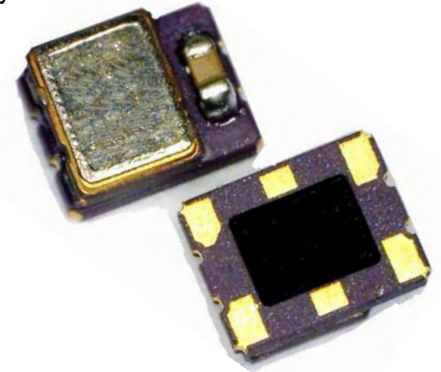


**Q-Family N-Series (VC)TCXOs. 0.8 pS Phase Jitter.****(V)MQN326T: CMOS Output 245 MHz max.****(V)MQN326P: LVPECL Outputs 1450 MHz max.****(V)MQN326D: LVDS Outputs 1450 MHz max.**

N - series

**MERCURY**  
Since 1973

The (V)MQN326T , (V)MQN326P and (V)MQN326D Series are members of Mercury's **Q-Family** Temperature Compensated oscillators that can be delivered within days. With low current consumption (44 mA for LVPECL 212.500 MHz at 3.3V) and an integrated phase jitter performance of 0.8 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.

**General Specifications:** at Ta=+25°C, CL=15 pF

Output Logic Type	LVC MOS / LV TTL	LVPECL	LVDS
Frequency Range	10 ~ 245 MHz	10 ~ 1450 MHz	10 ~ 1450 MHz
Load	15 pF	Differential 100Ω	Differential 100Ω
Power Supply Voltage (V <sub>DD</sub> )	V <sub>DD</sub> = +2.5V D.C.±5% (voltage code "25") or +3.3V D.C.±5% (voltage code "33") Note: Not over a continuous range from 2.5V to 3.3V.		
Output "High" Voltage; V <sub>OH</sub>	0.9*V <sub>DD</sub> min.	V <sub>DD</sub> - 1.03V min. V <sub>DD</sub> - 0.6V max.	V <sub>DD</sub> : 1.4 V typical V <sub>DD</sub> : 1.6 V max.
Output "Low" Voltage; V <sub>OL</sub>	0.1*V <sub>DD</sub> max.	V <sub>DD</sub> - 1.85V min. V <sub>DD</sub> - 1.6V max	V <sub>DD</sub> : 1.1 V typical V <sub>DD</sub> : 0.9 V min.
Initial Calibration Tolerance	±1.0ppm. max. at +25°C±2°C.( Upon shipment )		
Frequency Stability	Temperature (ref to +25°C): ±2.5ppm over -30°C to +85°C (default ) ±0.5ppm over -30°C to +85°C (available) ±1ppm 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 (at 50% V <sub>DD</sub> )	50% ±5%	50% ±5%	50% ±5%
Rise Time (Tr) / Fall Time (Tf)	1.5 nS. Typ. 3.0 nS. max. (10% ↔ 90% waveform )	0.2 nS Typ. 0.5 nS max. (20% ↔ 80% waveform )	0.2 nS Typ. 0.4 nS max. (20% ↔ 80% waveform )
Current Consumption, V <sub>DD</sub> = +2.5V.	50 MHz: 24 mA typ. 125 MHz: 28 mA typ. 200 MHz: 30 mA typ.	156 MHz: 36 mA typ. 600 MHz: 40 mA typ. 800 MHz: 46 mA typ. 1 GHz: 50 mA typ.	156 MHz: 22 mA typ. 600 MHz: 28 mA typ. 800 MHz: 30 mA typ. 1 GHz: 34 mA typ.

