



Technical Data: Quartz Crystals

**49SMX (4H-LB)**

**QUARTZ CRYSTAL SPECIFICATIONS**

Ref No. \_\_\_\_\_  
 Date \_\_\_\_\_  
 Page: \_\_\_\_\_ of \_\_\_\_\_

Customer \_\_\_\_\_  
 Part No. \_\_\_\_\_ Part No. \_\_\_\_\_  
 Spec. No. \_\_\_\_\_ Dwg. or Spec. No.: \_\_\_\_\_ Rev. \_\_\_\_\_

**ELECTRICAL**

- 1.0 Operating Temperature Range \_\_\_\_\_°C to \_\_\_\_\_°C
- 2.0 Frequency Temperature Stability = ± \_\_\_\_\_% over \_\_\_\_\_°C to \_\_\_\_\_°C.

3.0 Specifications at 25°C ± 2°C:	Value	Units
3.1 Frequency		MHz
3.2 Frequency Calibration Tolerance		± %
3.3 Pullability		
3.4 Load Capacitance		pF
3.5 Effective Series Resistance		Ohms, Max.
3.6 Drive level-correlation/operating		mW
3.7 Shunt Capacitance		pF, Max.
3.8 Oscillation Mode		
3.9 Aging Rate		ppm/yr
3.10 Test Circuit	Saunders 150C	

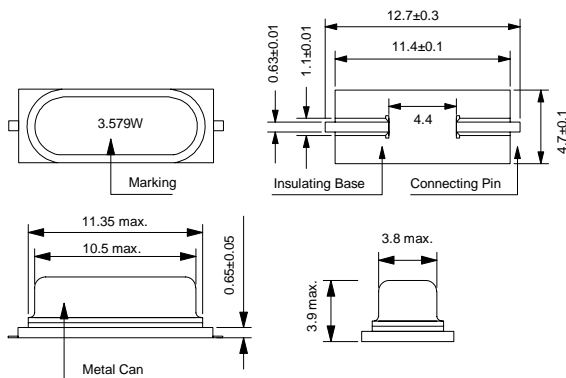
**MECHANICAL**

- 4.0 Holder Type: 49SMX (4HLB)
- 4.1 Marking: One line on top, Example: 3.579W

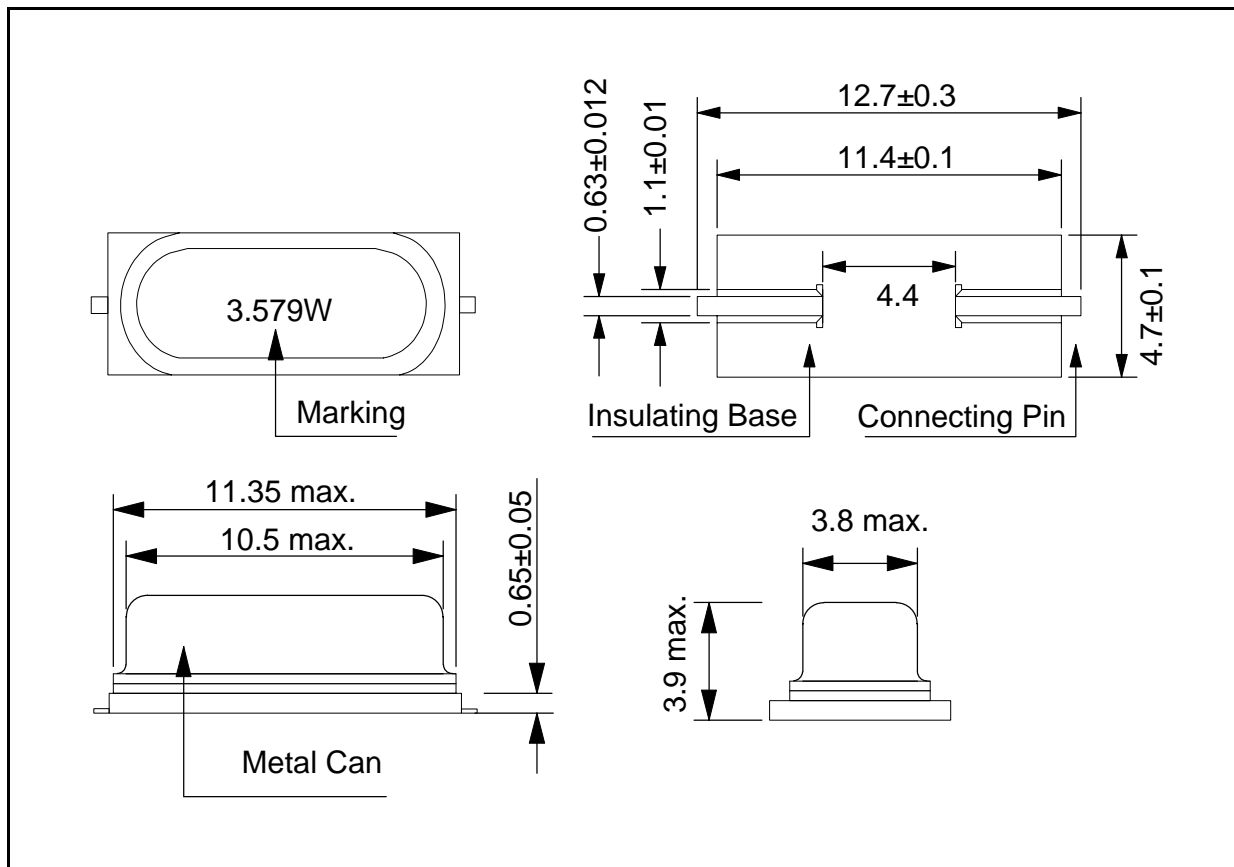
**OTHER SPECS**

Lead composition: Kovar with a 60/40 solder electroplate over nickel barrier.

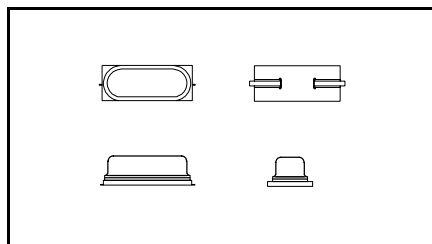
**49SMX (4HLB)**



**49SMX (4HLB)**



Enlarged View



Actual Size Shown Above





49SMX (4H-LB) Standard Frequencies

49SMX (4H-LB)

FREQUENCY MHZ	FREQUENCY DESIGNATOR	MAXIMUM EQUIVALENT SERIES RESISTANCE OHMS
3.000000	030	200
3.276800	032	200
3.579545	035	200
3.600000	036	200
3.634195	0363	200
3.686400	0368	200
3.840000	038	200
4.000000	040	150
4.032000	0403	150
4.096000	0409	150
4.433619	044	150
4.608000	046	150
4.915200	049	150
5.120000	051	120
5.990400	059	120
6.000000	060	100
6.144000	061	100
6.553600	0655	100
7.159090	071	80
7.372800	073	80
7.864320	078	80
8.000000	080	80
8.867238	088	80
9.830400	098	60
10.000000	100	60
10.240000	1024	60
11.059200	1105	60

FREQUENCY MHZ	FREQUENCY DESIGNATOR	MAXIMUM EQUIVALENT SERIES RESISTANCE OHMS
12.000000	120	60
12.288000	122	60
14.318180	143	50
14.400000	144	50
14.745600	147	50
15.000000	150	50
16.000000	160	50
16.147200	161	50
16.384000	163	50
18.432000	184	50
19.660800	196	50
20.000000	200	40
20.800000	208	40
24.000000	240	40
24.576000	245	40
29.491200	294	40*
30.000000	300	40*
31.350000	313	40*
32.424000	3242	40*
36.000000	360	40*
40.000000	400	40*
48.000000	480	100 3OT
50.000000	500	100 3OT
57.600000	576	100 3OT
60.000000	600	100 3OT
70.000000	700	100 3OT
75.000000	750	100 3OT
125.000000	1250	100 3OT

