

General Description:

The LWN4013AQ 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 SOT89-3L, 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:

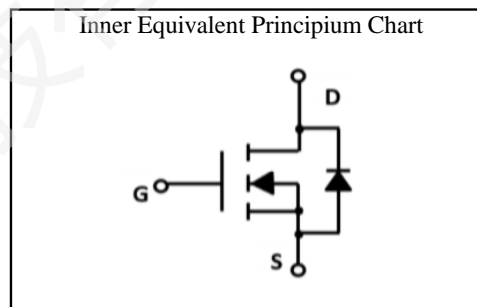
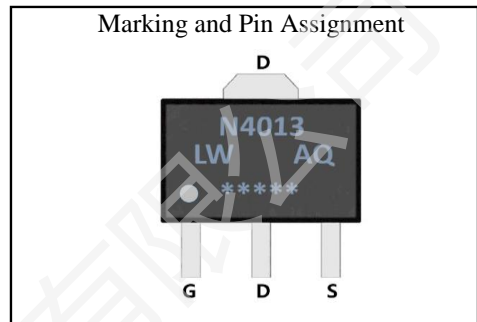
- DC-DC Converter
- Portable Equipment
- Power Management

100% DVDS Tested

100% Avalanche Tested



V_{DSS}	40	V
I_D	11	A
P_D	1.9	W
$R_{DS(ON)}$ TYPE	11	m Ω



Package Marking and Ordering Information:

Marking	Part Number	Package	Packing	Qty.
N4013/LW AQ/D.C.	LWN4013AQ	SOT89-3L	Reel	1000 Pcs

Absolute Maximum Ratings:

Symbol	Parameter	Value	Units
V_{DSS}	Drain-to-Source Voltage	40	V
I_D	Continuous Drain Current	$T_A=25^\circ\text{C}$	11
	Continuous Drain Current	$T_A=100^\circ\text{C}$	6.9
I_{DM}^{a1}	Pulsed Drain Current	44	A
E_{AS}^{a2}	Single pulse avalanche energy	48	mJ
V_{GS}	Gate-to-Source Voltage	± 20	V
P_D	Power Dissipation	1.9	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
$R_{\theta JA}^{a3}$	Thermal Resistance, Junction-to-Ambient	65.7	$^\circ\text{C/W}$

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	$V_{DS}=V_{GS}, I_D=250\mu A$	1.2	1.6	2.0	V
$R_{DS(ON)1}$	Drain-to-Source On-Resistance	$V_{GS}=10V, I_D=10A$	--	11	15	$m\Omega$
$R_{DS(ON)2}$	Drain-to-Source On-Resistance	$V_{GS}=4.5V, I_D=8.0A$	--	13	20	$m\Omega$

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{GS}=0V$	--	1199	--	pF
C_{oss}	Output Capacitance	$V_{DS}=20V$	--	93	--	
C_{riss}	Reverse Transfer Capacitance	$f=1.0MHz$	--	85	--	
R_G	Gate resistance	$V_{GS}=0V, V_{DS}=0V, f=1MHz$	--	1.6	--	Ω

