

SUNSTAR 微波光电 <http://www.rfoe.net/> TEL: 0755-83396822 FAX: 0755-83376182 E-MAIL: szsss20@163.com

VOLTAGE CONTROLLED CRYSTAL OSCILLATORS HCMOS/TTL 5V

SURFACE MOUNT
T2002, T2006
T2021, T2022,
T2024
T2031, T2032
T2034

5 x 7 mm Surface Mount

Commercial: 0° to 70°C

3 MHz to 45 MHz

GUARANTEED CAPTURE RANGE/ABSOLUTE PULL RANGE

Guaranteed Capture Range (GCR) and Absolute Pull Range (APR) are terms often used interchangeably. MF's Guaranteed Capture Range (GCR) is defined as the minimum guaranteed frequency deviation or "pull" (in ppm) around the nominal frequency, with all effects of temperature, variations in V_{DD} and load taken into account. This amount of absolute frequency deviation is available under all operating conditions for modulation or capturing other signals. No additional frequency capture allowances are necessary.

FEATURES

- Guaranteed Capture Range of ± 75 ppm or ± 100 ppm, depending on model
- Excellent incremental and best-straight-line linearity
- Start-up time is less than 5ms
- Each unit is ATE-tested to guarantee full compliance with all electrical specifications

TYPICAL APPLICATIONS

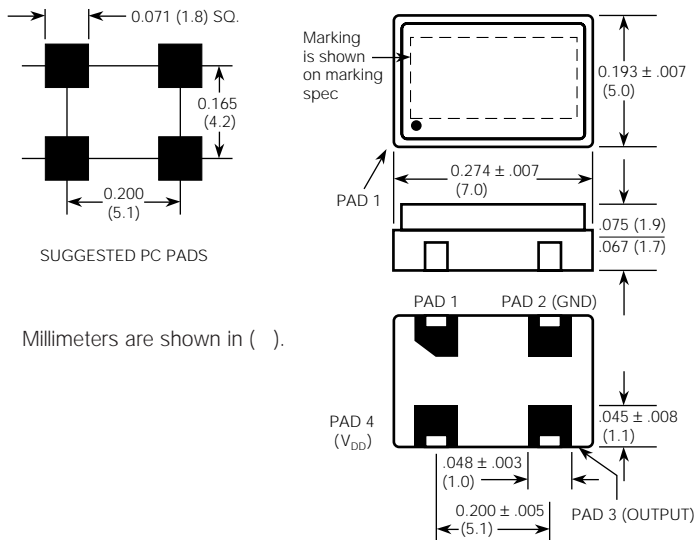
- Phase locked loops and data acquisition projects, including:
 - xDSL customer premise equipment
 - Cable modems
 - ATM/SONET/SDH

Description

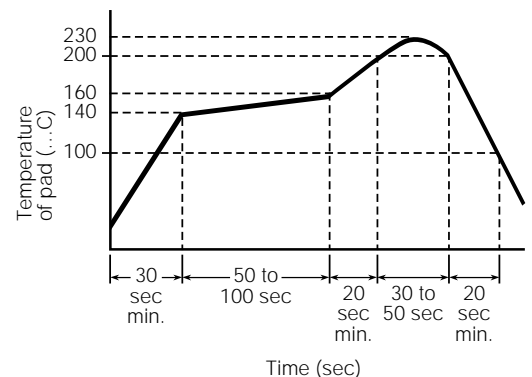
These SMD VCXOs generate a 5 volt HCMOS/TTL frequency output which is controlled ("pulled") by an input voltage. MF Electronics' VCXO specification defines not only the end-point frequency/voltage parameters, but also the center voltage at which the nominal frequency is achieved.

