PLETRONICS SM44K 32.768kHz 3225 CMOS Clock Oscillator

SM44K
3.2 x 2.5 x 0.95 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	±20*	-	±50	ppm	Includes supply voltage change, load change, aging for 1 year at 25°C ± 2°C, shock, vibration and temperatures. *See page 2
Operating Temperature Range	-20 -40 -40	-	+70 +85 +105	°C	
Supply Voltage [1] V_{CC}	1.6	3.3	3.63	V	
Input Current I_{CC}	-		35	µA	No Load
Output Disabled Current Icc	-	-	5	µA	
Output Waveform	CMOS				
Duty Cycle	45	-	55	%	At 50% Vcc level; C_{LOAD} = 15 pF
Output V_{HIGH} (I_{OH} = -1mA)	Vcc-0.4	-	-	V	
Output V_{LOW} (I_{OL} = 1mA)	-	-	0.4	V	
Output T_{RISE} and T_{FALL}	-	-	50	ns	C_{LOAD} = 15 pF 10% to 90% of V_{CC} See Load Circuit
Startup Time	-	-	20	ms	Time for output to reach specified frequency
$V_{DISABLE}$ VIL	-	-	0.3Vcc	V	Of V_{CC} applied to Pad 1
V_{ENABLE} VIH	0.7Vcc	-			
Enable/Disable Pullup Resistance	50	100	150	kΩ	Pad 1 low
Output Disable Time	-	-	1	µs	
Output Enable Time	-	-	20	ms	
Aging 1st Year	-	-	±3	ppm	At 25°C
Storage Temperature Range	-55	-	+125	°C	

Notes:
[1] Place an appropriate power supply bypass capacitor next to device for correct operation

Part Number (Example: SM4445KE-32.768K)

Series Model	Frequency Stability		Operating Temperature Range	Frequency	Optional T&R Packaging code
SM44	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 G = -40 to +105°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
** ±50ppm

Device Marking

P*32.7K*
- *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.

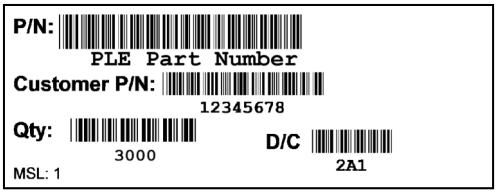
Codes for Date Code YMD (Year Month Day)

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

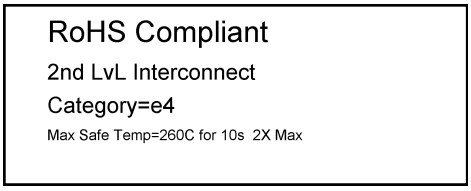
Code	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	G
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Code	H	J	K	L	M	N	P	R	T	U	V	W	X	Y	Z	
Day	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	

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



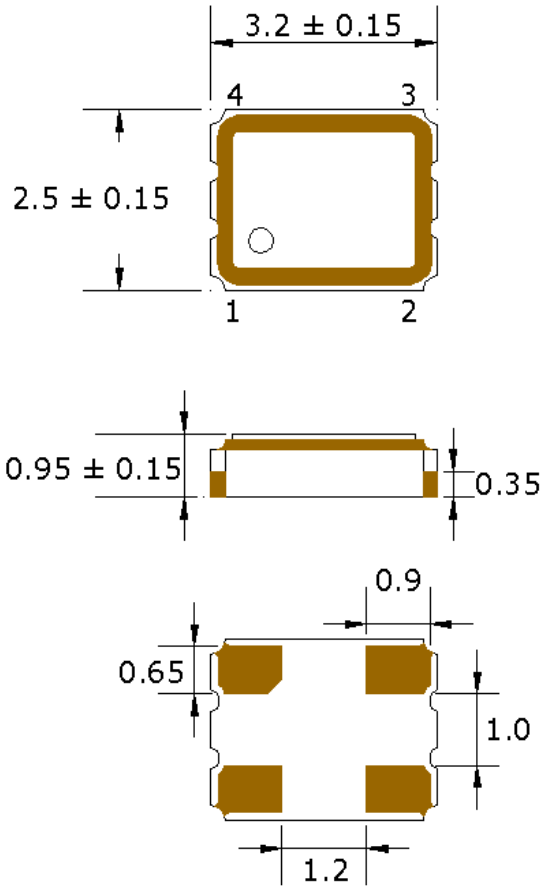
RoHS Label is 1" x 2.6" (25.4mm x 66.7mm)
Font is Arial



