



2025

Catalog

Crystal Devices

Products			Dimensions (mm)			Weight (g)	Applications					
Product Type	Page No.	Part Number	L	W	T (max.)		Digital Electronics OA, PC Peripherals Amusement	Car Electronics, ITS, Car Audio, Car Navigation	Car Electronics (ECU, Air Bag, ABS, TPMS etc.)	Mobile Comm. Wireless LAN Dedicated Short Range Comm.(DSRC)	Industrial Use (Broadcast, Medical, Base Station etc.)	
Crystal Units	3	CT1612RB	1.6	1.2	0.65	0.0052						
	4	CT2016DB (Low Profile)	2.0	1.6	0.65	0.0076				✓		
	4	CT2016DB	2.0	1.6	1.0	0.0109				✓		
	5	CX1008SB	1.0	0.8	0.3/0.27	0.0010	✓			✓		
	6	CX1210DB	1.2	1.0	0.3	0.0016	✓			✓		
	7	CX1210SB	1.2	1.0	0.35	0.0016	✓			✓		
	8	CX1612DB	1.6	1.2	0.33/0.4	0.0029	✓			✓		
	9	CX2016DB	2.0	1.6	0.45	0.0056	✓					
	10	CX2016GR (for Automotive)	2.0	1.6	0.785	0.0081						
	11	CX2016SA (for Automotive)	2.0	1.6	0.5	0.0063	✓	✓	✓			
	12	CX3225CA (for Automotive)	3.2	2.5	0.9	0.0212		✓	✓			
	13	CX3225GA (for Automotive)	3.2	2.5	0.95	0.0231		✓	✓			
	14	CX3225GB	3.2	2.5	0.9	0.0212	✓					
	15	CX3225SA (for Automotive)	3.2	2.5	0.8	0.0200		✓	✓			
		16	CX3225SB	3.2	2.5	0.6	0.0191	✓			✓	
	Clock Oscillators (SPXO)	19-20	KC2016Z (X type)	2.0	1.6	0.8	0.0071	✓			✓	✓
19, 21		KC2016Z (Y type)	2.0	1.6	0.8	0.0071	✓			✓	✓	
19-20		KC2520Z (X type)	2.5	2.0	0.8	0.0125	✓			✓	✓	
19, 21		KC2520Z (Y type)	2.5	2.0	0.8	0.0125	✓			✓	✓	
19-20		KC3225Z (X type)	3.2	2.5	0.8	0.0127	✓			✓	✓	
19, 21		KC3225Z (Y type)	3.2	2.5	0.8	0.0127	✓			✓	✓	
19-20		KC5032Z (X type)	5.0	3.2	1.2	0.0272	✓			✓	✓	
19, 21		KC5032Z (Y type)	5.0	3.2	1.2	0.0272	✓			✓	✓	
19-20		KC7050Z (X type)	7.0	5.0	1.2	0.0367	✓			✓	✓	
19, 21		KC7050Z (Y type)	7.0	5.0	1.2	0.0367	✓			✓	✓	
22-23		MC2016Z (X type)	2.0	1.6	0.8	0.0071		✓				
22, 24		MC2016Z (Y type)	2.0	1.6	0.8	0.0071		✓				
22-23		MC2520Z (X type)	2.5	2.0	0.8	0.0125		✓				
22, 24		MC2520Z (Y type)	2.5	2.0	0.8	0.0125		✓				
22-23		MC3225Z (X type)	3.2	2.5	0.8	0.0127		✓				
22, 24		MC3225Z (Y type)	3.2	2.5	0.8	0.0127		✓				
22-23		MC5032Z (X type)	5.0	3.2	1.2	0.0272		✓				
22, 24		MC5032Z (Y type)	5.0	3.2	1.2	0.0272		✓				
22-23		MC7050Z (X type)	7.0	5.0	1.2	0.0367		✓				
22, 24		MC7050Z (Y type)	7.0	5.0	1.2	0.0367		✓				
25-26		KC2016K (32.768kHz)	2.0	1.6	0.8	0.0070	✓			✓	✓	
25-26		KC2520K (32.768kHz)	2.5	2.0	0.8	0.0124	✓			✓	✓	
25-26		KC3225K (32.768kHz)	3.2	2.5	0.8	0.0126	✓			✓	✓	
25-26		KC5032K (32.768kHz)	5.0	3.2	1.2	0.0271	✓			✓	✓	
25-26		KC7050K (32.768kHz)	7.0	5.0	1.2	0.0366	✓			✓	✓	
27-29		KC2016K	2.0	1.6	0.8	0.0070	✓			✓	✓	
27-29		KC2520K	2.5	2.0	0.8	0.0124	✓			✓	✓	
27-29		KC3225K	3.2	2.5	0.8	0.0126	✓			✓	✓	
27-29		KC5032K	5.0	3.2	1.2	0.0271	✓			✓	✓	
27-29		KC7050K	7.0	5.0	1.2	0.0366	✓			✓	✓	
30-31		MC2016K (32.768kHz)	2.0	1.6	0.8	0.0070		✓				
30-31		MC2520K (32.768kHz)	2.5	2.0	0.8	0.0124		✓				
30-31		MC3225K (32.768kHz)	3.2	2.5	0.8	0.0126		✓				
30-31		MC5032K (32.768kHz)	5.0	3.2	1.2	0.0271		✓				
30-31		MC7050K (32.768kHz)	7.0	5.0	1.2	0.0366		✓				
32-34		MC2016K	2.0	1.6	0.8	0.0070		✓				
32-34		MC2520K	2.5	2.0	0.8	0.0124		✓				
32-34		MC3225K	3.2	2.5	0.8	0.0126		✓				
32-34		MC5032K	5.0	3.2	1.2	0.0271		✓				
32-34		MC7050K	7.0	5.0	1.2	0.0366		✓				
35-36		KC2016F (LV-PECL Output)	2.0	1.6	1.2	0.0068	✓			✓	✓	
35-36		KC2520F (LV-PECL Output)	2.5	2.0	1.2	0.0083	✓			✓	✓	
35-36		KC3225F (LV-PECL Output)	3.2	2.5	1.2	0.0115	✓			✓	✓	
37-38		KC2016F (LVDS Output)	2.0	1.6	1.2	0.0068				✓	✓	
37-38		KC2520F (LVDS Output)	2.5	2.0	1.2	0.0083				✓	✓	
37-38		KC3225F (LVDS Output)	3.2	2.5	1.2	0.0115				✓	✓	
39-40		KC2016F (HCSL Output)	2.0	1.6	1.2	0.0068				✓	✓	
39-40		KC2520F (HCSL Output)	2.5	2.0	1.2	0.0083				✓	✓	
39-40		KC3225F (HCSL Output)	3.2	2.5	1.2	0.0115				✓	✓	
41-42		MC2016F (LV-PECL Output)	2.0	1.6	1.2	0.0068		✓				
41-42	MC2520F (LV-PECL Output)	2.5	2.0	1.2	0.0083		✓					
41-42	MC3225F (LV-PECL Output)	3.2	2.5	1.2	0.0115		✓					
43-44	MC2016F (LVDS Output)	2.0	1.6	1.2	0.0068		✓					
43-44	MC2520F (LVDS Output)	2.5	2.0	1.2	0.0083		✓					
43-44	MC3225F (LVDS Output)	3.2	2.5	1.2	0.0115		✓					
45-46	MC2016F (HCSL Output)	2.0	1.6	1.2	0.0068		✓					
45-46	MC2520F (HCSL Output)	2.5	2.0	1.2	0.0083		✓					
45-46	MC3225F (HCSL Output)	3.2	2.5	1.2	0.0115		✓					
Temperature Compensated Crystal Oscillators (TCXO)	47	KT1612A	1.65	1.25	0.55	0.0040	✓			✓	✓	
	48	KT1612A (Low Voltage Drive)	1.65	1.25	0.55	0.0048				✓		
	49	KT1612A (Low Phase Noise)	1.65	1.25	0.55	0.0048	✓			✓	✓	
	50	KT2016K	2.0	1.6	0.8	0.0070	✓	✓		✓	✓	
	51	KT2016K (Low Voltage Drive)	2.0	1.6	0.8	0.0070				✓		
	52	KT2016K (Low Phase Noise)	2.0	1.6	0.8	0.0070	✓	✓		✓	✓	
	53	KT2520K	2.5	2.0	0.8	0.0080	✓	✓		✓	✓	

NR = Not Recommended

Products Part Number	Frequency Range (MHz)					Conditions of Use				RoHS Compliant*	AEC	
	1	10	50	100	300 to 800	Solder			Washable		Q100	Q200
						Manual	Reflow	Flow				
CT1612RB			38.4		76.8	Yes	Yes	No	Yes	Yes		
CT2016DB (Low Profile)		19.2	38.4			Yes	Yes	No	Yes	Yes		
CT2016DB		19.2	38.4			Yes	Yes	No	Yes	Yes		
CX1008SB			37.4		80	Yes	Yes	No	Yes	Yes		
CX1210DB			37.4		80	Yes	Yes	No	Yes	Yes		
CX1210SB			24		80	Yes	Yes	No	Yes	Yes		
CX1612DB			24		76.8	Yes	Yes	No	Yes	Yes		
CX2016DB			16		60	Yes	Yes	No	Yes	Yes		
CX2016GR (for Automotive)			16		50	Yes	Yes	No	Yes	Yes		Yes
CX2016SA (for Automotive)			16		60	Yes	Yes	No	Yes	Yes		Yes
CX3225CA (for Automotive)			12		54	Yes	Yes	No	Yes	Yes		Yes
CX3225GA (for Automotive)			8		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			12		54	Yes	Yes	No	Yes	Yes		
KC2016Z (X type)	0.5				170	No	Yes	No	NR	Yes		
KC2016Z (Y type)			24		72	No	Yes	No	NR	Yes		
KC2520Z (X type)	0.5				170	No	Yes	No	NR	Yes		
KC2520Z (Y type)			24		72	No	Yes	No	NR	Yes		
KC3225Z (X type)	0.5				170	No	Yes	No	NR	Yes		
KC3225Z (Y type)			24		72	No	Yes	No	NR	Yes		
KC5032Z (X type)	0.5				170	No	Yes	No	NR	Yes		
KC5032Z (Y type)			24		72	No	Yes	No	NR	Yes		
KC7050Z (X type)	0.5				170	No	Yes	No	NR	Yes		
KC7050Z (Y type)			24		72	No	Yes	No	NR	Yes		
MC2016Z (X type)	0.5				170	No	Yes	No	NR	Yes	Yes (option)	Yes
MC2016Z (Y type)			24		72	No	Yes	No	NR	Yes	Yes (option)	Yes
MC2520Z (X type)	0.5				170	No	Yes	No	NR	Yes	Yes (option)	Yes
MC2520Z (Y type)			24		72	No	Yes	No	NR	Yes	Yes (option)	Yes
MC3225Z (X type)	0.5				170	No	Yes	No	NR	Yes	Yes (option)	Yes
MC3225Z (Y type)			24		72	No	Yes	No	NR	Yes	Yes (option)	Yes
MC5032Z (X type)	0.5				170	No	Yes	No	NR	Yes	Yes (option)	Yes
MC5032Z (Y type)			24		72	No	Yes	No	NR	Yes	Yes (option)	Yes
MC7050Z (X type)	0.5				170	No	Yes	No	NR	Yes	Yes (option)	Yes
MC7050Z (Y type)			24		72	No	Yes	No	NR	Yes	Yes (option)	Yes
KC2016K (32.768kHz)	0.032768					No	Yes	No	NR	Yes		
KC2520K (32.768kHz)	0.032768					No	Yes	No	NR	Yes		
KC3225K (32.768kHz)	0.032768					No	Yes	No	NR	Yes		
KC5032K (32.768kHz)	0.032768					No	Yes	No	NR	Yes		
KC7050K (32.768kHz)	0.032768					No	Yes	No	NR	Yes		
KC2016K	1.5				160	No	Yes	No	NR	Yes		
KC2520K	1.5				160	No	Yes	No	NR	Yes		
KC3225K	1.5				160	No	Yes	No	NR	Yes		
KC5032K	1.5				160	No	Yes	No	NR	Yes		
KC7050K	1.5				160	No	Yes	No	NR	Yes		
MC2016K (32.768kHz)	0.032768					No	Yes	No	NR	Yes	Yes (option)	Yes
MC2520K (32.768kHz)	0.032768					No	Yes	No	NR	Yes	Yes (option)	Yes
MC3225K (32.768kHz)	0.032768					No	Yes	No	NR	Yes	Yes (option)	Yes
MC5032K (32.768kHz)	0.032768					No	Yes	No	NR	Yes	Yes (option)	Yes
MC7050K (32.768kHz)	0.032768					No	Yes	No	NR	Yes	Yes (option)	Yes
MC2016K	1.5				160	No	Yes	No	NR	Yes	Yes (option)	Yes
MC2520K	1.5				160	No	Yes	No	NR	Yes	Yes (option)	Yes
MC3225K	1.5				160	No	Yes	No	NR	Yes	Yes (option)	Yes
MC5032K	1.5				160	No	Yes	No	NR	Yes	Yes (option)	Yes
MC7050K	1.5				160	No	Yes	No	NR	Yes	Yes (option)	Yes
KC2016F (LV-PECL Output)				100/125/156.25		No	Yes	No	NR	Yes		
KC2520F (LV-PECL Output)				100/125/156.25		No	Yes	No	NR	Yes		
KC3225F (LV-PECL Output)				100/125/156.25		No	Yes	No	NR	Yes		
KC2016F (LVDS Output)				100/125/156.25		No	Yes	No	NR	Yes		
KC2520F (LVDS Output)				100/125/156.25		No	Yes	No	NR	Yes		
KC3225F (LVDS Output)				100/125/156.25		No	Yes	No	NR	Yes		
KC2016F (HCSL Output)				100/125/156.25		No	Yes	No	NR	Yes		
KC2520F (HCSL Output)				100/125/156.25		No	Yes	No	NR	Yes		
KC3225F (HCSL Output)				100/125/156.25		No	Yes	No	NR	Yes		
MC2016F (LV-PECL Output)				100/125/156.25		No	Yes	No	NR	Yes	Yes (option)	Yes
MC2520F (LV-PECL Output)				100/125/156.25		No	Yes	No	NR	Yes	Yes (option)	Yes
MC3225F (LV-PECL Output)				100/125/156.25		No	Yes	No	NR	Yes	Yes (option)	Yes
MC2016F (LVDS Output)				100/125/156.25		No	Yes	No	NR	Yes	Yes (option)	Yes
MC2520F (LVDS Output)				100/125/156.25		No	Yes	No	NR	Yes	Yes (option)	Yes
MC3225F (LVDS Output)				100/125/156.25		No	Yes	No	NR	Yes	Yes (option)	Yes
MC2016F (HCSL Output)				100/125/156.25		No	Yes	No	NR	Yes	Yes (option)	Yes
MC2520F (HCSL Output)				100/125/156.25		No	Yes	No	NR	Yes	Yes (option)	Yes
MC3225F (HCSL Output)				100/125/156.25		No	Yes	No	NR	Yes	Yes (option)	Yes
KT1612A		19.2			76.8	No	Yes	No	No	Yes		
KT1612A (Low Voltage Drive)			26		52	No	Yes	No	No	Yes		
KT1612A (Low Phase Noise)		19.2			76.8	No	Yes	No	No	Yes		
KT2016K		19.2			52.0	No	Yes	No	No	Yes	Yes (option)	Yes
KT2016K (Low Voltage Drive)			26		52	No	Yes	No	No	Yes		Yes
KT2016K (Low Phase Noise)		19.2			76.8	No	Yes	No	No	Yes		Yes
KT2520K		19.2			52.0	No	Yes	No	No	Yes	Yes (option)	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.



1.6 × 1.2mm for Mobile Communications



RoHS Compliant
PSL: R4Y MSL1

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

CT1612RB 38400 □ □ □ □ □ **CC**
① ② ③ ④ ⑤ ⑥ ⑦

- ① Series
- ② Frequency
- ③ Load Capacitance
- ④ Frequency Tolerance

B0	6 pF	—	F	$\pm 10 \times 10^{-6}$	Std.
C0	7 pF	—	G	$\pm 15 \times 10^{-6}$	—
D0	8 pF	Std.			

- ⑤ Operating Temp. Range
- ⑥ Frequency Temp. Stability

LH	-30 to +85° C	$\pm 12 \times 10^{-6}$ (at -30 to +85° C)
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⑦ Individual Specification (STD Specification is "CC" .)

Packaging (Tape & Reel 15000 pcs./ reel)

Specifications

Item	Symbol	Specification	Unit	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	$\times 10^{-6}$	25° C $\pm 3^\circ$ C
Motional Series Resistance	R1	Table 1	ohm	
Drive Level	DL	10	μ W	100 μ W 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	$\times 10^{-6}$	
Thermistor Resistance	—	Table 2	ohm	25° C $\pm 3^\circ$ 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	50 Ω max.

Table 2 Thermistor Resistance

Resistance	Specification
100k Ω	$\pm 1\%$

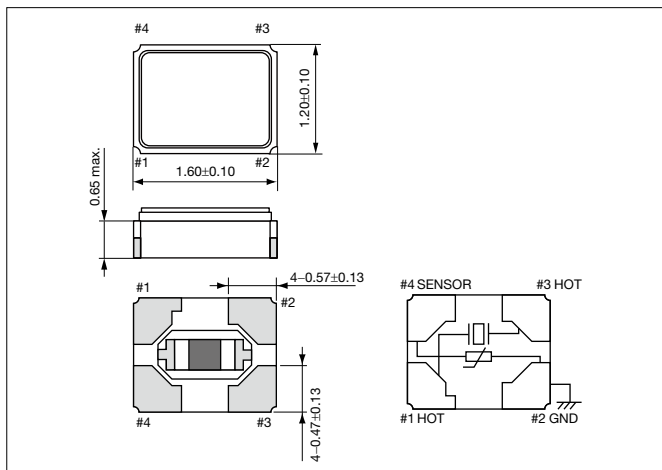
Table 3 Thermistor B-Constant

B-Constant	Specification
4250K	$\pm 1\%$

Crystal Units

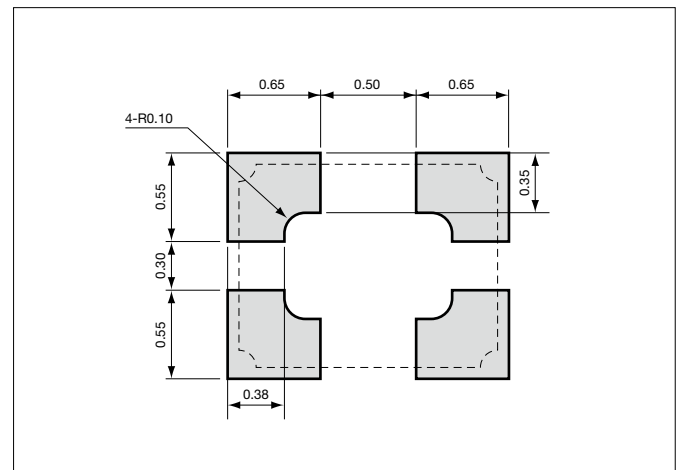
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)





2.0 × 1.6mm for Mobile Communications



RoHS Compliant
PSL: R4Y MSL1

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 □ □ □ □ □ **CC**
① ② ③ ④ ⑤ ⑥ ⑦

- ① Series
- ② Frequency
- ③ Load Capacitance
- ④ Frequency Tolerance

B0	6 pF	—	F	$\pm 10 \times 10^{-6}$	Std.
C0	7 pF	Std.	G	$\pm 15 \times 10^{-6}$	—

- ⑤ Operating Temp. Range
- ⑥ Frequency Temp. Stability

PF	- 40 to +85° C	$\pm 10 \times 10^{-6}$ (at - 25 to +85° C)
RH	- 40 to +105° C	$\pm 12 \times 10^{-6}$ (at - 30 to +85° C)

- ⑦ Individual Specification (STD Specification is "CC" .)

Packaging (Tape & Reel 12000 pcs./ reel)

Specifications

Item	Symbol	Specification	Unit	Remarks
Frequency Range	f _{nom}	19200 / 38400	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	μ W	100 μ W 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/ 38400kHz	80 Ω max.

Table 2 Thermistor Resistance

Resistance	Specification
100kΩ	± 1%

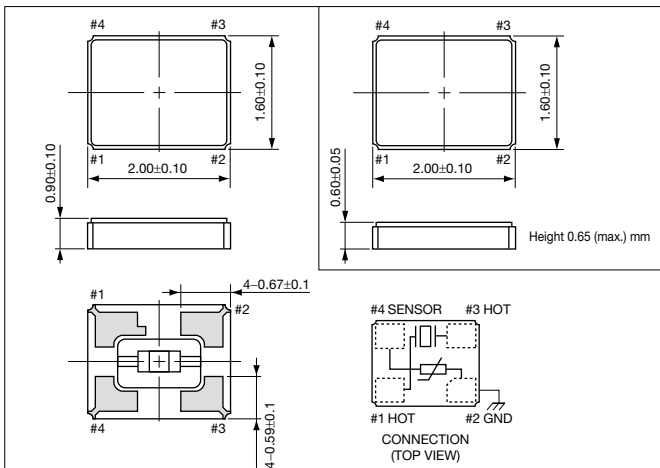
Table 3 Thermistor B-Constant

B-Constant	Specification
4250K	± 1%

Crystal Units

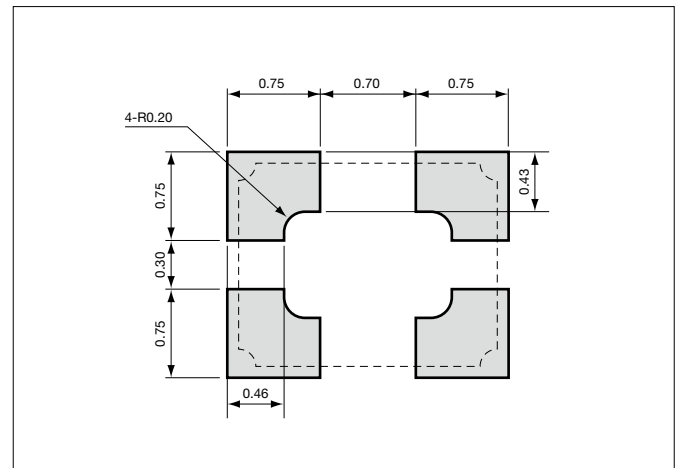
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)





1.0 × 0.8mm for Consumer Products/ Mobile Communications



RoHS Compliant
PSL: R4Y MSL1

How to Order

CX1008SB 37400 □□ □ □ □ **CC**
① ② ③④ ⑤ ⑥ ⑦ ⑧

- ① Series (Type and Size)
- ② Frequency (37400 to 80000kHz)
- ③④ Load Capacitance (Unit:pF) Ex.: D1:8.1pF

③ Integer part		④ After the decimal point	
D	8	0	.0
E	9	1	.1
F	10	2	.2
G	11	3	.3
H	12	4	.4
Z	Special suffix	5	.5
		6	.6
		7	.7
		8	.8
		9	.9

Packaging
(Tape & Reel 21000 pcs./ reel)

⑤ Frequency Tolerance

F	±10×10 ⁻⁶
G	±15×10 ⁻⁶
H	±20×10 ⁻⁶
J	±25×10 ⁻⁶
K	±30×10 ⁻⁶
M	±40×10 ⁻⁶
P	±50×10 ⁻⁶
W	All Over
Z	Special suffix

Features

- Ultra-miniature and low profile (1.0 × 0.8 × 0.3/0.27mm max.)
- Crystal unit for mobile communication Systems.
- Reflow compatible
- Using ceramic package resulting in high reliability

Applications

- Mobile Communications

⑥ Operating Temp. Range ⑦ Frequency Temp. Stability

⑥	⑦	F	J	L	R	S
		±10ppm	±15ppm	±20ppm	±40ppm	±50ppm
G	-20 to 75°C	✓	✓	✓	✓	✓
L	-30 to 85°C		✓	✓	✓	✓
P	-40 to 85°C			✓	✓	✓
R	-40 to 105°C				✓	✓
S	-40 to 125°C				✓	✓

⑧ Individual Specification (STD Specification is "CC" .)

Specifications

Item	Symbol	Specification	Unit	Remarks
Frequency Range	f _{nom}	37400 to 80000	kHz	Please contact us for other frequency range.
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	10μW(100μW max.)	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	
Shunt capacitance	C0	1.0max.	pF	

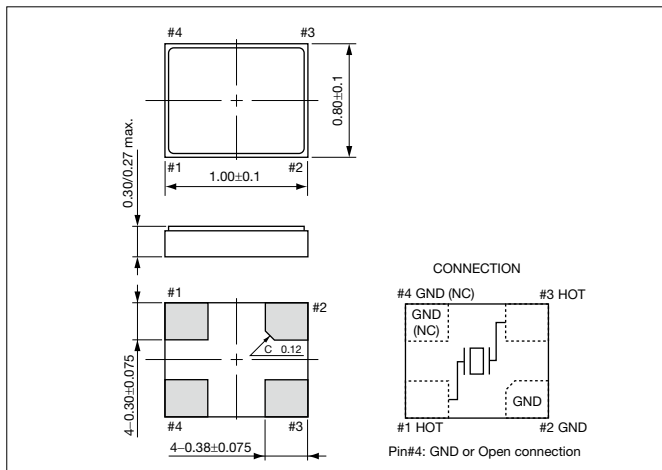
◆Table 1 Motional Series Resistance ESR (C1)

Frequency (MHz)	ESR (Ohm)
37.4 ≤ F < 48	60
48 ≤ F ≤ 80	50

Please contact us for other specifications.

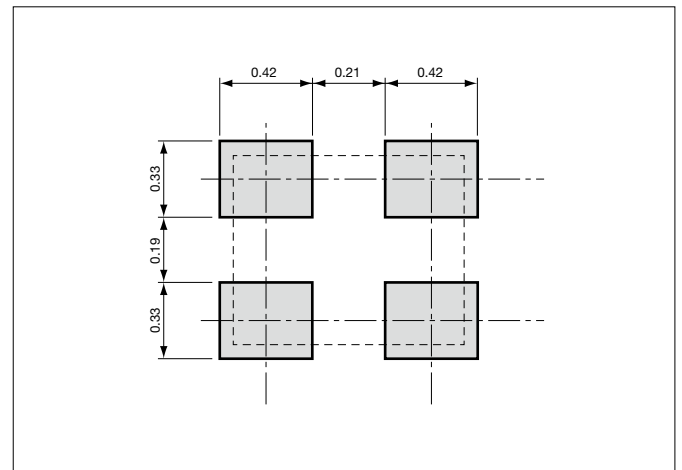
Dimensions

(Unit: mm)



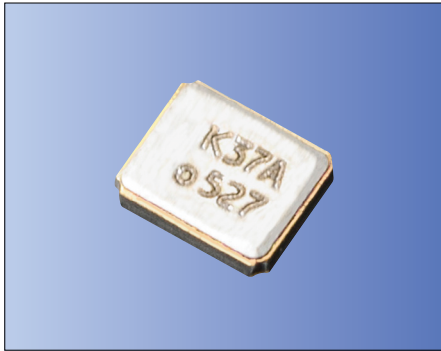
Recommended Land Pattern

(Unit: mm)





1.2 × 1.0mm for Consumer Products/ Mobile Communications



RoHS Compliant
PSL: R4Y MSL1

How to Order

CX1210DB 37400 □□ □□ □□ CC
① ② ③④ ⑤ ⑥ ⑦ ⑧

- ① Series (Type and Size)
- ② Frequency (37400 to 80000kHz)
- ③④ Load Capacitance (Unit:pF) Ex.: D1:8.1pF

③ Integer part		④ After the decimal point	
D	8	0	.0
E	9	1	.1
F	10	2	.2
G	11	3	.3
H	12	4	.4
Z	Special suffix	5	.5
		6	.6
		7	.7
		8	.8
		9	.9

Packaging

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

⑤ Frequency Tolerance

F	±10×10 ⁻⁶
G	±15×10 ⁻⁶
H	±20×10 ⁻⁶
J	±25×10 ⁻⁶
K	±30×10 ⁻⁶
M	±40×10 ⁻⁶
P	±50×10 ⁻⁶
W	All Over
Z	Special suffix

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.

⑥ Operating Temp. Range ⑦ Frequency Temp. Stability

⑥	⑦	F	J	L	R	S
		±10ppm	±15ppm	±20ppm	±40ppm	±50ppm
G	-20 to 75°C	✓	✓	✓	✓	✓
L	-30 to 85°C		✓	✓	✓	✓
P	-40 to 85°C			✓	✓	✓
R	-40 to 105°C				✓	✓
S	-40 to 125°C				✓	✓

⑧ Individual Specification (STD Specification is "CC" .)

