

## MEMS TCXO Runs on Micro Current

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This tiny clock oscillator takes advantage of MEMS technology to achieve excellent stability while drawing minimal current for battery-powered applications.



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Although it is still a relatively new technology, microelectromechanical systems (MEMS) components are making a splash in many different applications within the RF/microwave field, including for oscillation and timing. As demonstrated by the SiT1552 temperature-compensated oscillator (TCXO) from [SiTime Corp.](#), MEMS technology can achieve superb timekeeping performance with very little power. This MEMS TCXO runs at an output frequency of 32.768 kHz with less than 1  $\mu\text{A}$  current consumption (typically 0.99  $\mu\text{A}$ ) for supply voltages of +1.50 to +3.63 VDC.

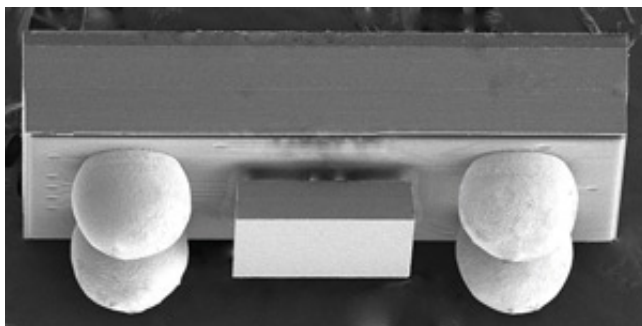
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The TCXO is an excellent low-power fit for a variety of timekeeping applications, from sleep clocks in wireless communications equipment to reference clocks in medical electronic equipment. The low current and low power consumption translate into extended operating periods for any electronic device needing the timekeeping function while operating on battery power.



Each SiT1552 MEMS TCXO consists of a MEMS resonator and programmable analog circuitry packed within one of a number of different packages offered by the company, including an ultra small chip-scale package (CSP; see *figure*). Output signals exhibit worst-case 10%-to-90% rise/fall time of 200 ns, with typical rise/fall time of 100 ns. The MEMS oscillators are impressively stable with time, temperature, and voltage, with initial stability tolerance of  $\pm 5$  ppm and frequency stability

maintained within  $\pm 1.5$  ppm across the full supply voltage range. The TCXO is available in different stability versions, with frequency stability ratings of  $\pm 5$ ,  $\pm 10$ , and  $\pm 20$  ppm for the one 32.768-kHz output frequency.

The MEMS oscillator requires only 200 ms typical startup time at power up and suffers worst-case long-term jitter of only 2.5  $\mu\text{s}$ . Versions are available for a commercial operating temperature range of 0 to

+70°C and an industrial operating temperature range of -40 to +85°C. The MEMS TCXO is available in a CSP housing measuring only 1.5 × 0.8 mm. For other package options, such as an SOT-23-5 package or a surface-mount package measuring just 2.0 × 1.2 mm, contact SiTime.

The miniature MEMS TCXOs are lead-free components that are both RoHS and REACH compliant. They offer two output voltage options: a standard LVCMOS output swing and the firm's patented NanoDrive reduced output swing. The output swing for the latter is customer specific and factory programmed for an output between 200 and 800 mV for reduced power consumption. The silicon MEMS technology in these oscillators provides an output clock duty cycle ranging from a minimum of 48% to a maximum of 52%. In addition to the low-power operation, they are designed and constructed for outstanding shock resistance and reliability compared to quartz crystal oscillators, with expected mean time before failure (MTBF) of more than 500 million hours.

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