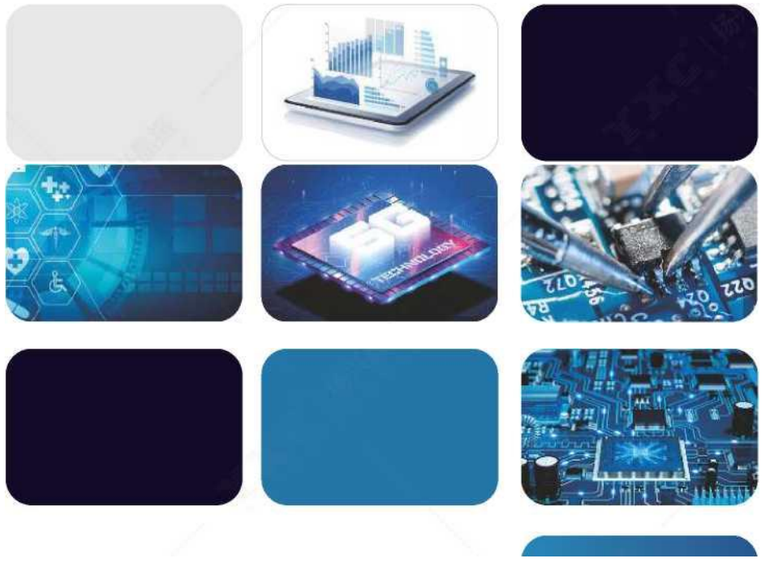


品质为本服务为根

YXC® 扬兴晶振」

产品手册

深圳扬兴科技有限公司

Up-to-date products as well as leading edge technology enable YXC to provide the optimal frequency solutions worldwide.YXC has dedicated to meet and exceed various frequency demands.

— WWW.YXC.HK —

CRYSTAL OSCILLATOR

Quality-oriented, service-oriented

■公司简介

深圳扬兴科技有限公司创立于 1986 年 7 月，在晶振领域已有三十余年行业经验，是一家专 业的晶振供应商。深圳扬兴是一家晶振授权与独立型供应商，其通过 IS09001 企业质量管理体 系认证，拥有自主品牌 YXC,品牌创立至今约十年，在行业内拥有极高的知名度和美誉度，同 时产品通过 ROHS 认证及 REACH 认证，并畅销国内外。现扬兴为日本 EPSON 在大中华区的一 级代理商，有源晶振销量在代理中位列第一，亦是美国 SITIME 可编程晶振亚洲区一级代理商， MEMS 晶振销量位列全球代理第一。同时，扬兴于 2016 年初成为中国首家可编程晶振厂商，是 国内首家拥有快速编程的晶振制造商，产品拥有超低功耗、超小体积的绝对领先优势。

公司目前拥有先进的测试仪器和经验丰富的销售技术团队，主营产品系列有：可编程晶振、 石英振荡器、石英晶体谐振器、时钟晶振、陶瓷谐振器、TCXO 温补晶振、滤波器等。扬兴产 品广泛应用于钟表、安防、网络摄像头、数码产品、车载数码、MID 平板电脑、网络通讯、基 站、光电技术等设备及各种频率控制设备。

深圳扬兴科技有限公司的使命是为客户提供最佳频率解决方案，力争在 2020 年成为晶振行 业的领导者。多年来，扬兴科技凭着“品质为本，服务为根”的经营理念，秉承“质量第一、用户至尊”的服务宗旨，在行业内外赢得了广大用户的认可。

ShenZhen YANG XING Technology Co.,Ltd, which was founded in July 1986, is a professional crystal oscillator supplier with industrial experience of over thirty years. YANG XING has obtained the IS09001 Enterprise quality management system certification with its self-owned brand-YXC. It is one well received as well as independent supplier, which passed ROSH and REACH. There exists a great demand of YANG XING* s products home and abroad. At present YANG XING, as the A-level agent of both corporation EPSON in Japan (oscillator sales ranked first in all agents) and corporation SITIME in United States, has the best sale of MEMS crystal oscillator all over the world. At the same time, early in 2016 YANG XING become China's first programmable manufacturers, rapid programming mass MEMS oscillators, and the product have the absolute advantage with Ultra-low power consumption and super small size.

YANG XING possesses the advanced testing equipment and experienced selling groups. Its main products are as follows: Programmable crystals, quartz oscillator, quartz crystal resonators, crystal clock vibration, ceramic resonator, TCXO removing crystals, filter, etc. Products are widely applied to various kinds of frequency control devices and others like: Clocks and watches, security, network cameras, digital products, car digital, MID tablet computer, network communication, base station, and photoelectric technology.

The mission YANG XING has always been devoting to is to provide the optimal frequency solution to customers, making itself try hard to get the leadership in the industry. For years, YANG XING has wined the approval of thousands of users with its unique operation principle —— "Quality is the stem and service is the root" as well as its service aim —— "Quality first, user first".

■ DIRECTORY

■ Technical Terminology

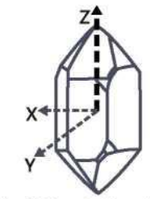
(1) quartz material and frequency control products
(2) piezoelectricity
(3) type of quartz crystal cut
(4) mode of vibration
(5) frequency-temperature characteristics
(6) equivalent circuit of a crystal resonator
(7) resonance frequency
(8) terminologies
(9) oscillators

If you have any questions please E-mail us.

(1) quartz material and frequency control products

Quartz, a kind of crystallized Silicon Dioxide, SiO2, 32 symmetry group of trigonal system (Fig.1), exhibits piezoelectric property, which is the operating base of the electromechanical products. With its intrinsic high Q-value, the quartz based resonator and oscillator are the most widely adopted as the reference signal source in circuitry for frequency control applications. Quartz frequency control products can be categorized into bulk acoustic wave application devices, such as crystals/resonators, monolithic crystal filters and clock oscillator, and surface accoustic wave application devices, such as SAW resonators and SAW filters. A piece of quartz crystal in a specific orientation cut, shape and dimensions is named crystal wafer (blank). Such a crystal wafer with two deposited electrodes on both sides and housed in a holder is a crystal unit (one-port resonator). By using the one-port resonators as impedance elements, crystal bandpass filters can be obtained. By incorporating the crystal resonator into a kind of electric circuit, one could get different kinds of

clock crystal oscillators (CXO), for example, Pierce Oscillator, Colpitts Oscillator, Simple Package Crystal Oscillator, Voltage Controlled Crystal Oscillators, Temperature Compensated Crystal Oscillator, Oven

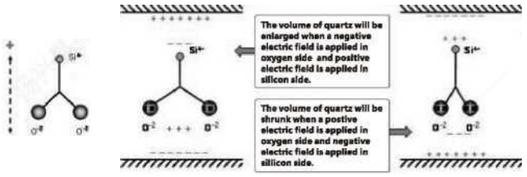


(Fig.1)Crystallized quartz material

Controlled Crystal Oscillator, and so on. Instead of bulk vibration of quartz crystals, a shorter wavelength (higher frequency) vibration can be achieved by surface wave propagation with inter-digital-transducer (IDT) electrodes on the surface of quartz material. This vibration mechanism can be used for resonator and filter applications

(2)piezoelectricity

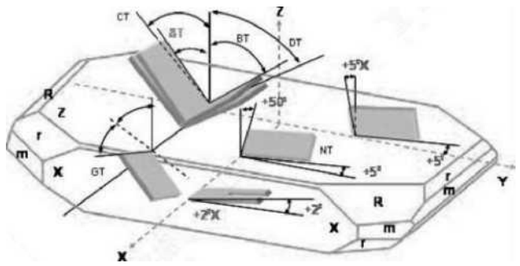
The Silicon Dioxide atom is electrical natural in stable state. The electric dipole is along with silicon asix.(Fig.2) shows simplified two dimensional structure. When we apply an electric field along with dipole direction, with positive charged at the silicon side and negative charged at the oxygen side, the oxygenation will repel to each other creating an induced electrical field to balance the system. The oxygen ions will toward to each other if we apply a negative charged and positive charged electric field to silicon and oxygen ions respectively. The oxygen ions will vibrate along horizontal direction in the same frequency as the alternative electric field along with vertical direction. The displacement of ions or the amplitude of vibration depends on the angle between the electrical field and the electric dipole of quartz. In practical three dimensional quartz crystals, electrical field is supplied by electrodes coated on the surface of quartz wafer. The orientation of dipole can be decided through different kinds of cutting angles for quartz bar.



(Fig. 2) Simplified one dimensional piezoelectricity of SiO2

(3)type of quartz crystal cut

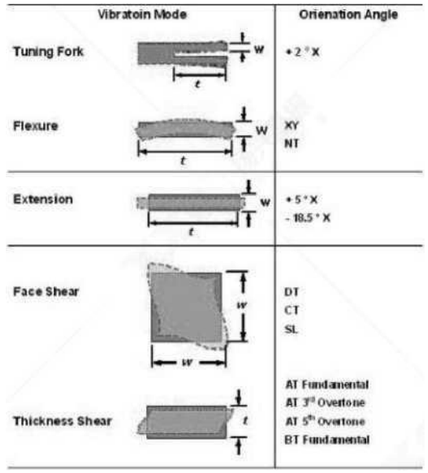
According to different cut angles to quartz bars, there are different kinds of quartz plates, for examples, AT 各 BT-, CT-, DT-, NT-, GT- cut plates Different types of quartz cuts, indicated by a set of Euler angles, have different available elastic, piezoelectric and dielectric properties, which are the basic parameters for designing a quartz crystal device. The most often used Quartz-cut types are shown in (Fig.3) schematically.



(Fig. 3)Orientation angle of a Z-plate quartz crystal.

(4) mode of vibration

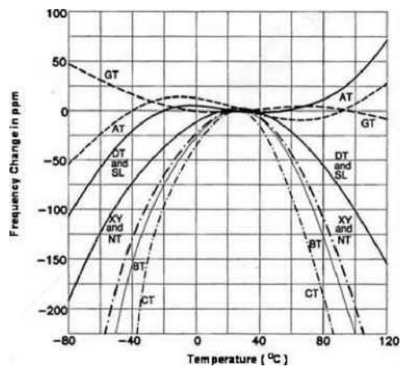
The vibration modes of the quartz crystal units are grouped into flexure, extension, face shear and thickness shear modes. The schematics of the vibration modes and the plate cuts usually used are listed in Table 1. Fundamental mode and overtone modes can be operated in any kinds of resonators. Fundamental mode is most often used, but for the thickness type devices the overtone modes are often used as well, as shown in (Fig.4)



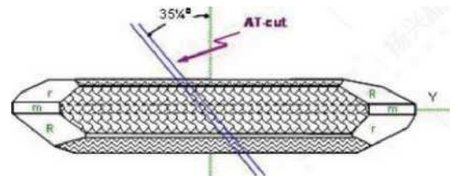
(Fig.4)Vibration Mode and Cut Angle.

(5) frequency-temperature characteristics

Most of the quartz products are used as an electrical circuit component for frequency selection and/or frequency control, so the frequency-temperature characteristic of the devices is the most important parameter. This part per million (ppm) level stability of frequency-temperature characteristic is another merit of quartz frequency device that LCR discrete component oscillation circuitry can' t be achieved in mass-production scale. For the usually used quartz crystal cuts, their frequency-temperature characteristics are shown in (Fig. 5).



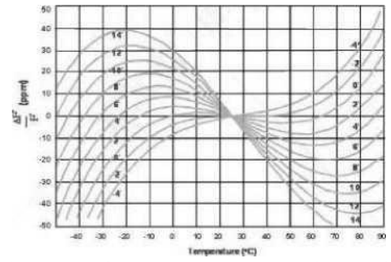
(Fig. 5) Frequency-temperature characteristics of various quartz cuts.AT-cut is the most popular crystal cut in the quartz devices for MHz applications. (Fig. 6) shows the orientation of AT plat from top view of + X-axis.



(Fig.6) Orientation of AT plat

(Fig. 7) shows the frequency-temperature characteristics of the AT-cut crystal operating in thickness-shear mode, with the cut angle deviation as a parameter. It is shown that AT-cut quartz has excellent frequency stability over a wide temperature range since the first-and second-order of the temperature coefficients go to zero in this range and the temperature coefficient is only dominated by a third-order function of the temperature deviation.

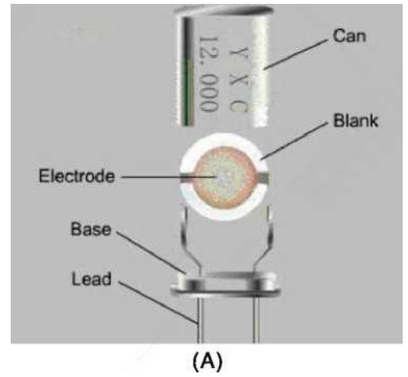
Afs (i) = A1 (Ti -25)3 + A2 (Ti -25)2 + A3 (Ti -25) + A4



(Fig. 7) AT - cut frequency-temperature characteristics.

(6) equivalent circuit of a crystal resonator

(Fig. 8) shows the schematic of both metal can type and ceramic SMD type resonators and its symbol. The electrical properties of the unloaded resonator can be approximately expressed in Butterworth-Van Dyke (BVD) equivalent circuit as shown in (Fig.9) when operating near a resonance frequency zone.



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(0

(Fig.8)(a)Metal can type resonator
(b) Ceramic SMD type resonator
(c) Symbol of crystal usnit

By using the four parameters shown in (Fig .8) the major electrical properties of a crystal resonator and of a oscillator consisting of the crystal resonator are described as follows.

C1 L1 R1

O—
------ II—
Co

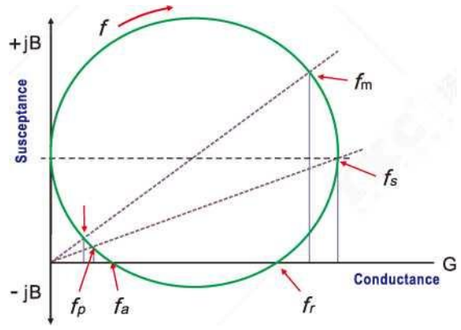
Co:Shunt Capacitance
C1:Motional Capacittance
L1:Motional Inductance
R1:Motional Resistance

(Fig.9)

石英晶体介绍
Technical Survey For Quartz Crystal

(7)resonance frequency

In literatures and product descriptions, there are three pairs of resonance frequencies, i,e., the "series resonance frequency" and " parallel resonance frequency", (fs and fp), the "resonance frequency" and "anti-resonance" frequency, (fr and fa), and the "maximum and minimum total admittance located" frequencies, (fm and fn). All of them can be obtained from the lumped equivalent circuit parameters as given in(Fig.9)The definitions and relationship of the resonance frequency pairs can be clearly expressed in a complex admittance diagram given in (Fig. 10).



(Fig. 10) Complex Admittance of Resonator

The series and parallel resonance frequencies, fs and fp are determined by taking the input electrical conductance (real part of the admittance) and resistance (real part of the electric input impedance) in maximum, respectively, as shown in (Fig. 10). The resonance frequency, fr and anti-resonance frequency, fa , are given by the two roots where the susceptance (imaginary part of the input electric admittance) equals to zero, as shown in (Fig. 1 0). The resonance frequency and anti-resonance frequency fr and fa are the frequencies of principal interest in two terminal applications. For evaluating the equivalent circuit of a resonator, however, the characteristic frequencies, fs and fp are more important. They are given by

= W 亦向.....

Where, C1 and L1 are the motional capacitance and motional inductance, respectively, and Co is the static capacitance appearing in shunt branch (Fig. 9).

(8) terminologies

(1) Nominal Frequency and Its Tolerance or Calibration Accuracy

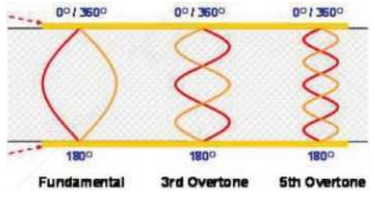
The frequency of a crystal resonator is typically specified in megahertz (MHz) or kilohertz (kHz). The normal frequency is the output frequency what we expect from the crystal oscillation circuitry with proper matching. There is an amount of frequency deviation from the nominal frequency at ambient temperature (referenced to 25© for a real device. The tolerance of the idea central frequency deviation, as a parameter of the device, is specified with a maximum value, expressed in percent (%) or parts per million (ppm).

(2) Fundamental and Overtone Vibrations The thickness shear vibration is the main vibration mode existed in AT cut. The high order harmonic vibrations are co-existed with fundamental vibration between electrode areas. Due to the reverse polarity of two electrodes, only odd number harmonic vibrations can be excited in piezoelectric quartz resonators.(Fig. 11)

ELECTRODE* —r ■

QuAm?
BLANK

(Fig. 11) Only odd number harmonic vibrations can be excited in crystal resonator



ELECTROQF

3. Load Capacitance Load capacitance, CL, is the amount of capacitance that the oscillator exhibits when looking into the circuit through the two ends of the resonator. The load capacitance is formally in either series or parallel with the resonator. For parallel load case the existence of CL will affect the parallel resonance frequency and the parallel-load resonance frequency, fL, is given by

fi = fs^ + CJ(Co + Ct) ---------- (3)

This parameter is necessary to be specified.

4. Frequency-Temperature Stability

Frequency-Temperature stability is indicated by the amount of frequency variation from the value at the standard ambient temperature (25Q, usually), caused by the operating temperature change. This parameter is specified by a curve showing the frequency variation (expressed in % or ppm) versus the temperature deviation from the reference temperature (25 心）. The temperature stability of a quartz device depends on the type of cut, the mode of vibration, and the dimension of the quartz blank. Besides, the deviation value is associated with the operating temperature range, the load capacitance and the drive level of the crystal resonator.

5. Equivalent Series Resistance (ESR) The resistance R1 appearing in the series branch (fig. 9) can be measured at series resonance frequency, where the effects of C1 and L1 are cancelled each other and the effective result of the branch is resistive. R1 represents the mechanical loss in the crystal unit and the holder.

6. Motional Capacitance C1 and Motional Inductance L1

These two parameters are definitely related by the series resonance frequency, fs, as given in (Fig.1 0), and fs is a very sure parameter in resonator design and in characterization. Only the value of C1 is specified in industry standard and L1 can be obtained from

$$A = \frac{1}{Eg} \quad \text{---------- (4)}$$

The value of C1 is very small in comparison with capacitances usually used in oscillation circuits and can be evaluated from the material and geometry parameters of the crystal plate and electrodes.

7.Static Capacitance Co (in Shunt) The shunt capacitance, Co , is a static capacitance, which is present whether the device is oscillating or not. The value of Co can be measured at very low frequency (less than or about 1.0 MHz), and theoretically is given by

q=吳普—(3)

where, A is the electrode area, d is the thickness of the blank, and E is the dielectric constant of the corresponding crystal cut. In practically, Co includes not only the static capacitance of plated quartz blank, but also the capacitance of conductive bonding material and the capacitance of housing itself.

8. Drive Level

The drive level of a resonator is the amount of power dissipation, expressed in nanowatts, microwatts or milliwatts. Operating level is the suitable power range to assure proper start and maintain a steady state oscillation. Drive level should be operated at the minimum level to avoid long-term frequency drift and crystal fracture. Generally, the smaller the product is, the lower the drive level should be applied without damaging the quartz resonators for long term usage. Generally, the drive level from 10p Wto 100 p W is good enough for most of the applications.

9. Quality Factor-Q

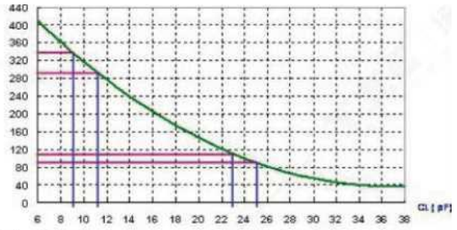
As a resonator, quality factor-Q value is a very important parameter. In specification, unloaded and loaded Q values are specified. The unloaded Q, or mechanical Q, can be expressed by

(6)

where, R1 is the resistance appearing in the series branch.
The loaded Q value depends on the loaded circuit.

10.Pullability
In a parallel-load capacitance oscillator, the oscillation frequency depends on the load capacitance, CL as shown in (Fig.8) and (Fig. 12). The frequency change (in ppm) as a function of the load capacitance change (in pF) is a specification. In certain applications where the variation of loaded resonance

frequency is mandatory (VCXO, for example), pullabilitv has to be soecified.



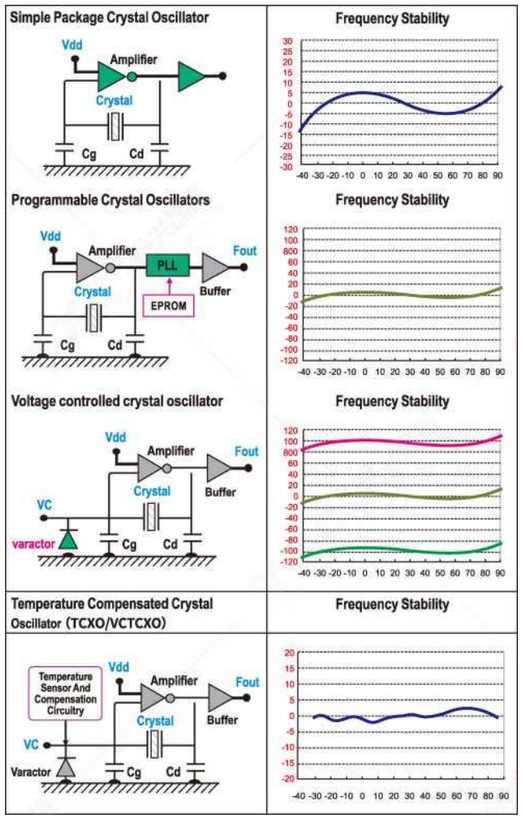
(Fig.12) Frequency variation vs. load capacitance

11 .Aging
Aging is the relative change of operating frequency over a specified time period and is expressed in parts per million (ppm) within a specified period. This rate of frequency change is normally exponential in character. The highest aging rate occurs within the first week of aging and decreases slowly after wards. Typically, aging is computed within first 30 days and is calculated over a long-term period (one year or ten years). Aging rate depends on many factors: seal method, integrity, manufacturing processes, material type, operating temperature, and frequency.

12.STORAGE TEMPERATURE RANGE The specification indicates the minimum and maximum temperatures in which the devices can be stored or exposed in a non -operating state. After storing or exposing the devices at the specified temperature range for a long time, all of the specifications are guaranteed over the specified operating temperature range.

13.Negative Resistance "-R" Negative resistance is introduced to describe the electric property of an oscillator circuit, This is the amount of resistance that the oscillator circuit exhibits when looking into the circuit through the terminals of the resonator. One of the basic oscillation conditions demands the amplifier have to supply enough gain to compensate the loss in the resonator. From resonator point of view, the load has to exhibit enough "negative resistance" to compensate the resistance of the resonator. This is an important parmeter in designing oscillators.

(9) oscillators



HG49XS

直插金属表面石英晶体谐振器
DIP Metal Surface Quartz Crystal Resonator

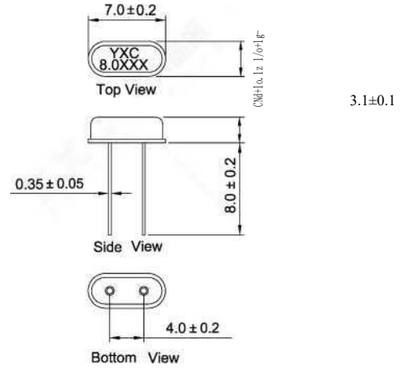
Features

■External dimensions: 7.0x4.0x 1.5mm.
■Frequency range: 8 MHz - 50MHz.
-Through hole type crystal units.
-A great number of standard frequencies.
-High frequency pullability and low equivalent series resistance.
-Highly mass production capability.
-Applications: PC, STB, LCDM and Cable Modem.

I Item / Type	I HC-49XS
Nominal Frequency Range	8-50MHZ
Vibration Mode	AT Fundamental
Load Capacitance	12pE 20pE or specify
Frequency Tolerance (at 25 °C)	±10 ppm, ± 20 ppm, or specify
Frequency Versus Temperature Characteristics	± 20 ppm, or specify
Operating Temperature	-20 ~ + 70 °C , - 40 ~ + 85 °C, or specify
Storage Temperature	-40 ~ +85 °C, or specify
Shunt Capacitance	5pFMax.
Level Of Drive	0.01- WOOuW
Frequency Aging (at 25 °C)	± 3 ppm/year Max.

Fundamental	
8.000-11.999MHz	80 Q Max.
12.000-15.999MHz	60 Q Max.
16.000-19.000 MHz	50 Q Max.
20.000~50.000MHz	40 Q Max.

Dimensions



Units: mm

「扬兴晶振」

HC-49US

直插金属表面石英晶体谐振器
DIP Metal Surface Quartz Crystal Resonator

Features

■ External dimensions: 11.5x4.5x3.68mm.
-Frequency range: 3.2768MHz ~ 64MHz.
-Through hole type crystal units.
• A great number of standard frequencies.
• High frequency pullability and low equivalent series resistance.
-Highly mass production capability.
• Applications: PC, STB, LCDM and Cable Modem.

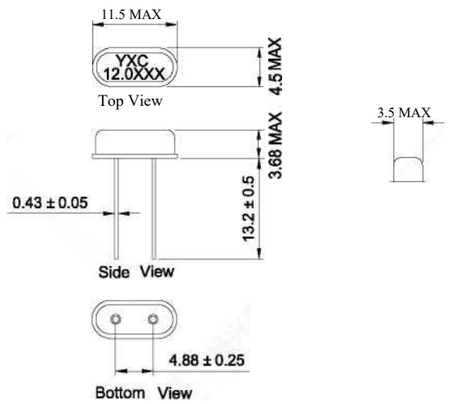
Electrical Specifications

Item / Type	I HC-49US
Nominal Frequency Range	3.2768 ~ 64 MHz
Vibration Mode	AT Fundamental
Load Capacitance	12pl= 20pB or specify
Frequency Tolerance (at 25 *C)	±10 ppm, ± 20 ppm, or specify
Frequency Versus Temperature Characteristics	± 20 ppm, or specify
Operating Temperature	-20 - + 70 #C , - 40 ~ + 85 #C$_f$ or specify
Storage Temperature	-40 ~ +85 °C, or specify
Shunt Capacitance	7 pF Max.
Level Of Drive	1 ~ 500 nW (100nWtypical)
Frequency Aging (at 25©	± 3 ppm/year Max.

Equivalent Series

、Fundamental		3rd Overtone	I
3.2768 ~ 4 MHz	180 Q Max.	20 ~ 25 MHz	100 Q Max.
4~5 MHz	120 Q Max.	25-64 MHz	80 Q Max.
5 ~ 6 MHz	100 Q Max.		
6 ~ 7 MHz	80 Q Max.		
7~10MHz	60 Q Max.		
10~27MHz	40 Q Max.		

Dimensions



Units: mm

扬兴使命：高效为客户提供时钟频率器件解决方案。

「扬兴晶振」

HC-49US3

直插金属表面石英晶体谐振器
DIP Metal Surface Quartz Crystal Resonator

Features

• External dimensions: 11.5x5.0x3.68mm.
-Frequency range: 3.579545MHz ~64MHz.
-Through hole type crystal units.
• A great number of standard frequencies.
• High frequency pullability and low equivalent series resistance.
-Highly mass production capability.
• Applications: PC, STB, LCDM and Cable Modem.

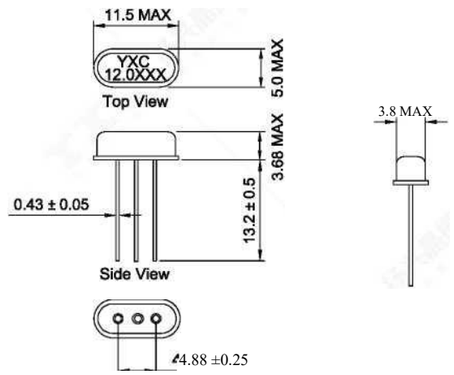
Electrical Specifications

Item / Type	J I HC-49US3
Nominal Frequency Range	3.579545 ~ 64MHz
Vibration Mode	AT Fundamental
Load Capacitance	12pE 20pB or specify
Frequency Tolerance (at 25 °C)	±10 ppm$_f$ ± 20 ppm, or specify
Frequency Versus Temperature Characteristics	± 20 ppm, or specify
Operating Temperature	-20 ~ + 70 °C $_f$ - 40 ~ + 85 °C, or specify
Storage Temperature	-40 ~ +85 °C, or specify
Shunt Capacitance	7 pF Max.
Level Of Drive	1 - 500 nW (100nWtypical)
Frequency Aging (at 25 °C)	± 3 ppm/year Max.

EquivalentSeriesResistance(ES^^^^^^HQ^^^^^H

Fundamental		3rd Overtone	
3.579545 ~4 MHz	150 Q Max.	20 ~ 25 MHz	100 Q Max.
4 ~ 5 MHz	120 Q Max.	25 ~ 64 MHz	80 0 Max.
5 ~6MHz	100 Q Max.		
6 ~ 7 MHz	80 *Q* Max.		
7~10MHz	60 Q Max.		
10~27MHz	40 Q Max.		

Dimensions



Units: mm

扬兴愿景：与员工客户共成长，共圆中华电子梦！

「扬兴晶振」

YT-26

直插金属表面石英晶体谐振器
DIP Metal Surface Quartz Crystal Resonator

Features

■ External dimensions: 2.0 x 6.0 mm.
■Frequency range: 32.768KHz.
-Frequency tolerance(standard): ±10ppm.
, Excellent Reliability Performance.
, Applications: clock and Microcomputer.

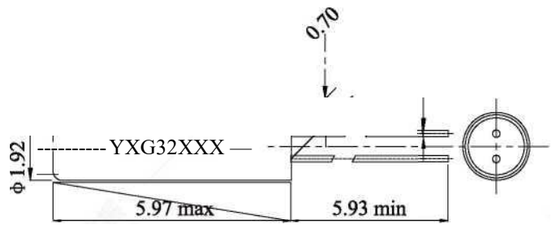
Electrical Specifications

Item / Type J	32.768 KHz
Load Capacitance	12.5PF, or specify
Frequency Tolerance (at 25 °C)	±10 ppm, ± 20 ppm, or specify
Frequency Versus Temperature Characteristics	0~-120ppm, or specify
Turnover Temperature	-(0.036±0.01)ppm/°C^2
Operating Temperature	-20 ~ + 70 °C, - 40 ~ + 85 'C, or specify
Storage Temperature	-40-+85 °C, or specify
Shunt Capacitance	1.6pF Max.
Level Of Drive	1 - 100 uW(1.0uWTyp)
Insulation Resistance	More Than 500MQ at DC 100V
Frequency Aging (at 25 °C)	± 3 ppm/year Max.

Equivalent Series Resistance(ESR)

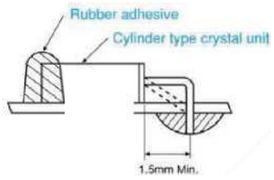
Fundamental	
32.768 KHz	40KQMax.

Dimensions



Units: mm(±0.1 mm)

• Mounting of cylinder type products:
Soldering the body of the cylinder type crystal units with PCB must be avoided due to deteriorate the characteristics or damage Soldering the body of the cylinder type crystal units with PCB must be avoided due to the products. Rubber adhesive is recommended.



• Soldering
Lead wires should be soldered within 3 seconds with the soldering iron heated to a temperature no higher than 300°C

「扬兴晶振」

YT-38

直插金属表面石英晶体谐振器
DIP Metal Surface Quartz Crystal Resonator

Features

-External dimensions: 3.0 x 8.0 mm.
■Frequency range: 32.768KHz.
■ Frequency tolerance(standard): ±10ppm.
■ Excellent Reliability Performance.
, Applications: clock and Microcomputer.

