

## General Description:

The LWP3009C4 uses advanced 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:

- Battery switching application
- Hard switched and high frequency circuits
- Power Management

**100% DVDS Tested**

**100% Avalanche Tested**



## Package Marking and Ordering Information:

| Marking          | Part Number | Package | Packing | Qty.     |
|------------------|-------------|---------|---------|----------|
| P3009/LW C4/D.C. | LWP3009C4   | TO-252  | Reel    | 2500 Pcs |

## Absolute Maximum Ratings:

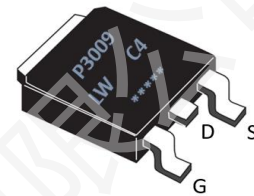
| Symbol         | Parameter                                        |                    | Value           | Units       |
|----------------|--------------------------------------------------|--------------------|-----------------|-------------|
| $V_{DSS}$      | Drain-to-Source Voltage                          |                    | -30             | V           |
| $I_D$          | Continuous Drain Current                         | $T_C=25^{\circ}C$  | -60             | A           |
|                | Continuous Drain Current                         | $T_C=100^{\circ}C$ | -38             | A           |
| $I_{DM}^{a1}$  | Pulsed Drain Current                             |                    | -240            | A           |
| $E_{AS}^{a2}$  | Single pulse avalanche energy                    |                    | 175             | mJ          |
| $V_{GS}$       | Gate-to-Source Voltage                           |                    | $\pm 20$        | V           |
| $P_D$          | Power Dissipation                                |                    | 59.5            | W           |
| $T_J, T_{STG}$ | Operating Junction and Storage Temperature Range |                    | 150, -55 to 150 | $^{\circ}C$ |
| $T_L$          | Maximum Temperature for Soldering                |                    | 260             | $^{\circ}C$ |

## Thermal Characteristics:

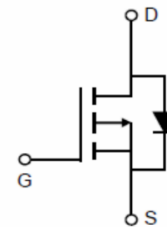
| Symbol               | Parameter                               | Value | Units         |
|----------------------|-----------------------------------------|-------|---------------|
| $R_{\theta JC}$      | Thermal Resistance, Junction-to-Case    | 2.1   | $^{\circ}C/W$ |
| $R_{\theta JA}^{a3}$ | Thermal Resistance, Junction-to-Ambient | 62.5  | $^{\circ}C/W$ |

|                           |      |            |
|---------------------------|------|------------|
| $V_{DSS}$                 | -30  | V          |
| $I_D$                     | -60  | A          |
| $P_D$                     | 59.5 | W          |
| $R_{DS(ON) \text{ TYPE}}$ | 6.0  | 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 | $V_{GS}=0V, I_D=-250\mu A$     | -30   | --   | --   | V         |
| $I_{DSS}$              | Drain to Source Leakage Current   | $V_{DS}=-30V, V_{GS}=0V$       | --    | --   | -1.0 | $\mu A$   |
| $I_{GSS(F)}$           | 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     | $V_{GS}=-10V, I_D=-15A$        | --    | 6.0  | 8.0  | $m\Omega$ |
| $R_{DS(ON)2}$          | Drain-to-Source On-Resistance     | $V_{GS}=-4.5V, I_D=-10A$       | --    | 8.5  | 10.5 | $m\Omega$ |

| Dynamic Characteristics |                              |                                |       |      |      |          |
|-------------------------|------------------------------|--------------------------------|-------|------|------|----------|
| Symbol                  | Parameter                    | Test Conditions                | Value |      |      | Units    |
|                         |                              |                                | Min.  | Typ. | Max. |          |
| $C_{iss}$               | Input Capacitance            | $V_{GS}=0V$                    | --    | 2860 | --   | pF       |
| $C_{oss}$               | Output Capacitance           | $V_{DS}=-15V$                  | --    | 416  | --   |          |
| $C_{rss}$               | Reverse Transfer Capacitance | $f=1.0MHz$                     | --    | 385  | --   |          |
| $R_G$                   | Gate resistance              | $V_{GS}=0V, V_{DS}=0V, f=1MHz$ | --    | 9.6  | --   | $\Omega$ |

