



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



Contact us

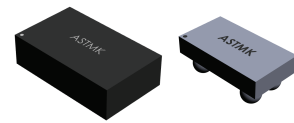
Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



Ultra-miniature, Low Power, 32.768kHz MEMS Oscillator



SMD: 2.0 x 1.2 x 0.6mm
CSP: 1.54 x 0.84 x 0.60mm

ASTMK



RoHS/RoHS II compliant

Moisture Sensitivity Level (MSL) – 1

FEATURES:

- Factory programmable output frequency: 1Hz to 32.768kHz
- Available in two types of ultra-miniature packages:
2.0 x 1.2 x 0.6mm (SMD); 1.54 x 0.84 x 0.6mm (CSP)
- Supply Voltage: 1.2V to 3.63V (-10 ~ +70°C); 1.5V to 3.63V (-40 ~ +85°C)
- Ultra-Low Current Consumption: 1.4µA max. (core current, no load)
- Frequency Stabilities include:
 - ±75ppm over -10 to +70°C, ±100ppm over -40 to +85°C
- Internal power supply filtering eliminates external bypass capacitor for V_{dd} port.
- Proprietary NanoDrive™ Technology by SiTime enables programmable output swing for lower power

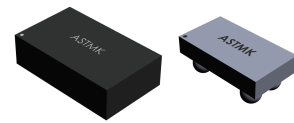
APPLICATIONS:

- Timekeeping
- Battery Management
- Mobile devices
- RTC reference clock
- Wireless accessories
- Fitness/Medical monitoring sensors
- Sport video cams

STANDARD SPECIFICATIONS:

| Parameters | Min | Typ | Max | Unit | Notes |
|--------------------------------------------------------------------------------------------------------------|-----------------|---------------------|---------------------|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Output Frequency Range (F _{out}) | 1 | | 32768 | Hz | Factory programmed between 1Hz and 32.768kHz, in the powers of 2 |
| Initial Frequency Tolerance (F _{tol}) ⁽¹⁾⁽⁵⁾ | -20 | | +20 | ppm | T _A = +25°C, post reflow, V _{dd} :1.5-3.63V |
| Frequency Stability over Temperature (F _{stab}) ⁽²⁾ | -75 | | +75 | ppm | T _A = -10°C to +70°C, V _{dd} :1.5-3.63V |
| | -100 | | +100 | | T _A = -40°C to +85°C, V _{dd} :1.5-3.63V |
| | -250 | | +250 | | T _A = -10°C to +70°C, V _{dd} :1.2-1.5V |
| Aging (@+25°C) | -1 | | +1 | ppm | First year |
| Supply Voltage (V _{dd}) | 1.2 | | 3.63 | V | T _A = -10°C to +70°C |
| | 1.5 | | 3.63 | | T _A = -40°C to +85°C |
| Core Operating Current (I _{dd}) ⁽³⁾ | | 0.90 | | µA | T _A = +25°C, V _{dd} : 1.8V. No load. |
| | | | 1.3 | | T _A = -10°C to +70°C, V _{dd} max: 3.63V. No load |
| | | | 1.4 | | T _A = -40°C to +85°C, V _{dd} max: 3.63V. No load. |
| Output Stage Operating Current (I _{dd out}) ⁽³⁾ | | 0.065 | 0.125 | µA/V _{pp} | T _A = -40°C to +85°C, V _{dd} max: 1.5-3.63V. No load. |
| Power Supply Ramp (t _{Vdd Ramp}) | | | 100 | ms | T _A = -40°C to +85°C, 0 to 90%*V _{dd} |
| Start-up Time (T _{start}) ⁽⁴⁾ | | | 300+1 period | ms | T _A = +25°C±10°C, valid output |
| | | | 500+1 period | | T _A = -40°C to +85°C, valid output |
| Operating Temperature Range (T _{use}) | -10 | | +70 | °C | Option "M" |
| | -40 | | +85 | | Option "L" |
| Period Jitter | | 35 | | ns _{RMS} | Cycles=10000, T _A = +25°C, V _{dd} :1.5-3.63V |
| LVC MOS Output Option (T _A = -40°C to +85°C. Typical values are at T _A = +25°C) | | | | | |
| Output Rise/Fall Time (t _r /t _f) | | 100 | 200 | ns | 10-90%(V _{dd}), 15pF load, V _{dd} :1.5-3.63V |
| Output Clock Duty Cycle | 48 | | 52 | % | |
| Output Voltage | V _{OH} | 90%*V _{dd} | | V | V _{dd} :1.5-3.63V. I _{OH} = -10µA, 15pF |
| | V _{OL} | | 10%*V _{dd} | | V _{dd} :1.5-3.63V. I _{OL} = 10µA, 15pF |
| NanoDrive™(6) Programmable, Reduced Swing Output Option | | | | | |
| Output Rise/Fall Time (t _r /t _f) | | | 200 | ns | 30-70%(V _{OL} / V _{OH}), 10pF load |
| Output Clock Duty Cycle | 48 | | 52 | % | |
| AC-coupled Programmable Output Swing (V _{sw}) | | 0.20 to 0.80 | | V | ASTMK does not internally AC-couple. This output description is intended for a receiver that is AC-coupled. See Part Identification section for available AC-coupled signal swing options. V _{dd} :1.5-3.63V. 10pF load, I _{OH} / I _{OL} =±0.2µA |

Ultra-miniature, Low Power, 32.768kHz MEMS Oscillator



SMD: 2.0 x 1.2 x 0.60mm
CSP: 1.54 x 0.84 x 0.60mm

ASTMK



RoHS/RoHS II compliant

(Continued)

| Parameters | Min | Typ | Max | Unit | Notes |
|---------------------------------------------------------------|--------|---------------|--------|------|-------------------------------------------------------------------------------------------------------------------------------------|
| DC-biased Programmable Output Voltage High Range (V_{OH}) | | 0.60 to 1.225 | | V | V_{dd} : 1.5-3.63V. I_{OH} = -0.2 μ A. 10pF load. See Part Identification section for available V_{OH} / V_{OL} levels. |
| DC-biased Programmable Output Voltage Low Range (V_{OL}) | | 0.35 to 0.80 | | V | V_{dd} : 1.5-3.63V. I_{OL} = 0.2 μ A. 10pF load. See Part Identification section for available V_{OH} / V_{OL} levels. |
| Programmable Output Voltage Swing Tolerance | -0.055 | | +0.055 | V | T_A = -40°C to +85°C, V_{dd} : 1.5-3.63V |

Note:

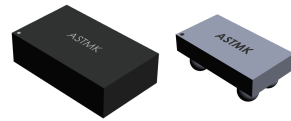
1. Measured peak-to-peak. Tested with Agilent 53132A frequency counter. Due to the low operating frequency, the gate time must be ≥ 100 ms to ensure an accurate frequency measurement.
2. Stability is specified for two operating voltage ranges. Stability progressively degrades with supply voltage below 1.5V. Measured peak-to-peak. Inclusive of initial tolerance at +25°C, and variations over operating temperature, rated power supply voltage and load.
3. Core operating current does not include output driver operating current or load current. To derive total operating current (no load), add core operating current + output driver operating current, where output driver operating current = $C_{driver} * V_{out} * F_{out}$.
4. Measured from the time V_{dd} reaches 1.5V.
5. Board-level underfill (BLUF) is not recommended for 1508 CSP package as it will cause a shift in the frequency tolerance.
6. NanoDrive™ is a SiTime trademark.

Absolute Maximum Ratings

Attempted operation outside the absolute maximum ratings may cause permanent damage to the part. Actual performance of the IC is only guaranteed within the operational specifications, not at absolute maximum ratings.

| Parameters | Test Condition | Value | Unit |
|-------------------------------------------------------|-----------------------------------------|--------------|------|
| Continuous Power Supply Voltage Range (V_{dd}) | | -0.5 to 3.63 | V |
| Short Duration Max. Power Supply Voltage (V_{dd}) | ≤ 30 minutes | 4.0 | V |
| Continuous Maximum Operating Temperature Range | V_{dd} : 1.5-3.63V | 105 | °C |
| Short Duration Max. Operating Temperature Range | V_{dd} : 1.5-3.63V, ≤ 30 minutes | 125 | °C |
| Human Body Model (HBM) ESD Protection | JESD22-A114 | 3000 | V |
| Charge-Device Model (CDM) ESD Protection | JESD22-C101 | 750 | V |
| Machine Model (MM) ESD Protection | JESD22-A115 | 300 | V |
| Latch-up Tolerance | JESD78 Compliant | | |
| Mechanical Shock Resistance | Mil 883, Method 2002 | 10000 | g |
| Mechanical Vibration Resistance | Mil 883, Method 2007 | 70 | g |
| 2012 SMD Junction Temperature | | 150 | °C |
| 1508 CSP Junction Temperature | | 150 | °C |
| Storage Temperature | | -65 to +150 | °C |