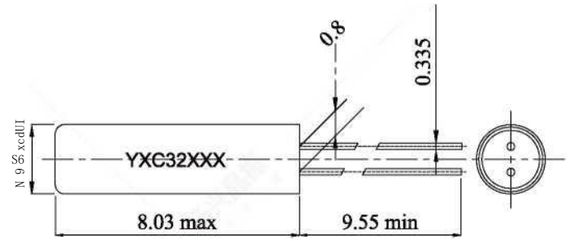
Electrical Specifications

Item / Type J	32.768 KHz
Load Capacitance	12.5PF, or speccify
Frequency Tolerance (at 25 #C)	±10 ppm, ± 20 ppm,or specify
Frequency Versus Temperature Characteristics	0~-120 ppm, or specify
Turnover Temperature	-(0.03610.01)ppm/°C^2
Operating Temperature	-20 ~ + 70 °C, - 40 ~ + 85 °C, or specify
Storage Temperature	-40~+85°C, or specify
Shunt Capacitance	1.8pF Max.
Level Of Drive	1 ~ 100 uW(1.0 nWTyp)
Insulation Resistance	More Than 500MQ at DC 100V
Frequency Aging (at 25 °C)	± 3 ppm/year Max.

Equivalent Series Resistance(ESR)

Fundamental	
32.768 KHz	40KQMax.

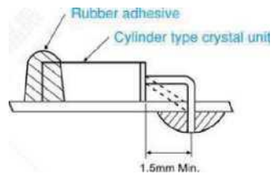
Dimensions



Units: mm(±0.1 mm)

• Mounting of cylinder type products:
deteriorate the characteristics or damage

the products. Rubber adhesive is recommended.



• Soldering
Lead wires should be soldered within 3 seconds with the soldering iron heated to a temperature no higher than 300°C

「扬兴晶振」

HC-49XSMD

贴片金属表面石英晶体谐振器
SMD Metal Surface Quartz Crystal Resonator

Features

■External dimensions: 6.1x4.0x 2.0mm.
■Frequency range: 8MHz~50MHz.
- Surface mount type crystal units.
- A great number of standard frequencies.
- High frequency pullability and low equivalent series resistance.

-Highly mass production capability.
- Applications: PC, STB, LCDM and Cable Modem.

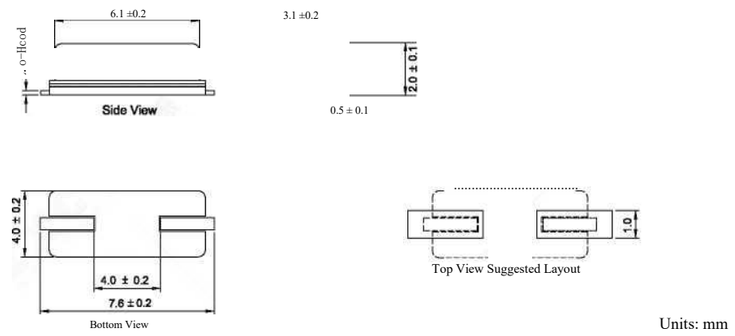
Electrical Specifications

Item / Type J	I HC-49XSMD
Nominal Frequency Range	8-50MHZ
Vibration Mode	AT Fundamental
Load Capacitance	12pE 20pE or specify
Frequency Tolerance (at 25 *C)	±10 ppm, ± 20 ppm, or specify
Frequency Versus Temperature Characteristics	± 20 ppm, or specify
Operating Temperature	-20 ~ + 70 °C, - 40 ~ + 85 °C$_f$ or specify
Storage Temperature	-40 ~ +85 ,C, or specify
Shunt Capacitance	5 pFMax.
Level Of Drive	0.01-1000 nW
Frequency Aging (at 25 °C)	± 3 ppm/year Max.

Equivalent Series Resistance(ESR)

8.000-11.999MHz	80 Q Max.
12.000-15.999MHz	60 Q Max.
16.000-19.000 MHz	50 Q Max.
20.000-50.000 MHz	40 Q Max.

Dimensions



Units: mm

「扬兴晶振」

HC-49SMD

贴片金属表面石英晶体谐振器
SMD Metal Surface Quartz Crystal Resonator

Features

-External dimensions: 11.4x4.8 x 3.8 mm.
-Frequency range: 3.2768MHz ~ 64MHz.
- Surface mount type crystal units.
- A great number of standard frequencies.
- High frequency pullability and low equivalent series resistance.

-Highly mass production capability.
- Applications: PC, STB, LCDM and Cable Modem.

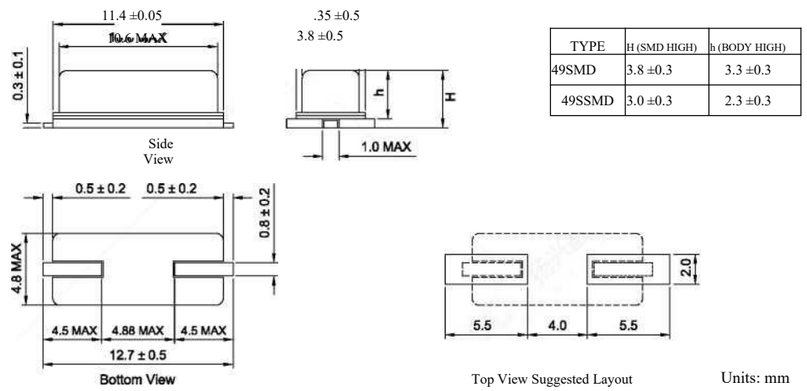
Electrical Specifications

Item / Type J	I HC-49SMD
Nominal Frequency Range	3.2768 ~ 64MHz
Vibration Mode	AT Fundamental
Load Capacitance	12pE 20pC or specify
Frequency Tolerance (at 25 #C)	±10 ppm, ± 20 ppm, or specify
Frequency Versus Temperature Characteristics	± 20 ppm, or specify
Operating Temperature	-20 ~ + 70 #C $_f$ - 40 ~ + 85 °C, or specify
Storage Temperature	-40 ~+85°C$_f$ or specify
Shunt Capacitance	7 pF Max.
Level Of Drive	1 - 500 nW(100uWtypical)
Frequency Aging (at 25 °C)	± 3 ppm/year Max.

rEquivalentSerie5Resistance(ESR)^^^^^^B9^^^^^M

1 Fundamental		K Overtone ,	
3.2768 ~ 4 MHz	180 O Max.	20 ~ 25 MHz	100 Q Max.
4 ~ 5 MHz	120 0 Max.	25-64 MHz	80 Q Max.
5 ~6 MHz	100 *Q* Max.		
6~7 MHz	80 O Max.		
7~10MHz	60 *Q* Max.		
10~27MHz	40 Q Max.		

Dimensions



TYPE	H (SMD HIGH)	h (BODY HIGH)
49SMD	3.8 ±0.3	3.3 ±0.3
49SSMD	3.0 ±0.3	2.3 ±0.3

Units: mm

「扬兴晶振」

YSX1210SL

贴片金属表面石英晶体谐振器
SMD Metal Surface Quartz Crystal Resonator

Features

- External dimensions: 1.20 x 1.00 x 0.35 mm.
- ■ Standard Frequency: 32~60MHz.
- Ultra-thin thickness 0.35mm.
- Excellent heat resistance and environmental characteristics.

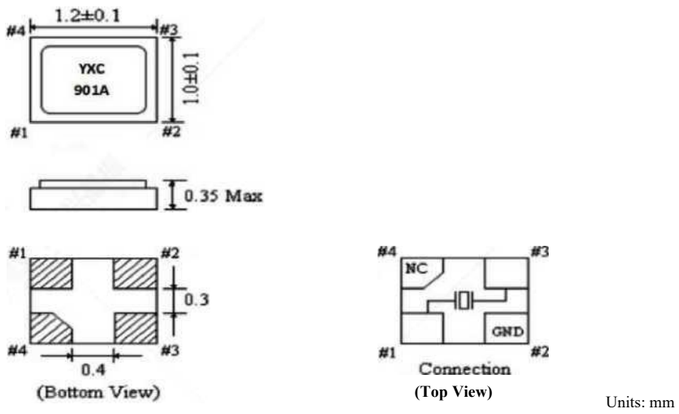
-Applications: mobile phone, Bluetooth,W-LAN ISM band radio,dock for MPU GPS, smart phone.

Electrical Specifications Item / Type	**.YSX1210SL j**
Vibration Mode	AT Fundamental
Load Capacitance	8pR10pF, or specify
Frequency Tolerance (at 25 °C)	±10 ppm, ± 30 ppm, or specify
Frequency Versus Temperature Characteristics	±20 ppm, or specify
Operating Temperature	-30 ~ + 85 °C, or specify
Storage Temperature	-40 ~+85 ,C,or specify
Shunt Capacitance	3 pF Max.
Level Of Drive	50 nW Max
Frequency Aging (at 25 °C)	± 2 ppm / year Max.

Equivalent Series Resistance(ESR)

Fundamental	
32-40 MHz	150 Q Max.
41 ~ 60 MHz	100 Q Max.

Dimensions



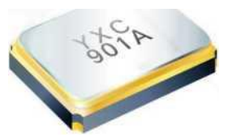
Units: mm

扬兴使命：高效为客户提供时钟频率器件解决方案。

「扬兴晶振」

YSX1612SL

贴片金属表面石英晶体谐振器
SMD Metal Surface Quartz Crystal Resonator



Features

- External dimensions: 1.60x 1.20x0.35mm.

-Standard Frequency: 24~60MHz.

- High precision and high frequency stability.

-Excellent heat resistance and environmental characteristics.

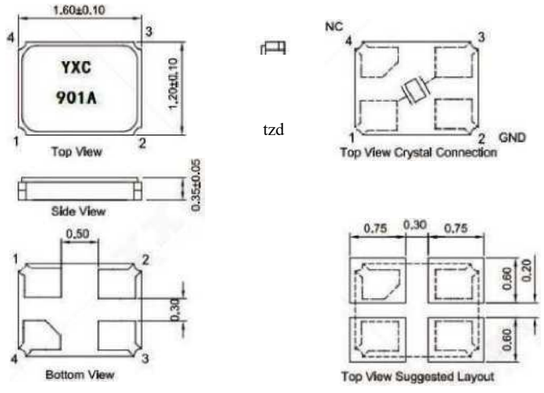
-Applications: mobile phone, Bluetooth, W-LAN ISM band radio, clock for MPU GPS, smart phone.

Electrical Specifications Item / Type	**[YSX1612SL j**
Vibration Mode	AT Fundamental
Load Capacitance	8pB10pF, or specify
Frequency Tolerance (at 25 *C)	±10 ppm, ± 30 ppm, or specify
Frequency Versus Temperature Characteristics	±20 ppm, or specify
Operating Temperature	-20 - + 70 °C , - 40 - + 85 ,C f or specify
Storage Temperature	-40 - + 85 °C, or specify
Shunt Capacitance	3 pF Max.
Level Of Drive	50 uWMax
Frequency Aging (at 25 °C)	± 2 ppm/year Max.

Equivalent Series Resistance(ESR)

Fundamental	
24-40 MHz	150 Q Max.
41- 60 MHz	100 Q Max.

Dimensions



Units: mm

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「扬兴晶振」

YSX211SL

贴片金属表面石英晶体谐振器
SMD Metal Surface Quartz Crystal Resonator

Features

- External dimensions: 2.05 x 1.65 x 0.50mm.

-Standard Frequency: 16~54MHz.

- High precision and high frequency stability.
- Excellent heat resistance and environmental characteristics.
- Applications: mobile phone, Bluetooth, W-LAN ISM band radio,clock for MPU GPS,smart phone.

Electrical Specifications

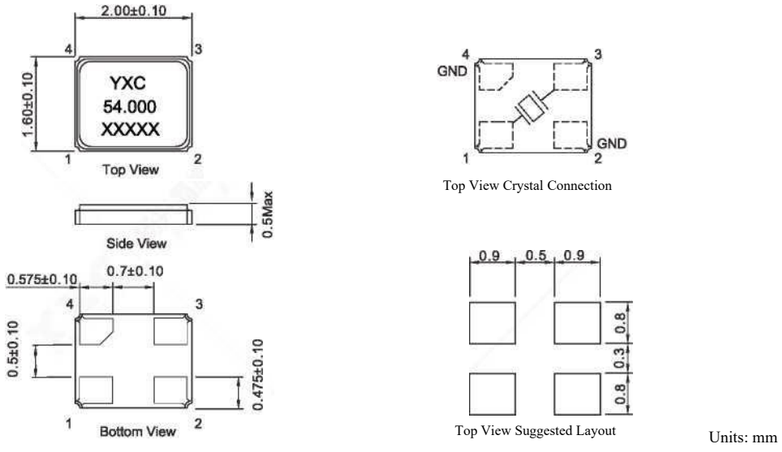
Item / Type J	I YSX211SL I
Vibration Mode	AT Fundamental
Load Capacitance	8pR 9pF, 12pF, or specify
Frequency Tolerance (at 25 °C)	± 10 ppm, ± 15 ppm, ± 20 ppm, or specify
Frequency Versus Temperature Characteristics	±20 ppm, or specify
Operating Temperature	-20 ~ + 70 °C , - 40 ~ + 85 °C , or specify
Storage Temperature	-40 ~ + 85 °C , or specify
Shunt Capacitance	3 pF Max.
Level of Drive	10-200 □ W Max.(10uW typical)
Frequency Aging (at 25 °C)	± 3 ppm/year Max.

Equivalent Series Resistance(ESR)

Fundamental

16 ~30MHz	100 Q Max.
30 ~ 54 MHz	80 Q Max.

Dimensions



Units: mm

「扬兴晶振」

YSX221SL

贴片金属表面石英晶体谐振器
SMD Metal Surface Quartz Crystal Resonator

Features

- External dimensions: 2.55x2.05 x 0.55mm.

-Frequency range: 12MHz~54MHz.

- High precision and high frequency stability.
- Excellent heat resistance and environmental characteristics.

-Applications: mobile phone, Bluetooth, W-LAN ISM band radio,clock for MPU GPS, smart phone.

Electrical Specifications

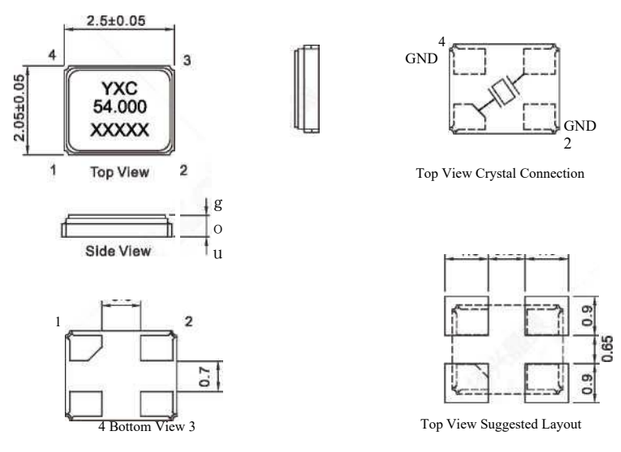
Item / Type J	I YSX221SL
Nominal Frequency Range	12 ~ 54 MHz
Vibration Mode	AT Fundamental
Load Capacitance	12pF= 20p6 or specify
Frequency Tolerance (at 25 °C)	± 10 ppm ± 20 ppm, or specify
Frequency Versus Temperature Characteristics	±20 ppm, or specify
Operating Temperature	-20 ~ + 70 °C, - 40 ~ + 85 °C, or specify
Storage Temperature	-40 ~ + 85 °C or specify
Shunt Capacitance	3 pF Max.
Level of Drive	1-200 uW Max. (100uW typical)
Frequency Aging (at 25©	± 3 ppm/year Max.

Equivalent Series Resistance(ESR)

Fundamental

12 ~ 14 MHz	150 O Max.
14-30 MHz	100 Q Max.
30-48 MHz	60 Q Max.
48 ~ 54 MHz	50 Q Max.

Dimensions



Units: mm

「扬兴晶振」

YSX321SL

贴片金属表面石英晶体谐振器
SMD Metal Surface Quartz Crystal Resonator

Features

- External dimensions: 3.2x2.5 x 0.7 mm.

-Frequency range: 8MHz~64MHz.

- High precision and high frequency stability.
- Extremely good for reducing EMI effect.
- RoHS Compliant/Pb Free.
- The best choice of Bluetooth, wireless communication set, DSC, PDA and mobile phone.

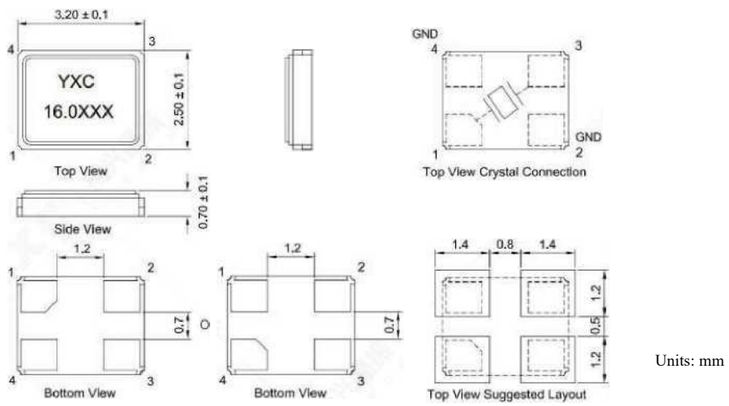
Electrical Specifications

Item / Type J	[YSX321SL J
Vibration Mode	AT Fundamental
Load Capacitance	12pF； 20pB or specify
Frequency Tolerance (at 25 °C)	± 10 ppm, ± 20 ppm, or specify
Frequency Versus Temperature Characteristics	±20 ppm, or specify
Operating Temperature	-20 ~ + 70 °C $_f$ - 40 ~ + 85 °C$_f$ or specify
Storage Temperature	-40 ~ + 85 ^{8}C $_f$ or specify
Shunt Capacitance	7 pF Max.
Level Of Drive	1-100 uW Max. (10uW typical)
Frequency Aging (at 25 °C)	± 3 ppm/year Max.
Insulation Resistance	More Than 500MQ at DC 100V

Equivalent Series Resistance(ESR)

Fundamental

8 - 11.2892 MHz	150Q Max.
12~ 16MHz	80 Q Max.
17-64 MHz	50 Q Max.



Units: mm

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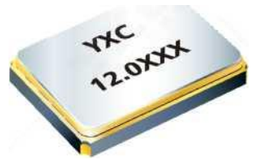
「扬兴晶振」

YSX531SL

贴片金属表面石英晶体谐振器
SMD Metal Surface Quartz Crystal Resonator

Features



- External dimensions: 5.Ox3.2 x 0.9 mm.

-Frequency range: 8MHz~54MHz.

- High precision characteristics covering up to wide frequency range.

-Higher frequency stability and reliability.

-Excellent for reducing EMI effect.

-The best choice of Bluetooth, wireless communication set, DSC, PDA,mobile phone and USB interface card.

Electrical Specifications

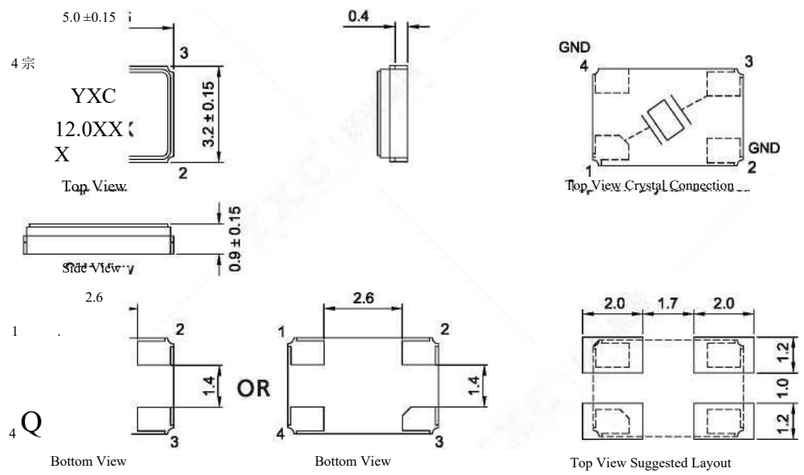
Item / Type J	, YSX531SL j
Vibration Mode	AT Fundamental
Load Capacitance	12pB 20pB or specify
Frequency Tolerance (at 25 °C)	± 10 ppm, ± 20 ppm$_f$ or specify
Frequency Versus Temperature Characteristics	±20 ppm, or specify
Operating Temperature	-20 ~ + 70 °C, - 40 ~ + 85 °C$_f$ or specify
Storage Temperature	-40 ~ + 85 °C , or specify
Shunt Capacitance	7 pF Max.
Level Of Drive	1-100 nW Max. (10uWtypical)
Frequency Aging (at 25 °C)	± 3 ppm/year Max.
Insulation Resistance	More Than 500MQ at DC 100V

Equivalent Series Resistance(ESR)

Fundamental

8 ~ 12 MHz	60 C - 80 Q
12 -25 MHz	40 Q ■ 60 Q
25 -54 MHz	30 Q - 40 Q

Dimensions



Units: mm

扬兴价值观：品质为本，服务为根。

「扬兴晶振」

YST310S

32.768KHZ 贴片金属表面石英晶体谐振器
SMD 32.768KHZ Metal Surface Quartz Crystal Resonator

Features

-External dimensions: 3.20x 1.50 x 0.75 mm.
• Standard Frequency: 32.768KHz.
, Applications in mobile phone. Notebook and RTC.

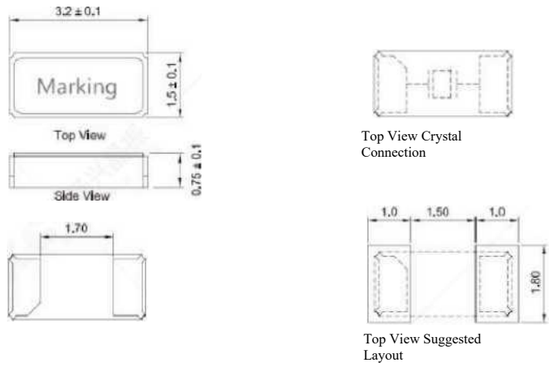
Electrical Specifications **Item / Type** **J**	**[YST310S** **j**
Frequency Tolerance(at 25 °C)	± 10 ppm , or specify
Load Capacitance (CL)	12.5 pF, or specify
Parabolic Coefficient (B)	(-0.03±0.01)*10 ⁶/°C²
Turnover Temperature (Ti)	25 °C ±5 °C
Operation Temperature Range	-40-+85°C
Shunt Capacitance (CO)	1.0pF typical
Motional Capacitance (C1)	3.4fF typical
Level Of Drive	1.0 nW
Frequency Aging (at 25 *C)	± 3 ppm/year Max.
Storage Temperature	-55~ + 125°C

Equivalent Series Resistance(ESR)

YST310S

70KQMax.

Dimensions



Marking: "YXC32XX" or "OXXXX"

Units: mm

「扬兴晶振」

YSX1610SK

32.768KHZ 贴片金属表面石英晶体谐振器
SMD 32.768KHZ Metal Surface Quartz Crystal Resonator

Features

• External dimensions: 1.60x 1.00x 0.50mm.
-Standard Frequency: 32.768KHz.
-Application for NB, Smart Phone, variety of compact portable consumer products reference clocks.

Electrical Specifications

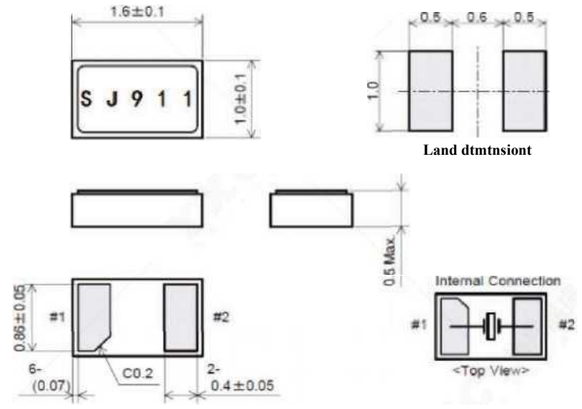
Item / Type	**1 YSX1610SK**
Standard Frequency	32.768KHZ
Frequency Tolerance(at 25 °C)	± 20 ppm , or specify
Load Capacitance (CL)	12.5 pF,or specify
Parabolic Coefficient (B)	(-0.03 ± 0.01)*10⁶/°C²
Turnover Temperature (Ti)	25 °C ± 5 °C
Operation Temperature Range	-40-+85°C
Shunt Capacitance (CO)	1.3pF typical
Motional Capacitance (C1)	7.5fF typical
Level Of Drive	0.1 nW
Frequency Aging (at 25 °C)	± 3 ppm/year Max.
Storage Temperature	-55~ + 125°C

Equivalent Series Resistance(ESR)

YSX1610SK

90KQMax.

Dimensions



Units: mm

「扬兴晶振」

YSX2012SK

32.768KHZ 贴片金属表面石英晶体谐振器
SMD 32.768KHZ Metal Surface Quartz Crystal Resonator

Features

■ External dimensions: 2.00x 1.20x 0.60mm.
-Standard Frequency: 32.768KHz.
• Applications in mobile phone. Notebook and DSC.

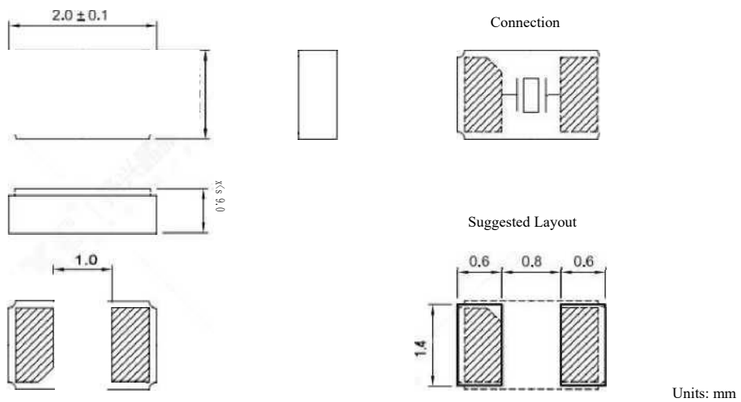
Electrical Specifications

Item / Type **J**	**[YSX2012SK J**
Frequency Tolerance(at 25 °C)	± 20 ppm , *or* specify
Load Capacitance (CL)	12.5 pF,or specify
Parabolic Coefficient (B)	(-0.03 ± 0.01)* 10^{-6} /°C^2
Turnover Temperature (Ti)	25 °C ± 5 °C
Operation Temperature Range	-40-+85°C
Shunt Capacitance (CO)	1.3pF typical
Motional Capacitance (C1)	7.0fF typical
Level Of Drive	0.1 RW
Frequency Aging (at 25 °C)	± 3 ppm/year Max.

Equivalent Series Resistance(ESR)

YSX2012SK	
90KQMax.	

Dimensions



Units: mm

YXC® 扬兴晶振」

YSX1612SC

车展属表面石英晶体谐振器
SMD AEC-Q200 Metal Surface Quartz Crystal Resonator

Features

• External dimensions: 1.60 x1.20 x 0.35mm.
-Standard Frequency: 24 ~60MHz.
-Reflow is possible.
• AEC-Q200 qualified.
-Applications: Bluetooth, GPS, Automotive electronics Industrial electronics

Storage Temperature	-55~ + 125°C

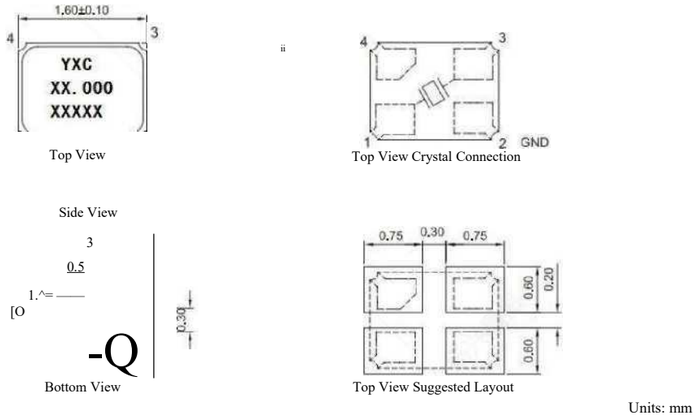
Electrical Specifications

Item / Type	**[YSX1612SC**
Vibration Mode	AT Fundamental
Load Capacitance	8pF； 10pF,or specify
Frequency Tolerance (at 25 *C)	±10 ppm, ± 30 ppm, or specify
Frequency Versus Temperature Characteristics	±50 ppm, or specify
Operating Temperature	-40 ~ + 125°C_f or specify
Storage Temperature	-40 ~ +125 ,C , or specify
Shunt Capacitance	3 pF Max.
Level Of Drive	50 nW Max
Frequency Aging (at 25 °C)	±: 2 ppm/year Max.

Equivalent Series Resistance(ESR)

Fundamental			
24.0-40.0 MHz	150 □ Max.	41.0-66.0 MHz	100 Q Max.

Dimensions



Units: mm

’扬兴晶振］

YSX211SC

车规级贴片金属表面石英晶体谐振器
SMD AEC-Q200 Metal Surface Quartz Crystal Resonator

Features

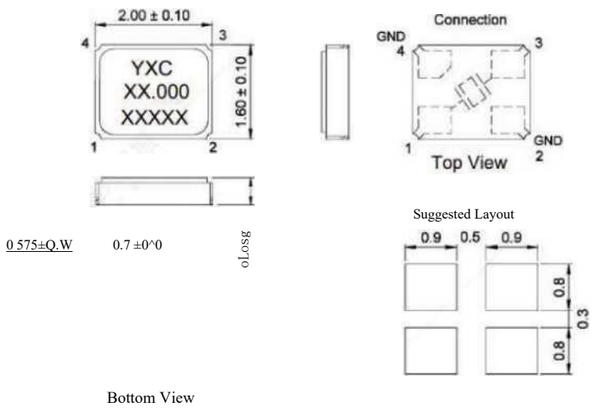
-External dimensions: 2.00 x 1.60 x 0.45 mm.
-Standard Frequency: 16 ~72MHz.
-Reflow is possible.
-AEC-Q200 qualified.
-Applications: Bluetooth, GPS, Automotive electronics Industrial electronics

Item / Type	I YSX211SC
Standard Frequency	16-72 MHz
Vibration Mode	AT Fundamental
Load Capacitance	8pB10pF, or specify
Frequency Tolerance (at 25 °C)	±: 10 ppm, ± 30 ppm, or specify
Frequency Versus Temperature Characteristics	±50 ppm, or specify
Operating Temperature	-40 ~ + 125°C$_f$ or specify
Storage Temperature	-40 ~ +125 °C , or specify
Shunt Capacitance	3 pF Max.
Level Of Drive	100uWMax
Frequency Aging (at 25 °C)	± 2 ppm / year Max.

Equivalent Series Resistance(ESR)

Fundamental		Fundamental	
16.0 ~ 20.0 MHz	200 Q Max.	26.0 ~40.0MHz	100 Q Max.
21.0 -25.0 MHz	120 Q Max.	41.0-72.0 MHz	60 Q Max.

Dimensions



0 575±Q.W 0.7 ±0^0 oLosg

Units: mm

扬兴愿景：与员工客户共成长，共圆中华电子梦！

YSX221SC

车规级贴片金属表面石英晶体谐振器
SMD AEC-Q200 Metal Surface Quartz Crystal Resonator

Features

-External dimensions: 2.50 x 2.00 x 0.55 mm.
-Standard Frequency: 12 ~80MHz.
■ Reflow is possible.
-AEC-Q200 qualified.
-Applications: Bluetooth, GPS, Automotive electronics
Industrial electronics

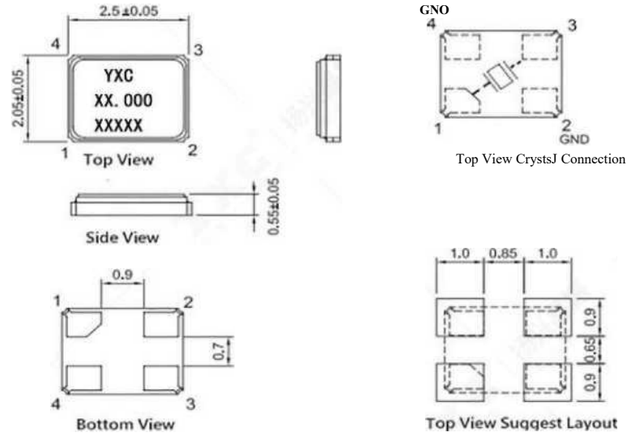
Electrical Specifications

Item / Type	I YSX221SC
Standard Frequency	12-80 MHz
Vibration Mode	AT Fundamental
Load Capacitance	8pE10pF,or specify
Frequency Tolerance (at 25 °C)	±: 10 ppm, ± 30 ppm, or specify
Frequency Versus Temperature Characteristics	±50 ppm, or specify
Operating Temperature	-40 ~ + 125°C, or specify
Storage Temperature	-40 - +125 °C $_f$ or specify
Shunt Capacitance	3 pF Max.
Level Of Drive	100uW Max
Frequency Aging (at 25 °C)	± 2 ppm/year Max.

