

## N-Channel Enhancement Mode MOSFET

### 1. Product Information

#### 1.1 Features

- ☒ Surface-mounted package
- ☒ Ultra-low  $R_{DS(ON)}$
- ☒ Advanced trench cell design

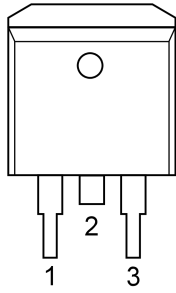
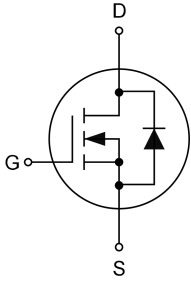
#### 1.2 Applications

- ☒ Power Tool appliances
- ☒ BMS appliances
- ☒ High power inverter system

#### 1.3 Quick reference

- ☒  $BV \geq 150\text{ V}$
- ☒  $P_D \leq 357\text{ W}$
- ☒  $I_D \leq 215\text{ A}$
- ☒  $R_{DS(ON)} \leq 4.0\text{ m}\Omega @V_{GS} = 10\text{ V}$

### 2. Pin Description

| Pin | Description | Simplified Outline                                                                                              | Symbol                                                                                |
|-----|-------------|-----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1   | Gate (G)    |  <p>Top View<br/>TO-263</p> |  |
| 2   | Drain (D)   |                                                                                                                 |                                                                                       |
| 3   | Source (S)  |                                                                                                                 |                                                                                       |

## 3. Limiting Values

| Symbol          | Parameter                                        | Conditions                                    | Min | Max      | Unit                 |
|-----------------|--------------------------------------------------|-----------------------------------------------|-----|----------|----------------------|
| $V_{DS}$        | Drain-Source Voltage                             | $T_C=25^{\circ}\text{C}$                      | 150 | -        | V                    |
| $V_{GS}$        | Gate-Source Voltage                              | $T_C=25^{\circ}\text{C}$                      | -   | $\pm 20$ | V                    |
| $I_D$           | Drain Current (DC)                               | $T_C=25^{\circ}\text{C}, V_{GS}=10\text{ V}$  | -   | 215      | A                    |
|                 |                                                  | $T_C=100^{\circ}\text{C}, V_{GS}=10\text{ V}$ | -   | 151      | A                    |
| $I_{DM}^*$      | Drain Current (Pulsed)                           | $T_C=25^{\circ}\text{C}, V_{GS}=10\text{ V}$  | -   | 752      | A                    |
| $P_D$           | Drain Power Dissipation                          | $T_C=25^{\circ}\text{C}$                      | -   | 357      | W                    |
| $I_S$           | Continuous-Source Current                        | $T_C=25^{\circ}\text{C}$                      | -   | 215      | A                    |
| $E_{AS}$        | Single Pulsed Avalanche Energy                   | $V_{DD}=50\text{ V}, L=0.5\text{ mH}$         | -   | 1286     | mJ                   |
| $T_J, T_{stg}$  | Operating Junction and Storage Temperature Range |                                               | -55 | 175      | $^{\circ}\text{C}$   |
| $R_{\theta JA}$ | Thermal Resistance-Junction to Ambient           |                                               | -   | 58       | $^{\circ}\text{C/W}$ |
| $R_{\theta JC}$ | Thermal Resistance-Junction to Case              |                                               | -   | 0.42     | $^{\circ}\text{C/W}$ |

Notes:

- \* Pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- \*\* Surface mounted on  $1\text{ in}^2$  pad area,  $t \leq 10\text{ sec}$ .
- \*\*\* Limited by bonding wire.

## 4. Marking Information

| Product Name | Marking               |
|--------------|-----------------------|
| KJ039N15D    | KJ039N15D<br>XXXXXX-X |

## Ordering Code

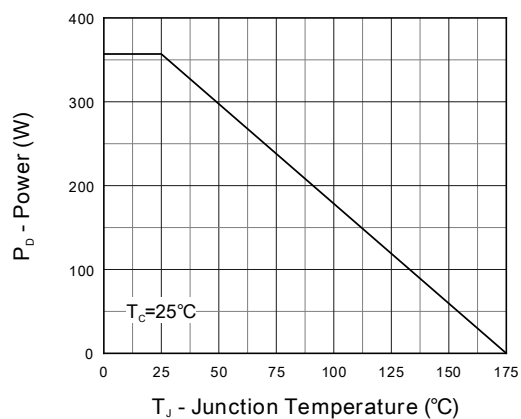
| Product Name | Package | Reel size | Tape width | Quantity (pcs) |
|--------------|---------|-----------|------------|----------------|
| KJ039N15D    | TO-263  | 13"       | 24 mm      | 800            |

