![Chipsmall logo]

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

Real Time Clock Module with I²C Bus

AB-RTCMC-32.768kHz-B5GA-S3

Moisture Sensitivity Level: MSL=1

Pb **RoHS/RoHS II compliant**

3.7 x 2.5 x 0.9 mm

FEATURES:

- With state-of-the-art RTC Technology by Micro Crystal AG
- RTC module with built-in crystal oscillating at 32.768 kHz
- 400kHz two-wire I2C interface
- Wide Interface operating voltage: 1.8 – 5.5 V
- Wide clock operating voltage: 1.2 – 5.5 V
- Low power consumption: 250 nA typ @ 3.0V / 25°C
- Provides year, month, day, weekday, hours, minutes, seconds
- Alarm and Timer functions
- Century flag
- Low voltage detector, internal power on reset
- Programmable clock output for peripheral devices (32.768 kHz, 1024 Hz, 32 Hz, 1 Hz)
- I2C slave address: read A3h, write A2h
- Small and compact package size: 3.7 x 2.5 x 0.9 mm. RoHS-compliant and 100% leadfree

APPLICATIONS:

- Wide range in communication & measuring equipment
- Commercial & Industrial applications
- Automotive electronics applications
- Wireless communications
- PDA and Palm Pilots
- Credit Cards with Security Technology

STANDARD SPECIFICATIONS:

Absolute Maximum Ratings

Parameters	Min.	Typ.	Max.	Units	Notes
Supply Voltage (V_{DD})	-0.5		+6.5	V	>GND / <V_{DD}
Supply Current (I_{DD}; I_{SS})	-50		+50	mA	V_{DD} Pin
Input Voltage (V_I)	V_{SS}-0.5		V_{DD} +0.5	V	Input Pin
Output Voltage (V_O)	V_{SS}-0.5		V_{DD} +0.5	V	$\overline{INT}$ Pin
DC Input Current (I_I)	-10		+10	mA	
DC Output Current (I_O)	-10		+10	mA	
Operating Temperature Range (T_{OPR})	-40		+85	ºC	
Storage Temperature (T_{STO})	-55		+125	ºC	Stored as bare product

Frequency Characteristics

Parameters	Min.	Typ.	Max.	Units	Notes
Frequency Accuracy (ΔF/F)		±10	±20	ppm	T_{AMB}=+25°C; V_{DD}=3.0V
Frequency vs Voltage (ΔF/V)		±0.8	±1.5	ppm/V	T_{AMB}=+25°C; V_{DD}=1.8~5.5V
Frequency vs Temperature (ΔF/T_{OPR})	-0.035ppm/°C² (T_{OPR}-T_O)² ±10%			ppm	T_{REF}=+25°C; V_{DD}=3.0V
Turnover Temperature (T_O)	+20	+25	+30	°C	
Aging (first year)	-3		+3	ppm	T_{AMB}=+25°C
Start-up Time (T_{START})		350	500	ms	T_{AMB}=+25°C
CLKOUT duty cycle	40	50	60	%	T_{AMB}=+25°C

