

General Description:

The LWD6001A4 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 TO-252-4L, 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:

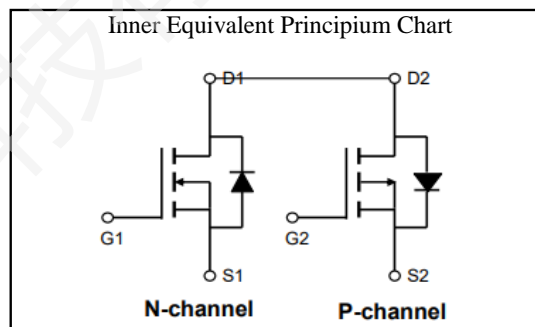
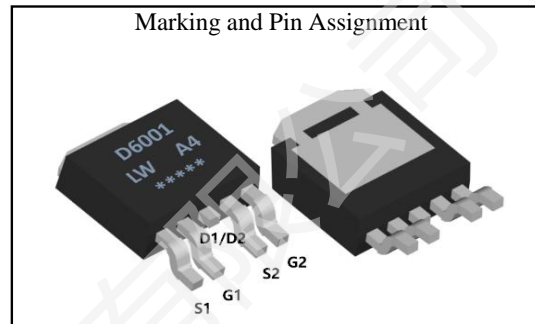
- DC-DC Converter
- Portable Equipment
- Power Management

100% DVDS Tested

100% Avalanche Tested



Symbol	N-Ch	P-Ch	Units
V_{DSS}	60	-60	V
I_D	16	-16	A
$R_{DS(ON) \text{ TYPE}}$	33.7	55	$m\Omega$



Package Marking and Ordering Information:

Marking	Part Number	Package	Packing	Qty.
D6001A/LW A4/D.C.	LWD6001A4	TO-252-4L	Reel	2500 Pcs

Absolute Maximum Ratings:

Symbol	Parameter	Value		Units	
		N-Ch	P-Ch		
V_{DSS}	Drain-to-Source Voltage	60	-60	V	
I_D	Continuous Drain Current	$T_C=25^\circ\text{C}$	16	-16	A
	Continuous Drain Current	$T_C=100^\circ\text{C}$	10	-10	A
I_{DM}^{a1}	Pulsed Drain Current		64	-64	A
E_{AS}^{a2}	Single pulse avalanche energy		39	34	mJ
V_{GS}	Gate-to-Source Voltage		± 20	± 20	V
P_D	Power Dissipation		30	32	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
		N-Ch	P-Ch	
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	4.16	3.9	$^\circ\text{C}/\text{W}$
$R_{\theta JA}^{a3}$	Thermal Resistance, Junction-to-Ambient	60	60	$^\circ\text{C}/\text{W}$

N-Channel 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	$V_{GS}=0V, I_D=250\mu A$	60	--	--	V
I_{DSS}	Drain to Source Leakage Current	$V_{DS}=60V, V_{GS}=0V$	--	--	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	$V_{DS}=V_{GS}, I_D=250\mu A$	1.1	1.6	2.1	V
$R_{DS(ON)1}$	Drain-to-Source On-Resistance	$V_{GS}=10V, I_D=8.0A$	--	33.7	45	$m\Omega$
$R_{DS(ON)2}$	Drain-to-Source On-Resistance	$V_{GS}=4.5V, I_D=3.0A$	--	37	55	$m\Omega$

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{GS}=0V$	--	990	--	pF
C_{oss}	Output Capacitance	$V_{DS}=30V$	--	42	--	
C_{riss}	Reverse Transfer Capacitance	$f=1.0MHz$	--	38	--	
R_G	Gate resistance	$V_{GS}=0V, V_{DS}=0V, f=1MHz$	--	1.4	--	Ω

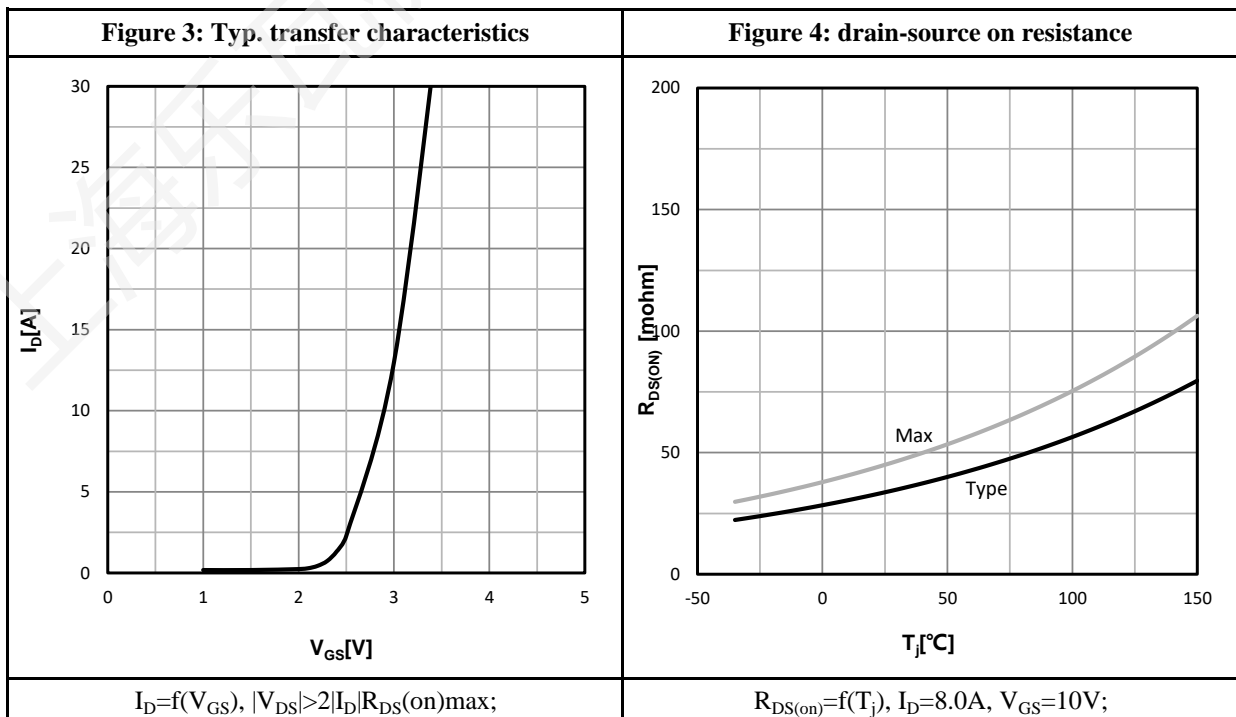
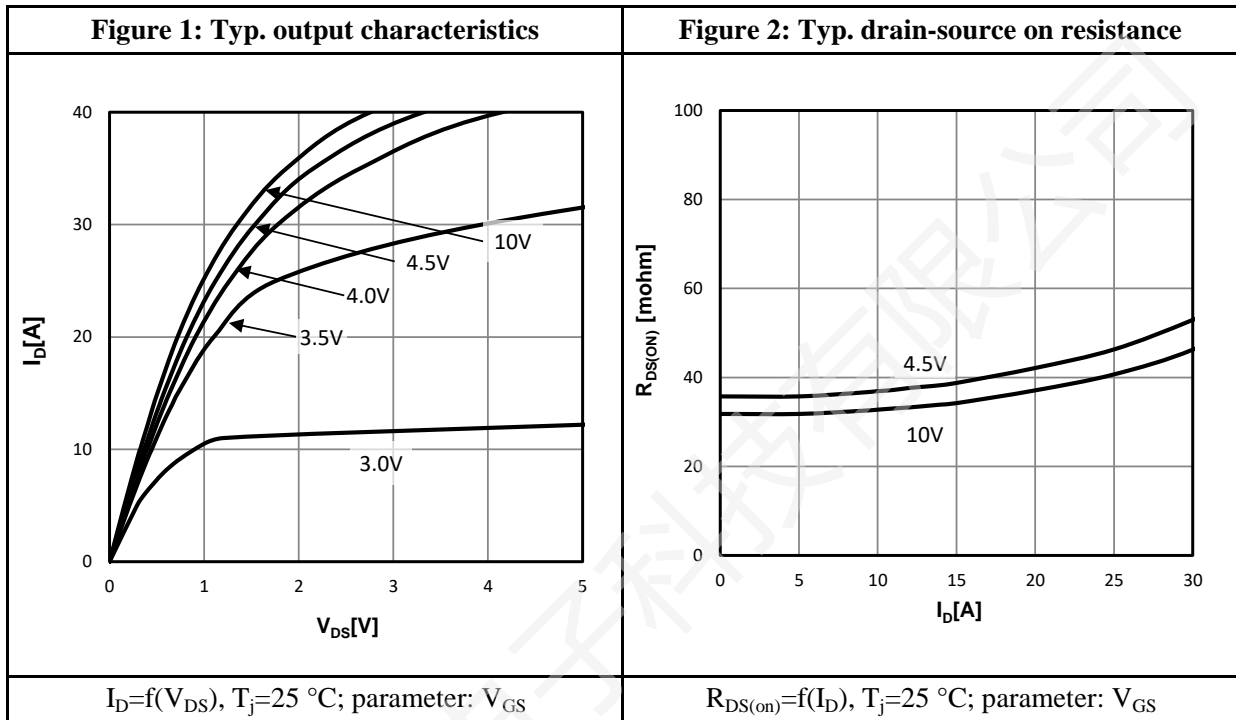
Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D=8.0A$	--	4.2	--	ns
t_r	Rise Time	$V_{DS}=30V$	--	3.4	--	
$t_{d(OFF)}$	Turn-Off Delay Time	$V_{GS}=10V$	--	16	--	
t_f	Fall Time	$R_G=3.0\Omega$	--	2.0	--	
Q_g	Total Gate Charge	$V_{GS}=10V$	--	22	--	nC
Q_{gs}	Gate to Source Charge	$V_{DS}=30V$	--	3.4	--	
Q_{gd}	Gate to Drain Charge	$I_D=8.0A$	--	4.7	--	

