

General Description:

The LWD6003AD5 Power MOSFET 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 PDFN5*6-8L, 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:

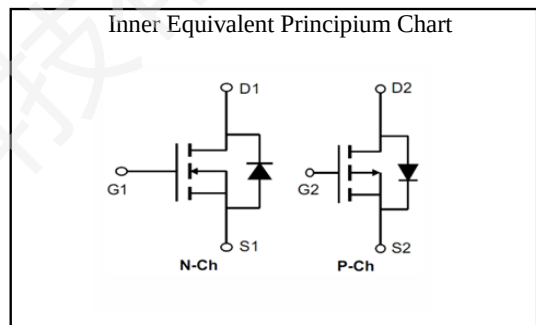
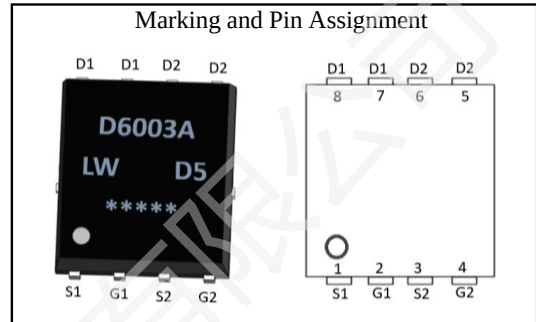
- DC-DC Converter
- Portable Equipment
- Power Management

100% DVDS Tested

100% Avalanche Tested



Symbol	N-Ch	P-Ch	Units
V_{DSS}	60	-60	V
I_D	40	-40	A
$R_{DS(ON) \text{ TYPE}}$	17	19	m Ω



Package Marking and Ordering Information:

Marking	Part Number	Package	Packing	Qty.
D6003A/LW D5/D.C.	LWD6003AD5	PDFN5*6-8L	Reel	5000 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	$T_C=25^\circ\text{C}$	40	-40	A
	Continuous Drain Current	$T_C=100^\circ\text{C}$	25	-25	A
I_{DM}^{a1}	Pulsed Drain Current		160	-160	A
E_{AS}^{a2}	Single pulse avalanche energy		80	76	mJ
V_{GS}	Gate-to-Source Voltage		± 20	± 20	V
P_D	Power Dissipation		80	85	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		1.56	1.47	$^\circ\text{C/W}$
$R_{\theta JA}^{a3}$	Thermal Resistance, Junction-to-Ambient		40	40	$^\circ\text{C/W}$

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	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.55	2.0	V
$R_{DS(ON)1}$	Drain-to-Source On-Resistance	$V_{GS}=10V, I_D=20A$	--	17	21	$m\Omega$
$R_{DS(ON)2}$	Drain-to-Source On-Resistance	$V_{GS}=4.5V, I_D=15A$	--	19	26	$m\Omega$

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{GS}=0V$	--	2285	--	pF
C_{oss}	Output Capacitance	$V_{DS}=30V$	--	100	--	
C_{rss}	Reverse Transfer Capacitance	$f=1.0MHz$	--	84	--	
R_G	Gate resistance	$V_{GS}=0V, V_{DS}=0V, f=1MHz$	--	2.0	--	Ω

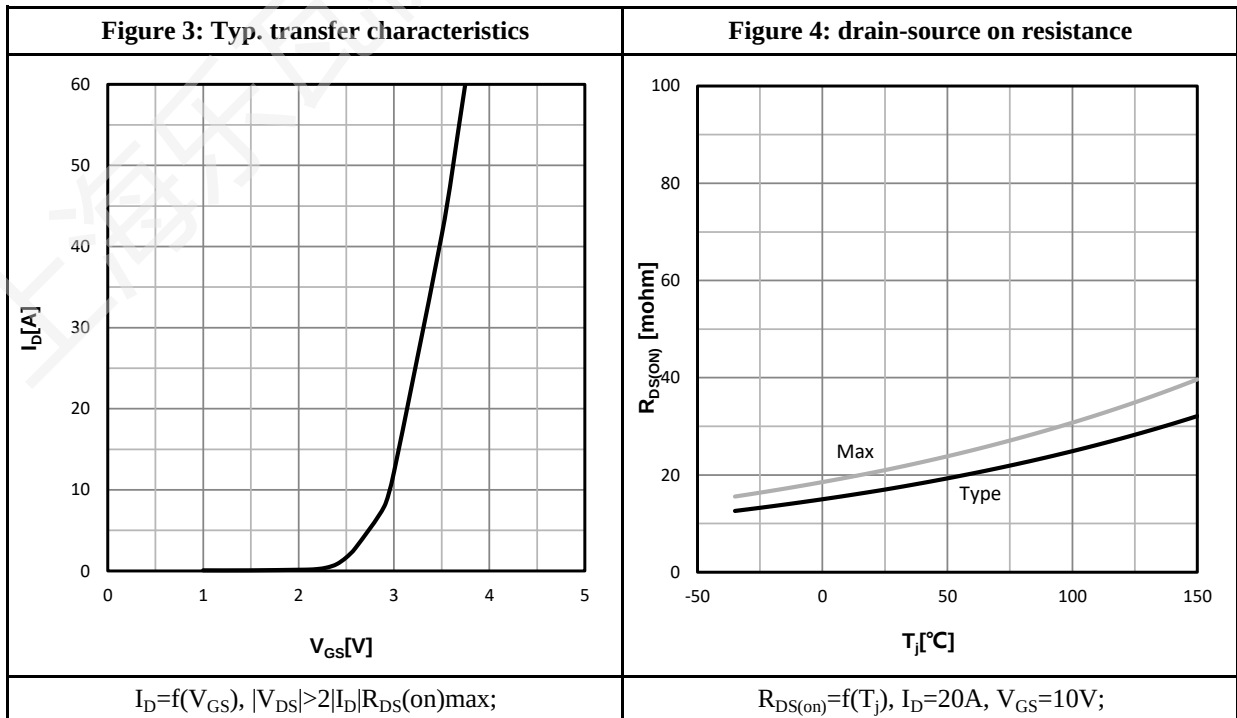
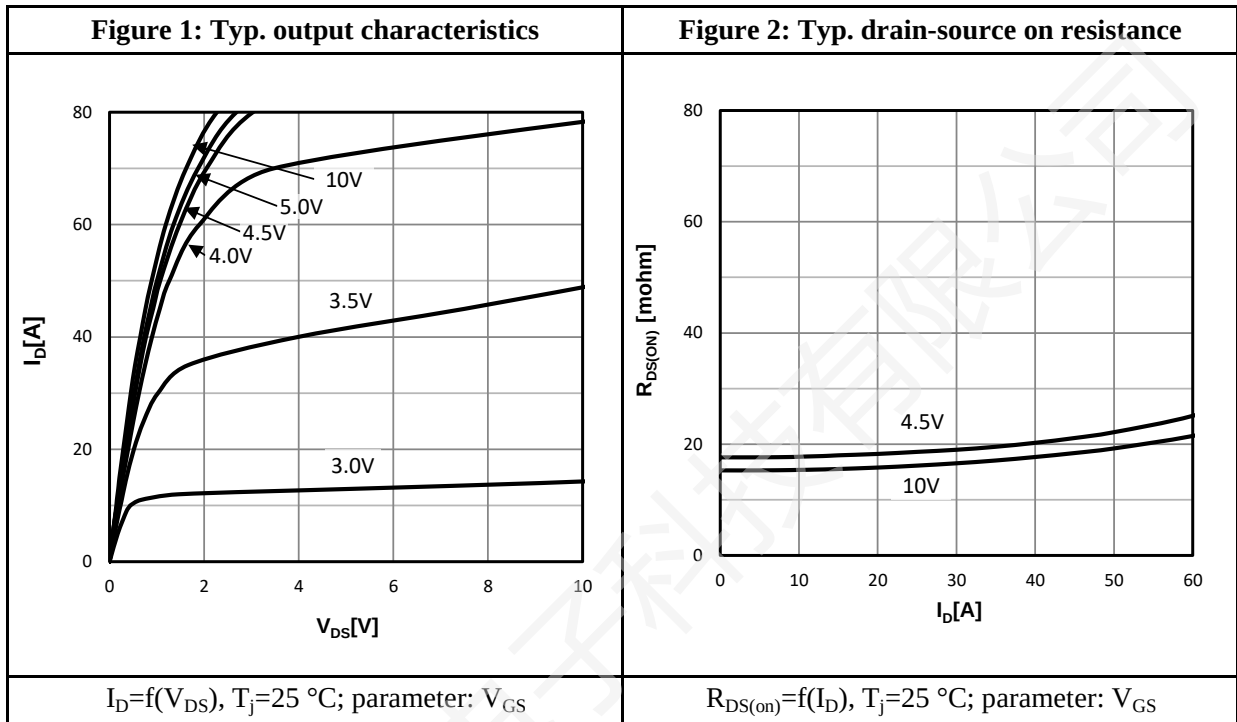
Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D=20A$	--	7.0	--	ns
t_r	Rise Time	$V_{DS}=30V$	--	5.5	--	
$t_{d(OFF)}$	Turn-Off Delay Time	$V_{GS}=10V$	--	30	--	
t_f	Fall Time	$R_G=3.0\Omega$	--	6.0	--	
Q_g	Total Gate Charge	$V_{GS}=10V$	--	50	--	nC
Q_{gs}	Gate to Source Charge	$V_{DS}=30V$	--	6.8	--	
Q_{gd}	Gate to Drain Charge	$I_D=20A$	--	11.3	--	

