

# Quartz Crystals

<b>X42</b>	<b>MJ</b>	<b>MF</b>	<b>MQ</b>	<b>Surface Mount</b>	<b>X42, MJ, MF, MQ</b>	<b>Fundamental</b>	<b>MJ, MQ</b>
4.0 * 2.5 * 0.7 mm	5.0 * 3.2 * 0.75 mm	6.0 * 3.5 * 1.0 mm	7.0 * 5.0 * 1.0 mm			<b>Fundamental</b>	<b>3rd Overtone</b>

## Features

### Specifications

- Exhibits extremely low aging with a high shock and vibration resistance
- The entire package can be grounded via the top metal lid and the two bottom pads
- This low 0.7mm package height is ideal for height constrained applications



## General Specifications

Item / Type	X42 series	MJ series	MF series	MQ series
Package Dimensions	( 4.0 * 2.5 * 0.7 mm )	( 5.0 * 3.2 * 0.75 mm )	( 6.0 * 3.5 * 1.0 mm )	( 7.0 * 5.0 * 1.0 mm )
Frequency Range	12.0 ~ 54.0 MHz ( Fund. ) 40.0 ~ 200.0 MHz ( 3rd )	8.0 ~ 52.0 MHz ( Fund. ) 40.0 ~ 125.0 MHz ( 3rd )	8.0 ~ 50.0 MHz ( Fund. ) 40.0 ~ 125.0 MHz ( 3rd )	6.0 ~ 50.0 MHz ( Fund. ) 40.0 ~ 200.0 MHz ( 3rd )
Crystal Cut	AT - Cut ; 3rd overtone			
Load Capacitance	Series or Parallel ( 8 to 32 pF ) resonance			
Drive Level	10 $\mu$ W typical ( 100 $\mu$ W max. )			
Frequency Tolerance	$\pm$ 10 ppm , $\pm$ 20 ppm or $\pm$ 30 ppm ( max. ) at 25°C			
Aging	$\Delta$ F / F : $\pm$ 3 ppm / year ( max. )			
Storage Temp. Range	- 50°C to 105°C			

## ESR ( Equivalent Series Resistance )

X42			MJ			MF			MQ		
Freq. ( MHz )	E.S.R.	Mode	Freq. ( MHz )	E.S.R.	Mode	Freq. ( MHz )	E.S.R.	Mode	Freq. ( MHz )	E.S.R.	Mode
12.0 ~ 14.9 MHz	80 $\Omega$	Fund.	8.0 ~ 9.9 MHz	150 $\Omega$	Fund.	8.0 ~ 11.9	80 $\Omega$	Fund.	6.0 ~ 8.0	80 $\Omega$	Fund.
15.0 ~ 29.9 MHz	50 $\Omega$		10.0 ~ 14.9 MHz	80 $\Omega$		12.0 ~ 15.9	60 $\Omega$		8.1 ~ 11.0	60 $\Omega$	
30.0 ~ 54.0 MHz	40 $\Omega$		15.0 ~ 19.9 MHz	50 $\Omega$		16.0 ~ 50.0	40 $\Omega$		11.1 ~ 14.0	50 $\Omega$	
			20.0 ~ 52.0 MHz	40 $\Omega$		40.1 ~ 50.0	80 $\Omega$		14.1 ~ 50.0	40 $\Omega$	
40.0 ~ 200.0 MHz	80 $\Omega$	3rd	40.1 ~ 50.0	80 $\Omega$	3rd	50.1 ~ 200.0	90 $\Omega$	3rd			

## Frequency stability Vs Operating temperature range

Frequency stability vs Operating temperature range							
Stability code	Temp. (°C) \ ppm	$\pm$ 5	$\pm$ 10	$\pm$ 15	$\pm$ 20	$\pm$ 25	$\pm$ 30
X	-10 to 60°C	○	○	○	○	○	○
Y	-20 to 70°C	▲	○	○	○	○	○
I	-40 to 85°C			○	○	○	○

