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!

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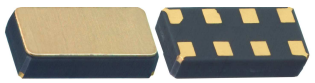
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

Real Time Clock Module with I²C Bus



3.2 x 1.5 x 0.8 mm

AB-RTCMC-32.768kHz-AIGZ-S7

RoHS/RoHS II compliant

Moisture Sensitivity Level: MSL=1

FEATURES:

- With state-of-the-art RTC Technology by Micro Crystal AG
- RTC module with built-in crystal oscillating at 32.768 kHz
- 350 nA timekeeping current at 3 V
- Timekeeping down to 1.0 V
- 1.3 V to 4.4 V I2C bus operating voltage
- Low operating current of 35 µA (at 400 kHz)
- 32.768kHz square wave on power-up to drive a microcontroller in low-power mode– Programmable from 1 Hz to 32.768kHz;– Can be disabled
- 400 kHz I2C serial interface
- Oscillator stop detection circuit monitors clock operation
- Accurate programmable watchdog– 62.5 ms to 31 min timeout
- Counters for tenths/hundredths of seconds, seconds, minutes, hours, day, date, month, year, and century
- Software clock calibration to compensate deviation of crystal due to temperature
- Automatic leap year compensation
- Ultra-small, 3.2 x1.5 mm, lead-free 8-pin ceramic leadless chip carrier

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

In accordance with the Absolute Maximum Rating System IEC 60134

Parameters	Symbol	Conditions	Min.	Max.	Units
Supply Voltage	V_{DD}	>GND / <V_{DD}	GND-0.3	+5.0	V
Input Voltage	V_I		GND-0.2	V_{DD}+0.3	V
Output Voltage	V_O		GND-0.2	V_{DD}+0.3	V
Output Current	I_O			20	mA
Power Dissipation	P_D			1	W
Operating Ambient Temperature Range	T_{OPR}		-40	+85	℃
Storage Temperature Range	T_{STO}	Stored as bare product	-55	+125	℃
Electro Static Discharge Voltage	V_{ESD}	HBM[1] T_A = 25℃ MM[2] T_A = 25℃		>1500 >1000	V

1) HBM: Human Body Model, according to JESD22-A114.

2) MM: Machine Model, according to JESD22-A115.

These data are based on characterization results, not tested in production. Stresses above these listed maximum ratings may cause permanent damage to the device. Exposure beyond specified operating conditions may affect device reliability or cause malfunction.

Operating and AC Measurement Conditions [1)]

Parameters	Symbol	Min.	Max.	Units
Supply Voltage	V_{DD}	1.3	4.4	V
Operating Ambient Temperature	T_A	-40	+85	℃
Load Capacitance	C_L		50	pF
Input Rise and Fall Times			5	ns
Input Pulse Voltages		0.2*V_{DD}	0.8*V_{DD}	V
Input and Output timing ref. Voltage		0.3*V_{DD}	0.7*V_{DD}	V

1) Output Hi-Z is defined as the point where data is no longer driven.

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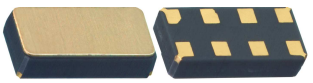
Real Time Clock Module with I²C Bus



3.2 x 1.5 x 0.8 mm

AB-RTCMC-32.768kHz-AIGZ-S7

Pb RoHS/RoHS II compliant

Capacitance

Parameters [1) 2)]	Symbol	Min.	Max.	Units
Input Capacitance	C_{IN}		7	pF
Output Capacitance	C_{OUT} [3)]		10	pF
Low-pass filter input time constant (SDA and SCL)	t_{LP}		50	ns

1) Effective capacitance measured with power supply at 3.6 V; sampled only, not 100% tested.

2) At 25°C, f = 1MHz.