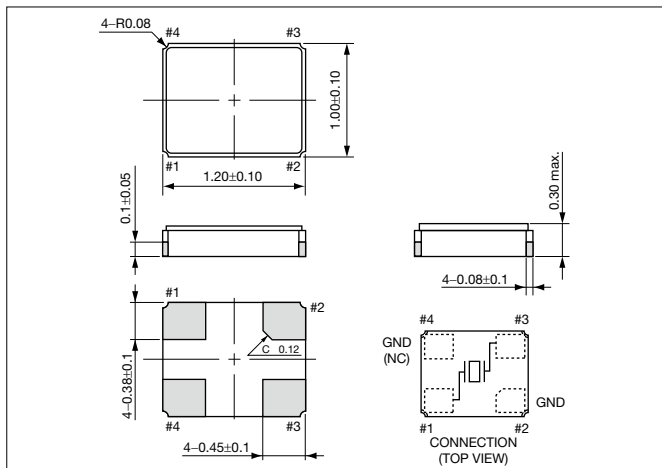
Specifications

Item	Symbol	Specification	Unit	Remarks
Frequency Range	f _{nom}	37400 to 80000	kHz	Please contact us for other frequency range.
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	10μW (100μW max.)	μ W	
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
Shunt capacitance	C0	2.0max.	pF	

Please contact us for other specifications.

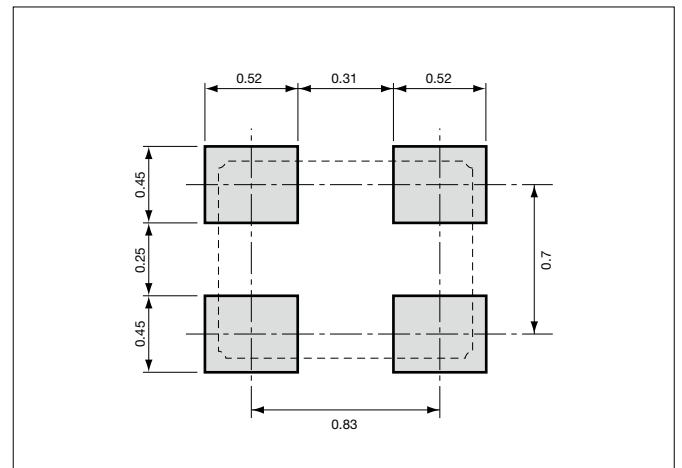
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)



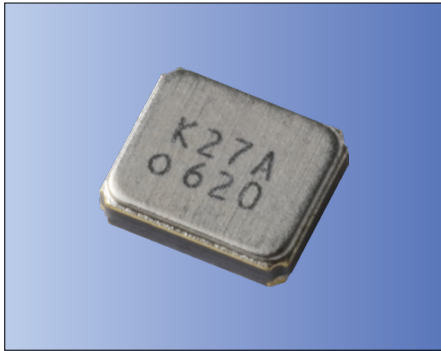
◆ Table 1
Motional Series Resistance ESR (C1)

Frequency (MHz)	ESR (Ohm)
37.4 ≤ F < 48	60
48 ≤ F ≤ 80	50

Crystal Units



1.2 × 1.0mm for Consumer Products/ Mobile Communications



RoHS Compliant
PSL: R4Y MSL1

How to Order

CX1210SB 27120 □□ □□ □□ CC
① ② ③④ ⑤ ⑥ ⑦ ⑧

- ① Series (Type and Size)
- ② Frequency (24000 to 80000kHz)
- ③④ Load Capacitance (Unit:pF) Ex.: D1:8.1pF

③ Integer part		④ After the decimal point	
D	8	0	.0
E	9	1	.1
F	10	2	.2
G	11	3	.3
H	12	4	.4
Z	Special suffix	5	.5
		6	.6
		7	.7
		8	.8
		9	.9

Packaging

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

⑤ Frequency Tolerance

F	±10×10 ⁻⁶
G	±15×10 ⁻⁶
H	±20×10 ⁻⁶
J	±25×10 ⁻⁶
K	±30×10 ⁻⁶
M	±40×10 ⁻⁶
P	±50×10 ⁻⁶
W	All Over
Z	Special suffix

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.

⑥ Operating Temp. Range ⑦ Frequency Temp. Stability

⑥	⑦	F	J	L	R	S
		±10ppm	±15ppm	±20ppm	±40ppm	±50ppm
G	-20 to 75°C	✓	✓	✓	✓	✓
L	-30 to 85°C		✓	✓	✓	✓
P	-40 to 85°C			✓	✓	✓
R	-40 to 105°C				✓	✓
S	-40 to 125°C				✓	✓

⑧ Individual Specification (STD Specification is "CC" .)

Specifications

Item	Symbol	Specification	Unit	Remarks
Frequency Range	f _{nom}	24000 to 80000	kHz	Please contact us for other frequency range.
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 μ W(100 μ W max.)	μ W	
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
Shunt capacitance	C0	2.0max.	pF	

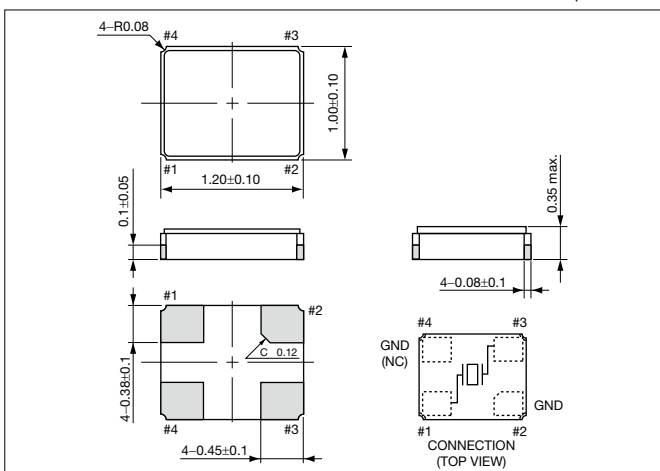
◆ Table 1 Motional Series Resistance ESR (C1)

Frequency (MHz)	ESR (Ohm)
24 ≤ F < 32	100
32 ≤ F < 37.4	80
37.4 ≤ F < 48	60
48 ≤ F ≤ 80	50

Please contact us for other specifications.

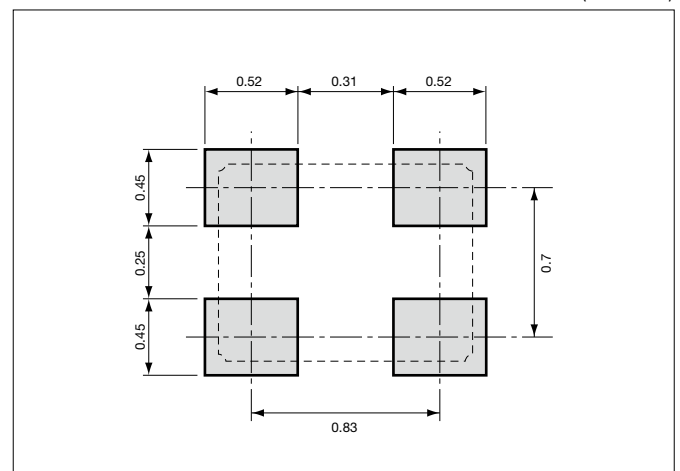
Dimensions

(Unit: mm)



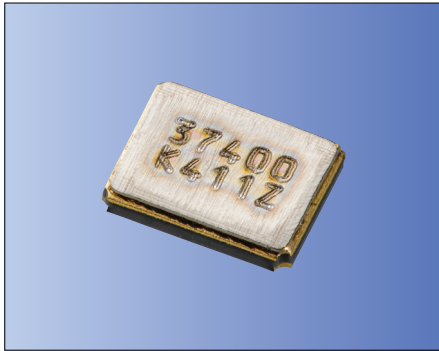
Recommended Land Pattern

(Unit: mm)





1.6 × 1.2mm for Consumer Products/ Mobile Communications



RoHS Compliant
PSL: R4Y MSL1

How to Order

CX1612DB 24000 □□ □□ □□ CC
① ② ③④ ⑤ ⑥ ⑦ ⑧

- ① Series (Type and Size)
- ② Frequency (24000 to 76800kHz)
- ③④ Load Capacitance (Unit:pF) Ex.: D1:8.1pF

③ Integer part		④ After the decimal point	
D	8	0	.0
E	9	1	.1
F	10	2	.2
G	11	3	.3
H	12	4	.4
Z	Special suffix	5	.5
		6	.6
		7	.7
		8	.8
		9	.9

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

⑤ Frequency Tolerance

F	±10×10 ⁻⁶
G	±15×10 ⁻⁶
H	±20×10 ⁻⁶
J	±25×10 ⁻⁶
K	±30×10 ⁻⁶
M	±40×10 ⁻⁶
P	±50×10 ⁻⁶
W	All Over
Z	Special suffix

Features

- Crystal unit for Digital Electronics and Consumer Products
- Ultra-miniature and low profile
32MHz or more accepts 0.35mm-high or less
- Ceramic package • Reflow compatible

Applications

- Smartphone (Bluetooth®, Wireless LAN, NFC)
- Wearable devices
- Short range wireless (LPWA)
- * Bluetooth® Trademarks are owned by Bluetooth SIG, Inc.

⑥ Operating Temp. Range ⑦ Frequency Temp. Stability

⑥	⑦	F	J	L	R	S
		±10ppm	±15ppm	±20ppm	±40ppm	±50ppm
G	-20 to 75°C	✓	✓	✓	✓	✓
L	-30 to 85°C		✓	✓	✓	✓
P	-40 to 85°C			✓	✓	✓
R	-40 to 105°C				✓	✓
S	-40 to 125°C				✓	✓

⑧ Individual Specification (STD Specification is "CC" .)

Specifications

Item	Symbol	Specification	Unit	Remarks
Frequency Range	f _{nom}	24000 to 76800	kHz	Please contact us for other frequency range.
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	10 μ W(100 μ W max.)	μ W	
Operating Temp. Range	T _{use}	- 30 to +85	° C	
Storage Temp. Range	T _{stg}	- 40 to +85	° C	
Frequency Temp. Characteristics	f _{tem}	± 20	× 10 ⁻⁶	Freq. deviation from the value at 25° C
Shunt capacitance	C0	2.0max.	pF	

◆ Table 1
Motional Series Resistance ESR (C1)

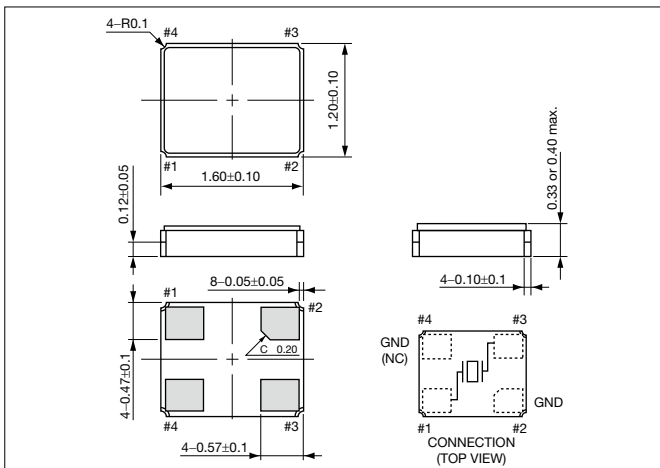
Frequency (MHz)	ESR (Ohm)
24 ≤ F < 32	150
32 ≤ F < 48	80
48 ≤ F ≤ 76.8	50

Crystal Units

Please contact us for other specifications.

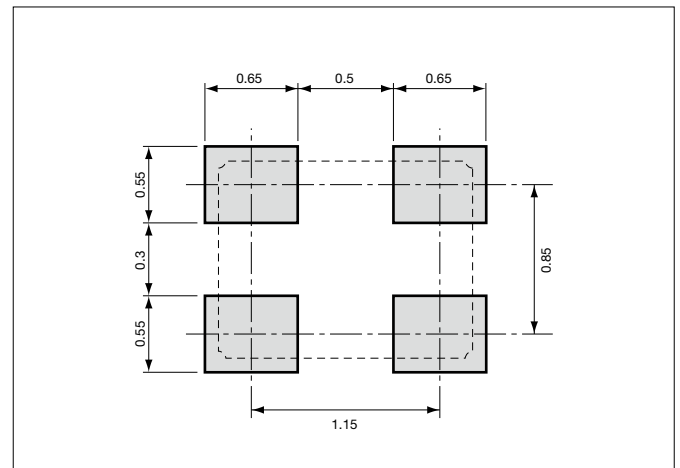
Dimensions

(Unit: mm)



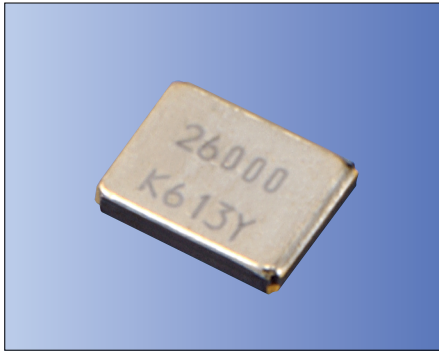
Recommended Land Pattern

(Unit: mm)





2.0 × 1.6mm for Consumer Products



RoHS Compliant
PSL: R4Y MSL1

How to Order

CX2016DB 27000 D0 G S S HH
① ② ③④ ⑤ ⑥ ⑦ ⑧

- ① Series (Type and Size)
- ② Frequency (16,000 to 60,000kHz)
- ③④ Load Capacitance (Unit:pF) Ex.: D1:8.1pF

③ Integer part		④ After the decimal point	
D	8	0	.0
E	9	1	.1
F	10	2	.2
G	11	3	.3
H	12	4	.4
Z	Special suffix	5	.5
		6	.6
		7	.7
		8	.8
		9	.9

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

⑤ Frequency Tolerance

F	±10×10 ⁻⁶
G	±15×10 ⁻⁶
H	±20×10 ⁻⁶
J	±25×10 ⁻⁶
K	±30×10 ⁻⁶
M	±40×10 ⁻⁶
P	±50×10 ⁻⁶
W	All Over
Z	Special suffix

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

⑥ Operating Temp. Range ⑦ Frequency Temp. Stability

⑥	⑦	Q	R	S	T	V	W
		±30ppm	±40ppm	±50ppm	±100ppm	±150ppm	±200ppm
L	-30 to 85°C	✓	✓	✓	✓	✓	✓
P	-40 to 85°C	✓	✓	✓	✓	✓	✓
R	-40 to 105°C	✓	✓	✓	✓	✓	✓
S	-40 to 125°C			✓	✓	✓	✓
T	-40 to 150°C				✓	✓	✓

⑧ Individual Specification (STD Specification is "HH" .)

Specifications

Item	Symbol	Specification	Unit	Remarks
Frequency Range	f _{nom}	16000 to 60000	kHz	Please contact us for other frequency range.
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	10 μ W(100 μ W max.)	μ W	
Operating Temp. Range	T _{use}	- 30 to +85	° C	
Storage Temp. Range	T _{stg}	- 40 to +85	° C	
Frequency Temp. Characteristics	f _{tem}	± 20	× 10 ⁻⁶	Freq. deviation from the value at 25° C
Shunt capacitance	C0	2.0max.	pF	

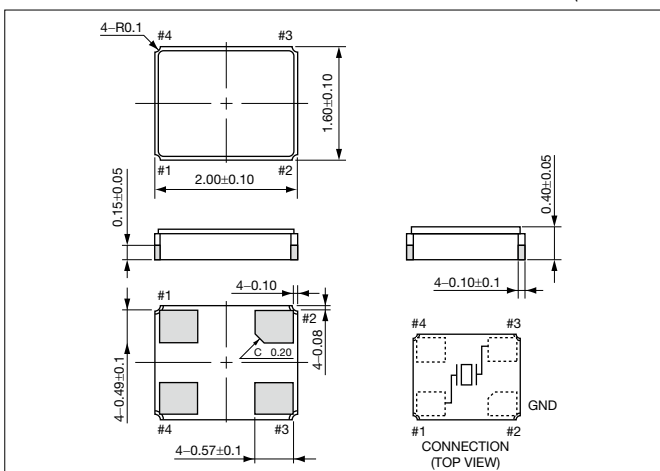
◆ Table 1 Motional Series Resistance ESR (C1)

Frequency (MHz)	ESR (Ohm)
16 ≤ F < 18	200
18 ≤ F < 20	150
20 ≤ F < 24	100
24 ≤ F < 26	80
26 ≤ F < 40	60
40 ≤ F ≤ 60	50

Please contact us for other specifications.

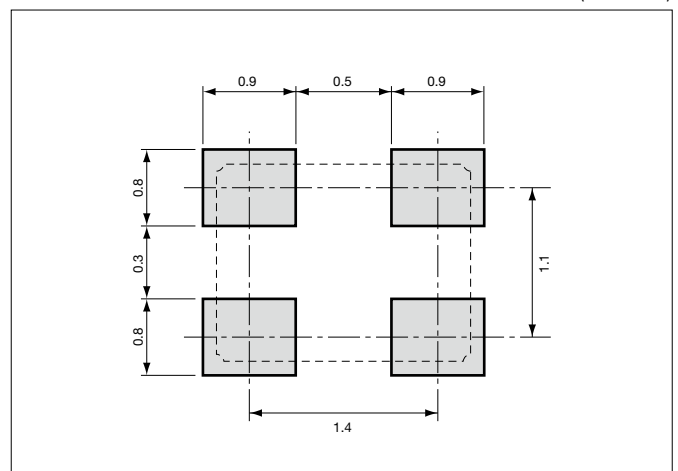
Dimensions

(Unit: mm)



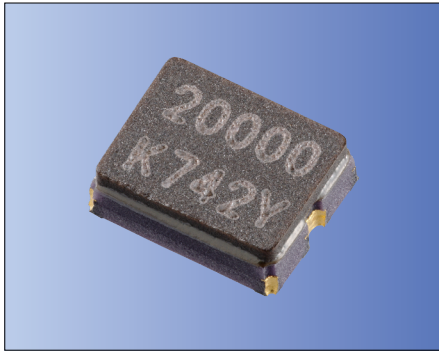
Recommended Land Pattern

(Unit: mm)





2.0 × 1.6mm for Automotive



AEC-Q200 RoHS Compliant
PSL: R4Y MSL1

How to Order

CX2016GR 25000 D0 H S S CC
① ② ③④ ⑤ ⑥ ⑦ ⑧

- ① Series (Type and Size)
- ② Frequency (16,000 to 50,000kHz)
- ③④ Load Capacitance (Unit:pF) Ex.: D1:8.1pF

③ Integer part		④ After the decimal point	
D	8	0	.0
E	9	1	.1
F	10	2	.2
G	11	3	.3
H	12	4	.4
Z	Special suffix	5	.5
		6	.6
		7	.7
		8	.8
		9	.9

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

⑤ Frequency Tolerance

H	±20×10 ⁻⁶
J	±25×10 ⁻⁶
K	±30×10 ⁻⁶
M	±40×10 ⁻⁶
P	±50×10 ⁻⁶
W	All Over
Z	Special suffix

Features

- Crystal unit for automotive electronics
- Ultra-miniature and low profile (2.0 × 1.6 × 0.715mm)
- 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)

⑥ Operating Temp. Range ⑦ Frequency Temp. Stability

⑥	⑦	S	T	V	W
		±50ppm	±100ppm	±150ppm	±200ppm
P	-40 to 85°C	✓	✓	✓	✓
R	-40 to 105°C	✓	✓	✓	✓
S	-40 to 125°C		✓	✓	✓
T	-40 to 150°C			✓	✓

⑧ Individual Specification (STD Specification is "CC" .)

Applications

- ECU • Automotive Camera • Radar

Specifications

Item	Symbol	Specification	Units	Remarks
Frequency Range	f _{nom}	16000 to 50000	kHz	Please contact us for other frequency range.
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	10 μ W(200 μ W max.)	μ W	
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
Shunt capacitance	C0	2.0max.	pF	

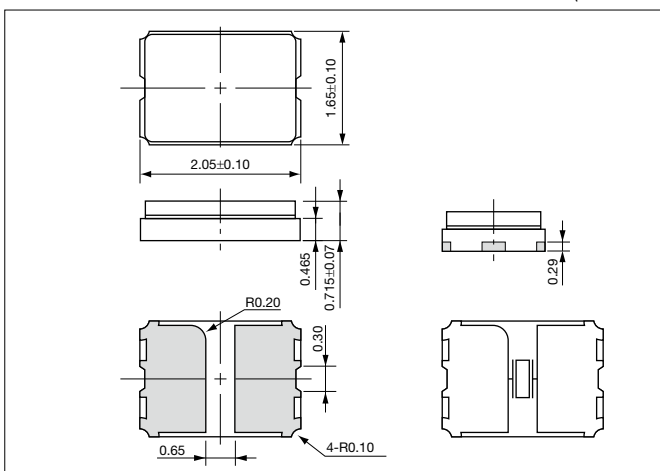
◆ Table 1
Motional Series Resistance ESR (C1)

Frequency (MHz)	ESR (Ohm)
16 ≤ F < 18	300
18 ≤ F < 20	200
20 ≤ F < 40	100
40 ≤ F ≤ 50	50

Please contact us for other specifications.

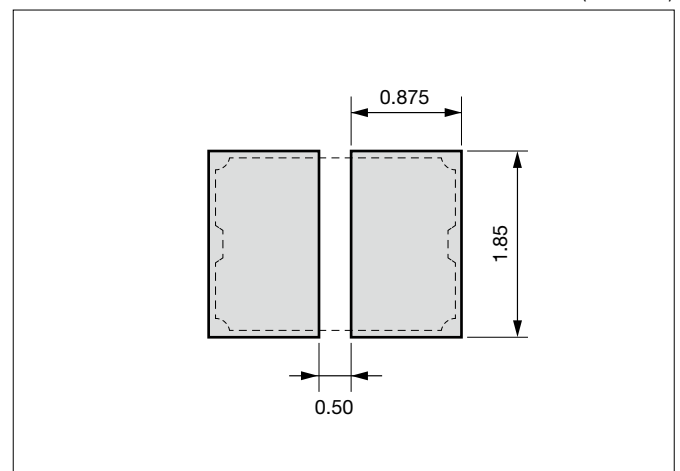
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)





2.0 × 1.6mm for Consumer Products/ Automotive



AEC-Q200 RoHS Compliant
 PSL: R4Y MSL1

How to Order

CX2016SA 25000 D0 G S S HH
① ② ③④ ⑤ ⑥ ⑦ ⑧

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

- ① Series (Type and Size)
- ② Frequency (16,000 to 60,000kHz)
- ③④ Load Capacitance (Unit:pF) Ex.: D1:8.1pF

③ Integer part		④ After the decimal point	
D	8	0	.0
E	9	1	.1
F	10	2	.2
G	11	3	.3
H	12	4	.4
Z	Special suffix	5	.5
		6	.6
		7	.7
		8	.8
		9	.9

⑤ Frequency Tolerance

F	±10×10 ⁻⁶
G	±15×10 ⁻⁶
H	±20×10 ⁻⁶
J	±25×10 ⁻⁶
K	±30×10 ⁻⁶
M	±40×10 ⁻⁶
P	±50×10 ⁻⁶
W	All Over
Z	Special suffix

Features

- Support a wide range of applications
- Ultra-miniature and low profile
(2.05 × 1.65 × 0.45mm)
- Ceramic package
- Reflow compatible

Applications

- ECU • Automotive Camera
- Digital Electronics • Consumer Products

⑥ Operating Temp. Range ⑦ Frequency Temp. Stability

⑥	⑦	Q	R	S	T	V	W
		±30ppm	±40ppm	±50ppm	±100ppm	±150ppm	±200ppm
L	-30 to 85°C	✓	✓	✓	✓	✓	✓
P	-40 to 85°C	✓	✓	✓	✓	✓	✓
R	-40 to 105°C	✓	✓	✓	✓	✓	✓
S	-40 to 125°C			✓	✓	✓	✓
T	-40 to 150°C				✓	✓	✓

⑧ Individual Specification (STD Specification is “HH” .)

Specifications

Item	Symbol	Specification	Unit	Remarks
Frequency Range	f _{nom}	16000 to 60000	kHz	Please contact us for other frequency range.
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	10μW(200μW max.)	μW	
Operating Temp. Range	T _{use}	-40 to +125 -40 to +150 -30 to +85	°C	
Storage Temp. Range	T _{stg}	-40 to +150	°C	
Frequency Temp. Characteristics	f _{tem}	±50 ±200 ±20	×10 ⁻⁶	Freq. deviation from the value at 25° C
Shunt capacitance	C0	2.0max.	pF	

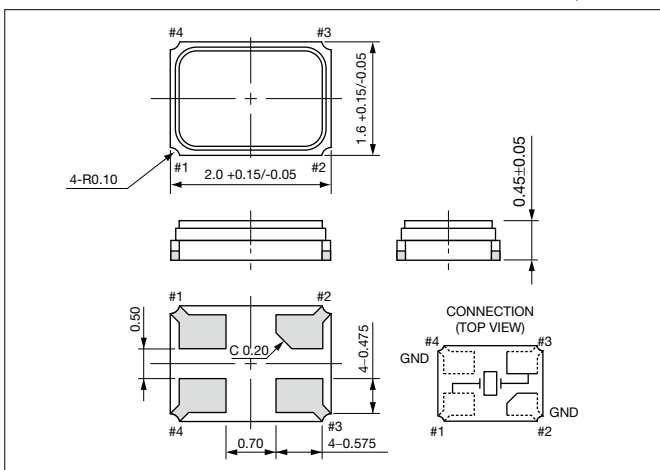
◆Table 1
Motional Series Resistance ESR (C1)

Frequency (MHz)	ESR (Ohm)
16 ≤ F < 18	200
18 ≤ F < 20	150
20 ≤ F < 24	100
24 ≤ F < 26	80
26 ≤ F < 40	60
40 ≤ F ≤ 60	50

Please contact us for other specifications.

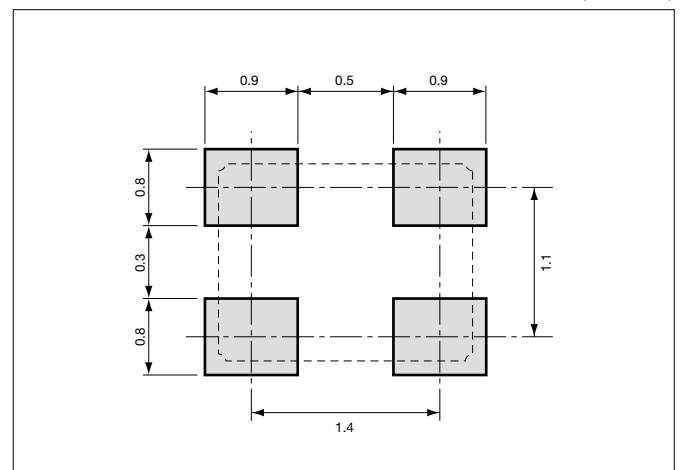
Dimensions

(Unit: mm)



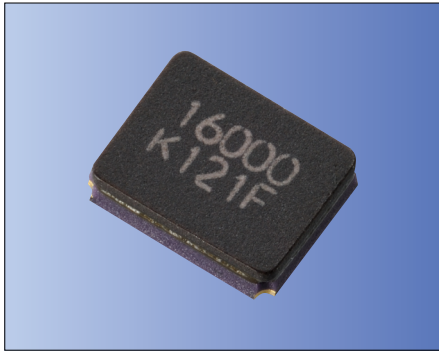
Recommended Land Pattern

(Unit: mm)





3.2 × 2.5mm for Automotive



AEC-Q200 RoHS Compliant
PSL: R4Y MSL1

How to Order

CX3225CA 16000 D0 G S S HH
① ② ③④ ⑤ ⑥ ⑦ ⑧

- ① Series (Type and Size)
- ② Frequency (12,000 to 54,000kHz)
- ③④ Load Capacitance (Unit:pF) Ex.: D1:8.1pF

③ Integer part		④ After the decimal point	
D	8	0	.0
E	9	1	.1
F	10	2	.2
G	11	3	.3
H	12	4	.4
Z	Special suffix	5	.5
		6	.6
		7	.7
		8	.8
		9	.9

Packaging
(Tape & Reel 3000 pcs./ reel)

⑤ Frequency Tolerance

H	±20×10 ⁻⁶
J	±25×10 ⁻⁶
K	±30×10 ⁻⁶
M	±40×10 ⁻⁶
P	±50×10 ⁻⁶
W	All Over
Z	Special suffix

Features

- Crystal unit for automotive electronics
- Small and low profile (3.2 × 2.5 × 0.8mm)
- Ceramic package
- Reflow compatible

Applications

- ECU
- High-Speed Automotive Network

⑥ Operating Temp. Range ⑦ Frequency Temp. Stability

⑥	⑦	Q	R	S	T	V	W
		±30ppm	±40ppm	±50ppm	±100ppm	±150ppm	±200ppm
L	-30 to 85°C	✓	✓	✓	✓	✓	✓
P	-40 to 85°C	✓	✓	✓	✓	✓	✓
R	-40 to 105°C		✓	✓	✓	✓	✓
S	-40 to 125°C			✓	✓	✓	✓
T	-40 to 150°C				✓	✓	✓

⑧ Individual Specification (STD Specification is "HH" .)

