

Product Documentation

CC8V-T1A Medical

**Quartz Crystal Unit
32 kHz – 102.4 kHz**

2. Product Description

The CC8V-T1A Medical is a low frequency SMD Quartz Crystal Unit that incorporates a tuning fork Quartz Crystal Resonator. The Quartz Crystal Resonator operates under vacuum condition in a hermetically sealed ceramic package with ceramic lid.

The CC8V-T1A Medical Tuning Fork Crystal is manufactured specifically for use in implantable medical devices.

- Safe for Helium environment: Ceramic lid with gold-tin preform-seal for best long-term hermeticity and stability.
- Ultra low profile (maximum height 0.67 mm), lightweight (4.7 mg)

Suitable oscillator-circuitries can operate the CC8V-T1A Medical Quartz Crystal Units in fundamental mode consuming very low power. For technical assistance for optimizing oscillator-circuitries please contact Micro Crystal under sales@microcrystal.com

2.1. Application Examples

Pacemakers
 Defibrillators
 Neurostimulators
 Cardiac Monitoring Devices
 Implantable Drug Delivery Pumps
 Infusion Pumps
 Cochlear Implants
 Smart Orthopedic Implants

2.2. Ordering Information

Example: CC8V-T1A* 32.768 kHz CL: 12.5 pF -20/+20ppm TA QM

| Code | Pads |
|------|-----------------------------|
| T1A | Au flashed pads |
| T2A | SnPb plated pads on request |
| T5A | ENEPIG plated pads |

| Code | Operating temperature range |
|------|-----------------------------|
| TA | -40 to +85°C |
| TB | -40 to +125°C |
| TC | -55 to +125°C |

| Code | Qualification |
|------|---------------|
| QM | Medical Grade |

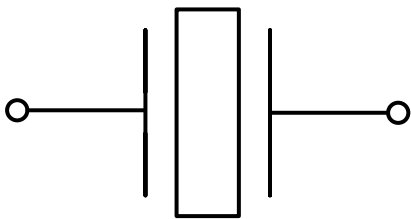
* The term Medical does not appear in the ordering information. QM implies medical.

3. Electrical Characteristics

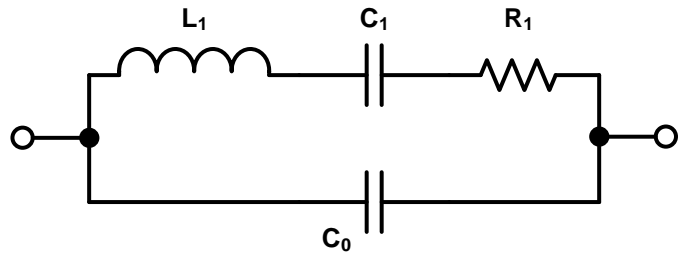
3.1. Equivalent Electrical Model

The Quartz Crystal Unit is a passive component with no polarity. The equivalent circuit of the quartz crystal at its fundamental resonance frequency is represented by the Equivalent Electrical Model:

Electrical Symbol:



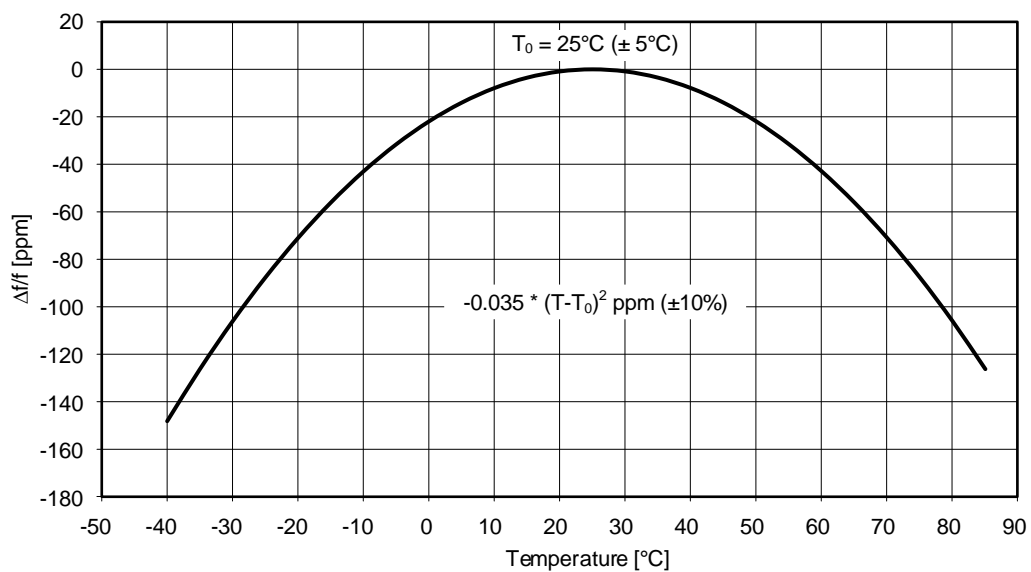
Equivalent Electrical Model:



