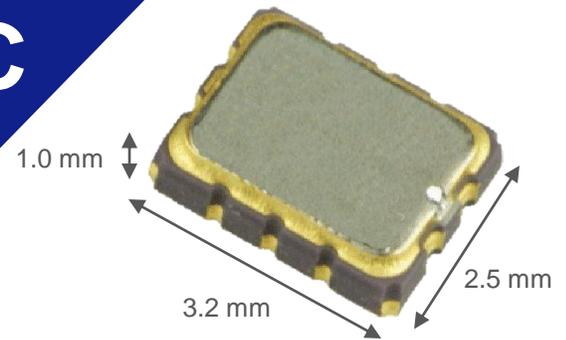


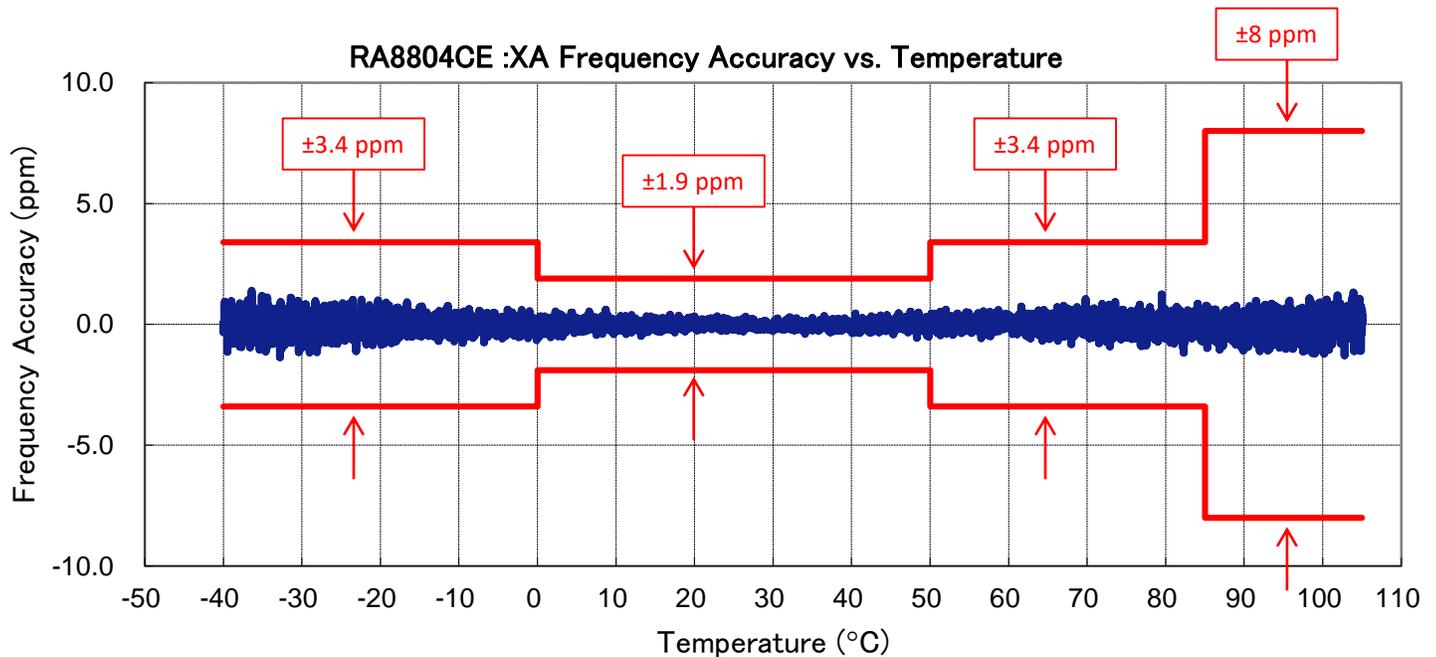
# AUTOMOTIVE RA8804CE DTCXO RTC

Precise Time Keeping. Extended Temperature. Low Power.



## Epson RA8804CE Automotive DTCXO RTC

- **Integrated Crystal with Factory-Calibrated DTCXO**
- **High Accuracy:**  $\pm 3.4$  ppm -40 to +85 °C ( $\pm 9$  s/mo.)  
 $\pm 8.0$  ppm -40 to +105 °C ( $\pm 20$  s/mo.)
- **Clock Output:** 1 Hz, 1024 Hz, 32.768 kHz
- **I<sup>2</sup>C Interface:** Fast-mode (400 kHz)  
The I2C-Bus is a trademark of NXP Semiconductors
- **Supply Voltage:** 1.6-5.5 V (main),  
1.5-5.5 V (battery backup)
- **Low Power:** 0.35  $\mu$ A (typ) backup current
- **Small Size:** 3.2 x 2.5 x 1.0
- **AEC-Q100 Grade 2 Qualified,**  
PPAP data available



Designed for precision time keeping, Epson's RA8804CE uses Digitally Temperature-Compensated Crystal Oscillator (DTCXO) technology to achieve  $\pm 3.4$  or  $\pm 8$  ppm accuracy over temperature of -40 to +85 °C or -40 to +105 °C respectively, equivalent to  $\pm 9$  or  $\pm 20$  seconds per month. Compared to RTCs integrated into microcontrollers (MCUs), Epson's RA8804CE includes an integrated crystal, is lower power, and is far more accurate.

