# Voltage Controlled Temperature Compensated Crystal Oscillators VCTCXO, VM53T Series, CMOS Output

**MERCURY**
Since 1973

**Features**:
- ♦ 5x3.2x2.2 mm ceramic SMD VCTCXOs with CMOS square wave output
- ♦ 0.01 uF decoupling capacitor built-in
- ♦ Wide frequency range: 1.0 MHz to 200.0 MHz
- ♦ Ideal for cellular phone, GPS.

RoHS Compliant Product by Mercury


**General Specifications** (at+25°C and specified input voltage

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Product Series** | | **VM53T** | | | | | |
| **Frequency Range** | | 1.0 MHz ~ 200.0 MHz NOTE: 32.768 KHz is also available | | | | | |
| **Output Wave From** | | **Square** wave. Wave form code is "**T**" | | | | | |
| **Initial Calibration Tolerance** (1) | | ±2 ppm at +25°C±2°c and Vcon = +1.5 V D.C. | | | | | |
| **Standard Frequencies (partial list)** | | 10.0, 12.8, 13.0, 14.4, 16.0, 16.384, 19.2, 19.440, 19.680, 20.0, 38.880 , 77.760 , 155.520 MHz ↓ | | | | | |
| **Frequency Stability (ppm)** | | ±0.5 pppm | ± 1 ppm | ±1.5 ppm | ±2.0 ppm | ±2.5 ppm | √: Available □: Call us ✕: Not available |
| **Temperature Range** | **0 to +50°C** | √ | √ | √ | √ | √ | |
| | **-10 to +60°C** | □ | √ | √ | √ | √ | |
| | **-20 to +70°C** | ✕ | √ | √ | √ | √ | |
| **Standard →** | **-30 to +75°C** | ✕ | √ | √ | √ | √ | |
| | **-40 to +85°C** | ✕ | √ | √ | √ | √ | |
| **Frequency Stability** | | | | | | | |
| **vs Aging** | | ±1.0 ppm max. first year at +25°C | | | | | |
| **vs Voltage Change** | | ±2 ppm max. for a ±10% input voltage change | | | | | |
| **vs Load Change** | | ±0.3 ppm max. for a ±10% loading condition change | | | | | |
| **vs Reflow** | | ±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**") | | | |
| **Current Consumption (typical)** | | 2 mA @ 8.192MHz; 4 mA @ 10 MHz; 17 mA @77.760 MHz; 35 mA @ 155.520 MHz | | | | | |
| **Output Voltage Level** | **Logic "1"** | **90% $V_{DD}$** min. | | | | | |
| | **Logic "0"** | **10% $V_{DD}$** max. | | | | | |
| **Rise Time and Fall Time** | | 1.5 ns typical; 2.0 nano.max. 10% ↔ 90% of $V_{DD}$ | | | | | |
| **Duty Cycle (Symmetry)** | | 50%±10% measured at 50% $V_{DD}$ | | | | | |
| **Start-up Time** | | 5 ms typical; 10 m. sec. max. | | | | | |
| **Electronic Frequency Tuning on pad 1. (VCTCXO only)** | **Frequency Deviation Range** | ±10 ppm typical with Vcontrol centered at = +1.5 V and Vcontrol range of ±1.0 V | | | | | |
| | **Slope Polarity** | **Positive**: Positive voltage for positive frequency shift | | | | | |
| | **Linearity** | 10 % max. | | | | | |
| **Output Load** | | 15 pF | | | | | |
| **SSB Phase Noise at +25°C** | **Offset** | 10 Hz | 100 Hz | 1 kHz | 10 kHz | 100 kHz | |
| | **VM53T33-100.000** | -72 dBc/Hz | -110 dBc/Hz | -125 dBc/Hz | -132 dBc/Hz | -125 dBc/Hz | |


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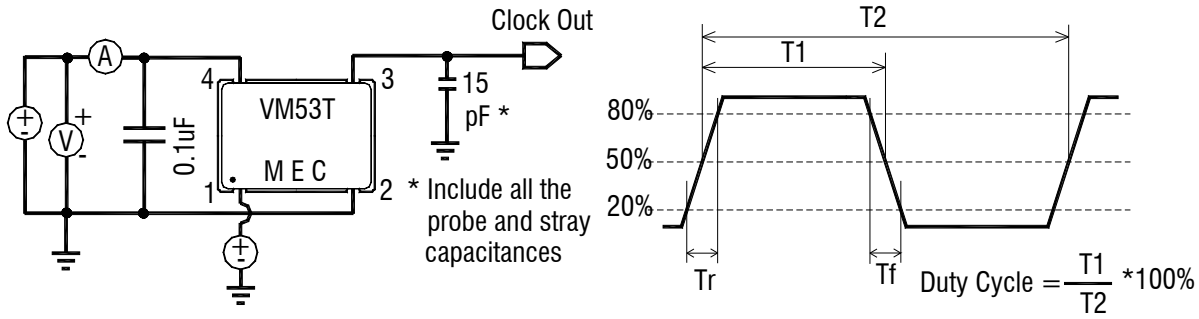
**Part Number Format and Example**:

| Part number example: | | | VM53T3-20.000-2.5/-30+75 | | | | ✍= Please specify | |
|---|---|---|---|---|---|---|---|---|
| | ✍ | | ✍ | | ✍ | | ✍ | |
| **VM53T** | 3 | — | **20.000** | — | **2.5** | / | **-30+75** | |
| ① | ② | | ③ | | ④ | | ⑤ | |

