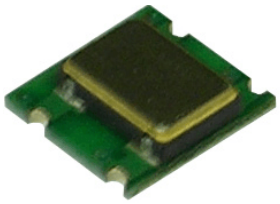
PLETRONICS
www.pletronics.com 425-776-1880



SM76D Series 5.0 V
CMOS Clock Oscillators

March 2008

Lead Free

- Pletronics' SM76D Series is a quartz crystal controlled precision square wave generator with a CMOS output. Made from SM77D device.
- The SM76D series will directly interface TTL devices also.
- S-Pkg is Solder pad compatible with the Epson SG615 and SG8002J and many other 9x14mm plastic J lead packages.
- FR4 base with an SM77D series oscillator.
- Capable of driving up to 30pF capacitive loads
- Tape and Reel or cut tape packaging available.
- 70 to 107 MHz
- 9.04mm x 8.23mm package
- Enable/Disable Function
- Disable function includes low standby power mode
- 3rd Overtone Crystals used
- Improved circuit to minimize oscillator issues such as multi-mode output signal.
- Low Jitter
- Has internal bypass capacitor on the Vcc lead
- Package changed in 2008

Pletronics Inc. certifies this device is in accordance with the RoHS 6/6 (2002/95/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: 0.4 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 +7.0V
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 155ºC
The thermal resistance junction to board is 60 to 100ºC/Watt depending on the solder pads, ground plane and construction of the PCB.

Product information is current as of publication date. The product conforms to specifications per the terms of the Pletronics standard warranty. Production processsing does not necessarily include testing of all parameters.

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SM76D Series 5.0 V
CMOS Clock Oscillators

March 2008

Part Number:

SM76	45	D	E	Y*	-80.0M	-XX

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

-80.0M — **Frequency in MHz**

Y* — **Supply Voltage V_{cc}**
Y = 5.0V ± 10%
(*Y is only included in P/N if enhanced OTR is not chosen)
Examples: SM7745DE, SM7744DY, SM7720DE

E — **Optional Enhanced OTR**
Blank = Temp. range -10 to +70°C
E = Temp. range -40 to +85°C

D — **Series Model**

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

SM76 — **Series Model**

Part Marking:

PLE
SM76
***FF.FFF* M**
• ***YMDXX***

or

PLE SM77
***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

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	1	2
Year	2006	2007	2008	2009	2010	2011	2012

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

Legacy Part Numbers:

'S' Denoted Symmetry of 45%/55% at 50% of V_{CC}. This is now the standard Duty Cycle and is no longer needed in the part number. We will still support part numbers with the 'S'. For example SM7645DY and SM7645DS describe the same specifications and can be used interchangeably by the customer.

-30 Denoted Output Load other than the standard 15 pF. Data sheets now reflect the specifications at all available loads so this load designation is no longer needed. We'll still support part numbers with this load designation.

