

General Description:

The LWD4001AS 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:

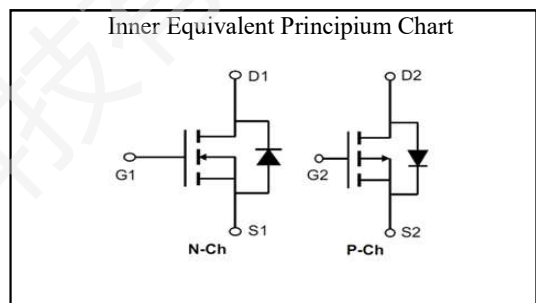
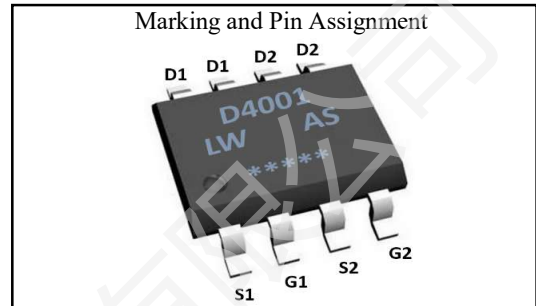
- DC-DC Converter
- Portable Equipment
- Power Management

100% DVDS Tested

100% Avalanche Tested



Symbol	N-Ch	P-Ch	Units
V_{DSS}	40	-40	V
I_D	6.5	-5.5	A
$R_{DS(ON)}$ TYPE	19	42	mΩ



Package Marking and Ordering Information:

Marking	Part Number	Package	Packing	Qty.
D4001/LW AS/D.C.	LWD4001AS	SOP-8	Reel	4000 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	$T_C=25^{\circ}\text{C}$	6.5	-5.5	A
	Continuous Drain Current	$T_C=100^{\circ}\text{C}$	4.1	-3.4	A
I_{DM}^{a1}	Pulsed Drain Current		26	-22	A
E_{AS}^{a2}	Single pulse avalanche energy		25	23	mJ
V_{GS}	Gate-to-Source Voltage		±15	±15	V
P_D	Power Dissipation		2.0	2.0	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	
$R_{\theta JA}^{a3}$	Thermal Resistance, Junction-to-Ambient		62.5	62.5	°C/W

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	$V_{GS}=+15V, V_{DS}=0V$	--	--	100	nA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	$V_{GS}=-15V, V_{DS}=0V$	--	--	-100	nA
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.5	2.0	V
$R_{DS(ON)1}$	Drain-to-Source On-Resistance	$V_{GS}=10V, I_D=10A$	--	19	23	$m\Omega$
$R_{DS(ON)2}$	Drain-to-Source On-Resistance	$V_{GS}=4.5V, I_D=5.0A$	--	22.5	30	$m\Omega$

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{GS} = 0V$	--	710	--	pF
C_{oss}	Output Capacitance	$V_{DS} = 20V$	--	56	--	
C_{rss}	Reverse Transfer Capacitance	$f = 1.0MHz$	--	49	--	
R_G	Gate resistance	$V_{GS}=0V, V_{DS}=0V, f=1.0MHz$	--	1.6	--	Ω

