IoT OPTIMIZED LOW PROFILE QUARTZ CRYSTAL

ABM11W SERIES

FEATURES

- Optimized for energy saving wearables, and IoT applications
- Plated at exceptionally low plating capacitance, as low as 4pF, with optimized ESR
- 0.5 mm max height ideally suited for height constrained designs
- Seam sealed for longterm reliability

APPLICATIONS

- Wearables
- Internet of Things (IoT)
- Bluetooth/Bluetooth Low Energy (BLE)
- Wireless modules
- Machine-to-machine (M2M) connectivity
- Ultra-low power MCU
- Near Field Communication (NFC)
- ISM Band

STANDARD SPECIFICATIONS

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Minimum</th>
<th>Typical</th>
<th>Maximum</th>
<th>Units</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency Range</td>
<td>16.0000</td>
<td></td>
<td>50.0000</td>
<td>MHz</td>
<td></td>
</tr>
<tr>
<td>Operating Mode</td>
<td>Fundamental</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Temperature Range</td>
<td>-40</td>
<td></td>
<td>+125</td>
<td>°C</td>
<td>See options</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-55</td>
<td></td>
<td>+125</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>Frequency Tolerance @ +25°C</td>
<td>-10</td>
<td></td>
<td>+10</td>
<td>ppm</td>
<td>See options</td>
</tr>
<tr>
<td>Frequency Stability over the Operating Temperature (ref. to +25°C)</td>
<td>-10</td>
<td>+10</td>
<td>ppm</td>
<td>See options</td>
<td></td>
</tr>
<tr>
<td>Equivalent series resistance (R1) (over -40°C to +125°C)</td>
<td>&lt; 150</td>
<td>200</td>
<td>Ω</td>
<td>16.0000 – 17.9999MHz</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt; 80</td>
<td>120</td>
<td></td>
<td></td>
<td>18.0000 – 20.9999MHz</td>
</tr>
<tr>
<td></td>
<td>&lt; 60</td>
<td>100</td>
<td></td>
<td></td>
<td>21.0000 – 29.9999MHz</td>
</tr>
<tr>
<td></td>
<td>&lt; 50</td>
<td>80</td>
<td></td>
<td></td>
<td>30.0000 – 37.9999MHz</td>
</tr>
<tr>
<td></td>
<td>&lt; 30</td>
<td>60</td>
<td></td>
<td></td>
<td>38.0000 – 50.0000MHz</td>
</tr>
<tr>
<td>Shunt capacitance (C0)</td>
<td>&lt; 1.0</td>
<td>2.0</td>
<td>pF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load capacitance (CL)</td>
<td>4.0</td>
<td></td>
<td>pF</td>
<td></td>
<td>See options</td>
</tr>
<tr>
<td>Drive Level</td>
<td>10</td>
<td>100</td>
<td>μW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aging (1 year)</td>
<td>-2</td>
<td>+2</td>
<td>ppm</td>
<td>@ 25°C±3°C</td>
<td></td>
</tr>
<tr>
<td>Insulation Resistance</td>
<td>500</td>
<td></td>
<td>MΩ</td>
<td></td>
<td>@ 100Vdc ± 15V</td>
</tr>
</tbody>
</table>

REVISED: 08.09.2018
**IoT OPTIMIZED LOW PROFILE QUARTZ CRYSTAL**

**ABM11W SERIES**

**OPTIONS AND PART IDENTIFICATION** *(NOTE 1)*

Note 1: Contact Abracon for part number requests with carrier frequency callouts up to 5 & 6 digit accuracy after the decimal.

