

## 1. Description

This Power MOSFET is produced using KIA advanced TRENCH technology. This advanced technology has been especially tailored to minimize conduction loss, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.

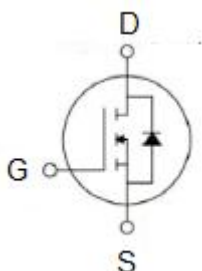
## 2. Features

- n  $R_{DS(ON)}=2.6m\Omega(\text{typ.})@V_{GS}=10V$
- n Very Low On-resistance  $R_{DS(ON)}$
- n Low  $C_{rss}$
- n Fast switching
- n 100% avalanche tested
- n Improved  $dv/dt$  capability

## 3. Application

- n PWM Application
- n Load Switch
- n Power Management

## 3. Pin configuration



| Pin     | Function |
|---------|----------|
| 4       | Gate     |
| 5,6,7,8 | Drain    |
| 1,2,3   | Source   |

#### 4. Ordering Information

| Part Number | Package | Brand |
|-------------|---------|-------|
| KNY3303B    | DFN5*6  | KIA   |

#### 5. Absolute maximum ratings

$T_C=25^{\circ}\text{C}$  unless otherwise noted

| Parameter   | Symbol                             | Rating     | Units              |
|---|------------------------------------|------------|--------------------|
| Drain-source voltage  | $V_{DSS}$                          | 30         | V                  |
| Continuous drain current  | $T_C=25^{\circ}\text{C}$<br>$I_D$  | 90         | A                  |
|   | $T_C=100^{\circ}\text{C}$<br>$I_D$ | 59         | A                  |
| Pulsed drain current -Pulsed <sup>1)</sup>                                    | $I_{DM}$                           | 360        | A                  |
| Gate-source voltage   | $V_{GS}$                           | $\pm 20$   | V                  |
| Single pulse avalanche energy <sup>2)</sup>                                   | $E_{AS}$                           | 342        | mJ                 |
| Power dissipation ( $T_C=25^{\circ}\text{C}$ )                                | $P_D$                              | 68         | W                  |
| Operating junction and storage temperature range                              | $T_J, T_{STG}$                     | -55 to 150 | $^{\circ}\text{C}$ |
| Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds | $T_L$                              | 300        | $^{\circ}\text{C}$ |

\*Drain current limited by maximum junction temperature.

#### 6. Thermal Data

| Parameter                        | Symbol          | Rating | Unit                 |
|----------------------------------|-----------------|--------|----------------------|
| Thermal resistance junction-case | $R_{\theta JC}$ | 1.83   | $^{\circ}\text{C/W}$ |

## 7. Electrical characteristics

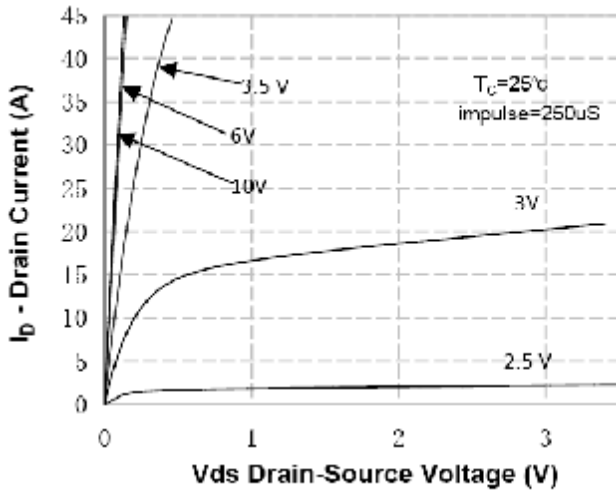
(T<sub>C</sub>=25°C, unless otherwise noted)