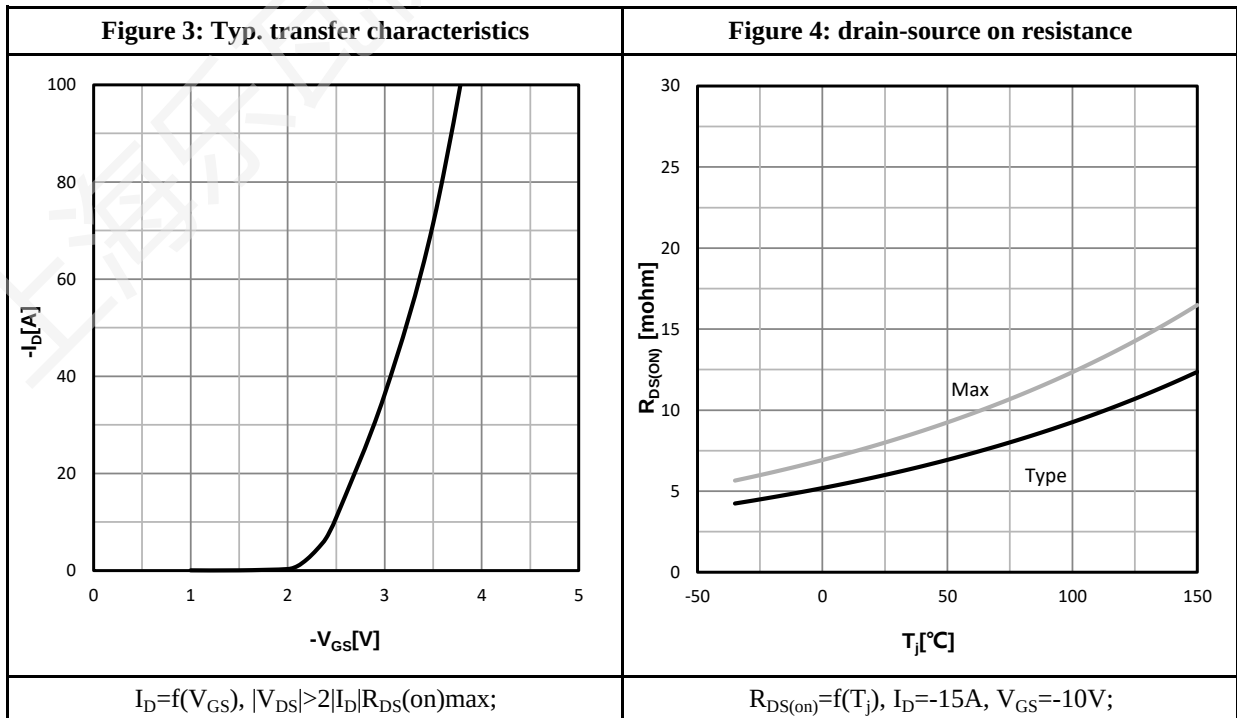
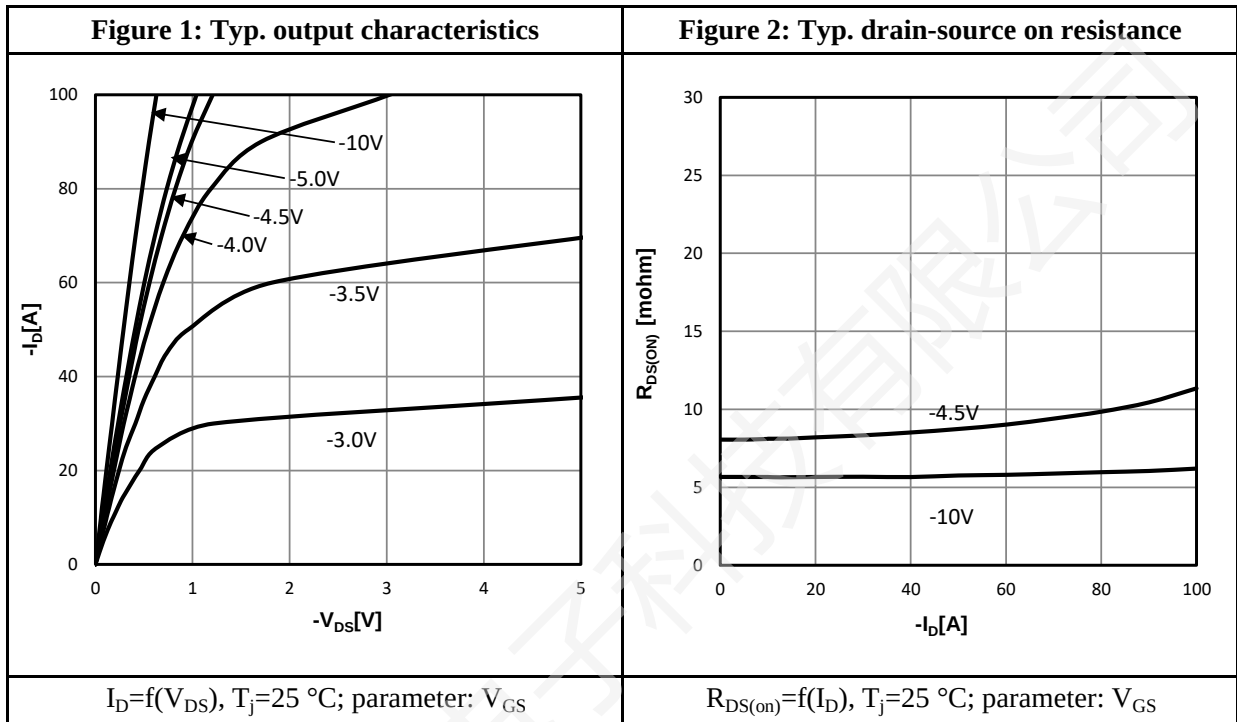
| Resistive Switching Characteristics |                       |                 |       |      |      |       |
|-------------------------------------|-----------------------|-----------------|-------|------|------|-------|
| Symbol                              | Parameter             | Test Conditions | Value |      |      | Units |
|                                     |                       |                 | Min.  | Typ. | Max. |       |
| $t_{d(ON)}$                         | Turn-on Delay Time    | $I_D=-15A$      | --    | 12.7 | --   | ns    |
| $t_r$                               | Rise Time             | $V_{DS}=-15V$   | --    | 5.8  | --   |       |
| $t_{d(OFF)}$                        | Turn-Off Delay Time   | $V_{GS}=-10V$   | --    | 57   | --   |       |
| $t_f$                               | Fall Time             | $R_G=3.0\Omega$ | --    | 116  | --   |       |
| $Q_g$                               | Total Gate Charge     | $V_{GS}=-10V$   | --    | 60   | --   | nC    |
| $Q_{gs}$                            | Gate to Source Charge | $V_{DS}=-15V$   | --    | 8.2  | --   |       |
| $Q_{gd}$                            | Gate to Drain Charge  | $I_D=-5.0A$     | --    | 11   | --   |       |

