Features
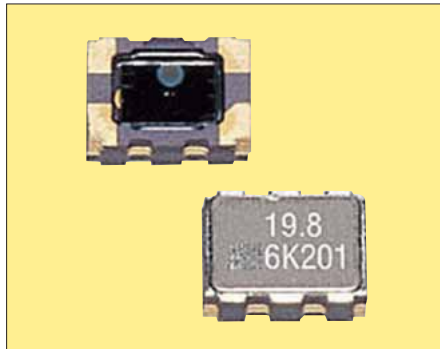
- VC-TCXO for cellular phone.
- Leadless type for auto pick-and-place.
- Ultra-miniature size. (3.2x2.5x1.05mm)
- Reflow soldering compatible.
- Low power consumption.
- Lead free

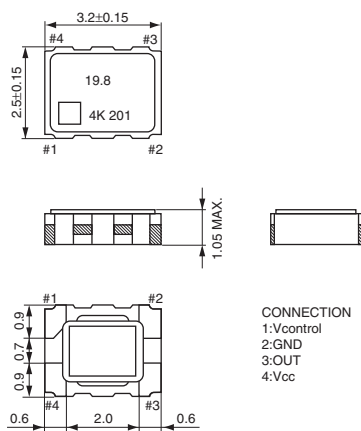**Pb Free**   **RoHS Conforming**

Specifications

Item	Symbol	Conditions	Min.	Max.	Units
Output Frequency Range	F_{OUT}		12.6	38.4	MHz
Frequency Stability	$\Delta f/fo$	vs Temperature	−2.0	+2.0	ppm
		vs Load	−0.2	+0.2	
		vs Voltage	−0.3	+0.3	
Storage Temp. Range	T_{STG}		−40	+85	°C
Operating Temp. Range	T_{OPR}		−30	+85	°C
Aging	Δf aging	Per Year	−1	1	ppm
Voltage control range	$\Delta f/V$	Positive	+/−8	+/−12	ppm
Supply Voltage	V_{DD}		2.4	5.5	Volt
Output Voltage	Vout	10k ohm // 10pF	0.8	—	Vp-p
Current Consumption	I_{DD}	12.6 ~26MHz	—	1.0	mA
		26 ~38.4MHz	—	1.5	
Duty Ratio	SYM	@50% V_{DD}	40	60	%
Harmonics	—		—	−5	dBc

Note: All electrical characteristics are defined at the maximum load and operating temperature range.
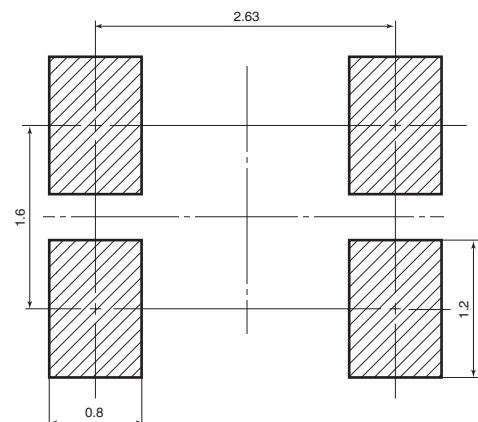
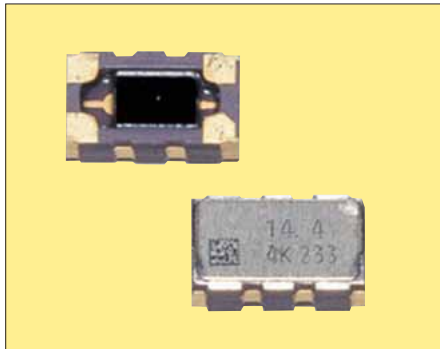## Dimensions   (Unit : mm)

VC-TCXO-214C

3.2±0.15
#4   #3
2.5±0.15
19.8
4K 201
#1   #2

1.05 MAX.

#1   #2
0.9
0.7
0.9
0.6 #4 2.0 #3 0.6

CONNECTION
1:Vcontrol
2:GND
3:OUT
4:Vcc

Recommended Land Pattern   (Unit : mm)

