



- Ultra-miniature 6x3.5 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, PDAs, GPS and PCMCIA.



SPECIFICATIONS

Crystal Holder Prefix ①:	MF series					
Mode of Vibration ② ③:	12.0 ~50.0 MHz AT-cut Fundamental mode 40.0~100.0 MHz AT-cut 3 rd Overtone mode					
Calibration Tolerance ⑤:	±10 ppm (±0.001 %), or ±20 ppm (±0.002 %), or ±30 ppm (±0.003 %) at 25°C ±5 ppm at +25°C is also available					
Frequency Stability ⑥:	±5 ppm (±0.0005 %); or ±10 ppm (±0.001 %) ;or ±30 ppm (±0.003 %)					
Operating Temperature Range ⑦	-20°C to +70°C. or -30°C to +85°C					
Shunt Capacitance (C₀):	2.0~4.0 pF typical, 5 pF maximum					
Equivalent Series Resistance (E.S.R.) ⑧	Frequency	Vibration. Mode	E.S.R. max.	Frequency	Vibration Mode	E.S.R. max.
	12.0 ~ 16.0	AT funda.	80 Ω	40.0 ~ 67.0	AT 3rd	70 Ω
	16.1 ~ 40.0	AT funda.	40 Ω	67.1~100.0	AT 3rd	90 Ω
Load Capacitance (C_L) ④:	Series (S)					
	Parallel: Please specify C _L value, typical C _L ranges from 10 to 32pF)					
Drive Level:	100 μW max.					
Aging:	Less than ±3 ppm per year at +25°C					
Reflow Soldering:	10 seconds maximum at +260°C two times or 180 seconds at 230°C one time					

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

MERCURY www.mercury-crystal.com

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

MEC Part Number MEC Specification Code

MF-12.800-12P 30/30/-20+70/80R
 MF-13.000-16P 30/30/-20+70/80R
 MF-14.400-16P 30/30/-20+70/80R
 MF-14.7456-16P 30/30/-20+70/80R
 MF-16.000-16P 30/30/-20+70/80R
 MF-16.384-16P 30/30/-20+70/40R
 MF-18.432-16P 30/30/-20+70/40R
 MF-19.200-16P 30/30/-20+70/40R
 MF-19.6608-16P 30/30/-20+70/40R
 MF-20.000-20P 30/30/-20+70/40R
 MF-20.2752-16P 30/30/-20+70/40R

MEC Part Number MEC Specification Code

MF-20.945-16P 30/30/-20+70/40R
 MF-24.550-32P 25/15/-40+85/20R for GPS
 MF-29.4912-32P 30/30/-20+70/40R
 MF-32.000-S 30/30/-20+70/40R
 MF-32.768-S 30/30/-20+70/40R
 MF-35.2512-S 30/30/-20+70/40R
 MF-48.000-S 30/30/-20+70/40R
 MF-40.000A3-S 30/30/-20+70/70R (AT 3rd O/T)
 MF-48.000A3-S 30/30/-20+70/70R (AT 3rd O/T)
 MF-49.4912A3-S 30/30/-20+70/70R (AT 3rd O/T)
 MF-50.000A3-S 30/30/-20+70/40R (AT 3rd O/T)

ENVIRONMENTAL AND MECHANICAL SPECIFICATIONS

Green Requirement	RoHS compliant and Pb (lead free)
Storage Temperature	-40°C to +85°C
Gross Leak	1 Kg Pressurized water immersion test per Mercury internal procedures
Fine Leak	< 5 x10 ⁻⁸ atm cc /sec by helium leak check
Shock	±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.
Vibration	±5 ppm max. Frequency:10 to 55 Hz, amplitude: 1.5 mm or 10 Gs rms. Duration: 6 hours.
Solderability	MIL-STD-883, Method 2003
Humidity	After 48 hours at 85°C, 85% relative humidity non-condensing
Thermal Shock	Temperature cycling: Exposed at -40°C for 30 minutes then to +85°C for 30 minutes for duration of 5 days
Marking Permanency	MIL-STD-202, Method 215. Laser engraved.
Insulation Resistance	500 MΩ min. at 100 V±15 V DC

HOW TO ORDER:

Complete Part Number = Mercury part number + Mercury spec. code. \varnothing = Please specify

Example: MF-16.000-16P-30/30/-20+70/580R-option

Explanation: MF series crystal, 16.000 MHz, 16 pF load capacitance, ± 30 ppm frequency tolerance, ± 30 ppm frequency stability over -20 to +70°C, ESR is 80 ohms max.

