

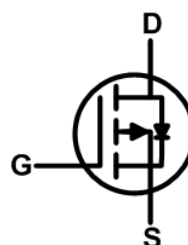
## P-Ch 30V Fast Switching MOSFETs

### Features:

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



TO252 Pin Configuration



### Description:

The KJD3115 is the high cell density trench P-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications. The KJD3115 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

### Product Summary

| BVDSS | RDSON  | ID   |
|-------|--------|------|
| -30V  | 10.5mΩ | -57A |

### Absolute Maximum Ratings

| Symbol                 | Parameter                                              | Rating     |              | Units       |
|------------------------|--------------------------------------------------------|------------|--------------|-------------|
|                        |                                                        | 10s        | Steady State |             |
| $V_{DS}$               | Drain-Source Voltage                                   | -30        |              | V           |
| $V_{GS}$               | Gate-Source Voltage                                    | $\pm 25$   |              | V           |
| $I_D@T_C=25^{\circ}C$  | Continuous Drain Current, $V_{GS}$ @ -10V <sup>1</sup> | -57        |              | A           |
| $I_D@T_C=100^{\circ}C$ | Continuous Drain Current, $V_{GS}$ @ -10V <sup>1</sup> | -36        |              | A           |
| $I_D@T_A=25^{\circ}C$  | Continuous Drain Current, $V_{GS}$ @ -10V <sup>1</sup> | -17.8      | -11.3        | A           |
| $I_D@T_A=70^{\circ}C$  | Continuous Drain Current, $V_{GS}$ @ -10V <sup>1</sup> | -14.2      | -9           | A           |
| $I_{DM}$               | Pulsed Drain Current <sup>2</sup>                      | -180       |              | A           |
| EAS                    | Single Pulse Avalanche Energy <sup>3</sup>             | 153        |              | mJ          |
| $I_{AS}$               | Avalanche Current                                      | -55.4      |              | A           |
| $P_D@T_C=25^{\circ}C$  | Total Power Dissipation <sup>4</sup>                   | 52.1       |              | W           |
| $P_D@T_A=25^{\circ}C$  | Total Power Dissipation <sup>4</sup>                   | 5          | 2            | W           |
| $T_{STG}$              | Storage Temperature Range                              | -55 to 150 |              | $^{\circ}C$ |
| $T_J$                  | Operating Junction Temperature Range                   | -55 to 150 |              | $^{\circ}C$ |

### Thermal Data

| Symbol          | Parameter                                                  | Typ. | Max. | Unit          |
|-----------------|------------------------------------------------------------|------|------|---------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient <sup>1</sup>           | ---  | 62   | $^{\circ}C/W$ |
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient <sup>1</sup> (t ≤ 10s) | ---  | 25   | $^{\circ}C/W$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case <sup>1</sup>              | ---  | 2.4  | $^{\circ}C/W$ |

**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 $25^\circ\text{C}$ , $I_D=-1mA$                    | ---  | -0.018 | ---       | V/ $^\circ\text{C}$  |
| $R_{DS(ON)}$                 | Static Drain-Source On-Resistance <sup>2</sup> | $V_{GS}=-10V$ , $I_D=-30A$                                      | ---  | ---    | 10.5      | m $\Omega$           |
|                              |                                                | $V_{GS}=-4.5V$ , $I_D=-15A$                                     | ---  | ---    | 18.5      |                      |
| $V_{GS(th)}$                 | Gate Threshold Voltage                         | $V_{GS}=V_{DS}$ , $I_D=-250\mu A$                               | -1.0 | ---    | -2.5      | V                    |
| $\Delta V_{GS(th)}$          | $V_{GS(th)}$ Temperature Coefficient           |                                                                 | ---  | 5.04   | ---       | 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                    | $V_{GS}=\pm 25V$ , $V_{DS}=0V$                                  | ---  | ---    | $\pm 100$ | nA                   |
| $g_{fs}$                     | Forward Transconductance                       | $V_{DS}=-5V$ , $I_D=-30A$                                       | ---  | 26.4   | ---       | S                    |
| $Q_g$                        | Total Gate Charge (-4.5V)                      | $V_{DS}=-15V$ , $V_{GS}=-4.5V$ , $I_D=-15A$                     | ---  | 33     | ---       | nC                   |
| $Q_{gs}$                     | Gate-Source Charge                             |                                                                 | ---  | 10.7   | ---       |                      |
| $Q_{gd}$                     | Gate-Drain Charge                              |                                                                 | ---  | 12.8   | ---       |                      |
| $T_{d(on)}$                  | Turn-On Delay Time                             | $V_{DD}=-15V$ , $V_{GS}=-10V$ ,<br>$R_G=3.3\Omega$ , $I_D=-15A$ | ---  | 8      | ---       | ns                   |
| $T_r$                        | Rise Time                                      |                                                                 | ---  | 17.8   | ---       |                      |
| $T_{d(off)}$                 | Turn-Off Delay Time                            |                                                                 | ---  | 78.4   | ---       |                      |
| $T_f$                        | Fall Time                                      |                                                                 | ---  | 43.6   | ---       |                      |
| $C_{iss}$                    | Input Capacitance                              | $V_{DS}=-15V$ , $V_{GS}=0V$ , $f=1MHz$                          | ---  | 3448   | ---       | pF                   |
| $C_{oss}$                    | Output Capacitance                             |                                                                 | ---  | 508    | ---       |                      |
| $C_{rss}$                    | Reverse Transfer Capacitance                   |                                                                 | ---  | 421    | ---       |                      |

