

## 40V 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

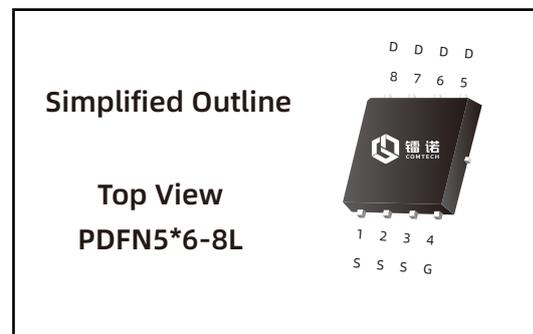
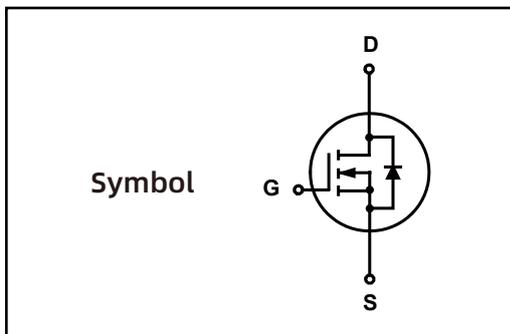
- ◇ DC-DC Converter
- ◇ Drones
- ◇ Motor drivers
- ◇ Light electric vehicles

#### 1.3 Quick reference

- ◇  $BV \cong 40\text{ V}$
- ◇  $P_{\text{tot}} \cong 41\text{ W}$
- ◇  $I_D \cong 68\text{ A}$
- ◇  $R_{DS(ON)} \cong 4.5\text{ m}\Omega @ V_{GS} = 10\text{ V}$
- ◇  $R_{DS(ON)} \cong 7.2\text{ m}\Omega @ V_{GS} = 6\text{ V}$



### 2. Pin Description



## 3.Limiting Values

| Symbol               | Parameter                      | Conditions  | Min | Max      | Unit             | Note   |
|----------------------|--------------------------------|---|-----|----------|------------------|--------|
| $V_{DS}$             | Drain-Source Voltage           | $T_C = 25\text{ }^\circ\text{C}$                        | -   | 40       | V                | -      |
| $V_{GS}$             | Gate-Source Voltage            | $T_C = 25\text{ }^\circ\text{C}$                        | -   | $\pm 20$ | V                | -      |
| $I_D^*$              | Drain Current ( DC )           | $T_C = 25\text{ }^\circ\text{C}, V_{GS} = 10\text{ V}$  | -   | 68       | A                | Fig.2  |
|                      |                                | $T_C = 100\text{ }^\circ\text{C}, V_{GS} = 10\text{ V}$ | -   | 44       | A                |        |
| $I_{DM}^{**},^{***}$ | Drain Current ( Pulsed )       | $T_C = 25\text{ }^\circ\text{C}, V_{GS} = 10\text{ V}$  | -   | 206      | A                | -      |
| $P_{tot}$            | Drain power dissipation        | $T_C = 25\text{ }^\circ\text{C}$                        | -   | 41       | W                | Fig.1  |
| $T_{stg}$            | Storage Temperature            |   | -55 | 150      | $^\circ\text{C}$ | -      |
| $T_J$                | Junction Temperature           |   | -   | 150      | $^\circ\text{C}$ | -      |
| $I_S$                | Continuous-Source Current      | $T_C = 25\text{ }^\circ\text{C}$                        | -   | 68       | A                | -      |
| $E_{AS}^*$           | Single Pulsed Avalanche Energy | $V_{DD} = 40\text{ V}, L = 10\text{ }\mu\text{H}$       | -   | 22       | mJ               | Fig.19 |

## 4.Thermal Characteristics

|                   |   |   |   |                    |        |
|-------------------|---|---|---|--------------------|--------|
| $R_{\theta JA}^*$ | Thermal Resistance- Junction to Ambient | - | - | $^\circ\text{C/W}$ | Fig.16 |
| $R_{\theta JC}^*$ | Thermal Resistance- Junction to Case    | - | 3 |                    |        |

