



## LV44F / LV44G Series 2.5 V LVDS Clock Oscillators

April 2017

Lead Free 

- Pletronics' LV44F and LV44G Series is a quartz crystal controlled precision square wave generator with a fast rise and fall time LVDS output.
- The package is designed for high density surface mount designs.
- Tape and Reel or cut tape packaging is available.
- 3.2 x 2.5 mm LCC Ceramic Package
- Enable/Disable Function on pad 1
- Disable function includes low standby power mode
- LV44F use Fundamental Mode Crystals  
13.5MHz to 110MHz
- LV44G use 3<sup>rd</sup> Overtone Crystals  
35MHz to 170MHz
- 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-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
Junction Temperature (T <sub>j</sub> )	-55°C to +150°C

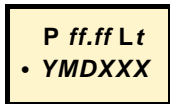
### Thermal Characteristics

The maximum die or junction temperature is 150°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:**

LV44	45	G	E	W	-125.0M	-XX	
							Packaging code or blank <b>T250</b> = 250 per Tape and Reel <b>T500</b> = 500 per Tape and Reel <b>T1K</b> = 1000 per Tape and Reel
							Frequency in MHz
							Supply Voltage $V_{CC}$ <b>W</b> = 2.5V $\pm$ 10%
							Optional Enhanced OTR <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
							Series Model <b>F</b> = Fundamental mode crystal <b>G</b> = 3 <sup>rd</sup> Overtone mode crystal
							Frequency Stability <b>45</b> = $\pm$ 50 ppm <b>44</b> = $\pm$ 25 ppm <b>20</b> = $\pm$ 20 ppm
							Series Model

**Marking Legend:**



- PLE = Pletronics
- ff.fff M = Frequency in MHz
- L = LVDS
- t = Mode of operation 'F' or 'G'
- 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	

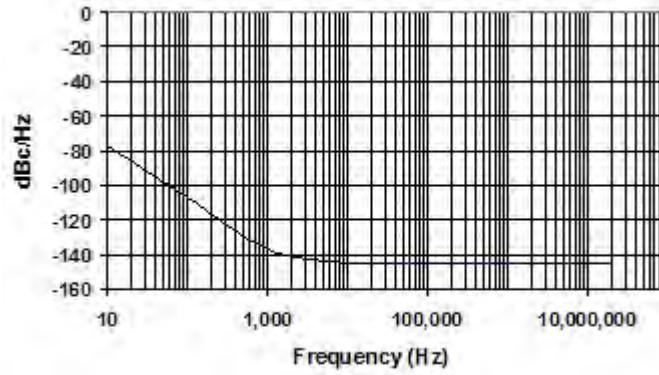
## Electrical Specification for 2.50V $\pm 10\%$ over the specified temperature range

Item	Min	Typ	Max	Unit	Condition	
Frequency Range	13.5	-	110	MHz	For "F" series devices	
	35	-	170	MHz	For "G" series devices	
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			
Supply Voltage Sensitivity	-2	-	2	ppm	For $V_{CC}$ change of $\pm 10\%$	
Output Waveform	LVDS					
Output High Level ( $V_{OH}$ )	-	1.43	1.60	V	See load circuit	
Output Low Level ( $V_{OL}$ )	0.90	1.10	-	V	See load circuit	
Output Offset Voltage	1.125	-	1.375	V		
Output Symmetry	45	-	55	%	output crossing point	See load circuit
Output Swing	250	350	450	mV	See load circuit	
Jitter*	-	-	0.6	ps RMS	12 KHz to 20 MHz from the output frequency	
	-	-	2.8	ps RMS	10 Hz to 1 MHz from the output frequency	
Output $T_{RISE}$ and $T_{FALL}$	-	150	400	ps	$V_{th}$ is 20% and 80% of waveform	
$V_{CC}$ Supply Current ( $I_{CC}$ )	-	12	20	mA	< 80MHz	"F" series devices
	-	16	27		$\geq 80$ MHz	
	-	12	20	mA	< 90MHz	"G" series devices
	-	16	27		$\geq 90$ MHz to 125MHz	
-	20	34	$\geq 125$ MHz to 160MHz			
-	24	40	$\geq 160$ MHz			
Disable current	-	-10	-	$\mu$ A	Pad 1 = 0.0 volts	
V disable	-	-	0.6	V	Referenced to pad 3	
V enable	1.9	-	-	V	Referenced to pad 3	
Output leakage $V_{OUT} = V_{CC}$	-10	-	+10	$\mu$ A	Pad 1 low, device disabled	
$V_{OUT} = 0V$	-10	-	+10	$\mu$ A		
Enable time	-	-	2	ms		
Disable time	-	-	200	ns	Time for output to reach a high Z state	
Start up time	-	-	2	ms	Time for output to reach specified frequency	
Operating Temperature	-10	-	+70	$^{\circ}$ C	Standard Temperature Range	
	-20	-	+70	$^{\circ}$ C	Extended Temperature Range "C" Option	
	-40	-	+85	$^{\circ}$ C	Extended Temperature Range "E" Option	
Storage Temperature	-55	-	+125	$^{\circ}$ C		
Standby Current $I_{CC}$	-	-	10	$\mu$ A	Pad 1 low, device disabled	

