

General Description:

The LWD4003AD3 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.
D4003A/LW D3/D.C.	LWD4003AD3	PDFN3.3*3.3-8L	Reel	5000 Pcs

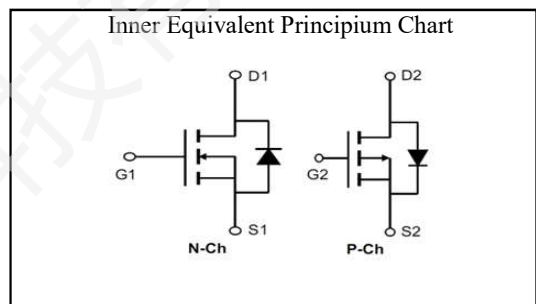
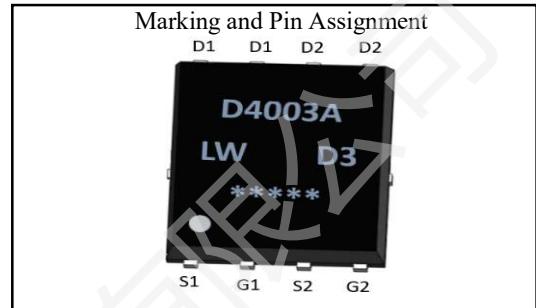
Absolute Maximum Ratings:

Symbol	Parameter	Value		Units
		N-Ch	P-Ch	
V_{DSS}	Drain-to-Source Voltage	40	-40	V
I_D	Continuous Drain Current	25	-22	A
	Continuous Drain Current	16	-14	A
I_{DM}^{a1}	Pulsed Drain Current	100	-88	A
E_{AS}^{a2}	Single pulse avalanche energy	47	49	mJ
V_{GS}	Gate-to-Source Voltage	±20	±20	V
P_D	Power Dissipation	25	25	W
T_J, T_{STG}	Operating Junction and Storage Temperature Range	150, -55 to 150		°C
T_L	Maximum Temperature for Soldering	260		°C

Thermal Characteristics:

Symbol	Parameter	Value		Units
		N-Ch	P-Ch	
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	5.0	5.0	°C/W

Symbol	N-Ch	P-Ch	Units
V_{DSS}	40	-40	V
I_D	25	-22	A
$R_{DS(ON) \text{ TYPE}}$	11	23	mΩ



N-Channel Electrical Characteristic ($T_C = 25\text{ }^{\circ}\text{C}$, 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 Ω
$R_{DS(ON)2}$	Drain-to-Source On-Resistance	$V_{GS}=4.5V, I_D=8.0A$	--	13	19	m Ω

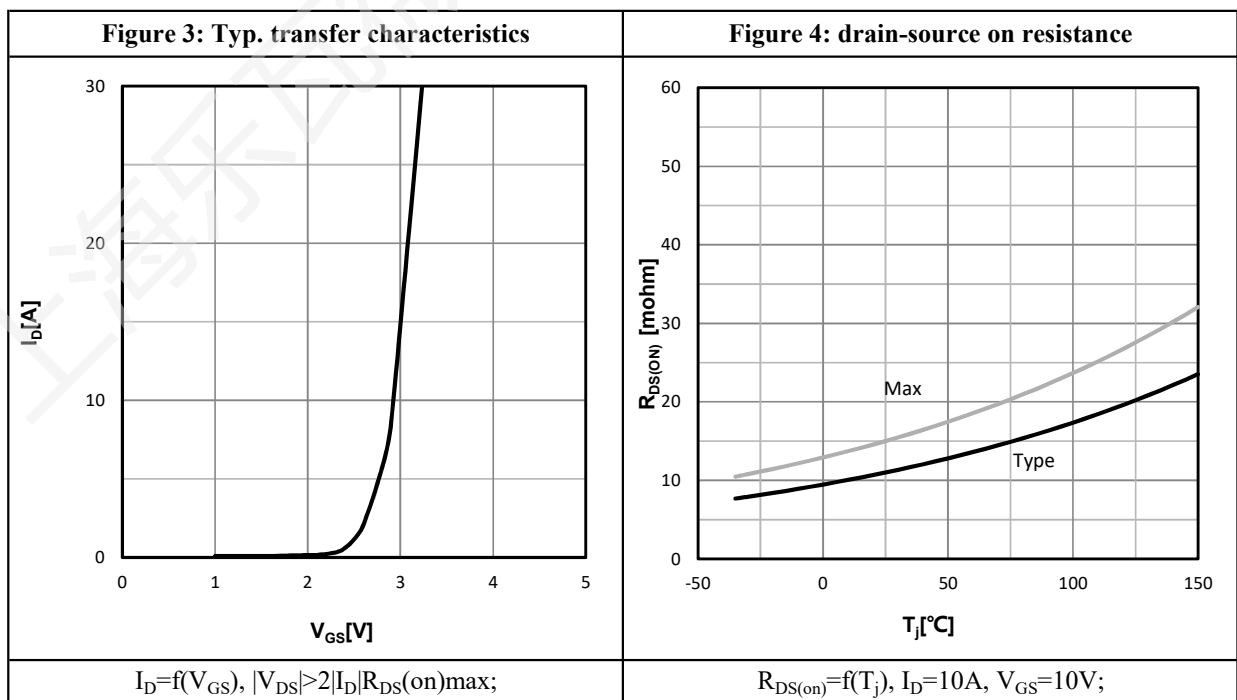
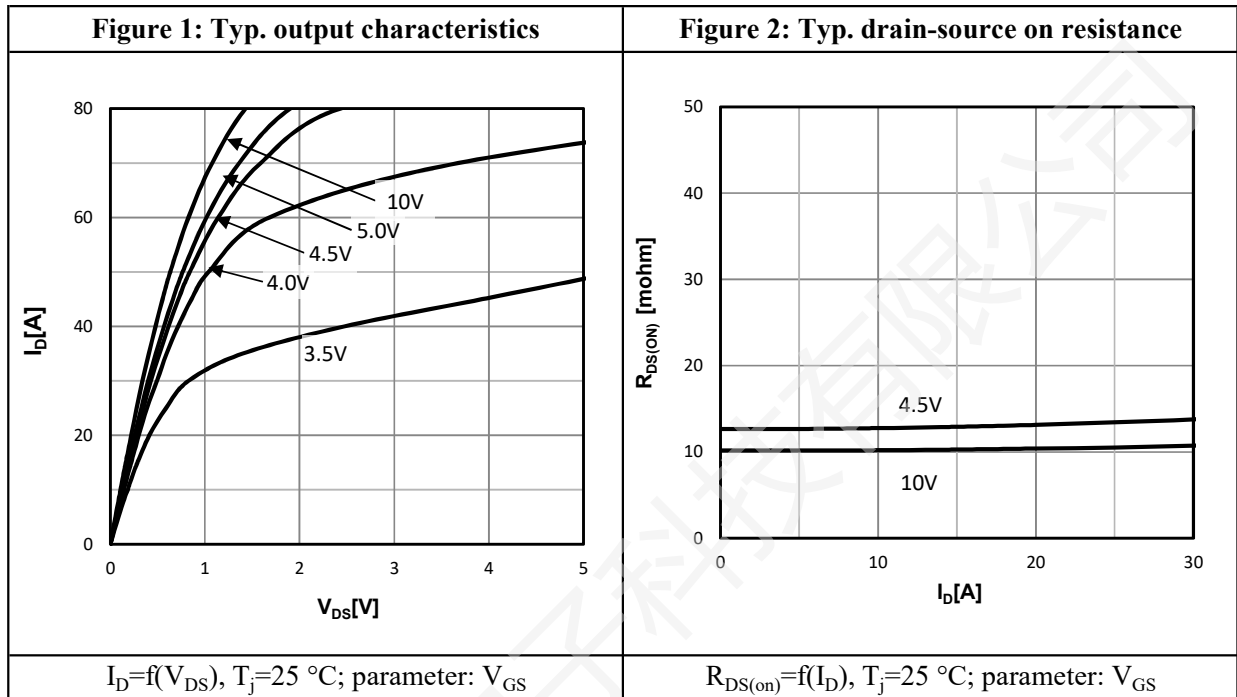
Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{GS} = 0V$	--	1199	--	pF
C_{oss}	Output Capacitance	$V_{DS} = 20V$	--	93	--	
C_{rss}	Reverse Transfer Capacitance	$f = 1.0MHz$	--	85	--	
R_G	Gate resistance	$V_{GS}=0V, V_{DS}=0V,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

