

Voltage Controlled Temperature Compensated Crystal Oscillators VCTCXO, VM572T Series, CMOS Output



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Features:

- ◆ 5x7x2.3 mm ceramic SMD VCTCXOs with CMOS square wave output
- ◆ Wide frequency range: 1.0 MHz to 156.0 MHz
- ◆ Frequency stability as tight as ± 0.5 ppm over 0°C to $+55^{\circ}\text{C}$ or ± 1 ppm over -40 to $+85^{\circ}\text{C}$
- ◆ An Improved version of the original VM57T series with an identical footprint



General Specifications (at $+25^{\circ}\text{C}$ and specified input voltage)

Product Series		VM572T				
Frequency Range		1.0 MHz ~ 156.0 MHz NOTE: 20 to 52.7 KHz including 32.768 KHz is also available				
Output Wave From		Square wave. Wave form code is "T"				
Initial Calibration Tolerance ⁽¹⁾		± 2 ppm at $+25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ with Vcontrol at 1.5V				
Standard Frequencies		10.0, 12.8, 13.0, 14.4, 16.0, 16.384, 19.2, 19.440, 19.680, 20.0, 25.0, 27.0, 38.880, 77.760, 155.520 MHz (partial list) ↓				
Frequency Stability (ppm)		± 0.5 ppm	± 1 ppm	± 1.5 ppm	± 2.0 ppm	± 2.5 ppm
Operating Temperature Range	0 to $+55^{\circ}\text{C}$	√	√	√	√	√
	-10 to $+60^{\circ}\text{C}$	√	√	√	√	√
	-20 to $+70^{\circ}\text{C}$	√	√	√	√	√
	-30 to $+85^{\circ}\text{C}$	□	√	√	√	Standard
	-40 to $+85^{\circ}\text{C}$	✗	□	√	√	√
Frequency Stability vs Aging vs Voltage Change vs Load Change vs Reflow		± 1.0 ppm max. first year at $+25^{\circ}\text{C}$ ± 0.2 ppm max. for a $\pm 5\%$ input voltage change ± 0.2 ppm max. for a $\pm 10\%$ loading condition change ± 1 ppm max. 1 reflow and measured 24 hours afterwards				
Supply Voltage (V_{DD})	+2.8 V (voltage code is "28")	+3.0 V (voltage code is "3")		+3.3 V (voltage code is "33")		+5.0 V (voltage code is "5")
Current Consumption (typical)	2 mA @ 8.192MHz 3 mA @ 10 MHz 5mA @ 24.576 MHz 11 mA @ 60.000 MHz 19 mA @ 150.000 MHz	2 mA @ 8.192MHz 4 mA @ 10 MHz 6 mA @ 24.576 MHz 14 mA @ 60.000 MHz 23 mA @ 150.000 MHz				5 mA @ 8.192MHz 7 mA @ 10 MHz 10 mA @ 24.576 MHz 24 mA @ 60.000 MHz 36 mA @ 150.000 MHz
Output Voltage Levels	Logic "1"	90% V_{DD} min.				
	Logic "0"	10% V_{DD} max.				
Rise Time and Fall Time		1.0 ~ 3.0 nano. sec. max. Freq. dependent. Measured at 20% ↔ 80% of the waveform.				
Duty Cycle (Symmetry)		50% $\pm 10\%$. Measured at 50% of the waveform.				
Start-up Time		10 m. sec. max.				
Output Load		15 pF				
Pad 1	Control Voltage (Vcontrol) Center and Range	1.5V ± 1.0 V. Positive transfer characteristic. Regardless of V_{DD} , Vcontrol center is always 1.5V. Contact Mercury if other Vcontrol center is required.				
	Frequency Deviation Range	± 5 ppm over 1.5V ± 1.0 V.				
	Input Impedance	1.0 M Ω min.				

