

Temperature Compensated Crystal Oscillators [TCXO " M " and VCTCXO " VM "]

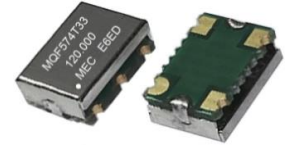


| TCXO | | | VCTCXO | | | Min. | Max. |
|---------|---------|---------|----------|----------|----------|------|-------|
| MQF _ T | MQF _ P | MQF _ D | VMQF _ T | VMQF _ P | VMQF _ D | 10 | 1,500 |
| CMOS | PECL | LVDS | CMOS | PECL | LVDS | MHz | MHz |

Features

1.0 pS Phase Jitter (typical)

The (V)MQF__T, (V)MQF__P and (V)MQF__D Series are members of Mercury's Q-Family Quick-Turn Temperature Compensated oscillators that can be delivered within days. With low current consumption (44 mA for PECL 212.500 MHz at 3.3V) and an integrated phase jitter performance of 1.0 pS RMS, they have gained its precision frequency control market position by providing engineers with next-day samples for prototypes and low cost, fast delivery for volume production (± 2.5 ppm over -30°C to +85°C).



General specifications , at Ta=+25°C

| Model | (V)MQF574T , (V)MQF576T | (V)MQF576P | (V)MQF576D | | | | | | |
|---|--|---|--|-------|--------|---------|-------|--------|---------------------------------|
| Output Logic | CMOS | PECL | LVDS | | | | | | |
| Supply Voltage V _{DD} (code) | + 2.5 V _{DD} ± 5% (voltage code " 25 ") + 3.3 V _{DD} ± 5% (voltage code " 33 ") | + 2.5 V _{DD} ± 5% (voltage code " 25 ") + 3.3 V _{DD} ± 5% (voltage code " 33 ") | + 2.5 V _{DD} ± 5% (voltage code " 25 ") + 3.3 V _{DD} ± 5% (voltage code " 33 ") | | | | | | |
| Available Frequency Range | 10 ~ 250 MHz | 10 ~ 1,500 MHz | 10 ~ 1,500 MHz | | | | | | |
| Load | 15 pF | 50 Ω into V _{cc} - 2V or Thevenin equivalent | 100 Ω | | | | | | |
| Output Logic " High " , " 1 " | 90 % V _{DD} | V _{DD} - 1.03 (min.) , V _{DD} - 0.6 (max.) | 1.4 V Typical , 1.6 V max. | | | | | | |
| Output Logic " Low " , " 0 " | 10 % V _{DD} | V _{DD} - 1.85 (min.) , V _{DD} - 1.6 (max.) | 1.1 V Typical , 0.9 V min. | | | | | | |
| (V _{DD} = + 2.5V) | 50 MHz : 24 mA | 156 MHz : 36 mA | 156 MHz : 22 mA | | | | | | |
| Current Consumption <small>All values are typical and over the operating temperatures.</small> | 125 MHz : 28 mA | 600 MHz : 40 mA | 600 MHz : 28 mA | | | | | | |
| | 200 MHz : 30 mA | 800 MHz : 46 mA | 800 MHz : 30 mA | | | | | | |
| (V _{DD} = + 3.3V) | 50 MHz : 26 mA | 156 MHz : 40 mA | 156 MHz : 25 mA | | | | | | |
| Current Consumption <small>All values are typical and over the operating temperatures.</small> | 125 MHz : 30mA | 600 MHz : 45 mA | 600 MHz : 30 mA | | | | | | |
| | 200 MHz : 34 mA | 800 MHz : 48 mA | 800 MHz : 32 mA | | | | | | |
| Current with Output Disabled | 18 mA (typical) | 18 mA (typical) | 18 mA (typical) | | | | | | |
| Rise Time / Fall Time | 1.5 nS. (Typical) , 3.0 nS. (max.) Tr / Tf : 10% ↔ 90% waveform | 0.2 nS. (Typical) , 0.5 nS. (max.) Tr / Tf : 20% ↔ 80% waveform | 0.2 nS. (Typical) , 0.4 nS. (max.) Tr / Tf : 20% ↔ 80% waveform | | | | | | |
| Initial Calibration Tolerance | ±2.0 ppm. max. at +25°C±2°C. (at the shipment) | | | | | | | | |
| Frequency Stability Codes | Temperature (refer to +25°C) | ± 2.5 ppm over -30°C to +85°C (default for Quick - Turn) ± 1.0 ppm over -40°C to +85°C (available) | | | | | | | |
| | Aging | ± 1.0 ppm max . , per year at 25°C | | | | | | | |
| | Voltage Change | ± 0.2 ppm max . , for a ±5% input voltage change. | | | | | | | |
| | Load Change | ± 0.2 ppm max . , for a ±10% load condition change. | | | | | | | |
| | Reflow | ± 1.0 ppm max . , 1 reflow and measured 24 hours afterwards. | | | | | | | |
| Duty Cycle | 50 % ± 5% | | | | | | | | |
| Start-up Time | 5 m sec. (max.) | | | | | | | | |
| Aging at Ta = +25°C | ± 2 ppm max. first year at 25°C ; ± 10 ppm max. over 10 years | | | | | | | | |
| Storage Temperature | -55°C to + 150°C | | | | | | | | |
| SSB Phase Noise [dBc / Hz (typical)] | Offset | 10 Hz | 100 Hz | 1K Hz | 10K Hz | 100K Hz | 1M Hz | 10M Hz | Phase Jitter (12KHz ~ 20 MHz) |
| | 156.25 MHz | -65 | -92 | -108 | -114 | -117 | -139 | -147 | 0.9 pS |
| | 212.5 MHz | -61 | -90 | -106 | -110 | -112 | -133 | -142 | 1.2 pS |
| | 622.08 MHz | -51 | -79 | -97 | -102 | -103 | -125 | -134 | 1.1 pS |