Electrical Specification for 5.00V ±10% over the specified temperature range

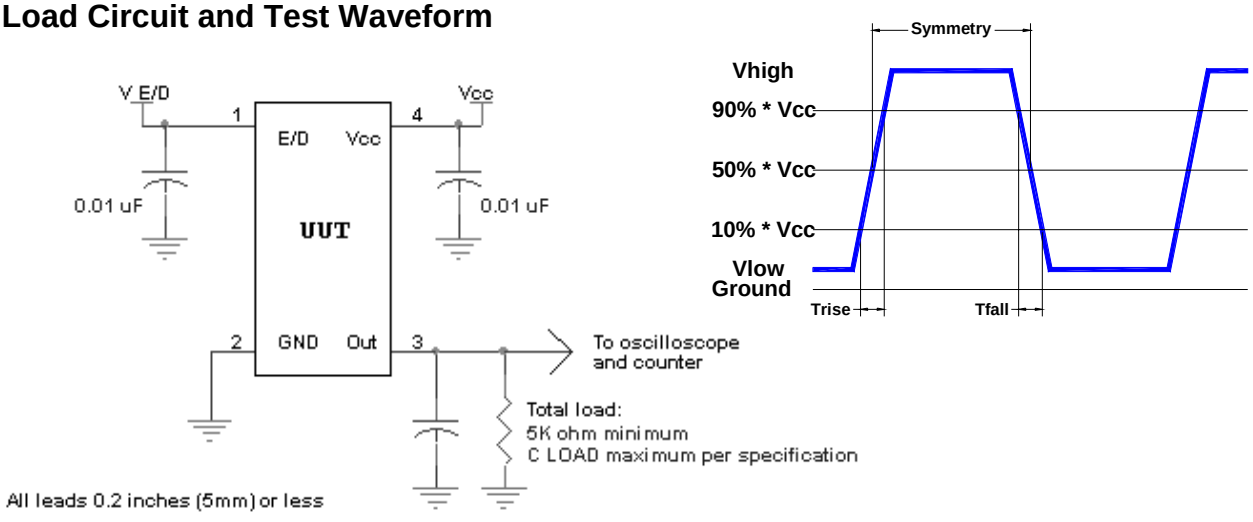
Item	Min	Max	Unit	Condition
Frequency Range	70	107	MHz	
Frequency Accuracy "45"	-50	+50	ppm	For all supply voltages, load changes, aging for 1 year, shock, vibration and temperatures
"44"	-25	+25		
"20"	-20	+20		
Output Waveform	CMOS			
Output High Level	0.5	-	V	Below V_{CC} (See load circuit)
Output Low Level	-	0.4	V	(See load circuit)
Output Symmetry	45	55	%	at 50% point of V_{CC} (See load circuit)
Jitter	-	1	pS RMS	12 KHz to 20 MHz from the output frequency
	-	4	pS RMS	10 Hz to 1 MHz from the output frequency
Enable/Disable Internal Pull-up	50	-	Kohm	to V_{CC}
V disable	-	0.5	V	Applied to pad 1
V enable	2.0	-	V	Applied to pad 1
Output leakage $V_{OUT} = V_{CC}$	-10	+10	uA	Pad 1 low, device disabled
$V_{OUT} = 0V$	-10	+10	uA	
Enable time	-	100	nS	Time for output to reach a logic state
Disable time	-	100	nS	Time for output to reach a high Z state
Start up time	-	10	mS	Time for output to reach specified frequency
Operating Temperature Range	-10	+70	°C	Standard Temperature Range
	-40	+85	°C	Extended Temperature Range "E" Option
Storage Temperature Range	-55	+125	°C	

Electrical Specification for 5.00V ±10% over the specified temperature range

Item	Min	Typ	Max	Unit	Condition	
V_{OUT} High (V_{OH})	0.5	0.3	-	V	Below V_{CC}, I_{OH} = +16 mA	
V_{OUT} Low (V_{OL})	-	0.3	0.4	V	I_{OL} = -16 mA	
Output T_{RISE} and T_{FALL}	-	2.0	4.0	nS	C_{LOAD} = 15 pF,	
	-	3.0	6.0	nS	C_{LOAD} =30 pF,	
V_{CC} Supply Current (I_{CC})	-	50	90	mA	>100 MHz	C_{LOAD} = 15 pF 10% to 90% of V_{CC} (See load circuit)
	-	45	80	mA	<=100 MHz	
	-	60	100	mA	>100 MHz	C_{LOAD} = 30 pF 10% to 90% of V_{CC} (See load circuit)
	-	50	100	mA	<=100 MHz	

Specifications with Pad 1 E/D open circuit

Load Circuit and 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

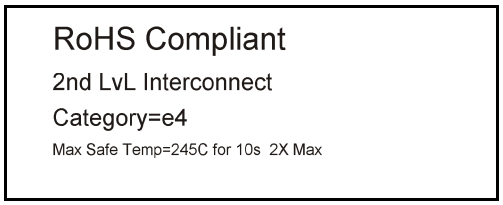
Model	Minimum Voltage	Conditions
Human Body Model	1500	MIL-STD-883 Method 3115
Charged Device Model	1000	JESD 22-C101

