

ISSUE 1; June 2016

### Description

- Ultra low power, ultra small MEMS oscillator at 32.768kHz with CMOS output in a plastic package. Factory programmable for a short lead time. Uses SiTime's MEMS First™ technology.
- APPLICATIONS:
  - Industrial Timekeeping
  - Industrial Battery Management
  - Multi-drop 32kHz Clock Distribution
  - Bluetooth Modules
  - WiFi Modules
  - RTC Reference Clock

### Frequency Parameters

- Frequency: 32.768kHz
- Frequency Tolerance:  $\pm 20.00$ ppm
- Tolerance Condition: @ 25°C, post reflow,  $V_s = 1.5V$  to 3.63V.
- Frequency Stability:  $\pm 75.00$ ppm to  $\pm 150.00$ ppm
- Ageing:  $\pm 1$ ppm max in 1st year @ 25°C
- Note: Frequency Tolerance is measured peak-to-peak. Tested with an Agilent 53132A frequency counter. Due to the low operating frequency the gate time must be  $\geq 100ms$  to ensure an accurate frequency measurement.
- Note: Frequency Stability is measured peak-to-peak. Inclusive of Frequency Tolerance @ 25°C and variations over operating temperature, supply voltage and load.

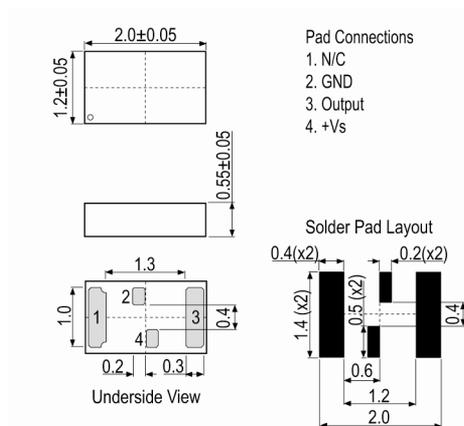
### Electrical Parameters

- Supply Voltage (over Operating Temperature Range): 1.5V to 3.63V
- Absolute Maximum Supply Voltage Rating: -0.5 to 3.63V
- Absolute Short Duration Supply Voltage (30mins max, over -40°C to 85°C): 4.0V max
- Note: Operating beyond these limits may result in change or permanent damage to the oscillator.
- Operating Current:
  - Measured with -
  - $T_A = 25^\circ C$ ,  $V_s = 1.5V$  to 3.3V and no load: 1µA typ
  - $T_A = -10^\circ C$  to 70°C,  $V_s = 3.63V$  and no load: 1.9µA max
  - $T_A = -40^\circ C$  to 85°C,  $V_s = 3.63V$  and no load: 2.2µA max
  - $T_A = -40^\circ C$  to 105°C,  $V_s = 3.63V$  and no load: 2.8µA max
- Power Supply Ramp (over Operating Temperature Range,  $V_s$  ramp-up from 0 to 90%): 100ms max
- Start Up Time @ Power Up:
  - Measured with -
  - $T_A = 25^\circ C \pm 10^\circ C$ : 180ms typ, 300ms max
  - $T_A = -40$  to 70°C: 450ms max
  - $T_A = 85^\circ C$ : 500ms max
  - $T_A = 105^\circ C$ : 800ms typ

### Operating Temperature Ranges

- 10 to 70°C
- 40 to 85°C
- 40 to 105°C

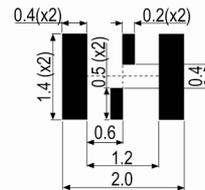
### Outline (mm)



#### Pad Connections

1. N/C
2. GND
3. Output
4. +Vs

#### Solder Pad Layout



### Sales Office Contact Details:

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#### Output Details

- Output Compatibility CMOS
- Drive Capability 15pF
- Output Voltage Levels (Vs=1.5V to 3.63V):  
Output Low (VoL): 10%Vs max  
Output High (VoH): 90%Vs min
- Maximum Output Drive (@ ≥80% LVCMOS swing, over Operating Temperature Range, Vs=1.5V to 3.3V): 50pF max

#### Noise Parameters

- Period Jitter (10000 cycles):  
Measured with TA=25°C: 35ns RMS typ

#### Environmental Parameters

- Absolute Short Duration Operating Temperature (30mins max, Vs=1.5V to 3.63V): 125°C max
- Storage Temperature Range: -65 to 150°C
- Junction Temperature: 150°C max
- ESD Levels:  
Human Body Model (JESD22-A114): 3000V max  
Charge Device Model (JESD22-C101): 750V max  
Machine Model (TA=25°C): 300V max
- Mechanical Shock: MIL-STD-883, Method 2002: 10000G max
- Vibration: MIL-STD-883, Method 2007: 70G max
- Latch Up Tolerance (JESD78): Compliant
- Note: Operating beyond these limits may result in change or permanent damage to the oscillator.

#### Manufacturing Details

- Maximum Process Temperature: Reflow profile as per JEDEC J-STD-020.
- Cleaning: Do not ultrasonic clean, this may cause permanent damage or long-term reliability issues to the oscillator.
- For noisy, high EM environments, we recommend the following design guidelines:-
- Place oscillator as far away from EM noise sources as possible (e.g., high-voltage switching regulators, motor drive control).
- Route noisy PCB traces, such as digital data lines or high di/dt power supply lines, away from the oscillator.
- Add a low ESR/ESL, 0.1uF to 1.0uF ceramic capacitor (X7R) to help filter high frequency noise on the Vs power-supply line. Place it as close to the oscillator Vs pad as possible.
- Place a solid GND plane underneath the oscillator to shield the oscillator from noisy traces on the other board layers.

#### Compliance

- RoHS Status (2011/65/EU) Compliant
- REACh Status Compliant
- MSL Rating (JEDEC-STD-033): 1

#### Packaging Details

- Pack Style: Reel Tape & reel in accordance with EIA-481-D  
Pack Size: 1,000

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**Electrical Specification - maximum limiting values**

Frequency	Temperature Range	Stability (Min)	Current (NoLoad)	Rise and Fall Time (90/10%)	Duty Cycle
	°C	ppm	mA	ns	%
32.768000kHz	-40 to 85	±100.00	-	200	48/52%
	-40 to 105	±150.00	-	200	48/52%
	-10 to 70	±75.00	-	200	48/52%

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