THE NEW VALUE FRONTIER

KYOCERA

Crystal Devices 2019

京セラ株式会社

Crystal Device Selection Guide

Products			Dimensions (mm)			Applications				
Product Type	Page No.	Part Number	L	W	T (max.)	Digital Elecronics OA, PC Peripherals Amusement	Car Electronics, ITS, Car Audio, Car Navigation	Car Electronics (ECU, Air Bag, ABS, TPMS etc.)	Mobile Comm. Wireless LAN Dedicatedd Short Range Comm.(DSRC)	Industrial Use (Broadcast, Medical, Base Station etc.)
kHz Range Crystal Devices	3	ST2012SB (Tuning Fork Units)	2.0	1.2	0.6	○			○	
	4	ST3215SB (Tuning Fork Units)	3.2	1.5	0.9	○	○		○	○
	5	KC2520B (Divided Down AT Cut Crystal Oscillators)	2.5	2.0	0.8	○	○		○	○
	6	KC2520M (Divided Down AT Cut Crystal Oscillators)	2.5	2.0	0.8	○	○		○	○
	7	KC3215A (Clock Oscillator)	3.2	1.5	1.0	○	○		○	○
	8	KT3225T (DTCXO)	3.2	2.5	1.0	○	○		○	○
	9	KR3225Y (Real Time Clock Module)	3.2	2.5	1.0	○	○		○	○
Crystal Units	11	CT1612DB	1.6	1.2	0.65				○	
	12	CT2016DB (Low Profile)	2.0	1.6	0.65				○	
	12	CT2016DB	2.0	1.6	1.0				○	
	13	CT2520DB	2.5	2.0	1.0		○		○	
	14	CX1008SB	1.0	0.8	0.3	○			○	
	15	CX1210DB	1.2	1.0	0.3	○			○	
	16	CX1210SB	1.2	1.0	0.35	○			○	
	17	CX1612DB (for Consumer Products)	1.6	1.2	0.4	○			○	
	18	CX1612DB (Mobile Communication)	1.6	1.2	0.33				○	
	19	CX2016DB	2.0	1.6	0.45	○			○	
	23	CX2016GR (for Automotive)	2.05	1.65	0.8		○	○		
	24	CX2016SA (for Automotive)	2.0	1.6	0.5		○	○		
	20	CX2520DB	2.5	2.0	0.55	○			○	
	25	CX3225GA	3.2	2.5	0.95		○	○		
	26	CX3225CA	3.2	2.5	0.9		○	○		
	21	CX3225GB	3.2	2.5	0.9	○				
	27	CX3225SA (for Automotive)	3.2	2.5	0.8		○	○		
	22	CX3225SB (for Consumer Products, Mobile Communication)	3.2	2.5	0.6	○			○	
	28	CX3225SB (for Automotive)	3.2	2.5	0.6		○			
Clock Oscillators (SPXO)	31-33	KC2016Z (X, Z type)	2.0	1.6	0.8	○			○	○
	31, 34-35	KC2016Z (Y, W type)	2.0	1.6	0.8	○			○	○
	31-33	KC2520Z (X, Z type)	2.5	2.0	0.8	○			○	○
	31, 34-35	KC2520Z (Y, W type)	2.5	2.0	0.8	○			○	○
	31-33	KC3225Z (X, Z type)	3.2	2.5	0.8	○			○	○
	31, 34-35	KC3225Z (Y, W type)	3.2	2.5	0.8	○			○	○
	31-33	KC5032Z (X, Z type)	5.0	3.2	1.2	○			○	○
	31, 34-35	KC5032Z (Y, W type)	5.0	3.2	1.2	○			○	○
	31-33	KC7050Z (X, Z type)	7.0	5.0	1.2	○			○	○
	31, 34-35	KC7050Z (Y, W type)	7.0	5.0	1.2	○			○	○
	36-38	MC2016Z (X, Z type)	2.0	1.6	0.8		○			
	36, 39-40	MC2016Z (Y, W type)	2.0	1.6	0.8		○			
	36-38	MC2520Z (X, Z type)	2.5	2.0	0.8		○			
	36, 39-40	MC2520Z (Y, W type)	2.5	2.0	0.8		○			
	36-38	MC3225Z (X, Z type)	3.2	2.5	0.8		○			
	36, 39-40	MC3225Z (Y, W type)	3.2	2.5	0.8		○			
	36-38	MC5032Z (X, Z type)	5.0	3.2	1.2		○			
	36, 39-40	MC5032Z (Y, W type)	5.0	3.2	1.2		○			
	36-38	MC7050Z (X, Z type)	7.0	5.0	1.2		○			
	36, 39-40	MC7050Z (Y, W type)	7.0	5.0	1.2		○			
	41-43	KC2016K	2.0	1.6	0.8	○			○	○
	41-43	KC2520K	2.5	2.0	0.8	○			○	○
	41-43	KC3225K	3.2	2.5	0.8	○			○	○
	41-43	KC5032K	5.0	3.2	1.2	○			○	○
	41-43	KC7050K	7.0	5.0	1.2	○			○	○
	44-46	MC2016K	2.0	1.6	0.8		○			
	44-46	MC2520K	2.5	2.0	0.8		○			
	44-46	MC3225K	3.2	2.5	0.8		○			
	44-46	MC5032K	5.0	3.2	1.2		○			
	44-46	MC7050K	7.0	5.0	1.2		○			
	47	KC2016B-C1	2.0	1.6	0.65	○	○		○	○
	48	KC2520B-C1	2.5	2.0	0.8	○	○		○	○
	49	KC2520B-C2	2.5	2.0	0.8	○	○		○	○
	51-52	KC2520C-C1/ C2	2.5	2.0	0.8	○	○		○	○
	50	KC2520M	2.5	2.0	0.8	○	○		○	○
	53-54	KC3225A-C2/ C3	3.2	2.5	1.0	○	○		○	○
	55	KC7050A-C1	7.0	5.0	1.8	○	○			○
	56	KC7050A-C2	7.0	5.0	1.8	○	○			○
	57	KC7050A-C3	7.0	5.0	1.8	○	○			○
	58	KC7050A-C5	7.0	5.0	1.8	○	○			○
	59	KC5032P-P2/ P3	5.0	3.2	1.3	○				○
	60	KC7050P-P2/ P3	7.0	5.0	1.8	○				○
	61	KC7050R-P3	7.0	5.0	1.8	○				○
	62	KC7050G-P3	7.0	5.0	1.8	○				○
	63	KC5032P-L2/ L3	5.0	3.2	1.3	○				○
	64	KC7050P-L2/ L3	7.0	5.0	1.8	○				○
	65	KC5032P-H2/ H3	5.0	3.2	1.3	○				○
	66	KC7050P-H2/ H3	7.0	5.0	1.8	○				○
Voltage Controlled Crystal Oscillators (VCXO)	67	KV5032D-C3	5.0	3.2	1.2	○	○			○
	68	KV7050B-C3	7.0	5.0	1.8	○	○			○
	69	KV5032D-P3	5.0	3.2	1.2	○	○			○
	70	KV7050C-P3	7.0	5.0	1.8	○	○			○
	71	KV5032R	5.0	3.2	1.2	○	○		○	○
	72	KV5032G	5.0	3.2	1.2	○	○		○	○
	73	KV7050R-P3	7.0	5.0	1.8	○	○			○
	74	KV7050G-P3	7.0	5.0	1.8	○	○			○
Temperature Compensated Crystal Oscillators (TCXO)	75	KT1612	1.65	1.25	0.55	○	○		○	○
	76	KT2016	2.0	1.6	0.8	○	○		○	○
	77	KT2520	2.5	2.0	0.8	○	○		○	○
	78	KT3225	3.2	2.5	0.8	○	○		○	○
	79	KT5032F	5.0	3.2	1.7					○
	80	KT7050	7.0	5.0	1.7					○

AS of February 2019

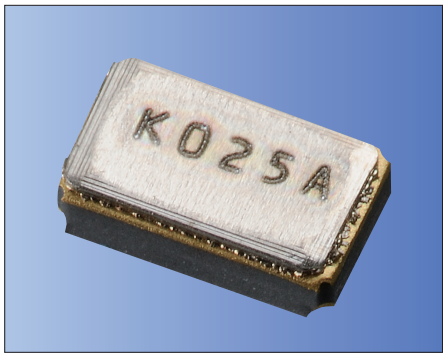
Products	Frequency Range (MHz)	Conditions of Use				RoHS Compli-ant*	AEC	
		Solder			Washable			
Part Number	1 10 50 100 300 to 800	Manual	Reflow	Flow			Q100	Q200
ST2012SB (Tuning Fork Units)	• 32.768kHz	Yes	Yes	No	Contact us	Yes		
ST3215SB (Tuning Fork Units)	• 32.768kHz	Yes	Yes	No	Contact us	Yes		Yes
KC2520B (Divided Down AT Cut Crystal Oscillators)	• 32.768kHz	Yes	Yes	No	Yes	Yes		
KC2520M (Divided Down AT Cut Crystal Oscillators)	• 32.768kHz	Yes	Yes	No	Yes	Yes	Yes	Yes
KC3215A (Clock Oscillator)	• 32.768kHz	Contact us	Yes	No	No	Yes		Yes
KT3225T (DTCXO)	• 32.768kHz	Contact us	Yes	No	No	Yes		Yes
KR3225Y (Real Time Clock Module)	• 32.768kHz	Contact us	Yes	No	No	Yes		Yes
CT1612DB	38.4---------- 76.8	Yes	Yes	No	Yes	Yes		
CT2016DB (Low Profile)	19.2 ---------- 60	Yes	Yes	No	Yes	Yes		
CT2016DB	19.2 ---------- 60	Yes	Yes	No	Yes	Yes		
CT2520DB	16 ---------- 60	Yes	Yes	No	Yes	Yes		Yes
CX1008SB	37.4 80	Yes	Yes	No	Yes	Yes		
CX1210DB	37.4 ----------80	Yes	Yes	No	Yes	Yes		
CX1210SB	27.12 32	Yes	Yes	No	Yes	Yes		
CX1612DB (for Consumer Products)	26---------- 60	Yes	Yes	No	Yes	Yes		
CX1612DB (Mobile Communication)	37.4 ---------- 60	Yes	Yes	No	Yes	Yes		
CX2016DB	16 ---------- 60	Yes	Yes	No	Yes	Yes		
CX2016GR (for Automotive)	16 ---------- 60	Yes	Yes	No	Yes	Yes		Yes
CX2016SA (for Automotive)	16 ---------- 60	Yes	Yes	No	Yes	Yes		Yes
CX2520DB	12---------- 54	Yes	Yes	No	Yes	Yes		
CX3225GA	8---------- 54	Yes	Yes	No	Yes	Yes		Yes
CX3225CA	12---------- 54	Yes	Yes	No	Yes	Yes		Yes
CX3225GB	12---------- 54	Yes	Yes	No	Yes	Yes		
CX3225SA (for Automotive)	8---------- 54	Yes	Yes	No	Yes	Yes		Yes
CX3225SB (for Consumer Products, Mobile Communication)	12---------- 54	Yes	Yes	No	Yes	Yes		
CX3225SB (for Automotive)	12---------- 54	Yes	Yes	No	Yes	Yes		Yes
KC2016Z (X, Z type)	0.5---------- 170	No	Yes	No	Yes	Yes		
KC2016Z (Y, W type)	24---------- 72	No	Yes	No	Yes	Yes		
KC2520Z (X, Z type)	0.5---------- 170	No	Yes	No	Yes	Yes		
KC2520Z (Y, W type)	24---------- 72	No	Yes	No	Yes	Yes		
KC3225Z (X, Z type)	0.5---------- 170	No	Yes	No	Yes	Yes		
KC3225Z (Y, W type)	24---------- 72	No	Yes	No	Yes	Yes		
KC5032Z (X, Z type)	0.5---------- 170	No	Yes	No	Yes	Yes		
KC5032Z (Y, W type)	24---------- 72	No	Yes	No	Yes	Yes		
KC7050Z (X, Z type)	0.5---------- 170	No	Yes	No	Yes	Yes		
KC7050Z (Y, W type)	24---------- 72	No	Yes	No	Yes	Yes		
MC2016Z (X, Z type)	0.5---------- 170	No	Yes	No	Yes	Yes	Yes	Yes
MC2016Z (Y, W type)	24---------- 72	No	Yes	No	Yes	Yes	Yes	Yes
MC2520Z (X, Z type)	0.5---------- 170	No	Yes	No	Yes	Yes	Yes	Yes
MC2520Z (Y, W type)	24---------- 72	No	Yes	No	Yes	Yes	Yes	Yes
MC3225Z (X, Z type)	0.5---------- 170	No	Yes	No	Yes	Yes	Yes	Yes
MC3225Z (Y, W type)	24---------- 72	No	Yes	No	Yes	Yes	Yes	Yes
MC5032Z (X, Z type)	0.5---------- 170	No	Yes	No	Yes	Yes	Yes	Yes
MC5032Z (Y, W type)	24---------- 72	No	Yes	No	Yes	Yes	Yes	Yes
MC7050Z (X, Z type)	0.5---------- 170	No	Yes	No	Yes	Yes	Yes	Yes
MC7050Z (Y, W type)	24---------- 72	No	Yes	No	Yes	Yes	Yes	Yes
KC2016K	1.5---------- 160	No	Yes	No	Yes	Yes		
KC2520K	1.5---------- 160	No	Yes	No	Yes	Yes		
KC3225K	1.5---------- 160	No	Yes	No	Yes	Yes		
KC5032K	1.5---------- 160	No	Yes	No	Yes	Yes		
KC7050K	1.5---------- 160	No	Yes	No	Yes	Yes		
MC2016K	1.5---------- 160	No	Yes	No	Yes	Yes	Yes	Yes
MC2520K	1.5---------- 160	No	Yes	No	Yes	Yes	Yes	Yes
MC3225K	1.5---------- 160	No	Yes	No	Yes	Yes	Yes	Yes
MC5032K	1.5---------- 160	No	Yes	No	Yes	Yes	Yes	Yes
MC7050K	1.5---------- 160	No	Yes	No	Yes	Yes	Yes	Yes
KC2016B-C1	1.5---------- 50	Yes	Yes	No	Yes	Yes		
KC2520B-C1	1.5---------- 125	Yes	Yes	No	Yes	Yes		
KC2520B-C2	125--160	Yes	Yes	No	Yes	Yes		
KC2520C-C1/ C2	1.5----------54	Yes	Yes	No	Yes	Yes		
KC2520M	1.5---------- 60	Yes	Yes	No	Yes	Yes	Yes	Yes
KC3225A-C2/ C3	1.5---------- 125	Yes	Yes	No	Yes	Yes		
KC7050A-C1	1.8---------- 39.99	Yes	Yes	No	Yes	Yes		
KC7050A-C2	1.8---------- 125	Yes	Yes	No	Yes	Yes		
KC7050A-C3	1.8---------- 170	Yes	Yes	No	Yes	Yes		
KC7050A-C5	1.8---------- 50	Yes	Yes	No	Yes	Yes		
KC5032P-P2/ P3	25---------- 175	Yes	Yes	No	Yes	Yes		
KC7050P-P2/ P3	25---------- 175	Yes	Yes	No	Yes	Yes		
KC7050R-P3	10----------800	Yes	Yes	No	Yes	Yes		
KC7050G-P3	10----------800	Yes	Yes	No	Yes	Yes		
KC5032P-L2/ L3	25---------- 175	Yes	Yes	No	Yes	Yes		
KC7050P-L2/ L3	25---------- 175	Yes	Yes	No	Yes	Yes		
KC5032P-H2/ H3	25---------- 175	Yes	Yes	No	Yes	Yes		
KC7050P-H2/ H3	25---------- 175	Yes	Yes	No	Yes	Yes		
KV5032D-C3	1.5---------- 170	Yes	Yes	No	Yes	Yes		
KV7050B-C3	1.5---------- 170	Yes	Yes	No	Yes	Yes		
KV5032D-P3	80 ---------- 170	Yes	Yes	No	Yes	Yes		
KV7050C-P3	80 ---------- 170	Yes	Yes	No	Yes	Yes		
KV5032R	10----------800	Yes	Yes	No	Yes	Yes		
KV5032G	10----------800	Yes	Yes	No	Yes	Yes		
KV7050R-P3	10----------800	Yes	Yes	No	Yes	Yes		
KV7050G-P3	10----------800	Yes	Yes	No	Yes	Yes		
KT1612	10----------52	Contact us	Yes	No	No	Yes		Yes
KT2016	10----------60	Contact us	Yes	No	No	Yes	Yes (option)	Yes
KT2520	10----------60	Contact us	Yes	No	No	Yes	Yes (option)	Yes
KT3225	10----------60	Contact us	Yes	No	No	Yes	Yes (option)	Yes
KT5032F	10---------- 40	Contact us	Yes	No	No	Yes		
KT7050	10---------- 40	Contact us	Yes	No	No	Yes		

* RoHS Compliant Products : Products which do not contain lead, cadmium, mercury, hexavalent chromium, PBB, PBDE, DEHP, BBP, DBP and DIBP, based on EU DIRECTIVE 2015/863/EU.
Substances exempted by the DIRECTIVE and impurities observed in the natural environment are excepted.

AS of February 2019

KYOCERA

2.0×1.2mm for Consumer/ Mobile Equipment



RoHS Compliant

Features

- Ultra Small, Low Profile
- Ceramic Package
- Reflow Compatible

Applications

- Consumer/ Mobile Equipment

How to Order

ST2012SB 32768 □□ H P W □□
① ② ③ ④ ⑤ ⑥ ⑦

① Series

② Frequency
32.768kHz

③ Load Capacitance

H5	12.5 pF	Std.
E0	9.0 pF	
C0	7.0 pF	
B0	6.0 pF	
A0	5.0 pF	
Z0	4.0 pF	

④ Frequency Tolerance

H	±20×10^{-6}

⑤ Operating Temp. Range

P	−40 to +85°C

⑥ Frequency Temp. Stability

W	±200×10^{-6}

⑦ Individual Specification

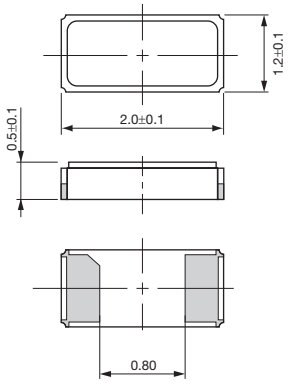
Packaging (Tape & Reel 3000/ 12000 pcs./ reel)

Specifications

Item	Symbol	Specification	Units	Remarks
Nominal Frequency	f_{nom}	32.768	kHz	
Frequency Tolerance	f_{tol}	±20	×10^{-6}	25°C±3°C
Turnover Temperature	Ti	+25±5	°C	
Parabolic Coefficient	B	−0.04 max.	×10^{-6}/ °C^2	
Motional Resistance	R1	80 k max.	ohm	
Motional Capacitance	C1	5.8 typ.	fF	
Shunt Capacitance	C0	1.3 typ.	pF	
Load Capacitance	CL	4.0/ 5.0/ 6.0/ 7.0/ 9.0/ 12.5	pF	Please contact us for other Load Capacitance.
Drive Level	DL	0.1	μW	0.5 max.
Operating Temp. Range	T_{use}	−40 to +85	°C	
Storage Temp. Range	T_{stg}	−40 to +85	°C	
Frequency Aging	f_{age}	±3	×10^{-6}	

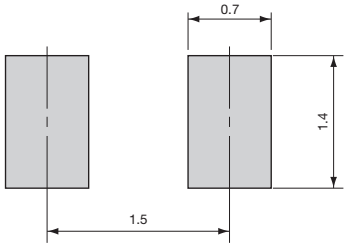
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)



AS of February 2019

KYOCERA

3.2×1.5mm for Consumer/ Mobile Equipment/ Automotive

AEC-Q200 RoHS Compliant

Features

- Small, Low Profile
- Ceramic Package
- Reflow Compatible

Applications

- Consumer/ Mobile Equipment
- Car navigation system
- Car audio system

How to Order

ST3215SB 32768 □□ □ P W □□
① ② ③ ④ ⑤ ⑥ ⑦

① Series

② Frequency
32.768kHz

③ Load Capacitance

H5	12.5 pF	Std.
E0	9.0 pF	
C0	7.0 pF	
B0	6.0 pF	
A0	5.0 pF	
Z0	4.0 pF	

④ Frequency Tolerance

F	±10×10^{-6}
H	±20×10^{-6}

⑤ Operating Temp. Range

P	−40 to +85°C

⑥ Frequency Temp. Stability

W	±200×10^{-6}

⑦ Individual Specification

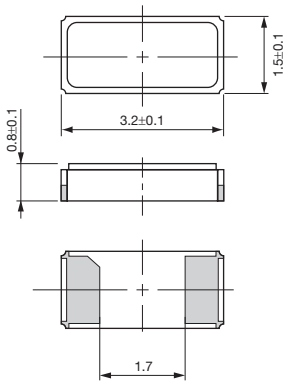
Packaging (Tape & Reel 3000/ 10000 pcs./ reel)

Specifications

Item	Symbol	Specification	Units	Remarks
Nominal Frequency	f_nom	32.768	kHz	
Frequency Tolerance	f_tol	±10, ±20	×10^{-6}	25°C±3°C
Turnover Temperature	Ti	+25±5	°C	
Parabolic Coefficient	B	−0.04 max.	×10^{-6}/ °C^2	
Motional Resistance	R1	70 k max.	ohm	
Motional Capacitance	C1	3.7 typ.	fF	
Shunt Capacitance	C0	0.9 typ.	pF	
Load Capacitance	CL	4.0/ 5.0/ 6.0/ 7.0/ 9.0/ 12.5	pF	Please contact us for other Load Capacitance.
Drive Level	DL	0.1	μW	0.5 max.
Operating Temp. Range	T_use	−40 to +85	°C	
Storage Temp. Range	T_stg	−55 to +85	°C	
Frequency Aging	f_age	±3	×10^{-6}	

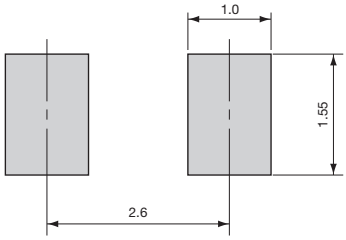
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)



CMOS/ 1.8V to 5.0V/ 2.5×2.0mm

RoHS Compliant

Features

- Miniature ceramic package
  2.5 (L) ×2.0 (W) ×0.7 (H) mm (Typ.)
- Highly reliable with seam welding
- CMOS output
- Supply voltage 1.8/ 2.5/ 3.3/ 5.0V
  Wide operating voltage range 1.6 to 5.5V
- Low current consumption

Applications

- Consumer/ Mobile Equipment

How to Order

KC2520B ① 32K7680 ② C ③ M ④ 2 ⑤ E ⑥ 00 ⑦

① Series
② Output Frequency (32.768kHz)
③ Output Type (CMOS)
④ Supply Voltage (1.8V, 2.5V, 3.3V, 5.0V Compatible)
⑤ Frequency Tolerance (See Specifications)
⑥ Symmetry/ INH Function (45/ 55%)
⑦ Individual Specification
(STD Specification is "00")

Packaging (Tape & Reel 2000 pcs./ reel)

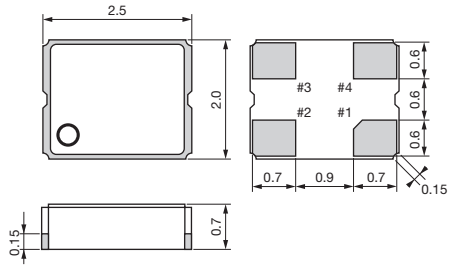
Specifications

Item	Symbol	Conditions	Specifications Min.	Specifications Max.	Units
Output Frequency Range	fo		32.768		kHz
Frequency Tolerance	f_tol	Initial (25°C), Stability (−40 to 85°C), Voltage change	−25	+25	×10⁻⁶
		Aging (@1year)	−3	+3	
		Other (load change, shock and vibration)	−4	+4	
Storage Temperature Range	T_stg		−55	+125	°C
Operating Temperature Range	T_use		−40	+85	°C
Max. Supply Voltage	—		−0.3	+7.0	V
Supply Voltage	Vcc		+1.6	+5.5	V
Current Consumption (Maximum Loaded/ 1.6≤Vcc≤2.0V)	Icc		—	120	μA
Current Consumption (Maximum Loaded/ 2.0<Vcc≤2.8V)			—	126	
Current Consumption (Maximum Loaded/ 2.8≤Vcc≤3.63V)			—	130	
Current Consumption (Maximum Loaded/ 3.63≤Vcc≤5.5V)			—	140	
Stand-by Current	I_std		—	10	μA
Symmetry	SYM	@50% Vcc	45	55	%
Rise/ Fall Time (10% Vcc to 90% Vcc Maximum Loaded)	Tr/ Tf		—	50	ns
Low Level Output Voltage	VOL	IOL=1mA	—	10% Vcc	V
High Level Output Voltage	VOH	IOH=−1mA	90% Vcc	—	
Output Load	L_CMOS	CMOS Output	—	15	pF
Low Level Input Voltage	VIL		—	30% Vcc	V
High Level Input Voltage	VIH		70% Vcc	—	
Disable Time	t_dis		—	100	ns
Enable Time	t_ena		—	2	ms
Start−up Time	t_str	@Minimum operating voltage to be 0 sec.	—	5	ms

Note: All electrical characteristics are defined at the maximum load and operating temperature range.

Dimensions

(Unit: mm)



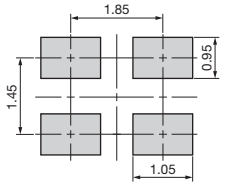
Plating: Ni+Au
Tolerance: ±0.1

Pad Connections	
#1	INH
#2	Case GND
#3	Output
#4	Vcc

INH Function	
Pad1	Pad3 (Output)
Open	Active
"H" Level	Active
"L" Level	High Z (No-Oscillation)

Recommended Land Pattern

(Unit: mm)

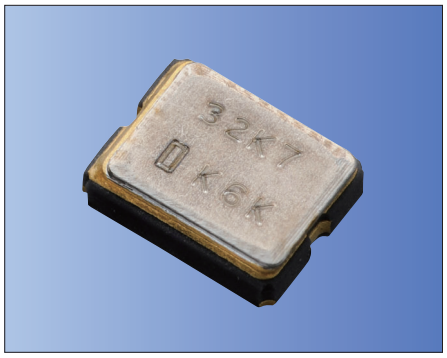


Note: A capacitor of value 0.01μF between Vcc and GND is recommended.

AS of February 2019

KYOCERA

CMOS/ 1.8V to 5.0V/ 2.5×2.0mm for Automotive



AEC-Q100/ 200 RoHS Compliant

Features

- Miniature ceramic package
  2.5 (L) ×2.0 (W) ×0.7 (H) mm (Typ.)
- Highly reliable with seam welding
- CMOS output
- Supply voltage 1.8/ 2.5/ 3.3/ 5.0V
  Wide operating voltage range 1.6 to 5.5V
- Low current consumption

Applications

- Car accessory

How to Order

KC2520M 32K7680 C M 3 E 00
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Output Frequency (32.768kHz)
③ Output Type (CMOS)
④ Supply Voltage (1.8V, 2.5V, 3.3V, 5.0V Compatible)
⑤ Frequency Tolerance (See Specifications)
⑥ Symmetry/ INH Function (45/ 55%)
⑦ Individual Specification
(STD Specification is "00")

Packaging (Tape & Reel 2000 pcs./ reel)

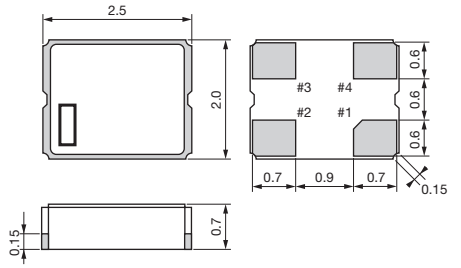
Specifications

Item	Symbol	Conditions	Specifications Min.	Specifications Max.	Units
Output Frequency Range	fo		32.768		kHz
Frequency Tolerance	f_tol	Initial (25°C), Stability (−40 to 125°C), Voltage change	−90	+90	×10⁻⁶
		Aging (@1year)	−3	+3	
		Other (load change, shock and vibration)	−4	+4	
Storage Temperature Range	T_stg		−55	+125	°C
Operating Temperature Range	T_use		−40	+125	°C
Max. Supply Voltage	—		−0.3	+7.0	V
Supply Voltage	Vcc		+1.6	+5.5	V
Current Consumption (Maximum Loaded/ 1.6≤Vcc≤2.0V)	Icc		—	150	μA
Current Consumption (Maximum Loaded/ 2.0<Vcc≤2.8V)			—	158	
Current Consumption (Maximum Loaded/ 2.8≤Vcc≤3.63V)			—	163	
Current Consumption (Maximum Loaded/ 3.63≤Vcc≤5.5V)			—	175	
Stand-by Current	I_std		—	10	μA
Symmetry	SYM	@50% Vcc	45	55	%
Rise/ Fall Time (10% Vcc to 90% Vcc Maximum Loaded)	Tr/ Tf		—	50	ns
Low Level Output Voltage	VOL	IOL=0.8mA	—	10% Vcc	V
High Level Output Voltage	VOH	IOH=−0.8mA	90% Vcc	—	
Output Load	L_CMOS	CMOS Output	—	15	pF
Low Level Input Voltage	VIL		—	30% Vcc	V
High Level Input Voltage	VIH		70% Vcc	—	
Disable Time	t_dis		—	100	ns
Enable Time	t_ena		—	2	ms
Start-up Time	t_str	@Minimum operating voltage to be 0 sec.	—	5	ms

Note: All electrical characteristics are defined at the maximum load and operating temperature range.

Dimensions

(Unit: mm)



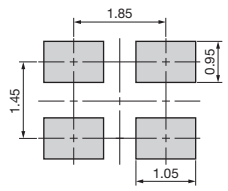
Plating: Ni+Au
Tolerance: ±0.1

Pad Connections	
#1	INH
#2	Case GND
#3	Output
#4	Vcc

INH Function	
Pad1	Pad3 (Output)
Open	Active
"H" Level	Active
"L" Level	High Z (No-Oscillation)

Recommended Land Pattern

(Unit: mm)

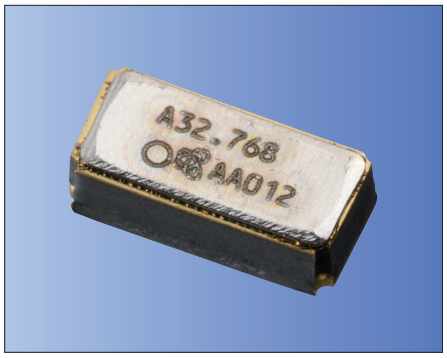


Note: A capacitor of value 0.01μF between Vcc and GND is recommended.

AS of February 2019

KYOCERA

CMOS/ 3.3V Typ./ 3.2×1.5mm



AEC-Q200 RoHS Compliant

Features

- Output frequency: 32.768kHz
- Miniature and Low profile ceramic package
- Wide operating voltage range 1.5V to 3.6V
- CMOS output
- Operating Temp. −40 to +105°C (option)
- V_{IO} controls amplitude.

Applications

- W-LAN etc.

How to Order

KC3215A 32768 C 33 A A E 00
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

① Series
② Output Frequency
③ Output type
④ Supply Voltage

33	3.3V

⑤ Frequency Tolerance

A	5±23×10^{-6}

⑥ Freq. Temp. Chrst.

A	+10/ −120×10^{-6}

⑦ Output Waveform Symmetric

E	45 to 55%

⑧ Individual Specification

00	STD Specification

Packaging (Tape & Reel 3000 pcs./ reel)

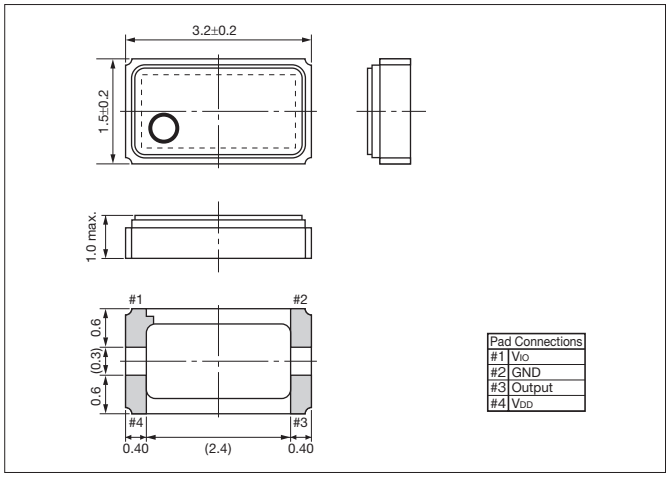
Specifications

Item	Symbol	Conditions	Specifications			Units
			Min.	Typ.	Max.	
Output Frequency Range	fo	Standard Frequency	—	32.768	—	kHz
Frequency Tolerance	f_tol	after 2times Reflow, V_{CC}=3.3V, Ta=25±2°C	−18	+5	+28	×10^{-6}
Frequency Temperature Characteristics	fo-Tc	Ta=−20 to +70°C (+25°C is reference)	−120	—	+10	×10^{-6}
Frequency Voltage Coefficient	fo-V	Ta=+25±2°C	−2.0	—	2.0	×10^{-6}/V
Frequency Aging	F_age	Per Year	−3.0	—	3.0	×10^{-6}
Storage Temperature	T_stg		−55	—	+125	°C
Operating Temperature	T_use		−40	—	+85	°C
Supply Voltage	V_{DD}		1.5	—	3.6	V
Interface Power Supply Voltage	V_{IO}		1.5	—	3.6	V
Current Consumption	I_{CC}	No load, V_{DD}=3.3V, V_{IO}=3.3V	—	0.9	1.5	μA
		load: 15pF, V_{DD}=3.3V, V_{IO}=3.3V	—	2.2	4.2	μA
Symmetry	SYM	@50% V_{IO}	45	—	55	%
Rise/ Fall Time	Tr/ Tf	load: 15pF, 20%V_{IO} to 80%V_{IO}	—	—	50	ns
Low Output Voltage	V_{OL}	I_{OL}=+0.4mA	—	—	0.4	V
High Output Voltage	V_{OH}	I_{OH}=−0.4mA	V_{IO}−0.4	—	—	V
CMOS Load	L_CMOS	CMOS Output	—	—	15	pF
Disable Delay Time	t_dis		—	—	1.0	μs
Start-up Time	t_str	Time at minimum Supply voltage to be 0 s	—	—	0.6	sec

* Unless otherwise stated, characteristics(specifications) shown in the above table are based on the rated operating temperature and voltage condition.
* Please contact us for other specifications.

Dimensions

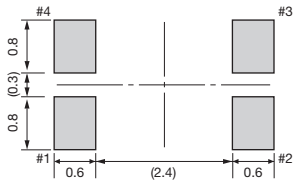
(Unit: mm)



Pad Connections	
#1	V_{IO}
#2	GND
#3	Output
#4	V_{DD}

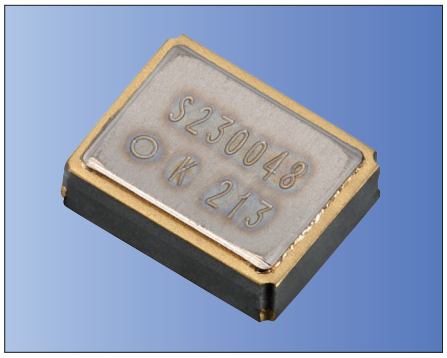
Recommended Land Pattern

(Unit: mm)



Note: A capacitor of value 0.01μF between V_{CC} and GND is recommended.
If V_{IO} function is not used, connect #1 to V_{DD}.

CMOS/ 3.0V Typ./ 3.2×2.5mm



AEC-Q200 RoHS Compliant

Features

- Miniature SMD type (3.2×2.5×1.0mm)
- 32.768kHz D-TCXO
- High frequency stability : ±5.0x10^{-6}/ –40 to +85°C
- Low supply current : 1.5μA typ (V_{DD}=3.0V, Output at no load)
- Temperature compensated voltage Range : 2.0V to 5.5V
- Operating Temp. –40 to +105°C (option)

Applications

- High accuracy time references
- Microcontroller with built in RTC

How to Order

Frequency Tolerance (vs Temp.) : ±3.8×10^{-6}/ –10°C to 60°C

KT3225T 32768 D G R □□ T xx
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

Frequency Tolerance (vs Temp.) : ±5.0×10^{-6}/ –40°C to 85°C

KT3225T 32768 E A W □□ T xx
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

① Series
② Output Frequency
③ Frequency Stability
④ Lower Temperature
⑤ Upper Temperature

	③	④	⑤
DGR	±3.8×10^{-6}	–10°C	+60°C
EAW	±5.0×10^{-6}	–40°C	+85°C

⑥ Supply Voltage

30	3.0V
33	3.3V
50	5.0V

⑦ Initial Frequency Tolerance

T	±3.0×10^{-6}

⑧ Individual Specification

Packaging (Tape & Reel 3000 pcs./ reel)

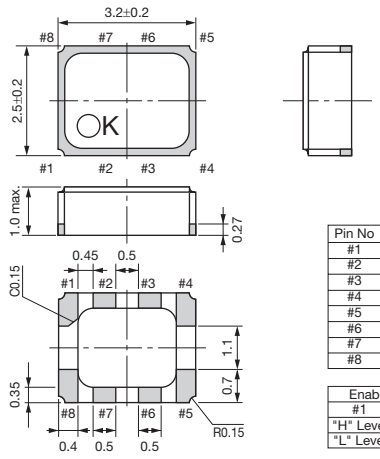
Specifications

Item	Symbol	Conditions	Specifications			Units
			Min.	Typ.	Max.	
Nominal Frequency	f_{nom}		—	32.768	—	kHz
Oscillation Output Voltage	V_{DD}		1.3	3.0	5.5	V
Temperature Compensated Voltage	V_{TEM}		2.0	3.0	5.5	V
Storage Temperature	T_{stg}		–40	+25	+85	°C
Operating Temperature	T_{use}		–40	+25	+85	°C
Initial Frequency Tolerance	—	Ta=25±2°C	–3.0	—	+3.0	×10^{-6}
Frequency Stability vs Temp.	fo-Tc	E : Ta=–40 to +85°C	–5.0	—	+5.0	×10^{-6}
Frequency Stability vs Supply Voltage	df/ fo	V_{DD}=2.0 to 5.5V, Ta=25±2°C	–1.0	—	+1.0	×10^{-6}/ V
Frequency Aging	f_{age}		–3.0	—	+3.0	×10^{-6}
Low Level Output Voltage	V_{OL}	I_{OL}=+1.0mA, V_{DD}=3V	0.0	—	0.8	V
High Level Output Voltage	V_{OH}	I_{OH}=–1.0mA, V_{DD}=3V	2.2	—	3.0	V
Low Level Input Voltage	V_{IL}	CLKOE pin	0.0	—	0.2×V_{DD}	V
High Level Input Voltage	V_{IH}	CLKOE pin	0.8×V_{DD}	—	5.5	V
DUTY Ratio	Duty	CL=15pF	40	—	60	%
Rise Time	Tr	20%V_{DD}~80%V_{DD}, CL=15pF, V_{DD}=3V	—	—	100	ns
Fall Time	Tf	80%V_{DD}~20%V_{DD}, CL=15pF, V_{DD}=3V	—	—	100	ns
Start-up Time	t_{str}	Ta=25°C	—	—	1.0	sec
		Ta=–40 to 85°C	—	—	3.0	sec
Power Supply Current1	$I_{CC}1$	CLKOE=V_{SS}, V_{DD}=3V	—	0.6	2.0	μA
Power Supply Current2	$I_{CC}2$	CLKOE=V_{DD}, V_{DD}=3V, Output at no load	—	1.5	4.0	μA
		CLKOE=V_{DD}, V_{DD}=3V, CL=15pF	—	2.7	5.5	μA
Output Load Condition	L_CMOS	CMOS Output	—	—	15.0	pF

* Please contact us for other specifications.

Dimensions

(Unit: mm)

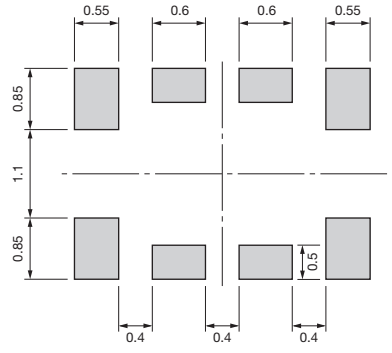


Pin No	Function
#1	CLKOE
#2	N.C
#3	N.C
#4	V_{SS}
#5	CLKOUT
#6	N.C
#7	N.C
#8	V_{DD}

Enable/ Disable Function	
#1	#5(Output)
"H" Level	Active
"L" Level	High Z(No-Oscillation)

Recommended Land Pattern

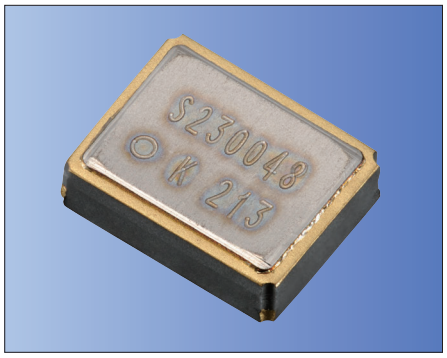
(Unit: mm)



Note: A capacitor of value 0.01μF between V_{DD} and GND is recommended.

AS of February 2019

CMOS/ 3.0V Typ./ 3.2×2.5mm



AEC-Q200 RoHS Compliant

Features

- Miniature SMD type (3.2×2.5×1.0mm)
- Built-in 32.768kHz D-TCXO
- I²C-BUS serial interface type : 400kHz high speed type
- Frequency selection function : 32.768kHz, 1024Hz, 32Hz, 1Hz
- Voltage detection function : 2.0V temp. compensated voltage detection 1.5V Low Voltage Detection
- Various functions including full calender, alarm and timer
- Operating Temp. −40 to +105°C (option)

Applications

- High accuracy time references

How to Order

Frequency Tolerance (vs Temp.) : ±3.8×10⁻⁶/ −10°C to 60°C

KR3225Y ① 32768 ② D ③ G ④ R ⑤ □□ ⑥ T ⑦ xx ⑧

Frequency Tolerance (vs Temp.) : ±5.0×10⁻⁶/ −40°C to 85°C

KR3225Y ① 32768 ② E ③ A ④ W ⑤ □□ ⑥ T ⑦ xx ⑧

① Series
② Output Frequency
③ Frequency Stability
④ Lower Temperature
⑤ Upper Temperature

	③	④	⑤
DGR	±3.8×10⁻⁶	−10°C	+60°C
EAW	±5.0×10⁻⁶	−40°C	+85°C

⑥ Supply Voltage

30	3.0V
33	3.3V
50	5.0V

⑦ Initial Frequency Tolerance

T	±3.0×10⁻⁶

⑧ Individual Specification

Packaging (Tape & Reel 3000 pcs./ reel)

Specifications

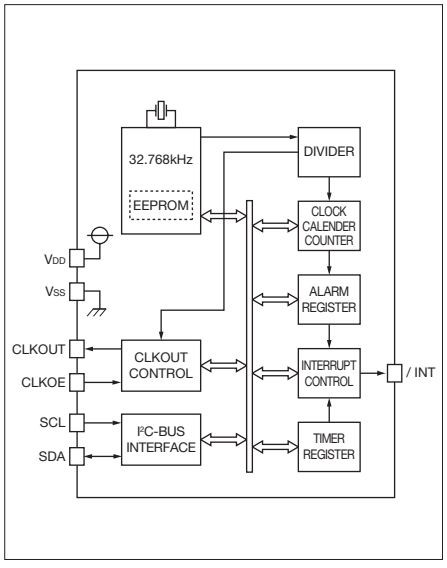
Item	Symbol	Conditions	Specification			Unit
			Min.	Typ.	Max.	
Nominal Frequency	f_nom		—	32.768	—	kHz
Time Keeping Voltage	VDD	—	1.3	3.0	5.5	V
Temperature Compensation Voltage	VTEM	—	2.0	3.0	5.5	V
Interface Voltage	VINT	—	1.5	3.0	5.5	V
Operationg Temperature Range	T_use	No condensation	−40	+25	+85	°C
Frequency Stability vs. Temp.	fo-Tc	E:Ta=−40 to +85°C	−5.0	—	+5.0	×10⁻⁶
Start up Time	t_str	Ta=25°C	—	—	1.0	sec
		Ta=−40 to +85°C	—	—	3.0	sec
Power Supply Current1	ICC1	SCL=SDA=/INT=VDD, CLKOE=VSS CLKOUT Non-operating output VDD=3V	—	0.6	2.0	μA
Power Supply Current2	ICC2	SCL=SDA=/INT=VDD, CLKOE=VDD CLKOUT output 32.768kHz, VDD=3V Output at no load	—	1.5	4.0	μA
		SCL=SDA=/INT=VDD, CLKOE=VDD CLKOUT output 32.768kHz, VDD=3V CL=15pF	—	2.7	5.5	μA
Low Voltage Detection Voltage	VDET		1.3	1.4	1.5	V

* Please contact us for other specifications.

Pin Functions

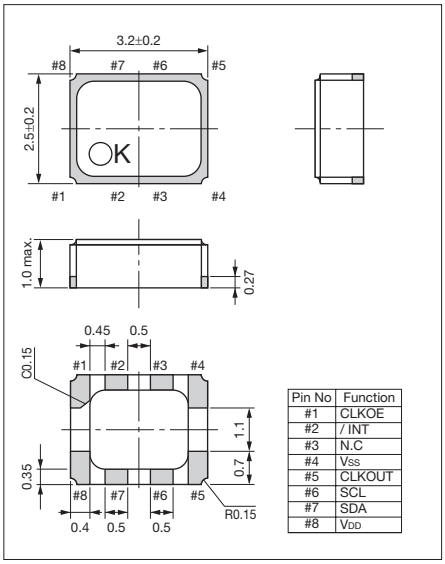
Pin Name	I/ O	Function
CLKOE	I	Input to control the output mode of the CLKOUT
/ INT	O	Outputs for alarm signals, timer signals, timer update signals and other signals
Vss	—	Pin connected to ground
CLKOUT	O	32.768kHz signal output (CMOS output)
SCL	I	Serial clock input for I²C BUS communications
SDA	I/ O	Serial data input output for I²C BUS communications
VDD	—	This pin is connected to a positive power supply

Block Diagram



Dimensions

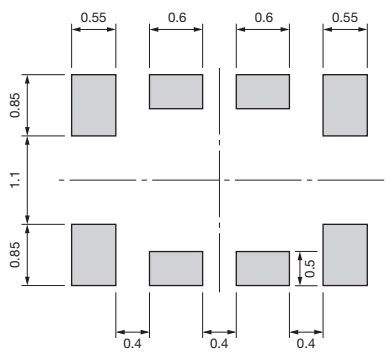
(Unit: mm)



Pin No	Function
#1	CLKOE
#2	/ INT
#3	N.C
#4	Vss
#5	CLKOUT
#6	SCL
#7	SDA
#8	VDD

Recommended Land Pattern

(Unit: mm)



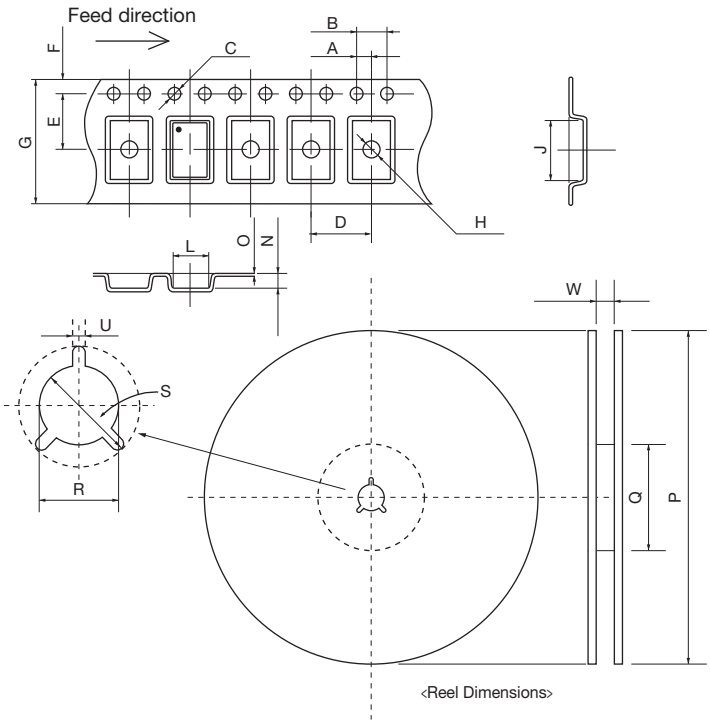
Note: A capacitor of value 0.01μF between VDD and GND is recommended.

Tape & Reel Specifications

■ kHz Range Crystal Units ■ kHz Range Crystal Oscillators ■ Real Time Clock Modules

		ST2012SB		ST3215SB		KC2520B KC2520M	KC3215A	KT3225T	KR3225Y
TAPE	A	2.0±0.05		2.0±0.1		2.0±0.05	2.0±0.05	2.0±0.05	2.0±0.05
	B	4.0±0.1		4.0±0.1		4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1
	C	ϕ1.5+0.1/ −0		ϕ1.5+0.1/ −0		ϕ1.5+0.1/ −0	ϕ1.5+0.1/ −0	ϕ1.5+0.1/ −0	ϕ1.5+0.1/ −0
	D	4.0±0.1		4.0±0.1		4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1
	E	3.5±0.05		5.5±0.1		3.5±0.05	3.5±0.05	3.5±0.05	3.5±0.05
	F	1.75±0.1		1.75±0.1		1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1
	G	8.0±0.2		12.0±0.3		8.0±0.2	8.0±0.3	8.0±0.3	8.0±0.3
	H	ϕ1.0+0.2/ −0		ϕ1.0+0.1/ −0		ϕ1.1±0.1	ϕ1.0+0.2/ −0	ϕ1.5+0.1/ −0	ϕ1.5+0.1/ −0
	J	2.25±0.1		3.6±0.1		2.7±0.1	3.5±0.05	3.5±0.1	3.5±0.1
	L	1.45±0.1		1.8±0.1		2.2±0.1	1.9±0.05	2.8±0.1	2.8±0.1
	N	0.75±0.1		1.0±0.1		1.0±0.1	1.1±0.05	1.1±0.1	1.1±0.1
	O	0.25±0.05		0.3±0.05		0.2±0.05	0.25±0.05	0.25±0.05	0.25±0.05
REEL	P	ϕ180+0/ −1.5	ϕ330±2	ϕ180+0/ −1.5	ϕ330±2	ϕ180+0/ −3	ϕ180+0/ −1.5	ϕ180+0/ −1.5	ϕ180+0/ −1.5
	Q	ϕ60+1.0/ −0	ϕ100±1.0	ϕ60+1.0/ −0	ϕ100±1.0	ϕ60+1/ −0	ϕ60+1.0/ −0	ϕ60+1.0/ −0	ϕ60+1.0/ −0
	R	ϕ13±0.2		ϕ13±0.2		ϕ13±0.2	ϕ13±0.2	ϕ13±0.2	ϕ13±0.2
	S	ϕ21±0.8		ϕ21±0.8		ϕ21±0.8	ϕ21±0.8	ϕ21±0.8	ϕ21±0.8
	U	2.0±0.5		2.0±0.5		2.0±0.5	2.0±0.5	2.0±0.5	2.0±0.5
	W	9.0+1.0/ −0	9.4±1.0	13.0+1.0/ −0	13.4±1.0	9.0+0.3/ −0	9.0+1.0/ −0	9.0+1.0/ −0	9.0+1.0/ −0
Qty.		3000	12000	3000	10000	2000	3000	3000	3000

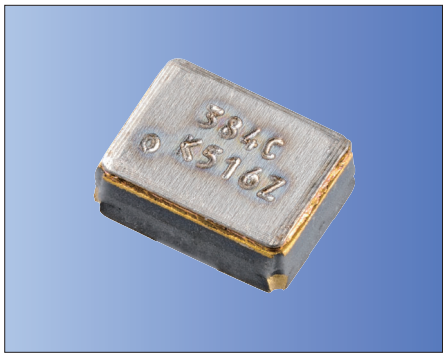
(Unit: mm)



<Reel Dimensions>

KYOCERA

1.6×1.2mm for Mobile Communications



RoHS対応品

Features

- Crystal Unit with Thermistor
- Reference frequency for telecommunication systems
- Reflow compatible
- Using ceramic package resulting in high reliability

Applications

- Mobile Communications, GNSS

How to Order

CT1612DB 38400 □□ □ □ □ □ □□

① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Frequency
③ Load Capacitance

B0	6 pF	—
C0	7 pF	—
D0	8 pF	Std.