Ultra-miniature, Low Power, 32.768kHz MEMS Oscillator



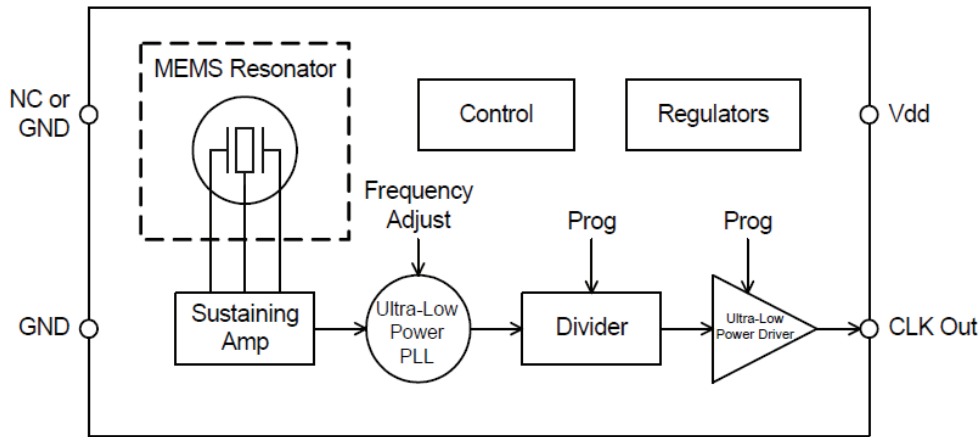
SMD: 2.0 x 1.2 x 0.60mm
CSP: 1.54 x 0.84 x 0.60mm

ASTMK



RoHS/RoHS II compliant

Block Diagram



PART IDENTIFICATION:

ASTMK - [] kHz - [] [] - [] [] [] - [] - []

| Output Frequency (kHz) |
|------------------------|
| 32.768 |
| 16.384 |
| 8.192 |
| 4.096 |
| 2.048 |
| 1.024 |
| 0.512 |
| 0.256 |
| 0.128 |
| 0.064 |
| 0.032 |
| 0.016 |
| 0.008 |
| 0.004 |
| 0.002 |
| 0.001 |

| Operating Temp. |
|------------------|
| M: -10°C ~ +70°C |
| L: -40°C ~ +85°C |

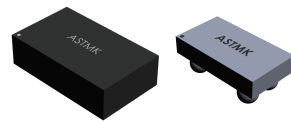
| Freq. Stability |
|-------------------------------------|
| P: ±75ppm (-10°C ~ +70°C only) |
| Q: ±100 ppm (-40°C ~ +85°C only) |

| Package Type |
|-------------------------|
| J: CSP (1.5 x 0.8mm) |
| H: SMD (2.0 x 1.2mm) |

| Packaging |
|-------------------------------------|
| Blank: Bulk |
| T: Tape & Reel (1kpcs / reel) |
| T3: Tape & Reel (3kpcs / reel) |
| T10: Tape & Reel (10kpcs / reel) |

| Output Level Option |
|------------------------------------------------------------------------------------|
| DCC: Rail-to-Rail LVCMOS |
| AA3: AC-coupled signal, swing level: 0.3V min. |
| D14: DC-coupled signal, V _{OL} : 0.400V max, V _{OH} : 1.100V min |
| D26: DC-coupled signal, V _{OL} : 0.525V max, V _{OH} : 1.225V min |

