

General Description:

The LWN40009AD3 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:

- DC-DC Converter
- Portable Equipment
- Power Management

100% DVDS Tested

100% Avalanche Tested


Package Marking and Ordering Information:

Marking	Part Number	Package	Packing	Qty.
N4009A/LW D3/D.C.	LWN4009AD3	PDFN3.3*3.3-8L	Reel	5000 Pcs

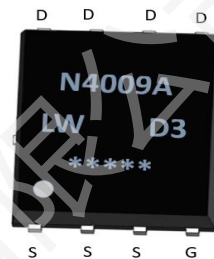
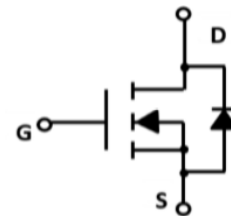
Absolute Maximum Ratings:

Symbol	Parameter	Value	Units
V_{DSS}	Drain-to-Source Voltage	40	V
I_D	Continuous Drain Current	$T_C=25^\circ\text{C}$	54
	Continuous Drain Current	$T_C=100^\circ\text{C}$	34
I_{DM}^{a1}	Pulsed Drain Current	216	A
E_{AS}^{a2}	Single pulse avalanche energy	125	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	78	$^\circ\text{C}/\text{W}$

V_{DSS}	40	V
I_D	54	A
P_D	30	W
$R_{DS(ON) \text{ TYPE}}$	4.7	$\text{m}\Omega$

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	$V_{GS}=0V, I_D=250\mu A$	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	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.5	2.0	V
$R_{DS(ON)1}$	Drain-to-Source On-Resistance	$V_{GS}=10V, I_D=20A$	--	4.7	6.1	$m\Omega$
$R_{DS(ON)2}$	Drain-to-Source On-Resistance	$V_{GS}=4.5V, I_D=15A$	--	6.4	9.5	$m\Omega$

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{GS}=0V$	--	1851	--	pF
C_{oss}	Output Capacitance	$V_{DS}=20V$	--	187	--	
C_{riss}	Reverse Transfer Capacitance	$f=1.0MHz$	--	160	--	
R_G	Gate resistance	$V_{GS}=0V, V_{DS}=0V, f=1MHz$	--	1.7	--	Ω

