

General Description:

The LWP4020AD3 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge and operation with gate voltage as low as 4.5V. 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:

- 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.
P4020A/LW D3/D.C.	LWP4020AD3	PDFN3.3*3.3-8L	Reel	5000 Pcs

Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$, unless otherwise specified):

Symbol	Parameter	Value	Units
V_{DSS}	Drain-to-Source Voltage	-40	V
I_D	Continuous Drain Current	-30	A
I_{DM}^{a1}	Pulsed Drain Current	-120	A
E_{AS}^{a2}	Single pulse avalanche energy	80	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:

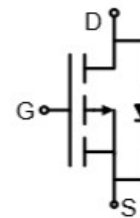
Symbol	Parameter	Value	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	4.2	$^\circ\text{C/W}$
$R_{\theta JA}^{a3}$	Thermal Resistance, Junction-to-Ambient	35	$^\circ\text{C/W}$

V_{DSS}	-40	V
I_D	-30	A
P_D	30	W
$R_{DS(ON) \text{ TYPE}}$	12	m Ω

Marking and Pin Assignment



Inner Equivalent Principium Chart



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	$V_{GS}=0V, I_D=-250\mu A$	-40	--	--	V
I_{DSS}	Drain to Source Leakage Current	$V_{DS}=-40V, V_{GS}=0V$	--	--	-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	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.2	-1.7	-2.3	V
$R_{DS(ON)1}$	Drain-to-Source On-Resistance	$V_{GS}=-10V, I_D=-12A$	--	12	17	m Ω
$R_{DS(ON)2}$	Drain-to-Source On-Resistance	$V_{GS}=-4.5V, I_D=-10A$	--	18	26	m Ω

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{GS} = 0V$	--	1915	--	pF
C_{oss}	Output Capacitance	$V_{DS} = -20V$	--	201	--	
C_{rss}	Reverse Transfer Capacitance	$f = 1.0MHz$	--	184	--	
R_G	Gate resistance	$V_{GS}=0V, V_{DS}=0V, f=1.0MHz$	--	8.0	--	Ω

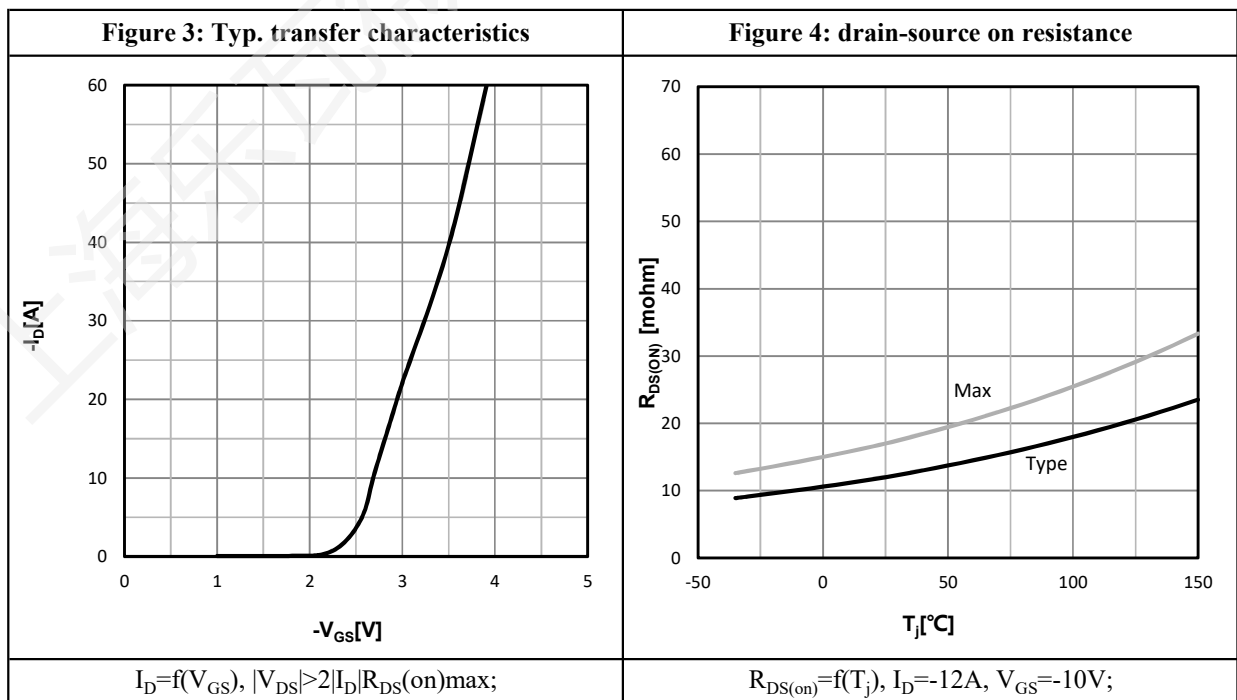
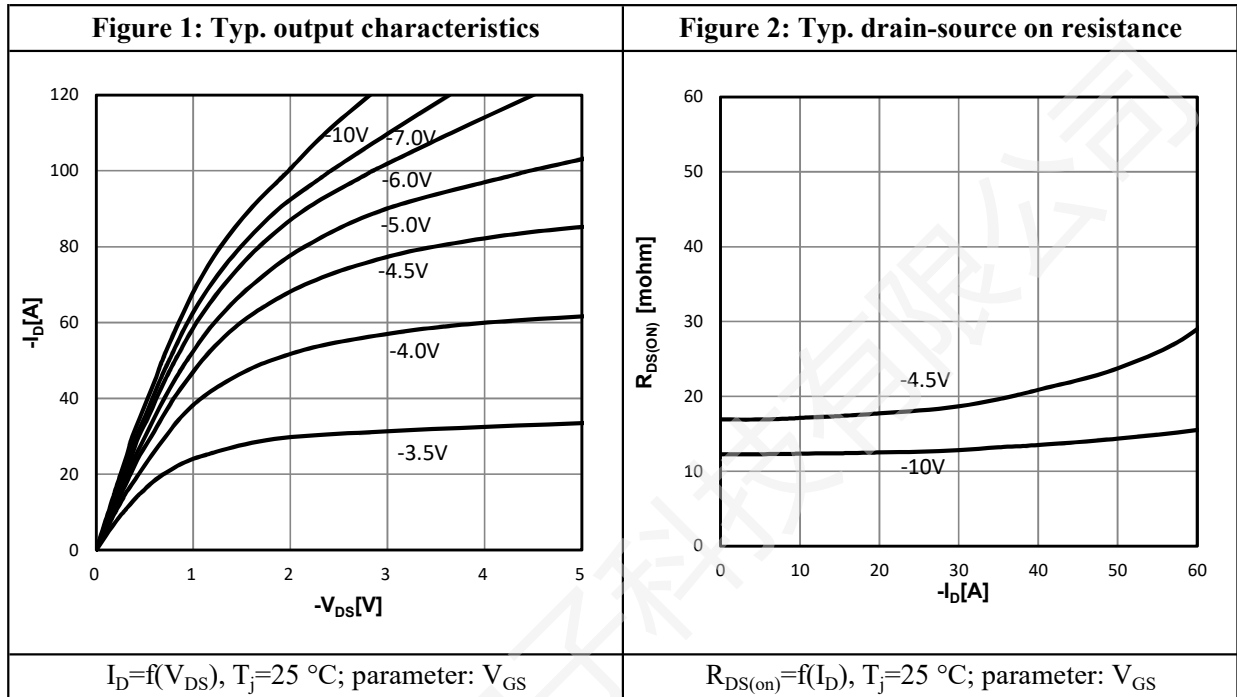
Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D = -12A$	--	11	--	ns
t_r	Rise Time	$V_{DS} = -20V$	--	20	--	
$t_{d(OFF)}$	Turn-Off Delay Time	$V_{GS} = -10V$	--	40	--	
t_f	Fall Time	$R_G = 3.0\Omega$	--	18	--	
Q_g	Total Gate Charge	$V_{GS} = -10V$	--	43	--	nC
Q_{gs}	Gate to Source Charge	$V_{DS} = -20V$	--	5.1	--	
Q_{gd}	Gate to Drain Charge	$I_D = -12A$	--	10	--	

