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

TCXO			VCTCXO			N series		SMD	2.5V	3.3V	Min. 10 MHz	Max. 1,500 MHz
MQN _ T	MQN _ P	MQN _ D	VMQN _ T	VMQN _ P	VMQN _ D							
CMOS	LVPECL	LVDS	CMOS	LVPECL	LVDS							

Features **0.8 pS Phase Jitter (typical)**

- Wide frequency range : 10 ~ 1500 MHz
- RMS Jitter (12 kHz ~ 20MHz) : 0.8 ps typ. (at 156.250 MHz)
- Package size : 3.2 x 2.5 x 1.6mm and 7.0 x 5.0 x 2.6mm
- Single end output : CMOS , Differential output : LVPECL or LVDS

General specifications , at Ta=+25°C

Model	(V)MQN326T , (V)MQN574T	(V)MQN326P , (V)MQN576P	(V)MQN326D , (V)MQN576D
Output Logic	CMOS	LVPECL	LVDS
Supply Voltage V_{DD} (code)	+ 2.5 V_{DD} ± 5% (voltage code " 25 ")	+ 2.5 V_{DD} ± 5% (voltage code " 25 ")	+ 2.5 V_{DD} ± 5% (voltage code " 25 ")
	+ 3.3 V_{DD} ± 5% (voltage code " 33 ")	+ 3.3 V_{DD} ± 5% (voltage code " 33 ")	+ 3.3 V_{DD} ± 5% (voltage code " 33 ")
Available Frequency Range	10 ~ 250 MHz	10 ~ 1,500 MHz	10 ~ 1,500 MHz
Output Load	15 pF	50 Ω into Vcc - 2V or Thevenin equiralent	100 Ω
Output Logic " High " , " 1 "	90 % V_{DD}	V_{DD} - 1.03 (min.) , V_{DD} - 0.6 (max.)	1.4 V (typ.) , 1.6 V (max.)
Output Logic " Low " , " 0 "	10 % V_{DD}	V_{DD} - 1.85 (min.) , V_{DD} - 1.6 (max.)	1.1 V (typ.) , 0.9 V (min.)
(V_{DD} = + 2.5V) Current Consumption (max.)	50 MHz : 34 mA	156 MHz : 46 mA	156 MHz : 32 mA
	125 MHz : 38 mA	600 MHz : 50 mA	800 MHz : 40 mA
	200 MHz : 40 mA	1,000 MHz : 60 mA	1,000 MHz : 44 mA
(V_{DD} = + 3.3V) Current Consumption (max.)	50 MHz : 36 mA	156 MHz : 50 mA	156 MHz : 35 mA
	125 MHz : 40mA	600 MHz : 55 mA	800 MHz : 40 mA
	200 MHz : 44 mA	1,000 MHz : 62 mA	1,000 MHz : 44 mA
Current with Output Disabled	18 mA (typ.)	18 mA (typ.)	18 mA (typ.)
Rise Time / Fall Time	1.5 nsec. (typ.) , 3.0 nsec. (max.) Tr / Tf : 10% ↔ 90% waveform	0.2 nsec. (typ.) , 0.5 nsec. (max.) Tr / Tf : 20% ↔ 80% waveform	0.2 nsec. (typ.) , 0.4 nsec. (max.) Tr / Tf : 20% ↔ 80% waveform

Initial Calibration Tolerance	± 1.0 ppm. (max.) at +25°C±2°C. (upon shipment) for Package Size (3.2 * 2.5 mm)		
	± 2.0 ppm. (max.) at +25°C±2°C. (upon shipment) for Package Size (5.0 * 7.0 mm)		
Frequency Stability Codes	Temperature (ref to +25°C)	± 2.0 ppm over -40°C to +85°C (default)	
		± 1.0 ppm over -40°C to +85°C (available)	
	Aging at Ta = +25°C	± 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	5.0 msec. (max.)		
RMS Jitter [12 kHz ~ 20 MHz]	0.8 psec (typ.)		