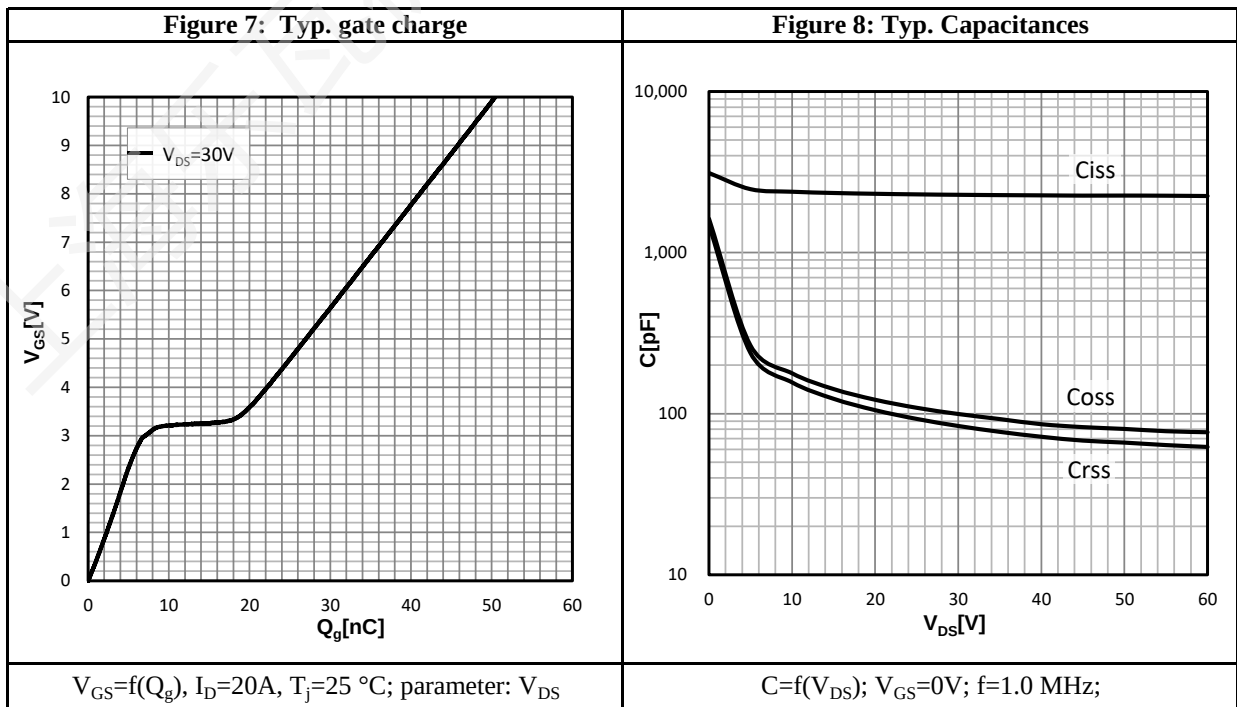
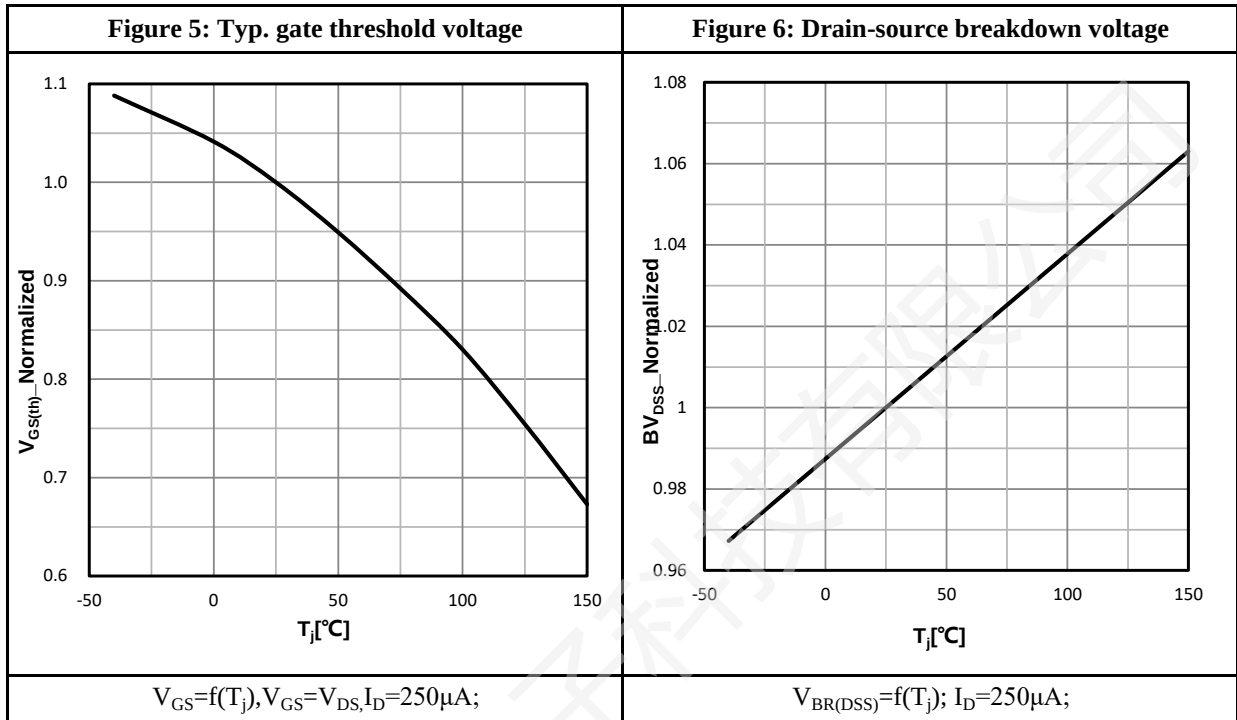
Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
I_S	Diode Forward Current	$T_C=25\text{ }^{\circ}\text{C}$	--	--	40	A
V_{SD}	Diode Forward Voltage	$I_S=20A, V_{GS}=0V$	--	--	1.2	V

