

General Description:

The LWD2003AD2 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 DFN2*2-6L, 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.
D2003A/D.C.	LWD2003AD2	DFN2*2-6L	Reel	3000 Pcs

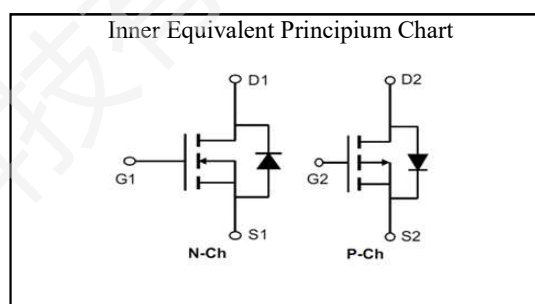
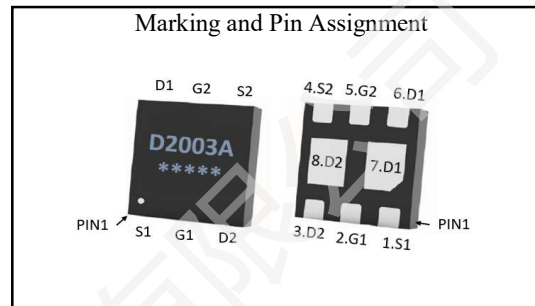
Absolute Maximum Ratings:

Symbol	Parameter	Value		Units	
		N-Ch	P-Ch		
V_{DSS}	Drain-to-Source Voltage	20	-20	V	
I_D	Continuous Drain Current	$T_C=25^\circ C$	8.0	-6.0	A
	Continuous Drain Current	$T_C=100^\circ C$	5.0	-3.8	A
I_{DM}^{a1}	Pulsed Drain Current		32	-24	A
E_{AS}^{a2}	Single pulse avalanche energy		16	11	mJ
V_{GS}	Gate-to-Source Voltage		± 10	± 10	V
P_D	Power Dissipation		2.5	2.5	W
T_J, T_{STG}	Operating Junction and Storage Temperature Range		150, -55 to 150		$^\circ C$
T_L	Maximum Temperature for Soldering		260		$^\circ C$

Thermal Characteristics:

Symbol	Parameter	Value		Units
		N-Ch	P-Ch	
$R_{\theta JA}^{a3}$	Thermal Resistance, Junction-to-Ambient	50	50	$^\circ C/W$

Symbol	N-Ch	P-Ch	Units
V_{DSS}	20	-20	V
I_D	8.0	-6.0	A
$R_{DS(ON) \text{ TYPE}}$	18	33	$m\Omega$



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	$V_{GS}=0V, I_D=250\mu A$	20	--	--	V
I_{DSS}	Drain to Source Leakage Current	$V_{DS}=20V, V_{GS}=0V$	--	--	1.0	μA
$I_{GSS(F)}$	Gate to Source Forward Leakage	$V_{GS}=+10V, V_{DS}=0V$	--	--	100	nA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	$V_{GS}=-10V, V_{DS}=0V$	--	--	-100	nA
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	0.4	0.7	1.0	V
$R_{DS(ON)1}$	Drain-to-Source On-Resistance	$V_{GS}=4.5V, I_D=5.0A$	--	18	24	$m\Omega$
$R_{DS(ON)2}$	Drain-to-Source On-Resistance	$V_{GS}=2.5V, I_D=3.0A$	--	25	35	$m\Omega$

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{GS} = 0V$	--	429	--	pF
C_{oss}	Output Capacitance	$V_{DS} = 10V$	--	78	--	
C_{rss}	Reverse Transfer Capacitance	$f = 1.0MHz$	--	70	--	
R_G	Gate resistance	$V_{GS}=0V, V_{DS}=0V, f=1.0MHz$	--	1.4	--	Ω

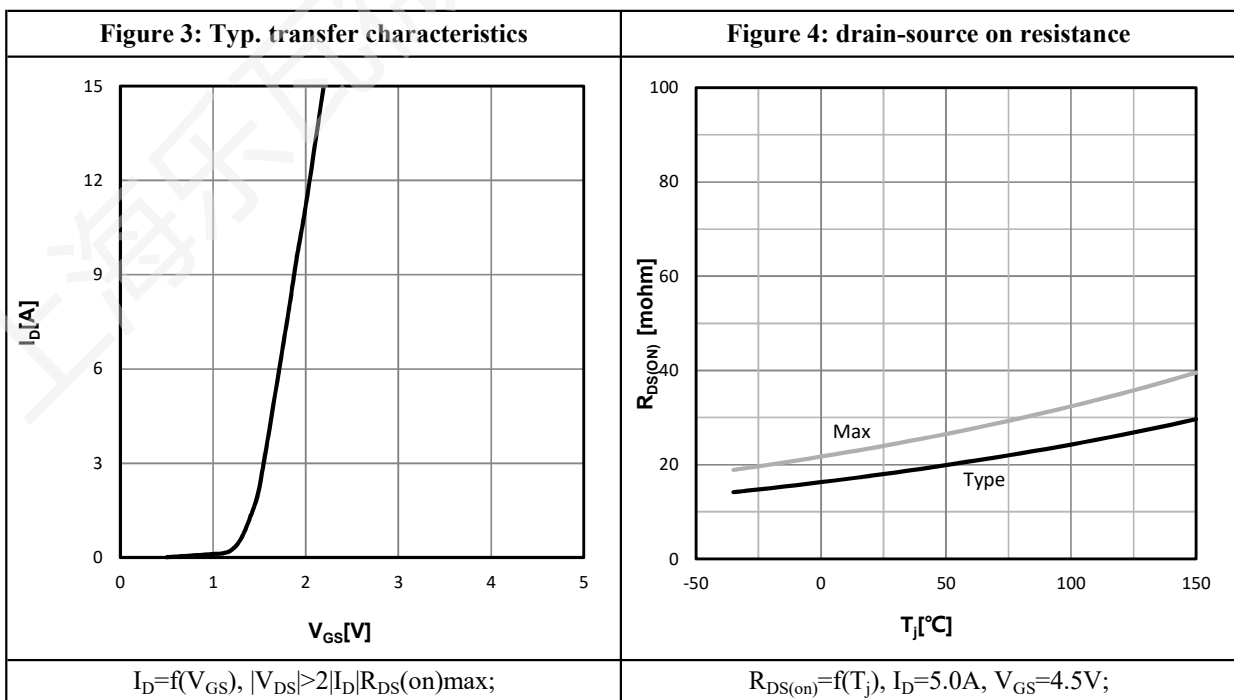
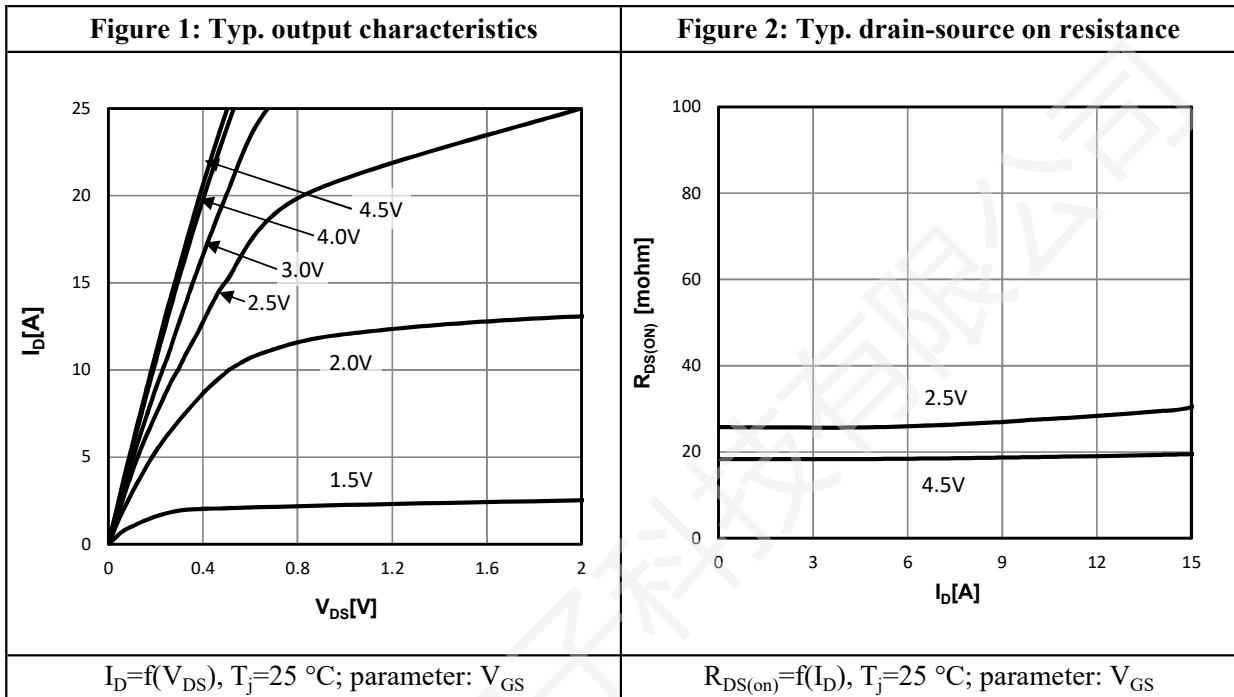
Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D = 5.0A$	--	10	--	ns
t_r	Rise Time	$V_{DS} = 10V$	--	32	--	
$t_{d(OFF)}$	Turn-Off Delay Time	$V_{GS} = 4.5V$	--	33	--	
t_f	Fall Time	$R_G = 3.0\Omega$	--	11	--	
Q_g	Total Gate Charge	$V_{GS} = 4.5V$	--	6.9	--	nC
Q_{gs}	Gate Source Charge	$V_{DS} = 10V$	--	0.9	--	
Q_{gd}	Gate Drain Charge	$I_D = 5.0A$	--	2.1	--	

