Crystal Devices

2026

KYOCERA AVX

Crystal Device Selection Guide

Products			Dimensions (mm)			Weight (g)	Applications				
Product Type	Page No.	Part Number	L	W	T (max.)		**Consumer Products** AV/OA, House-hold Appliance, Gaming Equipment etc.	**Automotive** ITS, IVI, Car Navigation, Infotainment etc.	**Automotive** ECU, TPMS, ADAS, Powertrain, ABS etc.	**Wireless Comm.** Smartphone, Wearable Device, Wireless LAN, Dedicated Short Range Communication (DSRC) etc.	**Industrial Equipment** Infrastructure, Medical Device, Server, Factory Automation Equipment, Wired Network 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	✓	✓		✓	✓

As of October 2025

NR = Not Recommended

Products	Frequency Range (MHz)	Conditions of Use				RoHS Compli-ant*	AEC	
		Solder			Washable			
Part Number	1 10 50 100 300 to 800	Manual	Reflow	Flow			Q100	Q200
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 ---------- 52.0	No	Yes	No	No	Yes		Yes
KT1612A (Low Voltage Drive)	26 --------- 52.0	No	Yes	No	No	Yes		Yes
KT1612A (Low Phase Noise)	19.2 ---------- 76.8	No	Yes	No	No	Yes		Yes
KT2016K	19.2 ---------- 52.0	No	Yes	No	No	Yes	Yes (option)	Yes
KT2016K (Low Voltage Drive)	26 --------- 52.0	No	Yes	No	No	Yes		Yes
KT2016K (Low Phase Noise)	19.2 ---------- 60.0	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.

Crystal Units with Thermistor
Surface Mount Type CT1612RB

1.6 × 1.2mm for Mobile Communications

RoHS Compliant
PSL: R4Y
MSL1

Features

- Ultra-miniature crystal unit with thermistor
- Reference frequency for telecommunication systems
- Reflow compatible
- Using ceramic package resulting in high reliability

Applications

- Consumer Products
- Wireless Comm. (Mobile Communications, GNSS)
- Industrial Equipment

How to Order

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

① Series
② Frequency
③ Load Capacitance

B0	6 pF	—
C0	7 pF	—
D0	8 pF	Std.

④ Frequency Tolerance

F	± 10 × 10^{-6}	Std.
G	± 15 × 10^{-6}	—

⑤ Operating Temp. Range
⑥ Frequency Temp. Stability

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

⑦ Individual Specification
(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	× 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}	
Thermistor Resistance	—	Table 2	ohm	25° C ± 3° C
Thermistor B-Constant	—	Table 3	K	25° C to 50° C

Please contact us for other specifications.

Table 1 Motional Series Resistance

Frequency Range	Motional Series Resistance
38400 to 76800kHz	50 Ω max.

Table 2 Thermistor Resistance

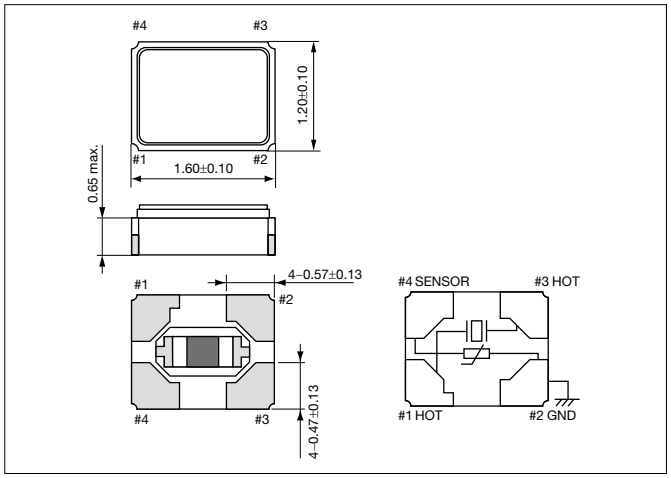
Resistance	Specification
100kΩ	± 1%

Table 3 Thermistor B-Constant

B-Constant	Specification
4250K	± 1%

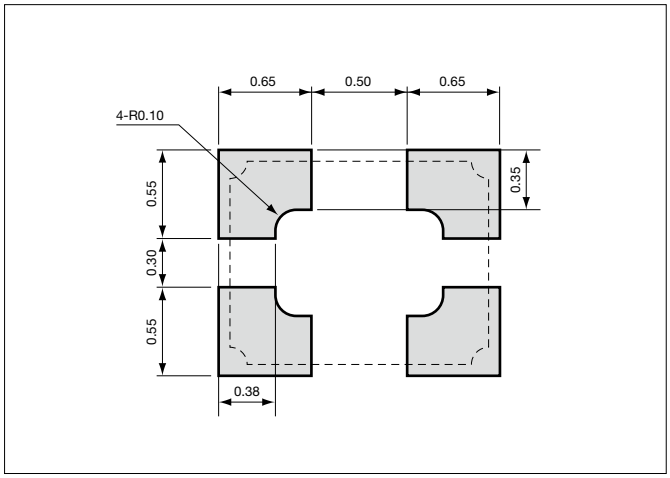
Dimensions

(Unit: mm)



Recommended Land Pattern

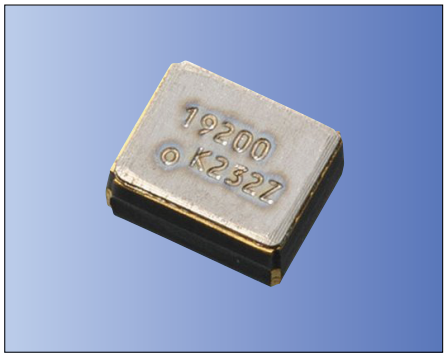
(Unit: mm)



Crystal Units

Crystal Units with Thermistor
Surface Mount Type CT2016DB

2.0 × 1.6mm for Mobile Communications



RoHS Compliant
PSL: R4Y
MSL1

Features

- Miniature 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

- Consumer Products
- Wireless Comm. (Mobile Communications, GNSS)
- Industrial Equipment

How to Order

CT2016DB 19200 □□ □ □ □ □ CC
① ② ③ ④ ⑤ ⑥ ⑦

① Series
② Frequency
③ Load Capacitance

B0	6 pF	—
C0	7 pF	Std.

④ Frequency Tolerance

F	± 10 × 10^{-6}	Std.
G	± 15 × 10^{-6}	—

⑤ Operating Temp. Range
⑥ Frequency Temp. Stability

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

⑦ Individual Specification
(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

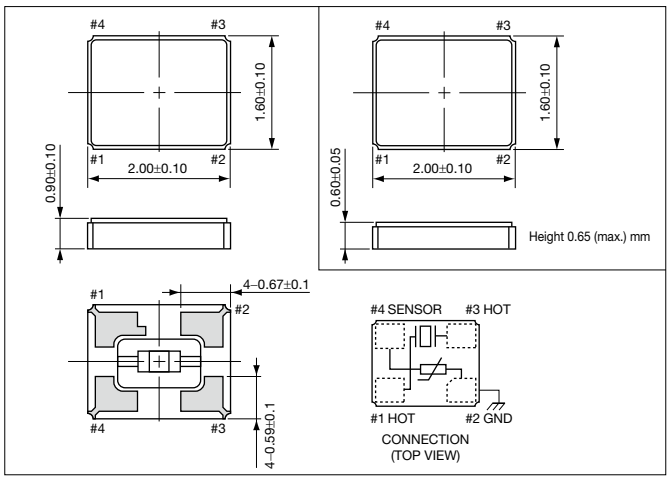
Resistance	Specification
100kΩ	± 1%

Table 3 Thermistor B-Constant

B-Constant	Specification
4250K	± 1%

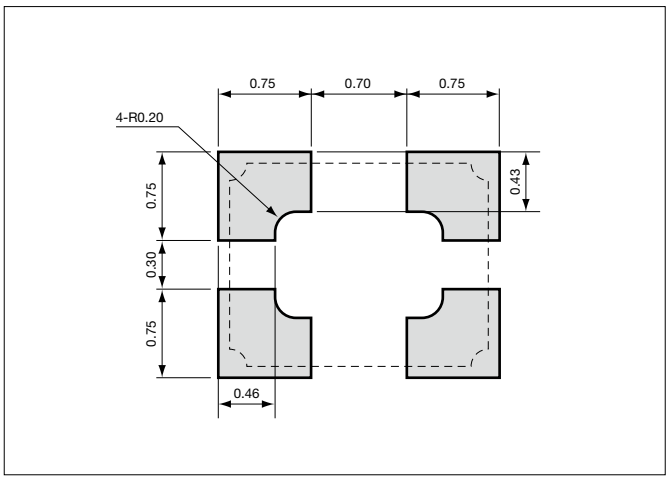
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)



Crystal Units

1.0 × 0.8mm for Consumer Products/ Mobile Communications

RoHS Compliant
PSL: R4Y MSL1

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

- Consumer Products
- Wireless Comm. (Mobile Communications)
- Industrial Equipment

How to Order

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

Packaging
(Tape & Reel 21000 pcs./ reel)

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

③Integer part	
D	8
E	9
F	10
G	11
H	12
Z	Special suffix

④After the decimal point	
0	.0
1	.1
2	.2
3	.3
4	.4
5	.5
6	.6
7	.7
8	.8
9	.9

⑤Frequency 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

⑥Operating Temp. Range ⑦Frequency Temp. Stability

⑥ \ ⑦		F ±10ppm	J ±15ppm	L ±20ppm	R ±40ppm	S ±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				✓	✓

⑧Individual 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	

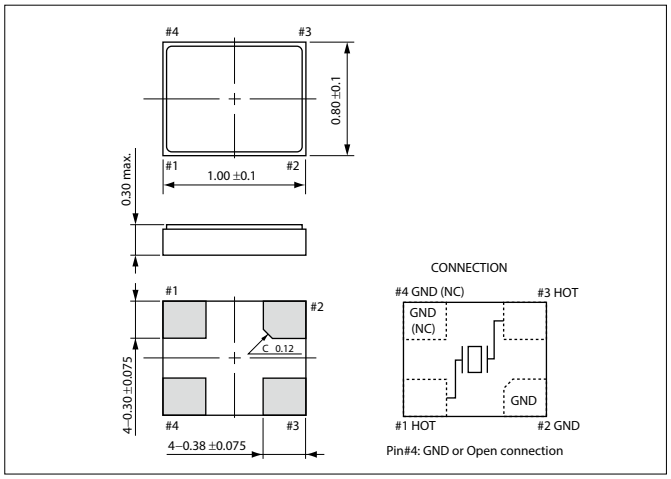
Please contact us for other specifications.

◆Table 1
Motional Series Resistance ESR (C1)

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

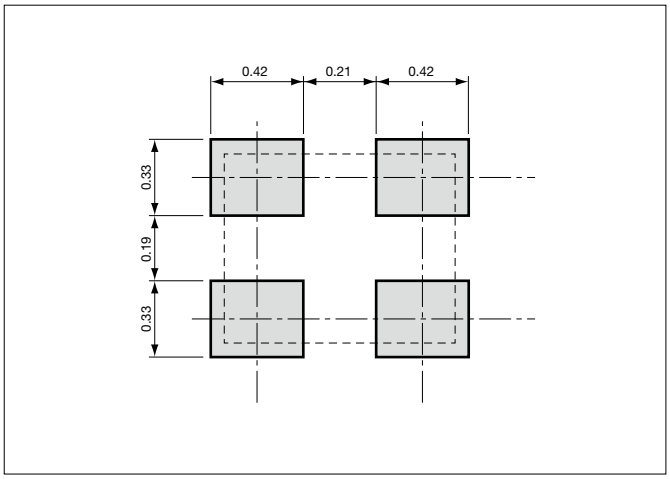
Dimensions

(Unit: mm)

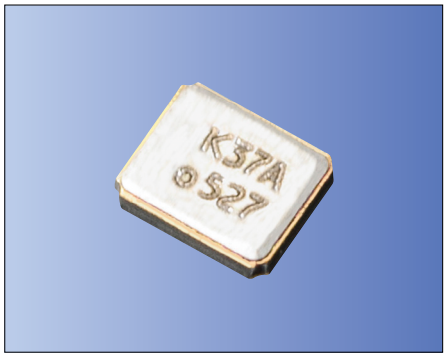


Recommended Land Pattern

(Unit: mm)



1.2 × 1.0mm for Consumer Products/ Mobile Communications



RoHS Compliant
PSL: R4Y
MSL1

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

- Consumer Products
- Wireless Comm. (Mobile Communications, Bluetooth®, Wireless LAN)
  *Bluetooth® is a registered trademark of Bluetooth SIG, Inc.
- Industrial Equipment

How to Order

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

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

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

③Integer part	
D	8
E	9
F	10
G	11
H	12
Z	Special suffix

④After the decimal point	
0	.0
1	.1
2	.2
3	.3
4	.4
5	.5
6	.6
7	.7
8	.8
9	.9

⑤Frequency 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

⑥Operating Temp. Range ⑦Frequency Temp. Stability

⑥ \ ⑦		F ±10ppm	J ±15ppm	L ±20ppm	R ±40ppm	S ±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				✓	✓

⑧Individual 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	

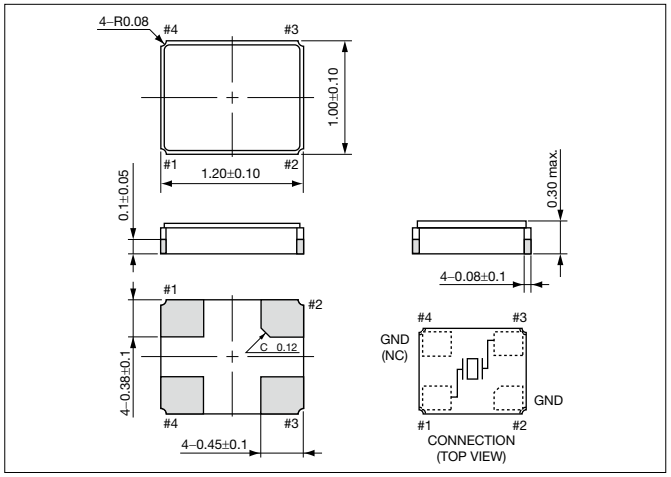
Please contact us for other specifications.

◆Table 1
Motional Series Resistance ESR (C1)

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

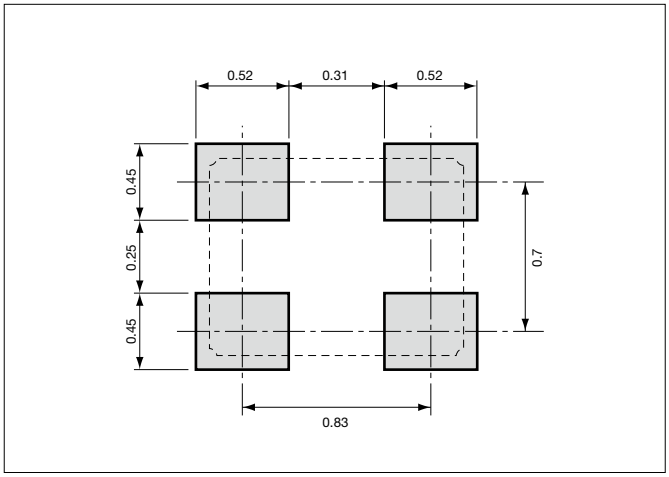
Dimensions

(Unit: mm)

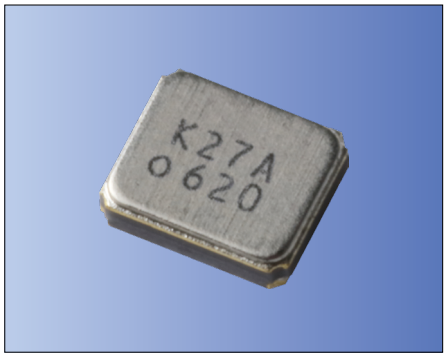


Recommended Land Pattern

(Unit: mm)



1.2 × 1.0mm for Consumer Products/ Mobile Communications



RoHS Compliant
PSL: R4Y
MSL1

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

- Consumer Products
- Wireless Comm. (Mobile Communications, Bluetooth®, Wireless LAN)
  *Bluetooth® is a registered trademark of Bluetooth SIG, Inc.
- Industrial Equipment

How to Order

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

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

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

③Integer part	
D	8
E	9
F	10
G	11
H	12
Z	Special suffix

④After the decimal point	
0	.0
1	.1
2	.2
3	.3
4	.4
5	.5
6	.6
7	.7
8	.8
9	.9

⑤Frequency 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

⑥Operating Temp. Range ⑦Frequency Temp. Stability

⑥ \ ⑦		F ±10ppm	J ±15ppm	L ±20ppm	R ±40ppm	S ±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				✓	✓

⑧Individual 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	

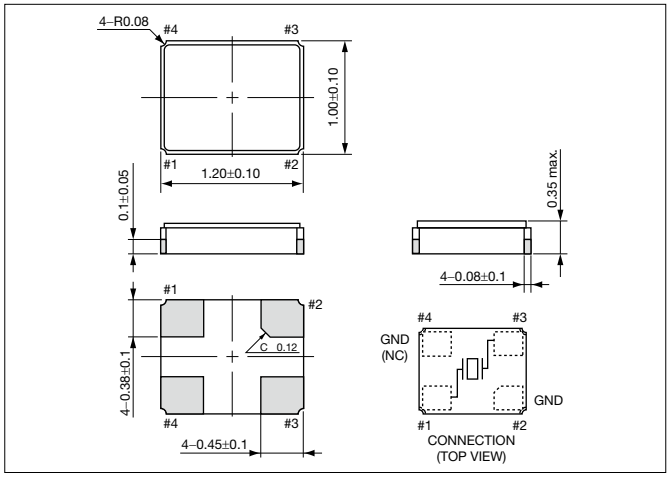
Please contact us for other specifications.

◆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

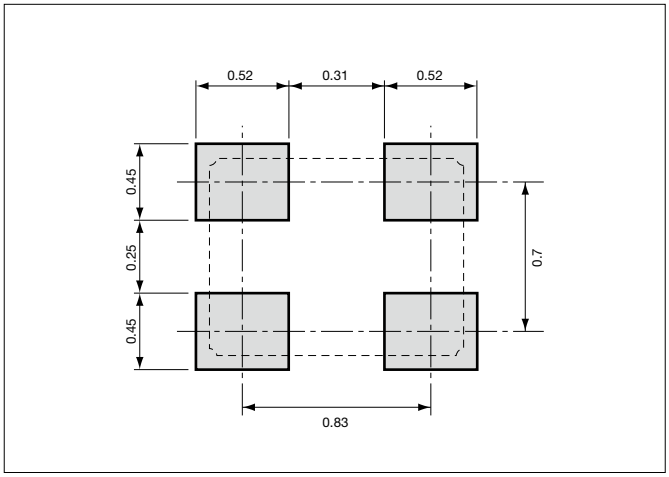
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)



1.6 × 1.2mm for Consumer Products/ Mobile Communications

RoHS Compliant
PSL: R4Y MSL1

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

- Consumer Products
- Wireless Comm. (Bluetooth®, Wireless LAN, NFC)

*Bluetooth® is a registered trademark of Bluetooth SIG, Inc.

- Industrial Equipment

How to Order

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

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

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

③Integer part	
D	8
E	9
F	10
G	11
H	12
Z	Special suffix

④After the decimal point	
0	.0
1	.1
2	.2
3	.3
4	.4
5	.5
6	.6
7	.7
8	.8
9	.9

⑤Frequency 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

⑥Operating Temp. Range ⑦Frequency Temp. Stability

⑥ \ ⑦		F ±10ppm	J ±15ppm	L ±20ppm	R ±40ppm	S ±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				✓	✓

⑧Individual 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	

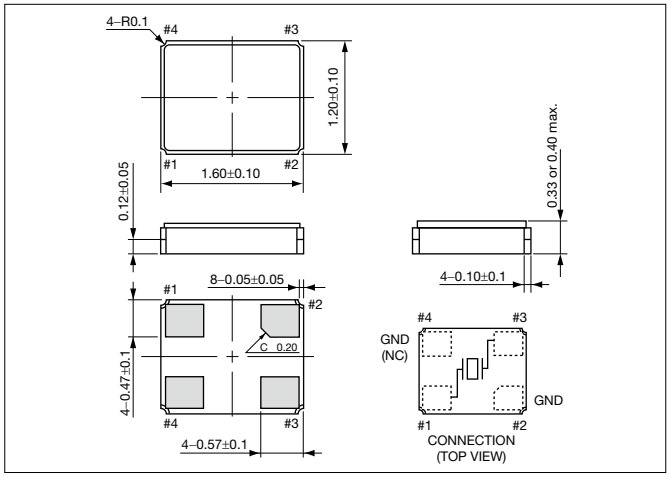
Please contact us for other specifications.

◆Table 1
Motional Series Resistance ESR (C1)

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

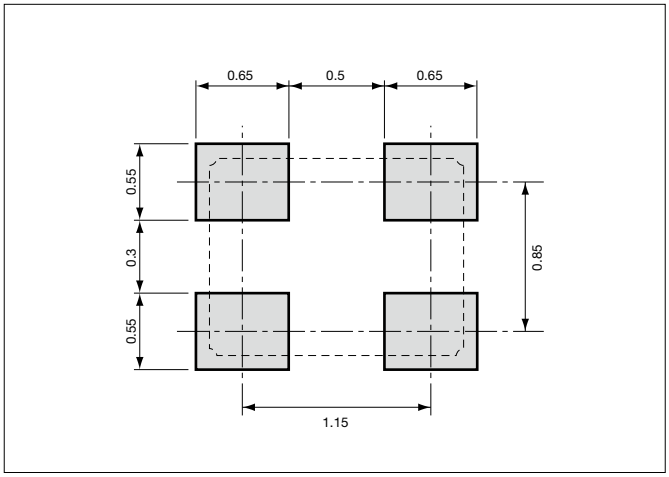
Dimensions

(Unit: mm)



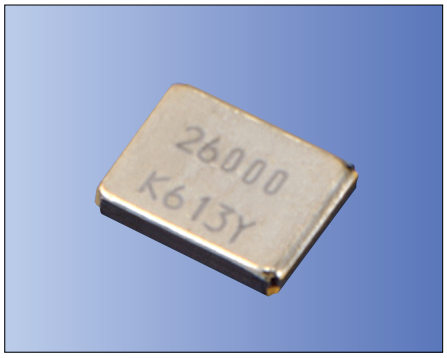
Recommended Land Pattern

(Unit: mm)



Crystal Units
Surface Mount Type CX2016DB

2.0 × 1.6mm for Consumer Products



RoHS Compliant
PSL: R4Y MSL1

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

Applications
- Consumer Products
- Wireless Comm.