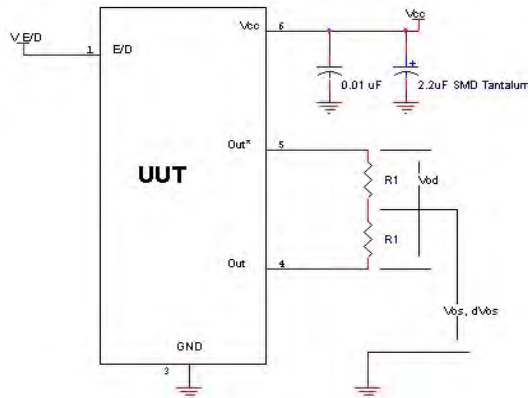
\* Measured at 125.0 MHz

Specifications with Pad 1 E/D open circuit unless stated otherwise

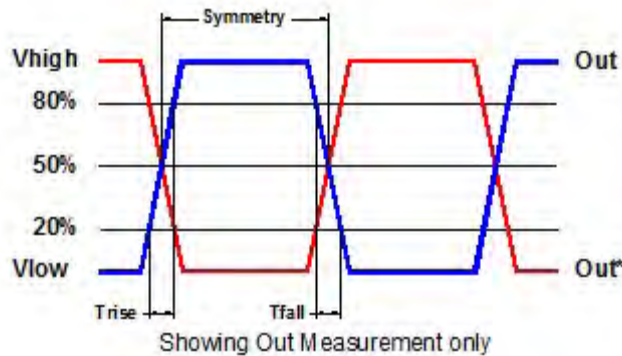
## Typical Phase-Noise Response



## 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

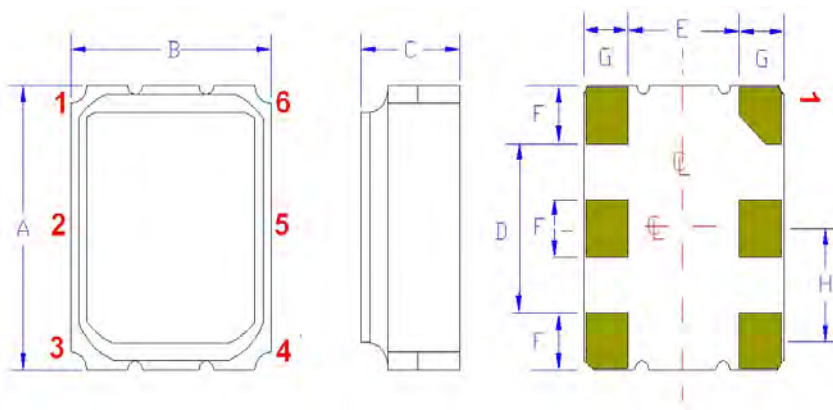
Label is 1" x 2.6" (25.4mm x 66.7mm)  
Font is Arial

<b>P/N:</b>  LV4445FEW-75.0M	
<b>Customer P/N:</b>  12345678	
<b>Qty:</b>  1000	<b>D/C</b>  0JX-MTG
MSL: 1	

RoHS Compliant 2nd LvL Interconnect Category=e4 Max Safe Temp=260C for 10s 2X Max
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<b>P/N:</b>  LV4445GEW-125.0M	
<b>Customer P/N:</b>  12345678	
<b>Qty:</b>  1000	<b>D/C</b>  0JX-MTG
MSL: 1	

## Mechanical:



	Inches	mm
A	0.125 ±0.004	3.20 ±0.10
B	0.098 ±0.004	2.50 ±0.10
C	0.040 max	1.00 max
D <sup>1</sup>	0.063	1.60
E <sup>1</sup>	0.051	1.30
F <sup>1</sup>	0.031	0.80
G <sup>1</sup>	0.024	0.60
H <sup>1</sup>	0.047	1.20

<sup>1</sup> Typical dimensions

### 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)

Not to Scale

Pad	Function	Note
1	Output Enable/Disable	When this pad is not connected the oscillator shall operate. When this pad is < 'V disable', 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 input on either pad

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.

