

## LV77D Series 3.3 V LVDS Clock Oscillators

February 2016

**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
- 80 MHz ~ 325 MHz

**Pletronics Inc. certifies this device is in accordance with the  
RoHS 6/6 (2011/65/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-020D.1

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	V	-125.0M	-XX
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## Part Marking:

	<b>Packaging code or blank</b> <b>T250</b> = 250 per Tape and Reel <b>T500</b> = 500 per Tape and Reel <b>T1K</b> = 1000 per Tape and Reel	<b>PLE LV77</b> <b>FF.FFF M</b> <b>• YMDXX</b>
	<b>Frequency in MHz</b>	<b>or</b> <b>LV7XYWWXX</b> <b>FF.FFF M</b> <b>• PLE XXX</b>
	<b>Supply Voltage V<sub>CC</sub></b> <b>V</b> = 3.3V $\pm$ 10%	
	<b>Optional Enhanced OTR</b> <b>Blank</b> = Temp. range -10 to +70°C <b>C</b> = Temp. range -20 to +70°C <b>E</b> = Temp. range -40 to +85°C	
	<b>Series Model</b>	
	<b>Frequency Stability</b> <b>45</b> = $\pm$ 50 ppm <b>44</b> = $\pm$ 25 ppm <b>20</b> = $\pm$ 20 ppm	
	<b>Series Model</b>	

## 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	4	5	6	7	8	Code	A	B	C	D	E	F	G	H	J	K	L	M
Year	2014	2015	2016	2017	2018	Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

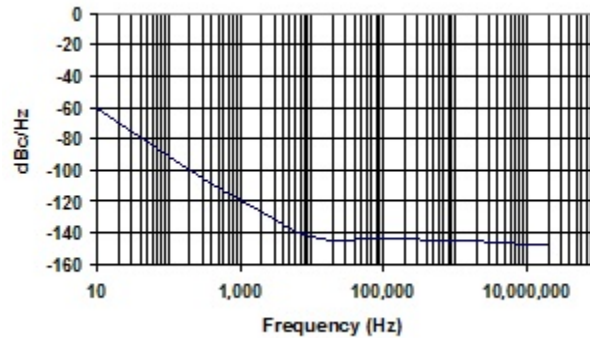
Code	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	G
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Code	H	J	K	L	M	N	P	R	T	U	V	W	X	Y	Z	
Day	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	

**Electrical Specification for 3.30V  $\pm 10\%$  over the specified temperature range and the frequency range of 80 to 325 MHz**

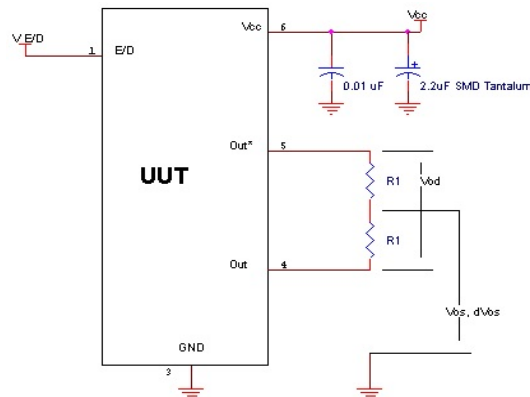
Item	Min	Max	Unit	Condition	
Frequency Accuracy “45”	-50	+50	ppm	For all supply voltages, load changes, aging for 1 year, shock, vibration and temperatures	
“44”	-25	+25			
“20”	-20	+20			
Output Waveform	LVDS				
Output High Level	--	1.60	Volts	-	See load circuit R1 = 50 ohms
Output Low Level	0.90	--	Volts	-	
Differential Output (V <sub>OD</sub> )	250	450	mVolts	-	
Output Offset Voltage (V <sub>OS</sub> )	1.125	1.375	Volts	≥ 80 MHz	
	1.125	1.500	Volts	< 80 MHz	
Differential Output Error (dV <sub>OS</sub> )	--	50	mVolts	-	
Output Symmetry	45	55	%	Referenced to 50% of amplitude or crossing point	
Output T <sub>RISE</sub> and T <sub>FALL</sub>	300	700	pS	≥ 80 MHz	Vth is 20% and 80% of waveform
	400	900	pS	< 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	-	66	mA	≥ 80 MHz	Includes current of properly terminated device
	-	45	mA	< 80 MHz	
Enable/Disable Internal Pull-up	50	-	Kohm	To Vcc (equivalent resistance)	
V disable	-	0.8	Volts	Referenced to Ground	
V enable	2.0	-	Volts	Referenced to Ground	
Output leakage V <sub>OUT</sub> = V <sub>CC</sub>	-10	+10	uA	Pad 1 low, device disabled	
V <sub>OUT</sub> = 0V	-10	+10	uA		
Enable time	-	2	mS	Time for output to reach a logic state	
Disable time	-	200	nS	Time for output to reach a high Z state	
Start up time	-	5	mS	≥ 80 MHz	Measured from the time Vcc = 3.0V
	-	3	mS	< 80 MHz	
Operating Temperature Range	-10	+70	°C	Standard Temperature Range	
	-20	+70	°C	Extended Temperature Range “C” Option	
	-40	+85	°C	Extended Temperature Range “E” Option	
Storage Temperature Range	-55	+125	°C		
Standby Current I <sub>CC</sub>	-	3	uA	≥ 80 MHz	Pad 1 low, device disabled
	-	1.5	mA	< 80 MHz	

