



# VOLTAGE CONTROLLED OSCILLATORS

PECL, 0° to 70°C



FULL SIZE D.I.L.  
M2911 thru M2913

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

## Thru-Hole, 5V ECLPS Complementary Output 15 MHz to 175 MHz SUPER-LOW JITTER 20 ps PEAK-PEAK

### ECLPS Complementary Thru-Hole VCXOs, 5V

These ECLPS VCXOs feature super-low jitter of 20 ps peak-to-peak. They are based on the same logic as our M2900s 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 ECL 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  $\pm 20$  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 ( $\Delta F/\Delta V$ ) transfer function and feature jitter specifications of less than 20 picoseconds 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.

These VCXOs provide complementary ECL 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 0, 25 and 70 degrees C. All oscillators will capture the rated pull at all operating temperatures.

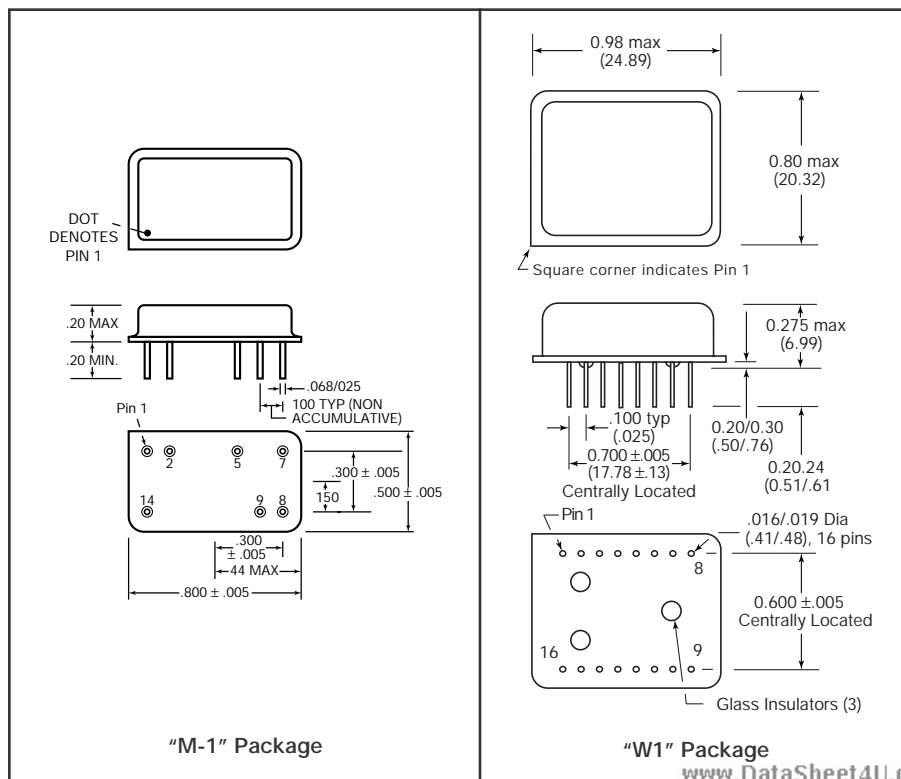
- Used in Sonet ST33 interface for generation of the transmitter data clock.
- Will drive standard interface chips in complementary ECL.
- Duty Cycle is typically 48/52
- Three frequency deviation choices.
- Output is ECL with typical rise and fall times of 225 ps.
- Exceptional linearity with Deviation Sensitivity Ratio not exceeding 2.0.
- Package is choice of double DIL, standard DIL with 7 pins (M1)

#### LOAD

All outputs must be loaded with 270 ohms to ground, or 50 ohms to +3V.

#### COMPATIBILITY

Outputs will drive all ECL families when they are operated in PECL configurations.