④ Frequency Tolerance

F	±10×10⁻⁶	Std.
G	±15×10⁻⁶	—

⑤ Operating Temp. Range ⑥ Frequency Temp. Stability

LH	−30 to +85°C	±12×10⁻⁶(at −30 to +85°C)

⑦ Individual Specification

Packaging (Tape & Reel 12000 pcs./ reel)

Specifications

Item	Symbol	Specification	Units	Remarks
Frequency Range	f_{nom}	38400 to 76800	kHz	
Overtone Order	OT	Fundamental	—	
Load Capacitance	CL	8	pF	Please contact us for other CL requirements.
Frequency Tolerance	f_{tol}	±10	×10⁻⁶	25°C±3°C
Motional Series Resistance	R1	Table 1	ohm	
Drive Level	DL	10	μW	100μW max.
Operating Temp. Range	T_{use}	−30 to +85	°C	
Storage Temp. Range	T_{stg}	−40 to +105	°C	
Frequency Temp. Characteristics	f_{tem}	±12	×10⁻⁶	
Thermistor Resistance	—	Table 2	ohm	25°C±3°C
Thermistor B-Constant	—	Table 3	K	25°C to 50°C

Please contact us for other specifications.

Table 1 Motional Series Resistance

Frequency Range	Motional Series Resistance
38400 to 76800kHz	80Ω max.

Table 2 Thermistor Resistance

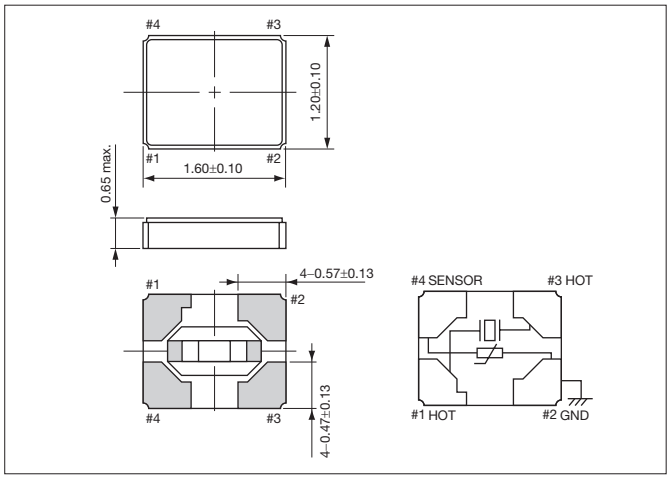
Resistance	Specification
22kΩ	±1%
100kΩ	±1%

Table 3 Thermistor B-Constant

B-Constant	Specification
3380K	±1%
4250K	±1%

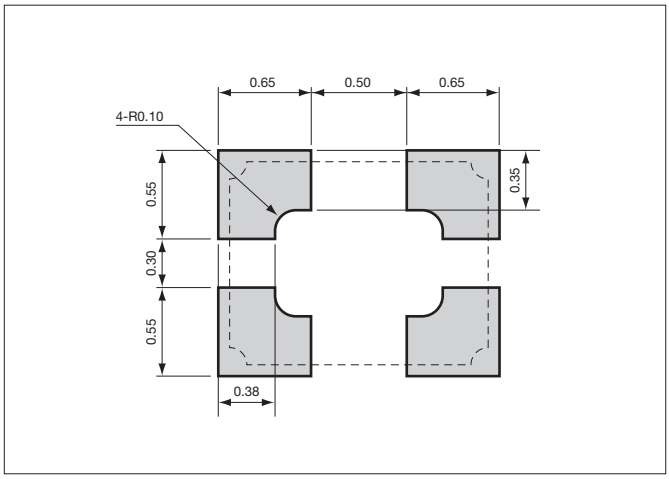
Dimensions

(Unit: mm)



Recommended Land Pattern

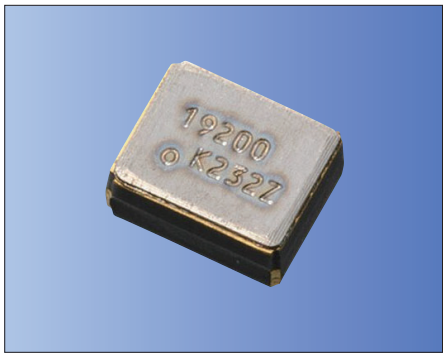
(Unit: mm)



Crystal Units

AS of February 2019

2.0×1.6mm for Mobile Communications



RoHS Compliant

Features

- Crystal Unit with Thermistor
- Height 0.65 (max.) mm is also available
- Reference frequency for telecommunication systems
- Reflow compatible
- Using ceramic package resulting in high reliability

Applications

- Mobile Communications, GNSS

How to Order

CT2016DB 19200 □□ □ □ □ □□

① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Frequency
③ Load Capacitance

B0	6 pF	—
C0	7 pF	Std.

④ Frequency Tolerance

F	±10×10⁻⁶	Std.
G	±15×10⁻⁶	—

⑤ Operating Temp. Range ⑥ Frequency Temp. Stability

PF	−40 to +85°C	±10×10⁻⁶(at −25 to +85°C)
RH	−40 to +105°C	±12×10⁻⁶(at −30 to +85°C)

⑦ Individual Specification

Packaging (Tape & Reel 12000 pcs./ reel)

Specifications

Item	Symbol	Specification	Units	Remarks
Frequency Range	f_{nom}	19200 to 60000	kHz	
Overtone Order	OT	Fundamental	—	
Load Capacitance	CL	7	pF	
Frequency Tolerance	f_{tol}	±10	×10⁻⁶	25°C±3°C
Motional Series Resistance	R1	Table 1	ohm	
Drive Level	DL	10	μW	100μW max.
Operating Temp. Range	T_{use}	−30 to +85	°C	
Storage Temp. Range	T_{stg}	−40 to +105	°C	
Frequency Temp. Characteristics	f_{tem}	±12	×10⁻⁶	Freq. deviation from the value at 32°C
Thermistor Resistance	—	Table 2	ohm	25°C
Thermistor B-Constant	—	Table 3	K	25°C to 50°C

Please contact us for other specifications.

Table 1 Motional Series Resistance

Frequency Range	Motional Series Resistance
19200 to 25999kHz	80Ω max.
26000 to 29999kHz	60Ω max.
30000 to 60000kHz	50Ω max.

Table 2 Thermistor Resistance

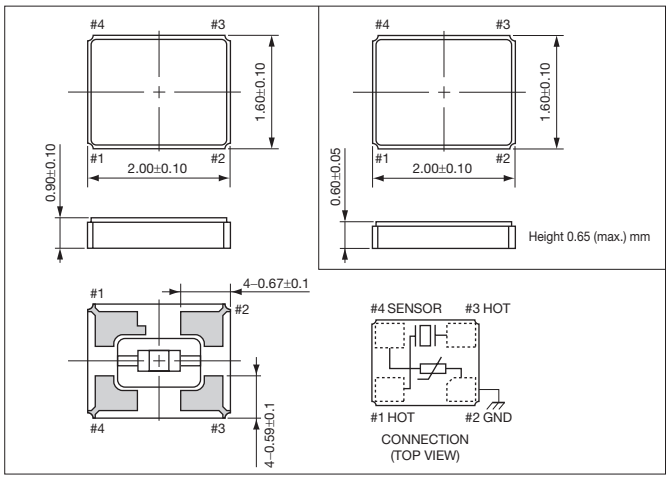
Resistance	Specification
100kΩ	±1%

Table 3 Thermistor B-Constant

B-Constant	Specification
4250K	±1%

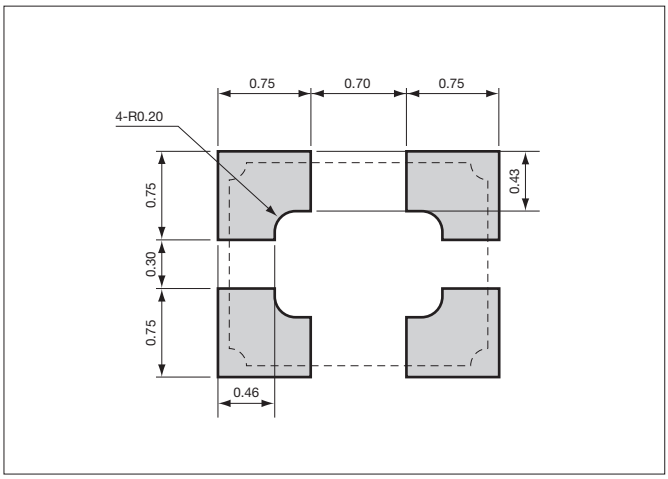
Dimensions

(Unit: mm)



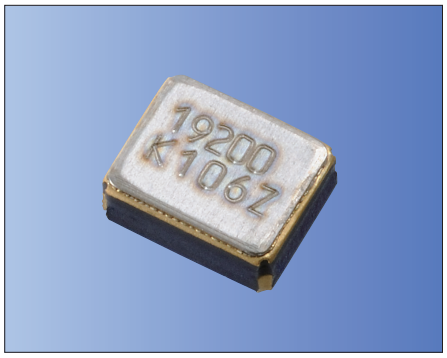
Recommended Land Pattern

(Unit: mm)



KYOCERA

2.5×2.0mm for Mobile Communications/ Automotive



AEC-Q200 RoHS Compliant

Features

- Reference frequency for telecommunication systems
- Reflow compatible
- Using ceramic package resulting in high reliability

Applications

- Mobile Communications, Bluetooth®, Wireless LAN, GNSS
- Car navigation system
- Car audio system

* Bluetooth® Trademarks are owned by Bluetooth SIG Inc.

How to Order

CT2520DB 19200 □□ □ □ □ □□

① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Frequency
③ Load Capacitance ④ Frequency Tolerance

B0	6 pF	—
C0	7 pF	Std.

F	±10×10⁻⁶	Std.
G	±15×10⁻⁶	—

⑤ Operating Temp. Range ⑥ Frequency Temp. Stability

FF	−20 to +70°C	±10×10⁻⁶
LH	−30 to +85°C	±12×10⁻⁶
LJ	−30 to +85°C	±15×10⁻⁶

⑦ Individual Specification

Packaging (Tape & Reel 12000 pcs./ reel)

Specifications

Item	Symbol	Specification	Units	Remarks
Frequency Range	f_{nom}	16000 to 60000	kHz	
Overtone Order	OT	Fundamental	—	
Load Capacitance	CL	7	pF	
Frequency Tolerance	f_{tol}	±10	×10⁻⁶	30°C±3°C
Motional Series Resistance	R1	Table 1	ohm	
Drive Level	DL	10	μW	100μW max.
Operating Temp. Range	T_{use}	−30 to +85	°C	
Storage Temp. Range	T_{stg}	−40 to +105	°C	
Frequency Temp. Characteristics	f_{tem}	±12	×10⁻⁶	Freq. deviation from the value at 30°C
Thermistor Resistance	—	Table 2	ohm	25°C
Thermistor B-Constant	—	Table 3	K	25°C to 50°C

Please contact us for other specifications.

Table 1 Motional Series Resistance

Frequency Range	Motional Series Resistance
16000 to 19199kHz	100Ω max.
19200 to 25999kHz	80Ω max.
26000 to 29999kHz	60Ω max.
30000 to 60000kHz	50Ω max.

Table 2 Thermistor Resistance

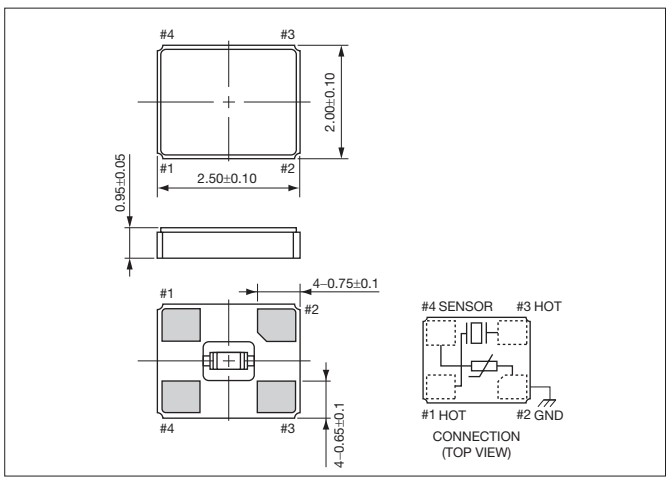
Resistance	Specification
100kΩ	±1%

Table 3 Thermistor B-Constant

B-Constant	Specification
4250K	±1%

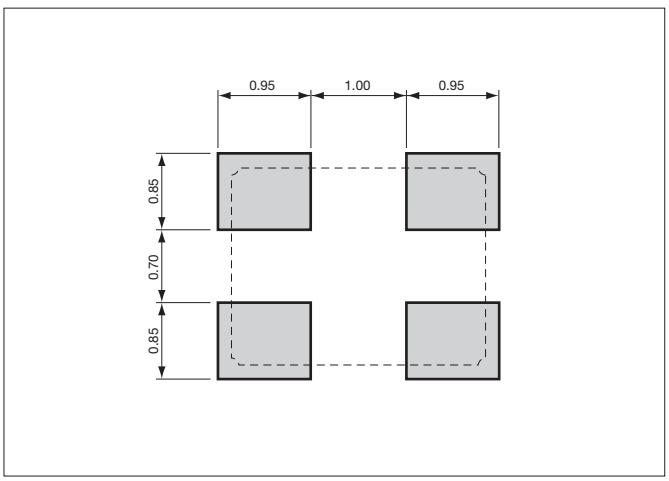
Dimensions

(Unit: mm)



Recommended Land Pattern

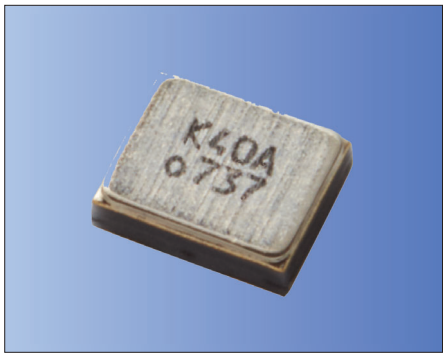
(Unit: mm)



AS of February 2019

KYOCERA

1.0×0.8mm for Mobile Communications



RoHS Compliant

Features

- Ultra-miniature and low profile (1.0×0.8×0.3mm max.)
- Crystal unit for mobile communication Systems.
- Reflow compatible
- Using ceramic package resulting in high reliability

Applications

- Mobile Communications

How to Order

CX1008SB 37400 □□ □ □ □ □□

① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Frequency
③ Load Capacitance
④ Frequency Tolerance

B0	6 pF	—
C0	7 pF	Std.

F	±10×10⁻⁶	Std.
G	±15×10⁻⁶	—

⑤ Operating Temp. Range ⑥ Frequency Temp. Stability

LH	−30 to +85°C	±12×10⁻⁶

⑦ Individual Specification

Packaging (Tape & Reel 12000 pcs./ reel)

Specifications

Item	Symbol	Specification	Units	Remarks
Frequency Range	f_{nom}	37400/ 80000	kHz	
Overtone Order	OT	Fundamental	—	
Load Capacitance	CL	7	pF	Please contact us for other CL requirements.
Frequency Tolerance	f_{tol}	±10	×10⁻⁶	25°C±3°C
Motional Series Resistance	R1	Table 1	ohm	
Drive Level	DL	Table 2	μW	
Operating Temp. Range	T_{use}	−30 to +85	°C	
Storage Temp. Range	T_{stg}	−40 to +105	°C	
Frequency Temp. Characteristics	f_{tem}	±12	×10⁻⁶	

Please contact us for other specifications.

Table 1 Motional Series Resistance

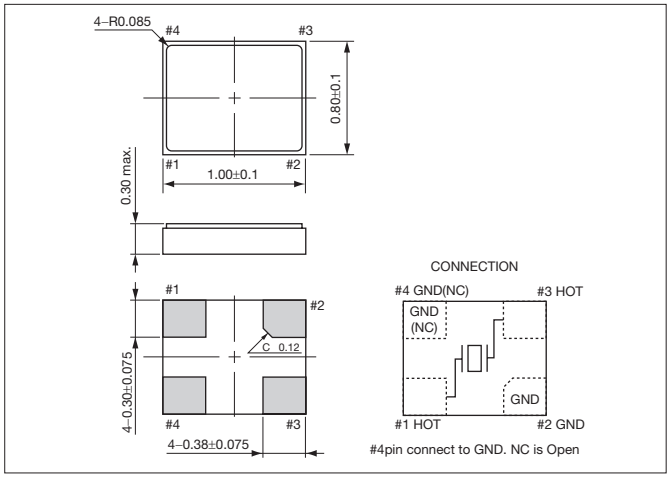
Frequency Range	Motional Series Resistance
f_{nom}=37400/ 80000kHz	60Ω max.

Table 2 Level of Drive

Frequency Range	Level of Drive
f_{nom}=37400/ 80000kHz	10μW (100μW max.)

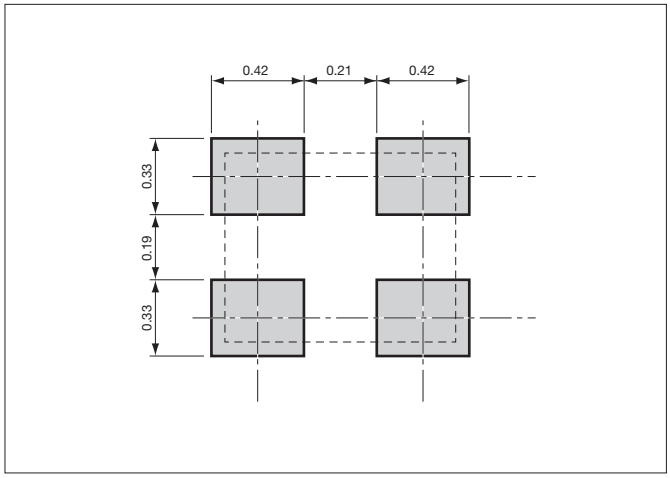
Dimensions

(Unit: mm)



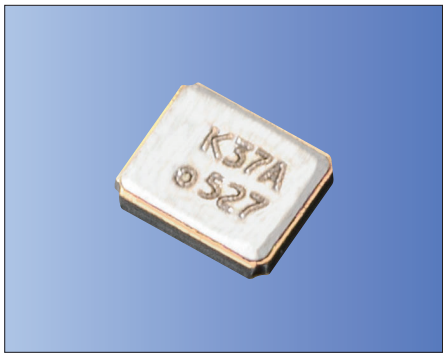
Recommended Land Pattern

(Unit: mm)



KYOCERA

1.2×1.0mm for Mobile Communications



RoHS Compliant

Features

- Ultra-miniature and low profile (1.2×1.0×0.3mm max.)
- Crystal unit for mobile communication Systems.
- Reflow compatible
- Using ceramic package resulting in high reliability

Applications

- Mobile Communications, Bluetooth®, Wireless LAN

* Bluetooth® Trademarks are owned by Bluetooth SIG Inc.

How to Order

CX1210DB 37400 □□ □ □ □ □ CC
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Frequency
③ Load Capacitance
④ Frequency Stability

D0	8 pF
H0	12 pF

F	±10×10⁻⁶
G	±15×10⁻⁶

⑤ Operating Temp. Range ⑥ Frequency Temp. Stability

FF	−20 to +70°C	±10×10⁻⁶
LH	−30 to +85°C	±12×10⁻⁶
LJ	−30 to +85°C	±15×10⁻⁶

⑦ Individual Specification
(STD Specification is "CC")

Packaging (Tape & Reel 1000/ 3000/ 12000/ 21000pcs./ reel)

Specifications

Item	Symbol	Specification	Units	Remarks
Frequency Range	f_{nom}	37400/ 40000/ 52000/ 80000	kHz	
Overtone Order	OT	Fundamental	—	
Load Capacitance	CL	8	pF	
Frequency Tolerance	f_{tol}	±10	×10⁻⁶	25°C±3°C
Motional Series Resistance	R1	Table 1	ohm	
Drive Level	DL	Table 2	μW	
Operating Temp. Range	T_{use}	−30 to +85	°C	
Storage Temp. Range	T_{stg}	−40 to +105	°C	
Frequency Temp. Characteristics	f_{tem}	±12	×10⁻⁶	Freq. deviation from the value at 25°C

Please contact us for other specifications.

Table 1 Motional Series Resistance

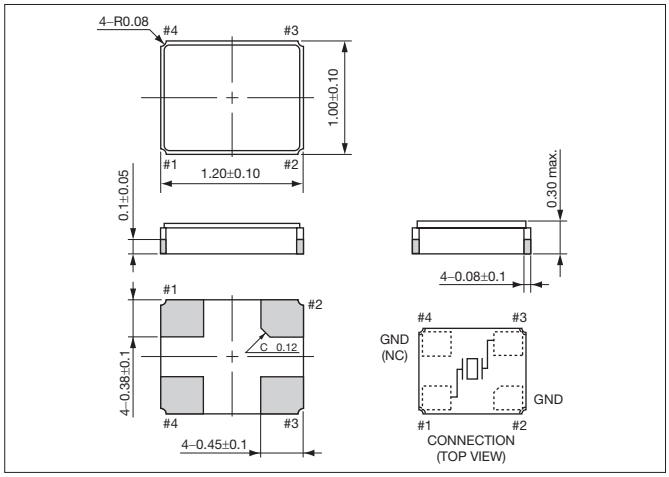
Frequency Range	Motional Series Resistance
f_{nom}=37400/ 40000/ 52000/ 80000kHz	60Ω max.

Table 2 Level of Drive

Frequency Range	Level of Drive
f_{nom}=37400/ 40000/ 52000/ 80000kHz	10μW (100μW max.)

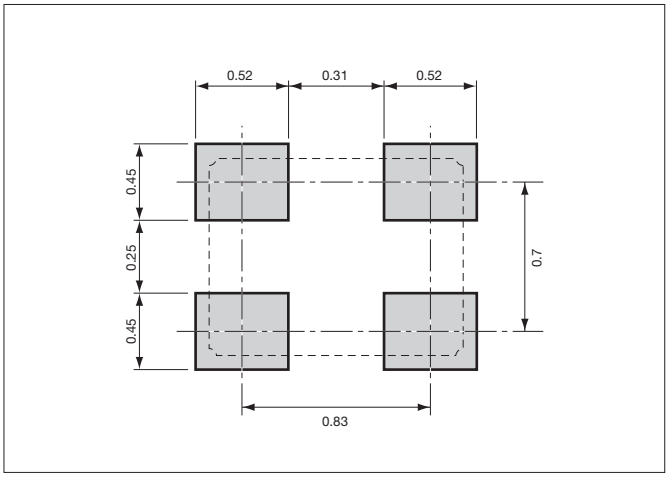
Dimensions

(Unit: mm)



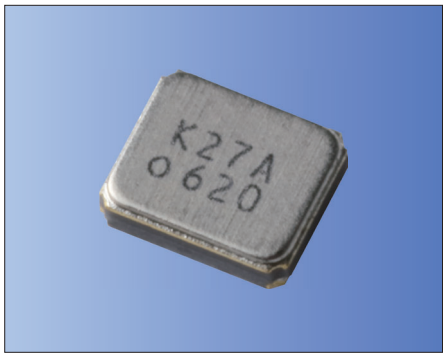
Recommended Land Pattern

(Unit: mm)



KYOCERA

1.2×1.0mm for Mobile Communications



RoHS Compliant

Features

- Ultra-miniature and low profile (1.2×1.0×0.35mm max.)
- Crystal unit for mobile communication Systems.
- Reflow compatible
- Using ceramic package resulting in high reliability

Applications

- Mobile Communications, Bluetooth®, Wireless LAN

* Bluetooth® Trademarks are owned by Bluetooth SIG Inc.

How to Order

CX1210SB 27120 □□ □ □ □ CC
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Frequency
③ Load Capacitance
④ Frequency Stability

B0	6 pF
D0	8 pF

F	±10×10⁻⁶
G	±15×10⁻⁶

⑤ Operating Temp. Range ⑥ Frequency Temp. Stability

FF	−20 to +70°C	±10×10⁻⁶
LH	−30 to +85°C	±12×10⁻⁶
LJ	−30 to +85°C	±15×10⁻⁶

⑦ Individual Specification
(STD Specification is "CC")

Packaging (Tape & Reel 1000/ 3000/ 12000/ 21000pcs./ reel)

Specifications

Item	Symbol	Specification	Units	Remarks
Frequency Range	f_{nom}	27120/ 32000	kHz	
Overtone Order	OT	Fundamental	—	
Load Capacitance	CL	8	pF	
Frequency Tolerance	f_{tol}	±10	×10⁻⁶	25°C±3°C
Motional Series Resistance	R1	Table 1	ohm	
Drive Level	DL	Table 2	μW	
Operating Temp. Range	T_{use}	−30 to +85	°C	
Storage Temp. Range	T_{stg}	−40 to +105	°C	
Frequency Temp. Characteristics	f_{tem}	±12	×10⁻⁶	Freq. deviation from the value at 25°C

Please contact us for other specifications.

Table 1 Motional Series Resistance

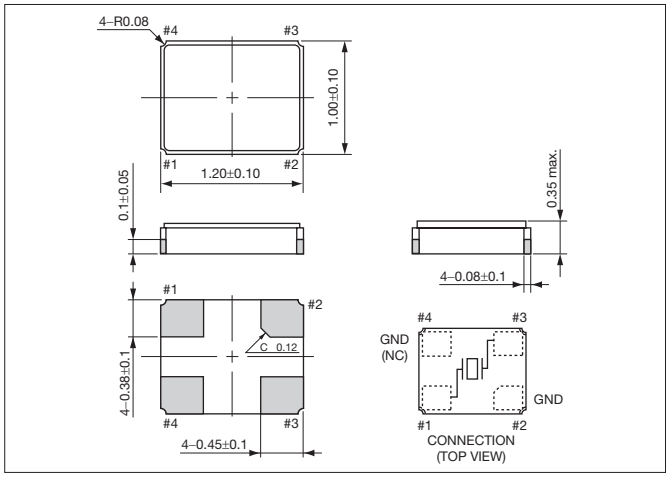
Frequency Range	Motional Series Resistance
f_{nom}=27120kHz	100Ω max.
f_{nom}=32000kHz	60Ω max.

Table 2 Level of Drive

Frequency Range	Level of Drive
f_{nom}=27120/ 32000kHz	10μW (100μW max.)

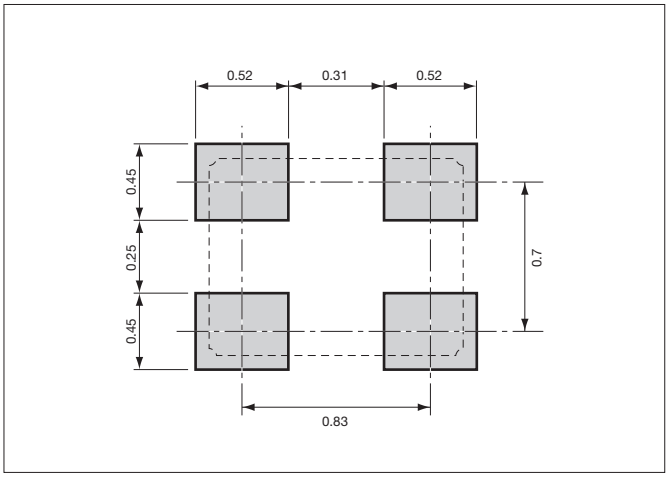
Dimensions

(Unit: mm)



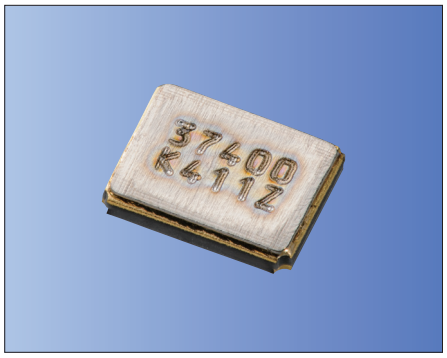
Recommended Land Pattern

(Unit: mm)



KYOCERA

1.6×1.2mm for Consumer Products



RoHS Compliant

Features

- Crystal unit for Consumer Products
- Ultra-miniature and low profile
- Ceramic package
- Reflow compatible

Applications

- Digital Electronics
- Consumer Products
- 1seg. tuner

How to Order

CX1612DB 36000 □□ G E J CC
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Frequency
③ Load Capacitance

B0	6 pF
D0	8 pF

④ Frequency Tolerance

G	±15×10⁻⁶

⑤ Operating Temp. Range ⑥ Frequency Temp. Stability

EJ	−10 to +70°C	±15×10⁻⁶

⑦ Individual Specification
(STD specification is "CC")

Packaging (Tape & Reel 3000/ 20000 pcs./ reel)

Specifications

Item	Symbol	Specification	Units	Remarks
Frequency Range	f_{nom}	26000 to 60000	kHz	
Overtone Order	OT	Fundamental	—	
Load Capacitance	CL	8	pF	
Frequency Tolerance	f_{tol}	±15	×10⁻⁶	25°C±3°C
Motional Series Resistance	R1	Table 1	ohm	
Drive Level	DL	Table 2	μW	
Operating Temp. Range	T_{use}	−10 to +70	°C	
Storage Temp. Range	T_{stg}	−40 to +85	°C	
Frequency Temp. Characteristics	f_{tem}	±15	×10⁻⁶	Freq. deviation from the value at 25°C

Please contact us for other specifications.

Table 1 Motional Series Resistance

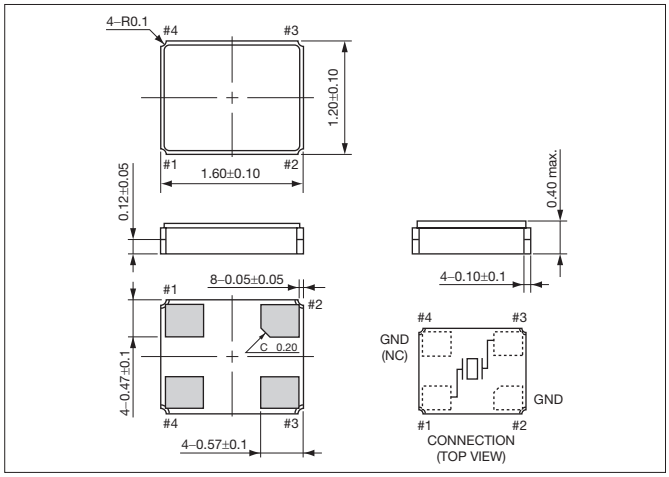
Frequency Range	Motional Series Resistance
26000≤f_{nom}<37400kHz	150Ω max.
37400≤f_{nom}<50000kHz	80Ω max.
50000≤f_{nom}≤60000kHz	50Ω max.

Table 2 Level of Drive

Frequency Range	Level of Drive
26000≤f_{nom}≤60000kHz	10μW (100μW max.)

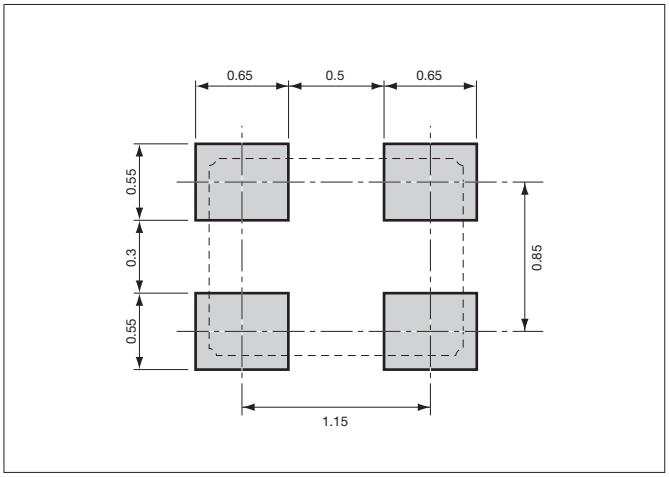
Dimensions

(Unit: mm)



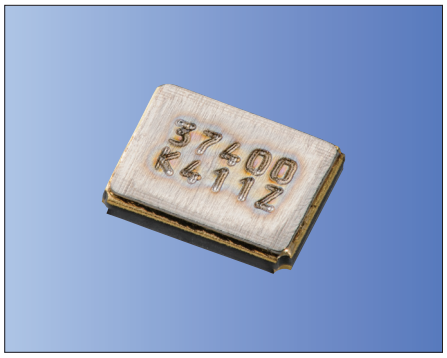
Recommended Land Pattern

(Unit: mm)



KYOCERA

1.6×1.2mm for Mobile Communications



RoHS Compliant

Features

- Reference frequency for telecommunication systems
- Reflow compatible
- Using ceramic package resulting in high reliability
- Ultra-miniature and low profile

Applications

- Mobile Communications, Bluetooth®, Wireless LAN

* Bluetooth® Trademarks are owned by Bluetooth SIG Inc.

How to Order

CX1612DB 37400 □□ □ □ □ □ CC
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Frequency
③ Load Capacitance
④ Frequency Tolerance

B0	6 pF
D0	8 pF

F	±10×10⁻⁶
G	±15×10⁻⁶

⑤ Operating Temp. Range ⑥ Frequency Temp. Stability

FF	−20 to +70°C	±10×10⁻⁶
LJ	−30 to +85°C	±15×10⁻⁶

⑦ Individual Specification
(STD Specification is "CC")

Packaging (Tape & Reel 3000/ 20000 pcs./ reel)

Specifications

Item	Symbol	Specification	Units	Remarks
Frequency Range	f_{nom}	37400 to 60000	kHz	
Overtone Order	OT	Fundamental	—	
Load Capacitance	CL	8	pF	
Frequency Tolerance	f_{tol}	±10	×10⁻⁶	25°C±3°C
Motional Series Resistance	R1	Table 1	ohm	
Drive Level	DL	Table 2	μW	
Operating Temp. Range	T_{use}	−30 to +85	°C	
Storage Temp. Range	T_{stg}	−40 to +85	°C	
Frequency Temp. Characteristics	f_{tem}	±15	×10⁻⁶	Freq. deviation from the value at 25°C

Please contact us for other specifications.

Table 1 Motional Series Resistance

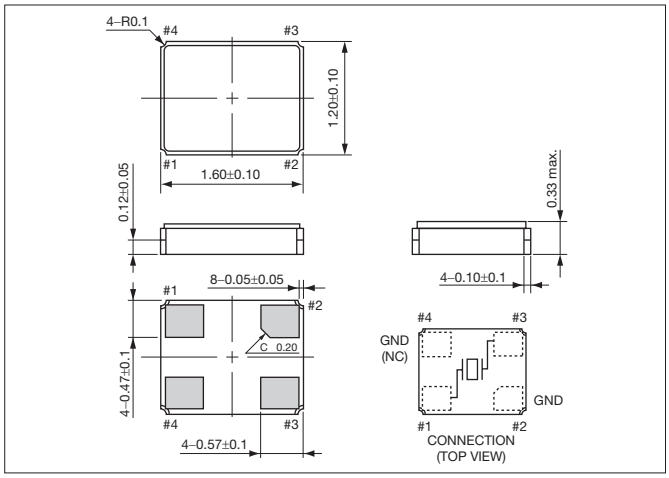
Frequency Range	Motional Series Resistance
37400≤f_{nom}<50000kHz	80Ω max.
50000≤f_{nom}≤60000kHz	50Ω max.

Table 2 Level of Drive

Frequency Range	Level of Drive
37400≤f_{nom}≤60000kHz	10μW (100μW max.)

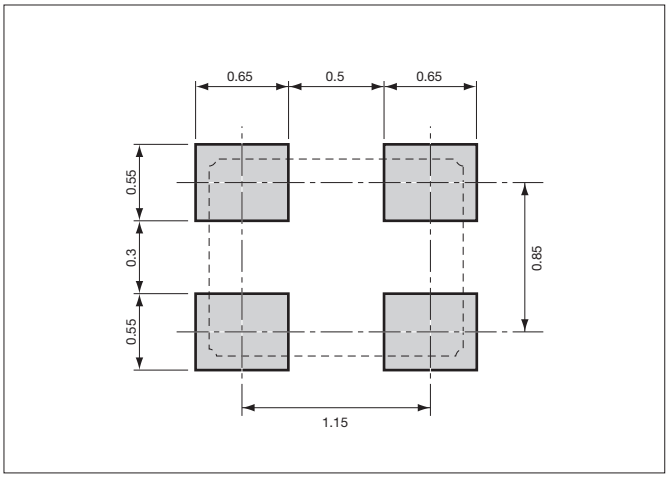
Dimensions

(Unit: mm)



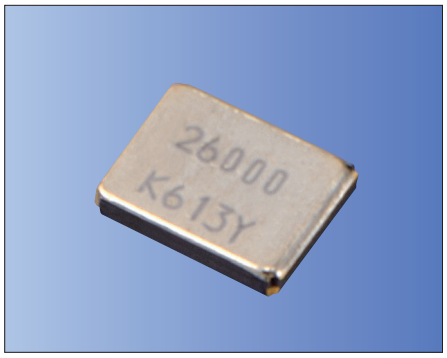
Recommended Land Pattern

(Unit: mm)



KYOCERA

2.0×1.6mm for Consumer Products/ Mobile Communications



RoHS Compliant

Features

- Crystal unit for Consumer Products
- Ultra-miniature and low profile (2.0×1.6×0.40mm)
- Ceramic package
- Reflow compatible

Applications

- Digital Electronics
- Consumer Products
- Mobile Communications, Bluetooth®, Wireless LAN

* Bluetooth® Trademarks are owned by Bluetooth SIG Inc.

How to Order

CX2016DB ① 27000 ② D0 ③ G ④ □ ⑤ J ⑥ CC ⑦

① Series
② Frequency
③ Load Capacitance
④ Frequency Tolerance

D0	8 pF	G	±15×10⁻⁶

⑤ Operating Temp. Range ⑥ Frequency Temp. Stability

EJ	−10 to +70°C	±15×10⁻⁶
LN	−30 to +85°C	±25×10⁻⁶

⑦ Individual Specification
(STD Specification is "CC")

Packaging (Tape & Reel 1000/ 3000/ 15000 pcs./ reel)

Specifications

Item	Symbol	Specification		Units	Remarks
Frequency Range	f_{nom}	16000 to 60000		kHz	
Overtone Order	OT	Fundamental		—	
Load Capacitance	CL	8		pF	Please contact us for other CL requirements.
Frequency Tolerance	f_{tol}	±15		×10⁻⁶	25°C±3°C
Motional Series Resistance	R1	Table 1		ohm	
Drive Level	DL	Table 2		μW	
Operating Temp. Range	T_{use}	−10 to +70	−30 to +85	°C	
Storage Temp. Range	T_{stg}	−40 to +85		°C	
Frequency Temp. Characteristics	f_{tem}	±15		×10⁻⁶	Freq. deviation from the value at 25°C

Please contact us for other specifications.

Table 1 Motional Series Resistance

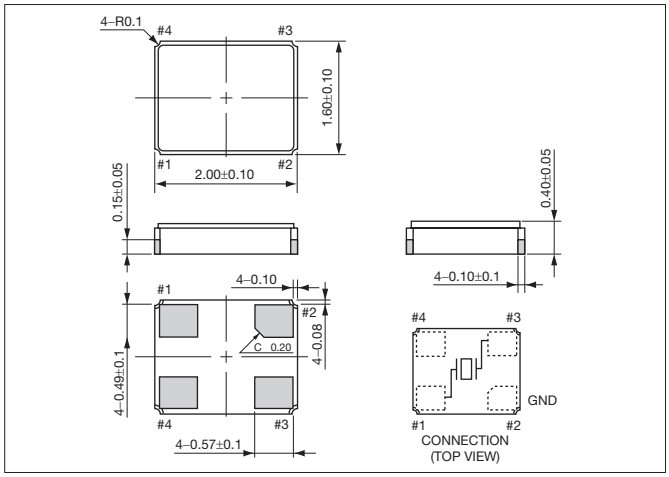
Frequency Range	Motional Series Resistance
16000≤f_{nom}<18000kHz	200Ω max.
18000≤f_{nom}<26000kHz	150Ω max.
26000≤f_{nom}<40000kHz	60Ω max.
40000≤f_{nom}≤60000kHz	50Ω max.

Table 2 Level of Drive

Frequency Range	Level of Drive
16000≤f_{nom}≤60000kHz	10μW (100μW max.)

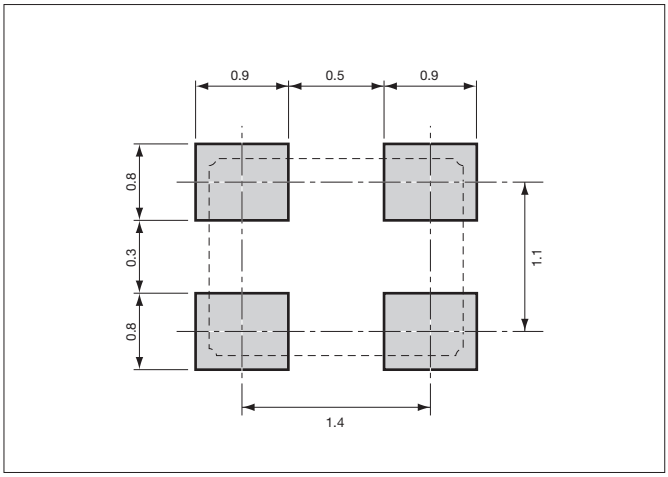
Dimensions

(Unit: mm)



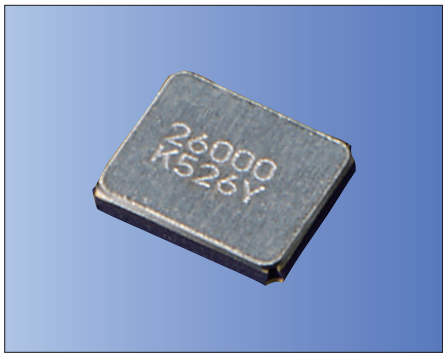
Recommended Land Pattern

(Unit: mm)



KYOCERA

2.5×2.0mm for Consumer Products/ Mobile Communications



RoHS Compliant

Features

- Crystal unit for Consumer Products
- Ceramic package
- Reflow compatible

Applications

- Digital Electronics
- Consumer Products
- Mobile Communications, Bluetooth®, Wireless LAN

* Bluetooth® Trademarks are owned by Bluetooth SIG Inc.

How to Order

CX2520DB 27000 D0 G □ J CC
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Frequency
③ Load Capacitance
④ Frequency Tolerance

D0	8 pF	G	±15×10⁻⁶

⑤ Operating Temp. Range ⑥ Frequency Temp. Stability

EJ	−10 to +70°C	±15×10⁻⁶
LN	−30 to +85°C	±25×10⁻⁶

⑦ Individual Specification
(STD Specification is "CC")

Packaging (Tape & Reel 1000/ 3000/ 12000 pcs./ reel)

Specifications

Item	Symbol	Specification		Units	Remarks
Frequency Range	f_{nom}	12000 to 54000		kHz	
Overtone Order	OT	Fundamental		—	
Load Capacitance	CL	8		pF	Please contact us for other CL requirements.
Frequency Tolerance	f_{tol}	±15		×10⁻⁶	25°C±3°C
Motional Series Resistance	R1	Table 1		ohm	
Drive Level	DL	Table 2		μW	
Operating Temp. Range	T_{use}	−10 to +70	−30 to +85	°C	
Storage Temp. Range	T_{stg}	−40 to +85		°C	
Frequency Temp. Characteristics	f_{tem}	±15		×10⁻⁶	Freq. deviation from the value at 25°C

Please contact us for other specifications.

Table 1 Motional Series Resistance

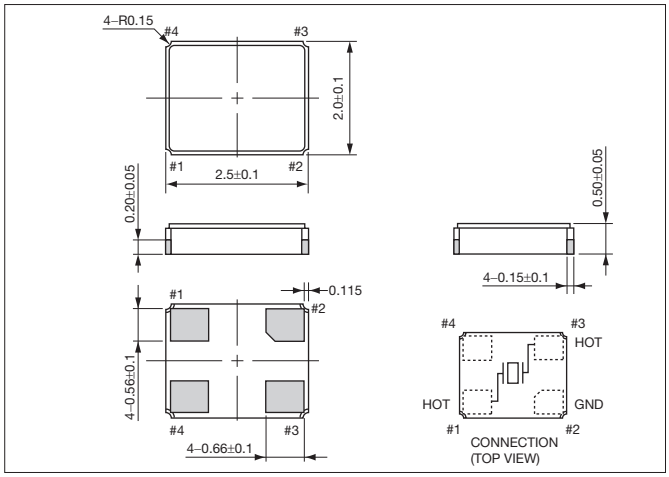
Frequency Range	Motional Series Resistance
12000≤f_{nom}<16000kHz	150Ω max.
16000≤f_{nom}<26000kHz	80Ω max.
26000≤f_{nom}<30000kHz	60Ω max.
30000≤f_{nom}≤54000kHz	50Ω max.

Table 2 Level of Drive

Frequency Range	Level of Drive
12000≤f_{nom}≤54000kHz	10μW (100μW max.)

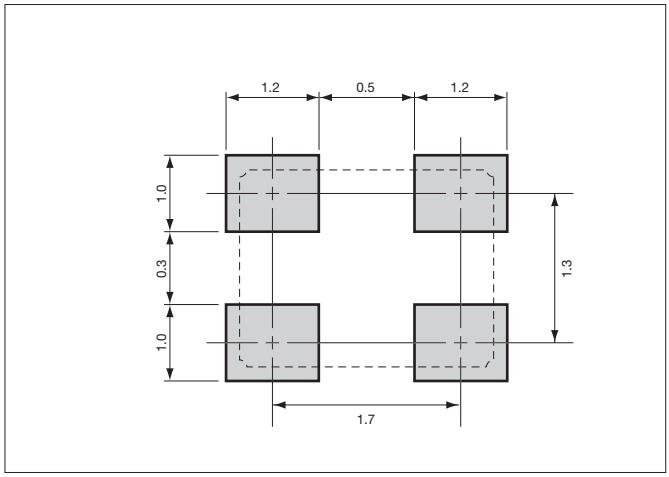
Dimensions

(Unit: mm)



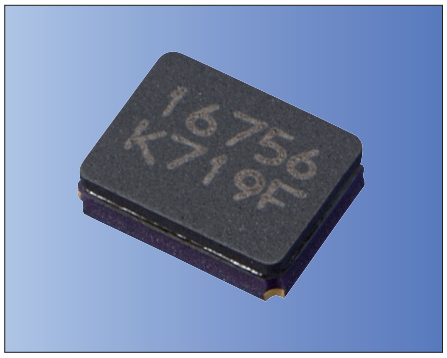
Recommended Land Pattern

(Unit: mm)



KYOCERA

3.2×2.5mm for Consumer Products



RoHS Compliant

Features

- Crystal unit for Consumer Products
- Small and low profile 0.9mm max. (3.2×2.5×0.8mm)
- Ceramic package
- Reflow compatible

Applications

- Digital Electronics
- Consumer Products

How to Order

CX3225GB ① 27000 ② D0 ③ H ④ E ⑤ Q ⑥ CC ⑦

① Series
② Frequency
③ Load Capacitance
④ Frequency Tolerance

D0	8 pF	H	±20×10⁻⁶

⑤ Operating Temp. Range ⑥ Frequency Temp. Stability

EQ	−10 to +70°C	±30×10⁻⁶

⑦ Individual Specification
(STD Specification is "CC")

Packaging (Tape & Reel 3000 pcs./ reel)

Specifications

Item	Symbol	Specification	Units	Remarks
Frequency Range	f_{nom}	12000 to 54000	kHz	
Overtone Order	OT	Fundamental	—	
Load Capacitance	CL	8	pF	Please contact us for other CL requirements.
Frequency Tolerance	f_{tol}	±20	×10⁻⁶	25°C±3°C
Motional Series Resistance	R1	Table 1	ohm	
Drive Level	DL	Table 2	μW	
Operating Temp. Range	T_{use}	−10 to +70	°C	
Storage Temp. Range	T_{stg}	−40 to +85	°C	
Frequency Temp. Characteristics	f_{tem}	±30	×10⁻⁶	Freq. deviation from the value at 25°C

Please contact us for other specifications.

Table 1 Motional Series Resistance

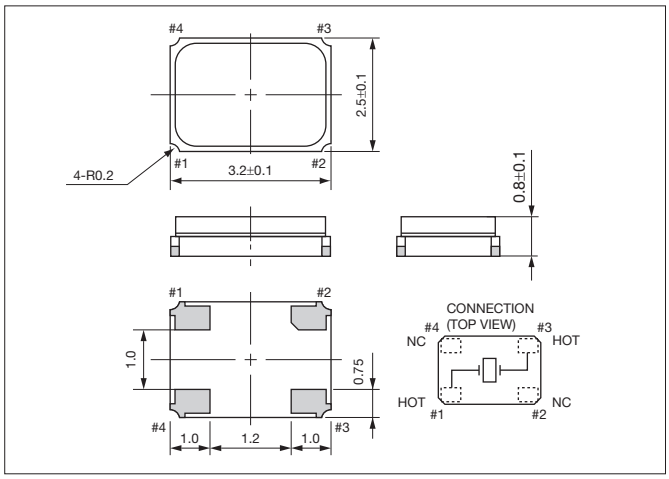
Frequency Range	Motional Series Resistance
12000≤f_{nom}<13000kHz	150Ω max.
13000≤f_{nom}<14000kHz	100Ω max.
14000≤f_{nom}<20000kHz	80Ω max.
20000≤f_{nom}<27000kHz	60Ω max.
27000≤f_{nom}≤54000kHz	50Ω max.

Table 2 Level of Drive

Frequency Range	Level of Drive
12000≤f_{nom}≤54000kHz	10μW (100μW max.)

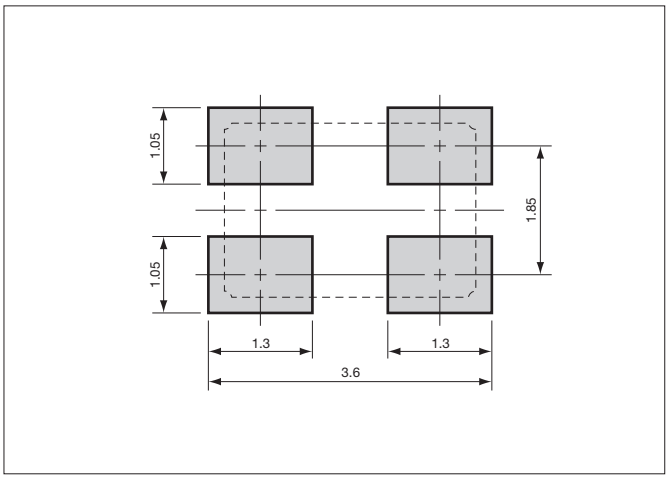
Dimensions

(Unit: mm)



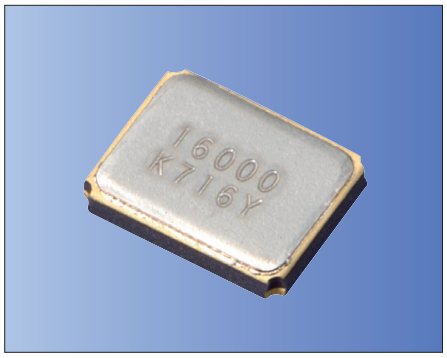
Recommended Land Pattern

(Unit: mm)



KYOCERA

3.2×2.5mm for Consumer Products/ Mobile Communications



RoHS Compliant

Features

- Crystal unit for Consumer Products
- Miniature and low profile (3.2×2.5×0.55mm)
- Ceramic package
- Reflow compatible

Applications

- Digital Electronics
- Consumer Products
- Mobile Communications, Bluetooth®, Wireless LAN

* Bluetooth® Trademarks are owned by Bluetooth SIG Inc.

How to Order

CX3225SB ① 12000 ② D0 ③ G ④ □ ⑤ J ⑥ CC ⑦

① Series
② Frequency
③ Load Capacitance

D0	8 pF

④ Frequency Tolerance

G	±15×10⁻⁶

⑤ Operating Temp. Range ⑥ Frequency Temp. Stability

EJ	−10 to +70°C	±15×10⁻⁶
LJ	−30 to +85°C	±15×10⁻⁶

⑦ Individual Specification
(STD Specification is "CC")

Packaging (Tape & Reel 3000 pcs./ reel)

Specifications

Item	Symbol	Specification		Units	Remarks
Frequency Range	f_nom	12000 to 54000		kHz	
Overtone Order	OT	Fundamental		—	
Load Capacitance	CL	8		pF	Please contact us for other CL requirements.
Frequency Tolerance	f_tol	±15		×10⁻⁶	25°C±3°C
Motional Series Resistance	R1	Table 1		ohm	
Drive Level	DL	Table 2		μW	
Operating Temp. Range	T_use	−10 to +70	−30 to +85	°C	
Storage Temp. Range	T_stg	−40 to +85		°C	
Frequency Temp. Characteristics	f_tem	±15		×10⁻⁶	Freq. deviation from the value at 25°C

Please contact us for other specifications.

Table 1 Motional Series Resistance

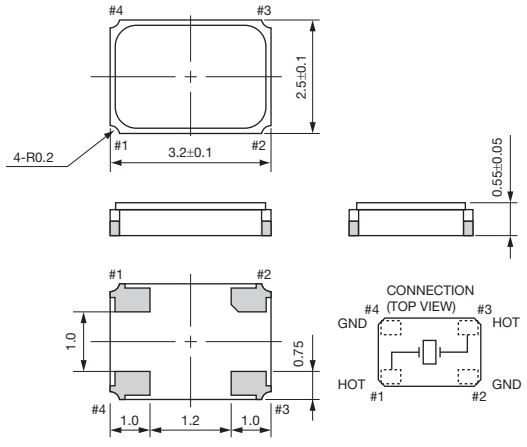
Frequency Range	Motional Series Resistance
12000≤f_nom<13000kHz	150Ω max.
13000≤f_nom<20000kHz	80Ω max.
20000≤f_nom≤54000kHz	50Ω max.

