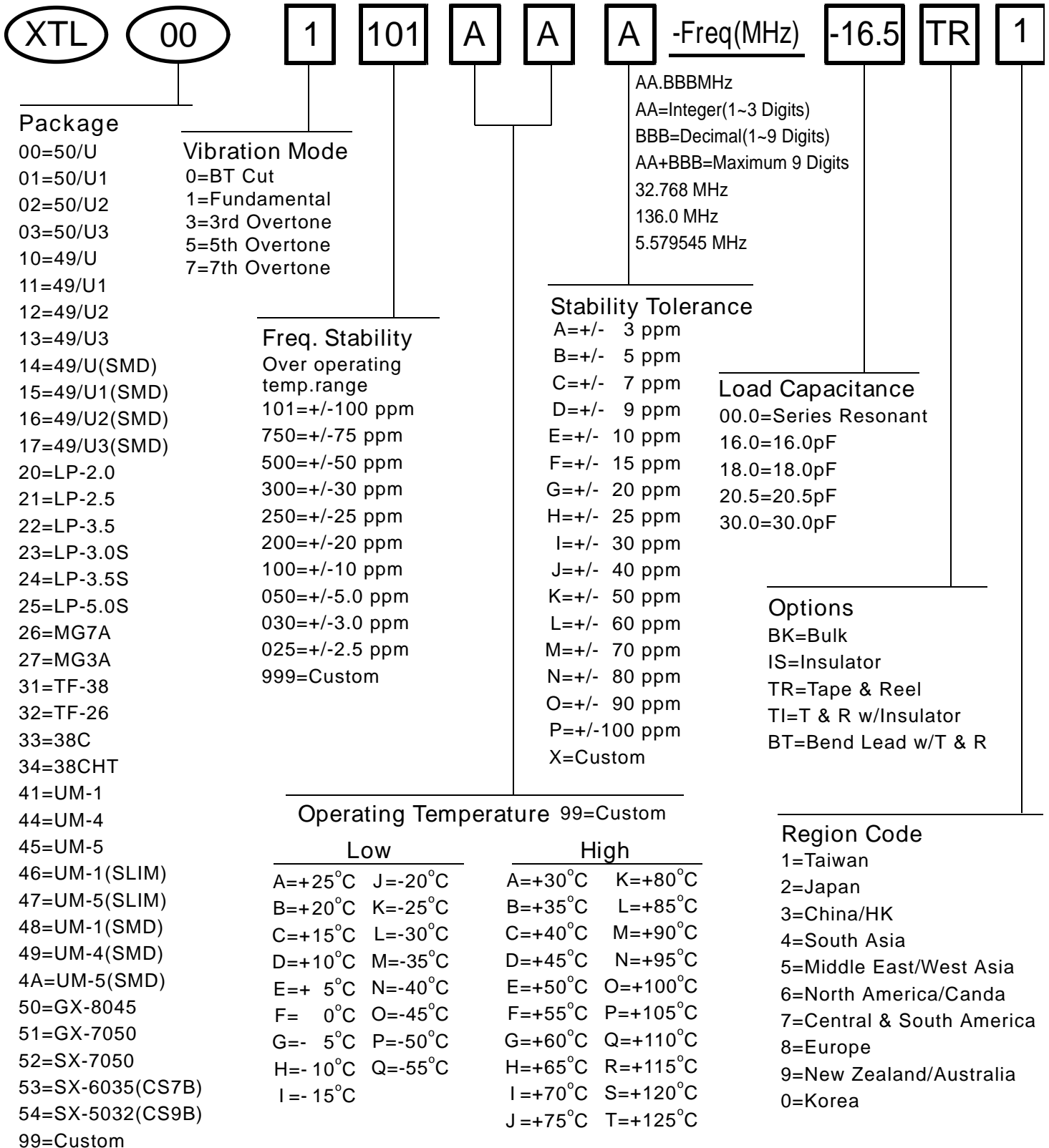


# Part Number Scheme

## Crystal





# CRYSTAL UNITS (DIP TYPE)

● **Application**

Microcomputer, VTR, Toy, TV game, Telecommunications.....

● **Specification**

Frequency range	See table 1
Vibration mode	AT cut: fundamental, third, fifth
Frequency tolerance at 25°C	±10, ±15, ±20, ±30, ±50 PPM
Operating temperature range and frequency stability	See Table 2
Equivalent series resistance	See Table 1
Shunt capacitance	7.0 pF max or special
Measure instrument	S&A 350A(PI) system
Load capacitance	Series, 16, 20, 30pF or special
Drive level	10, 100, 300, 1000uW or special
Insulation resistance	500MΩ min/DC 100V
Aging	±1, 3, 5PPM/year

● **Table 2 / Operating temperature range and frequency stability**

TEMP.	PPM							
	±3	±5	±7.5	±10	±15	±20	±30	±50
-0 ~ +50°C	△ ●	△ ●	△ ●	△ ●	△ ●	△ ●	△ ●	△ ●
-10 ~ +60°C	△ ●	△ ●	△ ●	△ ●	△ ●	△ ●	△ ●	△ ●
-20 ~ +70°C		△ ●	△ ●	△ ●	△ ●	△ ●	△ ●	△ ●
-30 ~ +80°C				△ ●	△ ●	△ ●	△ ●	△ ●
-40 ~ +90°C					△ ●	△ ●	△ ●	△ ●

HC-49U & 50U series: ●

LP series: ☆

UM series: △

● **Table 1/Frequency range & Equivalent series resistance (UNIT: Ω)**

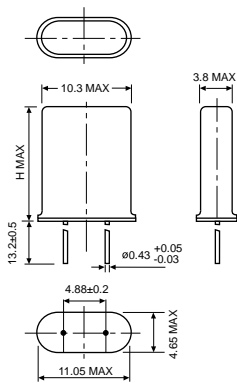
Frequency (MHz)	Vibration mode	HC-49/U HC-50/U	HC-49/U1 HC-50/U1	HC-49/U2 HC-50/U2	HC-49/U3 HC-50/U3
1.5 ~ 1.99	Fundamental/F	700			
2.0 ~ 2.99	Fundamental/F	500			600
3.0 ~ 3.19	Fundamental/F	300			400
3.2 ~ 3.99	Fundamental/F	150			200
4.0 ~ 4.49	Fundamental/F	90			150
4.5 ~ 4.99	Fundamental/F	70		100	80
5.0 ~ 6.99	Fundamental/F	50		60	60
7.0 ~ 9.99	Fundamental/F	35		40	40
10.0 ~ 30.0	Fundamental/F	25	35	25	25
20.0 ~ 24.99	Third/O3	45		50	50
25.0 ~ 90.0	Third/O3	40	50	40	40
70.0 ~ 160.0	Fifth/O5	70	70	70	70

Frequency (MHz)	Vibration mode	LP series
3.2 ~ 3.79	Fundamental/F	180
3.8 ~ 4.49	Fundamental/F	150
4.5 ~ 5.99	Fundamental/F	120
6.0 ~ 7.99	Fundamental/F	100
8.0 ~ 9.99	Fundamental/F	80
10.0 ~ 11.9	Fundamental/F	70
12.0 ~ 15.9	Fundamental/F	60
16.0 ~ 19.9	Fundamental/F	50
20.0 ~ 26.0	Fundamental/F	40
26.0 ~ 39.9	Third/O3	100
40.0 ~ 80.0	Third/O3	80

Frequency (MHz)	Vibration mode	UM-1 UM-1 slim	UM-5 UM-4
3.5 ~ 3.9	Fundamental/F	200	
4.0 ~ 4.99	Fundamental/F	150	
5.0 ~ 9.9	Fundamental/F	60	
10.0 ~ 14.9	Fundamental/F	40	60
15.0 ~ 50.0	Fundamental/F	30	35
30.0 ~ 49.9	Third/O3	45	50
50.0 ~ 100.0	Third/O3	60	60
75.0 ~ 160.0	Fifth/O5	80	90

