

CRYSTAL DEVICES 2022



Products			Dimensions (mm)			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. Wire-less LAN Dedicated Short Range Comm.(DSRC)	Industrial Use (Broadcast, Medical, Base Station etc.)
Crystal Units	3	CT1612RB	1.6	1.2	0.65				○	
	4	CT2016DB (Low Profile)	2.0	1.6	0.65				○	
	4	CT2016DB	2.0	1.6	1.0				○	
	5	CX1008SB	1.0	0.8	0.3	○			○	
	6	CX1210DB	1.2	1.0	0.3	○			○	
	7	CX1210SB	1.2	1.0	0.35	○			○	
	8	CX1612DB	1.6	1.2	0.33/0.4	○			○	
	9	CX2016DB	2.0	1.6	0.45	○			○	
	10	CX2016SA	2.0	1.6	0.5	○	○	○	○	
	11	CX3225SA (for Automotive)	3.2	2.5	0.8		○	○		
	12	CX3225GA (for Automotive)	3.2	2.5	0.95		○	○		
Clock Oscillators (SPXO)	15-16	KC2016Z (X type)	2.0	1.6	0.8	○			○	○
	15,17	KC2016Z (Y type)	2.0	1.6	0.8	○			○	○
	15-16	KC2520Z (X type)	2.5	2.0	0.8	○			○	○
	15,17	KC2520Z (Y type)	2.5	2.0	0.8	○			○	○
	15-16	KC3225Z (X type)	3.2	2.5	0.8	○			○	○
	15,17	KC3225Z (Y type)	3.2	2.5	0.8	○			○	○
	15-16	KC5032Z (X type)	5.0	3.2	1.2	○			○	○
	15,17	KC5032Z (Y type)	5.0	3.2	1.2	○			○	○
	15-16	KC7050Z (X type)	7.0	5.0	1.2	○			○	○
	15,17	KC7050Z (Y type)	7.0	5.0	1.2	○			○	○
	18-19	MC2016Z (X type)	2.0	1.6	0.8		○			
	18,20	MC2016Z (Y type)	2.0	1.6	0.8		○			
	18-19	MC2520Z (X type)	2.5	2.0	0.8		○			
	18,20	MC2520Z (Y type)	2.5	2.0	0.8		○			
	18-19	MC3225Z (X type)	3.2	2.5	0.8		○			
	18,20	MC3225Z (Y type)	3.2	2.5	0.8		○			
	18-19	MC5032Z (X type)	5.0	3.2	1.2		○			
	18,20	MC5032Z (Y type)	5.0	3.2	1.2		○			
	18-19	MC7050Z (X type)	7.0	5.0	1.2		○			
	18,20	MC7050Z (Y type)	7.0	5.0	1.2		○			
	21-23	KC2016K	2.0	1.6	0.8	○			○	○
	21-23	KC2520K	2.5	2.0	0.8	○			○	○
	21-23	KC3225K	3.2	2.5	0.8	○			○	○
	21-23	KC5032K	5.0	3.2	1.2	○			○	○
	21-23	KC7050K	7.0	5.0	1.2	○			○	○
	24-26	MC2016K	2.0	1.6	0.8		○			
	24-26	MC2520K	2.5	2.0	0.8		○			
	24-26	MC3225K	3.2	2.5	0.8		○			
	24-26	MC5032K	5.0	3.2	1.2		○			
	24-26	MC7050K	7.0	5.0	1.2		○			
	27	KC5032P-P2/ P3	5.0	3.2	1.3	○				○
	28	KC7050P-P2/ P3	7.0	5.0	1.8	○				○
	29	KC7050R-P3	7.0	5.0	1.8	○				○
	30	KC7050G-P3	7.0	5.0	1.8	○				○
	31	KC5032P-L2/ L3	5.0	3.2	1.3	○				○
	32	KC7050P-L2/ L3	7.0	5.0	1.8	○				○
	33	KC5032P-H2/ H3	5.0	3.2	1.3	○				○
	34	KC7050P-H2/ H3	7.0	5.0	1.8	○				○
Voltage Controlled Crystal Oscillators (VCXO)	35	KV5032R	5.0	3.2	1.2	○	○		○	○
	36	KV5032G	5.0	3.2	1.2	○	○		○	○
	37	KV7050R-P3	7.0	5.0	1.8	○	○			○
	38	KV7050G-P3	7.0	5.0	1.8	○	○			○
Temperature Compensated Crystal Oscillators (TCXO)	39	KT1612A (Low Phase Noise)	1.65	1.25	0.55	○			○	○
	40	KT1612A	1.65	1.25	0.55	○			○	○
	41	KT2016K	2.0	1.6	0.8	○	○		○	○
	42	KT2520K	2.5	2.0	0.8	○	○		○	○
	43	KT5032F	5.0	3.2	1.7					○
	44	KT7050	7.0	5.0	1.7					○

NR = Not recommended

	Products	Frequency Range (MHz)					Conditions of Use				RoHS Compli- ant*	AEC		
	Part Number	11050100300 to 800					Solder			Washable		Q100	Q200	
		Manual	Reflow	Flow										
	CT1612RB	38.4-----76.8					Yes	Yes	No	Yes	Yes			
	CT2016DB (Low Profile)	19.2	38.4				Yes	Yes	No	Yes	Yes			
	CT2016DB	19.2	38.4				Yes	Yes	No	Yes	Yes			
	CX1008SB	37.4-----80					Yes	Yes	No	Yes	Yes			
	CX1210DB	37.4-----80					Yes	Yes	No	Yes	Yes			
	CX1210SB	27.12	32	48				Yes	Yes	No	Yes	Yes		
	CX1612DB	24-----48					Yes	Yes	No	Yes	Yes			
	CX2016DB	16	-----50				Yes	Yes	No	Yes	Yes			
	CX2016SA	16	-----50				Yes	Yes	No	Yes	Yes		Yes	
	CX3225SA (for Automotive)	8	-----40				Yes	Yes	No	Yes	Yes		Yes	
	CX3225GA (for Automotive)	8	-----40				Yes	Yes	No	Yes	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	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	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
	KC5032P-P2/ P3	25-----175					Yes	Yes	No	NR	Yes			
	KC7050P-P2/ P3	25-----175					Yes	Yes	No	NR	Yes			
	KC7050R-P3	10	-----800					Yes	Yes	No	NR	Yes		
	KC7050G-P3	10	-----800					Yes	Yes	No	NR	Yes		
	KC5032P-L2/ L3	25-----175					Yes	Yes	No	NR	Yes			
	KC7050P-L2/ L3	25-----175					Yes	Yes	No	NR	Yes			
	KC5032P-H2/ H3	25-----175					Yes	Yes	No	NR	Yes			
	KC7050P-H2/ H3	25-----175					Yes	Yes	No	NR	Yes			
	KV5032R	10	-----800					Yes	Yes	No	NR	Yes		
	KV5032G	10	-----800					Yes	Yes	No	NR	Yes		
	KV7050R-P3	10	-----800					Yes	Yes	No	NR	Yes		
	KV7050G-P3	10	-----800					Yes	Yes	No	NR	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	-----40				Contact us	Yes	No	No	Yes			
	KT7050	10	-----40				Contact us	Yes	No	No	Yes			

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



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

① Series

② Frequency

③ Load Capacitance

④ Frequency Tolerance

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

⑤ Operating Temp. Range ⑥ Frequency Temp. Stability

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

Packaging (Tape & Reel 15000 pcs./ reel)

Specifications

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

Please contact us for other specifications.

Table 1 Motional Series Resistance

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

Table 2 Thermistor Resistance

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

Table 3 Thermistor B-Constant

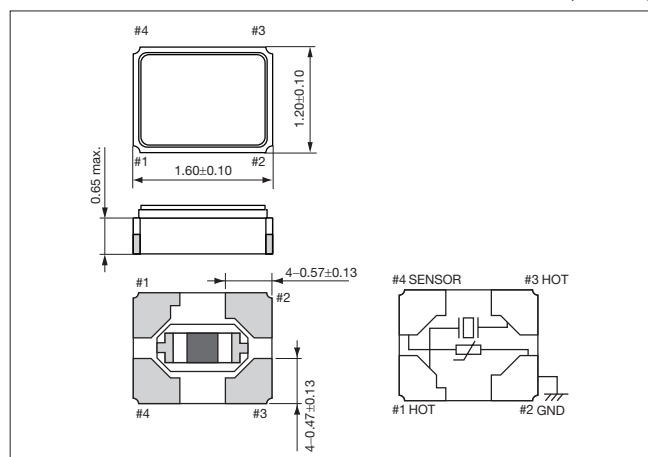
B-Constant	Specification
4250K	$\pm 1\%$

Crystal Units



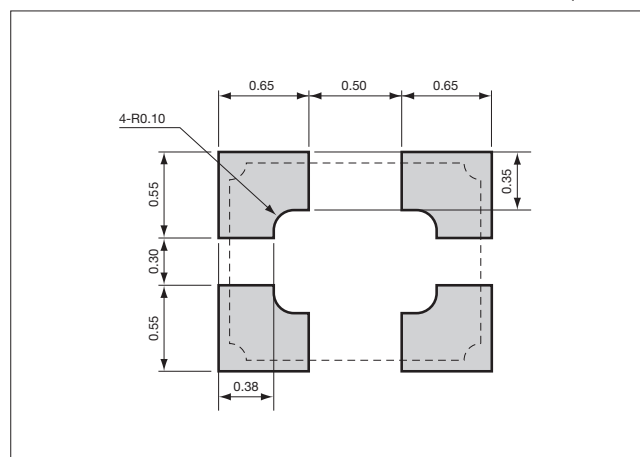
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)





2.0×1.6mm for Mobile Communications



RoHS Compliant

Features

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

Applications

- Mobile Communications, GNSS

How to Order

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

① Series

② Frequency

③ Load Capacitance

④ Frequency Tolerance

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

⑤ Operating Temp. Range ⑥ Frequency Temp. Stability

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

⑦ Individual Specification

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	$\times 10^{-6}$	25°C $\pm 3^\circ\text{C}$
Motional Series Resistance	R1	Table 1	ohm	
Drive Level	DL	10	μW	100 μW max.
Operating Temp. Range	T_{use}	-30 to +85	°C	
Storage Temp. Range	T_{stg}	-40 to +105	°C	
Frequency Temp. Characteristics	f_{tem}	± 12	$\times 10^{-6}$	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
100k Ω	$\pm 1\%$

Table 3 Thermistor B-Constant

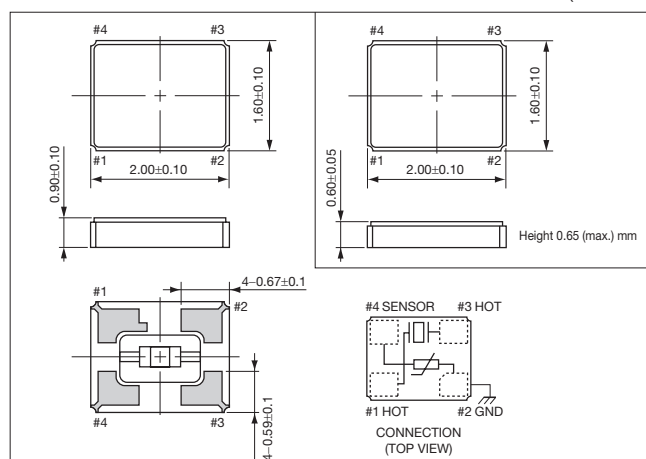
B-Constant	Specification
4250K	$\pm 1\%$

Crystal Units



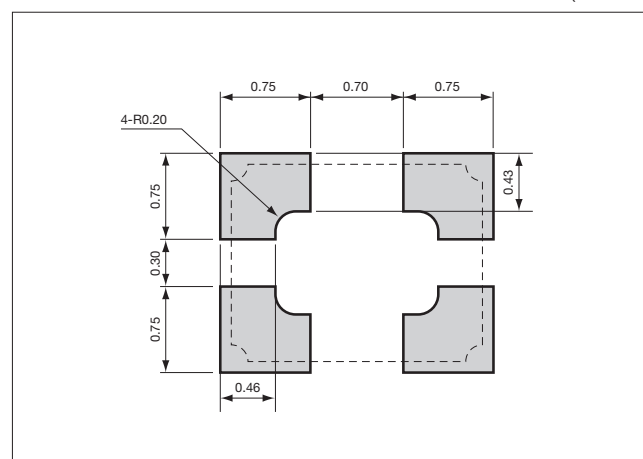
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)





1.0×0.8mm for Mobile Communications



RoHS Compliant

Features

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

Applications

- Mobile Communications

How to Order

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

①Series

③Load Capacitance

B0	6 pF	—
C0	7 pF	Std.

②Frequency

④Frequency Tolerance

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

⑤Operating Temp. Range ⑥Frequency Temp. Stability

LH	-30 to +85°C	$\pm 12 \times 10^{-6}$
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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	$\times 10^{-6}$	25°C $\pm 3^\circ\text{C}$
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	$\times 10^{-6}$	

Please contact us for other specifications.

Crystal Units



Table 1 Motional Series Resistance

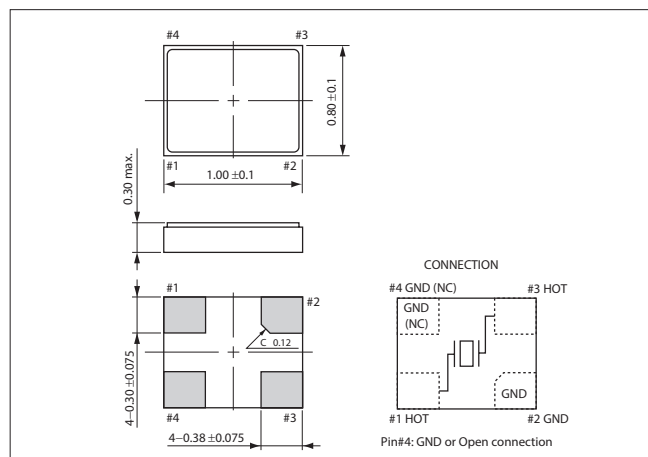
Frequency Range	Motional Series Resistance
$f_{nom}=37400$ to 80000kHz	60 Ω max.

Table 2 Level of Drive

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

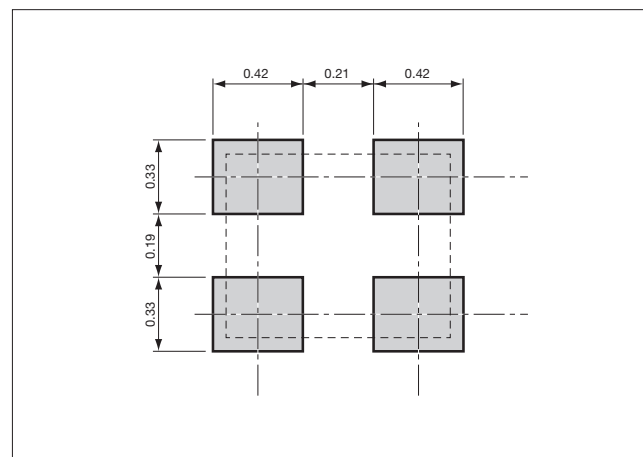
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)





1.2×1.0mm for Mobile Communications



RoHS Compliant

Features

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

Applications

- Mobile Communications, Bluetooth®, Wireless LAN

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

How to Order

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

①Series

③Load Capacitance

D0	8 pF
H0	12 pF

②Frequency

④Frequency Stability

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

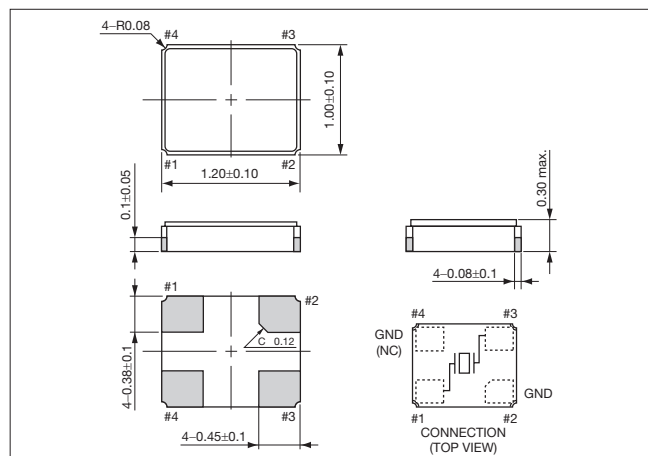
Frequency Range	Motional Series Resistance
f _{nom} =37400/ 40000/ 52000/ 80000kHz	60 Ω max.

Table 2 Level of Drive

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

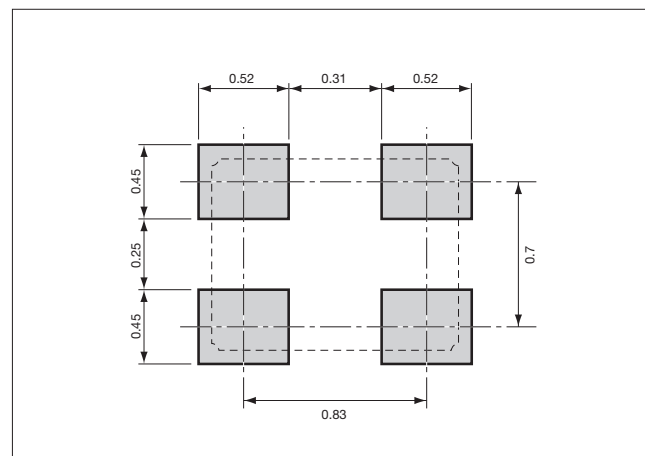
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)





1.2×1.0mm for 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

③Load Capacitance

B0	6 pF
D0	8 pF

②Frequency

④Frequency Stability

F	$\pm 10 \times 10^{-6}$
G	$\pm 15 \times 10^{-6}$

⑤Operating Temp. Range ⑥Frequency Temp. Stability

FF	-20 to +70°C	$\pm 10 \times 10^{-6}$
LH	-30 to +85°C	$\pm 12 \times 10^{-6}$
LJ	-30 to +85°C	$\pm 15 \times 10^{-6}$

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	kHz	
Overtone Order	OT	Fundamental	—	
Load Capacitance	CL	8	pF	
Frequency Tolerance	f_{tol}	± 10	$\times 10^{-6}$	25°C $\pm 3^\circ\text{C}$
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	$\times 10^{-6}$	Freq. deviation from the value at 25°C

Please contact us for other specifications.

Crystal Units



Table 1 Motional Series Resistance

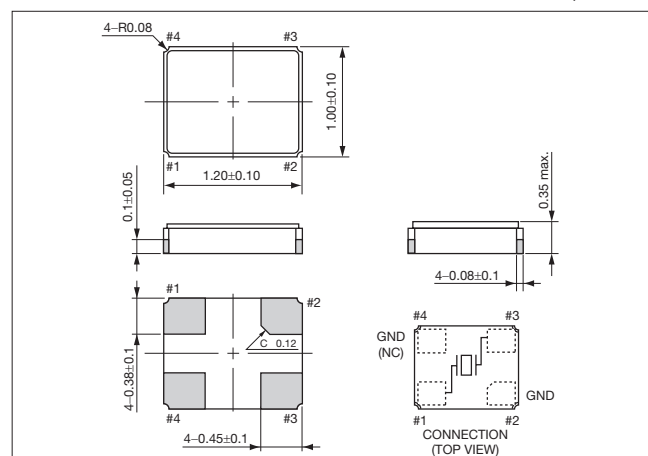
Frequency Range	Motional Series Resistance
$f_{nom}=27120\text{kHz}$	100 Ω max.
$f_{nom}=32000\text{kHz}$	60 Ω max.

Table 2 Level of Drive

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

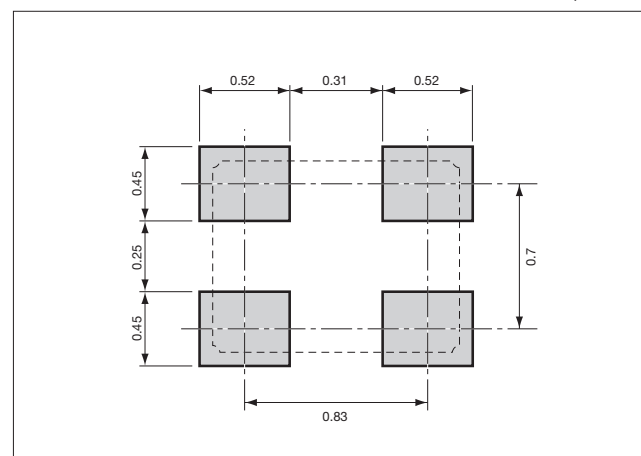
Dimensions

(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
32000kHz or more accepts 0.33mm-high
- 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

③Load Capacitance

D0 8 pF

②Frequency

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	
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.