○ : available

▲ : contact Mercury

## Outline Dimensions ( Unit : mm )

X42	MJ	MF	MQ
<p>Top View: 4.0 <math>\pm</math> 0.1 mm width, 2.5 <math>\pm</math> 0.1 mm height, 0.7 mm height.</p> <p>Bottom View: Pad 1, 3: Crystal; Pad 2, 4: Ground. Chamfered pad is pad No. 2.</p> <p>Suggested Layout: 1.4 mm spacing, 1.6 mm total width.</p>	<p>Top View: 5.0 <math>\pm</math> 0.1 mm width, 3.2 <math>\pm</math> 0.1 mm height, 0.75 mm height.</p> <p>Bottom View: Pad 1, 3: Crystal; Pad 2, 4: Ground. Chamfered pad is pad No. 2.</p> <p>Suggested Layout: 1.9 mm spacing, 2.3 mm total width.</p>	<p>Top View: 6.0 <math>\pm</math> 0.1 mm width, 3.5 <math>\pm</math> 0.1 mm height, 1.0 mm height.</p> <p>Bottom View: Pad 1, 3: Crystal; Pad 2, 4: Ground. Chamfered pad is pad No. 3.</p> <p>Suggested Layout: 1.9 mm spacing, 2.4 mm total width.</p>	<p>Top View: 7.0 <math>\pm</math> 0.2 mm width, 5.0 <math>\pm</math> 0.2 mm height, 1.0 mm height.</p> <p>Bottom View: Pad 1, 3: Crystal; Pad 2, 4: Ground. Chamfered pad is pad No. 4.</p> <p>Suggested Layout: 2.2 mm spacing, 1.4 mm total width.</p>

# 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 [ 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 / 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 Y4 [ 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
[ 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 ) :  <b>A</b> : AT-cut (fundamental)  <b>B</b> : BT-cut (fundamental)  <b>3</b> : AT-cut (3rd overtone)  <b>5</b> : AT-cut (5th overtone)</p>	<p>( Cutting method ) :  <b>A</b> : AT-cut , fundamental  <b>B</b> : BT-cut , fundamental  <b>3</b> : AT-cut , 3rd overtone  <b>5</b> : AT-cut , 5rd overtone</p>	<p>X21 marking rules  </p>																																																												
<table border="1"> <tr> <th>Table 1</th> <th>CL</th> <th>&lt; 10</th> <th>10</th> <th>11</th> <th>12</th> <th>13</th> <th>14</th> <th>15</th> <th>16</th> <th>17</th> <th>18</th> <th>19</th> <th>20</th> <th>21</th> <th>22</th> <th>23</th> <th>24</th> <th>25</th> <th>26</th> <th>27</th> <th>28</th> <th>29</th> <th>30</th> <th>31</th> <th>32</th> <th>33</th> <th>34</th> <th>&gt;34</th> <th>Series</th> </tr> <tr> <td></td> <td>Code</td> <td>A</td> <td>B</td> <td>C</td> <td>D</td> <td>E</td> <td>F</td> <td>G</td> <td>H</td> <td>I</td> <td>J</td> <td>K</td> <td>L</td> <td>M</td> <td>N</td> <td>O</td> <td>P</td> <td>Q</td> <td>R</td> <td>S</td> <td>T</td> <td>U</td> <td>V</td> <td>W</td> <td>X</td> <td>Y</td> <td>Z</td> <td>a</td> <td>b</td> </tr> </table>	Table 1	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		
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<table border="1"> <tr> <th>Table 2</th> <th>Month</th> <th>Jan.</th> <th>Feb.</th> <th>Mar.</th> <th>Apr.</th> <th>May</th> <th>Jun.</th> <th>Jul.</th> <th>Aug.</th> <th>Sep.</th> <th>Oct.</th> <th>Nov.</th> <th>Dec.</th> </tr> <tr> <td></td> <td>Code</td> <td>A</td> <td>B</td> <td>C</td> <td>D</td> <td>E</td> <td>F</td> <td>G</td> <td>H</td> <td>I</td> <td>J</td> <td>K</td> <td>L</td> </tr> </table>	Table 2	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																																		
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