

General Description:

The LWD6001AS 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 SOP-8, 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:

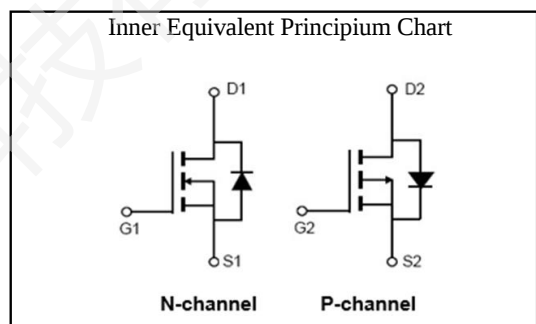
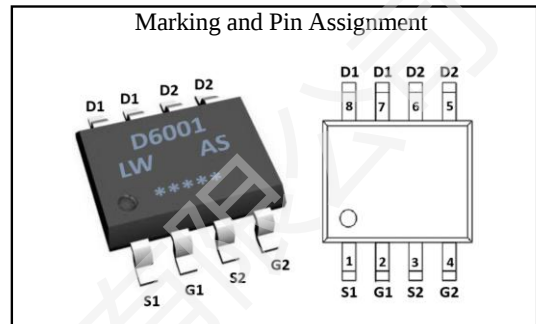
- DC-DC Converter
- Portable Equipment
- Power Management

100% DVDS Tested

100% Avalanche Tested



Symbol	N-Ch	P-Ch	Units
V_{DSS}	60	-60	V
I_D	6.0	-5.0	A
$R_{DS(ON)}$ TYPE	35	55	m Ω



Package Marking and Ordering Information:

Marking	Part Number	Package	Packing	Qty.
D6001/LW AS/D.C.	LWD6001AS	SOP-8	Reel	4000 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	$T_A=25^{\circ}\text{C}$	6.0	-5.0	A
	Continuous Drain Current	$T_A=100^{\circ}\text{C}$	3.8	-3.1	A
I_{DM}^{a1}	Pulsed Drain Current		24	-20	A
E_{AS}^{a2}	Single pulse avalanche energy		27	20	mJ
V_{GS}	Gate-to-Source Voltage		± 20	± 20	V
P_D	Power Dissipation		2.2	2.3	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	
$R_{\theta JA}^{a3}$	Thermal Resistance, Junction-to-Ambient		56	54	$^{\circ}\text{C/W}$

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	$V_{GS}=10V, I_D=8.0A$	--	35	45	m Ω
$R_{DS(ON)2}$	Drain-to-Source On-Resistance	$V_{GS}=4.5V, I_D=5.0A$	--	38	55	m Ω

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{GS}=0V$ $V_{DS}=30V$ $f=1.0MHz$	--	1056	--	pF
C_{oss}	Output Capacitance		--	42	--	
C_{rss}	Reverse Transfer Capacitance		--	28	--	
R_G	Gate resistance	$V_{GS}=0V, V_{DS}=0V, f=1MHz$	--	1.5	--	Ω

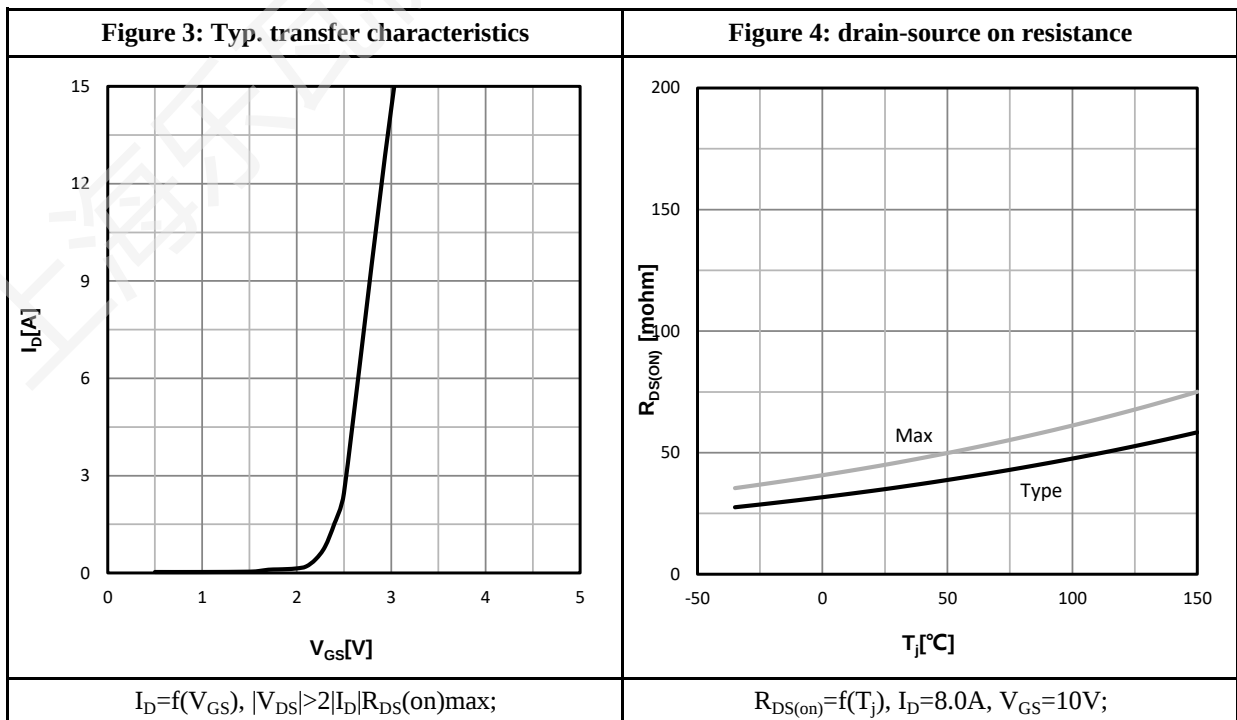
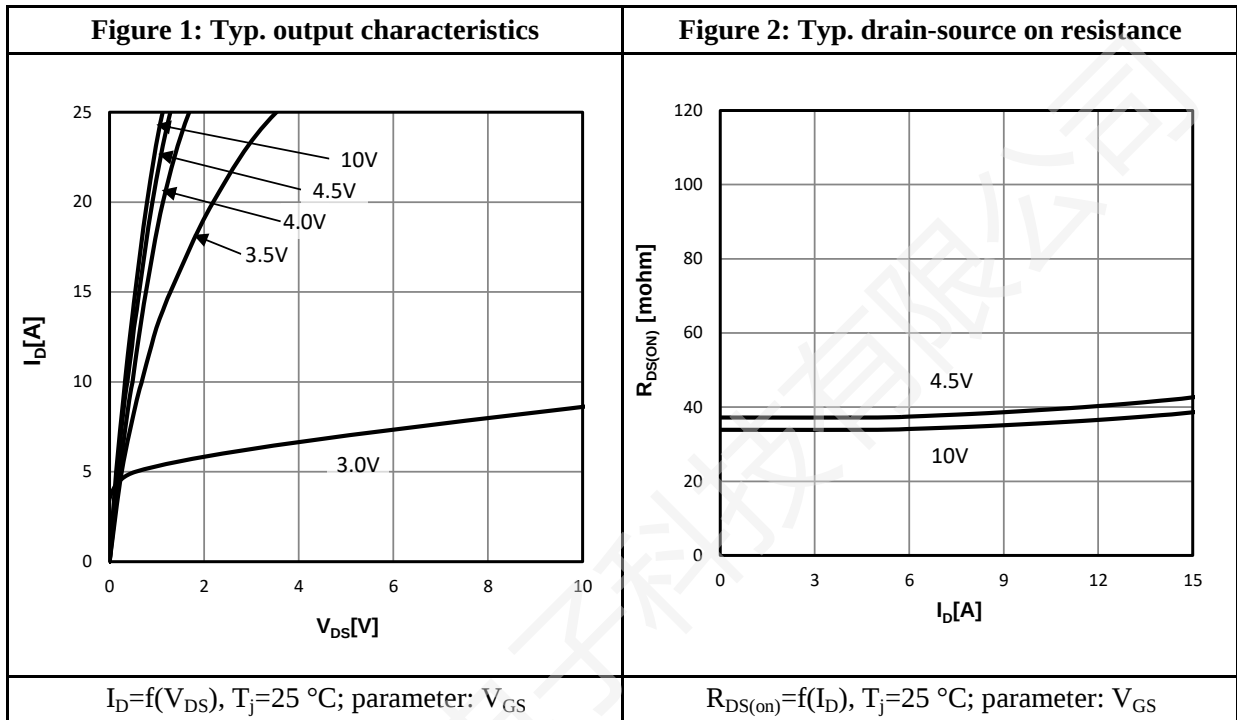
Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D=8.0A$ $V_{DS}=30V$ $V_{GS}=10V$ $R_G=3.0\Omega$	--	4.2	--	ns
t_r	Rise Time		--	3.4	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	16	--	
t_f	Fall Time		--	2.0	--	
Q_g	Total Gate Charge	$V_{GS}=10V$ $V_{DS}=30V$ $I_D=8.0A$	--	24	--	nC
Q_{gs}	Gate to Source Charge		--	2.7	--	
Q_{gd}	Gate to Drain Charge		--	4.5	--	