Specifications

Item	Symbol	Specification	Units	Remarks
Frequency Range	f _{nom}	12000 to 54000	kHz	Please contact us for other frequency range.
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	10 μ W(200 μ W max.)	μ W	
Operating Temp. Range	T _{use}	- 40 to +125	° C	
Storage Temp. Range	T _{stg}	- 40 to +150	° C	
Frequency Temp. Characteristics	f _{tem}	± 50	× 10 ⁻⁶	Freq. deviation from the value at 25° C
Shunt capacitance	C0	3.0max.	pF	

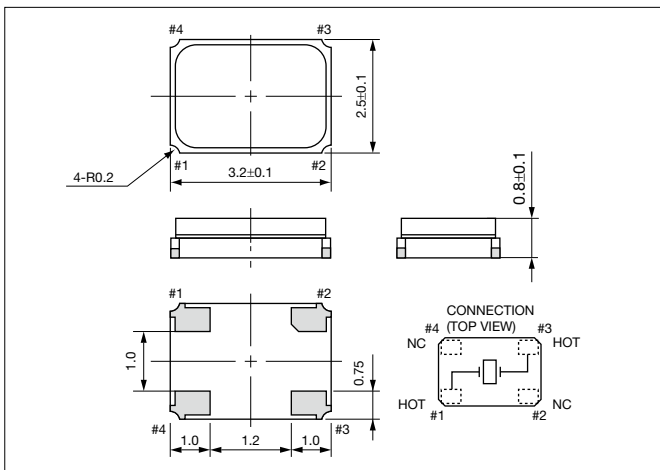
◆Table 1
Motional Series Resistance ESR (C1)

Frequency (MHz)	ESR (Ohm)
12 ≤ F < 20	120
20 ≤ F ≤ 54	100

Please contact us for other specifications.

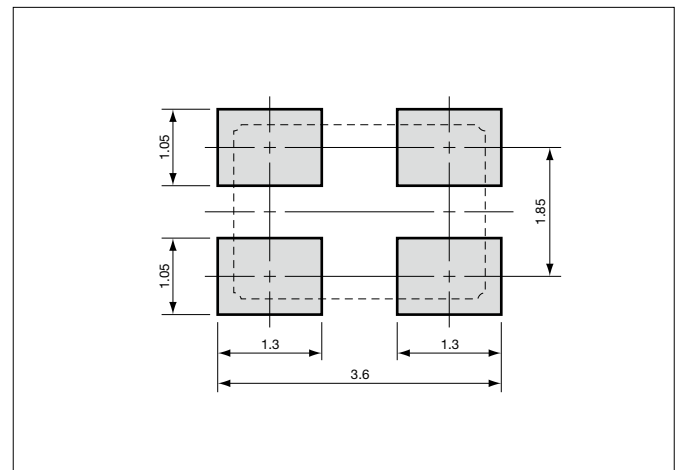
Dimensions

(Unit: mm)



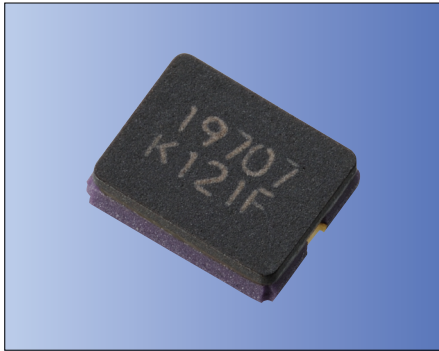
Recommended Land Pattern

(Unit: mm)





3.2 × 2.5mm for Automotive



AEC-Q200 RoHS Compliant
 PSL: R4Y MSL1

How to Order

CX3225GA 25000 D0 G S S CC
① ② ③④ ⑤ ⑥ ⑦ ⑧

- ① Series (Type and Size)
- ② Frequency (8,000 to 54,000kHz)
- ③④ Load Capacitance (Unit:pF) Ex.: D1:8.1pF

③ Integer part		④ After the decimal point	
D	8	0	.0
E	9	1	.1
F	10	2	.2
G	11	3	.3
H	12	4	.4
Z	Special suffix	5	.5
		6	.6
		7	.7
		8	.8
		9	.9

Packaging
(Tape & Reel 3000 pcs./ reel)

⑤ Frequency Tolerance

H	±20×10 ⁻⁶
J	±25×10 ⁻⁶
K	±30×10 ⁻⁶
M	±40×10 ⁻⁶
P	±50×10 ⁻⁶
W	All Over
Z	Special suffix

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 cycles (- 40 to +125° C)

Applications

- ECU • TPMS
- High-Speed Automotive Network

Specifications

Item	Symbol	Specification	Unit	Remarks
Frequency Range	f _{nom}	8000 to 54000	kHz	Please contact us for other frequency range.
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	10μW(200μW max.)	μ W	
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
Shunt capacitance	C0	3.0max.	pF	

Please contact us for other specifications.

⑥ Operating Temp. Range ⑦ Frequency Temp. Stability

*Frequency of 12,000 kHz or higher is supported. Please contact us for frequencies between 8,000 and 10,000 kHz.

⑥	⑦	Q	R	S	T	V	W
		±30ppm	±40ppm	±50ppm	±100ppm	±150ppm	±200ppm
L	-30 to 85°C	✓	✓	✓	✓	✓	✓
P	-40 to 85°C	✓	✓	✓	✓	✓	✓
R	-40 to 105°C		✓	✓	✓	✓	✓
S	-40 to 125°C			✓	✓	✓	✓
T	-40 to 150°C				✓	✓	✓

⑧ Individual Specification (STD Specification is “CC” .)

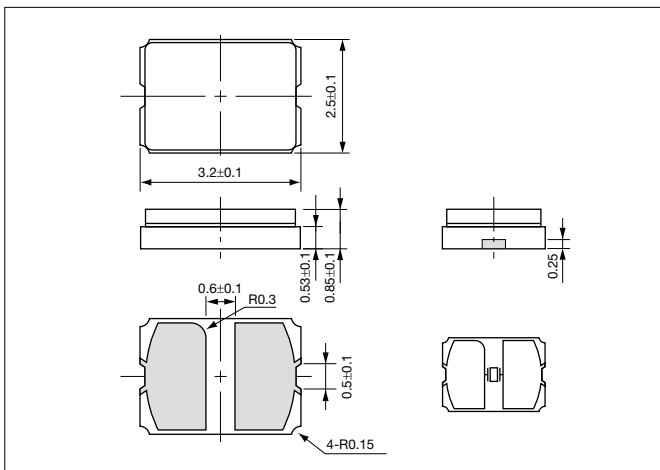
◆Table 1 Motional Series Resistance ESR (C1)

Frequency (MHz)	ESR (Ohm)
8 ≤ F < 9.8	500
9.8 ≤ F < 14	200
14 ≤ F < 16	120
16 ≤ F ≤ 54	100

Crystal Units

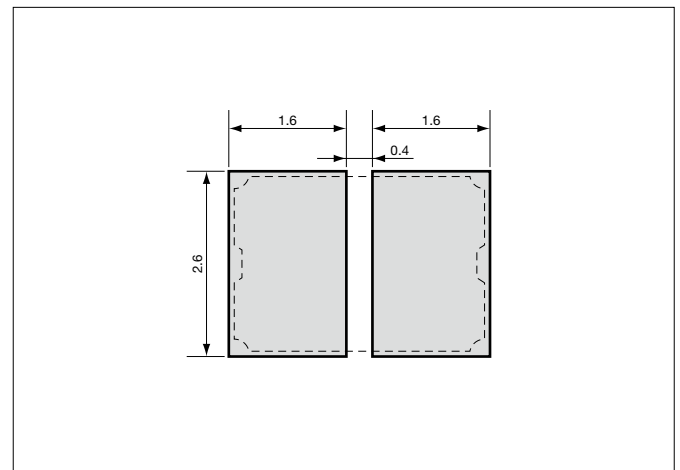
Dimensions

(Unit: mm)



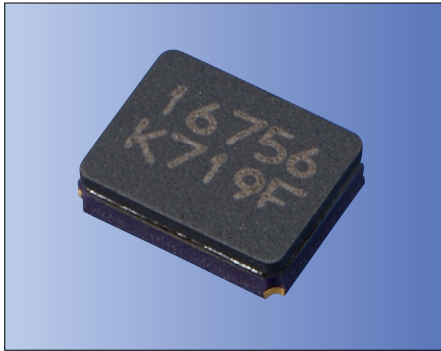
Recommended Land Pattern

(Unit: mm)





3.2 × 2.5mm for Consumer Products



RoHS Compliant
PSL: R4Y MSL1

How to Order

CX3225GB 25000 D0 G S S HH
① ② ③④ ⑤ ⑥ ⑦ ⑧

- ① Series (Type and Size)
- ② Frequency (12,000 to 54,000kHz)
- ③④ Load Capacitance (Unit:pF) Ex.: D1:8.1pF

③ Integer part		④ After the decimal point	
D	8	0	.0
E	9	1	.1
F	10	2	.2
G	11	3	.3
H	12	4	.4
Z	Special suffix	5	.5
		6	.6
		7	.7
		8	.8
		9	.9

Packaging
(Tape & Reel 3000 pcs./ reel)

⑤ Frequency Tolerance

H	±20×10 ⁻⁶
J	±25×10 ⁻⁶
K	±30×10 ⁻⁶
M	±40×10 ⁻⁶
P	±50×10 ⁻⁶
W	All Over
Z	Special suffix

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

⑥ Operating Temp. Range ⑦ Frequency Temp. Stability

⑥	⑦	Q	R	S	T	V	W
		±30ppm	±40ppm	±50ppm	±100ppm	±150ppm	±200ppm
L	-30 to 85°C	✓	✓	✓	✓	✓	✓
P	-40 to 85°C	✓	✓	✓	✓	✓	✓
R	-40 to 105°C		✓	✓	✓	✓	✓
S	-40 to 125°C			✓	✓	✓	✓
T	-40 to 150°C				✓	✓	✓

⑧ Individual Specification (STD Specification is “HH” .)

Specifications

Item	Symbol	Specification	Units	Remarks
Frequency Range	f _{nom}	12000 to 54000	kHz	Please contact us for other frequency range.
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	10μW(100μW max.)	μW	
Operating Temp. Range	T _{use}	- 40 to +85	° 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
Shunt capacitance	C0	3.0max.	pF	

Please contact us for other specifications.

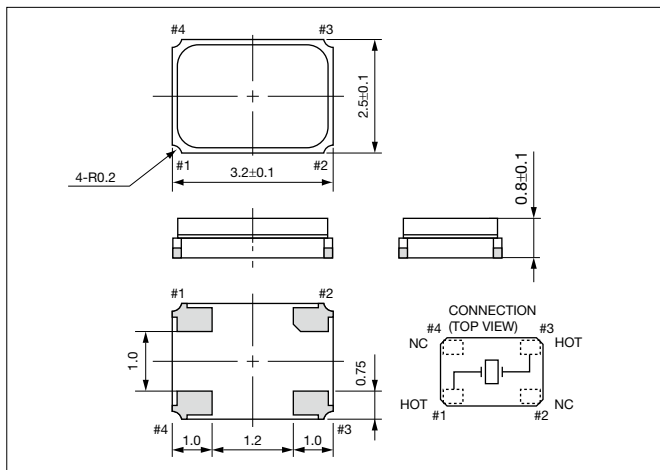
◆Table 1
Motional Series Resistance ESR (C1)

Frequency (MHz)	ESR (Ohm)
12 ≤ F < 13	100
13 ≤ F < 20	80
20 ≤ F ≤ 54	50

Crystal Units

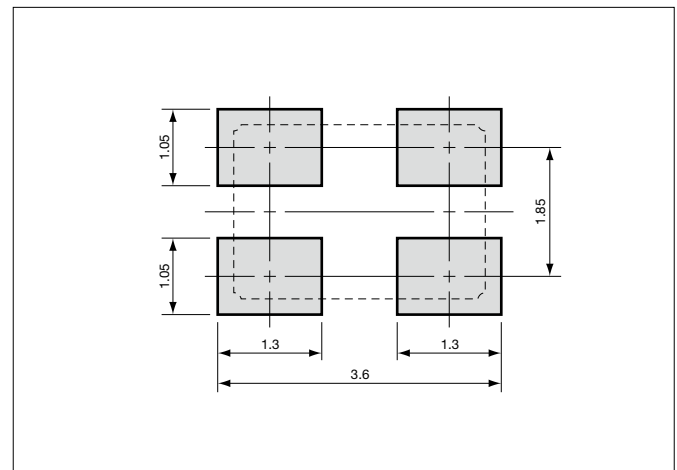
Dimensions

(Unit: mm)



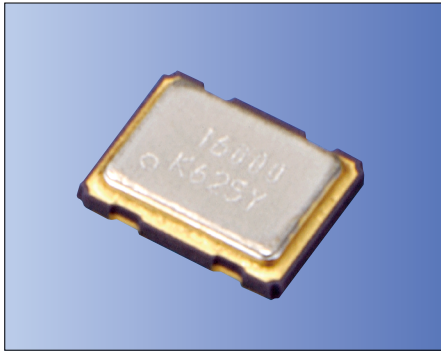
Recommended Land Pattern

(Unit: mm)





3.2 × 2.5mm for Automotive



How to Order

CX3225SA 25000 D0 G S S HH
① ② ③④ ⑤ ⑥ ⑦ ⑧

- ① Series (Type and Size)
- ② Frequency (8,000 to 54,000kHz)
- ③④ Load Capacitance (Unit:pF) Ex.: D1:8.1pF

③ Integer part		④ After the decimal point	
D	8	0	.0
E	9	1	.1
F	10	2	.2
G	11	3	.3
H	12	4	.4
Z	Special suffix	5	.5
		6	.6
		7	.7
		8	.8
		9	.9

Packaging
(Tape & Reel 3000 pcs./ reel)

⑤ Frequency Tolerance

F	±10×10 ⁻⁶
G	±15×10 ⁻⁶
H	±20×10 ⁻⁶
J	±25×10 ⁻⁶
K	±30×10 ⁻⁶
M	±40×10 ⁻⁶
P	±50×10 ⁻⁶
W	All Over
Z	Special suffix

AEC-Q200 RoHS Compliant
 PSL: R4Y MSL1

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)

⑥ Operating Temp. Range ⑦ Frequency Temp. Stability

*Frequency of 12,000 kHz or higher is supported. Please contact us for frequencies between 8,000 and 10,000 kHz

⑥	⑦	J	L	N	Q	R	S	T
		±15ppm	±20ppm	±25ppm	±30ppm	±40ppm	±50ppm	±100ppm
L	-30 to 85°C	✓	✓	✓	✓	✓	✓	✓
P	-40 to 85°C				✓	✓	✓	✓
R	-40 to 105°C					✓	✓	✓
S	-40 to 125°C						✓	✓
T	-40 to 150°C							✓

⑧ Individual Specification (STD Specification is “HH” .)

Applications

- ECU • TPMS
- High-Speed Automotive Network

Specifications

Item	Symbol	Specification	Unit	Remarks
Frequency Range	f _{nom}	8000 to 54000	kHz	Please contact us for other frequency range.
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	10μW(200μW max.)	μ W	
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
Shunt capacitance	C0	3.0max.	pF	

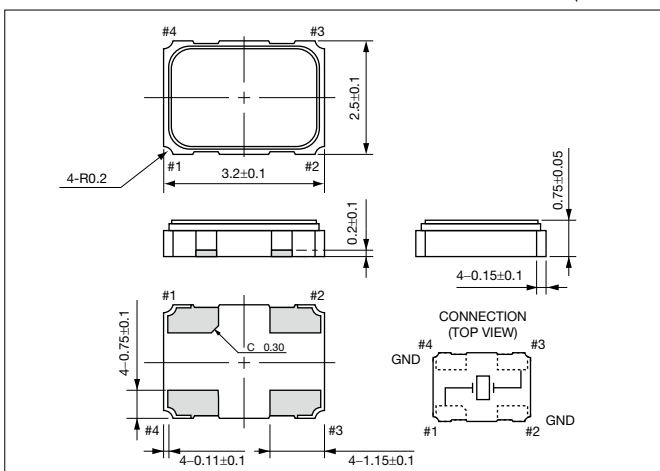
◆Table 1 Motional Series Resistance ESR (C1)

Frequency (MHz)	ESR (Ohm)
8 ≤ F < 9.8	500
9.8 ≤ F < 12	200
12 ≤ F < 16	120
16 ≤ F < 20	60
20 ≤ F ≤ 54	50

Please contact us for other specifications.

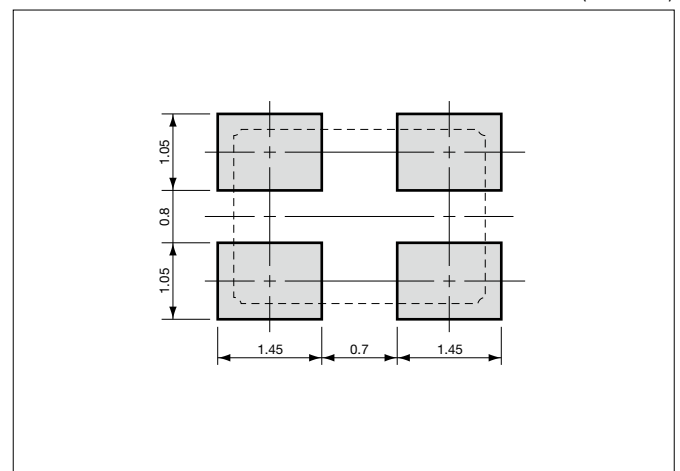
Dimensions

(Unit: mm)



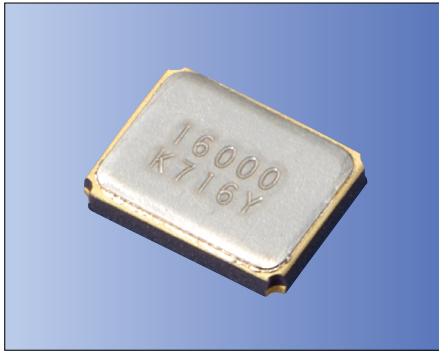
Recommended Land Pattern

(Unit: mm)





3.2 × 2.5mm for Consumer Products/ Mobile Communications



RoHS Compliant
PSL: R4Y MSL1

How to Order

CX3225SB 25000 D0 G S S CC
① ② ③④ ⑤ ⑥ ⑦ ⑧

- ① Series (Type and Size)
- ② Frequency (8,000 to 54,000kHz)
- ③④ Load Capacitance (Unit:pF) Ex.: D1:8.1pF

③ Integer part		④ After the decimal point	
D	8	0	.0
E	9	1	.1
F	10	2	.2
G	11	3	.3
H	12	4	.4
Z	Special suffix	5	.5
		6	.6
		7	.7
		8	.8
		9	.9

Packaging
(Tape & Reel 3000 pcs./ reel)

⑤ Frequency Tolerance

F	±10×10 ⁻⁶
G	±15×10 ⁻⁶
H	±20×10 ⁻⁶
J	±25×10 ⁻⁶
K	±30×10 ⁻⁶
M	±40×10 ⁻⁶
P	±50×10 ⁻⁶
W	All Over
Z	Special suffix

Features

- Crystal unit for consumer products and mobile communications
- 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.

⑥ Operating Temp. Range ⑦ Frequency Temp. Stability

⑥	⑦	J	L	N	Q	R	S	T
		±15ppm	±20ppm	±25ppm	±30ppm	±40ppm	±50ppm	±100ppm
B	0 to 70°C	✓	✓	✓	✓	✓	✓	✓
E	-10 to 70°C	✓	✓	✓	✓	✓	✓	✓
F	-20 to 70°C	✓	✓	✓	✓	✓	✓	✓
L	-30 to 85°C		✓	✓	✓	✓	✓	✓
P	-40 to 85°C				✓	✓	✓	✓
R	-40 to 105°C					✓	✓	✓

⑧ Individual Specification (STD Specification is "CC" .)

Specifications

Item	Symbol	Specification	Unit	Remarks
Frequency Range	f _{nom}	12000 to 54000	kHz	Please contact us for other frequency range.
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	10μW(100μW max.)	μ W	
Operating Temp. Range	T _{use}	-30 to +85	° C	
Storage Temp. Range	T _{stg}	-40 to +85	° C	
Frequency Temp. Characteristics	f _{tem}	± 20	× 10 ⁻⁶	Freq. deviation from the value at 25° C
Shunt capacitance	C0	3.0max.	pF	

◆ Table 1 Motional Series Resistance ESR (C1)

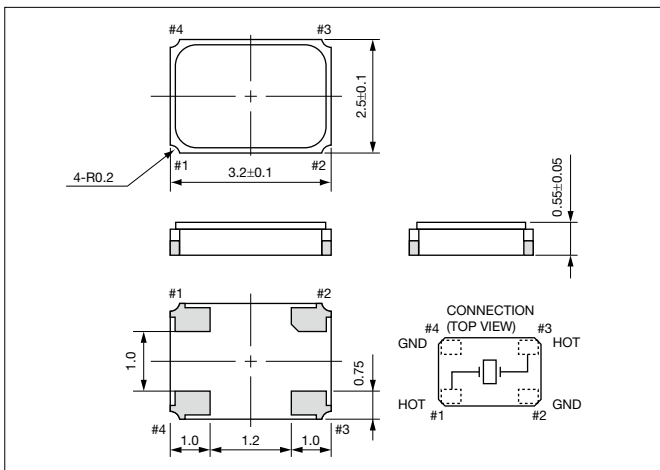
Frequency (MHz)	ESR (Ohm)
12 ≤ F < 13	150
13 ≤ F < 20	80
20 ≤ F ≤ 54	50

Crystal Units

Please contact us for other specifications.

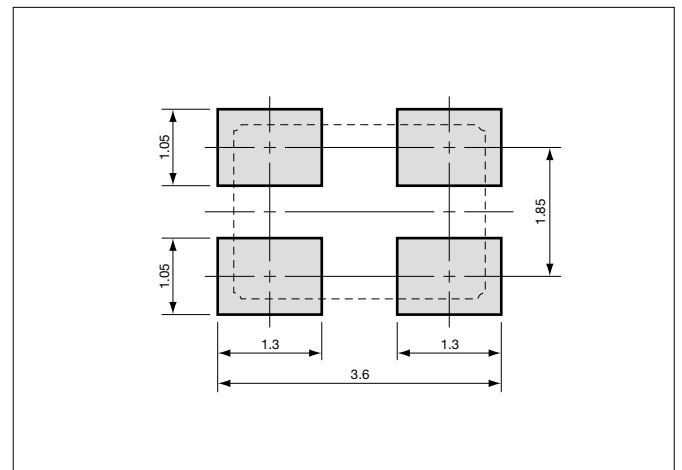
Dimensions

(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.

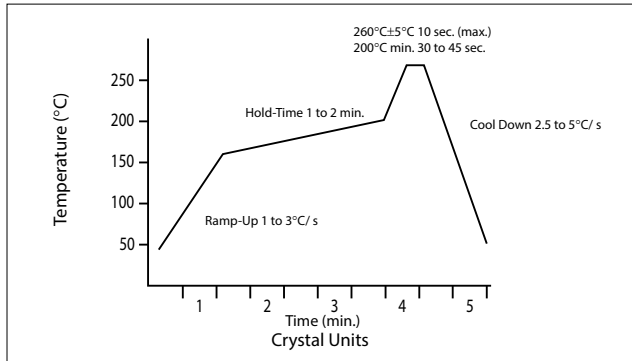
3. Soldering conditions

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.

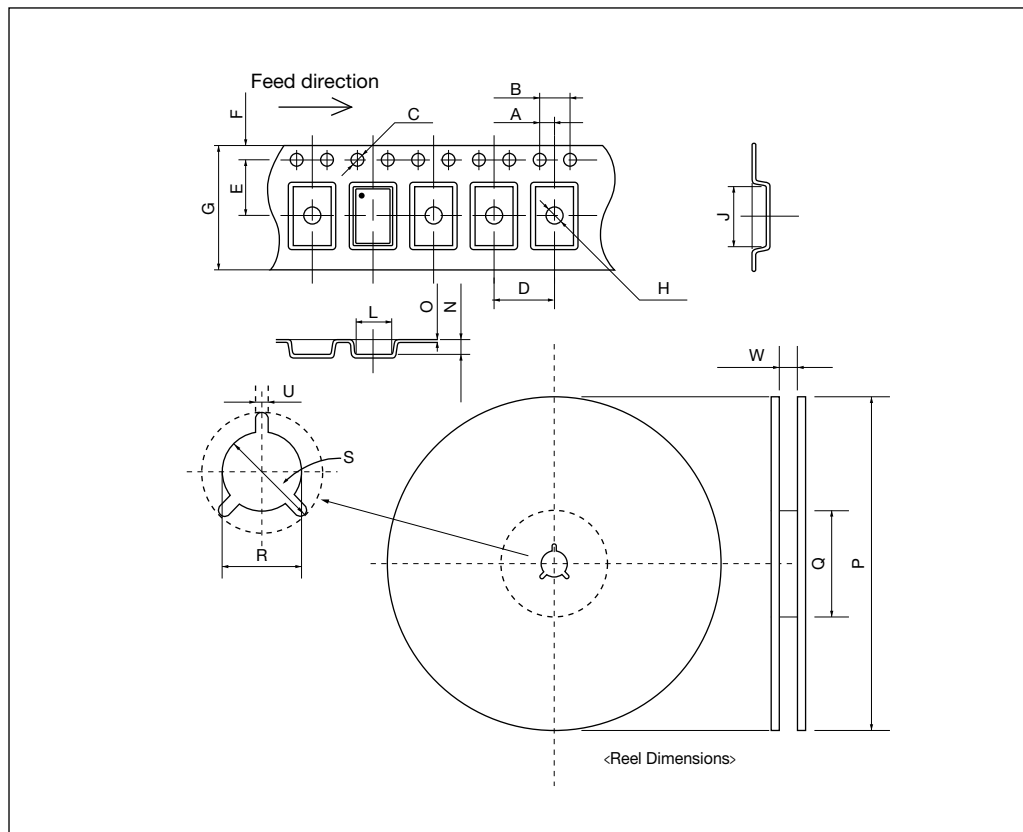
Tape & Reel Specifications

Crystal Units

(Unit: mm)

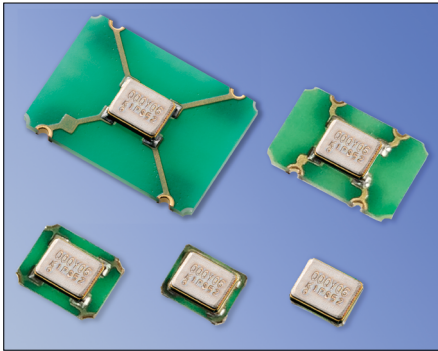
	CT1612RB	CT2016DB	CX1008SB	CX1210DB CX1210SB	CX1612DB	CX2016DB CX2016GR CX2016SA			
T A P E	A	2.0±0.05	2.0 ± 0.05	2.0 ± 0.05	2.0 ± 0.05	2.0 ± 0.05	2.0 ± 0.05		
	B	4.0±0.1	4.0 ± 0.1	4.0 ± 0.1	4.0 ± 0.1	4.0 ± 0.1	4.0 ± 0.1		
	C	φ1.5+0.1/-0	φ1.5+0.1/-0	φ1.5+0.1/-0	φ1.5+0.1/-0	φ1.5+0.1/-0	φ1.5+0.1/-0		
	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	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		
	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		
	H	φ0.5+0.05	φ1.0+0.1/-0	φ0.5 ± 0.1	φ0.5+0.05	φ0.5 ± 0.05	φ1.05 ± 0.05		
	J	1.90±0.1	2.3 ± 0.05/ 2.2 ± 0.05	1.20 ± 0.05	1.55 ± 0.05	1.80 ± 0.1	2.30 ± 0.1		
	L	1.50±0.1	1.9 ± 0.05	1.00 ± 0.05	1.35 ± 0.05	1.40 ± 0.1	1.90 ± 0.1		
	N	0.75±0.05	1.1 ± 0.05/ 0.75 ± 0.05	0.45 ± 0.05	0.45 ± 0.05	0.5 ± 0.1	0.7 ± 0.05		
R E E L	O	0.2±0.05	0.25 ± 0.05	0.2 ± 0.05	0.25 ± 0.05	0.2 ± 0.05	0.2 ± 0.05		
	P	φ330±2	φ330 ± 0.2	φ330 ± 2	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	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
	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
	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
	W	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
Qty.	15000	12000	21000	12000/21000	3000	20000	3000	15000	

	CX3225CA CX3225GA CX3225GB CX3225SA CX3225SB	
T A P E	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
R E E L	O	0.25±0.05
	P	φ180+0/-3
	E	φ60+1/-0
	E	φ13±0.2
	L	φ21±0.8
	U	2.0±0.5
	W	9.0±1.0
Qty.	3000	





