



TUNING FORK UNIT

PF-14 New Product

Applications

- Clock

Features

- 1.2 Φ the Smallest Cylinder
- Photolithography Process
- High Reliability and High Stability

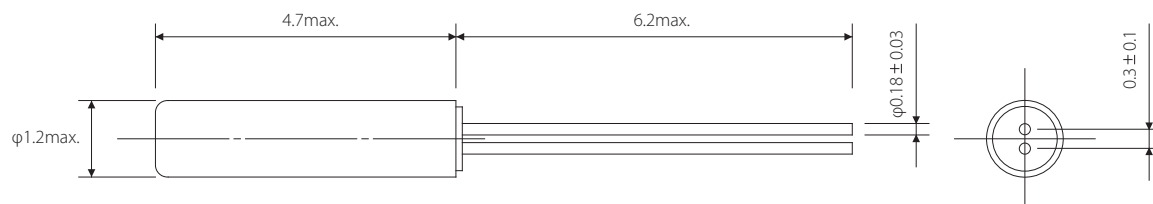
Specifications



Model	PF-14
Nominal frequency range	32.768 kHz
Storage temperature range	-55~+125°C
Operating temperature range	-40~+85°C
Frequency tolerance (at +25°C)	$\pm 20 \times 10^{-6}$
Load capacitance	7pF / 9pF / 12.5pF
Equivalent series resistance	50 k Ω Max.
Shunt capacitance	0.8 pF Typ.
Motional capacitance	1.9 fF Typ.
Turnover Temperature	+25°C $\pm$ 5°C
Frequency temperature characteristics	-0.035 $\pm$ 0.01 ppm / °C ²
Level of drive	0.1 μ W (1 μ W Max.)
Aging	$\pm$ 3ppm / Year

Package quantity: 1,000pcs max./Reel.

Outline and Dimensions [unit:mm]





TUNING FORK UNIT

SF-2012 New Product

Applications

• Consumer Mobile Equipment

Features

• Small / Low Profile ($2.0 \times 1.2 \times 0.6$) • Ceramic Package • Pb Free , Reflow Compatible

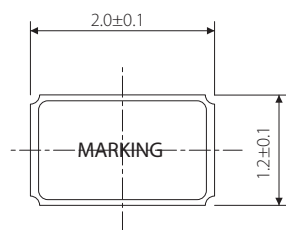
Specifications



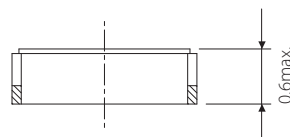
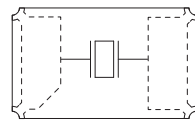
Model	SF-2012
Nominal frequency range	32.768 kHz
Storage temperature range	-40~+85°C
Operating temperature range	-40~+85°C
Frequency tolerance (at +25°C)	$\pm 20 \times 10^{-6}$
Load capacitance	12.5pF
Equivalent series resistance	90 k Ω Max.
Shunt capacitance	1.5 pF Typ.
Motional capacitance	6.0 fF Typ.
Turnover Temperature	+25°C $\pm$ 5°C
Parabolic Coefficient	-0.04 ppm / °C ² Max.
Level of drive	0.1 μ W (0.5 μ W Max.)
Aging	$\pm$ 3ppm / Year

Package quantity: 3,000pcs max./Reel.

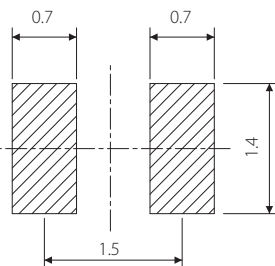
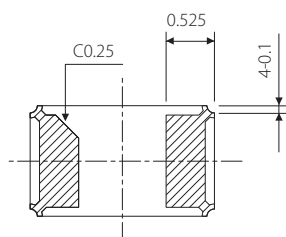
Outline and Dimensions [unit:mm]



TOP VIEW



Example of a Terminal Land Pattern



Maximum marking length	Marking
	line1
5	Laser
ex.)	S925A



TUNING FORK UNIT SF-3215

Applications

- Mobile Equipment / Portable Equipment etc.

Features

- Ultra thin / Dimensions (3.2 × 1.5 × 0.9)
- High reliability which adopted vacuum seal
- Reflow Soldering
- Emboss Taping

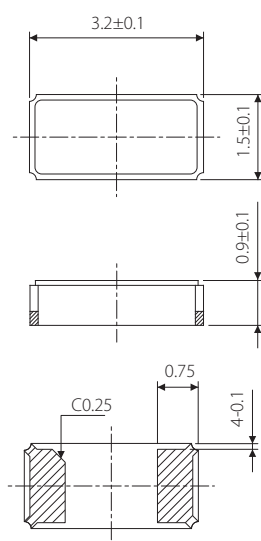
Specifications



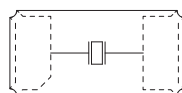
Model	SF-3215
Nominal frequency range	32.768 kHz
Storage temperature range	-55 ~ +125°C
Operating temperature range	-40 ~ +85°C
Frequency tolerance (at +25°C)	$\pm 20 \times 10^{-6}$
Load capacitance	7pF / 9pF / 12.5pF
Equivalent series resistance	70 kΩ Max.
Shunt capacitance	1.2 pF Typ.
Motional capacitance	3.7 fF Typ.
Turnover Temperature	+25°C ± 5°C
Parabolic Coefficient	$-0.035 \pm 0.01 \text{ ppm} / ^\circ\text{C}^2$
Level of drive	0.1 μW (0.5 μW Max.)
Aging	± 3ppm / Year

Package quantity: 3,000pcs max./Reel.

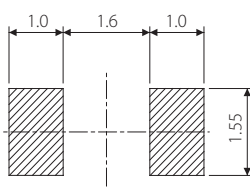
Outline and Dimensions [unit:mm]



TOP VIEW



Example of a Terminal Land Pattern



Maximum marking length	Marking
line1	
6	Laser
ex.)	SJK44A



TUNING FORK UNIT

SF-7015 New Product

Applications

- Consumer Mobile Equipment

Features

- Thickness has decreased by 35% (thickness 0.9mm max)
- Ceramic package of high reliability is adopted
- Pb Free / Reflow Compatible

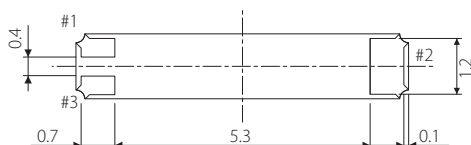
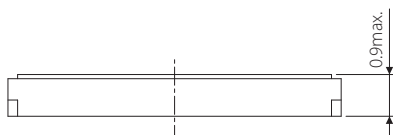
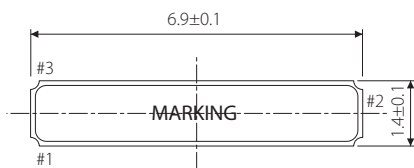
Specifications



Model	SF-7015
Nominal frequency range	32.768 kHz
Storage temperature range	-55 ~ +125°C
Operating temperature range	-40 ~ +85°C
Frequency tolerance (at +25°C)	$\pm 20 \times 10^{-6}$, $\pm 50 \times 10^{-6}$
Load capacitance	7pF / 9pF / 12.5pF
Equivalent series resistance	65 kΩ Max.
Shunt capacitance	0.8 pF Typ.
Motional capacitance	1.9 fF Typ.
Turnover Temperature	+25°C ± 5°C
Parabolic Coefficient	-0.035 ± 0.01 ppm / °C ² Max.
Level of drive	0.1 μW (1.0 μW Max.)
Aging	± 3 × 10 ⁻⁶ / Year (+25°C, 1st year)

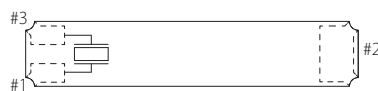
Package quantity: 3,000pcs max./Reel.

Outline and Dimensions [unit:mm]



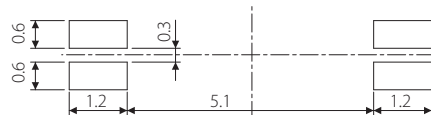
Maximum marking length	Marking
line1	
6	Laser
ex.) SJK44A	

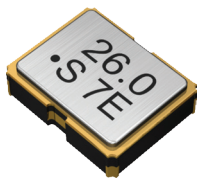
TOP VIEW



- Please do not connect to terminal #2.
- Surface mounting can also be done with the following land pattern.

Example of a Terminal Land Pattern





TUNING FORK UNIT

SFO-3225

Applications

- Clock and Data Recovery

Features

- Small ceramic package / Dimensions (3.2 × 2.5 × 0.9)
- Low power consumption (CMOS/IC 1.5 μ A) with Tri-state function and wide range operating temperature (-40°C ~ +85°C)
- Start-up time below 1 sec. Supply Voltage 1.5 ~ 5.5V

Specifications

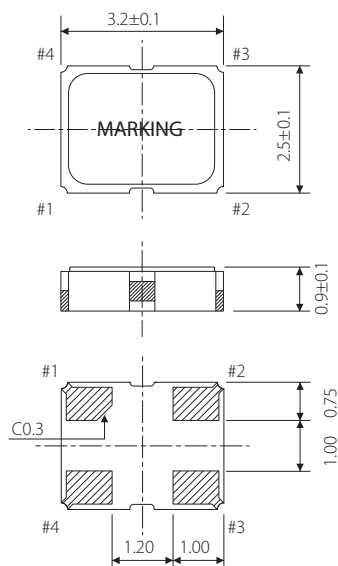


Model	SFO-3225	Condition
Output frequency	32.768 kHz	-
Storage temperature range	-55 ~ +125°C	-
Operating temperature range	-40 ~ +85°C	-
Frequency stability	(+5 ± 20) × 10 ⁻⁶	Vdd=+3.3V, +25°C
Frequency Temp. characteristics	(-9 ~ +10) × 10 ⁻⁶	at -20 ~ +70°C, +25°C as the reference
	(-140 ~ +10) × 10 ⁻⁶	at -40 ~ +85°C, +25°C as the reference
Power supply voltage	+1.5 ~ +5.5V	STD: +3.3V ± 10%
Current consumption	1.5 μ A max.	Vdd=+3.3V, No Load
	2.5 μ A max.	Vdd=+5.0V, No Load
Load	15pF max.	-
Output voltage level	V _{OL} : 0.4V max. / V _{OH} : (Vdd-0.4V) min.	CL=15pF, +25°C
Rise & Fall time	200ns max.	at 10% ~ 90% Vdd CL=15pF
Duty cycle	40% ~ 60%	at 1/2Vdd, CL=15pF, -40 ~ +85°C
Oscillation start up time	1sec max.	Vdd=1.5 ~ 5.5V, -40 ~ +85°C
Standby current consumption	1uA max.	25°C
Tri-state Function	-	#1: "H" → Output enable
		#1: "L" → Output disable (Hi-Z)

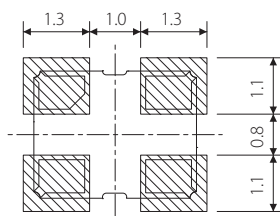
Package quantity: 3,000pcs max./Reel.

Outline and Dimensions [unit:mm]

Please connect the terminal CE at the High level when you do not use the oscillation stop function.



Example of a Terminal Land Pattern



Terminal	Connection
#1	OE
#2	GND
#3	OUTPUT
#4	Vdd

Tri-state Pin	Output
High	Active
Low	Hi-impedance



CRYSTAL UNIT

AX-1612 New Product

Applications

- OA / AV Machine / Bluetooth / Wireless LAN

Features

- Ultra thin / Dimensions (1.6×1.2×0.4)
- Ceramic Package
- High Reliability and High Stability

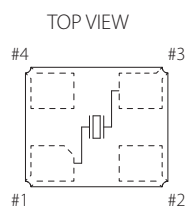
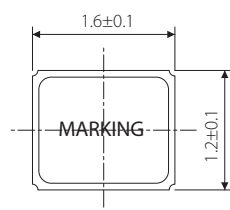
Specifications



Model	AX-1612	
Nominal frequency range	26.000~54.000 MHz	
Crystal cut	Fundamental [AT-cut]	
Storage temperature range	-40~+90°C	
Operating temperature range	-20~+70°C	-30~+85°C
Frequency temperature characteristics (Ref. to +25°C)	$\pm 15 \times 10^{-6}$	$\pm 20 \times 10^{-6}$
Frequency tolerance (at +25°C)	$\pm 10 \times 10^{-6}$	
Equivalent series resistance	200Ω: 26.000~39.999 MHz 100Ω: 40.000~54.000 MHz	
Load capacitance	8pF	
Shunt capacitance	5pF max.	
Level of drive	10 μW (100 μW max.)	

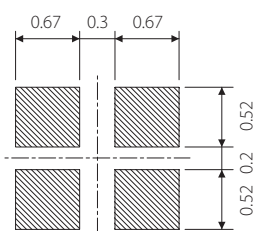
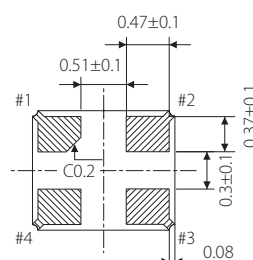
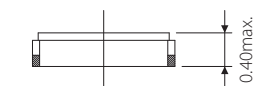
Package quantity: 3,000pcs max./Reel.

Outline and Dimensions [unit:mm]



- #1, #3 : Crystal terminal
- #4 : GND(Connected to cover) #2 : NC (Please connect it with GND.)

Example of a Terminal Land Pattern



Maximum marking length		Marking
line1	line2	
4	4	Laser
ex.)		40 . 0 S G A



SX-1612 Under Development

Applications

- OA / AV Machine / Bluetooth / Wireless LAN

Features

- Ultra thin / Dimensions (1.6×1.2×0.45)
- Ceramic Package
- High Reliability and High Stability

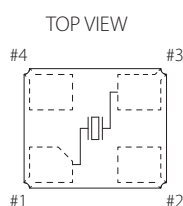
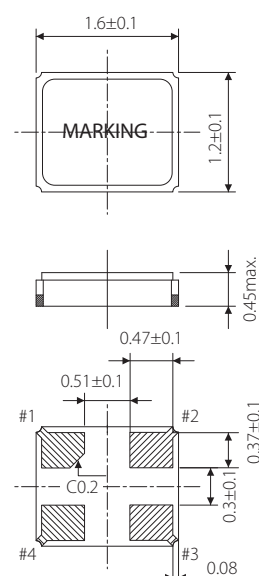
Specifications



Model	SX-1612	
Nominal frequency range	26.000~54.000 MHz	
Crystal cut	Fundamental [AT-cut]	
Storage temperature range	-40~+90°C	
Operating temperature range	-20~+70°C	-30~+85°C
Frequency temperature characteristics (Ref. to +25°C)	$\pm 15 \times 10^{-6}$	$\pm 20 \times 10^{-6}$
Frequency tolerance (at +25°C)	$\pm 15 \times 10^{-6}$	
Equivalent series resistance	200Ω: 26.000~39.999 MHz 100Ω: 40.000~54.000 MHz	
Load capacitance	8pF	
Shunt capacitance	5pF max.	
Level of drive	10 μW (100 μW max.)	

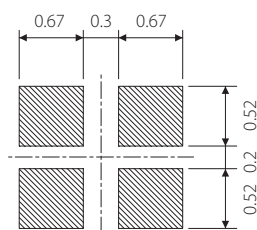
Package quantity: 3,000pcs max./Reel.

Outline and Dimensions [unit:mm]



- #1, #3 : Crystal terminal
- #4 : GND(Connected to cover) #2 : NC (Please connect it with GND.)

