

# Voltage Controlled Crystal Oscillators



**GTQF**  
CMOS waveform

**GPQF**  
PECL Differential

**GDQF**  
LVDS Differential

2.5 V 3.3 V

Min.  
10 MHz

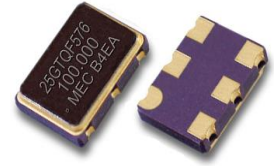
Max.  
1,500 MHz

## 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
- Output frequency range : 10 MHz to 1500 MHz
- Low RMS jitter 1.2 ps typical (12kHz to 20MHz)
- Package size : 3.2x2.5mm , 5.0x3.2mm , 7.0x5.0mm
- Next-day samples for prototypes



## General specifications , at Ta=+25°C

Model	GTQF		GPQF			GDQF			
Output Logic	CMOS		PECL			LVDS			
Supply Voltage V <sub>DD</sub> ( code )	+ 2.5 V ± 5% ( voltage code " 25 " )		+ 2.5 V ± 5% ( voltage code " 25 " )			+ 2.5 V ± 5% ( voltage code " 25 " )			
	+ 3.3 V ± 5% ( voltage code " 3 " )		+ 3.3 V ± 5% ( voltage code " 3 " )			+ 3.3 V ± 5% ( voltage code " 3 " )			
Available Frequency Range	10 ~ 250 MHz		10 ~ 1,500 MHz			10 ~ 1,500 MHz			
Output Load	15 pF		50 Ω into V <sub>DD</sub> - 2V or Thevenin equivalent			100 Ω between OUT and OUTN			
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 ( Typ. ) , 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 ( Typ. ) , 0.9 V ( min. )			
Current with Output Disable	16 mA ( typ. )		16 mA ( typ. )			16 mA ( typ. )			
Current Consumption ( V <sub>DD</sub> = + 3.3V )	10 ~ 50 MHz : 30 mA		10 ~ 250 MHz : 50 mA			10 ~ 250 MHz : 30 mA			
	51 ~ 150 MHz : 38 mA		251 ~ 750 MHz : 55 mA			251 ~ 750 MHz : 34 mA			
	151 ~ 250 MHz : 48 mA		751 ~ 1,500 MHz : 60 mA			751 ~ 1,500 MHz : 40 mA			
Rise Time / Fall Time	1.5 nsec. ( Typ. ) , 3.0 nsec. ( max. )		0.2 nsec. ( Typ. ) , 0.5 nsec. ( max. )			0.2 nsec. ( Typ. ) , 0.4 nsec. ( max. )			
	Tr / Tf : 10% → 90% waveform		Tr / Tf : 20% → 80% waveform			Tr / Tf : 20% → 80% waveform			
Duty Cycle	50 % ± 5%								
Start-up Time	10 msec. ( 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 Codes	Frequency Stability	± 25 ppm			± 50 ppm			± 100 ppm	
	Over Operating Temperature Range	A			B			C	
	Commercial ( -10°C to +70°C )	D			E			F	
Industrial ( -40°C to +85°C )									
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									
RMS Jitter [ 12 kHz ~ 20 MHz ]	1.2 psec ( typ. )								
Phase Noise [ dBc / Hz ( typ. ) ]	Offset	10 Hz	100 Hz	1 KHz	10 KHz	100 KHz	1 MHz	10 MHz	
	156.250 MHz	-55	-85	-109	-116	-118	-139	-146	
	491.52 MHz	-61	-86	-100	-105	-105	-126	-137	
<b>Control Voltage Function on Pad 1</b>									
Supply Voltage	V <sub>DD</sub> = +2.5 V ; Vcon Center = +1.25V				V <sub>DD</sub> = +3.3 V ; Vcon Center = +1.65V				
Vcontrol Range	+ 0.25V ~ +2.25V				+ 0.3V ~ +3.0V				
Frequency Pulling Range	± 80 ppm ( min. )				± 80 ppm ( min. )				
	Up to ± 200 ppm ( min. ) is also available. Please contact Mercury.								
Linearity	5% ( typ. ) ; 10% ( max. )								
Transfer Function	Positive Transfer								
Input Impedance	1 MΩ ( typ. )								
Bandwidth	10 KHz ( min. ) Measured at -3 dB								
<b>Output Enable Function on Pad 2</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 nsec. ( max. ) / 50 nsec. ( max. )								

