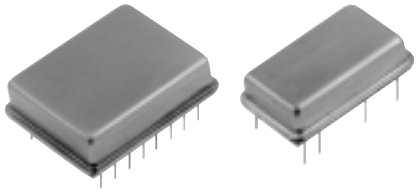
VOLTAGE CONTROLLED CRYSTAL OSCILLATORS
ECLPS PECL
Complementary Output 5V



FULL SIZE D.I.L.
M package
M2901 thru M2903

DOUBLE WIDE D.I.L.
W package
W2901 thru W2903
W2961 thru W2963

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

- Exceptional linearity with Deviation Sensitivity Ratio not exceeding 2.0
- Duty Cycle is typically 48/52
- Three frequency deviation choices.
- Output is ECL with typical rise and fall times of 225 ps

TYPICAL APPLICATIONS

- Used in Sonet ST33 interface for generation of the transmitter data clock
- Will drive standard interface chips in complementary ECL

SPECIAL APPLICATION NOTES

- All outputs must be loaded with 270 ohms to ground, or 50 ohms to +(V_{DD}-2) volt
- Outputs will drive all ECL families when they are operated in PECL configurations.

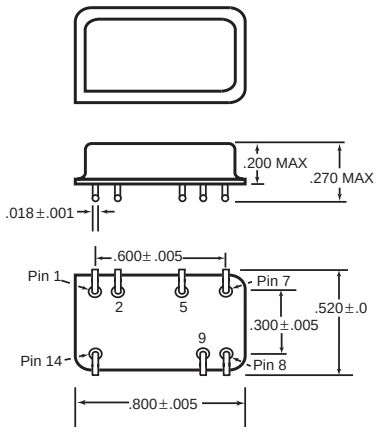
Description

These ECLPS VCXOs 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.

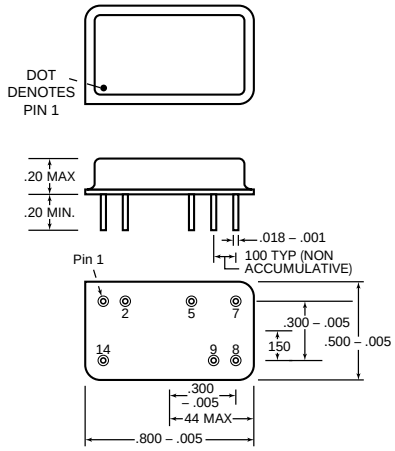
Users have a choice of the three most widely used combinations of pull, control voltage and center frequency deviation. The oscillators are available at frequencies from 15 to 175 MHz. Standard frequency stability is ±20 ppm.

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.

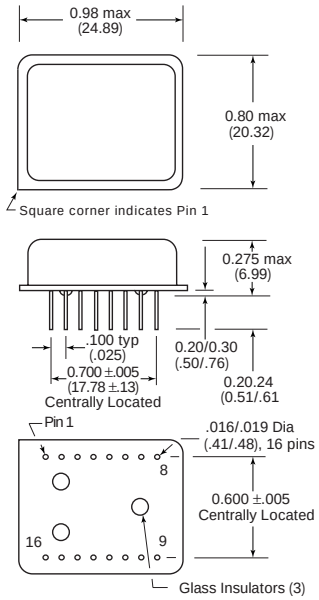
Designed originally for SONET applications, their combination of advanced characteristics provides special appeal to designers of highly evolved phase-locked-loop circuits. They provide tight control of the voltage-to-frequency (ΔF/ΔV) transfer function and feature jitter specifications of less than 100 picoseconds peak-to-peak. Typical jitter is 12.12 ps RMS.



"M-1" Package with Gull Wing



"M-1" Package



"W1" Package

MF ELECTRONICS

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VOLTAGE CONTROLLED CRYSTAL OSCILLATORS
PECL ECLPS Complementary Output 5V
Thru-Hole
Commercial: 0º to 70ºC
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ELECTRICAL SPECIFICATIONS

Frequency Range 14 KHz to 125 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 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	
Aging				
First year		3		ppm
After first year		1		ppm/yr
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	%
deviation sensitivity ratio			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 +125ºC

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 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 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}		
W2901-W2903	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}
W2961-W2963	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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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

Waveforms taken on TEK 11801B with SD-22 Head

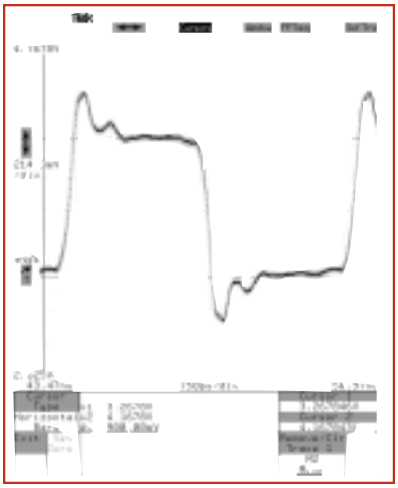

Fig. 1: 155.52 MHz PECL oscillator, showing steep rise and fall times and excellent duty cycle. Levels have 900 mv difference between “1” and “0”. Overshoots are caused by inductance of socket.

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.

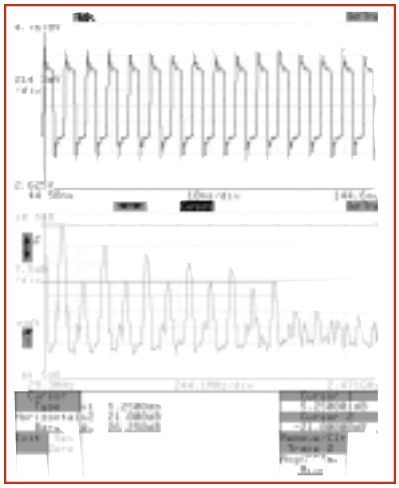

Fig. 3: 155.52 MHz oscillator showing no lower frequency component below 155.52 MHz. Second, and even harmonics are 21 db below fundamental. Odd harmonics which support the excellent square wave are present through the 11th harmonic.

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
- “2901” is model type
- “155.52 M” frequency in MHz
- Leave blank for straight leads Add “G” for gullwing

SS#	Rev.
M2901	A

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