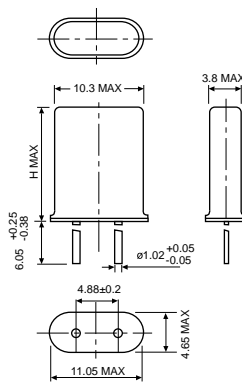
● **Dimension (unit: mm)**

**HC-49/U**



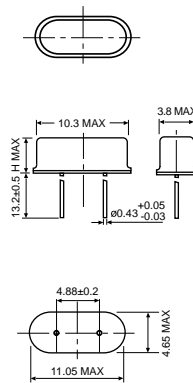
HOLDER	H
HC-49/U	13.1
HC-49/U1	9.5
HC-49/U2	11.0
HC-49/U3	11.4

**HC-50/U**



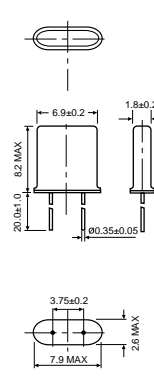
HOLDER	H
HC-50/U	13.1
HC-50/U1	9.5
HC-50/U2	11.0
HC-50/U3	11.4

**LP-2.0, 2.5, 3.5**

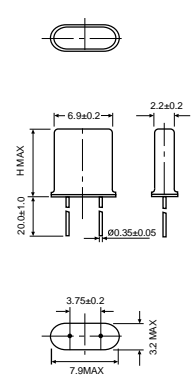


HOLDER	H
LP-2.0	2.2
LP-2.5	2.5
LP-3.5	3.5

**UM-1 slim**



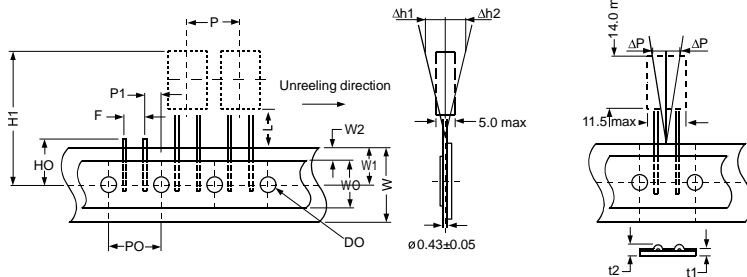
**UM-1, UM-4, UM-5**



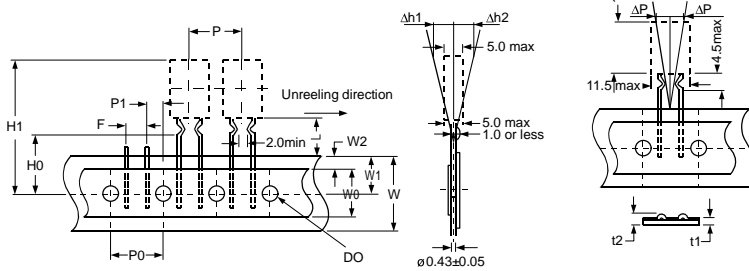
HOLDER	H
UM-1	8.2
UM-4	4.6
UM-5	6.0

• Tape specification

Item 1:

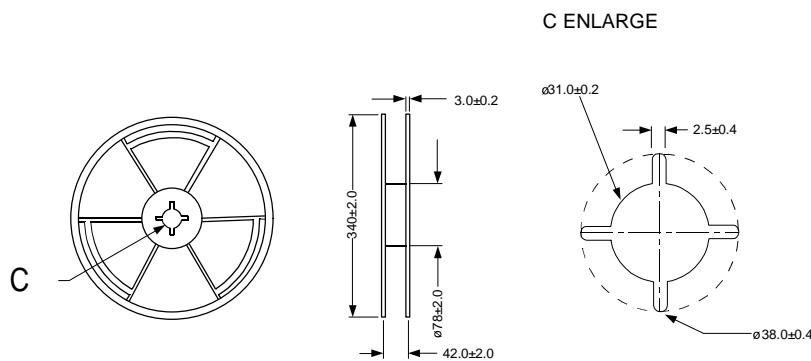


Item 2:

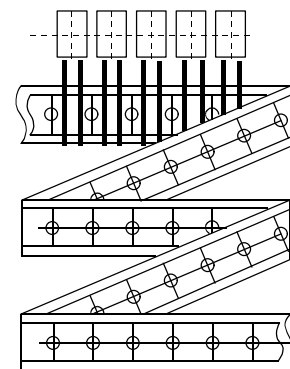


Symbol	Dimension tolerance(mm)
P	12.7 ± 1.0
P0	12.7 ± 0.3
P1	3.85 ± 0.7
F	5.0 ± 0.8
W	18.0 + 1.0 / -0.5
W0	12.5 or more
W1	9.0 + 0.75 / -0.5
W2	3.0 or less
D0	4.0 ± 0.2
L	9.5 or more
t1	0.6 ± 0.3
t2	1.5 or less
Δh1	2.0 or less
Δh2	2.0 or less
ΔP	2.0 or less
H0	
H1	34.46 or less

• Reel specification



• TAPE ARRANGE





# CRYSTAL UNITS

## 38C Crystal Unit

- **Typical applications**

Computer clocks, Video cameras and Audio equipment.

- **Features**

The 38C is a cylinder-shaped compact package most suitable for high-density mounting.

- **Typical specifications**

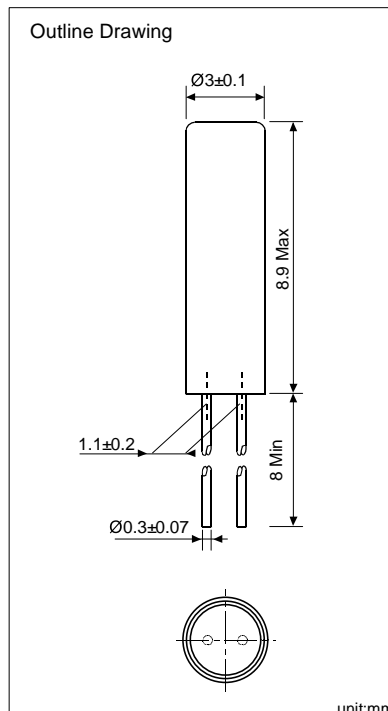
Type		XTL-33	
Nominal frequency range	Fundamental	AT-cut	3.579545~40.000 MHz
		BT-cut	30.000~40.000 MHz
	3rd overtone (AT-cut)		30.000~70.000 MHz
Frequency tolerance (at+25 °C)※1	38C2		±50x10 <sup>-6</sup>
	38C3		±30x10 <sup>-6</sup>
Temperature stability ※ 2			±50x10 <sup>-6</sup> over -10 ~ +70°C
Storage temperature range			-40 ~ +90°C
Resonance resistance			See Table 2
Load capacitance			12 pF, 16 pF, series (00:spec. code)
Shunt capacitance			5pF Max.
Level of drive			100µW Max.
Crystal cut			AT-cut, BT-cut

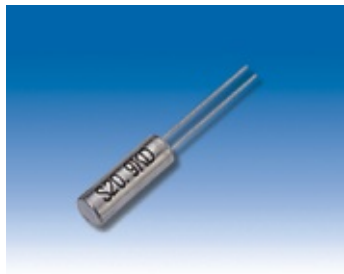
Notes: ※1.Consult us for other specification.  
 ※2.Does not include frequency tolerance.  
 3.Reflow processing is impossible.

