

APPROVAL SHEET

Customer : _____

Part Number: 2012 Seam Sealing CrystalLK Part No.: L216MK32M21LHolder : SMD2012Frequency: 32.768KHz 12.5PF ±20PPMManufacturer: Lucki ElectronicsDate: 2023-04-12

Prepared	Checked	Approved
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(For Customer Use)

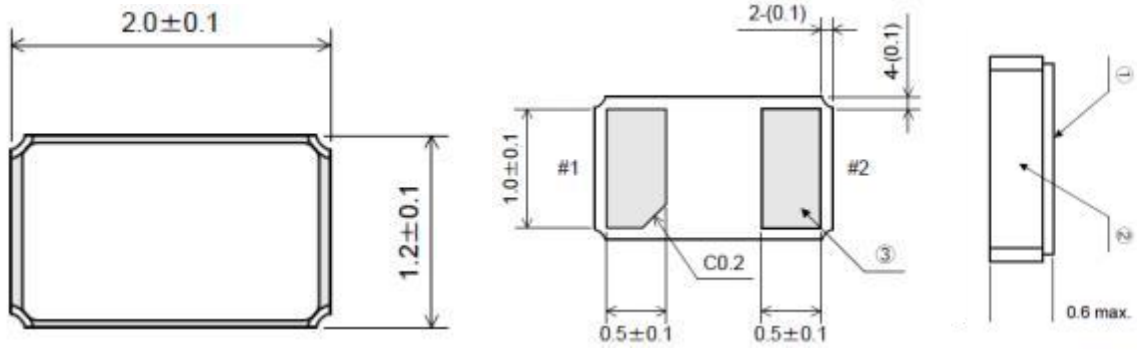
Acceptable	

1. ELECTRICAL SPECIFICATIONS

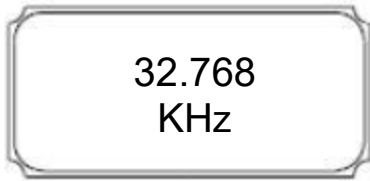
1.1 Hold Type: PSX-215

Parameter	Symb	Value	Condition
Frequency Range	F ₀	32.768Khz	
Frequency Tolerance	$\Delta f/f_0$	±20PPM	REF TO 25 °C
Temperature Coefficient	K	(-0.03±0.01) *10⁻⁶ / °C²	
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	90 KΩ	KΩ Max REF TO 25 °C
Shunt Capacitance	C ₀	7PF or less	
Load Capacitance	C _L	12.5 PF	
Insulator Resistance	IR	500 MΩ	DC100V±15V
Drive Level	DL	0.1 μW	0.5 μW Max
Capacitance Ratio	R	450 TYP	
Aging Rate	Δ /f	±3 PPM	at 25 °C ± 3 °C

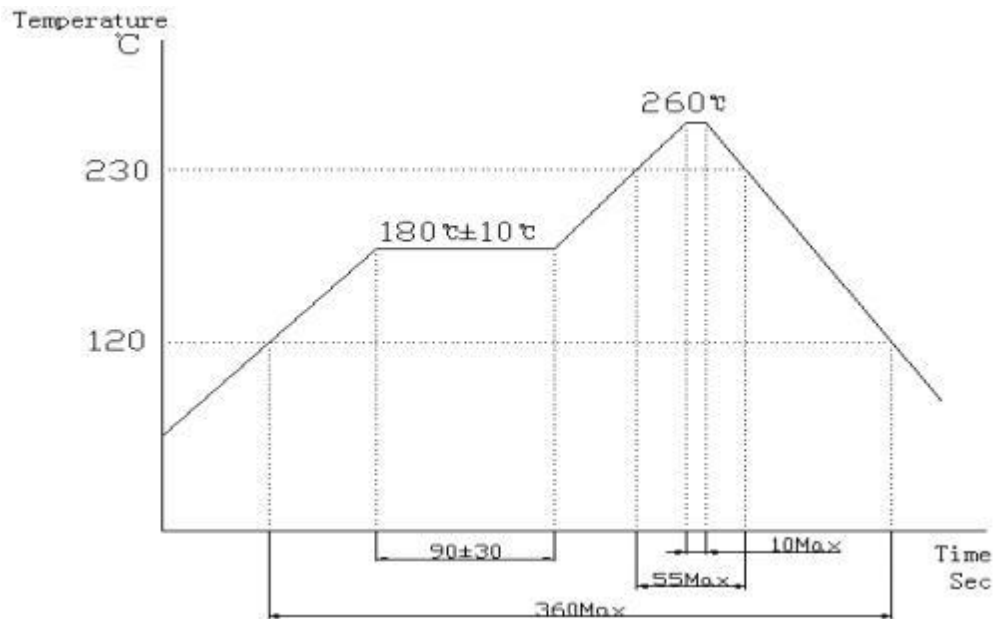
1.2 Dimension (Unit: mm)



