

### FEATURES

- **Miniature size: 7.0mm x 5mm x 1.2mm height**
- **Gold-plated ceramic base with metal seam-welded lid**
- **To minimize EMI the whole crystal may be grounded**
- **Tight tolerance of  $\pm 10$ ppm for telecommunications use**
- **High shock and vibration resistance**
- **Ideal for PDAs, GPS, PCMCIA and hand-held equipment**

### DESCRIPTION

Miniature surface-mount MQ crystals are produced using a ceramic substrate and fitted with a hermetically-sealed metal lid. The crystals are competitively priced, well-suited to mass-market electronic applications and may also be produced to close tolerances making this crystal a good choice for applications requiring low mass and tight tolerances. There are two package variants, 4 pad and two pad.

### SPECIFICATION

Frequency Range	
AT-Cut Fundamental:	6.0MHz to 45.0MHz
AT-Cut 3rd Overtone:	30.0MHz to 125.0MHz
Calibration Tolerance at 25°C*:	from $\pm 5$ ppm ( $\pm 10$ , $\pm 20$ or $\pm 30$ ppm standard)
Frequency stability	
-10° to +60°C	from $\pm 5$ ppm
-20° to +70°C	from $\pm 10$ ppm
-40° to +90°C	from $\pm 15$ ppm
-55 to +125°C	from $\pm 20$ ppm
Storage Temperature:	-55°~+105°C
Effective Series Resistance:	See table
Shunt Capacitance (C0):	2pF to 4pF typical, 7pF maximum
Load Capacitance (CL):	Series or from 10pF to 32pF (Customer specified CL)
Ageing:	< $\pm 3$ ppm per year at +25°C
Drive level:	100 $\mu$ W maximum
Reflow Soldering:	10s maximum, 260°C twice or 180s at 230°C, once.
Package:	Ceramic base, metal lid, Hermetic seal
Packaging:	16mm EIA tape and reel 1000 pieces per reel

### PART NUMBER GENERATION

Example: 12.000MHz MQ/20/30/-10+60/18pF/60R

Nominal Frequency

Package  
MQ = 4 pad  
MQ2 = 2 pad

Calibration tolerance  
at 25°C ( $\pm$ ppm)

Temperature Stability  
over temp. range ( $\pm$ ppm)

Operating Temp. Range (°C)  
Lower and upper limits

Load Capacitance  
Either SR for series or CL in pF

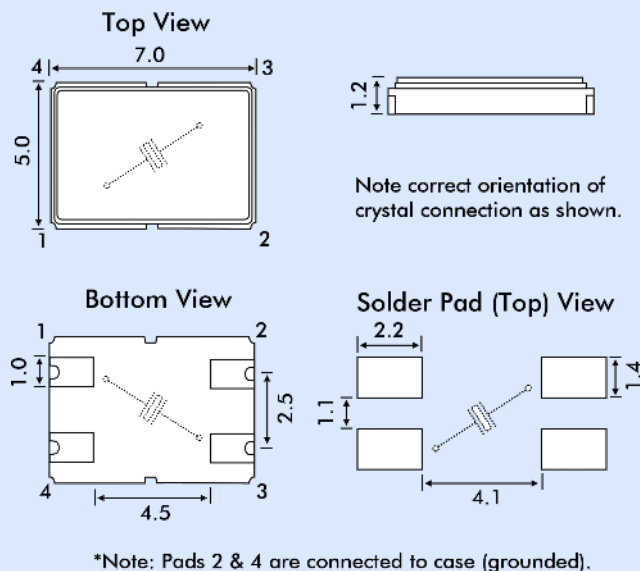
Equivalent Series Resistance  
Optional - use when special  
value is required



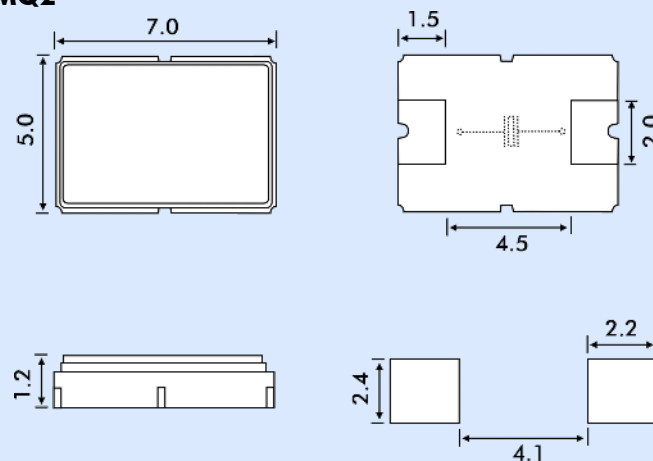
### OUTLINE & DIMENSIONS



#### MQ



#### MQ2



### EFFECTIVE SERIES RESISTANCE

Frequency Range MHz	Crystal Cut/ Mode	ESR $\Omega$ Max.
6.0 ~ 11.0	AT Fund.	60
11.1 ~ 14.0	AT Fund.	50
14.1 ~ 45.0	AT Fund.	40
30.0 ~ 40.0	AT 3rd OT	100
40.1 ~ 50.0	AT 3rd OT	80
50.1 ~ 125	AT 3rd OT	90