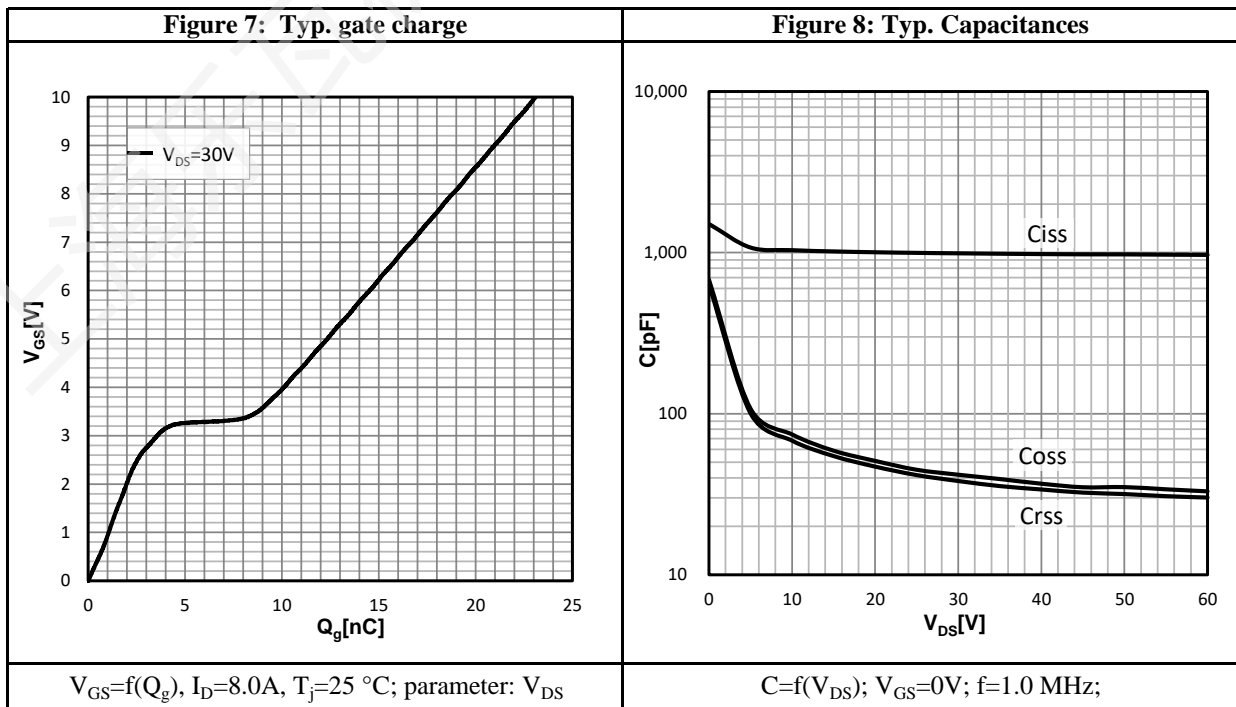
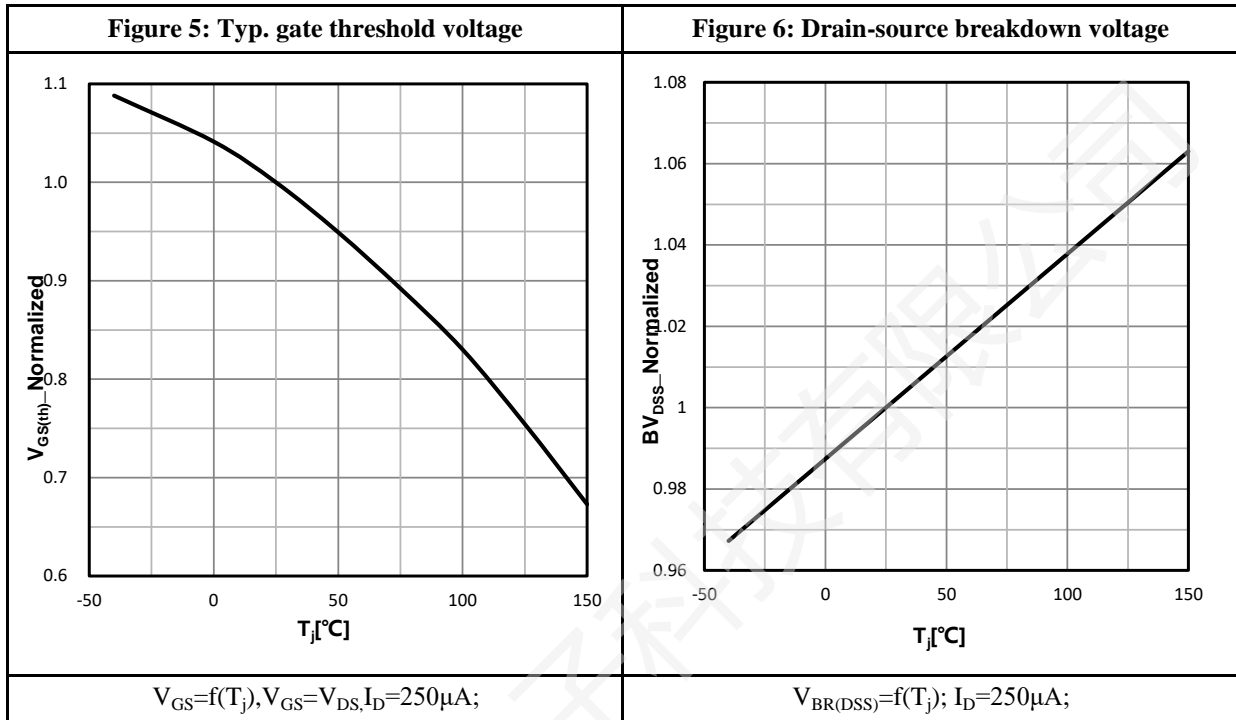
Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
I_S	Diode Forward Current	$T_C=25\text{ }^\circ\text{C}$	--	--	16	A
V_{SD}	Diode Forward Voltage	$I_S=8.0A, V_{GS}=0V$	--	--	1.2	V

