VOLTAGE CONTROLLED CRYSTAL OSCILLATORS
Complementary Output ECLPS 5V

FULL SIZE D.I.L.
M package
M2911 thru M2913

DOUBLE WIDE D.I.L.
W package
W2911 thru W2913
W2971 thru W2973

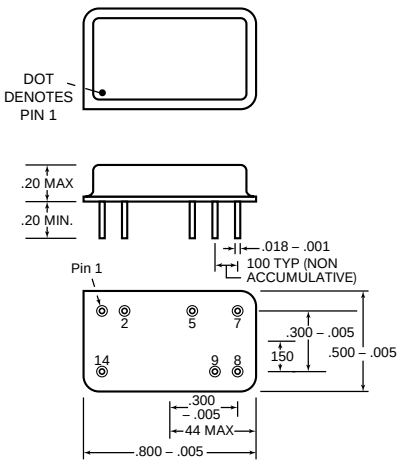
Thru-Hole
Commercial: 0º to 70ºC
15 MHz to 175 MHz

These VCXOs provide complementary PECL outputs thru 175 MHz with extremely fast rise and fall times. Each oscillator is computer tuned and computer tested to guarantee stability and frequency pull at 0º, 25º and 70ºC. All oscillators will capture the rated pull at all operating temperatures.

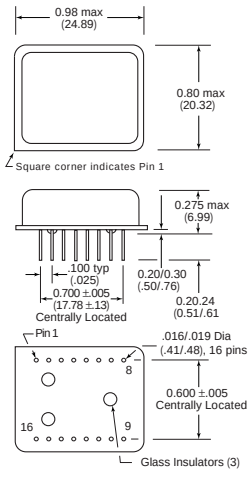
FEATURES
- Super low jitter of 20 ps peak to peak maximum limits loss of data packets in digital data recorvery
- Will drive standard interface chips in complementary PECL.
- Duty Cycle is typically 48/52
- Three frequency deviation choices
- Output is PECL with typical rise and fall times of 225 ps
- Exceptional linearity with Deviation Sensitivity Ratio not exceeding 2.0
- Package is choice of double DIL, standard DIL with 7 pins (M1)

TYPICAL APPLICATIONS
- Used in Sonet ST33 interface for generation of the transmitter data clock

SPECIAL APPLICATION NOTES
- All outputs must be loaded with 270 ohms to ground, or 50 ohms to +3V
- Outputs will drive all PECL families when they are operated in PECL configurations



"M-1" Package



"W1" Package

Description

These ECLPS VCXOs feature super-low jitter of 20 ps peak-to-peak. They are based on the same logic as our M2910s fixed frequency oscillators, and therefore exhibit identical waveform characteristics. These thru-hole VCXOs are designed for compatibility with digital and communications systems based on the ECLPS family of high speed PECL logic.

Users have a choice of the three most widely used combinations of pull, control voltage and center frequency deviation. The oscillators are available at frequencies from 15 to 175 MHz. Standard frequency stability is ±20 ppm.

All models have dual complementary outputs. All feature 250 ps typical rise/fall times and provide superior jitter. Their low output impedance and dual complementary outputs preserve waveform symmetry when sending the timing waveforms over appreciable distance. Output symmetry of 45/55 is standard.

Designed originally for advanced SONET applications, their combination of advanced characteristics provides special appeal to designers of highly evolved phase-locked-loop circuits. They provide tight control of the voltage-to-frequency (ΔF/ΔV) transfer function and feature jitter specifications of less than 20 pico-seconds peak-to-peak. Typical RMS jitter is 2.048 ps RMS.

These VCXOs are hermetically sealed in full size (H) or wide (W) DIL packages. Models W2911 through W2913 accept control voltage input on pin 1, while Models W2971 through W2973 accept control voltage on pin 6. All models are tested and guaranteed over full 0°C to 70°C temperature.

MF ELECTRONICS

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ONE DIL WIDE, M1 Package				
Model	Control Voltage for Nominal (Center) Freq.	Frequency Stability @ Center	Frequency Deviation	
			0.5 volts	4.5 volts
M2911	2.5 volts	±20 ppm	-50 to -100 ppm	50 to 100 ppm
M2912			-75 to -150 ppm	75 to 150 ppm
M2913			-100 to -200 ppm	100 to 200 ppm

DOUBLE DIL WIDE, W1 Package					
Voltage Control on Pin 1	Voltage Control on Pin 6	Control Voltage for Nominal (Center) Freq.	Frequency Stability @ Center	Frequency Deviation	
				0.5 volts	4.5 volts
W2911	W2971	2.5 volts	±20 ppm	-50 to -100 ppm	50 to 100 ppm
W2912	W2972			-75 to -150 ppm	75 to 150 ppm
W2913	W2973			-100 to -200 ppm	100 to 200 ppm