2.63
1.6
1.2
0.8

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

AVX

Features

- VC-TCXO for Cellular Phone.
- Leadless type for auto pick-and-place.
- Miniature size. (4x2.5x1.2mm).
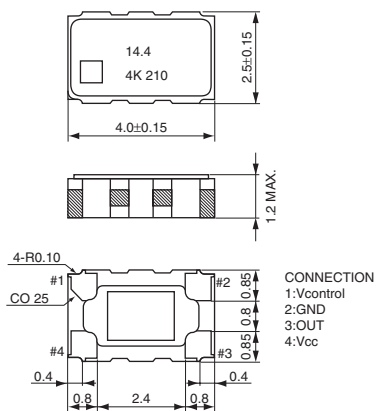- Reflow soldering compatible.
- Low power consumption.

Pb Free   **RoHS Conforming**

Specifications

Item	Symbol	Conditions		Min.	Max.	Units
Output Frequency Range	F_{OUT}			12.6	26	MHz
Frequency Stability	$\Delta f/fo$	vs Temperature		−2.0	+2.0	ppm
		vs Load		−0.2	+0.2	
		vs Voltage		−0.3	+0.3	
Storage Temp. Range	T_{STG}			−40	+85	°C
Operating Temp. Range	T_{OPR}			−30	+80	°C
Aging	Δf aging	Per Year		−1	1	ppm
Voltage control range	$\Delta f/V$	Positive		+/−8	+/−12	ppm
Supply Voltage	V_{DD}			2.4	5.5	Volt
Output Voltage	Vout	10k ohm // 10pF		0.8	—	Vp-p
Current Consumption (Maximum Loaded)	I_{DD}	12.6 ~15MHz		—	1.0	mA
		15 ~ 26MHz		—	1.5	
Duty Ratio	SYM	@50% V_{DD}		40	60	%
Harmonics	—			—	−5	dBc

Note: All electrical characteristics are defined at the maximum load and operating temperature range.
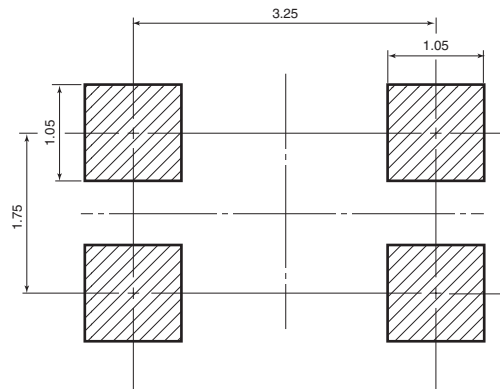
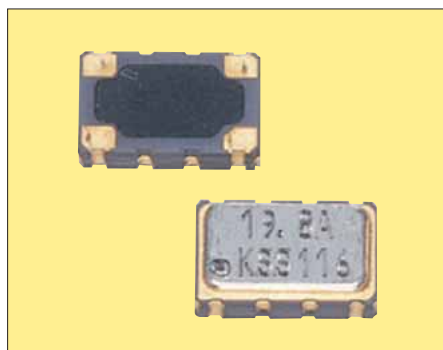## Dimensions   (Unit : mm)

VC-TCXO-212C

14.4
4K 210

2.5±0.15

4.0±0.15

1.2 MAX.

4-R0.10
CO 25
#1   #2
#4   #3
0.85
0.8
0.85
0.4   0.4
0.8   2.4   0.8

CONNECTION
1:Vcontrol
2:GND
3:OUT
4:Vcc

Recommended Land Pattern   (Unit : mm)

3.25
1.05
1.05
1.75

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

Pb Free　　　**RoHS Conforming**

Features

- VC-TCXO for cellular phone.
- Leadless type for auto pick-and-place.
- Miniature size. (5x3.2x1.35mm)
- Reflow soldering compatible.
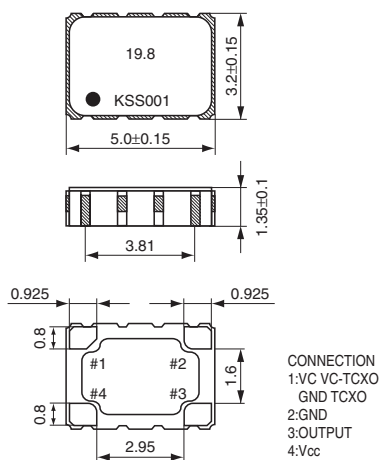- Low power consumption.