| Parameter   | Symbol              | Test Conditions  | Min | Typ  | Max  | Units |
|---|---------------------|--|-----|------|------|-------|
| Drain-source breakdown voltage                        | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V, I <sub>D</sub> =250uA   | 30  | -    | -    | V     |
| Drain-source leakage current                          | I <sub>DSS</sub>    | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V  | -   | -    | 1    | uA    |
| Gate-source forward leakage                           | I <sub>GSS</sub>    | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V   | -   | -    | ±100 | nA    |
| Gate threshold voltage                                | V <sub>GS(TH)</sub> | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA   | 1.2 | 1.5  | 2.5  | V     |
| Drain-source on-resistance                            | R <sub>DS(on)</sub> | V <sub>GS</sub> =10V, I <sub>D</sub> =20A  | -   | 2.6  | 3.5  | mΩ    |
|   |                     | V <sub>GS</sub> =4.5V, I <sub>D</sub> =15A   | -   | 3.5  | 5    | mΩ    |
| Input capacitance                                     | C <sub>iss</sub>    | V <sub>DS</sub> =15V, V <sub>GS</sub> =0V<br>f=1MHz  | -   | 4002 | -    | pF    |
| Output capacitance                                    | C <sub>oss</sub>    |  | -   | 438  | -    | pF    |
| Reverse transfer capacitance                          | C <sub>rss</sub>    |  | -   | 395  | -    | pF    |
| Turn-on delay time                                    | t <sub>d(on)</sub>  | V <sub>GS</sub> =10V, V <sub>DS</sub> =15V<br>R <sub>L</sub> =3Ω, I <sub>D</sub> =30A,<br>T <sub>J</sub> =25°C <sup>3)</sup> |     | 15   |      | ns    |
| Rise time   | t <sub>r</sub>      |  |     | 19   |      | ns    |
| Turn-off delay time                                   | t <sub>d(off)</sub> |  |     | 42   |      | ns    |
| Fall time   | t <sub>f</sub>      |  |     | 11   |      | ns    |
| Total gate charge(10V)                                | Q <sub>g</sub>      | V <sub>DS</sub> =15V, I <sub>D</sub> =30A<br>V <sub>GS</sub> =10V <sup>3)</sup>  | -   | 70   | -    | nC    |
| Gate-source charge                                    | Q <sub>gs</sub>     |  | -   | 45   | -    | nC    |
| Gate-drain charge                                     | Q <sub>gd</sub>     |  | -   | 12   | -    | nC    |
| Maximum Continuous Drain-Source Diode Forward Current | I <sub>S</sub>      | —  | -   | -    | 120  | A     |
| Maximum Pulsed Drain-Source Diode Forward Current     | I <sub>SM</sub>     | —  | -   | -    | 360  | A     |
| Diode forward voltage                                 | V <sub>SD</sub>     | I <sub>SD</sub> =30A, V <sub>GS</sub> =0V,<br>T <sub>J</sub> =25°C   | -   | -    | 1.2  | V     |
| Reverse recovery time                                 | T <sub>rr</sub>     | I <sub>F</sub> =30A di/dt=100A/μs  | -   | 48   | -    | ns    |
| Reverse recovery charge                               | Q <sub>rr</sub>     | I <sub>F</sub> =30A di <sub>F</sub> /dt=100A/μs  | -   | 80   | -    | nC    |

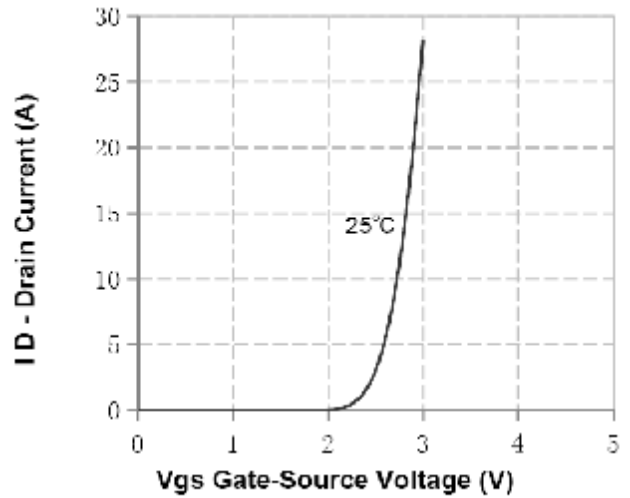
Note:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition: T<sub>J</sub>=25°C, V<sub>DD</sub>=30V, V<sub>G</sub>=10V, R<sub>G</sub>=25Ω, L=0.5mH, I<sub>AS</sub>=25A
3. Pulse Test: Pulse Width≤300us, Duty Cycle≤0.5%