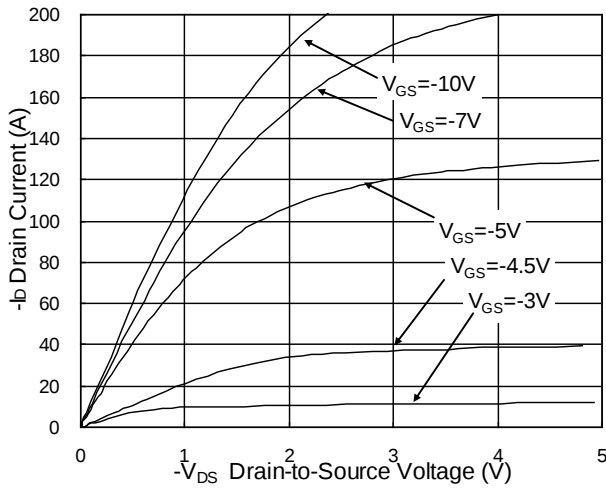
**Diode Characteristics**

| Symbol   | Parameter                                | Conditions                                                  | Min. | Typ. | Max. | Unit |
|----------|------------------------------------------|-------------------------------------------------------------|------|------|------|------|
| $I_S$    | Continuous Source Current <sup>1,5</sup> | $V_G=V_D=0V$ , Force Current                                | ---  | ---  | -57  | A    |
| $I_{SM}$ | Pulsed Source Current <sup>2,5</sup>     |                                                             | ---  | ---  | -180 | 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                    | $I_F=-15A$ , $dI/dt=100A/\mu s$ ,<br>$T_J=25^\circ\text{C}$ | ---  | 29   | ---  | nS   |
| $Q_{rr}$ | Reverse Recovery Charge                  |                                                             | ---  | 15   | ---  | nC   |

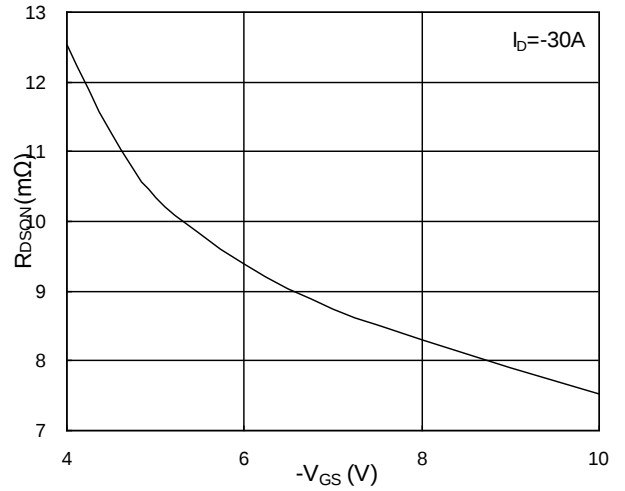
Note :

- 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  $V_{DD}=-25V$ ,  $V_{GS}=-10V$ ,  $L=0.1mH$ ,  $I_{AS}=-55.4A$
- 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.

