

LV78D Series 2.5 V LVDS Clock Oscillators

June 2005

Lead Free 

- Pletronics' LV78D Series is a quartz crystal controlled precision square wave generator with an LVDS 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 Tube packaging is available.
- 80 to 250 MHz
- 9.04mm x 8.91mm (S package)
- Enable/Disable Function on pad 2 (see LV76D for E/D on pad 1)
- Disable function includes low standby power mode
- 3rd Overtone Crystals used
- Low Jitter
- 5x7 mm LCC ceramic oscillator inside

**Pletronics Inc. certifies this device is in accordance with the
RoHS (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 _{CC} Supply Voltage	-0.5V to +5.0V
V _i Input Voltage	-0.5V to V _{CC} + 0.5V
V _o Output Voltage	-0.5V to V _{CC} + 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:

LV78	45	D	E	W	- 125.0M	-XX	Marking
Internal code or blank							
Frequency in MHz							<i>fff.fff</i> M
Supply Voltage V_{CC} W = 2.5V \pm 10%							W or B
Enhanced Specification E = Temperature range -40 to 85°C							E
Series Model							
Frequency Stability 45 = \pm 50 ppm 44 = \pm 25 ppm 20 = \pm 20 ppm							5 4 2
Series Model							LV78D

Part Marking:

LV78Dx
fff.fff M
PLE sss
yywwa

Where: x = Frequency stability
fff.fff = frequency in MHz
sss = Enhanced specification and voltage
yywwa = Date code

Pletronics may ship the following combinations without notice (this is an enhanced specified device)
44 (25 ppm) stability parts when 45 (50 ppm) was ordered
20 (20 ppm) stability parts when 45 (50 ppm) or 44 (25 ppm) was ordered.
E temperature range parts when extended was not ordered.

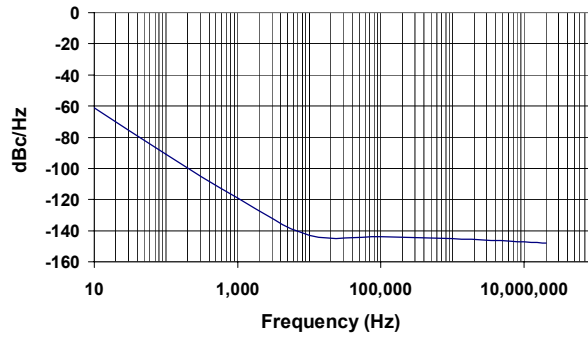
Pletronics may ship parts that are not marked for extended temperature range but were tested for extended temperature range, a Certificate of Conformance will accompany these parts.

Electrical Specification for 2.50V $\pm 10\%$ over the specified temperature range

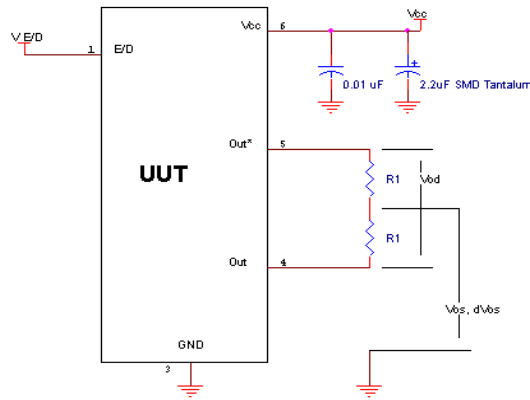
Item	Min	Max	Unit	Condition
Frequency Range	80	250	MHz	
Frequency Accuracy "45"	-50	+50	ppm	For all supply voltages, load changes, aging for 1 year, shock, vibration and temperatures
"44"	-25	+25		
"20"	-20	+20		
Output Waveform	LVDS			
Output High Level	--	1.60	Volts	See load circuit R1 = 50 ohms
Output Low Level	0.90	--	Volts	See load circuit R1 = 50 ohms
Differential Output (V_{OD})	247	454	mVolts	See load circuit R1 = 50 ohms
Output Offset Voltage (V_{OS})	1.125	1.375	Volts	See load circuit R1 = 50 ohms
Differential Output Error (dV_{OS})	--	50	mVolts	See load circuit R1 = 50 ohms
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
Jitter	-	0.15	pS RMS	Measured from 12KHz to 20MHz from Fnominal
	-	2.8		Measured from 10Hz to 1MHz from Fnominal
Vcc Supply Current	-	63	mA	Includes current of properly terminated device
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 $V_{OUT} = V_{CC}$	-10	+10	uA	Pad 1 low, device disabled
	$V_{OUT} = 0V$	-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	Measured from the time Vcc = 3.0V
Operating Temperature Range	0	+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