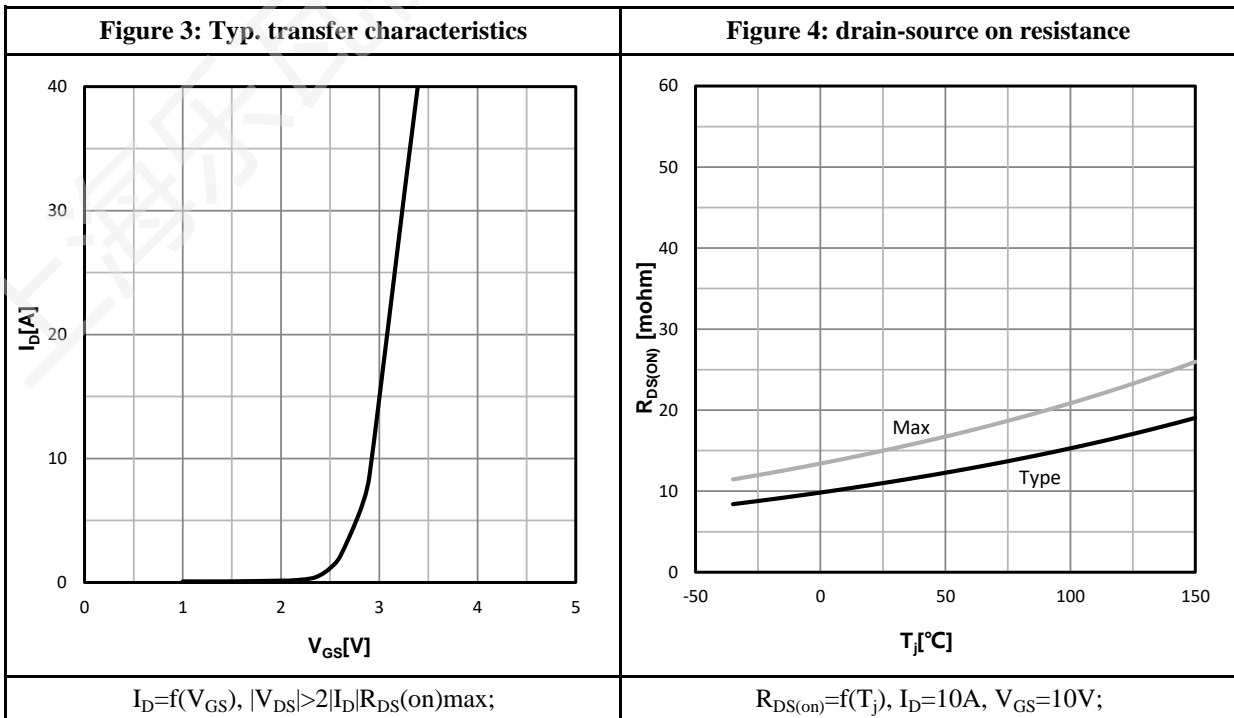
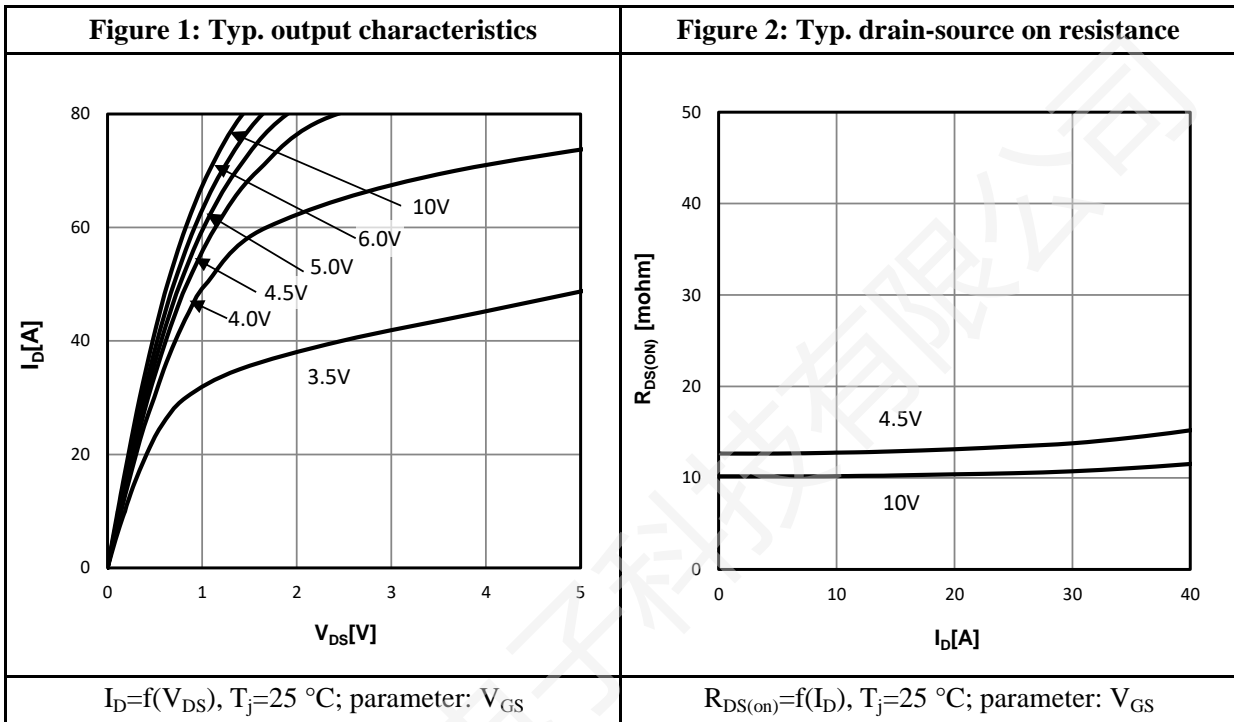
Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D=10A$	--	2.9	--	ns
t_r	Rise Time	$V_{DS}=20V$	--	13	--	
$t_{d(OFF)}$	Turn-Off Delay Time	$V_{GS}=10V$	--	21	--	
t_f	Fall Time	$R_G=3.0\Omega$	--	30	--	
Q_g	Total Gate Charge	$V_{GS}=10V$	--	26	--	nC
Q_{gs}	Gate to Source Charge	$V_{DS}=20V$	--	3.5	--	
Q_{gd}	Gate to Drain Charge	$I_D=10A$	--	5.4	--	