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 |
|--------------|---------|-----------|------------|----------|------|
| LNT055N040G  | 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   |
|--|--------------------------------|---|-----|------|-----------|---------------|--------|
| <b>Static Characteristics</b>                  |                                |   |     |      |           |               |        |
| $BV_{DSS}$                                     | Drain-Source Breakdown Voltage | $V_{GS} = 0\text{ V}, I_{DS} = 250\ \mu\text{A}$  | 40  | -    | -         | 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          | $V_{DS} = 40\text{ V}, V_{GS} = 0\text{ V}$   | -   | -    | 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            | $V_{GS} = 10\text{ V}, I_{DS} = 50\text{ A}$  | -   | 4    | 4.5       | m $\Omega$    | Fig.8  |
|  |                                | $V_{GS} = 4.5\text{ V}, I_{DS} = 30\text{ A}$   | -   | 5.5  | 6         |               |        |
| <b>Diode Characteristics</b>                   |                                |   |     |      |           |               |        |
| $V_{SD}^a$                                     | Diode Forward Voltage          | $I_{DS} = 50\text{ A}, V_{GS} = 0\text{ V}$   | -   | -    | 1.3       | V             | Fig.7  |
| $t_{rr}$                                       | Reverse Recovery Time          | $I_{DS} = 50\text{ A}, V_{GS} = 0\text{ V}$<br>$dI_{SD}/dt = 100\text{ A}/\mu\text{s}$                                | -   | 16   | -         | nS            | Fig.20 |
| $Q_{rr}$                                       | Reverse Recovery Charge        |   | -   | 19   | -         | nC            |        |
| <b>Dynamic Characteristics<sup>b</sup></b>     |                                |   |     |      |           |               |        |
| $C_{ISS}$                                      | Input Capacitance              | $V_{GS} = 0\text{ V}, V_{DS} = 20\text{ V}$<br>Frequency = 1 MHz  | -   | 3467 | -         | pF            | Fig.10 |
| $C_{OSS}$                                      | Output Capacitance             |   | -   | 236  | -         |               |        |
| $C_{rSS}$                                      | Reverse Transfer Capacitance   |   | -   | 182  | -         |               |        |
| $R_G$  | Gate Resistance                | F= 1 MHz  | -   | 2.3  | -         | $\Omega$      |        |
| $t_d(on)$                                      | Turn-on Delay Time             | $V_{DS} = 20\text{ V}, V_{GEN} = 10\text{ V},$<br>$R_G=2.8\ \Omega, R_L = 10\ \mu\text{H},$<br>$I_{DS} = 50\text{ A}$ | -   | 12   | -         | nS            | Fig.18 |
| $t_r$  | Turn-on Rise Time              |   | -   | 188  | -         |               |        |
| $t_d(off)$                                     | Turn-off Delay Time            |   | -   | 39   | -         |               |        |
| $t_f$  | Turn-off Fall Time             |   | -   | 10   | -         |               |        |
| $dv/dt$  | Peak Diode Recovery            |   | -   | 0.08 | -         |               |        |
| $di/dt$  | Peak Diode Recovery            | -   | 307 | -    | A/us      |               |        |
| <b>Gate Charge Characteristics<sup>b</sup></b> |                                |   |     |      |           |               |        |
| $Q_g$  | Total Gate Charge              | $V_{DS} = 20\text{ V}, V_{GS} = 10\text{ V},$<br>$I_{DS} = 50\text{ A}$   | -   | 56   | -         | nC            | Fig.17 |
| $Q_{gs}$                                       | Gate-Source Charge             |   | -   | 9    | -         |               |        |
| $Q_{gd}$                                       | Gate-Drain Charge              |   | -   | 16   | -         |               |        |
| $V_{plateau}$                                  | Gate plateau voltage           |   | -   | 3.3  | -         |               |        |

