

## PE76D / PE78D Series 2.5 V PECL Clock Oscillators

January 2008

**Do Not Use for New Designs - use PE55 or PE77**

- Pletronics' PE76D/PE78D Series is a quartz crystal controlled precision square wave generator with a PECL output.
- FR4 base with a mechanical metal cover.
- Solder pad compatible with many 9x14mm plastic J lead packages.
- Has internal bypass capacitor on the Vcc lead
- Tape and Reel or cut tape packaging is available.
- 40 to 250 MHz
- 9.04mm x 8.91mm (S package)
- Enable/Disable PE76D on pad 1  
PE78D on pad 2)
- Disable function includes low standby power mode
- 3<sup>rd</sup> Overtone Crystals used
- Low Jitter
- 5x7 mm LCC ceramic oscillator PE77 series

**Pletronics Inc. certifies this device is in accordance with the  
RoHS 5/6 (2002/95/EC) and WEEE (2002/96/EC) directives.**

Pletronics Inc. guarantees the device does not contain the following:  
Cadmium, Hexavalent Chromium, Lead, Mercury, PBB's, PBDE's  
Weight of the Device: 0.4 grams  
Moisture Sensitivity Level: 1 As defined in J-STD-020C  
Second Level Interconnect code: e4

### Absolute Maximum Ratings:

Parameter	Unit
V <sub>CC</sub> Supply Voltage	-0.5V to +7.0V
V <sub>i</sub> Input Voltage	-0.5V to V <sub>CC</sub> + 0.5V
V <sub>o</sub> Output Voltage	-0.5V to V <sub>CC</sub> + 0.5V

### Thermal Characteristics

The maximum die or junction temperature is 155°C  
The thermal resistance junction to board is 60 to 100°C/Watt depending on the solder pads, ground plane and construction of the PCB.

**Part Number:**

PE7x 45 D E W -125.0M -XX

**Part Marking:**

PLE PE77  
FF.FFF M  
• YMDXX

	<b>Packaging code or blank</b> T250 = 250 per Tape and Reel T500 = 500 per Tape and Reel T1K = 1000 per Tape and Reel
	<b>Frequency in MHz</b>
	<b>Supply Voltage V<sub>CC</sub></b> W = 2.5V ± 10%
	<b>Optional Enhanced OTR</b> Blank = Temp. range -10 to +70°C E = Temp. range -40 to +85°C
	<b>Series Model</b>
	<b>Frequency Stability</b> 45 = ± 50 ppm 44 = ± 25 ppm 20 = ± 20 ppm
	<b>Series Model</b> (where x is a 6 or 8)

**Marking Legend:**

PLE = Pletronics

FF.FFF M = Frequency in MHz

YYWW or YWW or YMD = Date of Manufacture (year and week, or year-month-day)

All other marking is internal factory codes

The marking is the PE77xxDW device  
The Tape and Reel and box marking shows the PE7x PN.

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

**Codes for Date Code YMD**

Code	6	7	8	9	0	1	2
Year	2006	2007	2008	2009	2010	2011	2012

Code	A	B	C	D	E	F	G	H	J	K	L	M
Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

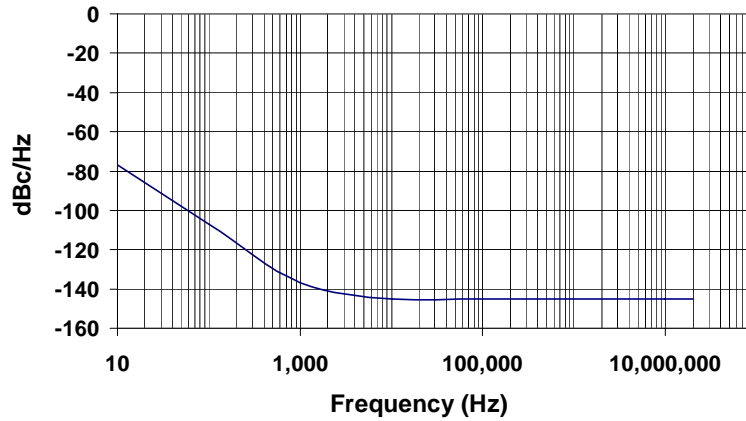
Code	1	2	3	4	5	6	7	8	9	A	B	C
Day	1	2	3	4	5	6	7	8	9	10	11	12
Code	D	E	F	G	H	J	K	L	M	N	P	R
Day	13	14	15	16	17	18	19	20	21	22	23	24
Code	T	U	V	W	X	Y	Z					
Day	25	26	27	28	29	30	31					