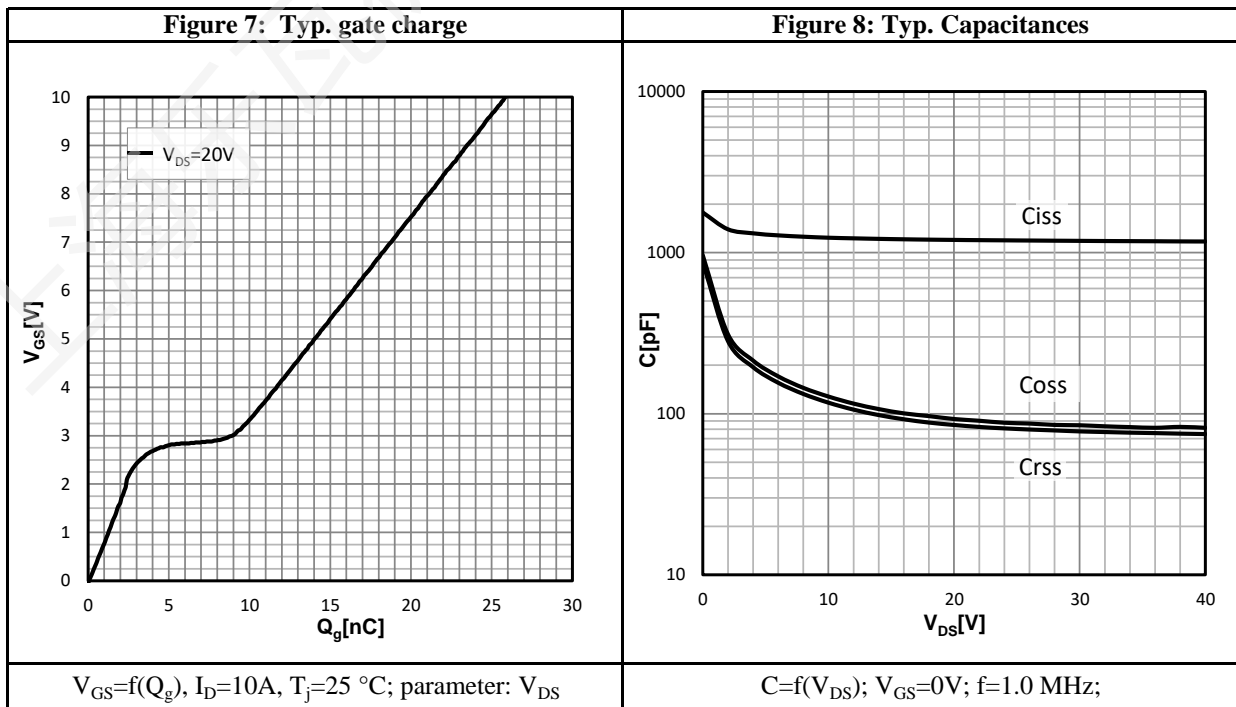
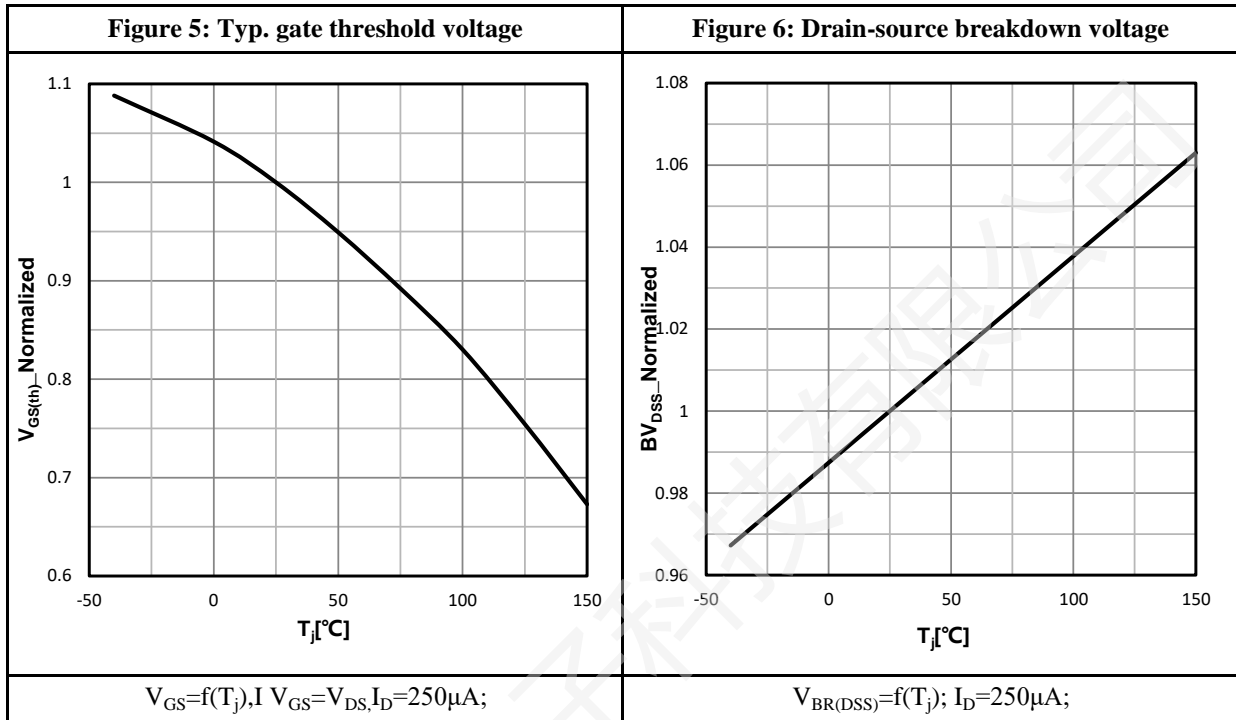
Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
I_S	Diode Forward Current	$T_A=25\text{ }^\circ\text{C}$	--	--	11	A
V_{SD}	Diode Forward Voltage	$I_S=10A, V_{GS}=0V$	--	--	1.2	V

