

## M1532 Series SPECIFICATION FOR 1.5x3.2 mm TUNING FORK SMT CRYSTAL

### FEATURES

Surface mount 32.768 kHz crystal  
with optional lower resistance value  
Compliant to RoHS directive

### APPLICATIONS

Real time clock circuits in communications equipment,  
test equipment; and portable and wearable devices.

### Ordering Information:

Product Family	Temperature Range		Tolerance at +25 °C		Stability		Load Capacitance		Resistance		Frequency
	Code	Value	Code	Value	Code	Value	Code	Value	Code	Value	
M1532	2	-40 to +85 °C	G	±20 ppm	Z	Parabolic Curve	Blank	12.5 pF (standard)	Blank	70 kohm max. (std.)	0.032768 MHz
							9	9 pF			
							6	6 pF	L	50 kohm max.	
							Other	Consult factory			
Example: M1532GZ 0.032768 MHz											
M1532	2		G		Z						0.032768 MHz

### Electrical Specifications:

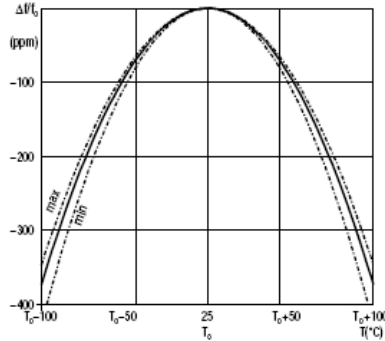
Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
Mode of Oscillation		Fundamental (XT cut)				
Frequency	F <sub>O</sub>	0.032768			MHz	
Frequency Tolerance	ΔF/F	-20		+20	ppm	@ +25 °C
Frequency Stability	ΔF/F	Parabolic Curve				Ref to +25 °C
Turnover Temperature	T <sub>T</sub>	+20	+25	+30	°C	
Parabolic Curve Const.	B	-0.028	-0.034	-0.040	ppm/°C <sup>2</sup>	
Operating Temperature	T <sub>A</sub>	-40		+85	°C	
Aging		-3		+3	ppm/year	@ +25 °C
Load Capacitance	C <sub>L</sub>	See ordering information (standard is 12.5 pF)			pF	
ESR	R <sub>s</sub>			70	kΩ	standard @ +25 °C
				50	kΩ	"L" option @ +25 °C
Shunt Capacitance	C <sub>O</sub>		0.95		pF	standard @ +25 °C
			1.3		pF	"L" option @ +25 °C
Drive Level	D <sub>L</sub>			1	μW	standard
				0.5	μW	"L" option

### Environmental & Package Specifications:

Storage Temperature	-55°C to 125°C
Mechanical Shock	3 drops from 75 cm onto a hard wood board; ±5 ppm maximum frequency change
Vibration	10 to 55 Hz, 1.5 mm double amplitude, 1.5 minute sweep, 2 hrs. in each of 3 mutually perpendicular axes, 6 hrs. total; ±5 ppm maximum frequency change
Humidity	+65 °C, 95% RH, 500 hrs.; ±10 ppm maximum frequency change
Thermal Shock	-40 °C to +100 °C, 30 minute dwell times, 5 cycles; ±5 ppm maximum frequency change
Hermeticity	1E-7 atm cc/s
Moisture Sensitivity Level	MSL1
Solderability	Per EIAJ-STD-002
Max. Soldering Conditions	See solder profile, Figure 1
Pad Termination	Gold, 0.3 μm to 1.0 μm thickness
Package Type	2-pad 1.5 X 3.2 X 0.9 mm leadless ceramic. RoHS compliant.

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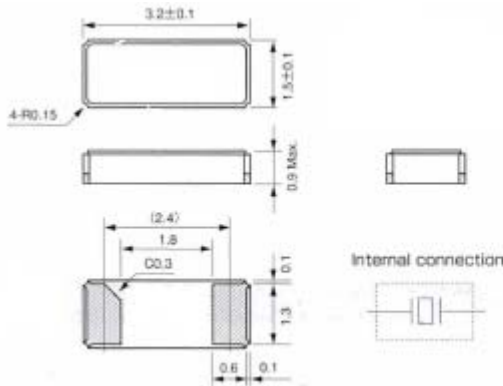
**Frequency vs. Temperature Characteristics:**



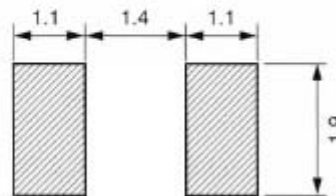
**Marking:**

Standard		“L” option
y m ###		y m L ##
<b>Legend</b>		
y = last digit of year of manufacture		
m = code for month of manufacture (1 = January . . .		
9 = September ; X = October . . . Z = December		
### or ## = factory lot number		