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Static Characteristics

Parameters		Min.	Typ.	Max.	Units	Notes
Supplies						
Supply Voltage (V_{DD})		1.2		5.5	V	I²C bus inactive T_{AMB}=+25℃
		1.8		5.5		I²C bus active f_{SCL}= 400kHz
		V_{LOW}		5.5		For clock data integrity T_{AMB}=+25℃
Current Consumption (I_{DDO})	f_{SCL}= 400kHz			800	μA	I²C bus active
	f_{SCL}= 100kHz			200		
Current Consumption (I_{DD}) [1) 2) 3)]	V_{DD} = 5.0V		275	550	nA	I²C bus inactive(f_{SCL}=0Hz) CLKOUT disabled T_{AMB}=+25℃
	V_{DD} = 3.0V		250	500		
	V_{DD} = 2.0V		225	450		
Current Consumption (I_{DD}) [1) 2) 3)]	V_{DD} = 5.0V		500	750	nA	I²C bus inactive(f_{SCL}=0Hz) CLKOUT disabled T_{AMB}=-40 ~ +85℃
	V_{DD} = 3.0V		400	650		
	V_{DD} = 2.0V		400	600		
Current Consumption (I_{DD32k}) [3)]	V_{DD} = 5.0V		2.5	3.4	μA	I²C bus inactive(f_{SCL}=0Hz) CLKOUT enabled (32.768kHz) Load=7.5pF / T_{AMB}= +25℃
	V_{DD} = 3.0V		1.5	2.2		
	V_{DD} = 2.0V		1.1	1.6		
Input						
LOW Level Input Voltage (V_{IL})		V_{SS}-0.5		30%* V_{DD}	V	
HIGH Level Input Voltage (V_{IH})		70%* V_{DD}		V_{DD}+0.5	V	
Input Leakage Current (I_L)		-1		+1	μA	V_I=V_{DD} or V_{SS}
Input Capacitance (C_I) [4)]				7	pF	
Output						
HIGH Level Output Current (I_{OH})	Pin: CLKOUT			1	mA	V_{OH} = 4.6V; V_{DD} = 5.0V
LOW Level Output Current (I_{OL})	Pin: SDA			-3	mA	V_{OL} = 0.4V; V_{DD} = 5.0V
	Pin: $\overline{INT}$			-1		
	Pin: CLKOUT			-1		
Output Leakage Current (I_{LO})		-1	0	+1	μA	V_O = V_{DD} or V_{SS}
Voltage Detector						
Low Voltage (V_{LOW})			0.9	1.0	V	T_{AMB}=+25℃

1) Timer source clock = 1/60 Hz.
2) CLKOUT disabled (FE = 0 or CLKOE = 0).
3) V_{IL} and V_{IH} with an input voltage swing of V_{SS} to V_{DD}.
4) Tested on sample basis.
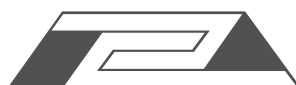
I²C Interface Dynamic Characteristics

All timing values are valid within the operating supply voltage range and references to V_{IL} and V_{IH} with an input voltage swing from V_{SS} and V_{DD}.

Parameters	Min.	Typ.	Max.	Units
SCL clock frequency (f_{SCL})			400	kHz
Hold time (repeated) START condition ($t_{HD;STA}$)	0.6			µs
Startup time for repeated START condition ($t_{SU;STA}$)	0.6			µs
LOW period of SCL clock (t_{LOW})	1.3			µs
HIGH period of SCL clock (t_{HIGH})	0.6			µs
Bus free time between STOP and START condition (t_{BUF})	1.3			µs
Rise time of both SDA and SCL signals (t_r)			0.3	µs
Fall time of both SDA and SCL signals (t_f)			0.3	µs
Capacitive load for each bus line (C_b)			400	pF
Data setup time ($t_{SU;DAT}$)	100			ns
Data hold time ($t_{HD;DAT}$)	0			ns
Setup time for STOP condition ($t_{SU;STO}$)	0.6			µs
Spike pulse width ($t_{w(spike)}$)			50	ns