Table 2 Level of Drive

Frequency Range	Level of Drive
12000≤f_nom≤54000kHz	10μW (100μW max.)

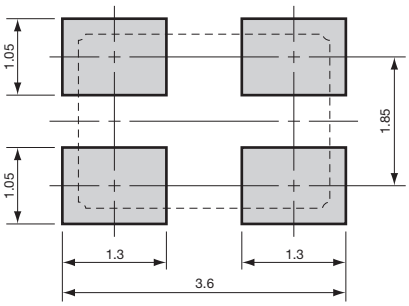
Dimensions

(Unit: mm)



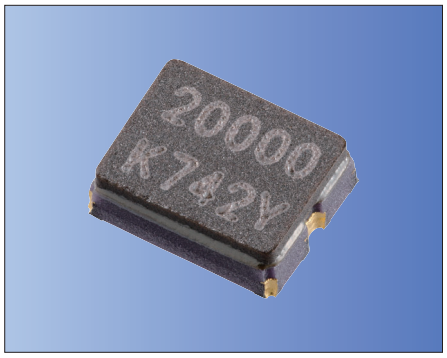
Recommended Land Pattern

(Unit: mm)



KYOCERA

2.0×1.6mm for Automotive



AEC-Q200 RoHS Compliant

Features

- Crystal unit for automotive electronics
- Ultra-miniature and low profile (2.0×1.6×0.8mm)
- Ceramic package
- Reflow compatible
- Durable, all-ceramic package, ideal for applications involving resin or epoxy over coating.
- Acceptable heat cycle solder junction for 3000 cycle (−40 to +125°C)

Applications

- ECU
- Automotive Camera
- Radar

How to Order

CX2016GR ① 27000 ② D0 ③ G ④ T ⑤ V ⑥ CC ⑦

① Series
② Frequency
③ Load Capacitance
④ Frequency Tolerance

③	
D0	8 pF

④	
G	±15×10^{-6}

⑤ Operating Temp. Range ⑥ Frequency Temp. Stability

⑤		⑥
TV	−40 to +150°C	±150×10^{-6}

⑦ Individual Specification
(STD Specification is "CC")

Packaging (Tape & Reel 3000/ 15000 pcs./ reel)

Specifications

Item	Symbol	Specification	Units	Remarks
Frequency Range	f_{nom}	16000 to 60000	kHz	
Overtone Order	OT	Fundamental	—	
Load Capacitance	CL	8	pF	Please contact us for other CL requirements.
Frequency Tolerance	f_{tol}	±50	×10^{-6}	25°C±3°C
Motional Series Resistance	R1	Table 1	ohm	
Drive Level	DL	Table 2	μW	
Operating Temp. Range	T_{use}	−40 to +150	°C	
Storage Temp. Range	T_{stg}	−40 to +150	°C	
Frequency Temp. Characteristics	f_{tem}	±150	×10^{-6}	Freq. deviation from the value at 25°C

Please contact us for other specifications.

Table 1 Motional Series Resistance

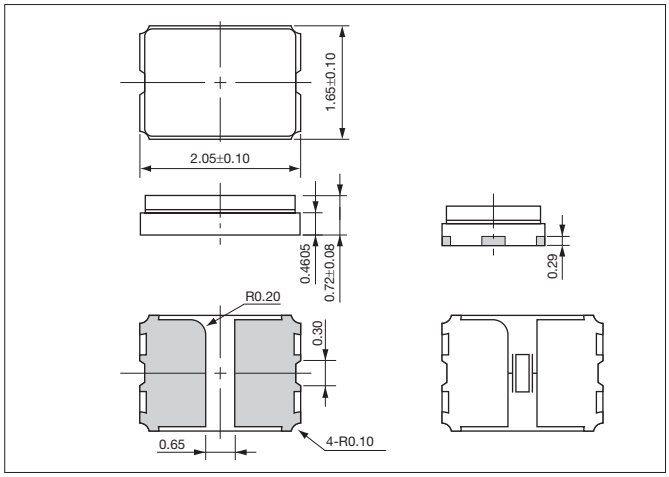
Frequency Range	Motional Series Resistance
16000≤f_{nom}<18000kHz	300Ω max.
18000≤f_{nom}<20000kHz	200Ω max.
20000≤f_{nom}<40000kHz	100Ω max.
40000≤f_{nom}≤60000kHz	50Ω max.

Table 2 Level of Drive

Frequency Range	Level of Drive
16000≤f_{nom}<60000kHz	10μW (200μW max.)

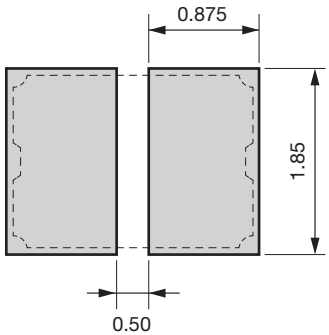
Dimensions

(Unit: mm)

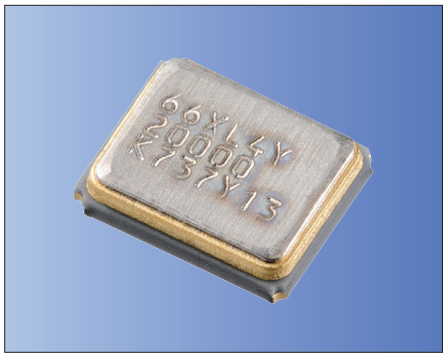


Recommended Land Pattern

(Unit: mm)



2.0×1.6mm for Automotive



AEC-Q200 RoHS Compliant

Features

- Crystal unit for automotive electronics
- Ultra-miniature and low profile (2.05×1.65×0.45mm)
- Ceramic package
- Reflow compatible

Applications

- ECU
- Automotive Camera
- Radar

How to Order

CX2016SA 20000 D0 G S S CC
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Frequency
③ Load Capacitance

D0	8 pF

④ Frequency Tolerance

G	±15×10⁻⁶

⑤ Operating Temp. Range ⑥ Frequency Temp. Stability

SS	−40 to +125°C	±50×10⁻⁶

⑦ Individual Specification
(STD Specification is "CC")

Packaging (Tape & Reel 3000/ 15000 pcs./ reel)

Specifications

Item	Symbol	Specification	Units	Remarks
Frequency Range	f_{nom}	16000 to 60000	kHz	
Overtone Order	OT	Fundamental	—	
Load Capacitance	CL	8	pF	Please contact us for other CL requirements.
Frequency Tolerance	f_{tol}	±15	×10⁻⁶	25°C±3°C
Motional Series Resistance	R1	Table 1	ohm	
Drive Level	DL	Table 2	μW	
Operating Temp. Range	T_{use}	−40 to +125	°C	
Storage Temp. Range	T_{stg}	−40 to +125	°C	
Frequency Temp. Characteristics	f_{tem}	±50	×10⁻⁶	Freq. deviation from the value at 25°C

Please contact us for other specifications.

Table 1 Motional Series Resistance

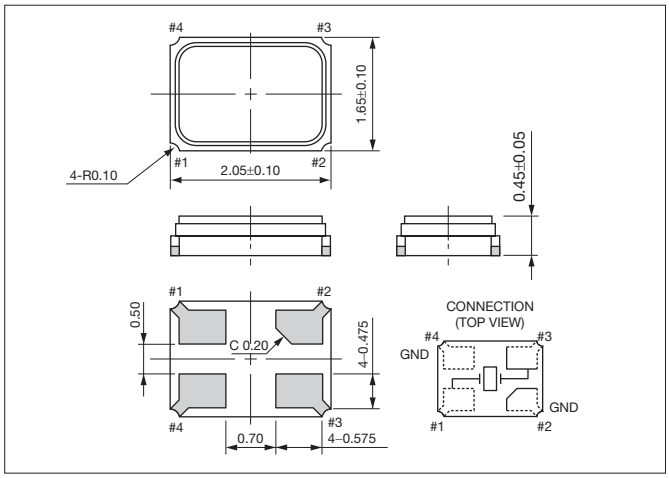
Frequency Range	Motional Series Resistance
16000≤f_{nom}<18000kHz	200Ω max.
18000≤f_{nom}<26000kHz	150Ω max.
26000≤f_{nom}<40000kHz	60Ω max.
40000≤f_{nom}≤60000kHz	50Ω max.

Table 2 Level of Drive

Frequency Range	Level of Drive
16000≤f_{nom}<60000kHz	10μW (200μW max.)

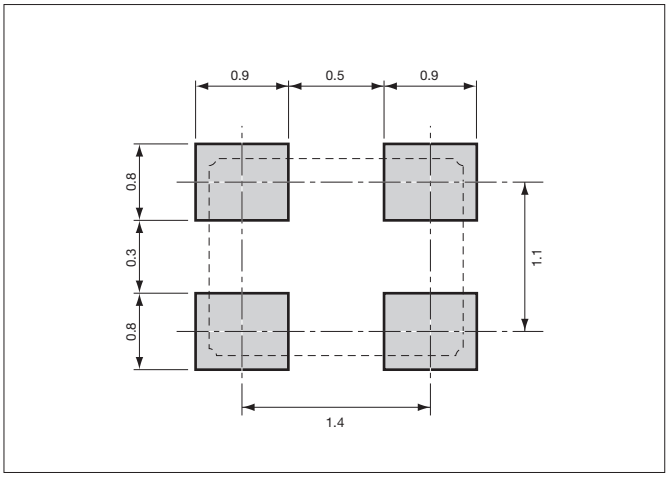
Dimensions

(Unit: mm)



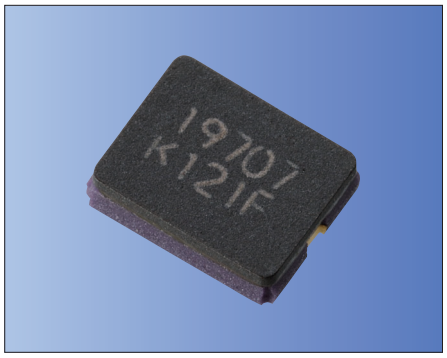
Recommended Land Pattern

(Unit: mm)



KYOCERA

3.2×2.5mm for Automotive



AEC-Q200 RoHS Compliant

Features

- Crystal unit for automotive electronics
- Improved solderability
- Small and low profile (3.2×2.5×0.85mm)
- Ceramic package
- Reflow compatible
- Acceptable heat cycle solder junction for 3000 cycle (−40 to +125°C)

Applications

- ECU
- TPMS
- High-Speed Automotive Network

How to Order

CX3225GA ① 16000 ② D0 ③ P ④ T ⑤ V ⑥ CC ⑦

① Series
② Frequency
③ Load Capacitance
④ Frequency Tolerance

D0	8 pF	P	±50×10^{-6}

⑤ Operating Temp. Range ⑥ Frequency Temp. Stability

TV	−40 to +150°C	±150×10^{-6}

⑦ Individual Specification
(STD Specification is "CC")

Packaging (Tape & Reel 3000 pcs./ reel)

Specifications

Item	Symbol	Specification	Units	Remarks
Frequency Range	f_{nom}	8000 to 54000	kHz	
Overtone Order	OT	Fundamental	—	
Load Capacitance	CL	8	pF	Please contact us for other CL requirements.
Frequency Tolerance	f_{tol}	±50	×10^{-6}	25°C±3°C
Motional Series Resistance	R1	Table 1	ohm	
Drive Level	DL	Table 2	μW	
Operating Temp. Range	T_{use}	−40 to +150	°C	
Storage Temp. Range	T_{stg}	−40 to +150	°C	
Frequency Temp. Characteristics	f_{tem}	±150	×10^{-6}	Freq. deviation from the value at 25°C

Please contact us for other specifications.

Table 1 Motional Series Resistance

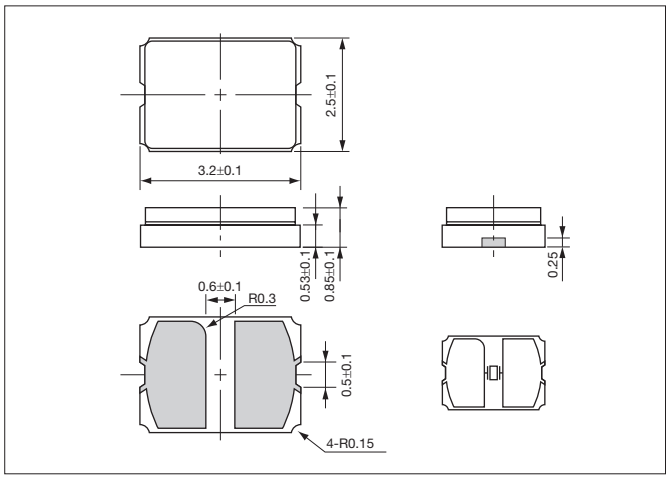
Frequency Range	Motional Series Resistance
8000≤f_{nom}< 9800kHz	500Ω max.
9800≤f_{nom}<13560kHz	200Ω max.
13560≤f_{nom}<16000kHz	120Ω max.
16000≤f_{nom}≤54000kHz	100Ω max.

Table 2 Level of Drive

Frequency Range	Level of Drive
8000≤f_{nom}≤54000kHz	10μW (200μW max.)

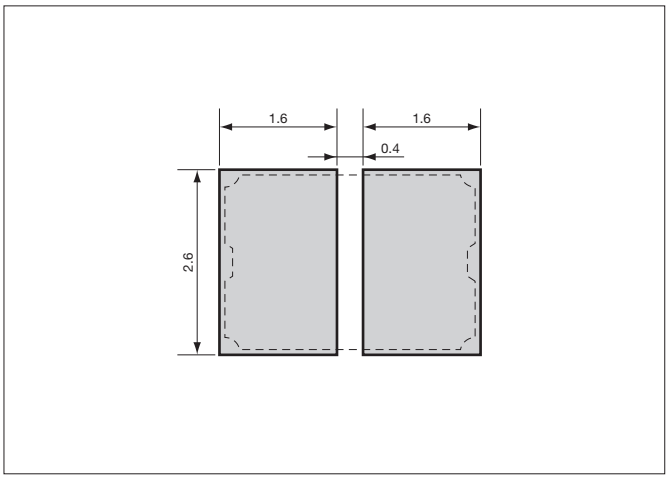
Dimensions

(Unit: mm)



Recommended Land Pattern

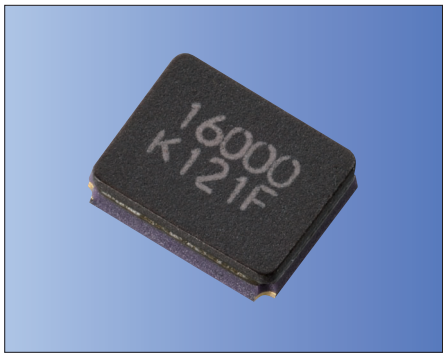
(Unit: mm)



AS of February 2019

KYOCERA

3.2×2.5mm for Automotive



AEC-Q200 RoHS Compliant

Features

- Crystal unit for automotive electronics
- Small and low profile (3.2×2.5×0.80mm)
- Ceramic package
- Reflow compatible

Applications

- ECU
- High-Speed Automotive Network

How to Order

CX3225CA 16000 D0 P S V CC
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Frequency
③ Load Capacitance
④ Frequency Tolerance

D0	8 pF	P	±50×10⁻⁶

⑤ Operating Temp. Range ⑥ Frequency Temp. Stability

SV	−40 to +125°C	±150×10⁻⁶

⑦ Individual Specification
(STD Standard is "CC")

Packaging (Tape & Reel 3000 pcs./ reel)

Specifications

Item	Symbol	Specification	Units	Remarks
Frequency Range	f_{nom}	12000 to 54000	kHz	
Overtone Order	OT	Fundamental	—	
Load Capacitance	CL	8	pF	Please contact us for other CL requirements.
Frequency Tolerance	f_{tol}	±50	$\times10^{-6}$	25°C±3°C
Motional Series Resistance	R1	Table 1	ohm	
Drive Level	DL	Table 2	μW	
Operating Temp. Range	T_{use}	−40 to +125	°C	
Storage Temp. Range	T_{stg}	−40 to +150	°C	
Frequency Temp. Characteristics	f_{tem}	±150	$\times10^{-6}$	Freq. deviation from the value at 25°C

Please contact us for other specifications.

Table 1 Motional Series Resistance

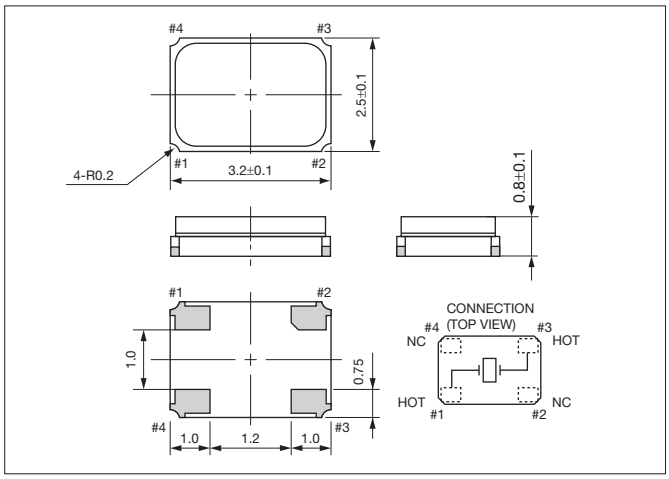
Frequency Range	Motional Series Resistance
12000≤f_{nom}<13560kHz	200Ω max.
13560≤f_{nom}<16000kHz	120Ω max.
16000≤f_{nom}≤54000kHz	100Ω max.

Table 2 Level of Drive

Frequency Range	Level of Drive
12000≤f_{nom}≤54000kHz	10μW (200μW max.)

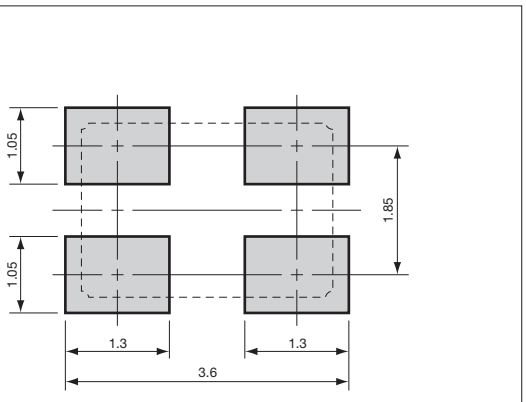
Dimensions

(Unit: mm)



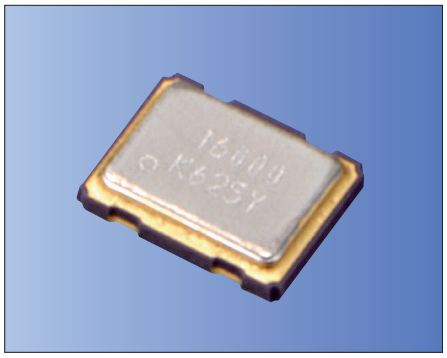
Recommended Land Pattern

(Unit: mm)



KYOCERA

3.2×2.5mm for Automotive



AEC-Q200 RoHS Compliant

Features

- Crystal unit for automotive electronics
- Improved solderability
- Improved mounting stability with 4 terminals
- Improved anti-noise performance with GND terminal
- Ceramic package
- Small and low profile
- Improved rust prevention performance
- Reflow compatible
- Highly reliable solder junction (3000 heat cycles −40 to +125°C)

Applications

- ECU
- TPMS
- High-Speed Automotive Network

How to Order

CX3225SA 12000 D0 P T V CC
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Frequency
③ Load Capacitance
④ Frequency Tolerance

D0	8 pF	P	±50×10⁻⁶

⑤ Operating Temp. Range ⑥ Frequency Temp. Stability

TV	−40 to +150°C	±150×10⁻⁶

⑦ Individual Specification
(STD Standard is "CC")

Packaging (Tape & Reel 3000 pcs./ reel)

Specifications

Item	Symbol	Specification	Units	Remarks
Frequency Range	f_{nom}	8000 to 54000	kHz	
Overtone Order	OT	Fundamental	—	
Load Capacitance	CL	8	pF	Please contact us for other CL requirements.
Frequency Tolerance	f_{tol}	±15	×10⁻⁶	25°C±3°C
Motional Series Resistance	R1	Table 1	ohm	
Drive Level	DL	Table 2	μW	
Operating Temp. Range	T_{use}	−40 to +150	°C	
Storage Temp. Range	T_{stg}	−40 to +150	°C	
Frequency Temp. Characteristics	f_{tem}	±150	×10⁻⁶	Freq. deviation from the value at 25°C

Please contact us for other specifications.

Table 1 Motional Series Resistance

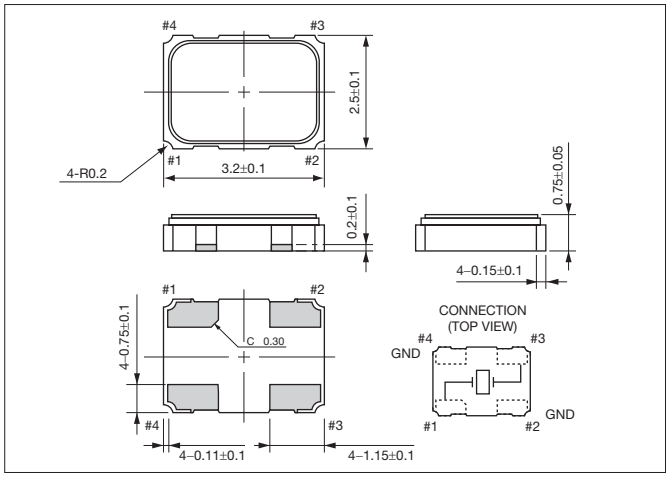
Frequency Range	Motional Series Resistance
8000≤f_{nom}< 9800kHz	500Ω max.
9800≤f_{nom}<13560kHz	200Ω max.
13560≤f_{nom}<16000kHz	100Ω max.
16000≤f_{nom}<20000kHz	60Ω max.
20000≤f_{nom}≤54000kHz	50Ω max.

Table 2 Level of Drive

Frequency Range	Level of Drive
8000≤f_{nom}≤54000kHz	10μW (200μW max.)

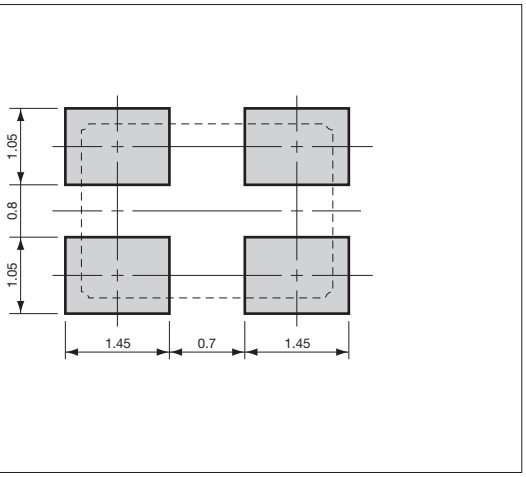
Dimensions

(Unit: mm)

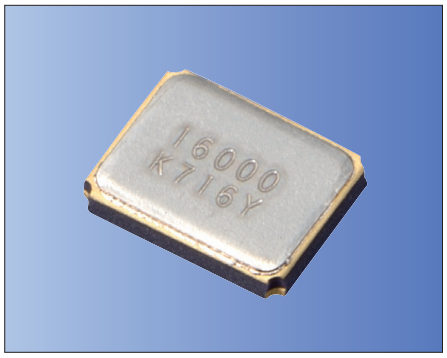


Recommended Land Pattern

(Unit: mm)



3.2×2.5mm for Automotive



AEC-Q200 RoHS Compliant

Features

- Crystal unit for automotive electronics
- Miniature and low profile (3.2×2.5×0.55mm)
- Ceramic package
- Reflow compatible

Applications

- Car Electronics
- High Speed Network
- Automotive Camera

How to Order

CX3225SB 19200 D0 G S S CC
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Frequency
③ Load Capacitance
④ Frequency Tolerance

D0	8 pF	G	±15×10⁻⁶

⑤ Operating Temp. Range ⑥ Frequency Temp. Stability

SS	−40 to +125°C	±50×10⁻⁶

⑦ Individual Specification
(STD Specification is "CC")

Packaging (Tape & Reel 3000 pcs./ reel)

Specifications

Item	Symbol	Specification	Units	Remarks
Frequency Range	f_{nom}	12000 to 54000	kHz	
Overtone Order	OT	Fundamental	—	
Load Capacitance	CL	8	pF	Please contact us for other CL requirements.
Frequency Tolerance	f_{tol}	±15	×10⁻⁶	25°C±3°C
Motional Series Resistance	R1	Table 1	ohm	
Drive Level	DL	Table 2	μW	
Operating Temp. Range	T_{use}	−40 to +125	°C	
Storage Temp. Range	T_{stg}	−40 to +125	°C	
Frequency Temp. Characteristics	f_{tem}	±50	×10⁻⁶	Freq. deviation from the value at 25°C

Please contact us for other specifications.

Table 1 Motional Series Resistance

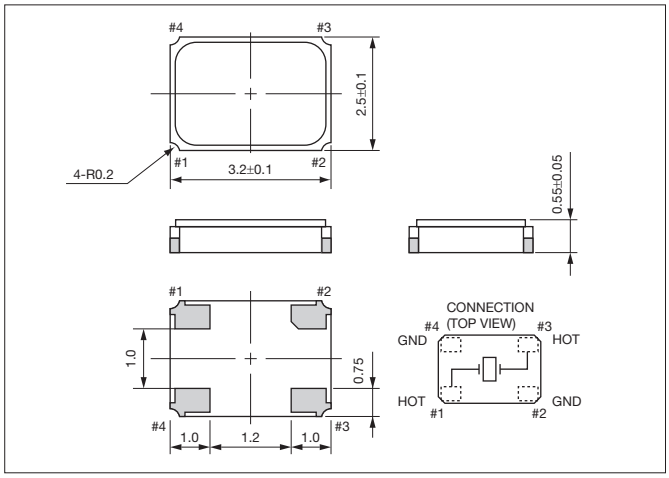
Frequency Range	Motional Series Resistance
12000≤f_{nom}<13000kHz	150Ω max.
13000≤f_{nom}<20000kHz	80Ω max.
20000≤f_{nom}≤54000kHz	50Ω max.

Table 2 Level of Drive

Frequency Range	Level of Drive
12000≤f_{nom}≤54000kHz	10μW (100μW max.)

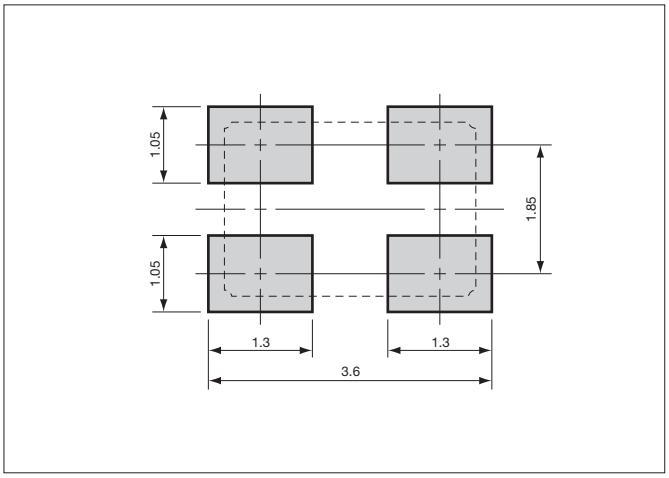
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)



1. Shock & Drop・Vibration

Do not inflict excessive shock and mechanical vibration that exceeds the norm, such as hitting or mistakenly dropping, when transporting and mounting on a board. There are cases when pieces of crystal break, and pieces that are used become damaged, and become inoperable. When a shock or vibration that exceeds the norm has been inflicted, make sure to check the characteristics.

2. Cleaning

Since a crystal piece can be broken by resonance when a crystal device is cleaned by ultrasonic cleaning, be careful when carrying out ultrasonic cleaning.

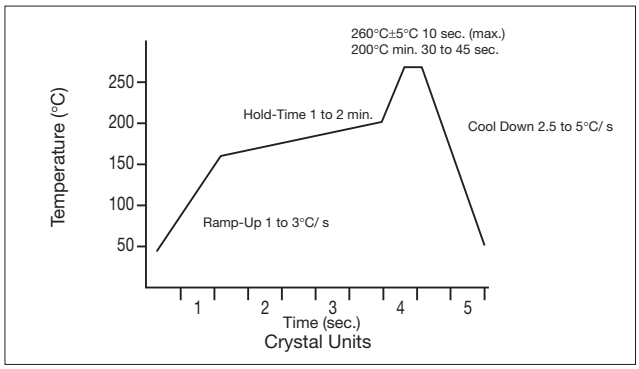
3. Soldering conditions

To maintain the product reliability, please follow recommended conditions.

Standard soldering iron conditions

	Crystal Units
Soldering iron	280°C to 340°C
Time	3+1/ −0 sec. max.

Reflow conditions (Example)



Recommended reflow Conditions vary depending upon products.
Please check with the respective specification for details.

4. Mounting Precautions

The lead of the device and the pattern of the board is soldered on the surface. Since extreme deformation of the board tears off the pattern, tears off the lead metal, cracks the solder and damages the sealed part of the device and there are cases in which performance deteriorates and operation fails, use it within the stipulated bending conditions. Due to the small cracks in the board resulting from mounting, please pay sufficient attention when attaching a device at the position where the warping of the board is great.

When using an automatic loading machine, as far as possible, select a type that has a small impact and use it while confirming that there is no damage.

Surface mount devices are NOT flow soldering compatible.

5. Storage Condition

Since the long hour high temperature and low temperature storage, as well as the storage at high humidity are causes of deterioration in frequency accuracy and solderability.

Parts should be stored in temperature range of −5 to +40°C, humidity 40 to 60% RH, and avoid direct sunlight. Then use within 6 months.

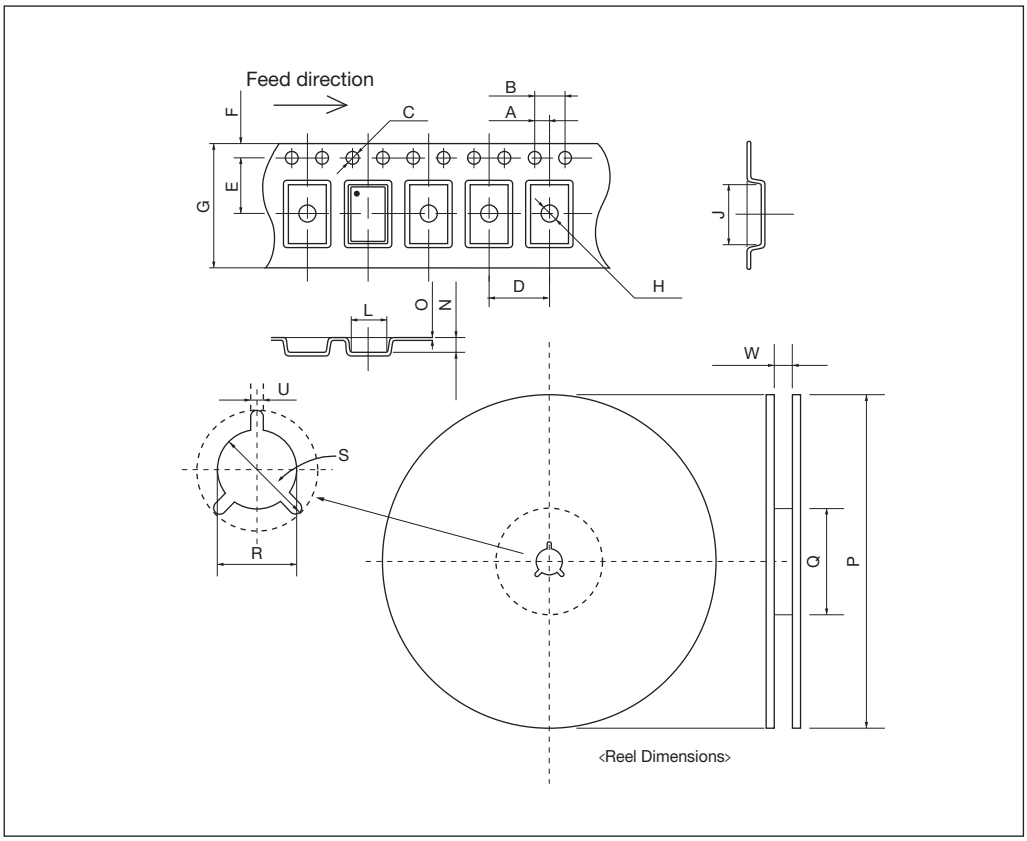
Tape & Reel Specifications

■ Crystal Units

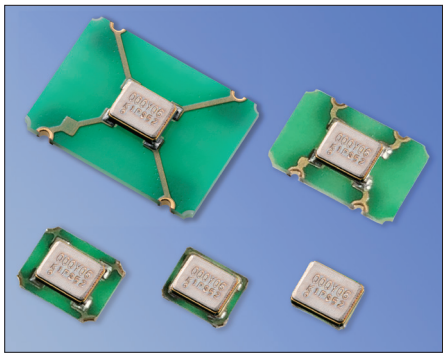
(Unit: mm)

		CT1612DB	CT2016DB	CT2520DB	CX1008SB	CX1210DB CX1210SB	CX1612DB		CX2016DB CX2016SA CX2016GR		CX2520DB	
TAPE	A	2.0±0.05	2.0±0.05	2.0±0.05	2.0±0.05	2.0±0.05	2.0±0.05		2.0±0.05		2.0±0.05	
	B	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1		4.0±0.1		4.0±0.1	
	C	ϕ1.5+0.1/−0	ϕ1.5+0.1/−0	ϕ1.5+0.1/−0	ϕ1.5+0.1/−0	ϕ1.5+0.1/−0	ϕ1.5+0.1/−0		ϕ1.5+0.1/−0		ϕ1.5+0.1/−0	
	D	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1		4.0±0.1		4.0±0.1	
	E	3.5±0.05	3.5±0.05	3.5±0.05	3.5±0.05	3.5±0.05	3.5±0.05		3.5±0.05		3.5±0.05	
	F	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1		1.75±0.1		1.75±0.1	
	G	8.0±0.2	8.0±0.2	8.0±0.2	8.0±0.2	8.0±0.2	8.0±0.2		8.0±0.2		8.0±0.2	
	H	ϕ0.5+0.05	ϕ1.0+0.1/−0	ϕ1.0+0.1/−0	ϕ0.5±0.1	ϕ0.5+0.05	ϕ0.5±0.05		ϕ1.05±0.05		ϕ1.05±0.05	
	J	1.90±0.1	2.3±0.05/ 2.2±0.05	2.9±0.05	1.20±0.05	1.55±0.05	1.80±0.1		2.30±0.1		2.7±0.1	
	L	1.50±0.1	1.9±0.05	2.4±0.05	1.00±0.05	1.35±0.05	1.40±0.1		1.90±0.1		2.2±0.1	
	N	0.75±0.05	1.1±0.05/ 0.75±0.05	1.1±0.05	0.45±0.05	0.45±0.05	0.5±0.1		0.7±0.05		0.6±0.1	
	O	0.2±0.05	0.25±0.05	0.25±0.05	0.2±0.05	0.25±0.05	0.2±0.05		0.2±0.05		0.2±0.05	
REEL	P	ϕ330±2	ϕ330±0.2	ϕ330±2	ϕ330±2	ϕ330±2	ϕ180+0/−3	ϕ330±2	ϕ180+0/−3	ϕ330±2	ϕ180+0/−3	ϕ330±2
	Q	ϕ100±1.0	ϕ100±1.0	ϕ100±1.0	ϕ100±1.0	ϕ100±1.0	ϕ60+1/−0	ϕ100±1.0	ϕ60+1/−0	ϕ100±1.0	ϕ60+1/−0	ϕ100±1.0
	R	ϕ13±0.2	ϕ13±0.2	ϕ13±0.2	ϕ13±0.2	ϕ13±0.2	ϕ13±0.2	ϕ13±0.2	ϕ13±0.2	ϕ13±0.2	ϕ13±0.2	ϕ13±0.2
	S	ϕ21±0.8	ϕ21±0.8	ϕ21±0.8	ϕ21±0.8	ϕ21±0.8	ϕ21±0.8	ϕ21±0.8	ϕ21±0.8	ϕ21±0.8	ϕ21±0.8	ϕ21±0.8
	U	2.0±0.5	2.0±0.5	2.0±0.5	2.0±0.5	2.0±0.5	2.0±0.5	2.0±0.5	2.0±0.5	2.0±0.5	2.0±0.5	2.0±0.5
	W	9.4±1.0	9.4±1.0	9.4±1.0	9.4±1.0	9.4±1.0	9.0±1.0	9.4±1.0	9.0±1.0	9.4±1.0	9.0±1.0	9.4±1.0
Qty.		15000	12000	12000	21000	12000/21000	3000	20000	3000	15000	3000	12000

		CX3225SA CX3225SB CX3225GA CX3225CA CX3225GB
TAPE	A	2.0±0.05
	B	4.0±0.1
	C	ϕ1.55±0.05
	D	4.0±0.05
	E	3.5±0.05
	F	1.75±0.1
	G	8.0±0.2
	H	ϕ1.05±0.1
	J	3.5±0.1
	L	2.8±0.1
	N	1.0±0.1
	O	0.25±0.05
REEL	P	ϕ180+0/−3
	Q	ϕ60+1/−0
	R	ϕ13±0.2
	S	ϕ21±0.8
	U	2.0±0.5
	W	9.0±1.0
Qty.		3000



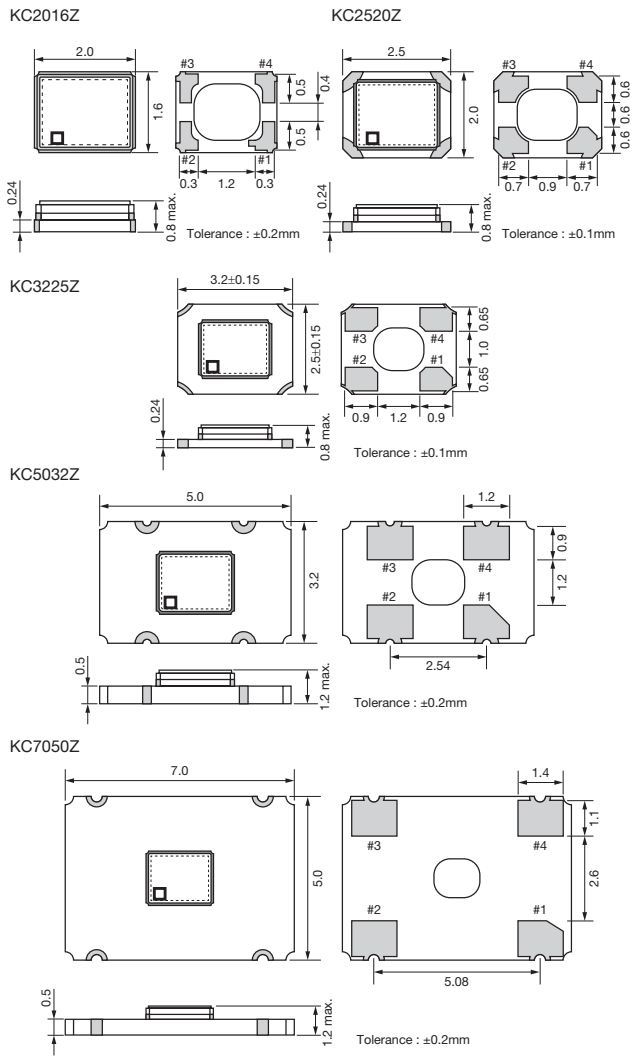
CMOS/ 1.8V, 2.5V, 3.3V/ 2.0×1.6, 2.5×2.0, 3.2×2.5, 5.0×3.2, 7.0×5.0mm



RoHS Compliant

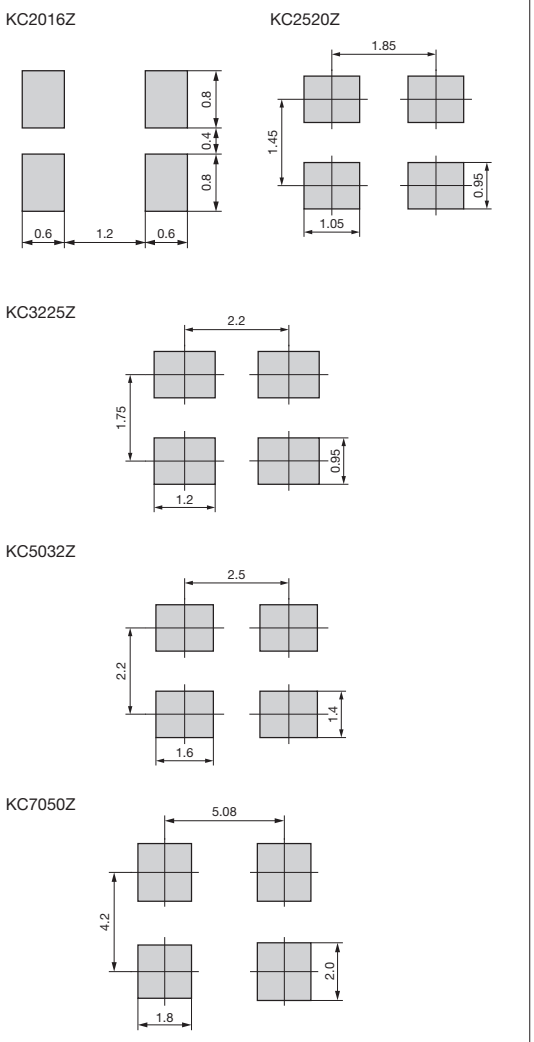
Dimensions

(Unit : mm)



Recommended Land Pattern

(Unit : mm)



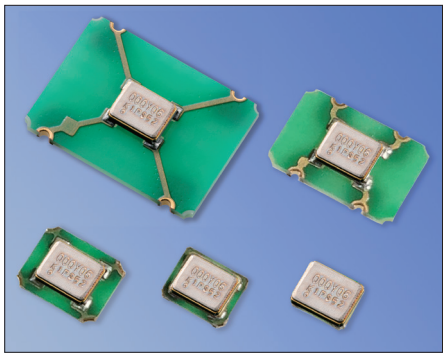
Pad Connections	
#1	INH
#2	Case GND
#3	Output
#4	Vcc

INH Function	
Pad1	Pad3 (Output)
Open	Active
"H" Level	Active
"L" Level	High Z (No-Oscillation)

AS of February 2019

KYOCERA

CMOS/ 1.8V, 2.5V, 3.3V / 2.0×1.6, 2.5×2.0, 3.2×2.5, 5.0×3.2, 7.0×5.0mm



RoHS Compliant

Features

- Frequency Range 0.5 to 170 MHz
- CMOS Output
- Short Lead Time
- Heat resistant up to +125°C

Applications

- Consumer/ Networking/ Industrial/ Amuse

Table 1

Freq. Tol.		Operating Temperature Range (°C)	Note
Code	× 10^{-6}		
0	± 50	−10 to +70	For additional stability, please contact us.
S	± 30		
U	± 25		
W	± 20		
G	± 50	−40 to +85	
H	± 30		
J	± 25		
K	± 20		
6	± 50	−40 to +105	
5	± 30		
X	± 100	−40 to +125	
Z	± 50		
9	± 30		

How to Order

KC□□□□Z　25.0000　C　1　□　X　00
①　②　③　④　⑤　⑥　⑦

① Series

KC2016Z	2016 Size	KC2520Z	2520 Size
KC3225Z	3225 Size	KC5032Z	5032 Size
KC7050Z	7050 Size		

② Output Frequency (25.0000 : 25MHz)
③ Output Type (C : CMOS)
④ Supply Voltage
(1 : 1.8V/ 2.5V/ 3.3V Compatible)
⑤ Frequency Tolerance (See Table 1)
⑥ Symmetry/ INH Function

X	STD 45/ 55%

⑦ Individual Specification
(STD Specification is "00")

Packaging Tape&Reel

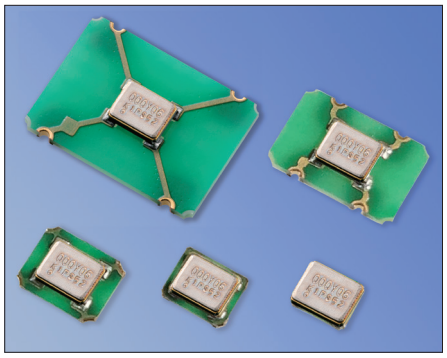
KC7050Z/ KC5032Z	1000 pcs/ reel
KC3225Z/ KC2520Z/ KC2016Z	2000 pcs/ reel

Specifications

Item	Symbol	Conditions		Min.	Max.	Units
Output Frequency Range	fo			0.5	170	MHz
Frequency Tolerance	$f_{\_tol}$	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration		See Table 1		
Storage Temperature Range	$T_{\_stg}$			−55	150	°C
Operating Temperature Range	$T_{\_use}$			See Table 1		
Max. Supply Voltage	—			−0.3	4.5	V
Supply Voltage	V_{CC}			1.71	3.63	V
Current Consumption (Noload/ 1.71≤V_{CC}≤2.25)	I_{CC}	0.5≤fo<5MHz		—	5.2	mA
		5≤fo<15MHz		—	5.8	
		15≤fo<30MHz		—	6.2	
		30≤fo<50MHz		—	6.8	
		50≤fo≤60MHz		—	6.8	
		60<fo<75MHz		—	9	
		75≤fo<105MHz		—	10	
		105≤fo<130MHz		—	10.5	
		130≤fo<160MHz		—	11.5	
		160≤fo≤170MHz		—	12.5	
Current Consumption (Noload/ 2.25<V_{CC}≤2.8)	I_{CC}	0.5≤fo<5MHz		—	5.5	
		5≤fo<15MHz		—	6	
		15≤fo<30MHz		—	6.5	
		30≤fo<50MHz		—	7.2	
		50≤fo≤60MHz		—	7.4	
		60<fo<75MHz		—	10	
		75≤fo<105MHz		—	11.5	
		105≤fo<130MHz		—	12.5	
		130≤fo<160MHz		—	14	
		160≤fo≤170MHz		—	15	
Current Consumption (Noload/ 2.8<V_{CC}≤3.63)	I_{CC}	0.5≤fo<5MHz		—	5.8	
		5≤fo<15MHz		—	6.5	
		15≤fo<30MHz		—	7.3	
		30≤fo<50MHz		—	8	
		50≤fo≤60MHz		—	8.5	
		60<fo<75MHz		—	12.5	
		75≤fo<105MHz		—	14.5	
		105≤fo<130MHz		—	15.5	
		130≤fo<160MHz		—	18	
		160≤fo≤170MHz		—	19.5	
Stand-by Current	$I_{\_std}$			—	5	μA
Symmetry	SYM	@50% V_{CC}		45	55	%
Rise/ Fall Time (20% to 80% Output Level)	Tr/ Tf	0.5≤fo≤60MHz	Loaded/ 1.71≤V_{CC}≤2.25	—	4	ns
			Loaded/ 2.25<V_{CC}≤2.8	—	3	
			Loaded/ 2.8<V_{CC}≤3.63	—	2.5	
		60<fo≤170MHz	Loaded/ 1.71≤V_{CC}≤2.25	—	1.5	
			Loaded/ 2.25<V_{CC}≤2.8	—	1.3	
			Loaded/ 2.8<V_{CC}≤3.63	—	1	
Low Level Output Voltage	V_{OL}	I_{OL} = 4mA		—	10% V_{CC}	V
High Level Output Voltage	V_{OH}	I_{OH} = −4mA		90% V_{CC}	—	V
Output Load (CMOS)	L_CMOS			—	15	pF
Low Level Input Voltage	V_{IL}			—	30% V_{CC}	V
High Level Input Voltage	V_{IH}			70% V_{CC}	—	V
Disable Time	$t_{\_dis}$			—	200	ns
Enable Time	$t_{\_ena}$			—	5	ms
Start-up Time	$t_{\_str}$	@Minimum operating voltage to be 0 sec.		—	5	ms

All electrical characteristics are defined at the maximum load and operating temperature range.

CMOS/ 1.8V, 2.5V, 3.3V / 2.0×1.6, 2.5×2.0, 3.2×2.5, 5.0×3.2, 7.0×5.0mm



RoHS Compliant

Features

- Frequency Range 0.5 to 170 MHz
- CMOS Output
- Tighter Tolerance
- Short Lead Time
- Heat resistant up to +125°C

Applications

- Consumer/ Networking/ Industrial/ Amuse

Table 2

Freq. Tol.		Operating Temperature Range (°C)	Note
Code	× 10^{-6}		
A	± 2	−40 to +85	For additional stability, please contact us.
B	± 5	−40 to +105	
4	± 20	−40 to +105	
D	± 10	−40 to +125	

How to Order

KC□□□□Z 25.0000 C □ □ Z 00
① ② ③ ④ ⑤ ⑥ ⑦

① Series

KC2016Z	2016 Size	KC2520Z	2520 Size
KC3225Z	3225 Size	KC5032Z	5032 Size
KC7050Z	7050 Size		

② Output Frequency (25.0000 : 25MHz)
③ Output Type (C : CMOS)
④ Supply Voltage

1	1.8V	2	2.5V
3	3.3V		

⑤ Frequency Tolerance (See Table 2)
⑥ Symmetry/ INH Function

Z	STD 45/ 55%

⑦ Individual Specification
(STD Specification is "00")

Packaging Tape&Reel

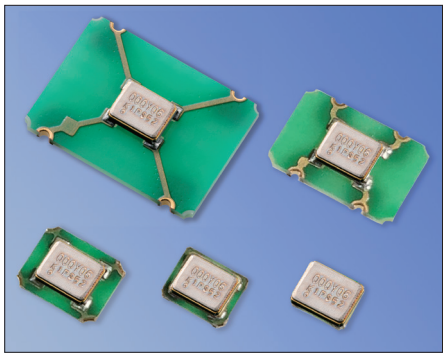
KC7050Z/ KC5032Z	1000 pcs/ reel
KC3225Z/ KC2520Z/ KC2016Z	2000 pcs/ reel

Specifications

Item	Symbol	Conditions		Min.	Max.	Units
Output Frequency Range	fo			0.5	170	MHz
Frequency Tolerance	$f_{\_tol}$	Initial tolerance, Operating temperature range			See Table 2	
Storage Temperature Range	$T_{\_stg}$			−55	150	°C
Operating Temperature Range	$T_{\_use}$				See Table 2	
Max. Supply Voltage	—			−0.3	4.5	V
Supply Voltage	V_{CC}	Code: ④ : 1		1.71	1.89	V
		Code: ④ : 2		2.25	2.75	
		Code: ④ : 3		2.97	3.63	
Current Consumption (Noload/ 1.71≤V_{CC}≤2.25)	I_{CC}	0.5≤fo<5MHz		—	5.2	mA
		5≤fo<15MHz		—	5.8	
		15≤fo<30MHz		—	6.2	
		30≤fo<50MHz		—	6.8	
		50≤fo≤60MHz		—	6.8	
		60<fo<75MHz		—	9	
		75≤fo<105MHz		—	10	
		105≤fo<130MHz		—	10.5	
		130≤fo<160MHz		—	11.5	
		160≤fo≤170MHz		—	12.5	
Current Consumption (Noload/ 2.25<V_{CC}≤2.8)	I_{CC}	0.5≤fo<5MHz		—	5.5	
		5≤fo<15MHz		—	6	
		15≤fo<30MHz		—	6.5	
		30≤fo<50MHz		—	7.2	
		50≤fo≤60MHz		—	7.4	
		60<fo<75MHz		—	10	
		75≤fo<105MHz		—	11.5	
		105≤fo<130MHz		—	12.5	
		130≤fo<160MHz		—	14	
		160≤fo≤170MHz		—	15	
Current Consumption (Noload/ 2.8<V_{CC}≤3.63)	I_{CC}	0.5≤fo<5MHz		—	5.8	
		5≤fo<15MHz		—	6.5	
		15≤fo<30MHz		—	7.3	
		30≤fo<50MHz		—	8	
		50≤fo≤60MHz		—	8.5	
		60<fo<75MHz		—	12.5	
		75≤fo<105MHz		—	14.5	
		105≤fo<130MHz		—	15.5	
		130≤fo<160MHz		—	18	
		160≤fo≤170MHz		—	19.5	
Stand-by Current	$I_{\_std}$			—	5	μA
Symmetry	SYM	@50% V_{CC}		45	55	%
Rise/ Fall Time (20% to 80% Output Level)	Tr/ Tf	0.5≤fo≤60MHz	Loaded/ 1.71≤V_{CC}≤2.25	—	4	ns
			Loaded/ 2.25<V_{CC}≤2.8	—	3	
			Loaded/ 2.8<V_{CC}≤3.63	—	2.5	
		60<fo≤170MHz	Loaded/ 1.71≤V_{CC}≤2.25	—	1.5	
			Loaded/ 2.25<V_{CC}≤2.8	—	1.3	
			Loaded/ 2.8<V_{CC}≤3.63	—	1	
Low Level Output Voltage	V_{OL}	I_{OL} = 4mA		—	10% V_{CC}	V
High Level Output Voltage	V_{OH}	I_{OH} = −4mA		90% V_{CC}	—	V
Output Load (CMOS)	L_CMOS			—	15	pF
Low Level Input Voltage	V_{IL}			—	30% V_{CC}	V
High Level Input Voltage	V_{IH}			70% V_{CC}	—	V
Disable Time	$t_{\_dis}$			—	200	ns
Enable Time	$t_{\_ena}$			—	5	ms
Start-up Time	$t_{\_str}$	@Minimum operating voltage to be 0 sec.		—	5	ms

All electrical characteristics are defined at the maximum load and operating temperature range.