CONNECTIONS

T Package	
Pad 1.	Control Voltage
Pad 2.	Ground
Pad 3.	Output
Pad 4.	+5V, V_{DD}



"T" Package



Recommended Reflow Soldering Profile





**VOLTAGE CONTROLLED
CRYSTAL OSCILLATORS**
HCMOS/TTL 5V
Surface Mount, 5V
Commercial: 0° to 70°C
3 MHz to 45 MHz

SURFACE MOUNT
T2002, T2006
T2021, T2022,
T2024
T2031, T2032
T2034

Center Frequency is Between Two Voltages with ±50 ppm stability

MODEL	Letter ID	Control Voltage (Volts)	Guaranteed Frequency Deviation (ppm)	Control Capture Range (ppm)	Center Voltage at Center Frequency	Frequency Stability (ppm)
T2002	VA	0.3 to 4.0	± 75 min	± 75	1.3 to 2.3	50, max
T2006	VB	0 to 5.0	± 100 min	± 100	-	

Center Frequency is at 2.5V with ±50 ppm stability

MODEL	Letter ID	Control Voltage (Volts)	Guaranteed Frequency Deviation (ppm)	Control Capture Range (ppm)	Center Frequency Voltage (Volts)	Frequency Stability (ppm)
T2021	VC	0.5 to 4.5	± 75 to 150	± 75	2.5	± 30 typ ± 50, max
T2022	VD	0.5 to 4.5	± 100 to 200	± 100	2.5	
T2024	VE	0 to 5.0	± 100 to 250	± 100	2.5	

Center Frequency is at 2.5V with ±25 ppm stability

MODEL	Letter ID	Guaranteed Control Voltage (Volts)	Control Frequency Deviation (ppm)	Center Capture Range (ppm)	Frequency Voltage (Volts)	Frequency Stability (ppm)
T2031	VF	0.5 to 4.5	± 75 to 150	± 75	2.5	± 20 typ ± 25, max
T2032	VG	0.5 to 4.5	± 100 to 200	± 100	2.5	
T2034	VH	0 to 5.0	± 100 to 250	± 100	2.5	

DESCRIPTIONS

T2002	±75 ppm, min. deviation when using 0 to 4.0V control-voltage
T2006	±100 ppm, min. deviation when using 0 to 5.0V rail-to-rail control-voltage
T2021	±75 ppm capture when using using 0.5 to 4.5V control-voltage and 2.5V center with ±50 ppm stability
T2022	±100 ppm capture when using using 0.5 to 4.5V control-voltage and 2.5V center with ±50 ppm stability
T2024	±100 ppm capture when using using 0 to 5.0V control-voltage and 2.5V center with ±50 ppm stability
T2031	±75 ppm capture when using using 0.5 to 4.5V control-voltage and 2.5V center with ±25 ppm stability
T2032	±100 ppm capture when using using 0.5 to 4.5V control-voltage and 2.5V center with ±25 ppm stability
T2034	±100 ppm capture when using using 0 to 5.0V control-voltage and 2.5V center with ±25 ppm stability

FREQUENCY STABILITY

Frequency stability vs. Temperature (0 to 70°C) is typically better than ±20 ppm. Since the deviation of each oscillator is tested and guaranteed over the whole operating temperature range, it is not necessary to make additional capture allowances. All oscillators will capture frequencies with the full minimum values of the deviation under all conditions.

QUALITY

Each VCXO is computer-tested at three temperatures to guarantee full compliance to the specification.