Note: KUAJIEXIN defines "Green" as lead-free (RoHS compliant) and halogen free (Br or Cl does not exceed 900 ppm by weight in homogeneous material and total of Br and Cl does not exceed 1500 ppm by weight; Follow IEC 61249-2-21 and IPC/JEDEC J-STD-020C).

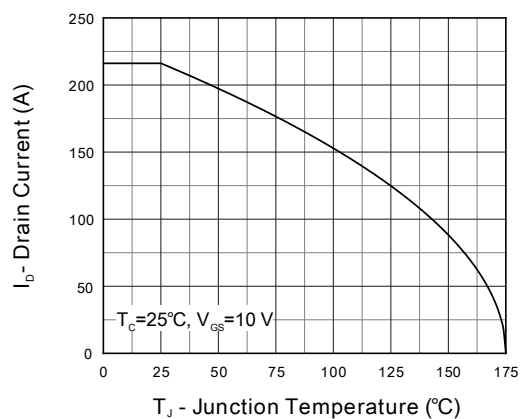
## 6. Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

| Symbol                      | Parameter                      | Conditions                                                                                                              | Min | Typ  | Max  | Unit |
|-----------------------------|--------------------------------|-------------------------------------------------------------------------------------------------------------------------|-----|------|------|------|
| Static Characteristics      |                                |                                                                                                                         |     |      |      |      |
| BV <sub>DSS</sub>           | Drain-Source Breakdown Voltage | V <sub>GS</sub> =0 V, I <sub>DS</sub> =250 μA                                                                           | 150 | -    | -    | V    |
| V <sub>GS(th)</sub>         | Gate Threshold Voltage         | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250 μA                                                              | 2.5 | -    | 4.5  | V    |
| I <sub>DSS</sub>            | Drain Leakage Current          | V <sub>DS</sub> =150 V, V <sub>GS</sub> =0 V                                                                            | -   | -    | 1    | μA   |
| I <sub>GSS</sub>            | Gate Leakage Current           | V <sub>DS</sub> =0 V, V <sub>GS</sub> =±20 V                                                                            | -   | -    | ±100 | nA   |
| R <sub>DS(ON)</sub>         | On-State Resistance            | V <sub>GS</sub> =10 V, I <sub>DS</sub> =20 A                                                                            | -   | 3.6  | 4.0  | mΩ   |
| Diode Characteristics       |                                |                                                                                                                         |     |      |      |      |
| V <sub>SD</sub>             | Diode Forward Voltage          | I <sub>SD</sub> =1 A, V <sub>GS</sub> =0 V                                                                              | -   | -    | 1.2  | V    |
| t <sub>rr</sub>             | Reverse Recovery Time          | I <sub>SD</sub> =20 A, V <sub>GS</sub> =0 V,<br>dI <sub>SD</sub> /dt=100 A/μs                                           | -   | 122  | -    | ns   |
| Q <sub>rr</sub>             | Reverse Recovery Charge        |                                                                                                                         | -   | 279  | -    | nC   |
| Dynamic Characteristics     |                                |                                                                                                                         |     |      |      |      |
| C <sub>iss</sub>            | Input Capacitance              | V <sub>GS</sub> =0 V, V <sub>DS</sub> =75 V,<br>Frequency=1 MHz                                                         | -   | 6550 | -    | pF   |
| C <sub>oss</sub>            | Output Capacitance             |                                                                                                                         | -   | 770  | -    |      |
| C <sub>rss</sub>            | Reverse Transfer Capacitance   |                                                                                                                         | -   | 8    | -    |      |
| t <sub>d(on)</sub>          | Turn-on Delay Time             | V <sub>DS</sub> =75 V, V <sub>GEN</sub> =10 V,<br>R <sub>G</sub> =6 Ω, R <sub>L</sub> =3.75 Ω,<br>I <sub>DS</sub> =20 A | -   | 48   | -    | ns   |
| t <sub>r</sub>              | Turn-on Rise Time              |                                                                                                                         | -   | 92   | -    |      |
| t <sub>d(off)</sub>         | Turn-off Delay Time            |                                                                                                                         | -   | 93   | -    |      |
| t <sub>f</sub>              | Turn-off Fall Time             |                                                                                                                         | -   | 59   | -    |      |
| Gate Charge Characteristics |                                |                                                                                                                         |     |      |      |      |
| Q <sub>g</sub>              | Total Gate Charge              | V <sub>DS</sub> =75 V, V <sub>GS</sub> =10 V,<br>I <sub>DS</sub> =20 A                                                  | -   | 89   | -    | nC   |
| Q <sub>gs</sub>             | Gate-Source Charge             |                                                                                                                         | -   | 33   | -    |      |
| Q <sub>gd</sub>             | Gate-Drain Charge              |                                                                                                                         | -   | 17   | -    |      |