1.2.1 Marking



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

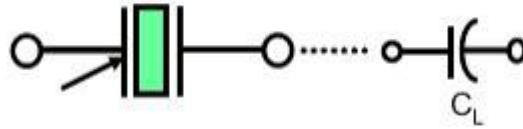
@WELDING

@LEADS

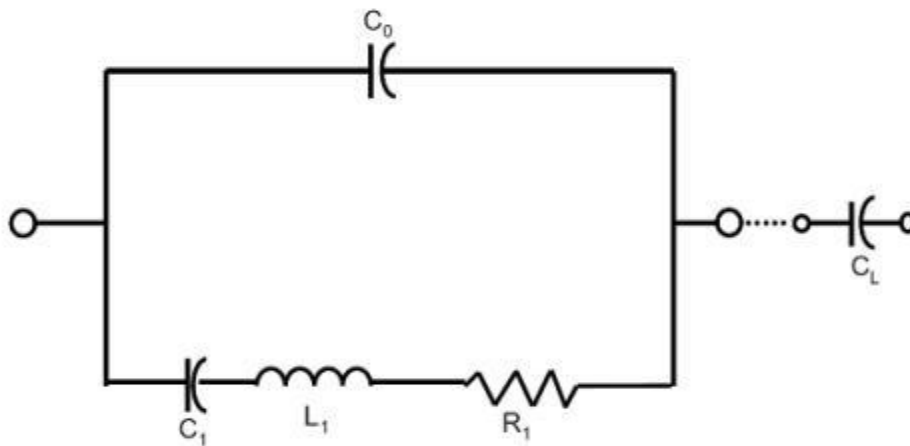
@OTHER VISUAL DEFECT

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

2.2 Equivalent Circuits



Symbol for crystal unit



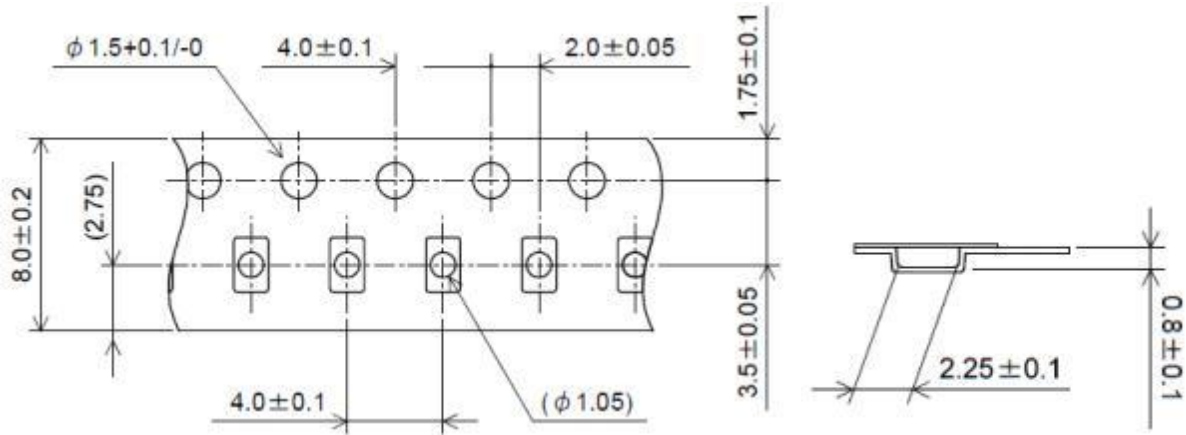
3.RELIABILITY(MECHANICAL AND ENVIRONMENTAL ENDURANCE)

