



PLETRONICS SM22-J Series 2016 CMOS Clock Oscillator



SM22J
2.05 x 1.65 x 0.75 mm
LCC Ceramic Package

Features

- Quartz crystal controlled precision square wave oscillator
- CMOS Output
- Enable/Disable Function includes low standby power
- Low Jitter
- 1.63 ~ 3.63V Supply Voltage
- 1 - 50 MHz Frequency Range

Applications

Driving A/Ds, D/As, FPGAs
Digital Video
Ethernet, GbE
Medical
Storage Area Networking
COTS
Broad Band Access
SONET/ SDH/ DWDM
Base Stations/ Picocell
Test & Measurement

Electrical Characteristics

Parameter	Min	Typ	Max	Unit	Condition
Frequency Range ² Fo	1	-	50	MHz	
Frequency Stability ² ± 20 = 20* , ± 25 = 44 , ± 50 = 45	±20	-	±50	ppm	Includes supply voltage change, load change, aging for 1 year at 25°C ± 2°C, shock, vibration and temperatures. *limited frequencies, see page 3
Operating Temperature Range ²	-10 -20 -40 -40	- - - -	+70 +70 +85 +105	°C	Standard range Extended range C option Extended range E option Extended range G option
Supply Voltage ^{1,2} Vcc	1.63	-	3.63	Volts	
Output Waveform	CMOS				
Duty Cycle	45	-	55	%	@0.5Vcc
Output High Level (VOH)	Vcc - 0.4	-	-	V	
Output Low Level (VOL)	-	-	0.4	V	
Output T _{RISE} and T _{FALL}	-	2 1.5	6 5	ns	1MHz ~ < 20MHz ≥ 20MHz ~ 50MHz C _{LOAD} = 15 pF 10% to 90% of Vcc
Startup Time	-	-	10	ms	Time for output to reach specified frequency
V _{DISABLE} (VIL)	-	-	0.4	V	
V _{ENABLE} (VIH)	0.7Vcc	-			
Enable Time	-	-	10	ms	Time for output to reach specified frequency
Disable Time	-	-	200	ns	Time for output to reach a high Z state
Enable/Disable Internal Pull-up	30	70	150	Kohm	To Vcc; Pin 1 ≥ 0.7Vcc
Output Leakage V _{OUT} = V _{CC} V _{OUT} = 0V	- -10	-	+10 -	μA	Pad 1 low
Standby Current	-	-	10	μA	
Phase Noise 1 kHz 10 kHz 100 kHz 1 MHz 5 MHz	-	-141 -153 -160 -162 -162	-	dBc/Hz	25°C ± 2°C, Fo = 50 MHz
rms Phase Jitter	-	77	-	fs	12kHz ~ 5 MHz; Fo = 50MHz
Storage Temperature Range	-55	-	+125	°C	

Notes: Specifications with Pad 1 E/D open circuit

¹ Place an appropriate power supply bypass capacitor next to device for correct operation

² Specified by part number



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Electrical Characteristics - Input Current

Parameter	Min	Typ	Max	Unit	Condition
Supply Current I_{CC} ($V_{CC}=3.3V$, no load)	-	1.0	2.0	mA	3 MHz
	-	1.2	2.5		20 MHz
	-	1.5	3.0		50 MHz

Parameter	Min	Typ	Max	Unit	Condition
Supply Current I_{CC} ($V_{CC}=2.5V$, no load)	-	0.7	1.4	mA	3 MHz
	-	0.8	1.6		20 MHz
	-	1.0	2.0		50 MHz

Parameter	Min	Typ	Max	Unit	Condition
Supply Current I_{CC} ($V_{CC}=1.8V$, no load)	-	0.7	1.0	mA	3 MHz
	-	0.7	1.2		20 MHz
	-	0.8	1.5		50 MHz

Specifications with Pad 1 E/D circuit open



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Part Number

Series Model	Frequency Stability		Operating Temperature Range	Frequency in MHz	Optional T&R Packaging code
SM22	45	J	E	- 25.0M	-XX
	45 = ± 50 ppm 44 = ± 25 ppm 20* = ± 20 ppm		Blank = -10 to +70°C (STD) C = -20 to +70°C E = -40 to +85°C G = -40 to +105°C (±50ppm)	1 - 50 MHz	T250 = 250 per Reel T500 = 500 per Reel T3K = 3000 per Reel (Std)

* Contact PLE sales for limited frequencies for ±20ppm -40 to 85C. Full frequency range available which excludes aging.