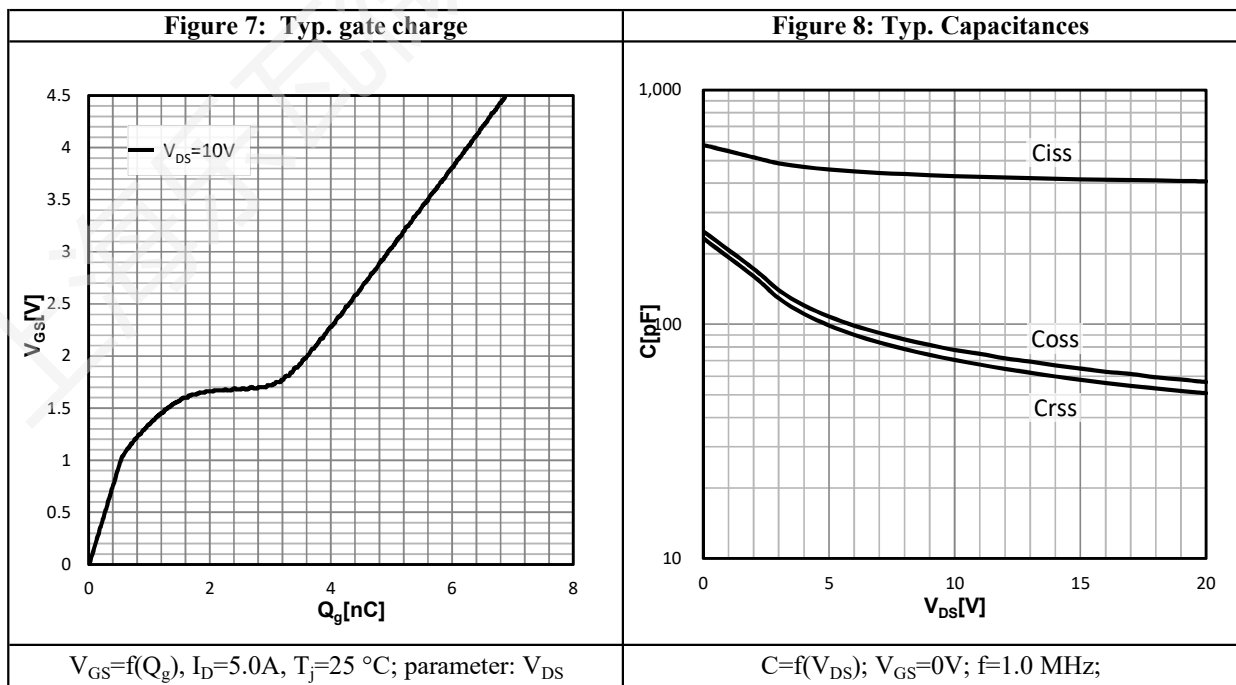
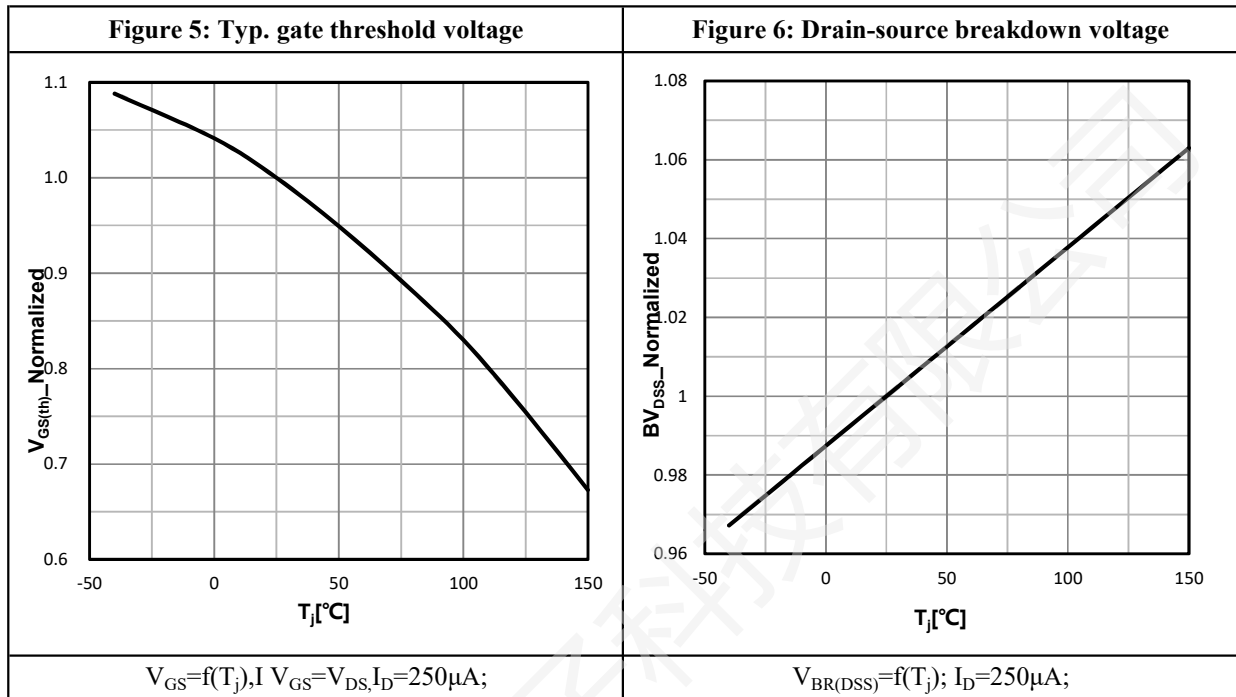
Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
I_S	Diode Forward Current	$T_C = 25\text{ }^\circ\text{C}$	--	--	8.0	A
V_{SD}	Diode Forward Voltage	$I_S = 5.0A, V_{GS} = 0V$	--	--	1.2	V