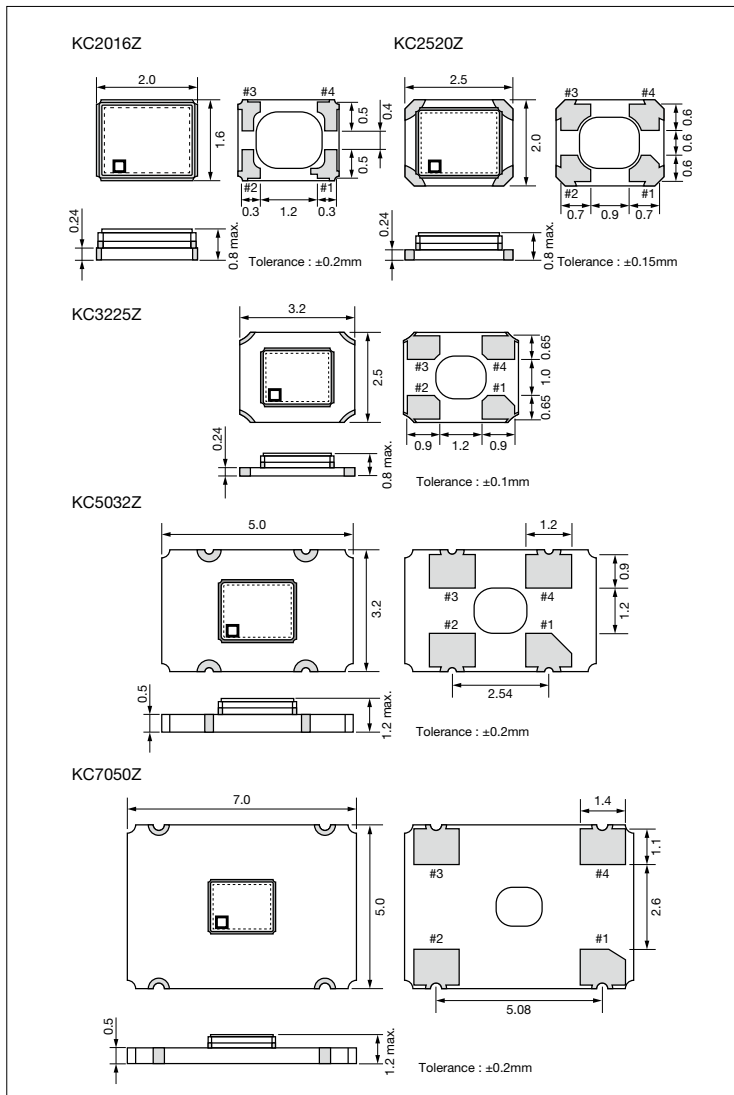
CMOS, 2.0 × 1.6 / 2.5 × 2.0 / 3.2 × 2.5 / 5.0 × 3.2 / 7.0 × 5.0mm



RoHS Compliant
PSL: R4Y MSL1

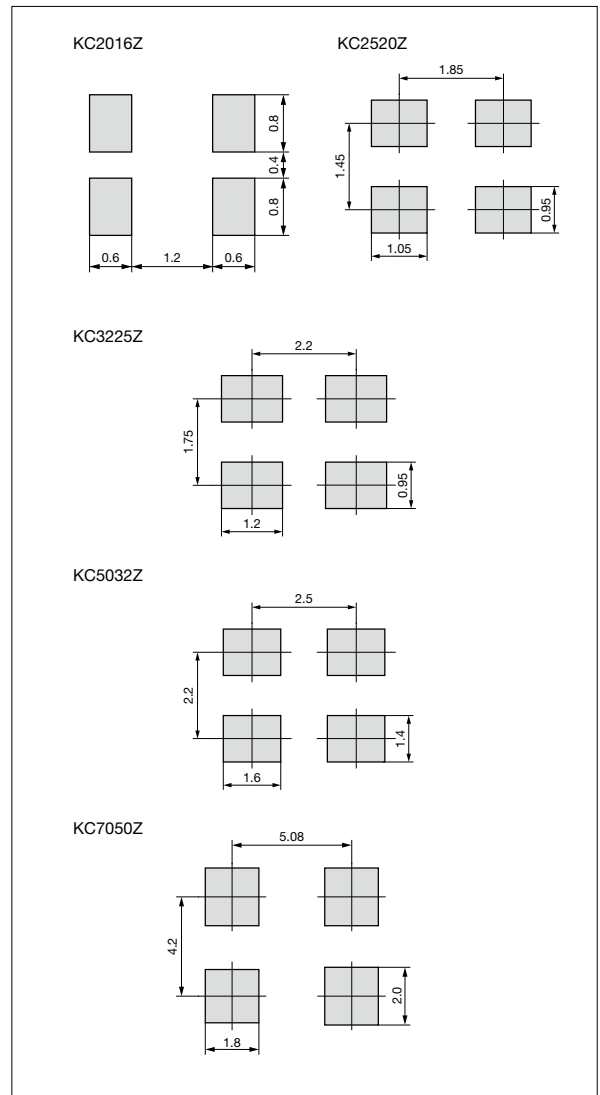
Dimensions

(Unit : mm)



Recommended Land Patterns

(Unit : mm)



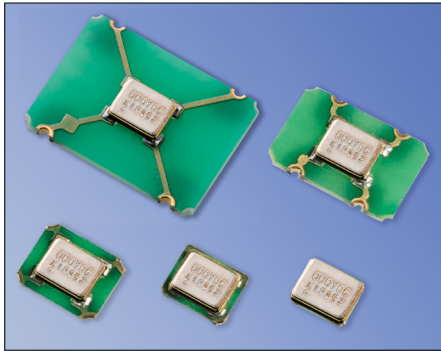
Clock Oscillators

Pad Connections	
#1	Stand-by Function
#2	Case GND
#3	Output
#4	Vcc

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



CMOS, 2.0 × 1.6 / 2.5 × 2.0 / 3.2 × 2.5 / 5.0 × 3.2 / 7.0 × 5.0mm



RoHS Compliant
PSL: R4Y MSL1

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. Code	× 10 ⁻⁶	Operating Temperature Range (° C)	Note
S	± 30	- 10 to +70	For additional stability, please contact us.
U	± 25		
W	± 20		
G	± 50	- 40 to +85	
H	± 30		
J	± 25		
K	± 20	- 40 to +105	
L	± 15		
6	± 50		
5	± 30	- 40 to +125	
X	± 100		
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	45/ 55%
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⑦ Individual Specification (STD Specification is "00" .)

Packaging Tape&Reel

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

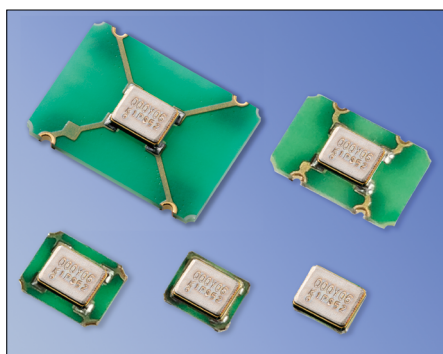
Specifications

Item	Symbol	Conditions	Min.	Max.	Unit	
Output Frequency Range	f _o		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 ≤ f _o < 5MHz	—	5.2	mA	
		5 ≤ f _o < 15MHz	—	5.8		
		15 ≤ f _o < 30MHz	—	6.2		
		30 ≤ f _o < 50MHz	—	6.8		
		50 ≤ f _o ≤ 60MHz	—	6.8		
		60 < f _o < 75MHz	—	9		
		75 ≤ f _o < 105MHz	—	10		
		105 ≤ f _o < 130MHz	—	10.5		
		130 ≤ f _o < 160MHz	—	11.5		
160 ≤ f _o ≤ 170MHz	—	12.5				
Current Consumption (Noload/ 2.25 < V _{cc} ≤ 2.8)	I _{cc}	0.5 ≤ f _o < 5MHz	—	5.5	mA	
		5 ≤ f _o < 15MHz	—	6		
		15 ≤ f _o < 30MHz	—	6.5		
		30 ≤ f _o < 50MHz	—	7.2		
		50 ≤ f _o ≤ 60MHz	—	7.4		
		60 < f _o < 75MHz	—	10		
		75 ≤ f _o < 105MHz	—	11.5		
		105 ≤ f _o < 130MHz	—	12.5		
		130 ≤ f _o < 160MHz	—	14		
160 ≤ f _o ≤ 170MHz	—	15				
Current Consumption (Noload/ 2.8 < V _{cc} ≤ 3.63)	I _{cc}	0.5 ≤ f _o < 5MHz	—	5.8	mA	
		5 ≤ f _o < 15MHz	—	6.5		
		15 ≤ f _o < 30MHz	—	7.3		
		30 ≤ f _o < 50MHz	—	8		
		50 ≤ f _o ≤ 60MHz	—	8.5		
		60 < f _o < 75MHz	—	12.5		
		75 ≤ f _o < 105MHz	—	14.5		
		105 ≤ f _o < 130MHz	—	15.5		
		130 ≤ f _o < 160MHz	—	18		
160 ≤ f _o ≤ 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 ≤ f _o ≤ 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 < f _o ≤ 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} = 5mA	—	10% V _{cc}	V	
High Level Output Voltage	V _{oH}	I _{oH} = - 5mA	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, 2.0×1.6/2.5×2.0/3.2×2.5 /5.0×3.2/7.0×5.0mm



RoHS Compliant
PSL: R4Y MSL1

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

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
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⑤ Frequency Tolerance (See Table 3)

⑥ Symmetry/ INH Function

Y	45/ 55%
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⑦ Individual Specification (STD Specification is “00” .)

Packaging Tape&Reel

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

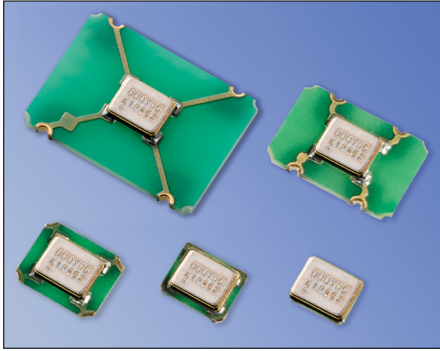
Specifications

Item	Symbol	Conditions	Min.	Max.	Unit	
Output Frequency Range	fo		For output frequency range, please contact us.		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}		1.71	3.63	V	
Current Consumption (Noload/ 1.71≤V _{cc} ≤2.25)	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} ≤2.8)	I _{cc}	24 ≤ fo<30MHz	—	3.5		
		30 ≤ fo<50MHz	—	4		
		50 ≤ fo ≤ 60MHz	—	4.3		
		60<fo<72MHz	—	4.8		
Current Consumption (Noload/ 2.8<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}	45	55	%	
Rise/ Fall Time (20% to 80% Output Level)	Tr/ Tf	Loaded/ 1.71 ≤ V _{cc} ≤ 2.25	—	4	ns	
		Loaded/ 2.25<V _{cc} ≤ 2.8	—	3.2		
		Loaded/ 2.8<V _{cc} ≤ 3.63	—	2.7		
Low Level Output Voltage	VoL	I _{oL} = 5mA	—	10% V _{cc}	V	
High Level Output Voltage	VoH	I _{oH} = - 5mA	90% V _{cc}	—	V	
Output Load (CMOS)	L _{CMOS}		—	15	pF	
Low Level Input Voltage	ViL		—	30% V _{cc}	V	
High Level Input Voltage	ViH		70% V _{cc}	—	V	
Disable Time	t _{dis}		—	200	ns	
Enable Time	t _{ena}		—	10	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	—	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.



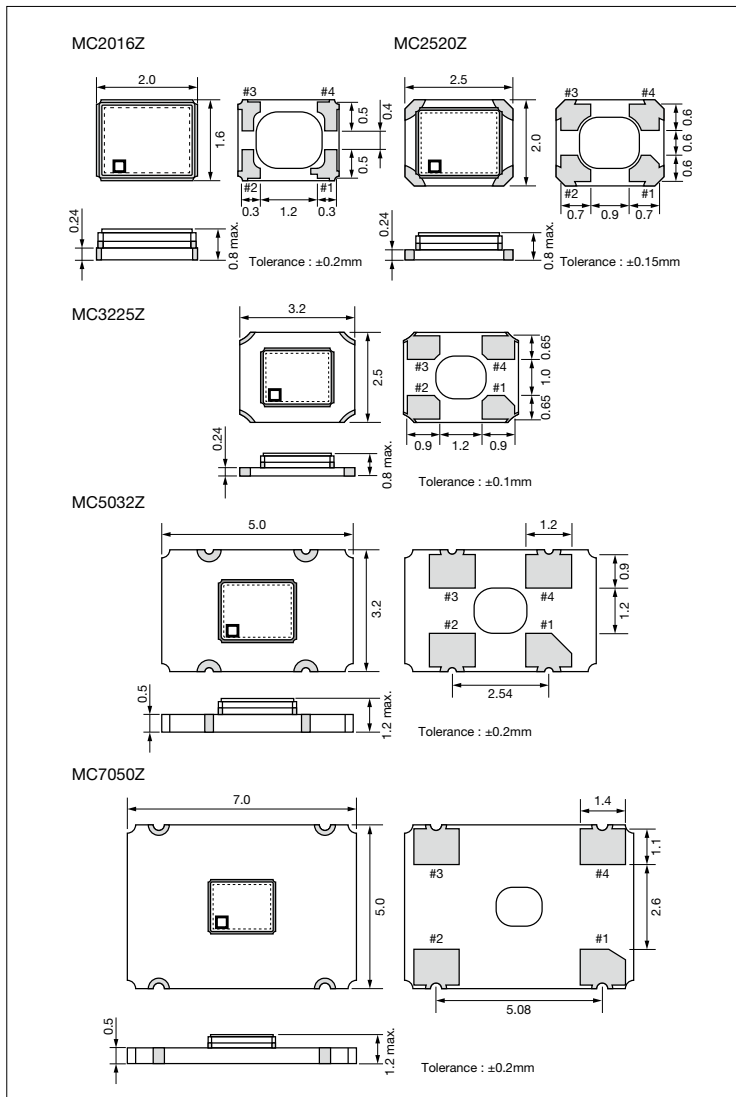
CMOS, 2.0 × 1.6 / 2.5 × 2.0 / 3.2 × 2.5 / 5.0 × 3.2 / 7.0 × 5.0mm



AEC-Q100/200 **RoHS Compliant**
PSL: R4Y MSL1

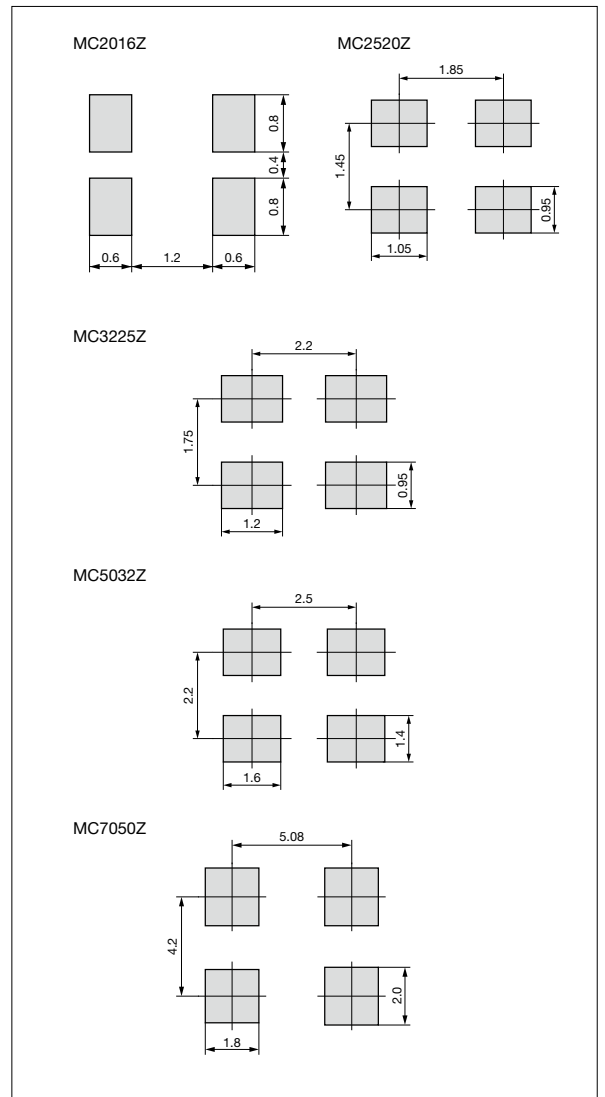
Dimensions

(Unit : mm)



Recommended Land Pattern

(Unit : mm)



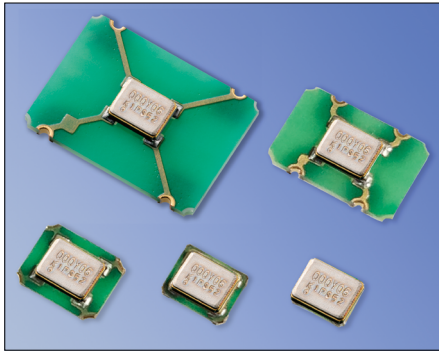
Clock Oscillators

Pad Connections	
#1	Stand-by Function
#2	Case GND
#3	Output
#4	Vcc

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



CMOS, 2.0×1.6/2.5×2.0/3.2×2.5 /5.0×3.2/7.0×5.0mm



AEC-Q100/200 RoHS Compliant
PSL: R4Y MSL1

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

How to Order

MC□□□□Z 25.0000 C 1 □ X SH
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
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⑤ Frequency Tolerance (See Table 5)

⑥ Symmetry/ INH Function

X	45/ 55%
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⑦ Individual Specification

(STD Specification is "SH" .)

Packaging Tape&Reel

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

Specifications

Item	Symbol	Conditions	Min.	Max.	Unit	
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		
Current Consumption (Noload/ 2.25 < V _{cc} ≤ 2.8)	I _{cc}	0.5 ≤ fo < 5MHz	—	5.5	mA	
		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		
Current Consumption (Noload/ 2.8 < V _{cc} ≤ 3.63)	I _{cc}	0.5 ≤ fo < 5MHz	—	5.8	mA	
		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		
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	VoL	I _{oL} = 5mA	—	10% V _{cc}	V	
High Level Output Voltage	VoH	I _{oH} = - 5mA	90% V _{cc}	—	V	
Output Load (CMOS)	L _{CMOS}		—	15	pF	
Low Level Input Voltage	ViL		—	30% V _{cc}	V	
High Level Input Voltage	ViH		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	

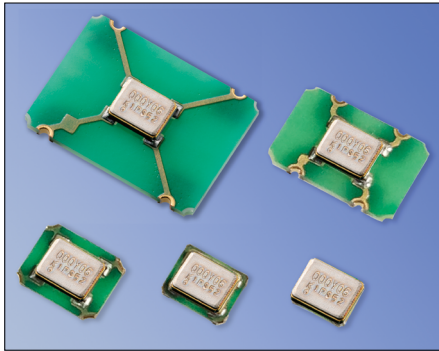
All electrical characteristics are defined at the maximum load and operating temperature range.

Clock Oscillators for Automotive

Clock MC-Z Series “Y” type (Low Jitter type)



CMOS, 2.0×1.6/2.5×2.0/3.2×2.5 /5.0×3.2/7.0×5.0mm



AEC-Q100/200 RoHS Compliant
PSL: R4Y MSL1

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

How to Order

MC□□□□Z 25.0000 C 1 □ Y SH
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
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⑤ Frequency Tolerance (See Table 7)

⑥ Symmetry/ INH Function

Y	45/ 55%
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⑦ Individual Specification

(STD Specification is “SH” .)

Packaging Tape&Reel

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

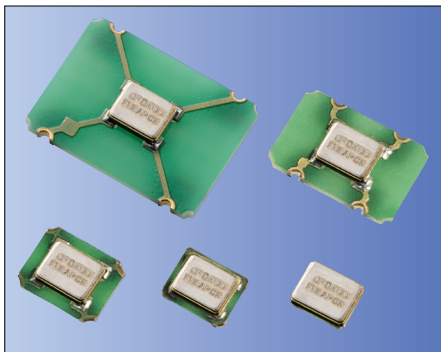
Specifications

Item	Symbol	Conditions	Min.	Max.	Unit	
Output Frequency Range	f _o		For output frequency range, please contact us.		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}		1.71	3.63	V	
Current Consumption (Noload/ 1.71≤V _{cc} ≤2.25)	I _{cc}	24 ≤ f _o <30MHz	—	2.7	mA	
		30 ≤ f _o <50MHz	—	3.3		
		50 ≤ f _o ≤ 60MHz	—	3.7		
		60<f _o <72MHz	—	4		
Current Consumption (Noload/ 2.25<V _{cc} ≤2.8)	I _{cc}	24 ≤ f _o <30MHz	—	3.5		
		30 ≤ f _o <50MHz	—	4		
		50 ≤ f _o ≤ 60MHz	—	4.3		
		60<f _o <72MHz	—	4.8		
Current Consumption (Noload/ 2.8<V _{cc} ≤3.63)	I _{cc}	24 ≤ f _o <30MHz	—	4		
		30 ≤ f _o <50MHz	—	5		
		50 ≤ f _o ≤ 60MHz	—	5.5		
		60<f _o <72MHz	—	6		
Stand-by Current	I _{std}		—	5	μA	
Symmetry	SYM	@50% V _{cc}	45	55	%	
Rise/ Fall Time (20% to 80% Output Level)	Tr/ Tf	Loaded/ 1.71 ≤ V _{cc} ≤ 2.25	—	4	ns	
		Loaded/ 2.25<V _{cc} ≤ 2.8	—	3.2		
		Loaded/ 2.8<V _{cc} ≤ 3.63	—	2.7		
Low Level Output Voltage	V _{oL}	I _{oL} = 5mA	—	10% V _{cc}	V	
High Level Output Voltage	V _{oH}	I _{oH} = - 5mA	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}		—	10	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	—	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, 2.0×1.6/2.5×2.0/3.2×2.5 /5.0×3.2/7.0×5.0mm



RoHS Compliant
PSL: R4Y MSL1

Features

- CMOS output
- Wide Supply Voltage
 - 1.6 to 3.63V
- Low current consumption
- Low Phase Noise

Applications

- Consumer / Networking / Industrial / Audio Codec / Amuse / Clock for sleep

Table 1

Freq. Code	Tol. $\times 10^{-6}$	Operating Temperature Range (°C)	Note
2	± 25	- 40 to +85	Standard specifications
3	± 90	- 40 to +125	

How to Order

KC□□□K 32K7680 C 1 □ A 00
 ① ② ③ ④ ⑤ ⑥ ⑦

① Series

KC2016K	2016 Size	KC2520K	2520 Size
KC3225K	3225 Size	KC5032K	5032 Size
KC7050K	7050 Size		

② Output Frequency (32.768kHz)

③ Output Type (C: CMOS)

④ Supply Voltage

1	1.8V/ 2.5V/ 3.3V compatible
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⑤ Frequency Tolerance (See Table 1)

⑥ Symmetry/ INH Function

A	45/ 55%
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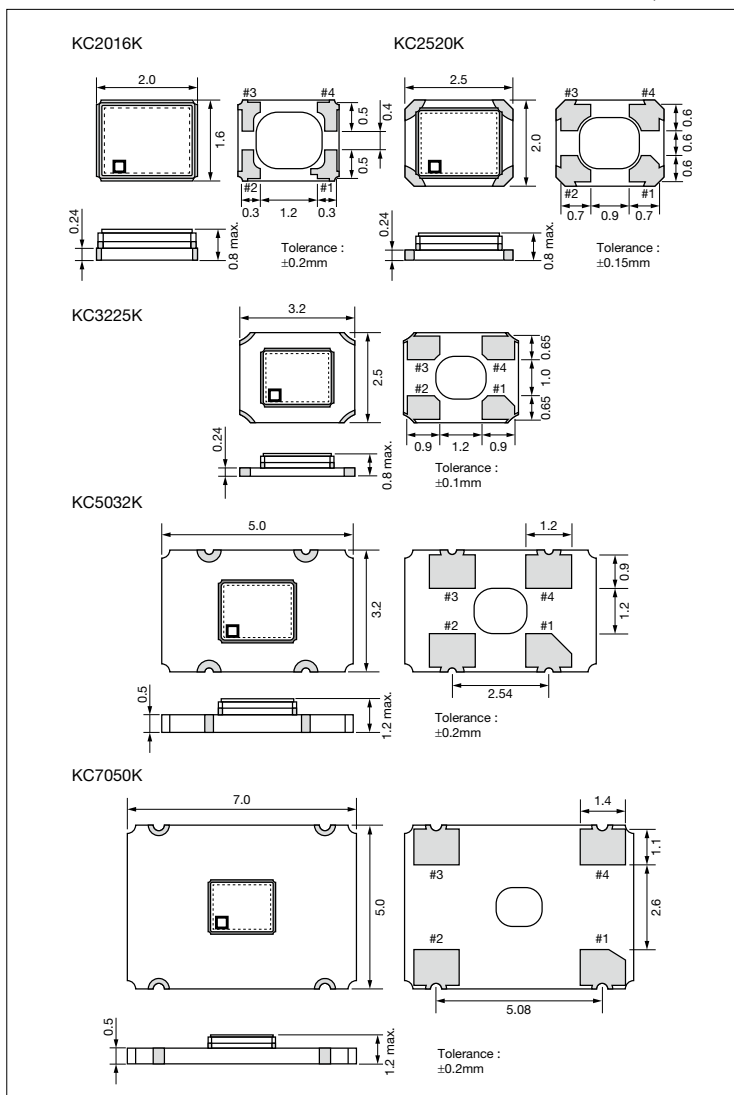
⑦ Individual Specification (STD Specification is "00" .)

Packaging Tape & Reel

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

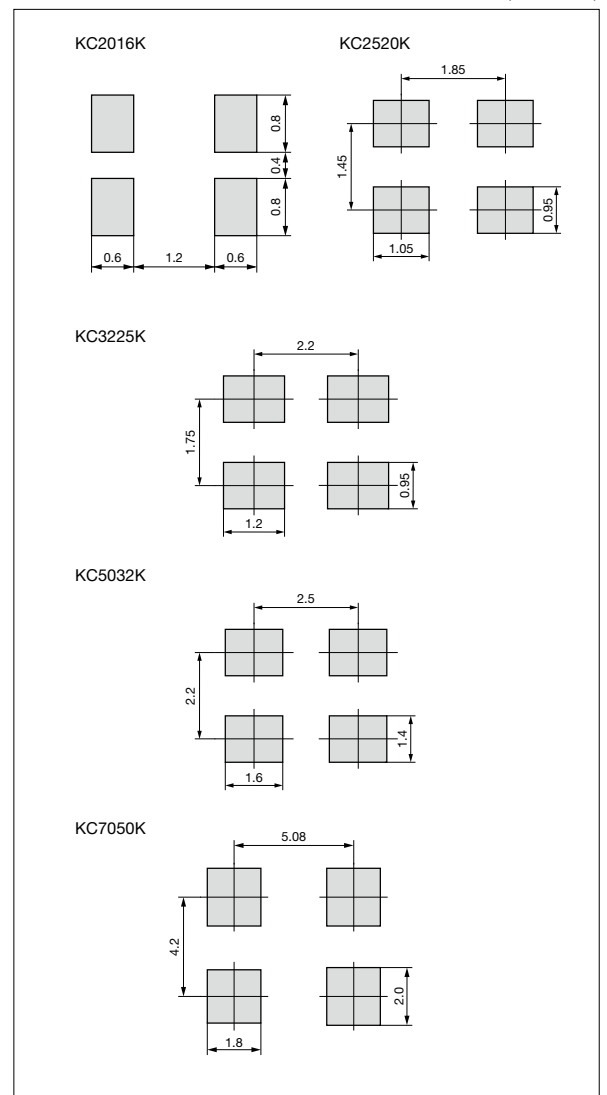
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)





CMOS, 2.0×1.6/2.5×2.0/3.2×2.5 /5.0×3.2/7.0×5.0mm

Specifications

Item	Symbol	Conditions	Min.	Max.	Unit	
Output Frequency	F _o		32.768		kHz	
Frequency Tolerance	F _{tol}	Initial tolerance(@+25° C), Operating temperature range, Rated power supply voltage change (V _{cc} ± 10%)	Temp.: - 40 to +85° C	- 25	+25	× 10 ⁻⁶
			Temp.: - 40 to +125° C	- 90	+90	
	F _{Aging}	Aging (@1 year)	- 3	+3		
	F _{oth}	Others (Load change, shock and vibration)	- 4	+4		
Storage Temperature Range	T _{STG}		- 55	+150	° C	
Operating Temperature	T _{use}		- 40	+85	° C	
			- 40	+125		
Max. Supply Voltage	—		- 0.3	+4.5	V	
Supply Voltage	V _{cc}		+1.60	+3.63	V	
Current Consumption (No Load)	I _{cc}	1.6 ≤ V _{cc} ≤ 2.0V	—	28	μ A	
		2.0 < V _{cc} ≤ 2.8V	—	29		
		2.8 < V _{cc} ≤ 3.63V	—	30		
Stand-by Current	I _{std}		—	5	μA	
Symmetry	SYM	@50% V _{cc}	45	55	%	
Rise/ Fall Time (10% VCC to 90% VCC Out- put Level)	Tr/ Tf		—	50	ns	
Low Level Output Voltage	V _{OL}	I _{OL} = 1mA	—	10% V _{cc}	V	
High Level Output Voltage	V _{OH}	I _{OH} = -1mA	90% V _{cc}	—	V	
Output Load	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}		—	100	ns	
Enable Time	t _{ena}		—	2	ms	
Start-up Time	t _{sta}	@Minimum operating voltage to be 0 sec.	—	5	ms	

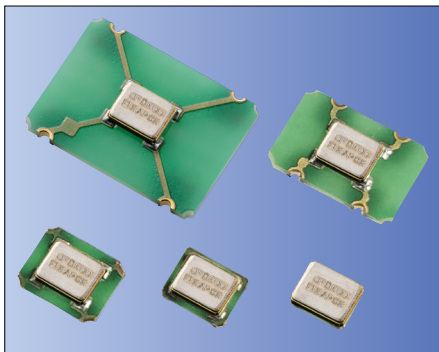
Note: All electrical characteristics are defined at the maximum load and operating temperature range.