| Control Voltage Function on Pad 1 | | Output Enable Function on pad 2 | |
|-----------------------------------|---|---------------------------------|--|
| Control Voltage Center and Range | +1.5V ± 1.0V for both V _{DD} = 2.5V and 3.3V | OE Control | 70% of V _{DD} (min.) to enable output. (Open connection prohibit.) |
| Frequency Pulling Range | ± 8 ppm min. | | 30% of V _{DD} (max.) to disable output |
| Linearity | ± 1 % typical. ± 10% max. | | |
| Transfer Function | Positive Transfer | Output Enable / Disable Time | 200 nS. Max. / 50 nS. Max. |
| Input Impedance | 770 KΩ typical. | | |
| Harmonics | -5.0 dBc max. | | |

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Temperature Compensated Crystal Oscillators [TCXO " M " and VCTCXO " VM "]



| TCXO | | | VCTCXO | | | Min. | Max. |
|---------|---------|---------|----------|----------|----------|------|-------|
| MQF _ T | MQF _ P | MQF _ D | VMQF _ T | VMQF _ P | VMQF _ D | 10 | 1,500 |
| CMOS | PECL | LVDS | CMOS | PECL | LVDS | MHz | MHz |

Part Number Format and Example

- Example :
- 1.VMQF574T33 - 120.000 - 2.5 / -40+85
 - 2.VMQF576P33 - 120.000 - 2.5 / -40+85

| VMQF | 574 | T | 33 | - | 120.000 | - | 2.5 | / | -40+85 |
|--|---|----------------------------------|--|---|----------------------|---|-----------------|---|-----------------------------|
| Hold Type " MQF " : TCXO " VMQF " : VCTCXO | Package " 574 " 4pad (5.0 * 7.0 mm) | T : CMOS | Supply Voltage " 33 " for 3.3V " 25 " for 2.5V | | Center Freq. (MHz) | | Freq. Stability | | Operating Temperature Range |
| VMQF | 576 | P | 33 | - | 120.000 | - | 2.5 | / | -40+85 |
| Hold Type " MQF " : TCXO " VMQF " : VCTCXO | Package " 576 " 6pad (5.0 * 7.0 mm) | T : CMOS P : PECL D : LVDS | Supply Voltage " 33 " for 3.3V " 25 " for 2.5V | | Center Freq. (MHz) | | Freq. Stability | | Operating Temperature Range |

Outline Dimensions (Unit : mm) , Suggested pad Layout for SMDs

| [MQF574T] | [MQF576T] , [MQF576P] , [MQF576D] |
|--|--|
| <p>Top View MEC 7.0 ± 0.2</p> <p>Bottom View 1.4, 1.1, 5.08, 2.6, 2.0, 4.2, 5.08, 2.54, 1.8</p> <p>Land Pattern 2.0, 4.2, 2.54, 1.8</p> <p>Pad Connections : Pad 1 : Make no connection if TCXO ; Control voltage if VCTCXO Pad 2 : Ground Pad 3 : Output Pad 4 : Supply voltage</p> | <p>MEC 7.0 ± 0.2, 5.0 ± 0.2, 2.5 ± 0.1</p> <p>Bottom View 1.4, 1.2, 5.08, 2.6, 2.0, 4.2, 2.54, 1.8</p> <p>Land Pattern 5.08, 2.0, 4.2, 2.54, 1.8</p> <p>Pad 1 : No Connection for TCXO Voltage Control for VCTCXO Pad 2 : Output Enable Pad 3 : Ground Pad 4 : CMOS : Output PECL / LVDS : Differential Pad 5 : CMOS : No Connection PECL / LVDS : Complementary Pad 6 : Supply Voltage</p> |

