

## General Description:

The LWP2025AD3D 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 PDFN3.3\*3.3-8L, 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:

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

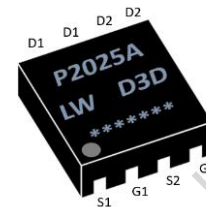
**100% DVDS Tested**

**100% Avalanche Tested**

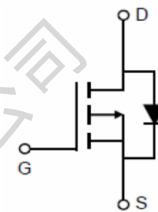


|                   |     |            |
|-------------------|-----|------------|
| $V_{DSS}$         | -20 | V          |
| $I_D$             | -21 | A          |
| $P_D$             | 22  | W          |
| $R_{DS(ON)}$ TYPE | 20  | m $\Omega$ |

## Marking and Pin Assignment



## Inner Equivalent Principium Chart



## Package Marking and Ordering Information:

| Marking            | Part Number | Package        | Packing | Qty.     |
|--------------------|-------------|----------------|---------|----------|
| P2025A/LW D3D/D.C. | LWP2025AD3D | PDFN3.3*3.3-8L | Reel    | 5000 Pcs |

## Absolute Maximum Ratings:

| Symbol         | Parameter  | Value                   | Units            |
|----------------|--|-------------------------|------------------|
| $V_{DSS}$      | Drain-to-Source Voltage                          | -20                     | V                |
| $I_D$          | Continuous Drain Current                         | $T_C=25^\circ\text{C}$  | -21              |
|                | Continuous Drain Current                         | $T_C=100^\circ\text{C}$ | -13              |
| $I_{DM}^{a1}$  | Pulsed Drain Current                             | -62                     | A                |
| $E_{AS}^{a2}$  | Single pulse avalanche energy                    | 72                      | mJ               |
| $V_{GS}$       | Gate-to-Source Voltage                           | $\pm 12$                | V                |
| $P_D$          | Power Dissipation                                | 22                      | 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 | 5.6   | $^\circ\text{C}/\text{W}$ |

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

| Static Characteristics |                                   |                                |       |      |      |            |
|------------------------|-----------------------------------|--------------------------------|-------|------|------|------------|
| Symbol                 | Parameter                         | Test Conditions                | Value |      |      | Units      |
|                        |                                   |                                | Min.  | Typ. | Max. |            |
| $V_{DSS}$              | Drain to Source Breakdown Voltage | $V_{GS}=0V, I_D=-250\mu A$     | -20   | --   | --   | V          |
| $I_{DSS}$              | Drain to Source Leakage Current   | $V_{DS}=-20V, V_{GS}=0V$       | --    | --   | 1.0  | $\mu A$    |
| $I_{GSS(F)}$           | Gate to Source Forward Leakage    | $V_{GS}=-10V, V_{DS}=0V$       | --    | --   | 100  | nA         |
| $I_{GSS(R)}$           | Gate to Source Reverse Leakage    | $V_{GS}=+10V, V_{DS}=0V$       | --    | --   | -100 | nA         |
| $V_{GS(TH)}$           | Gate Threshold Voltage            | $V_{DS}=V_{GS}, I_D=-250\mu A$ | -0.4  | -0.6 | -1.0 | V          |
| $R_{DS(ON)1}$          | Drain-to-Source On-Resistance     | $V_{GS}=-4.5V, I_D=-5.0A$      | --    | 20   | 25   | m $\Omega$ |
| $R_{DS(ON)2}$          | Drain-to-Source On-Resistance     | $V_{GS}=-2.5V, I_D=-5.0A$      | --    | 25   | 40   | m $\Omega$ |

| Dynamic Characteristics |                              |                 |       |      |      |       |
|-------------------------|------------------------------|-----------------|-------|------|------|-------|
| Symbol                  | Parameter                    | Test Conditions | Value |      |      | Units |
|                         |                              |                 | Min.  | Typ. | Max. |       |
| $C_{iss}$               | Input Capacitance            | $V_{GS} = 0V$   | --    | 1012 | --   | pF    |
| $C_{oss}$               | Output Capacitance           | $V_{DS} = -10V$ | --    | 165  | --   |       |
| $C_{rss}$               | Reverse Transfer Capacitance | $f = 1.0MHz$    | --    | 159  | --   |       |