● **Table 1 Frequency-Temperature Tolerance (Ref. to +25°C)**

	Tolerance (x10 <sup>-6</sup> )										
	±30	±50	±100								+20 -80
0 ~ +50°C	○	○	○								
-10 ~ +50°C	○	○	○								
-10 ~ +60°C	○	○	○								●
-10 ~ +70°C	○	●	●								
-20 ~ +70°C	○	○	○								
-30 ~ +75°C											
-30 ~ +80°C											
-35 ~ +80°C											
-40 ~ +85°C											

Practicability: ● recommended, ○suppliable, ※ BT-cut crystal



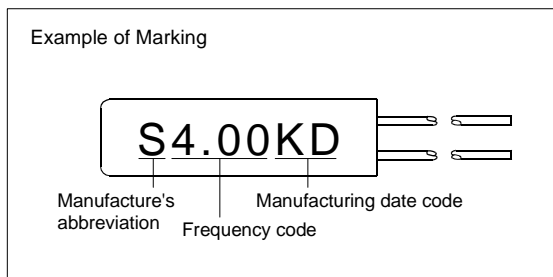


# CRYSTAL Units

## 38C Crystal Unit

Table 2 / Recommended Frequencies and Max. Resonance Resistance (38C)

Nominal frequency (MHz) Fundamental (AT-cut)	Resonance resistance ( $\Omega$ )	Nominal frequency (MHz)	Resonance resistance ( $\Omega$ )	Nominal frequency (MHz)	Resonance resistance ( $\Omega$ )
3.579545	200	8.388608	80	16.384	35
3.6864	200	8.867238	80	17.445	35
3.840	200	9.000	60	17.600	35
3.888	200	9.216	60	17.734475	35
3.93216	200	9.300	60	18.355	35
4.000	150	9.534765	60	18.432	35
4.032	150	9.534965	60	19.06993	25
4.194304	150	9.600	60	19.200	25
4.332	150	9.65625	60	19.3125	25
4.40625	150	9.8304	60	19.401256	25
4.433619	150	10.000	50	19.6608	25
4.435571	150	10.069929	50	20.000	25
4.500	120	10.185	50	20.945	25
4.800	120	10.240	50	22.1184	25
4.9152	120	10.245	50	22.5792	25
5.000	100	10.715034	50	23.59296	25
5.034964	100	10.752	50	24.000	25
5.068	100	11.000	50	24.576	25
5.120	100	11.0592	50	25.07812	25
5.369318	100	11.580417	50	25.175	25
5.5296	100	12.000	50	25.42657	25
5.727272	100	12.288	50	25.600	25
5.947552	100	12.58291	50	25.750	25
6.000	80	12.800	50	27.750	25
6.048	80	13.000	35	28.63636	25
6.144	80	13.300857	35	29.4912	25
6.176	80	13.500	35		
6.400	80	13.5168	35		
6.500	80	13.825	35		
6.5536	80	14.120	35		
7.000	80	14.21875	35	(BT-cut)	
7.15909	80	14.31818	35	32.000	20
7.200	80	14.500	35	36.000	20
7.3728	80	14.540	35	40.000	20
7.680	80	14.610	35		
7.776	80	15.000	35	3rd overtone(AT-cut)	
7.948	80	15.360	35	36.000	60
7.980	80	15.891606	35	40.000	60
8.000	80	16.000	35	48.000	60
8.192	80	16.044	35	50.000	60





# CRYSTAL UNITS

## 38CHT Crystal Unit

- **Typical applications**

Cordless telephones, Specific low-power transceivers, Pagers and Cellular telephones.

- **Features**

The 38CHT is a heat-resisting crystal unit assembled in a cylinder-shaped compact package most suitable for high-density mounting.

- **Typical specifications**

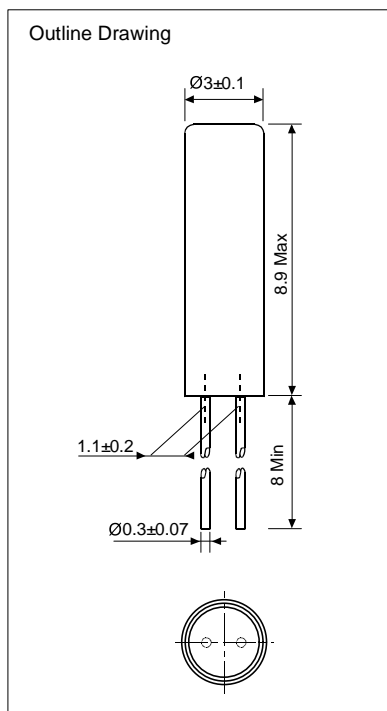
Type			XTL-34
Nominal frequency range	Fundamental	AT-cut	3.579545~40.000 MHz
		BT-cut	30.000~40.000 MHz
	3rd overtone (AT-cut)		30.000~90.000 MHz
Frequency tolerance (at+25 °c)※1		38CHT4	±20x10 <sup>-6</sup>
Temperature stability ※2			±10x10 <sup>-6</sup> over -10 ~ +70°C
Storage temperature range			-40 ~ +90°C
Resonance resistance			See Table 2
Load capacitance			12 pF, 16 pF, series (00:spec. code)
Shunt capacitance			5pF Max.
Level of drive			100μ W Max.
Crystal cut			AT-cut, BT-cut

Notes: ※1.Consult us for other specification.  
 ※2.Does not include frequency tolerance.

● **Table 1 Frequency-Temperature Tolerance (Ref. to +25°C)**

	Tolerance (x10 <sup>-6</sup> )									
	±3.0	±5.0	±7.5	±10	±15	±20	±30			※ ±20 ※ -80
0 ~ +50°C	●	○	○	○	○	○	○			
-10 ~ +50°C		○	○	○	○	○	○			
-10 ~ +60°C		○	○	●	○	○	○			●
-10 ~ +70°C			○	○	○	○	●			
-20 ~ +70°C				○	○	○	○			
-30 ~ +75°C					○	○	○			
-30 ~ +80°C					○	○	○			
-35 ~ +80°C						○	○			
-40 ~ +85°C						○	○			

Practicability: ● recommended, ○ suppliable, \* BT-cut crystal



unit:mm



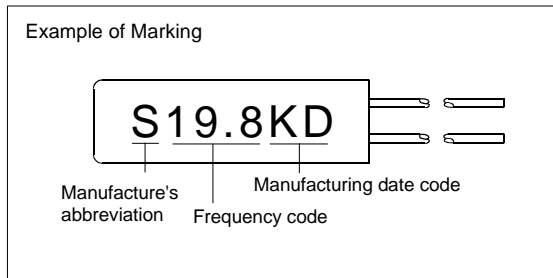
# CRYSTAL UNITS

## 38CHT Crystal Unit

Table 2 Recommended Frequencies and Max. Resonance Resistance (38CHT)

Nominal frequency (MHz) Fundamental (AT-cut)	Resonance resistance (Ω)	Nominal frequency (MHz)	Resonance resistance (Ω)	Nominal frequency (MHz)	Resonance resistance (Ω)
7.680	80	16.03495	35	25.42657	25
9.95328	60	16.384	35	29.4912	25
10.000	50	18.432	35		
11.0592	50	19.200	25		
11.750	50	19.6608	25		
-----					
12.000	50	19.800	25	40.000	60
12.288	50	20.945	25	44.545	60
12.600	50	21.245	25	48.000	60
12.800	50	21.250	25	50.000	60
13.000	35	21.345	25	66.666	60
-----					
14.400	35	21.350	25	80.000	60
14.985513	35	23.500	25	82.705	60
15.200	35	24.00014	25		
15.360	35	24.55142	25		
15.8565	35	24.576	25		

Example of Marking





# CRYSTAL UNITS

(SMD TYPE - Metal)

● Application

Radio communication, Audio-visual equipment, Office automation equipment, Consumer product,.....

