



PLETRONICS OeD4 Series OeXO® Oscillator



OeD4
5.0 x 3.2 x 1.85 mm
LCC Ceramic Package

Features

- Temperature Compensated Crystal Oscillator
- Optional Voltage Control Function
- Low Power / Fast Warm Up
- CMOS or Clipped Sine Wave Output
- 2.5V to 3.3V nominal Supply Voltage
- See table for developed Frequencies

Applications

SONET / SDH / DWDM
Test & Measurement
Telecom Transmission & Switching Equipment
Base Stations / Picocell
Wireless Communication Equipment

Electrical Characteristics for CMOS

Parameter	Min	Typ	Max	Unit	Condition (Consult factory for other options)
Frequency Range ²	8.192	-	40.0	MHz	See table below for developed frequencies
Frequency Stability vs. Temperature ²	-	-	±200	ppb	Over -40°C to +85°C at fixed V _{CC} + load
	-	-	±100		Over -10°C to +70°C (reference to midpoint min/max frequency)
	-	-	±50		Over 0°C to +70°C
Frequency Initial Calibration		-	±2.0	ppm	Vcontrol 1.50 volts at 25°C ± 2°C when V _{CC} ≥ 2.8 volts, If Vcontrol used
Operating Temperature Range ²	0 -10 -40	-	+70 +70 +85	°C	
Supply Voltage ^{1,2} V _{CC}	2.5	-	3.3	Volts	± 5%
Supply Current ² I _{CC}	-	3.5 4.5 6.5	-	mA	10 MHz 25 MHz 40 MHz Load: 15 pF, V _{CC} ± 5%
Frequency Stability vs. Supply	-	-	±0.2	ppm	Load: 15 pF, V _{CC} ± 5%
Frequency Stability vs. Load	-	-	±0.2	ppm	Load: 15 pF ± 10%
Vcontrol Range	0.5	-	2.5	Volts	1.50 volts nominal
Frequency Pullability ²	0	±8.0	±12.0	ppm	Positive Slope
Linearity	-	-	2.0	%	
Output Waveform			CMOS		
Duty Cycle	40	50	60	%	Load: 15 pF Vth: T _R and T _F 10% and 90% of V _{CC} Vth: D.C. 50% of V _{CC}
Output V _{HIGH}	90	-	-	%V _{CC}	
Output V _{LOW}	-	-	10	%V _{CC}	
Output T _{RISE} and T _{FALL}	-	-	6.5	ns	
Startup Time	-	-	10.0	ms	Within ± 2.0 ppm of final frequency
Long Term Stability (Aging)	-	-	±1.0	ppm	Per year at 25°C ± 2°C
Phase Noise	100 Hz 1 kHz 10 kHz 100 kHz 1 MHz	-	-122 -142 -154 -157 -159	-	dBc/Hz 25°C ± 2°C at 20.0 MHz
Jitter	-	0.3	-	pS	
Storage Temperature Range	-55	-	+95	°C	

Note: ¹ Place a 10nF power supply bypass capacitor next to device for correct operation

² Typical capabilities shown. A unique OeXO® datasheet is created for each specific device. See Factory for other options.



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Electrical Characteristics for Clipped Sine Wave

