

General Description:

The LWN6045A4 uses trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications. The package form is TO-252, which accords with the ROHS standard and Halogen Free standard.

Features:

- Fast Switching
- Low Gate Charge and $R_{DS(ON)}$
- Low Reverse transfer capacitances

Applications:

- DC-DC Converter
- Portable Equipment
- Power Management

100% DVDS Tested

100% Avalanche Tested


Package Marking and Ordering Information:

| Marking | Part Number | Package | Packing | Qty. |
|------------------|-------------|---------|---------|----------|
| N6045/LW A4/D.C. | LWN6045A4 | TO-252 | Reel | 2500 Pcs |

Absolute Maximum Ratings:

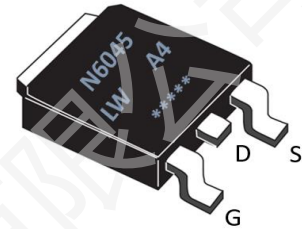
| Symbol | Parameter | Value | Units |
|----------------|--|-------------------------|------------------|
| V_{DSS} | Drain-to-Source Voltage | 60 | V |
| I_D | Continuous Drain Current | $T_C=25^\circ\text{C}$ | 16 |
| | Continuous Drain Current | $T_C=100^\circ\text{C}$ | 10 |
| I_{DM}^{a1} | Pulsed Drain Current | 64 | A |
| E_{AS}^{a2} | Single pulse avalanche energy | 50 | mJ |
| V_{GS} | Gate-to-Source Voltage | ± 20 | V |
| P_D | Power Dissipation | 30 | W |
| T_J, T_{STG} | Operating Junction and Storage Temperature Range | 150, -55 to 150 | $^\circ\text{C}$ |
| T_L | Maximum Temperature for Soldering | 260 | $^\circ\text{C}$ |

Thermal Characteristics:

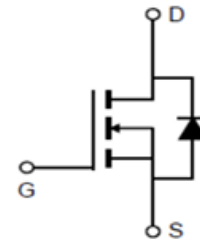
| Symbol | Parameter | Value | Units |
|----------------------|---|-------|---------------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case | 4.2 | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JA}^{a3}$ | Thermal Resistance, Junction-to-Ambient | 100 | $^\circ\text{C}/\text{W}$ |

| | | |
|---------------------------|----|------------------|
| V_{DSS} | 60 | V |
| I_D | 16 | A |
| P_D | 30 | W |
| $R_{DS(ON) \text{ TYPE}}$ | 33 | $\text{m}\Omega$ |

Marking and Pin Assignment



Inner Equivalent Principium Chart



Electrical Characteristic ($T_j = 25\text{ }^\circ\text{C}$, unless otherwise specified):

| Static Characteristics | | | | | | |
|------------------------|-----------------------------------|-------------------------------|-------|------|------|-----------|
| Symbol | Parameter | Test Conditions | Value | | | Units |
| | | | Min. | Typ. | Max. | |
| V_{DSS} | Drain to Source Breakdown Voltage | $V_{GS}=0V, I_D=250\mu A$ | 60 | -- | -- | V |
| I_{DSS} | Drain to Source Leakage Current | $V_{DS}=60V, V_{GS}=0V$ | -- | -- | 1.0 | μA |
| $I_{GSS(F)}$ | Gate to Source Forward Leakage | $V_{GS}=+20V, V_{DS}=0V$ | -- | -- | 100 | nA |
| $I_{GSS(R)}$ | Gate to Source Reverse Leakage | $V_{GS}=-20V, V_{DS}=0V$ | -- | -- | -100 | nA |
| $V_{GS(TH)}$ | Gate Threshold Voltage | $V_{DS}=V_{GS}, I_D=250\mu A$ | 1.1 | 1.6 | 2.1 | V |
| $R_{DS(ON)1}$ | Drain-to-Source On-Resistance | $V_{GS}=10V, I_D=8.0A$ | -- | 33 | 45 | $m\Omega$ |
| $R_{DS(ON)2}$ | Drain-to-Source On-Resistance | $V_{GS}=4.5V, I_D=3.0A$ | -- | 38 | 55 | $m\Omega$ |

| Dynamic Characteristics | | | | | | |
|-------------------------|------------------------------|--------------------------------|-------|------|------|----------|
| Symbol | Parameter | Test Conditions | Value | | | Units |
| | | | Min. | Typ. | Max. | |
| C_{iss} | Input Capacitance | $V_{GS}=0V$ | -- | 971 | -- | pF |
| C_{oss} | Output Capacitance | $V_{DS}=30V$ | -- | 40 | -- | |
| C_{riss} | Reverse Transfer Capacitance | $f=1.0MHz$ | -- | 37 | -- | |
| R_G | Gate resistance | $V_{GS}=0V, V_{DS}=0V, f=1MHz$ | -- | 1.4 | -- | Ω |