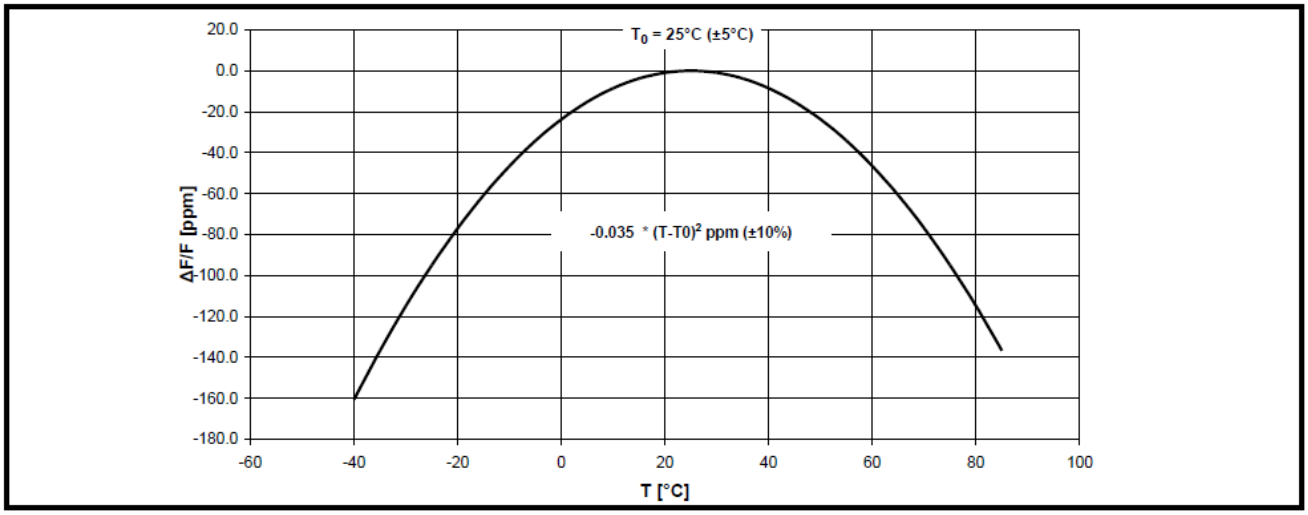
3) Outputs deselected.

Frequency Characteristics

T_{amb} = +25°C; f_{OSC} = 32.768 kHz

Parameters	Symbol	Conditions	Min.		Max.	Units
Frequency Accuracy	Δf/f	T_{amb} = +25°C	-20		+20	ppm
Frequency vs. Temperature Characteristics	$\Delta f / T_{OPR}$	T_{OPR}= -40 to +85°C	$-0.035^{ppm}/°C^2 * (T_{OPR} - T_0)^2$ (±10%)			ppm
Turnover Temperature	T_O		+20	+25	+30	°C
Aging (first year)	Δf/f	T_{amb} = +25°C	-3		+3	ppm
Oscillator Start-up Voltage	V_{Start}	≤10 seconds	1.5			V
Oscillator Start-up Time	T_{Start}	V_{DD} = 3.0V			1	s
CLKOUT Duty Cycle		F_{CLKOUT} = 32.768kHz T_{amb}= +25°C	40	50	60	%

FREQUENCY VS. TEMPERATURE CHARACTERISTICS



Static Characteristics

Valid for T_{amb}= -40°C to +85°C; V_{DD}= 1.3 V to 4.4 V (except where noted)

Parameters	Symbol	Conditions	Min.	Typ.	Max.	Units
Supply Voltage	V_{DD} 1)	Clock	1.0		4.4	V
		I^2C Bus (400kHz)	1.3		4.4	V
Supply Current SCL=400kHz No Load	I_{DD1}	V_{DD} = 4.4V			100	µA
		V_{DD} = 3.6V		50	70	µA
		V_{DD} = 3.0V		35		µA
		V_{DD} = 2.5V		30		µA
		V_{DD} = 2.0V		20		µA
Supply Current (standby) SCL = 0Hz; CLKOUT off All inputs ≥V_{DD}-0.2V ≤V_{SS}+0.2V	I_{DD2}	V_{DD} = 4.4V			950	nA
		V_{DD} = 3.6V		375	700	nA
		V_{DD} = 3.0V at 25°C		350	500	nA
		V_{DD} = 2.0V at 25°C		310	450	nA
		V_{DD} = 1.0V at 25°C		270	400	nA
LOW Level Input Voltage	V_{IL}		-0.2		0.3*V_{DD}	V
HIGH Level Input Voltage	V_{IH}		0.7*V_{DD}		V_{DD}+0.3	V
HIGH Level Output Voltage	V_{OH}	V_{DD}=4.4V, I_{OH} = -1.0mA (push-pull)	2.4			V
LOW Level Output Voltage	V_{OL}	V_{DD}=4.4V, I_{OL} = 3.0mA (SDA)			0.4	V
		V_{CC}=4.4V, I_{OL} = 1.0mA (SQW, $\overline{INT}$)			0.4	
Pull-up Supply voltage (open drain)		$\overline{INT}$			4.4	V
Input Leakage Current	I_{LI}	0V ≤ V_{IN} ≤ V_{DD}	-1		+1	µA
Output Leakage Current	I_{LO}	0V ≤ V_{OUT} ≤ V_{DD}	-1		+1	µA