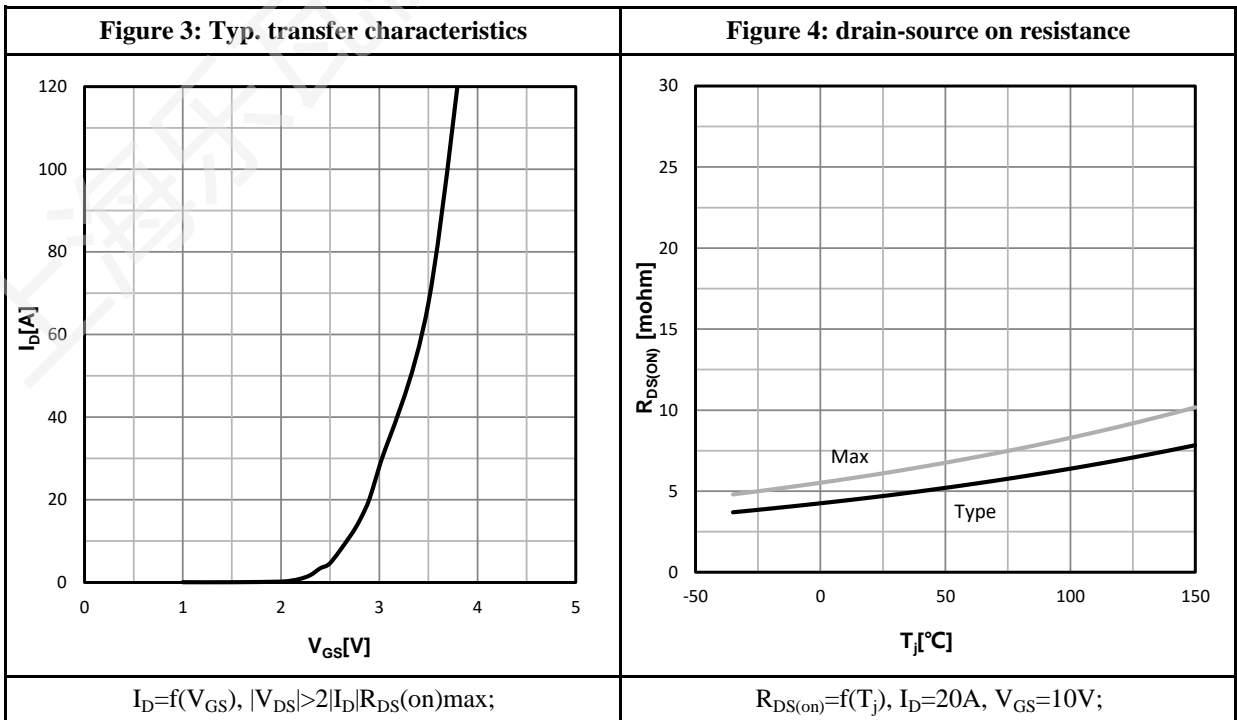
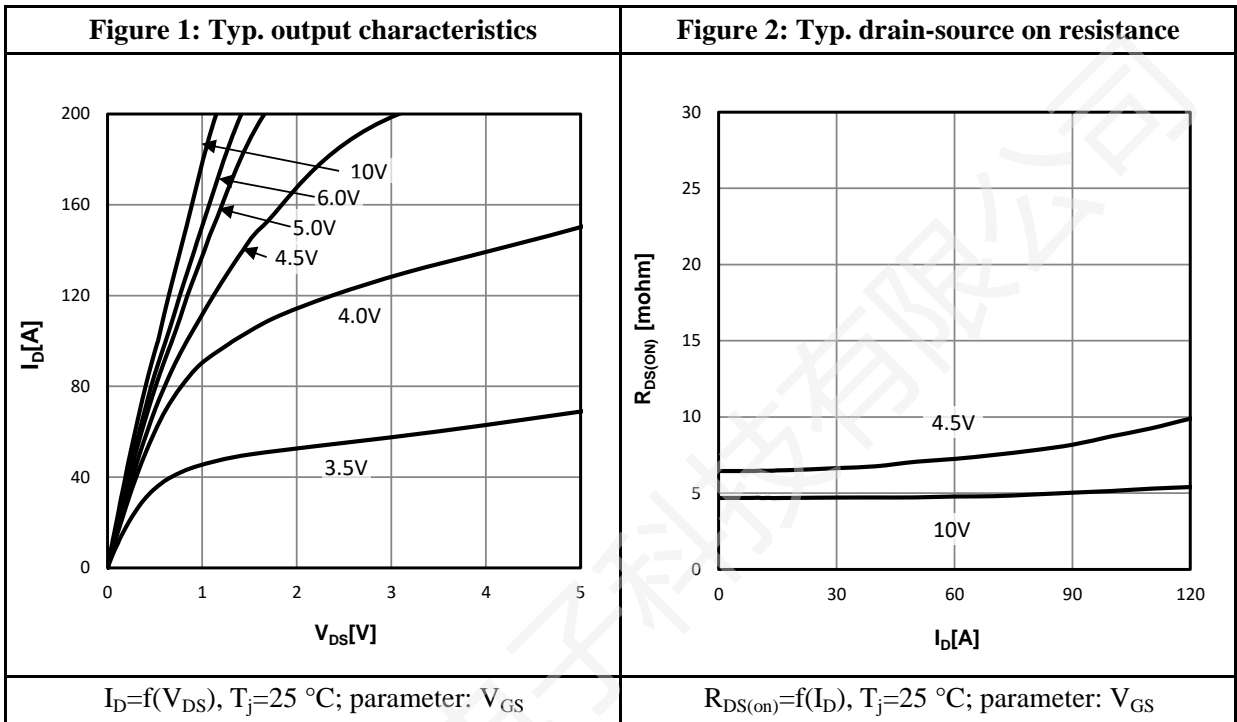
Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D=20A$	--	5.0	--	ns
t_r	Rise Time	$V_{DS}=20V$	--	15	--	
$t_{d(OFF)}$	Turn-Off Delay Time	$V_{GS}=10V$	--	20	--	
t_f	Fall Time	$R_G=3.0\Omega$	--	10	--	
Q_g	Total Gate Charge	$V_{GS}=10V$	--	42	--	nC
Q_{gs}	Gate to Source Charge	$V_{DS}=20V$	--	6.1	--	
Q_{gd}	Gate to Drain Charge	$I_D=20A$	--	8.9	--	

