

## LV77D Series 2.5 V LVDS Clock Oscillators

April 2007

**Lead Free** 

- Pletronics' LV77D Series is a quartz crystal controlled precision square wave generator with an LVDS output.
- The package is designed for high density surface mount designs.
- Low cost mass produced oscillator.
- Tape and Reel or cut tape packaging is available.
- 5 x 7 mm LCC Ceramic Package
- Enable/Disable Function on pad 1
- Disable function includes low standby power mode
- Low Jitter

**Pletronics Inc. certifies this device is in accordance with the RoHS 6/6 (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: 0.16 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 +5.0V
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 30 to 50°C/Watt depending on the solder pads, ground plane and construction of the PCB.

**Part Number:**

LV77 45 D E W -125.0M -XX

**Part Marking:**

<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>

PLE LV77  
FF.FFF M  
• YMDXX

or

LV7XYWWXX  
FF.FFF M  
• PLE XXX

**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

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

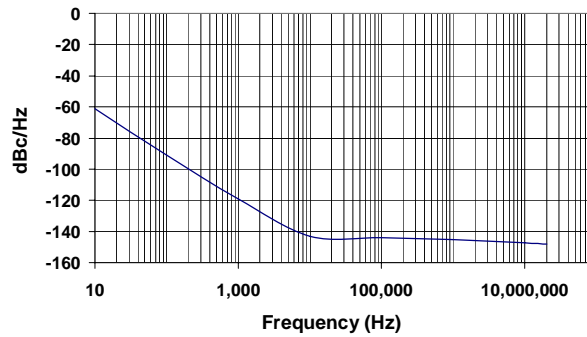
Code	1	2	3	4	5	6	7	8	9	A	B	C
Day	1	2	3	4	5	6	7	8	9	10	11	12
Code	D	E	F	G	H	J	K	L	M	N	P	R
Day	13	14	15	16	17	18	19	20	21	22	23	24
Code	T	U	V	W	X	Y	Z					
Day	25	26	27	28	29	30	31					

## Electrical Specification for 2.50V $\pm 10\%$ over the specified temperature range and the frequency range of 1 to 250 MHz

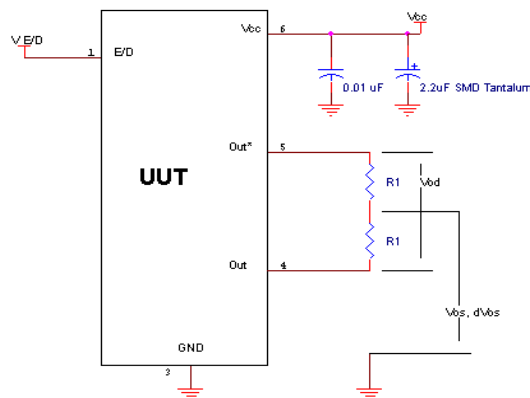
Item	Min	Max	Unit	Condition	
Frequency Accuracy	"45"	-50	+50	ppm	For all supply voltages, load changes, aging for 1 year, shock, vibration and temperatures
	"44"	-25	+25		
	"20"	-20	+20		
Output Waveform	LVDS				
Output High Level	--	1.60	Volts	See load circuit R1 = 50 ohms	
Output Low Level	0.90	--	Volts		
Differential Output ( $V_{OD}$ )	250	450	mVolts		
Differential Output Error ( $dV_{OS}$ )	--	50	mVolts		
Output Offset Voltage ( $V_{OS}$ )	1.125	1.375	Volts	$\geq 80$ MHz	See load circuit R1 = 50 ohms
	1.125	1.500	Volts	$< 80$ MHz	
Output Symmetry	45	55	%	Referenced to 50% of amplitude or crossing point	
Output $T_{RISE}$ and $T_{FALL}$	300	700	pS	Vth is 20% and 80% of waveform $\geq 80$ MHz	
	400	900	pS	Vth is 20% and 80% of waveform $< 80$ MHz	
Jitter	-	0.6	pS RMS	Measured from 12KHz to 20MHz from Fnominal	
	-	2.8		Measured from 10Hz to 1MHz from Fnominal	
Vcc Supply Current	-	63	mA	$\geq 80$ MHz	Includes current of properly terminated device
	-	40	mA	$< 80$ MHz	
Enable/Disable Internal Pull-up	50	-	Kohm	To Vcc (equivalent resistance)	
V disable	-	0.4	Volts	Referenced to Ground	
V enable	2.0	-	Volts		
Output leakage $V_{OUT} = V_{CC}$	-10	+10	$\mu$ A	Pad 1 low, device disabled	
	$V_{OUT} = 0V$	-10	+10		
Enable	-	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	-	5	mS	$\geq 80$ MHz	Measured from the time $V_{CC} = 2.2V$
	-	3	mS	$< 80$ MHz	
Operating Temperature Range	-10	+70	$^{\circ}C$	Standard Temperature Range	
	-40	+85	$^{\circ}C$	Extended Temperature Range "E" Option	
Storage Temperature Range	-55	+125	$^{\circ}C$		
Standby Current $I_{CC}$	-	3	$\mu$ A	Pad 1 low, device disabled $\geq 80$ MHz	
	-	1.5	mA	Pad 1 low, device disabled $< 80$ MHz	

