KYOCERA

2024

Crystal Devices

KYOCERA AVX

Products			Dimensions (mm)			Weight (g)	Applications				
Product Type	Page No.	Part Number	L	W	T (max.)		Digital Electronics OA, PC Peripherals Amusement	Car Electronics, ITS, Car Audio, Car Navigation	Car Electronics (ECU, Air Bag, ABS, TPMS etc.)	Mobile Comm. Wireless LAN Dedicatedd Short Range Comm.(DSRC)	Industrial Use (Broadcast, Medical, Base Station etc.)
Crystal Units	3	CT1612RB	1.6	1.2	0.65	0.0052				○	
	4	CT2016DB (Low Profile)	2.0	1.6	0.65	0.0076				○	
	4	CT2016DB	2.0	1.6	1.0	0.0109				○	
	5	CX1008SB	1.0	0.8	0.3	0.0010	○			○	
	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		○			
Temperature Compensated Crystal Oscillators (TCXO)	35	KT1612A (Low Voltage Drive)	1.65	1.25	0.55	0.0048				○	
	36	KT1612A (Low Phase Noise)	1.65	1.25	0.55	0.0048	○			○	○
	37	KT1612A	1.65	1.25	0.55	0.0040	○			○	○
	38	KT2016K	2.0	1.6	0.8	0.0070	○	○		○	○
	39	KT2520K	2.5	2.0	0.8	0.0080	○	○		○	○
	40	KT5032F	5.0	3.2	1.7	0.0669					○
	41	KT7050	7.0	5.0	1.7	0.1322					○

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	27.12 32 48 76.8	Yes	Yes	No	Yes	Yes		
CX1612DB	24 -------- 48	Yes	Yes	No	Yes	Yes		
CX2016DB	16 ---------- 50	Yes	Yes	No	Yes	Yes		
CX2016GR (for Automotive)	16 20	Yes	Yes	No	Yes	Yes		Yes
CX2016SA (for Automotive)	16 ---------- 50	Yes	Yes	No	Yes	Yes		Yes
CX3225CA (for Automotive)	12 ---------- 54	Yes	Yes	No	Yes	Yes		Yes
CX3225GA (for Automotive)	8 ---------- 40	Yes	Yes	No	Yes	Yes		Yes
CX3225GB	12 ---------- 54	Yes	Yes	No	Yes	Yes		
CX3225SA (for Automotive)	8 ---------- 40	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
KT1612A (Low Voltage Drive)	26 ---------- 52	No	Yes	No	No	Yes		
KT1612A (Low Phase Noise)	19.2 ---------- 76.8	No	Yes	No	No	Yes		
KT1612A	19.2 ---------- 76.8	No	Yes	No	No	Yes		
KT2016K	19.2 ---------- 52.0	No	Yes	No	No	Yes	Yes (option)	Yes
KT2520K	19.2 ---------- 52.0	No	Yes	No	No	Yes	Yes (option)	Yes
KT5032F	10 ---------- 44.8	Contact us	Yes	No	No	Yes		
KT7050	10 ---------- 44.8	Contact us	Yes	No	No	Yes		

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

1.6×1.2mm for Mobile Communications

RoHS Compliant

Features

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

Applications

- Mobile Communications, GNSS

How to Order

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

①Series
②Frequency
③Load Capacitance

B0	6 pF	—
C0	7 pF	—
D0	8 pF	Std.

④Frequency Tolerance

F	±10×10^{-6}	Std.
G	±15×10^{-6}	—

⑤Operating Temp. Range ⑥Frequency Temp. Stability

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

⑦Individual Specification

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	μW	100μW max.
Operating Temp. Range	T_{use}	−30 to +85	°C	
Storage Temp. Range	T_{stg}	−40 to +105	°C	
Frequency Temp. Characteristics	f_{tem}	±12	×10^{-6}	
Thermistor Resistance	—	Table 2	ohm	25°C±3°C
Thermistor B-Constant	—	Table 3	K	25°C to 50°C

Please contact us for other specifications.

Table 1 Motional Series Resistance

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

Table 2 Thermistor Resistance

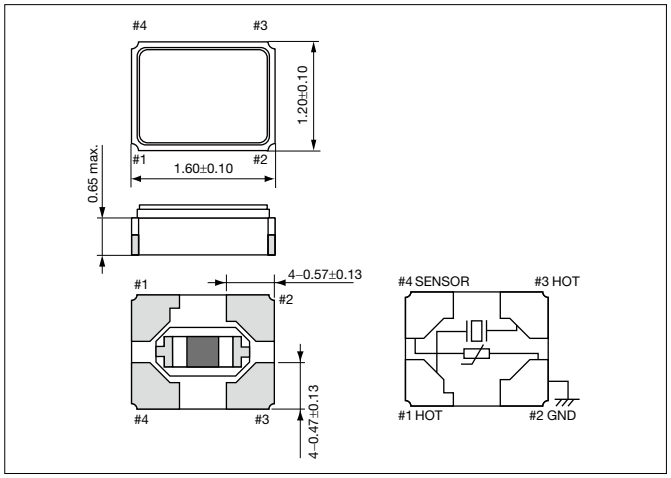
Resistance	Specification
100kΩ	±1%

Table 3 Thermistor B-Constant

B-Constant	Specification
4250K	±1%

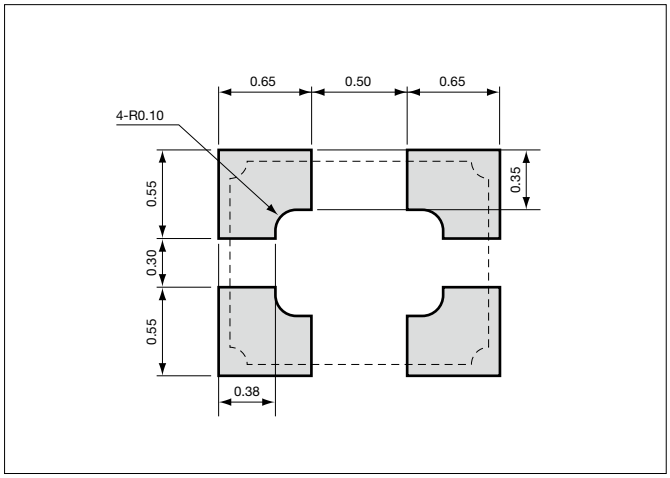
Dimensions

(Unit: mm)



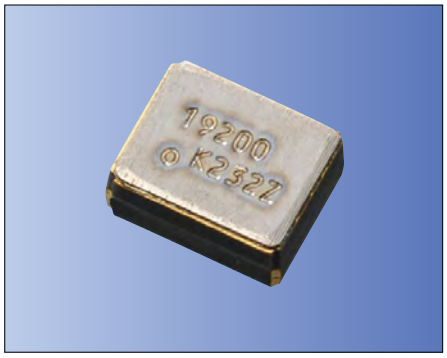
Recommended Land Pattern

(Unit: mm)



Crystal Units

2.0×1.6mm for Mobile Communications



RoHS Compliant

Features

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

Applications

- Mobile Communications, GNSS

How to Order

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

①Series
②Frequency
③Load Capacitance

B0	6 pF	—
C0	7 pF	Std.

④Frequency Tolerance

F	±10×10⁻⁶	Std.
G	±15×10⁻⁶	—

⑤Operating Temp. Range ⑥Frequency 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)

⑦Individual Specification

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	μW	100μW max.
Operating Temp. Range	T_{use}	−30 to +85	°C	
Storage Temp. Range	T_{stg}	−40 to +105	°C	
Frequency Temp. Characteristics	f_{tem}	±12	×10⁻⁶	Freq. deviation from the value at 32°C
Thermistor Resistance	—	Table 2	ohm	25°C
Thermistor B-Constant	—	Table 3	K	25°C to 50°C

Please contact us for other specifications.

Table 1 Motional Series Resistance

Frequency Range	Motional Series Resistance
19200/ 38400kHz	80 Ω max.

Table 2 Thermistor Resistance

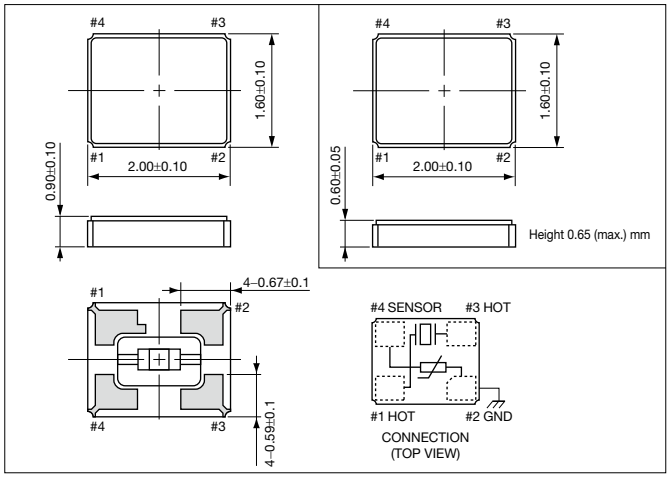
Resistance	Specification
100kΩ	±1%

Table 3 Thermistor B-Constant

B-Constant	Specification
4250K	±1%

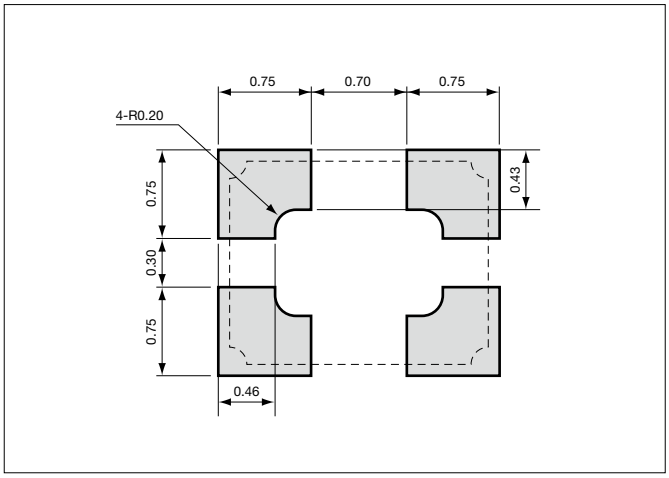
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)



Crystal Units

1.0×0.8mm for Consumer Products/ Mobile Communications

RoHS Compliant

Features

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

Applications

- Mobile Communications

How to Order

CX1008SB 37400 □□ □ □ □ □□
① ② ③ ④ ⑤ ⑥ ⑦

①Series
②Frequency
③Load Capacitance
④Frequency Tolerance

B0	6 pF	—
C0	7 pF	Std.

F	±10×10^{-6}	Std.
G	±15×10^{-6}	—

⑤Operating Temp. Range ⑥Frequency Temp. Stability

LH	−30 to +85°C	±12×10^{-6}

⑦Individual Specification

Packaging (Tape & Reel 21000 pcs./ reel)

Specifications

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

Please contact us for other specifications.

Table 1 Motional Series Resistance

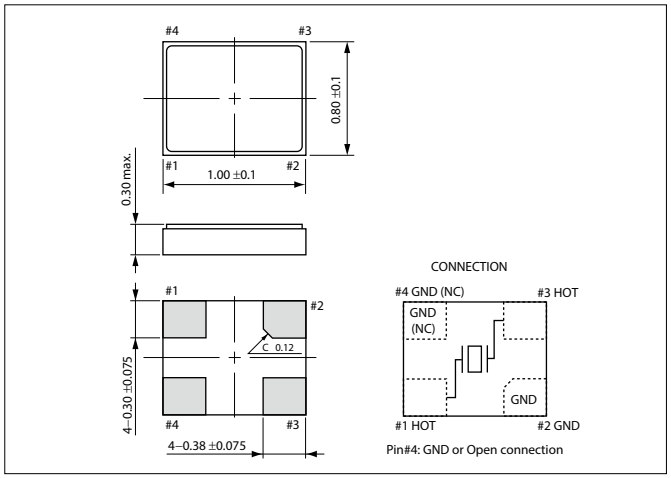
Frequency Range	Motional Series Resistance
f_{nom}=37400 to 80000kHz	60 Ω max.

Table 2 Level of Drive

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

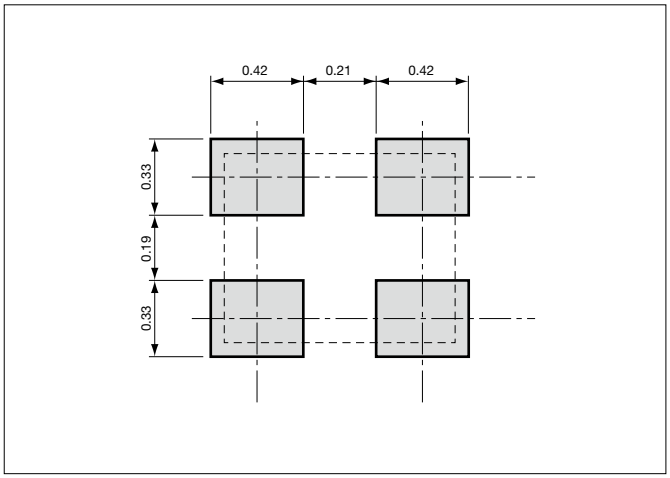
Dimensions

(Unit: mm)



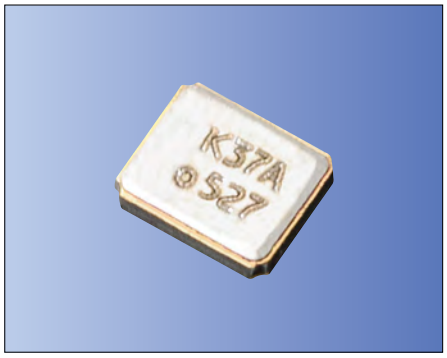
Recommended Land Pattern

(Unit: mm)



Crystal Units

1.2×1.0mm for Consumer Products/ Mobile Communications



RoHS Compliant

Features

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

Applications

- Mobile Communications, Bluetooth®, Wireless LAN

* Bluetooth® Trademarks are owned by Bluetooth SIG, Inc.

How to Order

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

①Series
②Frequency
③Load Capacitance
④Frequency Stability

D0	8 pF
H0	12 pF

F	±10×10⁻⁶
G	±15×10⁻⁶

⑤Operating Temp. Range ⑥Frequency Temp. Stability

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

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

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

Specifications

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

Please contact us for other specifications.

Table 1 Motional Series Resistance

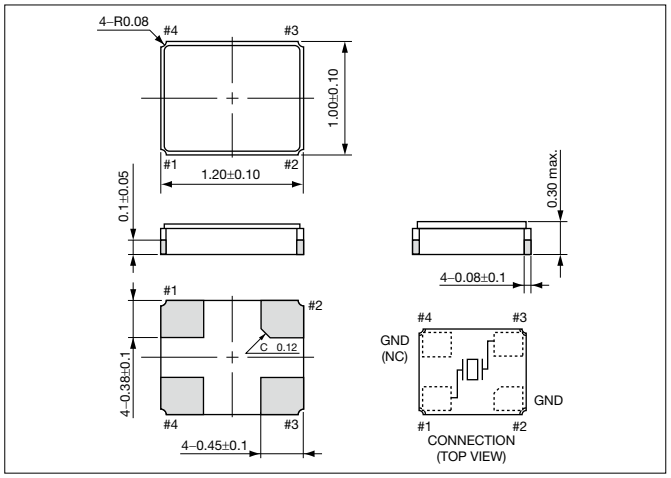
Frequency Range	Motional Series Resistance
f_{nom}=37400/ 40000/ 52000/ 80000kHz	60 Ω max.

Table 2 Level of Drive

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

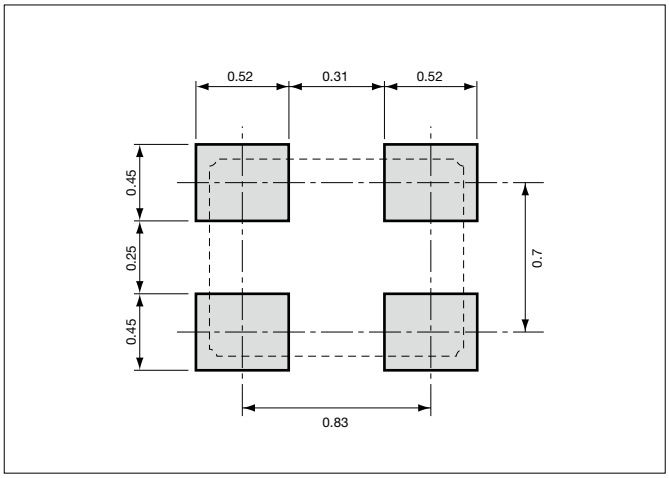
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)



1.2×1.0mm for Consumer Products/ Mobile Communications

RoHS Compliant

Features

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

Applications

- Mobile Communications, Bluetooth®, Wireless LAN

* Bluetooth® Trademarks are owned by Bluetooth SIG, Inc.

