32.768kHz MEMS Resonator

Application

- Small and low-profile devices
  Ex. Wearables, Stylus pen, Wireless module, Hearing aids, Smart cards, Medical patch devices, Wireless Earphone, etc.
- Industrial Equipment
  Ex. Encoder, PLC (Programmable Logic Controller)
  FEMS (Factory Energy Management System)
  BEMS (Building Energy Management System), etc.
- Lighting
- Embedding in ICs
  Ex. Microcomputers, real-time clocks, etc.

Product Concept

- World’s Smallest Size 0.9 x 0.6 x 0.3 (in mm)
  - Realizing 50% area saving compared with 1.2x1.0mm sized turning fork crystal.
- Built-in Capacitance
  - Space saving by reducing the external load capacitance for oscillation circuit.
- High Temperature / High Reliability
  - Available for use in high temperature applications due to the use of non organic adhesives.
- Low ESR
  - Lower power consumption can be realized by optimizing IC gain.

High Temperature / High Reliability

- HAST*/PCT** Test
  [Test condition] Temperature: 120°C, Humidity: 85%, Air pressure: 1.7atm

Frequency drift

![Graph showing frequency drift comparison between conventional crystal resonator and Murata MEMS resonator.](image)

Murata MEMS exhibits stable frequency stability even under harsh environment by eliminating organic material inside the package.

Temperature characteristics

![Graph showing temperature characteristics comparison between Murata MEMS resonator and conventional crystal resonator.](image)

Good temperature characteristics are realized by optimizing device structure and design.

*High Accelerated Stress Test
**Pressure Cooker Test

Product specifications are as of April 2020. They are subject to change without notice.
Murata Manufacturing Co., Ltd.
No. VPPT-2004-0004-D
**Space saving**

65% space saving is achieved compared to a 1.2x1.0mm sized crystal with 0.4x0.2mm sized load capacitors.

**Low power consumption**

The low ESR can be utilized to lower the IC gain. This enables a reduction in the current consumption of the oscillation circuit and the power consumption of the overall design.

<table>
<thead>
<tr>
<th>Resonator</th>
<th>ESR spec.</th>
<th>IC gain</th>
<th>Oscillation margin</th>
<th>Current Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>General 2012 and 1610 size crystal</td>
<td>90 kΩ max.</td>
<td>High</td>
<td>Good Enough</td>
<td>115.6 nA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low</td>
<td>Not Enough</td>
<td>100.9 nA</td>
</tr>
<tr>
<td>Murata MEMS</td>
<td>75 kΩ max.</td>
<td>High</td>
<td>Excellent</td>
<td>115.5 nA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low</td>
<td>Good Enough</td>
<td>100.9 nA</td>
</tr>
</tbody>
</table>

13% saving!

**Product lineup and dimensions**

<table>
<thead>
<tr>
<th>Part number</th>
<th>Operating Temperature Range</th>
<th>Frequency Tolerance</th>
<th>Frequency Shift by Temperature</th>
<th>Load Capacitance*</th>
<th>Equivalent Series Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>WMRAG32K76CS1C00R0</td>
<td>-30 to +85°C</td>
<td>±20ppm</td>
<td>-150 to +10 ppm</td>
<td>8pF</td>
<td>75 kΩ max.</td>
</tr>
<tr>
<td>WMRAG32K76CS2C00R0</td>
<td>-40 to +85°C</td>
<td></td>
<td>-200 to +10 ppm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WMRAG32K76CS3C00R0</td>
<td>-40 to +105°C</td>
<td></td>
<td>-270 to +10 ppm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WMRAG32K76CS4C00R0</td>
<td>-40 to +125°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*When considering replacement from a crystal resonator, note that the load capacitance value differs for crystal resonators and MEMS resonators.

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**Terminal No.**
(1) X1 or Xout
(2) GND
(3) GND or NC

**If you need...**

MEMS on PCB Sample Also Available!