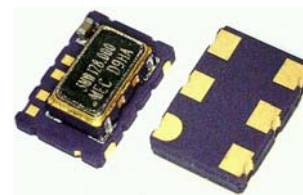


TCXO <b>MW _ D</b>	VCTCXO <b>VMW _ D</b>	<b>Low Cost .</b> <b>Wide Frequency Range.</b>	LVDS	Thru-Hole	SMD	15pF	3.3V	Min. <b>12 MHz</b>	Max. <b>800 MHz</b>
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**Features**

- Wide frequency range : [ 12.0 MHz ~ 800.0 MHz ]
- Low cost , Moderate jitter , Ideal for SONET , xDSL.



**General specifications of all available packages , at Ta=+25°C , CL=15pF**

Frequency Range	<b>12.0 MHz ~ 800.0 MHz</b>						
Output Wave Form	Differential <b>LVDS</b> square wave . Wave code is " D "						
Initial Calibration Tolerance	Models with mechanical trimmer: <math>\pm 2.0\text{ ppm}</math> ( +25°C $\pm 2^\circ\text{C}</math> ) .$						
Standard Frequency ( Partial list )	10.000	12.800	16.000	19.440	20.000	25.000	27.000
	30.000	32.000	32.768	38.880	40.000	50.000	54.000
	64.000	65.536	77.760	80.000	100.000	128.000	155.520
	160.000	200.000	311.040	320.000	409.600	622.080	800.000
Frequency Stability ( ppm )	$\pm 1.0\text{ ppm}$	$\pm 2.0\text{ ppm}$	$\pm 2.5\text{ ppm}$	$\pm 3.0\text{ ppm}$	$\pm 4.0\text{ ppm}$	$\pm 5.0\text{ ppm}$	○ : available △ : contact us X : not available
Frequency Stability vs Temperature ( examples )	0°C to 50°C	○	○	○	○	○	
	-10°C to 60°C	△	○	○	○	○	
	-20°C to 70°C	X	○	○	○	○	
	-30°C to 75°C	X	○	○	○	○	
-40°C to 85°C	X	X	X	△	△	○	
Frequency Stability	vs Aging	$\pm 1.0\text{ ppm max.}$ , per year at 25°C .					
	vs Voltage Change	$\pm 0.3\text{ ppm max.}$ , for a $\pm 5\%$ input voltage change .					
	vs Load Change	$\pm 0.3\text{ ppm max.}$ , for a $\pm 10\%$ load condition change .					
	vs Reflow ( SMD type )	$\pm 1.0\text{ ppm max.}$ , 1 reflow and measured 24 hours afterwards .					
Mechanical Frequency Tuning	$\pm 3.0\text{ ppm (min.)}$ tuning Note: VMW57D have no mechanical trimmer built-in .						
Input Voltage Range	+3.3 V ( voltage code is " 33 " )						
Output Logic Levels	Logic High " 1 "	1.4 V typical ; 1.6 V min.					
	Logic Low " 0 "	0.9 V min. ; 1.1 V max.					
Output Differential Voltage, V <sub>OD</sub>	247 mV min.; 355 mV typical ; 454 mV max. Output 1 - output 2						
Output Differential Error, dV <sub>OD</sub>	-50 mV min ; 50 mV max.						