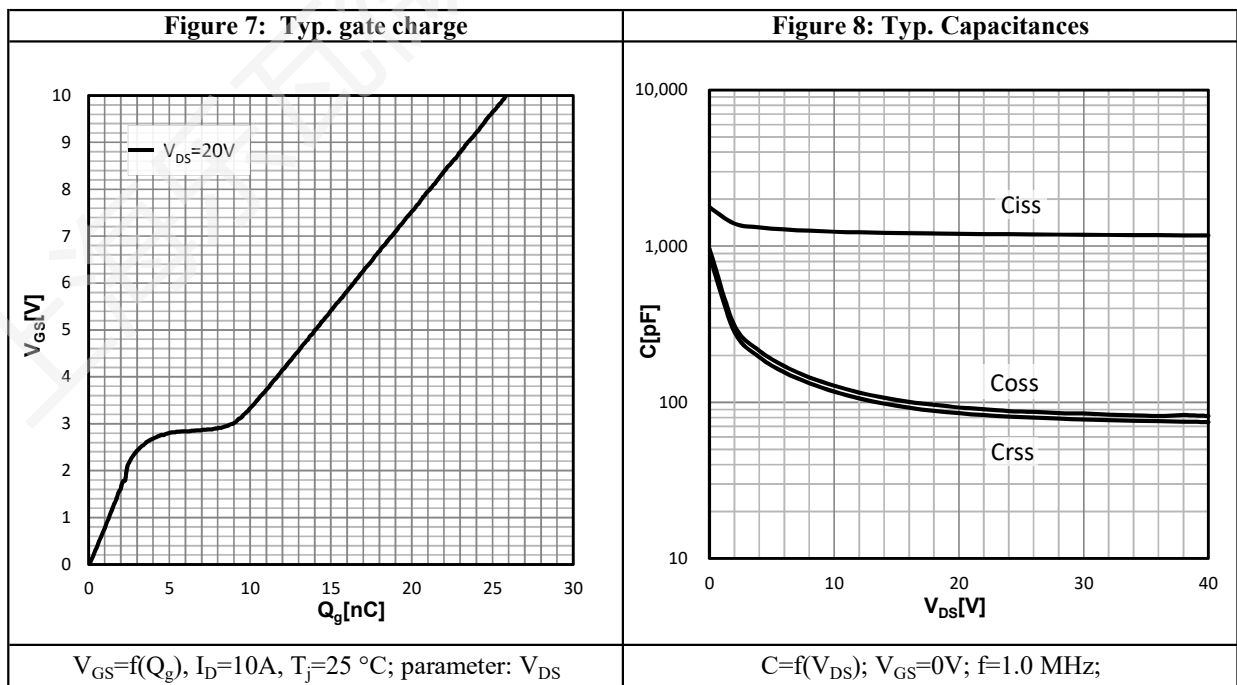
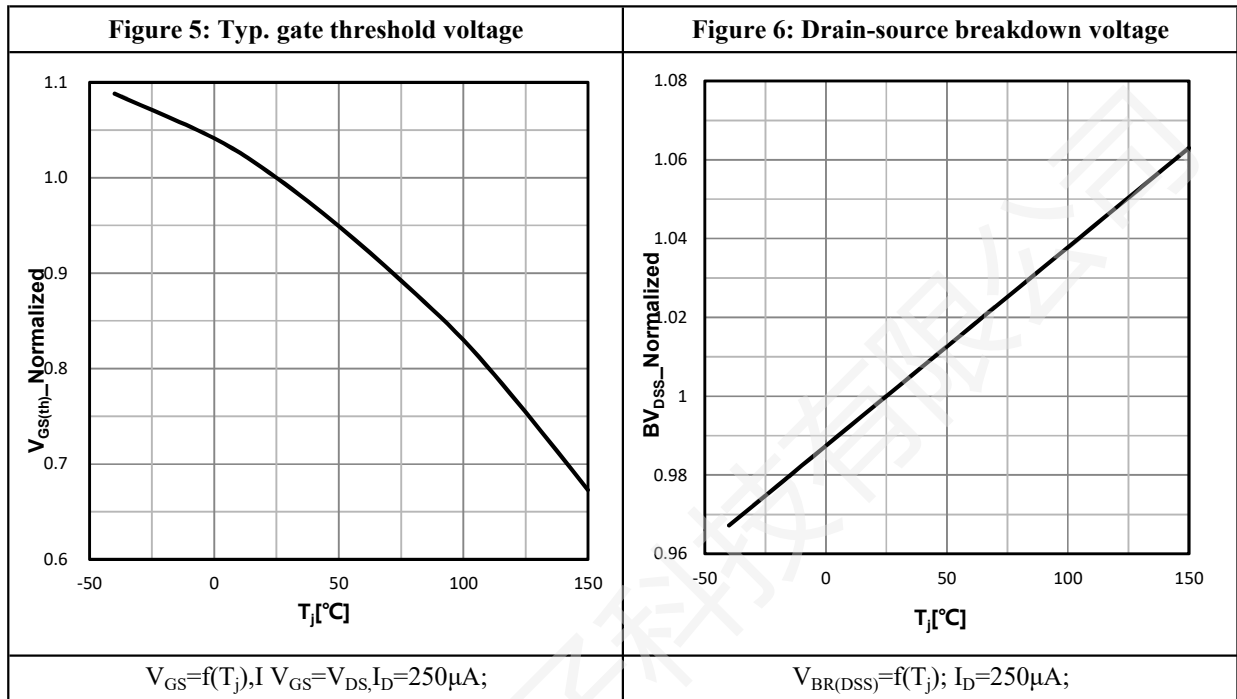
Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D = 10A$	--	2.9	--	ns
t_r	Rise Time	$V_{DS} = 20V$	--	13	--	
$t_{d(OFF)}$	Turn-Off Delay Time	$V_{GS} = 10V$	--	21	--	
t_f	Fall Time	$R_G = 3.0\Omega$	--	6.2	--	
Q_g	Total Gate Charge	$V_{GS} = 10V$	--	25.9	--	nC
Q_{gs}	Gate Source Charge	$V_{DS} = 20V$	--	3.5	--	
Q_{gd}	Gate 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	$T_C = 25\text{ }^{\circ}\text{C}$	--	--	25	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 $T_J=25\text{ }^{\circ}\text{C}$