# Epson RA8804CE DTCXO RTC

Epson pioneered Real-Time Clocks by introducing the RTC module in 1986 and the world's first DTCXO RTC in 2008. Epson is the RTC module market leader with the #1 share. Epson continues to innovate, by improving accuracy, reducing power, and extending the temperature range of RTCs.

An RTC is essentially an I<sup>2</sup>C-accessible wristwatch for electronic systems. Epson's RA8804CE includes a crystal, a digitally temperature-compensated crystal oscillator (DTCXO), and counters to keep track of time and date. Epson's RA8804CE also includes time-keeping functions such as alarms and timers.

## ADVANTAGES

- Built-in kHz Crystal
- High Accuracy Enabled by DTCXO Technology
- Small Size
- Low power
- AEC-Q100 Grade 2 Qualified

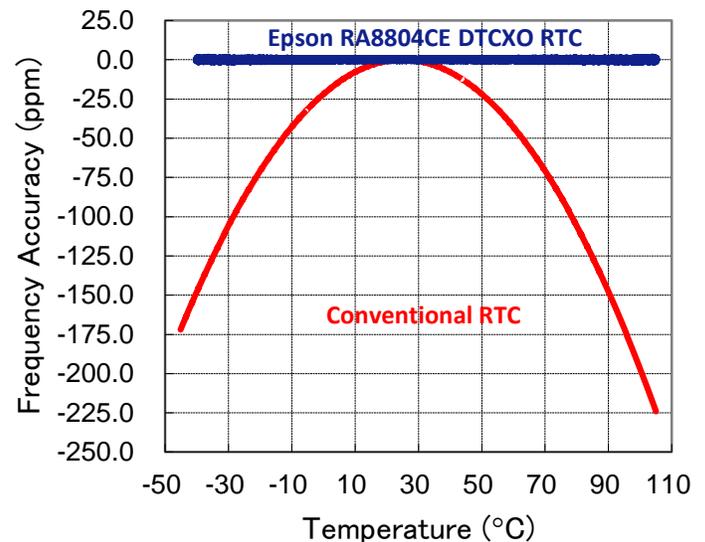
### High Accuracy Enabled by DTCXO Technology

The accuracy of conventional RTCs is determined by the frequency vs. temperature stability of a tuning-fork crystal. Conventional RTCs generally specify accuracy only at room temperature. At +105 °C, conventional RTCs are accurate to typically -225 ppm, which is 10 minutes per month.

Epson's RA8804CE uses a Digitally Temperature-Compensated Crystal Oscillator (DTCXO) and is factory calibrated to achieve < ±3.4 ppm from -40 to +85 °C and < ±8.0 ppm from -40 to +105 °C. This ensures accuracy of better than ±9 seconds per month or ±20 seconds per month respectively, which is essential for precise time keeping, as required by car clocks, infotainment, battery management, and other automotive applications.

DTCXO technology is only possible with an integrated crystal. Integrating the crystal eliminates frequency variation due to load capacitance on the board and allows manufacturing calibration of the oscillator and crystal combination. In addition to improving accuracy, the integrated crystal saves board space and avoids startup problems due to humidity or board leakage.

### Frequency Accuracy vs. Temperature



Product	Microcontroller with RTC	Epson RTC	Epson RA8900 DTCXO RTC	Epson RA8804CE DTCXO RTC
Crystal	external	integrated	integrated	integrated
Power	1 μA - 50 μA	0.13 μA - 1 μA	0.7 μA	0.35 μA
Accuracy	± 30 ppm @ +25 °C +28 -214 ppm -40 to +85 °C	5 ± 23 ppm @ +25 °C -120 +10 ppm -20 to +70 °C	±3.4 ppm -40 to +85 °C ±5 ppm -40 to +85 °C	±3.4 ppm -40 to +85 °C ±5 ppm -40 to +85 °C ±8 ppm -40 to +105 °C

\*RX6110SAB Application manual

### Time-Keeping Functions

All clock and calendar functions, including alarms and timers, are accessible via the I<sup>2</sup>C interface. Epson's RA8804CE also has a frequency output pin which can be programmed to 1 Hz, 1024 Hz, or 32.768 kHz.

### Ordering Options

Epson's RA8804CE is available in two stability grades and one package size.

Stability Grades			Packages	
XA	±3.4 ppm -40 to +85 °C	±8 ppm -40 to +105 °C	CE	3.2 mm x 2.5 mm x 1.0 mm
XB	±5.0 ppm -40 to +85 °C	±8 ppm -40 to +105 °C		

### Automotive Quality

Epson's RA8804CE is manufactured on a dedicated automotive line, meets all applicable automotive quality standards, including AEC-Q100 Grade 2, ISO9001, and TS16949. PPAP data is available upon request.