Phase Noise [dBc / Hz (typ.)]	Offset	10 Hz	100 Hz	1K Hz	10K Hz	100K Hz	1M Hz	10M Hz
	125 MHz	-51	-93	-111	-123	-125	-135	-155
	212.5 MHz	-42	-87	-105	-115	-118	-130	-151

Storage Temperature	-55°C to + 125°C							

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 on Pad 2	70% of V_{DD} (min.) to enable output. (Open connection prohibit.)
Frequency Pulling Range	± 8 ppm (min.)		
Linearity	1% (typ.) ; 10% (max.)		30% of V_{DD} (max.) to disable output (high impedance).
Transfer Function	Positive Transfer		
Absolute Voltage	4.0 V (max.)	Ouput Enable Time / Disable Time	200 nsec. (max.) / 50 nsec. (max.)
Input Impedance	770 K Ω (typ.)		

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Part Number Format and Example

[1] Holder Type	[2] Package Code	[3] Waveform Code	[4] Supply Voltage	–	[5] Center Frequency	–	[6] Frequency Stability	/	[7] Operating Temp. Range

Examples	(1)	MQN	326	D	25	-	622.080	-	1.0	/	-40+85
	(2)	VMQN	576	P	33	-	120.000	-	2.0	/	-40+85

Ex (1) : MQN326D25 - 622.080 - 1.0 / -40+85 [TCXO , MQN326 type , LVDS , +2.5V , 622.080MHz , ±1.0ppm from -40°C to 85°C]

Ex (2) : VMQN576P33 - 120.000 - 2.0 / -40+85 [VCTCXO , VMQN576 type , LVPECL , +3.3V , 120.000MHz , ±2.0ppm from -40°C to 85°C]

[1]	Holder Type : " MQN " stands for TCXO ; " VMQN " stands for VCTCXO
[2]	Package Code : " 326 " stands for 3.2 x 2.5 x 1.6 mm 6pad ; " 576 " stands for 5.0 x 7.0 x 2.6 mm 6pad
[3]	Output Waveform Code : " T " stands for CMOS ; " P " stands for LVPECL ; " D " stands for LVDS
[4]	Supply Voltage : " 25 " stands for +2.5V ; " 33 " stands for +3.3V
[5]	Center Frequency in MHz
[6]	Frequency Stability in ± _ ppm ; ex 1 : ± 1.0ppm --- 1.0 , ex 2 : ± 2.0ppm --- 2.0
[7]	Operating Temperature Range in °C ex : -40 °C to 85°C ------ -40+85

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

[(V)MQN574T]	[(V)MQN576P] , [(V)MQN576D]	[(V)MQN326T] , [(V)MQN326P] , [(V)MQN326D]

[(V)MQN574T]

Pad Connections :
Pad 1 : NC for TCXO ; VC for VCTCXO
Pad 2 : Ground
Pad 3 : Output
Pad 4 : Supply Voltage

[(V)MQN576P] , [(V)MQN576D]

Pad Connections :
Pad 1 : NC for TCXO ; VC for VCTCXO
Pad 2 : Output Enable
Pad 3 : Ground
Pad 4 : Output
Pad 5 : Complementary
Pad 6 : Supply Voltage

[(V)MQN326T] , [(V)MQN326P] , [(V)MQN326D]

Pad Connections :
Pad 1 : NC for TCXO ; VC for VCTCXO
Pad 2 : Output Enable
Pad 3 : Ground
Pad 4 : Output
Pad 5 : CMOS : NC ; LVPECL / LVDS : Complementary
Pad 6 : Supply Voltage

