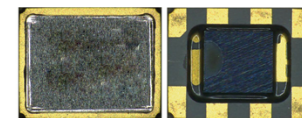


# REAL TIME CLOCK MODULE WITH 32.768kHz TCXO



3.2 x 2.5 x 1.0 mm

**AB-RTCMK-32.768kHz**

Moisture Sensitivity Level: MSL=1



**RoHS**  
Compliant

## FEATURES:

- Ultra low profile, 3.2 x 2.5 x 1.0 mm, Seam sealed SMT package
- Exceptional Frequency Stability over temperature;  $\pm 5.0$  ppm max. over  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Operating Voltage;  $+1.30\text{V}$  to  $+5.50\text{V}$
- $4.0\mu\text{A}$  max. current at no load
- I2C Communication
- Clock function : Hour/ Min / Sec
- Leap year automatic distinction calendar function till 2099
- Alarm interruption function for day, date, hour and minute settings
- A constant cycle timer interruption function : 244.14us to 255 min
- Time update interruption function : Min / Sec
- Clock output function : 32.768kHz / 1024Hz / 32Hz / 1Hz

## APPLICATIONS:

- Smart cards
- Wireless sensors and tags
- Medical electronics
- Utility meters
- Data loggers
- Appliances
- Handsets
- Consumer electronics

## STANDARD SPECIFICATIONS:

| Parameters  | Minimum               | Typical | Maximum               | Units | Notes   |
|---|-----------------------|---------|-----------------------|-------|---|
| Nominal Frequency (f0)                            |                       | 32.768  |                       | kHz   |   |
| Frequency Tolerance (df/f0)                       | -3.0                  |         | +3.0                  | ppm   | Initial + 2 times reflow<br>Ta= $\pm 25 \pm 2^{\circ}\text{C}$  |
| Frequency Stability vs Temp. (df/f0)              | -5.0                  |         | +5.0                  | ppm   | Ta= $-40$ to $+85^{\circ}\text{C}$  |
| Frequency Stability vs Voltage (df/dV)            | -1.0                  |         | +1.0                  | ppm/V | Ta= $\pm 25^{\circ}\text{C}$<br>V <sub>DD</sub> =2.0 to 5.5V  |
| Frequency Aging Rate (dfag)                       | -3.0                  |         | +3.0                  | ppm   | Ta= $\pm 25^{\circ}\text{C}$ , first year   |
| Start Up Time (Tst)                               |                       |         | 1.0                   | sec   | Ta= $\pm 25^{\circ}\text{C}$<br>V <sub>DD</sub> =1.3V   |
|   |                       |         | 3.0                   | sec   | Ta= $-40$ to $+85^{\circ}\text{C}$<br>V <sub>DD</sub> =1.3 to 5.5V                                      |
| Power Supply Current 1 (I <sub>DD1</sub> )        |                       | 0.6     | 2.0                   | uA    | SCL=SDA=/INT=V <sub>DD</sub><br>CLKOUT=V <sub>SS</sub> ,<br>V <sub>DD</sub> =3V                         |
| Power Supply Current 2 (I <sub>DD2</sub> )        |                       | 1.5     | 4.0                   | uA    | SCL=SDA=/INT=V <sub>DD</sub><br>CLKOUT=V <sub>DD</sub> ,<br>V <sub>DD</sub> =3V, CL <sub>OUT</sub> =0pF |
| Input Leak Current (I <sub>LK</sub> )             | -0.5                  |         | +0.5                  | uA    | CLKOE,SCL,SDA<br>V <sub>IN</sub> =V <sub>DD</sub> or V <sub>SS</sub>                                    |
| Output Leak Current (I <sub>OZ</sub> )            | -0.5                  |         | +0.5                  | uA    | CLKOUT,/INT,SDA<br>V <sub>OUT</sub> =V <sub>DD</sub> or V <sub>SS</sub>                                 |
| “H” Input Voltage (V <sub>IH</sub> )              | 0.8 x V <sub>DD</sub> |         | 5.5                   | V     | CLKOE,SCL,SDA   |
| “L” Input Voltage (V <sub>IL</sub> )              | 0.0                   |         | 0.2 x V <sub>DD</sub> | V     | CLKOE,SCL,SDA   |
| “H” Output Voltage (V <sub>OH</sub> )             | 2.2                   |         | 3.0                   | V     | CLKOUT, V <sub>DD</sub> =3.0V,<br>I <sub>OH</sub> =-1mA   |
| “L” Output Voltage                                | V <sub>OL1</sub>      | 0.0     | 0.8                   | V     | CLKOUT, V <sub>DD</sub> =3.0V,<br>I <sub>OL</sub> =1mA  |
|   | V <sub>OL2</sub>      | 0.0     | 0.4                   | V     | /INT, V <sub>DD</sub> =3.0V,<br>I <sub>OL</sub> =1mA  |
|   | V <sub>OL3</sub>      | 0.0     | 0.4                   | V     | SDA, V <sub>DD</sub> $\geq$ 2.0V,<br>I <sub>OL</sub> =3mA   |
| Low Voltage Detection Voltage (V <sub>DET</sub> ) | 1.3                   | 1.4     | 1.5                   | V     |   |

