



Issue	September 13, 2023
Rev.	1.0
Page	9

CRYSTAL UNIT SPECIFICATIONS

客户批准 Customer Approval

(请批准后回签一份 Please Return A Copy With Approval)

Customer	
Custome P/N	
Product	CRYSTAL RESONATORS
Spec	PMX145/32.768K/12.5PF/+20PPM
A-Crystal P/N	AM13276812503T6

Drawn	Checked	Approved
<i>caogaobang</i>	<i>tanglong</i>	<i>huanqweilong</i>



1. ELECTRICAL SPECIFICATIONS

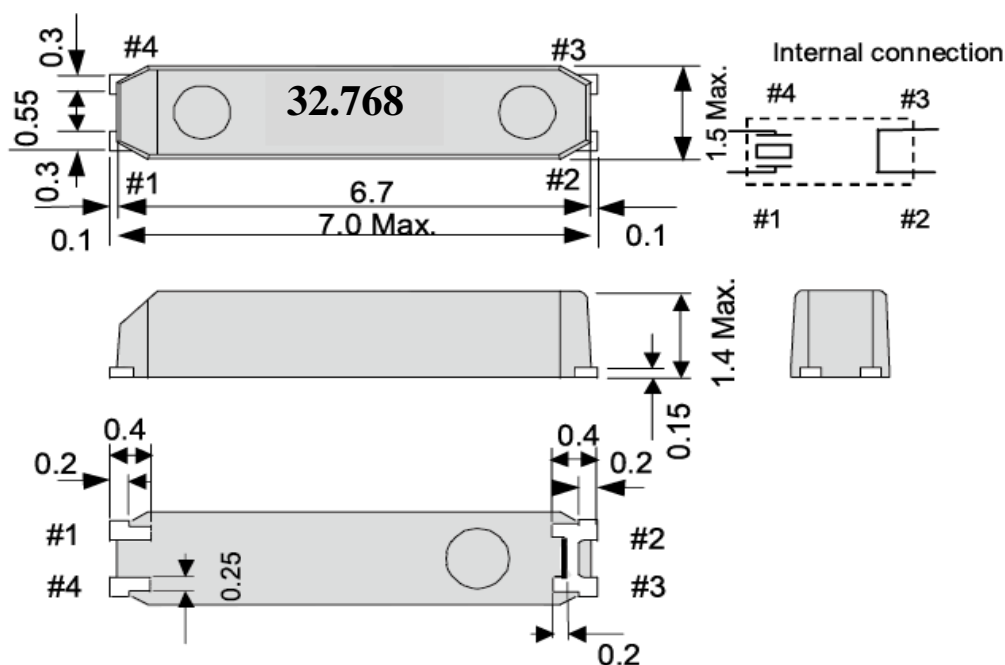
1.1 Hold Type: PMX-145

Parameter	Symb	Value	Condition
Frequency Range	F_0	32.768 KHz	
Frequency Tolerance	$\Delta f/f_0$	± 20 PPM	REF TO 25°C
Temperature Coefficient	K	-0.034 ± 0.006 ppm/(°C)²	
Turnover Temperature	T_{TO}	25 ± 5 °C	
Operating Temperature Range	T_{OP}	-40°C to 85°C	
Storage Temperature Range	T_{ST}	-55°C to 125°C	
Quality Factor	Q	60,000 TYP	
Series Resistance	R_1	65 K Ω	REF TO 25°C
Shunt Capacitance	C_0	1.8 PF TYP	0.9~2.0PF
Motional Capacitance	C_1	1.9 TYP	
Load Capacitance	C_L	12.5 PF	
Insulator Resistance	IR	500 M Ω	DC100V $\pm 15\text{V}$
Drive Level	L	1 μ W	
Capacitance ratio	R	450 TYP	
Aging Rate	Δ / f	± 5 PPM	at 25°C $\pm 3^\circ\text{C}$

注：ROHS 豁免 ROHS exemption, 高温高铅 high lead and high temperature;