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

Fig.1 Power Capability

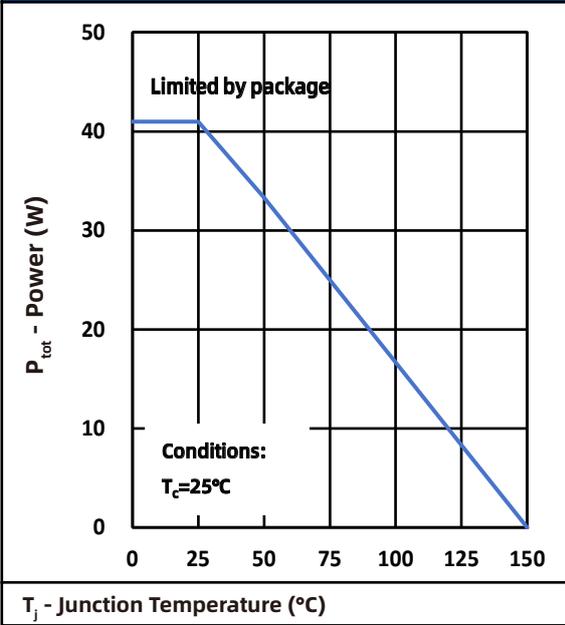


Fig.2 Current Capability

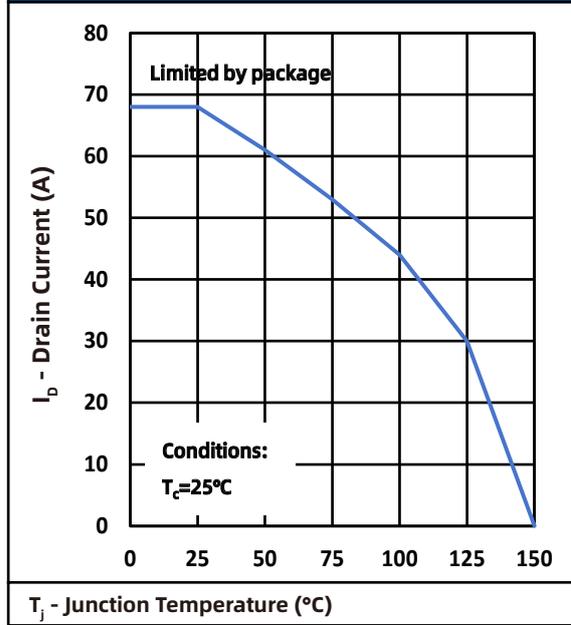


Fig.3 Output Characteristics@ $T_j = -55^\circ\text{C}$

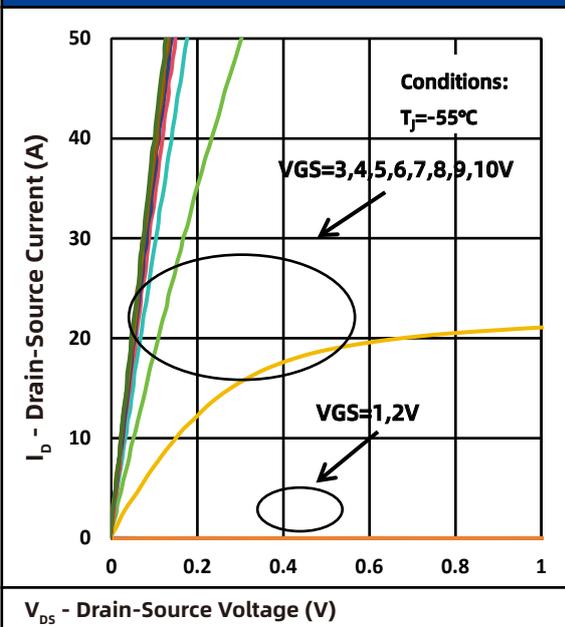
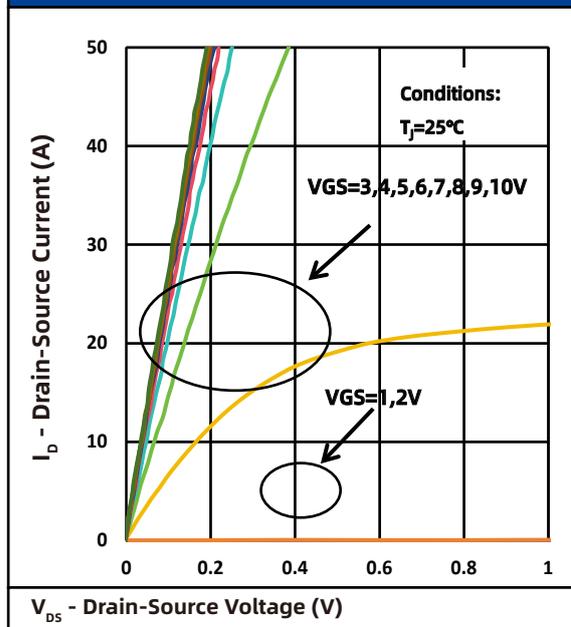