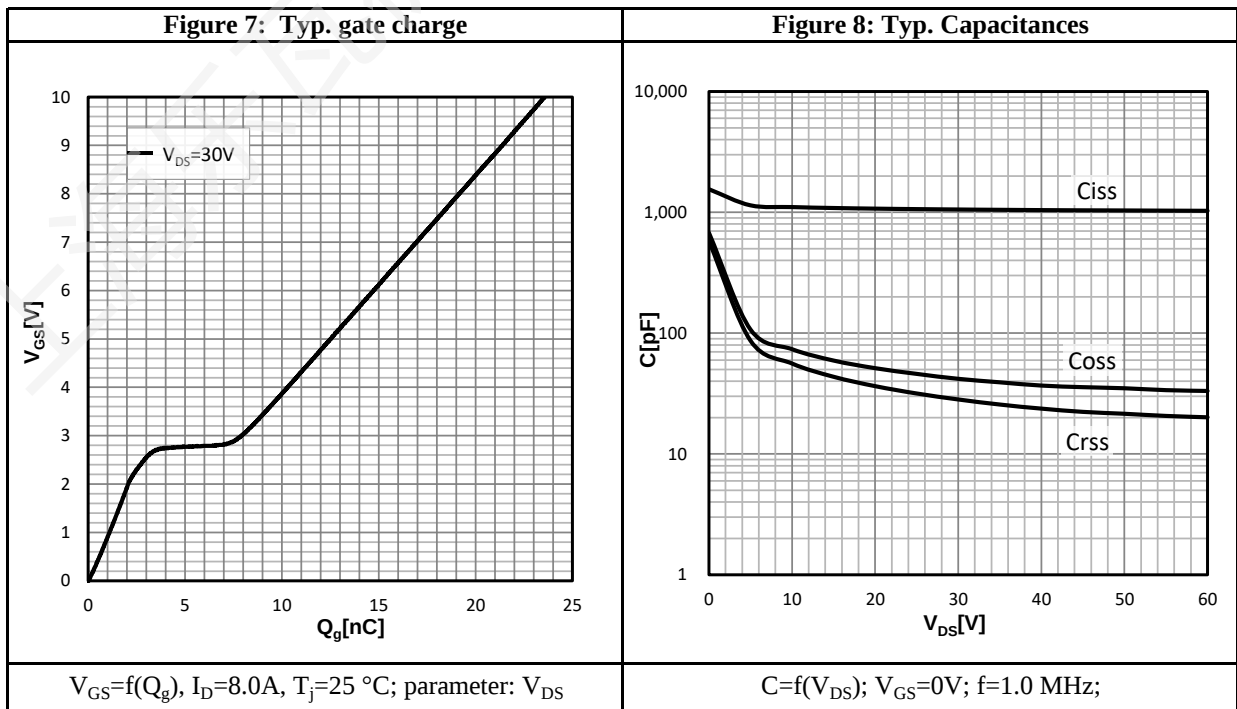
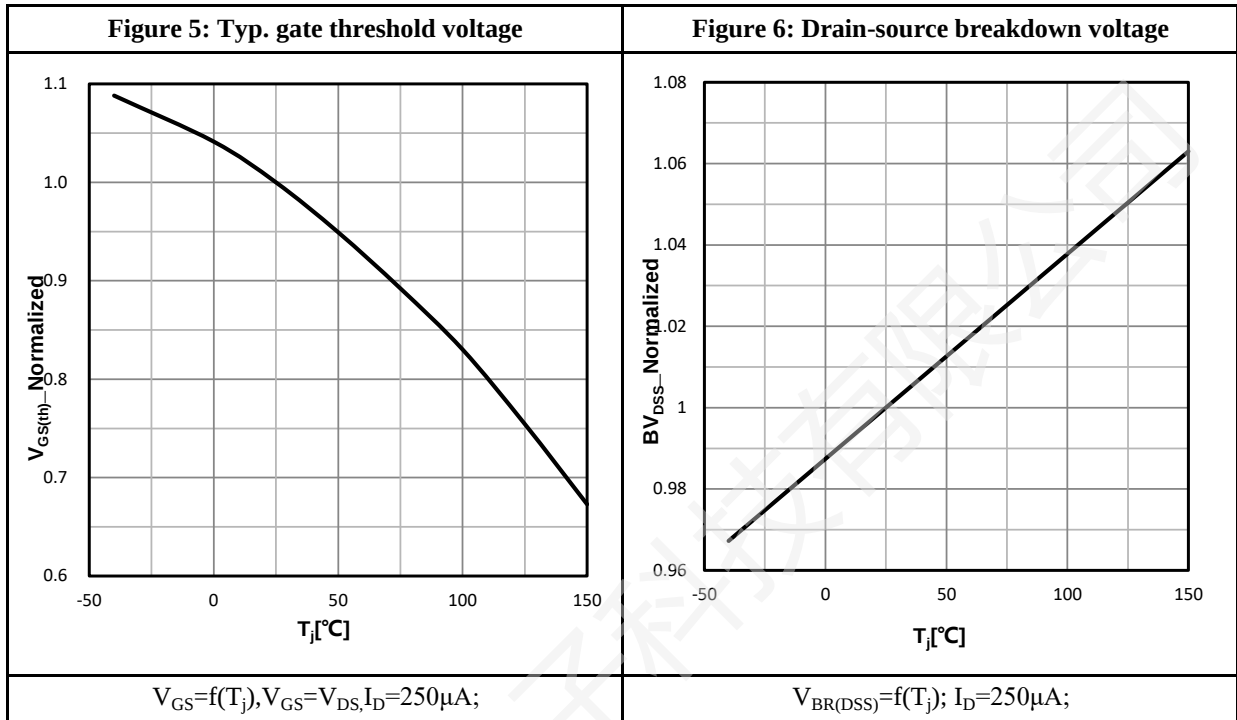
Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
I_S	Diode Forward Current	$T_A=25\text{ }^{\circ}\text{C}$	--	--	6.0	A
V_{SD}	Diode Forward Voltage	$I_S=8.0A, V_{GS}=0V$	--	--	1.2	V

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

a2: $V_{DD}=30V, L=0.1mH, R_G=25\Omega$, 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.

