

Increased safety and longer battery life for standalone devices

Precision and low power consumption: SMD fuses from SCHURTER

The range of battery-powered devices extends from powerful hand tools for craftsmen, to sensors for room surveillance all the way through life-saving medical aids. The safety of such devices presents quite a challenge. To ensure the safe operation of standalone devices, SCHURTER offers two SMD fuses with low power dissipation and tight tolerances for tripping time.

Many billions of lithium-ion batteries were manufactured in 2010. At the same time, the number of application areas for these products has also increased. These days, battery-powered devices can be found everywhere. And although these handy assistants are very useful, they also always present a source of danger. Any such device can catch fire, or an overcurrent condition can damage electronic circuits. In some cases, for example in medical technology, even a brief malfunction could place a patient's health at risk.



Fig. 2: Insulin pump

When it comes to safety technology, a short and precisely defined reaction time in the event of faults is important along with reliability across a wide temperature range. Both requirements have to be assured during the device's overall service life. Furthermore, the typical design parameters of standalone devices must be considered: The focus here is on low power consumption, small form factor and an attractive price/performance ratio. In addition, there are further desirable characteristics such as those relating to recycling.



Fig. 1: Hearing aid

Safe overcurrent protection

Many types of damage can be avoided with effective overcurrent protection. In principle, a fuse is sufficient for this purpose. Although unimposing, a fuse must meet a wide range of challenging requirements, if it is to provide for the efficient and effective safe operation of insulin pumps, hearing aids or blood glucose meters.



Fig. 3: Blood glucose meter

In principle, overcurrent protection can also be implemented with an active protection circuitry. The SMD fuses from SCHURTER, however, can replace such an approach with distinct advantages.

USF 0402 and USFF 1206 SMD fuses

A fuse is clearly more reliable compared to an active protection circuitry. In addition, it requires little space at low cost. In terms of power dissipation and tripping time, there is a clear difference among the various fuses available on the market. As for all these aspects, both the USF 0402 and USFF 1206 SMD fuses from SCHURTER feature values that make them a perfect solution for overcurrent protection for battery-driven devices.

Both fuses have been developed for the overcurrent protection of secondary circuits. The rated currents for the USF 0402 range from 375 mA to 5 A, while it has a rated voltage of 32 VDC up to 4 A and 24 VDC up to 5 A. The breaking capacity is specified at 35 A at rated voltage. The USFF 1206 was developed for smaller rated currents of from 50 to 250 mA; its rated voltage is 63 VDC and its breaking capacity is 100 A.



Fig. 4: USF 0402 super-quick-acting SMD fuse, 1.05 x 0.55 mm, with rated currents from 375 mA to 5 A.



Fig. 5: USFF 1206 super-quick-acting SMD fuse, 3.2 x 1.6 mm, with rated currents from 50 mA to 250 mA.

Low power dissipation

The first characteristic that differentiates these units from standard commercial products is their low power dissipation. For example, the 200 mA version of the USFF 1206 features a voltage drop of 87 mV at rated current. This value is much lower than for any comparable product in the market. As for the USF 0402, the voltage drop of the 1 A version is 65 mV at rated current. This is made possible by a unique design. The melting wire is wire-bonded and it is just a few micrometers thick. It is made of a special metal alloy. In the case of the USF 0402, the melting wire is encapsulated in a special epoxy resin; on the USFF 1206, which is somewhat larger, it is surrounded by air. Both technologies inhibit the dissipation of heat and thus drop power dissipation.

Tight tolerance in tripping time

The second differentiating characteristic is their tight tolerance in tripping time. For instance, the USFF 1206 is designed for a tripping time between 0.1 and 1 millisecond at tenfold rated current according to the component standard UL 248-14. But the tripping-time window of the USFF 1206 is considerably narrower: With a nominal tripping time of 0.5 milliseconds, for instance, the fuse trips within a tolerance band between 0.4 and 0.6 milliseconds.

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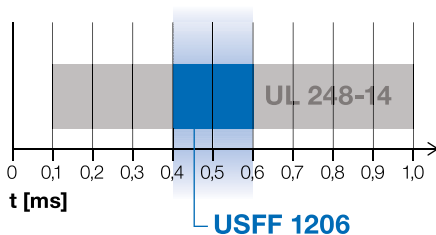


Fig. 6: Precise tripping-time window at tenfold rated current

Fuses with clear advantages

This precise tripping time increases safety for users, the environment and the device itself. Both SMD fuses make it possible to design standalone devices without active protection circuitry, which has a positive impact on the cost, size and battery lifetime of the corresponding device.

The low power dissipation and tight tolerance in tripping time are valid over the entire specified temperature range. In addition, the fuses feature a high service lifetime. In particular, they do not change their performance characteristics when handling pulsed loads such as in devices with electronically commutated motors.

Continual advances in development

In past years, SCHURTER has continually enhanced its know-how and applied it to both of these unique fuses. The company is delighted to be able to support its customers with this knowledge. Furthermore, custom-designed solutions are also possible such as versions of both fuses with current ratings outside the E Series.

You can find a detailed product overview of all SCHURTER SMD fuse products on our website: www.schurter.com/pg01_2

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Technical data

	USF 0402	USFF 1206
Rated voltage	24 - 32 VDC	125 VAC, 36 VDC
Rated current	0.375 - 5 A	0.050 - 0.250 A
Breaking capacity	35 A	100 A
Characteristic	Super-quick-acting FF	Super-quick-acting FF
Mounting	PCB, SMT	PCB, SMT
Dimensions (l x w x h) in mm	1.1 x 0.6 x 0.5	3.2 x 1.6 x 1.6
Approvals	UL 248 - 14	UL 248 - 14
Voltage drop at rated current	52 - 70 mV	75 - 95 mV 450 mV at 50 mA



About SCHURTER

SCHURTER is an internationally leading innovator and manufacturer of fuses, connectors, circuit breakers, input systems and EMC products as well as a PCB-assembly service provider for the electronics industry.

Among SCHURTER's customers are manufacturers of computers and peripheral equipment, appliances/instruments, telecommunication equipment, operator panels, medical technology, industry automations, renewable energy, aerospace, hobby, household and gardening equipment.

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