Example of a Terminal Land Pattern



Maximum marking length		Marking
line1	line2	
4	4	Laser
ex.)		40 . 0 S G A



CRYSTAL UNIT

SX-2016

Applications

- OA / AV Equipment / Bluetooth / Wireless LAN

Features

- Ultra thin / Dimensions (2.0×1.6×0.55)
- Ceramic Package
- High Reliability and High Stability

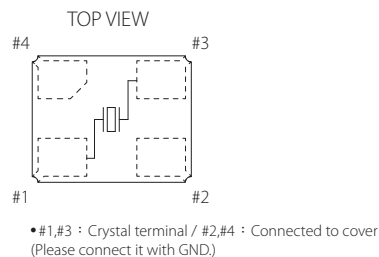
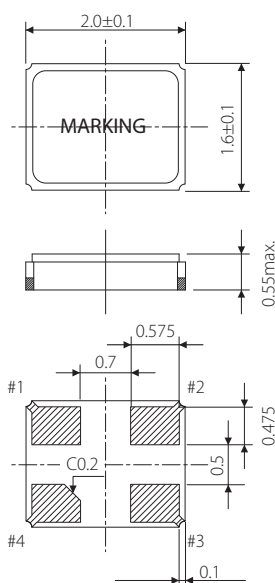
Specifications



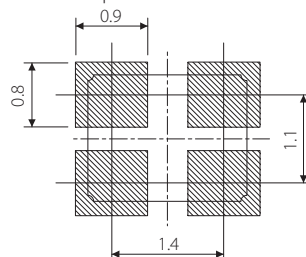
Model	SX-2016	
Nominal frequency range	16.000~56.000 MHz	
Crystal cut	Fundamental [AT-cut]	
Storage temperature range	-40~+90°C	
Operating temperature range	-10~+60°C	-30~+85°C
Frequency temperature characteristics (Ref. to +25°C)	$\pm 10 \times 10^{-6}$	$\pm 15 \times 10^{-6}$
Frequency tolerance (at +25°C)	$\pm 10 \times 10^{-6}$	
Equivalent series resistance	150 Ω: 16.000~19.999 MHz 100 Ω: 20.000~29.999 MHz 80 Ω: 30.000~35.999 MHz 60 Ω: 36.000~56.000 MHz	
Load capacitance	8pF, 12pF	
Shunt capacitance	5pF max.	
Level of drive	10 μW (100 μW max.)	

Package quantity: 3,000pcs max./Reel.

Outline and Dimensions [unit:mm]



Example of a Terminal Land Pattern



Maximum marking length		Marking
line1	line2	
4	4	Laser
ex.)		26 . 0 S G A



CRYSTAL UNIT

SX-2520

Applications

- Mobile Communication / Bluetooth / Wireless LAN

Features

- Ultra thin / Dimensions (2.5 × 2.0 × 0.55)
- Ceramic SMD Package
- Vacuum Seam Sealed
- Tight Tolerance and Stability
- Reflow Soldering / Emboss Taping
- Compliant products with AEC-Q200

Specifications

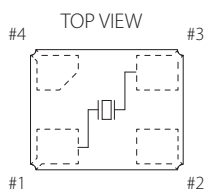
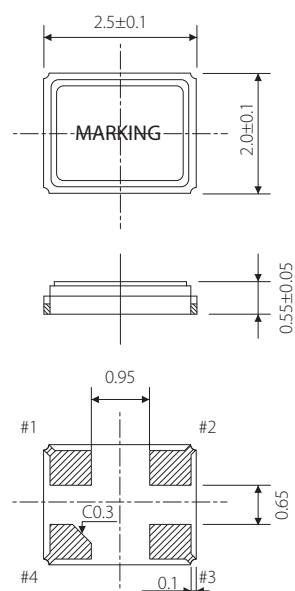


Model	SX-2520	
Nominal frequency range	12.000~66.000 MHz	
Crystal cut	Fundamental [AT-cut]	
Storage temperature range	-40~+90°C; -40~+125°C (For AEC-Q200)	
Operating temperature range	-10~+60°C	-30~+85°C
Frequency temperature characteristics (Ref. to +25°C)	$\pm 10 \times 10^{-6}$	$\pm 15 \times 10^{-6}$
Frequency tolerance (at +25°C)	$\pm 10 \times 10^{-6}$	
Equivalent series resistance	150Ω: 12.000~15.999 MHz 80Ω: 16.000~19.999 MHz 60Ω: 20.000~29.999 MHz 50Ω: 30.000~34.999 MHz 40Ω: 35.000~66.000 MHz	
Load capacitance	8pF, 12pF	
Shunt capacitance	5pF max.	
Level of drive	10 μW (100 μW max.)	

Package quantity: 3,000pcs max./Reel.

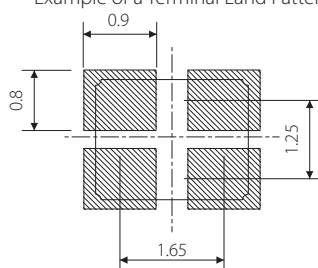
The product is suitable for Car multimedia, Car accessory application.

Outline and Dimensions [unit:mm]



• #1, #3 : Crystal terminal / #2, #4 : Connected to cover
(Please connect it with GND.)

Example of a Terminal Land Pattern



Maximum marking length		Marking
line1	line2	
4	4	Laser
ex.)		40 . 0 S G A



CRYSTAL UNIT

SX-3225

Applications

- OA / AV Machine / Bluetooth / Wireless LAN

Features

- Ultra thin / Dimensions (3.2×2.5×0.8)
- Ceramic SMD Package
- Vacuum Seam Sealed
- Tight Tolerance and Stability
- Reflow Soldering / Emboss Taping
- Compliant products with AEC-Q200

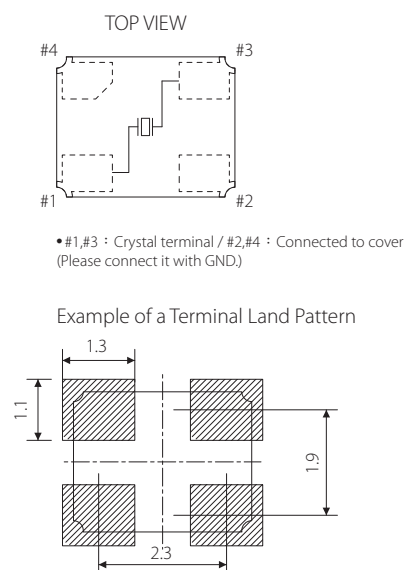
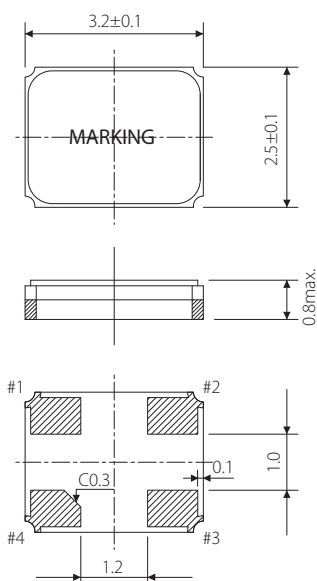
Specifications



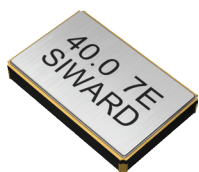
Model	SX-3225	
Nominal frequency range	10.000~54.000 MHz	54.000~125.000 MHz
Crystal cut	Fundamental [AT-cut]	3rd overtone[AT-cut]
Storage temperature range	-40~+90°C; -40~+125°C (For AEC-Q200)	
Operating temperature range	-10~+60°C	-30~+85°C
Frequency temperature characteristics (Ref. to +25°C)	$\pm 10 \times 10^{-6}$	$\pm 15 \times 10^{-6}$
Frequency tolerance (at +25°C)	$\pm 10 \times 10^{-6}$	
Equivalent series resistance	100Ω: 10.000~15.999 MHz 80Ω: 16.000~18.999 MHz 60Ω: 19.000~29.999 MHz 40Ω: 30.000~54.000 MHz	100Ω: 54.000~125 MHz
Load capacitance	series, 10pF, 12pF, 16pF	
Shunt capacitance	5pF max.	
Level of drive	10 μW (100 μW max.)	

Package quantity: 3,000pcs max./Reel.
The product is suitable for Car multimedia, Car accessory application.

Outline and Dimensions [unit:mm]



Maximum marking length		Marking
line1	line2	
4	4	Laser
ex.)		24 . 5 S G A



CRYSTAL UNIT

SX-5032

Applications

- Cellular / PHS / Cordless Telephones / Pagers

Features

- Ultra thin / Dimensions (5.0 × 3.2 × 0.7)
- Ceramic SMD Package
- Vacuum Seam Sealed
- Tight Tolerance and Stability
- Reflow Soldering / Emboss Taping
- Compliant products with AEC-Q200

Specifications

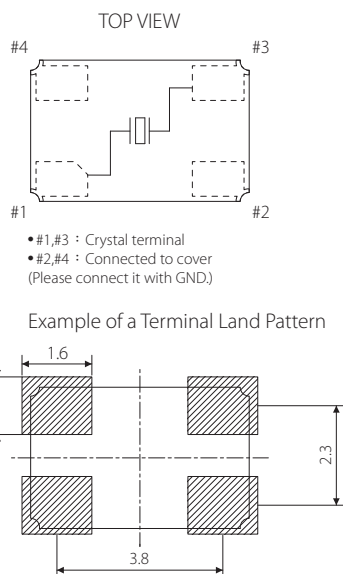
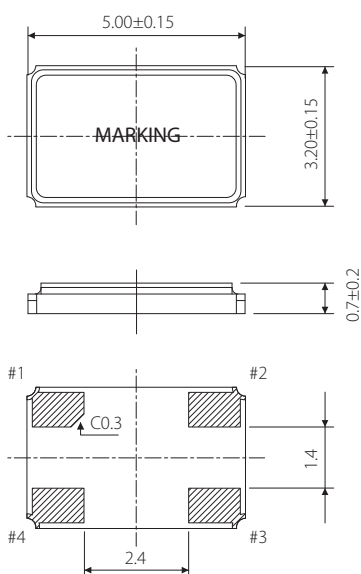


Model	SX-5032			
Nominal frequency range	8.000~54.000 MHz		40.000~100.000 MHz	
Crystal cut	Fundamental [AT-cut]		3rd overtone [AT-cut]	
Storage temperature range	-40~+90℃; -40~+125℃ (For AEC-Q200)			
Operating temperature range	-10~+60℃	-30~+80℃	-10~+60℃	-30~+80℃
Frequency temperature characteristics (Ref. to +25℃)	± 10 × 10 ⁻⁶	± 15 × 10 ⁻⁶	± 10 × 10 ⁻⁶	± 15 × 10 ⁻⁶
Frequency tolerance (at +25℃)	± 10 × 10 ⁻⁶			
Equivalent series resistance	60 Ω: 8.000~10.999 MHz 50 Ω: 11.000~11.999 MHz 40 Ω: 12.000~24.999 MHz 30 Ω: 25.000~54.000 MHz		120 Ω: 40.000~59.999 MHz 80 Ω: 60.000~100.000 MHz	
Load capacitance	series, 10pF, 12pF, 16pF			
Shunt capacitance	5pF max.			
Level of drive	10 μ W (100 μ W max.)			

Package quantity: 1,000pcs max./Reel.

The product is suitable for Car multimedia, Car accessory application.

Outline and Dimensions [unit:mm]



Maximum marking length		Marking
line1	line2	
7	7	Laser
ex.)		16. 0GA SIWARD



CRYSTAL UNIT

SX-6035

Applications

- Cellular / PHS / Cordless Telephones / Pagers

Features

- Dimensions (6.0 × 3.5 × 1.0)
- Ceramic SMD Package
- Vacuum Seam Sealed
- Tight Tolerance and Stability
- Reflow Soldering / Emboss Taping

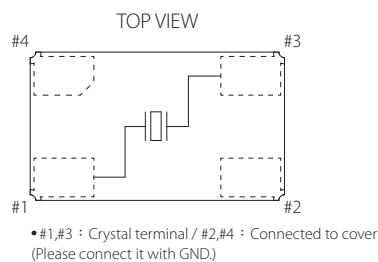
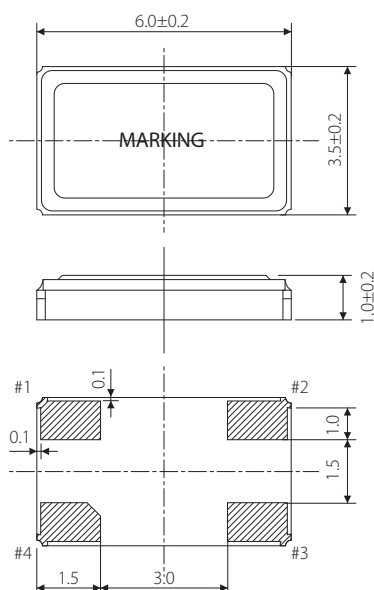
Specifications



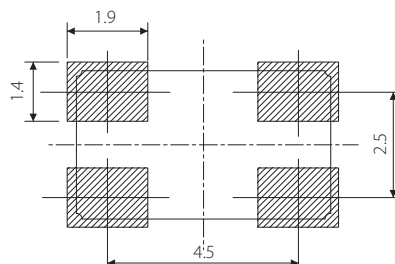
Model	SX-6035	
Nominal frequency range	8.000~50.000 MHz	
Crystal cut	Fundamental [AT-cut]	
Storage temperature range	-40~+90°C	
Operating temperature range	-10~+60°C	-30~+85°C
Frequency temperature characteristics (Ref. to +25°C)	$\pm 10 \times 10^{-6}$	$\pm 15 \times 10^{-6}$
Frequency tolerance (at +25°C)	$\pm 10 \times 10^{-6}$	
Equivalent series resistance	80 Ω: 8.000~8.999 MHz 60 Ω: 9.000~9.999 MHz 50 Ω: 10.000~11.999 MHz 40 Ω: 12.000~24.999 MHz 30 Ω: 25.000~50.000 MHz	
Load capacitance	series, 10pF, 12pF, 16pF	
Shunt capacitance	5pF max.	
Level of drive	10 μW (100 μW max.)	

Package quantity: 1,000pcs max./Reel.

Outline and Dimensions [unit:mm]



Example of a Terminal Land Pattern



Maximum marking length		Marking
line1	line2	
7	7	Laser
ex.)		16. 0GA SIWARD



CRYSTAL UNIT

SX-7050

Applications

- Cellular / PHS / Cordless Telephones / Pagers

Features

- Dimensions (7.0 × 5.0 × 1.1)
- Ceramic SMD Package
- Vacuum Seam Sealed
- Tight Tolerance and Stability
- Reflow Soldering / Emboss Taping

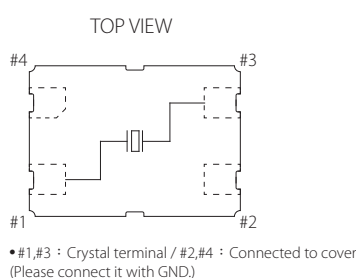
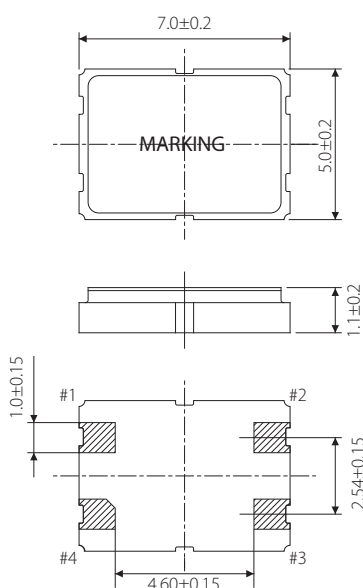
Specifications



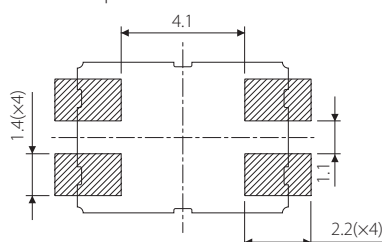
Model	SX-7050			
Nominal frequency range	6.000~40.000 MHz		30.000~100.000 MHz	
Crystal cut	Fundamental [AT-cut]		3rd overtone [AT-cut]	
Storage temperature range	-40~+90℃			
Operating temperature range	-10~+60℃	-30~+80℃	-10~+60℃	-30~+80℃
Frequency temperature characteristics (Ref. to +25℃)	± 10× 10 ⁻⁶	± 20× 10 ⁻⁶	± 10× 10 ⁻⁶	± 20× 10 ⁻⁶
Frequency tolerance (at +25℃)	± 10× 10 ⁻⁶ , ± 20× 10 ⁻⁶ , ± 30× 10 ⁻⁶			
Equivalent series resistance	80 Ω: 6.000~7.999 MHz 60 Ω: 8.000~9.999 MHz 40 Ω: 10.000~14.999 MHz 30 Ω: 15.000~40.000 MHz		80 Ω: 30.000~100.000 MHz	
Load capacitance	series, 16pF, 20pF, 30pF			
Shunt capacitance	5pF max.			
Level of drive	10 μ W (100 μ W max.)			