How to Order

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

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

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

③Integer part	
D	8
E	9
F	10
G	11
H	12
Z	Special suffix

④After the decimal point	
0	.0
1	.1
2	.2
3	.3
4	.4
5	.5
6	.6
7	.7
8	.8
9	.9

⑤Frequency 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

⑥Operating Temp. Range ⑦Frequency Temp. Stability

⑥ \ ⑦		J ±15ppm	L ±20ppm	Q ±30ppm	R ±40ppm	S ±50ppm	T ±100ppm	V ±150ppm
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						✓	✓

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

Specifications

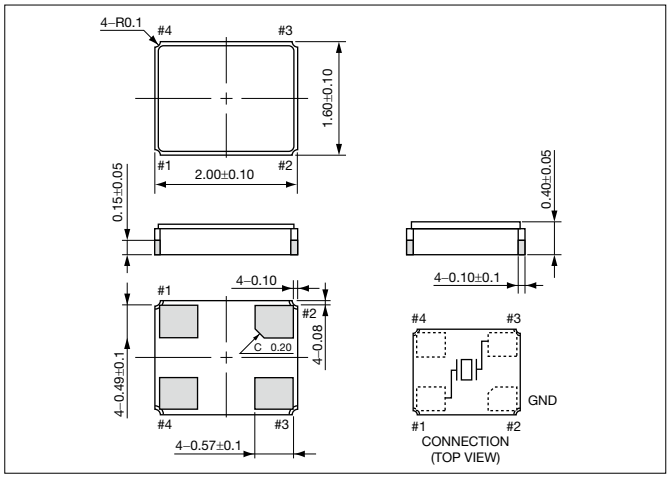
Item	Symbol	Specification	Unit	Remarks
Frequency Range	f_nom	16000 to 60000	kHz	Please contact us for other frequency range.
Overtone Order	OT	Fundamental	—	
Load Capacitance	CL	8	pF	Please contact us for other CL requirements.
Frequency Tolerance	f_tol	± 15	× 10⁻⁶	25° C ± 3° C
Motional Series Resistance	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	

Please contact us for other specifications.

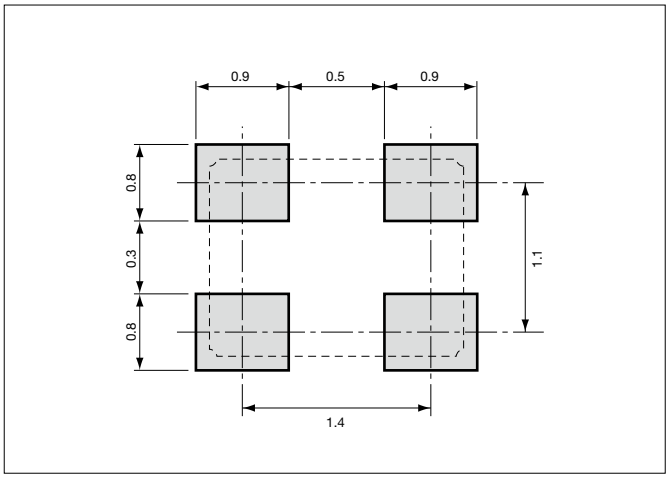
◆Table 1
Motional Series Resistance ESR (C1)

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

Dimensions (Unit: mm)

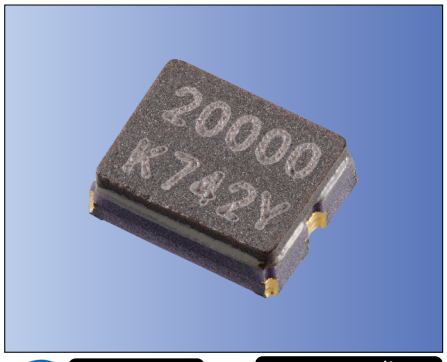


Recommended Land Pattern (Unit: mm)



Crystal Units
Surface Mount Type CX2016GR

2.0 × 1.6mm for Automotive



AEC-Q200 RoHS Compliant
PSL: R4Y MSL1

How to Order

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

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

③Integer part	
D	8
E	9
F	10
G	11
H	12
Z	Special suffix

④After the decimal point	
0	.0
1	.1
2	.2
3	.3
4	.4
5	.5
6	.6
7	.7
8	.8
9	.9

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

⑤Frequency Tolerance

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

⑥Operating Temp. Range ⑦Frequency Temp. Stability

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

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

Features

- Crystal unit for automotive electronics
- 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)

Applications

- Automotive (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	

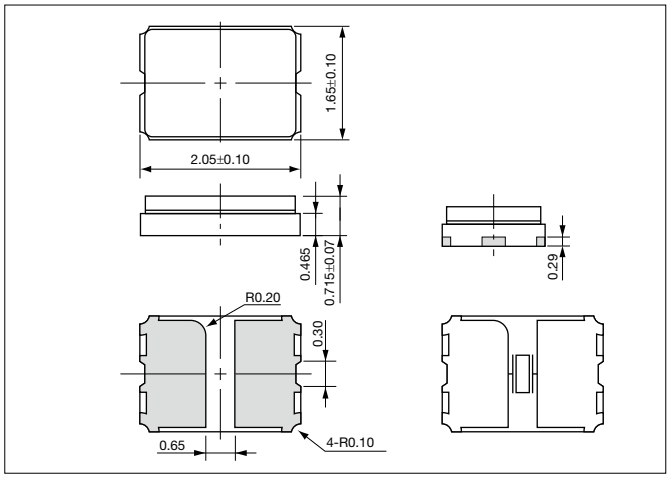
Please contact us for other specifications.

◆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

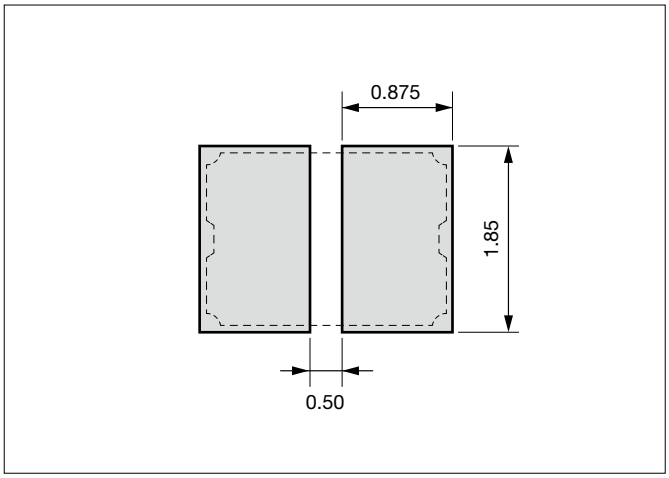
Dimensions

(Unit: mm)



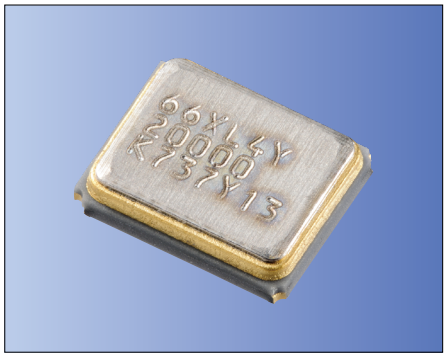
Recommended Land Pattern

(Unit: mm)



Crystal Units
Surface Mount Type CX2016SA

2.0 × 1.6mm for Automotive



AEC-Q200 PSL: R4Y

RoHS Compliant 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)

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

③Integer part	
D	8
E	9
F	10
G	11
H	12
Z	Special suffix

④After the decimal point	
0	.0
1	.1
2	.2
3	.3
4	.4
5	.5
6	.6
7	.7
8	.8
9	.9

⑤Frequency 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
- Miniature and low profile
  (2.05 × 1.65 × 0.45mm)
- Ceramic package
- Reflow compatible

Applications

- Automotive (ECU, Automotive Camera)

⑥Operating Temp. Range ⑦Frequency Temp. Stability

⑥ \ ⑦		J ±15ppm	L ±20ppm	Q ±30ppm	R ±40ppm	S ±50ppm	T ±100ppm	V ±150ppm	W ±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						✓	✓	✓

⑧Individual Specification (STD Specification are "HH" and "JJ" *.)
* "JJ" is made overseas. Please contact us for supported frequencies.

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	

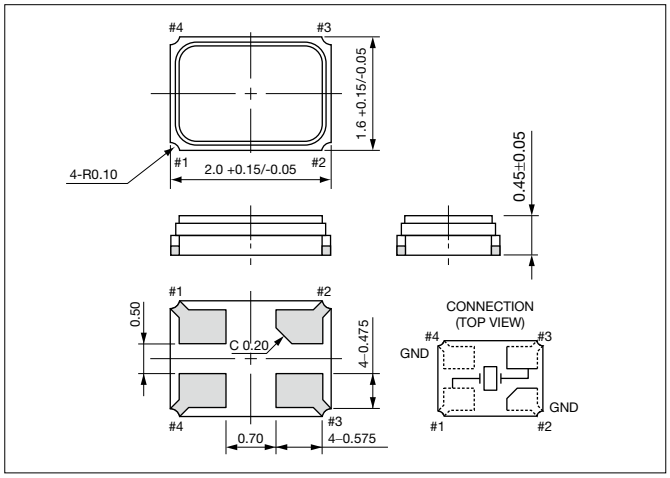
Please contact us for other specifications.

◆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

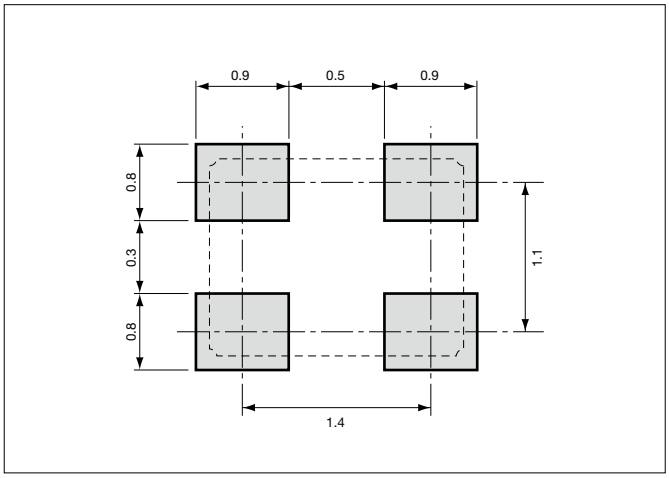
Dimensions

(Unit: mm)



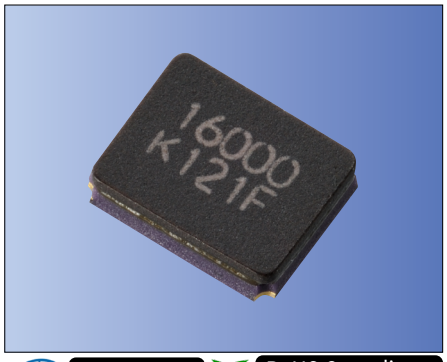
Recommended Land Pattern

(Unit: mm)



Crystal Units
Surface Mount Type CX3225CA

3.2 × 2.5mm for Automotive



AEC-Q200 RoHS Compliant
PSL: R4Y MSL1

Features

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

Applications

- Automotive (ECU, High-Speed Automotive Network)

How to Order

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

Packaging
(Tape & Reel 3000 pcs./ reel)

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

③Integer part	
D	8
E	9
F	10
G	11
H	12
Z	Special suffix

④After the decimal point	
0	.0
1	.1
2	.2
3	.3
4	.4
5	.5
6	.6
7	.7
8	.8
9	.9

⑤Frequency Tolerance

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

⑥Operating Temp. Range ⑦Frequency Temp. Stability

⑥ \ ⑦		Q ±30ppm	R ±40ppm	S ±50ppm	T ±100ppm	V ±150ppm	W ±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				✓	✓	✓

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

Specifications

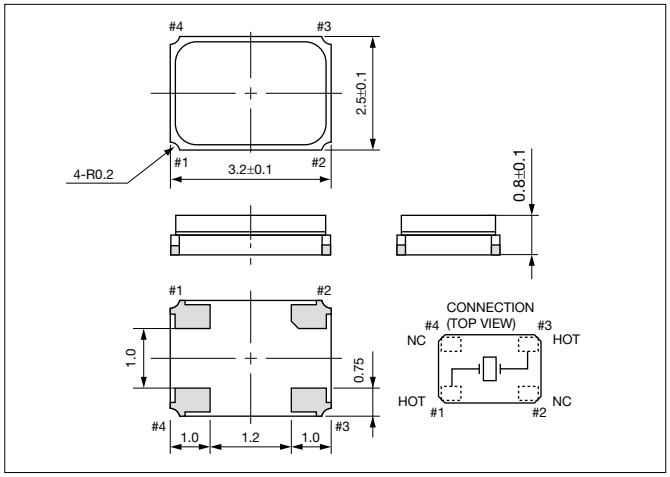
Item	Symbol	Specification	Units	Remarks
Frequency Range	f_{nom}	12000 to 54000	kHz	Please contact us for other frequency range.
Overtone Order	OT	Fundamental	—	
Load Capacitance	CL	8	pF	Please contact us for other CL requirements.
Frequency Tolerance	f_{tol}	± 20	× 10^{-6}	25° C ± 3° C
Motional Series 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	

Please contact us for other specifications.

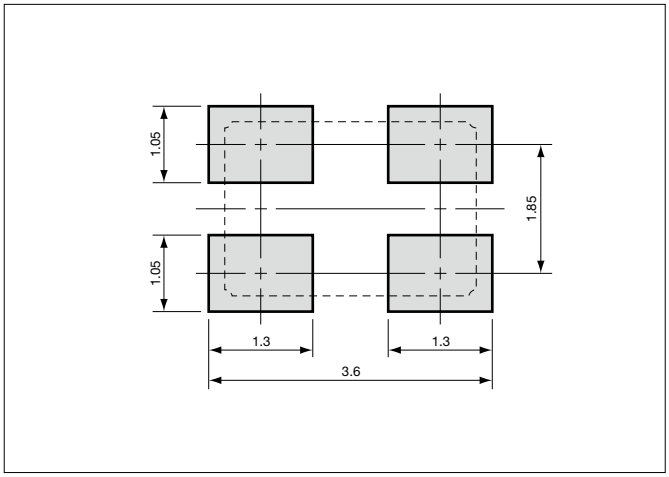
◆Table 1
Motional Series Resistance ESR (C1)

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

Dimensions (Unit: mm)

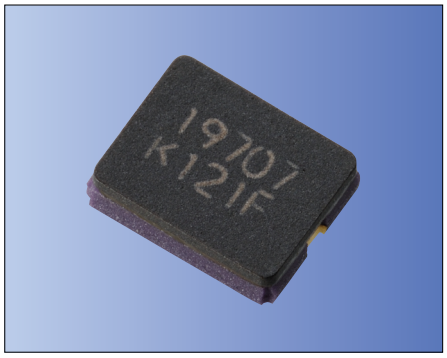


Recommended Land Pattern (Unit: mm)



Crystal Units
Surface Mount Type CX3225GA

3.2 × 2.5mm for Automotive



AEC-Q200 PSL: R4Y

RoHS Compliant MSL1

Features

- Crystal unit for automotive electronics
- Improved solderability
- Miniature 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

- Automotive (ECU, High-Speed Automotive Network, TPMS)

How to Order

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

Packaging
(Tape & Reel 3000 pcs./ reel)

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

③Integer part	
D	8
E	9
F	10
G	11
H	12
Z	Special suffix

④After the decimal point	
0	.0
1	.1
2	.2
3	.3
4	.4
5	.5
6	.6
7	.7
8	.8
9	.9

⑤Frequency Tolerance

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

⑥Operating Temp. Range ⑦Frequency 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 ±30ppm	R ±40ppm	S ±50ppm	T ±100ppm	V ±150ppm	W ±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				✓	✓	✓

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

Specifications

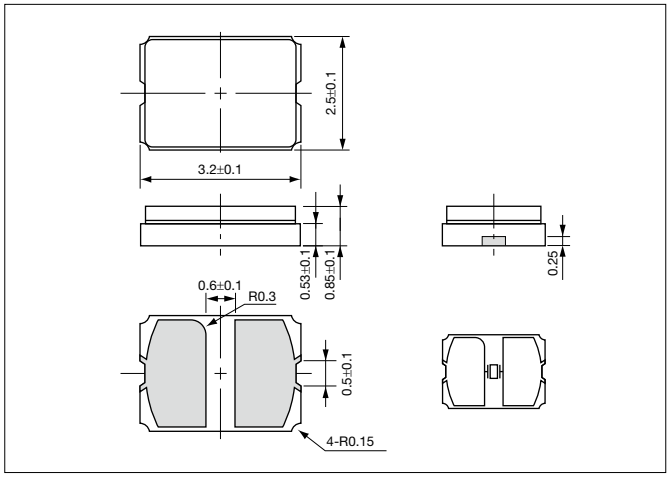
Item	Symbol	Specification	Unit	Remarks
Frequency Range	f_{nom}	8000 to 54000	kHz	Please contact us for other frequency range.
Overtone Order	OT	Fundamental	—	
Load Capacitance	CL	8	pF	Please contact us for other CL requirements.
Frequency Tolerance	f_{tol}	±50	×10⁻⁶	25° C ± 3° C
Motional Series Resistance	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.

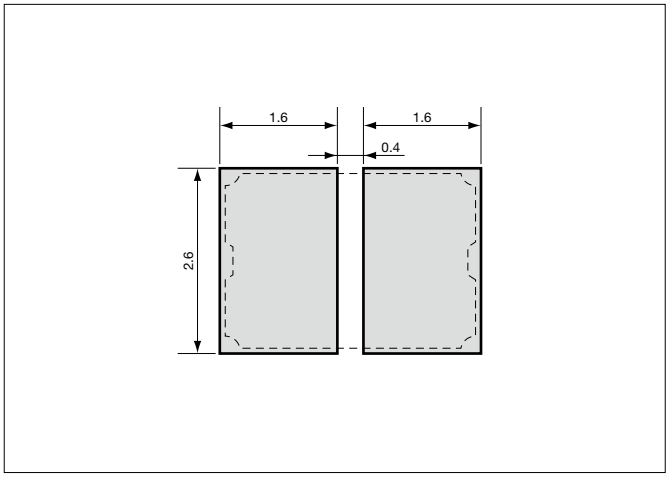
◆Table 1
Motional Series Resistance ESR (C1)

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

Dimensions (Unit: mm)

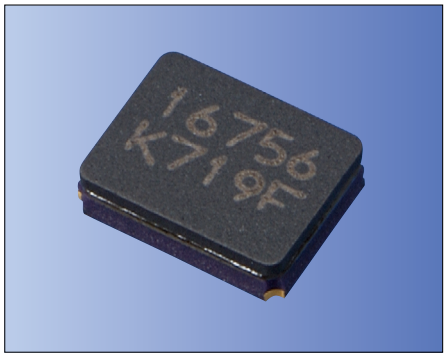


Recommended Land Pattern (Unit: mm)



Crystal Units
Surface Mount Type CX3225GB

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

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

③Integer part	
D	8
E	9
F	10
G	11
H	12
Z	Special suffix

④After the decimal point	
0	.0
1	.1
2	.2
3	.3
4	.4
5	.5
6	.6
7	.7
8	.8
9	.9

Packaging
(Tape & Reel 3000 pcs./ reel)

⑤Frequency Tolerance

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
- Miniature and low profile 0.9mm max. (3.2 × 2.5 × 0.8mm)
- Ceramic package
- Reflow compatible

Applications

- Consumer Products

⑥Operating Temp. Range ⑦Frequency Temp. Stability

⑥ \ ⑦		Q ±30ppm	R ±40ppm	S ±50ppm	T ±100ppm	V ±150ppm	W ±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				✓	✓	✓

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

Specifications

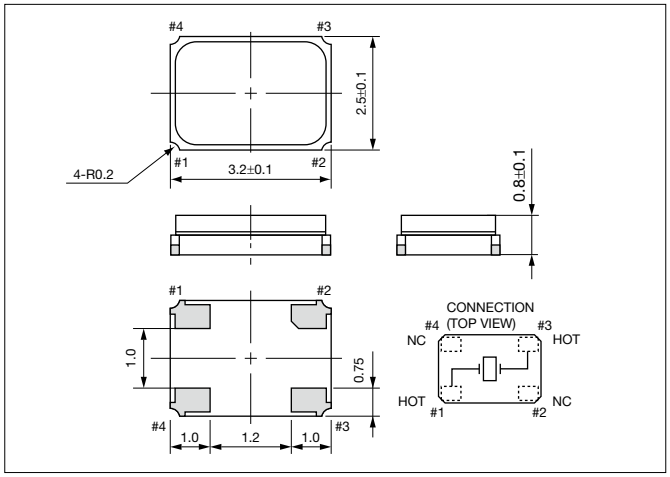
Item	Symbol	Specification	Units	Remarks
Frequency Range	f_{nom}	12000 to 54000	kHz	Please contact us for other frequency range.
Overtone Order	OT	Fundamental	—	
Load Capacitance	CL	8	pF	Please contact us for other CL requirements.
Frequency Tolerance	f_{tol}	± 20	× 10^{-6}	25° C ± 3° C
Motional Series 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.

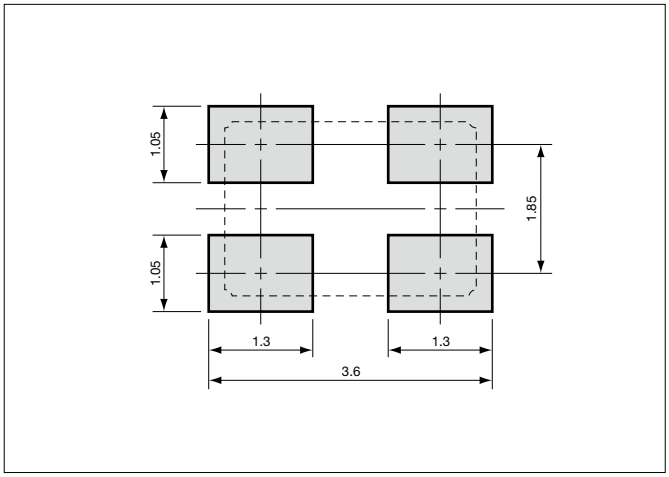
◆Table 1
Motional Series Resistance ESR (C1)

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

Dimensions (Unit: mm)



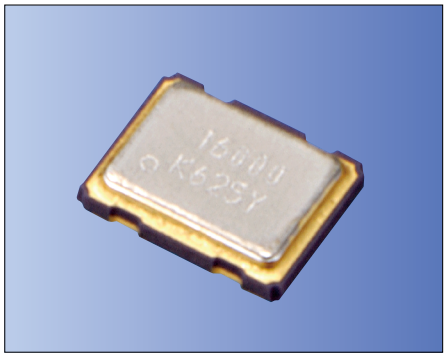
Recommended Land Pattern (Unit: mm)



Crystal Units

As of October 2025

3.2 × 2.5mm for Automotive



AEC-Q200 PSL: R4Y

RoHS Compliant MSL1

How to Order

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

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

③Integer part	
D	8
E	9
F	10
G	11
H	12
Z	Special suffix

④After the decimal point	
0	.0
1	.1
2	.2
3	.3
4	.4
5	.5
6	.6
7	.7
8	.8
9	.9

Packaging
(Tape & Reel 3000 pcs./ reel)

⑤Frequency 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

⑥Operating Temp. Range ⑦Frequency 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 ±15ppm	L ±20ppm	N ±25ppm	Q ±30ppm	R ±40ppm	S ±50ppm	T ±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							✓

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

Features

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

Applications

- Automotive (ECU, High-Speed Automotive Network, TPMS)

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	

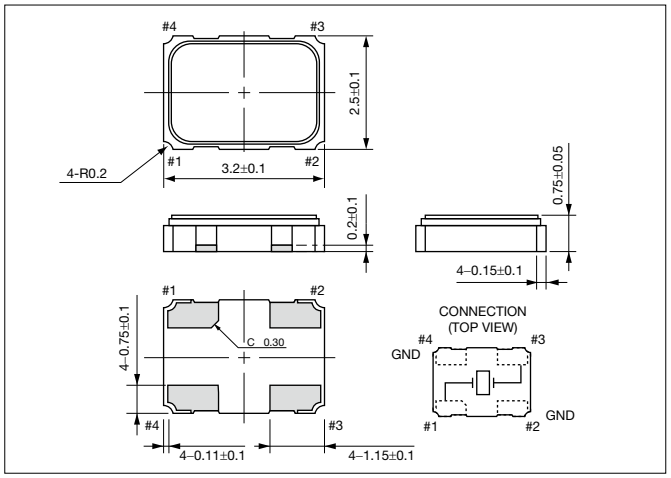
Please contact us for other specifications.