## Electrical Specification for 2.50V $\pm 5\%$ over the specified temperature range

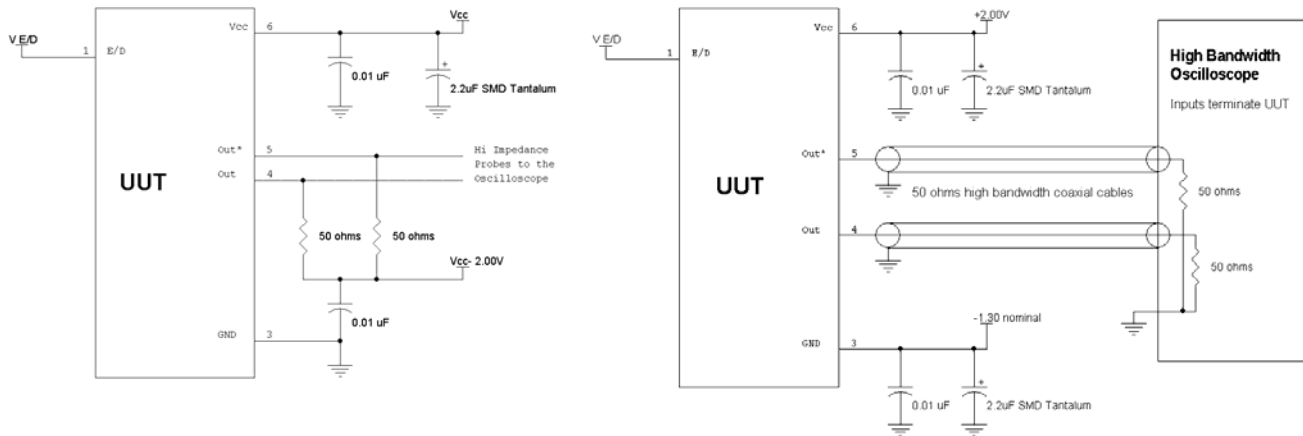
Item	Min	Max	Unit	Condition
Frequency Range	40	250	MHz	
Frequency Accuracy "45"	-50	+50	ppm	For all supply voltages, load changes, aging for 1 year, shock, vibration and temperatures
"44"	-25	+25		
"20"	-20	+20		
Output Waveform	PECL /ECL			
Output High Level (0°C to 85°C)	1.475	1.760	volts	Referenced to Ground, $V_{CC} = 2.5 V$
	0.975	1.260	volts	Referenced to termination voltage, $V_{CC} = 2.5 V$
	-1.025	-0.740	volts	Referenced to $V_{CC}$ , $V_{CC} = 2.5 V$
Output High Level (-40°C)	1.415	1.620	volts	Referenced to Ground, $V_{CC} = 2.5 V$
	0.915	1.12	volts	Referenced to termination voltage, $V_{CC} = 2.5 V$
	-1.085	-0.88	volts	Referenced to $V_{CC}$ , $V_{CC} = 2.5 V$
Output Low Level (0°C to 85°C)	0.690	1.095	volts	Referenced to Ground, $V_{CC} = 2.5 V$
	0.190	0.595	volts	Referenced to termination voltage, $V_{CC} = 2.5 V$
	-1.810	-1.405	volts	Referenced to $V_{CC}$ , $V_{CC} = 2.5 V$
Output Low Level (-40°C)	0.670	1.195	volts	Referenced to Ground, $V_{CC} = 2.5 V$
	0.170	0.695	volts	Referenced to termination voltage, $V_{CC} = 2.5 V$
	-1.830	-1.305	volts	Referenced to $V_{CC}$ , $V_{CC} = 2.5 V$
Output Symmetry	45	55	%	at 50% point of $V_{CC}$ (See load circuit)
Jitter	-	0.13	pS RMS	12 KHz to 20 MHz from the output frequency
	-	2.8	pS RMS	10 Hz to 1 MHz from the output frequency
Output $T_{RISE}$ and $T_{FALL}$	-	0.7	nS	$V_{th}$ is 20% and 80% of waveform
$V_{CC}$ Supply Current ( $I_{CC}$ )	-	90	mA	
Enable/Disable Internal Pull-up	50	-	Kohm	to $V_{CC}$
V disable	-	0.6	volts	Referenced to pad 3
V enable	1.7	-	volts	Referenced to pad 3
Output leakage $V_{OUT} = V_{CC}$	-10	+10	uA	Pad 1 low, device disabled
	$V_{OUT} = 0V$	-10	+10	
Enable time	-	10	nS	Time for output to reach a logic state
Disable time	-	10	nS	Time for output to reach a high Z state
Start up time	-	10	mS	Time for output to reach specified frequency
Operating Temperature Range	-10	+70	°C	Standard Temperature Range
	-40	+85	°C	Extended Temperature Range "E" Option
Storage Temperature Range	-55	+125	°C	
Standby Current $I_{CC}$	-	3	uA	Pad 1 low, device disabled