NO.	TEST	TEST METHOD AND CONDITION	REQUIREMENTS
1	VIBRATION	(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: ≥5G	FREQUENCY CHANGE: ±10PPM MAX. RESISTANCE CHANGE: ± 15%RRMAX
2	SHOCK	3 TIMES FREE DROP FROM 75CM HEIGHT TO HARD WOODEN BOARD OF THICKNESS MORE THAN 30MM.	FREQUENCY CHANGE: ±10PPM MAX. RESISTANCE CHANGE: ± 15%RRMAX.
3	LEAKAGE	PUT CRYSTAL UNITS INTO A HERMETIC CONTAINER AND HELIUM FOR 0.5-0.6. MPA,AND KEEP IT FOR 1H;CHECK THE LEAKAGE BY A HELIUM LEAK DETECTOR.	LEAKAGE:1X10 ⁻⁸ MBAR.L/S MAX.
4	SOLDERABILITY	(1)DIP THE LEADS INTO FLUX(ROJIN METHANOL) FOR 3~5S. (2)DIP THE LEADS INTO 245±5℃ 99% SN DIPPING SOLUTION FOR 5S.	THE DIPPED PART OF THE LEADS SHOULD HAVE 95% SN COATING.
5	SOLDERING HEAT RESISISTANCE TEST	(1)PERFORM ELECTRICAL CHARACTERISTICS TEST BEFORE STARTING THIS PROCEDURE. (2)DIP THE LEADS INTO FLUX(ROJIN METHANOL) 5±0.5S. (3)DIP THE LEADS INTO 260±5℃ 99% SN DIPPING SOLUTION FOR 5S. (4)TAKE THE UNIT OUT ,STORE AT ROOM TEMPER ATURE FOR 30S THEN MEASURE THE ELCTRICAL CHARACTERISTICS.	SHOULD PASS SEALING AND VISUAL TEST. FREQUENCY CHANGE: ±10PPM MAX.
6	LEAK TEST	USE HELIUM LEAK DETECTOR. BOMBING PRESSURE:5 KG/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	THE CRYSTAL UNITS SHALL BE PUT IN SOMEWHERE FOR 500 HOURS AT TEMPERATURE OF 125℃±5℃,THEN KEEP IT FOR 1 TO 2 HOURS UNDER ROOM TEMPERATURE.	FREQUENCY CHANGE: ±10PPM MAX. RESISTANCE CHANGE: ± 15%RRMAX.