<table>
<thead>
<tr>
<th>ABM11W-</th>
<th>MHz</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Packaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency in MHz</td>
<td>Load Capacitance (pF)</td>
<td>Custom ESR if other than standard</td>
<td>Operating Temp.</td>
<td>Freq. Tolerance</td>
<td>Freq. Stability</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Please specify the Frequency in MHz out to <strong>4 digit</strong> accuracy after the decimal. (e.g. 16.0000MHz)</td>
<td>8: 8pF</td>
<td>R □: Specify a value in Ω (e.g.: R40)</td>
<td>I: 0°C ~ 50°C</td>
<td>1: ± 10 ppm</td>
<td>U: ± 10 ppm (*)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7: 7pF</td>
<td></td>
<td>E: 0°C ~ +70°C</td>
<td>7: ± 15 ppm</td>
<td>G: ± 15 ppm (**)*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6: 6pF</td>
<td></td>
<td>B: -20°C ~ +70°C</td>
<td>2: ± 20 ppm</td>
<td>X: ± 20 ppm (**)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3: 3pF</td>
<td></td>
<td>N: -30°C ~ +85°C</td>
<td>4: ± 30 ppm</td>
<td>Y: ± 30 ppm (**)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2: 2pF</td>
<td></td>
<td>D: -40°C ~ +85°C</td>
<td>5: ± 50 ppm</td>
<td>H: ± 35 ppm (**)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1: 1pF</td>
<td></td>
<td>J: -40°C ~ +105°C (*)</td>
<td></td>
<td>Z: ± 50 ppm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0: 0pF</td>
<td></td>
<td>K: -40°C ~ +125°C (*)</td>
<td></td>
<td>Q: ± 100 ppm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(*) Only offered @ Freq. Stability options: Z & Q.
Contact ABRACON for tighter Frequency Stability.

(**) Only offered @ Operating Temp. Range options: I, E, & B, C, N, & D.
Contact ABRACON for wider Operating Temp. Range.
TYPICAL ESR (EQUIVALENT SERIES RESISTANCE) Vs. TEMPERATURE CHARACTERISTICS

![ESR Graph]

TYPICAL FREQUENCY Vs. TEMPERATURE CHARACTERISTICS

![Frequency Graph]
**TYPICAL FREQUENCY TOLERANCE DISTRIBUTION (AT 25°C ± 3°C)**

![Frequency Tolerance Distribution Graph]

100 samples  
16.0000MHz to 50.0000MHz

**TYPICAL ESR DISTRIBUTION (AT 25°C ± 3°C)**

**ESR Distribution @ 16.0000MHz**

100 samples  
MAX ESR = 89.5 Ω

**ESR Distribution @ 27.0000MHz**

100 samples  
MAX ESR = 28.3 Ω

**ESR Distribution @ 50.0000MHz**

100 samples  
MAX ESR = 13.4 Ω

100 samples  
MAX ESR = 89.5 Ω

100 samples  
MAX ESR = 28.3 Ω

100 samples  
MAX ESR = 13.4 Ω

100 samples  
MAX ESR = 89.5 Ω

100 samples  
MAX ESR = 28.3 Ω

100 samples  
MAX ESR = 13.4 Ω

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100 samples  
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MAX ESR = 28.3 Ω

100 samples  
MAX ESR = 13.4 Ω

100 samples  
MAX ESR = 89.5 Ω

100 samples  
MAX ESR = 28.3 Ω

100 samples  
MAX ESR = 13.4 Ω
SPICE MODELS (BASED ON TYPICAL VALUES AT 25°C ± 3°C)

MECHANICAL DIMENSIONS

Note:
Due to material availability the Chamfer could be located on pin #1, 2 or 4. Be advised that the Chamfer location has no impact on the electrical performance of the device.

DIMENSIONS: MM
REFLOW PROFILE

<table>
<thead>
<tr>
<th>Zone</th>
<th>Description</th>
<th>Temperature</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Preheat</td>
<td>$T_{SPN} \sim T_{MAX}$ (150°C \sim 180°C)</td>
<td>60 – 120 sec.</td>
</tr>
<tr>
<td>2</td>
<td>Reflow</td>
<td>$T_L$ (217°C)</td>
<td>45 – 90 sec.</td>
</tr>
<tr>
<td>3</td>
<td>Peak Heat</td>
<td>$T_P$ (260°C) (MAX)</td>
<td>10 sec.</td>
</tr>
</tbody>
</table>

PACKAGING

T3: Tape and reel (3,000 pcs/reel)