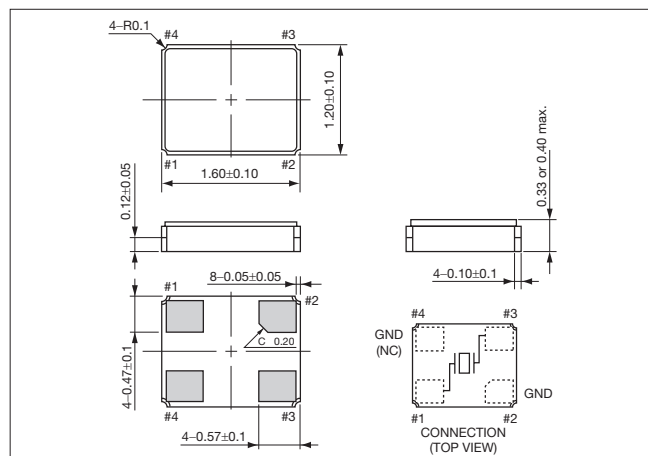
Table 1 Motional Series Resistance

Please contact us for other frequency range.

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

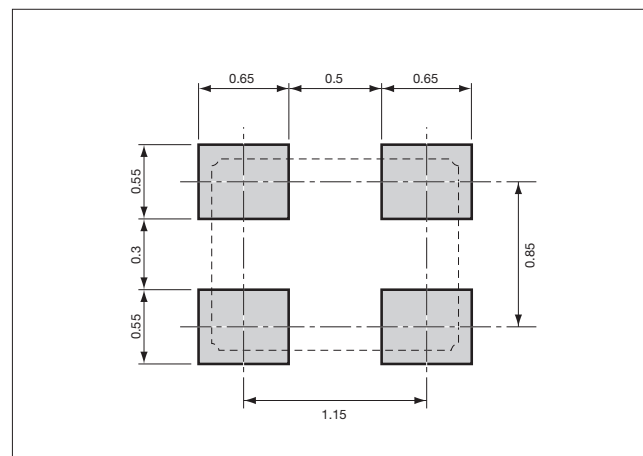
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)





2.0×1.6mm for Consumer Products/ Mobile Communications



RoHS Compliant

Features

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

Applications

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

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

How to Order

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

①Series

②Frequency

③Load Capacitance

D0 8 pF

④Frequency Tolerance

G $\pm 15 \times 10^{-6}$

⑤Operating Temp. Range ⑥Frequency Temp. Stability

LL -30 to +85°C

$\pm 20 \times 10^{-6}$

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	$\times 10^{-6}$	25°C ± 3 °C
Motional Series Resistance	R1	Table 1	ohm	
Drive Level	DL	10 μ W(100 μ W max.)	μ W	
Operating Temp. Range	T_{use}	-30 to +85	°C	
Storage Temp. Range	T_{stg}	-40 to +85	°C	
Frequency Temp. Characteristics	f_{tem}	± 20	$\times 10^{-6}$	Freq. deviation from the value at 25°C

Please contact us for other specifications.

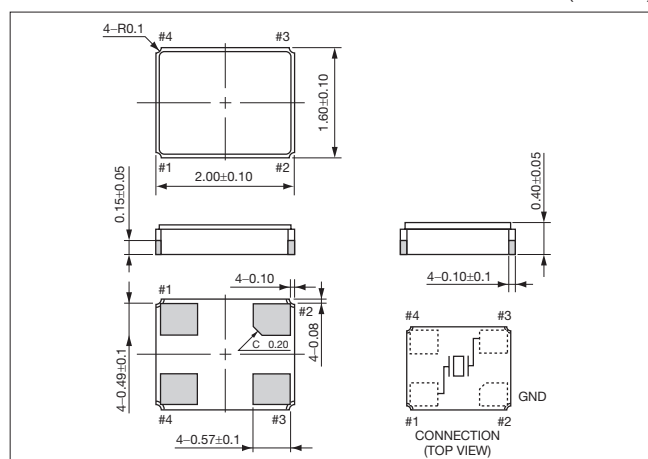
Table 1 Motional Series Resistance

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.

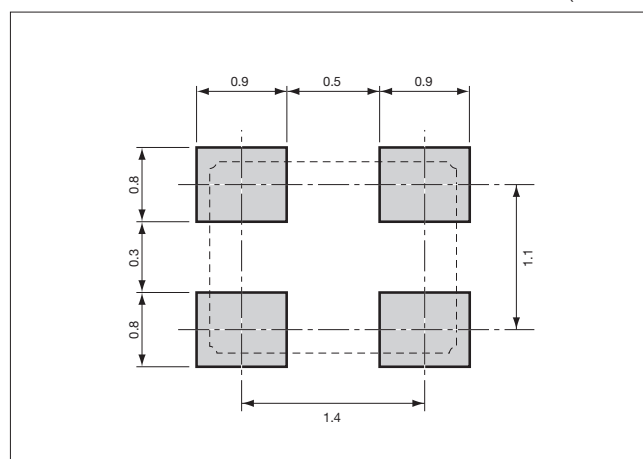
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)





2.0×1.6mm for Consumer Products/ Mobile Communication/ 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
- Mobile Communication

How to Order

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

①Series

③Load Capacitance

D0 8 pF

②Frequency

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

⑦Individual Specification

(STD Specification is "CC".)

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	°C	
Storage Temp. Range	T _{stg}	-40 to +150	°C	
Frequency Temp. Characteristics	f _{tem}	±50 ±200	×10 ⁻⁶	Freq. deviation from the value at 25°C

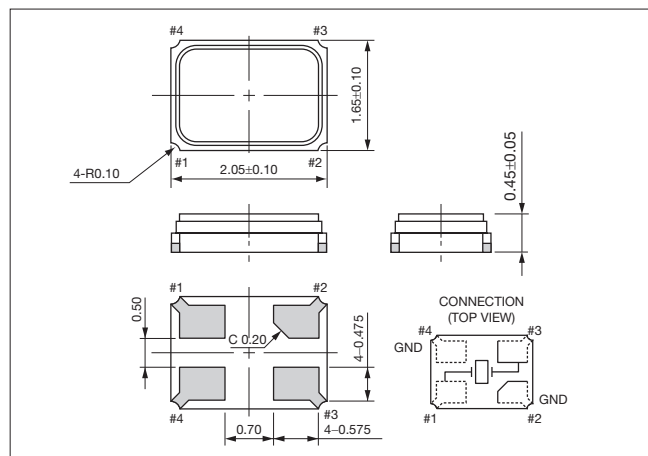
Please contact us for other specifications.

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.

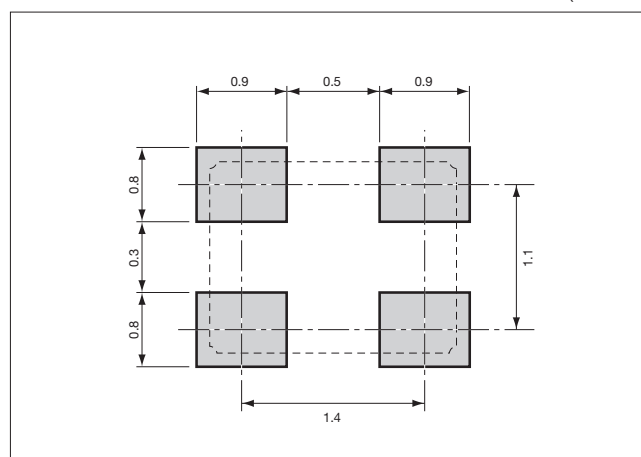
Dimensions

(Unit: mm)



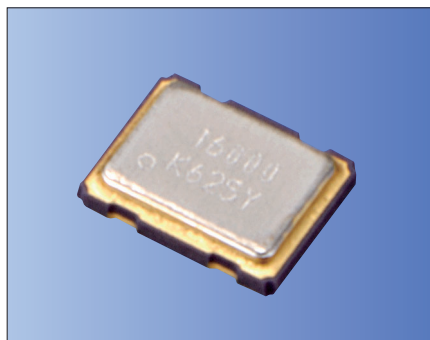
Recommended Land Pattern

(Unit: mm)





3.2×2.5mm for Automotive



AEC-Q200 RoHS Compliant

Features

- Crystal unit for automotive electronics
- 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 CC
① ② ③ ④ ⑤ ⑥ ⑦

①Series

③Load Capacitance

D0 8 pF

⑤Operating Temp. Range ⑥Frequency Temp. Stability

TV -40 to +150°C

⑦Individual Specification

(STD Standard is "CC".)

Packaging (Tape & Reel 3000 pcs./ reel)

②Frequency

④Frequency Tolerance

G ±15×10⁻⁶

±150×10⁻⁶

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

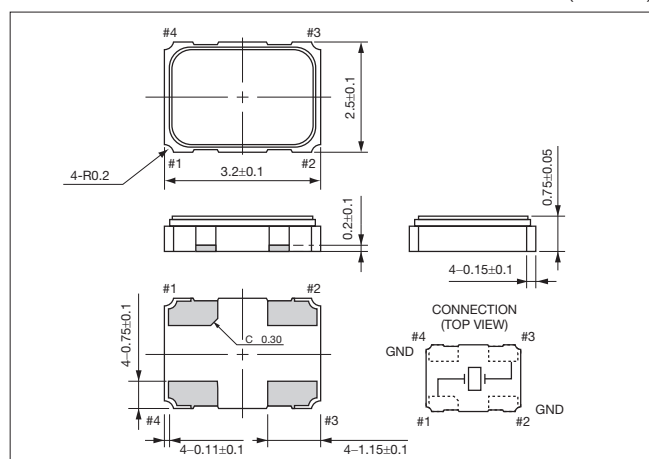
Please contact us for other specifications.

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.

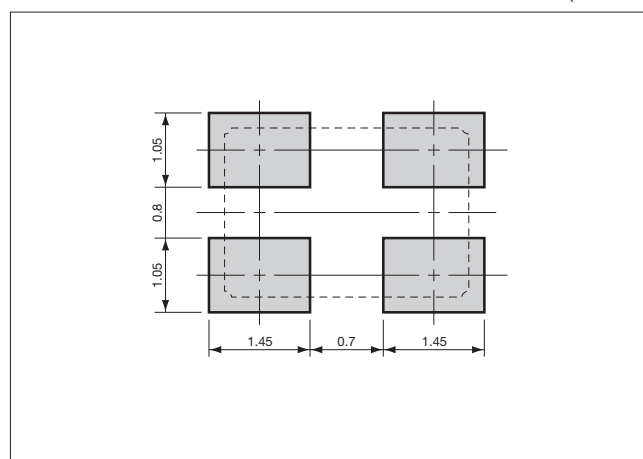
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)





3.2×2.5mm for 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 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
TV −40 to +150°C	±150×10 ^{−6}

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

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

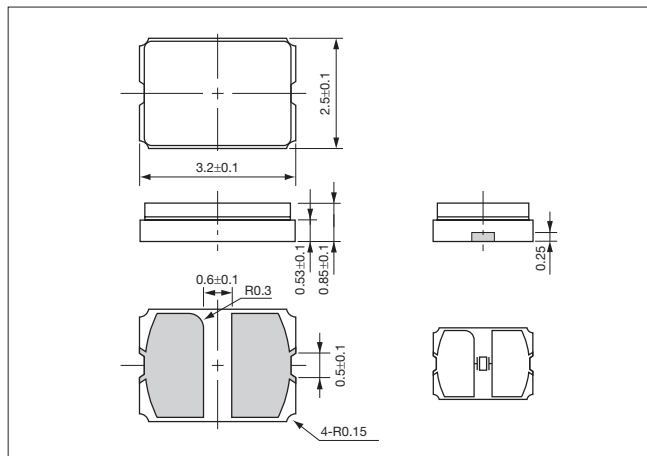
Please contact us for other specifications.

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.

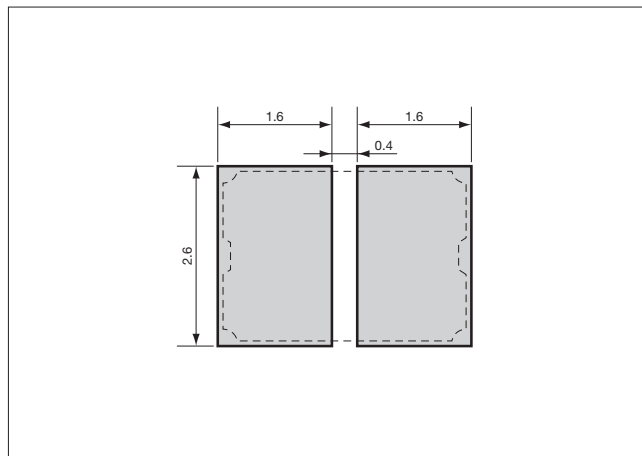
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)





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.

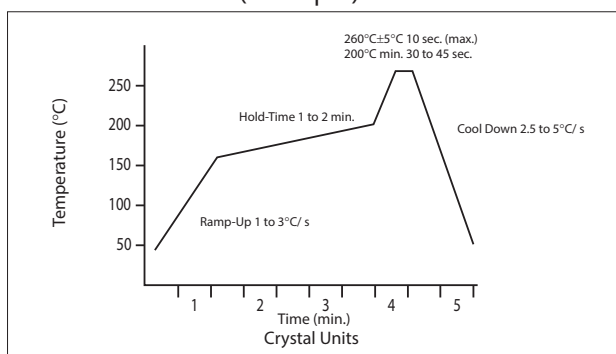
3. Soldering conditions

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.



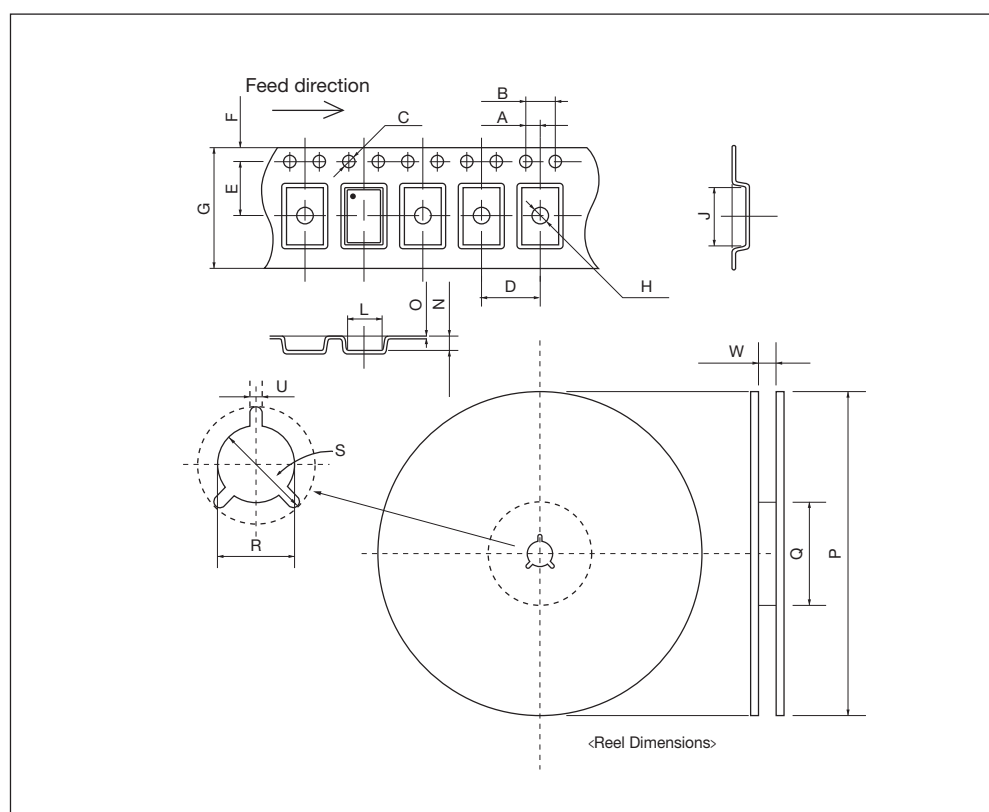


Tape & Reel Specifications

■Crystal Units

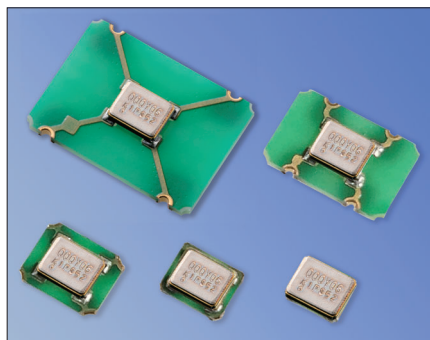
(Unit: mm)

		CT1612RB	CT2016DB	CX1008SB	CX1210DB CX1210SB	CX1612DB		CX2016DB CX2016SA		CX2520DB	
T A P E	A	2.0±0.05	2.0±0.05	2.0±0.05	2.0±0.05	2.0±0.05		2.0±0.05		2.0±0.05	
	B	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1		4.0±0.1		4.0±0.1	
	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	
	D	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1		4.0±0.1		4.0±0.1	
	E	3.5±0.05	3.5±0.05	3.5±0.05	3.5±0.05	3.5±0.05		3.5±0.05		3.5±0.05	
	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	
	G	8.0±0.2	8.0±0.2	8.0±0.2	8.0±0.2	8.0±0.2		8.0±0.2		8.0±0.2	
	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		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		2.7±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		2.2±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		0.6±0.1	
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		0.2±0.05		
R E E L	P	φ330±2	φ330±0.2	φ330±2	φ330±2	φ180+0/-3	φ330±2	φ180+0/-3	φ330±2	φ180+0/-3	φ330±2
	Q	φ100±1.0	φ100±1.0	φ100±1.0	φ100±1.0	φ60+1/-0	φ100±1.0	φ60+1/-0	φ100±1.0	φ60+1/-0	φ100±1.0
	R	φ13±0.2	φ13±0.2	φ13±0.2	φ13±0.2	φ13±0.2	φ13±0.2	φ13±0.2	φ13±0.2	φ13±0.2	φ13±0.2
	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	9.4±1.0	9.4±1.0	9.4±1.0	9.4±1.0	9.0±1.0	9.4±1.0	9.0±1.0	9.4±1.0	9.0±1.0	9.4±1.0
Qty.		15000	12000	21000	12000/21000	3000	20000	3000	15000	3000	12000





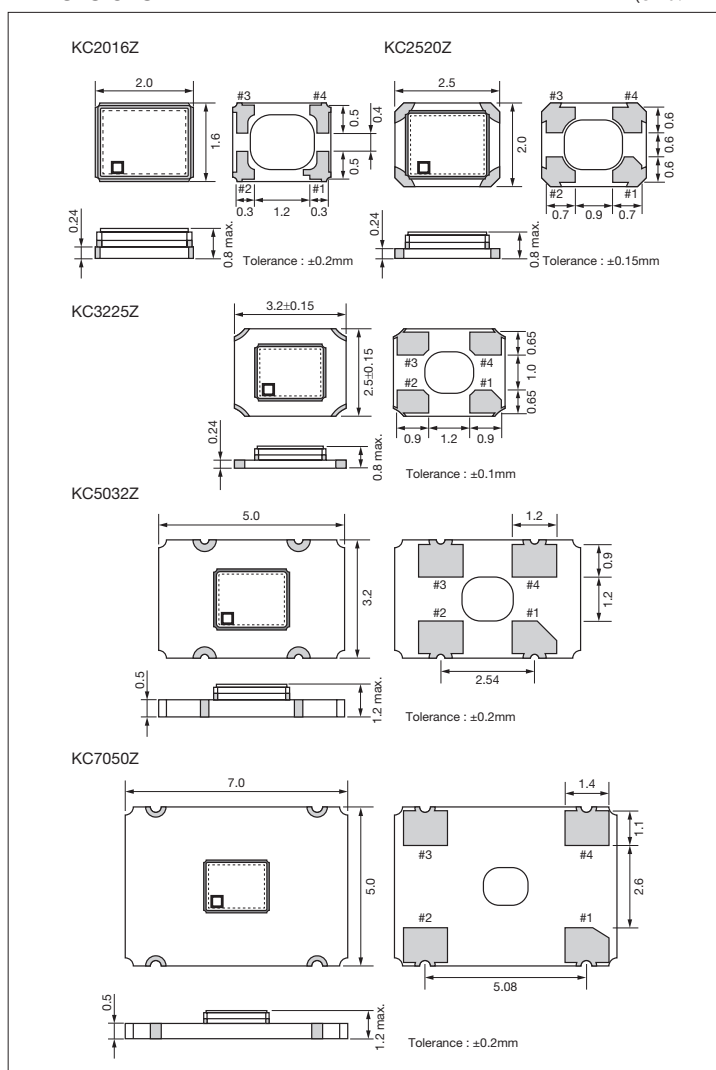
CMOS/ 1.8V, 2.5V, 3.3V/ 2.0×1.6, 2.5×2.0, 3.2×2.5, 5.0×3.2, 7.0×5.0mm