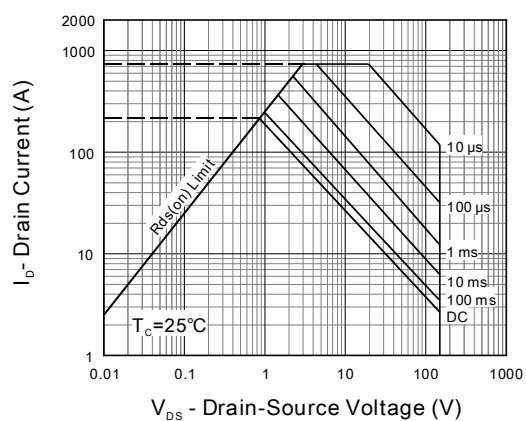
## 7. Typical Characteristics



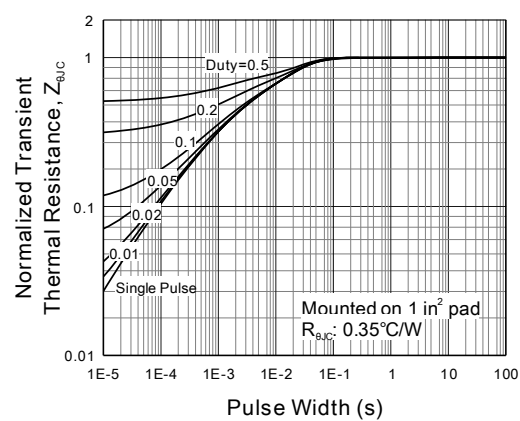
**Figure 1. Power Capability**



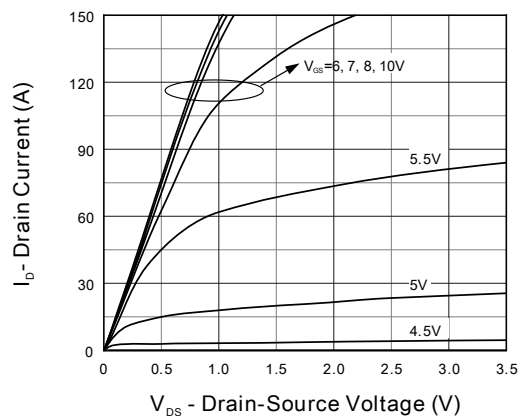
**Figure 2. Current Capability**



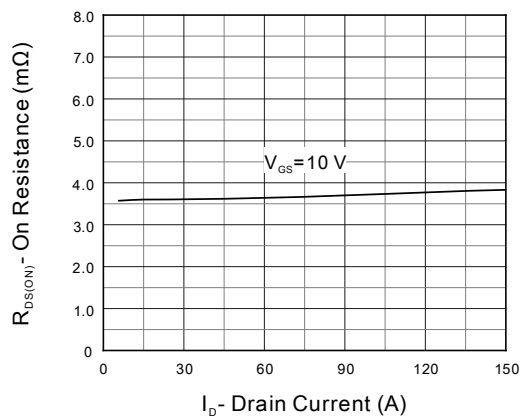
**Figure 3. Safe Operation Area**



**Figure 4. Transient Thermal Impedance**



**Figure 5. Output Characteristics**



**Figure 6. On Resistance**

## 7. Typical Characteristics (cont.)

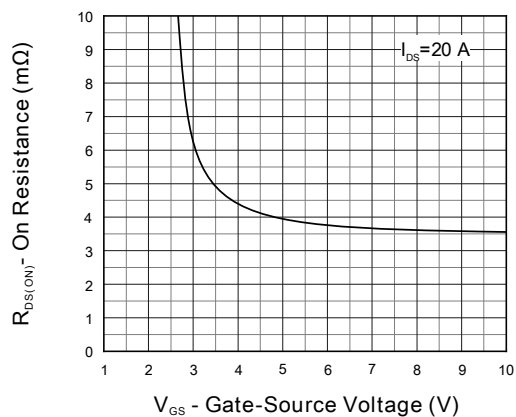


Figure 7. Transfer Characteristics

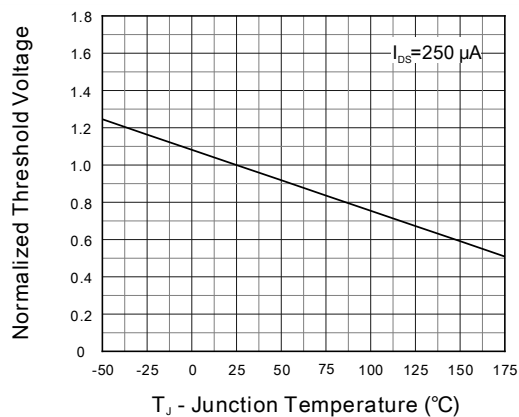


Figure 8. Normalized Threshold Voltage

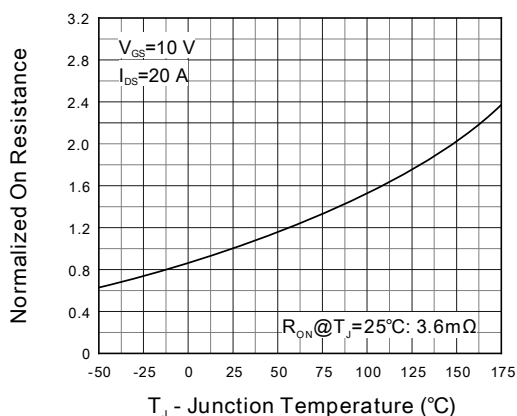


Figure. Normalized On Resistance

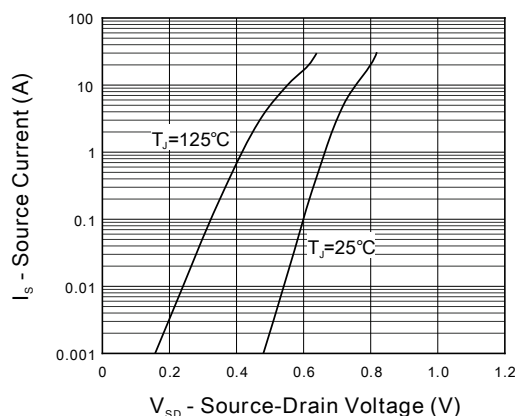


Figure 10. Diode Forward Current

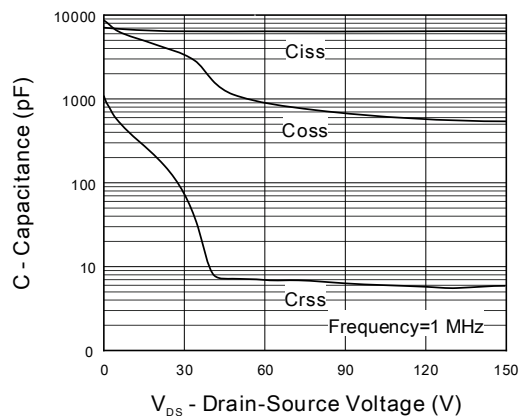


Figure 11. Capacitance

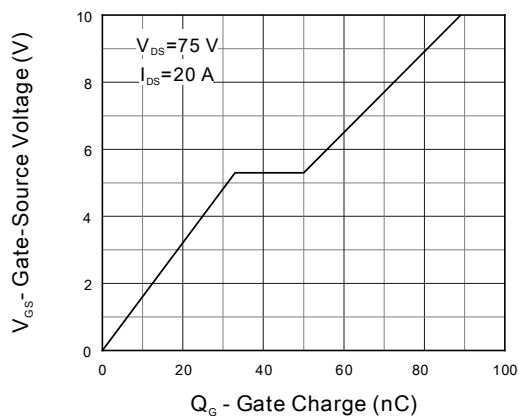
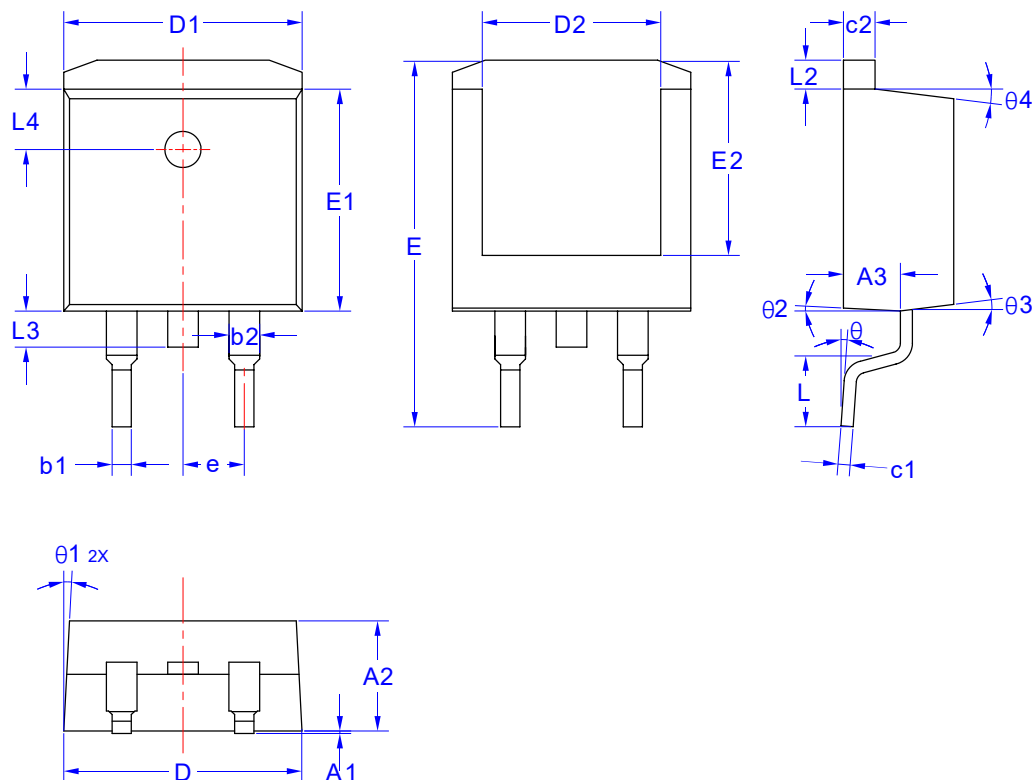


Figure 12. Gate Charge