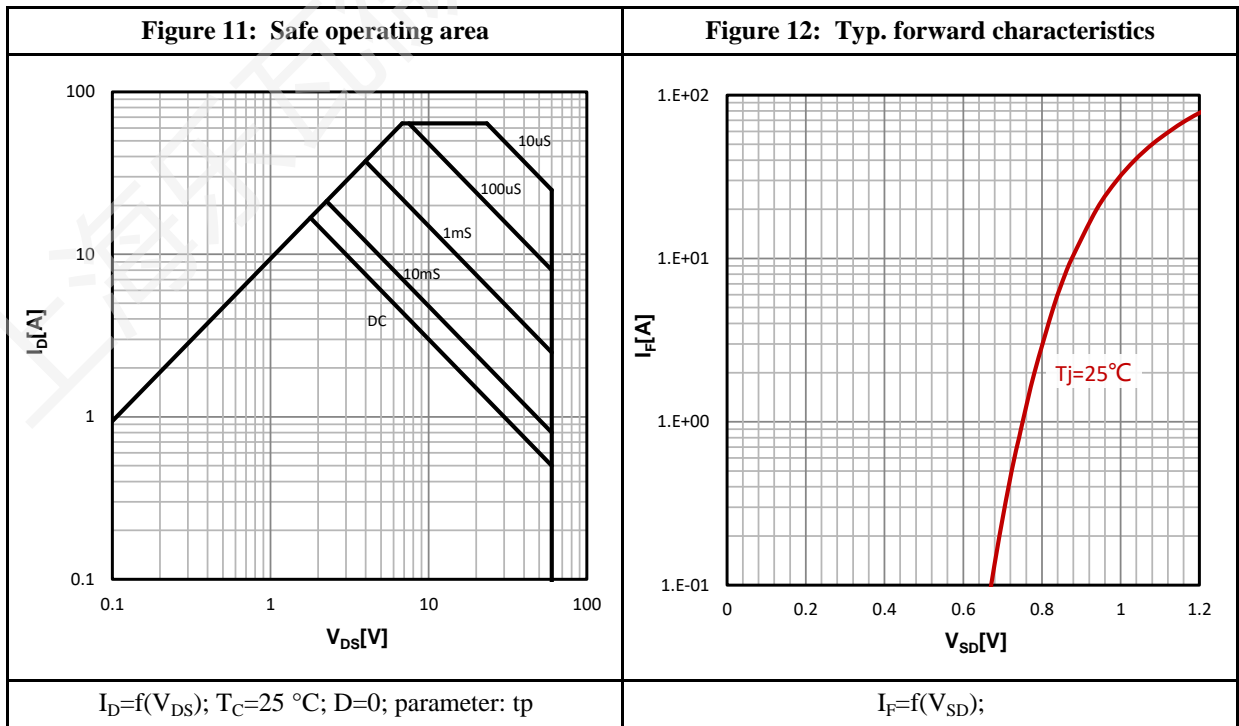
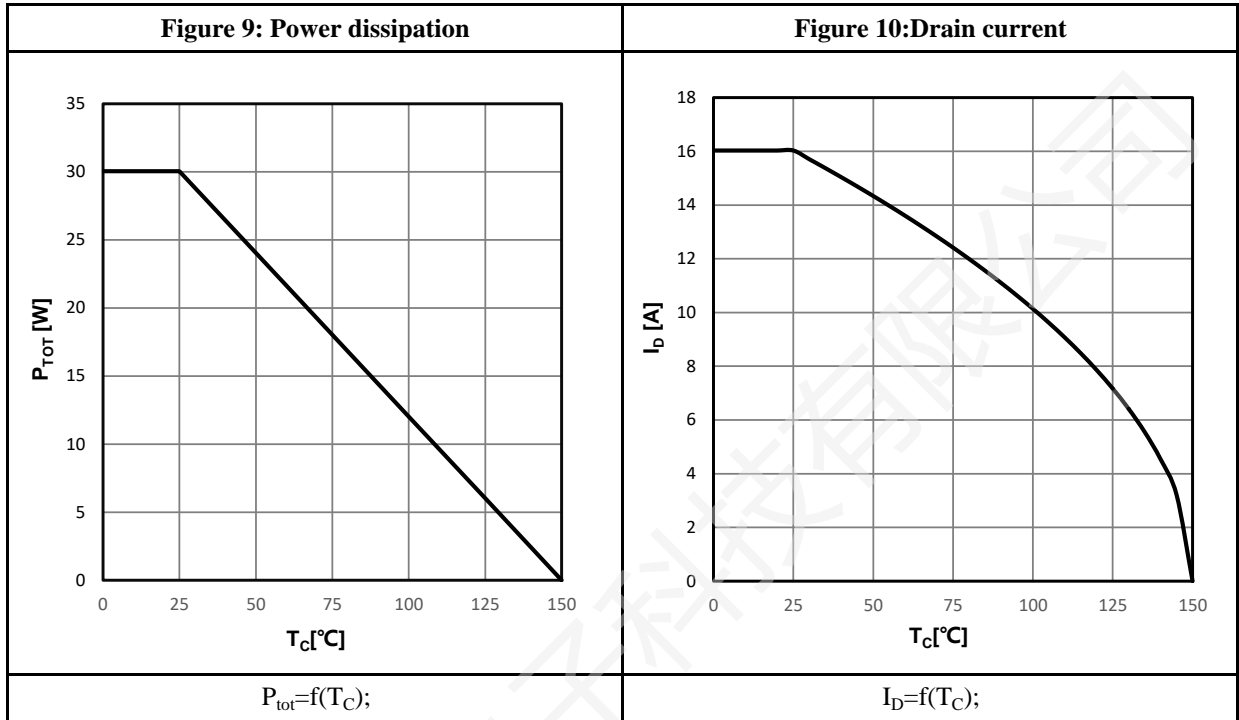
a1: Repetitive rating; pulse width limited by maximum junction temperature