N-Channel Characteristics Curve:




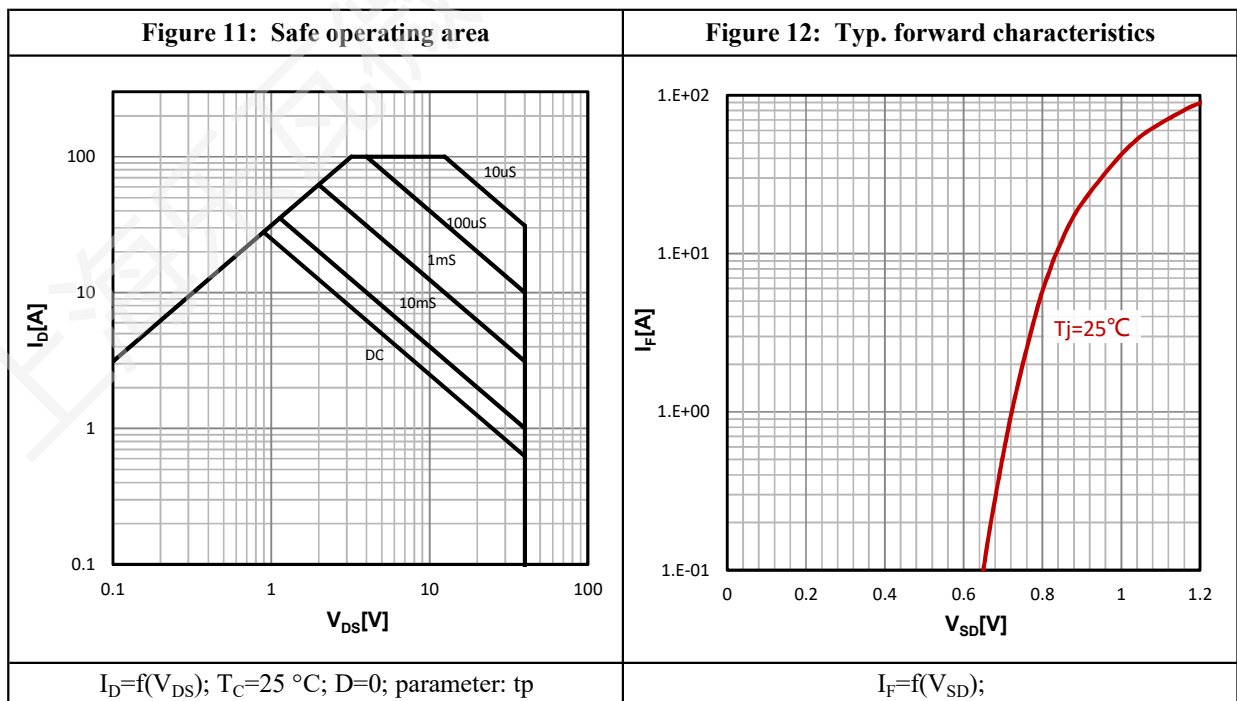
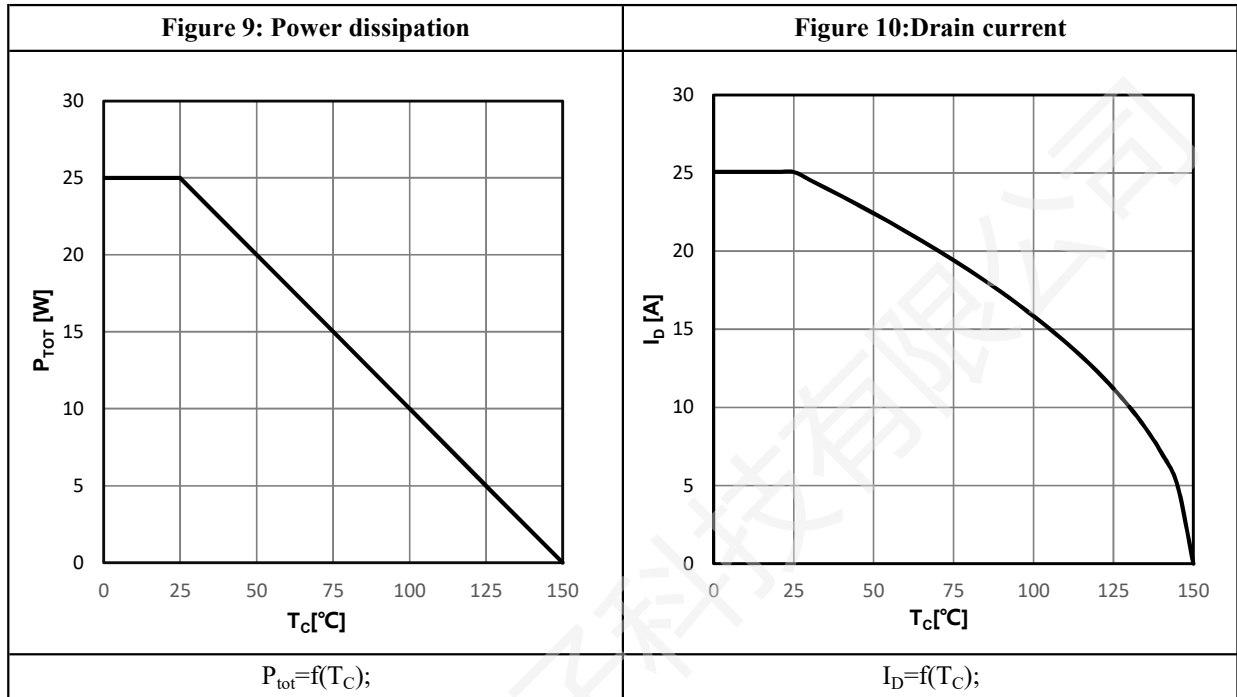
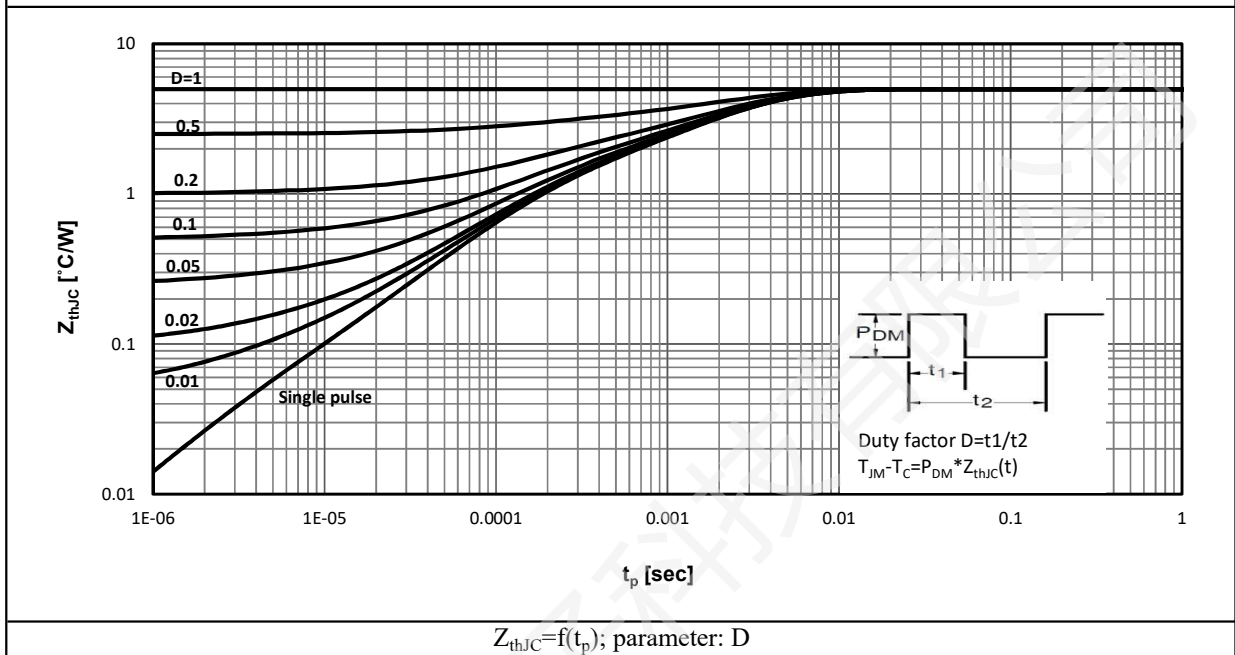
