

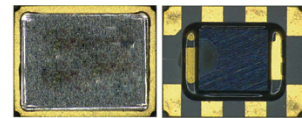
# REAL TIME CLOCK MODULE WITH 32.768kHz TCXO

AB-RTCMK-32.768kHz

Moisture Sensitivity Level: MSL=1



RoHS  
Compliant



3.2 x 2.5 x 1.0 mm

## 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 $T_a = +25 \pm 2^{\circ}\text{C}$
Frequency Stability vs Temp. (df/f0)	-5.0		+5.0	ppm	$T_a = -40$ to $+85^{\circ}\text{C}$
Frequency Stability vs Voltage (df/dV)	-1.0		+1.0	ppm/V	$T_a = +25^{\circ}\text{C}$ $V_{DD} = 2.0$ to $5.5\text{V}$
Frequency Aging Rate (dfag)	-3.0		+3.0	ppm	$T_a = +25^{\circ}\text{C}$ , first year
Start Up Time (Tst)			1.0	sec	$T_a = +25^{\circ}\text{C}$ $V_{DD} = 1.3\text{V}$
			3.0	sec	$T_a = -40$ to $+85^{\circ}\text{C}$ $V_{DD} = 1.3$ to $5.5\text{V}$
Power Supply Current 1 ( $I_{DD1}$ )		0.6	2.0	$\mu\text{A}$	SCL=SDA=/INT= $V_{DD}$ CLKOUT= $V_{SS}$ , $V_{DD} = 3\text{V}$
Power Supply Current 2 ( $I_{DD2}$ )		1.5	4.0	$\mu\text{A}$	SCL=SDA=/INT= $V_{DD}$ CLKOUT= $V_{DD}$ , $V_{DD} = 3\text{V}$ , CL <sub>OUT</sub> =0pF
Input Leak Current ( $I_{LK}$ )	-0.5		+0.5	$\mu\text{A}$	CLKOE,SCL,SDA $V_{IN} = V_{DD}$ or $V_{SS}$
Output Leak Current ( $I_{OZ}$ )	-0.5		+0.5	$\mu\text{A}$	CLKOUT,/INT,SDA $V_{OUT} = V_{DD}$ or $V_{SS}$
"H" Input Voltage ( $V_{IH}$ )	$0.8 \times V_{DD}$		5.5	V	CLKOE,SCL,SDA
"L" Input Voltage ( $V_{IL}$ )	0.0		$0.2 \times V_{DD}$	V	CLKOE,SCL,SDA
"H" Output Voltage ( $V_{OH}$ )	2.2		3.0	V	CLKOUT, $V_{DD} = 3.0\text{V}$ , $I_{OH} = -1\text{mA}$
"L" Output Voltage	$V_{OL1}$	0.0	0.8	V	CLKOUT, $V_{DD} = 3.0\text{V}$ , $I_{OL} = 1\text{mA}$
	$V_{OL2}$	0.0	0.4	V	/INT, $V_{DD} = 3.0\text{V}$ , $I_{OL} = 1\text{mA}$
	$V_{OL3}$	0.0	0.4	V	SDA, $V_{DD} \geq 2.0\text{V}$ , $I_{OL} = 3\text{mA}$
Low Voltage Detection Voltage ( $V_{DET}$ )	1.3	1.4	1.5	V	

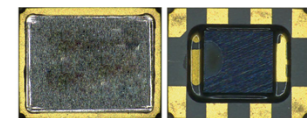
For detail data sheet, please contact [tech-support@abracon.com](mailto:tech-support@abracon.com)