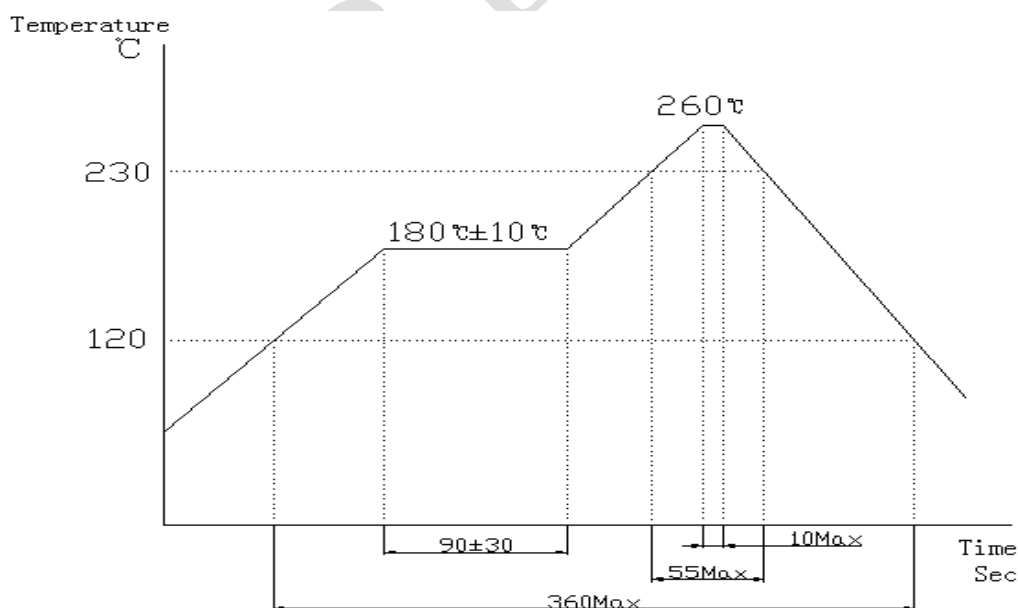


1.2 Dimension (Unit: mm)



Do not connect #2 and #3 to external device.
Metal may be exposed on the top or bottom of this product.
This will not affect any quality, reliability or electrical spec.

1.3 Reflow solder





2. TEST STANDARD

2.1 GENERAL ELECTRICAL CHARACTERISTICS AND VISUAL TESTING

2.1.1 LOT CLASSIFICATION : If the quantity is 1000 PCS or more, 1000 PCS is one lot

2.1.2 SAMPLING TEST METHOD : MIL-STD-105E G-II

2.1.3 TEST LEVEL

A) HIGH LEVEL DEFECT : AQL 0.065% [200 pcs]

B) MEDIUM LEVEL DEFECT : AQL 0.25% [50 pcs]

C) LOW LEVEL DEFECT : AQL 0.4% [32 pcs]