1. Oscillator startup guaranteed down to 1.5 V only.

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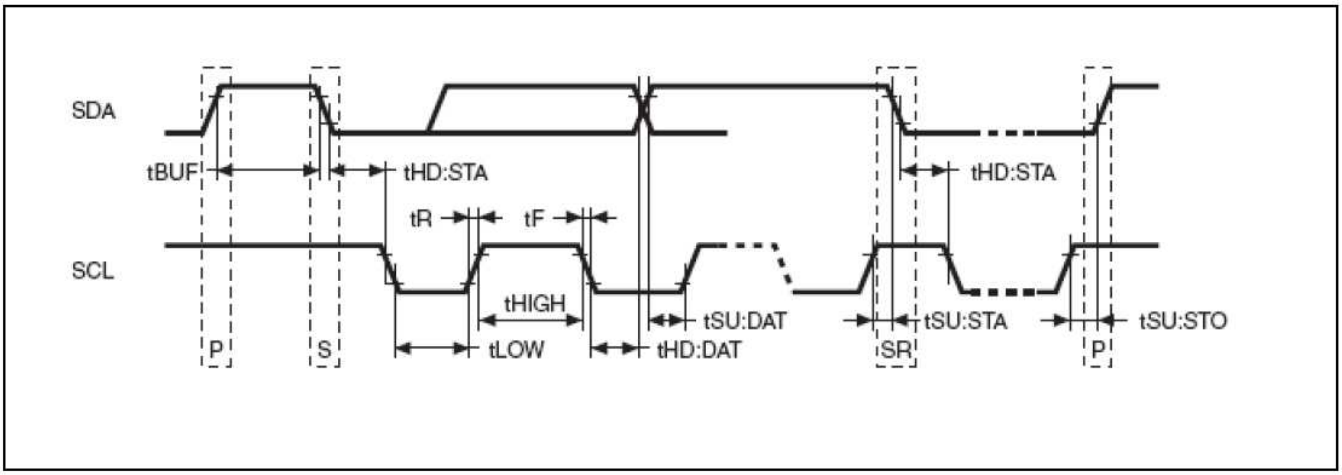
I²C Interface Dynamic Characteristics

Valid for T_{amb}= -40°C to +85°C; V_{DD}= 1.3 V to 4.4 V (except where noted)

Parameters	Symbol	Min.	Typ.	Max.	Units
SCL Clock Frequency	f_{SCL}	0		400	kHz
START Condition Setup Time (only relevant for a repeated start condition)	$t_{SU:STA}$	600			ns
START Condition Hold Time (after this period the first clock pulse is generated)	$t_{HD:STA}$	600			ns
Data Setup Time [1)]	$t_{SU:DAT}$	100			ns
Data Hold Time	$t_{HD:DAT}$	0			µs
STOP Condition Setup Time	$t_{SU:STO}$	600			ns
Bus Free Time between STOP and START condition	t_{BUF}	1.3			µs
SCL "LOW time"	t_{LOW}	1.3			µs
SCL "HIGH time"	t_{HIGH}	600			ns
SCL and SDA Rise Time	t_R			300	ns
SCL and SDA Fall Time	t_F			300	ns
Watchdog Output Pulse Width	t_{REC}	96		98	ms

1. Transmitter must internally provide a hold time to bridge the undefined region (300 ns max) of the falling edge of SCL.

