

LV77F / LV77G Series 2.5 V LVDS Clock Oscillators

November 2018

Lead Free

- 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 3rd 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 _{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
Junction Temperature (T _j)	-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	
							Packaging code or blank T250 = 250 per Tape and Reel T500 = 500 per Tape and Reel T1K = 1000 per Tape and Reel
							Frequency in MHz
							Supply Voltage V_{CC} W = 2.5V ± 10%
							Optional Enhanced OTR Blank = Temp. range -10 to +70°C C = Temp. range -20 to +70°C E = Temp. range -40 to +85°C
							Series Model F = Fundamental mode crystal G = 3 rd Overtone mode crystal
							Frequency Stability 45 = ± 50 ppm 44 = ± 25 ppm 20 = ± 20 ppm
							Series Model

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

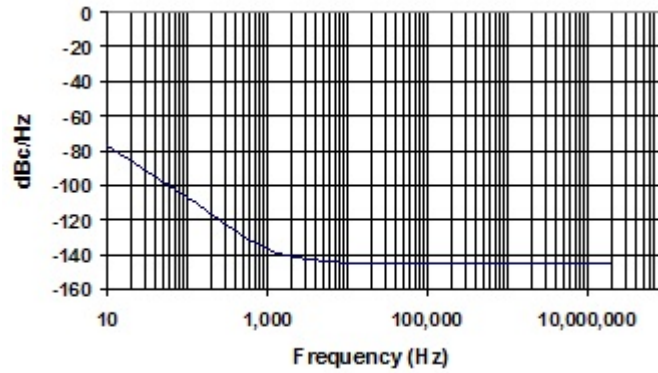
Code	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	G
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Code	H	J	K	L	M	N	P	R	T	U	V	W	X	Y	Z	
Day	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	

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

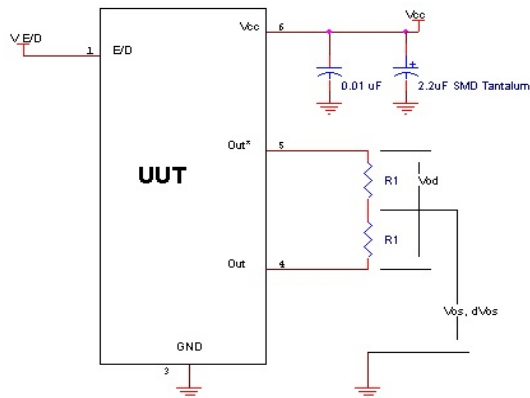
Item	Min	Typ	Max	Unit	Condition	
Frequency Range	13	-	110	MHz	For "F" series devices	
	35	-	220	MHz	For "G" series devices	
Frequency Accuracy "45"	-50	-	+50	ppm	For all supply voltages, load changes, aging for 1 year, shock, vibration and temperatures	
"44"	-25	-	+25			
"20"	-20	-	+20			
Supply Voltage 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	≤ 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 ≥ 80 MHz	"F" series devices
	-	12	20	mA	< 90 MHz	"G" series devices
	-	16	27		≥ 90 MHz to > 125 MHz	
	-	20	34		≥ 125 MHz to > 160 MHz	
-	24	40		≥ 160 MHz		
Disable current	-	-10	-	μ 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	μ A	Pad 1 low, device disabled	
	$V_{OUT} = 0V$	-10	+10	μ 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	μ A	Pad 1 low, device disabled	