Output Offset Voltage, Vos	1.125 V min. ; 1.200 V typical ; 1.375 V max.						
Offset Magnitude Error, dVos	0 mV min. ; 3 mV typical ; 25 m V max.						
Rise Time and Fall Time	1.5 n sec. ( max. ) ; 20% $\leftrightarrow$ 80% of waveform .						
Current Consumption. ( Measured with load )	24 MHz $\leq$ f <sub>out</sub> : 33 mA ( max. ) ; 24 MHz $\leq$ f <sub>out</sub> $\leq$ 96 MHz : 50 mA ( max. )						
	96 MHz $\leq$ f <sub>out</sub> $\leq$ 700 MHz : 85 mA ( max. )						
Duty Cycle	50% $\pm$ 5% measured at 1.25V						
Start-Up Time.	5.0m sec. ( typ. ) , 10.0m sec. ( max. ) ( reach 90% amplitude and at +25°C $\pm 2^\circ\text{C}$ )						
Output Load	50 $\Omega$ from each load						
Drive Capability	100 $\Omega$ between LVDS and complimentary LVDS output						
Pad 1. Option VCTCXO only	Control Voltage Center , Range	+ 1.5 V $\pm$ 1.0V					
	Frequency Deviation Range	$\pm 5.0\text{ ppm ( min. )}$ with Vcon = +1.5 V $\pm$ 1.0 V					
	Linearity	6% typical ; 10% max.					
	Slope Polarity	Positive : Positive voltage for positive frequency shift					
Tri - State Function. on pad No. 2	No Connection	Differential LVDS and complimentary LVDS outputs .					
	Disable	Both outputs are disabled ( high impedance ) when pad No.2 is taken below 0.45*Vcc referenced to ground ( threshold ) Oscillator is always On . Only buffer stage is disabled . Disable current : 50 uA max. ( at 0.0V ) , Disable time : 10 ns ( max. )					
	Enable	At disabled mode , both outputs are enabled when Tri-state pad is taken above 0.45*Vcc referenced to ground ( threshold ) ; Enable time : 10ns + one period of the output frequency ( max. )					
SSB Phase Noise at 25°C ( typical )	Offset	10 Hz	100 Hz	1 KHz	10 KHz	100 KHz	
	MW5762D33 - 100.000	-75 dBc / Hz	-104 dBc / Hz	-115 dBc / Hz	-120 dBc / Hz	-122 dBc / Hz	
	MW5762D33 - 622.080	-55 dBc / Hz	-85 dBc / Hz	-109 dBc / Hz	-115 dBc / Hz	-110 dBc / Hz	
Phase Jitter ( RMS ) ( 12 KHz to 20 MHz )	2.6 ps ( typ. ) 4.0 ps ( max. ) for 155.520 MHz						
Period Jitter [ typical ]	Frequency Range	38.880 MHz	77.760 MHz	155.520 MHz	622.080 MHz		
	[ RMS ]	2.5 ps	4.0 ps	5.0 ps	8.0 ps		
	[ Peak to peak ]	20.0 ps	32.0 ps	28.0 ps	45.0 ps		
Storage Temperature	-55°C to +125°C						