For detail data sheet, please contact [tech-support@abracon.com](mailto:tech-support@abracon.com)

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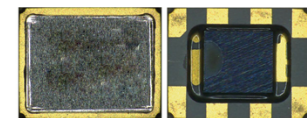
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Revised: 09.30.12

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3.2 x 2.5 x 1.0 mm

AB-RTCMK-32.768kHz

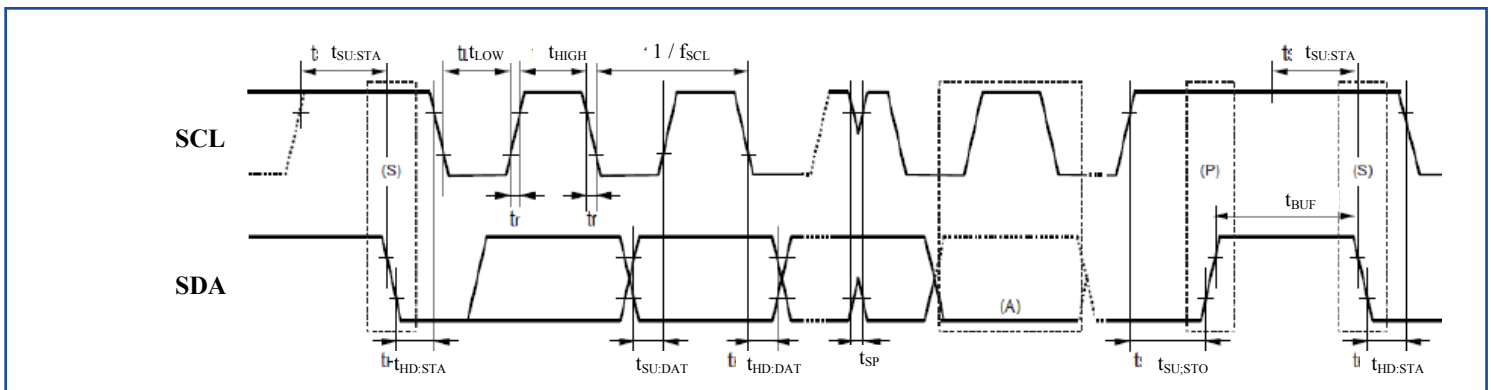


**RoHS**  
Compliant

## AC ELECTRICAL CHARACTERISTICS

| Parameters   | Minimum | Typical | Maximum | Units | Notes      |
|--|---------|---------|---------|-------|------------|
| SCL Clock Frequency ( $f_{SCL}$ )                            |         |         | 400     | kHz   |            |
| START Condition Setup Time ( $t_{SU,STA}$ )                  | 0.6     |         |         | sec   |            |
| START Condition Hold Time ( $t_{HD,STA}$ )                   | 0.6     |         |         | sec   |            |
| Data Input Setup Time ( $t_{SU,DAT}$ )                       | 100     |         |         | nsec  |            |
| Data Input Hold Time ( $t_{HD,DAT}$ )                        | 0       |         | 900     | nsec  |            |
| STOP Condition Setup Time ( $t_{SU,STO}$ )                   | 0.6     |         |         | sec   |            |
| Bus Idle Time Between START and STOP Condition ( $t_{BUF}$ ) | 1.3     |         |         | sec   |            |
| SCL Low Time ( $t_{LOW}$ )                                   | 1.3     |         |         | sec   |            |
| SCL High Time ( $t_{HIGH}$ )                                 | 0.6     |         |         | sec   |            |
| SCL, SDA Rise Time ( $t_r$ )                                 |         |         | 0.3     | sec   | 20% to 80% |
| SCL, SDA Fall Time ( $t_f$ )                                 |         |         | 0.3     | sec   | 80% to 20% |
| Allowable Spike Time on Bus ( $t_{SP}$ )                     |         |         | 50      | nsec  |            |