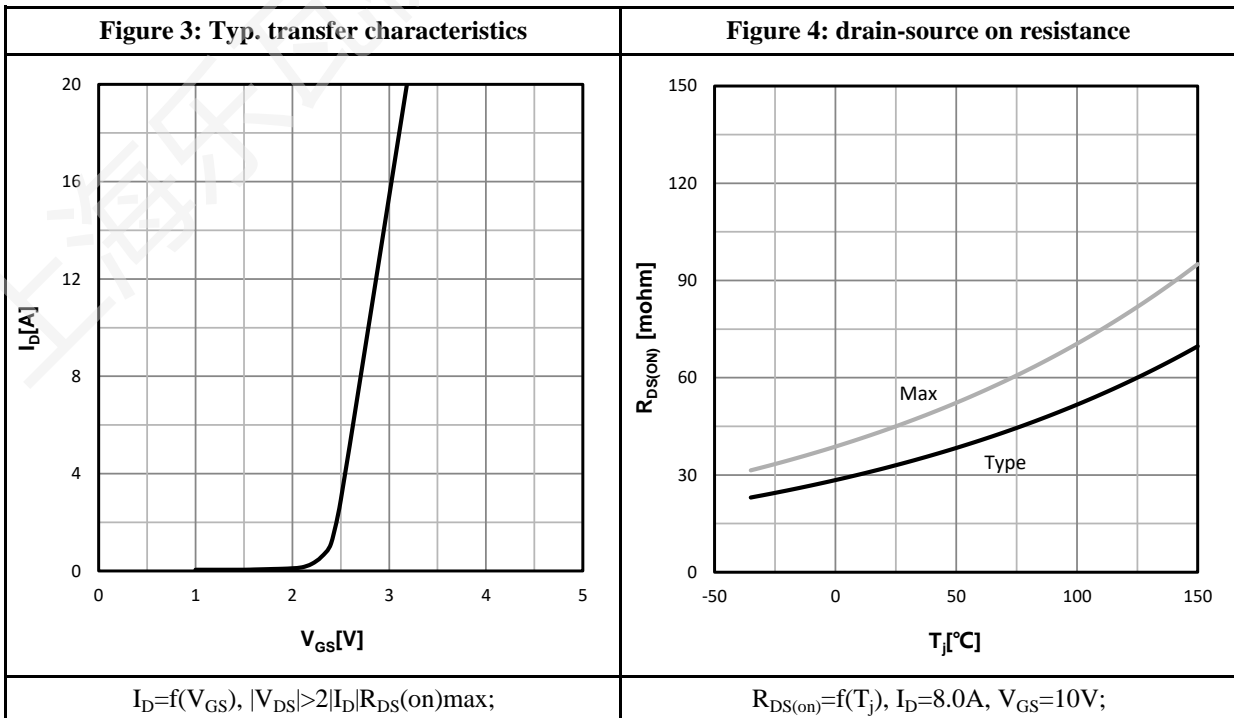
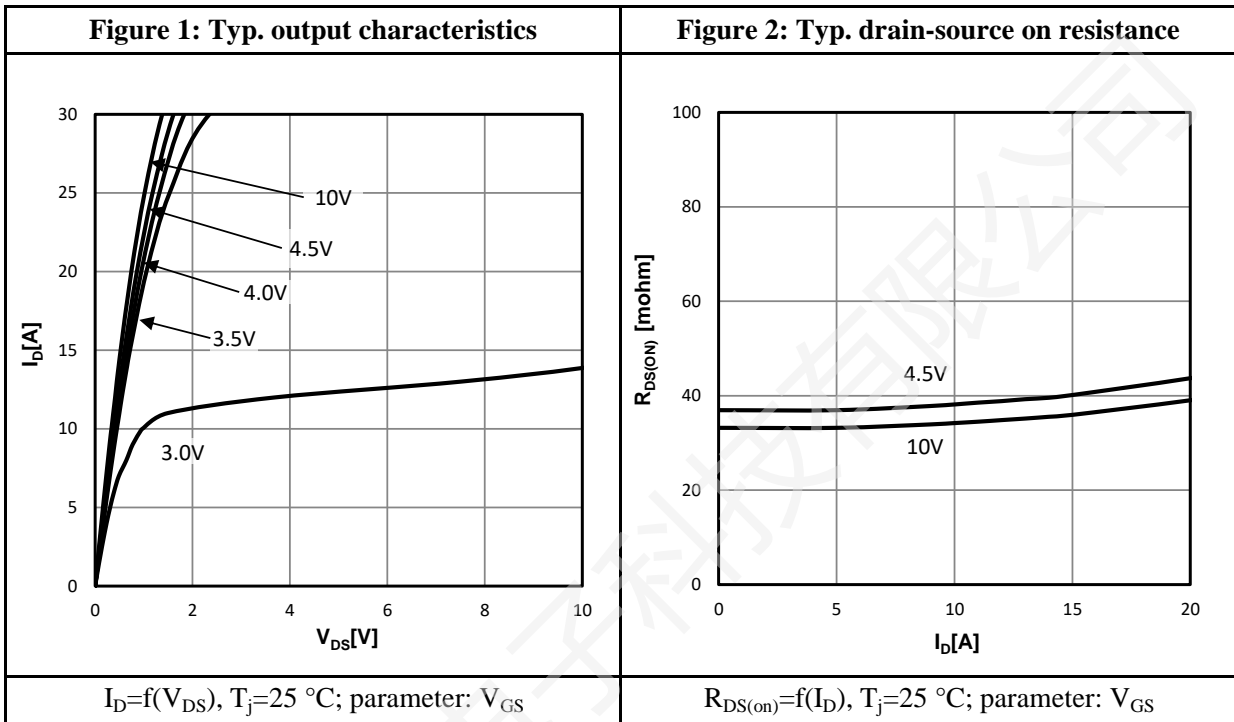
| Resistive Switching Characteristics | | | | | | |
|-------------------------------------|-----------------------|-----------------|-------|------|------|-------|
| Symbol | Parameter | Test Conditions | Value | | | Units |
| | | | Min. | Typ. | Max. | |
| $t_{d(ON)}$ | Turn-on Delay Time | $I_D=5.0A$ | -- | 8.0 | -- | ns |
| t_r | Rise Time | $V_{DS}=30V$ | -- | 3.6 | -- | |
| $t_{d(OFF)}$ | Turn-Off Delay Time | $V_{GS}=10V$ | -- | 19.2 | -- | |
| t_f | Fall Time | $R_G=3.0\Omega$ | -- | 3.2 | -- | |
| Q_g | Total Gate Charge | $V_{GS}=10V$ | -- | 23 | -- | nC |
| Q_{gs} | Gate to Source Charge | $V_{DS}=30V$ | -- | 2.7 | -- | |
| Q_{gd} | Gate to Drain Charge | $I_D=5.0A$ | -- | 5.0 | -- | |