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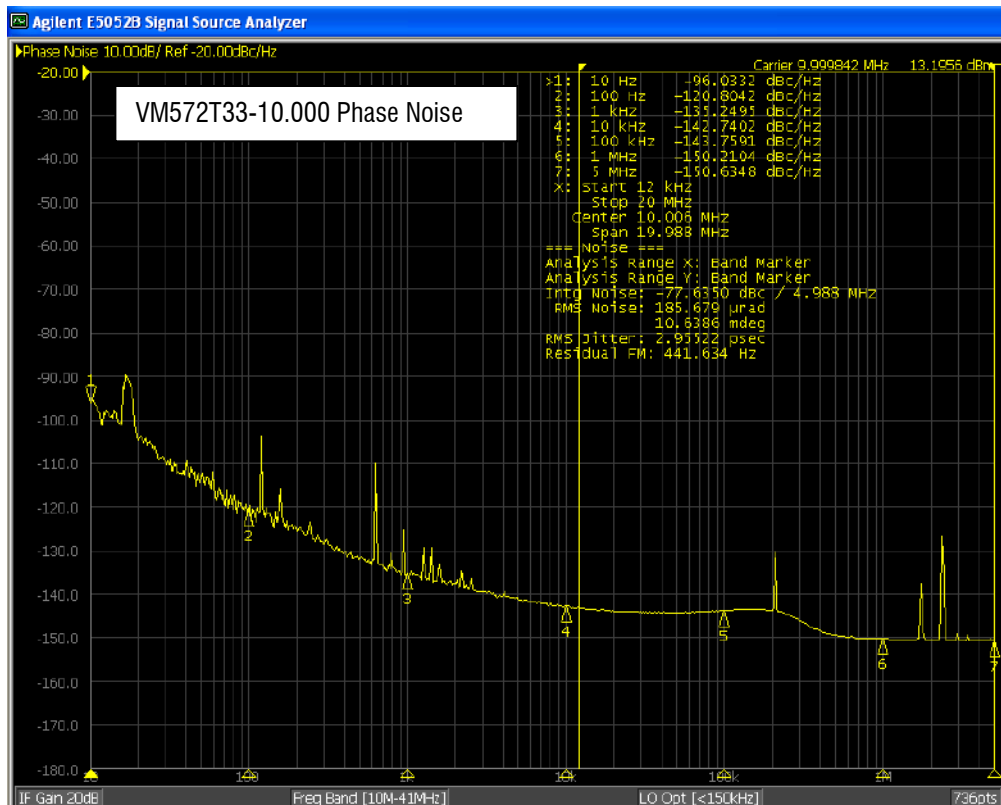
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SSB Phase Noise (dBc/Hz) and RMS Jitter (All at +25°C, typical values, Vcontrol=Gnd)	Offset	10 Hz	100 Hz	1 kHz	10 kHz	100 kHz	1 MHz	5 MHz
	VM572T33-10.000 (see plot below)	-96	-120	-135	-142	-143	-149	-150
	RMS Jitter: 2.5 ps typical							
	VM572T5-10.000	-93	-120	-137	-144	-145	-152	-152
	RMS Jitter: 1.8 ps typical							
	VM572T33-40.000	-71	-109	-118	-119	-116	-108	-116
	RMS Jitter: 30.0 ps typical							
	VM572T33-64.000	-68	-99	-118	-121	-117	-109	-120
	RMS Jitter: 18.0 ps							
VM572T33-150.000	-63	-91	-108	-116	-112	-105	-122	
RMS Jitter: 10.0 ps								
VM572T33-155.520	-54	-91	-110	-116	-108	-105	-122	
RMS Jitter: 11.4 ps								



Environmental Performance Specifications

Green Requirement	RoHS compliant, Pb (lead) free in accordance with EU Directive 2002/95/EC
MSL Level	Level 1 according to IPC/JEDEC J-STD-020D.1
Humidity	85% RH, 85°C, 48 hours
Hermeticity	Leak rate 2×10^{-8} ATM-cm ³ /sec max. (Crystal part only).
Solderability	MIL-STD-202F method 208E
Vibration	MIL-STD-202F method 204, 35G, 50 to 2000 Hz
Shock	MIL-STD-202F method 213B, test condi. E, 1000GG ½ sine wave

