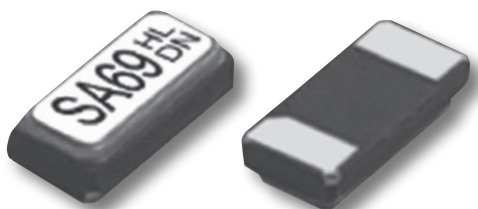


TUNING FORK CRYSTALS 32.768 KHZ LOW ESR AND EXTENDED TEMP RANGE -40 TO 125°C

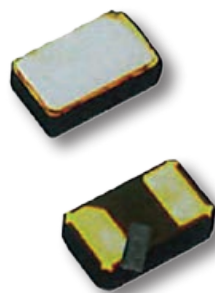


Due to the ongoing miniaturization of electronic devices, manufacturers of passive and active components strive to reduce their component design. This applies also to clock crystals which are widely used in applications as home automation, metering or mobile phones requiring a precise timing frequency. The time reference is provided often by tuning fork quartzes. Based on the 32.768 kHz, the one-second interval is generated by dividing the frequency.

The effect of the miniaturization of conventional quartz is often underestimated. Reducing the size means in most cases also reduction of the inner quartz blank. This usually causes an increase of the ESR value (Equivalent Series Resistance). But precisely this resistance should be as low as possible in order to ensure a high "Q"-value and reliable start of oscillation. In addition take into account that a higher ESR will increase the

power consumption. Because in order to maintain the quartz oscillating it is necessary to permanently supply the crystal with energy and the higher ESR cause bigger losses. Since the frequency of the processors increases as well over last time, keep in mind that effects of EMI became more important in quartz design.

Fortunately SMI INC. offers a solution in a very small 3.2 x 1.5 mm package for the challenges of an oscillator design. The standard 31M327BRR offers a ESR of just 40 kOhm max. An improvement of approximately 40% compared to the usual ESR of 70 kOhm for a 3.2 x 1.5 mm tuning fork design. This tuning fork is therefore perfectly suited in application using battery power supply as „low power micro computer“ applications. The crystals are manufactured with most common load capacitance of 12.5 pF. 9.0 pF, 6.0 pF are also feasible.



For harsh environment SMI released an ultra small SMD Tuning Fork Crystal suitable for the extended temperature range of -40 up to 125°C. The 212M327B-HAT is produced in a package size 2 x 1.2 x 0.5 mm with 3 Kpcs taped on reel.

