

## P-Ch 100V Fast Switching MOSFETs

### Features:

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

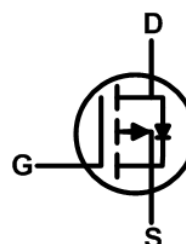
### Description:

The KJD0139 uses advanced trench MOSFET technology to provide excellent  $R_{DS(ON)}$  and gate charge for use in a wide variety of other applications.

The KJD0139 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.



TO252 Pin Configuration



### Product Summary

| BVDSS | RDSON | ID   |
|-------|-------|------|
| -100V | 50mΩ  | -30A |

### Absolute Maximum Ratings

| Symbol                 | Parameter                                              | Rating     | Units |
|------------------------|--------------------------------------------------------|------------|-------|
| $V_{DS}$               | Drain-Source Voltage                                   | -100       | V     |
| $V_{GS}$               | Gate-Source Voltage                                    | ±20        | V     |
| $I_D@T_C=25^{\circ}C$  | Continuous Drain Current, $V_{GS}$ @ -10V <sup>1</sup> | -30        | A     |
| $I_D@T_C=100^{\circ}C$ | Continuous Drain Current, $V_{GS}$ @ -10V <sup>1</sup> | -19        | A     |
| $I_{DM}$               | Pulsed Drain Current <sup>2</sup>                      | -100       | A     |
| EAS                    | Single Pulse Avalanche Energy <sup>3</sup>             | 345        | mJ    |
| $I_{AS}$               | Avalanche Current                                      | 28         | A     |
| $P_D@T_C=25^{\circ}C$  | Total Power Dissipation <sup>4</sup>                   | 104        | 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 <sup>1</sup> | ---  | 62   | °C/W |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case <sup>1</sup>    | ---  | 1.22 | °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                 | $V_{GS}=0V, I_D=-250\mu A$                          | -100 | ---  | ---       | V         |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance <sup>2</sup> | $V_{GS}=-10V, I_D=-10A$                             | ---  | 42   | 50        | $m\Omega$ |
|              |                                                | $V_{GS}=-4.5V, I_D=-8A$                             | ---  | 46   | 55        |           |
| $V_{GS(th)}$ | Gate Threshold Voltage                         | $V_{GS}=V_{DS}, I_D=-250\mu A$                      | -1.2 | -1.8 | -2.5      | V         |
| $I_{DSS}$    | Drain-Source Leakage Current                   | $V_{DS}=-100V, V_{GS}=0V, T_J=25^\circ\text{C}$     | ---  | ---  | -50       | $\mu A$   |
| $I_{GSS}$    | Gate-Source Leakage Current                    | $V_{GS}=\pm 20V, V_{DS}=0V$                         | ---  | ---  | $\pm 100$ | nA        |
| $g_{fs}$     | Forward Transconductance                       | $V_{DS}=-10V, I_D=-10A$                             | ---  | 32   | ---       | S         |
| $Q_g$        | Total Gate Charge                              | $V_{DS}=-80V, V_{GS}=-10V, I_D=-14A$                | ---  | 92   | ---       | nC        |
| $Q_{gs}$     | Gate-Source Charge                             |                                                     | ---  | 17.5 | ---       |           |
| $Q_{gd}$     | Gate-Drain Charge                              |                                                     | ---  | 14   | ---       |           |
| $T_{d(on)}$  | Turn-On Delay Time                             | $V_{DD}=-50V, V_{GS}=-10V, R_G=3.3\Omega, I_D=-14A$ | ---  | 20.5 | ---       | ns        |
| $T_r$        | Rise Time                                      |                                                     | ---  | 32.2 | ---       |           |
| $T_{d(off)}$ | Turn-Off Delay Time                            |                                                     | ---  | 123  | ---       |           |
| $T_f$        | Fall Time                                      |                                                     | ---  | 63.7 | ---       |           |
| $C_{iss}$    | Input Capacitance                              | $V_{DS}=-25V, V_{GS}=0V, f=1\text{MHz}$             | ---  | 6516 | ---       | pF        |
| $C_{oss}$    | Output Capacitance                             |                                                     | ---  | 223  | ---       |           |
| $C_{rss}$    | Reverse Transfer Capacitance                   |                                                     | ---  | 125  | ---       |           |

