

## N-Ch 100V Fast Switching MOSFETs

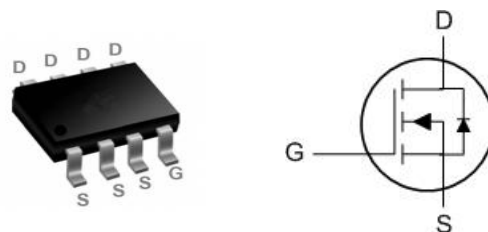
### Description

The SK14N10-P8 is the high cell density trench N-ch MOSFETs, which provide excellent  $R_{DS(ON)}$  and gate charge for most of the Synchronous Rectification for AC/DC Quick Charger.

### Feature

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

| BVDSS | $R_{DS(ON)}$ | ID  |
|-------|--------------|-----|
| 100V  | 8m $\Omega$  | 14A |



SOP8 Pin Configuration

### Absolute Maximum Ratings

| Symbol                     | Parameter                                  | Rating     | Units            |
|----------------------------|--|------------|------------------|
| $V_{DS}$                   | Drain-Source Voltage                       | 100        | V                |
| $V_{GS}$                   | Gate-Source Voltage                        | $\pm 20$   | V                |
| $I_D@T_A=25^\circ\text{C}$ | Continuous Drain Current <sup>1</sup>      | 13.5       | A                |
| $I_D@T_A=70^\circ\text{C}$ | Continuous Drain Current <sup>1</sup>      | 10.5       | A                |
| $I_{DM}$                   | Pulsed Drain Current <sup>2</sup>          | 55         | A                |
| EAS                        | Single Pulse Avalanche Energy <sup>3</sup> | 33         | mJ               |
| $I_{AS}$                   | Avalanche Current                          | 15         | A                |
| $P_D@T_A=25^\circ\text{C}$ | Total Power Dissipation <sup>4</sup>       | 3.1        | W                |
| $T_{STG}$                  | Storage Temperature Range                  | -55 to 150 | $^\circ\text{C}$ |
| $T_J$                      | Operating Junction Temperature Range       | -55 to 150 | $^\circ\text{C}$ |

### Thermal Data

| Symbol          | Parameter  | Typ. | Max. | Unit               |
|-----------------|--|------|------|--------------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient <sup>1</sup> ( $t \leq 10\text{s}$ ) | ---  | 40   | $^\circ\text{C/W}$ |
|                 | Thermal Resistance Junction-Ambient <sup>1</sup>                         | ---  | 75   | $^\circ\text{C/W}$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case <sup>1</sup>                            | ---  | 24   | $^\circ\text{C/W}$ |

## Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)

