



# SQ33D Series 1.8 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 15pF capacitive loads
- Tube packaging is available.
- 70 to 165 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 +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

## 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	X	- 85.0M	-XX		Marking	
								Internal code or blank	
								<b>Output Load Capacitance</b> Blank = 15pF maximum	none
								<b>Frequency in MHz</b>	fff.fff M
								<b>Supply Voltage V<sub>CC</sub></b> X = 1.8V ± 5%	X, C or D
								<b>Enhanced Specifications</b> (apply in the order shown) E = Temperature range -40 to 85°C S = Symmetry 45%/55% at 50% of V <sub>CC</sub>	E S
								<b>Series Model</b>	
								<b>Frequency Stability</b> 45 = ± 50 ppm 44 = ± 25 ppm 20 = ± 20 ppm	5 4 2
								<b>Series Model</b>	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

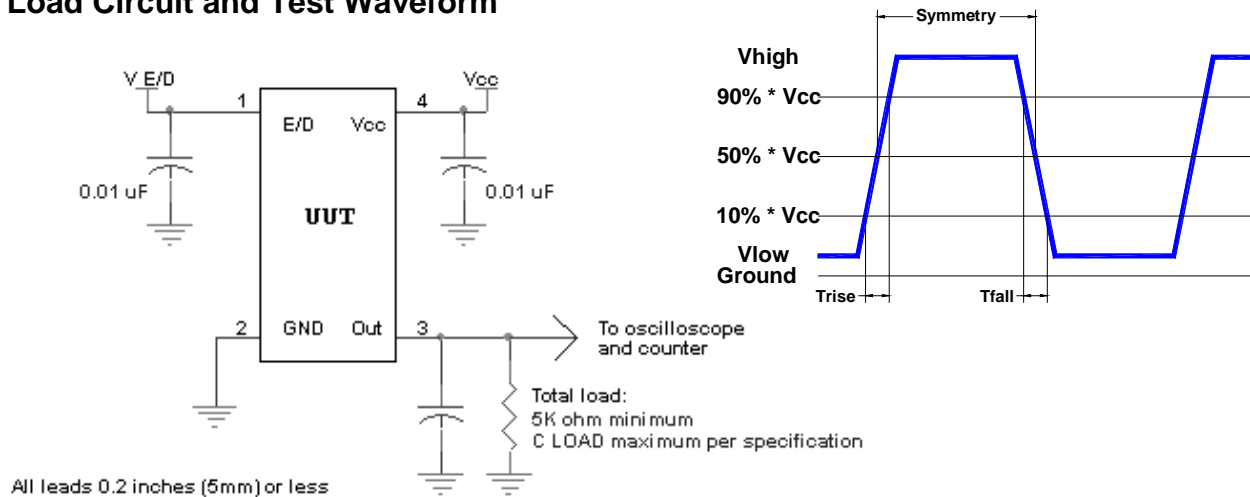
Item	Min	Max	Unit	Condition
Frequency Range	70	165	MHz	
Frequency Accuracy "45"	-50	+50	ppm	For all supply voltages, load changes, aging for 1 year, shock, vibration and temperatures
"44"	-25	+25		
"20"	-20	+20		
Output Waveform	CMOS			
Output High Level	0.4	-	V	Below $V_{CC}$ (See load circuit)
Output Low Level	-	0.4	V	(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	30	-	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	$\mu$ A	Pad 1 low, device disabled
	$V_{OUT} = 0V$	-10	+10	
Standby Current $I_{CC}$	-	10	$\mu$ A	Pad 1 low, device disabled
Enable time	-	2	mS	Time for output to resume operation
Disable time	-	200	nS	Time for output to reach a high Z state
Start up time	-	5	mS	Time for output to reach specified frequency
Operating Temperature Range	0	+70	$^{\circ}$ C	Standard Temperature Range
	- 40	+85	$^{\circ}$ C	Extended Temperature Range "E" Option
Storage Temperature Range	- 55	+125	$^{\circ}$ C	

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

Item	Min	Typ	Max	Unit	Condition	
$V_{OUT}$ High ( $V_{OH}$ )	0.4	0.3	-	V	Below $V_{CC}$ , $I_{OH} = +8$ mA	
$V_{OUT}$ Low ( $V_{OL}$ )	-	0.3	0.4	V	$I_{OL} = -8$ mA	
Output $T_{RISE}$ and $T_{FALL}$	-	1.5	2.5	nS	$C_{LOAD} = 15$ pF 20% to 80% of $V_{CC}$ (See load circuit)	
$V_{CC}$ Supply Current ( $I_{CC}$ )	-	21	33	mA	>125 MHz	$C_{LOAD} = 15$ pF 20% to 80% of $V_{CC}$ (See load circuit)
	-	17	27	mA	>95 MHz and $\leq 125$ MHz	
	-	11	19	mA	$\leq 95$ 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:		
	SQ3345DX-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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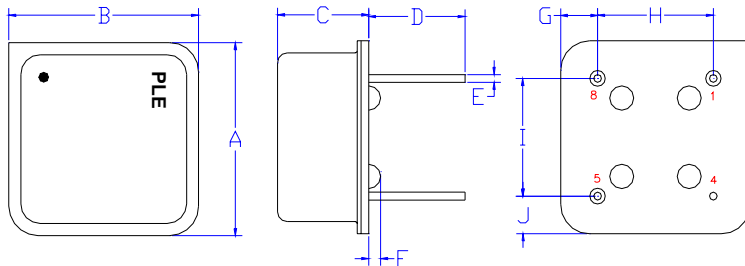
<p><b>Pb Free</b></p> <p>2nd LvL Interconnect Category=e2</p> <p>Max Safe Temp=280C for 15s (Wave solder only) Max Safe Temp=245C for 10s (Reflow only)</p>
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## PCB Mounting (typical for lead free processing)

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 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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### Contacting Pletronics Inc.

Pletronics Inc.  
19013 36<sup>th</sup> Ave. W, Suite H  
Lynnwood, Washington 98036-5761 USA  
Tel: 425-776-1880  
Fax: 425-776-2760  
E-mail: [ple-sales@pletronics.com](mailto:ple-sales@pletronics.com)  
URL: [www.pletronics.com](http://www.pletronics.com)

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