Test Circuits and Output Waveforms

CMOS for 4pad package

NC for TCXO
VC for VCTCXO

CMOS for 6pad package

No Connection for TCXO
Voltage Control for VCTCXO

LVPECL

VC for VCTCXO
NC for TCXO

V_{DD} = 3.3V ; R1 = R3 = 127 Ω ; R2 = R4 = 82.5 Ω
V_{DD} = 2.5V ; R1 = R3 = 250 Ω ; R2 = R4 = 62.5 Ω

LVDS

No Connection for TCXO
Voltage Control for VCTCXO

Emboss Taping and Reel Specifications

[VCXO]	[(VC)TCXO]
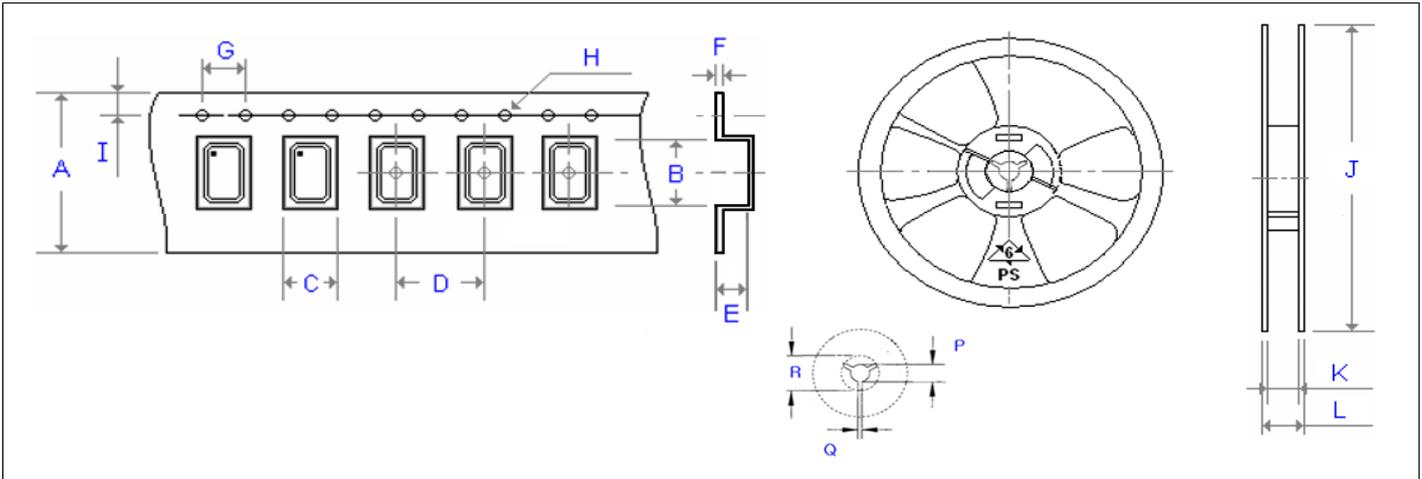
Carrier Type Dimensions (unit : mm) ±0.3mm

	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	Ø 1.50	1.75	3000
G_326	8.00	3.40	2.70	4.00	1.40	0.25	4.00	Ø 1.50	1.75	3000
G_536	12.00	5.30	3.60	8.00	1.40	0.30	4.00	Ø 1.50	1.75	1000
G_576	16.00	7.30	5.30	8.00	1.90	0.30	4.00	Ø 1.50	1.75	1000
G_538	12.00	5.40	3.60	8.00	1.70	0.30	4.00	Ø 1.50	1.75	1000
G_578	16.00	7.30	5.30	8.00	1.90	0.30	4.00	Ø 1.50	1.75	1000
(V)M21	8.00	2.30	1.90	4.00	0.90	0.25	4.00	Ø 1.50	1.75	3000
ME21	8.00	2.30	1.50	4.00	1.35	0.25	4.00	Ø 1.50	1.75	3000
(V)M22	8.00	2.80	2.25	4.00	1.10	0.30	4.00	Ø 1.50	1.75	3000
(V)M_32	8.00	3.71	2.80	4.00	1.75	0.25	4.00	Ø 1.50	1.75	3000
(V)M_326	12.00	3.60	2.90	4.00	1.70	0.30	4.00	Ø 1.50	1.75	1000
(V)M_53	12.00	5.30	3.60	8.00	1.40	0.30	4.00	Ø 1.50	1.75	1000
(V)M_538	12.00	5.40	3.60	8.00	1.70	0.30	4.00	Ø 1.50	1.75	1000
(V)M_57(2)	16.00	7.40	5.50	8.00	2.80	0.35	4.00	Ø 1.50	1.75	500
(V)M_43 (63)	24.00	11.80	10.00	16.00	5.00	0.30	4.00	Ø 1.50	1.75	500

Reel Dimensions (unit : mm) +2.0 / -0.0mm

	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