



## SQ33D Series 2.5 V CMOS Clock Oscillators

January 2006

**Lead Free** 

- Pletronics' SQ33D Series is a quartz crystal controlled precision square wave generator with a CMOS output.
- The SQ33D series will directly interface TTL devices also.
- Greatly reduces RFI and EMI system sensitivity
- Minimizes RFI radiation, eases meeting FCC Class B emissions standards.
- Capable of driving up to 30pF capacitive loads
- Tube packaging is available.
- 70 to 135 MHz
- Half Size Thru-Hole DIP package
- Enable/Disable Function
- Disable function includes low standby power mode
- 3<sup>rd</sup> 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
- 5x7 mm LCC ceramic oscillator inside

**Pletronics Inc. certifies this device is in accordance with the  
RoHS (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: 2.0 grams

Moisture Sensitivity Level: 1 As defined in J-STD-020C

Second Level Interconnect code: e1 or e2

### Absolute Maximum Ratings:

Parameter	Unit
V <sub>CC</sub> Supply Voltage	-0.5V to +7.0V
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

### Thermal Characteristics

The maximum die or junction temperature is 155°C

The thermal resistance junction to board is 110°C/Watt depending on the solder pads, ground plane and construction of the PCB.

### Part Number:

SQ33	45	D	ES	W	-85.0M	-30	-XX	Marking
Internal code or blank								
<b>Output Load Capacitance</b> <b>Blank</b> = 15pF maximum <b>30</b> = 30pF maximum - <100 MHz only								none
Frequency in MHz								fff.fff M
<b>Supply Voltage V<sub>CC</sub></b> <b>W</b> = 2.5V ± 10%								W, B, C or D
<b>Enhanced Specifications</b> (apply in the order shown) <b>E</b> = Temperature range -40 to 85°C <b>S</b> = Symmetry 45%/55% at 50% of V <sub>CC</sub>								E S
Series Model								
<b>Frequency Stability</b> <b>45</b> = ± 50 ppm <b>44</b> = ± 25 ppm <b>20</b> = ± 20 ppm								5 4 2
Series Model								SQ3

### Part Marking:

PLE  
SQ3xsss  
fff.fff M  
yywwaLF

Where: x = Frequency stability  
 sss = Enhanced specification and voltage  
 fff.fff = Frequency in MHz  
 yywwa = Date code  
 LF = Lead Free

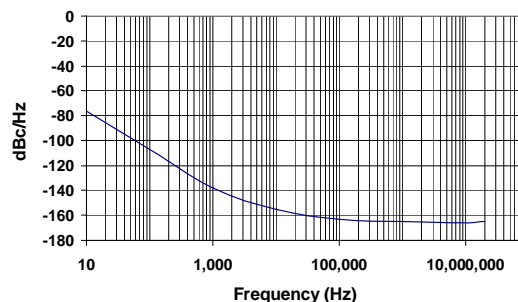
Pletronics may ship the following combinations without notice (this is an enhanced specified device)  
 44 (25 ppm) stability parts when 45 (50 ppm) was ordered  
 20 (20 ppm) stability parts when 45 (50 ppm) or 44 (25 ppm) was ordered.  
 E temperature range parts when extended was not ordered.  
 S symmetry parts when 40/60% symmetry was ordered.

Pletronics may ship parts that are not marked for extended temperature range but were tested for extended temperature range, a Certificate of Conformance will accompany these parts.

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

Item	Min	Max	Unit	Condition
Frequency Range	70	135	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	90	-	%	of $V_{CC}$ (See load circuit)
Output Low Level	-	10	%	of $V_{CC}$ (See load circuit)
Output Symmetry	40	60	%	at 50% point of $V_{CC}$ (See load circuit) Standard
	45	55	%	for "S" option parts
Jitter	-	0.6	pS RMS	12 KHz to 20 MHz from the output frequency
	-	2.5	pS RMS	10 Hz to 1 MHz from the output frequency
Enable/Disable Internal Pull-up	50	-	Kohm	to $V_{CC}$
V disable	-	30	%	of $V_{CC}$ applied to pad 1
V enable	70	-	%	of $V_{CC}$ applied to pad 1
Output leakage $V_{OUT} = V_{CC}$	-10	+10	uA	Pad 1 low, device disabled
	$V_{OUT} = 0V$	-10	+10	
Standby Current $I_{CC}$	-	3	uA	Pad 1 low, device disabled
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	0	+70	°C	Standard Temperature Range
	-40	+85	°C	Extended Temperature Range "E" Option
Storage Temperature Range	-55	+125	°C	