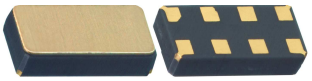
I²C Interface Timing Characteristics



Real Time Clock Module with I²C Bus

AB-RTCMC-32.768kHz-AIGZ-S7

RoHS/RoHS II compliant



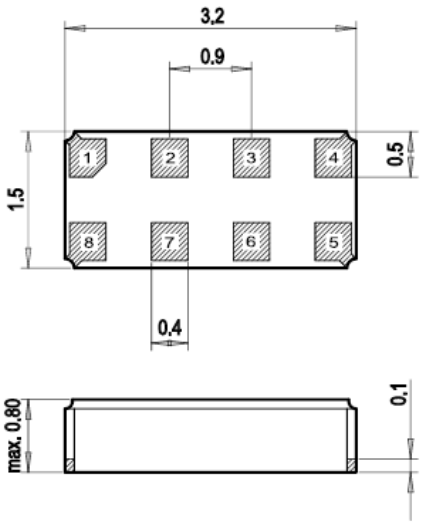
3.2 x 1.5 x 0.8 mm

PART IDENTIFICATIONS:

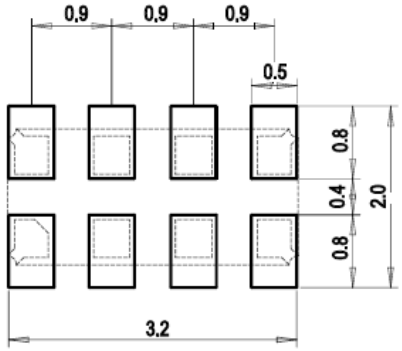
AB-RTCMC-32.768 kHz-AIGZ-S7- ☐

Packaging
Blank: Bulk
T: 1000pcs/reel

OUTLINE DIMENSIONS:



Recommended Land Pattern



Dimensions: mm

PIN DESCRIPTIONS:

Pin No.	Pin Name	Function
1	SDA	Serial data; open-drain; requires pull-up resistor
2	CLKOUT	Clock Output
3	V_{SS}	Ground
4	NC	Not connected
5	V_{DD}	Power Supply voltage
6	$\overline{INT}$	Interrupt output; open-drain; requires pull-up resistor; active low
7	NC	Not connected
8	SCL	Serial clock input; requires pull-up resistor

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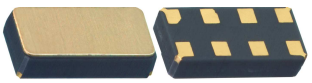
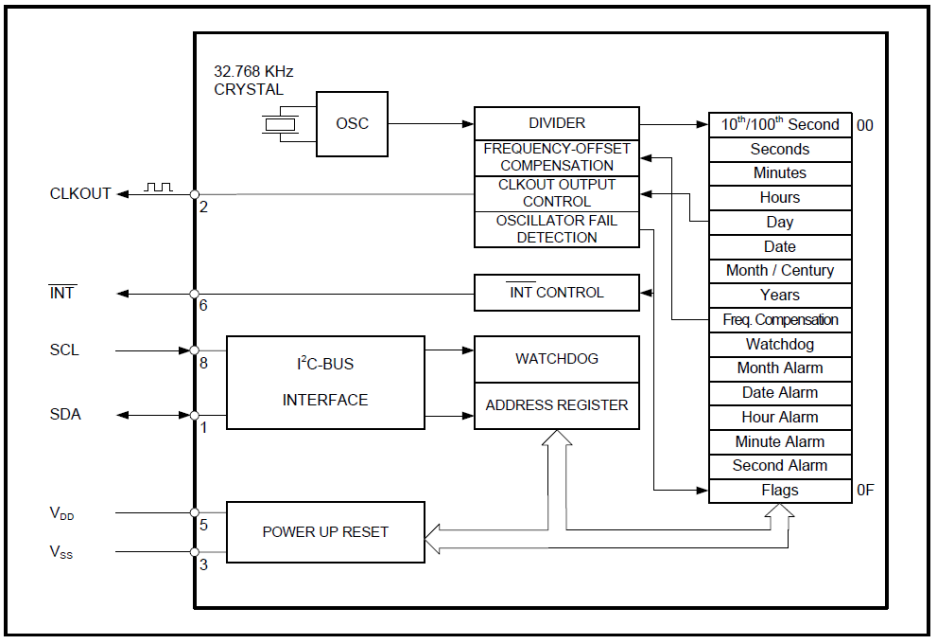
RoHS/RoHS II compliant