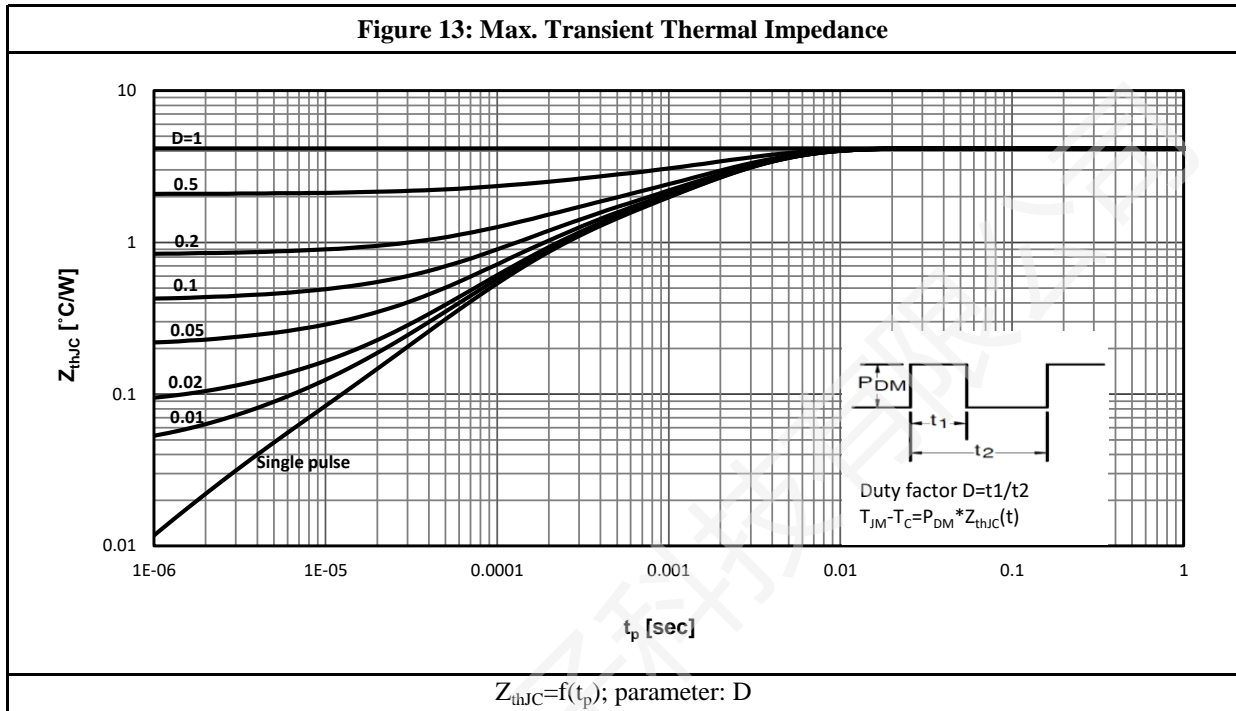
a2: $V_{DD}=30V, L=0.5mH, R_G=25\Omega$, Starting $T_J=25\text{ }^\circ\text{C}$

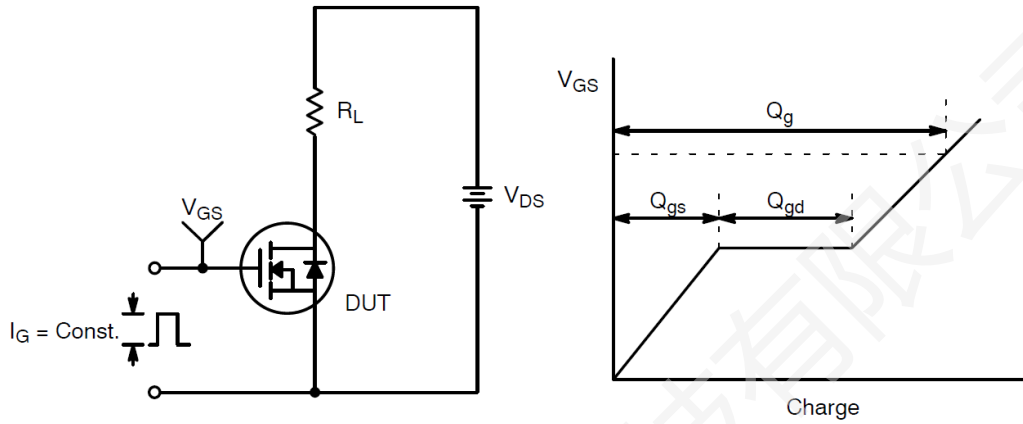
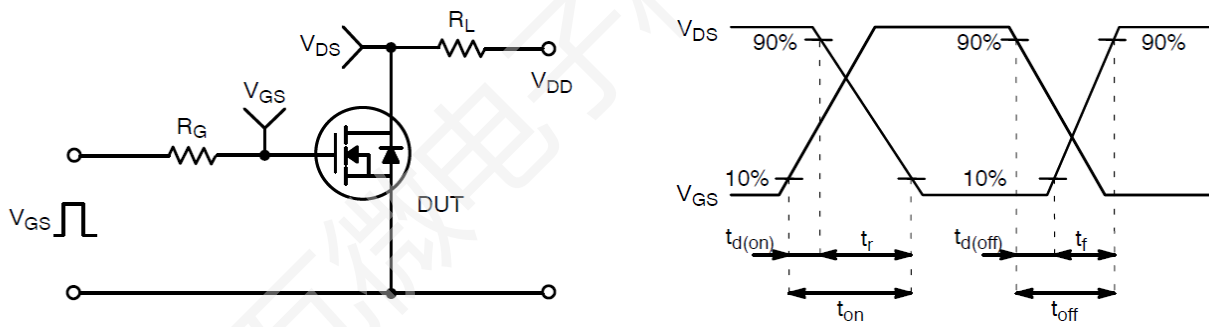
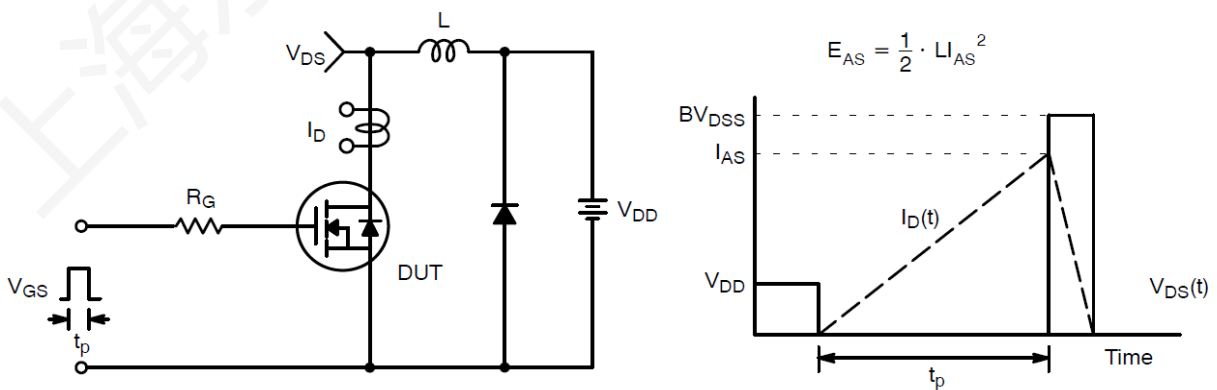
a3: Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm² (one layer, 70 μm thick) copper area for drain connection.

