



## SQ33D Series 3.3 V CMOS Clock Oscillators

January 2006



- 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 50pF capacitive loads
- Tube packaging is available.
- 70 to 180 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	V	-125.0M	-30	-XX	Marking
Internal code or blank								
<b>Output Load Capacitance</b> <b>Blank</b> = 15pF maximum <b>30</b> = 30pF maximum - <160 MHz only <b>50</b> = 50pF maximum - <120 MHz only								none
Frequency in MHz								fff.fff M
<b>Supply Voltage V<sub>CC</sub></b> <b>V</b> = 3.3V ± 10%								V, B 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)

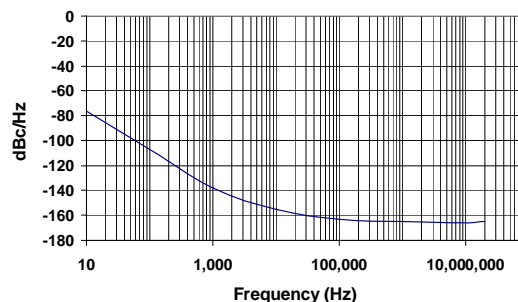
- 44 (25 ppm) stability parts when 45 (50 ppm) was ordered
- 20 (20 ppm) stability parts when 45 (50 ppm) or 44 (25 ppm) was ordered.
- E temperature range parts when extended was not ordered.
- S symmetry parts when 40/60% symmetry was ordered.

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 3.30V $\pm 10\%$ over the specified temperature range

Item	Min	Max	Unit	Condition
Frequency Range	70	180	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 for "S" option parts
	45	55	%	
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 3.30V $\pm 10\%$ over the specified temperature range

Item	Min	Typ	Max	Unit	Condition	
V <sub>OUT</sub> High (V <sub>OH</sub> )	2.5	2.7	-	V	V <sub>CC</sub> = 2.97V, I <sub>OH</sub> = +8 mA	
V <sub>OUT</sub> Low (V <sub>OL</sub> )	-	0.3	0.4	V	V <sub>CC</sub> = 2.97V, I <sub>OL</sub> = -8 mA	
Output T <sub>RISE</sub> and T <sub>FALL</sub>	-	0.8	1.5	nS	>130 MHz	C <sub>LOAD</sub> = 15 pF 10% to 90% of V <sub>CC</sub> See Load Circuit
	-	1.0	2.0	nS	>110 MHz and <=130 MHz	
	-	1.2	2.5	nS	>80 MHz and <=110 MHz	
	-	2.0	3.0	nS	<=80 MHz	
	-	1.2	2.0	nS	>130 MHz	C <sub>LOAD</sub> = 30 pF 10% to 90% of V <sub>CC</sub> See Load Circuit
	-	1.3	2.5	nS	>110 MHz and <=130 MHz	
	-	1.4	3.0	nS	>80 MHz and <=110 MHz	
	-	2.0	4.0	nS	<=80 MHz	
	-	2.1	3.5	nS	>110 MHz and <=130 MHz	C <sub>LOAD</sub> = 50 pF 10% to 90% of V <sub>CC</sub> See Load Circuit
	-	2.1	4.5	nS	>80 MHz and <=110 MHz	
	-	3.0	5.0	nS	<=80 MHz	
	-	3.0	5.0	nS	<=80 MHz	
V <sub>CC</sub> Supply Current (I <sub>CC</sub> )	-	30	70	mA	>130 MHz	C <sub>LOAD</sub> = 15 pF
	-	25	60	mA	>110 MHz and <=130 MHz	
	-	20	50	mA	>80 MHz and <=110 MHz	
	-	18	40	mA	<=80 MHz	
	-	40	90	mA	>130 MHz	C <sub>LOAD</sub> = 30 pF
	-	32	70	mA	>110 MHz and <=130 MHz	
	-	26	57	mA	>80 MHz and <=110 MHz	
	-	22	45	mA	<=80 MHz	
	-	44	80	mA	>110 MHz and <=130 MHz	C <sub>LOAD</sub> = 50 pF
	-	34	65	mA	>80 MHz and <=110 MHz	
	-	29	50	mA	<=80 MHz	
	-	29	50	mA	<=80 MHz	