How to Order

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

①Series
②Frequency
③Load Capacitance
④Frequency Stability

B0	6 pF
D0	8 pF

F	±10×10⁻⁶
G	±15×10⁻⁶

⑤Operating Temp. Range ⑥Frequency Temp. Stability

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

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

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

Specifications

Item	Symbol	Specification	Unit	Remarks
Frequency Range	f_{nom}	27120 / 32000 / 48000 / 76800	kHz	
Overtone Order	OT	Fundamental	—	
Load Capacitance	CL	8	pF	
Frequency Tolerance	f_{tol}	±10	×10⁻⁶	25°C±3°C
Motional Series Resistance	R1	Table 1	ohm	
Drive Level	DL	Table 2	μW	
Operating Temp. Range	T_{use}	−30 to +85	°C	
Storage Temp. Range	T_{stg}	−40 to +105	°C	
Frequency Temp. Characteristics	f_{tem}	±12	×10⁻⁶	Freq. deviation from the value at 25°C

Please contact us for other specifications.

Table 1 Motional Series Resistance

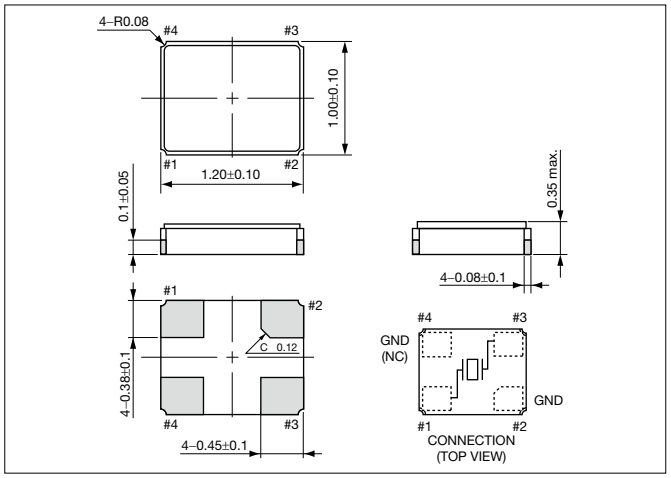
Frequency Range	Motional Series Resistance
f_{nom}=27120kHz	100 Ω max.
f_{nom}=32000kHz	60 Ω max.

Table 2 Level of Drive

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

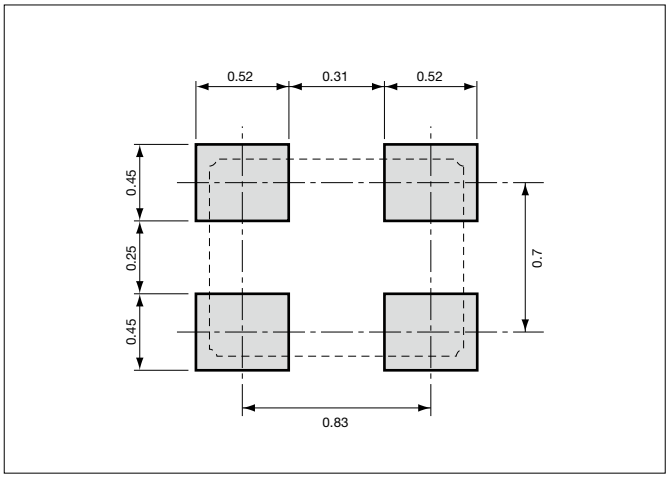
Dimensions

(Unit: mm)

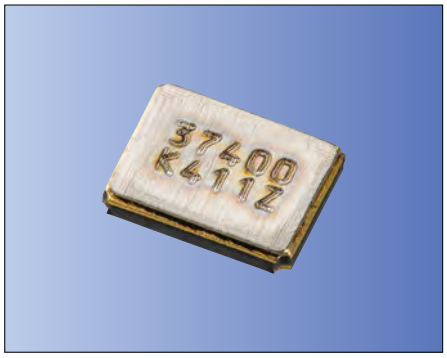


Recommended Land Pattern

(Unit: mm)



1.6×1.2mm for Consumer Products/ Mobile Communications



RoHS Compliant

Features

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

Applications

- Smartphone (Bluetooth®, Wireless LAN, NFC)
- Wearable devices
- Short range wireless (LPWA)

* Bluetooth® Trademarks are owned by Bluetooth SIG, Inc.

How to Order

CX1612DB 24000 □□ G L L CC
① ② ③ ④ ⑤ ⑥ ⑦

①Series
②Frequency
③Load Capacitance

D0	8 pF

④Frequency Tolerance

G	±15×10⁻⁶

⑤Operating Temp. Range ⑥Frequency Temp. Stability

LL	−30 to +85°C	±20×10⁻⁶

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

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

Specifications

Item	Symbol	Specification	Unit	Remarks
Frequency Range	f_{nom}	24 / 26 / 32 / 37.4 / 38.4 / 40 / 48	MHz	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	$\times10^{-6}$	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 +85	°C	
Frequency Temp. Characteristics	f_{tem}	±20	$\times10^{-6}$	Freq. deviation from the value at 25°C

Please contact us for other specifications.

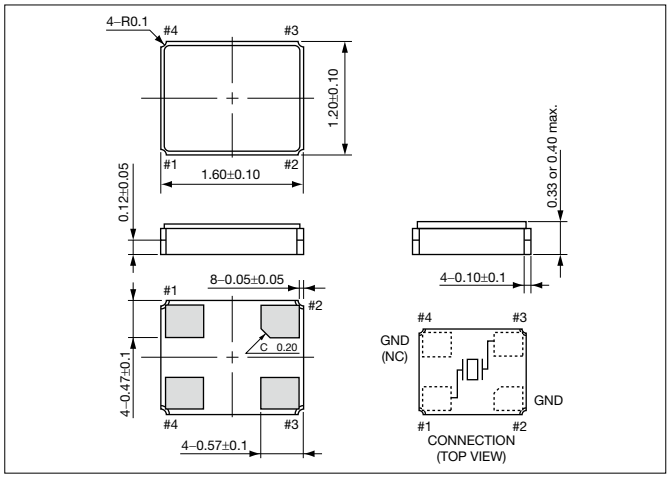
Table 1 Motional Series Resistance

Please contact us for other frequency range.

Frequency Range	Motional Series Resistance
24MHz	150 Ω max.
38.4MHz	80 Ω max.
48MHz	50 Ω max.

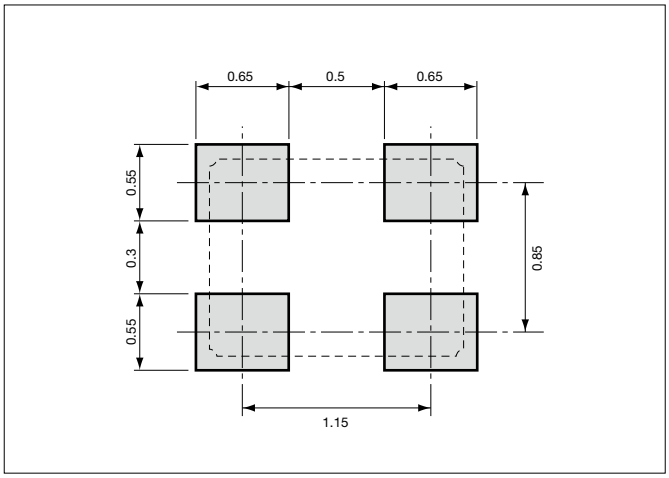
Dimensions

(Unit: mm)

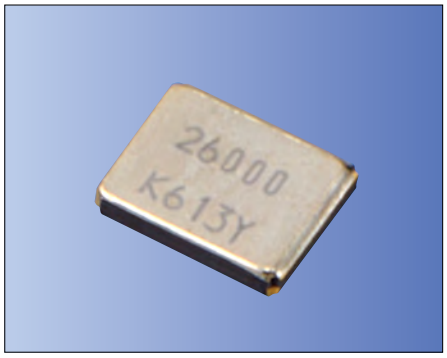


Recommended Land Pattern

(Unit: mm)



2.0×1.6mm for Consumer Products



RoHS Compliant

Features

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

Applications

- Digital Electronics
- Consumer Products

How to Order

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

①Series
②Frequency
③Load Capacitance

D0	8 pF

④Frequency Tolerance

G	±15×10⁻⁶

⑤Operating Temp. Range ⑥Frequency Temp. Stability

LL	−30 to +85°C	±20×10⁻⁶

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

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

Specifications

Item	Symbol	Specification	Unit	Remarks
Frequency Range	f_{nom}	16 / 20 / 24 / 25 / 26 / 27 / 30 / 32 / 37.4 / 38.4 / 40 / 48 / 50	MHz	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.)	μW	
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

Please contact us for other specifications.

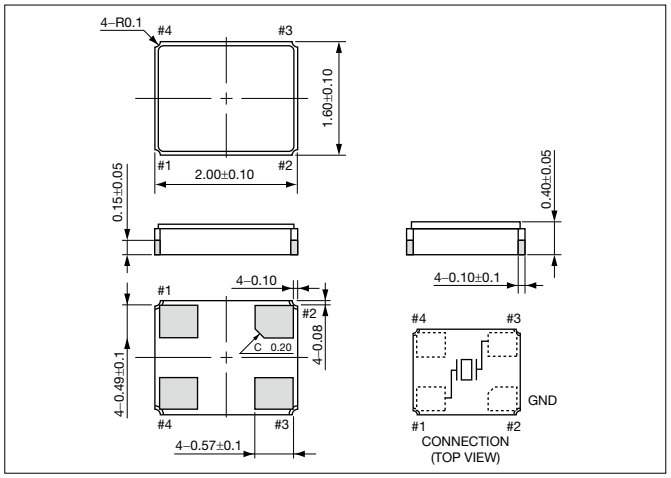
Table 1 Motional Series Resistance

Please contact us for other frequency range.

Frequency	Motional Series Resistance
16MHz	200 Ω max.
20MHz	150 Ω max.
32MHz	60 Ω max.
50MHz	50 Ω max.

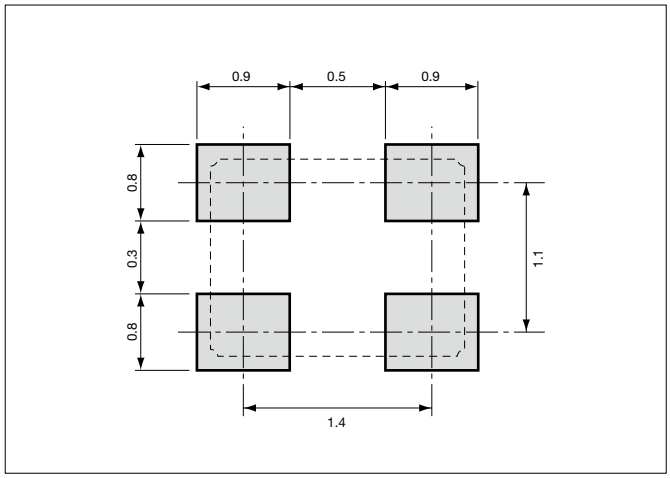
Dimensions

(Unit: mm)

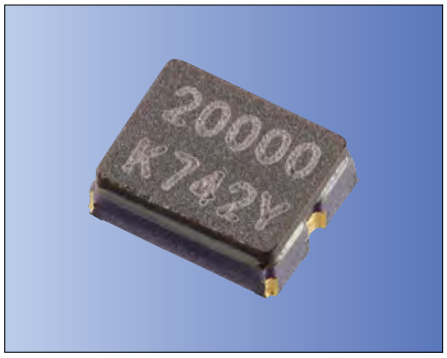


Recommended Land Pattern

(Unit: mm)



2.0×1.6mm for Automotive



AEC-Q200 RoHS Compliant

Features

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

- ECU
- Automotive Camera
- Radar

How to Order

CX2016GR ① 20000 ② D0 ③ G ④ T ⑤ V ⑥ CC ⑦

①Series
②Frequency
③Load Capacitance
④Frequency Tolerance

D0	8 pF	G	±15×10^{-6}

⑤Operating Temp. Range ⑥Frequency Temp. Stability

TV	–40 to +150°C	±150×10^{-6}

⑦Individual Specification
(STD Specification is "CC")

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

Specifications

Item	Symbol	Specification	Units	Remarks
Frequency Range	f_{nom}	16000 / 20000	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	Table 2	µW	
Operating Temp. Range	T_{use}	–40 to +150	°C	
Storage Temp. Range	T_{stg}	–40 to +150	°C	
Frequency Temp. Characteristics	f_{tem}	±150	×10^{-6}	Freq. deviation from the value at 25°C

Please contact us for other specifications.

Table 1 Motional Series Resistance

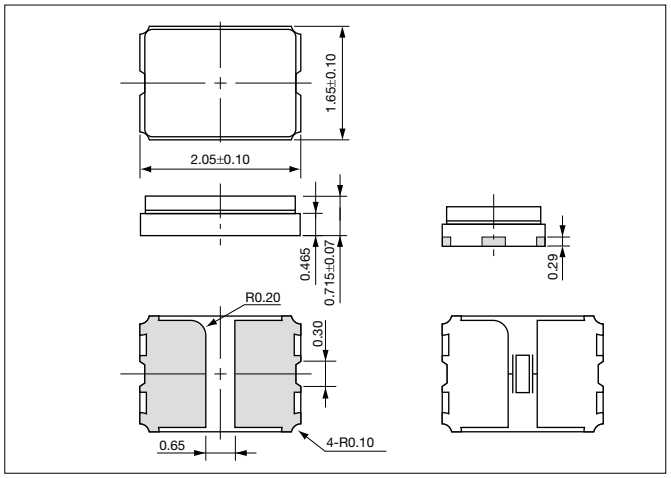
Frequency Range	Motional Series Resistance
16000kHz	300Ω max.
20000kHz	100Ω max.

Table 2 Level of Drive

Frequency Range	Level of Drive
16000, 20000kHz	10µW (200µW max.)

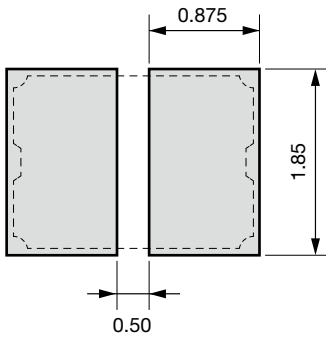
Dimensions

(Unit: mm)



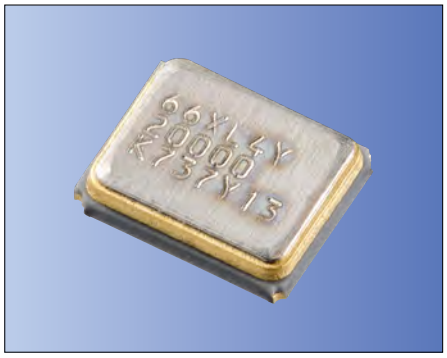
Recommended Land Pattern

(Unit: mm)



KYOCERA

2.0×1.6mm for Consumer Products/ Automotive



AEC-Q200 RoHS Compliant

Features

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

Applications

- ECU
- Automotive Camera
- Digital Electronics
- Consumer Products

How to Order

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

①Series
②Frequency
③Load Capacitance

D0	8 pF

④Frequency Tolerance

G	±15×10⁻⁶

⑤Operating Temp. Range ⑥Frequency Temp. Stability

SS	−40 to +125°C	±50×10⁻⁶
TW	−40 to +150°C	±200×10⁻⁶
LL	−30 to +85°C	±20×10⁻⁶

⑦Individual Specification

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

Specifications

Item	Symbol	Specification			Unit	Remarks
Frequency Range	f_{nom}	16 / 20 / 24 / 25 / 26 / 27 / 30 / 32 / 37.4 / 38.4 / 40 / 48 / 50			MHz	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

Please contact us for other specifications.

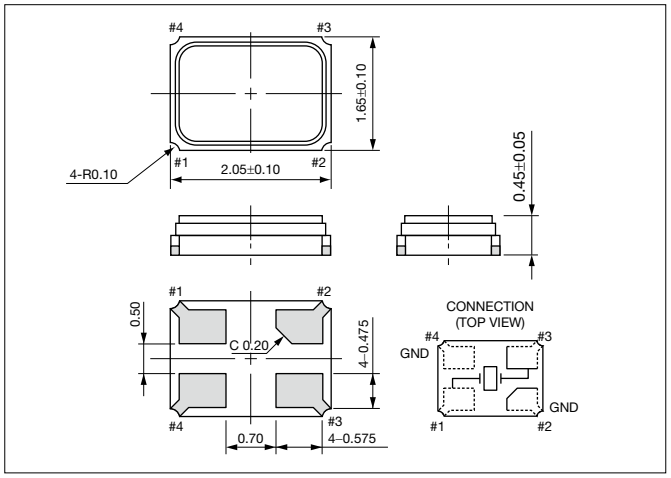
Table 1 Motional Series Resistance

Please contact us for other frequency range.

Frequency Range	Motional Series Resistance
16MHz	200 Ω max.
20MHz	150 Ω max.
32MHz	60 Ω max.
50MHz	50 Ω max.

