



# PLETRONICS SM33K 32.768kHz 2520 CMOS Clock Oscillator



SM33K  
2.5 x 2.0 x 0.81 mm  
LCC Ceramic Package

## Features

- Quartz crystal controlled precision square wave oscillator
- CMOS Output
- Enable/Disable Function
- 1.6 ~ 3.63V nominal Supply Voltage
- 32.768 kHz

## Applications

- RTC
- Smartphone
- IoT
- Wearable Device
- Watch
- Medical

## Electrical Characteristics

Parameter	Min	Typ	Max	Unit	Condition
Frequency	-	32.768	-	kHz	
Frequency Stability	$\pm 20^*$	-	$\pm 50$	ppm	Includes supply voltage change, load change, aging for 1 year at 25°C $\pm 2^{\circ}\text{C}$ , shock, vibration and temperatures. *See page 2
Operating Temperature Range	-20 -40	-	+70 +85	°C	
Supply Voltage <sup>1</sup> V <sub>CC</sub>	1.6	3.3	3.63	V	
Input Current I <sub>CC</sub>	-		35	μA	No Load
Output Disabled Current I <sub>CC</sub>	-	-	5	μA	
Output Waveform	CMOS				
Duty Cycle	45	-	55	%	At 50% V <sub>CC</sub> level; C <sub>LOAD</sub> = 15 pF
Output V <sub>HIGH</sub> (I <sub>OH</sub> = -1mA)	V <sub>CC</sub> -0.4	-	-	V	
Output V <sub>LOW</sub> (I <sub>OL</sub> = 1mA)	-	-	0.4	V	
Output T <sub>RISE</sub> and T <sub>FALL</sub>	-	-	50	ns	C <sub>LOAD</sub> = 15 pF 10% to 90% of V <sub>CC</sub> See Load Circuit
Startup Time	-	-	20	ms	Time for output to reach specified frequency
V <sub>DISABLE</sub> V <sub>IL</sub>	-	-	0.3V <sub>CC</sub>	V	Of V <sub>CC</sub> applied to Pad 1
V <sub>ENABLE</sub> V <sub>IH</sub>	0.7V <sub>CC</sub>	-			
Enable/Disable Pullup Resistance	50	100	150	kΩ	Pad 1 low
Output Disable Time	-	-	1	μs	
Output Enable Time	-	-	20	ms	
Aging 1st Year	-	-	$\pm 3$	ppm	At 25°C
Storage Temperature Range	-55	-	+125	°C	

### Notes:

<sup>1</sup> Place an appropriate power supply bypass capacitor next to device for correct operation



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Part Number (Example: SM3345KE-32.768K)

Series Model	Frequency Stability		Operating Temperature Range	Frequency	Optional T&R Packaging code
SM33	45	K	E	- 32.768K	-XX
	45 = ± 50 ppm 44 = ± 25 ppm 20* = ± 20 ppm		C = -20 to +70°C E = -40 to +85°C	32.768kHz	T250 = 250 per Reel T500 = 500 per Reel T3K = 3000 per Reel (Std)

\* Includes aging for -20 to +70°C, excludes aging for -40 to +85°C

## Device Marking

P32.7K
• YMDxxx

P = Pletronics  
32.7K = 32.768 kHz  
YMD = 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 YMD (Year Month Day)

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

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

## 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

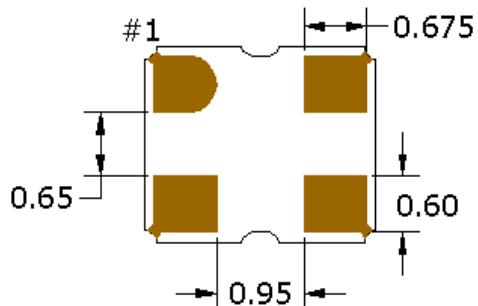
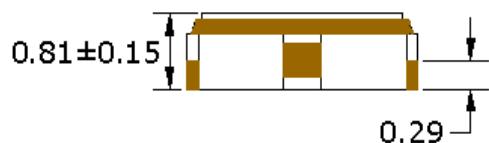
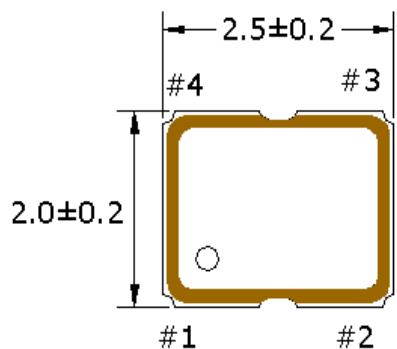
P/N:
PLE Part Number
Customer P/N:
12345678
Qty:
3000
D/C
2A1
MSL: 1

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: 0.018 grams  
Moisture Sensitivity Level: 1 As defined in J-STD-020D  
Second Level Interconnect code: e4