**Diode Characteristics**

| Symbol   | Parameter                                | Conditions                                          | Min. | Typ.  | Max. | Unit |
|----------|------------------------------------------|-----------------------------------------------------|------|-------|------|------|
| $I_S$    | Continuous Source Current <sup>1,5</sup> | $V_G=V_D=0V$ , Force Current                        | ---  | ---   | -30  | A    |
| $V_{SD}$ | Diode Forward Voltage <sup>2</sup>       | $V_{GS}=0V, I_S=-1A, T_J=25^\circ\text{C}$          | ---  | ---   | 1.2  | V    |
| $t_{rr}$ | Reverse Recovery Time                    | $I_F=-14A, di/dt=-100A/\mu s, T_J=25^\circ\text{C}$ | ---  | 31.2  | ---  | nS   |
| $Q_{rr}$ | Reverse Recovery Charge                  |                                                     | ---  | 31.97 | ---  | nC   |

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  $V_{DD}=-25V, V_{GS}=-10V, L=0.88mH, I_{AS}=-28A$
- 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.

## Typical Characteristics

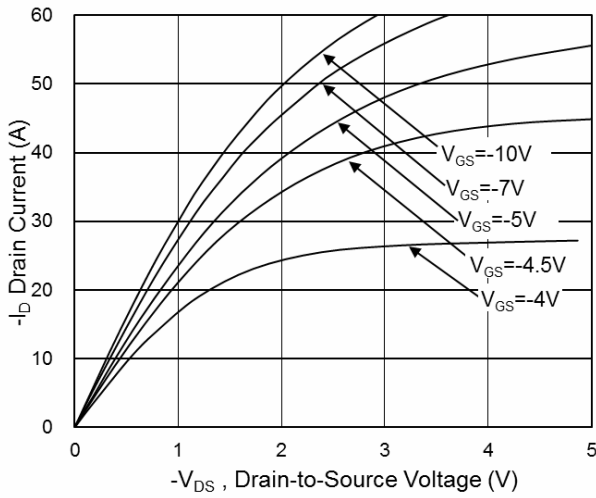


Fig.1 Typical Output Characteristics

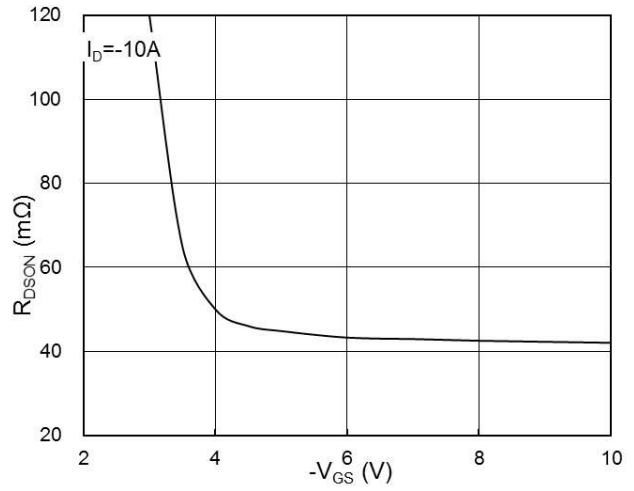


Fig.2 On-Resistance vs G-S Voltage

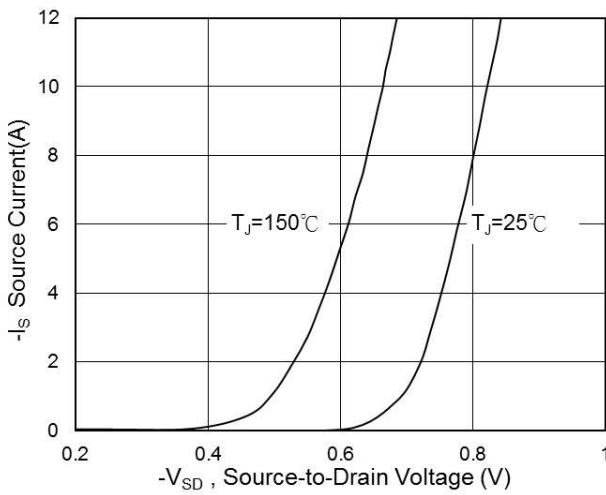


Fig.3 Typical S-D Diode Forward Voltage

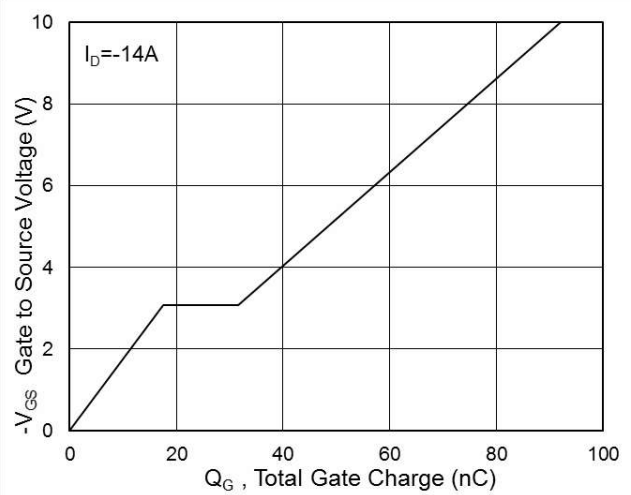


Fig.4 Gate-Charge Characteristics

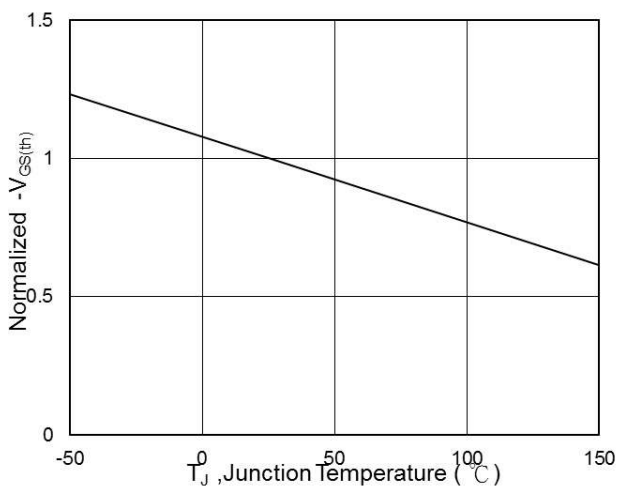


Fig.5 Normalized  $V_{GS(th)}$  vs  $T_J$

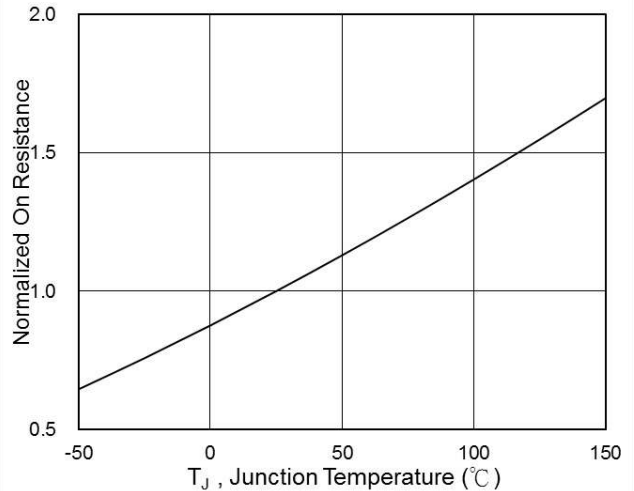
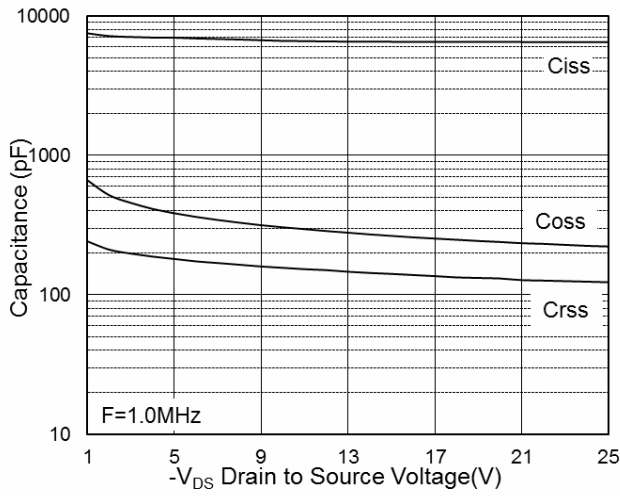
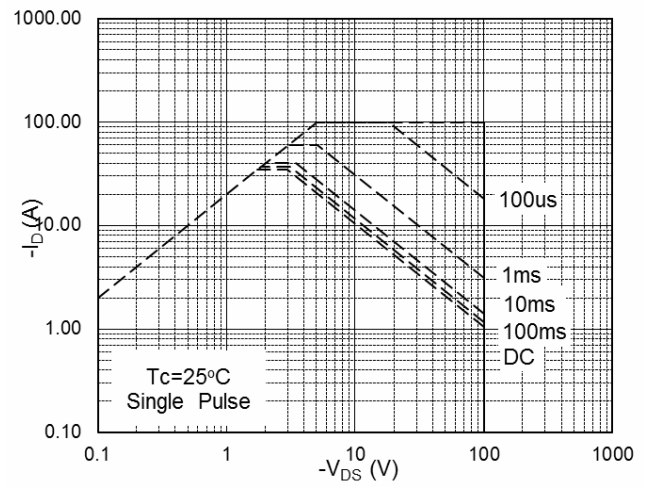


