# AEC®

**Abundance Enterprise Co.**

# PRODUCT SPECIFICATION

## CRYSTAL RESONATOR

**AEC PART NUMBER / SPEC. NO: ZM146-32.768K-20-12.5p**

**CUSTOMER:**

**This model is ROHS/PB-free compliance according to the ROHS directive 2002/95/EC**

| | |
|---|---|
| **Production Name** | **Crystal Resonator** |
| **Frequency** | **32.768KHz** |
| **Model No** | **ZM146-32.768K-20-12.5p** |
| **Issue Date** | **18th Jan 2013** |


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| Prepared | Inspection | Approved |
|---|---|---|
| *Victor* | *Andy* | *Henkie* |

## 1. GENERAL PROVISION

**1-1 Production Name: SMD Crystal Resonator**

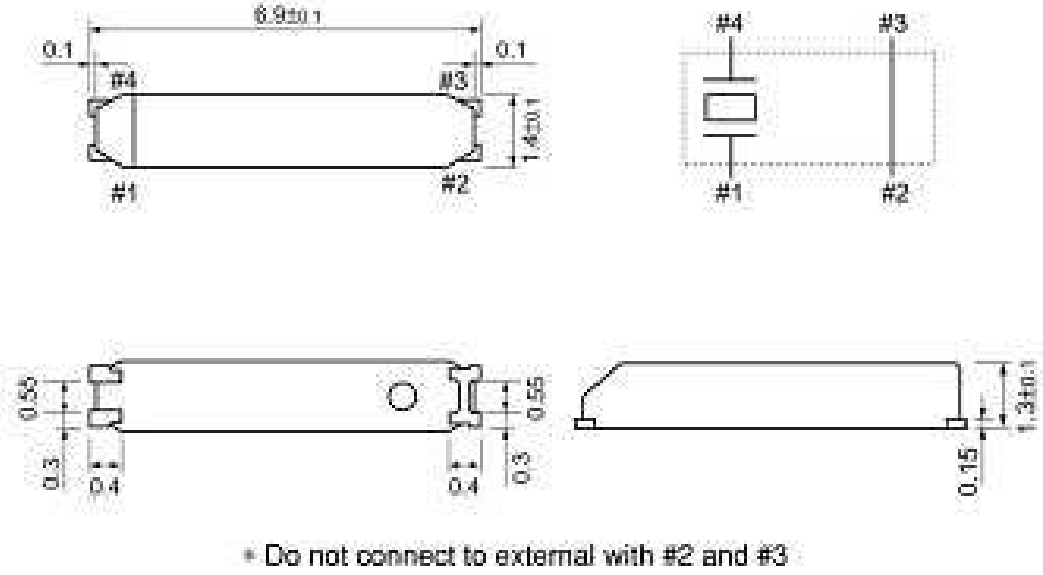
**1-2 Holder Type: ZM146**

**1-3 This specification relates to the crystal resonator to be supplied by Abundance Enterprise Co. ( AEC ).**

## 2. ELECTRICAL DATA

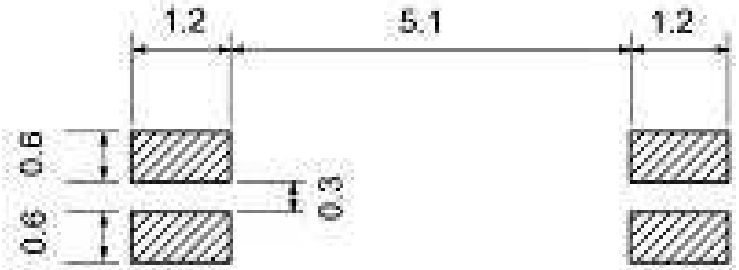
| Items | Parameters | | Condition |
|---|---|---|---|
| 2-1 | Frequency: | | 32.768KHz |
| 2-2 | Load Capacitance | | 12.5pF |
| 2-3 | Frequency Tolerance | | +/- 20 ppm |
| 2-4 | Temperature Range | Operating | (-40℃~to 85℃)℃ |
| | | Storage | (-55℃~to 125℃)℃ |
| 2-5 | Equivalent Series Resistance | | 65K ohm |
| 2-6 | Shunt Capacitance | | 0.8pF (typ.) |
| 2-7 | Motional Capacitance | | 1.9 fF (typ.) |
| 2-8 | Q-Factor | | 60K Typical |
| 2-9 | Parabolic Coefficient | | -0.034ppm+/-0.006/(△℃)$^2$ (typ.) |
| 2-10 | Turnover Temperature | | 25℃+/-5℃℃ |
| 2-11 | Shock Resistance | | +/-3ppm max. Natural Drop 3 Times On Hard Wooden Board From Height of 75cm. |
| 2-12 | Insulation Resistance | | 500 Mega Ω Min./DC 100V |
| 2-13 | Drive Level | | 1u Watts max. |
| 2-14 | Aging (at 25℃)℃ | | +/-5 ppm/year max. |
| 2-15 | Capacitance Ratio | | 450 Typical |