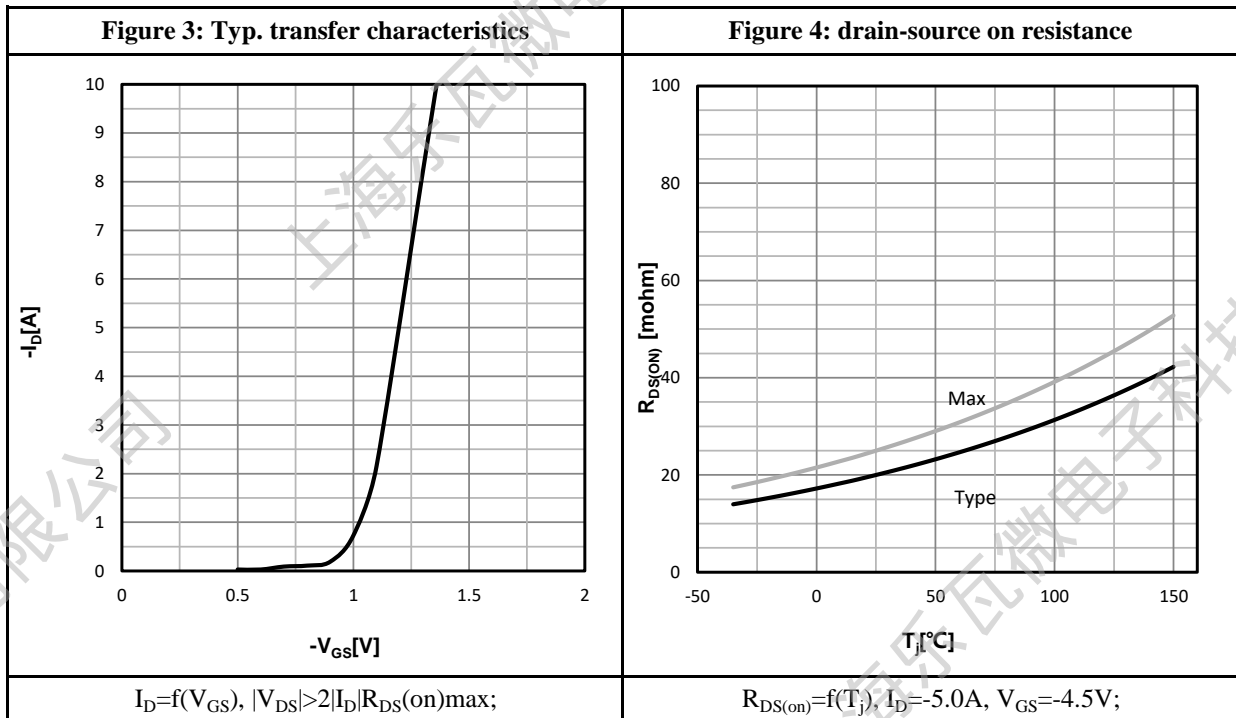
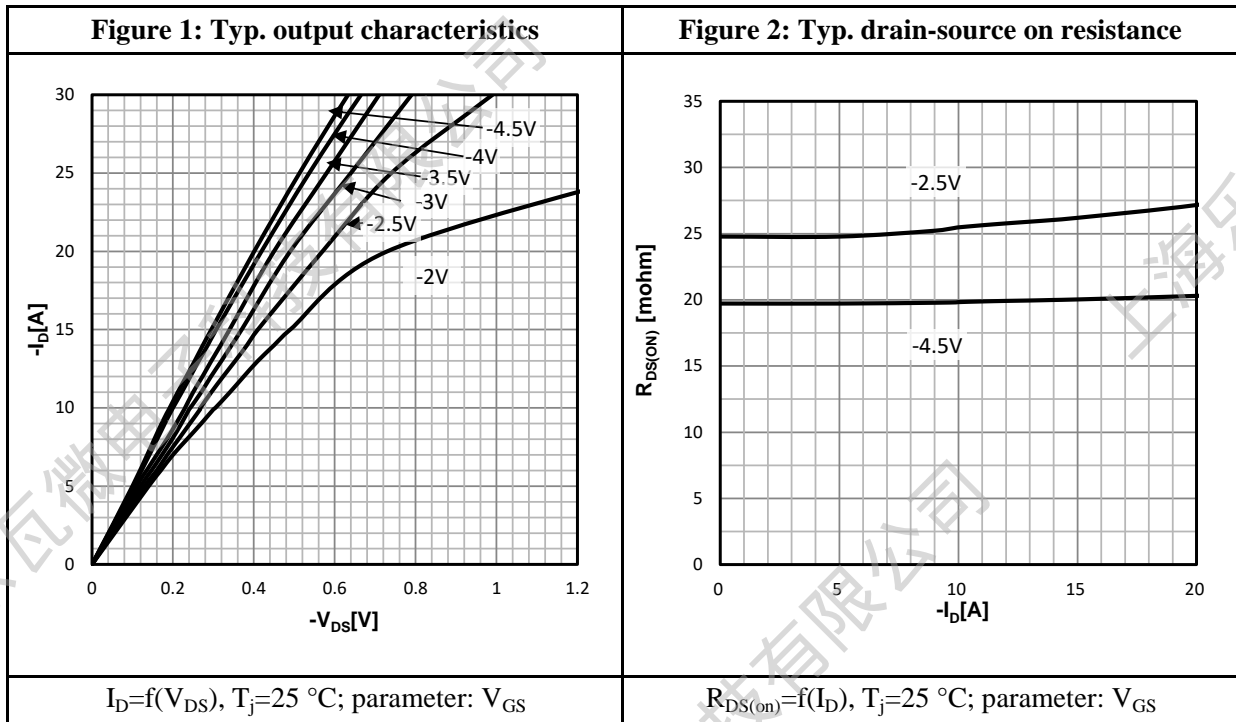
| Resistive Switching Characteristics |                     |                   |       |      |      |       |
|-------------------------------------|---------------------|-------------------|-------|------|------|-------|
| Symbol                              | Parameter           | Test Conditions   | Value |      |      | Units |
|                                     |                     |                   | Min.  | Typ. | Max. |       |
| $t_{d(ON)}$                         | Turn-on Delay Time  | $I_D = -5.0A$     | --    | 25   | --   | ns    |
| $t_r$                               | Rise Time           | $V_{DS} = -10V$   | --    | 30   | --   |       |
| $t_{d(OFF)}$                        | Turn-Off Delay Time | $V_{GS} = -4.5V$  | --    | 60   | --   |       |
| $t_f$                               | Fall Time           | $R_G = 3.0\Omega$ | --    | 45   | --   |       |
| $Q_g$                               | Total Gate Charge   | $V_{GS} = -10V$   | --    | 29   | --   | nC    |
| $Q_{gs}$                            | Gate Source Charge  | $V_{DS} = -10V$   | --    | 1.7  | --   |       |
| $Q_{gd}$                            | Gate Drain Charge   | $I_D = -5.0A$     | --    | 3.3  | --   |       |

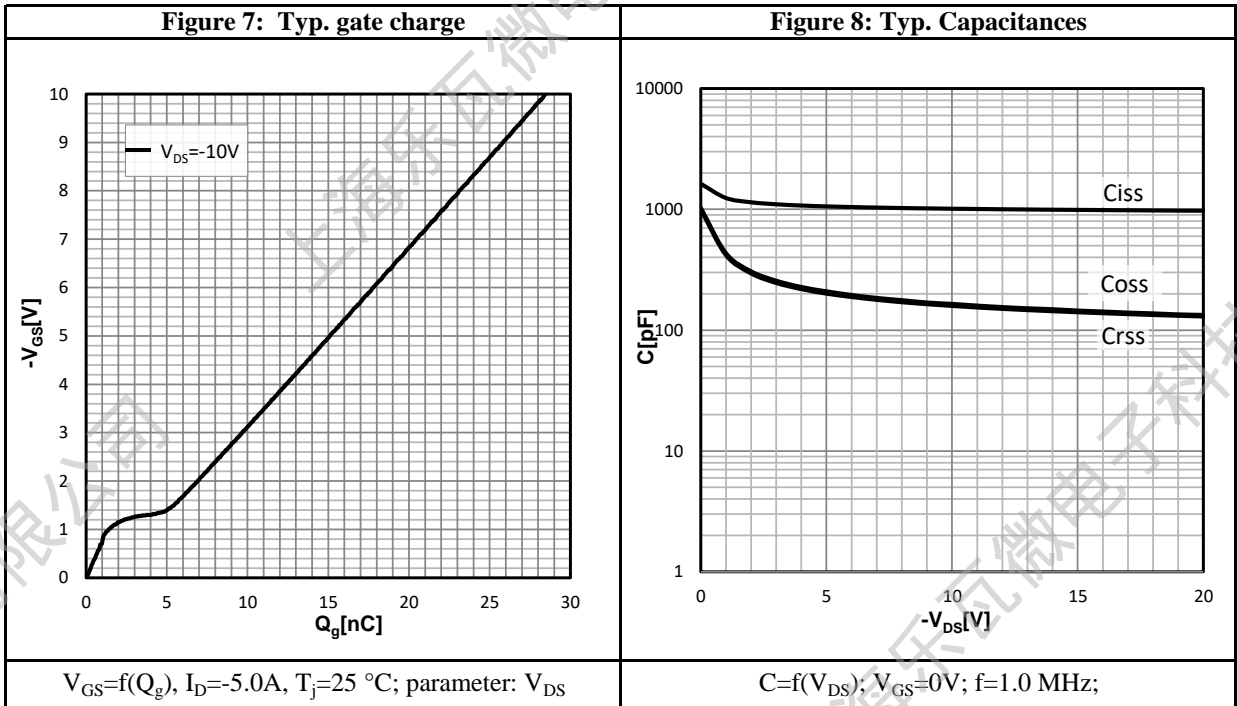
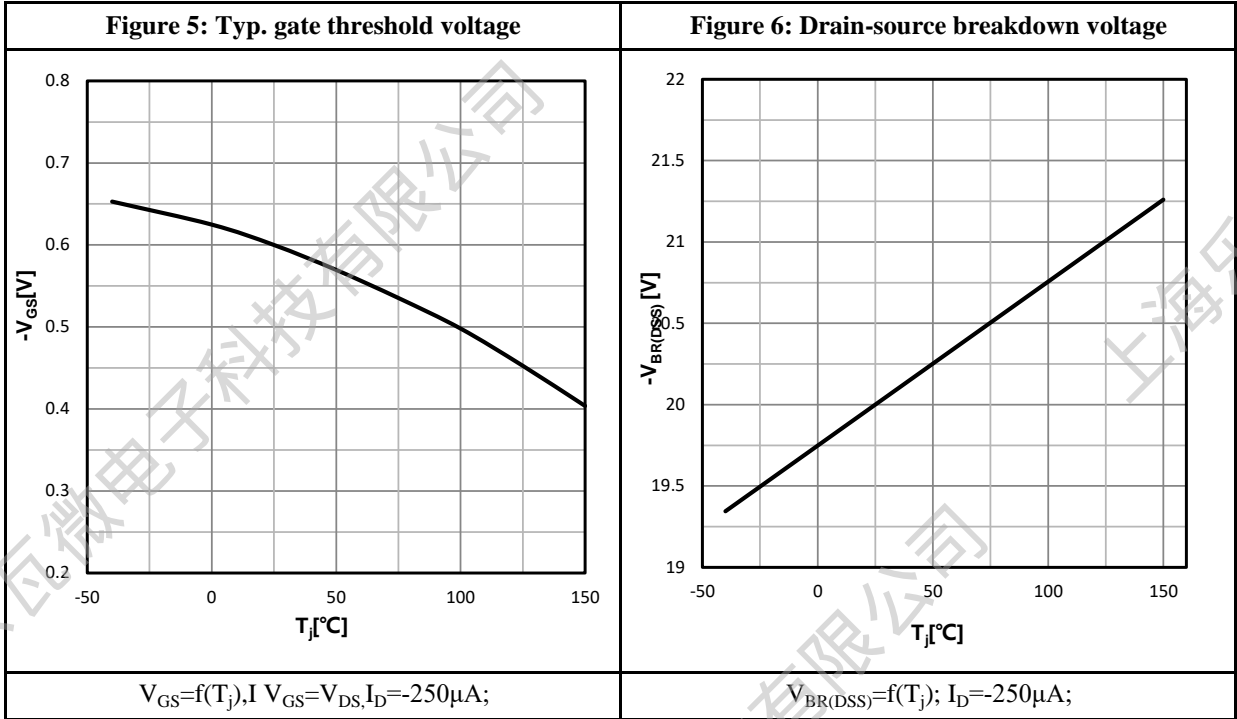
| Source-Drain Diode Characteristics |                       |                                  |       |      |      |       |
|------------------------------------|-----------------------|----------------------------------|-------|------|------|-------|
| Symbol                             | Parameter             | Test Conditions                  | Value |      |      | Units |
|                                    |                       |                                  | Min.  | Typ. | Max. |       |
| $I_S$                              | Diode Forward Current | $T_A = 25\text{ }^\circ\text{C}$ | --    | --   | -21  | A     |
| $V_{SD}$                           | Diode Forward Voltage | $I_S = -5.0A, V_{GS} = 0V$       | --    | --   | -1.2 | V     |

