# FKS0094

## N-Ch 100V Fast Switching MOSFETs

- ★ 100% EAS Guaranteed
- ★ Low $R_{DS(ON)}$
- ★ Low Gate Charge
- ★ RoHs and Halogen-Free Compliant

## Product Summary

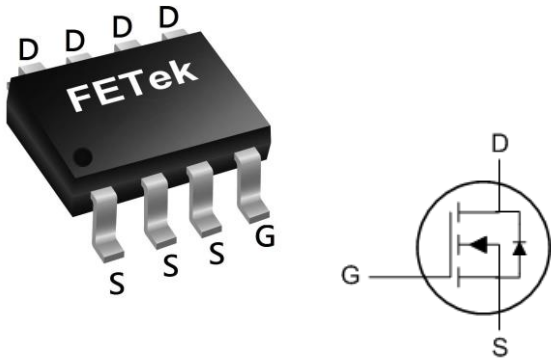
Green

| BVDSS | RDSON | ID |
|---|---|---|
| 100V | 12mΩ | 11.5A |

## Description

The FKS0094 is the high cell density trenched N-ch MOSFETs, which provide excellent RDSON and gate charge for most of the Synchronous Rectification for AC/DC Quick Charger.

## SOP8 Pin Configuration




## Absolute Maximum Ratings

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 100 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$@$T_A$=25°C | Continuous Drain Current[1] | 11.5 | A |
| $I_D$@$T_A$=70°C | Continuous Drain Current[1] | 9 | A |
| $I_{DM}$ | Pulsed Drain Current[2] | 46 | A |
| EAS | Single Pulse Avalanche Energy[3] | 12 | mJ |
| $I_{AS}$ | Avalanche Current | 9 | A |
| $P_D$@$T_A$=25°C | Total Power Dissipation[4] | 3.1 | W |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | °C |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | °C |

## Thermal Data

| Symbol | Parameter | Typ. | Max. | Unit |
|---|---|---|---|---|
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient [1](t≦10s) | --- | 40 | °C/W |
| | Thermal Resistance Junction-Ambient [1] | --- | 75 | °C/W |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case[1] | --- | 24 | °C/W |

## Electrical Characteristics ($T_J$=25 ˚C, unless otherwise noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V , $I_D$=250uA | 100 | --- | --- | V |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance[2] | $V_{GS}$=10V , $I_D$=11.5A | --- | 9 | 12 | mΩ |
| | Static Drain-Source On-Resistance[2] | $V_{GS}$=4.5V , $I_D$=9.5A | --- | 12 | 15.5 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$=$V_{DS}$ , $I_D$ =250uA | 1.2 | --- | 2.3 | V |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=80V , $V_{GS}$=0V , $T_J$=25˚C | --- | --- | 1 | uA |
| | | $V_{DS}$=80V , $V_{GS}$=0V , $T_J$=55˚C | --- | --- | 5 | |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$=±20V , $V_{DS}$=0V | --- | --- | ±100 | nA |
| gfs | Forward Transconductance | $V_{DS}$=5V , $I_D$=11.5A | --- | 45 | --- | S |
| Qg | Total Gate Charge (10V) | $V_{DS}$=50V , $V_{GS}$=10V , $I_D$=11.5A | --- | 35 | --- | nC |
| Qg | Total Gate Charge (4.5V) | | --- | 16 | --- | |
| Qgs | Gate-Source Charge | | --- | 8 | --- | |
| Qgd | Gate-Drain Charge | | --- | 4 | --- | |
| Td(on) | Turn-On Delay Time | $V_{DD}$=50V , $V_{GS}$=10V , $R_G$=3Ω, $I_D$=11.5A | --- | 9 | --- | ns |
| Tr | Rise Time | | --- | 4.5 | --- | |
| Td(off) | Turn-Off Delay Time | | --- | 35 | --- | |
| Tf | Fall Time | | --- | 5.5 | --- | |
| Ciss | Input Capacitance | $V_{DS}$=50V , $V_{GS}$=0V , f=1MHz | --- | 2550 | --- | pF |
| Coss | Output Capacitance | | --- | 305 | --- | |
| Crss | Reverse Transfer Capacitance | | --- | 12 | --- | |

## Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current[1,5] | $V_G$=$V_D$=0V , Force Current | --- | --- | 4 | A |
| $V_{SD}$ | Diode Forward Voltage[2] | $V_{GS}$=0V , $I_S$=1A , $T_J$=25˚C | --- | --- | 1.1 | V |
| $t_{rr}$ | Reverse Recovery Time | $I_F$=11.5A , di/dt=100A/μs , $T_J$=25˚C | --- | 28 | --- | nS |
| $Q_{rr}$ | Reverse Recovery Charge | | --- | 120 | --- | nC |