**MERCURY**[www.mercury-crystal.com](http://www.mercury-crystal.com)Taiwan: TEL (886)-2-2406-2779, FAX (886)-2-2496-0769, e-mail: [sales-tw@mercury-crystal.com](mailto:sales-tw@mercury-crystal.com)U.S.A.: TEL (1)-909-466-0427, FAX (1)-909-466-0762, e-mail: [sales-us@mercury-crystal.com](mailto:sales-us@mercury-crystal.com)

<b>Current Consumption,</b> $V_{DD} = +3.3V$ .	50 MHz: 26 mA typ. 125 MHz: 30 mA typ. 200 MHz: 34 mA typ.	156 MHz: 40 mA typ. 600 MHz: 45 mA typ. 800 MHz: 48 mA typ. 1 GHz: 52 mA typ.	156 MHz: 25 mA typ. 600 MHz: 30 mA typ. 800 MHz: 32 mA typ. 1 GHz: 36 mA typ.
<b>Current with Output Disabled</b>	18 mA typical	18 mA typical	18 mA typical
<b>Start-up Time</b>	5 ms max.		
<b>Output Enable Function on pad 2</b>			
<b>OE Control on Pad 2</b>	0.7% of $V_{DD}$ minimum or no connection to enable output. LVCMOS/LVTTL level.		
	0.3% of $V_{DD}$ maximum to disable output (high impedance). LVCMOS/LVTTL level.		
<b>Output Enable Time</b>	200 ns max.		
<b>Output Disable Time</b>	50 ns max.		
<b>Phase Jitter, rms</b> (12 KHz to 20 MHz)	0.8 pS typical		
<b>Phase Jitter, rms</b> (1.875 MHz to 20 MHz)	< 150 fs		
<b>Control Voltage Function on Pad 1</b>			
<b>Supply Voltage (<math>V_{DD}</math>)</b>	$V_{DD} = +2.5 V$ ; $V_{con}$ Center = +1.4V		$V_{DD} = +3.3 V$ ; $V_{con}$ Center = +1.5V
<b>Vcontrol Range</b>	$+1.4V \pm 1.0V$		$+1.5V \pm 1.0V$
<b>Frequency Pulling Range</b>	$\pm 8$ ppm min.		
<b>Linearity</b>	$\pm 5\%$ typical. $\pm 10\%$ max.		
<b>Transfer Function</b>	Positive Transfer		
<b>Absolute Voltage</b>	2.8 V max. for 2.5V $V_{DD}$ ; 3.8 V max. for 3.3V $V_{DD}$		
<b>Input Impedance</b>	1 M $\Omega$ typical		
<b>Bandwidth</b>	10 KHz min. Measured at -3 dB.		

### Environmental Performance Specifications

<b>Green Requirement</b>	RoHS compliant, Pb (lead) free in accordance with EU Directive 2002/95/EC 6/6 (2002/95/EC) and WEEE (2002/96/EC). Free of halide, cadmium, hexavalent chromium, lead, mercury, PBB's and PBDE's.		
<b>Moisture Sensitivity Level</b>	Level 1 (infinite) according to IPC/JEDEC J-STD-020D.1		
<b>Second Level Interconnect</b>	e4		
<b>Storage temp. range</b>	-55 to +125°C		
<b>Humidity</b>	85% RH, 85°C, 48 hours		
<b>Fine Leak / Gross Leak</b>	MIL-Std-883, method 1014, condition A / MIL-Std-883, method 1014, condition C		
<b>Solderability</b>	MIL-STD-202F method 208E		
<b>Reflow</b>	260°C for 10 sec. 2X.		
<b>Vibration</b>	MIL-STD-202F method 204, 35G, 50 to 2000 Hz		
<b>Shock</b>	MIL-STD-202F method 213B, test condi. E, 1000GG ½ sine wave		
<b>Resistance to Solvent</b>	MIL-STD-202, method 215		
<b>Temperature Cycling</b>	MIL-STD-883, method 1010		
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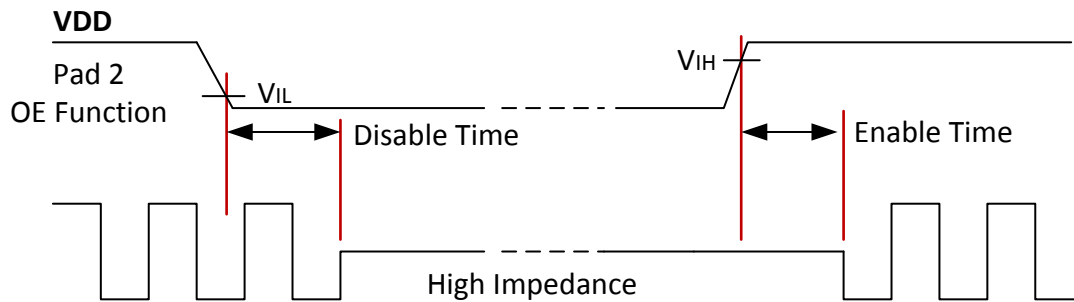
<b>ESD Rating</b>	Human body model (HBM): 1500 V min.
<b>Pad Surface Finish</b>	Gold (0.3 um to 1.0 um) over nickel (1.27 um to 8.89 um)
<b>Weight of the Device</b>	0.045 grams typical