## Mechanical Dimensions



Shape of pad 1 may differ

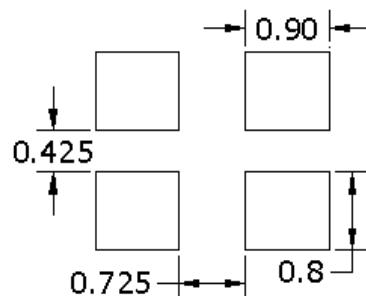
Dimensions in mm

## Pad Connections

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

### ENABLE/DISABLE

Pad 1	Output
VIH/Open	Active
VIL/Gnd	Disabled/Tristate



### Pad Layout

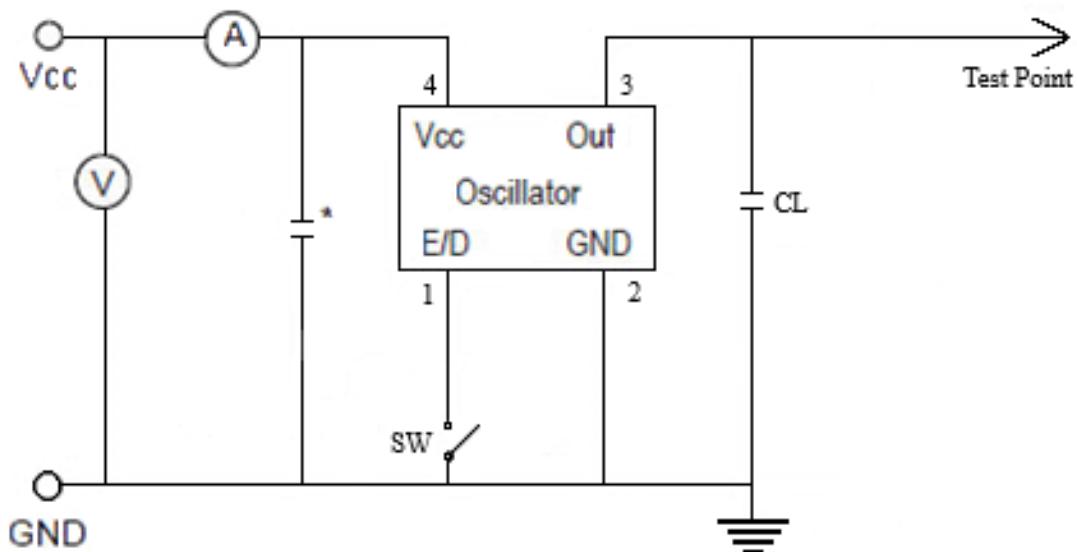
Disclaimer: Recommended layout shown. Adjust layout as needed for individual process requirements.

**Contacts (pads): Gold (0.3 to 1.0  $\mu$ m) over Nickel (1.27 to 8.89  $\mu$ m)**  
**Pad 1 shape may be rounded or chamfered corner**

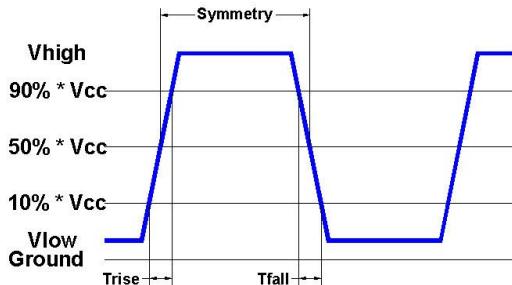
For Optimum Jitter Performance, Pletronics recommends:

- 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  
 \* 0.01µF external by-pass filter is recommended