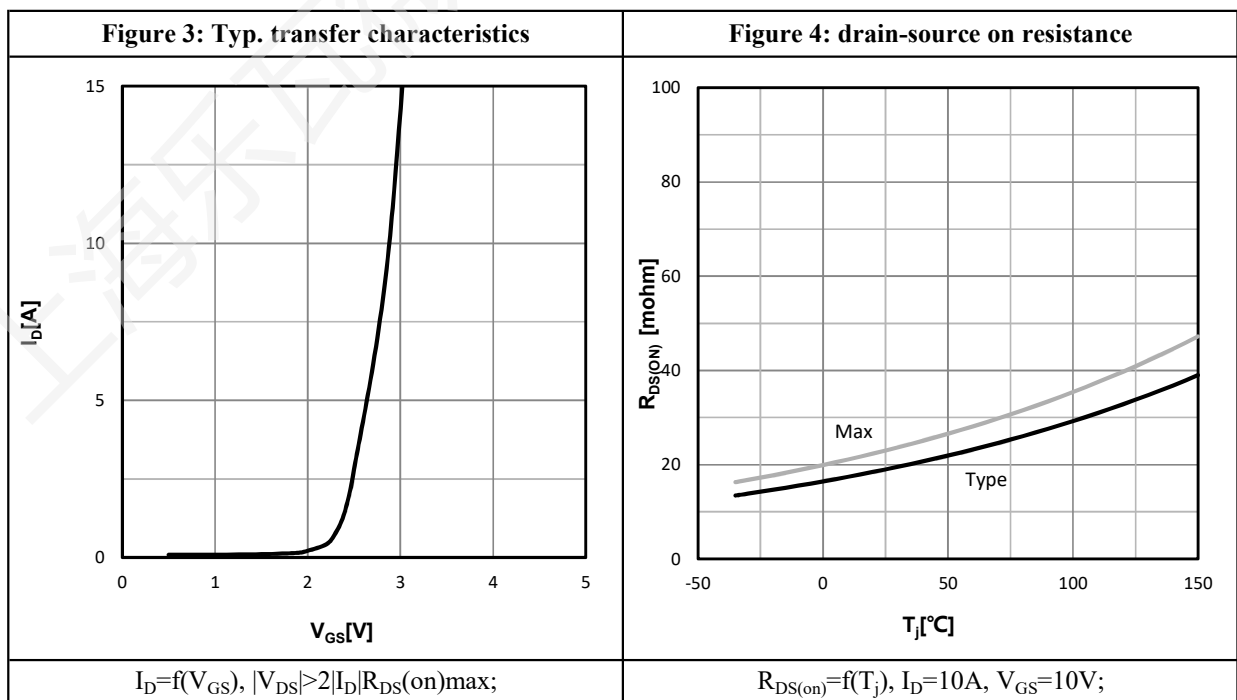
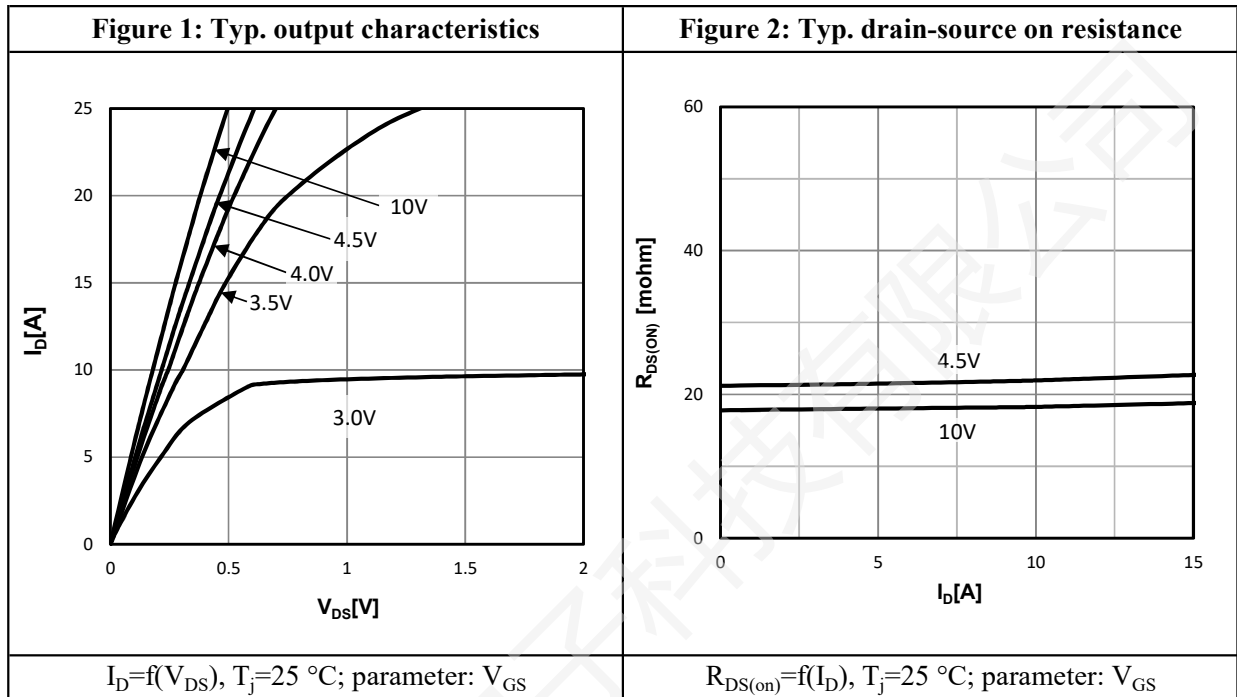
Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D = 10A$	--	6.0	--	ns
t_r	Rise Time	$V_{DS} = 20V$	--	5.4	--	
$t_{d(OFF)}$	Turn-Off Delay Time	$V_{GS} = 10V$	--	3.3	--	
t_f	Fall Time	$R_G = 3.0\Omega$	--	4.2	--	
Q_g	Total Gate Charge	$V_{GS} = 10V$	--	17	--	nC
Q_{gs}	Gate Source Charge	$V_{DS} = 20V$	--	2.3	--	
Q_{gd}	Gate Drain Charge	$I_D = 10A$	--	3.3	--	