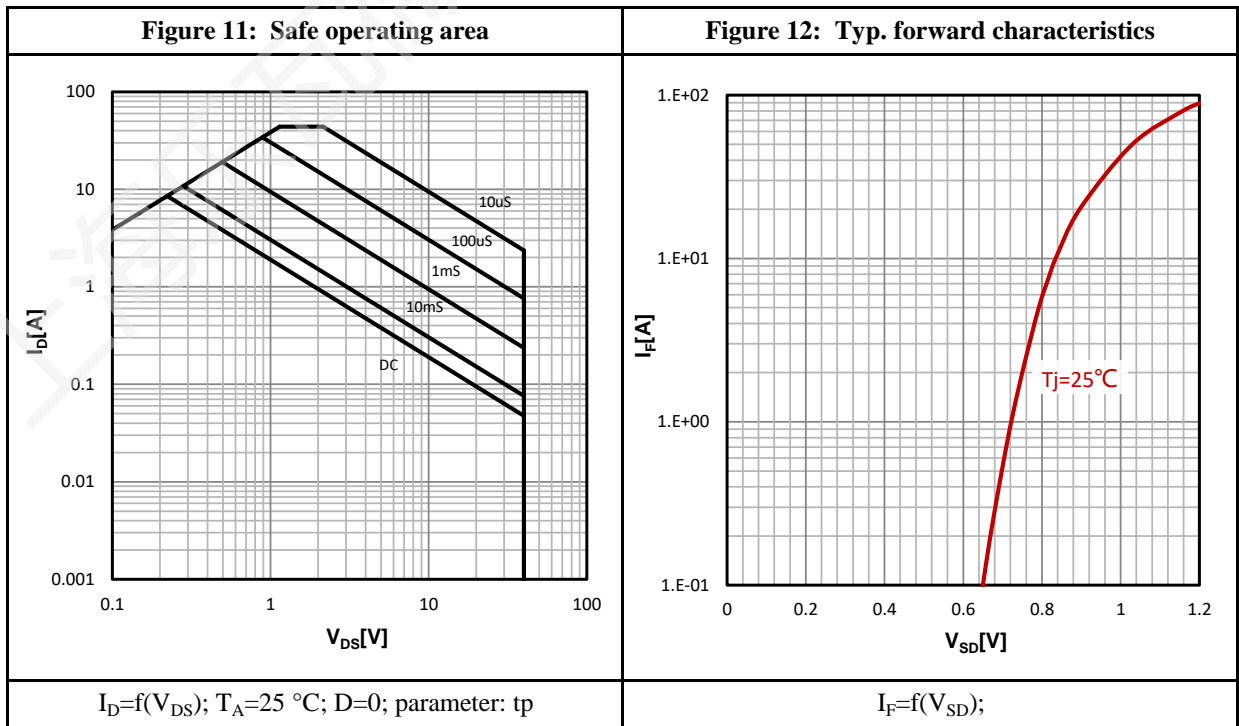
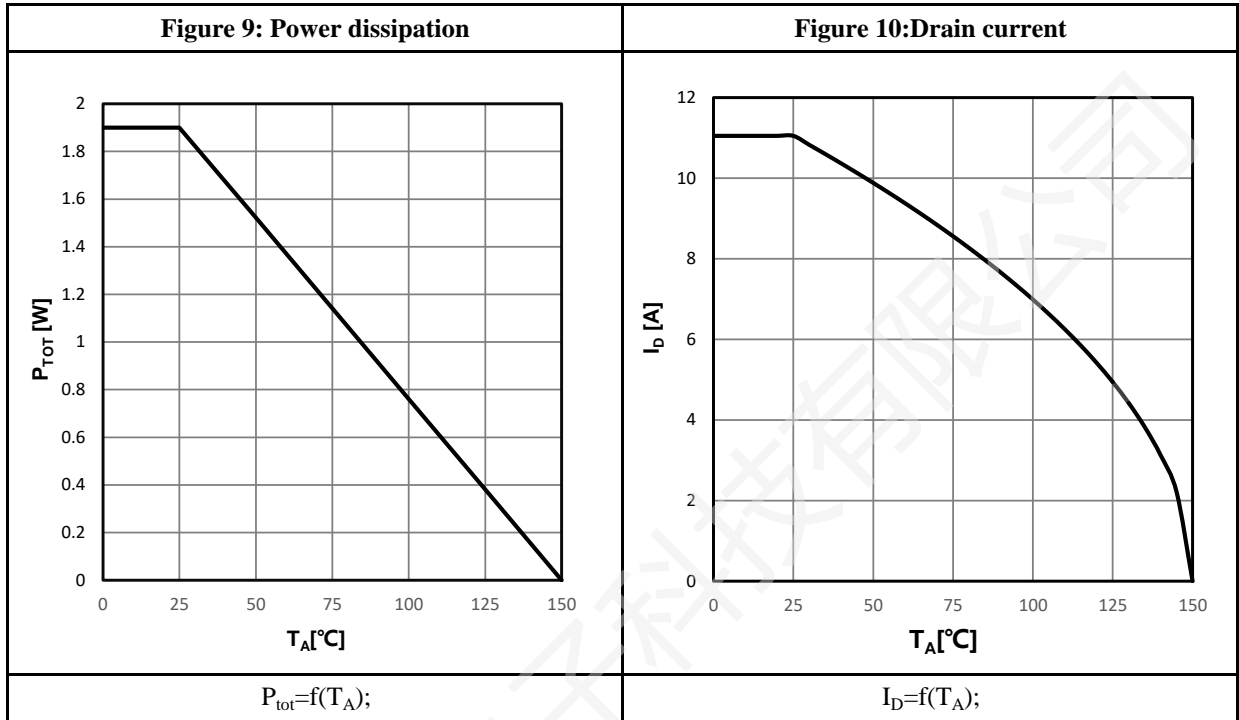
a1: Repetitive rating; pulse width limited by maximum junction temperature