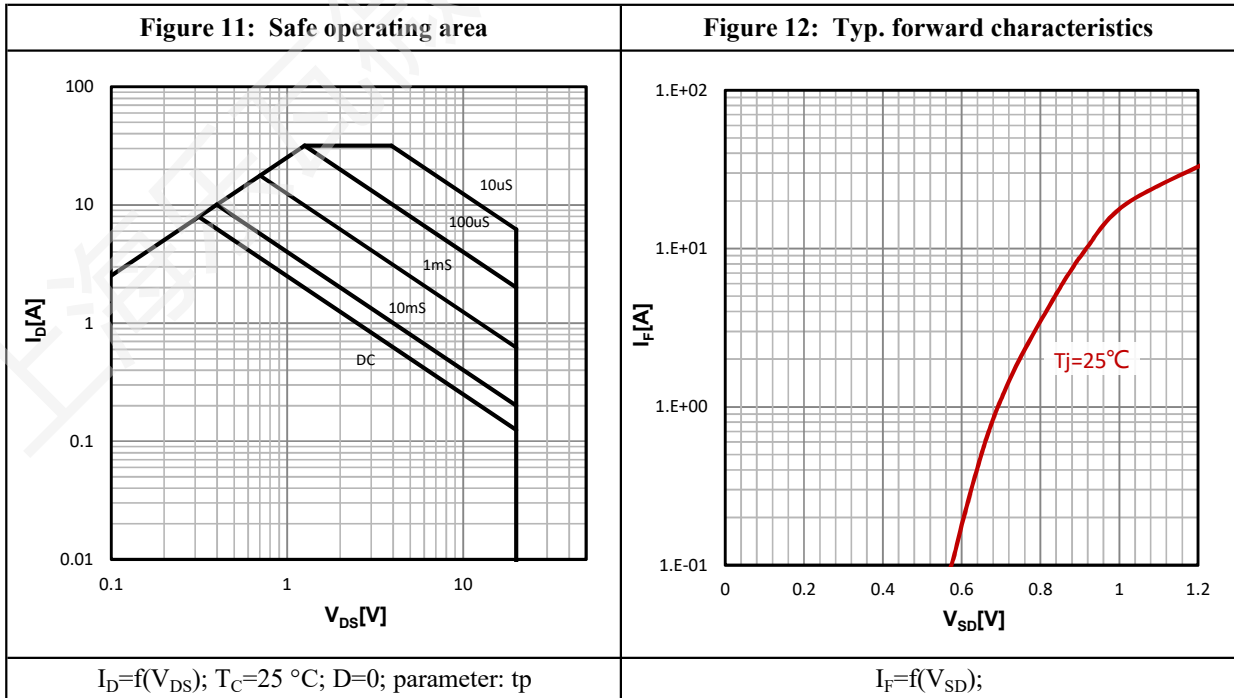
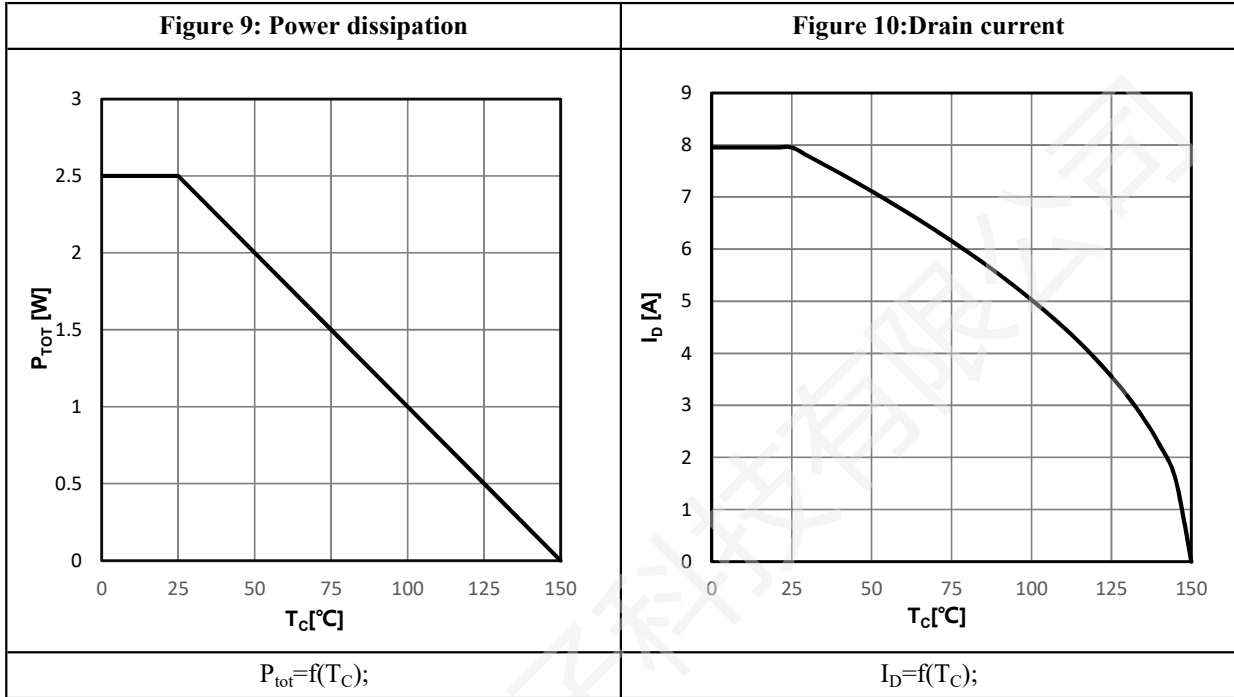
a1: Repetitive rating; pulse width limited by maximum junction temperature