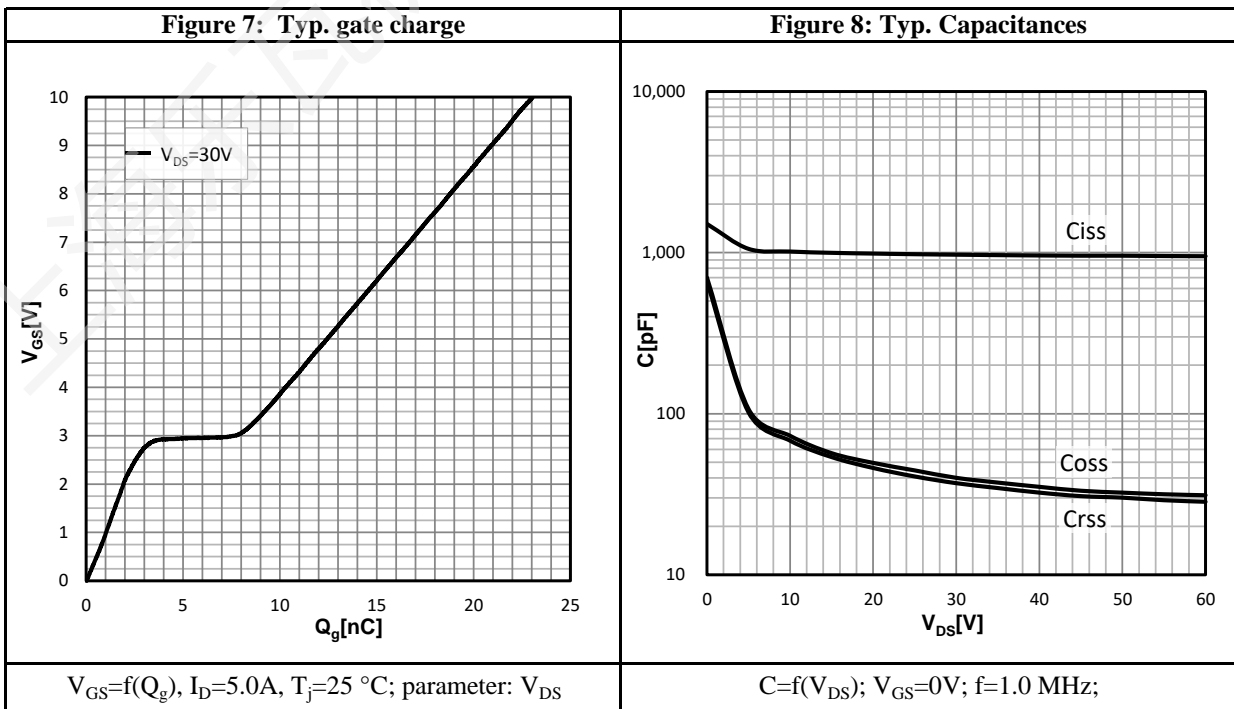
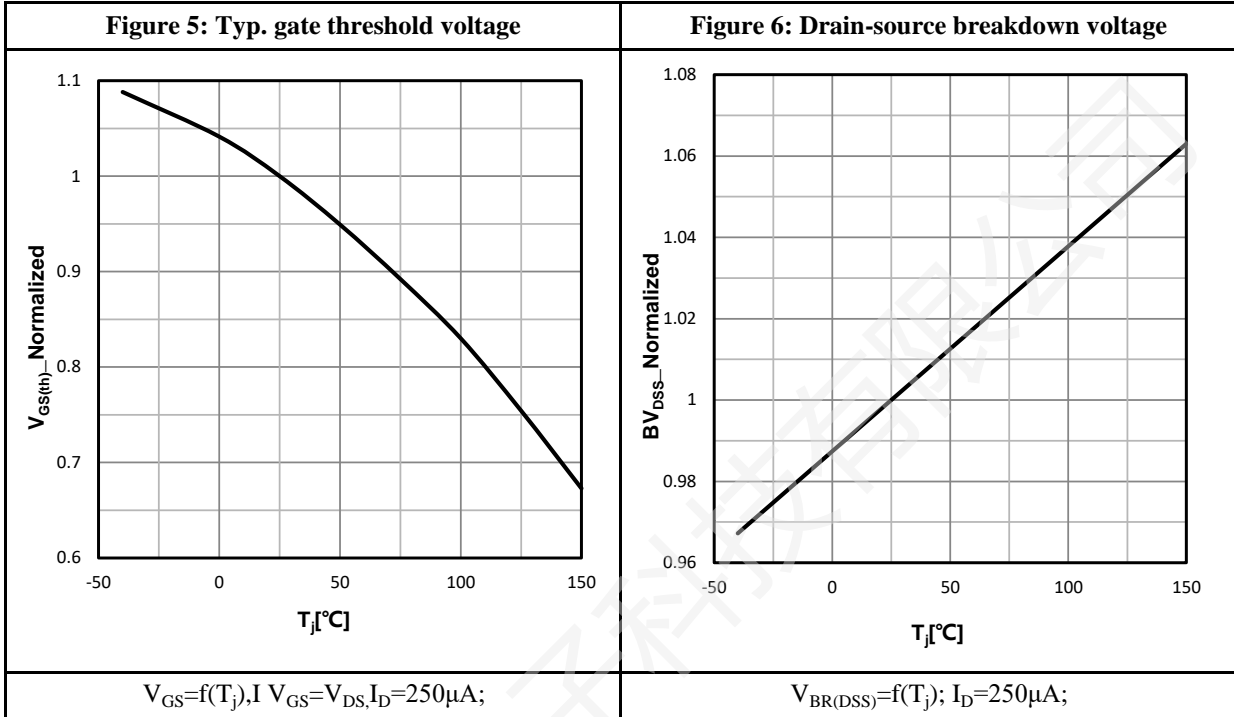
| Source-Drain Diode Characteristics | | | | | | |
|------------------------------------|-----------------------|--------------------------------|-------|------|------|-------|
| Symbol | Parameter | Test Conditions | Value | | | Units |
| | | | Min. | Typ. | Max. | |
| I_S | Diode Forward Current | $T_C=25\text{ }^\circ\text{C}$ | -- | -- | 16 | A |
| I_{SM} | Diode Pulse Current | | -- | -- | 64 | A |
| V_{SD} | Diode Forward Voltage | $I_S=8.0A, V_{GS}=0V$ | -- | -- | 1.2 | V |

