

## 60V N-Channel Enhancement Mode MOSFET

### 1.Product Information

#### 1.1 Features

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

#### 1.2 Applications

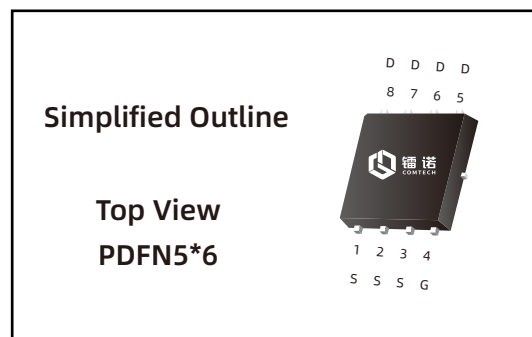
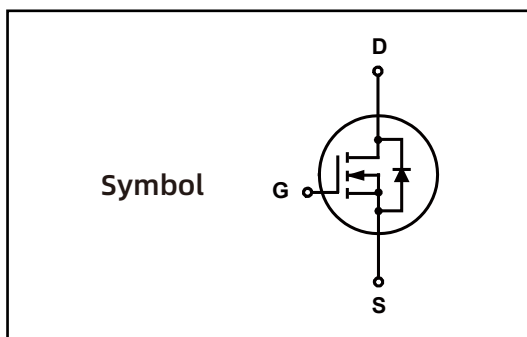
- ◇ DC-DC Converter
- ◇ Drones
- ◇ Motor drivers
- ◇ Light electric vehicles

#### 1.3 Quick reference

- ◇  $BV \cong 60\text{ V}$
- ◇  $P_{\text{tot}} \cong 290\text{ W}$
- ◇  $I_D \cong 197\text{ A}$
- ◇  $R_{DS(ON)} \cong 5.5\text{ m}\Omega @ V_{GS} = 10\text{ V}$



### 2.Pin Description



### 3.Limiting Values

| Symbol             | Parameter                      | Conditions                                                | Min | Max      | Unit                  | Note   |
|--------------------|--------------------------------|-----------------------------------------------------------|-----|----------|-----------------------|--------|
| $V_{DS}$           | Drain-Source Voltage           | $T_C = 25\text{ }^{\circ}\text{C}$                        | -   | 60       | V                     | -      |
| $V_{GS}$           | Gate-Source Voltage            | $T_C = 25\text{ }^{\circ}\text{C}$                        | -   | $\pm 20$ | V                     | -      |
| $I_D^*$            | Drain Current ( DC )           | $T_C = 25\text{ }^{\circ}\text{C}, V_{GS} = 10\text{ V}$  | -   | 197      | A                     | Fig.2  |
|                    |                                | $T_C = 100\text{ }^{\circ}\text{C}, V_{GS} = 10\text{ V}$ | -   | 125      | A                     |        |
| $I_{DM}^{**}, ***$ | Drain Current ( Pulsed )       | $T_C = 25\text{ }^{\circ}\text{C}, V_{GS} = 10\text{ V}$  | -   | 340      | A                     | -      |
| $P_{tot}$          | Drain power dissipation        | $T_C = 25\text{ }^{\circ}\text{C}$                        | -   | 290      | W                     | Fig.1  |
|                    |                                | $T_C = 100\text{ }^{\circ}\text{C}$                       | -   | 116      | W                     |        |
|                    | Linear reduction               | $T_A > 25\text{ }^{\circ}\text{C}$                        | -   | 2.32     | W/ $^{\circ}\text{C}$ |        |
| $T_{stg}$          | Storage Temperature            |                                                           | -55 | 150      | $^{\circ}\text{C}$    | -      |
| $T_J$              | Junction Temperature           |                                                           | -   | 150      | $^{\circ}\text{C}$    | -      |
| $I_S$              | Continuous-Source Current      | $T_C = 25\text{ }^{\circ}\text{C}$                        | -   | 197      | A                     | -      |
| $E_{AS}^*$         | Single Pulsed Avalanche Energy | $V_{DD} = 60\text{ V}, L = 0.1\text{ mH}$                 | -   | 304      | mJ                    | Fig.19 |

### 4.Thermal Characteristics

|                   |                                         |   |      |                      |        |
|-------------------|-----------------------------------------|---|------|----------------------|--------|
| $R_{\theta JA}^*$ | Thermal Resistance- Junction to Ambient | - | 28   | $^{\circ}\text{C/W}$ | Fig.16 |
| $R_{\theta JC}^*$ | Thermal Resistance- Junction to Case    | - | 0.43 |                      |        |

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 |
|--------------|---------|-----------|------------|----------|------|
| LNT060N060G  | PDFN5*6 | 330mm     | 12mm       | 5000     |      |

