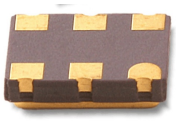
PLETRONICS
Innovations in
Frequency Control



LV99D Series 3.3 V
LVDS Clock Oscillators

November 2018

Lead Free

- 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_{CC} Supply Voltage	-0.5V to +5.0V
Vi Input Voltage	-0.5V to V_{CC} + 0.5V
Vo 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 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

-XX — Packaging code or blank
- **T250** = 250 per Tape and Reel
- **T500** = 500 per Tape and Reel
- **T1K** = 1000 per Tape and Reel

-375.0M — Frequency in MHz

V — Supply Voltage V_{CC}
- **V** = 3.3V ± 10%

E — Temperature Range
- blank = -10 to +70°C
- **C** = -40 to +70°C
- **E** = -40 to +85°C

D — Series Model

45 — Frequency Stability
- **45** = ± 50 ppm
- **44** = ± 25 ppm
- **20** = ± 20 ppm

LV99 — Series Model

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

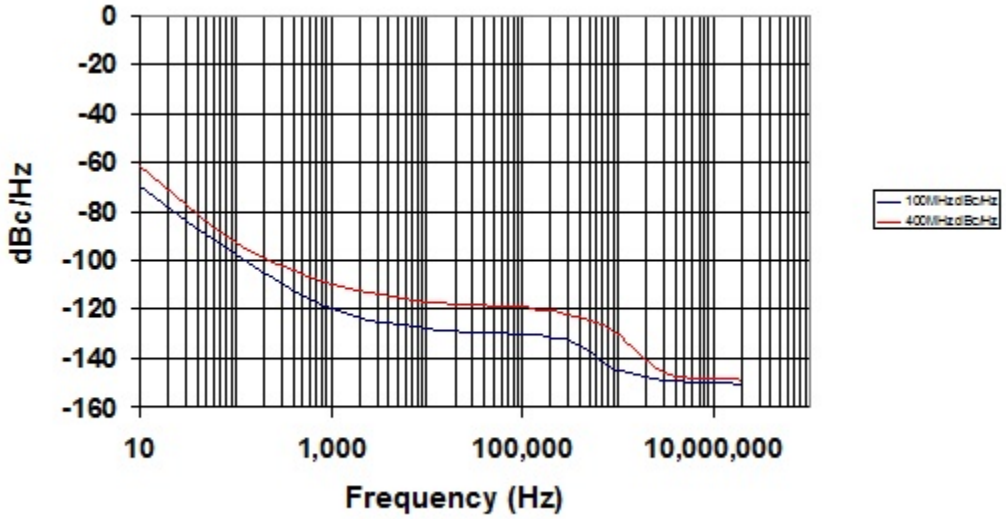
Code	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	G
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Code	**H**	**J**	**K**	**L**	**M**	**N**	**P**	**R**	**T**	**U**	**V**	**W**	**X**	**Y**	**Z**	
Day	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	

Electrical Specification for 3.30V ±10% over the specified temperature range and the frequency range of 10.9 MHz to 670 MHz

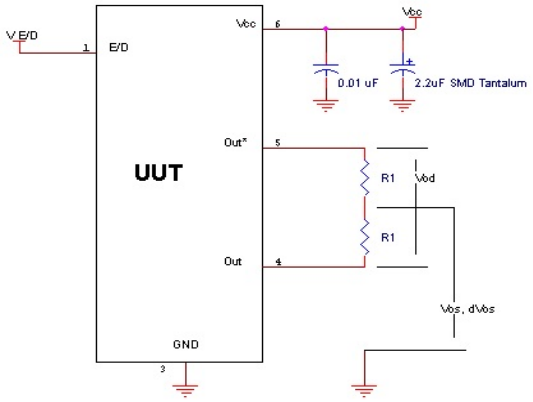
Item	Min	Max	Unit	Condition
Frequency Accuracy "45"	-50	+50	ppm	For all supply voltages, load changes, aging for 1 year, shock, vibration and temperatures
"44"	-25	+25		
"20"	-20	+20		
Output Waveform	LVDS			
Output High Level	--	1.60	Volts	See load circuit R1 = 50 ohms
Output Low Level	0.90	--	Volts	
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	Vth is 20% and 80% of waveform
Jitter	-	0.6	pS RMS	Measured from 12KHz to 20MHz from Fnominal
	-	2.8		Measured from 10Hz to 20MHz from Fnominal
Output Short Circuit Current	-	-20	mA	Vout = 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	uA	
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	-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

