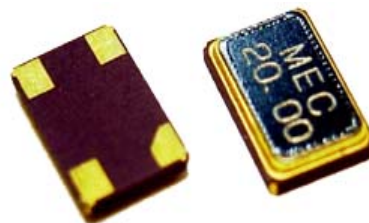


- Ultra-miniature 5x3.2 mm; ultra thin 1.0 mm height
- Gold plated ceramic base with metal lid seam welded package
- Extremely low aging. Specifically designed for hand-held communication equipment, MP3, PDAs, GPS and W-LAN.
- High shock resistance and vibration resistance
- RoHS compliant and lead free product

**SPECIFICATIONS**

|                                                |                                                                                                                              |                     |             |
|------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|---------------------|-------------|
| <b>Crystal Holder Prefix ①</b>                 | <b>MJ series</b>                                                                                                             |                     |             |
| <b>Frequency Range ②</b>                       | 10 ~ 48.0 MHz AT-cut Fundamental mode                                                                                        |                     |             |
| <b>Calibration Tolerance ④</b>                 | Available from $\pm 5$ ppm ( $\pm 0.0005\%$ ) to $\pm 30$ ppm ( $\pm 0.003\%$ ) at 25°C                                      |                     |             |
| <b>Frequency Stability ⑤</b>                   | Available from $\pm 5$ ppm ( $\pm 0.0005\%$ ) to $\pm 30$ ppm ( $\pm 0.003\%$ ) over operating temperature range shown below |                     |             |
| <b>Operating Temperature Range ⑥</b>           | -20°C to +70°C. or -30°C to +85°C.                                                                                           |                     |             |
| <b>Equivalent Series Resistance (E.S.R.) ⑦</b> | Frequency                                                                                                                    | Oscillation Mode    | E.S.R. max. |
|                                                | 10.0 ~ 12.0                                                                                                                  | AT fundamental mode | 80 $\Omega$ |
|                                                | 12.0 ~ 16.0                                                                                                                  | AT fundamental mode | 60 $\Omega$ |
|                                                | 16.01 ~ 48.0                                                                                                                 | AT fundamental mode | 50 $\Omega$ |
| <b>Load Capacitance (<math>C_L</math>) ③</b>   | Series: spec. code is “S”                                                                                                    |                     |             |
|                                                | Parallel: Please specify $C_L$ value, typical $C_L$ ranges from 10 to 32pF                                                   |                     |             |
| <b>Shunt Capacitance (<math>C_0</math>)</b>    | 2.0 ~ 4.0 pF typical, 5 pF maximum                                                                                           |                     |             |
| <b>Drive Level</b>                             | 100 $\mu$ W max.                                                                                                             |                     |             |
| <b>Aging</b>                                   | Less than $\pm 3$ ppm per year at +25°C                                                                                      |                     |             |

**Note:** Tighter tolerance, tighter stability and lower ESR are available.

**STANDARD FREQUENCIES AND PART NUMBERS** (partial frequency list only. Frequency tolerance, frequency stability and ESR can be specified per your requirements).

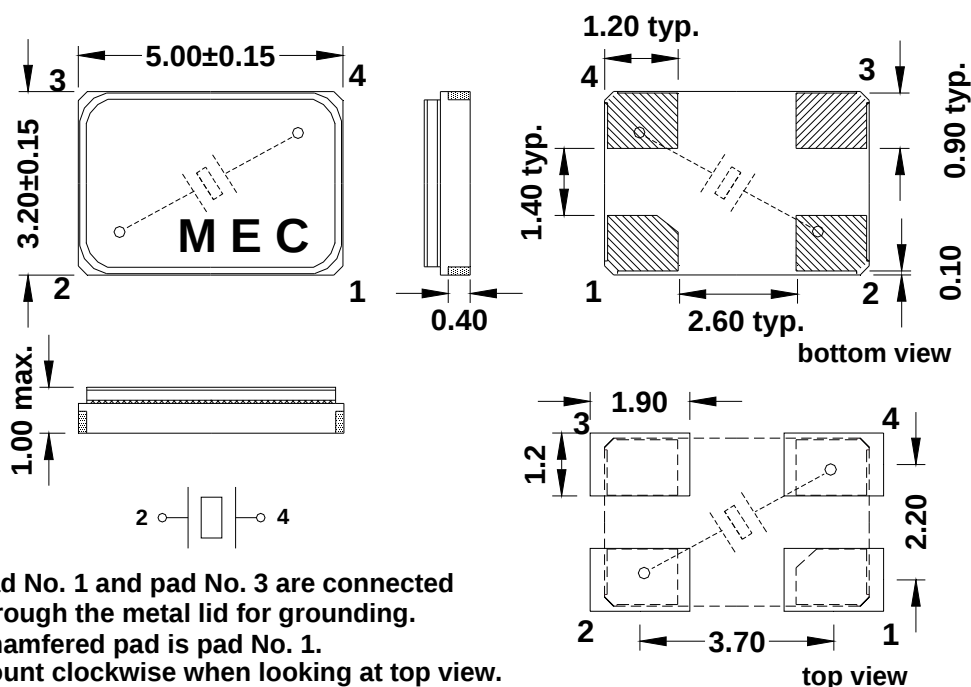
| <u>MEC Part Number</u> | <u>MEC Spec. Code</u> | <u>MEC Part Number</u> | <u>MEC Spec. Code</u> |
|------------------------|-----------------------|------------------------|-----------------------|
| MJ-10.000-16P          | 30/30/-20+70/80R      | MJ-20.000-20P          | 30/30/-20+70/50R      |
| MJ-12.000-16P          | 30/30/-20+70/80R      | MJ-20.945-16P          | 30/30/-20+70/50R      |
| MJ-16.000-16P          | 30/30/-20+70/60R      | MJ-29.4912-32P         | 30/30/-20+70/50R      |
| MJ-18.432-16P          | 30/30/-20+70/50R      | MJ-32.000-S            | 30/30/-20+70/50R      |
| MJ-19.6608-16P         | 30/30/-20+70/50R      | MJ-32.768-S            | 30/30/-20+70/50R      |