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   |
|------------------------------------------|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------|-----|-------|------|-------|--------|
| Static Characteristics                   |                                |                                                                                                                             |     |       |      |       |        |
| BV <sub>DSS</sub>                        | Drain-Source Breakdown Voltage | V <sub>GS</sub> = 0 V, I <sub>DS</sub> = 250 μA                                                                             | 60  | -     | -    | V     |        |
| V <sub>GS(th)</sub>                      | Gate Threshold Voltage         | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>DS</sub> = 250 μA                                                                | 2   | -     | 4    | V     |        |
| I <sub>DSS</sub>                         | Drain Leakage Current          | V <sub>DS</sub> = 60 V, V <sub>GS</sub> = 0 V                                                                               | -   | -     | 1    | μA    |        |
| I <sub>GSS</sub>                         | Gate Leakage Current           | V <sub>GS</sub> = ± 20 V, V <sub>DS</sub> = 0 V                                                                             | -   | -     | ±100 | nA    |        |
| R <sub>DS(ON)</sub> <sup>a</sup>         | On-State Resistance            | V <sub>GS</sub> = 10 V, I <sub>DS</sub> = 10 A                                                                              | -   | 4.5   | 5.5  | mΩ    | Fig.8  |
| Diode Characteristics                    |                                |                                                                                                                             |     |       |      |       |        |
| V <sub>SD</sub> <sup>a</sup>             | Diode Forward Voltage          | I <sub>SD</sub> = 10 A, V <sub>GS</sub> = 0 V                                                                               | -   | -     | 1.3  | V     | Fig.7  |
| t <sub>rr</sub>                          | Reverse Recovery Time          | I <sub>DS</sub> = 10 A, V <sub>GS</sub> = 0 V                                                                               | -   | 31    | -    | nS    | Fig.20 |
| Q <sub>rr</sub>                          | Reverse Recovery Charge        | di <sub>SD</sub> /dt = 100 A/μs                                                                                             | -   | 92    | -    | nC    |        |
| Dynamic Characteristics <sup>b</sup>     |                                |                                                                                                                             |     |       |      |       |        |
| C <sub>iSS</sub>                         | Input Capacitance              | V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 30 V<br>Frequency = 1 MHz                                                          | -   | 3849  | -    | pF    | Fig.10 |
| C <sub>OSS</sub>                         | Output Capacitance             |                                                                                                                             | -   | 586   | -    |       |        |
| C <sub>rSS</sub>                         | Reverse Transfer Capacitance   |                                                                                                                             | -   | 261   | -    |       |        |
| R <sub>G</sub>                           | Gate Resistance                | F= 1 MHz                                                                                                                    | -   | 1.7   | -    | Ω     |        |
| t <sub>d(on)</sub>                       | Turn-on Delay Time             | V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 10 V,<br>R <sub>G</sub> =2.7 Ω, R <sub>L</sub> = 20 uH,<br>I <sub>DS</sub> = 10 A | -   | 30    | -    | nS    | Fig.18 |
| t <sub>r</sub>                           | Turn-on Rise Time              |                                                                                                                             | -   | 60    | -    |       |        |
| t <sub>d(off)</sub>                      | Turn-off Delay Time            |                                                                                                                             | -   | 51    | -    |       |        |
| t <sub>f</sub>                           | Turn-off Fall Time             |                                                                                                                             | -   | 20    | -    |       |        |
| dv/dt(on)                                | Turn-on Peak Diode Recovery    |                                                                                                                             | -   | 0.399 | -    | KV/us |        |
| dv/dt(off)                               | Turn-off Peak Diode Recovery   |                                                                                                                             | -   | 1.255 | -    |       |        |
| di/dt(on)                                | Turn-on Peak Diode Recovery    |                                                                                                                             | -   | 364   | -    | A/us  |        |
| di/dt(off)                               | Turn-off Peak Diode Recovery   |                                                                                                                             | -   | 338   | -    |       |        |
| Gate Charge Characteristics <sup>b</sup> |                                |                                                                                                                             |     |       |      |       |        |
| Q <sub>g</sub>                           | Total Gate Charge              | V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 10 V,<br>I <sub>DS</sub> = 10 A                                                   | -   | 77    | -    | nC    | Fig.9  |
| Q <sub>gs</sub>                          | Gate-Source Charge             |                                                                                                                             | -   | 11    | -    |       |        |
| Q <sub>gd</sub>                          | Gate-Drain Charge              |                                                                                                                             | -   | 46    | -    |       |        |
| V <sub>plateau</sub>                     | Gate plateau voltage           |                                                                                                                             | -   | 4.3   | -    | V     |        |

Notes :

