

# Voltage Controlled Crystal Oscillators



**GTQF**  
CMOS waveform

**GPQF**  
PECL Differential

**GDQF**  
LVDS Differential

2.5 V 3.3 V

Min.  
10 MHz

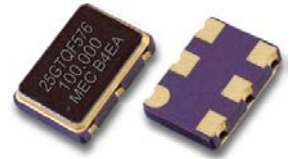
Max.  
1,500 MHz

## 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 <sub>DD</sub> ( code )	+ 2.5 V <sub>DD</sub> ± 5% ( voltage code " 25 " ) + 3.3 V <sub>DD</sub> ± 5% ( voltage code " 3 " )	+ 2.5 V <sub>DD</sub> ± 5% ( voltage code " 25 " ) + 3.3 V <sub>DD</sub> ± 5% ( voltage code " 3 " )	+ 2.5 V <sub>DD</sub> ± 5% ( voltage code " 25 " ) + 3.3 V <sub>DD</sub> ± 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 <sub>DD</sub>	V <sub>DD</sub> - 1.03 ( min. ) , V <sub>DD</sub> - 0.6 ( max. )	1.4 V Typical , 1.6 V max.							
Output Logic " Low " , " 0 "	10 % V <sub>DD</sub>	V <sub>DD</sub> - 1.85 ( min. ) , V <sub>DD</sub> - 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 <sub>DD</sub> = + 3.3V )	10 MHz : 17 mA ; 150 MHz : 28 mA 50 MHz : 20 mA ; 200 MHz : 33 mA 100 MHz : 24 mA ; 250 MHz : 37 mA	100 MHz : 50 mA ; 750 MHz : 64 mA 250 MHz : 55 Ma ; 1,000 : 68 mA 500 MHz : 60 mA ; 1,350 MHz : 72 mA	100 MHz : 25 mA ; 750 MHz : 39 mA 250 MHz : 30 mA ; 1,000 : 43 mA 500 MHz : 35 mA ; 1,350 MHz : 47mA							
All values are typical and over the operating temperatures.										
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 Commercial ( -10°C to +70°C ) Industrial ( -40°C to +85°C )	± 25 ppm A D	± 50 ppm B E	± 100 ppm C E	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					
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
[ dBc / Hz ( typical ) ]	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
	10 KHz	-123	-119	-118	-113	-110	-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	1.0	-1.1	1.2	1.5	1.1
Supply Voltage ( V <sub>DD</sub> )	V <sub>DD</sub> = +2.5 V ; Vcon Center = +1.25V					V <sub>DD</sub> = +3.3 V ; Vcon Center = +1.65V				
Vcontrol Range	+ 0.2V ~ +2.3V ± 80 ppm ( min. )					+ 0.3V ~ +3.0V ± 80 ppm ( min. )				
Frequency Pulling Range	Up to ± 200 ppm ( min. ) is also available. Please contact Mercury.									
Absolute Voltage	2.8 V max. for 2.5V V <sub>DD</sub> ; 4.0 V max. for 3.3V V <sub>DD</sub>									
Linearity	± 5% typical. ±10% ( max. )					Input Impedance				
Transfer Function	Positive Transfer					Bandwidth				
						1 MΩ typical				
						10 KHz min. Measured at -3 dB				
<b>Output Enable Function</b>										
OE Control on Pad 2	70% of V <sub>DD</sub> ( min. ) to enable output. ( Open connection prohibit. ) 30% of V <sub>DD</sub> ( 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

G_QF326	G_QF536	G_QF576
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		

Mercury [www.mercury-crystal.com](http://www.mercury-crystal.com)

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## 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": $\pm 50$ ppm over -40 to +85°C. Other frequency stabilities are available.		$\pm 100$ ppm ( min.) frequency pulling range.		Frequency ( MHz )

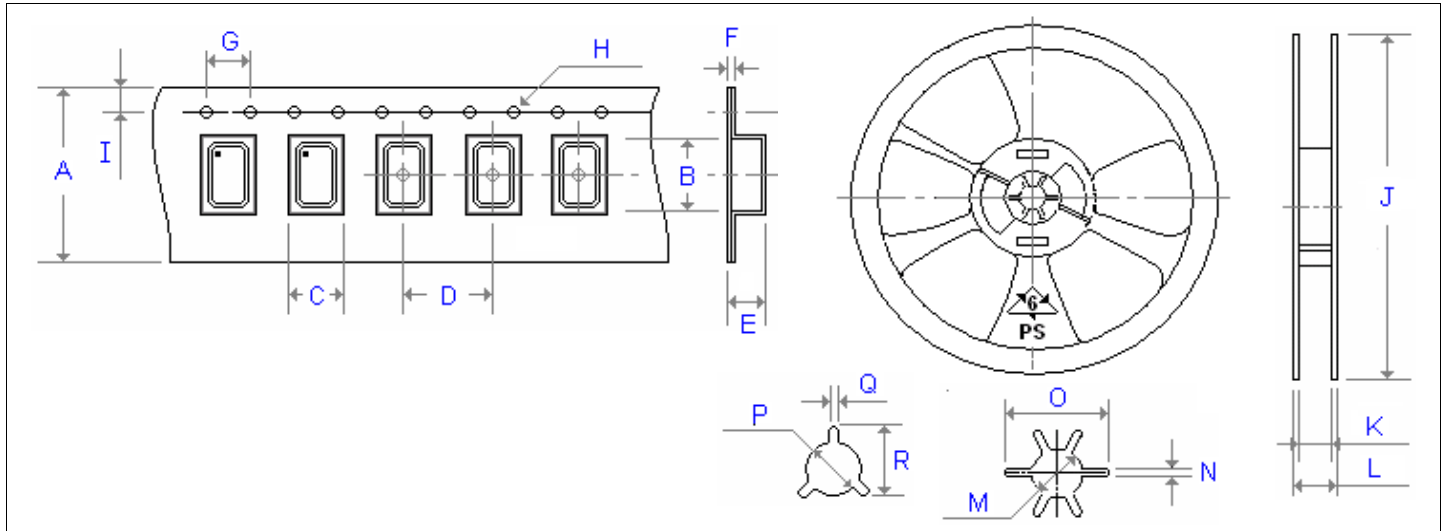
## Test Circuits and Output Waveforms

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

# 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