◆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

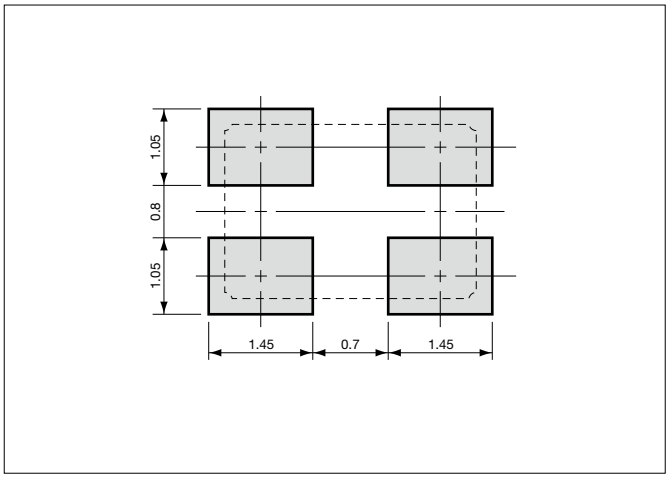
Dimensions

(Unit: mm)

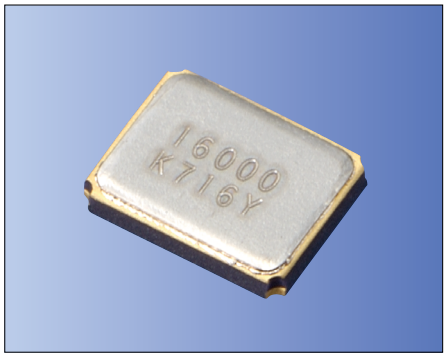


Recommended Land Pattern

(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

Packaging
(Tape & Reel 3000 pcs./ reel)

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

③Integer part	
D	8
E	9
F	10
G	11
H	12
Z	Special suffix

④After the decimal point	
0	.0
1	.1
2	.2
3	.3
4	.4
5	.5
6	.6
7	.7
8	.8
9	.9

⑤Frequency 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

- Consumer Products
- Wireless Comm. (Mobile Communications, Bluetooth®, Wireless LAN)

*Bluetooth® is a registered trademark of Bluetooth SIG, Inc.

⑥Operating Temp. Range ⑦Frequency Temp. Stability

⑥ \ ⑦		J ±15ppm	L ±20ppm	N ±25ppm	Q ±30ppm	R ±40ppm	S ±50ppm	T ±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					✓	✓	✓

⑧Individual 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	

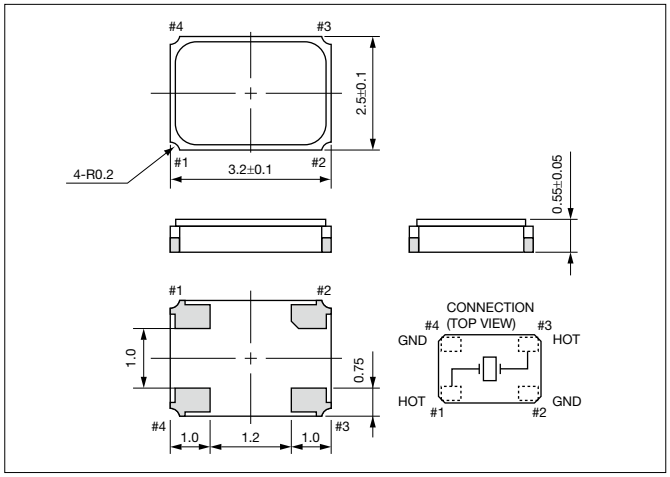
Please contact us for other specifications.

◆Table 1
Motional Series Resistance ESR (C1)

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

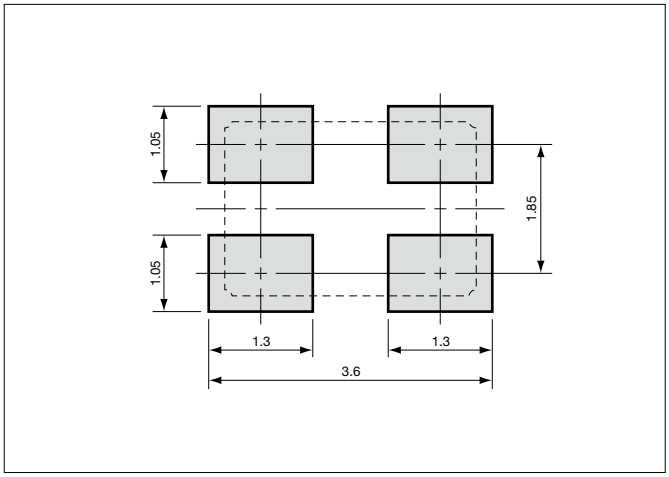
Dimensions

(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.

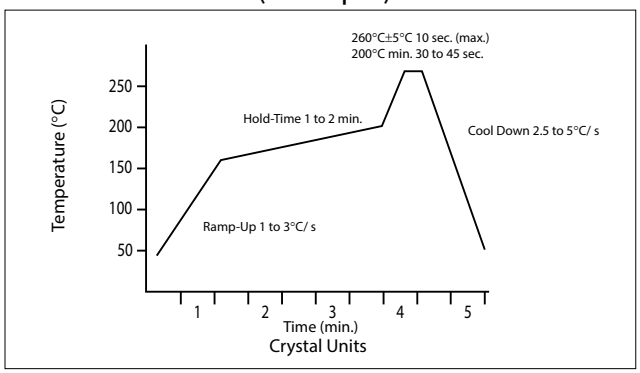
3. Soldering conditions

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.

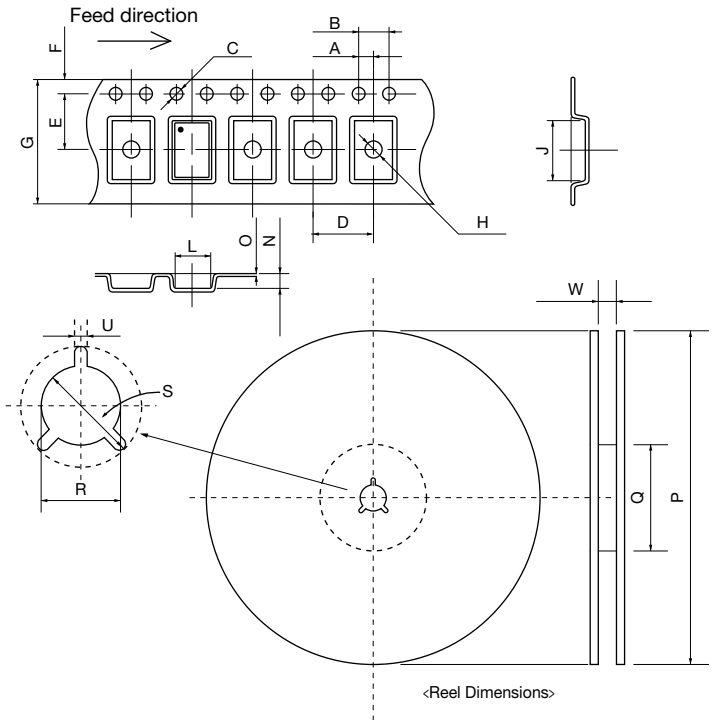
Tape & Reel Specifications

■ Crystal Units

(Unit: mm)

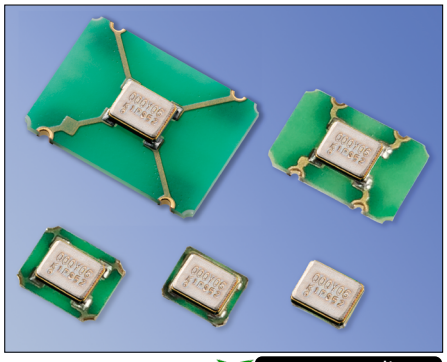
		CT1612RB	CT2016DB	CX1008SB	CX1210DB CX1210SB	CX1612DB		CX2016DB CX2016GR CX2016SA	
TAPE	A	2.0±0.05	2.0 ± 0.05	2.0 ± 0.05	2.0 ± 0.05	2.0 ± 0.05		2.0 ± 0.05	
	B	4.0±0.1	4.0 ± 0.1	4.0 ± 0.1	4.0 ± 0.1	4.0 ± 0.1		4.0 ± 0.1	
	C	ϕ1.5+0.1/−0	ϕ1.5+0.1/ − 0	ϕ1.5+0.1/ − 0	ϕ1.5+0.1/ − 0	ϕ1.5+0.1/ − 0		ϕ1.5+0.1/ − 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 ± 0.05	
	L	1.50±0.1	1.9 ± 0.05	1.00 ± 0.05	1.35 ± 0.05	1.40 ± 0.1		1.90 ± 0.05	
	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	
	O	0.2±0.05	0.25 ± 0.05	0.2 ± 0.05	0.25 ± 0.05	0.2 ± 0.05		0.25 ± 0.05	
REEL	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/-0	9.4 ± 1.0	9.0+1.0/-0	9.4 ± 1.0
Qty.		15000	12000	21000	12000/21000	3000	20000	3000	15000

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



<Reel Dimensions>

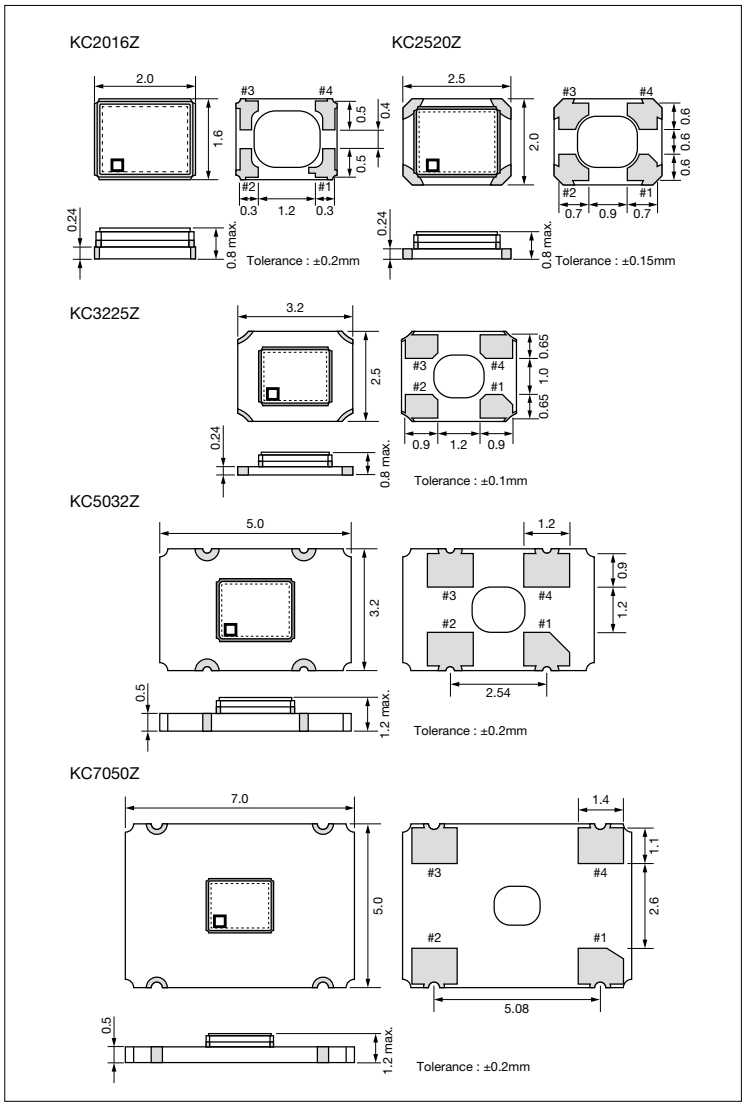
CMOS, 2.0 × 1.6 / 2.5 × 2.0 / 3.2 × 2.5 / 5.0 × 3.2 / 7.0 × 5.0mm



RoHS Compliant
PSL: R4Y MSL1

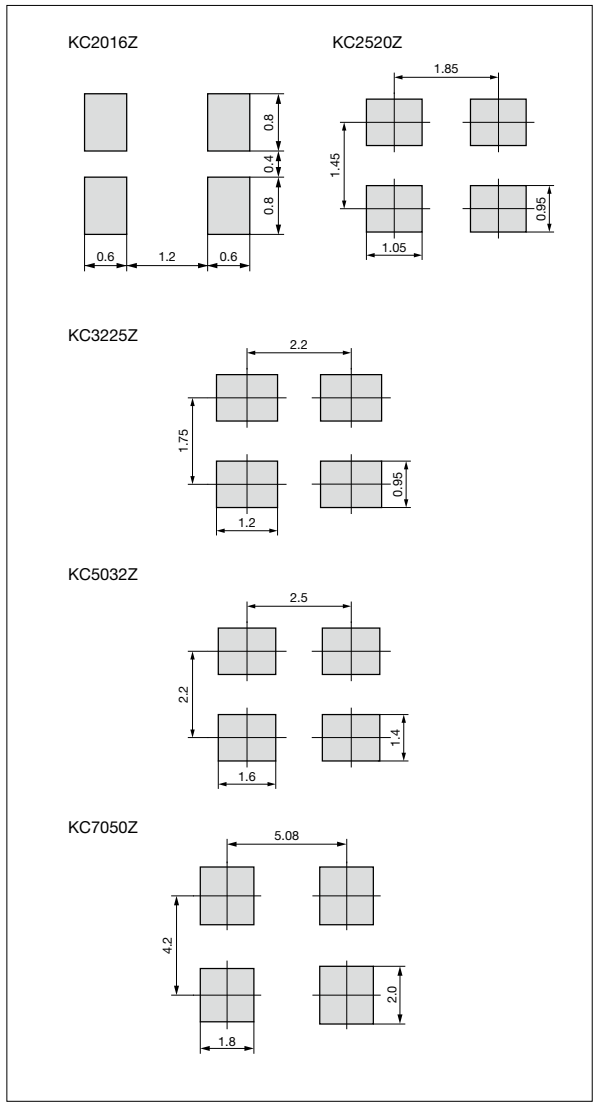
Dimensions

(Unit : mm)



Recommended Land Patterns

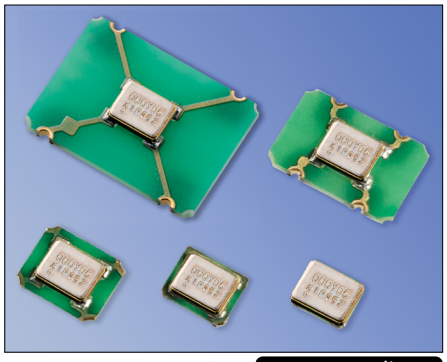
(Unit : mm)



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 • Wireless Comm. • Industrial

Table 1

Freq. Tol. Code	Freq. Tol. × 10^{-6}	Operating Temperature Range (° C)	Note
S	± 30	− 10 to +70	For additional stabillity, please contact us.
U	± 25		
W	± 20		
G	± 50	− 40 to +85	
H	± 30		
J	± 25		
K	± 20		
L	± 15		
6	± 50	− 40 to +105	
5	± 30		
X	± 100	− 40 to +125	
Z	± 50		
9	± 30		

How to Order

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

① Series

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

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

1	1.8V/ 2.5V/ 3.3V compatible

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

X	45/ 55%

⑦ Individual Specification
(STD Specification is “00” .)

Packaging Tape&Reel

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

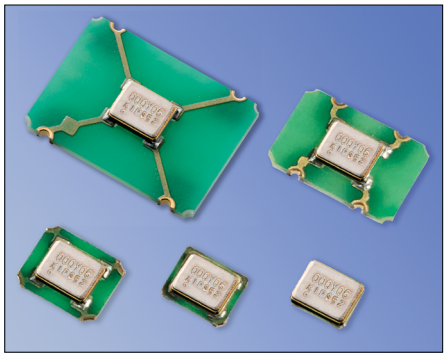
Specifications

Item	Symbol	Conditions		Min.	Max.	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 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	Vcc			1.71	3.63	V
Current Consumption (Noload/ 1.71≤Vcc≤2.25)	Icc	0.5 ≤ fo<5MHz		—	5.2	mA
		5 ≤ fo<15MHz		—	5.8	
		15 ≤ fo<30MHz		—	6.2	
		30 ≤ fo<50MHz		—	6.8	
		50 ≤ fo ≤ 60MHz		—	6.8	
		60<fo<75MHz		—	9	
		75 ≤ fo<105MHz		—	10	
		105 ≤ fo<130MHz		—	10.5	
		130 ≤ fo<160MHz		—	11.5	
		160 ≤ fo ≤ 170MHz		—	12.5	
Current Consumption (Noload/ 2.25<Vcc≤2.8)	Icc	0.5 ≤ fo<5MHz		—	5.5	
		5 ≤ fo<15MHz		—	6	
		15 ≤ fo<30MHz		—	6.5	
		30 ≤ fo<50MHz		—	7.2	
		50 ≤ fo ≤ 60MHz		—	7.4	
		60<fo<75MHz		—	10	
		75 ≤ fo<105MHz		—	11.5	
		105 ≤ fo<130MHz		—	12.5	
		130 ≤ fo<160MHz		—	14	
		160 ≤ fo ≤ 170MHz		—	15	
Current Consumption (Noload/ 2.8<Vcc≤3.63)	Icc	0.5 ≤ fo<5MHz		—	5.8	
		5 ≤ fo<15MHz		—	6.5	
		15 ≤ fo<30MHz		—	7.3	
		30 ≤ fo<50MHz		—	8	
		50 ≤ fo ≤ 60MHz		—	8.5	
		60<fo<75MHz		—	12.5	
		75 ≤ fo<105MHz		—	14.5	
		105 ≤ fo<130MHz		—	15.5	
		130 ≤ fo<160MHz		—	18	
		160 ≤ fo ≤ 170MHz		—	19.5	
Stand-by Current	I_std			—	5	μA
Symmetry	SYM	@50% Vcc		45	55	%
Rise/ Fall Time (20% to 80% Output Level)	Tr/ Tf	0.5 ≤ fo ≤ 60MHz	Loaded/ 1.71 ≤ Vcc ≤ 2.25	—	4	ns
			Loaded/ 2.25<Vcc ≤ 2.8	—	3	
			Loaded/ 2.8<Vcc ≤ 3.63	—	2.5	
		60<fo ≤ 170MHz	Loaded/ 1.71 ≤ Vcc ≤ 2.25	—	1.5	
			Loaded/ 2.25<Vcc ≤ 2.8	—	1.3	
			Loaded/ 2.8<Vcc ≤ 3.63	—	1	
Low Level Output Voltage	VOL	IOL = 5mA		—	10% Vcc	V
High Level Output Voltage	VOH	IOH = − 5mA		90% Vcc	—	V
Output Load (CMOS)	L_CMOS			—	15	pF
Low Level Input Voltage	VIL			—	30% Vcc	V
High Level Input Voltage	VIH			70% Vcc	—	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
Clock 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



PSL: R4Y

RoHS Compliant
MSL1

Features

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

Applications

- Consumer • Wireless Comm. • Industrial

Table 3

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

How to Order

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

① Series

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

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

1	1.8V/ 2.5V/ 3.3V compatible

⑤ Frequency Tolerance (See Table 3)
⑥ Symmetry/ INH Function

Y	45/ 55%

⑦ Individual Specification
(STD Specification is “00” .)

Packaging Tape&Reel

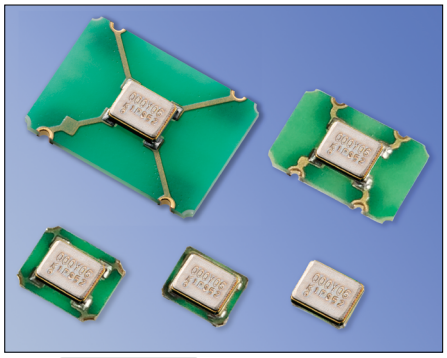
KC7050Z/ KC5032Z	1000 pcs./ reel
KC3225Z/ KC2520Z/ KC2016Z	2000 pcs./ reel

Specifications

Item	Symbol	Conditions	Min.	Max.	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	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	Jsigma	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.