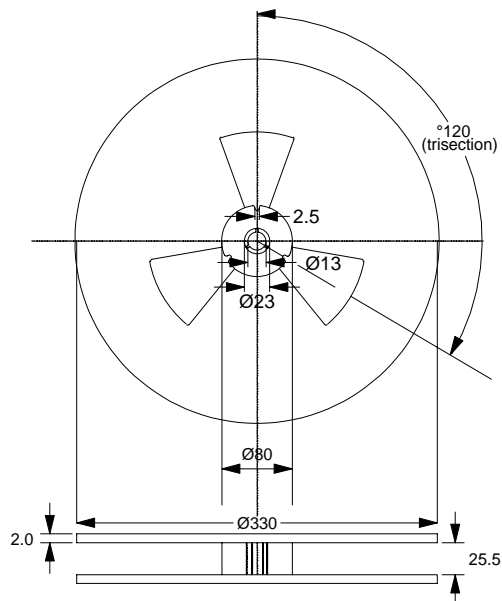
\* Fundamental BT-Cut

**Note: Special frequencies and specifications are available upon request.**

**4HLB DIMENSIONS**

**4HLB REEL DIMENSIONS**

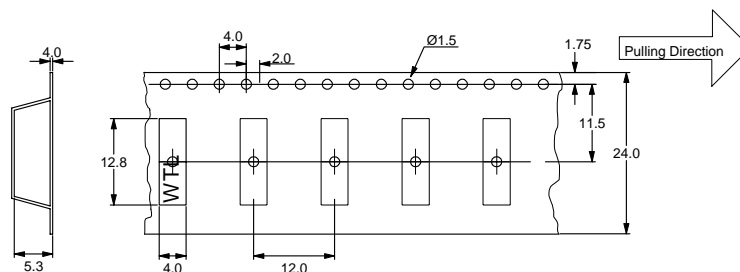
**4HLB**



Carrier Tape: Polystyrene

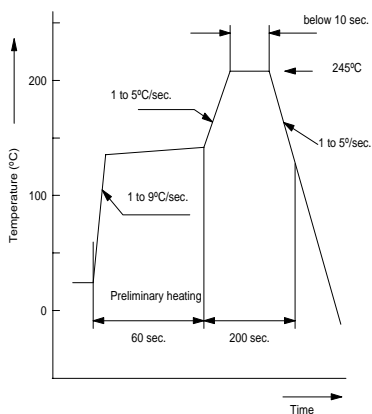
Parts Quantity Per Reel: 1,000

**4HLB EMBOSSED CARRIER DIMENSIONS**

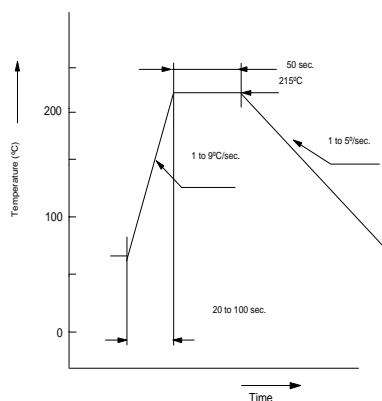


**Conditional chart for soldering of SMD products**

• Infrared - reflow



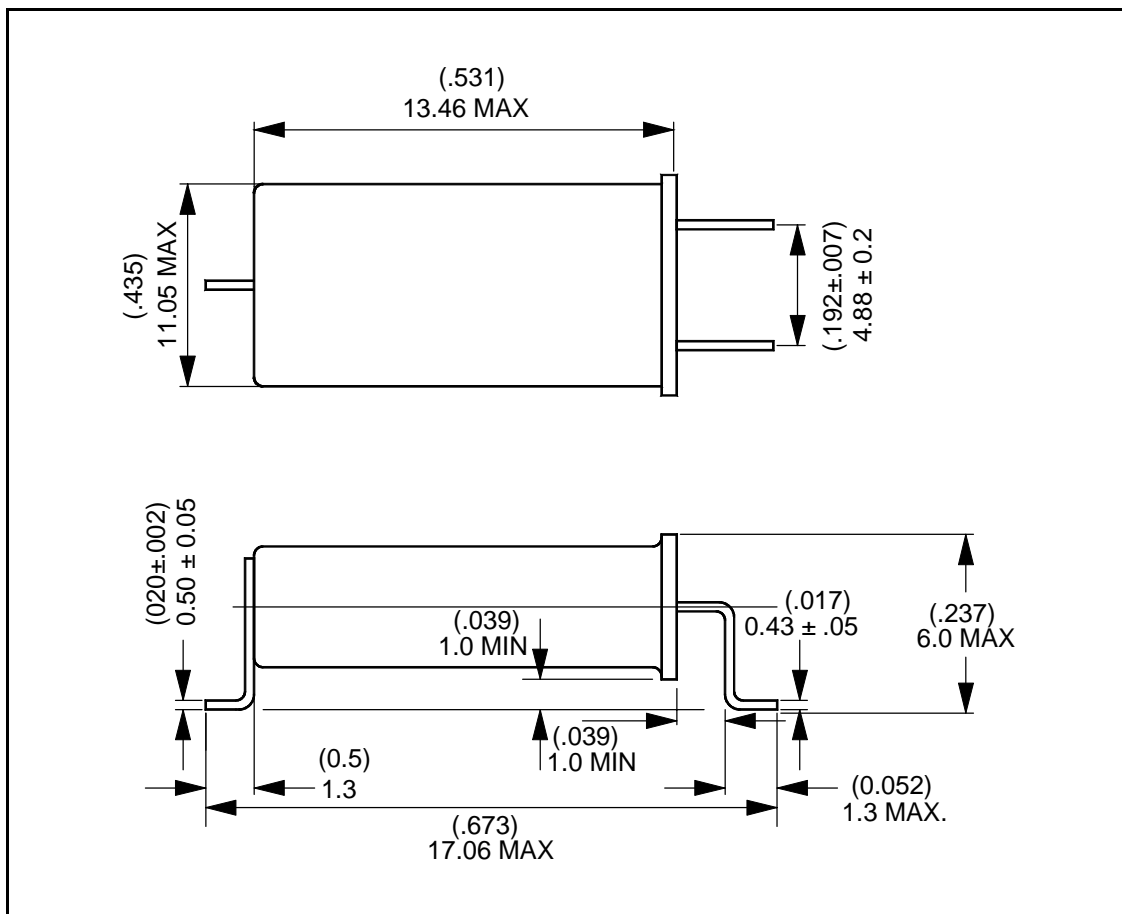
• Vapor Phase - reflow



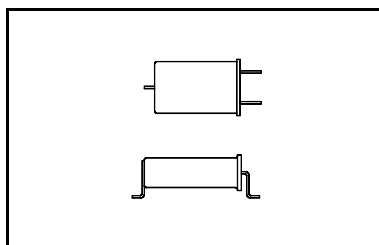


SURFACE MOUNT CRYSTAL

# SURFACE MOUNT CRYSTAL HC-49/U HOLDER



Enlarged View

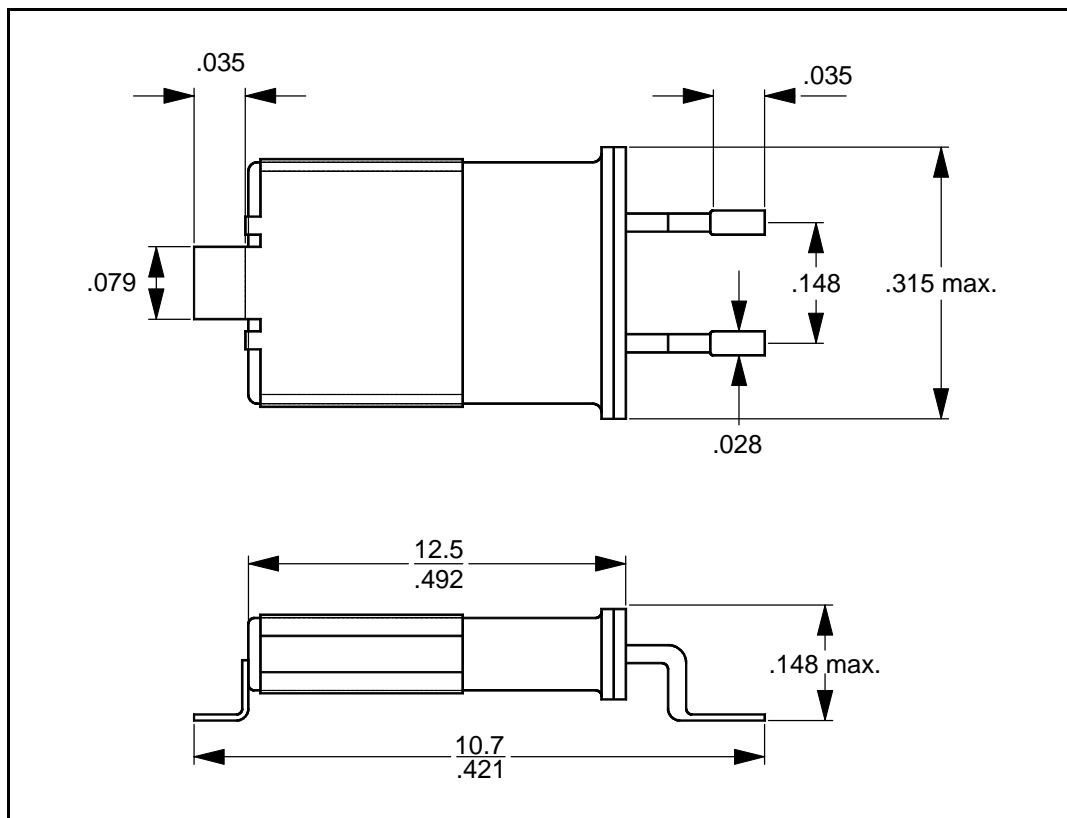


Actual Size Shown Above 1=1

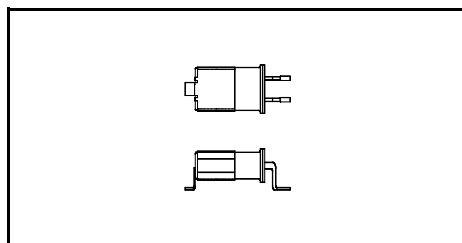
Call WTL for Details



UM-1/A UM-4 AND UM-5 SMD HOLDER



Enlarged View



Actual Size Shown Above 1=1

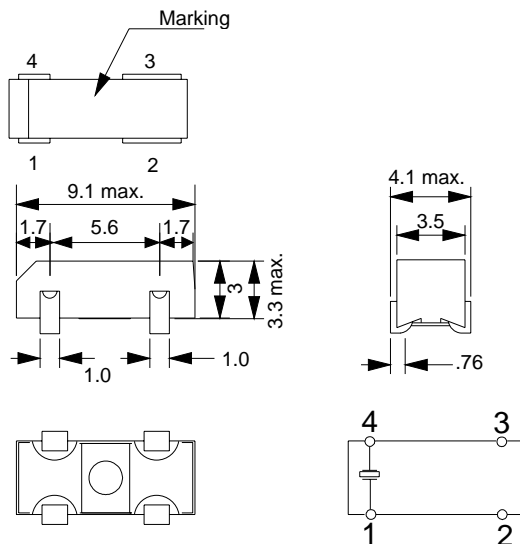
Call WTL for Details



**STANDARD SPECIFICATIONS**

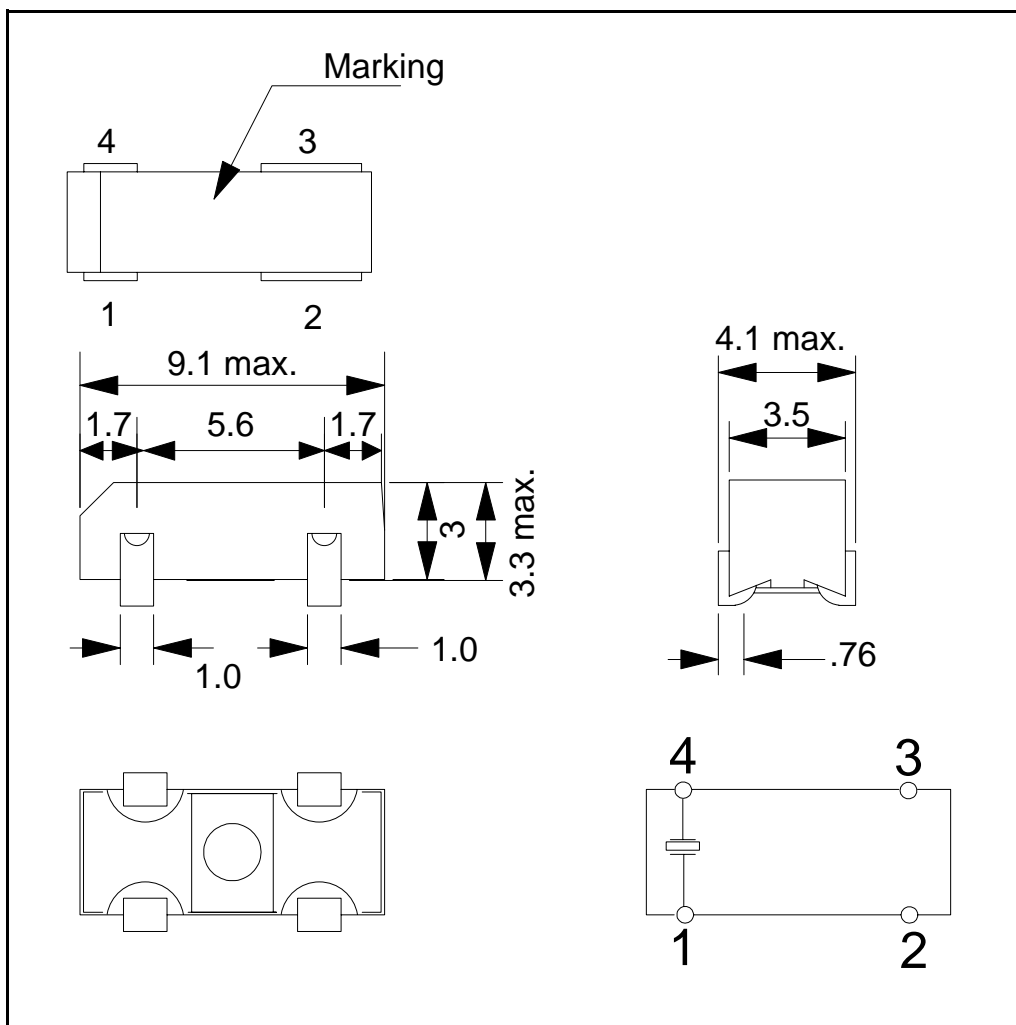
Part No.	P/N	90M327
Holder type		90SMX
Nominal frequency at +24°C	F	32.768kHz
Frequency tolerance	$\Delta f/F$	$\pm 30$ ppm
Load capacitance	$C_L$	12.5pF, Typical
Series resistance	$R_S$	50 k $\Omega$ max.
Drive level	P	1.0 $\mu$ W max.
Quality factor	Q	50000 min.
Turnover temperature	$T_T$	+ 24°C $\pm$ 4°C
Parabolic curvature constant	K	-0.035ppm/°C <sup>2</sup> , Typical
Shunt capacitance	$C_O$	1.35pF, Typical
Motional capacitance	$C_1$	0.0030pF, Typical
Aging	$\Delta f/F$	First year: 3ppm max. at +24°C
Operating temperature range	$T_O$	-10°C to + 60°C
Storage Temperature range	$T_S$	-30°C to + 70°C
Reflow soldering condition	$T_R$	10 seconds max. at + 260°C
Shock	$\Delta f/F$	3ppm max.
Vibration	$\Delta f/F$	3ppm max.

**90SMX**

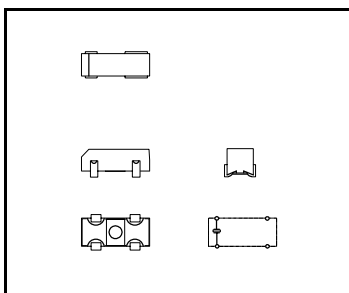




90SMX



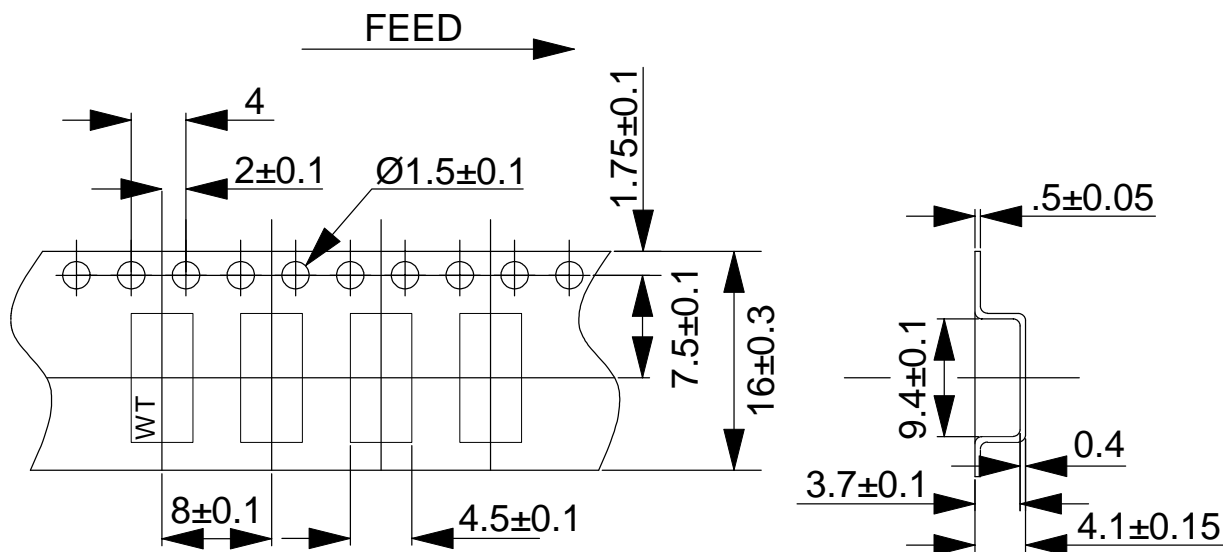
Enlarged View



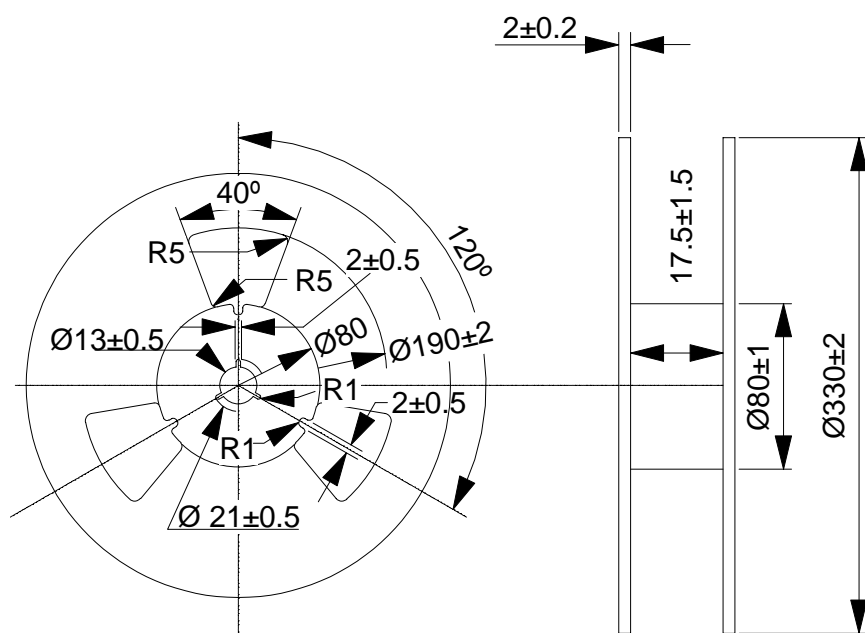
90SMX (Surface Mount Device)

TAPE SPECIFICATIONS FOR 90SMX

90SMX



REEL SPECIFICATIONS FOR 90SMX



2,000 pieces per reel



Technical Data: Quartz Crystals

**86SMX**

**QUARTZ CRYSTAL SPECIFICATIONS**

Ref No. \_\_\_\_\_

Date \_\_\_\_\_

Page: \_\_\_\_\_

Customer \_\_\_\_\_

Part No. \_\_\_\_\_

Part No. \_\_\_\_\_

Spec. No. \_\_\_\_\_

Dwg. or Spec. No.: \_\_\_\_\_

Rev. \_\_\_\_\_

**ELECTRICAL**

1.0 Operating Temperature Range \_\_\_\_\_°C to \_\_\_\_\_°C

2.0 Frequency Temperature Stability = ± \_\_\_\_\_% over \_\_\_\_\_°C to \_\_\_\_\_°C.

3.0 Specifications at 25°C ± 2°C:

	Value	Units
3.1 Frequency		MHz
3.2 Frequency Calibration Tolerance		± %
3.3 Pullability		
3.4 Load Capacitance		pF
3.5 Effective Series Resistance		Ohms, Max.
3.6 Drive level-correlation/operating		mW
3.7 Shunt Capacitance		pF, Max.
3.8 Oscillation Mode		
3.9 Aging Rate		ppm/yr
3.10 Test Circuit	Saunders 150C	

**MECHANICAL**

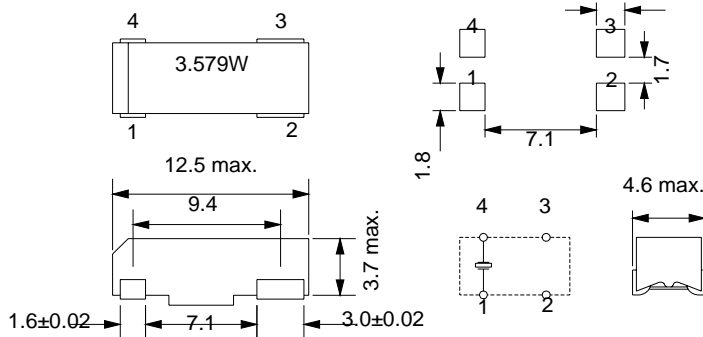
4.0 Holder Type: 86SMX

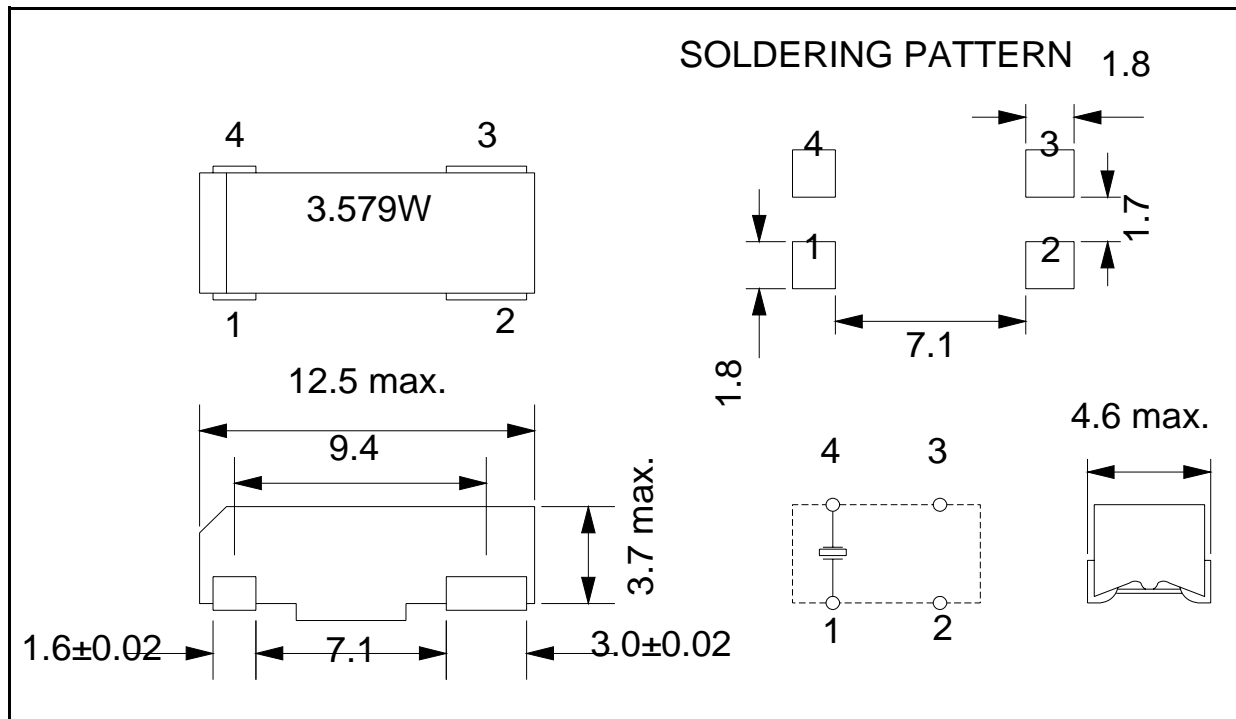
4.1 Marking: One line on top, Example: 3.579W