RoHS Compliant

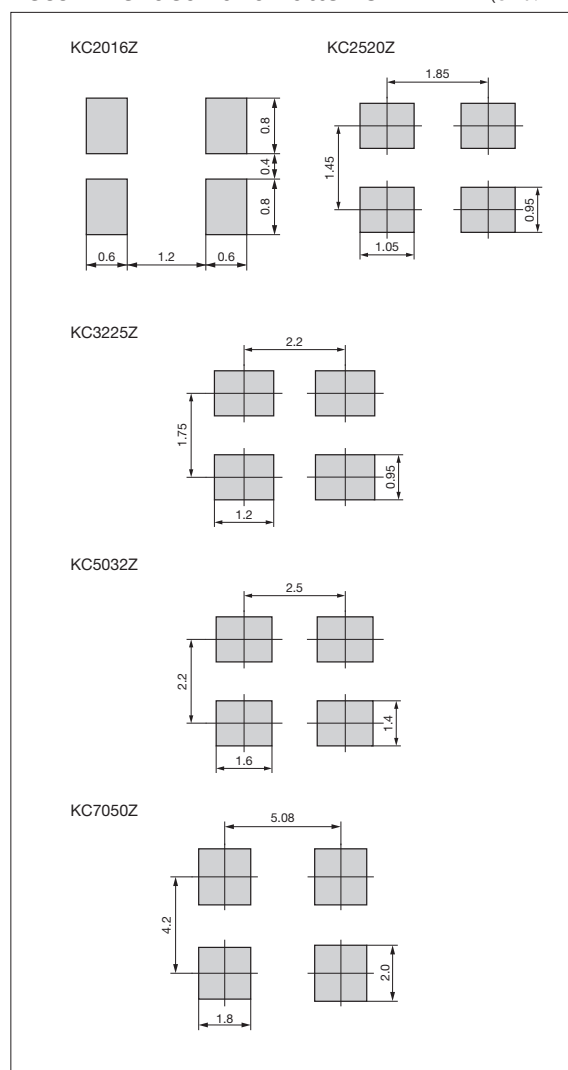
Dimensions

(Unit : mm)



Recommended Land Patterns

(Unit : mm)



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

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

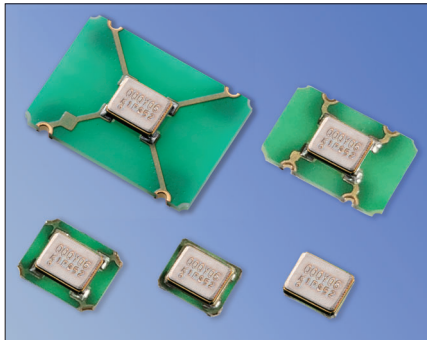


Clock Oscillators Surface Mount Type

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

How to Order

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

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	f _o		0.5	170	MHz
Frequency Tolerance	f _{tol}	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration	See Table 1.		
Storage Temperature Range	T _{stg}		-55	150	°C
Operating Temperature Range	T _{use}		See Table 1.		
Max. Supply Voltage	—		-0.3	4.5	V
Supply Voltage	V _{cc}		1.71	3.63	V
Current Consumption (Noload/ 1.71≤V _{cc} ≤2.25)	I _{cc}	0.5≤f _o <5MHz	—	5.2	mA
		5≤f _o <15MHz	—	5.8	
		15≤f _o <30MHz	—	6.2	
		30≤f _o <50MHz	—	6.8	
		50≤f _o <60MHz	—	6.8	
		60<f _o <75MHz	—	9	
		75≤f _o <105MHz	—	10	
		105≤f _o <130MHz	—	10.5	
		130≤f _o <160MHz	—	11.5	
		160≤f _o ≤170MHz	—	12.5	
Current Consumption (Noload/ 2.25<V _{cc} ≤2.8)	I _{cc}	0.5≤f _o <5MHz	—	5.5	
		5≤f _o <15MHz	—	6	
		15≤f _o <30MHz	—	6.5	
		30≤f _o <50MHz	—	7.2	
		50≤f _o <60MHz	—	7.4	
		60<f _o <75MHz	—	10	
		75≤f _o <105MHz	—	11.5	
		105≤f _o <130MHz	—	12.5	
		130≤f _o <160MHz	—	14	
		160≤f _o ≤170MHz	—	15	
Current Consumption (Noload/ 2.8<V _{cc} ≤3.63)	I _{cc}	0.5≤f _o <5MHz	—	5.8	
		5≤f _o <15MHz	—	6.5	
		15≤f _o <30MHz	—	7.3	
		30≤f _o <50MHz	—	8	
		50≤f _o <60MHz	—	8.5	
		60<f _o <75MHz	—	12.5	
		75≤f _o <105MHz	—	14.5	
		105≤f _o <130MHz	—	15.5	
		130≤f _o <160MHz	—	18	
		160≤f _o ≤170MHz	—	19.5	
Stand-by Current	I _{std}		—	5	μA
Symmetry	SYM	@50% V _{cc}	45	55	%
Rise/ Fall Time (20% to 80% Output Level)	Tr/ Tf	0.5≤f _o ≤60MHz	Loaded/ 1.71≤V _{cc} ≤2.25	—	4
			Loaded/ 2.25<V _{cc} ≤2.8	—	3
			Loaded/ 2.8<V _{cc} ≤3.63	—	2.5
		60<f _o ≤170MHz	Loaded/ 1.71≤V _{cc} ≤2.25	—	1.5
			Loaded/ 2.25<V _{cc} ≤2.8	—	1.3
			Loaded/ 2.8<V _{cc} ≤3.63	—	1
Low Level Output Voltage	V _{OL}	I _{OL} = 4mA	—	10% V _{cc}	V
High Level Output Voltage	V _{OH}	I _{OH} = -4mA	90% V _{cc}	—	V
Output Load (CMOS)	L _{CMOS}		—	15	pF
Low Level Input Voltage	V _{IL}		—	30% V _{cc}	V
High Level Input Voltage	V _{IH}		70% V _{cc}	—	V
Disable Time	t _{dis}		—	200	ns
Enable Time	t _{ena}		—	5	ms
Start-up Time	t _{str}	@Minimum operating voltage to be 0 sec.	—	5	ms

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



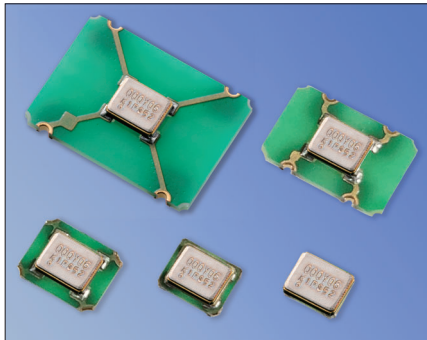


Clock Oscillators Surface Mount Type

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

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

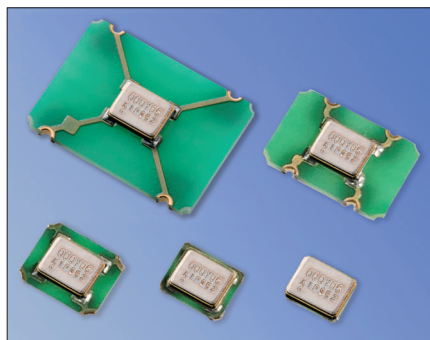
Item	Symbol	Conditions	Min.	Max.	Unit
Output Frequency Range	fo		24	72	MHz
Frequency Tolerance	f _{tol}	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration	See Table 3		
Storage Temperature Range	T _{stg}		-55	150	°C
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	%
			40<fo≤72MHz	45	
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} = 4mA	—	10% V _{cc}	V
High Level Output Voltage	V _{OH}	I _{OH} = -4mA	90% V _{cc}	—	V
Output Load (CMOS)	L _{CMOS}		—	15	pF
Low Level Input Voltage	V _{IL}		—	30% V _{cc}	V
High Level Input Voltage	V _{IH}		70% V _{cc}	—	V
Disable Time	t _{dis}		—	200	ns
Enable Time	t _{ena}		—	5	ms
Start-up Time	t _{str}	@Minimum operating voltage to be 0 sec.	—	5	ms
1 Sigma Jitter	J _{Sigma}	Measured with Wavecrest SIA-3000	—	5	ps
Peak to Peak Jitter	J _{PK_PK}		—	50	
Phase Jitter	—	@50MHz V _{cc} = 3.3V	BW : 12kHz to 20MHz	1	ps

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





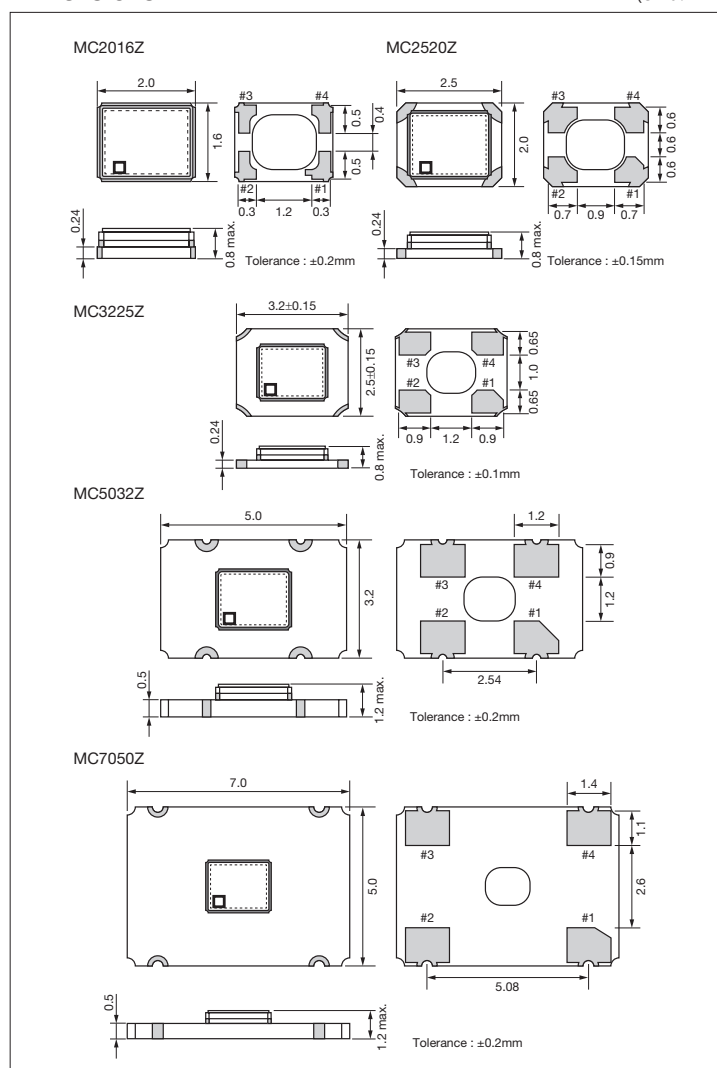
CMOS/ 1.8V, 2.5V, 3.3V / 2.0×1.6, 2.5×2.0, 3.2×2.5, 5.0×3.2, 7.0×5.0mm for Automotive



AEC-Q100/ 200 RoHS Compliant

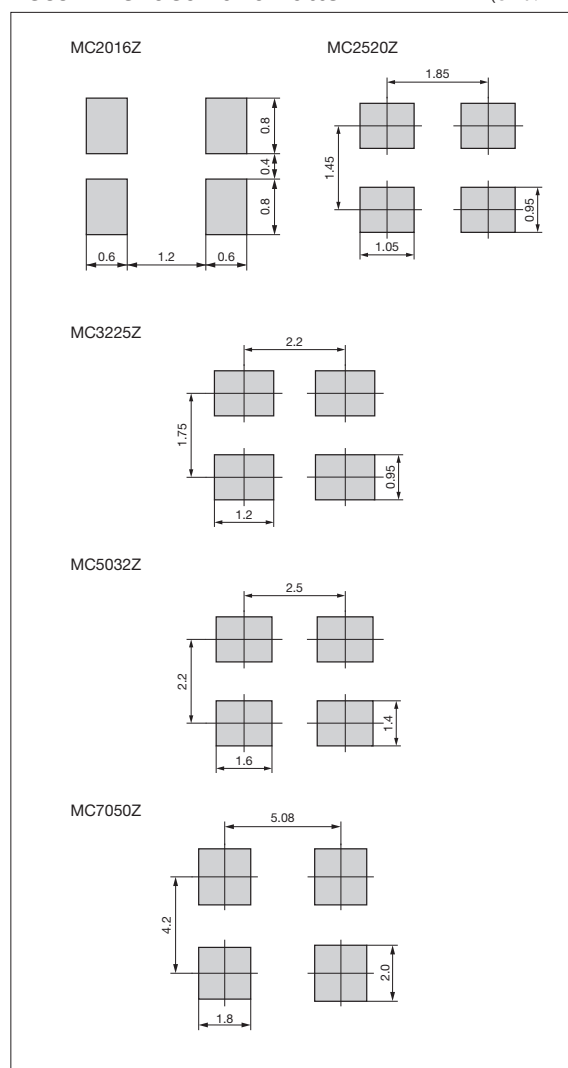
Dimensions

(Unit : mm)



Recommended Land Pattern

(Unit : mm)



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

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

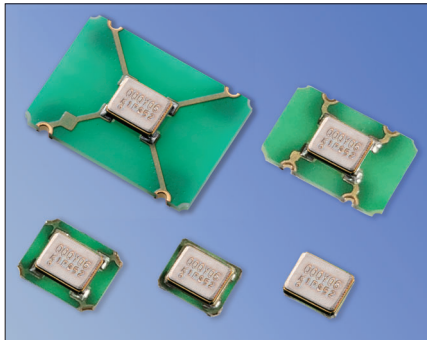




Clock Oscillators Surface Mount Type Clock MC-Z-Series "X" type (STD, Short LT type)



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

How to Order

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

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%
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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	f _o			0.5	170	MHz
Frequency Tolerance	f _{tol}	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration		See Table 5		
Storage Temperature Range	T _{stg}			-55	150	°C
Operating Temperature Range	T _{use}			See Table 5		
Max. Supply Voltage	—			-0.3	4.5	V
Supply Voltage	V _{cc}			1.71	3.63	V
Current Consumption (Noload/ 1.71≤V _{cc} ≤2.25)	I _{cc}	0.5≤f _o <5MHz		—	5.2	mA
		5≤f _o <15MHz		—	5.8	
		15≤f _o <30MHz		—	6.2	
		30≤f _o <50MHz		—	6.8	
		50≤f _o ≤60MHz		—	6.8	
		60<f _o <75MHz		—	9	
		75≤f _o <105MHz		—	10	
		105≤f _o <130MHz		—	10.5	
		130≤f _o <160MHz		—	11.5	
160≤f _o ≤170MHz		—	12.5			
Current Consumption (Noload/ 2.25<V _{cc} ≤2.8)	I _{cc}	0.5≤f _o <5MHz		—	5.5	
		5≤f _o <15MHz		—	6	
		15≤f _o <30MHz		—	6.5	
		30≤f _o <50MHz		—	7.2	
		50≤f _o ≤60MHz		—	7.4	
		60<f _o <75MHz		—	10	
		75≤f _o <105MHz		—	11.5	
		105≤f _o <130MHz		—	12.5	
		130≤f _o <160MHz		—	14	
160≤f _o ≤170MHz		—	15			
Current Consumption (Noload/ 2.8<V _{cc} ≤3.63)	I _{cc}	0.5≤f _o <5MHz		—	5.8	
		5≤f _o <15MHz		—	6.5	
		15≤f _o <30MHz		—	7.3	
		30≤f _o <50MHz		—	8	
		50≤f _o ≤60MHz		—	8.5	
		60<f _o <75MHz		—	12.5	
		75≤f _o <105MHz		—	14.5	
		105≤f _o <130MHz		—	15.5	
		130≤f _o <160MHz		—	18	
160≤f _o ≤170MHz		—	19.5			
Stand-by Current	I _{std}			—	5	μA
Symmetry	SYM	@50% V _{cc}		45	55	%
Rise/ Fall Time (20% to 80% Output Level)	Tr/ Tf	0.5≤f _o ≤60MHz	Loaded/ 1.71≤V _{cc} ≤2.25	—	4	ns
			Loaded/ 2.25<V _{cc} ≤2.8	—	3	
			Loaded/ 2.8<V _{cc} ≤3.63	—	2.5	
		60<f _o ≤170MHz	Loaded/ 1.71≤V _{cc} ≤2.25	—	1.5	
			Loaded/ 2.25<V _{cc} ≤2.8	—	1.3	
			Loaded/ 2.8<V _{cc} ≤3.63	—	1	
Low Level Output Voltage	V _{OL}	I _{OL} = 4mA		—	10% V _{cc}	V
High Level Output Voltage	V _{OH}	I _{OH} = -4mA		90% V _{cc}	—	V
Output Load (CMOS)	L _{CMOS}			—	15	pF
Low Level Input Voltage	V _{IL}			—	30% V _{cc}	V
High Level Input Voltage	V _{IH}			70% V _{cc}	—	V
Disable Time	t _{dis}			—	200	ns
Enable Time	t _{ena}			—	5	ms
Start-up Time	t _{str}	@Minimum operating voltage to be 0 sec.		—	5	ms

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



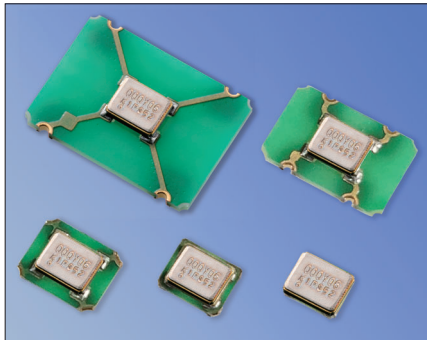


Clock Oscillators Surface Mount Type

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.		Operating Temperature Range (°C)	Note
Code	$\times 10^{-6}$		
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 □ 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%
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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	f _o		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≤f _o <30MHz	—	2.7	mA
		30≤f _o <50MHz	—	3.3	
		50≤f _o <60MHz	—	3.7	
		60<f _o <72MHz	—	4	
Current Consumption (Noload/ 2.25<V _{cc} ≤2.8)	I _{cc}	24≤f _o <30MHz	—	3.5	
		30≤f _o <50MHz	—	4	
		50≤f _o <60MHz	—	4.3	
		60<f _o <72MHz	—	4.8	
Current Consumption (Noload/ 2.8<V _{cc} ≤3.63)	I _{cc}	24≤f _o <30MHz	—	4	
		30≤f _o <50MHz	—	5	
		50≤f _o <60MHz	—	5.5	
		60<f _o <72MHz	—	6	
Stand-by Current	I _{std}		—	5	μA
Symmetry	SYM	@50% V _{cc}			%
		24≤f _o ≤40MHz	40	55	
		40<f _o ≤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} = 4mA	—	10% V _{cc}	V
High Level Output Voltage	V _{OH}	I _{OH} = -4mA	90% V _{cc}	—	V
Output Load (CMOS)	L _{CMOS}		—	15	pF
Low Level Input Voltage	V _{IL}		—	30% V _{cc}	V
High Level Input Voltage	V _{IH}		70% V _{cc}	—	V
Disable Time	t _{dis}		—	200	ns
Enable Time	t _{ena}		—	5	ms
Start-up Time	t _{str}	@Minimum operating voltage to be 0 sec.	—	5	ms
1 Sigma Jitter	J _{Sigma}	Measured with Wavecrest SIA-3000	—	5	ps
Peak to Peak Jitter	J _{PK_PK}		—	50	
Phase Jitter	—	@50MHz V _{cc} = 3.3V	BW : 12kHz to 20MHz	1	ps

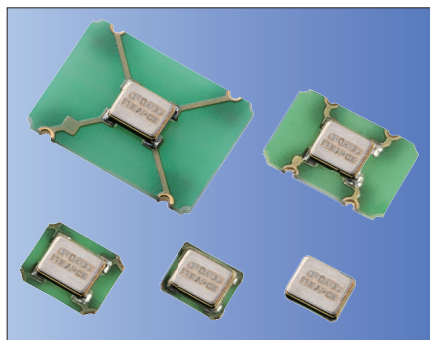
All electrical characteristics are defined at the maximum load and operating temperature range.