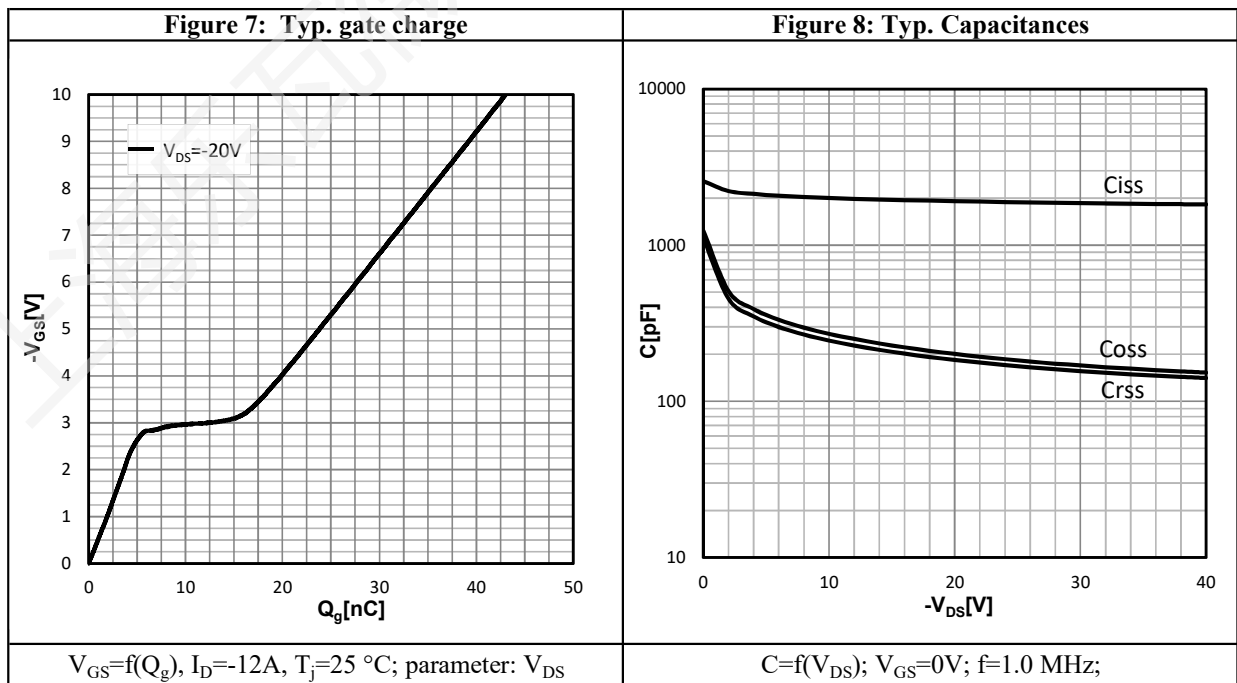
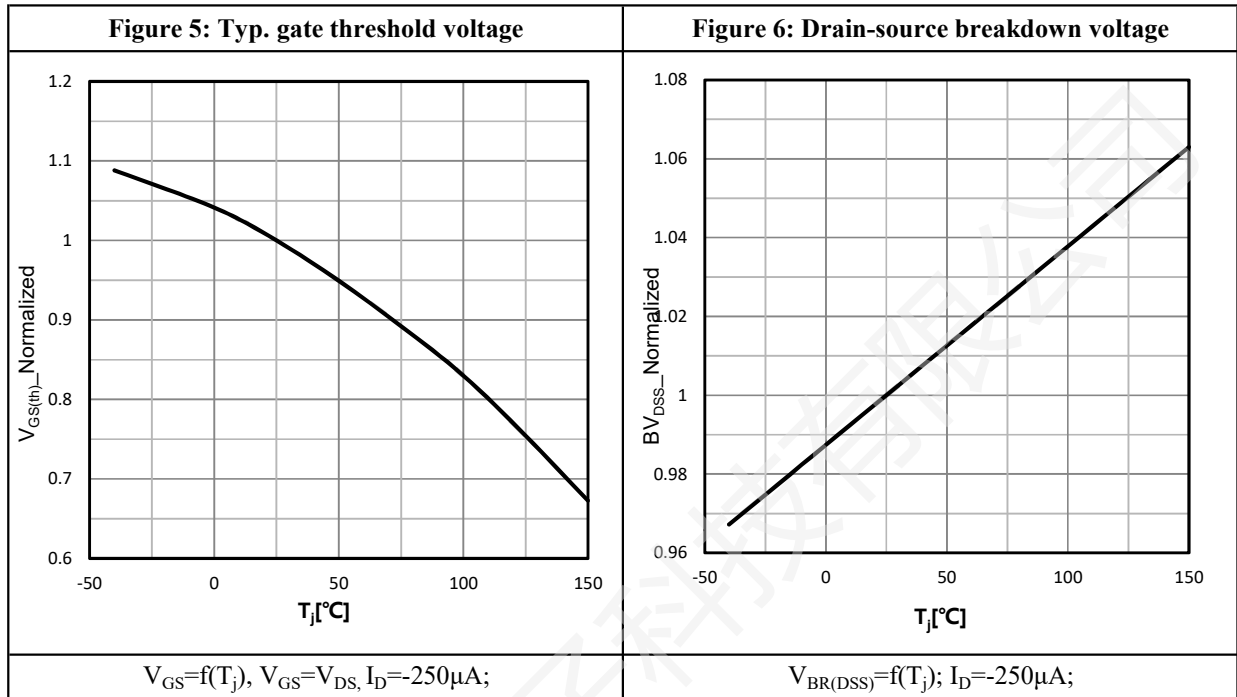
Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
I_S	Diode Forward Current	$T_C = 25\text{ }^{\circ}\text{C}$	--	--	-30	A
V_{SD}	Diode Forward Voltage	$I_S = -12A, V_{GS} = 0V$	--	--	-1.2	V