| Symbol              | Parameter                                      | Conditions   | Min. | Typ. | Max. | Unit |
|---------------------|--|--|------|------|------|------|
| BV <sub>DSS</sub>   | Drain-Source Breakdown Voltage                 | V <sub>GS</sub> =0V, I <sub>D</sub> =250uA   | 100  | ---  | ---  | V    |
| R <sub>DS(ON)</sub> | Static Drain-Source On-Resistance <sup>2</sup> | V <sub>GS</sub> =10V, I <sub>D</sub> =13.5A  | ---  | 6.6  | 8    | mΩ   |
|                     | Static Drain-Source On-Resistance <sup>2</sup> | V <sub>GS</sub> =4.5V, I <sub>D</sub> =11.5A   | ---  | 8.7  | 10.5 |      |
| V <sub>GS(th)</sub> | Gate Threshold Voltage                         | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA                                 | 1.2  | ---  | 2.3  | V    |
| I <sub>DSS</sub>    | Drain-Source Leakage Current                   | V <sub>DS</sub> =80V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C                          | ---  | ---  | 1    | uA   |
|                     |  | V <sub>DS</sub> =80V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C                          | ---  | ---  | 5    |      |
| I <sub>GSS</sub>    | Gate-Source Leakage Current                    | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V   | ---  | ---  | ±100 | nA   |
| g <sub>fs</sub>     | Forward Transconductance                       | V <sub>DS</sub> =5V, I <sub>D</sub> =13.5A   | ---  | 75   | ---  | S    |
| Q <sub>g</sub>      | Total Gate Charge (10V)                        | V <sub>DS</sub> =50V, V <sub>GS</sub> =10V, I <sub>D</sub> =13.5A                        | ---  | 45   | ---  | nC   |
| Q <sub>g</sub>      | Total Gate Charge (4.5V)                       |  | ---  | 19.3 | ---  |      |
| Q <sub>gs</sub>     | Gate-Source Charge                             |  | ---  | 9.5  | ---  |      |
| Q <sub>gd</sub>     | Gate-Drain Charge                              |  | ---  | 4.8  | ---  |      |
| T <sub>d(on)</sub>  | Turn-On Delay Time                             | V <sub>DD</sub> =50V, V <sub>GS</sub> =10V, R <sub>G</sub> =3Ω,<br>I <sub>D</sub> =13.5A | ---  | 10   | ---  | ns   |
| T <sub>r</sub>      | Rise Time                                      |  | ---  | 6.5  | ---  |      |
| T <sub>d(off)</sub> | Turn-Off Delay Time                            |  | ---  | 45   | ---  |      |
| T <sub>f</sub>      | Fall Time                                      |  | ---  | 7.5  | ---  |      |
| C <sub>iss</sub>    | Input Capacitance                              | V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f=1MHz  | ---  | 3320 | ---  | pF   |
| C <sub>oss</sub>    | Output Capacitance                             |  | ---  | 605  | ---  |      |
| C <sub>rss</sub>    | Reverse Transfer Capacitance                   |  | ---  | 20   | ---  |      |

## Diode Characteristics

| Symbol          | Parameter                                | Conditions  | Min. | Typ. | Max. | Unit |
|-----------------|--|---|------|------|------|------|
| I <sub>S</sub>  | Continuous Source Current <sup>1,5</sup> | V <sub>G</sub> =V <sub>D</sub> =0V, Force Current             | ---  | ---  | 5    | A    |
| V <sub>SD</sub> | Diode Forward Voltage <sup>2</sup>       | V <sub>GS</sub> =0V, I <sub>S</sub> =1A, T <sub>J</sub> =25°C | ---  | ---  | 1.1  | V    |
| t <sub>rr</sub> | Reverse Recovery Time                    | I <sub>F</sub> =13.5A, di/dt=100A/μs,                         | ---  | 33   | ---  | nS   |
| Q <sub>rr</sub> | Reverse Recovery Charge                  | T <sub>J</sub> =25°C  | ---  | 150  | ---  | nC   |

Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3.The test condition is V<sub>DD</sub>=25V, V<sub>GS</sub>=10V, L=0.3mH, I<sub>AS</sub>=15A
- 4.The power dissipation is limited by 150°C junction temperature
- 5.The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub>, in real applications , should be limited by total power dissipation.

## Typical Characteristics

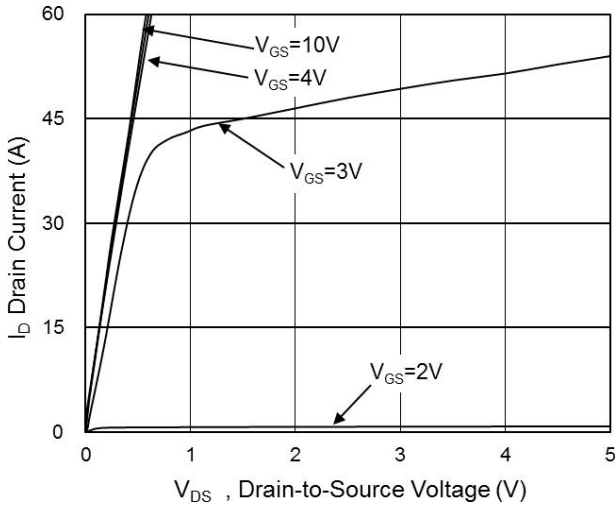


Fig.1 Typical Output Characteristics

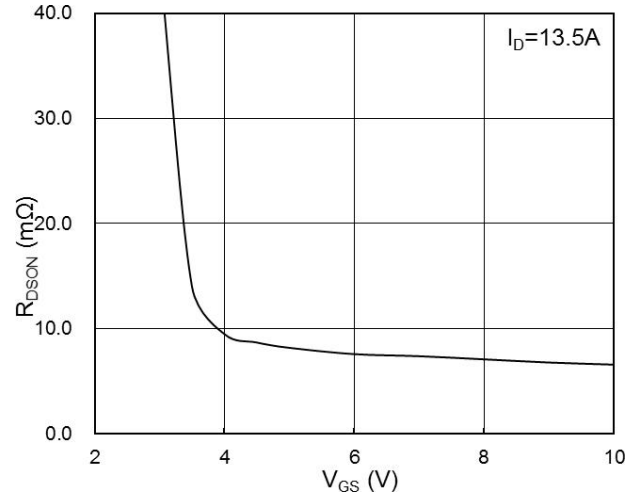


Fig.2 On-Resistance vs. G-S Voltage

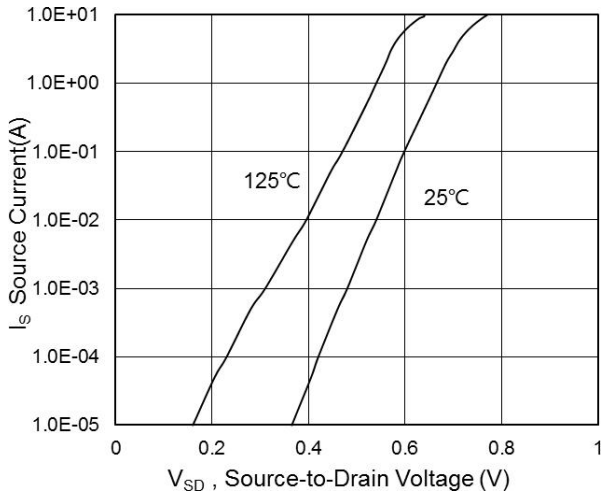


Fig.3 Source-Drain Forward Characteristics

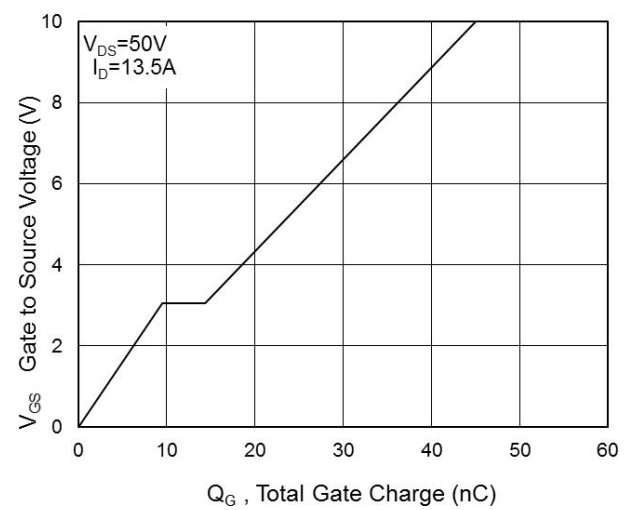


Fig.4 Gate-Charge Characteristics

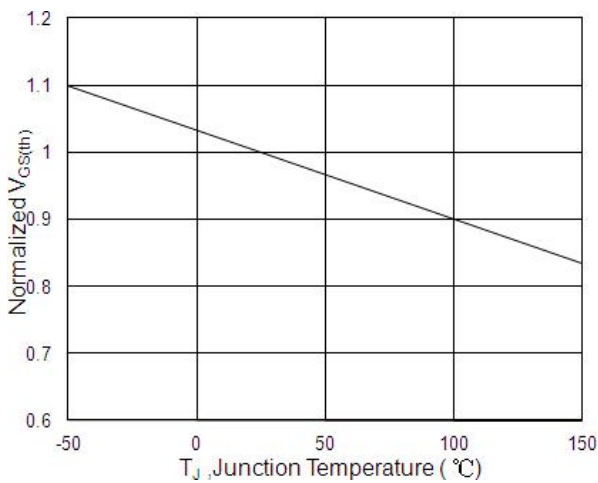


Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$

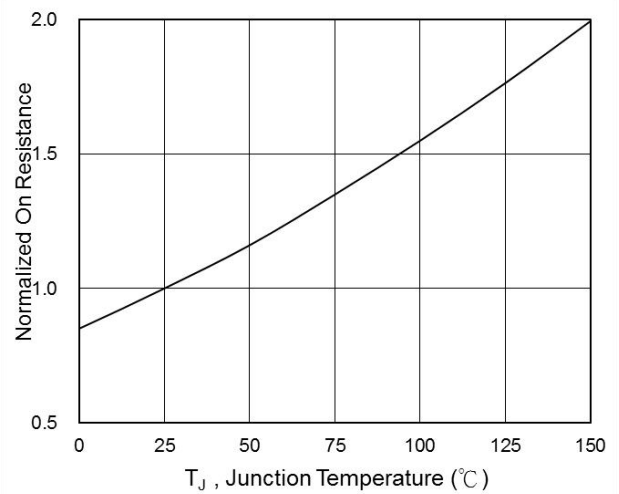
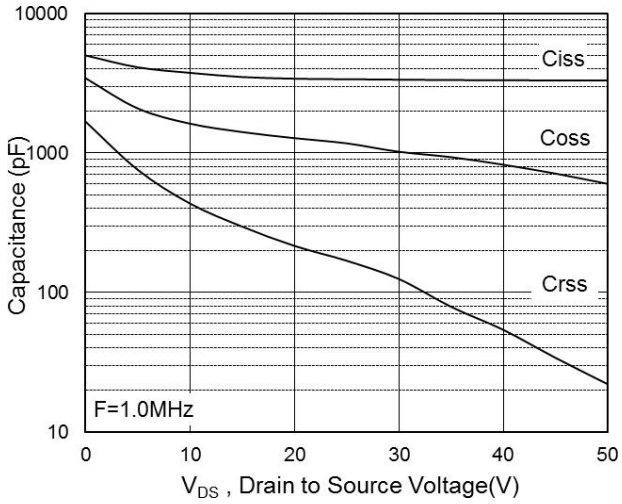
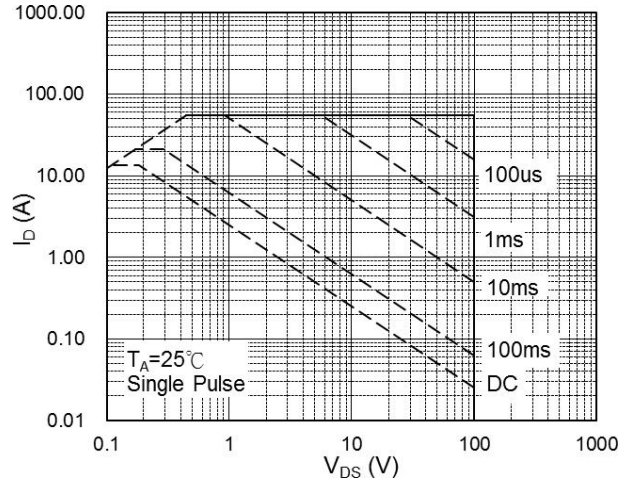


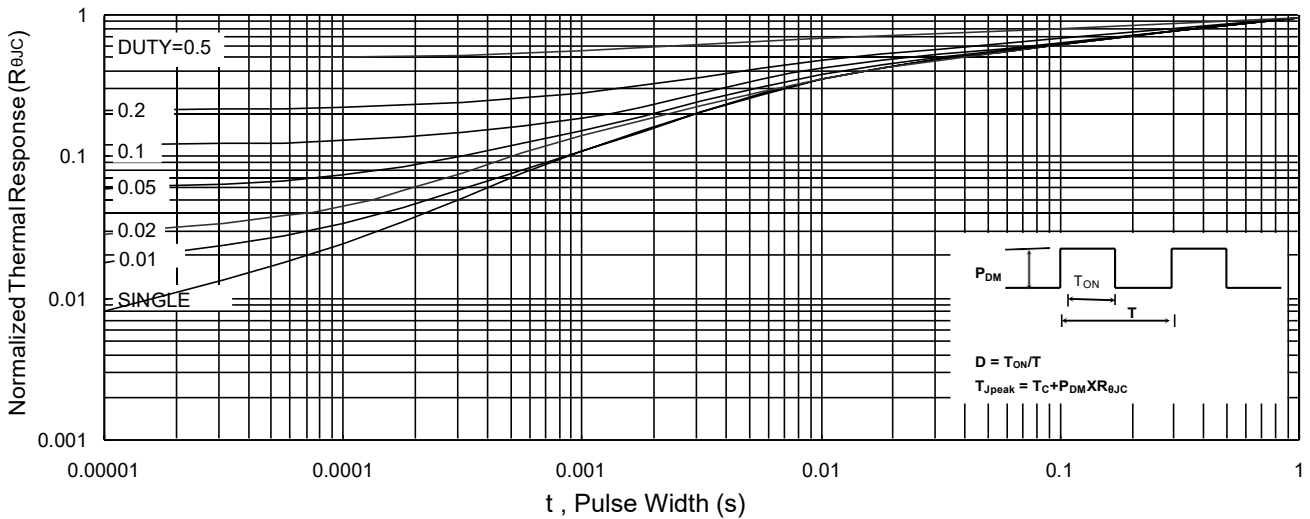
Fig.6 Normalized  $R_{DSON}$  vs.  $T_J$



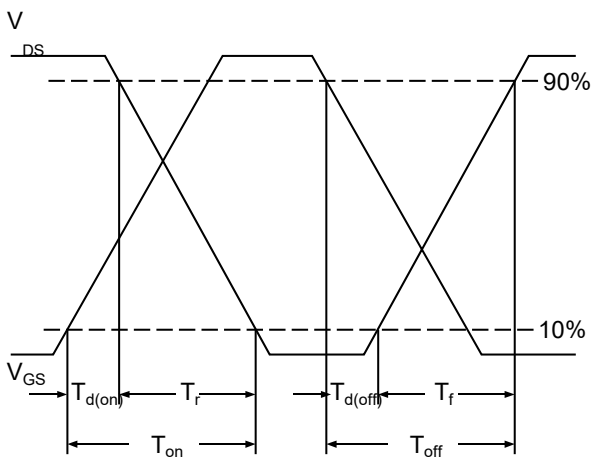
**Fig.7 Capacitance**



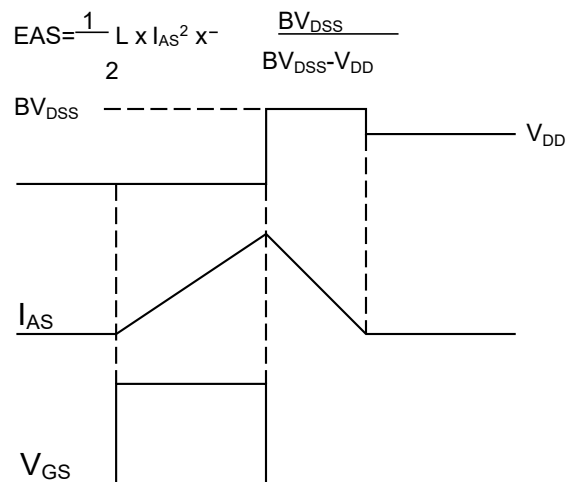
**Fig.8 Safe Operating Area**



**Fig.9 Normalized Maximum Transient Thermal Impedance**



**Fig.10 Switching Time Waveform**



**Fig.11 Unclamped Inductive Switching Waveform**