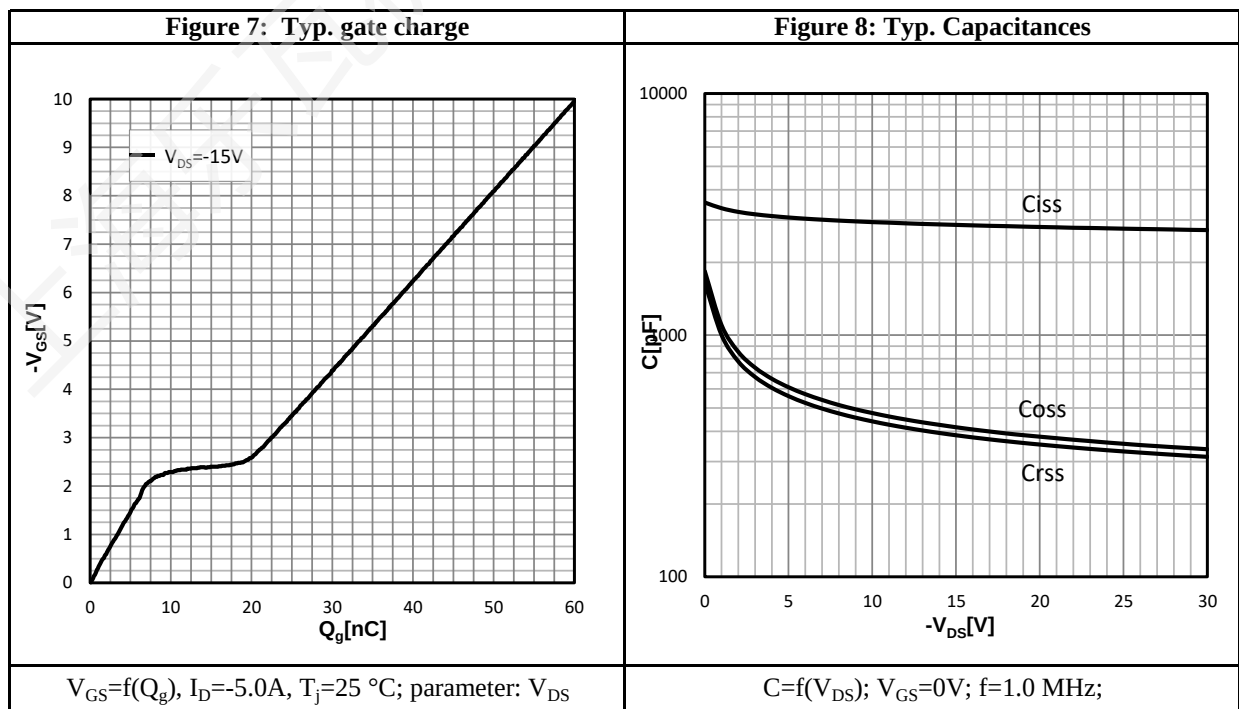
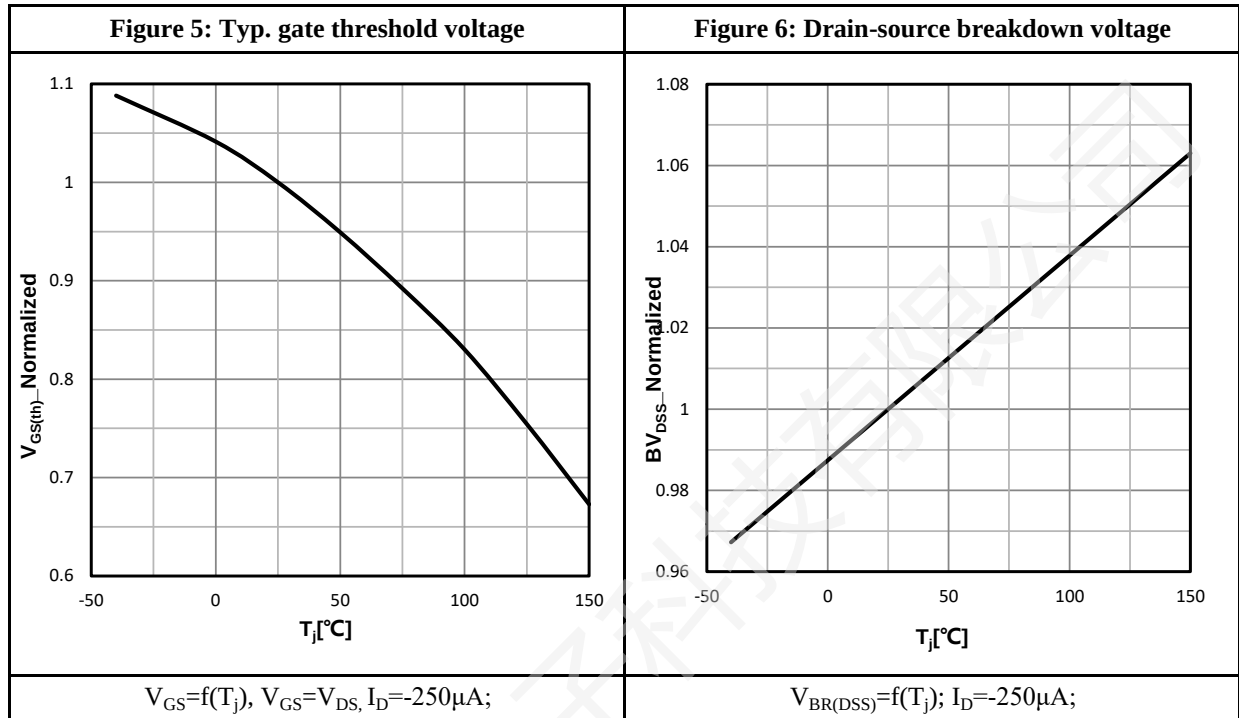
| Source-Drain Diode Characteristics |                       |                                  |       |      |      |       |
|------------------------------------|-----------------------|----------------------------------|-------|------|------|-------|
| Symbol                             | Parameter             | Test Conditions                  | Value |      |      | Units |
|                                    |                       |                                  | Min.  | Typ. | Max. |       |
| $I_S$                              | Diode Forward Current | $T_C=25\text{ }^{\circ}\text{C}$ | --    | --   | -60  | A     |
| $V_{SD}$                           | Diode Forward Voltage | $I_S=-15A, V_{GS}=0V$            | --    | --   | -1.2 | V     |