Specifications with Pad 1 E/D open circuit

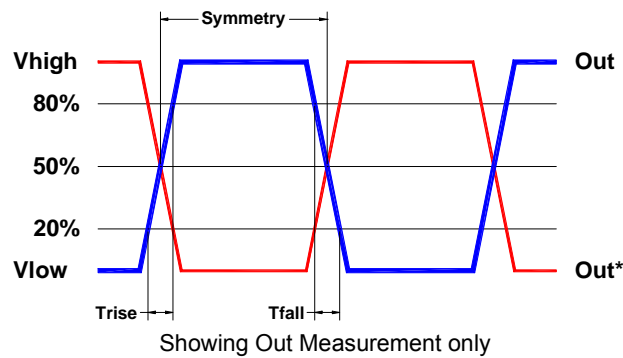
## Typical Phase-Noise Response



## 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

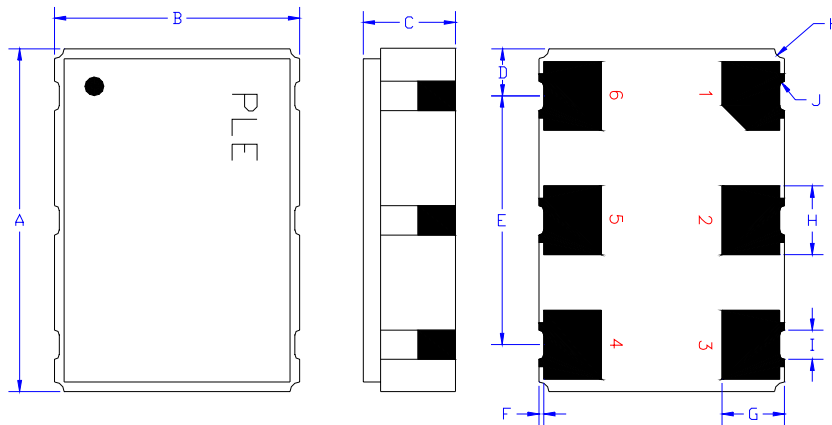
Label is 1" x 2.6" (25.4mm x 66.7mm)  
Font is Courier New  
Bar code is 39-Full ASCII

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

P/N:		
	LV7745DW-100.0M	
Customer P/N:		
	12345678	
Qty:		D/C 
	1000	75501

RoHS Compliant
2nd LvL Interconnect
Category=e4
Max Safe Temp=260C for 10s 2X Max

## Mechanical:



	Inches	mm
A	0.276 ±0.006	7.00 ±0.15
B	0.197 ±0.006	5.00 ±0.15
C	0.067 max	1.70 max
D <sup>1</sup>	0.038	0.96
E <sup>1</sup>	0.200	5.08
F <sup>1</sup>	0.004	0.10
G <sup>1</sup>	0.050	1.27
H <sup>1</sup>	0.055	1.40
I <sup>1</sup>	0.024	0.60
J <sup>1</sup>	0.004R	0.10R
K <sup>1</sup>	0.008R	0.20R

### Contacts:

Gold 11.8 pinches 0.3 µm minimum over  
Nickel 50 to 350 pinches 1.27 to 8.89 µm

<sup>1</sup> Typical dimensions

Not to Scale

Pad	Function	Note
1	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 <sub>CC</sub> if the oscillator is to be always on.
2	No connect	There is no internal connection to this pad
3	Ground (GND)	
4	Output	The outputs must be terminated, 100 ohms between the outputs is the ideal termination.
5	Output*	
6	Supply Voltage (V <sub>CC</sub> )	Recommend connecting appropriate power supply bypass capacitors as close as possible.