Specifications with Pad 1 E/D open circuit

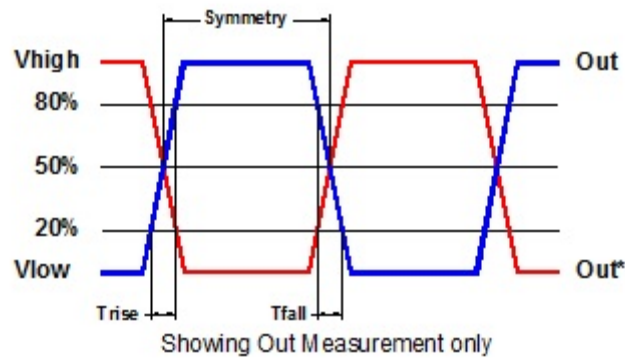
### Typical Phase-Noise Response



### 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

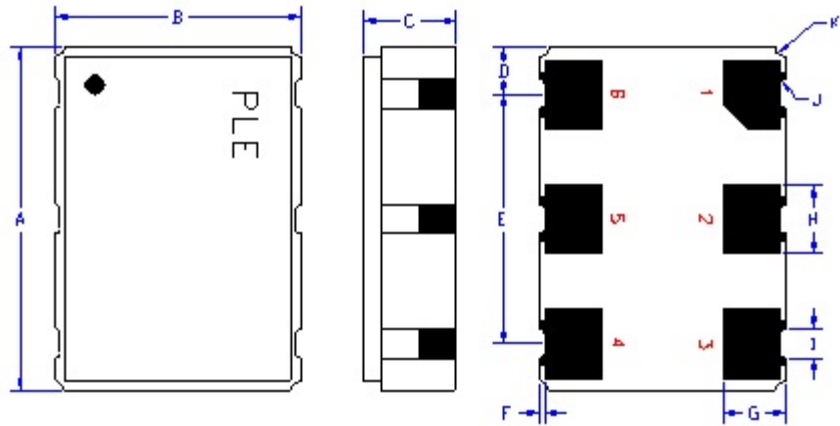
Label is 1" x 2.6" (25.4mm x 66.7mm)  
Font is Courier New  
Bar code is 39-Full ASCII

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

P/N:			
	LV7745DV-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:**



**Contacts (pads):**

Gold 11.8 to 39.4µinches (0.3 to 1.0µm)  
over  
Nickel 50 to 350 µinches (1.27 to 8.89 µm)

<sup>1</sup> Typical dimensions

Not to Scale

	Inches	mm
A	0.276 $\pm$ 0.006	7.00 $\pm$ 0.15
B	0.197 $\pm$ 0.006	5.00 $\pm$ 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

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.