## 3. DIMENSION & LAND PATTERN




* Do not connect to external with #2 and #3

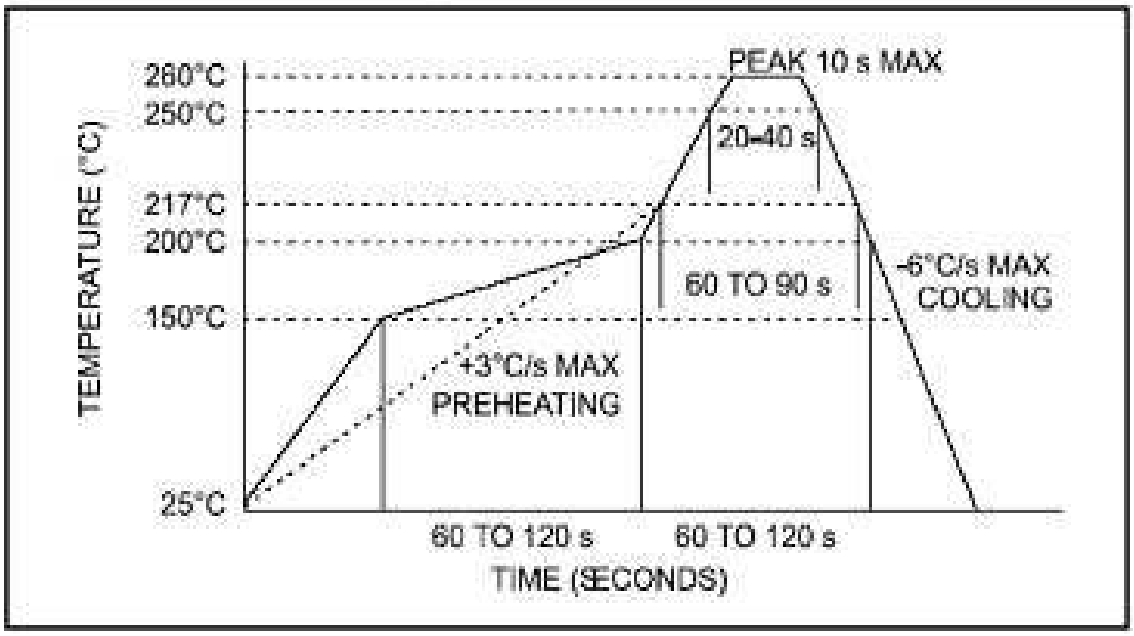
### Recommended Soldering Pads




**Unit: mm**

| Abundance Enterprise Co. | | NO. | REVISED DATE | MODIFY CONTENTS |
|---|---|---|---|---|
| | | 1 | 2006.10.4 | ORIGINAL |
| | | | | |
| DIMENTION | mm | | | |
| SCALE | | MODEL | | ZM-145 PAD AND PRODUCT DIMENTION |
| TOLERANCE | ±0.2 | PART NAME | | ZM-146 |

## 4. Soldering Condition



## 5. Testing standard

5.1.1 Lot Classification: If the quantity is 1000pcs or more, 1000pcs is one lot
5.1.2 Sampling Test method: MIL-STD- 105E G-II
5.1.3 Test Level
A) High Level Defect: AQL 0.065% [200pcs]
B) Medium Level Defect: AQL 0.25% [50pcs]
C) Low Level Defect: AQL 0.4%[32pcs]
5.1.4 Defect Classification
A) High Level
i)NO Frequency
ii)MIXING
iii)Leak Defect

B) Medium Level- Electrical Characteristic Defect
i) Frequency
ii) Oscillation
iii) Electrical Current
iv) Other Electrical Characteristics Defect

C) Visual
i) Marking
ii) Welding
iii) Leads
iv) other visual defect

Testing method and its standard can be modified depending on the customer's request.