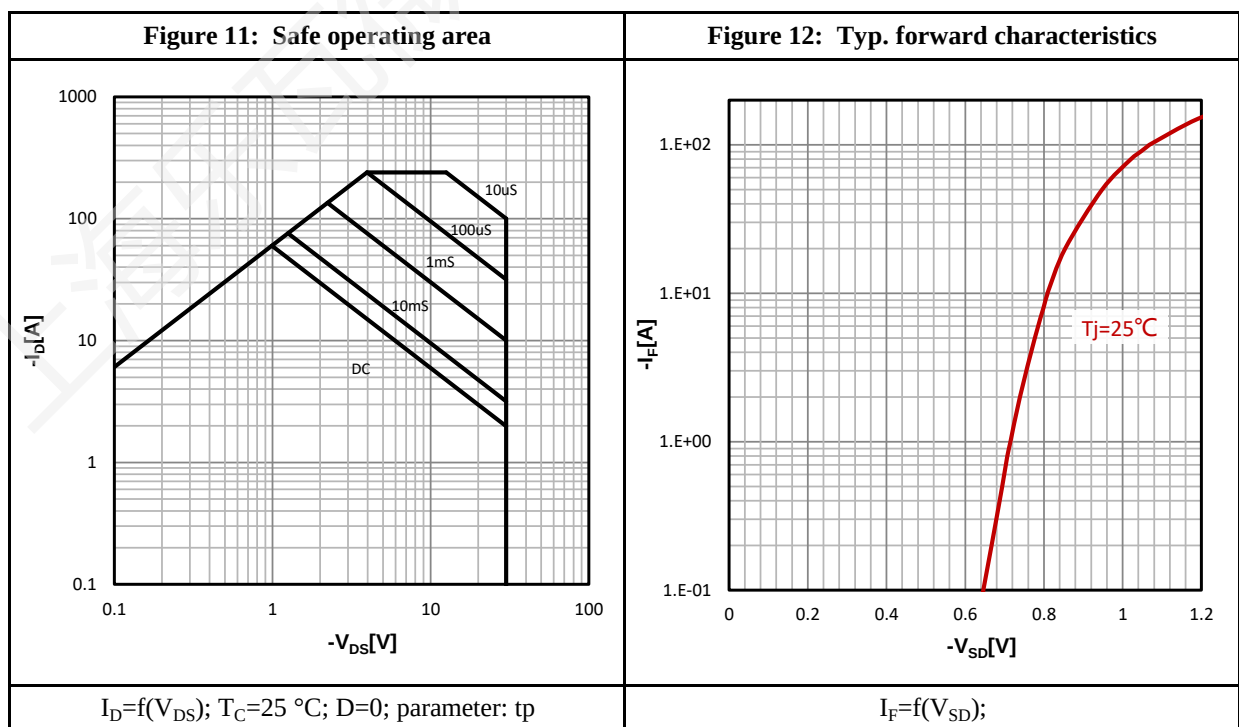
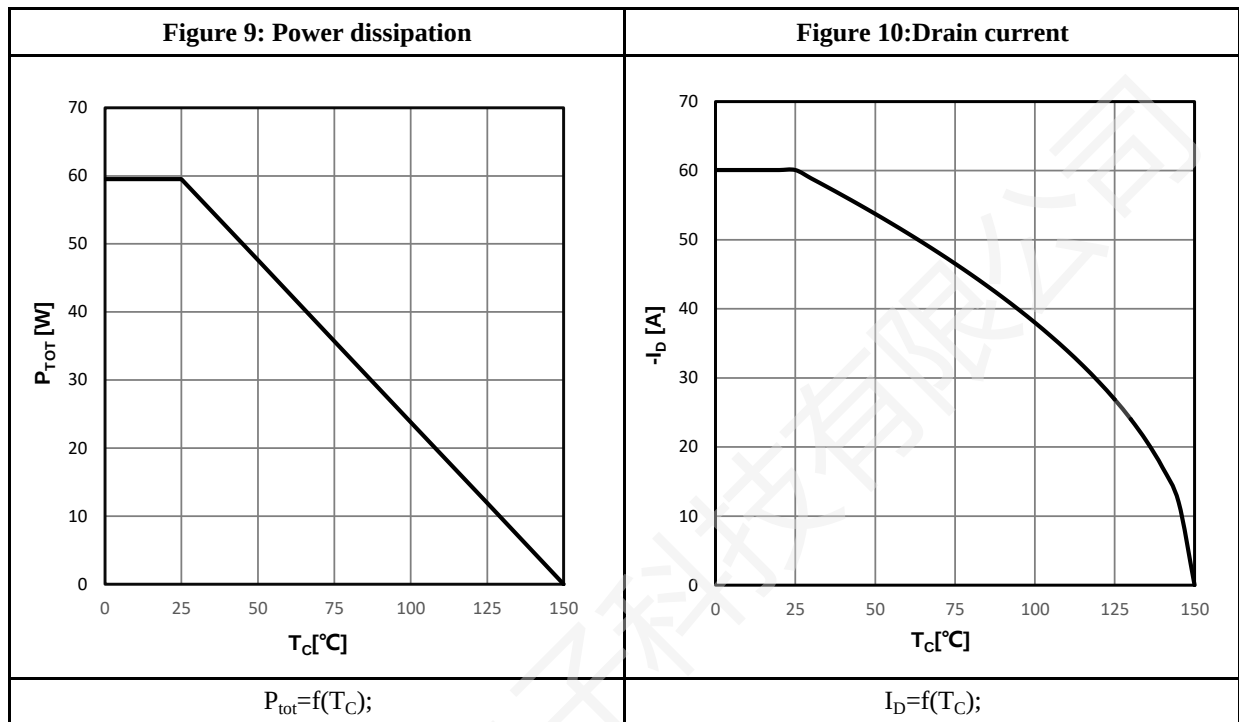
a1: Repetitive rating; pulse width limited by maximum junction temperature