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

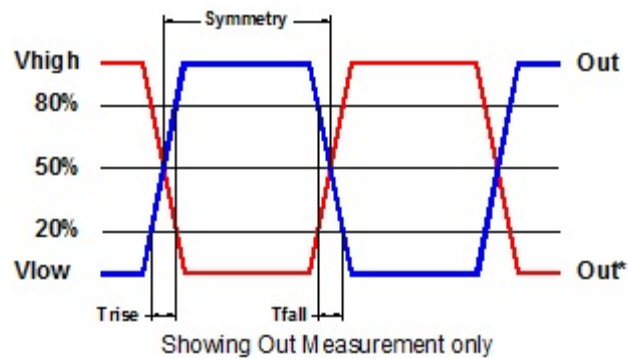
Typical Phase-Noise Response



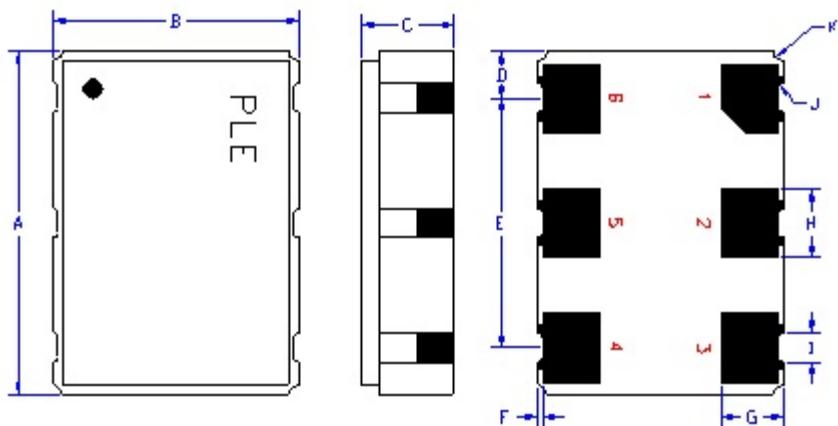
Load Circuit



Test Waveform



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 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

¹ Typical dimensions

Not to Scale

Contacts (pads) :

Gold 11.8 to 39.4 μ mches (0.3 to 1.0 μ m) over Nickel 50 to 350 μ mches (1.27 to 8.89 μ 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.



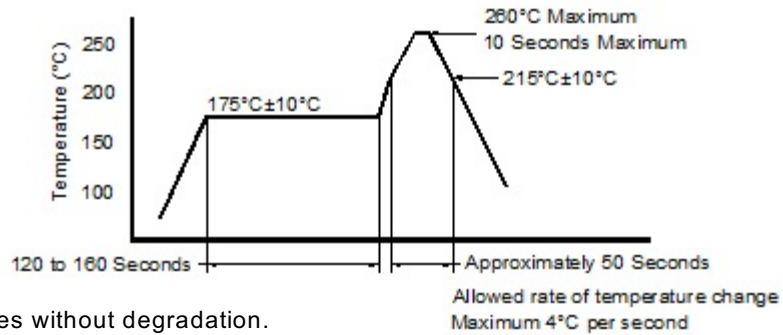
Layout and application information

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)



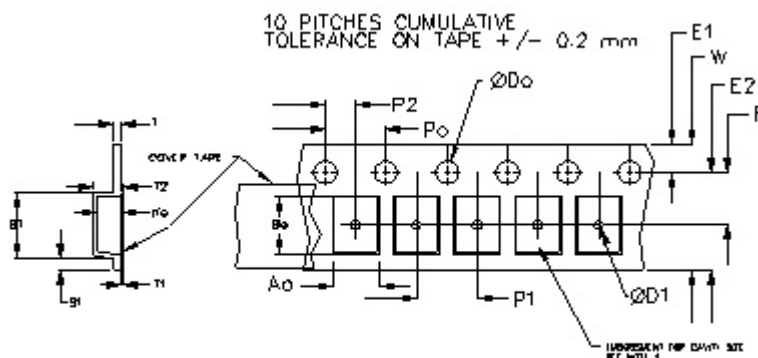
The part may be reflowed 3 times without degradation.

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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Contacting Pletronics Inc.

Pletronics Inc.
19013 36th Ave. West
Lynnwood, WA 98036-5761 USA

Tel: 425-776-1880
Fax: 425-776-2760
E-mail: ple-sales@pletronics.com
URL: www.pletronics.com

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Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)

Факс: 8 (812) 320-02-42

Электронная почта: org@eplast1.ru

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.