N-Channel Characteristics Curve:




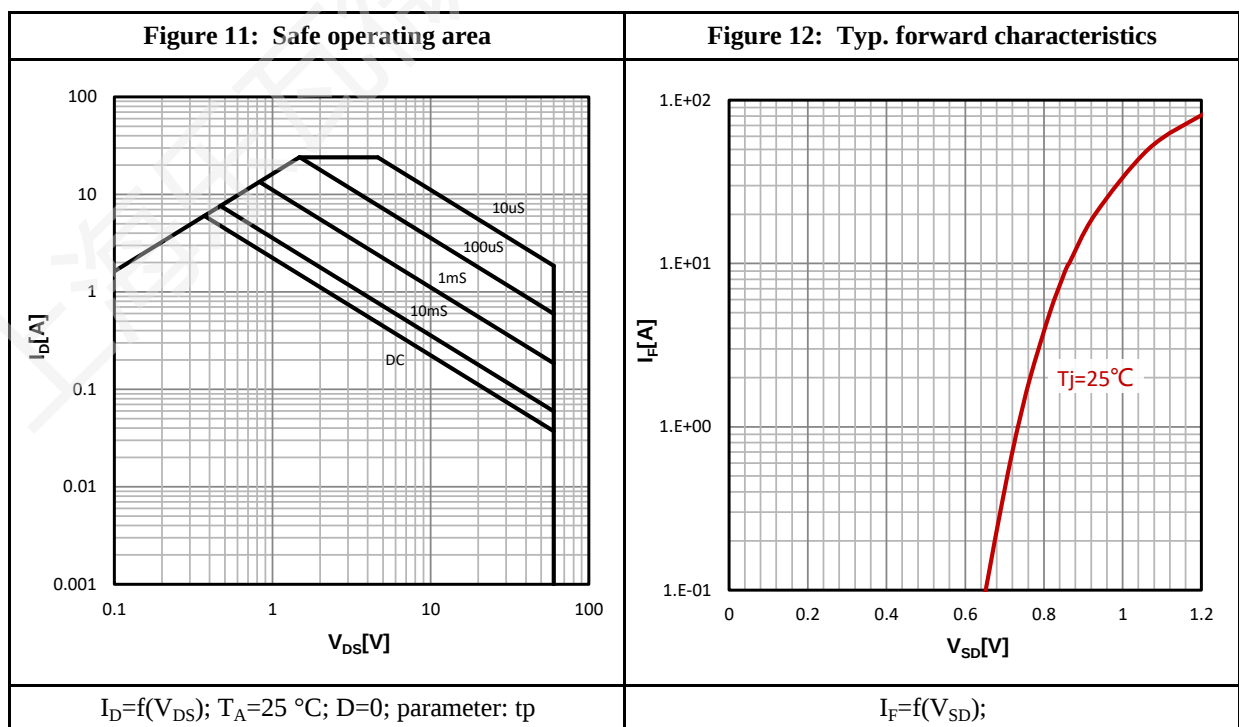
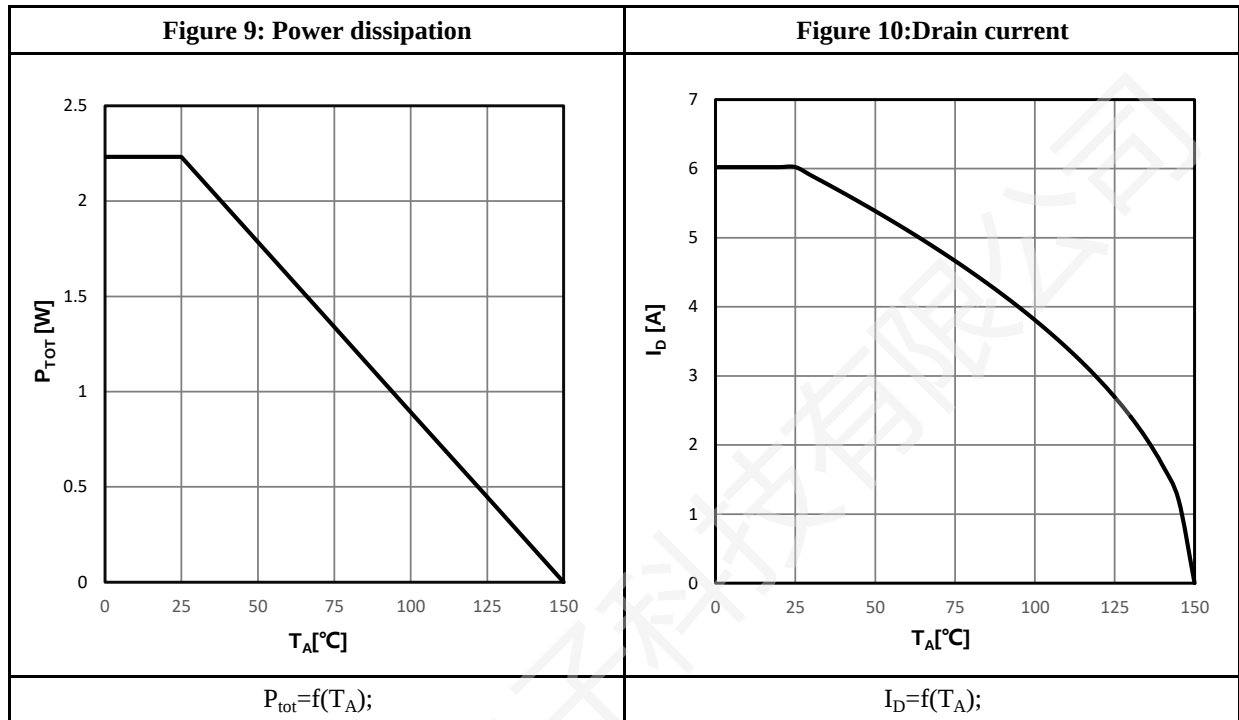
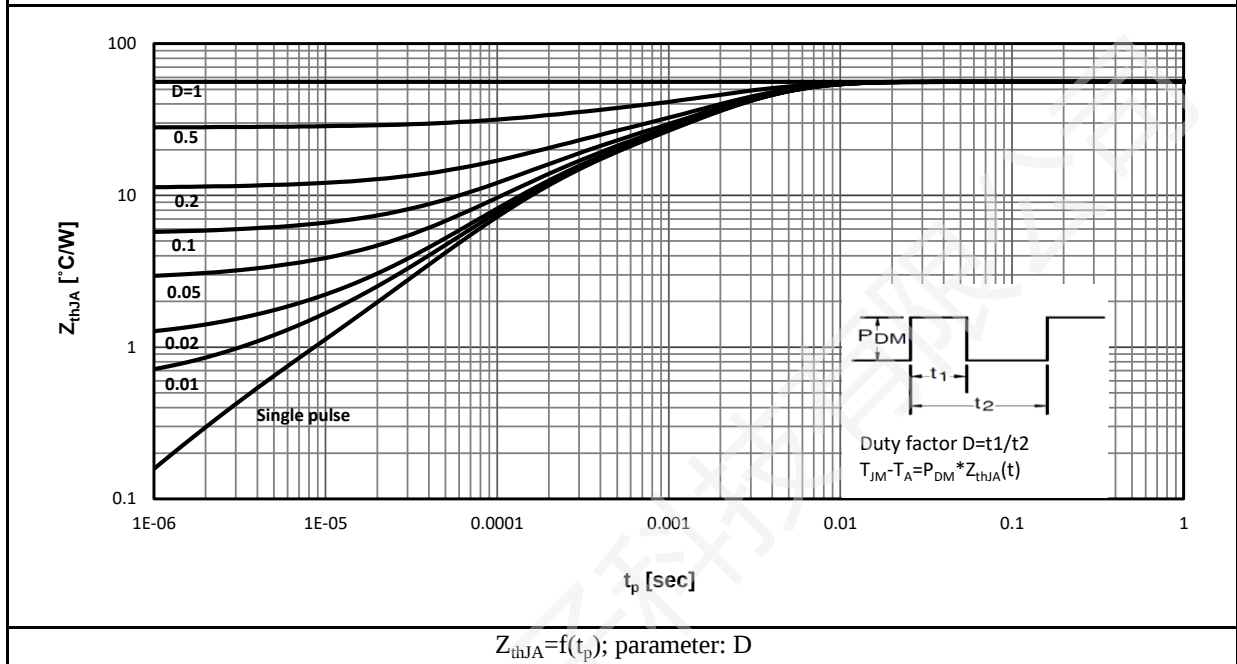
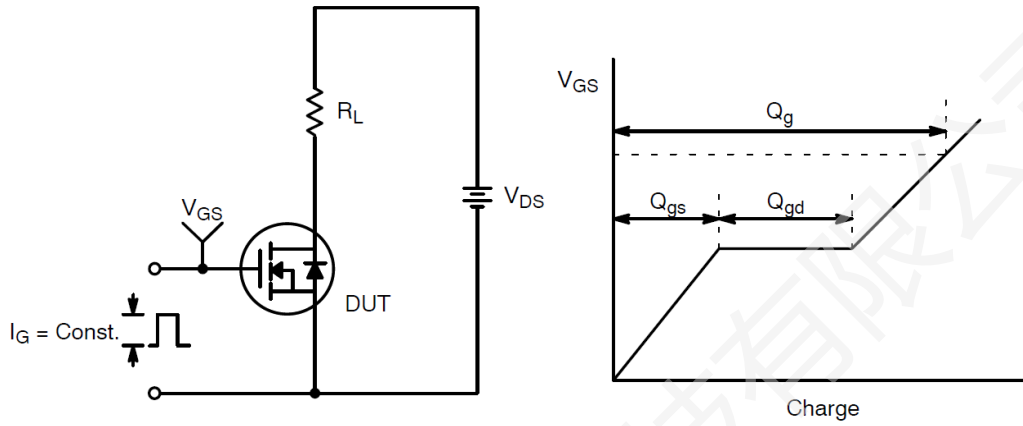
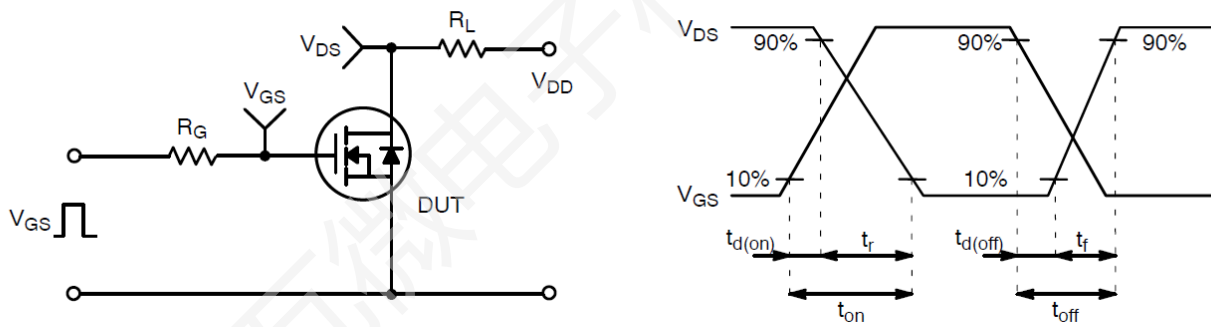
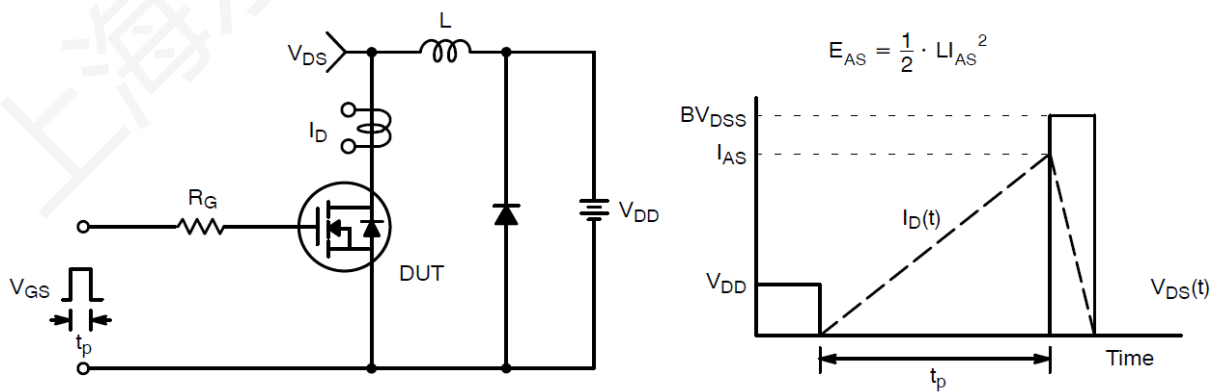


Figure 13: Max. Transient Thermal Impedance


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

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	-2.1	V
$R_{DS(ON)1}$	Drain-to-Source On-Resistance	$V_{GS}=-10V, I_D=-5.0A$	--	55	71	$m\Omega$
$R_{DS(ON)2}$	Drain-to-Source On-Resistance	$V_{GS}=-4.5V, I_D=-4.0A$	--	70	100	$m\Omega$

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{GS}=0V$	--	472	--	pF
C_{oss}	Output Capacitance	$V_{DS}=-30V$	--	90	--	
C_{rss}	Reverse Transfer Capacitance	$f=1.0MHz$	--	6.7	--	
R_G	Gate resistance	$V_{GS}=0V, V_{DS}=0V, f=1MHz$	--	3.5	--	Ω