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

a2: $V_{DD} = -20V, L = 0.1mH, R_G = 25\Omega$, Starting $T_J = 25^{\circ}\text{C}$

a3: Surface Mounted on FR4 Board, $t \leq 10\text{sec}$

Characteristics Curve:




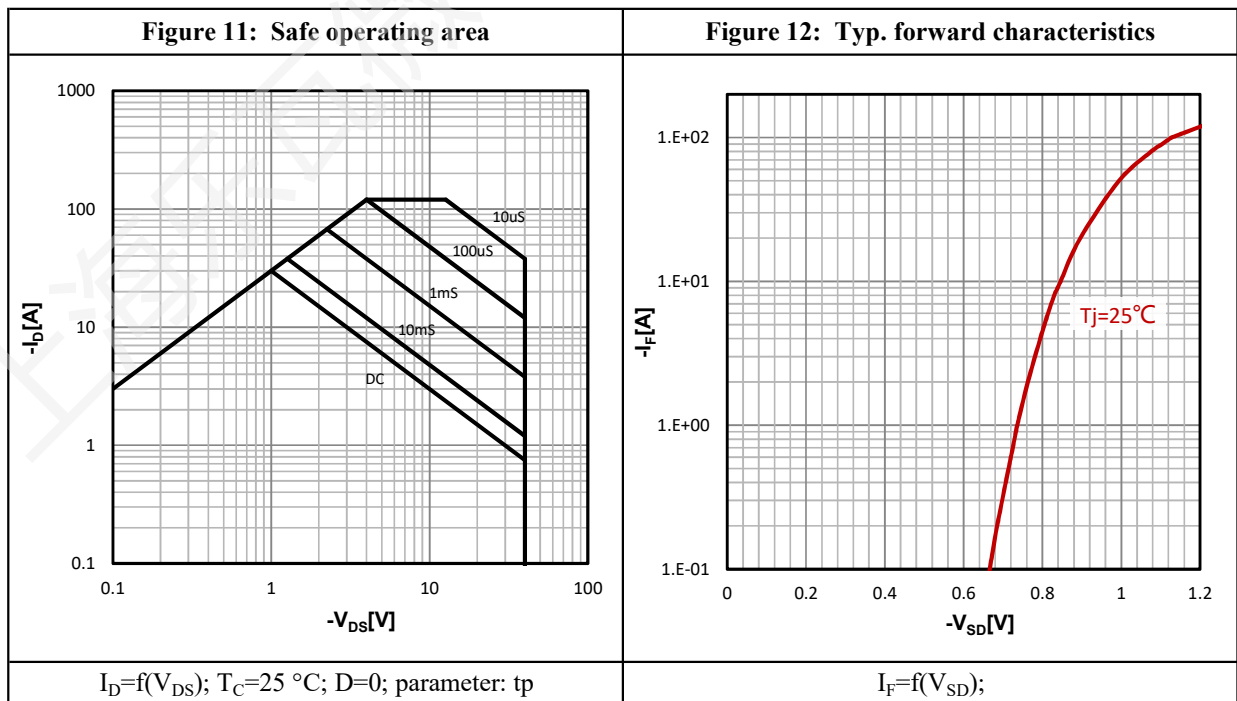
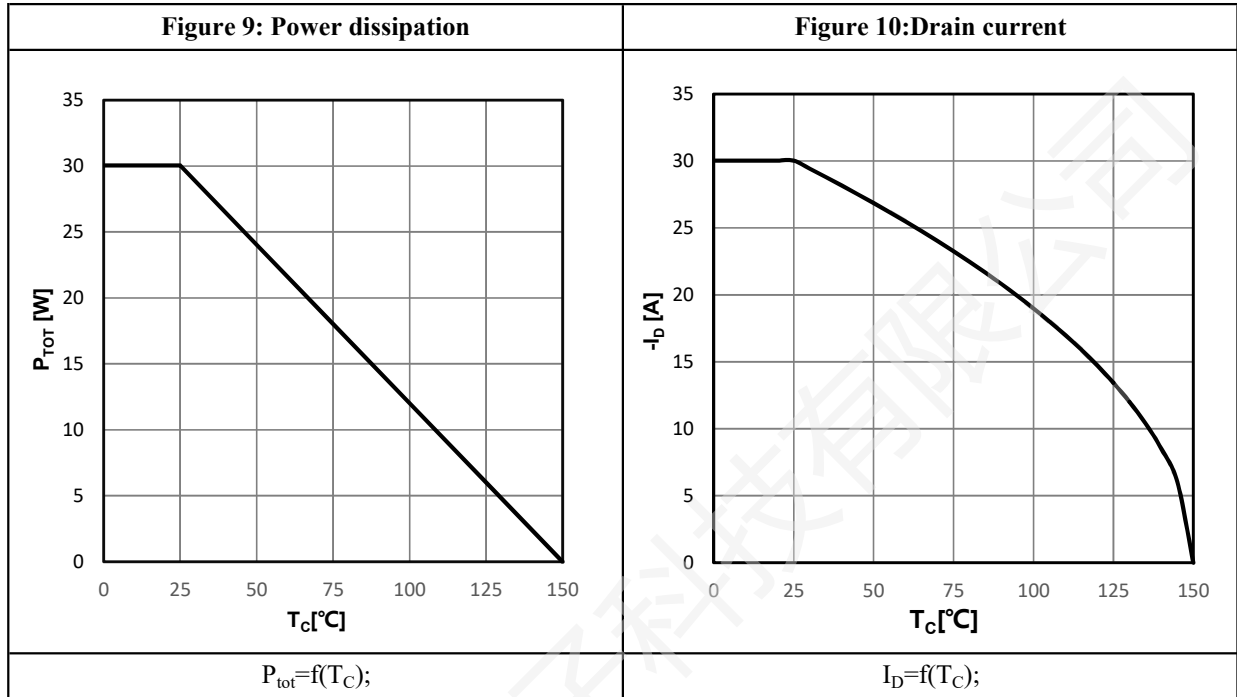
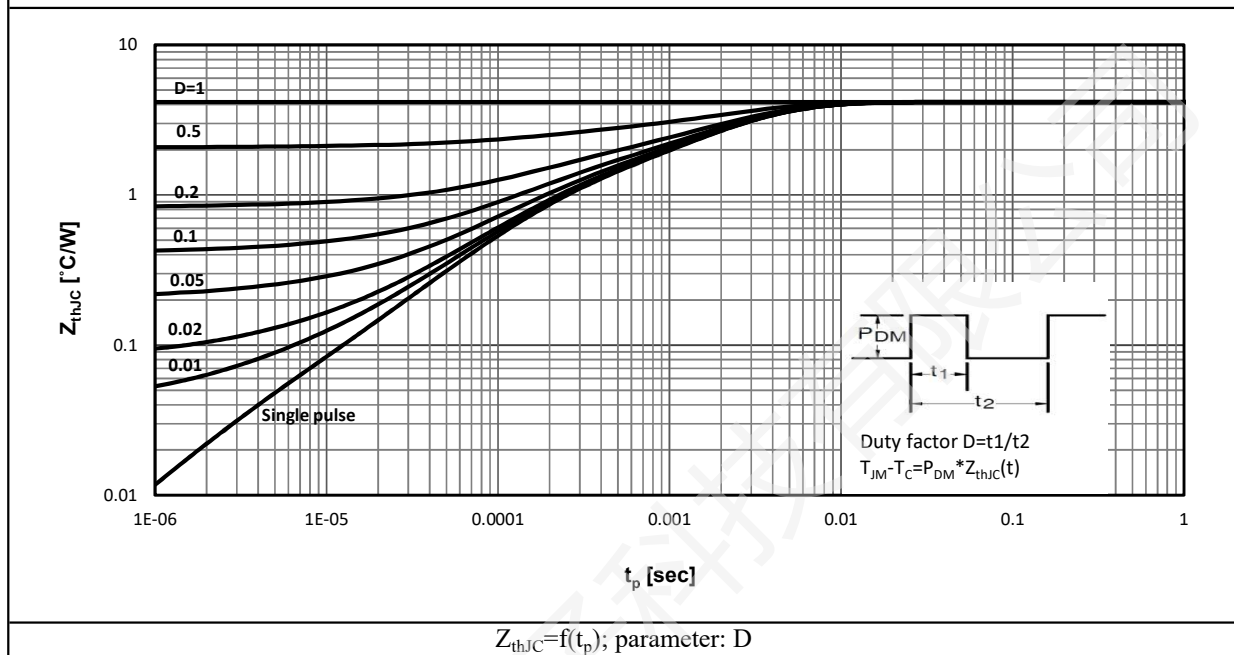
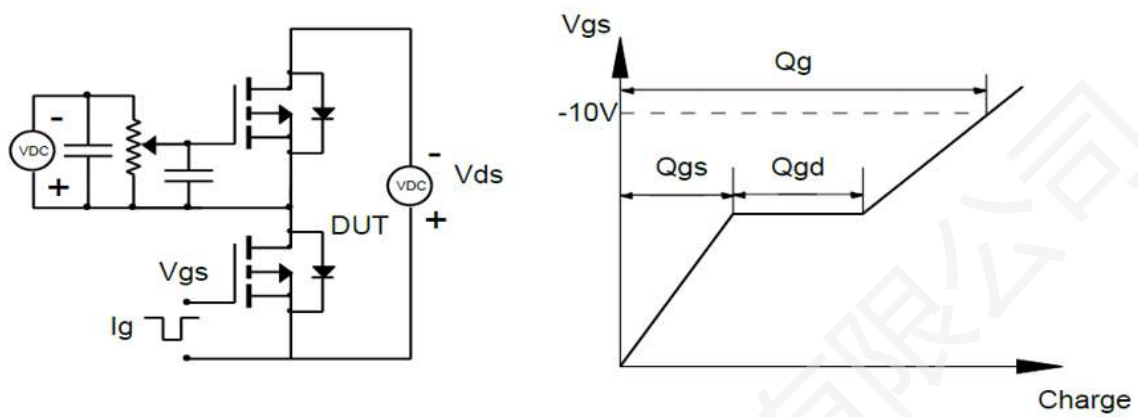