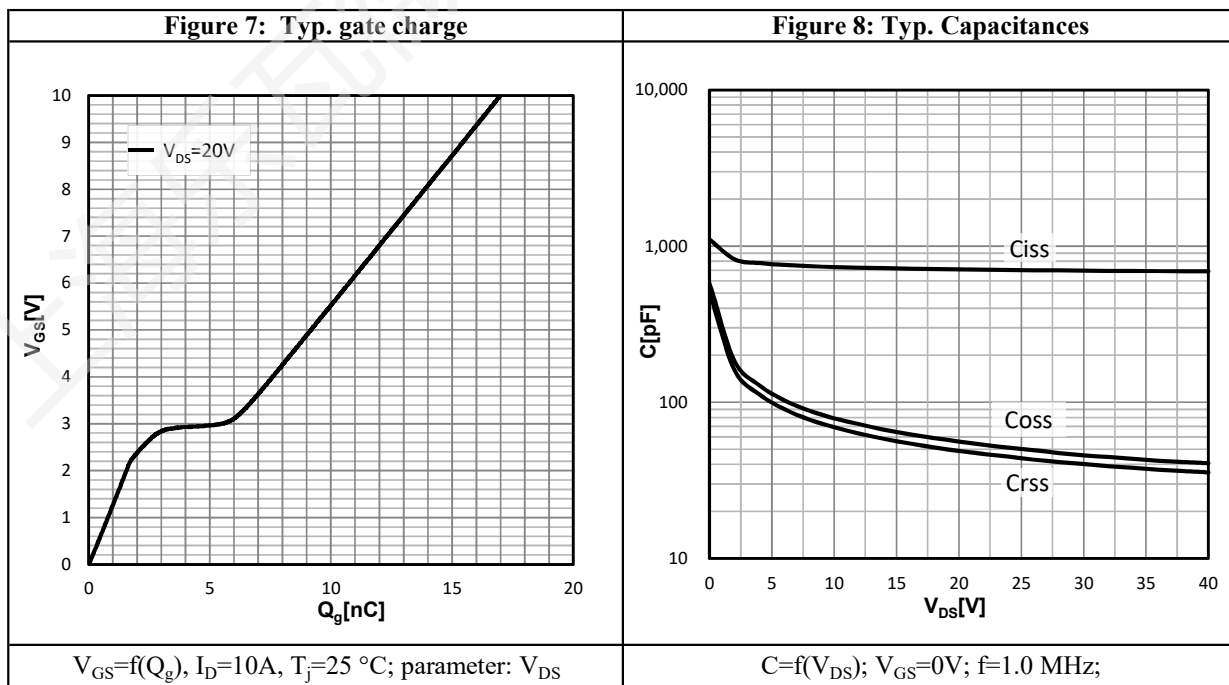
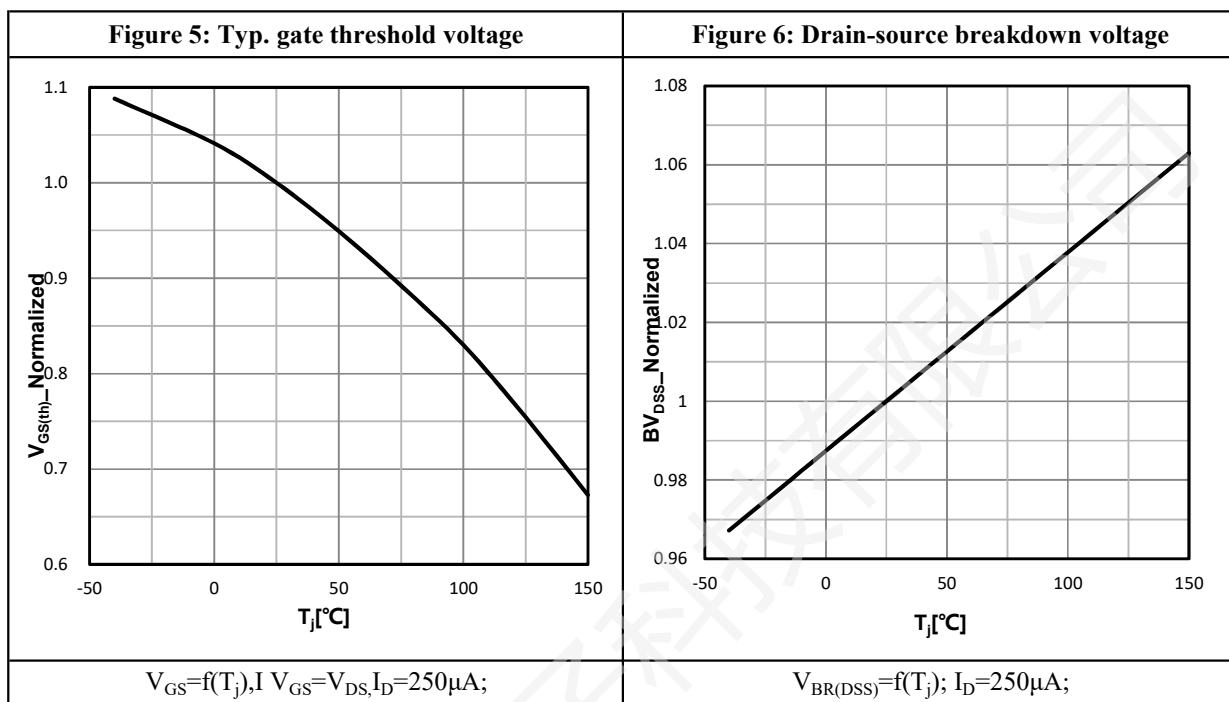
Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
I_S	Diode Forward Current	$T_C = 25\text{ }^{\circ}\text{C}$	--	--	6.5	A
V_{SD}	Diode Forward Voltage	$I_S=10A, V_{GS}=0V$	--	--	1.2	V

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

a2: $V_{DD}=20V, L=0.1mH, R_G=25\Omega$, Starting $T_J=25\text{ }^{\circ}\text{C}$

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

N-Channel Characteristics Curve:




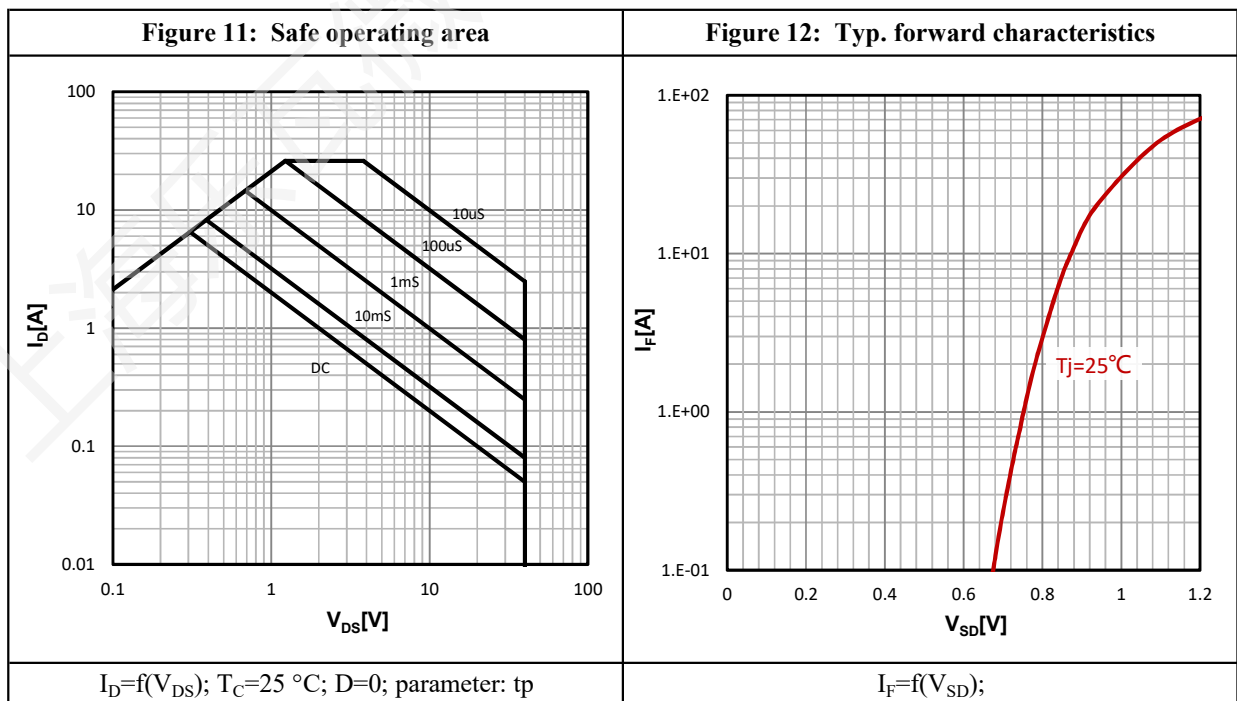
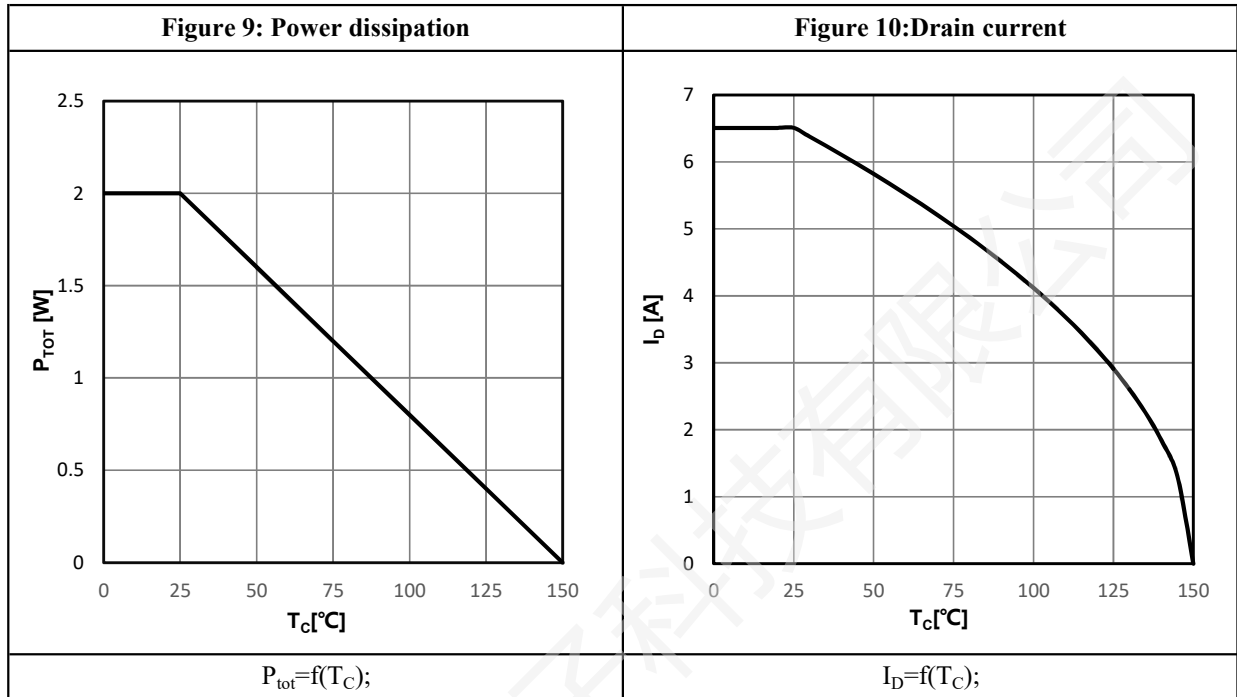
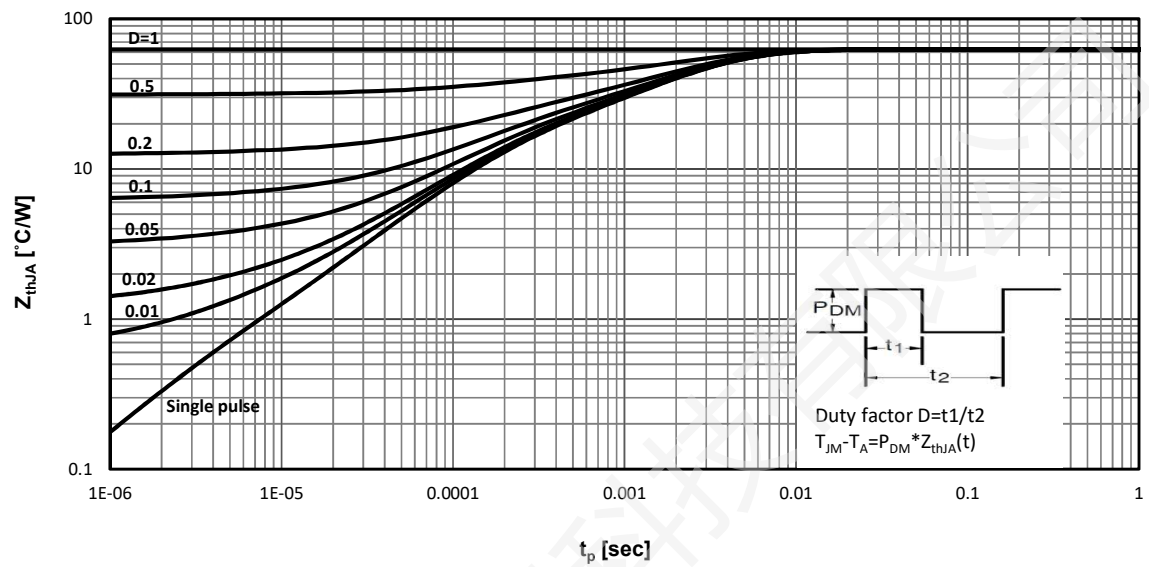