## ENVIRONMENTAL AND MECHANICAL SPECIFICATIONS

|                              |                                                                                                                                                                              |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Green Requirement</b>     | RoHS compliant and Pb (lead) free                                                                                                                                            |
| <b>Storage Temperature</b>   | -40°C to +105°C                                                                                                                                                              |
| <b>Gross Leak</b>            | 1 Kg Pressurized water immersion test per Mercury internal procedures                                                                                                        |
| <b>Fine Leak</b>             | < 5 x10 <sup>-8</sup> atm cc /sec by helium leak check                                                                                                                       |
| <b>Shock</b>                 | ±5 ppm max. Free drop 3 times from 75 cm height onto a hard wooden board or half sine wave acceleration of 100G peak amplitude for 11 m. sec. duration, 3 cycles each plane. |
| <b>Vibration</b>             | ±5 ppm max. Frequency:10 to 55 Hz, amplitude: 1.5 mm or 10 Gs rms. Duration: 6 hours.                                                                                        |
| <b>Solderability</b>         | MIL-STD-883, Method 2003                                                                                                                                                     |
| <b>Humidity</b>              | After 48 hours at 85°C, 85% relative humidity non-condensing                                                                                                                 |
| <b>Thermal Shock</b>         | Temperature cycling: Exposed at -40°C for 30 minutes then to +85°C for 30 minutes for duration of 5 days                                                                     |
| <b>Marking Permanency</b>    | MIL-STD-202, Method 215. Laser engraved.                                                                                                                                     |
| <b>Insulation Resistance</b> | 500 MΩ min. at 100 V±15 V DC                                                                                                                                                 |

## PACKAGE DIMENSIONS AND SUGGESTED PAD LAYOUT

Unit: mm



**HOW TO ORDER:**

**Complete Part Number** = Mercury part number + Mercury spec. code.

 = Please specify

**Example:** MJ-16.000-16P-10/30/-20+70/60R-option

**Explanation:** MJ series crystal, 16.000 MHz, 16 pF load capacitance,  $\pm 10$  ppm frequency tolerance,  $\pm 30$  ppm frequency stability over -20 to +70°C, ESR is 60 ohms max.

|     |                                                                                   |   |                                                                                   |   |                                                                                   |   |                                                                                    |   |                                                                                     |   |                                                                                     |  |
|-----|-----------------------------------------------------------------------------------|---|-----------------------------------------------------------------------------------|---|-----------------------------------------------------------------------------------|---|------------------------------------------------------------------------------------|---|-------------------------------------------------------------------------------------|---|-------------------------------------------------------------------------------------|--|
|     |  |   |  |   |  |   |  |   |  |   |  |  |
| MJ- | 16.000                                                                            | — | 30P                                                                               | — | 10                                                                                | / | 30                                                                                 | / | -20+70                                                                              | / | 60R                                                                                 |  |
| ①   | ②                                                                                 |   | ③                                                                                 |   | ④                                                                                 |   | ⑤                                                                                  |   | ⑥                                                                                   |   | ⑦                                                                                   |  |

①: Crystal package prefix

②: Frequency in MHz

③: Load Capacitance (Use “S” for series; use “\_P” for parallel load capacitance)

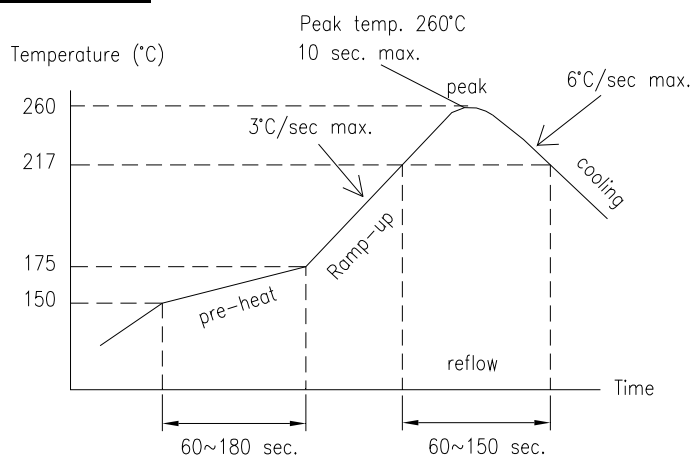
④: Frequency Tolerance in ppm at +25°C

⑤: Frequency stability in ppm

⑥: Operating temperature range in °C

⑦: ESR (Equivalent Series Resistance) ohms max.

**RECOMMENDED REFLOW SOLDERING PROFILE:**



**TAPE AND REEL SPEC.:**

1K pcs per reel,

unit: mm