**Part Number Format and Example:**

Example: VMQN326P33-212.500-2.0/-40+85

VMQN	326	P	33	-	212.500	-	2.0	/	-40+85
Holder Type "MQN":TCXO "VMQN":VCTCXO	Package Size "326": 3.2x2.5 mm	T: CMOS P: LVPECL D: LVDS	Supply Voltage "33" for 3.3V "25" for 2.5V		Frequency (MHz)		Frequency Stability		Operating Temp. Range

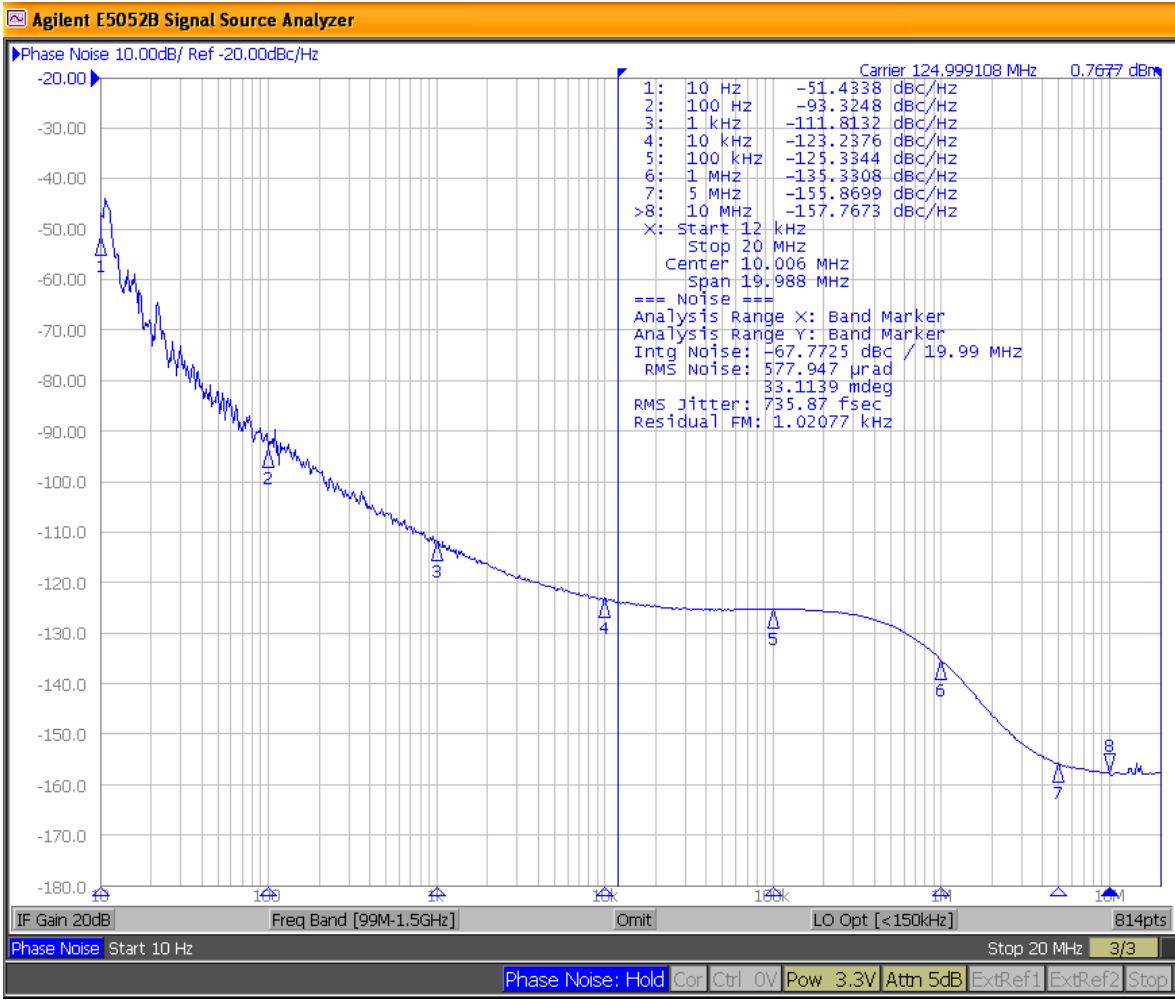
**Output OE Function on pad 2**



**VMQN326 Series Phase Noise and Phase Jitter Data** (typical), VDD=+3.3V, Vcontrol=0.0V , Output :LVDS

	Frequency (MHz)	125.000	212.5	312.5
<b>SSB Phase Noise Data</b> (dBc/Hz Typical)	<b>10 Hz offset</b>	-51	-42	-49