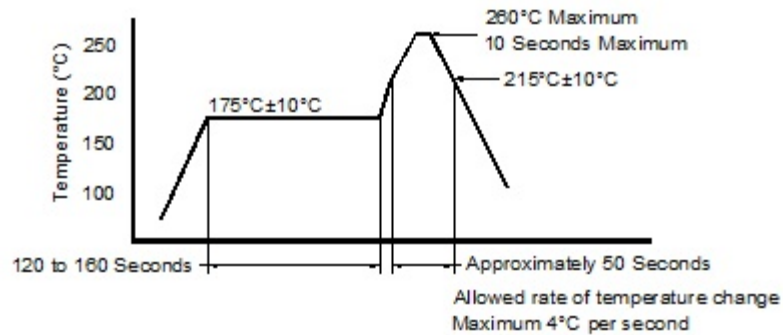
**Layout and application information**

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)



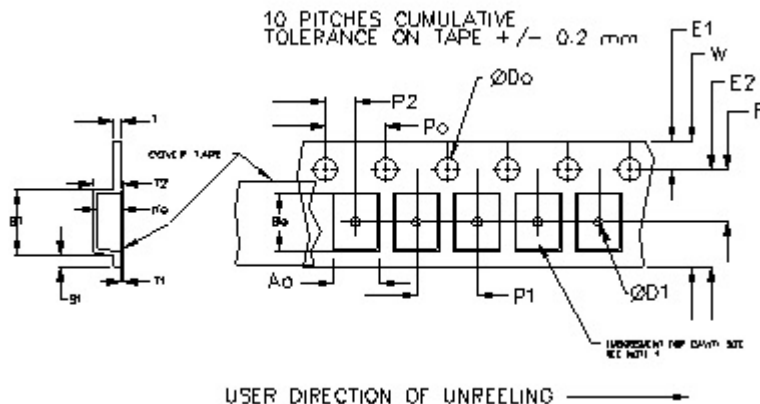
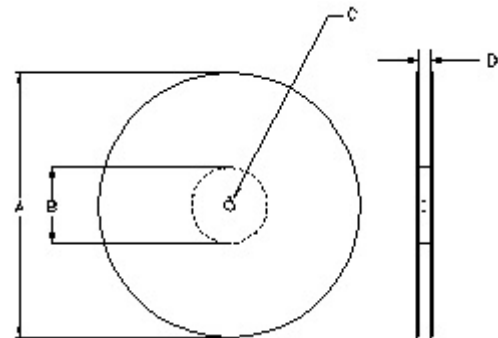
The part may be reflowed 3 times without degradation.

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

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
	mm	177.8	254.0	330.2
B	inches	2.50	4.00	3.75
	mm	63.5	101.6	95.3
C	mm	13.0 +0.5 / -0.2		
D	mm	16.4 +2.0 -0.0	16.4 +2.0 -0.0	16.4 +2.0 -0.0
				16.0

Reel dimensions may vary from the above

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## PLETRONICS INC. DOCUMENT CONTROL

This is the document control page. **This is not printed or part of the PDF that can be downloaded on the web site.** This is to keep the history of the datasheet document and all revisions.

Part Number Family: LV77D  
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PDF File Name: LV77D 3.3V.pdf  
Written By: R Gubser  
Approved By: Melody Mistlin and Claude Lee after sales and engineering group review.

This specification was written around the NPC IC CF5037 for  $\geq 80$  MHz and Anasem IC AS148xx for  $< 80$  MHz and data taken at PLE about its performance.

### Revision History:

April 2005	Initial Release
June 2005	Added dual voltage marking code B, added IC code, deleted substitute note
Jan 2006	Added 1-80 MHz specs per Anasem IC, updated to new process label & important notice
Sept 2006	Updated marking page, RoHS label & mech shock & jitter to .6 from .15
Oct 2006	Added T250, etc. Changed height from 1.87 to 1.70 max
Dec 2006	Deleted Frequency range
April 2007	Changed std OTR to -10 from 0 on part number and table
January 30, 2010	Added the limited frequencies available at $\leq 80$ MHz Added a maximum thickness to the gold on the package rag
April 26, 2010	Added the "C" temperature range, Added 3 times reflow rag
January 28, 2011	Changed the upper frequency to 325 MHz Rag
February 28, 2014	Lower frequency changed to 80 MHz (removed table of frequencies $< 80$ ). Changed enable/disable times to 2ms/200ns.
July 6, 2015	Corrected typo in gold thickness on mechanical pages (39.4 uinches from 29.4) Typo, MM DK
February 3, 2016	Updated date code range. Lower frequency on electrical specification page changed from 1 to 80.