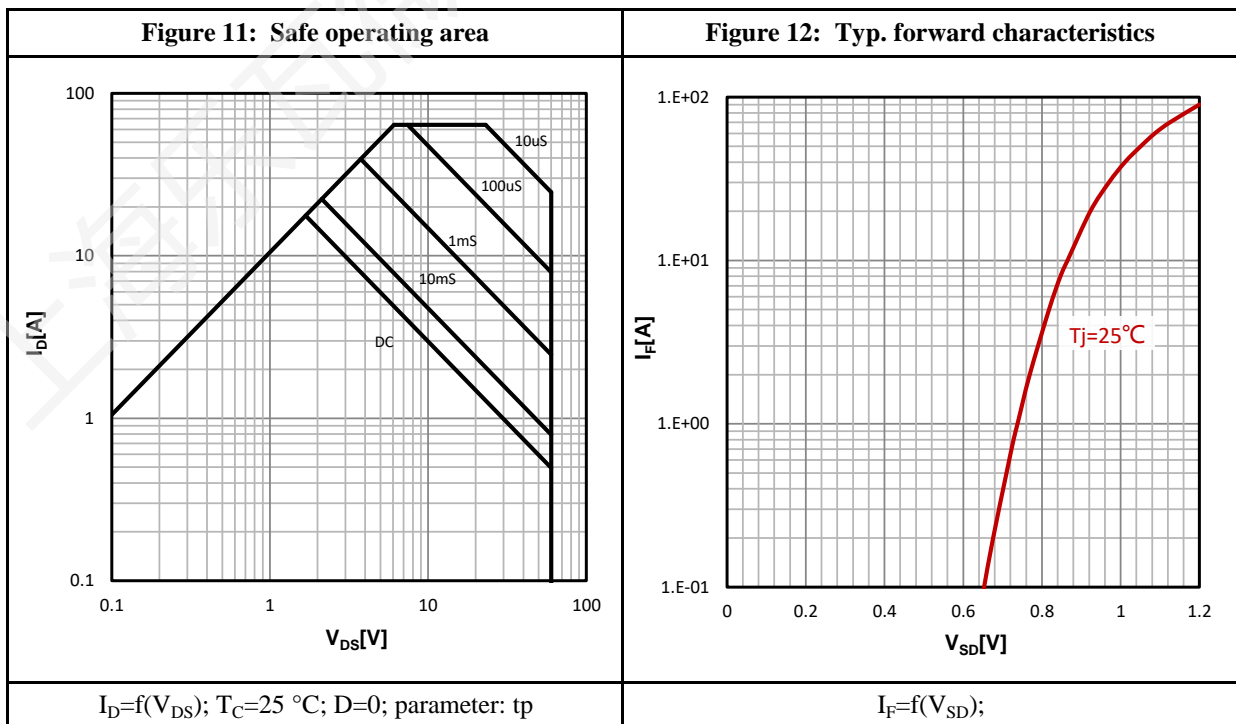
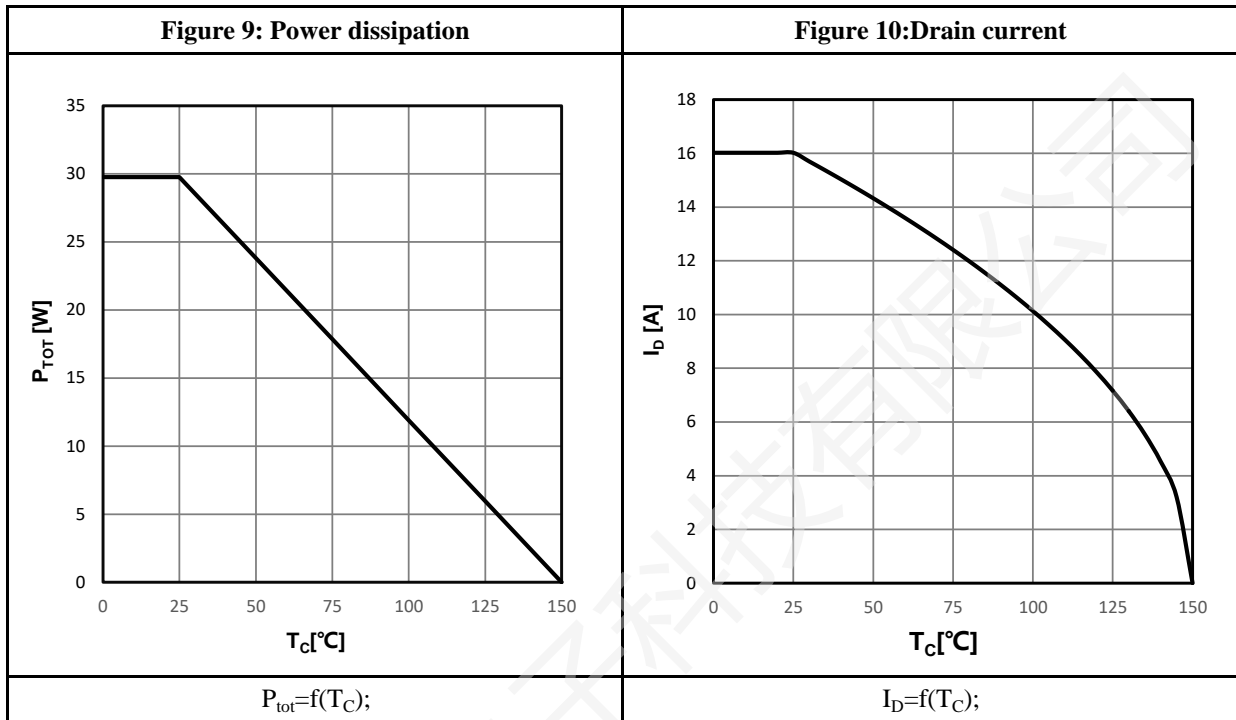
a1: Repetitive rating; pulse width limited by maximum junction temperature