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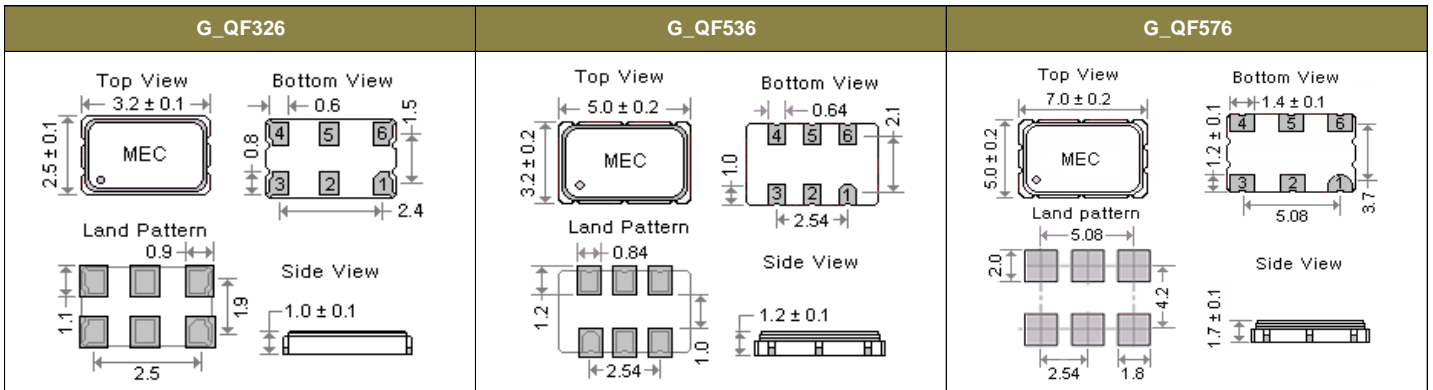
**Max.**  
**1,500 MHz**

## Part Number Format and Example

Example : 3GPQF576 - E - 100N - 622.080

3	GPQF	576	-	E	-	100N	-	622.080
Supply Voltage "3" for 3.3V "25" for 2.5V	GTQF : CMOS GPQF : PECL GDQF : LVDS	Package Size "576" : 7.0 * 5.0 mm "536" : 5.0 * 3.2 mm "326" : 3.2 * 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 )