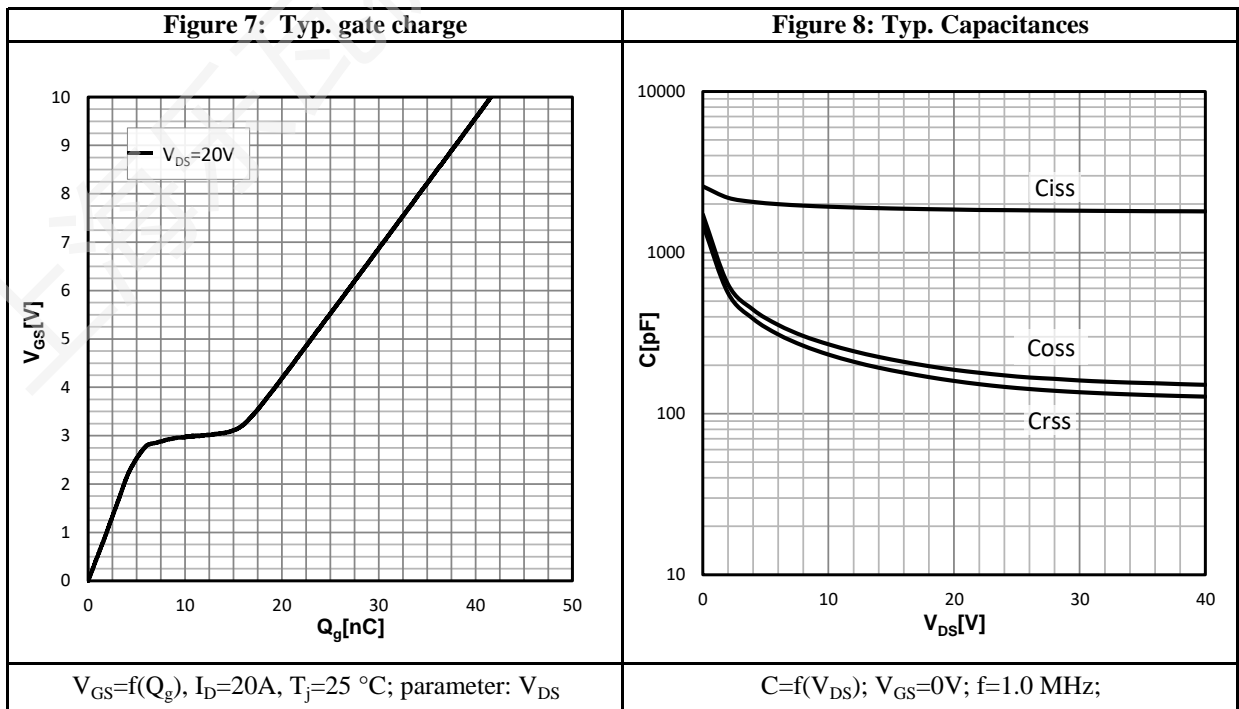
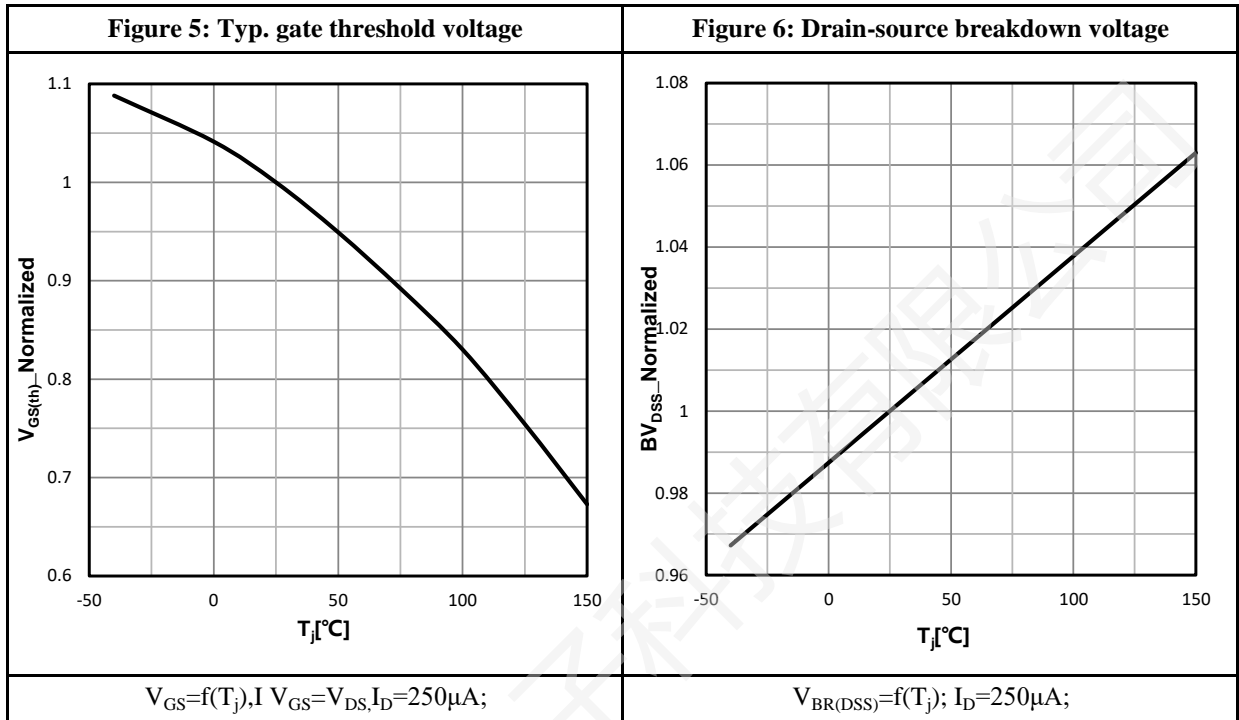
Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
I_S	Diode Forward Current	$T_C=25\text{ }^\circ\text{C}$	--	--	54	A
V_{SD}	Diode Forward Voltage	$I_S=20A, V_{GS}=0V$	--	--	1.2	V