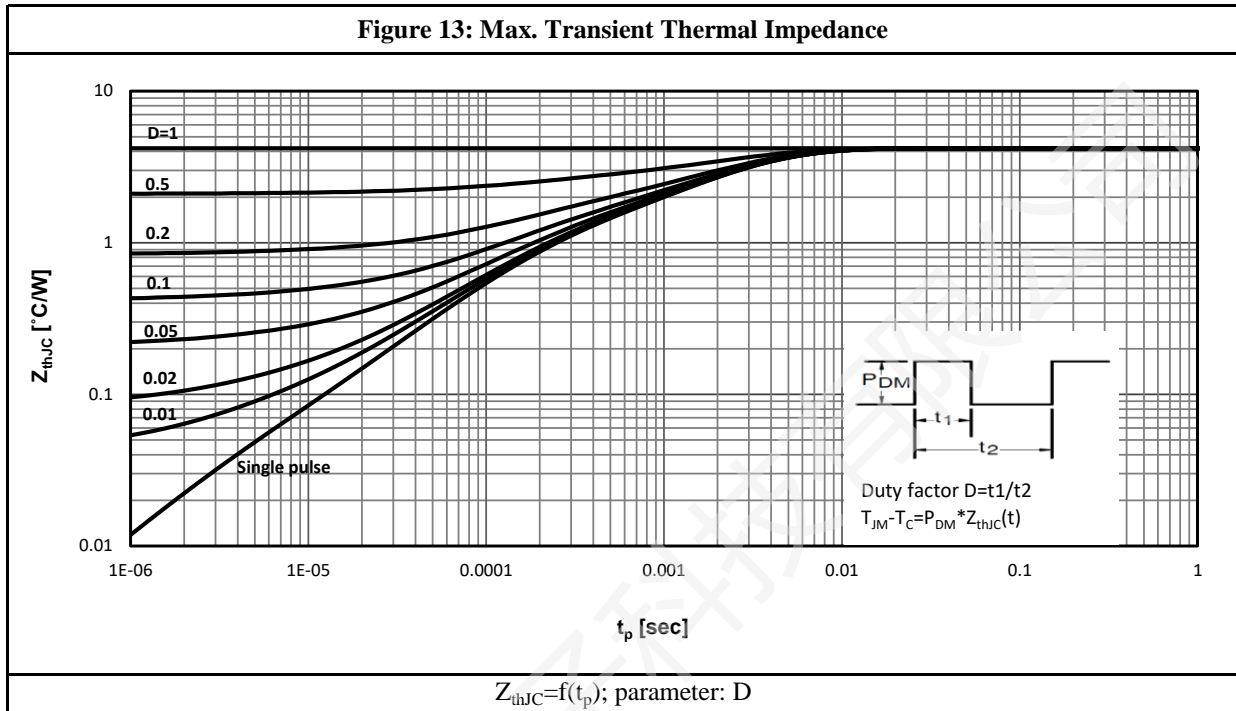
a2: $V_{DD}=30V, L=1mH, R_G=25\Omega$, Starting $T_j=25\text{ }^\circ\text{C}$