Note :
1.The data tested by surface mounted on a 1 inch$^2$ FR-4 board with 2OZ copper.
2.The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%
3.The EAS data shows Max. rating . The test condition is $V_{DD}$=25V,$V_{GS}$=10V,L=0.3mH,$I_{AS}$=9A
4.The power dissipation is limited by 150˚C junction temperature
5.The data is theoretically the same as $I_D$ and $I_{DM}$ , in real applications , should be limited by total power dissipation.

## Typical Characteristics

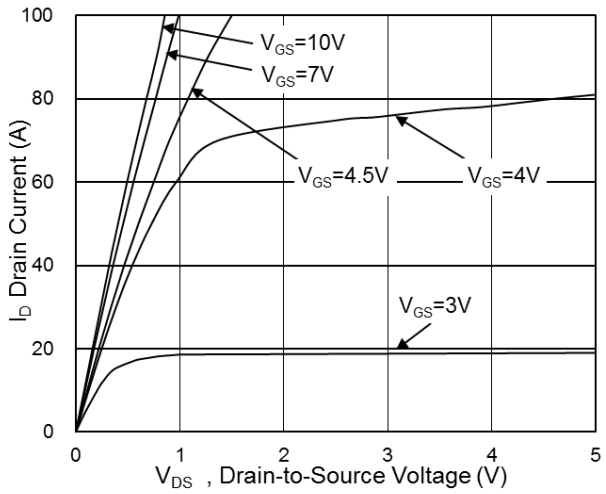



