

## LV99D Series 3.3 V LVDS Clock Oscillators

November 2018



- Pletronics' LV99D 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
- Output frequency is synthesized.
- Low Jitter

**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-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:**

LV99	45	D	E	V	-375.0M	-XX	
							<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>Frequency in MHz</b>
							<b>Supply Voltage V<sub>CC</sub></b> <b>V = 3.3V ± 10%</b>
							<b>Temperature Range</b> blank = -10 to +70°C <b>C</b> = -40 to +70°C <b>E</b> = -40 to +85°C
							<b>Series Model</b>
							<b>Frequency Stability</b> <b>45</b> = ± 50 ppm <b>44</b> = ± 25 ppm <b>20</b> = ± 20 ppm
							<b>Series Model</b>

**Part Marking:**

PLE LV99  
FF.FFF M  
• YMDXX

**Marking Legend:**

PLE = Pletronics  
 FF.FFF M = Frequency in MHz  
 YMD = Date of Manufacture (year-month-day)  
 All other marking is internal factory codes

**Codes for Date Code YMD**

Code	6	7	8	9	0	Code	A	B	C	D	E	F	G	H	J	K	L	M
Year	2016	2017	2018	2019	2020	Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

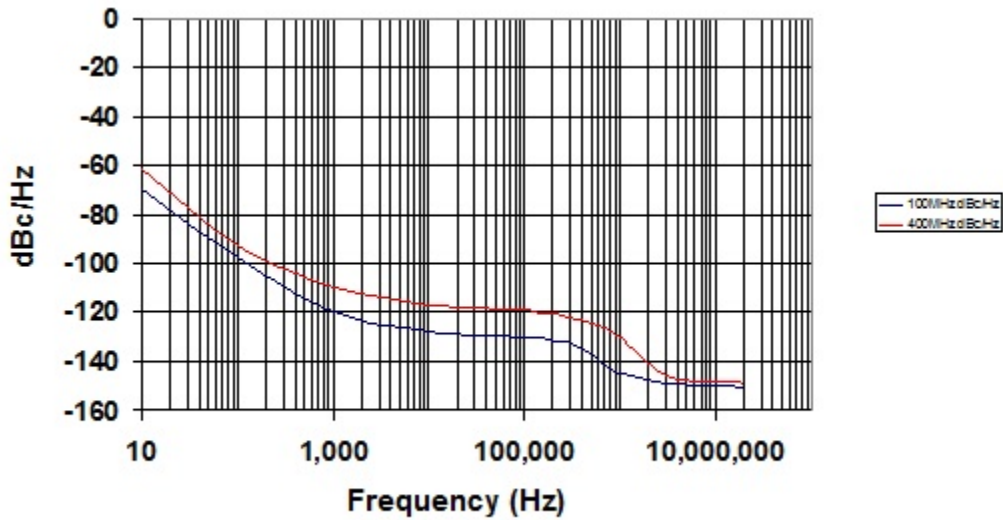
Code	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	G
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Code	H	J	K	L	M	N	P	R	T	U	V	W	X	Y	Z	
Day	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	

## Electrical Specification for 3.30V $\pm 10\%$ over the specified temperature range and the frequency range of 10.9 MHz to 670 MHz

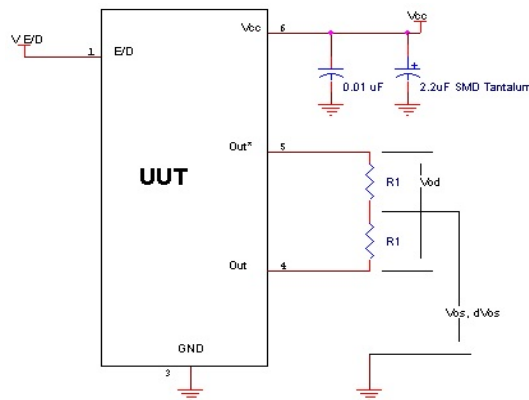
Item	Min	Max	Unit	Condition	
Frequency Accuracy	"45"	-50	+50	ppm	For all supply voltages, load changes, aging for 1 year, shock, vibration and temperatures
	"44"	-25	+25		
	"20"	-20	+20		
Output Waveform	LVDS				
Output High Level	--	1.60	Volts	See load circuit R1 = 50 ohms	
Output Low Level	0.90	--	Volts		
Differential Output ( $V_{OD}$ )	250	450	mVolts		
Output Offset Voltage ( $V_{OS}$ )	1.125	1.375	Volts		
Differential Output Error ( $dV_{OS}$ )	--	50	mVolts		
Output Symmetry	47	53	%	Referenced to 50% of amplitude or crossing point	
Output $T_{RISE}$ and $T_{FALL}$	150	230	pS	$V_{th}$ is 20% and 80% of waveform	
Jitter	-	0.6	pS RMS	Measured from 12KHz to 20MHz from $F_{nominal}$	
	-	2.8		Measured from 10Hz to 20MHz from $F_{nominal}$	
Output Short Circuit Current	-	-20	mA	$V_{out} = 0.0V$	
Vcc Supply Current	-	80	mA		
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	$V_{OUT} = V_{CC}$	-20	+20	uA	Pad 1 low, device disabled
	$V_{OUT} = 0V$	-20	+20		
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 $V_{cc} = 3.0V$	
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		

