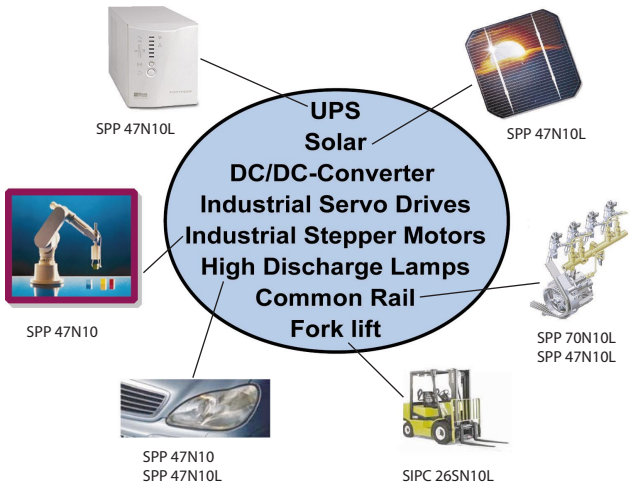
100-V MOS transistors in S-FET technology

MOSFETs for the next millennium



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The latest 100-V MOS transistors from Infineon Technologies are setting new standards for low-resistance switches: thanks to their S-FET technology, a 35% lower $R_{DS(on)}$ and up to 30% higher nominal currents can be achieved than for competitor products. The benefits for the user are a reduced power dissipation and hence the option of implementing more compact designs. In addition, the outstanding ruggedness of these transistors obviates the need for protection circuits.

Siemens Semiconductors introduced the S-FET technology for power MOSFET transistors in 1996. The 55/60-V transistors which were the first products of this development have proved highly successful. Thanks to versions in the SO-8, SOT-223, DPAK and TO-220 packages, this technology has now become well established on a global scale.

This series was followed by 20V/30V products for low-voltage applications. A transistor in a TO-220 package allows a switch to be implemented with a resistance of less than 6 mΩ for switching currents up to 80 A.

Thanks to the continuous development of the S-FET technology, transistors for 24V and 48V applications are now available with a breakdown voltage of 100 V (Fig. 1).

New 100-V transistors in S-FET technology

The new 100-V transistors from Infineon Technologies allow forward losses to be significantly reduced and higher currents to be switched than before. They are also distinguished by their great ruggedness with respect to avalanches and short circuits. In addition forward resistors can now be implemented in more compact packages. Thus a TO-247 package can be replaced by a TO-220 version with smaller dimensions, giving the user greater flexibility in design and reduced insertion volumes.

The 16-mΩ switch in the TO-220 package sets new standards in terms of $R_{DS(on)}$, drain current and avalanche stability. This is clearly illustrated by a comparison of the SPP 70N10L with competitor models (Figs. 2 to 4).

Thanks to the ruggedness of these transistors, the layout of many ap-

100-V S-FET complements the product range

20 V	55 V	55 V	100 V
200 mΩ BSO 220N	8 mΩ BUZ 111S	36 mΩ SPD 31N05	16 mΩ SPP 70N10L
30 V	7 mΩ BUZ 111SL	26 mΩ SPD 28N05L	26 mΩ SPP 47N10L
17 mΩ BSO 302SN	10 mΩ BUZ 110S	50 mΩ SPD 23N05	33 mΩ SPP 47N10
50 mΩ BSO 305N	10 mΩ BUZ 110SL	40 mΩ SPD 21N05L	
42 mΩ BSO 304SN	15 mΩ BUZ 100S	80 mΩ SPD 14N05	
75 mΩ BSO 307N	12 mΩ BUZ 100SL	64 mΩ SPD 13N05L	
75 mΩ BSP 308	18 mΩ BUZ 102S	100 mΩ SPD 09N05	
15 mΩ SPD 30N03	15 mΩ BUZ 102SL	100 mΩ SPD 80N05L	
18 mΩ SPD 30N03L	36 mΩ BUZ 103S	**60 V**	**Packages**
23 mΩ SPD 28N03	26 mΩ BUZ 103SL	120 mΩ BSO 615NV	TO-220 / TO-263
28 mΩ SPD 28N03	50 mΩ BUZ 101S	150 mΩ BSO 615N	
6 mΩ SPP 80N03	40 mΩ BUZ 101SL	120 mΩ BSP 320S	DPAK/IPAK
8 mΩ SPP 80N03L	80 mΩ BUZ 104S	150 mΩ BSP 318S	SO-8
15 mΩ SPP 46N03	64 mΩ BUZ 104SL		SOT-223
18 mΩ SPP 46N03L			
23 mΩ SPP 30N03			
28 mΩ SPP 30N03L			

Fig. 1 Infineon Technologies is currently offering MOS transistors in S-FET technology with breakdown voltages of 20 to 100 V in the SO-8, SOT-223, DPAK/IPAK and TO-220/TO-263 packages.

plications becomes much simpler because protection circuits for disturbances (load jumps, short circuits, line surge voltages etc.) can be obviated or significantly under-dimensioned.