Clock Oscillators





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

How to Order

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

① Series

② Output Frequency (25.0000: 25MHz)

③ Output Type (C: CMOS)

④ Supply Voltage

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

⑤ Frequency Tolerance (See Table 1)

⑥ Symmetry/ INH Function

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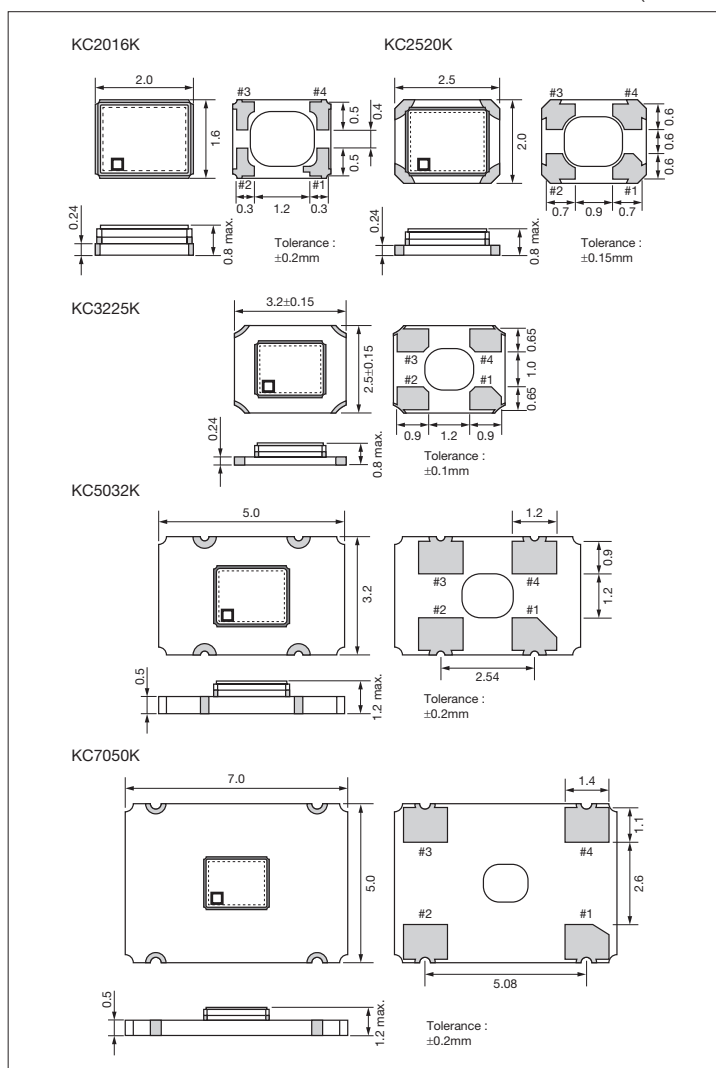
⑦ Individual Specification
(STD Specification is "00".)

Packaging Tape & Reel

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

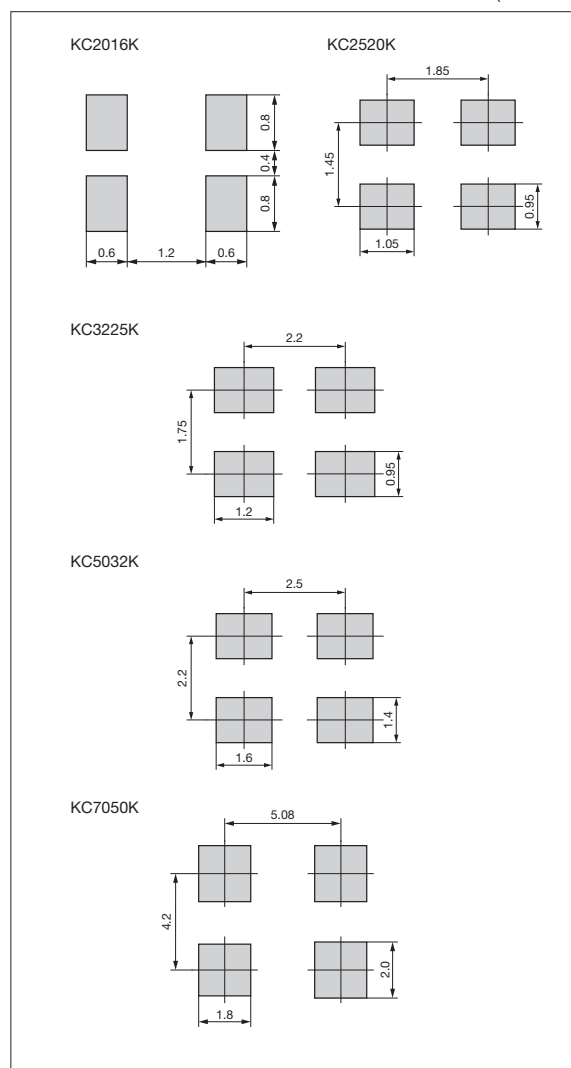
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)





CMOS/ 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}	f _o			1.5	160	MHz
Frequency Tolerance	f _{tol}	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration	Temp.: -10 to +70°C/ -40 to +85°C/ -40 to +105°C	-50	+50	×10 ⁻⁶
			Temp.: -10 to +70°C	-30	+30	
			Temp.: -10 to +70°C	-25	+25	
Storage Temperature Range	T _{stg}			-55	+125	°C
Operating Temperature Range	T _{use}			-10	+70	°C
				-40	+85	
				-40	+105	
Max. Supply Voltage	—			-0.3	+4.0	V
Supply Voltage	V _{cc}	CodeⓈ : 1 : 1.5≤F0≤125MHz		+1.60	+3.63	V
		CodeⓈ : 2 : 125<F0≤160MHz		+2.25	+3.63	
Current Consumption (Maximum Loaded)	I _{cc}	1.5≤F0≤24MHz	1.6≤V _{cc} ≤2.25V	—	2.5	mA
			2.25<V _{cc} ≤2.8V	—	3.0	
			2.8<V _{cc} ≤3.63V	—	3.5	
		24<F0≤40MHz	1.6≤V _{cc} ≤2.25V	—	3.5	
			2.25<V _{cc} ≤2.8V	—	4.5	
			2.8<V _{cc} ≤3.63V	—	5.0	
		40<F0≤62.5MHz	1.6≤V _{cc} ≤2.25V	—	5.0	
			2.25<V _{cc} ≤2.8V	—	5.5	
			2.8<V _{cc} ≤3.63V	—	6.0	
		62.5<F0≤80MHz	1.6≤V _{cc} ≤2.25V	—	6.0	
			2.25<V _{cc} ≤2.8V	—	6.5	
			2.8<V _{cc} ≤3.63V	—	8.0	
Stand-by Current	I _{std}	1.5≤F0≤80MHz		—	5.0	μA
		80<F0≤160MHz		—	10.0	
				—	10.0	
Symmetry	SYM	@50% V _{cc}		45	55	%
Rise/ Fall Time (10% to 90% Output Level)	Tr/ Tf	1.5≤F0≤80MHz	1.6≤V _{cc} ≤2.25V	—	6.0	ns
			2.25<V _{cc} ≤2.8V	—	5.0	
			2.8<V _{cc} ≤3.63V	—	4.5	
		80<F0≤125MHz	1.6<V _{cc} ≤3.63V	—	4.0	
		125<F0≤160MHz	2.25<V _{cc} ≤3.63V	—	2.5	
Low Level Output Voltage	V _{OL}	I _{OL} = 4mA (F0≤80MHz), I _{OL} = 8mA (F0>80MHz)		—	10% V _{cc}	V
High Level Output Voltage	V _{OH}	I _{OH} = -4mA (F0≤80MHz), I _{OH} = -8mA (F0>80MHz)		90% V _{cc}	—	V
Output Load	L _{CMOS}			15		pF
Low Level Input Voltage	V _{IL}			—	30% V _{cc}	V
High Level Input Voltage	V _{IH}			70% V _{cc}	—	V
Disable Time	t _{dis}	1.5≤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	J _{Sigma}	1.5≤F0≤80MHz	Measured with Wavecrest SIA-3000	—	5	ps
		80<F0≤125MHz		—	4	
		125<F0≤160MHz		—	3	
Peak to Peak Jitter	J _{PK-PK}	1.5≤F0≤80MHz		—	50	ps
		80<F0≤125MHz		—	40	
		125<F0≤160MHz		—	25	
Phase Jitter	J _{Phase}	@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.

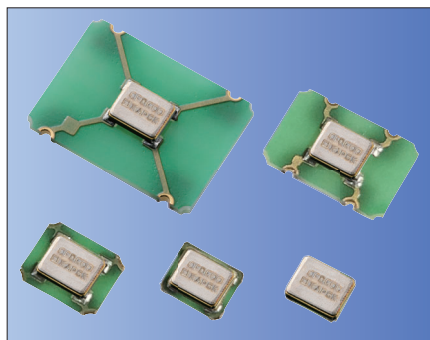
Pad Connections	
#1	INH
#2	Case GND
#3	Output
#4	Vcc

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





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



AEC-Q100/200 RoHS Compliant

Features

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

Applications

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

Table 1

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

How to Order

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

① Series

② Output Frequency (25.0000: 25MHz)

③ Output Type (C: CMOS)

④ Supply Voltage

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

⑤ Frequency Tolerance (See Table 1)

⑥ Symmetry/ INH Function

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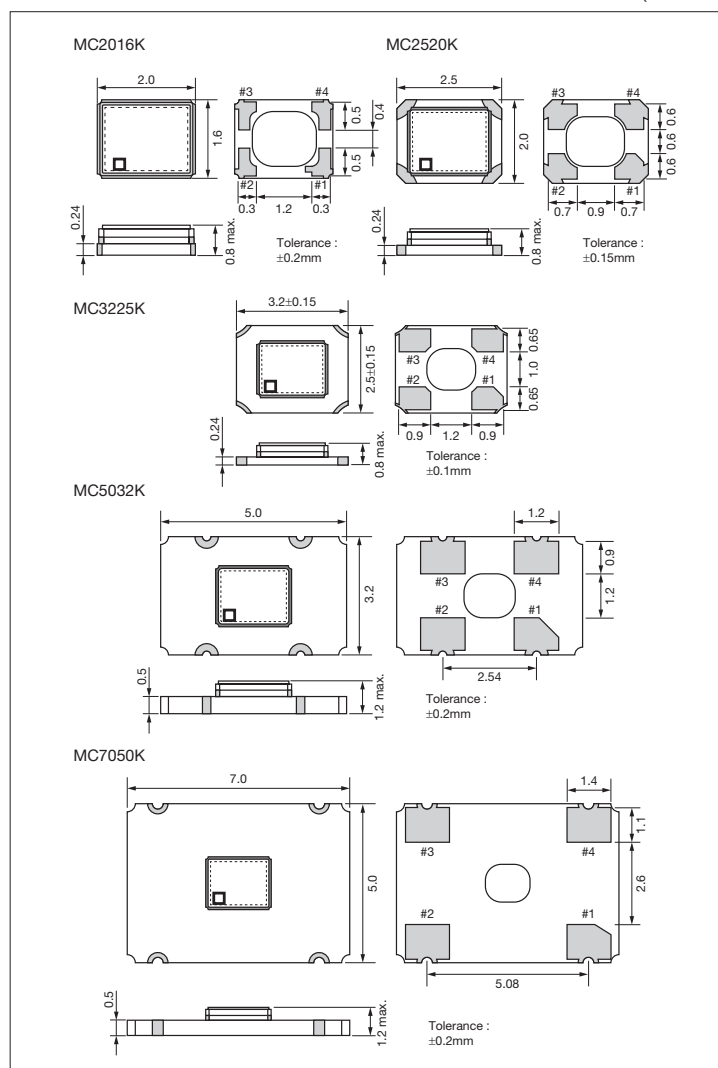
⑦ Individual Specification
(STD Specification is "SH".)

Packaging Tape & Reel

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

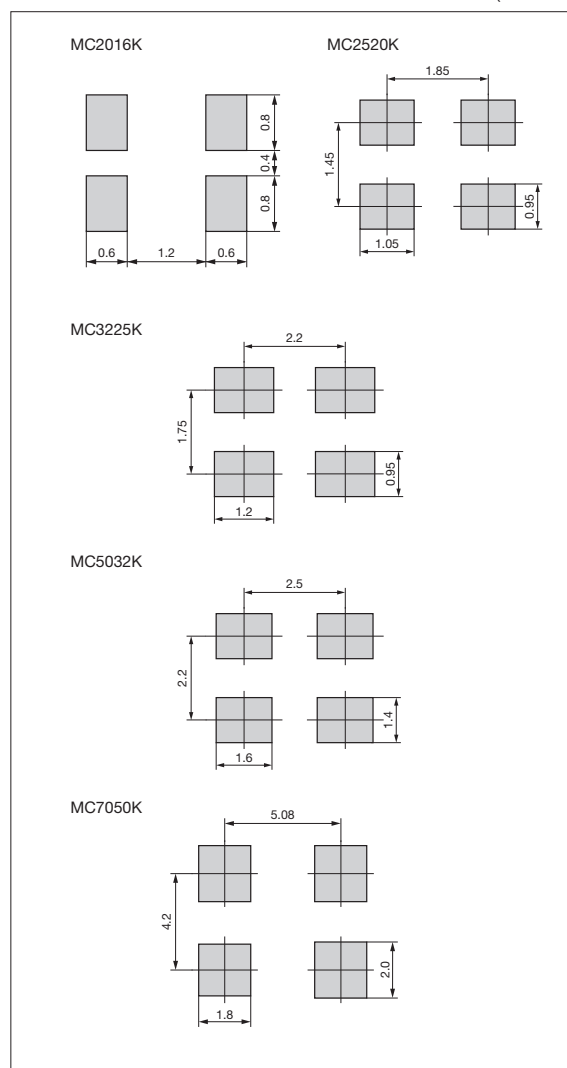
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)





CMOS/ 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}	f _o			1.5	160	MHz
Frequency Tolerance	f _{tol}	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration	Temp.: -40 to +85°C/ -40 to +105°C	-50	+50	× 10 ⁻⁶
			Temp.: -40 to +125°C	-100	+100	
Storage Temperature Range	T _{stg}			-55	+125	°C
Operating Temperature Range	T _{use}			-40	+85	°C
				-40	+105	
				-40	+125	
Max. Supply Voltage	—			-0.3	+4.0	V
Supply Voltage	V _{cc}	CodeⓈ : 1 : 1.5≤F ₀ ≤125MHz		+1.60	+3.63	V
		CodeⓈ : 2 : 125<F ₀ ≤160MHz		+2.25	+3.63	
Current Consumption (Maximum Loaded)	I _{cc}	1.5≤F ₀ ≤24MHz	1.6≤V _{cc} ≤2.25V	—	2.5	mA
			2.25<V _{cc} ≤2.8V	—	3.0	
			2.8<V _{cc} ≤3.63V	—	3.5	
		24<F ₀ ≤40MHz	1.6≤V _{cc} ≤2.25V	—	3.5	
			2.25<V _{cc} ≤2.8V	—	4.5	
			2.8<V _{cc} ≤3.63V	—	5.0	
		40<F ₀ ≤62.5MHz	1.6≤V _{cc} ≤2.25V	—	5.0	
			2.25<V _{cc} ≤2.8V	—	5.5	
			2.8<V _{cc} ≤3.63V	—	6.0	
		62.5<F ₀ ≤80MHz	1.6≤V _{cc} ≤2.25V	—	6.0	
			2.25<V _{cc} ≤2.8V	—	6.5	
			2.8<V _{cc} ≤3.63V	—	8.0	
		80<F ₀ ≤125MHz	1.6≤V _{cc} ≤2.25V	—	11.0	
			2.25<V _{cc} ≤2.8V	—	14.0	
			2.8<V _{cc} ≤3.63V	—	17.0	
Stand-by Current	I _{std}	1.5≤F ₀ ≤80MHz		—	5.0	μA
		80<F ₀ ≤160MHz		—	10.0	
Symmetry	SYM	@50% V _{cc}		45	55	%
Rise/ Fall Time (10% to 90% Output Level)	Tr/ Tf	1.5≤F ₀ ≤80MHz	1.6≤V _{cc} ≤2.25V	—	6.0	ns
			2.25<V _{cc} ≤2.8V	—	5.0	
			2.8<V _{cc} ≤3.63V	—	4.5	
		80<F ₀ ≤125MHz	1.6≤V _{cc} ≤3.63V	—	4.0	
Low Level Output Voltage	V _{OL}	I _{OL} = 4mA (F ₀ ≤80MHz), I _{OL} = 8mA (F ₀ >80MHz)		—	10% V _{cc}	V
High Level Output Voltage	V _{OH}	I _{OH} = -4mA (F ₀ ≤80MHz), I _{OH} = -8mA (F ₀ >80MHz)		90% V _{cc}	—	V
Output Load	L _{CMOS}			15		pF
Low Level Input Voltage	V _{IL}			—	30% V _{cc}	V
High Level Input Voltage	V _{IH}			70% V _{cc}	—	V
Disable Time	t _{dis}	1.5≤F ₀ ≤80MHz		—	200	ns
		80<F ₀ ≤125MHz		—	100	
		125<F ₀ ≤160MHz		—	100	
Enable Time	t _{ena}			—	5	ms
Start-up Time	t _{str}	1.5≤F ₀ ≤80MHz	@Minimum operating voltage to be 0 sec.	—	5	ms
		80<F ₀ ≤125MHz		—	10	
		125<F ₀ ≤160MHz		—	10	
1Sigma Jitter	J _{Sigma}	1.5≤F ₀ ≤80MHz	Measured with Wavecrest SIA-3000	—	5	ps
		80<F ₀ ≤125MHz		—	4	
		125<F ₀ ≤160MHz		—	3	
Peak to Peak Jitter	J _{PK-PK}	1.5≤F ₀ ≤80MHz		—	50	ps
		80<F ₀ ≤125MHz		—	40	
		125<F ₀ ≤160MHz		—	25	
Phase Jitter	J _{Phase}	@25MHz	BW : 12kHz to 20MHz	—	1.0	ps





CMOS/ 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	INH
#2	Case GND
#3	Output
#4	Vcc

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





Clock Oscillators Surface Mount Type KC5032P-P2/ KC5032P-P3 Series



LV-PECL/ 3.3V or 2.5V/ 5.0×3.2mm



RoHS Compliant

Features

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

Table 1

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

How to Order

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

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

Packaging (Tape & Reel 1000 pcs./ reel)

Specifications

Item	Symbol	Conditions		Specifications		Unit
				KC5032P-P2	KC5032P-P3	
Output Frequency Range ^{Note1}	f _o			25 to 175		MHz
Frequency Tolerance	f _{tol}	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration		±50/ -40 to +105°C		×10 ⁻⁶
				±100/ -40 to +85°C		
				±50/ -40 to +85°C		
				±50/ 0 to +70°C		
				±30/ 0 to +70°C		
				±25/ 0 to +70°C		
Storage Temperature Range	T _{stg}			-55 to +125		°C
Operating Temperature Range	T _{use}	Standard Specifications		0 to +70/ -40 to +85		°C
		Extend (Option)		-40 to +105		
Max. Supply Voltage	—			-0.3 to +4.0		V
Supply Voltage	V _{CC}			+2.375 to +2.625	+2.97 to +3.63	V
Current Consumption	I _{CC}			70 max.		mA
Stand-by Current	I _{std}			30 max.		μA
Symmetry	SYM	50ohm @crossing point		50±5		%
Rise/ Fall Time (20% V _{CC} to 80% V _{CC} Maximum Loaded)	Tr/ Tf	50ohm		0.6 max.		ns
Low Level Output Voltage ^{Note2}	V _{OL}			V _{CC} -1.810 to V _{CC} -1.620		V
High Level Output Voltage ^{Note2}	V _{OH}			V _{CC} -1.025 to V _{CC} -0.880		V
Output Load	RL			50		ohm
Input Voltage Range	V _{IN}			0 to V _{CC}		
Low Level Input Voltage	V _{IL}			30% V _{CC} max.		V
High Level Input Voltage	V _{IH}			70% V _{CC} min.		V
Disable Time	t _{dis}			200 max.		ns
Enable Time	t _{ena}			10 max.		ms
Start-up Time	t _{str}	@Minimum operating voltage to be 0 sec.		10 max.		ms
Deterministic Jitter	DJ	Measured with Wavecrest SIA-3000		2 max.		ps
1 Sigma Jitter	J _{Sigma}			4 max.		ps
Peak to Peak Jitter	J _{PK-PK}			30 max.		ps
Phase Jitter	J _{Phase}	@156.25MHz V _{CC} =3.3V	BW : 12kHz to 20MHz	0.3 max.		ps

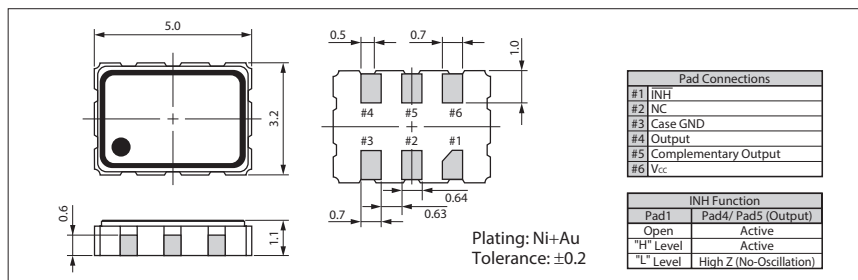
Note : All electrical characteristics are defined at the maximum load and operating temperature range.