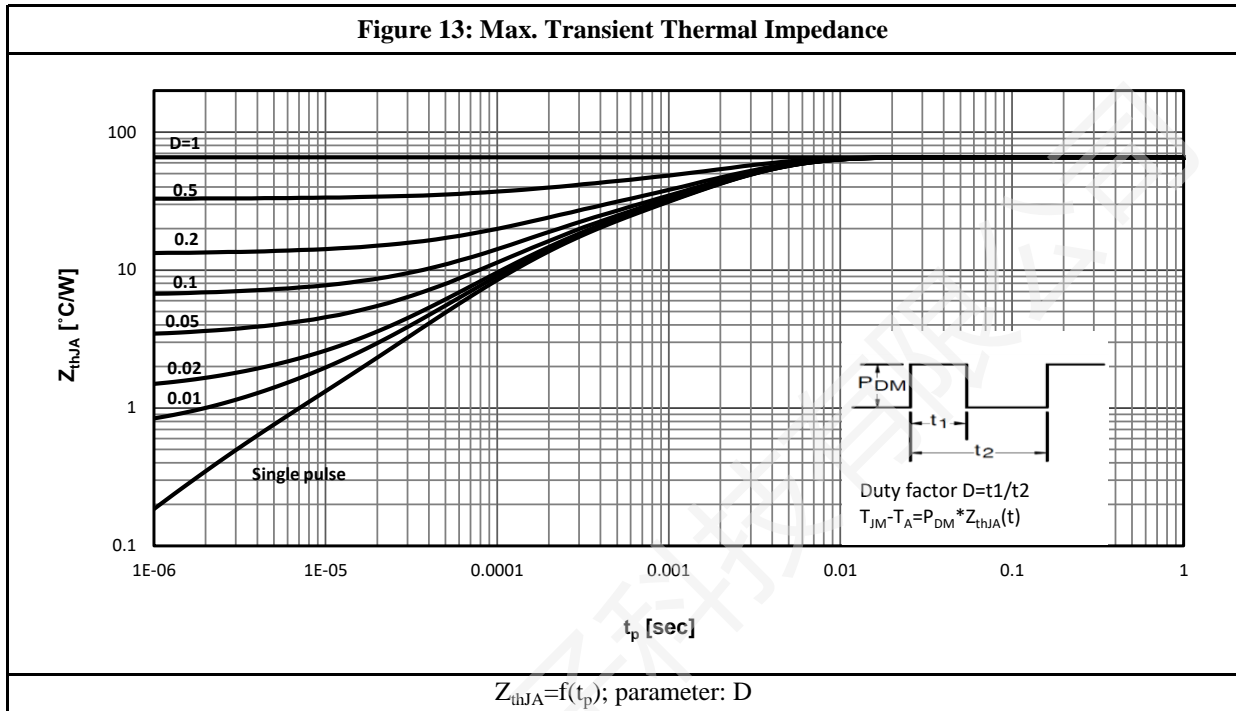
a2: $V_{DD}=20V, L=0.1mH, R_G=25\Omega$, Starting $T_J=25\text{ }^\circ\text{C}$