**OTHER SPECS**

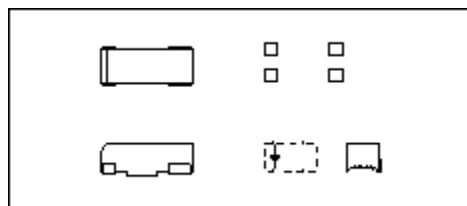
**86SMX**

**SOLDERING PATTERN 1.8**





Enlarged View



Actual Size Shown Above 1=1



**86SMX Family (Surface Mount Device)**

**86SMX**

**STANDARD SPECIFICATIONS**

NOTES

- |  |                                       |
|--|---------------------------------------|
| 1. Holder type                         | 86SMX                                 |
| 2. Frequency                           | 3.276800MHz to 75.000000 MHz          |
| 3. Calibration tolerance               | ±50 ppm (±0.005%) at + 25°C           |
| 4. Temperature stability tolerance     | ±100 ppm (±0.01%) over -20°C to +70°C |
| 5. Shunt capacitance (C <sub>0</sub> ) | 7 pF max.                             |
| 6. Drive Level (P)                     | 0.5 mW max.                           |
| 7. Cut                                 | AT-Cut                                |
| 8. Reflow soldering condition          | 10 seconds max. at +260°C             |
| 9. Marking                             | WTL Part No., Frequency, Date Code.   |

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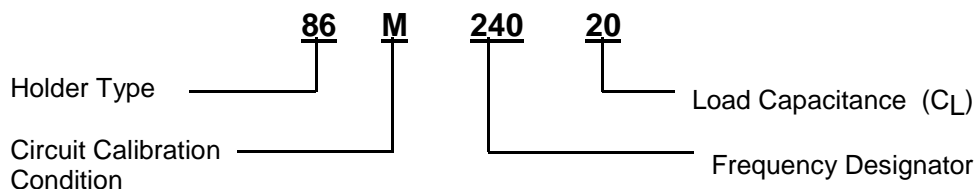
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**PART NUMBERING GUIDE**



**EXAMPLE**

CIRCUIT CALIBRATION CONDITION	FREQUENCY	PART NO.
Parallel Resonance=M C <sub>L</sub> =20pF	24.000000 MHz	86M240-20
Series Resonance=S	24.000000 MHz	86S240



86SMX Standard Frequencies

86SMX

FREQUENCY MHZ	FREQUENCY DESIGNATOR	MAXIMUM EQUIVALENT SERIES RESISTANCE OHMS	FREQUENCY MHZ	FREQUENCY DESIGNATOR	MAXIMUM EQUIVALENT SERIES RESISTANCE OHMS
3.276800	032	200	12.288000	12288	60
3.579545	035	200	12.296000	1229	60
3.686400	0368	200	12.800000	128	60
3.840000	038	200	13.000000	130	50
3.932160	039	200	13.500000	135	50
3.932200	03932	200	13.700000	137	50
4.000000	040	150	14.000000	140	50
4.032000	0403	150	14.318180	143	50
4.096000	0409	150	14.745600	147	50
4.194304	041	150	14.985500	14985	50
4.340198	0434	150	15.000000	150	50
4.433000	04433	150	15.360000	153	50
4.433619	044	150	16.000000	160	50
4.608000	046	150	16.044000	1604	50
4.915200	049	150	16.257000	162	50
5.000000	050	120	16.384000	163	50
5.033000	0503	120	16.670000	1667	50
5.068800	0506	120	16.934400	169	50
5.980000	0597	120	17.600000	176	50
6.000000	060	100	18.432000	184	50
6.080000	0608	100	18.600000	186	50
6.144000	061	100	18.867000	188	50
6.500000	065	100	19.069929	19069	50
7.159090	07159	80	19.164000	1916	50
7.250000	072	80	19.200000	192	50
7.372800	073	80	19.660800	196	50
7.680000	0768	80	19.800000	198	50
7.864320	078	80	20.000000	200	40
8.000000	080	80	22.118400	221	40
8.002000	08002	80	22.190000	2219	40
8.192000	081	80	22.500000	225	40
8.867238	088	80	23.347200	23347	40
9.000000	090	60	24.000000	240	40
9.216000	092	60	24.576000	245	40
9.600000	096	60	25.000000	250	40
9.830400	098	60	25.175000	25175	40
10.000000	100	60	25.750000	2575	40
10.185000	1018	60	27.000000	270	40
10.240000	1024	60	28.322000	28322	40
10.245000	10245	60	29.491200	29491	40
10.700000	107	60	30.000000	300	100 3OT
10.738635	10738	60	32.000000	320	100 3OT
10.752000	1075	60	32.424000	32424	100 3OT
11.000000	110	60	36.000000	360	100 3OT
11.059200	1105	60	38.400000	384	100 3OT
11.868000	1186	60	40.000000	400	100 3OT
11.980800	1198	60	48.000000	480	100 3OT
12.000000	120	60	50.000000	500	100 3OT
12.059200	12059	60	57.600000	576	100 3OT
12.096000	1209	60	60.000000	600	100 3OT
12.272700	12272	60	70.000000	700	100 3OT
			75.000000	750	100 3OT

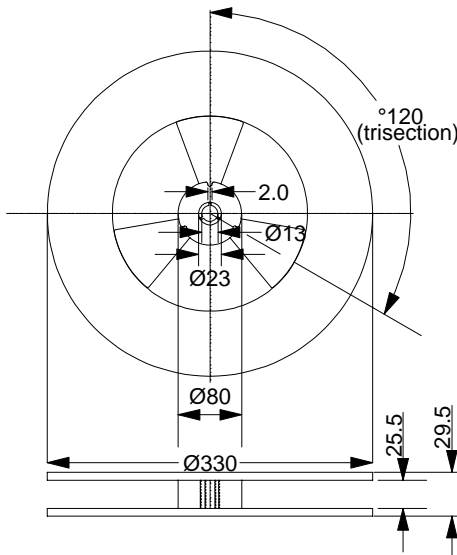
**Note: Special frequencies and specifications are available upon request.**



86SMX DIMENSIONS

86SMX

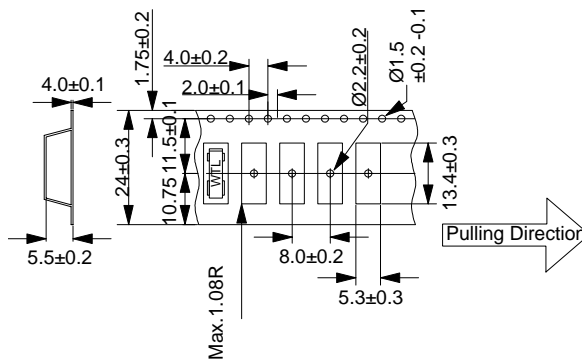
86SMX REEL DIMENSIONS



Material: Cardboard

Parts Quantity Per Reel: 1,000

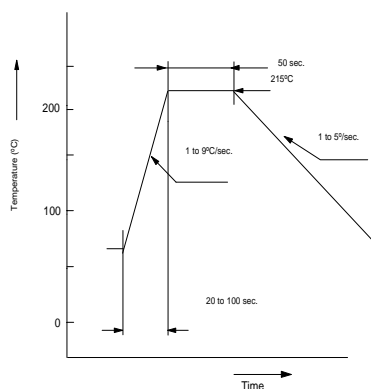
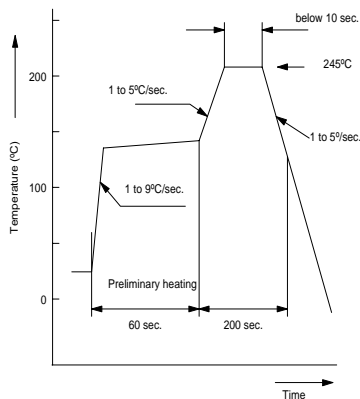
86SMX EMBOSSED CARRIER DIMENSIONS



Conditional chart for soldering of SMD products

• Infrared - reflow

• Vapor Phase - reflow





Technical Data: Quartz Crystals

49SMX -CB

QUARTZ CRYSTAL SPECIFICATIONS

Ref No. \_\_\_\_\_

Date \_\_\_\_\_

Page: \_\_\_\_\_

Customer \_\_\_\_\_

Part No. \_\_\_\_\_

Part No. \_\_\_\_\_

Spec. No. \_\_\_\_\_

Dwg. or Spec. No.: \_\_\_\_\_

Rev. \_\_\_\_\_

ELECTRICAL

1.0 Operating Temperature Range \_\_\_\_\_ °C to \_\_\_\_\_ °C

2.0 Frequency Temperature Stability = ± \_\_\_\_\_ % over \_\_\_\_\_ °C to \_\_\_\_\_ °C.

3.0 Specifications at 25°C ± 2°C:

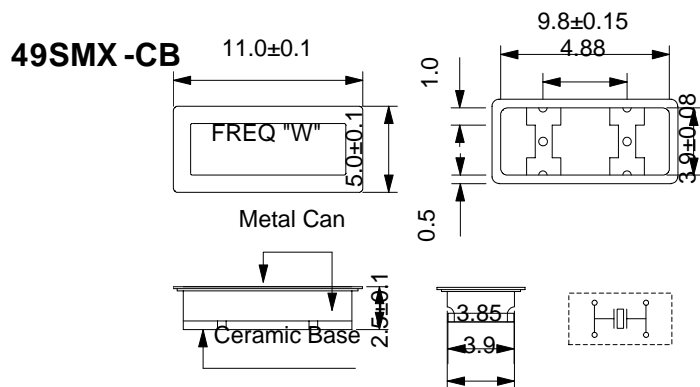
	Value	Units
3.1 Frequency		MHz
3.2 Frequency Calibration Tolerance		± %
3.3 Pullability		
3.4 Load Capacitance		pF
3.5 Effective Series Resistance		Ohms, Max.
3.6 Drive level-correlation/operating		mW
3.7 Shunt Capacitance		pF, Max.
3.8 Oscillation Mode		
3.9 Aging Rate		ppm/yr
3.10 Test Circuit	Saunders 150C	

MECHANICAL

4.0 Holder Type: 49SMX-CB

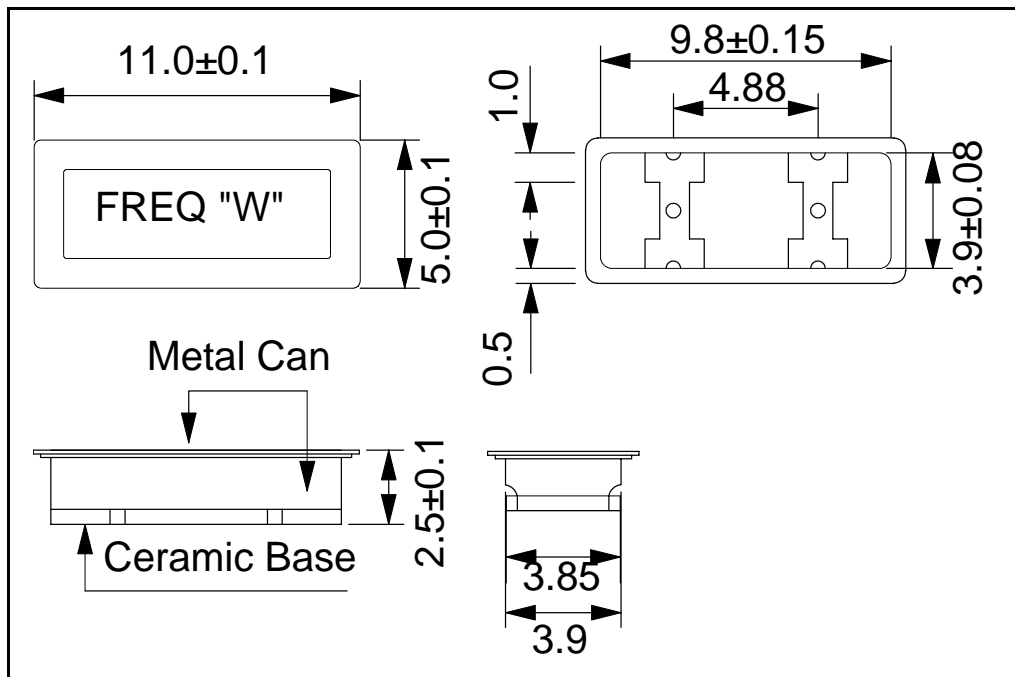
4.1 Marking: One line on top.

OTHER SPECS

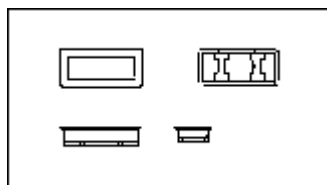




49SMX -CB



Enlarged View



Actual Size Shown Above 1=1



**49SMX-CB Family (Surface Mount Device)**

**49SMX -CB Family**

**STANDARD SPECIFICATIONS**

NOTES

- |                          |  |
|--------------------------|--|
| 1. Holder type           | 49SMX-CB                                       |
| 2. Frequency             | 3.276800 MHz TO 75.000000 MHz                  |
| 3. Calibration tolerance | ±50 ppm (±0.005%) at + 25°C                    |
| 4. Temperature           | ±50 ppm (±0.005%) over -20°C to +70°C (AT-Cut) |
| stability tolerance      | ±100 ppm (±0.01%) over -10°C to +60°C (BT-Cut) |
| 5. Shunt capacitance     | 7 pF max.                                      |
| 6. Drive Level           | 0.5 mW max.                                    |
| 7. Cut                   | AT-Cut & BT-Cut                                |
| 8. Marking               | WTL Part No., Frequency, Date Code.            |

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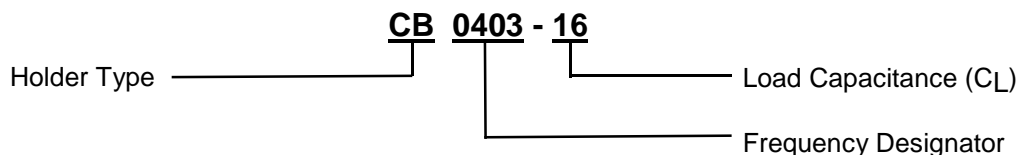
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**PART NUMBERING GUIDE**



**EXAMPLE**

CIRCUIT CALIBRATION CONDITION	FREQUENCY	PART NO.
Parallel Resonance=M C <sub>L</sub> =16pF	4.032000 MHz	CB0403-16
Series Resonance=S	4.032000 MHz	CBS0403

**HOW TO ORDER STANDARD WTL CRYSTALS**

Order by WTL Part No.