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

Note2: DC characteristic

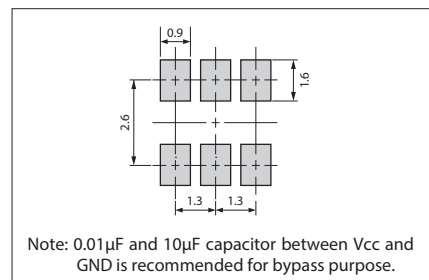
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)





LV-PECL/ 3.3V or 2.5V/ 7.0×5.0mm



RoHS Compliant

Features

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

Table 1

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

How to Order

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

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

Packaging (Tape & Reel 1000 pcs./ reel)

Specifications

Item	Symbol	Conditions		Specifications		Unit
				KC7050P-P2	KC7050P-P3	
Output Frequency Range ^{Note1}	f _o			25 to 175		MHz
Frequency Tolerance	f _{tol}	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration		±50/ -40 to +105°C		×10 ⁻⁶
				±100/ -40 to +85°C		
				±50/ -40 to +85°C		
				±50/ 0 to +70°C		
				±30/ 0 to +70°C		
				±25/ 0 to +70°C		
Storage Temperature Range	T _{stg}			-55 to +125		°C
Operating Temperature Range	T _{use}	Standard Specifications Extend (Option)		0 to +70/ -40 to +85 -40 to +105		°C
Max. Supply Voltage	—			-0.3 to +4.0		V
Supply Voltage	V _{cc}			+2.375 to +2.625	+2.97 to +3.63	V
Current Consumption	I _{cc}			70 max.		mA
Stand-by Current	I _{std}			30 max.		µA
Symmetry	SYM	50ohm @crossing point		50±5		%
Rise/ Fall Time (20% V _{cc} to 80% V _{cc} Maximum Loaded)	Tr/ Tf	50ohm		0.6 max.		ns
Low Level Output Voltage ^{Note2}	V _{OL}			V _{cc} -1.810 to V _{cc} -1.620		V
High Level Output Voltage ^{Note2}	V _{OH}			V _{cc} -1.025 to V _{cc} -0.880		V
Output Load	R _L			50		ohm
Input Voltage Range	V _{IN}			0 to V _{cc}		
Low Level Input Voltage	V _{IL}			30% V _{cc} max.		V
High Level Input Voltage	V _{IH}			70% V _{cc} min.		V
Disable Time	t _{dis}			200 max.		ns
Enable Time	t _{ena}			10 max.		ms
Start-up Time	t _{str}	@Minimum operating voltage to be 0 sec.		10 max.		ms
Deterministic Jitter	DJ	Measured with Wavecrest SIA-3000		2 max.		ps
1 Sigma Jitter	J _{Sigma}			4 max.		ps
Peak to Peak Jitter	J _{PK-PK}			30 max.		ps
Phase Jitter	J _{Phase}	@156.25MHz V _{cc} =3.3V	BW : 12kHz to 20MHz	0.3 max.		ps

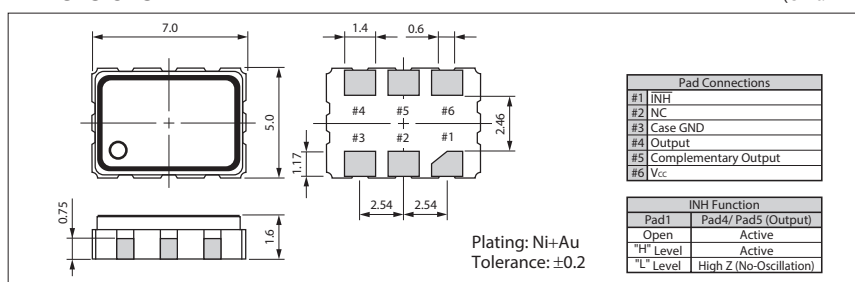
Note : All electrical characteristics are defined at the maximum load and operating temperature range.

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

Note2: DC characteristic

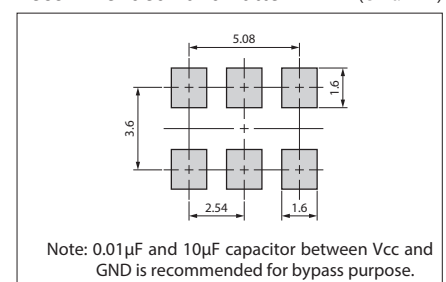
Dimensions

(Unit: mm)



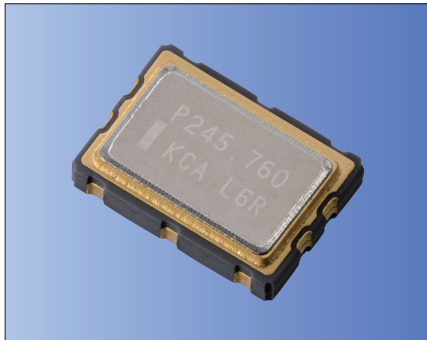
Recommended Land Pattern

(Unit: mm)





LV-PECL/ 3.3V/ 7.0×5.0mm



RoHS Compliant

Features

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

Table 1

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

How to Order

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

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

Packaging (Tape & Reel 1000 pcs./ reel)

Specifications

Item	Symbol	Conditions	Min.	Max.	Unit
Output Frequency Range ^{Note1}	f _o		10	800	MHz
Frequency Tolerance	f _{tol}	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration Temp.: -40 to +85°C	-50	+50	$\times 10^{-6}$
Storage Temperature Range	T _{stg}		-55	+125	°C
Operating Temperature Range	T _{use}		-40	+85	°C
Max. Supply Voltage	—		-0.5	+4.2	V
Supply Voltage	V _{CC}		+2.97	+3.63	V
Current Consumption	I _{CC}		—	100	mA
Disable Current	I _{DE}		—	30	mA
Symmetry	SYM	50ohm @crossing point	45	55	%
Rise/ Fall Time (20% to 80% Output Level)	Tr/ Tf	50ohm	—	0.4	ns
Low Level Output Voltage ^{Note2}	V _{OL}		—	V _{CC} -1.620	V
High Level Output Voltage ^{Note2}	V _{OH}		V _{CC} -1.025	—	V
Output Load	—	LV-PECL Output	—	50	ohm
Low Level Input Voltage ^{Note2}	V _{IL}		—	30% V _{CC}	V
High Level Input Voltage ^{Note2}	V _{IH}		70% V _{CC}	—	V
Disable Time	t _{dis}		—	200	ns
Enable Time	t _{ena}		—	2	ms
Start-up Time	t _{str}	@Minimum operating voltage to be 0 sec.	—	10	ms
Phase Jitter	J _{Phase}	@622.08MHz	BW : 12kHz to 20MHz	Typ. 3.0	ps
Phase Noise	—	@622.08MHz	@10Hz offset	Typ. -40	dBc/ Hz
			@100Hz offset	Typ. -70	
			@1kHz offset	Typ. -95	
			@10kHz offset	Typ. -105	
			@100kHz offset	Typ. -105	
			@1MHz offset	Typ. -125	
			@10MHz offset	Typ. -135	

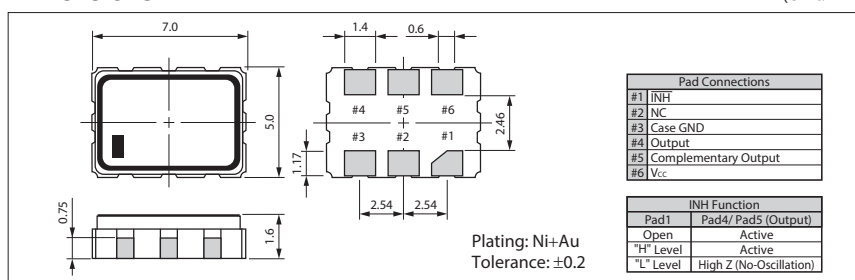
Note : All electrical characteristics are defined at the maximum load and operating temperature range.

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

Note2: DC characteristic

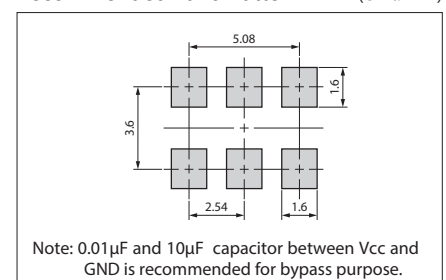
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)





LV-PECL/ 3.3V/ 7.0×5.0mm



RoHS Compliant

Features

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

Table 1

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

How to Order

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

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

Packaging (Tape & Reel 1000 pcs./ reel)

Specifications

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

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

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

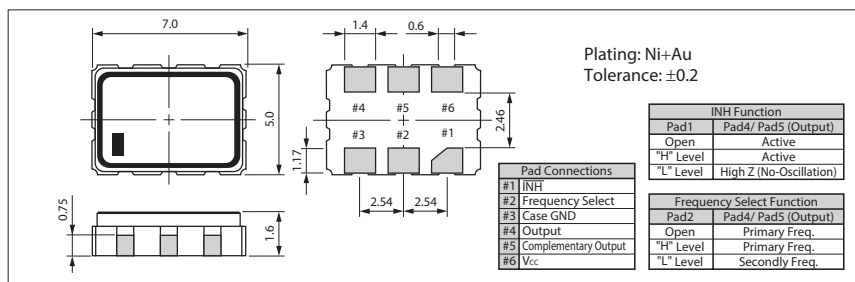
Note2: DC characteristic

Clock Oscillators



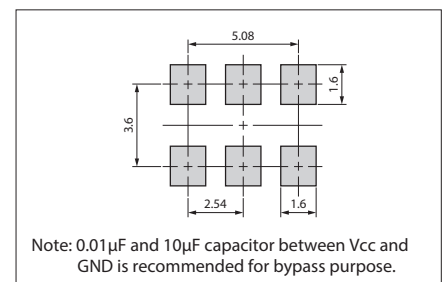
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)





LVDS/ 3.3V or 2.5V/ 5.0×3.2mm



RoHS Compliant

Features

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

Table 1

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

How to Order

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

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

Packaging (Tape & Reel 1000 pcs./ reel)

Specifications

Item	Symbol	Conditions	Specifications		Unit
			KC5032P-L2	KC5032P-L3	
Output Frequency Range ^{Note1}	f _o		25 to 175		MHz
Frequency Tolerance	f _{tol}	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration	$\pm 50/ -40$ to $+105^\circ\text{C}$		$\times 10^{-6}$
			$\pm 100/ -40$ to $+85^\circ\text{C}$		
			$\pm 50/ -40$ to $+85^\circ\text{C}$		
			$\pm 50/ 0$ to $+70^\circ\text{C}$		
			$\pm 30/ 0$ to $+70^\circ\text{C}$		
Storage Temperature Range	T _{stg}		-55 to $+125$		°C
Operating Temperature Range	T _{use}	Standard Specifications Extend (Option)	0 to $+70/ -40$ to $+85$ -40 to $+105$		°C
Max. Supply Voltage	—		-0.3 to $+4.0$		V
Supply Voltage	V _{cc}		$+2.375$ to $+2.625$	$+2.97$ to $+3.63$	V
Current Consumption	I _{cc}		50 max.		mA
Stand-by Current	I _{std}		30 max.		μA
Symmetry	SYM	100ohm @crossing point	50±5		%
Rise/ Fall Time (20% V _{cc} to 80% V _{cc} Maximum Loaded)	Tr/ Tf	100ohm	0.6 max.		ns
Low Level Output Voltage ^{Note2}	V _{OL}		0.9 min. Typ.:1.1		V
High Level Output Voltage ^{Note2}	V _{OH}		1.6 max. Typ.:1.43		V
Differential Output Voltage ^{Note2}	V _{OD}		247 to 454 Typ.:330		mV
Differential Output Voltage Error ^{Note2}	dV _{OD}	dV _{OD} = V _{OD1} -V _{OD2}	50 max.		mV
Offset Voltage	V _{OS}		1.125 to 1.375		V
Offset Voltage Error	dV _{OS}	dV _{OS} = V _{OS1} -V _{OS2}	50 max.		mV
Output Load	R _L	LVDS Output	100		ohm
Input Voltage Range	V _{IN}		0 to V _{cc}		V
Low Level Input Voltage	V _{IL}		30% V _{cc} max.		V
High Level Input Voltage	V _{IH}		70% V _{cc} min.		V
Disable Time	t _{dis}		200 max.		ns
Enable Time	t _{ena}		10 max.		ms
Start-up Time	t _{str}	@Minimum operating voltage to be 0 sec.	10 max.		ms
Deterministic Jitter	DJ	Measured with Wavecrest SIA-3000	2 max.		ps
1 Sigma Jitter	J _{Sigma}		4 max.		ps
Peak to Peak Jitter	J _{PK-PK}		30 max.		ps
Phase Jitter	J _{Phase}	@156.25MHz V _{cc} =3.3V BW : 12kHz to 20MHz	0.3 max.		ps

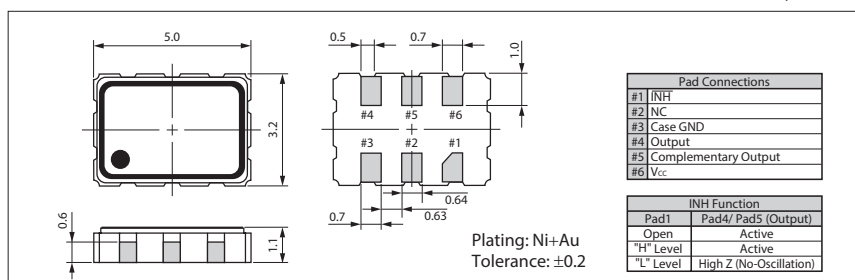
Note : All electrical characteristics are defined at the maximum load and operating temperature range.

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

Note2: DC characteristic

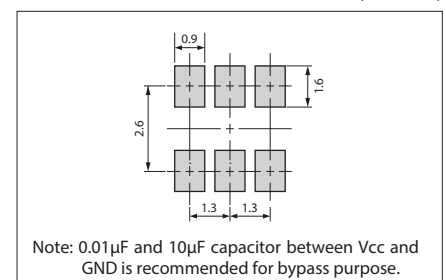
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)





LVDS/ 3.3V or 2.5V/ 7.0×5.0mm



RoHS Compliant

Features

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

Table 1

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

How to Order

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

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

Packaging (Tape & Reel 1000 pcs./ reel)

Specifications

Item	Symbol	Conditions	Specifications		Unit
			KC7050P-L2	KC7050P-L3	
Output Frequency Range ^{Note1}	f _o		25 to 175		MHz
Frequency Tolerance	f _{tol}	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration	$\pm 50/ -40$ to $+105^{\circ}\text{C}$		$\times 10^{-6}$
			$\pm 100/ -40$ to $+85^{\circ}\text{C}$		
			$\pm 50/ -40$ to $+85^{\circ}\text{C}$		
			$\pm 50/ 0$ to $+70^{\circ}\text{C}$		
			$\pm 30/ 0$ to $+70^{\circ}\text{C}$		
Storage Temperature Range	T _{stg}		-55 to $+125$		°C
Operating Temperature Range	T _{use}	Standard Specifications Extend (Option)	0 to $+70/ -40$ to $+85$ -40 to $+105$		°C
Max. Supply Voltage	—		-0.3 to $+4.0$		V
Supply Voltage	V _{cc}		$+2.375$ to $+2.625$	$+2.97$ to $+3.63$	V
Current Consumption	I _{cc}		50 max.		mA
Stand-by Current	I _{std}		30 max.		μA
Symmetry	SYM	100ohm @crossing point	50±5		%
Rise/ Fall Time (20% V _{cc} to 80% V _{cc} Maximum Loaded)	Tr/ Tf	100ohm	0.6 max.		ns
Low Level Output Voltage ^{Note2}	V _{OL}		0.9 min. Typ.:1.1		V
High Level Output Voltage ^{Note2}	V _{OH}		1.6 max. Typ.:1.43		V
Differential Output Voltage ^{Note2}	V _{OD}		247 to 454 Typ.:330		mV
Differential Output Voltage Error ^{Note2}	dV _{OD}	dV _{OD} = V _{OD1} -V _{OD2}	50 max.		mV
Offset Voltage	V _{OS}		1.125 to 1.375		V
Offset Voltage Error	dV _{OS}	dV _{OS} = V _{OS1} -V _{OS2}	50 max.		mV
Output Load	RL	LVDS Output	100		ohm
Input Voltage Range	V _{IN}		0 to V _{cc}		V
Low Level Input Voltage	V _{IL}		30% V _{cc} max.		V
High Level Input Voltage	V _{IH}		70% V _{cc} min.		V
Disable Time	t _{dis}		200 max.		ns
Enable Time	t _{ena}		10 max.		ms
Start-up Time	t _{str}	@Minimum operating voltage to be 0 sec.	10 max.		ms
Deterministic Jitter	DJ	Measured with Wavecrest SIA-3000	2 max.		ps
1 Sigma Jitter	J _{Sigma}		4 max.		ps
Peak to Peak Jitter	J _{PK-PK}		30 max.		ps
Phase Jitter	J _{Phase}	@156.25MHz V _{cc} =3.3V BW : 12kHz to 20MHz	0.3max.		ps

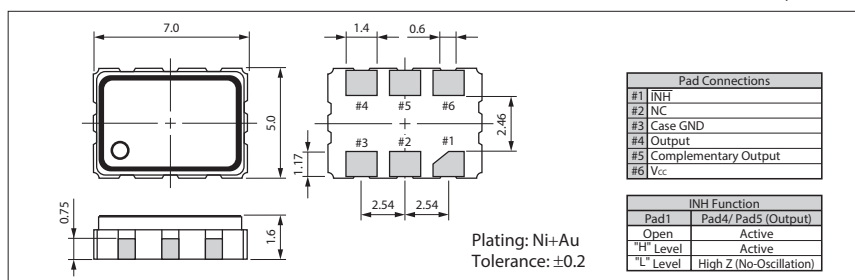
Note : All electrical characteristics are defined at the maximum load and operating temperature range.