Typical phase-noise characteristics at 106.25MHz

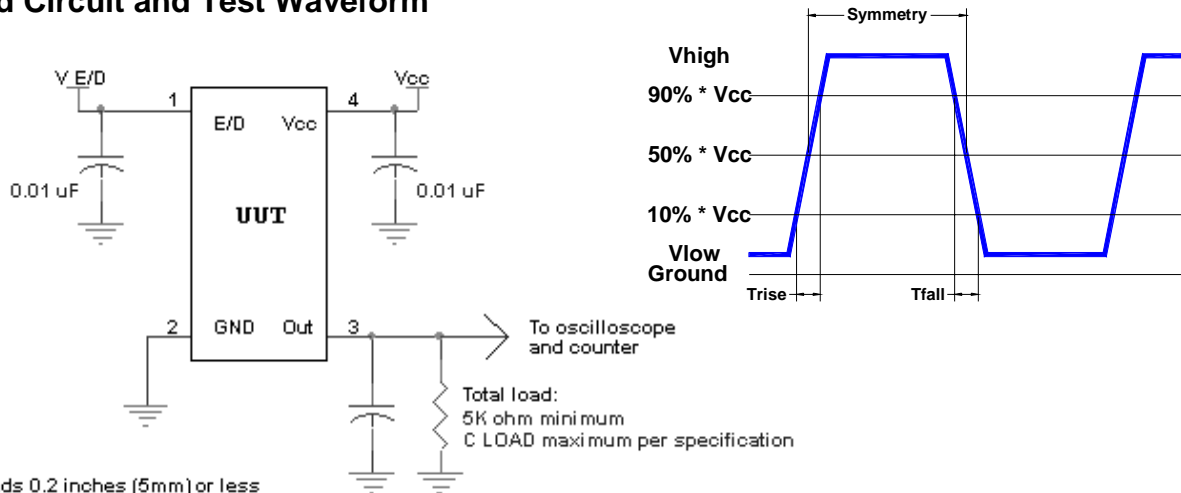


## Electrical Specification for 2.50V $\pm 10\%$ over the specified temperature range

Item	Min	Typ	Max	Unit	Condition	
$V_{OUT}$ High ( $V_{OH}$ )	2.5	2.7	-	V	$V_{CC} = 2.97V$ , $I_{OH} = +8$ mA	
$V_{OUT}$ Low ( $V_{OL}$ )	-	0.3	0.4	V	$V_{CC} = 2.97V$ , $I_{OL} = -8$ mA	
Output $T_{RISE}$ and $T_{FALL}$	-	1.0	3.0	nS	>110 MHz	$C_{LOAD} = 15$ pF 10% to 90% of $V_{CC}$ See Load Circuit
	-	1.0	3.0	nS	>80 MHz and $\leq 110$ MHz	
	-	2.0	4.0	nS	$\leq 80$ MHz	
	-	2.5	4.0	nS	>110 MHz	$C_{LOAD} = 30$ pF 10% to 90% of $V_{CC}$ See Load Circuit
	-	2.5	4.0	nS	>80 MHz and $\leq 110$ MHz	
	-	3.5	6.0	nS	$\leq 80$ MHz	
$V_{CC}$ Supply Current ( $I_{CC}$ )	-	25	60	mA	>110 MHz	$C_{LOAD} = 15$ pF
	-	20	50	mA	>80 MHz and $\leq 110$ MHz	
	-	15	40	mA	$\leq 80$ MHz	
	-	38	70	mA	>110 MHz	$C_{LOAD} = 30$ pF
	-	31	60	mA	>80 MHz and $\leq 110$ MHz	
	-	20	45	mA	$\leq 80$ 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 A
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

P/N:		
	SQ3344DW-100.0M	
Customer P/N:		
	12345678	
Qty:		D/C 
	1000	0502A6

<p><b>Pb Free</b></p> <p>2nd LvL Interconnect Category=e1</p> <p>Max Safe Temp=280C for 15s (Wave solder only) Max Safe Temp=245C for 10s (Reflow only)</p>
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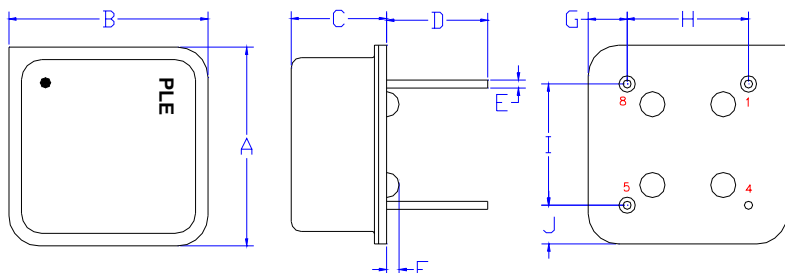
<p><b>Pb Free</b></p> <p>2nd LvL Interconnect Category=e2</p> <p>Max Safe Temp=280C for 15s (Wave solder only) Max Safe Temp=245C for 10s (Reflow only)</p>
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## PCB Mounting (typical for lead free processing)

Hand soldering is recommended.

Wave solder at 255°C to 280°C with maximum wave exposure of 15 seconds  
Reflow solder maximum exposure of 245°C for 15 seconds  
Soldering done in a nitrogen atmosphere enhances the solder joint quality.

## Mechanical:



Cover:  
Kovar  
Electroless Nickel Plated  
1  $\mu$ inch (25  $\mu$ m) typical  
Resistance welded to base

Base:  
Kovar  
Glass to metal sealed leads

Pin 4 Connected to case

Label:  
White Kapton with Black Letters  
–or–  
Blue Epoxy heat cure ink with laser  
marked lettering

**Not to scale**

	Inches	mm
A	0.487 $\pm$ 0.005	12.37 $\pm$ 0.13
B	0.487 $\pm$ 0.005	12.37 $\pm$ 0.13
C	0.225 $\pm$ 0.011	5.72 $\pm$ 0.28
D <sup>1</sup>	0.250	6.35
E <sup>1</sup>	0.020	0.51
F <sup>1</sup>	0.031	0.79
G <sup>1</sup>	0.094	2.37
H <sup>1</sup>	0.300	7.62
I <sup>1</sup>	0.200	7.62
J <sup>1</sup>	0.094	2.37

<sup>1</sup> Nominal 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 <sub>CC</sub> if the oscillator is to be always on.
4	Ground (GND)	
5	Output	
8	Supply Voltage (V <sub>CC</sub> )	Recommend connecting appropriate power supply bypass capacitors as close as possible.

## Layout and application information



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.



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January 2006

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## IMPORTANT NOTICE

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