

# Quartz Crystals

**M49**

[ 12.4 \* 4.5 \* 4.0 mm ]

**ML49**

[ 12.4 \* 4.5 \* 3.0 mm ]

Surface Mount Crystals

Fundamental

3rd Overtone

Min.

3 MHz

Max.

100 MHz

## Features

### Specifications

- Withstands solder reflow and available in EIA-481A tape and reel
- AT-strip crystal inside. Optimized for low spurious.
- Lowest cost among all Mercury SMD crystals



## General Specifications

Item / Type	M49 ( 12.4 * 4.5 * 4.0mm ) series	ML49 ( 12.4 * 4.5 * 3.0mm ) series
Frequency Range & Crystal Cut	3.000 ~ 48.000 MHz , AT-cut , Fundamental Mode ( see Table 1 ) 27.000 ~ 100.000 MHz , AT-cut , 3rd overtone ( see Table 1 )	
Load Capacitance	Series or Parallel ( 8 to 32 pF ) resonance	
Drive Level	100μ W typical ( 500μ W max. )	
Frequency Tolerance	± 10 ppm , ± 20 ppm or ± 30 ppm ( max. ) at 25°C	
Frequency Stability	See Table 2	
Aging	ΔF / F : ±3 ppm / year ( max. )	
Storage Temperature Range	- 50°C to 105°C	

Table 1

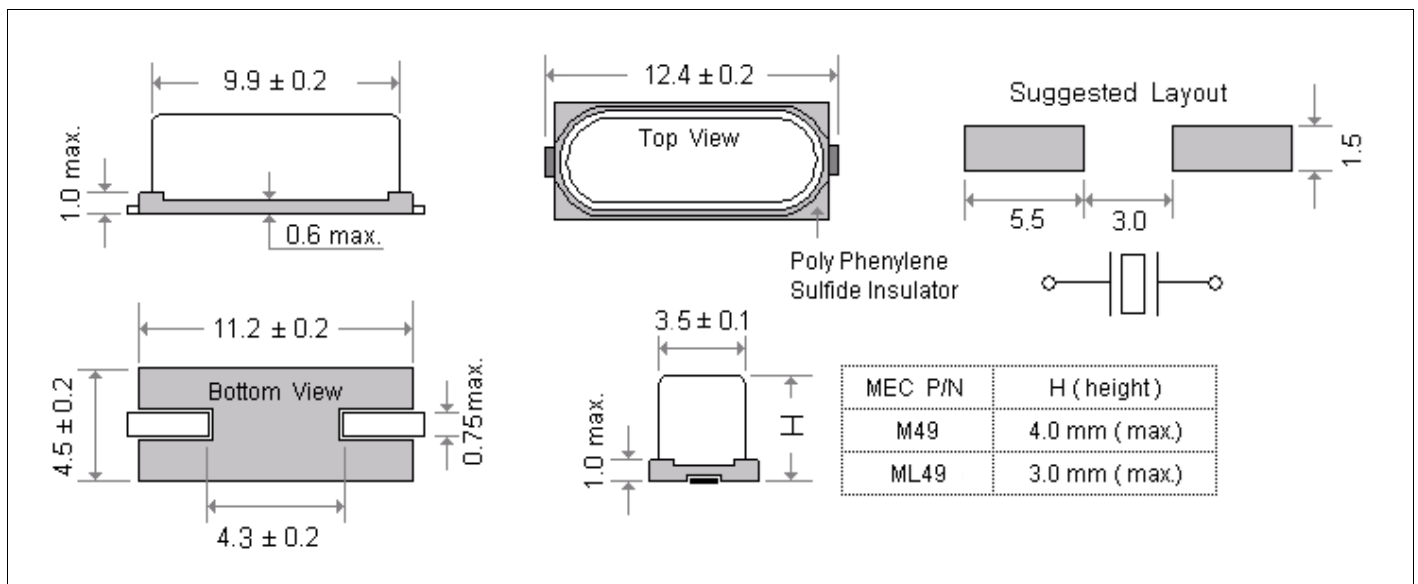
ESR ( Equivalent Series Resistance )					
Freq.(MHz)	E.S.R.	Osc. Mode	Freq.(MHz)	E.S.R.	Osc. Mode
3.0 ~ 3.4	300 Ω	AT , Fund.	27.0 ~ 30.0	150 Ω	AT , 3rd
3.5 ~ 6.0	120 Ω		30.1 ~ 50.0	100 Ω	
6.1 ~ 10.0	60 Ω		50.1 ~ 100.0	80 Ω	
10.1 ~ 48.0	40 Ω				