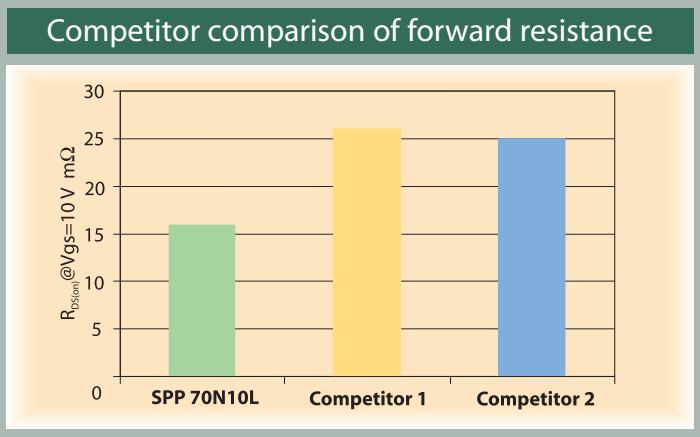

Fig. 2 The SPP70N10L in the TO-220 package attains the lowest $R_{DS(on)}$ available on the market for 100V transistors.

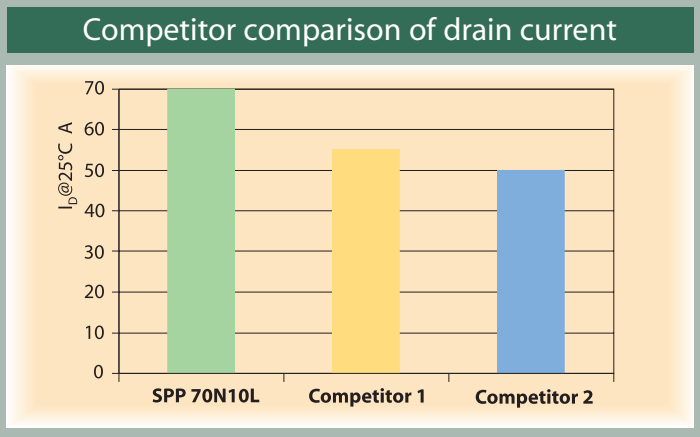

Fig. 3 A switch in the TO-220 package can handle up to 70 A at 100V. This was made possible thanks to improvements in its thermal properties and mounting technology.

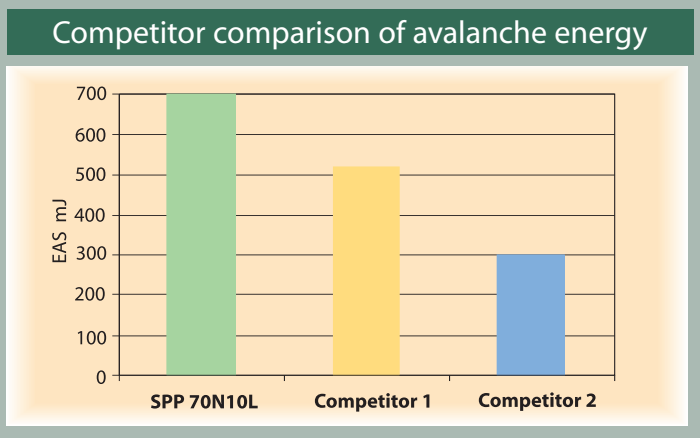

Fig. 4 Extreme ruggedness is a special performance feature of MOS transistors.

Target applications

MOSFETs with breakdown voltages of 100 V are used principally in the telecommunications, industrial and automotive sectors. Their applications include:

- DC-DC converters for
  - telecommunications,
  - boost converters for supplying an additional voltage (e.g. HID lamps, common rail systems),
  - industrial power supplies for automation technology in the range from several watts (flyback converters) up to several kW (forward converters).
- UPS applications in the lower power range for PCs or smaller medical equipment,
- Valve drivers for common-rail systems in the latest motor vehicles,
- Pulse rectifiers for
  - battery-powered vehicles
  - low-voltage motors in industry (fork-lift trucks, servo motors, smaller positioning drives),
  - Three-phase asynchronous motors,
  - DC motors with electronic commutation.

Simulation models

Circuit layouts can be designed much more efficiently with the aid of simulation models which take into account self-heating effects.
The "PSpice" and "Saber" models can be downloaded from the following Internet address:
http://www.infineon.com/products/36/368.htm
Chips alone are available for all products.

SUMMARY
The new 100-V transistors in S-FET technology allow a significantly lower drain-source on resistance and considerably higher nominal currents than hitherto. The user can implement more compact designs thanks to their greatly reduced power dissipation.

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