

## LV77F / LV77G Series 2.5 V LVDS Clock Oscillators

November 2018



- Pletronics' LV77F and LV77G 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.
- 5 x 7 mm LCC Ceramic Package
- Enable/Disable Function on pad 1
- Disable function includes low standby power mode
- LV77F use Fundamental Mode Crystals  
 13MHz to 110MHz
- LV77G use 3<sup>rd</sup> Overtone Crystals  
 35MHz to 220MHz
- 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:**

LV77	45	G	E	W	-125.0M	-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>W</b> = 2.5V ± 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>F</b> = Fundamental mode crystal <b>G</b> = 3 <sup>rd</sup> Overtone mode crystal
							<b>Frequency Stability</b> <b>45</b> = ± 50 ppm <b>44</b> = ± 25 ppm <b>20</b> = ± 20 ppm
							<b>Series Model</b>

**Marking Legend:**



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

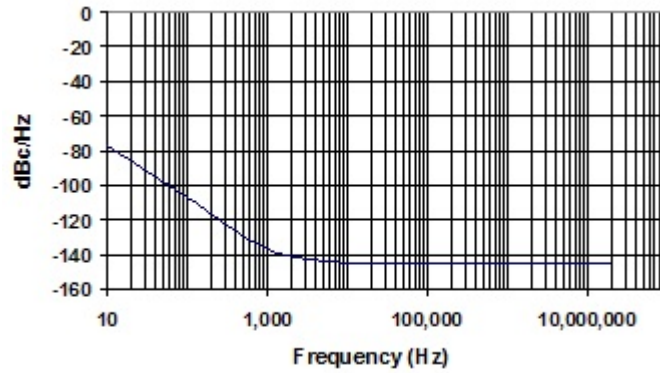
Code	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	G
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Code	H	J	K	L	M	N	P	R	T	U	V	W	X	Y	Z	
Day	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	

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

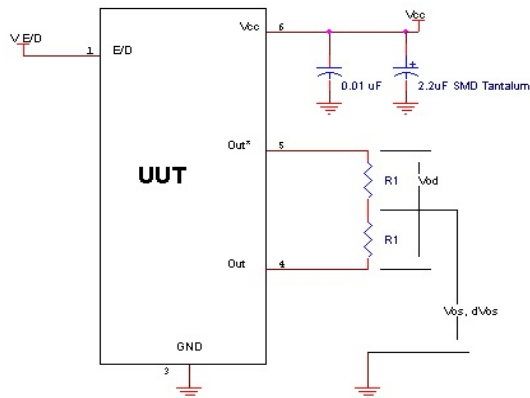
Item	Min	Typ	Max	Unit	Condition	
Frequency Range	13	-	110	MHz	For "F" series devices	
	35	-	220	MHz	For "G" series devices	
Frequency Accuracy "45"	-50	-	+50	ppm	For all supply voltages, load changes, aging for 1 year, shock, vibration and temperatures	
"44"	-25	-	+25			
"20"	-20	-	+20			
Supply Voltage Sensitivity	-2	-	2	ppm	For $V_{CC}$ change of $\pm 10\%$	
Output Waveform	LVDS					
Output High Level ( $V_{OH}$ )	-	1.43	1.60	volts	See load circuit	
Output Low Level ( $V_{OL}$ )	0.90	1.10	-	volts	See load circuit	
Output Offset Voltage	1.125	-	1.375	volts		
Output Symmetry	45	-	55	%	output crossing point	$\leq 200$ MHz
	40	-	60	%	output crossing point	$> 200$ MHz
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 16	20 27	mA	$< 80$ MHz $\geq 80$ MHz	"F" series devices
	-	12	20	mA	$< 90$ MHz	"G" series devices
	-	16	27		$\geq 90$ MHz to $> 125$ MHz	
	-	20	34		$\geq 125$ MHz to $> 160$ MHz	
-	24	40		$\geq 160$ MHz		
Disable current	-	-10	-	$\mu$ A	Pad 1 = 0.0 volts	
V disable	-	-	30	% $V_{CC}$	Referenced to pad 3	
V enable	70	-	-	% $V_{CC}$	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	