ELECTRICAL SPECIFICATIONS

Frequency Range 15 MHz 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, V_{DD}	4.5	5.0	5.5	volts
Input Current, including load current of both ouputs				
at 4.5V		60		ma
at 5.0V		68		ma
at 5.5V		76		ma
Output Levels (PECL), at 5.0 V_{DD}				
"0" Level,		3.2	3.37	volts
"1" Level,	4.02	4.1		volts
Symmetry differential		48/52	45/55	
Input Impedance	50	1000		Kohms
Control Voltage Bandwith	10	20		KHz
Control Voltage, V_C	0	0.5 to 4.5	15	Volts, DC
Jitter, with Tektronix 11801B & SD22 Head in jitter color mode		15	20	ps, Pk-Pk
Linearity best straight line, percent of total deviation sensitivity ratio		5	10 2	%
Rise Time (20 to 80%)	100	225	350	ps
Fall Time (20 to 80%)	100	225	350	ps

ENVIRONMENTAL SPECIFICATIONS

Temperature

Operating	0º to 70°C
Storage	-55º 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

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% RH at 85°C

Gross Leak – Each unit is checked in 125°C fluorocarbon

Fine Leak – Mass spectrometer leak rate less than 2 x 10^{-8} atmos, cc/sec of helium

Pins – Kovar, with 7 microinch gold over nickel

Bend Test – Will withstand two bends of 90° from reference

Header – Steel with gold over nickel

Case – Stainless steel, type 304

Marking – Resistant to 85% RH at 85°C

Resistance to Solvents – MIL STD 202, Method 215

CONNECTIONS

	Pin	Used For	Pin	Used For
All single DIL models	1	Control Voltage Input, V_C	8	Output 1
	2	Not Used	9	Output 2 (Complement)
	5	Not Used	14	+5V, V_{DD}
	7	Ground, V_{SS}		
W2911-W2913	1	Control Voltage Input	9	Output 1
	2	Not Used	10	Output 2
	3	Not Used	11	Not used
	4	Not Used	12	Not used
	5	Not Used	13	Not used
	6	Not Used	14	Not used
	7	Not Used	15	Not used
	8	Ground, V_{SS}	16	+5V, V_{DD}
W2971-W2973	1	Not Used	9	Output 1
	2	Not Used	10	Output 2
	3	Not Used	11	Not used
	4	Not Used	12	Not used
	5	Not Used	13	Not used
	6	Control Voltage Input, V_C	14	Not used
	7	Not Used	15	Not used
	8	Ground, V_{SS}	16	+5V, V_{DD}

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Waveforms taken on TEK 11801B with SD-22 Head

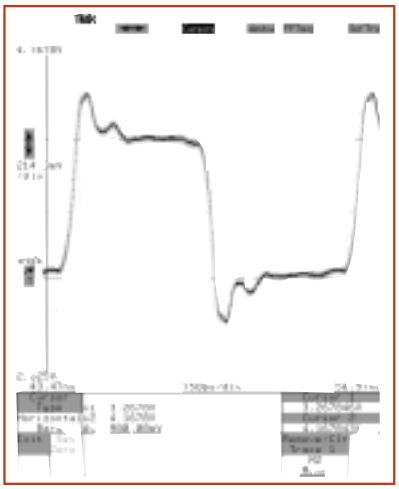

Fig. 1: 155.52 MHz PECL oscillator, showing steep rise and fall times and excellent duty cycle. Levels have 900 mv difference between “1” and “0”.

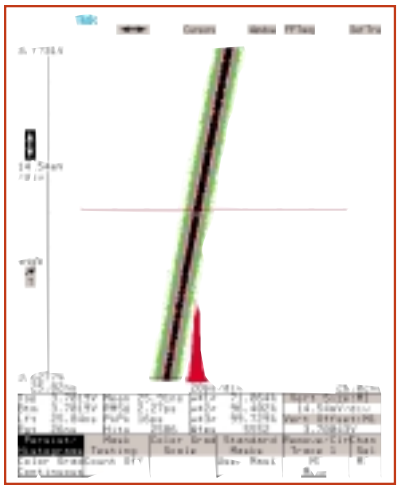

Fig. 2: M2912-77.76 MHz oscillator with expansion of transition at 3.7 volts. Jitter is shown by the histogram of the distribution of the waveform at 3.7 volts. The distribution is unimodal, with peak-to-peak jitter of 16 ps peak-to-peak, and 2.27 ps RMS.

HOW TO ORDER

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

M 2912-77.76 M

- “M” is full size DIL “W” is double wide DIL
- “2912” is model type
- “77.76 M” frequency in MHz

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.
M2911	A