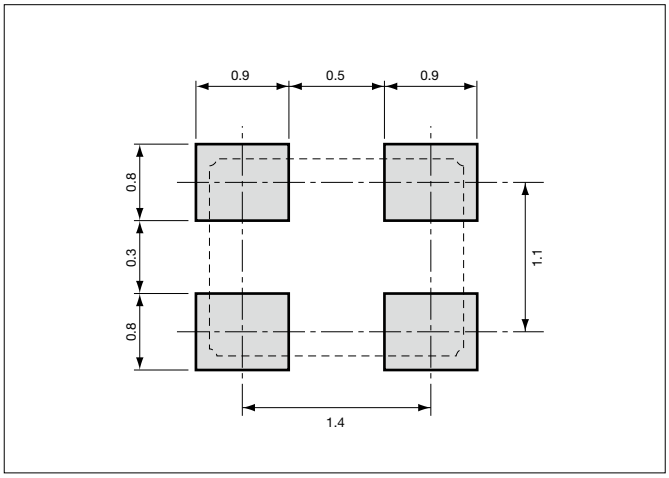
Dimensions

(Unit: mm)

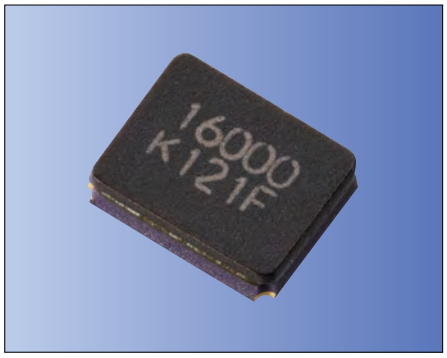


Recommended Land Pattern

(Unit: mm)



3.2×2.5mm for Automotive



AEC-Q200 RoHS Compliant

Features

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

Applications

- ECU
- High-Speed Automotive Network

How to Order

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

①Series
②Frequency
③Load Capacitance
④Frequency Tolerance

D0	8 pF	P	±50×10⁻⁶

⑤Operating Temp. Range ⑥Frequency Temp. Stability

SV	−40 to +125°C	±150×10⁻⁶

⑦Individual Specification
(STD Standard is "CC")

Packaging (Tape & Reel 3000 pcs./ reel)

Specifications

Item	Symbol	Specification	Units	Remarks
Frequency Range	f_{nom}	12000 to 54000	kHz	
Overtone Order	OT	Fundamental	—	
Load Capacitance	CL	8	pF	Please contact us for other CL requirements.
Frequency Tolerance	f_{tol}	±50	×10⁻⁶	25°C±3°C
Motional Series Resistance	R1	Table 1	ohm	
Drive Level	DL	Table 2	μW	
Operating Temp. Range	T_{use}	−40 to +125	°C	
Storage Temp. Range	T_{stg}	−40 to +150	°C	
Frequency Temp. Characteristics	f_{tem}	±150	×10⁻⁶	Freq. deviation from the value at 25°C

Please contact us for other specifications.

Table 1 Motional Series Resistance

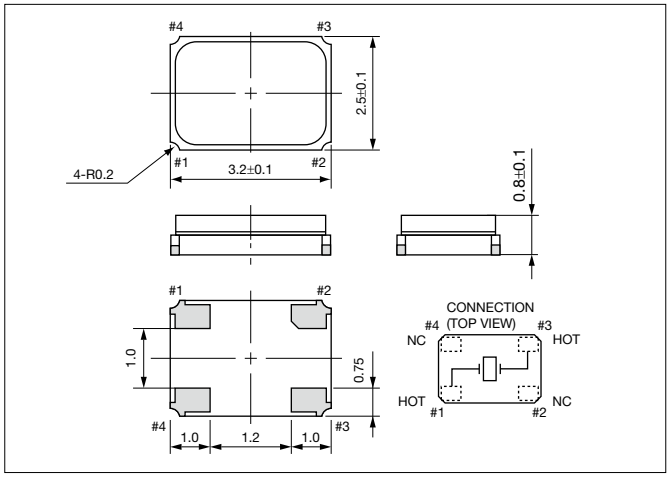
Frequency Range	Motional Series Resistance
12000≤f_{nom}<13560kHz	200Ω max.
13560≤f_{nom}<16000kHz	120Ω max.
16000≤f_{nom}≤54000kHz	100Ω max.

Table 2 Level of Drive

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

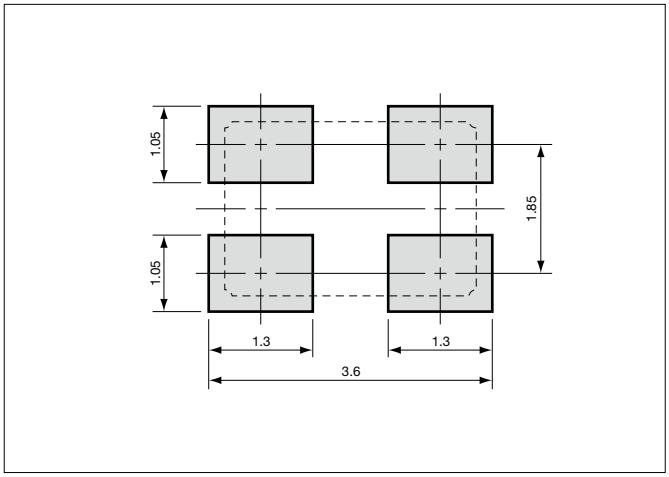
Dimensions

(Unit: mm)

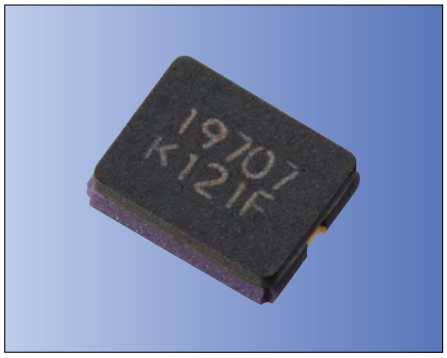


Recommended Land Pattern

(Unit: mm)



3.2×2.5mm for Automotive



AEC-Q200 RoHS Compliant

Features

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

Applications

- ECU
- TPMS
- High-Speed Automotive Network

How to Order

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

①Series
②Frequency
③Load Capacitance

D0	8 pF

④Frequency Tolerance

P	±50×10^{-6}

⑤Operating Temp. Range ⑥Frequency Temp. Stability

TV	−40 to +150°C	±150×10^{-6}

⑦Individual Specification

Packaging (Tape & Reel 3000 pcs./ reel)

Specifications

Item	Symbol	Specification	Unit	Remarks
Frequency Range	f_{nom}	8 / 12 / 16 / 20 / 25 / 40	MHz	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.)	μW	
Operating Temp. Range	T_{use}	−40 to +150	°C	
Storage Temp. Range	T_{stg}	−40 to +150	°C	
Frequency Temp. Characteristics	f_{tem}	±150	×10^{-6}	Freq. deviation from the value at 25°C

Please contact us for other specifications.

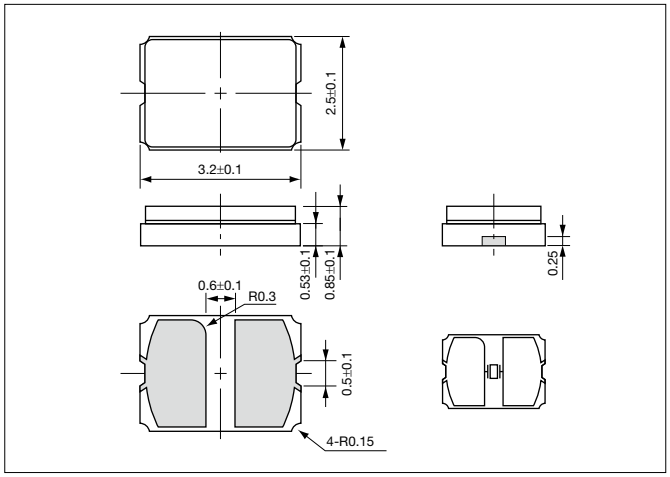
Table 1 Motional Series Resistance

Please contact us for other frequency range.

Frequency	Motional Series Resistance
8MHz	500 Ω max.
12MHz	200 Ω max.
20MHz	100 Ω max.

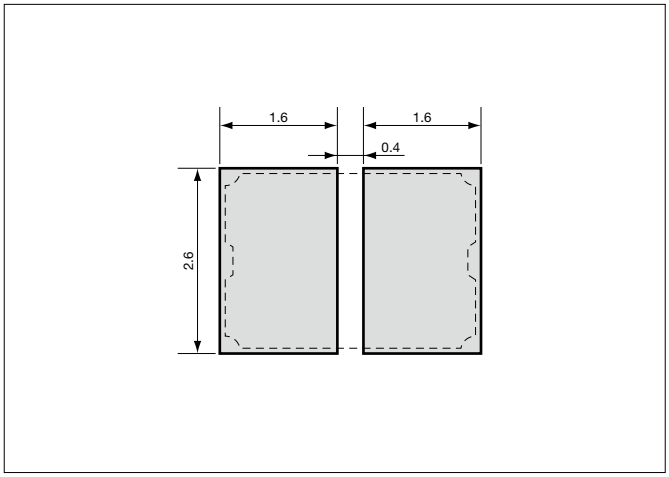
Dimensions

(Unit: mm)

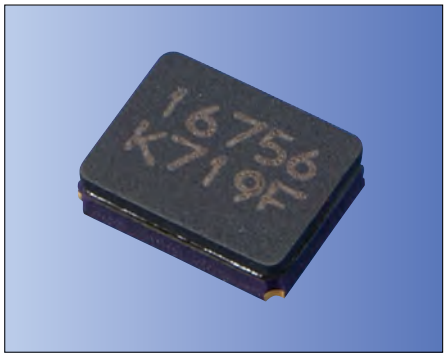


Recommended Land Pattern

(Unit: mm)



3.2×2.5mm for Consumer Products



RoHS Compliant

Features

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

Applications

- Digital Electronics
- Consumer Products

How to Order

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

①Series
②Frequency
③Load Capacitance

D0	8 pF

④Frequency Tolerance

H	±20×10⁻⁶

⑤Operating Temp. Range ⑥Frequency Temp. Stability

EQ	−10 to +70°C	±30×10⁻⁶

⑦Individual Specification
(STD Specification is "CC")

Packaging (Tape & Reel 3000 pcs./ reel)

Specifications

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

Please contact us for other specifications.

Table 1 Motional Series Resistance

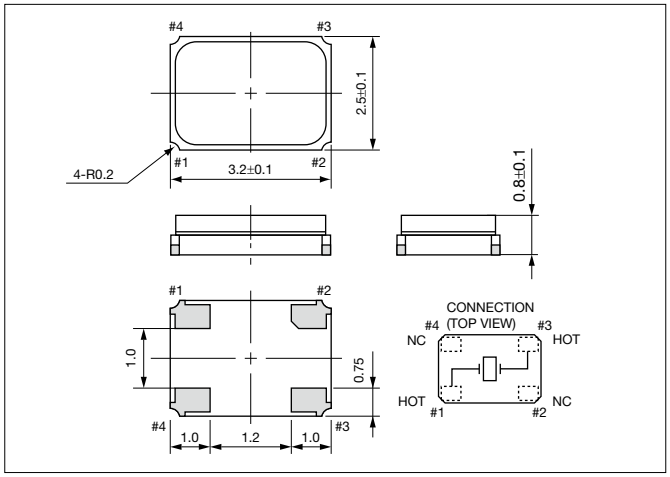
Frequency Range	Motional Series Resistance
12000≤f_{nom}<13000kHz	150Ω max.
13000≤f_{nom}<14000kHz	100Ω max.
14000≤f_{nom}<20000kHz	80Ω max.
20000≤f_{nom}<27000kHz	60Ω max.
27000≤f_{nom}≤54000kHz	50Ω max.

Table 2 Level of Drive

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

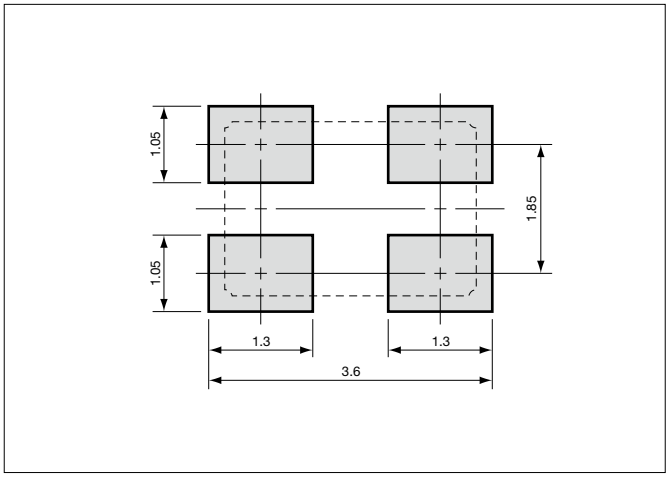
Dimensions

(Unit: mm)

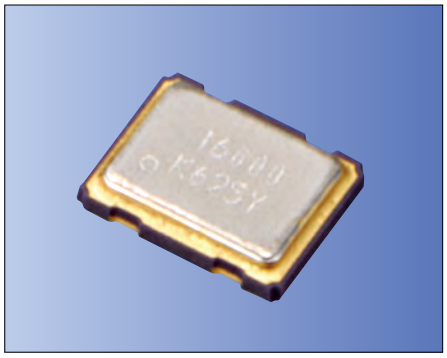


Recommended Land Pattern

(Unit: mm)



3.2×2.5mm for Automotive



AEC-Q200 RoHS Compliant

Features

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

Applications

- ECU
- TPMS
- High-Speed Automotive Network

How to Order

CX3225SA 12000 D0 G T V □□
① ② ③ ④ ⑤ ⑥ ⑦

①Series
②Frequency
③Load Capacitance

D0	8 pF

④Frequency Tolerance

G	±15×10^{-6}

⑤Operating Temp. Range ⑥Frequency Temp. Stability

TV	−40 to +150°C	±150×10^{-6}

⑦Individual Specification

Packaging (Tape & Reel 3000 pcs./ reel)

Specifications

Item	Symbol	Specification	Unit	Remarks
Frequency Range	f_{nom}	8 / 10 / 12 / 15 / 16 / 20 / 24 / 26 / 27 / 40	MHz	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 +150	°C	
Storage Temp. Range	T_{stg}	−40 to +150	°C	
Frequency Temp. Characteristics	f_{tem}	±150	×10^{-6}	Freq. deviation from the value at 25°C

Please contact us for other specifications.

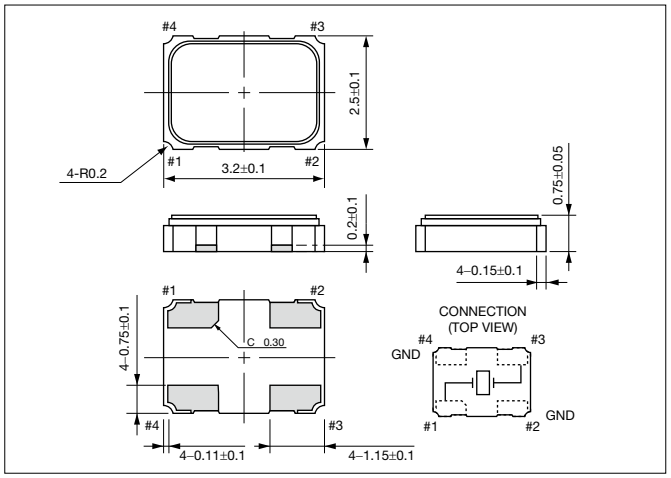
Table 1 Motional Series Resistance

Please contact us for other frequency range.

Frequency	Motional Series Resistance
8MHz	500 Ω max.
12MHz	200 Ω max.
16MHz	60 Ω max.
20MHz	50 Ω max.

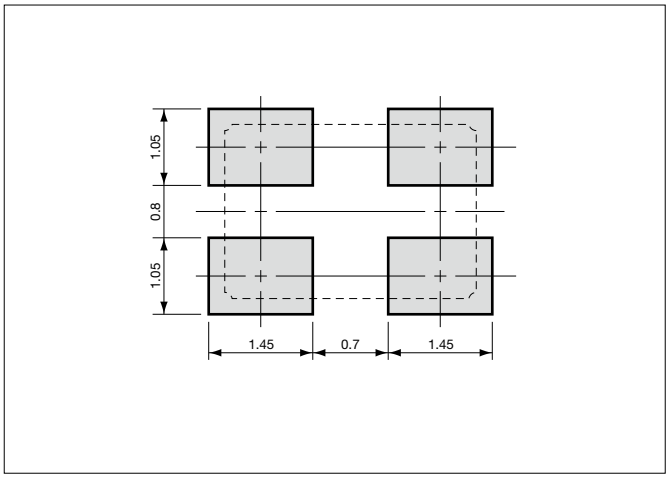
Dimensions

(Unit: mm)

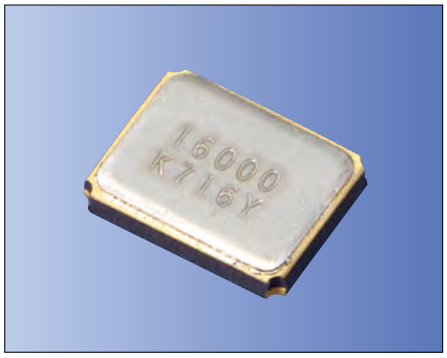


Recommended Land Pattern

(Unit: mm)



3.2×2.5mm for Consumer Products/ Mobile Communications



RoHS Compliant

Features

- Crystal unit for consumer products and mobile communications
- Miniature and low profile (3.2×2.5×0.55mm)
- Ceramic package
- Reflow compatible

Applications

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

* Bluetooth® Trademarks are owned by Bluetooth SIG Inc.