Package quantity: 1,000pcs max./Reel.

Outline and Dimensions [unit:mm]



Example of a Terminal Land Pattern



Maximum marking length		Marking
line1	line2	
8	8	Laser
ex.)		16. 0GA SIWARD



CRYSTAL UNIT

GX-32254

Applications

- Computer Clocks / DVC / DSC / OA AV Machine

Features

- Dimensions (3.2×2.5×0.8)
- Ceramic SMD Package
- Glass sealed
- Tight Tolerance and Stability
- Reflow Soldering / Emboss Taping
- Compliant products with AEC-Q200

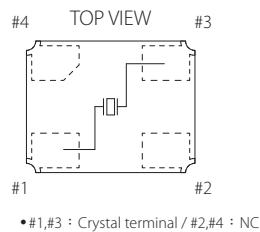
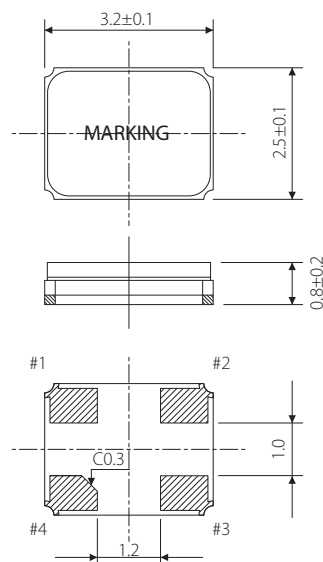
Specifications



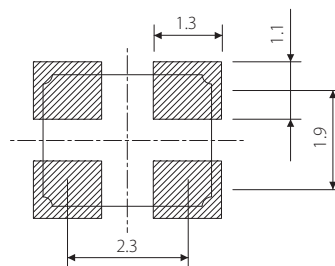
Model	GX-32254	
Nominal frequency range	10.000~54.000 MHz	
Crystal cut	Fundamental [AT-cut]	
Storage temperature range	-40~+90°C ; -40~+125°C (For AEC-Q200)	
Operating temperature range	-10~+60°C	-30~+85°C
Frequency temperature characteristics (Ref. to +25°C)	$\pm 30 \times 10^{-6}$	$\pm 50 \times 10^{-6}$
Frequency tolerance (at +25°C)	$\pm 10 \times 10^{-6}$	
Equivalent series resistance	200 Ω: 10.000~12.999 MHz 150 Ω: 13.000~13.999 MHz 120 Ω: 14.000~15.999 MHz	100 Ω: 16.000~18.999 MHz 80 Ω: 19.000~29.999 MHz 60 Ω: 30.000~54.000 MHz
Load capacitance	series, 10pF, 12pF, 16pF	
Shunt capacitance	5pF max.	
Level of drive	10 μW (100 μW max.)	

Package quantity: 3,000pcs max./Reel.
The product is suitable for Car multimedia, Car accessory application.

Outline and Dimensions [unit:mm]



Example of a Terminal Land Pattern



Maximum marking length		Marking
line1	line2	
4	4	Laser
ex.)		24 . 5 S G A



CRYSTAL UNIT

GX-50322, GX-50324

Applications

- Cordless Telephones / Facsimile / Computer Clocks

Features

- Dimensions (5.0 × 3.2 × 1.1)
- Ceramic SMD Package
- Glass Sealed
- Tight Tolerance and Stability
- Reflow Soldering / Emboss Taping
- Compliant products with AEC-Q200

Specifications



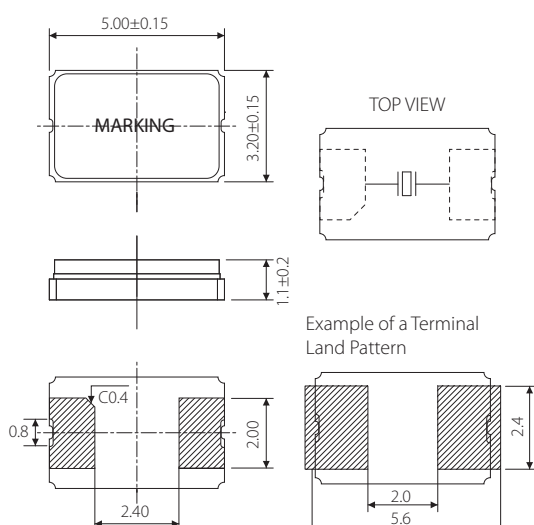
Model	GX-50322, GX-50324	
Nominal frequency range	8.000~54.000 MHz	45.000~60.000 MHz
Crystal cut	Fundamental [AT-cut]	3rd overtone [AT-cut]
Storage temperature range	-40~+90°C; -40~+125°C (For AEC-Q200)	
Operating temperature range	-10~+70°C, -40~+85°C	
Frequency temperature characteristics (Ref. to +25°C)	$\pm 30 \times 10^{-6}$ (-10~+70°C), $\pm 50 \times 10^{-6}$, $\pm 100 \times 10^{-6}$	
Frequency tolerance (at +25°C)	$\pm 30 \times 10^{-6}$, $\pm 50 \times 10^{-6}$	
Equivalent series resistance	300Ω: 8.000~9.999 MHz 60Ω: 10.000~15.999 MHz 50Ω: 16.000~54.000 MHz	90Ω: 45.000~60.000 MHz
Load capacitance	series, 10pF, 12pF, 16pF, 18pF, 20pF	
Shunt capacitance	5pF max.	
Level of drive	10 μW (100 μW max.)	

Package quantity: 1,000pcs max./Reel.

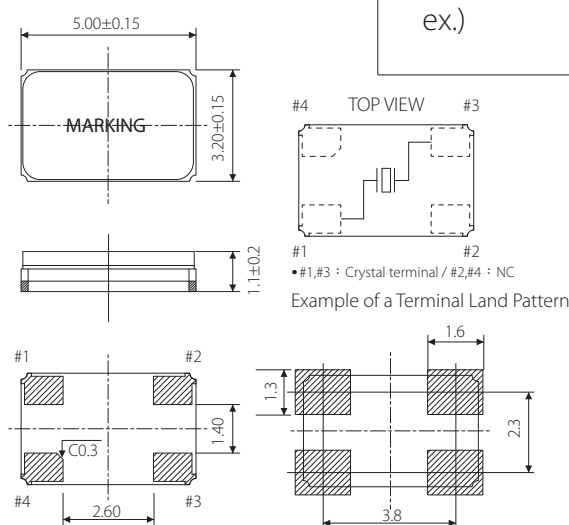
The product is suitable for Car multimedia, Car accessory application.

Outline and Dimensions [unit:mm]

GX-50322



GX-50324



Maximum marking length		Marking
line1	line2	
7	7	Laser
ex.)		16. 0GA SIWARD



CRYSTAL UNIT

GX-60352, GX-60354

Applications

- Cordless Telephones / Facsimile
- Computer Clocks

Features

- Dimensions (6.0×3.5×1.1)
- Ceramic SMD Package
- Glass sealed
- Tight Tolerance and Stability
- Reflow Soldering / Emboss Taping
- Compliant products with AEC-Q200

Specifications



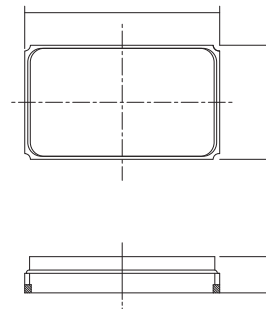
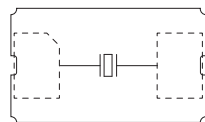
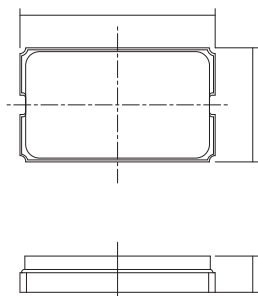
Model	GX-60352, GX-60354	
Nominal frequency range	8.000~50.000 MHz	45.000~60.000 MHz
Crystal cut	Fundamental [AT-cut]	3rd overtone [AT-cut]
Storage temperature range	-40~+90°C; -40~+125°C (For AEC-Q200)	
Operating temperature range	-10~+70°C, -40~+85°C	
Frequency temperature characteristics (Ref. to +25°C)	$\pm 30 \times 10^{-6}$ (-10~+70°C), $\pm 50 \times 10^{-6}$, $\pm 100 \times 10^{-6}$	
Frequency tolerance (at +25°C)	$\pm 30 \times 10^{-6}$, $\pm 50 \times 10^{-6}$	
Equivalent series resistance	80 Ω: 8.000~9.999 MHz 60 Ω: 10.000~15.999 MHz 50 Ω: 16.000~50.000 MHz	90 Ω: 45.000~60.000 MHz
Load capacitance	series, 10pF, 12pF, 16pF, 18pF, 20pF	
Shunt capacitance	5pF max.	
Level of drive	10 μW (100 μW max.)	

Package quantity: 1,000pcs max./Reel.
The product is suitable for Car multimedia, Car accessory application.

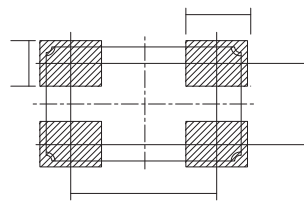
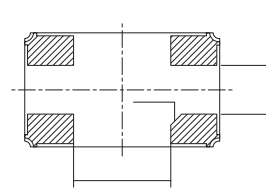
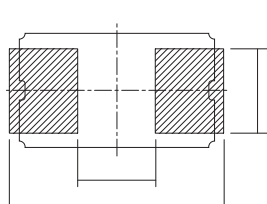
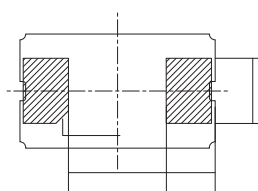
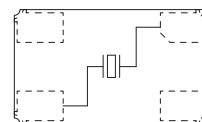
Outline and Dimensions [unit:mm]

GX-60352

GX-60354



Maximum marking length		Marking
line1	line2	
7	7	Laser
ex.)		16. 0GA SIWARD





CRYSTAL UNIT

GX-70502, GX-70504

Applications

- Cordless Telephones / Facsimile / Computer Clocks

Features

- Dimensions (7.0×5.0×1.4)
- Ceramic SMD Package
- Glass Sealed
- Tight Tolerance and Stability
- Reflow Soldering / Emboss Taping
- Compliant products with AEC-Q200

Specifications

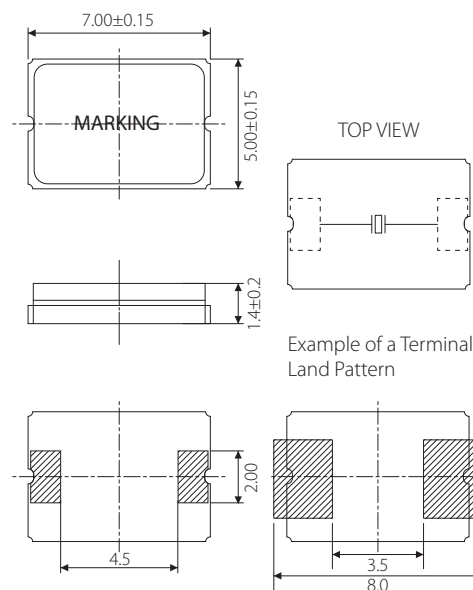


Model	GX-70502, GX-70504	
Nominal frequency range	6.000~54.000 MHz	30.000~70.000 MHz
Crystal cut	Fundamental [AT-cut]	3rd overtone [AT-cut]
Storage temperature range	-40~+90°C; -40~+125°C (For AEC-Q200)	
Operating temperature range	-10~+70°C, -40~+85°C	
Frequency temperature characteristics (Ref. to +25°C)	$\pm 30 \times 10^{-6}$ (-10~+70°C), $\pm 50 \times 10^{-6}$, $\pm 100 \times 10^{-6}$	
Frequency tolerance (at +25°C)	$\pm 30 \times 10^{-6}$, $\pm 50 \times 10^{-6}$	
Equivalent series resistance	100Ω: 6.000~6.999 MHz 80Ω: 7.000~9.999 MHz 60Ω: 10.000~15.999 MHz 50Ω: 16.000~54.000 MHz	80Ω: 30.000~44.999 MHz 70Ω: 50.000~59.999 MHz 60Ω: 60.000~70.000 MHz
Load capacitance	series, 10pF, 12pF, 16pF, 18pF, 20pF	
Shunt capacitance	5pF max.	
Level of drive	10 μW (100 μW max.)	

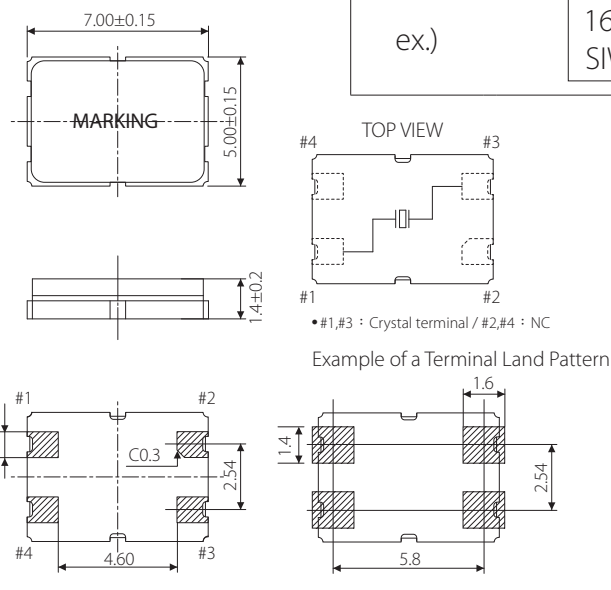
Package quantity: 1,000pcs max./Reel.
The product is suitable for Car multimedia, Car accessory application.

Outline and Dimensions [unit:mm]

GX-70502



GX-70504



Maximum marking length		Marking
line1	line2	
7	7	Laser
ex.)		16. 0GA SIWARD



CRYSTAL UNIT

LP-3.5S, 4.2S

Applications

- Cordless Telephones / Facsimile

Features

- Dimensions (12.3×4.7×H)
- Resistance Sealed
- Metal Package
- Tight Tolerance and Stability
- SMD Lower Height Design

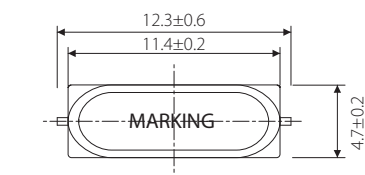
Specifications



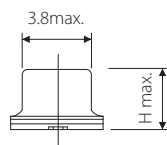
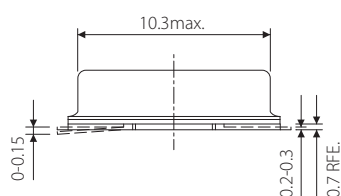
Model	LP-3.5S, LP-4.2S	
Nominal frequency range	3.5000~40.000 MHz	30.000~80.000 MHz
Crystal cut	Fundamental [AT-cut]	3rd overtone [AT-cut]
Storage temperature range	-40~+90°C	
Operating temperature range	-10~+70°C, -40~+85°C	
Frequency temperature characteristics (Ref. to +25°C)	$\pm 50 \times 10^{-6}$	
Frequency tolerance (at +25°C)	$\pm 50 \times 10^{-6}$	
Equivalent series resistance	Please refer to the following ESR Table	
Load capacitance	Series, 10pF, 12pF, 16pF	
Shunt capacitance	5pF max.	
Level of drive	10 μ W (100 μ W max.)	

Package quantity: 1,000pcs max./Reel.