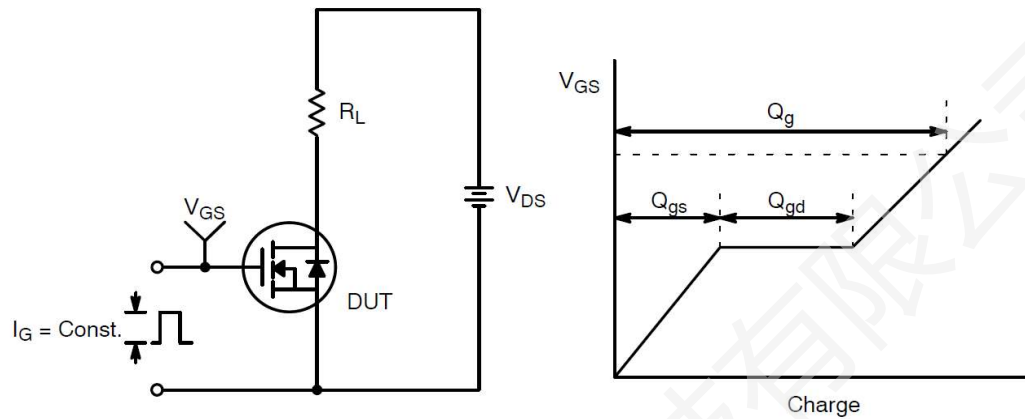
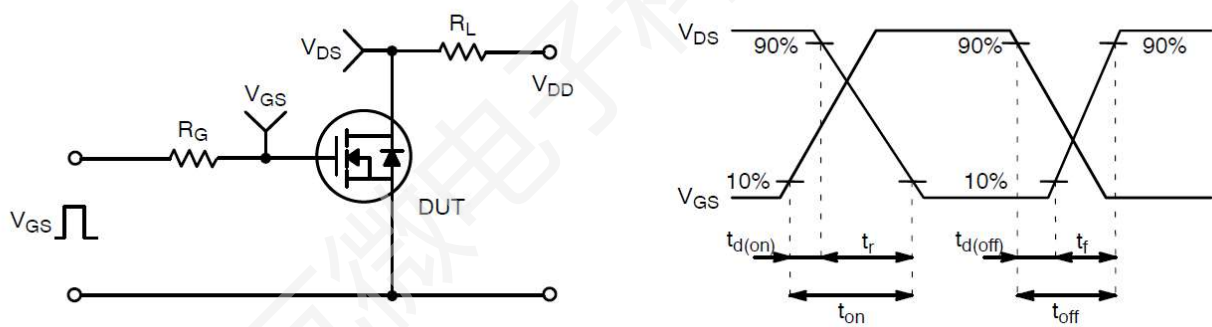
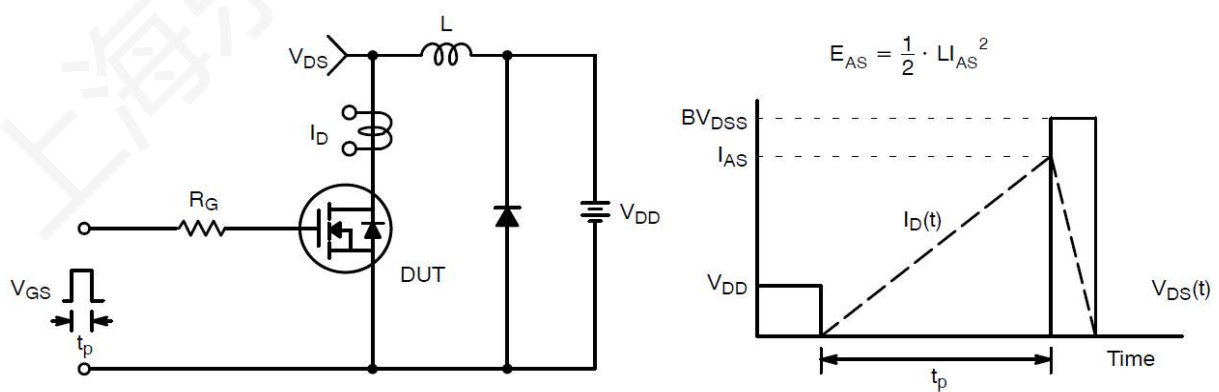