## TIMING CHART



## PART IDENTIFICATION:

AB - RTCMK - 32.768 kHz -

| Packaging         |
|-------------------|
| Blank: Bulk       |
| T: 1000pcs/reel   |
| T3*: 3000pcs/reel |

\*3000pcs/reel: standard reel quantity

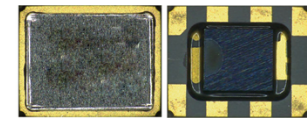
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3.2 x 2.5 x 1.0 mm

AB-RTCMK-32.768kHz

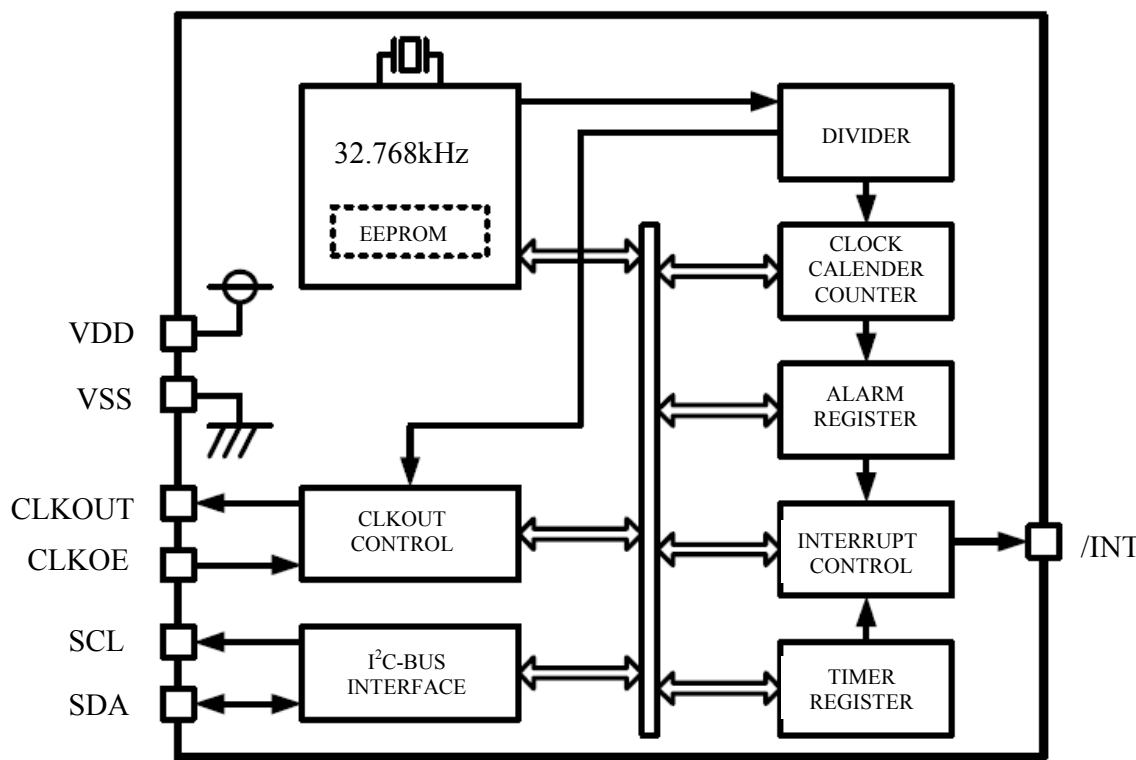


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## FUNCTION:

| Pin No. | Pin Name | I/O    | Function   |
|---------|----------|--------|--|
| 1       | CLKOE    | Input  | This is an input pin used to control the output mode of the CLKOUT pin. When this pin's level is high, the CLKOUT pin is in output mode. When it is low, the CLKOUT pin is "Hi-Z" (High Impedance).  |
| 2       | /INT     | Output | This pin is used to output alarm signals, timer signals, timer update signals, and other signals. This pin is an open drain pin.   |
| 3       | N.C.     |        | This pin is open.  |
| 4       | VSS      |        | This pin is connected to ground.   |
| 5       | CLKOUT   | Output | This pin outputs a 32.768kHz signal. This is the C-MOS output pin with output control provided via the CLKOE pin.  |
| 6       | SCL      | Input  | This is the serial clock input for I <sup>2</sup> C BUS communications.  |
| 7       | SDA      | I/O    | This is the serial data input/output for I <sup>2</sup> C BUS communications. This pin's signal is used for input and output of address, data, and ACK bits, synchronized with the serial clock used for I <sup>2</sup> C communication. This pin is an N-ch open drain pin during output. |
| 8       | VDD      |        | This pin is connected to a positive power supply.  |