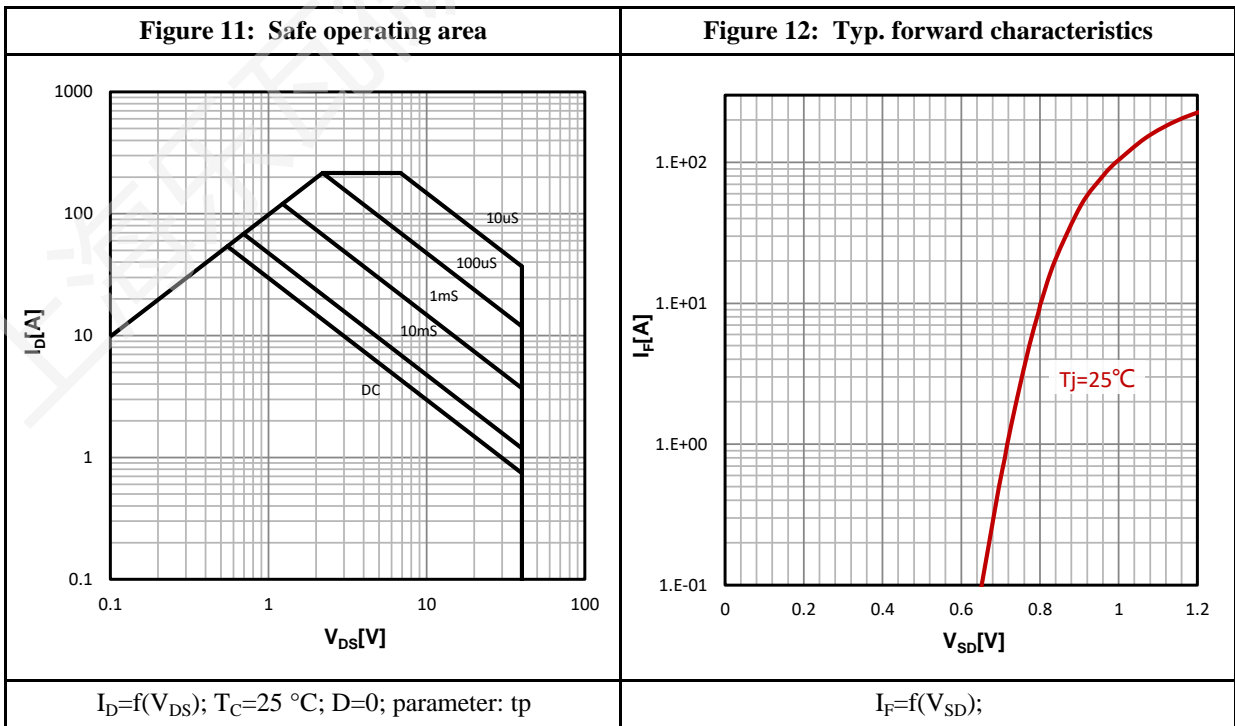
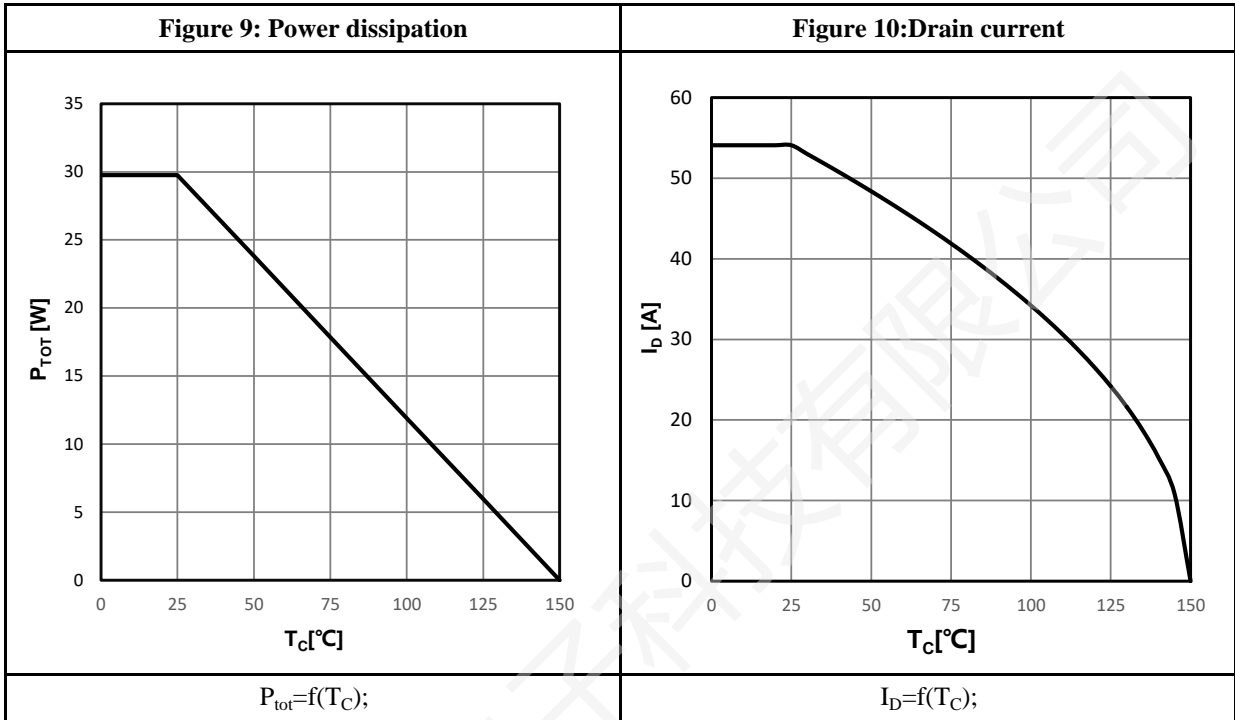
a1: Repetitive rating; pulse width limited by maximum junction temperature