	<b>100 Hz offset</b>	-93	-87	-88
	<b>1 KHz offset</b>	-111	-105	-101
	<b>10 KHz offset</b>	-123	-115	-111
	<b>100 KHz offset</b>	-125	-118	-114
	<b>1 MHz offset</b>	-135	-130	-124
	<b>5 MHz offset</b>	-155	-151	-147
<b>Phase Jitter pS</b> (12KHz ~ 20 MHz, RMS)		0.73	0.85	0.88

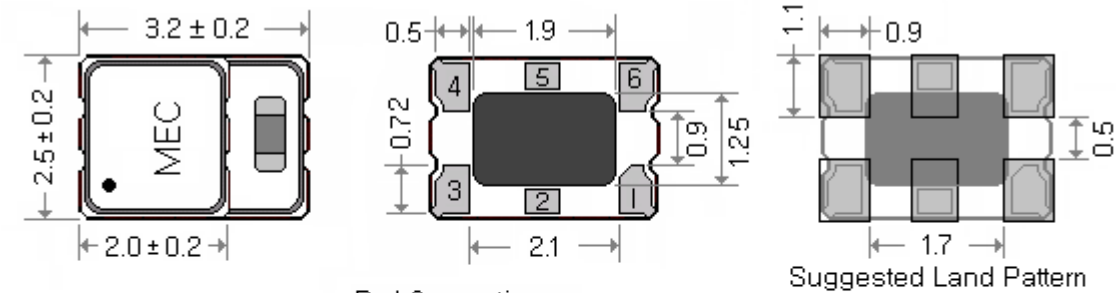
**Phase Noise Plot of VMQN32D33-125.000 MHz, VDD=+3.3V, Vcontrol=0.0V**



**Package Dimensions and Recommended Solder Pad Layout**

unit: (mm)

326 Package unit: mm



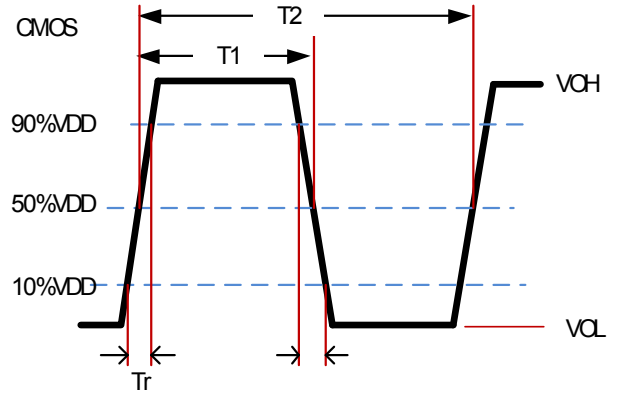
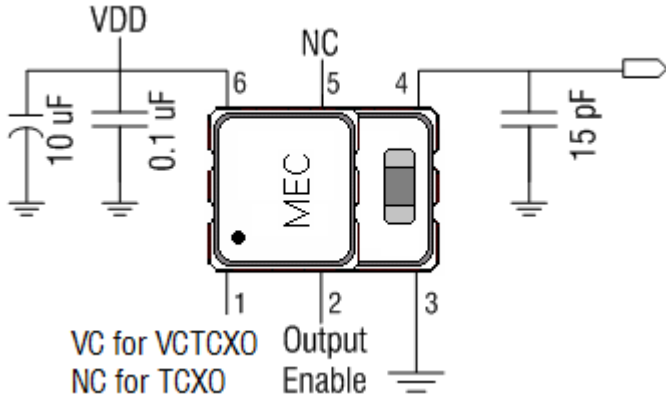
Pad Connections :