How to Order

CX3225SB 27000 D0 G L L CC
① ② ③ ④ ⑤ ⑥ ⑦

①Series
②Frequency
③Load Capacitance

D0	8 pF

④Frequency Tolerance

G	±15×10⁻⁶

⑤Operating Temp. Range ⑥Frequency Temp. Stability

LL	−30 to +85°C	±20×10⁻⁶

⑦Individual Specification
(STD Specification is "CC")

Packaging (Tape & Reel 3000 pcs./ reel)

Specifications

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

Please contact us for other specifications.

Table 1 Motional Series Resistance

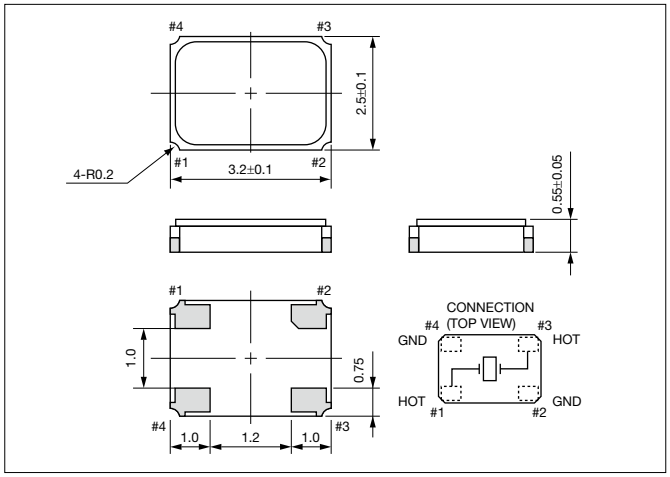
Frequency Range	Motional Series Resistance
12000≤f_{nom}<13000kHz	150Ω max.
13000≤f_{nom}<20000kHz	80Ω max.
20000≤f_{nom}≤54000kHz	50Ω max.

Table 2 Level of Drive

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

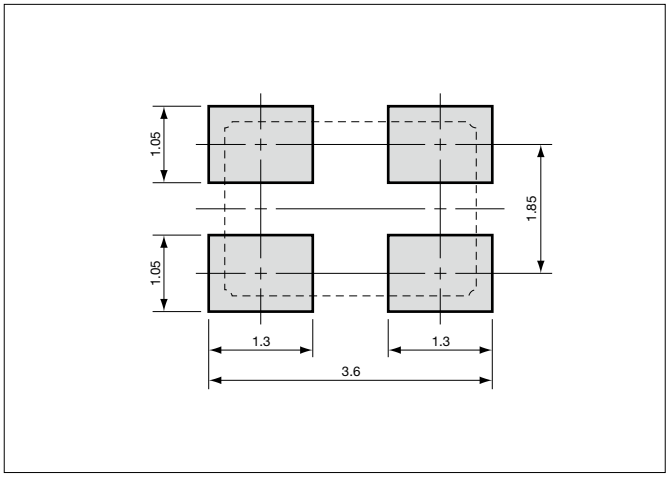
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)



1. Shock & Drop / Vibration

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

2. Cleaning

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

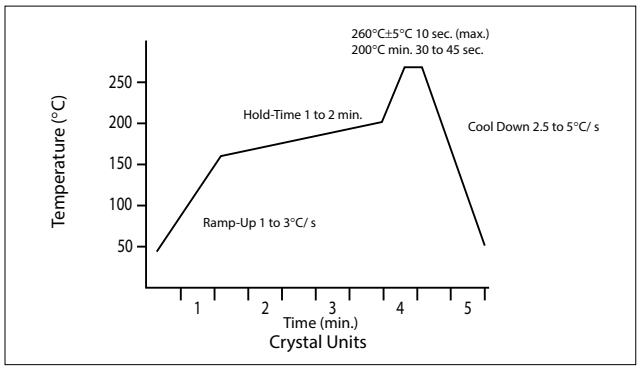
3. Soldering conditions

To maintain the product reliability, please follow recommended conditions.

Standard soldering iron conditions

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

Reflow conditions (Example)



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

4. Mounting Precautions

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

5. Storage Condition

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

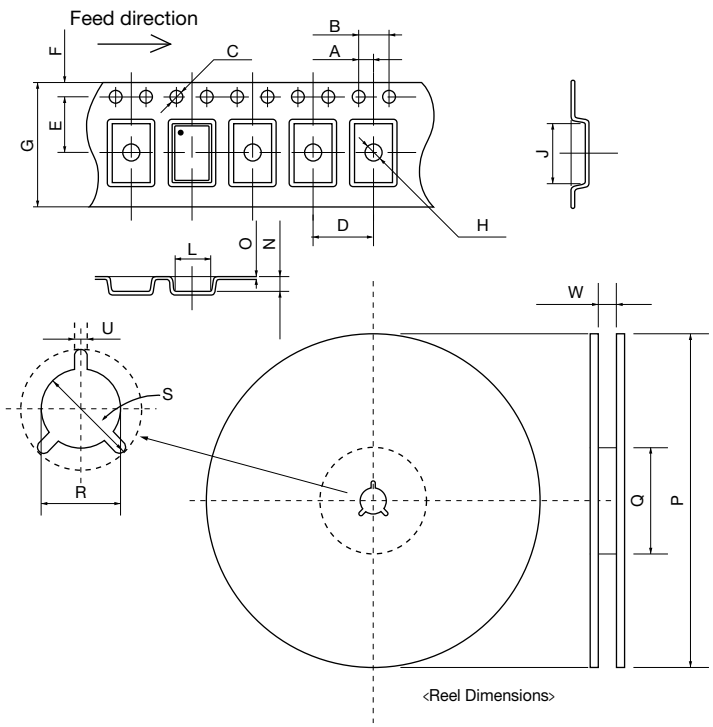
Tape & Reel Specifications

■Crystal Units

(Unit: mm)

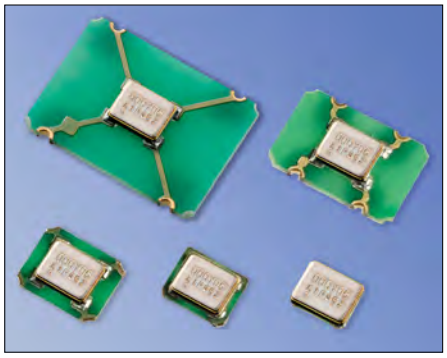
		CT1612RB	CT2016DB	CX1008SB	CX1210DB CX1210SB	CX1612DB		CX2016DB CX2016GR CX2016SA	
TAPE	A	2.0±0.05	2.0±0.05	2.0±0.05	2.0±0.05	2.0±0.05		2.0±0.05	
	B	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1		4.0±0.1	
	C	ϕ1.5+0.1/−0	ϕ1.5+0.1/−0	ϕ1.5+0.1/−0	ϕ1.5+0.1/−0	ϕ1.5+0.1/−0		ϕ1.5+0.1/−0	
	D	4.0±0.1	4.0±0.1	4.0±0.1	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±0.1	
	L	1.50±0.1	1.9±0.05	1.00±0.05	1.35±0.05	1.40±0.1		1.90±0.1	
	N	0.75±0.05	1.1±0.05/ 0.75±0.05	0.45±0.05	0.45±0.05	0.5±0.1		0.7±0.05	
	O	0.2±0.05	0.25±0.05	0.2±0.05	0.25±0.05	0.2±0.05		0.2±0.05	
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	9.4±1.0	9.0±1.0	9.4±1.0
Qty.		15000	12000	21000	12000/21000	3000	20000	3000	15000

		CX3225CA CX3225GA CX3225GB CX3225SA CX3225SB
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
Qty.		3000



<Reel Dimensions>

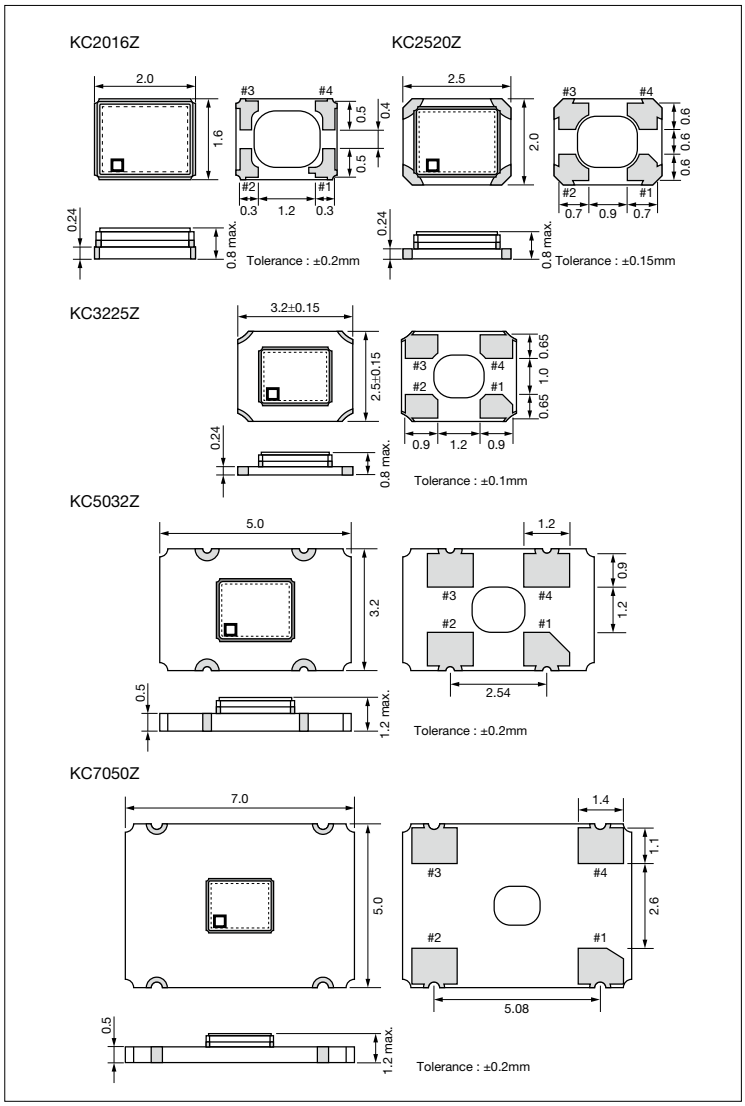
CMOS/ 1.8V, 2.5V, 3.3V/ 2.0×1.6, 2.5×2.0, 3.2×2.5, 5.0×3.2, 7.0×5.0mm



RoHS Compliant

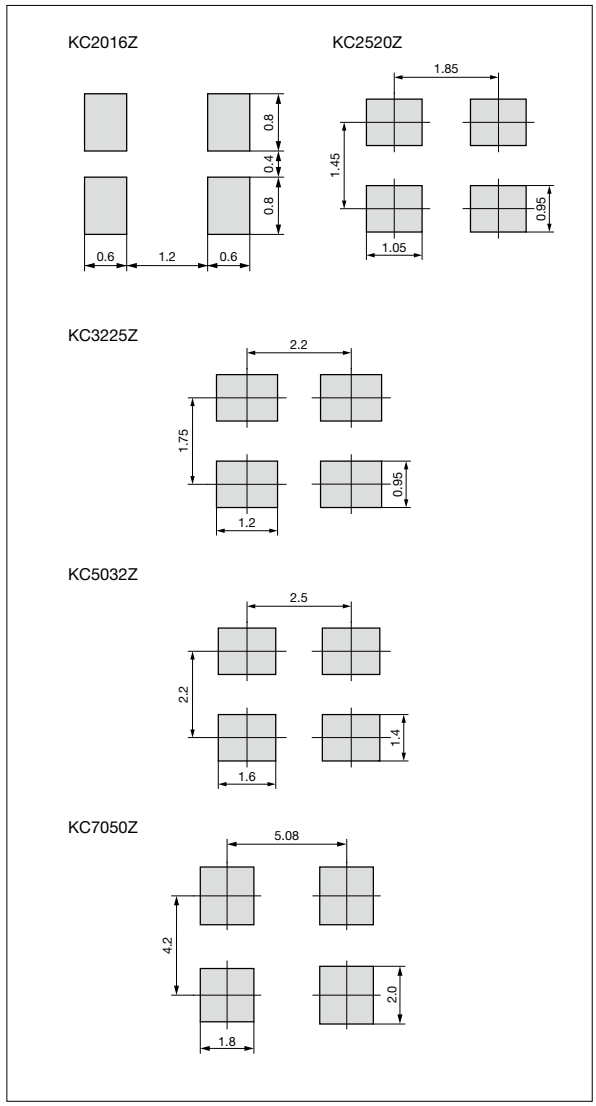
Dimensions

(Unit : mm)



Recommended Land Patterns

(Unit : mm)

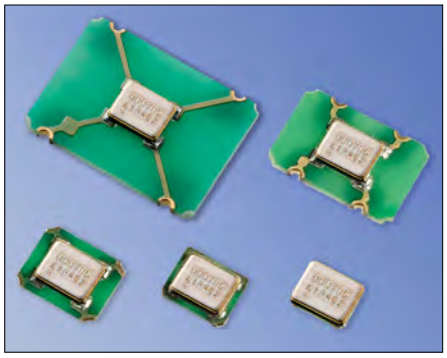


Pad Connections	
#1	Stand-by Function
#2	Case GND
#3	Output
#4	Vcc

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

Clock Oscillators Surface Mount Type
Clock Z-Series "X" type (STD, Short LT type)

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



RoHS Compliant

Features

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

Applications

- Consumer/ Networking/ Industrial/ Amuse

Table 1

Freq. Tol. 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

①Series

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

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

X	STD 45/ 55%

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

Packaging Tape&Reel

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

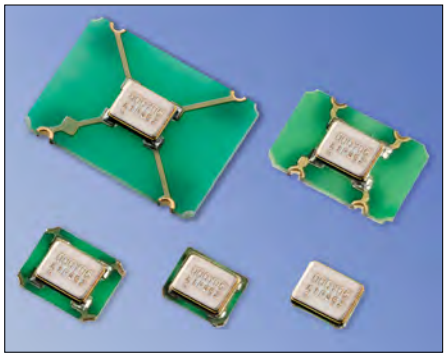
Specifications

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 Surface Mount Type
Clock Z-Series "Y" type (CMOS, Low Jitter type)

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



RoHS Compliant

Features

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

Applications

- Consumer/ Networking/ Industrial/ Amuse

Table 3

Freq. Tol. 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

①Series

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

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

Y	STD/ Low Jitter 45/ 55%

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

Packaging Tape&Reel

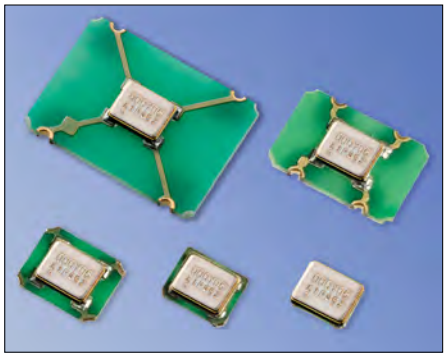
KC7050Z/ KC5032Z	1000 pcs./ reel
KC3225Z/ KC2520Z/ KC2016Z	2000 pcs./ reel

Specifications

Item	Symbol	Conditions		Min.	Max.	Unit
Output Frequency Range	fo			24	72	MHz
Frequency Tolerance	$f_{\_tol}$	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration		See Table 3		
Storage Temperature Range	$T_{\_stg}$			−55	150	°C
Operating Temperature Range	$T_{\_use}$			See Table 3		
Max. Supply Voltage	—			−0.3	4.5	V
Supply Voltage	V_{CC}			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}	24≤fo≤40MHz	40	55	%
			40<fo≤72MHz	45	55	
Rise/ Fall Time (20% to 80% Output Level)	Tr/ Tf	Loaded/ 1.71≤V_{CC}≤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.