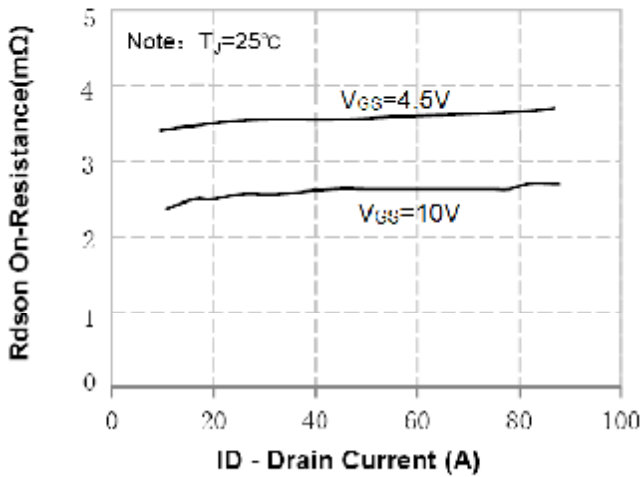
**8. Typical Electrical Characteristics**



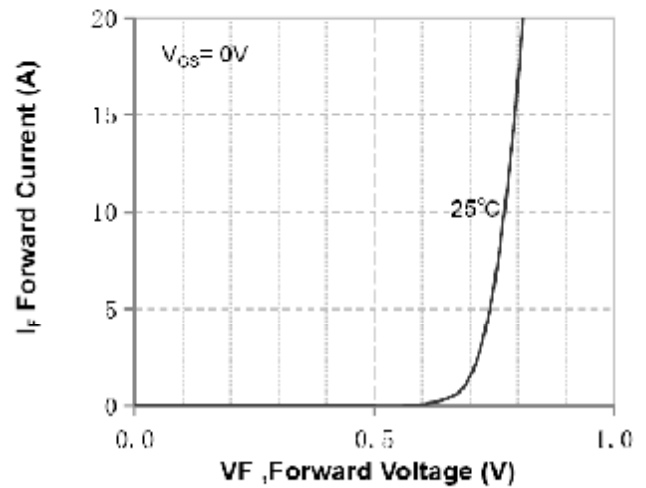
**Figure 1. On-Region Characteristics**



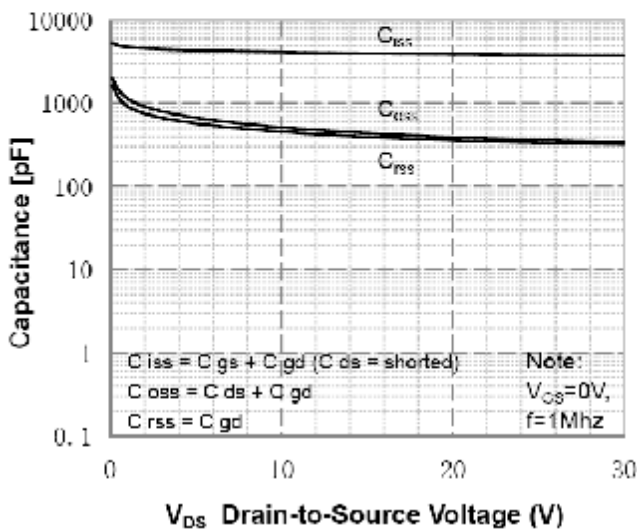
**Figure 2. Transfer Characteristics**



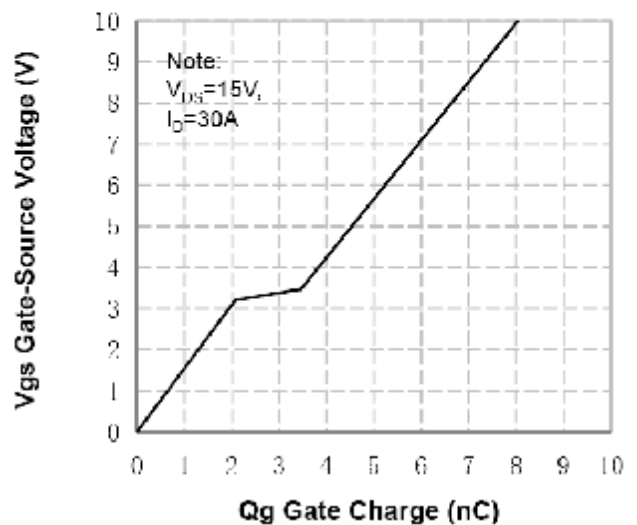
**Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage**



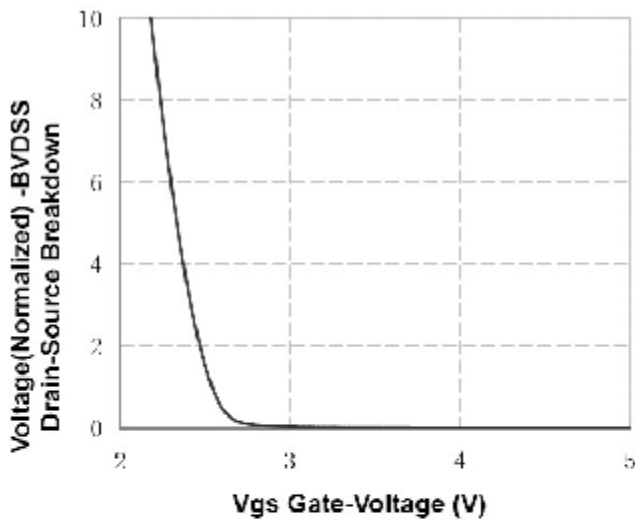
**Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature**



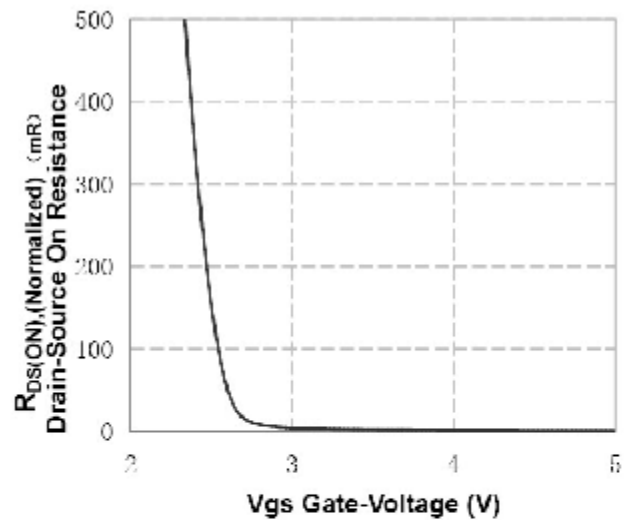
**Figure 5. Capacitance Characteristics**