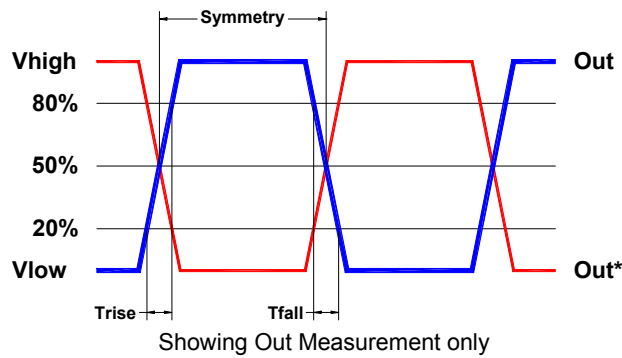
Typical Phase-Noise Response



Load Circuit



Test Waveform



Reliability: Environmental Compliance

Parameter	Condition
Mechanical Shock	MIL-STD-883 Method 2002, Condition A
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:		
	LV7845DW-156.25M	
Customer P/N:		
	12345678	
Qty:		D/C 
	1000	75409

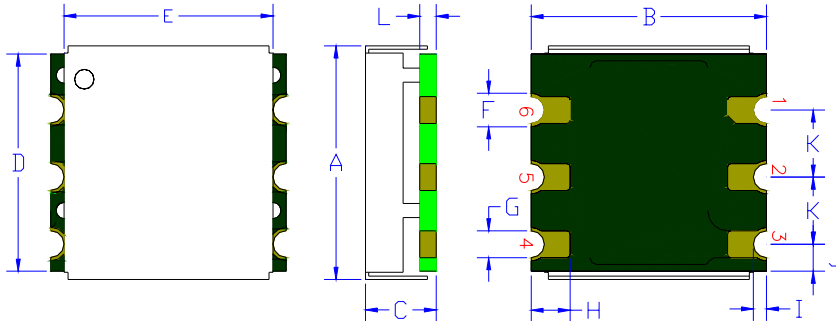
Pb Free
2nd LvL Interconnect
Category=e4
Max Safe Temp=260C for 10s



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Mechanical:



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

	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 ¹	0.324	8.23
E ¹	0.316	8.03
F ¹	0.050	1.27
G ¹	0.040	1.02
H ¹	0.059	1.50
I ¹	0.020	0.51
J ¹	0.040	1.02
K ¹	0.100	2.54
L ¹	0.026 typical	0.66

Pad	Function	Note
1	No connect	There is no internal connection to this pad
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.
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 _{CC})	Recommend connecting appropriate power supply bypass capacitors as close as possible.



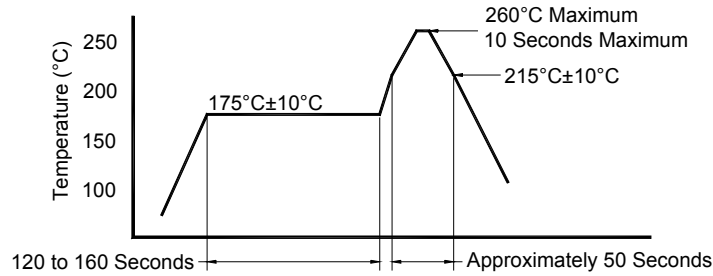
Layout and application information

Recommend connecting Pad 1 and Pad 2 together to permit the design to accept Enable/Disable on both input pads (see LV76D for E/D on pad 1)

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.

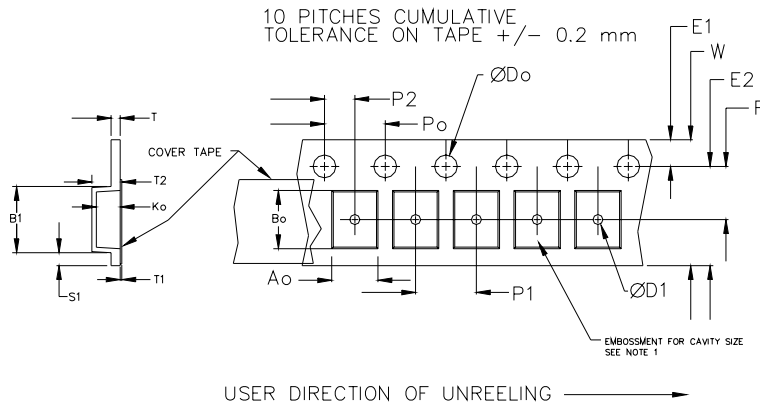
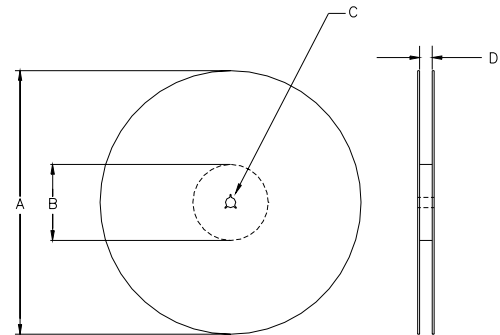
Allowed rate of temperature change
Maximum 4°C per second

Tape and Reel: available for quantities of 250 to 1000 per reel

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

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	16.4 +2.0 -0.0	16.4 +2.0 -0.0	16.4 +2.0 -0.0	
	mm	---	---	24.4 +2.0 -0.0	24.0
	mm	---	---	32.4 +2.0 -0.0	32.0

Reel dimensions may vary from the above



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