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

Note2: DC characteristic

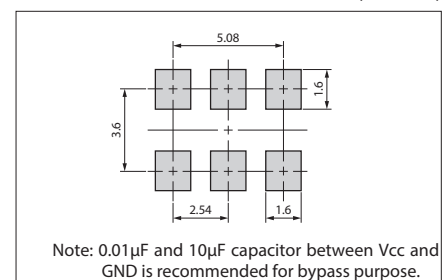
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)





Clock Oscillators Surface Mount Type KC5032P-H2/ KC5032P-H3 Series



HCSL/ 3.3V or 2.5V/ 5.0×3.2mm



RoHS Compliant

Features

- Miniature ceramic package
- Highly reliable with seam welding
- HCSL output
- Supply voltage Vcc=3.3V, 2.5V
- $\pm 25 \times 10^{-6}$ available
- Low Phase Noise

Table 1

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

How to Order

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

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

Packaging (Tape & Reel 1000 pcs./ reel)

Specifications

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

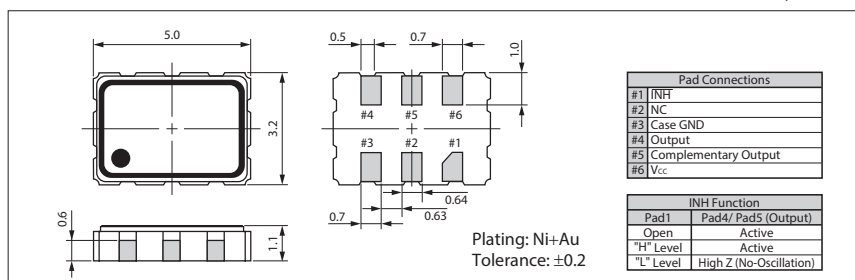
Note : All electrical characteristics are defined at the maximum load and operating temperature range.

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

Note2: DC characteristic

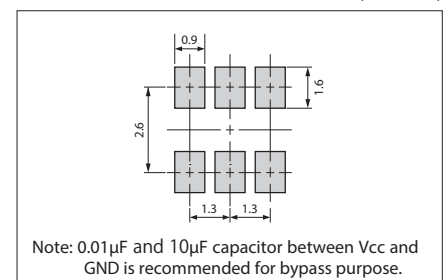
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)





HCSL/ 3.3V or 2.5V/ 7.0×5.0mm



RoHS Compliant

Features

- Miniature ceramic package
- Highly reliable with seam welding
- HCSL output
- Supply voltage Vcc=3.3V, 2.5V
- $\pm 25 \times 10^{-6}$ available
- Low Phase Noise

Table 1

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

How to Order

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

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

Packaging (Tape & Reel 1000 pcs./ reel)

Specifications

Item	Symbol	Conditions		Specifications				Unit
				KC7050P-H2		KC7050P-H3		
				Min.	Max.	Min.	Max.	
Output Frequency Range ^{Note1}	fo			25	175	25	175	MHz
Frequency Tolerance	f_tol	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration		-50	+50	-50	+50	×10 ⁻⁶
Storage Temperature Range	T_stg			-55	+125	-55	+125	°C
Operating Temperature Range	T_use			0	+70	0	+70	°C
				-40	+85	-40	+85	
				-40	+105	-40	+105	
Max. Supply Voltage	—			-0.3	+4.0	-0.3	+4.0	V
Supply Voltage	Vcc			2.375	2.625	2.97	3.63	V
Current Consumption	Icc			—	50	—	50	mA
Stand-by Current	I_std			—	20	—	20	μA
Symmetry	SYM	50ohm @crossing point		45	55	45	55	%
Rise/ Fall Time 0.175V to 0.525V	Tr/ Tf	50ohm		—	0.5	—	0.5	ns
Low Level Output Voltage ^{Note2}	VoL			-0.15	+0.15	-0.15	+0.15	V
High Level Output Voltage ^{Note2}	VoH			+0.66	+0.85	+0.66	+0.85	V
Output Load	RL	HCSL Output		50		50		ohm
Low Level Input Voltage	ViL			—	30% Vcc	—	30% Vcc	V
High Level Input Voltage	ViH			70% Vcc	—	70% Vcc	—	V
Disable Time	t_dis			—	200	—	200	ns
Enable Time	t_ena			—	10	—	10	ms
Start-up Time	t_str	@Minimum operating voltage to be 0 sec.		—	10	—	10	ms
Deterministic Jitter	DJ	Measured with Wavecrest SIA-3000		—	2	—	2	ps
1 sigma Jitter	Jsigma			—	4	—	4	ps
Peak to Peak Jitter	JPK-PK			—	30	—	30	ps
Phase Jitter	JPhase	@100MHz Vcc=3.3V	BW : 12kHz to 20MHz	—	0.5	—	0.5	ps
Phase Noise	—	@100MHz Vcc=3.3V	@10Hz offset	Typ. -77				dBc/ Hz
			@100Hz offset	Typ. -107				
			@1kHz offset	Typ. -130				
			@10kHz offset	Typ. -142				
			@100kHz offset	Typ. -149				
			@1MHz offset	Typ. -150				
			@10MHz offset	Typ. -152				

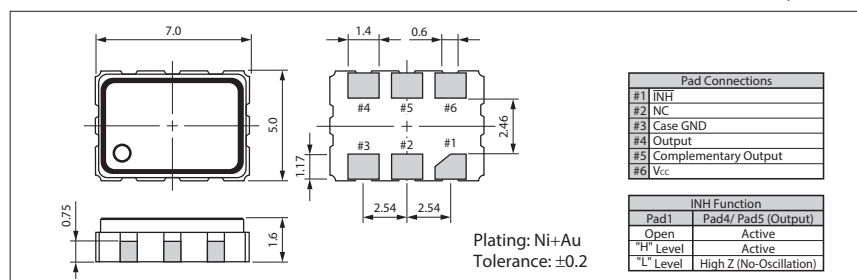
Note : All electrical characteristics are defined at the maximum load and operating temperature range.

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

Note2: DC characteristic

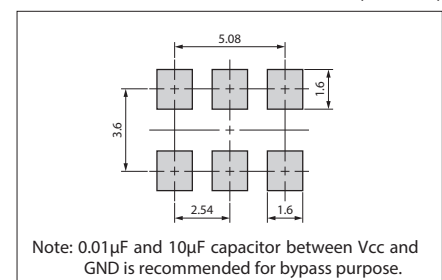
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)





Voltage Controlled Crystal Oscillators (VCXO) Surface Mount Type KV5032R Series



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



RoHS Compliant

Features

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

Applications

- WDM/ Networking

Table 1

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

How to Order

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

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

Packaging (Tape & Reel 1000 pcs./ reel)

Specifications

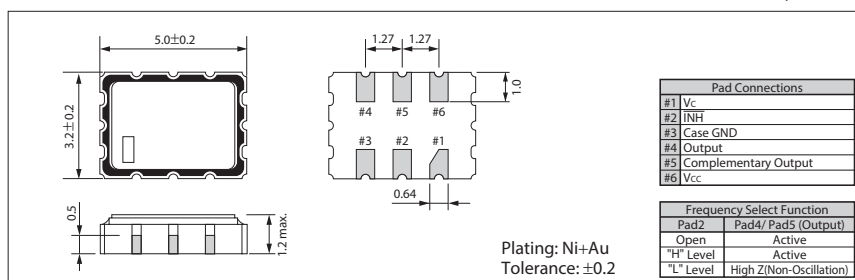
Item	Symbol	Conditions	Min.	Max.	Unit
Output Frequency Range ^{Note1}	f _o		10	800	MHz
Frequency Tolerance	f _{tol}	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration Temp.: -40 to +85°C	-50	+50	$\times 10^{-6}$
Absolute Pull Range	APR		±100	—	$\times 10^{-6}$
Control Voltage	V _c		0	+3.3	V
Storage Temperature Range	T _{stg}		-55	+125	°C
Operating Temperature Range	T _{use}		-40	+85	°C
Max. Supply Voltage	—		-0.5	+4.2	V
Supply Voltage	V _{cc}		+2.25 +2.97	+2.75 +3.63	V
Linearity	—	V _c =0V to +3.3V	-10	10	%
Current Consumption	I _{cc}	LV-PECL Output (2.25≤V _{cc} ≤2.75V) LV-PECL Output (2.97≤V _{cc} ≤3.63V) LVDS Output (2.25≤V _{cc} ≤2.75V, 2.77≤V _{cc} ≤3.63V)	— — —	80 100 40	mA
Symmetry	SYM	LV-PECL Output 50ohm @crossing point LVDS Output 100ohm @crossing point	45 45	55 55	%
Rise/ Fall Time (20% to 80% Output Level)	Tr/ Tf	LV-PECL Output 50ohm LVDS Output 100ohm	— —	0.4 0.6	ns
Low Level Output Voltage ^{Note2}	V _{OL}		—	V _{cc} - 1.620	V
High Level Output Voltage ^{Note2}	V _{OH}	LV-PECL Output	V _{cc} - 1.025	—	V
Output Load	—		—	50	ohm
Low Level Output Voltage ^{Note2}	V _{OL}	Typ. 1.1V	0.9	—	V
High Level Output Voltage ^{Note2}	V _{OH}	Typ. 1.43V	—	1.6	V
Differential Output Voltage ^{Note2}	V _{OD}	Typ. 330mV	175	454	mV
Differential Output Voltage Error ^{Note2}	dV _{OD}	dV _{OD} = V _{OD1} -V _{OD2}	—	50	mV
Offset Voltage	V _{OS}	Typ. 1.25V	1.125	1.375	V
Offset Voltage Error	dV _{OS}	dV _{OS} = V _{OS1} -V _{OS2}	—	50	mV
Output Load	—		—	100	ohm
Low Level Input Voltage ^{Note2}	V _{IL}		—	30% V _{cc}	V
High Level Input Voltage ^{Note2}	V _{IH}		70% V _{cc}	—	V
Input Resistance	—		150	—	k ohm
Disable Time	t _{dis}		—	200	ns
Enable Time	t _{ena}		—	2	ms
Start-up Time	t _{str}	@Minimum operating voltage to be 0 sec.	—	10	ms
Phase Jitter	J _{phase}	@622.08MHz	BW : 12kHz to 20MHz @10Hz offset @100Hz offset @1kHz offset @10kHz offset @100kHz offset @1MHz offset @10MHz offset	Typ. 3.0 Typ. -40 Typ. -70 Typ. -95 Typ. -105 Typ. -105 Typ. -125 Typ. -135	ps
Phase Noise	—	@622.08MHz			dBc/ Hz

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

Note1: Please contact us for inquiry about operating temperature range, available frequencies and other conditions. Note2: DC characteristic

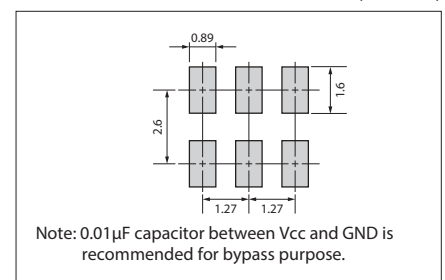
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)





Voltage Controlled Crystal Oscillators (VCXO)

Surface Mount Type KV5032G Series Dual Selectable



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



RoHS Compliant

Features

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

Applications

- WDM/ Networking

Table 1

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

How to Order

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

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

Packaging (Tape & Reel 1000 pcs./ reel)

Specifications

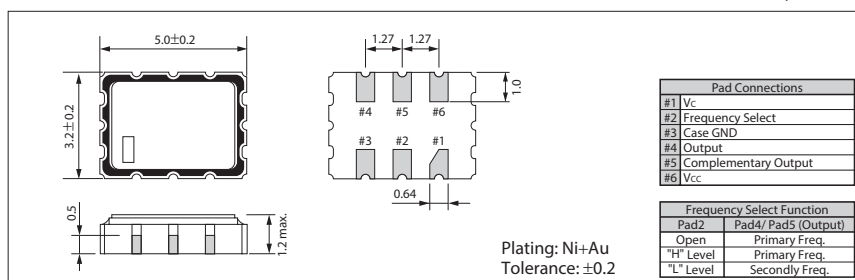
Item	Symbol	Conditions		Min.	Max.	Unit	
Output Frequency Range ^{Note1}	f1	Primary Output/ #2 "H" -Level or Open		10	800	MHz	
	f2	Secondary Output/ #2 "L" -Level		10	800		
Frequency Tolerance	f _{tol}	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration	Temp.: -40 to +85°C	-50	+50	×10 ⁻⁶	
Absolute Pull Range	APR			±100	—	×10 ⁻⁶	
Control Voltage	V _c			0	+3.3	V	
Storage Temperature Range	T _{stg}			-55	+125	°C	
Operating Temperature Range	T _{use}			-40	+85	°C	
Max. Supply Voltage	—			-0.5	+4.2	V	
Supply Voltage	V _{cc}			+2.25	+2.75	V	
				+2.97	+3.63		
Linearity	—	V _c =0V to +3.3V		-10	10	%	
Current Consumption	I _{cc}	LV-PECL Output (2.25≤V _{cc} ≤2.75V)		—	80	mA	
		LV-PECL Output (2.97≤V _{cc} ≤3.63V)		—	100		
		LVDS Output (2.25≤V _{cc} ≤2.75V, 2.77≤V _{cc} ≤3.63V)		—	40		
Symmetry	SYM	LV-PECL Output 50ohm @crossing point		45	55	%	
		LVDS Output 100ohm @crossing point		45	55		
Rise/ Fall Time (20% to 80% Output Level)	Tr/ Tf	LV-PECL Output 50ohm		—	0.4	ns	
		LVDS Output 100ohm		—	0.6		
Low Level Output Voltage ^{Note2}	V _{OL}	LV-PECL Output		—	V _{cc} - 1.620	V	
High Level Output Voltage ^{Note2}	V _{OH}			V _{cc} - 1.025	—	V	
Output Load	—			50		ohm	
Low Level Output Voltage ^{Note2}	V _{OL}	LVDS Output	Typ. 1.1V	0.9	—	V	
High Level Output Voltage ^{Note2}	V _{OH}		Typ. 1.43V	—	1.6	V	
Differential Output Voltage ^{Note2}	V _{OD}		Typ. 330mV	175	454	mV	
Differential Output Voltage Error ^{Note2}	dV _{OD}		dV _{OD} = V _{OD1} -V _{OD2}	—	50	mV	
Offset Voltage	V _{OS}		Typ. 1.25V	1.125	1.375	V	
Offset Voltage Error	dV _{OS}		dV _{OS} = V _{OS1} -V _{OS2}	—	50	mV	
Output Load	—				100		ohm
Low Level Input Voltage ^{Note2}	V _{IL}				—	30% V _{cc}	V
High Level Input Voltage ^{Note2}	V _{IH}			70% V _{cc}	—	V	
Input Resistance	—			150	—	k ohm	
Start-up Time	t _{str}	@Minimum operating voltage to be 0 sec.		—	10	ms	
Phase Jitter	J _{Phase}	@622.08MHz	BW : 12kHz to 20MHz	Typ. 3.0		ps	
Phase Noise	—	@622.08MHz	@10Hz offset	Typ. -40		dBc/ Hz	
			@100Hz offset	Typ. -70			
			@1kHz offset	Typ. -95			
			@10kHz offset	Typ. -105			
			@100kHz offset	Typ. -105			
			@1MHz offset	Typ. -125			
			@10MHz offset	Typ. -135			

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

Note1: Please contact us for inquiry about operating temperature range, available frequencies and other conditions. Note2: DC characteristic

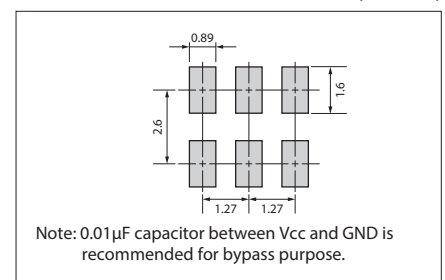
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)



Voltage Controlled Crystal Oscillators





Voltage Controlled Crystal Oscillators (VCXO) Surface Mount Type KV7050R-P3 Series



LV-PECL/ 3.3V/ 7.0×5.0mm



RoHS Compliant

Features

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

Table 1

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

How to Order

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

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

Packaging (Tape & Reel 1000 pcs./ reel)

Specifications

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

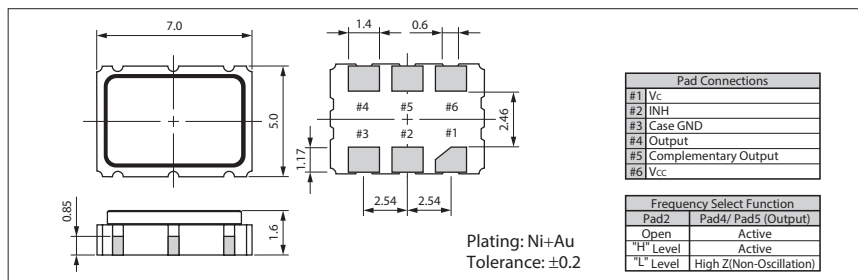
Note : All electrical characteristics are defined at the maximum load and operating temperature range.

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

Note2: DC characteristic

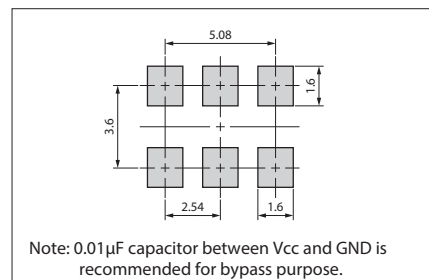
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)





Voltage Controlled Crystal Oscillators (VCXO) Surface Mount Type KV7050G-P3 Series Dual Selectable



LV-PECL/ 3.3V/ 7.0×5.0mm



RoHS Compliant

Features

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

Table 1

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

How to Order

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

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

Packaging (Tape & Reel 1000 pcs./ reel)

Specifications

Item	Symbol	Conditions	Min.	Max.	Unit
Output Frequency Range ^{Note1}	f1	Primary Output/ #2 "H"-Level or Open	10	800	MHz
	f2	Secondary Output/ #2 "L"-Level	10	800	MHz
Frequency Tolerance @V _c =+1.65V	f _{tol}	Initial tolerance, Operating temperature range, Rated power supply voltage change, Load change, Aging (1 year @25°C), Shock and vibration	-50	+50	$\times 10^{-6}$
Absolute Pull Range	APR		± 100	—	$\times 10^{-6}$
Control Voltage	V _c		0	+3.3	V
Storage Temperature Range	T _{stg}		-55	+125	°C
Operating Temperature Range	T _{use}		-40	+85	°C
Max. Supply Voltage	—		-0.5	+4.2	V
Supply Voltage	V _{cc}		+2.97	+3.63	V
Linearity	—	V _c =0V to +3.3V	-10	+10	%
Current Consumption	I _{cc}		—	100	mA
Symmetry	SYM	50ohm @crossing point	45	55	%
Rise/ Fall Time (20% to 80% Output Level)	Tr/ Tf	50ohm	—	0.4	ns
Low Level Output Voltage ^{Note2}	V _{OL}		—	V _{cc} -1.620	V
High Level Output Voltage ^{Note2}	V _{OH}		V _{cc} -1.025	—	V
Output Load	—	LV-PECL Output	—	50	ohm
Low Level Input Voltage	V _{IL}		—	30% V _{cc}	V
High Level Input Voltage	V _{IH}		70% V _{cc}	—	V
Input Resistance	—		TYP	1	Mohm
Start-up Time	t _{str}	@Minimum operating voltage to be 0 sec.	—	10	ms
Phase Jitter	J _{phase}	@622.08MHz	BW : 12kHz to 20MHz		Typ. 3.0
Phase Noise	—	@622.08MHz	@10Hz offset	Typ. -40	dBc/ Hz
			@100Hz offset	Typ. -70	
			@1kHz offset	Typ. -95	
			@10kHz offset	Typ. -105	
			@100kHz offset	Typ. -125	
			@1MHz offset	Typ. -125	
			@10MHz offset	Typ. -135	

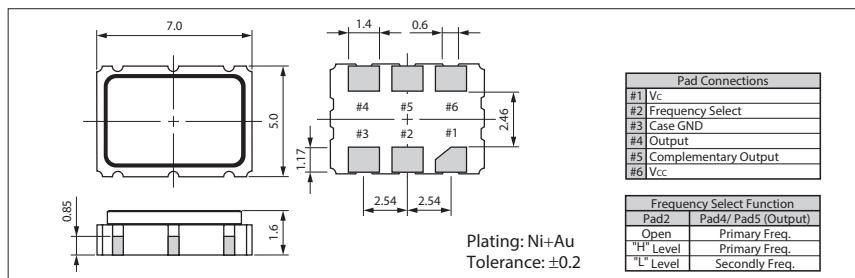
Note : All electrical characteristics are defined at the maximum load and operating temperature range.