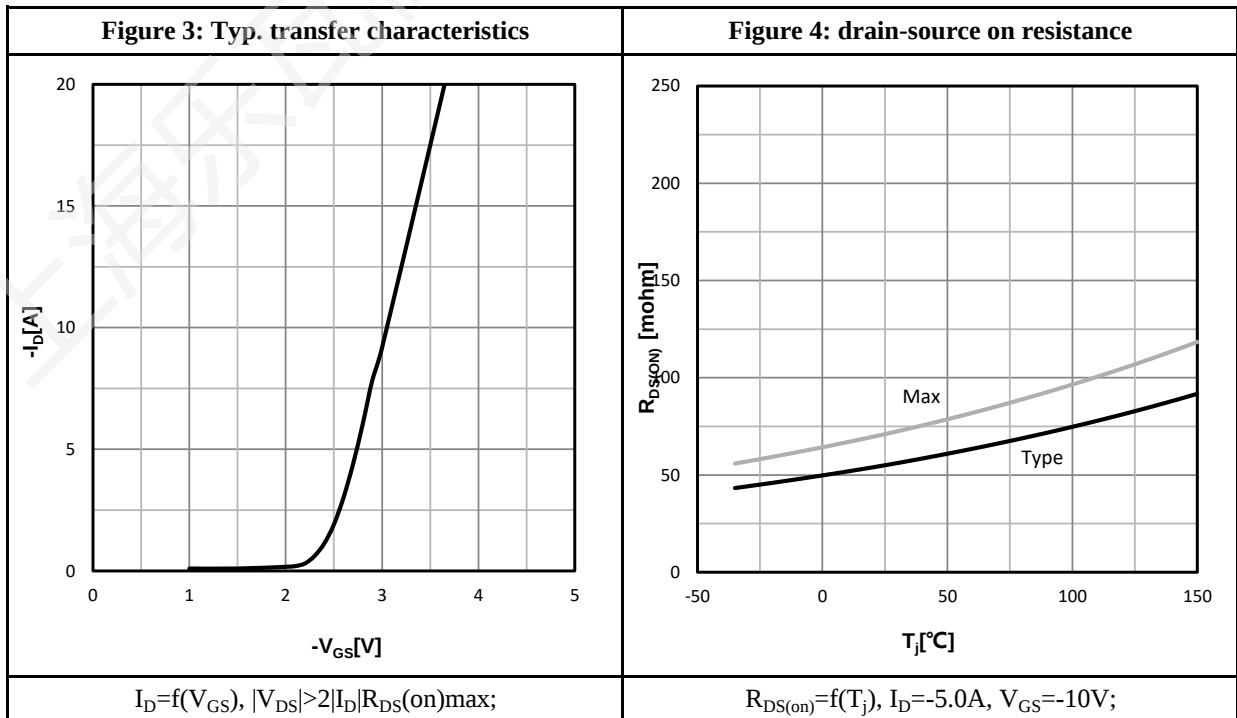
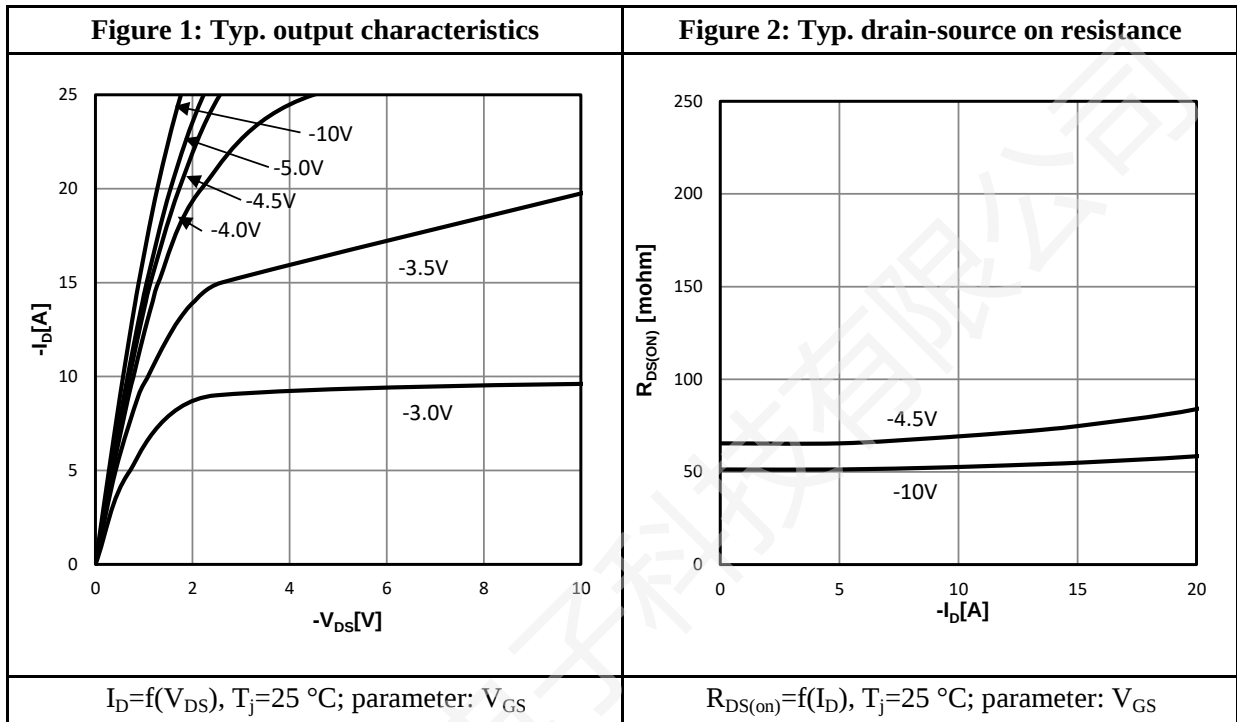
Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D=-5.0A$	--	9.0	--	ns
t_r	Rise Time	$V_{DS}=-30V$	--	10	--	
$t_{d(OFF)}$	Turn-Off Delay Time	$V_{GS}=-10V$	--	25	--	
t_f	Fall Time	$R_G=3.0\Omega$	--	11	--	
Q_g	Total Gate Charge	$V_{GS}=-10V$	--	10	--	nC
Q_{gs}	Gate to Source Charge	$V_{DS}=-30V$	--	1.6	--	
Q_{gd}	Gate to Drain Charge	$I_D=-5.0A$	--	1.4	--	