Note 1: Some specifications are package dependent. Please refer to the spec. sheet of individual packages once a package is selected .

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

Clipped Sine " S "

CMOS " T "

PECL Differential " P "

LVDS Differential " D "

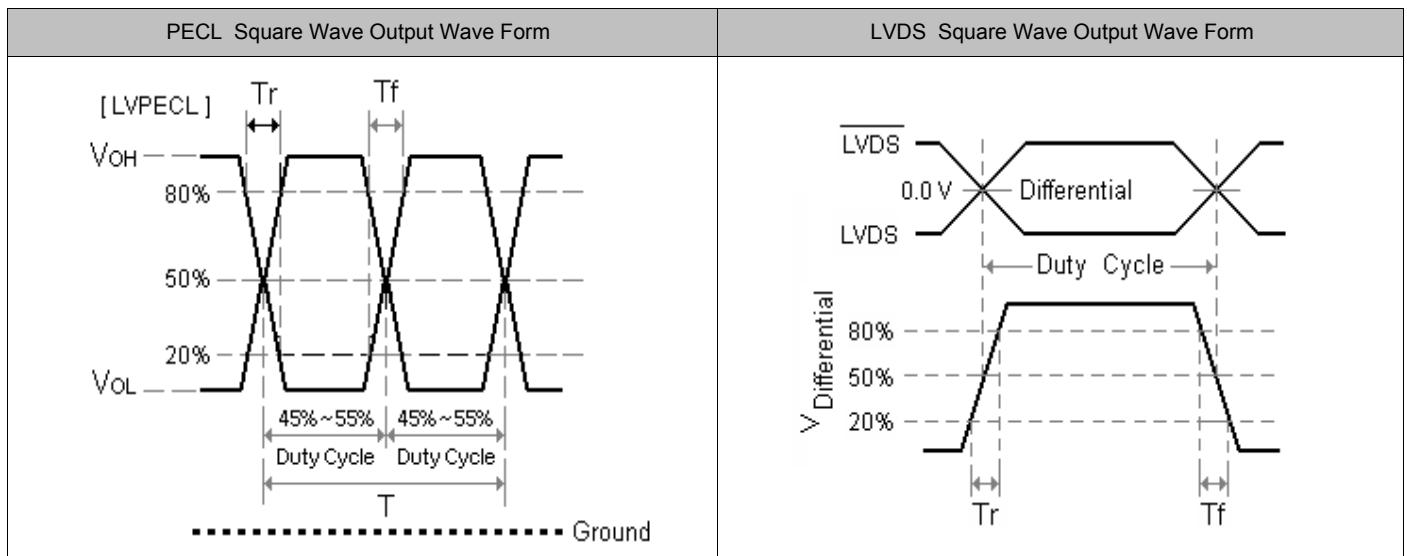
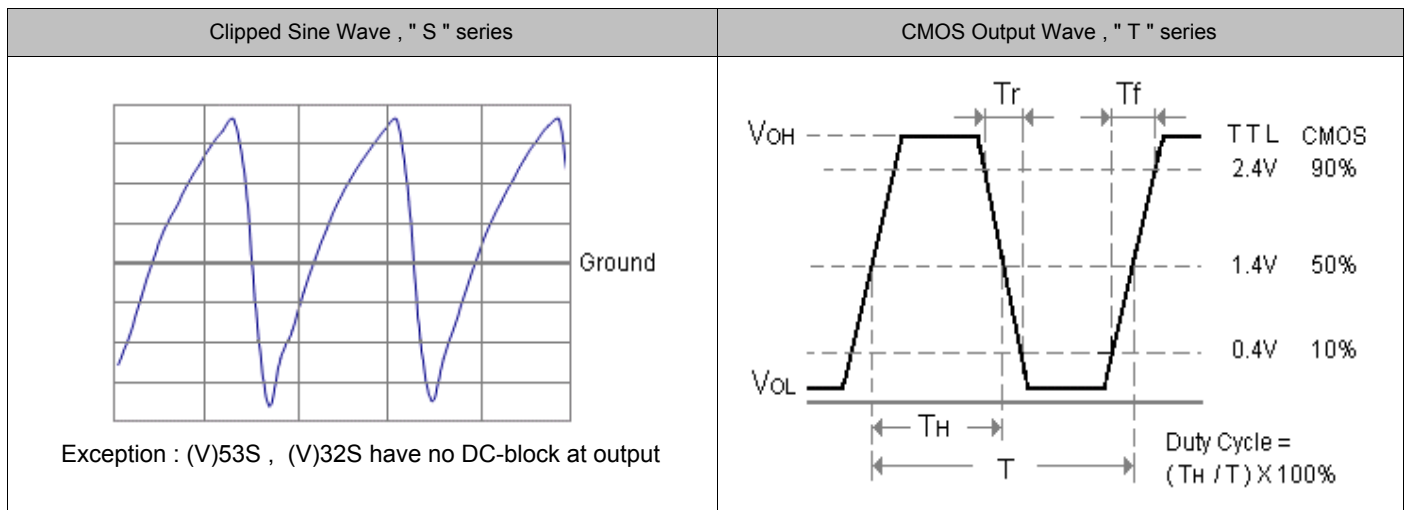
## Part Number Format and Example

	[ 1 ]	[ 2 ]	[ 3 ]	[ 4 ]		[ 5 ]		[ 6 ]		[ 7 ]	
	Holder Type	G	Output Wave	Supply Voltage	-	Center Frequency	-	Frequency Stability	/	Operating Temp. Range	
Examples	(1)	VM38	G	T	5	-	10.000	-	1.5	/	-20+70
	(2)	M57		S	3	-	20.000	-	2.5	/	-30+75

Ex (1) : VM38GT5 - 10.000 - 1.5 / -20+70 [ VCTCXO , VM38 type , RoHS , CMOS output , 5.0V , 10.000MHz , ±1.5ppm from -20°C to 70°C ]

Ex (2) : M57S3 - 20.000 - 2.5 / -30+75 [ TCXO , M57 type , Clipped Sine Wave , 3.0V , 20.000MHz , ±2.5ppm from -30°C to 75°C ]