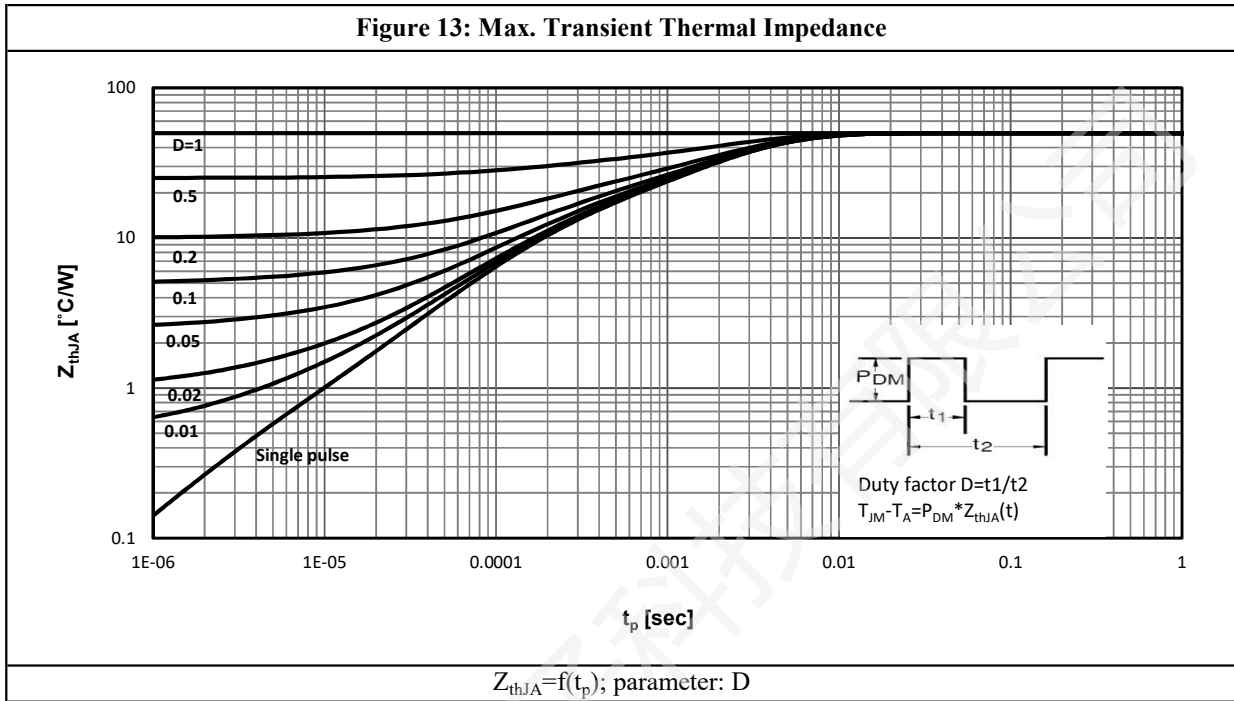
a2: $V_{DD} = 15V, L = 0.1mH, R_G = 25\Omega$, Starting $T_J = 25\text{ }^\circ\text{C}$

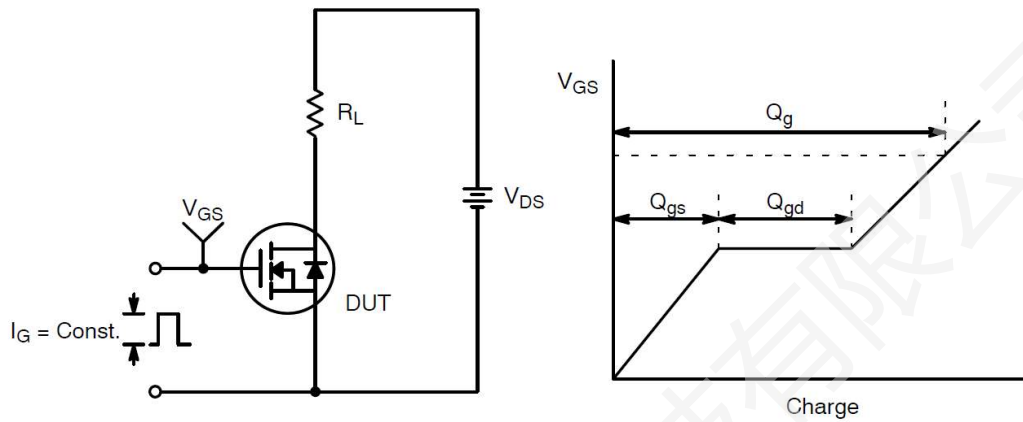
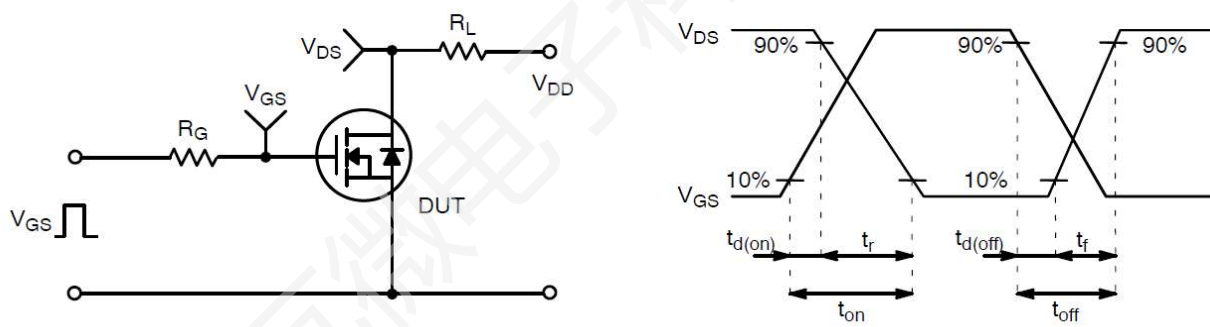
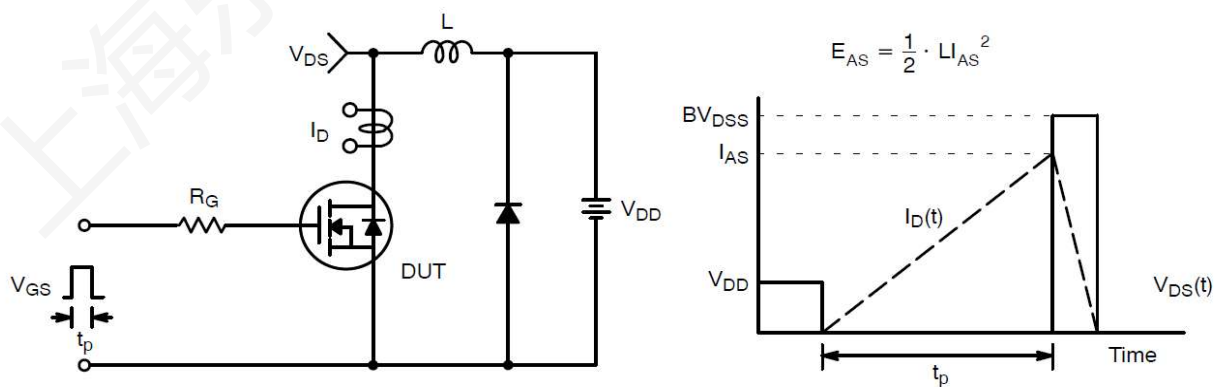
a3: Surface Mounted on FR4 Board, $t \leq 10sec$