CMOS/ 1.8V, 2.5V, 3.3V / 2.0×1.6, 2.5×2.0, 3.2×2.5, 5.0×3.2, 7.0×5.0mm



RoHS Compliant

Features

- Frequency Range 24 to 72 MHz
- CMOS Output
- Low Jitter
- Heat resistant up to +125°C

Applications

- Consumer/ Networking/ Industrial/ Amuse

Table 3

Freq. Tol.		Operating Temperature Range (°C)	Note
Code	× 10^{-6}		
0	± 50	−10 to +70	For additional stabillity, please contact us.
S	± 30		
U	± 25		
W	± 20		
G	± 50	−40 to +85	
H	± 30		
J	± 25		
K	± 20		
6	± 50	−40 to +105	
5	± 30		
X	± 100	−40 to +125	
Z	± 50		
9	± 30		

How to Order

KC□□□□Z 25.0000 C 1 □ Y 00
① ② ③ ④ ⑤ ⑥ ⑦

① Series

KC2016Z	2016 Size	KC2520Z	2520 Size
KC3225Z	3225 Size	KC5032Z	5032 Size
KC7050Z	7050 Size		

② Output Frequency (25.0000 : 25MHz)
③ Output Type (C : CMOS)
④ Supply Voltage
(1 : 1.8V/ 2.5V/ 3.3V Compatible)
⑤ Frequency Tolerance (See Table 3)
⑥ Symmetry/ INH Function

Y	STD/ Low Jitter 45/ 55%

⑦ Individual Specification
(STD Specification is "00")

Packaging Tape&Reel

KC7050Z/ KC5032Z	1000 pcs/ reel
KC3225Z/ KC2520Z/ KC2016Z	2000 pcs/ reel

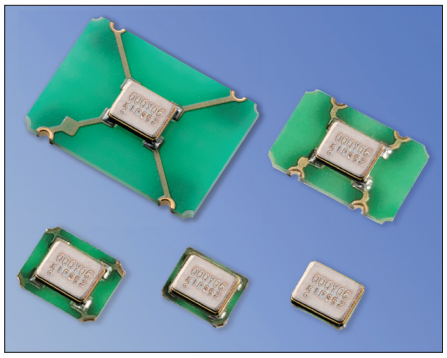
Specifications

Item	Symbol	Conditions		Min.	Max.	Units
Output Frequency Range	fo			24	72	MHz
Frequency Tolerance	f_{tol}	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration		See Table 3		
Storage Temperature Range	T_{stg}			−55	150	°C
Operating Temperature Range	T_{use}			See Table 3		
Max. Supply Voltage	—			−0.3	4.5	V
Supply Voltage	V_{CC}	Code: ④ : 1		1.71	1.89	V
		Code: ④ : 2		2.25	2.75	
		Code: ④ : 3		2.97	3.63	
Current Consumption (Noload/ 1.71≤V_{CC}≤1.89)	I_{CC}	24≤fo<30MHz		—	2.7	mA
		30≤fo<50MHz		—	3.3	
		50≤fo≤60MHz		—	3.7	
		60<fo<72MHz		—	4	
Current Consumption (Noload/ 2.25<V_{CC}≤2.75)	I_{CC}	24≤fo<30MHz		—	3.5	
		30≤fo<50MHz		—	4	
		50≤fo≤60MHz		—	4.3	
		60<fo<72MHz		—	4.8	
Current Consumption (Noload/ 2.97<V_{CC}≤3.63)	I_{CC}	24≤fo<30MHz		—	4	
		30≤fo<50MHz		—	5	
		50≤fo≤60MHz		—	5.5	
		60<fo<72MHz		—	6	
Stand-by Current	I_{std}			—	5	µA
Symmetry	SYM	@50% V_{CC}	24≤fo≤40MHz	40	55	%
			40<fo≤72MHz	45	55	
Rise/ Fall Time (20% to 80% Output Level)	Tr/ Tf	Loaded/ 1.71≤V_{CC}≤1.89		—	4	ns
		Loaded/ 2.25≤V_{CC}≤2.75		—	3.2	
		Loaded/ 2.97≤V_{CC}≤3.63		—	2.7	
Low Level Output Voltage	V_{OL}	I_{OL} = 4mA		—	10% V_{CC}	V
High Level Output Voltage	V_{OH}	I_{OH} = −4mA		90% V_{CC}	—	V
Output Load (CMOS)	L_CMOS			—	15	pF
Low Level Input Voltage	V_{IL}			—	30% V_{CC}	V
High Level Input Voltage	V_{IH}			70% V_{CC}	—	V
Disable Time	t_{dis}			—	200	ns
Enable Time	t_{ena}			—	5	ms
Start-up Time	t_{str}	@Minimum operating voltage to be 0 sec.		—	5	ms
1 Sigma Jitter	J_{Sigma}	Measured with Wavecrest SIA-3000		—	5	ps
Peak to Peak Jitter	J_{PK_PK}			—	50	
Phase Jitter	—	@50MHz V_{CC} = 3.3V	BW : 12kHz to 20MHz	1		ps

All electrical characteristics are defined at the maximum load and operating temperature range.

KYOCERA

CMOS/ 1.8V, 2.5V, 3.3V / 2.0×1.6, 2.5×2.0, 3.2×2.5, 5.0×3.2, 7.0×5.0mm



RoHS Compliant

Features

- Frequency Range 24 to 72 MHz
- CMOS Output
- Low current consumption
- Tighter Tolerance
- Low Jitter
- Heat resistant up to +125°C

Applications

- Networking/ Industrial/ Smart meters/ Mobile Communications

Table 4

Freq. Tol. Code	Freq. Tol. × 10^{-6}	Operating Temperature Range (°C)	Note
A	± 2	−40 to +85	For additional stabillity, please contact us.
B	± 5	−40 to +105	
4	± 20	−40 to +105	
D	± 10	−40 to +125	

How to Order

KC□□□□Z 25.0000 C □ □ W 00
① ② ③ ④ ⑤ ⑥ ⑦

① Series

KC2016Z	2016 Size	KC2520Z	2520 Size
KC3225Z	3225 Size	KC5032Z	5032 Size
KC7050Z	7050 Size		

② Output Frequency (25.0000 : 25MHz)
③ Output Type (C : CMOS)
④ Supply Voltage

1	1.8V	2	2.5V
3	3.3V		

⑤ Frequency Tolerance (See Table 4)
⑥ Symmetry/ INH Function

W	STD 45/ 55%

⑦ Individual Specification
(STD Specification is "00")

Packaging Tape&Reel

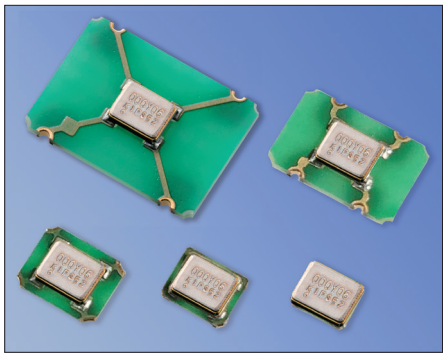
KC7050Z/ KC5032Z	1000 pcs/ reel
KC3225Z/ KC2520Z/ KC2016Z	2000 pcs/ reel

Specifications

Item	Symbol	Conditions		Min.	Max.	Units
Output Frequency Range	fo			24	72	MHz
Frequency Tolerance	$f_{\_tol}$	Initial tolerance, Operating temperature range			See Table 4	
Storage Temperature Range	$T_{\_stg}$			−55	150	°C
Operating Temperature Range	$T_{\_use}$				See Table 4	
Max. Supply Voltage	—			−0.3	4.5	V
Supply Voltage	V_{CC}	Code: ④ : 1		1.71	1.89	V
		Code: ④ : 2		2.25	2.75	
		Code: ④ : 3		2.97	3.63	
Current Consumption (Noload/ 1.71≤V_{CC}≤1.89)	I_{CC}	24≤fo<30MHz		—	2.7	mA
		30≤fo<50MHz		—	3.3	
		50≤fo≤60MHz		—	3.7	
		60<fo<72MHz		—	4	
Current Consumption (Noload/ 2.25<V_{CC}≤2.75)	I_{CC}	24≤fo<30MHz		—	3.5	
		30≤fo<50MHz		—	4	
		50≤fo≤60MHz		—	4.3	
		60<fo<72MHz		—	4.8	
Current Consumption (Noload/ 2.97<V_{CC}≤3.63)	I_{CC}	24≤fo<30MHz		—	4	
		30≤fo<50MHz		—	5	
		50≤fo≤60MHz		—	5.5	
		60<fo<72MHz		—	6	
Stand-by Current	$I_{\_std}$			—	5	µA
Symmetry	SYM	@50% V_{CC}	24≤fo≤40MHz	40	55	%
			40<fo≤72MHz	45	55	
Rise/ Fall Time (20% to 80% Output Level)	Tr/ Tf	Loaded/ 1.71≤V_{CC}≤1.89		—	4	ns
		Loaded/ 2.25≤V_{CC}≤2.75		—	3.2	
		Loaded/ 2.97≤V_{CC}≤3.63		—	2.7	
Low Level Output Voltage	V_{OL}	I_{OL} = 4mA		—	10% V_{CC}	V
High Level Output Voltage	V_{OH}	I_{OH} = −4mA		90% V_{CC}	—	V
Output Load (CMOS)	L_CMOS			—	15	pF
Low Level Input Voltage	V_{IL}			—	30% V_{CC}	V
High Level Input Voltage	V_{IH}			70% V_{CC}	—	V
Disable Time	$t_{\_dis}$			—	200	ns
Enable Time	$t_{\_ena}$			—	5	ms
Start-up Time	$t_{\_str}$	@Minimum operating voltage to be 0 sec.		—	5	ms
1 Sigma Jitter	J_{Sigma}	Measured with Wavecrest SIA-3000		—	5	ps
Peak to Peak Jitter	J_{PK_PK}			—	50	
Phase Jitter	—	@50MHz V_{CC} = 3.3V	BW : 12kHz to 20MHz	1		ps

All electrical characteristics are defined at the maximum load and operating temperature range.

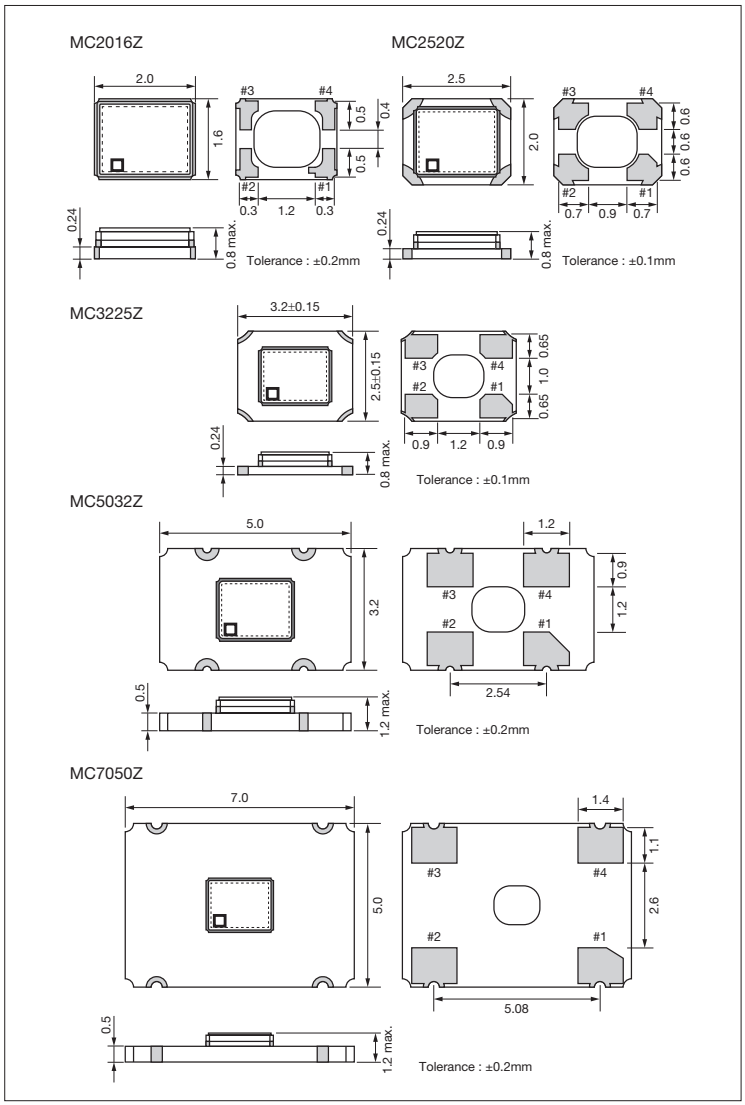
CMOS/ 1.8V, 2.5V, 3.3V / 2.0×1.6, 2.5×2.0, 3.2×2.5, 5.0×3.2, 7.0×5.0mm for Automotive



AEC-Q100/ 200 RoHS Compliant

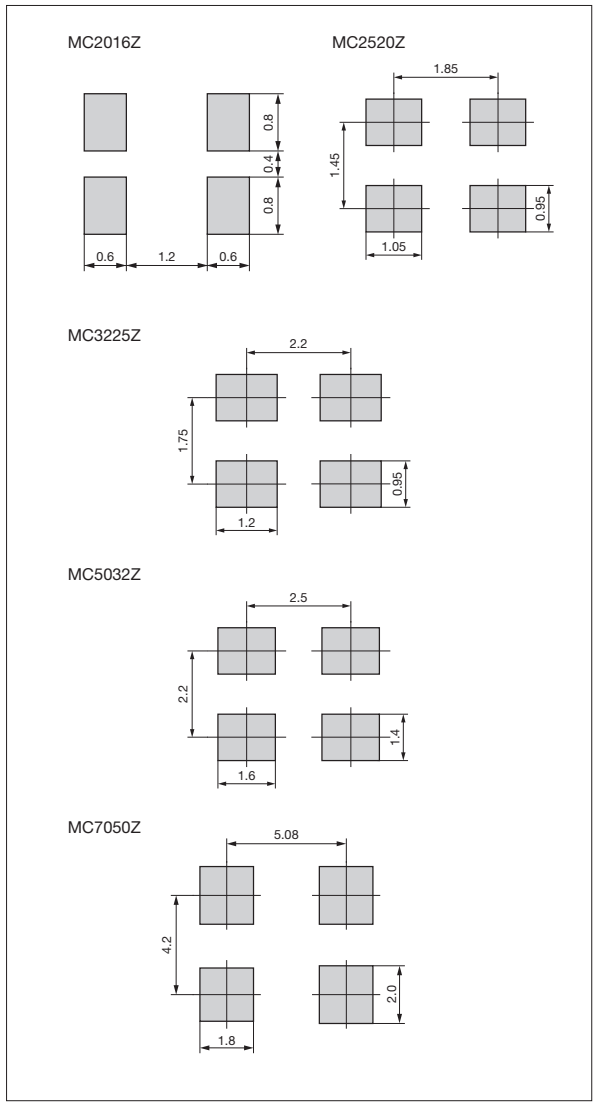
Dimensions

(Unit : mm)



Recommended Land Pattern

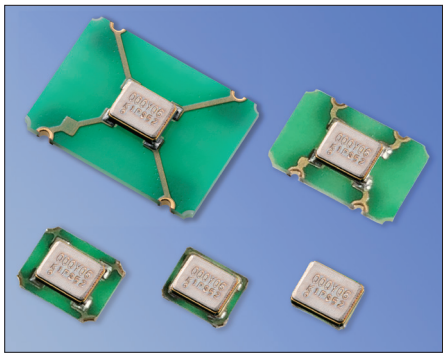
(Unit : mm)



Pad Connections	
#1	INH
#2	Case GND
#3	Output
#4	Vcc

INH Function	
Pad1	Pad3 (Output)
Open	Active
"H" Level	Active
"L" Level	High Z (No-Oscillation)

CMOS/ 1.8V, 2.5V, 3.3V / 2.0×1.6, 2.5×2.0, 3.2×2.5, 5.0×3.2, 7.0×5.0mm for Automotive



AEC-Q100/ 200 RoHS Compliant

Features

- Frequency Range 0.5 to 170 MHz
- CMOS Output
- Short Lead Time
- Heat resistant up to +125°C

Applications

- Automotive

Table 5

Freq. Tol.		Operating Temperature Range (°C)	Note
Code	× 10^{-6}		
G	± 50	−40 to +85	For additional stabillity, please contact us.
H	± 30		
J	± 25		
K	± 20		
6	± 50	−40 to +105	
5	± 30		
X	± 100	−40 to +125	
Z	± 50		
9	± 30		

How to Order

MC □□□□ Z 25.0000 C 1 □ X 00
① ② ③ ④ ⑤ ⑥ ⑦

① Series

MC2016Z	2016 Size	MC2520Z	2520 Size
MC3225Z	3225 Size	MC5032Z	5032 Size
MC7050Z	7050 Size		

② Output Frequency (25.0000 : 25MHz)
③ Output Type (C : CMOS)
④ Supply Voltage
(1 : 1.8V/ 2.5V/ 3.3V Compatible)
⑤ Frequency Tolerance (See Table 5)
⑥ Symmetry/ INH Function

X	STD 45/ 55%

⑦ Individual Specification
(STD Specification is "00")

Packaging Tape&Reel

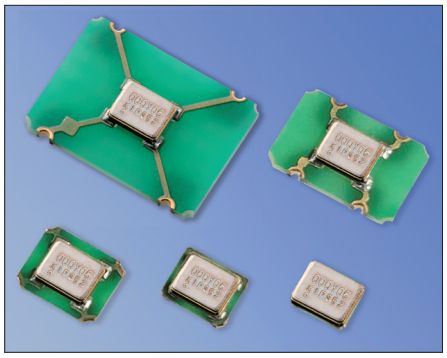
MC7050Z/ MC5032Z	1000 pcs/ reel
MC3225Z/ MC2520Z/ MC2016Z	2000 pcs/ reel

Specifications

Item	Symbol	Conditions		Min.	Max.	Units
Output Frequency Range	fo			0.5	170	MHz
Frequency Tolerance	$f_{\_tol}$	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration		See Table 5		
Storage Temperature Range	$T_{\_stg}$			−55	150	°C
Operating Temperature Range	$T_{\_use}$			See Table 5		
Max. Supply Voltage	—			−0.3	4.5	V
Supply Voltage	V_{CC}			1.71	3.63	V
Current Consumption (Noload/ 1.71≤V_{CC}≤2.25)	I_{CC}	0.5≤fo<5MHz		—	5.2	mA
		5≤fo<15MHz		—	5.8	
		15≤fo<30MHz		—	6.2	
		30≤fo<50MHz		—	6.8	
		50≤fo≤60MHz		—	6.8	
		60<fo<75MHz		—	9	
		75≤fo<105MHz		—	10	
		105≤fo<130MHz		—	10.5	
		130≤fo<160MHz		—	11.5	
		160≤fo≤170MHz		—	12.5	
Current Consumption (Noload/ 2.25<V_{CC}≤2.8)	I_{CC}	0.5≤fo<5MHz		—	5.5	
		5≤fo<15MHz		—	6	
		15≤fo<30MHz		—	6.5	
		30≤fo<50MHz		—	7.2	
		50≤fo≤60MHz		—	7.4	
		60<fo<75MHz		—	10	
		75≤fo<105MHz		—	11.5	
		105≤fo<130MHz		—	12.5	
		130≤fo<160MHz		—	14	
		160≤fo≤170MHz		—	15	
Current Consumption (Noload/ 2.8<V_{CC}≤3.63)	I_{CC}	0.5≤fo<5MHz		—	5.8	
		5≤fo<15MHz		—	6.5	
		15≤fo<30MHz		—	7.3	
		30≤fo<50MHz		—	8	
		50≤fo≤60MHz		—	8.5	
		60<fo<75MHz		—	12.5	
		75≤fo<105MHz		—	14.5	
		105≤fo<130MHz		—	15.5	
		130≤fo<160MHz		—	18	
		160≤fo≤170MHz		—	19.5	
Stand-by Current	$I_{\_std}$			—	5	μA
Symmetry	SYM	@50% V_{CC}		45	55	%
Rise/ Fall Time (20% to 80% Output Level)	Tr/ Tf	0.5≤fo≤60MHz	Loaded/ 1.71≤V_{CC}≤2.25	—	4	ns
			Loaded/ 2.25<V_{CC}≤2.8	—	3	
			Loaded/ 2.8<V_{CC}≤3.63	—	2.5	
		60<fo≤170MHz	Loaded/ 1.71≤V_{CC}≤2.25	—	1.5	
			Loaded/ 2.25<V_{CC}≤2.8	—	1.3	
			Loaded/ 2.8<V_{CC}≤3.63	—	1	
Low Level Output Voltage	V_{OL}	I_{OL} = 4mA		—	10% V_{CC}	V
High Level Output Voltage	V_{OH}	I_{OH} = −4mA		90% V_{CC}	—	V
Output Load (CMOS)	L_CMOS			—	15	pF
Low Level Input Voltage	V_{IL}			—	30% V_{CC}	V
High Level Input Voltage	V_{IH}			70% V_{CC}	—	V
Disable Time	$t_{\_dis}$			—	200	ns
Enable Time	$t_{\_ena}$			—	5	ms
Start-up Time	$t_{\_str}$	@Minimum operating voltage to be 0 sec.		—	5	ms

All electrical characteristics are defined at the maximum load and operating temperature range.

CMOS/ 1.8V, 2.5V, 3.3V / 2.0×1.6, 2.5×2.0, 3.2×2.5, 5.0×3.2, 7.0×5.0mm for Automotive



AEC-Q100/ 200 RoHS Compliant

Features

- Frequency Range 0.5 to 170 MHz
- CMOS Output
- Tighter Tolerance
- Short Lead Time
- Heat resistant up to +125°C

Applications

- Automotive

Table 6

Freq. Tol.		Operating Temperature Range (°C)	Note
Code	× 10^{-6}		
A	± 2	−40 to +85	For additional stability, please contact us.
B	± 5	−40 to +105	
4	± 20	−40 to +105	
D	± 10	−40 to +125	

How to Order

MC□□□□Z 25.0000 C □ □ Z 00
① ② ③ ④ ⑤ ⑥ ⑦

① Series

MC2016Z	2016 Size	MC2520Z	2520 Size
MC3225Z	3225 Size	MC5032Z	5032 Size
MC7050Z	7050 Size		

② Output Frequency (25.0000 : 25MHz)
③ Output Type (C : CMOS)
④ Supply Voltage

1	1.8V	2	2.5V
3	3.3V		

⑤ Frequency Tolerance (See Table 6)
⑥ Symmetry/ INH Function

Z	STD 45/ 55%

⑦ Individual Specification
(STD Specification is "00")

Packaging Tape&Reel

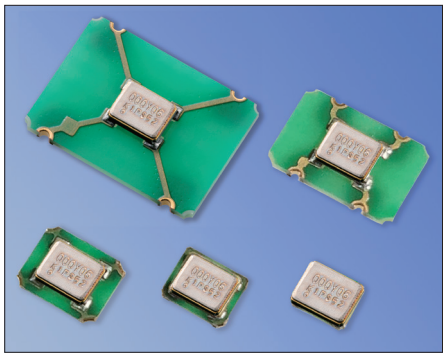
MC7050Z/ MC5032Z	1000 pcs/ reel
MC3225Z/ MC2520Z/ MC2016Z	2000 pcs/ reel

Specifications

Item	Symbol	Conditions		Min.	Max.	Units
Output Frequency Range	fo			0.5	170	MHz
Frequency Tolerance	$f_{\_tol}$	Initial tolerance, Operating temperature range			See Table 6	
Storage Temperature Range	$T_{\_stg}$			−55	150	°C
Operating Temperature Range	$T_{\_use}$				See Table 6	
Max. Supply Voltage	—			−0.3	4.5	V
Supply Voltage	V_{CC}	Code: ④ : 1		1.71	1.89	V
		Code: ④ : 2		2.25	2.75	
		Code: ④ : 3		2.97	3.63	
Current Consumption (Noload/ 1.71≤V_{CC}≤2.25)	I_{CC}	0.5≤fo<5MHz		—	5.2	mA
		5≤fo<15MHz		—	5.8	
		15≤fo<30MHz		—	6.2	
		30≤fo<50MHz		—	6.8	
		50≤fo≤60MHz		—	6.8	
		60<fo<75MHz		—	9	
		75≤fo<105MHz		—	10	
		105≤fo<130MHz		—	10.5	
		130≤fo<160MHz		—	11.5	
		160≤fo≤170MHz		—	12.5	
Current Consumption (Noload/ 2.25<V_{CC}≤2.8)	I_{CC}	0.5≤fo<5MHz		—	5.5	
		5≤fo<15MHz		—	6	
		15≤fo<30MHz		—	6.5	
		30≤fo<50MHz		—	7.2	
		50≤fo≤60MHz		—	7.4	
		60<fo<75MHz		—	10	
		75≤fo<105MHz		—	11.5	
		105≤fo<130MHz		—	12.5	
		130≤fo<160MHz		—	14	
		160≤fo≤170MHz		—	15	
Current Consumption (Noload/ 2.8<V_{CC}≤3.63)	I_{CC}	0.5≤fo<5MHz		—	5.8	
		5≤fo<15MHz		—	6.5	
		15≤fo<30MHz		—	7.3	
		30≤fo<50MHz		—	8	
		50≤fo≤60MHz		—	8.5	
		60<fo<75MHz		—	12.5	
		75≤fo<105MHz		—	14.5	
		105≤fo<130MHz		—	15.5	
		130≤fo<160MHz		—	18	
		160≤fo≤170MHz		—	19.5	
Stand-by Current	$I_{\_std}$			—	5	μA
Symmetry	SYM	@50% V_{CC}		45	55	%
Rise/ Fall Time (20% to 80% Output Level)	Tr/ Tf	0.5≤fo≤60MHz	Loaded/ 1.71≤V_{CC}≤2.25	—	4	ns
			Loaded/ 2.25<V_{CC}≤2.8	—	3	
			Loaded/ 2.8<V_{CC}≤3.63	—	2.5	
		60<fo≤170MHz	Loaded/ 1.71≤V_{CC}≤2.25	—	1.5	
			Loaded/ 2.25<V_{CC}≤2.8	—	1.3	
			Loaded/ 2.8<V_{CC}≤3.63	—	1	
Low Level Output Voltage	V_{OL}	I_{OL} = 4mA		—	10% V_{CC}	V
High Level Output Voltage	V_{OH}	I_{OH} = −4mA		90% V_{CC}	—	V
Output Load (CMOS)	L_CMOS			—	15	pF
Low Level Input Voltage	V_{IL}			—	30% V_{CC}	V
High Level Input Voltage	V_{IH}			70% V_{CC}	—	V
Disable Time	$t_{\_dis}$			—	200	ns
Enable Time	$t_{\_ena}$			—	5	ms
Start-up Time	$t_{\_str}$	@Minimum operating voltage to be 0 sec.		—	5	ms

All electrical characteristics are defined at the maximum load and operating temperature range.

CMOS/ 1.8V, 2.5V, 3.3V / 2.0×1.6, 2.5×2.0, 3.2×2.5, 5.0×3.2, 7.0×5.0mm for Automotive



AEC-Q100/ 200 RoHS Compliant

Features

- Frequency Range 24 to 72 MHz
- CMOS Output
- Low Jitter
- Heat resistant up to +125°C

Applications

- Automotive (Radar, Camera, Network)

Table 7

Freq. Tol.		Operating Temperature Range (°C)	Note
Code	× 10^{-6}		
G	± 50	−40 to +85	For additional stabillity, please contact us.
H	± 30		
J	± 25		
K	± 20		
6	± 50	−40 to +105	
5	± 30		
X	± 100	−40 to +125	
Z	± 50		
9	± 30		

How to Order

MC □□□□ Z　25.0000　C　1　□　Y　00
①　②　③　④　⑤　⑥　⑦

① Series

MC2016Z	2016 Size	MC2520Z	2520 Size
MC3225Z	3225 Size	MC5032Z	5032 Size
MC7050Z	7050 Size		

② Output Frequency (25.0000 : 25MHz)
③ Output Type (C : CMOS)
④ Supply Voltage
(1 : 1.8V/ 2.5V/ 3.3V Compatible)
⑤ Frequency Tolerance (See Table 7)
⑥ Symmetry/ INH Function

Y	STD/ Low Jitter 45/ 55%

⑦ Individual Specification
(STD Specification is "00")

Packaging Tape&Reel

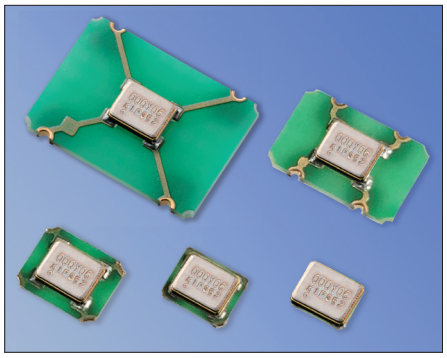
MC7050Z/ MC5032Z	1000 pcs/ reel
MC3225Z/ MC2520Z/ MC2016Z	2000 pcs/ reel

Specifications

Item	Symbol	Conditions		Min.	Max.	Units
Output Frequency Range	fo			24	72	MHz
Frequency Tolerance	$f_{\_tol}$	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration		See Table 7		
Storage Temperature Range	$T_{\_stg}$			−55	150	°C
Operating Temperature Range	$T_{\_use}$			See Table 7		
Max. Supply Voltage	—			−0.3	4.5	V
Supply Voltage	V_{CC}	Code: ④ : 1		1.71	1.89	V
		Code: ④ : 2		2.25	2.75	
		Code: ④ : 3		2.97	3.63	
Current Consumption (Noload/ 1.71≤V_{CC}≤1.89)	I_{CC}	24≤fo<30MHz		—	2.7	mA
		30≤fo<50MHz		—	3.3	
		50≤fo≤60MHz		—	3.7	
		60<fo<72MHz		—	4	
Current Consumption (Noload/ 2.25<V_{CC}≤2.75)	I_{CC}	24≤fo<30MHz		—	3.5	
		30≤fo<50MHz		—	4	
		50≤fo≤60MHz		—	4.3	
		60<fo<72MHz		—	4.8	
Current Consumption (Noload/ 2.97<V_{CC}≤3.63)	I_{CC}	24≤fo<30MHz		—	4	
		30≤fo<50MHz		—	5	
		50≤fo≤60MHz		—	5.5	
		60<fo<72MHz		—	6	
Stand-by Current	$I_{\_std}$			—	5	µA
Symmetry	SYM	@50% V_{CC}	24≤fo≤40MHz	40	55	%
			40<fo≤72MHz	45	55	
Rise/ Fall Time (20% to 80% Output Level)	Tr/ Tf	Loaded/ 1.71≤V_{CC}≤1.89		—	4	ns
		Loaded/ 2.25≤V_{CC}≤2.75		—	3.2	
		Loaded/ 2.97≤V_{CC}≤3.63		—	2.7	
Low Level Output Voltage	V_{OL}	I_{OL} = 4mA		—	10% V_{CC}	V
High Level Output Voltage	V_{OH}	I_{OH} = −4mA		90% V_{CC}	—	V
Output Load (CMOS)	L_CMOS			—	15	pF
Low Level Input Voltage	V_{IL}			—	30% V_{CC}	V
High Level Input Voltage	V_{IH}			70% V_{CC}	—	V
Disable Time	$t_{\_dis}$			—	200	ns
Enable Time	$t_{\_ena}$			—	5	ms
Start-up Time	$t_{\_str}$	@Minimum operating voltage to be 0 sec.		—	5	ms
1 Sigma Jitter	J_{Sigma}	Measured with Wavecrest SIA-3000		—	5	ps
Peak to Peak Jitter	J_{PK_PK}			—	50	
Phase Jitter	—	@50MHz V_{CC} = 3.3V	BW : 12kHz to 20MHz	1		ps

All electrical characteristics are defined at the maximum load and operating temperature range.

CMOS/ 1.8V, 2.5V, 3.3V / 2.0×1.6, 2.5×2.0, 3.2×2.5, 5.0×3.2, 7.0×5.0mm for Automotive



AEC-Q100/ 200 RoHS Compliant

Features

- Frequency Range 24 to 72 MHz
- CMOS Output
- Tighter Tolerance
- Low Jitter
- Heat resistant up to +125°C

Applications

- Automotive (Radar, Camera, Network)

Table 8

Freq. Tol. Code	Freq. Tol. × 10^{-6}	Operating Temperature Range (°C)	Note
A	± 2	−40 to +85	For additional stabillity, please contact us.
B	± 5	−40 to +105	
4	± 20	−40 to +105	
D	± 10	−40 to +125	

How to Order

MC □□□□ Z 25.0000 C □ □ □ W 00
① ② ③ ④ ⑤ ⑥ ⑦

① Series

MC2016Z	2016 Size	MC2520Z	2520 Size
MC3225Z	3225 Size	MC5032Z	5032 Size
MC7050Z	7050 Size		

② Output Frequency (25.0000 : 25MHz)
③ Output Type (C : CMOS)
④ Supply Voltage

1	1.8V	2	2.5V
3	3.3V		

⑤ Frequency Tolerance (See Table 8)
⑥ Symmetry/ INH Function

W	STD 45/ 55%

⑦ Individual Specification
(STD Specification is "00")

Packaging Tape&Reel

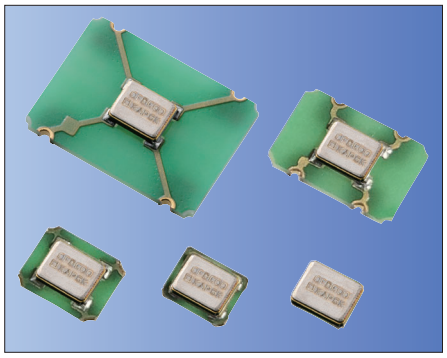
MC7050Z/ MC5032Z	1000 pcs/ reel
MC3225Z/ MC2520Z/ MC2016Z	2000 pcs/ reel

Specifications

Item	Symbol	Conditions		Min.	Max.	Units
Output Frequency Range	fo			24	72	MHz
Frequency Tolerance	$f_{\_tol}$	Initial tolerance, Operating temperature range		See Table 8		
Storage Temperature Range	$T_{\_stg}$			−55	150	°C
Operating Temperature Range	$T_{\_use}$			See Table 8		
Max. Supply Voltage	—			−0.3	4.5	V
Supply Voltage	V_{CC}	Code: ④ : 1		1.71	1.89	V
		Code: ④ : 2		2.25	2.75	
		Code: ④ : 3		2.97	3.63	
Current Consumption (Noload/ 1.71≤V_{CC}≤1.89)	I_{CC}	24≤fo<30MHz		—	2.7	mA
		30≤fo<50MHz		—	3.3	
		50≤fo≤60MHz		—	3.7	
		60<fo<72MHz		—	4	
Current Consumption (Noload/ 2.25<V_{CC}≤2.75)	I_{CC}	24≤fo<30MHz		—	3.5	
		30≤fo<50MHz		—	4	
		50≤fo≤60MHz		—	4.3	
		60<fo<72MHz		—	4.8	
Current Consumption (Noload/ 2.97<V_{CC}≤3.63)	I_{CC}	24≤fo<30MHz		—	4	
		30≤fo<50MHz		—	5	
		50≤fo≤60MHz		—	5.5	
		60<fo<72MHz		—	6	
Stand-by Current	$I_{\_std}$			—	5	µA
Symmetry	SYM	@50% V_{CC}	24≤fo≤40MHz	40	55	%
			40<fo≤72MHz	45	55	
Rise/ Fall Time (20% to 80% Output Level)	Tr/ Tf	Loaded/ 1.71≤V_{CC}≤1.89		—	4	ns
		Loaded/ 2.25≤V_{CC}≤2.75		—	3.2	
		Loaded/ 2.97≤V_{CC}≤3.63		—	2.7	
Low Level Output Voltage	V_{OL}	I_{OL} = 4mA		—	10% V_{CC}	V
High Level Output Voltage	V_{OH}	I_{OH} = −4mA		90% V_{CC}	—	V
Output Load (CMOS)	L_CMOS			—	15	pF
Low Level Input Voltage	V_{IL}			—	30% V_{CC}	V
High Level Input Voltage	V_{IH}			70% V_{CC}	—	V
Disable Time	$t_{\_dis}$			—	200	ns
Enable Time	$t_{\_ena}$			—	5	ms
Start-up Time	$t_{\_str}$	@Minimum operating voltage to be 0 sec.		—	5	ms
1 Sigma Jitter	J_{Sigma}	Measured with Wavecrest SIA-3000		—	5	ps
Peak to Peak Jitter	J_{PK_PK}			—	50	
Phase Jitter	—	@50MHz V_{CC} = 3.3V	BW : 12kHz to 20MHz	1		ps

All electrical characteristics are defined at the maximum load and operating temperature range.

CMOS/ 1.8V, 2.5V, 3.3V, 5.0V / 2.0×1.6, 2.5×2.0, 3.2×2.5, 5.0×3.2, 7.0×5.0mm



RoHS Compliant

Features

- Frequency Range 1.5 to 160MHz
- CMOS output
- Wide Supply Voltage
  - 1.6 to 3.63V (Ver.E)
  - 2.5,3.3,5.0V(Ver.N)
- Low current consumption
- Option: Low Phase Noise Version

Applications

- Consumer/ Networking/ Industrial/ Audio Codec/ Amuse

Table 1

Freq. Tol. Code	Freq. Tol. × 10^{-6}	Operating Temperature Range (°C)	Note
0	± 50	−10 to +70	Standard specifications
S	± 30		With only certain frequencies
U	± 25		
G	± 50	−40 to +85	
6	± 50	−40 to +105	

How to Order

KC2520K ① 25.0000 ② C ③ □ ④ □ ⑤ □ ⑥ 00 ⑦

① Series
② Output Frequency (25.0000: 25MHz)
③ Output Type (C: CMOS)
④ Supply Voltage
Standard : Version E

1	1.8V/ 2.5V/ 3.3V compatible
2	2.5V/ 3.3V compatible

Low Phase Noise : Version N

2	2.5V	3	3.3V
5	5.0V		

⑤ Frequency Tolerance (See Table 1)
⑥ Symmetry/ INH Function

E	45/ 55%
N	45/ 55%

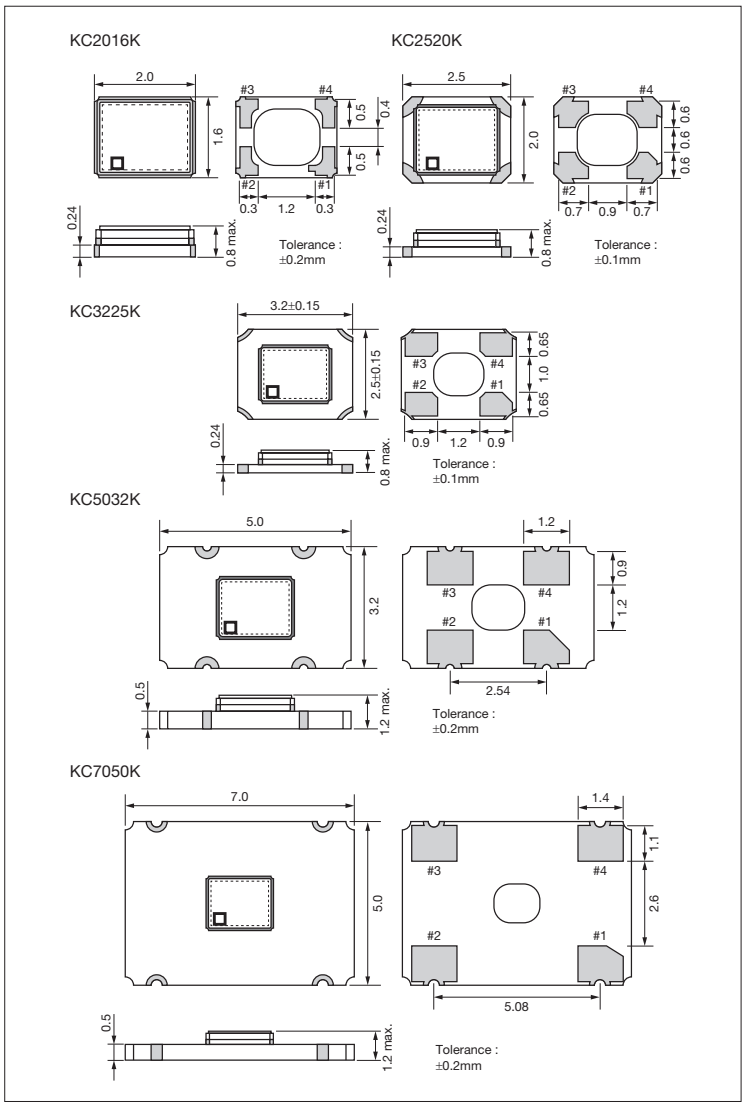
⑦ Individual Specification
(STD Specification is "00")

Packaging Tape & Reel

KC7050K/ KC5032K	1000 pcs/ reel
KC3225K/ KC2520K/ KC2016K	2000 pcs/ reel

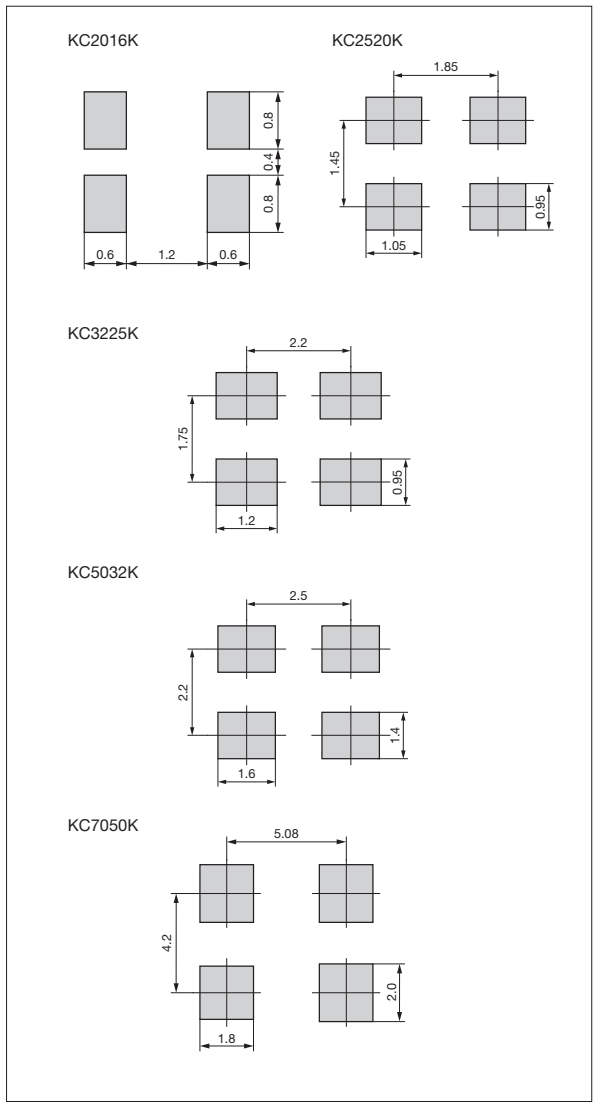
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)



AS of February 2019

CMOS/ 1.8V, 2.5V, 3.3V, 5.0V / 2.0×1.6, 2.5×2.0, 3.2×2.5, 5.0×3.2, 7.0×5.0mm

Specifications

Item	Symbol	Conditions		Version E (Standard) Min.	Version E (Standard) Max.	Version N (Low Phase Noise) Min.(codeU)	Version N (Low Phase Noise) Max.(codeU)	Units
Output Frequency Range[Note1]	fo			1.5	160	1.5	80	MHz
Frequency Tolerance	f_tol	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration	Temp.: −10 to +70°C/ −40 to +85°C/ −40 to +105°C	−50	+50	−50	+50	×10⁻⁶
			Temp.: −10 to +70°C	−30	+30	−30	+30	
			Temp.: −10 to +70°C	−25	+25	−25	+25	
Frequency Aging	f_age	@25°C First year		−3	+3	−3	+3	×10⁻⁶/ y
Storage Temperature Range	T_stg			−55	+125	−55	+125	°C
Operating Temperature Range	T_use			−10	+70	−10	+70	°C
				−40	+85	−40	+85	
				−40	+105	−40	+105	
Max. Supply Voltage	—			−0.3	+4.0	−0.3	+7.0	V
Supply Voltage	Vcc	Code ④ : 1/ E : 1.5≤F0≤125MHz		+1.60	+3.63	—	—	V
		Code ④ : 2/ E : 125<F0≤160MHz		+2.25	+3.63	—	—	
		Code ④ : 2/ N : 1.5≤F0≤80MHz		—	—	+2.25(+2.38)	+2.75(+2.62)	
		Code ④ : 3/ N : 1.5≤F0≤80MHz		—	—	+2.97(+3.14)	+3.63(+3.46)	
		Code ④ : 5/ N : 1.5≤F0≤80MHz		—	—	+4.5(+4.75)	+5.5(+5.25)	
Current Consumption (Maximum Loaded)	Icc	1.5≤F0<24MHz	E : 1.6≤Vcc≤2.25V	—	2.5	—	—	mA
			E : 2.25<Vcc≤2.8V/ N : 2.25≤Vcc≤2.75V	—	3.0	—	4	
			E : 2.8<Vcc≤3.63V/ N : 2.97≤Vcc≤3.63V	—	3.5	—	6	
			N : 4.50≤Vcc≤5.50V	—	—	—	24	
		24≤F0≤40MHz	E : 1.6≤Vcc≤2.25V	—	3.5	—	—	
			E : 2.25<Vcc≤2.8V/ N : 2.25≤Vcc≤2.75V	—	4.5	—	5	
			E : 2.8<Vcc≤3.63V/ N : 2.97≤Vcc≤3.63V	—	5.0	—	7	
			N : 4.50≤Vcc≤5.50V	—	—	—	24	
		40<F0≤62.5MHz	E : 1.6≤Vcc≤2.25V	—	5.0	—	—	
			E : 2.25<Vcc≤2.8V/ N : 2.25≤Vcc≤2.75V	—	5.5	—	8	
			E : 2.8<Vcc≤3.63V/ N : 2.97≤Vcc≤3.63V	—	6.0	—	11	
			N : 4.50≤Vcc≤5.50V	—	—	—	24	
		62.5<F0≤80MHz	E : 1.6≤Vcc≤2.25V	—	6.0	—	—	
			E : 2.25<Vcc≤2.8V/ N : 2.25≤Vcc≤2.75V	—	6.5	—	14	
			E : 2.8<Vcc≤3.63V/ N : 2.97≤Vcc≤3.63V	—	8.0	—	18	
			N : 4.50≤Vcc≤5.50V	—	—	—	40	
		80<F0≤125MHz	E : 1.6≤Vcc≤2.25V	—	11.0	—	—	
			E : 2.25<Vcc≤2.8V	—	14.0	—	—	
			E : 2.8<Vcc≤3.63V	—	17.0	—	—	
		125<F0≤160MHz	E : 2.25<Vcc≤2.8V	—	25.0	—	—	
			E : 2.8<Vcc≤3.63V	—	27.0	—	—	
Stand-by Current	I_std	1.5≤Fo≤80MHz		—	5.0	—	10.0	μA
		80≤Fo≤125MHz		—	5.0	—	—	
		125≤Fo≤160MHz		—	10.0	—	—	
Symmetry	SYM	@50% Vcc		45	55	45	55	%
Rise/ Fall Time (10% to 90% Output Level)	Tr/ Tf	1.5≤F0≤80MHz	E : 1.6≤Vcc≤2.25V	—	6.0	—	—	ns
			E : 2.25<Vcc≤2.8V/ N : 2.25≤Vcc≤2.75V	—	5.0	—	6.0	
			E : 2.8<Vcc≤3.63V/ N : 2.97≤Vcc≤3.63V	—	4.5	—	5.0	
			N : 4.50≤Vcc≤5.50V	—	—	—	8.0	
		80<F0≤125MHz	E : 1.6<Vcc≤3.63V	—	4.0	—	—	
		125<F0≤160MHz	E : 2.25<Vcc≤3.63V	—	2.5	—	—	
Low Level Output Voltage	Vol	E : Iol= 4mA		—	10% Vcc	—	10% Vcc	V
		N (1.5≤Fo≤62.5MHz) : Iol= 4mA						
		N (62.5<Fo≤80MHz) : Iol= 8mA						
High Level Output Voltage	Voh	E : Ioh=−4mA		90% Vcc	—	90% Vcc	—	V
		N (1.5≤Fo≤62.5MHz) : Ioh= −4mA						
		N (62.5<Fo≤80MHz) : Ioh= −8mA						
Output Load	L_CMOS			15		30		pF
Low Level Input Voltage	Vil			—	30% Vcc	—	30% Vcc	V
High Level Input Voltage	Vih			70% Vcc	—	70% Vcc	—	V

CMOS/ 1.8V, 2.5V, 3.3V, 5.0V / 2.0×1.6, 2.5×2.0, 3.2×2.5, 5.0×3.2, 7.0×5.0mm

Item	Symbol	Conditions		Version E (Standard)		Version N (Low Phase Noise)		Units
				Min.	Max.	Min.(codeU)	Max.(codeU)	
Disable Time	$t_{\_dis}$	1.5≤F0≤80MHz		—	200	—	150	ns
		80<F0≤125MHz		—	200	—	—	
		125<F0≤160MHz		—	100	—	—	
Enable Time	$t_{\_ena}$			—	5	—	5	ms
Start-up Time	$t_{\_str}$	1.5≤F0≤80MHz	@Minimum operating voltage to be 0 sec.	—	5	—	5	ms
		80<F0≤125MHz		—	5	—	—	
		125<F0≤160MHz		—	10	—	—	
1Sigma Jitter	J_{Sigma}	1.5≤F0≤80MHz	Measured with Wavecrest SIA-3000	—	5	—	4	ps
		80<F0≤125MHz		—	5	—	—	
		125<F0≤160MHz		—	3	—	—	
Peak to Peak Jitter	J_{PK-PK}	1.5≤F0≤80MHz		—	50	—	40	ps
		80<F0≤125MHz		—	50	—	—	
		125<F0≤160MHz		—	25	—	—	
Phase Jitter	J_{Phase}	@25MHz	BW : 12kHz to 20MHz	—	1.0	—	0.5	ps
Phase Noise	—	@25MHz	@10Hz offset	Typ. –89		Typ. –92		dBc/ Hz
			@100Hz offset	Typ. –119		Typ. –126		
			@1kHz offset	Typ. –143		Typ. –151		
			@10kHz offset	Typ. –157		Typ. –160		
			@100kHz offset	Typ. –160		Typ. –167		
			@1MHz offset	Typ. –162		Typ. –170		
			@10MHz offset	Typ. –162		Typ. –170		

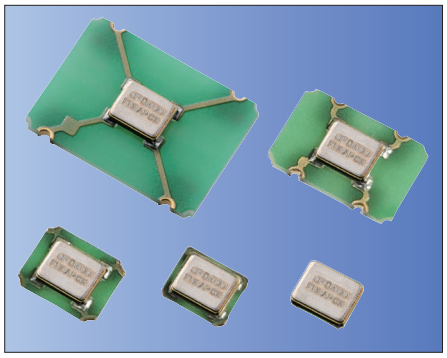
Note: All electrical characteristics are defined at the maximum load and operating temperature range.
Note1: Please contact us for inquiry about operating temperature range, available frequencies and other conditions.