● Specification

Frequency range	See table 1
Vibration mode	AT cut: fundamental, third, fifth
Frequency tolerance at 25°C	±10, ±15, ±20, ±30, ±50 PPM
Operating temperature range and frequency stability	See Table 2
Equivalent series resistance	See Table 1
Shunt capacitance	7.0 pF max or special
Measure instrument	S&A 350A(PI) system
Load capacitance	Series, 16, 20, 30pF or special
Drive level	10, 100, 300, 1000uW or special
Insulation resistance	500MΩmin/DC 100V
Aging	±1, 3, 5PPM/year

● Table 2 / Operating temperature range and frequency stability

PPM	±3	±5	±7.5	±10	±15	±20	±30	±50
TEMP.								
-0 ~ +50	△ ●	△ ●	△ ●	△ ●	△ ●	△ ●	△ ●	△ ●
-10 ~ +60	△ ●	△ ●	△ ●	△ ●	△ ●	△ ●	△ ●	△ ●
-20 ~ +70		△ ●	△ ●	△ ●	△ ●	△ ●	△ ●	△ ●
-30 ~ +80				△ ●	△ ●	△ ●	△ ●	△ ●
-40 ~ +90					△ ●	△ ●	△ ●	△ ●

HC-49U series: ●  
LP series: ☆  
UM series: △

● Table 1/Frequency range & Equivalent series resistance (UNIT: \*)

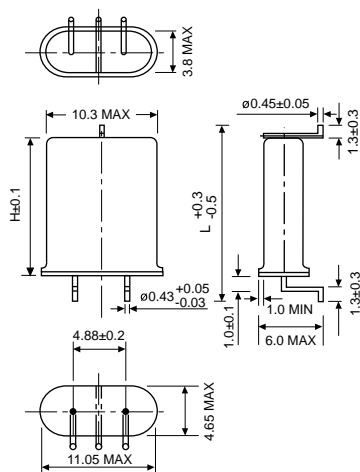
Frequency (MHz)	Vibration mode	HC-49/U HC-50/U	HC-49/U1 HC-50/U1	HC-49/U2 HC-50/U2	HC-49/U3 HC-50/U3
1.5 - 1.99	Fundamental/F	700			
2.0 - 2.99	Fundamental/F	500			600
3.0 - 3.19	Fundamental/F	300			400
3.2 - 3.99	Fundamental/F	150			200
4.0 - 4.49	Fundamental/F	90			150
4.5 - 4.99	Fundamental/F	70		100	80
5.0 - 6.99	Fundamental/F	50		60	60
7.0 - 9.99	Fundamental/F	35		40	40
10.0 - 30.0	Fundamental/F	25	35	25	25
20.0 - 24.99	Third/O3	45		50	50
25.0 - 90.0	Third/O3	40	50	40	40
70.0 - 160.0	Fifth/O5	70	70	70	70

Frequency (MHz)	Vibration mode	LP series
3.2 - 3.79	Fundamental/F	180
3.8 - 4.49	Fundamental/F	150
4.5 - 5.99	Fundamental/F	120
6.0 - 7.99	Fundamental/F	100
8.0 - 9.99	Fundamental/F	80
10.0 - 11.9	Fundamental/F	70
12.0 - 15.9	Fundamental/F	60
16.0 - 19.9	Fundamental/F	50
20.0 - 26.0	Fundamental/F	40
26.0 - 39.9	Third/O3	100
40.0 - 60.0	Third/O3	80

Frequency (MHz)	Vibration mode	UM-1S	UM-5S UM-4S
3.5 - 3.9	Fundamental/F	200	
4.0 - 4.99	Fundamental/F	150	
5.0 - 9.9	Fundamental/F	60	
10.0 - 14.9	Fundamental/F	40	60
15.0 - 50.0	Fundamental/F	30	35
30.0 - 49.9	Third/O3	45	50
50.0 - 100.0	Third/O3	60	60
75.0 - 160.0	Fifth/O5	80	90

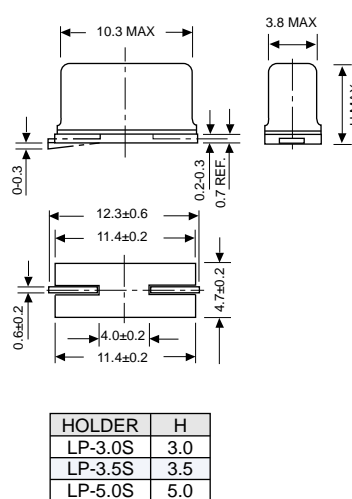
● Dimension (unit: mm)

HC-49/U(SMD)



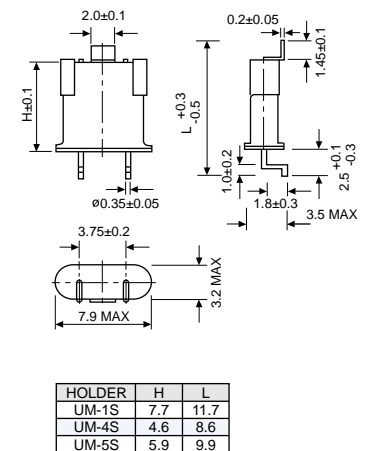
HOLDER	H	L
HC-49/U	13.1	17.06
HC-49/U1	9.5	13.46
HC-49/U2	11.0	14.96
HC-49/U3	11.4	15.36

LP-3.0S, 3.5S, 5.0S(SMD)



HOLDER	H
LP-3.0S	3.0
LP-3.5S	3.5
LP-5.0S	5.0

UM-1S, UM-4S, UM-5S(SMD)

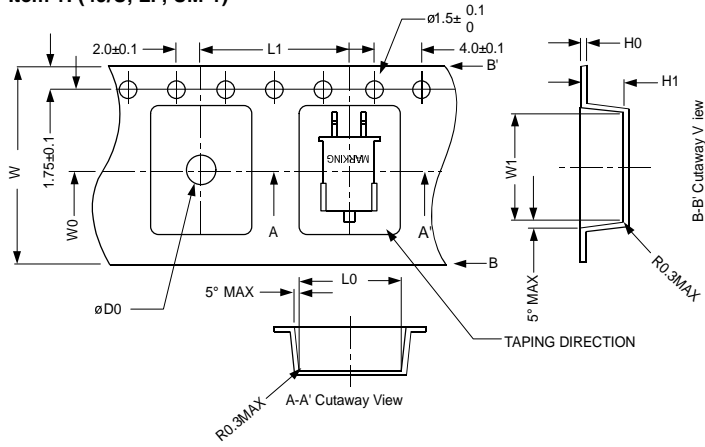


HOLDER	H	L
UM-1S	7.7	11.7
UM-4S	4.6	8.6
UM-5S	5.9	9.9



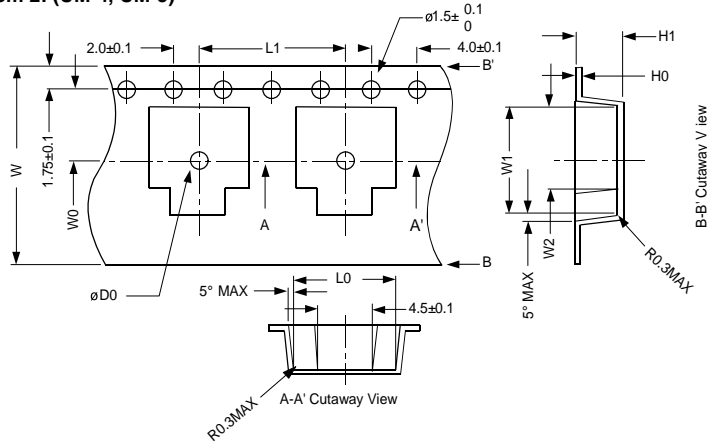
• Tape specification

Item 1: (49/U, LP, UM-1)



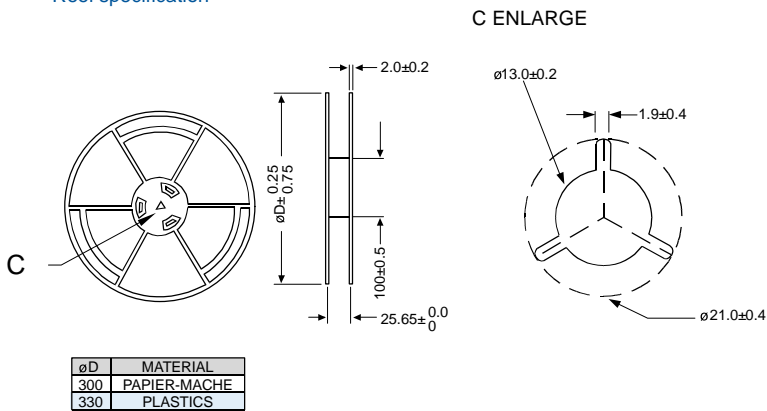
Symbol	Dimension tolerance (mm)		
	49/U	LP	UM-1
W	$32.0 \pm 0.3$	$24 \pm 0.3$	$24 \pm 0.3$
W <sub>0</sub>	$14.2 \pm 0.1$	$11.5 \pm 0.1$	$11.5 \pm 0.1$
W <sub>1</sub>	$18.0 \pm 0.2$	$13.0 \pm 0.1$	$13.9 \pm 0.1$
L <sub>0</sub>	$11.2 \pm 0.1$	$5.1 \pm 0.1$	$8.7 \pm 0.1$
L <sub>1</sub>	$16.0 \pm 0.1$	$12.0 \pm 0.1$	$12.0 \pm 0.1$
H <sub>0</sub>	$0.4 \pm 0.05$	$0.4 \pm 0.05$	$0.3 \pm 0.05$
H <sub>1</sub>	$4.8 \pm 0.1$	$4.3 \pm 0.1$	$3.6 \pm 0.1$
$\phi D_0$	$2.0 \pm 0.1$	$2.0 \pm 0.1$	$2.2 \pm 0.1$