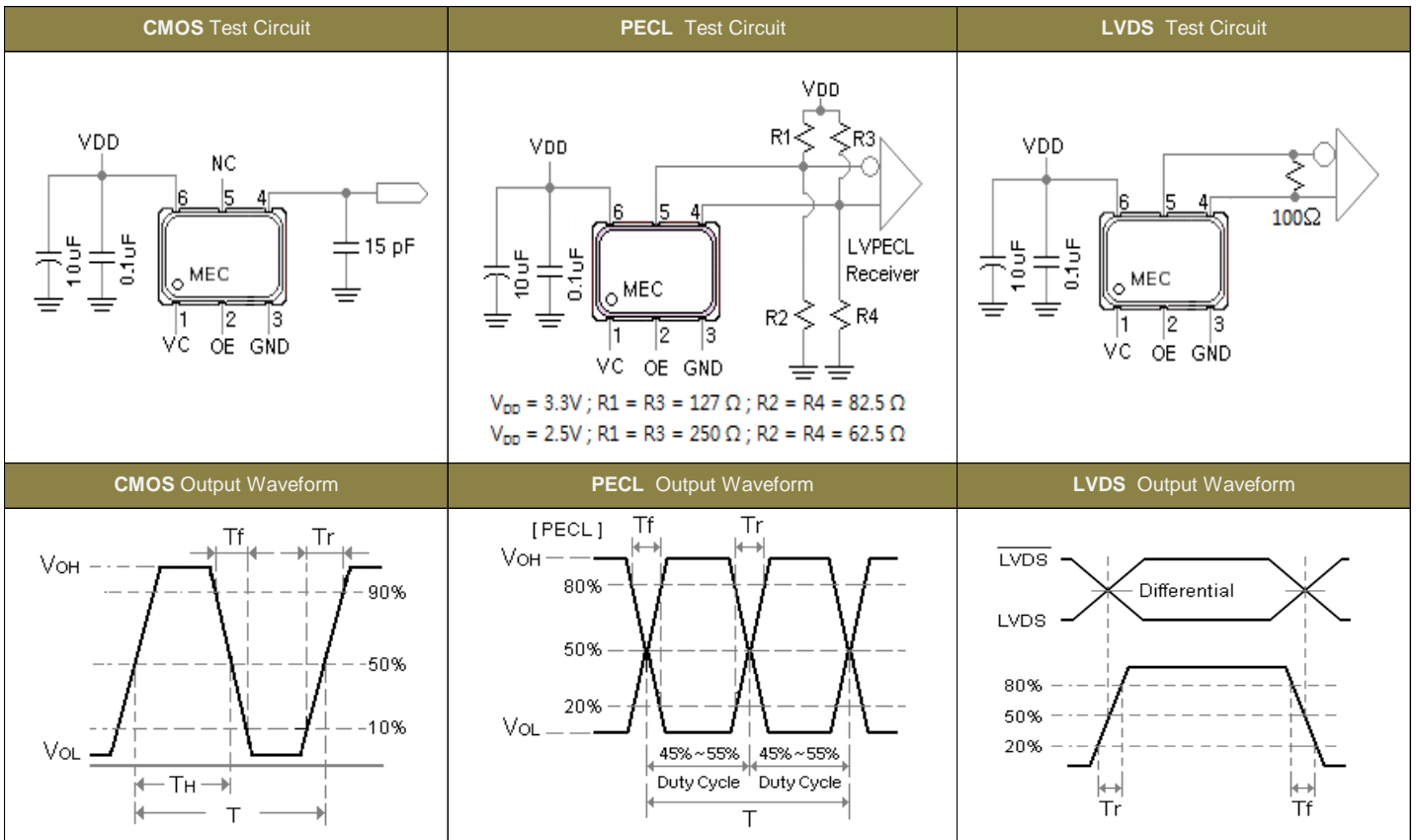
## Outline Dimensions ( Unit : mm ) , Suggested pad Layout for SMDs



## Pad Connections :

<b>Pad 1 :</b> VCXO	<b>Pad 2 :</b> OE: High Enable	<b>Pad 3 :</b> Ground
<b>Pad 4 :</b> [ CMOS : Output , PECL or LVDS : Differential ]	<b>Pad 5 :</b> [ CMOS : NC , PECL or LVDS : Complementary ]	<b>Pad 6 :</b> Supply Voltage