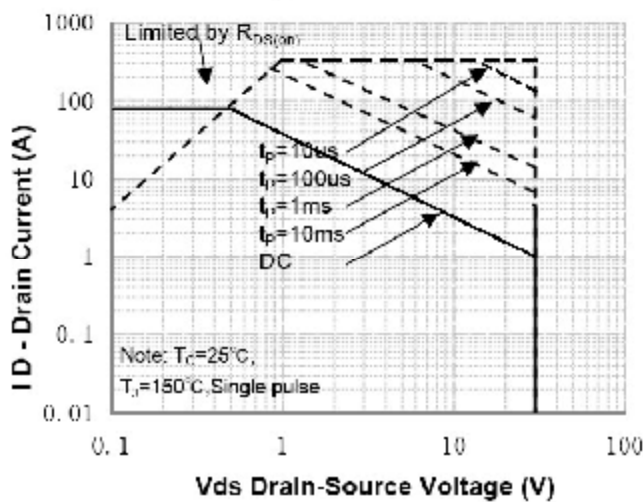
**Figure 6. Gate Charge Characteristics**



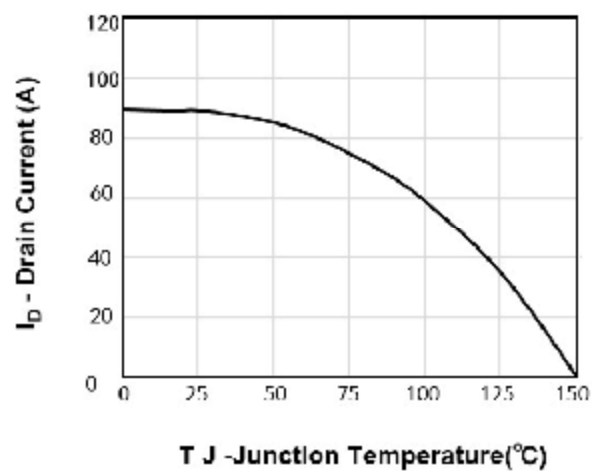
**Figure 7. Breakdown Voltage Variation vs Gate-Voltage**



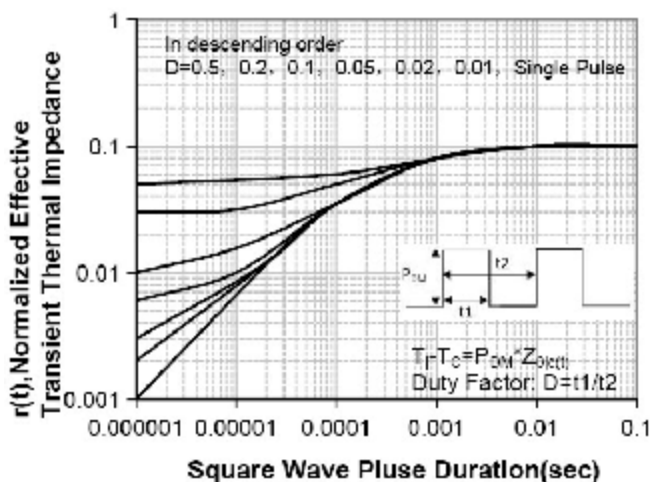
**Figure 8. On-Resistance Variation vs Gate Voltage**



**Figure 9. Maximum Safe Operating Area**



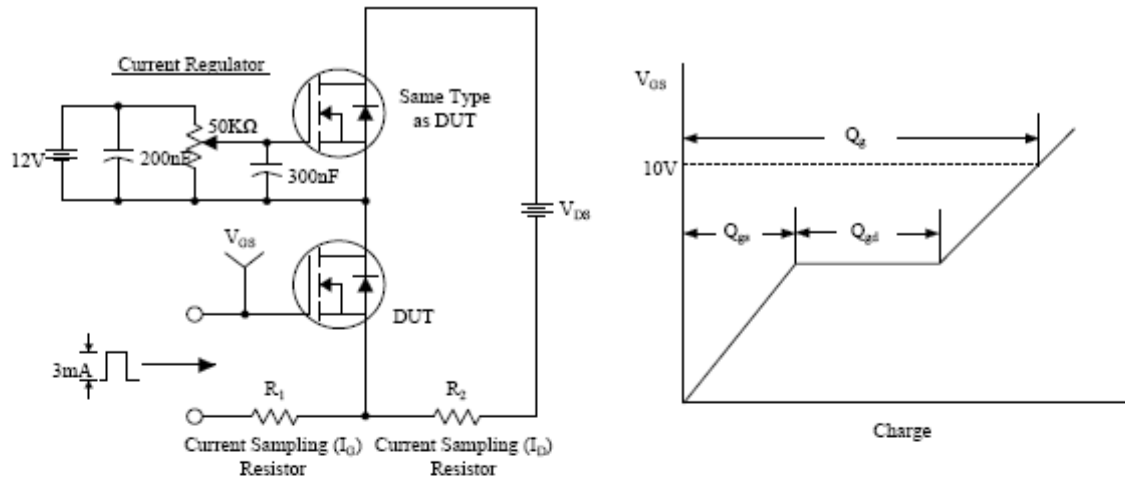
**Figure 10. Maximum PContinuous Drain Current vs Case Temperature**