- L₁** Motional Inductance
- C₁** Motional Capacitance
- R₁** Motional Resistance (ESR)

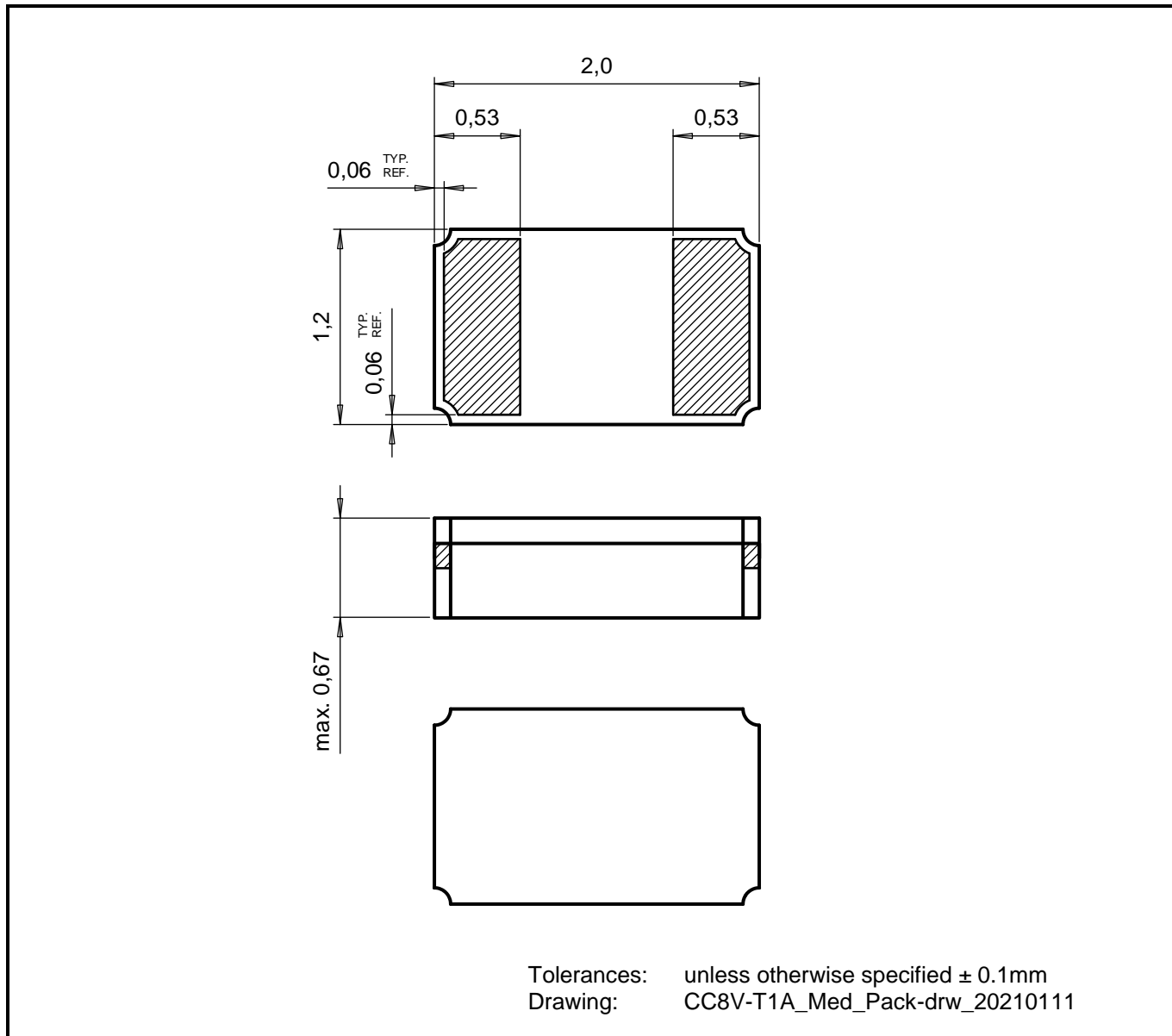
- C₀** Static Capacitance (Shunt capacitance)