Fig.4 Transfer Characteristics@ $T_j = 25^\circ\text{C}$



## 7. Typical Characteristics

Fig.5 Output Characteristics@Tj 150°C

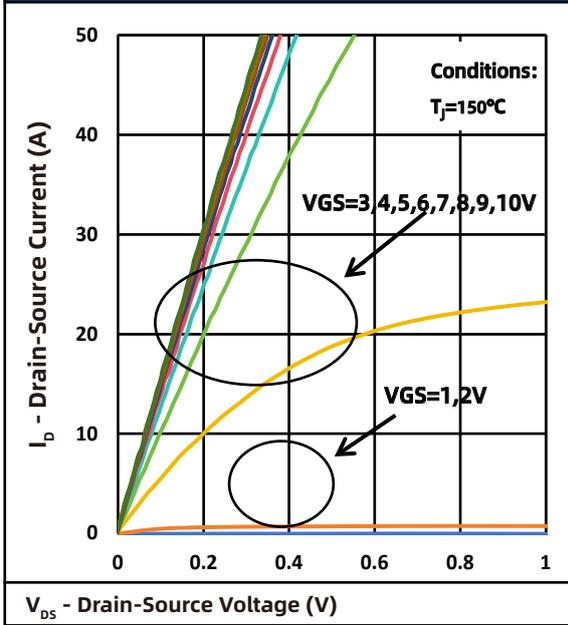


Fig.6 Transfer Characteristics vs Temp

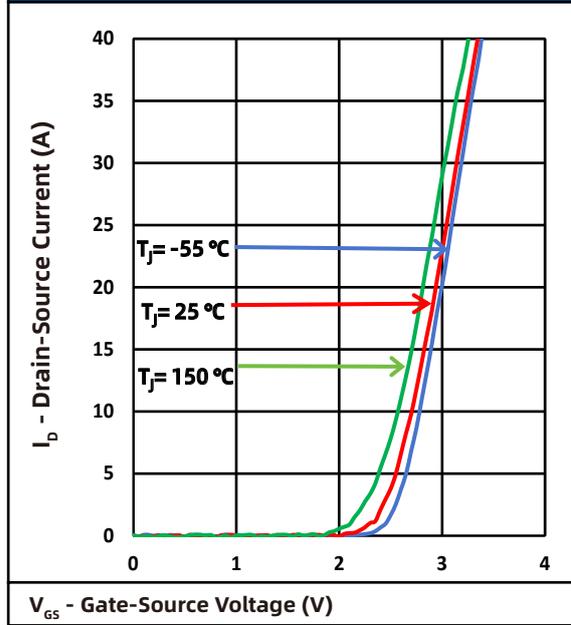