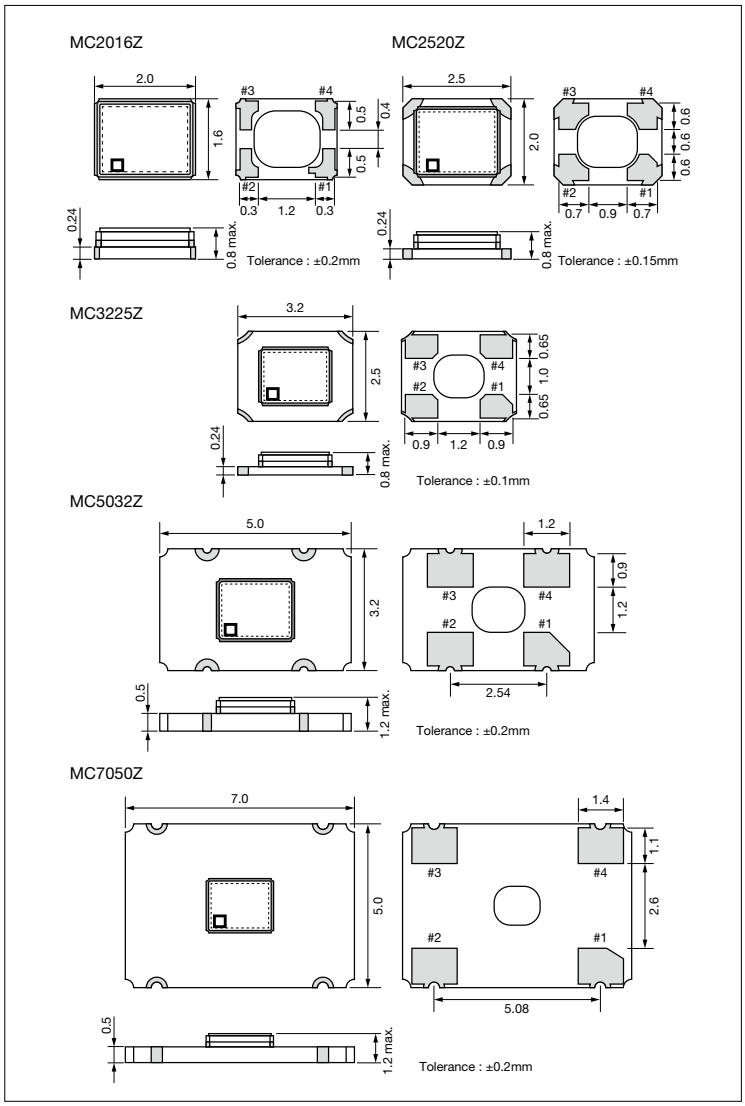
CMOS, 2.0 × 1.6 / 2.5 × 2.0 / 3.2 × 2.5 / 5.0 × 3.2 / 7.0 × 5.0mm



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

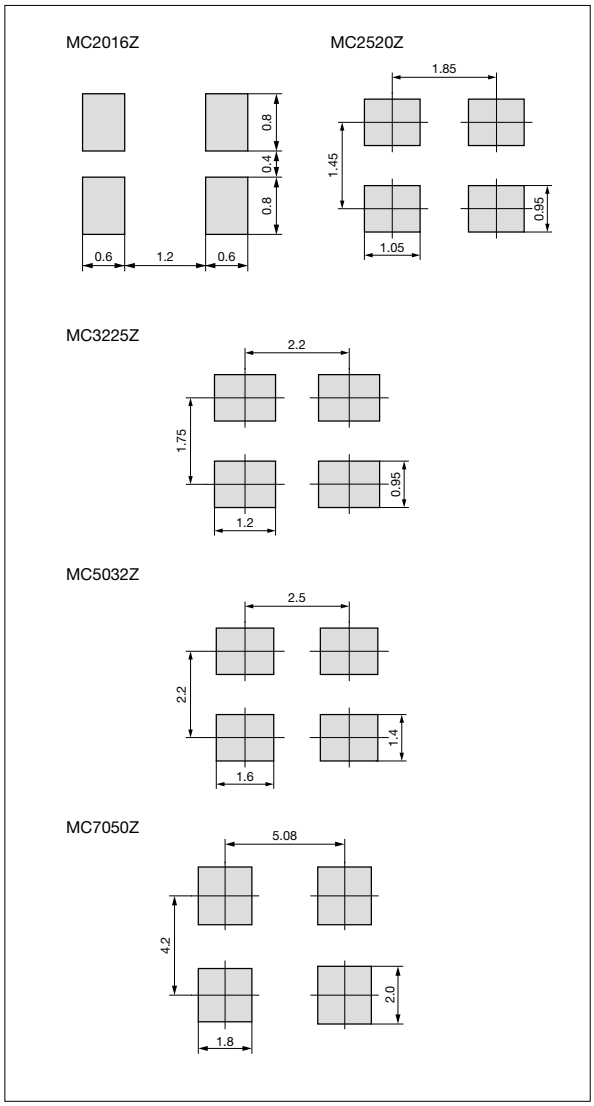
Dimensions

(Unit : mm)



Recommended Land Pattern

(Unit : mm)

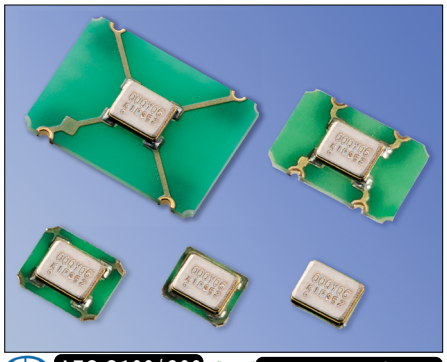


Pad Connections	
#1	Stand-by Function
#2	Case GND
#3	Output
#4	Vcc

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

Clock Oscillators for Automotive
Clock MC-Z-Series "X" type (Short LT 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
*AEC-Q100 qualified (Option)
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	Freq. Tol. × 10^{-6}	Operating Temperature Range (° C)	Note
G	± 50	− 40 to +85	For additional stabillity, please contact us.
H	± 30		
J	± 25		
K	± 20		
6	± 50	− 40 to +105	
5	± 30		
X	± 100	− 40 to +125	
Z	± 50		
9	± 30		

How to Order

MC □□□□ Z 25.0000 C 1 □ X 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

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

X	45/ 55%

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

Packaging Tape&Reel

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

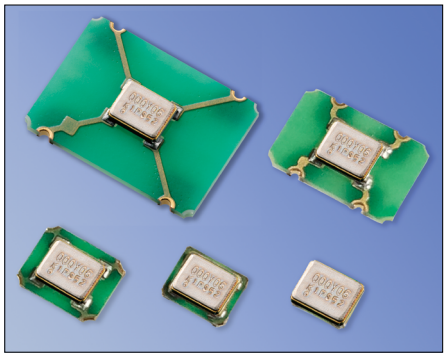
Specifications

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	Vcc			1.71	3.63	V
Current Consumption (Noload/ 1.71≤Vcc≤2.25)	Icc	0.5 ≤ fo<5MHz		—	5.2	mA
		5 ≤ fo<15MHz		—	5.8	
		15 ≤ fo<30MHz		—	6.2	
		30 ≤ fo<50MHz		—	6.8	
		50 ≤ fo ≤ 60MHz		—	6.8	
		60<fo<75MHz		—	9	
		75 ≤ fo<105MHz		—	10	
		105 ≤ fo<130MHz		—	10.5	
		130 ≤ fo<160MHz		—	11.5	
		160 ≤ fo ≤ 170MHz		—	12.5	
Current Consumption (Noload/ 2.25<Vcc≤2.8)	Icc	0.5 ≤ fo<5MHz		—	5.5	
		5 ≤ fo<15MHz		—	6	
		15 ≤ fo<30MHz		—	6.5	
		30 ≤ fo<50MHz		—	7.2	
		50 ≤ fo ≤ 60MHz		—	7.4	
		60<fo<75MHz		—	10	
		75 ≤ fo<105MHz		—	11.5	
		105 ≤ fo<130MHz		—	12.5	
		130 ≤ fo<160MHz		—	14	
		160 ≤ fo ≤ 170MHz		—	15	
Current Consumption (Noload/ 2.8<Vcc≤3.63)	Icc	0.5 ≤ fo<5MHz		—	5.8	
		5 ≤ fo<15MHz		—	6.5	
		15 ≤ fo<30MHz		—	7.3	
		30 ≤ fo<50MHz		—	8	
		50 ≤ fo ≤ 60MHz		—	8.5	
		60<fo<75MHz		—	12.5	
		75 ≤ fo<105MHz		—	14.5	
		105 ≤ fo<130MHz		—	15.5	
		130 ≤ fo<160MHz		—	18	
		160 ≤ fo ≤ 170MHz		—	19.5	
Stand-by Current	I_std			—	5	μA
Symmetry	SYM	@50% Vcc		45	55	%
Rise/ Fall Time (20% to 80% Output Level)	Tr/ Tf	0.5 ≤ fo ≤ 60MHz	Loaded/ 1.71 ≤ Vcc ≤ 2.25	—	4	ns
			Loaded/ 2.25<Vcc ≤ 2.8	—	3	
			Loaded/ 2.8<Vcc ≤ 3.63	—	2.5	
		60<fo ≤ 170MHz	Loaded/ 1.71 ≤ Vcc ≤ 2.25	—	1.5	
			Loaded/ 2.25<Vcc ≤ 2.8	—	1.3	
			Loaded/ 2.8<Vcc ≤ 3.63	—	1	
Low Level Output Voltage	VOL	IOL = 5mA		—	10% Vcc	V
High Level Output Voltage	VOH	IOH = − 5mA		90% Vcc	—	V
Output Load (CMOS)	L_CMOS			—	15	pF
Low Level Input Voltage	VIL			—	30% Vcc	V
High Level Input Voltage	VIH			70% Vcc	—	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
*AEC-Q100 qualified (Option)
PSL: R4Y MSL1

Features

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

Applications

- Automotive

Table 7

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

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

⑤ Frequency Tolerance (See Table 7)
⑥ Symmetry/ INH Function

Y	45/ 55%

⑦ Individual Specification
(STD Specification is “SH” .)

Packaging Tape&Reel

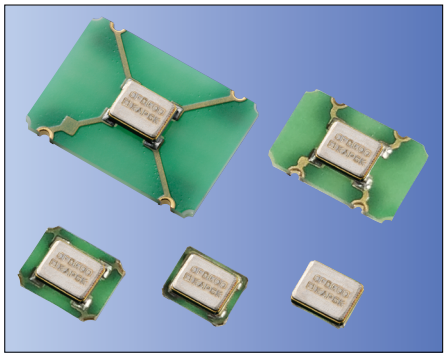
MC7050Z/ MC5032Z	1000 pcs./ reel
MC3225Z/ MC2520Z/ MC2016Z	2000 pcs./ reel

Specifications

Item	Symbol	Conditions		Min.	Max.	Unit
Output Frequency Range	fo			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 ≤ 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	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



PSL: R4Y

RoHS Compliant
MSL1

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

Applications
- Consumer (Audio Codec)
- Wireless Comm.
- Industrial
- Clock for sleep

Table 1

Freq. Tol. Code	Freq. Tol. × 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

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

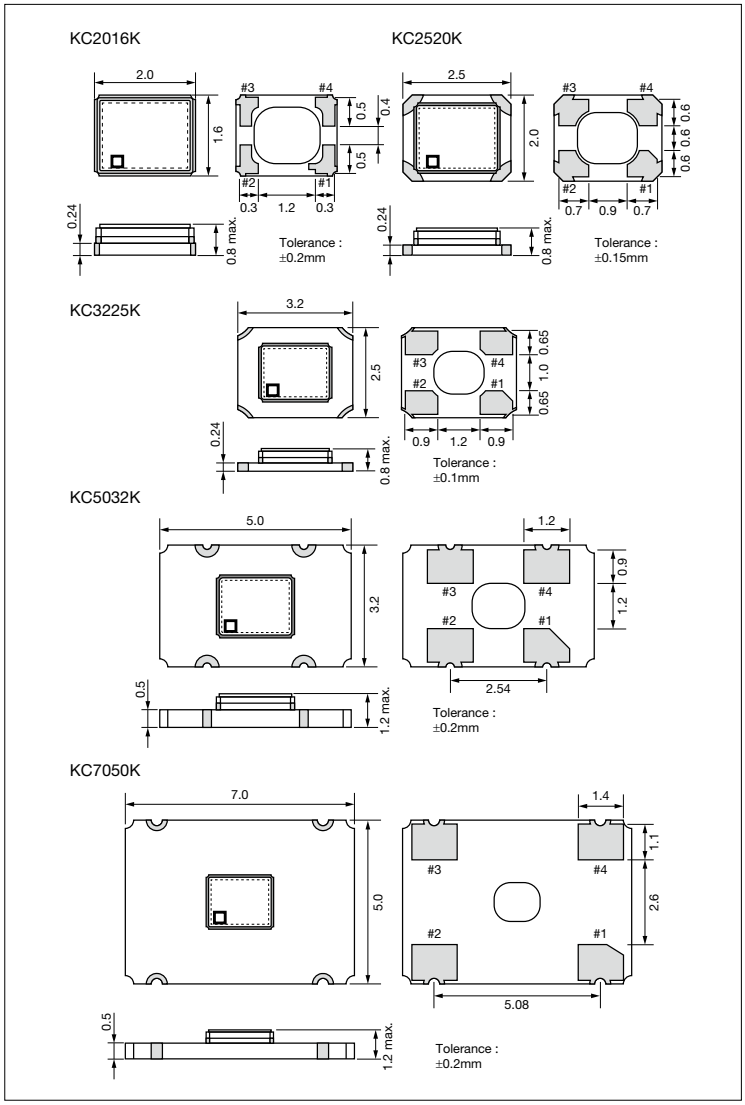
A	45/ 55%

⑦ Individual Specification
(STD Specification is “00” .)

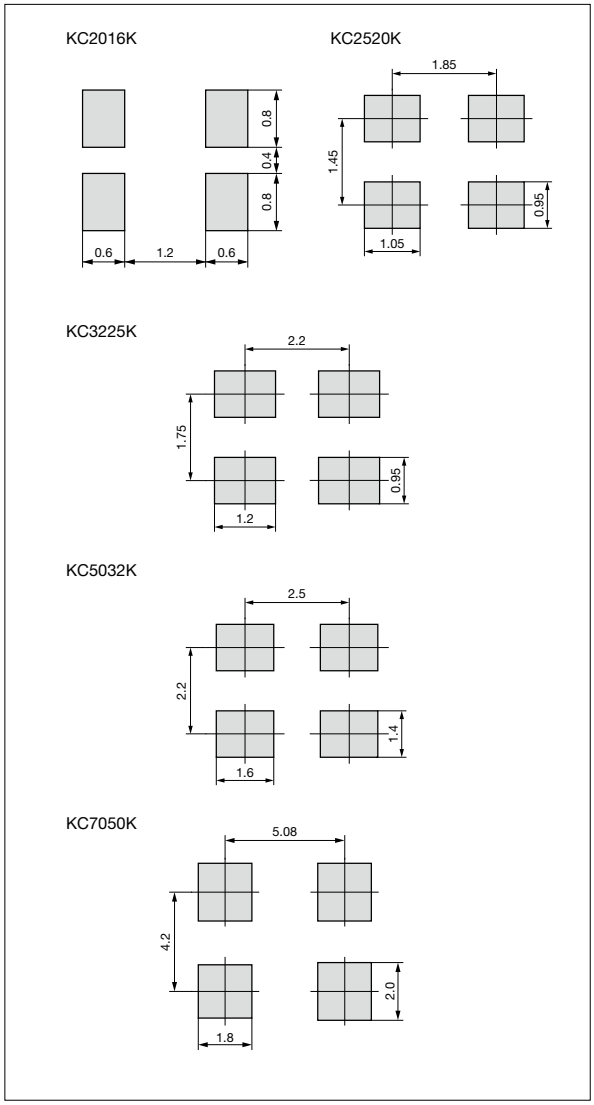
Packaging Tape & Reel

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

Dimensions (Unit: mm)



Recommended Land Pattern (Unit: mm)



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

Specifications

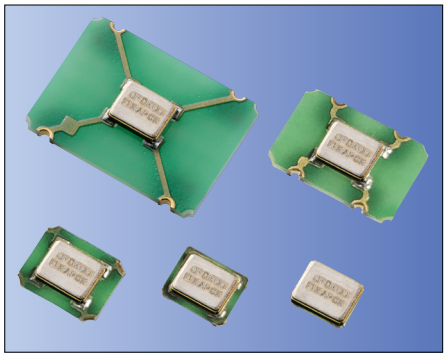
Item	Symbol	Conditions		Min.	Max.	Unit
Output Frequency	Fo			32.768		kHz
Frequency Tolerance	F_tol	Initial tolerance(@+25° C), Operating temperature range, Rated power supply voltage change (Vcc ± 10%)	Temp.: − 40 to +85° C	− 25	+25	× 10 − 6
			Temp.: − 40 to +125° C	− 90	+90	
	F_Aging	Aging (@1 year)		− 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	Vcc			+1.60	+3.63	V
Current Consumption (No Load)	Icc	1.6 ≤ Vcc ≤ 2.0V		—	28	µ A
		2.0<Vcc ≤ 2.8V		—	29	
		2.8<Vcc ≤ 3.63V		—	30	
Stand-by Current	I_std			—	5	µA
Symmetry	SYM	@50% Vcc		45	55	%
Rise/ Fall Time (10% VCC to 90% VCC Output Level)	Tr/ Tf			—	50	ns
Low Level Output Voltage	VOL	IOL= 1mA		—	10% Vcc	V
High Level Output Voltage	VOH	IOH= −1mA		90% Vcc	—	V
Output Load	L_CMOS			15		pF
Low Level Input Voltage	VIL			—	30% Vcc	V
High Level Input Voltage	VIH			70% Vcc	—	V
Disable Time	t_dis			—	100	ns
Enable Time	t_ena			—	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	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



PSL: R4Y

RoHS Compliant
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 (Audio Codec)
- Wireless Comm.
- Industrial

Table 1

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

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

E	45/ 55%

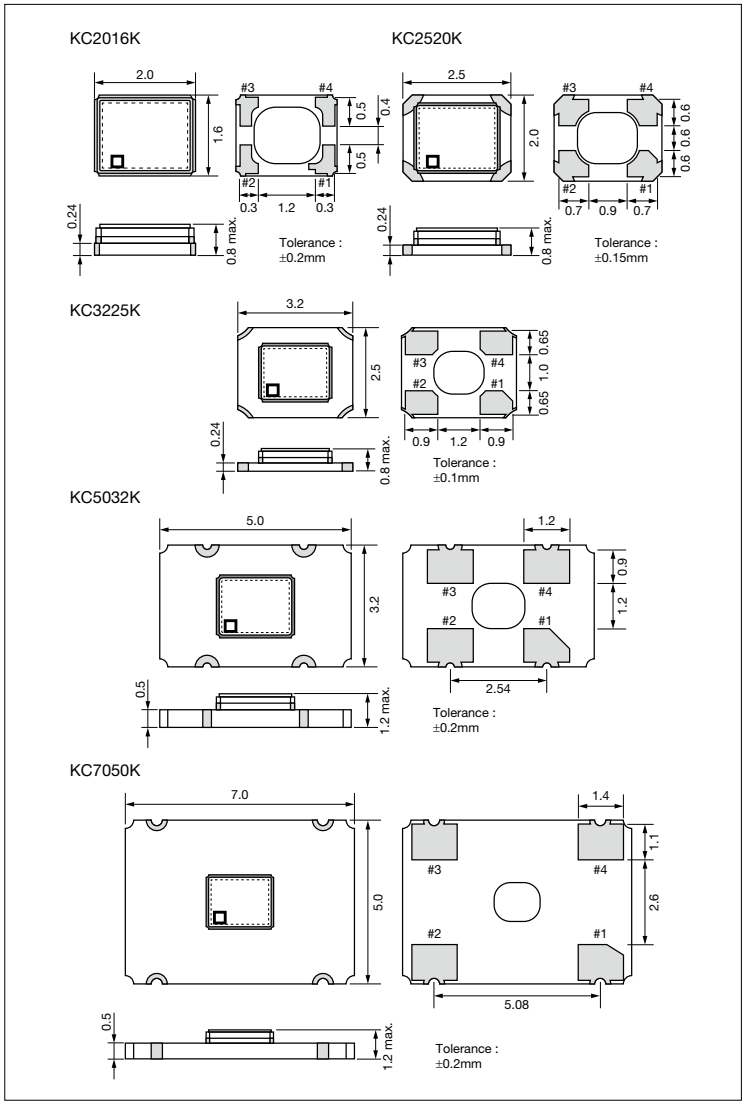
⑦ Individual Specification
(STD Specification is "00" .)

Packaging Tape & Reel

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

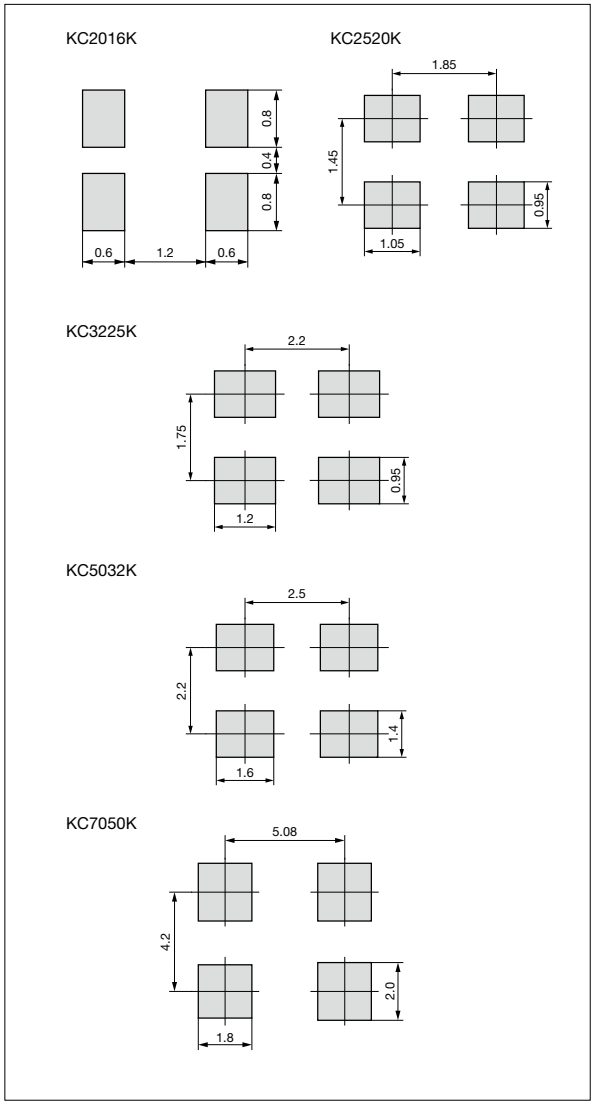
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)



Clock Oscillators

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]	fo			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	Vcc	Code ④ : 1 : 1.5 ≤ F0 ≤ 125MHz		+1.60	+3.63	V
		Code ④ : 2 : 125<F0 ≤ 160MHz		+2.25	+3.63	
Current Consumption (Maximum Loaded)	Icc	1.5 ≤ F0 ≤ 24MHz	1.6 ≤ Vcc ≤ 2.25V	—	2.5	mA
			2.25<Vcc ≤ 2.8V	—	3.0	
			2.8<Vcc ≤ 3.63V	—	3.5	
		24<F0 ≤ 40MHz	1.6 ≤ Vcc ≤ 2.25V	—	3.5	
			2.25<Vcc ≤ 2.8V	—	4.5	
			2.8<Vcc ≤ 3.63V	—	5.0	
		40<F0 ≤ 62.5MHz	1.6 ≤ Vcc ≤ 2.25V	—	5.0	
			2.25<Vcc ≤ 2.8V	—	5.5	
			2.8<Vcc ≤ 3.63V	—	6.0	
		62.5<F0 ≤ 80MHz	1.6 ≤ Vcc ≤ 2.25V	—	6.0	
			2.25<Vcc ≤ 2.8V	—	6.5	
			2.8<Vcc ≤ 3.63V	—	8.0	
		80<F0 ≤ 125MHz	1.6 ≤ Vcc ≤ 2.25V	—	11.0	
			2.25<Vcc ≤ 2.8V	—	14.0	
			2.8<Vcc ≤ 3.63V	—	17.0	
		125<F0 ≤ 160MHz	2.25<Vcc ≤ 2.8V	—	25.0	
			2.8<Vcc ≤ 3.63V	—	27.0	
Stand-by Current	I_std	1.5 ≤ Fo ≤ 80MHz		—	5.0	µA
		80<Fo ≤ 160MHz		—	10.0	
Symmetry	SYM	@50% Vcc		45	55	%
Rise/ Fall Time (10% to 90% Output Level)	Tr/ Tf	1.5 ≤ F0 ≤ 80MHz	1.6 ≤ Vcc ≤ 2.25V	—	6.0	ns
			2.25<Vcc ≤ 2.8V	—	5.0	
			2.8<Vcc ≤ 3.63V	—	4.5	
		80<F0 ≤ 125MHz	1.6<Vcc ≤ 3.63V	—	4.0	
		125<F0 ≤ 160MHz	2.25<Vcc ≤ 3.63V	—	2.5	
Low Level Output Voltage	VOL	IOL= 4mA (F0≤80MHz), IOL= 8mA (F0>80MHz)		—	10% Vcc	V
High Level Output Voltage	VOH	IOH= −4mA (F0≤80MHz), IOH= −8mA (F0>80MHz)		90% Vcc	—	V
Output Load	L_CMOS			15		pF
Low Level Input Voltage	VIL			—	30% Vcc	V
High Level Input Voltage	VIH			70% Vcc	—	V
Disable Time	t_dis	1.5 ≤ F0 ≤ 80MHz		—	200	ns
		80<F0 ≤ 125MHz		—	100	
		125<F0 ≤ 160MHz		—	100	
Enable Time	t_ena			—	2	ms
Start-up Time	t_str	1.5 ≤ F0 ≤ 80MHz	@Minimum operating voltage to be 0 sec.	—	2	ms
		80<F0 ≤ 125MHz		—	2	
		125<F0 ≤ 160MHz		—	2	
1 Sigma Jitter	Jsigma	1.5 ≤ F0 ≤ 80MHz	Measured with Wavecrest SIA-3000	—	5	ps
		80<F0 ≤ 125MHz		—	4	
		125<F0 ≤ 160MHz		—	3	
Peak to Peak Jitter	JPK-PK	1.5 ≤ F0 ≤ 80MHz		—	50	ps
		80<F0 ≤ 125MHz		—	40	
		125<F0 ≤ 160MHz		—	25	
Phase Jitter	JPhase	@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		

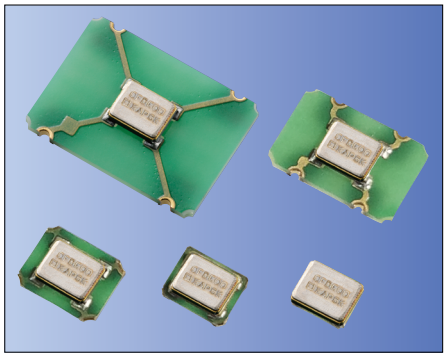
Note: All electrical characteristics are defined at the maximum load and operating temperature range.
Note1: Please contact us for inquiry about operating temperature range, available frequencies and other conditions.