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

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




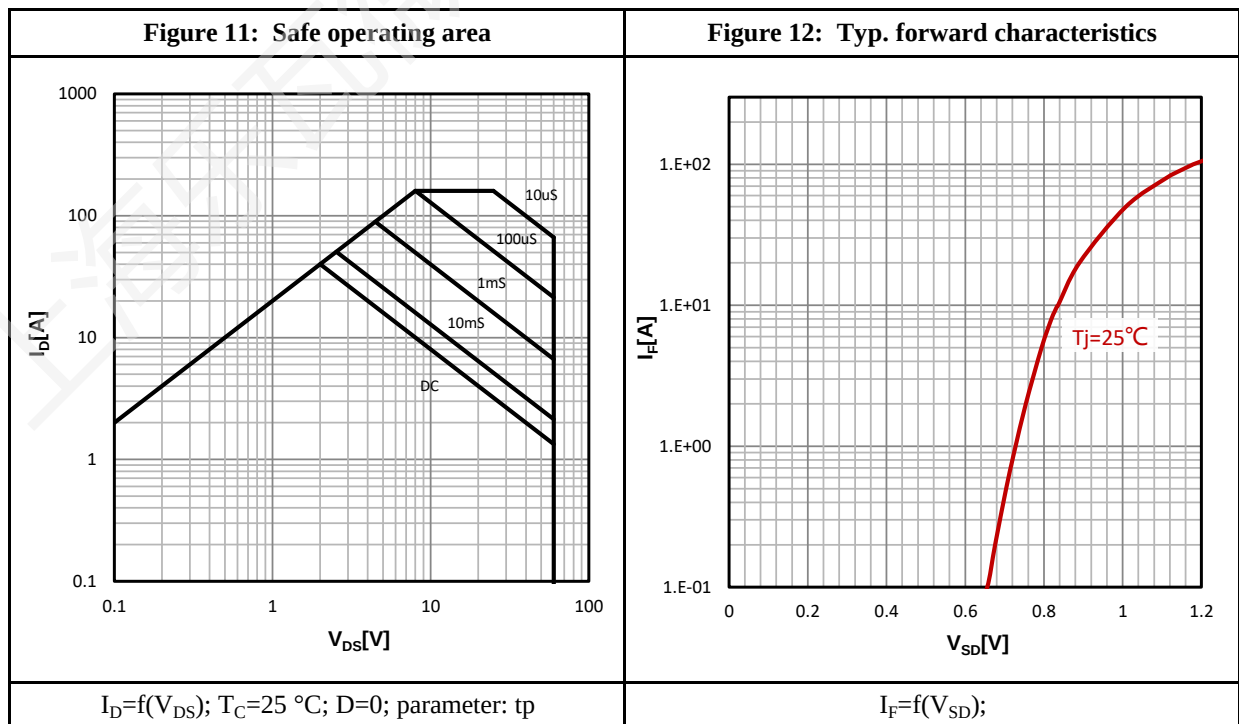
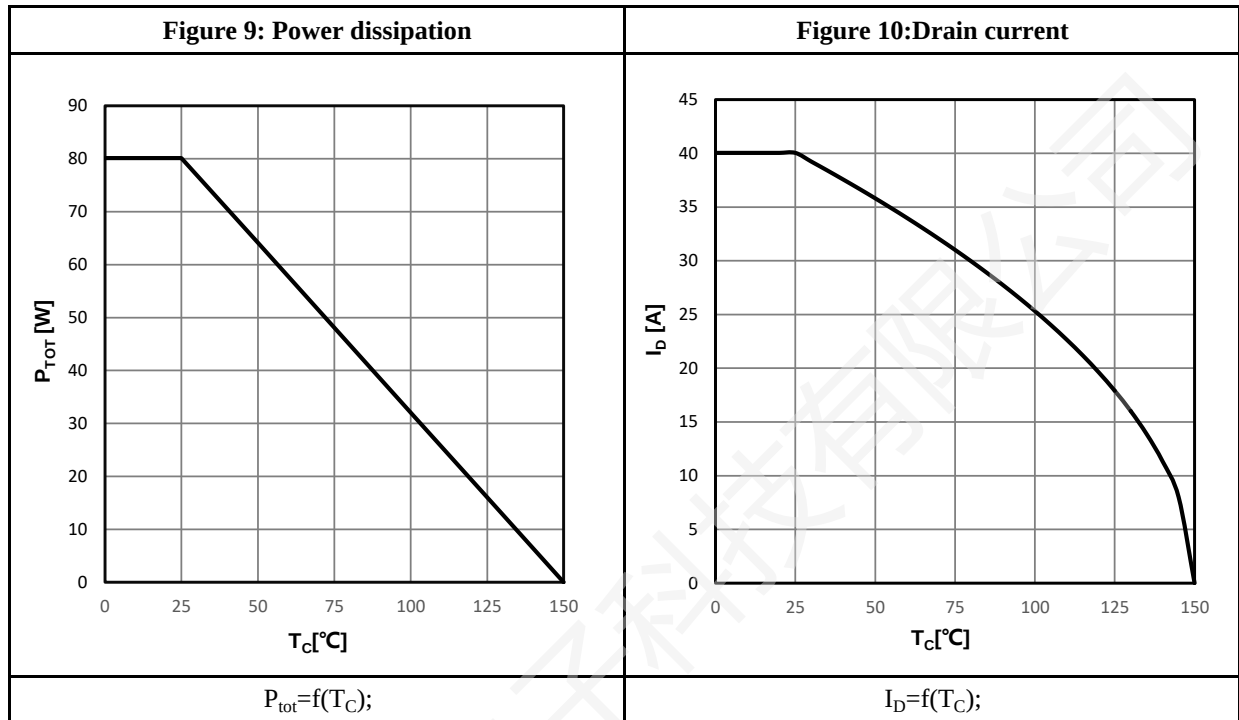
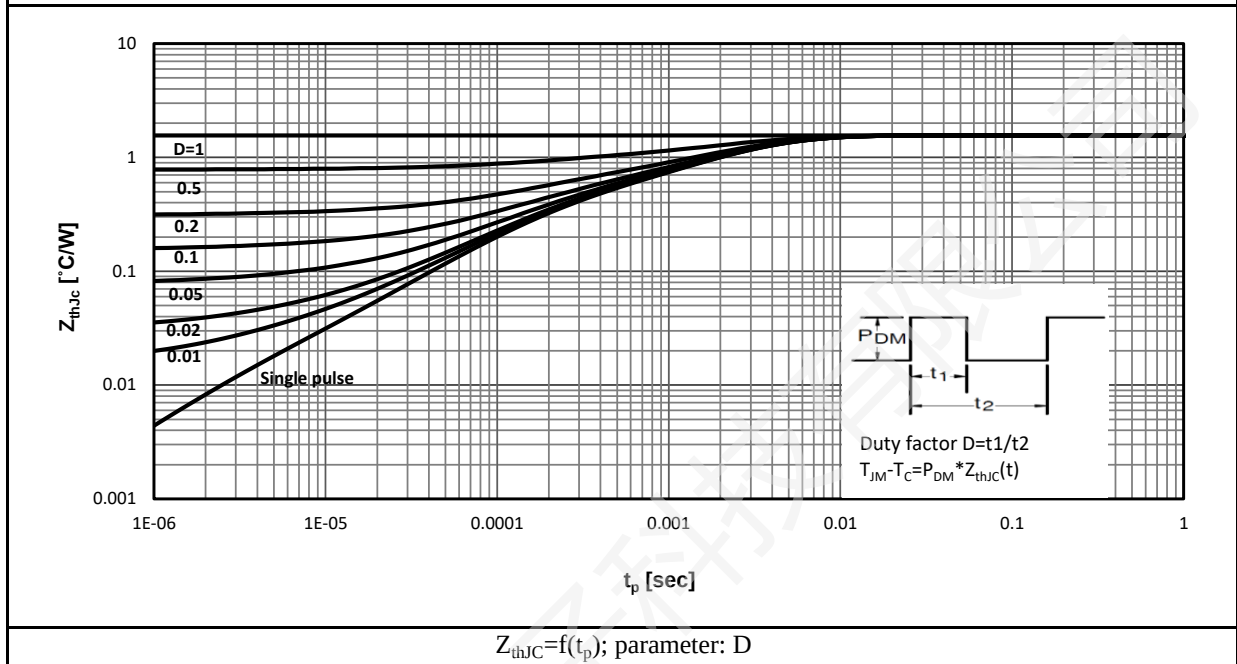
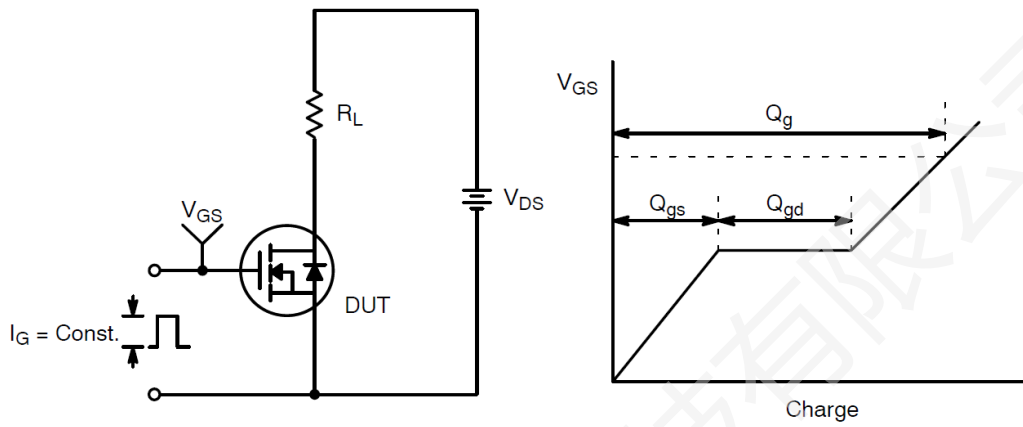
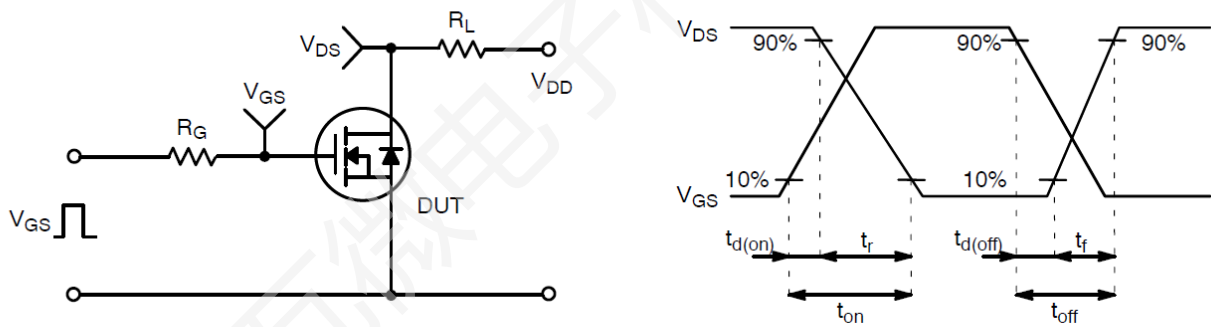
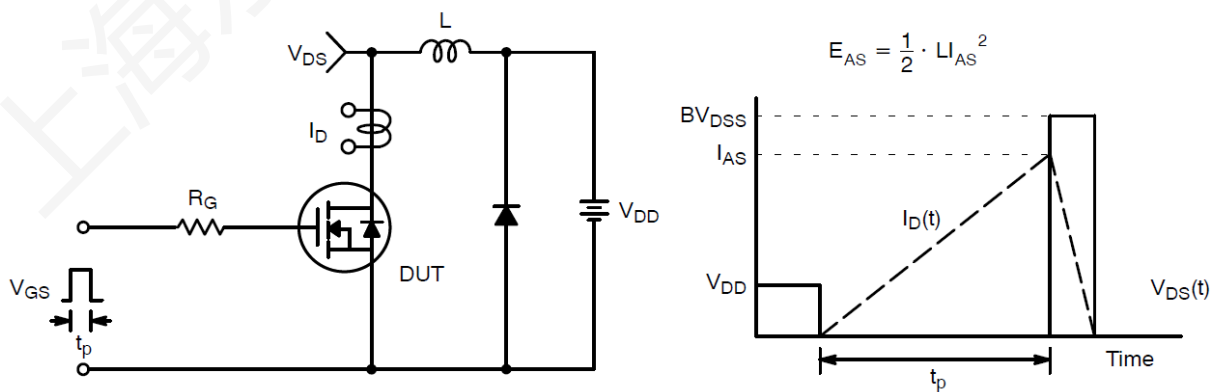


Figure 13: Max. Transient Thermal Impedance


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	-1.8	-2.3	V
$R_{DS(ON)1}$	Drain-to-Source On-Resistance	$V_{GS}=-10V, I_D=-20A$	--	19	24	$m\Omega$
$R_{DS(ON)2}$	Drain-to-Source On-Resistance	$V_{GS}=-4.5V, I_D=-15A$	--	25	32	$m\Omega$

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{GS}=0V$	--	1508	--	pF
C_{oss}	Output Capacitance	$V_{DS}=-30V$	--	266	--	
C_{rss}	Reverse Transfer Capacitance	$f=1.0MHz$	--	21	--	
R_G	Gate resistance	$V_{GS}=0V, V_{DS}=0V, f=1MHz$	--	7.7	--	Ω