**Dimensions:**



**Recommended Pad Lay Out**



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**Reflow Soldering Conditions:**

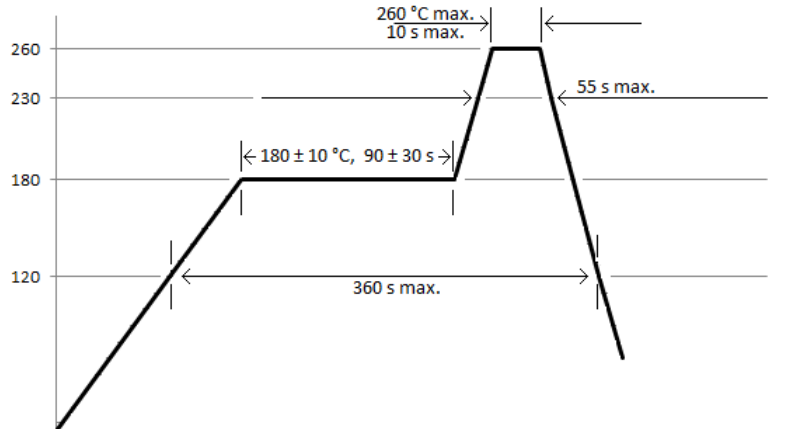
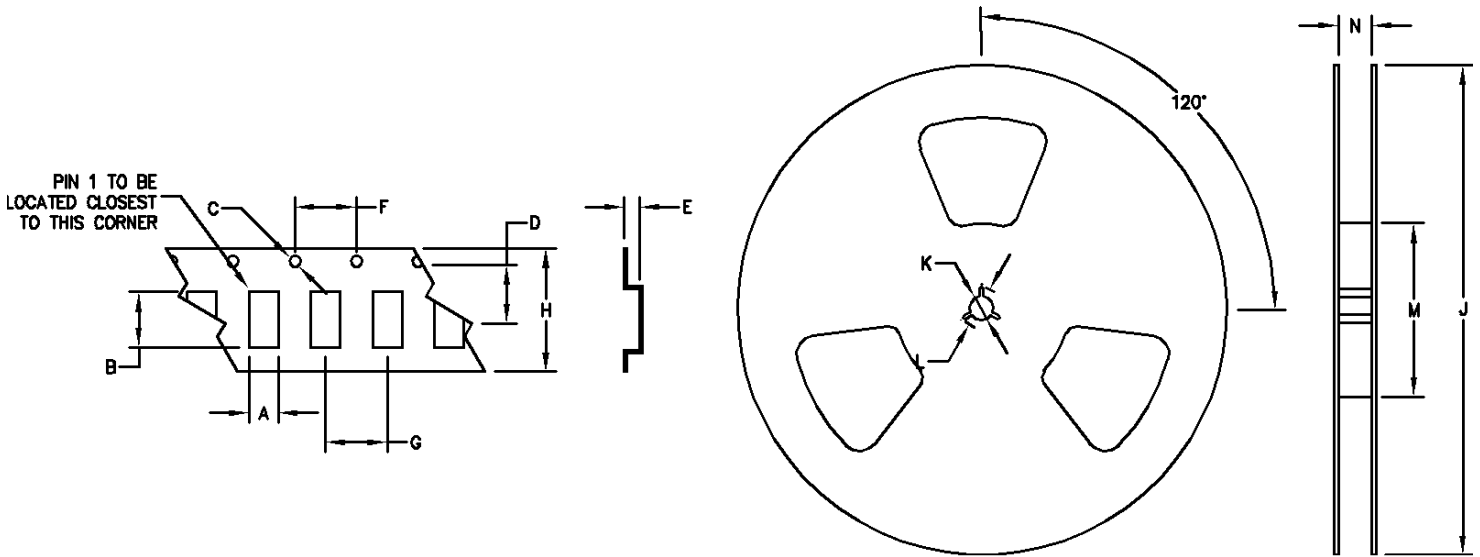


Figure 1

**Tape and Reel Specifications:**



Tape and Reel Specifications												
A	B	C	D	E	F	G	H	J	K	L	M	N
1.9	3.6	1.5	5.5	1.0	4.0	4.0	12.0	180	13.0	21.0	60.0	13.0

Units per reel = 3,000.

Revision 0  
10/07/15