3.2. Frequency vs Temperature Characteristics

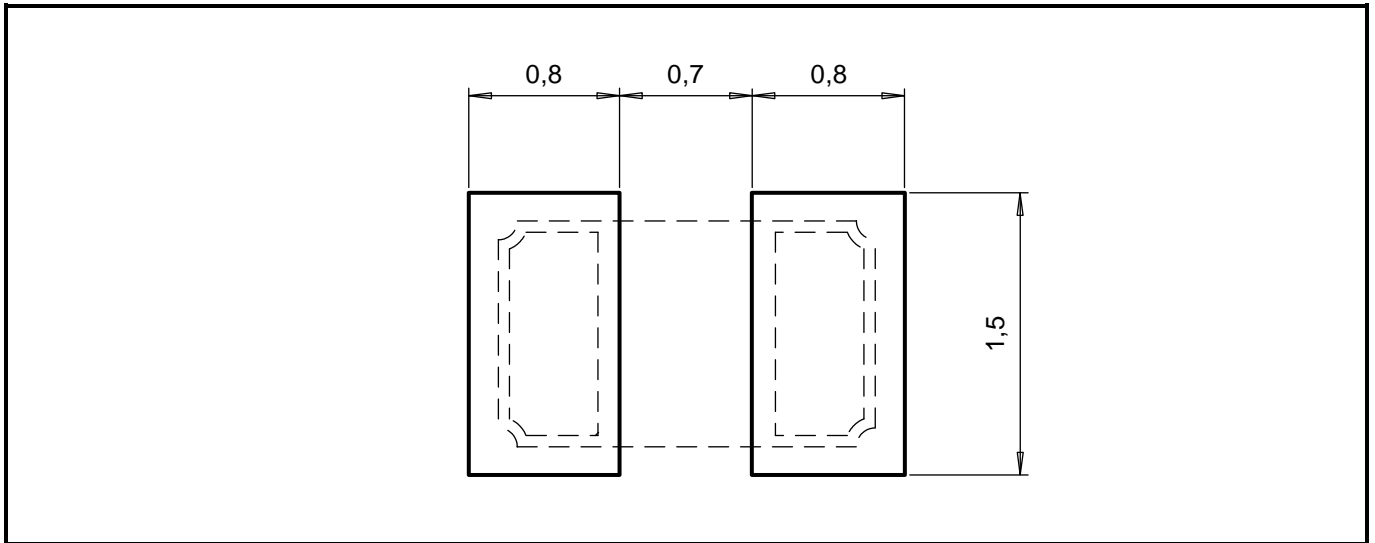


4. Mechanical Properties

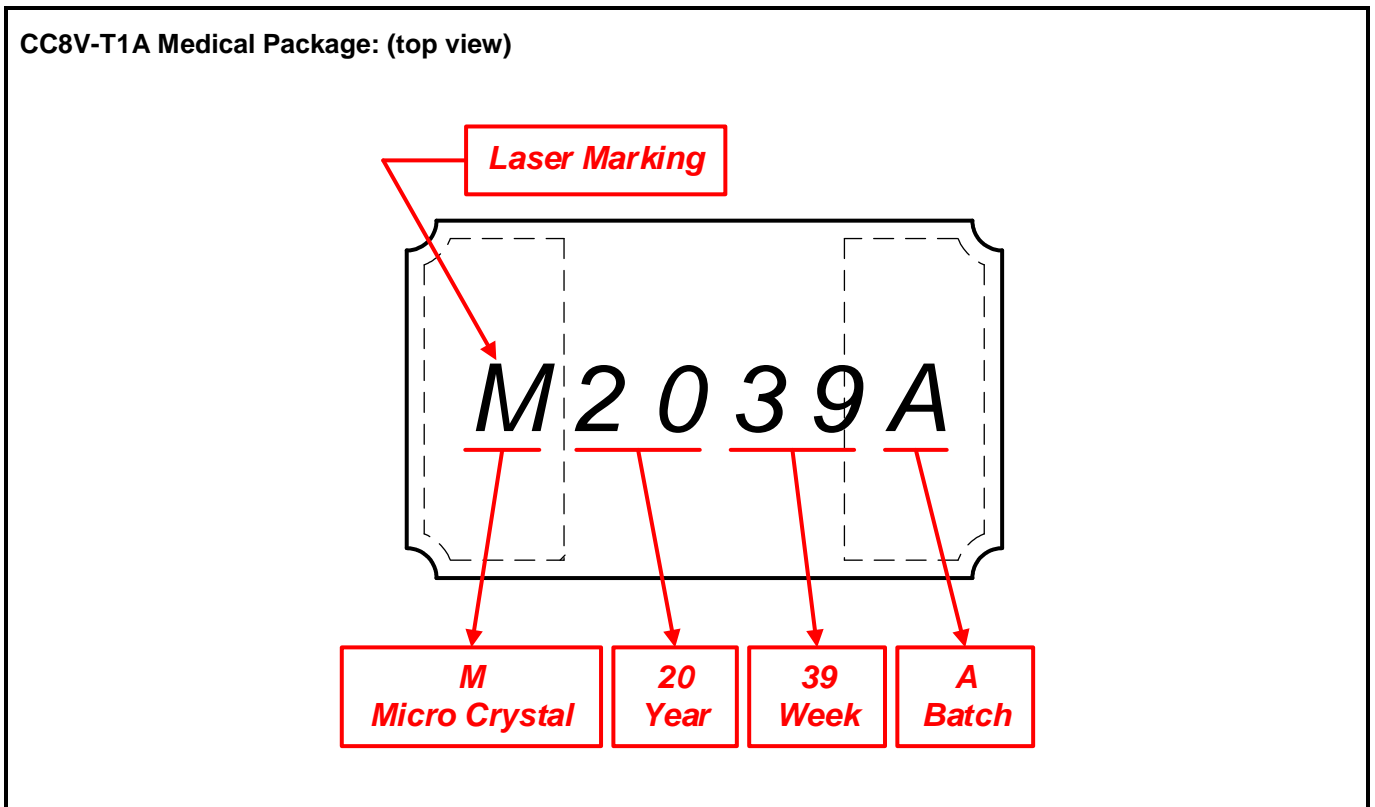
4.1. Package Dimension



4.2. Recommended Solderpad Layout



4.3. Product Marking