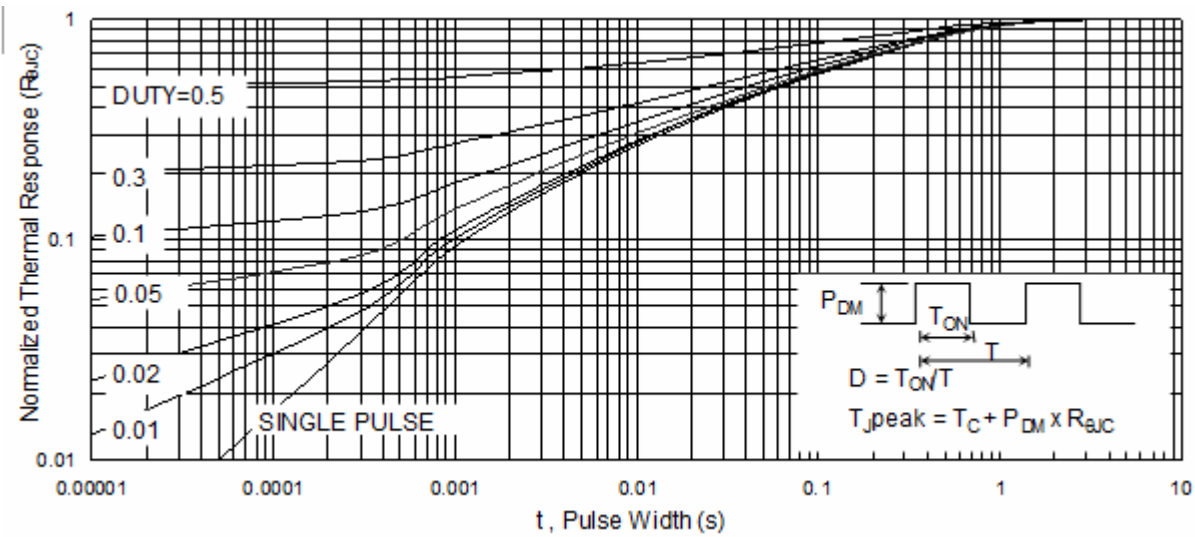
Fig.6 Normalized  $R_{DS(on)}$  vs  $T_J$



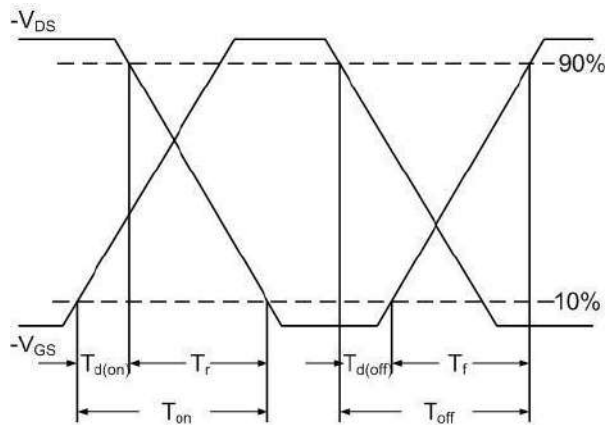
**Fig.7 Capacitance**



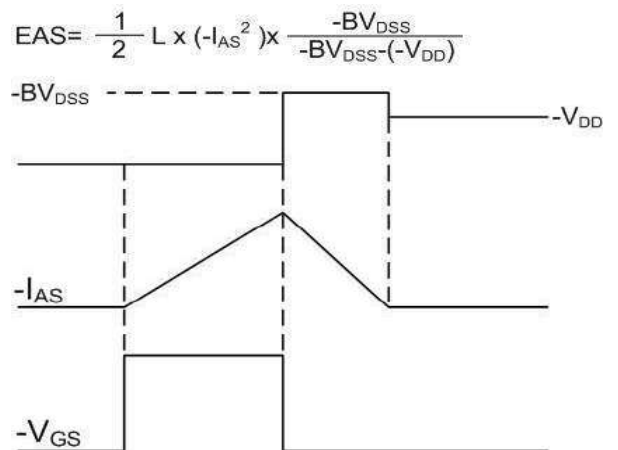
**Fig.8 Safe Operating Area**



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



**Fig.10 Switching Time Waveform**



**Fig.11 Unclamped Inductive Waveform**