Figure 13: Max. Transient Thermal Impedance

 $Z_{thJA} = f(t_p)$; parameter: D

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	$V_{GS}=-15V, V_{DS}=0V$	--	--	-100	nA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	$V_{GS}=+15V, V_{DS}=0V$	--	--	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	$V_{GS}=-10V, I_D=-4.5A$	--	42	51	$m\Omega$
$R_{DS(ON)2}$	Drain-to-Source On-Resistance	$V_{GS}=-4.5V, I_D=-3.0A$	--	51.5	62	$m\Omega$

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{GS} = 0V$	--	629	--	pF
C_{oss}	Output Capacitance	$V_{DS} = -20V$	--	64	--	
C_{rss}	Reverse Transfer Capacitance	$f = 1.0MHz$	--	55	--	
R_G	Gate resistance	$V_{GS}=0V, V_{DS}=0V, f=1.0MHz$	--	13	--	Ω

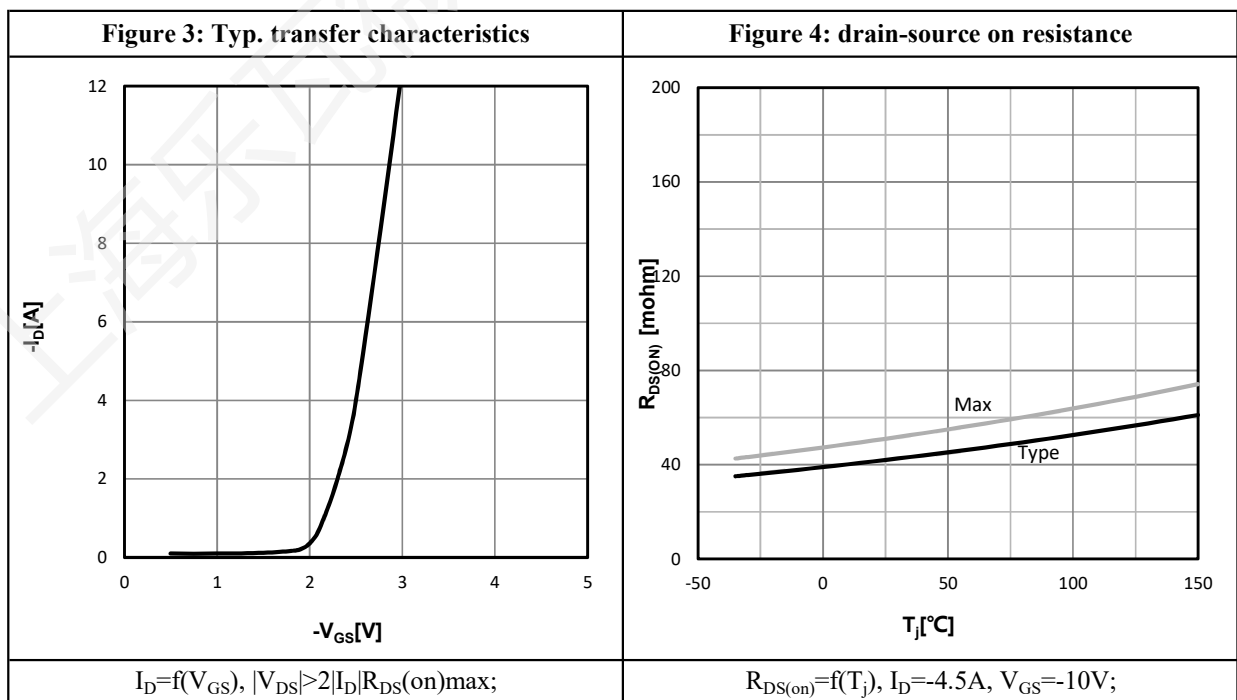
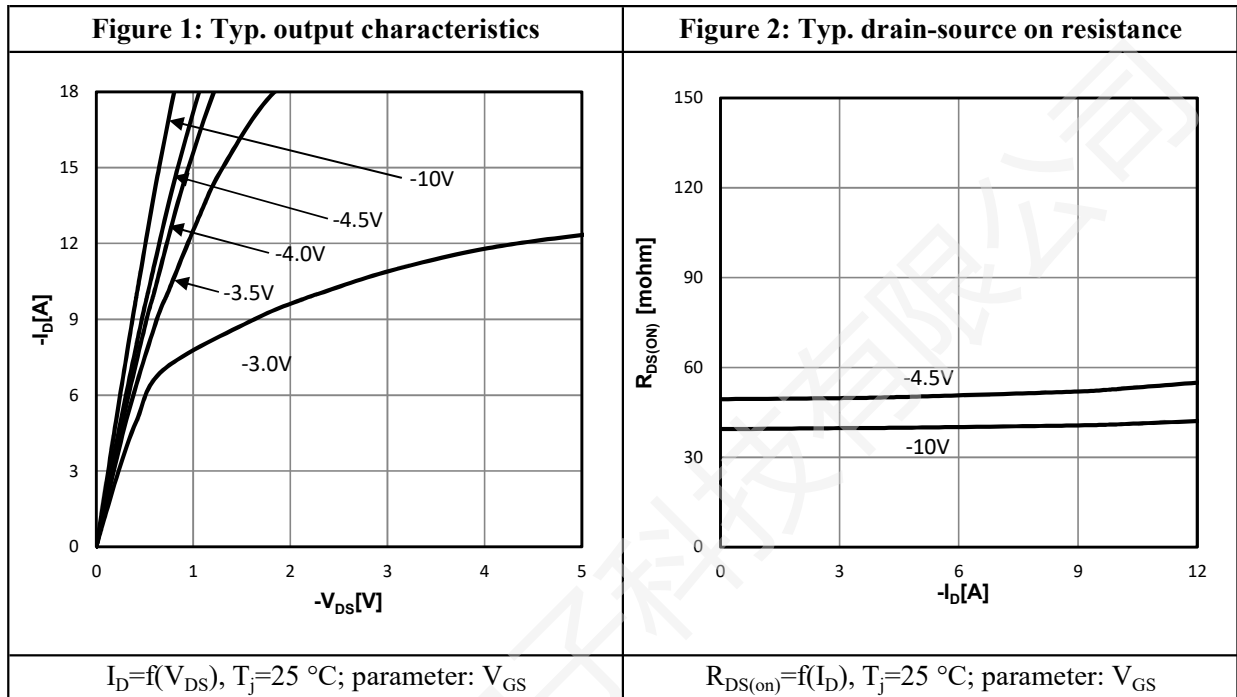
Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D = -4.5A$	--	6.0	--	ns
t_r	Rise Time	$V_{DS} = -20V$	--	8.1	--	
$t_{d(OFF)}$	Turn-Off Delay Time	$V_{GS} = -10V$	--	43	--	
t_f	Fall Time	$R_G = 3.0\Omega$	--	15	--	
Q_g	Total Gate Charge	$V_{GS} = -10V$	--	15	--	nC
Q_{gs}	Gate to Source Charge	$V_{DS} = -20V$	--	1.9	--	
Q_{gd}	Gate to Drain Charge	$I_D = -4.5A$	--	2.7	--	