Specifications

Item	Symbol	Conditions	Min.	Max.	Units
Output Frequency Range	F_{OUT}		12.6	26	MHz
Frequency Stability	$\Delta f/fo$	vs Temperature	−2.0	+2.0	ppm
		vs Load	−0.2	+0.2	
		vs Voltage	−0.3	+0.3	
Storage Temp. Range	T_{STG}		−40	+85	°C
Operating Temp. Range	T_{OPR}		−30	+80	°C
Aging	Δf aging	Per Year	−1	1	ppm
Voltage control range	$\Delta f/V$	Positive	+/−8	+/−12	ppm
Supply Voltage	V_{DD}		2.4	5.5	Volt
Output Voltage	Vout	10k ohm // 10pF	0.8	—	Vp-p
Current Consumption	I_{DD}		—	2.0	mA
Duty Ratio	SYM	@50% V_{DD}	40	60	%
Harmonics	—		—	−5	dBc

Note: All electrical characteristics are defined at the maximum load and operating temperature range.
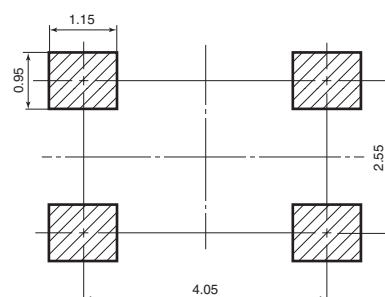
Dimensions
(Unit : mm)

(VC-)TCXO-208C

19.8
● KSS001
3.2±0.15
5.0±0.15

1.35±0.1
3.81

0.925　　0.925
0.8
#1　#2
#4　#3
1.6
0.8
2.95

CONNECTION
1:VC VC-TCXO
  GND TCXO
2:GND
3:OUTPUT
4:Vcc

Recommended Land Pattern
(Unit : mm)

1.15
0.95
2.55
4.05

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

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.
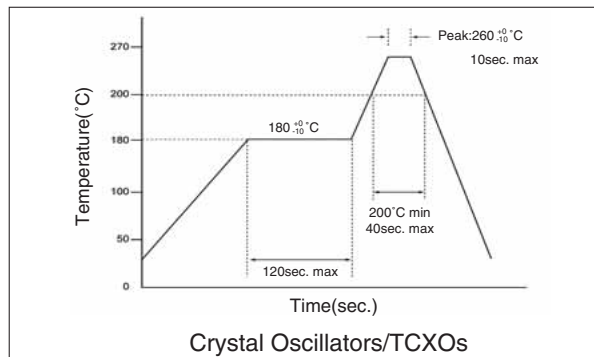
3. Soldering conditions

To maintain the product reliability, please follow recommended conditions.

Standard soldering iron conditions

	Crystal Oscillators
Soldering iron	280˚C ~ 340˚C
Time	3+1/–0sec. max

Reflow conditions (Example)

Crystal Oscillators/TCXOs

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

4. Mounting Precautions

Leaded Devices

The special glass, located where the lead of the retainer base comes out, is aligned with the coefficient of thermal expansion of the lead, If the glass is damaged and cracks appear, there may be cases in which performance deteriorates and it fails to operate.

Consequently, when making the device adhere closely and applying solder, align the gap of the hole of the board with the gap of the lead and insert without excessive force.

When making the device adhere closely to a through hole board and applying solder, be careful that the solder does not get into the metal part of the retainer base and cause a short. Putting in an insulation spacer is one more method of preventing a short circuit.

When the lead is mounted floating, fix it as far as possible so that contact with other parts and the breakage due to the fatigue, and the mechanical resonance of the lead will not occur.