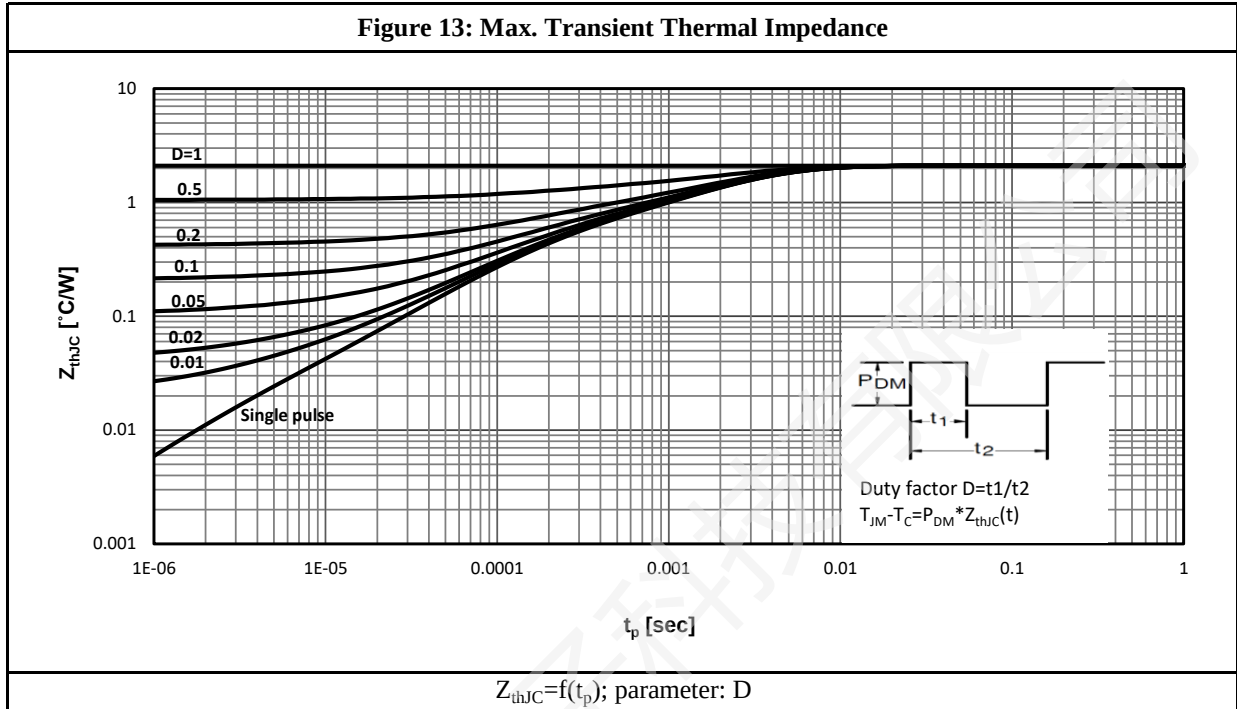
a2:  $V_{DD}=-15V, L=0.5mH, R_G=25\Omega$ , Starting  $T_J=25\text{ }^{\circ}\text{C}$