## BLOCK DIAGRAM:

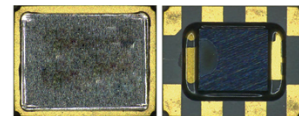


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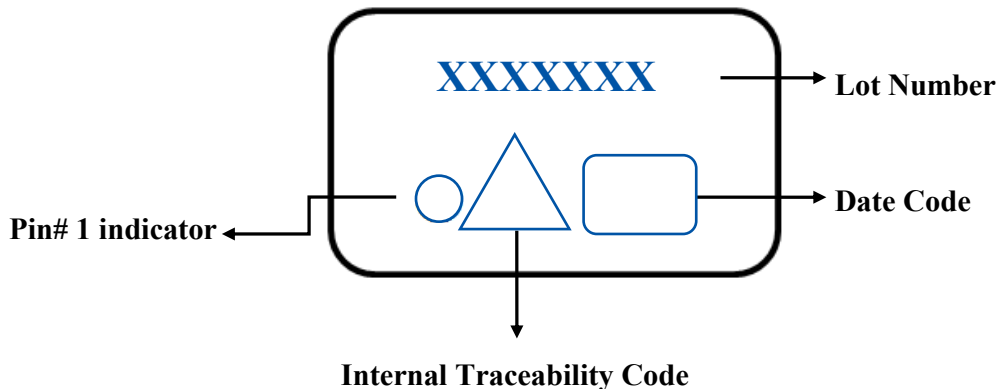


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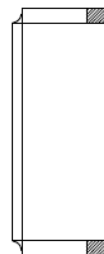
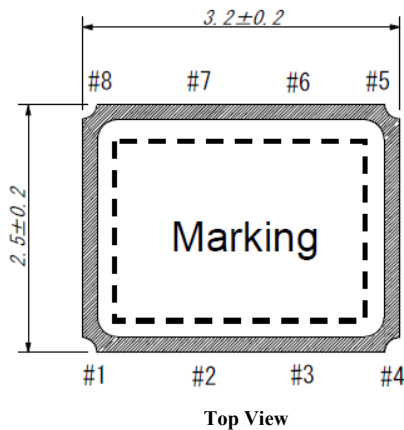


3.2 x 2.5 x 1.0 mm

## MARKING:

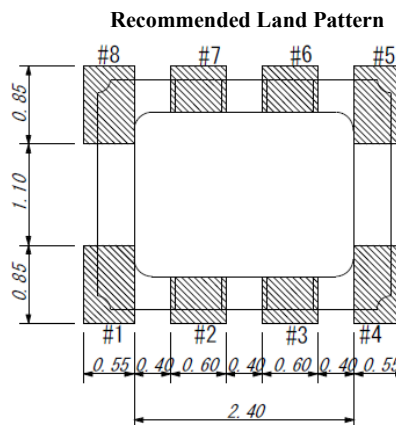
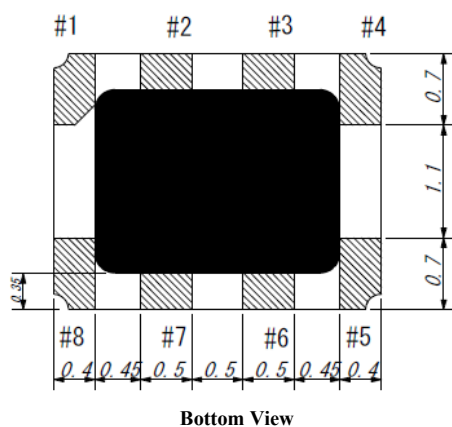


## OUTLINE DRAWING:



### PIN / Function

|            |             |
|------------|-------------|
| #1 : CLKOE | #5 : CLKOUT |
| #2 : /INT  | #6 : SCL    |
| #3 : N.C.  | #7 : SDA    |
| #4 : VSS   | #8 : VDD    |



