

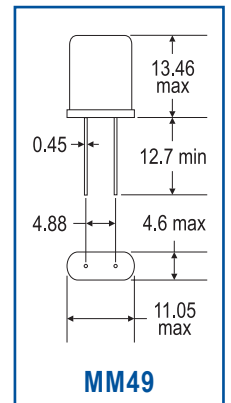
# Microprocessor Crystals

## MM49 <sup>M</sup> SM49

For many years, the MM49 unit was an industry-standard crystal, with advantages in size and cost. Although smaller and newer designs have gained large acceptance, the reliable MM49 remains the most economical in many applications. In addition, it can usually be designed to provide special motional parameter requirements, such as VCXO pull, that smaller crystal units cannot match. So if cost is an issue, Monitor recommends the rugged, resistance-welded MM49, and its surface-mountable partner, the SM49.

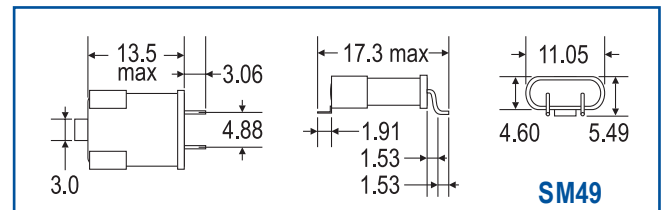
SPECIFICATIONS	MM49 & SM49	
Frequency Range	1.0 ~ 200.0 MHz*	
Operating Temp Range	-20°C ~ 70°C (other ranges available, please call factory)	
Storage Temp Range	-55°C ~ 105°C	
Shunt Capacitance	7.0 pF max	
Calibration Tolerance	± 30ppm @ 25°C	
Frequency Tolerance vs Temp Range	± 50ppm from -20°C to 70°C standard (call for other options)	
Equiv Series Resistance (MHz = Ω max) <small>Fundamental unless otherwise otherwise indicated</small>	1.0 = 3000	24.0 ~ 75.0 = 40 (3rd Overtone)
	1.843 ~ 4.0 = 800	75.0 ~ 160.0 = 80 (5th Overtone)
	4.0 ~ 6.0 = 100	160.0 ~ 180.0 = 120 (7th Overtone)
	6.0 ~ 24.0 = 40	180.0 ~ 200.0 = 140 (9th Overtone)
Drive Level	0.1 mW max	
Humidity	85% RH, 85°C, 48 Hours	
Hermetic Seal	Leak Rate $2 \times 10^{-8}$ ATM-cm <sup>3</sup> /sec max	
Solderability	MIL-STD-202F Method 208E	
Vibration	MIL-STD-202F Method 204; 35G, 50~2000 Hz (<25.0 MHz); 20G, 50~2000 Hz (25.0 MHz)	
Shock	MIL-STD-202F Method 213B Test Cond E, 1000G, 1/2 Sine Wave	
Packaging	Bulk (standard); Tape & Reel available (see over)	

\* Call for your specific frequency requirement

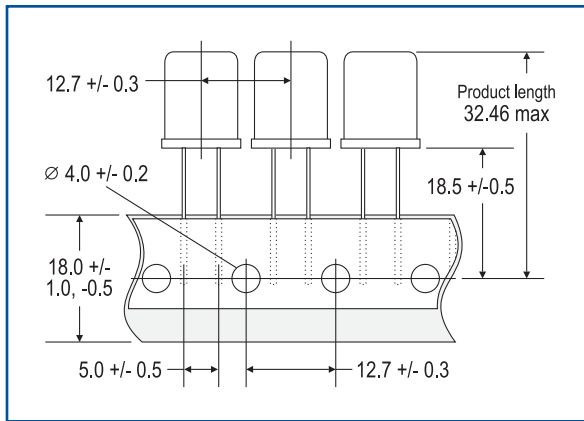


Units = mm

Monitor Products has a proven track record as a pioneer manufacturer in the frequency control market. If our extensive selection of standard and engineered crystals and oscillators does not meet your spec, we will work with you towards a customized solution.



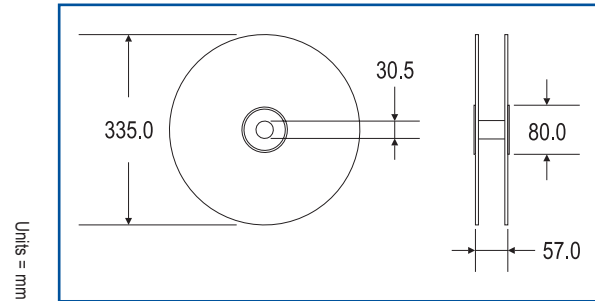
# MM49 M SM49 Microprocessor Crystals



## TAPE & REEL SPECIFICATIONS

**MM49:** 18.0mm tape, 1500 pcs/reel (specs as pictured)

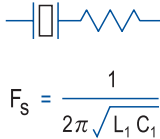
**SM49:** Please contact factory



## CRYSTAL CORRELATION THEORY

### Series Resonance:

At series resonance, the crystal looks resistive in the circuit, and correlation of frequency is not a problem. It must be specified if unit is to be manufactured at series or at a particular load capacitance.



### Anti-Resonance Parallel:

Crystals operating at anti-resonance will look inductive in the circuit. Changes of reactive values in the circuit will change the crystal frequency. If the crystal is to be used at anti-resonance, the load capacitance should always be specified. The load capacitance  $C_L$  is the dynamic capacitance of the total circuit.



$$F_p = \frac{1}{2\pi\sqrt{\frac{C_1 + C_0}{L_1 C_1 C_0}}}$$

## PART NUMBERING KEY

### Sample Part Number

MM49N1C3A @ 14.31818 MHz =

SM49N1C3A @ 16.0 MHz =

SERIES	CORRELATION	MODE	FREQUENCY STABILITY	TEMP RANGE	PACKAGING	FREQUENCY (MHz)
MM49 SM49	L = 12 pF M = 15 pF N = 20 pF O = 32 pF Q = 24 pF S = Series Resonant X = Cust spec	1 = Fundamental* 3 = 3rd Overtone 5 = 5th Overtone 7 = 7th Overtone	C = ± 50 ppm* X = Cust spec	3 = -20°C~70°C* 9 = Cust spec	A = Std package B = 3rd lead, 0.5" E = Tape & Reel J = Insulating sleeve K = Insulating spacer X = Cust spec	14.31818 16.0
MM49	N	1	C	3	A	14.31818
MM49	N	1	C	3	A	16.0

\* Standard

Call factory for additional options. Use full descriptive part number when ordering. Parts will be marked with series and frequency only.