49SMX-CB Standard Frequencies

49SMX -CB Family

FREQUENCY MHZ	FREQUENCY DESIGNATOR	MAXIMUM EQUIVALENT SERIES RESISTANCE OHMS
3.276800	032	200
3.579545	035	200
3.600000	036	200
3.634195	0363	200
3.686400	0368	200
3.840000	038	200
4.000000	040	150
4.032000	0403	150
4.096000	0409	150
4.433619	044	150
4.608000	046	150
4.915200	049	150
5.120000	051	120
5.990400	059	120
6.000000	060	100
6.144000	061	100
6.553600	0655	100
7.159090	071	80
7.372800	073	80
7.864320	078	80
8.000000	080	80
8.867238	088	80
9.830400	098	60
10.000000	100	60
10.240000	1024	60
11.059200	1105	60
12.000000	120	60

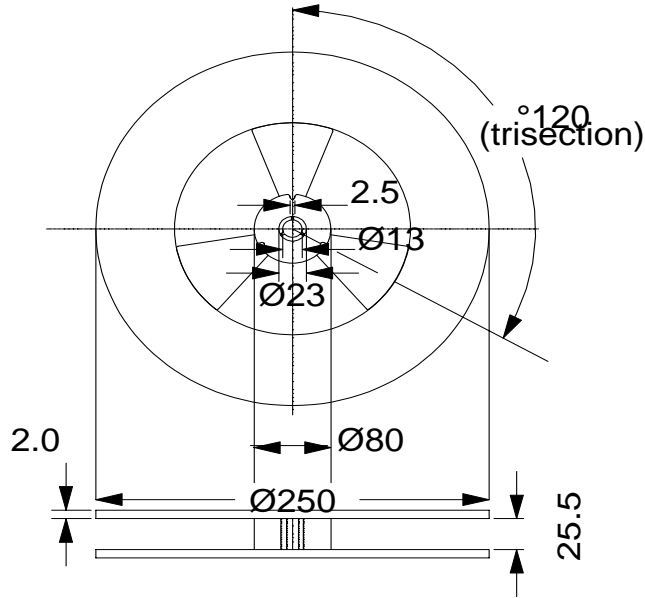
FREQUENCY MHZ	FREQUENCY DESIGNATOR	MAXIMUM EQUIVALENT SERIES RESISTANCE OHMS
12.288000	122	60
14.318180	143	50
14.400000	144	50
14.745600	147	50
15.000000	150	50
16.000000	160	50
16.147200	161	50
16.384000	163	50
18.432000	184	50
19.660800	196	50
20.000000	200	40
20.800000	208	40
24.000000	240	40
24.576000	245	40
29.491200	274	40*
30.000000	300	40*
31.350000	313	40*
32.424000	3242	40*
36.000000	360	40*
40.000000	400	40*
48.000000	480	100 3OT
50.000000	500	100 3OT
57.600000	576	100 3OT
60.000000	600	100 3OT
70.000000	700	100 3OT
75.000000	750	100 3OT

\* Fundamental BT-Cut

**Note: Special frequencies and specifications are available upon request.**

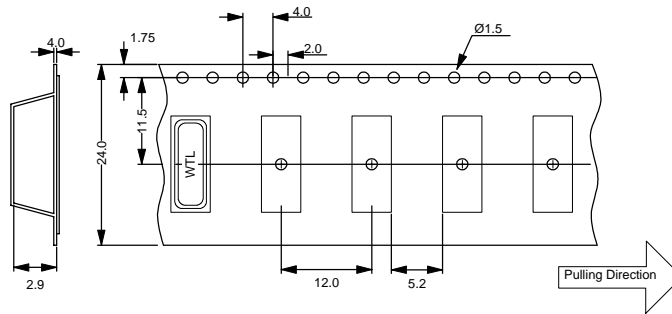


### 49SMX-CB REEL DIMENSIONS



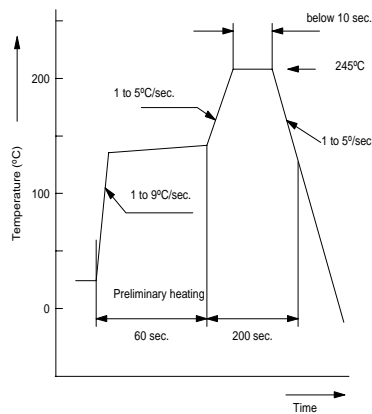
Material: Cardboard Parts Quantity per Reel: 1000

### 49SMX-CB EMBOSSED CARRIER

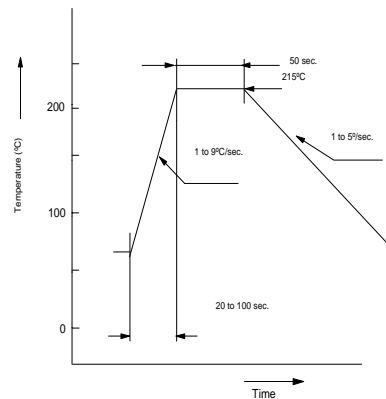


### Conditional chart for soldering of SMD products

#### • Infrared - reflow



#### • Vapor Phase - reflow



**- TIGHT TOLERANCE 9.5 - 200 MHz -** Technical Data: Quartz Crystals **93SMX**

**QUARTZ CRYSTAL SPECIFICATIONS**

Ref No. \_\_\_\_\_  
 Date \_\_\_\_\_  
 Page: \_\_\_\_\_ of \_\_\_\_\_

Customer \_\_\_\_\_  
 Part No. \_\_\_\_\_ Part No. \_\_\_\_\_  
 Spec. No. \_\_\_\_\_ Dwg. or Spec. No.: \_\_\_\_\_ Rev. \_\_\_\_\_

**ELECTRICAL**

- 1.0 Operating Temperature Range \_\_\_\_\_ °C to \_\_\_\_\_ °C
- 2.0 Frequency Temperature Stability = ± \_\_\_\_\_ % over \_\_\_\_\_ °C to \_\_\_\_\_ °C.

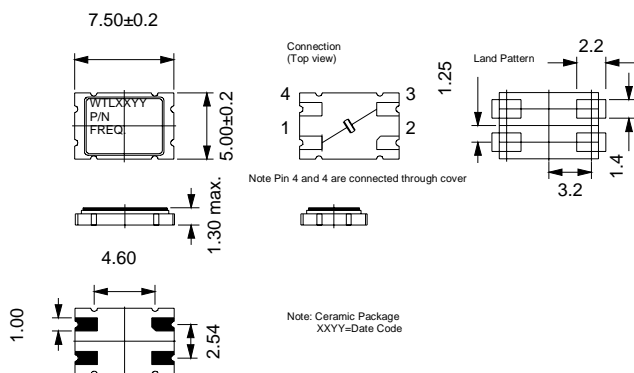
3.0 Specifications at 25°C ± 2°C:	Value	Units
3.1 Frequency		MHz
3.2 Frequency Calibration Tolerance		± %
3.3 Pullability		
3.4 Load Capacitance		pF
3.5 Effective Series Resistance		Ohms, Max.
3.6 Drive level-correlation/operating		mW
3.7 Shunt Capacitance		pF, Max.
3.8 Oscillation Mode		
3.9 Aging Rate		ppm/yr
3.10 Test Circuit	Saunders 150C	

**MECHANICAL**

- 4.0 Holder Type: 93SMX
- 4.1 Marking: 3 lines on top.

**OTHER SPECS**

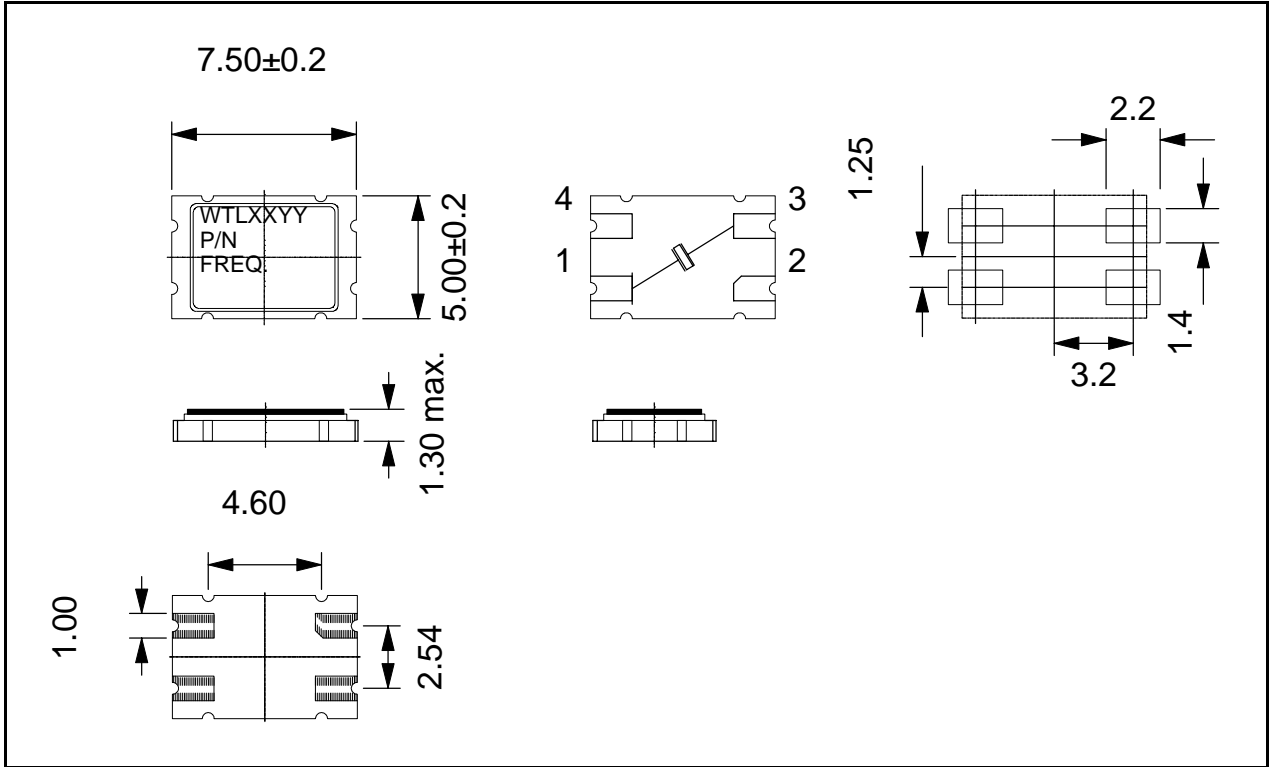
**93SMX**



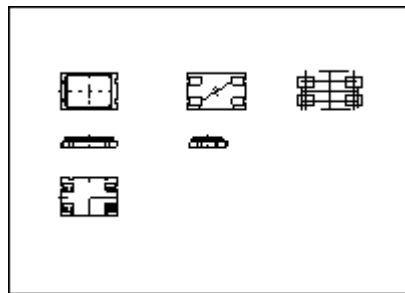


**- TIGHT TOLERANCE 9.5 - 200 MHz -**

**93SMX**



Enlarged View

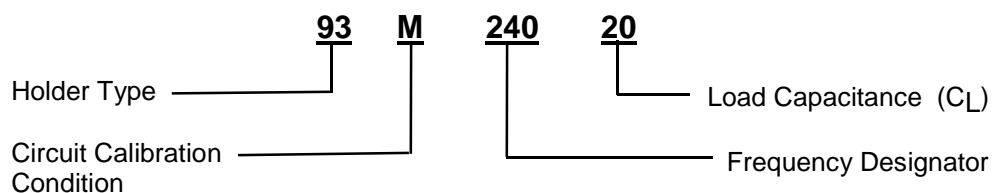


Actual Size Shown Above 1=1

**93SMX Family (Surface Mount Device) - TIGHT TOLERANCE - 93SMX**

<b>STANDARD SPECIFICATIONS</b>		<b>NOTES</b>
1. Holder type	93SMX	
2. Frequency	10.000000MHz to 200.000000 MHz	
3. Calibration tolerance	±10 ppm (±0.001%) at + 25°C	
4. Temperature stability tolerance	±5 ppm (±0.0005%) over -30°C to +85°C	
5. Shunt capacitance (C <sub>0</sub> )	7 pF max.	
6. Drive Level (P)	50 uW max.	
7. Cut	AT-Cut	
8. Reflow soldering condition	10 seconds max. at +260°C	
9. Marking	WTL Part No., Frequency, Date Code.	

**PART NUMBERING GUIDE**



**EXAMPLE**

CIRCUIT CALIBRATION CONDITION	FREQUENCY	PART NO.
Parallel Resonance=M C <sub>L</sub> =20pF	24.000000 MHz	93M240-20
Series Resonance=S	24.000000 MHz	93S240



93SMX Standard Frequencies

- TIGHT TOLERANCE -

93SMX

FREQUENCY MHZ	FREQUENCY DESIGNATOR	MAXIMUM EQUIVALENT SERIES RESISTANCE OHMS
9.500000	095	60
10.000000	100	60
10.004600	10004	60
10.005000	10005	60
10.254000	10245	60
10.702800	10702	60
10.730000	1073	60
10.990000	1099	60
11.000000	110	50
11.059200	1105	50
11.981350	119	50
12.000000	120	50
12.288000	122	50
12.352000	123	50
12.800000	128	50
13.107200	131	50
13.500000	135	50
13.990000	139	50
14.000000	140	40
14.318180	143	40
14.745600	147	40
15.000000	150	40
15.135400	151	40
15.360000	153	40
15.435000	154	40
15.990000	159	40
16.000000	160	30
16.384000	163	30
16.633300	1663	30
17.734475	177	30
19.636200	1963	30
19.660800	196	30
20.000000	200	30
20.945000	209	30
21.480000	214	30
21.855000	218	30
22.000000	220	30
22.068960	2206	30
22.118400	221	30
22.248000	222	30
22.500000	225	30
24.000000	240	30

FREQUENCY MHZ	FREQUENCY DESIGNATOR	MAXIMUM EQUIVALENT SERIES RESISTANCE OHMS
24.000140	240001	30
25.000000	250	30
26.150000	261	30
26.995000	269	30
27.010000	2701	30
27.055000	2705	30
29.345000	293	30
29.500000	295	30
30.000000	300	30
30.865000	308	30
32.000000	320	30
32.424000	3242	30
32.785200	327	30
36.000000	360	30
37.000000	370	30
38.400000	384	30
40.000000	400	30
40.210000	402	30
40.500000	405	30
45.158400	451	80 3OT
49.431700	494	80 3OT
50.348330	503	50 3OT
52.372000	523	50 3OT
54.295000	542	50 3OT
54.466400	544	50 3OT
57.600000	576	50 3OT
57.741600	5774	50 3OT
57.767000	5776	50 3OT
66.662500	666	50 3OT
69.487500	691	50 3OT
70.400000	704	50 3OT
80.000000	800	50 3OT
81.920000	819	50 3OT
90.000000	900	100 5OT
92.940500	929	100 5OT
100.000000	1000	100 5OT
110.000000	1100	100 5OT
120.000000	1200	100 5OT
150.000000	1500	100 5OT
151.000000	1510	100 5OT
200.000000	2000	100 5OT

