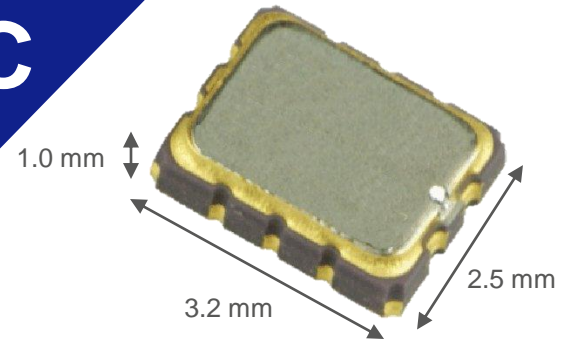


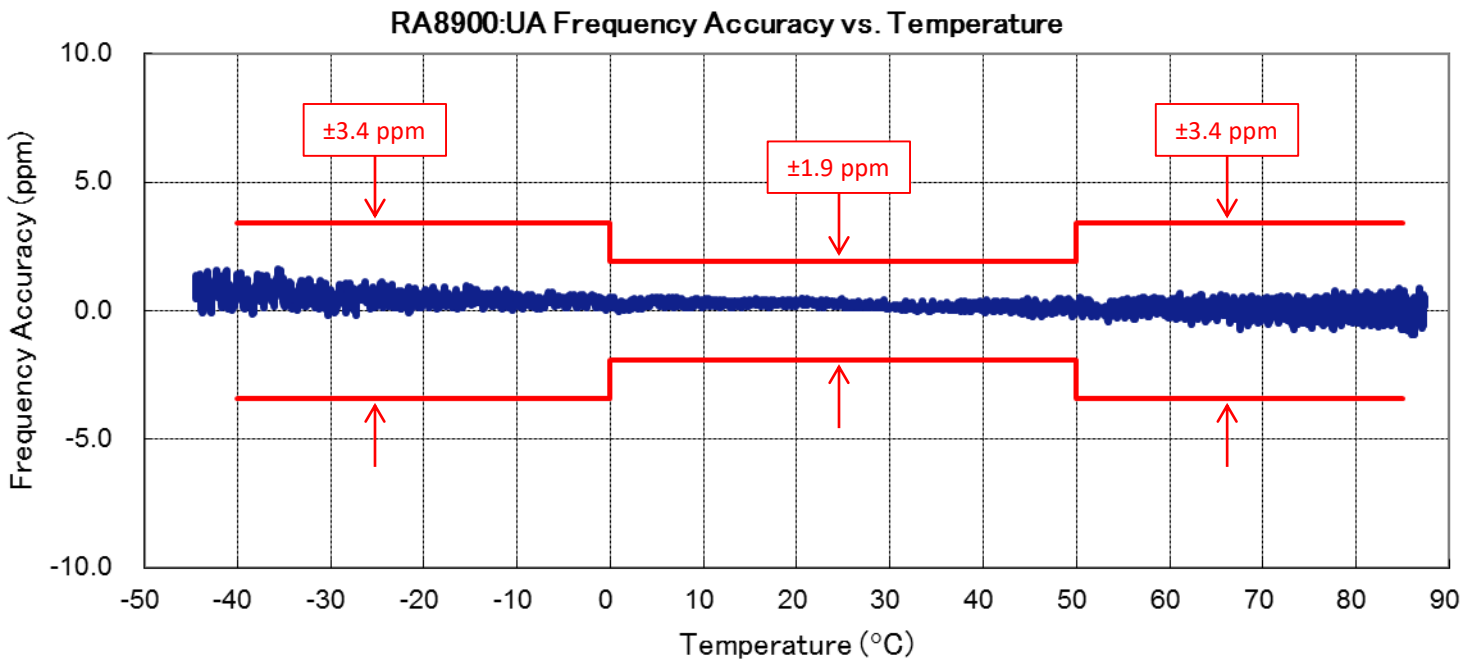
# AUTOMOTIVE RA8900CE DTCXO RTC

Precise Timekeeping. Small Size. Low Power.



