ON Semiconductor FDMS86181
Shielded Gate MOSFET

The newest technical innovations in the device and package
made by ON Semiconductor/Fairchild

25 million electric vehicles were sold in 2016. Consequently, power MOSFET sales in automotive applications have surpassed computing and data storage, and now represent more than 20% of the total market. As vehicle numbers increase worldwide and people adopt electric vehicles, this sector’s rapid growth will continue at a 5.1% compound annual growth rate from 2016–2022.

If we look at today’s market shares, Infineon Technologies has gained a leading place in many market segments, owing to its acquisition of International Rectifier. ON Semiconductor, a strong competitor in second place, is also making its first appearance after its acquisition of Fairchild.

System Plus Consulting presents this full reverse costing study to provide insights into and data about the technology, manufacturing cost and selling price of the ON Semiconductor FDMS86181 PowerTrench MOSFET.

The PowerTrench 100V MOSFET is the latest MOSFET specifically designed for automotive applications by ON Semiconductor/Fairchild. The FDMS86181 drives 124A with on-resistance of 4.2 mΩ and a current density of 11.8 A/mm².

The MOSFET is designed with Fairchild’s typical PowerTrench structure where the shield electrode is connected to the source. The shield electrode provides charge balance for the transistor’s drift region. This enables the use of higher doping in the drift region, resulting in reduced drift resistance. Fairchild’s new medium voltage MOSFETs are optimized to improve the diode characteristics as well as the output capacitance. The specific resistance has been significantly improved, as have the switching characteristics.

Another important innovation is present in the packaging. Fairchild’s Power56 package is not yet standard so Fairchild uses a copper lead frame connection both for the source and the gate. The two lead frames can be connected to the metal contact with a unique nickel layer deposited during front-end process.

Based on a complete teardown analysis, the report also provides an estimation of the production cost of the transistor and package. The report shows the impact of the technical innovations on the final MOSFET cost breakdown.
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