Item 2: (UM-4, UM-5)

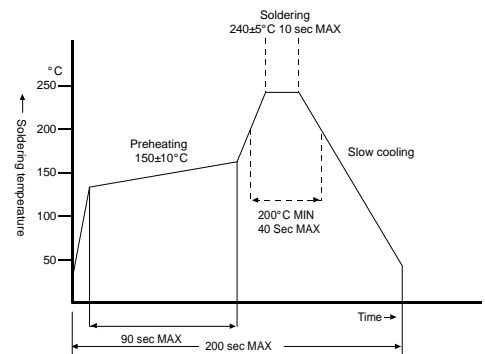


Symbol	Dimension tolerance (mm)		
	UM-5	UM-4	
W	$24.0 \pm 0.3$	$16.0 \pm 0.3$	
W <sub>0</sub>	$11.5 \pm 0.1$	$7.5 \pm 0.1$	
W <sub>1</sub>	$11.4 \pm 0.1$	$8.9 \pm 0.1$	
W <sub>2</sub>	$8.7 \pm 0.1$	$6.7 \pm 0.1$	
L <sub>0</sub>	$8.4 \pm 0.1$	$8.3 \pm 0.1$	
L <sub>1</sub>	$12.0 \pm 0.1$	$12.0 \pm 0.1$	
H <sub>0</sub>	$0.4 \pm 0.05$	$0.4 \pm 0.05$	
H <sub>1</sub>	$3.7 \pm 0.1$	$3.9 \pm 0.1$	
$\phi D_0$	$2.0 \pm 0.1$	$1.6 \pm 0.1$	

• Reel specification



• Solder reflow diagram





# CRYSTAL UNITS

## MG7A Crystal Unit SMD

● **Typical applications**

Pagers, Cordless telephones, Cellular telephones and Computer clocks.

● **Features**

The MG7A is surface mounting type crystal unit assembled in a compact package. The heat-resisting characteristics are outstanding and reflow soldering is possible.

● **Typical specifications**

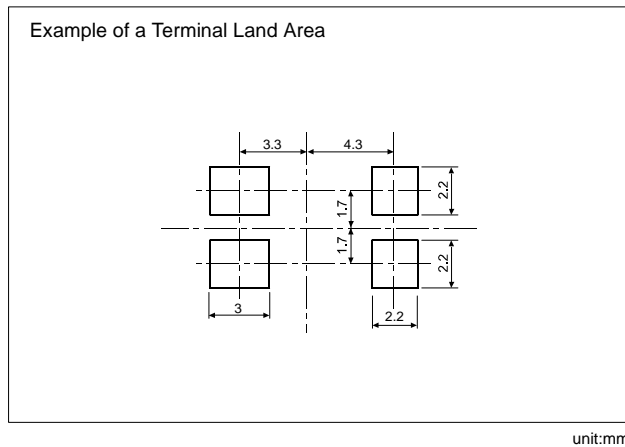
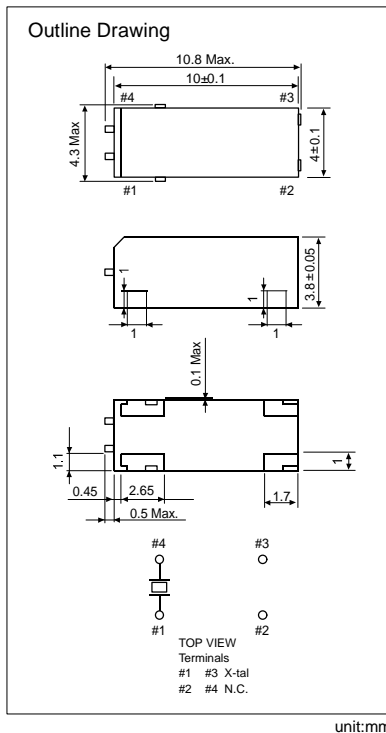
Type		XTL-26	
Nominal frequency range	Fundamental	AT-cut	3.579545~40.000 MHz
		BT-cut	30.000~40.000 MHz
	3rd overtone	(AT-cut)	30.000~90.000 MHz
Frequency tolerance (at+25°C)※1		MG-7A1	±100x10 <sup>-6</sup>
		MG7A2	±50x10 <sup>-6</sup>
Temperature stability (at+25°C)※2		±100x10 <sup>-6</sup> over -10 ~ +70 °C	
Storage temperature range		-40 ~ +90 °C	
Resonance resistance		See Table 2	
Load capacitance		12 pF, 16 pF, series (00:spec. code)	
Shunt capacitance		5pF Max.	
Level of drive		100µW Max.	
Condition of reflow soldering		See Fig. 1.	
Crystal cut		AT-cut, BT-cut	

Notes: ※1.Consult us for other specification.  
 ※2.Does not include frequency tolerance.

● **Table 1 Frequency-Temperature Tolerance (Ref. to +25 °C)**

	Tolerance (x10 <sup>-6</sup> )									
	±3.0	±5.0	±7.5	±10	±15	±20	±30	±50	±100	※ ±20 ※ -80
0 ~ +50 °C	●	○	○	○	○	○	○	○	○	
-10 ~ +50 °C		○	○	○	○	○	○	○	○	
-10 ~ +60 °C		○	○	○	○	○	○	○	○	●
-10 ~ +70 °C			○	○	○	○	●	○	○	
-20 ~ +70 °C				○	○	○	○	○	○	
-30 ~ +75 °C					○	○	○	○	○	
-30 ~ +80 °C						○	○	○	○	
-35 ~ +80 °C							○	○	○	
-40 ~ +85 °C								○	○	