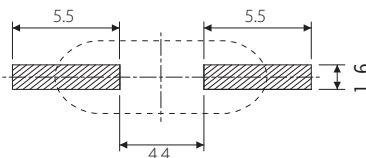
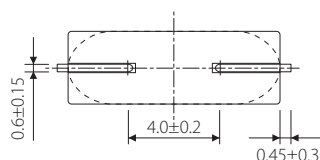
Outline and Dimensions [unit:mm]



Maximum marking length		Marking
line1	line2	
10	9	Laser
9	-	Ink



HOLDER	H
LP-3.5S	3.5
LP-4.2S	4.2



Frequency	ESR(Ω)
Fundamental	
3.500~ 3.999	150
4.000~ 4.999	120
5.000~ 5.999	100
6.000~ 8.999	80
9.000~ 9.999	60
10.000~ 12.999	50
13.000~ 18.999	40
19.000~ 40.000	30
3rd overtone	
30.000~ 44.999	80
45.000~ 59.999	70
60.000~ 80.000	60



CRYSTAL UNIT

LP-2.5, LP-3.5

Applications

- Video Camera / Audio Equipment / Cordless Telephone / HDD

Features

- Dimensions (11.05 × 4.65 × H)
- Industry Standard Package
- Resistance Sealed
- Tight Tolerance and Stability

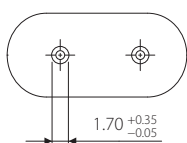
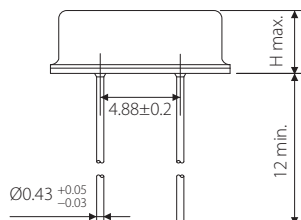
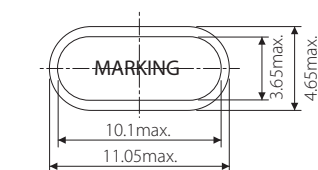
Specifications



Model	LP-2.5, LP-3.5	
Nominal frequency range	3.5000~40.000 MHz	30.000~80.000 MHz
Crystal cut	Fundamental [AT-cut]	3rd overtone [AT-cut]
Storage temperature range	-40~+90°C	
Operating temperature range	-10~+70°C, -40~+85°C	
Frequency temperature characteristics (Ref. to +25°C)	$\pm 50 \times 10^{-6}$	
Frequency tolerance (at +25°C)	$\pm 50 \times 10^{-6}$	
Equivalent series resistance	Please refer to the following ESR Table	
Load capacitance	series, 10pF, 12pF, 16pF	
Shunt capacitance	5pF max.	
Level of drive	10 μ W (100 μ W max.)	

Package quantity: 1,000pcs max./Reel.

Outline and Dimensions [unit:mm]



Maximum marking length		Marking
line1	line2	
10	9	Laser
9	-	Ink

HOLDER	H
LP-2.5	2.5
LP-3.5	3.5

Frequency	ESR(Ω)
Fundamental	
3.500~ 3.999	150
4.000~ 4.999	120
5.000~ 5.999	100
6.000~ 8.999	80
9.000~ 9.999	60
10.000~12.999	50
13.000~18.999	40
19.000~40.000	30
3rd overtone	
30.000~44.999	80
45.000~59.999	70
60.000~80.000	60



VOLTAGE CONTROLLED CRYSTAL OSCILLATOR SCV-3225

Applications

- Digital TV-tuner / Digital Video / DVD / DSC

Features

- Small ceramic package / Dimensions (3.2 × 2.5 × 0.9)
- Wide pulling range
- Low current consumption

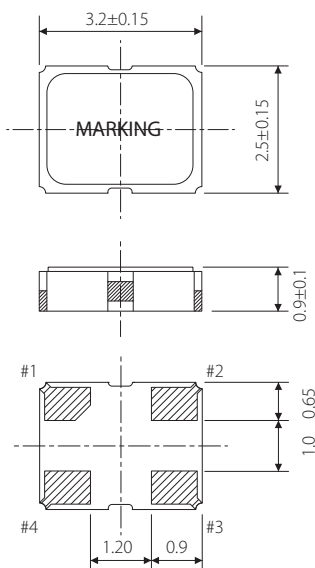
Specifications



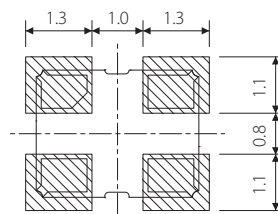
Model		SCV-3225		
Frequency range		1.5~54 MHz		
Nominal frequency		27.000, 54.000MHz		
Storage temperature range		-40~+85°C		
Operating temperature range		-20~+75°C		
Power supply voltage (Vdd)		$\pm 30 \times 10^{-6}$, $\pm 50 \times 10^{-6}$		
Power supply voltage		+3.3V DC $\pm 10\%$	+2.8V DC $\pm 10\%$	+1.8V DC $\pm 10\%$
External control function External control voltage		$\pm 100 \times 10^{-6}$ min. / +1.65V ± 1.65 V DC	$\pm 90 \times 10^{-6}$ min. / +1.4V ± 1.4 V DC	$\pm 80 \times 10^{-6}$ min. / +0.9V ± 0.9 V DC
Current consumption		13mA max.	9mA max.	3mA max.
Output	Load	CMOS (15pF)		
	Level	V _{OL} :10%V _{DD} max. / V _{OH} : 90%V _{DD} min.		
	Rise & Fall time	6ns max. / 0.1V _{DD} - 0.9V _{DD}		
	Duty cycle	40%~60% at 1/2V _{DD}		
Phase noise		-130 dBc / Hz typ. (at 1kHz)		

Package quantity: 3,000pcs max./Reel.

Outline and Dimensions [unit:mm]



Example of a Terminal Land Pattern



Terminal	Connection
#1	Vcont
#2	GND
#3	OUTPUT
#4	Vdd



VOLTAGE CONTROLLED CRYSTAL OSCILLATOR VCX95

Applications

- Set-top Box / MPEG / ADSL / Frequency Transmission

Features

- Dimensions (5.0 × 3.2 × 1.1)
- Ceramic SMD Package
- Seam sealed
- Low current consumption and CMOS Output
- Wide pulling range

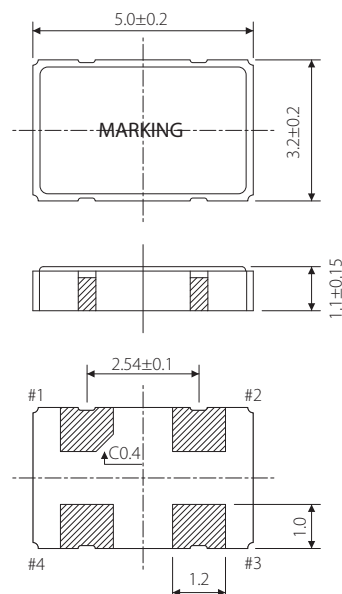
Specifications



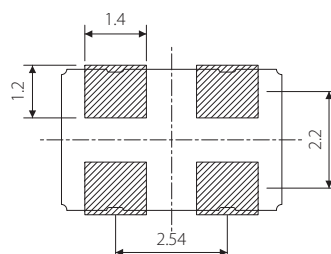
Model		VCX95	
Frequency range		1.500～61.440 MHz	
Nominal frequency		27.000 MHz	
Storage temperature range		-40～+85℃	
Operating temperature range		-20～+70℃	
Frequency stability		±30×10 ⁻⁶ , ±50×10 ⁻⁶	
Power supply voltage (Vdd)		+3.3V DC±10%	+5.0V DC±10%
External control function External control voltage		±100×10 ⁻⁶ min. / +1.65V±1.5V DC (< 30MHz)	±100×10 ⁻⁶ min. / +2.5V±2.0V DC
		±70×10 ⁻⁶ min. / +1.65V±1.5V DC (30MHz≤)	
Current consumption		10 mA max. (F≤20MHz) 15 mA max. (20-30MHz) 20 mA max. (> 30MHz) 25 mA max. (> 40MHz)	15 mA max. (F≤20MHz) 20 mA max. (20-30MHz) 25 mA max. (> 30MHz) 30 mA max. (> 40MHz)
Output	Load	CMOS (15pF)	
	Level	V _{OL} :10%Vdd max. / V _{OH} : 90%Vdd min.	
	Rise & Fall time	6ns max. / 0.1Vdd - 0.9Vdd	
	Duty cycle	45%～55% at 1/2Vdd	
Phase noise		-130 dBc / Hz typ. (at 1kHz)	

Package quantity: 1,000pcs max./Reel.

Outline and Dimensions [unit:mm]



Example of a Terminal Land Pattern



Terminal	Connection
#1	Vcont
#2	GND
#3	OUTPUT
#4	Vdd



VOLTAGE CONTROLLED CRYSTAL OSCILLATOR VCX91, VCX92

Applications

- Set-top Box / MPEG / ADSL / Frequency Transmission

Features

- Dimensions (7.0 × 5.0 × 1.6)
- Ceramic SMD Package / Seam sealed
- Low control voltage and CMOS Output
- Reflow soldering / Emboss taping / Wide pulling range
- Tri-state Option

Specifications

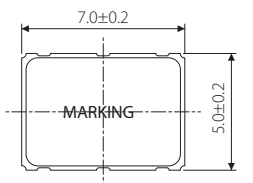


Model		VCX91,VCX92	
Frequency range		1.5~54 MHz	
Nominal frequency		27.000, 35.328MHz	
Storage temperature range		-40~+85°C	
Operating temperature range		-20~+70°C	
Frequency stability		$\pm 30 \times 10^{-6}$, $\pm 50 \times 10^{-6}$	
Power supply voltage (Vdd)		+3.3V DC $\pm 10\%$	+5.0V DC $\pm 10\%$
External control function		$\pm 100 \times 10^{-6}$ min. / +1.65V ± 1.5 V DC (<45MHz)	$\pm 100 \times 10^{-6}$ min. / +2.5V ± 2.0 V DC
External control voltage		$\pm 75 \times 10^{-6}$ min. / +1.65V ± 1.5 V DC (45MHz $\leq$)	
Current consumption		10 mA max. (F $\leq$ 20MHz) 15 mA max. (20-30MHz) 20 mA max. (> 30MHz) 25 mA max. (> 40MHz)	15 mA max. (F $\leq$ 20MHz) 20 mA max. (20-30MHz) 25 mA max. (> 30MHz) 30 mA max. (> 40MHz)
Output	Load	CMOS(15pF)	
	Level	VOL:10%Vdd max. / VOH: 90%Vdd min.	
	Rise & Fall time	6ns max. / 0.1Vdd - 0.9Vdd	
	Duty cycle	45%~55% at 1/2Vdd	
Phase noise		'-130dBc / Hz max. (at 1kHz)	
Tri-state Function / VCX92		#2:N.C. or "H"→Output enable / #2:"L"→Hi-Z (Output disable)	

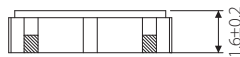
Package quantity: 1,000pcs max./Reel.

Outline and Dimensions [unit:mm]

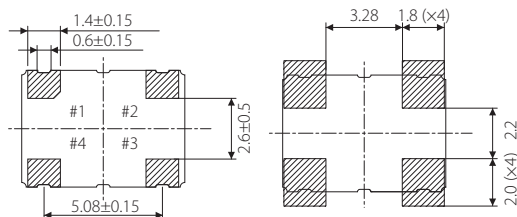
VCX91



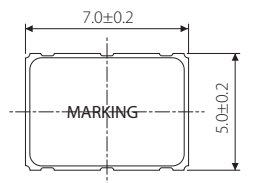
Terminal	Connection
#1	Vcont
#2	GND
#3	OUTPUT
#4	Vdd



Example of a Terminal Land Pattern



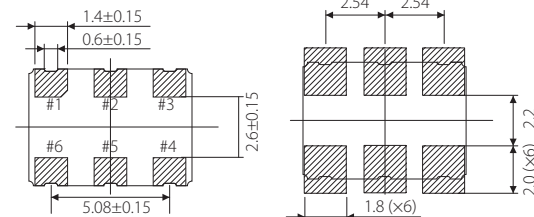
VCX92



Terminal	Connection
#1	Vcont
#2	CE
#3	GND
#4	OUTPUT
#5	N.C.
#6	Vdd



Example of a Terminal Land Pattern





TEMPERATURE-COMPENSATED CRYSTAL OSCILLATOR **TXO92, VTX92**

Applications

- Cellular / PHS / GPS / Communication Equipment

Features

- Ultra-thin / Dimensions (3.2×2.5×0.9)
- Low phase noise / Low power consumption
- Seam sealed
- High stability $\pm 2.5\text{ppm}$ / $-30^{\circ}\text{C} \sim +75^{\circ}\text{C}$

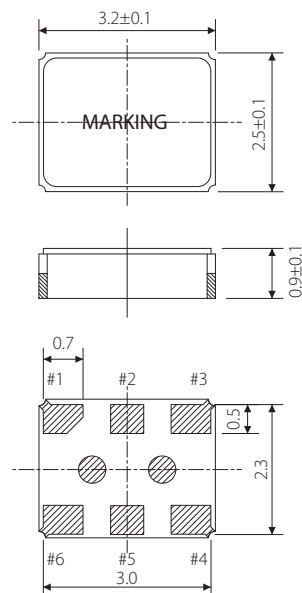
Specifications



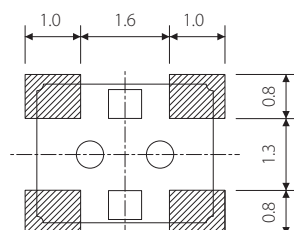
Model		TXO92	VTX92
Frequency range		8.000~45.000 MHz	
Nominal frequency (MHz)		8, 10, 13, 14.4, 16.3676, 19.2, 19.8, 20, 24.5535, 26, 39, 40, 44	
Frequency stability	Tolerance at 25°C	$\pm 2.0 \times 10^{-6}$ (Sixty minutes after reflow)	
	Temperature (Ref.to+25°C)	$\pm 2.5 \times 10^{-6}$ / $-30 \sim +75^{\circ}\text{C}$	
	Supply voltage change	$\pm 0.2 \times 10^{-6}$ / $V_{dd} \pm 5\%$	
	Load change	$\pm 0.2 \times 10^{-6}$ / $Z_L \pm 10\%$	
Aging (at 25°C)		$\pm 1.0 \times 10^{-6}$ / First year	
Storage temperature range		$-40 \sim +85^{\circ}\text{C}$	
Power supply voltage (Vcc)		+2.5, +2.8V, +3.0V, +3.3V DC $\pm 5\%$	
Current consumption		1.5mA max. ($\sim 20\text{MHz}$), 2.0mA max. ($\sim 32\text{MHz}$), 2.5mA max. ($\sim 45\text{MHz}$)	
Output	Load (ZL)	10k Ω //10pF	
	Voltage	0.8V p-p min.	
	Waveform	Clipped Sine Wave (DC-coupled output)	
External controlfunction	Frequency tuning range	—	$\pm 8.0 \times 10^{-6}$ min. (Positive)
	External control voltage	—	+1.5V $\pm 1.0\text{V}$ DC
	Input impedance (Zvin)	—	500k Ω min. (650k Ω typ.)
Phase noise		-135dBc typ. at 1kHz offset	

Package quantity: 3,000pcs max./Reel.

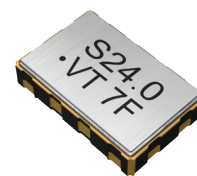
Outline and Dimensions [unit:mm]



Example of a Terminal Land Pattern



Terminal	Connection	
	TCXO	VC-TCXO
#1	GND	Vcont
#2	N.C.	
#3	GND	
#4	OUTPUT	
#5	N.C.	
#6	Vdd	



TEMPERATURE-COMPENSATED CRYSTAL OSCILLATOR TXO83, VTX83

Applications

- Cellular / PHS / GPS / Communication Equipment

Features

- Dimensions (5.0 × 3.2 × 1.05)
- Seam sealed
- Low phase noise / Low power consumption
- High stability $\pm 2.5\text{ppm} / -30^{\circ}\text{C} \sim +75^{\circ}\text{C}$
- Clipped sine output (DC coupled)

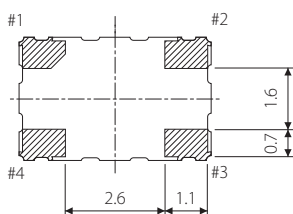
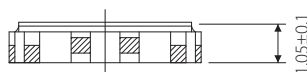
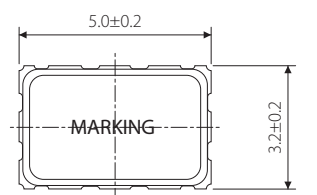
Specifications



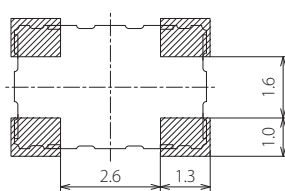
Model		TXO83	VTX83
Frequency range		6.000~45.000 MHz	
Nominal frequency (MHz)		8, 10, 12, 12.8, 13, 14.4, 16.368, 19.2, 19.8, 20, 24.5535, 26, 40	
Frequency stability	Tolerance at 25°C	$\pm 2.0 \times 10^{-6}$ (Sixty minutes after reflow)	
	Temperature (Ref.to+25°C)	$\pm 2.5 \times 10^{-6} / -30 \sim +75^{\circ}\text{C}$	
	Supply voltage change	$\pm 0.2 \times 10^{-6} / V_{\text{dd}} \pm 5\%$	
	Load change	$\pm 0.2 \times 10^{-6} / Z_L \pm 10\%$	
Aging (at 25°C)		$\pm 1.0 \times 10^{-6} / \text{First year}$	
Storage temperature range		$-40 \sim +85^{\circ}\text{C}$	
Power supply voltage (Vcc)		+2.8V, +3.0V, +3.3V, +5.0V DC $\pm 5\%$	
Current consumption		1.5mA max. ($\sim 20\text{MHz}$), 2.0mA max. ($\sim 32\text{MHz}$), 2.5mA max. ($\sim 45\text{MHz}$)	
Output	Load (ZL)	10k Ω // 10pF	
	Voltage	0.8V p-p min.	
	Waveform	Clipped Sine Wave (DC-coupled output)	
External controlfunction	Frequency tuning range	—	$\pm 8.0 \times 10^{-6}$ min. (Positive)
	External control voltage	—	+1.5V $\pm 1.0\text{V}$ DC
	Input impedance (Zvin)	—	500k Ω min. (650k Ω typ.)
Phase noise		-135dBc typ. at 1kHz offset	

Package quantity: 1,000pcs max./Reel.

Outline and Dimensions [unit:mm]



Example of a Terminal Land Pattern



Terminal	Connection	
	TCXO	VC-TCXO
#1	GND	Vcont
#2	GND	
#3	OUTPUT	
#4	Vdd	



HCMOS TCXO STO-2520B

Applications

- Cellular and Network Equipment

Features

- HCMOS output with Tri-state function
- Ceramic package, Dimensions (2.5 × 2.0 × 0.9)
- High stability $\pm 2.5\text{ppm} / -30^\circ\text{C} \sim +75^\circ\text{C}$
- Low current consumption
- Low phase noise, Low jitter

Specifications



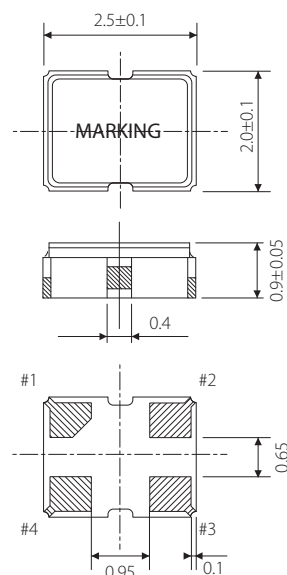
Model		STO-2520B
Frequency range		0.675~55.000 MHz
Nominal frequency (MHz)		5, 10, 12, 16, 20, 24, 32, 40, 44
Storage temperature range		-40~+125 °C
Operating temperature range		-30~+75 °C
Frequency stability	Tolerance at 25°C	$\pm 2.0 \times 10^{-6}$ (Sixty minutes after reflow)
	Temperature (+25°C basis)	$\pm 2.5 \times 10^{-6} / -30 \sim +75^\circ\text{C}$
	Supply voltage change	$\pm 0.2 \times 10^{-6} / V_{\text{dd}} \pm 5\%$
	Load change	$\pm 0.2 \times 10^{-6} / Z_L \pm 10\%$
Aging		$\pm 1.0 \times 10^{-6} / \text{year at } +25^\circ\text{C}$
Power supply voltage (Vdd)		+2.5V, +2.8V, +3.3V DC $\pm 10\%$
Current consumption		*note / 10uA max (Standby)
Output level		C-MOS
Load		15pF
Output voltage level		$V_{\text{OL}}: 10\%V_{\text{dd}} \text{ max.} / V_{\text{OH}}: 90\%V_{\text{dd}} \text{ min.}$
Rise & Fall time		5ns max. / 10%Vdd - 90%Vdd
Duty cycle		45% ~ 55% at 1/2Vdd
Phase Noise / Jitter		-145dBc / Hz Typ. at 10kHz offset / 1 σ 3ps typ.
Tri-state Function		#1: Floating. or "H" → Output enable / #1: "L" → Output disable (Hi-Z)

*Reference / Idd Spec (mA max.)

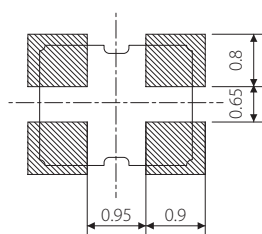
Frequency	4~10MHz	~20MHz	~30MHz	~40MHz	~54MHz
2.5V	3.1	3.7	4.2	4.6	5.5
2.8V	3.4	4.1	4.7	5.2	6.0
3.3V	4.0	4.8	5.5	6.0	7.0

Package quantity: 1,000pcs max./Reel.

Outline and Dimensions [unit:mm]



Example of a Terminal Land Pattern



Terminal	Connection
#1	Tri-state
#2	GND
#3	OUTPUT
#4	Vdd

Tri-state Function

Tri-state Pin	Output
High or Floating	Active
Low	Hi-impedance



HCMOS TCXO STO-3225B

Applications

- Cellular and Network Equipment

Features

- HCMOS output with Tri-state function
- Ceramic package, Dimensions (3.2×2.5×1.0)
- High stability $\pm 2.5\text{ppm} / -30^{\circ}\text{C} \sim +75^{\circ}\text{C}$
- Low current consumption
- Low phase noise, Low jitter

Specifications



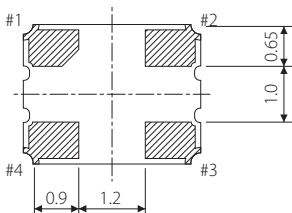
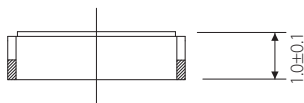
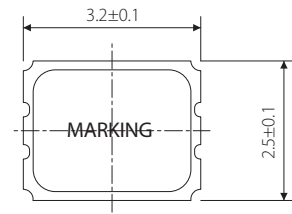
Model		STO-3225B
Frequency range		0.675~55.000 MHz
Nominal frequency (MHz)		5, 10, 12, 16, 20, 24, 32, 40, 44
Storage temperature range		-40~+125 °C
Operating temperature range		-30~+75 °C
Frequency stability	Tolerance at 25°C	$\pm 2.0 \times 10^{-6}$ (Sixty minutes after reflow)
	Temperature (+25°C basis)	$\pm 2.5 \times 10^{-6} / -30 \sim +75^{\circ}\text{C}$
	Supply voltage change	$\pm 0.2 \times 10^{-6} / V_{\text{DD}} \pm 5\%$
	Load change	$\pm 0.2 \times 10^{-6} / Z_L \pm 10\%$
Aging		$\pm 1.0 \times 10^{-6} / \text{year at } +25^{\circ}\text{C}$
Power supply voltage (Vdd)		+2.5V, +2.8V, +3.3V DC $\pm 10\%$
Current consumption		*note / 10uA max (Standby)
Output level		C-MOS
Load		15pF
Output voltage level		$V_{\text{OL}}: 10\%V_{\text{DD}} \text{ max.} / V_{\text{OH}}: 90\%V_{\text{DD}} \text{ min.}$
Rise & Fall time		5ns max. / 10%Vdd - 90%Vdd
Duty cycle		45% ~ 55% at 1/2Vdd
Phase Noise / Jitter		-145dBc/Hz Typ. at 10kHz offset / 1σ 3ps typ.
Tri-state Function		#1: Floating, or "H" → Output enable / #1: "L" → Output disable (Hi-Z)

*Reference / Idd Spec [mA max.]

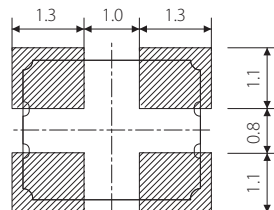
Frequency	4~10MHz	~20MHz	~30MHz	~40MHz	~54MHz
2.5V	3.1	3.7	4.2	4.6	5.5
2.8V	3.4	4.1	4.7	5.2	6.0
3.3V	4.0	4.8	5.5	6.0	7.0

Package quantity: 1,000pcs max./Reel.

Outline and Dimensions [unit:mm]



Example of a Terminal Land Pattern



Terminal	Connection
#1	Tri-state
#2	GND
#3	OUTPUT
#4	Vdd

Tri-state Function

Tri-state Pin	Output
High or Floating	Active
Low	Hi-impedance



HCMOS TCXO STO-5032B

Applications

- Cellular and Network Equipment

Features

- HCMOS output with Tri-state function
- Ceramic package, Dimensions (5.0×3.2×1.05)
- High stability $\pm 2.5\text{ppm} / -30^{\circ}\text{C} \sim +75^{\circ}\text{C}$
- Low current consumption
- Low phase noise, Low jitter

Specifications



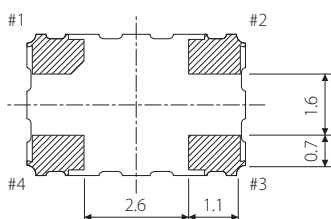
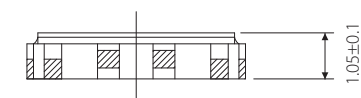
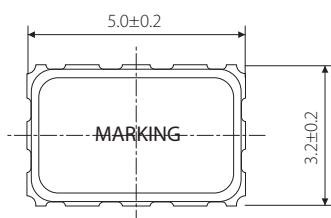
Model		STO-5032B
Frequency range		0.675~55.000 MHz
Nominal frequency (MHz)		5, 10, 12, 16, 20, 24, 32, 40, 44
Storage temperature range		-40~+125 °C
Operating temperature range		-30~+75 °C
Frequency stability	Tolerance at 25°C	$\pm 2.0 \times 10^{-6}$ (Sixty minutes after reflow)
	Temperature (+25°C basis)	$\pm 2.5 \times 10^{-6} / -30 \sim +75^{\circ}\text{C}$
	Supply voltage change	$\pm 0.2 \times 10^{-6} / \text{Vdd} \pm 5\%$
	Load change	$\pm 0.2 \times 10^{-6} / \text{ZL} \pm 10\%$
Aging		$\pm 1.0 \times 10^{-6} / \text{year at } +25^{\circ}\text{C}$
Power supply voltage (Vdd)		+2.5V, +2.8V, +3.3V DC $\pm 5\%$
Current consumption		*note / 10uA max (Standby)
Output level		C-MOS
Load		15pF
Output voltage level		V _{OL} : 10%Vdd max. / V _{OH} : 90%Vdd min.
Rise & Fall time		5ns max. / 10%Vdd - 90%Vdd
Duty cycle		45%~55% at 1/2Vdd
Phase Noise / Jitter		-145dBc/Hz Typ. at 10kHz offset / 1 σ 3ps typ.
Tri-state Function		#1: Floating. or "H" → Output enable / #1: "L" → Output disable (Hi-Z)

*Reference / Idd Spec (mA max.)

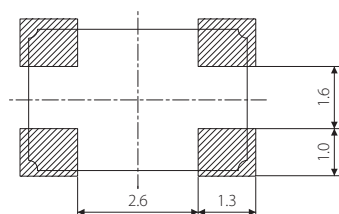
Frequency	4~10MHz	~20MHz	~30MHz	~40MHz	~54MHz
2.5V	3.1	3.7	4.2	4.6	5.5
2.8V	3.4	4.1	4.7	5.2	6.0
3.3V	4.0	4.8	5.5	6.0	7.0

Package quantity: 1,000pcs max./Reel.

Outline and Dimensions [unit:mm]



Example of a Terminal Land Pattern



Terminal	Connection
#1	Tri-state
#2	GND
#3	OUTPUT
#4	Vdd

Tri-state Function

Tri-state Pin	Output
High or Floating	Active
Low	Hi-impedance



HCMOS TCXO STO-7050B

Applications

- Cellular and Network equipment

Features

- HCMOS output with Tri-state function
- Ceramic package, Dimensions(7.0×5.0×1.40)
- High stability $\pm 2.5\text{ppm} / -30^{\circ}\text{C} \sim +75^{\circ}\text{C}$
- Low current consumption
- Low phase noise, Low jitter

Specifications



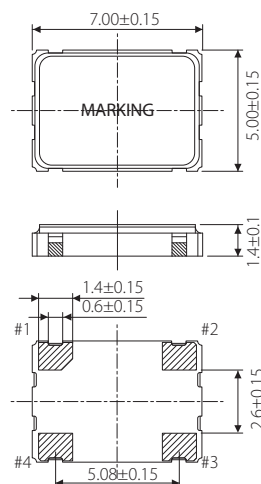
Model		STO-7050B
Frequency range		0.675~55.000 MHz
Nominal frequency (MHz)		5, 10, 12, 16, 20, 24, 32, 40, 44
Storage temperature range		-40~+125 °C
Operating temperature range		-30~+75 °C
Frequency stability	Tolerance at 25°C	$\pm 2.0 \times 10^{-6}$ (Sixty minutes after reflow)
	Temperature (+25°C basis)	$\pm 2.5 \times 10^{-6} / -30 \sim +75^{\circ}\text{C}$
	Supply voltage change	$\pm 0.2 \times 10^{-6} / \text{Vdd} \pm 5\%$
	Load change	$\pm 0.2 \times 10^{-6} / \text{ZL} \pm 10\%$
Aging		$\pm 1.0 \times 10^{-6} / \text{year at } +25^{\circ}\text{C}$
Power supply voltage (Vdd)		+2.5V, +2.8V, +3.3V DC $\pm 5\%$
Current consumption		*note / 10uA max (Standby)
Output level		C-MOS
Load		15pF
Output voltage level		V _{OL} : 10%Vdd max. / V _{OH} : 90%Vdd min.
Rise & Fall time		5ns max. / 10%Vdd - 90%Vdd
Duty cycle		45%~55% at 1/2Vdd
Phase Noise / Jitter		-145dBc / Hz Typ. at 10kHz offset / 1 σ 3ps typ.
Tri-state Function		#1: Floating. or "H"→Output enable / #1: "L"→Output disable (Hi-Z)

*Reference / Idd Spec (mA max.)

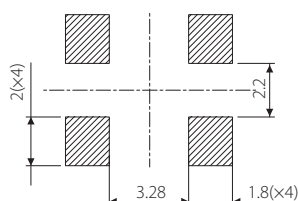
Frequency	4~10MHz	~20MHz	~30MHz	~40MHz	~54MHz
2.5V	3.1	3.7	4.2	4.6	5.5
2.8V	3.4	4.1	4.7	5.2	6.0
3.3V	4.0	4.8	5.5	6.0	7.0

Package quantity: 1,000pcs max./Reel.

