



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
- 2.8V 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 ±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	-40	-	+85	°C	Widest range available	
Supply Voltage ^{1,2} V _{CC}	2.8	-	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%	
V _{control} 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	
Output V _{HIGH}	90	-	-	%V _{CC}	V _{th} : T _R and T _F 10% and 90% of V _{CC} V _{th} : D.C. 50% of 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	-120 -134 -144 -145	-	dBc/Hz	25°C ± 2°C at 20.0 MHz	
Jitter	-	0.6	-	pS	Frequency offset from carrier 12 kHz to 20 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.



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	-	+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	-40	-	+85	°C	Widest range available
Supply Voltage ^{1,2} V _{CC}	2.8	-	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	-	-120 -134 -144 -145	-	dBc/Hz	25°C ± 2°C at 20.0 MHz
Jitter	-	0.6	-	ps	Frequency offset from carrier 12 kHz to 20 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.

10.00M, 16.384M, 20.00M, 25.00M, 40.00M



PLETRONICS OeD4 Series OeXO® Oscillator

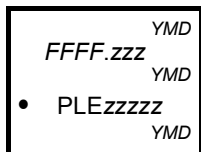
Part Number (Possible Options shown)

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	0°C -10°C -20°C -30°C -40°C	+70°C +80°C +85°C	± 0.05 ± 0.1 ± 0.2	0 ± 5 ± 8	8.192 - 40 MHz

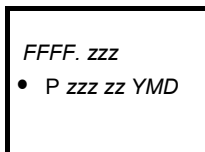
¹ Contact Factory for non-standard specifications

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

Device Marking



OR



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



RoHS Compliant

2nd Lvl Interconnect

Category=e4

Max Safe Temp=260C for 10s 2X Max

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

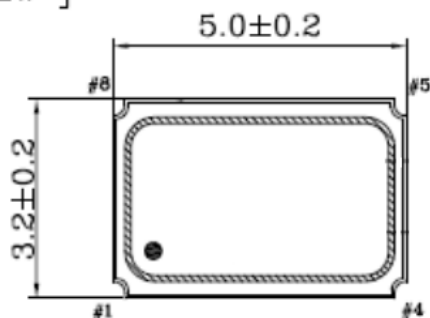
Weight of the Device: 0.10 grams

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

Second Level Interconnect code: e4

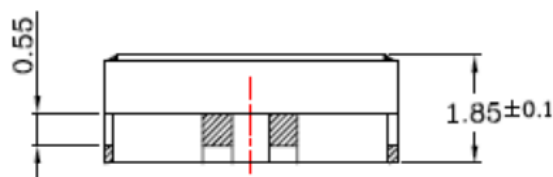
Mechanical Dimensions

[TOP VIEW]

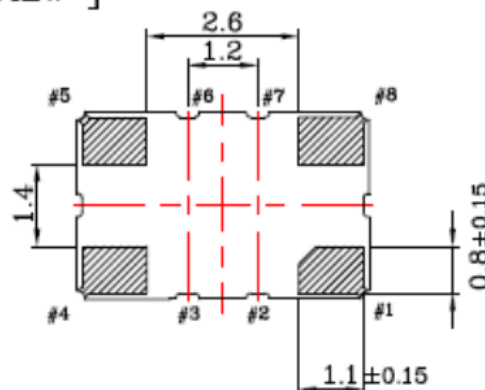


Pin 1 Mark

[SIDE VIEW]

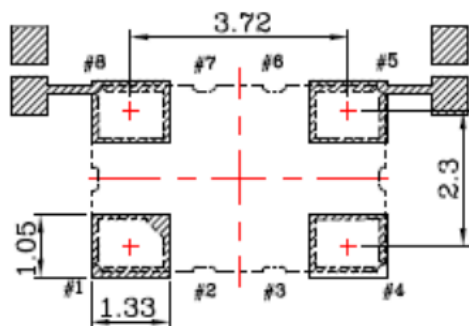


[BOTTOM VIEW]



Recommended soldering pattern

★To ensure optimal oscillator performance, place a by-pass capacitor of 0.1uF as close to the part as possible between Vdd and GND pads.



Pad Layout (Top View)

Disclaimer: Recommended layout shown.
Adjust pad layout as needed for individual
process requirements.
Solder mask required, as shown.