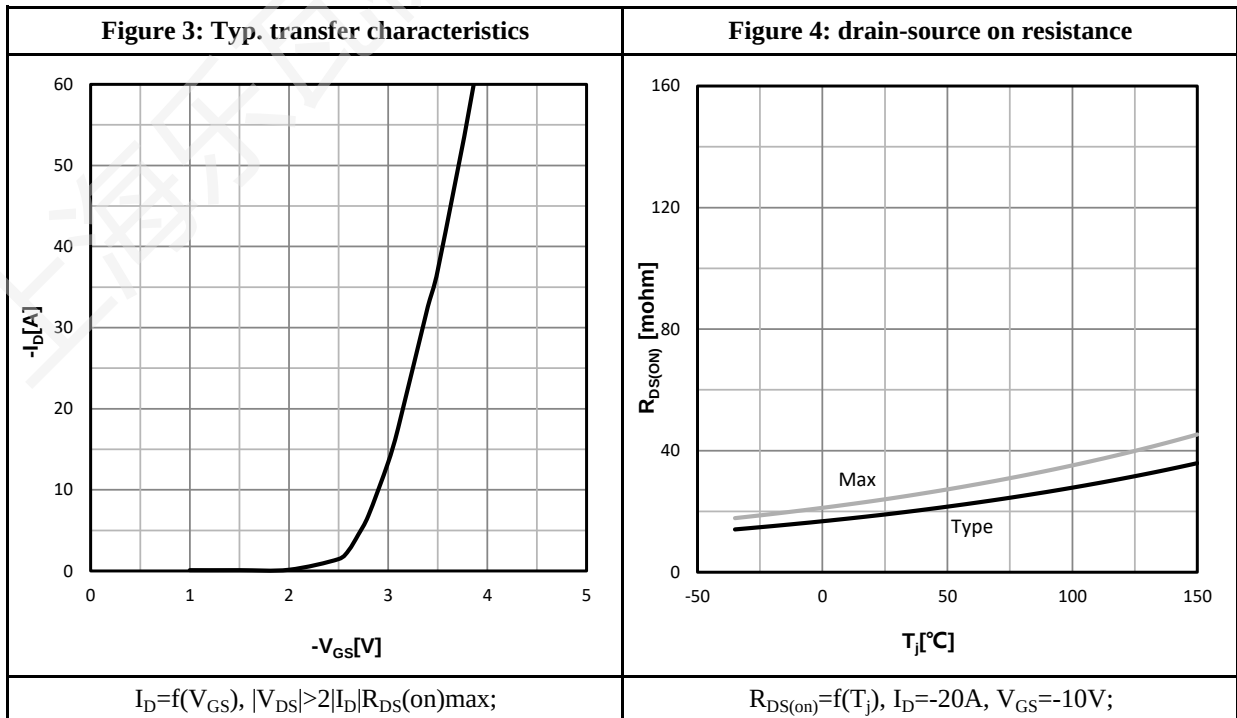
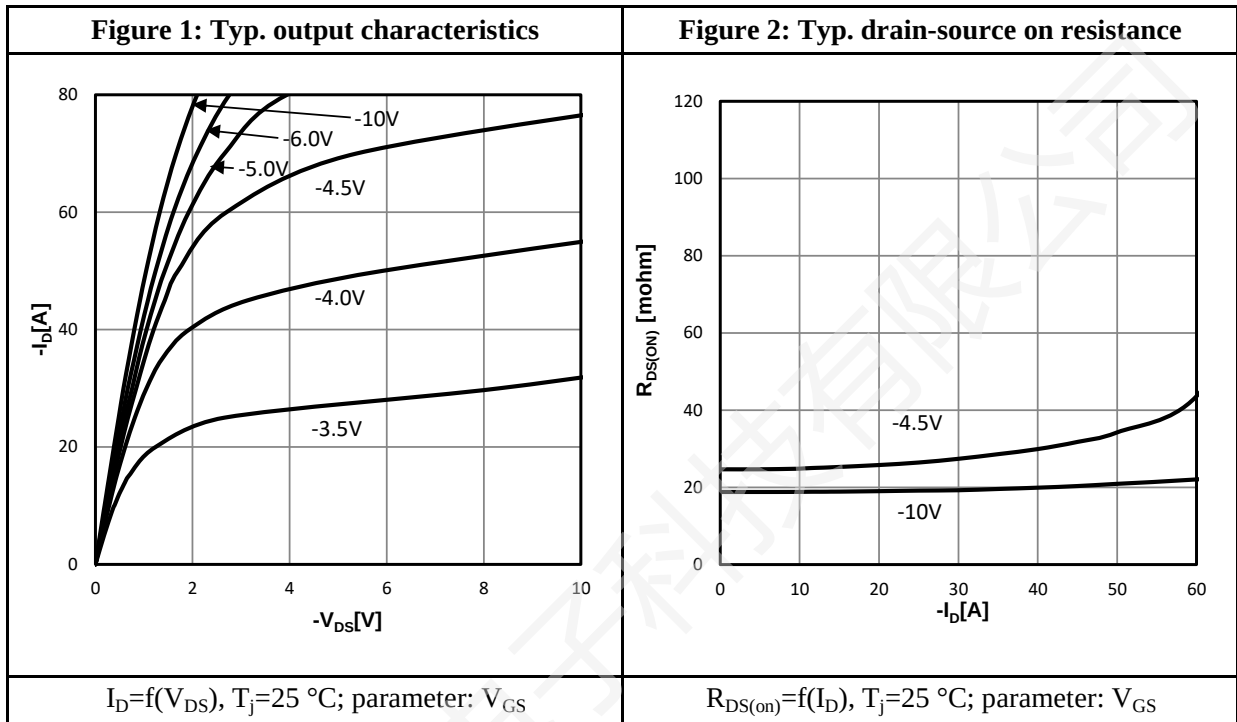
Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D=-20A$	--	10	--	ns
t_r	Rise Time	$V_{DS}=-30V$	--	15	--	
$t_{d(OFF)}$	Turn-Off Delay Time	$V_{GS}=-10V$	--	35	--	
t_f	Fall Time	$R_G=3.0\Omega$	--	12	--	
Q_g	Total Gate Charge	$V_{GS}=-10V$	--	26	--	nC
Q_{gs}	Gate to Source Charge	$V_{DS}=-30V$	--	5.3	--	
Q_{gd}	Gate to Drain Charge	$I_D=-20A$	--	4.3	--	