Equivalent Series Resistance(ESR)

12.0 ~ 15.0MHz	180 Q Max.	21.0-30.0 MHz	100 Q Max.
16.0 -20.0MHz	150 Q Max.	31.0~80.0MHz	60 Q Max.

Dimensions



Units: mm

扬兴价值观：品质为本，服务为根=

扬兴晶振」

YSX321SC

车规融展属表面石英晶体谐振器
SMD AEC-Q200 Metal Surface Quartz Crystal Resonator

Features

■ External dimensions: 3.20x2.50x 0.70mm.
-Standard Frequency:8.0-66MHz.
• Low impedance performance.
•AEC-Q200 qualified.
-Applications: Bluetooth,GPS, Automotive electronics
Industrial electronics

Electrical Specifications

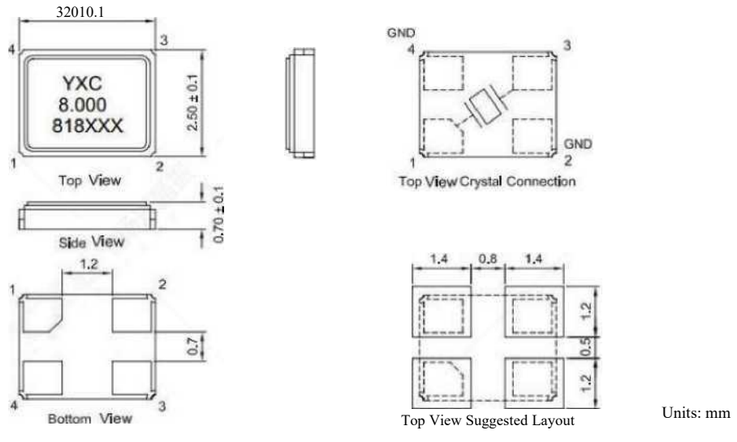
Hem / Type J	**I YSX321SC** J
Vibration Mode	AT Fundamental
Load Capacitance	8pF,12pF,or specify
Frequency Tolerance (at 25 °C)	±10 ppm, ± 30 ppm, or specify
Frequency Versus Temperature Characteristics	±50 ppm, or specify
Operating Temperature	-40 ~ + 125°C, or specify
Storage Temperature	-40 ~ +125,C f or specify
Shunt Capacitance	3 pF Max.
Level Of Drive	200 nW Max
Frequency Aging (at 25 °C)	± 2 ppm/year Max.

Equivalent Series Resistance(ESR)

	Fundamental		
8.0~9.9MHz	800 Q Max.	12.0-12.9 MHz	100 Q Max.
10.0 -10.9MHz	250 Q Max.	13.0-15.9 MHz	80 *Q* Max.
11.0 ~11.9MHz	150Q Max.	16.0-20.9 MHz	70 Q Max

21.0-29.9 MHz	60 Q Max.		
30.0 ~ 66.0 MHz	50 Q Max.		

Dimensions



Units: mm

扬兴使命：高效为客户提供时钟频率器件解决方案。

「扬兴晶振」

YSX530SC

车展属表面石英晶体谐振器
SMD AEC-Q200 Metal Surface Quartz Crystal Resonator

Features

■ External dimensions: 5.00x3.20x 1.10mm.
-Standard Frequency:7.6~54MHz.
• High resolution frequency tolerance is obtained.
• AEC-Q200 qualified.
-Applications: Bluetooth, GPS, Automotive electronics Industrial electronics

Electrical Specifications

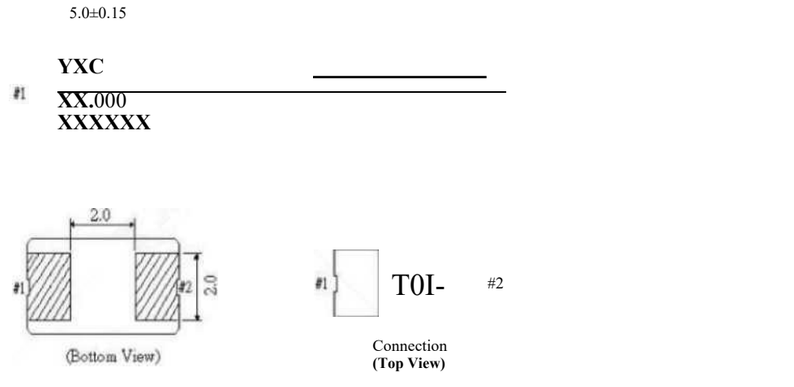
Item / Type J	**1 YSX530SC** J
Vibration Mode	AT Fundamental
Load Capacitance	18pF, 20pF, or specify
Frequency Tolerance (at 25 °C)	± 10 ppm, ± 30 ppm, or specify
Frequency Versus Temperature Characteristics	±50 ppm, or specify
Operating Temperature	-40 ~ +125°C, or specify
Storage Temperature	-40 ~ +125 *C , or specify
Shunt Capacitance	5 pF Max.
Level Of Drive	300 nW Max
Frequency Aging (at 25 *C)	± 2 ppm/year Max.

Equivalent Series Resistance(ESR)

	Fundamental		
7.6 -11.9 MHz	100 *Q* Max.	14.0 -19.9 MHz	50 Q Max.
12.0 -13.9MHz	60 Q Max.	20.0 ~ 54.0 MHz	40 Q Max.

Dimensions

扬兴原景，与品丁客户共成长，共圆中华由子梦！



Units: mm

扬兴晶振」

YSX531SC

车规融展属表面石英晶体谐振器
SMD AEC-Q200 Metal Surface Quartz Crystal Resonator

Features

■ External dimensions: 5.00 x 3.20 x 0.85 mm.

-Standard Frequency: 7.6~54MHz.

- High resolution frequency tolerance is obtained.
- AEC-Q200 qualified.

-Applications: Bluetooth, GPS, Automotive electronics Industrial electronics

Electrical Specifications

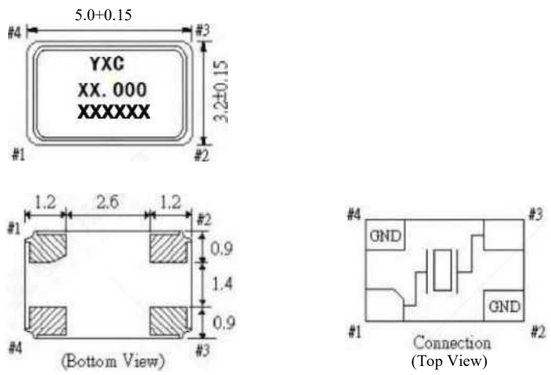
Item / Type	I YSX531SC J
Vibration Mode	AT Fundamental
Load Capacitance	18 pF, 20pF,or specify
Frequency Tolerance (at 25 °C)	± 10 ppm, ± 30 ppm, or specify
Frequency Versus Temperature Characteristics	±50 ppm, or specify
Operating Temperature	-40 ~ + 125°C, or specify
Storage Temperature	-40 ~ +125*C , or specify
Shunt Capacitance	5 pF Max.
Level Of Drive	300 nW Max
Frequency Aging (at 25 *C)	± 2 ppm/year Max.

Equivalent Series Resistance(ESR)

Fundamental

7.6 -11.9 MHz	100 Q Max.	14.0-19.9 MHz	50 Q Max.
12.0-13.9MHz	60 Q Max.	20.0-54.0 MHz	40 Q Max.

Dimensions



Units: mm

「扬兴晶振」

YSX530GA

贴片陶瓷表面石英晶体谐振器
SMD Ceramic Surface Quartz Crystal Resonator

Features

- External dimensions: 5.0x3.2 x 1.2 mm.

-Frequency range: 8MHz~54MHz.

- 2 pads SMD glass sealed crystal units.
- High reliable environmental performance.
- Tight tolerance and stability parts are available.
- Designed for automatic mounting and reflow soldering.
- Reasonable cost and good delivery performance.
- Contains Pb in sealing glass exempted by RoHS directive.

-The best choice of portable PC, PDA, DSC, and USB interface card.

Electrical Specifications

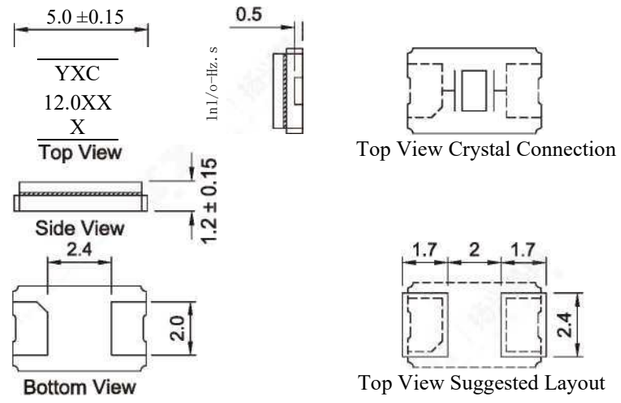
I Item / Tvne	I YSX530GA
Nominal Frequency Range	8 ~54 MHz
Vibration Mode	AT Fundamental
Load Capacitance	12pE 20pE or specify
Frequency Tolerance (at 25 °C)	± 10 ppm, ± 20 ppm, or specify
Frequency Versus Temperature Characteristics	±20 ppm, or specify
Operating Temperature	-20 ~ + 70 °C , - 40 ~ + 85 °C, or specify
Storage Temperature	-40 ~ + 85 *C , or specify
Shunt Capacitance	7 pF Max.
Level Of Drive	1-100 pi W Max. (10 uW typical)
Frequency Aging (at 25 °C)	± 3 ppm/year Max.
Insulation Resistance	More Than 500MQ at DC 100V

Equivalent Series Resistance(ESR)

Fundamental

8 ~12MHz	60 Q ~ 80 Q
12 ~25MHz	40 Q ~ 60 Q
25-54 MHz	30 Q ~ 40 O

Dimension s



Units: mm

「扬兴晶振」

YSX146GA

vcA 贴片陶瓷表面石英晶体谐振器

1，八 SMD Ceramic Surface Quartz Crystal Resonator

Features

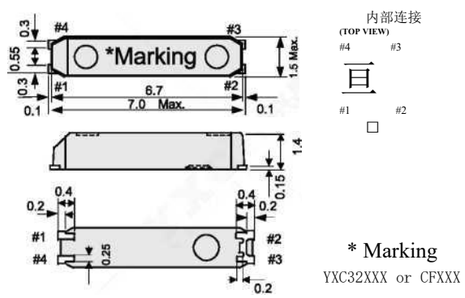
-External dimensions: 7.Ox 1.5 x 1.4 mm /8.0x 3.8x 2.54 mm.
-Frequency range: 32.768KHz.
-portable consumer products reference clocks.
- High reliable environmental performance.
- RoHS compliant/Pb Free.
- Measurement Instrument : S&A 250B(Measured FL).

Electrical Specifications

[Item / Type	I YSX146GA/YSX306GA
Nominal Frequency Range	32.768 KHz
Vibration Mode	+2°X-cut Fundamental
Load Capacitance	12.5pF, or specify
Frequency Tolerance (at 25 °C)	± 20 ppm , or specify
Operating Temperature	40~ + 85°C
Storage Temperature	-55~ + 125°C
Shunt Capacitance	2.0pF typical
Level of Drive	1.0 nW Max.
Frequency Aging (at 25 °C)	± 5 ppm/year Max.
Turnover Temperature	25 °C ± 5 °C
Temperature Coefficient	-0.036 ± 0.006ppm/°C²
Motional Resistance	65KO Max (YSX146GA) / 50KO Max(YSX306GA)
Motional Capacitance	3.0 fF typical

Dimensions

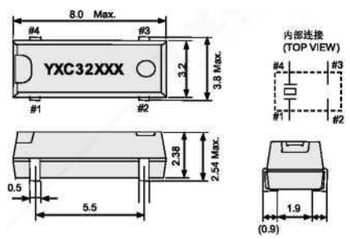
- YSX146GA



内部连接
(TOP VIEW)
#4 #3
#1 #2

* Marking
YXC32XXX or CFXXX

- YSX306GA



Units: mm

「扬兴晶振」

YSO110TR

贴片金属表面振荡器
SMD Metal Surface Oscillator

Features

-Package Size: 1.6*1.2 2.0*1.6 2.5*2.0 3.2*2.5 5.0*3.2 7.0*5.0mm
-Frequency range: 1 MHz ~ 54MHz.
- Ultra Small SMD seam sealed crystal oscillator units.
- Applications: WLAN, Bluetooth, DSC, DSL and other IT product.

Electrical Specifications

Item / Type J	I YSO110TR I
Output Type	CMOS
Supply Voltage	1.8V-3.3V
Oscillation Mode	Fundamental
Frequency Tolerance (at 25°C)	±10ppm $_f$ ±20ppm, or specify
Output Load	15 pF, or specify
Operating Temperature Range	-40~+85°C,-40~+125*C $_f$ or specify
Frequency Versus Temperature Characteristics	± 20ppm, ± 30ppm $_f$ ± 50ppm, or specify
Storage Temperature Range	-55- + 125 °C
Voltage Vol (Max.)/Vol (Min.)	90%Vdd min./10%Vdd max
Symmetry	45-55%
Rise (Tr)/Fall (Tf) Time	4ns Max.
Start-up Time	3msMax.
Supply Current	See Below
Frequency Aging (at 25°C)	± 3 ppm/year Max.

Dimensions

PAD	#1	#2	#3	#4
FUNCTION	Tri-state	GND	OUTPUT	VDD

Notes:

1. To maintain stable operation provide a 0.01uF to 0.1uF by-pass capacitor at a location as near as possible to the power source terminal of the crystal product (between Vcc-GND)

Top View

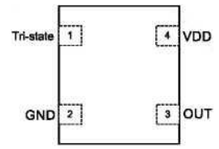
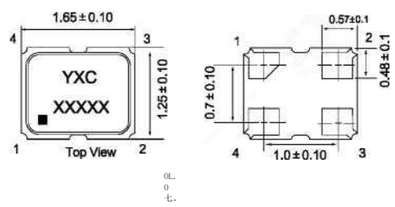


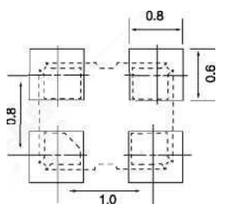
Figure 1. Pin Assignments

Package Size - Dimensions(Unit:mm)

1.6x1.2x0.60mm



Recommended layout Pattern (Unit:mm)



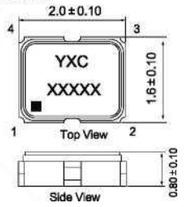
YSO110TR

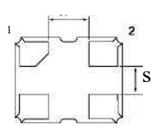
贴片金属表面振荡器
SMD Metal Surface Oscillator

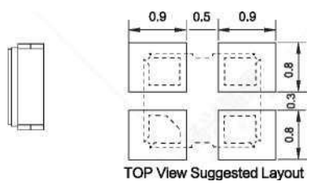
Package Size - Dimensions(Unit:mm)

Recommended layout Pattern (Unit:mm)

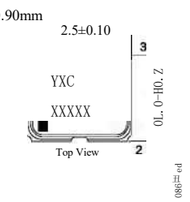
2.0x1.6x0.80mm

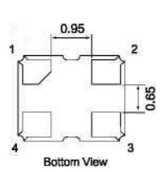


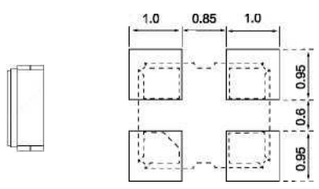




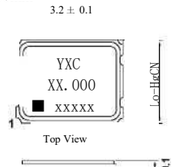
2.5x2.0x0.90mm

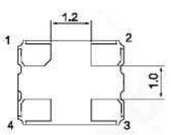


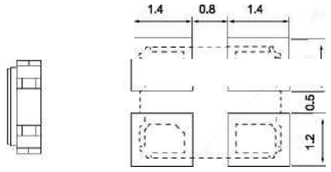




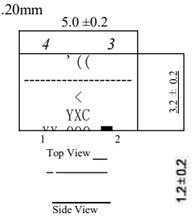
3.2x2.5xi .00mm

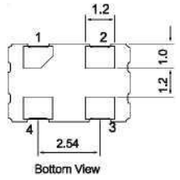


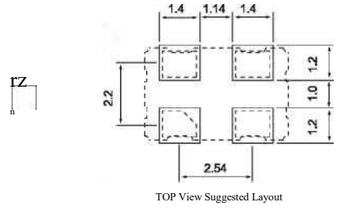




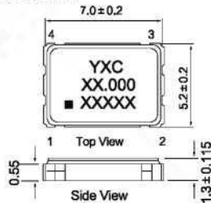
5.0x3.2x1.20mm

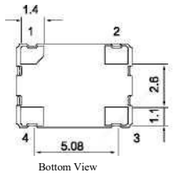


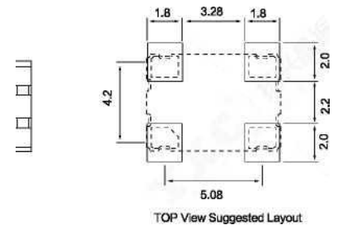




7.0x5.0x1.30mm







YSO130HR

贴片金属表面振荡器
SMD Metal Surface Oscillator

Features

- Package Size: 3.2*2.5 5.0*3.2 7.0*5.0mm
- Frequency range: 1MHz~100MHz.
- Ultra Small SMD seam sealed crystal oscillator units.
- Applications: WLAN, Bluetooth, RTC, DSL and other IT product.
- Tri-state function available

Electrical Specifications

Item / Type	J I YSO130HR
Output Frequency Range	1MHz~100MHz
Output Type	CMOS
Supply Voltage	5V,or specify
Oscillation Mode	Fundamental
Frequency Tolerance (at 25°C)	±10ppm, ±20ppm, or specify
Output Load	15 pF, or specify
Operating Temperature Range	-40~ +85 °C, or specify
Frequency Versus Temperature Characteristics	± 20ppm, ± 30ppm, ± 50ppm, or specify
Storage Temperature Range	-55~ + 125 'C
Voltage Vol (Max.)/Vo I (Min.)	90%Vdd min./10%Vdd max
Symmetry	45-55%
Rise (Tr)/Fall (Tf)Time	4ns Max.
Start-up Time	3 ms Max.
Supply Current	See Below
Frequency Aging (at 25°C)	± 3 ppm/year Max.

Dimensions

PAD	#1	#2	#3	#4
FUNCTION	Tri-state	GND	OUTPUT	VDD

Notes:

1. To maintain stable operation provide a 0.01 uF to 0.1uF by-pass capacitor at a location as near as possible to the power source terminal of the crystal product (between Vcc-GND)

Top View

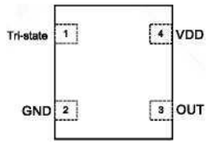
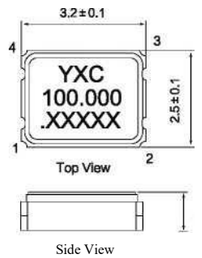


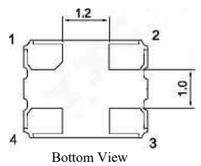
Figure 1. Pin Assignments

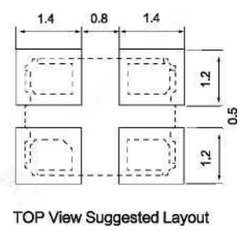
Package Size ~ Dimensions(Umt:mm)

Recommended layout Pattern (Umt:mm)

3.2x2.5x1.00mm





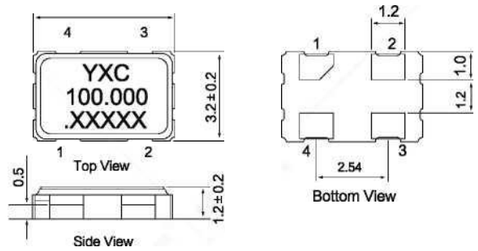


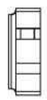
YSO130HR

贴片金属表面振荡器
SMD Metal Surface Oscillator

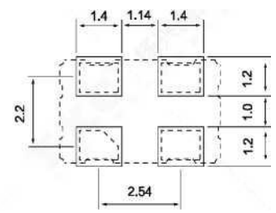
Package Size - Dimensions(Umt:mm)

5.0x3.2x1.2umm



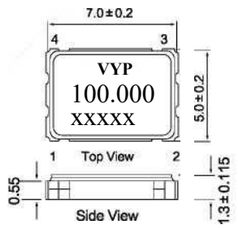


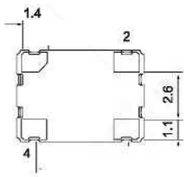
Recommended layout Pattern (Unit:mm)

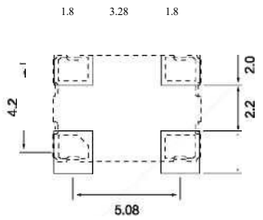


TOP View Suggested Layout

7.0x5.0x1.30mm







TOP View Suggested Layout

★ INPUT CURRENT

Vdc=5V 15pF only		
^^^^Voltage	5V	
Frequenc^^Size	7050/5032	**3225**
1-36MHZ	8mA max	8mA max
36~70MHZ	20mA max	20mA max
70-100MHZ	55mA max	25mA max

「扬兴晶振」

YSO120TK

贴片金属表面振荡器
SMD Metal Surface Oscillator

Features

-Package Size:1.6*1.2 2.0*1.6 2.5*2.0 3.2*2.5 5.0*3.2 7.0*5.0mm
• Frequency range: 32.768KHz.
■ Ultra Small SMD seam sealed clock crystal oscillator units.
• Applications: WLAN, Bluetooth, RTC, DSL and other IT product.
-Tri-state function available

Electrical Specifications

Item / Type	J I YSO120TK
Output Frequency Range	32.768KHZ
Output Type	CMOS
Supply Voltage	1.8V-3.3V
Oscillation Mode	Fundamental
Frequency Tolerance (at 25°C)	±10ppm₍ ±20ppm, or specify
Output Load	15 pF, or specify
Operating Temperature Range	-40-+85 °C, -40~+125°C , or specify
Frequency Versus Temperature Characteristics	± 20ppm, ± 30ppm, ± 50ppm, or specify
Storage Temperature Range	-55~ + 125 °C
Voltage Vol (Max.)/Vo I (Min.)	90%Vdd min./10%Vdd max
Symmetry	45-55%
Rise (Tr)/Fall (Tf)Time	30ns Max.
Start-up Time	3 ms Max.
Supply Current	See Below
Frequency Aging (at 25°C)	± 3 ppm/year Max.

Dimensions

PAD	#1	#2	#3	#4
FUNCTION	Tri-state	GND	OUTPUT	VDD

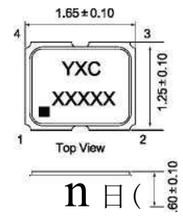
Notes:

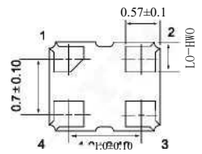
1. To maintain stable operation provide a 0.01 uF to 0.1uF by-pass capacitor at a location as near as possible to the power source terminal of the crystal product (between Vcc-GND)

Figure 1. Pin Assignments

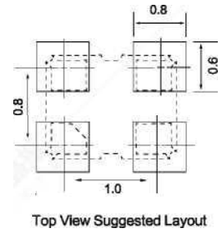
Package Size ~ Dimensions(Umt:mm)

1.6x1 2x0.60mm





Recommended layout Pattern (Umt:mm)



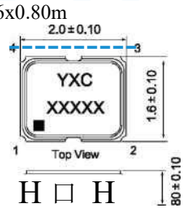
Top View Suggested Layout

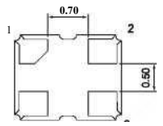
YSO120TK

贴片金属表面振荡器
SMD Metal Surface Oscillator

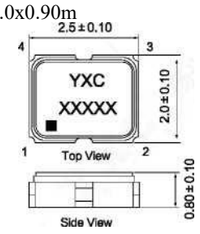
Package Size - Dimensions(Unit:mm)

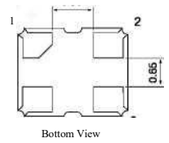
2.0x1.6x0.80mm



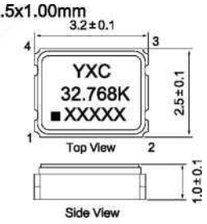


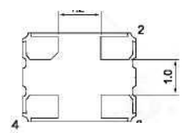
2.5x2.0x0.90mm



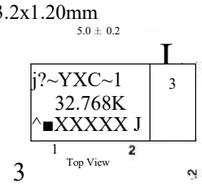


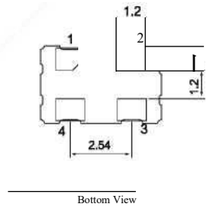
3.2x2.5x1.00mm



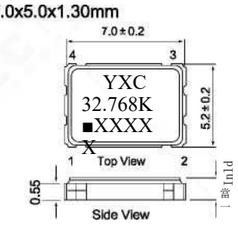


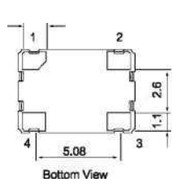
5.0x3.2x1.20mm



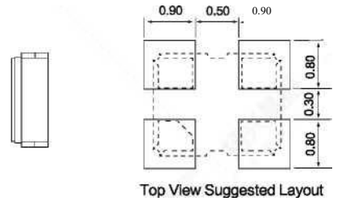


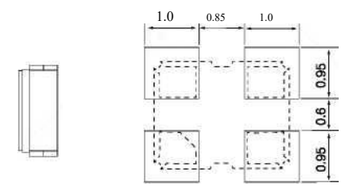
7.0x5.0x1.30mm

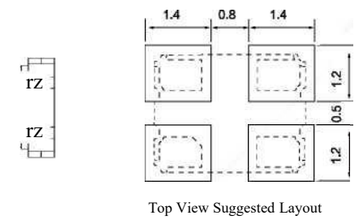


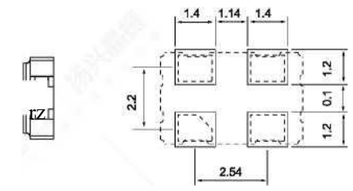


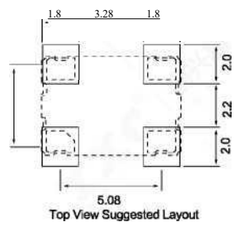
Recommended layout Pattern (Unit:mm)











YSO230LR

贴片金属表面振荡器
SMD Metal Surface Oscillator

Features

-External dimensions: 2.5x2.0x1.1mm 3.2x2.5x1.2mm 5.0x3.2x1.3mm 7.0x5.0x1.6mm.

-Frequency range: 13.5MHz ~200MHz.

• Output LVPECL or LVDS .

■ Quartz Crystal Differential Oscillator.

•High precision characteristic covering up to wide frequency range.

•High stability; low jitter, low power consumption.

-Applications： 10 GB Ethernet, SONET, SATA, SAS, Fibre Channel

Electrical Specifcations

Item / Type ■ /	LVPECL ,7050/5032	LVPECL 3225/2520 」	LVDS 、7050/5032	LVDS 3225/2520	Remarks L i
Output Frequency Range	13.5-200MHZ	13.5-156.25MHZ	13.5-200MHZ	13.5-156.25MHZ	
Supply Voltage	2.5V-3.3V		1.8V, 2.5V-3.3V		
Operating Temperature Range	-40~ + 85°C				
Storage Temperature Range	-55- +125°C				
Total Stability	±50ppm				
Current consumption	80mA Max	50mA Max	60mA Max	40mA Max	OE=Vcc,LVPECL=(50) Q or LVDS=(100) Q
Disable Current	10p AMax				OE=GND
Output Voltage (LVPECL)	VOH=Vcc-1.03 Min		—		DC characteristics
	VOL=Vcc-1.6 Max		-		
Output Voltage (LVDS)	—		VOD= 247~454mV		VOD1, VOD2 DC characteristics
	—		dVOD=50mV Max.		dVOD= I VOD1-VOD2 I
	—		VOS= 1.125-1.375V		VOS1.VOS2
	--		dVOS=50mV Max.		dVOS= I VOS1-VOS2 I
Output Load Condition	L PECL=50Q		—		Terminated to Vcc-2.0V
	—		L LVDS=100Q		Connected between OUT to OUT
lutput Voltage	VIH=70% VccMin, VIL=30%Vcc Max				OE terminal
Output Symmetry	45-55%				
Rise Time/Fall Time	0.8nS Max				LVPECL: Between 20%and 80% of (VOH-VOL), LVDS:Between 20% and 80% Differential Output peak to peak voltage
Start-up time	10mS				Time at minimum supply voltage to be 0 s
Aging	±3ppm				25°C,First year, Vcc=2.5V,3.3V
Phase Jitter (12KHZ-20MHZ)	100MHZ	125MHZ	I 148.5MHZ	156.25MHZ	180MHZ 200MHZ
	0.3ps Typ.	0.1 ps Typ.			

Dimension s

PAD	#1	#2	#3	#4	#5	#6
FUNCTION	OE	NC	GND	OUT+	OUT-	VDD

Notes:
1. To maintain stable operation provide a 0.01 uF to 0.1 uF by-pass capacitor at a location as near as possible to the power source terminal of the crystal producttt between Vcc-GND)

Top View

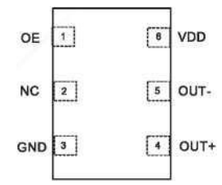


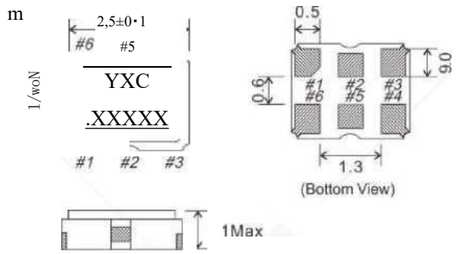
Figure 1. Pin Assignments

YSO230LR

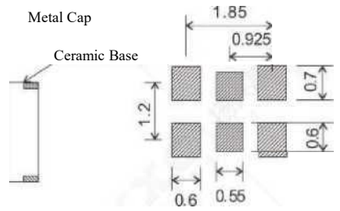
贴片金属表面振荡器
SMD Metal Surface Oscillator

Package Size - Dimensions(Umt:mm)

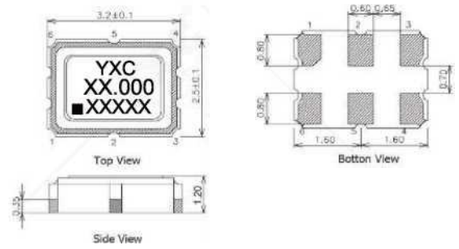
2.5x2.0x1.10mm

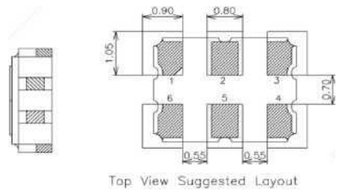


Recommended layout Pattern (Unitmm)

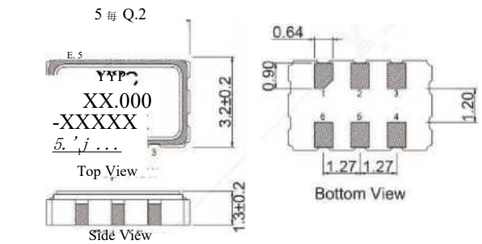


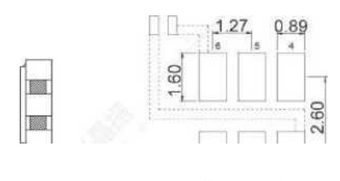
3.2x2.5x1.20mm



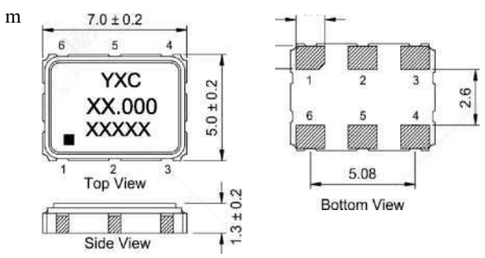


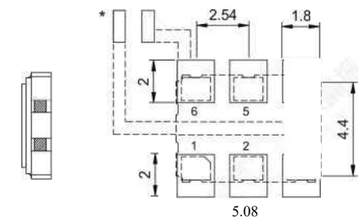
5.0x3.2x1.30mm





7.0x5.0x1.60mm





YSO140TC

车规级贴片金属表面振荡器
AEC-Q200 Oscillators

Features

-Package Size: 1.6*1.2 2.0*1.6 2.5*2.0 3.2*2.5 5.0*3.2 7.0*5.0mm
• AEC-Q200
-Frequency range: 1MHz ~54MHz.
■Ultra Small SMD seam sealed clock crystal oscillator units.
■Applications: TPMS GPS Vehicle backup camera and Voice-Control

Electrical Specifications

1 Item / Type	**J I YSO140TC**
Output Frequency Range	1~54MHz or specify
Output Type	CMOS
Supply Voltage	1.8V ~ 3.3V
Oscillation Mode	Fundamental
Total Tolerance	±50ppm$_f$ ±100ppm, or specify
Output Load	15 pF, or specify
Operating Temperature Range	-40~+85°C$_f$ -40~+125°C, or specify
Storage Temperature Range	-55~ + 125 °C
Voltage Vol (Max.) / Vo 1 (Min.)	90%Vdd min./10%Vdd max
Symmetry	45-55%
Rise(Tr) Time Fall(Ti) Time	5ns/5ns Max.
Start-up Time	3 ms Max.
Output Current	See Below
Frequency Aging (at 25 °C)	± 3 ppm / year Max.