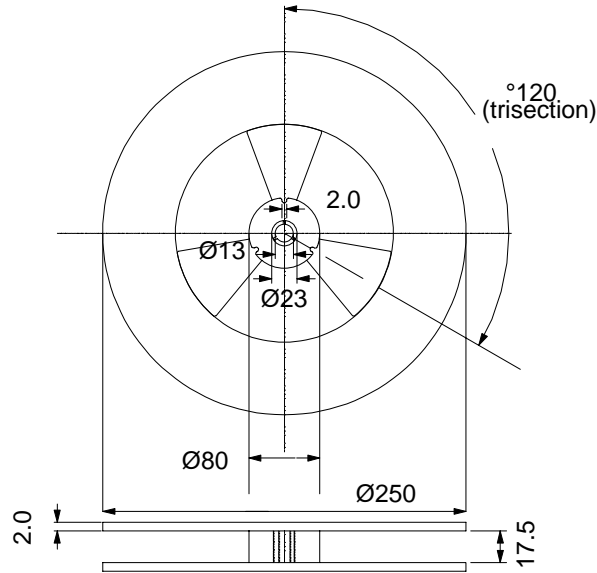
**Note: Special frequencies and specifications are available upon request.**



93SMX DIMENSIONS

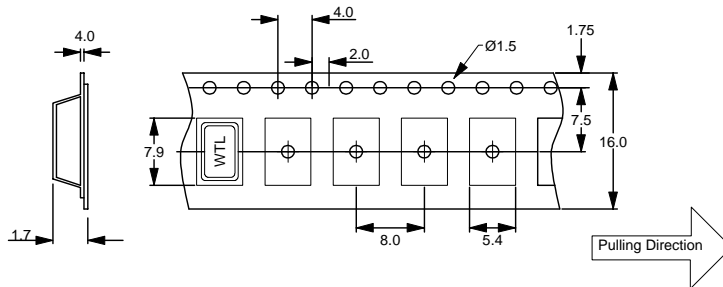
93SMX REEL DIMENSIONS

93SMX



Material: Cardboard

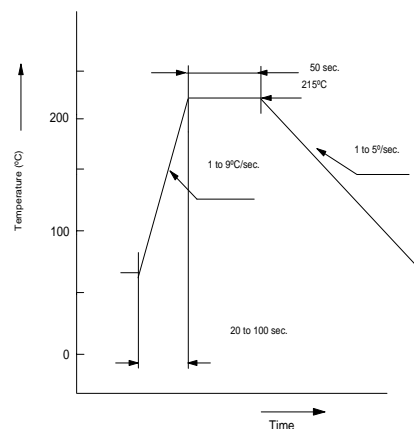
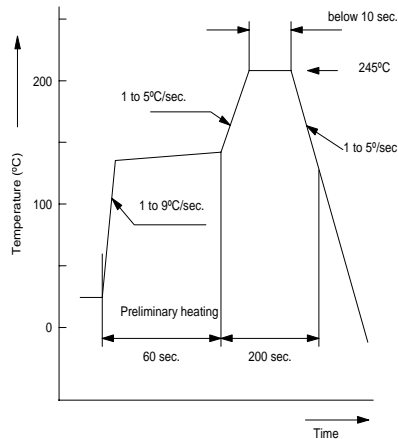
93SMX EMBOSSED CARRIER DIMENSIONS



Conditional chart for soldering of SMD products

● Infrared - reflow

● Vapor Phase - reflow



**- TIGHT TOLERANCE 10 - 200 MHz -**

**94SMX**

**QUARTZ CRYSTAL SPECIFICATIONS**

Ref No. \_\_\_\_\_

Date \_\_\_\_\_

Page: \_\_\_\_\_ of \_\_\_\_\_

Customer \_\_\_\_\_

Part No. \_\_\_\_\_

Part No. \_\_\_\_\_

Spec. No. \_\_\_\_\_

Dwg. or Spec. No.: \_\_\_\_\_

Rev. \_\_\_\_\_

**ELECTRICAL**

1.0 Operating Temperature Range \_\_\_\_\_°C to \_\_\_\_\_°C

2.0 Frequency Temperature Stability = ± \_\_\_\_\_% over \_\_\_\_\_°C to \_\_\_\_\_°C.

3.0 Specifications at 25°C ± 2°C:

	Value	Units
3.1 Frequency		MHz
3.2 Frequency Calibration Tolerance		± %
3.3 Pullability		
3.4 Load Capacitance		pF
3.5 Effective Series Resistance		Ohms, Max.
3.6 Drive level-correlation/operating		mW
3.7 Shunt Capacitance		pF, Max.
3.8 Oscillation Mode		
3.9 Aging Rate		ppm/yr
3.10 Test Circuit	Saunders 150C	

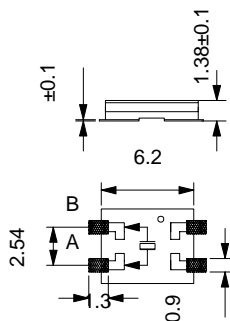
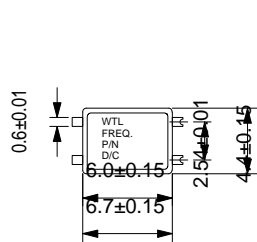
**MECHANICAL**

4.0 Holder Type: 94SMX

4.1 Marking: 4 lines on top.

**OTHER SPECS**

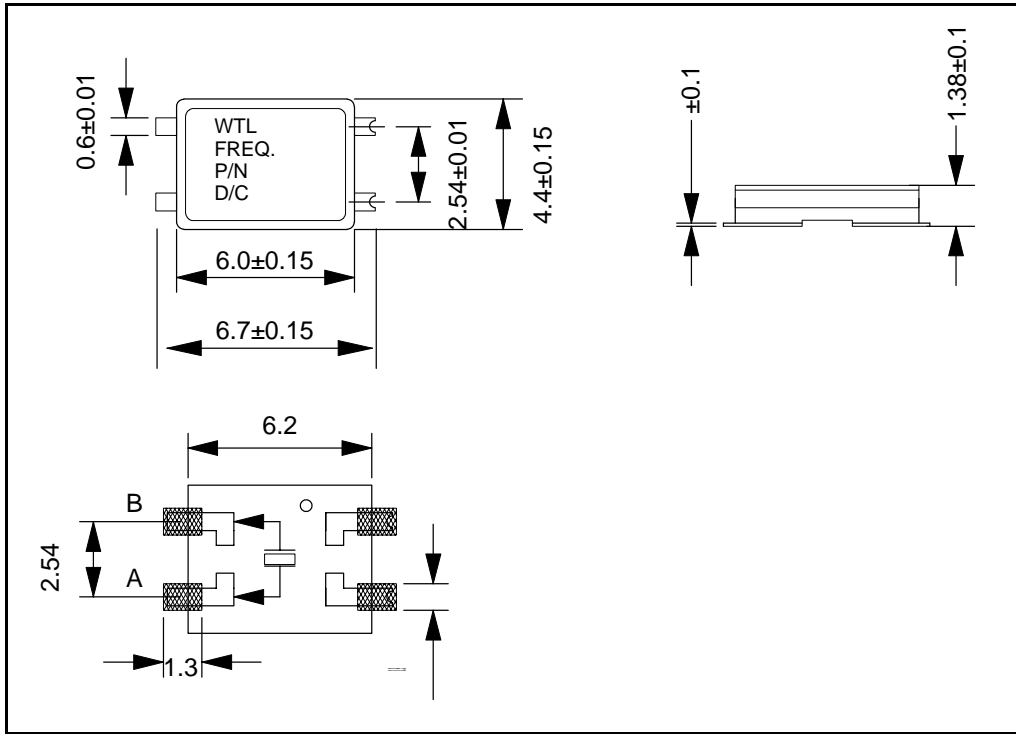
**94SMX**



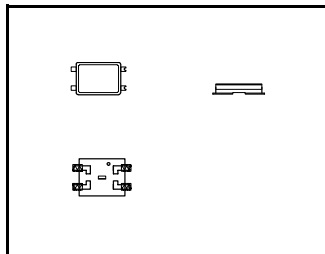
Note: Shaded areas are the Land Pattern.



**- TIGHT TOLERANCE 10 - 200 MHz - 94SMX**



Enlarged View



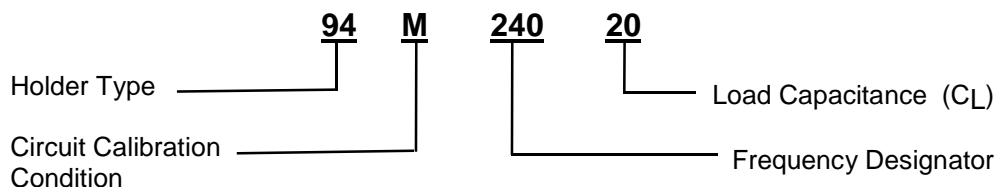
Actual Size Shown Above 1=1

**STANDARD SPECIFICATIONS**

NOTES

- |  |                                       |  |
|--|---------------------------------------|--|
| 1. Holder type                         | 94SMX                                 |  |
| 2. Frequency                           | 10.000000MHz to 200.000000 MHz        |  |
| 3. Calibration tolerance               | ±10 ppm (±0.001%) at + 25°C           |  |
| 4. Temperature stability tolerance     | ±4 ppm (±0.0004%) over -20°C to +70°C |  |
| 5. Shunt capacitance (C <sub>0</sub> ) | 7 pF max.                             |  |
| 6. Drive Level (P)                     | 0.5 mW max.                           |  |
| 7. Cut                                 | AT-Cut                                |  |
| 8. Reflow soldering condition          | 10 seconds max. at +260°C             |  |
| 9. Marking                             | WTL Part No., Frequency, Date Code.   |  |

**PART NUMBERING GUIDE**



**EXAMPLE**

CIRCUIT CALIBRATION CONDITION	FREQUENCY	PART NO.
Parallel Resonance=M C <sub>L</sub> =20pF	24.000000 MHz	94M240-20
Series Resonance=S	24.000000 MHz	94S240



94SMX Standard Frequencies

- TIGHT TOLERANCE -

94SMX

FREQUENCY MHZ	FREQUENCY DESIGNATOR	MAXIMUM EQUIVALENT SERIES RESISTANCE OHMS
10.000000	100	30
10.004600	10004	30
10.005000	10005	30
10.254000	10245	30
10.702800	10702	30
10.730000	1073	30
11.059200	1105	30
11.981350	119	30
12.000000	120	30
12.288000	122	30
12.352000	123	30
12.800000	128	30
13.107200	131	30
13.500000	135	30
14.318180	143	30
14.745600	147	30
15.000000	150	30
15.135400	151	30
15.360000	153	30
15.435000	154	30
16.000000	160	30
16.384000	163	30
16.633300	1663	30
17.734475	177	30
19.636200	1963	30
19.660800	196	30
20.000000	200	30
20.945000	209	30
21.480000	214	30
21.855000	218	30
22.000000	220	30
22.068960	2206	30
22.118400	221	30
22.248000	222	30
22.500000	225	30
24.000000	240	30
24.000140	240001	30
25.000000	250	30

FREQUENCY MHZ	FREQUENCY DESIGNATOR	MAXIMUM EQUIVALENT SERIES RESISTANCE OHMS
26.150000	261	30
26.995000	269	30
27.010000	2701	30
27.055000	2705	30
29.345000	293	30
29.500000	295	30
30.000000	300	30
30.865000	308	30
32.000000	320	30
32.424000	3242	30
32.785200	327	30
36.000000	360	30
37.000000	370	30
38.400000	384	30
40.000000	400	30
40.210000	402	30
45.158400	451	50 3OT
49.431700	494	50 3OT
50.348330	503	50 3OT
52.372000	523	50 3OT
54.295000	542	50 3OT
54.466400	544	50 3OT
57.600000	576	50 3OT
57.741600	5774	50 3OT
57.767000	5776	50 3OT
66.662500	666	50 3OT
69.487500	691	50 3OT
70.400000	704	50 3OT
80.000000	800	50 3OT
81.920000	819	50 3OT
92.940500	929	50 3OT
100.000000	1000	50 3OT
110.000000	1100	50 3OT
120.000000	1200	50 3OT
150.000000	1500	50 3OT
151.000000	1510	90 5OT
200.000000	2000	90 5OT

**Note: Special frequencies and specifications are available upon request.**





**- TIGHT TOLERANCE 10 - 100 MHz -**

Technical Data: Quartz Crystals

**95SMX**

**QUARTZ CRYSTAL SPECIFICATIONS**

Ref No. \_\_\_\_\_

Date \_\_\_\_\_

Page: \_\_\_\_\_ of \_\_\_\_\_

Customer \_\_\_\_\_

Part No. \_\_\_\_\_

Part No. \_\_\_\_\_

Spec. No. \_\_\_\_\_

Dwg. or Spec. No.: \_\_\_\_\_

Rev. \_\_\_\_\_

**ELECTRICAL**

1.0 Operating Temperature Range \_\_\_\_\_ °C to \_\_\_\_\_ °C

2.0 Frequency Temperature Stability = ± \_\_\_\_\_ % over \_\_\_\_\_ °C to \_\_\_\_\_ °C.

3.0 Specifications at 25°C ± 2°C:

	Value	Units
3.1 Frequency		MHz
3.2 Frequency Calibration Tolerance		± %
3.3 Pullability		
3.4 Load Capacitance		pF
3.5 Effective Series Resistance		Ohms, Max.
3.6 Drive level-correlation/operating		mW
3.7 Shunt Capacitance		pF, Max.
3.8 Oscillation Mode		
3.9 Aging Rate		ppm/yr
3.10 Test Circuit	Saunders 150C	

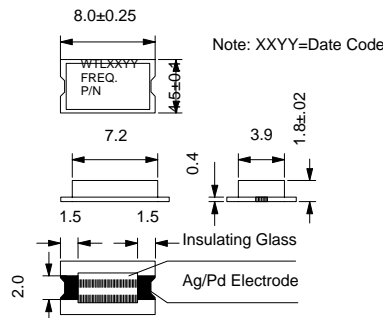
**MECHANICAL**

4.0 Holder Type: 95SMX

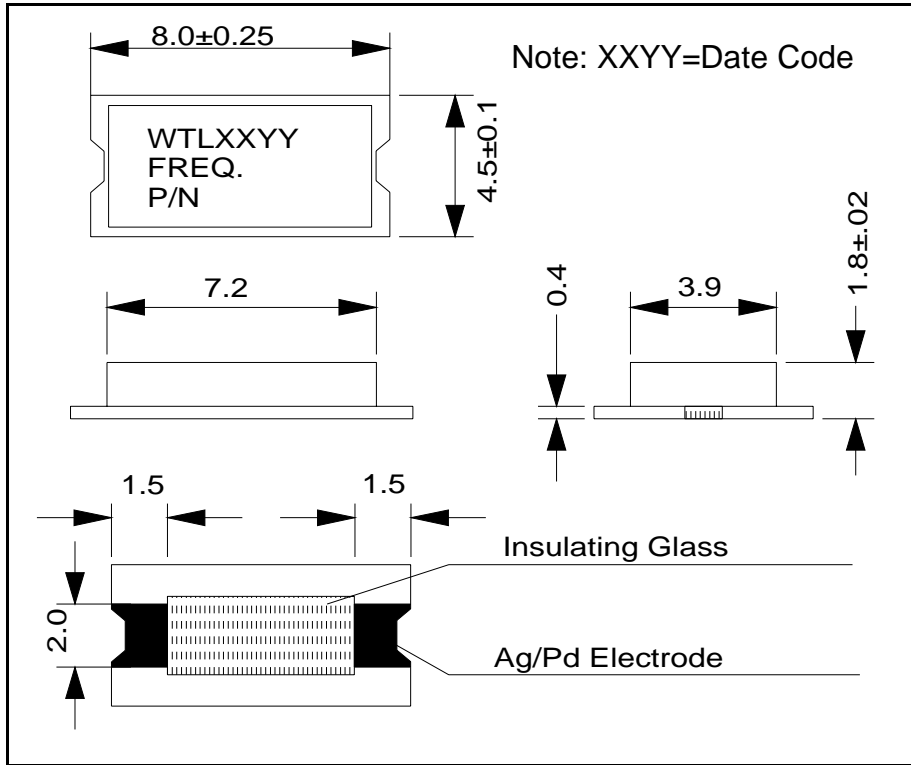
4.1 Marking: 3 lines on top.