2.1.4 DEFECT CLASSIFICATION

A) HIGH LEVEL

@NO FREQUENCY

@MIXING

@LEAK DEFECT

B) MEDIUM LEVEL - ELECTRICAL CHARACTERISTIC DEFECT

@FREQUENCY

@OSCILLATION

@ELECTRICAL CURRENT

@OTHER ELECTRICAL CHARACTERISTICS DEFECT

C) VISUAL

@MARKING

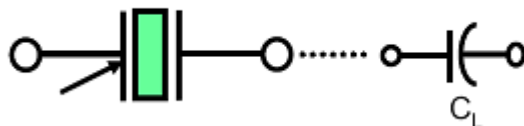
@WELDING

@LEADS

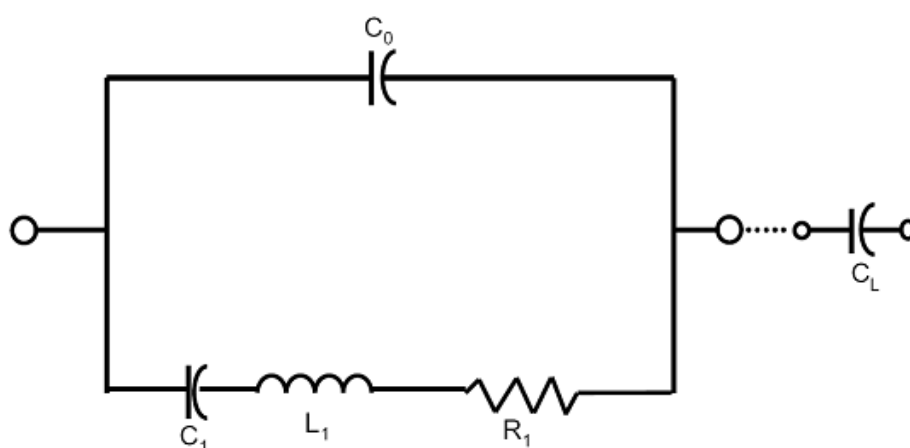
@OTHER VISUAL DEFECT

TESTING METHOD AND ITS STANDARD CAN BE MODIFIED DEPENDING
ON THE CUSTOMER'S REQUEST

2.2 Equivalent Circuits



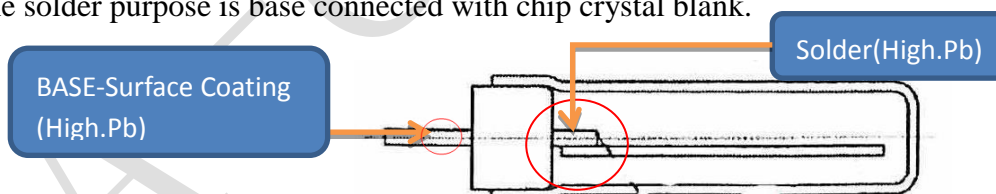
Symbol for crystal unit



2.3 That Exemption Rule:

- 1) A-crystal' S SMD Tuning Fork Crystal series (P/N: PMX-145) contain Pb chemical substance where solder material is over limitation. The location see at below drawing:

The solder purpose is base connected with chip crystal blank.



- 2) Below statement is that exemption rule:

Lead in high melting temperature type solders (i.e. lead-based alloys containing 85 % by weight or more lead). (Rohs 6/5 2002/95/EC)

高熔點銲錫中的鉛(例如鉛含量 $\geq 85\%$ 合金中的鉛)。



3.RELIABILITY(MECHANICAL AND ENVIRONMENTAL ENDURANCE)

NO.	TEST	TEST METHOD AND CONDITION	REQUIREMENTS
1	VIBRATION 振动试验	(1)VIBRATION FREQUENCY: 10 TO 55HZ (2)VIBRATION AMPLITUDE: 1.5MM (3)CYCLE TIME: 1~2MIN(10-55-10HZ) (4)DIRECTION: X.Y. Z (5)DURATION: 2H/EACH DIRECTION (6)G-FORCE: $\geq 5G$	FREQUENCY CHANGE: $\pm 10PPM$ Max. RESISTANCE CHANGE: $\pm 15\%RR$ Max
2	DROP TEST 跌落试验	3 TIMES FREE FROM 75CM HEIGHT TABLE TO 3CM THICKNESS HARD WOOD BOARD, AFTER 30 MINUTES, THE RELATIVE CHANGE VALUE OF FREQUENCY WAS MEASURED.	FREQUENCY CHANGE: $\pm 10PPM$ Max . RESISTANCE CHANGE: $\pm 15\%RR$ Max
3	LEAKAGE 气密性	PUT CRYSTAL UNITS INTO A HERMETIC CONTAINER AND HELIUM FOR 0.5-0.6MPA, AND KEEP IT FOR 1H; CHECK THE LEAKAGE BY A HELIUM LEAK DETECTOR.	LEAKAGE: $1*10^{-8}$ mbar.l/s Max.
4	SOLDERABILIT Y 可焊性试验	(1)DIP IN FLUX 3~5SECONDS, (2)DIP THE LEADS INTO $260 \pm 5^{\circ}C$ 99% SN DIPPING SOLUTION FOR 5S.	THE DIPPED PART OF THE LEADS SHOULD HAVE 95% SN COATING.
5	SOLDER HEAT RESISTANCE TEST 耐焊接热	(1)PRE-HEAT: $125^{\circ}C$ 60~120 SECONDS (2)SOLDER TEMPERATURE: $260 \pm 5^{\circ}C$ 99% SN DIPPING SOLUTION FOR 5S. (3)TAKE THE UNIT OUT ,STORE AT ROOM TEMPER ATURE FOR 30S THEN MEASURE THE ELCTRICAL CHARACTERISTICS.	SHOULD PASS SEALING AND VISUAL TEST. FREQUENCY CHANGE: $\pm 10PPM$ MAX.
6	LEAK TEST 气密性试验	USE HELIUM LEAK DETECTOR. BOMBING PRESSURE: $5KG/CM^2$ BOMBING TIME: 2 HOURS LEAK SHOULD BE LESS THAN $1E-8$ ATM.CC/SEC.	GAS OR AIR SHOULD NOT BE DETECTED.
7	HIGH TEMPERATURE ENDURANCE 耐高温	THE CRYSTAL UNITS SHALL BE PUT IN SOMEWHERE FOR 500 HOURS AT TEMPERATURE OF $125^{\circ}C \pm 5^{\circ}C$,THEN KEEP IT FOR 1 TO 2 HOURS UNDER ROOM TEMPERATURE.	FREQUENCY CHANGE: $\pm 10PPM$ MAX. RESISTANCE CHANGE: $\pm 15\%RR$ MAX.