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

b : Guaranteed by design, not subject to production testing

## 7. Typical Characteristics

Fig.1 Power Capability

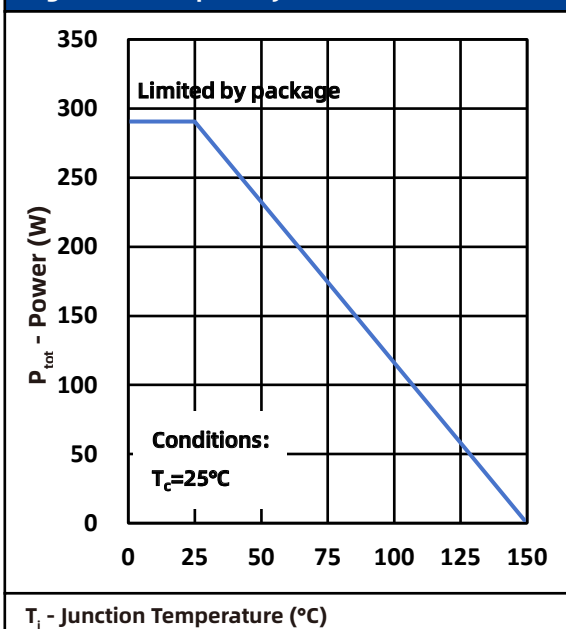


Fig.2 Current Capability

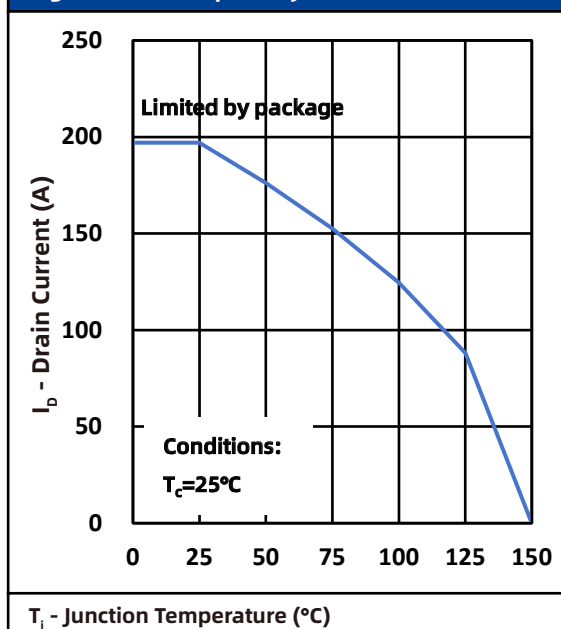


Fig.3 Output Characteristics@ $T_j = -55^\circ\text{C}$

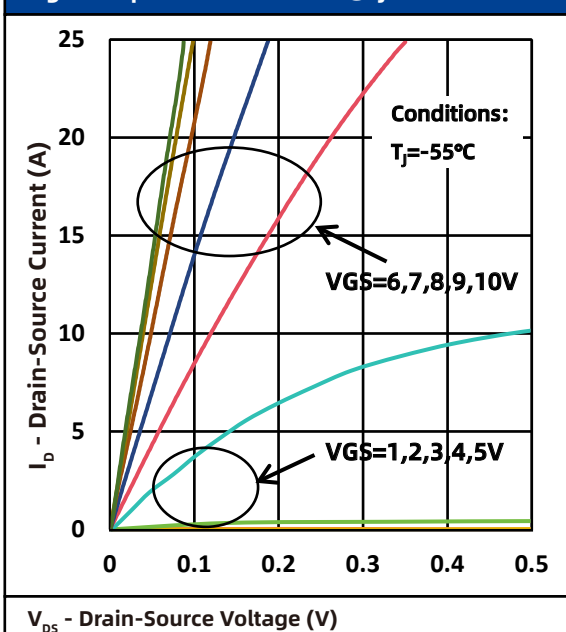
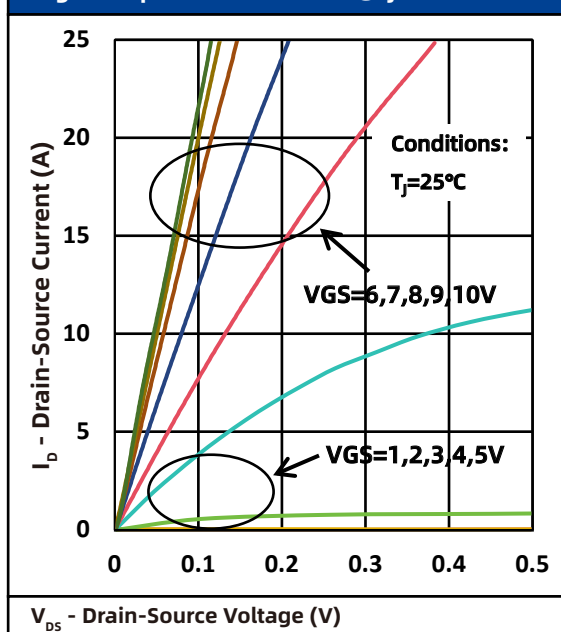