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)

Clock Oscillators for Automotive
Clock MC-K Series (32.768kHz)

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



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

Features

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

Applications

- Automotive (ADAS)
- Clock for sleep

Table 1

Freq. Tol.		Operating Temperature Range (° C)	Note
Code	× 10^{-6}		
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

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

A	45/ 55%

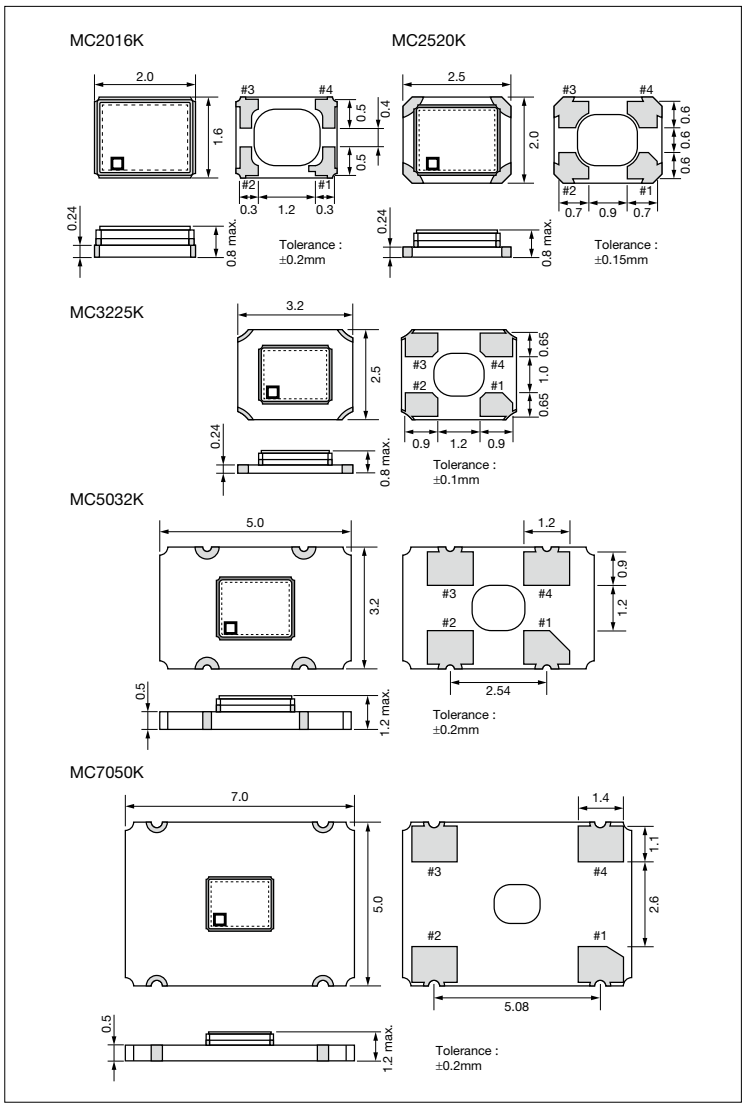
⑦ Individual Specification
(STD Specification is “SH” .)

Packaging Tape & Reel

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

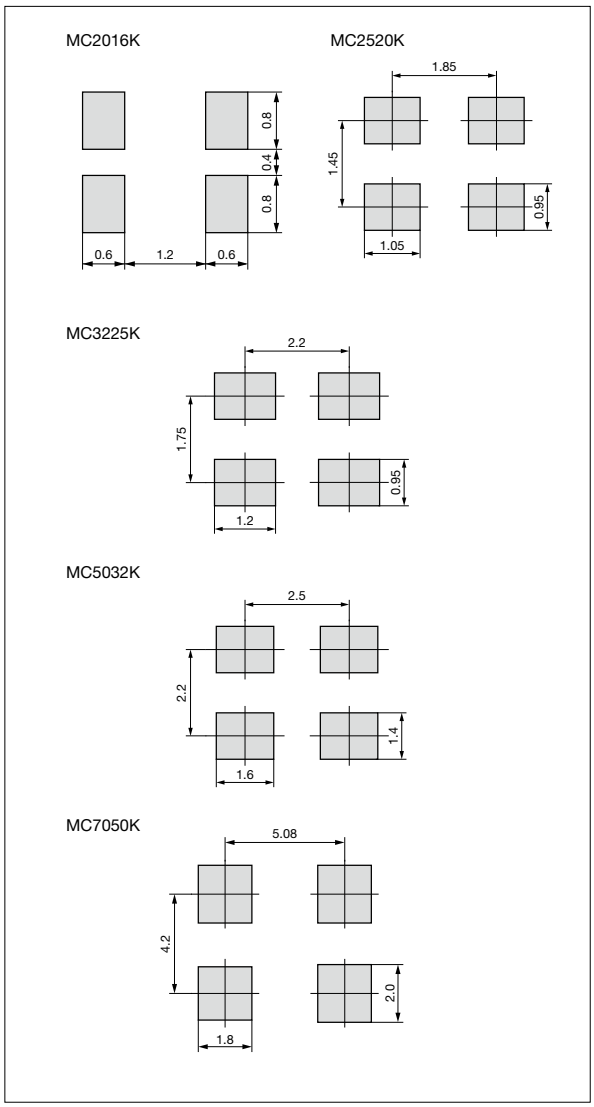
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)



Specifications

Item	Symbol	Conditions		Min.	Max.	Unit
Output Frequency	Fo			32.768		kHz
Frequency Tolerance	F_tol	Initial tolerance, Operating temperature range, Rated power supply voltage change (Vcc ± 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	Vcc			+1.60	+3.63	V
Current Consumption (No Load)	Icc	1.6 ≤ Vcc ≤ 2.0V		—	28	µA
		2.0<Vcc ≤ 2.8V		—	29	
		2.8<Vcc ≤ 3.63V		—	30	
Stand-by Current	I_std			—	5	µA
Symmetry	SYM	@50% Vcc		45	55	%
Rise/ Fall Time (10% VCC to 90% VCC Output Level)	Tr/ Tf			—	50	ns
Low Level Output Voltage	VOL	IOL= 1mA		—	10% Vcc	V
High Level Output Voltage	VOH	IOH= −1mA		90% Vcc	—	V
Output Load	L_CMOS			15		pF
Low Level Input Voltage	VIL			—	30% Vcc	V
High Level Input Voltage	VIH			70% Vcc	—	V
Disable Time	t_dis			—	100	ns
Enable Time	t_ena			—	2	ms
Start-up Time	t_sta	@Minimum operating voltage to be 0 sec.		—	5	ms

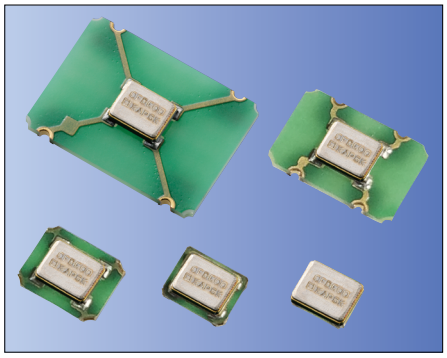
Note: All electrical characteristics are defined at the maximum load and operating temperature range.

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

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

Clock Oscillators for Automotive
Clock MC-K Series

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



AEC-Q100/ 200
*AEC-Q100 qualified (Option)
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. Tol. Code	Freq. Tol. × 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

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

E	45/ 55%

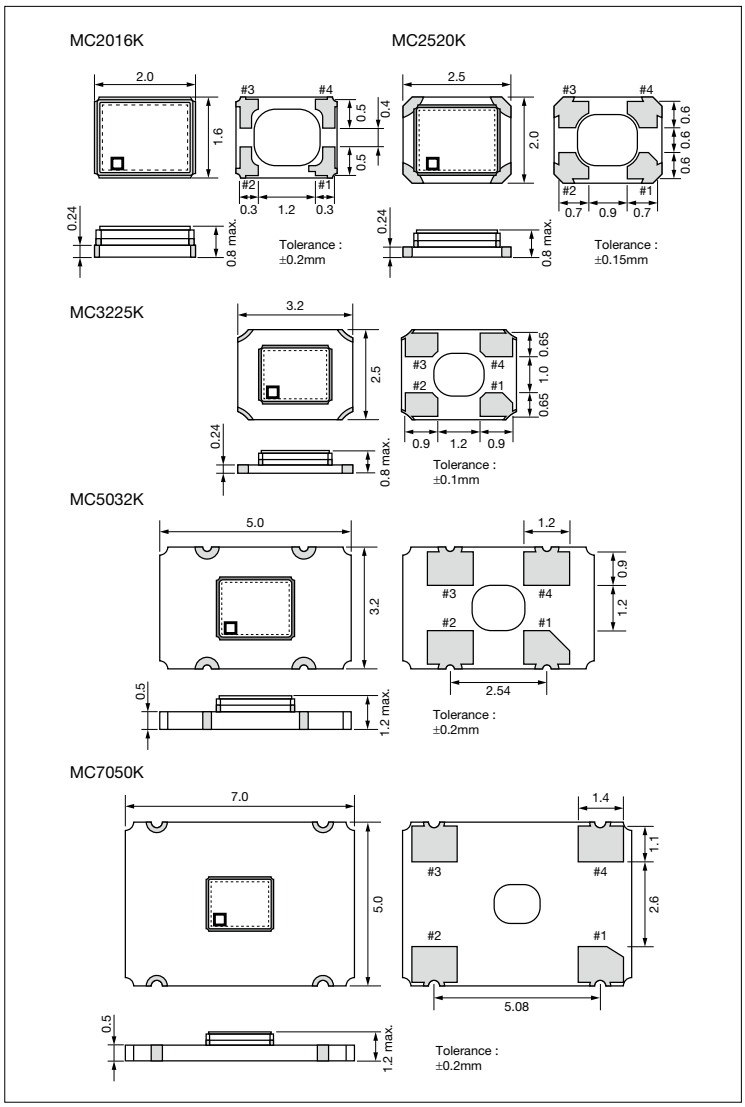
⑦ Individual Specification
(STD Specification is “SH” .)

Packaging Tape & Reel

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

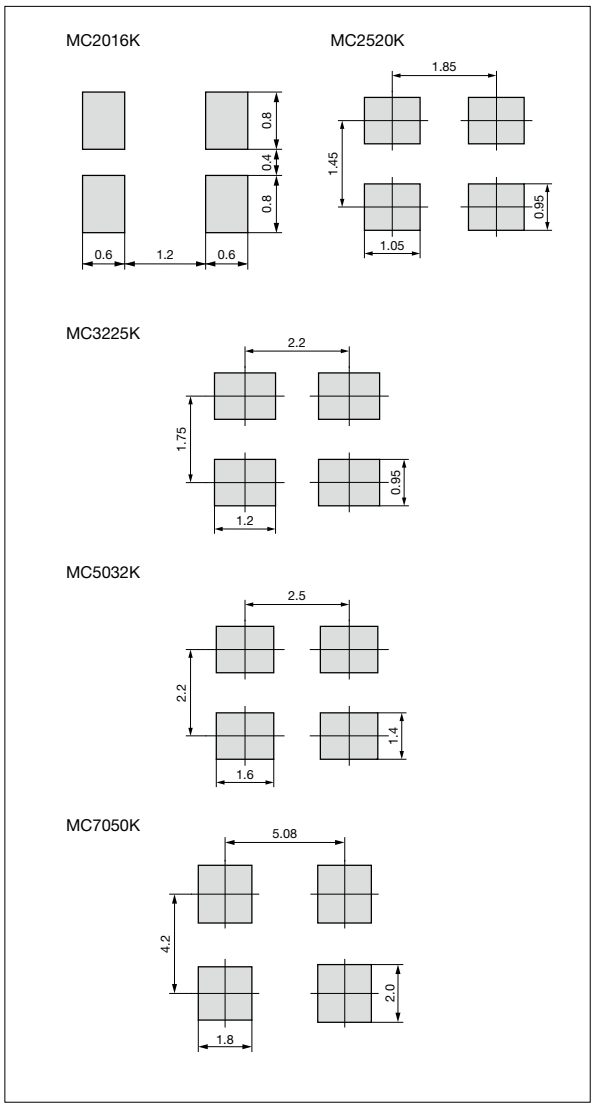
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)



Specifications

Item	Symbol	Conditions		Min.	Max.	Unit
Output Frequency Range[Note1]	fo			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	
				− 40	+125	
Max. Supply Voltage	—			− 0.3	+4.0	V
Supply Voltage	Vcc	Code ④ : 1 : 1.5 ≤ F0 ≤ 125MHz		+1.60	+3.63	V
		Code ④ : 2 : 125<F0 ≤ 160MHz		+2.25	+3.63	
Current Consumption (Maximum Loaded)	Icc	1.5 ≤ F0 ≤ 24MHz	1.6 ≤ Vcc ≤ 2.25V	—	2.5	mA
			2.25<Vcc ≤ 2.8V	—	3.0	
			2.8<Vcc ≤ 3.63V	—	3.5	
		24<F0 ≤ 40MHz	1.6 ≤ Vcc ≤ 2.25V	—	3.5	
			2.25<Vcc ≤ 2.8V	—	4.5	
			2.8<Vcc ≤ 3.63V	—	5.0	
		40<F0 ≤ 62.5MHz	1.6 ≤ Vcc ≤ 2.25V	—	5.0	
			2.25<Vcc ≤ 2.8V	—	5.5	
			2.8<Vcc ≤ 3.63V	—	6.0	
		62.5<F0 ≤ 80MHz	1.6 ≤ Vcc ≤ 2.25V	—	6.0	
			2.25<Vcc ≤ 2.8V	—	6.5	
			2.8<Vcc ≤ 3.63V	—	8.0	
		80<F0 ≤ 125MHz	1.6 ≤ Vcc ≤ 2.25V	—	11.0	
			2.25<Vcc ≤ 2.8V	—	14.0	
			2.8<Vcc ≤ 3.63V	—	17.0	
		125<F0 ≤ 160MHz	2.25<Vcc ≤ 2.8V	—	25.0	
			2.8<Vcc ≤ 3.63V	—	27.0	
Stand-by Current	I_std	1.5 ≤ Fo ≤ 80MHz		—	5.0	μA
		80<Fo ≤ 160MHz		—	10.0	
Symmetry	SYM	@50% Vcc		45	55	%
Rise/ Fall Time (10% to 90% Output Level)	Tr/ Tf	1.5 ≤ F0 ≤ 80MHz	1.6 ≤ Vcc ≤ 2.25V	—	6.0	ns
			2.25<Vcc ≤ 2.8V	—	5.0	
			2.8<Vcc ≤ 3.63V	—	4.5	
		80<F0 ≤ 125MHz	1.6<Vcc ≤ 3.63V	—	4.0	
		125<F0 ≤ 160MHz	2.25<Vcc ≤ 3.63V	—	2.5	
Low Level Output Voltage	VOL	IOL= 4mA (F0≤80MHz), IOL= 8mA (F0>80MHz)		—	10% Vcc	V
High Level Output Voltage	VOH	IOH= −4mA (F0≤80MHz), IOH= −8mA (F0>80MHz)		90% Vcc	—	V
Output Load	L_CMOS			15		pF
Low Level Input Voltage	VIL			—	30% Vcc	V
High Level Input Voltage	VIH			70% Vcc	—	V
Disable Time	t_dis	1.5 ≤ F0 ≤ 80MHz		—	200	ns
		80<F0 ≤ 125MHz		—	100	
		125<F0 ≤ 160MHz		—	100	
Enable Time	t_ena			—	2	ms
Start-up Time	t_str	1.5 ≤ F0 ≤ 80MHz	@Minimum operating voltage to be 0 sec.	—	2	ms
		80<F0 ≤ 125MHz		—	2	
		125<F0 ≤ 160MHz		—	2	
1Sigma Jitter	Jsigma	1.5 ≤ F0 ≤ 80MHz	Measured with Wavecrest SIA-3000	—	5	ps
		80<F0 ≤ 125MHz		—	4	
		125<F0 ≤ 160MHz		—	3	
Peak to Peak Jitter	JPK-PK	1.5 ≤ F0 ≤ 80MHz		—	50	ps
		80<F0 ≤ 125MHz		—	40	
		125<F0 ≤ 160MHz		—	25	
Phase Jitter	JPhase	@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

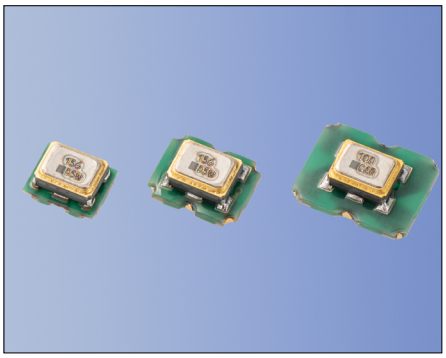
Item	Symbol	Conditions		Min.	Max.	Unit
Phase Noise	—	@25MHz	@10Hz offset	Typ. – 89		dBc/ Hz
			@100Hz offset	Typ. – 119		
			@1kHz offset	Typ. – 143		
			@10kHz offset	Typ. – 157		
			@100kHz offset	Typ. – 160		
			@1MHz offset	Typ. – 162		
			@10MHz offset	Typ. – 162		

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° C

Applications

- Consumer Products (Audio Codec)
- Wireless Comm.
- Industrial

Table 1

Freq. Tol. Code	Freq. Tol. × 10^{-6}	Operating Temperature Range (° C)	Note
0	± 50	−10 to +70	For additional stabillity, 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　100.000　P　□　□　K　00
①　②　③　④　⑤　⑥　⑦

①Series

KC2016F	2016 Size	KC2520F	2520 Size
KC3225F	3225 Size		

②Output Frequency（100.000：100MHz）
③Output Type（P：LV-PECL）
④Supply Voltage

2	2.5V	3	3.3V

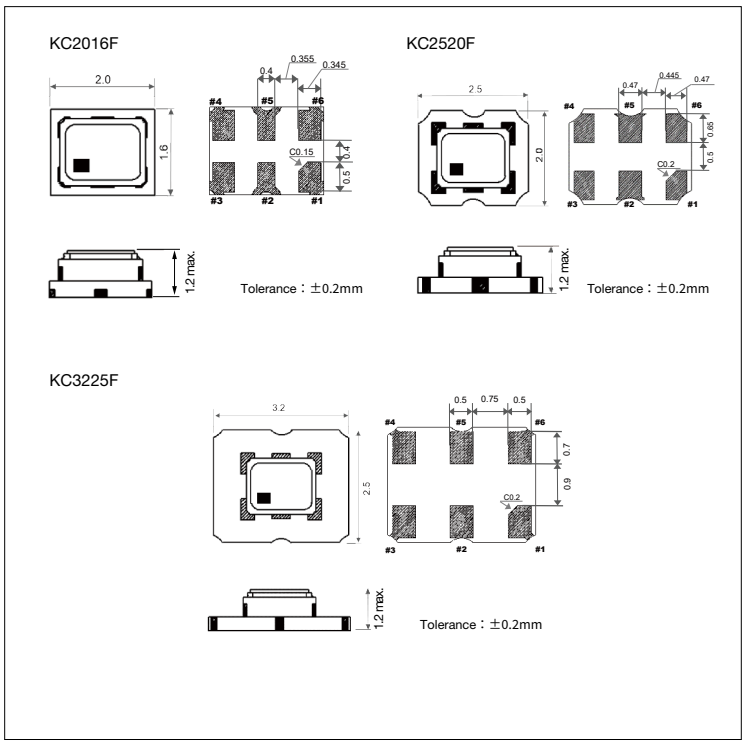
⑤ Frequency Tolerance (See Table 1)
⑥Symmetry/ INH Function
⑦Individual Specification
(STD Specification is "00" .)