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 ($T_C = 25\text{ }^\circ\text{C}$, unless otherwise specified):

Static Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
V_{DSS}	Drain to Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-20	--	--	V
I_{DSS}	Drain to Source Leakage Current	$V_{DS}=-20V, V_{GS}=0V$	--	--	1.0	μA
$I_{GSS(F)}$	Gate to Source Forward Leakage	$V_{GS}=-10V, V_{DS}=0V$	--	--	-100	nA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	$V_{GS}=+10V, V_{DS}=0V$	--	--	100	nA
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.4	-0.6	-1.0	V
$R_{DS(ON)1}$	Drain-to-Source On-Resistance	$V_{GS}=-4.5V, I_D=-5.0A$	--	33	40	$m\Omega$
$R_{DS(ON)2}$	Drain-to-Source On-Resistance	$V_{GS}=-2.5V, I_D=-3.0A$	--	43	53	$m\Omega$

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{GS} = 0V$	--	401	--	pF
C_{oss}	Output Capacitance	$V_{DS} = -10V$	--	62	--	
C_{rss}	Reverse Transfer Capacitance	$f = 1.0MHz$	--	51	--	
R_G	Gate resistance	$V_{GS}=0V, V_{DS}=0V, f=1.0MHz$	--	13	--	Ω

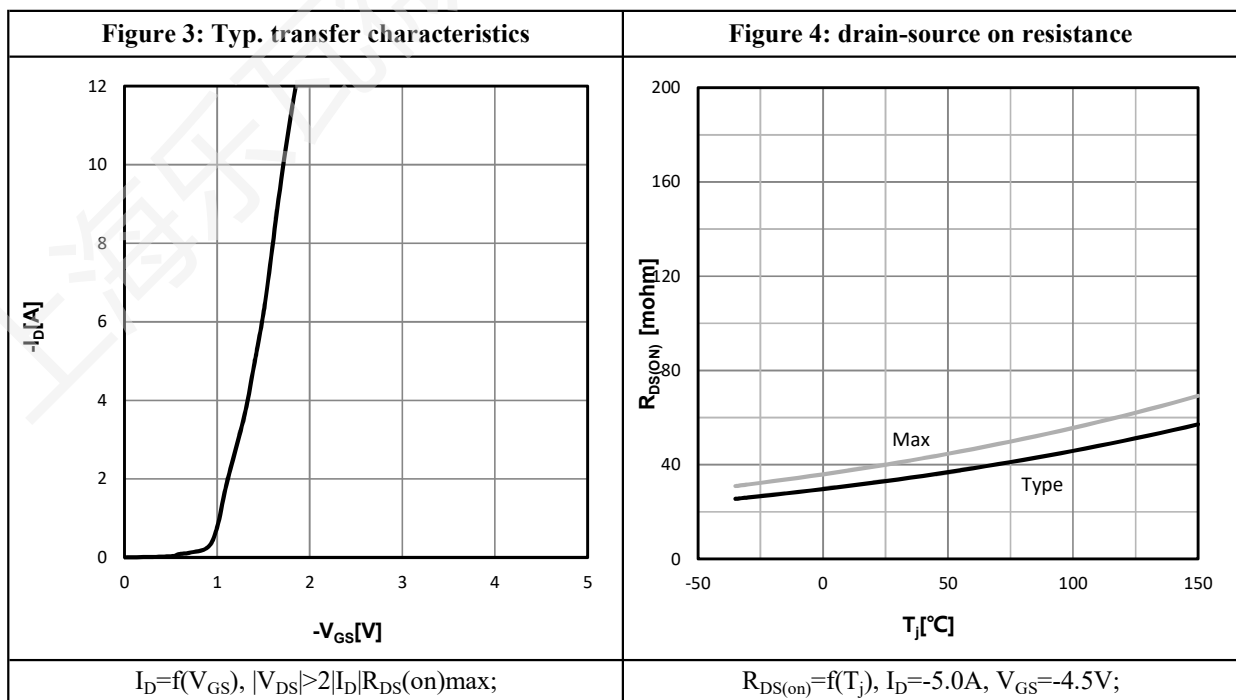
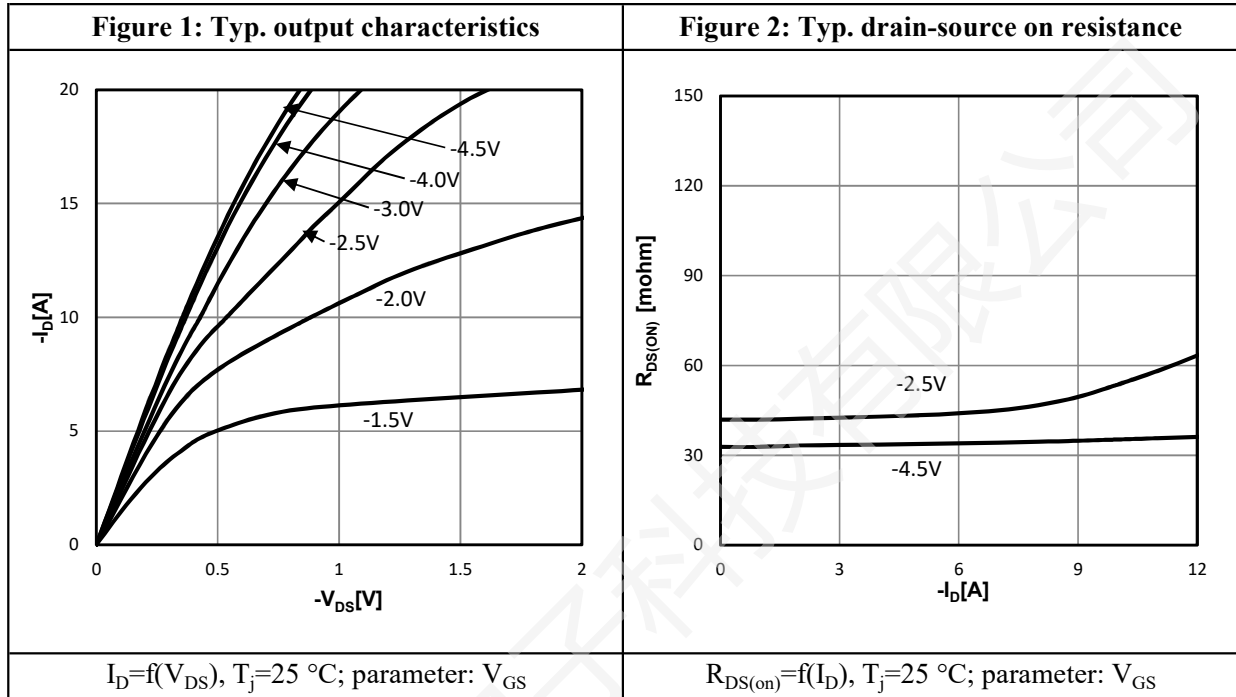
Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D = -5.0A$	--	10	--	ns
t_r	Rise Time	$V_{DS} = -10V$	--	35	--	
$t_{d(OFF)}$	Turn-Off Delay Time	$V_{GS} = -4.5V$	--	27	--	
t_f	Fall Time	$R_G = 1.0\Omega$	--	11	--	
Q_g	Total Gate Charge	$V_{GS} = -4.5V$	--	5.4	--	nC
Q_{gs}	Gate to Source Charge	$V_{DS} = -10V$	--	0.9	--	
Q_{gd}	Gate to Drain Charge	$I_D = -5.0A$	--	1.0	--	

