QTCH HIGH TEMPERATURE MINIATURE SMD OSCILLATORS
5 x 7mm, 3.2 x 5mm, 2.5 x 3.2mm, SMD UP TO 200ºC
2.5Vdc and 3.3Vdc - 32.768 kHz*

Description

The QTCH series are miniature surface-mount (SMD) crystal oscillators supporting 32.768kHz* fundamental mode operating in a wide supply voltage range from 2.5Vdc to 3.3Vdc, very low power consumption (<3mA) with a temperature range from -55ºC to +200ºC. Package offerings in three low profile ceramic packages, 2.5x3.2mm, 3.2x5.0mm and 5.0x7.0mm, which are hermetically sealed with gold plated contacts or hot solder dipped.

* See separate data sheet for other frequencies.

Features

• ECCN: EAR99
• Wide operating temperature -55ºC to +200ºC available
• Very low power consumption
• CMOS logic 2.5Vdc and 3.3Vdc
• Tri-State Output Standard
• Fundamental amode AT cut crystal
• High shock and vibration resistant
• Military screening tests per MIL-PRF-55310 available
• Tape and reel packaging
• Lead Free, RoHS Compliant

Applications

• Drilling, data logging tools
• Oil service industry
• High temperature applications

See our Stock List (Updated Monthly)

Ordering Information

Sample part number

QTCH350LD92-32K768Hz

Output Frequency

QTCH 350 LD 92 - 32.768kHz

Frequency vs. Temperature Code:

87 = ± 150ppm at -20ºC to +185ºC
88 = ± 200ppm at -20ºC to +175ºC
89 = ± 250ppm at -40ºC to +185ºC
90 = ± 200ppm at -40ºC to +185ºC
91 = ± 250ppm at -55ºC to +185ºC
92 = ± 250ppm at 0ºC to +200ºC
93 = ± 200ppm at 0ºC to +200ºC
94 = ± 250ppm at 0ºC to +200ºC
95 = ± 250ppm at -20ºC to +200ºC
96 = ± 250ppm at -40ºC to +200ºC
97 = ± 250ppm at -55ºC to +200ºC
98 = ± 250ppm at 0ºC to +185ºC

Logic & Supply Voltage:

L = HCMOS +3.3V at 15pF
N = LVHCMOS +2.5V at 15pF

Tristate

D = Tristate

Lead Finish

T = Standard
S = Solder Dip (*)

Package

570 = 5.0 x 7.0mm
350 = 3.2 x 5.0mm
230 = 2.5 x 3.2mm

Other Options Available For An Additional Charge

Hot Solder Dip to your specifications

(*) Hot Solder Dip Sn60/Pb40 per MIL-PRF 55310 is optional for an additional cost

Specifications subject to change without prior notice.

For Non-Standard requirements, contact Q-Tech Corporation at Sales@Q-Tech.com

Frequency stability vs. temperature codes may not be available in all frequencies.
QTCH570 Package Outline and Pin Connections
Dimensions are in inches (mm)

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TRISTATE</td>
</tr>
<tr>
<td>2</td>
<td>GND/CASE</td>
</tr>
<tr>
<td>3</td>
<td>OUTPUT</td>
</tr>
<tr>
<td>4</td>
<td>VDD</td>
</tr>
</tbody>
</table>

Marking
Line 1: QTCH570  (First 7 Characters of Description)
Line 2: XX.XXX   (6 Characters of Frequency)
Line 3: Dot (Pin 1 Indicator) + Date code (YY/WW), Internal Traceability Code

Package Information
- Termination pads (4x), Electro nickel plating 1.27µm ~ 8.89µm typ.,
  with gold 0.3µm ~ 1.0µm flash plate
- Weight: 0.15g typ., 2.0g max.

An external bypass capacitor 0.01µF is required between Vdd and GND
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2.5Vdc and 3.3Vdc - 32.768 kHz*

QTCH350 Package Outline and Pin Connections
Dimensions are in inches (mm)

Pin No. | Function
--- | ---
1 | TRISTATE
2 | GND/CASE
3 | OUTPUT
4 | VDD

An external bypass capacitor 0.01µF is required between Vdd and GND

Marking
Line 1: QXX.XXX (Q for Q-Tech, no space 7 Characters of Frequency)
Line 2: Dot (Pin 1 Indicator) + Date code (YY/WW), Internal Traceability Code

Package Information
- Termination pads (4x), Electro nickel plating 1.27µm ~ 8.89µm typ., with gold 0.3µm ~ 1.0µm flash plate
- Weight: 0.057g typ.
QTCH230 Package Outline and Pin Connections
Dimensions are in inches (mm)

An external bypass capacitor 0.01µF is required between Vdd and GND

Marking
Line 1: QXX.XXX (Q for Q-Tech, no space 7 Characters of Frequency)
Line 2: Dot (Pin 1 Indicator) + Date code (Y/WW), Internal Traceability Code