- Pad 1 : No Connection for TCXO / Voltage Control for VCTCXO
- Pad 2 : Output Enable
- Pad 3 : Ground
- Pad 4 : CMOS : Output  
LVPECL / LVDS : Differential
- Pad 5 : CMOS : No Connection  
LVPECL / LVDS : Complimentary
- Pad 6 : Supply Voltage

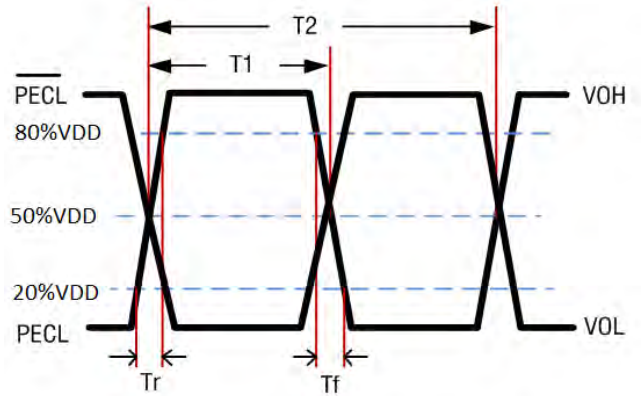
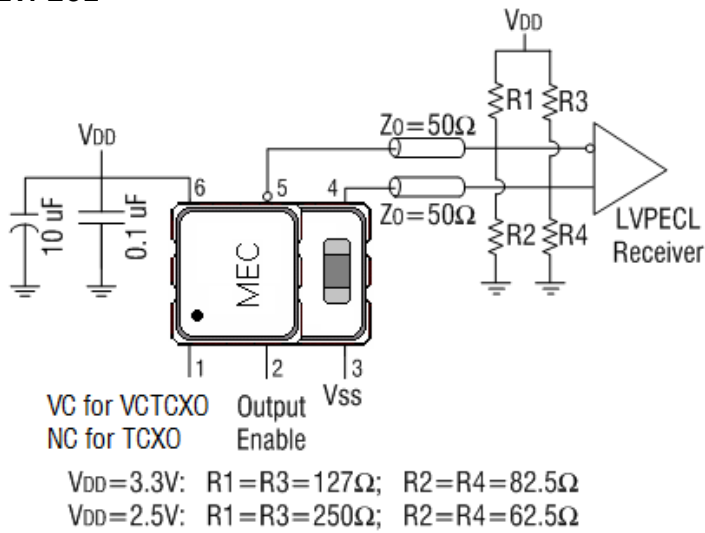
**Test Circuits and Output Waveforms**

