

Product Documentation

CC7V-T1A Medical

**Quartz Crystal Unit
32 kHz – 100 kHz**

2. Product Description

The CC7V-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 CC7V-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.
- Low profile (maximum height 0.90 mm), lightweight (12.5 mg)

Suitable oscillator-circuitries can operate the CC7V-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: CC7V-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

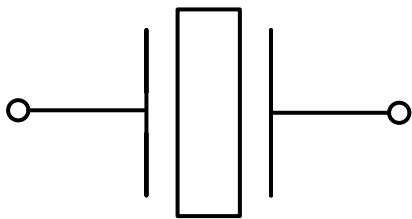
* The term Medical does not appear in the ordering information. QM implies medical.

3. Electrical Characteristics

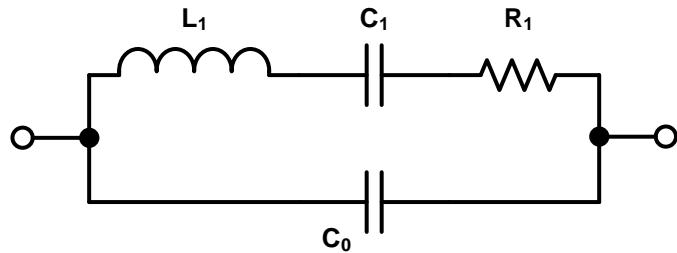
3.1. Equivalent Electrical Model

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:



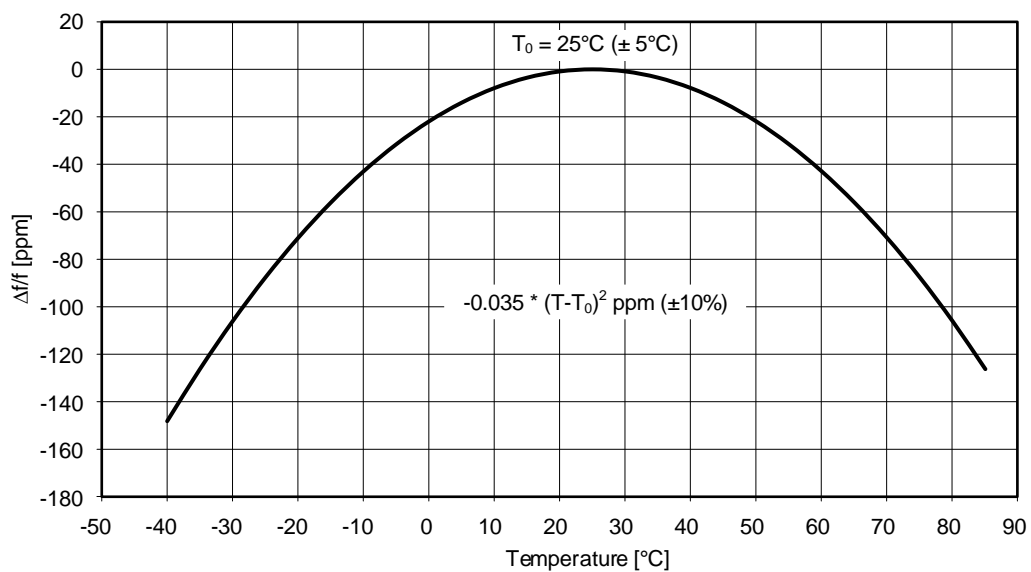
Equivalent Electrical Model:



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

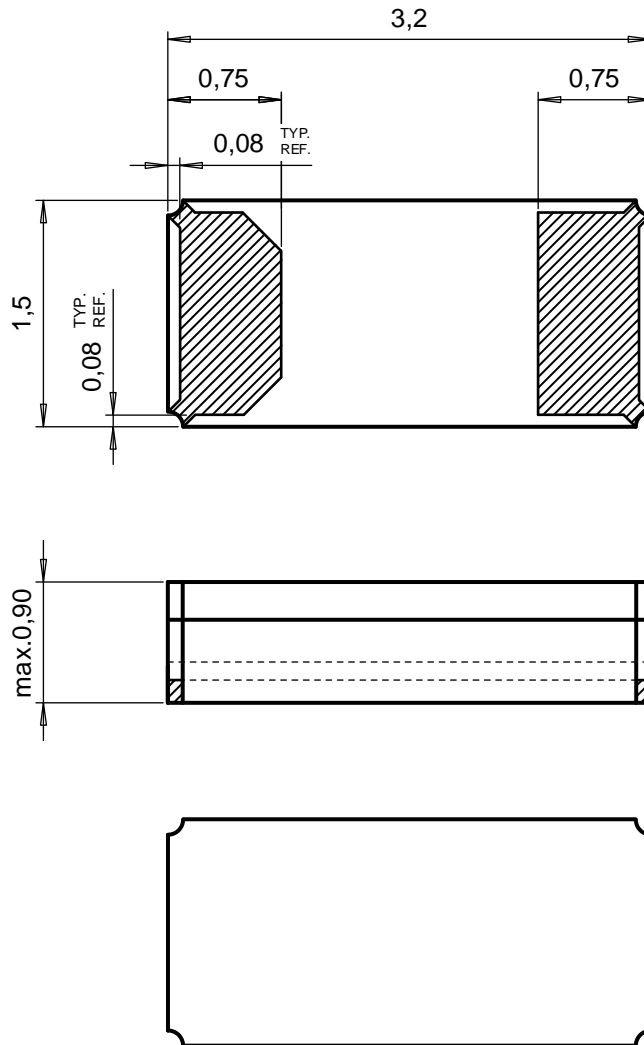
- C₀** Static Capacitance (Shunt capacitance)