①: Product Series. Use "M53T" for TCXO product. ②: Voltage code; Use"**28**" for +2.8 V; use "**3**" for +3.0 V; use "**33**" for +3.3 V; ③: Frequency in MHz ④: Frequency stability in ppm ⑤: Operating Temperature range in °C

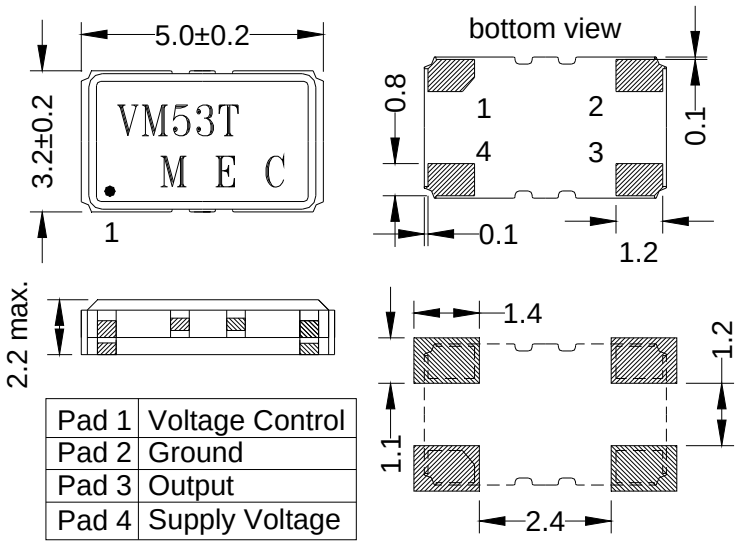
**CMOS Square Wave VCTCXO Test Circuit and Output Wave Form:**




**Environment Performance Specifications**

| | |
|---|---|
| Green Requirement | RoHS compliant, Pb (lead) free |
| MSL Level | MSL 1 per IPC/JEDEC-STD-020C |
| Humidity | 85% RH, 85°C, 48 hours. Crystal part only. |
| Hermeticity | Leak rate $2x10^{-8}$ 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 |
| Storage temp. range | -55 to +125°C |

**Package Dimensions and Suggested Land Pattern:** Unit: mm

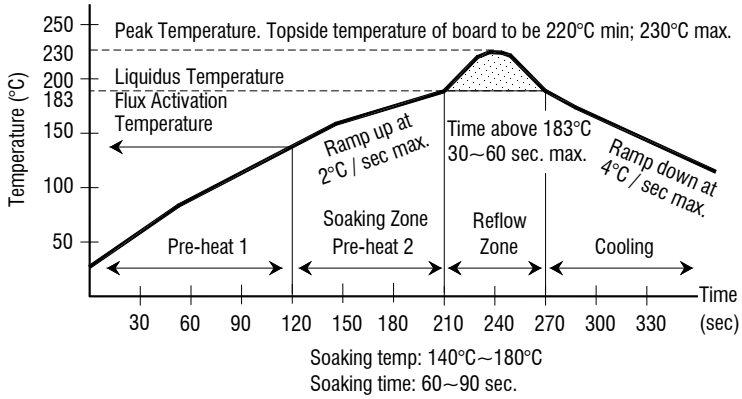



| | |
|---|---|
| Pad 1 | Voltage Control |
| Pad 2 | Ground |
| Pad 3 | Output |
| Pad 4 | Supply Voltage |

**Recommended Solder Reflow Profiles**

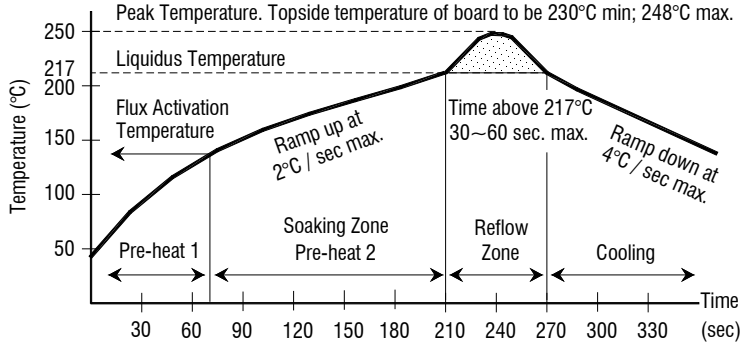
245°C liquidus 221°C solidus solder alloy is used in the assembly of VM53T products.
Do not exceed the reflow conditions given below.

Profile A (low temperature solder reflow): For Sn62 Pb36 Ag2 and Sn63 Pb37 alloy.




Soaking temp: 140°C~180°C
Soaking time: 60~90 sec.

Profile B (high temperature solder reflow): For Sn96.5% Ag 3.5% Cu 0.5% alloy.




Soaking temp: 140°C~200°C
Soaking time: 90~120 sec.