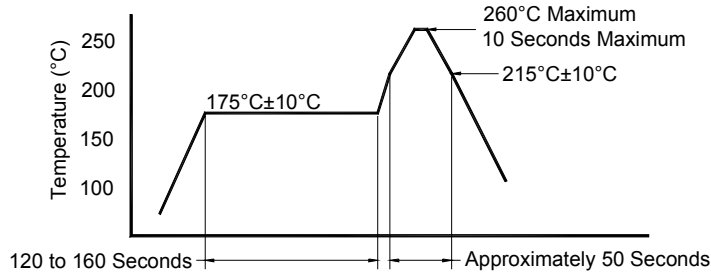
## Layout and application information

Recommend connecting Pad 1 and Pad 2 together to permit the design to accept Enable/Disable on both input pads

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.

## Reflow Cycle (typical for lead free processing)



The part may be reflowed 2 times without degradation.

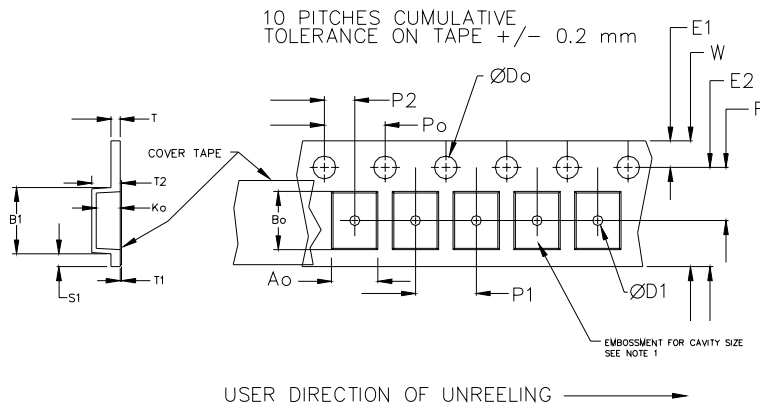
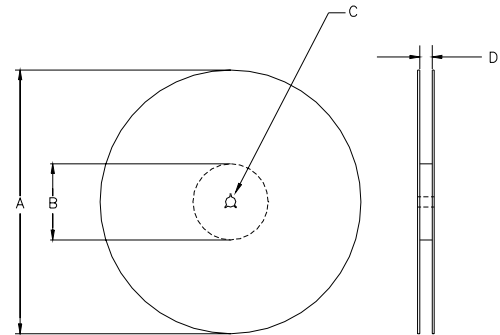
Allowed rate of temperature change  
Maximum 4°C per second

## 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 ±0.1	4.0 ±0.1	2.0 ±0.05	0.6	0.6	0.1
12mm		1.5			2.0 ±0.1			
16mm		1.5			2.0 ±0.1			
24mm		1.5			2.0 ±0.1			

Variable Dimensions Table 2							
Tape Size	B1 Max	E2 Min	F	P1	T2 Max	W Max	Ao, Bo & Ko
16 mm	12.1	14.25	7.5 ±0.1	8.0 ±0.1	8.0	16.3	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	16.4 +2.0 -0.0	16.4 +2.0 -0.0	16.4 +2.0 -0.0	

Reel dimensions may vary from the above



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### Contacting Pletronics Inc.

Pletronics Inc.  
19013 36<sup>th</sup> Ave. West  
Lynnwood, WA 98036-5761 USA

Tel: 425-776-1880  
Fax: 425-776-2760  
E-mail: [ple-sales@pletronics.com](mailto:ple-sales@pletronics.com)  
URL: [www.pletronics.com](http://www.pletronics.com)

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