Practicability: ● recommended, ○ suppliable, ※ BT-cut crystal



unit:mm

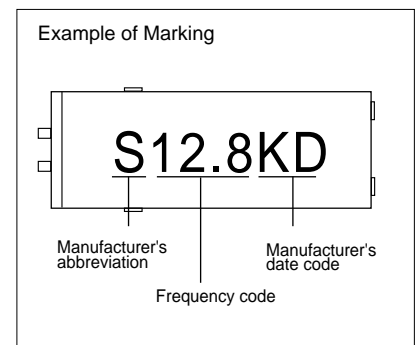
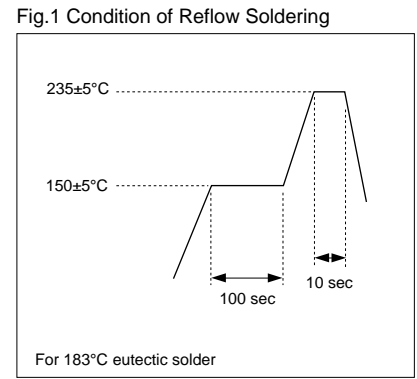
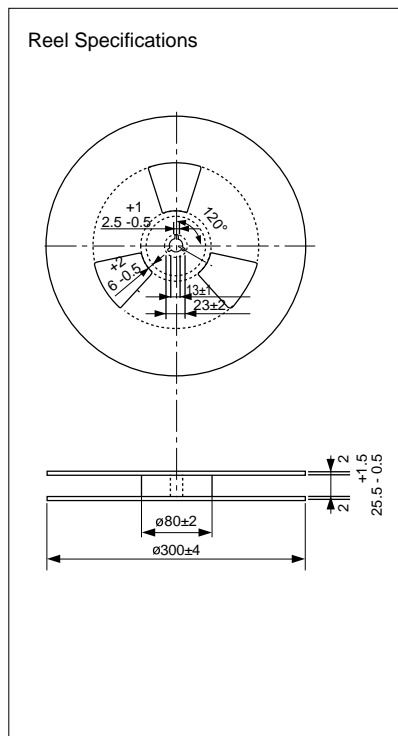
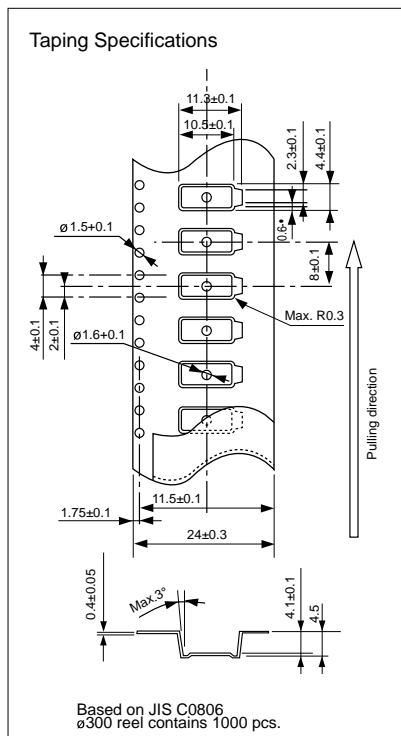


# CRYSTAL Units

## MG7A Crystal Unit SMD

Table 2 Recommended Frequencies and Max. Resonance Resistance (MG7A)

Nominal frequency (MHz) Fundamental (AT-cut)	Resonance resistance (Ω)	Nominal frequency (MHz)	Resonance resistance (Ω)	Nominal frequency (MHz)	Resonance resistance (Ω)
3.579545	200	10.000	50	22.5792	25
3.6864	200	10.185	50	23.592	25
3.93216	200	10.240	50	24.000	25
4.000	150	10.245	50	24.576	25
4.032	150	10.715034	50	25.07812	25
-----					
4.194304	150	10.752	50	25.175	25
4.433619	150	11.000	50	25.42657	25
4.435571	150	11.0592	50	25.600	25
4.500	120	12.000	50	25.750	25
4.800	120	12.288	50	29.4912	25
-----					
4.9152	120	12.58291	50	37.525	25
5.000	100	12.800	50	(BT-cut)	
5.0688	100	13.000	35	32.000	20
5.120	100	13.500	35	36.000	20
5.369318	100	13.5168	35	40.000	20
-----					
5.5296	100	14.21875	35	3rd overtone(AT-cut)	
5.727272	100	14.31818	35	36.000	60
6.000	80	14.7456	35	40.000	60
6.048	80	15.000	35	43.200	60
6.144	80	15.360	35	44.545	60
-----					
6.176	80	15.9744	35	50.000	60
6.400	80	16.000	35	66.666	60
6.500	80	16.044	35	80.000	60
6.5536	80	16.384	35	82.705	60
7.000	80	17.445	35	-----	
-----					
7.15909	80	17.600	35		
7.200	80	17.734475	35		
7.3728	80	18.355	35		
7.680	80	18.432	35		
7.776	80	19.06993	25		
-----					
7.948	80	19.200	25		
7.980	80	19.3125	25		
8.000	80	19.401256	25		
8.192	80	19.6608	25		
8.867238	80	20.000	25		
-----					
9.216	60	20.945	25		
9.534765	60	21.0526	25		
9.600	60	21.250	25		
9.656525	60	22.1184	25		
9.8304	60	22.53125	25		





# CRYSTAL UNITS

## MG3A Crystal Unit SMD

● **Typical applications**

Pagers, Cordless telephones, Cellular telephones and Computer clocks.

● **Features**

The MG3A is a surface mounting type crystal unit assembled in a compact package. The heat-resisting characteristics are outstanding as a duplex construction is adopted. Reflow soldering is possible.

● **Typical specifications**

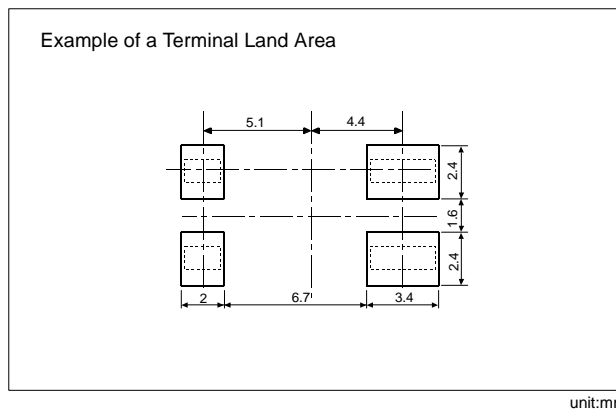
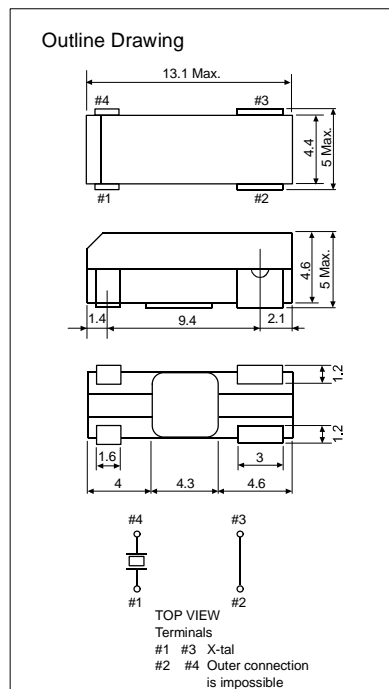
Type			XTL-27
Nominal frequency range	Fundamental	AT-cut	3.579545~40.000 MHz
		BT-cut	30.000~40.000 MHz
	3rd overtone	(AT-cut)	30.000~90.000 MHz
Frequency tolerance (at+25 °C)※1	MG3A1		±100x10 <sup>-6</sup>
	MG3A2		±50x10 <sup>-6</sup>
Temperature stability※2			±100x10 <sup>-6</sup> over -10 ~ +70°C
Storage temperature range			-40 ~ +90°C
Resonance resistance			See Table 2
Load capacitance			12 pF, 16 pF, series (00:spec. code)
Shunt capacitance			5pF Max.
Level of drive			100 μW Max.
Condition of reflow soldering			See Fig. 1.
Crystal cut			AT-cut, BT-cut

Notes: ※1.Consult us for other specification.  
 ※2.Does not include frequency tolerance.

● **Table 1 Frequency-Temperature Tolerance (Ref. to +25 °C)**

	Tolerance (x10 <sup>-6</sup> )										
	±3.0	±5.0	±7.5	±10	±15	±20	±30	±50	±100	※ ±20 -80	
0 ~ +50 °C	●	○	○	○	○	○	○	○	○	○	
-10 ~ +50 °C		○	○	○	○	○	○	○	○	○	
-10 ~ +60 °C		○	○	○	○	○	○	○	○	○	●
-10 ~ +70 °C			○	○	○	○	○	●	●		
-20 ~ +70 °C				○	○	○	○	○	○		
-30 ~ +75 °C					○	○	○	○	○		
-30 ~ +80 °C					○	○	○	○	○		
-35 ~ +80 °C						○	○	○	○		
-40 ~ +85 °C						○	○	○	○		