3.2. Frequency vs Temperature Characteristics



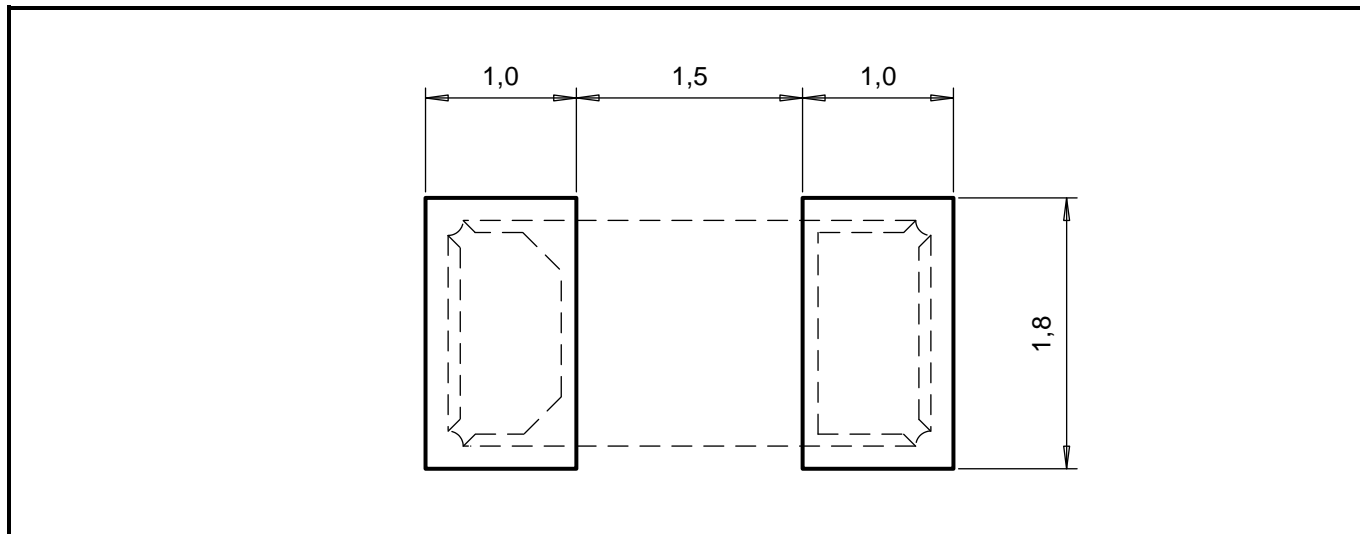
4. Mechanical Properties

4.1. Package Dimension

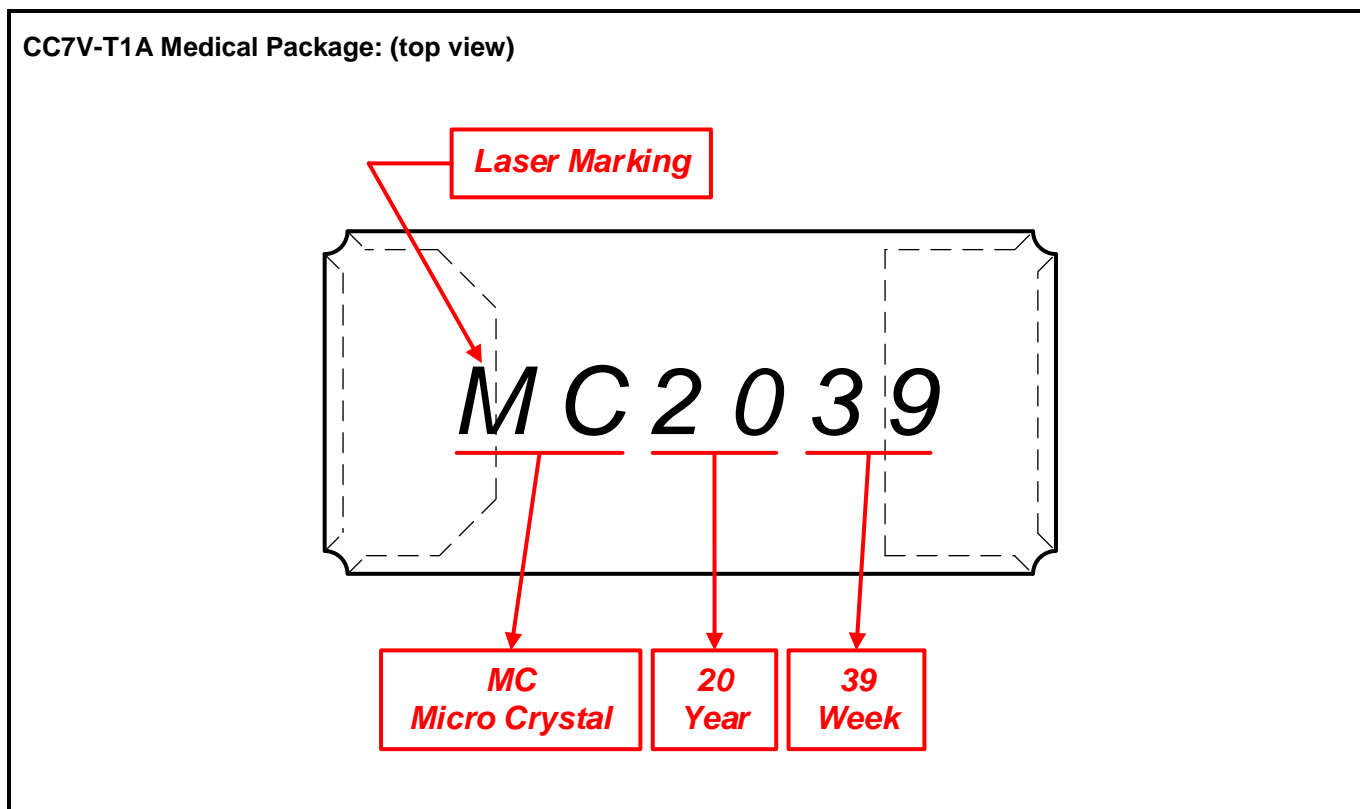


Tolerances: unless otherwise specified $\pm 0.1\text{mm}$
Drawing: CC7V-T1A_Med_Pack-drw_20210126