Specifications with Pad 1 E/D open circuit

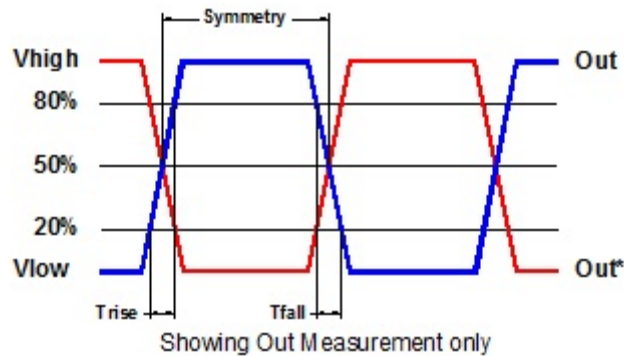
**Typical Phase-Noise Response**



**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	2000	MIL-STD-883 Method 3115
Charged Device Model	1500	JESD 22-C101

## Package Labeling

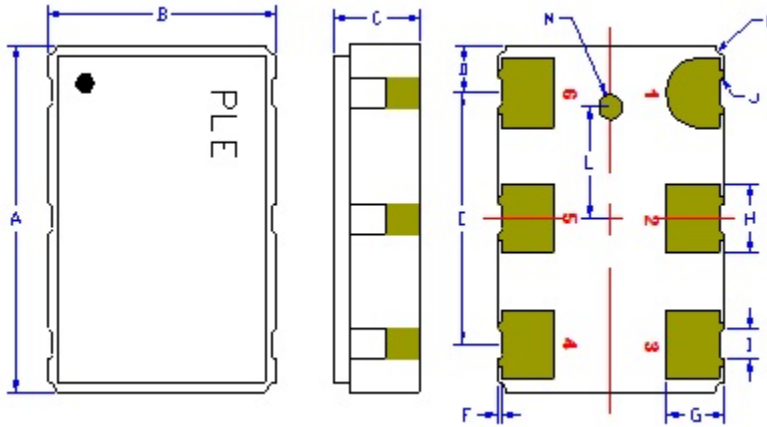
Label is 1" x 2.6" (25.4mm x 66.7mm)  
Font is Courier New  
Bar code is 39-Full ASCII

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

<b>P/N:</b>  LV9920DV-312.50M	
<b>Customer P/N:</b>  12345678	
<b>Qty:</b>  1000	<b>D/C:</b>  7AA-BT

<b>RoHS Compliant</b> 2nd Lvl Interconnect Category=e4 Max Safe Temp=260C for 10s 2X Max
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**Mechanical:**



	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
L <sup>1</sup>	0.089	2.25
M <sup>1</sup>	0.010r	0.25r

**Contacts:**

Gold 11.8 to 39.4  $\mu$ mches (0.3 to 1.0  $\mu$ m)  
over  
Nickel 50 to 350  $\mu$ mches (1.27 to 8.89  $\mu$ m)

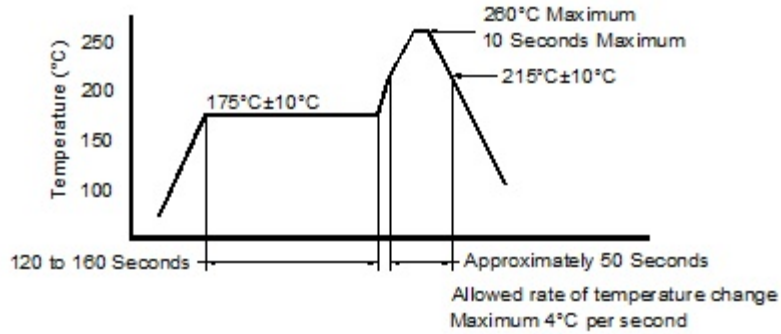
Center metalized pad "M" on the base is  
not internally connected.

<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. If <0.80 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	This pad should be connected to Ground or Supply Voltage to lower the packages thermal resistance.
3	Ground (GND)	
4	Output	The outputs must be terminated, 100 ohms between the outputs is the ideal termination. Capacitor coupled terminations can be used.
5	Output*	
6	Supply Voltage (V <sub>CC</sub> )	Recommend connecting appropriate power supply bypass capacitors as close as possible.

**Reflow Cycle (typical for lead free processing)**



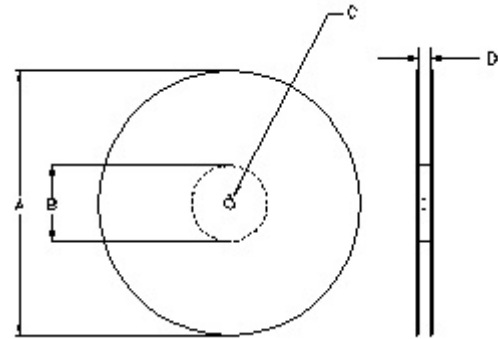
The part may be reflowed 3 times without degradation.

**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			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			Tape Width
A		inches	mm	mm	
A	inches	7.0	10.0	13.0	16.0
	mm	177.8	254.0	330.2	
B	inches	2.50	4.00	3.75	16.0
	mm	63.5	101.6	95.3	
C	mm	13.0 +0.5 / -0.2			16.0
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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