Table 2

Frequency stability Vs Operating temperature range						
Stability code	Temp. (°C) \ ppm	± 10	± 15	± 20	± 25	± 30
X	-10 to 60°C	○	○	○	○	○
Y	-20 to 70°C	▲	○	○	○	○
I	-40 to 85°C		○	○	○	○

○ : available ; ▲ : contact Mercury

## Outline Dimensions ( Unit : mm )



Mercury [www.mercury-crystal.com](http://www.mercury-crystal.com)

■ Taiwan : Tel: (+886)-2-2406-2779 / sales-tw@mercury-crystal.com

■ USA : Tel: (+1)-909-466-0427 / sales-us@mercury-crystal.com

■ China : Tel: (+86)-512-5763-8100 / sales-cn@mercury-crystal.com

# Part Number Formats and Product Marking Rules

## Quartz Crystals

### Holder Type

SMD type :	X11	X21	X22	X32	X42	MJ	MF	MQ	M49	ML49	MP5	MP4	MP25	MP24
Dip type :	H49	HUS	HUSL	U1	U5	T38	T26							
Jacket type :	H49MJ	49TMJ	U1MJ	U5MJ	T26MJ									
Gull wing :	H49SM	49TSM	U1SM	U5SM	T26SM									

### Part Number Format

	[ 1 ] Holder Type	-	[ 2 ] Center Freq.	-	[ 3 ] CL	-	[ 4 ] Freq. Tolerance	/	[ 5 ] Freq. Stability	[ 6 ] Operating Temp. Range Code	/	[ 7 ] Special ESR
Example (1)	H49	-	40.000A3	-	12	-	30	/	30	X		
(2)	X32	-	26.000	-	16	-	30	/	30	X	/	20R
(3)	MJ	-	12.000	-	20	-	10	/	10	W		
(4)	M49	-	24.000	-	18	-	20	/	30	H	/	15R

- Ex (1) : H49 - 40.000A3 - 12 - 30 / 30 X [ 49/U type , 40.000MHz , AT-cut 3rd overtone , 12pF , ±30ppm ( 25°C ) , ±30ppm ( -10°C to 60°C ) ]  
 Ex (2) : X32 - 26.000 - 16 - 30 / 30 X / 20R [ X32 type , 26.000MHz , 16pF , ±30ppm ( 25°C ) , ±30ppm ( -10°C to 60°C ) , 20 Ω ]  
 Ex (3) : MJ - 12.000 - 20 - 10 / 10 W [ MJ type , 12.000MHz , 20pF , ±10ppm ( 25°C ) , ±10ppm ( 0°C to 50°C ) ]  
 Ex (4) : M49 - 24.000 - 18 - 20 / 30 H / 15R [ M49 type , 24.000MHz , 18pF , ±20ppm ( 25°C ) , ±30ppm ( -30°C to 85°C ) , 15 Ω ]