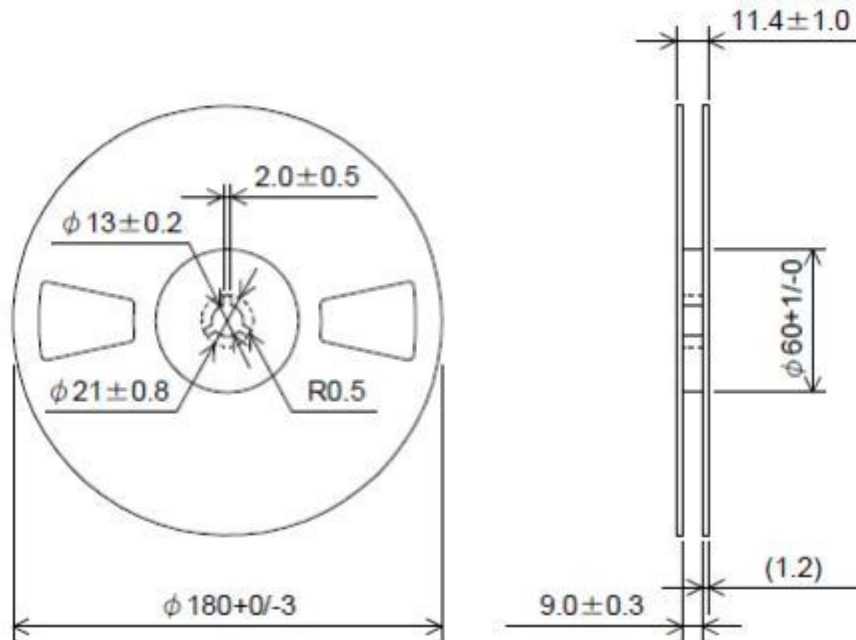
NO.	TEST	TEST METHOD AND CONDITION	REQUIREMENTS
8	LOW TEMPERATURE ENDURANCE	THE CRYSTAL UNITS SHALL BE PUT IN SOMEWHERE FOR 500 HOURS AT TEMPERATURE OF -40°C, THEN KEEP IT FOR 1 TO 2 HOURS UNDER ROOM.	FREQUENCY CHANGE: ±10PPM MAX. RESISTANCE CHANGE: ± 15%RRMAX
9	HUMIDITY ENDURANCE	SOMEWHERE AT 40°C±5°C 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	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%RRMAX.
11	LEAD TENSILTY	(1)FIX THE UNIT. (2)APPLY 2LB OF WEIGHT AXIS TO THE LESDS. (3)TIME:5S	SHOULD PASS SEALING AND VISUAL TEST.
12	LEAD BENDING	(1) ATTACH 1LB OF WEIGHT TO EACH OF THE LEADS. (2) BENDING ANGLE:90°(FROM THE NOMAL POSITION TO 45°OPPOSTTE DIRECTION) (3) BENDING TIME:3S(EACH DIRECTION) NUMBER OF BENDING:2TIMES (4) 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)



4.2 Reel Dimensions (Unit: mm)



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

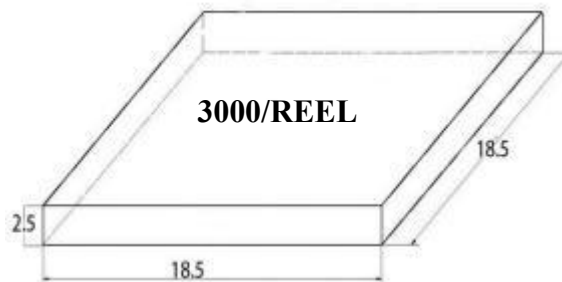
Per plastic reel 3000 pieces of Crystal Resonators

Per inner box 3k/reel

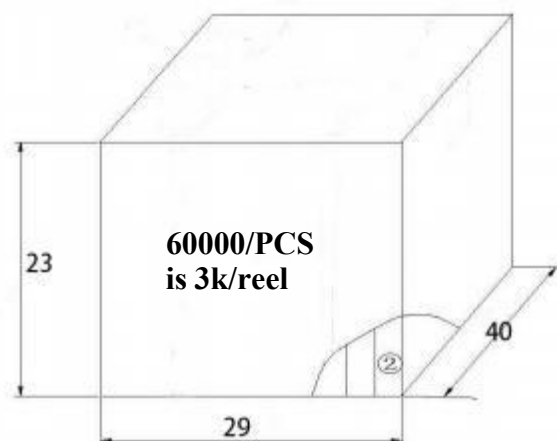
Per package 20 inner boxes & 10 inner boxes

(30000 pieces of Crystal Resonators & 60000 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

LK Pb-free program.

The LK 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.

LK 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: LK's definition of components apply to quartz crystal devices

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

Recommended Solder Composition

LK'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 LK specification sheet shall indicate if the device is classified as Pb-free.

Marking and Labeling: LK 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.

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