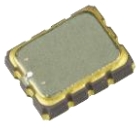
REAL TIME CLOCK MODULE (I^2C)

For Automotive, Built-in 32.768 kHz DTCXO,
High Stability, +125 ºC

Product Number (2,000 pcs / Reel)
RA8000CE YB A0 : X1B000501A00115
RA8000CE YB B8 : X1B000501A00915
RA8000CE YB C0 : X1B000501A01015

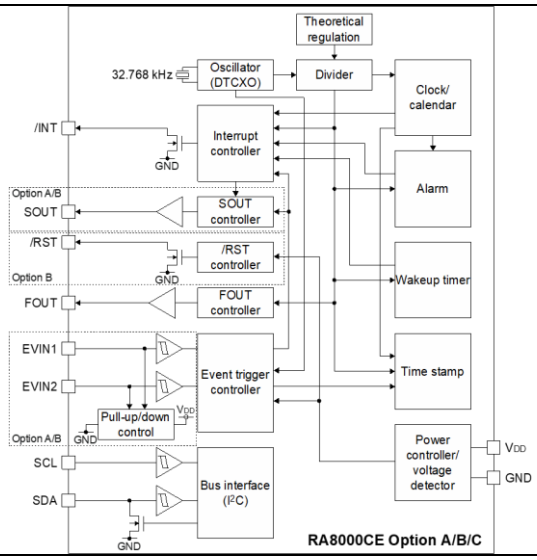
RA8000CE

- Built in frequency adjusted 32.768 kHz crystal unit and DTCXO
- Interface Type : I^2C-Bus
- Time stamp function : 2 times stamped from year to second
- Reset functions with a delay : Detect a main power supply and remove the reset
- Interrupt output : Wake up every minute or every second
- Alarm interruption : Day, date, hour, minute, second
- Auto repeat wakeup timer interruption
- Self-monitoring interruption : Crystal oscillation stop, V_{DD} low
- AEC-Q100 compliant



RA8000CE
(3.2 × 2.5 mm, t = 1.0 mm Max.)

Block diagram



Overview

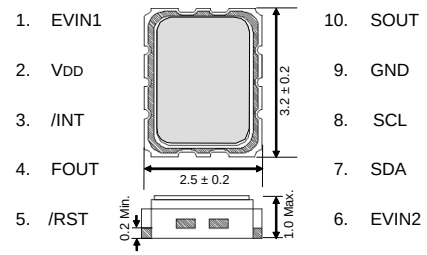
- Interface type
  I^2C-Bus interface Fast-Mode 400 kHz
- High stability
  YB : ±5.0 x 10^{-6} / -40 ºC to +85 ºC (Monthly rate: ±13.2 seconds)
  : ±8.0 x 10^{-6} / +85 ºC to +105 ºC (Monthly rate: ±21 seconds)
  : ±50.0 x 10^{-6} / +105 ºC to +125 ºC (Monthly rate: ±132 seconds)
- Clock output function
  Output frequency is selectable from 32.768 kHz, 1024 Hz, 1 Hz
- Wakeup timer function
  Can generate an interrupt in 976.56 µs to 32-year cycle.
  Can be used as a time integration meter.
  Can be used as a watchdog timer.
- Time stamp function
  Record data: 1/1024 seconds to 1 second, seconds, minutes, hours, days, months, years.
  Number of recordable events: 2 events
  Trigger source: External event (EVIN) input, voltage drop/oscillation stop status detected, command input from the host.
  EVIN pin has function of chattering-cancel.
- Reset function with a delay
  Can output a reset signal when a V_{DD} voltage drop status is detected.
- Status output (SOUT)
  Can output the selected internal flag (interrupt flag, voltage drop detection flag) status.

Pin Function

Signal Name	I / O	Function
EVIN1, 2	Input	External event input pins Pull-up and pull-down is configurable by the resisters
SCL	Input	Serial clock input pin
SDA	Input / Output	Serial data input and output pin
FOUT	Output	Frequency output pin (CMOS). 32.768 kHz (default), 1024 Hz or 1 Hz clock output is selectable. This pin can be switched to the wakeup timer interrupt output (CMOS)
/INT	Output	Interrupt output pin (N-ch. open drain). The wakeup timer, time update, alarm, and/or event detection interrupt signals can be selected to output from this pin. When two or more signals are selected, they are NORed before being output.
/RST	Output	Reset output pin (N-ch. open drain)
SOUT	Output	Status output pin
V_{DD}	-	Power-supply pin
GND	-	Ground pin

Terminal connection / External dimensions (Unit: mm)

RA8000CE



*The above diagram is the terminal layout for Option B.
For other options, please refer to the Pin Option section.