Packaging Tape & Reel

KC3225F/ KC2520F/ KC2016F	2000 pcs./ reel

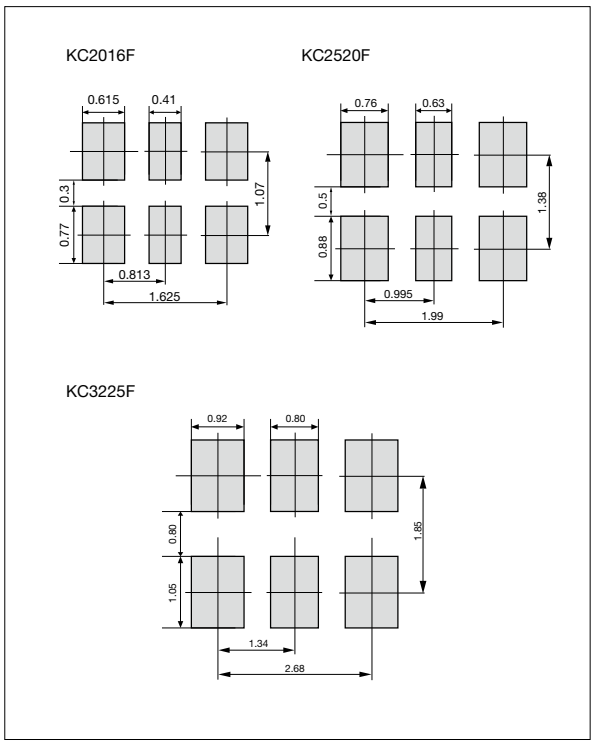
Dimensions

(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

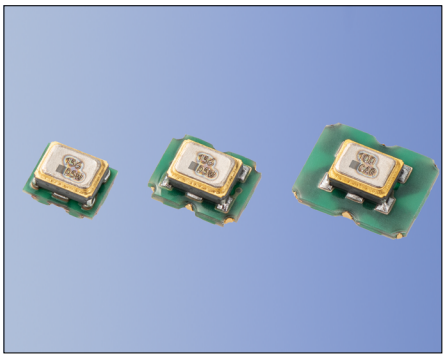
Specifications

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	$\times 10^{-6}$
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	Vcc	@+2.5V		+2.375 to +2.625	V
		@+3.3V		+3.135 to +3.465	
Current Consumption	Icc			65 max.	mA
Stand-by Current	I_std			30 max.	µA
Symmetry	SYM	50ohm @50% output swing		50±5	%
Rise/ Fall Tim (20% Vcc to 80% Vcc)	Tr/ Tf	50ohm		0.4 max.	ns
Low Level Output Voltage	VOL			Vcc−1.810 to Vcc−1.620	V
High Level Output Voltage	VOH			Vcc−1.085 to Vcc−0.880	V
Output Load	—	LV-PECL Output		50	Ohm
Low Level Input Voltage	VIL			30% Vcc max.	V
High Level Input Voltage	VIH			70% Vcc min.	V
Disable Time	t_dis			200 max.	ns
Enable Time	t_ena			10 max.	ms
Start-up Time	t_str	@Minimum operating voltage to be 0 sec.		10 max.	ms
Deterministic Jitter[Note1]	DJ	DJ pk-pk		2 max.	ps
1Sigma Jitter[Note1]	JSigma			4 max.	ps
Peak to Peak Jitter[Note1]	JPK-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 Products (Audio Codec)
- Wireless Comm.
- Industrial

Table 1

Freq. Tol. Code	Freq. Tol. × 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　100.000　L　□　□　K　00
①　②　③　④　⑤　⑥　⑦

①Series

KC2016F	2016 Size	KC2520F	2520 Size
KC3225F	3225 Size		

②Output Frequency（100.000：100MHz）
③Output Type（L：LVDS）
④Supply Voltage

2	2.5V	3	3.3V

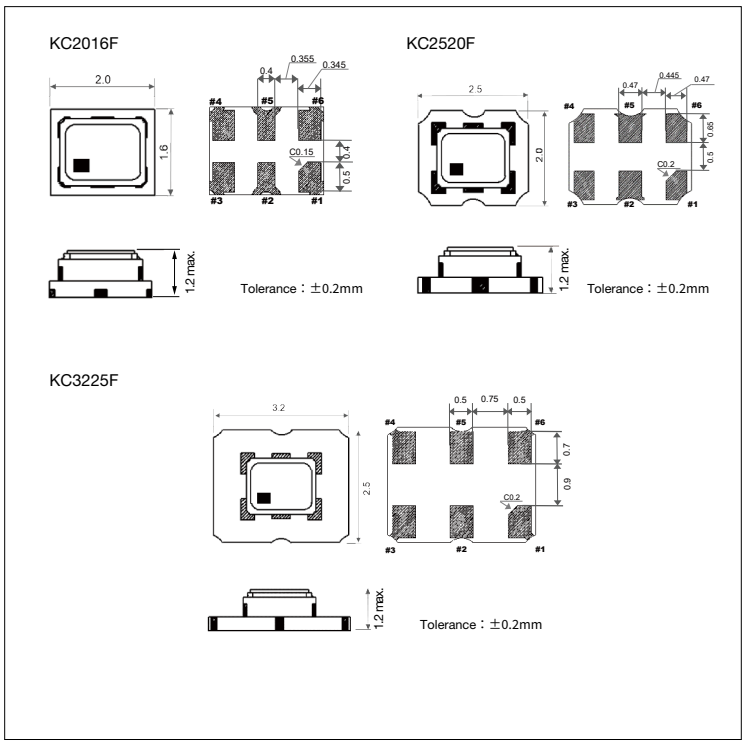
⑤ Frequency Tolerance (See Table 1)
⑥Symmetry/ INH Function
⑦Individual Specification
(STD Specification is “00”.)

Packaging Tape & Reel

KC3225F/ KC2520F/ KC2016F	2000 pcs./ reel

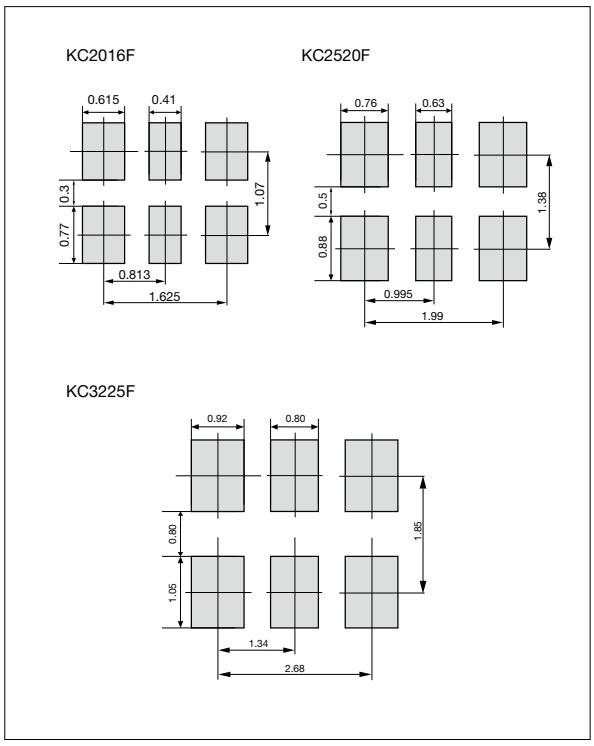
Dimensions

(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

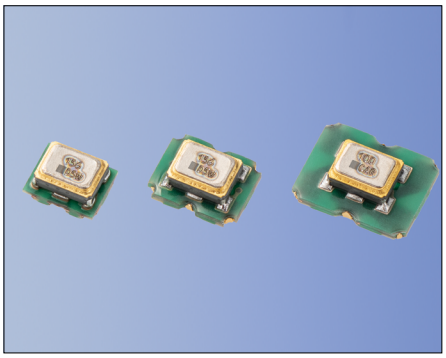
Specifications

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	$\times 10^{-6}$
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	Vcc	@+2.5V		+2.375 to +2.625	V
		@+3.3V		+3.135 to +3.465	
Current Consumption	Icc			24 max.	mA
Stand-by Current	I_std			30 max.	μA
Symmetry	SYM	100ohm @50% Vopp		50±5	%
Rise/ Fall Tim (20% Vcc to 80% Vcc)	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
Diffrentical Output Voltage	VOD			247 to 454 Typ.:330	mV
Diffrentical Output Voltage Error	dVOD	dVOD =| VOD1 - VOD2|		50 max.	
Offset Voltage	VOs			1.125 to 1.375 Typ.:1.25	V
Offset Voltage Error	dVOs	dVOD =| VOD1 - VOD2|		50 max.	mV
Output Load	—	LVDS Output		100	ohm
Low Level Input Voltage	VIL			30% Vcc max.	V
High Level Input Voltage	VIH			70% Vcc min.	V
Disable Time	t_dis			200 max.	ns
Enable Time	t_ena			10 max.	ms
Start-up Time	t_str	@Minimum operating voltage to be 0 sec.		10 max.	ms
Deterministic Jitter[Note1]	DJ	DJ pk-pk		2 max.	ps
1Sigma Jitter[Note1]	JSigma			4 max.	ps
Peak to Peak Jitter[Note1]	JPK-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 Products (Audio Codec)
- Wireless Comm.
- Industrial

Table 1

Freq. Tol. Code	Freq. Tol. × 10^{-6}	Operating Temperature Range (° C)	Note
0	± 50	−10 to +70	For additional stabillity, 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　100.000　H　□　□　K　00
①　②　③　④　⑤　⑥　⑦

①Series

KC2016F	2016 Size	KC2520F	2520 Size
KC3225F	3225 Size		

②Output Frequency（100.000：100MHz）
③Output Type（H：HCSL）
④Supply Voltage

2	2.5V	3	3.3V

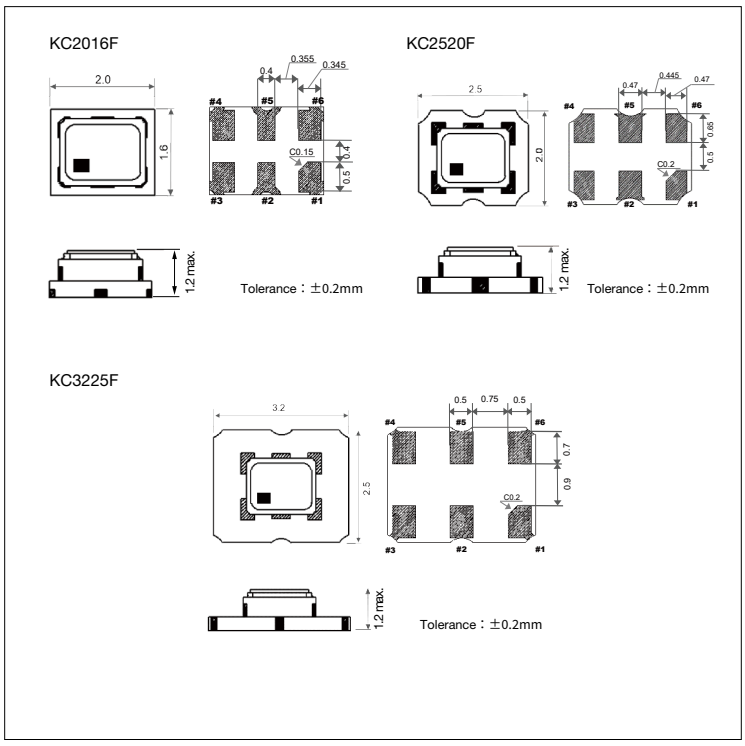
⑤ Frequency Tolerance (See Table 1)
⑥Symmetry/ INH Function
⑦Individual Specification
(STD Specification is “00”.)

Packaging Tape & Reel

KC3225F/ KC2520F/ KC2016F	2000 pcs./ reel

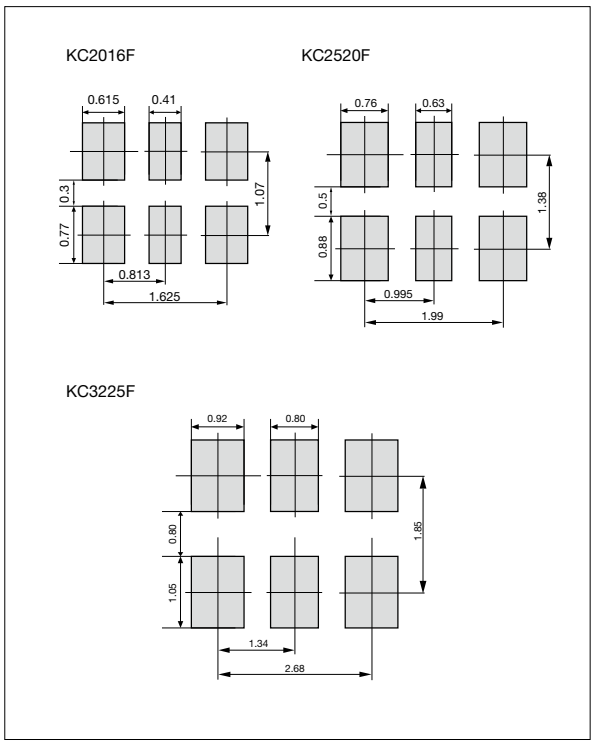
Dimensions

(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

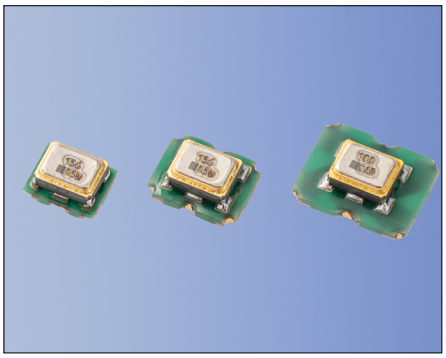
Specifications

Item	Symbol	Conditions		Specifications	Units
Output Frequency Range	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	$\times 10^{-6}$
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	Vcc	@+2.5V		+2.375 to +2.625	V
		@+3.3V		+3.135 to +3.465	
Current Consumption	Icc			46 max.	mA
Stand-by Current	I_std			30 max.	µA
Symmetry	SYM	50ohm @Cross Point output swing		50±5	%
Rise/ Fall Tim (20% Vcc to 80% Vcc)	Tr/ Tf	50ohm/+0.175V to +0.525V		0.6 max.	ns
Low Level Output Voltage	VOL			−0.15 to +0.15	V
High Level Output Voltage	VOH			+0.60 to +0.90	V
Output Load	—	HCSL Output		50	ohm
Low Level Input Voltage	VIL			30% Vcc max.	V
High Level Input Voltage	VIH			70% Vcc min.	V
Disable Time	t_dis			200 max.	ns
Enable Time	t_ena			10 max.	ms
Start-up Time	t_str	@Minimum operating voltage to be 0 sec.		10 max.	ms
Deterministic Jitter[Note1]	DJ	DJ pk-pk		2 max.	ps
1Sigma Jitter[Note1]	JSigma			4 max.	ps
Peak to Peak Jitter[Note1]	JPK-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
*AEC-Q100 qualified (Option)
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° C

Applications

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

Table 1

Freq. Tol. Code	Freq. Tol. × 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

MC □□□□ F　100.000　P □ □ K 00
①　②　③④⑤⑥⑦

①Series

MC2016F	2016 Size	MC2520F	2520 Size
MC3225F	3225 Size		

②Output Frequency（100.000：100MHz）
③Output Type（P：LV-PECL）
④Supply Voltage

2	2.5V	3	3.3V

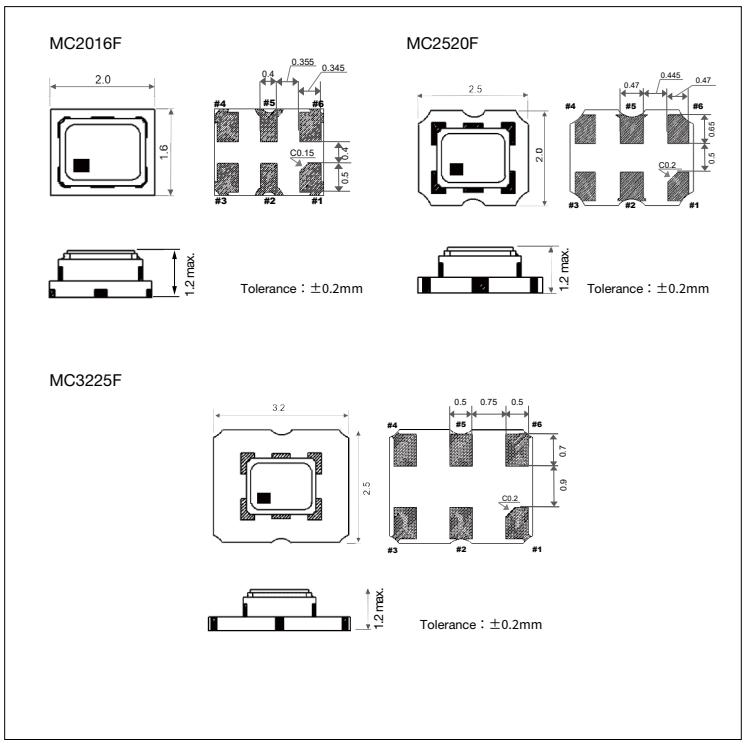
⑤ Frequency Tolerance (See Table 1)
⑥Symmetry/ INH Function
⑦Individual Specification
(STD Specification is “00”.)

Packaging Tape & Reel

MC3225F/ MC2520F/ MC2016F	2000 pcs./ reel

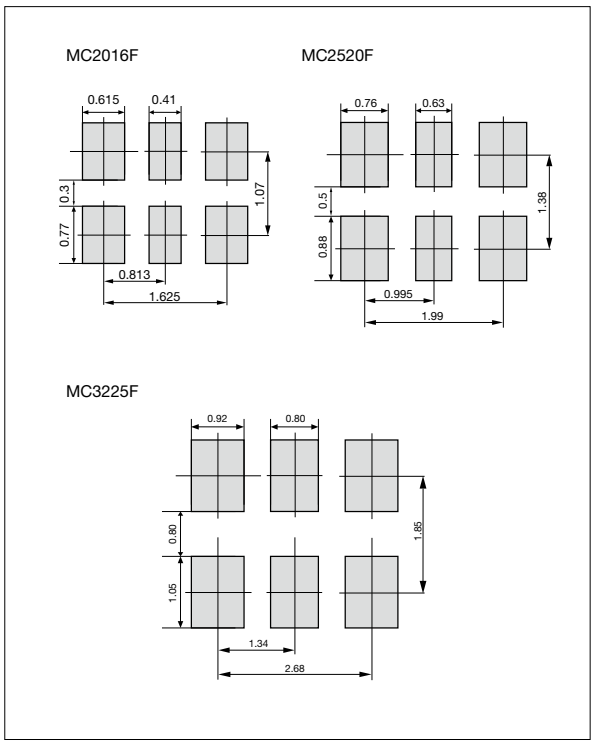
Dimensions

(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

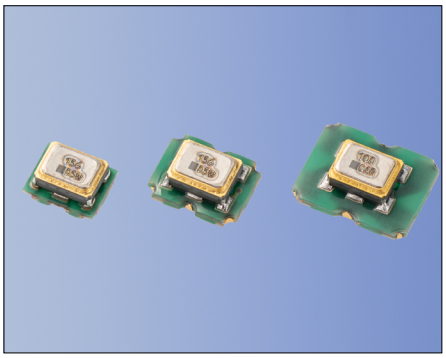
Item	Symbol	Conditions		Specifications	Units
Output Frequency Range	fo			100/125/156.25	MHz
Frequency Tolerance	f_tol	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration		See Table 1	$\times 10^{-6}$
Storage Temperature 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	Vcc	@+2.5V		+2.375 to +2.625	V
		@+3.3V		+3.135 to +3.465	
Current Consumption	Icc			65 max.	mA
Stand-by Current	I_std			30 max.	µA
Symmetry	SYM	50ohm @50% output swing		50±5	%
Rise/ Fall Tim (20% Vcc to 80% Vcc)	Tr/ Tf	50ohm		0.4 max.	ns
Low Level Output Voltage	VOL			Vcc−1.810 to Vcc−1.620	V
High Level Output Voltage	VOH			Vcc−1.085 to Vcc−0.880	V
Output Load	—	LV-PECL Output		50	Ohm
Low Level Input Voltage	VIL			30% Vcc max.	V
High Level Input Voltage	VIH			70% Vcc min.	V
Disable Time	t_dis			200 max.	ns
Enable Time	t_ena			10 max.	ms
Start-up Time	t_str	@Minimum operating voltage to be 0 sec.		10 max.	ms
Deterministic Jitter[Note1]	DJ	DJ pk-pk		2 max.	ps
1Sigma Jitter[Note1]	JSigma			4 max.	ps
Peak to Peak Jitter[Note1]	JPK-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”

Clock Oscillators for Automotive Clock MC-F Series (LVDS)

LVDS, 2.0×1.6 / 2.5×2.0 / 3.2×2.5mm



AEC-Q100/ 200 RoHS Compliant
*AEC-Q100 qualified (Option)
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

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

Table 1

Freq. Tol. Code	Freq. Tol. × 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

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

①Series

MC2016F	2016 Size	MC2520F	2520 Size
MC3225F	3225 Size		

②Output Frequency（100.000：100MHz）
③Output Type（L：LVDS）
④Supply Voltage

2	2.5V	3	3.3V

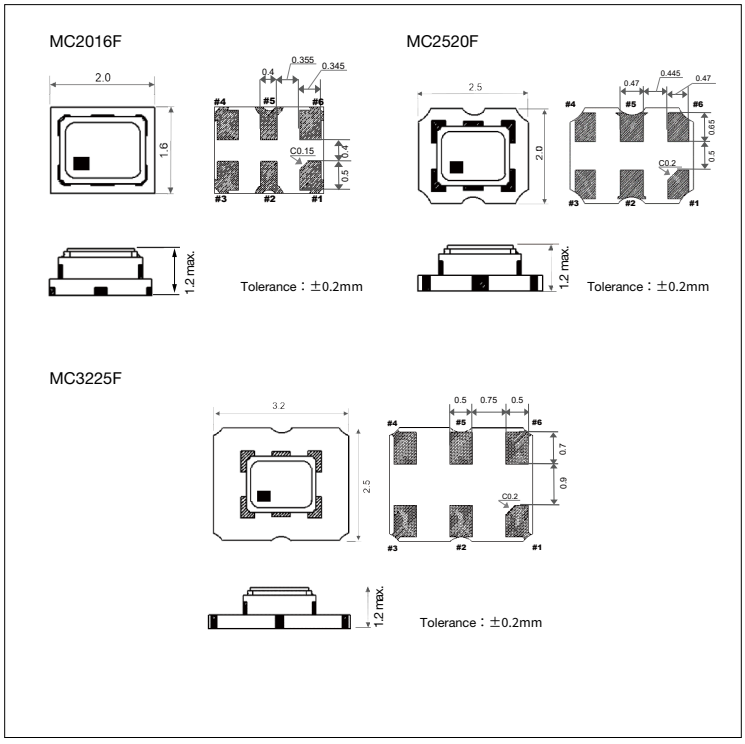
⑤ Frequency Tolerance (See Table 1)
⑥Symmetry/ INH Function
⑦Individual Specification
(STD Specification is “00”.)