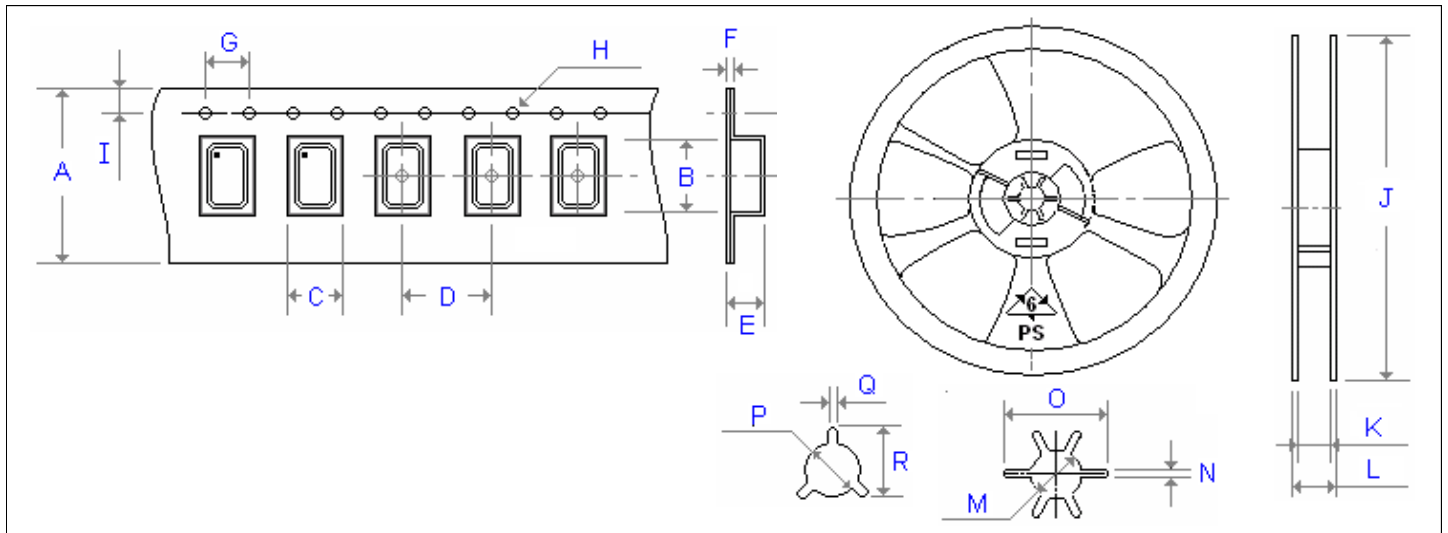
Test Circuits and Output Waveforms

| CMOS | PECL | LVDS |
|---|--|--|
| <p>VDD, 10uF, 0.1uF, 15 pF</p> <p>MEC</p> <p>1 Output Enable</p> <p>No Connection for TCXO Voltage Control for VCTCXO</p> | <p>VDD, 10uF, 0.1uF, R1, R2, R3, R4, LVPECL Receiver</p> <p>MEC</p> <p>1 Output Enable</p> <p>Vc for VCTCXO Output NC for TCXO Enable</p> <p>VDD = 3.3 V : R1 = R3 = 127Ω ; R2 = R4 = 82.5Ω VDD = 2.5 V : R1 = R3 = 250Ω ; R2 = R4 = 62.5Ω</p> | <p>VDD, 10uF, 0.1uF, 100Ω</p> <p>MEC</p> <p>1 Output Enable</p> <p>No Connection for TCXO Voltage Control for VCTCXO</p> |

Emboss Taping and Reel Specifications

[VCXO]

[(VC)TCXO]