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

Note2: DC characteristic

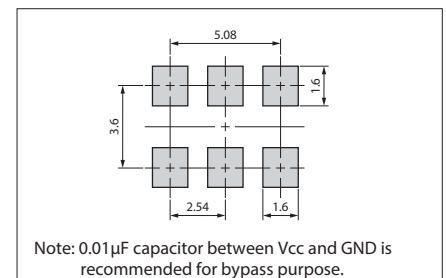
Dimensions

(Unit: mm)



Recommended Land Pattern

(Unit: mm)



Voltage Controlled Crystal Oscillators





Temperature Compensated Crystal Oscillators (TCXO) Surface Mount Type TCXO KT1612A Series (Low Phase Noise, With Disable Function)



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.
: $\pm 2.0 \times 10^{-6}$ / -30 to +85°C
: $\pm 0.5 \times 10^{-6}$ / -30 to +85°C (for GNSS)
- 1.68 to 3.63V drive available
- Reflow compatible

Applications

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

*Wi-Fi® Trademarks are owned by 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	$\pm 0.5 \times 10^{-6}$
B	$\pm 1.0 \times 10^{-6}$
C	$\pm 1.5 \times 10^{-6}$
D	$\pm 2.0 \times 10^{-6}$

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

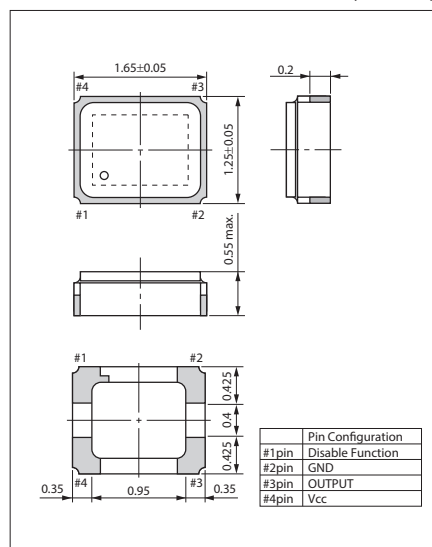
Item	Symbol	Conditions	Min.	Max.	Units
Output Frequency Range	fo	Standard Output Frequency: 19.2, 26.0, 38.4, 48.0, 52.0, 76.8	19.2	76.8	MHz
Frequency Tolerance	f _{tol}	vs Temperature	-0.5/ -2	+0.5/ +2	$\times 10^{-6}$
		vs Load	-0.1	+0.1	
		vs Voltage	-0.1	+0.1	
Frequency Aging	f _{age}	Per Year	-1	+1	$\times 10^{-6}$
Storage Temperature Range	T _{stg}		-40	+85	°C
Operating Temperature Range	T _{use}		-30	+85	°C
Supply Voltage	V _{cc}		1.68	3.63	V
Output Level	V _{pp}	Clipped Sine*, Load: 10k ohm / / 10pF	0.8	—	Vp-p
Current Consumption	I _{cc}		—	3	mA
Harmonics	—		—	-5	dBc

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

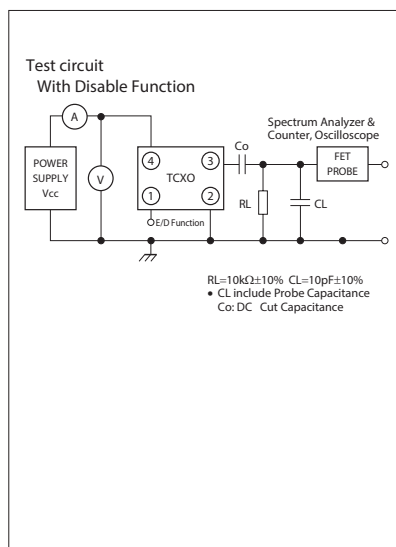
* Please contact us for other specifications.

Dimensions

(Unit: mm)

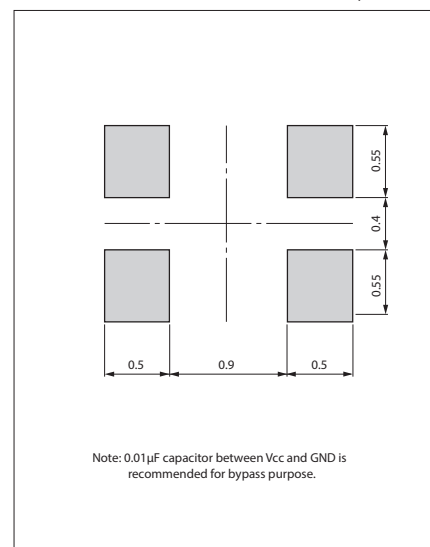


Test Circuit



Recommended Land Pattern

(Unit: mm)





Temperature Compensated Crystal Oscillators (TCXO, VCTCXO) Surface Mount Type TCXO KT1612A Series



1.6×1.2mm



RoHS Compliant

Features

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

Applications

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

How to Order

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

① Series

② Output Frequency

③ Freq. Temp. Chrst.

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

④ Lower Operating Temp.

C	-30°C
E	-20°C
G	-10°C

⑤ Upper Operating Temp.

W	+85°C
V	+80°C
U	+75°C

⑥ Supply Voltage

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

⑦ Voltage Control Function

T	TCXO
Spec. Code*	VCTCXO

*Please contact us for Spec. Code.

⑧ Individual Specification

Packaging (Tape & Reel 18000 pcs./ reel)

Specifications

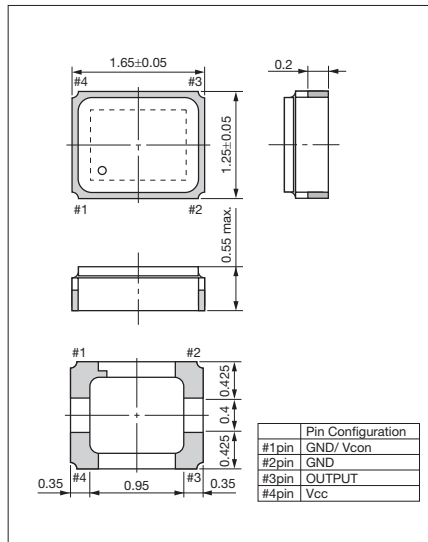
Item	Symbol	Conditions	Min.	Max.	Unit
Output Frequency Range	f _o	Standard Output Frequency: 19.2, 26.0, 38.4, 48.0, 52.0, 76.8	19.2	76.8	MHz
Frequency Tolerance	f _{tol}	vs Temperature	-0.5/ -2	+0.5/ +2	× 10 ⁻⁶
		vs Load	-0.2	+0.2	
		vs Voltage	-0.2	+0.2	
Frequency Aging	f _{age}	Per Year	-1	+1	× 10 ⁻⁶
Storage Temperature Range	T _{stg}		-40	+85	°C
Operating Temperature Range	T _{use}		-30	+85	°C
Voltage Control Range	f _{cont}	Positive	±8	±15	× 10 ⁻⁶
Supply Voltage	V _{cc}		1.68	3.63	V
Output Level	V _{pp}	Clipped Sine*, Load: 10k ohm // 10pF	0.8	—	Vp-p
Current Consumption	I _{cc}		—	2	mA
Harmonics	—		—	-5	dBc

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

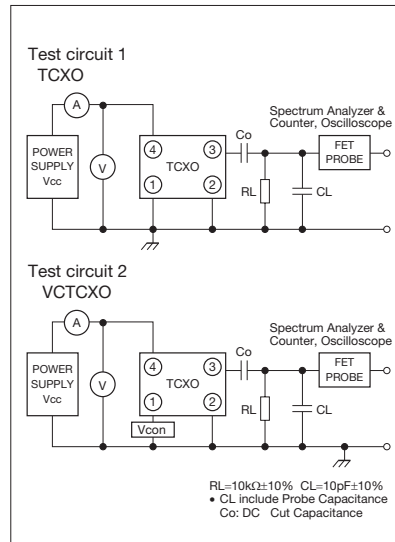
* Please contact us for other specifications.

Dimensions

(Unit: mm)

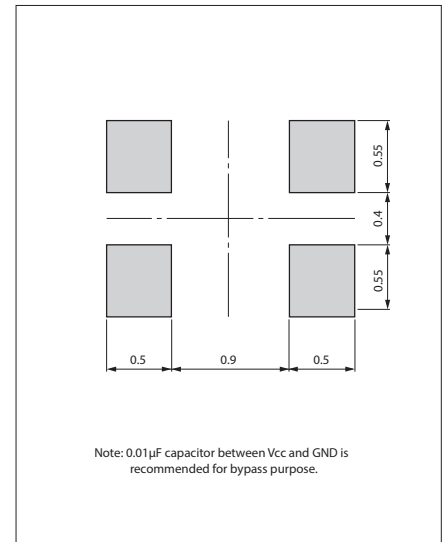


Test Circuit



Recommended Land Pattern

(Unit: mm)



Temperature Compensated Crystal Oscillators





Temperature Compensated Crystal Oscillators (TCXO, VCTCXO) Surface Mount Type TCXO KT2016K Series



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:
: $\pm 2.0 \times 10^{-6}/-30$ to $+85^{\circ}\text{C}$
: $\pm 0.5 \times 10^{-6}/-30$ to $+85^{\circ}\text{C}$ (for GNSS)
- 1.68 to 3.63V available
- Reflow compatible
- Operating Temp. -40 to $+105^{\circ}\text{C}$ (Option)
- Disable Function (Option)

Applications

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

How to Order

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

① Series

② Output Frequency

③ Freq. Temp. Chrst.

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

④ Lower Operating Temp.

C	-30°C
E	-20°C
G	-10°C

⑤ Upper Operating Temp.

W	$+85^{\circ}\text{C}$
V	$+80^{\circ}\text{C}$
U	$+75^{\circ}\text{C}$

⑥ Supply Voltage

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

⑦ Voltage Control Function

T	TCXO
Spec. Code*	VCTCXO

*Please contact us for Spec. Code.

⑧ Individual Specification

Packaging (Tape & Reel 15000 pcs./ reel)

Specifications

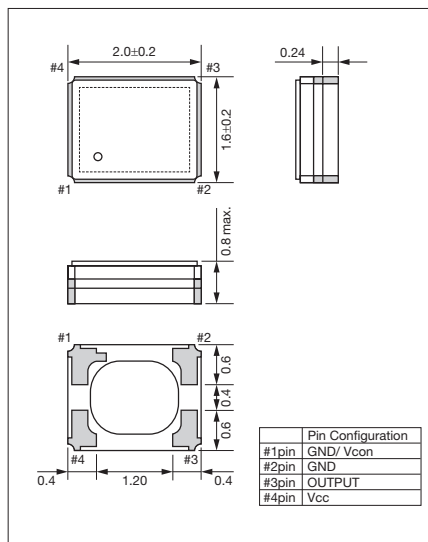
Item	Symbol	Conditions	Min.	Max.	Unit
Output Frequency Range	f_o	Standard Output Frequency: 19.2, 26.0, 32.0, 38.4, 48.0, 52.0	19.2	52	MHz
Frequency Tolerance	f_{tol}	vs Temperature	$-0.5/-2$	$+0.5/+2$	$\times 10^{-6}$
		vs Load	-0.2	$+0.2$	
		vs Voltage	-0.2	$+0.2$	
Frequency Aging	f_{age}	Per Year	-1	$+1$	$\times 10^{-6}$
Storage Temperature Range	T_{stg}		-40	$+85$	$^{\circ}\text{C}$
Operating Temperature Range	T_{use}		-30	$+85$	$^{\circ}\text{C}$
Voltage Control Range	f_{cont}	Positive	± 8	± 15	$\times 10^{-6}$
Supply Voltage	V_{cc}		1.68	3.63	V
Output Level	V_{pp}	Clipped Sine*, Load: 10k ohm // 10pF	0.8	—	Vp-p
Current Consumption	I_{cc}		—	2	mA
Harmonics	—		—	-5	dBc

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

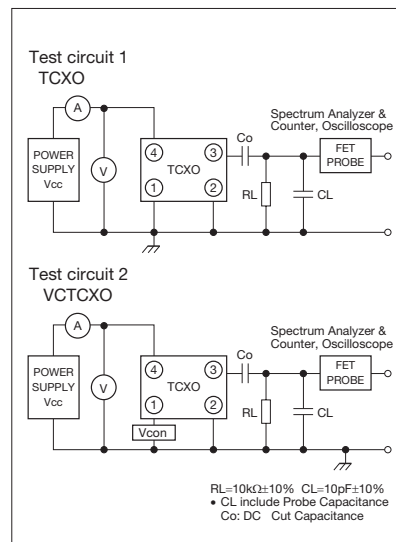
* Please contact us for other specifications.

Dimensions

(Unit: mm)

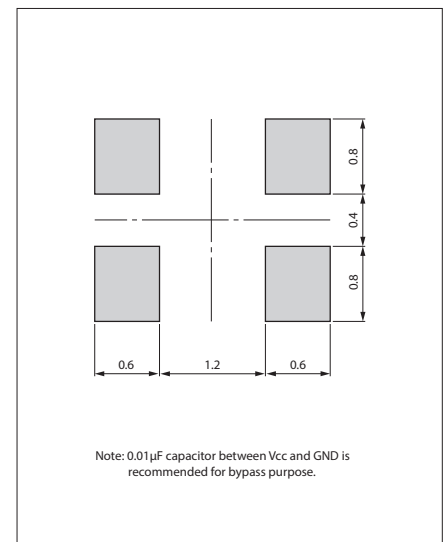


Test Circuit



Recommended Land Pattern

(Unit: mm)

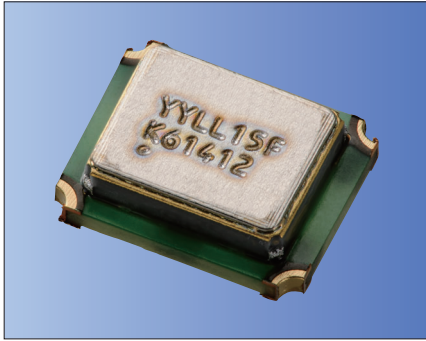




Temperature Compensated Crystal Oscillators (TCXO, VCTCXO) Surface Mount Type TCXO KT2520K Series



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.
: $\pm 2.0 \times 10^{-6}/-30$ to $+85^{\circ}\text{C}$
: $\pm 0.5 \times 10^{-6}/-30$ to $+85^{\circ}\text{C}$ (for GNSS)
- 1.68 to 3.63V drive available
- Reflow compatible
- Operating Temp. -40 to $+105^{\circ}\text{C}$ (Option)
- Disable Function (Option)

Applications

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

How to Order

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

① Series

② Output Frequency

③ Freq. Temp. Chrst.

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

④ Lower Operating Temp.

C	-30°C
E	-20°C
G	-10°C

⑤ Upper Operating Temp.

W	$+85^{\circ}\text{C}$
V	$+80^{\circ}\text{C}$
U	$+75^{\circ}\text{C}$

⑥ Supply Voltage

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

⑦ Voltage Control Function

T	TCXO
Spec. Code*	VCTCXO

*Please contact us for Spec. Code.

⑧ Individual Specification

Packaging (Tape & Reel 12000 pcs./ reel)

Specifications

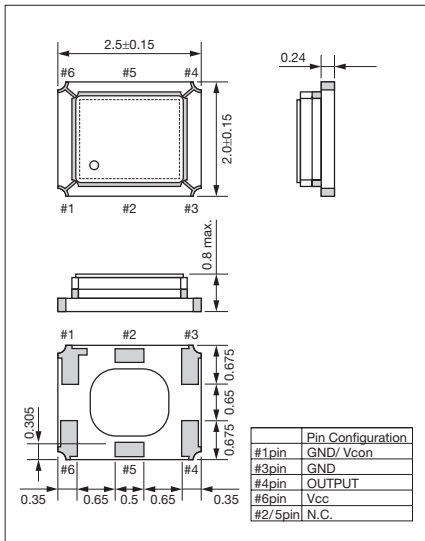
Item	Symbol	Conditions	Min.	Max.	Unit
Output Frequency Range	f_o	Standard Output Frequency: 19.2, 26.0, 32.0, 38.4, 48.0, 52.0	19.2	52	MHz
Frequency Tolerance	f_{tol}	vs Temperature	$-0.5/-2$	$+0.5/+2$	$\times 10^{-6}$
		vs Load	-0.2	$+0.2$	
		vs Voltage	-0.2	$+0.2$	
Frequency Aging	f_{age}	Per Year	-1	$+1$	$\times 10^{-6}$
Storage Temperature Range	T_{stg}		-40	$+85$	$^{\circ}\text{C}$
Operating Temperature Range	T_{use}		-30	$+85$	$^{\circ}\text{C}$
Voltage Control Range	f_{cont}	Positive	± 8	± 15	$\times 10^{-6}$
Supply Voltage	V_{cc}		1.68	3.63	V
Output Level	V_{pp}	Clipped Sine*, Load: 10k ohm // 10pF	0.8	—	Vp-p
Current Consumption	I_{cc}		—	2	mA
Harmonics	—		—	-5	dBc

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

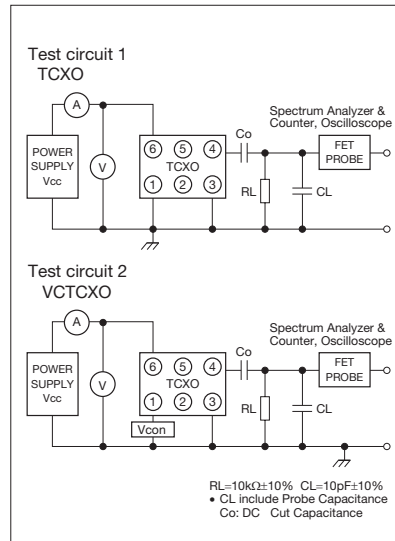
* Please contact us for other specifications.

Dimensions

(Unit: mm)

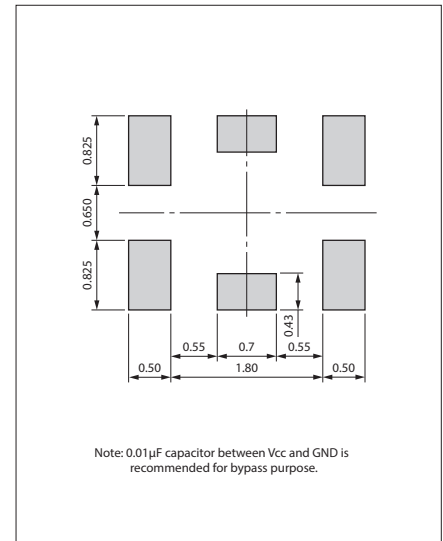


Test Circuit



Recommended Land Pattern

(Unit: mm)



Temperature Compensated Crystal Oscillators





Temperature Compensated Crystal Oscillators (TCXO, VCTCXO) Surface Mount Type TCXO KT5032F Series for Smallcell/ Stratum3



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	$\pm 0.5 \times 10^{-6}$
K	$\pm 0.28 \times 10^{-6}$
A	$\pm 0.1 \times 10^{-6}$

④Operating Temperature Range

⑤Supply Voltage

33	3.3V
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⑥Voltage Control Function

T	TCXO
Spec. Code*	VCTCXO

⑦Individual Specification

Packaging (Tape & Reel 1000 pcs./ reel)

Specifications

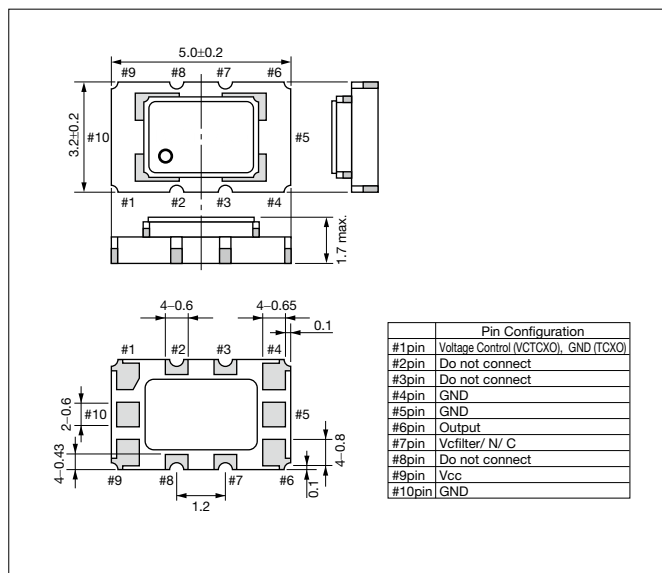
Item	Symbol	Conditions		Min.	Max.	Unit
Output Frequency Range	f _o	Standard Frequency: 10, 19.2, 20, 24.576, 26, 30.72, 38.88, 40		10	40	MHz
Frequency Tolerance	f _{tol}	vs Temperature [±(fmax-fmin)/ 2fo] vs Voltage		-0.5	+0.5	× 10 ⁻⁶
				-0.28	+0.28	
				-0.1	+0.1	
Supply Voltage	V _{CC}			+2.3	+3.63	V
Current Consumption	I _{CC}	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	V _{pp}	Clipped Sine*, Load: 10k ohm // 10pF		0.8	—	V _{p-p}
Low Level Output Voltage	V _{OL}	CMOS, Load: 15pF I _{OL} =4mA		—	10% V _{CC}	V
High Level Output Voltage	V _{OH}	CMOS, Load: 15pF I _{OH} =-4mA		90% V _{CC}	—	V
Rise / Fall Time (10%V _{CC} to 90%V _{CC})	Tr/ Tf	CMOS, Load: 15pF		—	8	ns
Symmetry	SYM	50% V _{CC}		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 ($\geq 1nF$) to the line-out terminal of the oscillator.