When the lead is bent and used, do not bend the lead directly from the base, separate it 0.5mm or more and then bend it. When bending, before attaching to the board, fix the place where the lead comes out in advance and attach it after bending so that a crack does not occur in the glass part.

Surface Mount Devices

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 +40C˚, humidity 40 to 60% RH, and avoid direct sunlight. Then use within 6 months.

6. In order to use crystal oscillators

(1) The minlature crystal oscillator for the clock utillzes a C-MOS IC and incorporates a protective circuit against static electricity. However, exerclse care in the same manner as for a normal C–MOS IC.

(2) Internal capacitor is not provided in the power supply section (+DC–GNC).
To serve as overimpressed voltage and overcurrent protective device, place a bypass capacitor (0.01 μF) as near as possible to the (+DC–GND) terminal.
However, the capacity value is meant as a guideline.
Depending on the capacitor type, frequency characteristics vary. Accordingly, use a capacitor that matches the frequency characteristics.

(3) Applying reverse voltage could result in damage to internal parts. Take care not to connect terminals incorrectly.

(4) Please do not use oscillators under unfavorable condition such as beyond specified range in catalog or specification sheet.

(5) Please keep oscillators away from water, salt water or harmful gas.

(6) K50H-3C / FSO 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) K50H-3C / FSO series has Bypass Capacitior between VDD and GND.
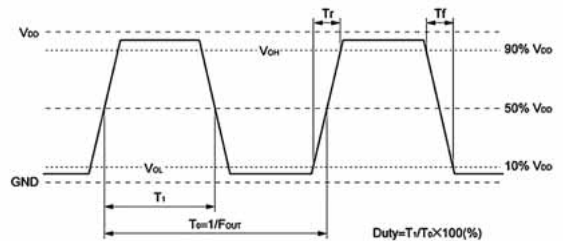
Test Circuits and Clock Timing Chart
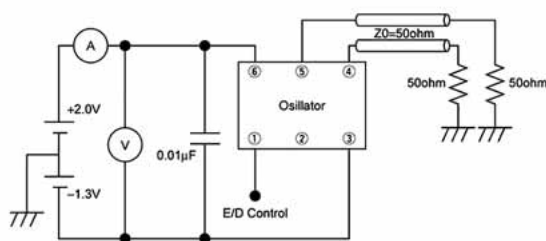
CMOS Output Test Circuits
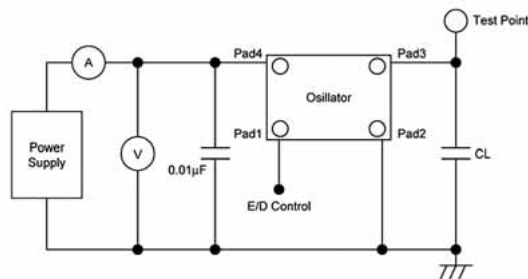
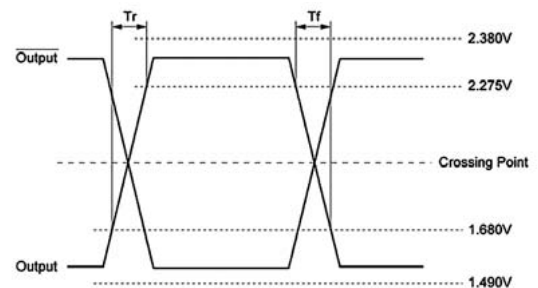Note) Maximum load(Includes capacitances of fixture and probe)

**Clock Timing chart(C-MOS Output)**

LV-PECL Output Test Circuits

Clock Timing chart (LV-PECL Output)