PIN#	FUNCTION
1	VCON:VC-TCXO NC:TCXO
4	GND
5	Fout
8	VDD

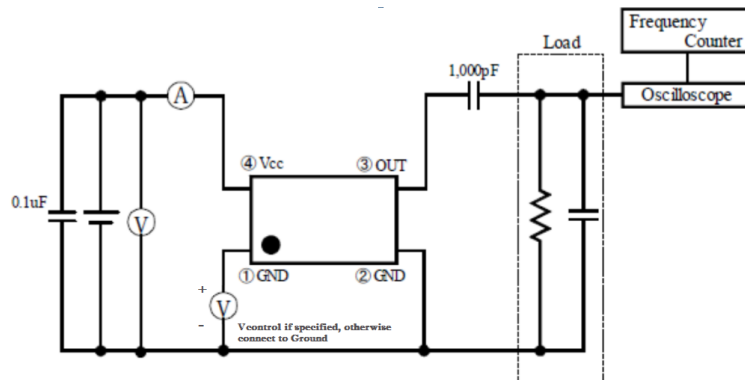
Contacts (pads): Gold (0.3 to 1.0 μm) over Nickel (1.27 to 8.89 μm)

For Optimum Jitter Performance, Pletronics recommends:

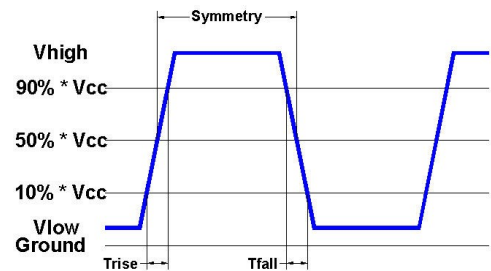
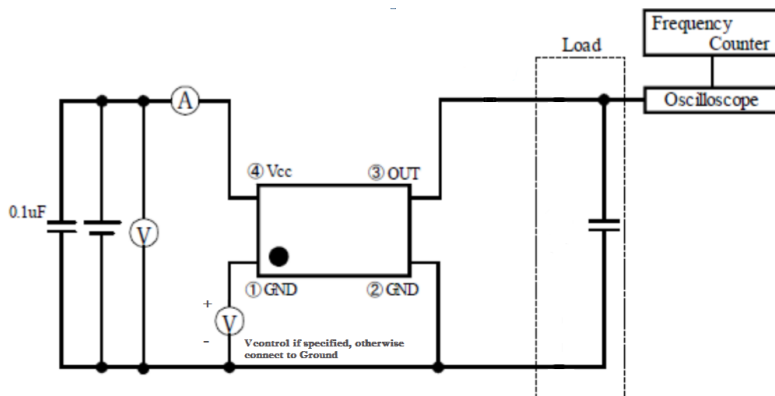
- A ground plane under the device
- Do not route large transient signals (both current and voltage) under the device
- Do not place near a large magnetic field such as a high frequency switching power supply
- Do not place near piezoelectric buzzers or mechanical fans
- Minimize air flow across the device

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

Thermal Characteristics:

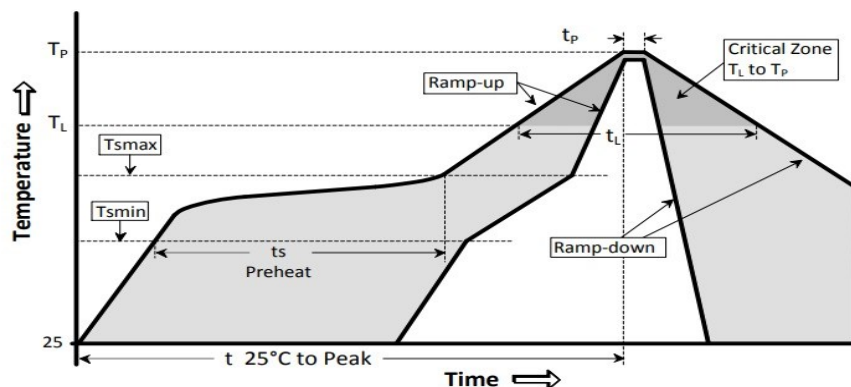
The maximum die or junction temperature is 125°C