4.2. Recommended Solderpad Layout



4.3. Product Marking

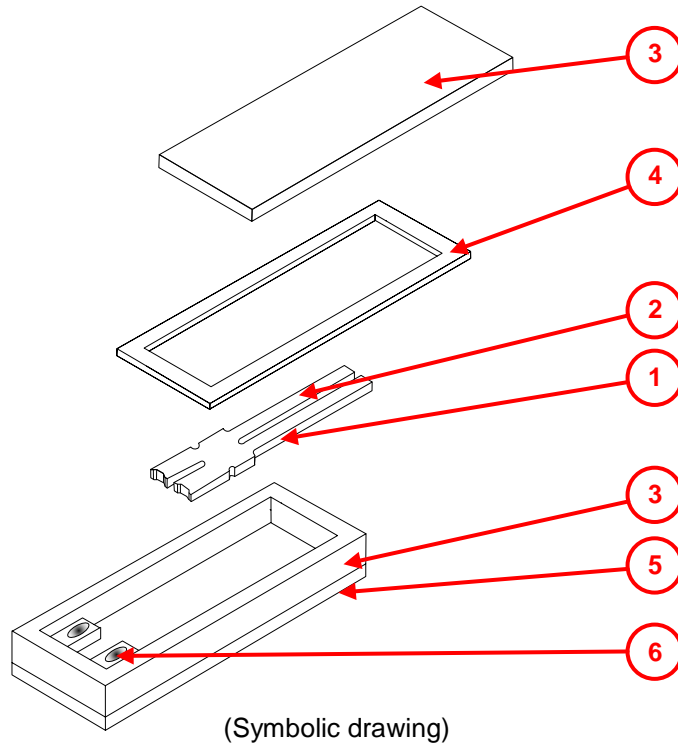


5. Material Composition Declaration & Environmental Information

5.1. Homogenous Material Composition Declaration

Homogenous material information according to IPC-1752 standard

Material Composition CC7V-T1A Medical:



No.	Item Component Name	Sub Item Material Name	Material Weight		Substance Element	CAS Number	Comment	
			(mg)	(%)				
1	Resonator	Quartz Crystal	0.13	100%	SiO ₂	14808-60-7		
2	Electrodes	Cr+Au	0.01	6%	Cr	7440-47-3		
				94%	Au	7440-57-5		
3	Housing	Ceramic	11.11	100%	Al ₂ O ₃	1344-28-1		
4	Seal	Solder Preform	0.54	80%	Au80 / Sn20	Au:	7440-57-5	
				20%		Sn:	7440-31-5	
5	Terminations	Internal and external terminals	0.59	80%	W	W:	7440-33-7	Tungsten
				15%	Ni	Ni:	7440-02-0	Nickel plating
				5%	Au 0.5 micron	Au:	7440-57-5	Gold plating
6	Conductive adhesive	Silver filled Silicone glue	0.09	88%	Ag	Ag:	7440-22-4	
				12%	Siloxanes and silicones		68083-19-2	di-Me, vinyl group-terminated
				0%	Distillates, petroleum hydrotreated		64742-47-8	Does not appear in finished product
Unit weight			12.5					

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	Conductive adhesive	Silver filled Silicone glue	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 12.5 mg.

Item Material Name	No.	Item Component Name	Material Weight		Substance Element	CAS Number	Comment
			(mg)	(%)			
Quartz Crystal	1	Resonator	0.13	1.04	SiO ₂	14808-60-7	
Chromium	2	Electrodes	0.0006	0.005	Cr	7440-47-3	
Ceramic	3	Housing	11.11	89.09	Al ₂ O ₃	1344-28-1	
Gold	2 4 5	Electrodes Seal Terminations	0.47	3.78	Au	7440-57-5	
Tin	4	Seal	0.11	0.87	Sn	Sn: 7440-31-5	
Nickel	5	Terminations	0.09	0.71	Ni	Ni: 7440-02-0	
Tungsten	5	Terminations	0.47	3.79	W	W: 7440-33-7	
Silver	6a	Conductive adhesive	0.08	0.64	Ag	Ag: 7440-22-4	
Siloxanes and silicones	6b	Conductive adhesive	0.011	0.087	Siloxanes and silicones	68083-19-2	di-Me, vinyl group-terminated
Distillates	6c	Conductive adhesive	0	0	Distillates	64742-47-8	hydrotreated petroleum, does not appear in finished products
Unit weight (total)			12.5	100			