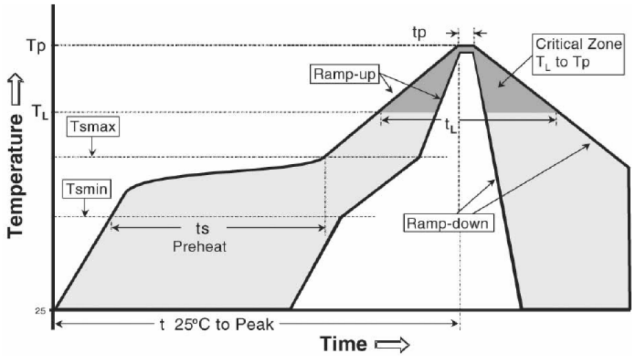
3.2 x 1.5 x 0.8 mm

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

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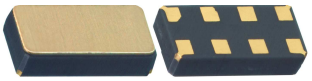
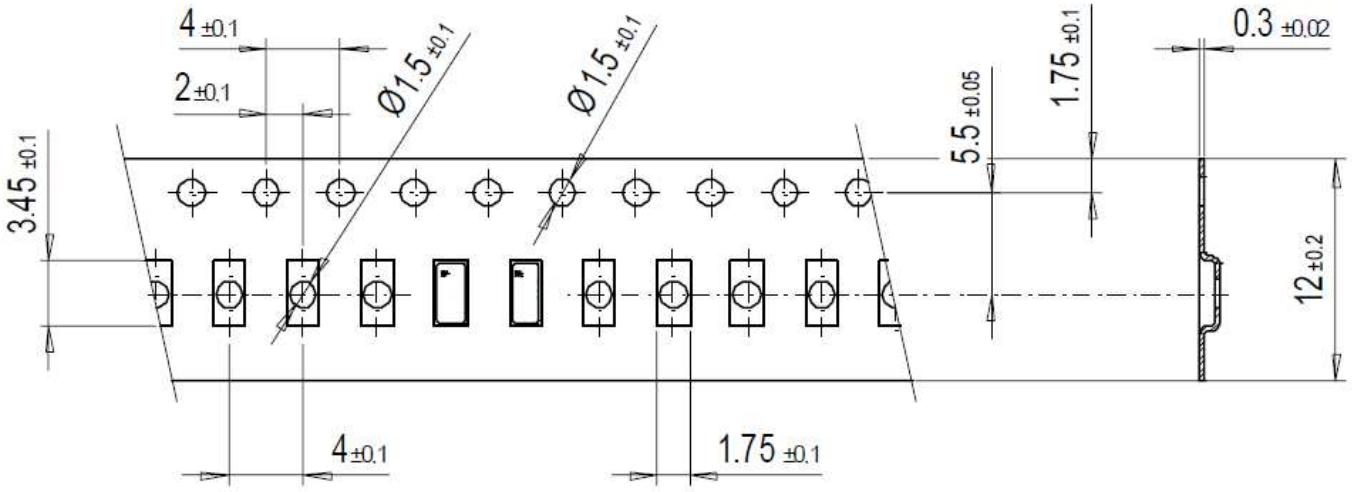


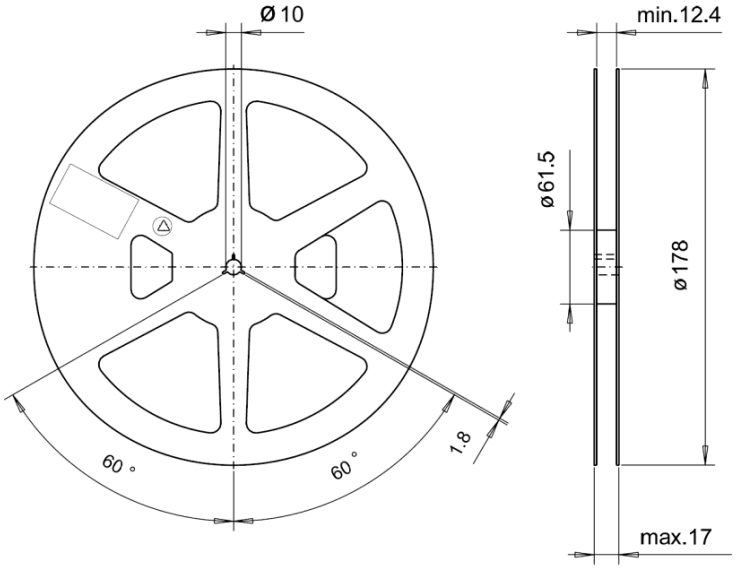
3.2 x 1.5 x 0.8 mm

Pb RoHS/RoHS II compliant

TAPE & REEL:

T = 1000pcs/reel





Dimension: mm

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