Specifications with Pad 1 E/D open circuit

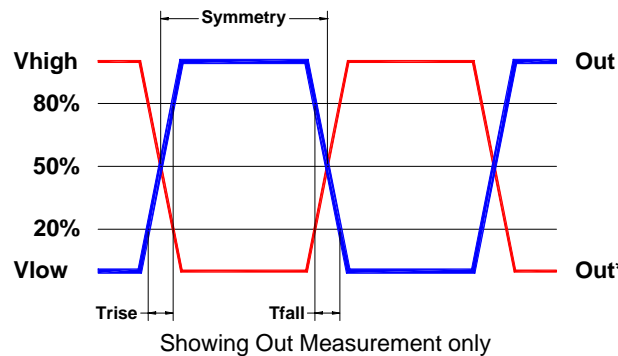
## Typical Phase-Noise Response



## Load Circuit



## Test Waveform



## Reliability: Environmental Compliance

Parameter	Condition
Mechanical Shock	MIL-STD-883 Method 2002, Condition B
Vibration	MIL-STD-883 Method 2007, Condition A
Solderability	MIL-STD-883 Method 2003
Thermal Shock	MIL-STD-883 Method 1011, Condition A




## ESD Rating

Model	Minimum Voltage	Conditions
Human Body Model	1500	MIL-STD-883 Method 3115
Charged Device Model	1000	JESD 22-C101

## Package Labeling

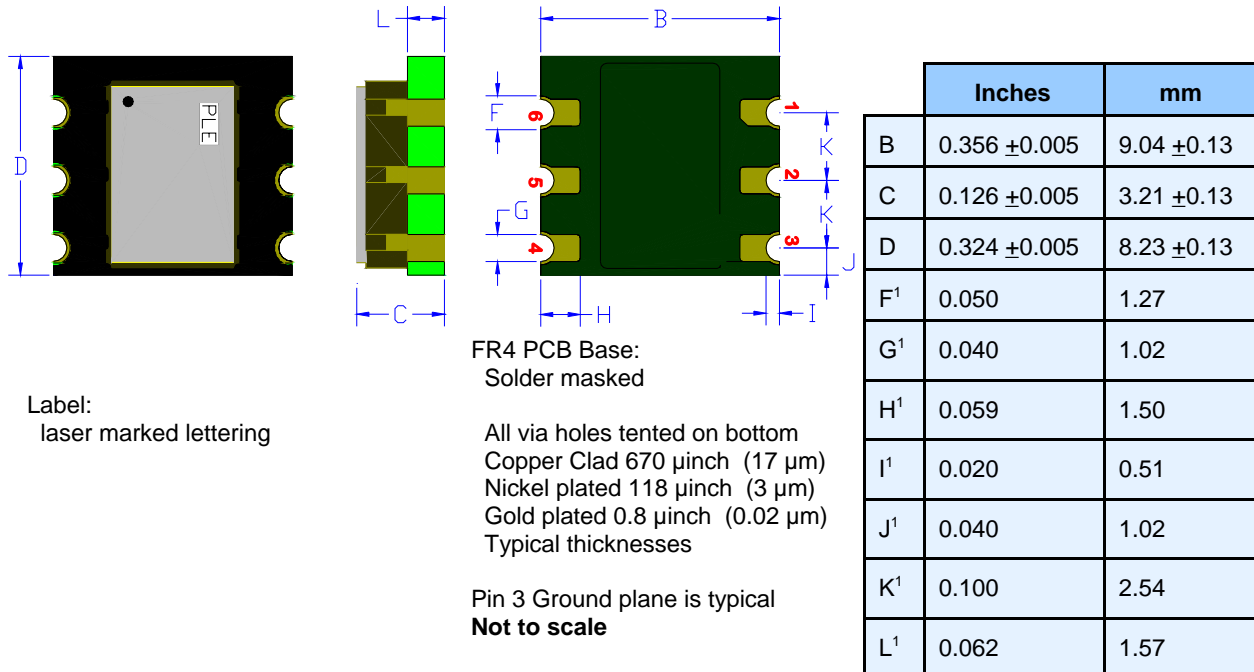
Label is 1" x 2.6" (25.4mm x 66.7mm)  
Font is Courier New  
Bar code is 39-Full ASCII  
(PE76 example shown)