## 6. Reliability Test Standard- Environmental

| Test Item | Testing procedure and Conditions | Evaluation |
|---|---|---|
| 1.Thermal stock Test | 1.The test should be performed in accordance with the following condition for 10 cycle.<br><br>2. The crystal unit should be kept in room temperature for 1 hour then tested. | The Crystal unit should fulfill the specified requirements of the electrical characteristics and appearance. |
| 2. Humidity | 1.Temperature: +40 ℃ +/-2 ℃<br>Relative humidity: 90~95%<br>Test period: 48 hours<br><br>2. The crystal unit should be kept in room temperature for 1 hour then tested. | The Crystal unit should fulfill the specified requirements of the electrical characteristics and appearance |
| 3. Cold Temperature Test | 1.Temperature: -40 ℃ +/-2 ℃<br>Test period: 2 hours<br><br>2. The crystal unit should be kept in room temperature for 1 hour then tested. | The Crystal unit should fulfill the specified requirements of the electrical characteristics and appearance |
| 4. Thermal Test | 1.Temperature: +85 ℃ +/-2 ℃<br>Test period: 24 hours<br><br>2. The crystal unit should be kept in room temperature for 1 hour then tested. | The Crystal unit should fulfill the specified requirements of the electrical characteristics and appearance |
| 5. Rapid change in Temperature | 1.Temperature: +85 ℃ +/-2 ℃<br><br>Test period: 48 hours<br>2. The crystal unit should be kept in room temperature for 1 hour then tested. | The Crystal unit should fulfill the specified requirements of the electrical characteristics and appearance |

## 7. Reliability Test Standard- Mechanical.

| Test Item | Testing procedure and Conditions | Evaluation |
|---|---|---|
| 1. Lead Tension | 1. Fix the unit<br>2. Apply 2LB of Weight Axis to the leads<br>3. Time: 5 Seconds. | Should pass sealing and visual test. |
| 2. Lead bending | 1. Attach 1 LB of Weight to each of the leads<br>2. Bending Angle 90° (From the normal position to 45° opposite direction<br>3. Bending Time: 3 Seconds(Each direction)<br>4. Number of bending: 2 Times | Should pass sealing and visual test. |
| 3. Leads Solder ability | 1. Dip the leads into flux (Rojin Methanol) for 5 seconds.<br>2. Dip the leads into 250 +/- 5℃ 99% Sn Dipping solution for 5 seconds. | Should pass sealing and visual test. |
| 4. Soldering heat resistance test | 1.Perform Electrical Characteristics Test before starting this procedure.<br>2. Dip the leads into flux (Rojin methanol) for 5 seconds.<br>3. Dip the leads into 260 +/- 5℃ 99% Sn Dipping solution for 5 seconds.<br>4. Take the unit out, store at room temperature for 30 seconds then measure the electrical characteristics. | Should pass sealing and visual test. |
| 5 Vibration | 1.Perform electrical characteristics test before starting this procedure.<br>2. The unit should be fixed onto a vibrating machine and then shaken X, Y, Z Directions.<br>Vibration frequency: 10~55Hz<br>Amplitude: 0.03 inch<br>Factor time: 1 minutes<br>Testing Time: 30 minutes each for X, Y, Z directions | Should pass sealing and visual test. |
| 6. Drop Test | 1.Perform Electrical characteristics test before starting this procedure.<br>2. From the height of 500mm drop the unit 3 times onto a hard rubber surface. | Should pass sealing and visual test. |
| 7 Leak test | USE helium Leak detector.<br>Bombing pressure: 5kg/cm$^2$<br>Leak should be less than 1E- 8atm.cc/sec. | GAS or Air should not be detected. |
| 8. Marking erase | Submerge the unit into IPA [ISOPROPYL ALCOHOL] Solution for 10 Minutes and Brush the marking 10 times with a tooth brush. | Marking should not be erased. |

# 8. Caution

In order to maintain quality, without change in characteristics of the crystal unit, please follow below recommendation

8.1 Shock

8.1.1 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.

8.2 Environment.

8.2.1 Crystal units frequency can be changed due to surrounding temperature. If it is stored next to a high temperature heater (above +85℃) or below 40℃. And a strong light source for long period of time, the electrical characteristics can be changed. It is suggested that these environments can be avoided.

8.2.2 If the unit is placed in a humid environment, lead terminal can be damaged; therefore , do not store the crystal units in humid environment.

8.2.3 Crystal unit has vibrating characteristics. If it is placed where vibration exists, the operating characteristics can be altered; therefore, this environment should be avoided.

8.3 Lead

8.3.1 If the leads are bent 90° from its axis for more than 2 times the terminal could be disconnected; therefore, do not bent the leads excessively.

8.3.2 After soldering crystal units into a PCB, impacting the unit form the top, bottom, left or right side of the unit can shatter the glass portion of the base, rendering the unit useless.

8.4 Assembly method

8.4.1 Correct ultrasonic frequency for cleaning should be less than 20KHz.

8.4.2 Soldering should be done using IEC 61760-1 or PB- Free products.

8.5 Storage

8.5.1 If the crystal units are stored in humid or salty environment.
Appearance can be changed and solder ability can be deteriorate; therefore, avoid storing in such environment, do not store the crystal unit more than 3 months.