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: 0.024 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
VIH/Open	Active
VIL/Gnd	Disabled/Tristate

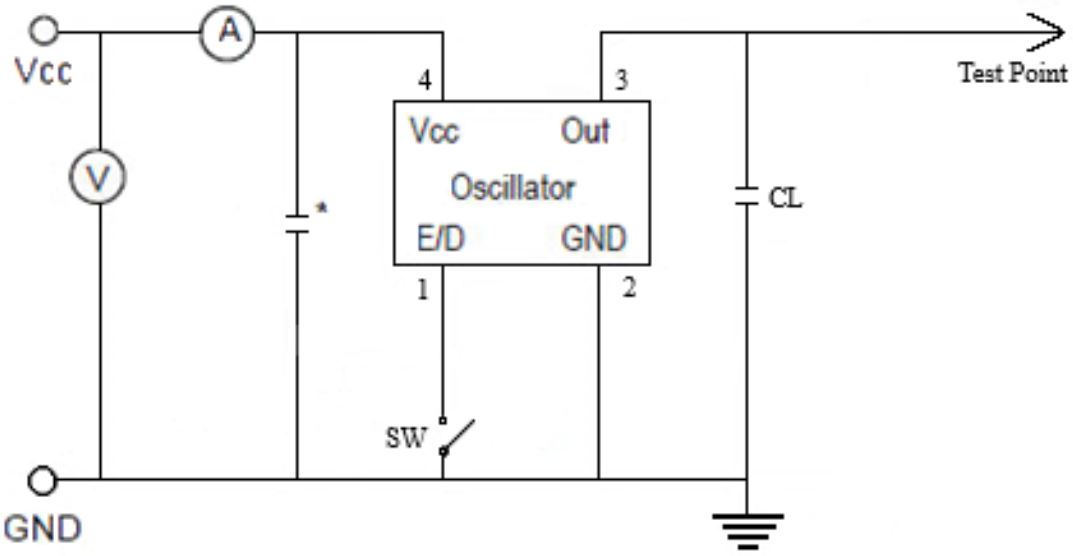
Pad Layout
Disclaimer: Recommended layout shown. Adjust layout as needed for individual process requirements.

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

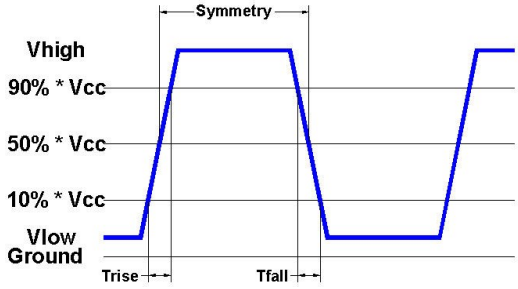
For Optimum Jitter Performance, Pletronics recommends:

- 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
* 0.01µF 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

Thermal Characteristics:
The maximum die or junction temperature is 150°C

ESD Rating

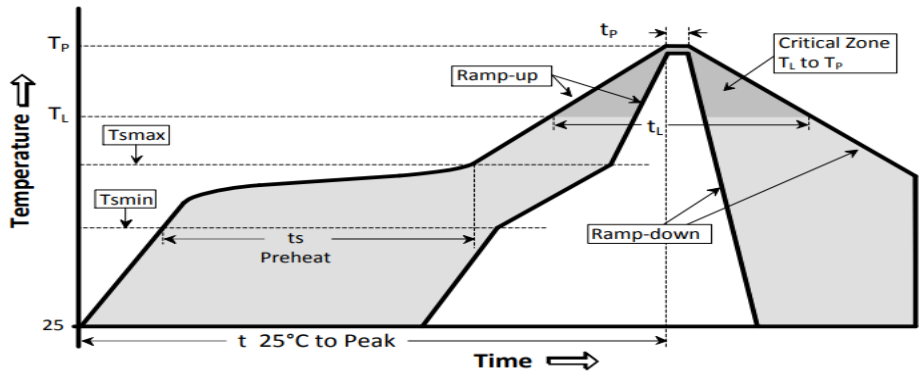
Model	Min. Voltage	Condition
Human Body Model	2000V	JESD22-A114
Machine Model	200V	JESD22-A115