Pad Connections	
#1	Stand-by Function
#2	Case GND
#3	Output
#4	V _{cc}

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



CMOS, 2.0×1.6/2.5×2.0/3.2×2.5 /5.0×3.2/7.0×5.0mm



RoHS Compliant
PSL: R4Y MSL1

Features

- Frequency Range 1.5 to 160MHz
- CMOS output
- Wide Supply Voltage
 - 1.6 to 3.63V
- Low current consumption
- Low Phase Noise

Applications

- Consumer / Networking / Industrial / Audio Codec / Amuse

Table 1

Freq. Tol. Code	Tol. × 10 ⁻⁶	Operating Temperature Range (°C)	Note
0	± 50	-	Standard specifications
S	± 30	- 10 to +70	
U	± 25	-	With only certain frequencies
G	± 50	- 40 to +85	
6	± 50	- 40 to +105	
X	± 100	- 40 to +125	

How to Order

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

① Series

KC2016K	2016 Size	KC2520K	2520 Size
KC3225K	3225 Size	KC5032K	5032 Size
KC7050K	7050 Size		

② Output Frequency (25.0000: 25MHz)

③ Output Type (C: CMOS)

④ Supply Voltage

1	1.8V/ 2.5V/ 3.3V compatible
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⑤ Frequency Tolerance (See Table 1)

⑥ Symmetry/ INH Function

E	45/ 55%
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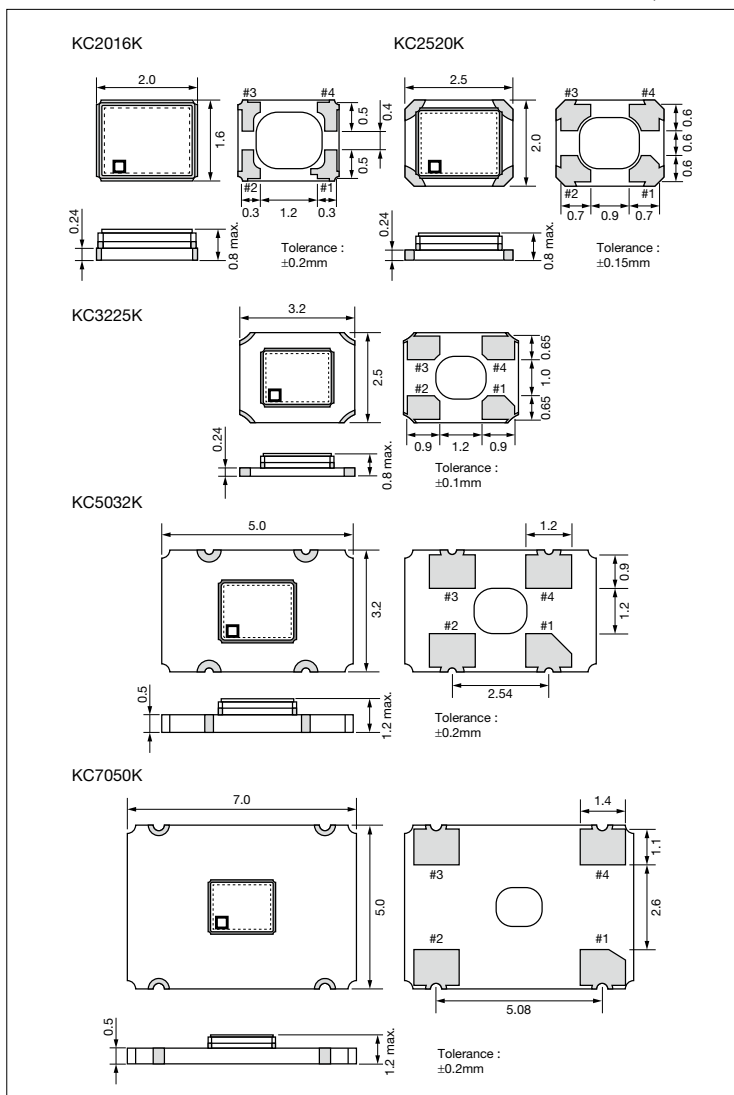
⑦ Individual Specification (STD Specification is "00" .)

Packaging Tape & Reel

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

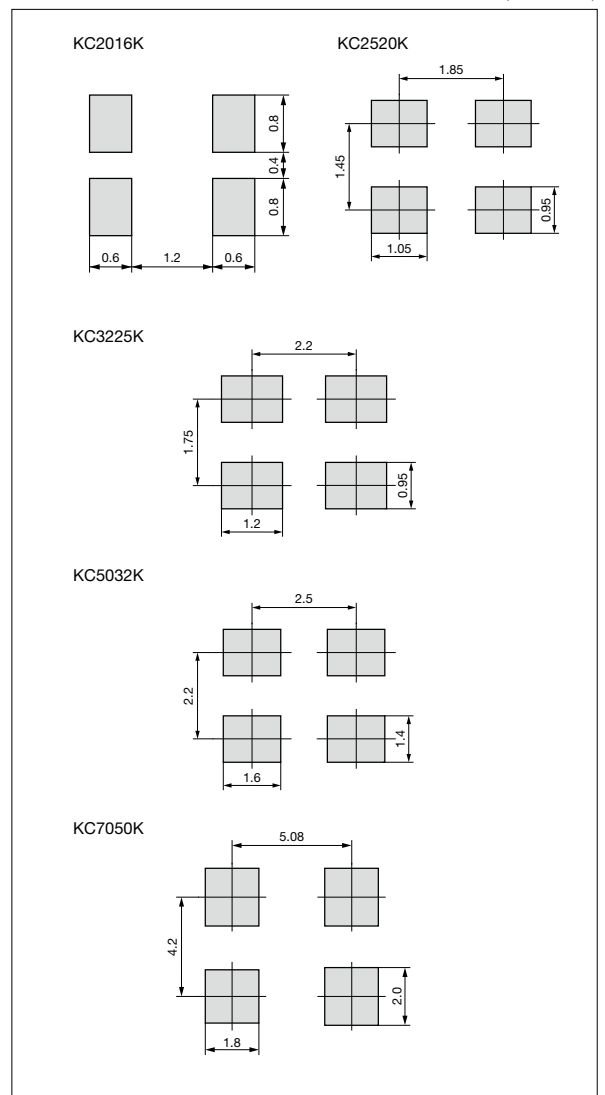
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)





CMOS, 2.0×1.6/2.5×2.0/3.2×2.5 /5.0×3.2/7.0×5.0mm

Specifications

Item	Symbol	Conditions	Min.	Max.	Unit	
Output Frequency Range ^{Note1}	f _o		1.5	160	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	× 10 ⁻⁶
			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}		- 10	+70	° C	
			- 40	+85		
			- 40	+105		
Max. Supply Voltage	—		- 0.3	+4.0	V	
Supply Voltage	V _{cc}	Code ④ : 1 : 1.5 ≤ F ₀ ≤ 125MHz	+1.60	+3.63	V	
		Code ④ : 2 : 125<F ₀ ≤ 160MHz	+2.25	+3.63		
Current Consumption (Maximum Loaded)	I _{cc}	1.5 ≤ F ₀ ≤ 24MHz	1.6 ≤ V _{cc} ≤ 2.25V	—	2.5	mA
			2.25<V _{cc} ≤ 2.8V	—	3.0	
			2.8<V _{cc} ≤ 3.63V	—	3.5	
		24<F ₀ ≤ 40MHz	1.6 ≤ V _{cc} ≤ 2.25V	—	3.5	
			2.25<V _{cc} ≤ 2.8V	—	4.5	
			2.8<V _{cc} ≤ 3.63V	—	5.0	
		40<F ₀ ≤ 62.5MHz	1.6 ≤ V _{cc} ≤ 2.25V	—	5.0	
			2.25<V _{cc} ≤ 2.8V	—	5.5	
			2.8<V _{cc} ≤ 3.63V	—	6.0	
		62.5<F ₀ ≤ 80MHz	1.6 ≤ V _{cc} ≤ 2.25V	—	6.0	
			2.25<V _{cc} ≤ 2.8V	—	6.5	
			2.8<V _{cc} ≤ 3.63V	—	8.0	
		80<F ₀ ≤ 125MHz	1.6 ≤ V _{cc} ≤ 2.25V	—	11.0	
			2.25<V _{cc} ≤ 2.8V	—	14.0	
2.8<V _{cc} ≤ 3.63V	—		17.0			
125<F ₀ ≤ 160MHz	2.25<V _{cc} ≤ 2.8V	—	25.0			
	2.8<V _{cc} ≤ 3.63V	—	27.0			
Stand-by Current	I _{std}	1.5 ≤ F ₀ ≤ 80MHz	—	5.0	μA	
		80<F ₀ ≤ 160MHz	—	10.0		
Symmetry	SYM	@50% V _{cc}	45	55	%	
Rise/ Fall Time (10% to 90% Output Level)	Tr/ Tf	1.5 ≤ F ₀ ≤ 80MHz	1.6 ≤ V _{cc} ≤ 2.25V	—	6.0	ns
			2.25<V _{cc} ≤ 2.8V	—	5.0	
			2.8<V _{cc} ≤ 3.63V	—	4.5	
		80<F ₀ ≤ 125MHz	1.6<V _{cc} ≤ 3.63V	—	4.0	
		125<F ₀ ≤ 160MHz	2.25<V _{cc} ≤ 3.63V	—	2.5	
Low Level Output Voltage	V _{OL}	I _{OL} = 4mA (F ₀ ≤80MHz), I _{OL} = 8mA (F ₀ >80MHz)	—	10% V _{cc}	V	
High Level Output Voltage	V _{OH}	I _{OH} = -4mA (F ₀ ≤80MHz), I _{OH} = -8mA (F ₀ >80MHz)	90% V _{cc}	—	V	
Output Load	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}	1.5 ≤ F ₀ ≤ 80MHz	—	200	ns	
		80<F ₀ ≤ 125MHz	—	100		
		125<F ₀ ≤ 160MHz	—	100		
Enable Time	t _{ena}		—	5	ms	
Start-up Time	t _{str}	1.5 ≤ F ₀ ≤ 80MHz	—	5	ms	
		80<F ₀ ≤ 125MHz	@Minimum operating voltage to be 0 sec.	10		
		125<F ₀ ≤ 160MHz		10		
1 Sigma Jitter	J _{sigma}	1.5 ≤ F ₀ ≤ 80MHz	—	5	ps	
		80<F ₀ ≤ 125MHz	—	4		
		125<F ₀ ≤ 160MHz	—	3		
Peak to Peak Jitter	J _{PK-PK}	1.5 ≤ F ₀ ≤ 80MHz	—	50	ps	
		80<F ₀ ≤ 125MHz	—	40		
		125<F ₀ ≤ 160MHz	—	25		
Phase Jitter	J _{Phase}	@25MHz BW : 12kHz to 20MHz	—	1.0	ps	



CMOS, 2.0×1.6/2.5×2.0/3.2×2.5 /5.0×3.2/7.0×5.0mm

Item	Symbol	Conditions	Min.	Max.	Unit
Phase Noise	—	@25MHz	@10Hz offset	Typ. - 89	dBc/ Hz
			@100Hz offset	Typ. - 119	
			@1kHz offset	Typ. - 143	
			@10kHz offset	Typ. - 157	
			@100kHz offset	Typ. - 160	
			@1MHz offset	Typ. - 162	
			@10MHz offset	Typ. - 162	

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

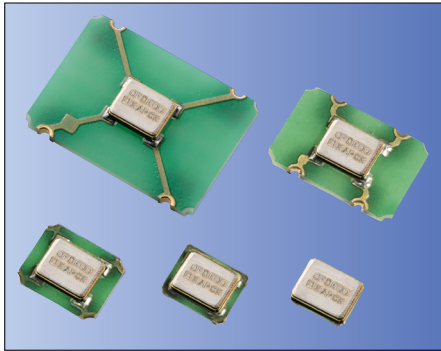
Note1: Please contact us for inquiry about operating temperature range, available frequencies and other conditions.

Pad Connections	
#1	Stand-by Function
#2	Case GND
#3	Output
#4	Vcc

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



CMOS, 2.0×1.6/2.5×2.0/3.2×2.5 /5.0×3.2/7.0×5.0mm



AEC-Q100/200 RoHS Compliant
PSL: R4Y MSL1

Features

- CMOS output
- Wide Supply Voltage
 - 1.6 to 3.63V
- Low current consumption
- Low Phase Noise

Applications

- Car accessories / ADAS / Clock for sleep

Table 1

Freq. Tol. Code	× 10 ⁻⁶	Operating Temperature Range (°C)	Note
2	± 25	- 40 to +85	Standard specifications
3	± 90	- 40 to +125	

How to Order

MC□□□□K 32K7680 C 1 □ A SH
① ② ③ ④ ⑤ ⑥ ⑦

① Series

MC2016K	2016 Size	MC2520K	2520 Size
MC3225K	3225 Size	MC5032K	5032 Size
MC7050K	7050 Size		

② Output Frequency (32.768kHz)

③ Output Type (C: CMOS)

④ Supply Voltage

1	1.8V/ 2.5V/ 3.3V compatible
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⑤ Frequency Tolerance (See Table 1)

⑥ Symmetry/ INH Function

A	45/ 55%
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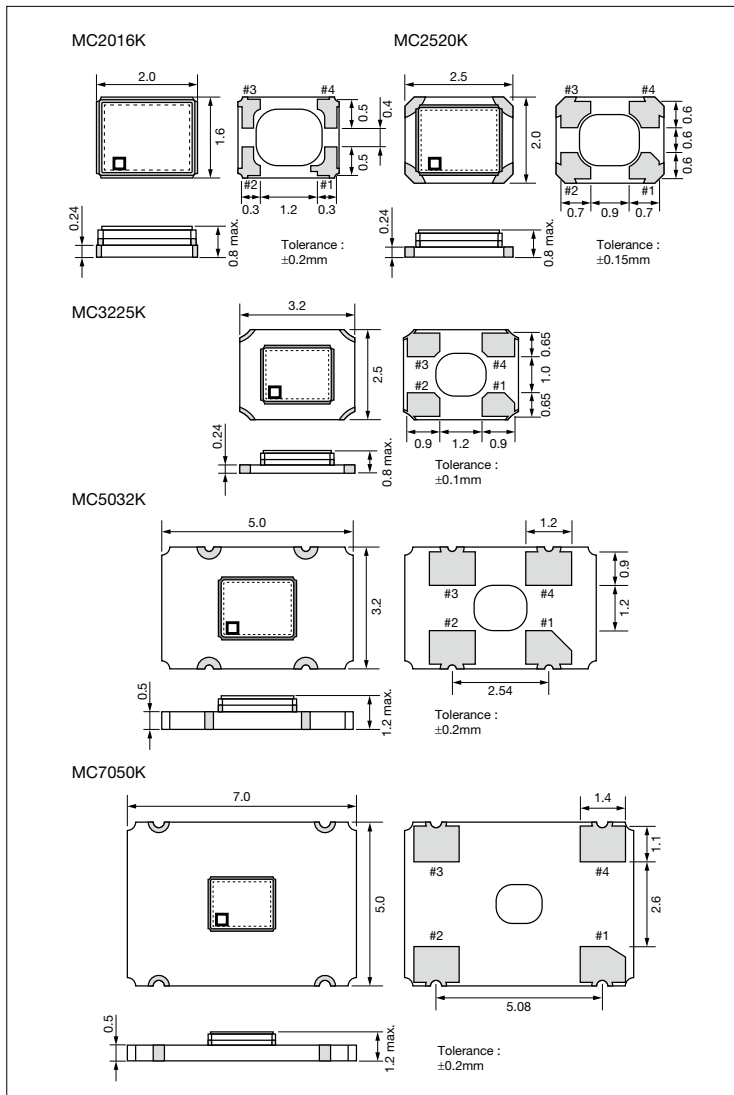
⑦ Individual Specification (STD Specification is "SH" .)

Packaging Tape & Reel

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

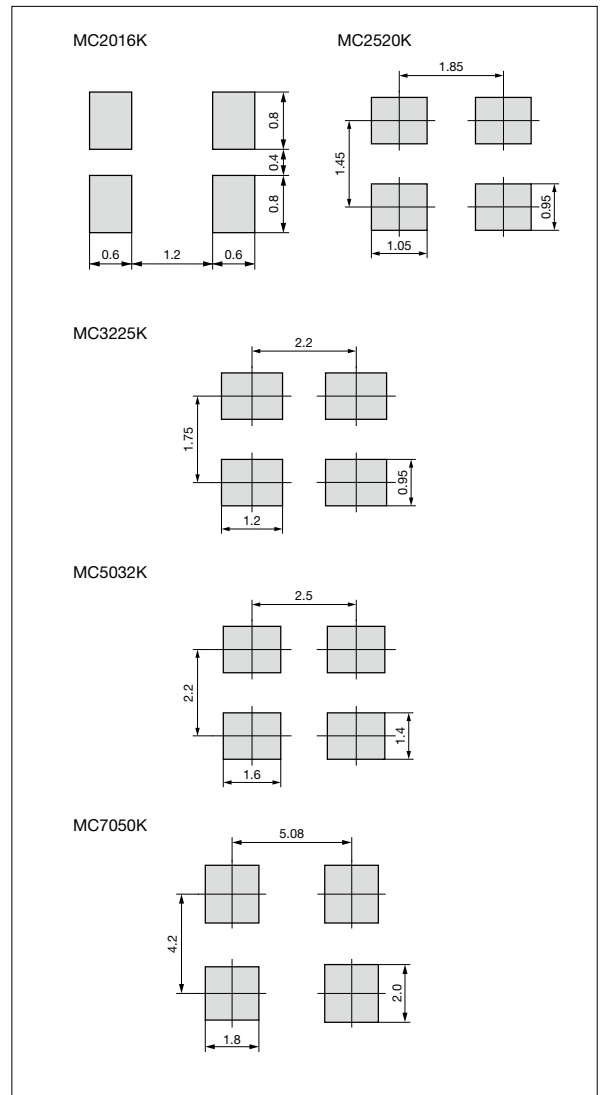
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)





CMOS, 2.0×1.6/2.5×2.0/3.2×2.5 /5.0×3.2/7.0×5.0mm

Specifications

Item	Symbol	Conditions	Min.	Max.	Unit	
Output Frequency	F _o		32.768		kHz	
Frequency Tolerance	F _{tol}	Initial tolerance, Operating temperature range, Rated power supply voltage change (V _{cc} ± 10%)	Temp.: - 40 to +85° C	- 25	+25	× 10 ⁻⁶
			Temp.: - 40 to +125° C	- 90	+90	
	F _{Aging}	Aging (@1 year),	- 3	+3		
	F _{Oth}	Others (Load change, Shock and vibration)	- 4	+4		
Storage Temperature Range	T _{STG}		- 55	+150	° C	
Operating Temperature Range	T _{use}		- 40	+85	° C	
			- 40	+125		
Max. Supply Voltage	—		- 0.3	+4.5	V	
Supply Voltage	V _{cc}		+1.60	+3.63	V	
Current Consumption (No Load)	I _{cc}	1.6 ≤ V _{cc} ≤ 2.0V	—	28	μA	
		2.0 < V _{cc} ≤ 2.8V	—	29		
		2.8 < V _{cc} ≤ 3.63V	—	30		
Stand-by Current	I _{std}		—	5	μA	
Symmetry	SYM	@50% V _{cc}	45	55	%	
Rise/ Fall Time (10% V _{CC} to 90% V _{CC} Output Level)	Tr/ Tf		—	50	ns	
Low Level Output Voltage	V _{oL}	I _{oL} = 1mA	—	10% V _{cc}	V	
High Level Output Voltage	V _{oH}	I _{oH} = -1mA	90% V _{cc}	—	V	
Output Load	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}		—	100	ns	
Enable Time	t _{ena}		—	2	ms	
Start-up Time	t _{sta}	@Minimum operating voltage to be 0 sec.	—	5	ms	

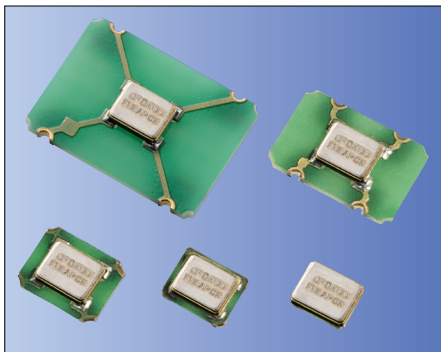
Note: All electrical characteristics are defined at the maximum load and operating temperature range.

Pad Connections	
#1	Stand-by Function
#2	Case GND
#3	Output
#4	V _{cc}

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



CMOS, 2.0×1.6/2.5×2.0/3.2×2.5 /5.0×3.2/7.0×5.0mm



AEC-Q100/200 RoHS Compliant
PSL: R4Y MSL1

Features

- Frequency Range 1.5 to 160MHz
- CMOS output
- Wide Supply Voltage
 - 1.6 to 3.63V
- Low current consumption
- Low Phase Noise

Applications

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

Table 1

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

How to Order

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

① Series

MC2016K	2016 Size	MC2520K	2520 Size
MC3225K	3225 Size	MC5032K	5032 Size
MC7050K	7050 Size		

② Output Frequency (25.0000: 25MHz)

③ Output Type (C: CMOS)

④ Supply Voltage

1	1.8V/ 2.5V/ 3.3V compatible
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⑤ Frequency Tolerance (See Table 1)

⑥ Symmetry/ INH Function

E	45/ 55%
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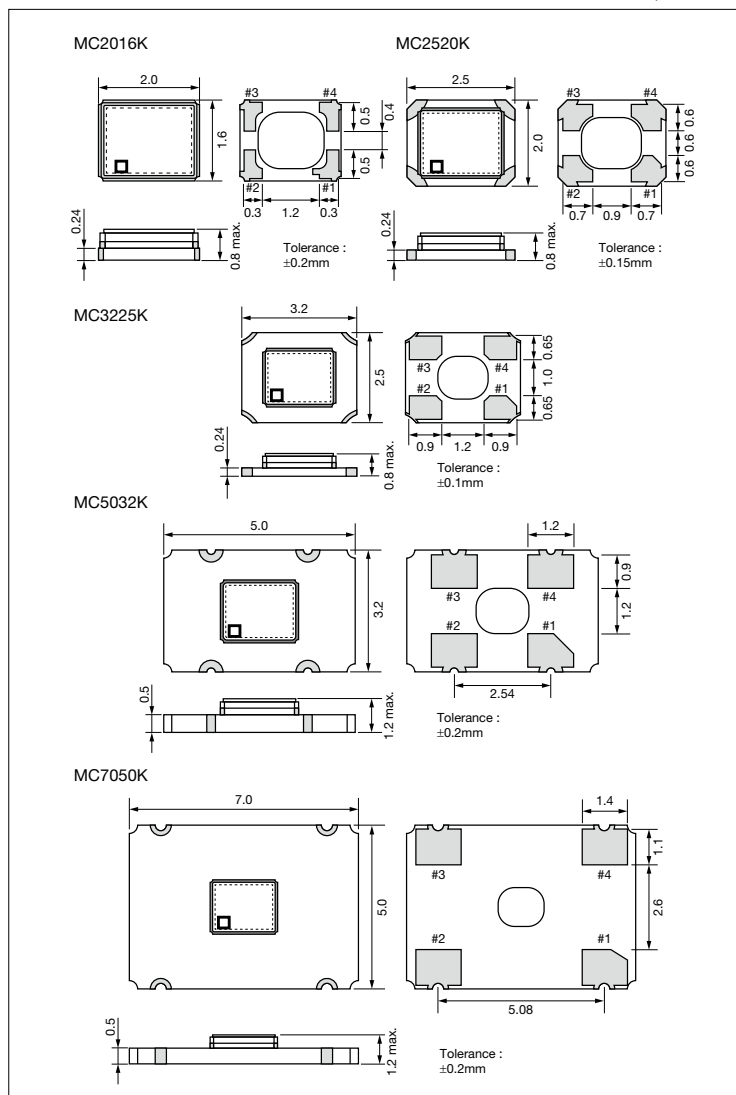
⑦ Individual Specification (STD Specification is "SH" .)

Packaging Tape & Reel

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

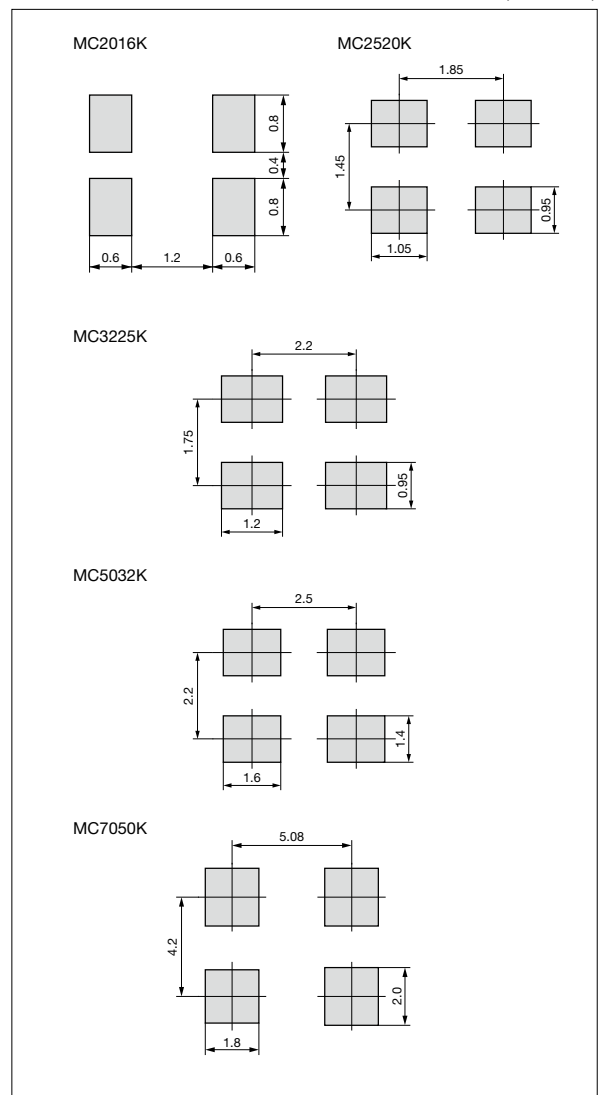
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)





CMOS, 2.0×1.6/2.5×2.0/3.2×2.5 /5.0×3.2/7.0×5.0mm

Specifications

Item	Symbol	Conditions	Min.	Max.	Unit	
Output Frequency Range ^{Note1}	f _o		1.5	160	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	× 10 ⁻⁶
			Temp.: - 40 to +125° C	- 100	+100	
Storage Temperature Range	T _{stg}		- 55	+125	° C	
Operating Temperature Range	T _{use}		- 40	+85	° C	
			- 40	+105		
Max. Supply Voltage	—		- 0.3	+4.0	V	
Supply Voltage	V _{cc}	Code ④ : 1 : 1.5 ≤ F ₀ ≤ 125MHz	+1.60	+3.63	V	
		Code ④ : 2 : 125<F ₀ ≤ 160MHz	+2.25	+3.63		
Current Consumption (Maximum Loaded)	I _{cc}	1.5 ≤ F ₀ ≤ 24MHz	1.6 ≤ V _{cc} ≤ 2.25V	—	2.5	mA
			2.25<V _{cc} ≤ 2.8V	—	3.0	
			2.8<V _{cc} ≤ 3.63V	—	3.5	
		24<F ₀ ≤ 40MHz	1.6 ≤ V _{cc} ≤ 2.25V	—	3.5	
			2.25<V _{cc} ≤ 2.8V	—	4.5	
			2.8<V _{cc} ≤ 3.63V	—	5.0	
		40<F ₀ ≤ 62.5MHz	1.6 ≤ V _{cc} ≤ 2.25V	—	5.0	
			2.25<V _{cc} ≤ 2.8V	—	5.5	
			2.8<V _{cc} ≤ 3.63V	—	6.0	
		62.5<F ₀ ≤ 80MHz	1.6 ≤ V _{cc} ≤ 2.25V	—	6.0	
			2.25<V _{cc} ≤ 2.8V	—	6.5	
			2.8<V _{cc} ≤ 3.63V	—	8.0	
		80<F ₀ ≤ 125MHz	1.6 ≤ V _{cc} ≤ 2.25V	—	11.0	
			2.25<V _{cc} ≤ 2.8V	—	14.0	
2.8<V _{cc} ≤ 3.63V	—		17.0			
2.25<V _{cc} ≤ 2.8V	—		25.0			
125<F ₀ ≤ 160MHz	2.25<V _{cc} ≤ 2.8V	—	25.0			
	2.8<V _{cc} ≤ 3.63V	—	27.0			
Stand-by Current	I _{std}	1.5 ≤ F ₀ ≤ 80MHz	—	5.0	μA	
		80<F ₀ ≤ 160MHz	—	10.0		
Symmetry	SYM	@50% V _{cc}	45	55	%	
Rise/ Fall Time (10% to 90% Output Level)	Tr/ Tf	1.5 ≤ F ₀ ≤ 80MHz	1.6 ≤ V _{cc} ≤ 2.25V	—	6.0	ns
			2.25<V _{cc} ≤ 2.8V	—	5.0	
			2.8<V _{cc} ≤ 3.63V	—	4.5	
		80<F ₀ ≤ 125MHz	1.6<V _{cc} ≤ 3.63V	—	4.0	
125<F ₀ ≤ 160MHz	2.25<V _{cc} ≤ 3.63V	—	2.5			
Low Level Output Voltage	V _{OL}	I _{OL} = 4mA (F ₀ ≤80MHz), I _{OL} = 8mA (F ₀ >80MHz)	—	10% V _{cc}	V	
High Level Output Voltage	V _{OH}	I _{OH} = -4mA (F ₀ ≤80MHz), I _{OH} = -8mA (F ₀ >80MHz)	90% V _{cc}	—	V	
Output Load	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}	1.5 ≤ F ₀ ≤ 80MHz	—	200	ns	
		80<F ₀ ≤ 125MHz	—	100		
		125<F ₀ ≤ 160MHz	—	100		
Enable Time	t _{ena}		—	5	ms	
Start-up Time	t _{str}	1.5 ≤ F ₀ ≤ 80MHz	@Minimum operating voltage to be 0 sec.	—	5	ms
		80<F ₀ ≤ 125MHz		—	10	
		125<F ₀ ≤ 160MHz		—	10	
1Sigma Jitter	J _{Sigma}	1.5 ≤ F ₀ ≤ 80MHz	Measured with Wavecrest SIA-3000	—	5	ps
		80<F ₀ ≤ 125MHz		—	4	
		125<F ₀ ≤ 160MHz		—	3	
Peak to Peak Jitter	J _{PK-PK}	1.5 ≤ F ₀ ≤ 80MHz		—	50	ps
		80<F ₀ ≤ 125MHz		—	40	
		125<F ₀ ≤ 160MHz		—	25	
Phase Jitter	J _{Phase}	@25MHz	BW : 12kHz to 20MHz	—	1.0	ps



CMOS, 2.0×1.6/2.5×2.0/3.2×2.5 /5.0×3.2/7.0×5.0mm

Item	Symbol	Conditions	Min.	Max.	Unit
Phase Noise	—	@25MHz	@10Hz offset	Typ. - 89	dBc/ Hz
			@100Hz offset	Typ. - 119	
			@1kHz offset	Typ. - 143	
			@10kHz offset	Typ. - 157	
			@100kHz offset	Typ. - 160	
			@1MHz offset	Typ. - 162	
			@10MHz offset	Typ. - 162	

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

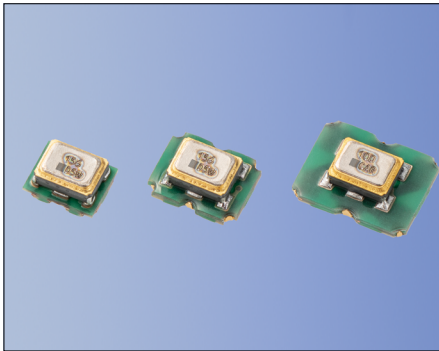
Note1: Please contact us for inquiry about operating temperature range, available frequencies and other conditions.