Practicability: ● recommended, ○ suppliable, ※ BT-cut crystal



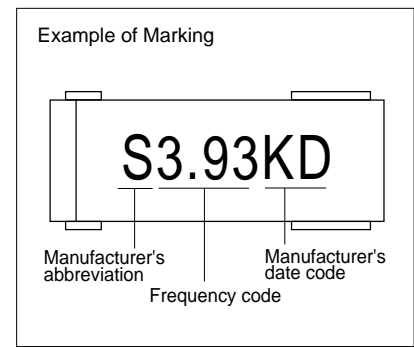
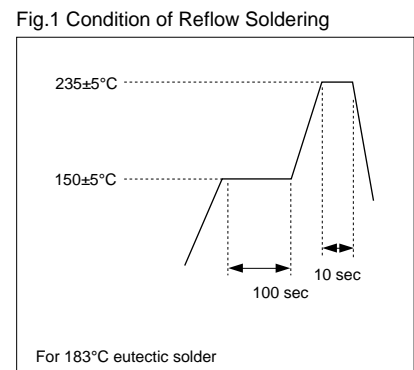
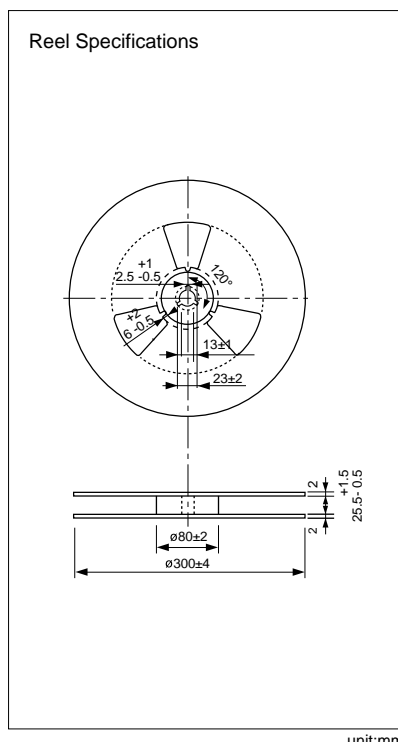
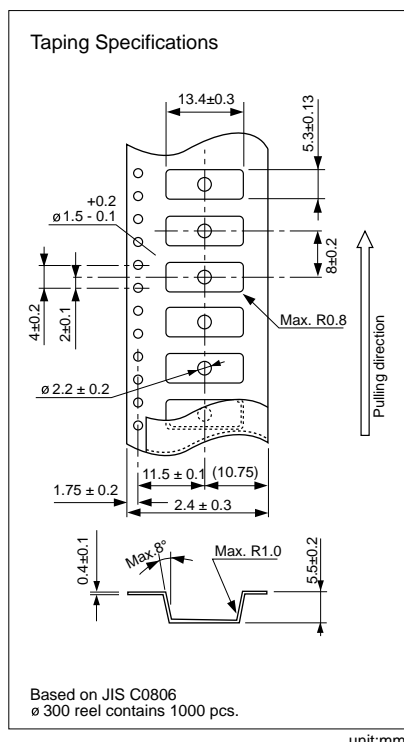


## CRYSTAL Units

### MG3A Crystal Unit SMD

Table 2 Recommended Frequencies and Max. Resonance Resistance (MG3A)

Nominal frequency (MHz) Fundamental (AT-cut)	Resonance resistance (Ω)	Nominal frequency (MHz)	Resonance resistance (Ω)	Nominal frequency (MHz)	Resonance resistance (Ω)
3.579545	200	10.000	50	21.250	25
3.6864	200	10.185	50	22.1184	25
3.840	200	10.240	50	22.5792	25
3.93216	200	10.245	50	23.592	25
4.000	150	10.260	50	24.000	25
4.032	150	10.715034	50	24.576	25
4.194304	150	10.752	50	25.07812	25
4.433619	150	11.000	50	25.174825	25
4.435571	150	11.0592	50	25.42657	25
4.500	120	11.454544	50	25.600	25
4.800	120	12.000	50	25.750	25
4.9152	120	12.288	50	28.322	25
5.000	100	12.58291	50	29.4912	25
5.068	100	12.800	50		
5.120	100	13.000	35		
5.369318	100	13.500	35	(BT-cut)	
5.5296	100	13.5168	35	32.000	20
5.727272	100	14.7456	35	36.000	20
6.000	80	14.9015	35	40.000	20
6.048	80	15.000	35		
6.144	80	15.360	35	3rd overtone(AT-cut)	
6.176	80	16.000	35	36.000	60
6.400	80	16.044	35	38.00053	60
6.500	80	16.384	35	40.000	60
6.5536	80	17.445	35	48.000	60
				50.000	60
7.000	80	17.600	35	66.666	60
7.15909	80	17.734475	35	80.000	60
7.200	80	18.355	35	82.705	60
7.3728	80	18.432	35		
7.680	80	18.8696	35		
7.776	80	19.069908	25		
7.948	80	19.06993	25		
7.980	80	19.200	25		
8.000	80	19.3125	25		
8.192	80	19.401256	25		
8.867238	80	19.6608	25		
9.216	60	20.000	25		
9.534765	60	20.945	25		
9.600	60	21.145	25		
9.656525	60	21.245	25		





# CRYSTAL UNITS

## (SMD TYPE - Ceramic)

● **Application**

Radio communication, Audio-visual equipment, Office automation equipment, Consumer product,.....

● **Specification**

Frequency range	See table 1
Vibration mode	AT cut: fundamental, third, fifth
Frequency tolerance at 25°C	±10, ±15, ±20, ±30, ±50 PPM
Operating temperature range and frequency stability	See Table 2
Equivalent series resistance	See Table 1
Shunt capacitance	7.0p F max or special
Measure instrument	S&A 350A(PI) system
Load capacitance	Series, 16, 20, 30pF or special
Drive level	10, 100, 300, 1000uW or special
Insulation resistance	500MΩmin/DC 100V
Aging	±1, 3, 5PPM/year

● **Table 1/Frequency range & Equivalent series resistance**

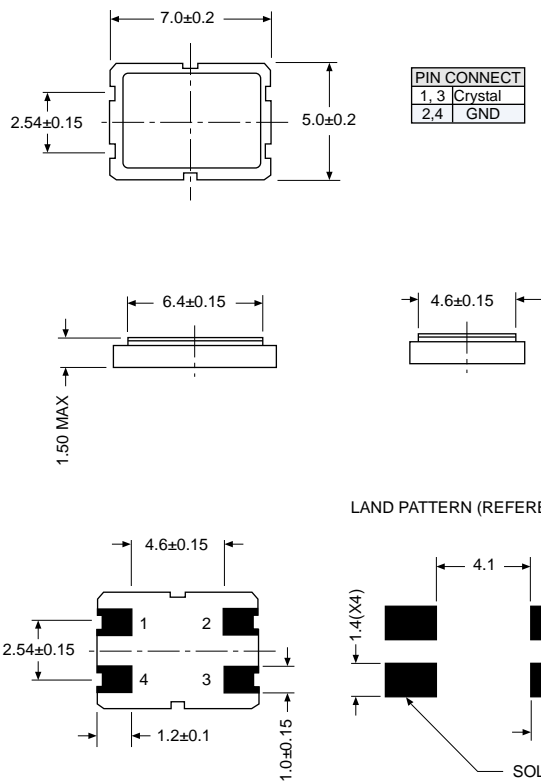
Frequency (MHz)	Vibration mode	SX-7050 (Ω)	SX-6035 (Ω)
8.0 ~ 9.9	Fundamental/F	60	
10.0 ~ 11.9	Fundamental/F	40	80
12.0 ~ 14.9	Fundamental/F	40	60
15.0 ~ 40.0	Fundamental/F	30	50
30.0 ~ 79.9	Third/O3	80	90
80.0 ~ 100.0	Third/O3	80	90
90.0 ~ 160.0	Fifth/O5	120	150

