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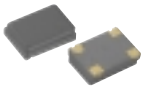
CRYSTAL OSCILLATORS
HCMOS/TTL 5V



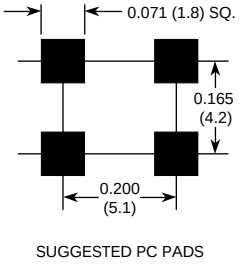
SURFACE MOUNT
T package
T1280, T1281,
T1282, T1286,
T1288, T1289
T1991, T1992,
T1998, T1999
T3290, T3291,
T3292, T3296,
T3298, T3299
T3991, T3992,
T3998, T3999

5 x 7 mm Surface Mount
Commercial: 0º to 70ºC
FIXED FREQUENCY, 1KHz to 175 MHz
TRISTATE, 14 KHz to 175 MHz

FEATURES
- Fixed frequency or Tristate
- Very low power when tristated
- Frequency from 1 KHz to 175 MHz
- Start up time less than 5 ms
- Stability options from ±100 ppm to ±20 ppm
- Guaranteed start-up with ramping DC Supply
- 45/55 symmetry available

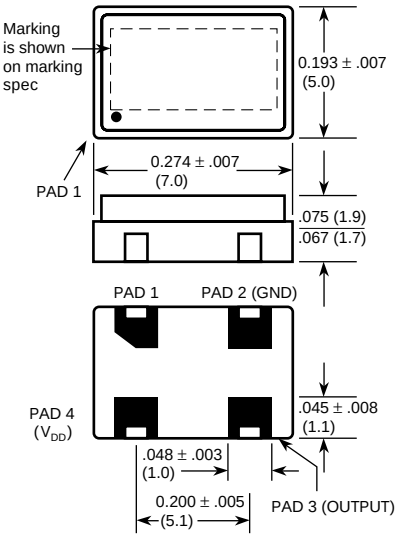
TYPICAL APPLICATIONS
- Any surface mount PCB that requires a standard HCMOS/TTL 5V clock, including microprocessors and microcontrollers.

Description
MF Electronics T-series surface mount (SMD) oscillators provide clock wave-forms needed to clock standard HCMOS or TTL circuits.



SUGGESTED PC PADS

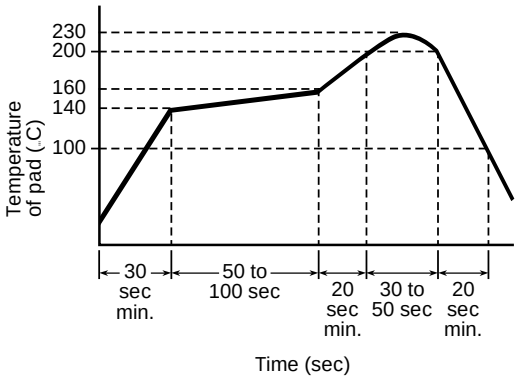
Millimeters are shown in ( ).



"T" Package

CONNECTIONS

	Fixed Output Models	Tristate Models
PAD 1	NOT USED	Floating or "1": Oscillator runs Ground or "0": Disable or Tristate
PAD 2	Ground and Case	
PAD 3	Output	
PAD 4	+5V, V_{DD}	



Recommended Reflow Soldering Profile

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ELECTRICAL SPECIFICATIONS

Frequency Range

Fixed Output	1 KHz to 175 MHz
Tristate	14 KHz to 175 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	4.50	5.0	5.50	volts
Input Current				
3 M to 10 MHz		6	10	mA
10.1 to 20 MHz		10	13	mA
20.1 to 30 MHz		11	15	mA
30.1 to 50 MHz		16	22	mA
50.1 to 67 MHz		20	30	mA
67.1 to 125 MHz		25	35	mA
Output Levels				
"0" Level, sinking 16 mA			0.4	volts
"1" Level,				
TTL	2.4	4.6		volts
CMOS, sourcing 8 mA	V_{DD}-.4			volts
Rise and Fall Times				
TTL, from 0.8 to 2.4V		2.4	4	ns
HCMOS, 15 pf, 20 to 80%				
1 KHz to 75 MHz		2.5	4	ns
75.1 to 175 MHz		1.5	2	ns
HCMOS, 30 pf, 20 to 80%				
1 KHz to 125MHz		4.0	6	ns
HCMOS, 50 pf, 20 to 80%				
1KHz to 75 MHz		4.0	6	ns
Jitter				
from positve edge to positive edge			100	ps RMS
Symmetry				
10 TTL, @ 1.4V		45/55	40/60	percent
Depending on model			or 45/55	percent
HCMOS, @ 50% V_{DD}		45/55	40/60	percent
Depending on model			or 45/55	percent
Aging				
First year		3		ppm
After first year		1		ppm/yr