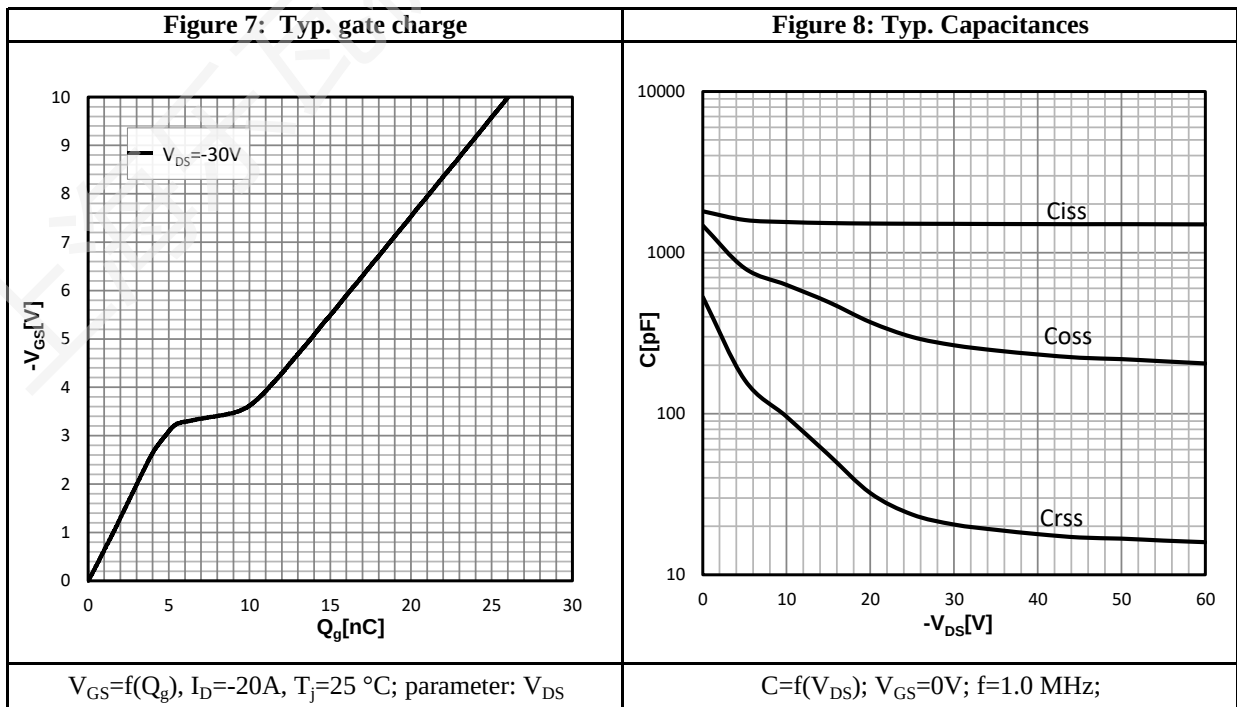
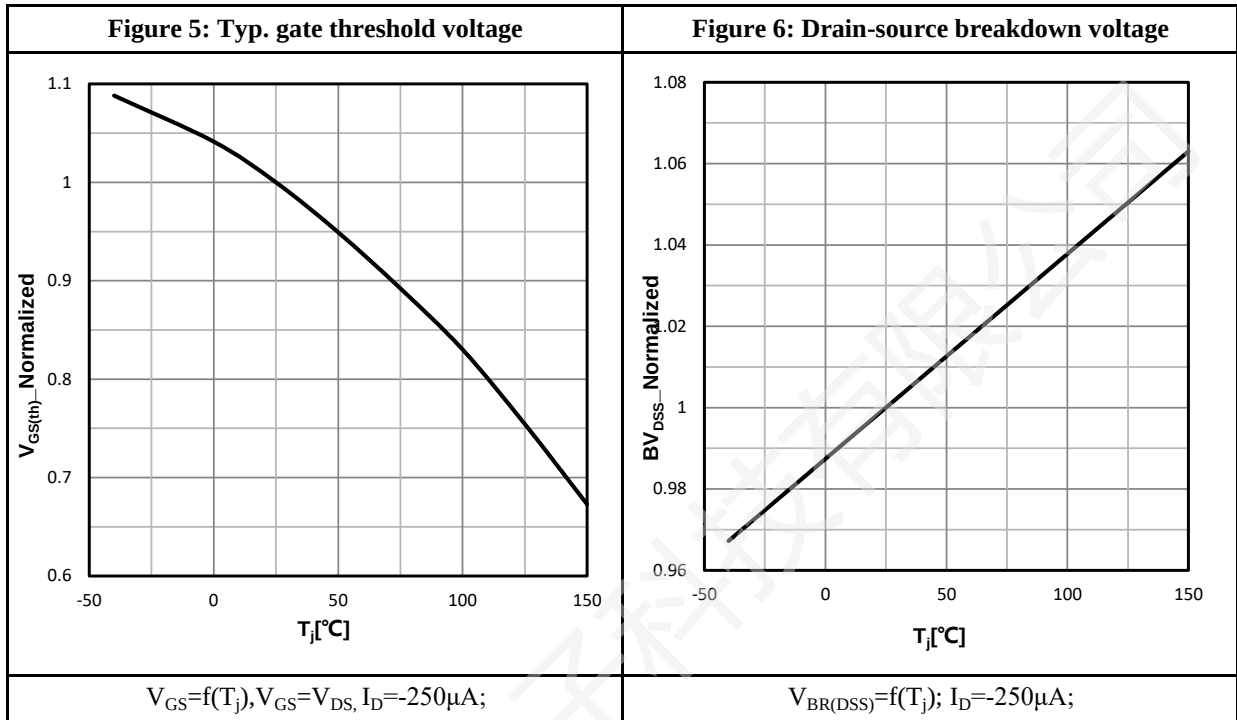
Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
I_S	Diode Forward Current	$T_C=25\text{ }^{\circ}\text{C}$	--	--	-40	A
V_{SD}	Diode Forward Voltage	$I_S=-20A, V_{GS}=0V$	--	--	-1.2	V