Fig.4 Output Characteristics@ $T_j = 25^\circ\text{C}$



## 7. Typical Characteristics

Fig.5 Output Characteristics@T<sub>j</sub> 150°C

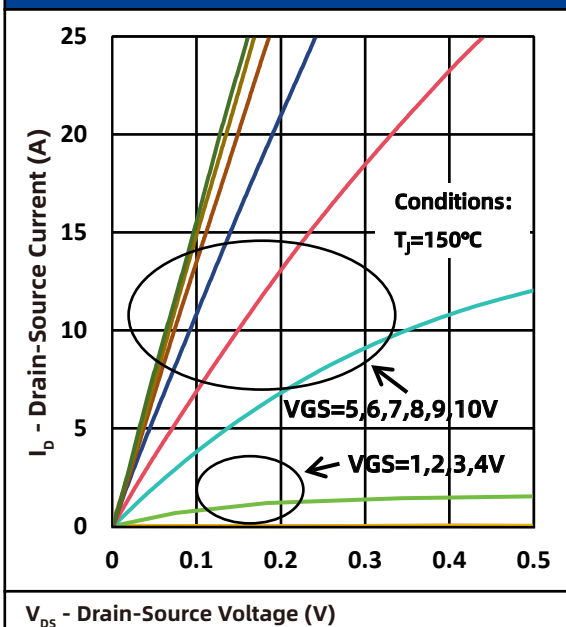


Fig.6 Transfer Characteristics vs Temp

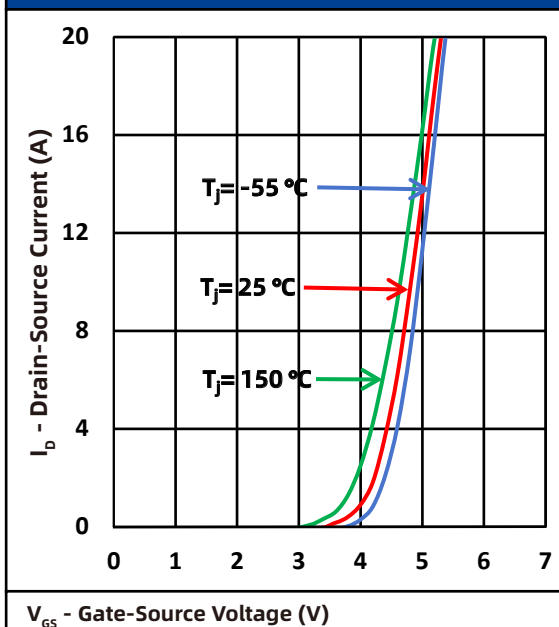


Fig.7 Body Diode Characteristics

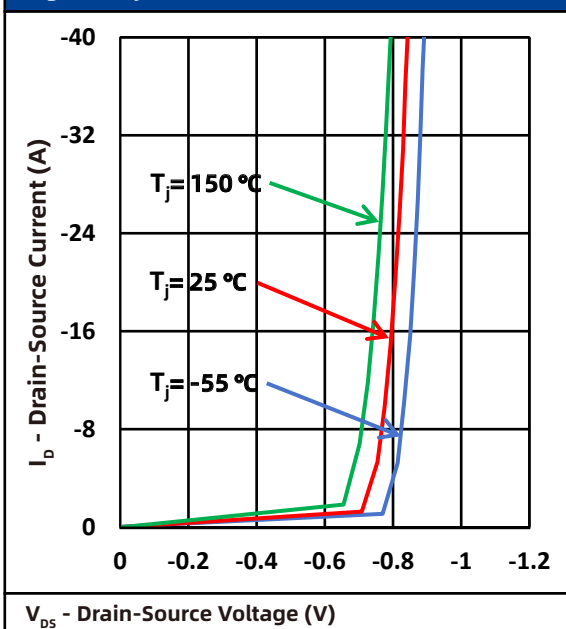
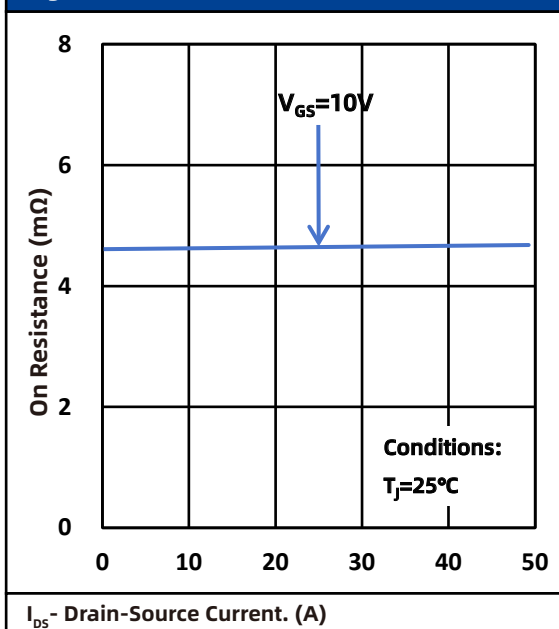
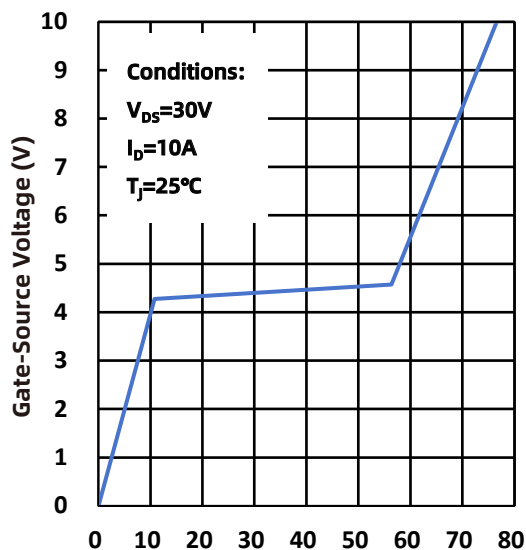