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3.2 x 2.5 x 1.0 mm

AB-RTCMK-32.768kHz

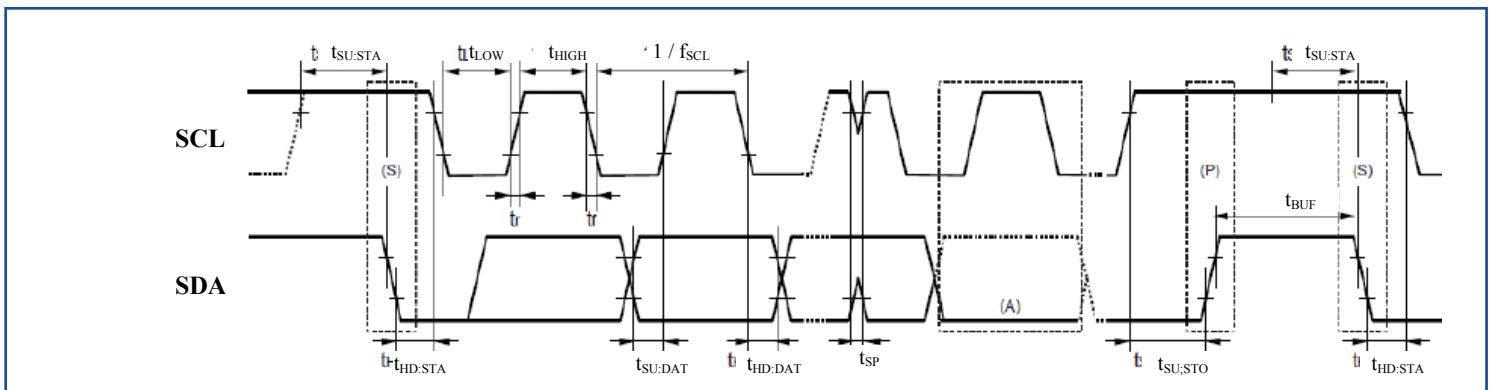


RoHS  
Compliant

## 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

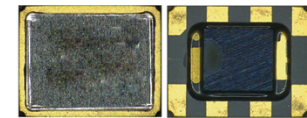
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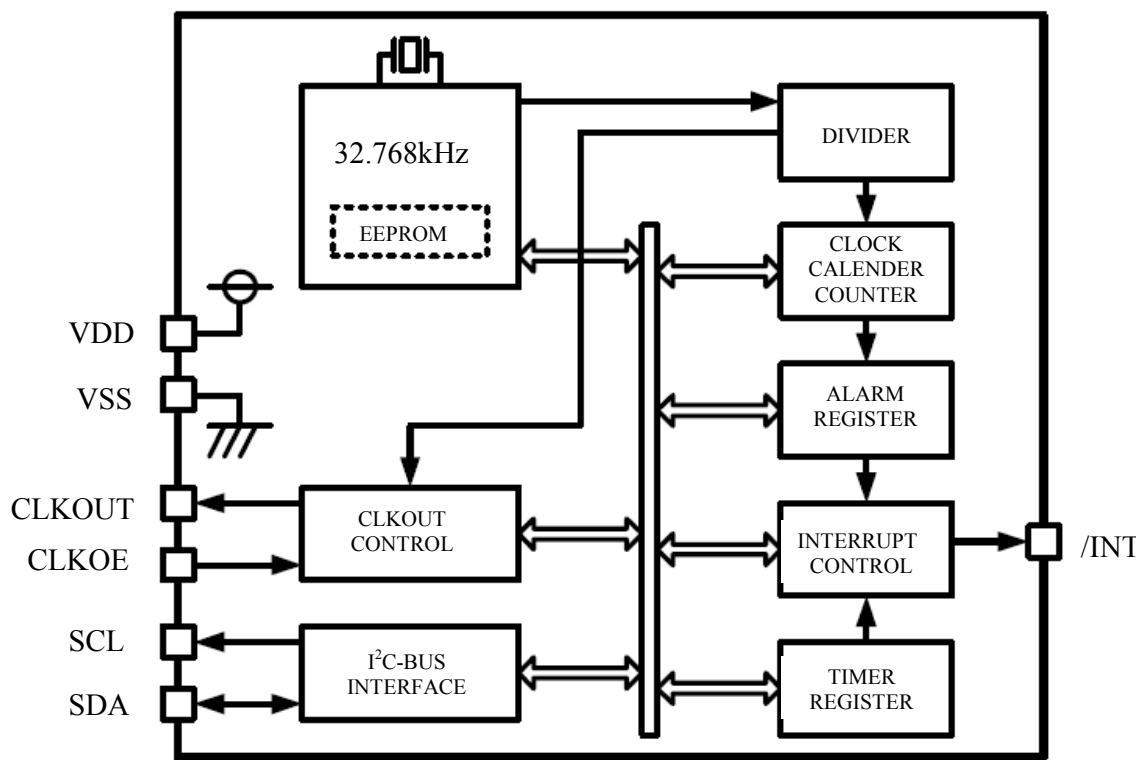