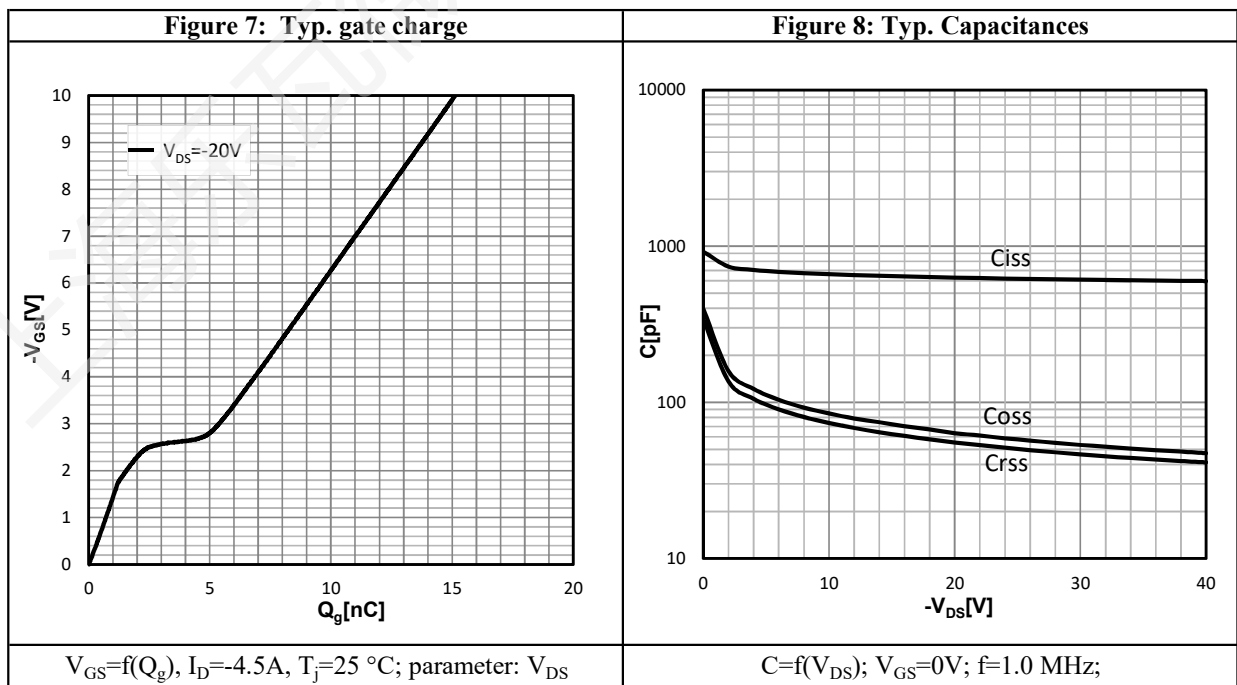
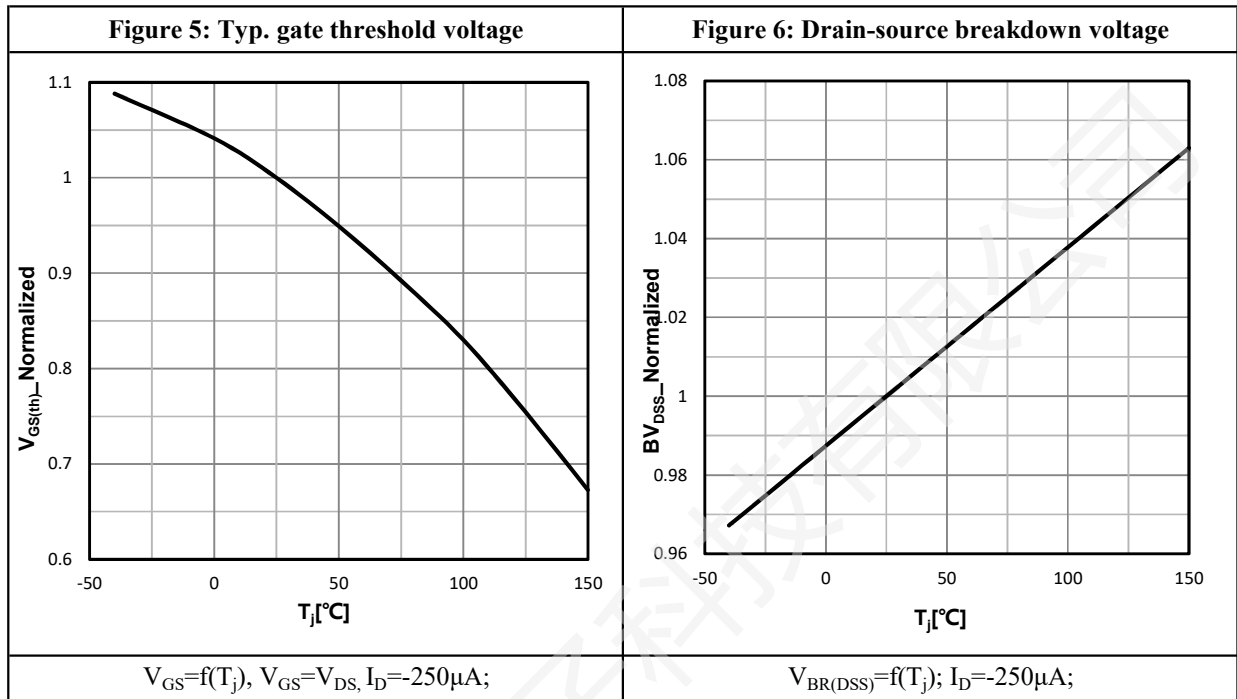
Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
I_S	Diode Forward Current	$T_C = 25\text{ }^{\circ}\text{C}$	--	--	-5.5	A
V_{SD}	Diode Forward Voltage	$I_S = -4.5A, V_{GS} = 0V$	--	--	-1.2	V