Duty cycle =  $\left(\frac{T1}{T2}\right) * 100\%$ . Measured at 50% VDD

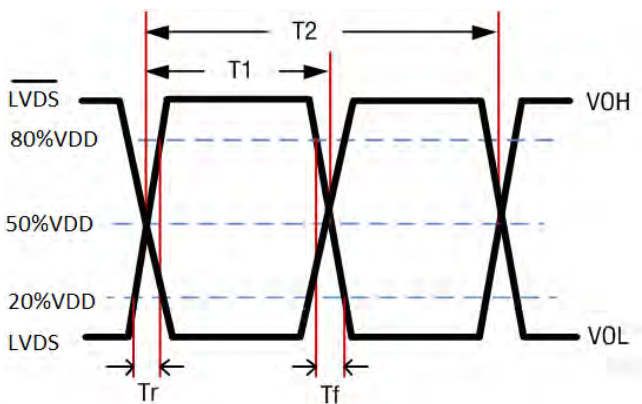
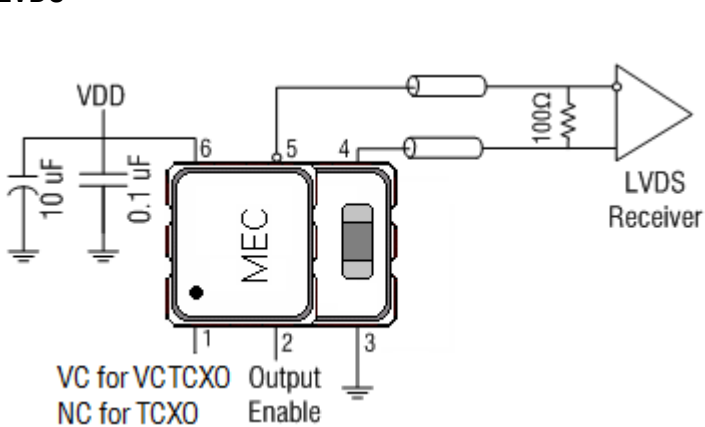
**CMOS**



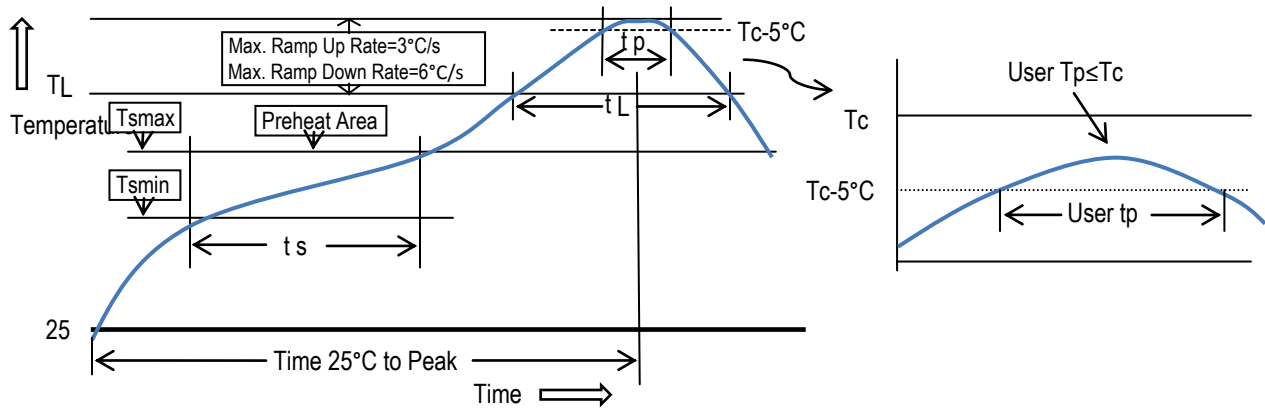
**LVPECL**



**LVDS**



**Recommended Solder Reflow Profile** (per IPC/JEDEC J-STD-020D.1)



Profile Feature	Sn-Pb Eutectic Assembly	Pb-free Assembly
Preheat/Soak		
- Temperature min. (Ts min.)	100°C	150°C
- Temperature max. (Ts max.)	150°C	200°C
- Time (ts) (Ts min. to Ts max.)	60 to 120 seconds	60 to 180 seconds
Ramp-up rate (TL to Tp)	3°C / sec. max.	3°C / sec. max.
Liquidous temperature (TL)	183°C	217°C
Time (tL) maintained above TL	60 to 150 seconds	60 to 150 seconds
Peak package body temperature (Tp)	235°C	260°C
Time (Tp) within 5°C of the classification temperature Tc	10 to 30 seconds	20 to 40 seconds
Ramp-down rate (Tp to TL)	6°C / second max.	6°C / second max.
Time 25°C to peak temperature	6 minutes max.	8 minutes max.

All temperatures refer to topside of the package, measured on the package body surface.