Ultra-miniature, Low Power, 32.768kHz MEMS Oscillator



SMD: 2.0 x 1.2 x 0.60mm
CSP: 1.54 x 0.84 x 0.60mm

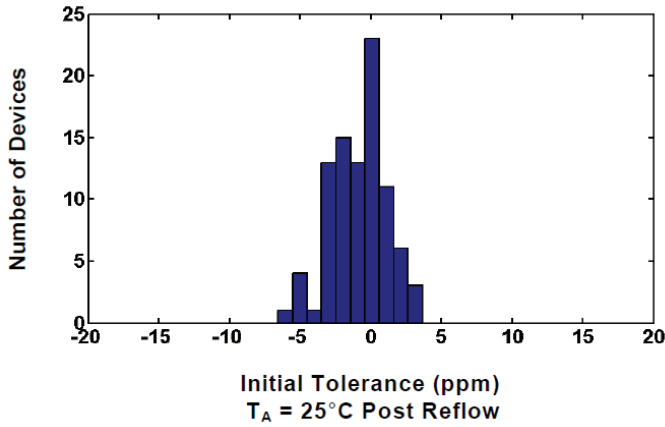
ASTMK



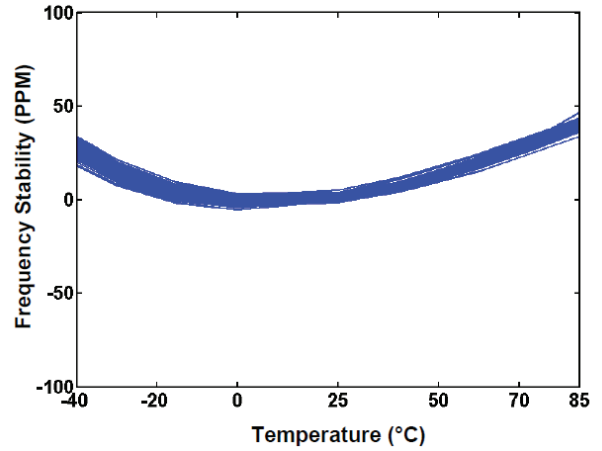
RoHS/RoHS II compliant

Typical Performance Data (TA=25°C, Vdd=1.8V, unless otherwise stated)

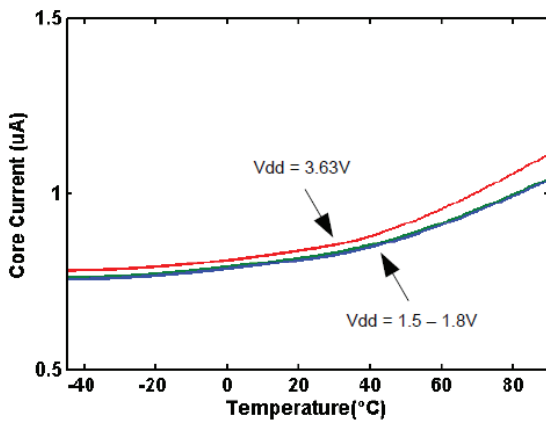
Initial Tolerance Histogram



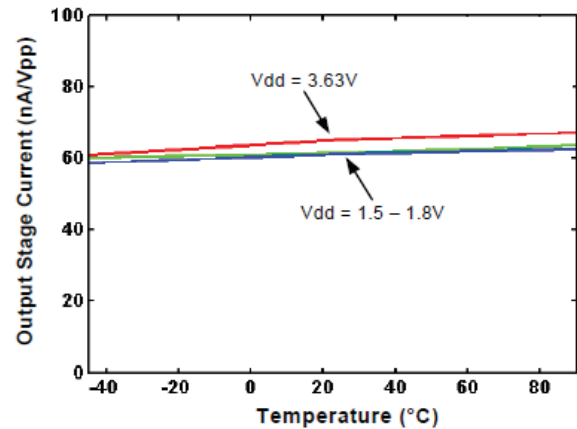
Frequency Stability vs. Operating Temperature Range



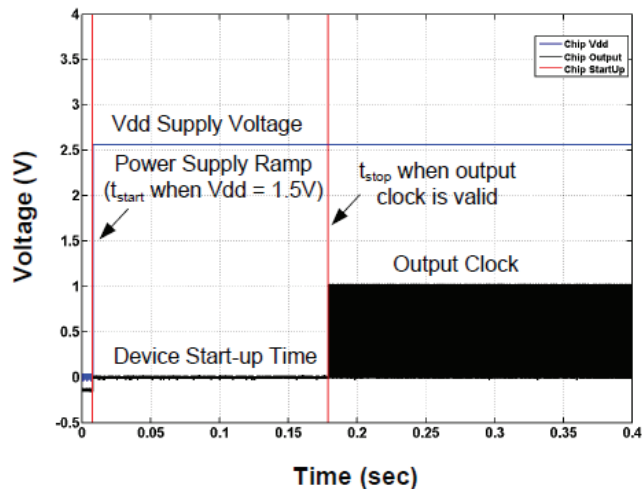
Core Current vs. Operating Temperature Range