[ 1 ]	Holder Type " M " stands for TCXO , " VM " stands for VCTCXO
[ 2 ]	Please add " G " after the " type code " for RoHS compliant ( Does not apply to (V)M32 , (V)M53 , (V)M536_ , (V)M57_ , (V)M576_ )
[ 3 ]	" S " stands for Clipped Sine Wave ; " T " stands for Square Wave ; " D " stands for LVDS differential ; " P " stands for PECL differential ex 1 : M44T --- TCXO , M44 package , CMOS output ; ex 2 : VM38P --- VCTCXO , VM38 package , PECL differential
[ 2 ]	Supply voltage , " 28 " stands for +2.8V ; " 3 " stands for +3.0V ; " 33 " stands for +3.3V ; " 5 " stands for +5.0V
[ 3 ]	Center Frequency in MHz
[ 4 ]	Frequency stability in ±_ ppm ; ex 1 : ± 2.5ppm --- 2.5 , ex 2 : ± 1.0ppm --- 1.0
[ 5 ]	Operating temperature range in °C ex 1 : -10 °C to 60°C ----- -10+60 ; ex 2 : -20 °C to 70°C ----- -20+70 ; ex 3 : -40 °C to 85°C ----- -40+85



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

Clipped Sine " S "

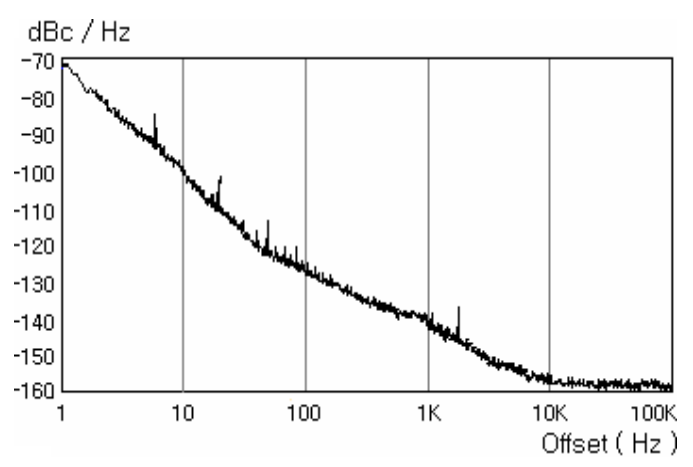
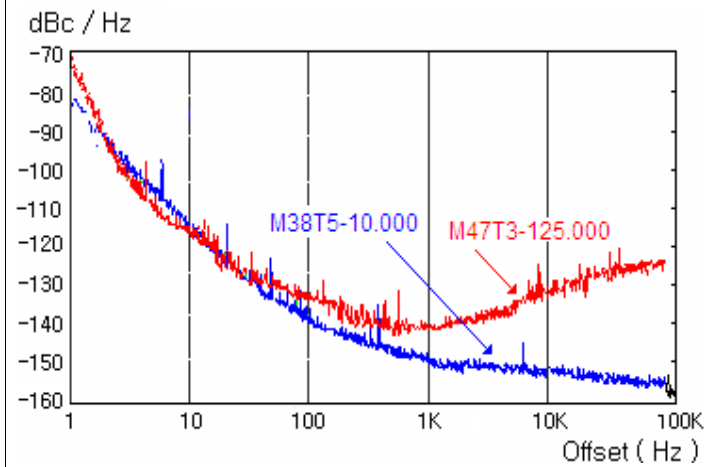
CMOS " T "

PECL Differential " P "

LVDS Differential " D "

**Square Wave** Typical Phase Noise (M38T5 Series)

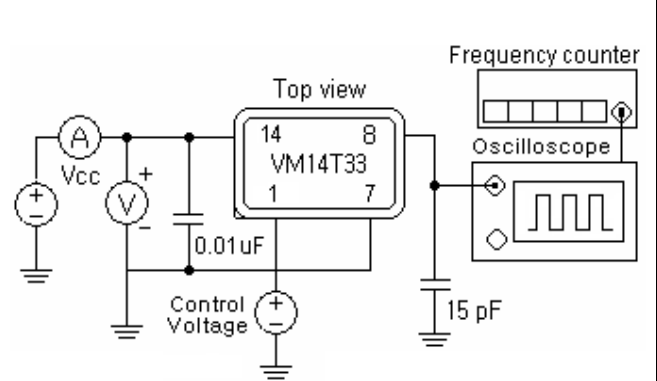
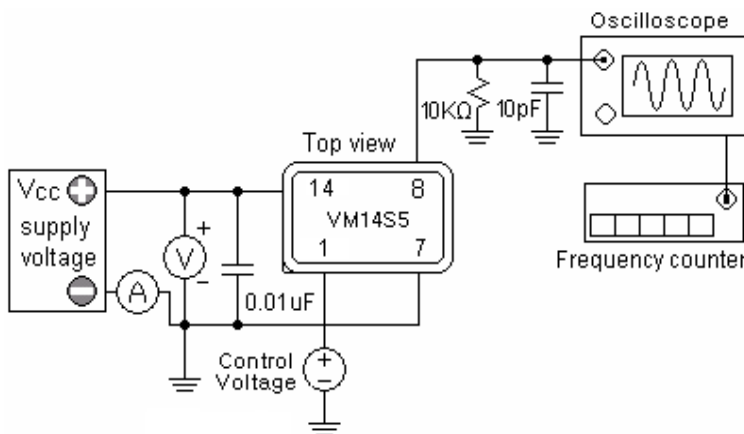
**Clipped Sine Wave** Typical Phase Noise (M38S5-10.000)