Device Marking

PFF.F
• YMxxx

P = Pletronics
FF.F = Frequency in MHz (frequency is 4 characters, includes the decimal)
YM = Date Code, All other marking is internal code

Note: Specifications such as frequency stability, supply voltage and operating temperature range, etc. are not identified from marking. External packaging labels and packing list will correctly identify the ordered Pletronics part number.

Codes for Date Code YM (Year Month)

Code	3	4	5	6	7	Code	A	B	C	D	E	F	G	H	J	K	L	M
Year	2023	2024	2025	2026	2027	Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

Package Labeling

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

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

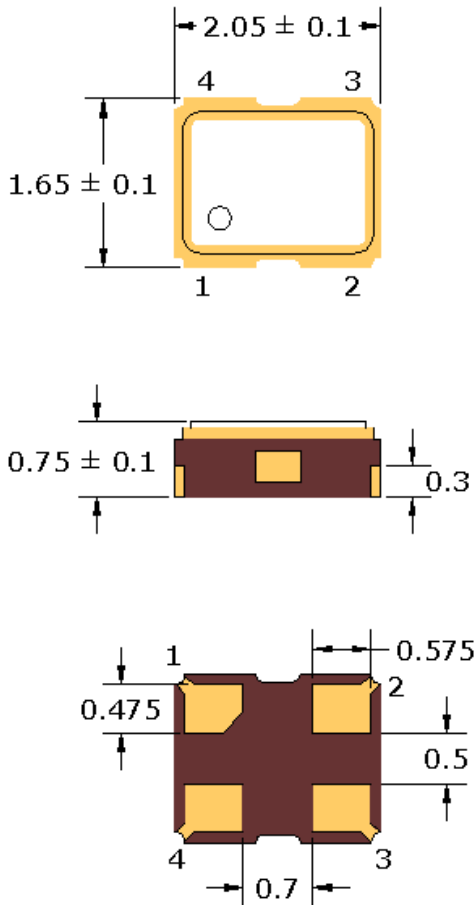
P/N:		PLE Part Number
Customer P/N:		12345678
Qty:		D/C
MSL: 1	3000	2A1

RoHS Compliant
2nd Lvl Interconnect
Category=e4
Max Safe Temp=260C for 10s 2X Max

Pletronics Inc. certifies this device is in accordance with the RoHS and REACH directives.

Pletronics Inc. guarantees the device does not contain the following: Cadmium, Hexavalent Chromium, Lead, Mercury, PBB's, PBDE's
Weight of the Device: 0.013 grams
Moisture Sensitivity Level: 1 As defined in J-STD-020D
Second Level Interconnect code: e4