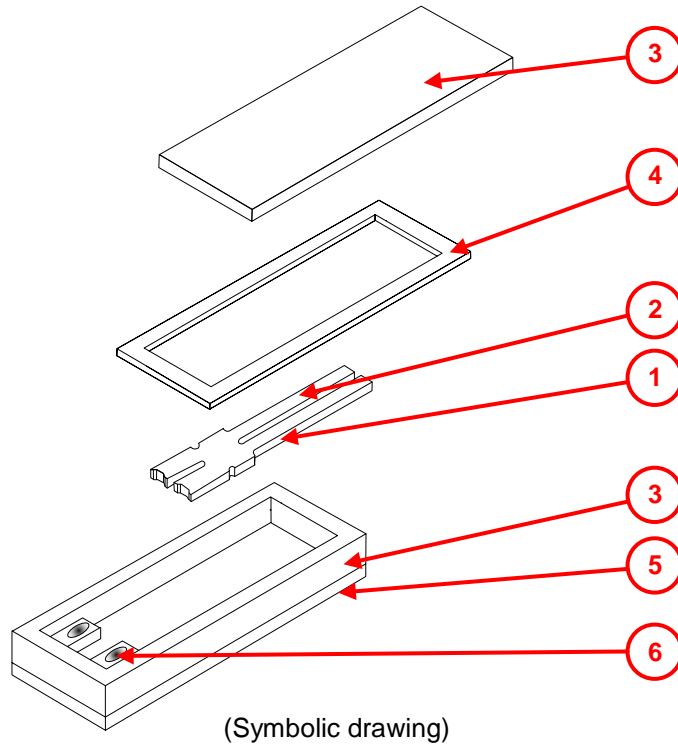


5. Material Composition Declaration & Environmental Information

5.1. Homogenous Material Composition Declaration

Homogenous material information according to IPC-1752 standard

Material Composition CC8V-T1A Medical:



| No. | Item Component Name | Sub Item Material Name | Material Weight | | Substance Element | CAS Number | Comment |
|-----|---------------------|---------------------------------|-----------------|------|--------------------------------|---------------|----------------|
| | | | (mg) | (%) | | | |
| 1 | Resonator | Quartz Crystal | 0.22 | 100% | SiO ₂ | 14808-60-7 | |
| 2 | Electrodes | Cr+Au | 0.005 | 6% | Cr | 7440-47-3 | |
| | | | | 94% | Au | 7440-57-5 | |
| 3 | Housing | Ceramic | 3.99 | 100% | Al ₂ O ₃ | 1344-28-1 | |
| 4 | Seal | Solder Preform | 0.18 | 80% | Au80 / Sn20 | Au: 7440-57-5 | |
| | | | | 20% | | Sn: 7440-31-5 | |
| 5 | Terminations | Internal and external terminals | 0.30 | 80% | Mo | Mo: 7439-98-7 | Molybdenum |
| | | | | 15% | Ni | Ni: 7440-02-0 | Nickel plating |
| | | | | 5% | Au 0.5 micron | Au: 7440-57-5 | Gold plating |
| 6 | Resonator attach | Gold bumps | 0.024 | 100% | Au | 7440-57-5 | |
| | | Unit weight | 4.72 | | | | |

5.2. Material Analysis & Test Results

Homogenous material information according to IPC-1752 standard

| No. | Item Component Name | Sub Item Material Name | RoHS | | | | | | Halogen | | | | Phthalates | | | | |
|-----|---------------------|-----------------------------|-------|----|----|------|-------|------|---------|----|----|----|------------|-----|-------|------|----|
| | | | Pb | Cd | Hg | Cr+6 | PBB | PBDE | F | Cl | Br | - | BBP | DBP | DEHP | DINP | |
| 1 | Resonator | Quartz Crystal | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd |
| 2 | Electrodes | Cr+Au | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd |
| 3 | Housing | Ceramic | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd |
| 4 | Seal | Solder Preform | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd |
| 5 | Terminations | Int. & ext. terminals | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd |
| 6 | Resonator attach | Gold bumps | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd | nd |
| | MDL | Measurement Detection Limit | 2 ppm | | | | 5 ppm | | 50 ppm | | | | 0.003% | | 0.01% | | |

nd = not detectable

Test methods:

| | | |
|-------------------|---|--------------------------------|
| RoHS | Test method with reference to IEC 62321-5: 2013 | MDL: 2 ppm (PBB / PBDE: 5 ppm) |
| Halogen | Test method with reference to BS EN 14582:2007 | MDL: 50 ppm |
| Phthalates | Test method with reference to EN 14372 | MDL: 0.003 % (DINP 0.01%) |

5.3. Recycling Material Information

Recycling material information according to IPC-1752 standard.

Element weight is accumulated and referenced to the unit weight of 4.72 mg.

| Item Material Name | No. | Item Component Name | Material Weight | | Substance Element | CAS Number | Comment |
|---------------------|------------------|--|-----------------|-------|--------------------------------|---------------|---------|
| | | | (mg) | (%) | | | |
| Quartz Crystal | 1 | Resonator | 0.22 | 4.68 | SiO ₂ | 14808-60-7 | |
| Chromium | 2 | Electrodes | 0.0003 | 0.006 | Cr | 7440-47-3 | |
| Ceramic | 3 | Housing | 3.99 | 84.53 | Al ₂ O ₃ | 1344-28-1 | |
| Gold | 2 4 5 6 | Electrodes Seal Terminations Resonator attach | 0.19 | 3.98 | Au | 7440-57-5 | |
| Tin | 4 | Seal | 0.036 | 0.76 | Sn | Sn: 7440-31-5 | |
| Nickel | 5 | Terminations | 0.045 | 0.95 | Ni | Ni: 7440-02-0 | |
| Molybdenum | 5 | Terminations | 0.24 | 5.08 | Mo | Mo: 7439-98-7 | |
| Unit weight (total) | | | 4.72 | 100 | | | |

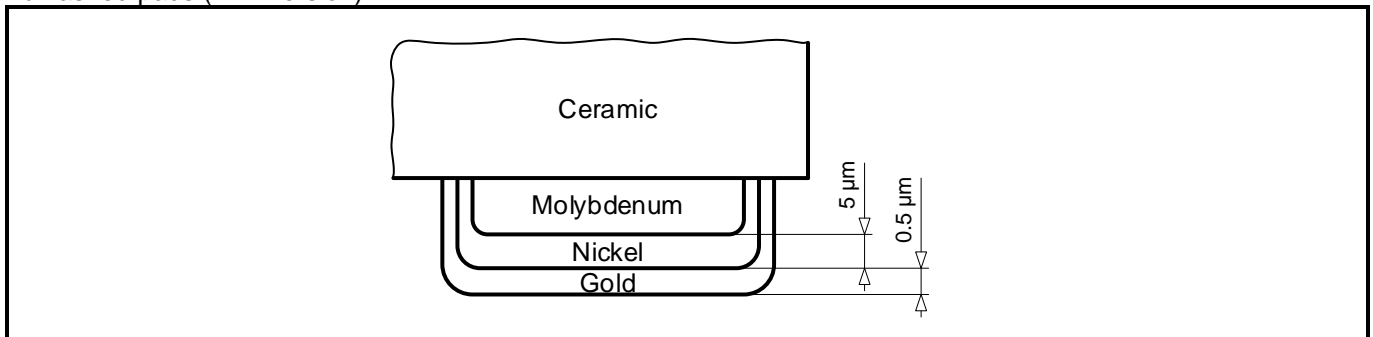
5.4. Environmental Properties & Absolute Maximum Ratings