[ 1 ]	Holder Type										
[ 2 ]	Center frequency . Please add " A3 , A5 or B " after the " Freq. in MHz " for the quartz cut other options . Blank : AT-cut fund. mode ; A3 : AT-cut 3rd overtone ; A5 : AT-cut 5th overtone ; B : BT-cut fund. mode										
[ 3 ]	Load Capacitance ( CL ) : series ( spec. code is " S " ) or										
	Parallel ( If parallel , please specify CL value , typical CL ranges from 8 to 32 pF )										
	Available Options " V " = Vinyl sleeve around holder , " K " = 3rd lead at bottom center , " R " = On reel " G " = 3rd lead at top center , " I " = Teflon insulator at bottom										
[ 4 ]	Calibration tolerance value : freq. tolerance value ( at 25°C ) , industrial temp. range										
[ 5 ]	Frequency Stability , industrial temp. range										
[ 6 ]	Temp. Range	W	0°C ~ +50°C	X	-10°C ~ +60°C	Y	-20°C ~ +70°C	F	-30°C ~ +70°C	G	-10°C ~ +80°C
		H	-30°C ~ +85°C	I	-40°C ~ +85°C	J	-40°C ~ +90°C	K	-40°C ~ +105°C	M	-55°C ~ +105°C
	Options	N	-55°C ~ +125°C	Z	Customized						
[ 7 ]	If non-standard please enter the desired ESR ( Equivalent Series Resistance ) after " / " , for example " 20R " : 20Ω										