Mechanical Dimensions

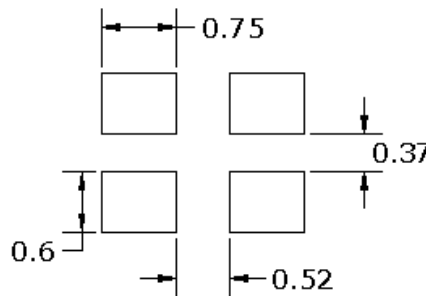


Dimensions in mm

Pad Connections

Pad	Function
1	Enable/Disable
2	Ground
3	Output
4	Vcc

ENABLE/DISABLE	
Pad 1	Output
V _{IH} /Open	Active
V _{IL} /Gnd	Disabled/Tristate



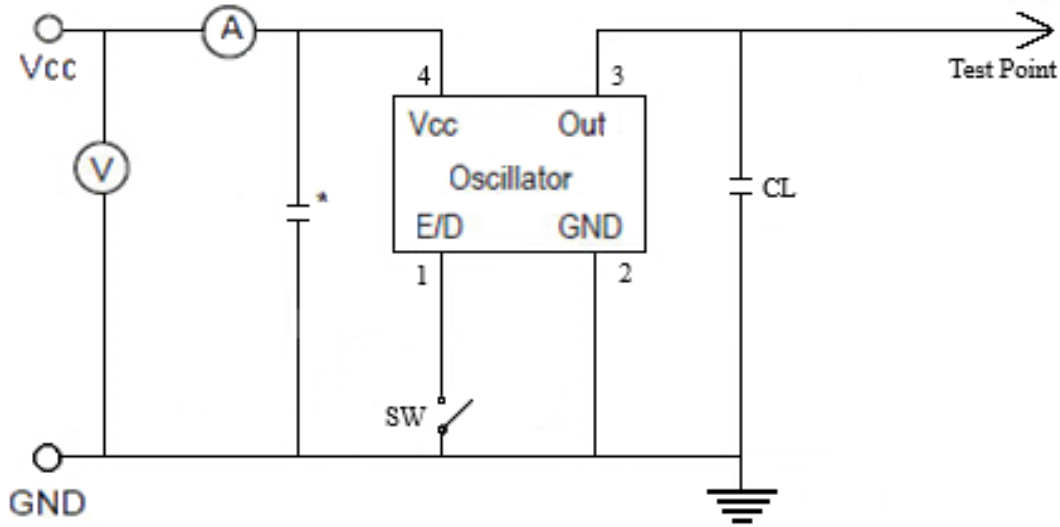
Pad Layout
Disclaimer: Recommended layout shown. Adjust layout as needed for individual process requirements.

Contacts (pads): Gold (0.3 to 1.0 μm) over Nickel (1.27 to 8.89 μm)

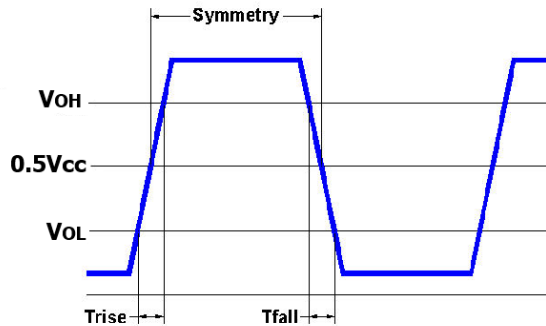
For Optimum Jitter Performance, Pletronics recommends:

- A ground plane under the device
- Do not route large transient signals (both current and voltage) under the device
- Do not place near a large magnetic field such as a high frequency switching power supply
- Do not place near piezoelectric buzzers or mechanical fans

Electrical Test / Load Circuit



Notes:
 CL: 15pF Includes the input capacitance of oscilloscope
 * 0.01 μ F external by-pass filter is recommended



Environmental / ESD Ratings

Reliability: Environmental

Parameter	Condition
Mechanical Shock	MIL-STD-883, Method 2002, Condition B
Vibration	MIL-STD-883, Method 2007, Condition A
Solderability	IPC J-STD-002
Thermal Cycle	MIL-STD-883 Method 1010, Condition B

ESD Rating

Model	Min. Voltage	Condition
Human Body Model	2000V	JESD22-A114
Machine Model	200V	JESD22-A115

Absolute Maximum Ratings

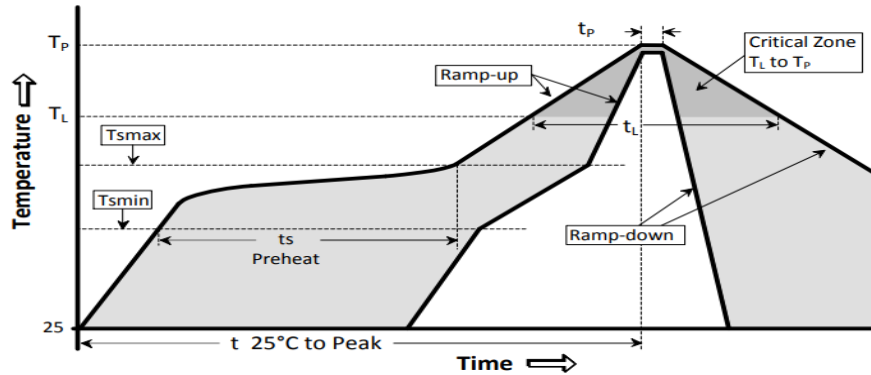
Parameter	Unit
V _{CC} Supply Voltage	-0.3V to +4.0V
V _i Input Voltage	-0.3V to V _{CC} + 0.3V
V _o Output Voltage	-0.3V to V _{CC} + 0.3V

