

Quartz Crystals

| Surface Mount | | Thru - Hole type | | 32.768 KHz | Frequency Tolerance options | | |
|--------------------------|------------------------|-------------------------|-------------------------|------------|-----------------------------|----------|----------|
| X2012 | X3215 | T26 | T38 | | ± 5 ppm | ± 10 ppm | ± 20 ppm |
| [2.05 * 1.2 * 0.55 mm] | [3.2 * 1.5 * 0.8 mm] | [2.0 ϕ * 6.0 mm] | [3.0 ϕ * 8.0 mm] | | | | |

Features

Specifications

Ultra compact, thin, and light weight tuning fork crystal unit

- Excellent heat resistance and environmental characteristics
- Excellent electrical performance optimum for mobile communications, OA (office automation) and AV (audiovisual) applications
- RoHS Compliant. Meets the re-flow profiling requirements using lead-free solder



General Specifications

| Frequency Range | 32.768 KHz | | | |
|------------------------------|--|---------------------------|---|-------------------------|
| Hold type | Surface Mount Type | | Thru - Hole Type | |
| Item / Type | X2012 | X3215 | T26 | T38 |
| Package sizes | [2.05 * 1.2 * 0.55 mm] | [3.2 * 1.5 * 0.8 mm] | [2.0 ϕ * 6.0 mm] | [3.0 ϕ * 8.0 mm] |
| Shunt Capacitance | 1.3 pF typ. / 1.5 pF max. | 1.0 pF typ. / 1.6 pF max. | 1.5 pF max. | 0.9 pF max. |
| Equivalent series resistance | 80 K Ω max. | | 40 K Ω max. | 35 K Ω max. |
| Temperature coefficient | - 0.04 x 10 ⁻⁶ / °C ² max. | | - 0.035 x 10 ⁻⁶ / °C ² max. | |
| Drive Level | 0.1 μ W typical (0.5 μ W max.) | | 1.0 μ W typical | |
| Operating Temperature Range | - 40 °C to 85 °C | | - 10 °C to 60 °C | |
| Storage Temperature Range | - 40 °C to 125 °C | | - 40 °C to 85 °C | |
| Crystal Cut | XT - Cut | | | |
| Load Capacitance | 7 pF , 9 pF or 12.5 pF | | | |
| Frequency Tolerance | ± 5 ppm , ± 10 ppm , ± 20 ppm (max.) at 25°C | | | |
| Turning POINT | + 25 °C ± 5 °C | | | |
| Insulation resistance | 500 M Ω min. | | | |

Outline Dimensions (Unit : mm)

| X2012 | X3215 |
|-------|-------|
| | |
| T26 | T38 |
| | |

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) : A : AT-cut (fundamental) B : BT-cut (fundamental) 3 : AT-cut (3rd overtone) 5 : AT-cut (5th overtone)</p> | <p>(Cutting method) : A : AT-cut , fundamental B : BT-cut , fundamental 3 : AT-cut , 3rd overtone 5 : AT-cut , 5rd overtone</p> | <p>X21 marking rules</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1"> <tr> <td>Table 1</td> <td>CL</td> <td>< 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>>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 | | |
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| <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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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