**MF ELECTRONICS**

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 Thru-Hole, 5V  
 ECLPS Complementary Output  
 15 MHz to 175 MHz  
 Super-Low Jitter 20 ps Peak-to-Peak

FULL SIZE D.I.L.  
 M2911 thru M2913

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

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

#### SPECIFICATIONS

##### Temperature

Operating 0 to 70°C

	MIN.	TYP	MAX	UNITS
Input Voltage, $V_{DD}$	4.5	5.0	5.5	volts

##### Input Current, including load current of both outputs

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
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Control Voltage Bandwidth	10	20	KHz
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##### Frequency Stability

Control Voltage, $V_C$	0	0.5 to 4.5	15	Volts, DC
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##### Jitter, with Tektronix 11801B & SD22 Head in jitter color mode

15 20 ps, Pk-Pk

Linearity, best straight line, percent of total	5	10	%
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Rise Time (20 to 80%)	100	225	350	ps
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Fall Time (20 to 80%)	100	225	350	ps
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#### MECHANICAL SPECIFICATIONS

<b>Shock</b>	1000 g's, 0.35 ms, 1/2 sine wave, 3 shocks in each plane
<b>Vibration</b>	10-2000 Hz of .06" d.a. or 20 g's, whichever is less
<b>Humidity</b>	Resistant to 85% RH at 85°C
<b>Gross Leak</b>	Each unit is checked in 125°C fluorocarbon
<b>Fine Leak</b>	Mass spectrometer leak rate less than $2 \times 10^{-8}$ atmos, cc/sec of helium
<b>Pins</b>	Kovar, with 7 microinch gold over nickel
<b>Bend Test</b>	Will withstand two bends of 90° from reference
<b>Header</b>	Steel with gold over nickel
<b>Case</b>	Stainless steel, type 304
<b>Marking</b>	Resistant to 85% RH at 85°C
<b>Resistance to Solvents</b>	MIL STD 202, Method 215
<b>Storage Temperature</b>	-55 to +125°C

#### ENVIRONMENTAL SPECIFICATIONS

**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 G's, 0.35 ms, 1/2 sine wave, 3 shocks in each plane

**Vibration** – 10-2000 Hz of .06" d.a. or 20 G's, whichever is less

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

#### CONNECTIONS

	Pin	Used For	Pin	Used For
<b>All single DIL models</b>	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, $V_{SS}$		
<b>W2911-W2913</b>	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, $V_{DD}$
<b>W2971-W2973</b>	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

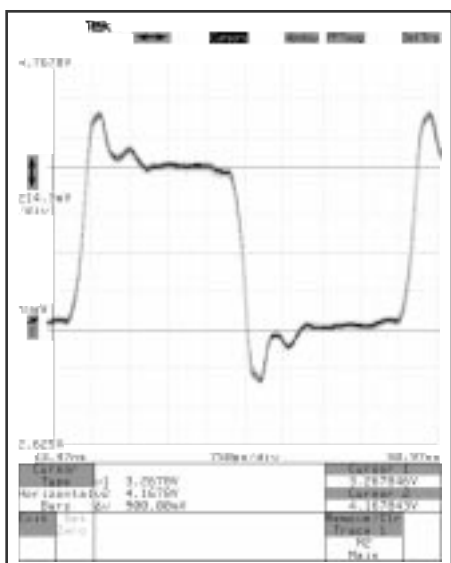


Fig. 1: 155.52 MHz PECL oscillator, showing steep rise and fall times and excellent duty cycle. Levels have 900 mv difference between "1" and "0".

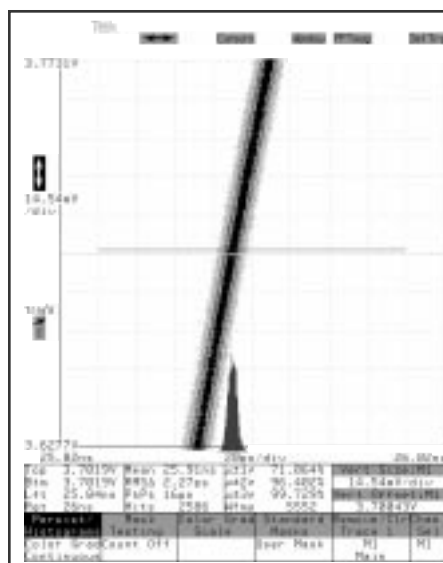


Fig. 2: M2912-77.76 MHz oscillator with expansion of transition at 3.7 volts. Jitter is shown by the histogram of the distribution of the waveform at 3.7 volts. The distribution is unimodal, with peak-to-peak jitter of 16 ps peak-to-peak, and 2.27 ps RMS.

### 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