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

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




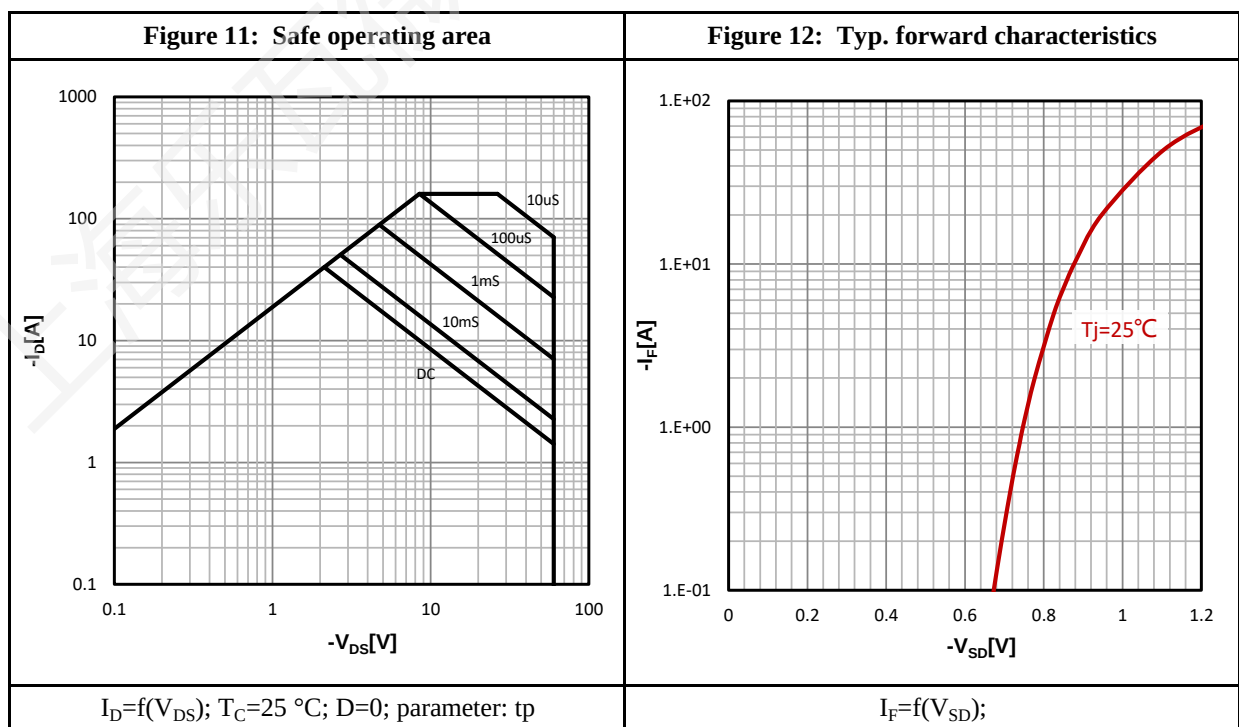
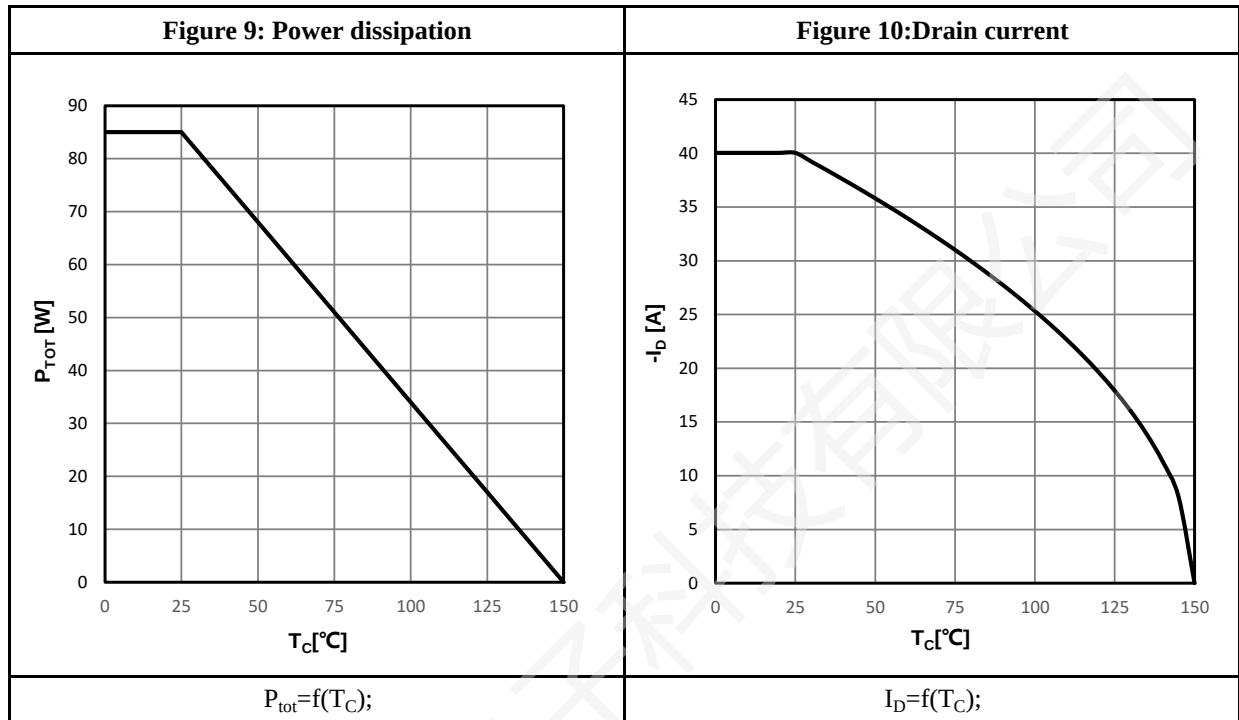
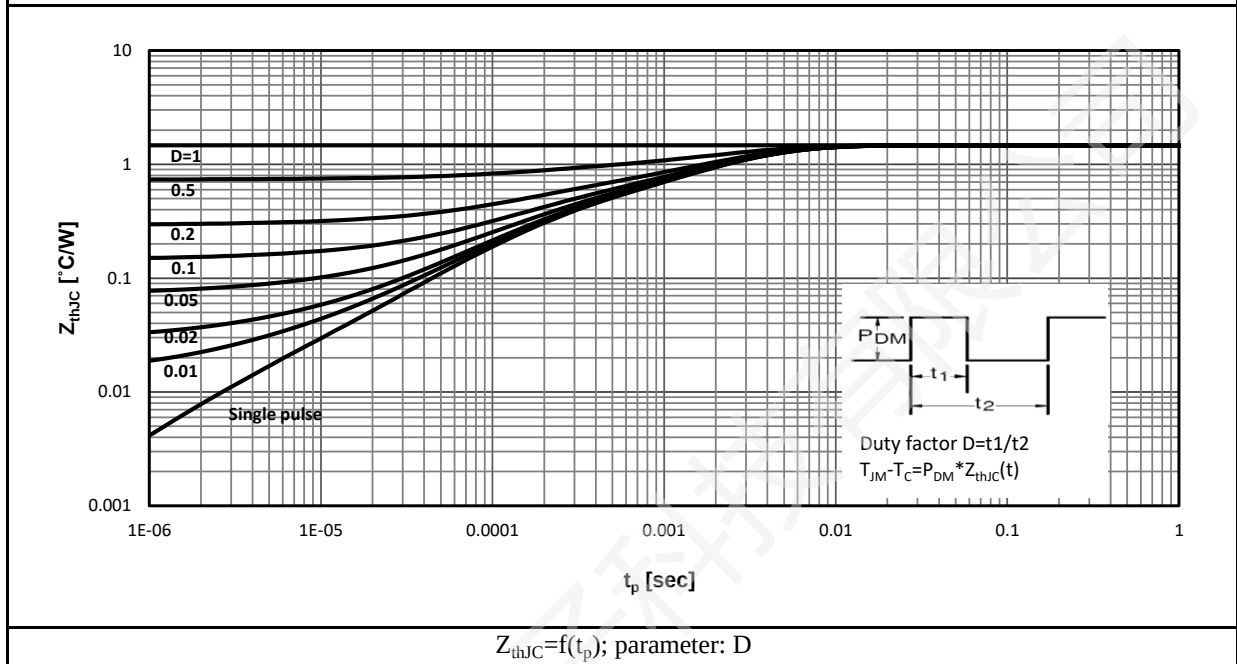
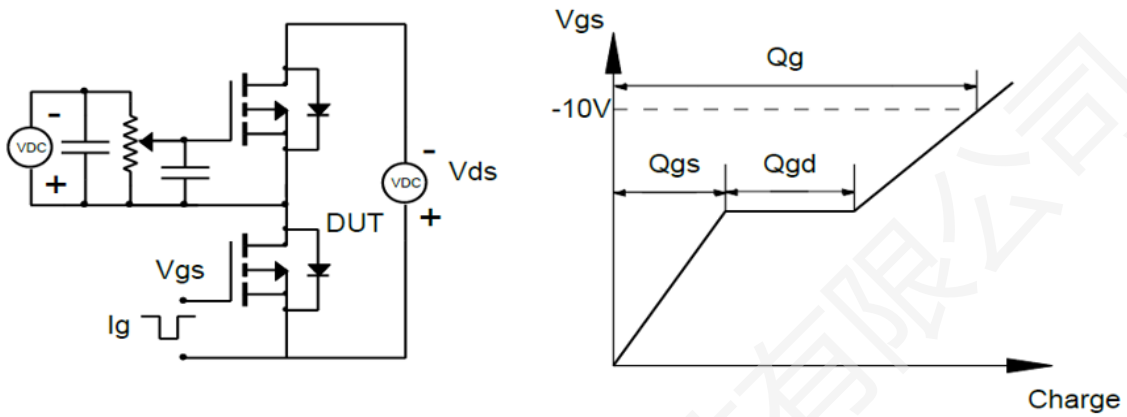
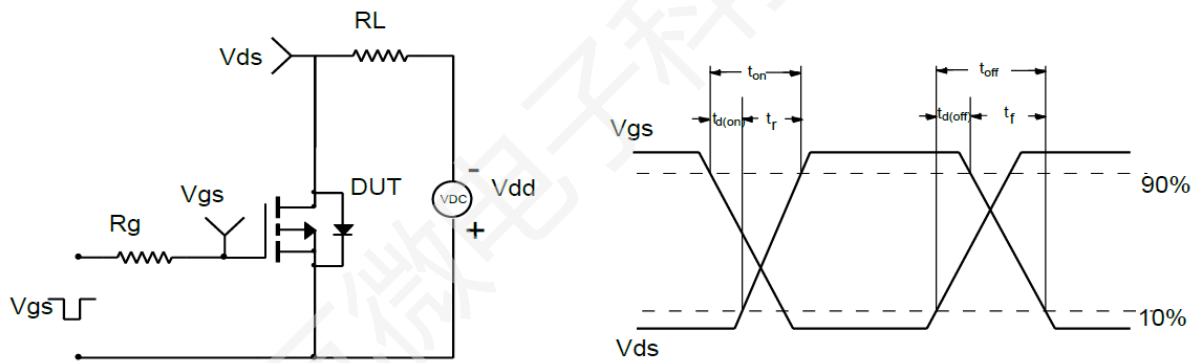
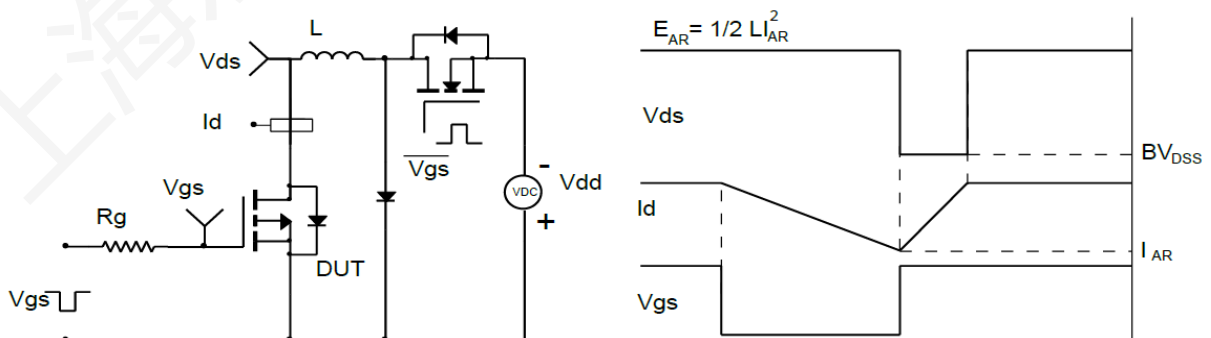
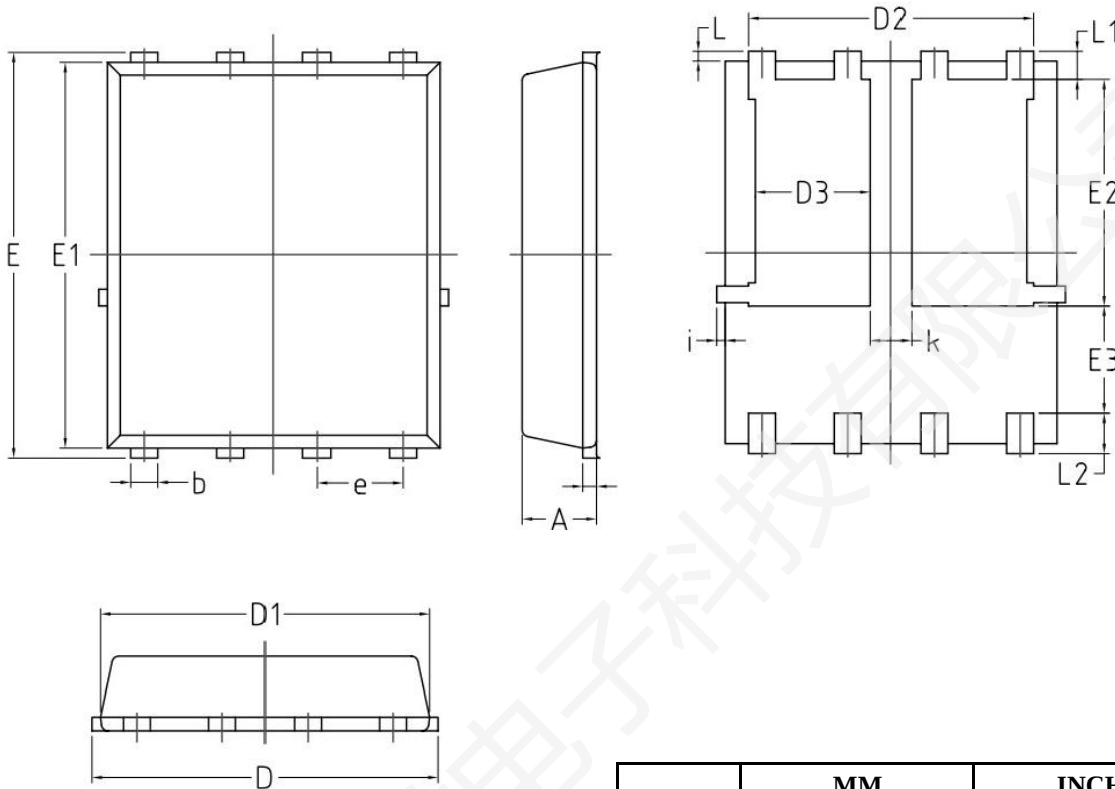


Figure 13: Max. Transient Thermal Impedance


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	MM		INCH	
	MIN	MAX	MIN	MAX
A	0.90	1.20	0.0354	0.0472
b	0.34	0.48	0.0134	0.0189
C	0.203 BSC		0.0080 BSC	
D	4.80	5.40	0.1890	0.2126
D1	4.80	5.00	0.1890	0.1969
D2	4.11	4.31	0.1620	0.1700
D3	1.60	1.80	0.0629	0.0708
E	5.90	6.15	0.2323	0.2421
E1	5.65	5.85	0.2224	0.2303
E2	3.30	3.60	0.1300	0.1417
E3	1.40	/	0.0551	/
e	1.27 BSC		0.05 BSC	
L	0.05	0.28	0.0019	0.0110
L1	0.38	0.58	0.0150	0.0228
L2	0.38	0.71	0.0150	0.0280
I	/	0.18	/	0.0070
k	0.50	0.70	0.0197	0.0276

Revision History:

Revison	Date	Descriptions
Rev 1.1	July.2025	Initial Version

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