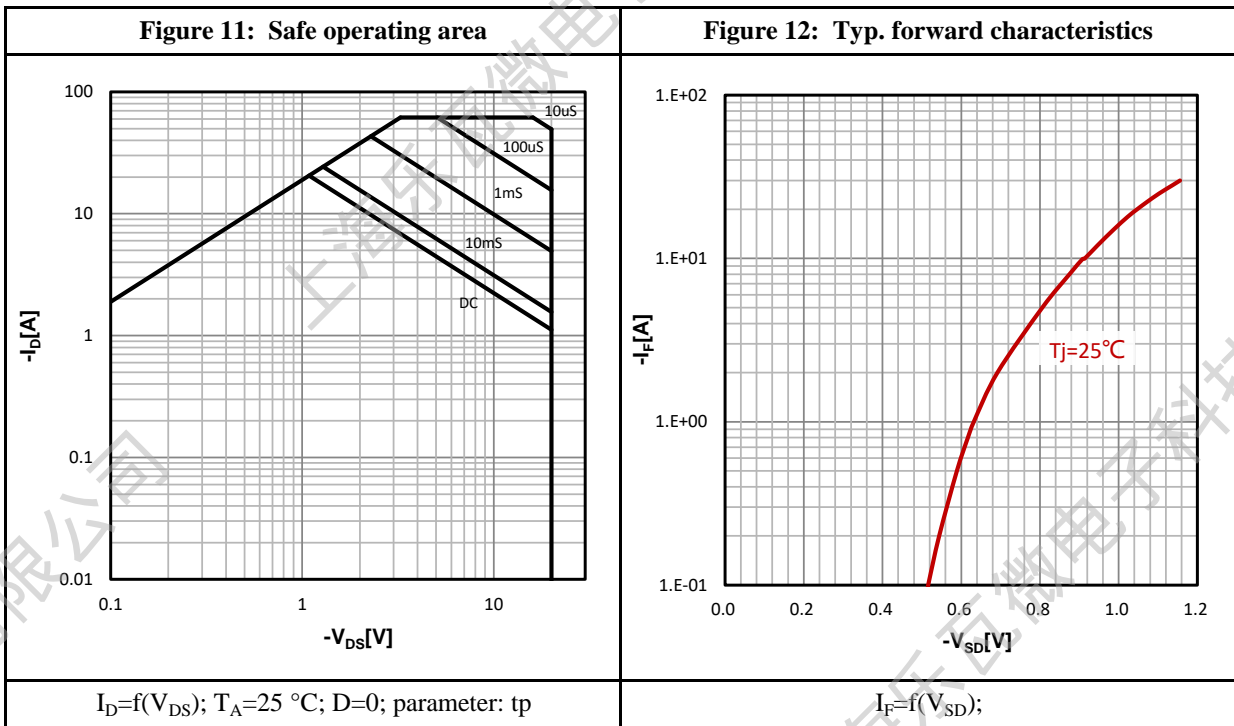
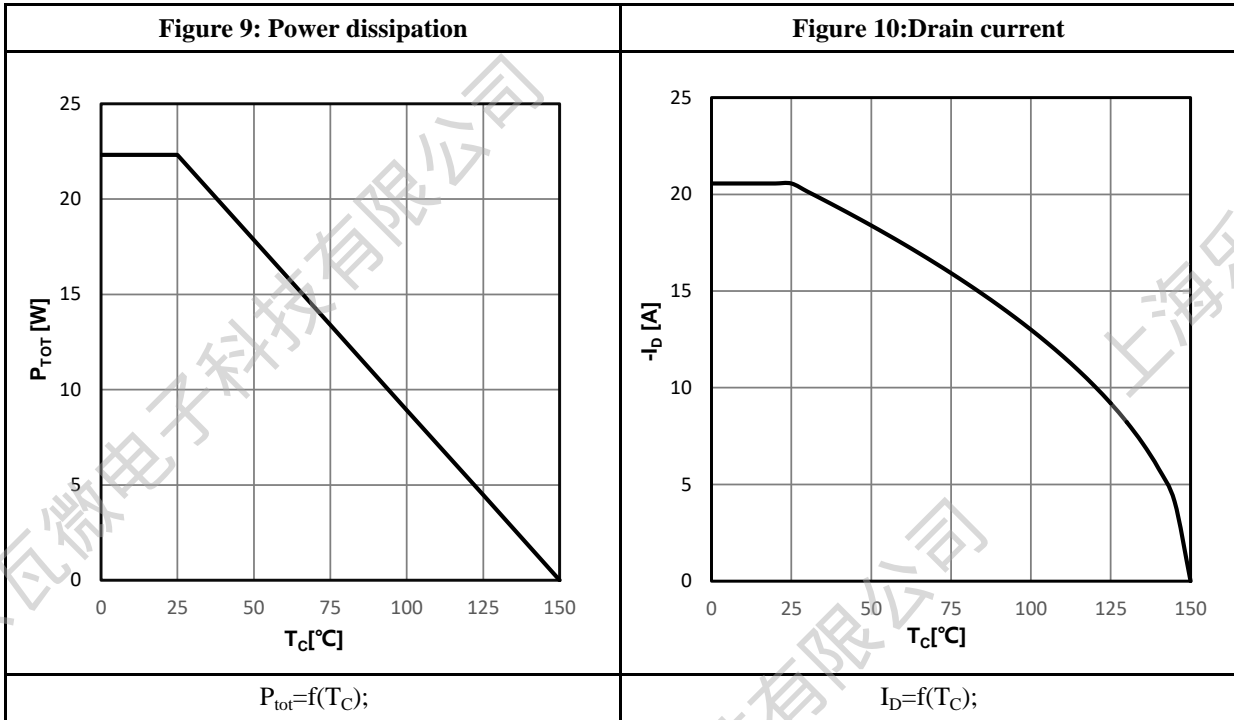
a1: Repetitive rating; pulse width limited by maximum junction temperature