Dimensions

PAD	#1	#2	#3	#4
FUNCTION	Tri-state	GND	OUTPUT	VDD

Notes:

1. To maintain stable operation provide a 0.01uF to 0.1uF by-pass capacitor at a location as near as possible to the power source terminal of the crystal product (between Vcc-GND)

Top View

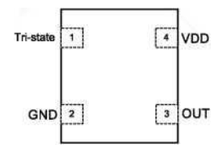
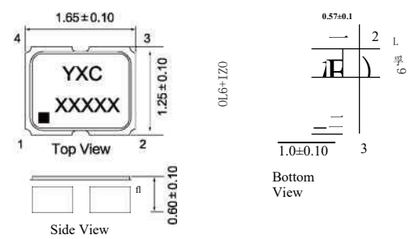


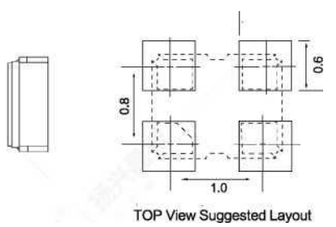
Figure 1. Pin Assignments

Package Size - Dimensions(Unit:mm)

1.6x1.2x0.60mm



Recommended layout Pattern (Unitmm)



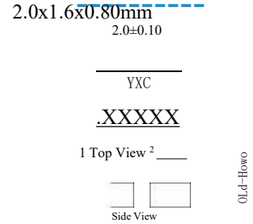
YSO140TC

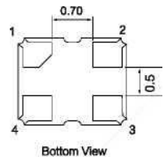
车规级贴片金属表面振荡器
AEC-Q200 Oscillators

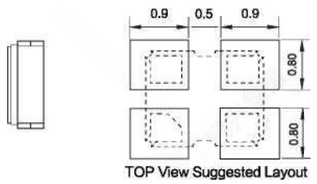
Package Size - Dimensions(Unit:mm)

Recommended layout Pattern (Unit:mm)

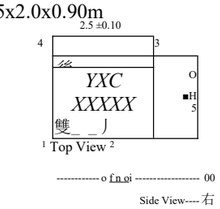
2.0x1.6x0.80mm

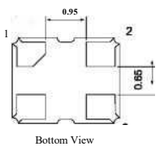


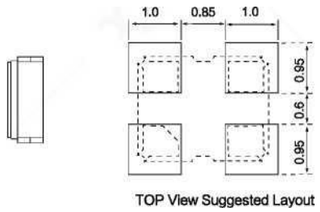




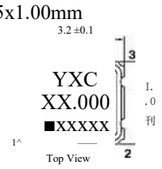
2.5x2.0x0.90mm

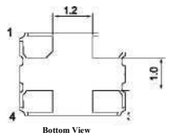


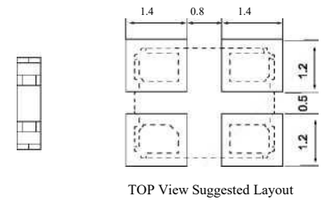




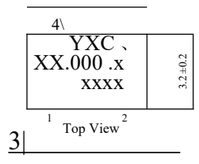
3.2x2.5x1.00mm

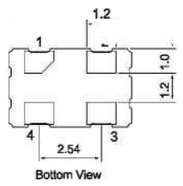




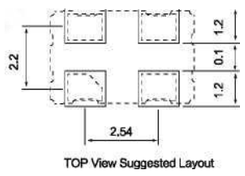


5.0x3.2x1.20mm

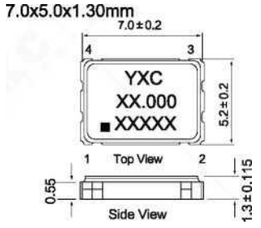


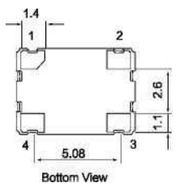


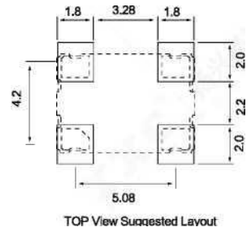
1.4 1.14 1.4



7.0x5.0x1.30mm

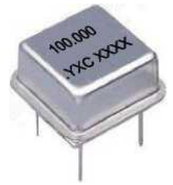






YSO1212SR

直插金属表面振荡器
DIP Metal Surface Oscillator



Features

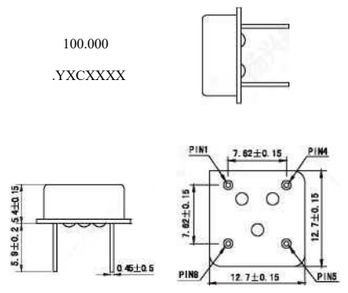
-External dimensions: 12.7 x 12.7 x 5.4 mm.
-Frequency range: 1MHz -100MHz.
-All metal welded package.
-Builtin CMOS IC with tristate function.

Applications

-Monitor, computers, wireless Ian card & wire, CDplayer, HDD,Work station.

Electrical Specifications **Item / Type** J	**[YSO1212SR** j
Output Type	CMOS
Supply Voltage	3.3V/5V, or specify
Oscillation Mode	Fundamental
Frequency Tolerance	± 20ppm, ±25ppm, or specify
Output Load	15 pF, or specify
Operating Temperature Range	-20 ~ + 70 °C , - 40 ~ + 85 °C, or specify
Storage Temperature Range	-40- + 85 °C,- 55 ~ +125°C
Voltage Vol (Max.)/Vo I (Min.)	90%Vdd min./10%Vdd max
Symmetry	40 ~ 60 % Standard
Rise (Tr)/Fall(Tf) Time	10ns Max.
Start-up Time	10ms Max.
Supply Current	30 mA Max. «50MHz)
Frequency Aging (at 25 °C)	士 3 ppm/year Max.

Dimension s



引脚功能定义		
引脚	功能	定义
1	E/D	三态/无三态
4	GND	接地
5	OUTPUT	输出
8	Vdd	电源电压

Units: mm

「扬兴晶振」

YSO1512SR

直插金属表面振荡器
DIP Metal Surface Oscillator

Features

• External dimensions: 20.4x 12.8x 5.3 mm.
-Frequency range: 1MHz ~ 100MHz.
• All metal welded package.
• Builtin CMOS IC with tristate function.

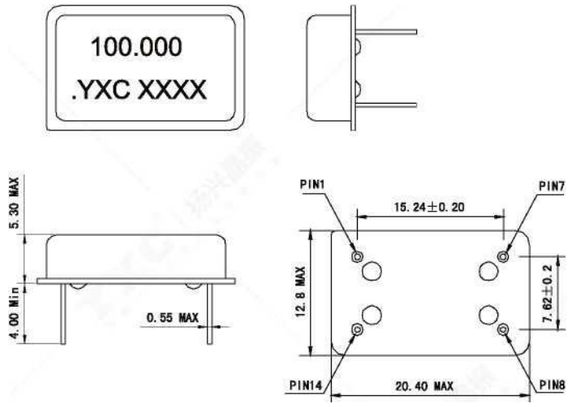
Applications

• Monitor, computers, wireless Ian card & wire,CDplayer, HDD, Work station.

Electrical Specifications

Item / Type	I I YSO1512SR
Output Frequency Range	1 ~ 100 MHz
Output Type	CMOS
Supply Voltage	3.3V/5V, or specify
Oscillation Mode	Fundamental
Frequency Tolerance	± 20ppm, ±25ppm$_f$ or specify
Output Load	15 pF, or specify
Operating Temperature Range	-20 ~ + 70 °C , - 40 ~ + 85 *0, or specify
Storage Temperature Range	-40- + 85 °C,- 55 ~ +125 °C
Voltage Vol (Max.)/Vol (Min.)	90%Vdd min./10%Vdd max
Symmetry	40 ~ 60 % Standard
Rise (Tr)/ Fall (Tf) Time	10 ns Max.
Start-up Time	10ms Max.
Supply Current	30 mA Max. «50MHz)

Dimensions



引脚功能定义		
引脚	功能	定义
1	E/D	三态/无三态
7	GND	接地
8	OUTPUT	输出
14	Vdd	电源电压

Units: mm

「扬兴晶振」

YSO680PR

贴片金属表面可编程振荡器
SMD Metal Surface Programmable Oscillator

Features

• Quartz Crystal Programmable Oscillator
• Any frequency between 1 MHz~108MHz accurate to 6 decimal places
• Operating temperature from -40°C to +85°C
-CMOS compatible output
• Industry-standard packages: 2.5 x 2.0,3.2 x 2.5,5.0 x 3.2,7.0 x 5.0 mm x mm
Applications:
-Ideal for e-Books, clock for MPU, Consumer electronics, etc

Frequency Aging (at 25 °C)	± 3 ppm/year Max.

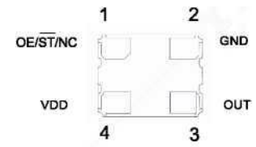
Electrical Specifications

All Min and Max limits are specified over temperature and rated operating voltage with 15 pF output load unless otherwise stated. Typical values are at 25°C and nominal supply voltage.

Parameter	1.8V	2.5 V	3.3 V
Frequency Range	1MHz~108MHz	1MHz~108MHz	1MHz~108MHz
SupplyVoltage Variation(Vdd)10%	1.62V-1.98V	2.25 V-2.75 V	2.97 V-3.63 V
Standby Current	15p A		
Frequency Tolerance	± 20ppm, ±25ppm,± 50ppm, or specify		
Output Load	15 pF, or specify		
Operating Temperature Range	-40 ~ + 85 °C, or specify		
Storage Temperature Range	-55~ + 125°C		
Voltage Vol (Max.)/Vo I (Min.)	VOH=90%Vdd / VOL=10%Vdd		
Duty Cycle	45- 55%		
Start-up Time	10ms Max.		
Supply Current	See Below		
Frequency Aging (at 25°C)	± 3 ppm / year Max.		

Pin Description

Pin	Symbol	Functionality	
1	OE/ST/NC	Output Enable	Pin 1=H: Specified frequency output Pin 1=L: Pin 3 output is low. Specified frequency output stop.
		Standby	Pin 1=H: Specified frequency output Pin 1=L: Pin 3 output is low. Device goes to sleep mode. Supply current reduces to 15 p A(Standby Current).
		No Connect	Pin 1=VDD or Pin 1 is Open. Specified frequency output. Pin 1 has no function.
2	GND	Power	Electrical ground
3	OUT	Output	Oscillator output
4	VDD	Power	Power supply voltage



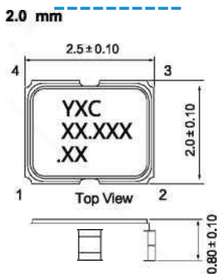
Pin Assignments

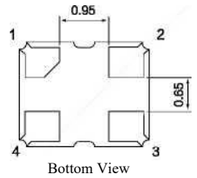
YSO680PR

贴片金属表面可编程振荡器
SMD Metal Surface Programmable Oscillator

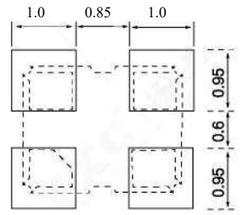
Package Size - Dimensions (Unit: mm)

2.0 mm



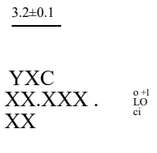


Recommended Land Pattern (Unit: mm)

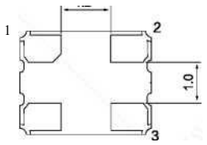


TOP View Suggested Layout

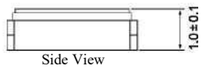
3.2 x 2.5 mm



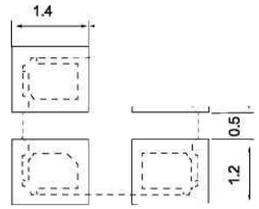
Top View 2



Bottom View

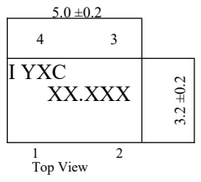


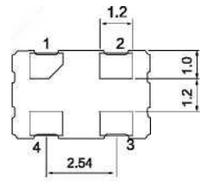
Side View



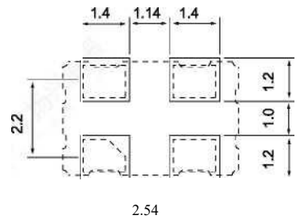
TOP View Suggested Layout

5.0 x 3.2 mm



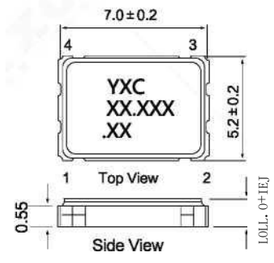


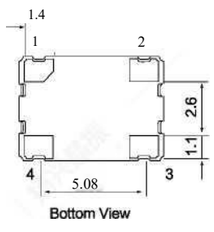
Side View

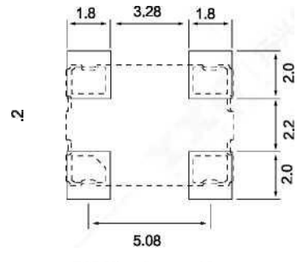


TOP View Suggested Layout

7.0 x 5.0 mm







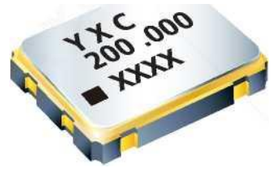
TOP View Suggested Layout

Notes:

1. A capacitor of value 0.01 uF-0.1 uFor higher between Vdd and GND is required.

YSO690PR

贴片金属表面可编程振荡器
SMD Metal Surface Programmable Oscillator



Features

- Quartz Crystal Programmable Oscillator
- Any frequency between 1 MHz~200MHz accurate to 6 decimal places
- Operating temperature from -40°Cto+85°C
- Period Jitter, Typical: 1pSec at 12KHz to 20MHz
- CMOS compatible output

-Industry-standard packages: 2.0x1.6 ,*2.5* x 2.0,3.2 x 2.5,5.0 x 3.2,7.0 x 5.0 mm x mm

Applications:

.Ideal for DSC, DVC, DVR, IP CAM, Tablets, e-Books, SSD, GPON, EPON, etc

-Ideal for high-speed serial protocols such as : USB, SATA, SAS,

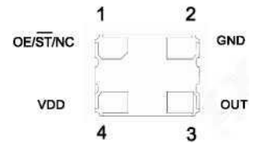
Electrical Specifications

All Min and Max limits are specified over temperature and rated operating voltage with 15 pF output load unless otherwise stated. Typical values are at 25°C and nominal supply voltage.

Parameter	1.8V	2.5 V	3.3 V
Frequency Range	1MHz~125MHz	1MHz~200MHz	1MHz~200MHz
SupplyVoltage Variation(Vdd)10%	1.62V-1.98V	2.25 V-2.75 V	2.97 V-3.63 V
Standby Current	400 nA		
Frequency Tolerance	± 20ppm, ±25ppm,± 50ppm, or specify		
Output Load	15pF, or specify		
Operating Temperature Range	-40 ~ + 85 °C, or specify		
Storage Temperature Range	-55 ~+150 °C		
Voltage Vol (Max.) / Vol (Min.)	VOH = 90%Vdd/VOL = 10% Vdd		
Duty Cycle	45~ 55%		
Period Jitter(@12K-20Mhz)	1.8V=1.5ps 2.5V=1.1ps 3.3V=1ps		
Start-up Time	7 ms Max.		
Supply Current	See Below		
Frequency Aging (at 25 *C)	± 3 ppm/year Max.		

Pin Description

Pin	Symbol	Functionality	
1	OE/ST/NC	Output Enable	H : specified frequency output L : output is low. Specified frequency output stop.
		Standby	H : specified frequency output L : output is low. Device goes to sleep mode. Supply current reduces to 400uA(Standby Current).
		No Connect	Pin 1 = VDD or Pin 1 is Open : Specified frequency output. Pin 1 has no function
2	GND	Power	Electrical ground
3	OUT	Output	Oscillator output
4	VDD	Power	Power supply voltage



Pin Assignments

★ INPUT CURRENT 工作电流

Supply Voltage	Power Dissipaton				
	1.000-30.000	**30.000 ~ 75.000**	**75.000-110.000**	**133.000-166.000**	**166.000-200.000**
1.8V	**18 mA max**	**19 mA max**	**20 mA max**	**20 mA max**	**20 mA max**
2.5 V	**21 mA max**	**22mA max**	**23 mA max**	**24mA max**	**25mA max**
3.3 V	***23* mA max**	**24 mA max**	**25 mA max**	**26 mA max**	**27 mA max**

「扬兴晶振」

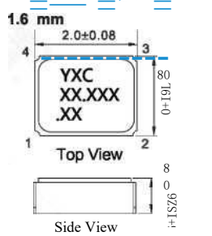
YSO690PR

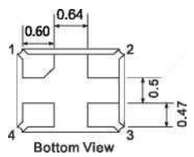
贴片金属表面可编程振荡器
SMD Metal Surface Programmable Oscillator

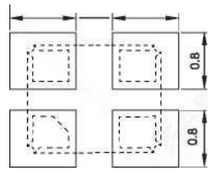
Package Size - Dimensions (Unit: mm)

Recommended Land Pattern (Unit: mm)

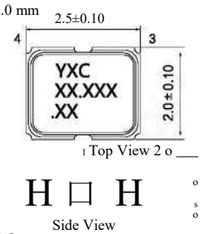
1.6 mm

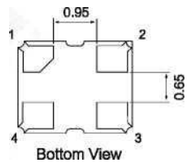


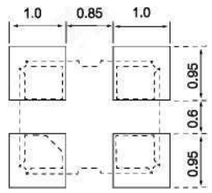




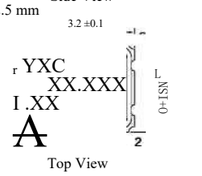
2.5 x 2.0 mm

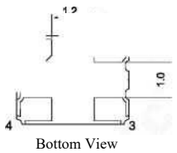


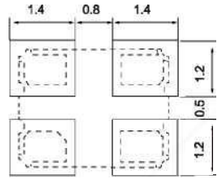




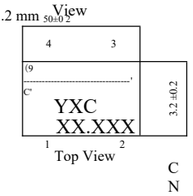
3.2 x 2.5 mm

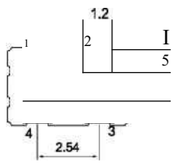


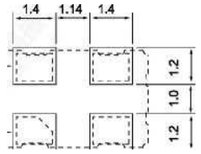




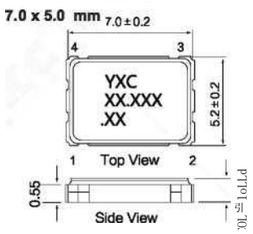
5.0 x 3.2 mm

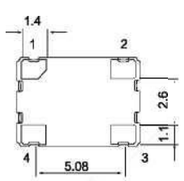


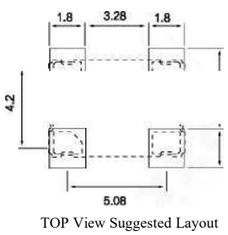




7.0 x 5.0 mm







Notes:
1. A capacitor of value 0.01 pF~0.1pFor higher between Vdd and GND is required.

「扬兴晶振」

YSO210PR

贴片金属表面可编程振荡器
SMD Metal Surface Programmable Oscillator

Features

-External dimensions: 3 .2x2.5x 1.2mm 5.0x3.2x1.3mm 7.0x5.0x1.6mm.
-Frequency range: 10MHz ~ 1 500MHz.
-Output LVPECLorLVDS .
-Quartz Crystal Programmable Differential Oscillator.
•High precision characteristic covering up to wide frequency range.
•High stability, lowjitter, low power consumption.
-Applications： 10 GB Ethernet, SONET, SATA, SAS, Fibre Channel

Electrical Specifications

Item / Type	LVPECL	LVDS	Remarks
Output Frequency Range	10MHZ ~ 1500MHZ		
Supply Voltage	2.5Vdc 士 10%	3.3Vdc ± 10%	
Operating Temperature Range	-40~ +85°C		
Storage Temperature Range	-55- +125°C		
Total Stability	± 50ppm		
Input Resistance	IMohms Typ		
Current consumption	80mA Max	50mA Max	OE=Vcc, LVPECL=(50) Q or LVDS=(100)Q
Disable Current	16mA Typ		OE=GND
Output Voltage (LVPECL)	VOH=Vcc-1.03 Min	—	DC characteristics
	VOL=Vcc-1.6 Max	-	
Output Voltage (LVDS)	—	VOD=175mVMin.	VOD1.VOD2 / DC characteristics
	—	dVOD=50mV Max.	dVOD= | VOD1-VOD2 I
	—	VOS=1.25VTyp.	VOS1, VOS2
	—	dVOS=50mV Max.	dVOS= I VOS1-VOS2 |
Output Load Condition	L PECL=50Q	—	Terminated to Vcc-2.0V
	—	L LVDS=100Q	Connected between OUT to OUT
lutput Voltage	VIH=70% VccMin, VIL=30%Vcc Max		OE terminal
Output Symmetry	45-55%		
Rise Time/FallTime	1nS Max		LVPECL: Between 20%and 80% of (VOH-VOL), LVDS:Between 20% and 80% Differential Output peak to peak voltage
Start-up time	10mS		Time at minimum supply voltage to be 0 s
Phase Jitter (12KHZ-20MHZ)	1.0pS Typ.		200MHZ-800MHZ
	2.0pS Typ.		801MHZ-1500MHZ
Aging	±3ppm		25°C,First year, Vcc=2.5V,33V

Dimensions

PAD	#1	#2	#3	#4	#5	#6
FUNCTION	OE	NC	GND	OUT+	OUT-	VDD

Notes:
1. To maintain stabie operation provide a 0.01 uF to 0.1uF by-pass capacitor at *a* location as near as possible to the power source terminal of the crystal product] between Vcc-GND)

Top View

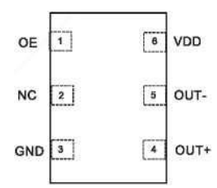


Figure 1. Pin Assignments

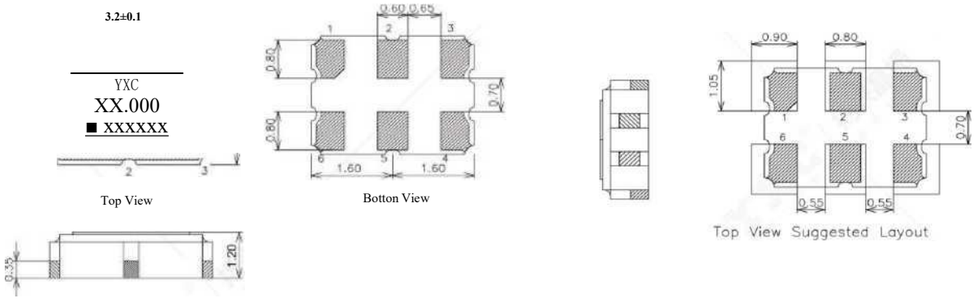
YSO210PR

贴片金属表面可编程振荡器
SMD Metal Surface Programmable Oscillator

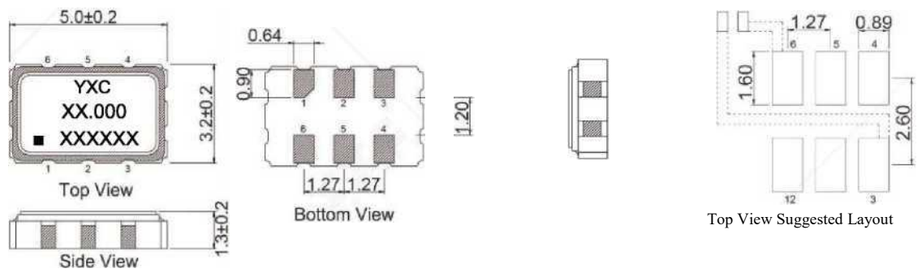
Package Size - Dimensions(Umt:mm)

Recommended layout Pattern (Umt:mm)

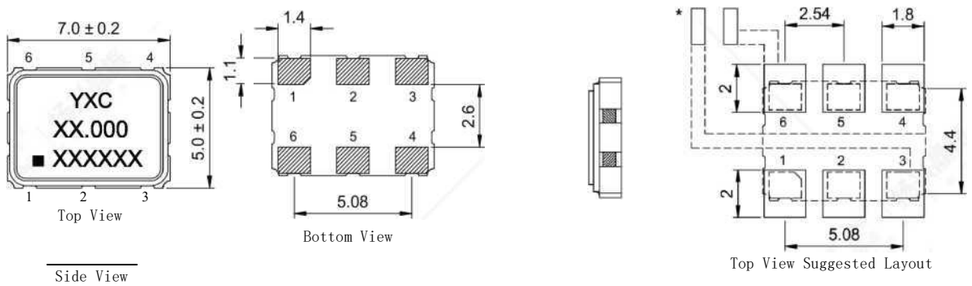
3. 2x2. 5x1. 20mm



5. 0x3. 2x1. 30mm



7. 0x5. 0x1. 60mm



YSV220PR

贴片金属表面可编程振荡器
SMD Metal Surface Programmable Oscillator

Features

-External dimensions: 3 .2x 2.5x 1.2mm 5.0x3.2x1.3mm 7.0x5.0x1.6mm.
-Frequency range: 10MHz -1 500MHz.
-Output LVPECLor LVDS .
-Quartz Crystal Programmable Voltage Controlled Differential Oscillator.
,High precision characteristic covering up to wide frequency range.
■ High stability; low jitter; low power consumption.
-Applications： 10 GB Ethernet, SONET, SATA, SAS, Fibre Channel

Item/Type SMDVCXO	LVPECL	LVDS	Remarks
Output Frequency Range	10MHZ ~ 1500MHZ		
Supply Voltage	2.5Vdc± 10%	3.3Vdc± 10%	
Operating Temperature Range	-40~ +85°C		
Storage Temperature Range	-55~ +125°C		
Total Stability	±50ppm		
Absolute Pull Range	±50ppmMin$_f$		
Input Resistance	IMohms Typ		
Current	80mA Max	50mA Max	OE=Vcc, LVPECL=(50) Q or LVDS=(100) Q
Disable Current	16mA Typ		OE=GND
Output Voltage (LVPECL)	VOH=Vcc-1.03 Min	—	DC characteristics
	VOL=Vcc-1.6 Max	-	
Output Voltage (LVDS)	—	VOD=175mVMin.	VOD1, VOD2
	—	dVOD=50mV Max.	dVOD= I VOD1-VOD2 I
	—	VOS=1.25VTyp.	VOS1, VOS2
	—	dVOS=50mV Max.	dVOS= I VOS1-VOS2 I
Output Load Condition	L PECL=50Q	—	Terminated to Vcc-2.0V
	—	L LVDS=100Q	Connected between OUT to OUT
lutput Voltage	VIH=70% VccMin, VIL=30%Vcc Max		OE terminal
Output Symmetry	45-55%		
Rise Time/FallTime	1nS Max		LVPECL: Between 20% and 80% of (VOH-VOL), LVDS:Between 20% and 80% Differential Output peak to peak voltage
Start-up time	10mS		Time at minimum supply voltage to be 0 s
Phase Jitter (12KHZ-20MHZ)	1.0pS Typ.		200MHZ-800MHZ
	2.0pS Typ.		801MHZ-1500MHZ
Aging	±3ppm		25°C,First year, Vcc=2.5V,3.3V

Dimension s

PAD	#1	#2	#3	#4	#5	#6
FUNCTION	Vcon	OE	GND	OUT+	OUT-	VDD

Top View

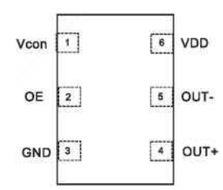


Figure 1. Pin Assignments

Notes:
1. To maintain stable operation provide a 0.01 uF to 0.1uF by-pass capacitor at a location as near as possible to the power source terminal of the crystal product(between Vcc-GND)

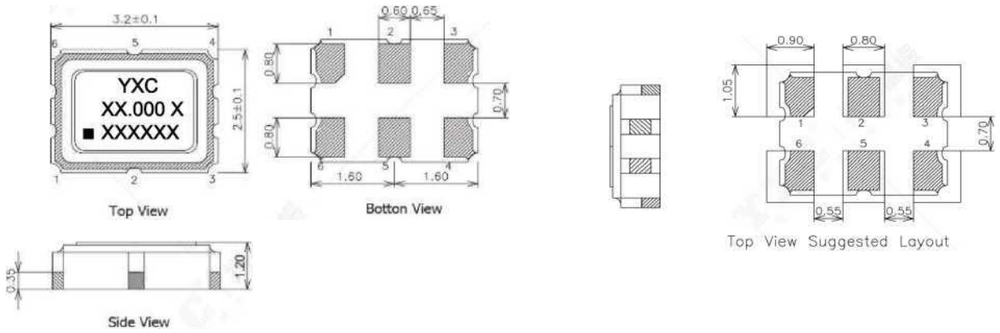
YSV220PR

贴片金属表面可编程振荡器
SMD Metal Surface Programmable Oscillator

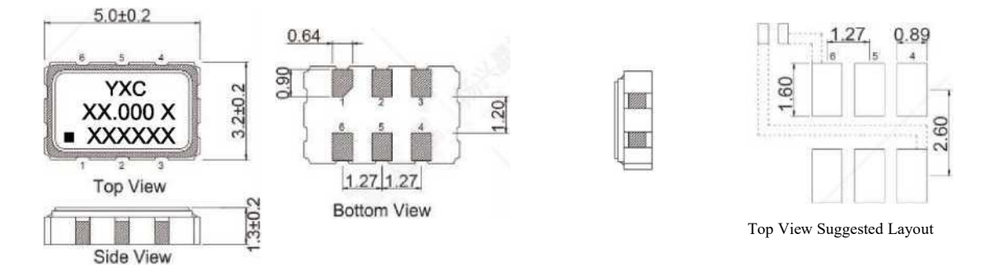
Package Size - Dimensions(Unit:mm)

Recommended layout Pattern (Unit:mm)