* Please contact us for other specifications.

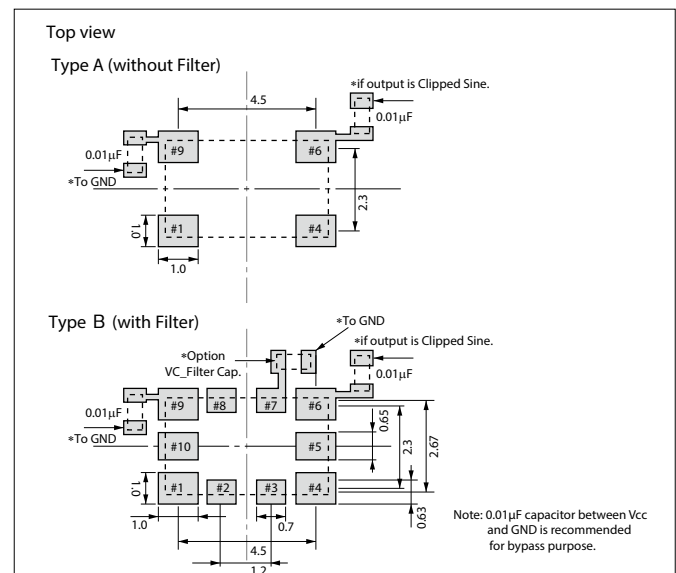
Dimensions

(Unit: mm)



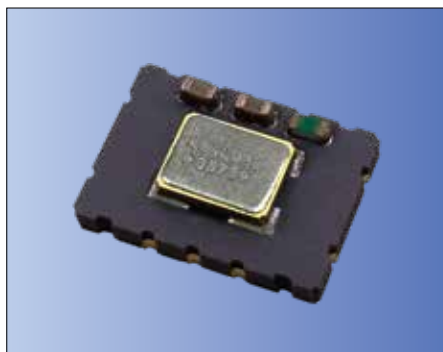
Recommended Land Pattern

(Unit: mm)





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

How to Order

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

①Series

③Output Frequency

④Freq. Temp. Chrst.

U	$\pm 0.5 \times 10^{-6}$
K	$\pm 0.28 \times 10^{-6}$
A	$\pm 0.1 \times 10^{-6}$

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.

⑨Individual Specification

Packaging (Tape & Reel 1000 pcs./ reel)

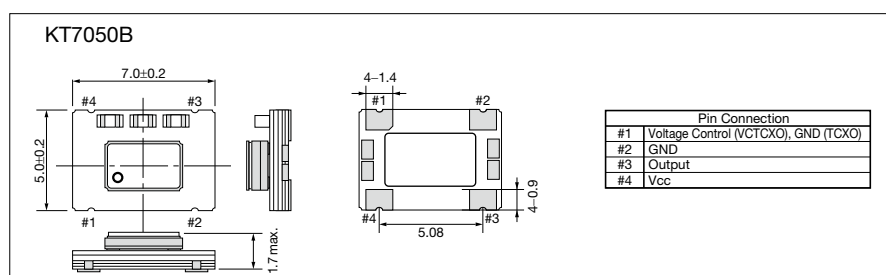
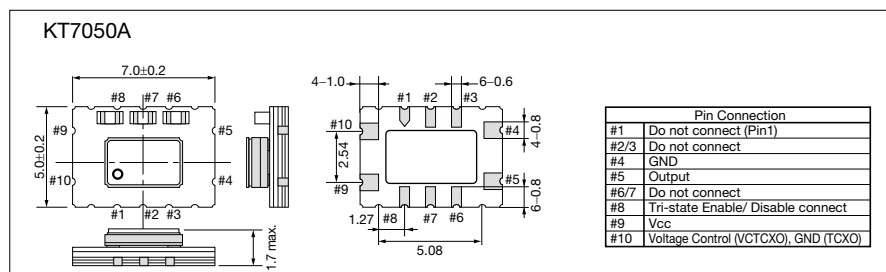
- Compliant to the GR1244-Core & GR253-Core
- Recommended in Microsemi's ZLAN-68 app. note for Stratum3 applications based on tests performed by Kyocera.

Specifications

Item	Symbol	Conditions		Min.	Max.	Unit
Output Frequency Range	fo	Standard Frequency: 10, 19.2, 20, 24.576, 26, 30.72, 38.88, 40		10	40	MHz
Frequency Tolerance	f_tol	vs Temperature [±(fmax-fmin)/ 2fo] vs Voltage		-0.5	+0.5	× 10 ⁻⁶
				-0.28	+0.28	
				-0.1	+0.1	
Supply Voltage	Vcc			+2.7	+5.5	V
Current Consumption	Icc	CMOS Output		—	6	mA
Frequency Aging	f_age	20years aging @40°C Including temp characteristics, initial tolerance, rated power supply voltage change and load change.		-4.6	+4.6	× 10 ⁻⁶
Voltage Control Range	f_cont	Positive *100k ohm min		±5	±20	× 10 ⁻⁶
Output Level	Vpp	Clipped Sine, Load: 10k ohm // 10pF		0.8	—	Vp-p
Low Level Output Voltage	VoL	CMOS, Load: 15pF IoL=4mA		—	10% Vcc	V
High Level Output Voltage	VoH	CMOS, Load: 15pF IoH= -4mA		90% Vcc	—	V
Rise / Fall Time (10%Vcc to 90%Vcc)	Tr/ Tf	CMOS, Load: 15pF		—	8	ns
Symmetry	SYM	50% Vcc		45	55	%
Phase Noise	—	@20MHz	@10Hz offset	—	-90	dBc/ Hz
			@100Hz offset	—	-120	
			@1kHz offset	—	-140	
			@10kHz offset	—	-150	
			@100kHz offset	—	-150	

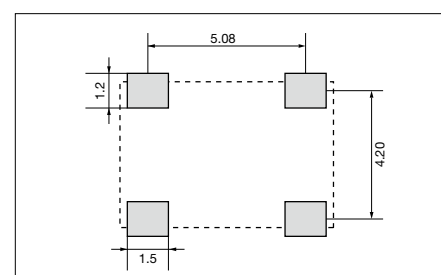
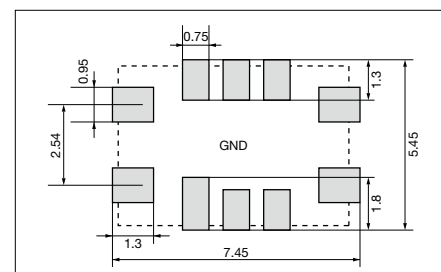
* Please contact us for other specifications.

Dimensions



Recommended Land Pattern

(Unit: mm)





1. Shock & Drop / Vibration

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

2. Cleaning

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

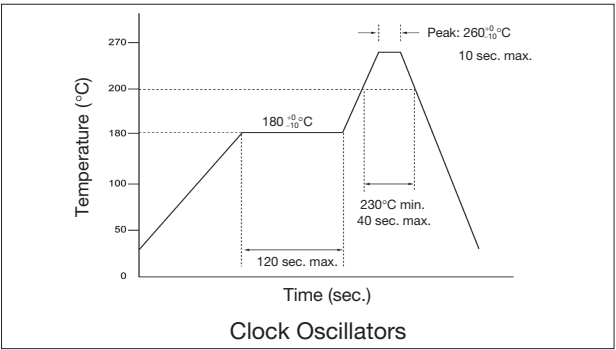
3. Soldering conditions

To maintain the product reliability, please follow recommended conditions.

Standard soldering iron conditions

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

Reflow conditions (Example)



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

4. Mounting Precautions

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

5. Storage Condition

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



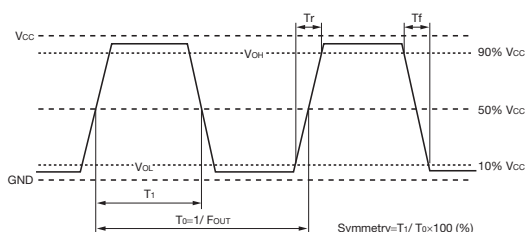


6. In order to use clock oscillators

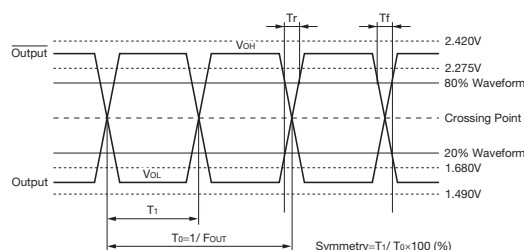
- (1) The miniature oscillator for the clock utilizes a CMOS IC and incorporates a protective circuit against static electricity. However, exercise care in the same manner as for a normal CMOS IC.
- (2) Internal capacitor is not provided in the power supply section (+DC-GND). *
To serve as overimpressed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

Clock Timing Chart

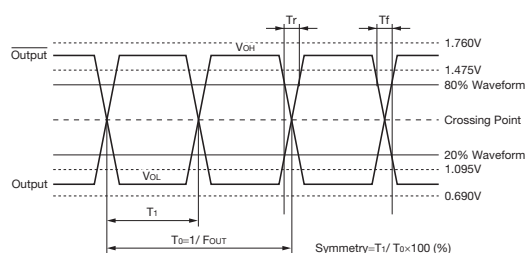
[CMOS Output]



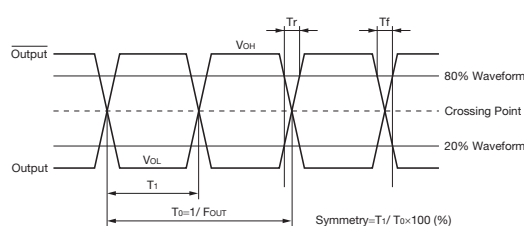
[LV-PECL (3.3V) Output]



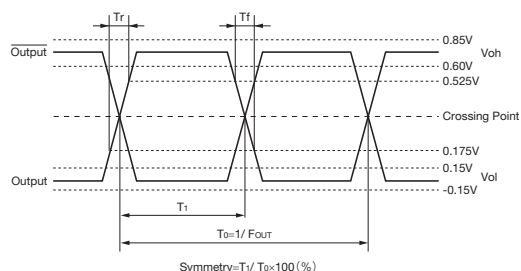
[LV-PECL (2.5V) Output]



[LVDS Output]



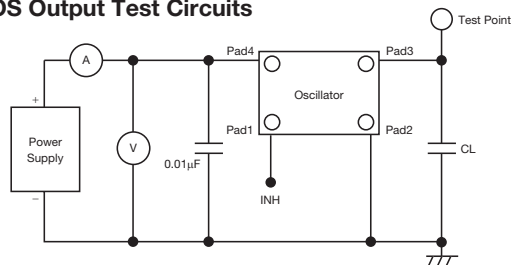
[HCSL-Output]





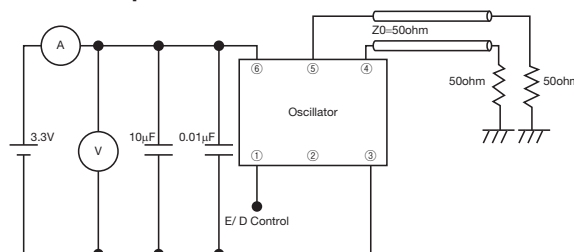
Test Circuits

CMOS Output Test Circuits

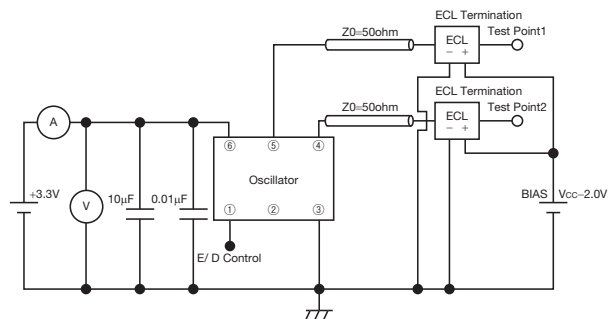


Note) Maximum load (Includes capacitances of fixture and probe)

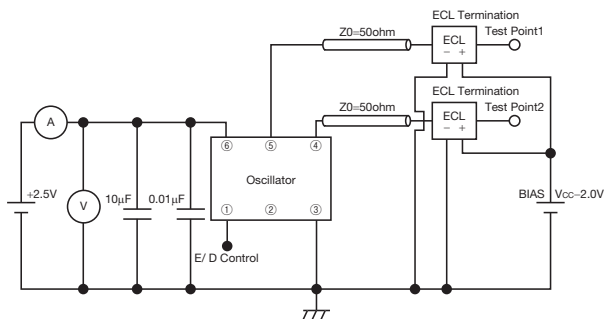
HCSL Output Test Circuits



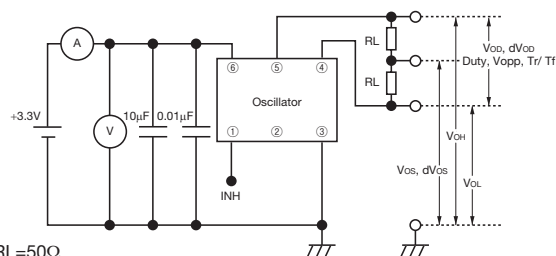
LV-PECL (3.3V/ XO) Output Test Circuits



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

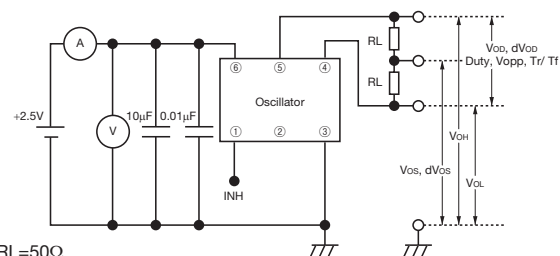


LVDS (3.3V/ XO) Output Test Circuits



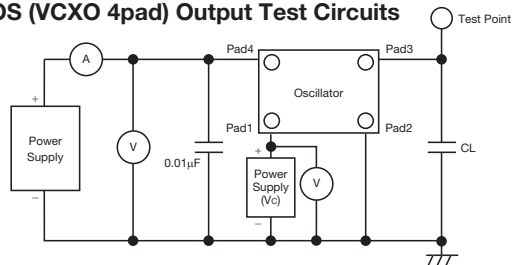
Note) $R_L = 50\Omega$

LVDS (2.5V/ XO) Output Test Circuits



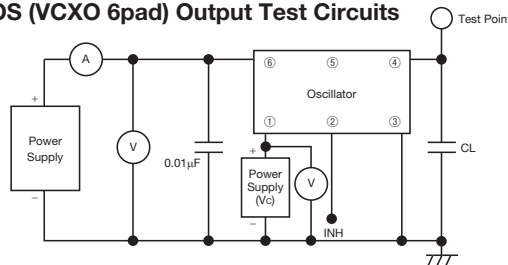
Note) $R_L = 50\Omega$

CMOS (VCXO 4pad) Output Test Circuits



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

CMOS (VCXO 6pad) Output Test Circuits



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



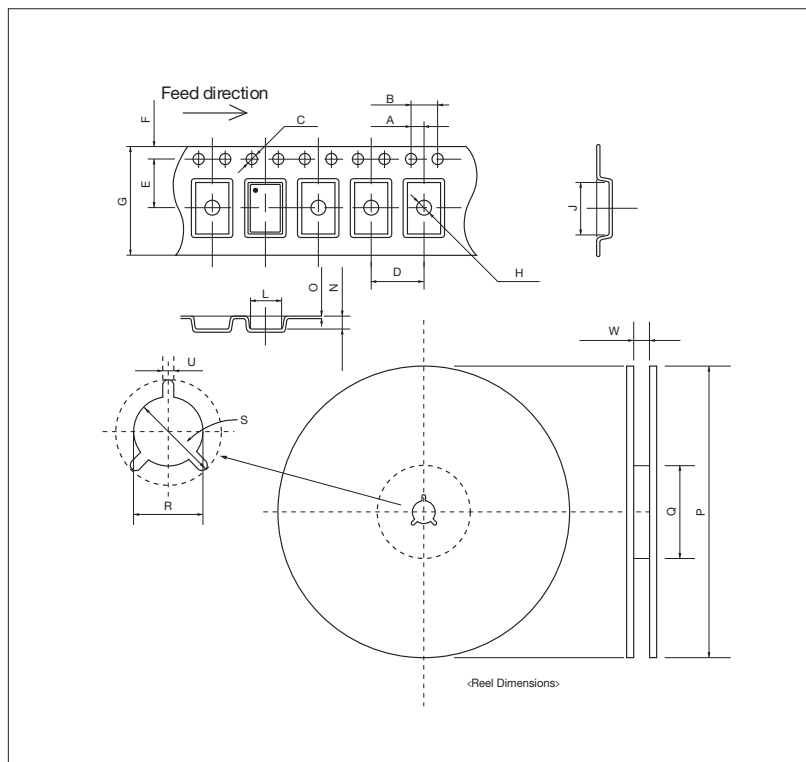


Tape & Reel Specifications

■ Clock Oscillators, Voltage Controlled Crystal Oscillators ■ Temperature Compensated Crystal Oscillators (TCXO)

		KC2016Z KC2016K MC2016Z MC2016K	KC2520B KC2520K KC2520Z MC2520K MC2520Z	KC3225K KC3225Z MC3225K MC3225Z	KC5032K KC5032P KC5032Z MC5032K MC5032Z KV5032G KV5032R	KC7050G KC7050K KC7050P KC7050R KC7050Z MC7050K MC7050Z KV7050B KV7050G KV7050R	KT1612A	KT2016K	KT2520K	KT5032F	KT7050
T A P E	A	2.0±0.05	2.0±0.05	2.0±0.05	1.5±0.1/-0	2.0±0.1	2.0±0.05	2.0±0.05	2.0±0.05	2.0±0.05	2.0±0.1
	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	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	φ1.05±0.1	φ1.1±0.1	φ1.5±0.1/0	φ1.5±0.1/0	φ1.55±0.1	φ0.5±0.05	φ1.0±0.1/-0	φ1.1±0.1	φ1.55±0.05	φ1.55±0.05
	J	2.25±0.1	2.7±0.1	3.5±0.05	5.5±0.1	7.4±0.1	1.85±0.1	2.4±0.05	2.9±0.1	5.9±0.1	8.21±0.1
	L	1.85±0.1	2.2±0.1	2.8±0.05	3.7±0.1	5.4±0.1	1.45±0.1	2.0±0.05	2.4±0.1	3.7±0.1	5.78±0.1
	N	0.95±0.1	1.0±0.1	1.1±0.05	1.4±0.1	2.0±0.1	0.65±0.05	0.9±0.05	1.15±0.1	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
R E E L	P	φ180+0/-3	φ180+0/-3	φ180+0/-3	φ180+0/-3	φ180+0/-3	φ330+0/-2	φ330+0/-2	φ330+0/-2	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	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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