Pad Connections	
#1	INH
#2	Case GND
#3	Output
#4	V_{CC}

INH Function	
Pad1	Pad3 (Output)
Open	Active
"H" Level	Active
"L" Level	High Z (No-Oscillation)

KYOCERA

CMOS/ 1.8V, 2.5V, 3.3V, 5.0V / 2.0×1.6, 2.5×2.0, 3.2×2.5, 5.0×3.2, 7.0×5.0mm for Automotive



AEC-Q100/ 200 RoHS Compliant

Features

- Frequency Range 1.5 to 160MHz
- CMOS output
- Wide Supply Voltage
  - 1.6 to 3.63V (Ver.E)
  - 2.5,3.3,5.0V(Ver.N)
- Low current consumption
- Option: Low Phase Noise Version

Applications

- Automotive Radar/ Camera/ Navigation/ Sensor/ Mirror/ Head light

Table 1

Freq. Tol.		Operating Temperature Range (°C)	Note
Code	× 10^{-6}		
G	± 50	−40 to +85	Standard specifications
6	± 50	−40 to +105	
X	± 100	−40 to +125	

How to Order

MC2520K 25.0000 C □ □ □ 00
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Output Frequency (25.0000: 25MHz)
③ Output Type (C: CMOS)
④ Supply Voltage
Standard : Version E

1	1.8V/ 2.5V/ 3.3V compatible
2	2.5V/ 3.3V compatible

Low Phase Noise : Version N

2	2.5V	3	3.3V
5	5.0V		

⑤ Frequency Tolerance (See Table 1)
⑥ Symmetry/ INH Function

E	45/ 55%
N	45/ 55%, Low Phase Noise

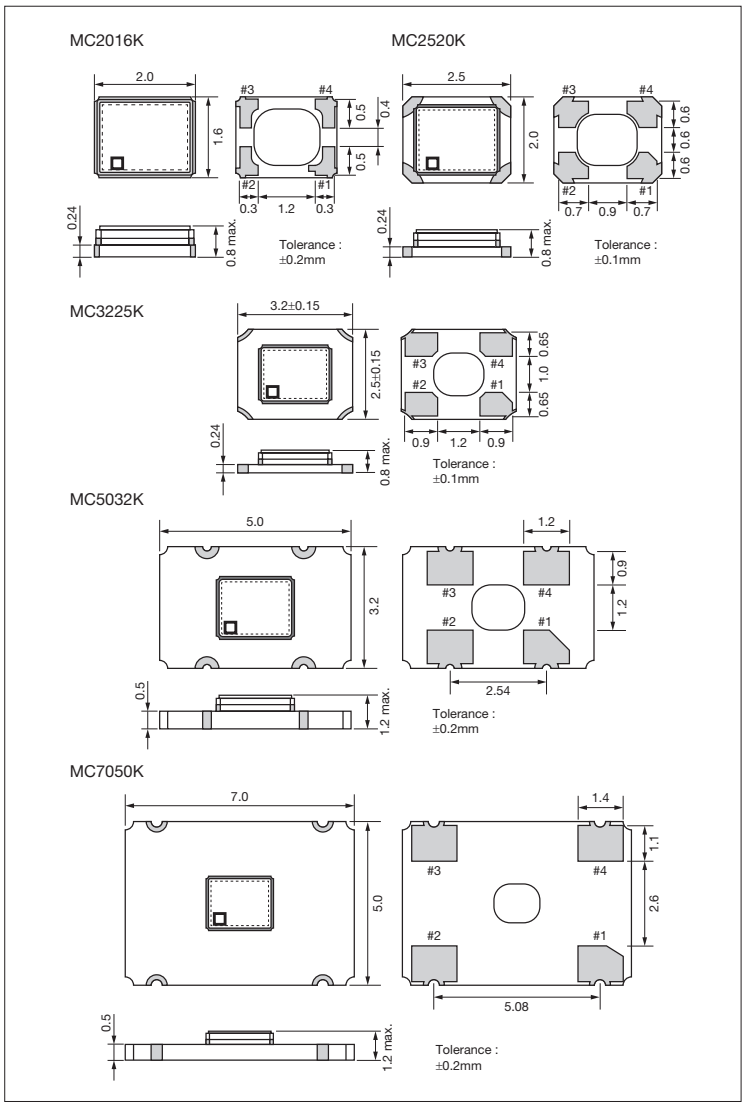
⑦ Individual Specification
(STD Specification is "00")

Packaging Tape & Reel

MC7050K/ MC5032K	1000 pcs/ reel
MC3225K/ MC2520K/ MC2016K	2000 pcs/ reel

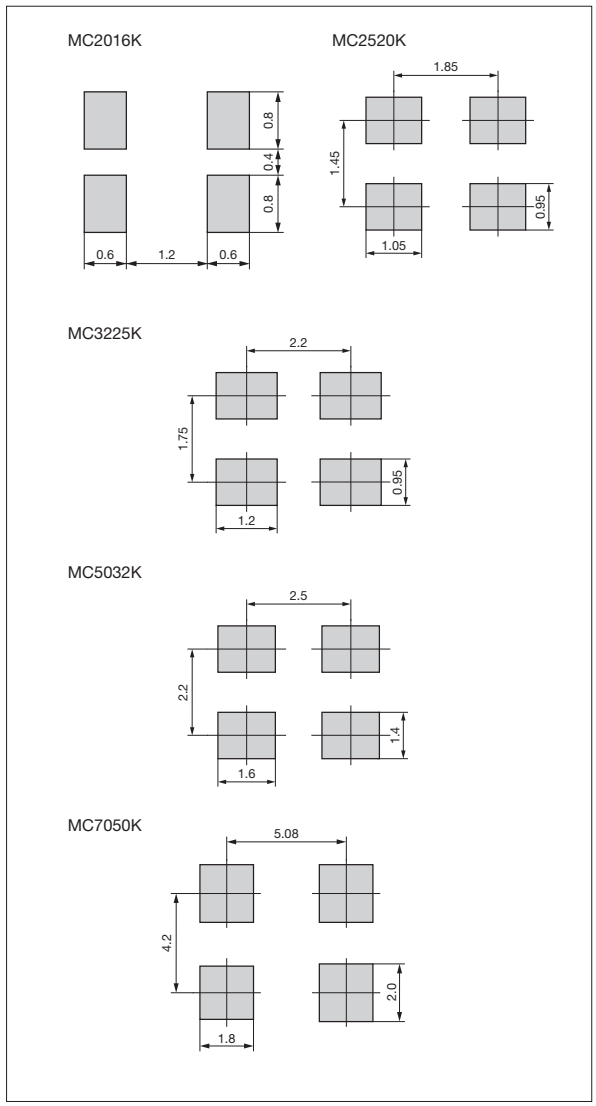
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)



Crystal Oscillators

CMOS/ 1.8V, 2.5V, 3.3V, 5.0V / 2.0×1.6, 2.5×2.0, 3.2×2.5, 5.0×3.2, 7.0×5.0mm for Automotive

Specifications

Item	Symbol	Conditions		Version E (Standard) Min.	Version E (Standard) Max.	Version N (Low Phase Noise) Min.(codeU)	Version N (Low Phase Noise) Max.(codeU)	Units
Output Frequency Range[Note1]	fo			1.5	160	1.5	80	MHz
Frequency Tolerance	f_tol	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration	Temp.: −40 to +85°C/ −40 to +105°C	−50	+50	−50	+50	×10⁻⁶
			Temp.: −40 to +125°C	−100	+100	−100	+100	
Frequency Aging	f_age	@25°C First year		−3	+3	−3	+3	×10⁻⁶/ y
Storage Temperature Range	T_stg			−55	+125	−55	+125	°C
Operating Temperature Range	T_use			−40	+85	−40	+85	°C
				−40	+105	−40	+105	
				−40	+125	−40	+125	
Max. Supply Voltage	—			−0.3	+4.0	−0.3	+7.0	V
Supply Voltage	Vcc	Code ④ : 1/ E : 1.5≤F0≤125MHz		+1.60	+3.63	—	—	V
		Code ④ : 2/ E : 125<F0≤160MHz		+2.25	+3.63	—	—	
		Code ④ : 2/ N : 1.5≤F0≤80MHz		—	—	+2.25(+2.38)	+2.75(+2.62)	
		Code ④ : 3/ N : 1.5≤F0≤80MHz		—	—	+2.97(+3.14)	+3.63(+3.46)	
		Code ④ : 5/ N : 1.5≤F0≤80MHz		—	—	+4.5(+4.75)	+5.5(+5.25)	
Current Consumption (Maximum Loaded)	Icc	1.5≤F0<24MHz	E : 1.6≤Vcc≤2.25V	—	2.5	—	—	mA
			E : 2.25<Vcc≤2.8V/ N : 2.25≤Vcc≤2.75V	—	3.0	—	4	
			E : 2.8<Vcc≤3.63V/ N : 2.97≤Vcc≤3.63V	—	3.5	—	6	
			N : 4.50≤Vcc≤5.50V	—	—	—	24	
		24≤F0≤40MHz	E : 1.6≤Vcc≤2.25V	—	3.5	—	—	
			E : 2.25<Vcc≤2.8V/ N : 2.25≤Vcc≤2.75V	—	4.5	—	5	
			E : 2.8<Vcc≤3.63V/ N : 2.97≤Vcc≤3.63V	—	5.0	—	7	
			N : 4.50≤Vcc≤5.50V	—	—	—	24	
		40<F0≤62.5MHz	E : 1.6≤Vcc≤2.25V	—	5.0	—	—	
			E : 2.25<Vcc≤2.8V/ N : 2.25≤Vcc≤2.75V	—	5.5	—	8	
			E : 2.8<Vcc≤3.63V/ N : 2.97≤Vcc≤3.63V	—	6.0	—	11	
			N : 4.50≤Vcc≤5.50V	—	—	—	24	
		62.5<F0≤80MHz	E : 1.6≤Vcc≤2.25V	—	6.0	—	—	
			E : 2.25<Vcc≤2.8V/ N : 2.25≤Vcc≤2.75V	—	6.5	—	14	
			E : 2.8<Vcc≤3.63V/ N : 2.97≤Vcc≤3.63V	—	8.0	—	18	
			N : 4.50≤Vcc≤5.50V	—	—	—	40	
		80<F0≤125MHz	E : 1.6≤Vcc≤2.25V	—	11.0	—	—	
			E : 2.25<Vcc≤2.8V	—	14.0	—	—	
			E : 2.8<Vcc≤3.63V	—	17.0	—	—	
		125<F0≤160MHz	E : 2.25<Vcc≤2.8V	—	25.0	—	—	
			E : 2.8<Vcc≤3.63V	—	27.0	—	—	
Stand-by Current	I_std	1.5≤Fo≤80MHz		—	5.0	—	10.0	μA
		80≤Fo≤125MHz		—	5.0	—	—	
		125≤Fo≤160MHz		—	10.0	—	—	
Symmetry	SYM	@50% Vcc		45	55	45	55	%
Rise/ Fall Time (10% to 90% Output Level)	Tr/ Tf	1.5≤F0≤80MHz	E : 1.6≤Vcc≤2.25V	—	6.0	—	—	ns
			E : 2.25<Vcc≤2.8V/ N : 2.25≤Vcc≤2.75V	—	5.0	—	6.0	
			E : 2.8<Vcc≤3.63V/ N : 2.97≤Vcc≤3.63V	—	4.5	—	5.0	
			N : 4.50≤Vcc≤5.50V	—	—	—	8.0	
		80<F0≤125MHz	E : 1.6<Vcc≤3.63V	—	4.0	—	—	
		125<F0≤160MHz	E : 2.25<Vcc≤3.63V	—	2.5	—	—	
Low Level Output Voltage	Vol	E : Iol= 4mA		—	10% Vcc	—	10% Vcc	V
		N (1.5≤Fo≤62.5MHz) : Iol= 4mA						
		N (62.5<Fo≤80MHz) : Iol= 8mA						
High Level Output Voltage	Voh	E : Ioh=−4mA		90% Vcc	—	90% Vcc	—	V
		N (1.5≤Fo≤62.5MHz) : Ioh= −4mA						
		N (62.5<Fo≤80MHz) : Ioh= −8mA						
Output Load	L_CMOS			15		30 (5.0V)/ 15 (2.5, 3.3V)		pF
Low Level Input Voltage	Vil			—	30% Vcc	—	30% Vcc	V
High Level Input Voltage	Vih			70% Vcc	—	70% Vcc	—	V

CMOS/ 1.8V, 2.5V, 3.3V, 5.0V / 2.0×1.6, 2.5×2.0, 3.2×2.5, 5.0×3.2, 7.0×5.0mm for Automotive

Item	Symbol	Conditions		Version E (Standard)		Version N (Low Phase Noise)		Units
				Min.	Max.	Min.(codeU)	Max.(codeU)	
Disable Time	$t_{\_dis}$	1.5≤F0≤80MHz		—	200	—	150	ns
		80<F0≤125MHz		—	200	—	—	
		125<F0≤160MHz		—	100	—	—	
Enable Time	$t_{\_ena}$			—	5	—	5	ms
Start-up Time	$t_{\_str}$	1.5≤F0≤80MHz	@Minimum operating voltage to be 0 sec.	—	5	—	5	ms
		80<F0≤125MHz		—	5	—	—	
		125<F0≤160MHz		—	10	—	—	
1Sigma Jitter	J_{Sigma}	1.5≤F0≤80MHz	Measured with Wavecrest SIA-3000	—	5	—	4	ps
		80<F0≤125MHz		—	5	—	—	
		125<F0≤160MHz		—	3	—	—	
Peak to Peak Jitter	J_{PK-PK}	1.5≤F0≤80MHz		—	50	—	40	ps
		80<F0≤125MHz		—	50	—	—	
		125<F0≤160MHz		—	25	—	—	
Phase Jitter	J_{Phase}	@25MHz	BW : 12kHz to 20MHz	—	1.0	—	0.5	ps
Phase Noise	—	@25MHz	@10Hz offset	Typ. –89		Typ. –92		dBc/ Hz
			@100Hz offset	Typ. –119		Typ. –126		
			@1kHz offset	Typ. –143		Typ. –151		
			@10kHz offset	Typ. –157		Typ. –160		
			@100kHz offset	Typ. –160		Typ. –167		
			@1MHz offset	Typ. –162		Typ. –170		
			@10MHz offset	Typ. –162		Typ. –170		

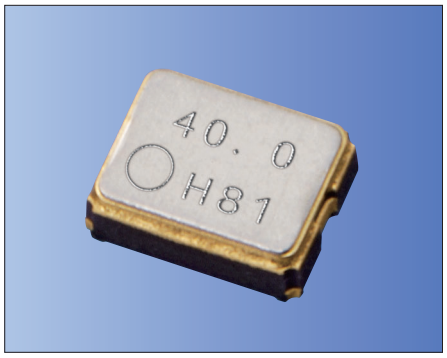
Note: All electrical characteristics are defined at the maximum load and operating temperature range.
Note1: Please contact us for inquiry about operating temperature range, available frequencies and other conditions.

Pad Connections	
#1	INH
#2	Case GND
#3	Output
#4	V_{CC}

INH Function	
Pad1	Pad3 (Output)
Open	Active
"H" Level	Active
"L" Level	High Z (No-Oscillation)

KYOCERA

CMOS/ 1.8V to 3.3V/ 2.0×1.6mm



RoHS Compliant

Features

- Ultra Miniature ceramic package
  2.0 (L) ×1.6 (W) ×0.55 (H) mm (Typ.)
- Highly reliable with seam welding
- CMOS output
- Supply voltage Vcc=1.8V/ 2.5V/ 3.3V
  Wide operating voltage range 1.6 to 3.63V
- Low current consumption

Table 1

Freq. Tol.		Operating Temperature Range (°C)	Note
Code	× 10^{-6}		
0	± 50	−10 to +70	Standard specifications
S	± 30		Please contact us for available frequencies.
U	± 25		
F	±100	−40 to +85	
G	± 50		
6	± 50	−40 to +105	

How to Order

KC2016B ① 40.0000 ② C ③ 1 ④ □ ⑤ E ⑥ 00 ⑦

① Series
② Output Frequency
③ Output Type (CMOS)
④ Supply Voltage (1.8V, 2.5V, 3.3V Compatible)
⑤ Frequency Tolerance (See Table 1)
⑥ Symmetry/ INH Function (45/ 55%)
⑦ Individual Specification
(STD Specification is "00")

Packaging (Tape & Reel 2000 pcs./ reel)

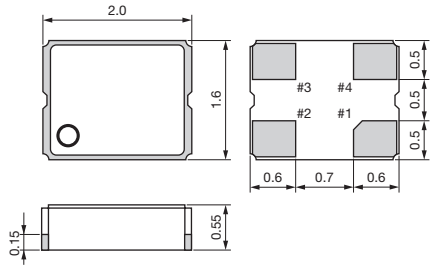
Specifications

Item	Symbol	Conditions		Min.	Max.	Units
Output Frequency Range	fo			1.5	50	MHz
Frequency Tolerance	$f_{\_tol}$	Initial tolerance, Operating temperature range, Rated power supply voltage change, Aging (1 year @25°C), Shock and vibration	Temp.: −40 to +85°C	−100	+100	×10^{-6}
			Temp.: −10 to +70°C/ −40 to +85°C/ −40 to +105°C	−50	+50	
			Temp.: −10 to +70°C	−30	+30	
			Temp.: −10 to +70°C	−25	+25	
Storage Temperature Range	$T_{\_stg}$			−55	+125	°C
Operating Temperature Range	$T_{\_use}$	Standard Specifications		−10	+70	°C
		Extend (Option)		−40	+85	
				−40	+105	
Max. Supply Voltage	—			−0.6	+6.0	V
Supply Voltage	Vcc			+1.6	+3.63	V
Current Consumption (Maximum Loaded/ 1.6≤Vcc≤2.0V)	Icc	1.5≤fo≤24MHz		—	2.5	mA
		24<fo≤40MHz		—	3.5	
		40<fo≤50MHz		—	4.5	
Current Consumption (Maximum Loaded/ 2.0<Vcc≤2.8V)		1.5≤fo≤24MHz		—	3.0	
		24<fo≤40MHz		—	4.5	
		40<fo≤50MHz		—	5.0	
Current Consumption (Maximum Loaded/ 2.8<Vcc≤3.63V)		1.5≤fo≤24MHz		—	3.5	
		24<fo≤40MHz		—	5.0	
		40<fo≤50MHz		—	6.0	
Stand-by Current	$I_{\_std}$			—	10	μA
Symmetry	SYM	@50% Vcc		45	55	%
Rise/ Fall Time (10% Vcc to 90% Vcc Maximum Loaded)	Tr/ Tf	1.6≤Vcc≤2.0V		—	6.5	ns
		2.0<Vcc≤2.8V		—	5.0	
		2.8<Vcc≤3.63V		—	4.5	
Low Level Output Voltage	VOL	IOL=4mA		—	10% Vcc	V
High Level Output Voltage	VOH	IOH=−4mA		90% Vcc	—	V
CMOS Load	L_CMOS	CMOS Output		—	15	pF
Input Voltage Range	VIN			0	Vcc	V
Low Level Input Voltage	VIL			—	30% Vcc	V
High Level Input Voltage	VIH			70% Vcc	—	V
Disable Time	$t_{\_dis}$			—	100	ns
Enable Time	$t_{\_ena}$			—	5	ms
Start-up Time	$t_{\_str}$	@Minimum operating voltage to be 0 sec.		—	10	ms
1 Sigma Jitter	JSigma	Measured with Wavecrest SIA-3000		—	8	ps
Peak to Peak Jitter	JPK-PK			—	80	ps

Note: All electrical characteristics are defined at the maximum load and operating temperature range.
Please contact us for inquiry about operating temperature range, available frequencies and other conditions.

Dimensions

(Unit: mm)



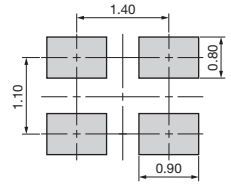
Plating: Ni+Au
Tolerance: ±0.1

Pad Connections	
#1	INH
#2	Case GND
#3	Output
#4	Vcc

INH Function	
Pad1	Pad3 (Output)
Open	Active
"H" Level	Active
"L" Level	High Z (No-Oscillation)

Recommended Land Pattern

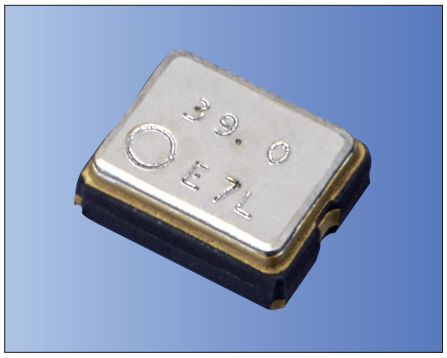
(Unit: mm)



Note: A capacitor of value 0.01μF between Vcc and GND is recommended.

KYOCERA

CMOS/ 1.8V to 3.3V/ 2.5×2.0mm



RoHS Compliant

Features

- Miniature ceramic package
  2.5 (L) ×2.0 (W) ×0.7 (H) mm (Typ.)
- Highly reliable with seam welding
- CMOS output
- Supply voltage 1.8/ 2.5/ 3.3V
  Wide operating voltage range 1.6 to 3.63V
- Low current consumption
- High output frequency 125MHz

Table 1

Freq. Tol. Code	Freq. Tol. × 10^{-6}	Operating Temperature Range (°C)	Note
0	± 50	−10 to +70	Standard specifications
S	± 30		Please contact us for available frequencies.
U	± 25		
F	±100	−40 to +85	
G	± 50		
6	± 50	−40 to +105	

How to Order

KC2520B ① 25.0000 ② C ③ 1 ④ □ ⑤ E ⑥ 00 ⑦

① Series
② Output Frequency
③ Output Type (CMOS)
④ Supply Voltage (1.8V, 2.5V, 3.3V Compatible)
⑤ Frequency Tolerance (See Table 1)
⑥ Symmetry/ INH Function (45/ 55%)
⑦ Individual Specification
(STD Specification is "00")

Packaging (Tape & Reel 2000 pcs./ reel)

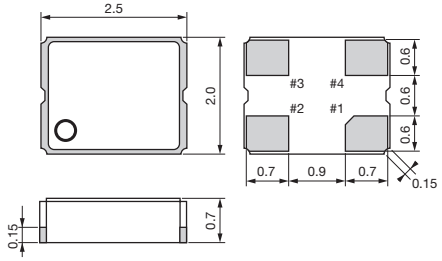
Specifications

Item	Symbol	Conditions		Specifications Min.	Specifications Max.	Units
Output Frequency Range	fo			1.5	125	MHz
Frequency Tolerance	$f_{\_tol}$	Initial tolerance, Operating temperature range, Rated power supply voltage change, Aging (1 year @25°C), Shock and vibration	Temp.: −40 to +85°C	−100	+100	×10^{-6}
			Temp.: −10 to +70°C/ −40 to +85°C/ −40 to +105°C	−50	+50	
			Temp.: −10 to +70°C	−30	+30	
Storage Temperature Range	$T_{\_stg}$			−55	+125	°C
Operating Temperature Range	$T_{\_use}$	Standard Specifications		−10	+70	°C
		Extend (Option)		−40	+85	
				−40	+105	
Max. Supply Voltage	—	1.5≤fo≤80MHz		−0.6	+6.0	V
		80<fo≤125MHz		−0.3	+4.0	
Supply Voltage	Vcc			+1.6	+3.63	V
Current Consumption (Maximum Loaded/ 1.6≤Vcc≤2.0V)	Icc	1.5≤fo≤24MHz		—	2.5	mA
		24<fo≤40MHz		—	3.5	
		40<fo≤60MHz		—	5.0	
		60<fo≤80MHz		—	6.0	
		80<fo≤125MHz		—	11.0	
Current Consumption (Maximum Loaded/ 2.0<Vcc≤2.8V)		1.5≤fo≤24MHz		—	3.0	
		24<fo≤40MHz		—	4.5	
		40<fo≤60MHz		—	5.5	
		60<fo≤80MHz		—	6.5	
		80<fo≤125MHz		—	14.0	
Current Consumption (Maximum Loaded/ 2.8<Vcc≤3.63V)		1.5≤fo≤24MHz		—	3.5	
		24<fo≤40MHz		—	5.0	
		40<fo≤60MHz		—	6.0	
		60<fo≤80MHz		—	8.0	
		80<fo≤125MHz		—	17.0	
Stand-by Current	$I_{\_std}$			—	10	µA
Symmetry	SYM	@50%Vcc		45	55	%
Rise/ Fall Time (10% Vcc to 90% Vcc Maximum Loaded)	Tr/ Tf	1.6≤Vcc≤2.0V/ 1.5<fo≤80MHz		—	6.5	ns
		2.0<Vcc≤2.8V/ 1.5<fo≤80MHz		—	5.0	
		2.8<Vcc≤3.63V/ 1.5<fo≤80MHz		—	4.5	
		1.6≤Vcc≤3.63V/ 80<fo≤125MHz		—	4.0	
Low Level Output Voltage	VOL	IOL=4mA		—	10%Vcc	V
High Level Output Voltage	VOH	IOH=−4mA		90%Vcc	—	V
Output Load	L_CMOS	CMOS Output		—	15	pF
Low Level Input Voltage	VIL			—	30%Vcc	V
High Level Input Voltage	VIH			70%Vcc	—	V
Disable Time	$t_{\_dis}$			—	100	ns
Enable Time	$t_{\_ena}$			—	5	ms
Start-up Time	$t_{\_str}$	@Minimum operating voltage to be 0 sec.		—	10	ms
1 Sigma Jitter	JSigma	Measured with Wavecrest SIA-3000	1.5≤fo≤80MHz	—	8	ps
			80<fo≤125MHz	—	4	
Peak to Peak Jitter	JPK-PK	Measured with Wavecrest SIA-3000	1.5≤fo≤80MHz	—	80	ps
			80<fo≤125MHz	—	40	

Note: All electrical characteristics are defined at the maximum load and operating temperature range.
Please contact us for inquiry about operating temperature range, available frequencies and other conditions.

Dimensions

(Unit: mm)



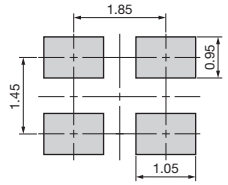
Plating: Ni+Au
Tolerance: ±0.1

Pad Connections	
#1	INH
#2	Case GND
#3	Output
#4	Vcc

INH Function	
Pad1	Pad3 (Output)
Open	Active
"H" Level	Active
"L" Level	High Z (No-Oscillation)

Recommended Land Pattern

(Unit: mm)

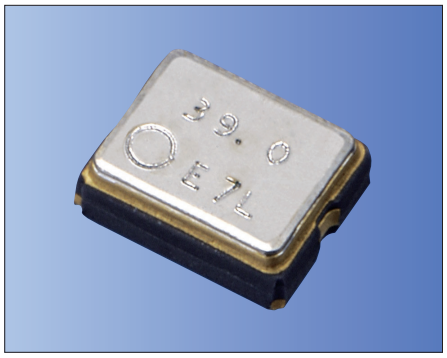


Note: A capacitor of value 0.01µF between Vcc and GND is recommended.

AS of February 2019

KYOCERA

CMOS/ 2.5V to 3.3V/ 2.5×2.0mm



RoHS Compliant

Features

- Miniature ceramic package
  2.5 (L) ×2.0 (W) ×0.7 (H) mm (Typ.)
- Highly reliable with seam welding
- CMOS output
- Supply voltage 2.5/ 3.3V
  Wide operating voltage range 2.25 to 3.63V
- Low current consumption
- High output frequency 160MHz

Table 1

Freq. Tol. Code	Freq. Tol. × 10^{-6}	Operating Temperature Range (°C)	Note
0	± 50	−10 to +70	Standard specifications
S	± 30		Please contact us for available frequencies.
U	± 25		
F	±100	−40 to +85	
G	± 50		
6	± 50	−40 to +105	

How to Order

KC2520B 125.000 C 2 □ E 00
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Output Frequency
③ Output Type (CMOS)
④ Supply Voltage (2.5V, 3.3V Compatible)
⑤ Frequency Tolerance (See Table 1)
⑥ Symmetry/ INH Function (45/ 55%)
⑦ Individual Specification
(STD Specification is "00")

Packaging (Tape & Reel 2000 pcs./ reel)

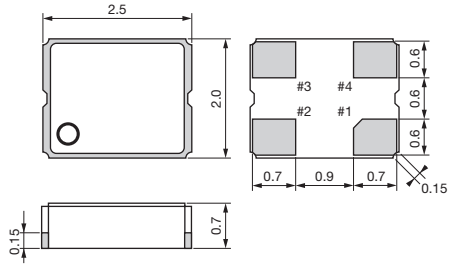
Specifications

Item	Symbol	Conditions		Specifications Min.	Specifications Max.	Units
Output Frequency Range	fo	fo>125MHz		125	160	MHz
Frequency Tolerance	f_tol	Over all conditions : initial tolerance, operating temperature range, rated power supply voltage change, load change, aging (1year @25°C), shock and vibration	Temp. : −40 ～ +85°C	−100	+100	×10^{-6}
			Temp.: −10 to +70°C/ −40 to +85°C/ −40 to +105°C	−50	+50	
			Temp. : −10 ～ +70°C	−30	+30	
Storage Temperature Range	T_stg			−55	+125	°C
Operating Temperature Range	T_use	Standard Specifications		−10	+70	°C
		Extend (Option)		−40	+85	
				−40	+105	
Max. Supply Voltage	—			−0.3	+4.0	V
Supply Voltage	Vcc			+2.25	+3.63	V
Current Consumption (Maximum Loaded/ 2.25≤Vcc≤2.75V)	Icc	125<fo≤160MHz		—	25	mA
Current Consumption (Maximum Loaded/ 2.75≤Vcc≤3.63V)		125<fo≤160MHz		—	27	
Stand-by Current	I_std			—	10	μA
Symmetry	SYM	@50% Vcc		45	55	%
Rise/ Fall Time (10% Vcc to 90% Vcc Maximum Loaded)	Tr/ Tf	125<fo≤160MHz		—	2.5	ns
Low Level Output Voltage	VOL	IOL=4mA		—	10% Vcc	V
High Level Output Voltage	VOH	IOH=−4mA		90% Vcc	—	
Output Load	L_CMOS	CMOS Output		—	15	pF
Low Level Input Voltage	VIL			—	30% Vcc	V
High Level Input Voltage	VIH			70% Vcc	—	
Disable Time	t_dis			—	100	ns
Enable Time	t_ena			—	5	ms
Start-up Time	t_str	@Minimum operating voltage to be 0 sec.		—	10	ms
1 Sigma Jitter	JSigma	Measured with Wavecrest SIA-3000 125<fo≤160MHz		—	3	ps
Peak to Peak Jitter	JPK-PK			—	25	

Note: All electrical characteristics are defined at the maximum load and operating temperature range.
Please contact us for inquiry about operating temperature range, available frequencies and other conditions.

Dimensions

(Unit: mm)



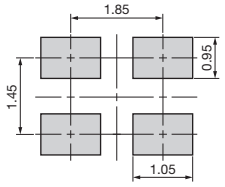
Plating: Ni+Au
Tolerance: ±0.1

Pad Connections	
#1	INH
#2	Case GND
#3	Output
#4	Vcc

INH Function	
Pad1	Pad3 (Output)
Open	Active
"H" Level	Active
"L" Level	High Z (No-Oscillation)

Recommended Land Pattern

(Unit: mm)

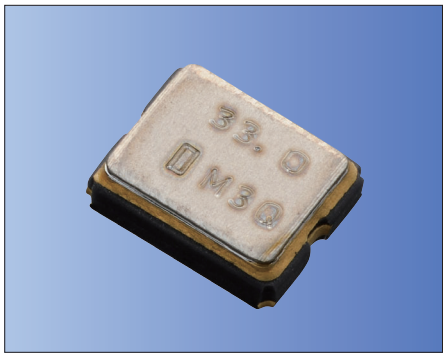


Note: A capacitor of value 0.01μF between Vcc and GND is recommended.

AS of February 2019

KYOCERA

CMOS/ 1.8V to 3.3V/ 2.5×2.0mm for Automotive



AEC-Q100/ 200 RoHS Compliant

Features

- Miniature ceramic package
  2.5 (L) ×2.0 (W) ×0.7 (H) mm (Typ.)
- Highly reliable with seam welding
- CMOS output
- Supply voltage 1.8/ 2.5/ 3.3V
  Wide operating voltage range 1.6 to 3.63V
- Low current consumption

Table 1

Freq. Tol.		Operating Temperature Range (°C)	Note
Code	× 10^{-6}		
F	±100	−40 to +85	Please contact us for available frequencies.
G	± 50		
6	± 50	−40 to +105	
X	±100	−40 to +125	Standard specifications

How to Order

KC2520M 25.0000 C 1 □ E SH
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Output Frequency
③ Output Type (CMOS)
④ Supply Voltage (1.8V, 2.5V, 3.3V Compatible)
⑤ Frequency Tolerance (See Table 1)
⑥ Symmetry/ INH Function (45/ 55%)
⑦ Individual Specification
(STD Specification is "SH")

Packaging (Tape & Reel 2000 pcs./ reel)

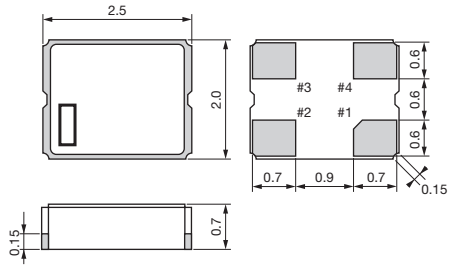
Specifications

Item	Symbol	Conditions		Specifications Min.	Specifications Max.	Units
Output Frequency Range	fo			1.5	60	MHz
Frequency Tolerance	$f_{\_tol}$	Initial tolerance, Operating temperature range, Rated power supply voltage change, Aging (1 year @25°C), Shock and vibration	Temp.: −40 to +85°C −40 to +125°C	−100	+100	×10^{-6}
			Temp.: −40 to +85°C −40 to +105°C	−50	+50	
Storage Temperature Range	$T_{\_stg}$			−55	+125	°C
Operating Temperature Range	$T_{\_use}$			−40	+125	°C
Max. Supply Voltage	—	1.5≤fo≤60MHz		−0.6	+6.5	V
Supply Voltage	V_{CC}			+1.6	+3.63	V
Current Consumption (Maximum Loaded/ 1.6≤V_{CC}≤2.0V)	I_{CC}	1.5≤fo≤24MHz		—	2.5	mA
		24<fo≤40MHz		—	3.0	
		40<fo≤60MHz		—	4.5	
Current Consumption (Maximum Loaded/ 2.0<V_{CC}≤2.8V)		1.5≤fo≤24MHz		—	3.0	
		24<fo≤40MHz		—	4.0	
		40<fo≤60MHz		—	5.0	
Current Consumption (Maximum Loaded/ 2.8<V_{CC}≤3.63V)		1.5≤fo≤24MHz		—	3.5	
		24<fo≤40MHz		—	5.0	
		40<fo≤60MHz		—	6.5	
Stand-by Current	$I_{\_std}$			—	10	µA
Symmetry	SYM	@50%V_{CC}		45	55	%
Rise/ Fall Time (10% V_{CC} to 90% V_{CC} Maximum Loaded)	Tr/ Tf	1.6≤V_{CC}≤2.0V		—	6.5	ns
		2.0<V_{CC}≤2.8V		—	5.5	
		2.8<V_{CC}≤3.63V		—	4.5	
Low Level Output Voltage	V_{OL}	I_{OL}=4mA		—	10%V_{CC}	V
High Level Output Voltage	V_{OH}	I_{OH}=−4mA		90%V_{CC}	—	V
Output Load	L_CMOS	CMOS Output		—	15	pF
Low Level Input Voltage	V_{IL}			—	30%V_{CC}	V
High Level Input Voltage	V_{IH}			70%V_{CC}	—	V
Disable Time	$t_{\_dis}$			—	100	ns
Enable Time	$t_{\_ena}$			—	5	ms
Start-up Time	$t_{\_str}$	@Minimum operating voltage to be 0 sec.		—	10	ms
1 Sigma Jitter	J_{Sigma}	Measured with Wavecrest SIA-3000		—	8	ps
Peak to Peak Jitter	J_{PK-PK}			—	80	ps

Note: All electrical characteristics are defined at the maximum load and operating temperature range.
Please contact us for inquiry about operating temperature range, available frequencies and other conditions.

Dimensions

(Unit: mm)



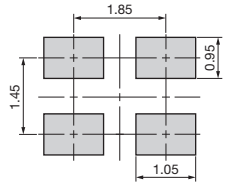
Plating: Ni+Au
Tolerance: ±0.1

Pad Connections	
#1	INH
#2	Case GND
#3	Output
#4	V_{CC}

INH Function	
Pad1	Pad3 (Output)
Open	Active
"H" Level	Active
"L" Level	High Z (No-Oscillation)

Recommended Land Pattern

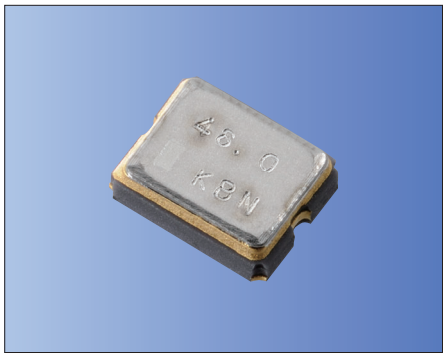
(Unit: mm)



Note: A capacitor of value 0.01µF between V_{CC} and GND is recommended.

AS of February 2019

CMOS/ 1.8V/ 2.5×2.0mm



RoHS Compliant

Features

- Miniature ceramic package
  2.5 (L) ×2.0 (W) ×0.7 (H) mm (Typ.)
- High Stability Output Frequency
  ±10×10^{-6} (−10 to +70°C)
  ±15×10^{-6} (−40 to +85°C)
- CMOS output
- Supply voltage V_{CC}=1.8V
  Low Power Supply Consumption

Applications

- Wi-Fi, Bluetooth® etc.

* Bluetooth® is a registered trademarks of Bluetooth SIG Inc.

Table 1

Freq. Tol.		Operating Temperature Range (°C)	Note
Code	× 10^{-6}		
Y	±10	−10 to +70	Please contact us for available frequencies.
K	±20	−40 to +85	
L	±15		Standard specifications

How to Order

KC2520C 40.0000 C 1 □ E 00
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Output Frequency
③ Output Type (CMOS)
④ Supply Voltage (1.8V)
⑤ Frequency Tolerance (See Table 1)
⑥ Symmetry/ INH Function (45/ 55%)
⑦ Individual Specification
(STD Specification is "00")

Packaging (Tape & Reel 2000 pcs./ reel)

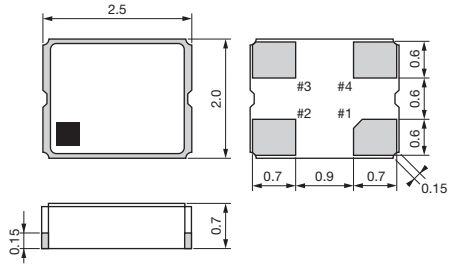
Specifications

Item	Symbol	Conditions		Min.	Max.	Units
Output Frequency Range	fo			1.5	54	MHz
Frequency Tolerance	f_tol	Initial tolerance, Operating temperature range, Rated power supply voltage change, Aging (1 year @25°C), Shock and vibration	Temp.: −40 to +85°C	−15	+15	×10^{-6}
			Temp.: −40 to +85°C	−20	+20	
			Temp.: −10 to +70°C	−10	+10	
Storage Temperature Range	T_stg			−55	+125	°C
Operating Temperature Range	T_use			−10	+70	°C
				−40	+85	
Max. Supply Voltage	—			−0.3	+4.0	V
Supply Voltage	Vcc			+1.6	+2.0	V
Current Consumption (Maximum Loaded)	Icc	CL≤15pF	1.5≤fo<24MHz	—	4	mA
			24≤fo≤54MHz	—	4.5	
Stand-by Current	I_std			—	5	µA
Symmetry	SYM	@50% Vcc		45	55	%
Rise/ Fall Time (10% Vcc to 90% Vcc Maximum Loaded)	Tr/ Tf			—	4	ns
Low Level Output Voltage	VOL	IOL=4mA		—	10% Vcc	V
High Level Output Voltage	VOH	IOH=−4mA		90% Vcc	—	V
CMOS Load	L_CMOS	CMOS Output		—	15	pF
Input Voltage Range	VIN			0	Vcc	V
Low Level Input Voltage	VIL			—	30% Vcc	V
High Level Input Voltage	VIH			70% Vcc	—	V
Disable Time	t_dis			—	100	ns
Enable Time	t_ena			—	5	ms
Start-up Time	t_str	@Minimum operating voltage to be 0 sec.		—	10	ms
1 Sigma Jitter	JSigma	Measured with Wavecrest SIA-3000		—	8	ps
Peak to Peak Jitter	JPK-PK			—	80	ps

Note: All electrical characteristics are defined at the maximum load and operating temperature range.
Please contact us for inquiry about operating temperature range, available frequencies and other conditions.

Dimensions

(Unit: mm)



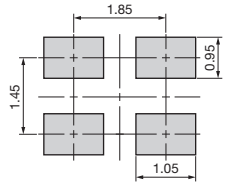
Plating: Ni+Au
Tolerance: ±0.1

Pad Connections	
#1	INH
#2	Case GND
#3	Output
#4	Vcc

INH Function	
Pad1	Pad3 (Output)
Open	Active
"H" Level	Active
"L" Level	High Z (No-Oscillation)

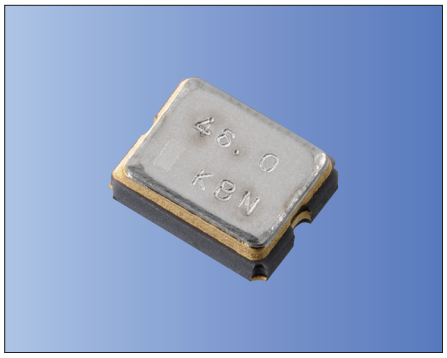
Recommended Land Pattern

(Unit: mm)



Note: A capacitor of value 0.01µF between Vcc and GND is recommended.

CMOS/ 2.5V to 3.3V/ 2.5×2.0mm



RoHS Compliant

Features

- Miniature ceramic package
  2.5 (L) ×2.0 (W) ×0.7 (H) mm (Typ.)
- High Stability Output Frequency
  $\pm10\times10^{-6}$ (−10 to +70°C)
  $\pm15\times10^{-6}$ (−40 to +85°C)
- CMOS output
- Supply voltage Vcc=2.5V/ 3.3V Compatible
  Low Power Supply Consumption
- Wide Operating Voltage Range 2.25 to 3.63V

Applications

- Wi−Fi, Bluetooth® etc.

* Bluetooth® is a registered trademarks of Bluetooth SIG Inc.

How to Order

KC2520C 40.0000 C 2 □ E 00
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Output Frequency
③ Output Type (CMOS)
④ Supply Voltage (2.5V, 3.3V Compatible)
⑤ Frequency Tolerance (See Table 1)
⑥ Symmetry/ INH Function (45/ 55%)
⑦ Individual Specification
(STD Specification is "00")

Packaging (Tape & Reel 2000 pcs./ reel)

Table 1

Freq. Tol. Code	Freq. Tol. × 10^{-6}	Operating Temperature Range (°C)	Note
Y	±10	−10 to +70	Please contact us for available frequencies.
K	±20	−40 to +85	
L	±15		Standard specifications

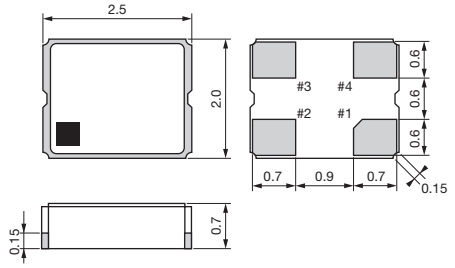
Specifications

Item	Symbol	Conditions		Min.	Max.	Units
Output Frequency Range	fo			1.5	54	MHz
Frequency Tolerance	f_tol	Initial tolerance, Operating temperature range, Rated power supply voltage change, Aging (1 year @25°C), Shock and vibration	Temp.: −40 to +85°C	−15	+15	×10^{-6}
			Temp.: −40 to +85°C	−20	+20	
			Temp.: −10 to +70°C	−10	+10	
Storage Temperature Range	T_stg			−55	+125	°C
Operating Temperature Range	T_use			−10	+70	°C
				−40	+85	
Max. Supply Voltage	—			−0.3	+4.0	V
Supply Voltage	Vcc			+2.25	+3.63	V
Current Consumption	Icc	CL=15pF @2.5V	1.5≤fo<24MHz	—	3.0	mA
			24≤fo≤40MHz	—	3.5	
			40<fo≤54MHz	—	4.5	
		CL=15pF @3.3V	1.5≤fo<24MHz	—	3.5	
			24≤fo≤40MHz	—	5.0	
			40<fo≤54MHz	—	6.0	
Stand-by Current	I_std			—	5	µA
Symmetry	SYM	@50% Vcc		45	55	%
Rise/ Fall Time (10% Vcc to 90% Vcc Maximum Loaded)	Tr/ Tf			—	4	ns
Low Level Output Voltage	VOL	IOL=4mA		—	10% Vcc	V
High Level Output Voltage	VOH	IOH=−4mA		90% Vcc	—	V
CMOS Load	L_CMOS	CMOS Output		—	15	pF
Input Voltage Range	VIN			0	Vcc	V
Low Level Input Voltage	VIL			—	30% Vcc	V
High Level Input Voltage	VIH			70% Vcc	—	V
Disable Time	t_dis			—	100	ns
Enable Time	t_ena			—	5	ms
Start-up Time	t_str	@Minimum operating voltage to be 0 sec.		—	10	ms
1 Sigma Jitter	JSigma	Measured with Wavecrest SIA-3000		—	8	ps
Peak to Peak Jitter	JPK-PK			—	80	ps

Note: All electrical characteristics are defined at the maximum load and operating temperature range.
Please contact us for inquiry about operating temperature range, available frequencies and other conditions

Dimensions

(Unit: mm)



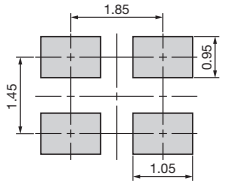
Plating: Ni+Au
Tolerance: ±0.1

Pad Connections	
#1	INH
#2	Case GND
#3	Output
#4	Vcc

INH Function	
Pad1	Pad3 (Output)
Open	Active
"H" Level	Active
"L" Level	High Z (No-Oscillation)

Recommended Land Pattern

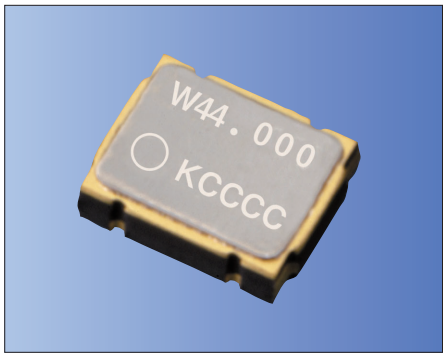
(Unit: mm)



Note: A capacitor of value 0.01µF between Vcc and GND is recommended.

AS of February 2019

CMOS/ 2.5V/ 3.2×2.5mm



RoHS Compliant

Features

- Miniature ceramic package
- Highly reliable with seam welding
- CMOS output
- Supply voltage V_{CC}=2.5V
  Lower voltage available
- ±25×10^{-6} available

Table 1

Freq. Tol. Code	Freq. Tol. × 10^{-6}	Operating Temperature Range (°C)	Note
0	± 50	−10 to +70	Standard specifications
S	± 30		Please contact us for available frequencies.
U	± 25		
F	±100	−40 to +85	
G	± 50		
6	± 50	−40 to +105	

How to Order

KC3225A 25.0000 C 2 □ E 00
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Output Frequency
③ Output Type (CMOS)
④ Supply Voltage (2.5V)
⑤ Frequency Tolerance (See Table 1)
⑥ Symmetry/ INH Function (45/ 55%)
⑦ Individual Specification
(STD Specification is "00")

Packaging (Tape & Reel 2000 pcs./ reel)

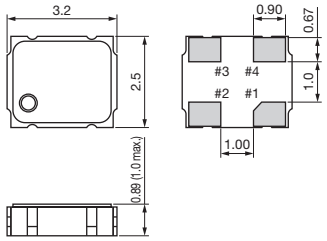
Specifications

Item	Symbol	Conditions		Min.	Max.	Units
Output Frequency Range	fo			1.5	125	MHz
Frequency Tolerance	$f_{\_tol}$	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration	Temp.: −40 to +85°C	−100	+100	×10^{-6}
			Temp.: −10 to +70°C/ −40 to +85°C/ −40 to +105°C	−50	+50	
			Temp.: −10 to +70°C	−30	+30	
			Temp.: −10 to +70°C	−25	+25	
Storage Temperature Range	$T_{\_stg}$			−55	+125	°C
Operating Temperature Range	$T_{\_use}$	Standard Specifications		−10	+70	°C
		Extend (Option)		−40	+85	
				−40	+105	
Max. Supply Voltage	—			−0.5	+7.0	V
Supply Voltage	V_{CC}	Freq. Tol.Code: 0, S, F		+2.25	+2.75	V
		Freq. Tol.Code: U, G, 6		+2.38	+2.62	
Current Consumption (Maximum Loaded)	I_{CC}	1.5≤fo≤26MHz		—	4	mA
		26<fo≤50MHz		—	6	
		50<fo≤67.5MHz		—	9	
		67.5<fo≤95MHz		—	14	
		95<fo≤125MHz		—	18	
Stand-by Current	$I_{\_std}$			—	10	µA
Symmetry	SYM	@50% V_{CC}		45	55	%
Rise/ Fall Time (10% V_{CC} to 90% V_{CC} Maximum Loaded)	Tr/ Tf	1.5≤fo≤67.5MHz		—	6	ns
		67.5<fo≤125MHz		—	4	
Low Level Output Voltage	V_{OL}	I_{OL}=4mA		—	10% V_{CC}	V
High Level Output Voltage	V_{OH}	I_{OH}=−4mA		90% V_{CC}	—	V
CMOS Load	L_CMOS	CMOS Output		—	15	pF
Input Voltage Range	V_{IN}			0	V_{CC}	V
Low Level Input Voltage	V_{IL}			—	30% V_{CC}	V
High Level Input Voltage	V_{IH}			70% V_{CC}	—	V
Disable Time	$t_{\_dis}$			—	150	ns
Enable Time	$t_{\_ena}$			—	5	ms
Start-up Time	$t_{\_str}$	@Minimum operating voltage to be 0 sec.		—	10	ms
1 Sigma Jitter	J_{Sigma}	Measured with Wavecrest SIA-3000	1.5≤fo≤60MHz	—	8	ps
			60<fo≤125MHz	—	5	
Peak to Peak Jitter	J_{PK-PK}	Measured with Wavecrest SIA-3000	1.5≤fo≤60MHz	—	80	ps
			60<fo≤125MHz	—	40	

Note: All electrical characteristics are defined at the maximum load and operating temperature range.
Please contact us for inquiry about operating temperature range, available frequencies and other conditions.

Dimensions

(Unit: mm)



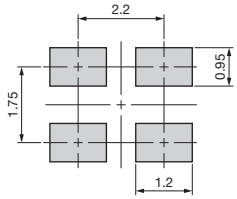
Plating: Ni+Au
Tolerance: ±0.1

Pad Connections	
#1	INH
#2	Case GND
#3	Output
#4	V_{CC}

INH Function	
Pad1	Pad3 (Output)
Open	Active
"H" Level	Active
"L" Level	High Z (No-Oscillation)

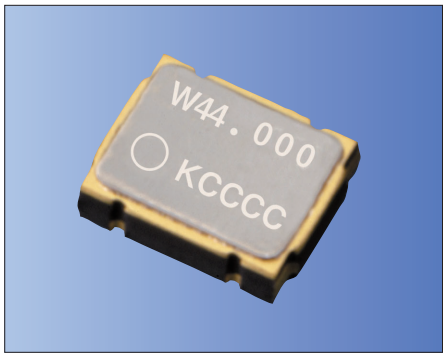
Recommended Land Pattern

(Unit: mm)



Note: A capacitor of value 0.01µF between V_{CC} and GND is recommended.