Fig.7 Body Diode Characteristics

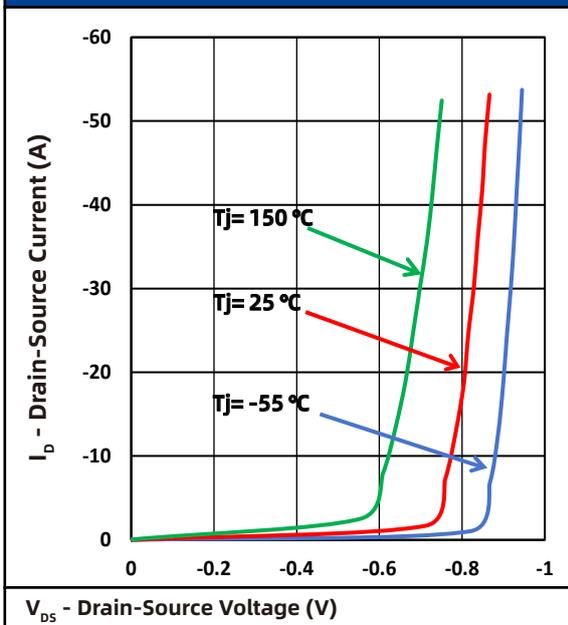
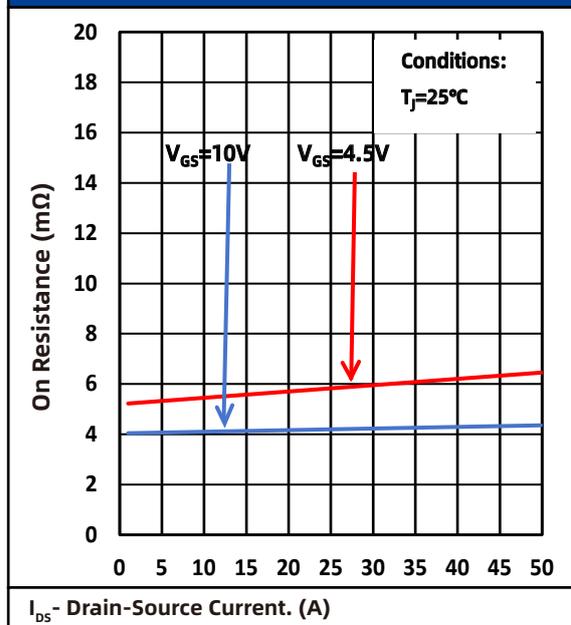
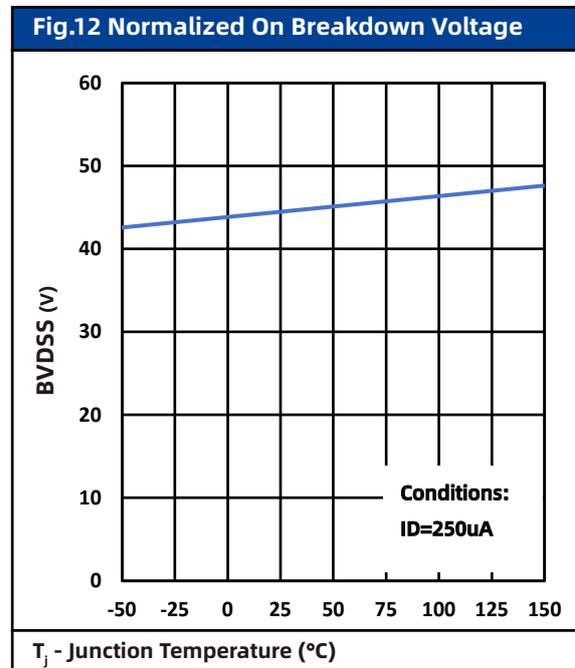
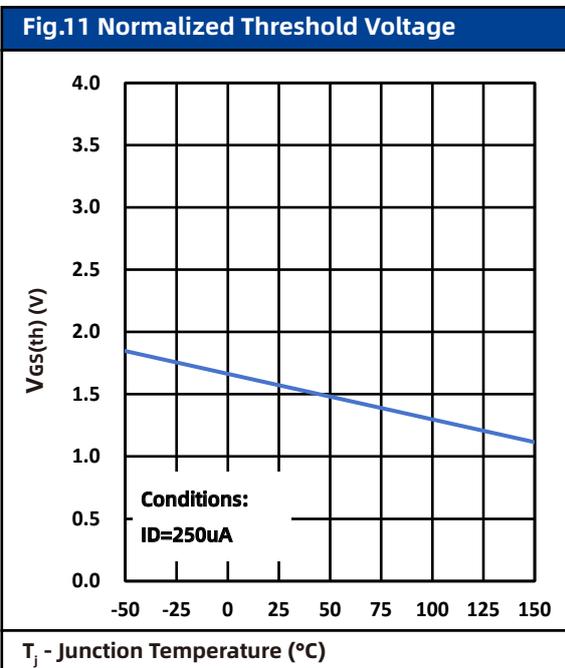
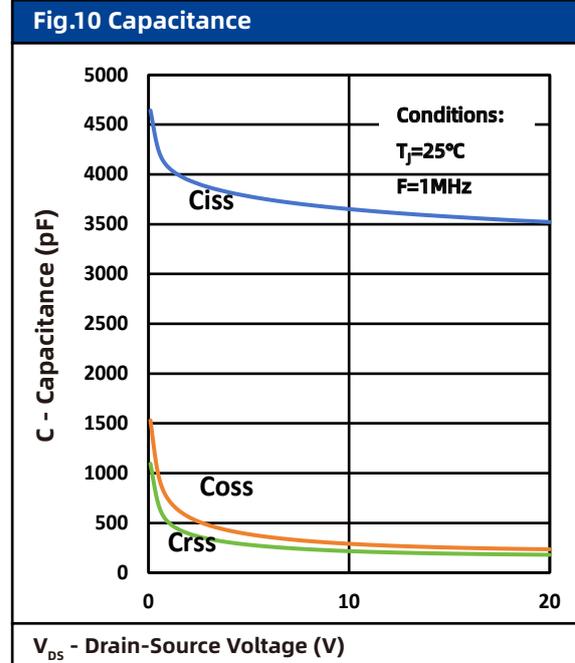
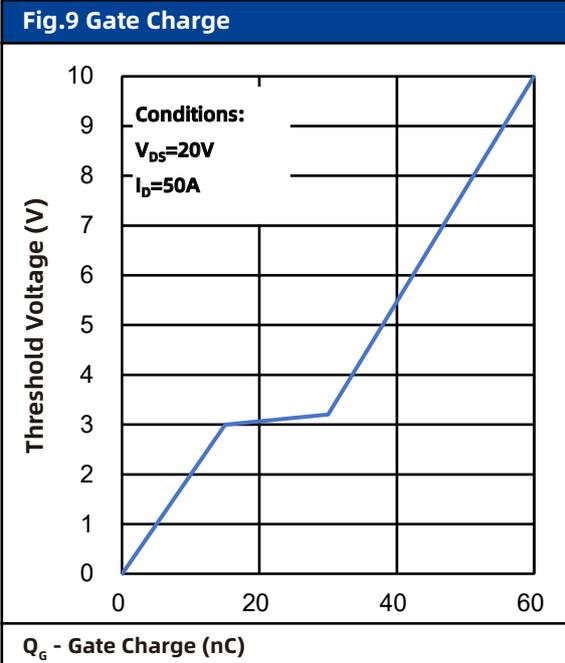