Parameter	Min	Typ	Max	Unit	Condition (Consult factory for other options)
Frequency Range ²	8.192	-	40.0	MHz	See table below for developed frequencies
Frequency Stability vs. Temperature ²	-	-	±200 ±100 ±50	ppb	Over -40°C to +85°C Over -10°C to +70°C Over 0°C to +70°C at fixed V _{CC} + load (reference to midpoint min/max frequency) See factory for other options
Frequency Initial Calibration		-	±2.0	ppm	V _{control} 1.50 volts at 25°C ± 2°C when V _{CC} ≥ 2.8 volts If V _{control} used
Operating Temperature Range ²	0 -10 -40	-	+70 +70 +85	°C	
Supply Voltage ^{1,2} V _{CC}	2.5	-	3.3	V	± 5%
Supply Current ² I _{CC}	-	2.0 3.0 4.0	-	mA	10 MHz 25 MHz 40 MHz Load: 10 Kohm 10 pF, V _{CC} ± 5%
Frequency Stability vs. Supply	-	-	±0.2	ppm	Load: 10 Kohm 10 pF, V _{CC} ± 5%
Frequency Stability vs. Load	-	-	±0.2	ppm	Load: 10 Kohm 10 pF ± 10%
V _{control} Range	0.5	-	2.5	Volts	1.50 volts nominal for V _{CC}
Frequency Pullability ²	0	±8.0	±12.0	ppm	Positive Slope
Linearity	-	-	2.0	%	
Output Waveform			Clipped Sine Wave		DC Coupled
Output Level	0.8	-	-	V p-p	Load: 10 Kohm 10 pF ± 10%
Startup Time	-	-	10.0	ms	Within ± 2.0 ppm of final frequency
Long Term Stability (Aging)	-	-	±1.0	ppm	Per year at 25°C ± 2°C
Phase Noise	100 Hz 1 kHz 10 kHz 100 kHz 1 MHz	-	-122 -142 -154 -157 -159	-	dBc/Hz 25°C ± 2°C at 20.0 MHz
Jitter	-	0.3	-	ps	Frequency offset from carrier 12 kHz to 5 MHz Typical performance at 20.0 MHz
Storage Temperature Range	-55	-	+95	°C	

Note: ¹ Place a 10nF power supply bypass capacitor next to device for correct operation

² Typical capabilities shown. A unique OeXO® datasheet is created for each specific device. See Factory for other options.

The following is a list of developed frequencies. Consult factory for other options.

10.0M, 14.4, 16.384M, 19.2M, 20.0M, 25.0M, 26.0M, 28.8M, 40.00M



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Part Number (Possible Options shown)

Series Model	V _{CC} Supply Voltage ¹	Operating Temperature		Stability ^{1,2}	Pullability ¹	Frequency
		Lowest	Highest	(ppm)	(ppm)	(MHz)
OED4	A unique number will be assigned for your exact specification					-19.44M
	3.3 volts nominal 3.0 volts nominal 2.8 volts nominal 2.5 volts nominal	0°C -10°C -40°C	+70°C +85°C	± 0.05 ± 0.1 ± 0.2	0 ± 5 ± 8	8.192 - 40 MHz

¹ Contact Factory for non-standard specifications

² Not all stabilities are available with all operating temperature ranges. Contact Factory for exact combinations available.

Device Marking



FFFF = Crystal Frequency in MHz (See Note below)

z = Internal factory codes

PLE = Pletronics

YMD = Date code (may appear in one of 3 locations shown)

Note: Output Frequency may be half the Crystal Frequency marking, depending on requirements.

Specifications such as part number, frequency stability, supply voltage and operating temperature range, etc. are not identified from marking. External packaging labels and packing list will correctly identify the ordered Pletronics part number.

Codes for Date Code YMD (Year Month Day)

Code	3	4	5	6	7	Code	A	B	C	D	E	F	G	H	J	K	L	M
Year	2023	2024	2025	2026	2027	Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

Code	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	T	U	V	W	X	Y	Z
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

Package Labeling

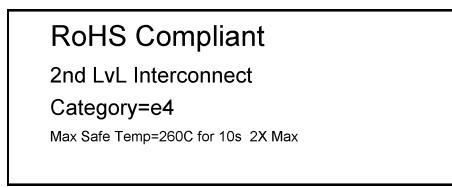
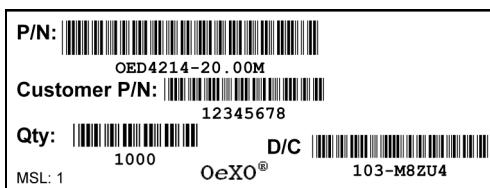
P/N Label is 1" x 2.6" (25.4mm x 66.7mm)

Font is Courier New

Bar code is 39-Full ASCII

RoHS Label is 1" x 2.6" (25.4mm x 66.7mm)

Font is Arial



Pletronics Inc. certifies this device is in accordance with the RoHS and REACH directives.