Pad Connections	
#1	Stand-by Function
#2	Case GND
#3	Output
#4	Vcc

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



LV-PECL, 2.0×1.6 / 2.5×2.0 / 3.2×2.5mm



RoHS Compliant
PSL: R4Y MSL1

Features

- Output Frequency: 100/125/156.25MHz
- LV-PECL output
- Supply voltage $V_{CC}=3.3V, 2.5V$
- Low Jitter
- Heat resistant up to $+125^{\circ}C$

Applications

- Consumer / Networking / Industrial / Audio Codec / Amuse

Table 1

Freq. Tol. Code	$\times 10^{-6}$	Operating Temperature Range ($^{\circ}C$)	Note
0	± 50	-10 to +70	For additional stability, please contact us.
F	± 100	-40 to +85	
G	± 50	-40 to +85	
6	± 50	-40 to +105	
7	± 100	-40 to +105	
X	± 100	-40 to +125	

How to Order

KC□□□□F ① 100.000 ② P □ □ K 00 ③ ④ ⑤ ⑥ ⑦

① Series

KC2016F	2016 Size	KC2520F	2520 Size
KC3225F	3225 Size		

② Output Frequency (100.000 : 100MHz)

③ Output Type (P : LV-PECL)

④ Supply Voltage

2	2.5V	3	3.3V
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⑤ Frequency Tolerance (See Table 1)

⑥ Symmetry/ INH Function

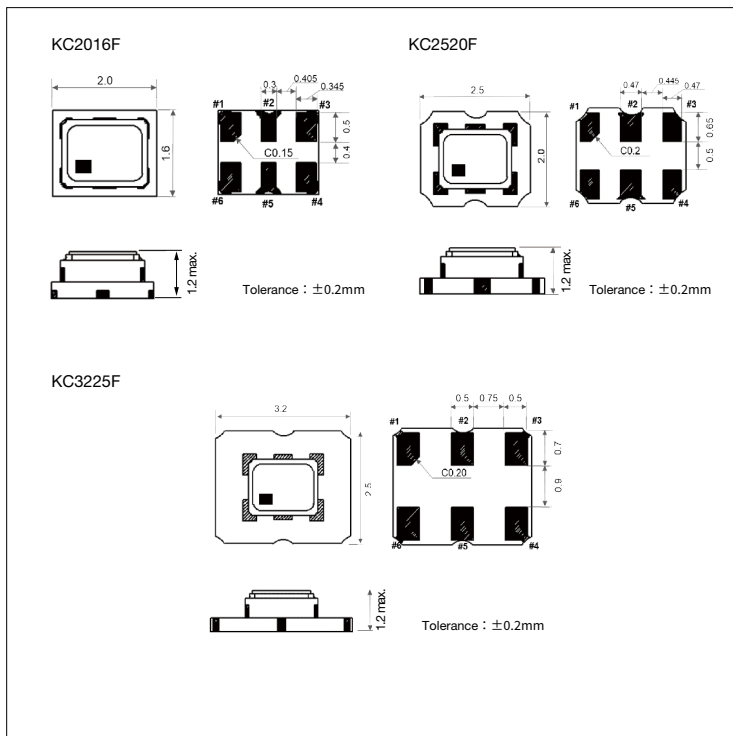
⑦ Individual Specification (STD Specification is "00" .)

Packaging Tape & Reel

KC3225F/ KC2520F/ KC2016F	2000 pcs./ reel
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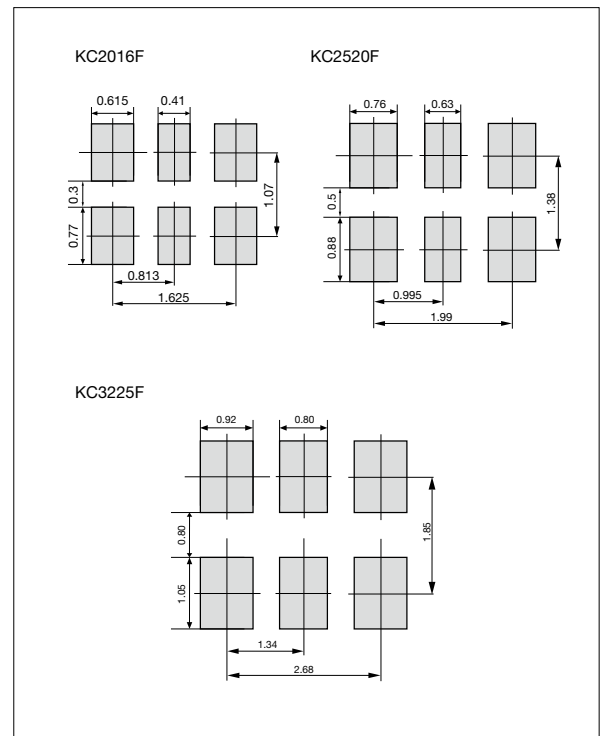
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)



Pad Connections	
#1	Stand-by Function
#2	NC
#3	Case GND
#4	Output
#5	Complementary Output
#6	Vcc

Stand-by Function	
Pad1	Pad4 / Pad5
Open	Active
"H" Level	Active
"L" Level	No-Oscillation



LV-PECL, 2.0×1.6 / 2.5×2.0 / 3.2×2.5mm

Specifications

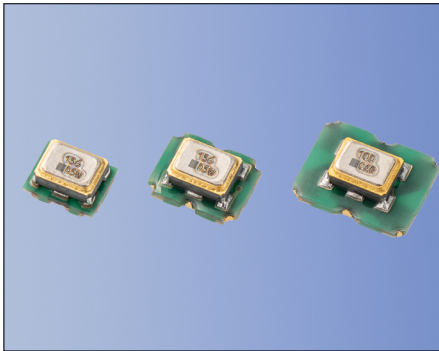
Item	Symbol	Conditions	Specifications	Units	
Output Frequency Range	fo		100/125/156.25	MHz	
Frequency Tolerance	f _{tol}	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25° C), Shock and vibration	See Table 1	× 10 ⁻⁶	
Storage Temperature Range	T _{stg}		-55 to +125	° C	
Operating Temperature Range	T _{use}		See Table 1	° C	
Max. Supply Voltage	—		-0.3 to +4.0	V	
Supply Voltage	V _{cc}	@+2.5V @+3.3V	+2.375 to +2.625 +3.135 to +3.465	V	
Current Consumption	I _{cc}		65 max.	mA	
Stand-by Current	I _{std}		30 max.	µA	
Symmetry	SYM	50ohm @50% output swing	50±5	%	
Rise/ Fall Tim (20% V _{cc} to 80% V _{cc})	Tr/ Tf	50ohm	0.4 max.	ns	
Low Level Output Voltage	V _{OL}		V _{cc} -1.810 to V _{cc} -1.620	V	
High Level Output Voltage	V _{OH}		V _{cc} -1.085 to V _{cc} -0.880	V	
Output Load	—	LV-PECL Output	50	Ohm	
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 ^{Note1}	DJ	DJ pk-pk	2 max.	ps	
1Sigma Jitter ^{Note1}	J _{Sigma}		4 max.	ps	
Peak to Peak Jitter ^{Note1}	J _{PK-PK}		30 max.	ps	
Phase Jitter	—	BW: 12kHz to 20MHz @+3.3V, 25degC	@100MHz	0.15 max.	ps
			@125MHz	0.15 max.	ps
			@156.25MHz	0.10 max.	ps

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

Note1: Jitter is measured with the Time Interval Analyzer “Wavecrest SIA-3000”



LVDS, 2.0×1.6 / 2.5×2.0 / 3.2×2.5mm



RoHS Compliant
PSL: R4Y MSL1

Features

- Output Frequency: 100/125/156.25MHz
- LVDS output
- Supply voltage $V_{CC}=3.3V, 2.5V$
- Low Jitter
- Heat resistant up to +125° C

Applications

- Consumer / Networking / Industrial / Audio Codec / Amuse

Table 1

Freq. Code	Tol. $\times 10^{-6}$	Operating Temperature Range (°C)	Note
0	± 50	-10 to +70	For additional stability, please contact us.
F	± 100	-40 to +85	
G	± 50	-40 to +85	
6	± 50	-40 to +105	
7	± 100	-40 to +105	
X	± 100	-40 to +125	

How to Order

KC□□□□F ① 100.000 ② L □ □ K 00 ③ ④ ⑤ ⑥ ⑦

① Series

KC2016F	2016 Size	KC2520F	2520 Size
KC3225F	3225 Size		

② Output Frequency (100.000 : 100MHz)

③ Output Type (L : LVDS)

④ Supply Voltage

2	2.5V	3	3.3V
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⑤ Frequency Tolerance (See Table 1)

⑥ Symmetry/ INH Function

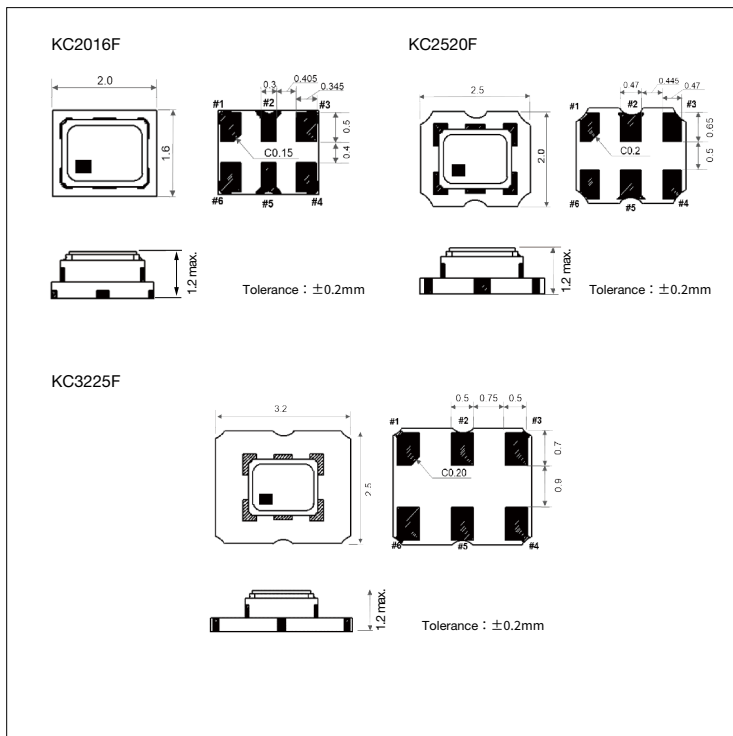
⑦ Individual Specification (STD Specification is "00" .)

Packaging Tape & Reel

KC3225F/ KC2520F/ KC2016F	2000 pcs./ reel
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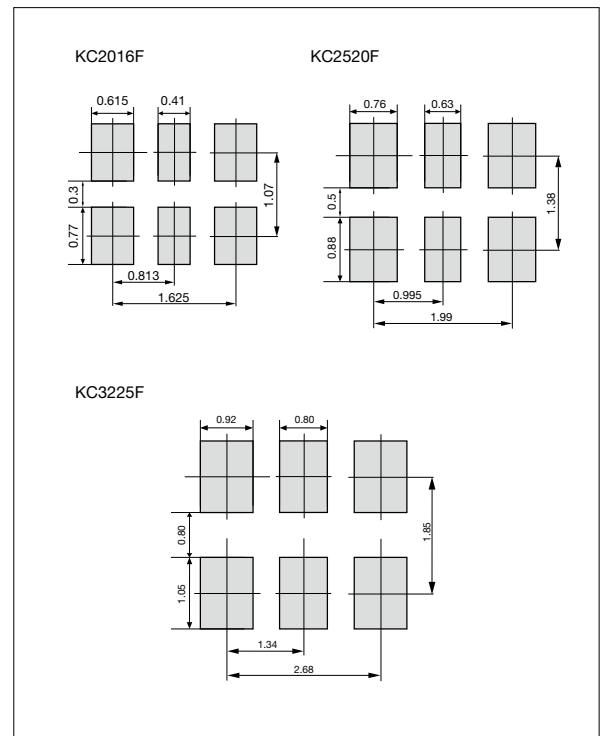
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)



Pad Connections	
#1	Stand-by Function
#2	NC
#3	Case GND
#4	Output
#5	Complementary Output
#6	Vcc

Stand-by Function	
Pad1	Pad4 / Pad5
Open	Active
"H" Level	Active
"L" Level	No-Oscillation



LVDS, 2.0×1.6 / 2.5×2.0 / 3.2×2.5mm

Specifications

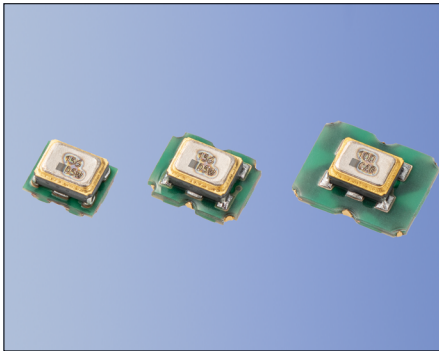
Item	Symbol	Conditions	Specifications	Units	
Output Frequency Range	fo		100/125/156.25	MHz	
Frequency Tolerance	f _{tol}	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25° C), Shock and vibration	See Table 1	×10 ⁻⁶	
Storage Temperature Range	T _{stg}		-55 to +125	°C	
Operating Temperature Range	T _{use}		See Table 1	°C	
Max. Supply Voltage	—		-0.3 to +4.0	V	
Supply Voltage	V _{cc}	@+2.5V @+3.3V	+2.375 to +2.625 +3.135 to +3.465	V	
Current Consumption	I _{cc}		24 max.	mA	
Stand-by Current	I _{std}		30 max.	μA	
Symmetry	SYM	100ohm @50% V _{opp}	50±5	%	
Rise/ Fall Tim (20% V _{cc} to 80% V _{cc})	Tr/ Tf	100ohm	0.3 max.	ns	
Low Level Output Voltage	VoL		0.9 min. Typ.:1.1	V	
High Level Output Voltage	VoH		1.6 max. Typ.:1.43	V	
Differential Output Voltage	V _{od}		247 to 454 Typ.:330	mV	
Differential Output Voltage Error	dV _{OD}	dV _{OD} = V _{OD1} - V _{OD2}	50 max.		
Offset Voltage	V _{Os}		1.125 to 1.375 Typ.:1.25	V	
Offset Voltage Error	dV _{Os}	dV _{OD} = V _{OD1} - V _{OD2}	50 max.	mV	
Output Load	—	LVDS Output	100	ohm	
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 ^{Note1}	DJ	DJ pk-pk	2 max.	ps	
1Sigma Jitter ^{Note1}	J _{Sigma}		4 max.	ps	
Peak to Peak Jitter ^{Note1}	J _{PK-PK}		35 max.	ps	
Phase Jitter	—	BW: 12kHz to 20MHz @+3.3V, 25degC	@100MHz	0.15 max.	ps
			@125MHz	0.15 max.	ps
			@156.25MHz	0.10 max.	ps

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

Note1: Jitter is measured with the Time Interval Analyzer “Wavecrest SIA-3000”



HCSL, 2.0×1.6 / 2.5×2.0 / 3.2×2.5mm



RoHS Compliant
PSL: R4Y MSL1

Features

- Output Frequency: 100/125/156.25MHz
- HCSL output
- Supply voltage $V_{CC}=3.3V, 2.5V$
- Low Jitter
- Heat resistant up to +125° C

Applications

- Consumer / Networking / Industrial / Audio Codec / Amuse

Table 1

Freq. Code	Tol. $\times 10^{-6}$	Operating Temperature Range (°C)	Note
0	± 50	-10 to +70	For additional stability, please contact us.
F	± 100	-40 to +85	
G	± 50	-40 to +85	
6	± 50	-40 to +105	
7	± 100	-40 to +105	
X	± 100	-40 to +125	

How to Order

KC□□□□F ① 100.000 ② H □ □ K 00 ③ ④ ⑤ ⑥ ⑦

① Series

KC2016F	2016 Size	KC2520F	2520 Size
KC3225F	3225 Size		

② Output Frequency (100.000 : 100MHz)

③ Output Type (H : HCSL)

④ Supply Voltage

2	2.5V	3	3.3V
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⑤ Frequency Tolerance (See Table 1)

⑥ Symmetry/ INH Function

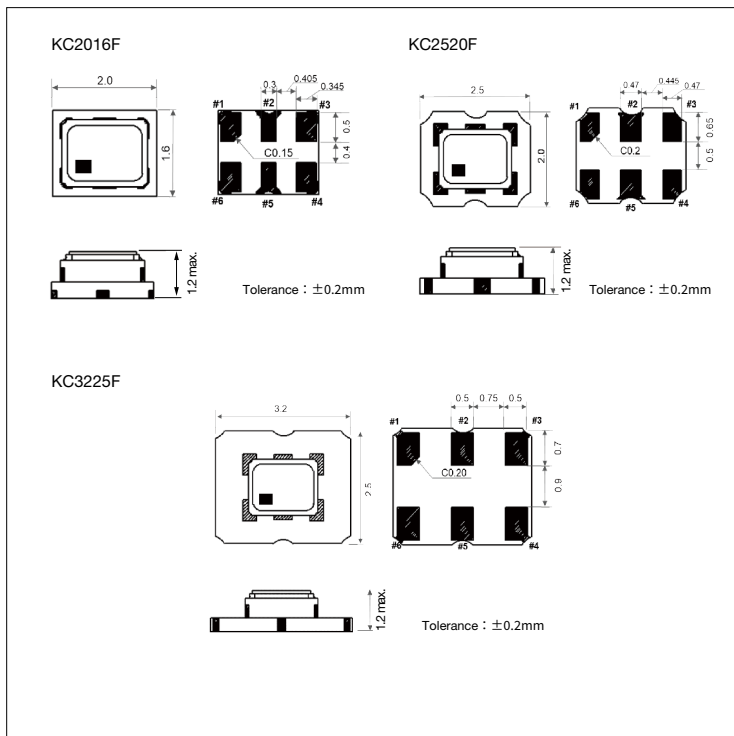
⑦ Individual Specification (STD Specification is "00" .)

Packaging Tape & Reel

KC3225F/ KC2520F/ KC2016F	2000 pcs./ reel
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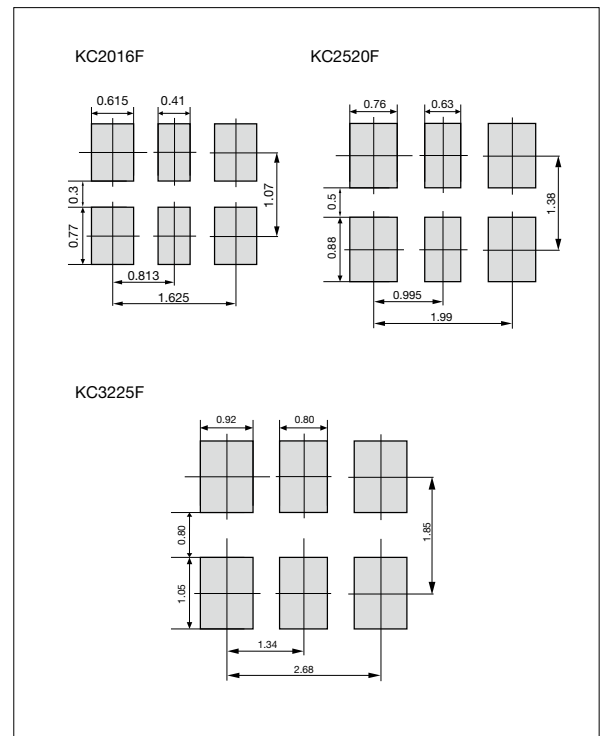
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)



Pad Connections	
#1	Stand-by Function
#2	NC
#3	Case GND
#4	Output
#5	Complementary Output
#6	Vcc

Stand-by Function	
Pad1	Pad4 / Pad5
Open	Active
"H" Level	Active
"L" Level	No-Oscillation



HCSL, 2.0×1.6 / 2.5×2.0 / 3.2×2.5mm

Specifications

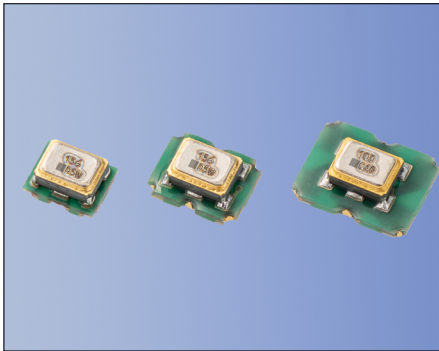
Item	Symbol	Conditions	Specifications	Units	
Output Frequency Range	f _o		100/125/156.25	MHz	
Frequency Tolerance	f _{tol}	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25° C), Shock and vibration	See Table 1	×10 ⁻⁶	
Storage Temperature Range	T _{stg}		-55 to +125	°C	
Operating Temperature Range	T _{use}		See Table 1	°C	
Max. Supply Voltage	—		-0.3 ~ +4.0	V	
Supply Voltage	V _{CC}	@+2.5V @+3.3V	+2.375 to +2.625 +3.135 to +3.465	V	
Current Consumption	I _{CC}		46 max.	mA	
Stand-by Current	I _{std}		30 max.	μA	
Symmetry	SYM	50ohm @Cross Point output swing	50±5	%	
Rise/ Fall Tim (20% V _{CC} to 80% V _{CC})	Tr/ Tf	50ohm/+0.175V to +0.525V	0.6 max.	ns	
Low Level Output Voltage	V _{OL}		-0.15 to +0.15	V	
High Level Output Voltage	V _{OH}		+0.60 to +0.90	V	
Output Load	—	HCSL Output	50	ohm	
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 ^{Note1}	DJ	DJ pk-pk	2 max.	ps	
1Sigma Jitter ^{Note1}	J _{sigma}		4 max.	ps	
Peak to Peak Jitter ^{Note1}	J _{PK-PK}		30 max.	ps	
Phase Jitter	—	BW: 12kHz to 20MHz @+3.3V, 25degC	@100MHz	0.15 max.	ps
			@125MHz	0.15 max.	ps
			@156.25MHz	0.10 max.	ps

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

Note1: Jitter is measured with the Time Interval Analyzer “Wavecrest SIA-3000”



LV-PECL, 2.0×1.6 / 2.5×2.0 / 3.2×2.5mm



AEC-Q100/200 RoHS Compliant
PSL: R4Y MSL1

Features

- Output Frequency: 100/125/156.25MHz
- LV-PECL output
- Supply voltage $V_{CC}=3.3V, 2.5V$
- Low Jitter
- Heat resistant up to $+125^{\circ}C$

Applications

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

Table 1

Freq. Tol. Code	$\times 10^{-6}$	Operating Temperature Range ($^{\circ}C$)	Note
0	± 50	-10 to +70	For additional stability, please contact us.
F	± 100	-40 to +85	
G	± 50	-40 to +85	
6	± 50	-40 to +105	
7	± 100	-40 to +105	
X	± 100	-40 to +125	

How to Order

MC□□□□F ① 100.000 ② P □ □ K 00 ③ ④ ⑤ ⑥ ⑦

① Series

MC2016F	2016 Size	MC2520F	2520 Size
MC3225F	3225 Size		

② Output Frequency (100.000 : 100MHz)

③ Output Type (P : LV-PECL)

④ Supply Voltage

2	2.5V	3	3.3V
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⑤ Frequency Tolerance (See Table 1)

⑥ Symmetry/ INH Function

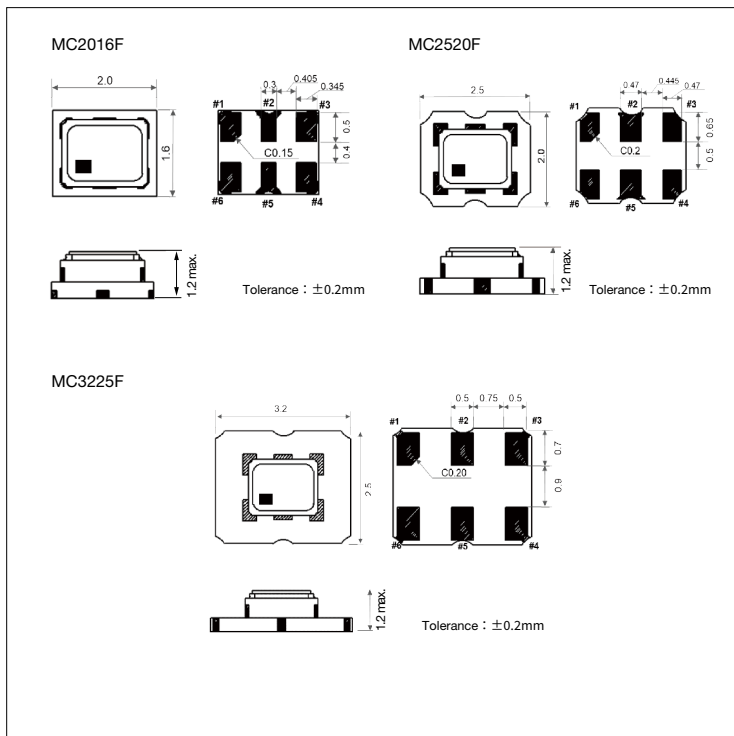
⑦ Individual Specification (STD Specification is "00" .)