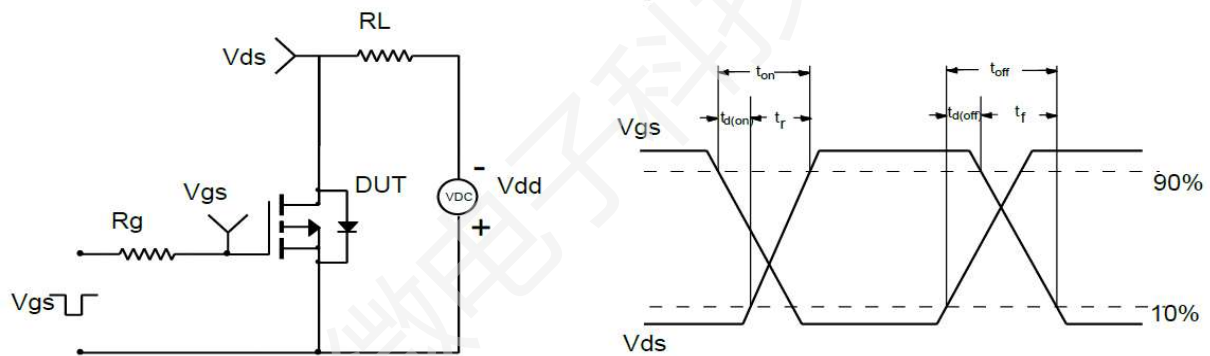
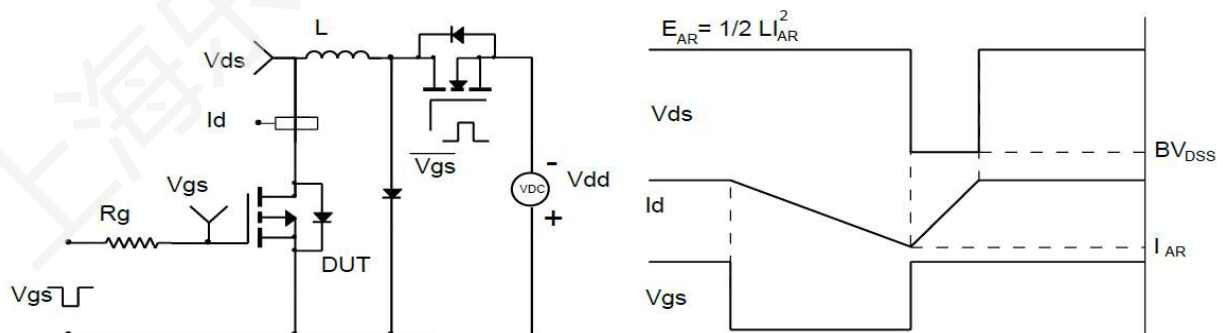
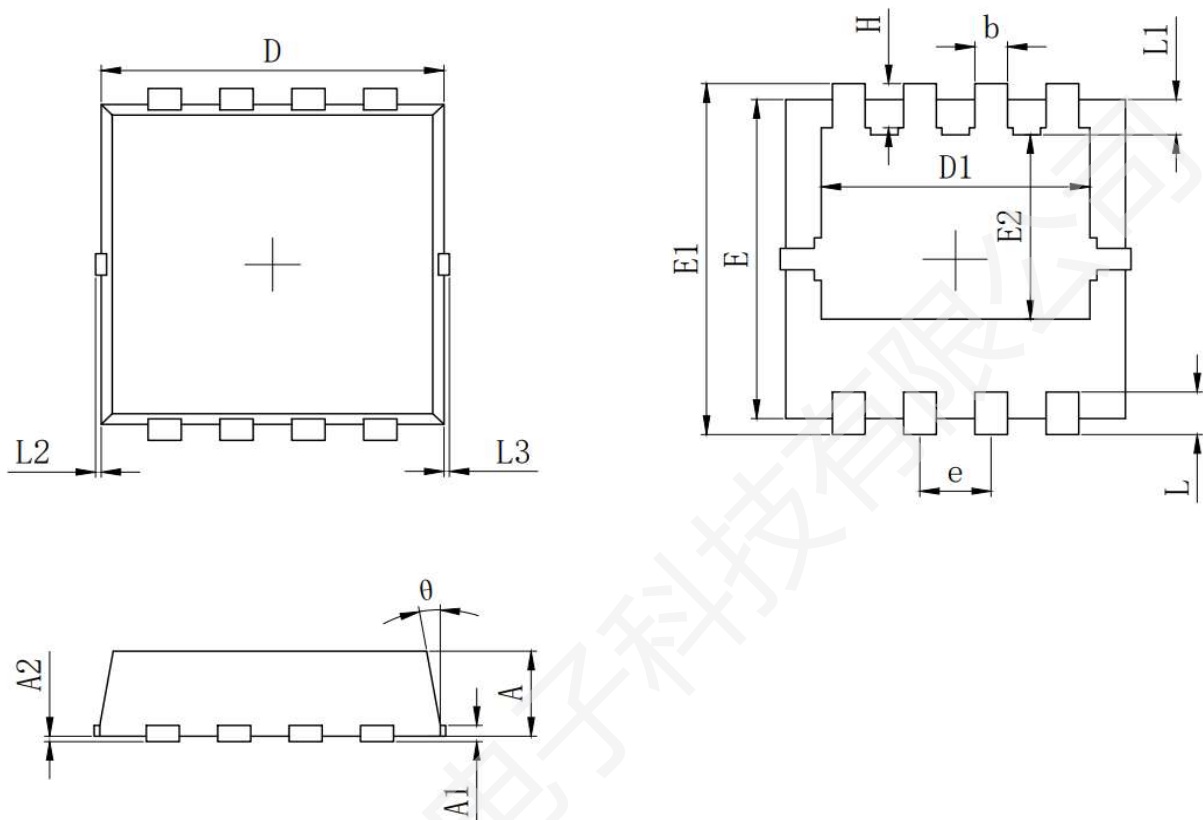


Figure 13: Max. Transient Thermal Impedance


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:


Symbol	MILLIMETER		
	Min	Nom	Max
A	0.700	0.800	0.900
A1	0.152 REF		
A2	0~0.05		
D	3.000	3.100	3.200
D1	2.300	2.450	2.600
E	2.900	3.000	3.100
E1	3.150	3.300	3.450
E2	1.535	1.735	1.935
b	0.200	0.300	0.400
e	0.550	0.650	0.750
L	0.300	0.400	0.500
L1	0.180	0.330	0.480
L2	0~0.100		
L3	0~0.100		
H	0.315	0.415	0.515
θ	8°	10°	12°

Revision History:

Revison	Date	Descriptions
Rev 1.1	July.2025	Initial Version

Disclaimer:

The information in this document is believed to be accurate and reliable. However, no responsibility is assumed by LW-Micro for its use. All operating parameters must be designed, validated and tested to ensure they meet the requirements of your application. LW-Micro reserves the right to make any specification and/or circuitry changes without prior notification. Before starting a brand-new project, please contact LW-Micro Sales to get the most recent relevant information.

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