| Package | Description |
|-----------------------|---|
| DFN-2 ceramic package | Dual Flat No Leads (DFN), hermetically sealed ceramic package with ceramic lid. Safe for Helium environment. |

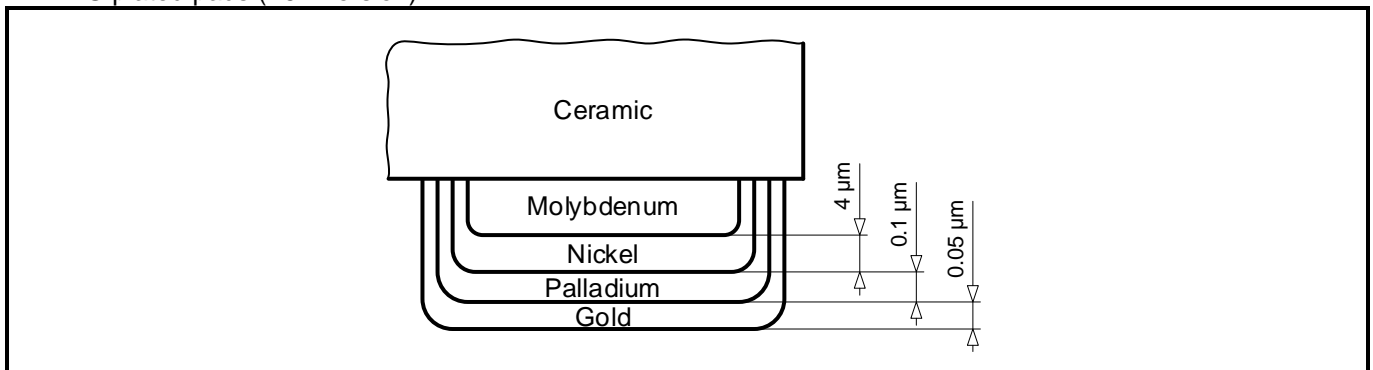
| Parameter | Directive | Conditions | Value |
|----------------------------------|----------------------|-----------------------|----------------------|
| Product weight (total) | | | 4.72 mg |
| Storage temperature | | Store as bare product | -55 to +125°C |
| Moisture sensitivity level (MSL) | IPC/JEDEC J-STD-020D | | MSL 1 |
| FIT / MTBF | | | available on request |

Terminal finishes:

Au flashed pads (T1A version):