Absolute Maximum Ratings

Parameter	Unit
V_{CC} Supply Voltage	-0.3V to +4.5V
Vi Input Voltage	-0.3V to +4.5V
Vo Output Voltage	-0.3V to +4.5V

Reflow Cycle

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

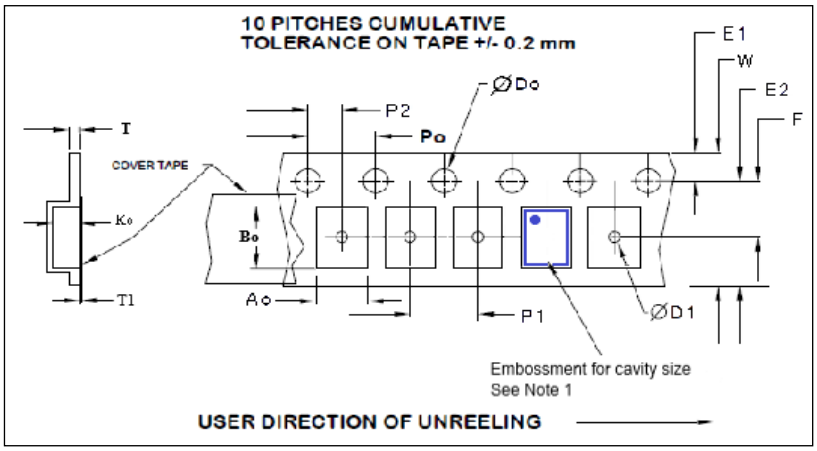


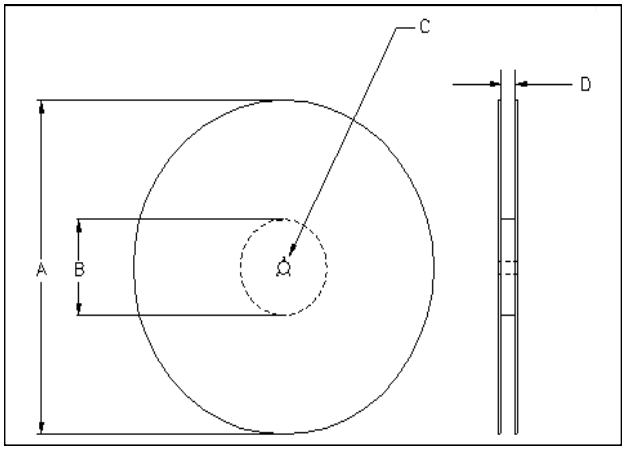
Temperature Profile	Symbol	Condition	Unit
Average ramp-up rate	(Ts_{max} to T_P)	3°C / second max	°C / s
Ramp down Rate	T_{cool}	6°C / second max	°C / s
Time 25°C to Peak Temperature	$T_{to\text{-}peak}$	8 minutes max	min
Preheat			
Temperature min	Ts_{min}	150	°C
Temperature max	Ts_{max}	200	°C
Time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

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

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	3.5 ±0.05	4.0 ±0.1	8.2	2.7±0.1	3.4±0.1	1.4±0.1

Dimensions in mm Drawing Not to scale

Note 1: Embossed cavity to conform to EIA– 481-B

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

Reel Dimensions (may vary) Table 3						
	A		B		C	D
Reel Size	Inches	mm	Inches	mm	mm	mm
7	7.0	180	2.3	60	13.0 +0.5 -0.2	Tape size +0.4 +2.0 -0.0

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