IoT OPTIMIZED LOW PROFILE QUARTZ CRYSTAL

ABM12W SERIES

FEATURES

- Optimized for energy saving wearables and IoT applications
- Plated at exceptionally low plating capacitance, as low as 4pF, with optimized ESR
- 0.4 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>24.0000</td>
<td>52.0000</td>
<td></td>
<td>MHz</td>
<td></td>
</tr>
<tr>
<td>Operation Mode</td>
<td></td>
<td>Fundamental</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Temperature Range</td>
<td></td>
<td>-40</td>
<td>+125</td>
<td>°C</td>
<td>See options</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-55</td>
<td>125</td>
<td></td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>Frequency Tolerance @ +25°C</td>
<td>-10</td>
<td>10</td>
<td></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; 90</td>
<td>150</td>
<td>Ω</td>
<td>24.0000 – 31.9999MHz</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt; 80</td>
<td>100</td>
<td></td>
<td>32.0000 – 36.9999MHz</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt; 60</td>
<td>80</td>
<td></td>
<td>37.0000 – 52.0000MHz</td>
<td></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>100</td>
<td>pF</td>
<td>See options</td>
<td></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>@ 100Vdc ± 15V</td>
<td></td>
</tr>
</tbody>
</table>

• Optimized for energy saving wearables and IoT applications
• Plated at exceptionally low plating capacitance, as low as 4pF, with optimized ESR
• 0.4 mm max height ideally suited for height constrained designs
• Seam sealed for longterm reliability
## IoT OPTIMIZED LOW PROFILE QUARTZ CRYSTAL

### ABM12W SERIES

**ABM12W** - MHz - - - -

<table>
<thead>
<tr>
<th>Optionsaki</th>
<th>Description</th>
</tr>
</thead>
</table>
| Frequency in MHz | Please specify the Frequency in MHz out to 4 digit accuracy after the decimal.  
(e.g. 16.0000MHz) |
| Load Capacitance (pF) | 8: 8pF  
7: 7pF  
6: 6pF  
4: 4pF |
| Custom ESR if other than standard | R □: Specify a value in Ω (e.g.: R70) |
| Operating Temp. | I: 0°C ~ 50°C  
E: 0°C ~ +70°C  
B: -20°C ~ +70°C  
C: -30°C ~ +70°C  
N: -30°C ~ +85°C  
D: -40°C ~ +85°C  
J: -40°C ~ +105°C (*)  
K: -40°C ~ +125°C (*) |
| Freq. Tolerance | 1: ± 10 ppm  
7: ± 15 ppm  
2: ± 20 ppm  
3: ± 25 ppm  
4: ± 30 ppm  
5: ± 50 ppm |
| Freq. Stability | U: ± 10 ppm (*)  
G: ± 15 ppm (**)  
X: ± 20 ppm (**)  
W: ± 25 ppm (**)  
Y: ± 30 ppm (**)  
Z: ± 50 ppm  
Q: ± 100 ppm |
| Packaging | Blank: Bulk  
T3: 3kpcs / reel |

(*): 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.  

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**Note 1:** Contact Abracon for part number requests with carrier frequency callouts up to 5 & 6 digit accuracy after the decimal.
IoT OPTIMIZED LOW PROFILE QUARTZ CRYSTAL

ABM12W SERIES

TYPICAL FREQUENCY Vs. TEMPERATURE CHARACTERISTICS

TYPICAL ESR (EQUIVALENT SERIES RESISTANCE) Vs. TEMPERATURE CHARACTERISTICS

1.6 x 1.2 x 0.4mm
RoHS/RoHS II Compliant
MSL = N/A: NOT APPLICABLE

Part # Configuration of tested samples:
- ABM12W-24.000MHz-4-K2Q-T
- ABM12W-40.000MHz-4-K2Q-T
- ABM12W-52.000MHz-4-K2Q-T

Part # Configuration of tested samples:
- ABM12W-24.000MHz-4-K2Q-T
- ABM12W-40.000MHz-4-K2Q-T
- ABM12W-52.000MHz-4-K2Q-T

For terms and conditions of sales, please visit:
www.abracon.com

ABRACON IS
ISO9001-2015
CERTIFIED

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For terms and conditions of sales, please visit:
www.abracon.com

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IoT OPTIMIZED LOW PROFILE QUARTZ CRYSTAL

ABM12W SERIES

TYPICAL FREQUENCY TOLERANCE DISTRIBUTION (AT 25°C ± 3°C)

Frequency Tolerance Distribution
100 samples
24.0000MHz-52.0000MHz

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

ESR Distribution @ 24.0000MHz
100 samples
MAX ESR = 86.4 Ω

ESR Distribution @ 40.0000MHz
100 samples
MAX ESR = 33.7 Ω

ESR Distribution @ 52.0000MHz
100 samples
MAX ESR = 22.6 Ω

ABRACON IS
ISO9001-2015
CERTIFIED

1.6 x 1.2 x 0.4mm
RoHS/RoHS II Compliant
MSL = N/A: NOT APPLICABLE
IoT OPTIMIZED LOW PROFILE QUARTZ CRYSTAL

ABM12W SERIES

SPICE MODELS (BASED ON TYPICAL VALUES AT 25°C ± 3°C)

<table>
<thead>
<tr>
<th>Frequency: 24.0000MHz</th>
<th>Frequency: 24.0000MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plating Load: 4µF</td>
<td>Plating Load: 6µF</td>
</tr>
<tr>
<td>C0 = 0.55 pF</td>
<td>C0 = 0.49 pF</td>
</tr>
<tr>
<td>R1 = 54.20 Ω</td>
<td>R1 = 67.91 Ω</td>
</tr>
<tr>
<td>L1 = 52.88 nH</td>
<td>L1 = 50.66 nH</td>
</tr>
<tr>
<td>C1 = 0.83 nF</td>
<td>C1 = 0.87 nF</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Frequency: 40.0000MHz</th>
<th>Frequency: 40.0000MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plating Load: 4µF</td>
<td>Plating Load: 6µF</td>
</tr>
<tr>
<td>C0 = 0.69 pF</td>
<td>C0 = 0.63 pF</td>
</tr>
<tr>
<td>R1 = 27.21 Ω</td>
<td>R1 = 22.99 Ω</td>
</tr>
<tr>
<td>L1 = 10.55 nH</td>
<td>L1 = 10.47 nH</td>
</tr>
<tr>
<td>C1 = 1.50 nF</td>
<td>C1 = 1.51 nF</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Frequency: 52.0000MHz</th>
<th>Frequency: 52.0000MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plating Load: 4µF</td>
<td>Plating Load: 6µF</td>
</tr>
<tr>
<td>C0 = 0.69 pF</td>
<td>C0 = 0.64 pF</td>
</tr>
<tr>
<td>R1 = 18.03 Ω</td>
<td>R1 = 18.27 Ω</td>
</tr>
<tr>
<td>L1 = 5.74 nH</td>
<td>L1 = 5.50 nH</td>
</tr>
<tr>
<td>C1 = 1.63 nF</td>
<td>C1 = 1.70 nF</td>
</tr>
</tbody>
</table>

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.
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**ABM12W SERIES**

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**REFLOW PROFILE**

![Reflow Profile Diagram]

<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>$T_{\text{MIN}} = T_{\text{MAX}}$ 150°C – 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)

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**DIMENSIONS: mm**