

## 30V N-Channel Enhancement Mode MOSFET

### 1. Product Information

#### 1.1 Features

- ◇ Advanced SGT cell design
- ◇ Low Gate Charge
- ◇ Low On-Resistance
- ◇ RoHS and Halogen-Free Compliant
- ◇ 100%  $\Delta V_{DS}$  & UIS & Rg Tested

#### 1.2 Applications

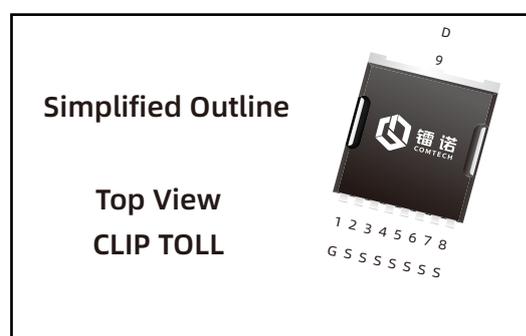
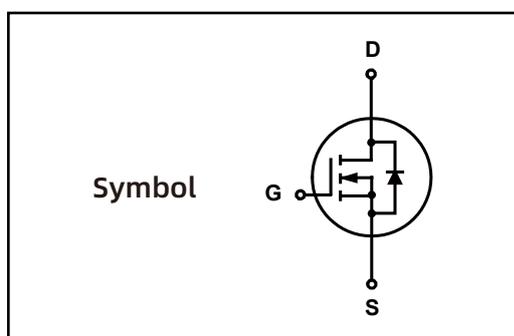
- ◇ DC-DC Converter
- ◇ Drones
- ◇ Motor drivers
- ◇ Light electric vehicles

#### 1.3 Quick reference

- ◇  $BV \cong 30\text{ V}$
- ◇  $P_{\text{tot}} \cong 400\text{ W}$
- ◇  $I_D \cong 500\text{ A}$
- ◇  $R_{DS(ON)} \cong 0.3\text{ m}\Omega @ V_{GS} = 10\text{ V}$
- ◇  $R_{DS(ON)} \cong 0.4\text{ m}\Omega @ V_{GS} = 4.5\text{ V}$



### 2. Pin Description



### 3.Limiting Values

| Symbol               | Parameter                      | Conditions  | Min | Max      | Unit             | Note   |
|----------------------|--------------------------------|---|-----|----------|------------------|--------|
| $V_{DS}$             | Drain-Source Voltage           | $T_C = 25\text{ }^\circ\text{C}$                        | -   | 30       | V                | -      |
| $V_{GS}$             | Gate-Source Voltage            | $T_C = 25\text{ }^\circ\text{C}$                        | -   | $\pm 20$ | V                | -      |
| $I_D^*$              | Drain Current ( DC )           | $T_C = 25\text{ }^\circ\text{C}, V_{GS} = 10\text{ V}$  | -   | 1000     | A                | Fig.2  |
|                      |                                | $T_C = 100\text{ }^\circ\text{C}, V_{GS} = 10\text{ V}$ | -   | 707      | A                |        |
| $I_{DM}^{**},^{***}$ | Drain Current ( Pulsed )       | $T_C = 25\text{ }^\circ\text{C}, V_{GS} = 10\text{ V}$  | -   | 2244     | A                | -      |
| $P_{tot}$            | Drain power dissipation        | $T_C = 25\text{ }^\circ\text{C}$                        | -   | 400      | W                | Fig.1  |
|                      |                                | $T_C = 100\text{ }^\circ\text{C}$                       | -   | 200      | W                |        |
| $T_{stg}$            | Storage Temperature            |   | -55 | 175      | $^\circ\text{C}$ | -      |
| $T_J$                | Junction Temperature           |   | -   | 175      | $^\circ\text{C}$ | -      |
| $I_S$                | Continuous-Source Current      | $T_C = 25\text{ }^\circ\text{C}$                        | -   | 1000     | A                | -      |
| $E_{AS}^*$           | Single Pulsed Avalanche Energy | $V_{DD} = 30\text{ V}, L = 0.5\text{ mH}$               | -   | 6724     | mJ               | Fig.19 |

### 4.Thermal Characteristics

|                   |   |   |     |                           |        |
|-------------------|---|---|-----|---------------------------|--------|
| $R_{\theta JA}^*$ | Thermal Resistance- Junction to Ambient | - | 16  | $^\circ\text{C}/\text{W}$ | Fig.16 |
| $R_{\theta JC}^*$ | Thermal Resistance- Junction to Case    | - | 0.2 |                           |        |

Notes :

\* Surface Mounted on 1 in<sup>2</sup> pad area,  $t \leq 10\text{ sec}$

\*\* Pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$

\*\*\* limited by bonding wire

### 5.Marking Information

| Product Name | Package   | Reel size | Tape width | Quantity | Note |
|--------------|-----------|-----------|------------|----------|------|
| LNR20N030CT  | CLIP TOLL | 330mm     | 12mm       | 2000     |      |

Note: COMTECH 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 ( $T_A=25^\circ$ Unless Otherwise Noted )

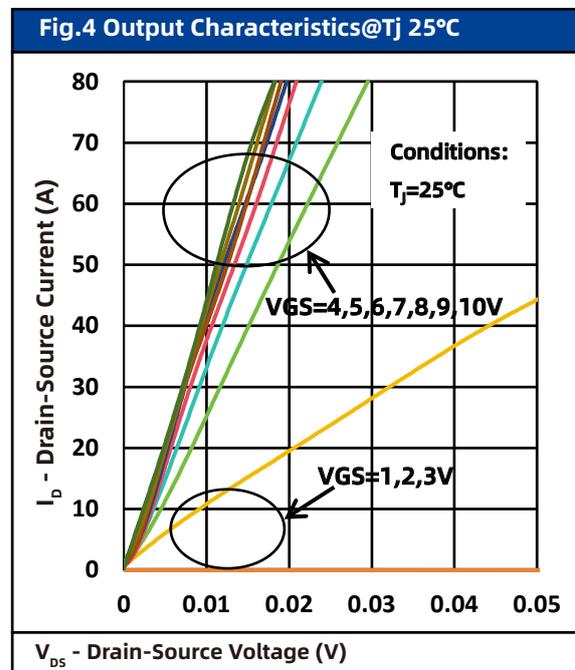
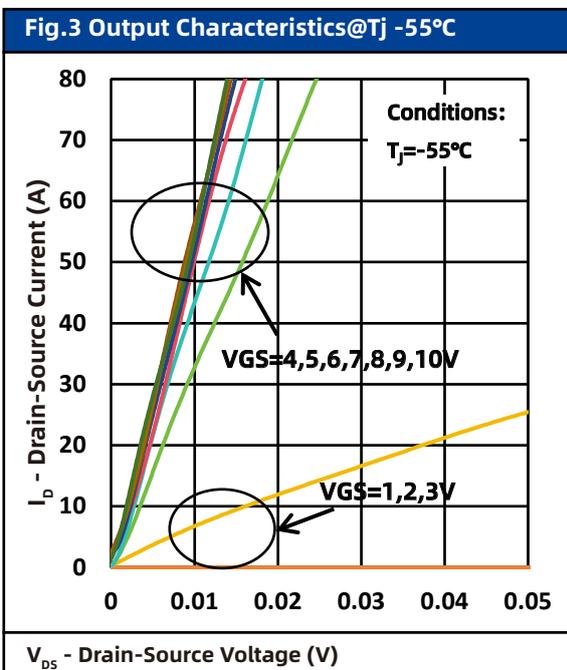
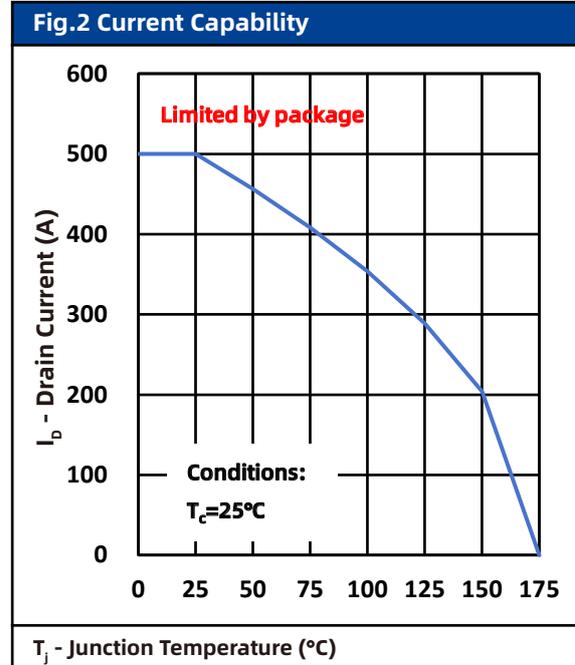
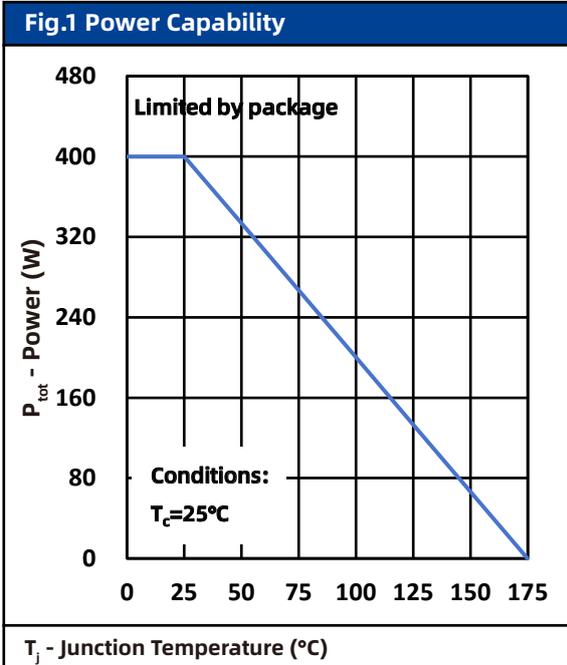
| Symbol   | Parameter                      | Conditions  | Min | Typ   | Max              | Unit          | Note   |
|--|--------------------------------|---|-----|-------|------------------|---------------|--------|
| <b>Static Characteristics</b>                  |                                |   |     |       |                  |               |        |
| $BV_{DSS}$                                     | Drain-Source Breakdown Voltage | $V_{GS} = 0\text{ V}, I_{DS} = 250\ \mu\text{A}$  | 30  | -     | -                | V             |        |
| $V_{GS(th)}$                                   | Gate Threshold Voltage         | $V_{DS} = V_{GS}, I_{DS} = 250\ \mu\text{A}$  | 1   | -     | 3                | V             |        |
| $I_{DSS}$                                      | Drain Leakage Current          | $V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$   | -   | -     | 1                | $\mu\text{A}$ |        |
| $I_{GSS}$                                      | Gate Leakage Current           | $V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$   | -   | -     | $\pm 100$        | nA            |        |
| $R_{DS(on)}^a$                                 | On-State Resistance            | $V_{GS} = 10\text{ V}, I_{DS} = 50\text{ A}$  | -   | 0.2   | 0.3              | m $\Omega$    | Fig.8  |
|  |                                | $V_{GS} = 4.5\text{ V}, I_{DS} = 30\text{ A}$   | -   | 0.3   | 0.4              |               |        |
| <b>Diode Characteristics</b>                   |                                |   |     |       |                  |               |        |
| $V_{SD}^a$                                     | Diode Forward Voltage          | $I_{SD} = 50\text{ A}, V_{GS} = 0\text{ V}$   | -   | -     | 1.3              | V             | Fig.7  |
| $t_{rr}$                                       | Reverse Recovery Time          | $I_{DS} = 50\text{ A}, V_{GS} = 0\text{ V}$   | -   | 183   | -                | nS            | Fig.20 |
| $Q_{rr}$                                       | Reverse Recovery Charge        | $di_{SD}/dt = 100\text{ A}/\mu\text{s}$   | -   | 611   | -                | nC            |        |
| <b>Dynamic Characteristics<sup>b</sup></b>     |                                |   |     |       |                  |               |        |
| $C_{ISS}$                                      | Input Capacitance              | $V_{GS} = 0\text{ V}, V_{DS} = 15\text{ V}$<br>Frequency = 1 MHz  | -   | 16342 | -                | pF            | Fig.10 |
| $C_{OSS}$                                      | Output Capacitance             |   | -   | 8072  | -                |               |        |
| $C_{rSS}$                                      | Reverse Transfer Capacitance   |   | -   | 1347  | -                |               |        |
| $R_G$  | Gate Resistance                | F = 1 MHz   | -   | 4     | -                | $\Omega$      |        |
| $t_d(on)$                                      | Turn-on Delay Time             | $V_{DS} = 15\text{ V}, V_{GS} = 10\text{ V},$<br>$R_G = 2.8\ \Omega, R_L = 8\ \mu\text{H},$<br>$I_{DS} = 50\text{ A}$ | -   | 27    | -                | nS            | Fig.18 |
| $t_r$  | Turn-on Rise Time              |   | -   | 242   | -                |               |        |
| $t_d(off)$                                     | Turn-off Delay Time            |   | -   | 390   | -                |               |        |
| $t_f$  | Turn-off Fall Time             |   | -   | 262   | -                |               |        |
| $dv/dt$  | Peak Diode Recovery            |   | -   | 0.05  | -                |               |        |
| $di/dt$  | Peak Diode Recovery            | -   | 221 | -     | A/ $\mu\text{s}$ |               |        |
| <b>Gate Charge Characteristics<sup>b</sup></b> |                                |   |     |       |                  |               |        |
| $Q_g$  | Total Gate Charge              | $V_{DS} = 15\text{ V}, V_{GS} = 10\text{ V},$<br>$I_{DS} = 50\text{ A}$   | -   | 384   | -                | nC            | Fig.9  |
| $Q_{gs}$                                       | Gate-Source Charge             |   | -   | 49    | -                |               |        |
| $Q_{gd}$                                       | Gate-Drain Charge              |   | -   | 92    | -                |               |        |
| $V_{plateau}$                                  | Gate plateau voltage           |   | -   | 2.5   | -                |               |        |

Notes :

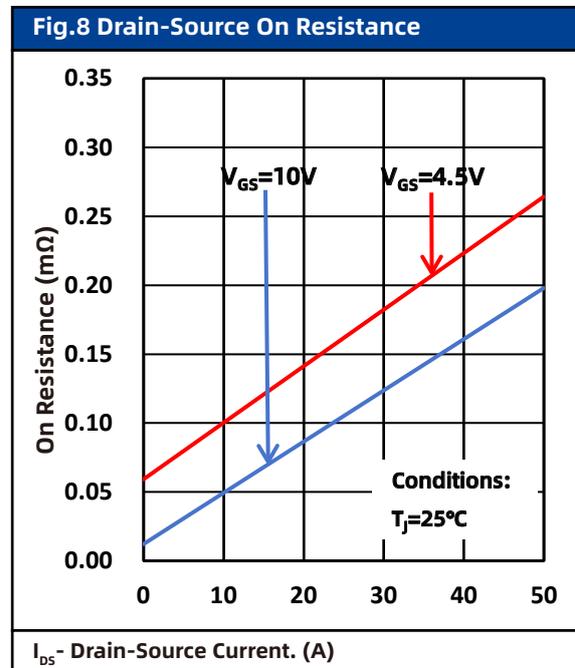
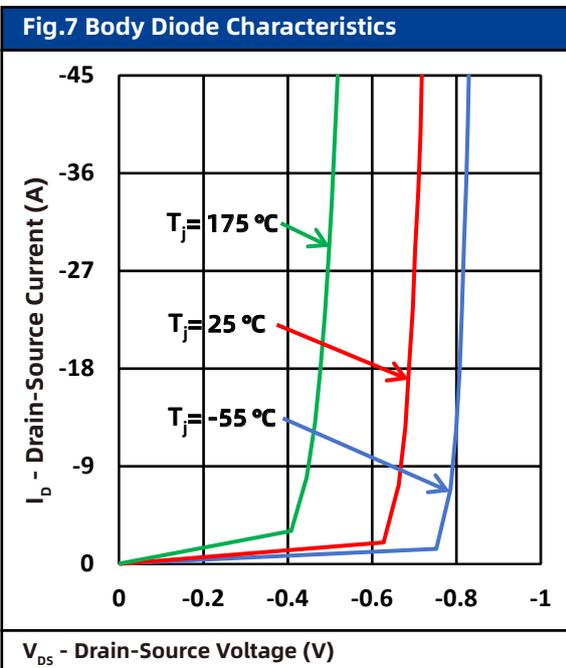
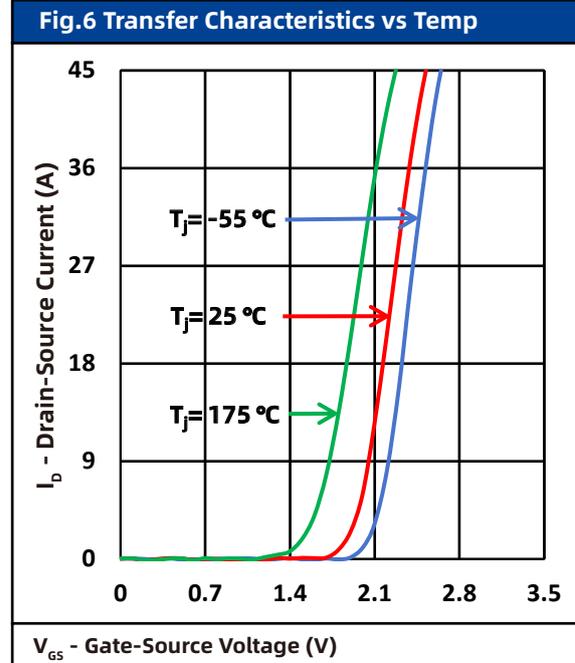
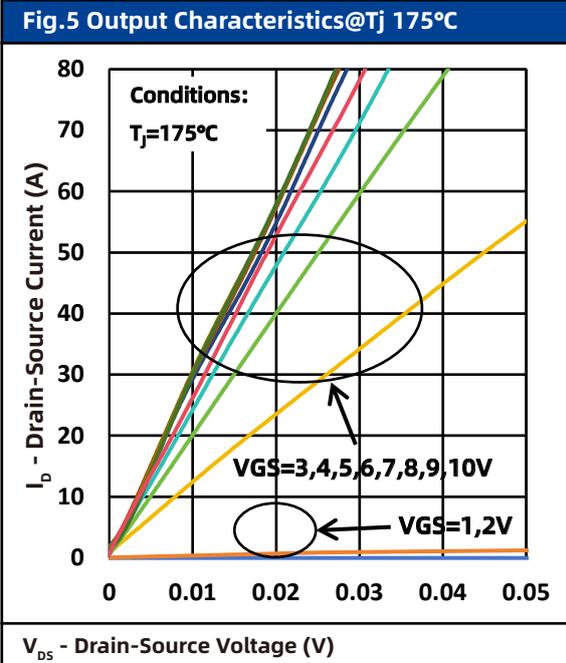
a : Pulse test ; pulse width  $\leq 300\ \mu\text{s}$ , duty cycle  $\leq 2\%$

b : Guaranteed by design, not subject to production testing

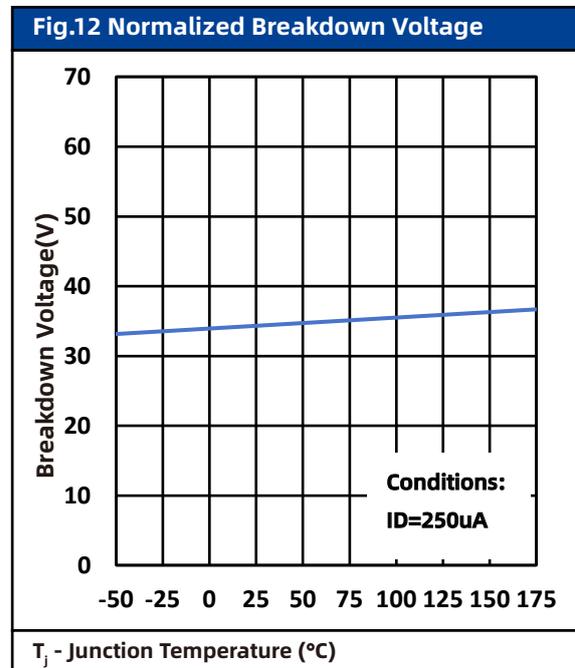
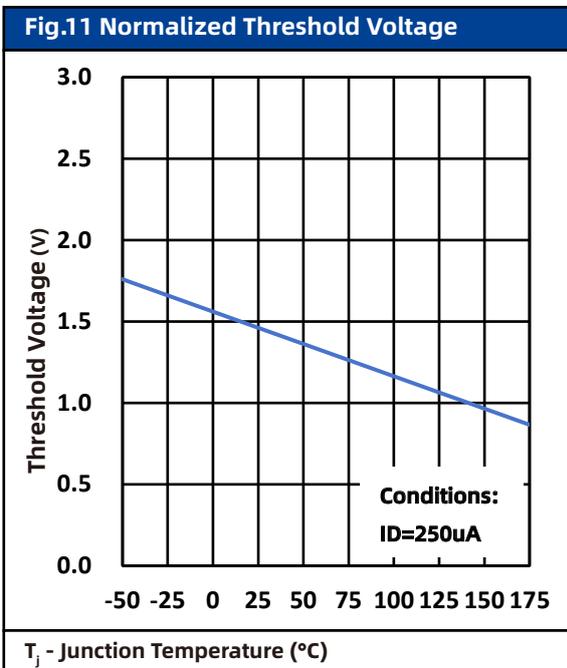
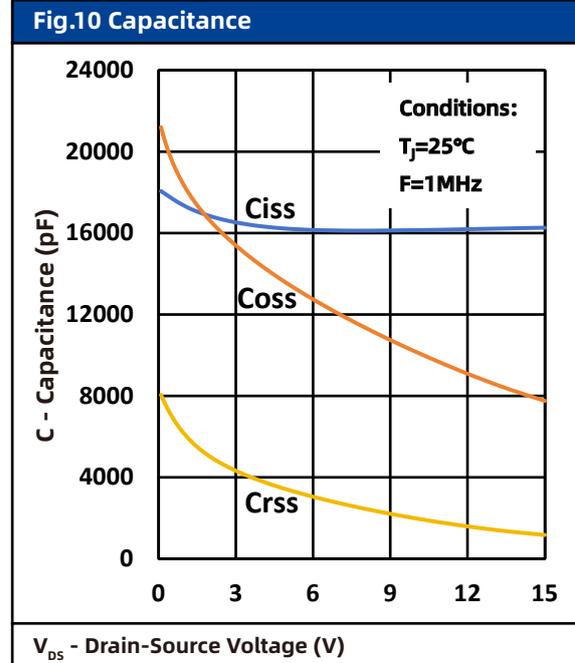
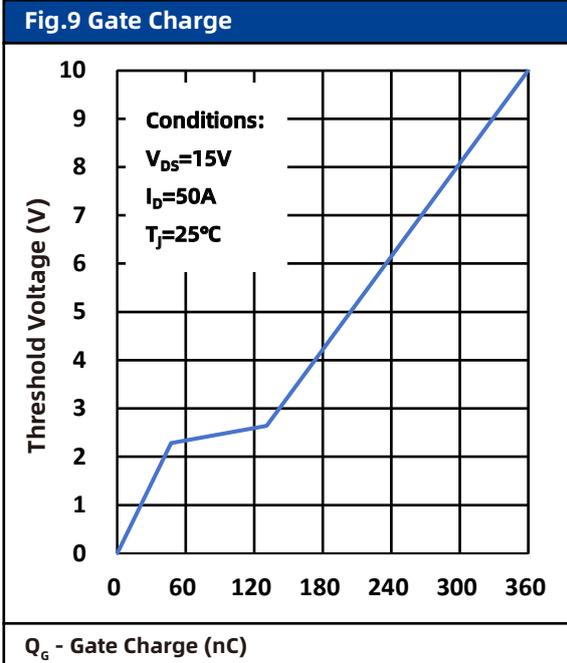
## 7. Typical Characteristics



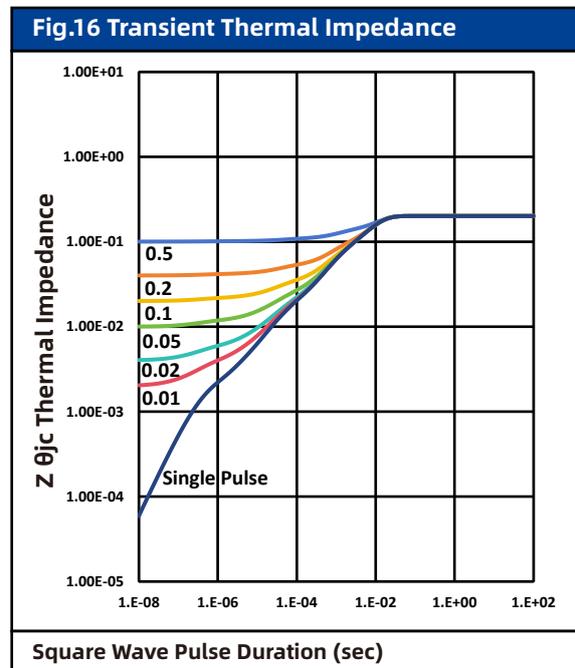
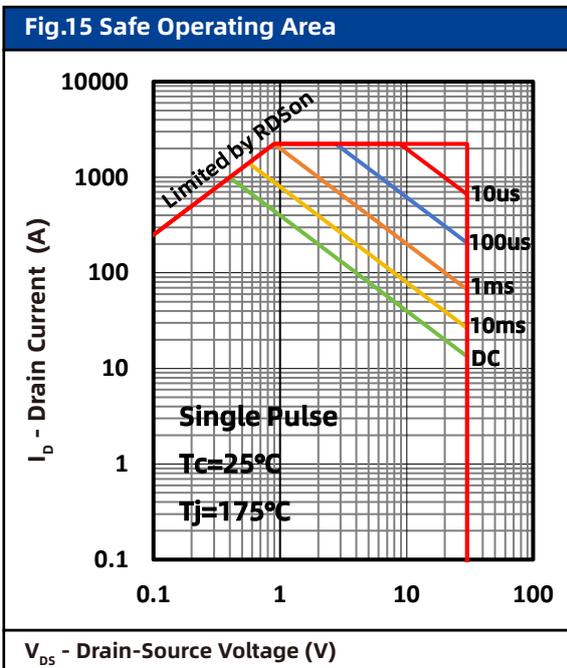
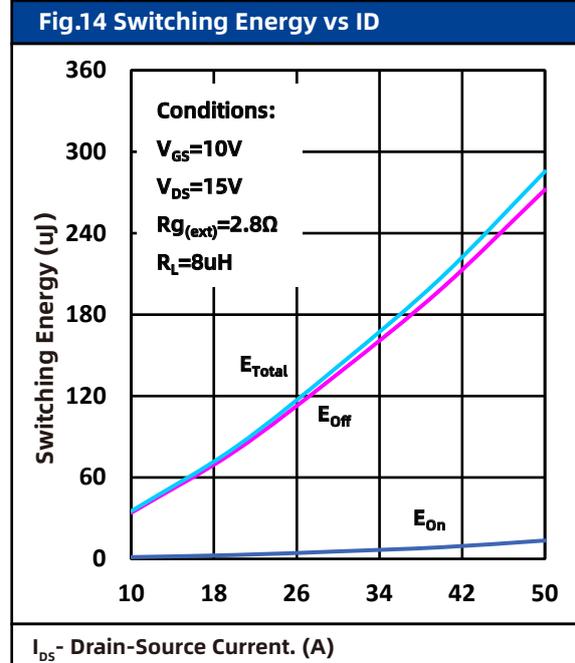
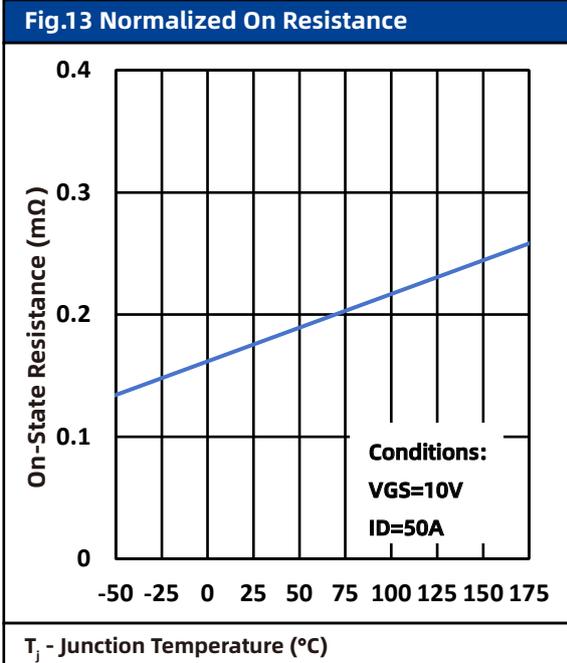
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Fig.17 Gate Charge Test Circuit & Waveform