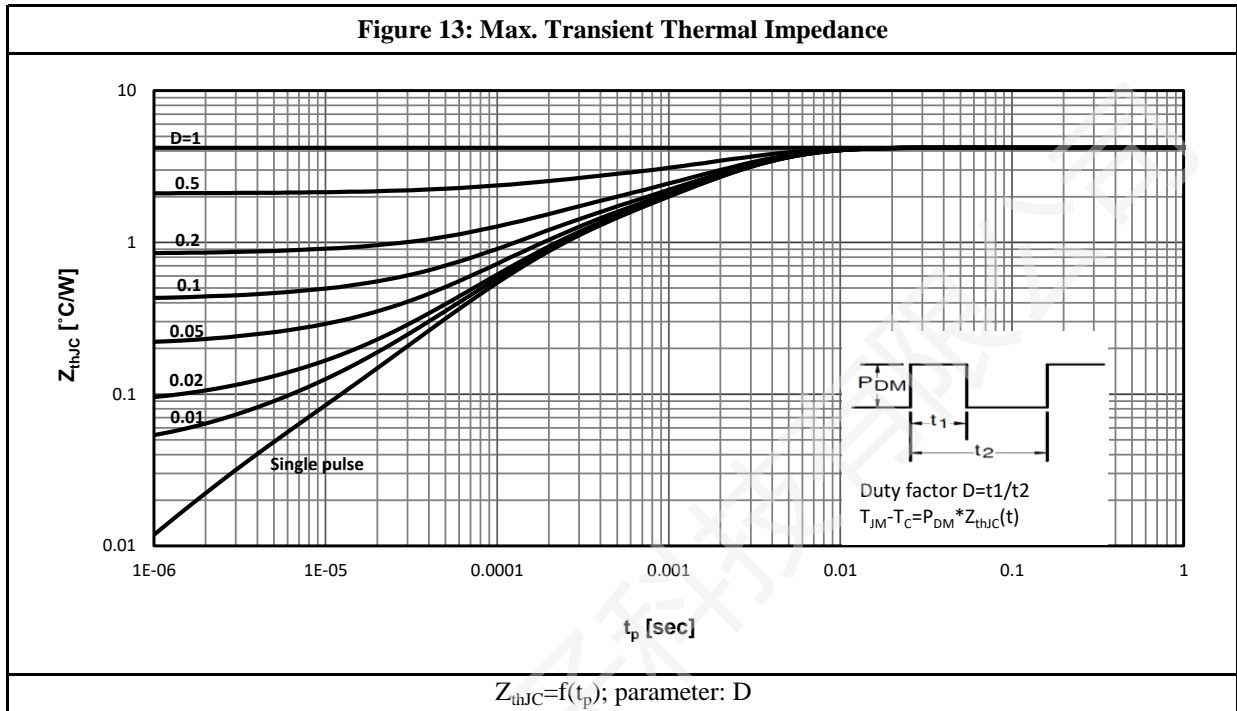
a2: $V_{DD}=20V, L=0.1mH, R_G=25\Omega$, Starting $T_J=25\text{ }^\circ\text{C}$