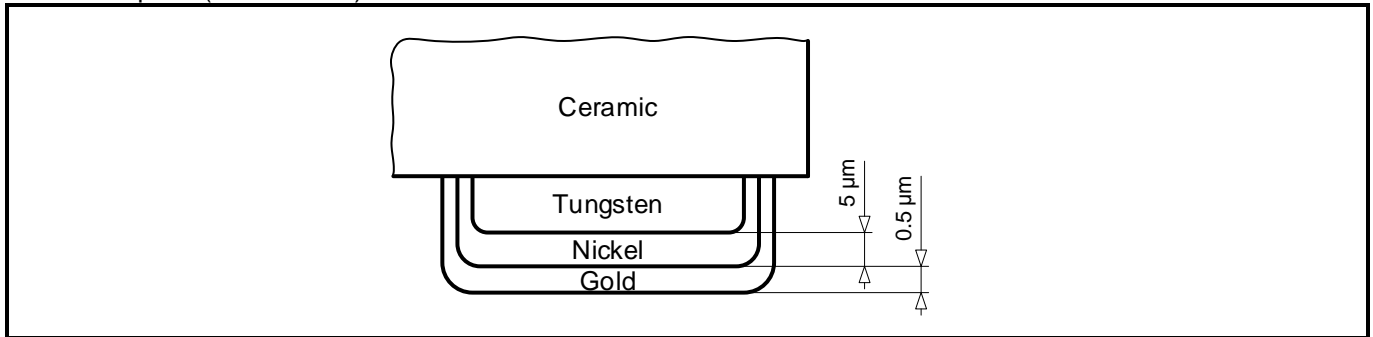
5.4. Environmental Properties & Absolute Maximum Ratings

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

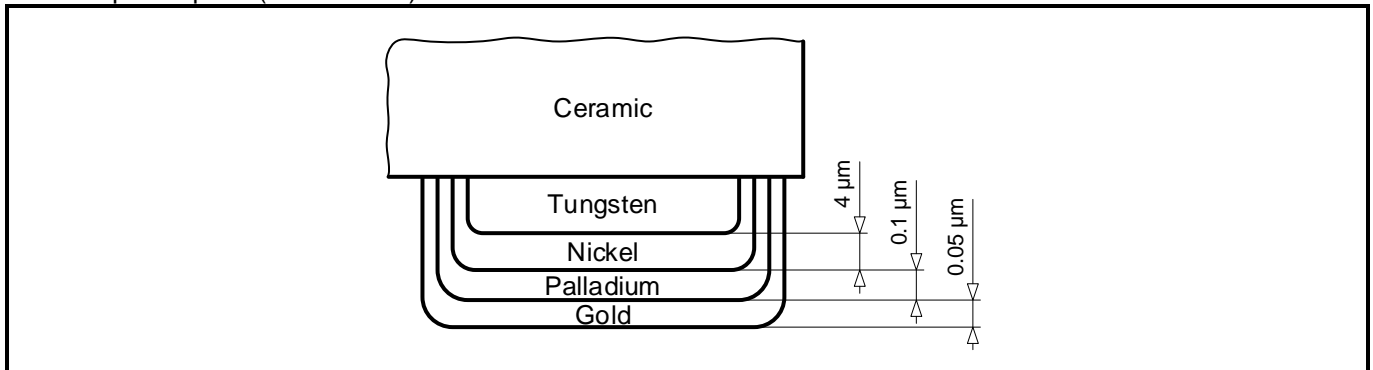
Parameter	Directive	Conditions	Value
Product weight (total)			12.5 mg
Storage temperature		Store as bare product	-55 to +125°C
Moisture sensitivity level (MSL)	IPC/JEDEC J-STD-020D		MSL 1
FIT / MTBF			available on request

Terminal finishes:

Au flashed pads (T1A version):