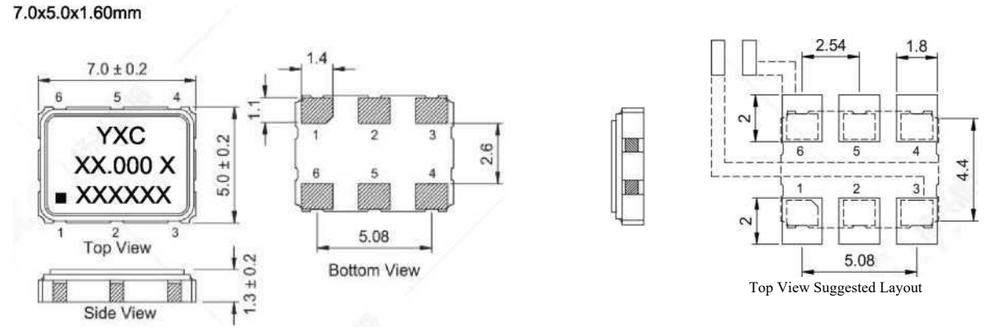
3.2x2.5x1.20mm



5.0x3.2x1.30mm



7.0x5.0x1.60mm



YSV310PR

贴片金属表面可编程振荡器
SMD Metal Surface Programmable Oscillator

Features

-External dimensions: 3 .2x2 .5x 1.2mm 5.0x3.2x1.3mm 7.0x5.0x1.6mm.
-Frequency range: 10MHz -250MHz.
■ Output CMOS .
■Quartz Crystal Programmable Voltage Controlled Oscillator.
-High precision characteristic covering up to wide frequency range.
-High stability; low jitter, low power consumption.
-Applications： 10 GB Ethernet, SONET, SATA, SAS, Fibre Channel

Electrical Specifications

Item/Type SMD VCXO [1]	I CMOS J
Output Frequency Range	10MHZ ~ 250MHZ
Supply Voltage	2.5Vdc + 10% 3.3Vdc ± 10%
Operating Temperature Range	-40~ +85°C
Storage Temperature Range	-55 - +125°C
Total Stability	±50ppm
Absolute Pull Range	±50ppmMin
Input Resistance	IMohms Typ
Current	40mA Max
Output Load condition CMOS	15PF
Output Voltage	VOH=90%Vcc Min
	VOL=10%Vcc Max
Input Voltage	VIH=70% Vcc Min, VIL=30%Vcc Max
Symmetry	45-55%
Rise Time/FallTime	4nS Max
Start-up time	10mS Max
Phase Jitter (12KHZ-20MHZ)	1.0pS Typ.
Aging（25X,First year, Vcc=2.5V,3.3V)	±3ppm

Dimensions

PAD	#1	#2	#3	#4	#5	#6
FUNCTION	Vcon	NC	GND	OUT	NC	VDD

Notes:
1. To maintain stable operation provide a 0.01uF to 0.1uF by-pass capacitor at a location as near as possible to the power source terminal of the crystal product(between Vcc-GND)

Top View

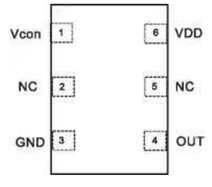


Figure 1. Pin Assignments

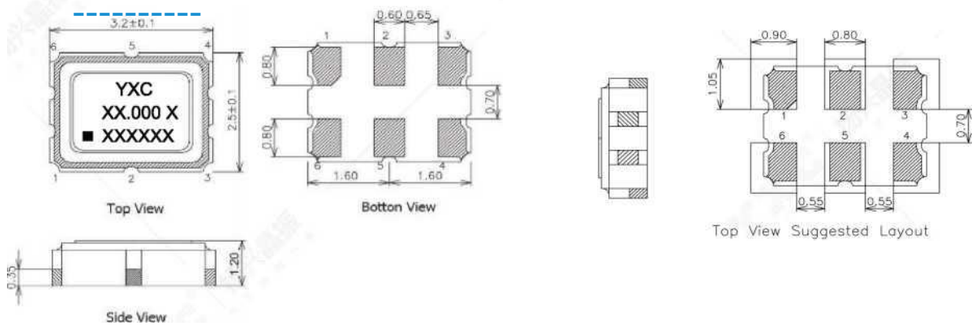
YSV310PR

贴片金属表面可编程振荡器
SMD Metal Surface Programmable Oscillator

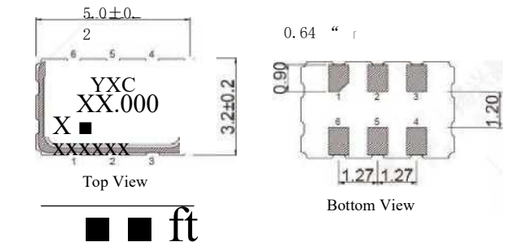
Package Size - Dimensions(Unit:mm)

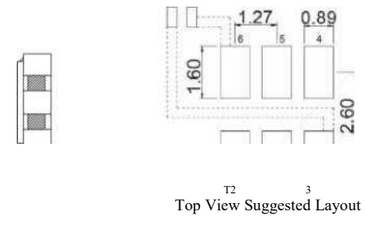
Recommended layout Pattern (Unit:mm)

3.2x2.5x1.20mm

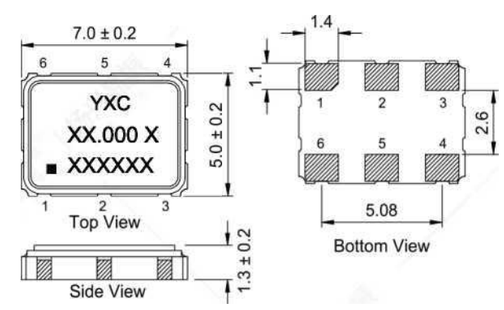


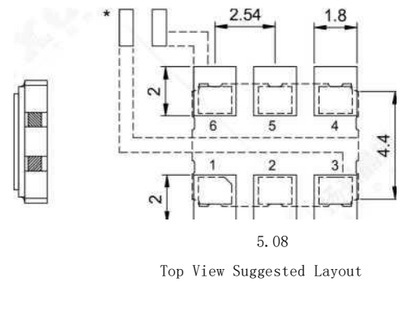
5.0x3.2x1.30m
m





7.0x5.0x1.60mm





MEMS 可编程振荡器

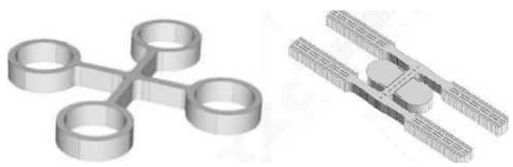
MEMS Programmable Oscillator

■ MEMS Resonators

(1) MEMS Resonators

Revolutionary TempFlat™ MEMS Resonators

All-silicon MEMS resonators are at the core of MEMS-based silicon oscillator and clock generator products. These extremely stable and ultra-robust resonators, based on TempFlat MEMS technology, are manufactured using standard CMOS process equipment in semiconductor fabs, using silicon on insulator (SOI) wafers. The resonators are vacuum-sealed in silicon and can be packaged in cost-effective plastic packages.There are both kHz and MHz frequency resonators. With sub-uA power consumption, kHz frequency resonators are typically used for time-keeping applications (e.g. real time clocks) and power management (e.g. sleep, wake-up functions)(Fig.1). MHz resonators are used as references in various serial and parallel protocols where data transfer



speed is critical(Fig.2).

TempFlat MEMS Technology

Until recently, all MEMS-based oscillators used complex compensation circuitry to stabilize the output

(Fig.1) MHz Resonator (Fig.2) KHz Resonator

frequency over temperature. TempFlat MEMS resonator technology is a revolutionary breakthrough that reduces the need for temperature compensation. 32 kHz families are the first generation of devices to employ TempFlat MEMS technology. Uncompensated TempFlat MEMS -based 32 kHz timing devices have frequency stability that is two times better than 32 kHz quartz crystals. Plus, TempFlat MEMS-based 32 KHz solutions consume much less power and board space compared to quartz-based timing devices.

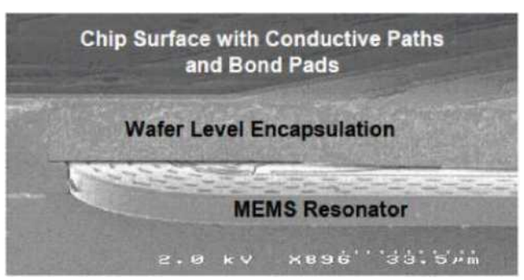
Integrated Timing Functionality

MEMS resonators are the first and only solutions that enable complete integration of timing within a semiconductor package. Because resonators are manufactured using the MEMS First process, they can be cost-effectively embedded with another SOC die inside a plastic package. This unique capability offers the benefits of increased system performance and reliability, simplified system design, and reduced technical support. SOC vendors who use MEMS resonators can now provide a complete, highly-accurate embedded clocking solution without the need for any external timing components.

1.1 Manufacturing MEMS

Manufacturing TempFlat™ MEMS Resonators

MEMS resonators uses a process called MEMS First ™.This process produces very small silicon resonator die that are fully vacuum-sealed in silicon, extremely stable and highly durable. Because this process uses state-of-the-art CMOS foundry tools and materials, MEMS are highly manufacturable with excellent yields, quality and reliability.



(Fig.3)Chip Surface with Conductive Paths and Bond Pads

Features	Benefits
- TempFlat MEMS resonators use single-crystal silicon	, 100% predictable from lot to lot , Simpler temperature compensation scheme, better stability, lower power and lower cost
- High temperature in-process encapsulation to protect MEMS structure	- Annealing results in higher long term reliability and zero drift
■ Standard materials and processes	■ Leverage existing supply chain for lower cost
- Industry standard process-control and six sigma philosophy	, 90%+ yields, <1 DPPM quality, zero MEMS failures to date

(Fig.4)MEMS First™ Features and Benefits The MEMS First Process

Prior to the development of the MEMS First process, packaging was the key barrier to commercializing MEMS resonators. This barrier was overcome through this process by successfully encapsulating resonators within individual micro -vacuum chambers on silicon wafers.

The resonator structure is first etched in a silicon on insulator (SOI) layer using a deep reactive ion etching (DRIE) process. After the resonators are etched, the wafer surfaces are planarized by filling the trenches with oxide. The oxide is patterned to form contact holes that allow electrical connection to the resonator. Thin silicon layers are grown on top of the oxide and vents are patterned to allow removal of the oxide that surrounds the resonator beams. Oxide is removed with hydrofluoric acid vapor to create freestanding resonator beams, allowing the resonators to vibrate.

Final encapsulation using Epi-Seal™ process, an exceptionally clean epitaxial sealing method, is essential to forming stable resonators. This process is the only demonstrated fabrication process that produces MEMS resonators with stability. Within high-temperature epitaxial reactors, the resonators and vacuum cavities are cleaned with hydrogen and chlorine gas. The resonators are sealed with a durable poly silicon cap that protects the resonator die and enable them to withstand very high pressure.

Electrical vias are formed to the resonators and electrodes by etching and filling trenches. Electrical interconnects are made with aluminum traces and bond pads. The process is completed with final deposition of silicon oxide and nitride scratch masks steps. The resulting wafers can be back-grounded to less than 100m thick and packaged with industry standard IC packaging processes such as plastic molding, flip chip and chip stack.

1.2 Integration

Silicon MEMS resonators are available in die form and can be cost-effectively embedded with other die inside a standard plastic semiconductor package(Fig.5). Integrating a MEMS resonator offers numerous benefits. By completely eliminating external timing circuits, systems designers will experience enhanced performance, reduced board space, reduced support costs and faster time to revenue.

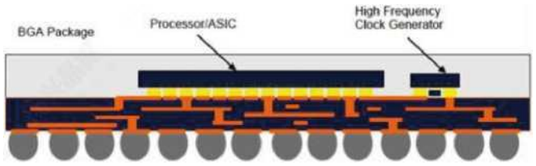
*Integration enables a high precision clock (±5 PPM or ±25 PPM)

*Eliminates all external clocks to simplify system design and reduce board space

*Simplifies technical support. Reduces customer issues related to bad layout practices, incorrect decoupling/filtering, and selection of un-matched / inappropriate crystal resonator/ oscillator

’Compatible with any standard packaging technology

*Enables a standard supply chain: scalable, shorter lead times, reduced BOM



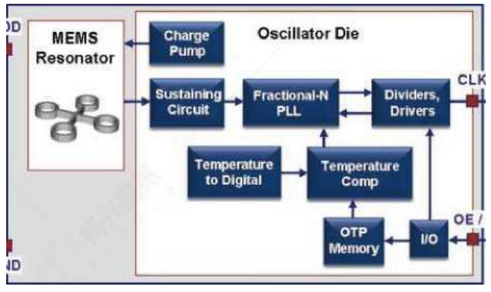
(Fig.5) BGA Package

(2) MEMS Oscillation

Silicon MEMS-based oscillators are manufactured completely in Silicon.The timing devices comprise a MEMS resonator die mounted to a programmable analog oscillator die encapsulated within a cost-effective, standard plastic package.

2.1 Architecture

A MEMS oscillator combines a MEMS resonator die with a programmable oscillator IC. Both die are mounted together through a stacked-die or flip-chip process and co-packaged in industry-standard plastic packages or chip-scale packaging.

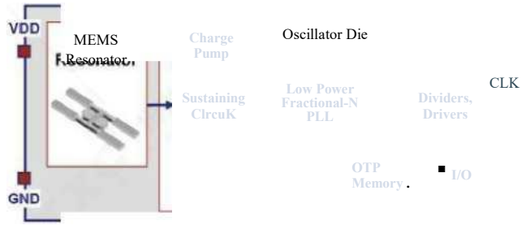


(Fig.6) MEMS Oscillator Architecture
with TempFlat Technology

A MEMS resonator is connected to the MEMS -specific circuit blocks on the analog oscillator IC and is driven through electrostatic excitation (Fig.6). A MEMS bias generator is used to bias the electrostatic transducers that are built in the MEMS die. The resonator sustaining circuit brings the resonator into mechanical oscillation.

The output frequency is configured through use of a Fractional-N phase locked loop (PLL) located on the analog oscillator die. In most families, the output drivers enable configurable drive strength for best matching of transmission line impedances and to reduce system EMI. On -chip one time programmable (OTP) memory is used to store the configuration parameters.

TempFlat™ MEMS technology, first deployed in the SiT15xx 32 kHz families, reduces the need for temperature compensation. This simplifies the design of the analog oscillator IC, reduces system size and lowers power consumption. In some MEMS oscillator families, the functional blocks associated with temperature compensated can be eliminated (Fig.7). For precision timing applications, ultra-performance XOs and differential XOs employ a temperature sensor and a temperature to digital converter which work with the Frac-N PLL to perform temperature compensation.



(Fig.7)MEMS Oscillator Architecture
with Temperature Compensation

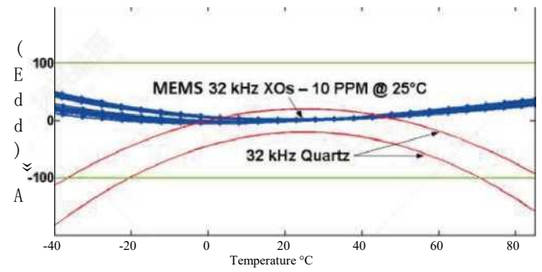
2.2 Stability Performance

MEMS Oscillator Frequency Stability

The frequency output of all oscillators varies over temperature. This variation is a crucial performance specification that is expressed as frequency stability and measured in parts per million (PPM). This stability rating is inclusive of variation over temperature, voltage, process and soldering.

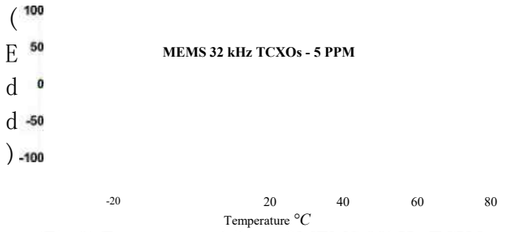
32 kHz Frequency Stability

In terms of frequency stability, revolutionary TempFlat™ MEMS 32 kHz oscillators are two times more accurate than quartz XTALs. The measured frequency variation of MEMS-based 32 kHz oscillators is plotted in blue lines as shown below. The red lines represent the frequency variation range of 32 kHz crystal resonators (XTALs). At room temperature (25° C), 32 kHz devices are trimmed to< 10 PPM, while quartz XTALs demonstrate 20 PPM variation. Over the entire industrial temperature range, the devices exhibit < 75 to 100 PPM stability compared to typical quartz XTALs with -160 to -200 PPM.



(Fig.8) MEMS VS Quartz

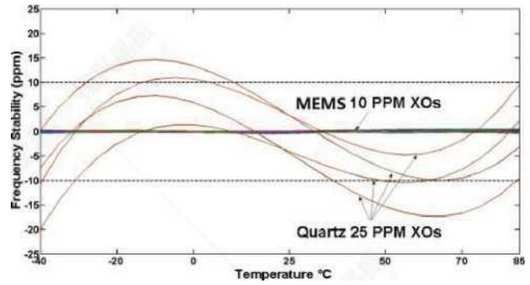
With temperature compensation added, 32 kHz TCXOs exhibit frequency stability well within their ±5 PPM specification over temperature as shown below(Fig.9). The devices has achieved TCXO-level stability in a timing solution that consumes up to 50% less power and is up to 80% smaller than quartz-based solutions.



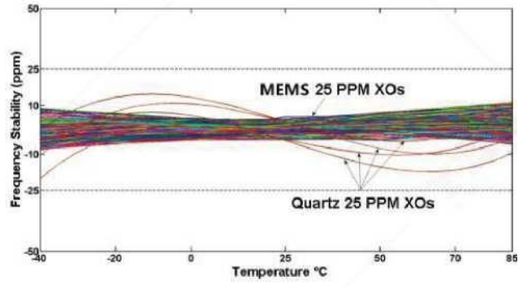
(Fig.9) Frequency stability of MEMS 32kHz TCXOs

MHz Oscillator Frequency Stability

The frequency variation of standard AT cut quartz crystal oscillators is shown below(Fig.10), along with the stability of typical MEMS oscillators. Since revolutionary MEMS oscillators have built-in temperature compensation, these devices exhibit very flat frequency stability over the entire industrial temperature range, with adequate margin at the low and high temperatures to meet the specifications of high performance applications.



(Fig. 10) The frequency variation MEMS vs Quartz 25 PPM XOs, as shown in the plot below (Fig.11),have better frequency stability characteristics compared to quartz 25 PPM XOs.



(Fig.11) MEMS vs Quartz

2.3 Phase Noise Performance

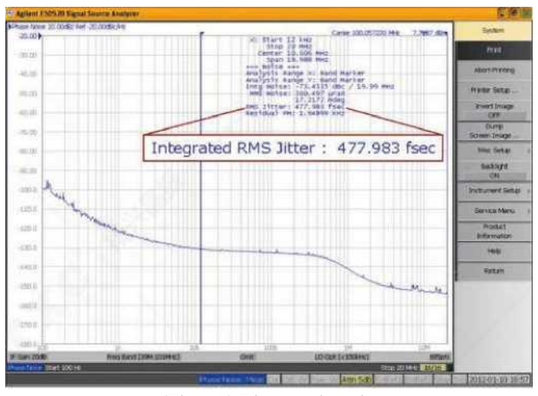
Low Phase Noise and Jitter of MEMS Oscillators

Phase noise is a key specification that is very important to the performance and operation of the system. Wireless and GPS applications

have stringent requirements for close-in phase noise (< 10 kHz offset) while serial communications applications such as SONET, Gigabit and 10 Gigabit Ethernet, SATA, SAS, FibreChannel, PCI-Express, USB have specifications for RMS phase jitter (integrated over 12 kHz to 20 MHz offsets of the carrier frequency).

The phase noise and phase jitter of MEMS oscillators has seen dramatic improvement over the past 3 years. Newer devices, such as the Encore platform based single-ended and differential products (SiT820x and SiT912x) offer typical RMS phase jitter of 500 femto-seconds, and a maximum of 1 ps, integrated from 12 kHz to 20 MHz. No other MEMS oscillator offers such performance.

(Fig.11) below shows an example of a phase noise plot for a 100 MHz MEMS oscillator (12 kHz to 20 MHz) with 478 femtoseconds of integrated RMS phase noise.



(Fig. 12) Phase noise plot

2.4 Quality/Reliability

Highest Reliability, Robustness and Resilience

MEMS oscillators have superior reliability (operating life), robustness (ability to withstand shock and vibration) and resilience. MEMS resonators are made of silicon and manufactured in ultra-clean semiconductor foundries using proven design rules to ensure high yield and semiconductor-level quality. The qualification and lifetime testing results lead to a mean time between failure (MTBF) of more than 1000 million hours (FIT<1). Silicon MEMS devices demonstrate shock and vibration resistance of 50,000 g and 70 g respectively.

	MEMS Oscillators
Reliability/MTBF	1000 million hours
Shock Resistance	50,000 *g* shock
Vibration Resistance	70 *g* vibration

(Fig.13) The result of the test

2.5 Packaging

Drop-in Replacements for Quartz

A variety of industry-standard packages enable 100% drop-in replacement of quartz devices. Because these devices are pin compatible and fit onto common quartz oscillator PCB pad layouts, board design changes are not required to upgrade from quartz to MEMS devices.

Smallest Oscillator Package

To support space requirements of ultra-small applications, μPower oscillators are available in tiny 1.5 x 0.8 x 0.6H mm CSP (chip-scale packages). These μPower devices are the world's smallest oscillators and the first available in CSP.

Lower-profile Packages

MEMS resonators are thinner than any packaged quartz crystal. Standard packages are 0.75 to 0.90 mm thick, depending on the footprint size.

Plastic Packaging

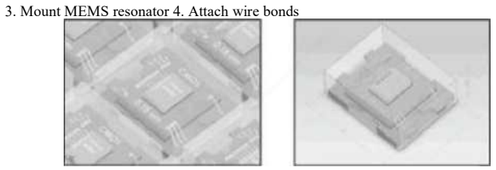
MEMS resonators and the companion oscillator ICs are molded into plastic packages. The low cost plastic injection molded packages is for higher reliability, lower lead inductance and improved thermal performance.

The industry-standard plastic packages are widely used throughout the electronics industry and are available from numerous suppliers.

Standard Semiconductor Packaging Processes

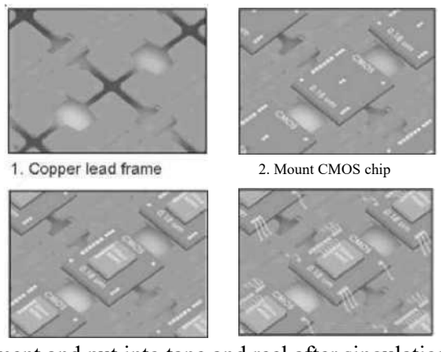
MEMS-based tinning devices follow a standard semiconductor packaging flow.Slicon MEMS resonators are vacuum sealed using an advanced Epi-Seal™ process, which eliminates foreign particles, improves reliability, and enables use of modern packaging technologies.

The packaging flow(Fig.14) represents the process used for MHz oscillators packaged in quad flat no-lead (QFN) packages. After dicing, MEMS and CMOS chips are mounted, typically in a stacked die arrangement, on lead frame strips or substrates either by flip chip or standard die attach. They are wire bonded with thin gold or copper wires. The populated lead frames or substrates are then transfer molded. The molded devices are singulated and tested on standard handling and automated test equipment.



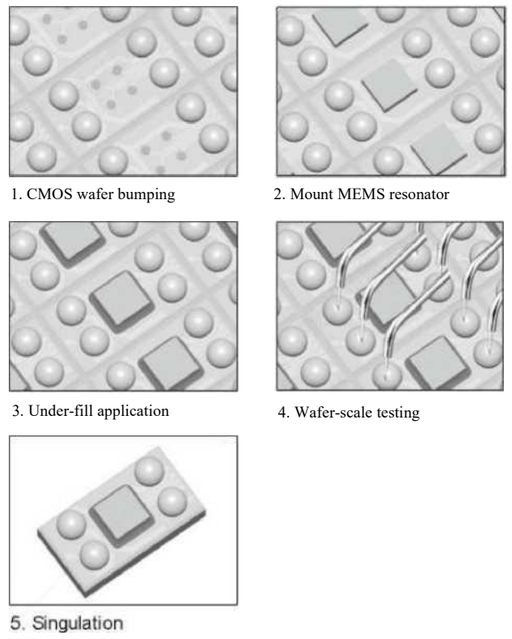
(Fig.14) MHz oscillators packaging

The flow(Fig.15) shows the process for packaging ultra-small p Power oscillators in wafer-level chip scale packages (WLCSP). The MEMS and CMOS wafers are bumped at wafer-scale in a standard chip scale assembly line. The MEMS die are diced and flip-chipped to the CMOS wafer and then epoxy under-fill is applied to the flip-chip interface. The two-die WLCSP wafer is then tested at wafer scale using standard automated test



equipment and put into tape and reel after singulation.

(Fig. 15) ultra-small μPower oscillators packaging



Features:

- Low Power Programmable Oscillator
- Any frequency between 1 MHz and 110 MHz accurate to 6 decimal places
- 100% pin-to-pin drop-in replacement to quartz-based XO
- Operating temperature from -40° C to 85° C.
- Low power consumption of 3.5 mA typical at 1.8V
- Standby mode for longer battery life, fast startup time of 5 ms
- LVCMOS/HCMOS compatible output
- Industry-standard packages: 2.0 x 1.6,2.5 x 2.0,3.2 x 2.5,5.0 x 3.2, 7.0 x 5.0 mm x mm

Applications:

- Ideal for DSC, DVC, DVR, IP CAM, Tablets, e-Books, SSD, GPON, EPON, etc
- Ideal for high-speed serial protocols such as: USB, SATA, SAS, Firewire, 100M/1G/10G Ethernet, etc.

Electrical Specifications

Table 1. Electrical Characteristics

All Min and Max limits are specified over temperature and rated operating voltage with 15 pF output load unless otherwise stated. Typical values are at 25°C and nominal supply voltage.

Parameters						Condition
Frequency Range						
Output Frequency Range		1	-	110	MHz	
Frequency Stability and Aging						
Frequency Stability	F_stab	-20	-	+20	ppm	Inclusive of initial tolerance at 25°C, 1 st year aging at 25°C, and variations over operating temperature, rated power supply voltage and load.
		-25	—	+25	PPm	
		-50	—	+50	PPm	
Operating Temperature Range						
Operating Temperature Range	T_use	-20	—	+70	°C	Extended Commercial
		-40	-	+85	°C	Industrial
Supply Voltage and Current Consumption						
Supply Voltage	Vdd	1.62	1.8	1.98	V	
		2.25	2.5	2.75	V	
		2.52	2.8	3.08	V	
		2.7	3.0	3.3	V	
		2.97	3.3	3.63	V	
		2.25	—	3.63	V	
Current Consumption	Idd		3.8	4.5	mA	No load condition, f = 20 MHz, Vdd = 2.8V to 3.3V
			3.7	4.2	mA	No load condition, f = 20 MHz, Vdd = 2.5V
			3.5	4.1	mA	No load condition, f = 20 MHz, Vdd = 1.8V
OE Disable Current	I_OD		—	4.2	mA	Vdd = 2.5V to 3.3V, OE = GND, Output in high-Z state
			-	4.0	mA	Vdd = 1.8V, OE = GND, Output in high-Z state
Standby Current	I_stri		2.1	4.3	MA	ST = GND, Vdd = 2.8V to 3.3V, Output is weakly pulled down
			1.1	2.5	MA	ST = GND, Vdd = 2.5V, Output is weakly pulled down
			0.2	1.3	MA	ST = GND, Vdd = 1.8V, Output is weakly pulled down
LVCMOS Output Characteristics						
Duty Cycle	DC	45	—	55	%	All Vdds. See Duty Cycle definition in Figure 3 and Footnote 8
Rise/Fall Time	Tr,Tf	—	1	2	ns	Vdd = 2.5V, 2.8V, 3.0V or 3.3V, 20% - 80%
		—	1.3	2.5	ns	Vdd =1.8^ 20%-80%
		—	—	2	ns	Vdd = 2.25V - 3.63V, 20% - 80%
Output High Voltage	VOH	90%	—	—	Vdd	IOH = -4 mA (Vdd = 3.0V or 3.3V) IOH = -3 mA (Vdd = 2.8V and Vdd = 2.5V) IOH =-2 mA (Vdd = 1.8V)
Output Low Voltage	VOL	—	—	10%	Vdd	IOL = 4 mA (Vdd = 3.0V or 3.3V) IOL = 3 mA (Vdd = 2.8V and Vdd = 2.5V) IOL = 2 mA (Vdd = 1.8V)

Table 1. Electrical Characteristics (continued)

Parameters						Condition
Input Characteristics						
Input High Voltage	VIH	70%	-	-	Vdd	Pin tOEorST
Input Low Voltage	VIL	—	—	30%	Vdd	Pin 1,OE or ST
Input Pull-up Impedance	Z_in	50	87	150	kQ	Pin 1, OE logic high or logic low, or ST logic high
		2	-	-	MQ	Pin 1, ST logic low
Startup and Resume Timing						
Startup Time	T_start	—	-	5	ms	Measured from the time Vdd reaches its rated minimum value
Enable/Disable Time	T_oe	—	—	130	ns	f = 110 MHz. For other frequencies, T_oe = 100 ns + 3 * cycles
Resume Time	T_resume	—	-	5	ms	Measured from the time ST pin crosses 50% threshold
Jitter						
RMS Period Jitter	TJitt		1.8	3	PS	f = 75 MHz, Vdd = 2.5V, 2.8V, 3.0V or 3.3V
			1.8	3	PS	f = 75 MHz, Vdd = 1.8V
Peak-to-peak Period Jitter	T_pk		12	25	PS	f = 75 MHz, Vdd = 2.5V, 2.8V, 3.0V or 3.3V
			14	30	PS	f = 75 MHz, Vdd = 1.8V
RMS Phase Jitter (random)	T_phj		0.5	0.9	PS	f = 75 MHz, Integration bandwidth = 900 kHz to 7.5 MHz
			1.3	2	PS	f = 75 MHz, Integration bandwidth = 12 kHz to 20 MHz

Table 2. Pin Description

Symbol		Functionality	
1	OE/ST/NC	Output Enable	H〔1】: specified frequency output L: output is high impedance. Only output driver is disabled.
		Standby	H〔1】: specified frequency output L: output is low (weak pull down). Device goes to sleep mode. Supply current reduces to I_std.
		No Connect	Any voltage between 0 and Vdd or Open"】: Specified frequency output. Pin 1 has no function.
2	**GND**	Power	Electrical ground
3	**OUT**	Output	Oscillator output
4	**VDD**	**Power**	Power supply voltage?

Notes:

1. In OE or ST mode, a pull-up resistor of 10 kQ or less is recommended if pin 1 is not externally driven. If pin 1 needs to be left floating, use the NC option.
2. A capacitor of value 0.1 pF or higher between Vdd and GND is required.

Top View

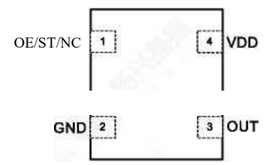
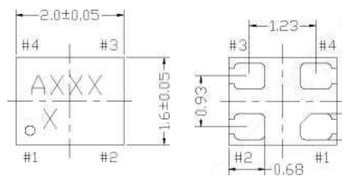


Figure 1. Pin Assignments

Dimensions and Patterns

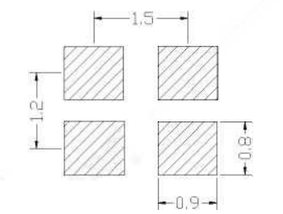
Package Size - Dimensions (Unit: mm)^

2.0 x 1.6x0.75 mm

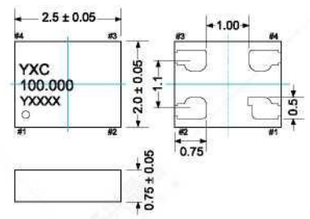
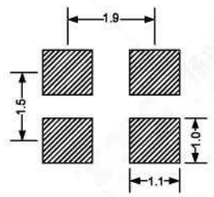
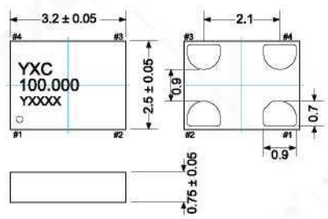
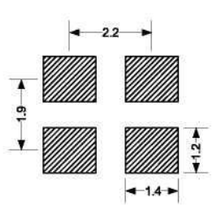
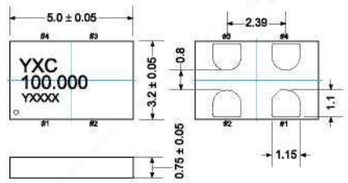
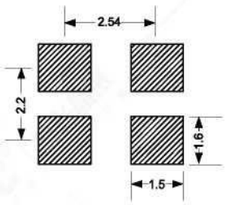
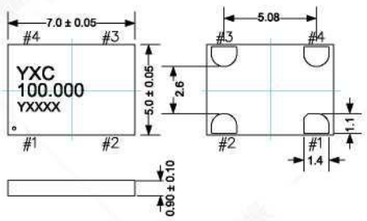
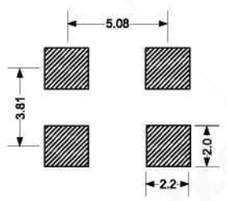


0,75±0,05

Recommended Land Pattern (Unit: mm)



Dimensions and Patterns

Package Size – Dimensions (Unit: mm)[3]	Recommended Land Pattern (Unit: mm)[4]
2.5 x 2.0 x 0.75 mm 	
3.2 x 2.5 x 0.75 mm 	
5.0 x 3.2 x 0.75 mm 	
7.0 x 5.0 x 0.90 mm 	

Notes:

3. Top marking: Y denotes manufacturing origin and XXXX denotes manufacturing lot number. The value of Y will depend on the assembly location of the device.
4. A capacitor of value 0.1 pF or higher between Vdd and GND is required.