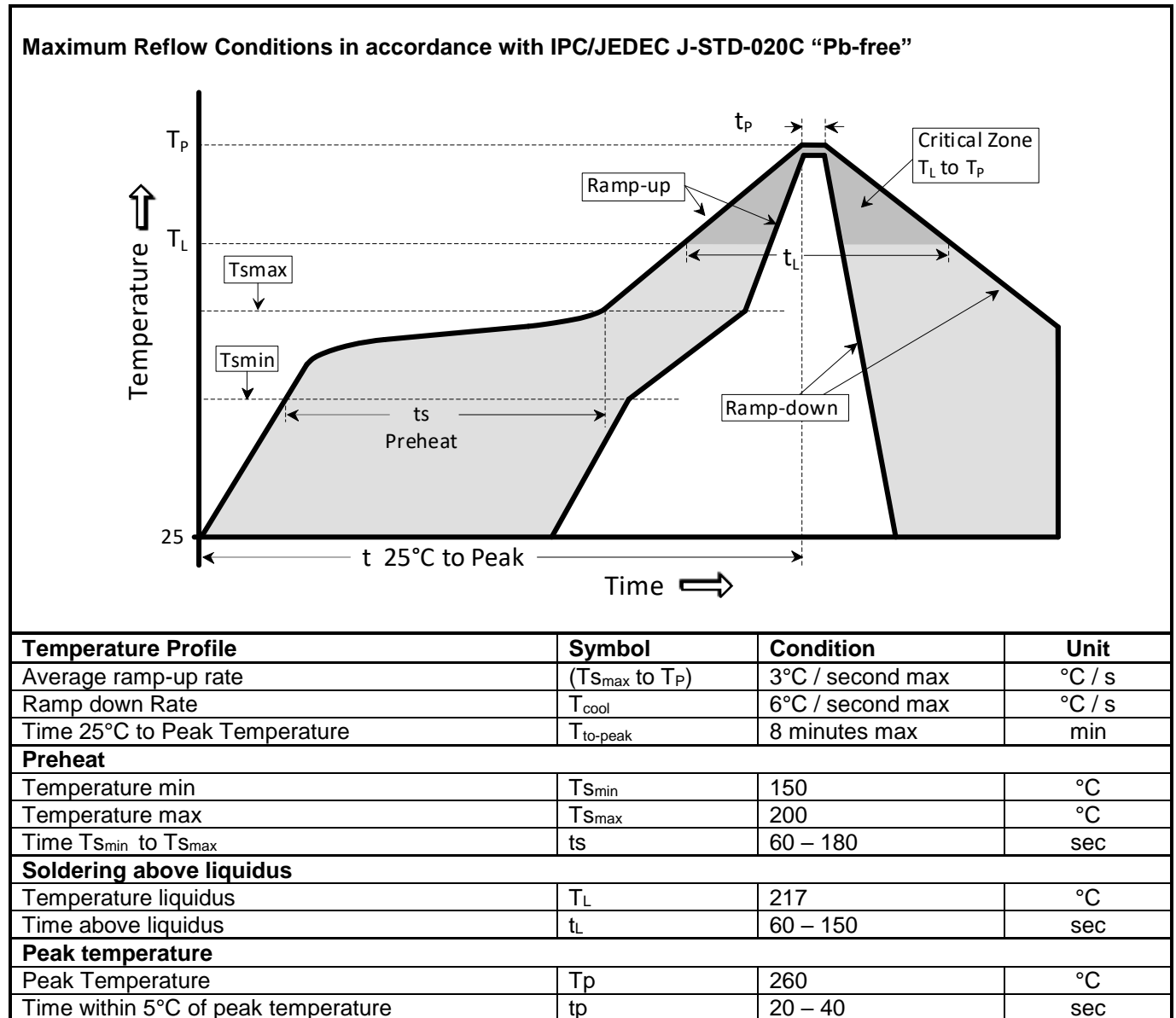


ENEPIG plated pads (T5A version):



6. Application Information

6.1. Soldering Information



6.2. Handling Instructions for Quartz Crystal Units

The built-in tuning-fork crystal consists of pure Silicon Dioxide in crystalline form. The cavity inside the package is evacuated and hermetically sealed in order for the crystal blank to function undisturbed from air molecules, humidity and other influences.

Shock and vibration:

Keep the crystal / module from being exposed to **excessive mechanical shock and vibration**. Micro Crystal guarantees that the crystal / module will bear a mechanical shock of 5000 g / 0.3 ms.

The following special situations may generate either shock or vibration:

Multiple PCB panels - Usually at the end of the pick & place process the single PCBs are cut out with a router. These machines sometimes generate vibrations on the PCB that have a fundamental or harmonic frequency close to the resonance frequency of the crystal unit. This might cause breakage of crystal blanks due to resonance. Router speed should be adjusted to avoid resonant vibration.

Ultrasonic cleaning - Avoid cleaning processes using ultrasonic energy. These processes can damage crystals due to mechanical resonance of the crystal blank.

Overheating, rework high temperature exposure:

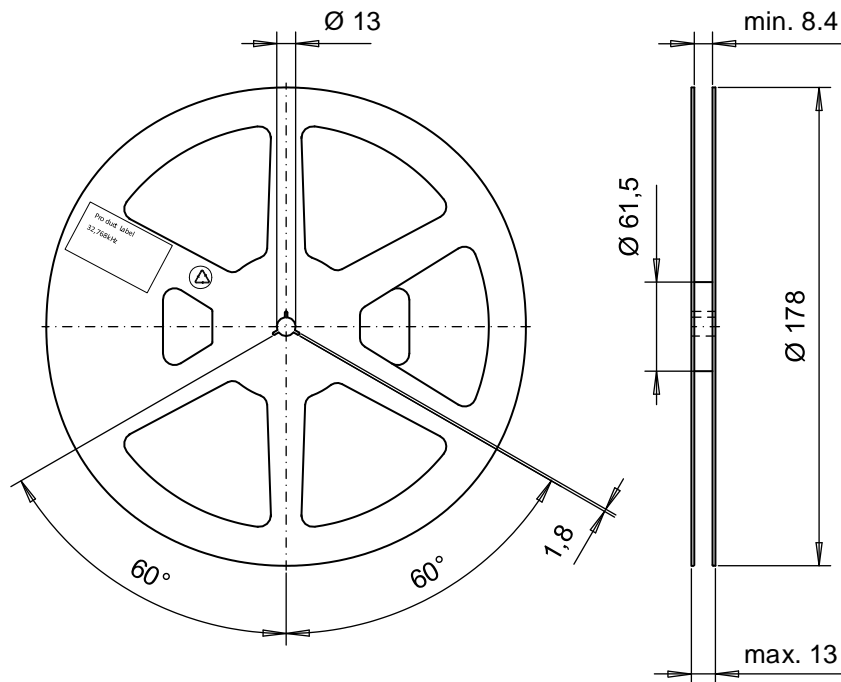
Avoid overheating the package. The package is sealed with a seal ring consisting of 80% Gold and 20% Tin. The eutectic melting temperature of this alloy is at 280°C. Heating the seal ring up to >280°C will cause melting of the metal seal which then, due to the vacuum, is sucked into the cavity forming an air duct. This happens when using hot-air-gun set at temperatures >300°C.

Use the following methods for rework:

- Use a hot-air- gun set at 270°C.
- Use 2 temperature controlled soldering irons, set at 270°C, with special-tips to contact all solder-joints from both sides of the package at the same time, remove part with tweezers when pad solder is liquid.

7. Packing & Shipping Information

Reel: 7" = 178 mm

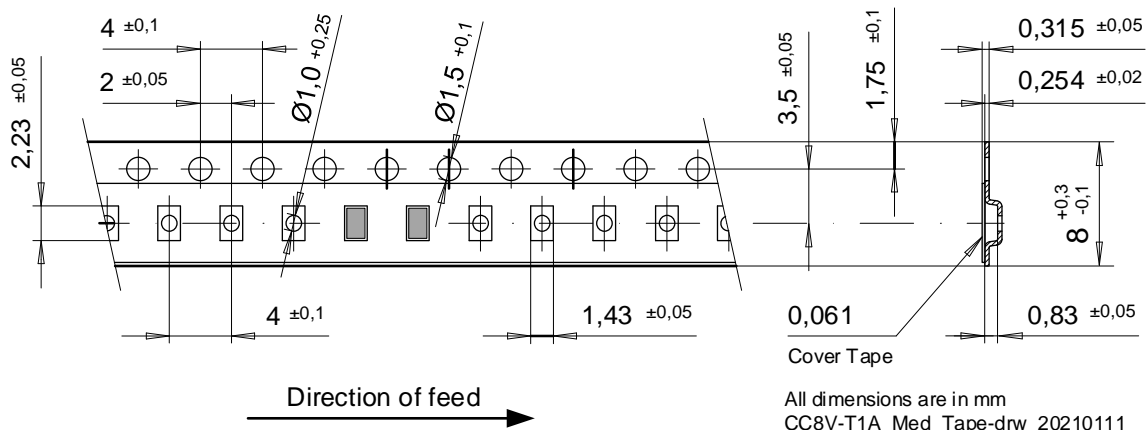


Carrier Tape:

Material: Polycarbonate

Width: 8 mm

Tape Leader and Trailer: Minimum length 300 mm



All dimensions are in mm
 CC8V-T1A_Med_Tape-drw_20210111

Cover Tape:

Tape: Polypropylene, 3M™ Universal Cover Tape (UCT)

Adhesive Type: Pressure sensitive, Synthetic Polymer

Thickness: 0.061 mm

Peel Method:

Medial section removal, both lateral stripes remain on carrier

8. Compliance Information

Micro Crystal confirms that the product Quartz Crystal Unit CC8V-T1A Medical is compliant with “EU RoHS Directive” and “EU REACH Directives”.

Please find the actual Certificate of Conformance for Environmental Regulations on our website:

[CoC Environment CC&CM-Series.pdf](#)

9. Document Revision History

| Date | Revision # | Revision Details |
|---------------|------------|------------------|
| February 2021 | 1.0 | First release |
| | | |

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