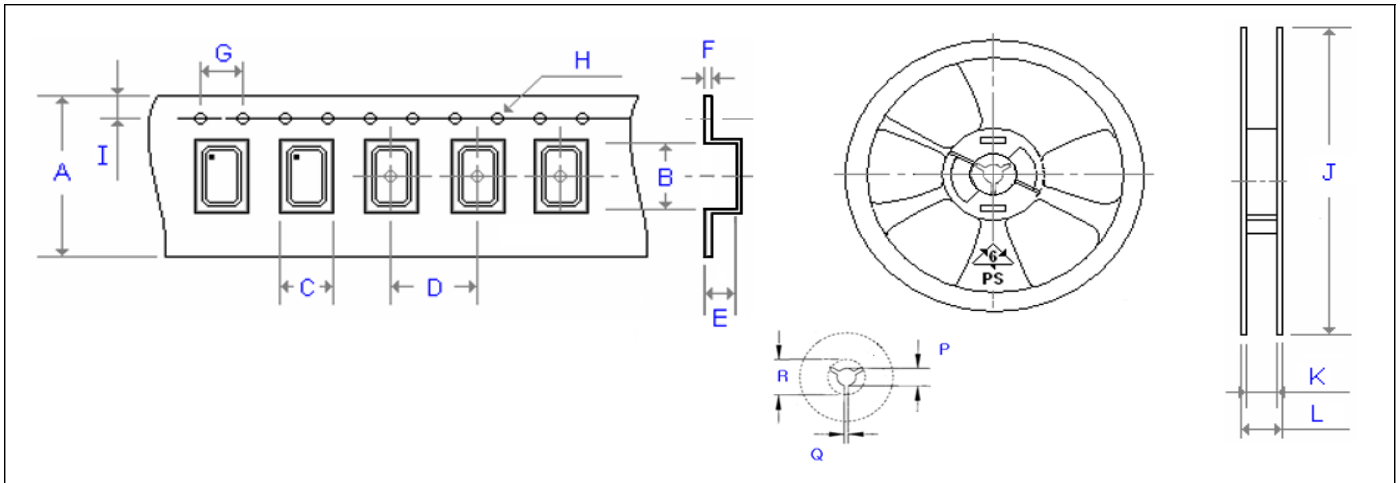
## Test Circuits and Output Waveforms



## Emboss Taping and Reel Specifications

[ VCXO ]

[ ( VC )TCXO ]



Carrier Type Dimensions ( unit : mm ) ±0.3mm

	A	B	C	D	E	F	G	H	I	pcs / reel
G_226	8.00	2.80	2.25	4.00	1.10	0.30	4.00	∅ 1.50	1.75	3000
G_326	8.00	3.40	2.70	4.00	1.40	0.25	4.00	∅ 1.50	1.75	3000
G_536	12.00	5.30	3.60	8.00	1.40	0.30	4.00	∅ 1.55	1.75	1000
G_576	16.00	7.30	5.30	8.00	1.90	0.30	4.00	∅ 1.50	1.75	1000
G_538	12.00	5.40	3.60	8.00	1.70	0.30	4.00	∅ 1.55	1.75	1000
G_578	16.00	7.30	5.30	8.00	1.90	0.30	4.00	∅ 1.50	1.75	1000
(V)M21	8.00	2.30	1.90	4.00	0.90	0.25	4.00	∅ 1.55	1.75	3000
ME21	8.00	2.30	1.50	4.00	1.35	0.25	4.00	∅ 1.50	1.75	3000
(V)M22	8.00	2.80	2.25	4.00	1.10	0.30	4.00	∅ 1.50	1.75	3000
(V)M_32	8.00	3.71	2.80	4.00	1.75	0.25	4.00	∅ 1.50	1.75	3000
(V)M_326	12.00	3.60	2.90	4.00	1.70	0.30	4.00	∅ 1.50	1.75	1000
(V)M_53	12.00	5.30	3.60	8.00	1.40	0.30	4.00	∅ 1.50	1.75	1000
(V)M_538	12.00	5.40	3.60	8.00	1.70	0.30	4.00	∅ 1.50	1.75	1000
(V)M_57(2)	16.00	7.40	5.50	8.00	2.80	0.35	4.00	∅ 1.50	1.75	500
(V)M_43 (63)	24.00	11.80	10.00	16.00	5.00	0.30	4.00	∅ 1.50	1.75	500

Reel Dimensions ( unit : mm ) ±2mm

	J	K	L	P	Q	R	pcs / reel
G_226	180.00	9.00	12.00	13.20	2.10	-	3000
G_326	180.00	9.00	12.00	13.20	2.10	-	3000
G_536	180.00	13.00	16.00	13.20	2.50	-	1000
G_576	180.00	17.20	19.30	13.30	2.20	22.00	1000
G_538	180.00	13.00	16.00	13.20	2.50	-	1000
G_578	180.00	17.20	19.30	13.30	2.20	22.00	1000
(V)M21	180.00	9.00	12.00	13.20	2.10	-	3000
ME21	180.00	9.00	12.00	13.20	2.10	-	3000
(V)M22	180.00	9.00	12.00	13.20	2.10	-	3000
(V)M_32	180.00	9.00	12.00	13.20	2.10	-	3000
(V)M_326	180.00	13.00	16.00	13.20	2.50	-	1000
(V)M_53	180.00	13.00	16.00	13.20	2.50	-	1000
(V)M_538	180.00	13.00	16.00	13.20	2.50	-	1000
(V)M_57(2)	180.00	17.20	19.30	13.30	2.20	22.00	500
(V)M_43 (63)	330.00	24.50	29.10	13.00	2.20	17.30	500