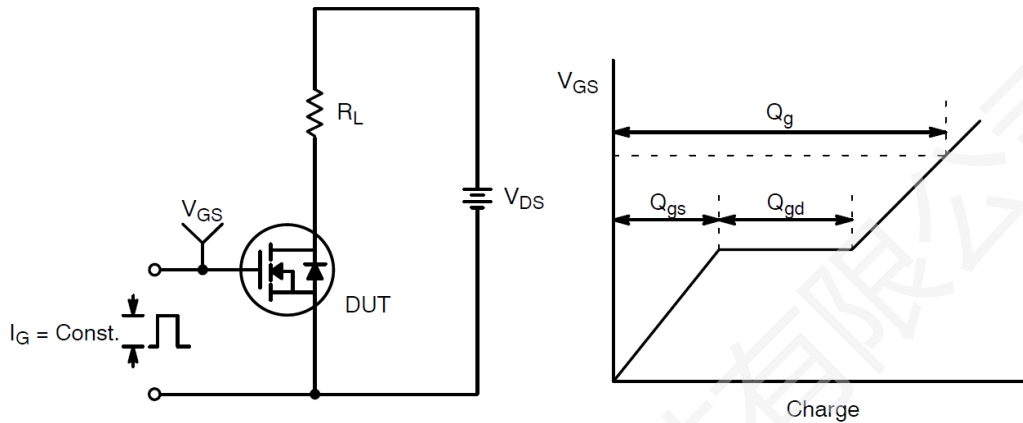
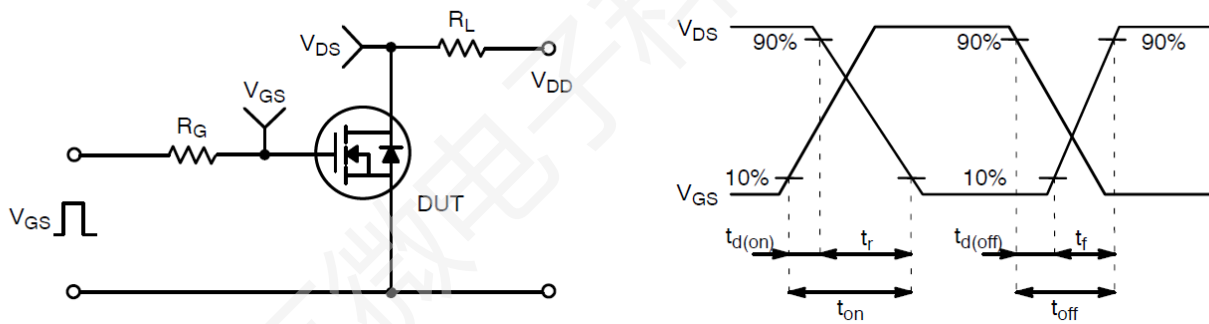
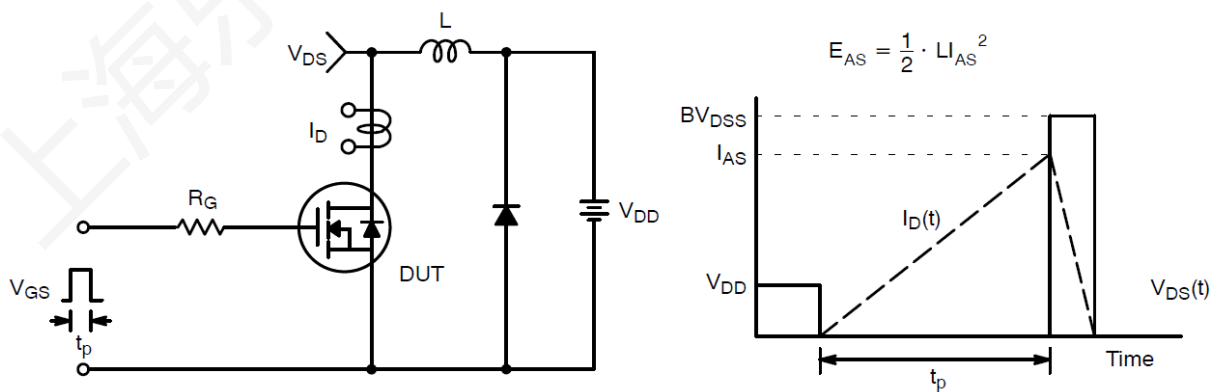
a3: Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm² (one layer, 70 μm thick) copper area for drain connection.