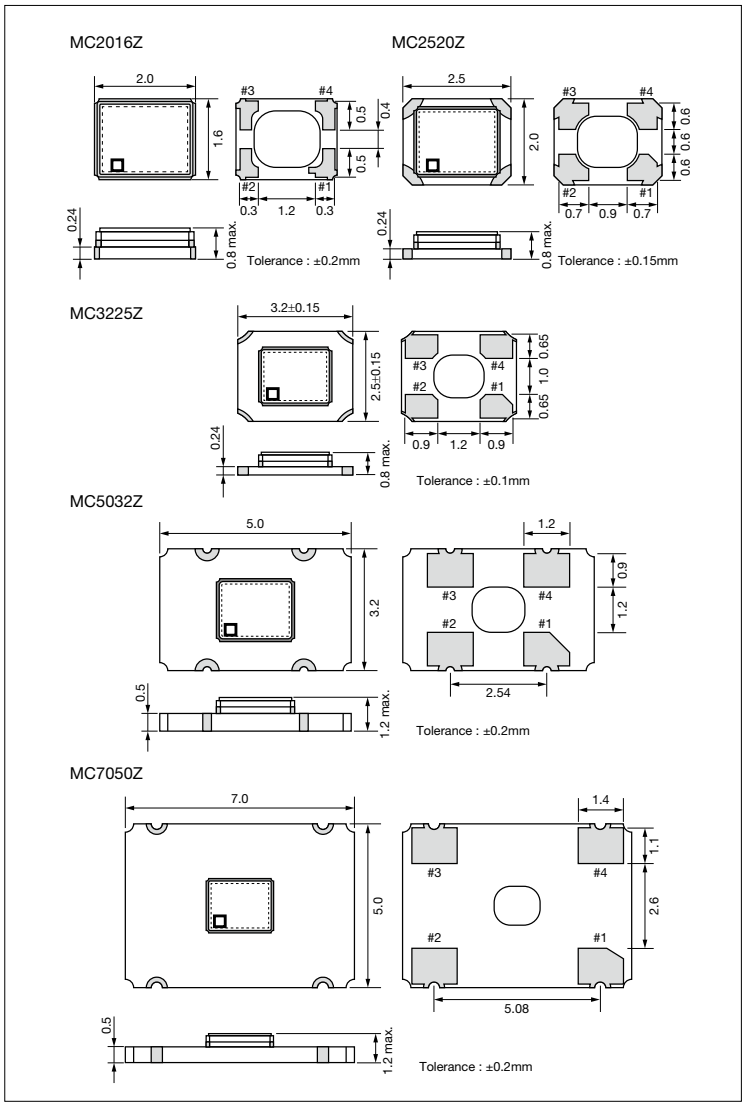
CMOS/ 1.8V, 2.5V, 3.3V / 2.0×1.6, 2.5×2.0, 3.2×2.5, 5.0×3.2, 7.0×5.0mm for Automotive



AEC-Q100/ 200 RoHS Compliant

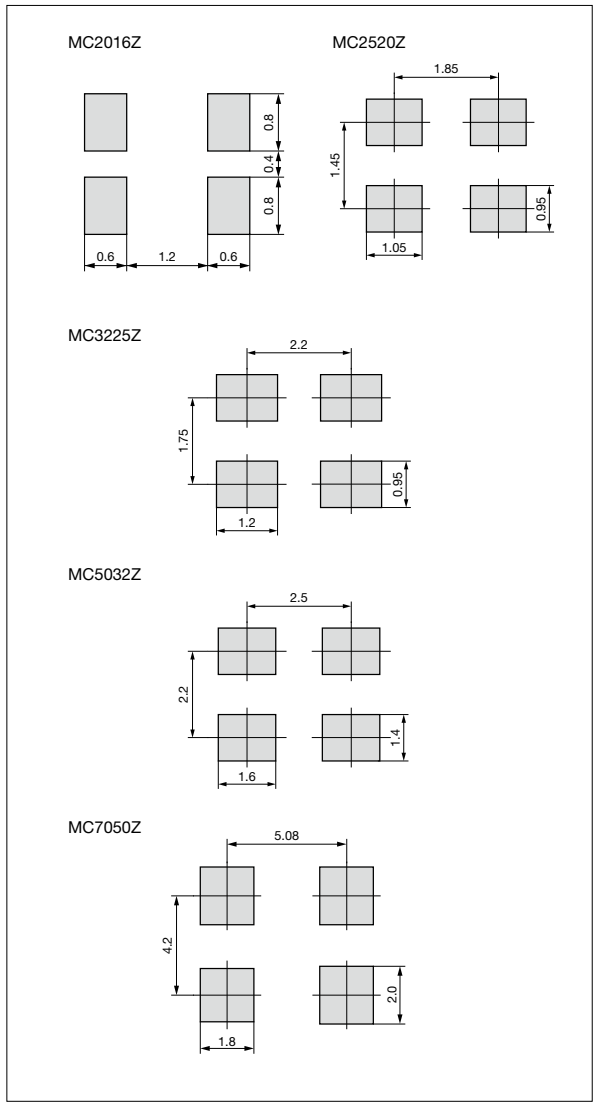
Dimensions

(Unit : mm)



Recommended Land Pattern

(Unit : mm)

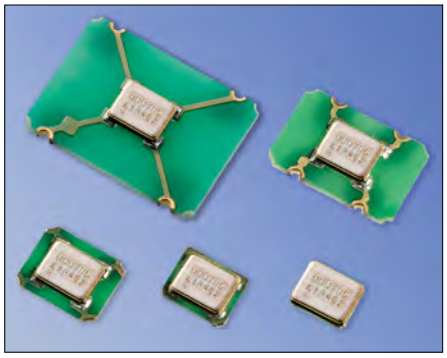


Pad Connections	
#1	Stand-by Function
#2	Case GND
#3	Output
#4	Vcc

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

Clock Oscillators Surface Mount Type
Clock MC-Z-Series "X" type (STD, Short LT type)

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



AEC-Q100/ 200 RoHS Compliant

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

Applications
- Automotive

Table 5

Freq. Tol. Code	Freq. Tol. × 10^{-6}	Operating Temperature Range (°C)	Note
G	± 50	−40 to +85	For additional stability, 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

①Series

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

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

X	STD 45/ 55%

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

Packaging Tape&Reel

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

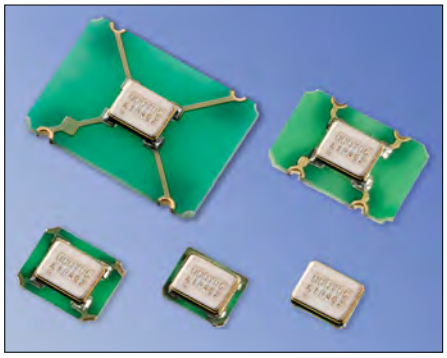
Specifications

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 Surface Mount Type
Clock MC-Z-Series "Y" type (CMOS, Low Jitter type)

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



AEC-Q100/ 200 RoHS Compliant

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

Applications
- Automotive (Radar, Camera, Network)

Table 7

Freq. Tol. 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

①Series

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

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

Y	STD/ Low Jitter 45/ 55%

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

Packaging Tape&Reel

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

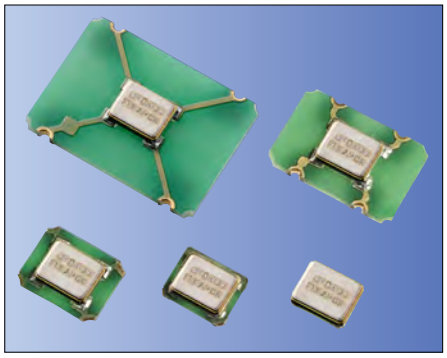
Specifications

Item	Symbol	Conditions		Min.	Max.	Unit
Output Frequency Range	fo			24	72	MHz
Frequency Tolerance	$f_{\_tol}$	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration		See Table 7		
Storage Temperature Range	$T_{\_stg}$			−55	150	°C
Operating Temperature Range	$T_{\_use}$			See Table 7		
Max. Supply Voltage	—			−0.3	4.5	V
Supply Voltage	V_{CC}			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}	24≤fo≤40MHz	40	55	%
			40<fo≤72MHz	45	55	
Rise/ Fall Time (20% to 80% Output Level)	Tr/ Tf	Loaded/ 1.71≤V_{CC}≤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.

Clock Oscillators Surface Mount Type
Clock K-Series (32.768kHz)

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



RoHS Compliant

Features

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

Applications

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

Table 1

Freq. 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

KC2520K 32K7680 C 1 □ A 00
① ② ③ ④ ⑤ ⑥ ⑦

①Series
②Output Frequency (32.768kHz)
③Output Type (C: CMOS)
④Supply Voltage

1	1.8V/ 2.5V/ 3.3V compatible

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

A	45/ 55%

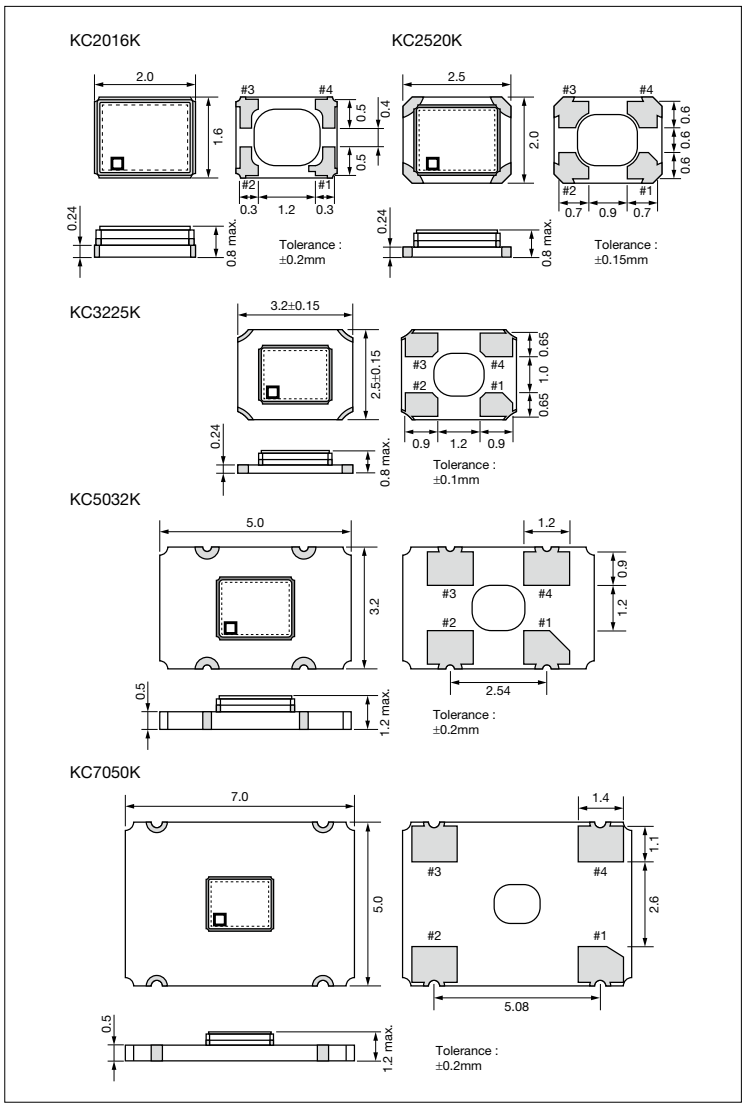
⑦Individual Specification
(STD Specification is "00".)

Packaging Tape & Reel

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

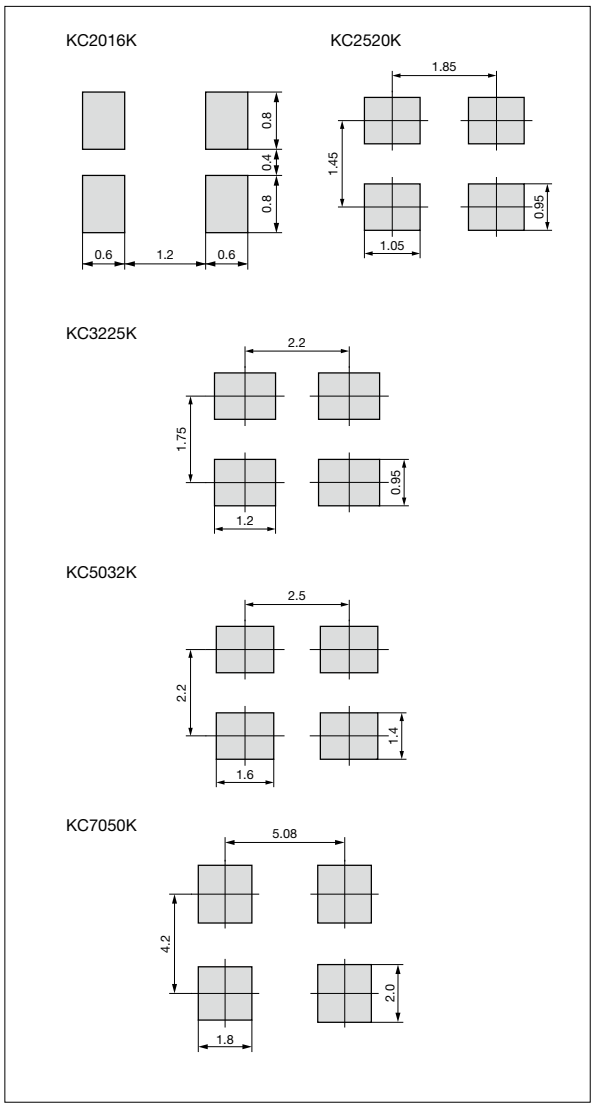
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)



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

Specifications

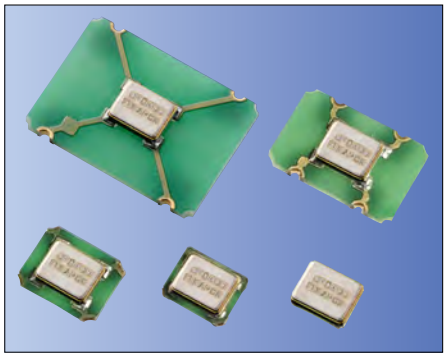
Item	Symbol	Conditions		Min.	Max.	Unit
Output Frequency	Fo			32.768		kHz
Frequency Tolerance	$F_{\_tol}$	Initial tolerance(@+25°C), Operating temperature range, Rated power supply voltage change (Vcc±10%)	Temp.: −40 to +85°C	−25	+25	×10⁻⁶
			Temp.: −40 to +125°C	−90	+90	
	$F_{\_Aging}$	Aging (@1 year)		−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	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)

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



RoHS Compliant

Features

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

Applications

- Consumer/ Networking/ Industrial/ Audio Codec/ Amuse

Table 1

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

How to Order

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

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

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

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

E	45/ 55%

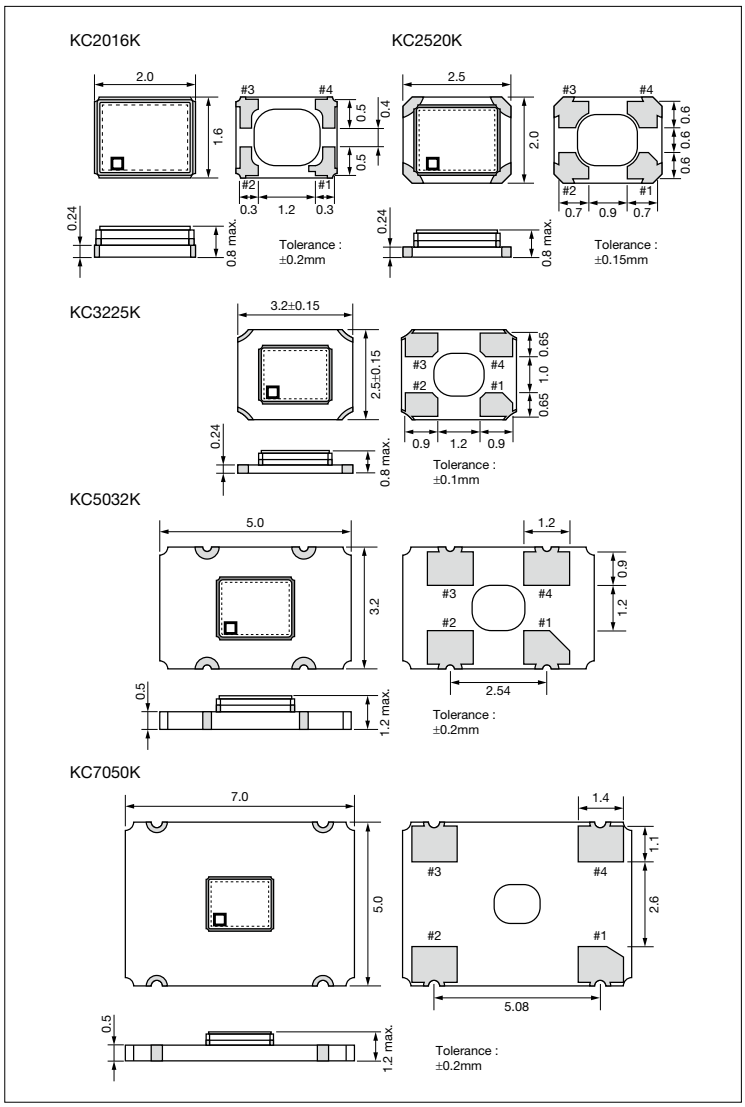
⑦Individual Specification
(STD Specification is "00".)