Features:

- Any frequency between 115 MHz and 137 MHz accurate to 6 decimal places
- 100% pin-to-pin drop-in replacement to quartz-based XO
- Excellent total frequency stability as low as ±20 ppm
- Operating temperature from -40° C to 85° C.
- Low power consumption of 4.9 mA typical at 1.8V
- Standby mode for longer battery life. Fast startup time of 5 ms
- LVCMOS/HCMOS compatible output
- Industry-standard packages: 2.0 x 1.6, 2.5 x 2.0, 3.2 x 2.5, 5.0 x 3.2, 7.0 x 5.0 mm x mm

Applications:

- Ideal for GPON/GPON, network switches, routers, servers, embedded systems
- Ideal for Ethernet, PCI-E, DDR, etc.

Electrical Specifications

Table 1. Electrical Characteristics

All Min and Max limits are specified over temperature and rated operating voltage with 15 pF output load unless otherwise stated. Typical values are at 25° C and nominal supply voltage.

Parameters	Symbol	Min.	Typ.	Max.	Unit	Condition
Frequency Range						
Output Frequency Range	f	115		137	MHz	
Frequency Stability and Aging						
Frequency Stability	F_stab	-20	—	+20	PPm	Inclusive of Initial tolerance at 25°C, 1 st year aging at 25°C, and variations over operating temperature, rated power supply voltage and load.
		-25	—	+25	PPm	
		-50	—	+50	PPm	
Operating Temperature Range						
Operating Temperature Range	T_use	-20	—	+70	°C	Extended Commercial
		-40	—	+85	°C	Industrial
Supply Voltage and Current Consumption						
Supply Voltage	Vdd	1.62	1.8	1.98	V	
		2.25	2.5	2.75	V	
		2.52	2.8	3.08	V	
		2.7	3.0	3.3	V	
		2.97	3.3	3.63	V	
		2.25	—	3.63	V	
Current Consumption	Idd	-	6.2	7.5	mA	No load condition, f= 125 MHz, Vdd = 2.8V, 3.0V, 3.3V or 2.25 to 3.63V
			5.5	6.4	mA	No load condition, f= 125 MHz, Vdd = 2.5V
			4.9	5.6	mA	No load condition, f = 125 MHz, Vdd = 1.8V
OE Disable Current	I_OD		—	4.2	mA	Vdd = 2.5V to 3.3V, OE = GND, Output in high-Z state
			—	4.0	mA	Vdd = 1.8V, OE = GND, Output in high-Z state
Standby Current	I_std		2.6	4.3	pA	ST = GND, Vdd = 2.8V to 3.3V, Output is weakly pulled down
			1.4	2.5	pA	ST = GND, Vdd = 2.5V, Output is weakly pulled down
			0.6	1.3	pA	ST = GND, Vdd = 1.8V, Output is weakly pulled down
LVCMOS Output Characteristics						
Duty Cycle	DC	45	—	55	%	All Vdds
Rise/Fall Time	Tr,Tf	—	1	2	ns	Vdd = 2.5V, 2.8V, 3.0V or 3.3V, 20% - 80%
		—	1.3	2.5	ns	Vdd=1.8V,20%-80%
		—	0.8	2	ns	Vdd = 2.25V - 3.63V, 20% -80%
Output High Voltage	VOH	90%	—	—	Vdd	IOH = Y mA (Vdd = 3.0V or 3.3V)
Output Low Voltage	VOL	—	-	10%	Vdd	IOL = 4 mA (Vdd = 3.0V or 3.3V)

Table 1. Electrical Characteristics (continued)

Parameters						Condition
Input Characteristics						
Input High Voltage	VIH	70%	—	—	Vdd	Pin1,OE or ST
Input Low Voltage	VIL	—	—	30%	Vdd	Pin 1,OE or ST
Input Pull-up Impedance	ZJn	50	87	150	kQ	Pin 1, OE logic high or logic low, or ST logic high
		2	—	—	MQ	Pin 1, ST logic low
Startup and Resume Timing						
Start up Time	T_start	-	-	5	ms	Measured from the time Vdd reaches its rated minimum value
Enable/Disable Time	T_oe	-	-	122	ns	f = 137 MHz. For other frequencies, T_oe = 100 ns + 3* cycles
Resume Time	T_resume	-	-	5	ms	Measured from the time ST pin crosses 50% threshold
Jitter						
RMS Period Jitter	TJitt		1.9	3	PS	f= 125 MHz, Vdd = 2.5V, 2.8V, 3.0V or 3.3V
			1.8	4	PS	f=125 MH 乙 Vdd = 1.8V
Peak-to-peak Period Jitter	T_pk		12	25	PS	f= 125 MH 乙 Vdd = 2.5V, 2.8V, 3.0V or 3.3V
			14	30	PS	f= 125 MH 乙 Vdd = 1.8V
RMS Phase Jitter (random)	T_phj		0.5	0.9	PS	Integration bandwidth = 900 kHz to 7.5 MHz
			1.3	2	PS	Integration bandwidth = 12 kHz to 20 MHz

Table 2. Pin Description

Pin	Symbol	Functionality	
1	OE/ ST/NC	Output Enable	H"】: specified frequency output L: output is high impedance. Only output driver is disabled.
		Standby	H 「]: specified frequency output L: output is low (weak pull down). Device goes to sleep mode. Supply current reduces to l_std.
		No Connect	Any voltage between 0 and Vdd or Open"】: Specified frequency output. Pin 1 has no function.
2	GND	Power	Electrical ground
3	OUT	Output	Oscillator output
4	VDD	Power	Power supply voltage。

Notes:

1. In OE or ST mode, a pull-up resistor of 10 kQ or less is recommended if pin 1 is not externally driven. If pin 1 needs to be left floating, use the NC option.
2. A capacitor of value 0.1 pF or higher between Vdd and GND is required.

Top View

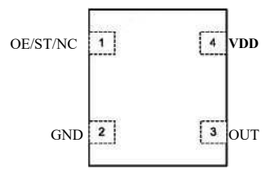
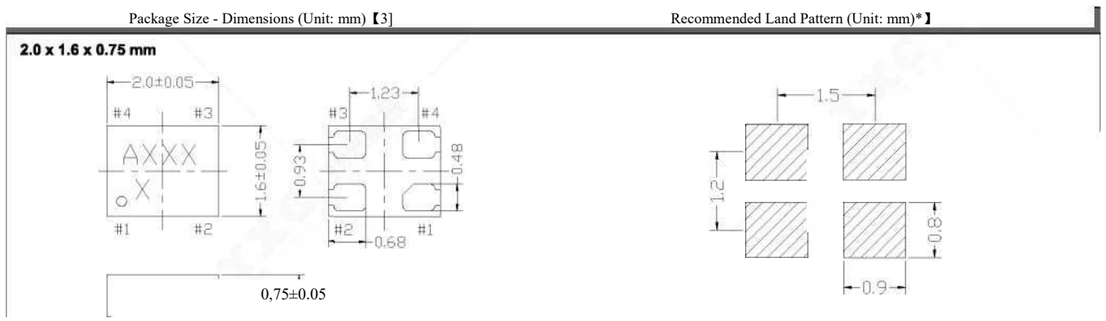


Figure 1. Pin Assignments

Dimensions and Patterns

Package Size - Dimensions (Unit: mm)【3] Recommended Land Pattern (Unit: mm)*】

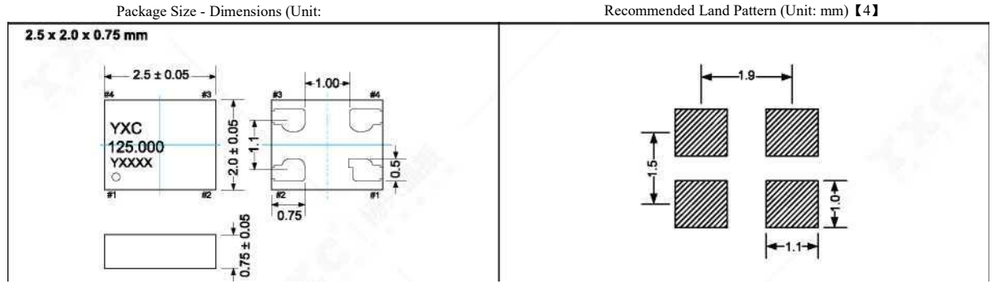
2.0 x 1.6 x 0.75 mm



Dimensions and Patterns

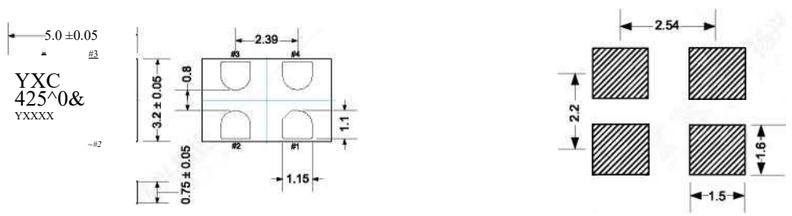
Package Size - Dimensions (Unit: Recommended Land Pattern (Unit: mm)【4】

2.5 x 2.0 x 0.75 mm

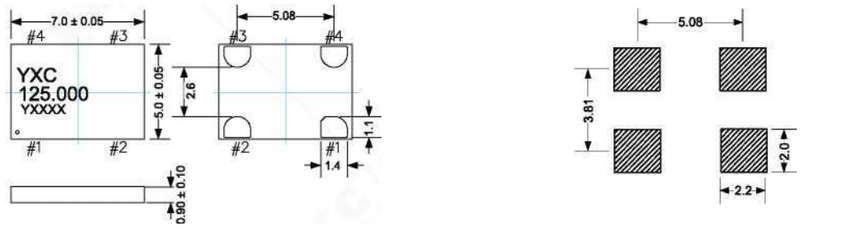


3.2 x 2.5 x 0.75 mm

5.0x3.2x0.75 mm

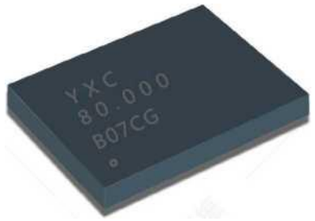


7.0 x 5.0 x 0.90 mm



Notes:

3. Top marking: Y denotes manufacturing origin and XXXX denotes manufacturing lot number. The value of'V will depend on the assembly location of the device.
4. A capacitor of value 0.1 pF or higher between Vdd and GND is required.



Features

- Any frequency between 1 and 80 MHz accurate to 6 decimal places
- 100% pin-to-pin drop-in replacement to quartz-based oscillators
- Ultra low phase jitter: 0.5 ps (12 kHz to 20 MHz)
- Frequency stability as low as ±10 PPM
- Industrial or extended commercial temperature range
- LVCMOS/LVTTL compatible output
- Standard 4-pin packages: 2.5 x 2.0, 3.2 x 2.5, 5.0 x 3.2, 7.0 x 5.0 mm x mm
- Outstanding silicon reliability of 2 FIT or 500 million hourMTBF
- Ultra short lead time

Applications

- SATA, SAS, Ethernet, PCI Express, video, WiFi
- Computing, storage, networking, telecom, industrial control

Electrical

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Frequency Range						
Output Frequency Range	f	1		80	MHz	
Frequency Stability and Aging						
Frequency Stability	F_stab	-10		+10	PPM	Inclusive of Initial tolerance at 25 °C, and variations over operating temperature, rated power supply voltage and load
		-20		+20	PPM	
		-25		+25	PPM	
		-50		+50	PPM	
First year Aging	F_aging	-1.5		+1.5	PPM	25°C
10-year Aging		-5		+5	PPM	25°C
Operating Temperature Range						
Operating Temperature Range	T_use	-20		+70	P	Extended Commercial
		-40		+85	°C	Industrial
Supply Voltage and Current Consumption						
Supply Voltage	Vdd	1.71	1.8	1.89	V	Supply voltages between 2.5V and 3.3V can be supported.
		2.25	2.5	2.75	V	
		2.52	2.8	3.08	V	
		2.97	3.3	3.63	V	
Current Consumption	Idd		31	33	mA	No load condition, f = 20 MHz, Vdd = 2.5V, 2.8V or 3.3V
			29	31	mA	No load condition, f = 20 MHz, Vdd = 1.8V
OE Disable Current	I_OD			31	mA	Vdd = 2.5V, 2.8V or 3.3V, OE = GND, output is Weakly Pulled Down
				30	mA	Vdd = 1.8 V. OE = GND, output is Weakly Pulled Down
Standby Current	I_std			70	MA	Vdd = 2.5V, 2.8V or 3.3V, ST = GND, output is Weakly Pulled Down
				10	MA	Vdd = 1.8 V. ST = GND, output is Weakly Pulled Down
LVCMOS Output Characteristics						
Duty Cycle	DC	45		55	%	
Rise/Fall Time	Tr,Tf		1.2	2	ns	15 pF load, 10%-90% Vdd
Output Voltage High	VOH	90%			Vdd	IOH = -6 mA, IOL = 6 mA, (Vdd = 3.3V, 2.8V, 2.5V) IOH --3 mA, IOL - 3 mA, (Vdd - 1.8V)
Output Voltage Low	VOL			10%	Vdd	
Input Characteristics						
Input Voltage High	VIH	70%			Vdd	Pin 1,OE or ST
Input Voltage Low	VIL			30%	Vdd	Pin 1,OE or ST
Input Pull-up Impedance	ZJn		100	250	*kQ*	Pin 1, OE logic high or logic low, or ST logic high
		2			*MQ*	Pin 1, ST logic low

Note:
1. All electrical specifications in the above table are specified with 15 pF output load and for all Vdd(s) unless otherwise stated.

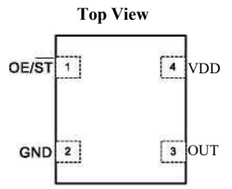
Electrical Characteristics"

Parameter						Condition
Startup and Resume Timing						
Startup Time	T_start	-	7	10	ms	Measured from the time Vdd reaches its rated minimum value
OE Enable/Disable Time	T oe	-	-	150	ns	f = 80 MHz, For other frequencies, T_oe = 100 ns + 3 cycles
Resume Time	T_resume	—	6	10	ms	In standby mode, measured from the time ST pin crosses 50% threshold. Refer to Figure 5.
Jitter						
RMS Period Jitter	TJitt	-	1.5	2	PS	
		-	2	3	ps	f=75 MHz, Vdd = 1.8V
RMS Phase Jitter (random)	T_phj	-	0.5	1	ps	f = 10 MHz, Integration bandwidth = 12 kHz to 20 MHz

Note:
1. All electrical specifications in the above table are specified with 15 pF output load and for all Vdd(s) unless otherwise stated.

Pin Configuration

Pin	Symbol	Functionality	
1	OE/ST	Output Enable	H or Open[2】： specified frequency output L: output is high impedance. Only output driver is disabled.
		Standby	H or Open【2】： specified frequency output L: output is low (weak pull down). Device goes to sleep mode. Supply current reduces to I_std.
2	GND	Power	Electrical ground^】
3	OUT	Output	Oscillator output
4	VDD	Power	Power supply voltage[3]



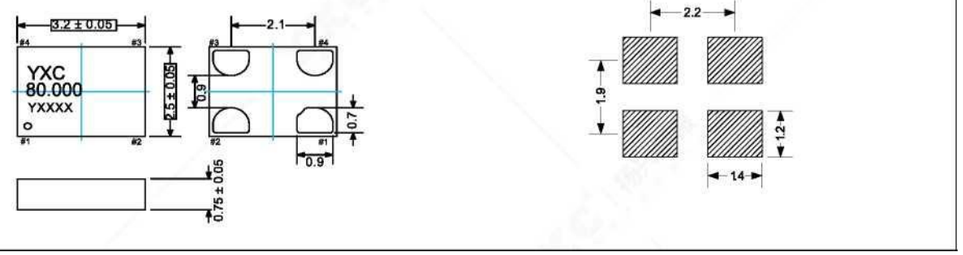
Notes:
2. A pull-up resistor of <10 kD between OE/ ST pin and Vdd is recommended in high noise environment.
3. A capacitor of value 0.1 pF between Vdd and GND is recommended.

Dimensions and Patterns

Package Size – Dimensions (Unit: mm) [4] | **Recommended Land Pattern (Unit: mm) [5]**

2.7 x 2.4 x 0.75 mm (100% compatible with 2.5 x 2. 0 mm footprint)

3.2 x 2.5 x 0.75 mm

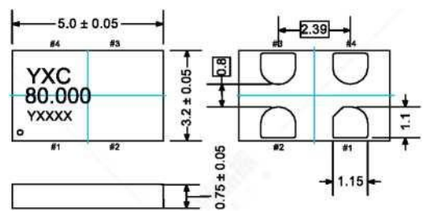


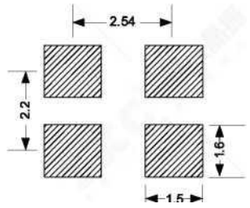
YSO8208MR

高效能可编程振荡器
Ultra-performance Oscillators

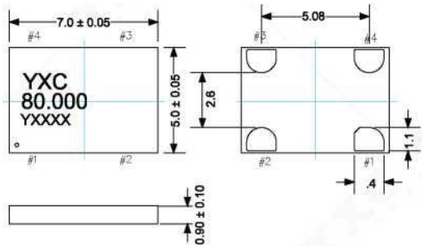
Dimensions and Patterns

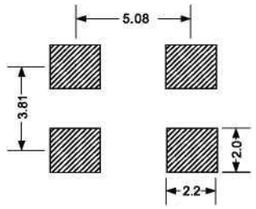
5.0 x 3.2 x 0.75 mm





7.0 x 5.0 x 0.90 mm

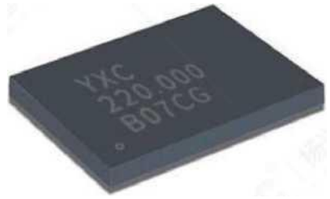




Notes:
4. Top marking: Y denotes manufacturing origin and XXXX denotes manufacturing lot number. The value of'Y'will depend on the assembly location of the device.
5. A capacitor of value 0.1 pF between Vdd and GND is recommended.

YSO8209MR

高效能可编程振荡器
Ultra-performance Oscillators



Features

- Any frequency between 80.000001 and 220 MHz accurate to 6 decimal places
- 100% pin-to-pin drop-in replacement to quartz-based oscillators
- Ultra low phase jitter: 0.5 ps (12 kHz to 20 MHz)
- Frequency stability as low as ±10 PPM
- Industrial or extended commercial temperature range
- LVCMOS/LVTTL compatible output Standby or output enable modes
- Standard 4-pin packages: 2.5 x 2.0,3.2 x 2.5,5.0 x 3.2,7.0 x 5.0 mm^2
- Outstanding silicon reliability of 2 FIT or 500 million hour MTBF
- Ultra short lead time

Applications

- SATA, SAS, Ethernet, 10-Gigabit Ethernet, SONET, PCI Express, video, Wireless
- Computing, storage, networking, telecom, industrial control

Electrical Characteristics

Parameter	Symbol	Min.	iyp-	Max.	Unit	Condition
Output Frequency Range	f	80.000001		220	MHz	
Frequency Stability	F_stab	-10		+10	PPM	Inclusive of Initial tolerance at 25 °C, and variations over operating temperature, rated power supply voltage and load
		-20		+20	PPM	
		-25		+25	PPM	
		-50		+50	PPM	
Operating Temperature Range	T_use	-20		+70	°C	Extended Commercial
		-40		+85	°C	Industrial
Supply Voltage	Vdd	1.71	1.8	1.89	V	
		2.25	2.5	2.75	V	
		2.52	2.8	3.08	V	
		2.97	3.3	3.63	V	
Current Consumption	Idd		34	36	mA	No load condition, f= 100 MHz, Vdd = 2.5V, 2.8V or 3.3V
			30	33	mA	No load condition, f= 100 MH 乙 Vdd = 1.8V
OE Disable Current	l_OD			31	mA	Vdd = 2.5V, 2.8V or 3.3V, OE = GND, output is Weakly Pulled Down
				30	mA	Vdd = 1.8 V. OE = GND, output is Weakly Pulled Down
Standby Current	l_std			70	MA	Vdd = 2.5V, 2.8V or 3.3V, ST = GND, output is Weakly Pulled Down
				10	pA	Vdd = 1.8 V. ST = GND, output is Weakly Pulled Down
Duty Cycle	DC	45		55	%	f<= 165 MHz, all Vdds.
		40		60	%	f> 165 MHz, all Vdds.
Rise/Fall Time	Tr,Tf	-	1.2	2	ns	15 pF load, 10%-90% Vdd
Output Voltage High	VOH	90%		-	Vdd	IOH = -6 mA, IOL = 6 mA, (Vdd = 3.3V, 2.8V, 2.5V) IOH = -3 mA, IOL = 3 mA, (Vdd = 1.8V)
Output Voltage Low	VOL	-		10%	Vdd	
Input Voltage High	VIH	70%		..	Vdd	Pin 1,OE or ST
Input Voltage Low	VIL			30%	Vdd	Pin 1,OE or ST
Input Pull-up Impedance	Z_in		100	250	kQ	Pin 1, OE logic high or logic low, or ST logic high
		2		—	MQ	Pin 1, ST logic low
Startup Time	T_start		7	10	ms	Measured from the time Vdd reaches its rated minimum value
OE Enable/Disable Time	T oe			115	ns	f = 80 MHz, For other frequencies, T_oe = 100 ns + 3 cycles
Resume Time	T_resume			10	ms	In standby mode, measured from the time ST pin crosses 50% threshold. Refer to Figure 5.
RMS Period Jitter	TJitt		1.5	2	PS	f = 156.25 MHz, Vdd = 2.5V, 2.8V or 3.3V
			2	3	ps	f= 156.25 MHz, Vdd = 1.8V
RMS Phase Jitter (random)	T_phj		0.5	1	ps	f = 156.25 MHz, Integration bandwidth = 12 kHz to 20 MHz
First year Aging	F_aging	-1.5	—	+1.5	PPM	25°C
10-year Aging		-5	-	+5	PPM	25°C

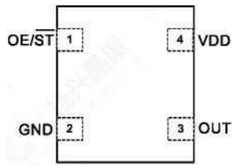
Note:
1. All electrical specifications in the above table are specified with 15 pF +10% output load and for all Vdd(s) unless otherwise stated.
2. Contact YXC for custom drive strength to drive higher or multiple load, or SoftEdge™ option for EMI reduction.

YSO8209M R

Pin Configuration

Pin	Symbol		Functionality
1	OE/ST	Output Enable	H or Open：specified frequency output L: output is high impedance. Only output driver is disabled.
		Standby	H or Open QI： specified frequency output L: output is low (weak pull down). Device goes to sleep mode. Supply current reduces to I_std.
2	GND	Power	Electrical ground
3	OUT	Output	Oscillator output
4	VDD	Power	Power supply voltage

Top View



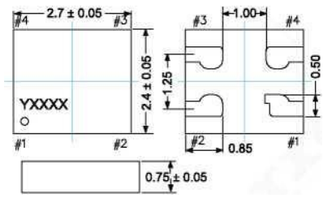
Note:
3. A pull-up resistor of <10 kQ between OE/ ST pin and Vdd is recommended in high noise environment

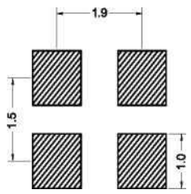
Dimensions and Patterns

Package Size - Dimensions (Unit: mm)【句

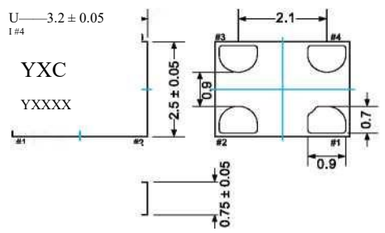
Recommended Land Pattern (Unit: mm)

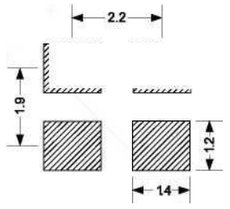
2.7 x 2.4 x 0.75 mm (100% compatible with 2.5 x2. 0 mm footprint)



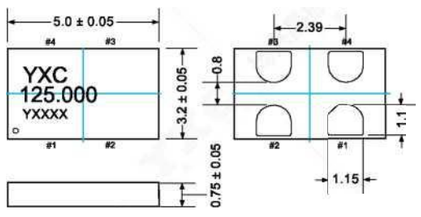


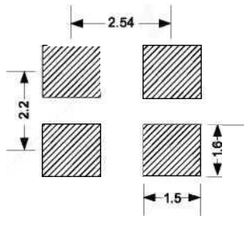
3.2 x 2.5 x 0.75 mm





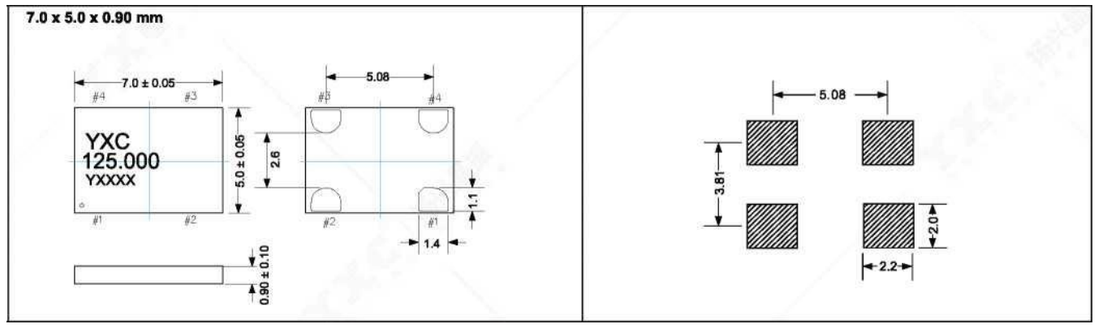
5.0 x 3.2 x 0.75 mm





YSO8209M R

Dimensions and Patterns



Notes:
4. lop marking: Y denotes manufacturing origin and XXXX denotes manufacturing lot number. The value of Y will depend on the assembly location of the device.
5. A capacitor of value 0.1 yF between Vdd and GND is recommended.

YSO8918MR

军工级可编程振荡器
+125*0 High Temp Oscillators

Features

- Frequencies between 1 MHz and 110 MHz accurate to 6 decimal places
- Operating temperature from -40°C to 125°C.
- Supply voltage of 1.8V or 2.5V to 3.3V
- Excellent total frequency stability as low as ±20 ppm
- Low power consumption of 3.5 mA typical at 1.8V
- LVCMOS/LVTTL compatible output
- Industry-standard packages: 2.0 x 1.6,2.5 x 2.0, 3.2 x 2.5,5.0 x 3.2, 7.0 x 5.0 mm x mm

Applications

- Industrial, medical, non AEC-Q100 automotive, avionics and other high temperature applications
- Industrial sensors, PLC, motor servo, outdoor networking equipment, medical video cam, asset tracking systems, etc.

Electrical Specifications

Table 1. Electrical Characteristics

All Min and Max limits are specified over temperature and rated operating voltage with 15 pF output load unless otherwise stated. Typical values are at 25°C and nominal supply voltage.

Parameters	Symbol	Min.	Typ.	Max.	Unit	Condition
Frequency Range						
Output Frequency Range	f	1	-	110	MHz	Refer to Table 7 for the exact list of supported frequencies list of supported frequencies
Frequency Stability and Aging						
Frequency Stability	F_stab	-20	-	+20	ppm	Inclusive of Initial tolerance at 25°C, 1st year aging at25°C, and variations over operating temperature, rated power supply voltage and load (15 pF ± 10%).
		-25	—	+25	ppm	
		-30	—	+30	PPm	
		-50	—	+50	ppm	
Operating Temperature Range						
Operating Temperature Range (ambient)	T_use	■40	—	+105	°C	Extended Industrial
		-40	—	+125	°C	Automotive
Supply Voltage and Current Consumption						
Supply Voltage	Vdd	1.62	1.8	1.98	V	
		2.25	2.5	2.75	V	
		2.52	2.8	3.08	V	
		2.7	3.0	3.3	V	
		2.97	3.3	3.63	V	
		2.25	—	3.63	V	
Current Consumption	Idd		3.8	4.7	mA	No load condition, f = 20 MHz, Vdd = 2.8V, 3.0V or 3.3V
			3.6	4.5	mA	No load condition, f = 20 MHz, Vdd = 2.5V
			3.5	4.5	mA	No load condition, f = 20 MHz, Vdd = 1.8V
OE Disable Current	l_od		-	4.5	mA	Vdd = 2.5V to 3.3V, OE = Low, Output in high Z state.
			-	4.3	mA	Vdd = 1.8V, OE = Low, Output in high Z state.
Standby Current	l_std		2.6	8.5	pA	Vdd = 2.8V to 3.3V, ST = Low, Output is weakly pulled down
			1.4	5.5	pA	Vdd = 2.5V, ST = Low, Output is weakly pulled down
			0.6	4.0	HA	Vdd = 1.8V, ST = Low, Output is weakly pulled down
LVCMOS Output Characteristics						
Duty Cycle	DC	45	—	55	%	All Vdds
Rise/Fall Time	Tr,Tf	—	1.0	2.0	ns	Vdd = 2.5V, 2.8V, 3.0V or 3.3V, 20% - 80%
		—	1.3	2.5	ns	Vdd =1.8V,20%-80%
		-	1.0	3	ns	Vdd = 2.25V - 3.63V, 20% - 80%
Output High Voltage	VOH	90%	—	—	Vdd	IOH = V mA (Vdd = 3.0V or 3.3V) IOH =-3 mA (Vdd = 2.8V or 2.5V) IOH=-2mA(Vdd = 1.8V)
Output Low Voltage	VOL	—	—	10%	Vdd	IOL = 4 mA (Vdd = 3.0V or 3.3V) IOL = 3 mA (Vdd = 2.8V or 2.5V) IOL = 2 mA (Vdd = 1.8V)

YSO8918MR

军工级可编程振荡器
+ 12513 High Temp Oscillators

Table 1. Electrical Characteristics (continued)

Parameters		Min.				Condition
Input Characteristics						
Input High Voltage	VIH	70%	—	-	Vdd	Pin 1,OEorST
Input Low Voltage	VIL	-	—	30%	Vdd	Pin 1,OE or ST
Input Pull-up Impedence	Z_in	50	87	150	kn	Pin 1, OE logic high or logic low, or ST logic high
		2	—	-	*MQ*	Pin 1, ST logic low
Startup and Resume Timing						
Startup Time	T_start	-	—	5	ms	Measured from the time Vdd reaches its rated minimum value
Enable/Disable Time	T_oe	-	-	130	ns	f = 110 MHz. For other frequencies, T_oe = 100 ns + 3 * clock periods
Resume Time	T_resume	-	—	5	ms	Measured from the time ST pin crosses 50% threshold
Jitter						
RMS Period Jitter	TJitt		1.6	2.5	PS	f = 75MHz, Vdd = 2.5V, 2.8V, 3.0V or 3.3V
			1.9	3	PS	f = 75MHz, Vdd = 1.8V
Peak-to-peak Period Jitter	T_pk		12	20	PS	f = 75MH 乙 Vdd = 2.5V, 2.8V, 3.0V or 3.3V
			14	25	PS	f = 75MHz,Vdd = 1.8V
RMS Phase Jitter (random)	T_phj		0.5	0.8	PS	f = 75MHz, Integration bandwidth = 900 kHz to 7.5 MHz
			1.3	2	PS	f = 75MHz, Integration bandwidth = 12 kHz to 20 MHz

Table 2. Pin Description

Pin	Symbol	Functionality	
1	OE/ST/NC	Output Enable	H〔1】: specified frequency output L: output is high impedance. Only output driver is disabled.
		Standby	H〔1】: specified frequency output L: output is low (weak pull down). Device goes to sleep mode. Supply current reduces to l_std.
		No Connect	Any voltage between 0 and Vdd or Open(1):Specified frequency output. Pin 1 has no function.
2	GND	Power	Electrical ground
3	OUT	Output	Oscillator output
4	VDD	Power	Power supply voltage?

