

Voltage Controlled Crystal Oscillators



GTQF
CMOS waveform

GPQF
PECL Differential

GDQF
LVDS Differential

2.5 V 3.3 V

Min.
10 MHz

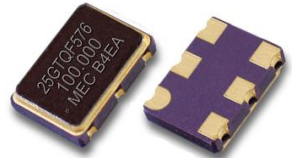
Max.
1,500 MHz

Features

Quick - turn Clock Oscillators

1.2 pS Phase Jitter (typical)

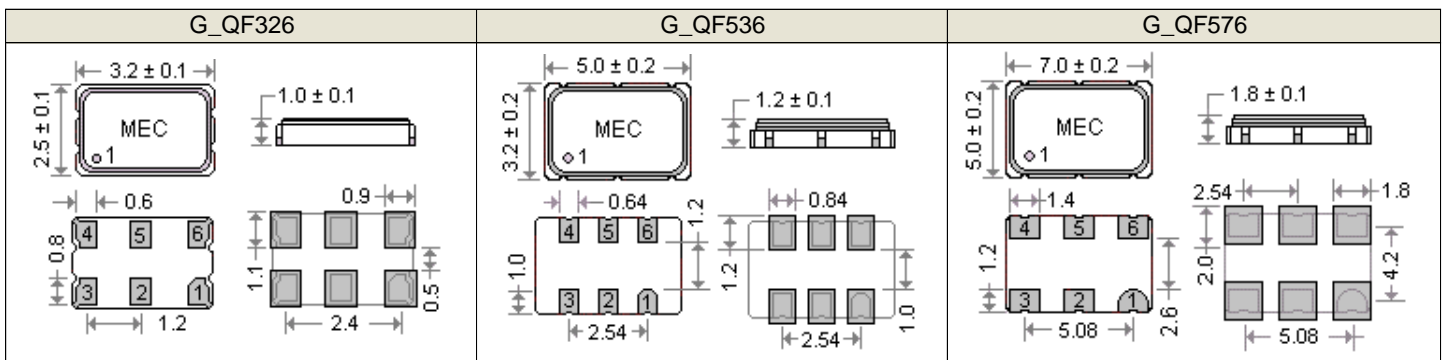
The GTQF, GPQF and GDQF Series are members of Mercury's Q-Family Quick-Turn crystal oscillators that can be delivered within days. With low current consumption (54 mA for PECL 622.080 MHz at 3.3V) and an integrated phase jitter performance of 1.0 pS RMS, they have gained its precision frequency control market position by providing engineers with next-day samples for prototypes and low cost, fast delivery for volume production. The perfect solution to replace traditional XO's & VCXO's that use a more expensive, high-frequency, fundamental crystal and a noisy PLL multiplier circuit