Packaging Tape & Reel

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

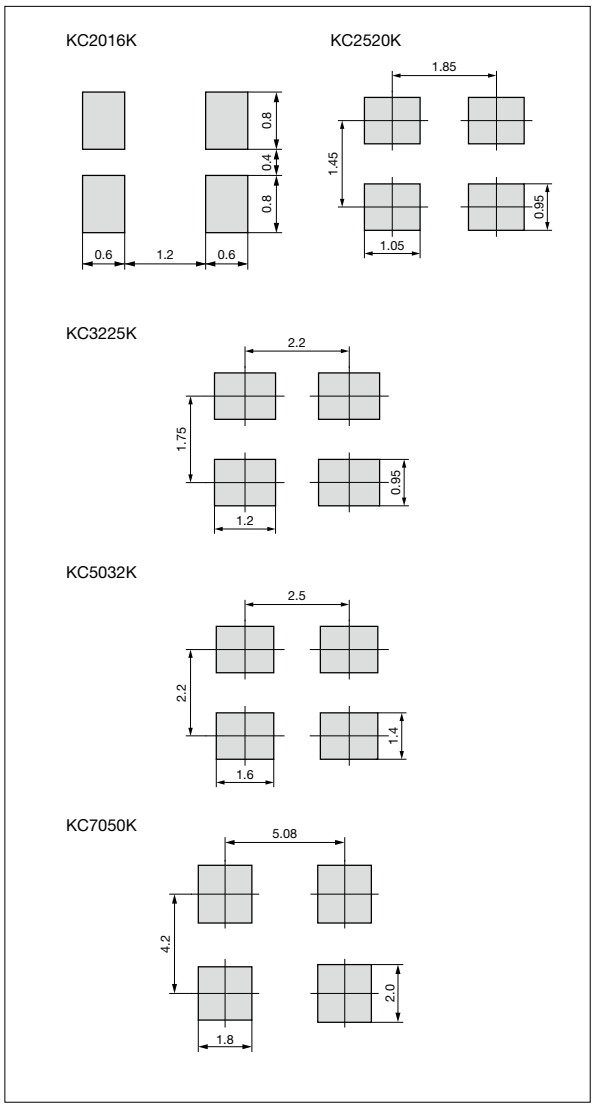
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)



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

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	Code④ : 1 : 1.5≤F0≤125MHz		+1.60	+3.63	V
		Code④ : 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			—	5	ms
Start-up Time	t_str	1.5≤F0≤80MHz	@Minimum operating voltage to be 0 sec.	—	5	ms
		80<F0≤125MHz		—	10	
		125<F0≤160MHz		—	10	
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/ 1.8V, 2.5V, 3.3V / 2.0×1.6, 2.5×2.0, 3.2×2.5, 5.0×3.2, 7.0×5.0mm

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.

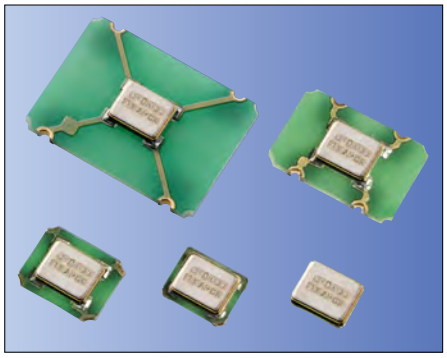
Pad Connections	
#1	Stand-by Function
#2	Case GND
#3	Output
#4	Vcc

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

Clock Oscillators Surface Mount Type
Clock MC-K Series (32.768kHz)

KYOCERA

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



AEC-Q100/ 200 RoHS Compliant

Features

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

Applications

- Car accessories / ADAS / Clock for sleep

Table 1

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

How to Order

MC2520K 32K7680 C 1 □ A SH
① ② ③ ④ ⑤ ⑥ ⑦

①Series
②Output Frequency (32.768kHz)
③Output Type (C: CMOS)
④Supply Voltage

1	1.8V/ 2.5V/ 3.3V compatible

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

A	45/ 55%

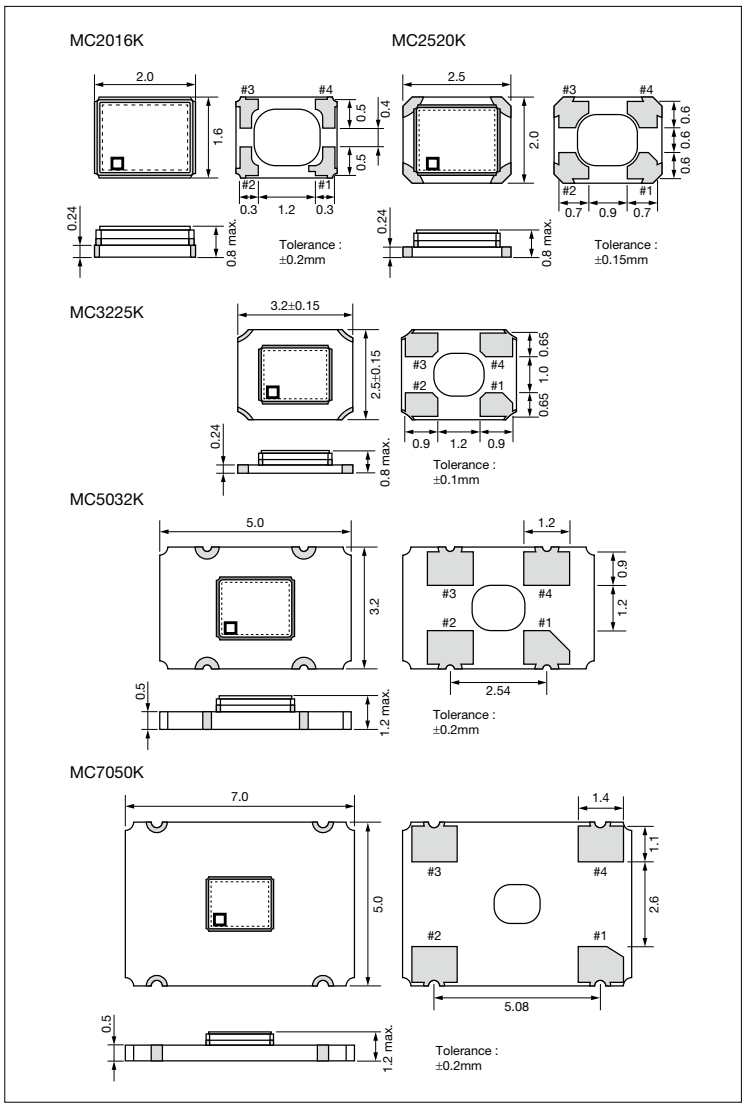
⑦Individual Specification
(STD Specification is "SH".)

Packaging Tape & Reel

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

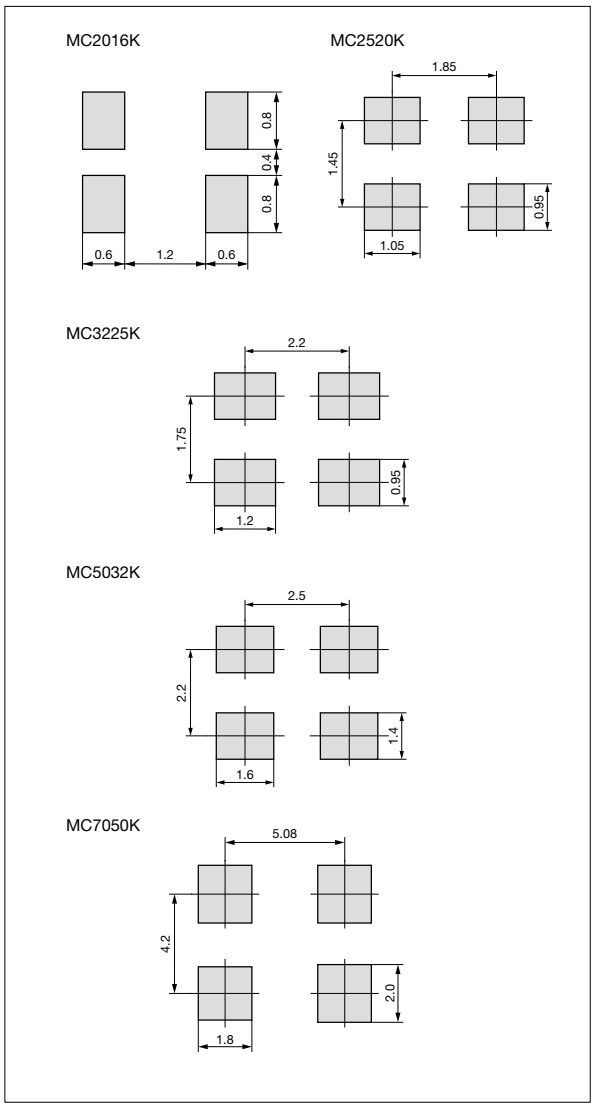
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)



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

Specifications

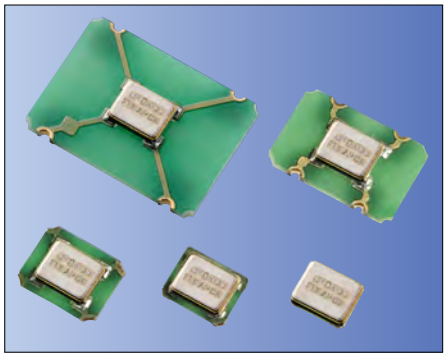
Item	Symbol	Conditions		Min.	Max.	Unit
Output Frequency	Fo			32.768		kHz
Frequency Tolerance	$F_{\_tol}$	Initial tolerance, Operating temperature range, Rated power supply voltage change (Vcc±10%)	Temp.: −40 to +85°C	−25	+25	$\times10^{-6}$
			Temp.: −40 to +125°C	−90	+90	
	$F_{\_Aging}$	Aging (@1 year),		−3	+3	
	$F_{\_Oth}$	Others (Load change, Shock and vibration)		−4	+4	
Storage Temperature Range	$T_{\_STG}$			−55	+150	°C
Operating Temperature Range	$T_{\_use}$			−40	+85	°C
				−40	+125	
Max. Supply Voltage	—			−0.3	+4.5	V
Supply Voltage	V_{CC}			+1.60	+3.63	V
Current Consumption (No Load)	I_{CC}	1.6≤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	V_{OL}	I_{OL}= 1mA		—	10% V_{CC}	V
High Level Output Voltage	V_{OH}	I_{OH}= −1mA		90% V_{CC}	—	V
Output Load	L_CMOS			15		pF
Low Level Input Voltage	V_{IL}			—	30% V_{CC}	V
High Level Input Voltage	V_{IH}			70% V_{CC}	—	V
Disable Time	$t_{\_dis}$			—	100	ns
Enable Time	$t_{\_ena}$			—	2	ms
Start-up Time	$t_{\_sta}$	@Minimum operating voltage to be 0 sec.		—	5	ms

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

Pad Connections	
#1	Stand-by Function
#2	Case GND
#3	Output
#4	V_{CC}

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

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



AEC-Q100/ 200 RoHS Compliant

Features

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

How to Order

MC2520K 25.0000 C □ □ E SH
① ② ③ ④ ⑤ ⑥ ⑦

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

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

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

E	45/ 55%

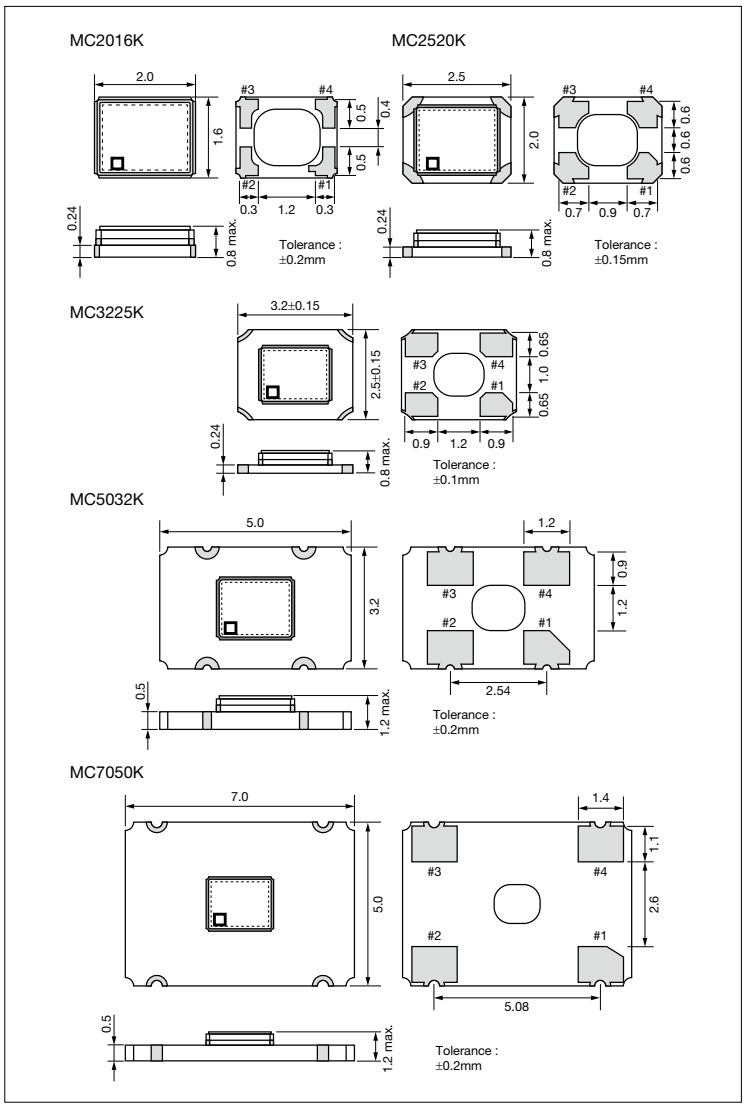
⑦Individual Specification
(STD Specification is "SH".)

Packaging Tape & Reel

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

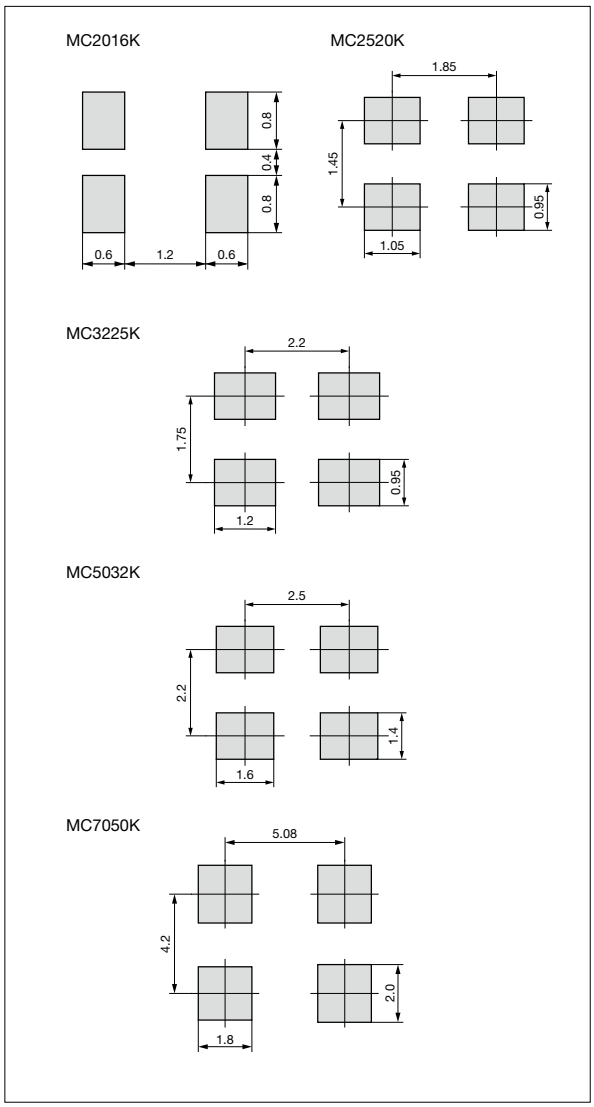
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)



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

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	Code④ : 1 : 1.5≤F0≤125MHz		+1.60	+3.63	V
		Code④ : 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			—	5	ms
Start-up Time	t_str	1.5≤F0≤80MHz	@Minimum operating voltage to be 0 sec.	—	5	ms
		80<F0≤125MHz		—	10	
		125<F0≤160MHz		—	10	
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/ 1.8V, 2.5V, 3.3V / 2.0×1.6, 2.5×2.0, 3.2×2.5, 5.0×3.2, 7.0×5.0mm for Automotive

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		

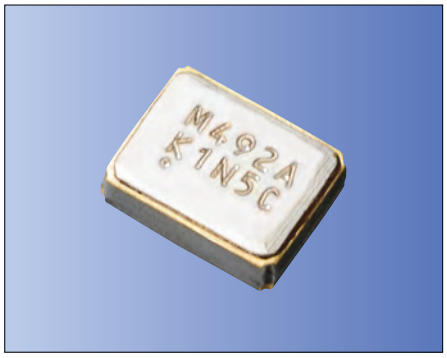
Note: All electrical characteristics are defined at the maximum load and operating temperature range.
Note1: Please contact us for inquiry about operating temperature range, available frequencies and other conditions.

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)

Find TCXO Here

1.6×1.2mm



RoHS Compliant

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

Applications

- Mobile communications, Wireless modules
- GNSS Unit

How to Order

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

①Series

KT1612A	1612 Size

②Output Frequency

③Freq. Temp. Chrst.