**OTHER SPECS**

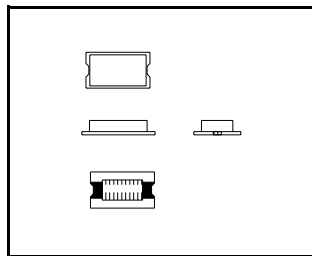
**95SMX**



**- TIGHT TOLERANCE 10 - 150 MHz - 95SMX**



Enlarged View



Actual Size Shown Above 1=1



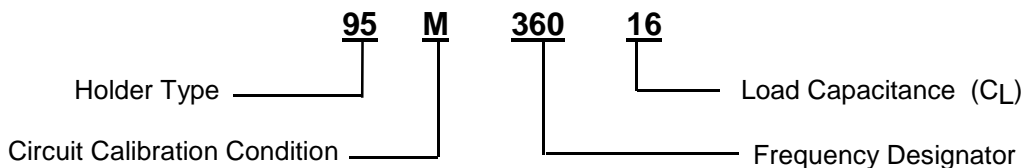
**95SMX Family (Surface Mount Device)**

**95SMX**

**STANDARD SPECIFICATIONS**

NOTES

1. Holder type	95SMX
2. Frequency	10.000000MHz to 100.000000 MHz
3. Mode of Oscillation	10.0 to 39.99MHz/Fundamental 40.0 to 90.00MHz/3rd Overtone 91.0 to 100.00MHz/5th Overtone
4. Frequency Tolerance	±10ppm (±0.001%) at +25°C
5. Temperature stability tolerance	±5 ppm to ±10ppm, -10°C to +70°C
6. Shunt capacitance (C <sub>0</sub> )	7 pF max.
7. Drive Level (P)	0.5 mW max.
8. Cut	AT-Cut
9. Reflow soldering condition	10 seconds max at +260°C
10. Marking	WTL Part No., Frequency, Date Code.



**EXAMPLE**

CIRCUIT CALIBRATION CONDITION	FREQUENCY	PART NO.
Parallel Resonance=M C <sub>L</sub> =16pF	100.000000 MHz	95M360-16
Series Resonance=S	100.000000 MHz	95S360



95SMX Standard Frequencies

- TIGHT TOLERANCE -

95SMX

FREQUENCY MHZ	FREQUENCY DESIGNATOR	MAXIMUM EQUIVALENT SERIES RESISTANCE OHMS	FREQUENCY MHZ	FREQUENCY DESIGNATOR	MAXIMUM EQUIVALENT SERIES RESISTANCE OHMS
10.000000	100	50	26.150000	261	30
10.004600	10004	50	26.995000	269	30
10.005000	10005	50	27.010000	2701	30
10.254000	10245	50	27.055000	2705	30
10.702800	10702	50	29.345000	293	30
10.730000	1073	50	29.500000	295	30
11.059200	1105	50	30.000000	300	30
11.981350	119	50	30.865000	308	30
12.000000	120	50	32.000000	320	30
12.288000	122	50	32.424000	3242	30
12.352000	123	50	32.785200	327	30
12.800000	128	50	36.000000	360	30
13.107200	131	50	37.000000	370	30
13.500000	135	50	38.400000	384	30
13.900000	139	50	39.990000	399	30
14.000000	140	40	40.000000	400	60 3OT
14.318180	143	40	40.210000	402	60 3OT
14.745600	147	40	45.158400	451	60 3OT
15.000000	150	40	49.431700	494	60 3OT
15.135400	151	40	49.990000	499	60 3OT
15.360000	153	40	50.348330	503	60 3OT
15.435000	154	40	52.372000	523	60 3OT
15.990000	159	40	54.295000	542	60 3OT
16.000000	160	30	54.466400	544	60 3OT
16.384000	163	30	57.600000	576	60 3OT
16.633300	1663	30	57.741600	5774	60 3OT
17.734475	177	30	57.767000	5776	60 3OT
19.636200	1963	30	66.662500	666	60 3OT
19.660800	196	30	69.487500	694	60 3OT
20.000000	200	30	70.400000	704	60 3OT
20.945000	209	30	80.000000	800	60 3OT
21.480000	214	30	81.920000	819	100 3OT
21.855000	218	30	89.000000	890	100 3OT
22.000000	220	30	90.000000	900	100 3OT
22.068960	2206	30	91.000000	910	100 5OT
22.118400	221	30	92.940500	929	100 5OT
22.248000	222	30	100.000000	1000	100 5OT
22.500000	225	30			
24.000000	240	30			
24.000140	240001	30			
25.000000	250	30			

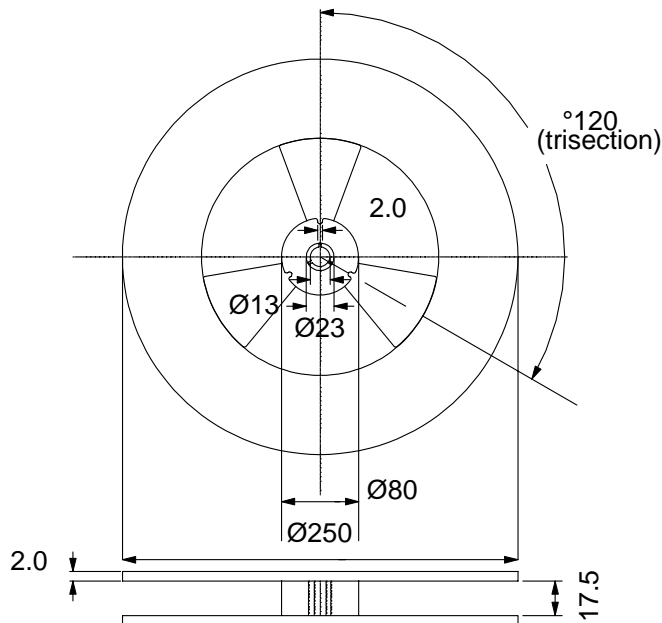
**Note: Special frequencies and specifications are available upon request.**



95SMX DIMENSIONS

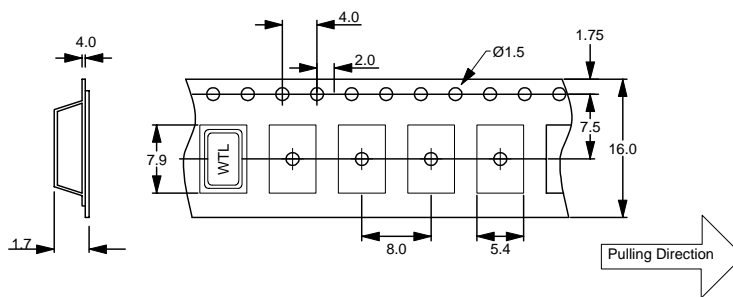
95SMX REEL DIMENSIONS

95SMX



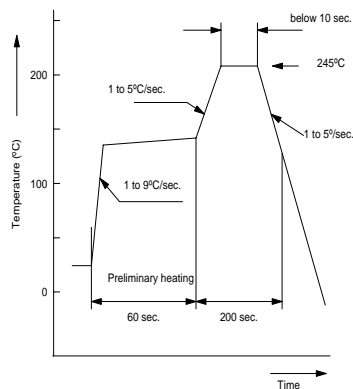
Material: Cardboard

95SMX EMBOSSED CARRIER DIMENSIONS

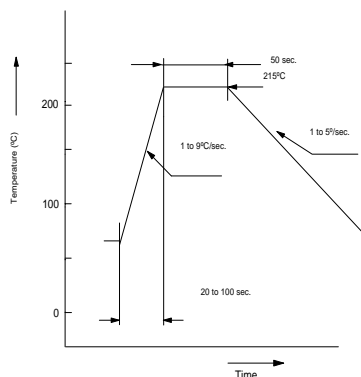


Conditional chart for soldering of SMD products

• Infrared - reflow



• Vapor Phase - reflow



**- TIGHT TOLERANCE 10 - 200 MHz -**

Technical Data: Quartz Crystals

**96SMX**

**QUARTZ CRYSTAL SPECIFICATIONS**

Ref No. \_\_\_\_\_  
 Date \_\_\_\_\_  
 Page: \_\_\_\_\_ of \_\_\_\_\_

Customer \_\_\_\_\_  
 Part No. \_\_\_\_\_ Part No. \_\_\_\_\_  
 Spec. No. \_\_\_\_\_ Dwg. or Spec. No.: \_\_\_\_\_ Rev. \_\_\_\_\_

**ELECTRICAL**

- 1.0 Operating Temperature Range \_\_\_\_\_°C to \_\_\_\_\_°C
- 2.0 Frequency Temperature Stability = ± \_\_\_\_\_% over \_\_\_\_\_°C to \_\_\_\_\_°C.

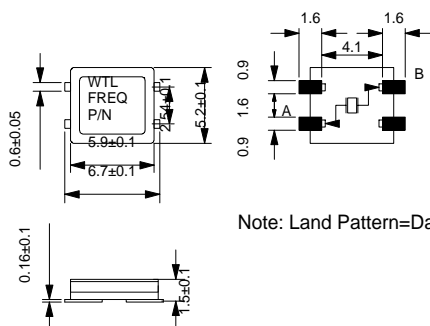
3.0 Specifications at 25°C ± 2°C:	Value	Units
3.1 Frequency		MHz
3.2 Frequency Calibration Tolerance		± %
3.3 Pullability		
3.4 Load Capacitance		pF
3.5 Effective Series Resistance		Ohms, Max.
3.6 Drive level-correlation/operating		mW
3.7 Shunt Capacitance		pF, Max.
3.8 Oscillation Mode		
3.9 Aging Rate		ppm/yr
3.10 Test Circuit	Saunders 150C	

**MECHANICAL**

- 4.0 Holder Type: 96SMX
- 4.1 Marking: 3 lines on top.

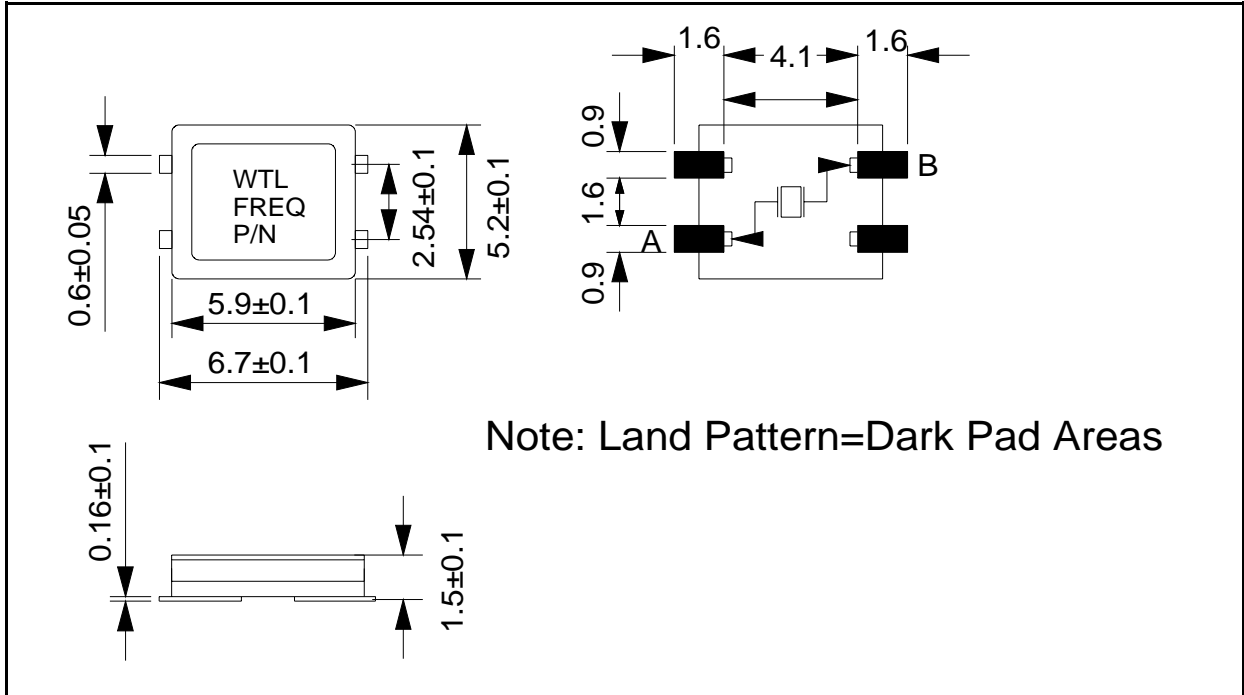
**OTHER SPECS**

**96SMX**

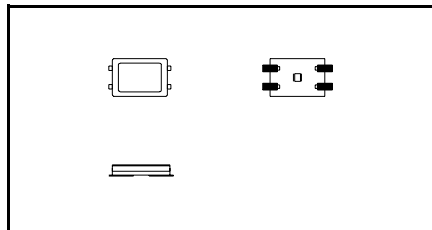


Note: Land Pattern=Dark Pad Areas

**- TIGHT TOLERANCE 10 - 200 MHz - 96SMX**



Enlarged View



Actual Size Shown Above 1=1

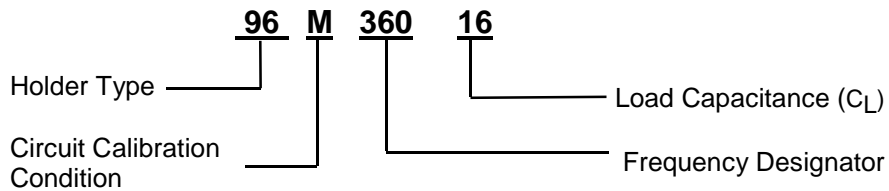


**STANDARD SPECIFICATIONS**

NOTES

1. Holder type	96SMX
2. Frequency	10.000000 MHz to 200.000000 MHz
3. Calibration tolerance	±10 ppm (±0.001%) at + 25°C
4. Temperature stability tolerance	±4 ppm (±0.0004%)
5. Shunt capacitance	7 pF max.
6. Drive Level	0.5 mW max.
7. Cut	AT-Cut
8. Reflow soldering condition	10 seconds max. at +260°C
9. Marking	WTL Part No., Frequency, Date Code.