Fig.8 Drain-Source On Resistance



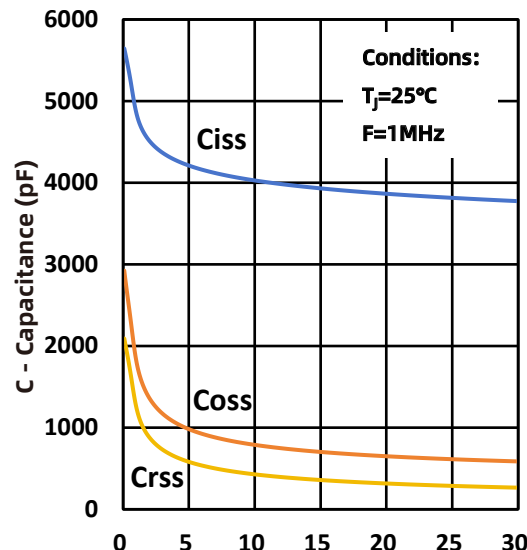
## 7. Typical Characteristics

Fig.9 Gate Charge



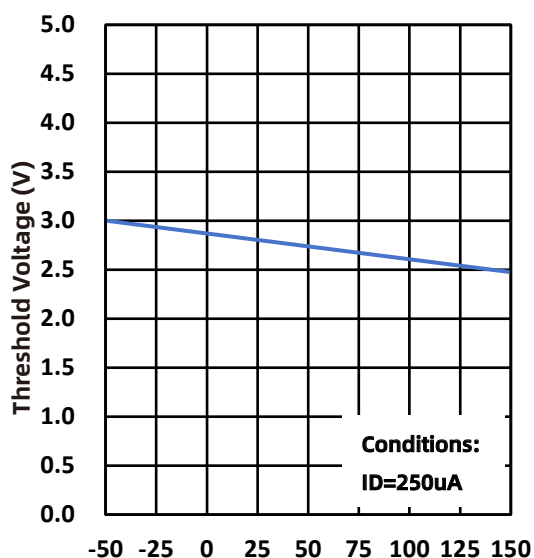
$Q_g$  - Gate Charge (nC)

Fig.10 Capacitance



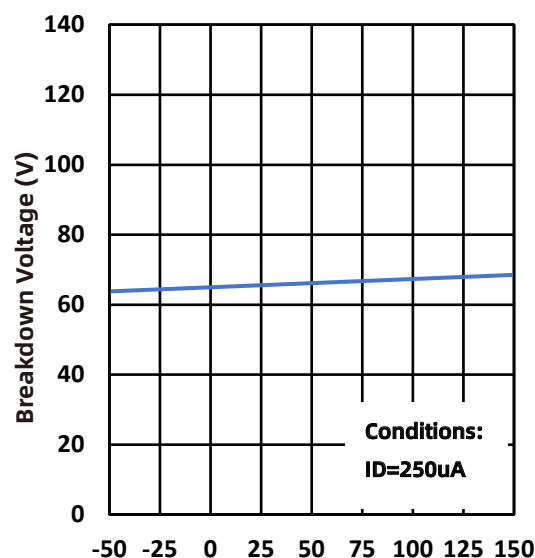
$V_{DS}$  - Drain-Source Voltage (V)

Fig.11 Normalized Threshold Voltage



$T_J$  - Junction Temperature ( $^\circ C$ )

Fig.12 Normalized Breakdown Voltage



$T_J$  - Junction Temperature ( $^\circ C$ )