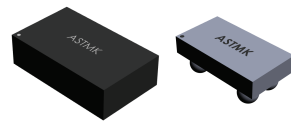
Output Stage Current vs. Operating Temperature Range



32.768kHz Start-up Time



Ultra-miniature, Low Power, 32.768kHz MEMS Oscillator



SMD: 2.0 x 1.2 x 0.60mm
CSP: 1.54 x 0.84 x 0.60mm

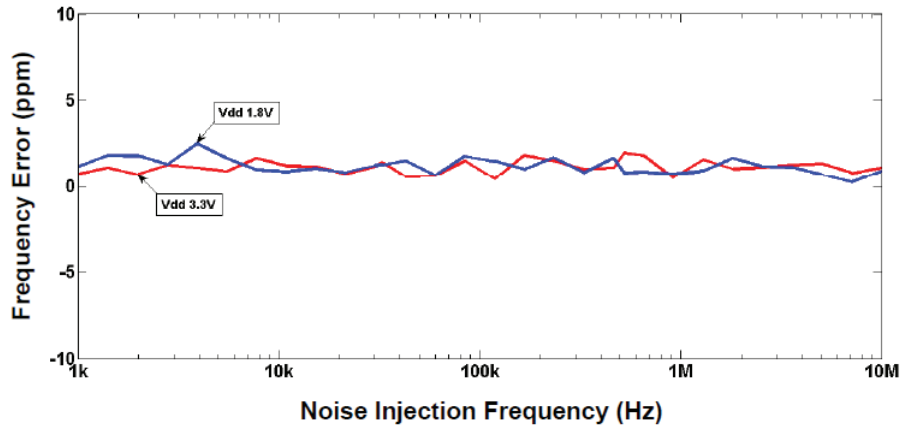
ASTMK



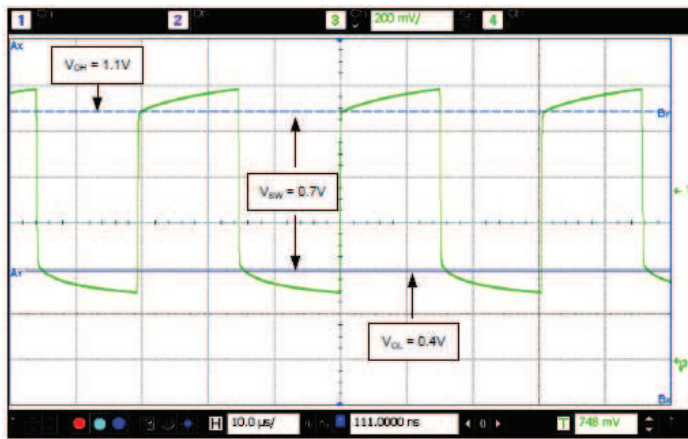
RoHS/RoHS II compliant

Typical Performance Data (TA=25°C, Vdd=1.8V, unless otherwise stated)---(Continued)

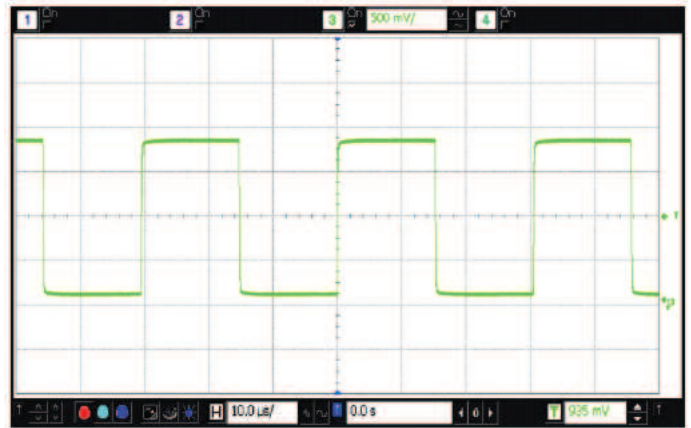
Power Supply Noise Rejection ($\pm 150\text{mV}$ Noise)