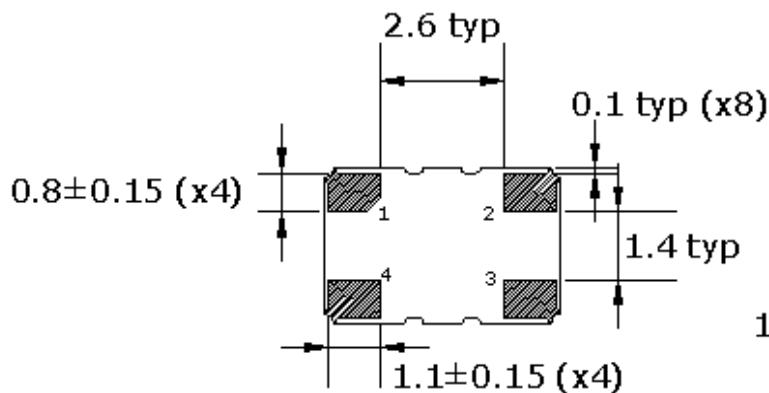
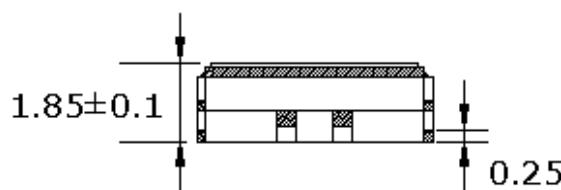
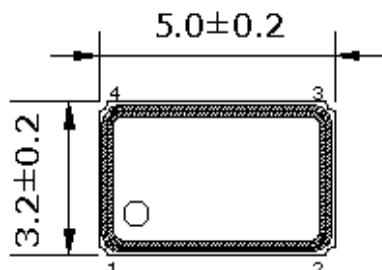
Pletronics Inc. guarantees the device does not contain the following: Cadmium, Hexavalent Chromium, Lead, Mercury, PBB's, PBDE's

Weight of the Device: 0.10 grams

Moisture Sensitivity Level: 1 As defined in J-STD-020D

Second Level Interconnect code: e4

Mechanical Dimensions

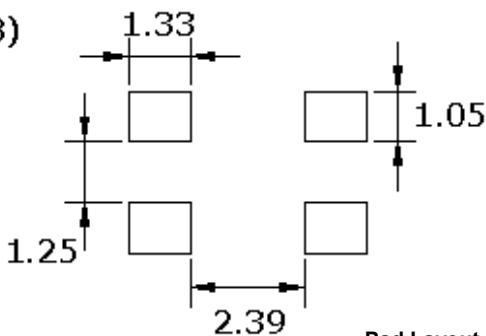


Dimensions in mm

Pin Connections

Pin	Function
1	Voltage Control (VCTCXO) Gnd/NC (TCXO)
2	Ground
3	Output
4	V _{oc}

Solder Pad Layout



Pad Layout

Disclaimer: Recommended layout shown. Adjust pad layout as needed for individual process requirements.

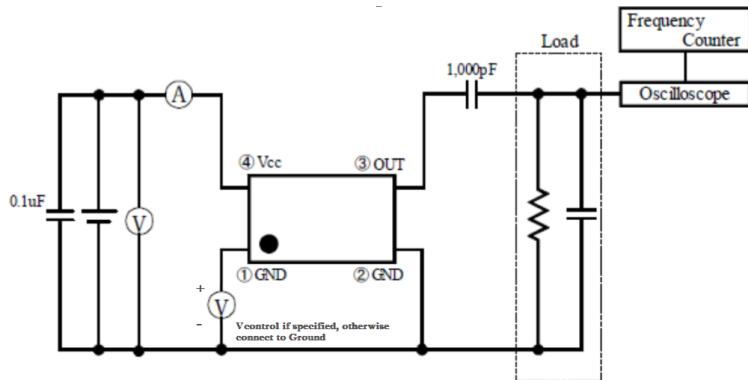
Contacts (pads): Gold (0.3 to 1.0 μ m) over Nickel (1.27 to 8.89 μ m)