**Fig.1 Typical Output Characteristics**

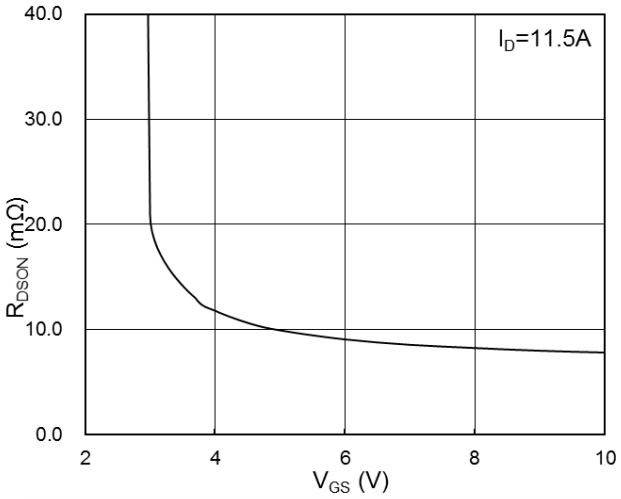



**Fig.2 On-Resistance vs. G-S Voltage**

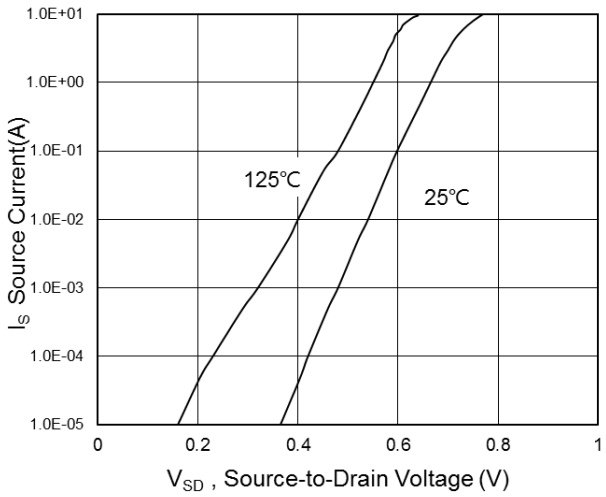



**Fig.3 Source-Drain Forward Characteristics**

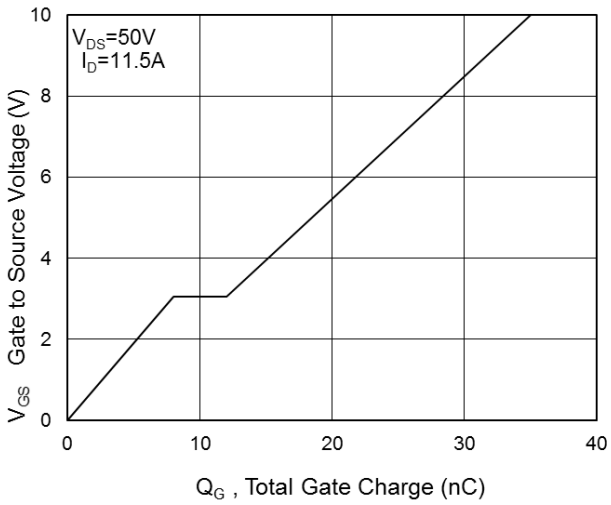



**Fig.4 Gate-Charge Characteristics**

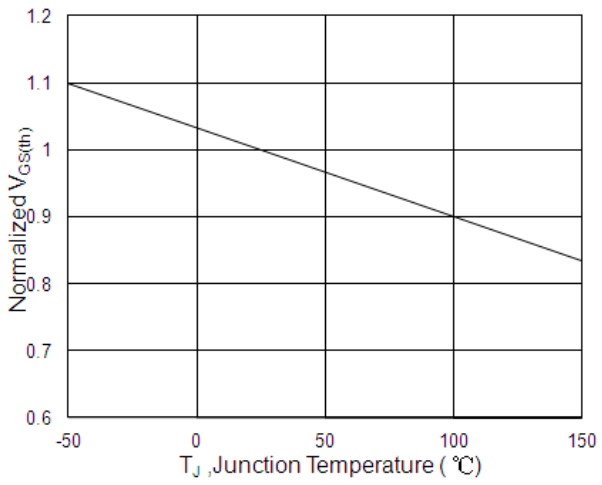



**Fig.5 Normalized $V_{GS(th)}$ vs. $T_J$**

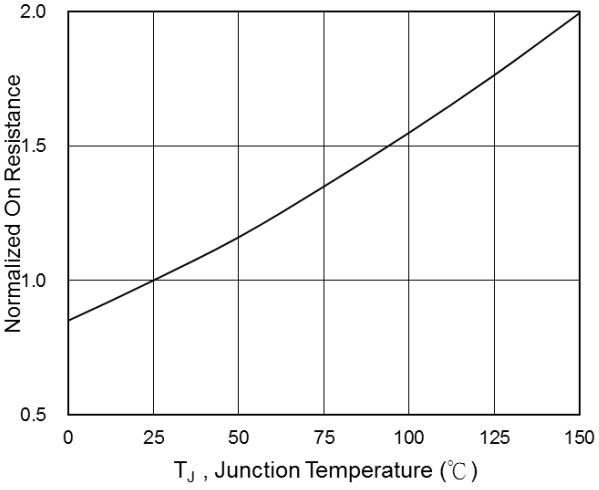