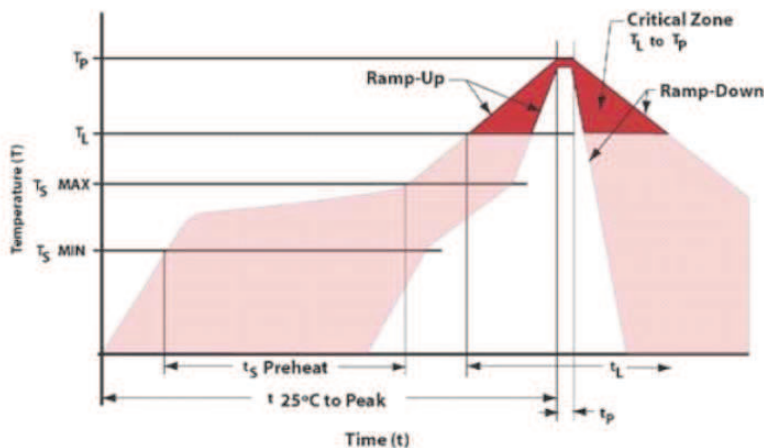
NanoDrive™ Output Waveform ($V_{OH} = 1.1\text{V}$, $V_{OL} = 0.4\text{V}$)



LVC MOS Output Waveform ($V_{\text{swing}} = 1.8\text{V}$)



REFLOW PROFILE:



| Item | Conditions |
|------------------------------------------|------------------|
| T_S MAX to T_L (Ramp-up Rate) | 3°C/second max |
| Preheat | |
| Temperature Minimum (T_S MIN) | 150°C |
| Temperature Typical (T_S TYP) | 175°C |
| Temperature Maximum (T_S MAX) | 200°C |
| Time (t_s) | 60 – 180 seconds |
| Ramp-up Rate (T_L to T_P) | 3°C/second max |
| Time Maintained Above | |
| Temperature (T_L) | 217°C |
| Time (t_L) | 60 – 150 seconds |
| Peak Temperature (T_P) | 260°C max |
| Target Peak Temperature (T_P Target) | 255°C |
| Time within 5°C of actual peak (t_p) | 20 – 40 seconds |
| Max. Number of Reflow Cycles | 3 |
| Ramp-down Rate | 6°C/second max |
| Time 25°C to Peak Temperature (t) | 8 minutes max |

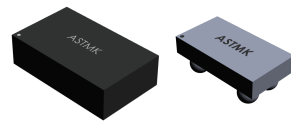
ABRACON IS
ISO9001:2008
CERTIFIED

 **ABRACON** LLC
The Power of Linking Together

5101 Hidden Creek Lane Spicewood TX 78669
Phone: 512-371-6159 | Fax: 512-351-8858
For terms and conditions of sales please visit:
www.abracon.com

Revised: 06.17.2017

Ultra-miniature, Low Power, 32.768kHz MEMS Oscillator



SMD: 2.0 x 1.2 x 0.60mm
CSP: 1.54 x 0.84 x 0.60mm

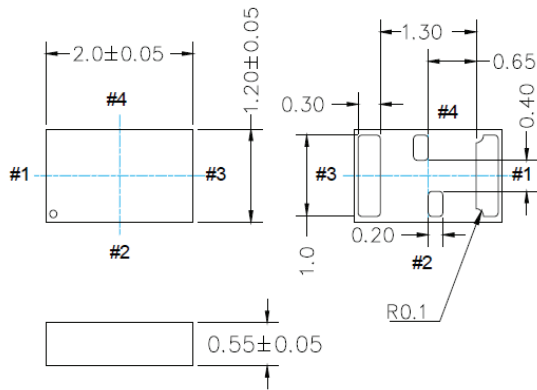
ASTMK



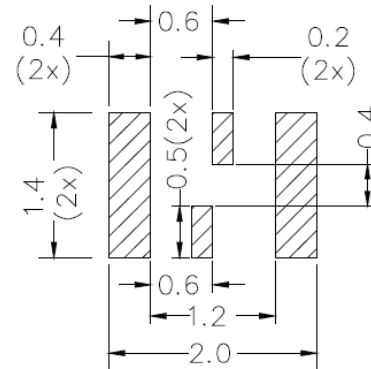
RoHS/RoHS II compliant

OUTLINE DIMENSION:

2012 SMD package:

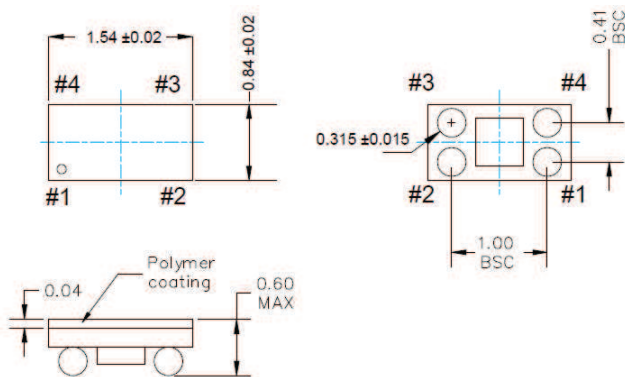


Recommended Land Pattern

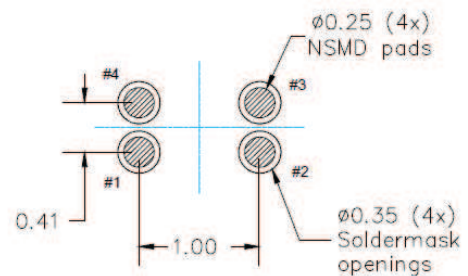


| Pin | Name | I/O | Functionality |
|-----|-----------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | NC | No Connect | No connection. Will not respond to any input signal. |
| 2 | GND | Power Supply Ground | Connect to ground. All GND pins must be connected to power supply ground. |
| 3 | CLK Out | OUT | Oscillator clock output. |
| 4 | V _{dd} | Power Supply | Connect to power supply 1.5V ≤ V _{dd} ≤ 3.63V for operation over -40°C to +85°C temperature range. Under normal operating conditions, V _{dd} doesn't require external bypass/decoupling capacitor(s). Internal power supply filtering will reject more than ±150mVpp with frequency components through 10MHz. |

1508 CSP package:



Recommended Land Pattern



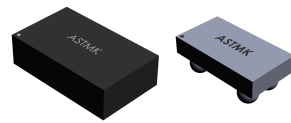
(soldermask openings shown with heavy dashed line)

Recommend 4-mil (0.1mm) stencil thickness

| Pin | Name | I/O | Functionality |
|-----|-----------------|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1,4 | GND | Power Supply Ground | Connect to ground. Acceptable to connect pin 1 and 4 together. Both pins must be connected to GND. |
| 2 | CLK Out | OUT | Oscillator clock output. |
| 3 | V _{dd} | Power Supply | Connect to power supply 1.2V ≤ V _{dd} ≤ 3.63V. Under normal operating conditions, V _{dd} doesn't require external bypass/decoupling capacitor(s). Internal power supply filtering will reject more than ±150mVpp with frequency components through 10MHz. |

Dimensions: mm

Ultra-miniature, Low Power, 32.768kHz MEMS Oscillator



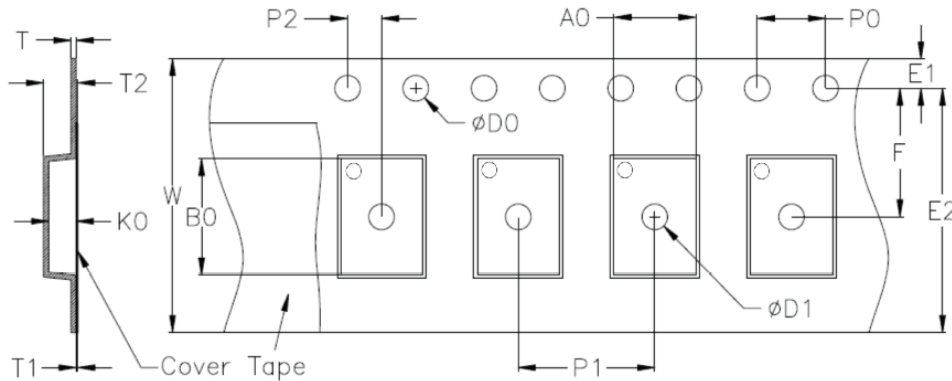
SMD: 2.0 x 1.2 x 0.60mm
CSP: 1.54 x 0.84 x 0.60mm