Specifications with Pad 1 E/D open circuit

### PCB Mounting (typical for lead free processing)

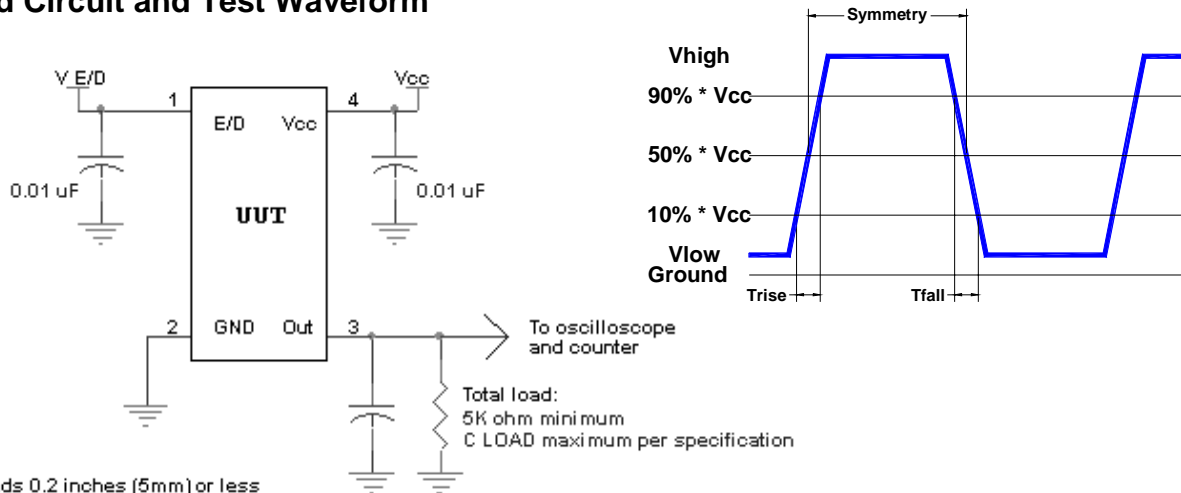
**Hand soldering is recommended.**

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.

## Load Circuit and Test Waveform



All leads 0.2 inches (5mm) or less

## 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

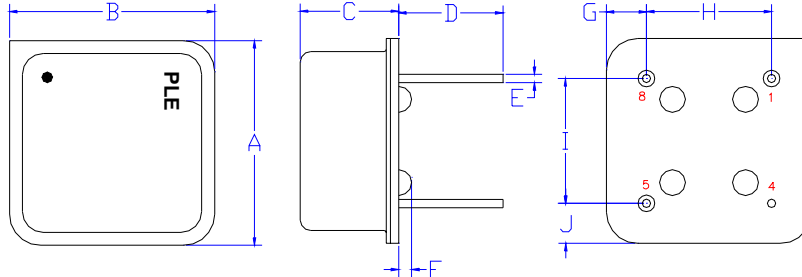
Label is 1" x 2.6" (25.4mm x 66.7mm)  
 Font is Arial

P/N:		
	SQ3345DV-125.0M	
Customer P/N:		
	12345678	
Qty:		D/C
	1000	0502A6

<b>Pb Free</b>
2nd Lvl Interconnect Catagory=e1
Max Safe Temp=280C for 15s (Wave solder only) Max Safe Temp=245C for 10s (Reflow only)

<b>Pb Free</b>
2nd Lvl Interconnect Catagory=e2
Max Safe Temp=280C for 15s (Wave solder only) Max Safe Temp=245C for 10s (Reflow only)

## Mechanical:



**Cover:**  
Kovar  
Electroless Nickel Plated  
1 μinch (25 μm) 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 ±0.005	12.37 ±0.13
B	0.487 ±0.005	12.37 ±0.13
C	0.225 ±0.011	5.72 ±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.

## IMPORTANT NOTICE

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