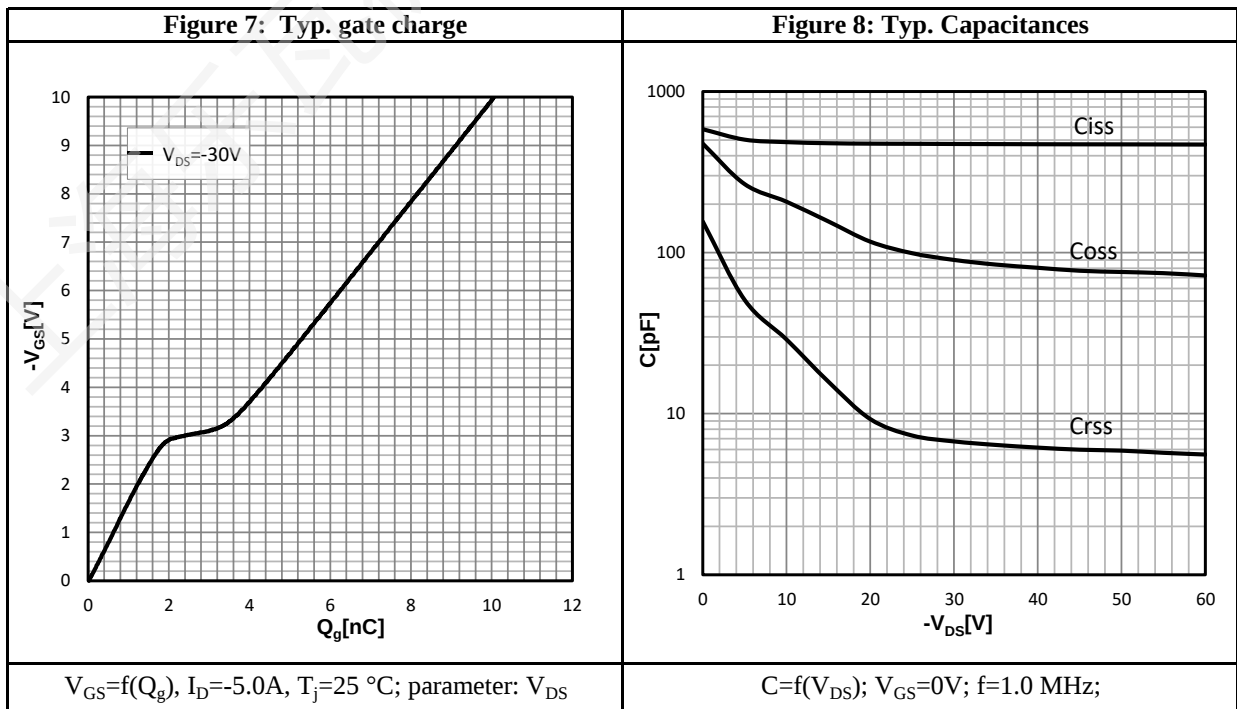
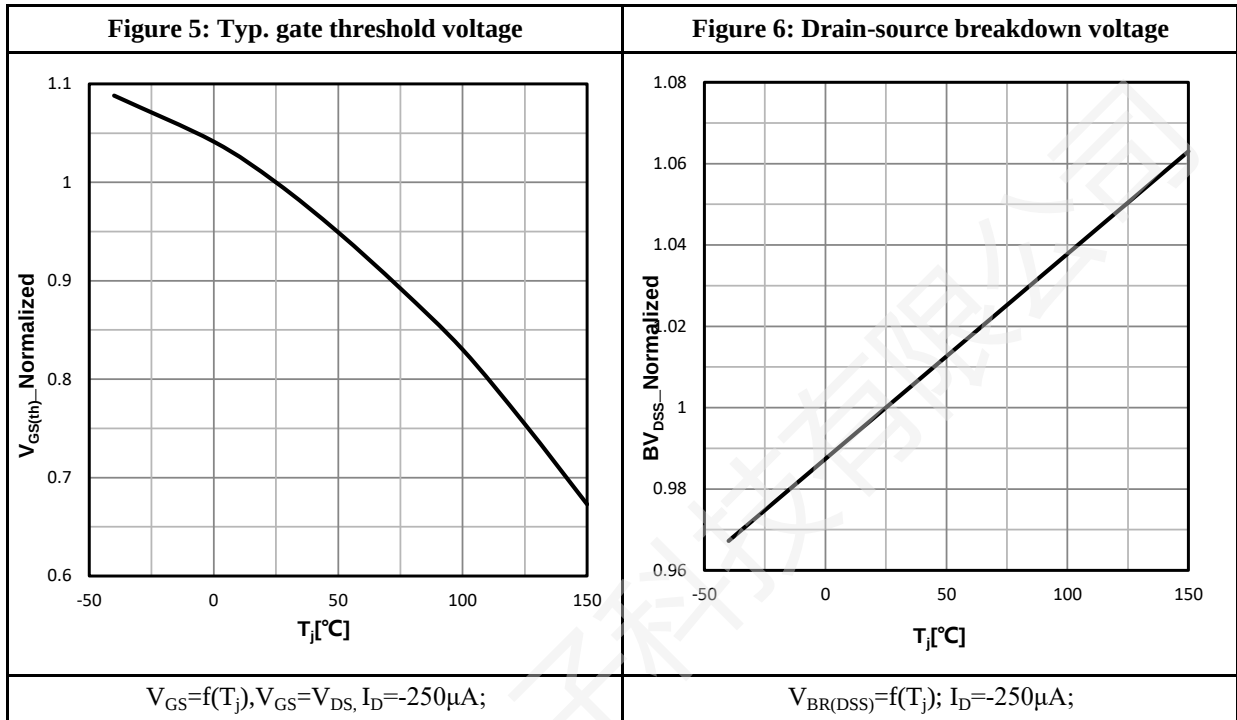
Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
I_S	Diode Forward Current	$T_A=25\text{ }^{\circ}\text{C}$	--	--	-5.0	A
V_{SD}	Diode Forward Voltage	$I_S=-5.0A, V_{GS}=0V$	--	--	-1.2	V

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

a2: $V_{DD}=-30V, L=0.1mH, R_G=25\Omega$, 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.

P-Channel Characteristics Curve:




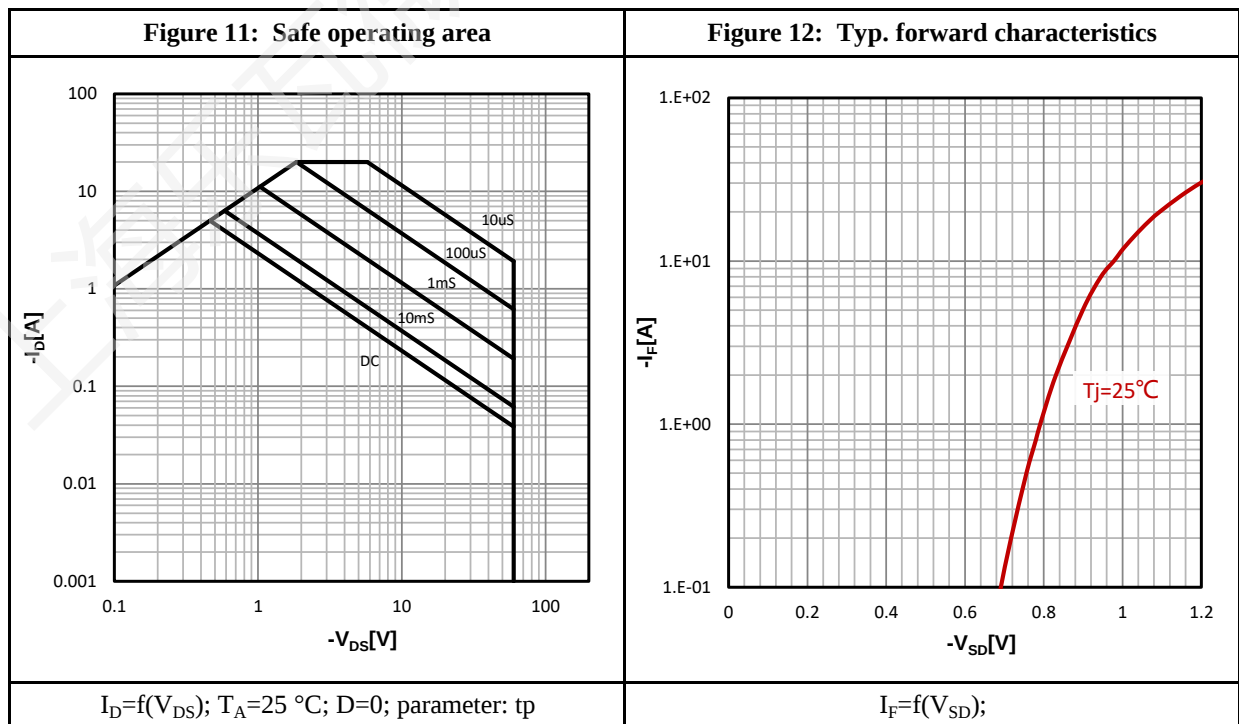
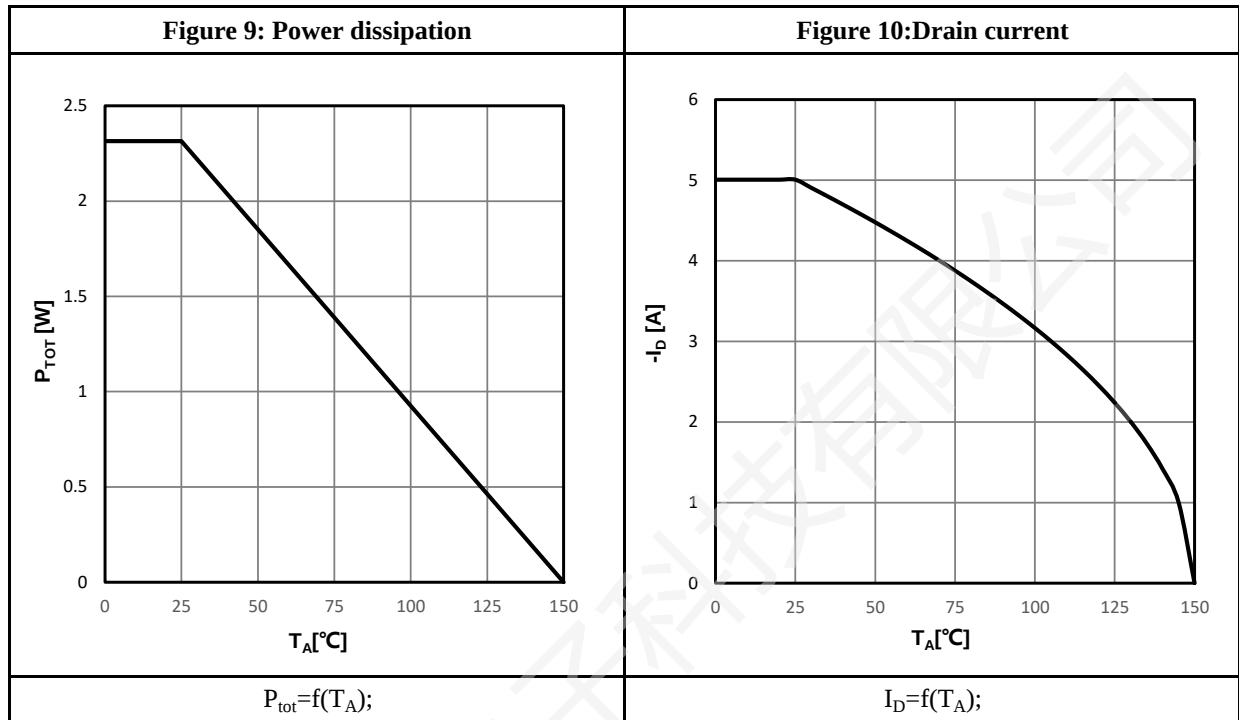
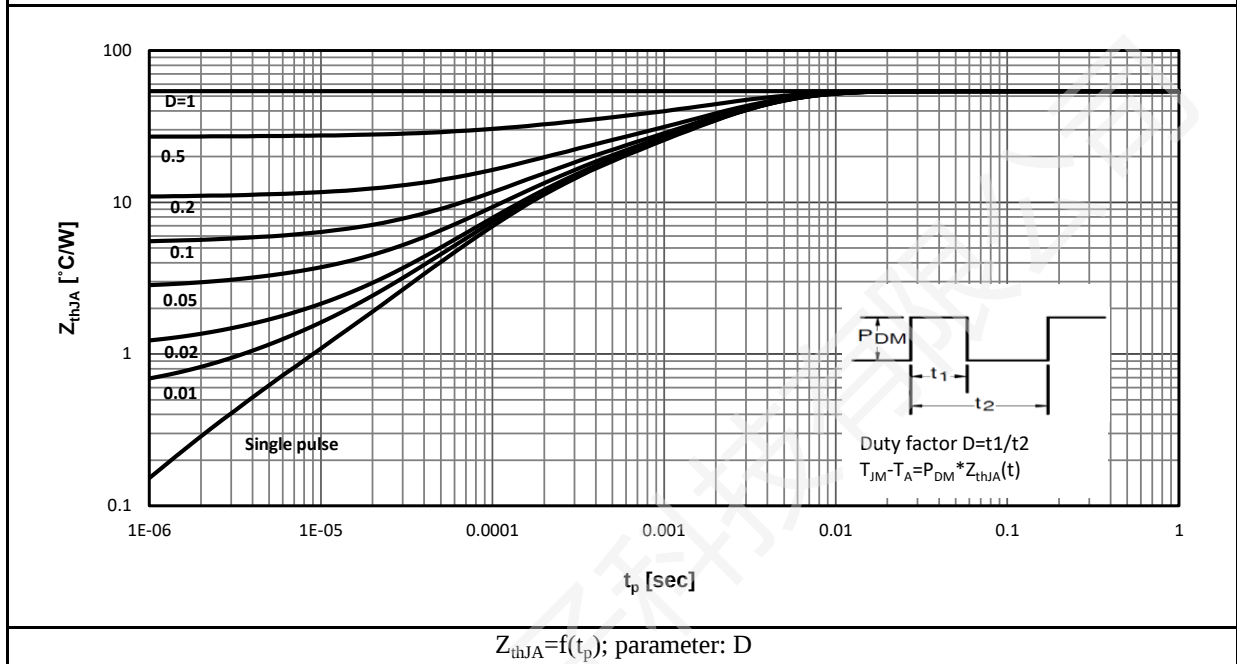
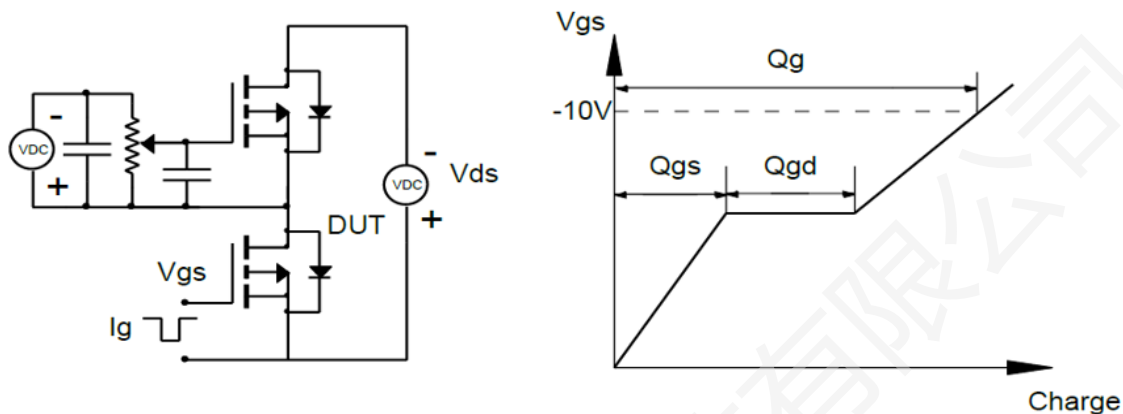
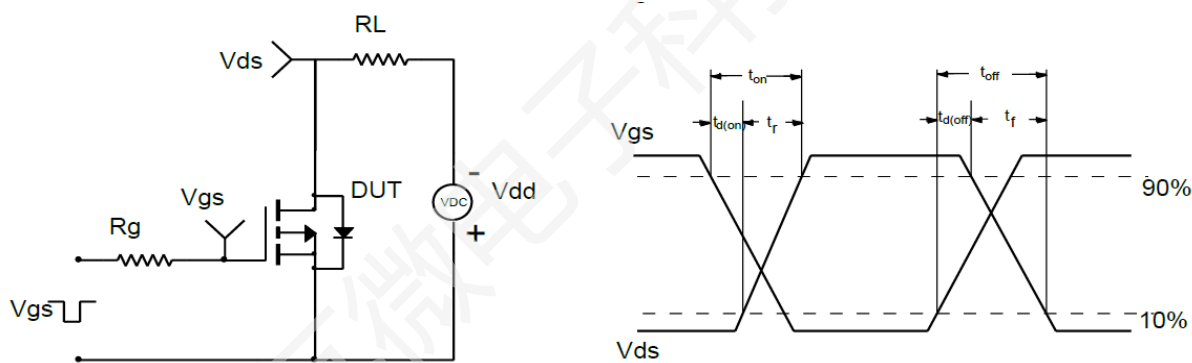
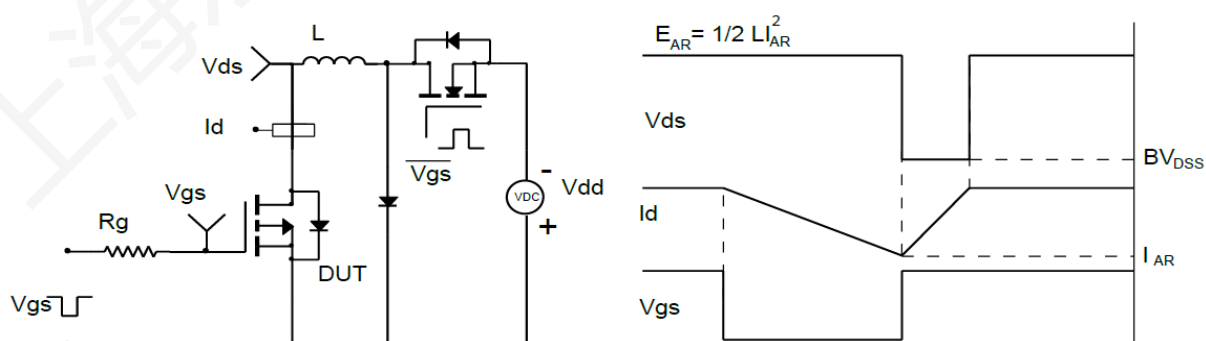
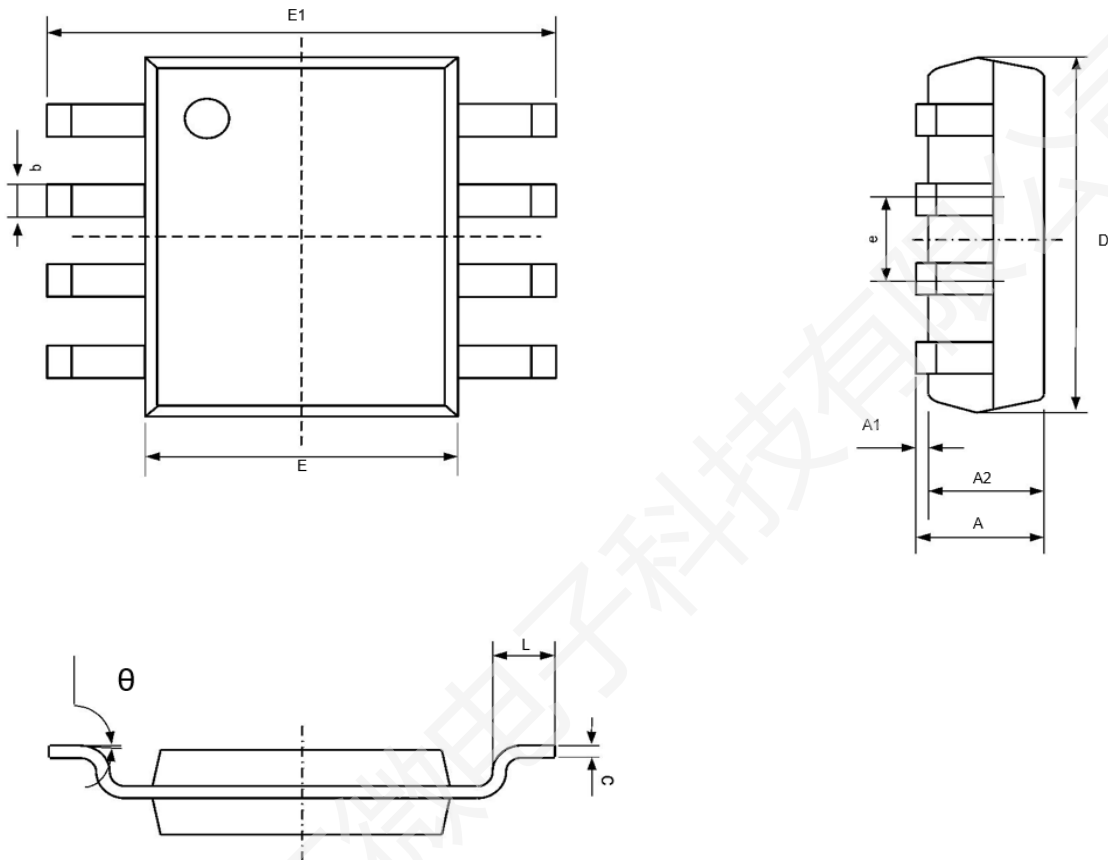


Figure 13: Max. Transient Thermal Impedance


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	Dimensions In Millimeters		
	Min	Ref	Max
A	1.350	1.550	1.750
A1	0.030	0.140	0.250
A2	1.350	1.450	1.550
b	0.330	0.430	0.530
c	0.160	0.205	0.250
D	4.700	5.000	5.300
E	3.800	3.900	4.000
E1	5.800	6.000	6.200
e	1.270(BSC)		
L	0.400	0.835	1.270
θ	0°	4°	8°

Revision History:

Revision	Date	Descriptions
Rev 1.1	Sep.2025	Formal Version

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