ASTMK



RoHS/RoHS II compliant

TAPE & REEL:

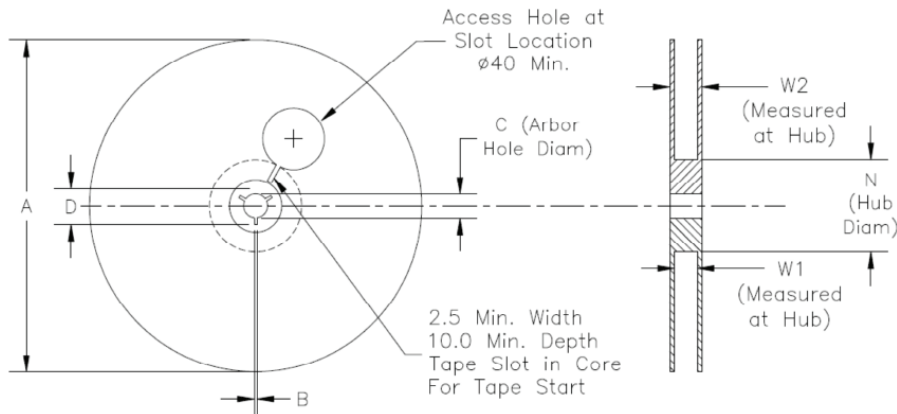


Tape Dimensions for 2012 SMD package (Unit: mm)

| D0 | D1 min. | E1 | E2 min. | F | P0 | P1 | P2 |
|-----------|---------|----------|---------|----------|-----------|-----------|----------|
| 1.55±0.05 | 1.0 | 1.75±0.1 | 6.05 | 3.5±0.05 | 4.0±0.1 | 4.0±0.1 | 2.0±0.05 |
| T | T1 max. | T2 max. | W max. | A0 | B0 | K0 | |
| 0.25±0.05 | NA | NA | 8.3 | 1.6±0.05 | 2.25±0.10 | 0.65±0.05 | |

Tape Dimensions for 1508 CSP package (Unit:mm)

| D0 | D1 min. | E1 | E2 min. | F | P0 | P1 | P2 |
|-----------|---------|----------|---------|-----------|-----------|-----------|----------|
| 1.55±0.05 | 0.18 | 1.75±0.1 | 6.05 | 3.5±0.05 | 4.0±0.1 | 4.0±0.1 | 2.0±0.05 |
| T | T1 max. | T2 max. | W max. | A0 | B0 | K0 | |
| 0.20±0.02 | NA | NA | 8.3 | 0.96±0.03 | 1.66±0.03 | 0.63±0.03 | |



| Option | A max. | B min. | C | D min. | N | W1 | W2 max. |
|--------|--------|--------|---------------|--------|---------|------------|---------|
| T & T3 | 180.5 | 1.5 | 13.0+0.6/-0.2 | 20.2 | 60±0.5 | 8.4+1.5/-0 | 14.4 |
| T10 | 330 | 1.5 | 13.0±0.2 | 20.2 | 100±0.5 | 8.4+1.5/-0 | 14.4 |

T= Tape and reel (1,000pcs/reel)
T3= Tape and reel (3,000pcs/reel)
T10= Tape and reel (10,000pcs/reel)

Unit: mm

ATTENTION: Abracon Corporation's products are COTS – Commercial-Off-The-Shelf products; suitable for Commercial, Industrial and, where designated, Automotive Applications. Abracon's products are not specifically designed for Military, Aviation, Aerospace, Life-dependant Medical applications or any application requiring high reliability where component failure could result in loss of life and/or property. For applications requiring high reliability and/or presenting an extreme operating environment, written consent and authorization from Abracon Corporation is required. Please contact Abracon Corporation for more information.

ABRACON IS
ISO9001:2008
CERTIFIED



5101 Hidden Creek Lane Spicewood TX 78669
Phone: 512-371-6159 | Fax: 512-351-8858
For terms and conditions of sales please visit:
www.abracon.com

Revised: 06.17.2017