● **Table 2 / Operating temperature range and frequency stability**

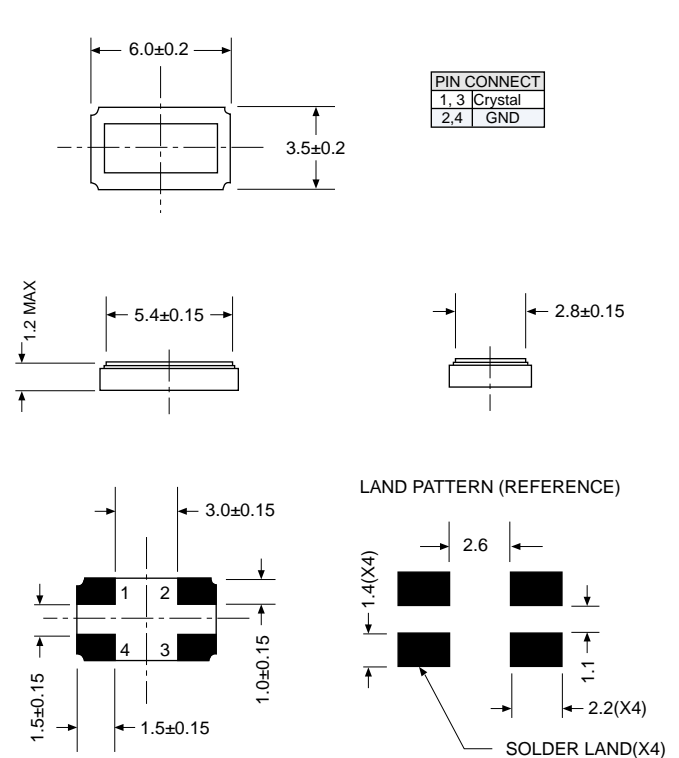
TEMP. \ PPM	PPM				
	±5	±10	±20	±30	±50
-0 ~ +50°C	○	○	○	○	○
-10 ~ +60°C	○	○	○	○	○
-20 ~ +70°C		○	○	○	○
-30 ~ +80°C			○	○	○
-40 ~ +90°C				○	○

● **Dimension & Land pattern (unit: mm)**

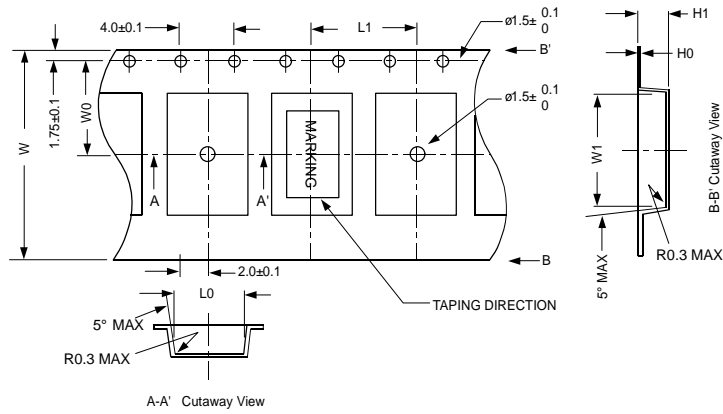
**SX-7050**



**SX-6035(CS7B)**

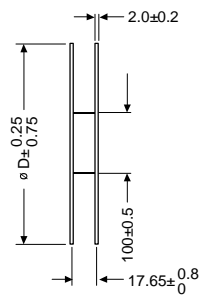
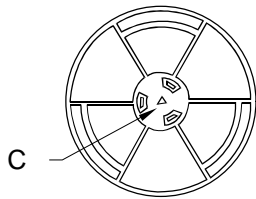


• Tape specification

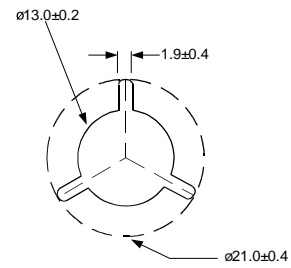


Symbol	Dimension tolerance (mm)		
	SX-7050	SX-6035	
W	16.0 ± 0.3	12.0 ± 0.3	
W0	7.5 ± 0.1	5.5 ± 0.1	
W1	7.4 ± 0.1	6.5 ± 0.1	
L0	5.4 ± 0.1	4.1 ± 0.1	
L1	8.0 ± 0.1	8.0 ± 0.1	
H0	0.3 ± 0.05	0.3 ± 0.05	
H1	1.9 ± 0.1	2.0 ± 0.1	

• Reel specification

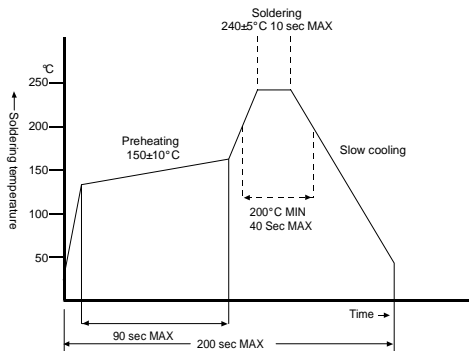


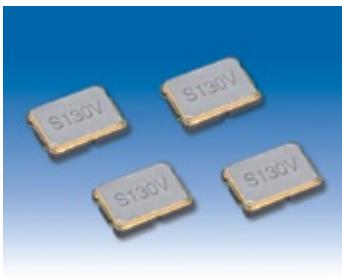
C ENLARGE



øD	MATERIAL
300	PAPIER-MACHE
330	PLASTICS

• Solder reflow diagram





# CRYSTAL UNITS

## SX-5032(CS9B) (SMD TYPE - Ceramic)

- Application

PHS, Cellular phones, Cordless telephones, Pagers.

- Features

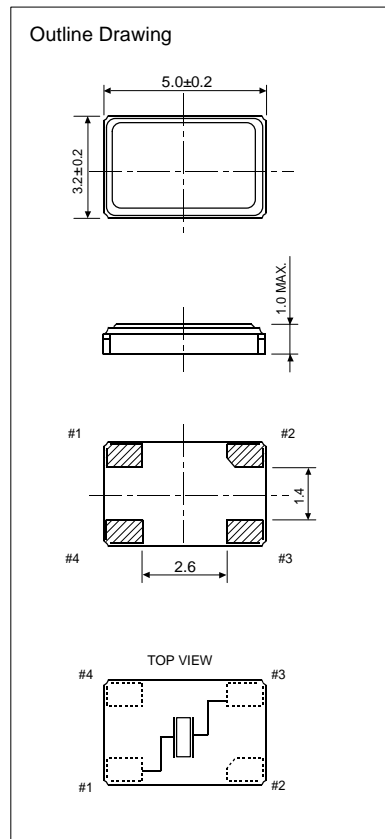
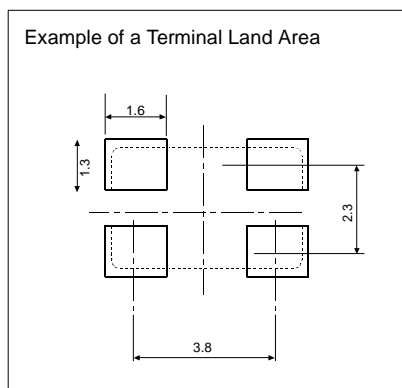
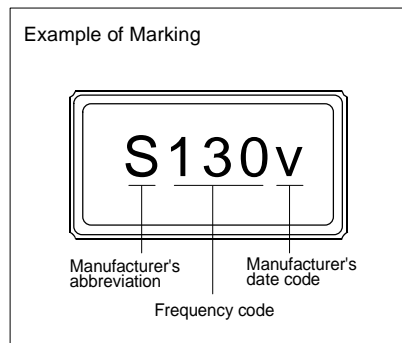
The CS9B is an ultra-compact and ultra-thin version of surface mounting type. A highly-reliable Seam-weld sealing is adopted to assure high realization and reflow soldering is possible.

- Specification

Frequency range	12.600 ~ 30.000MHz
Vibration mode	Fundamental
Load capacitance	Series, 10 pF, 12 pF, 16 pF
Level of drive	10 $\mu$ W(100 $\mu$ W MAX.)
Temperature Stability	$\pm$ 10 ppm
Equivalent series resistance	40 $\Omega$
Frequency tolerance(@25 °C)	$\pm$ 10 ppm
Operating temp. range	-10 ~ 60 °C
Storage temp. range	-40 ~ 90 °C

Consult us for other specification.

- Dimension & Land pattern (unit: mm)



- CS9B Frequency range and ESR specification

AT cut Fundamental	
Freq. range (MHz)	ESR ( $\Omega$ )
12.600000	40
12.800000	40
13.000000	40
14.400000	40
19.200000	40
19.680000	40
20.657500	40
20.945000	40