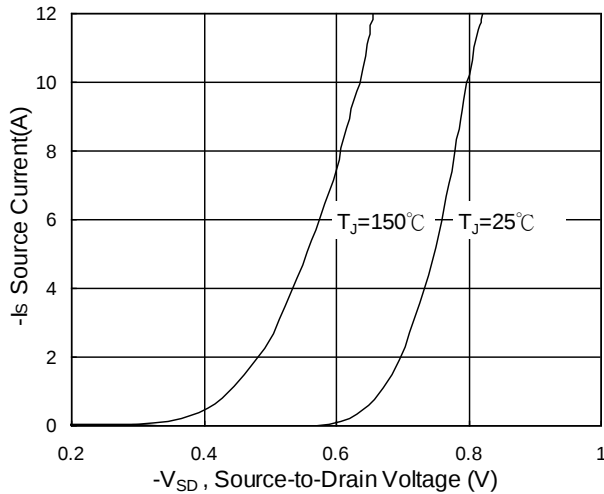
## Typical Characteristics



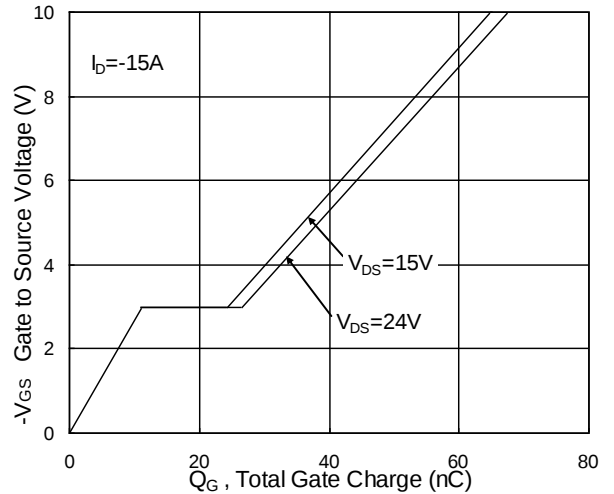
**Fig.1 Typical Output Characteristics**



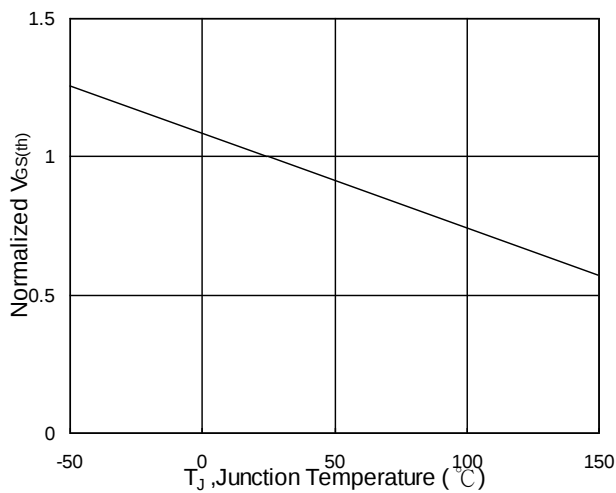
**Fig.2 On-Resistance v.s Gate-Source**



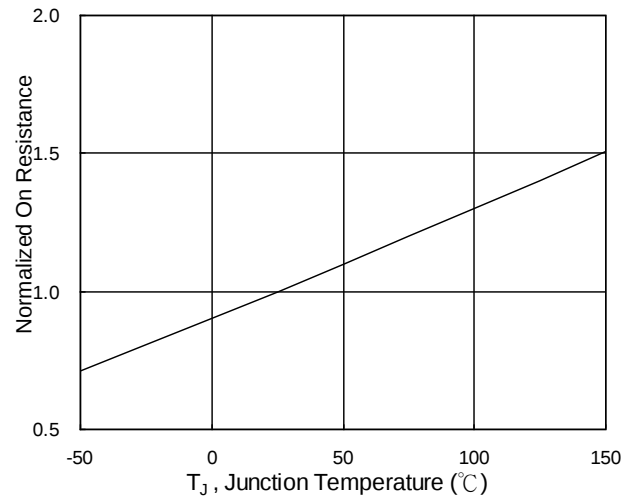
**Fig.3 Forward Characteristics Of Reverse**