Package Labeling

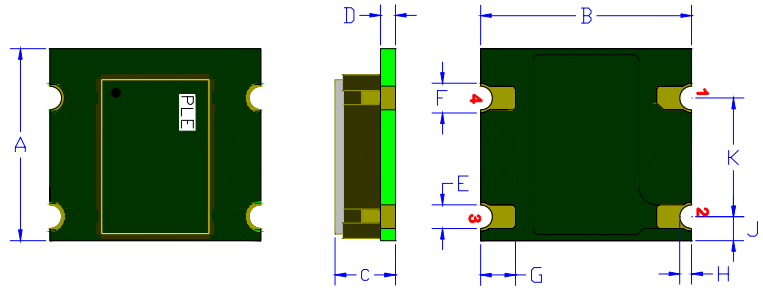
Label is 1" x 2.6" (25.4mm x 66.7mm)
Font is Courier New
Bar code is 39-Full ASCII



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



Mechanical:



	Inches	mm
A	0.324 ±0.003	8.23 ±0.07
B	0.356 ±0.005	9.04 ±0.13
C	0.135 ±0.005	3.43 ±0.13
D[1]	0.062	1.57
E[1]	0.050	1.27
F[1]	0.050	1.27
G[1]	0.059	1.50
H[1]	0.020	0.51
J[1]	0.040	1.02
K[1]	0.200	5.08

Label:
Laser marked on the ceramic package metal cover

FR4 PCB Base:
Solder masked
All via holes tented on bottom
Copper Clad ½ oz. Typical
Gold plated 0.02 µinch (0.5 µm)

Pin 3 Ground plane is typical

Not to scale
[1] Typical dimension

Pad	Function	Note
1	Output Enable/Disable	When this pad is not connected the oscillator shall operate. When this pad is logic low the output will be inhibited (high impedance state.) Recommend connecting this pad to V_{CC} if the oscillator is to be always on.
2	Ground (GND)	
3	Output	
4	Supply Voltage (V_{CC})	Recommend connecting appropriate power supply bypass capacitors as close as possible.

Layout and application information

Lead Free

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.

Mechanical (obsolete version):

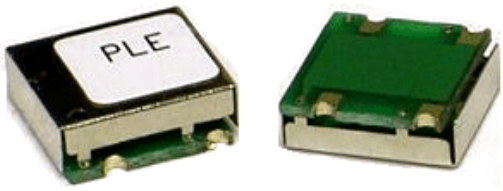
The cover is no longer being supplied over this part. This part is made with a hermetically sealed SM77D series oscillator. This part is now exposed.

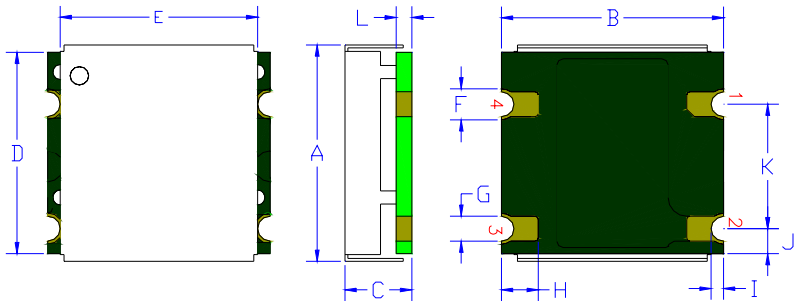
The cover has been deleted as it was causing problems with the newer high temperature RoHS lead free processes. The cover purpose was only cosmetic.

All parts ordered in 2008 will be made in the new fashion.

There is no change in electrical properties.

Pletronics does recommend that all designs should transition to the SM77D ceramic part. This is the base part of the SM76D.





