

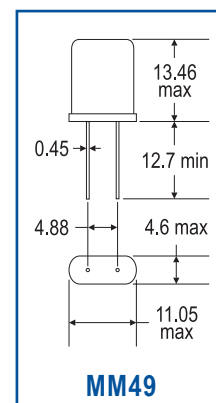
Microprocessor Crystals

MM49 • 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.

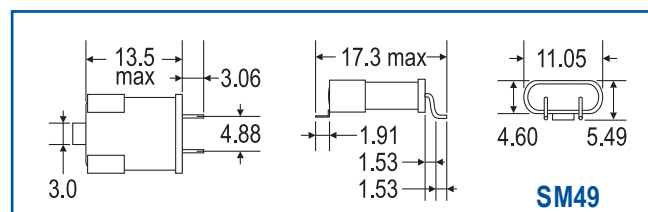
SPECIFICATIONS	MM49 & SM49								
Frequency Range	1.0 ~ 200.0 MHz*								
Operating Temp Range	-20°C ~ 70°C (other ranges available, please call factory)								
Storage Temp Range	-55°C ~ 105°C								
Shunt Capacitance	7.0 pF max								
Calibration Tolerance	± 30ppm @ 25°C								
Frequency Tolerance vs Temp Range	± 50ppm from -20°C to 70°C standard (call for other options)								
Equiv Series Resistance (MHz = Ω max)	<table border="1"> <tr> <td>1.0 = 3000</td><td>24.0 ~ 75.0 = 40 (3rd Overtone)</td></tr> <tr> <td>1.843 ~ 4.0 = 800</td><td>75.0 ~ 160.0 = 80 (5th Overtone)</td></tr> <tr> <td>4.0 ~ 6.0 = 100</td><td>160.0 ~ 180.0 = 120 (7th Overtone)</td></tr> <tr> <td>6.0 ~ 24.0 = 40</td><td>180.0 ~ 200.0 = 140 (9th Overtone)</td></tr> </table>	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)
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<small>Fundamental unless otherwise otherwise indicated</small>									
Drive Level	0.1 mW max								
Humidity	85% RH, 85°C, 48 Hours								
Hermetic Seal	Leak Rate 2×10^{-8} ATM-cm ³ /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

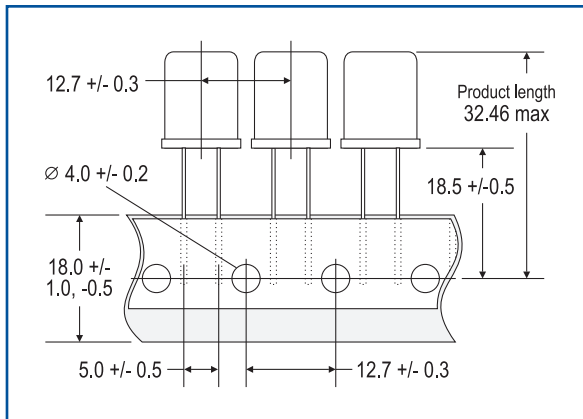


Units = mm

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.



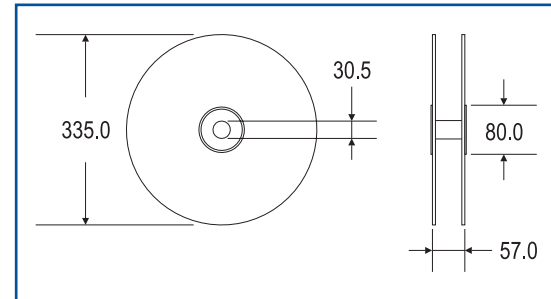
MM49 • SM49 Microprocessor Crystals



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.

$$F_s = \frac{1}{2\pi\sqrt{L_1 C_1}}$$

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	
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.