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

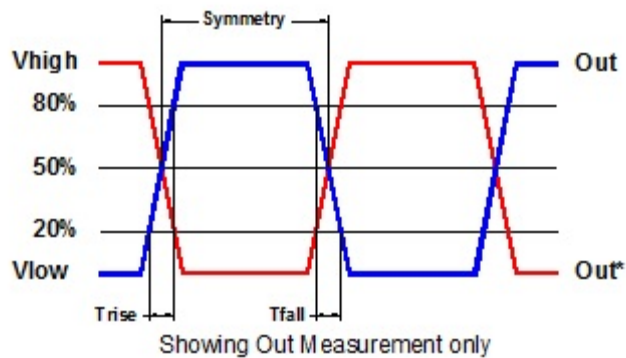
## Typical Phase-Noise Response



## 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

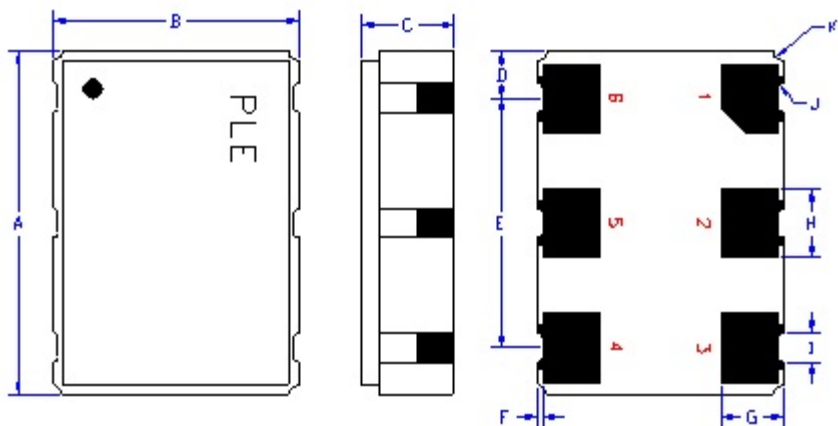
Label is 1" x 2.6" (25.4mm x 66.7mm)  
Font is Arial

<b>P/N:</b>  LV7745FEW-75.0M	
<b>Customer P/N:</b>  12345678	
<b>Qty:</b>  1000	<b>D/C</b>  0AN
MSL: 1	

<b>RoHS Compliant</b> 2nd LvL Interconnect Category=e4 Max Safe Temp=260C for 10s 2X Max
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<b>P/N:</b>  LV7745GEW-125.0M	
<b>Customer P/N:</b>  12345678	
<b>Qty:</b>  1000	<b>D/C</b>  0AN
MSL: 1	

## 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

<sup>1</sup> Typical dimensions

Not to Scale

## Contacts (pads) :

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)

Pad	Function	Note
1	Output Enable/Disable	When this pad is not connected the oscillator shall operate. When this pad is <30% of $V_{CC}$ , 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	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 ( $V_{CC}$ )	Recommend connecting appropriate power supply bypass capacitors as close as possible.



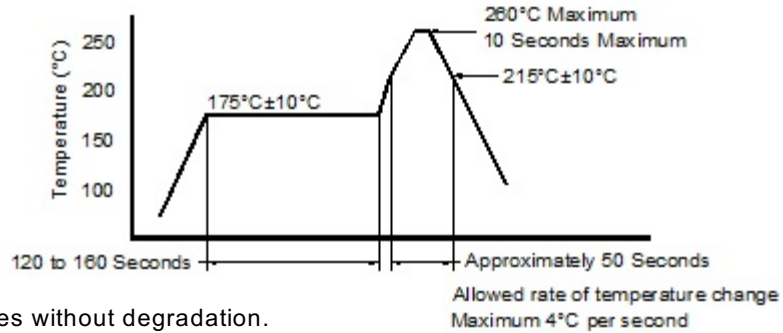
## Layout and application information

Recommend connecting Pad 1 and Pad 2 together to permit the design to accept Enable/Disable 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.

## Reflow Cycle (typical for lead free processing)



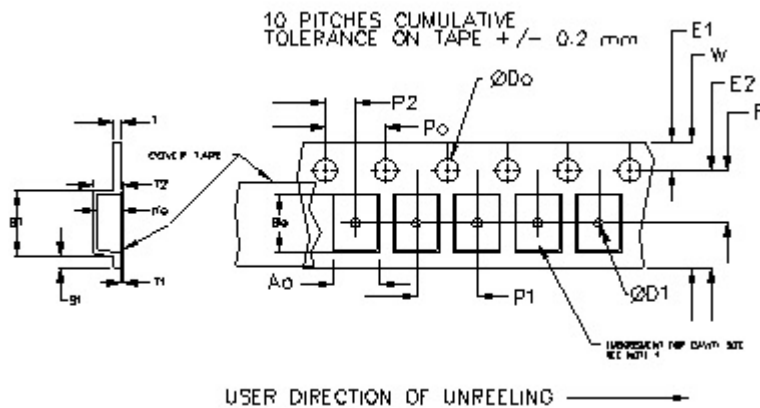
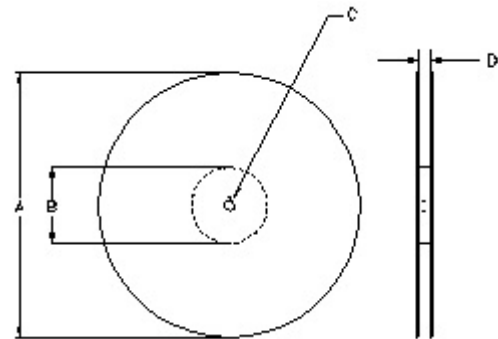
The part may be reflowed 3 times without degradation.

## 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	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			1.5			
24mm		1.5			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	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	

Reel dimensions may vary from the above

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- Подбор аналогов;
- Консультации по применению компонента;
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- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



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