A	±0.5×10⁻⁶
B	±1.0×10⁻⁶
C	±1.5×10⁻⁶
D	±2.0×10⁻⁶

④Lower Operating Temp.

C	−30°C
E	−20°C
G	−10°C

⑤Upper Operating Temp.

W	+85°C
V	+80°C
U	+75°C

⑥Supply Voltage

12	1.2V

⑦Disable Function

N	With Disable Function

⑧Individual Specification

⑨Low Voltage Drive Type

Y	Low Voltage Drive

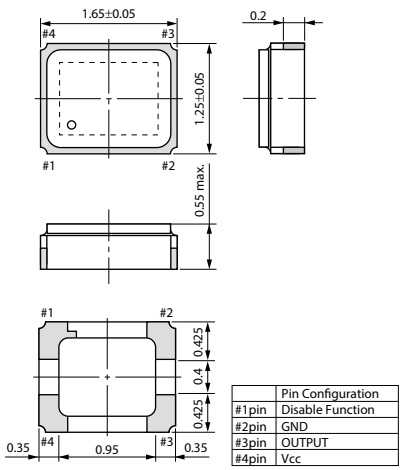
Packaging (Tape & Reel 18000 pcs./ reel)

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	mA
Harmonics	—		—	−5	dBc

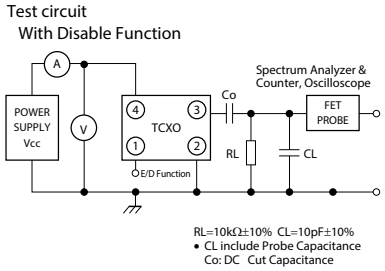
* : A DC-cut capacitor is not embedded in this crystal oscillator. Connect a DC-cut capacitor (≥1nF) to the line-out terminal of the oscillator.
* Please contact us for other specifications.

Dimensions (Unit: mm)

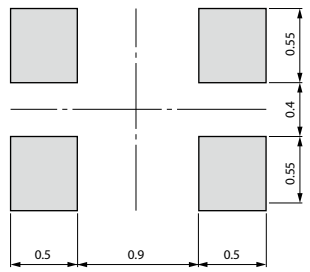


	Pin Configuration
#1pin	Disable Function
#2pin	GND
#3pin	OUTPUT
#4pin	Vcc

Test Circuit



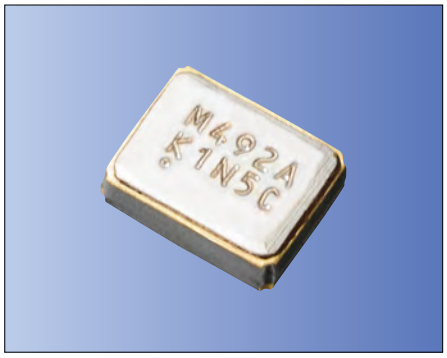
Recommended Land Pattern (Unit: mm)



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

As of October 2023

1.6×1.2mm



RoHS Compliant

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

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

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

How to Order

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

①Series

KT1612A	1612 Size

②Output Frequency

③Freq. Temp. Chrst.

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

④Lower Operating Temp.

C	−30°C
E	−20°C
G	−10°C

⑤Upper Operating Temp.

W	+85°C
V	+80°C
U	+75°C

⑥Supply Voltage

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

⑦Disable Function

N	With Disable Function

⑧Individual Specification

⑨Low Phase Noise Type

G	Low Phase Noise

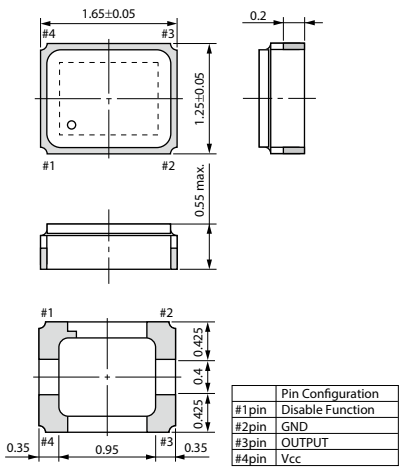
Packaging (Tape & Reel 18000 pcs./ reel)

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		—	3	mA
Harmonics	—		—	−5	dBc

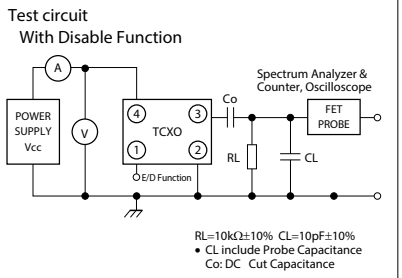
* : A DC-cut capacitor is not embedded in this crystal oscillator. Connect a DC-cut capacitor (≥1nF) to the line-out terminal of the oscillator.
* Please contact us for other specifications.

Dimensions (Unit: mm)

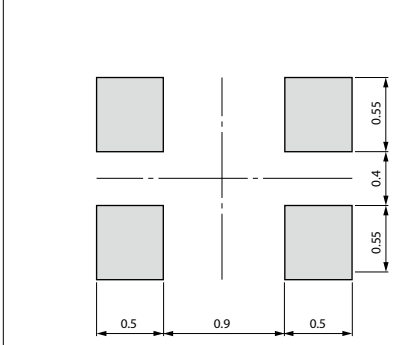


	Pin Configuration
#1pin	Disable Function
#2pin	GND
#3pin	OUTPUT
#4pin	Vcc

Test Circuit

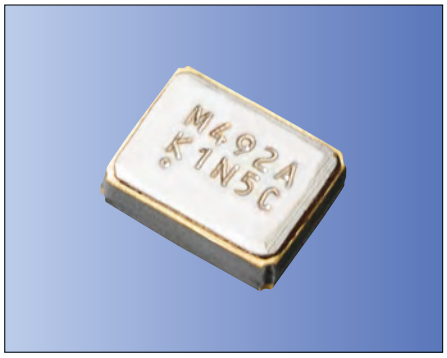


Recommended Land Pattern (Unit: mm)



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

1.6×1.2mm



RoHS Compliant

Features

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

Applications

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

How to Order

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

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

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

④Lower Operating Temp.

C	−30°C
E	−20°C
G	−10°C

⑤Upper Operating Temp.

W	+85°C
V	+80°C
U	+75°C

⑥Supply Voltage

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

⑦Voltage Control Function

T	TCXO
Spec. Code*	VCTCXO

*Please contact us for Spec. Code.

⑧Individual Specification

Packaging (Tape & Reel 18000 pcs./ reel)

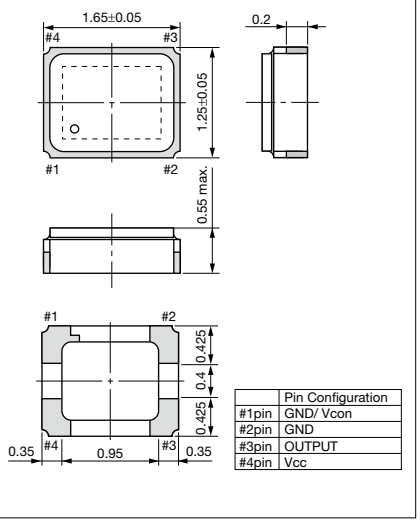
Specifications

Item	Symbol	Conditions	Min.	Max.	Unit
Output Frequency Range	fo	Standard Output Frequency: 19.2 / 26.0 / 38.4 / 48.0 / 52.0 / 76.8	19.2	76.8	MHz
Frequency Tolerance	f_tol	vs Temperature	−0.5/ −2	+0.5/ +2	×10^{-6}
		vs Load	−0.2	+0.2	
		vs Voltage	−0.2	+0.2	
Frequency Aging	f_age	Per Year	−1	+1	×10^{-6}
Storage Temperature Range	T_stg		−40	+85	°C
Operating Temperature Range	T_use		−30	+85	°C
Voltage Control Range	f_cont	Positive	±8	±15	×10^{-6}
Supply Voltage	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.

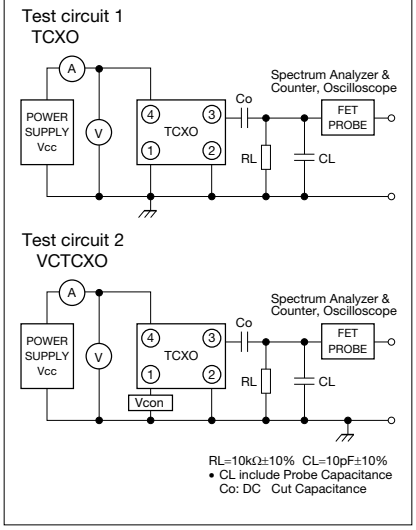
Dimensions

(Unit: mm)



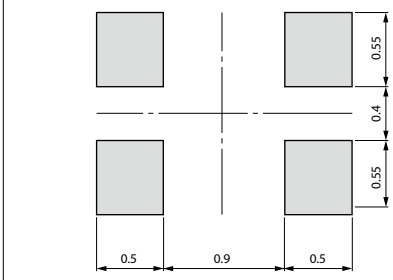
	Pin Configuration
#1pin	GND/ Vcon
#2pin	GND
#3pin	OUTPUT
#4pin	Vcc

Test Circuit



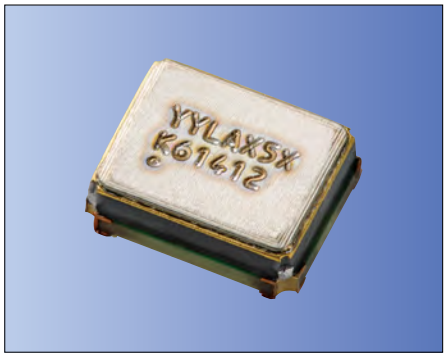
Recommended Land Pattern

(Unit: mm)



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

2.0×1.6mm



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

Features

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

Applications

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

How to Order

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

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

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

④Lower Operating Temp.

C	−30°C
E	−20°C
G	−10°C

⑤Upper Operating Temp.

W	+85°C
V	+80°C
U	+75°C

⑥Supply Voltage

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

⑦Voltage Control Function

T	TCXO
Spec. Code*	VCTCXO

*Please contact us for Spec. Code.

⑧Individual Specification

Packaging (Tape & Reel 15000 pcs./ reel)

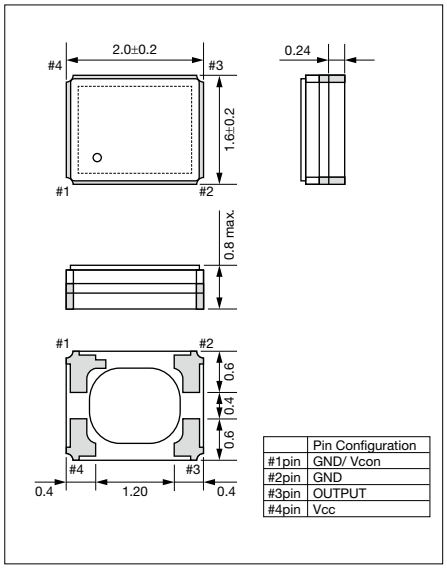
Specifications

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.

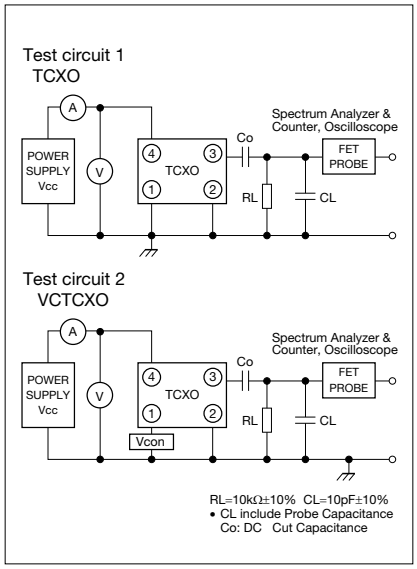
Dimensions

(Unit: mm)



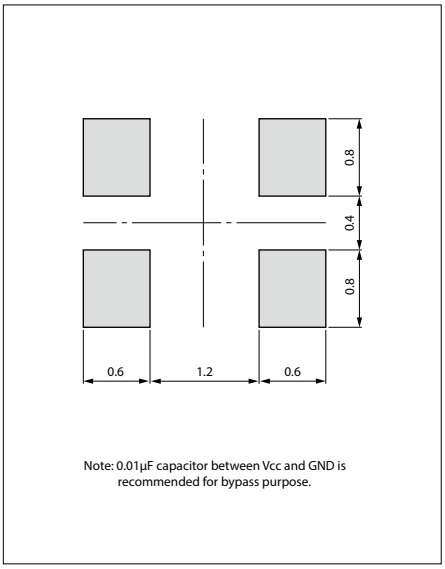
	Pin Configuration
#1pin	GND/ Vcon
#2pin	GND
#3pin	OUTPUT
#4pin	Vcc

Test Circuit



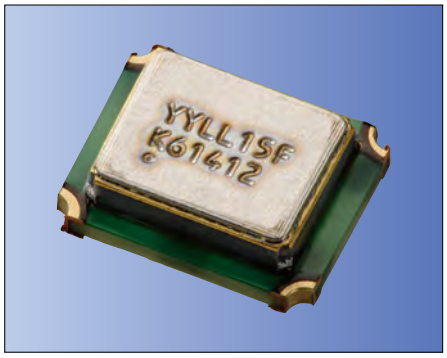
Recommended Land Pattern

(Unit: mm)



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

2.5×2.0mm



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

Features

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

Applications

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

How to Order

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

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

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

④Lower Operating Temp.

C	−30°C
E	−20°C
G	−10°C

⑤Upper Operating Temp.

W	+85°C
V	+80°C
U	+75°C

⑥Supply Voltage

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

⑦Voltage Control Function

T	TCXO
Spec. Code*	VCTCXO

*Please contact us for Spec. Code.
⑧Individual Specification

Packaging (Tape & Reel 12000 pcs./ reel)

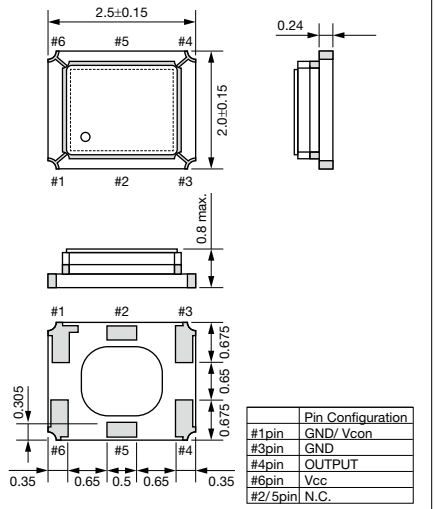
Specifications

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.

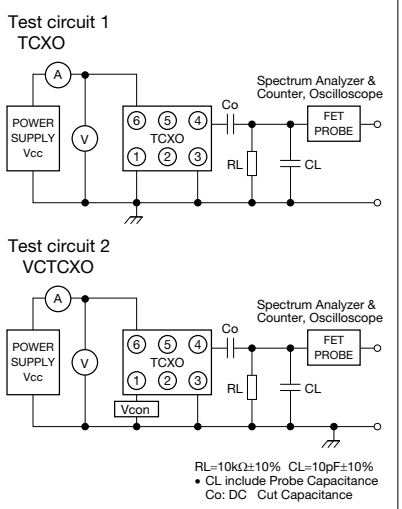
Dimensions

(Unit: mm)



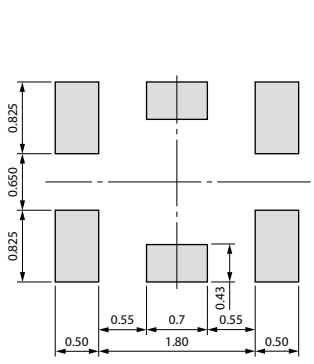
	Pin Configuration
#1pin	GND/ Vcon
#3pin	GND
#4pin	OUTPUT
#6pin	Vcc
#2/ 5pin	N.C.

Test Circuit



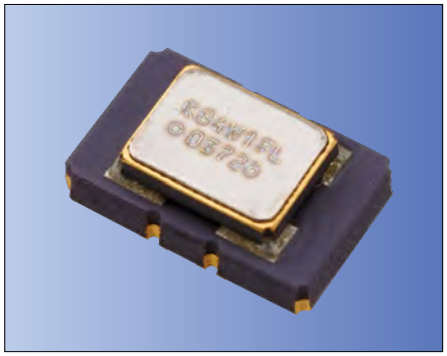
Recommended Land Pattern

(Unit: mm)



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

5.0×3.2mm



RoHS Compliant

Features

- High stability and high reliability
- 2.3 to 3.63V drive available
- Clipped sine wave or CMOS level output
- Low phase noise
- Operating Temp. −40 to +105°C (Option)

Applications

- 5G, Smallcell, Stratum3
- SONET/ SDH/ Ethernet
- SyncE/ IEEE 1588

How to Order

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

①Series

②Output Frequency

③Frequency Tolerance

U	±0.5×10⁻⁶
K	±0.28×10⁻⁶
A	±0.1×10⁻⁶

④Operating Temperature Range

GT	-10°C to 70°C
AW	-40°C to 85°C
AY	-40°C to 105°C

⑤Supply Voltage

33	3.3V

⑥Voltage Control Function

T	TCXO
Spec. Code*	VCTCXO

*Please contact us for Spec. Code.