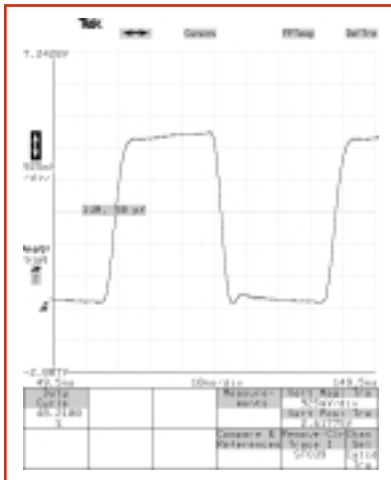


Fig. 1 T2002-14M, with 50 pf load

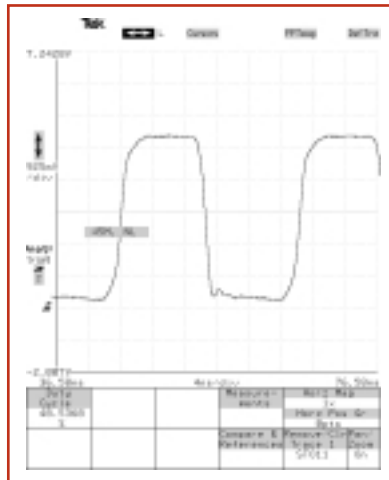


Fig. 2 T2042-45 M, without load

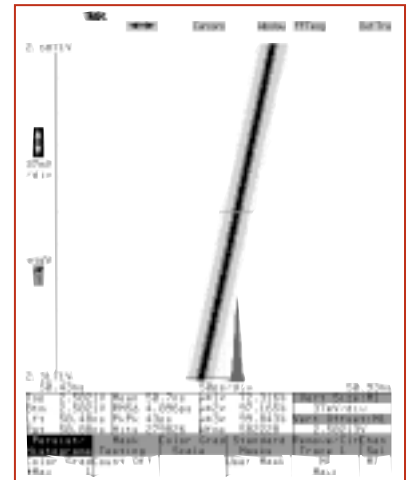


Fig. 3 T2032-20.48M





VOLTAGE CONTROLLED
CRYSTAL OSCILLATORS
HCMOS/TTL 5V
Surface Mount, 5V
Commercial: 0° to 70°C
3 MHz to 45 MHz

SURFACE MOUNT
T2002, T2006
T2021, T2022,
T2024
T2031, T2032
T2034

ELECTRICAL SPECIFICATIONS

Frequency Range 3 MHz to 45 MHz

Frequency Stability Includes calibration at 25°C, operating temperature, change of input voltage, change of load, shock and vibration.

	MIN	TYP	MAX	UNITS
Input Voltage	4.5	5.0	5.5	volts
Input Current,				
3M to 8M				
5.5 V _{DD} @ 15 pf			12	mA
5.5 V _{DD} @ 50 pf			14	mA
8M to 20M				
5.5 V _{DD} @ 15 pf			18	mA
5.5 V _{DD} @ 50 pf			22	mA
20M to 45M				
5.5 V _{DD} @ 15 pf			26	mA
5.5 V _{DD} @ 50 pf			30	mA

Output Levels

"0" Level, sinking 16 mA. 0.4 volts
 "1" Level, sourcing 10 mA. V_{DD} - .4 volts

Rise and Fall Times, HCMOS

HCMOS, from 20 to 80%, 15 pf 2.5 ns
 HCMOS, from 20 to 80%, 50 pf 5.0 ns

Symmetry

10 TTL, @ 1.4 V, (TTL) 45/55 percent
 NL to 30 pf (HCMOS) 45/55 percent
 NL to 50 pf (HCMOS) > 30 MHz 40/60 percent

Aging

First year 3 ppm
 After first year 1 ppm/yr

Input Impedance,

Pad 1., Control Voltage 100 1000 Kohms

Control Voltage Bandwidth

15 75 KHz

ENVIRONMENTAL SPECIFICATIONS

Temperature

Operating 0° to 70°C
 Storage -55° to +125°C

Temperature Cycle – Not to exceed ±5 ppm change when exposed to 2 hours maximum at each temperature from 0 to 120°C, with 25°C reference

Shock – 1000 Gs, 0.35 ms, 1/2 sine wave, 3 shocks in each plane

Vibration – 10-2000 Hz of .06" d.a. or 20 Gs, whichever is less

Humidity – Resistant to 85° R.H. at 85°C

MECHANICAL SPECIFICATIONS

Gross Leak – Each unit checked in 125°C fluorocarbon

Fine Leak – Mass spectrometer leak rate less than 5 X 10⁻⁸ atoms, cc/sec of helium

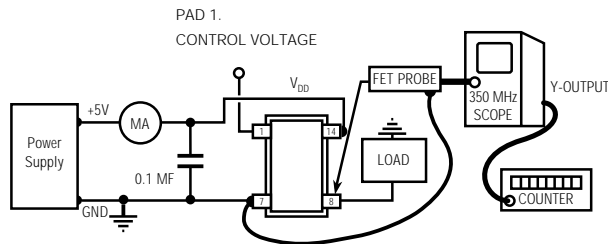
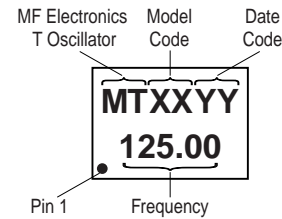
Pads – 60 microinch of gold over nickel

Marking – Print is permanent

Resistance to Solvents – MIL STD 202, Method 215

MARKING SPECIFICATION

The format for the marking is:



To adapt Fet probe to receptacle use Tektronix Part #103-0164-00

To connect output to scope use Tektronix Part #131-0258-00 (receptacle)

TEST CIRCUIT





VOLTAGE CONTROLLED
 CRYSTAL OSCILLATORS
 HCMOS/TTL 5V
Surface Mount, 5V
 Commercial: 0° to 70°C
 3 MHz to 45 MHz

SURFACE MOUNT
 T2002, T2006
 T2021, T2022,
 T2024
 T2031, T2032
 T2034

DEVIATION vs CONTROL VOLTAGE
 FOR T2034-20M, TYPICAL

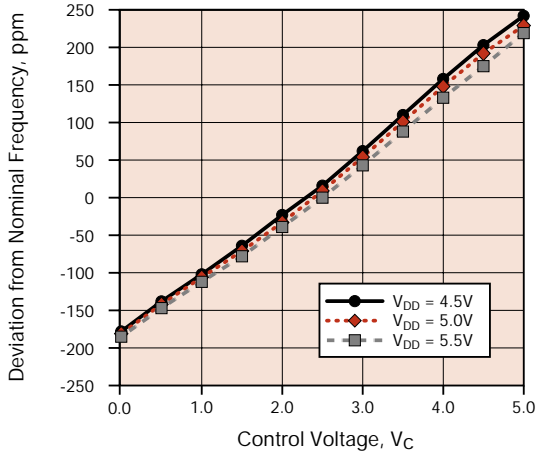


Fig. 4 Deviation vs. Control Voltage at 0°C

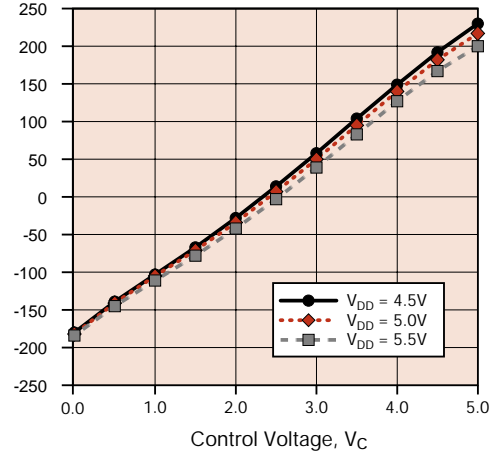


Fig. 5 Deviation vs. Control Voltage at 25°C

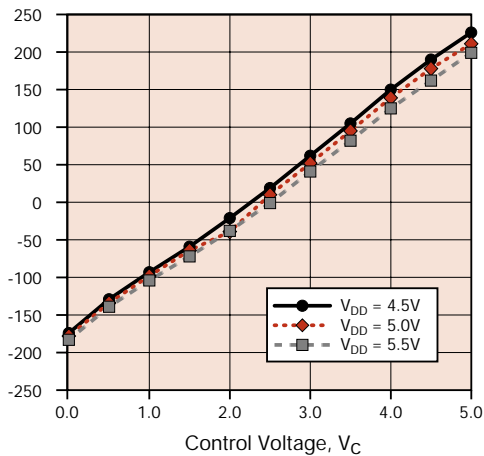


Fig. 6 Deviation vs. Control Voltage at 70°C

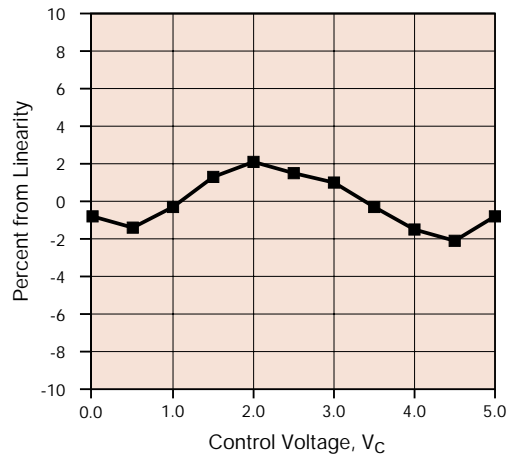


Fig. 7 Departure from Linearity





VOLTAGE CONTROLLED
 CRYSTAL OSCILLATORS
 HCMOS/TTL 5V
Surface Mount, 5V
 Commercial: 0° to 70°C
 3 MHz to 45 MHz