## Environmental / ESD Ratings

Reliability: Environmental

ESD Rating

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

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

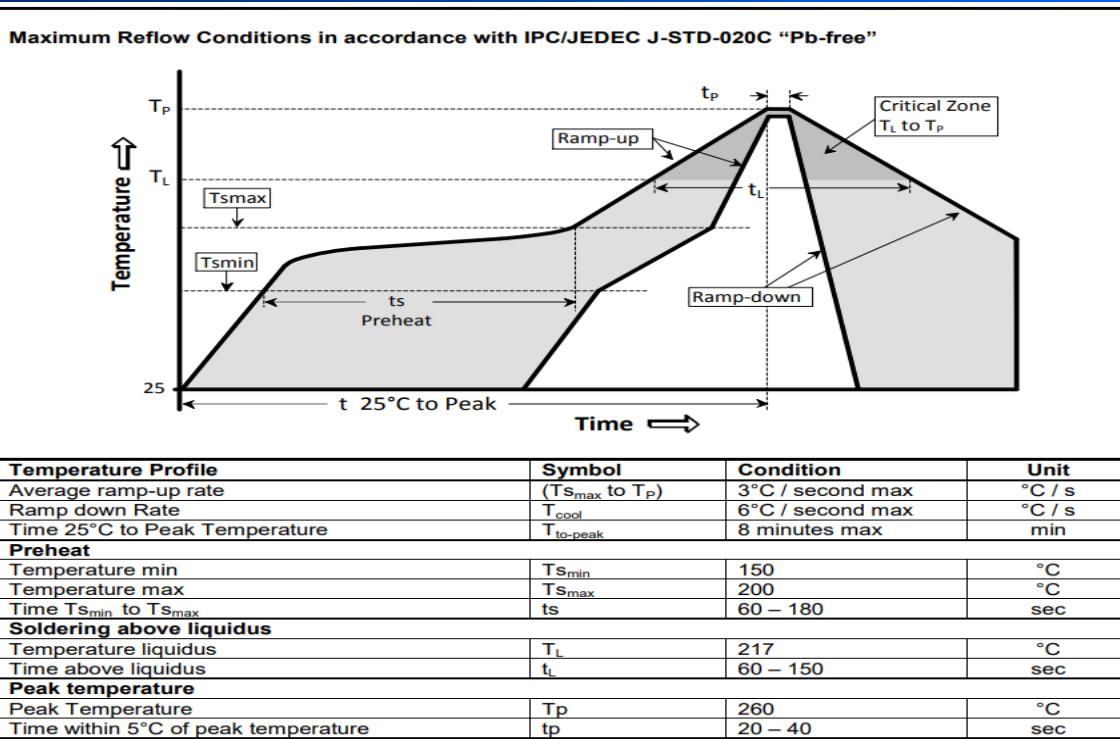
## Absolute Maximum Ratings

Parameter	Unit
V <sub>cc</sub> Supply Voltage	-0.3V to +4.5V
V <sub>i</sub> Input Voltage	-0.3V to +4.5V
V <sub>o</sub> Output Voltage	-0.3V to +4.5V

## Thermal Characteristics:

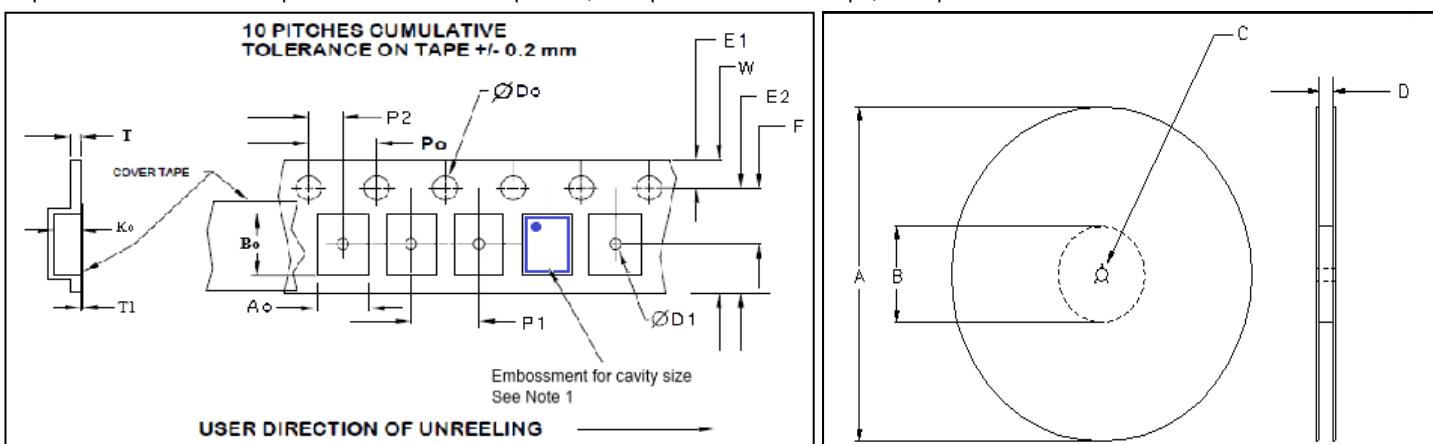
The maximum die or junction temperature is 150°C

## Reflow Cycle



## Tape and Reel

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



Tape Variable Dimensions Table 2							
Tape Size	E2 typ	F	P1	W max	Ao	Bo	Ko
8mm	6.25 ±0.05	3.5 ±0.1	4.0 ±0.1	8.2	2.25±0.1	2.75±0.1	1.15±0.1

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

Reel Dimensions (may vary) Table 3						
	A		B		C	D
Reel Size	Inches	mm	Inches	mm	mm	mm
7	7.0	180	2.42	61.5	13.0 +0.4 +0.5 -0.2 +2.0 -0.0	Tape size +0.4 +0.5 -0.2 +2.0 -0.0

Tape Constant Dimensions Table 1							
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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