I²C Interface Timing Characteristics
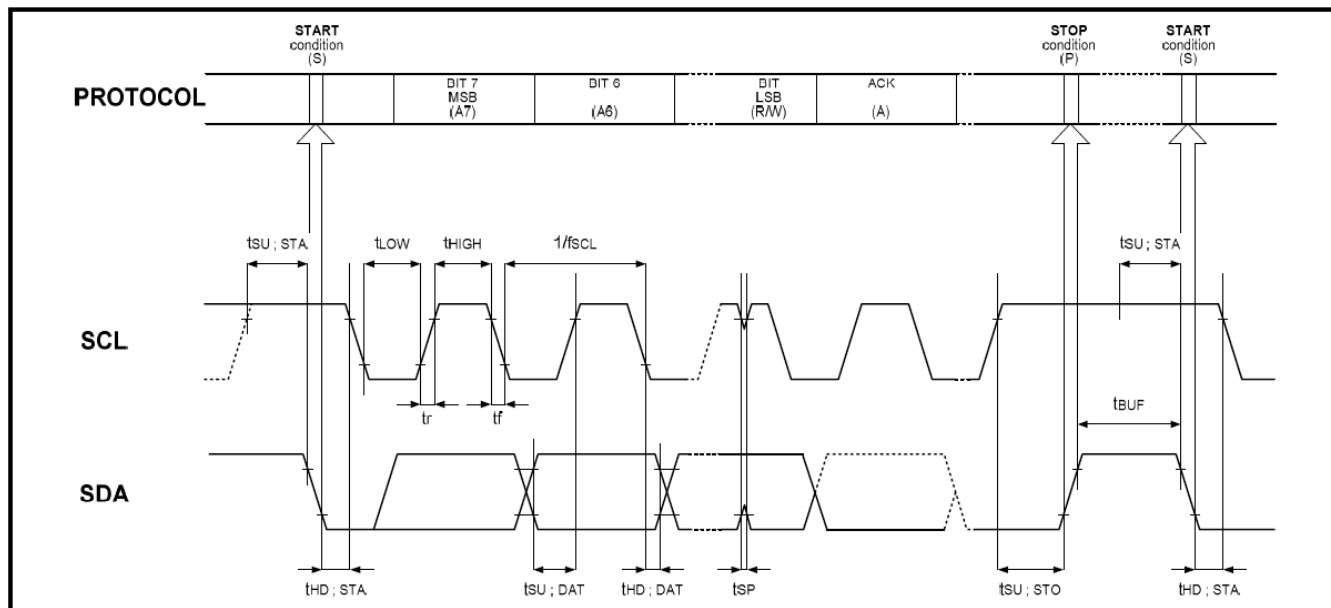
Note:
The I²C BUS access time between a START and a START condition or between a START and a STOP condition to this device must be less than one second.

ABRACON IS
ISO 9001 : 2008
CERTIFIED

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3.7 x 2.5 x 0.9 mm

▷ PART IDENTIFICATIONS:

AB-RTCMC-32.768 kHz-B5GA-S3-☐
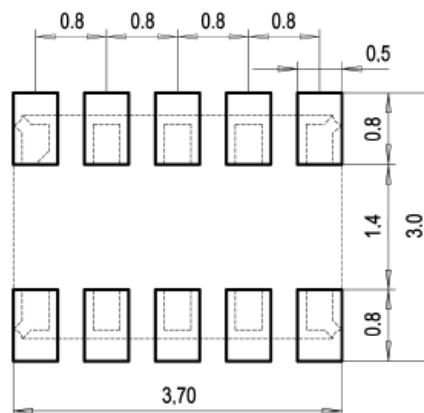
Packaging
Blank: Bulk
T: 1000pcs/reel

▷ OUTLINE DIMENSIONS:
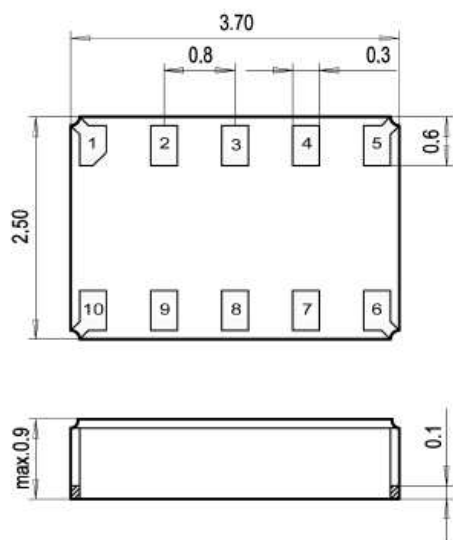
Recommended Land Pattern

Dimensions: mm

▷ PIN DESCRIPTIONS:

Pin No.	Pin Name	Function
1	CLKOE	CLKOUT enable/disable pin; enable is active HIGH; tie to GND when not using CLKOUT
2	V_{DD}	Positive supply voltage
3	CLKOUT	Clock Output pin; push-pull
4	SCL	Serial Clock Input pin; requires pull-up resistor
5	SDA	Serial Data Input-Output pin; open-drain; requires pull-up resistor
6	$\overline{INT}$	Interrupt Output pin; open-drain; active LOW
7	V_{SS}	Ground
8	N.C.	Not Connected
9	N.C.	Not Connected
10	N.C.	Not Connected

Real Time Clock Module with I²C Bus

AB-RTCMC-32.768kHz-B5GA-S3

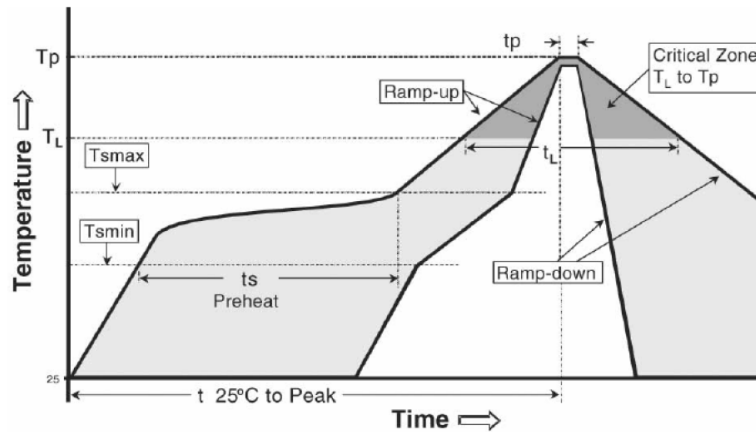**Pb** | **RoHS/RoHS II compliant**

3.7 x 2.5 x 0.9 mm

▷ BLOCK DIAGRAM:
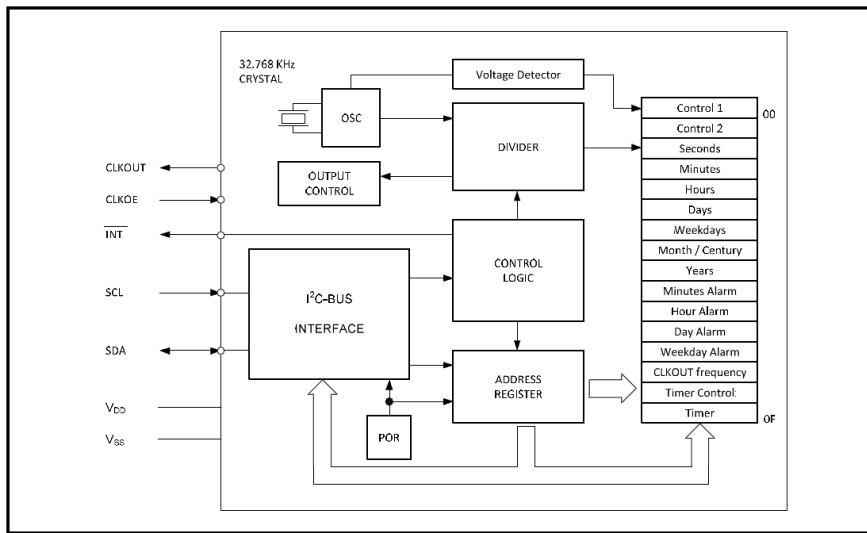
▷ RECOMMENDED REFLOW PROFILE:

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

Temperature	Conditions	Units
Average Ramp-up Rate (T_{Smax} to T_P)	3℃/second max	℃/s
Ramp Down Rate (T_{cool})	6℃/second max	℃/s
Time 25℃ to Peak Temperature ($T_{to-peak}$)	8 minutes max	m
Preheat		
Temperature Min (T_{Smin})	150	℃
Temperature Max (T_{Smax})	200	℃
Time Ts_{min} to Ts_{max} (ts)	60 ~ 180	sec
Time Above Liquidus		
Temperature Liquidus (T_L)	217	℃
Time above Liquidus (t_L)	60 ~150	sec
Peak Temperature		
Peak Temperature (T_P)	260	℃
Time within 5℃ of Peak Temperature (t_P)	20 ~ 40	sec