Tape & Reel Specifications

■Crystal Oscillators

		KC2520	K25	K30	FXO-61F FXO-64F VC-FXO-65F
T A P E	A	2.0±0.1	2.0±0.1	2.0±0.1	2.0±0.1
	B	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	φ1.55±0.1
	D	4.0±0.1	8.0±0.1	8.0±0.1	8.0±0.1
	E	3.5±0.05	3.5±0.05	5.5±0.1	5.5±0.1
	F	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	12.0±0.2	12.0±0.3
	H	φ1.1±0.1	φ1.55±0.1	φ1.55±0.1	φ1.55±0.1
	J	2.7±0.1	3.5±0.05	5.5±0.1	5.4±0.1
	L	2.2±0.1	2.8±0.05	3.7±0.1	3.6±0.1
	N	1.25±0.1	1.1±0.05	1.4±0.1	1.7±0.1
	O	0.2±0.05	0.3±0.05	0.3±0.05	0.3±0.05
R E E L	P	φ180+0/−3	φ180+0/−3	φ180+0/−3	φ254±2
	Q	φ60+1/−0	φ60+1/−0	φ60+1/−0	φ100±1
	R	φ13±0.2	φ13±0.2	φ13±0.2	φ13±0.5
	S	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
	W	9.0±0.3	9.0±0.3	13.0±0.3	13.4+2/−0
Qty		2000	2000	1000	1000

Feed direction

<Reel Dimensions>
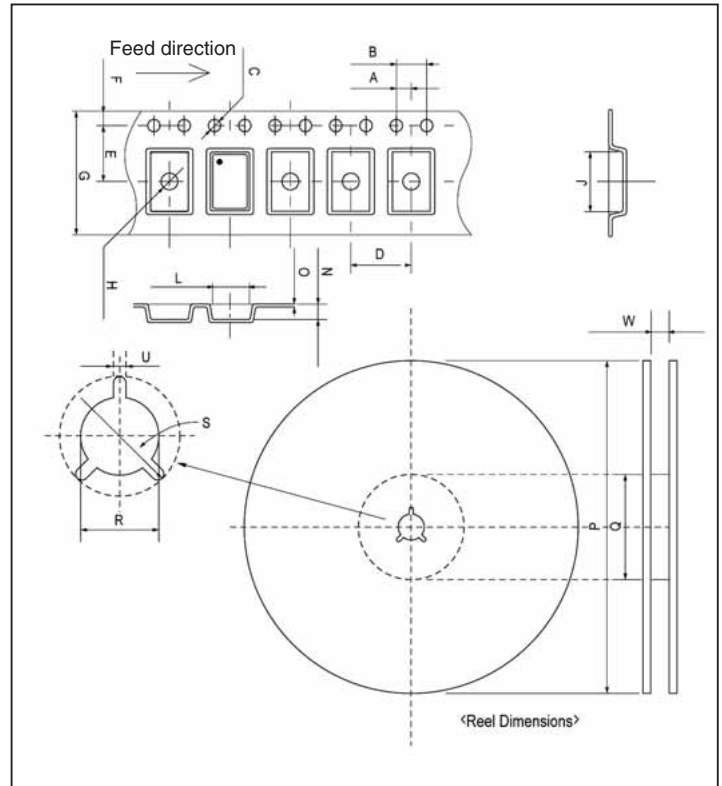
		FSO-1C/1D FSO-2B/2C/2D VC-FSO-1D	FXO-31F FXO-34F FXO-37F VC-FXO-35F VCXO-7050	K50H K50 K53 K50V-3P	KT21	(VC)TCXO-214C	(VC)TCXO-212C	(VC)TCXO-208C MFO-208F	KT18B	KT20A	(VC)TCXO-204C
T A P E	A	2.0±0.1	2.0±0.1	2.0±0.1	2.0±0.1	2.0±0.1	2.0±0.1	2.0±0.1	2.0±0.1	2.0±0.1	2.0±0.1
	B	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1
	C	φ1.55±0.1	φ1.55±0.1	φ1.5±0.1	φ1.5+0.1/−0	φ1.5-0.1/−0	φ1.5+0.1/−0	φ1.5+0.1/−0	φ1.5+0.1/−0	φ1.5+0.1/−0	φ1.5+0.1/−0
	D	8.0±0.1	8.0±0.1	8.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1	8.0±0.1/4.0±0.1	8.0±0.1/4.0±0.1	8.0±0.1	4.0±0.1
	E	7.5±0.1	7.5±0.1	7.5±0.1	3.5±0.1	3.5±0.05	5.5±0.1	5.5±0.1	5.5±0.1	5.5±0.1	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	16.0±0.3	16.0±0.3	16.0±0.2	8.0±0.3	8.0±0.2	8.0±0.3/12.0±0.3	12.0±0.3	12.0±0.3	12.0±0.3	16.0±0.3
	H	φ1.55	φ1.55	φ1.55±0.1	φ1.5+0.1/−0	φ1.0+0.2/−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
	J	8.18	8.18	7.4±0.1	3.5±0.1	3.6±0.1	4.4±0.1	5.5±0.1	5.5±0.1	5.5±0.1	7.4±0.1
	L	5.56	5.56	5.4±0.1	2.8±0.1	2.9±0.1	2.9±0.1	3.7±0.1	3.7±0.1	3.7±0.1	5.4±0.1
	N	2.16±0.1	2.16±0.1	2.0±0.1	1.1±0.1	1.3±0.1	1.1±0.1/1.3±0.1	1.6±0.1/1.5±0.1	1.6±0.1/1.5±0.1	1.8±0.1	2.1±0.1
	O	0.3±0.05	0.3±0.05	0.3±0.05	0.25±0.05	0.3±0.05	0.2±0.05/0.3±0.05	0.3±0.05	0.3±0.05	0.3±0.05	0.3±0.05
R E E L	P	φ330±2φ254±2	φ330±2φ254±2	φ180+0/−3	φ180±2	φ180+1/−1.5	φ254±1/φ180+1/−1.5	φ330±1	φ330±1	φ330±1	φ254±2
	Q	φ100±1	φ100±1	φ60+1/−0	φ60	φ60+1/−0	φ100±1/φ60+1/−0	φ100±1/φ60	φ100±1φ60	φ100±1	φ100±1
	R	φ13±0.3	φ13±0.3	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±0.2	2.0±0.5
	W	16.4	17.5±0.5/16.4	17±0.2	9.0±0.1	9.0+0.3/−0	9.0±0.3/13.0±0.3−0	13.5±1	13.5±1	13.5±1	17.5±0.5
Qty		3000/1000	3000/1000	1000	2000	2000	4000/2000	2000	4000	4000	1000