**Fig.6 Normalized $R_{DSON}$ vs. $T_J$**

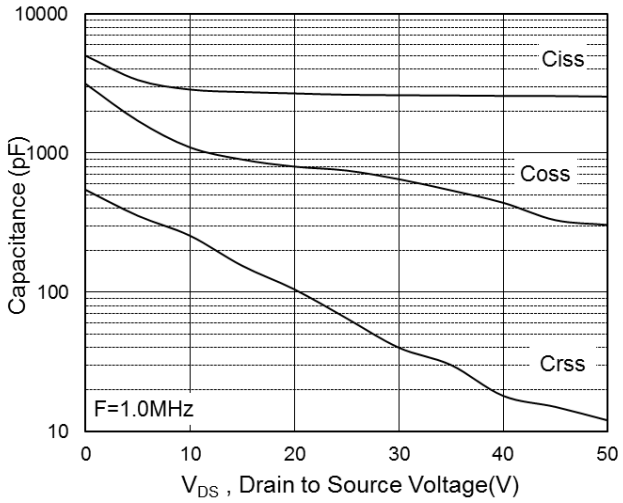



Fig.7 Capacitance

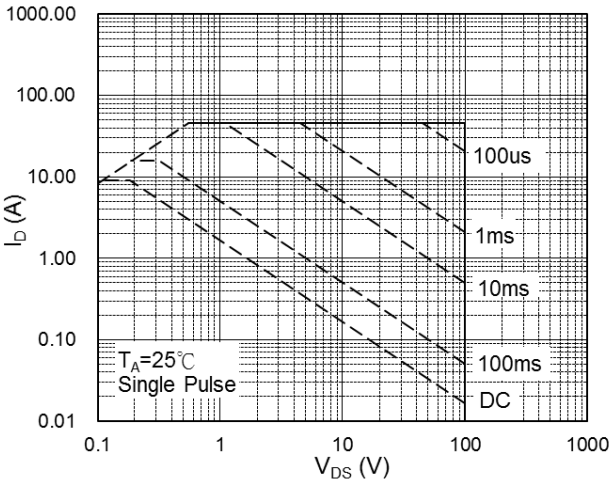



Fig.8 Safe Operating Area

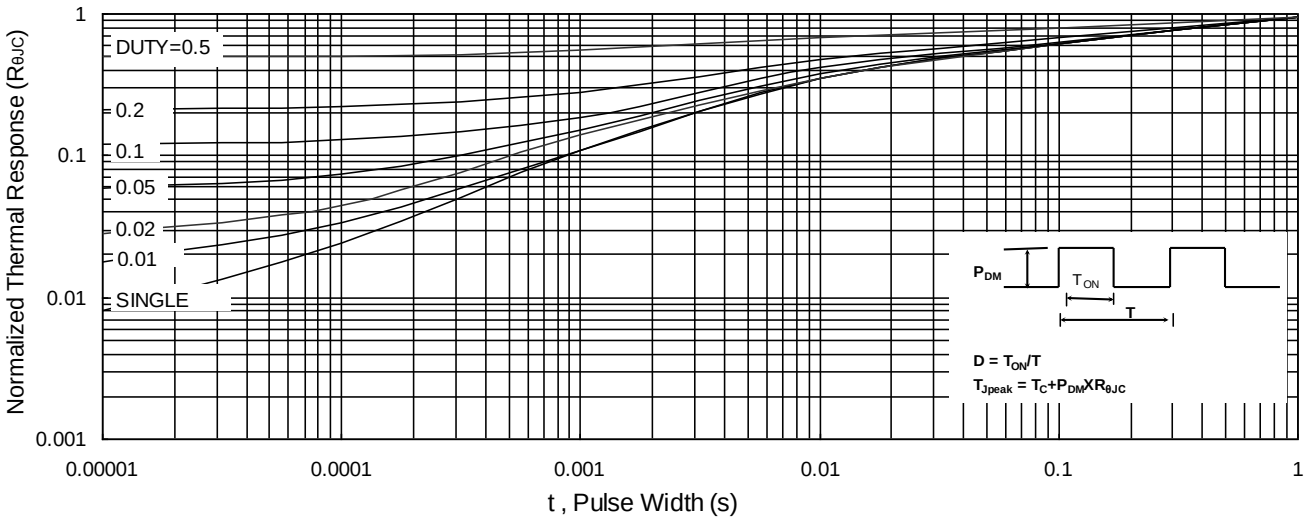



Fig.9 Normalized Maximum Transient Thermal Impedance

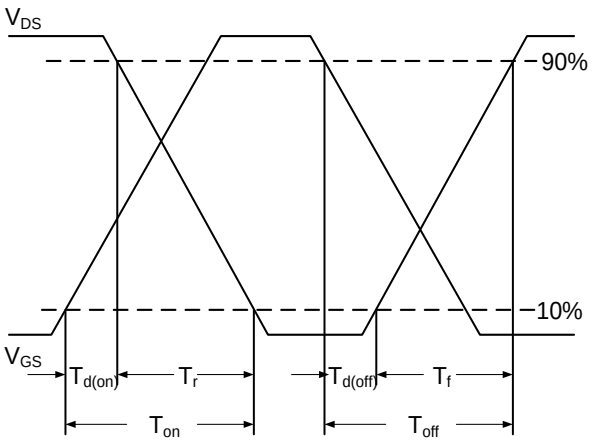



Fig.10 Switching Time Waveform

$$EAS = \frac{1}{2} L \times I_{AS}^2 \times \frac{BV_{DSS}}{BV_{DSS}-V_{DD}}$$

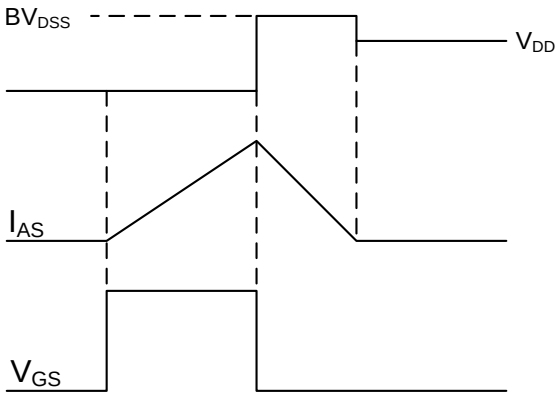



Fig.11 Unclamped Inductive Switching Waveform