## Test Circuits

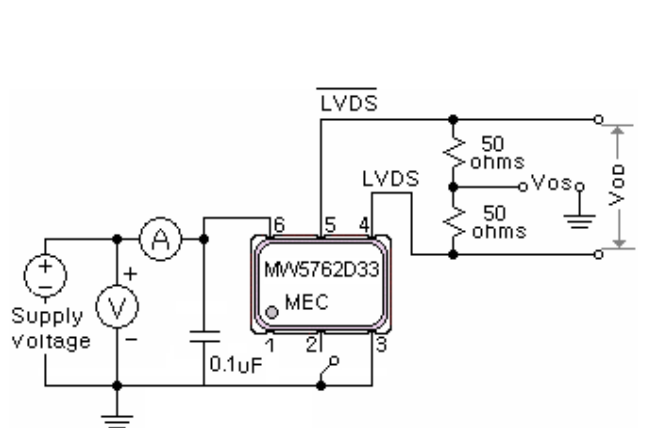
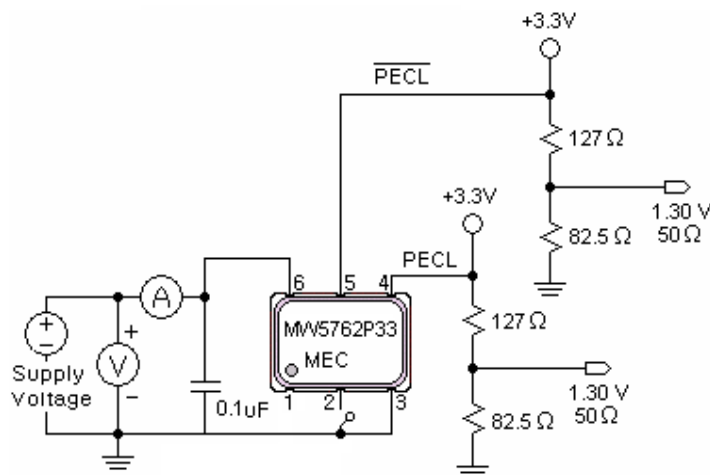
( VC )TCXO with **clipped sine** wave: Ex. VM14S5

( VC )TCXO with **CMOS** square wave: Ex. VM14T33



( VC )TCXO with **PECL** output: Ex. VMW5762P33

( VC )TCXO with **LVDS** output: Ex. VMW5762D33



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

Clipped Sine " S "

CMOS " T "

PECL Differential " P "

LVDS Differential " D "

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

[ Please refer to page 6 for product series selections . ]