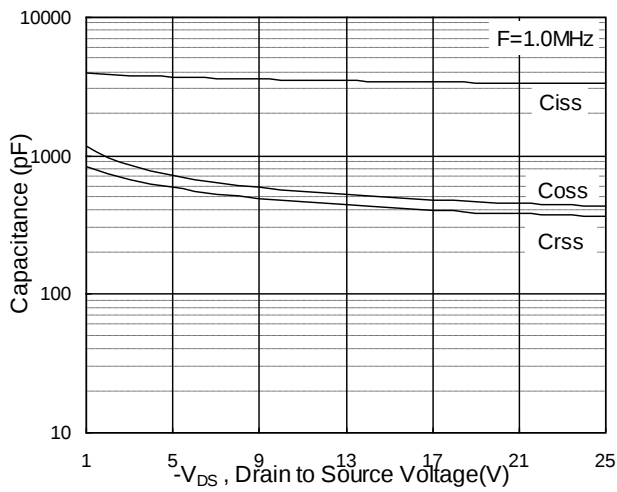
**Fig.4 Gate-Charge Characteristics**



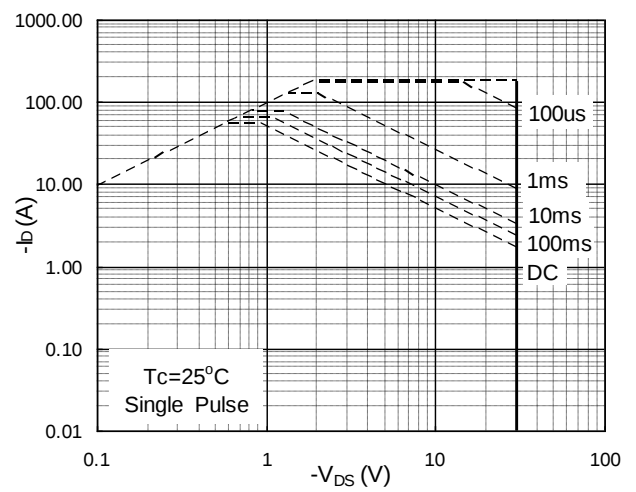
**Fig.5 Normalized  $V_{GS(th)}$  v.s  $T_J$**



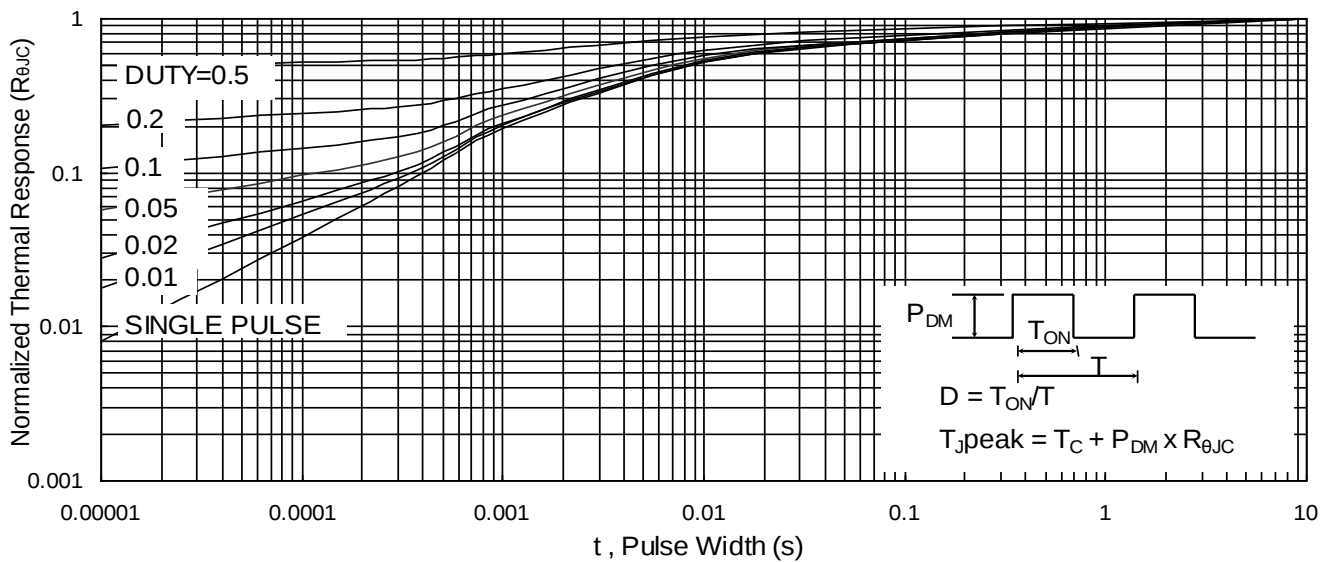
**Fig.6 Normalized  $R_{DS(on)}$  v.s  $T_J$**