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

Reflow Cycle

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

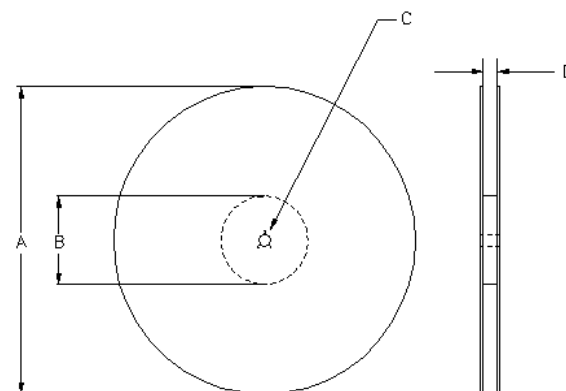
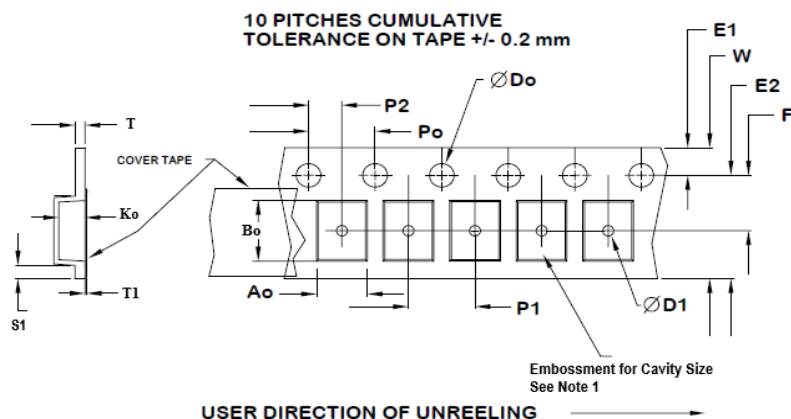


The part may be reflowed 2 times without degradation (typical for lead free processing).

Temperature Profile	Symbol	Condition	Unit
Average ramp-up rate	$(T_{Smax} \text{ to } T_P)$	3°C / second max	°C / s
Ramp down Rate	T_{cool}	6°C / second max	°C / s
Time 25°C to Peak Temperature	$T_{to-peak}$	8 minutes max	min
Preheat			
Temperature min	T_{Smin}	150	°C
Temperature max	T_{Smax}	200	°C
Time T_{Smin} to T_{Smax}	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	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	S1 min	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	0.6	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



Important Notice

Pletronics Incorporated (PLE) reserves the right to make corrections, improvements, modifications and other changes to this product at anytime. PLE reserves the right to discontinue any product or service without notice. Customers are responsible for obtaining the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to PLE's terms and conditions of sale supplied at the time of order acknowledgment.

PLE warrants performance of this product to the specifications applicable at the time of sale in accordance with PLE's limited warranty. Testing and other quality control techniques are used to the extent PLE deems necessary to support this warranty. Except where mandated by specific contractual documents, testing of all parameters of each product is not necessarily performed.

PLE assumes no liability for application assistance or customer product design. Customers are responsible for their products and applications using PLE components. To minimize the risks associated with the customer products and applications, customers should provide adequate design and operating safeguards.

PLE products are not designed, intended, authorized or warranted to be suitable for use in life support applications, weapons, weapon systems or space applications, devices or systems or other critical applications that may involve potential risks of death, personal injury or severe property or environmental damage. Inclusion of PLE products in such applications is understood to be fully at the risk of the customer. Use of PLE products in such applications requires the written approval of an appropriate PLE officer. Questions concerning potential risk applications should be directed to PLE.

PLE does not warrant or represent that any license, either express or implied, is granted under any PLE patent right, copyright, artwork or other intellectual property right relating to any combination, machine or process which PLE product or services are used. Information published by PLE regarding third-party products or services does not constitute a license from PLE to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from PLE under the patents or other intellectual property of PLE.

Reproduction of information in PLE data sheets or web site is permissible only if the reproduction is without alteration and is accompanied by associated warranties, conditions, limitations and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. PLE is not responsible or liable for such altered documents.

Resale of PLE products or services with statements different from or beyond the parameters stated by PLE for that product or service voids all express and implied warranties for the associated PLE product or service and is an unfair or deceptive business practice. PLE is not responsible for any such statements.

Contacting Pletronics Inc.

Pletronics, Inc.
19013 36th Ave. West
Lynnwood, WA 98036-5761
U.S.A.

Tel: 425.776.1880
Fax: 425.776.2760
email: ple-sales@pletronics.com

URL: www.pletronics.com