

# Quartz Crystals

**X11**  
[ 1.6 \* 1.2 \* 0.4 mm ]

**X21**  
[ 2.0 \* 1.6 \* 0.5 mm ]

**X22**  
[ 2.5 \* 2.0 \* 0.6 mm ]

**X32**  
[ 3.2 \* 2.5 \* 0.7 mm ]

**Surface Mount**

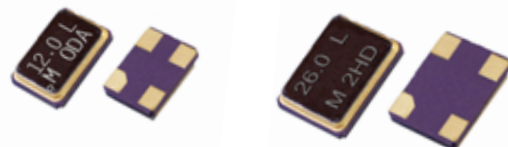
X11, X21, X22, X32  
**Fundamental**

X32  
**3rd Overtone**

**Features**

**Specifications**

- The entire package can be grounded via the top metal lid and the two bottom pads
- Small footprint. Ideal for space constrained applications
- Exhibits extremely low aging with a high shock & vibration resistance



**General Specifications**

| Item / Type                     | X11 ( 1.6 * 1.2 * 0.4 mm )                              | X21 ( 2.0 * 1.6 * 0.5 mm ) | X22 ( 2.5 * 2.0 * 0.6 mm ) | X32 ( 3.2 * 2.5 * 0.7 mm )                              |
|---------------------------------|---|----------------------------|----------------------------|---|
| Frequency Range                 | 24.0 ~ 48.0 MHz ( Fund. )                               | 20.0 ~ 54.0 MHz ( Fund. )  | 12.0 ~ 60.0 MHz ( Fund. )  | 8 ~ 54.0 MHz ( Fund. )<br>40 ~ 125 MHz ( 3rd Overtone ) |
| Crystal Cut // Load Capacitance | AT - Cut // Series or Parallel ( 8 to 32 pF ) resonance |                            |                            |   |
| Drive Level                     | 10 μ W typical ( 100μ W max. )                          |                            |                            |   |
| Frequency Tolerance             | ± 10 ppm , ± 20 ppm or ± 30 ppm ( max. ) at 25°C        |                            |                            |   |
| Aging                           | ΔF / F : ± 3 ppm / year ( max. )                        |                            |                            |   |
| Storage Temperature Range       | - 50°C to 105°C   |                            |                            |   |

**ESR ( Equivalent Series Resistance )**

| X11             |            | X21             |            | X22             |            | X32              |            |                 |
|-----------------|------------|-----------------|------------|-----------------|------------|------------------|------------|-----------------|
| Frequency Range | E. S. R.   | Frequency Range | E. S. R.   | Frequency Range | E. S. R.   | Frequency Range  | E. S. R.   | Oscillator Mode |
| 24.0 ~ 29.9 MHz | 120 Ω max. | 20.0 ~ 23.9 MHz | 120 Ω max. | 12.0 ~ 15.9 MHz | 300 Ω max. | 8.0 ~ 9.9 MHz    | 600 Ω max. | Fund. Mode      |
| 30.0 ~ 36.9 MHz | 100 Ω max. | 24.0 ~ 29.9 MHz | 100 Ω max. | 16.0 ~ 29.9 MHz | 100 Ω max. | 10.0 ~ 11.9 MHz  | 200 Ω max. |                 |
| 40.0 ~ 48.0 MHz | 80 Ω max.  | 30.0 ~ 37.9 MHz | 80 Ω max.  | 30.0 ~ 60.0 MHz | 70 Ω max.  | 12.0 ~ 29.9 MHz  | 100 Ω max. |                 |
|                 |            | 38.0 ~ 54.0 MHz | 60 Ω max.  |                 |            | 30.0 ~ 54.0 MHz  | 60 Ω max.  | 3rd Overtone    |
|                 |            |                 |            |                 |            | 40.0 ~ 200.0 MHz | 80 Ω max.  |                 |