Outline and Dimensions [unit:mm]



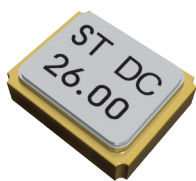
Example of a Terminal Land Pattern



Terminal	Connection
#1	Tri-state
#2	GND
#3	OUTPUT
#4	Vdd

Tri-state Function

Tri-state Pin	Output
High or Floating	Active
Low	Hi-impedance



TCXO GPS STO-2016A

Applications

- GPS

Features

- Small ceramic package / Dimensions (2.0×1.6×0.8)
- High stability $\pm 0.5\text{ppm} / -30^{\circ}\text{C} \sim +85^{\circ}\text{C}$
- Low current consumption
- Low phase noise
- Clipped sine output (DC coupled)

Specifications



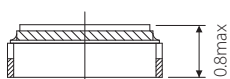
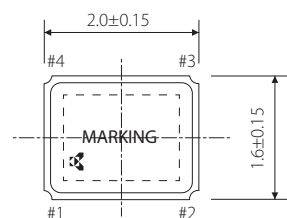
Model		STO-2016A
Nominal frequency (MHz)		16.368, 16.369, 19.2, 26, 27.456, 33.6 MHz
Frequency stability	Tolerance at 25°C	$\pm 2.0 \times 10^{-6}$ (Sixty minutes after reflow)
	Temperature (+25°C basis)	$\pm 0.5 \times 10^{-6} / -30 \sim +85^{\circ}\text{C}$
	Supply voltage change	$\pm 0.2 \times 10^{-6} / V_{\text{dd}} \pm 5\%$
	Load change	$\pm 0.2 \times 10^{-6} / Z_L \pm 10\%$
Aging		$\pm 1.0 \times 10^{-6} / \text{First year}$
Storage temperature range		$-40 \sim +85^{\circ}\text{C}$
Power supply voltage (Vcc)		+1.8V, +2.8V, +3.0V, +3.3V DC $\pm 5\%$
Current consumption		2.0 mA max.
Output	Load (ZL)	10k Ω // 10pF
	Voltage	0.8V p-p min.
	Waveform	Clipped Sine Wave (DC-coupled output)

*Reference / Idd Spec

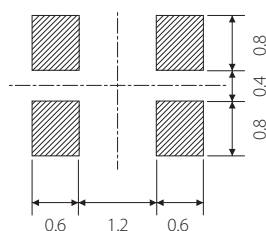
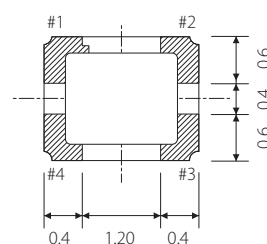
Frequency stability[MHz]	Offset	at 10Hz	at 100Hz	at 1kHz	at 10kHz	Unit
16.368, 16.369		-90(typ.)	-115(typ.)	-135(typ.)	-150(typ.)	dBc/Hz
26.000		-70(typ.)	-105(typ.)	-130(typ.)	-145(typ.)	dBc/Hz

Package quantity: 1,000pcs max./Reel.

Outline and Dimensions [unit:mm]

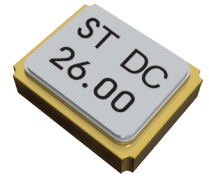


Note: A capacitor of value 0.01 μF between Vdd and GND is recommended.



Terminal	Connection
#1	GND
#2	GND
#3	OUTPUT
#4	Vdd

TCXO GPS STO-2520A



Applications

- GPS

Features

- Small ceramic package / Dimensions (2.5 × 2.0 × 0.8)
- High stability $\pm 0.5\text{ppm} / -30^{\circ}\text{C} \sim +85^{\circ}\text{C}$
- Low current consumption
- Low phase noise
- Clipped sine output (DC coupled)

Specifications



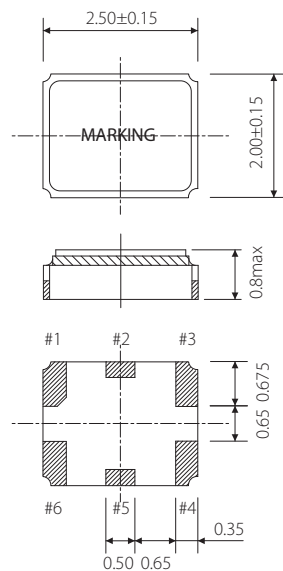
Model		STO-2520A
Nominal frequency (MHz)		16,368, 16,369, 19.2, 23.104, 26, 27.456, 33.6, 38.4 MHz
Frequency stability	Tolerance at 25°C	$\pm 2.0 \times 10^{-6}$ (Sixty minutes after reflow)
	Temperature (+25°C basis)	$\pm 0.5 \times 10^{-6} / -30 \sim +85^{\circ}\text{C}$
	Supply voltage change	$\pm 0.2 \times 10^{-6} / V_{\text{DD}} \pm 5\%$
	Load change	$\pm 0.2 \times 10^{-6} / Z_L \pm 10\%$
Aging		$\pm 1.0 \times 10^{-6} / \text{First year}$
Storage temperature range		$-40 \sim +85^{\circ}\text{C}$
Power supply voltage (Vcc)		+1.8V, +2.8V, +3.0V, +3.3V DC $\pm 5\%$
Current consumption		2.0 mA max.
Output	Load (ZL)	10k Ω //10pF
	Voltage	0.8V p-p min.
	Waveform	Clipped Sine Wave (DC-coupled output)

*Reference / Idd Spec

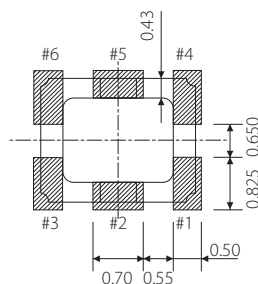
Frequency stability[MHz]	Offset	at 10Hz	at 100Hz	at 1kHz	at 10kHz	Unit
16.368, 16.369		-90(typ.)	-115(typ.)	-135(typ.)	-150(typ.)	dBc/Hz
26.000		-70(typ.)	-105(typ.)	-130(typ.)	-145(typ.)	dBc/Hz

Package quantity: 1,000pcs max./Reel.

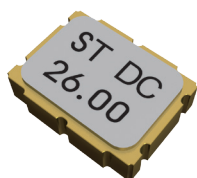
Outline and Dimensions [unit:mm]



Example of a Terminal Land Pattern



Terminal	Connection
#1	GND
#2	N.C.
#3	GND
#4	OUTPUT
#5	N.C.
#6	Vdd



TCXO GPS STO-3225A

Applications

- GPS

Features

- Small ceramic package / Dimensions (3.2×2.5×1.0)
- High stability $\pm 0.5\text{ppm}$ / $-30^{\circ}\text{C} \sim +85^{\circ}\text{C}$
- Low current consumption
- Low phase noise
- Clipped sine output (DC coupled)

Specifications



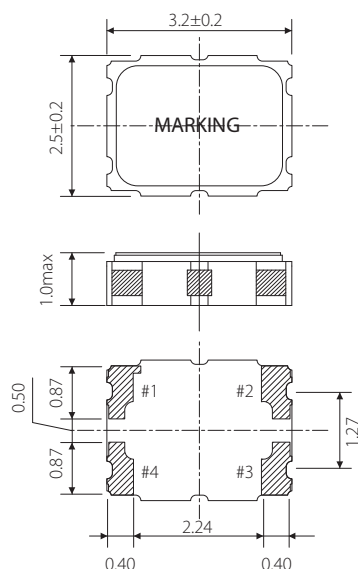
Model		STO-3225A
Nominal frequency (MHz)		16.368, 16.369, 19.2, 24.5535, 26, 27, 27.456
Frequency stability	Tolerance at 25°C	$\pm 2.0 \times 10^{-6}$ (Sixty minutes after reflow)
	Temperature (+25°C basis)	$\pm 0.5 \times 10^{-6}$ / $-30 \sim +85^{\circ}\text{C}$
	Supply voltage change	$\pm 0.2 \times 10^{-6}$ / $V_{dd} \pm 5\%$
	Load change	$\pm 0.2 \times 10^{-6}$ / $Z_L \pm 10\%$
Aging		$\pm 1.0 \times 10^{-6}$ / First year
Storage temperature range		$-40 \sim +85^{\circ}\text{C}$
Power supply voltage (Vcc)		+1.8V, +2.8V, +3.0V, +3.3V DC $\pm 5\%$
Current consumption		2.0 mA max.
Output	Load (ZL)	10k Ω // 10pF
	Voltage	0.8V p-p min.
	Waveform	Clipped Sine Wave (DC-coupled output)

*Reference / Idd Spec

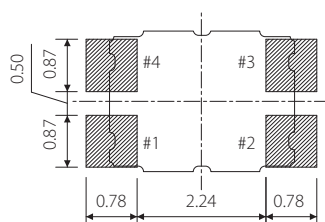
Frequency stability [MHz]	Offset	at 10Hz	at 100Hz	at 1kHz	at 10kHz	Unit
16.368, 19.2		-85(typ.)	-115(typ.)	-135(typ.)	-148(typ.)	dBc/Hz
26.000		-85(typ.)	-110(typ.)	-135(typ.)	-145(typ.)	dBc/Hz

Package quantity: 1,000pcs max./Reel.

Outline and Dimensions [unit:mm]



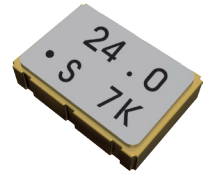
Example of a Terminal Land Pattern



Terminal	Connection
#1	Tri-state
#2	GND
#3	OUTPUT
#4	Vdd

CRYSTAL OSCILLATOR

SCO-2016 *New Product*



Applications

- Mobile phone / Wireless-LAN / PC-Card / DVD / DVC / DSC etc..

Features

- Small ceramic package / Dimensions (2.05 × 1.65 × 0.85)
- Low current consumption
- CMOS output / with Tri-state function

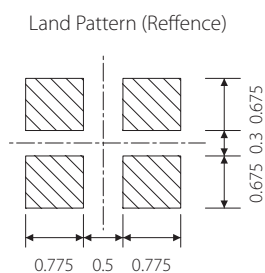
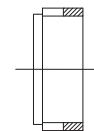
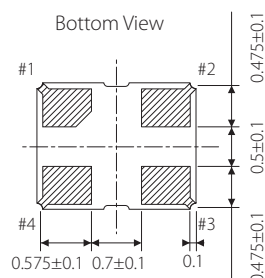
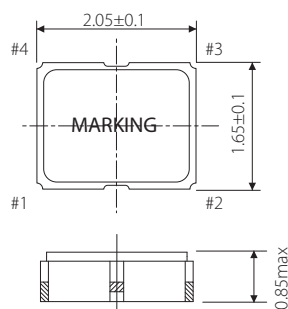
Specifications



Model	SCO-2016		
Frequency range	1.500~54.000 MHz		
Storage temperature range	-40~+85°C		
Operating temperature range	-10~+70°C		
Frequency stability	$\pm 25 \times 10^{-6}$, $\pm 30 \times 10^{-6}$, $\pm 50 \times 10^{-6}$, $\pm 100 \times 10^{-6}$		
Power supply voltage (Vdd)	+3.3V DC $\pm 5\%$	+2.5V DC $\pm 5\%$	+1.8V DC $\pm 5\%$
Current consumption	3.5 mA max: ~24MHz 5.0 mA max: ~40MHz 8.0 mA max: ~54MHz	3.0 mA max: ~24MHz 4.5 mA max: ~40MHz 5.0 mA max: ~54MHz	2.5 mA max: ~24MHz 3.5 mA max: ~40MHz 4.5 mA max: ~54MHz
Output level	C-MOS		
Load	15pF max.		
Output voltage level	V _{OL} :10%Vdd max. / V _{OH} :90%Vdd min.		
Rise & Fall time	4.5ns max. / 0.1Vdd - 0.9Vdd	5.0ns max. / 0.1Vdd - 0.9Vdd	6.5ns max. / 0.1Vdd - 0.9Vdd
Duty cycle	45% ~ 55% at 1/2Vdd		
Tri-state Function	#1: Floating or "H"→Output enable / #1: "L"→Output disable(Hi-Z)		

Package quantity: 3,000pcs max./Reel.

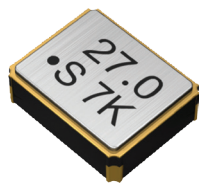
Outline and Dimensions [unit:mm]



Terminal	Connection
#1	Tri-state or N.C
#2	GND
#3	OUTPUT
#4	Vdd

Tri-state Function

Tri-state Pin	Output
High or Floating	Active
Low	Hi-impedance



CRYSTAL OSCILLATOR

SCO-2520

Applications

- Cellular / PC Mainboard / VGA Card / DVD / Scanner / Game Console / DSC

Features

- Ultra thin / Dimensions (2.5×2.0×0.8)
- Wide range operating temperature (-40~85°C)
- Low power consumption

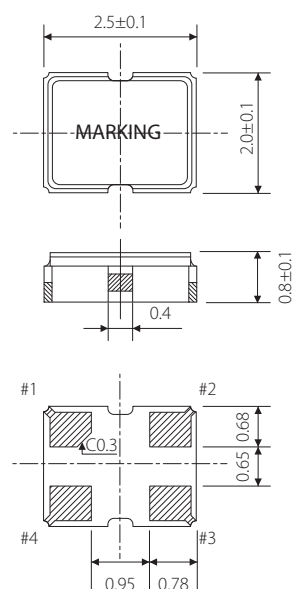
Specifications



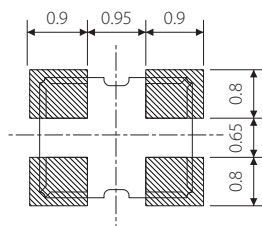
Model	SCO-2520			
Frequency range	0.750~50.000 MHz			
Storage temperature range	-55~+100°C			
Operating temperature range	-20~+70°C, -40~+85°C			
Frequency stability	$\pm 30 \times 10^{-6}$ (-20~70°C), $\pm 50 \times 10^{-6}$, $\pm 100 \times 10^{-6}$			
Power supply voltage (Vdd)	+3.3V DC $\pm 5\%$	+3.0V DC $\pm 5\%$	+2.5V DC $\pm 5\%$	+1.8V DC $\pm 5\%$
Current consumption	6 mA max: ~19MHz 7 mA max: ~39.9MHz 8 mA max: ~50MHz	5.5 mA max: 19.9MHz 6.5 mA max: ~39.9MHz 7.5 mA max: ~50MHz	4.5 mA max: ~19.9MHz 5.5 mA max: ~39.9MHz 6.5 mA max: ~50MHz	2.5 mA max: ~29.9MHz 3.0 mA max: ~39.9MHz 3.5 mA max: ~50MHz
Output level	C-MOS			
Load	15pF max.			
Output voltage level	VOL: 10%Vdd max. / VOH: 90%Vdd min.			
Rise & Fall time	10ns max. / 0.1Vdd - 0.9Vdd			
Duty cycle	45%~55% at 1/2Vdd	40%~60% at 1/2Vdd	45%~55% at 1/2Vdd	
Tri-state Function	#1: Floating or "H"→Output enable / #1: "L"→Output disable(Hi-Z)			

Package quantity: 3,000pcs max./Reel.

Outline and Dimensions [unit:mm]



Example of a Terminal Land Pattern



Terminal	Connection
#1	Tri-state
#2	GND
#3	OUTPUT
#4	Vdd

Tri-state Function

Tri-state Pin	Output
High or Floating	Active
Low	Hi-impedance

PRECISION CRYSTAL OSCILLATOR

SHO-2520



Applications

- Wireless-LAN / PLC modem / WiMax / Mobile Communications etc..

Features

- Ceramic package / Dimensions (2.5 × 2.0 × 0.9)
- High stability $\pm 10\text{ppm}/-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$
- Low current consumption
- 3.1mA typ. (40MHz Vdd=+2.5V)
- Low phase noise, Low jitter
- CMOS output with Tri-state function

Specifications

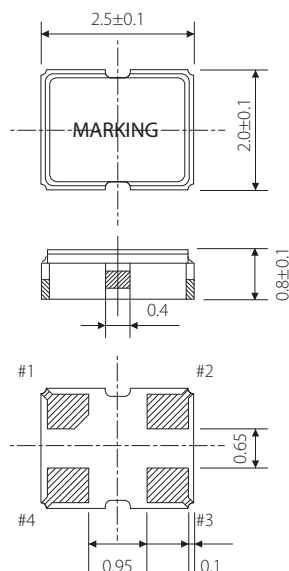


Model	SHO-2520
Frequency range	0.675~55.000 MHz
Nominal Frequency (MHz)	5, 10, 12, 16, 20, 24, 32, 40, 44
Storage temperature range	-40~+125°C
Operating temperature range	-40~+85°C
Frequency stability	$\pm 10 \times 10^{-6}$, $\pm 15 \times 10^{-6}$ ※1
Power supply voltage (Vdd)	+2.5V, +3.0V, +3.3V DC $\pm 10\%$
Current consumption	7mA max. / 10uA max (Standby)
Output level	C-MOS
Load	15pF max.
Output voltage level	V _{OL} : 10%Vdd max. / V _{OH} : 90%Vdd min.
Rise & Fall time	5ns max. / 10%Vdd - 90%Vdd
Duty cycle	45%~55% at 1/2Vdd
Phase Noise / Jitter	-145dBc / Hz Typ. at 10kHz offset / 1 σ 3ps typ.
Tri-state Function	#1: Floating or "H"→Output enable / #1: "L"→Output disable (Hi-Z)

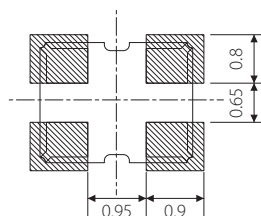
Package quantity: 3,000pcs max./Reel.