<p style="text-align: center;">[ (V) M_42 _ _ ]</p> <p><b>P</b>                  Pad 1 : Control voltage for VCTCXO. Make no connection if TCXO.                  Pad 2 : Ground ; Pin 3 : Output , Pin 4 : Supply Voltage</p>	<p style="text-align: center;">[ (V) M_62 _ _ ]</p> <p><b>Pad Connections :</b>                  Pad 1 , 2 , 4 : Ground , Pad 3 : Output , Pad 6 : Supply Voltage                  Pad 5 : Control voltage for VCTCXO. Make no connection if TCXO.</p>
<p style="text-align: center;">[ (V) M38 _ _ ]</p> <p><b>Pin Connections :</b>                  Pin 1 : Control Voltage for VCTCXO , No physical pin 1 for TCXO ( 3 pins only ) .                  Pin 7 : Ground ; Pin 8 : Output , Pin 14 : Supply Voltage</p>	<p style="text-align: center;">[ (V) M39 _ _ ]</p> <p><b>Pin Connections :</b>                  Pin 1 : Control voltage for VCTCXO [ No physical pin 1 for TCXO. ( 3 pins only ) .]                  Pin 7 : Ground ; Pin 8 : Output , Pin 14 : Supply Voltage</p>
<p style="text-align: center;">[ (V) M47 _ _ ]</p> <p><b>Pin Connections :</b>                  Pin 1 : Control voltage for VCTCXO , No connection for TCXO .                  Pin 7 : Ground ; Pin 8 : Output , Pin 14 : Supply Voltage</p>	<p style="text-align: center;">[ (V) M8 _ _ ] --- Gull - wing SMD is also available .</p> <p><b>Pin Connections :</b>                  Pin 1 : Control voltage for VCTCXO ; No connection for TCXO .                  Pin 4 : Ground ; Pin 5 : Output , Pin 8 : Supply Voltage</p>
<p style="text-align: center;">[ (V) M14 _ _ ] --- Gull - wing SMD is also available .</p> <p><b>Pin Connections :</b>                  Pin 1 : Control voltage for VCTCXO , No connection for TCXO .                  Pin 7 : Ground ; Pin 8 : Output , Pin 14 : Supply Voltage</p>	<p style="text-align: center;">[ (V) M15 _ _ ] --- Gull - wing SMD is also available .</p> <p><b>Pin Connections :</b>                  Pin 1 : Control voltage for VCTCXO , No connection for TCXO .                  Pin 7 : Ground ; Pin 8 : Output , Pin 14 : Supply Voltage</p>

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

Clipped Sine " S "

CMOS " T "

PECL Differential " P "

LVDS Differential " D "

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

[ Please refer to page 6 for product series selections . ]

<p style="text-align: center;">[ (V) M32S ] --- Clipped Sine wave</p> <p>Pad Connections :                  Pad 1 : Control voltage for VCTCXO ; Ground for TCXO .                  Pad 2 : Ground ; Pin 3 : Output , Pin 4 : Supply Voltage</p>	<p style="text-align: center;">[ (V) M53S ] --- Clipped Sine wave</p> <p>Pad Connections :                  Pad 1 : Control voltage for VCTCXO ; Ground for TCXO .                  Pad 2 : Ground ; Pad 3 : Output , Pad 4 : Supply Voltage</p>
<p style="text-align: center;">[ (V) M57S ] --- Clipped Sine wave</p> <p>Pad Connections :                  Pad 1 : Control voltage for VCTCXO ; Ground for TCXO .                  Pad 2 : Ground ; Pad 3 : Output , Pad 4 : Supply Voltage</p>	<p style="text-align: center;">[ (V) M_531T_ ] , [ (V) M_53T_ ] --- CMOS output</p> <p>Pad Connections :                  Pad 1 : Control voltage for VCTCXO. Make no connection if TCXO.                  Pad 2 : Ground ; Pad 3 : Output , Pad 4 : Supply Voltage</p>
<p style="text-align: center;">[ (V) M_536T_ ] --- CMOS output</p> <p>Pad Connections :                  Pad 1 : Control voltage for VCTCXO. Make no connection if TCXO.                  Pad 2 : N / C ; Pad 3 : Ground ; Pad 4 : Output                  Pad 5 : N / C ; Pad 6 : Supply Voltage</p>	<p style="text-align: center;">[ (V)M_536P for PECL ] ; [ (V)M_536D for LVDS ]</p> <p>Pad Connections :                  Pad 1 : Control voltage for VCTCXO. Make no connection if TCXO.                  Pad 2 : Tri-state ; Pad 3 : Ground ; Pad 4 : PECL or LVDS output                  Pad 5 : Complimentary PECL or LVDS Output ; Pad 6 : Supply Voltage</p> <p style="text-align: center; color: red;">[ under development ]</p>
<p style="text-align: center;">[ (V) M_572T_ ] --- CMOS output</p> <p>Pad Connections :                  Pad 1 : NC --- TCXO ; Vcon --- VCTCXO                  Pad 2 : Ground ; Pad 3 : Output , Pad 4 : Supply Voltage</p>	<p style="text-align: center;">[ (V)M5762P for PECL ] ; [ (V)M5762D for LVDS ]</p> <p>Pad Connections :                  Pad 1 : Control voltage for VCTCXO. Do not make any connection for TCXO.                  Pad 2 : Tri-state ; Pad 3 : Ground ; Pad 4 : PECL or LVDS output                  Pad 5 : Complimentary PECL or LVDS Output ; Pad 6 : Supply Voltage</p>

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