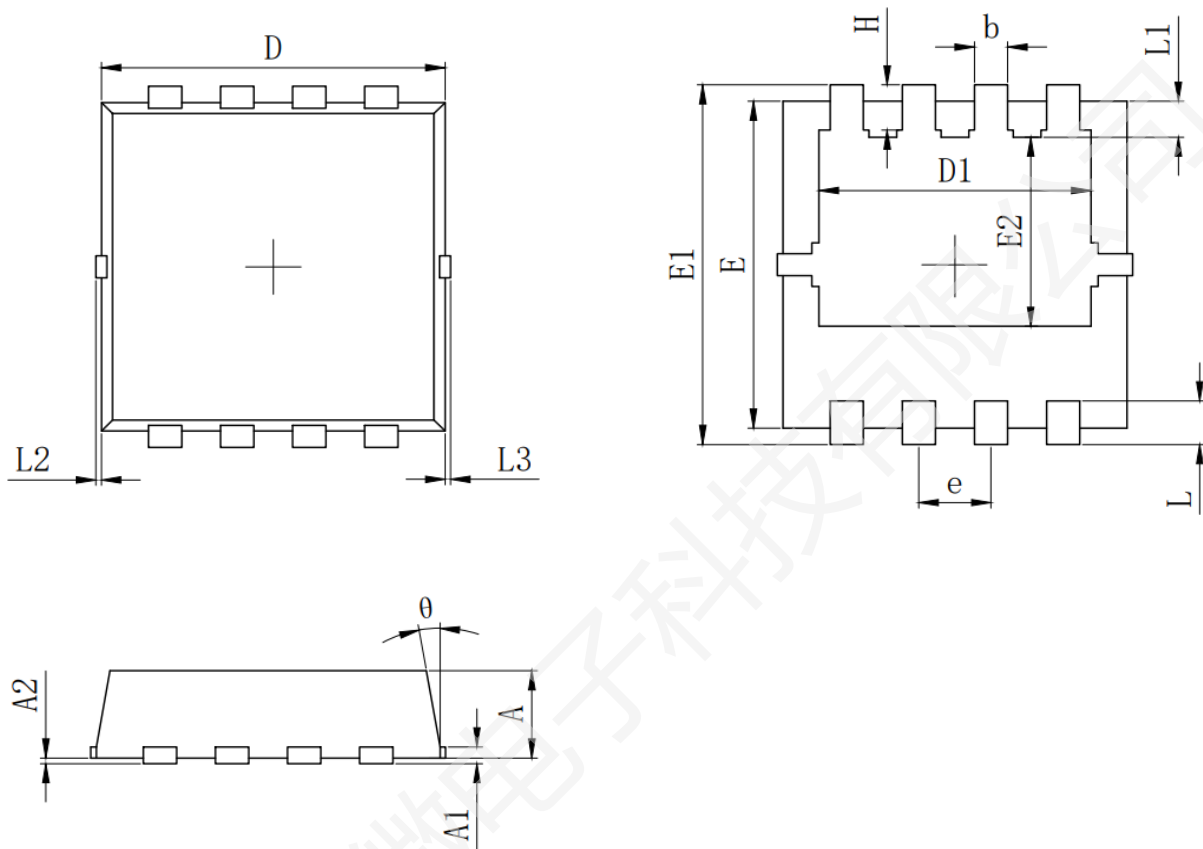
Characteristics Curve:








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:


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

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Mailing Address: Unit 02&04&05, 10th Floor, Building 5, No.666 Shengxia Road, No.122 Yindong Road,
China (Shanghai) Pilot Free Trade Zone
Shanghai Lewa Micro-electronics Technology Co., Ltd