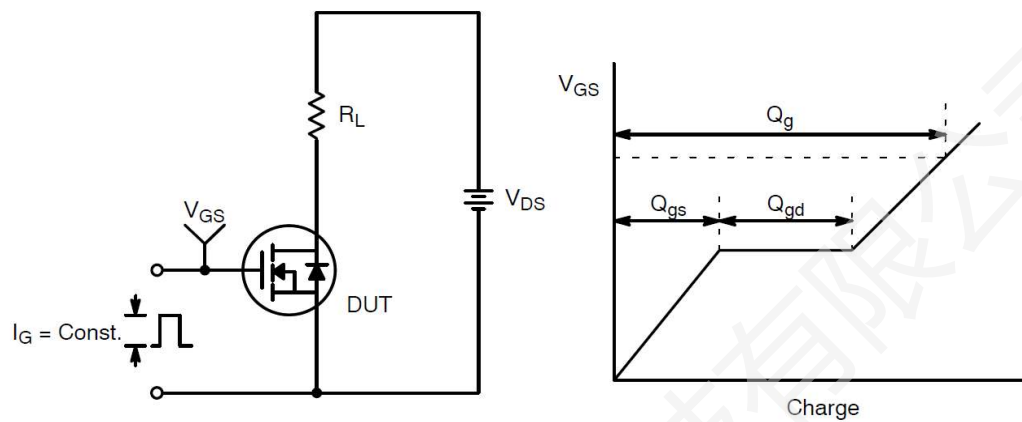
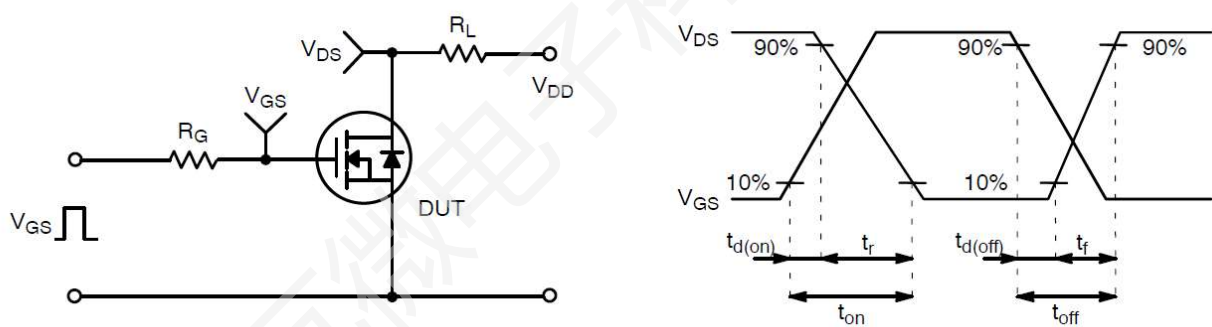
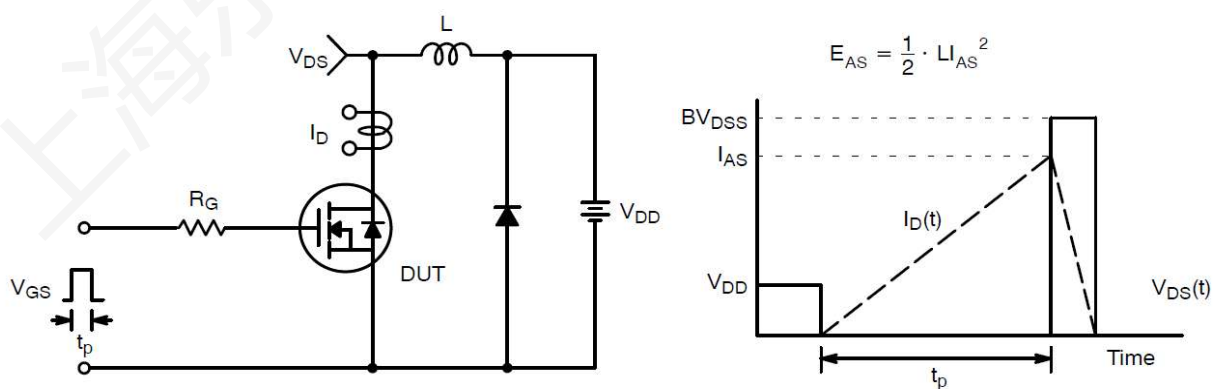