General specifications , at Ta=+25°C , CL=15pF

| Model | GTQF | GPQF | GDQF | | | | | | | |
|---|--|---|---|---|---|-----------|-------------------------------|------------|-----------|-----------|
| 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 " 3 ") | + 2.5 V _{DD} ± 5% (voltage code " 25 ") + 3.3 V _{DD} ± 5% (voltage code " 3 ") | + 2.5 V _{DD} ± 5% (voltage code " 25 ") + 3.3 V _{DD} ± 5% (voltage code " 3 ") | | | | | | | |
| Available Frequency Range | 10 ~ 250 MHz | 10 ~ 1,500 MHz | 10 ~ 1,500 MHz | | | | | | | |
| Load | 15 pF | Differential | Differential | | | | | | | |
| 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. | | | | | | | |
| Current with Output Disable | 16 mA typical | 16 mA typical | 16 mA typical | | | | | | | |
| Current Consumption (V _{DD} = +3.3V) | 10 MHz : 17 mA ; 150 MHz : 28 mA | 100 MHz : 50 mA ; 750 MHz : 64 mA | 100 MHz : 25 mA ; 750 MHz : 39 mA | | | | | | | |
| All values are typical and over the operating temperatures. | 50 MHz : 20 mA ; 200 MHz : 33 mA | 250 MHz : 55 Ma ; 1,000 : 68 mA | 250 MHz : 30 mA ; 1,000 : 43 mA | | | | | | | |
| | 100 MHz : 24 mA ; 250 MHz : 37 mA | 500 MHz : 60 mA ; 1,350 MHz : 72 mA | 500 MHz : 35 mA ; 1,350 MHz : 47mA | | | | | | | |
| 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 | | | | | | | |
| Duty Cycle | 50 % ± 5% | | | | | | | | | |
| Start-up Time | 10 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 | | | | | | | | | |
| Frequency Stability (1) Codes | Frequency Stability over Operating Temperature Range | ± 25 ppm | ± 50 ppm | ± 100 ppm | If non-standard , please enter the desired stability after the " C " or " I " represents . For example : " C20 " ± 20 ppm over -10°C to +70°C ; " I20 " ± 20 ppm over -40°C to +85°C | | | | | |
| | Commercial (-10°C to +70°C) | A | B | C | | | | | | |
| | Industrial (-40°C to +85°C) | D | E | E | | | | | | |
| SSB Phase Noise | Offset / Freq. | 77.76 MHz | 122.88 MHz | 125 MHz | 156.25 MHz | 212.5 MHz | 491.52 MHz | 622.08 MHz | 1,000 MHz | 1,250 MHz |
| | 10 Hz | -57 | -68 | -63 | -55 | -62 | -61 | -48 | -52 | -42 |
| | 100 Hz | -94 | -99 | -94 | -85 | -93 | -86 | -85 | -82 | -81 |
| | 1 KHz | -114 | -113 | -113 | -109 | -105 | -100 | -101 | -93 | -93 |
| [dBc / Hz (typical)] | 10 KHz | -123 | -119 | -118 | -116 | -113 | -105 | -102 | -97 | -96 |
| | 100 KHz | -124 | -120 | -119 | -118 | -115 | -105 | -103 | -97 | -97 |
| | 1 MHz | -144 | -140 | -137 | -139 | -135 | -126 | -124 | -118 | -119 |
| | | -152 | -148 | -148 | -146 | -143 | -137 | -133 | -127 | -129 |
| Phase Jitter (12KHz ~ 20 MHz, RMS) unit : pS. | 0.9 | 0.8 | 1.1 | 0.9 | 1.0 | -1.1 | 1.2 | 1.5 | 1.1 | |
| Supply Voltage (V _{DD}) | V _{DD} = +2.5 V ; Vcon Center = +1.25V | | | V _{DD} = +3.3 V ; Vcon Center = +1.65V | | | | | | |
| Vcontrol Range | + 0.2V ~ +2.3V | | | + 0.3V ~ +3.0V | | | | | | |
| Frequency Pulling Range | ± 80 ppm (min.) | | | ± 80 ppm (min.) | | | | | | |
| Absolute Voltage | Up to ± 200 ppm (min.) is also available. Please contact Mercury. 2.8 V max. for 2.5V V _{DD} ; 4.0 V max. for 3.3V V _{DD} | | | | | | | | | |
| Linearity | ± 5% typical. ±10% (max.) | | | Input Impedance | | | 1 MΩ typical | | | |
| Transfer Function | Positive Transfer | | | Bandwidth | | | 10 KHz min. Measured at -3 dB | | | |
| Output Enable Function | | | | | | | | | | |
| OE Control on Pad 2 | 70% of V _{DD} (min.) to enable output. (Open connection prohibit.) 30% of V _{DD} (max.) to disable output . | | | | | | | | | |
| Output Enable Time / Disable Time | 200 nS. Max. / 50 nS. Max. | | | | | | | | | |
| Integrated Phase Jitter | 1.2 pS typical (12 KHz to 20 MHz) ; < 100 fS (1.875 KHz to 20 MHz) | | | | | | | | | |

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



Pad Connections

Pad 1 : Control Voltage ; Pad 2 : OE: High Enable ; Pad 3 : Ground ; Pad 4 : [CMOS : Output , PECL or LVDS : Differential] ;

Pad 5 : [CMOS : NC , PECL or LVDS : Complementary] ; Pad 6 : Supply Voltage

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10 MHz

Max.
1,500 MHz

Part Number Format and Example

Example : 3GPQN576 - E - 100N - 622.080

| | | | | | | | | |
|----------------|--|--|---|--|---|--|---|--------------------------|
| 3 | GPQF | 576 | - | E | - | 100N | - | 622.08 |
| Supply Voltage | GTQF : CMOS "3" for 3.3V "25" for 2.5V | Package Size "576" : 7 x 5 mm "536" : 5 x 3.2 mm "326" : 3.2 x 2.5 mm | | Frequency Stability Code "E": ± 50 ppm over -40 to +85°C. Other frequency stabilities are available. | | ±100 ppm (min.) frequency pulling range. | | Frequency (MHz) |

Test Circuits and Output Waveforms

| CMOS Test Circuit | PECL Test Circuit | LVDS Test Circuit |
|-----------------------|---|-----------------------|
| | <p style="text-align: center;"> $V_{DD} = 3.3V ; R1 = R3 = 127 \Omega ; R2 = R4 = 82.5 \Omega$ $V_{DD} = 2.5V ; R1 = R3 = 250 \Omega ; R2 = R4 = 62.5 \Omega$ </p> | |
| CMOS Output Wave Form | PECL Output Wave Form | LVDS Output Wave Form |
| | | |