Packaging Tape & Reel

MC3225F/ MC2520F/ MC2016F	2000 pcs./ reel

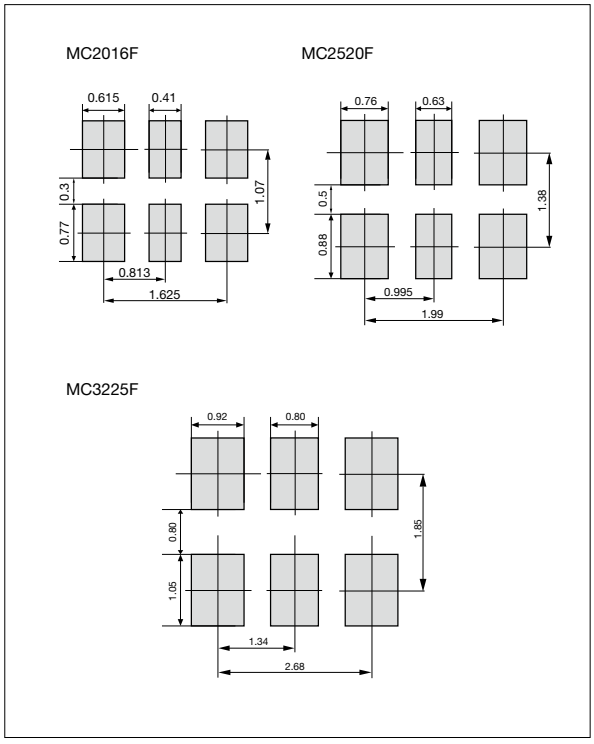
Dimensions

(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

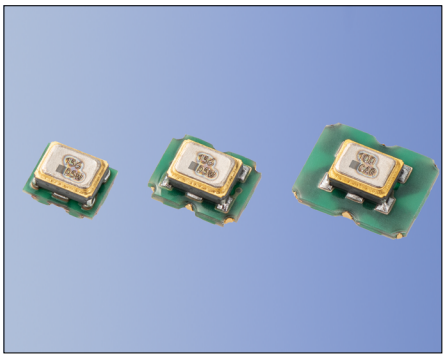
Specifications

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	$\times 10^{-6}$
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	Vcc	@+2.5V		+2.375 to +2.625	V
		@+3.3V		+3.135 to +3.465	
Current Consumption	Icc			24 max.	mA
Stand-by Current	I_std			30 max.	µA
Symmetry	SYM	100ohm @50% Vopp		50±5	%
Rise/ Fall Tim (20% Vcc to 80% Vcc)	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
Diffrentical Output Voltage	VOD			247 to 454 Typ.:330	mV
Diffrentical Output Voltage Error	dVOD	dVOD =| VOD1 - VOD2|		50 max.	
Offset Voltage	VOs			1.125 to 1.375 Typ.:1.25	V
Offset Voltage Error	dVOs	dVOD =| VOD1 - VOD2|		50 max.	mV
Output Load	—	LVDS Output		100	ohm
Low Level Input Voltage	VIL			30% Vcc max.	V
High Level Input Voltage	VIH			70% Vcc min.	V
Disable Time	t_dis			200 max.	ns
Enable Time	t_ena			10 max.	ms
Start-up Time	t_str	@Minimum operating voltage to be 0 sec.		10 max.	ms
Deterministic Jitter[Note1]	DJ	DJ pk-pk		2 max.	ps
1Sigma Jitter[Note1]	JSigma			4 max.	ps
Peak to Peak Jitter[Note1]	JPK-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
*AEC-Q100 qualified (Option)
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

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

Table 1

Freq. Tol. Code	Freq. Tol. × 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

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

①Series

MC2016F	2016 Size	MC2520F	2520 Size
MC3225F	3225 Size		

②Output Frequency（100.000：100MHz）
③Output Type（H：HCSL）
④Supply Voltage

2	2.5V	3	3.3V

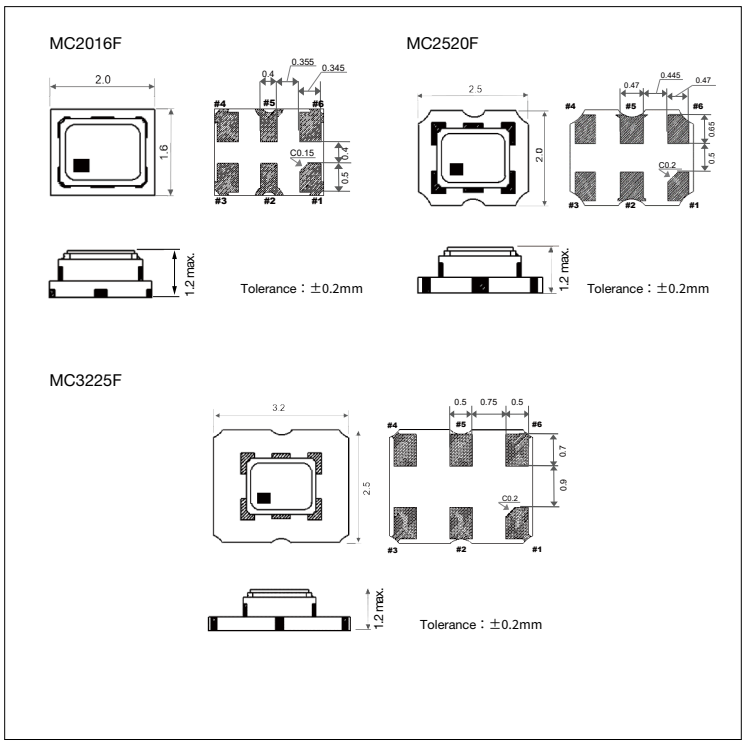
⑤ Frequency Tolerance (See Table 1)
⑥Symmetry/ INH Function
⑦Individual Specification
(STD Specification is “00”.)

Packaging Tape & Reel

MC3225F/ MC2520F/ MC2016F	2000 pcs./ reel

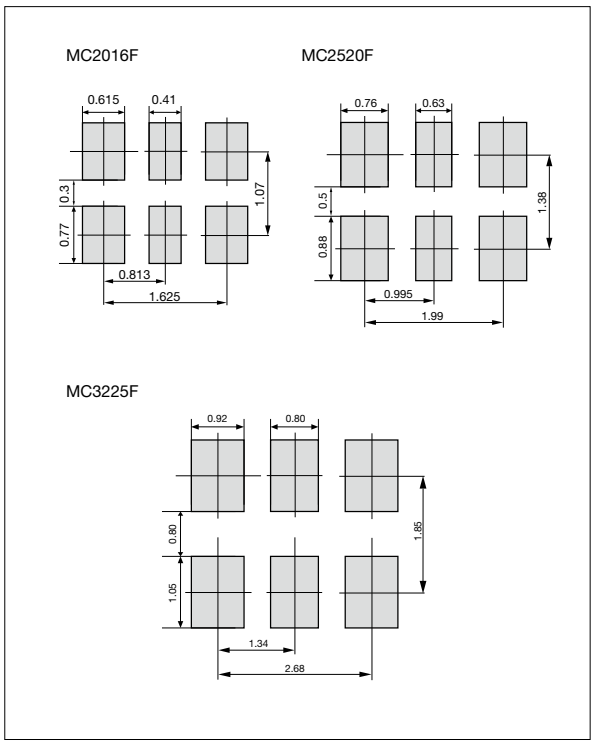
Dimensions

(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

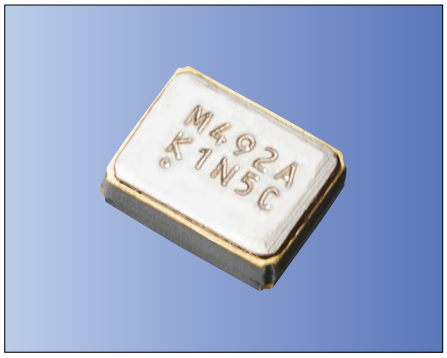
Item	Symbol	Conditions		Specifications	Units
Output Frequency Range	fo			100/125/156.25	MHz
Frequency Tolerance	f_tol	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25° C), Shock and vibration		See Table 1	$\times 10^{-6}$
Storage Temperature 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	Vcc	@+2.5V		+2.375 to +2.625	V
		@+3.3V		+3.135 to +3.465	
Current Consumption	Icc			46 max.	mA
Stand-by Current	I_std			30 max.	µA
Symmetry	SYM	50ohm @Cross Point output swing		50±5	%
Rise/ Fall Tim (20% Vcc to 80% Vcc)	Tr/ Tf	50ohm/+0.175V to +0.525V		0.6 max.	ns
Low Level Output Voltage	VOL			−0.15 to +0.15	V
High Level Output Voltage	VOH			+0.60 to +0.90	V
Output Load	—	HCSL Output		50	ohm
Low Level Input Voltage	VIL			30% Vcc max.	V
High Level Input Voltage	VIH			70% Vcc min.	V
Disable Time	t_dis			200 max.	ns
Enable Time	t_ena			10 max.	ms
Start-up Time	t_str	@Minimum operating voltage to be 0 sec.		10 max.	ms
Deterministic Jitter[Note1]	DJ	DJ pk-pk		2 max.	ps
1Sigma Jitter[Note1]	JSigma			4 max.	ps
Peak to Peak Jitter[Note1]	JPK-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”

Temperature Compensated Crystal Oscillators (TCXO, VCTCXO)

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

- Consumer Products
- Automotive (ITS, IVI, Car Navigation, Infotainment etc.)
- Wireless Comm. (Mobile Communications, W-LAN, Low power radio communications, GNSS Unit)
- Industrial Equipment

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

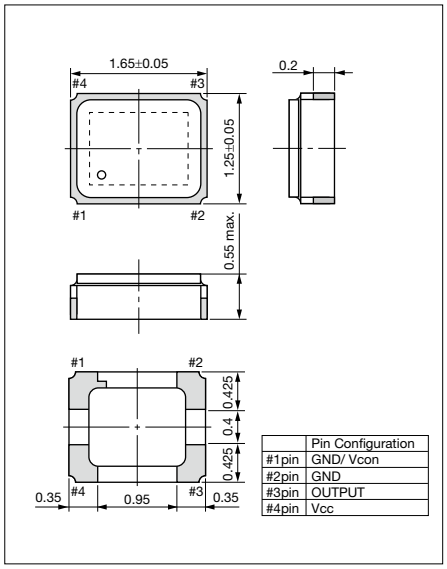
Packaging (Tape & Reel 18000 pcs./ reel)

Specifications

Item	Symbol	Conditions	Min.	Max.	Unit
Output Frequency Range	fo	Standard Output Frequency: 19.2 / 26.0 / 38.4 / 48.0 / 52.0	19.2	52.0	MHz
Frequency Tolerance	$f_{\_tol}$	vs Temperature	− 0.5/ − 2	+0.5/ +2	× 10^{-6}
		vs Load	− 0.2	+0.2	
		vs Voltage	− 0.2	+0.2	
Frequency Aging	$f_{\_age}$	Per Year	− 1	+1	× 10^{-6}
Storage Temperature Range	$T_{\_stg}$		− 40	+85	° C
Operating Temperature Range	$T_{\_use}$		− 30	+85	° C
Voltage Control Range	$f_{\_cont}$	Positive	± 8	± 15	× 10^{-6}
Supply Voltage	Vcc		1.68	3.63	V
Output Level	Vpp	Clipped Sine*, Load: 10k ohm / / 10pF	0.8	—	Vp − p
Current Consumption	Icc		—	2	mA
Harmonics	—		—	− 5	dBc

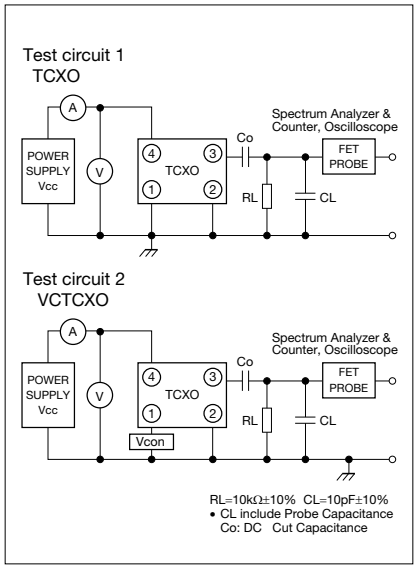
* : A DC-cut capacitor is not embedded in this crystal oscillator. Connect a DC-cut capacitor (≥ 1nF) to the line-out terminal of the oscillator.
* Please contact us for other specifications.

Dimensions (Unit: mm)

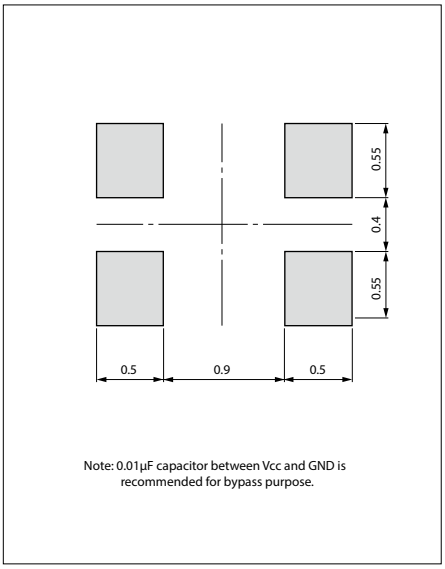


	Pin Configuration
#1pin	GND/ Vcon
#2pin	GND
#3pin	OUTPUT
#4pin	Vcc

Test Circuit

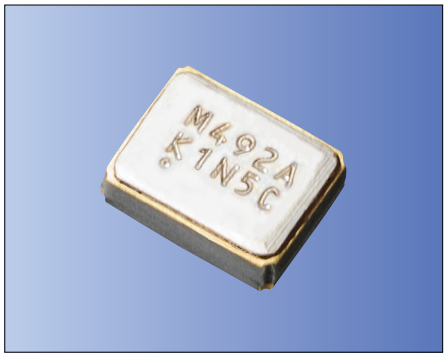


Recommended Land Pattern (Unit: mm)



Note: 0.01μF capacitor between Vcc and GND is recommended for bypass purpose.

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

- Consumer Products
- Automotive (ITS, IVI, Car Navigation, Infotainment etc.)
- Wireless Comm. (Mobile Communications, Wireless modules, GNSS Unit)
- Industrial Equipment

How to Order

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

① Series

KT1612A	1612 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

12	1.2V

⑦ Disable Function

N	With Disable Function

⑧ Individual Specification

⑨ Low Voltage Drive Type

B/Y	Low Voltage Drive

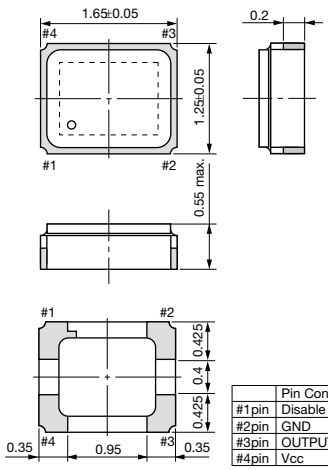
Packaging (Tape & Reel 18000 pcs./ reel)

Specifications

Item	Symbol	Conditions	Min.	Max.	Units
Output Frequency Range	fo	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	Vcc		1.1	2.0	V
Output Level	Vpp	Clipped Sine*, Load: 10k ohm / / 10pF	0.8	—	Vp − p
Current Consumption	Icc		—	2.5	mA
Harmonics	—		—	− 5	dBc

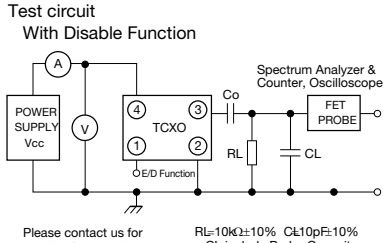
* : A DC-cut capacitor is not embedded in this crystal oscillator. Connect a DC-cut capacitor (≥ 1nF) to the line-out terminal of the oscillator.
* Please contact us for other specifications.

Dimensions (Unit: mm)



	Pin Configuration
#1pin	Disable Function
#2pin	GND
#3pin	OUTPUT
#4pin	Vcc

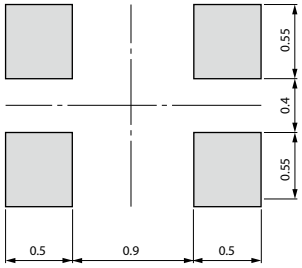
Test Circuit



Please contact us for details of a test circuit with Enable/Disable.

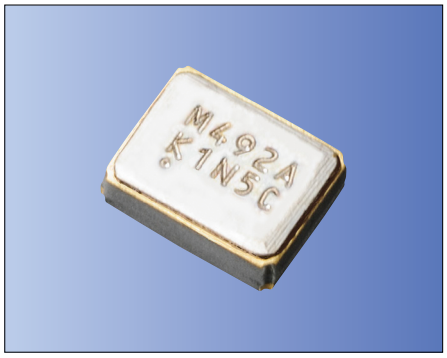
RL=10kΩ±10% CL=10pF±10%
• CL include Probe Capacitance
Co: DC Cut Capacitance

Recommended Land Patter (Unit: mm)



Note: 0.01μF capacitor between Vcc and GND is recommended for bypass purpose.

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



AEC-Q200 PSL: R4Y

RoHS Compliant MSL1

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. : ± 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

- Consumer Products
- Automotive (ITS, IVI, Car Navigation, Infotainment etc.)
- Wireless Comm. (Mobile Communications, Wireless modules, GNSS Unit, Wi-Fi 6 (IEEE802.11ax))
- Industrial Equipment (Networking equipments)

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	± 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

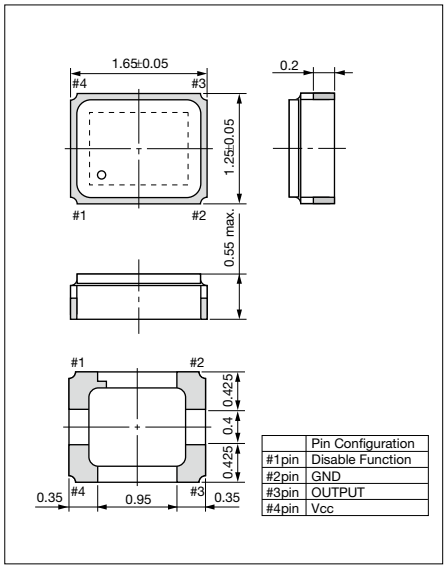
Packaging (Tape & Reel 18000 pcs./ reel)

Specifications

Item	Symbol	Conditions	Min.	Max.	Units
Output Frequency Range	fo	Standard Output Frequency: 19.2 / 26.0 / 38.4 / 48.0 / 52.0 / 76.8	19.2	76.8	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	Vcc		1.68	3.63	V
Output Level	Vpp	Clipped Sine*, Load: 10k ohm / / 10pF	0.8	—	Vp − p
Current Consumption	Icc		—	5.6	mA
Harmonics	—		—	− 5	dBc

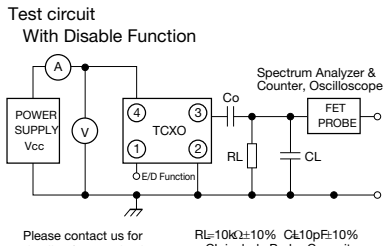
* : A DC-cut capacitor is not embedded in this crystal oscillator. Connect a DC-cut capacitor (≥ 1nF) to the line-out terminal of the oscillator.
* Please contact us for other specifications.

Dimensions (Unit: mm)



	Pin Configuration
#1pin	Disable Function
#2pin	GND
#3pin	OUTPUT
#4pin	Vcc

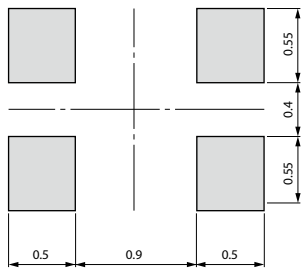
Test Circuit



Please contact us for details of a test circuit with Enable/Disable.

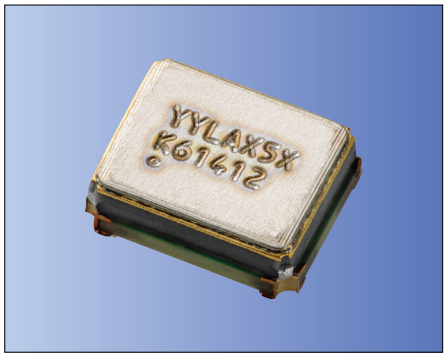
RL=10kΩ±10% CL=10pF±10%
• CL include Probe Capacitance
Co: DC Cut Capacitance

Recommended Land Patter (Unit: mm)



Note: 0.01μF capacitor between Vcc and GND is recommended for bypass purpose.

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

- Consumer Products
- Automotive (ITS, IVI, Car Navigation, Infotainment etc.)
- Wireless Comm. (Mobile Communications, W-LAN, Low power radio communications, GNSS Unit)
- Industrial Equipment

How to Order

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

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

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

④ Lower Operating Temp.

C	− 30° C
E	− 20° C
G	− 10° C

⑤ Upper Operating Temp.

W	+85° C
V	+80° C
U	+75° C

⑥ Supply Voltage

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

⑦ Voltage Control Function

T	TCXO
Spec. Code*	VCTCXO

*Please contact us for Spec. Code.

⑧ Individual Specification

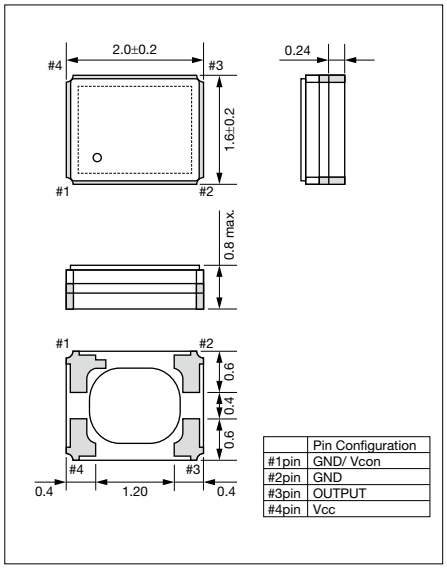
Packaging (Tape & Reel 15000 pcs./ reel)

Specifications

Item	Symbol	Conditions	Min.	Max.	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	Vcc		1.68	3.63	V
Output Level	Vpp	Clipped Sine*, Load: 10k ohm / / 10pF	0.8	—	Vp-p
Current Consumption	Icc		—	2	mA
Harmonics	—		—	− 5	dBc

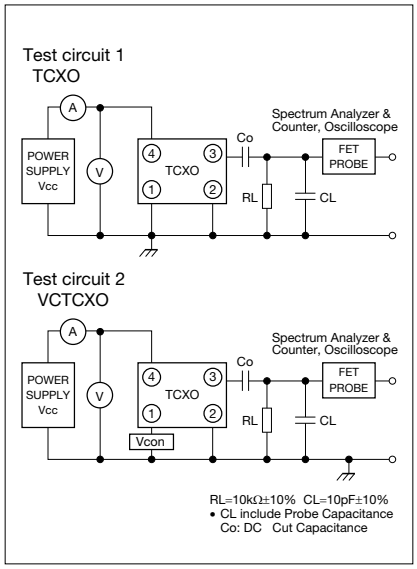
* : A DC-cut capacitor is not embedded in this crystal oscillator. Connect a DC-cut capacitor (≥ 1nF) to the line-out terminal of the oscillator.
* Please contact us for other specifications.