Fig.8 Drain-Source On Resistance



## 7. Typical Characteristics



## 7. Typical Characteristics

Fig.13 Normalized On Resistance

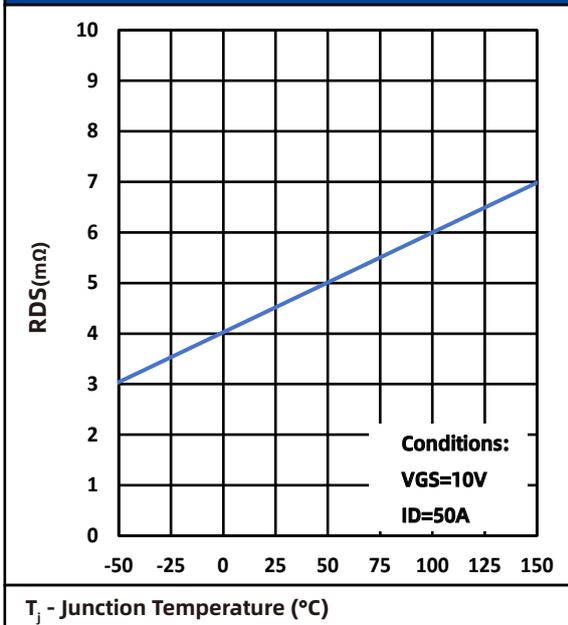


Fig.14 Switching Energy vs ID

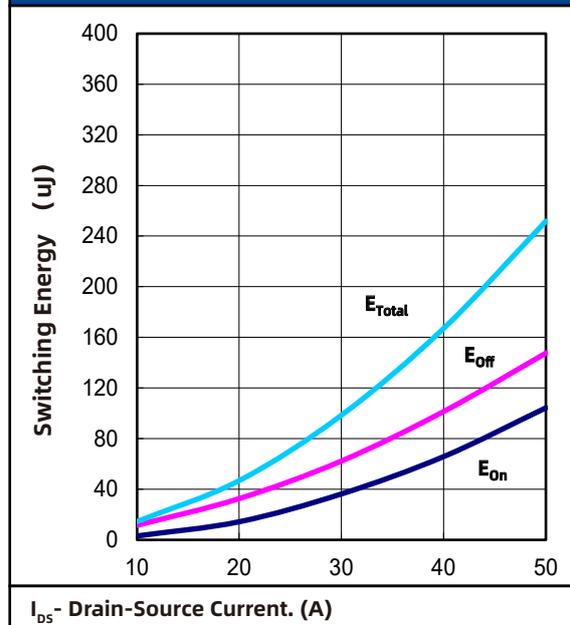


Fig.15 Safe Operating Area

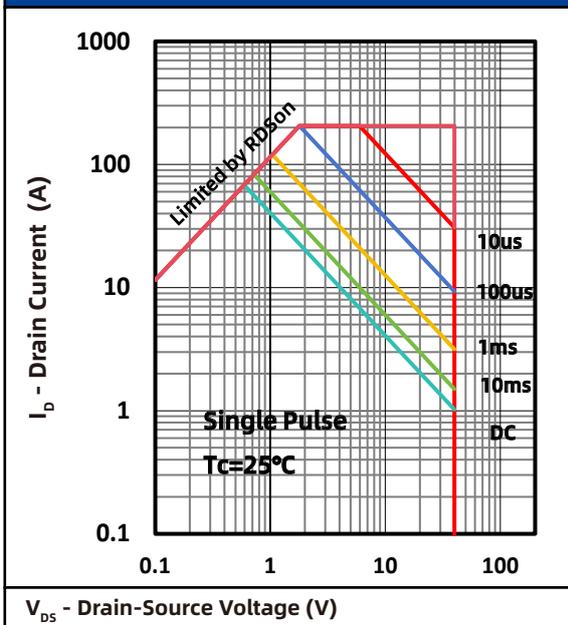
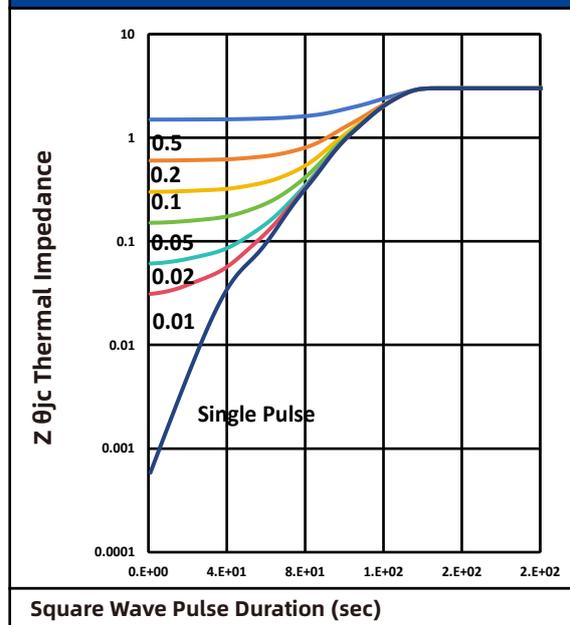