ZHEJIANG A-CRYSTAL
ELECTRONIC TECHNOLOGY CO., LTD.

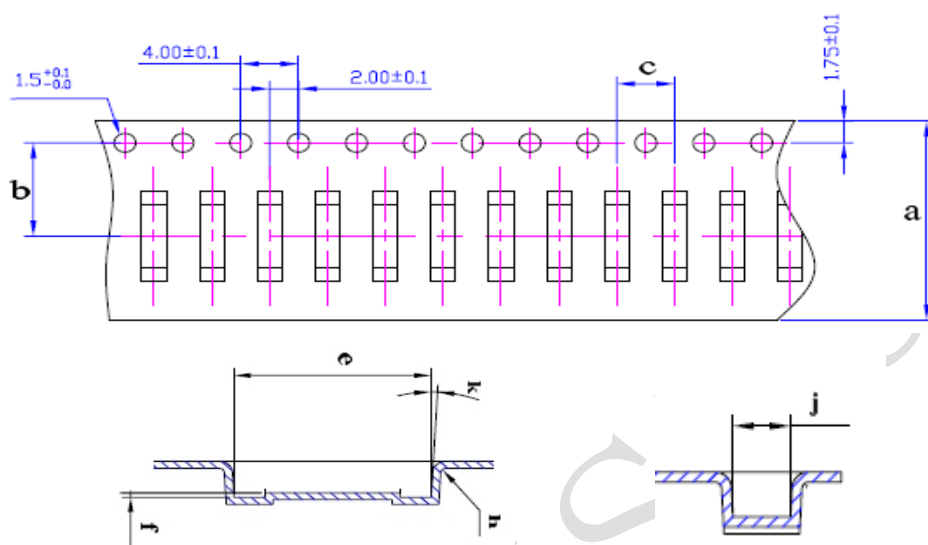


NO.	TEST	TEST METHOD AND CONDITION	REQUIREMENTS
8	LOW TEMPERATURE ENDURANCE 耐低温	THE CRYSTAL UNITS SHALL BE PUT IN SOMEWHERE FOR 500 HOURS AT TEMPERATURE OF -40°C, THEN KEEP IT FOR 1 TO 2 HOURS UNDER ROOM.	FREQUENCY CHANGE: ±10PPM MAX. RESISTANCE CHANGE: ± 15%RRMAX
9	HUMIDITY ENDURANCE 耐湿性	SOMEWHERE AT 40°C ±5°C IN RELATIVE HUMIDITY OF 90%~95% FOR 72 HOURS, THEN KEEP IT FOR ONE OR TWO HOURS UNDER ROOM TEMPERATURE	FREQUENCY CHANGE: ±10PPM MAX. RESISTANCE CHANGE: ± 15%RRMAX.
10	TEMPERATURE CYCLE 温度循环	TEMPERATURE SHIFT FROM LOW(-40°C) TO HIGH(100°C,KEEP 30 MINUTES),SATISFY HIGH(100°C) TO LOW(-40°C,KEEP 30 MINUTES),THEN GO UP TO ROOM TEMPERATURE FOR 10 CYCLES.	FREQUENCY CHANGE: ±10PPM MAX. RESISTANCE CHANGE: ± 15%R M X.
11	LEAD TENSILTY 引线强度	(1)FIX THE UNIT. (2)APPLY 2LB OF WEIGHT AXIS TO THE LESDS. (3)TIME:5S	SHOULD PASS SEALING A D VISUAL TEST.
12	LEAD BENDING 引线强度	ATTACH 1LB OF WEIGHT TO EACH OF THE LEADS. BENDING ANGLE:90 °(FROM THE NOMAL POSITION TO 45 °OPPOSTTE DIRECTION) BENDING TIME:3S(EACH DIRECTION) NUMBER OF BENDING:2TIMES NUMBER OF BENDING:2TIMES	SHOULD PASS SEALING AND VISUAL TEST.
13	MARKING ERASE	SUBMERGE THE UNIT INTO IPA[ISOPROPYL ALCOHOL] SOLUTION FOR 10MINUTES AND BRUSH THE MARKING 10 TIMES WITH A TOOTH BRUSH.	MARKING SHOULD NOT BE ERASED.



