

May 29, 2007

**Epson Toyocom Launches the World's Smallest SAW Resonator for
Vehicle Remote Keyless Entry Systems**

Epson Toyocom Corporation has released the NS-21R SAW resonator^(*1) for use as reference clock in communications applications such as short-range wireless equipment. Measuring just $2.5 \times 2.0 \times 0.86$ mm, the device is the smallest of its kind in the world^(*2). Samples will begin shipping in June 2007.

Due to the demand for smaller radio devices typified by the remote keyless entry systems installed in passenger vehicles, further reductions in the size of SAW resonators are desired.

The NS-21R is a SAW resonator with superior temperature characteristics achieved through application of Epson Toyocom's original technology. Thanks to development of unique quartz cutting angles that serve to reduce the CI value^(*3), the NS-21R measures just $2.5 \times 2.0 \times 0.86$ mm, one-third the size of earlier products.

This reduction in size will contribute to higher density for small radio devices typified by the remote keyless entry systems installed in passenger vehicles, resulting in improved design freedom and smaller devices with higher performance.

Main Specifications

Item	Standard specification
Nominal frequency range	300 MHz ~ 500 MHz
Frequency tolerance	$\pm 50 \times 10^{-6}$, $\pm 100 \times 10^{-6}$, $\pm 150 \times 10^{-6}$
Turnover temperature	$+20^{\circ}\text{C} \pm 20^{\circ}\text{C}$
Parabolic coefficient	$(-0.016 \pm 0.004) \times 10^{-6}/^{\circ}\text{C}^2$
Motional resistance	20 Ω max.
Operating temperature range	$-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$
External dimensions (mm)	2.5 × 2.0 × 0.86 t

(*1) SAW resonator

A crystal unit that uses surface acoustic waves. SAW resonators can provide high frequency at the same frequency as the carrier wave through fundamental oscillation. They also have very low motional resistance. This makes them suitable for the reference clocks in remote keyless entry systems installed in passenger vehicles and specific low power systems.

Epson Toyocom first commercialized SAW resonators in 1997 and has offered them continuously since then. Furthermore, since 2002, the company has offered products that feature superior temperature characteristics, with a parabolic coefficient less than half that of typical SAW resonators, through application of Epson Toyocom's original technology.

(*2) According to studies conducted by Epson Toyocom. As of May 22, 2007.

(*3) CI value

CI is an abbreviation of crystal impedance. This is equal to vibration loss at the equivalent resistance component inside the crystal unit. It indicates the ease of oscillation. It is also referred to as motional resistance.