⑧Individual Specification

Packaging (Tape & Reel 1000 pcs./ reel)

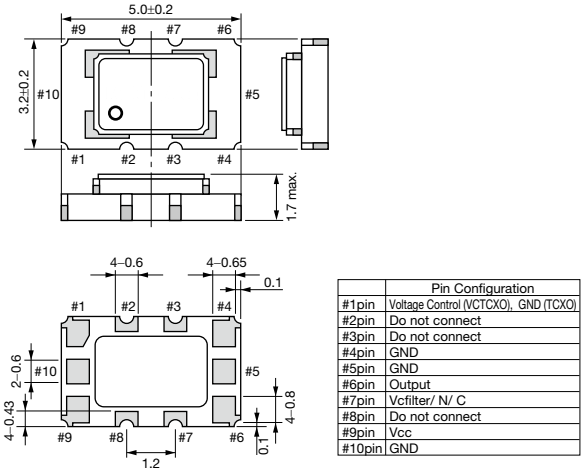
Specifications

Item	Symbol	Conditions		Min.	Max.	Unit
Output Frequency Range	fo	Standard Frequency: 10 / 12.8 / 20 / 25.6 / 44.8		10	44.8	MHz
Frequency Tolerance	f_tol	vs Temperature [±(fmax-fmin)/ 2fo]		−0.5	+0.5	×10⁻⁶
				−0.28	+0.28	
				−0.1	+0.1	
		vs Voltage		−0.1	+0.1	
Supply Voltage	Vcc			+2.3	+3.63	V
Current Consumption	Icc	CMOS Output		—	6	mA
Frequency Aging	f_age	20years aging @40°C Including temp characteristics, initial tolerance, rated power supply voltage change and load change.		−4.6	+4.6	×10⁻⁶
Voltage Control Range	f_cont	Positive *100k ohm min		±5	±20	×10⁻⁶
Output Level	Vpp	Clipped Sine*, Load: 10k ohm // 10pF		0.8	—	Vp-p
Low Level Output Voltage	VOL	CMOS, Load: 15pF IOL=4mA		—	10% Vcc	V
High Level Output Voltage	VOH	CMOS, Load: 15pF IOH=−4mA		90% Vcc	—	V
Rise / Fall Time (10%Vcc to 90%Vcc)	Tr/ Tf	CMOS, Load: 15pF		—	8	ns
Symmetry	SYM	50% Vcc		45	55	%
Phase Noise	—	@20MHz	@10Hz offset	—	−90	dBc/ Hz
			@100Hz offset	—	−120	
			@1kHz offset	—	−140	
			@10kHz offset	—	−150	
			@100kHz offset	—	−150	

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

Dimensions

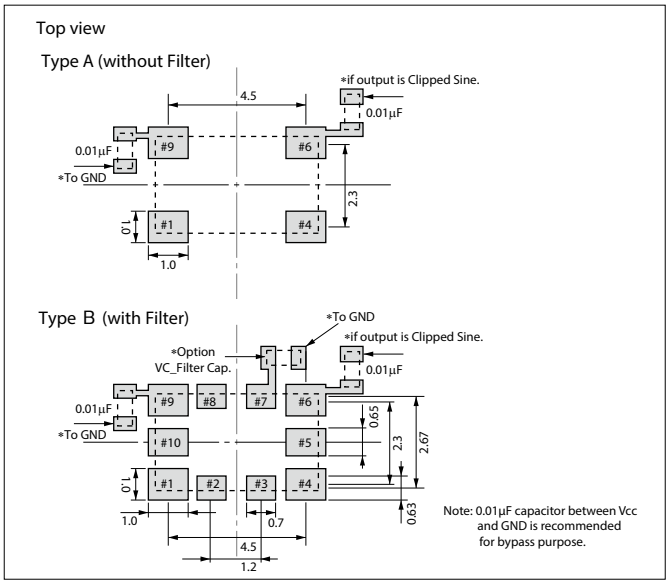
(Unit: mm)



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

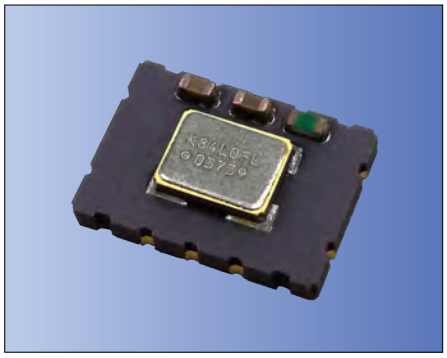
Recommended Land Pattern

(Unit: mm)



Temperature Compensated Crystal Oscillators

7.0×5.0mm



RoHS Compliant

Features

- High stability and high reliability
- 2.3 to 3.63V drive available
- Clipped sine wave or CMOS level output
- Low phase noise
- Disable Function (KT7050A)
- Operating Temp. −40 to +105°C (Option)

Applications

- 5G, Smallcell, Stratum3
- SONET/ SDH/ Ethernet
- SyncE/ IEEE 1588

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

How to Order

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

①Series
③Output Frequency
④Freq. Temp. Chrst.

U	±0.5×10⁻⁶
K	±0.28×10⁻⁶
A	±0.1×10⁻⁶

⑥Supply Voltage

33	3.3V

②Land Type

A	10Pads
B	4Pads

⑤Operating Temperature Range

GT	-10°C to 70°C
AW	-40°C to 85°C
AY	-40°C to 105°C

⑦Voltage Control Function

T	TCXO
Spec. Code*	VCTCXO

*Please contact us for Spec. Code.

⑧Individual Specification
Packaging (Tape & Reel 1000 pcs./ reel)

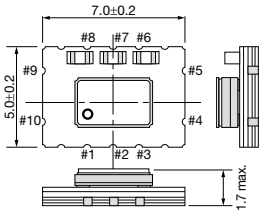
Specifications

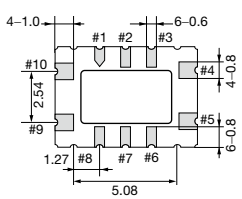
Item	Symbol	Conditions		Min.	Max.	Unit
Output Frequency Range	fo	Standard Frequency: 10 / 12.8 / 20 / 25.6 / 44.8		10	44.8	MHz
Frequency Tolerance	f_tol	vs Temperature [±(fmax-fmin)/ 2fo]		−0.5	+0.5	×10⁻⁶
				−0.28	+0.28	
				−0.1	+0.1	
		vs Voltage		−0.1	+0.1	
Supply Voltage	Vcc			+2.3	+3.63	V
Current Consumption	Icc	CMOS Output		—	6	mA
Frequency Aging	f_age	20years aging @40°C Including temp characteristics, initial tolerance, rated power supply voltage change and load change.		−4.6	+4.6	×10⁻⁶
Voltage Control Range	f_cont	Positive *100k ohm min		±5	±20	×10⁻⁶
Output Level	Vpp	Clipped Sine, Load: 10k ohm // 10pF		0.8	—	Vp-p
Low Level Output Voltage	VOL	CMOS, Load: 15pF IOL=4mA		—	10% Vcc	V
High Level Output Voltage	VOH	CMOS, Load: 15pF IOH=−4mA		90% Vcc	—	V
Rise / Fall Time (10%Vcc to 90%Vcc)	Tr/ Tf	CMOS, Load: 15pF		—	8	ns
Symmetry	SYM	50% Vcc		45	55	%
Phase Noise	—	@20MHz	@10Hz offset	—	−90	dBc/ Hz
			@100Hz offset	—	−120	
			@1kHz offset	—	−140	
			@10kHz offset	—	−150	
			@100kHz offset	—	−150	

* Please contact us for other specifications.

Dimensions

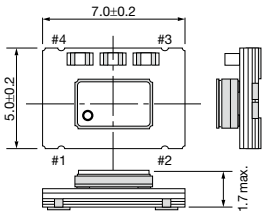
KT7050A

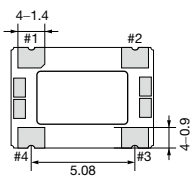




Pin Connection	
#1	Do not connect (Pin1)
#2/3	Do not connect
#4	GND
#5	Output
#6/7	Do not connect
#8	Tri-state Enable/ Disable connect
#9	Vcc
#10	Voltage Control (VCTCXO), GND (TCXO)

KT7050B

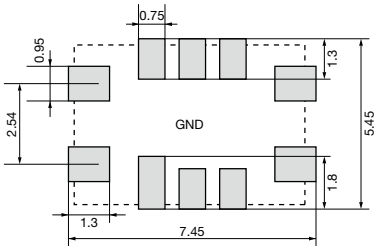


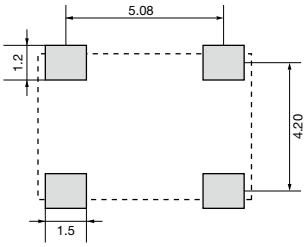


Pin Connection	
#1	Voltage Control (VCTCXO), GND (TCXO)
#2	GND
#3	Output
#4	Vcc

Recommended Land Pattern

(Unit: mm)





1. Shock & Drop / Vibration

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

2. Cleaning

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

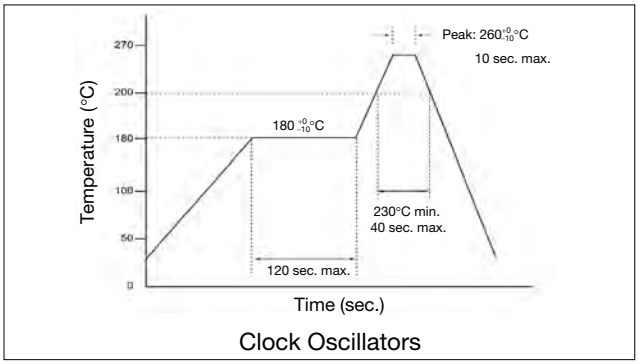
3. Soldering conditions

To maintain the product reliability, please follow recommended conditions.

Standard soldering iron conditions

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

Reflow conditions (Example)



Clock Oscillators

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

4. Mounting Precautions

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

5. Storage Condition

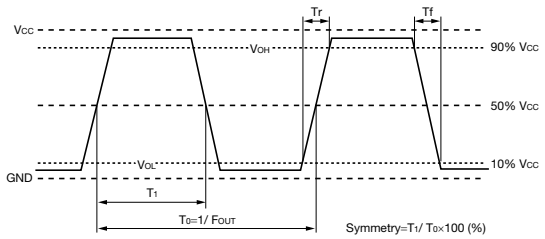
Since the long hour high temperature and low temperature storage, as well as the storage at high humidity are causes of deterioration in frequency accuracy and solderability.
Parts should be stored in temperature range of −5 to +40°C, humidity 40 to 60% RH, and avoid direct sunlight. Then use within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

6. In order to use clock oscillators

(1) The miniature oscillator for the clock utillzes a CMOS IC and incorporates a protective circuit against static electricity. However, exercise care in the same manner as for a normal CMOS IC.
(2) Internal capacitor is not provided in the power supply section (+DC-GND).
To serve as overimpressed voltage and overcurrent protective device, place a bypass capacitor (0.01µF) as near as possible to the (+DC-GND) terminal. However, the capacitance value is meant as a guideline. Depending on the capacitor type, frequency characteristics vary. Accordingly, use a capacitor that matches the frequency characteristics.
(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.

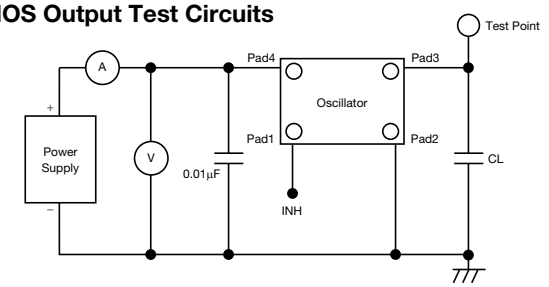
Clock Timing Chart

[CMOS Output]



Test Circuits

CMOS Output Test Circuits



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

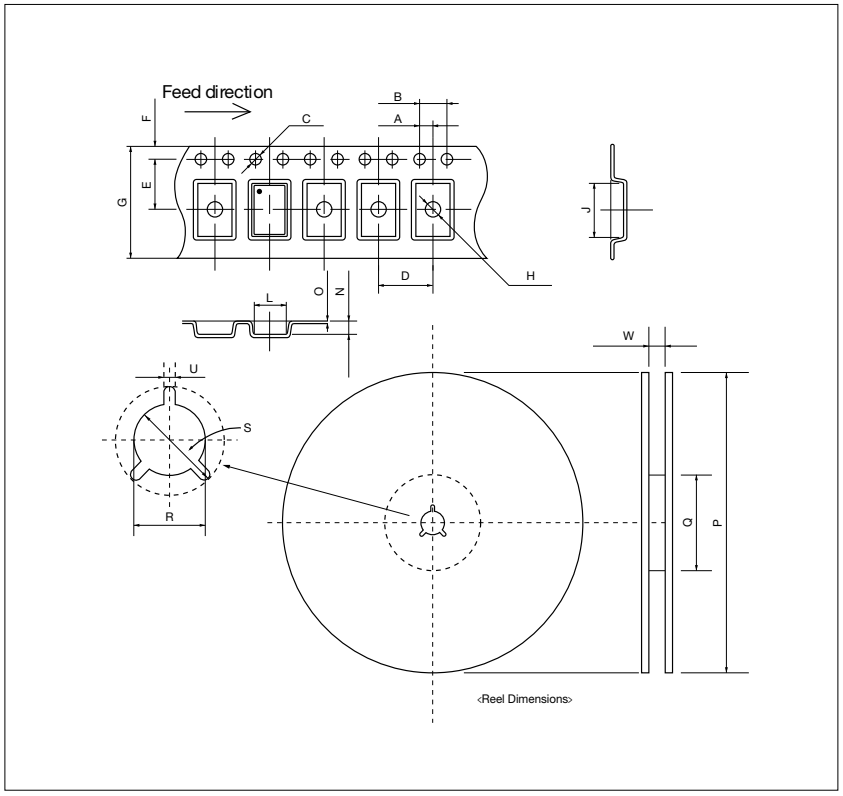
Tape & Reel Specifications

■Clock Oscillators

■Temperature Compensated Crystal Oscillators (TCXO)

		KC2016K KC2016Z MC2016K MC2016Z	KC2520K KC2520Z MC2520K MC2520Z	KC3225K KC3225Z MC3225K MC3225Z	KC5032K KC5032Z MC5032K MC5032Z	KC7050K KC7050Z MC7050K MC7050Z	KT1612A	KT2016K	KT2520K	KT5032F	KT7050
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	2.0±0.05	2.0±0.1
	B	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.05	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1
	C	ϕ1.5+0.1/ −0	ϕ1.5+0.1/ −0	ϕ1.5+0.1/ −0	ϕ1.5+0.1/ −0	Φ1.5+0.1/-0	ϕ1.5+0.1/ −0	ϕ1.5+0.1/ −0	ϕ1.5+0.1/ −0	ϕ1.55±0.05	ϕ1.5+0.1/ −0
	D	4.0±0.1	4.0±0.1	4.0±0.1	8.0±0.1	8.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1	8.0±0.1	8.0±0.1
	E	3.5±0.05	3.5±0.05	3.5±0.05	5.5±0.05	7.5±0.1	3.5±0.05	3.5±0.05	3.5±0.05	5.5±0.05	7.5±0.1
	F	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1
	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	12.0±0.2	16.0+0.3/ −0.1
	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	ϕ1.55±0.05	ϕ1.55±0.05
	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	5.9±0.1	8.21±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	3.7±0.1	5.78±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	2.0±0.1	2.16±0.1
	O	0.2±0.05	0.2±0.05	0.25±0.05	0.3±0.05	0.3±0.05	0.2±0.05	0.25±0.05	0.25±0.05	0.3±0.05	0.3±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	ϕ254±2.0	ϕ254±2.0
	Q	ϕ60+1/ −0	ϕ60+1/ −0	ϕ60+1/ −0	ϕ60+1/ −0	ϕ60+1/ −0	ϕ100±1.0	ϕ100±1.0	ϕ100±1.0	ϕ100±1.0	ϕ100+1.0/ −0
	R	ϕ13±0.2	ϕ13±0.2	ϕ13±0.2	ϕ13±0.2	ϕ13±0.2	ϕ13±0.2	ϕ13±0.2	ϕ13±0.2	ϕ13±0.2	ϕ13±0.2
	S	ϕ21±0.8	ϕ21±0.8	ϕ21±0.8	ϕ21±0.8	ϕ21±0.8	ϕ21±0.8	ϕ21±0.8	ϕ21±0.8	ϕ21±0.8	ϕ21±0.8
	U	2.0±0.5	2.0±0.5	2.0±0.5	2.0±0.5	2.0±0.5	2.0±0.5	2.0±0.5	2.0±0.5	2.0±0.5	2.0±0.5
	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	13.5±1.0	16.4+1.0/ −0
Qty.		2000	2000	2000	1000	1000	18000	15000	12000	1000	1000

(Unit: mm)



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