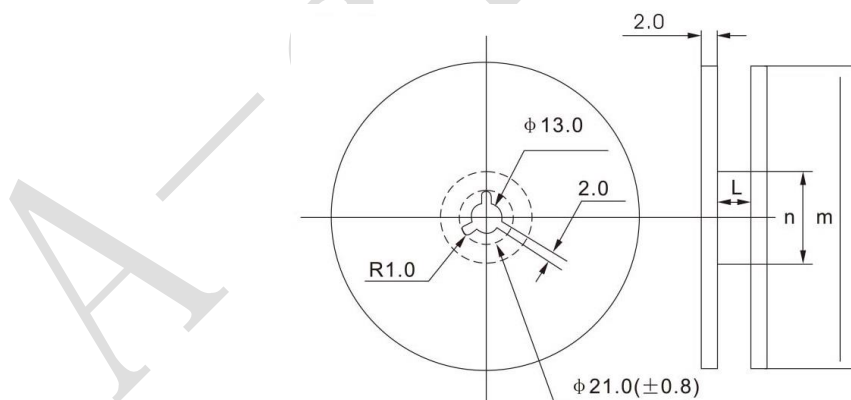
4.PACKING

4.1 Packing Method Sketch Map (Unit: mm)



Quantity Pcs/reel	a	b	c	e	f	h	j	k
3k/reel & 9k/reel	16.0	7.5	4.0	7.2	0.15	0.5	1.65	3

4.2 Reel Dimensions (Unit: mm)



Pieces per reel	φ m	φ n	L	Carrier tape size
3000/reel	180±3	60min	17.5	16
9000/reel	330±3	80min	17.5	16



4.3 Section of package

Package is made of corrugated paper with thickness of 0.8cm. Package has 10 inner boxes, each box has 1 reel

4.3.1 Quantity of package

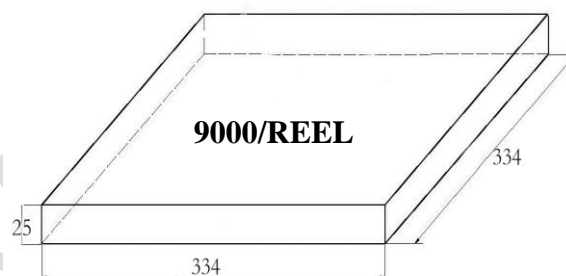
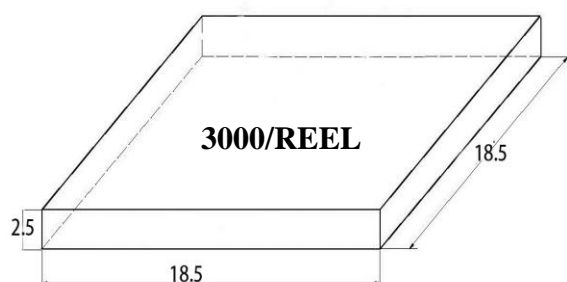
Per plastic reel 3000 pieces of Crystal Resonators

Per inner box 3k/reel & 9k/reel

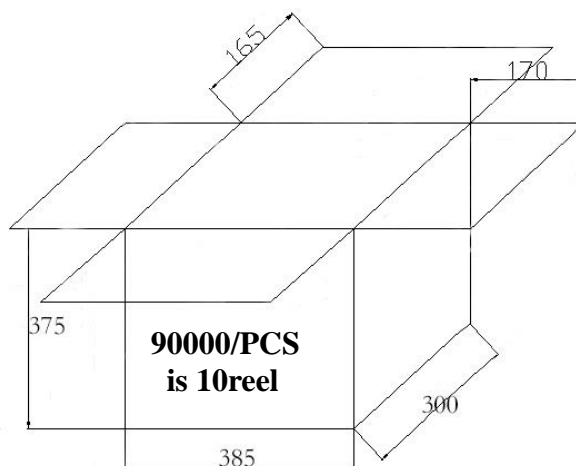
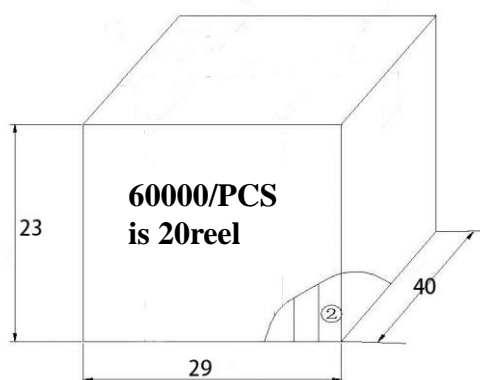
Per package 20 inner boxes & 10 inner boxes