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## FUNCTION:

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:

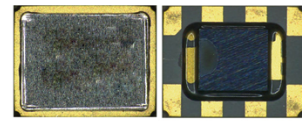


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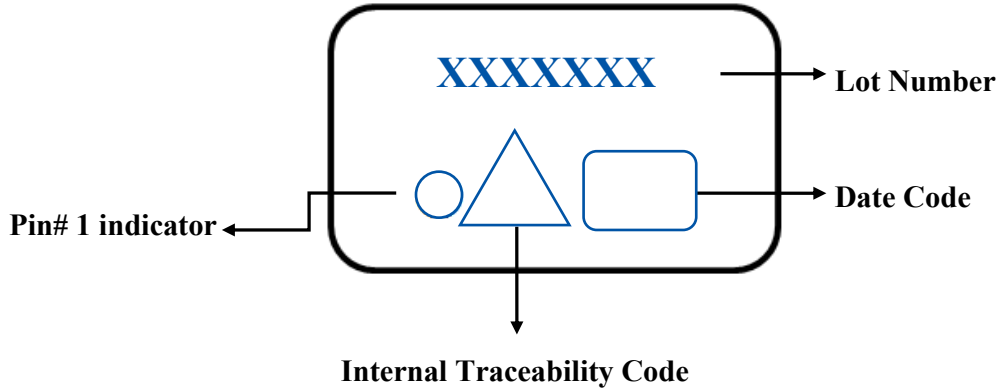


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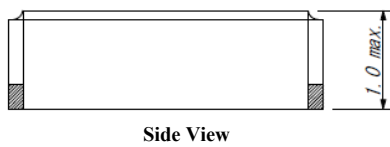
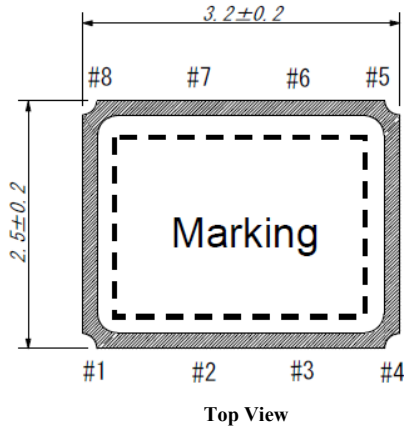


3.2 x 2.5 x 1.0 mm

## MARKING:

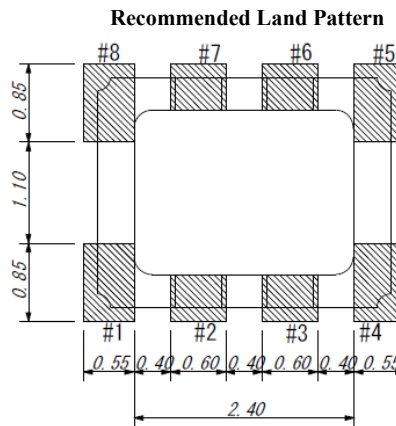
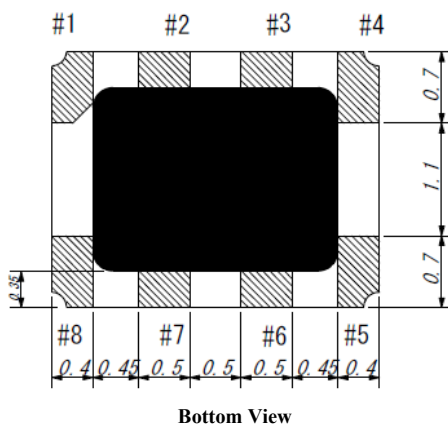