※1 Frequency stability includes initial tolerance, temperature characteristics, supply voltage & load stability, reflow freq. shift, aging (1year @25°C).

Outline and Dimensions [unit:mm]



Example of a Terminal Land Pattern



Terminal	Connection
#1	Tri-state
#2	GND
#3	OUTPUT
#4	Vdd

Tri-state Function

Tri-state Pin	Output
High or Floating	Active
Low	Hi-impedance



PRECISION CRYSTAL OSCILLATOR

SHO-3225

Applications

- Wireless-LAN / PLC modem / WiMax / Mobile Communications etc..

Features

- Ceramic package / Dimensions (3.2 × 2.5 × 0.9)
- High stability $\pm 5\text{ppm}$ / $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$
- Low current consumption
- 3.1mA typ. (40MHz Vdd=+2.5V)
- Low phase noise, Low jitter
- CMOS output with Tri-state function

Specifications

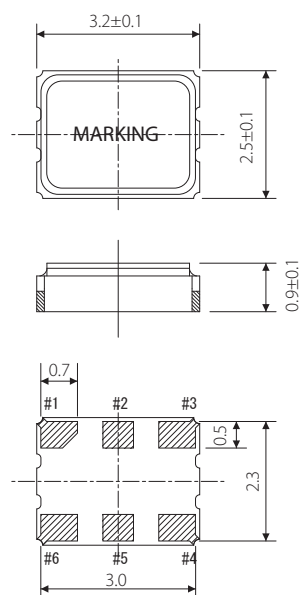


Model	SHO-3225
Frequency range	2.500~60.000 MHz
Nominal Frequency (MHz)	5, 10, 12, 16, 20, 24, 32, 40, 44
Storage temperature range	$-30^{\circ}\text{C} \sim +75^{\circ}\text{C}$, $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$
Operating temperature range	$-30^{\circ}\text{C} \sim +75^{\circ}\text{C}$, $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$
Frequency stability	$\pm 10 \times 10^{-6}$, $\pm 15 \times 10^{-6}$ ※1
Power supply voltage (Vdd)	+1.8, +2.5, +3.0V, +3.3V DC $\pm 10\%$
Current consumption	7mA max. / 10uA max (Standby)
Output level	C-MOS
Load	15pF max.
Output voltage level	V _{OL} : 10%Vdd max. / V _{OH} : 90%Vdd min.
Rise & Fall time	5ns max. / 10%Vdd - 90%Vdd
Duty cycle	45% ~ 55% at 1/2Vdd
Phase Noise / Jitter	-145dBc/Hz Typ. at 10kHz offset / 1 σ 3ps typ.
Tri-state Function	#1: Floating or "H"→Output enable / #1: "L"→Output disable (Hi-Z)

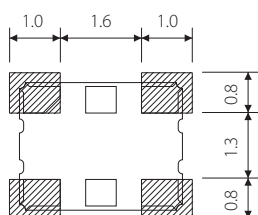
Package quantity: 3,000pcs max./Reel.

※1 Frequency stability includes initial tolerance, temperature characteristics, supply voltage & load stability, reflow freq. shift, aging(1year @25°C).

Outline and Dimensions [unit:mm]



Example of a Terminal Land Pattern



Terminal	Connection
#1	Tri-state
#2	N.C.
#3	GND
#4	OUTPUT
#5	N.C.
#6	Vdd

Tri-state Function

Tri-state Pin	Output
High or Floating	Active
Low	Hi-impedance

CRYSTAL OSCILLATOR

OSC81



Applications

- Mobile phone / Wireless-LAN / PC-Card / DVD / DVC / DSC etc..

Features

- Ceramic package / Dimensions (3.2 × 2.5 × 0.9)
- SMD Package / Low power supply voltage
- Low current consumption
- Wide range operating temperature (-40 ~ +85°C)
- Enable / Disable feature

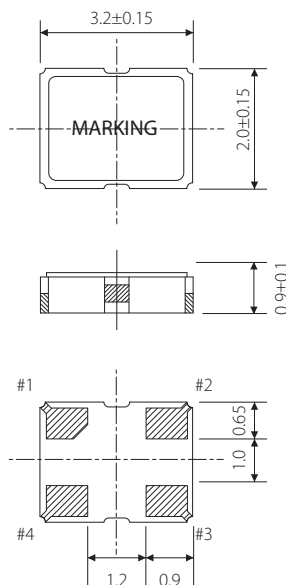
Specifications



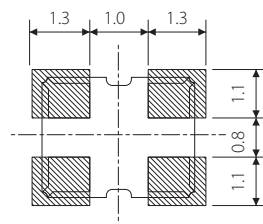
Model	OSC81		
Frequency range	0.625 ~ 80.000MHz		0.625 ~ 50.000 MHz
Storage temperature range	-55 ~ +100°C		
Operating temperature range	-20 ~ +70°C, -40 ~ +85°C		
Frequency stability	±30 × 10 ⁻⁶ , (-20 ~ +70°C), ±50 × 10 ⁻⁶ , ±100 × 10 ⁻⁶		
Power supply voltage (Vdd)	+3.3V DC ±5%	+2.5V DC ±5%	+1.8V DC ±5%
Current consumption	7 mA max: ~20MHz 13 mA max: ~40MHz 19 mA max: ~60MHz 24 mA max: ~75MHz	5 mA max: ~20MHz 9 mA max: ~40MHz 11 mA max: ~60MHz 14 mA max: ~75MHz	2.5 mA max: ~20MHz 3.0 mA max: ~40MHz 3.5 mA max: ~50MHz
Output level	C-MOS		
Load	15pF max.		
Output voltage level	V _{OL} : 10%Vdd max. / V _{OH} : 90%Vdd min.		
Rise & Fall time	10ns max. / 10%Vdd - 90%Vdd		
Duty cycle	45% ~ 55% at 1/2Vdd		40% ~ 60% at 1/2Vdd
Tri-state Function	#1: Floating or "H" → Output enable / #1: "L" → Output disable (Hi-Z)		

Package quantity: 3,000pcs max./Reel.

Outline and Dimensions [unit:mm]



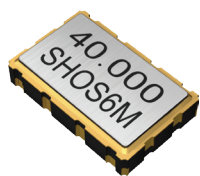
Example of a Terminal Land Pattern



Terminal	Connection
#1	Tri-state
#2	GND
#3	OUTPUT
#4	Vdd

Tri-state Function

Tri-state Pin	Output
High or Floating	Active
Low	Hi-impedance



PRECISION CRYSTAL OSCILLATOR

OSC73

Applications

- Wireless-LAN / PLC Modem / WiMax / Mobile Communications etc

Features

- Ceramic package / Dimensions (5.0×3.2×1.05)
- Low phase noise, Low jitter
- Low current consumption
- CMOS output with Tri-state function
- 3.1mA typ. (40MHz Vdd=+2.5V)

Specifications

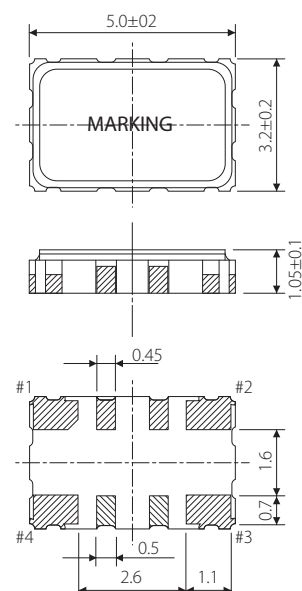


Model	OSC73
Frequency range	2.500~60.000 MHz
Nominal Frequency (MHz)	5, 10, 12, 16, 20, 24, 32, 40, 44
Storage temperature range	-40~ +85°C
Operating temperature range	-40~ +85°C
Frequency stability	$\pm 10 \times 10^{-6}$, $\pm 15 \times 10^{-6}$ ※1
Aging	$\pm 2 \times 10^{-6}$ / 1st year at 25°C
Power supply voltage (Vdd)	+1.8, +2.5, +3.0V, +3.3V DC $\pm 10\%$
Current consumption	7mA max. / 10uA max (Standby)
Output level	C-MOS
Load	15pF max.
Output voltage level	V _{OL} : 10%Vdd max. / V _{OH} : 90%Vdd min.
Rise & Fall time	5ns max. / 10%Vdd - 90%Vdd
Duty cycle	45%~55% at 1/2Vdd
Phase Noise / Jitter	-143dBc / Hz Typ. at 10kHz offset / 1 σ 3ps typ.
Tri-state Function	#1: Floating or "H"→Output enable / #1: "L"→Output disable(Hi-Z)

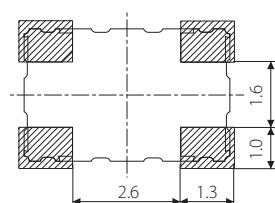
Package quantity: 1,000pcs max./Reel.

※1 Frequency stability includes initial tolerance, temperature characteristics, supply voltage & load stability, reflow freq. shift, aging (1year @25°C).

Outline and Dimensions [unit:mm]



Example of a Terminal Land Pattern



Terminal	Connection
#1	Tri-state
#2	GND
#3	OUTPUT
#4	Vdd

Tri-state Function

Tri-state Pin	Output
High or Floating	Active
Low	Hi-impedance

CRYSTAL OSCILLATOR

OSC71



Applications

- PC Main board / VGA card / DVD / DVC / DSC / Printer / Scanner / Game Console

Features

- Ceramic package / Dimensions (5.0×3.2×0.9)
- Operating Temperature -40°C ~ +85°C
- CMOS / TTL output / with Tri-state function

Specifications



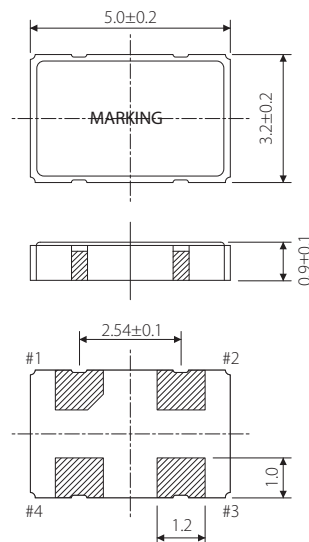
Model	OSC71	
Frequency range	0.500~156.250 MHz	0.500~110.000 MHz
Storage temperature range	-55~+125°C	
Operating temperature range	0~+70°C, -40~+85°C	
Frequency stability	$\pm 25 \times 10^{-6}$, $\pm 50 \times 10^{-6}$, $\pm 100 \times 10^{-6}$	
Power supply voltage (Vdd)	+3.3V DC $\pm 10\%$	+5.0V DC $\pm 10\%$
Current consumption	10(※10) mA max: 0.5~14.9MHz 15(※15) mA max: 15~29.9MHz 20(※25) mA max: 30~39.9MHz 25(※30) mA max: 40~49.9MHz 30 mA max: 50~59.9MHz 40 mA max: 60~79.9MHz 50 mA max: 80~125MHz 55 mA max: 125.1~156.25MHz	10(※15) mA max: 0.5~14.9MHz 15(※20) mA max: 15~29.9MHz 20(※30) mA max: 30~39.9MHz 25(※40) mA max: 40~49.9MHz 30 mA max: 50~59.9MHz 40 mA max: 60~79.9MHz 50 mA max: 80~110MHz
Output level	TTL-CMOS (See Table A)	
Tri-state Function	#1: Floating or "H"→Output enable / #1: "L"→Output disable (Hi-Z)	

Tabla A

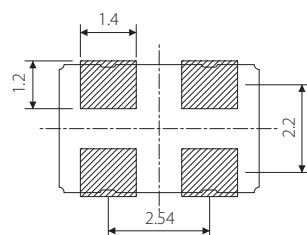
Output level	CMOS	TTL (+5.0V only)
Load	15pF (※ 30pF)	2TTL, 5TTL, 10TTL
Level	$V_{OL}: 10\%V_{dd} \text{ max.} / V_{OH}: 90\%V_{dd} \text{ min.}$	$V_{OL}: +0.4 \text{ max.} / V_{OH}: 2.4V \text{ min.}$
Rise & Fall time	10ns max : F ≤ 40MHz, 7ns max : F > 40MHz, 2ns max : F > 125MHz	
	0.1Vdd - 0.9Vdd	+0.4V DC - +2.4V DC
Duty cycle	40% ~ 60% at 1/2Vdd	40% ~ 60% at +1.4V

Package quantity: 1,000pcs max./Reel.

Outline and Dimensions [unit:mm]



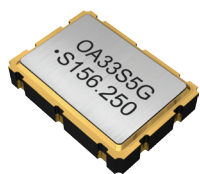
Example of a Terminal Land Pattern



Terminal	Connection
#1	Tri-state
#2	GND
#3	OUTPUT
#4	Vdd

Tri-state Function

Tri-state Pin	Output
High or Floating	Active
Low	Hi-impedance



LVPECL DIFFERENTIAL OUTPUTS CRYSTAL OSCILLATOR

OSC57A

Applications

- SONET / SDH / Gbits / Ethernet / IEEE1394 / Fibre Channel

Features

- Ceramic package /
- Low phase jitter / 0.3ps typ. / 12kHz to 20MHz offset
- Dimensions (7.0×5.0×1.5)
- LVPECL differential outputs with Tri-state function
- Low Jitter

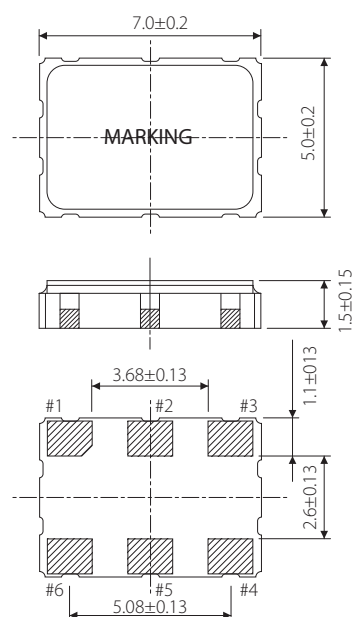
Specifications



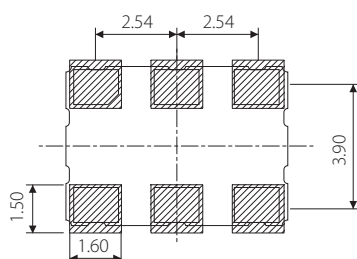
Model	OSC57A	
Frequency range	40.000~160.000 MHz	
Nominal Frequency (MHz)	50, 62.5, 100, 106.25, 108, 125, 133, 155.52, 156.25	
Storage temperature range	-40~+85°C	
Operating temperature range	-10~+70°C	
Frequency stability	$\pm 30 \times 10^{-6}$, $\pm 50 \times 10^{-6}$, $\pm 100 \times 10^{-6}$	
Power supply voltage (Vcc)	+3.3V DC $\pm 5\%$	+2.5V DC $\pm 5\%$
Input voltage level	V_{IL} : 0.3Vcc max. / V_{IH} : 0.7Vcc min.	
Current consumption	90mA max. (60mA typ.) / 30uA max. (Standby)	
Output level	LVPECL	
Load	50 Ω (terminus to Vcc-2V)	
Output voltage level	V_{OL} : Vcc-1.620 max. / V_{OH} : Vcc-1.025 min.	
Rise & Fall time	1ns max. (0.5ns typ.) / 20%~80% output swing level	
Duty cycle	45~55% at 50% output swing level	40~60% at 50% output swing level
Jitter	RMS 1 σ 5ps max. (3ps typ.)	
Phase Jitter	RMS 1ps max. (0.3ps typ.) / 12kHz to 20MHz offset	
Tri-state Function	#1: Floating or "H" → Output enable / #1: "L" → Output disable (Hi-Z)	

Package quantity: 1,000pcs max./Reel.

