

REAL TIME CLOCK MODULE (I²C)

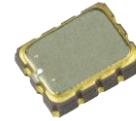
For Automotive, Built-in 32.768 kHz DTCXO,
High Stability, +125 °C



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

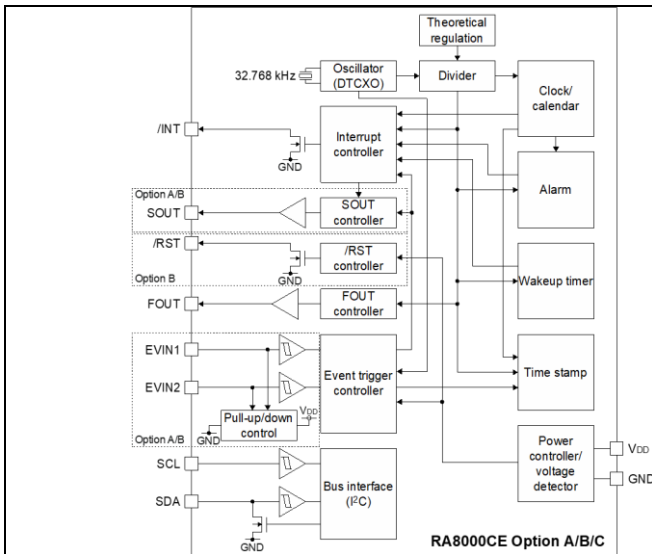
RA8000CE

- Built in frequency adjusted 32.768 kHz crystal unit and DTCXO
- Interface Type : I²C-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



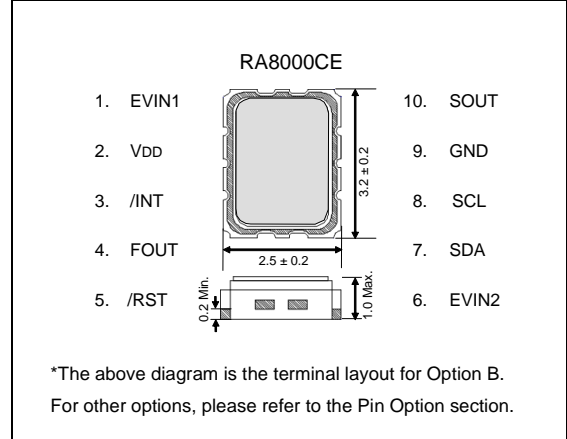
Overview

- Interface type
I²C-Bus interface Fast-Mode 400 kHz
- High stability
YB : ±5.0 × 10⁻⁶ / -40 °C to +85 °C (Monthly rate: ±13.2 seconds)
: ±8.0 × 10⁻⁶ / +85 °C to +105 °C (Monthly rate: ±21 seconds)
: ±50.0 × 10⁻⁶ / +105 °C to +125 °C (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 resistors
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)



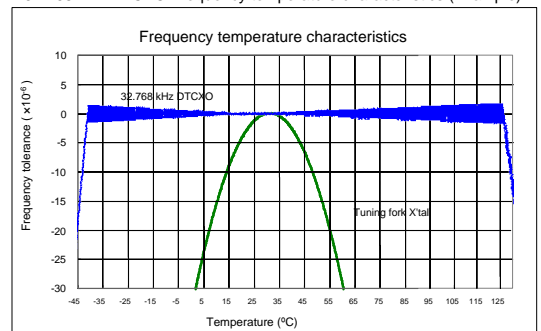
Specifications (characteristics)

* 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	°C		
Frequency tolerance	Δ f / f	YB	T _a = -40 °C to +85 °C	±5.0		x 10 ⁻⁶		
			T _a = +85 °C to +105 °C	±8.0				
			T _a = +105 °C to +125 °C	±50.0				
Current consumption	I _{DD1} I _{DD2} I _{DD11} I _{DD12}	/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
				V _{DD} = 3 V	-	0.3	1.7	
			With /RST pin	V _{DD} = 5 V	-	1.5	3.7	
				V _{DD} = 2 V	-	0.6	2.25	

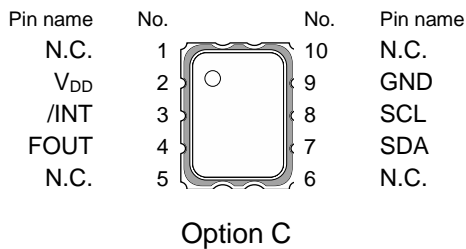
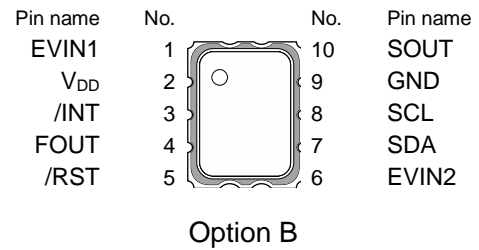
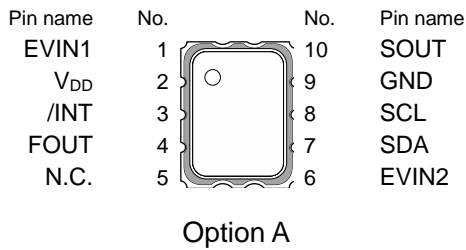
32.768 kHz-DTCXO Frequency temperature characteristics (Example)





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.



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: $\pm 5.0 \times 10^{-6}$ / -40 °C to +85 °C (Monthly rate: ± 13.2 seconds)
 $\pm 8.0 \times 10^{-6}$ / +85 °C to +105 °C (Monthly rate: ± 21 seconds)
 $\pm 50.0 \times 10^{-6}$ / +105 °C to +125 °C (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.)

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