SURFACE MOUNT
 T2002, T2006
 T2021, T2022,
 T2024
 T2031, T2032
 T2034

TYPICAL PERFORMANCE

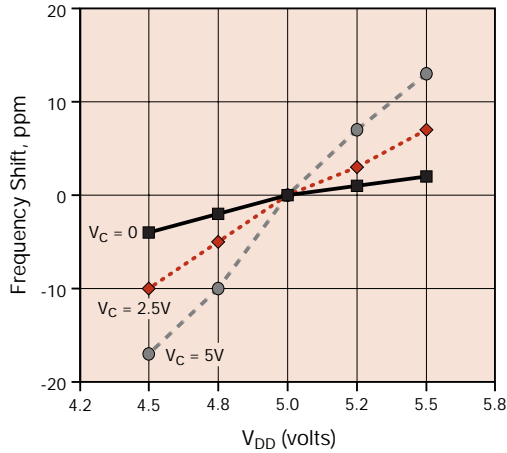


Fig. 8 Frequency Shift due to V_{DD} at 25°C

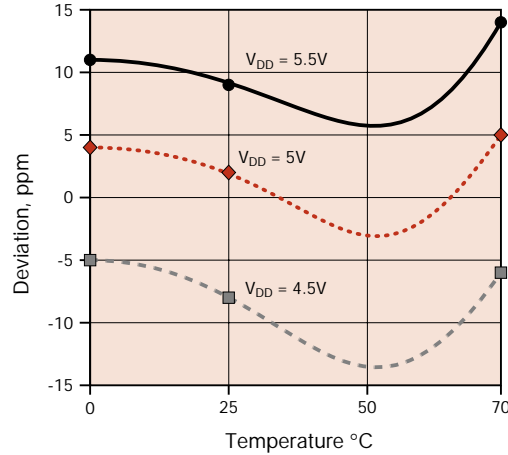


Fig. 9 Frequency Shift vs. Temperature

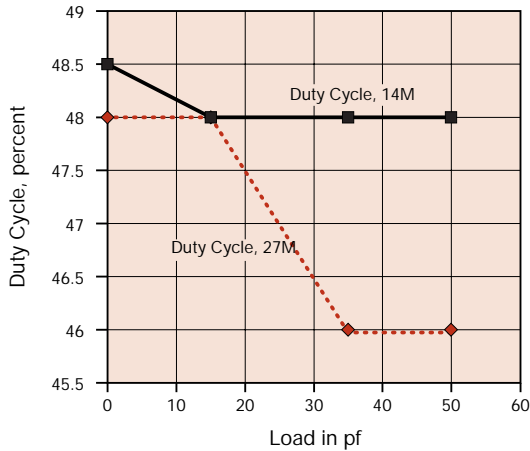


Fig. 10 Duty Cycle vs. Load
 14 MHz & 27 MHz

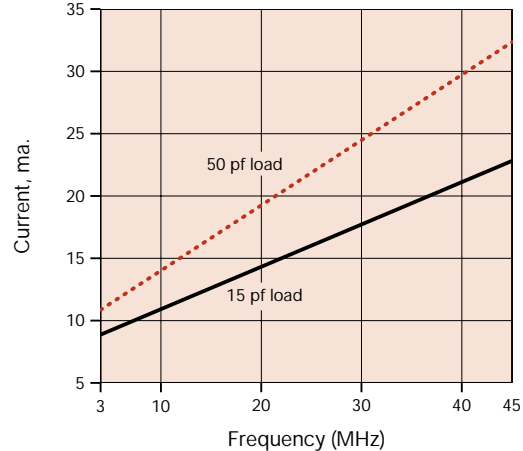
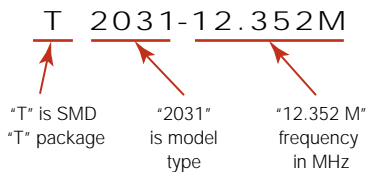


Fig. 11 Current vs. Center Frequency

HOW TO ORDER

For Part Number, put package type before model number, and add frequency in MHz, for example:



Unless customer-specific terms and conditions are signed by an officer of MF Electronics, the sale of this and all MF Electronics products are subject to terms and conditions set forth at www.mfelectronics.com/terms