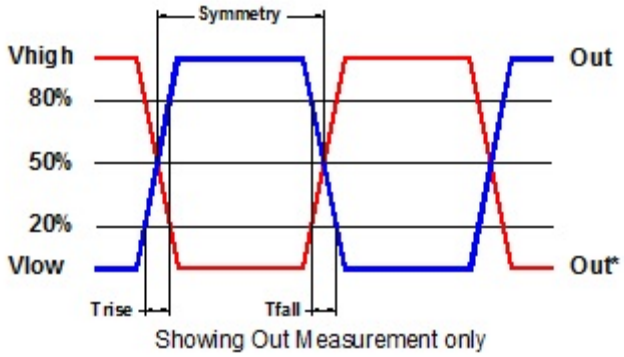
Typical Phase-Noise Response



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

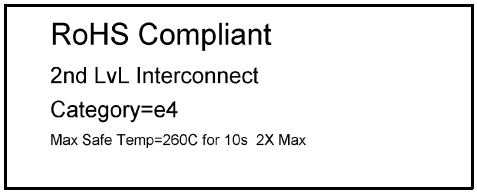
ESD Rating

Model	Minimum Voltage	Conditions
Human Body Model	2000	MIL-STD-883 Method 3115
Charged Device Model	1500	JESD 22-C101

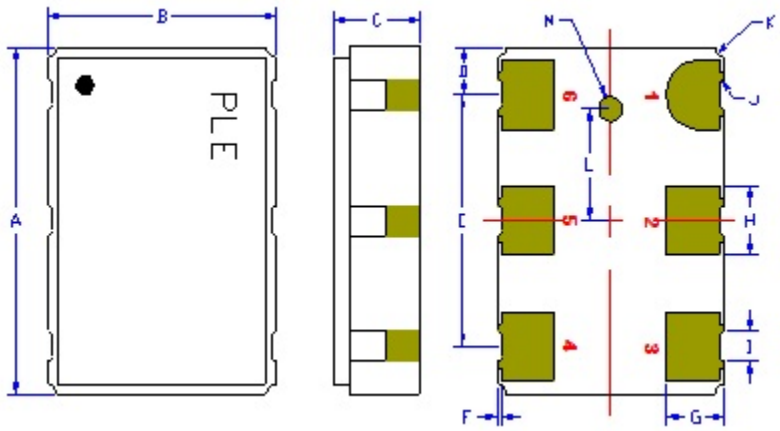
Package Labeling

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



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[1]	0.038	0.96
E[1]	0.200	5.08
F[1]	0.004	0.10
G[1]	0.050	1.27
H[1]	0.055	1.40
I[1]	0.024	0.60
J[1]	0.004r	0.10r
K[1]	0.008r	0.20r
L[1]	0.089	2.25
M[1]	0.010r	0.25r

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

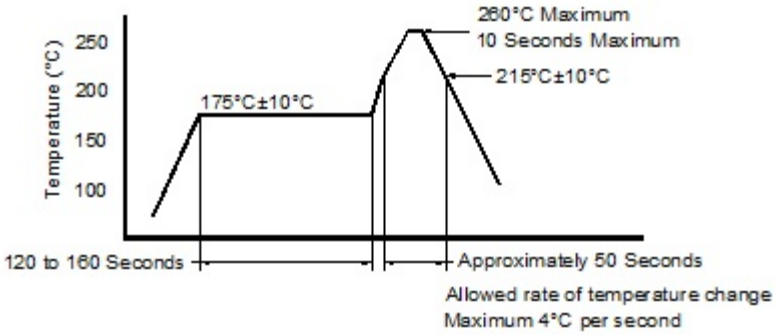
Center metalized pad “M” on the base is not internally connected.

[1] 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_{CC} 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_{CC})	Recommend connecting appropriate power supply bypass capacitors as close as possible.

Reflow Cycle (typical for lead free processing)



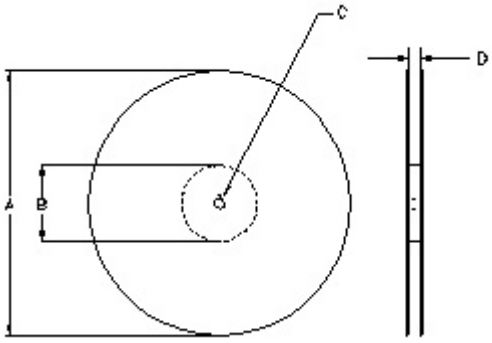
The part may be reflowed 3 times without degradation.

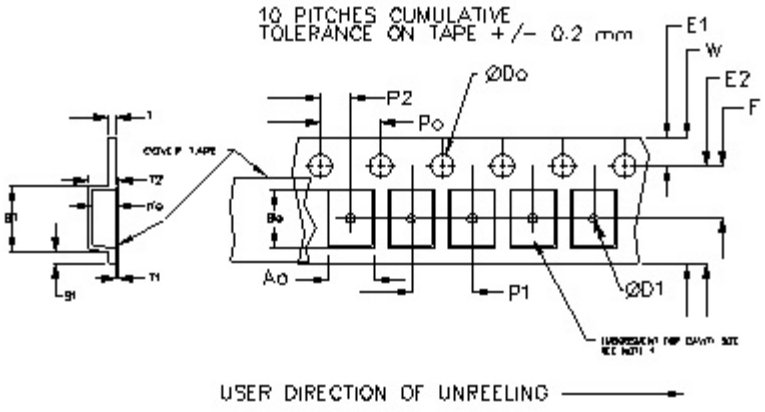
Tape and Reel: available for quantities of 250 to 1000 per reel, cut tape for < 250

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						
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	Tape Width
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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