CMOS/ 3.3V/ 3.2×2.5mm



RoHS Compliant

Features

- Miniature ceramic package
- Highly reliable with seam welding
- CMOS output
- Supply voltage V_{CC}=3.3V
- ±25×10^{-6} available

Table 1

Freq. Tol. Code	Freq. Tol. × 10^{-6}	Operating Temperature Range (°C)	Note
0	± 50	−10 to +70	Standard specifications
S	± 30		Please contact us for available frequencies.
U	± 25		
F	±100	−40 to +85	
G	± 50		
6	± 50	−40 to +105	

How to Order

KC3225A 25.0000 C 3 □ E 00
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Output Frequency
③ Output Type (CMOS)
④ Supply Voltage (3.3V)
⑤ Frequency Tolerance (See Table 1)
⑥ Symmetry/ INH Function (45/ 55%)
⑦ Individual Specification
(STD Specification is "00")

Packaging (Tape & Reel 2000 pcs./ reel)

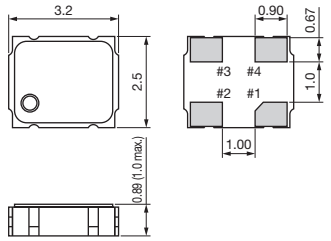
Specifications

Item	Symbol	Conditions		Min.	Max.	Units
Output Frequency Range	fo			1.5	125	MHz
Frequency Tolerance	$f_{\_tol}$	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration	Temp.: −40 to +85°C	−100	+100	×10^{-6}
			Temp.: −10 to +70°C/ −40 to +85°C/ −40 to +105°C	−50	+50	
			Temp.: −10 to +70°C	−30	+30	
			Temp.: −10 to +70°C	−25	+25	
Storage Temperature Range	$T_{\_stg}$			−55	+125	°C
Operating Temperature Range	$T_{\_use}$	Standard Specifications		−10	+70	°C
		Extend (Option)		−40	+85	
				−40	+105	
Max. Supply Voltage	—			−0.5	+7.0	V
Supply Voltage	V_{CC}	Freq. Tol.Code: 0, S, F		+2.97	+3.63	V
		Freq. Tol.Code: U, G, 6		+3.14	+3.46	
Current Consumption (Maximum Loaded)	I_{CC}	1.5≤fo≤26MHz		—	6	mA
		26<fo≤50MHz		—	8	
		50<fo≤67.5MHz		—	12	
		67.5<fo≤95MHz		—	20	
		95<fo≤125MHz		—	25	
Stand-by Current	$I_{\_std}$			—	10	µA
Symmetry	SYM	@50% V_{CC}		45	55	%
Rise/ Fall Time (10% V_{CC} to 90% V_{CC} Maximum Loaded)	Tr/ Tf	1.5≤fo≤67.5MHz		—	5	ns
		67.5<fo≤125MHz		—	3	
Low Level Output Voltage	V_{OL}	I_{OL}=4mA		—	10% V_{CC}	V
High Level Output Voltage	V_{OH}	I_{OH}=−4mA		90% V_{CC}	—	V
CMOS Load	L_CMOS	CMOS Output		—	15	pF
Input Voltage Range	V_{IN}			0	V_{CC}	V
Low Level Input Voltage	V_{IL}			—	30% V_{CC}	V
High Level Input Voltage	V_{IH}			70% V_{CC}	—	V
Disable Time	$t_{\_dis}$			—	150	ns
Enable Time	$t_{\_ena}$			—	5	ms
Start-up Time	$t_{\_str}$	@Minimum operating voltage to be 0 sec.		—	10	ms
1 Sigma Jitter	J_{Sigma}	Measured with Wavecrest SIA-3000	1.5≤fo≤60MHz	—	8	ps
			60<fo≤125MHz	—	5	
Peak to Peak Jitter	J_{PK-PK}	Measured with Wavecrest SIA-3000	1.5≤fo≤60MHz	—	80	ps
			60<fo≤125MHz	—	40	

Note: All electrical characteristics are defined at the maximum load and operating temperature range.
Please contact us for inquiry about operating temperature range, available frequencies and other conditions.

Dimensions

(Unit: mm)



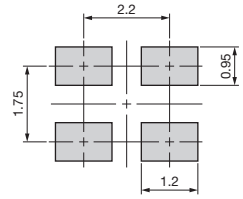
Plating: Ni+Au
Tolerance: ±0.1

Pad Connections	
#1	INH
#2	Case GND
#3	Output
#4	V_{CC}

INH Function	
Pad1	Pad3 (Output)
Open	Active
"H" Level	Active
"L" Level	High Z (No-Oscillation)

Recommended Land Pattern

(Unit: mm)



Note: A capacitor of value 0.01µF between V_{CC} and GND is recommended.

CMOS/ 1.8V/ 7.0×5.0mm

RoHS Compliant

Features

- Miniature ceramic package
- Highly reliable with seam welding
- CMOS output
- Supply voltage V_{CC}=1.8V
  Lower voltage available
- ±25×10^{-6}, ±20×10^{-6} available

Table 1

Stability		Operating Temperature Range (°C)	Note
Code	× 10^{-6}		
0	± 50	−10 to +70	Standard specifications
S	± 30		Please contact us for available frequencies.
U	± 25		
W	± 20		
F	±100	−40 to +85	
G	± 50		
6	± 50	−40 to +105	

How to Order

KC7050A 25.0000 C 1 □ E 00
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Output Frequency
③ Output Type (CMOS)
④ Supply Voltage (1.8V)
⑤ Frequency Tolerance (See Table 1)
⑥ Symmetry/ INH Function (45/ 55%)
⑦ Individual Specification
(STD Specification is "00")

Packaging (Tape & Reel 1000 pcs./ reel)

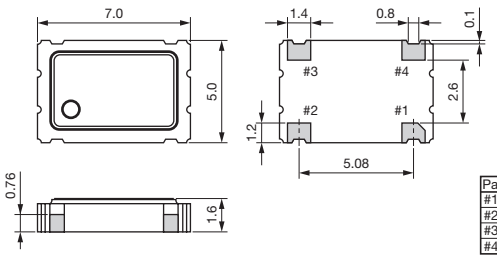
Specifications

Item	Symbol	Conditions		Min.	Max.	Units
Output Frequency Range	fo			1.8	39.99	MHz
Frequency Tolerance	f_tol	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration	Temp.: −40 to +85°C	−100	+100	×10^{-6}
			Temp.: −10 to +70°C/ −40 to +85°C/ −40 to +105°C	−50	+50	
			Temp.: −10 to +70°C	−30	+30	
			Temp.: −10 to +70°C	−25	+25	
			Temp.: −10 to +70°C	−20	+20	
Storage Temperature Range	T_stg			−55	+125	°C
Operating Temperature Range	T_use	Standard Specifications		−10	+70	°C
		Extend (Option)		−40	+85	
				−40	+105	
Max. Supply Voltage	—			−0.5	+3.6	V
Supply Voltage	V_{CC}	Freq. Tol.Code: 0, S, F		+1.71	+1.89	V
		Freq. Tol.Code: U, G, W ,6		+1.75	+1.85	
Current Consumption (Maximum Loaded)	I_{CC}	1.8≤fo≤25MHz		—	3	mA
		25<fo≤39.99MHz		—	4	
Stand-by Current	I_std			—	10	µA
Symmetry	SYM	@50% V_{CC}		45	55	%
Rise/ Fall Time (10% V_{CC} to 90% V_{CC} Maximum Loaded)	Tr/ Tf			—	9	ns
Low Level Output Voltage	V_{OL}	I_{OL}=2.8mA		—	10% V_{CC}	V
High Level Output Voltage	V_{OH}	I_{OH}=−2.8mA		90% V_{CC}	—	V
CMOS Load	L_CMOS	CMOS Output		—	15	pF
Input Voltage Range	V_{IN}			0	V_{CC}	V
Low Level Input Voltage	V_{IL}			—	30% V_{CC}	V
High Level Input Voltage	V_{IH}			70% V_{CC}	—	V
Disable Time	t_dis			—	150	ns
Enable Time	t_ena			—	5	ms
Start-up Time	t_str	@Minimum operating voltage to be 0 sec.		—	10	ms
1 Sigma Jitter	JSigma	Measured with Wavecrest SIA-3000		—	8	ps
Peak to Peak Jitter	JPK-PK			—	80	ps

Note: All electrical characteristics are defined at the maximum load and operating temperature range.
Please contact us for inquiry about operating temperature range, available frequencies and other conditions.

Dimensions

(Unit: mm)



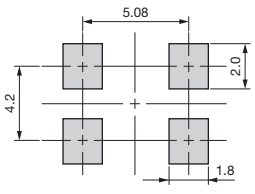
Plating: Ni+Au
Tolerance: ±0.2

Pad Connections	
#1	INH
#2	Case GND
#3	Output
#4	V_{CC}

INH Function	
Pad1	Pad3 (Output)
Open	Active
"H" Level	Active
"L" Level	High Z (No-Oscillation)

Recommended Land Pattern

(Unit: mm)



Note: A capacitor of value 0.01µF between V_{CC} and GND is recommended.

CMOS/ 2.5V/ 7.0×5.0mm

RoHS Compliant

Features

- Miniature ceramic package
- Highly reliable with seam welding
- CMOS output
- Supply voltage V_{CC}=2.5V
  Lower voltage available
- ±25×10^{-6}, ±20×10^{-6} available

Table 1

Stability		Operating Temperature Range (°C)	Note
Code	× 10^{-6}		
0	± 50	−10 to +70	Standard specifications
S	± 30		Please contact us for available frequencies.
U	± 25		
W	± 20		
F	±100	−40 to +85	
G	± 50		
6	± 50	−40 to +105	

How to Order

KC7050A 25.0000 C 2 □ E 00
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Output Frequency
③ Output Type (CMOS)
④ Supply Voltage (2.5V)
⑤ Frequency Tolerance (See Table 1)
⑥ Symmetry/ INH Function (45/ 55%)
⑦ Individual Specification
(STD Specification is "00")

Packaging (Tape & Reel 1000 pcs./ reel)

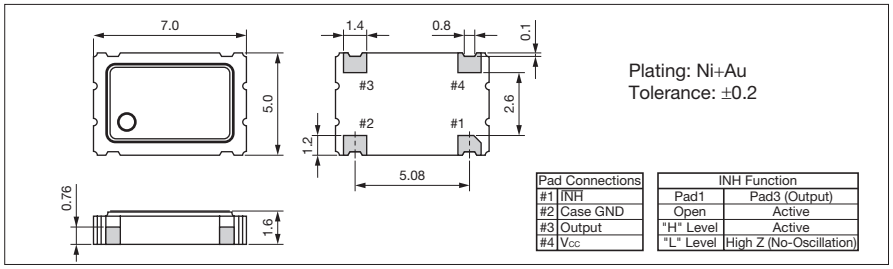
Specifications

Item	Symbol	Conditions		Min.	Max.	Units
Output Frequency Range	fo			1.8	125	MHz
Frequency Tolerance	$f_{\_tol}$	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration	Temp.: −40 to +85°C	−100	+100	×10^{-6}
			Temp.: −10 to +70°C/ −40 to +85°C/ −40 to +105°C	−50	+50	
			Temp.: −10 to +70°C	−30	+30	
			Temp.: −10 to +70°C	−25	+25	
			Temp.: −10 to +70°C	−20	+20	
Storage Temperature Range	$T_{\_stg}$			−55	+125	°C
Operating Temperature Range	$T_{\_use}$	Standard Specifications		−10	+70	°C
		Extend (Option)		−40	+85	
				−40	+105	
Max. Supply Voltage	—			−0.5	+7.0	V
Supply Voltage	V_{CC}	Freq. Tol.Code: 0, S, F		+2.25	+2.75	V
		Freq. Tol.Code: U, G, 6		+2.38	+2.62	
		Freq. Tol.Code: W		+2.43	+2.57	
Current Consumption (Maximum Loaded)	I_{CC}	1.8≤fo≤20MHz		—	5	mA
		20<fo≤40MHz		—	10	
		40<fo≤60MHz		—	15	
		60<fo≤85MHz		—	20	
		85<fo≤100MHz		—	22	
		100<fo≤125MHz		—	27	
Stand-by Current	$I_{\_std}$			—	10	µA
Symmetry	SYM	@50% V_{CC}		45	55	%
Rise/ Fall Time (10% V_{CC} to 90% V_{CC} Maximum Loaded)	Tr/ Tf	1.8≤fo≤40MHz		—	7	ns
		40<fo≤85MHz		—	4	
		85<fo≤125MHz		—	3	
Low Level Output Voltage	V_{OL}	I_{OL}=4mA/ 8mA (40MHz<fo)		—	10% V_{CC}	V
High Level Output Voltage	V_{OH}	I_{OH}=−4mA/ −8mA (40MHz<fo)		90% V_{CC}	—	V
CMOS Load	L_CMOS	CMOS Output		—	15	pF
Input Voltage Range	V_{IN}			0	V_{CC}	V
Low Level Input Voltage	V_{IL}			—	30% V_{CC}	V
High Level Input Voltage	V_{IH}			70% V_{CC}	—	V
Disable Time	$t_{\_dis}$			—	150	ns
Enable Time	$t_{\_ena}$			—	5	ms
Start-up Time	$t_{\_str}$	@Minimum operating voltage to be 0 sec.		—	10	ms
1 Sigma Jitter	J_{Sigma}	Measured with Wavecrest SIA-3000	1.8≤fo<40MHz	—	8	ps
			40≤fo≤100MHz	—	5	
			100<fo≤125MHz	—	4	
Peak to Peak Jitter	J_{PK-PK}	Measured with Wavecrest SIA-3000	1.8≤fo<40MHz	—	80	ps
			40≤fo<100MHz	—	40	
			100≤fo≤125MHz	—	30	

Note: All electrical characteristics are defined at the maximum load and operating temperature range.
Please contact us for inquiry about operating temperature range, available frequencies and other conditions.

Dimensions

(Unit: mm)



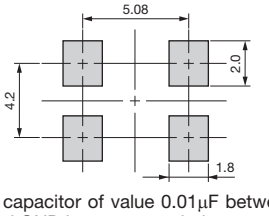
Plating: Ni+Au
Tolerance: ±0.2

Pad Connections	
#1	INH
#2	Case GND
#3	Output
#4	V_{CC}

INH Function	
Pad1	Pad3 (Output)
Open	Active
"H" Level	Active
"L" Level	High Z (No-Oscillation)

Recommended Land Pattern

(Unit: mm)



Note: A capacitor of value 0.01µF between V_{CC} and GND is recommended.

CMOS/ 3.3V/ 7.0×5.0mm

RoHS Compliant

Features

- Miniature ceramic package
- Highly reliable with seam welding
- CMOS output
- Supply voltage V_{CC}=3.3V
- ±25×10^{-6}, ±20×10^{-6} available

Table 1

Stability Code	Stability × 10^{-6}	Operating Temperature Range (°C)	Note
0	± 50	−10 to +70	Standard specifications
S	± 30		Please contact us for available frequencies.
U	± 25		
W	± 20		
F	±100	−40 to +85	
G	± 50		
6	± 50	−40 to +105	

How to Order

KC7050A 25.0000 C 3 □ E 00
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Output Frequency
③ Output Type (CMOS)
④ Supply Voltage (3.3V)
⑤ Frequency Tolerance (See Table 1)
⑥ Symmetry/ INH Function (45/ 55%)
⑦ Individual Specification
(STD Specification is "00")

Packaging (Tape & Reel 1000 pcs./ reel)

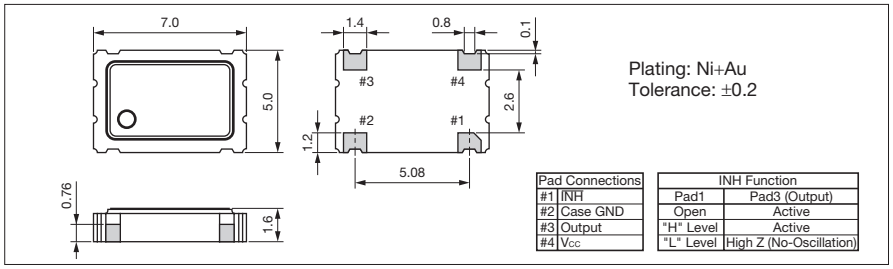
Specifications

Item	Symbol	Conditions		Min.	Max.	Units
Output Frequency Range	fo			1.8	170	MHz
Frequency Tolerance	f_tol	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration	Temp.: −40 to +85°C	−100	+100	×10^{-6}
			Temp.: −10 to +70°C/ −40 to +85°C/ −40 to +105°C	−50	+50	
			Temp.: −10 to +70°C	−30	+30	
			Temp.: −10 to +70°C	−25	+25	
			Temp.: −10 to +70°C	−20	+20	
Storage Temperature Range	T_stg			−55	+125	°C
Operating Temperature Range	T_use	Standard Specifications		−10	+70	°C
		Extend (Option)		−40	+85	
				−40	+105	
Max. Supply Voltage	—	fo<135MHz		−0.5	+7.0	V
		fo≥135MHz		−0.5	+5.0	
Supply Voltage	Vcc	Freq. Tol.Code: 0, S, F		+2.97	+3.63	V
		Freq. Tol.Code: U, G, 6		+3.14	+3.46	
		Freq. Tol.Code: W		+3.20	+3.40	
Current Consumption (Maximum Loaded)	Icc	1.8≤fo≤20MHz		—	10	mA
		20<fo≤40MHz		—	15	
		40<fo≤60MHz		—	30	
		60<fo≤100MHz		—	35	
		100<fo≤135MHz		—	45	
		135<fo≤170MHz		—	60	
Stand-by Current	I_std			—	10	µA
Symmetry	SYM	@50% Vcc		45	55	%
Rise/ Fall Time (10% Vcc to 90% Vcc Maximum Loaded)	Tr/ Tf	1.8≤fo≤26MHz		—	10	ns
		26<fo≤45MHz		—	8	
		45<fo≤100MHz		—	5	
		100<fo≤170MHz		—	2.5	
Low Level Output Voltage	VOL	IOL=8mA		—	10% Vcc	V
High Level Output Voltage	VOH	IOH=−8mA		90% Vcc	—	V
CMOS Load	L_CMOS	CMOS Output		—	15	pF
Input Voltage Range	VIN			0	Vcc	V
Low Level Input Voltage	VIL			—	30% Vcc	V
High Level Input Voltage	VIH			70% Vcc	—	V
Disable Time	t_dis			—	150	ns
Enable Time	t_ena			—	5	ms
Start-up Time	t_str	@Minimum operating voltage to be 0 sec.		—	10	ms
1 Sigma Jitter	JSigma	Measured with Wavecrest SIA-3000	1.8≤fo<40MHz	—	8	ps
			40≤fo≤100MHz	—	5	
			100<fo≤170MHz	—	4	
Peak to Peak Jitter	JPK-PK	Measured with Wavecrest SIA-3000	1.8≤fo<40MHz	—	80	ps
			40≤fo≤100MHz	—	40	
			100<fo≤170MHz	—	30	

Note: All electrical characteristics are defined at the maximum load and operating temperature range.
Please contact us for inquiry about operating temperature range, available frequencies and other conditions.

Dimensions

(Unit: mm)



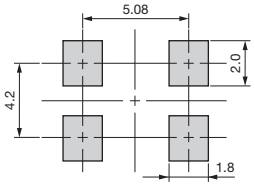
Plating: Ni+Au
Tolerance: ±0.2

Pad Connections	
#1	INH
#2	Case GND
#3	Output
#4	Vcc

INH Function	
Pad1	Pad3 (Output)
Open	Active
"H" Level	Active
"L" Level	High Z (No-Oscillation)

Recommended Land Pattern

(Unit: mm)



Note: A capacitor of value 0.01µF between Vcc and GND is recommended.

CMOS/ 5.0V/ 7.0×5.0mm

RoHS Compliant

Features

- Miniature ceramic package
- Highly reliable with seam welding
- CMOS output
- Supply voltage V_{CC}=5.0V

Table 1

Stability		Operating Temperature Range (°C)	Note
Code	× 10^{-6}		
0	± 50	−10 to +70	Standard specifications
S	± 30		Please contact us for available frequencies.
U	± 25		
F	±100	−40 to +85	
G	± 50		
6	± 50	−40 to +105	

How to Order

KC7050A 25.0000 C 5 □ D 00
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Output Frequency
③ Output Type (CMOS)
④ Supply Voltage (5.0V)
⑤ Frequency Tolerance (See Table 1)
⑥ Symmetry/ INH Function (45/ 55%, Disable)
⑦ Individual Specification (STD Specification is "00")

Packaging (Tape & Reel 1000 pcs./ reel)

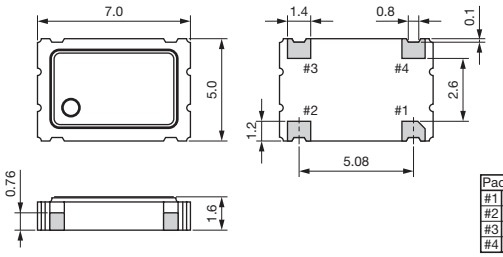
Specifications

Item	Symbol	Conditions		Min.	Max.	Units
Output Frequency Range	fo			1.8	50	MHz
Frequency Tolerance	$f_{\_tol}$	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration	Temp.: −40 to +85°C	−100	+100	×10^{-6}
			Temp.: −10 to +70°C/ −40 to +85°C/ −40 to +105°C	−50	+50	
			Temp.: −10 to +70°C	−30	+30	
			Temp.: −10 to +70°C	−25	+25	
Storage Temperature Range	$T_{\_stg}$			−55	+125	°C
Operating Temperature Range	$T_{\_use}$	Standard Specifications		−10	+70	°C
		Extend (Option)		−40	+85	
				−40	+105	
Max. Supply Voltage	—			−0.5	+7.0	V
Supply Voltage	V_{CC}	Freq. Tol.Code: 0, S, F		+4.5	+5.5	V
		Freq. Tol.Code: U, G, 6		+4.75	+5.25	
Current Consumption (Maximum Loaded)	I_{CC}	1.8≤fo≤20MHz		—	25	mA
		20<fo≤40MHz		—	35	
		40<fo≤50MHz		—	50	
Disable Current	$I_{\_dis}$			—	20	mA
Symmetry	SYM	@50% V_{CC}		45	55	%
Rise/ Fall Time (10% V_{CC} to 90% V_{CC} Maximum Loaded)	Tr/ Tf	1.8≤fo≤26MHz		—	10	ns
		26<fo≤50MHz		—	8	
Low Level Output Voltage	V_{OL}	I_{OL}=16mA		—	10% V_{CC}	V
High Level Output Voltage	V_{OH}	I_{OH}=−16mA		90% V_{CC}	—	V
CMOS Load	L_CMOS	CMOS Output		—	50	pF
Input Voltage Range	V_{IN}			0	V_{CC}	V
Low Level Input Voltage	V_{IL}			—	0.8	V
High Level Input Voltage	V_{IH}			2.2	—	V
Disable Time	$t_{\_dis}$			—	100	ns
Enable Time	$t_{\_ena}$			—	100	ns
Start-up Time	$t_{\_str}$	@Minimum operating voltage to be 0 sec.		—	10	ms
1 Sigma Jitter	J_{Sigma}	Measured with Wavecrest SIA-3000	1.8≤fo<40MHz	—	8	ps
			40≤fo≤50MHz	—	5	
Peak to Peak Jitter	J_{PK-PK}	Measured with Wavecrest SIA-3000	1.8≤fo<40MHz	—	80	ps
			40≤fo≤50MHz	—	40	

Note: All electrical characteristics are defined at the maximum load and operating temperature range.
Please contact us for inquiry about operating temperature range, available frequencies and other conditions.

Dimensions

(Unit: mm)



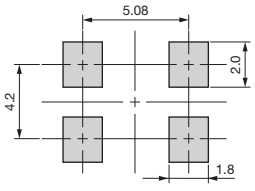
Plating: Ni+Au
Tolernce: ±0.2

Pad Connections	
#1	INH
#2	Case GND
#3	Output
#4	V_{CC}

INH Function	
Pad1	Pad3 (Output)
Open	Active
"H" Level	Active
"L" Level	High Z (Disable)

Recommended Land Pattern

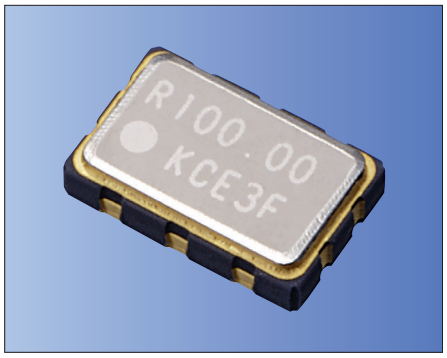
(Unit: mm)



Note: A capacitor of value 0.01μF between V_{CC} and GND is recommended.

KYOCERA

LV-PECL/ 3.3V or 2.5V/ 5.0×3.2mm



RoHS Compliant

Features

- Miniature ceramic package
- Highly reliable with seam welding
- LV-PECL output
- Supply voltage Vcc=3.3V, 2.5V
- ±25×10^{-6} available
- Low Phase Noise

Table 1

Freq. Tol. Code	× 10^{-6}	Operating Temperature Range (°C)	Note
0	± 50	0 to +70	Standard specifications
S	± 30		Please contact us for available frequencies.
U	± 25		
F	±100	−40 to +85	
G	± 50		
6	± 50	−40 to +105	

How to Order

KC5032P 125.000 P □ □ J 00
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Output Frequency
③ Output Type (LV-PECL)
④ Supply Voltage (3 : 3.3V or 2 : 2.5V)
⑤ Frequency Tolerance (See Table 1)
⑥ Symmetry/ INH Function
J : 45/ 55%
⑦ Individual Specification
(STD Specification is "00")

Packaging (Tape & Reel 1000 pcs./ reel)

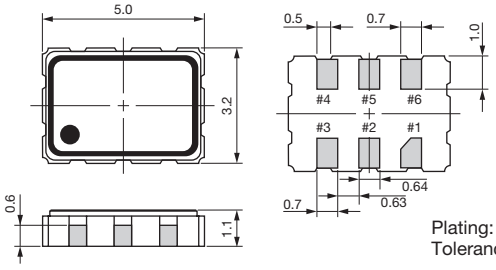
Specifications

Item	Symbol	Conditions		Specifications KC5032P-P2	Specifications KC5032P-P3	Units
Output Frequency Range[Note1]	fo			25 to 175		MHz
Frequency Tolerance	f_tol	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration		±50/ −40 to +105°C		×10^{-6}
				±100/ −40 to +85°C		
				±50/ −40 to +85°C		
				±50/ 0 to +70°C		
				±30/ 0 to +70°C		
				±25/ 0 to +70°C		
Storage Temperature Range	T_stg			−55 to +125		°C
Operating Temperature Range	T_use	Standard Specifications		0 to +70/ −40 to +85		°C
		Extend (Option)		−40 to +105		
Max. Supply Voltage	—			−0.5 to +5.0		V
Supply Voltage	Vcc			+2.375 to +2.625	+2.97 to +3.63	V
Current Consumption	Icc			70 max.		mA
Stand-by Current	I_std			20 max.		μA
Symmetry	SYM	50ohm @crossing point		50±5		%
Rise/ Fall Time (20% Vcc to 80% Vcc Maximum Loaded)	Tr/ Tf	50ohm		0.6 max.		ns
Low Level Output Voltage[Note2]	VOL			Vcc−1.810 to Vcc−1.620		V
High Level Output Voltage[Note2]	VOH			Vcc−1.025 to Vcc−0.880		V
Output Load	RL			50		ohm
Input Voltage Range	VIN			0 to Vcc		
Low Level Input Voltage	VIL			30% Vcc max.		V
High Level Input Voltage	VIH			70% Vcc min.		V
Disable Time	t_dis			150 max.		ns
Enable Time	t_ena			10 max.		ms
Start-up Time	t_str	@Minimum operating voltage to be 0 sec.		10 max.		ms
Deterministic Jitter	DJ	Measured with Wavecrest SIA-3000		2 max.		ps
1 Sigma Jitter	Jsigma			4 max.		ps
Peak to Peak Jitter	JPK-PK			30 max.		ps
Phase Jitter	Jphase	@156.25MHz Vcc=3.3V	BW : 12kHz to 20MHz	0.3 max.		ps

Note : All electrical characteristics are defined at the maximum load and operating temperature range.
Note1: Please contact us for inquiry about operating temperature range, available frequencies and other conditions.
Note2: DC characteristic

Dimensions

(Unit: mm)



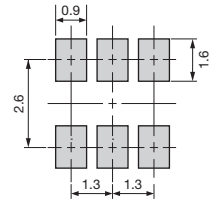
Plating: Ni+Au
Tolerance: ±0.2

Pad Connections	
#1	INH
#2	NC
#3	Case GND
#4	Output
#5	Complementary Output
#6	Vcc

INH Function	
Pad1	Pad4/ Pad5 (Output)
Open	Active
"H" Level	Active
"L" Level	High Z (No-Oscillation)

Recommended Land Pattern

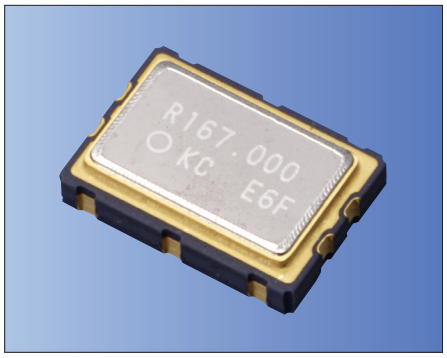
(Unit: mm)



Note: A capacitor of value 0.01μF and 10μF between Vcc and GND is recommended.

KYOCERA

LV-PECL/ 3.3V or 2.5V/ 7.0×5.0mm



RoHS Compliant

Features

- Miniature ceramic package
- Highly reliable with seam welding
- LV-PECL output
- Supply voltage Vcc=3.3V, 2.5V
- ±25×10^{-6} available
- Low Phase Noise

Table 1

Freq. Tol. Code	× 10^{-6}	Operating Temperature Range (°C)	Note
0	± 50	0 to +70	Standard specifications
S	± 30		Please contact us for available frequencies.
U	± 25		
F	±100	−40 to +85	
G	± 50		
6	± 50	−40 to +105	

How to Order

KC7050P 125.000 P □ □ J 00
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Output Frequency
③ Output Type (LV-PECL)
④ Supply Voltage (3 : 3.3V or 2 : 2.5V)
⑤ Frequency Tolerance (See Table 1)
⑥ Symmetry/ INH Function
J : 45/ 55%
⑦ Individual Specification
(STD Specification is "00")

Packaging (Tape & Reel 1000 pcs./ reel)

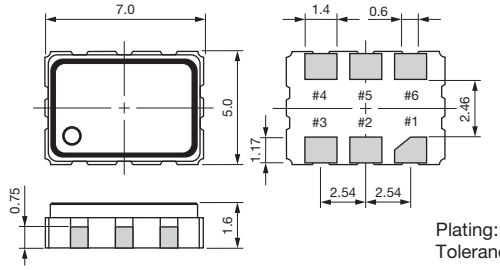
Specifications

Item	Symbol	Conditions		Specifications KC7050P-P2	Specifications KC7050P-P3	Units
Output Frequency Range[Note1]	fo			25 to 175		MHz
Frequency Tolerance	f_tol	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration		±50/ −40 to +105°C		×10^{-6}
				±100/ −40 to +85°C		
				±50/ −40 to +85°C		
				±50/ 0 to +70°C		
				±30/ 0 to +70°C		
				±25/ 0 to +70°C		
Storage Temperature Range	T_stg			−55 to +125		°C
Operating Temperature Range	T_use	Standard Specifications		0 to +70/ −40 to +85		°C
		Extend (Option)		−40 to +105		
Max. Supply Voltage	—			−0.5 to +5.0		V
Supply Voltage	Vcc			+2.375 to +2.625	+2.97 to +3.63	V
Current Consumption	Icc			70 max.		mA
Stand-by Current	I_std			20 max.		μA
Symmetry	SYM	50ohm @crossing point		50±5		%
Rise/ Fall Time (20% Vcc to 80% Vcc Maximum Loaded)	Tr/ Tf	50ohm		0.6 max.		ns
Low Level Output Voltage[Note2]	VOL			Vcc−1.810 to Vcc−1.620		V
High Level Output Voltage[Note2]	VOH			Vcc−1.025 to Vcc−0.880		V
Output Load	RL			50		ohm
Input Voltage Range	VIN			0 to Vcc		
Low Level Input Voltage	VIL			30% Vcc max.		V
High Level Input Voltage	VIH			70% Vcc min.		V
Disable Time	t_dis			150 max.		ns
Enable Time	t_ena			10 max.		ms
Start-up Time	t_str	@Minimum operating voltage to be 0 sec.		10 max.		ms
Deterministic Jitter	DJ	Measured with Wavecrest SIA-3000		2 max.		ps
1 Sigma Jitter	Jsigma			4 max.		ps
Peak to Peak Jitter	JPK-PK			30 max.		ps
Phase Jitter	Jphase	@156.25MHz Vcc=3.3V	BW : 12kHz to 20MHz	0.3 max.		ps

Note : All electrical characteristics are defined at the maximum load and operating temperature range.
Note1: Please contact us for inquiry about operating temperature range, available frequencies and other conditions.
Note2: DC characteristic

Dimensions

(Unit: mm)



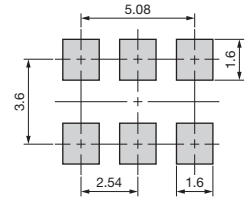
Plating: Ni+Au
Tolerance: ±0.2

Pad Connections	
#1	INH
#2	NC
#3	Case GND
#4	Output
#5	Complementary Output
#6	Vcc

INH Function	
Pad1	Pad4/ Pad5 (Output)
Open	Active
"H" Level	Active
"L" Level	High Z (No-Oscillation)

Recommended Land Pattern

(Unit: mm)



Note: A capacitor of value 0.01μF and 10μF between Vcc and GND is recommended.

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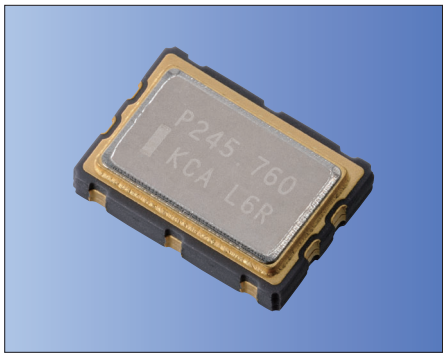
LV-PECL/ 3.3V/ 7.0×5.0mm



RoHS Compliant

Features

- High frequency to 800MHz
- LV-PECL output
- Miniature ceramic package
- for WDM, Networking Applications

Table 1

Freq. Tol.		Operating Temperature Range (°C)	Note
Code	× 10^{-6}		
G	±50	−40 to +85	Please contact us for available frequencies.

How to Order

KC7050R 622.080 P 3 G D 00
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Output Frequency
③ Output Type (LV-PECL)
④ Supply Voltage (3.3V)
⑤ Frequency Tolerance (See Table 1)
⑥ Symmetry/ INH Function
(45/ 55%, Disable)
⑦ Individual Specification
(STD Specification is "00")

Packaging (Tape & Reel 1000 pcs./ reel)

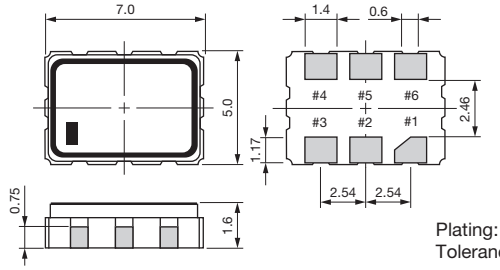
Specifications

Item	Symbol	Conditions		Min.	Max.	Units
Output Frequency Range[Note1]	fo			10	800	MHz
Frequency Tolerance	$f_{\_tol}$	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration	Temp.: −40 to +85°C	−50	+50	×10^{-6}
Storage Temperature Range	$T_{\_stg}$			−55	+125	°C
Operating Temperature Range	$T_{\_use}$			−40	+85	°C
Max. Supply Voltage	—			−0.5	+4.2	V
Supply Voltage	V_{CC}			+2.97	+3.63	V
Current Consumption	I_{CC}			—	100	mA
Disable Current	I_{DE}			—	30	mA
Symmetry	SYM	50ohm @crossing point		45	55	%
Rise/ Fall Time (20% to 80% Output Level)	Tr/ Tf	50ohm		—	0.4	ns
Low Level Output Voltage[Note2]	V_{OL}			—	V_{CC}−1.620	V
High Level Output Voltage[Note2]	V_{OH}			V_{CC}−1.025	—	V
Output Load	—	LV-PECL Output		50		ohm
Low Level Input Voltage[Note2]	V_{IL}			—	30% V_{CC}	V
High Level Input Voltage[Note2]	V_{IH}			70% V_{CC}	—	V
Disable Time	$t_{\_dis}$			—	200	ns
Enable Time	$t_{\_ena}$			—	2	ms
Start-up Time	$t_{\_str}$	@Minimum operating voltage to be 0 sec.		—	10	ms
Phase Jitter	J_{Phase}	@622.08MHz	BW : 12kHz to 20MHz	Typ. 3.0		ps
Phase Noise	—	@622.08MHz	@10Hz offset	Typ. −40		dBc/ Hz
			@100Hz offset	Typ. −70		
			@1kHz offset	Typ. −95		
			@10kHz offset	Typ. −105		
			@100kHz offset	Typ. −105		
			@1MHz offset	Typ. −125		
			@10MHz offset	Typ. −135		

Note : All electrical characteristics are defined at the maximum load and operating temperature range.
Note1: Please contact us for inquiry about operating temperature range, available frequencies and other conditions.
Note2: DC characteristic

Dimensions

(Unit: mm)



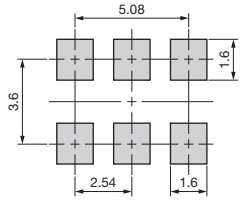
Plating: Ni+Au
Tolerance: ±0.2

Pad Connections	
#1	INH
#2	NC
#3	Case GND
#4	Output
#5	Complementary Output
#6	V_{CC}

INH Function	
Pad1	Pad4/ Pad5 (Output)
Open	Active
"H" Level	Active
"L" Level	High Z (No-Oscillation)

Recommended Land Pattern

(Unit: mm)

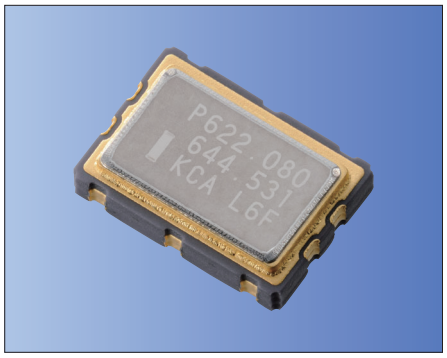


Note: A capacitor of value 0.01μF and 10μF between V_{CC} and GND is recommended.

AS of February 2019

KYOCERA

LV-PECL/ 3.3V/ 7.0×5.0mm



RoHS Compliant

Features

- High frequency to 800MHz
- Dual frequency selectable
- LV-PECL output
- Miniature ceramic package
- for WDM, Networking Applications

Table 1

Freq. Tol. Code	Freq. Tol. × 10^{-6}	Operating Temperature Range (°C)	Note
G	±50	−40 to +85	Please contact us for available frequencies.

How to Order

KC7050G 622A644 P 3 G D 00
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Output Frequency/ Selection Frequency
③ Output Type (LV-PECL)
④ Supply Voltage (3.3V)
⑤ Frequency Tolerance (See Table 1)
⑥ Symmetry/ INH Function
(45/ 55%, Disable)
⑦ Individual Specification
(STD Specification is "00")

Packaging (Tape & Reel 1000 pcs./ reel)

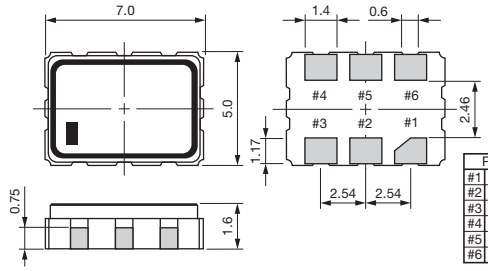
Specifications

Item	Symbol	Conditions		Min.	Max.	Units
Output Frequency Range[Note1]	f1	Primary Output/ #2 "H"−Level or Open		10	800	MHz
	f2	Secondary Output/ #2 "L"-Level		10	800	MHz
Frequency Tolerance	$f_{\_tol}$	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration	Temp.: −40 to +85°C	−50	+50	×10^{-6}
Storage Temperature Range	$T_{\_stg}$			−55	+125	°C
Operating Temperature Range	$T_{\_use}$			−40	+85	°C
Max. Supply Voltage	—			−0.5	+4.2	V
Supply Voltage	V_{CC}			+2.97	+3.63	V
Current Consumption	I_{CC}			—	100	mA
Symmetry	SYM	50ohm @crossing point		45	55	%
Rise/ Fall Time (20% to 80% Output Level)	Tr/ Tf	50ohm		—	0.4	ns
Low Level Output Voltage[Note2]	V_{OL}			—	V_{CC}−1.620	V
High Level Output Voltage[Note2]	V_{OH}			V_{CC}−1.025	—	V
Output Load	—	LV-PECL Output		50		ohm
Low Level Input Voltage	V_{IL}			—	30% V_{CC}	V
High Level Input Voltage	V_{IH}			70% V_{CC}	—	V
Start-up Time	$t_{\_str}$	@Minimum operating voltage to be 0 sec.		—	10	ms
Phase Jitter	J_{Phase}	@622.08MHz	BW : 12kHz to 20MHz	Typ. 3.0		ps
Phase Noise	—	@622.08MHz	@10Hz offset	Typ. −40		dBc/ Hz
			@100Hz offset	Typ. −70		
			@1kHz offset	Typ. −95		
			@10kHz offset	Typ. −105		
			@100kHz offset	Typ. −105		
			@1MHz offset	Typ. −125		
			@10MHz offset	Typ. −135		

Note : All electrical characteristics are defined at the maximum load and operating temperature range.
Note1: Please contact us for inquiry about operating temperature range, available frequencies and other conditions.
Note2: DC characteristic

Dimensions

(Unit: mm)



Plating: Ni+Au
Tolerance: ±0.2

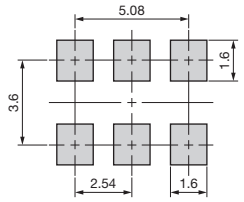
Pad Connections	
#1	INH
#2	Frequency Select
#3	Case GND
#4	Output
#5	Complementary Output
#6	V_{CC}

INH Function	
Pad1	Pad4/ Pad5 (Output)
Open	Active
"H" Level	Active
"L" Level	High Z (No-Oscillation)

Frequency Select Function	
Pad2	Pad4/ Pad5 (Output)
Open	Primary Freq.
"H" Level	Primary Freq.
"L" Level	Secondly Freq.

Recommended Land Pattern

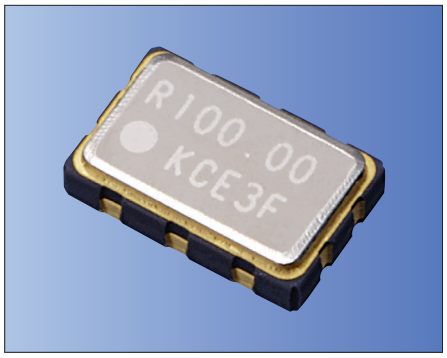
(Unit: mm)



Note: A capacitor of value 0.01μF and 10μF between V_{CC} and GND is recommended.

KYOCERA

LVDS/ 3.3V or 2.5V/ 5.0×3.2mm



RoHS Compliant

Features

- Miniature ceramic package
- Highly reliable with seam welding
- LVDS output
- Supply voltage V_{CC}=3.3V, 2.5V
- ±25×10^{-6} available
- Low Phase Noise

Table 1

Freq. Tol.		Operating Temperature Range (°C)	Note
Code	× 10^{-6}		
0	± 50	0 to +70	Standard specifications
S	± 30		Please contact us for available frequencies.
U	± 25		
F	±100	−40 to +85	
G	± 50		
6	± 50	−40 to +105	

How to Order

KC5032P 125.000 L □ □ J 00
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Output Frequency
③ Output Type (LVDS)
④ Supply Voltage (3 : 3.3V or 2 : 2.5V)
⑤ Frequency Tolerance (See Table 1)
⑥ Symmetry/ INH Function
J : 45/ 55%
⑦ Individual Specification
(STD Specification is "00")

Packaging (Tape & Reel 1000 pcs./ reel)

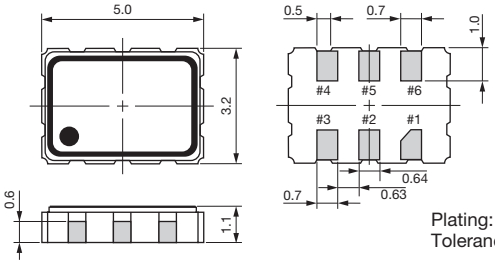
Specifications

Item	Symbol	Conditions		Specifications KC5032P-L2	Specifications KC5032P-L3	Units
Output Frequency Range[Note1]	fo			25 to 175		MHz
Frequency Tolerance	$f_{\_tol}$	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration		±50/ −40 to +105°C		×10^{-6}
				±100/ −40 to +85°C		
				±50/ −40 to +85°C		
				±50/ 0 to +70°C		
				±30/ 0 to +70°C		
				±25/ 0 to +70°C		
Storage Temperature Range	$T_{\_stg}$			−55 to +125		°C
Operating Temperature Range	$T_{\_use}$	Standard Specifications		0 to +70/ −40 to +85		°C
		Extend (Option)		−40 to +105		
Max. Supply Voltage	—			−0.5 to +5.0		V
Supply Voltage	V_{CC}			+2.375 to +2.625	+2.97 to +3.63	V
Current Consumption	I_{CC}			50 max.		mA
Stand-by Current	$I_{\_std}$			20 max.		µA
Symmetry	SYM	100ohm @crossing point		50±5		%
Rise/ Fall Time (20% V_{CC} to 80% V_{CC} Maximum Loaded)	Tr/ Tf	100ohm		0.6 max.		ns
Low Level Output Voltage[Note2]	V_{OL}			0.9 min. Typ.:1.1		V
High Level Output Voltage[Note2]	V_{OH}			1.6 max. Typ.:1.43		V
Diffrentical Output Voltage[Note2]	V_{OD}			247 to 454 Typ.:330		mV
Diffrentical Output Voltage Error[Note2]	dV_{OD}	dV_{OD}=¦V_{OD1}−V_{OD2}¦		50 max.		mV
Offset Voltage	V_{OS}			1.125 to 1.375		V
Offset Voltage Error	dV_{OS}	dV_{OS}=¦V_{OS1}−V_{OS2}¦		50 max.		mV
Output Load	RL	LVDS Output		100		ohm
Input Voltage Range	V_{IN}			0 to V_{CC}		V
Low Level Input Voltage	V_{IL}			30% V_{CC} max.		V
High Level Input Voltage	V_{IH}			70% V_{CC} min.		V
Disable Time	$t_{\_dis}$			200 max.		ns
Enable Time	$t_{\_ena}$			10 max.		ms
Start-up Time	$t_{\_str}$	@Minimum operating voltage to be 0 sec.		10 max.		ms
Deterministic Jitter	DJ	Measured with Wavecrest SIA-3000		2 max.		ps
1 Sigma Jitter	Jsigma			4 max.		ps
Peak to Peak Jitter	J_{PK-PK}			30 max.		ps
Phase Jitter	J_{Phase}	@156.25MHz V_{CC}=3.3V	BW : 12kHz to 20MHz	0.3 max.		ps

Note : All electrical characteristics are defined at the maximum load and operating temperature range.
Note1: Please contact us for inquiry about operating temperature range, available frequencies and other conditions.
Note2: DC characteristic

Dimensions

(Unit: mm)



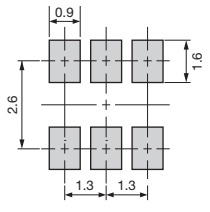
Plating: Ni+Au
Tolerance: ±0.2

Pad Connections	
#1	INH
#2	NC
#3	Case GND
#4	Output
#5	Complementary Output
#6	V_{CC}

INH Function	
Pad1	Pad4/ Pad5 (Output)
Open	Active
"H" Level	Active
"L" Level	High Z (No-Oscillation)

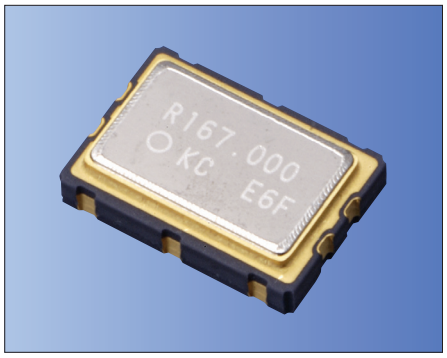
Recommended Land Pattern

(Unit: mm)



Note: A capacitor of value 0.01µF and 10µF Between V_{CC} and GND is recommended.

LVDS/ 3.3V or 2.5V/ 7.0×5.0mm



RoHS Compliant

Features

- Miniature ceramic package
- Highly reliable with seam welding
- LVDS output
- Supply voltage Vcc=3.3V, 2.5V
- ±25×10^{-6} available
- Low Phase Noise

Table 1

Freq. Tol.		Operating Temperature Range (°C)	Note
Code	× 10^{-6}		
0	± 50	0 to +70	Standard specifications
S	± 30		Please contact us for available frequencies.
U	± 25		
F	±100	−40 to +85	
G	± 50		
6	± 50	−40 to +105	

How to Order

KC7050P 125.000 L □ □ J 00
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Output Frequency
③ Output Type (LVDS)
④ Supply Voltage (3 : 3.3V or 2 : 2.5V)
⑤ Frequency Tolerance (See Table 1)
⑥ Symmetry/ INH Function
J : 45/ 55%
⑦ Individual Specification
(STD Specification is "00")

Packaging (Tape & Reel 1000 pcs./ reel)

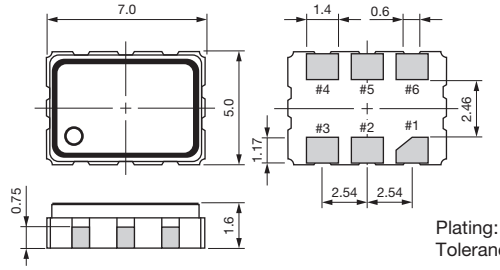
Specifications

Item	Symbol	Conditions	Specifications KC7050P-L2	Specifications KC7050P-L3	Units
Output Frequency Range[Note1]	fo		25 to 175		MHz
Frequency Tolerance	f_tol	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration	±50/ −40 to +105°C		×10^{-6}
			±100/ −40 to +85°C		
			±50/ −40 to +85°C		
			±50/ 0 to +70°C		
			±30/ 0 to +70°C		
			±25/ 0 to +70°C		
Storage Temperature Range	T_stg		−55 to +125		°C
Operating Temperature Range	T_use	Standard Specifications	0 to +70/ −40 to +85		°C
		Extend (Option)	−40 to +105		
Max. Supply Voltage	—		−0.5 to +5.0		V
Supply Voltage	Vcc		+2.375 to +2.625	+2.97 to +3.63	V
Current Consumption	Icc		50 max.		mA
Stand-by Current	I_std		20 max.		µA
Symmetry	SYM	100ohm @crossing point	50±5		%
Rise/ Fall Time (20% Vcc to 80% Vcc Maximum Loaded)	Tr/ Tf	100ohm	0.6 max.		ns
Low Level Output Voltage[Note2]	VOL		0.9 min. Typ.:1.1		V
High Level Output Voltage[Note2]	VOH		1.6 max. Typ.:1.43		V
Diffrentical Output Voltage[Note2]	VOD		247 to 454 Typ.:330		mV
Diffrentical Output Voltage Error[Note2]	dVOD	dVOD=¦VOD1−VOD2¦	50 max.		mV
Offset Voltage	VOS		1.125 to 1.375		V
Offset Voltage Error	dVOS	dVOS=¦VOS1−VOS2¦	50 max.		mV
Output Load	RL	LVDS Output	100		ohm
Input Voltage Range	VIN		0 to Vcc		V
Low Level Input Voltage	VIL		30% Vcc max.		V
High Level Input Voltage	VIH		70% Vcc min.		V
Disable Time	t_dis		200 max.		ns
Enable Time	t_ena		10 max.		ms
Start-up Time	t_str	@Minimum operating voltage to be 0 sec.	10 max.		ms
Deterministic Jitter	DJ	Measured with Wavecrest SIA-3000	2 max.		ps
1 Sigma Jitter	Jsigma		4 max.		ps
Peak to Peak Jitter	JPK-PK		30 max.		ps
Phase Jitter	JPhase	@156.25MHz Vcc=3.3V, BW : 12kHz to 20MHz	0.3max.		ps

Note : All electrical characteristics are defined at the maximum load and operating temperature range.
Note1: Please contact us for inquiry about operating temperature range, available frequencies and other conditions.
Note2: DC characteristic

Dimensions

(Unit: mm)



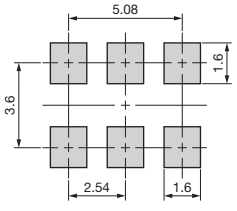
Plating: Ni+Au
Tolerance: ±0.2

Pad Connections	
#1	INH
#2	NC
#3	Case GND
#4	Output
#5	Complementary Output
#6	Vcc

INH Function	
Pad1	Pad4/ Pad5 (Output)
Open	Active
"H" Level	Active
"L" Level	High Z (No-Oscillation)

Recommended Land Pattern

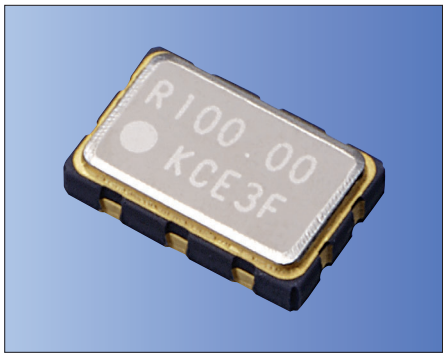
(Unit: mm)



Note: A capacitor of value 0.01µF and 10µF Between Vcc and GND is recommended.