Dimensions (Unit: mm)

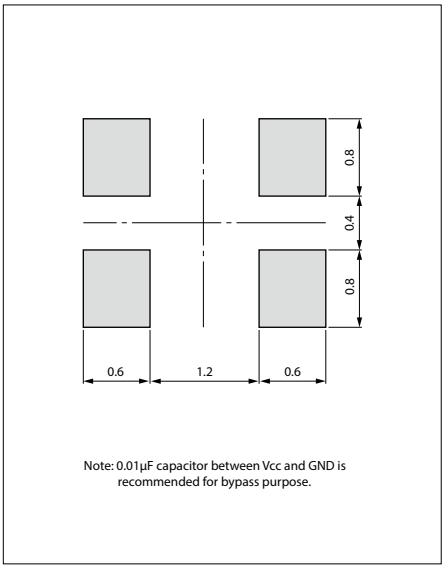


	Pin Configuration
#1pin	GND/ Vcon
#2pin	GND
#3pin	OUTPUT
#4pin	Vcc

Test Circuit

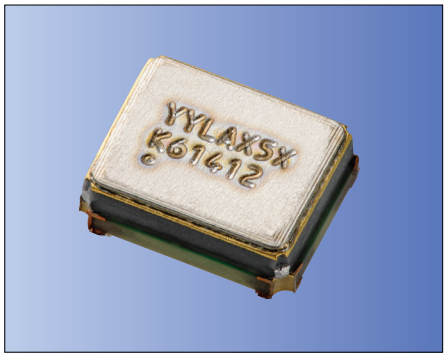


Recommended Land Pattern (Unit: mm)



Note: 0.01μF capacitor between Vcc and GND is recommended for bypass purpose.

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



PSL: R4Y

RoHS Compliant

MSL1

Features

- 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

- Consumer Products
- Automotive (ITS, IVI, Car Navigation, Infotainment etc.)
- Wireless Comm. (Mobile Communications, Wireless modules, GNSS Unit)
- Industrial Equipment

How to Order

KT2016K 26000 □ □ □ □□ N x Y
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

12	1.2V

⑦ Disable Function

N	With Disable Function

⑧ Individual Specification

⑨ Low Voltage Drive Type

B/Y	Low Voltage Drive

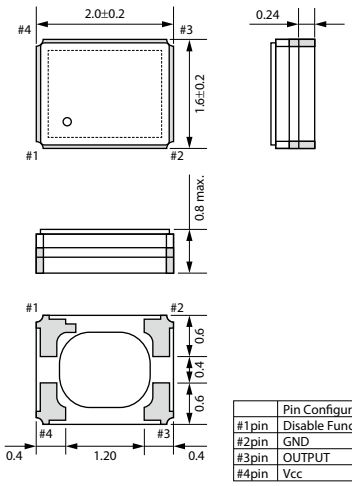
Packaging (Tape & Reel 15000 pcs./ reel)

Specifications

Item	Symbol	Conditions	Min.	Max.	Units
Output Frequency Range	fo	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	Vcc		1.1	2.0	V
Output Level	Vpp	Clipped Sine*, Load: 10k ohm / / 10pF	0.8	—	Vp − p
Current Consumption	Icc		—	2.5	mA
Harmonics	—		—	− 5	dBc

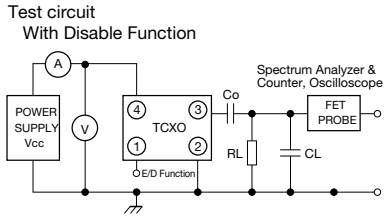
* : A DC-cut capacitor is not embedded in this crystal oscillator. Connect a DC-cut capacitor (≥ 1nF) to the line-out terminal of the oscillator.
* Please contact us for other specifications.

Dimensions (Unit: mm)



	Pin Configuration
#1pin	Disable Function
#2pin	GND
#3pin	OUTPUT
#4pin	Vcc

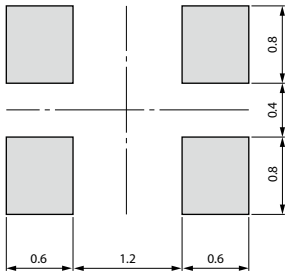
Test Circuit



Please contact us for details of a test circuit with Enable/Disable.

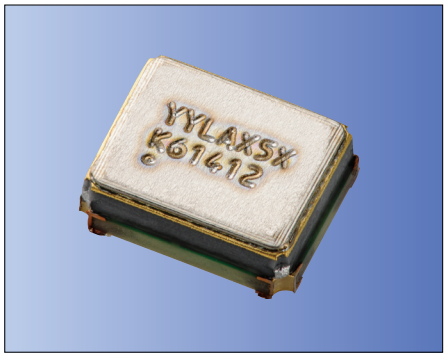
RL=10kΩ±10% CL≥10pF±10%
• CL include Probe Capacitance
Co: DC Cut Capacitance

Recommended Land Patter (Unit: mm)



Note: 0.01μF capacitor between Vcc and GND is recommended for bypass purpose.

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



AEC-Q200 PSL: R4Y

RoHS Compliant MSL1

Features

- 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

- Consumer Products
- Automotive (ITS, IVI, Car Navigation, Infotainment etc.)
- Wireless Comm. (Mobile Communications, Wireless modules, GNSS Unit, Wi-Fi 6 (IEEE802.11ax))
- Industrial Equipment (Networking equipments)

How to Order

KT2016K 26000 □ □ □ □□ N x G

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

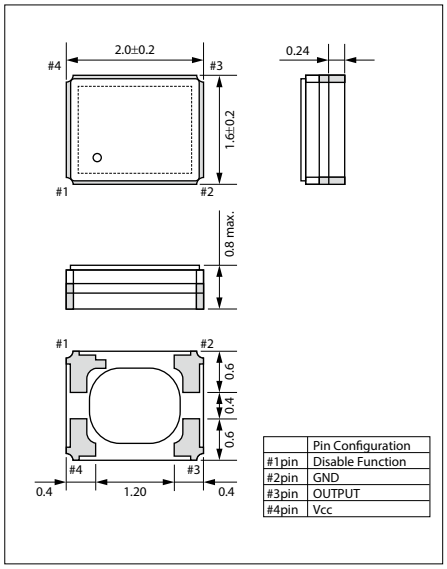
Packaging (Tape & Reel 18000 pcs./ reel)

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	Vcc		1.68	3.63	V
Output Level	Vpp	Clipped Sine*, Load: 10k ohm / / 10pF	0.8	—	Vp − p
Current Consumption	Icc		—	5.6	mA
Harmonics	—		—	− 5	dBc

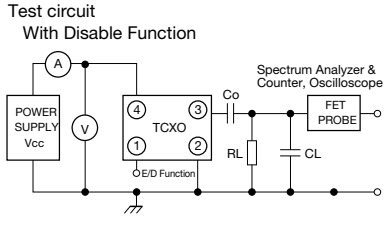
* : A DC-cut capacitor is not embedded in this crystal oscillator. Connect a DC-cut capacitor (≥ 1nF) to the line-out terminal of the oscillator.
* Please contact us for other specifications.

Dimensions (Unit: mm)



	Pin Configuration
#1pin	Disable Function
#2pin	GND
#3pin	OUTPUT
#4pin	Vcc

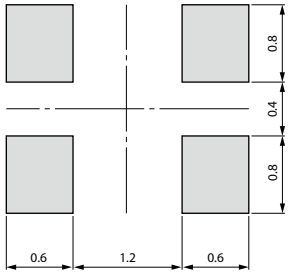
Test Circuit



Please contact us for details of a test circuit with Enable/Disable.

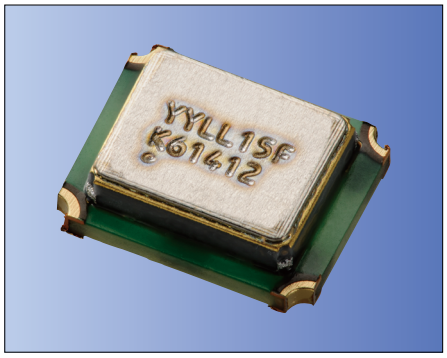
RL=10kΩ±10% CL=10pF±10%
• CL include Probe Capacitance
Co: DC Cut Capacitance

Recommended Land Patter (Unit: mm)



Note: 0.01μF capacitor between Vcc and GND is recommended for bypass purpose.

Surface Mount Type TCXO KT2520K Series 2.5 × 2.0mm



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

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

- Consumer Products
- Automotive (ITS, IVI, Car Navigation, Infotainment etc.)
- Wireless Comm. (Mobile Communications, W-LAN, Low power radio communications, GNSS Unit)
- Industrial Equipment

How to Order

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

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

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

④ Lower Operating Temp.

C	− 30° C
E	− 20° C
G	− 10° C

⑤ Upper Operating Temp.

W	+85° C
V	+80° C
U	+75° C

⑥ Supply Voltage

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

⑦ Voltage Control Function

T	TCXO
Spec. Code*	VCTCXO

*Please contact us for Spec. Code.

⑧ Individual Specification

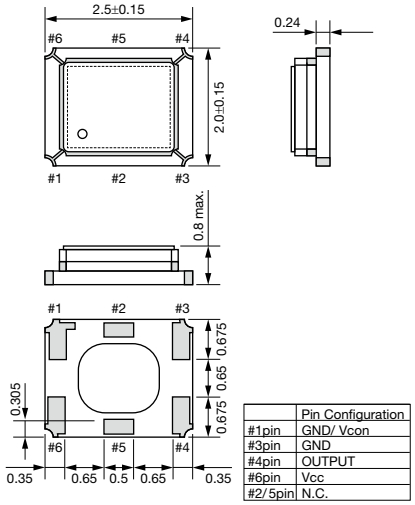
Packaging (Tape & Reel 12000 pcs./ reel)

Specifications

Item	Symbol	Conditions	Min.	Max.	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	Vcc		1.68	3.63	V
Output Level	Vpp	Clipped Sine*, Load: 10k ohm / / 10pF	0.8	—	Vp-p
Current Consumption	Icc		—	2	mA
Harmonics	—		—	− 5	dBc

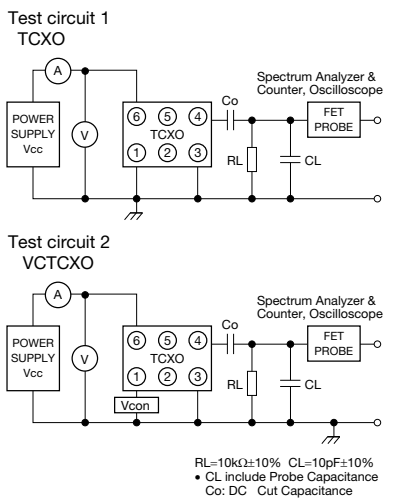
* : A DC-cut capacitor is not embedded in this crystal oscillator. Connect a DC-cut capacitor (≥ 1nF) to the line-out terminal of the oscillator.
* Please contact us for other specifications.

Dimensions (Unit: mm)

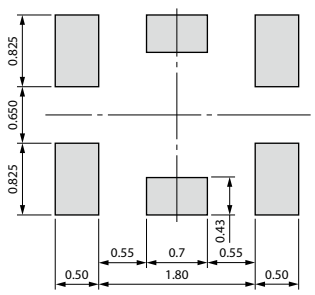


	Pin Configuration
#1pin	GND/ Vcon
#3pin	GND
#4pin	OUTPUT
#6pin	Vcc
#2/ 5pin	N.C.

Test Circuit



Recommended Land Pattern (Unit: mm)



Note: 0.01μF capacitor between Vcc and GND is recommended for bypass purpose.

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.

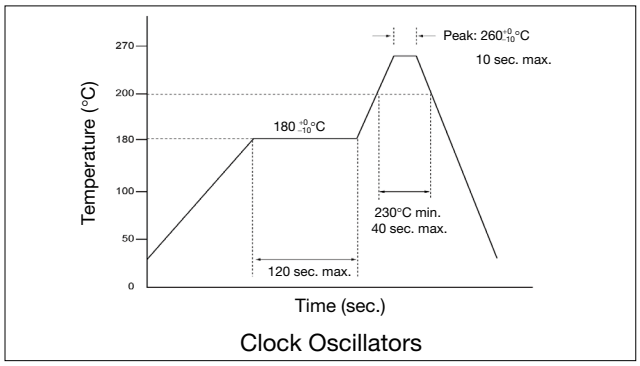
2. Cleaning

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

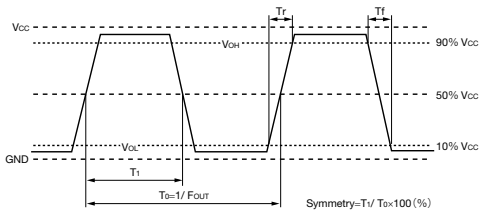
Since the long hour high temperature and low temperature storage, as well as the storage at high humidity are causes of deterioration in frequency accuracy and solderability.
Parts should be stored in temperature range of − 5 to +40° C, humidity 40 to 60% RH, and avoid direct sunlight. Then use within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

6. In order to use clock oscillators

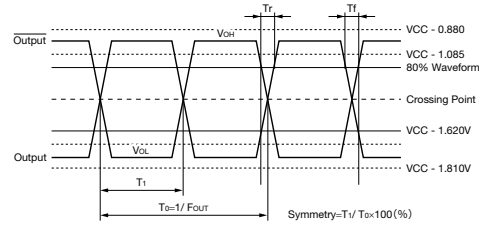
(1) The miniature oscillator for the clock utilizes an IC and incorporates a protective circuit against static electricity. However, exercise care in the same manner as for a normal IC.
(2) Internal capacitor is not provided in the power supply section (+DC-GND).
To serve as overimpressed voltage and 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

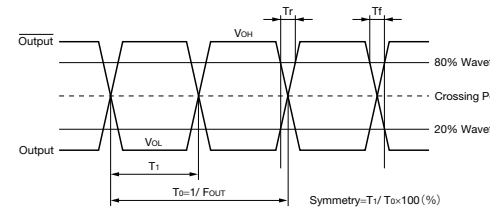
[CMOS Output]



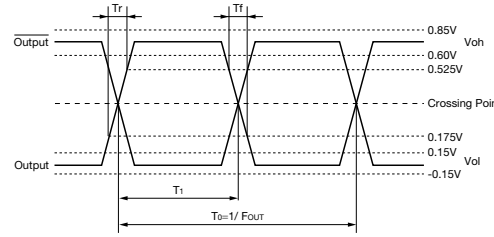
[LV-PECL Output]



[LVDS Output]

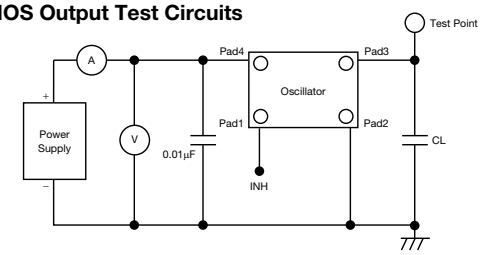


[HCSL-Output]



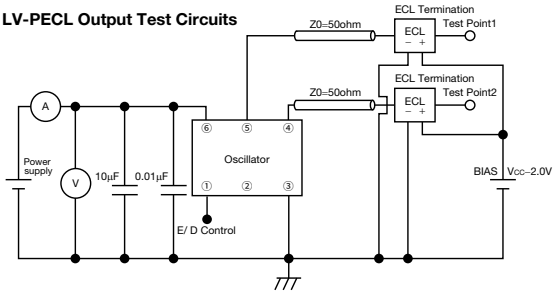
Test Circuits

CMOS Output Test Circuits

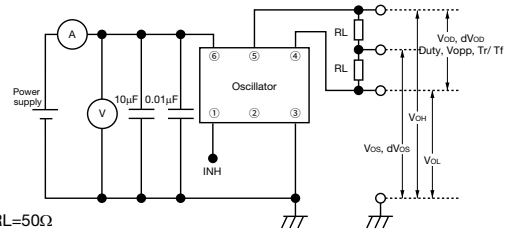


Note) Maximum load (Includes capacitances of fixture and probe)

LV-PECL Output Test Circuits

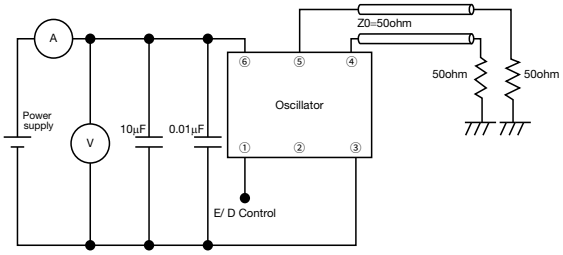


LVDS Output Test Circuits



Note) RL=50Ω

HCSL Output Test Circuits



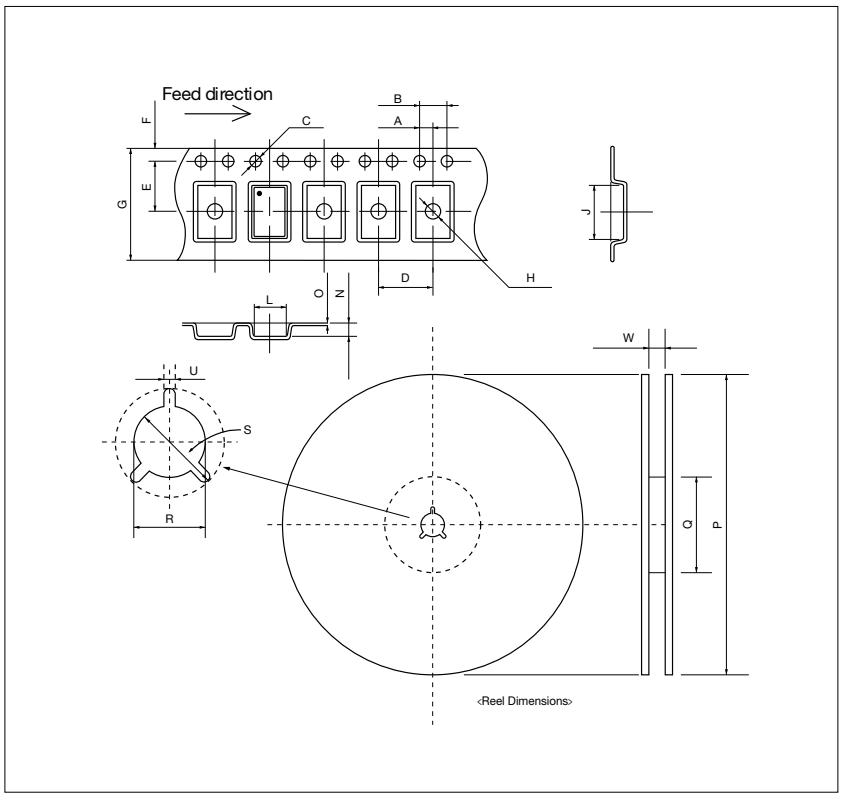
Tape & Reel Specifications

■ 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
TAPE	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	Φ 1.5+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
REEL	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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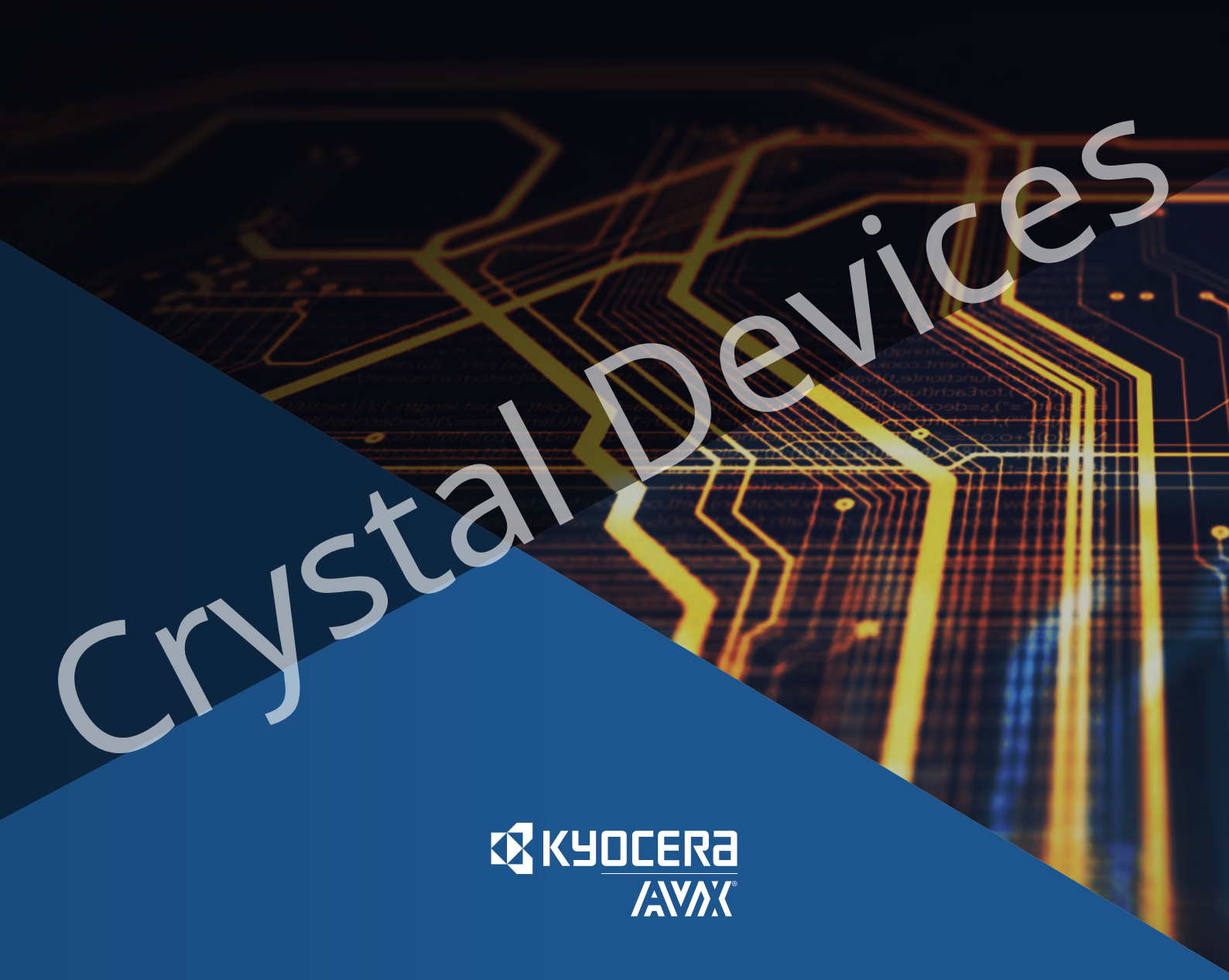

Crystal Devices

KYOCERA AVX

京セラ株式会社
KYOCERA Corporation

当カタログに記載の情報は 2025 年 10 月時点のものです。
The information contained in this catalog is current as of October 2025.