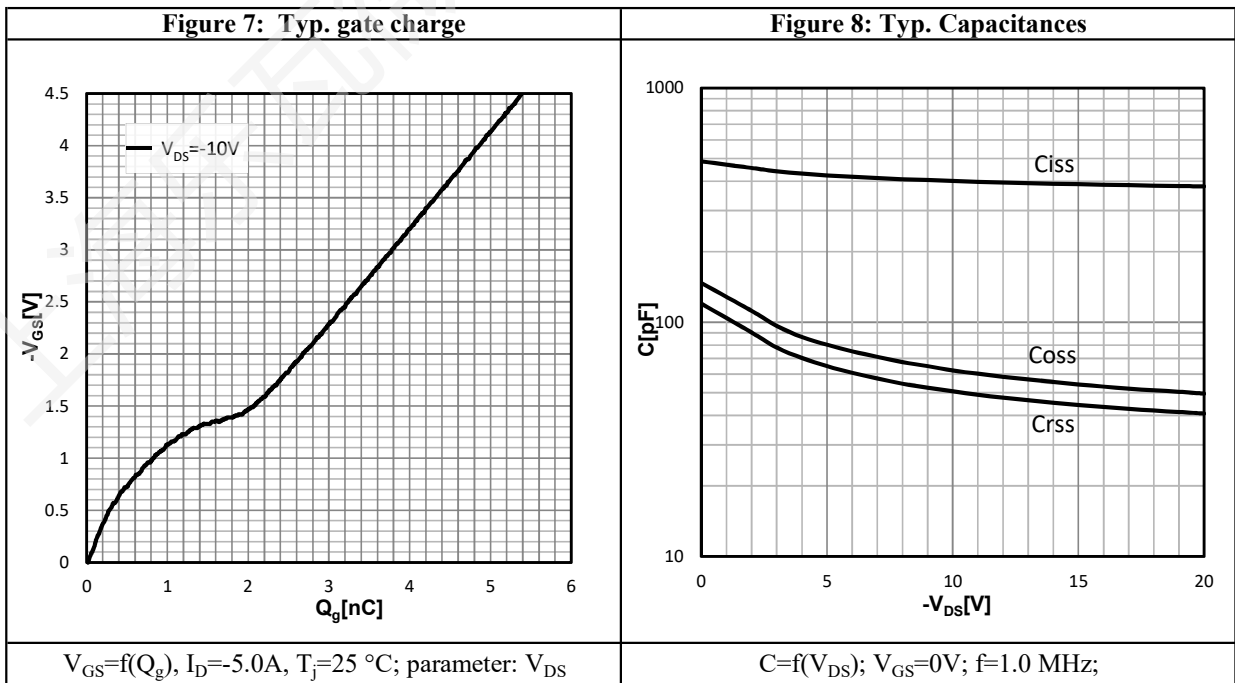
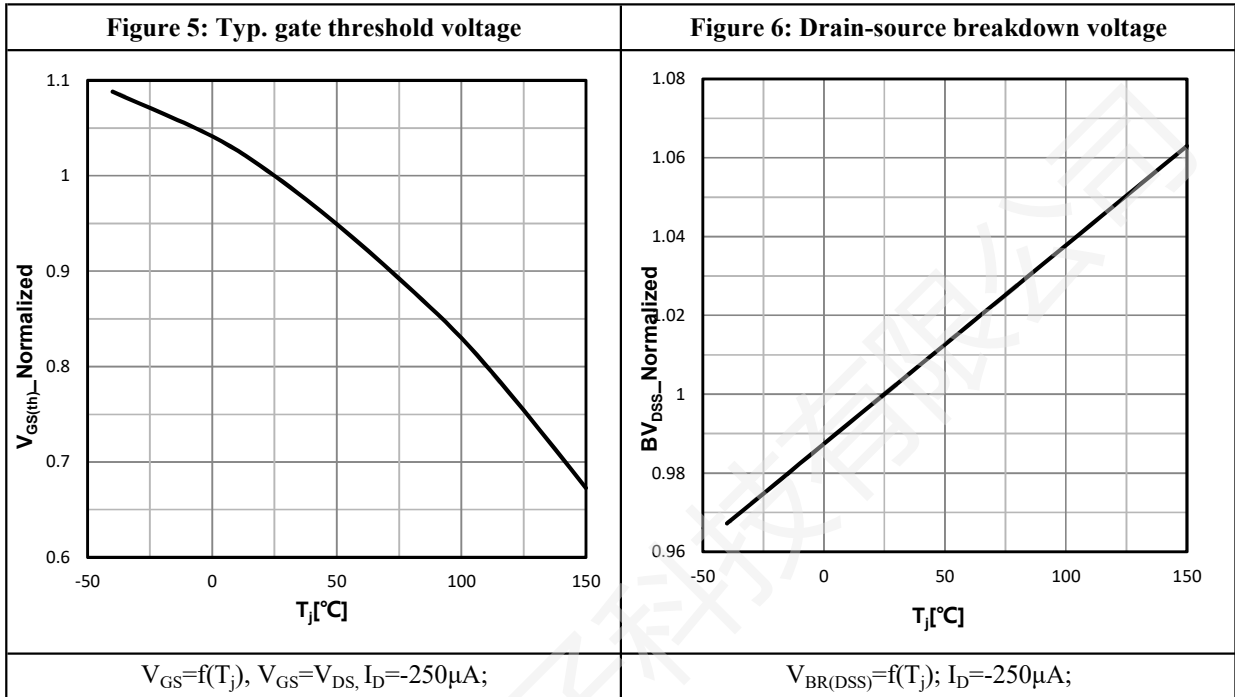
Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
I_S	Diode Forward Current	$T_C = 25\text{ }^\circ\text{C}$	--	--	-6.0	A
V_{SD}	Diode Forward Voltage	$I_S = -5.0A, V_{GS} = 0V$	--	--	-1.2	V