Dimension : mm

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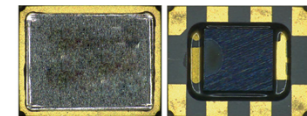
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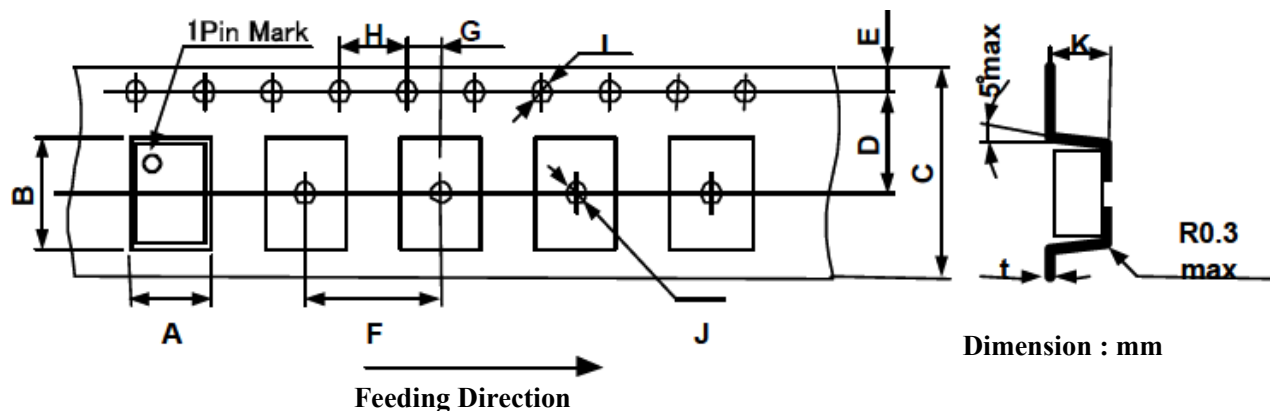


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## TAPE & REEL:

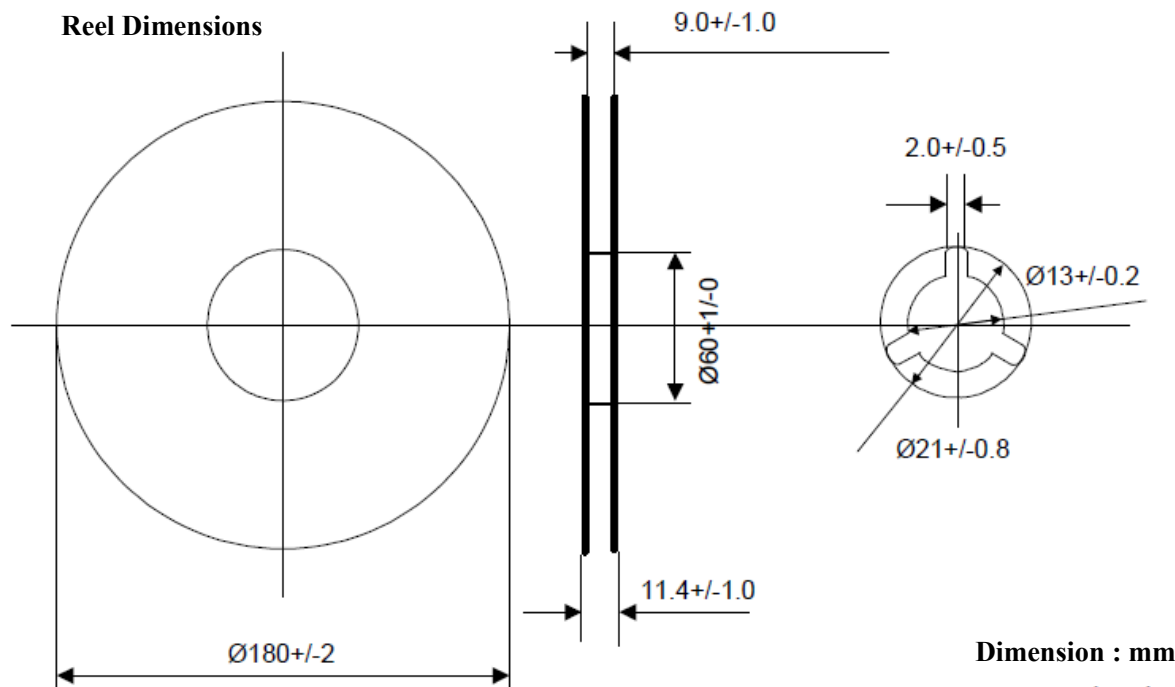
T: 1000pcs/reel

T3: 3000pcs/reel (standard reel quantity)



| A           | B          | C            | D             | E          | F           |
|-------------|------------|--------------|---------------|------------|-------------|
| 2.80 ± 0.1  | 3.50 ± 0.1 | 8.00 ± 0.3   | 3.50 ± 0.05   | 1.75 ± 0.1 | 4.00 ± 0.1  |
| G           | H          | I            | J             | K          | T           |
| 2.00 ± 0.05 | 4.00 ± 0.1 | ø1.5 +1.0/-0 | ø 1.5 +1.0/-0 | 1.10 ± 0.1 | 0.25 ± 0.05 |

### Reel Dimensions



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