## 8. Package Dimensions

### TO-263 Package



| Symbol | Dimensions in Millimeters |           |        |
|--------|---------------------------|-----------|--------|
|        | MIN                       | NOM       | MAX    |
| A1     | 0.020                     | -         | 0.200  |
| A2     | 4.470                     | 4.570     | 4.670  |
| A3     | 2.300                     | 2.350     | 2.400  |
| b1     | 0.750                     | -         | 0.850  |
| b2     | 1.220                     | -         | 1.320  |
| c1     | 0.500                     | -         | 0.550  |
| c2     | 1.300                     | -         | 1.350  |
| D      | 9.780                     | 9.880     | 9.980  |
| D1     |                           | 9.880 REF |        |
| D2     |                           | 7.400 REF |        |
| E      | 14.900                    | 15.100    | 15.300 |
| E1     | 9.100                     | 9.200     | 9.300  |

| Symbol     | Dimensions in Millimeters |           |       |
|------------|---------------------------|-----------|-------|
|            | MIN                       | NOM       | MAX   |
| E2         |                           | 8.100 REF |       |
| e          |                           | 5.540 REF |       |
| L          | 2.100                     | 2.300     | 2.500 |
| L2         | 1.025                     | -         | 1.375 |
| L3         | 1.300                     | 1.500     | 1.700 |
| L4         | 2.400                     | 2.500     | 2.600 |
| $\theta$   |                           | 0~8°      |       |
| $\theta 1$ |                           | 3°        |       |
| $\theta 2$ |                           | 3°        |       |
| $\theta 3$ |                           | 7°        |       |
| $\theta 4$ |                           | 7°        |       |
|            |                           |           |       |