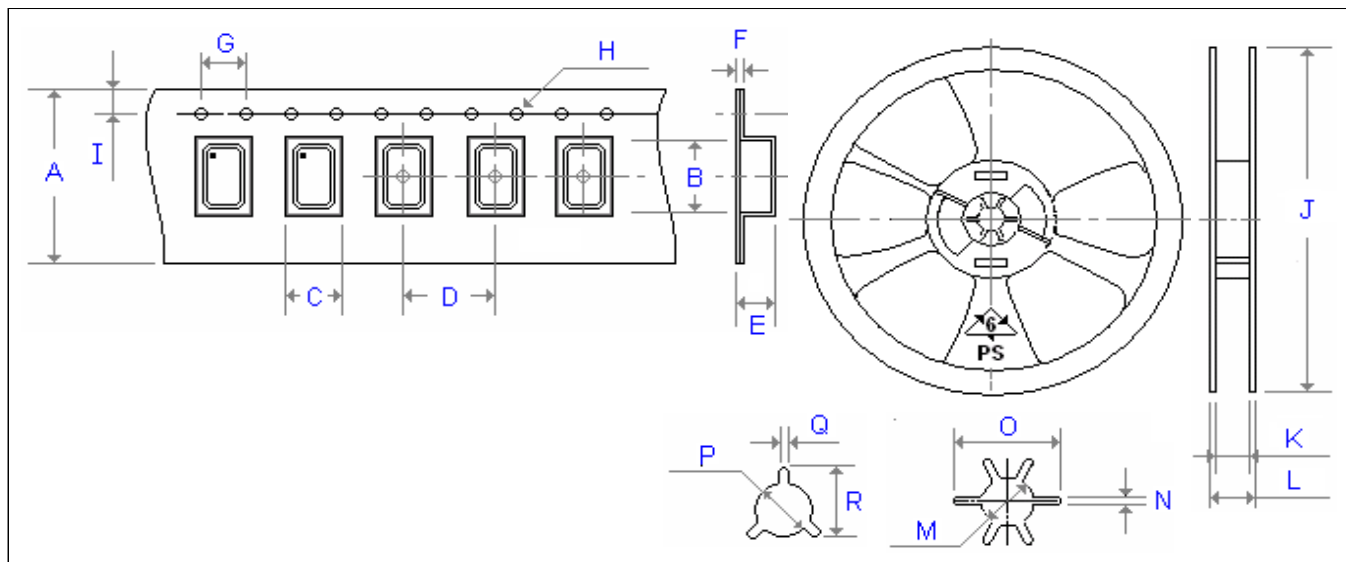
### Production Marking Rules

General X'tal package type marking rules	MQ, MF, MJ, X42 marking rules	X22, X32 marking rules																																																												
<p>( Cutting method ) :                      A : AT-cut (fundamental)                      B : BT-cut (fundamental)                      3 : AT-cut (3rd overtone)                      5 : AT-cut (5th overtone)</p> <p>Lot code :                      ( month ) : Table 2                      ( Year ) :                      ex : 2020 --- 0                      2021 --- 1</p> <p>Load capacitance (CL) : Table 1</p>	<p>Mercury Logo</p> <p>( Cutting method ) :                      A : AT-cut , fundamental                      B : BT-cut , fundamental                      3 : AT-cut , 3rd overtone                      5 : AT-cut , 5rd overtone</p> <p>Lot code :                      ( Month ) --- Table 2                      ( Year ) --- 2020 --- 0</p> <p>Load capacitance (CL) : Table 1</p>	<p>Mercury Logo</p> <p>( Month ) --- Table 2                      ( Year ) 2020 --- 0                      2021 --- 1</p> <p>Load capacitance (CL) : Table 1</p>																																																												
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## Emboss Taping and Reel Specifications

[ Crystal Units ]

[ M . C . F . Units ]



Carrier Type Dimensions ( unit : mm )

	A	B	C	D	E	F	G	H	I	pcs / reel
X11	8.0	1.8	1.4	4.0	0.5	0.3	4.0	Ø 1.55	1.75	3000
X21	8.0	2.3	1.9	4.0	0.6	0.2	4.0	Ø 1.50	1.75	3000
X22	8.0	2.7	2.3	4.0	1.2	0.3	4.0	Ø 1.50	1.75	3000
X32	8.0	3.4	2.7	4.0	1.4	0.3	4.0	Ø 1.50	1.75	3000
X42	12.0	4.3	2.8	8.0	1.0	0.3	4.0	Ø 1.55	1.75	1000
X2012	8.0	2.3	1.5	4.0	0.8	0.3	4.0	Ø 1.50	1.75	3000
X3215	12.0	3.4	1.7	4.0	1.0	0.3	4.0	Ø 1.50	1.75	3000
MJ	12.0	5.3	3.6	8.0	1.4	0.3	4.0	Ø 1.55	1.75	1000
MF	16.0	6.3	3.8	8.0	1.4	0.3	4.0	Ø 1.50	1.75	1000
MQ	16.0	7.2	5.4	8.0	1.8	0.3	4.0	Ø 1.55	1.75	1000
M49	24.0	15.0	5.0	12.0	4.3	0.4	4.0	Ø 1.55	1.75	1000
ML49	24.0	14.8	5.0	12.0	3.5	0.4	4.0	Ø 1.55	1.75	1000
MP4 ( 24 )	24.0	13.3	5.1	12.0	4.2	0.4	4.0	Ø 1.55	1.75	1000
MP5 ( 25 )	24.0	13.4	5.1	12.0	5.2	0.4	4.0	Ø 1.55	1.75	1000

Reel Dimensions ( unit : mm )

	J	K	L	M	N	O	P	Q	R	pcs / reel
X11	180.0	9.0	12.0	-	-	-	13.2	2.1	-	3000
X21	180.0	9.0	12.0	-	-	-	13.2	2.1	-	3000
X22	180.0	9.0	12.0	-	-	-	13.2	2.1	-	3000
X32	180.0	9.0	12.0	-	-	-	13.2	2.1	-	3000
X42	180.0	13.0	16.0	-	-	-	13.2	2.5	-	1000
X2012	180.0	9.0	11.4	-	-	-	13.0	2.0	21.0	3000
X3215	180.0	13.0	15.4	-	-	-	13.0	-	-	3000
MJ	180.0	13.0	16.0	-	-	-	13.2	2.5	-	1000
MF	180.0	17.2	19.3	-	-	-	13.3	2.2	22.0	1000
MQ	180.0	17.2	19.3	-	-	-	13.3	2.2	22.0	1000
M49	330.0	25.0	30.0	-	-	-	13.4	2.5	19.5	1000
ML49	330.0	25.0	30.0	-	-	-	13.4	2.5	19.5	1000
MP4 ( 24 )	330.0	25.0	30.0	-	-	-	13.4	2.5	19.5	1000
MP5 ( 25 )	330.0	25.0	30.0	-	-	-	13.4	2.5	19.5	1000