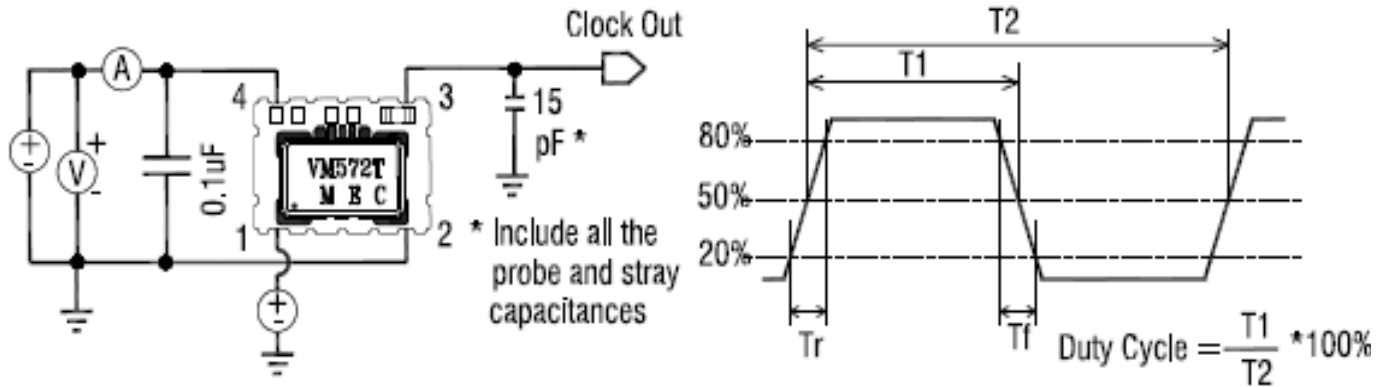
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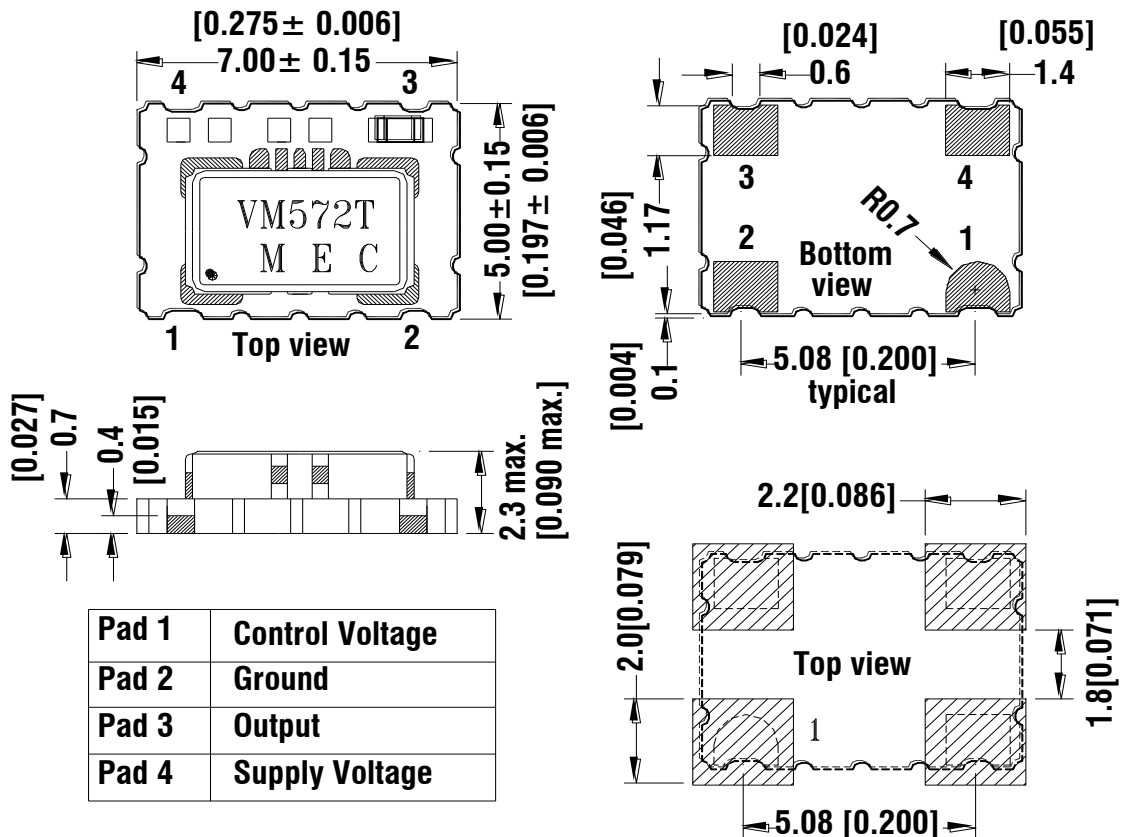
Electrostatic Sensitivity	Human body model (HBM) according to IEC 61000-4-2.
Storage temp. range	-55 to +125°C
Contact pad surface finish	0.3~1.2 um gold over 1.27~8.89 um nickel

CMOS Square Wave VCTCXO Test Circuit and Waveform:



Package Dimensions and Suggested Land Pattern:

Unit: mm [Inches]



Rounded pad is pad No. 1. Count counter-clockwise when looking at top view.
Count clockwise when looking at bottom view. Decoupling capacitor is not built-in.