## OUTLINE DRAWING:



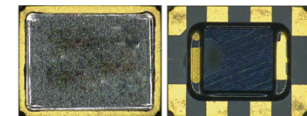
### PIN / Function

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



Dimension : mm

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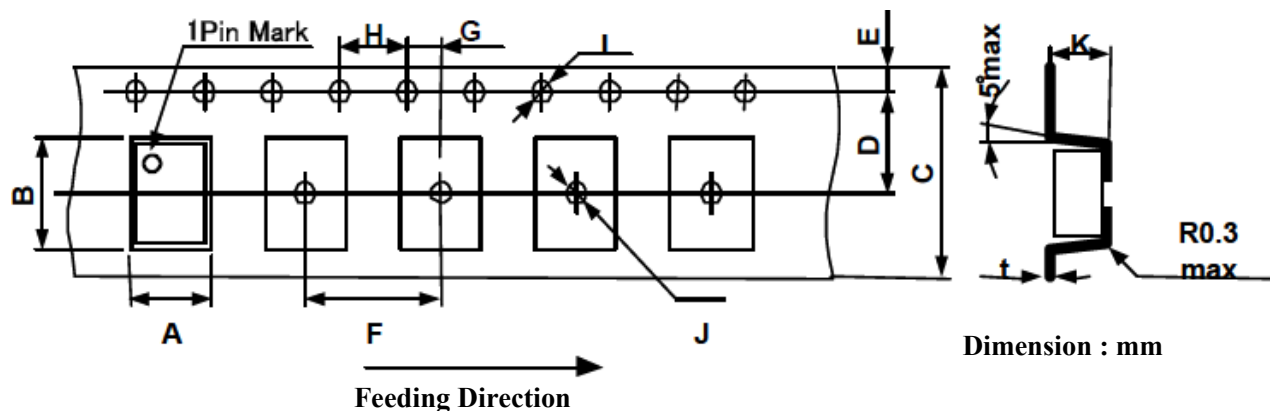


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## TAPE & REEL:

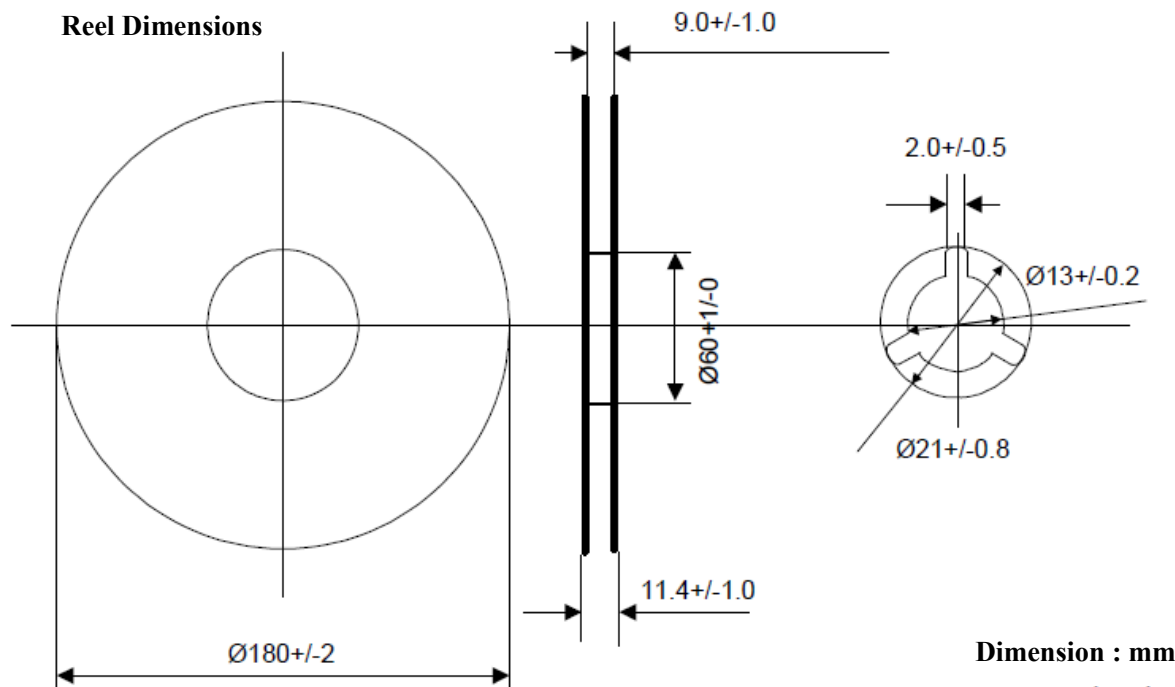
T: 1000pcs/reel

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



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

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