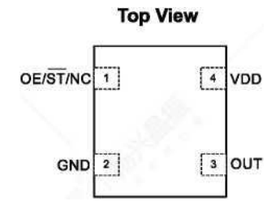
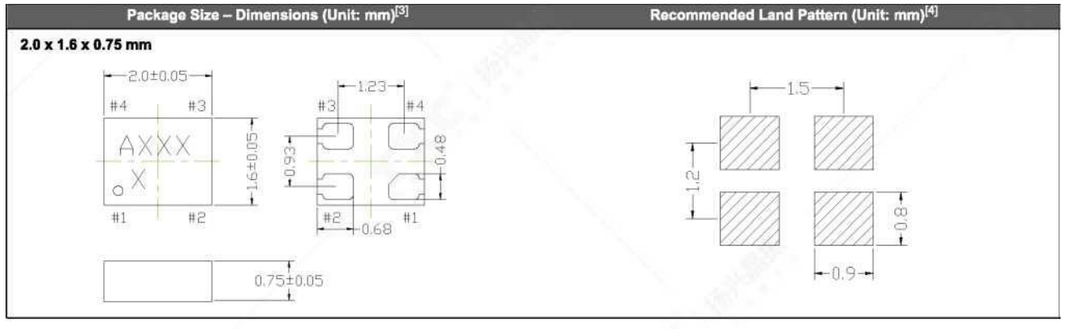


Figure 1. Pin Assignments

Notes:

1. In OE or ST mode, a pull-up resistor of 10 kQ or less is recommended if pin 1 is not externally driven. If pin 1 needs to be left floating, use the NC option.
2. A capacitor of value 0.1 pF or higher between Vdd and GND is required.

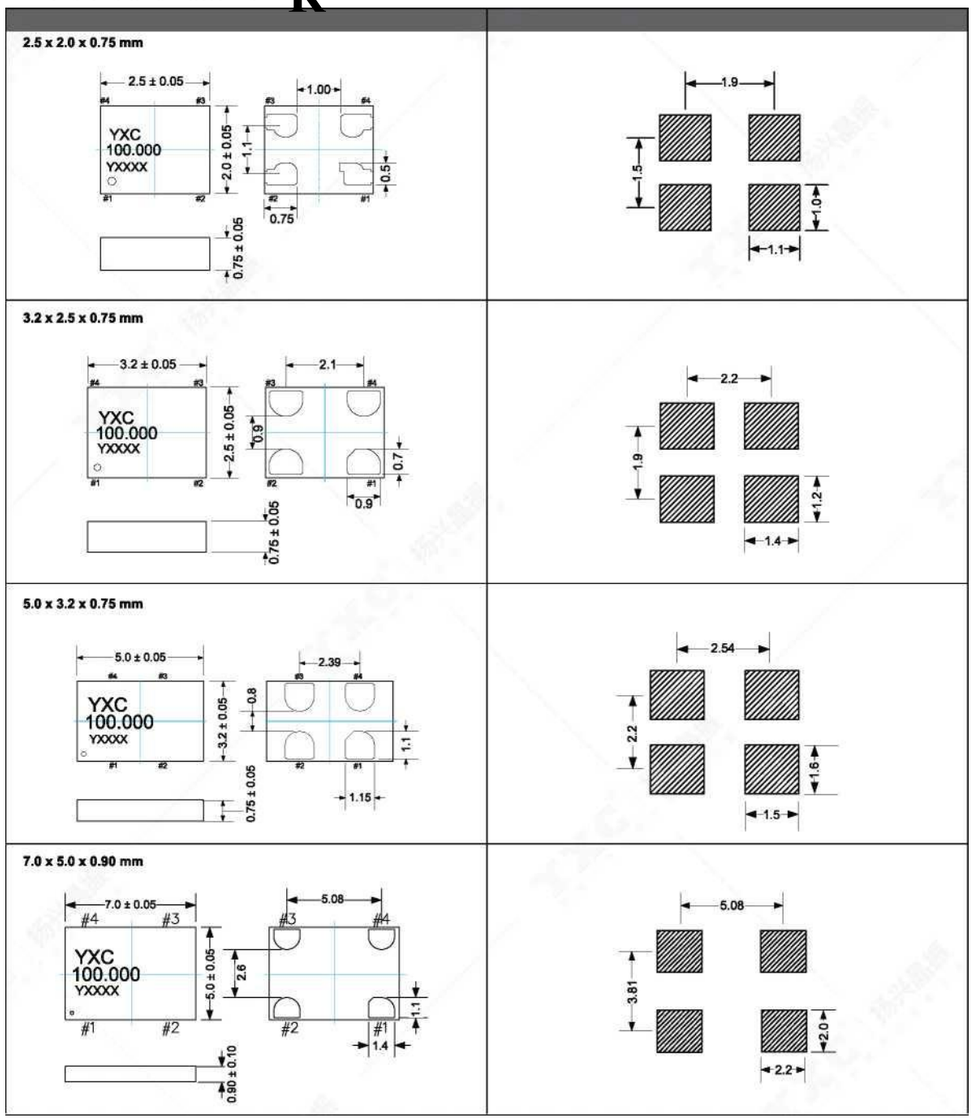
Dimensions and Patterns



YSO8918MR

军工级可编程振荡器
+125X) High Temp Oscillators

Dimensions and Patterns



Notes:

3. Tbp marking: Y denotes manufacturing origin and XXXX denote s manufacturing lot number. The value of 丫 will depend on the assembly location of the device.
4. A capacitor of value 0.1 pF or higher between Vdd and GND is required.

YSO8920MR

军工级可编程振荡器
+ 12513 High Temp Oscillators

Features:

- Frequencies between 1 MHz and 110 MHz accurate to 6 decimal places
- Operating temperature from -55° C to 125° C
- Supply voltage of 1.8V or 2.5V to 3.3V
- Excellent total frequency stability as low as ±20 ppm
- Low power consumption of 3.5 mA typical at 1.8V
- LVCMOS/LVTTL compatible output
- Industry-standard packages: 2.0 x 1.6,2.5 x 2.0,3.2 x 2.5,5.0 x 3.2, 7.0 x 5.0 mm x mm

Applications:

- Ruggedized equipment in harsh operating environment

Electrical Specifications

Table 1. Electrical Characteristics

All Min and Max limits are specified over temperature and rated operating voltage with 15 pF output load unless otherwise stated. Typical values are at *25°C* and nominal supply voltage.

Parameters	Symbol	Min.	Typ.	Max.	Unit	Condition
Frequency Range						
Output Frequency Range	f	1	-	110	MHz	Refer to Table 2 for the exact list of supported frequencies list of supported frequencies
Frequency Stability and Aging						
Frequency Stability	F_stab	-20	-	+20	ppm	Inclusive of Initial tolerance at 25°C, 1 st year aging at 25°C, and variations over operating temperature, rated power supply voltage and load (15 pF ± 10%).
		-25	-	+25	PPm	
		-30	-	+30	PPm	
		-50	-	+50	PPm	
Operating Temperature Range						
Operating Temperature Range	T use	-55	-	+125	p	
Supply Voltage and Current Consumption						
Supply Voltage	Vdd	1.62	1.8	1.98	V	
		2.25	2.5	2.75	V	
		2.52	2.8	3.08	V	
		2.7	3.0	3.3	V	
		2.97	3.3	3.63	V	
		2.25	-	3.63	V	
Current Consumption	Idd		3.8	4.7	mA	No load condition, f = 20 MHz, Vdd = 2.8V, 3.0V or 3.3V
			3.6	4.5	mA	No load condition, f = 20 MHz, Vdd = 2.5V
			3.5	4.5	mA	No load condition, f = 20 MHz, Vdd = 1.8V
OE Disable Current	l_od		-	4.5	mA	Vdd = 2.5V to 3.3V, OE = Low, Output in high Z state.
			-	4.3	mA	Vdd = 1.8V, OE = Low, Output in high Z state.
Standby Current	l_std		2.6	8.5	S	Vdd = *2.8V* to 3.3V, ST = Low, Output is weakly pulled down
			1.4	5.5	pA	Vdd = 2.5V, ST = Low, Output is weakly pulled down
			0.6	4.0	pA	Vdd = 1.8V, ST = Low, Output is weakly pulled down
LVCMOS Output Characteristics						
Duty Cycle	DC	45	-	55	%	All Vdds
Rise/Fall Time	Tr,Tf	—	1.0	2.0	ns	Vdd = 2.5V, 2.8V, 3.0V or 3.3V, 20% - 80%
		—	1.3	2.5	ns	Vdd=1.8V,20%-80%
		—	1.0	3	ns	Vdd = 2.25V - 3.63V, 20% - 80%
Output High Voltage	VOH	90%	—	—	Vdd	IOH = -4 mA (Vdd = 3.0V or 3.3V) IOH = -3 mA (Vdd = 2.8V or 2.5V) IOH =-2 mA (Vdd = 1.8V)
Output Low Voltage	VOL	—	—	10%	Vdd	IOL = 4 mA (Vdd = 3.0V or 3.3V) IOL = 3 mA (Vdd = 2.8V or 2.5V) IOL = 2 mA (Vdd = 1.8V)

Table 1. Electrical Characteristics (Continued)

Parameters		Min.				Condition
Input Characteristics						
Input High Voltage	VIH	70%	–	–	Vdd	Pin 1, OE or ST
Input Low Voltage	VIL	–	–	30%	Vdd	Pin 1, OE or ST
Input Pull-up Impedence	ZJn	50	87	150	g	Pin 1, OE logic high or logic low, or ST logic high
		2	–	–	MQ	Pin 1, ST logic low
Startup and Resume Timing						
Startup Time	T_start	–	–	5	ms	Measured from the time Vdd reaches ils rated minimum value
Enable/Dlsable Time	T_oe	-	-	130	ns	f = 110 MHz. For other frequencies, T_oe = 100 ns + 3 * clock periods
Resume Time	T_resume	-	-	5	ms	Measured from the time ST pin crosses 50% threshold
Jitter						
RMS Period Jitter	TJitt		1.6	2.5	PS	f = 75MHz, Vdd = 2.5V, 2.8V, 3.0V or 3.3V
			1.9	3	PS	f= 75MHz, Vdd = 1.8V
Peak-to-peak Period Jitter	T_pk		12	20	PS	f= 75MHz, Vdd = 2.5V, 2.8V, 3.0V or 3.3V
			14	25	PS	f = 75MHz,Vdd = 1.8V
RMS Phase Jitter (random)	T_phj		0.5	0.8	PS	f = 75MHz, Integration bandwidth = 900 kHz to 7.5 MHz
			1.3	2	PS	f = 75MHz, Integration bandwidth = 12 kHz to 20 MHz

Table 2. Pin Description

Pin	Symbol	Functionality	
1	OE/ST/NC	Output Enable	H【1】; specified frequency output L: output is high impedance. Only output driver is disabled.
		Standby	H〔1】: specified frequency output L: output is low (weak pull down). Device goes to sleep mode. Supply current reduces to l_std.
		No Connect	Any voltage between 0 and Vdd or Open。】: Specified frequency output. Pin 1 has no function.
2	GND	Power	Electrical ground
3	OUT	Output	Oscillator output
4	VDD	Power	Power supply voltage?

Top View

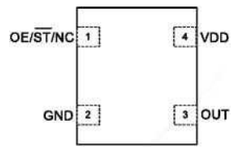


Figure 1. Pin Assignments

Notes:
1. In 0E or ST mode, a pull-up resistor of 10kohm or less is recommended if pin 1 is not externally driven. If pin 1 needs to be left floating, use the NC option.
2. A capacitor of value 0.1 pF or higher between Vdd and GND is required.

Table 3. List of Supported Frequencies^

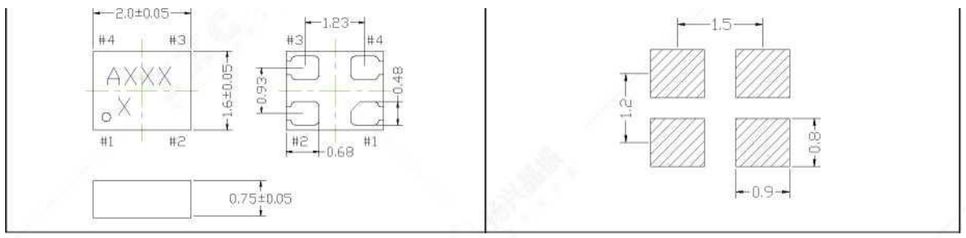
Frequency Range (-55 to +125X)	
Min.	**Max.**
1.000000 MHz	61.222999 MHz
61.674001 MHz	69.239999 MHz
70.827001 MHz	78.714999 MHz
79.561001 MHz	80.159999 MHz
80.174001 MHz	80.779999 MHz
82.632001 MHz	91.833999 MHz
95.474001 MHz	96.191999 MHz
96.209001 MHz	96.935999 MHz
99.158001 MHz	110.000000 MHz

Notes:
3. Any frequency with in the min and max values in the above table are supported with 6 decimal places of accuracy.

Dimensions and Patterns

Package Size - Dimensions (Unit: mm).】 **Recommended Land Pattern (Unit: mm)^**

2.0x1.6x0.75 mm

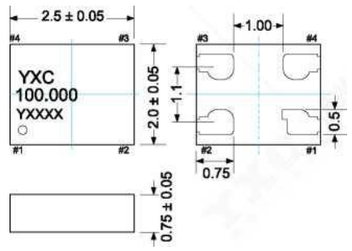


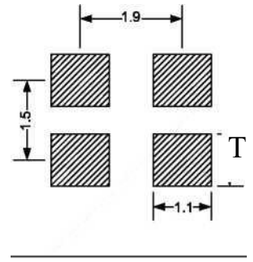
Dimensions and Patterns

Package Size - Dimensions (Unit: mm)H】

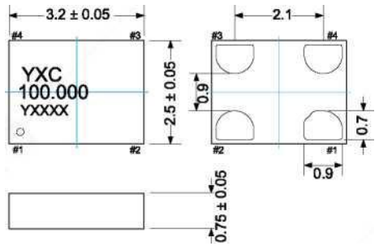
Recommended Land Pattern (Unit: mm)回

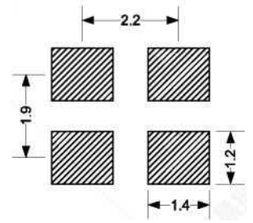
2.5 x 2.0 x 0.75 mm



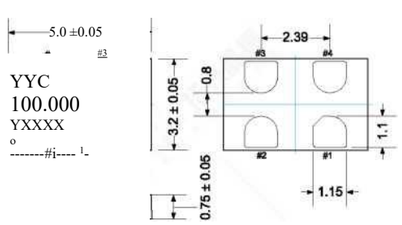


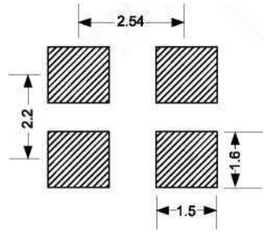
3.2 x 2.5 x 0.75 mm



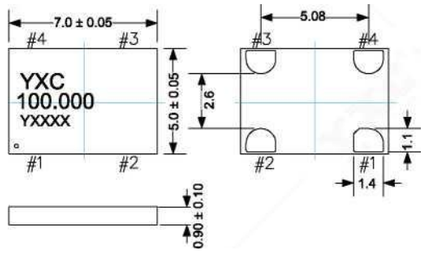


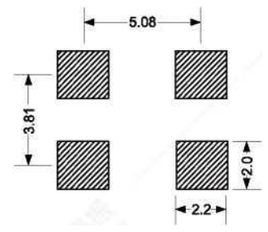
5.0 x 3.2 x 0.75 mm





7.0 x 5.0 x 0.90 mm





Notes:

4. Top marking: Y denotes manufacturing origin and XXXX denotes manufacturing lot number. The value of 丫 will depend on the assembly location of the device.
5. A capacitor of value 0.1 卩F or higher between Vdd and GND is required.

YSO9121MR

差分可编程振荡器
Differential Oscillators

Features

- Any frequency between 1 MHz and 220 MHz accurate to 6 decimal places
- LVPECL and LVDS output signaling types
- 0.6ps RMS phase jitter (random) over 12 kHz to 20 MHz bandwidth
- . Frequency stability as low as ±10 ppm
- Industrial and extended commercial temperature ranges
- . Industry-standard packages: 3.2x2.5, 5.0x3.2 and 7.0x5.0 mmxmm
- For frequencies higher than 220 MHz, refer to YSO9122MR datasheet

Applications

- 10GB Ethernet, SONET, SATA, SAS, Fibre Channel, PCI-Express
- Telecom, networking, instrumentation, storage, servers

Electrical Characteristics

Parameter and Conditions	Symbol	Min.	Typ.	Max.	Unit	Condition
LVPECL and LVDS, Common Electrical Characteristics						
Supply Voltage	Vdd	2.97	3.3	3.63	V	
		2.25	2.5	2.75	V	
		2.25	_	3.63	V	Termination schemes in Figures 1 and 2 -XXordering code
		1.71	1.8	1.89	V	Only for LVDS output
Output Frequency Range	f	1		220	MHz	
Frequency Stability	F_stab	-10		+10	PPm	Inclusive of initial tolerance, operating temperature, rated power supply voltage, and load variations
		-20		+20	ppm	
		-25		+25	PPm	
		-50		+50	PPm	
First Year Aging	F_aging1	-2		+2	ppm	*25°C*
10-year Aging	F_aging10	-5		+5	PPm	25°C
Operating Temperature Range	T_use	■40		+85	°C	Industrial
		-20		+70	°C	Extended Commercial
Input Voltage High	VIH	70%		_	Vdd	Pin 1,OE or ST
Input Voltage Low	VIL	_		30%	Vdd	Pin 1,OE or ST
Input Pull-up Impedance	ZJn	_	100	250	kQ	Pin 1, OE logic high or logic low, or ST logic high
		2	-	-	MQ	Pin 1, ST logic low
Start-up Time	T_start	_	6	10	ms	Measured from the time Vdd reaches its rated minimum value.
Resume Time	T_resume	-	6	10	**ms**	In Standby mode, measured from the time ST pin crosses 50% threshold.
Duty Cycle	DC	45	_	55	%	
LVPECL, DC and AC Characteristics						
Current Consumption	Idd		61	69	mA	Excluding Load Termination Current, Vdd = 3.3V or 2.5V
OE Disable Supply Current	l_OE			35	mA	OE = Low
Output Disable Leakage Current	l_leak			1	S	OE = Low
Standby Current	l_std			100	pA	ST = Low, for all Vdds
Maximum Output Current	l_driver			30	mA	Maximum average current drawn from OUT+ or OUT-
Output High Voltage	VOH	Vdd-1.1		Vdd-0.7	V	See Figure 1(a)
Output Low Voltage	VOL	Vdd-1.9		Vdd-1.5	V	See Figure 1 (a)
Output Differential Voltage Swing	V_Swing	1.2	1.6	2.0	V	See Figure 1 (b)
Rise/Fall Time	Tr,Tf		300	700	PS	20% to 80%, see Figure 1(a)
OE Enable/Dlsable Time	T oe		—	115	ns	f = 212.5 MHz - For other frequencies, T oe = 100ns + 3 period
RMS Period Jitter	TJitt		1.2	1.7	PS	f=100 MHz, VDD = 3.3V or 2.5V
			1.2	1.7	PS	f = 156.25 MHz, VDD = 3.3V or 2.5V
			1.2	1.7	PS	f = 212.5 MHz, VDD = 3.3V or 2.5V
RMS Phase Jitter (random)	T_phj		0.6	0.85	PS	f = 156.25 MHz, Integration bandwidth = 12 kHz to 20 MHz, all Vdds
LVDS, DC and AC Characteristics						
Current Consumption	Idd	_	47	55	mA	Excluding Load Termination Current, Vdd = 3.3V or 2.5V
OE Disable Supply Current	l_OE	-	-	35	mA	OE = Low
Differential Output Voltage	VOD	250	350	450	mV	See Figure 2

YSO9121MR

差分可编程振荡器
Differential Oscillators

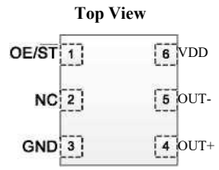
Electrical Characteristics (continued)

Parameter and Conditions	Symbol	Mln.	Typ.	Max.	Unit	Condition
LVDS, DC and AC Characteristics (continued)						
Output Disable Leakage Current	l_leak	—	—	1	pA	OE = Low
Standby Current	l_std	-	-	100	MA	ST = Low, for all Vdds
VOD Magnitude Change	AVOD	-	-	50	mV	See Figure 2
Offset Voltage	VOS	1.125	1.2	1.375	V	See Figure 2
VOS Magnitude Change	AVOS		_	50	mV	See Figure 2
Rise/Fall Time	Tr,Tf		495	700	PS	20% to 80%, see Figure *2*
OE Enable/Disable Time	T oe		—	115	ns	f= 212.5 MHz- For other frequencies, T oe = 100ns + 3 period
RMS Period Jitter	TJitt		1.2	1.7	PS	f= 100 MHz, VDD = 3.3V or 2.5V
			1.2	1.7	PS	f= 156.25 MHz, VDD = 3.3V or 2.5V
			1.2	1.7	PS	f = 212.5 MHz, VDD = 3.3V or 2.5V
RMS Phase Jitter (random)	T_phj		0.6	0.85	PS	f = 156.25 MHz, Integration bandwidth = 12 kHz to 20 MHz, all Vdds

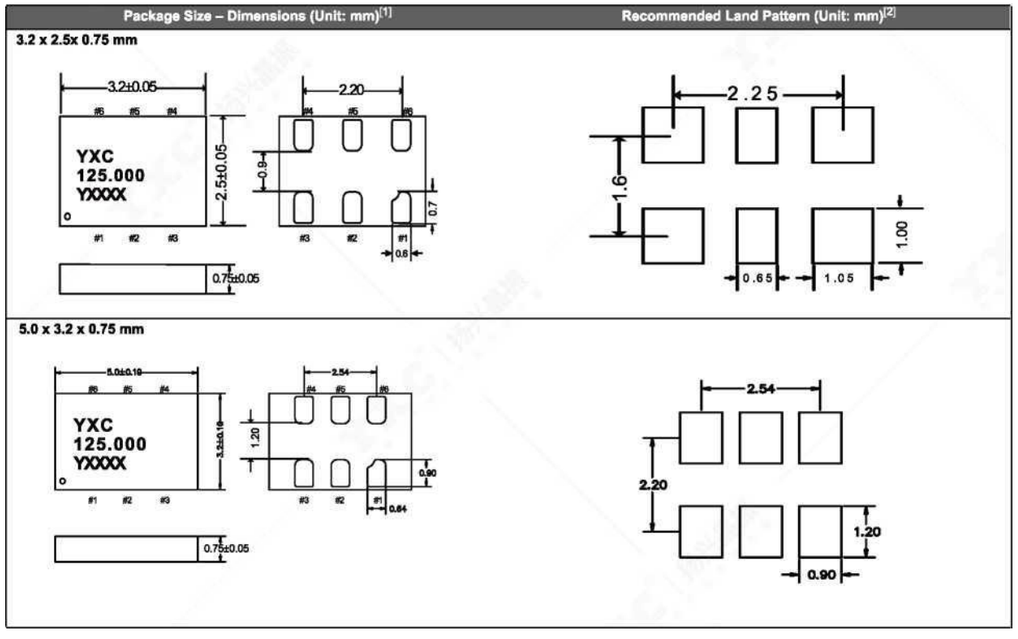
Pin Description

Pin	Map		Functionality
1	OE	Input	H or Open: specified frequency output L: output is high impedance
	ST	Input	H or Open: specified frequency output L: Device goes to sleep mode. Supply current reduces to 1 stri.
2	NC	NA	No Connect; Leave it floating or connect to GND for better heat dissipation
3	GND	Power	VDD Power Supply Ground
4	OUT+	Output	Oscillator output
5	OUT-	Output	Complementary oscillator output
6	VDD	Power	Power supply voltage

Top View



Dimensions and Patterns

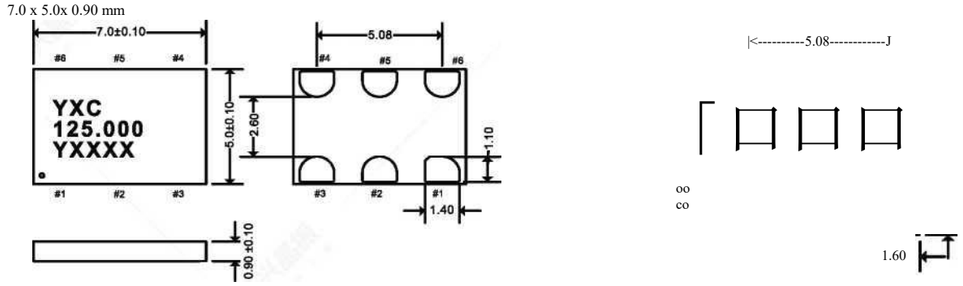


YSO9121MR

差分可编程振荡器
Differential Oscillators

Dimensions and Patterns

7.0 x 5.0x 0.90 mm



Notes:
1. Top Marking: Y denotes manufacturing origin and XXXX denotes manufacturing lot number. The value of "Y** will depend on the assembly location of the device.
2. A capacitor of value 0.1 JtF between Vdd and GND is recommended.

Frequencies Not Supported

I Range 1: From 209.000001 MHz to 210.999999 MH:

YSO9122MR

差分可编程振荡器
Differential Oscillators

Features

- Any frequency between 220 MHz and 625 MHz accurate to 6 decimal places
- LVPECL and LVDS output signaling types
- 0.6ps RMS phase jitter (random) over 12 kHz to 20 MHz bandwidth
- Frequency stability as low as ±10 ppm
- Industrial and extended commercial temperature ranges
- Industry-standard packages: 3.2x2.5, 5.0x3.2 and 7.0x5.0 mmxmm
- For frequencies lower than 220 MHz, refer to YSO9121 MR datasheet

Applications

- 10GB Ethernet, SONET, SATA, SAS, Fibre Channel, PC I-Express
- Telecom, networking, instrumentation, storage, servers

Electrical Characteristics

Parameter and Conditions	Symbol	Min.	Typ.	Max.	Unit	Condition
LVPECL and LVDS, Common Electrical Characteristics						
Supply Voltage	Vdd	2.97	3.3	3.63	V	
		2.25	2.5	2.75	V	
		2.25		3.63	V	Termination schemes in Figures 1 and 2-XX ordering code
Output Frequency Range	f	220		625	MHz	
Frequency Stability	F_stab	-10		+10	PPm	Inclusive of initial tolerance, operating temperature, rated power supply voltage, and load variations
		-20		+20	ppm	
		-25		+25	PPm	
		-50		+50	PPm	
First Year Aging	F_aging1	-2		+2	PPm	25°C
10-year Aging	F_aging10	-5		+5	PPm	25°C
Operating Temperature Range	T_use	-40		+85	°C	Industrial
		-20		+70	•c	Extended Commercial
Input Voltage High	VIH	70%		-	Vdd	Pin 1,OEorST
Input Voltage Low	VIL	-		30%	Vdd	Pin 1,OEorST
Input Pull-up Impedance	Z_in	-	100	250	kQ	Pin 1, OE logic high or logic low, or ST logic high
		2	-	-	MQ	Pin 1, ST logic low
Start-up Time	Tstart	__	6	10	ms	Measured from the time Vdd reaches its rated minimum value.
Resume Time	T_resume	-	6	10	ms	In Standby mode, measured from the time ST pin crosses 50% threshold.
Duty Cycle	DC	45	-	55	%	
LVPECL, DC and AC Characteristics						
Current Consumption	Idd		61	69	mA	Excluding Load Termination Current, Vdd = 3.3V or 2.5V
OE Disable Supply Current	l_OE			35	mA	OE = Low
Output Disable Leakage Current	IJeak			1	pA	OE = Low
Standby Current	l_std			100	pA	ST = Low, for all Vdds
Maximum Output Current	l_driver			30	mA	Maximum average current drawn from OUT+ or OUT-
Output High Voltage	VOH	Vdd-1.1		Vdd-0.7	V	See Figure 1(a)
Output Low Voltage	VOL	Vdd-1.9		Vdd-1.5	V	See Figure 1(a)
Output Differential Voltage Swing	V Swing	1.2	1.6	2.0	V	See Figure 1(b)
Rise/Fall Time	Tr,Tf		300	500	PS	20% to 80%, see Figure 1(a)
OE Enable/Disable Time	T oe		—	115	ns	f = 220 MHz - For other frequencies, T oe = 100ns + 3 period
RMS Period Jitter	TJitt		1.2	1.7	PS	f = 266 MHz, VDD = 3.3V or 2.5V
			1.2	1.7	PS	f = 312.5 MHz, VDD = 3.3V or 2.5V
			1.2	1.7	PS	f = 622.08 MHz, VDD = 3.3V or 2.5V
RMS Phase Jitter (random)	T_phj		0.6	0.85	PS	f = 312.5 MHz, Integration bandwidth = 12 kHz to 20 MHz, all Vdds
LVDS, DC and AC Characteristics						
Current Consumption	Idd	__	47	55	mA	Excluding Load Termination Current, Vdd = 3.3V or 2.5V
OE Disable Supply Current	l_OE	__	__	35	mA	OE = Low
Differential Output Voltage	VOD	250	350	450	mV	See Figure 2

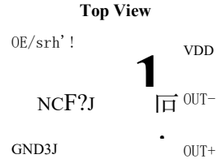
Electrical Characteristics (continued)

Parameter and Conditions	Symbol	Min.	Typ.	Max.	Unit	Condition
LVDS, DC and AC Characteristics (continued)						
Output Disable Leakage Current	IJeak	-	-	1	pA	OE = Low
Standby Current	l_std	-	-	100	MA	ST = Low, for all Vdds
VOD Magnitude Change	AVOD	__	__	50	mV	See Figure 2
Offset Voltage	VOS	1.125	1.2	1.375	V	See Figure 2
VOS Magnitude Change	AVOS		-	50	mV	See Figure 2
Rise/Fall Time	Tr,Tf		495	600	PS	20% to 80%, see Figure 2
OE Enable/Disable Time	T oe		—	115	ns	f = 220 MHz - For other frequencies, T oe = 100ns + 3 period
RMS Period Jitter	TJitt		1.4	1.7	PS	f = 266 MHz, VDD = 3.3V or 2.5V
			1.4	1.7	PS	f = 312.5 MHz, VDD = 3.3V or 2.5V
			1.2	1.7	PS	f = 622.08 MHz, VDD = 3.3V or 2.5V
RMS Phase Jitter (random)	T_phj		0.6	0.85	PS	f = 312.5 MHz, Integration bandwidth = 12 kHz to 20 MHz, all Vdds

Pin Description

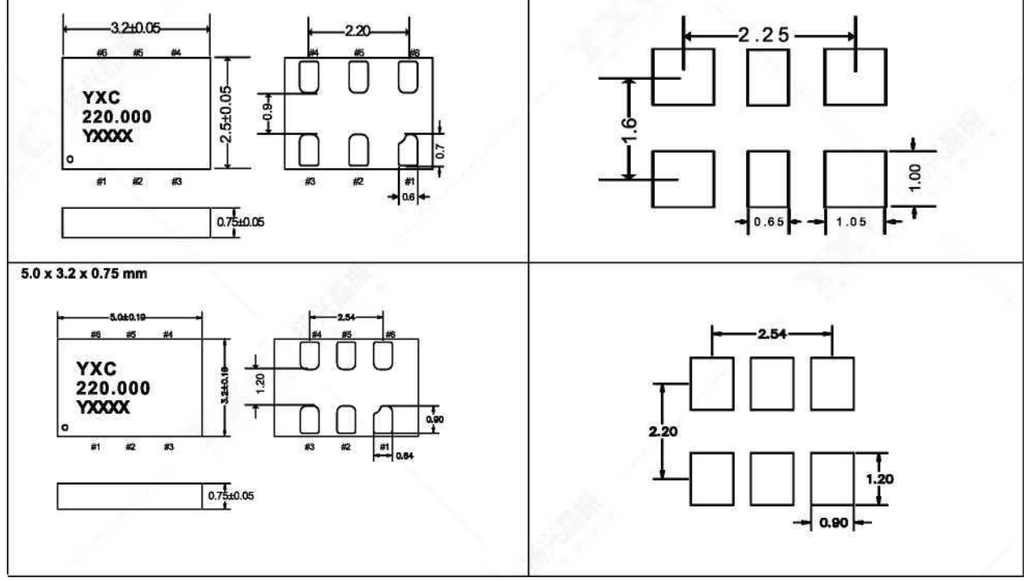
Pin	Map		Functionality
1	OE	Input	H or Open: specified frequency output L: output is high impedance
	ST	Input	H or Open: specified frequency output L: Device goes to sleep mode. Supply current reduces to l_std.
2	NC	NA	No Connect; Leave it floating or connect to GND for better heat dissipation
3	GND	Power	VDD Power Supply Ground
4	OUT+	Output	Oscillator output
5	OUT-	Output	Complementary oscillator output
6	VDD	Power	Power supply voltage

Top View



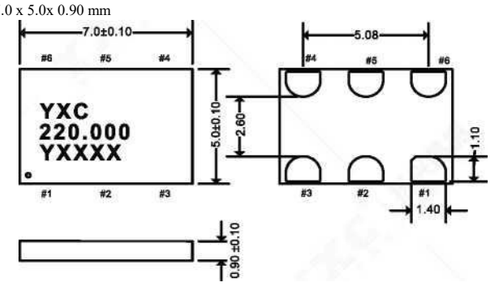
Dimensions and Patterns

Package Size – Dimensions (Unit: mm)[1]	Recommended Land Pattern (Unit: mm)[2]
3.2 x 2.5x 0.75 mm	
5.0 x 3.2 x 0.75 mm	



Dimensions and Patterns

7.0 x 5.0x 0.90 mm



Notes:
1. Top Marking: Y denotes manufacturing origin and XXXX denotes manufacturing lot number. The value of **¥" will depend on the assembly location of the device.
2. A capacitor of value 0.1 p.F between Vdd and GND is recommended.