N-Channel 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

P-Channel 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	$V_{GS}=0V, I_D=-250\mu A$	-60	--	--	V
I_{DSS}	Drain to Source Leakage Current	$V_{DS}=-60V, V_{GS}=0V$	--	--	-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	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.3	-1.65	-2.5	V
$R_{DS(ON)1}$	Drain-to-Source On-Resistance	$V_{GS}=-10V, I_D=-5.0A$	--	55	80	$m\Omega$
$R_{DS(ON)2}$	Drain-to-Source On-Resistance	$V_{GS}=-4.5V, I_D=-4.0A$	--	69	120	$m\Omega$

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{GS}=0V$	--	490	--	pF
C_{oss}	Output Capacitance	$V_{DS}=-30V$	--	87	--	
C_{rss}	Reverse Transfer Capacitance	$f=1.0MHz$	--	5.8	--	
R_G	Gate resistance	$V_{GS}=0V, V_{DS}=0V, f=1MHz$	--	3.0	--	Ω

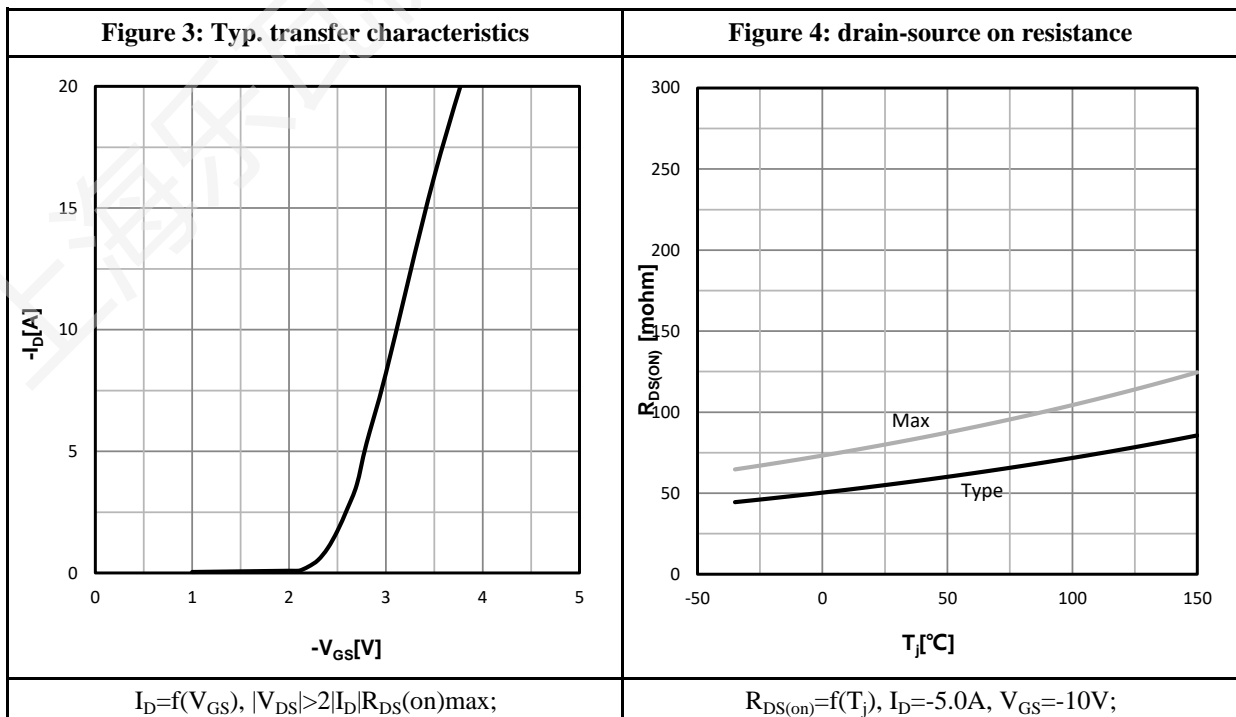
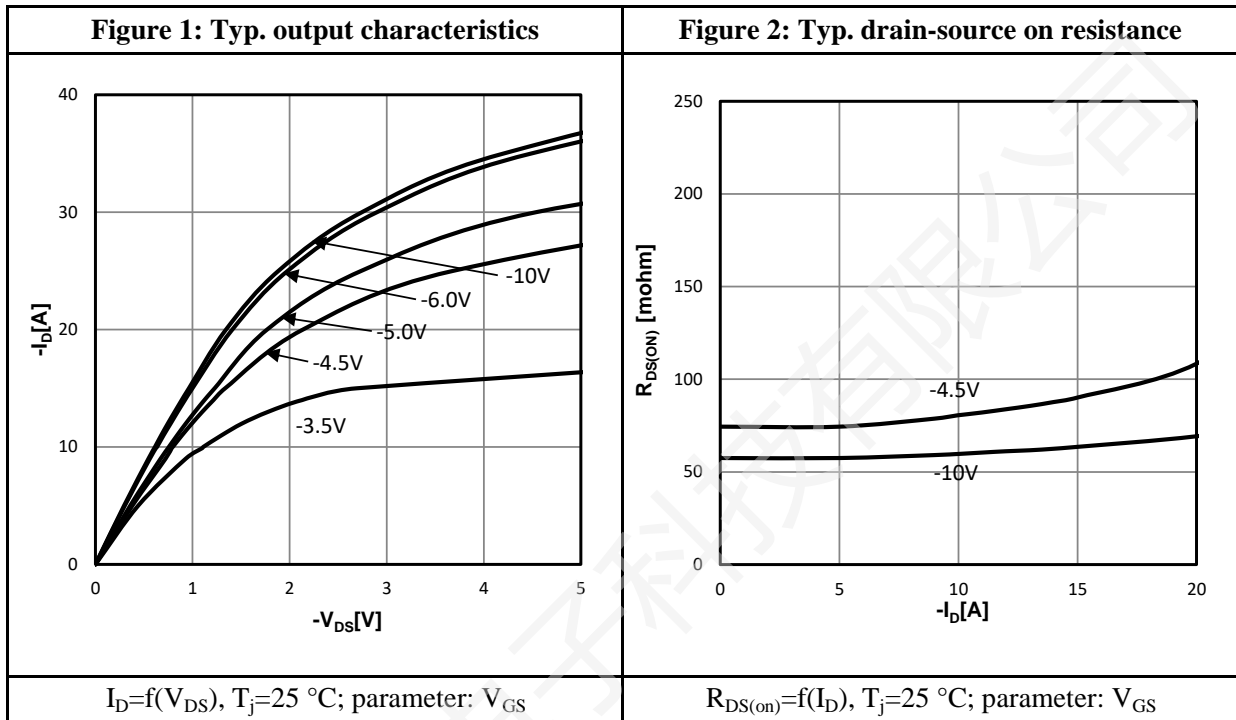
Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D=-5.0A$	--	9.0	--	ns
t_r	Rise Time	$V_{DS}=-30V$	--	10	--	
$t_{d(OFF)}$	Turn-Off Delay Time	$V_{GS}=-10V$	--	25	--	
t_f	Fall Time	$R_G=3.0\Omega$	--	11	--	
Q_g	Total Gate Charge	$V_{GS}=-10V$	--	8.0	--	nC
Q_{gs}	Gate to Source Charge	$V_{DS}=-30V$	--	1.8	--	
Q_{gd}	Gate to Drain Charge	$I_D=-5.0A$	--	1.1	--	