For Optimum Jitter Performance, Pletronics recommends:

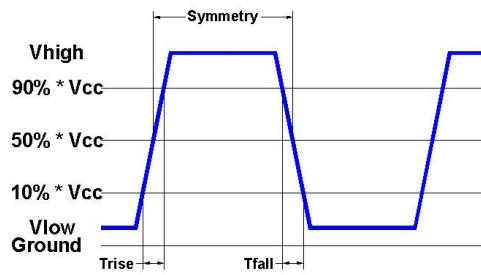
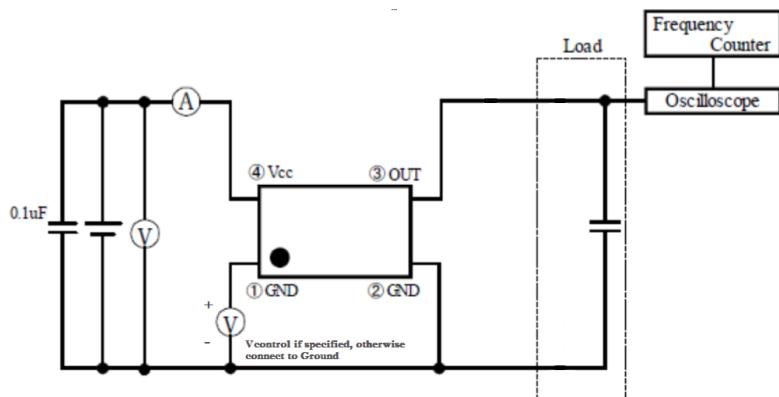
- A ground plane under the device
- Do not route large transient signals (both current and voltage) under the device
- Do not place near a large magnetic field such as a high frequency switching power supply
- Do not place near piezoelectric buzzers or mechanical fans
- Minimize air flow across the device

Electrical Test /Load Circuit

Clipped Sine Wave



CMOS



Environmental / ESD Ratings

Reliability: Environmental

Parameter	Condition
Mechanical Shock	MIL-STD-883, Method 2002, Condition B
Vibration	MIL-STD-883, Method 2007, Condition A
Solderability	IPC J-STD-002
Thermal Cycle	MIL-STD-883 Method 1010, Condition B

ESD Rating

Model	Min. Voltage	Condition
Human Body Model	2000V	JESD22-A114
Machine Model	200V	JESD22-A115

Absolute Maximum Ratings

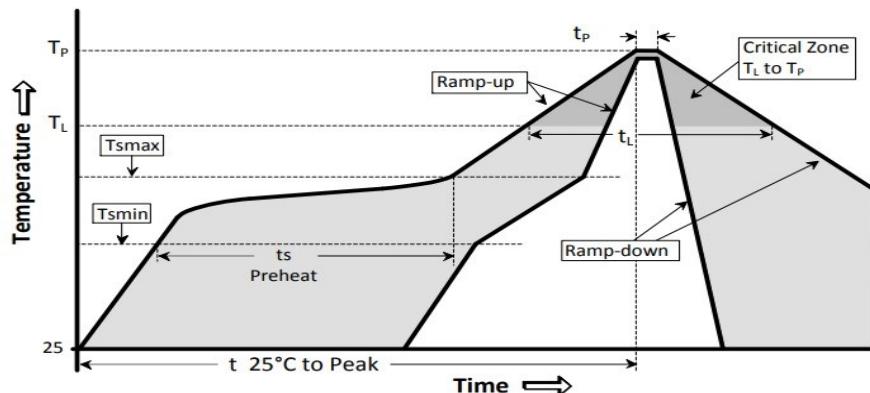
Parameter	Unit
V_{CC} Supply Voltage	-0.6V to +4.6V
V_i Input Voltage	-0.6V to $V_{CC} + 0.6V$
I_o Output Current	-10mA to +10mA

Thermal Characteristics:

The maximum die or junction temperature is 125°C

Reflow Cycle

Maximum Reflow Conditions in accordance with IPC/JEDEC J-STD-020C "Pb-free"