Packaging Tape & Reel

MC3225F/ MC2520F/ MC2016F	2000 pcs./ reel
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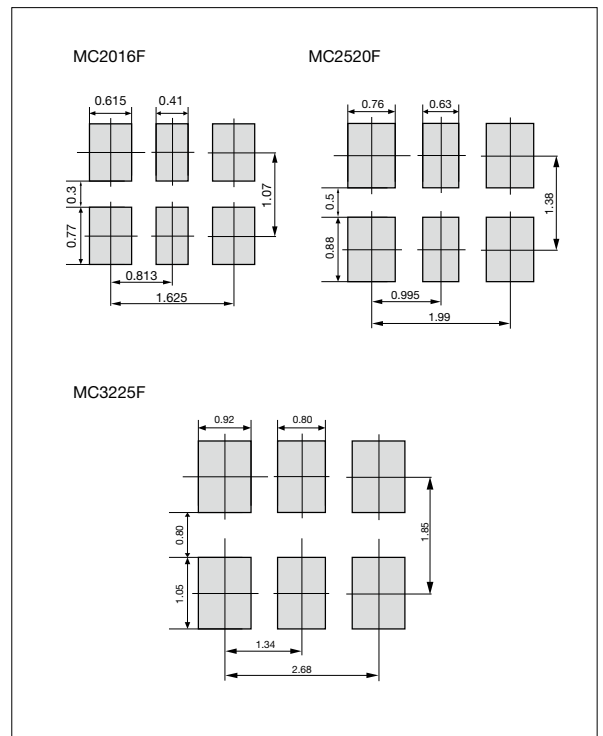
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)



Pad Connections	
#1	Stand-by Function
#2	NC
#3	Case GND
#4	Output
#5	Complementary Output
#6	Vcc

Stand-by Function	
Pad1	Pad4 / Pad5
Open	Active
"H" Level	Active
"L" Level	No-Oscillation



LV-PECL, 2.0×1.6 / 2.5×2.0 / 3.2×2.5mm

Specifications

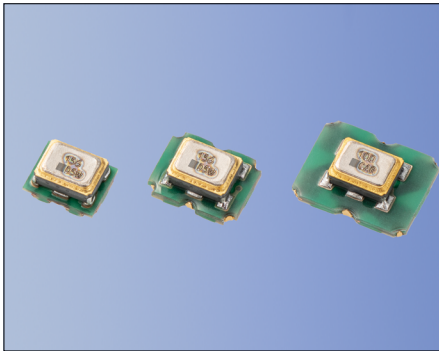
Item	Symbol	Conditions	Specifications	Units	
Output Frequency Range	fo		100/125/156.25	MHz	
Frequency Tolerance	f _{tol}	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25° C), Shock and vibration	See Table 1	× 10 ⁻⁶	
Storage Temperature Range	T _{stg}		-55 to +125	° C	
Operating Temperature Range	T _{use}		See Table 1	° C	
Max. Supply Voltage	—		-0.3 to +4.0	V	
Supply Voltage	V _{cc}	@+2.5V @+3.3V	+2.375 to +2.625 +3.135 to +3.465	V	
Current Consumption	I _{cc}		65 max.	mA	
Stand-by Current	I _{std}		30 max.	µA	
Symmetry	SYM	50ohm @50% output swing	50±5	%	
Rise/ Fall Tim (20% V _{cc} to 80% V _{cc})	Tr/ Tf	50ohm	0.4 max.	ns	
Low Level Output Voltage	V _{OL}		V _{cc} -1.810 to V _{cc} -1.620	V	
High Level Output Voltage	V _{OH}		V _{cc} -1.085 to V _{cc} -0.880	V	
Output Load	—	LV-PECL Output	50	Ohm	
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 ^{Note1}	DJ	DJ pk-pk	2 max.	ps	
1Sigma Jitter ^{Note1}	J _{Sigma}		4 max.	ps	
Peak to Peak Jitter ^{Note1}	J _{PK-PK}		30 max.	ps	
Phase Jitter	—	BW: 12kHz to 20MHz @+3.3V, 25degC	@100MHz	0.15 max.	ps
			@125MHz	0.15 max.	ps
			@156.25MHz	0.10 max.	ps

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

Note1: Jitter is measured with the Time Interval Analyzer “Wavecrest SIA-3000”



LVDS, 2.0×1.6 / 2.5×2.0 / 3.2×2.5mm



AEC-Q100/200 RoHS Compliant
PSL: R4Y MSL1

Features

- Output Frequency: 100/125/156.25MHz
- LVDS output
- Supply voltage $V_{CC}=3.3V, 2.5V$
- Low Jitter
- Heat resistant up to $+125^{\circ}C$

Applications

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

Table 1

Freq. Tol. Code	$\times 10^{-6}$	Operating Temperature Range ($^{\circ}C$)	Note
0	± 50	-10 to +70	For additional stability, please contact us.
F	± 100	-40 to +85	
G	± 50	-40 to +85	
6	± 50	-40 to +105	
7	± 100	-40 to +105	
X	± 100	-40 to +125	

How to Order

MC□□□□F ① 100.000 ② L □ □ K 00 ③ ④ ⑤ ⑥ ⑦

① Series

MC2016F	2016 Size	MC2520F	2520 Size
MC3225F	3225 Size		

② Output Frequency (100.000 : 100MHz)

③ Output Type (L : LVDS)

④ Supply Voltage

2	2.5V	3	3.3V
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⑤ Frequency Tolerance (See Table 1)

⑥ Symmetry/ INH Function

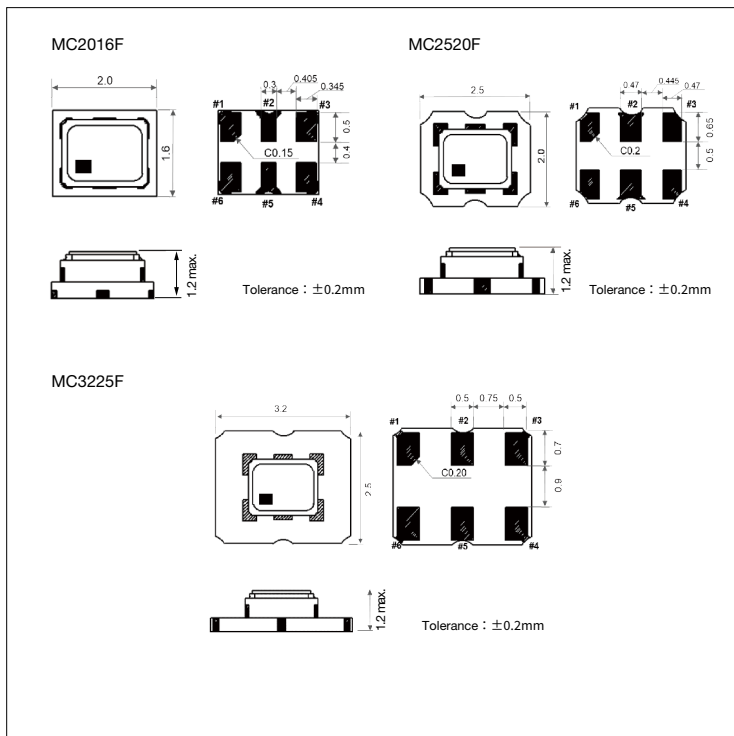
⑦ Individual Specification (STD Specification is "00" .)

Packaging Tape & Reel

MC3225F/ MC2520F/ MC2016F	2000 pcs./ reel
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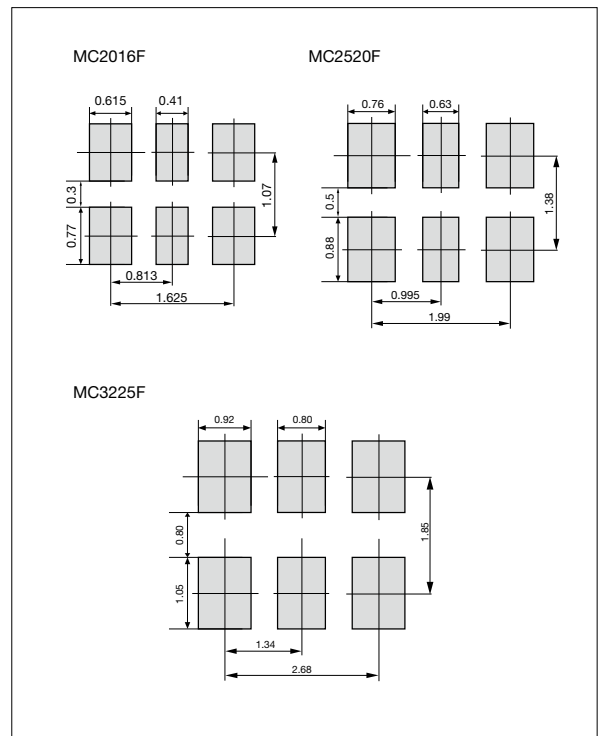
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)



Pad Connections	
#1	Stand-by Function
#2	NC
#3	Case GND
#4	Output
#5	Complementary Output
#6	Vcc

Stand-by Function	
Pad1	Pad4 / Pad5
Open	Active
"H" Level	Active
"L" Level	No-Oscillation



LVDS, 2.0×1.6 / 2.5×2.0 / 3.2×2.5mm

Specifications

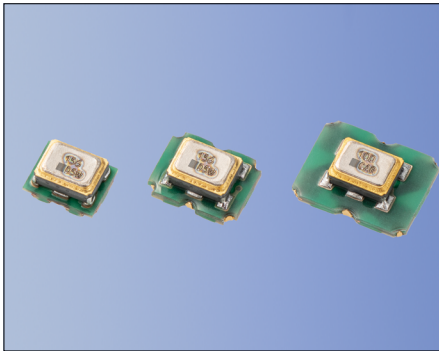
Item	Symbol	Conditions	Specifications	Units	
Output Frequency Range	fo		100/125/156.25	MHz	
Frequency Tolerance	f _{tol}	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25° C), Shock and vibration	See Table 1	× 10 ⁻⁶	
Storage Temperature Range	T _{stg}		-55 to +125	° C	
Operating Temperature Range	T _{use}		See Table 1	° C	
Max. Supply Voltage	—		-0.3 to +4.0	V	
Supply Voltage	V _{cc}	@+2.5V	+2.375 to +2.625	V	
		@+3.3V	+3.135 to +3.465		
Current Consumption	I _{cc}		24 max.	mA	
Stand-by Current	I _{std}		30 max.	μA	
Symmetry	SYM	100ohm @50% V _{opp}	50±5	%	
Rise/ Fall Tim (20% V _{cc} to 80% V _{cc})	Tr/ Tf	100ohm	0.3 max.	ns	
Low Level Output Voltage	V _{oL}		0.9 min. Typ.:1.1	V	
High Level Output Voltage	V _{oH}		1.6 max. Typ.:1.43	V	
Differential Output Voltage	V _{oD}		247 to 454 Typ.:330	mV	
Differential Output Voltage Error	dV _{oD}	dV _{oD} = V _{oD1} - V _{oD2}	50 max.		
Offset Voltage	V _{os}		1.125 to 1.375 Typ.:1.25	V	
Offset Voltage Error	dV _{os}	dV _{os} = V _{oD1} - V _{oD2}	50 max.	mV	
Output Load	—	LVDS Output	100	ohm	
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 ^{Note1}	DJ	DJ pk-pk	2 max.	ps	
1Sigma Jitter ^{Note1}	J _{Sigma}		4 max.	ps	
Peak to Peak Jitter ^{Note1}	J _{PK-PK}		35 max.	ps	
Phase Jitter	—	BW: 12kHz to 20MHz @+3.3V, 25degC	@100MHz	0.15 max.	ps
			@125MHz	0.15 max.	ps
			@156.25MHz	0.10 max.	ps

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

Note1: Jitter is measured with the Time Interval Analyzer “Wavecrest SIA-3000”



HCSL, 2.0×1.6 / 2.5×2.0 / 3.2×2.5mm



AEC-Q100/200 RoHS Compliant
PSL: R4Y MSL1

Features

- Output Frequency: 100/125/156.25MHz
- HCSL output
- Supply voltage $V_{CC}=3.3V, 2.5V$
- Low Jitter
- Heat resistant up to $+125^{\circ}C$

Applications

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

Table 1

Freq. Tol. Code	$\times 10^{-6}$	Operating Temperature Range ($^{\circ}C$)	Note
0	± 50	-10 to +70	For additional stability, please contact us.
F	± 100	-40 to +85	
G	± 50	-40 to +85	
6	± 50	-40 to +105	
7	± 100	-40 to +105	
X	± 100	-40 to +125	

How to Order

MC□□□□F ① 100,000 ② H □ □ K 00 ③ ④ ⑤ ⑥ ⑦

① Series

MC2016F	2016 Size	MC2520F	2520 Size
MC3225F	3225 Size		

② Output Frequency (100,000 : 100MHz)

③ Output Type (H : HCSL)

④ Supply Voltage

2	2.5V	3	3.3V
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⑤ Frequency Tolerance (See Table 1)

⑥ Symmetry/ INH Function

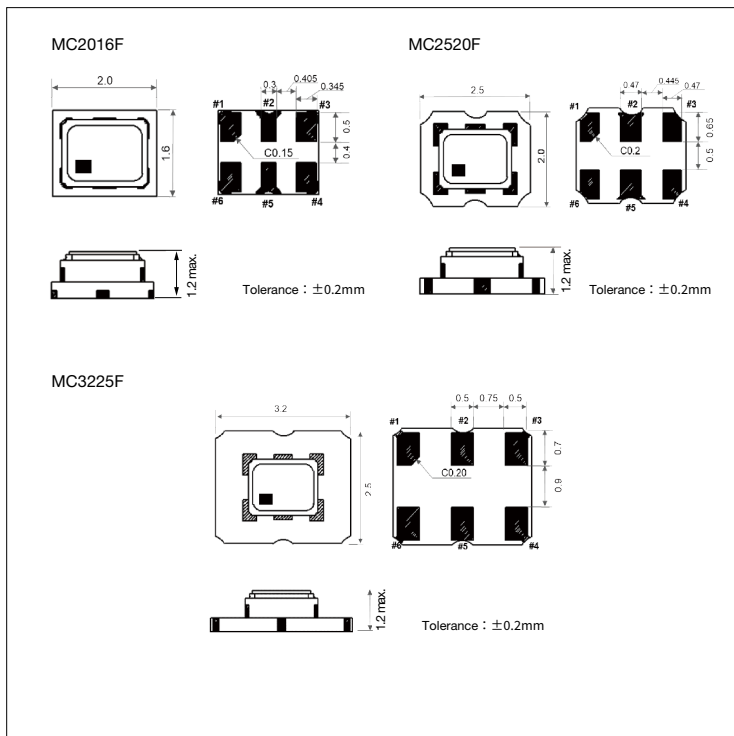
⑦ Individual Specification (STD Specification is "00" .)

Packaging Tape & Reel

MC3225F/ MC2520F/ MC2016F	2000 pcs./ reel
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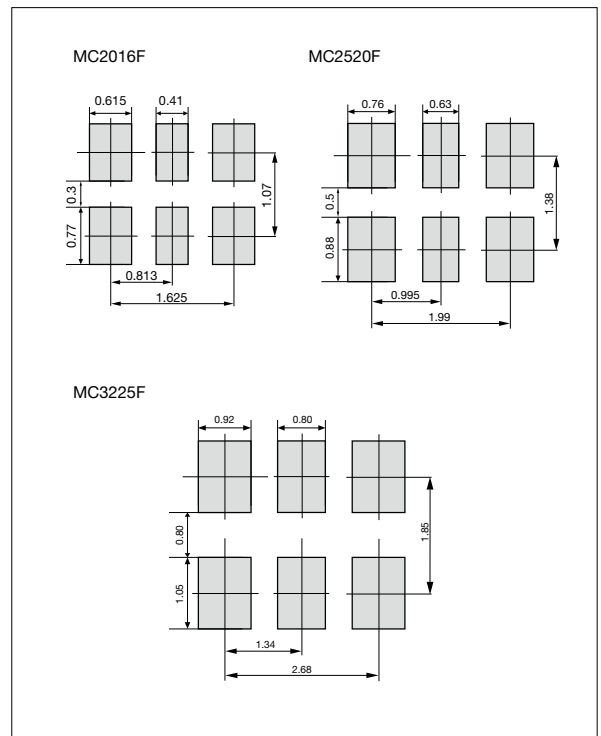
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)



Pad Connections	
#1	Stand-by Function
#2	NC
#3	Case GND
#4	Output
#5	Complementary Output
#6	Vcc

Stand-by Function	
Pad1	Pad4 / Pad5
Open	Active
"H" Level	Active
"L" Level	No-Oscillation



HCSL, 2.0×1.6 / 2.5×2.0 / 3.2×2.5mm

Specifications

Item	Symbol	Conditions	Specifications	Units	
Output Frequency Range	f _o		100/125/156.25	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	×10 ⁻⁶	
Storage Temperature Range	T _{stg}		-55 to +125	° C	
Operating Temperature Range	T _{use}		See Table 1	° C	
Max. Supply Voltage	—		-0.3 ~ +4.0	V	
Supply Voltage	V _{cc}	@+2.5V @+3.3V	+2.375 to +2.625 +3.135 to +3.465	V	
Current Consumption	I _{cc}		46 max.	mA	
Stand-by Current	I _{std}		30 max.	μA	
Symmetry	SYM	50ohm @Cross Point output swing	50±5	%	
Rise/ Fall Tim (20% V _{cc} to 80% V _{cc})	Tr/ Tf	50ohm/+0.175V to +0.525V	0.6 max.	ns	
Low Level Output Voltage	V _{oL}		-0.15 to +0.15	V	
High Level Output Voltage	V _{oH}		+0.60 to +0.90	V	
Output Load	—	HCSL Output	50	ohm	
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 ^{Note1}	DJ	DJ pk-pk	2 max.	ps	
1Sigma Jitter ^{Note1}	J _{Sigma}		4 max.	ps	
Peak to Peak Jitter ^{Note1}	J _{PK-PK}		30 max.	ps	
Phase Jitter	—	BW: 12kHz to 20MHz @+3.3V, 25degC	@100MHz	0.15 max.	ps
			@125MHz	0.15 max.	ps
			@156.25MHz	0.10 max.	ps

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

Note1: Jitter is measured with the Time Interval Analyzer “Wavecrest SIA-3000”



Surface Mount Type TCXO KT1612A Series

1.6 × 1.2mm



RoHS Compliant
PSL: R4Y MSL1

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

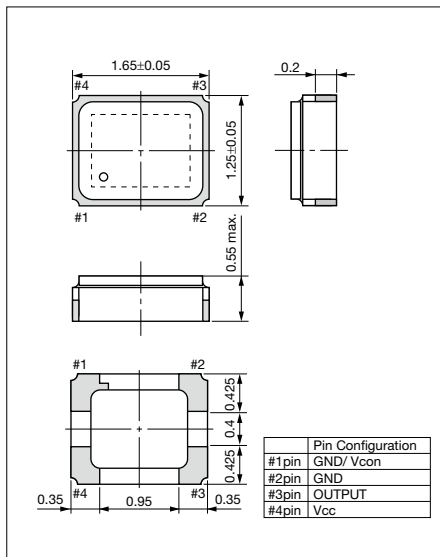
Item	Symbol	Conditions	Min.	Max.	Unit
Output Frequency Range	fo	Standard Output Frequency: 19.2 / 26.0 / 38.4 / 48.0 / 52.0 / 76.8	19.2	76.8	MHz
Frequency Tolerance	f _{tol}	vs Temperature	-0.5 / -2	+0.5 / +2	× 10 ⁻⁶
		vs Load	-0.2	+0.2	
		vs Voltage	-0.2	+0.2	
Frequency Aging	f _{age}	Per Year	-1	+1	× 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	V _{cc}		1.68	3.63	V
Output Level	V _{pp}	Clipped Sine*, Load: 10k ohm // 10pF	0.8	—	V _{p-p}
Current Consumption	I _{cc}		—	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.

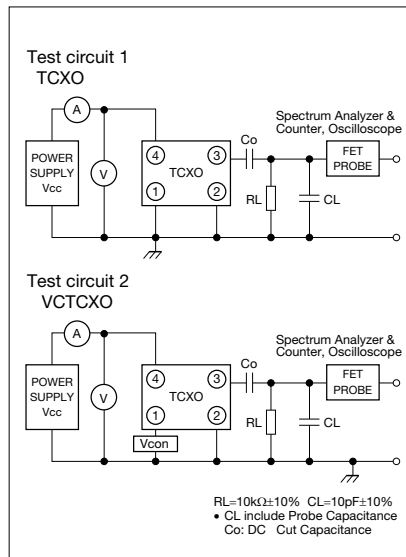
* Please contact us for other specifications.

Dimensions

(Unit: mm)

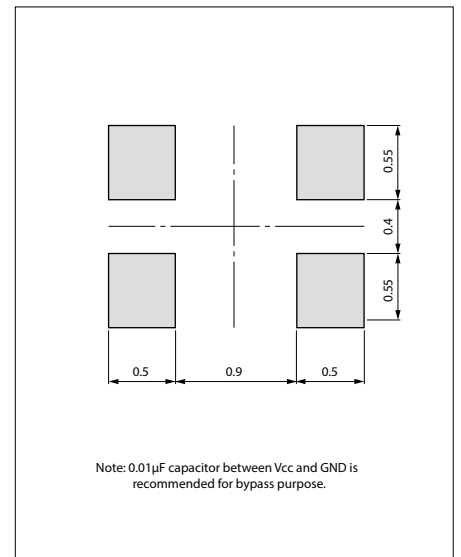


Test Circuit



Recommended Land Pattern

(Unit: mm)





Surface Mount Type TCXO KT1612A Series (Low Voltage Drive, With Disable Function) 1.6 × 1.2mm



RoHS Compliant
PSL: R4Y MSL1

Features

- Ultra-miniature SMD type (1.65 × 1.25 × 0.55mm)
- With Disable Function
- Freq. temp. characteristics:
: ± 2.0 × 10⁻⁶ / -30 to +85° C
: ± 0.5 × 10⁻⁶ / -30 to +85° C (for GNSS)
- 1.1 to 2.0V drive available
- Reflow compatible
- Low temperature operation: -40° C (option)

Applications

- Mobile communications, Wireless modules
- GNSS Unit

How to Order

KT1612A 26000 □ □ □ □ N X Y
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

① Series	KT1612A 1612 Size	⑤ Upper Operating Temp.	W +85° C
② Output Frequency		V +80° C	
③ Freq. Temp. Chrst.	A ± 0.5 × 10 ⁻⁶	U +75° C	
	B ± 1.0 × 10 ⁻⁶	⑥ Supply Voltage	12 1.2V
	C ± 1.5 × 10 ⁻⁶	⑦ Disable Function	N With Disable Function
	D ± 2.0 × 10 ⁻⁶	⑧ Individual Specification	
④ Lower Operating Temp.	C -30° C	⑨ Low Voltage Drive Type	Y Low Voltage Drive
	E -20° C		
	G -10° C		

Packaging (Tape & Reel 18000 pcs./ reel)

Specifications

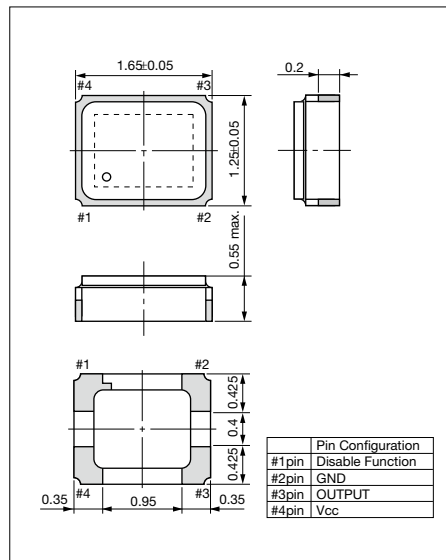
Item	Symbol	Conditions	Min.	Max.	Units
Output Frequency Range	f _o	Standard Output Frequency: 26.0 / 38.4 / 52.0	26.0	52.0	MHz
Frequency Tolerance	f _{tol}	vs Temperature	-0.5/ -2	+0.5/ +2	× 10 ⁻⁶
		vs Load	-0.1	+0.1	
		vs Voltage	-0.1	+0.1	
Frequency Aging	f _{age}	Per Year	-1	+1	× 10 ⁻⁶
Storage Temperature Range	T _{stg}		-40	+85	° C
Operating Temperature Range	T _{use}		-30	+85	° C
Supply Voltage	V _{cc}		1.1	2.0	V
Output Level	V _{pp}	Clipped Sine*, Load: 10k ohm // 10pF	0.8	—	V _{p-p}
Current Consumption	I _{cc}		—	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.

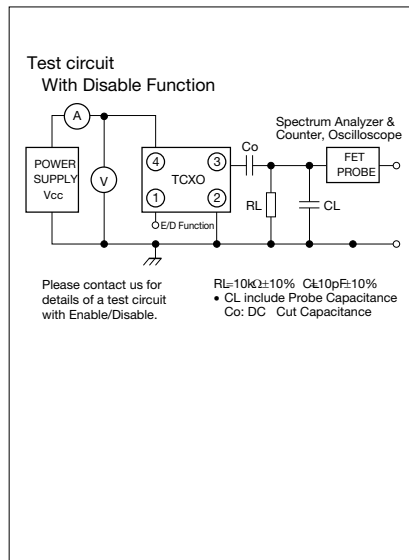
* Please contact us for other specifications.

Dimensions

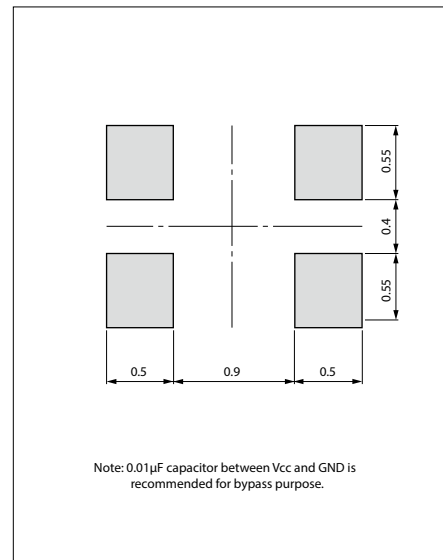
(Unit: mm)



Test Circuit



Recommended Land Patter (Unit: mm)





Surface Mount Type TCXO KT1612A Series (Low Phase Noise, With Disable Function) 1.6 × 1.2mm



Features

- Ultra-miniature SMD type (1.65 × 1.25 × 0.55mm)
- Low Phase Noise : -164dBc/Hz@100kHz offset, 52MHz
- With Disable Function
- Freq. temp. characteristics. : $\pm 2.0 \times 10^{-6}/-30$ to $+85^\circ\text{C}$: $\pm 0.5 \times 10^{-6}/-30$ to $+85^\circ\text{C}$ (for GNSS)
- 1.68 to 3.63V drive available
- Reflow compatible
- Operating Temp. -40 to $+105^\circ\text{C}$ (Option)

How to Order

KT1612A 52000 N X G
 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

① Series

KT1612A	1612 Size
---------	-----------

② Output Frequency

③ Freq. Temp. Chrst.

A	$\pm 0.5 \times 10^{-6}$
B	$\pm 1.0 \times 10^{-6}$
C	$\pm 1.5 \times 10^{-6}$
D	$\pm 2.0 \times 10^{-6}$

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 Disable Function

N	With Disable Function
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⑧ Individual Specification

⑨ Low Phase Noise Type

F/G	Low Phase Noise
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Applications

- Mobile communications, Wireless modules
- GNSS Unit
- Wi-Fi 6 (IEEE802.11ax)
- Networking equipments

*Wi-Fi® is a registered trademark of Wi-Fi Alliance.

Packaging (Tape & Reel 18000 pcs./reel)

Specifications

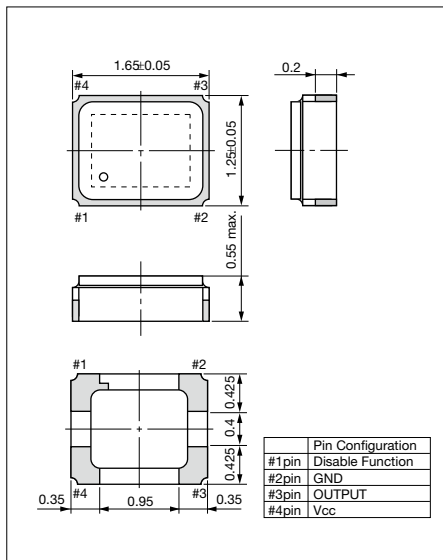
Item	Symbol	Conditions	Min.	Max.	Units
Output Frequency Range	fo	Standard Output Frequency: 19.2 / 26.0 / 38.4 / 48.0 / 52.0 / 76.8	19.2	76.8	MHz
Frequency Tolerance	f _{tol}	vs Temperature	-0.5/ -2	+0.5/ +2	$\times 10^{-6}$
		vs Load	-0.1	+0.1	
		vs Voltage	-0.1	+0.1	
Frequency Aging	f _{age}	Per Year	-1	+1	$\times 10^{-6}$
Storage Temperature Range	T _{stg}		-40	+85	°C
Operating Temperature Range	T _{use}		-30	+85	°C
Supply Voltage	V _{cc}		1.68	3.63	V
Output Level	V _{pp}	Clipped Sine*, Load: 10k ohm // 10pF	0.8	—	V _p - p
Current Consumption	I _{cc}		—	5.6	mA
Harmonics	—		—	-5	dBc

*: A DC-cut capacitor is not embedded in this crystal oscillator. Connect a DC-cut capacitor ($\geq 1\text{nF}$) to the line-out terminal of the oscillator.

