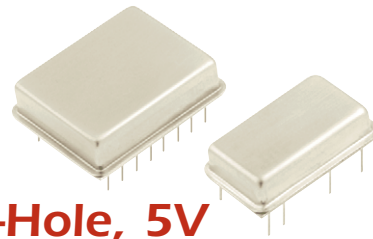




# VOLTAGE CONTROLLED OSCILLATORS

PECL, 0° to 70°C



**FULL SIZE D.I.L.**  
M2901 thru M2903  
L2901 thru L2903

**DOUBLE WIDE D.I.L.**  
W2901 thru W2903  
W2961 thru W2963

## ECLPS Complementary Thru-Hole VCXOs, 5V

These ECLPS VCXOs are our most advanced fixed frequency types. 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 100 picoseconds peak-to-peak. Typical jitter is 12.12 ps RMS.

These VCXOs are hermetically sealed in full size (M) or wide (W) DIL packages. Models W2901 through W2903 accept control voltage input on pin 1, while Models W2961 through W2963 accept control voltage on pin 6. All models are tested and guaranteed over full 0°C to 70°C temperature.

## Thru-Hole, 5V ECLPS Complementary Output 15 MHz to 175 MHz

**These VCXO's 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.**

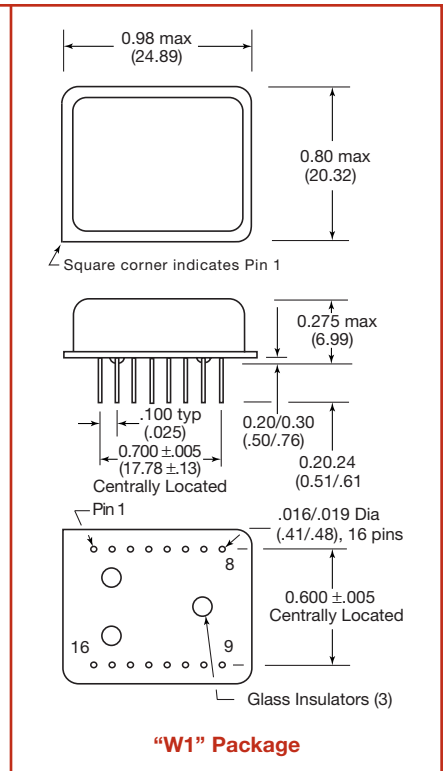
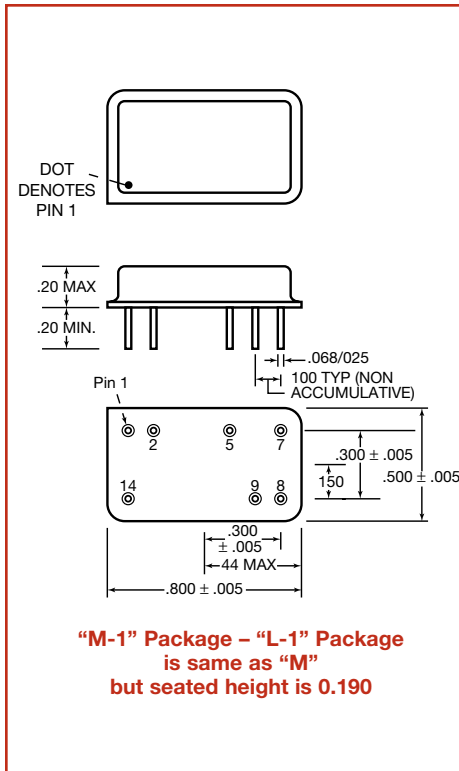
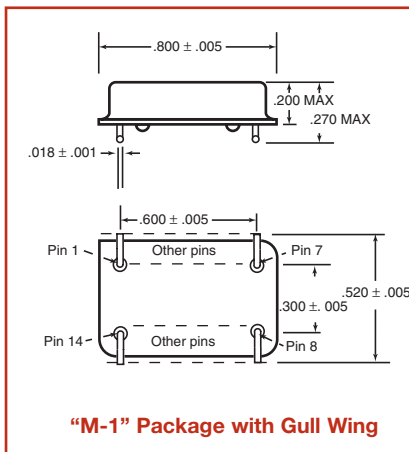
- Used in Sonet ST33 interface for generation of the transmitter data clock.
- Will drive standard interface chips in complementary ECL.
- Duty Cycle is typically 48/52
- Three frequency deviation choices.
- Output is ECL with typical rise and fall times of 225 ps.
- Exceptional linearity with Deviation Sensitivity Ratio not exceeding 2.0.
- Package is choice of double DIL, standard DIL with 7 pins (M1) or low profile (L1).