Outline and Dimensions [unit:mm]



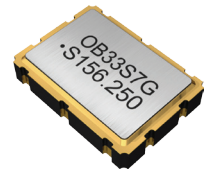
Example of a Terminal Land Pattern



Terminal	Connection
#1	Tri-state
#2	N.C.
#3	Vss
#4	OUT
#5	OUTN
#6	Vdd

Tri-state Function

Tri-state Pin	Output
High or Floating	Active
Low	Hi-impedance



LVDS DIFFERENTIAL OUTPUTS CRYSTAL OSCILLATOR

OSC57B

Applications

- SONET / SDH / Gbits / Ethernet / IEEE1394 / Fibre Channel

Features

- Ceramic package / Dimensions (7.0×5.0×1.5)
- Low Jitter
- Low phase jitter / 0.3ps typ. / 12kHz to 20MHz offset
- LVDS differential outputs with Tri-state function

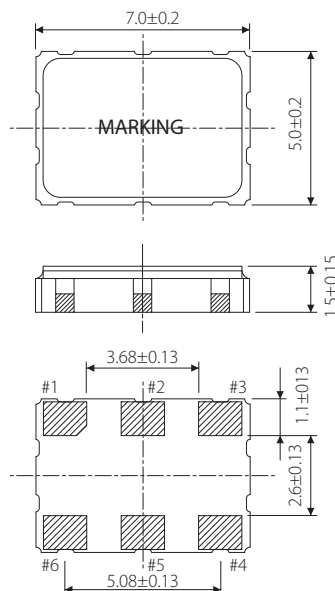
Specifications



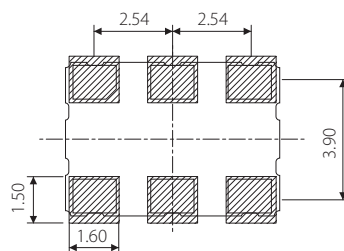
Model	OSC57B
Frequency range	80.000~160.000 MHz
Nominal Frequency (MHz)	100, 106.25, 108, 125, 133, 155.52, 156.25
Storage temperature range	-40~+85°C
Operating temperature range	-10~+70°C
Frequency stability	$\pm 30 \times 10^{-6}$, $\pm 55 \times 10^{-6}$, $\pm 100 \times 10^{-6}$
Power supply voltage (Vcc)	+2.5V, +3.3V DC $\pm 5\%$
Input voltage level	V _{IL} : 0.3V _{CC} max. / V _{IH} : 0.7V _{CC} min.
Current consumption	70mA max. (50mA typ.) / 30uA max. (Standby)
Output level	LVDS
Load	100Ω (OUT-OUTN)
Output voltage level	V _{OL} : 0.9V min. / V _{OH} : 1.6V max.
Differential output voltage	0.33V typ.
Offset voltage	1.25V typ.
Rise & Fall time	1ns max. / 20%~80%Output swing level
Duty cycle	45~55% at 50% output swing level
Jitter	RMS 1σ 5ps max. (3ps typ.)
Phase Jitter	RMS 1ps max. (0.3ps typ.) / 12kHz to 20MHz offset
Tri-state Function	#1: Floating or "H"→Output enable / #1: "L"→Output disable (Hi-Z)

Package quantity: 1,000pcs max./Reel.

Outline and Dimensions [unit:mm]



Example of a Terminal Land Pattern



Terminal	Connection
#1	Tri-state
#2	N.C.
#3	GND
#4	OUT
#5	OUTN
#6	Vdd

Tri-state Function

Tri-state Pin	Output
High or Floating	Active
Low	Hi-impedance



CRYSTAL OSCILLATOR

OSC52

Applications

- PC Main board / VGA card / DVD / DVC / DSC / Printer / Scanner / Game Console

Features

- Low height ceramic package / Dimensions (7.0×5.0×1.4)
- CMOS / TTL Output with Tri-state function

Specifications



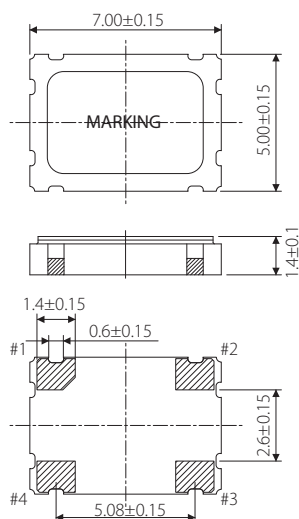
Model	OSC52	
Nominal frequency range	0.500~160.000 MHz	0.500~107.000 MHz
Storage temperature range	-55~+125°C	
Operating temperature range	0~+70°C	
Frequency stability	$\pm 20 \times 10^{-6}$, $\pm 25 \times 10^{-6}$, $\pm 50 \times 10^{-6}$, $\pm 100 \times 10^{-6}$	
Power supply voltage (Vdd)	+3.3V DC $\pm 10\%$	+5.0V DC $\pm 10\%$
Current consumption	10 mA max: 0.5~14.9MHz 15 mA max: 15~29.9MHz 20 mA max: 30~39.9MHz 25 mA max: 40~49.9MHz 30 mA max: 50~59.9MHz 35 mA max: 60~79.9MHz 45 mA max: 80~99.9MHz 50 mA max: 100~125MHz 65 mA max: 125.1~160MHz	10(※20) mA max: 0.5~19.9MHz 10(※35) mA max: 20~29.9MHz 15(※35) mA max: 30~34.9MHz 30(※35) mA max: 35~49.9MHz 30(※60) mA max: 50~65.9MHz 50(※60) mA max: 66~80.0MHz 60 mA max: 80.1~107MHz
Output level	TTL-CMOS (See Table A)	
Tri-state Function	#1: Floating or "H"→Output enable / #1: "L"→Output disable (Hi-Z)	

Table A

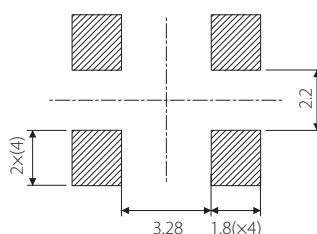
Output level	CMOS	TTL (+5.0V only)
Load	15pF (※50pF)	2TTL, 5TTL, 10TTL
Level	V _{OL} : 10%Vdd max. / V _{OH} : 90%Vdd min.	V _{OL} : +0.4 max. / V _{OH} : 2.4V min.
Rise & Fall time	10ns max: F ≤ 40MHz, 7ns max: F > 40MHz, 5ns max: F > 100MHz at 10%~90% Vdd	at +0.4V - +2.4VDC
Duty cycle	45%~55% at 1/2Vdd F ≤ 50MHz 40%~60% at 1/2Vdd F ≤ 50MHz	40%~60% at +1.4V

Package quantity: 1,000pcs max./Reel. / Please consult with us for more details and Vdd: +1.8V, +2.5V, +2.8V, +3.0V

Outline and Dimensions [unit:mm]



Example of a Terminal Land Pattern



Terminal	Connection
#1	Tri-state
#2	GND
#3	OUTPUT
#4	Vdd

Tri-state Function

Tri-state Pin	Output
High or Floating	Active
Low	Hi-impedance



PROGRAMMABLE CRYSTAL OSCILLATOR

SPO-2520B New Product

Applications

- Any frequency

Features

- One time programmable
- PLL circuit provides wide frequency range application (1-200MHz)
- Low power consumption design
- Low jitter design with new developed IC
- High frequency capable device

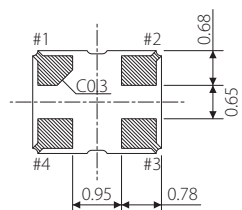
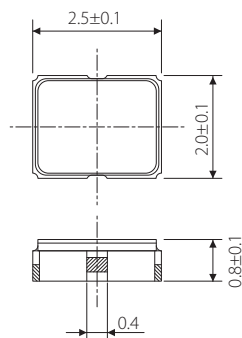
Specifications



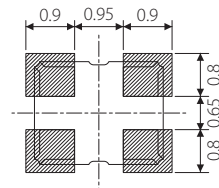
Model	SPO-2520B
Nominal Frequency range	1MHz to 110MHz / 1.8V, 1MHz to 166MHz / 2.5V, 1MHz to 200MHz / 3.3V
Storage temperature range	-55 to +125 °C
Operating temperature range	-40 to +85 °C
Frequency stability	$\pm 30 \times 10^{-6}$, $\pm 50 \times 10^{-6}$, $\pm 100 \times 10^{-6}$
Power supply voltage (Vdd)	+1.8V DC $\pm 10\%$ ~ +3.3V DC $\pm 10\%$
Current consumption	30mA max
Output level	C-MOS
Load	15pF max.
Output voltage level	V _{OL} : 10%Vdd max. / V _{OH} : 90%Vdd min.
Rise & Fall time	5ns max. / 10%Vdd - 90%Vdd
Duty cycle	45 to 55% / 2.5 to 3.3V 40 to 60% / 1.8V at 1/2Vdd
Jitter (1sigma)	100ps max.
Tri-state Function	#1: Floating. or "H"→Output enable / #1: "L"→Output disable(Hi-Z)

Package quantity: 1,000pcs max./Reel.

Outline and Dimensions [unit:mm]



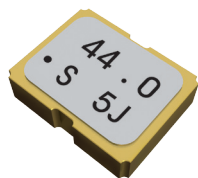
Example of a Terminal Land Pattern



Terminal	Connection
#1	Tri-state or N.C
#2	GND
#3	OUTPUT
#4	Vdd

Tri-state Function

Tri-state Pin	Output
High or Floating	Active
Low	Hi-Impedance



PROGRAMMABLE CRYSTAL OSCILLATOR

SPO-3225B New Product

Applications

- Any frequency

Features

- One time programmable
- PLL circuit provides wide frequency range application (1-200MHz)
- Low power consumption design
- Low jitter design with new developed IC
- High frequency capable device

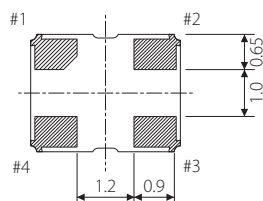
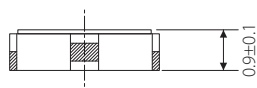
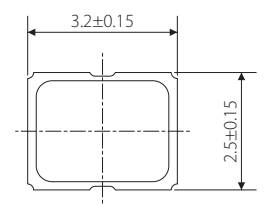
Specifications



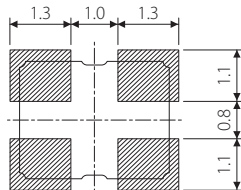
Model	SPO-3225B
Nominal Frequency range	1MHz to 110MHz / 1.8V, 1MHz to 166MHz / 2.5V, 1MHz to 200MHz / 3.3V
Storage temperature range	-55 to +125 °C
Operating temperature range	-40 to +85 °C
Frequency stability	$\pm 30 \times 10^{-6}$, $\pm 50 \times 10^{-6}$, $\pm 100 \times 10^{-6}$
Power supply voltage (Vdd)	+1.8V DC $\pm 10\%$ ~ +3.3V DC $\pm 10\%$
Current consumption	30mA max
Output level	C-MOS
Load	15pF max.
Output voltage level	V _{OL} : 10%Vdd max. / V _{OH} : 90%Vdd min.
Rise & Fall time	5ns max. / 10%Vdd - 90%Vdd
Duty cycle	45 to 55% / 2.5 to 3.3V 40 to 60% / 1.8V at 1/2Vdd
Jitter (1sigma)	100ps max.
Tri-state Function	#1: Floating. or "H"→Output enable / #1: "L"→Output disable(Hi-Z)

Package quantity: 3,000pcs max./Reel.

Outline and Dimensions [unit:mm]



Example of a Terminal Land Pattern



Terminal	Connection
#1	Tri-state or N.C
#2	GND
#3	OUTPUT
#4	Vdd

Tri-state Function

Tri-state Pin	Output
High or Floating	Active
Low	Hi-Impedance



PROGRAMMABLE CRYSTAL OSCILLATOR

SPO-5032B New Product

Applications

- Any frequency

Features

- One time programmable
- PLL circuit provides wide frequency range application (1-200MHz)
- Low power consumption design
- Low jitter design with new developed IC
- High frequency capable device

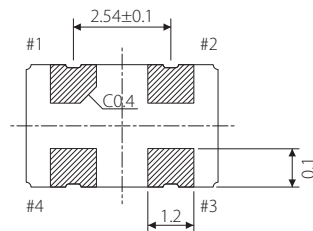
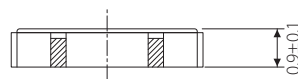
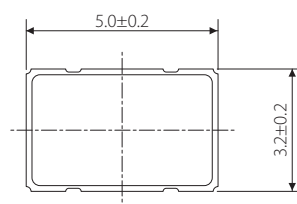
Specifications



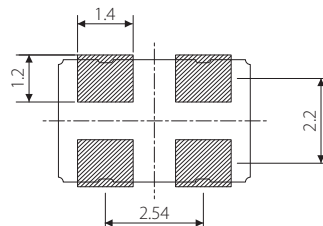
Model	SPO-5032B
Nominal Frequency range	1MHz to 110MHz / 1.8V, 1MHz to 166MHz / 2.5V, 1MHz to 200MHz / 3.3V
Storage temperature range	-55 to +125 °C
Operating temperature range	-40 to +85 °C
Frequency stability	$\pm 30 \times 10^{-6}$, $\pm 50 \times 10^{-6}$, $\pm 100 \times 10^{-6}$
Power supply voltage (Vdd)	+1.8V DC $\pm 10\%$ ~ +3.3V DC $\pm 10\%$
Current consumption	30mA max
Output level	C-MOS
Load	15pF
Output voltage level	V _{OL} : 10%Vdd max. / V _{OH} : 90%Vdd min.
Rise & Fall time	5ns max. / 10%Vdd - 90%Vdd
Duty cycle	45 to 55% / 2.5 to 3.3V 40 to 60% / 1.8V at 1/2Vdd
Jitter (1sigma)	100ps max.
Tri-state Function	#1: Floating. or "H"→Output enable / #1: "L"→Output disable(Hi-Z)

Package quantity: 1,000pcs max./Reel.

Outline and Dimensions [unit:mm]



Example of a Terminal Land Pattern



Terminal	Connection
#1	Tri-state or N.C
#2	GND
#3	OUTPUT
#4	Vdd

Tri-state Function

Tri-state Pin	Output
High or Floating	Active
Low	Hi-Impedance



PROGRAMMABLE CRYSTAL OSCILLATOR

SPO-7050B New Product

Applications

- Any frequency

Features

- One time programmable
- PLL circuit provides wide frequency range application (1-200MHz)
- Low power consumption design
- Low jitter design with new developed IC
- High frequency capable device

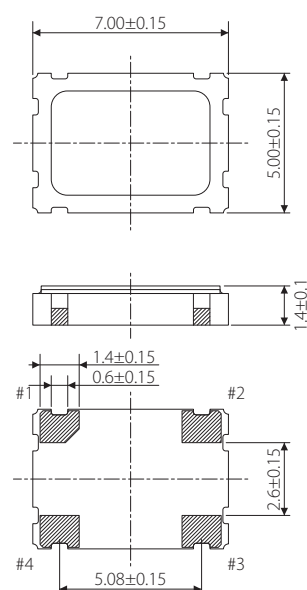
Specifications



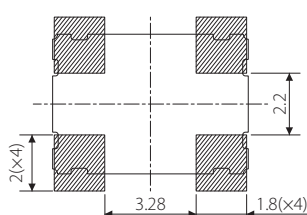
Model	SPO-7050B
Nominal Frequency range	1MHz to 110MHz / 1.8V, 1MHz to 166MHz / 2.5V, 1MHz to 200MHz / 3.3V
Storage temperature range	-55 to +125 °C
Operating temperature range	-40 to +85 °C
Frequency stability	$\pm 30 \times 10^{-6}$, $\pm 50 \times 10^{-6}$, $\pm 100 \times 10^{-6}$
Power supply voltage (Vdd)	+1.8V DC $\pm 10\%$ ~ +3.3V DC $\pm 10\%$
Current consumption	30mA max
Output level	C-MOS
Load	15pF
Output voltage level	V _{OL} : 10%Vdd max. / V _{OH} : 90%Vdd min.
Rise & Fall time	5ns max. / 10%Vdd - 90%Vdd
Duty cycle	45 to 55% / 2.5 to 3.3V 40 to 60% / 1.8V at 1/2Vdd
Jitter (1sigma)	100ps max.
Tri-state Function	#1: Floating, or "H"→Output enable / #1: "L"→Output disable(Hi-Z)

Package quantity: 1,000pcs max./Reel.

Outline and Dimensions [unit:mm]



Example of a Terminal Land Pattern



Terminal	Connection
#1	Tri-state or N.C
#2	GND
#3	OUTPUT
#4	Vdd

Tri-state Function

Tri-state Pin	Output
High or Floating	Active
Low	Hi-Impedance