## Epson RA8900CE Automotive DTCXO RTC

- **Integrated Crystal with Factory-Calibrated DTCXO**
- **High Accuracy:**  $\pm 3.4$  ppm -40 to +85 °C ( $\pm 9$  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:** 2.5-5.5 V (main), 1.6-5.5 V (battery backup)
- **Low Power:** 0.7  $\mu$ A (typ) backup current
- **AEC-Q200 Grade 3 Qualified,** PPAP data available



Designed for precision time keeping, Epson's RA8900CE uses Digitally Temperature-Compensated Crystal Oscillator (DTCXO) technology to achieve  $\pm 3.4$  or  $\pm 5$  ppm accuracy over temperature, equivalent to  $\pm 9$  or  $\pm 13$  seconds per month. Compared to RTCs integrated into microcontrollers (MCUs), Epson's RA8900CE includes an integrated crystal, is lower power, and is far more accurate.

# Epson RA8900CE Automotive 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 RA8900CE includes a crystal, a digitally temperature-compensated crystal oscillator (DTCXO), and counters to keep track of time and date. Epson's RA8900CE also includes time-keeping functions such as alarms and timers.

## ADVANTAGES

- Built-in kHz Crystal
- High Accuracy Enabled by DTCXO Technology
- Automatic Battery Backup
- Small Size
- Low power

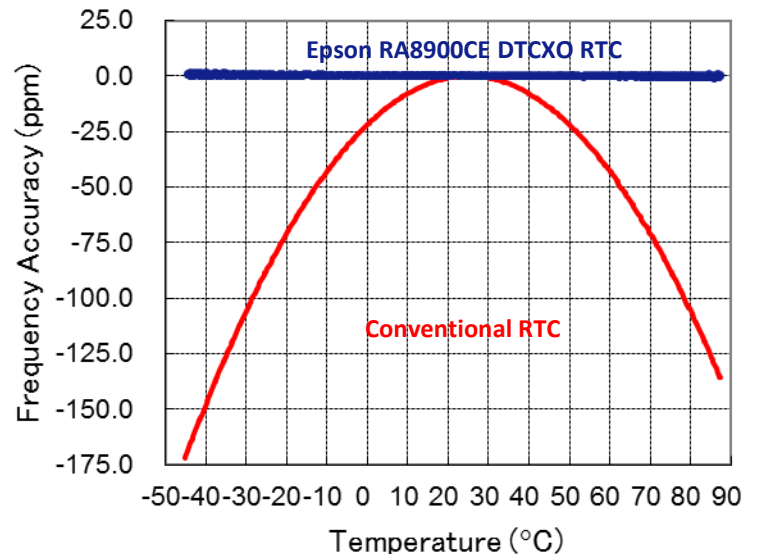
### High Accuracy Enabled by DTCXO Technology

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. Over a temperature range of -40 to +85 °C, conventional RTCs are accurate to typically -150 ppm, which is 6.5 minutes per month.

Epson's RA8900CE uses a Digitally Temperature-Compensated Crystal Oscillator (DTCXO) and is factory calibrated to achieve < ±3.4 ppm from -40 to +85 °C. This ensures accuracy of better than ±9 seconds per month, 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 RA8900CE DTCXO RTC
Crystal	external	integrated	integrated
Power	1 μA - 50 μA	0.13 μA - 1 μA	0.7 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	UA: ±3.4 ppm -40 to +85 °C UB: ±5 ppm -40 to +85 °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 RA8900CE also has a frequency output pin which can be programmed to 1 Hz, 1024 Hz, or 32.768 kHz.

### Automatic Battery Backup

Epson's RA8900CE can detect the loss of main power and automatically switch to backup power from a battery or supercapacitor. The Epson RA8900CE is intended for use with a 2.5-5.5 V main power supply. In backup mode, time keeping functions with battery voltages down to 1.6V with temperature compensation down to 2.0V.

### Ordering Options

Epson's RA8900CE is available in three stability grades and one package size.

Stability Grades		
UA	±1.9 ppm +0 to +50 °C	±3.4 ppm -40 to +85 °C
UB	±3.8 ppm +0 to +50 °C	±5.0 ppm -40 to +85 °C
UC	±3.8 ppm +0 to +50 °C	±5.0 ppm -30 to +70 °C

Package	
CE	3.2 mm x 2.5 mm x 1.0 mm

### Automotive Quality

Epson's RA8900CE is manufactured on a dedicated automotive line, meets all applicable automotive quality standards, including AEC-Q200 Grade 3, ISO9001, and TS16949. PPAP data is available upon request.