KYOCERA

HCSL/ 3.3V or 2.5V/ 5.0×3.2mm



RoHS Compliant

Features

- Miniature ceramic package
- Highly reliable with seam welding
- HCSL output
- Supply voltage V_{CC}=3.3V, 2.5V
- ±25×10^{-6} available
- Low Phase Noise

Table 1

Freq. Tol.		Operating Temperature Range (°C)	Note
Code	× 10^{-6}		
0	± 50	0 to +70	Standard specifications
S	± 30		Please contact us for available frequencies.
U	± 25		
F	±100	−40 to +85	
G	± 50		
6	± 50	−40 to +105	

How to Order

KC5032P 100.000 H □ □ J 00
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Output Frequency
③ Output Type (HCSL)
④ Supply Voltage (3 : 3.3V or 2 : 2.5V)
⑤ Frequency Tolerance (See Table 1)
⑥ Symmetry/ INH Function (45/ 55%)
⑦ Individual Specification
(STD Specification is "00")

Packaging (Tape & Reel 1000 pcs./ reel)

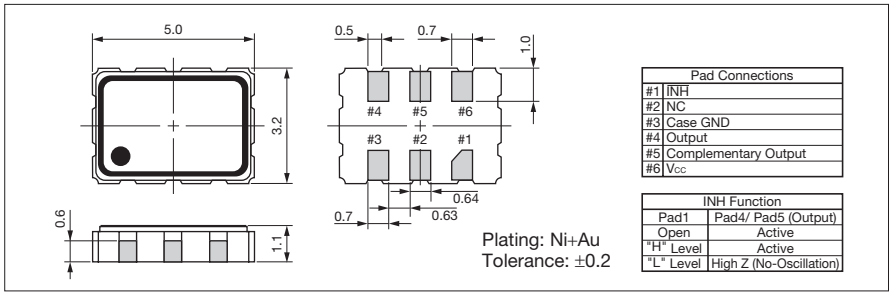
Specifications

Item	Symbol	Conditions		Specifications KC5032P-H2 Min.	KC5032P-H2 Max.	KC5032P-H3 Min.	KC5032P-H3 Max.	Units
Output Frequency Range[Note1]	fo			25	175	25	175	MHz
Frequency Tolerance	$f_{\_tol}$	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration		−50	+50	−50	+50	×10^{-6}
Storage Temperature Range	$T_{\_stg}$			−55	+125	−55	+125	°C
Operating Temperature Range	$T_{\_use}$			0	+70	0	+70	°C
				−40	+85	−40	+85	
				−40	+105	−40	+105	
Max. Supply Voltage	—			−0.3	+4.0	−0.3	+4.0	V
Supply Voltage	V_{CC}			2.375	2.625	2.97	3.63	V
Current Consumption	I_{CC}			—	50	—	50	mA
Stand-by Current	$I_{\_std}$			—	20	—	20	µA
Symmetry	SYM	50ohm @crossing point		45	55	45	55	%
Rise/ Fall Time 0.175V to 0.525V	Tr/ Tf	50ohm		—	0.5	—	0.5	ns
Low Level Output Voltage[Note2]	V_{OL}			−0.15	+0.15	−0.15	+0.15	V
High Level Output Voltage[Note2]	V_{OH}			+0.66	+0.85	+0.66	+0.85	V
Output Load	RL	HCSL Output		50		50		ohm
Low Level Input Voltage	V_{IL}			—	30% V_{CC}	—	30% V_{CC}	V
High Level Input Voltage	V_{IH}			70% V_{CC}	—	70% V_{CC}	—	V
Disable Time	$t_{\_dis}$			—	200	—	200	ns
Enable Time	$t_{\_ena}$			—	10	—	10	ms
Start-up Time	$t_{\_str}$	@Minimum operating voltage to be 0 sec.		—	10	—	10	ms
Deterministic Jitter	DJ	Measured with Wavecrest SIA-3000		—	2	—	2	ps
1sigma Jitter	J_{Sigma}			—	4	—	4	ps
Peak to Peak Jitter	J_{PK-PK}			—	30	—	30	ps
Phase Jitter	J_{Phase}	@100MHz V_{CC}=3.3V	BW : 12kHz to 20MHz	—	0.5	—	0.5	ps
Phase Noise	—	@100MHz V_{CC}=3.3V	@10Hz offset	Typ. −77				dBc/ Hz
			@100Hz offset	Typ. −107				
			@1kHz offset	Typ. −130				
			@10kHz offset	Typ. −142				
			@100kHz offset	Typ. −149				
			@1MHz offset	Typ. −150				
			@10MHz offset	Typ. −152				

Note : All electrical characteristics are defined at the maximum load and operating temperature range.
Note1: Please contact us for inquiry about operating temperature range, available frequencies and other conditions.
Note2: DC characteristic

Dimensions

(Unit: mm)



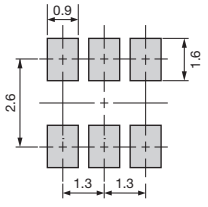
Plating: Ni+Au
Tolerance: ±0.2

Pad Connections	
#1	INH
#2	NC
#3	Case GND
#4	Output
#5	Complementary Output
#6	V_{CC}

INH Function	
Pad1	Pad4/ Pad5 (Output)
Open	Active
"H" Level	Active
"L" Level	High Z (No-Oscillation)

Recommended Land Pattern

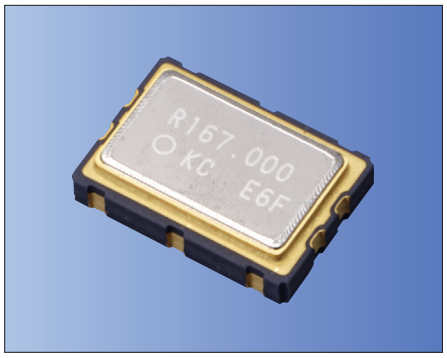
(Unit: mm)



Note: A capacitor of value 0.01µF and 10µF Between V_{CC} and GND is recommended.

KYOCERA

HCSL/ 3.3V or 2.5V/ 7.0×5.0mm



RoHS Compliant

Features

- Miniature ceramic package
- Highly reliable with seam welding
- HCSL output
- Supply voltage V_{CC}=3.3V, 2.5V
- ±25×10^{-6} available
- Low Phase Noise

Table 1

Freq. Tol.		Operating Temperature Range (°C)	Note
Code	× 10^{-6}		
0	± 50	0 to +70	Standard specifications
S	± 30		Please contact us for available frequencies.
U	± 25		
F	±100	−40 to +85	
G	± 50		
6	± 50	−40 to +105	

How to Order

KC7050P 100.000 H □ □ J 00
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Output Frequency
③ Output Type (HCSL)
④ Supply Voltage (3 : 3.3V or 2 : 2.5V)
⑤ Frequency Tolerance (See Table 1)
⑥ Symmetry/ INH Function(45/ 55%)
⑦ Individual Specification
(STD Specification is "00")

Packaging (Tape & Reel 1000 pcs./ reel)

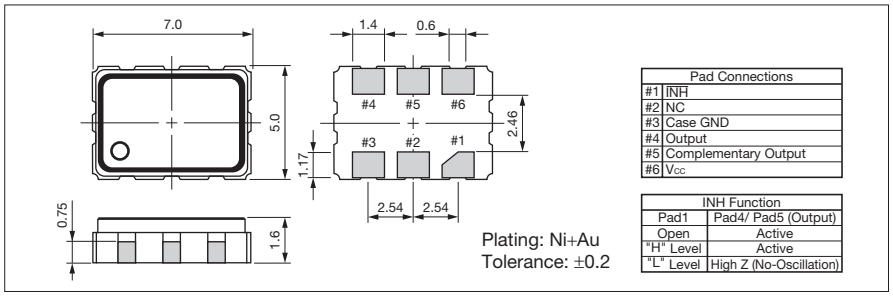
Specifications

Item	Symbol	Conditions		Specifications KC7050P-H2 Min.	KC7050P-H2 Max.	KC7050P-H3 Min.	KC7050P-H3 Max.	Units
Output Frequency Range[Note1]	fo			25	175	25	175	MHz
Frequency Tolerance	$f_{\_tol}$	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration		−50	+50	−50	+50	×10^{-6}
Storage Temperature Range	$T_{\_stg}$			−55	+125	−55	+125	°C
Operating Temperature Range	$T_{\_use}$			0	+70	0	+70	°C
				−40	+85	−40	+85	
				−40	+105	−40	+105	
Max. Supply Voltage	—			−0.3	+4.0	−0.3	+4.0	V
Supply Voltage	V_{CC}			2.375	2.625	2.97	3.63	V
Current Consumption	I_{CC}			—	50	—	50	mA
Stand-by Current	$I_{\_std}$			—	20	—	20	µA
Symmetry	SYM	50ohm @crossing point		45	55	45	55	%
Rise/ Fall Time 0.175V to 0.525V	Tr/ Tf	50ohm		—	0.5	—	0.5	ns
Low Level Output Voltage[Note2]	V_{OL}			−0.15	+0.15	−0.15	+0.15	V
High Level Output Voltage[Note2]	V_{OH}			+0.66	+0.85	+0.66	+0.85	V
Output Load	RL	HCSL Output		50		50		ohm
Low Level Input Voltage	V_{IL}			—	30% V_{CC}	—	30% V_{CC}	V
High Level Input Voltage	V_{IH}			70% V_{CC}	—	70% V_{CC}	—	V
Disable Time	$t_{\_dis}$			—	200	—	200	ns
Enable Time	$t_{\_ena}$			—	10	—	10	ms
Start-up Time	$t_{\_str}$	@Minimum operating voltage to be 0 sec.		—	10	—	10	ms
Deterministic Jitter	DJ	Measured with Wavecrest SIA-3000		—	2	—	2	ps
1sigma Jitter	J_{Sigma}			—	4	—	4	ps
Peak to Peak Jitter	J_{PK-PK}			—	30	—	30	ps
Phase Jitter	J_{Phase}	@100MHz V_{CC}=3.3V	BW : 12kHz to 20MHz	—	0.5	—	0.5	ps
Phase Noise	—	@100MHz V_{CC}=3.3V	@10Hz offset	Typ. −77				dBc/ Hz
			@100Hz offset	Typ. −107				
			@1kHz offset	Typ. −130				
			@10kHz offset	Typ. −142				
			@100kHz offset	Typ. −149				
			@1MHz offset	Typ. −150				
			@10MHz offset	Typ. −152				

Note : All electrical characteristics are defined at the maximum load and operating temperature range.
Note1: Please contact us for inquiry about operating temperature range, available frequencies and other conditions.
Note2: DC characteristic

Dimensions

(Unit: mm)

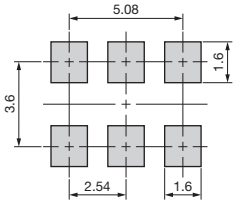


Pad Connections	
#1	INH
#2	NC
#3	Case GND
#4	Output
#5	Complementary Output
#6	V_{CC}

INH Function	
Pad1	Pad4/ Pad5 (Output)
Open	Active
"H" Level	Active
"L" Level	High Z (No-Oscillation)

Recommended Land Pattern

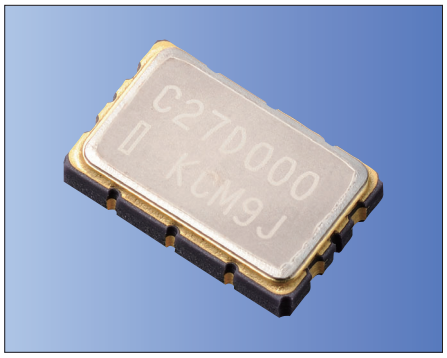
(Unit: mm)



Note: A capacitor of value 0.01µF and 10µF Between V_{CC} and GND is recommended.

AS of February 2019

CMOS/ 3.3V/ 5.0×3.2mm



RoHS Compliant

Features

- Miniature ceramic package
- Highly reliable with seam welding
- CMOS output
- Supply voltage Vcc=3.3V
- Excellent Jitter performance

Table 1

Freq. Tol.		Operating Temperature Range (°C)	Note
Code	× 10^{-6}		
0	±50	−10 to +70	Standard specifications
S	±30		Please contact us for available frequencies.
G	±50	−40 to +85	

How to Order

KV5032D 24.576 C 3 □ D 00
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Output Frequency
③ Output Type (CMOS)
④ Supply Voltage (3.3V)
⑤ Frequency Tolerance (See Table 1)
⑥ Symmetry/ INH Function/ Input Resistance (45/ 55%, Disable)
⑦ Individual Specification (STD Specification is "00")

Packaging (Tape & Reel 1000 pcs./ reel)

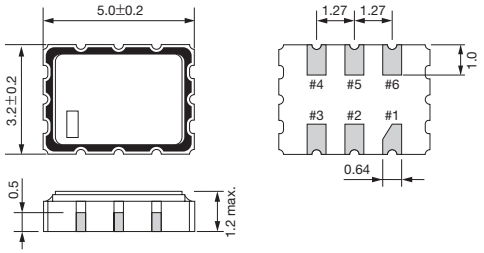
Specifications

Item	Symbol	Conditions		Min.	Max.	Units
Output Frequency Range[Note1]	fo			1.5	170	MHz
Frequency Tolerance	f_tol	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration	Temp.: −10 to +70°C/ −40 to +85°C	−50	+50	×10^{-6}
			Temp.: −10 to +70°C	−30	+30	
Absolute Pull Range	APR	1.5≤fo≤30MHz		±100	—	×10^{-6}
		30<fo≤170MHz		±50	—	
Control Voltage	Vc			0	+3.3	V
Storage Temperature Range	T_stg			−55	+125	°C
Operating Temperature Range	T_use	Standard Specifications		−10	+70	°C
		Extend (Option)		−40	+85	
Max. Supply Voltage	—	1.5≤fo≤80MHz		−0.5	+7	V
		80<fo≤170MHz		−0.5	+5	
Supply Voltage	Vcc			+2.97	+3.63	V
Current Consumption	Icc	1.5≤fo≤80MHz		—	15	mA
		80<fo≤170MHz		—	35	
Disable Current	I_dis	1.5≤fo≤80MHz		—	10	mA
		80<fo≤170MHz		—	50	μA
Symmetry	SYM	@50% Vcc		45	55	%
Rise/ Fall Time (10% Vcc to 90% Vcc)	Tr/ Tf	1.5≤fo≤30MHz		—	8	ns
		30<fo≤80MHz		—	5	
		80<fo≤170MHz		—	4	
Low Level Output Voltage	VOL			—	10% Vcc	V
High Level Output Voltage	VOH			90% Vcc	—	V
Output Load	L_CMOS	CMOS Output		—	15	pF
Input Voltage Range	VIN			0	+3.3	V
Low Level Input Voltage	VIL			—	30% Vcc	V
High Level Input Voltage	VIH			70% Vcc	—	V
Input Resistance	—	Code ⑥ : D		100	—	k ohm
		Code ⑥ : G or N		5	—	Mohm
Disable Time	t_dis			—	100	ns
Enable Time	t_ena	1.5≤fo≤80MHz		—	100	ns
		80<fo≤170MHz		—	100	
Start-up Time	t_str	@Minimum operating voltage to be 0 sec.		—	2	ms
				—	10	
Phase Jitter	JPhase	@155.52MHz	BW : 12kHz to 20MHz	—	1.0	ps
Phase Noise	—	@155.52MHz	@10Hz offset	Typ. −55		dBc/ Hz
			@100Hz offset	Typ. −85		
			@1kHz offset	Typ. −115		
			@10kHz offset	Typ. −130		
			@100kHz offset	Typ. −145		
			@1MHz offset	Typ. −150		
			@10MHz offset	Typ. −155		

Note : All electrical characteristics are defined at the maximum load and operating temperature range.
Note1: Please contact us for inquiry about operating temperature range, available frequencies and other conditions.

Dimensions

(Unit: mm)



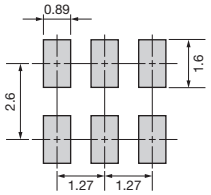
Plating: Ni+Au
Tolerance: ±0.2

Pad Connections	
#1	Vc
#2	INH
#3	Case GND
#4	Output
#5	NC
#6	Vcc

INH Function	
Pad2	Pad4 (Output)
Open	Active
"H" Level	Active
"L" Level	High Z

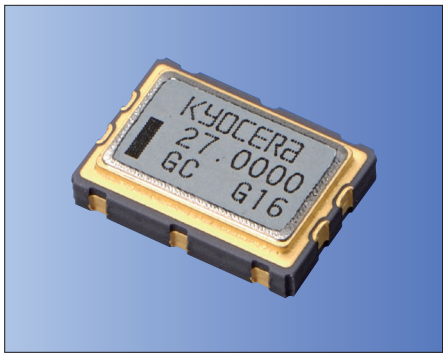
Recommended Land Pattern

(Unit: mm)



Note: A capacitor of value 0.01μF between Vcc and GND is recommended.

CMOS/ 3.3V/ 7.0×5.0mm



RoHS Compliant

Features

- Miniature ceramic package
- CMOS output
- High frequency to 170MHz
- Highly reliable with seam welding
- Supply voltage Vcc=3.3V
- Excellent Jitter performance

Table 1

Freq. Tol.		Operating Temperature Range (°C)	Note
Code	× 10^{-6}		
0	±50	−10 to +70	Standard specifications
S	±30		Please contact us for available frequencies.
G	±50	−40 to +85	

How to Order

KV7050B ① 24.576 ② C ③ 3 ④ □ ⑤ □ ⑥ 00 ⑦

① Series
② Output Frequency
③ Output Type (CMOS)
④ Supply Voltage (3.3V)
⑤ Frequency Tolerance (See Table 1)
⑥ Symmetry/ INH Function/ Input Resistance
D:1.5≤fo≤70MHz
N:70≤fo≤170MHz
⑦ Individual Specification
(STD Specification is "00")

Packaging (Tape & Reel 1000 pcs./ reel)

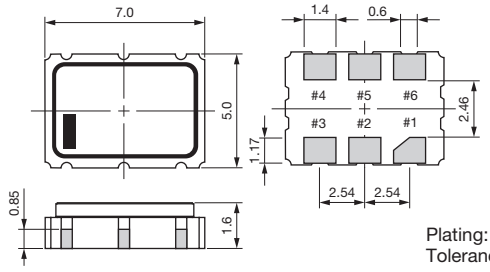
Specifications

Item	Symbol	Conditions		Min.	Max.	Units
Output Frequency Range[Note1]	fo			1.5	170	MHz
Frequency Tolerance[Note2]	f_tol	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration	Temp.: −10 to +70°C/ −40 to +85°C	−50	+50	×10^{-6}
			Temp.: −10 to +70°C	−30	+30	
Absolute Pull Range	APR	1.5≤fo≤30MHz		±100	—	×10^{-6}
		30<fo≤170MHz		±50	—	
Control Voltage	Vc			0	+3.3	V
Storage Temperature Range	T_stg			−55	+125	°C
Operating Temperature Range	T_use	Standard Specifications		−10	+70	°C
		Extend (Option)		−40	+85	
Max. Supply Voltage	—	1.5≤fo≤80MHz		−0.5	+7.0	V
		80<fo≤170MHz		−0.5	+5.0	
Supply Voltage	Vcc			+2.97	+3.63	V
Current Consumption	Icc	1.5≤fo≤80MHz		—	15	mA
		80<fo≤170MHz		—	30	
Disable Current	I_dis	1.5≤fo≤80MHz		—	10	mA
		80<fo≤170MHz		—	15	μA
Symmetry	SYM	@50% Vcc		45	55	%
Rise/ Fall Time (10% Vcc to 90% Vcc)	Tr/ Tf	1.5≤fo≤30MHz		—	8	ns
		30<fo≤80MHz		—	5	
		80<fo≤170MHz		—	2.5	
Low Level Output Voltage	VOL			—	10% Vcc	V
High Level Output Voltage	VOH			90% Vcc	—	V
Output Load	L_CMOS	CMOS Output		—	15	pF
Input Voltage Range	VIN			0	+3.3	V
Low Level Input Voltage	VIL			—	30% Vcc	V
High Level Input Voltage	VIH			70% Vcc	—	V
Input Resistance	—	Code ⑥ : D		100	—	k ohm
		Code ⑥ : G or N		5	—	Mohm
Disable Time	t_dis	1.5≤fo≤30MHz		—	100	ns
		30≤fo≤170MHz		—	200	
Enable Time	t_ena	1.5≤fo≤80MHz		—	100	ns
		80<fo≤170MHz		—	2	ms
Start-up Time	t_str	@Minimum operating voltage to be 0 sec.		—	10	ms
Phase Jitter	JPhase	@155.52MHz	BW : 12kHz to 20MHz	—	0.4	ps
Phase Noise	—	@155.52MHz	@10Hz offset	Typ. −70		dBc/ Hz
			@100Hz offset	Typ. −102		
			@1kHz offset	Typ. −128		
			@10kHz offset	Typ. −147		
			@100kHz offset	Typ. −158		
			@1MHz offset	Typ. −160		
			@10MHz offset	Typ. −161		

Note : All electrical characteristics are defined at the maximum load and operating temperature range.
Note1: Please contact us for inquiry about operating temperature range, available frequencies and other conditions.
Note2: Please contact us for the Frequency tolerance of −40 to +85°C.

Dimensions

(Unit: mm)



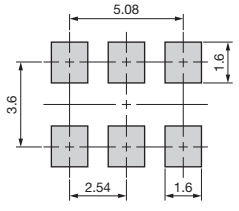
Plating: Ni+Au
Tolerance: ±0.2

Pad Connections	
#1	Vc
#2	INH
#3	Case GND
#4	Output
#5	NC
#6	Vcc

INH Function	
Pad2	Pad4 (Output)
Open	Active
"H" Level	Active
"L" Level	High Z

Recommended Land Pattern

(Unit: mm)



Note: A capacitor of value 0.01μF between Vcc and GND is recommended.

AS of February 2019

LV-PECL/ 3.3V/ 5.0×3.2mm

RoHS Compliant

Features

- Miniature ceramic package
- LV-PECL output
- High frequency to 170MHz
- Low Phase Noise

Table 1

Freq. Tol.		Operating Temperature Range (°C)	Note
Code	× 10^{-6}		
0	±50	−10 to +70	Standard specifications
S	±30		Please contact us for available frequencies.
G	±50	−40 to +85	

How to Order

KV5032D 155.520 P 3 □ J 00
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Output Frequency
③ Output Type (LV-PECL)
④ Supply Voltage (3.3V)
⑤ Frequency Tolerance (See Table 1)
⑥ Symmetry/ INH Function/ APR
(45/ 55%, Disable, APR50)
⑦ Individual Specification
(STD Specification is "00")

Packaging (Tape & Reel 1000 pcs./ reel)

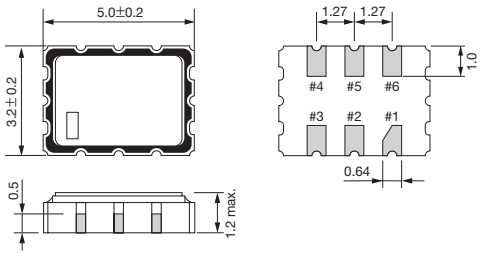
Specifications

Item	Symbol	Conditions		Min.	Max.	Units
Output Frequency Range[Note1]	fo			80	170	MHz
Frequency Tolerance[Note2]	f_tol	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Shock and vibration	Temp.: −10 to +70°C/ −40 to +85°C	−50	+50	×10^{-6}
			Temp.: −10 to +70°C	−30	+30	
Absolute Pull Range	APR	Standard Specifications		±50	—	×10^{-6}
		Extend (Option)		±100	—	
Frequency Aging	f_age	Per 20years @25°C		−15	+15	×10^{-6}
Control Voltage	Vc			0	+3.3	V
Storage Temperature Range	T_stg			−55	+125	°C
Operating Temperature Range	T_use	Standard Specifications		0	+70	°C
		Extend (Option)		−40	+85	
Max. Supply Voltage	—			−0.3	+5.0	V
Supply Voltage	Vcc			+2.97	+3.63	V
Current Consumption	Icc			—	85	mA
Disable Current	I_dis			—	5	mA
Symmetry	SYM	50ohm@crossing point		45	55	%
Rise/ Fall Time (20% to 80% Output Level)	Tr/ Tf	50ohm		—	0.7	ns
Low Level Output Voltage[Note3]	VOL			—	Vcc−1.620	V
High Level Output Voltage[Note3]	VOH			Vcc−1.025	—	V
Output Load	—	LV-PECL Output		50		ohm
Input Voltage Range	VIN			0	+3.3	V
Low Level Input Voltage[Note3]	VIL			—	30% Vcc	V
High Level Input Voltage[Note3]	VIH			70% Vcc	—	V
Input Resistance	—			10	—	Mohm
Disable Time	t_dis			—	200	ns
Enable Time	t_ena			—	2	ms
Start-up Time	t_str	@Minimum operating voltage to be 0 sec.		—	10	ms
Phase Jitter	JPhase	@122.88MHz	BW : 12kHz to 20MHz	—	0.3	ps
Phase Noise	—	@122.88MHz	@10Hz offset	Typ. −71		dBc/ Hz
			@100Hz offset	Typ. −102		
			@1kHz offset	Typ. −128		
			@10kHz offset	Typ. −146		
			@100kHz offset	Typ. −152		
			@1MHz offset	Typ. −156		
			@10MHz offset	Typ. −157		

Note : All electrical characteristics are defined at the maximum load and operating temperature range.
Note1: Please contact us for inquiry about operating temperature range, available frequencies and other conditions.
Note2: Please contact us for the Frequency tolerance of −40 to +85°C.
Note3: DC characteristic

Dimensions

(Unit: mm)



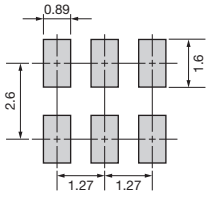
Plating: Ni+Au
Tolerance: ±0.2

Pad Connections	
#1	Vc
#2	INH
#3	Case GND
#4	Output
#5	NC
#6	Vcc

INH Function	
Pad2	Pad4 (Output)
Open	Active
"H" Level	Active
"L" Level	High Z

Recommended Land Pattern

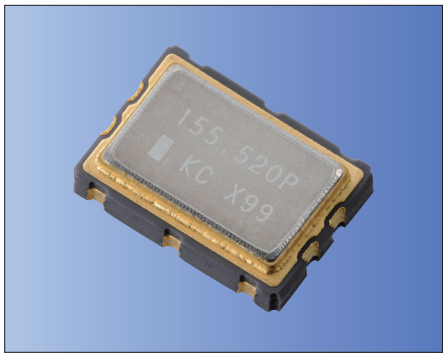
(Unit: mm)



Note: A capacitor of value 0.01μF between Vcc and GND is recommended.

Crystal Oscillators

LV-PECL/ 3.3V/ 7.0×5.0mm



RoHS Compliant

Features

- Miniature ceramic package
- LV-PECL output
- High frequency to 170MHz
- Low Phase Noise

Table 1

Freq. Tol. Code	Freq. Tol. × 10^{-6}	Operating Temperature Range (°C)	Note
0	±50	−10 to +70	Standard specifications
S	±30		Please contact us for available frequencies.
G	±50	−40 to +85	

How to Order

KV7050C 155.520 P 3 □ J 00
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Output Frequency
③ Output Type (LV-PECL)
④ Supply Voltage (3.3V)
⑤ Frequency Tolerance (See Table 1)
⑥ Symmetry/ INH Function/ APR
(45/ 55%, Disable, APR50)
⑦ Individual Specification
(STD Specification is "00")

Packaging (Tape & Reel 1000 pcs./ reel)

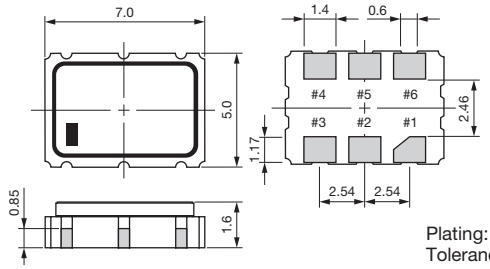
Specifications

Item	Symbol	Conditions		Min.	Max.	Units
Output Frequency Range[Note1]	fo			80	170	MHz
Frequency Tolerance[Note2]	f_tol	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Shock and vibration	Temp.: −10 to +70°C/ −40 to +85°C	−50	+50	×10^{-6}
			Temp.: −10 to +70°C	−30	+30	
Absolute Pull Range	APR	Standard Specifications		±50	—	×10^{-6}
		Extend (Option)		±100	—	
Frequency Aging	f_age	Per 20years @25°C		−15	+15	×10^{-6}
Control Voltage	Vc			0	+3.3	V
Storage Temperature Range	T_stg			−55	+125	°C
Operating Temperature Range	T_use	Standard Specifications		0	+70	°C
		Extend (Option)		−40	+85	
Max. Supply Voltage	—			−0.3	+5.0	V
Supply Voltage	Vcc			+2.97	+3.63	V
Current Consumption	Icc			—	85	mA
Disable Current	I_dis			—	5	mA
Symmetry	SYM	50ohm@crossing point		45	55	%
Rise/ Fall Time (20% to 80% Output Level)	Tr/ Tf	50ohm		—	0.7	ns
Low Level Output Voltage[Note3]	VOL			—	Vcc−1.620	V
High Level Output Voltage[Note3]	VOH			Vcc−1.025	—	V
Output Load	—	LV-PECL Output		50		ohm
Input Voltage Range	VIN			0	+3.3	V
Low Level Input Voltage[Note3]	VIL			—	30% Vcc	V
High Level Input Voltage[Note3]	VIH			70% Vcc	—	V
Input Resistance	—			10	—	Mohm
Disable Time	t_dis			—	200	ns
Enable Time	t_ena			—	2	ms
Start-up Time	t_str	@Minimum operating voltage to be 0 sec.		—	10	ms
Phase Jitter	JPhase	@122.88MHz	BW : 12kHz to 20MHz	—	0.3	ps
Phase Noise	—	@122.88MHz	@10Hz offset	Typ. −71		dBc/ Hz
			@100Hz offset	Typ. −102		
			@1kHz offset	Typ. −128		
			@10kHz offset	Typ. −146		
			@100kHz offset	Typ. −152		
			@1MHz offset	Typ. −156		
			@10MHz offset	Typ. −157		

Note : All electrical characteristics are defined at the maximum load and operating temperature range.
Note1: Please contact us for inquiry about operating temperature range, available frequencies and other conditions.
Note2: Please contact us for the Frequency tolerance of −40 to +85°C.
Note3: DC characteristic

Dimensions

(Unit: mm)



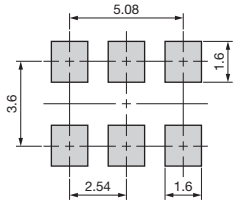
Plating: Ni+Au
Tolerance: ±0.2

Pad Connections	
#1	Vc
#2	INH
#3	Case GND
#4	Output
#5	Complementary Output
#6	Vcc

INH Function	
Pad2	Pad4 (Output)
Open	Active
"H" Level	Active
"L" Level	High Z

Recommended Land Pattern

(Unit: mm)



Note: A capacitor of value 0.01μF between Vcc and GND is recommended.

KYOCERA

LV-PECL or LVDS/ 3.3V or 2.5V/ 5.0×3.2mm

RoHS Compliant

Features

- High frequency to 800MHz
- LV-PECL output or LVDS output
- Miniature ceramic package
- Compact and low profile (5.0×3.2×1.2mm max.)
- Low current consumption

Applications

- WDM/ Networking

Table 1

Freq. Tol. Code	Freq. Tol. × 10^{-6}	Operating Temperature Range (°C)	Note
G	±50	−40 to +85	Please contact us for available frequencies.

How to Order

KV5032R 622.080 □ □ G D 00
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Output Frequency
③ Output Type (P : LV-PECL or L : LVDS)
④ Supply Voltage (3 : 3.3V or 2 : 2.5V)
⑤ Frequency Tolerance (See Table 1)
⑥ Symmetry/ INH Function (45/ 55%, Disable)
⑦ Individual Specification (STD Specification is "00")

Packaging (Tape & Reel 1000 pcs./ reel)

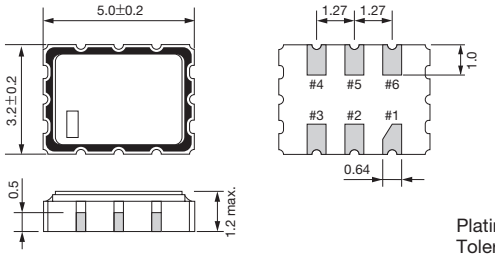
Specifications

Item	Symbol	Conditions		Min.	Max.	Units
Output Frequency Range[Note1]	fo			10	800	MHz
Frequency Tolerance	f_tol	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration	Temp.: −40 to +85°C	−50	+50	×10^{-6}
Absolute Pull Range	APR			±100	—	×10^{-6}
Control Voltage	Vc			0	+3.3	V
Storage Temperature Range	T_stg			−55	+125	°C
Operating Temperature Range	T_use			−40	+85	°C
Max. Supply Voltage	—			−0.5	+4.2	V
Supply Voltage	Vcc			+2.25	+2.75	V
				+2.97	+3.63	
Linearity	—	Vc=0V to +3.3V		−10	10	%
Current Consumption	Icc	LV-PECL Output (2.25≤Vcc≤2.75V)		—	80	mA
		LV-PECL Output (2.97≤Vcc≤3.63V)		—	100	
		LVDS Output (2.25≤Vcc≤2.75V, 2.77≤Vcc≤3.63V)		—	40	
Symmetry	SYM	LV-PECL Output 50ohm @crossing point		45	55	%
		LVDS Output 100ohm @crossing point		45	55	
Rise/ Fall Time (20% to 80% Output Level)	Tr/ Tf	LV-PECL Output 50ohm		—	0.4	ns
		LVDS Output 100ohm		—	0.6	
Low Level Output Voltage[Note2]	VOL	LV-PECL Output		—	Vcc −1.620	V
High Level Output Voltage[Note2]	VOH			Vcc −1.025	—	V
Output Load	—			50		ohm
Low Level Output Voltage[Note2]	VOL	LVDS Output	Typ. 1.1V	0.9	—	V
High Level Output Voltage[Note2]	VOH		Typ. 1.43V	—	1.6	V
Diffrentical Output Voltage[Note2]	VOD		Typ. 330mV	175	454	mV
Diffrentical Output Voltage Error[Note2]	dVOD		dVOD= ¦VOD1−VOD2¦	—	50	mV
Offset Voltage	VOS		Typ. 1.25V	1.125	1.375	V
Offset Voltage Error	dVOS		dVOS= ¦VOS1−VOS2¦	—	50	mV
Output Load	—			100		ohm
Low Level Input Voltage[Note2]	VIL			—	30% Vcc	V
High Level Input Voltage[Note2]	VIH			70% Vcc	—	V
Input Resistance	—			150	—	k ohm
Disable Time	t_dis			—	200	ns
Enable Time	t_ena			—	2	ms
Start-up Time	t_str	@Minimum operating voltage to be 0 sec.		—	10	ms
Phase Jitter	JPhase	@622.08MHz	BW : 12kHz to 20MHz	Typ. 3.0		ps
Phase Noise	—	@622.08MHz	@10Hz offset	Typ. −40		dBc/ Hz
			@100Hz offset	Typ. −70		
			@1kHz offset	Typ. −95		
			@10kHz offset	Typ. −105		
			@100kHz offset	Typ. −105		
			@1MHz offset	Typ. −125		
			@10MHz offset	Typ. −135		

Note : All electrical characteristics are defined at the maximum load and operating temperature range.
Note1: Please contact us for inquiry about operating temperature range, available frequencies and other conditions. Note2: DC characteristic

Dimensions

(Unit: mm)



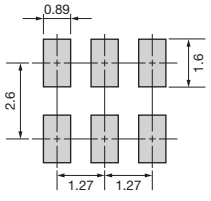
Plating: Ni+Au
Tolerance: ±0.2

Pad Connections	
#1	Vc
#2	INH
#3	Case GND
#4	Output
#5	Complementary Output
#6	Vcc

Frequency Select Function	
Pad2	Pad4/ Pad5 (Output)
Open	Active
"H" Level	Active
"L" Level	High Z(Non-Oscillation)

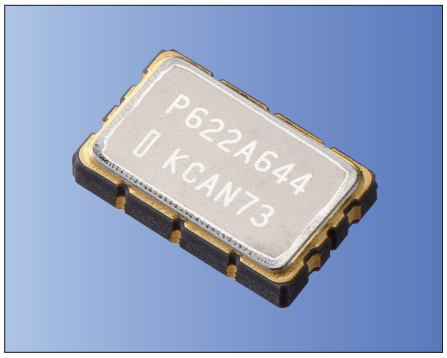
Recommended Land Pattern

(Unit: mm)



Note: A capacitor of value 0.01μF between Vcc and GND is recommended.

LV-PECL or LVDS/ 3.3V or 2.5V/ 5.0×3.2mm



RoHS Compliant

Features

- High frequency to 800MHz
- Dual frequency selectable
- LV-PECL output or LVDS output
- Miniature ceramic package
- Compact and low profile (5.0×3.2×1.2mm max.)
- Low current consumption

Applications

- WDM/ Networking

Table 1

Freq. Tol. Code	Freq. Tol. × 10^{-6}	Operating Temperature Range (°C)	Note
G	±50	−40 to +85	Please contact us for available frequencies.

How to Order

KV5032G 622A644 □ □ G F 00
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Output Frequency/ Selection Frequency
③ Output Type (P : LV-PECL or L : LVDS)
④ Supply Voltage (3 : 3.3V or 2 : 2.5V)
⑤ Frequency Tolerance (See Table 1)
⑥ Symmetry/ INH Function (45/ 55%)
⑦ Individual Specification (STD Specification is "00")

Packaging (Tape & Reel 1000 pcs./ reel)

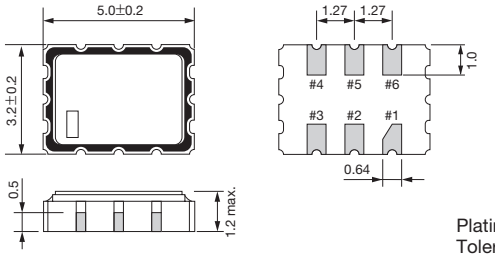
Specifications

Item	Symbol	Conditions		Min.	Max.	Units
Output Frequency Range[Note1]	f1	Primary Output/ #2 "H" -Level or Open		10	800	MHz
	f2	Secondary Output/ #2 "L" -Level		10	800	
Frequency Tolerance	f_tol	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration	Temp.: −40 to +85°C	−50	+50	×10^{-6}
Absolute Pull Range	APR			±100	—	×10^{-6}
Control Voltage	Vc			0	+3.3	V
Storage Temperature Range	T_stg			−55	+125	°C
Operating Temperature Range	T_use			−40	+85	°C
Max. Supply Voltage	—			−0.5	+4.2	V
Supply Voltage	Vcc			+2.25	+2.75	V
				+2.97	+3.63	
Linearity	—	Vc=0V to +3.3V		−10	10	%
Current Consumption	Icc	LV-PECL Output (2.25≤Vcc≤2.75V)		—	80	mA
		LV-PECL Output (2.97≤Vcc≤3.63V)		—	100	
		LVDS Output (2.25≤Vcc≤2.75V, 2.77≤Vcc≤3.63V)		—	40	
Symmetry	SYM	LV-PECL Output 50ohm @crossing point		45	55	%
		LVDS Output 100ohm @crossing point		45	55	
Rise/ Fall Time (20% to 80% Output Level)	Tr/ Tf	LV-PECL Output 50ohm		—	0.4	ns
		LVDS Output 100ohm		—	0.6	
Low Level Output Voltage[Note2]	VOL	LV-PECL Output		—	Vcc −1.620	V
High Level Output Voltage[Note2]	VOH			Vcc −1.025	—	V
Output Load	—			50		ohm
Low Level Output Voltage[Note2]	VOL	LVDS Output	Typ. 1.1V	0.9	—	V
High Level Output Voltage[Note2]	VOH		Typ. 1.43V	—	1.6	V
Diffrentical Output Voltage[Note2]	VOD		Typ. 330mV	175	454	mV
Diffrentical Output Voltage Error[Note2]	dVOD		dVOD=¦VOD1−VOD2¦	—	50	mV
Offset Voltage	VOS		Typ. 1.25V	1.125	1.375	V
Offset Voltage Error	dVOS		dVOS=¦VOS1−VOS2¦	—	50	mV
Output Load	—			100		ohm
Low Level Input Voltage[Note2]	VIL			—	30% Vcc	V
High Level Input Voltage[Note2]	VIH			70% Vcc	—	V
Input Resistance	—			150	—	k ohm
Start-up Time	t_str	@Minimum operating voltage to be 0 sec.		—	10	ms
Phase Jitter	JPhase	@622.08MHz	BW : 12kHz to 20MHz	Typ. 3.0		ps
Phase Noise	—	@622.08MHz	@10Hz offset	Typ. −40		dBc/ Hz
			@100Hz offset	Typ. −70		
			@1kHz offset	Typ. −95		
			@10kHz offset	Typ. −105		
			@100kHz offset	Typ. −105		
			@1MHz offset	Typ. −125		
			@10MHz offset	Typ. −135		

Note : All electrical characteristics are defined at the maximum load and operating temperature range.
Note1: Please contact us for inquiry about operating temperature range, available frequencies and other conditions. Note2: DC characteristic

Dimensions

(Unit: mm)



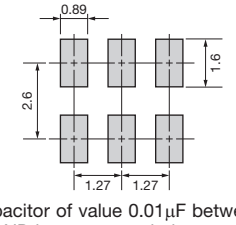
Pad Connections	
#1	Vc
#2	Frequency Select
#3	Case GND
#4	Output
#5	Complementary Output
#6	Vcc

Frequency Select Function	
Pad2	Pad4/ Pad5 (Output)
Open	Primary Freq.
"H" Level	Primary Freq.
"L" Level	Secondly Freq.

Plating: Ni+Au
Tolerance: ±0.2

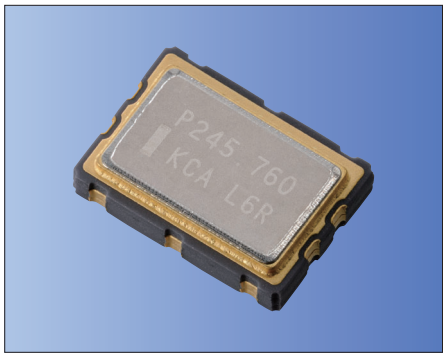
Recommended Land Pattern

(Unit: mm)



Note: A capacitor of value 0.01μF between Vcc and GND is recommended.

LV-PECL/ 3.3V/ 7.0×5.0mm



RoHS Compliant

Features

- High frequency to 800MHz
- LV-PECL output
- Miniature ceramic package
- for WDM, Networking Applications

Table 1

Freq. Tol. Code	Freq. Tol. × 10^{-6}	Operating Temperature Range (°C)	Note
G	±50	−40 to +85	Please contact us for available frequencies.

How to Order

KV7050R 622.080 P 3 G D 00
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Output Frequency
③ Output Type (LV-PECL)
④ Supply Voltage (3.3V)
⑤ Frequency Tolerance (See Table 1)
⑥ Symmetry/ INH Function (45/ 55%, Disable)
⑦ Individual Specification (STD Specification is "00")

Packaging (Tape & Reel 1000 pcs./ reel)

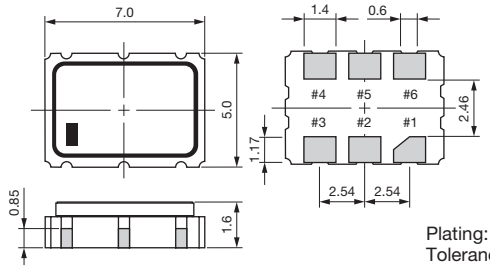
Specifications

Item	Symbol	Conditions		Min.	Max.	Units
Output Frequency Range[Note1]	fo			10	800	MHz
Frequency Tolerance @Vc=+1.65V	f_tol	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration	Temp.: −40 to +85°C	−50	+50	×10^{-6}
Absolute Pull Range	APR			±100	—	×10^{-6}
Control Voltage	Vc			0	+3.3	V
Storage Temperature Range	T_stg			−55	+125	°C
Operating Temperature Range	T_use			−40	+85	°C
Max. Supply Voltage	—			−0.5	+4.2	V
Supply Voltage	Vcc			+2.97	+3.63	V
Linearity	—	Vc=0V to +3.3V		−10	+10	%
Current Consumption	Icc			—	100	mA
Symmetry	SYM	50ohm @crossing point		45	55	%
Rise/ Fall Time (20% to 80% Output Level)	Tr/ Tf	50ohm		—	0.4	ns
Low Level Output Voltage[Note2]	VOL			—	Vcc−1.620	V
High Level Output Voltage[Note2]	VOH			Vcc−1.025	—	V
Output Load	—	LV-PECL Output		50		ohm
Low Level Input Voltage	VIL			—	30% Vcc	V
High Level Input Voltage	VIH			70% Vcc	—	V
Input Resistance	—			150	—	k ohm
Disable Time	t_dis			—	200	ns
Enable Time	t_ena			—	2	ms
Start-up Time	t_str	@Minimum operating voltage to be 0 sec.		—	10	ms
Phase Jitter	JPhase	@622.08MHz	BW : 12kHz to 20MHz	Typ. 3.0		ps
Phase Noise	—	@622.08MHz	@10Hz offset	Typ. −40		dBc/ Hz
			@100Hz offset	Typ. −70		
			@1kHz offset	Typ. −95		
			@10kHz offset	Typ. −105		
			@100kHz offset	Typ. −105		
			@1MHz offset	Typ. −125		
			@10MHz offset	Typ. −135		

Note : All electrical characteristics are defined at the maximum load and operating temperature range.
Note1: Please contact us for inquiry about operating temperature range, available frequencies and other conditions.
Note2: DC characteristic

Dimensions

(Unit: mm)



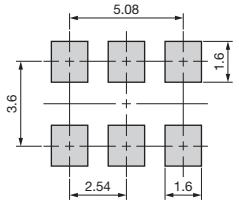
Plating: Ni+Au
Tolerance: ±0.2

Pad Connections	
#1	Vc
#2	INH
#3	Case GND
#4	Output
#5	Complementary Output
#6	Vcc

Frequency Select Function	
Pad2	Pad4/ Pad5 (Output)
Open	Active
"H" Level	Active
"L" Level	High Z(Non-Oscillation)

Recommended Land Pattern

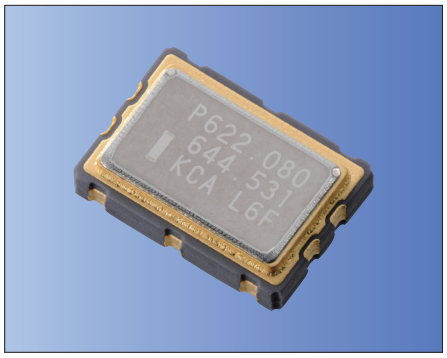
(Unit: mm)



Note: A capacitor of value 0.01μF between Vcc and GND is recommended.

KYOCERA

LV-PECL/ 3.3V/ 7.0×5.0mm



RoHS Compliant

Features

- High frequency to 800MHz
- Dual Selectable
- LV-PECL output
- Miniature ceramic package
- for WDM, Networking Applications

Table 1

Freq. Tol.		Operating Temperature Range (°C)	Note
Code	× 10^{-6}		
G	±50	−40 to +85	Please contact us for available frequencies.

How to Order

KV7050G 622A644 P 3 G F 00
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Output Frequency/ Selection Frequency
③ Output Type (LV-PECL)
④ Supply Voltage (3.3V)
⑤ Frequency Tolerance (See Table 1)
⑥ Symmetry (45/ 55%)
⑦ Individual Specification
(STD Specification is "00")

Packaging (Tape & Reel 1000 pcs./ reel)

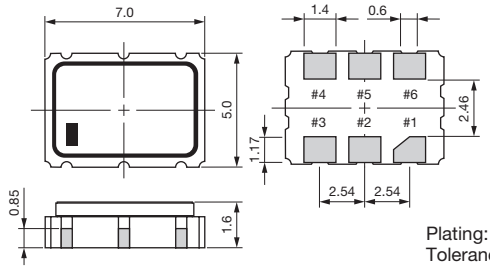
Specifications

Item	Symbol	Conditions		Min.	Max.	Units
Output Frequency Range[Note1]	f1	Primary Output/ #2 "H"-Level or Open		10	800	MHz
	f2	Secondary Output/ #2 "L"-Level		10	800	MHz
Frequency Tolerance @Vc=+1.65V	f_tol	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration	Temp.: −40 to +85°C	−50	+50	×10^{-6}
Absolute Pull Range	APR			±100	—	×10^{-6}
Control Voltage	Vc			0	+3.3	V
Storage Temperature Range	T_stg			−55	+125	°C
Operating Temperature Range	T_use			−40	+85	°C
Max. Supply Voltage	—			−0.5	+4.2	V
Supply Voltage	Vcc			+2.97	+3.63	V
Linearity	—	Vc=0V to +3.3V		−10	+10	%
Current Consumption	Icc			—	100	mA
Symmetry	SYM	50ohm @crossing point		45	55	%
Rise/ Fall Time (20% to 80% Output Level)	Tr/ Tf	50ohm		—	0.4	ns
Low Level Output Voltage[Note2]	VOL			—	Vcc−1.620	V
High Level Output Voltage[Note2]	VOH			Vcc−1.025	—	V
Output Load	—	LV-PECL Output		50		ohm
Low Level Input Voltage	VIL			—	30% Vcc	V
High Level Input Voltage	VIH			70% Vcc	—	V
Input Resistance	—			TYP	1	Mohm
Start-up Time	t_str	@Minimum operating voltage to be 0 sec.		—	10	ms
Phase Jitter	JPhase	@622.08MHz	BW : 12kHz to 20MHz	Typ. 3.0		ps
Phase Noise	—	@622.08MHz	@10Hz offset	Typ. −40		dBc/ Hz
			@100Hz offset	Typ. −70		
			@1kHz offset	Typ. −95		
			@10kHz offset	Typ. −105		
			@100kHz offset	Typ. −105		
			@1MHz offset	Typ. −125		
			@10MHz offset	Typ. −135		

Note : All electrical characteristics are defined at the maximum load and operating temperature range.
Note1: Please contact us for inquiry about operating temperature range, available frequencies and other conditions.
Note2: DC characteristic

Dimensions

(Unit: mm)



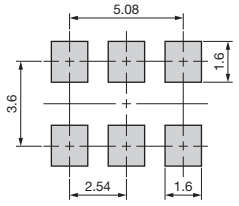
Plating: Ni+Au
Tolerance: ±0.2

Pad Connections	
#1	Vc
#2	Frequency Select
#3	Case GND
#4	Output
#5	Complementary Output
#6	Vcc

Frequency Select Function	
Pad2	Pad4/ Pad5 (Output)
Open	Primary Freq.
"H" Level	Primary Freq.
"L" Level	Secondly Freq.

Recommended Land Pattern

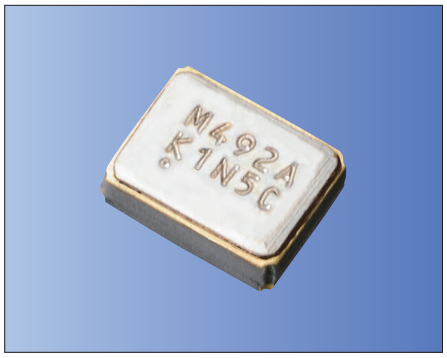
(Unit: mm)



Note: A capacitor of value 0.01μF between Vcc and GND is recommended.

AS of February 2019

1.6×1.2mm



AEC-Q200 RoHS Compliant

Features

- Ultra-miniature SMD type (1.65×1.25×0.55mm)
- Freq. temp. characteristics.
  : ±2.0×10^{-6}/ −30 to +85°C
  : ±0.5×10^{-6}/ −30 to +85°C (for GNSS)
- 1.68 to 3.63V drive available
- Reflow compatible
- Operating Temp. −40 to +105°C (Option)
- Disable Function (Option)

Applications

- Mobile Communications, W-LAN
- Low power radio communications
- GNSS Unit

How to Order

KT1612A 26000 □ □ □ □□ □ xx
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

① Series
② Output Frequency
③ Freq. Temp. Chrst.

A	±0.5×10^{-6}
B	±1.0×10^{-6}
C	±1.5×10^{-6}
D	±2.0×10^{-6}

④ Lower Operating Temp.

C	−30°C
E	−20°C
G	−10°C

⑤ Upper Operating Temp.

W	+85°C
V	+80°C
U	+75°C

⑥ Supply Voltage

18	1.8V	28	2.8V
30	3.0V	33	3.3V

⑦ Voltage Control Function

T	TCXO
Spec. Code*	VCTCXO

*Please contact us for Spec. Code.