Fig.16 Transient Thermal Impedance



## 7. Typical Characteristics

Fig.17 Gate Charge Test Circuit & Waveform

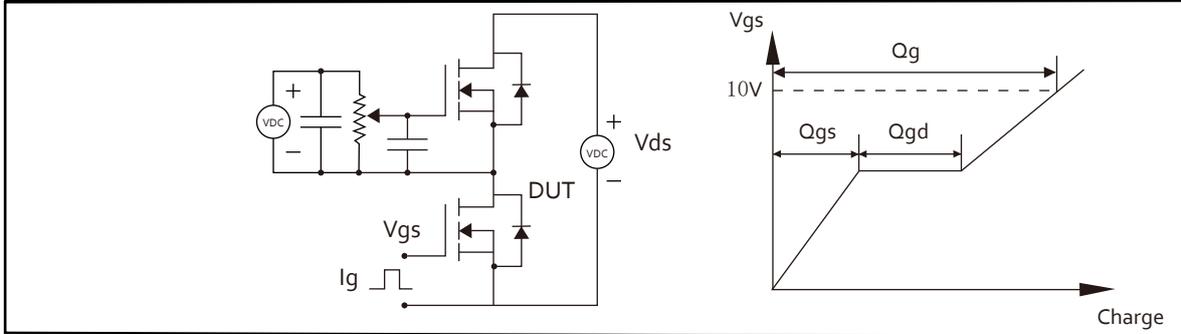


Fig.18 Resistive Switching Test Circuit & Waveforms

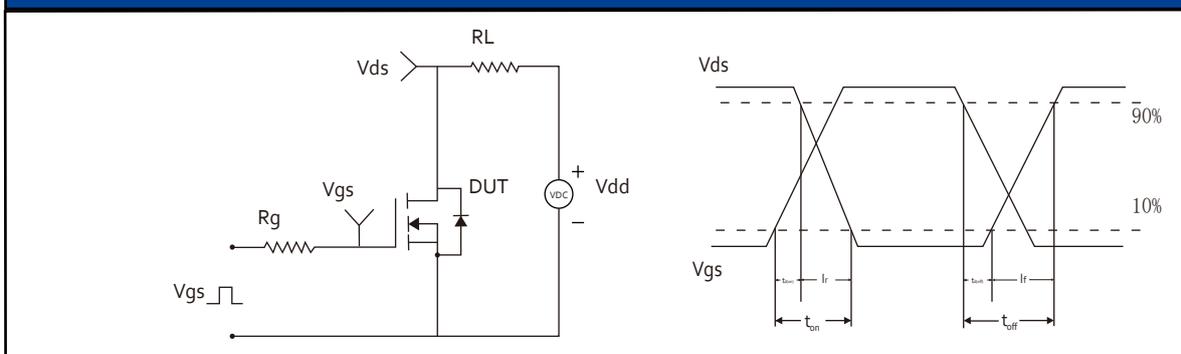


Fig.19 Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

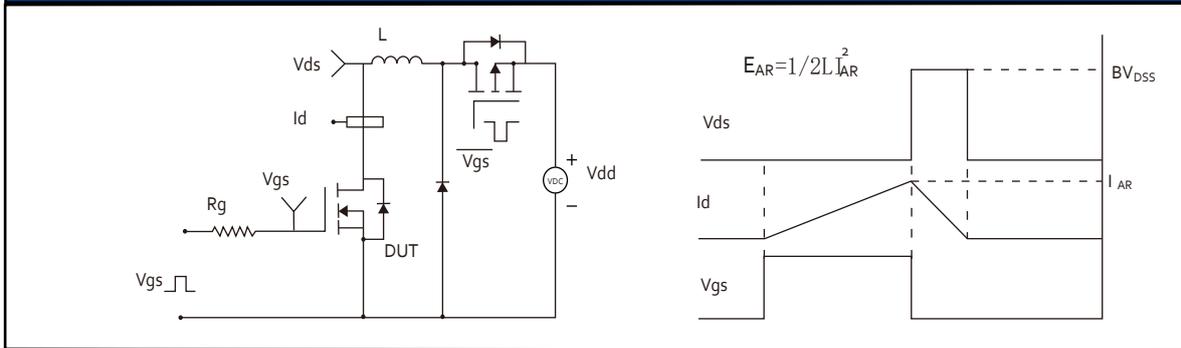
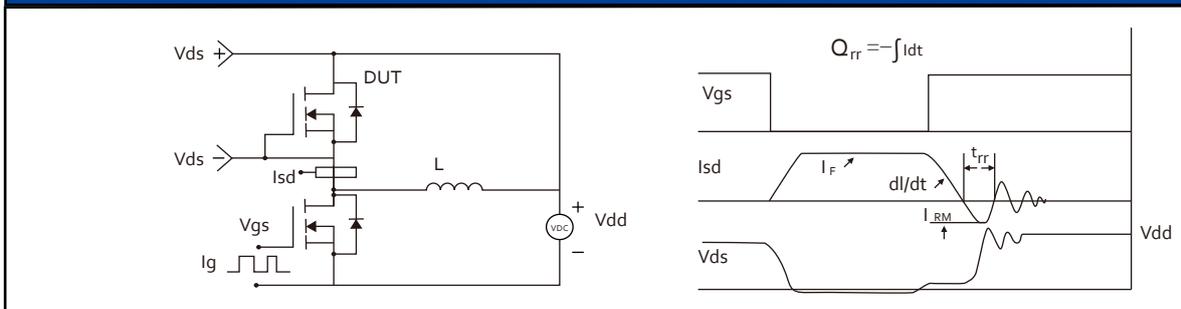
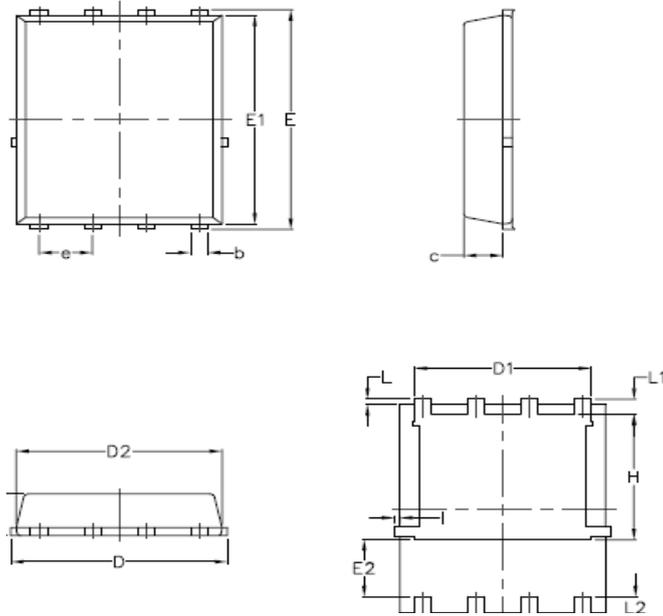


Fig.20 Diode Recovery Test Circuit & Waveforms



## 8. Package Dimensions

### PDFN5\*6-8L Package



| Symbol | Dimensions in Millimeters |       |
|--------|---------------------------|-------|
|        | Min.                      | Max.  |
| A      | 1.03                      | 1.17  |
| b      | 0.34                      | 0.48  |
| c      | 0.824                     | 0.970 |
| D      | 4.80                      | 5.40  |
| D1     | 4.11                      | 4.31  |
| D2     | 4.80                      | 5.00  |
| E      | 5.95                      | 6.15  |
| E1     | 5.65                      | 5.85  |
| E2     | 1.40                      | -     |
| E      | 1.27 BSC                  |       |
| L      | 0.05                      | 0.25  |
| L1     | 0.38                      | 0.50  |
| L2     | 0.38                      | 0.71  |
| H      | 3.30                      | 3.50  |
| I      | -                         | 0.18  |

## 9. Record of Document amendment

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