

# Quartz Crystals

## M49 , ML49

[ 12.4 \* 4.5 \* 4.0 ( 3.0 ) mm ]

## MP4 , MP5

[ 12.9 \* 4.5 \* 5.0 ( 4.0 ) mm ]

## MP24 , MP25

[ 11.4 \* 5.0 \* 5.0 ( 4.0 ) mm ]

SMD

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
- Designed for top board assembly and an one time solder reflow only
- Do not mount with the metal housing downward



### General Specifications

Item / Type	M49 ( 12.4 * 4.5 * 4.0mm ) series	MP4 ( 12.9 * 4.5 * 4.0 mm ) series	MP5 ( 12.9 * 4.5 * 5.0 mm ) series
	ML49 ( 12.4 * 4.5 * 3.0mm ) series	MP24 ( 11.4 * 5.0 * 4.0 mm ) series	MP25 ( 11.4 * 5.0 * 5.0 mm ) 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	100 μW ( typ. ) 500 μW ( 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 )

[ M49 ] ; [ ML49 ]	[ MP4 ] ; [ MP5 ]	[ MP24 ] ; [ MP25 ]																		
<p>Side View Top View Bottom View Suggested Layout</p> <p>Poly Phenylene Sulfide Insulator</p> <table border="1"> <thead> <tr> <th>MEC P/N</th> <th>H ( height )</th> </tr> </thead> <tbody> <tr> <td>M 49</td> <td>4.0 mm ( max. )</td> </tr> <tr> <td>ML 49</td> <td>3.0 mm ( max. )</td> </tr> </tbody> </table>	MEC P/N	H ( height )	M 49	4.0 mm ( max. )	ML 49	3.0 mm ( max. )	<p>Side View Top View Bottom View Suggested Layout</p> <p>Plastic molded base Lead frame contacts</p> <table border="1"> <thead> <tr> <th>MEC P/N</th> <th>H ( height )</th> </tr> </thead> <tbody> <tr> <td>MP 5</td> <td>5.0 mm ( max. )</td> </tr> <tr> <td>MP 4</td> <td>4.0 mm ( max. )</td> </tr> </tbody> </table>	MEC P/N	H ( height )	MP 5	5.0 mm ( max. )	MP 4	4.0 mm ( max. )	<p>Side View Top View Bottom View Suggested Layout</p> <p>Plastic molded base Lead frame contacts</p> <table border="1"> <thead> <tr> <th>MEC P/N</th> <th>H ( height )</th> </tr> </thead> <tbody> <tr> <td>MP 25</td> <td>5.0 mm ( max. )</td> </tr> <tr> <td>MP 24</td> <td>4.0 mm ( max. )</td> </tr> </tbody> </table>	MEC P/N	H ( height )	MP 25	5.0 mm ( max. )	MP 24	4.0 mm ( max. )
MEC P/N	H ( height )																			
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MP 25	5.0 mm ( max. )																			
MP 24	4.0 mm ( max. )																			

# Part Number Formats and Product Marking Rules

## Quartz Crystals

### Holder Type

SMD type :	X11	X21	X22	X32	MJ	MQ	M49	ML49	MP5	MP4	MP25	MP24
	X2012	X3215										
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 Options																														
	<table border="1"> <tr> <td>W</td> <td>0°C ~ +50°C</td> <td>X</td> <td>-10°C ~ +60°C</td> <td>Y</td> <td>-20°C ~ +70°C</td> <td>F</td> <td>-30°C ~ +70°C</td> <td>G</td> <td>-10°C ~ +80°C</td> </tr> <tr> <td>H</td> <td>-30°C ~ +85°C</td> <td>I</td> <td>-40°C ~ +85°C</td> <td>J</td> <td>-40°C ~ +90°C</td> <td>K</td> <td>-40°C ~ +105°C</td> <td>M</td> <td>-55°C ~ +105°C</td> </tr> <tr> <td>N</td> <td>-55°C ~ +125°C</td> <td>Z</td> <td>Customized</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	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	N	-55°C ~ +125°C	Z	Customized						
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																						
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, MJ 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 )                      C : CT-cut ( fundamental )                      SL : SL-cut ( fundamental )                      SC : SC-cut ( 3rd overtone )</p>	<p>( Cutting method ) :                      A : AT-cut , fundamental                      B : BT-cut , fundamental                      3 : AT-cut , 3rd overtone                      5 : AT-cut , 5rd overtone</p>	
<h4>X11 marking rules</h4>		<h4>X21 marking rules</h4>

CL	< 10	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	>34	Series
Code	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	a	b

