

## CERAMIC RESONATORS - Precautions for Handling

### 1. Precautions for Safety

- 1.1 Fail-Safe Design for Equipment in application of the Ceramic Resonators (Chip Type), it is recommended that equipment shall be protected by adding a protective and/or retardant design circuit against deteriorations and failures of the Ceramic Resonators.
- 1.2 Operating Temperature Ranges. The Ceramic Resonators (Chip Type) shall not be operated beyond the specified „Operating Temperature Range“ in the Catalogue or the Specifications.
- 1.3 Changes/Drifts in Oscillating Frequency. It shall be noted that oscillating frequencies of the Ceramic Resonators (Chip Type) may drift depending IC applied (the type names, the manufacturer) and capacitance values of external capacitors C1\* and C2\* and the circuit design. Note \*Refer to „Standard Test Circuit Diagram“ in the Catalogue or the individual Specification.
- 1.4 Abnormal Oscillation. The Ceramic Resonators (Chip Type) are always accompanied by superior resonances. Hence in the circuit, superior oscillations or stop of oscillation may occur depending on the circuit design (IC applied, frequency characteristics of the IC, supply voltage etc.) and/or environmental conditions. Attention shall be paid to those abnormalities above mentioned in circuit design.
- 1.5 Stray Capacitance. Stray capacitances and insulation resistances on printed circuit board may cause abnormalities of the Ceramic Resonators such as „higher harmonic oscillations“ or „stop of oscillation“ Attention shall be paid to those abnormalities above mentioned in Circuit design.
- 1.6 Matching Capacitors. In application of the Ceramic Resonators (Chip Type), two selected capacitors\*\* shall be added for constructing „Colpitts Oscillation Circuit“. Note \*\*The capacitance values are specified in the Catalogue.

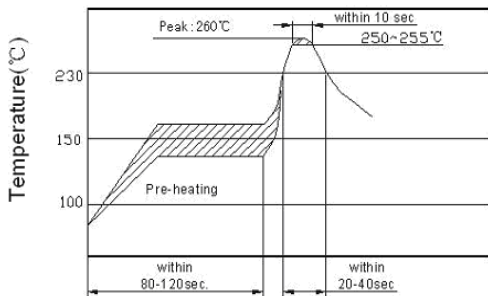
### 2. Prohibited Applications

- 2.1 „Flow Soldering“ shall not be applied to the Ceramic Resonators (Chip Type).
- 2.2 „Ultrasonic Cleaning“ and „Ultrasonic Welding“ shall not be applied to the Ceramic Resonators (Chip Type) for preventing them from electrical failures and mechanical damages.
- 2.3 Lacquer shall not be applied to resonator types KX-ZTT CC and KX-ZTT CR.

### 3. Handling Notes

- 3.1 Overvoltages Spikes & Electrostatic Discharges Abnormal/excess electrical stresses such as over voltage spikes and electrostatic discharges may cause electrical deteriorations and failures of the Ceramic Resonators and affect reliability of the devices.
- 3.2 Abnormal Mechanical Stresses.
  - (1) Abnormal/excess mechanical stresses such as falling shocks shall not be applied to the Ceramic Resonators (Chip Type) in handling to prevent them from being damaged or cracked.
  - (2) Dropped devices shall not be used.
- 3.3 Surface Mounting Consideration. In automated mounting of the Ceramic Resonators (Chip Type) on printed circuit boards, any bending expanding and pulling forces or shocks against the Ceramic Resonators (Chip Type) shall be kept minimum to prevent them from electrical failures and mechanical damages of the devices.
- 3.4 Soldering (Reflow).
  - (1) Solderings of the Ceramic Resonators (ChipType) shall conform to the soldering profile according to JEDEC J- STD-020E/2014 (Refer to table and profile at point 4).
  - (2) The Resonators are designed for „Reflow Soldering“.
  - (3) In the reflow solderings, too high soldering temperatures and too large temperature gradient such as rapid heating or cooling may cause electrical failures and mechanical damages of the devices.
- 3.5 Soldering Flux.
  - a) Resin-based and non-activated soldering flux is recommended.
  - b) The content of halogen in the flux shall be 0,1 wt.% or less.
- 3.6 Post Soldering Cleaning.
  - (1) Application of ultrasonic cleaning is prohibited.
  - (2) Cleaning Conditions such as kinds of cleaning solvents, immersion time and temperatures etc. shall be checked by experiments before production.
- 3.7 Operating and Storage Conditions. The Ceramic Resonators (Chip type) shall not be operated and/or stored under following environmental conditions.
  - a) To be exposed directly to water or salt water
  - b) To be exposed directly to sun-light
  - c) Under conditions of dew formation
  - d) Under conditions of corrosive atmosphere such as hydrogen sulphide, sulphurous acid, chlorine and ammonia.
- 3.8 Long Term Storage. The Ceramic Resonators (Chip Type) shall not be stored under severe conditions of high temperatures and high humidity.

General storage conditions for the resonators should be:  
 Standard storage temperature: 25±5°C humidity: 60±15%RH  
 Standard storage temperature range (if not otherwise specified): -40°C to +85°C  
 Moisture sensitivity level (MSL)=1  
 Use them within one year and check



#### 4. Lead-free procedure recommendation

Reflow of high soldering temperature district: 260°C max., 10s max.

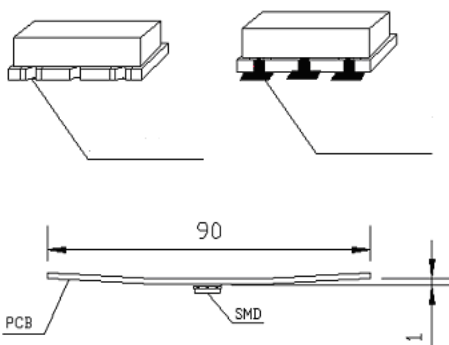
Manual soldering recommendation: Temperature of soldering iron is 270±5°C, putting the soldering iron on the equipment of 0.5mm high. Moreover, putting the dissolved soldering on the electrode for 3±1s.

\*The Resonator will be unstable and lose function if the above soldering temperature is overheated.

Soldering Profile Feature (acc. JEDEC J- STD-020E/2014)	Pb-Free Assembly
<b>Preheat/Soak</b>	
Temperature Min (Tmin)	150°C
Temperature Max (Tmax)	200°C
Time (Ts) from (Tmin to Tmax)	60-120 seconds
Ramp-up rate (T <sub>L</sub> to T <sub>P</sub> )	3°C/second max.
Liquidous Temperature (T <sub>L</sub> )	217°C
Time (t <sub>L</sub> ) maintained above T <sub>L</sub>	60-150 seconds
Peak package body temperature (T <sub>P</sub> )	260°C
Time (t <sub>P</sub> )* within 5°C of this specified classification temperature (T <sub>C</sub> )	30* seconds
Ramp-down rate (T <sub>P</sub> to T <sub>L</sub> )	6°C/second max.
Time 25°C to peak temperature	8 minutes max.
Tolerance for peak profile temperature (T <sub>P</sub> ) is defined as a supplier minimum and a user maximum	

#### 5. Application notice of SMD products

PCB soldering point should be satisfied with requirement of specification recommendation: Otherwise, the accurate level of soldering point will be lower, parts may fall off. Parts may fall off if CB winding is overlarge.



#### 6. Application notice of SMD products with SMD mounting machines

Since our products are Ceramic parts, please do not put too much mechanical pressure on the parts. We suggest using Mounting Machine of optical positioning rather than that of mechanical positioning. Damage of parts will happen if mechanical force is too large. Please estimate clearly on mounting before use.

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