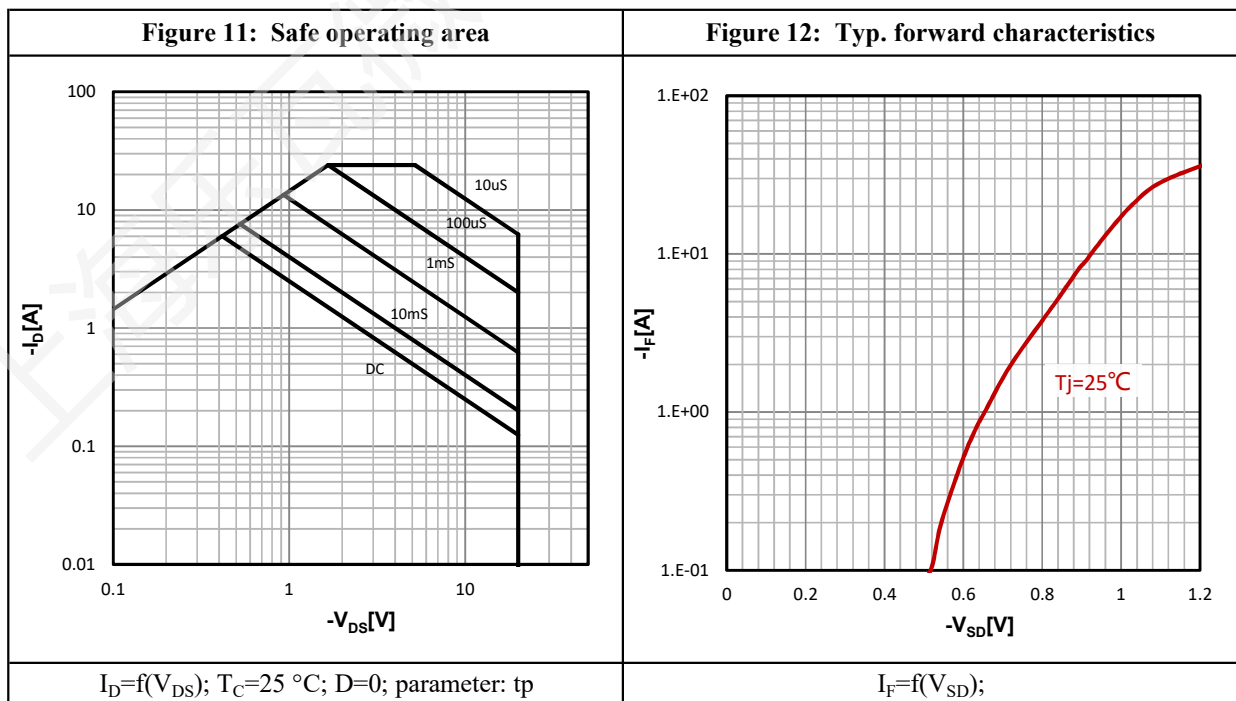
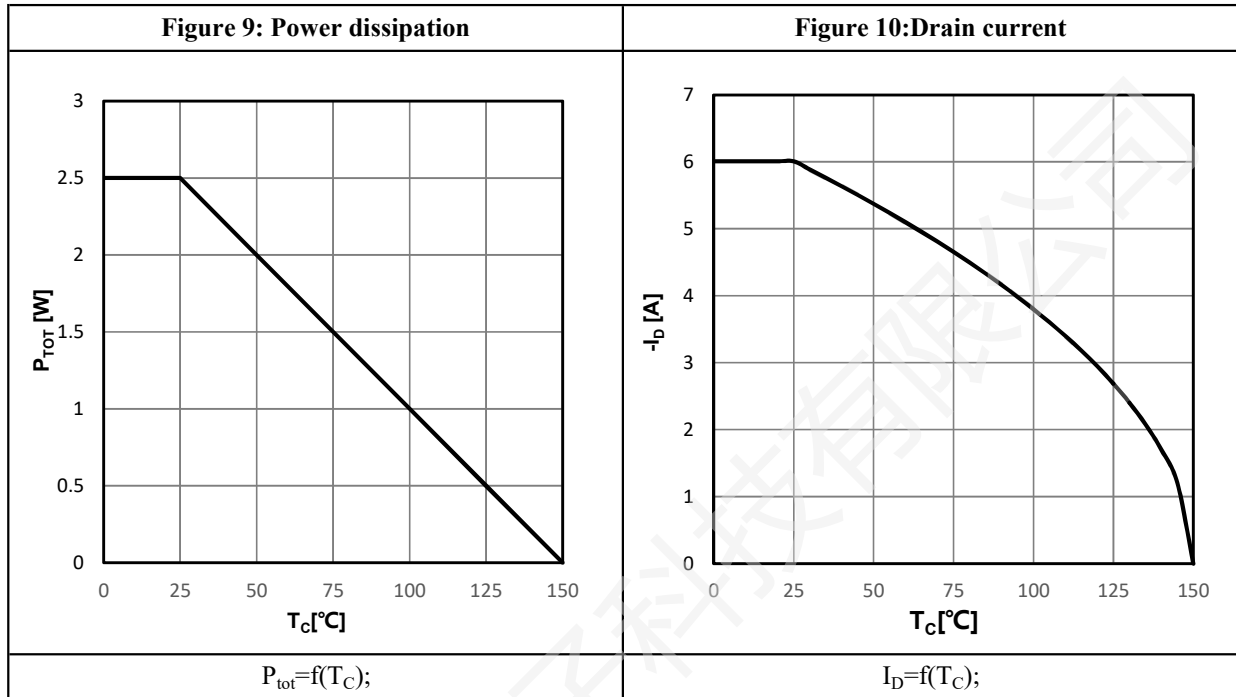
a1: Repetitive rating; pulse width limited by maximum junction temperature

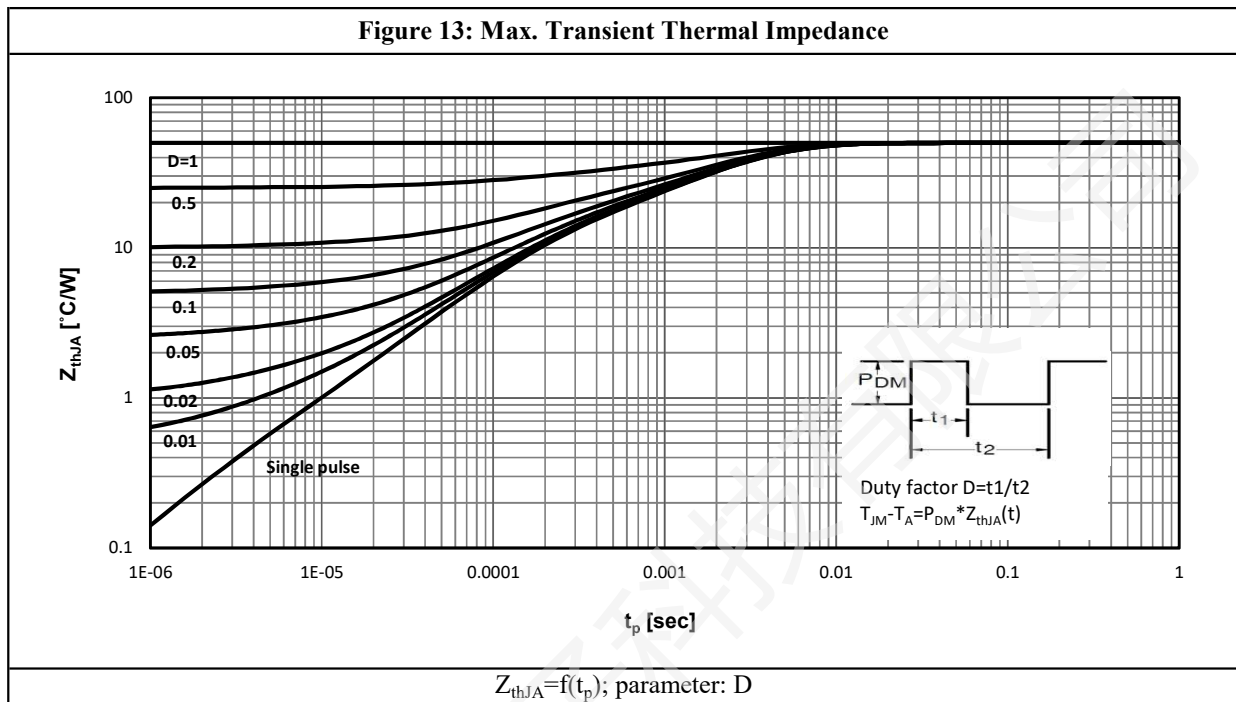
a2: $V_{DD} = -15V, L = 0.1mH, R_G = 25\Omega$, Starting $T_j = 25\text{ }^\circ\text{C}$