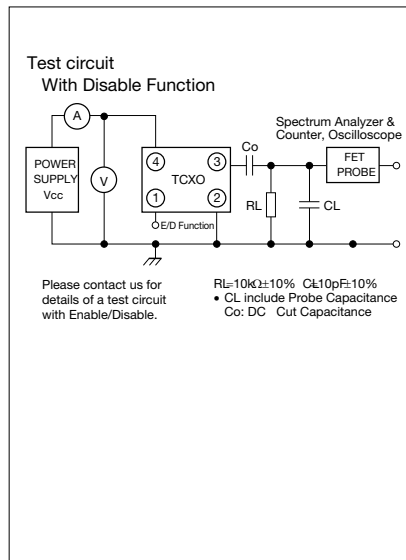
* Please contact us for other specifications.

Dimensions

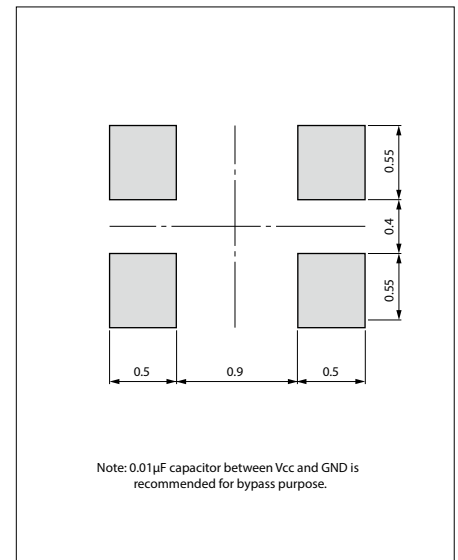
(Unit: mm)



Test Circuit



Recommended Land Patter (Unit: mm)



Temperature Compensated Crystal Oscillators (TCXO, VCTCXO)

Find TCXO Here



Surface Mount Type TCXO KT2016K Series

2.0 × 1.6mm



AEC-Q100/200 **RoHS Compliant**
 *AEC-Q100 qualified (Option) **PSL: R4Y** **MSL1**

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.
 - ④ Lower Operating Temp.
 - ⑤ Upper Operating Temp.
 - ⑥ Supply Voltage
 - ⑦ Voltage Control Function
 - ⑧ Individual Specification
- | | |
|---|--------------------------|
| A | ± 0.5 × 10 ⁻⁶ |
| B | ± 1.0 × 10 ⁻⁶ |
| C | ± 1.5 × 10 ⁻⁶ |
| D | ± 2.0 × 10 ⁻⁶ |
- | | | | |
|----|------|----|------|
| 18 | 1.8V | 28 | 2.8V |
| 30 | 3.0V | 33 | 3.3V |
- | | |
|-------------|--------|
| T | TCXO |
| Spec. Code* | VCTCXO |
- | | |
|---|--------|
| C | -30° C |
| E | -20° C |
| G | -10° C |
- | | |
|---|--------|
| W | +85° C |
| V | +80° C |
| U | +75° C |

Packaging (Tape & Reel 15000 pcs./ reel)

Specifications

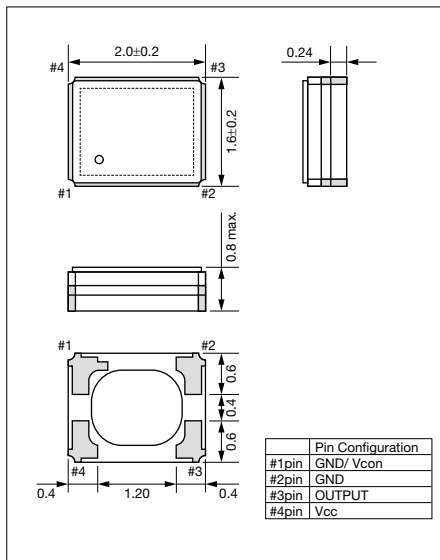
Item	Symbol	Conditions	Min.	Max.	Unit
Output Frequency Range	fo	Standard Output Frequency: 19.2 / 26.0 / 32.0 / 38.4 / 48.0 / 52.0	19.2	52	MHz
Frequency Tolerance	f _{tol}	vs Temperature	-0.5/ -2	+0.5/ +2	× 10 ⁻⁶
		vs Load	-0.2	+0.2	
		vs Voltage	-0.2	+0.2	
Frequency Aging	f _{age}	Per Year	-1	+1	× 10 ⁻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	V _{cc}		1.68	3.63	V
Output Level	V _{pp}	Clipped Sine*, Load: 10k ohm // 10pF	0.8	—	Vp-p
Current Consumption	I _{cc}		—	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.

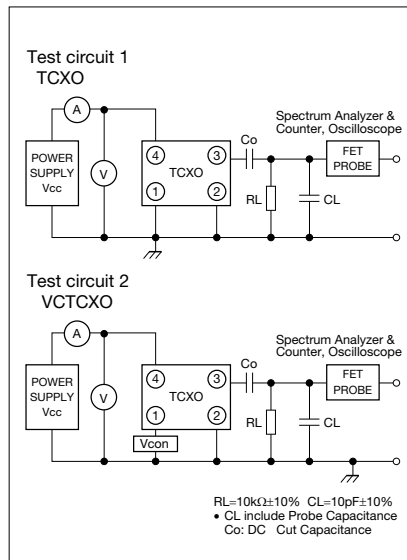
* Please contact us for other specifications.

Dimensions

(Unit: mm)

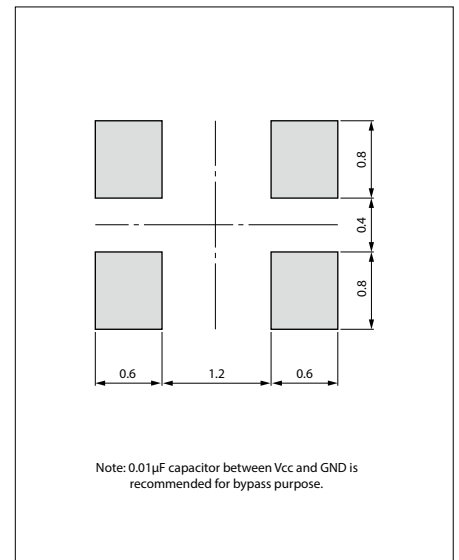


Test Circuit



Recommended Land Pattern

(Unit: mm)



Temperature Compensated Crystal Oscillators

Temperature Compensated Crystal Oscillators (TCXO)

Find TCXO Here



Surface Mount Type TCXO KT2016K Series (Low Voltage Drive, With Disable Function) 2.0 × 1.6mm



RoHS Compliant
PSL: R4Y MSL1

Features

- Ultra-miniature SMD type (2.0 × 1.6 × 0.8mm)
- With Disable Function
- Freq. temp. characteristics:
: ± 2.0 × 10⁻⁶ / -30 to +85° C
: ± 0.5 × 10⁻⁶ / -30 to +85° C (for GNSS)
- 1.1 to 2.0V drive available
- Reflow compatible
- Low temperature operation: -40°C (option)

Applications

- Mobile communications, Wireless modules
- GNSS Unit

How to Order

KT2016K 26000
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

① Series

KT2016K 2016 Size

② Output Frequency	A	± 0.5 × 10 ⁻⁶
③ Freq. Temp. Chrst.	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

12 1.2V

⑦ Disable Function

N With Disable Function

⑧ Individual Specification

⑨ Low Voltage Drive Type

B/Y Low Voltage Drive

Packaging (Tape & Reel 15000 pcs./ reel)

Specifications

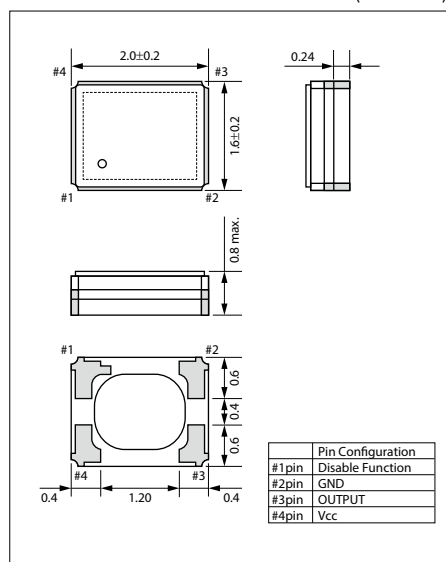
Item	Symbol	Conditions	Min.	Max.	Units
Output Frequency Range	f _o	Standard Output Frequency: 26.0 / 38.4 / 52.0	26.0	52.0	MHz
Frequency Tolerance	f _{tol}	vs Temperature	-0.5/ -2	+0.5/ +2	× 10 ⁻⁶
		vs Load	-0.1	+0.1	
		vs Voltage	-0.1	+0.1	
Frequency Aging	f _{age}	Per Year	-1	+1	× 10 ⁻⁶
Storage Temperature Range	T _{stg}		-40	+85	° C
Operating Temperature Range	T _{use}		-30	+85	° C
Supply Voltage	V _{cc}		1.1	2.0	V
Output Level	V _{pp}	Clipped Sine*, Load: 10k ohm // 10pF	0.8	—	V _{p-p}
Current Consumption	I _{cc}		—	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.

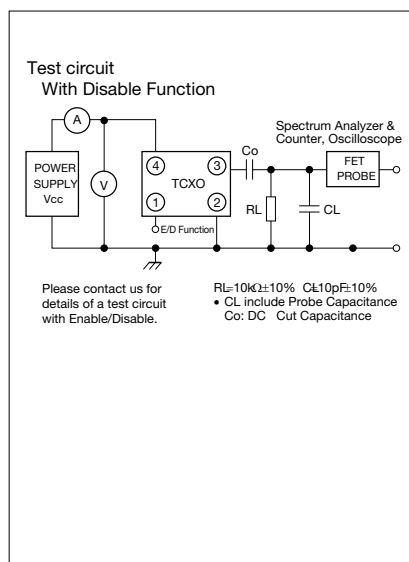
*Please contact us for other specifications.

Dimensions

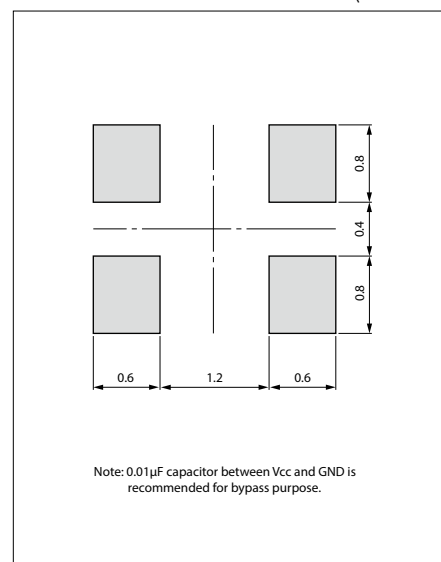
(Unit: mm)



Test Circuit



Recommended Land Patter (Unit: mm)

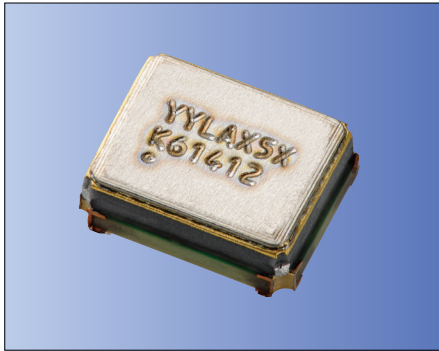


Temperature Compensated Crystal Oscillators (TCXO)

Find TCXO Here



Surface Mount Type TCXO KT2016K Series (Low Phase Noise, With Disable Function) 2.0 × 1.6mm



AEC-Q200 RoHS Compliant
PSL: R4Y MSL1

Features

- Ultra-miniature SMD type (2.0 × 1.6 × 0.8mm)
- Low Phase Noise : -164dBc/Hz@100kHz offset, 52MHz
- With Disable Function
- 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)

Applications

- Mobile communications, Wireless modules
- GNSS Unit
- Wi-Fi 6 (IEEE802.11ax)
- Networking equipments

*Wi-Fi® is a registered trademark of Wi-Fi Alliance.

How to Order

KT2016K 26000 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

① Series

KT2016K 2016 Size

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 Disable Function

N	With Disable Function
---	-----------------------

⑧ Individual Specification

⑨ Low Phase Noise Type

F/G	Low Phase Noise
-----	-----------------

Packaging (Tape & Reel 18000 pcs./reel)

Specifications

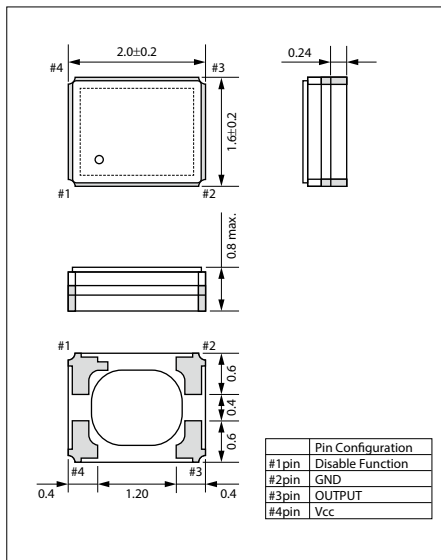
Item	Symbol	Conditions	Min.	Max.	Units
Output Frequency Range	fo	Standard Output Frequency: 19.2 / 26.0 / 38.4 / 48.0 / 52.0 / 60.0	19.2	60.0	MHz
Frequency Tolerance	f _{tol}	vs Temperature	-0.5/ -2	+0.5/ +2	× 10 ⁻⁶
		vs Load	-0.1	+0.1	
		vs Voltage	-0.1	+0.1	
Frequency Aging	f _{age}	Per Year	-1	+1	× 10 ⁻⁶
Storage Temperature Range	T _{stg}		-40	+85	°C
Operating Temperature Range	T _{use}		-30	+85	°C
Supply Voltage	V _{cc}		1.68	3.63	V
Output Level	V _{pp}	Clipped Sine*, Load: 10k ohm // 10pF	0.8	—	V _{p-p}
Current Consumption	I _{cc}		—	5.6	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.

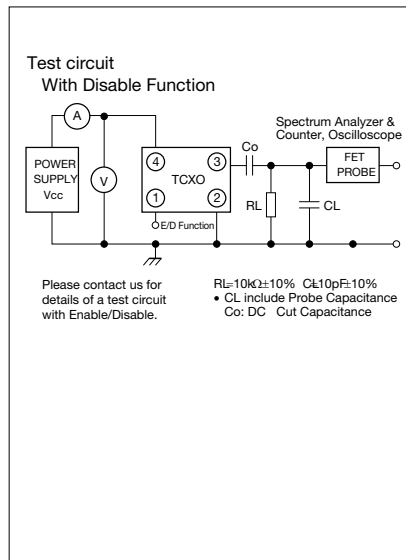
* Please contact us for other specifications.

Dimensions

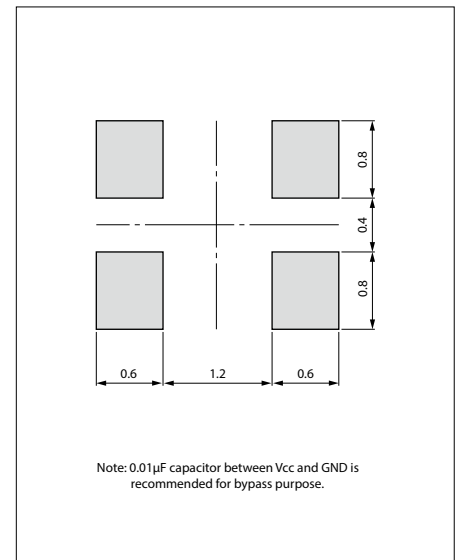
(Unit: mm)



Test Circuit



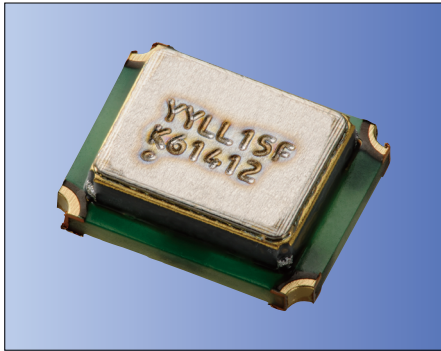
Recommended Land Patter (Unit: mm)





Surface Mount Type TCXO KT2520K Series

2.5 × 2.0mm



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)

AEC-Q100/200 RoHS Compliant
*AEC-Q100 qualified (Option) PSL: R4Y MSL1

Specifications

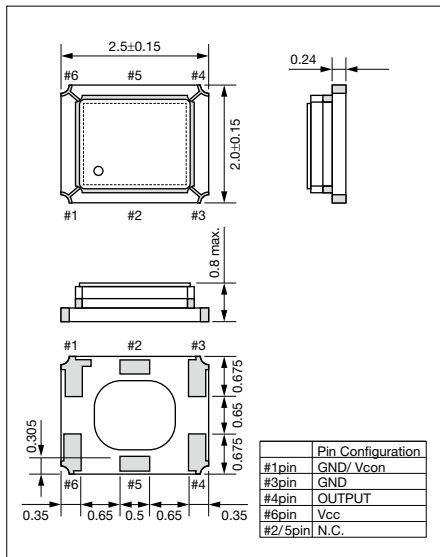
Item	Symbol	Conditions	Min.	Max.	Unit
Output Frequency Range	fo	Standard Output Frequency: 19.2, 26.0, 32.0, 38.4, 48.0, 52.0	19.2	52	MHz
Frequency Tolerance	f _{tol}	vs Temperature	-0.5/ -2	+0.5/ +2	× 10 ⁻⁶
		vs Load	-0.2	+0.2	
		vs Voltage	-0.2	+0.2	
Frequency Aging	f _{age}	Per Year	-1	+1	× 10 ⁻⁶
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	V _{cc}		1.68	3.63	V
Output Level	V _{pp}	Clipped Sine*, Load: 10k ohm // 10pF	0.8	—	Vp-p
Current Consumption	I _{cc}		—	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.

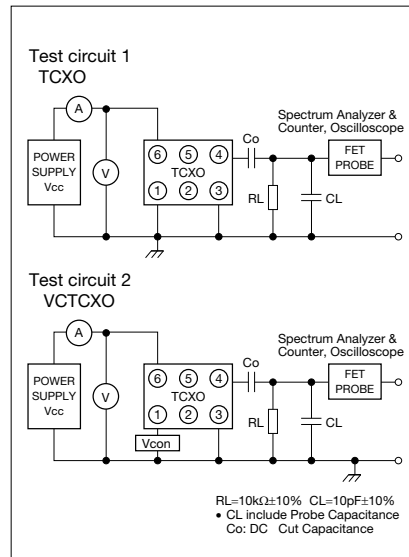
*Please contact us for other specifications.

Dimensions

(Unit: mm)

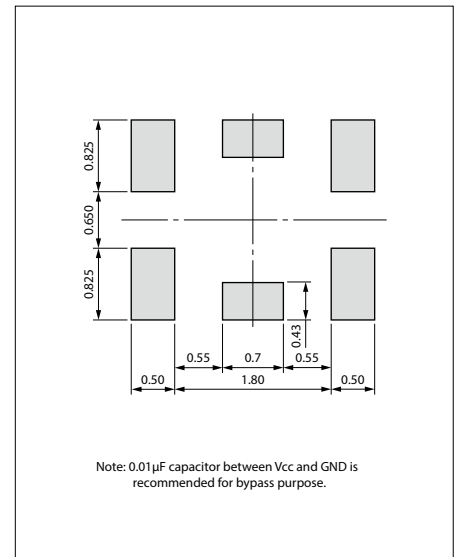


Test Circuit



Recommended Land Pattern

(Unit: mm)





Handling Notes for Clock Oscillators

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.

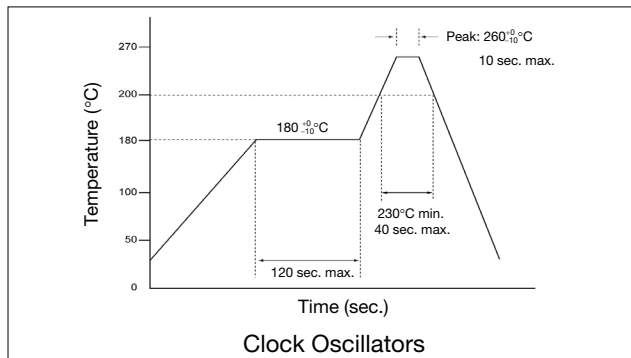
2. Cleaning

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.

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.

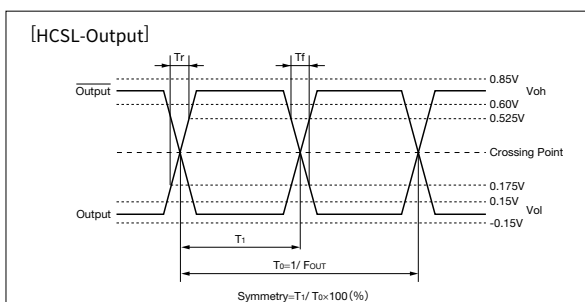
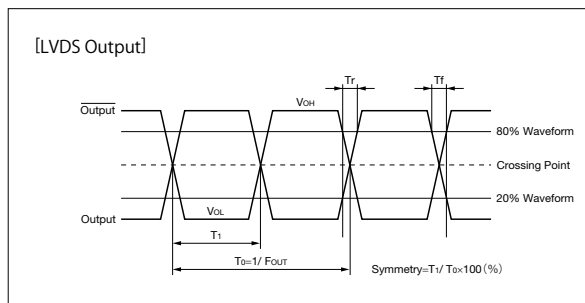
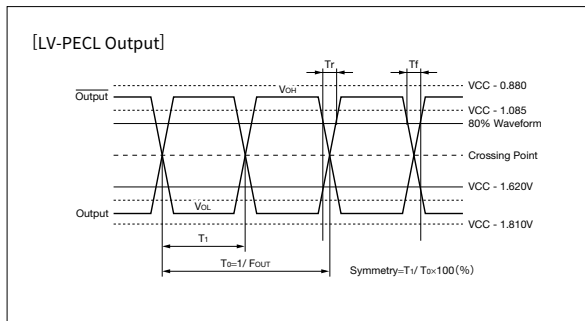
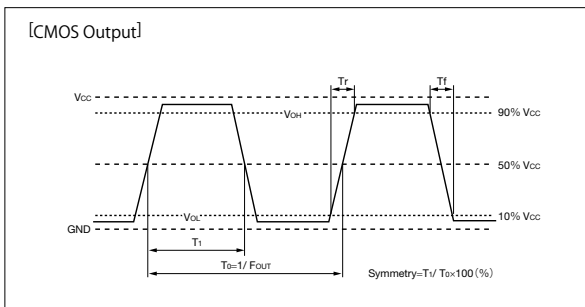
Parts should be stored in temperature range of - 5 to +40° C, humidity 40 to 60% RH, and avoid direct sunlight. Then use within 6 months.



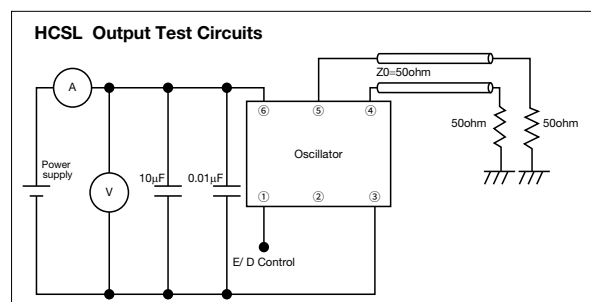
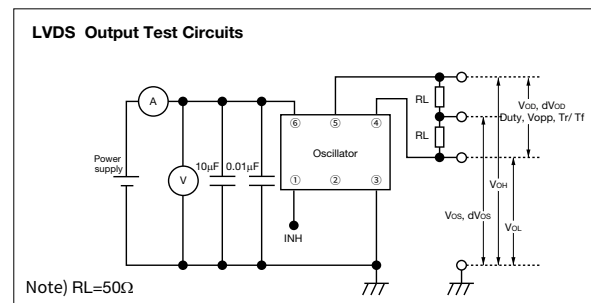
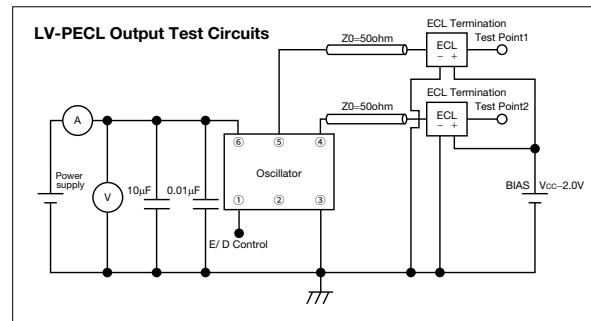
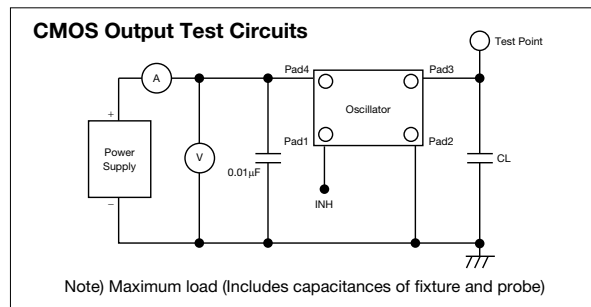
6. In order to use clock oscillators

- (1) The miniature oscillator for the clock utilizes an IC and incorporates a protective circuit against static electricity. However, exercise care in the same manner as for a normal 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.
- (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) Frequency drift may occur as a result of application of light such as direct sunlight or LED light etc. when operating clock oscillator Z series MC-Z series.
Please use in a design and environment that consider light shielding.
Note the frequency drift will not occur if used in a light-shielded environment.

Clock Timing Chart



Test Circuits



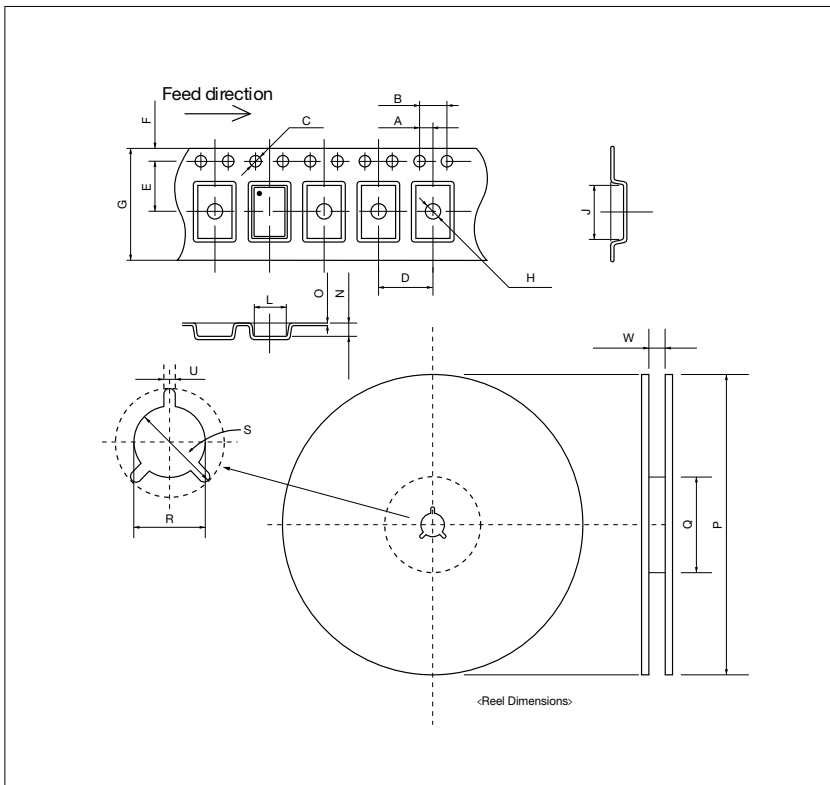
Tape & Reel Specifications

■ Clock Oscillators

■ Temperature Compensated Crystal Oscillators (TCXO)

		KC2016K KC2016Z MC2016K MC2016Z KC2016F MC2016F	KC2520K KC2520Z MC2520K MC2520Z KC2520F MC2520F	KC3225K KC3225Z MC3225K MC3225Z KC3225F MC3225F	KC5032K KC5032Z MC5032K MC5032Z	KC7050K KC7050Z MC7050K MC7050Z	KT1612A	KT2016K	KT2520K
T A P E	A	2.0 ± 0.05	2.0 ± 0.05	2.0 ± 0.05	2.0 ± 0.05	2.0 ± 0.1	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 ± 0.05	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	8.0 ± 0.1	8.0 ± 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	5.5 ± 0.05	7.5 ± 0.1	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	12.0 ± 0.3	16.0 ± 0.2	8.0 ± 0.2	8.0 ± 0.2	8.0+0.3/-0.2
	H	φ1.1 ± 0.1	φ1.1 ± 0.1	φ1.55 ± 0.05	φ1.5+0.1/0	φ1.55 ± 0.1	φ0.5 ± 0.05	φ1.0+0.1/-0	φ1.1 ± 0.1
	J	2.25 ± 0.05	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
	L	1.85 ± 0.05	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
	N	0.90 ± 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
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	
R E E L	P	φ180+0/-1.5	φ180+0/-1.5	φ180+0/-1.5	φ180+0/-1.5	φ180+0/-1.5	φ330+0/-2	φ330+0/-2	φ330+0/-2
	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
	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
	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
	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
	W	9.0+0.3/-0	9.0+0.3/-0	9.0+0.3/-0	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
Qty.		2000	2000	2000	1000	1000	18000	15000	12000

(Unit: mm)



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