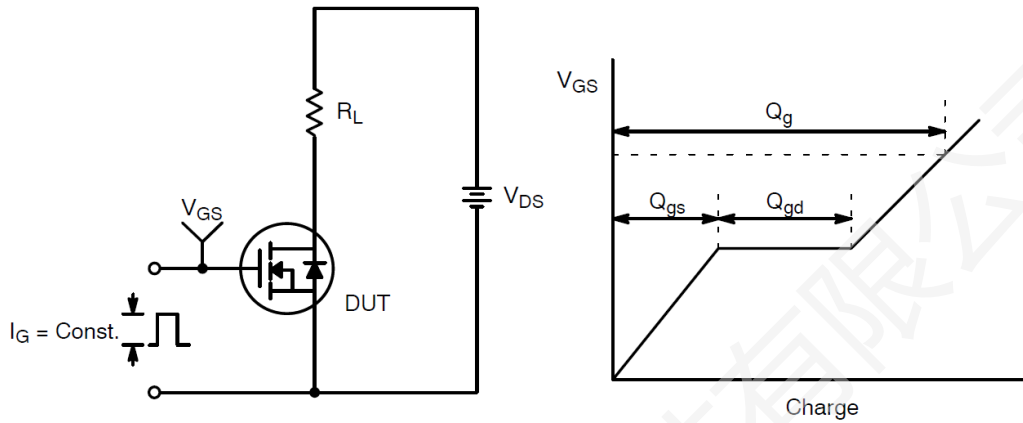
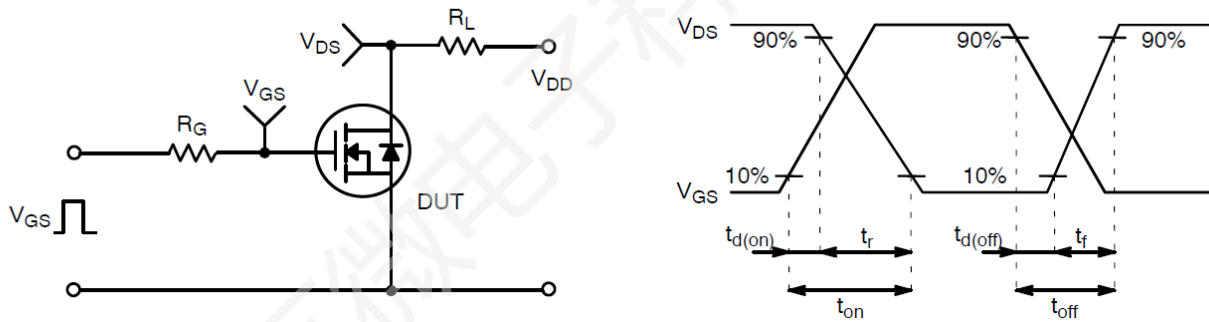
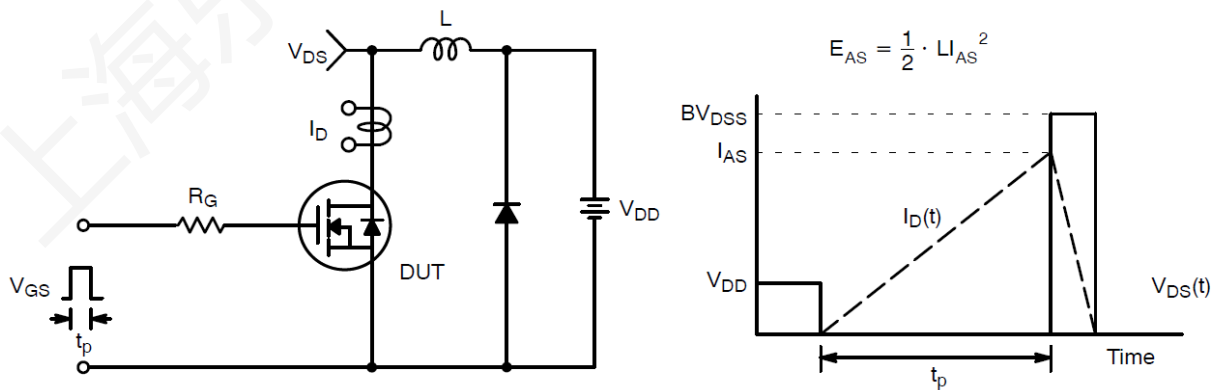
a3: Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm² (one layer, 70 μm thick) copper area for drain connection.