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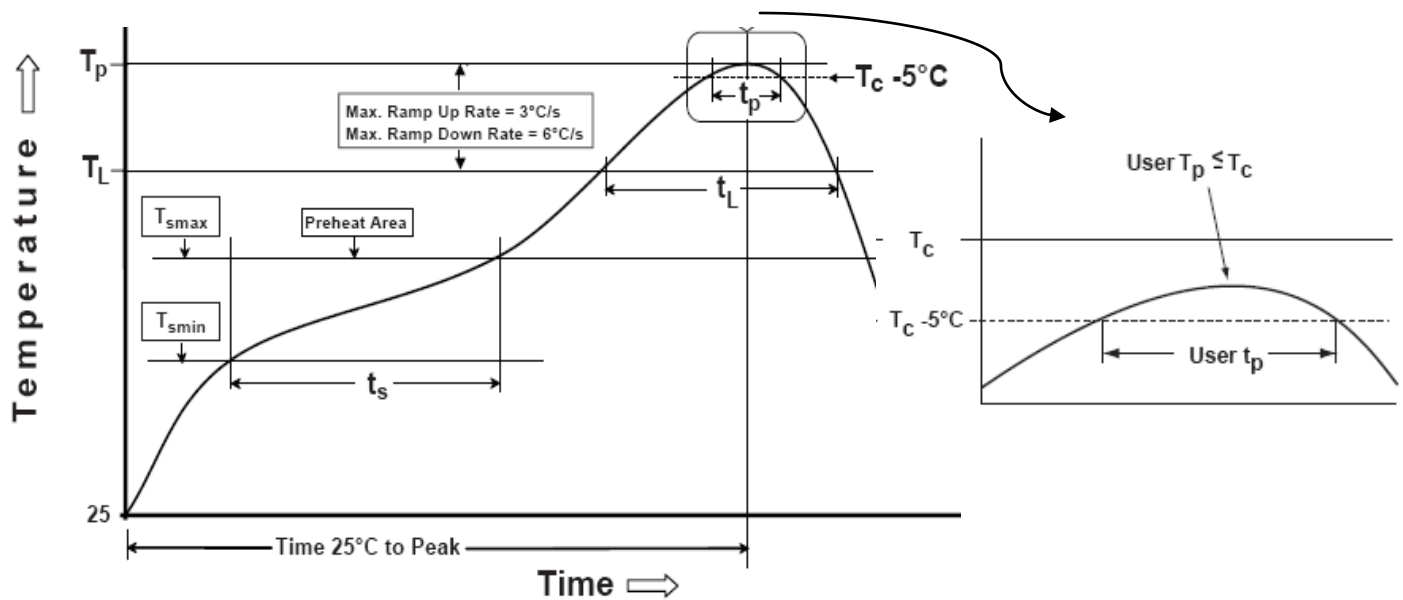
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Part Number Format and Example:

Part number example:		VM572T3-20.000-2.5/-30+75					≠ = Please specify	
VM572T	33	—	20.000	—	2.5	/	-30+75	
①	②		③		④		⑤	
①: Product Series		②: Voltage code; Use "28" for +2.8 V; use "3" for +3.0 V; use "33" for +3.3 V; use "5" for +5.0 V		③: Frequency in MHz		④: Frequency stability		⑤: Operating Temperature range in °C

Recommended Reflow Soldering Temperature Profiles

(from IPC/JEDEC J-STD-020D.1)



Profile Feature	Sn-Pb Eutectic Assembly	Pb-free Assembly
Preheat/Soak		
- Temperature min. (T_s min.)	100°C	150°C
- Temperature max. (T_s max.)	150°C	200°C
- Time (t_s) (T_s min. to T_s max.)	60 to 120 seconds	60 to 180 seconds
Ramp-up rate (T_L to T_p)	3°C / sec. max.	3°C / sec. max.
Liquidous temperature (T_L)	183°C	217°C
Time (t_L) maintained above T_L	60 to 150 seconds	60 to 150 seconds
Peak package body temperature (T_p)	235°C	260°C
Time (T_p) within 5°C of the classification temperature T_c	10 to 30 seconds	20 to 40 seconds
Ramp-down rate (T_p to T_L)	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.