## 7. Typical Characteristics

Fig.13 Normalized On Resistance

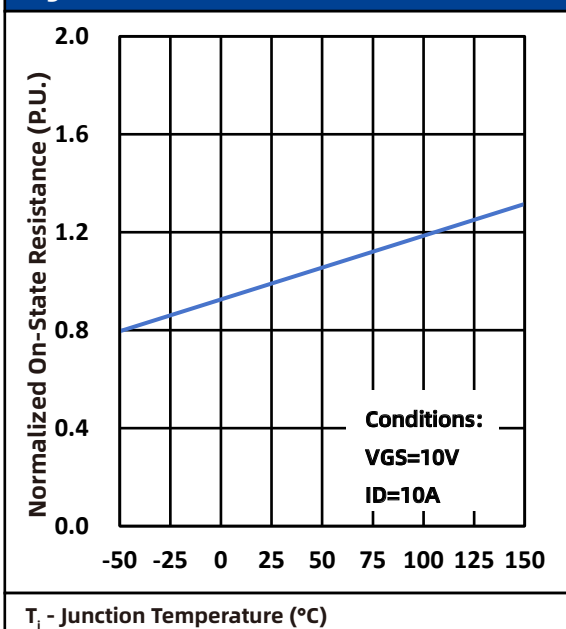


Fig.14 Switching Energy vs ID

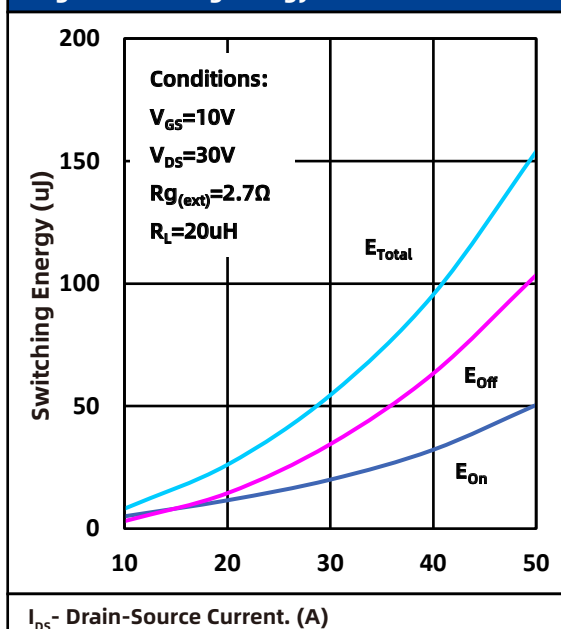


Fig.15 Safe Operating Area

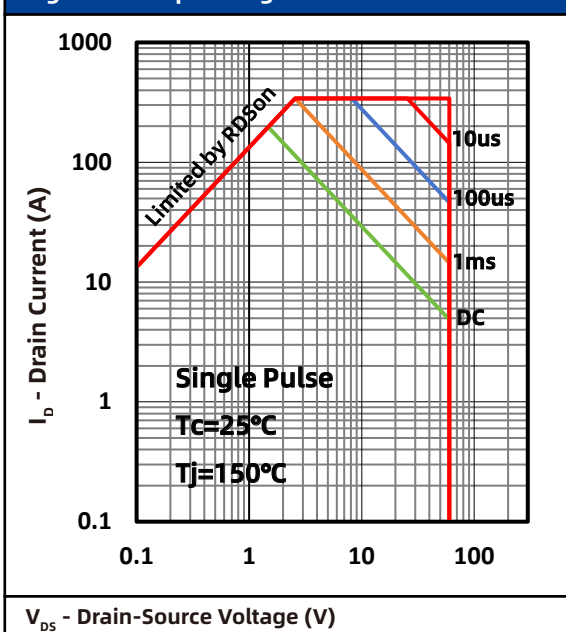
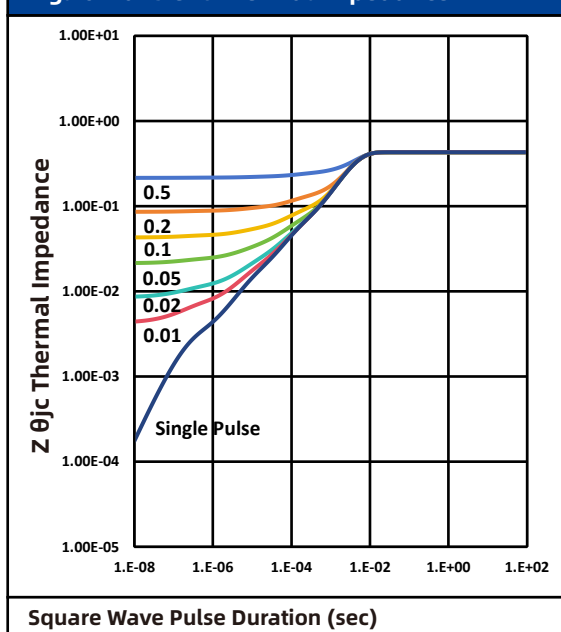