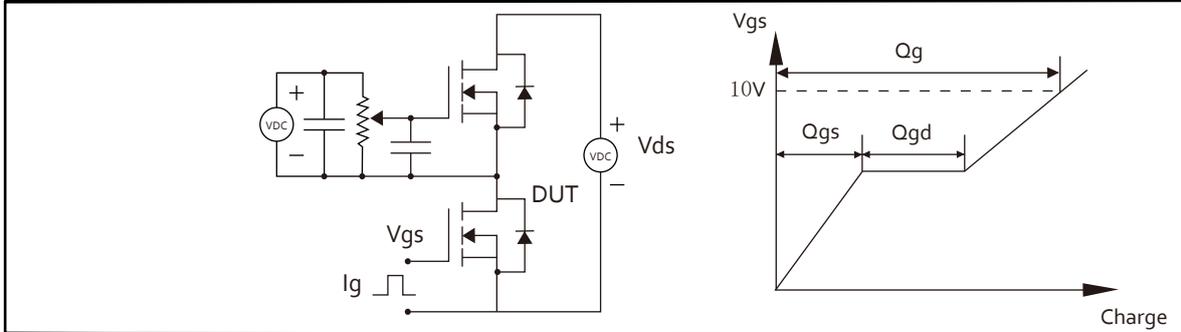


Fig.18 Resistive Switching Test Circuit & Waveforms

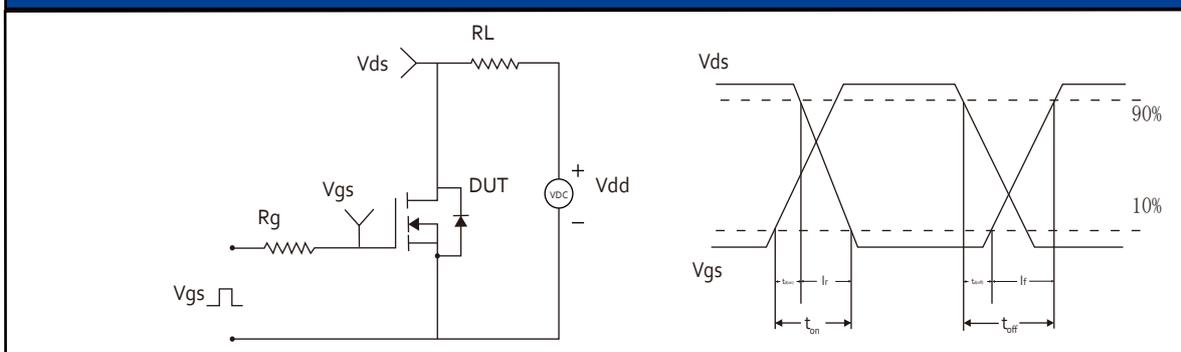


Fig.19 Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

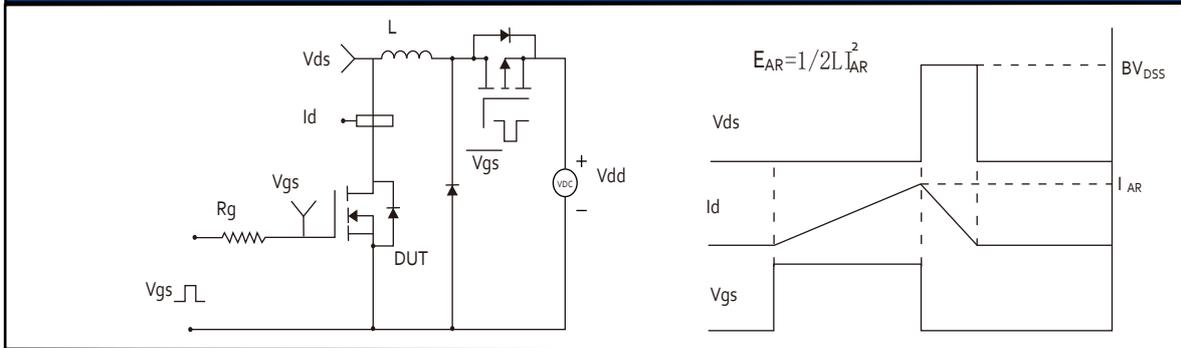
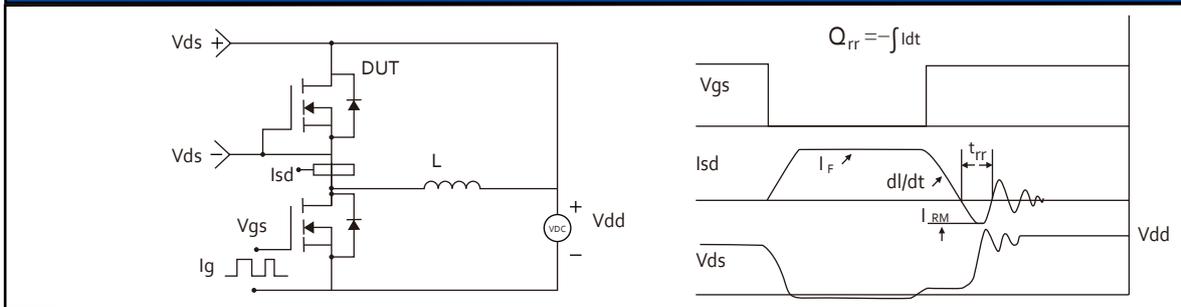
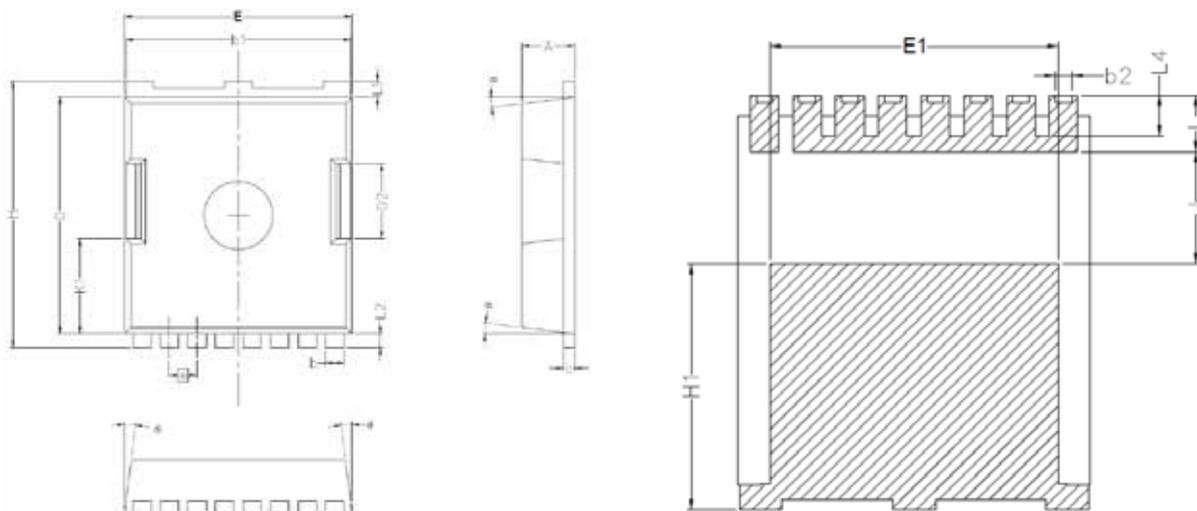


Fig.20 Diode Recovery Test Circuit & Waveforms



## 8. Package Dimensions

### CLIP TOLL Package



| Symbol   | Dimensions In Millimeters |       |
|----------|---------------------------|-------|
|          | Min.                      | Max.  |
| A        | 2.20                      | 2.40  |
| b        | 0.70                      | 0.90  |
| b1       | 9.70                      | 9.90  |
| b2       | 0.42                      | 0.50  |
| c        | 0.40                      | 0.60  |
| D        | 10.28                     | 10.58 |
| D2       | 3.10                      | 3.50  |
| E        | 9.70                      | 10.10 |
| E1       | 7.90                      | 8.30  |
| e        | 1.20BSC                   |       |
| H        | 11.48                     | 11.88 |
| H1       | 6.75                      | 7.15  |
| N        | 8                         |       |
| J        | 3.00                      | 3.30  |
| K1       | 3.98                      | 4.38  |
| L        | 1.40                      | 1.80  |
| L1       | 0.60                      | 0.80  |
| L2       | 0.50                      | 0.70  |
| L4       | 1.00                      | 1.30  |
| $\theta$ | 4°                        | 10°   |

## 9. Record of Document amendment

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1.初版发行