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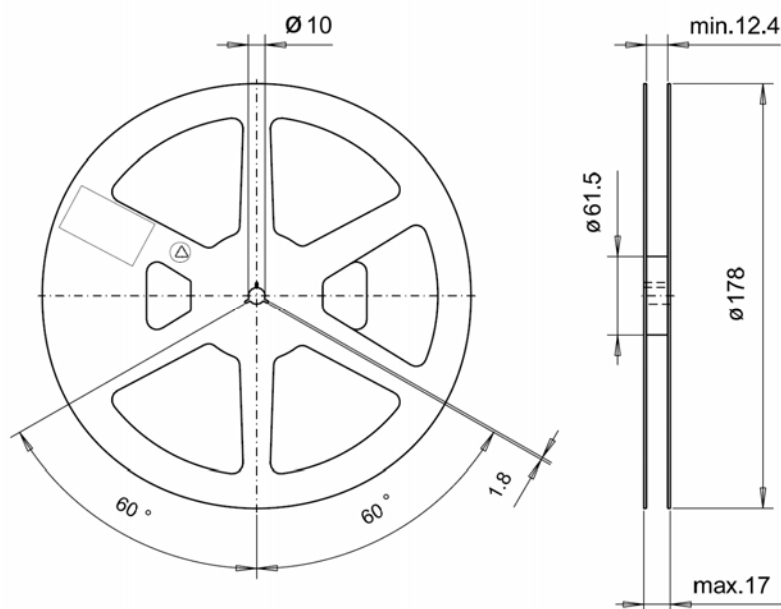
Pb | **RoHS/RoHS II compliant**

3.7 x 2.5 x 0.9 mm

▷ TAPE & REEL:

T = 1000pcs/reel
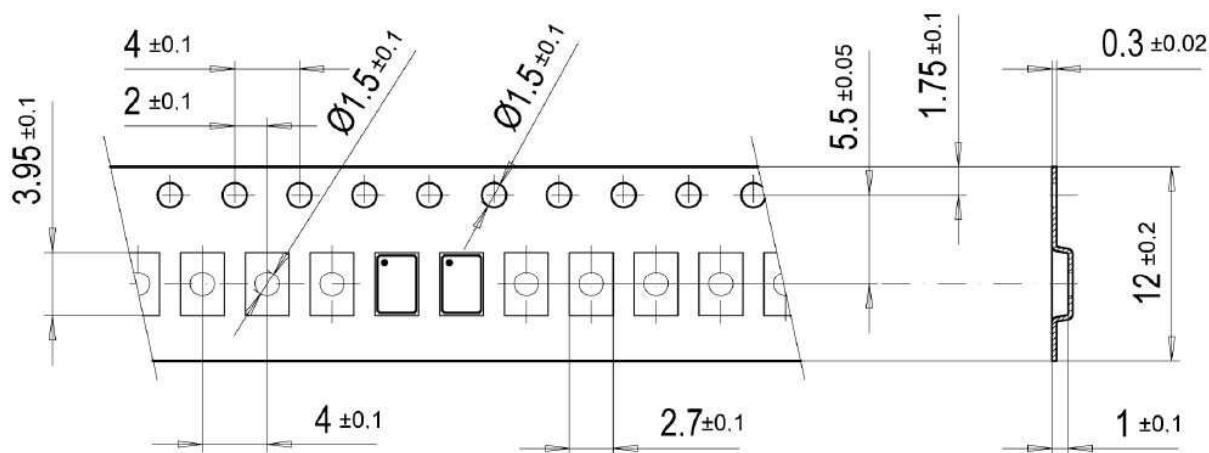
User Direction of Feed

Dimension: mm