(60000 pieces of Crystal Resonators & 90000 pieces of Crystal Resonators)

4.3.2 Inner Box Dimensions (Unit: mm)



4.3.3 Dimensions and Mark (Unit: mm)





5. CAUTION

* IN ORDER TO MAINTAIN QUALITY. WITHOUT CHANGE IN CHARACTERISTICS OF THE CRYSTAL UNITS. PLEASE FOLLOW BELOW RECOMMENDATION

5.1 SHOCK

5.1.1 ALL CRYSTAL UNITS HAVE A THIN CRYSTAL BLANKS WITHIN IF IT IS DROPPED ABOVE THE RECOMMENDED DROPPING HEIGHT(500mm) THE SPECIFIC CHARACTERISTICS AND APPEARANCE CAN BE CHANGED PLEASE PAY SPECIAL ATTENTION TO EXTERNAL SHOCK

5.2. ENVIRONMENTAL

5.2.1 CRYSTAL UNITS' FREQUENCY CAN BE CHANGED DUE TO SURROUNDING TEMPERATURE IF IT IS STORED NEXT TO A HIGH TEMPERATURE HEATER (ABOVE+85°C) OR BELOW 40°C. AND A STRONG LIGHT SOURCE FOR LONG PERIOD OF TIME. THE ELECTRICAL CHARACTERISTICS CAN BE CHANGED IT IS SUGGESTED THAT THESE ENVIRONMENTS BE AVOIDED

5.2.2 IF THE UNIT IS PLACED IN A HUMID ENVIRONMENT. LEAD TERMINAL CAN BE DAMAGED: THEREFORE. DO NOT STORE THE CRYSTAL UNITS IN A HUMID ENVIRONMENT

5.2.3 CRYSTAL UNIT HAS VIBRATING CHARACTERISTICS IF IT IS PLACED WHERE VIBRATION EXISTS THE OPERATING CHARACTERISTICS CAN BE ALTERED; THEREFORE THIS ENVIRONMENT SHOULD BE AVOIDED

5.3 LEADS

5.3.1 AFTER SOLDERING CRYSTAL UNITS INTO A PCB IMPACTING THE UNIT FROM THE TOP, BOTTOM LEFT OR RIGHT SIDE OF THE UNIT CAN SHATTER THE GLASS PORTION OF THE BASE RENDERING THE UNIT USELESS

5.4 ASSEMBLY METHOD

5.4.1 CORRECT ULTRASONIC FREQUENCY FOR CLEANING SHOULD BE LESS THAN 20KHZ

5.4.2 SOLDERING SHOULD BE DONE USING IEC 61760-1 OR PB-Free Products

5.5 STORAGE

5.5.1 IF THE CRYSTAL UNITS ARE STORED IN HUMID OR SALTY ENVIRONMENT APPEARANCE CAN BE CHANGED AND SOLDERABILITY CAN DETERIORATE; THEREFORE AVOID STORING IN SUCH ENVIRONMENT DO NOT STORE THE CRYSTAL UNIT MORE THAN 3 MONTHS



6. Pb-Free PRODUCTS

A-crystal Pb-free program.

The A-crystal Pb-free program is implemented in accordance with European Union (EU) Legislation titled "Restriction of the use of certain Hazardous Substances (RoHS)" including banning the use of Pb in electronic assemblies after July 1, 2006.

A-crystal Definitions

Pb-Free Classification: Component and Assembly Pb content shall be less than 0.1% by weight of the device (in accordance to IPC/EIA J-STD-006) and shall not be intentionally introduced.

Components: A-crystal's definition of components apply to quartz crystal devices

Assemblies: A-crystal's definition of assemblies apply to oscillator devices (XO, VCXO and TCXO's)

Recommended Solder Composition

A-crystal's is following industry trend of using alloy range Sn-Ag(3.4-4.1)-Cu(0.45-0.9) for reflow and wave soldering.

Pb-free Part Number Identification:

When applicable, the A-crystal specification sheet shall indicate if the device is classified as Pb-free.

Marking and Labeling: A-crystal has a Pb-free labeling method for the packaging of all Pb-free products. The lowest level shipping container shall identify the products as Pb-free.

OTHERS

If you have some doubt or unknowing about this specification, Please contact us for Settlement or development.