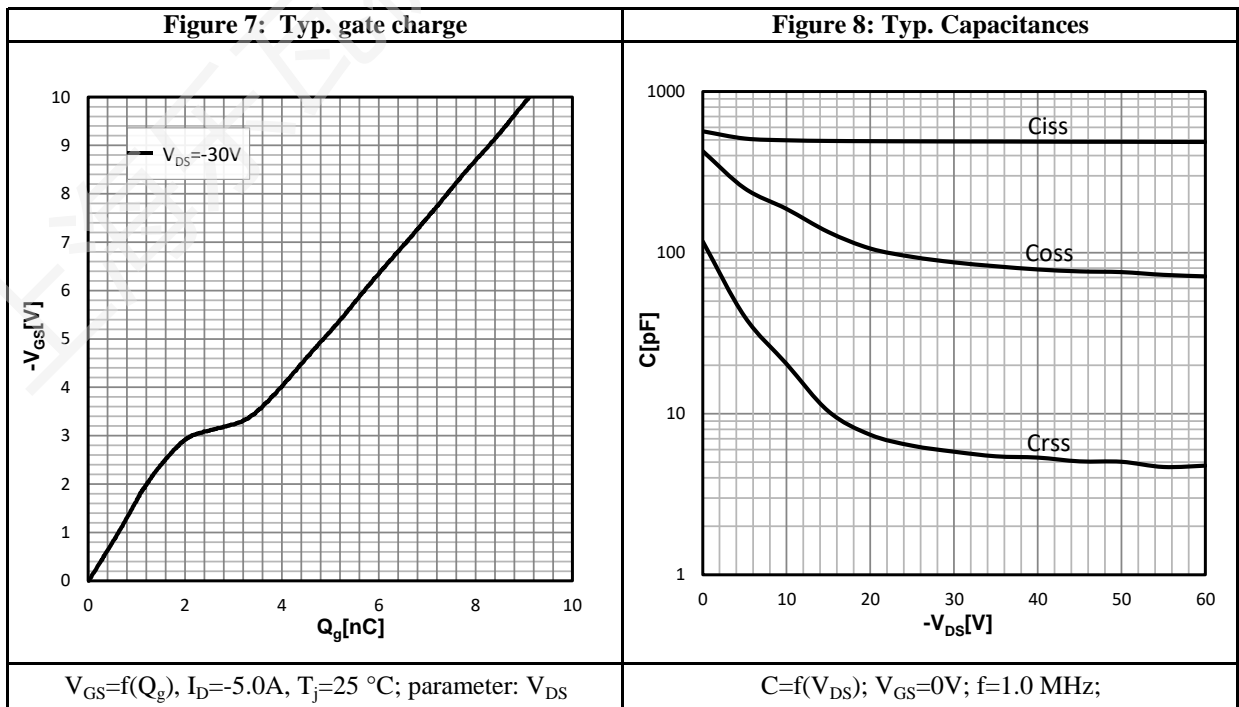
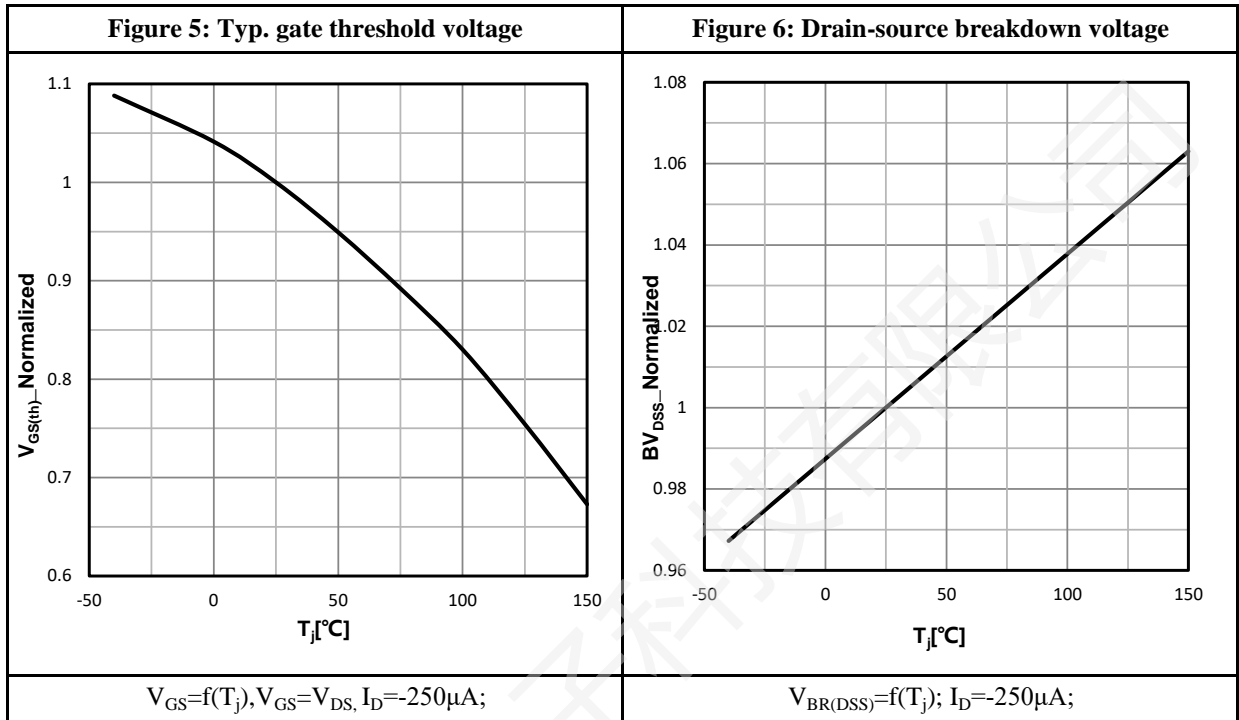
Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
I_S	Diode Forward Current	$T_C=25\text{ }^\circ\text{C}$	--	--	-16	A
V_{SD}	Diode Forward Voltage	$I_S=-5.0A, V_{GS}=0V$	--	--	-1.2	V