Figure 13: Max. Transient Thermal Impedance


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 ($T_C = 25\text{ }^{\circ}\text{C}$, 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	-1.7	-2.1	V
$R_{DS(ON)1}$	Drain-to-Source On-Resistance	$V_{GS}=-10V, I_D=-10A$	--	23	27	$m\Omega$
$R_{DS(ON)2}$	Drain-to-Source On-Resistance	$V_{GS}=-4.5V, I_D=-7.5A$	--	28	35	$m\Omega$

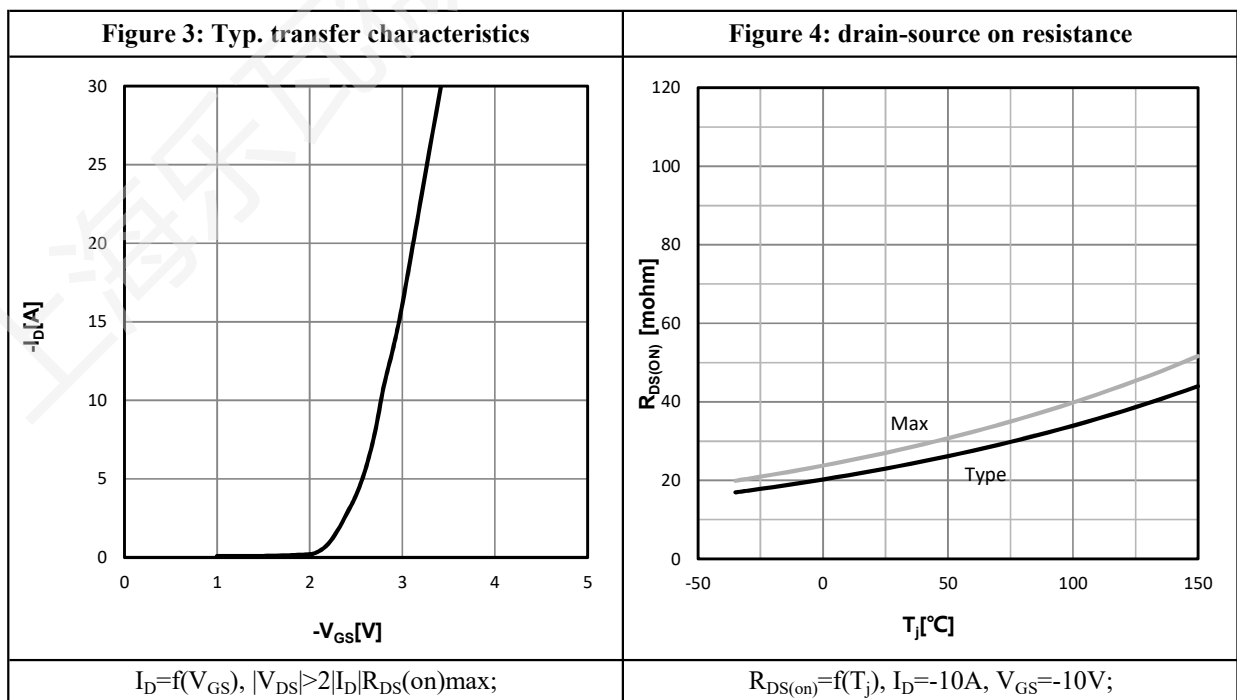
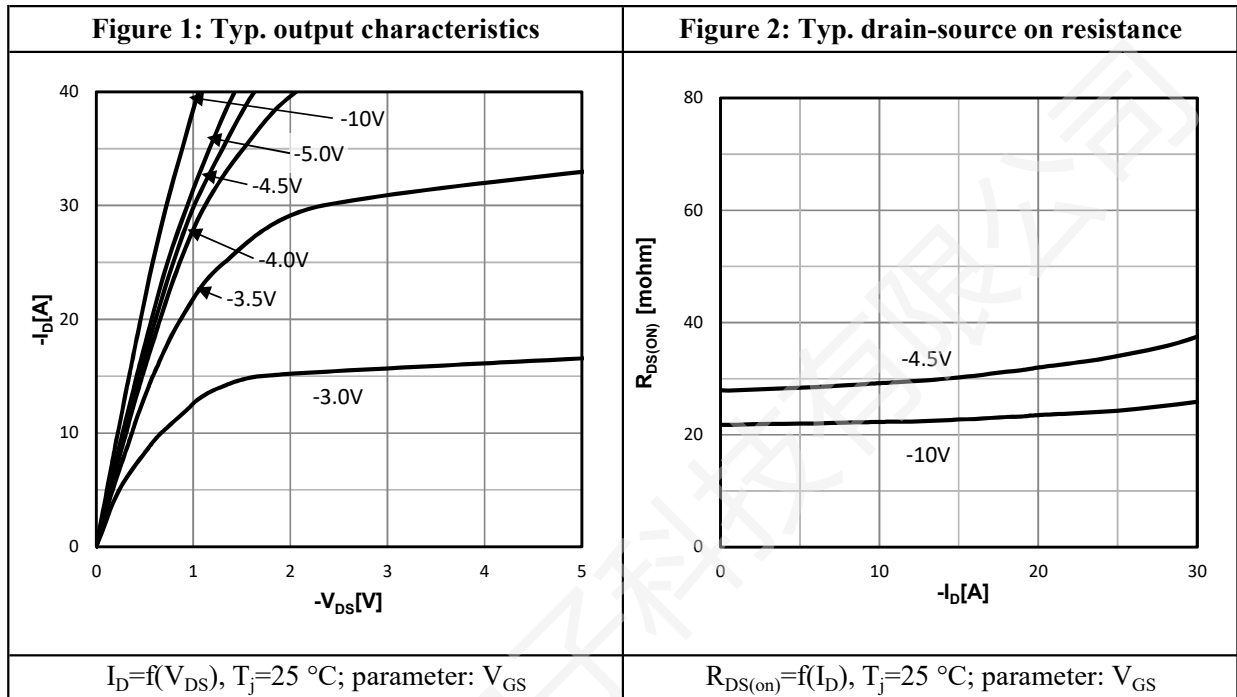
Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{GS} = 0V$	--	1254	--	pF
C_{oss}	Output Capacitance	$V_{DS} = -20V$	--	119	--	
C_{rss}	Reverse Transfer Capacitance	$f = 1.0MHz$	--	113	--	
R_G	Gate resistance	$V_{GS}=0V, V_{DS}=0V, f=1.0MHz$	--	10	--	Ω