**Frequency stability Vs Operating temperature range**

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

○ : available

▲ : contact Mercury

**Outline Dimensions ( Unit : mm )**

|  |  |
|--|--|
| <p style="text-align: center;"><b>X11</b></p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p><b>Top View</b></p> </div> <div style="text-align: center;"> <p><b>Bottom View</b></p> </div> <div style="text-align: center;"> <p><b>Suggested Layout</b></p> </div> </div> <p style="text-align: center;">Pad Connections :<br/>Pad 1 and 3 : Crystal<br/>Chamfered pad is pad No. 4</p>      | <p style="text-align: center;"><b>X21</b></p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p><b>Top View</b></p> </div> <div style="text-align: center;"> <p><b>Bottom View</b></p> </div> <div style="text-align: center;"> <p><b>Suggested Layout</b></p> </div> </div> <p style="text-align: center;">Pad Connections :<br/>Pad 1 and 3 : Crystal<br/>Chamfered pad is pad No. 2</p>      |
| <p style="text-align: center;"><b>X22</b></p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p><b>Top View</b></p> </div> <div style="text-align: center;"> <p><b>Bottom View</b></p> </div> <div style="text-align: center;"> <p><b>Suggested Layout</b></p> </div> </div> <p style="text-align: center;">Pad Connections :<br/>Pad 1 and 3 : Crystal<br/>Chamfered pad is pad No. 1 or 3</p> | <p style="text-align: center;"><b>X32</b></p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p><b>Top View</b></p> </div> <div style="text-align: center;"> <p><b>Bottom View</b></p> </div> <div style="text-align: center;"> <p><b>Suggested Layout</b></p> </div> </div> <p style="text-align: center;">Pad Connections :<br/>Pad 1 and 3 : Crystal<br/>Chamfered pad is pad No. 1 or 4</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 ]<br>Holder Type | - | [ 2 ]<br>Center Freq. | - | [ 3 ]<br>CL | - | [ 4 ]<br>Freq. Tolerance | / | [ 5 ]<br>Freq. Stability | [ 6 ]<br>Operating Temp. Range Code | / | [ 7 ]<br>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 .<br>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<br>Parallel ( If parallel , please specify CL value , typical CL ranges from 8 to 32 pF )<br>Available Options " V " = Vinyl sleeve around holder , " K " = 3rd lead at bottom center , " R " = On reel<br>" 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<br>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 ) :<br/> <b>A</b> : AT-cut (fundamental)<br/> <b>B</b> : BT-cut (fundamental)<br/> <b>3</b> : AT-cut (3rd overtone)<br/> <b>5</b> : AT-cut (5th overtone)</p>   | <p>( Cutting method ) :<br/> <b>A</b> : AT-cut , fundamental<br/> <b>B</b> : BT-cut , fundamental<br/> <b>3</b> : AT-cut , 3rd overtone<br/> <b>5</b> : AT-cut , 5rd overtone</p> | <p>X21 marking rules<br/> </p> |      |      |      |      |      |      |      |      |      |      |      |      |    |      |    |    |    |    |    |    |    |    |    |    |    |     |        |        |  |      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
| <table border="1"> <tr> <td>Table 1</td> <td>CL</td> <td>&lt; 10</td> <td>10</td> <td>11</td> <td>12</td> <td>13</td> <td>14</td> <td>15</td> <td>16</td> <td>17</td> <td>18</td> <td>19</td> <td>20</td> <td>21</td> <td>22</td> <td>23</td> <td>24</td> <td>25</td> <td>26</td> <td>27</td> <td>28</td> <td>29</td> <td>30</td> <td>31</td> <td>32</td> <td>33</td> <td>34</td> <td>&gt;34</td> <td>Series</td> </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 |  |  |
| 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      |        |  |      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
| <table border="1"> <tr> <td>Table 2</td> <td>Month</td> <td>Jan.</td> <td>Feb.</td> <td>Mar.</td> <td>Apr.</td> <td>May</td> <td>Jun.</td> <td>Jul.</td> <td>Aug.</td> <td>Sep.</td> <td>Oct.</td> <td>Nov.</td> <td>Dec.</td> </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   |        |        |  |      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |
| 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    |      |    |      |    |    |    |    |    |    |    |    |    |    |    |     |        |        |  |      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |