

## N-Ch 30V Fast Switching MOSFETs

- ★ 100% EAS Guaranteed
- ★ Green Device Available
- ★ Super Low Gate Charge
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology

### Description

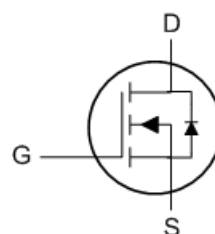
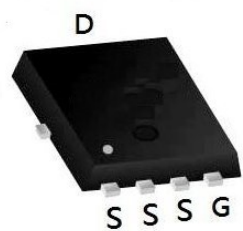
The SIR802DP-T1-GE3 is the high cell density trenched N-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The SIR802DP-T1-GE3 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

### Product Summary

| BVDSS | RDSON | ID   |
|-------|-------|------|
| 30V   | 1.5mΩ | 150A |

### PRPAK5X6 Pin Configuration



### Absolute Maximum Ratings

| Symbol                      | Parameter                                      | Rating     | Units            |
|-----------------------------|------------------------------------------------|------------|------------------|
| $V_{DS}$                    | Drain-Source Voltage                           | 30         | V                |
| $V_{GS}$                    | Gate-Source Voltage                            | $\pm 20$   | V                |
| $I_D@T_C=25^\circ\text{C}$  | Continuous Drain Current, $V_{GS} @ 10V^{1,6}$ | 150        | A                |
| $I_D@T_C=100^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ 10V^{1,6}$ | 80         | A                |
| $I_{DM}$                    | Pulsed Drain Current <sup>2</sup>              | 320        | A                |
| EAS                         | Single Pulse Avalanche Energy <sup>3</sup>     | 180        | mJ               |
| $I_{AS}$                    | Avalanche Current                              | 60         | A                |
| $P_D@T_C=25^\circ\text{C}$  | Total Power Dissipation <sup>4</sup>           | 187        | 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> | ---  | 62   | $^\circ\text{C/W}$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case <sup>1</sup>    | ---  | 1.1  | $^\circ\text{C/W}$ |

**Electrical Characteristics ( $T_J=25^\circ\text{C}$ , unless otherwise noted)**

| Symbol                       | Parameter                                      | Conditions                                                  | Min. | Typ.  | Max.      | Unit                |
|------------------------------|------------------------------------------------|-------------------------------------------------------------|------|-------|-----------|---------------------|
| $BV_{DSS}$                   | Drain-Source Breakdown Voltage                 | $V_{GS}=0V$ , $I_D=250\mu A$                                | 30   | ---   | ---       | V                   |
| $\Delta BV_{DSS}/\Delta T_J$ | $BV_{DSS}$ Temperature Coefficient             | Reference to $25^\circ\text{C}$ , $I_D=1mA$                 | ---  | 0.014 | ---       | $V/^\circ\text{C}$  |
| $R_{DS(ON)}$                 | Static Drain-Source On-Resistance <sup>2</sup> | $V_{GS}=10V$ , $I_D=30A$                                    | ---  | 1.5   | 2.0       | $m\Omega$           |
|                              |                                                | $V_{GS}=4.5V$ , $I_D=15A$                                   | ---  | 2.2   | 3.0       |                     |
| $V_{GS(th)}$                 | Gate Threshold Voltage                         | $V_{GS}=V_{DS}$ , $I_D=250\mu A$                            | 1.2  | ---   | 2.5       | V                   |
| $\Delta V_{GS(th)}$          | $V_{GS(th)}$ Temperature Coefficient           |                                                             | ---  | -4    | ---       | $mV/^\circ\text{C}$ |
| $I_{DSS}$                    | Drain-Source Leakage Current                   | $V_{DS}=24V$ , $V_{GS}=0V$ , $T_J=25^\circ\text{C}$         | ---  | ---   | 1         | $\mu A$             |
|                              |                                                | $V_{DS}=24V$ , $V_{GS}=0V$ , $T_J=55^\circ\text{C}$         | ---  | ---   | 5         |                     |
| $I_{GSS}$                    | Gate-Source Leakage Current                    | $V_{GS}=\pm 20V$ , $V_{DS}=0V$                              | ---  | ---   | $\pm 100$ | nA                  |
| $g_{fs}$                     | Forward Transconductance                       | $V_{DS}=5V$ , $I_D=30A$                                     | ---  | 50    | ---       | S                   |
| $R_g$                        | Gate Resistance                                | $V_{DS}=0V$ , $V_{GS}=0V$ , $f=1MHz$                        | ---  | 1.7   | ---       | $\Omega$            |
| $Q_g$                        | Total Gate Charge (4.5V)                       | $V_{DS}=15V$ , $V_{GS}=10V$ , $I_D=15A$                     | ---  | 56.9  | ---       | nC                  |
| $Q_{gs}$                     | Gate-Source Charge                             |                                                             | ---  | 13.8  | ---       |                     |
| $Q_{gd}$                     | Gate-Drain Charge                              |                                                             | ---  | 23.5  | ---       |                     |
| $T_{d(on)}$                  | Turn-On Delay Time                             | $V_{DD}=15V$ , $V_{GS}=10V$ , $R_G=3.3\Omega$ ,<br>$I_D=1A$ | ---  | 20.1  | ---       | ns                  |
| $T_r$                        | Rise Time                                      |                                                             | ---  | 6.3   | ---       |                     |
| $T_{d(off)}$                 | Turn-Off Delay Time                            |                                                             | ---  | 124.6 | ---       |                     |
| $T_f$                        | Fall Time                                      |                                                             | ---  | 15.8  | ---       |                     |
| $C_{iss}$                    | Input Capacitance                              | $V_{DS}=15V$ , $V_{GS}=0V$ , $f=1MHz$                       | ---  | 4345  | ---       | pF                  |
| $C_{oss}$                    | Output Capacitance                             |                                                             | ---  | 340   | ---       |                     |
| $C_{rss}$                    | Reverse Transfer Capacitance                   |                                                             | ---  | 225   | ---       |                     |

**Diode Characteristics**

| Symbol   | Parameter                                | Conditions                                      | Min. | Typ. | Max. | Unit |
|----------|------------------------------------------|-------------------------------------------------|------|------|------|------|
| $I_S$    | Continuous Source Current <sup>1,6</sup> | $V_G=V_D=0V$ , Force Current                    | ---  | ---  | 150  | A    |
| $V_{SD}$ | Diode Forward Voltage <sup>2</sup>       | $V_{GS}=0V$ , $I_S=1A$ , $T_J=25^\circ\text{C}$ | ---  | ---  | 1.2  | V    |

Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 20Z copper.
- 2.The data tested by pulsed , pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$
- 3.The EAS data shows Max. rating . The test condition is  $V_{DD}=25V$ ,  $V_{GS}=10V$ ,  $L=0.1mH$ ,  $I_{AS}=60A$
- 4.The power dissipation is limited by  $150^\circ\text{C}$  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.
- 6.Package limitation current is 85A.

N-Ch 30V Fast Switching MOSFETs

Typical Characteristics

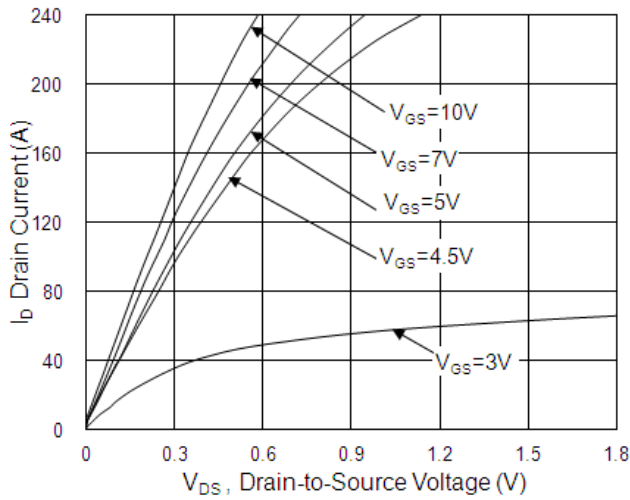


Fig.1 Typical Output Characteristics

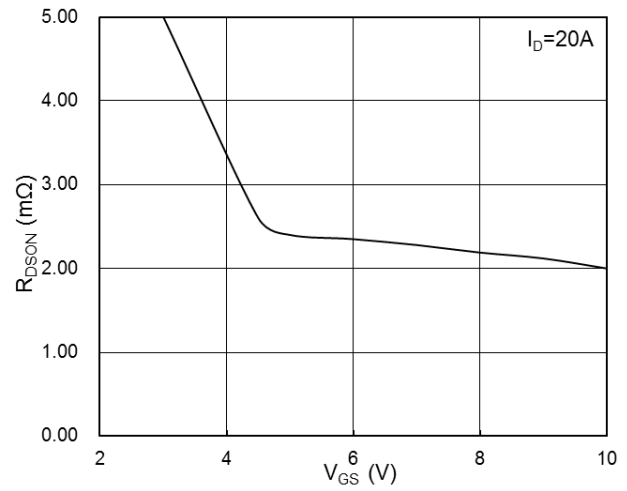


Fig.2 On-Resistance v.s Gate-Source

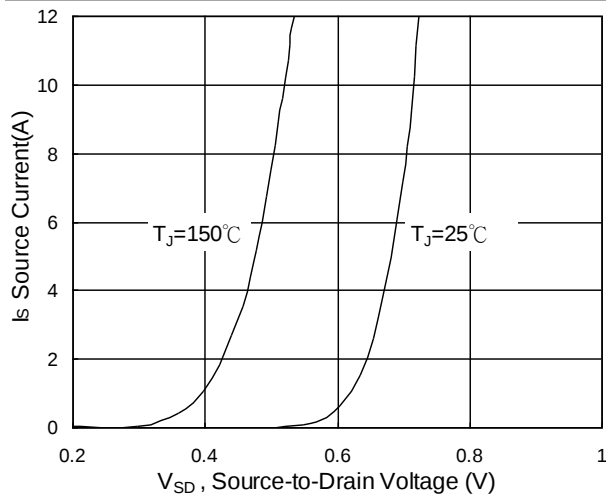


Fig.3 Forward Characteristics of Reverse

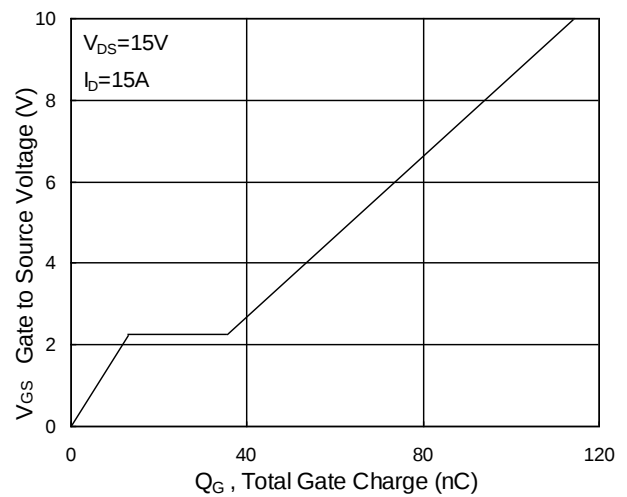


Fig.4 Gate-Charge Characteristics

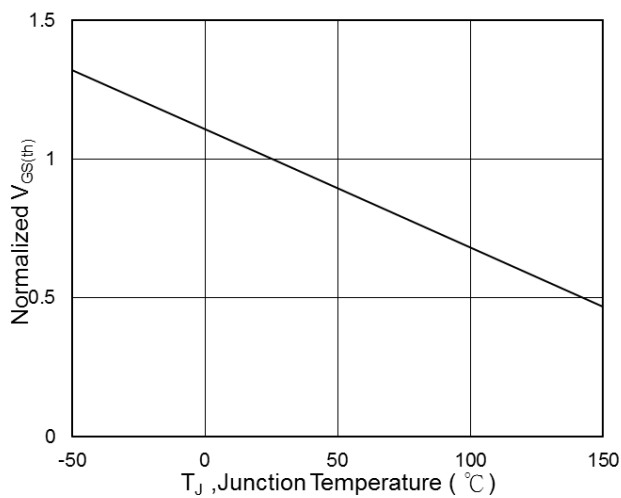


Fig.5 Normalized  $V_{GS(th)}$  v.s  $T_J$

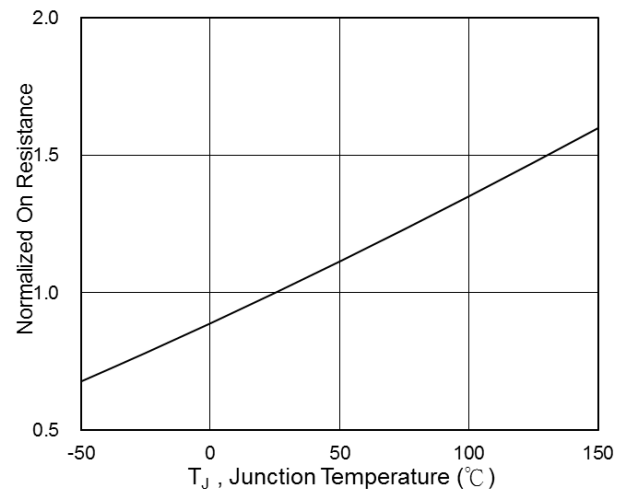


Fig.6 Normalized  $R_{DS(on)}$  v.s  $T_J$

N-Ch 30V Fast Switching MOSFETs

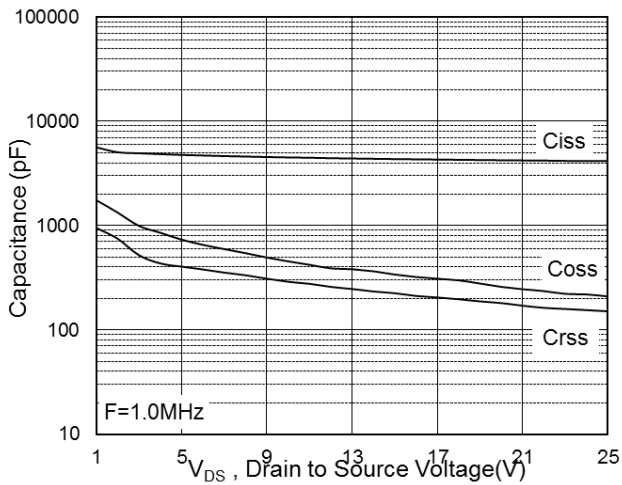


Fig.7 Capacitance

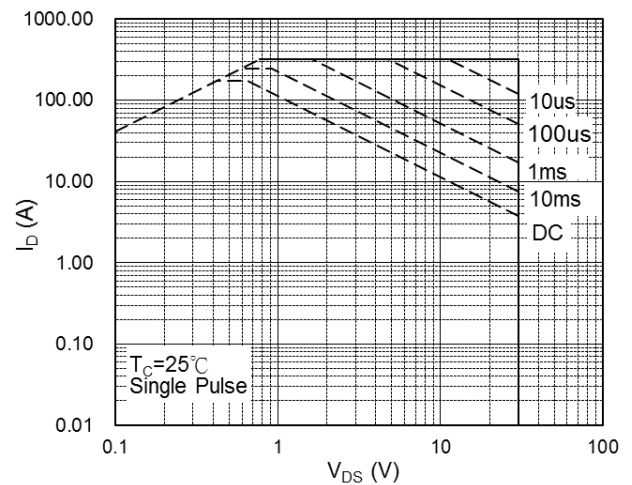


Fig.8 Safe Operating Area

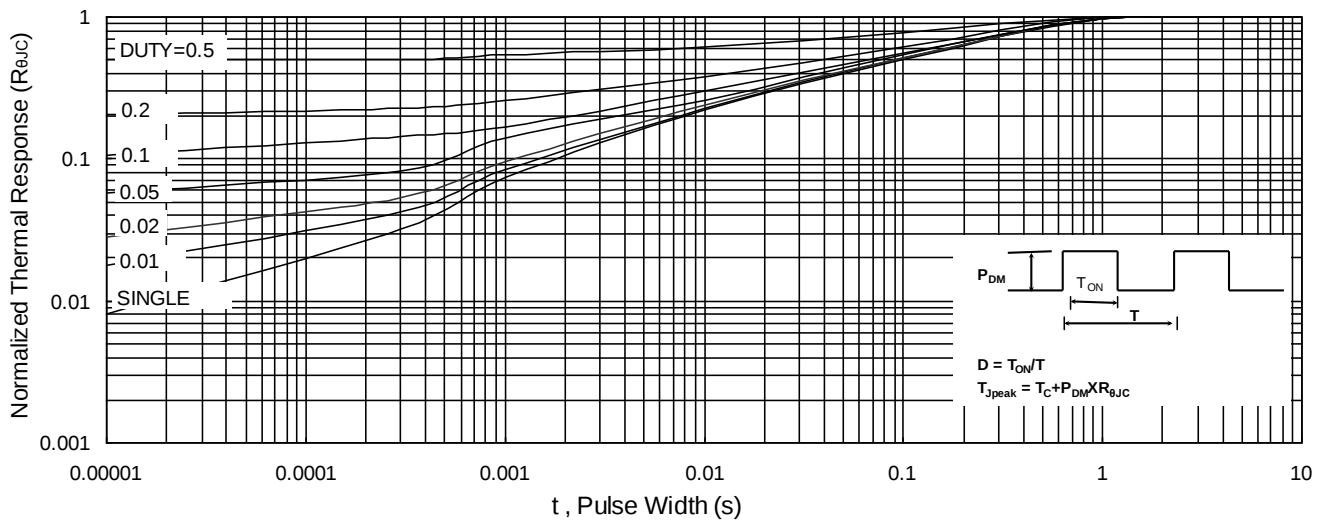


Fig.9 Normalized Maximum Transient Thermal Impedance

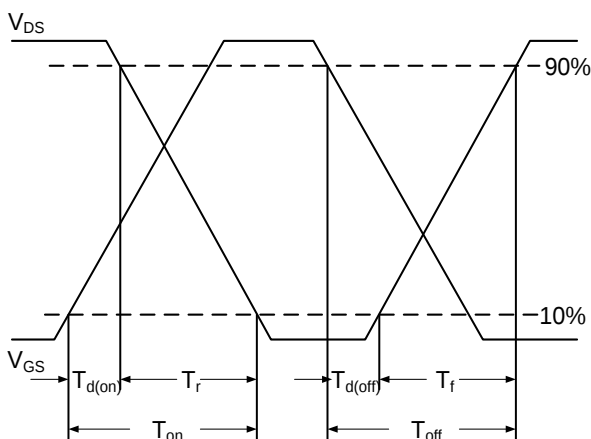


Fig.10 Switching Time Waveform

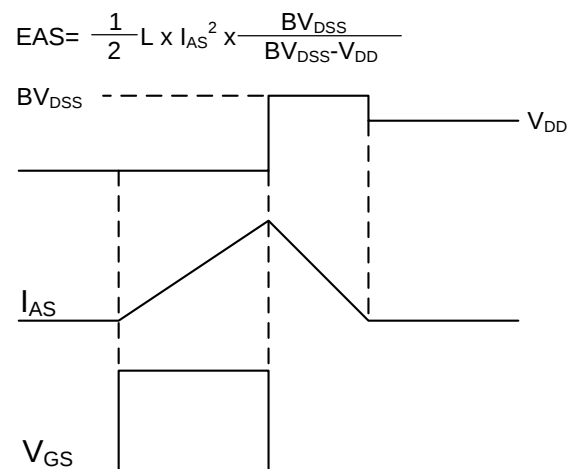


Fig.11 Unclamped Inductive Switching Waveform