SS#	Rev.
T2002	A



SUNSTAR 商斯达实业集团是集研发、生产、工程、销售、代理经销、技术咨询、信息服务等为一体的高科技企业，是专业高科技电子产品生产厂家，是具有 10 多年历史的专业电子元器件供应商，是中国最早和最大的仓储式连锁规模经营大型综合电子零部件代理分销商之一，是一家专业代理和分销世界各大品牌 IC 芯片和电子元器件的连锁经营综合性国际公司，专业经营进口、国产名厂名牌电子元件，型号、种类齐全。在香港、北京、深圳、上海、西安、成都等全国主要电子市场设有直属分公司和产品展示展销窗口门市部专卖店及代理分销商，已在全国范围内建成强大统一的供货和代理分销网络。我们专业代理经销、开发生产电子元器件、集成电路、传感器、微波光电元器件、工控机/DOC/DOM 电子盘、专用电路、单片机开发、MCU/DSP/ARM/FPGA 软件硬件、二极管、三极管、模块等，是您可靠的一站式现货配套供应商、方案提供商、部件功能模块开发配套商。商斯达实业公司拥有庞大的资料库，有数位毕业于著名高校——有中国电子工业摇篮之称的西安电子科技大学（西军电）并长期从事国防尖端科技研究的高级工程师为您精挑细选、量身订做各种高科技电子元器件，并解决各种技术问题。

微波光电部专业代理经销高频、微波、光纤、光电元器件、组件、部件、模块、整机；电磁兼容元器件、材料、设备；微波 CAD、EDA 软件、开发测试仿真工具；微波、光纤仪器仪表。欢迎国外高科技微波、光纤厂商将优秀产品介绍到中国、共同开拓市场。长期大量现货专业批发高频、微波、卫星、光纤、电视、CATV 器件：晶振、VCO、连接器、PIN 开关、变容二极管、开关二极管、低噪晶体管、功率电阻及电容、放大器、功率管、MMIC、混频器、耦合器、功分器、振荡器、合成器、衰减器、滤波器、隔离器、环行器、移相器、调制解调器；光电子器件和组件：红外发射管、红外接收管、光电开关、光敏管、发光二极管和发光二极管组件、半导体激光二极管和激光器组件、光电探测器和光接收组件、光发射接收模块、光纤激光器和光放大器、光调制器、光开关、DWDM 用光发射和接收器件、用户接入系统光收发器件与模块、光纤连接器、光纤跳线/尾纤、光衰减器、光纤适配器、光隔离器、光耦合器、光环行器、光复用器/转换器；无线收发芯片和模组、蓝牙芯片和模组。

更多产品请看本公司产品专用销售网站：

商斯达中国传感器科技信息网：<http://www.sensor-ic.com/>

商斯达工控安防网：<http://www.pc-ps.net/>

商斯达电子元器件网：<http://www.sunstare.com/>

商斯达微波光电产品网：[HTTP://www.rfoe.net/](http://www.rfoe.net/)

商斯达消费电子产品网：<http://www.icasic.com/>

商斯达实业科技产品网：<http://www.sunstars.cn/> 微波元器件销售热线：

地址：深圳市福田区福华路福庆街鸿图大厦 1602 室

电话：0755-82884100 83397033 83396822 83398585

传真：0755-83376182 (0) 13823648918 MSN: SUNS8888@hotmail.com

邮编：518033 E-mail:szss20@163.com QQ: 195847376

深圳赛格展销部：深圳华强北路赛格电子市场 2583 号 电话：0755-83665529 25059422

技术支持：0755-83394033 13501568376

欢迎索取免费详细资料、设计指南和光盘；产品凡多，未能尽录，欢迎来电查询。

北京分公司：北京海淀区知春路 132 号中发电子大厦 3097 号

TEL: 010-81159046 82615020 13501189838 FAX: 010-62543996

上海分公司：上海市北京东路 668 号上海赛格电子市场 D125 号

TEL: 021-28311762 56703037 13701955389 FAX: 021-56703037

西安分公司：西安高新开发区 20 所(中国电子科技集团导航技术研究所)

西安劳动南路 88 号电子商城二楼 D23 号

TEL: 029-81022619 13072977981 FAX:029-88789382