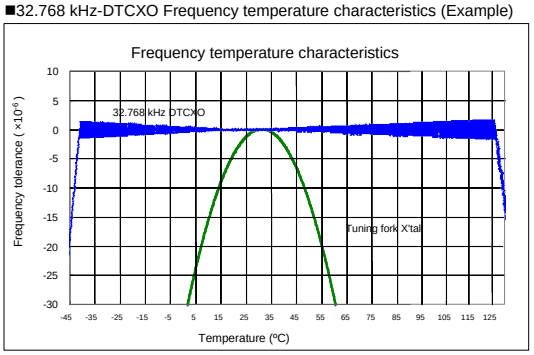
Specifications (characteristics)

∗ Refer to application manual for details

■ Electrical Characteristics

Item	Symbol	Conditions			Min.	Typ.	Max.	Unit
Operating voltage	V_{DD}	-			1.6	3.0	5.5	V
Temp. compensated Voltage	V_{TEM}	-			1.6	3.0	5.5	V
Clock supply voltage	V_{CLK}	-			1.3	3.0	5.5	V
Operating temperature	T_a	-			-40	+25	+125	ºC
Frequency tolerance	Δ f / f	YB	T_a = -40 ºC to +85 ºC			±5.0		x 10^{-6}
			T_a = +85 ºC to +105 ºC			±8.0		
			T_a = +105 ºC to +125 ºC			±50.0		
Current consumption	I_{DD1}	/INT = Hi-Z, FOUT: Output OFF (Hi-Z), Temp. Compensation interval 2.0 s, SCL = SDA = H	No /RST pin	V_{DD} = 5 V	-	0.35	1.8	µA
	I_{DD2}			V_{DD} = 3 V	-	0.3	1.7	
	I_{DD11}		With /RST pin	V_{DD} = 5 V	-	1.5	3.7	
	I_{DD12}			V_{DD} = 2 V	-	0.6	2.25	

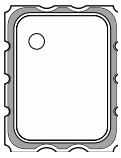
■32.768 kHz-DTCXO Frequency temperature characteristics (Example)



Pin Option

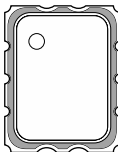
Pin No.	Pin name		
	Option A	Option B	Option C
1	EVIN1		N.C.
2	V_{DD}		
3	/INT		
4	FOUT		
5	N.C.	/RST	N.C.
6	EVIN2		N.C.
7	SDA		
8	SCL		
9	GND		
10	SOUT		N.C.

Pin name	No.		No.	Pin name
EVIN1	1		10	SOUT
V_{DD}	2		9	GND
/INT	3		8	SCL
FOUT	4		7	SDA
N.C.	5		6	EVIN2



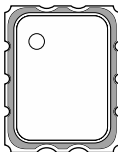
Option A

Pin name	No.		No.	Pin name
EVIN1	1		10	SOUT
V_{DD}	2		9	GND
/INT	3		8	SCL
FOUT	4		7	SDA
/RST	5		6	EVIN2



Option B

Pin name	No.		No.	Pin name
N.C.	1		10	N.C.
V_{DD}	2		9	GND
/INT	3		8	SCL
FOUT	4		7	SDA
N.C.	5		6	N.C.



Option C

Product name

RA8000CE YB A 0
① ② ③④

① Model CE type package 3.2 x 2.5 x 1.0 mm
② Frequency tolerance
YB: ±5.0 x 10^{-6} / -40 ºC to +85 ºC (Monthly rate: ±13.2 seconds)
±8.0 x 10^{-6} / +85 ºC to +105 ºC (Monthly rate: ±21 seconds)
±50.0 x 10^{-6} / +105 ºC to +125 ºC (Monthly rate: ±132 seconds)
③ Pin Option
A: Option A
B: Option B
C: Option C
④ Reset output function
0: No /RST pin
8: With /RST pin (V_{DD} drop detection voltage: +2.4 V Typ.)

PROMOTION OF ENVIRONMENTAL MANAGEMENT SYSTEM CONFORMING TO INTERNATIONAL STANDARDS

At Seiko Epson, all environmental initiatives operate under the Plan-Do-Check-Action (PDCA) cycle designed to achieve continuous improvements. The environmental management system (EMS) operates under the ISO 14001 environmental management standard.

All of our major manufacturing and non-manufacturing sites, in Japan and overseas, completed the acquisition of ISO 14001 certification.

ISO 14000 is an international standard for environmental management that was established by the International Standards Organization in 1996 against the background of growing concern regarding global warming, destruction of the ozone layer, and global deforestation.

WORKING FOR HIGH QUALITY

In order provide high quality and reliable products and services than meet customer needs, Seiko Epson made early efforts towards obtaining ISO9000 series certification and has acquired ISO9001 for all business establishments in Japan and abroad. We have also acquired IATF 16949 certification that is requested strongly by major automotive manufacturers as standard.

IATF 16949 is the international standard that added the sector-specific supplemental requirements for automotive industry based on ISO9001.

►Explanation of the mark that are using it for the catalog

Pb Free	►Pb free.
RoHS Compliant	►Complies with EU RoHS directive. *About the products without the Pb-free mark. Contains Pb in products exempted by EU RoHS directive. (Contains Pb in sealing glass, high melting temperature type solder or other.)
For Automotive	►Designed for automotive applications such as Car Multimedia, Body Electronics, Remote Keyless Entry etc.
Automotive Safety	►Designed for automotive applications related to driving safety (Engine Control Unit, Air Bag, ESC etc).