**PART NUMBERING GUIDE**



**EXAMPLE**

CIRCUIT CALIBRATION CONDITION	FREQUENCY	PART NO.
Parallel Resonance=M C <sub>L</sub> =16pF	36.000000 MHz	96M360-16
Series Resonance=S	36.000000 MHz	96S360

96SMX Standard Frequencies

**- TIGHT TOLERANCE -**

96SMX

FREQUENCY KHZ	FREQUENCY DESIGNATOR	MAXIMUM EQUIVALENT SERIES RESISTANCE OHMS	FREQUENCY MHZ	FREQUENCY DESIGNATOR	MAXIMUM EQUIVALENT SERIES RESISTANCE OHMS
1.000000	010	5000 SL-CUT	20.000000	200	30
1.008000	01008	5000 SL-CUT	20.945000	209	30
1.048576	0104	5000 SL-CUT	21.480000	214	30
1.080000	0108	5000 SL-CUT	21.855000	218	30
1.200000	012	5000 SL-CUT	22.000000	220	30
3.579545	035	200	22.068960	2206	30
4.000000	040	180	22.118400	221	30
4.406250	04406	180	22.248000	222	30
5.000000	050	150	22.500000	225	30
5.003000	05003	150	24.000000	240	30
5.120000	0512	150	24.000140	240001	30
5.997000	059	150	25.000000	250	30
6.000000	060	120	26.150000	261	60 3OT
6.003000	06003	120	26.995000	269	60 3OT
6.144000	061	120	27.010000	2701	60 3OT
6.400000	064	120	27.055000	2705	60 3OT
6.553600	0655	120	29.345000	293	60 3OT
8.000000	080	80	29.500000	295	60 3OT
8.192000	081	80	30.000000	300	60 3OT
9.216000	092	60	30.865000	308	60 3OT
9.600000	096	60	32.000000	320	60 3OT
9.827500	0982	60	32.424000	3242	60 3OT
10.000000	100	60	32.785200	327	60 3OT
10.004600	10004	60	36.000000	360	60 3OT
10.005000	10005	60	37.000000	370	60 3OT
10.254000	10245	60	38.400000	384	60 3OT
10.702800	10702	60	40.000000	400	60 3OT
10.730000	1073	60	40.210000	402	60 3OT
11.059200	1105	60	45.158400	451	60 3OT
11.981350	119	60	49.431700	494	60 3OT
12.000000	120	60	50.348330	503	60 3OT
12.288000	122	60	52.372000	523	60 3OT
12.352000	123	60	54.295000	542	60 3OT
12.800000	128	60	54.466400	544	60 3OT
13.107200	131	30	57.600000	576	60 3OT
13.500000	135	30	57.741600	5774	60 3OT
14.318180	143	30	57.767000	5776	60 3OT
14.745600	147	30	66.662500	666	60 3OT
15.000000	150	30	69.487500	691	60 3OT
15.135400	151	30	70.400000	704	60 3OT
15.360000	153	30	80.000000	800	60 3OT
15.435000	154	30	81.920000	819	60 3OT
16.000000	160	30	92.940500	929	60 3OT
16.384000	163	30	100.000000	1000	60 3OT
16.633300	1663	30	110.000000	1100	60 3OT
17.734475	177	30	120.000000	1200	60 3OT
17.636200	1963	30	200.000000	2000	60 3OT
19.660800	196	30			

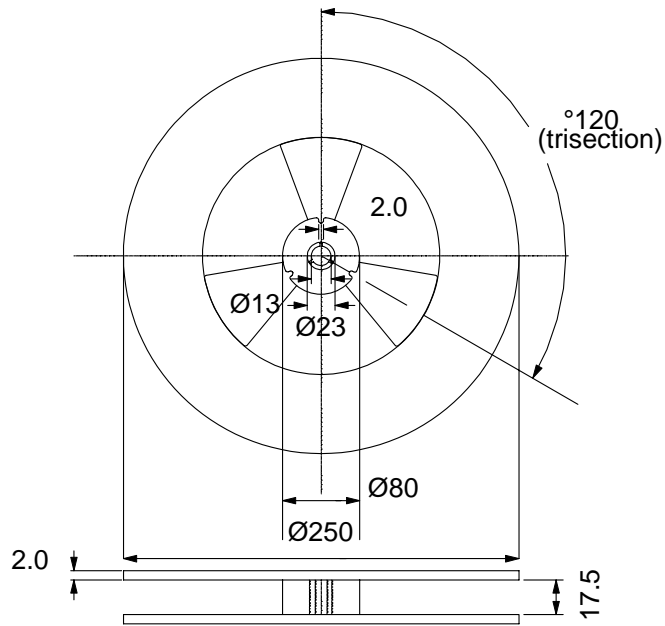
**Note: Special frequencies and specifications are available upon request.**



96SMX DIMENSIONS

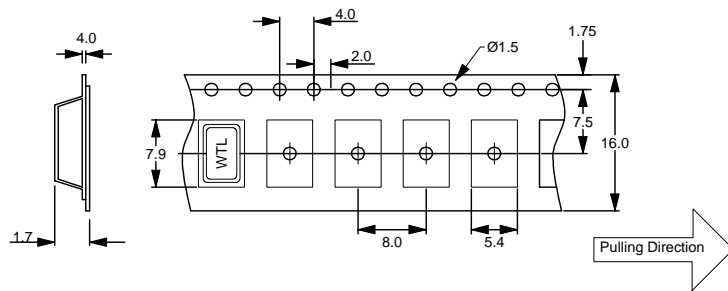
96SMX REEL DIMENSIONS

96SMX



Material: Cardboard

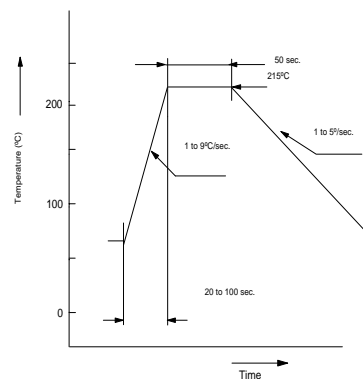
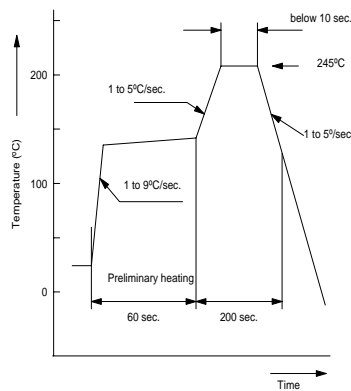
96SMX EMBOSSED CARRIER DIMENSIONS



Conditional chart for soldering of SMD products

• Infrared - reflow

• Vapor Phase - reflow



**- TIGHT TOLERANCE 10 - 250 MHz -**

Technical Data: Quartz Crystals

**97SMX**

**QUARTZ CRYSTAL SPECIFICATIONS**

Ref No. \_\_\_\_\_

Date \_\_\_\_\_

Page: \_\_\_\_\_

Customer \_\_\_\_\_

Part No. \_\_\_\_\_

Part No. \_\_\_\_\_

Spec. No. \_\_\_\_\_

Dwg. or Spec. No.: \_\_\_\_\_

Rev. \_\_\_\_\_

**ELECTRICAL**

1.0 Operating Temperature Range \_\_\_\_\_ °C to \_\_\_\_\_ °C

2.0 Frequency Temperature Stability = ± \_\_\_\_\_ % over \_\_\_\_\_ °C to \_\_\_\_\_ °C.

3.0 Specifications at 25°C ± 2°C:

	Value	Units
3.1 Frequency		MHz
3.2 Frequency Calibration Tolerance		± %
3.3 Pullability		
3.4 Load Capacitance		pF
3.5 Effective Series Resistance		Ohms, Max.
3.6 Drive level-correlation/operating		mW
3.7 Shunt Capacitance		pF, Max.
3.8 Oscillation Mode		
3.9 Aging Rate		ppm/yr
3.10 Test Circuit	Saunders 150C	

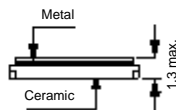
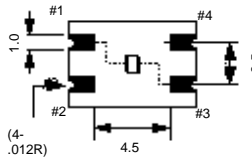
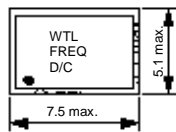
**MECHANICAL**

4.0 Holder Type: 97SMX

4.1 Marking: 3 lines on top.

**OTHER SPECS**

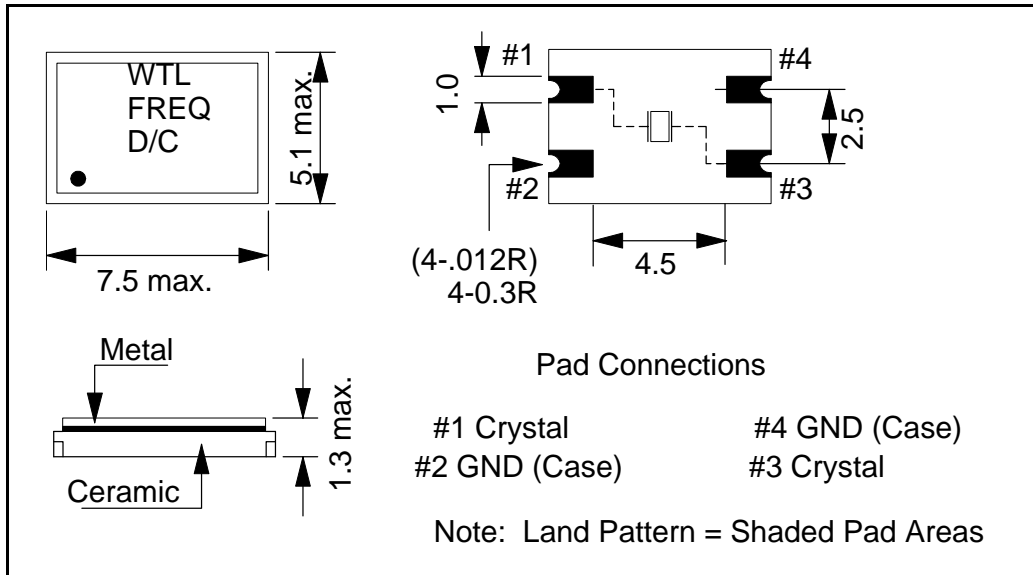
**97SMX**



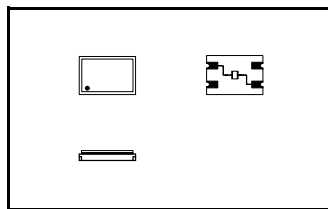
Pad Connections  
 #1 Crystal  
 #2 GND (case)  
 #3 Crystal  
 #4 GND (Case)

NOTE: Land Pattern= Shaded Pad Areas

**- TIGHT TOLERANCE 10 - 250 MHz - 97SMX**



Enlarged View

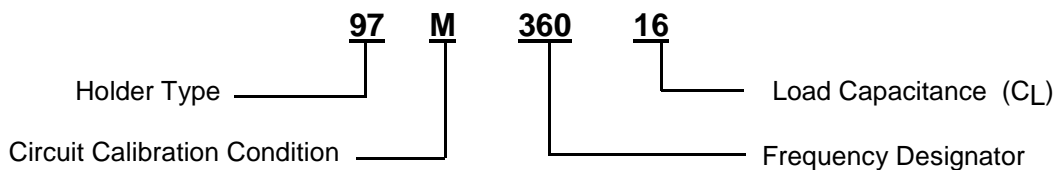


Actual Size Shown Above 1=1

**STANDARD SPECIFICATIONS**

NOTES

1. Holder type	97SMX
2. Frequency	10.000000MHz to 250.000000 MHz
3. Mode of Oscillation	10.0 to 39.99MHz/Fundamental 40.0 to 90.00MHz/3rd Overtone 91.0 to 150.00MHz/5th Overtone 151.0 to 200.00MHz/7th Overtone 201.0 to 250.00MHz/9th Overtone
4. Frequency Tolerance	±10ppm (±0.001%) at +25°C
5. Temperature stability tolerance	±5 ppm to ±10ppm, -10°C to +70°C
6. Shunt capacitance (C <sub>0</sub> )	7 pF max.
7. Drive Level (P)	0.5 mW max.
8. Cut	AT-Cut
9. Reflow soldering condition	10 seconds max at +260°C
10. Marking	WTL Part No., Frequency, Date Code.



**EXAMPLE**

CIRCUIT CALIBRATION CONDITION	FREQUENCY	PART NO.
Parallel Resonance=M C <sub>L</sub> =16pF	36.000000 MHz	97M360-16
Series Resonance=S	36.000000 MHz	97S360



## 97SMX Standard Frequencies

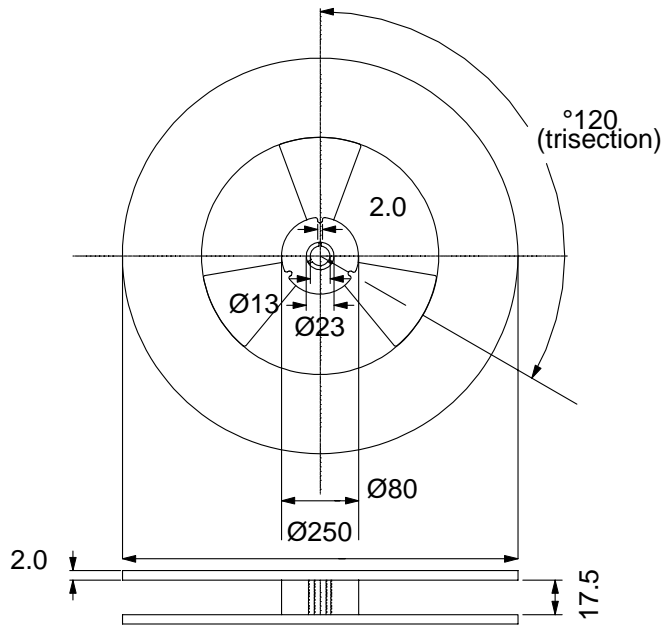
**- TIGHT TOLERANCE -****97SMX**

FREQUENCY MHZ	FREQUENCY DESIGNATOR	MAXIMUM EQUIVALENT SERIES RESISTANCE OHMS	FREQUENCY MHZ	FREQUENCY DESIGNATOR	MAXIMUM EQUIVALENT SERIES RESISTANCE OHMS
10.000000	100	50	26.150000	261	30
10.004600	10004	50	26.995000	269	30
10.005000	10005	50	27.010000	2701	30
10.254000	10245	50	27.055000	2705	30
10.702800	10702	50	29.345000	293	30
10.730000	1073	50	29.500000	295	30
11.059200	1105	50	30.000000	300	30
11.981350	119	50	30.865000	308	30
12.000000	120	50	32.000000	320	30
12.288000	122	50	32.424000	3242	30
12.352000	123	50	32.785200	327	30
12.800000	128	50	36.000000	360	30
13.107200	131	50	37.000000	370	30
13.500000	135	50	38.400000	384	30
13.900000	139	50	39.990000	399	30
14.000000	140	40	40.000000	400	60 3OT
14.318180	143	40	40.210000	402	60 3OT
14.745600	147	40	45.158400	451	60 3OT
15.000000	150	40	49.431700	494	60 3OT
15.135400	151	40	49.990000	499	60 3OT
15.360000	153	40	50.348330	503	60 3OT
15.435000	154	40	52.372000	523	60 3OT
15.990000	159	40	54.295000	542	60 3OT
16.000000	160	30	54.466400	544	60 3OT
16.384000	163	30	57.600000	576	60 3OT
16.633300	1663	30	57.741600	5774	60 3OT
17.734475	177	30	57.767000	5776	60 3OT
19.636200	1963	30	66.662500	666	60 3OT
19.660800	196	30	69.487500	694	60 3OT
20.000000	200	30	70.400000	704	60 3OT
20.945000	209	30	80.000000	800	60 3OT
21.480000	214	30	81.920000	819	100 3OT
21.855000	218	30	89.000000	890	100 3OT
22.000000	220	30	90.000000	900	100 3OT
22.068960	2206	30	91.000000	910	100 5OT
22.118400	221	30	92.940500	929	100 5OT
22.248000	222	30	100.000000	1000	100 5OT
22.500000	225	30	110.000000	1100	100 5OT
24.000000	240	30	120.000000	1200	100 5OT
24.000140	240001	30	150.000000	1500	100 5OT
25.000000	250	30	250.000000	2500	100 5OT