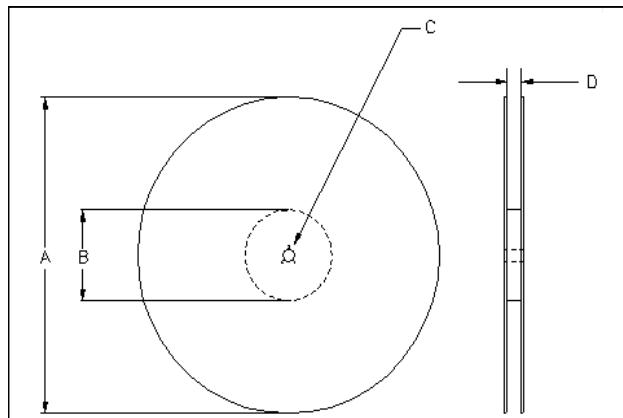
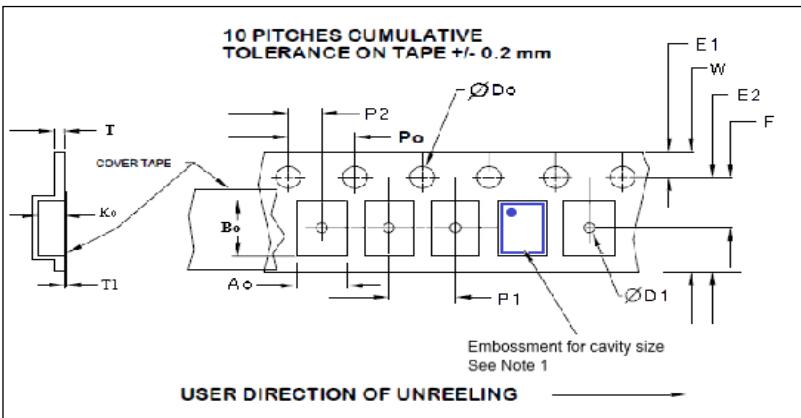


The part may be reflowed 2 times without degradation (typical for lead free processing).

Temperature Profile	Symbol	Condition	Unit
Average ramp-up rate	$(T_{S_{\max}} \text{ to } T_p)$	3°C / second max	°C / s
Ramp down Rate	T_{cool}	6°C / second max	°C / s
Time 25°C to Peak Temperature	$T_{\text{to-peak}}$	8 minutes max	min
Preheat			
Temperature min	$T_{S_{\min}}$	150	°C
Temperature max	$T_{S_{\max}}$	200	°C
Time $T_{S_{\min}} \text{ to } T_{S_{\max}}$	t_s	60 – 180	sec
Soldering above liquidus			
Temperature liquidus	T_L	217	°C
Time above liquidus	t_L	60 – 150	sec
Peak temperature			
Peak Temperature	T_p	260	°C
Time within 5°C of peak temperature	t_p	20 – 40	sec

Tape and Reel

Tape and Reel available for quantities of 250 to 1000 per reel, cut tape for < 250. 12mm tape, 8mm pitch.



Tape Variable Dimensions Table 2

Tape Size	E2 typ	F	P1	W max	Ao	Bo	Ko
12mm	10.25 ±0.05	5.5 ±0.05	8.0 ±0.1	12.2	3.5±0.1	5.3±0.1	1.9±0.1

Dimensions in mm Drawing Not to scale
Note 1: Embossed cavity to conform to EIA-481-B

Tape Constant Dimensions Table 1

Tape Size	Do	D1 min	E1	Po	P2	T max	T1 max
12mm	1.5 +0.1 -0.0	1.5	1.75 ±0.1	4.0 ±0.1	2.0 ±0.05	0.3	0.1

Reel Dimensions (may vary) Table 3

	A		B		C	D
Reel Size	Inches	mm	Inches	mm	mm	mm
7	7.0	180	2.50	60	13.0 +0.5 -0.2	Tape size +0.4 +2.0 -0.0

Product information is current as of publication date. The product conforms to specifications per the terms of the Pletronics standard warranty. May 31, 2024 Rev. G
Production processing does not necessarily include testing of all parameters.



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