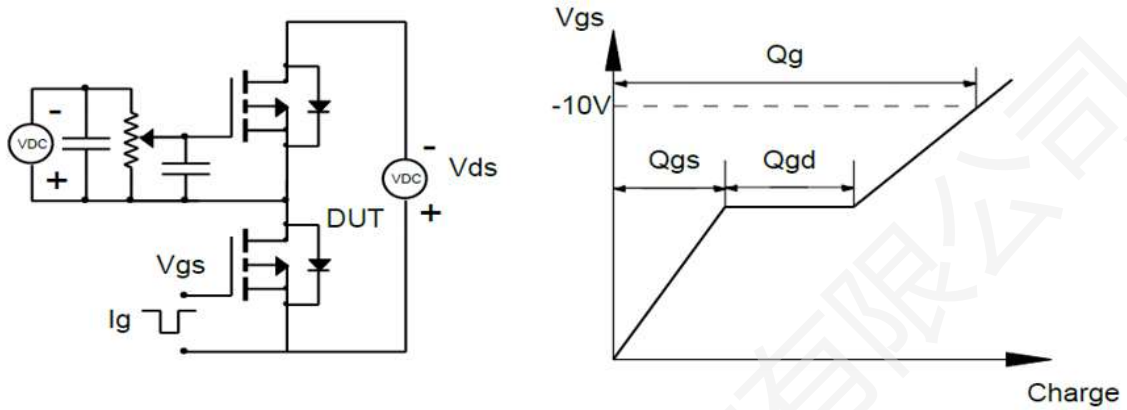
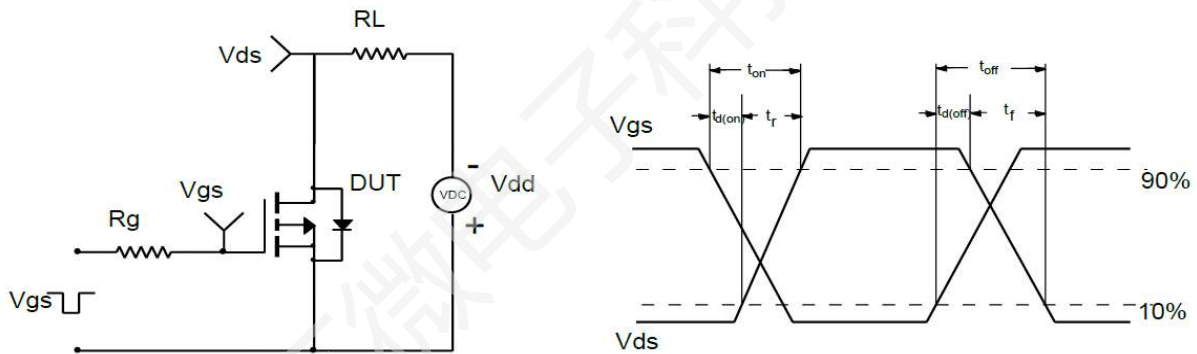
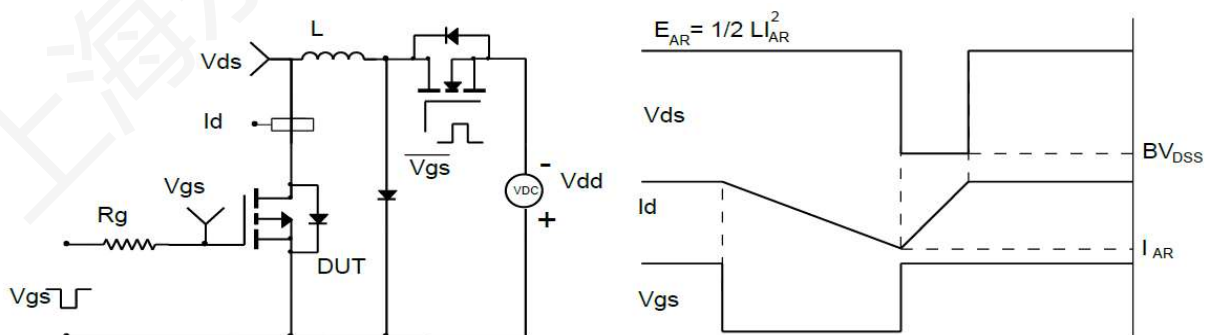
a3: Surface Mounted on FR4 Board, $t \leq 10sec$

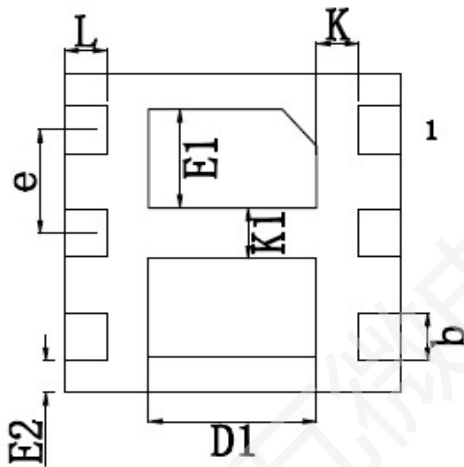
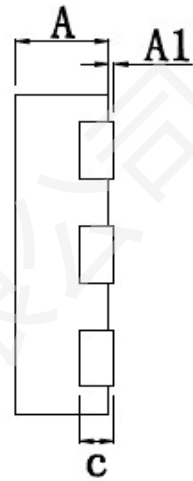
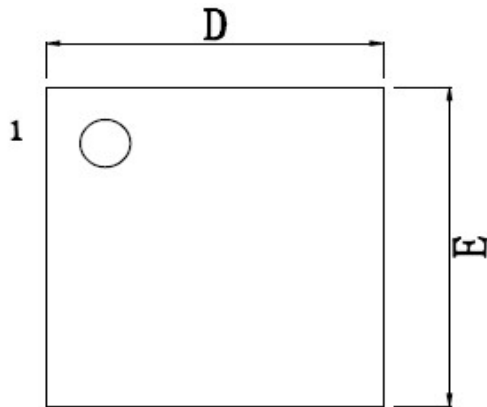
P-Channel Characteristics Curve:








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	MILIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0.00	—	0.05
b	0.25	0.30	0.35
b1	0.15	0.20	0.25
c	0.203 TYP		
D	1.95	2.00	2.05
D1	0.90	1.00	1.10
E	1.95	2.00	2.05
E1	0.52	0.62	0.72
E2	0.20 REF		
Nd	1.30 BSC		
e	0.65 BSC		
K	0.25 REF		
K1	0.32 REF		
L	0.20	0.25	0.30

Revision History:

Revison	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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