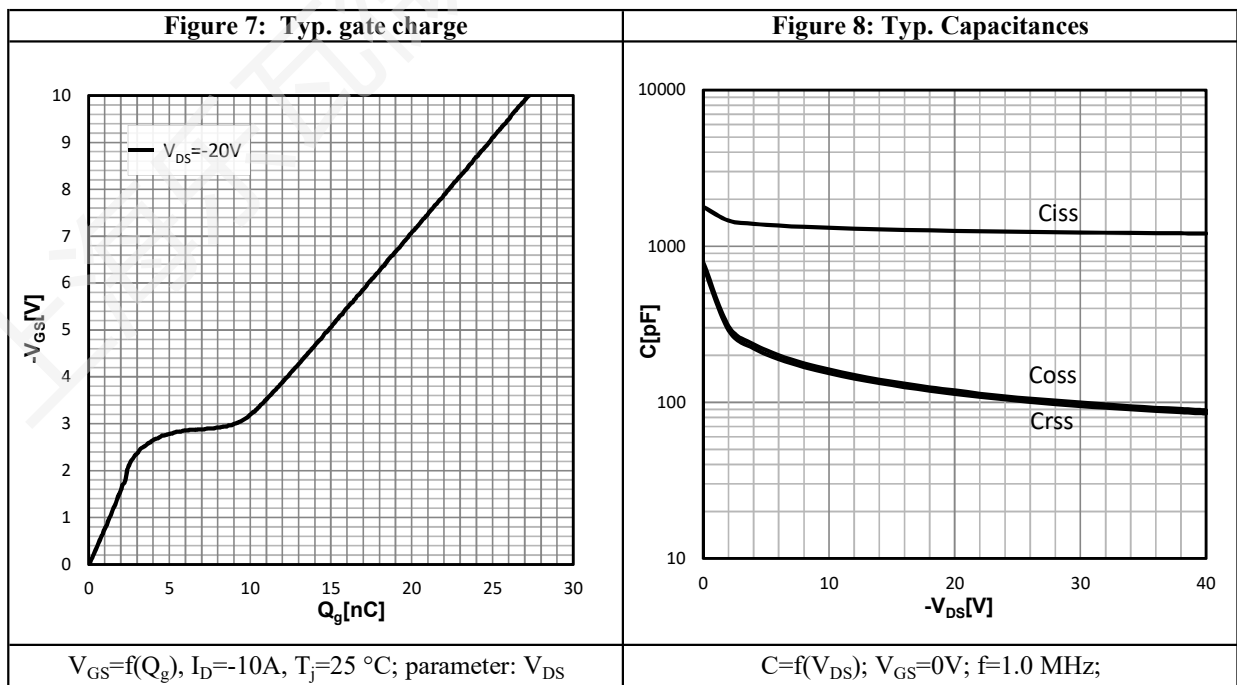
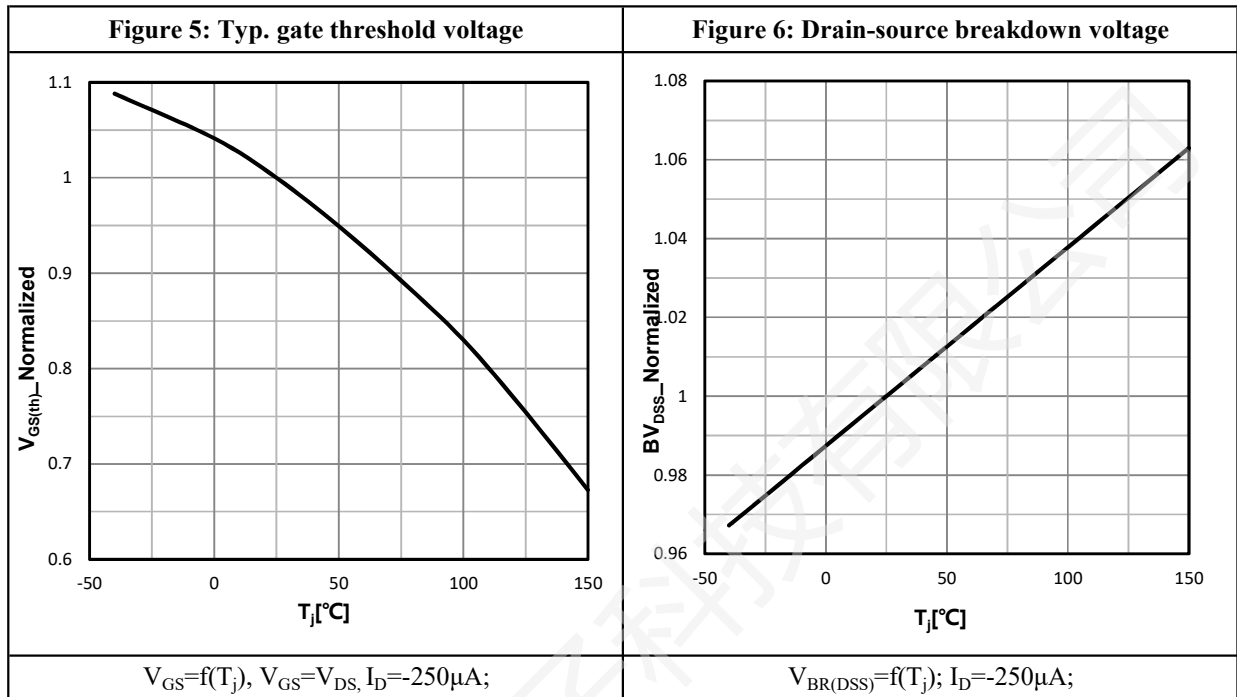
Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D = -10A$	--	8.0	--	ns
t_r	Rise Time	$V_{DS} = -20V$	--	6.0	--	
$t_{d(OFF)}$	Turn-Off Delay Time	$V_{GS} = -10V$	--	17	--	
t_f	Fall Time	$R_G = 3.0\Omega$	--	5.0	--	
Q_g	Total Gate Charge	$V_{GS} = -10V$	--	27.3	--	nC
Q_{gs}	Gate to Source Charge	$V_{DS} = -20V$	--	3.7	--	
Q_{gd}	Gate to Drain Charge	$I_D = -10A$	--	5.7	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
I_S	Diode Forward Current	$T_C = 25\text{ }^{\circ}\text{C}$	--	--	-22	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 $T_j = 25\text{ }^{\circ}\text{C}$

P-Channel Characteristics Curve:




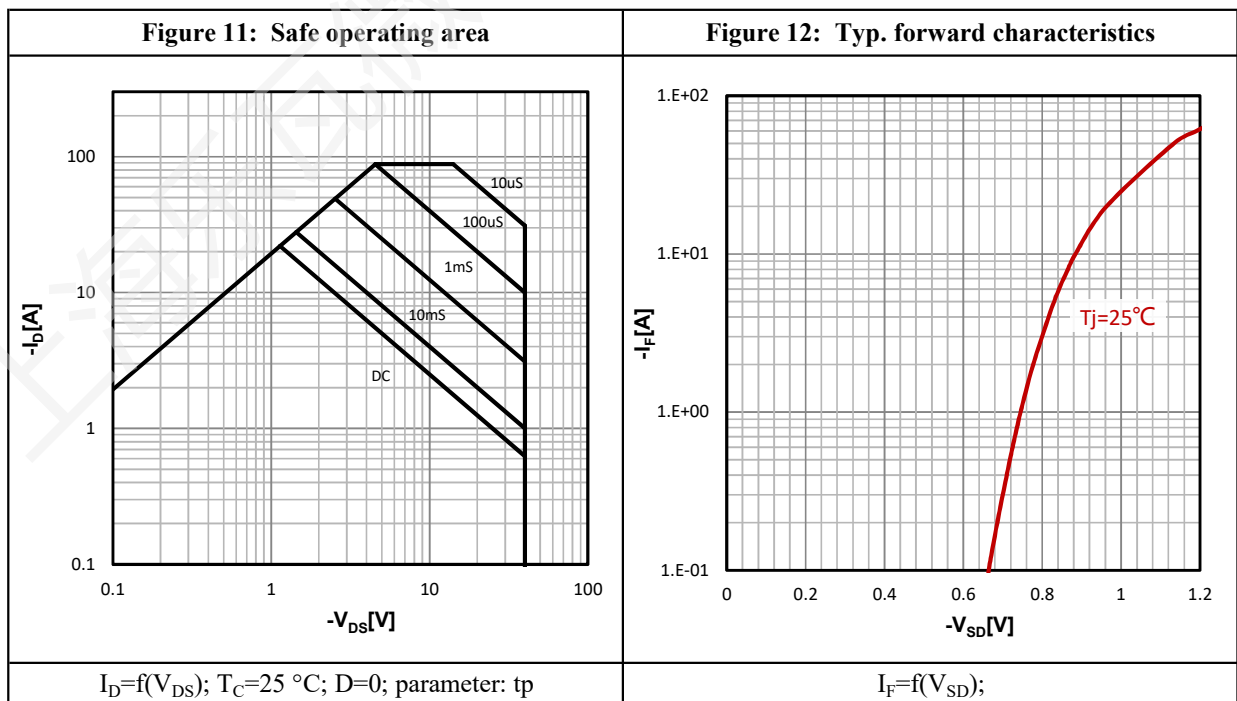
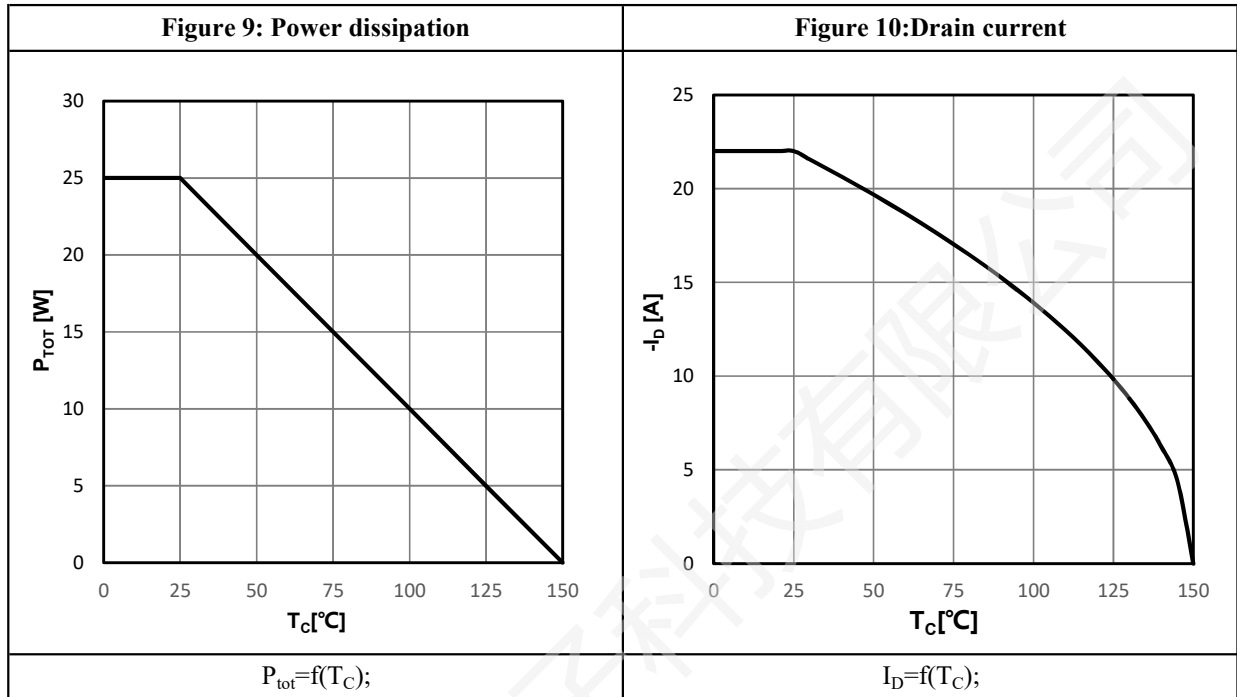
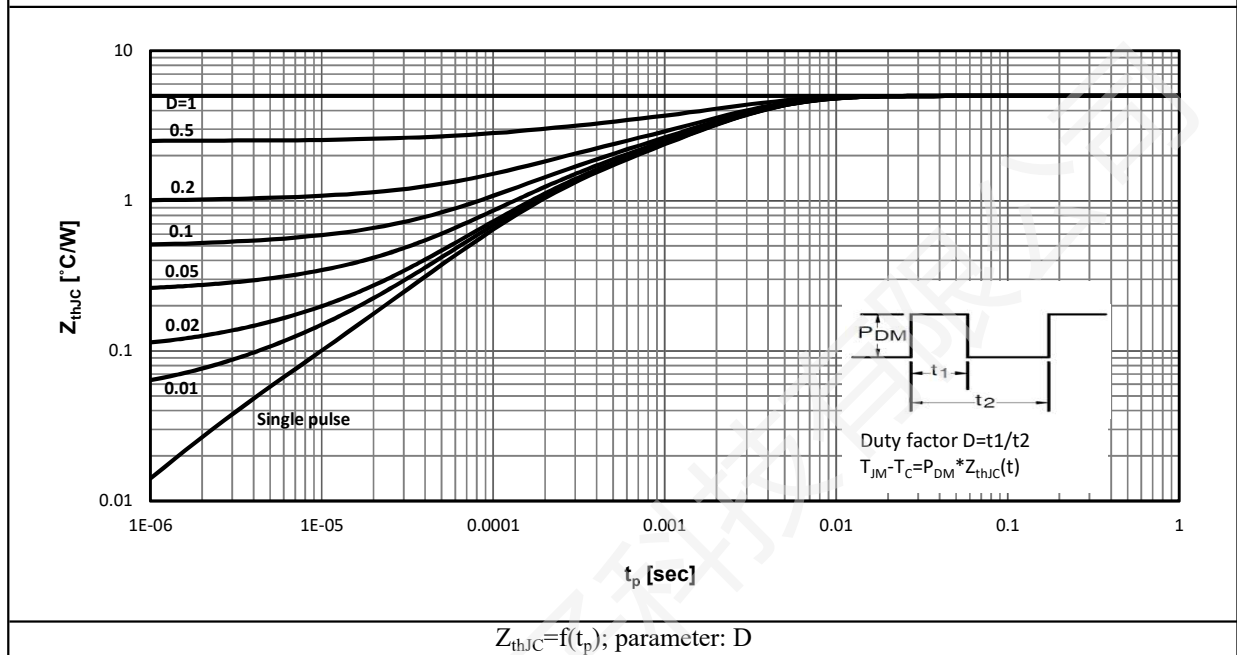
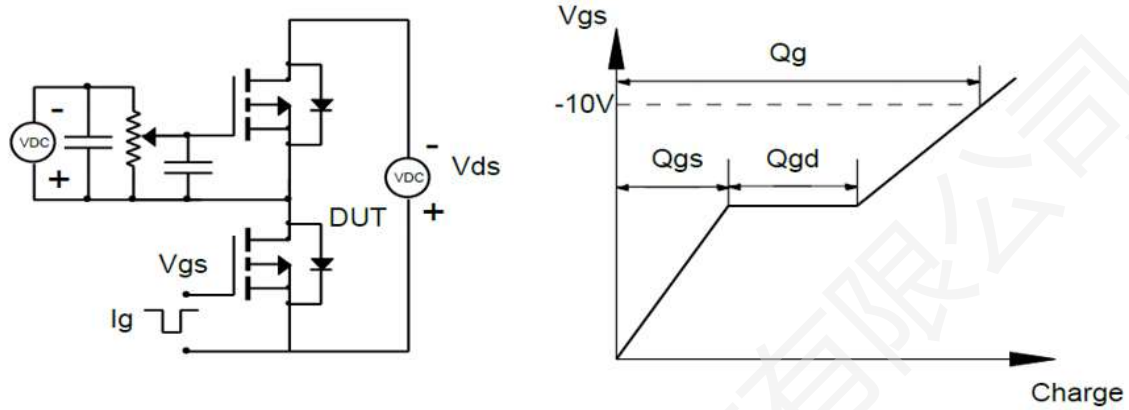
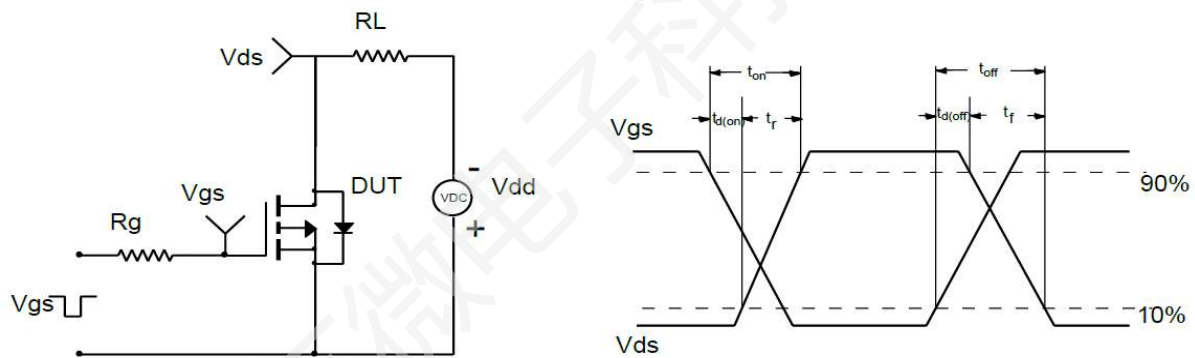
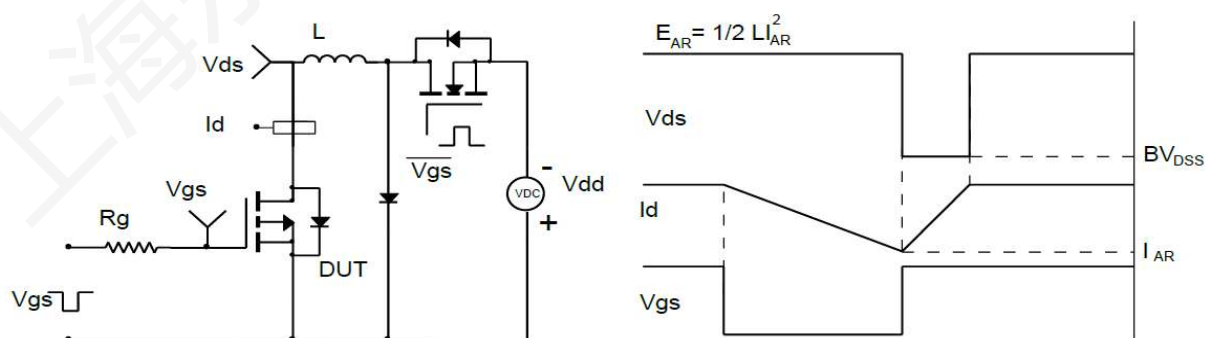
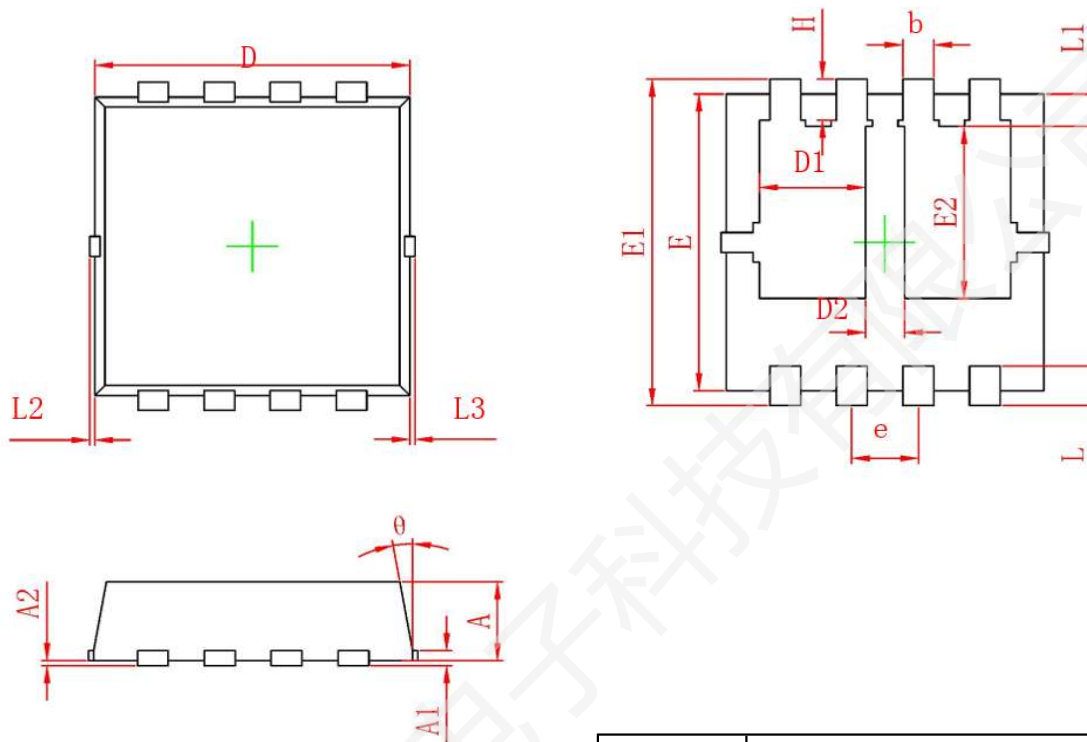


Figure 13: Max. Transient Thermal Impedance


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	MILLIMETER	
	MIN	MAX
A	0.700	0.900
A1	0.152 REF	
A2	0~0.05	
D	3.000	3.200
D1	0.935	1.135
D2	0.280	0.480
E	2.900	3.100
E1	3.150	3.450
E2	1.535	1.935
b	0.200	0.400
e	0.550	0.750
L	0.300	0.500
L1	0.180	0.480
L2	0~0.100	
L3	0~0.100	
H	0.315	0.515
θ	8°	12°

Revision History:

Revision	Date	Descriptions
Rev 1.1	July.2025	Initial Version

Disclaimer:

The information in this document is believed to be accurate and reliable. However, no responsibility is assumed by LW-Micro for its use. All operating parameters must be designed, validated and tested to ensure they meet the requirements of your application. LW-Micro reserves the right to make any specification and/or circuitry changes without prior notification. Before starting a brand-new project, please contact LW-Micro Sales to get the most recent relevant information.

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