Cover:
Centered on the base
304 Stainless Steel
0.010 inch (0.25µm)
Electroless Nickel Plated
1 µinch (25 µm) typical

Label:
White Kapton with Black Letters
–or--
Laser marked lettering

FR4 PCB Base:
Solder masked
All via holes tented on bottom
Copper Clad ½ oz. Typical
Gold plated 0.02 µinch (0.5 µm)

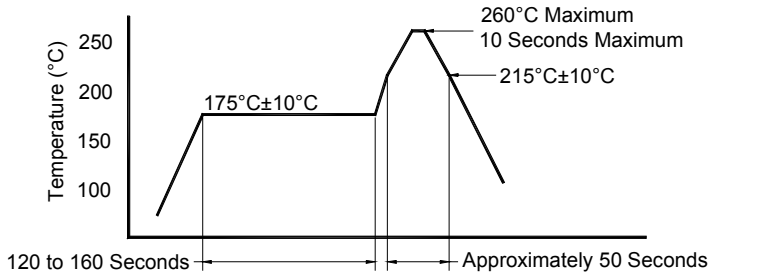
Pin 3 Ground plane is typical

Not to scale
[1] Typical dimension

	Inches	mm
A	0.351 ±0.003	8.91 ±0.07
B	0.356 ±0.005	9.04 ±0.13
C	0.103 ±0.005	2.62 ±0.13
D[1]	0.324	8.23
E[1]	0.316	8.03
F[1]	0.050	1.27
G[1]	0.040	1.02
H[1]	0.059	1.50
I[1]	0.020	0.51
J[1]	0.040	1.02
K[1]	0.200	5.08
L[1]	0.026 typical	0.66

- The package is not hermetically sealed.
- The sides are intentionally left open to permit cleaning material to freely flow in the package, thus minimizing the accumulation of contaminants during cleaning processes.
- The internal part of the package must be thoroughly dry before operating.

Reflow Cycle (typical for lead free processing)



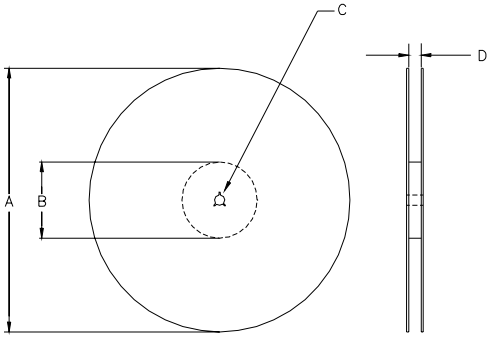
The part may be reflowed 2 times without degradation.

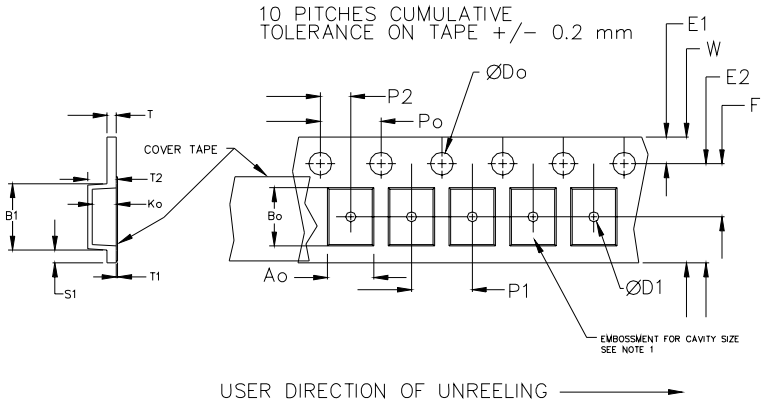
Tape and Reel: available for quantities of 250 to 1000 per reel, cut tape for < 250

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
24 mm	9.88	22.25	11.5 ±0.1	16.0 ±0.1	3.22	24.3	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	---	---	24.4 +2.0 -0.0	24.0

Reel dimensions may vary from the above

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