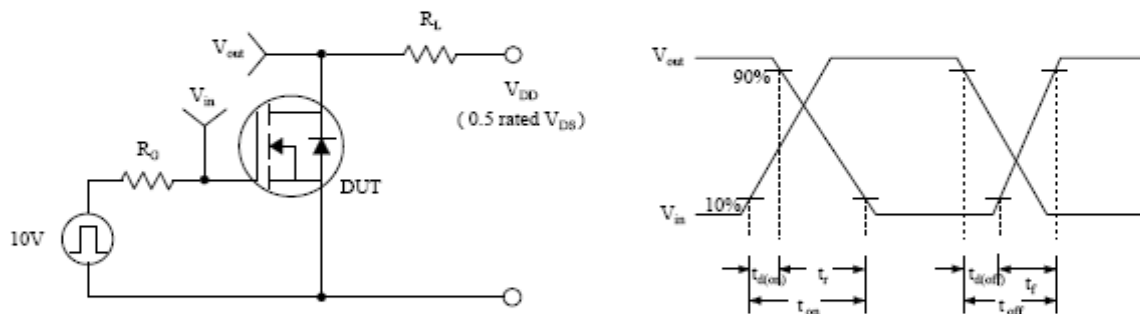
**Figure 11. Transient Thermal Response Curve**

**9. Test Circuits and Waveforms**

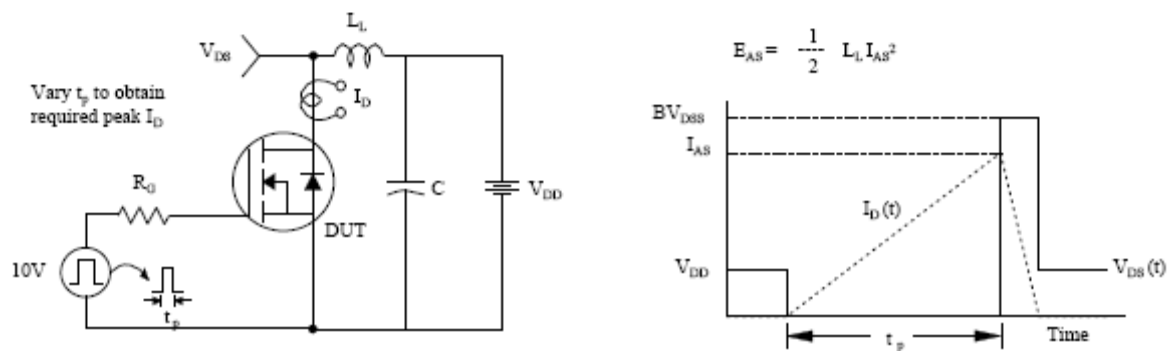
**Gate Charge Test Circuit & Waveform**



**Resistive Switching Test Circuit & Waveforms**



**Unclamped Inductive Switching Test Circuit & Waveforms**



### Peak Diode Recovery dv/dt Test Circuit & Waveforms