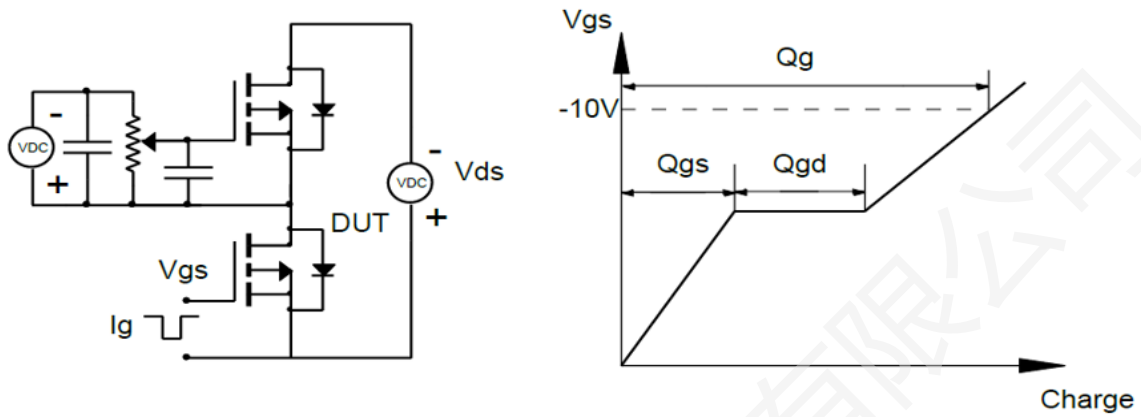
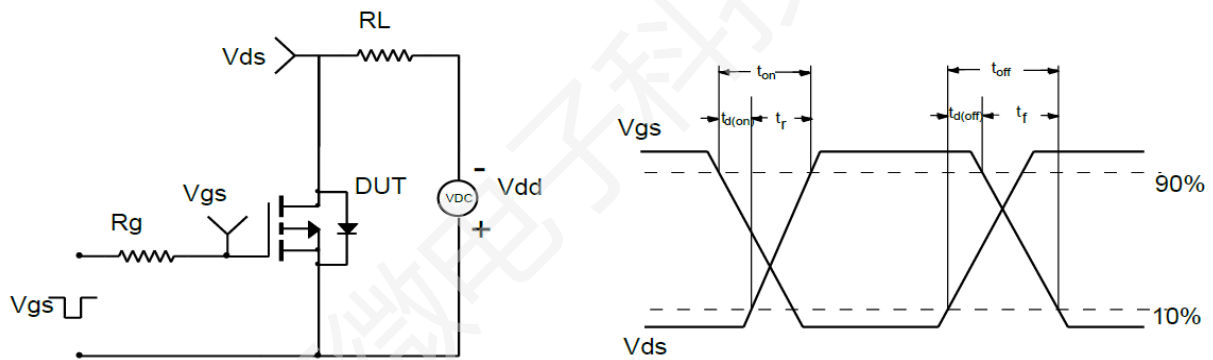
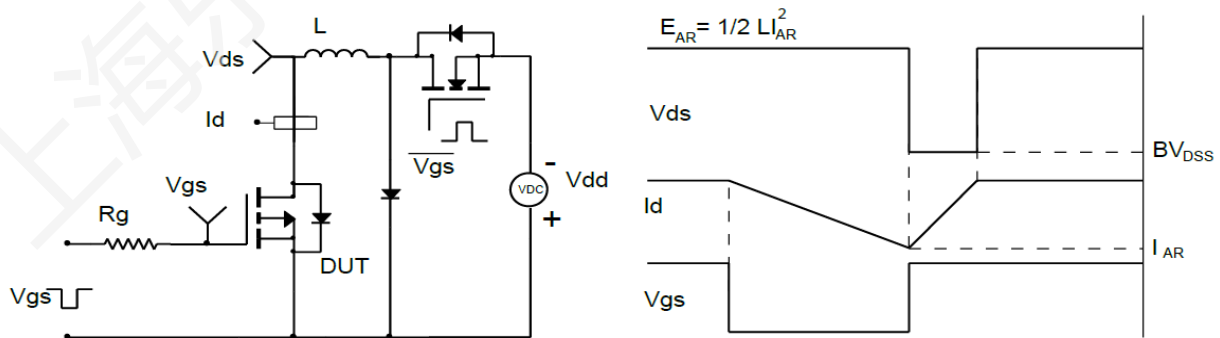
a3: Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm<sup>2</sup> (one layer, 70  $\mu m$  thick) copper area for drain connection.