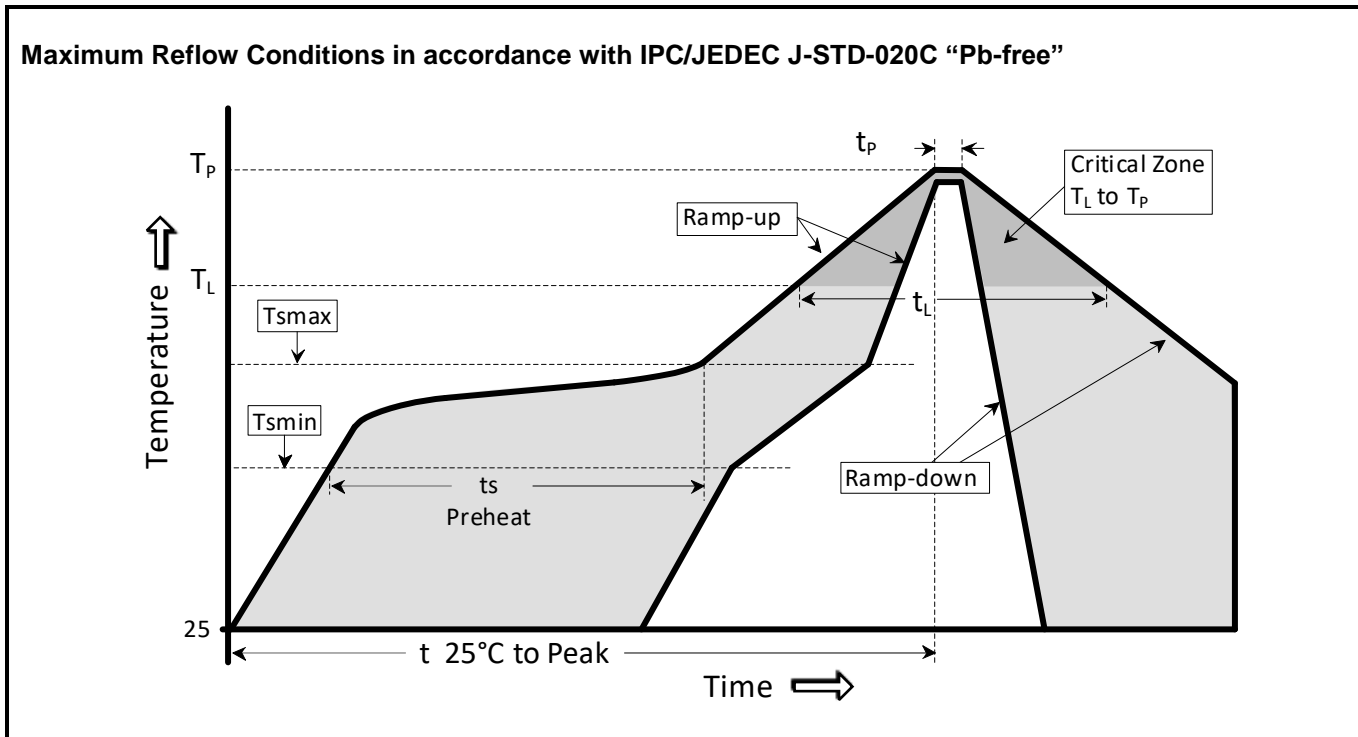


ENEPIG plated pads (T5A version):



6. Application Information

6.1. Soldering Information



Temperature Profile	Symbol	Condition	Unit
Average ramp-up rate	(T_{Smax} to T_P)	3°C / second max	°C / s
Ramp down Rate	T_{cool}	6°C / second max	°C / s
Time 25°C to Peak Temperature	$T_{to-peak}$	8 minutes max	min
Preheat			
Temperature min	T_{Smin}	150	°C
Temperature max	T_{Smax}	200	°C
Time T_{Smin} to T_{Smax}	t_s	60 – 180	sec
Soldering above liquidus			
Temperature liquidus	T_L	217	°C
Time above liquidus	t_L	60 – 150	sec
Peak temperature			
Peak Temperature	T_p	260	°C
Time within 5°C of peak temperature	t_p	20 – 40	sec

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:

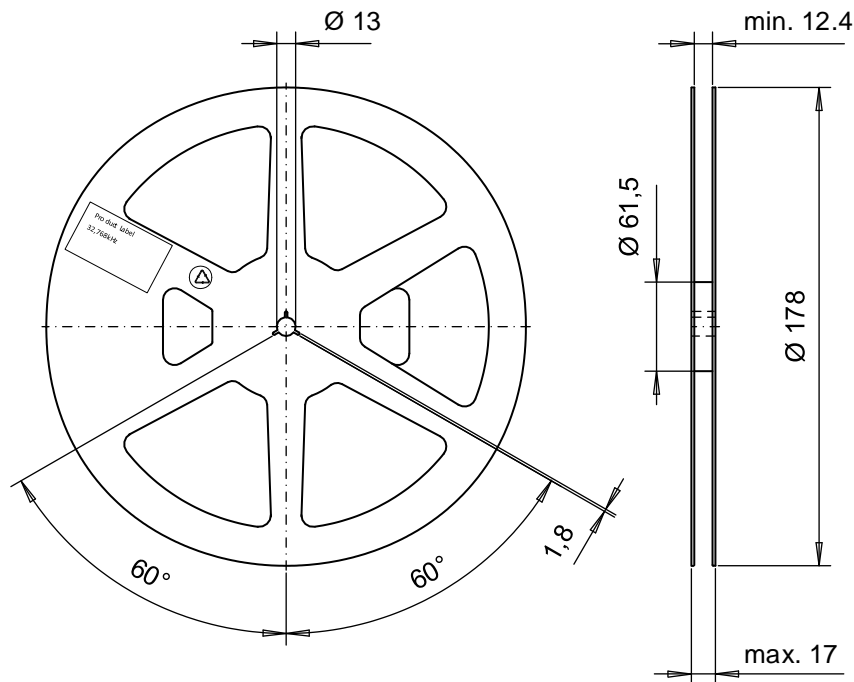
Avoid overheating the package. The package is sealed with a seal ring consisting of 80% Gold and 20% Tin. The eutectic melting temperature of this alloy is at 280°C. Heating the seal ring up to >280°C will cause melting of the metal seal which then, due to the vacuum, is sucked into the cavity forming 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

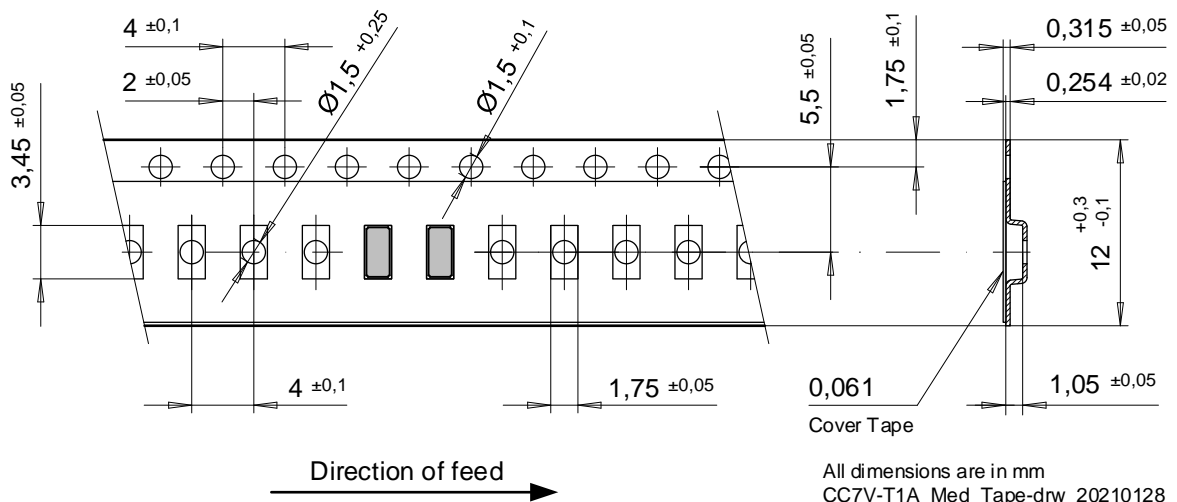


Carrier Tape:

Material: Polycarbonate

Width: 12 mm

Tape Leader and Trailer: Minimum length 300 mm



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 CC7V-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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