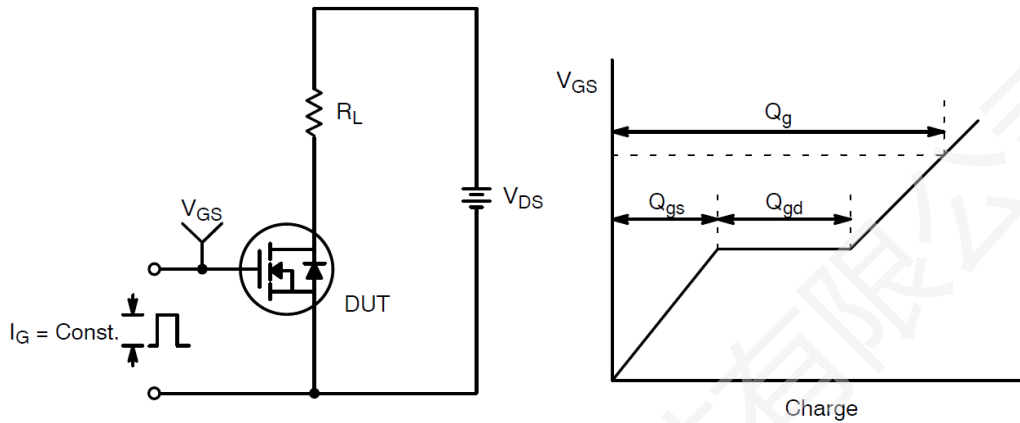
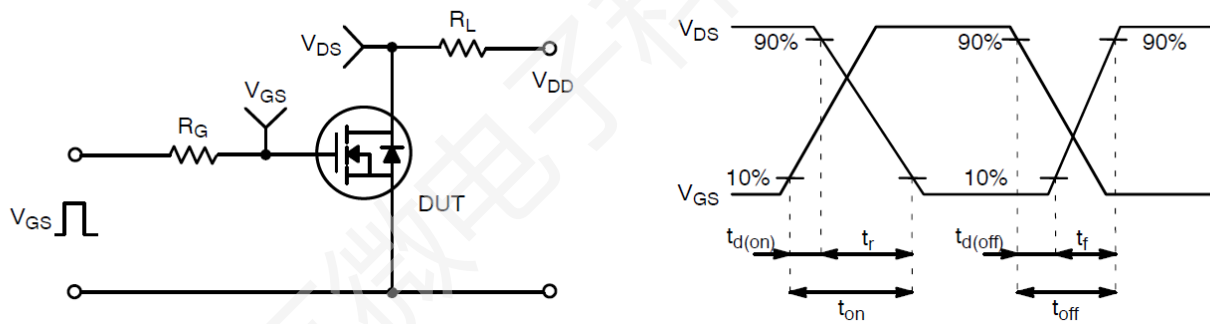
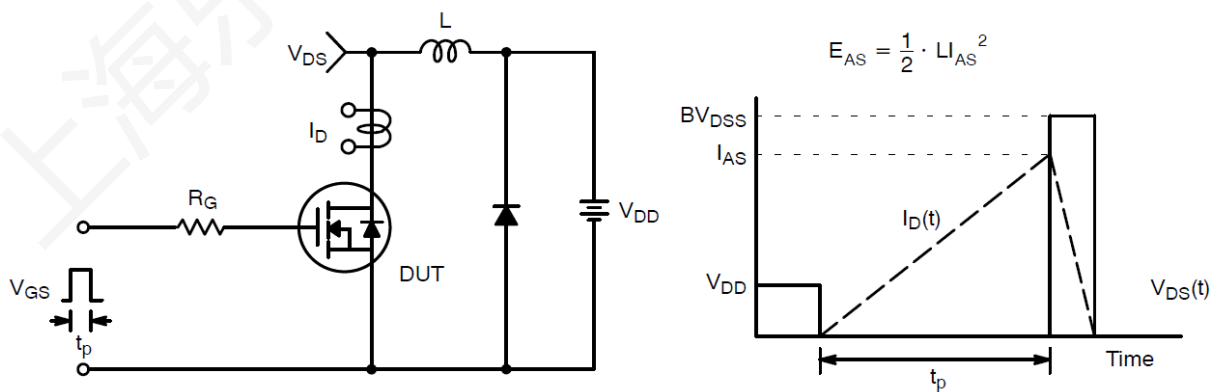
a3: Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm² (one layer, 70 μm thick) copper area for drain connection.

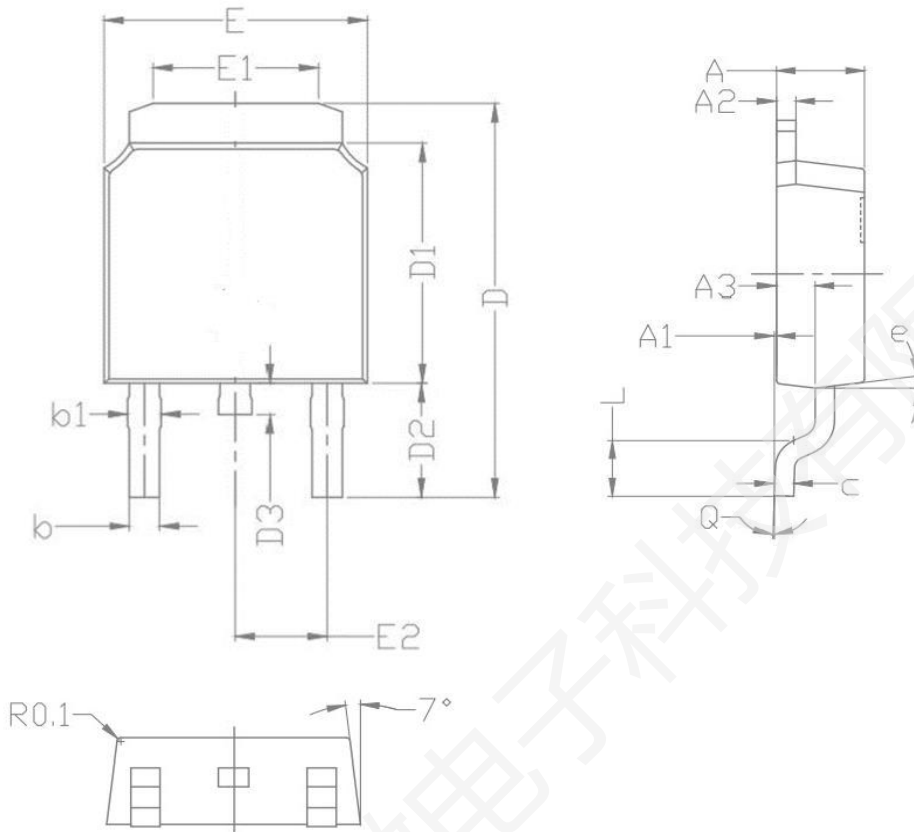
Characteristics Curve:








Test Circuit & Waveform:

Figure 14: Gate Charge Test Circuit & Waveform

Figure 15: Resistive Switching Test Circuit & Waveforms

Figure 16: Unclamped Inductive Switching Test Circuit & Waveforms

Package Outline:


| COMMON | | | |
|--------|--------|--------|--------|
| PKG | TO-252 | | |
| Symbol | Min | Nom | Max |
| A | 2.200 | 2.300 | 2.400 |
| A1 | 0.000 | 0.075 | 0.150 |
| A2 | 0.460 | 0.525 | 0.590 |
| A3 | 0.960 | 1.010 | 1.060 |
| b | 0.640 | 0.720 | 0.800 |
| C | 0.450 | 0.515 | 0.580 |
| D | 9.800 | 10.025 | 10.350 |
| D1 | 6.000 | 6.100 | 6.200 |
| D2 | 2.850 | 2.900 | 3.100 |
| D3 | 0.490 | 0.800 | 1.000 |
| E | 6.400 | 6.550 | 6.700 |
| E1 | 4.050 | 4.130 | 4.600 |
| E2 | 2.250 | 2.286 | 2.300 |
| L | 1.400 | 1.550 | 1.700 |
| e | 7° | 8° | 9° |
| Q | 0° | 5° | 10° |

Revision History:

| Revison | Date | Descriptions |
|----------------|-------------|---------------------|
| Rev 1.1 | July.2025 | Initial Version |

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