Input Requirements for Pin 1.:
"1": On – Pin 1 may float or 2.4V min., sourcing 400 microAmp
"0": Disable or Tristate – Pin 1 requires 0.4V, sinking 400 microAmp

FIXED OUTPUT

40/60 Symmetry		45/55 Symmetry		
MODEL	Marking Letter ID*	MODEL	Marking Letter ID*	Frequency Stability
T1280	A	T1286	AM	±100 ppm
T1281	O	T1991	BB	±25 ppm
T1282	B	T1992	BD	±50 ppm
T1288	BF	T1998	BH	±20 ppm
T1289	BJ	T1999	BK	±32 ppm

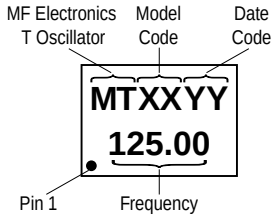
TRISTATE

40/60 Symmetry		45/55 Symmetry		
MODEL	Marking Letter ID*	MODEL	Marking Letter ID*	Frequency Stability
T3290	C	T3296	AN	±100 ppm
T3291	P	T3991	BA	±25 ppm
T3292	D	T3992	BC	±50 ppm
T3298	BE	T3998	BG	±20 ppm
T3299	BI	T3999	BL	±32 ppm

* See Marking Specification

MARKING SPECIFICATION

The format for the marking is:



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T3991, T3992,
T3998, T3999

ENVIRONMENTAL SPECIFICATIONS

Temperature — All models

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

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

Leak – MIL STD 883, Method 1014, condition A1

Case – Hermetically sealed package

Pads – 60 microinch of gold over nickel

Marking – Epoxy ink or laser engraved

Resistance to Solvents – MIL STD 202, Method 215

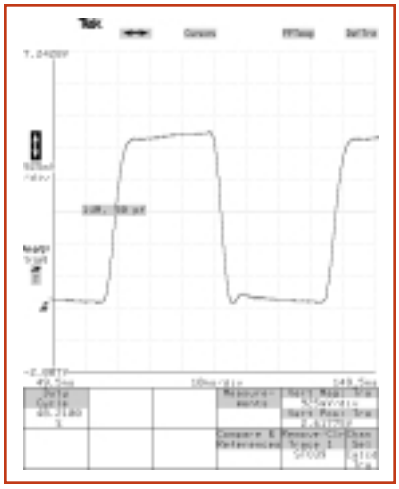
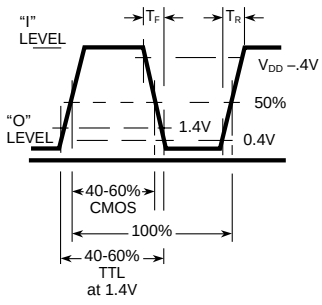
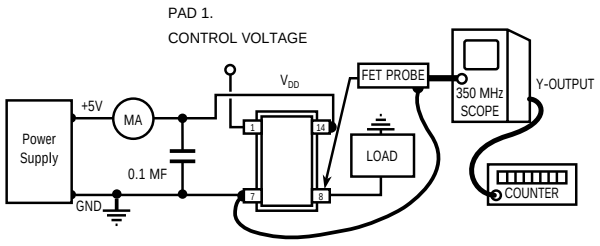


Fig. 1 T3290-14M with 50pf load
Duty Cycle is 48.2% at $V_{DD}/2$



WAVEFORMS



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

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

TEST CIRCUIT

HOW TO ORDER

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

T 3292 - 50M

"T" is SMD "T" package

"3292" is model type

"50 M" frequency in MHz

SS#	Rev.
T1280	A

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