Thermal Characteristics:

The maximum die or junction temperature is 150°C

Reflow Cycle

Maximum Reflow Conditions in accordance with IPC/JEDEC J-STD-020C "Pb-free"

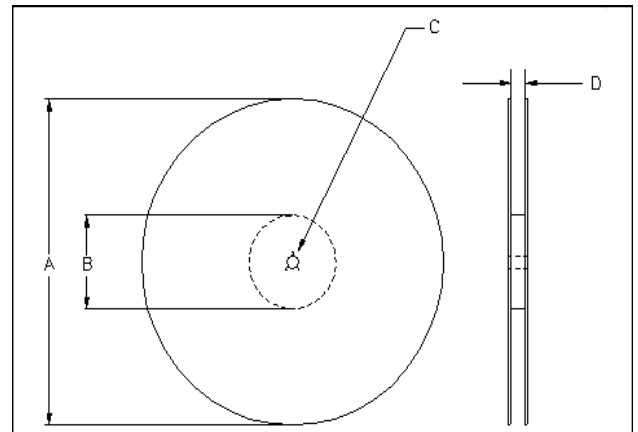
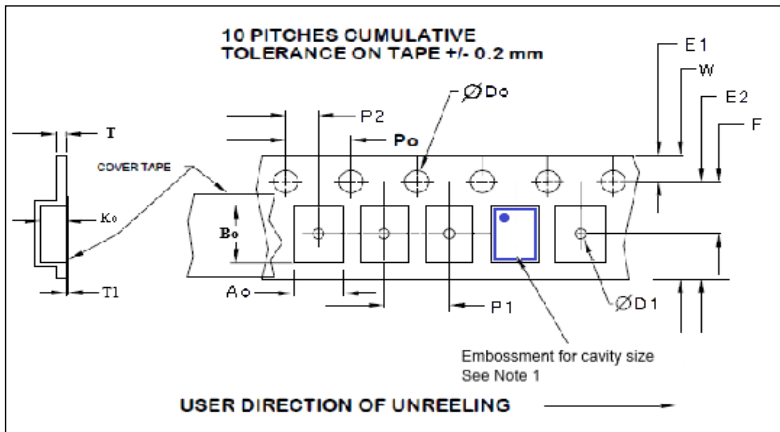


The part may be reflowed 2 times without degradation (typical for lead free processing).

Temperature Profile	Symbol	Condition	Unit
Average ramp-up rate	($T_{S_{max}}$ to T_P)	3°C / second max	°C / s
Ramp down Rate	T_{cool}	6°C / second max	°C / s
Time 25°C to Peak Temperature	$T_{to-peak}$	8 minutes max	min
Preheat			
Temperature min	$T_{S_{min}}$	150	°C
Temperature max	$T_{S_{max}}$	200	°C
Time $T_{S_{min}}$ to $T_{S_{max}}$	t_s	60 – 180	sec
Soldering above liquidus			
Temperature liquidus	T_L	217	°C
Time above liquidus	t_l	60 – 150	sec
Peak temperature			
Peak Temperature	T_P	260	°C
Time within 5°C of peak temperature	t_p	20 – 40	sec

Tape and Reel

Tape and Reel available for quantities of 250 to 3000 per reel, cut tape for < 250. 8mm tape, 4mm pitch.



Tape Size	E2 typ	F	P1	W max	Ao	Bo	Ko
8mm	6.25	3.5 ±0.05	4.0 ±0.1	8.2	1.9±0.1	2.3±0.1	0.9±0.1

Reel Size	A		B		C	D
	Inches	mm	Inches	mm	mm	mm
7	7.0	180	2.50	60	13.0 +0.5 -0.2	Tape size +0.4 +2.0 -0.0

Dimensions in mm Drawing Not to scale
Note 1: Embossed cavity to conform to EIA-481-B

Tape Size	Do	D1 min	E1	Po	P2	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	0.3	0.1



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