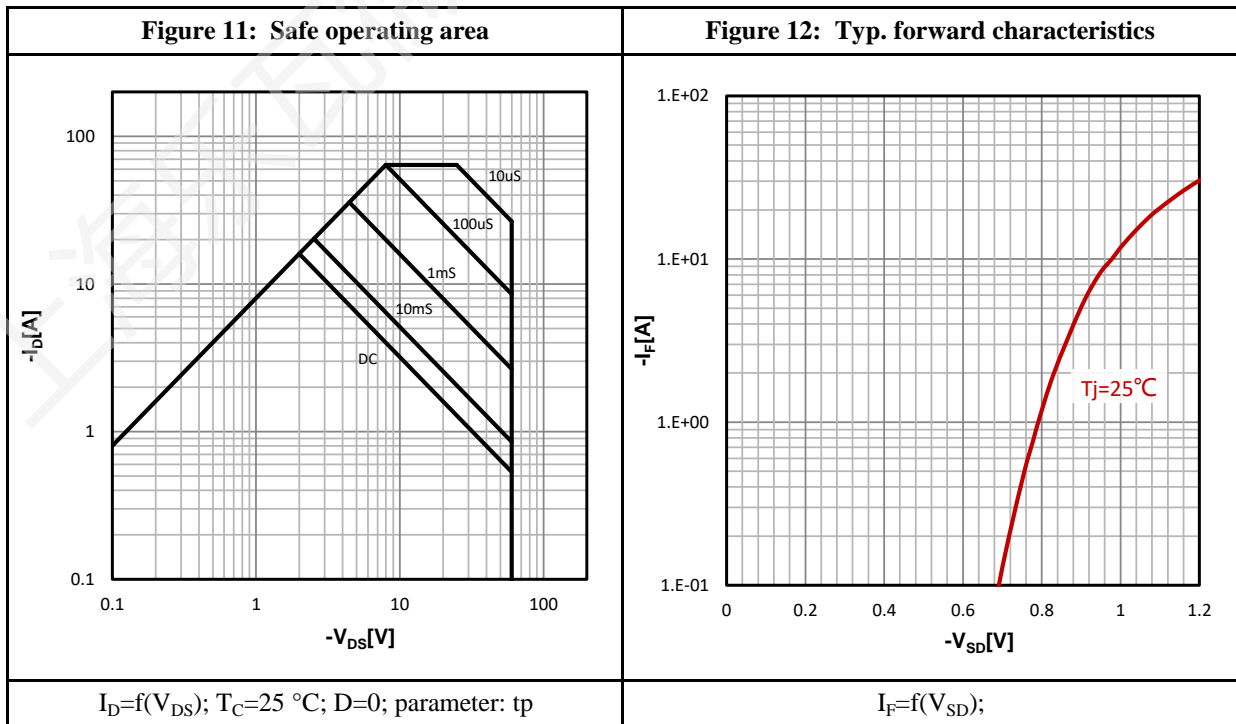
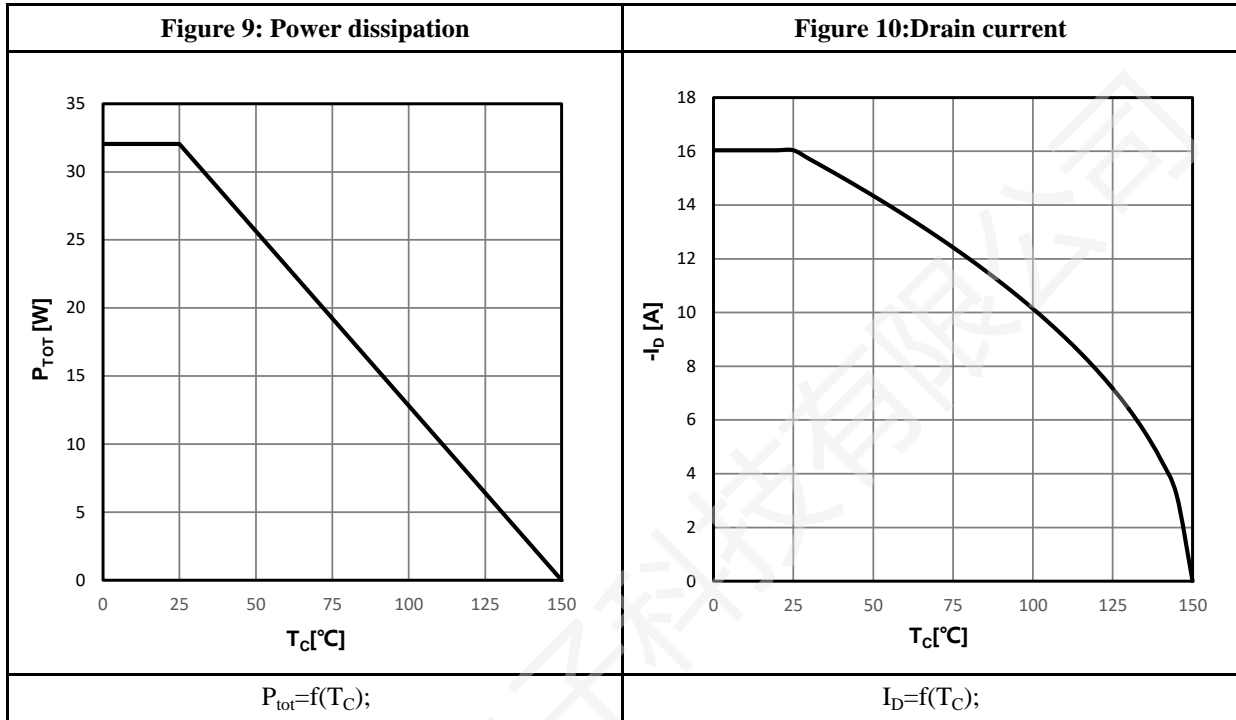
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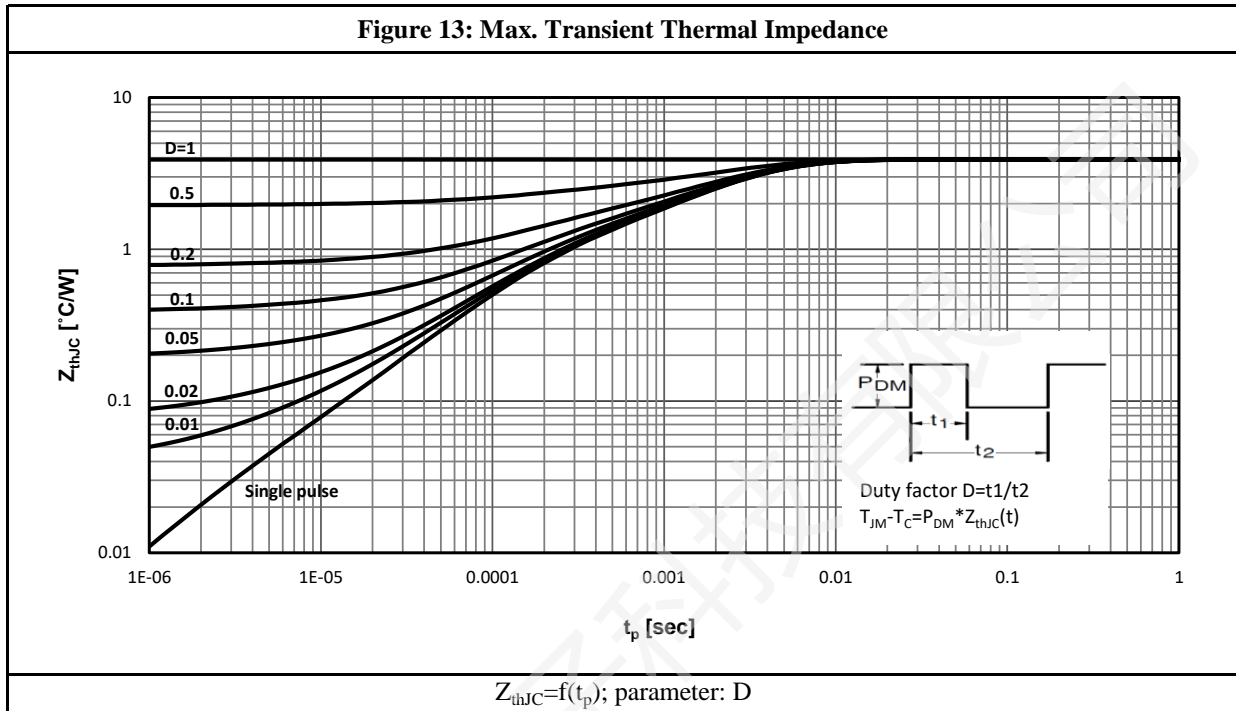
a2: $V_{DD}=-30V, L=0.5mH, R_G=25\Omega$, Starting $T_j=25\text{ }^\circ\text{C}$