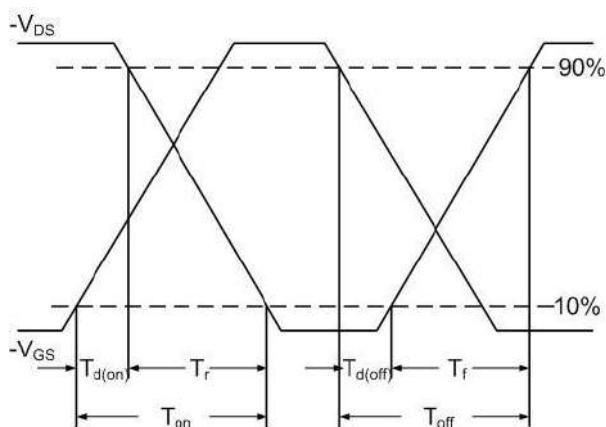
**Fig.7 Capacitance**



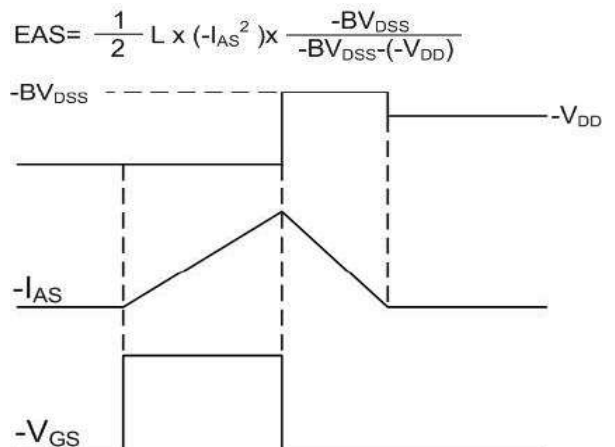
**Fig.8 Safe Operating Area**



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

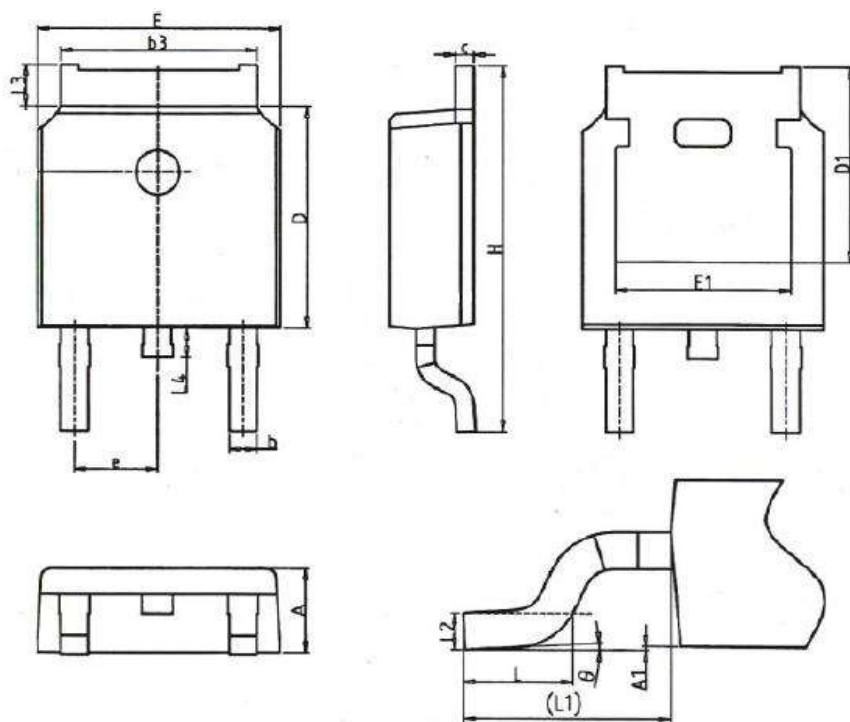


**Fig.10 Switching Time Waveform**



**Fig.11 Unclamped Inductive Switching Waveform**

## TO252 Package Outline



| SYMBOLS | MILLIMETERS |      | INCHES   |       |
|---------|-------------|------|----------|-------|
|         | MIN         | MAX  | MIN      | MAX   |
| A       | 2.18        | 2.40 | 0.086    | 0.095 |
| A1      | -           | 0.2  | -        | 0.008 |
| b       | 0.68        | 0.9  | 0.026    | 0.036 |
| b3      | 4.95        | 5.46 | 0.194    | 0.215 |
| c       | 0.43        | 0.89 | 0.017    | 0.035 |
| D       | 5.97        | 6.22 | 0.235    | 0.245 |
| D1      | 5.300REF    |      | 0.209REF |       |
| E       | 6.35        | 6.73 | 0.250    | 0.265 |
| E1      | 4.32        | --   | 0.170    | -     |
| e       | 2.286BSC    |      | 0.09BSC  |       |
| H       | 9.4         | 10.5 | 0.370    | 0.413 |
| L       | 1.38        | 1.78 | 0.054    | 0.070 |
| L1      | 2.90REF     |      | 0.114REF |       |
| L2      | 0.51BSC     |      | 0.020BSC |       |
| L3      | 0.88        | 1.28 | 0.034    | 0.050 |
| L4      | 0.5         | 1    | 0.019    | 0.039 |
| Θ       | 0°          | 8°   | 0°       | 8°    |