### 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.



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**Thru-Hole, 5V**  
**ECLPS Complementary Output**  
**15 MHz to 175 MHz**

**FULL SIZE D.I.L.**  
 M2901 thru M2903  
 L2901 thru L2903

**DOUBLE WIDE D.I.L.**  
 W2901 thru W2903  
 W2961 thru W2963

**ONE DIL WIDE, M1 Package**

Model	Control Voltage for Nominal (Center) Freq.	Frequency Stability @ Center	Frequency Deviation	
			0.5 volts	4.5 volts
M2901	2.5 volts	±20 ppm	-50 to -100 ppm	50 to 100 ppm
M2902			-75 to -150 ppm	75 to 150 ppm
M2903			-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
W2901	W2961	2.5 volts	±20 ppm	-50 to -100 ppm	50 to 100 ppm
W2902	W2962			-75 to -150 ppm	75 to 150 ppm
W2903	W2963			-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

**Control Voltage Bandwidth** 10 20 KHz

**Frequency Stability**

**Control Voltage,  $V_C$**  0 0.5 to 4.5 15 Volts, DC

**Jitter, with Tektronix 11801B & SD22 Head in jitter color mode (at 155.52M)**

80 100 ps, Pk-Pk

**Linearity, best straight line, percent of total** 5 10 %

**Rise Time (20 to 80%)** 100 225 350 ps

**Fall Time (20 to 80%)** 100 225 350 ps

**MECHANICAL SPECIFICATIONS**

**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% RH at 85°C

**Gross Leak** Each unit is checked in 125°C flourocarbon

**Fine Leak** Mass spectrometer leak rate less than  $2 \times 10^{-8}$  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

**Storage Temperature** -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>W2901-W2903</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>W2961-W2963</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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**ECLPS Complementary Output**  
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Waveforms taken on TEK 11801B with SD-22 Head

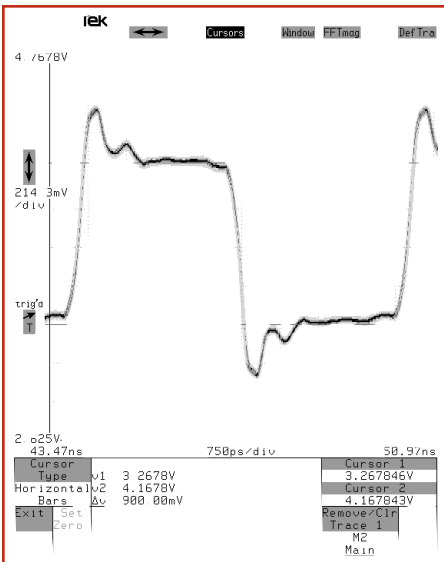


Fig. 1: 155.52 MHz PECL oscillator, showing steep rise and fall times and excellent duty cycle. Levels have 900 mv difference between "1" and "0". Overshoots are caused by inductance of socket.

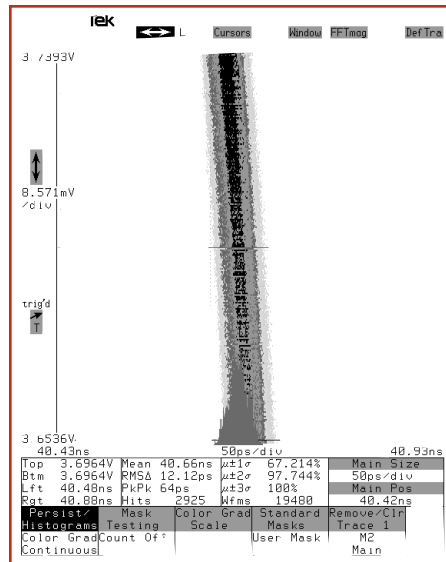


Fig. 2: 155.52 MHz oscillator with expansion of transition at 3.7 volts; speed is 3 mv/ps. Jitter is shown by the histogram, slicing the waveform at 3.7 volts. Distribution is unimodal, with peak-peak jitter of 57 ps.

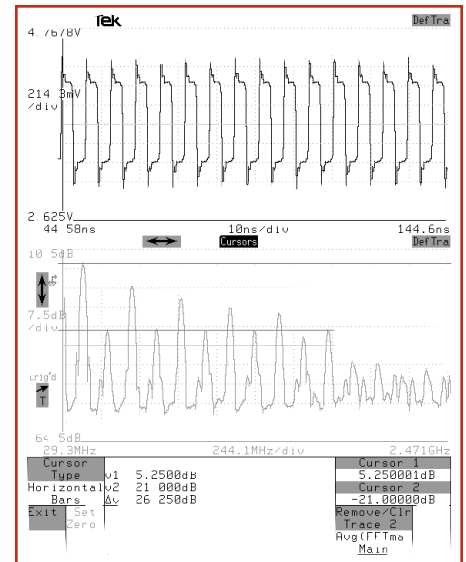


Fig. 3: 155.52 MHz oscillator showing no lower frequency component below 155.52 MHz. Second, and even harmonics are 21 db below fundamental. Odd harmonics which support the excellent square wave are present through the 11th harmonic.

**HOW TO ORDER**

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

**M 2901-155.52M**

↑

"M" is full size DIL  
 "W" is double wide DIL  
 "L" is low height, full size DIL

↑

"2901" is model type

↑

"155.52 M" frequency in MHz

Note: For Gull Wing, add "G" to part number