Part Numbering Key

STANDARD CRYSTALS

SERIES	CORRELATION	MODE	FREQUENCY STABILITY	TEMPERATURE RANGE	PACKAGING	FREQUENCY
MM26 SM60 MM38 SM61 MM49 SM62 MM80 SM63 MS49 SM64 SM37 SM66 SM38 SM70 SM39 SM80 SM55 SMS49	L = 12pf M = 15pf N = 20pf O = 32pf Q = 24pf R = 18pf S = Series resonant X = Customer spec	1 = Fundamental 3 = Third 5 = Fifth 7 = Seventh	A = 1000ppm B = 100ppm C = 50ppm D = 30ppm E = 25ppm F = 10ppm ⁺ H = 20ppm ⁺ X = Customer spec	0 = @ 25°C 1 = -10°C ~ 60°C 2 = 0°C ~ 70°C 3 = -20°C ~ 70°C 4 = -40°C ~ 70°C 5 = -40°C ~ 85°C 6 = -55°C ~ 125°C 7 = -10°C ~ 70°C 8 = -55°C ~ 105°C 9 = Customer spec	A = 2-lead B = 3rd lead, 0.5" D = Formed leads per spec E = Tape & reel F = 3rd lead, 1.0" J = Insulating sleeve K = Insulating spacer X = Customer spec	

STANDARD CLOCK OSCILLATORS

SERIES	SYMMETRY	FREQUENCY STABILITY	TEMPERATURE RANGE	PACKAGING	FREQUENCY
SM753 ⁺⁺ SM755 ⁺⁺ SM990 SM991 SM992 SM993 SM996 SM997	1 = 60/40% 2 = 55/45% (limited by frequency range & load)* 11 = 60/40% (ECL complementary output at Pin 1) 12 = 55/45% (ECL complementary output at Pin 1) 21 = 55/45% symmetry for SM990 series 22 = 60/40% symmetry for SM990 series	A = 1000ppm B = 100ppm* C = 50ppm D = 30ppm E = 25ppm F = 10ppm ⁺ H = 20ppm ⁺ J = 200ppm X = Customer spec	0 = @ 25°C 1 = -10°C ~ 60°C 2 = 0°C ~ 70°C* 3 = -20°C ~ 70°C 4 = -40°C ~ 70°C 5 = -40°C ~ 85°C 6 = -55°C ~ 125°C 7 = -10°C ~ 70°C 8 = -55°C ~ 105°C 9 = Customer spec	A = Bulk E = Tape & Reel* X = Customer spec	
970 (14-pin dip) 975 & 985 (8-pin dip)	T = TTL H = HCMOS/TTL HHT = HCMOS/TTL with Tristate	LOGIC EC = ECL EAG = PECL		970, 975 & 985 A = Anti-static tubes* G = SMD (gull-wing) J = SMD (J-lead) X = Customer spec	

⁺⁺ Programmable

STANDARD TCXOs

SERIES	FREQUENCY STABILITY	TEMPERATURE RANGE	OUTPUT LEVEL	PACKAGING	FREQUENCY
7400 7401 7402	A = ± 0.5ppm B = ± 1.0ppm C = ± 1.5ppm D = ± 2.0ppm E = ± 2.5ppm F = ± 3.0ppm G = ± 5.0ppm	1 = 15°C ~ 35°C 2 = 0°C ~ 50°C 3 = 0°C ~ 70°C 4 = -10°C ~ 60°C 5 = -15°C ~ 55°C 6 = -25°C ~ 65°C 7 = -20°C ~ 70°C 8 = -30°C ~ 75°C 9 = 0°C ~ 55°C	A = TTL B = CMOS (5V input) C = Sine wave D = CMOS (12V input)	1 (7400) 2 (7401) 3 (7402)	

* Standard

Options listed may not be available for every product.

Please contact Monitor for final confirmation of specifications.

+ Call factory for availability

Use full descriptive part numbers when ordering.

Parts will be marked with series and frequency only.

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