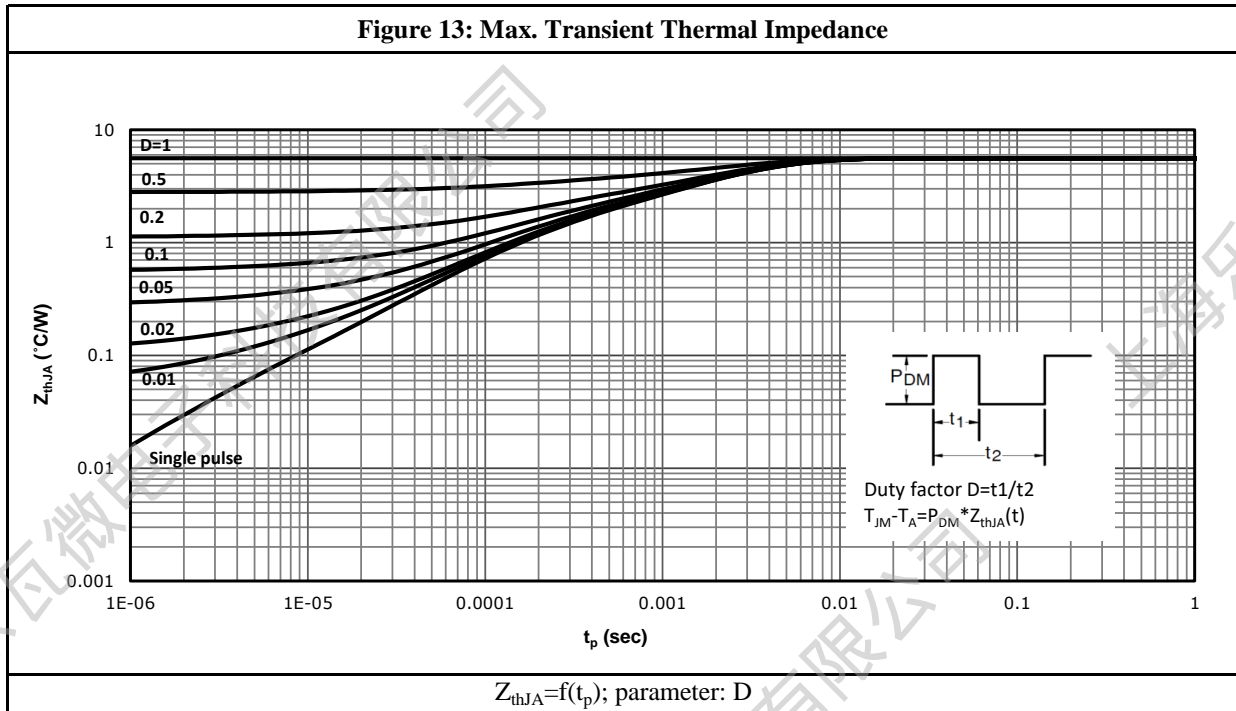
a2:  $V_{DD} = -10V, L = 1.0mH, R_G = 25\Omega$ , Starting  $T_j = 25\text{ }^\circ\text{C}$