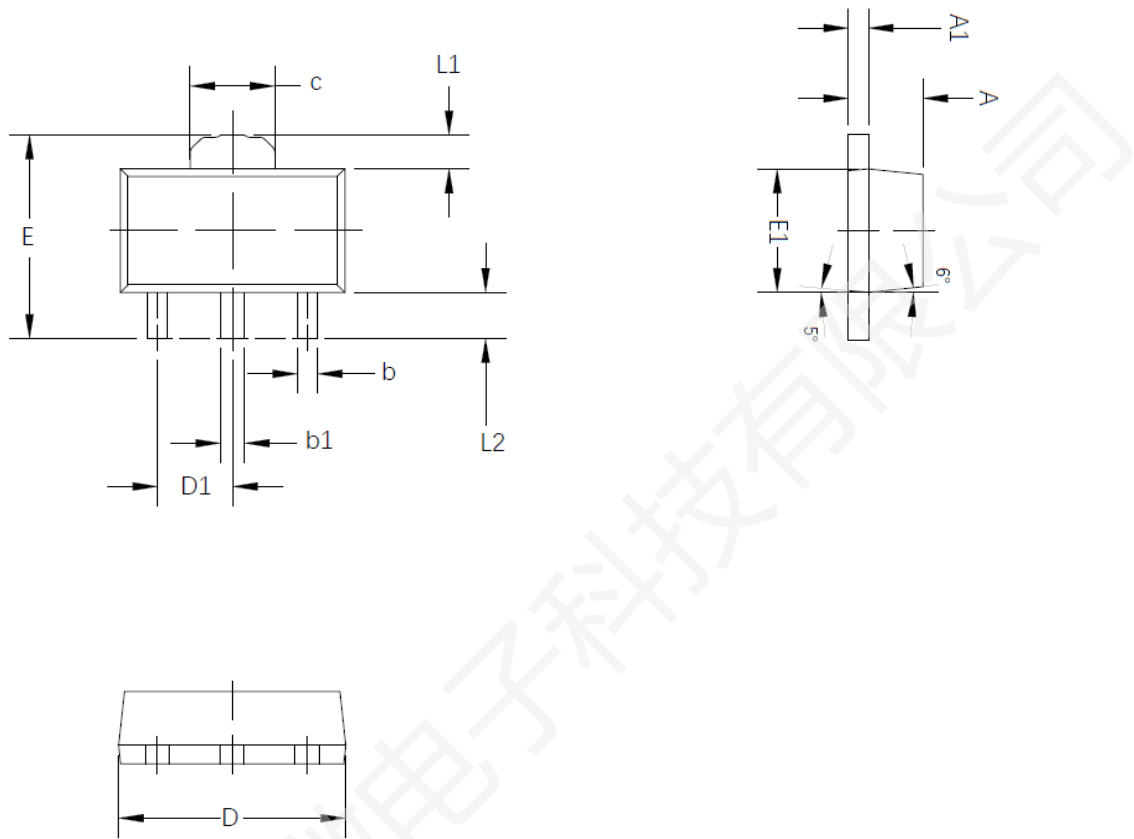
Characteristics Curve:








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:

COMMON DIMENSION (MM)

PKG	SOT89-3L		
Symbol	MIN	NOM	MAX
A	1.450	1.500	1.550
A1	0.350	0.400	0.450
b	0.350	0.430	0.500
b1	0.430	0.500	0.570
C	1.650	1.700	1.750
D	4.450	4.550	4.700
D1	1.470	1.500	1.550
E	4.100	4.200	4.300
E1	2.450	2.550	2.650
L1	0.630	0.700	0.770
L2	0.900	0.950	1.000

Revision History:

Revison	Date	Descriptions
Rev 1.0	Aug.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