Label is 1" x 2.6" (25.4mm x 66.7mm)  
Font is Arial

P/N:		
	PE7645DW-100.0M	
Customer P/N:		
	12345678	
Qty:		D/C
	1000	
		75409

RoHS Compliant
2nd Lvl Interconnect
Category=e4
Max Safe Temp=245C for 10s 2X Max

## Mechanical:



Pad		Function	Note
76	78		
1	2	Output Enable/Disable	When this pad is not connected the oscillator shall operate. When this pad is <0.30 volts, the output will be inhibited (high impedance state.) Recommend connecting this pad to $V_{CC}$ if the oscillator is to be always on.
2	1	No connect	There is no internal connection to this pad
3		Ground (GND)	
4		Output	Both outputs must be terminated and biased for proper operation. The ideal termination is 50 ohms connected to 2.0V below the Supply Voltage.
5		Output*	
6		Supply Voltage ( $V_{CC}$ )	Recommend connecting appropriate power supply bypass capacitors as close as possible.

## Layout and application information

Recommend connecting Pad 1 and Pad 2 together to permit the design to accept both Enable/Disable input pad versions to be used

For Optimum Jitter Performance, Pletronics recommends:

- a ground plane under the device
- no large transient signals (both current and voltage) should be routed under the device
- do not layout near a large magnetic field such as a high frequency switching power supply
- do not place near piezoelectric buzzers or mechanical fans.

## Mechanical (obsolete version):

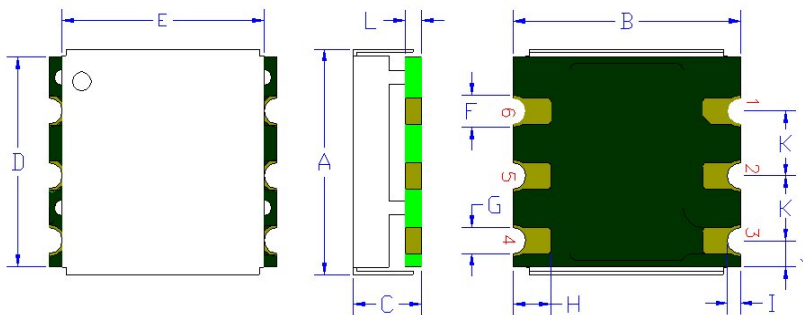
The cover is no longer being supplied over this part. This part is made with a hermetically sealed PE77xxDW series oscillator. This part is now exposed.

The cover has been deleted, the cover was causing problems with the newer high temperature RoHS lead free processes. The cover purpose was only cosmetic.

All parts with 2008 date codes will be made in the new fashion.

There is no change in electrical properties.

Pletronics does recommend that all designs should transition to the PE77xxDW ceramic part.



	Inches	mm
A	0.351 ±0.003	8.91 ±0.07
B	0.356 ±0.005	9.04 ±0.13
C	0.103 ±0.005	2.62 ±0.13
D <sup>1</sup>	0.324	8.23
E <sup>1</sup>	0.316	8.03
F <sup>1</sup>	0.050	1.27
G <sup>1</sup>	0.040	1.02
H <sup>1</sup>	0.059	1.50
I <sup>1</sup>	0.020	0.51
J <sup>1</sup>	0.040	1.02
K <sup>1</sup>	0.100	2.54
L <sup>1</sup>	0.026 typical	0.66

### Cover:

Centered on the base  
304 Stainless Steel  
0.010 inch (0.25mm)  
Electroless Nickel Plated  
1 μinch (25 μm) typical

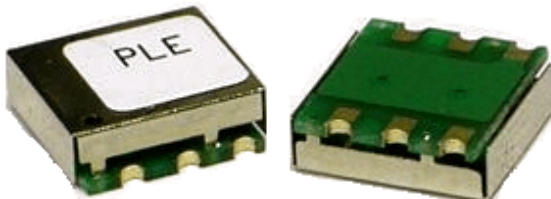
### Label:

White Kapton with Black Letters  
—or—  
Blue Epoxy heat cure ink covering  
top with laser marked lettering

### FR4 PCB Base:

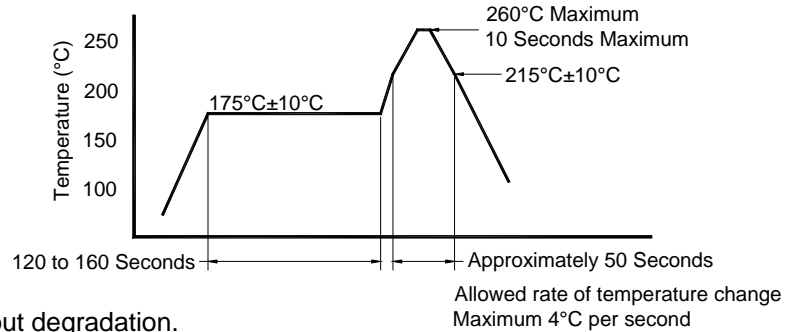
Solder masked  
Solder masked  
All via holes tented on bottom  
Copper Clad 670 μinch (17 μm)  
Nickel plated 118 μinch (3 μm)  
Gold plated 0.8 μinch (0.02 μm)  
Typical thicknesses

Pin 3 Ground plane is typical  
**Not to scale**



- The package is not hermetically sealed.
- The sides are intentionally left open to permit cleaning material to freely flow in the package, thus minimizing the accumulation of contaminants during cleaning processes.
- The internal part of the package must be thoroughly dry before operating.

## Reflow Cycle (typical for lead free processing)



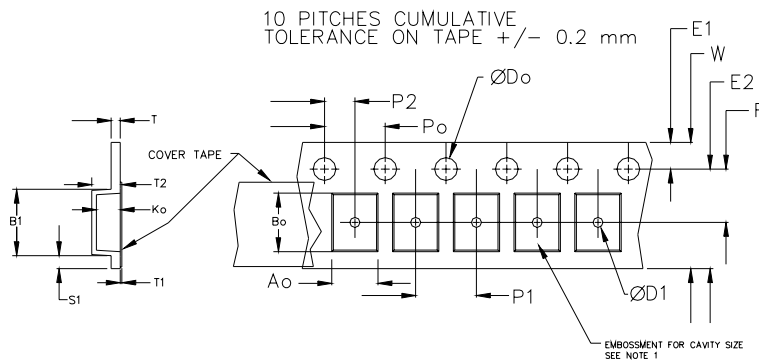
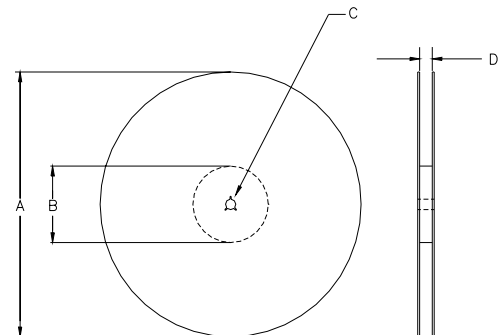
The part may be reflowed 2 times without degradation.

## Tape and Reel: available for quantities of 250 to 1000 per reel, cut tape for < 250

Constant Dimensions Table 1								
Tape Size	D0	D1 Min	E1	P0	P2	S1 Min	T Max	T1 Max
8mm	1.5 +0.1 -0.0	1.0	1.75	4.0	2.0 ±0.05	0.6	0.6	0.1
12mm		1.5			2.0 ±0.1			
16mm		1.5						
24mm		1.5						

Variable Dimensions Table 2							
Tape Size	B1 Max	E2 Min	F	P1	T2 Max	W Max	Ao, Bo & Ko
24 mm	9.88	22.25	11.5 ± 0.1	16.0 ± 0.1	3.22	24.3	Note 1

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



REEL DIMENSIONS					
A	inches	7.0	10.0	13.0	Tape Width
	mm	177.8	254.0	330.2	
B	inches	2.50	4.00	3.75	Tape Width
	mm	63.5	101.6	95.3	
C	mm	13.0 +0.5 / -0.2			Tape Width
D	mm	---	---	24.4 +2.0 -0.0	

Reel dimensions may vary from the above





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January 2008

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## 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.

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