	\varnothing	\varnothing		\varnothing		\varnothing		\varnothing		\varnothing		\varnothing
MF-	16.000		—	30P	—	10	/	30	/	-20+70	/	80R
①	②	③		④		⑤		⑥		⑦		⑧

①: Crystal package prefix

②: Frequency in MHz

③: Frequency between 40 MHz and 50 MHz can be either fundamental mode or 3rd overtone mode. Use “AF” for AT-cut fundamental mode and use “A3” AT-cut 3rd overtone mode.

For example: MQ-50.000A3 represents 50 MHz 3rd overtone

④: Load Capacitance (Use “S” for series; use “_P” for parallel load capacitance)

⑤: Frequency Tolerance at +25°C

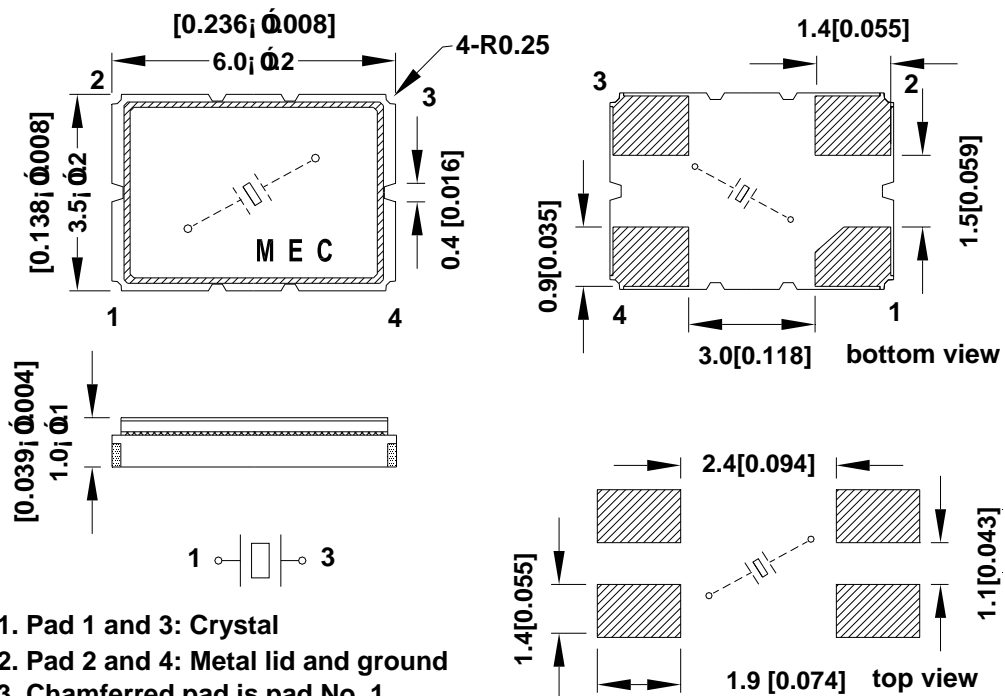
⑥: Frequency stability over operating temperature range

⑦: Operating temperature range

⑧: ESR (Equivalent Series Resistance in ohms) max.

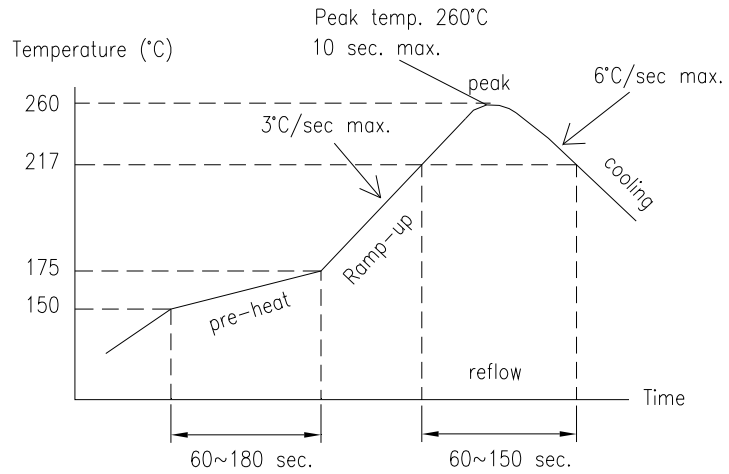
PACKAGE DIMENSIONS AND SUGGESTED PAD LAYOUT

Unit: mm [inches]



1. Pad 1 and 3: Crystal
2. Pad 2 and 4: Metal lid and ground
3. Chamfered pad is pad No. 1
4. Count clockwise when looking at top view
5. Count counter-clockwise when looking at bottom view

RECOMMENDED REFLOW SOLDERING PROFILE:



TAPE AND REEL SPEC.:

1K pcs per reel, unit: mm