Carrier Type Dimensions (unit : mm)

| | A | B | C | D | E | F | G | H | I | pcs / reel |
|-------------|------|------|------|------|-----|-----|-----|--------|------|------------|
| G_324 (6) | 8.0 | 3.4 | 2.7 | 4.0 | 1.4 | 0.3 | 4.0 | ∅ 1.50 | 1.75 | 3000 |
| G_534 | 12.0 | 5.3 | 3.6 | 8.0 | 1.4 | 0.3 | 4.0 | ∅ 1.55 | 1.75 | 1000 |
| G_576 | 16.0 | 7.3 | 5.3 | 8.0 | 1.9 | 0.3 | 4.0 | ∅ 1.55 | 1.75 | 1000 |
| G_42 | 24.0 | 12.4 | 10.3 | 16.0 | 5.0 | 0.3 | 4.0 | ∅ 1.55 | 1.75 | 500 |
| G_43 | 24.0 | 12.4 | 10.3 | 16.0 | 5.0 | 0.3 | 4.0 | ∅ 1.55 | 1.75 | 500 |
| G_62 | 24.0 | 12.4 | 10.3 | 16.0 | 5.0 | 0.3 | 4.0 | ∅ 1.55 | 1.75 | 500 |
| G_63 | 24.0 | 12.4 | 10.3 | 16.0 | 5.0 | 0.3 | 4.0 | ∅ 1.55 | 1.75 | 500 |
| (V)M_22 | 8.0 | 2.8 | 2.3 | 4.0 | 1.1 | 0.3 | 4.0 | ∅ 1.50 | 1.75 | 3000 |
| (V)M_32 | 8.0 | 3.4 | 2.7 | 4.0 | 1.4 | 0.3 | 4.0 | ∅ 1.50 | 1.75 | 3000 |
| (V)MQ_326 | 12.0 | 3.6 | 2.9 | 4.0 | 1.7 | 0.3 | 4.0 | ∅ 1.55 | 1.75 | 3000 |
| (V)M_53 | 12.0 | 5.3 | 3.6 | 8.0 | 1.4 | 0.3 | 4.0 | ∅ 1.55 | 1.75 | 1000 |
| (V)M_57 | 16.0 | 7.4 | 5.5 | 8.0 | 2.8 | 0.4 | 4.0 | ∅ 1.50 | 1.75 | 500 |
| (V)M_42 | 24.0 | 12.4 | 10.3 | 16.0 | 5.0 | 0.3 | 4.0 | ∅ 1.55 | 1.75 | 500 |
| (V)M_43 | 24.0 | 12.4 | 10.3 | 16.0 | 5.0 | 0.3 | 4.0 | ∅ 1.55 | 1.75 | 500 |
| (V)M_62 | 24.0 | 12.4 | 10.3 | 16.0 | 5.0 | 0.3 | 4.0 | ∅ 1.55 | 1.75 | 500 |
| (V)M_63 | 24.0 | 12.4 | 10.3 | 16.0 | 5.0 | 0.3 | 4.0 | ∅ 1.55 | 1.75 | 500 |

Reel Dimensions (unit : mm)

| | J | K | L | P | Q | R | pcs / reel |
|-------------|-------|------|------|------|-----|------|------------|
| G_324 (6) | 180.0 | 9.0 | 12.0 | 13.2 | 2.1 | - | 3000 |
| G_534 | 180.0 | 13.0 | 16.0 | 13.2 | 2.5 | - | 1000 |
| G_576 | 180.0 | 17.2 | 19.3 | 13.3 | 2.2 | 22.0 | 1000 |
| G_42 | 330.0 | 30.0 | 25.0 | 13.4 | 2.5 | 19.5 | 500 |
| G_43 | 330.0 | 30.0 | 25.0 | 13.4 | 2.5 | 19.5 | 500 |
| G_62 | 330.0 | 30.0 | 25.0 | 13.4 | 2.5 | 19.5 | 500 |
| G_63 | 330.0 | 30.0 | 25.0 | 13.4 | 2.5 | 19.5 | 500 |
| (V)M_22 | 180.0 | 9.0 | 12.0 | 13.2 | 2.1 | - | 3000 |
| (V)M_32 | 180.0 | 9.0 | 12.0 | 13.2 | 2.1 | - | 3000 |
| (V)MQ_326 | 180.0 | 9.0 | 12.0 | 13.2 | 2.1 | - | 3000 |
| (V)M_53 | 180.0 | 13.0 | 16.0 | 13.2 | 2.5 | 19.5 | 1000 |
| (V)M_57 | 180.0 | 17.2 | 19.3 | 13.3 | 2.2 | 22.0 | 500 |
| (V)M_42 | 330.0 | 30.0 | 25.0 | 13.4 | 2.5 | 19.5 | 500 |
| (V)M_43 | 330.0 | 30.0 | 25.0 | 13.4 | 2.5 | 19.5 | 500 |
| (V)M_62 | 330.0 | 30.0 | 25.0 | 13.4 | 2.5 | 19.5 | 500 |
| (V)M_63 | 330.0 | 30.0 | 25.0 | 13.4 | 2.5 | 19.5 | 500 |