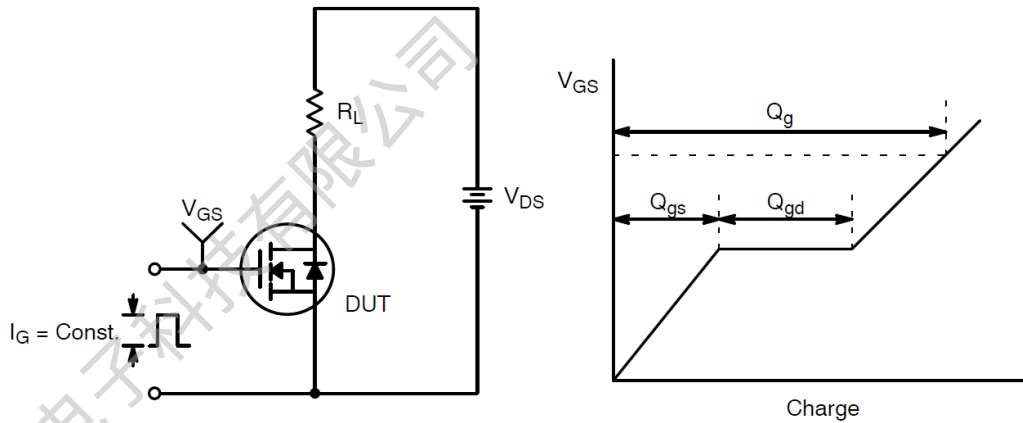
## Characteristics Curve:

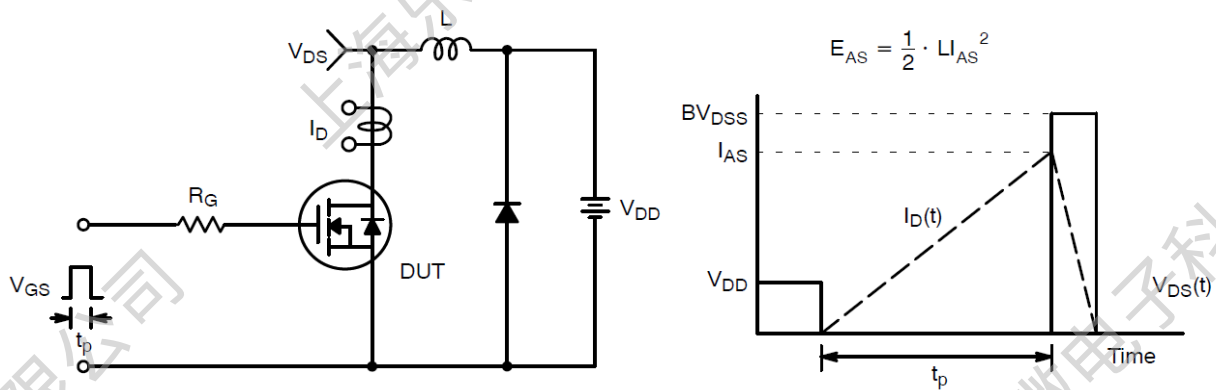


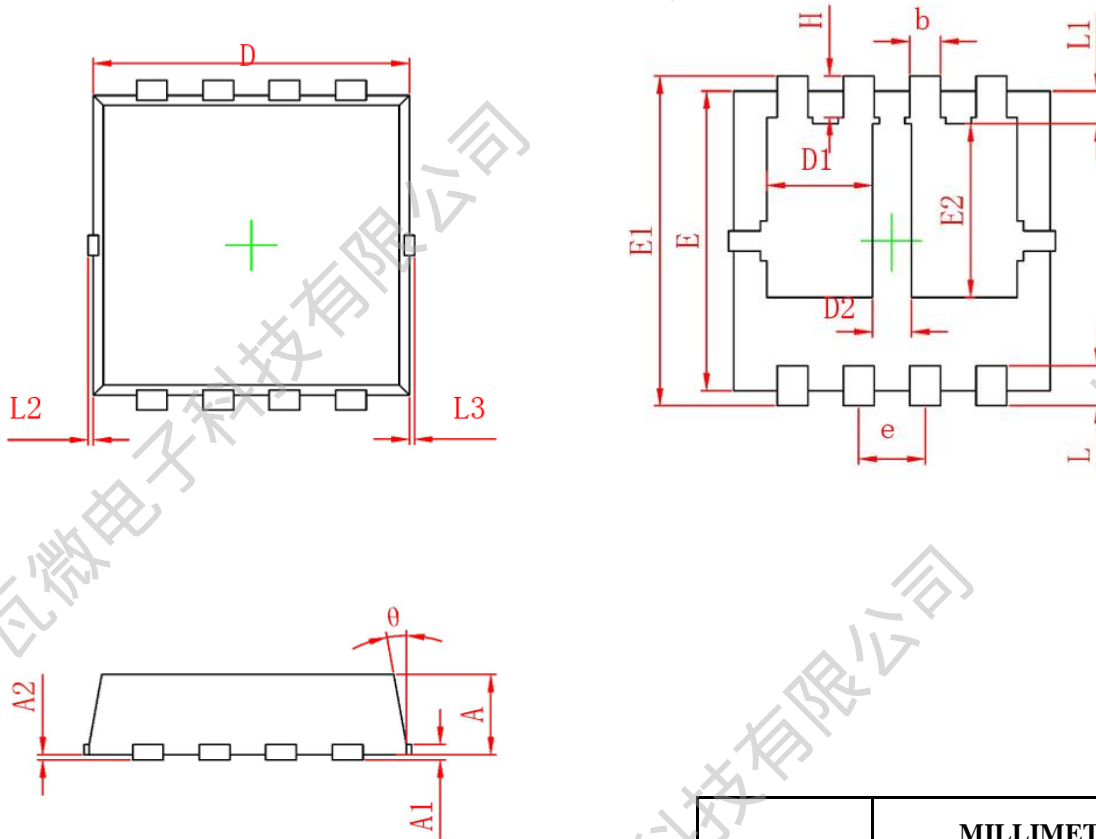






**Test Circuit & Waveform:**

**Figure 14: Gate Charge Test Circuit & Waveform**

**Figure 15: Resistive Switching Test Circuit & Waveforms**

**Figure 16: Unclamped Inductive Switching Test Circuit & Waveforms**

**Package Outline:**


| Symbol   | MILLIMETER |       |
|----------|------------|-------|
|          | MIN        | MIN   |
| A        | 0.700      | 0.900 |
| A1       | 0.152 REF  |       |
| A2       | 0~0.05     |       |
| D        | 3.000      | 3.200 |
| D1       | 0.935      | 1.135 |
| D2       | 0.280      | 0.480 |
| E        | 2.900      | 3.100 |
| E1       | 3.150      | 3.450 |
| E2       | 1.535      | 1.935 |
| b        | 0.200      | 0.400 |
| e        | 0.550      | 0.750 |
| L        | 0.300      | 0.500 |
| L1       | 0.180      | 0.480 |
| L2       | 0~0.100    |       |
| L3       | 0~0.100    |       |
| H        | 0.315      | 0.515 |
| $\theta$ | 8°         | 12°   |



**Revision History:**

| <b>Revison</b> | <b>Date</b> | <b>Descriptions</b> |
|----------------|-------------|---------------------|
| Rev 1.0        | Feb.2024    | Initial Version     |

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