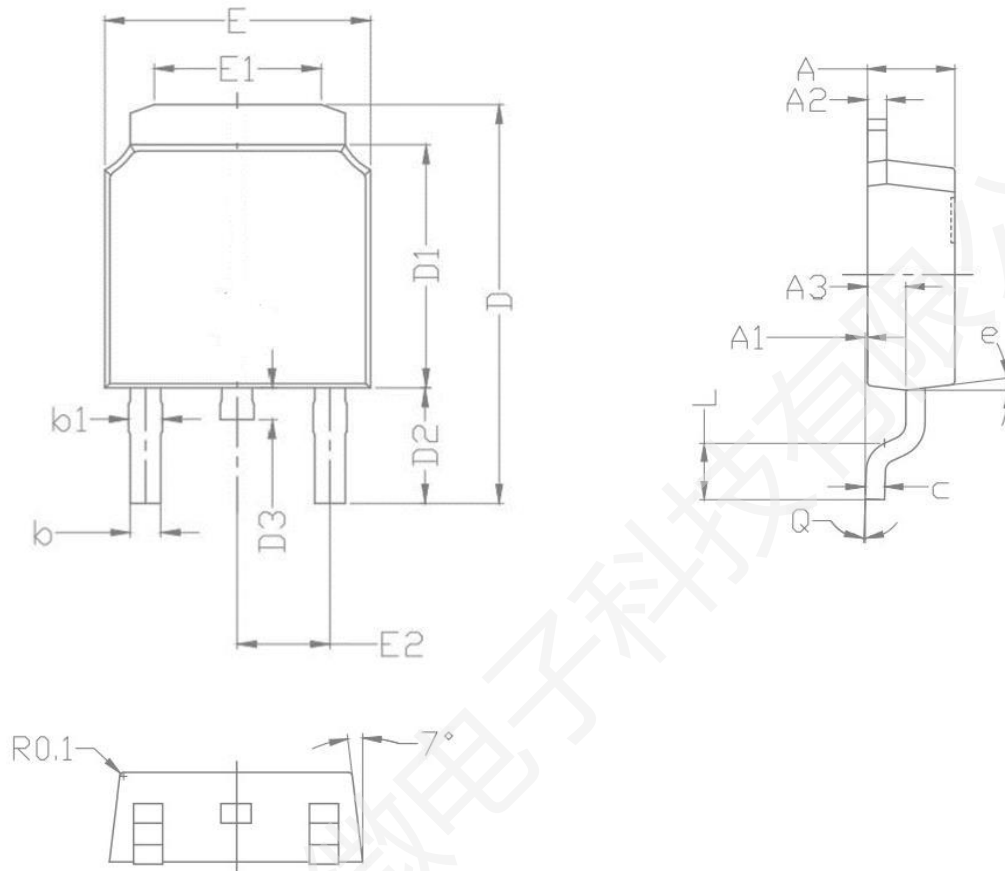
**Characteristics Curve:**






**Figure 13: Max. Transient Thermal Impedance**


**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 1.0 | July.2025 | Initial Version |

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