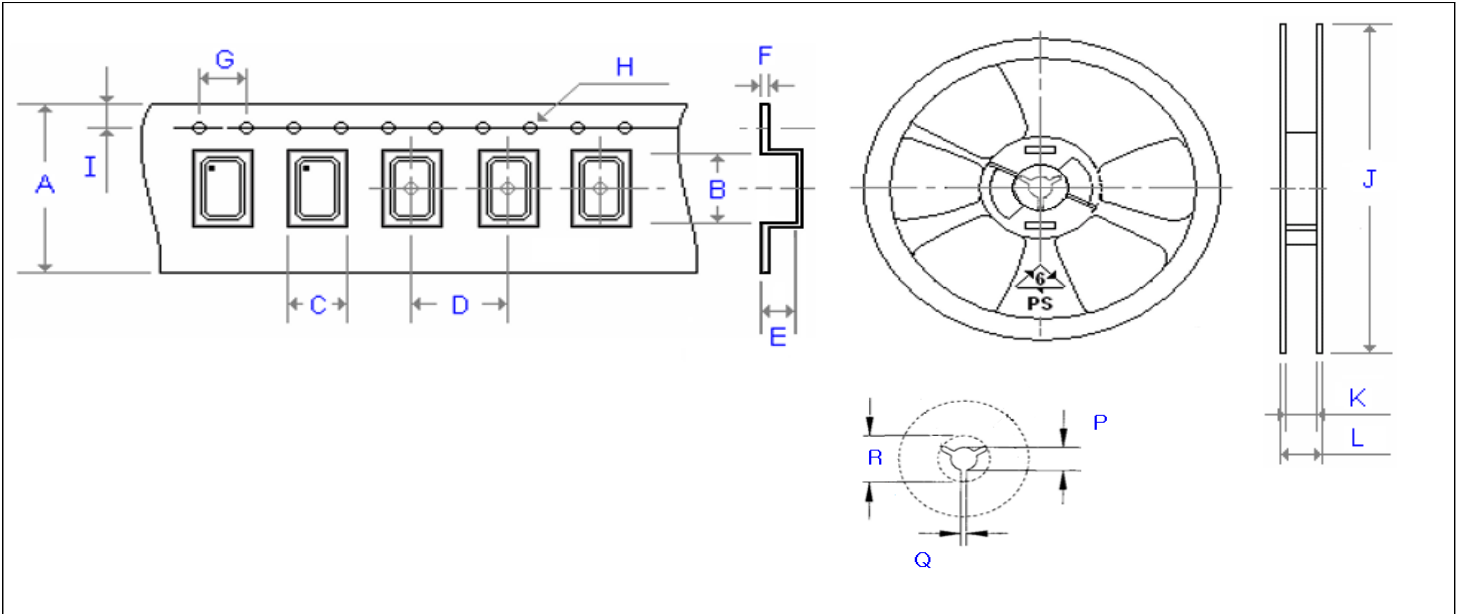
  

Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Code	A	B	C	D	E	F	G	H	I	J	K	L

# Emboss Taping and Reel Specifications

[ Crystal Units ]

[ M . C . F . Units ]



Carrier Type Dimensions ( unit : mm ) ±0.3mm

	A	B	C	D	E	F	G	H	I	pcs / reel
X11	8.00	1.79	1.39	4.00	0.45	0.25	4.00	∅ 1.50	1.75	3000
X21	8.00	2.30	1.90	4.00	0.60	0.20	4.00	∅ 1.50	1.75	3000
X22	8.00	2.80	2.25	4.00	1.10	0.30	4.00	∅ 1.50	1.75	3000
X32	8.00	3.40	2.70	4.00	1.40	0.25	4.00	∅ 1.50	1.75	3000
X2012	8.00	2.25	1.45	4.00	0.75	0.25	4.00	∅ 1.50	1.75	3000
X3215	12.00	3.40	1.75	4.00	0.87	0.32	4.00	∅ 1.50	1.75	3000
MJ	12.00	5.30	3.60	8.00	1.40	0.30	4.00	∅ 1.50	1.75	1000
MQ	16.00	7.20	5.40	8.00	1.80	0.30	4.00	∅ 1.50	1.75	1000
M49	24.00	15.00	5.00	12.00	4.25	0.40	4.00	∅ 1.50	1.75	1000
ML49	24.00	14.80	5.00	12.00	3.50	0.40	4.00	∅ 1.50	1.75	1000
MP4 ( 24 )	24.00	13.30	5.10	12.00	4.20	0.40	4.00	∅ 1.50	1.75	1000
MP5 ( 25 )	24.00	13.40	5.10	12.00	5.20	0.40	4.00	∅ 1.50	1.75	1000

Reel Dimensions ( unit : mm ) ±2mm

	J	K	L	P	Q	R	pcs / reel
X11	180.00	8.40	11.40	13.00	2.50	20.20	3000
X21	180.00	8.40	11.40	13.00	2.50	20.20	3000
X22	180.00	8.40	11.40	13.00	2.50	20.20	3000
X32	180.00	9.00	12.00	13.00	2.50	20.20	3000
X2012	180.00	9.00	11.40	13.00	2.50	20.20	3000
X3215	180.00	13.00	15.40	13.00	2.50	20.20	3000
MJ	180.00	13.00	16.00	13.00	2.50	20.20	1000
MQ	180.00	17.20	19.30	13.00	2.50	20.20	1000
M49	330.00	24.50	29.10	13.00	2.50	20.20	1000
ML49	330.00	24.50	29.10	13.00	2.50	20.20	1000
MP4 ( 24 )	330.00	24.50	29.10	13.00	2.50	20.20	1000
MP5 ( 25 )	330.00	24.50	29.10	13.00	2.50	20.20	1000