Frequencies Not Supported

Range 1: From 251.000001 MHz to 263.999999 MHz
Range 2: From 314.000000 MHz to 422.999999 MHz
Range 3: From 502.000001 MHz to 527.999999 MHz

YSO1532MK

KHZ 超小型系列
32KHZ Ultra small Oscillators

Features

- Smallest footprint in chip-scale (CSP): 1.5 x 0.8 mm
- Fixed 32.768 kHz
- <10 ppm frequency tolerance
- Ultra-low power: <1 pA
- Directly interfaces to XTAL inputs
- Supports coin-cell or super-cap battery backup voltages
- Vdd supply range: 1.5V to 3.63V over -40°C to +85°C
- Oscillator output eliminates external load caps
- Internal filtering eliminates external Vdd bypass cap
- NanoDrive™ programmable output swing for lowest power

Applications

- Mobile Phones, Tablets, Health and Wellness Monitors, Fitness Watches
- Sport Video Cams, Wireless Keypads, Ultra-Small Notebook PC
- Pulse-per-Second (pps) Timekeeping, RTC Reference Clock

MEMS

Electrical Characteristics

Parameter						Condition
Frequency and Stability						
Fixed Output Frequency	Fout		32.768		kHz	
Frequency Stability						
Frequency Tolerance (1)	F_tol			10	PPm	T_A = 25°C, post reflow, Vdd: 1.5V – 3.63V.
				20	PPm	T_A = 25°C, post reflow with board-level underfill, Vdd: 1.5V-3.63V.
Frequency Stability 以】	F_stab			75	PPm	T_A = -10°Cto+70°C, Vdd: 1.5V-3.63V.
				100		T_A = -40°C to +85°C, Vdd: 1.5V – 3.63V.
				250		T_A = -10°C to +70°C, Vdd: 1.2V-1.5V.
25°C Aging		-1		1	PPm	1st Year
Supply Voltage and Current Consumption						
Operating Supply Voltage	Vdd	1.2		3.63	V	T_A = -10°Cto+70°C
		1.5		3.63	V	T_A = -40°C to +85°C
Core Operating Current 间	Idd		0.90		MA	TA = 25°C, Vdd: 1.8V. No load
				1.3		T_A = -10°C to +70°C, Vdd max: 3.63V. No load
				1.4		T_A = -40°C to +85°C, Vdd max: 3.63V. No load
Output Stage Operating Current 阅	Idd_out		0.065	0.125	pA/Vpp	T_A = -40°C to +85°C, Vdd: 1.5V – 3.63V. No load
Power-Supply Ramp	t_Vdd_Ramp			100	ms	Vdd Ramp-up from 0 to 90%, T_A = -40°C to +85°C
Start-up Time at Power-up [4]	t_start		180	300	ms	T_A = -40°C < T_A< +50°C, valid output
				450		T_A = +50°C < T_A< +85°C, valid output
Operating Temperature Range						
Commercial Temperature	T_use	-10		70	°C	
Industrial Temperature		-40		85	°C	

Notes:
1. Measured peak-to-peak. Tested with Agilent 53132A frequency counter. Due to the low operating frequency, the gate time must be >100 ms to ensure an accurate frequency measurement.
2. Measured peak-to-peak. Inclusive of Initial Tolerance at 25°C, and variations over operating temperature, rated power supply voltage and load. Stability is specified for two operating voltage ranges. Stability progressively degrades with supply voltage below 1.5V.
3. Core operating current does not include output driver operating current or load current. To derive total operating current (no load), add core operating current + (0.065 pA/V) ^(output voltage swing).
4. Measured from the time Vdd reaches 1.5V.

YSO1532MK

KHZ 超小型系列
32KHZ Ultra small Oscillators

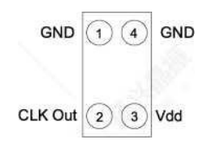
Electrical Characteristics (continued)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
LVCMOS Output Option, T_A =-40°C to +85°C, typical values are at T_A = 25°C						
Output Rise/Fall Time	tr, tf		100	200		10-90% (Vdd), 15 pF load, Vdd = 1.5V to 3.63V
				50		10-90% (Vdd), 5 pF load, Vdd > 1.62V
Output Clock Duty Cycle	DC	48		52	%	
Output Voltage High	VOH	90%			V	Vdd: 1.5V-3.63V. I_{OH} = -10|JA, 15 pF
Output Voltage Low	VOL			10%	V	Vdd: 1.5V-3.63V. I_{OL}= 10 |JA, 15 pF
NanoDrive™ Programmable, Reduced Swing Output						
Output Rise/Fall Time	tf,tf			200	ns	30-70% (V_{OL}/V_{OH}), 10 pF Load
Output Clock Duty Cycle	DC	48		52	%	
AC-coupled Programmable Output Swing	V_sw		0.20 to 0.80		V	YSO1532MK does not internally AC-couple. This output description is intended for a receiver that is AC-coupled. See Table 2 for acceptable NanoDrive swing options.Vdd: 1.5V - 3.63V, 10 pF Load, I_{OH} / I_{OL} = ±0.2 |JA. Vdd: 1.5V - 3.63V. I_{OH} = -0.2 pA, 10
DC-Biased Programmable Output Voltage High Range	VOH		0.60 to 1.225		V	pF Load. See Table 1 for acceptable V_{OH}/V_{OL} setting levels. Vdd: 1.5V-3.63V. I_{OL} = 0.2 pA, 10 pF Load. See Table 1 for
DC-Biased Programmable Output Voltage Low Range	VOL		0.35 to 0.80		V	acceptable V_{OH}/V_{OL} setting levels.
Programmable Output Voltage Swing Tolerance		-0.055		0.055	V	T_A = -40°C to +85°C, Vdd = 1.5V to 3.63V.
Jitter						
Period Jitter	TJitt		35		ºRMS	I Cycles = 10,000, T_A = 25°C, Vdd = 1.5V-3.63V

Pin Configuration

Pin	Symbol	I/O	Functionality
1,4	GND	Power Supply Ground	Connect to ground. Acceptable to connect pin 1 and 4 together. Both pins must be connected to GND.
2	CLK Out	OUT	Oscillator clock output The CLK can drive into a Ref CLK input or into an ASIC or chip-set's 32kHz XTAL input. When driving into an ASIC or chip-set oscillator input (X IN and X Out), the CLK Out is typically connected directly to the XTAL IN pin. No need for load capacitors. The output driver is intended to be insensitive to capacitive loading.
3	Vdd	Power Supply	Connect to power supply 1.2V M Vdd M 3.63V. Under normal operating conditions, Vdd does not require external bypass/decoupling capacitor(s). For more information about the internal power-supply filtering, see the *Power Supply Noise Immunity* section in the detailed description. Contact factory for applications that require a wider operating supply voltage range.

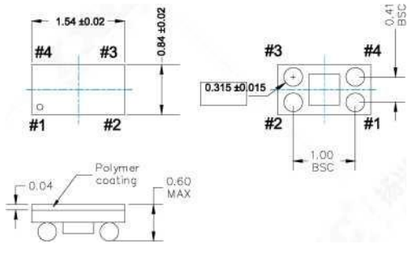
CSP Package (Top View)



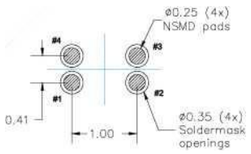
Dimensions and Patterns

Package Size - Dimensions (Unit: mm)

1.55x0.85 mm CSP



Recommended Land Pattern (Unit: mm)



(soldermask openings shown with heavy dashed line)

Recommend 4-mil (0.1mm) stencil thickness

System Block Diagram

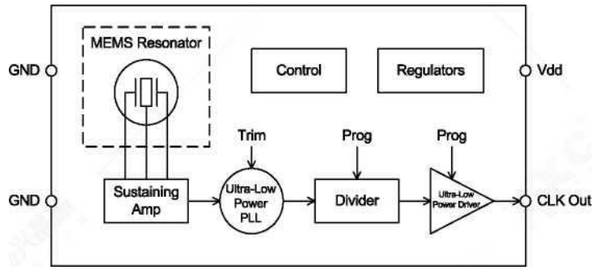


Figure 1.

Absolute Maximum

Attempted operation outside the absolute maximum ratings may cause permanent damage to the part. Actual performance of the IC is only guaranteed within the operational specifications, not at absolute maximum ratings.

Parameter	Test Condition	Value	Unit
Continuous Power Supply Voltage Range (Vdd)		-0.5 to 3.63	**V**
Short Duration Maximum Power Supply Voltage (Vdd)	<30 minutes	4.0	**V**
Continuous Maximum Operating Temperature Range	Vdd = 1.5V-3.63V	105	**°C**
Short Duration Maximum Operating Temperature Range	Vdd = 1.5V-3.63V, 530 mins	125	**°C**
Human Body Model ESD Protection	HBM, JESD22-A114	3000	**V**
Charge-Device Model (CDM) ESD Protection	JESD220C101	750	**V**
Machine Model (MM) ESD Protection	» = 25°C	300	**V**
Latch-up Tolerance	JESD78 Compliant		
Mechanical Shock Resistance	Mil 883, Method 2002	10,000	**g**
Mechanical Vibration Resistance	Mil 883, Method 2007	70	**g**
1508 CSP Junction Temperature		150	**°C**

Features

- Small SMD package: 2.0 x 1.2 mm (2012)[1]
- Pin-compatible to 2012 XTAL SMD package
- Fixed 32.768 kHz output frequency
- <20 ppm frequency tolerance
- Ultra-low power: <1 卩A
- Supports coin-cell or super-cap battery backup voltages
- Vdd supply range: 1.5V to 3.63V over -40° C to +85° C
- Oscillator output eliminates external load caps
- Internal filtering eliminates external Vdd bypass cap
- NanoDrive™ programmable output swing for lowest power

Applications

- Mobile Phones, Tablets, Health and Wellness Monitors, Fitness Watche
- Sport Video Cams, Wireless Keypads, Ultra-Small Notebook PC
- Pulse-per-Second (pps) Timekeeping, RTC Reference Clock

Note: 1. For the smallest 32 kHz XO in CSP (1.2mm²), consider the YSO1532MK

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Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Frequency and Stability						
Fixed Output Frequency	Fout		32.768		kHz	
Frequency Stability						
Frequency Tolerance	FJol			20	ppm	TA= 25°C, post reflow, Vdd: 1.5V - 3.63V.
Frequency Stability[3]	F_stab			75	PPm	TA= -10°C to +70°C, Vdd: 1.5V - 3.63V.
				100		TA= -40°C to +85°C, Vdd: 1.5V- 3.63V.
				250		TA=-10°C to +70°C, Vdd: 1.2V-1.5V.
25°C Aging		-1		1	ppm	1st Year
Supply Voltage and Current Consumption						
Operating Supply Voltage	Vdd	1.2		3.63	V	TA=-10°C to +70°C
		1.5		3.63	V	TA=V0°C to +85°C
Core Operating Current 【台]	Idd		0.90		卩A	TA=25°C,Vdd: 1.8V. No load
				1.3		TA=-10°C to +70°C, Vdd max: 3.63V. No load
				1.4		TA= -40°C to +85°C, Vdd max: 3.63V. No load
Output Stage Operating Current 卩]	Idd out		0.065	0.125	pA/Vpp	TA= -40°C to +85°C, Vdd: 1.5V- 3.63V. No load
Power-Supply Ramp	t_Vdd_Ramp			100	ms	TA= -40°C to +85°C, 0 to 90% Vdd
Start-up Time at Power-up[5]	t_start		180	300	ms	TA = -40°C M TA 《+50°C, valid output
				450		TA= +50°C < TA 《+85°C, valid output
Operating Temperature Range						
Commercial Temperature	T_use	-10		70	°C	
Industrial Temperature		■40		85	°C	

Notes:
2. Measured peak-to-peak. Tested with Agilent 53132A frequency counter. Due to the low operating frequency, the gate time must be 2100 ms to ensure an accurate frequency measurement.
3. Stability is specified for two operating voltage ranges. Stability progressively degrades with supply voltage below 1.5V. Measured peak-to-peak. Inclusive of Initial Tolerance at 25°C, and variations over operating temperature, rated power supply voltage and load.
4. Core operating current does not include output driver operating current or load current. To derive total operating current (no load), add core operating current + (0.065 卩A/V) * (peak-to-peak output Voltage swing).
5. Measured from the time Vdd reaches 1.5V.

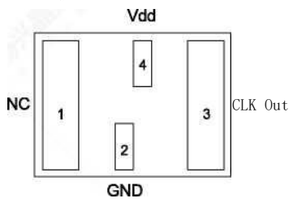
Electrical Characteristics (continued)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
LVCMOS Output Option, TA= -40°C to +85®C, typical values are at TA= 25°C						
Output Rise/Fall Time	u, tr		100	200		10-90% (Vdd), 15 pF load, Vdd = 1.5V to 3.63V
				50		10-90% (Vdd), 5 pF load, Vdd 21.62V
Output Clock Duty Cycle	DC	48		52	%	
Output Voltage High	VOH	90%			V	Vdd: 1.5V 一 3.63V. IQH = -10MA, 15 pF
Output Voltage Low	VOL			10%	V	Vdd: 1.5V - 3.63V. IQL= 10 卩A, 15 pF
NanoDrive™ Programmable, Reduced Swing Output						
Output Rise/Fall Time	tf,tf			200	ns	30-70% (VQL/VOH), 10 pF Load
Output Clock Duty Cycle	DC	48		52	%	
AC-coupled Programmable Output Swing	V_sw		0.20 to 0.80		V	YSO1533MK does not internally AG-couple. This output description is intended fora receiver that is AC-coupled. See Table 2for acceptable NanoDrive swing options. Vdd: 1.5V 一 3.63V, 10 pF Load, IQH / IOL = ±0.2 卩A.
DC-Biased Programmable Output Voltage High Range	VOH		0.60 to 1.225		V	Vdd: 1.5V - 3.63V. IQH = -0.2 pA, 10 pF Load. See Table 1 for acceptable VOH/VQL setting levels.
DC-Biased Programmable Output Voltage Low Range	VOL		0.35 to 0.80		V	Vdd: 1.5V - 3.63V. IQL = 0.2 pA, 10 pF Load. See Table 1 for acceptable VOH/VQL setting levels.
Programmable Output Voltage Swing Tolerance		-0.055		0.055	V	TA= -40°C to +85°C, Vdd = 1.5V to 3.63V.
Period Jitter	TJitt		35		ERMS	Cycles = 10,000, TA = 25°C, Vdd = 1.5V-3.63V

Pin Configuration

SMD Pin	Symbol	I/O	Functionality
1	NC	No Connect	No Connect. Will not respond to any input signal. When interfacing to an MCU's XTAL input pins, this pin is typically connected to the receiving IC's X Out pin. In this case, the YSO1533MKwill not be affected by the signal on this pin. If not interfacing to a XTAL oscillator, leave pin1 floating (noconnect).
2	GND	Power Supply Ground	Connect to ground. All GND pins must be connected to power supply ground.
3	CLK Out	OUT	Oscillator clock output. When interfacing to an MCU's XTAL, the CLK Out is typically connected to the receiving IC's X IN pin. The YSO1533MK oscillator output includes an internal driver. As a result, the output swing and operation is not dependent on capacitive loading.This makes the output much more flexible, layout independent, and robust under changing environmental and manufacturing conditions.
4	Vdd	Power Supply	Connect to power supply 1.5V W VddW 3.63V for operation over -40°C to +85°C temperature range. Under normal operatingconditions, Vdd does not require external bypass/decoupling capacitor(s). Internal powersupply filtering will reject more than ±150 mVpp with frequency components through 10MHz.Contact factory for applications that require a wider operating supply voltage range.

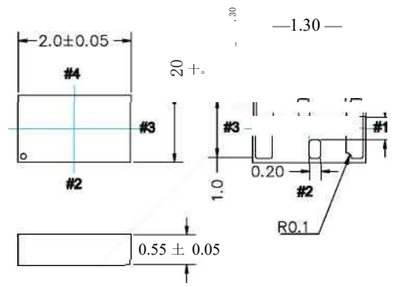
SMD Package (Top View)



Dimensions and Patterns

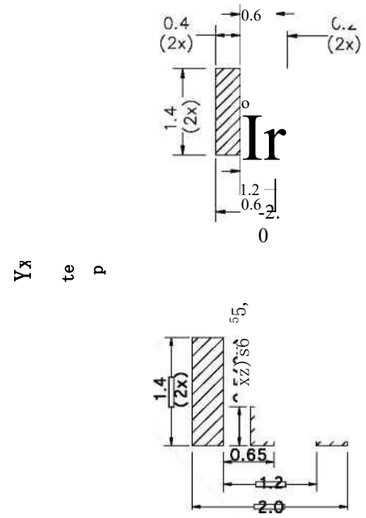
Package Size - Dimensions (Unit: mm)

2.0 x 1.2 mm SMD

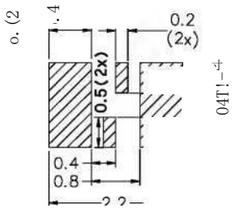


Recommended Land Pattern (Unit: mm)

YXC Only SPL



XTAL Compatible SPL



System Block Diagram

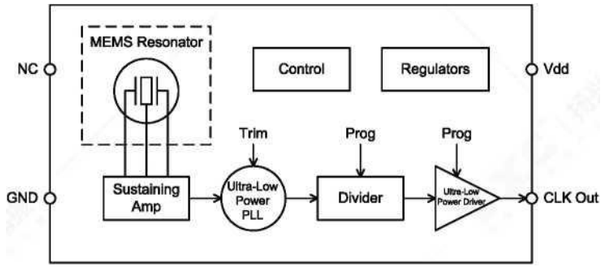


Figure 1.

Absolute Maximum

Attempted operation outside the absolute maximum ratings may cause permanent damage to the part. Actual performance of the IC is only guaranteed within the operational specifications, not at absolute maximum ratings.

Parameter	Test Condition	Value	Unit
Continuous Power Supply Voltage Range (Vdd)		-0.5 to 3.63	**V**
Short Duration Maximum Power Supply Voltage (Vdd)	《30 minutes, over -40°C to +85°C	4.0	**V**
Continuous Maximum Operating Temperature Range	Vdd = 1.5V-3.63V	105	**°C**
Short Duration Maximum Operating Temperature Range	Vdd = 1.5V-3.63V, 530 mins	125	**°C**
Human Body Model ESD Protection	HBM.JESD22-A114	3000	**V**
Charge-Device Model (CDM) ESD Protection	JESD220C101	750	**V**
Machine Model (MM) ESD Protection	T_A= 25°C	300	**V**
Latch-up Tolerance	JESD78 Compliant		
Mechanical Shock Resistance	Mil 883, Method 2002	10,000	**g**
Mechanical Vibration Resistance	Mil 883, Method 2007	70	**g**
2012 SMD J unction T em perature		150	**°C**
Storage Temperature		-65°C to150°C	

Features

- 32.768 kHz ±5, ±10, ±20 ppm frequency stability options over temp
- World's smallest TCXO in a 1.5 x 0.8 mm CSP
- Operating temperature ranges: 0°C to +70°C , -40°C to +85°C
- Ultra-low power: <1 pA
- Vdd supply range: 1.5V to 3.63V
- Improved stability reduces system power with fewer network timekeeping updates
- Na no Drive™ programmable output swing for lowest power and direct XTAL SoC input interface
- Internal filtering eliminates external Vdd bypass cap and saves space

Applications

- Smart Meters (AMR), Health and Wellness Monitors
- Pulse-per-Second (pps) Timekeeping, RTC Reference Clock

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Electrical Characteristics

[Parameter	Symbol	Min.	Typ-	Max.	Unit	Condition
Frequency and Stability						
Output Frequency	Fout		32.768		kHz	
Frequency Stability Over Temperature (1) (without Initial Offset 闫)	F_stab	-5.0		5.0	PPm	
		-10		10		
		-20		20		
Frequency Stability Over Temperature (with Initial Offset 闪)	F_stab	-10		10	PPm	
		-13		13		
		-22		22		
Frequency Stability vs Voltage	F_vdd	-0.75		0.75	ppm	1.8V ±10%
		-1.5		1.5	PPm	1.5V-3.63V
First Year Frequency Aging	F_aging	-1.0		1.0	PPm	T_A = *25°C,* Vdd = 3.3V
Jitter Performance OX = over temp)						
Long Term Jitter				2.5	卩Spp	81920 cycles (2.5 sec), 100 samples
Period Jitter			35		"RMS	Cycles = 10,000, T_A = 25°C, Vdd = 1.5V-3.63V
Supply Voltage and Current Consumption						
Operating Supply Voltage	Vdd	1.5		3.63	V	T_A = -40°C to +85°C
Core Supply Current	Idd		0.99		MA	T_A = 25°C, Vdd = 1.8V, LVCMOS Output configuration, No Load
				1.52		T_A = -40°C to +85°C, Vdd = 1.5V-3.63V, No Load
Power-Supply Ramp	t_Vdd_ Ramp			100	ms	Vdd Ramp-Up 0 to 90% Vdd, T_A = *-40°C* to +85°C
Start-up Time at Power-up	t_start		180	300	ms	T_A = -40°C +60°C, valid output
				350		T_A = +60°C to +70°C, valid output
				380		T_A = +70°C to +85°C, valid output

Notes:
1. No board level underfill. Measured as peak-to-peak/2. Inclusive of 3x-reflow and ±20% load variation. Tested with Agilent 53132A frequency counter. Due to the low operating frequency, the gate time must be 2100 ms to ensure an accurate frequency measurement.
2. Initial offset is defined as the frequency deviation from the ideal 32.768 kHz at room temperature, post reflow.
3. Core operating current does not include output driver operating current or load current. *To* derive total operating current (no load), add core operating current + output driver operating current, which is a function of the output voltage swing. See the description titled, Calculating Load Current.

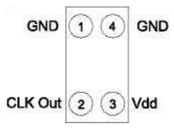
Electrical Characteristics (continued)

I Parameter	Symbol	Min.	Typ-	Max.	Unit	Condition
Operating Temperature Range						
Commercial Temperature	Op_Temp	0		70	°C	
Industrial Temperature		■40		85	°C	
LVCMOS Output						
Output Rlse/Fall Time			100	200		10-90% (Vdd), 15 pF Load
				50		10-90% (Vdd), 5 pF Load, Vdd N 1.62V
Output Clock Duty Cycle	DC	48		52	%	
Output Voltage High	VOH	90%			V	Vdd: 1.5V-3.63V. I_{OH} = -1 卩A, 15 pF Load
Output Voltage Low	VOL			10%	V	Vdd: 1.5V-3.63V. I_{OL} = 1 卩A, 15 pF Load
NanoDrive™ Reduced Swing Output						
Output Rise/Fall Time	tf.tf			200	ns	30-70% (V_{0L}/V_{0H}). 10 pF Load
Output Clock Duty Cycle	DC	48		52	%	
AC-coupled Programmable Output Swing	V_sw		0.20 to 0.80		V	YSO1552MK does not internally AC-couple. This output description is intended for a receiver that is AC-coupled. Vdd: 1.5V - 3.63V, 10 pF Load, I_{OH} / I_{OL} = ±0.2 pA
DC-Biased Programmable Output Voltage High Range	VOH		0.6 to 1.225		V	Vdd: 1.5V-3.63V. I_{OH} = -0.2 卩A, 10 pF Load
DC-Biased Programmable Output Voltage Low Range	VOL		0.35 to 0.80		V	Vdd: 1.5V - 3.63V. I_{OL} = 0.2 卩A, 10 pF Load
Programmable Output Voltage Swing Tolerance		-0.055		0.055	V	T_A = -40°C to +85°C, Vdd = 1.5V to 3.63V.

Pin Configuration

CSP Pin	Symbol	I/O	Functionality
1,4	GND	Power Supply Ground	Connect to ground. All GND pins must be connected to power supply ground. The GND pins can be connected together, as long as both GND pins are connected ground.
2	CLK Out	OUT	Oscillator clock output. When interfacing to an MCU's XTAL, the CLK Out is typically connected to the receiving IC's X IN pin. The YSO1552MK oscillator output includes an internal driver. As a result, the output swing and operation is not dependent on capacitive loading. This makes the output much more flexible, layout independent, and robust under changing environmental and manufacturing conditions.
3	Vdd	Power Supply	Connect to power supply 1.5V M Vdd W 3.63V. Under normal operating conditions, Vdd does not require external bypass/decoupling capacitor(s). For more information about the internal power-supply filtering, see *Power-Supply Noise Immunity setition* in the detailed description. Contact factory for applications that require a wider operating supply voltage range.

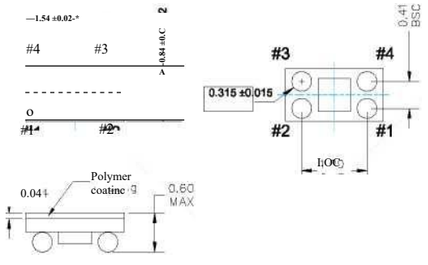
CSP Package (Top View)



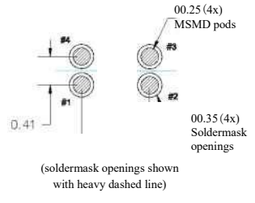
Dimensions and Patterns

Package Size - Dimensions (Unit: mm)

1.55x0.85 mm CSP



Recommended Land Pattern (Unit: mm)



(soldermask openings shown with heavy dashed line)

Recommend 4-mil (0.1mm) stencil thickness

System Block Diagram

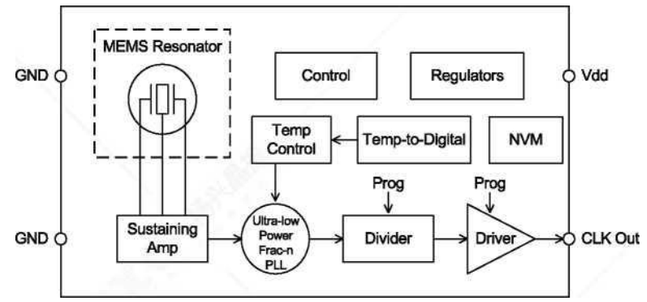


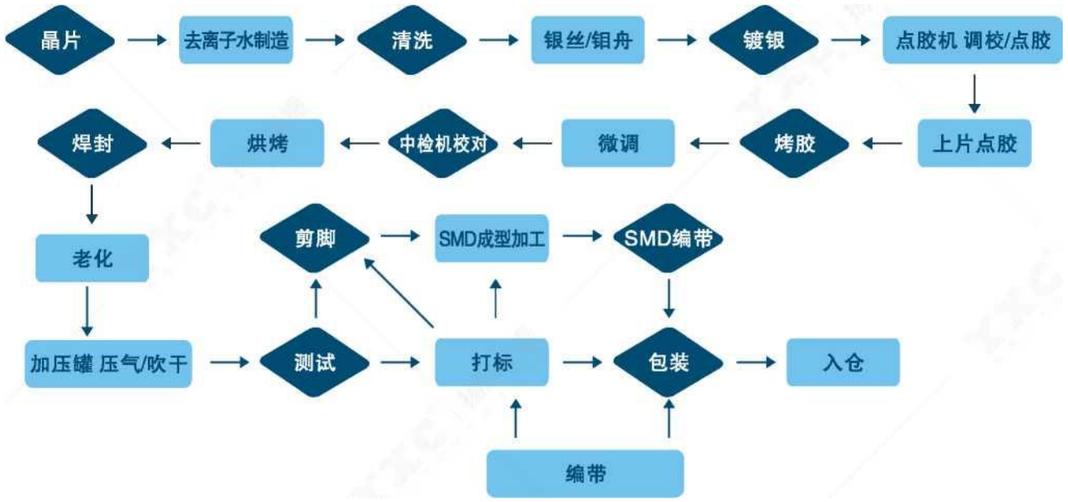
Figure 1.

Absolute Maximum

Attempted operation outside the absolute maximum ratings cause permanent damage to the part. Actual performance of the IC is only guaranteed within the operational specifications, not at absolute maximum ratings.

Parameter	Test Condition	Value	Unit
Continuous Power Supply Voltage Range (Vdd)		-0.5 to 3.63	V
Short Duration Maximum Power Supply Voltage (Vdd)	《30 minutes	4.0	V
Continuous Maximum Operating Temperature Range	Vdd = 1.5V-3.63V	105	°C
Short Duration Maximum Operating Temperature Range	Vdd = 1.5V-3.63V, ^30 mins	125	°C
Human Body Model (HBM) ESD Protection	JESD22-A114	3000	V
Charge-Device Model (CDM) ESD Protection	JESD22-A115	750	V
Machine Model (MM) ESD Protection	JESD22-C101	300	V
Latch-up Tolerance	JESD78 Compliant		
Mechanical Shock Resistance	Mil 883, Method 2002	10,000	g
Mechanical Vibration Resistance	Mil 883, Method 2007	70	g
1508 CSP Junction Temperature		150	°C
Storage Temperature		-65°Cto150°C	

石英晶体生产流程
Quartz Crystal Prodution Flow



MEMS 可编程晶振生产流程
MEMS Programmable Oscillator Production Flow

空白片库存 7050/5032/3225/2520/2016