⑧ Individual Specification

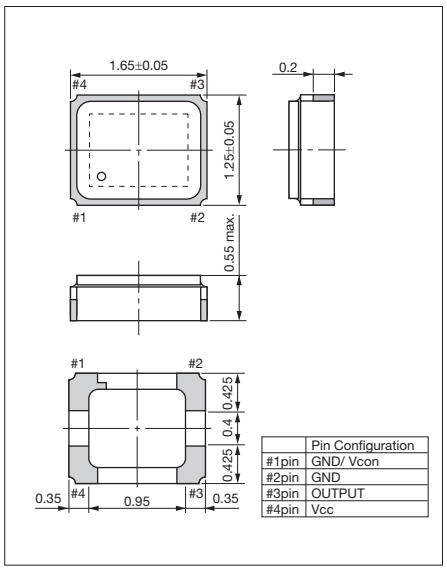
Packaging (Tape & Reel 18000 pcs./ reel)

Specifications

Item	Symbol	Conditions	Min.	Max.	Units
Output Frequency Range	fo		10	52	MHz
Frequency Tolerance	f_tol	vs Temperature	−0.5/ −2	+0.5/ +2	×10^{-6}
		vs Load	−0.2	+0.2	
		vs Voltage	−0.2	+0.2	
Frequency Aging	f_age	Per Year	−1	+1	×10^{-6}
Storage Temperature Range	T_stg		−40	+85	°C
Operating Temperature Range	T_use		−30	+85	°C
Voltage Control Range	f_cont	Positive	±8	±15	×10^{-6}
Supply Voltage	Vcc		1.68	3.63	V
Output Level	Vpp	Clipped Sine*, Load: 10k ohm / / 10pF	0.8	—	Vp−p
Current Consumption	Icc		—	2	mA
Harmonics	—		—	−5	dBc

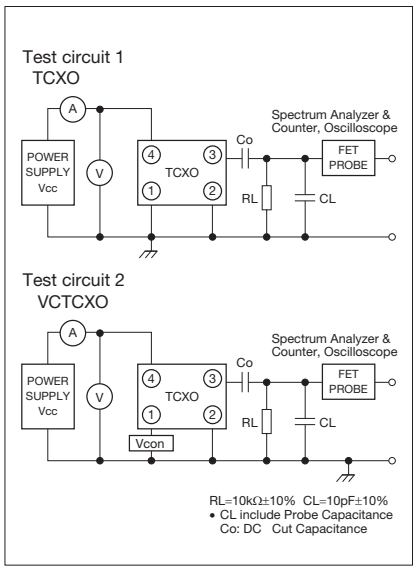
* : A DC-cut capacitor is not embedded in this crystal oscillator. Connect a DC-cut capacitor (≥1nF) to the line-out terminal of the oscillator.
* Please contact us for other specifications.

Dimensions (Unit: mm)

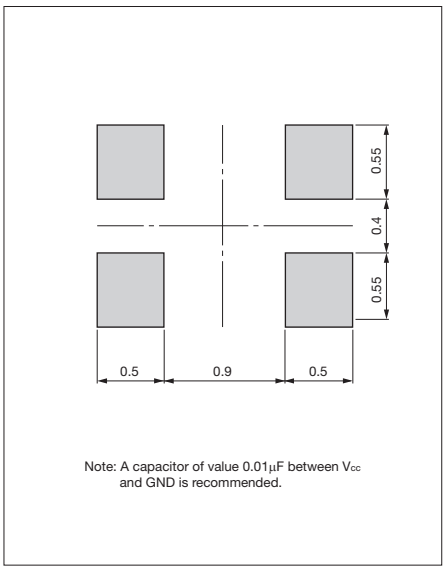


	Pin Configuration
#1pin	GND/ Vcon
#2pin	GND
#3pin	OUTPUT
#4pin	Vcc

Test Circuit



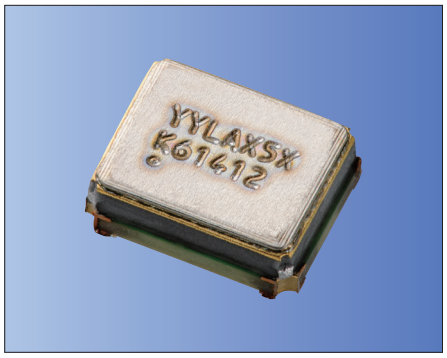
Recommended Land Pattern (Unit: mm)



Note: A capacitor of value 0.01μF between Vcc and GND is recommended.

Crystal Oscillators

2.0×1.6mm



AEC-Q100/ 200 RoHS Compliant

*AEC-Q100 qualified (Option)

Features

- Miniature SMD type (2.0×1.6×0.8mm)
- Freq. temp. characteristics.
  : ±2.0×10^{-6}/ −30 to +85°C
  : ±0.5×10^{-6}/ −30 to +85°C (for GNSS)
- 1.68 to 3.63V available
- Reflow compatible
- Operating Temp. −40 to +105°C (Option)
- Disable Function (Option)

Applications

- Mobile Communications, W-LAN
- Low power radio communications
- GNSS Unit

How to Order

KT2016K 26000 □ □ □ □□ □ xx
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

① Series
② Output Frequency
③ Freq. Temp. Chrst.

A	±0.5×10^{-6}
B	±1.0×10^{-6}
C	±1.5×10^{-6}
D	±2.0×10^{-6}

④ Lower Operating Temp.

C	−30°C
E	−20°C
G	−10°C

⑤ Upper Operating Temp.

W	+85°C
V	+80°C
U	+75°C

⑥ Supply Voltage

18	1.8V	28	2.8V
30	3.0V	33	3.3V

⑦ Voltage Control Function

T	TCXO
Spec. Code*	VCTCXO

*Please contact us for Spec. Code.

⑧ Individual Specification

Packaging (Tape & Reel 15000 pcs./ reel)

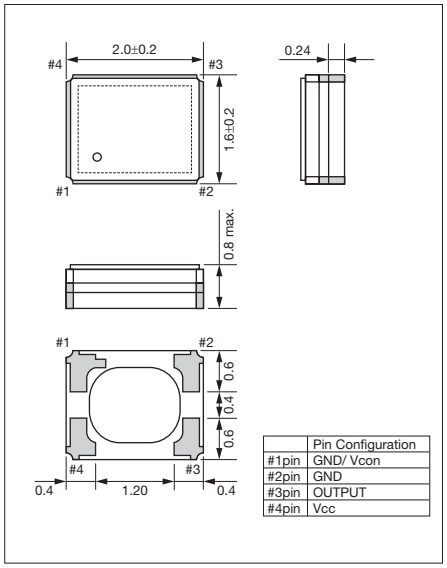
Specifications

Item	Symbol	Conditions	Min.	Max.	Units
Output Frequency Range	fo		10	60	MHz
Frequency Tolerance	f_tol	vs Temperature	−0.5/ −2	+0.5/ +2	×10^{-6}
		vs Load	−0.2	+0.2	
		vs Voltage	−0.2	+0.2	
Frequency Aging	f_age	Per Year	−1	+1	×10^{-6}
Storage Temperature Range	T_stg		−40	+85	°C
Operating Temperature Range	T_use		−30	+85	°C
Voltage Control Range	f_cont	Positive	±8	±15	×10^{-6}
Supply Voltage	Vcc		1.68	3.63	V
Output Level	Vpp	Clipped Sine*, Load: 10k ohm / / 10pF	0.8	—	Vp-p
Current Consumption	Icc		—	2	mA
Harmonics	—		—	−5	dBc

* : A DC-cut capacitor is not embedded in this crystal oscillator. Connect a DC-cut capacitor (≥1nF) to the line-out terminal of the oscillator.
* Please contact us for other specifications.

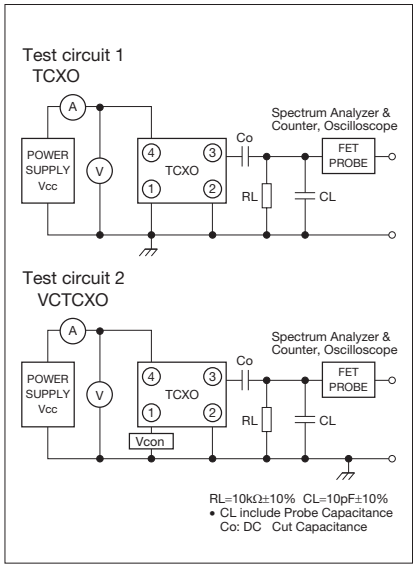
Dimensions

(Unit: mm)



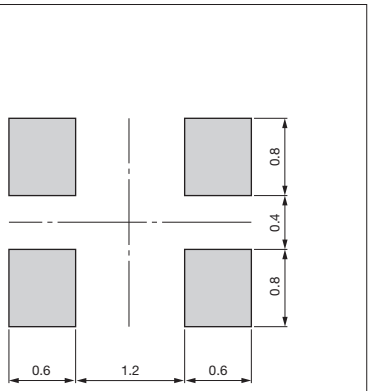
	Pin Configuration
#1pin	GND/ Vcon
#2pin	GND
#3pin	OUTPUT
#4pin	Vcc

Test Circuit



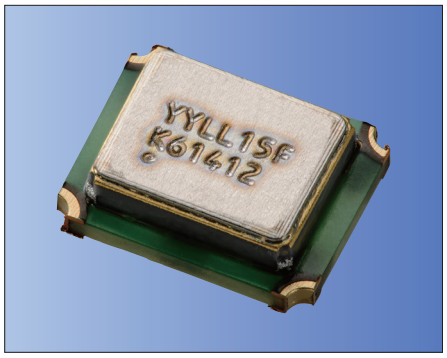
Recommended Land Pattern

(Unit: mm)



Note: A capacitor of value 0.01μF between Vcc and GND is recommended.

2.5×2.0mm



AEC-Q100/ 200 RoHS Compliant

*AEC-Q100 qualified (Option)

Features

- Miniature SMD type (2.5×2.0×0.8mm)
- Freq. temp. characteristics.
  : ±2.0×10^{-6}/ −30 to +85°C
  : ±0.5×10^{-6}/ −30 to +85°C (for GNSS)
- 1.68 to 3.63V drive available
- Reflow compatible
- Operating Temp. −40 to +105°C (Option)
- Disable Function (Option)

Applications

- Mobile Communications, W-LAN
- Low power radio communications
- GNSS Unit

How to Order

KT2520K 26000 □ □ □ □□ □ xx
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

① Series
② Output Frequency
③ Freq. Temp. Chrst.

A	±0.5×10^{-6}
B	±1.0×10^{-6}
C	±1.5×10^{-6}
D	±2.0×10^{-6}

④ Lower Operating Temp.

C	−30°C
E	−20°C
G	−10°C

⑤ Upper Operating Temp.

W	+85°C
V	+80°C
U	+75°C

⑥ Supply Voltage

18	1.8V	28	2.8V
30	3.0V	33	3.3V

⑦ Voltage Control Function

T	TCXO
Spec. Code*	VCTCXO

*Please contact us for Spec. Code.

⑧ Individual Specification

Packaging (Tape & Reel 12000 pcs./ reel)

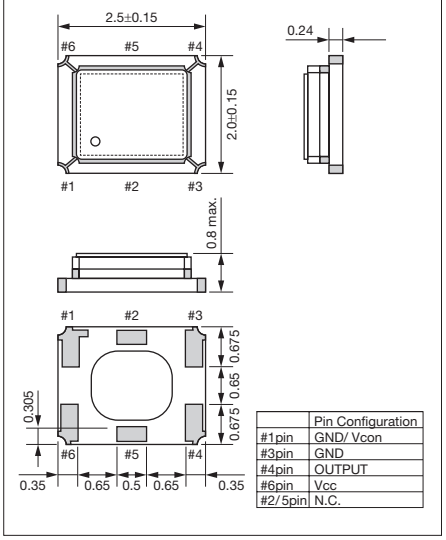
Specifications

Item	Symbol	Conditions	Min.	Max.	Units
Output Frequency Range	fo		10	60	MHz
Frequency Tolerance	f_tol	vs Temperature	−0.5/ −2	+0.5/ +2	×10^{-6}
		vs Load	−0.2	+0.2	
		vs Voltage	−0.2	+0.2	
Frequency Aging	f_age	Per Year	−1	+1	×10^{-6}
Storage Temperature Range	T_stg		−40	+85	°C
Operating Temperature Range	T_use		−30	+85	°C
Voltage Control Range	f_cont	Positive	±8	±15	×10^{-6}
Supply Voltage	Vcc		1.68	3.63	V
Output Level	Vpp	Clipped Sine*, Load: 10k ohm / / 10pF	0.8	—	Vp-p
Current Consumption	Icc		—	2	mA
Harmonics	—		—	−5	dBc

* : A DC-cut capacitor is not embedded in this crystal oscillator. Connect a DC-cut capacitor (≥1nF) to the line-out terminal of the oscillator.
* Please contact us for other specifications.

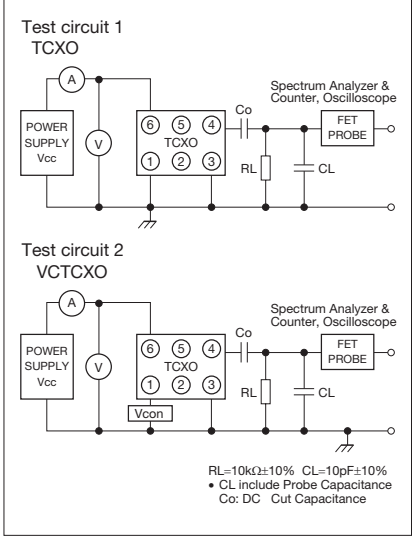
Dimensions

(Unit: mm)



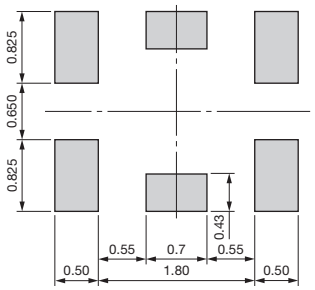
	Pin Configuration
#1pin	GND/ Vcon
#3pin	GND
#4pin	OUTPUT
#6pin	Vcc
#2/ 5pin	N.C.

Test Circuit



Recommended Land Pattern

(Unit: mm)

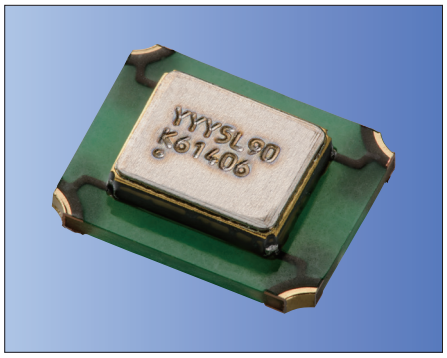


Note: A capacitor of value 0.01μF between Vcc and GND is recommended.

Crystal Oscillators

AS of February 2019

3.2×2.5mm



AEC-Q100/ 200 RoHS Compliant

*AEC-Q100 qualified (Option)

Features

- Miniature SMD type (3.2×2.5×0.8mm)
- Freq. temp. characteristics.
  : ±2.0×10^{-6}/ −30 to +85°C
  : ±0.5×10^{-6}/ −30 to +85°C (for GNSS)
- 1.68 to 3.63V drive available
- Reflow compatible
- Operating Temp. −40 to +105°C (Option)
- Disable Function (Option)

Applications

- Mobile Communications, W-LAN
- Low power radio communications
- GNSS Unit

How to Order

KT3225K 26000 □ □ □ □□ □ xx
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

① Series
② Output Frequency
③ Freq. Temp. Chrst.

A	±0.5×10^{-6}
B	±1.0×10^{-6}
C	±1.5×10^{-6}
D	±2.0×10^{-6}

④ Lower Operating Temp.

C	−30°C
E	−20°C
G	−10°C

⑤ Upper Operating Temp.

W	+85°C
V	+80°C
U	+75°C

⑥ Supply Voltage

18	1.8V	28	2.8V
30	3.0V	33	3.3V

⑦ Voltage Control Function

T	TCXO
Spec. Code*	VCTCXO

*Please contact us for Spec. Code.

⑧ Individual Specification

Packaging (Tape & Reel 12000 pcs./ reel)

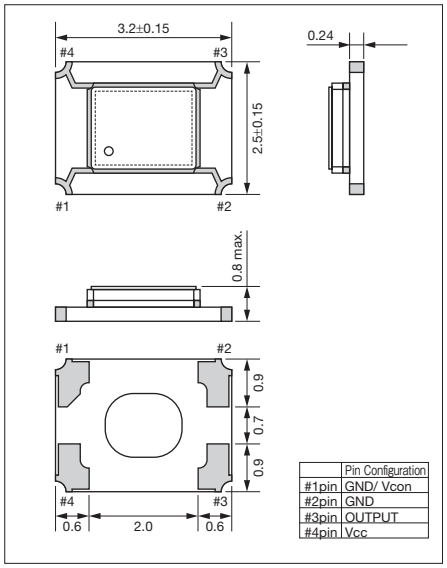
Specifications

Item	Symbol	Conditions	Min.	Max.	Units
Output Frequency Range	fo		10	60	MHz
Frequency Tolerance	f_tol	vs Temperature	−0.5/ −2	+0.5/ +2	×10^{-6}
		vs Load	−0.2	+0.2	
		vs Voltage	−0.2	+0.2	
Frequency Aging	f_age	Per Year	−1	+1	×10^{-6}
Storage Temperature Range	T_stg		−40	+85	°C
Operating Temperature Range	T_use		−30	+85	°C
Voltage Control Range	f_cont	Positive	±8	±15	×10^{-6}
Supply Voltage	Vcc		1.68	3.63	V
Output Level	Vpp	Clipped Sine*, Load: 10k ohm / / 10pF	0.8	—	Vp-p
Current Consumption	Icc		—	2	mA
Harmonics	—		—	−5	dBc

* : A DC-cut capacitor is not embedded in this crystal oscillator. Connect a DC-cut capacitor (≥1nF) to the line-out terminal of the oscillator.
* Please contact us for other specifications.

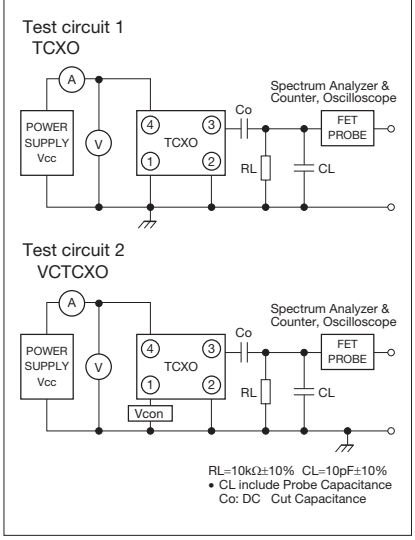
Dimensions

(Unit: mm)



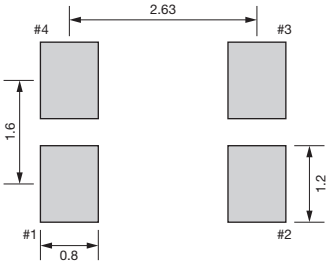
	Pin Configuration
#1pin	GND/ Vcon
#2pin	GND
#3pin	OUTPUT
#4pin	Vcc

Test Circuit



Recommended Land Pattern

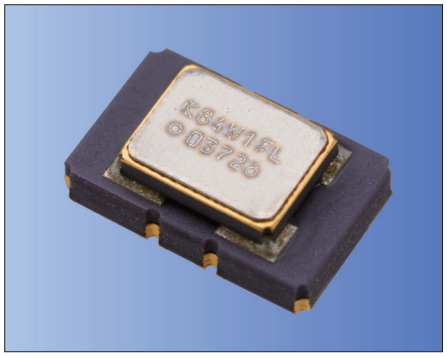
(Unit: mm)



Note: A capacitor of value 0.01μF between Vcc and GND is recommended.

Crystal Oscillators

5.0×3.2mm



RoHS Compliant

Features

- High stability and high reliability
- 2.3 to 3.63V drive available
- Clipped sine wave or CMOS level output
- Low phase noise

Applications

- 5G, Smallcell, Stratum3
- SONET/ SDH/ Ethernet

How to Order

KT5032F 20000 □ A □ 33 T xx
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

① Series
② Output Frequency
③ Frequency Tolerance
④ Lower Operating Temp.
⑤ Upper Operating Temp.

	③	④	⑤
KAW	±0.28×10⁻⁶	−40°C	+85°C
KAY	±0.28×10⁻⁶	−40°C	+105°C
AAY	±0.10×10⁻⁶	−40°C	+105°C

⑥ Supply Voltage

33	3.3V

⑦ Voltage Control Function

T	TCXO
Spec. Code*	VCTCXO

*Please contact us for Spec. Code.

⑧ Individual Specification

Packaging (Tape & Reel 1000 pcs./ reel)

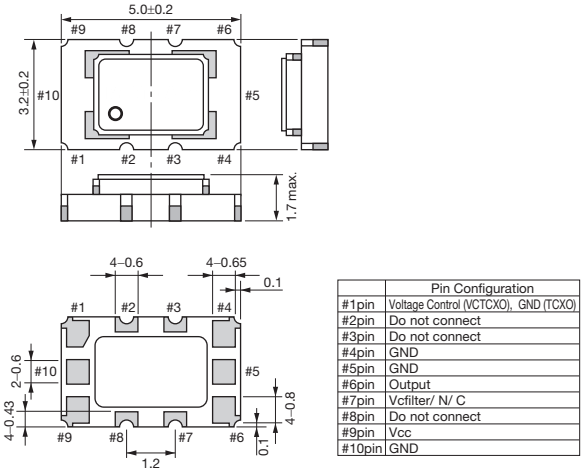
Specifications

Item	Symbol	Conditions		Min.	Max.	Units
Output Frequency Range	fo	Standard Frequency: 10, 19.2, 20, 24.576, 26, 30.72, 38.88, 40		10	40	MHz
Frequency Tolerance	f_tol	vs Temperature (−10 to +105°C) [±(fmax-fmin)/ 2fo]		−0.1	+0.1	×10⁻⁶
		vs Temperature (−40 to +85°C/ +105°C) [±(fmax-fmin)/ 2fo]		−0.28	+0.28	
		vs Voltage		−0.1	+0.1	
Supply Voltage	Vcc			+2.3	+3.63	V
Current Consumption	Icc	CMOS Output		—	6	mA
Frequency Aging	f_age	20years aging @40°C Including temp characteristics, initial tolerance, rated power supply voltage change and load change.		−4.6	+4.6	×10⁻⁶
Voltage Control Range	f_cont	Positive *100k ohm min		±5	±20	×10⁻⁶
Output Level	Vpp	Clipped Sine*, Load: 10k ohm // 10pF		0.8	—	Vp-p
Low Level Output Voltage	VOL	CMOS, Load: 15pF IOL=4mA		—	10% Vcc	V
High Level Output Voltage	VOH	CMOS, Load: 15pF IOH=−4mA		90% Vcc	—	V
Rise / Fall Time (10%Vcc to 90%Vcc)	Tr/ Tf	CMOS, Load: 15pF		—	8	ns
Symmetry	SYM	50% Vcc		45	55	%
Phase Noise	—	@20MHz	@10Hz offset	—	−90	dBc/ Hz
			@100Hz offset	—	−120	
			@1kHz offset	—	−140	
			@10kHz offset	—	−150	
			@100kHz offset	—	−150	

* : A DC-cut capacitor is not embedded in this crystal oscillator. In case of clipped sine output, connect a DC-cut capacitor (≥1nF) to the line-out terminal of the oscillator.
* Please contact us for other specifications.

Dimensions

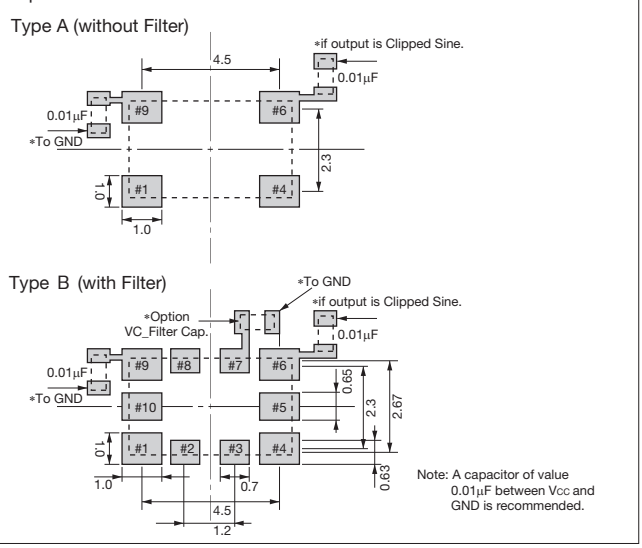
(Unit: mm)



	Pin Configuration
#1pin	Voltage Control (VCTCXO), GND (TCXO)
#2pin	Do not connect
#3pin	Do not connect
#4pin	GND
#5pin	GND
#6pin	Output
#7pin	Vcfilter/ N/ C
#8pin	Do not connect
#9pin	Vcc
#10pin	GND

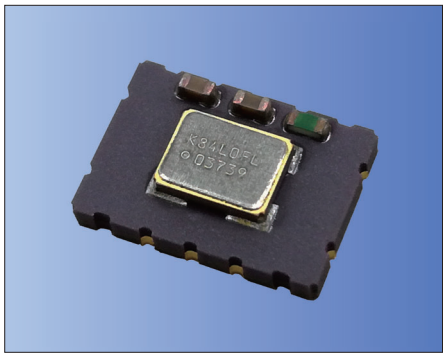
Recommended Land Pattern

(Unit: mm)



Crystal Oscillators

7.0×5.0mm



RoHS Compliant

Features

- High stability and high reliability
- 2.7 to 5.5V drive available
- Clipped sine wave or CMOS level output
- Low phase noise
- Disable Function (KT7050A)

Applications

- 5G, Smallcell, Stratum3
- SONET/ SDH/ Ethernet

- Compliant to the GR1244-Core & GR253-Core
- Recommended in Microsemi's ZLAN-68 app. note for Stratum3 applications based on tests performed by Kyocera.

How to Order

KT7050 □ 20000 □ A □ 33 T xx
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

① Series
② Land Type

A	10Pads
B	4Pads

③ Output Frequency
④ Freq. Temp. Chrst.
⑤ Lower Operating Temp.
⑥ Upper Operating Temp.

	④	⑤	⑥
KAW	±0.28×10^{-6}	−40°C	+85°C
KAY	±0.28×10^{-6}	−40°C	+105°C
AAY	±0.10×10^{-6}	−40°C	+105°C

⑦ Supply Voltage

33	3.3V

⑧ Voltage Control Function

T	TCXO
Spec. Code*	VCTCXO

*Please contact us for Spec. Code.

⑨ Individual Specification

Packaging (Tape & Reel 1000 pcs./ reel)

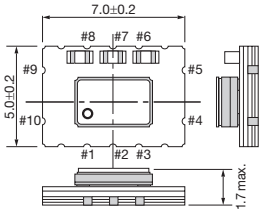
Specifications

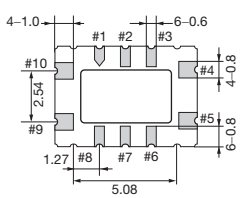
Item	Symbol	Conditions		Min.	Max.	Units
Output Frequency Range	fo	Standard Frequency: 10, 19.2, 20, 24.576, 26, 30.72, 38.88, 40		10	40	MHz
Frequency Tolerance	f_tol	vs Temperature (−10 to +105°C) [±(fmax-fmin)/ 2fo]		−0.1	+0.1	×10^{-6}
		vs Temperature (−40 to +85°C/ +105°C) [±(fmax-fmin)/ 2fo]		−0.28	+0.28	
		vs Voltage		−0.1	+0.1	
Supply Voltage	Vcc			+2.7	+5.5	V
Current Consumption	Icc	CMOS Output		—	6	mA
Frequency Aging	f_age	20years aging @40°C Including temp characteristics, initial tolerance, rated power supply voltage change and load change.		−4.6	+4.6	×10^{-6}
Voltage Control Range	f_cont	Positive *100k ohm min		±5	±20	×10^{-6}
Output Level	Vpp	Clipped Sine, Load: 10k ohm // 10pF		0.8	—	Vp-p
Low Level Output Voltage	VOL	CMOS, Load: 15pF IOL=4mA		—	10% Vcc	V
High Level Output Voltage	VOH	CMOS, Load: 15pF IOH=−4mA		90% Vcc	—	V
Rise / Fall Time (10%Vcc to 90%Vcc)	Tr/ Tf	CMOS, Load: 15pF		—	8	ns
Symmetry	SYM	50% Vcc		45	55	%
Phase Noise	—	@20MHz	@10Hz offset	—	−90	dBc/ Hz
			@100Hz offset	—	−120	
			@1kHz offset	—	−140	
			@10kHz offset	—	−150	
			@100kHz offset	—	−150	

* Please contact us for other specifications.

Dimensions

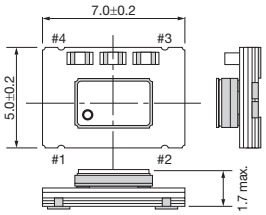
KT7050A

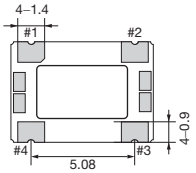




Pin Connection	
#1	Do not connect (Pin1)
#2/3	Do not connect
#4	GND
#5	Output
#6/7	Do not connect
#8	Tri-state Enable/ Disable connect
#9	Vcc
#10	Voltage Control (VCTCXO), GND (TCXO)

KT7050B

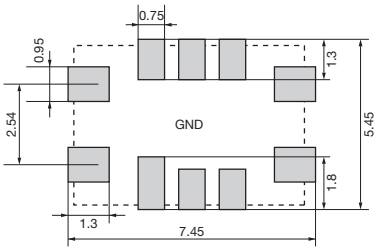


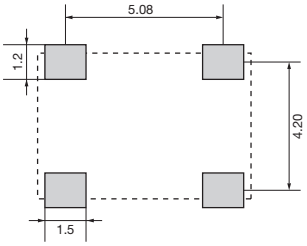


Pin Connection	
#1	Voltage Control (VCTCXO), GND (TCXO)
#2	GND
#3	Output
#4	Vcc

Recommended Land Pattern

(Unit: mm)





1. Shock & Drop • Vibration

Do not inflict excessive shock and mechanical vibration that exceeds the norm, such as hitting or mistakenly dropping, when transporting and mounting on a board. There are cases when pieces of crystal break, and pieces that are used become damaged, and become inoperable. When a shock or vibration that exceeds the norm has been inflicted, make sure to check the characteristics.

2. Cleaning

Since a crystal piece can be broken by resonance when a crystal device is cleaned by ultrasonic cleaning, be careful when carrying out ultrasonic cleaning.

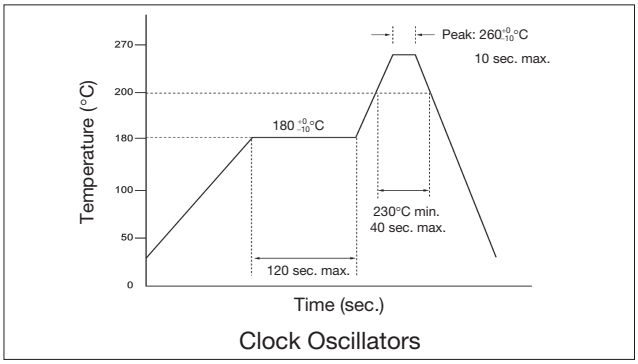
3. Soldering conditions

To maintain the product reliability, please follow recommended conditions.

Standard soldering iron conditions

	Clock Oscillators
Soldering iron	280°C to 340°C
Time	3+1/ −0 sec. max.

Reflow conditions (Example)



Recommended reflow Conditions vary depending upon products.
Please check with the respective specification for details.

4. Mounting Precautions

The lead of the device and the pattern of the board is soldered on the surface. Since extreme deformation of the board tears off the pattern, tears off the lead metal, cracks the solder and damages the sealed part of the device and there are cases in which performance deteriorates and operation fails, use it within the stipulated bending conditions. Due to the small cracks in the board resulting from mounting, please pay sufficient attention when attaching a device at the position where the warping of the board is great.
When using an automatic loading machine, as far as possible, select a type that has a small impact and use it while confirming that there is no damage.
Surface mount devices are NOT flow soldering compatible.

5. Storage Condition

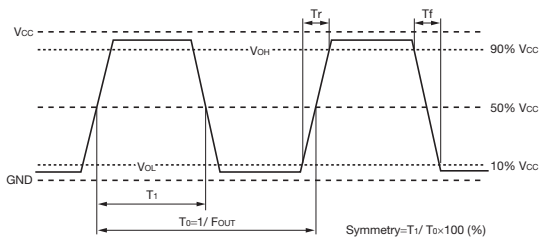
Since the long hour high temperature and low temperature storage, as well as the storage at high humidity are causes of deterioration in frequency accuracy and solderability.
Parts should be stored in temperature range of −5 to +40°C, humidity 40 to 60% RH, and avoid direct sunlight. Then use within 6 months.

6. In order to use clock oscillators

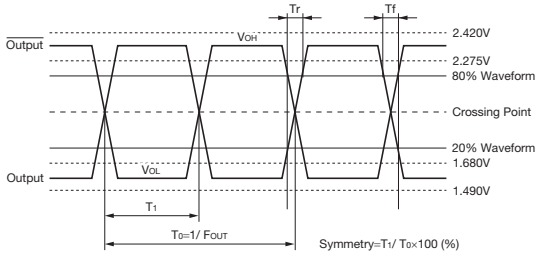
(1) The miniature oscillator for the clock utillzes a CMOS IC and incorporates a protective circuit against static electricity. However, exercise care in the same manner as for a normal CMOS IC.
(2) Internal capacitor is not provided in the power supply section (+DC-GND). *
To serve as overimpressed voltage and overcurrent protective device, place a bypass capacitor (0.01μF) as near as possible to the (+DC-GND) terminal. However, the capacitance value is meant as a guideline. Depending on the capacitor type, frequency characteristics vary. Accordingly, use a capacitor that matches the frequency characteristics.
* KC7050S series has Bypass Capacitior between Vcc and GND.
(3) Applying reverse voltage could result in damage to internal parts. Take care not to connect terminals incorrectly.
(4) Please do not use oscillators under unfavorable condition such as beyond specified range in catalog or specification sheet.
(5) Please keep oscillators away from water, salt water or harmful gas.
(6) KC7050S series should be stored in humidity-controlled area after the package is unsealed, in temperature +25±5°C, under humidity of 65%RH, and should be mounted on PCB within 7 days.

Clock Timing Chart

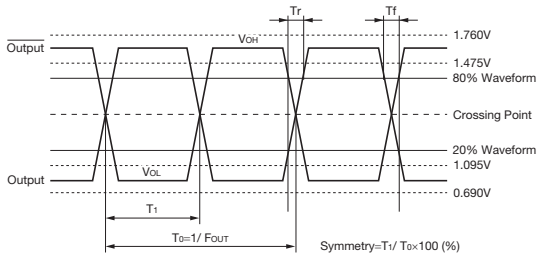
[CMOS Output]



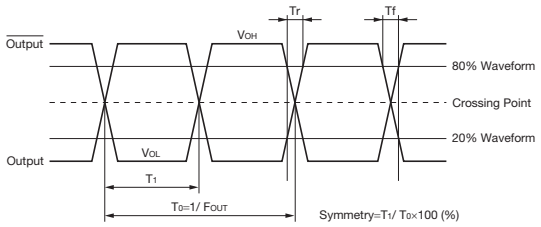
[LV-PECL (3.3V) Output]



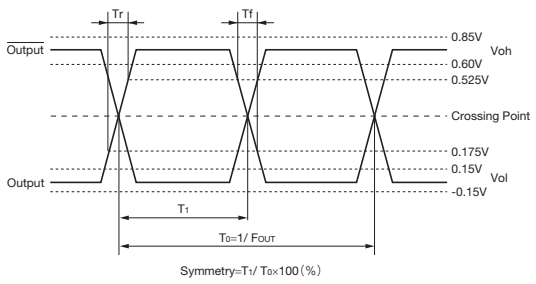
[LV-PECL (2.5V) Output]



[LVDS Output]

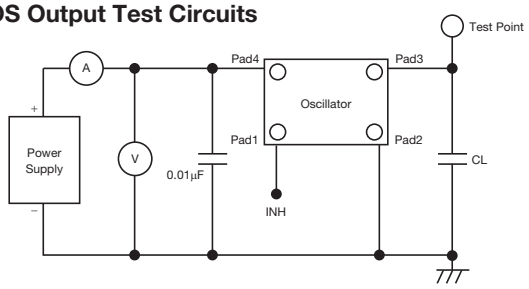


[HCSL-Output]



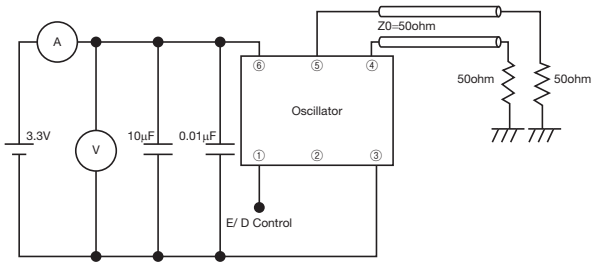
Test Circuits

CMOS Output Test Circuits

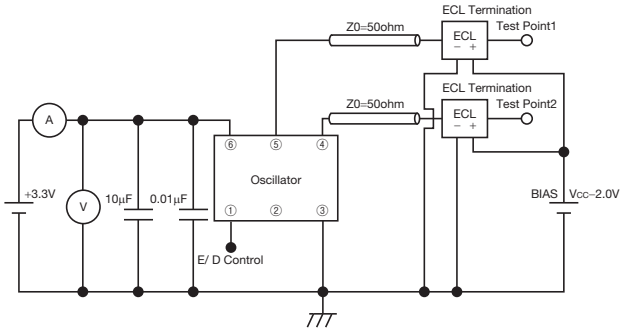


Note) Maximum load (Includes capacitances of fixture and probe)

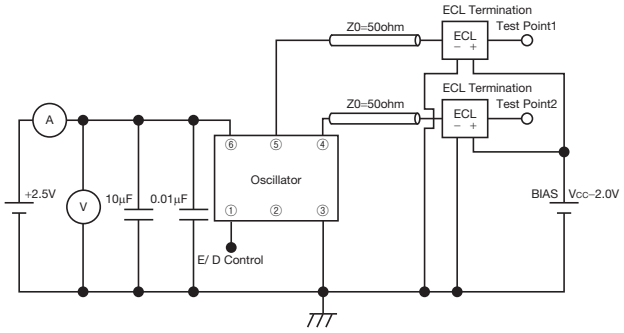
HCSL Output Test Circuits



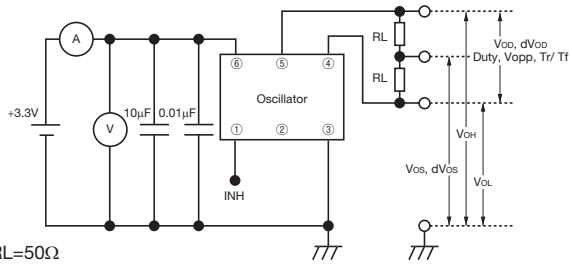
LV-PECL (3.3V/ XO) Output Test Circuits



LV-PECL (2.5V/ XO) Output Test Circuits

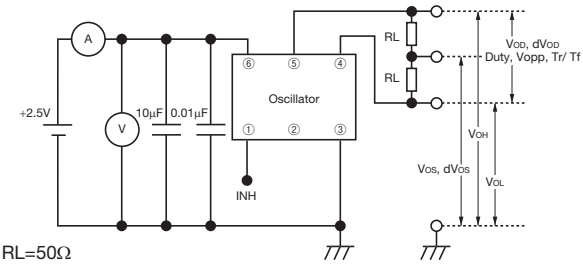


LVDS (3.3V/ XO) Output Test Circuits



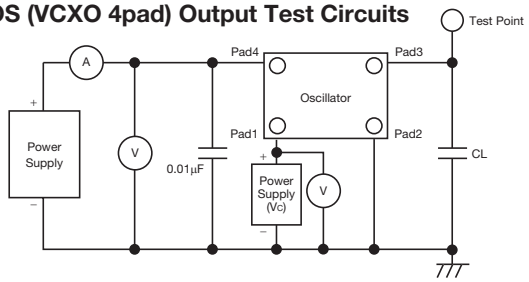
Note) RL=50Ω

LVDS (2.5V/ XO) Output Test Circuits



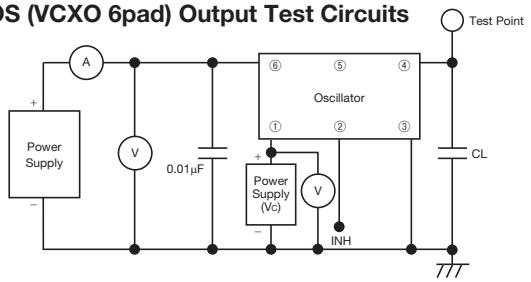
Note) RL=50Ω

CMOS (VCXO 4pad) Output Test Circuits



Note) Maximum load (Includes capacitances of fixture and probe)

CMOS (VCXO 6pad) Output Test Circuits



Note) Maximum load (Includes capacitances of fixture and probe)

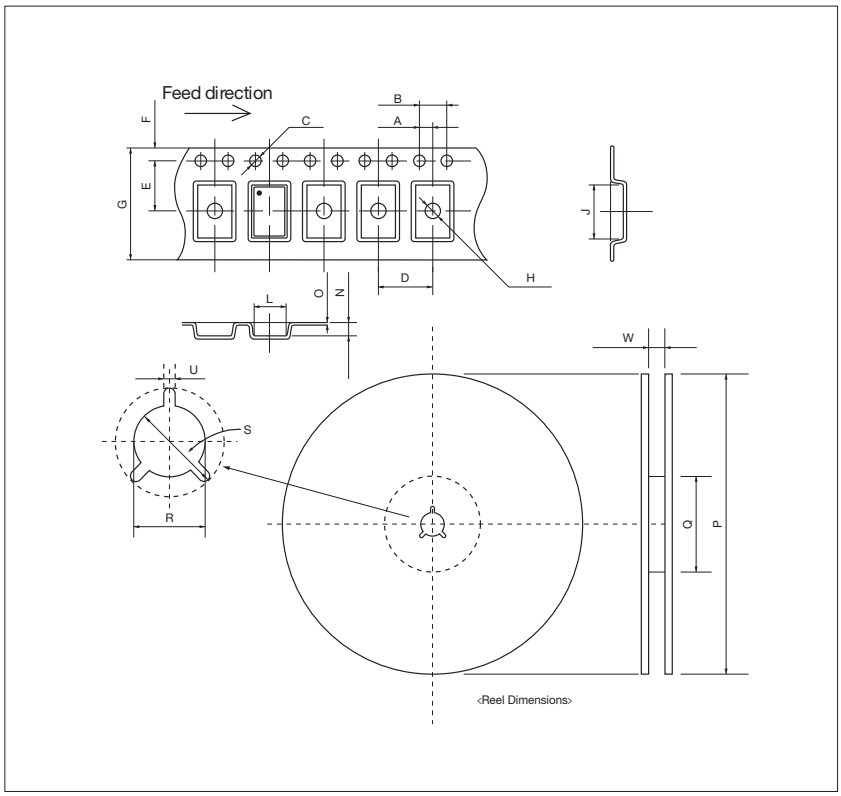
Tape & Reel Specifications

■ Clock Oscillators

■ Temperature Compensated Crystal Oscillators (TCXO)

		KC2016B KC2016Z KC2016K MC2016Z MC2016K	KC2520B KC2520C KC2520K KC2520M KC2520Z MC2520K MC2520Z	KC3225A KC3225K KC3225Z MC3225K MC3225Z	KC5032E KC5032K KC5032P KC5032Z MC5032K MC5032Z KV5032D KV5032G KV5032R	KC7050A KC7050G KC7050K KC7050P KC7050R KC7050Z MC7050K MC7050Z KV7050B KV7050C KV7050G KV7050R	KT1612	KT2016	KT2520	KT3225	KT5032	KT7050
TAPE	A	2.0±0.05	2.0±0.05	2.0±0.05	1.5+0.1/ −0	2.0±0.1	2.0±0.05	2.0±0.05	2.0±0.05	2.0±0.05	2.0±0.05	2.0±0.1
	B	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.05	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1
	C	ϕ1.5+0.1/ −0	ϕ1.5+0.1/ −0	ϕ1.5+0.1/ −0	ϕ1.5+0.1/ −0	ϕ1.5±0.1	ϕ1.5+0.1/ −0	ϕ1.5+0.1/ −0	ϕ1.5+0.1/ −0	ϕ1.5+0.1/ −0	ϕ1.55±0.05	ϕ1.5+0.1/ −0
	D	4.0±0.1	4.0±0.1	4.0±0.1	8.0±0.1	8.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1	8.0±0.1	8.0±0.1
	E	3.5±0.05	3.5±0.05	3.5±0.05	5.5±0.05	7.5±0.1	3.5±0.05	3.5±0.05	3.5±0.05	3.5±0.05	5.5±0.05	7.5±0.1
	F	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1
	G	8.0±0.2	8.0±0.2	8.0±0.2	12.0±0.3	16.0±0.2	8.0±0.2	8.0±0.2	8.0+0.3/ −0.2	8.0±0.3	12.0±0.2	16.0+0.3/ −0.1
	H	ϕ1.05±0.1	ϕ1.1±0.1	ϕ1.5+0.1/ 0	ϕ1.5+0.1/ 0	ϕ1.55±0.1	ϕ0.5±0.05	ϕ1.0+0.1/ −0	ϕ1.1±0.1	ϕ1.5+0.1/ −0	ϕ1.55±0.05	ϕ1.55±0.05
	J	2.25±0.1	2.7±0.1	3.5±0.05	5.5±0.1	7.4±0.1	1.85±0.1	2.4±0.05	2.9±0.1	3.5±0.1	5.9±0.1	8.21±0.1
	L	1.85±0.1	2.2±0.1	2.8±0.05	3.7±0.1	5.4±0.1	1.45±0.1	2.0±0.05	2.4±0.1	2.8±0.1	3.7±0.1	5.78±0.1
	N	0.95±0.1	1.0±0.1	1.1±0.05	1.4±0.1	2.0±0.1	0.65±0.05	0.9±0.05	1.15±0.1	1.1±0.1	2.0±0.1	2.16±0.1
	O	0.2±0.05	0.2±0.05	0.25±0.05	0.3±0.05	0.3±0.05	0.2±0.05	0.25±0.05	0.25±0.05	0.25±0.05	0.3±0.05	0.3±0.05
REEL	P	ϕ180+0/ −3	ϕ180+0/ −3	ϕ180+0/ −3	ϕ180+0/ −3	ϕ180+0/ −3	ϕ330+0/ −2	ϕ330+0/ −2	ϕ330+0/ −2	ϕ330+0/ −2	ϕ254±2.0	ϕ254±2.0
	Q	ϕ60+1/ −0	ϕ60+1/ −0	ϕ60+1/ −0	ϕ60+1/ −0	ϕ60+1/ −0	ϕ100±1.0	ϕ100±1.0	ϕ100±1.0	ϕ100±1.0	ϕ100±1.0	ϕ100+1.0/ −0
	R	ϕ13±0.2	ϕ13±0.2	ϕ13±0.2	ϕ13±0.2	ϕ13±0.2	ϕ13±0.2	ϕ13±0.2	ϕ13±0.2	ϕ13±0.2	ϕ13±0.2	ϕ13±0.2
	S	ϕ21±0.8	ϕ21±0.8	ϕ21±0.8	ϕ21±0.8	ϕ21±0.8	ϕ21±0.8	ϕ21±0.8	ϕ21±0.8	ϕ21±0.8	ϕ21±0.8	ϕ21±0.8
	U	2.0±0.5	2.0±0.5	2.0±0.5	2.0±0.5	2.0±0.5	2.0±0.5	2.0±0.5	2.0±0.5	2.0±0.5	2.0±0.5	2.0±0.5
	W	9.0+0.3/ −0	9.0+0.3/ −0	9.0±0.3	13.0±0.3	17±0.2	9.4+1.0/ −0.5	9.4+1.0/ −0.5	9.4+1.0/ −0.5	9.4+1.0/ −0.5	13.5±1.0	16.4+1.0/ −0
Qty.		2000	2000	2000	1000	1000	18000	15000	12000	12000	1000	1000

(Unit: mm)



Notes for Using the Catalog

1. Specifications described in this catalog are for references. Products specifications shall be based on written documents agreed by each party.

2. Contents in this catalog are subject to change without notice. It is recommended to confirm the latest information at the time of usage. Also, Kyocera Electronic Components Catalog is revised once a year. We may not be able to accept requests based on old catalogs.

3. Products in this catalog are intended to be used in general electronic equipment such as office equipment, audio and visual equipment, communication equipment, measurement instrument and home appliances. It is absolutely recommended to consult with our sales representatives in advance upon planning to use our products in applications which require extremely high quality and reliability such as aircraft and aerospace equipment, traffic systems, safety systems, power plant and medical equipment including life maintenance systems.

4. Even though we strive for improvements of quality and reliability of products, it is requested to design with enough safety margin in equipment or systems in order not to threaten human lives directly or damage human bodies or properties by an accidental result of products.

5. It is requested to design based on guaranteed specifications for such as maximum ratings, operating voltage and operating temperature. It is not the scope of our guarantee for unsatisfactory results due to misuse or inadequate usage of products in the catalog.

6. Operation summaries and circuit examples in this catalog are intended to explain typical operation and usage of the product. It is recommended to perform circuit and assembly design considering surrounding conditions upon using products in this catalog.

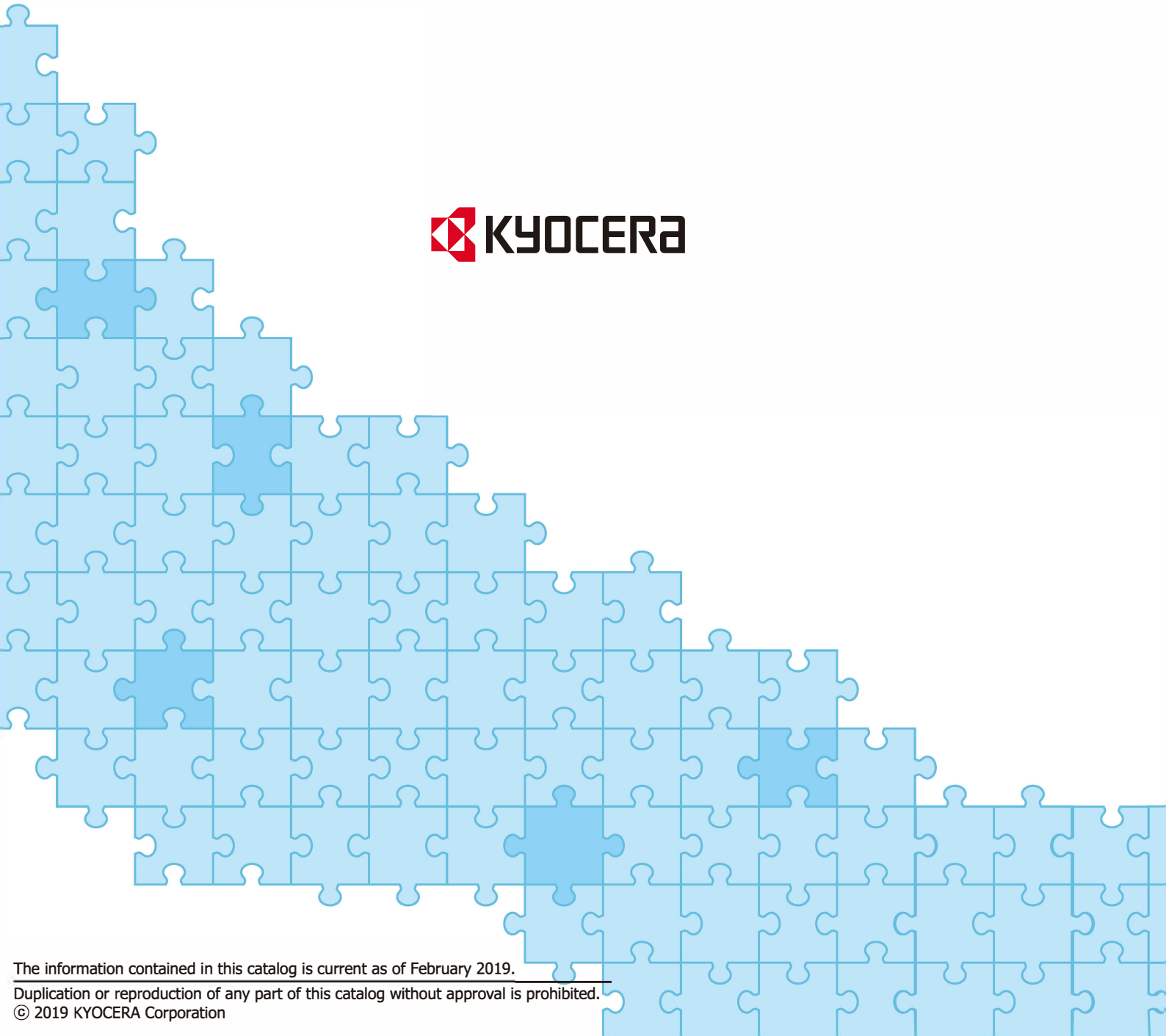
7. Technical information described in this catalog is meant to explain typical operations and applications of products, and it is not intended to guarantee or license intellectual properties or other industrial rights of the third party or Kyocera.

8. Trademarks, logos and brand names used in this catalog are owned by Kyocera or the corresponding third party.

9. Certain products in this catalog are subject to the Foreign Exchange and Foreign Trade Control Act of Japan, and require the license from Japanese Government upon exporting the restricted products and technical information under the law.
   Besides, it is requested not to use products and technical information in the catalog for the development and/or manufacture of weapons of mass destruction or other conventional weapons, nor to provide them to any third party with the possibility of having such purposes.

10. It is prohibited to reprint and reproduce a part or whole of this catalog without permission.

11. Contents described herein are as of March 2019.



The information contained in this catalog is current as of February 2019.