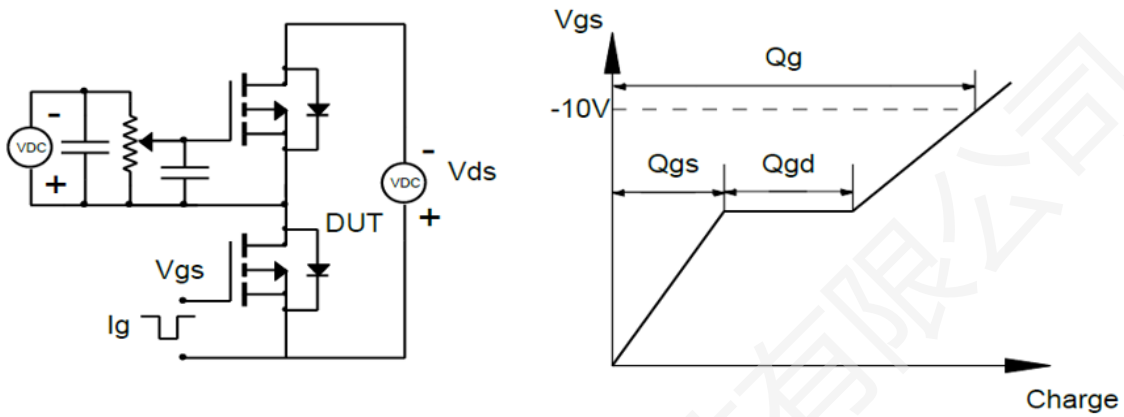
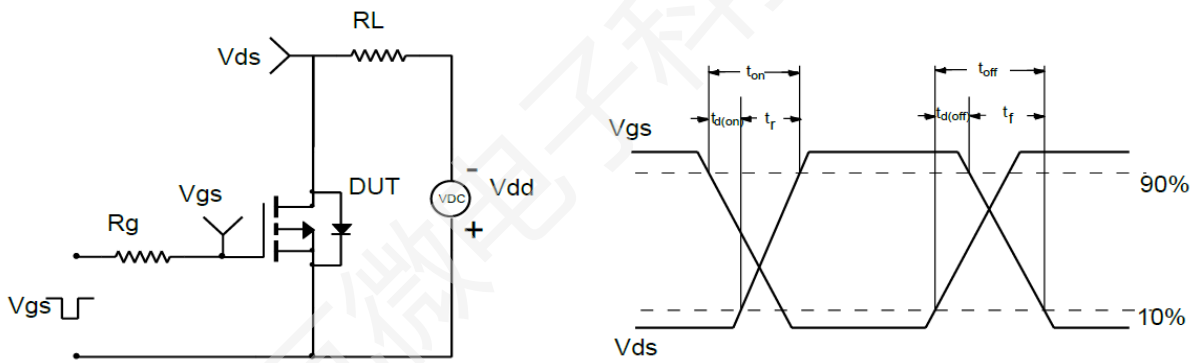
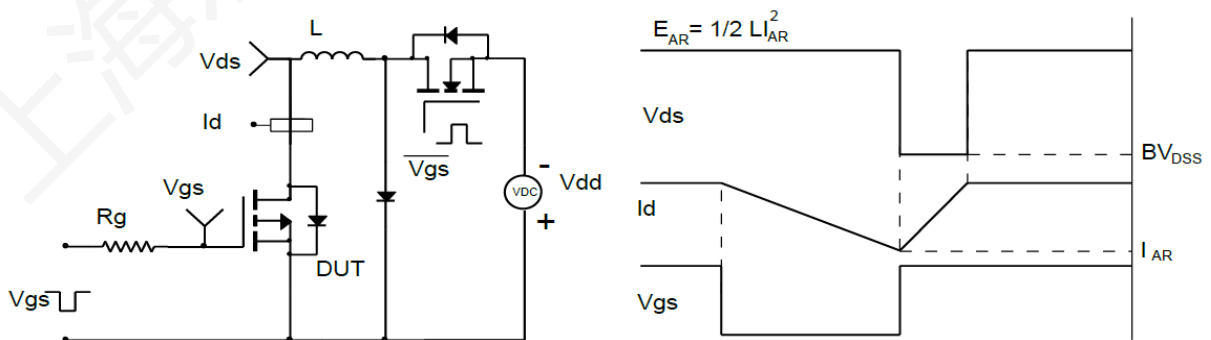
a3: Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm² (one layer, 70 μm thick) copper area for drain connection.

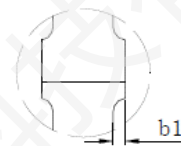
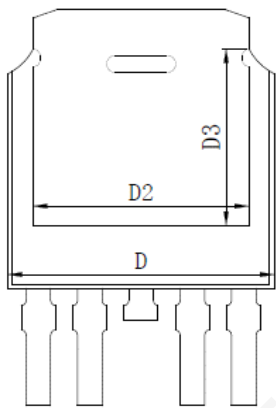
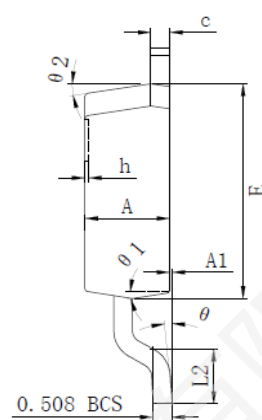
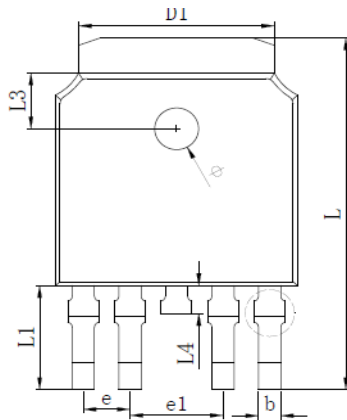
P-Channel Characteristics Curve:








P-Channel 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	TYP	MAX
A	2.200	2.300	2.400
A1	0.000		0.127
b	0.550	0.600	0.650
b1	0.000		0.120
c(电镀后)	0.460	0.520	0.580
D	6.500	6.600	6.700
D1	5.334REF		
D2	5.346REF		
D3	4.490REF		
E	6.000	6.100	6.200
e	1.270TYP		
e1	2.540TYP		
h	0.000	0.100	0.200
L	9.900	10.100	10.300
L1	2.988REF		
L2	1.400	1.550	1.700
L3	1.600REF		
L4	0.700	0.800	0.900
φ	1.100	1.200	1.300
θ	0°		8°
θ1	9° TYP		
θ2	9° TYP		

Revision History:

Revison	Date	Descriptions
Rev 1.1	Jun.2025	Initial Version

Disclaimer:

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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
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