ORDERING FORMAT FOR CRYSTAL OSCILLATORS

Please specify the following items when ordering crystal oscillators.

I. **Standard products shown in the catalogue:**

    Please specify package type and nominal frequency.

II. **Special-order products:**

    Please specify the following items in spification.

1 . Frequency

    (1)Oscillation Frequency _____ Hz

2 . Frequency Stability

    (1)Temperature _____ $\times 10^{-6}$ MAX. _____ ~ _____˚C (On the basis of +25˚C frequency)

    (2)Supply Voltage _____ $\times 10^{-6}$ MAX. _____ VDC ± _____ %

    (3)Load. _____ $\times 10^{-6}$ MAX. _____ Ω// _____ pF ± _____ % ± _____ %

    (4)Aging _____ $\times 10^{-6}$ MAX./year

3 . Frequency Tuning Range

    ± _____ $\times 10^{-6}$ MIN

4 . Frequency Control Range

    ± _____ ~± _____ $\times 10^{-6}$ /+ _____ V± _____ V

5 . Output

    (1)Voltage _____ Vrms _____ V_{P-P} MIN.

    (2)Wave Form

       Sine, Half sine wave, Harmonics 2nd _____ dB, 3rd _____ dB, Others _____ dB

    (3)Load Resistance _____ Ω//Capacitance _____ pF

6 . Supply Voltage

    (1)For circuit _____ VDC± _____ %, _____ mA MAX.

7 . Environmental Condition

    (1)Operating Temperature Range _____ ~ _____ ˚C

    (2)Vibration

       Total Amplitude _____ mm, Vibration Frequency _____ Hz~ _____ Hz

    (3)Shock _____

8 . Dimensions, Pin Connection _____

9 . Application _____