Fig.16 Transient Thermal Impedance



## 7. Typical Characteristics

Fig.17 Gate Charge Test Circuit & Waveform

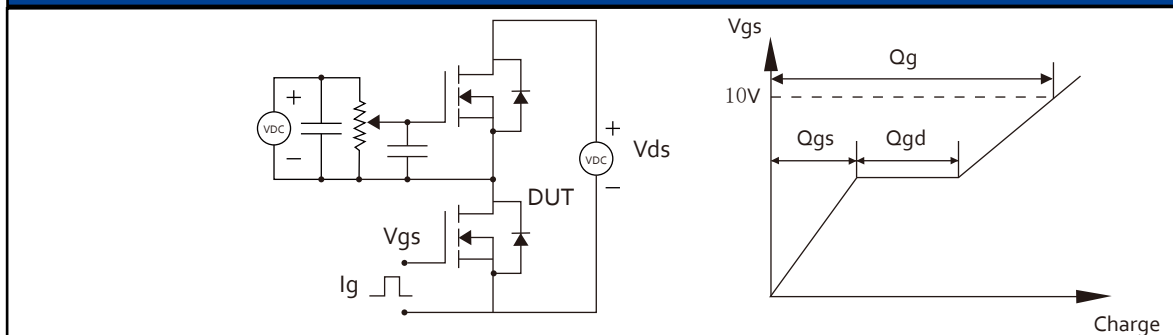


Fig.18 Resistive Switching Test Circuit & Waveforms

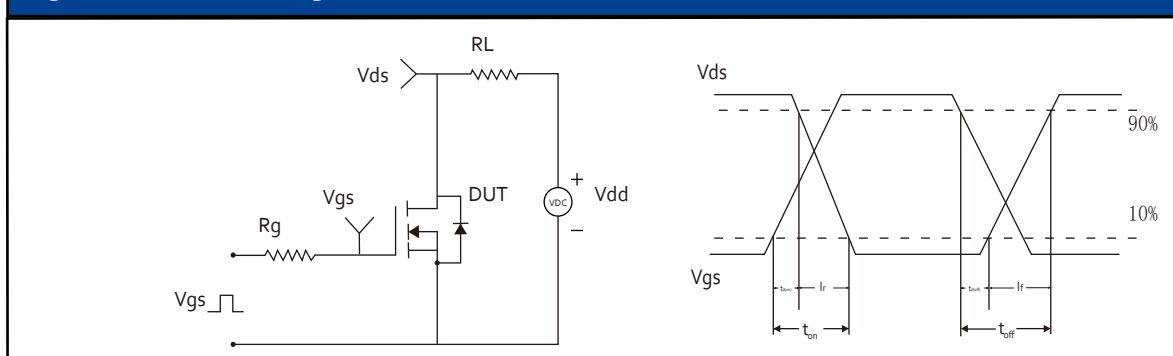


Fig.19 Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

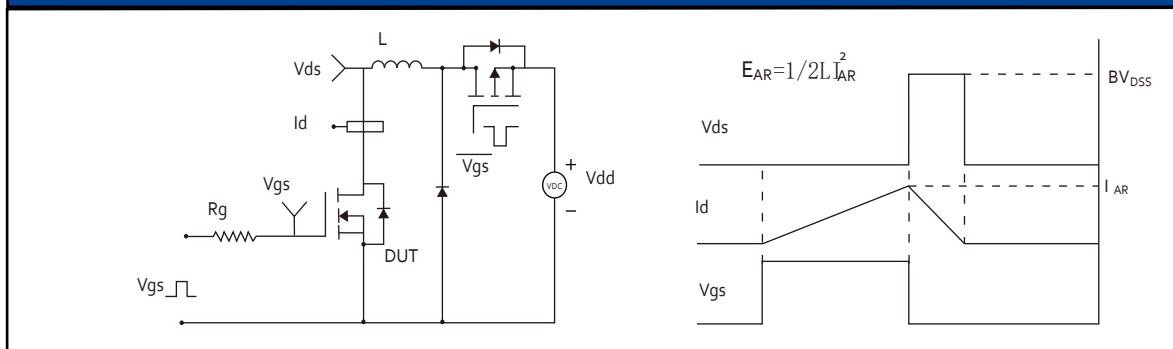
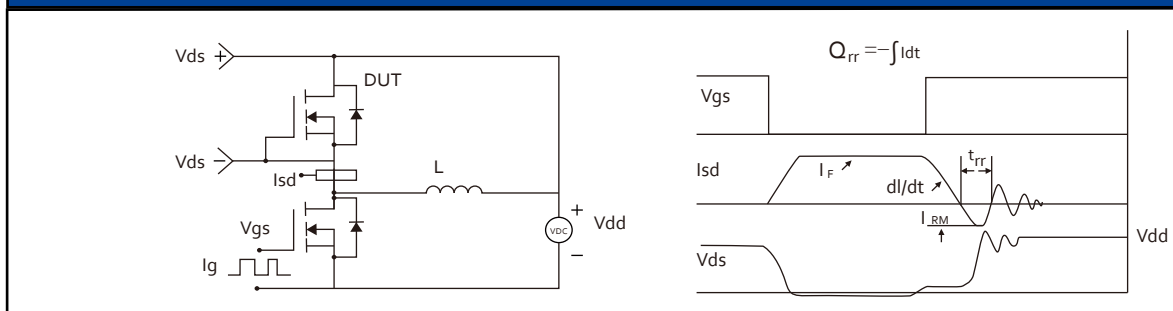
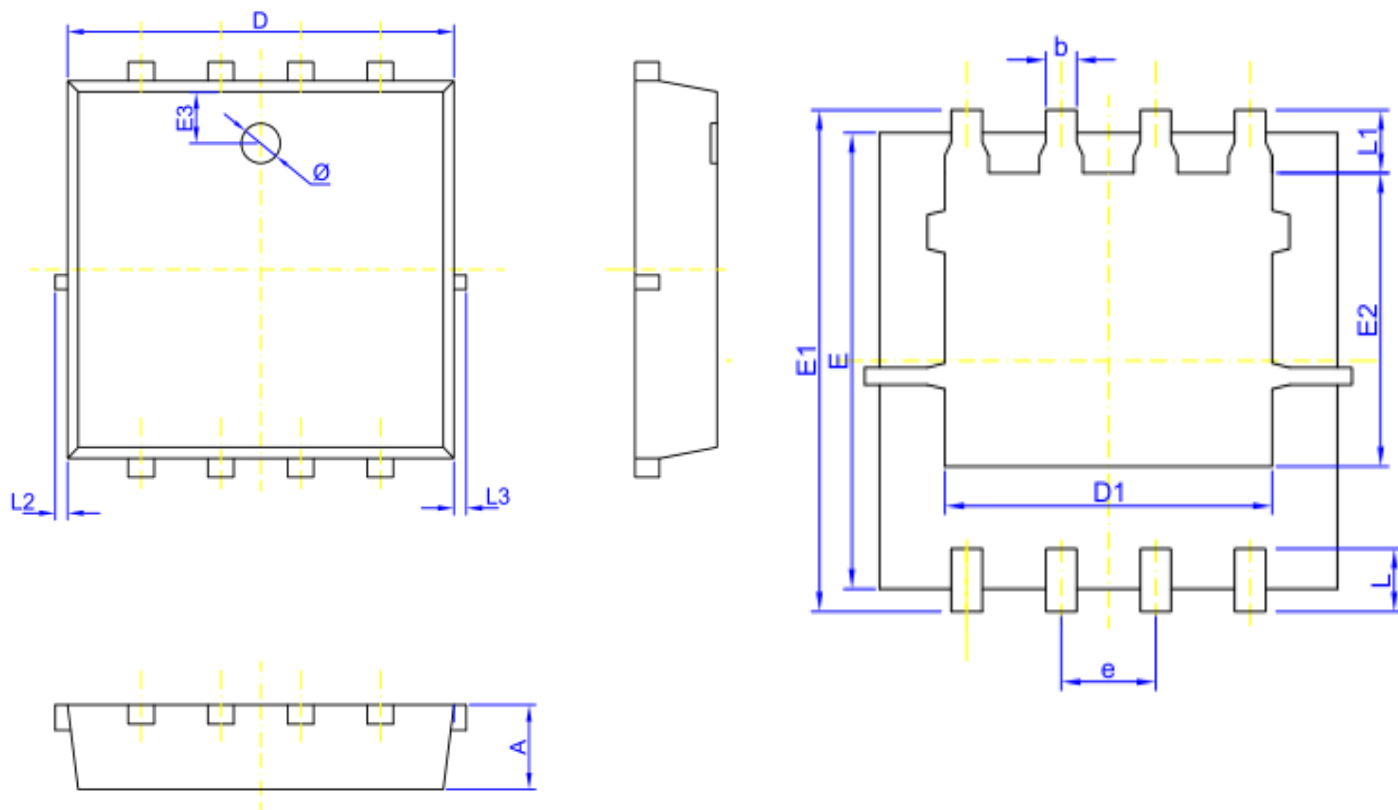


Fig.20 Diode Recovery Test Circuit & Waveforms



## 8. Package Dimensions

### PDFN5\*6 Package



| Symbol | Dimensions In Millimeters |       |       |
|--------|---------------------------|-------|-------|
|        | MIN.                      | NOM.  | MAX.  |
| A      | 0.900                     | 1.000 | 1.100 |
| D      | 4.950                     | 5.050 | 5.150 |
| D1     | 3.850                     | 4.050 | 4.250 |
| E      | 5.750                     | 5.850 | 5.950 |
| E1     | 5.950                     | 6.150 | 6.350 |
| E2     | 3.300                     | 3.500 | 3.700 |
| E3     | 0.900                     | 1.100 | 1.300 |
| b      | 0.250                     | 0.300 | 0.350 |
| e      | 1.220                     | 1.270 | 1.320 |
| L      | 0.585                     | 0.685 | 0.785 |
| L1     | 0.525                     | 0.625 | 0.725 |
| Ø      | 1.000                     | 1.200 | 1.400 |
| L2     | 0~0.100                   |       |       |
| L3     | 0~0.100                   |       |       |



## 9. Record of Document amendment

产品名称: LNT060N060G

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版本: 01

修改记录:

1.初版发行