**Note: Special frequencies and specifications are available upon request.**

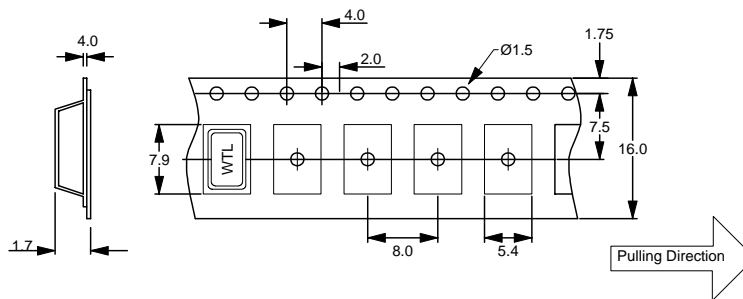
97SMX REEL DIMENSIONS

97SMX



Material: Cardboard

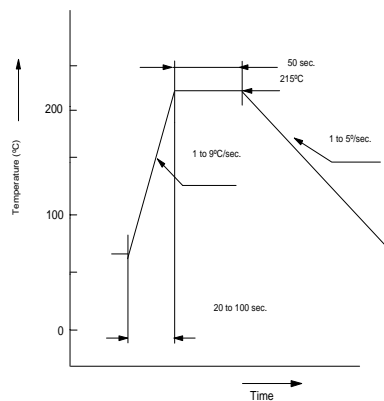
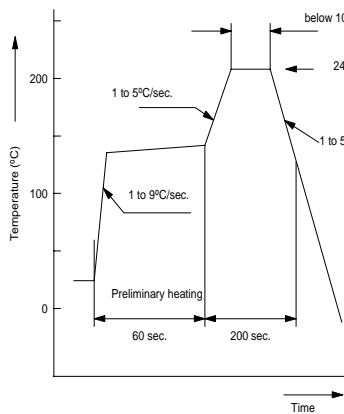
97SMX EMBOSSED CARRIER DIMENSIONS



Conditional chart for soldering of SMD products

• Infrared - reflow

• Vapor Phase - reflow





**- TIGHT TOLERANCE 10 - 200 MHz -**

Technical Data: Quartz Crystals

**98SMX**

**QUARTZ CRYSTAL SPECIFICATIONS**

Ref No. \_\_\_\_\_

Date \_\_\_\_\_

Page: \_\_\_\_\_ of \_\_\_\_\_

Customer \_\_\_\_\_

Part No. \_\_\_\_\_

Part No. \_\_\_\_\_

Spec. No. \_\_\_\_\_

Dwg. or Spec. No.: \_\_\_\_\_

Rev. \_\_\_\_\_

**ELECTRICAL**

1.0 Operating Temperature Range \_\_\_\_\_ °C to \_\_\_\_\_ °C

2.0 Frequency Temperature Stability = ± \_\_\_\_\_ % over \_\_\_\_\_ °C to \_\_\_\_\_ °C.

3.0 Specifications at 25°C ± 2°C:

	Value	Units
3.1 Frequency		MHz
3.2 Frequency Calibration Tolerance		± %
3.3 Pullability		
3.4 Load Capacitance		pF
3.5 Effective Series Resistance		Ohms, Max.
3.6 Drive level-correlation/operating		mW
3.7 Shunt Capacitance		pF, Max.
3.8 Oscillation Mode		
3.9 Aging Rate		ppm/yr
3.10 Test Circuit	Saunders 150C	

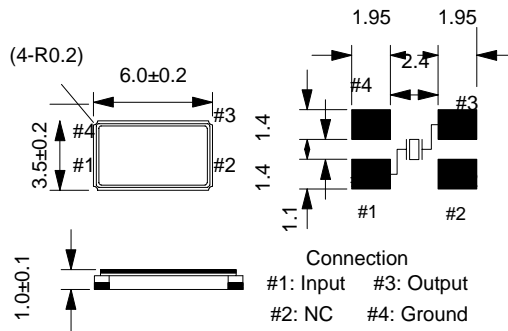
**MECHANICAL**

4.0 Holder Type: 98SMX

4.1 Marking: 3 lines on top.

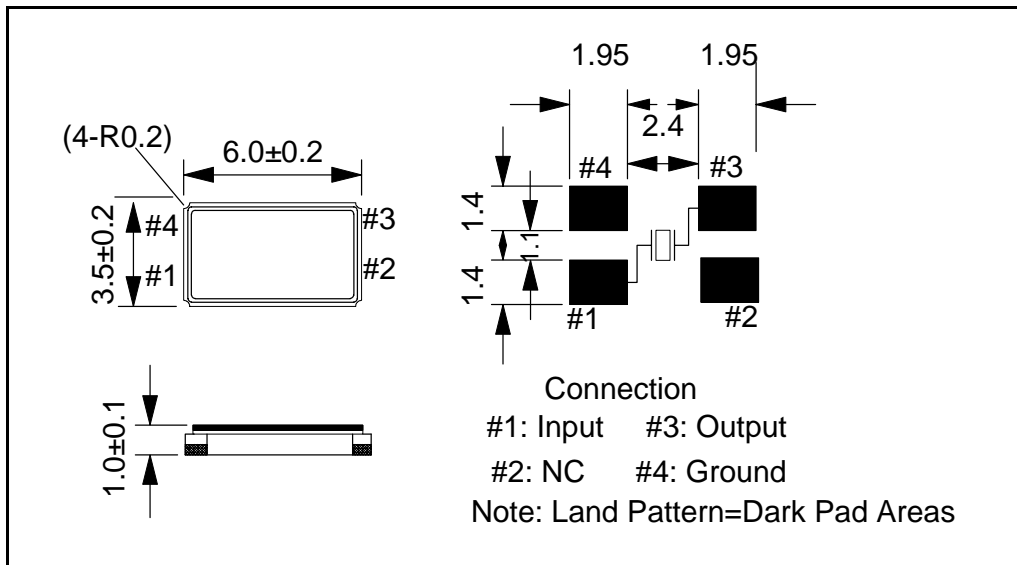
**OTHER SPECS**

**98SMX**

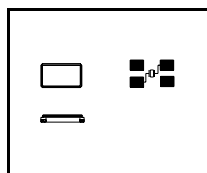




**- TIGHT TOLERANCE 10 - 200 MHz - 98SMX**



Enlarged View



Actual Size Shown Above 1=1

**98SMX Family (Surface Mount Device) - TIGHT TOLERANCE - 98SMX**

**STANDARD SPECIFICATIONS**

NOTES

- |  |                                       |
|--|---------------------------------------|
| 1. Holder type                         | 98SMX, Glass Base, Metal Top          |
| 2. Frequency                           | 10.000000MHz to 200.000000 MHz        |
| 3. Calibration tolerance*              | ±10 ppm (±0.001%) at + 25°C           |
| 4. Temperature stability tolerance*    | ±4 ppm (±0.0004%) over -10°C to +60°C |
| 5. Shunt capacitance (C <sub>0</sub> ) | 7 pF max.                             |
| 6. Drive Level (P)                     | 0.5 mW max.                           |
| 7. Cut                                 | AT-Cut                                |
| 8. Reflow soldering condition          | 10 seconds max at +260°C              |
| 9. Marking                             | WTL Part No., Frequency, Date Code.   |

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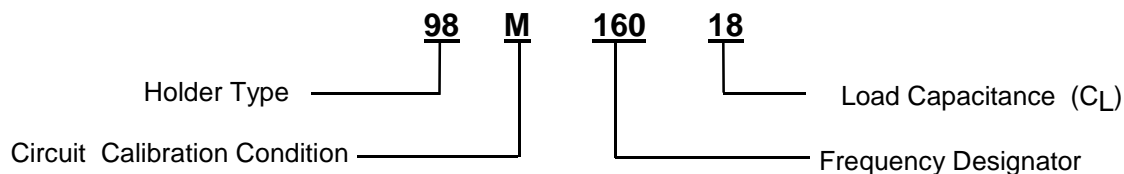
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**EXAMPLE**

CIRCUIT CALIBRATION CONDITION	FREQUENCY	PART NO.
Parallel Resonance=M C <sub>L</sub> =18pF	16.000000 MHz	98M160-18
Series Resonance=S	16.000000 MHz	98S160

\*NOTE: (3 & 4) Call factory for tighter "Tolerance/Stability" specification.



98SMX Standard Frequencies

- TIGHT TOLERANCE -

98SMX

FREQUENCY MHZ	FREQUENCY DESIGNATOR	MAXIMUM EQUIVALENT SERIES RESISTANCE OHMS
10.000000	100	30
10.004600	10004	30
10.005000	10005	30
10.254000	10245	30
10.702800	10702	30
10.730000	1073	30
11.059200	1105	30
11.981350	119	30
12.000000	120	30
12.288000	122	30
12.352000	123	30
12.800000	128	30
13.107200	131	30
13.500000	135	30
14.318180	143	30
14.745600	147	30
15.000000	150	30
15.135400	151	30
15.360000	153	30
15.435000	154	30
16.000000	160	30
16.384000	163	30
16.633300	1663	30
17.734475	177	30
19.636200	1963	30
19.660800	196	30
20.000000	200	30
20.945000	209	30
21.480000	214	30
21.855000	218	30
22.000000	220	30
22.068960	2206	30
22.118400	221	30
22.248000	222	30
22.500000	225	30
24.000000	240	30
24.000140	240001	30
25.000000	250	30

FREQUENCY MHZ	FREQUENCY DESIGNATOR	MAXIMUM EQUIVALENT SERIES RESISTANCE OHMS
26.150000	261	30
26.995000	269	30
27.010000	2701	30
27.055000	2705	30
29.345000	293	30
29.500000	295	30
30.000000	300	30
30.865000	308	30
32.000000	320	30
32.424000	3242	30
32.785200	327	30
36.000000	360	30
37.000000	370	30
38.400000	384	30
40.000000	400	30
40.210000	402	30
45.158400	451	50 30T
49.431700	494	50 30T
50.348330	503	50 30T
52.372000	523	50 30T
54.295000	542	50 30T
54.466400	544	50 30T
57.600000	576	50 30T
57.741600	5774	50 30T
57.767000	5776	50 30T
66.662500	666	50 30T
69.487500	691	50 30T
70.400000	704	50 30T
80.000000	800	50 30T
81.920000	819	50 30T
92.940500	929	50 30T
100.000000	1000	50 30T
110.000000	1100	50 30T
120.000000	1200	50 30T
150.000000	1500	50 30T
151.000000	1510	50 30T
200.000000	2000	90 50T

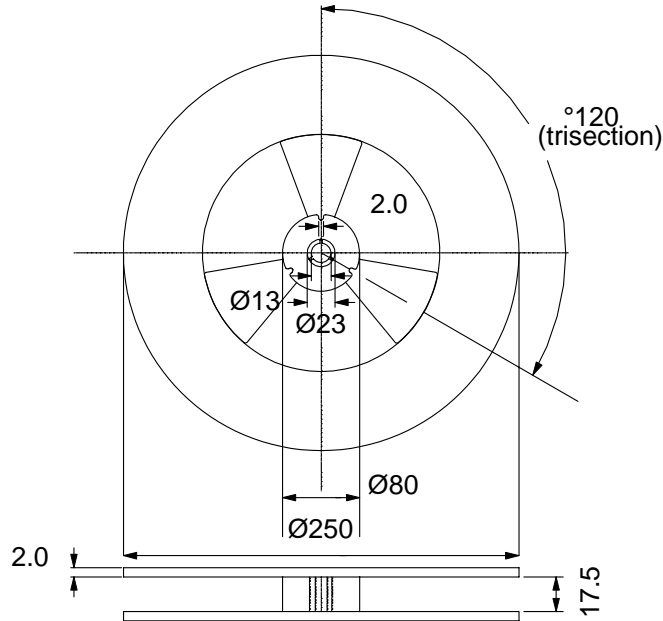
**Note: Special frequencies and specifications are available upon request.**



98SMX DIMENSIONS

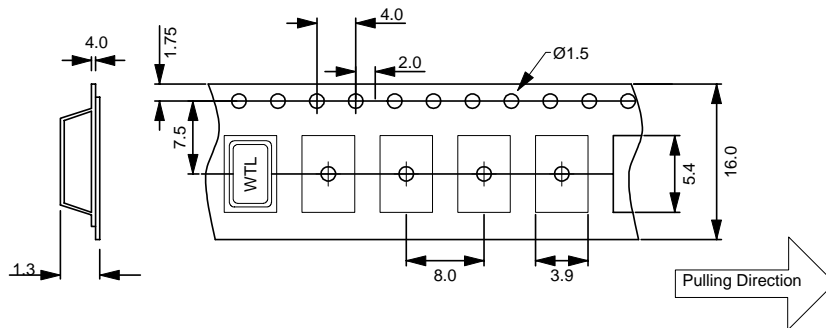
98SMX REEL DIMENSIONS

98SMX



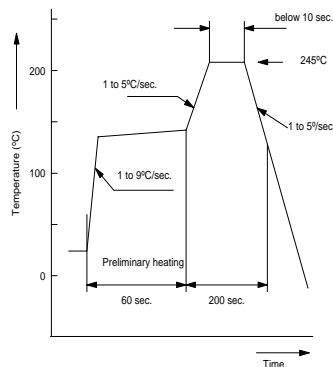
Material: Cardboard

98SMX EMBOSSED CARRIER DIMENSIONS

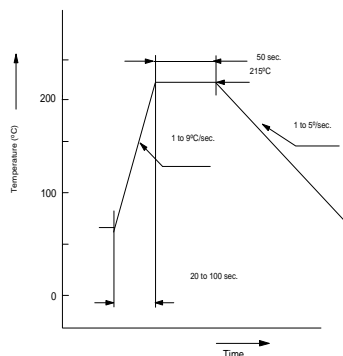


Conditional chart for soldering of SMD products

• Infrared - reflow



• Vapor Phase - reflow





QUARTZ CRYSTAL SURFACE MOUNT SPECIFICATION RFQ FORM

Supply the Specifications and Fax WTL with your Information

NAME: \_\_\_\_\_ TITLE: \_\_\_\_\_ COMPANY: \_\_\_\_\_
ADDRESS: \_\_\_\_\_ PHONE: \_\_\_\_\_ FAX NO: \_\_\_\_\_
CITY: \_\_\_\_\_ STATE: \_\_\_\_\_ ZIP: \_\_\_\_\_ EMAIL: \_\_\_\_\_
MAIL STOP: \_\_\_\_\_

Quantity Needed

IMMEDIATE: \_\_\_\_\_ DELIVERY REQUIRED: \_\_\_\_\_
FUTURE NEEDS: \_\_\_\_\_ APPROX. DELIVERY DATE: \_\_\_\_\_
CUSTOMER SPEC. DRAWING NO: \_\_\_\_\_ TARGET PRICE: \_\_\_\_\_ PER \_\_\_\_\_
DEVICE TYPE & APPLICATION: \_\_\_\_\_
PROJECT DESCRIPTION OR NO.: \_\_\_\_\_

How to Order Custom-Designed WTL Crystals

Please provide the following information concerning your crystal requirements

- 1. Holder Type \_\_\_\_\_
2. Nominal Frequency \_\_\_\_\_ MHz or \_\_\_\_\_ KHz
3. Frequency Calibration Tolerance (at +25°C) \_\_\_\_\_ ppm
4. Load Capacitance (CL) \_\_\_\_\_ pf
5. Temperature Stability Tolerance \_\_\_\_\_ ppm
6. Operating Temperature Range \_\_\_\_\_ °C to \_\_\_\_\_ °C
7. Equivalent Series Resistance (RS) \_\_\_\_\_ Ω max.
8. Shunt Capacitance (CO) \_\_\_\_\_ pF max.
9. Drive Level (P) \_\_\_\_\_ mW max.
10. Harmonic Mode \_\_\_\_\_ Fundamental or \_\_\_\_\_ Overtone
11. Additional specifications, if any: \_\_\_\_\_