Package Information
• Termination pads (4x), Electro nickel plating 1.27µm ~ 8.89µm typ.,
  with gold 0.3µm ~ 1.0µm flash plate
• Weight: 0.025g typ.
## Electrical Characteristics

<table>
<thead>
<tr>
<th>Parameters</th>
<th>QTCH-ND</th>
<th>QTCH-LD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output frequency range (Fo) 1/</td>
<td>32.768kHz</td>
<td></td>
</tr>
<tr>
<td>Supply voltage (Vdd)</td>
<td>2.5Vdc ± 10%</td>
<td>3.3Vdc ± 10%</td>
</tr>
<tr>
<td>Maximum Applied Voltage (Vdd max.)</td>
<td>-0.3 to +7.0Vdc</td>
<td></td>
</tr>
<tr>
<td>Frequency stability (ΔF/ΔT)</td>
<td>See Part Number on Page 1</td>
<td></td>
</tr>
<tr>
<td>Operating temperature (Topr)</td>
<td>See Part Number on Page 1</td>
<td></td>
</tr>
<tr>
<td>Storage temperature (Tsto)</td>
<td>-62ºC to + 150ºC</td>
<td></td>
</tr>
<tr>
<td>Operating supply current (No Load)</td>
<td>70μA typ.</td>
<td>120μA max.</td>
</tr>
<tr>
<td>Symmetry (50% of output waveform)</td>
<td>45% min</td>
<td>50% typ.</td>
</tr>
<tr>
<td>Rise and Fall times</td>
<td>50ns typ.</td>
<td>200ns max.</td>
</tr>
<tr>
<td>Output Load</td>
<td>15pF max.</td>
<td></td>
</tr>
<tr>
<td>Start-up time (Tstup)</td>
<td>10ms max.</td>
<td></td>
</tr>
<tr>
<td>High Output Voltage (Voh)</td>
<td>Vdd - 0.4 min.</td>
<td></td>
</tr>
<tr>
<td>Low Output Voltage (Vol)</td>
<td>0V min.</td>
<td>0.4V max.</td>
</tr>
<tr>
<td>Enable VIH Pin 1</td>
<td>VIH ≥ 0.7*Vdd Active</td>
<td></td>
</tr>
<tr>
<td>Disable VIL Pin 1</td>
<td>VIL ≤ 0.3*Vdd High Impedance</td>
<td></td>
</tr>
<tr>
<td>Aging</td>
<td>±5ppm/first year</td>
<td></td>
</tr>
</tbody>
</table>

### Notes:
1/ See separate data sheet for other frequencies.
QTECH Corporation  -  10150 W. Jefferson Boulevard, Culver City 90232  -  Tel:  310-836-7900  -  Fax:  310-836-2157  -  www.q-tech.com

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**Output Waveform (Typical)**

![Output Waveform Diagram]

**Reflow Profile**

![Reflow Profile Diagram]

**Test Circuit**

![Test Circuit Diagram]

The Tristate function on pin 1 has a built-in pull-up resistor so it can be left floating or tied to Vdd without deteriorating the electrical performance.

**Embossed Tape and Reel Information**

Dimensions are in mm. Tape is compliant to EIA-481-A.

<table>
<thead>
<tr>
<th>Package</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>QTCH 570</td>
<td>5.35 ±0.1</td>
<td>7.75 ±0.1</td>
<td>1.85 ±0.1</td>
</tr>
<tr>
<td>QTCH 350</td>
<td>3.70 ±0.1</td>
<td>5.50 ±0.1</td>
<td>1.40 ±0.1</td>
</tr>
<tr>
<td>QTCH 230</td>
<td>2.80 ±0.1</td>
<td>3.50 ±0.1</td>
<td>1.50 ±0.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reel size (Diameter in mm)</th>
<th>Qty per reel (pcs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>178</td>
<td>1,000</td>
</tr>
</tbody>
</table>

**Environmental and Mechanical Specifications**

<table>
<thead>
<tr>
<th>Environmental Test</th>
<th>Test Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature cycling</td>
<td>MIL-STD-883, Method 1010, Cond. B</td>
</tr>
<tr>
<td>Seal: Fine and Gross Leak</td>
<td>MIL-STD-883, Method 1014, Cond. A and C</td>
</tr>
<tr>
<td>Vibration sinusoidal</td>
<td>MIL-STD-202, Method 204, Cond. D</td>
</tr>
<tr>
<td>Shock, non operating</td>
<td>MIL-STD-202, Method 213, Cond. I</td>
</tr>
<tr>
<td>Resistance to solvents</td>
<td>MIL-STD-202, Method 215</td>
</tr>
<tr>
<td>Solderability</td>
<td>MIL-STD-202, Method 208</td>
</tr>
<tr>
<td>ESD Classification</td>
<td>MIL-STD-883, Method 3015, Class 1</td>
</tr>
<tr>
<td>Moisture Sensitivity Level</td>
<td>J-STD-020, MSL=1</td>
</tr>
</tbody>
</table>

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