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

a2: $V_{DD} = -20V, L = 0.1mH, R_G = 25\Omega$, Starting $T_J = 25^{\circ}\text{C}$

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

P-Channel Characteristics Curve:




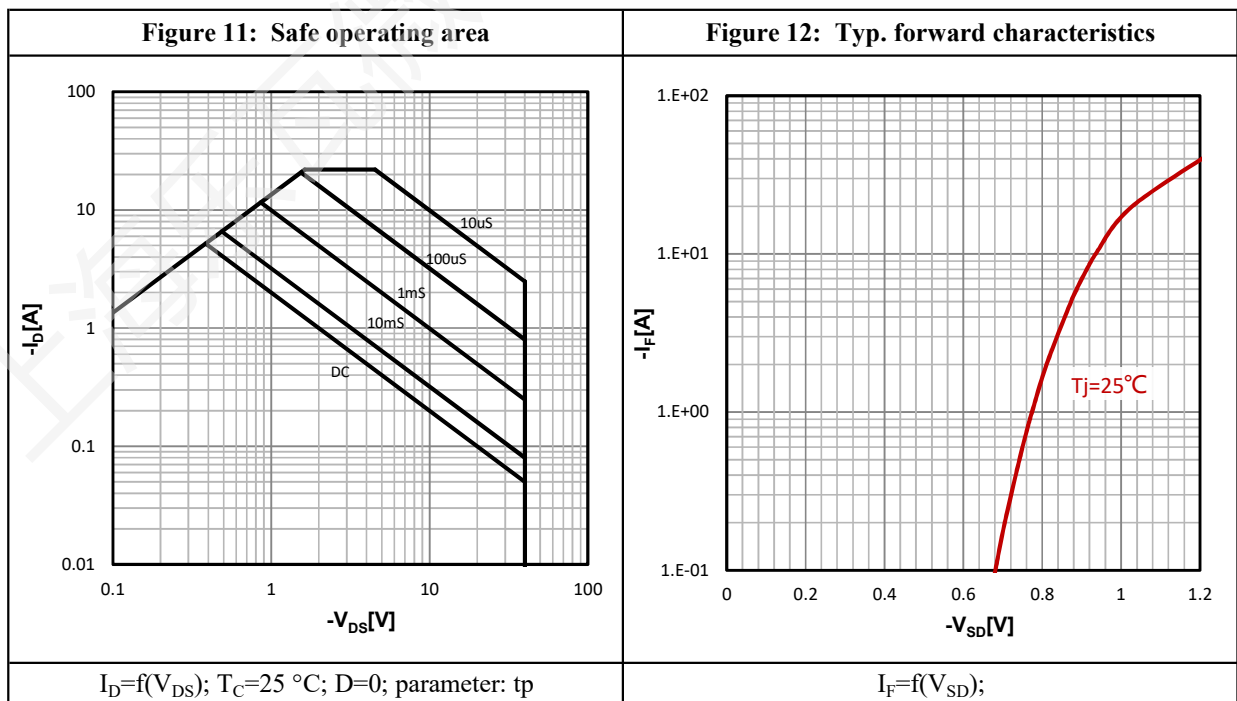
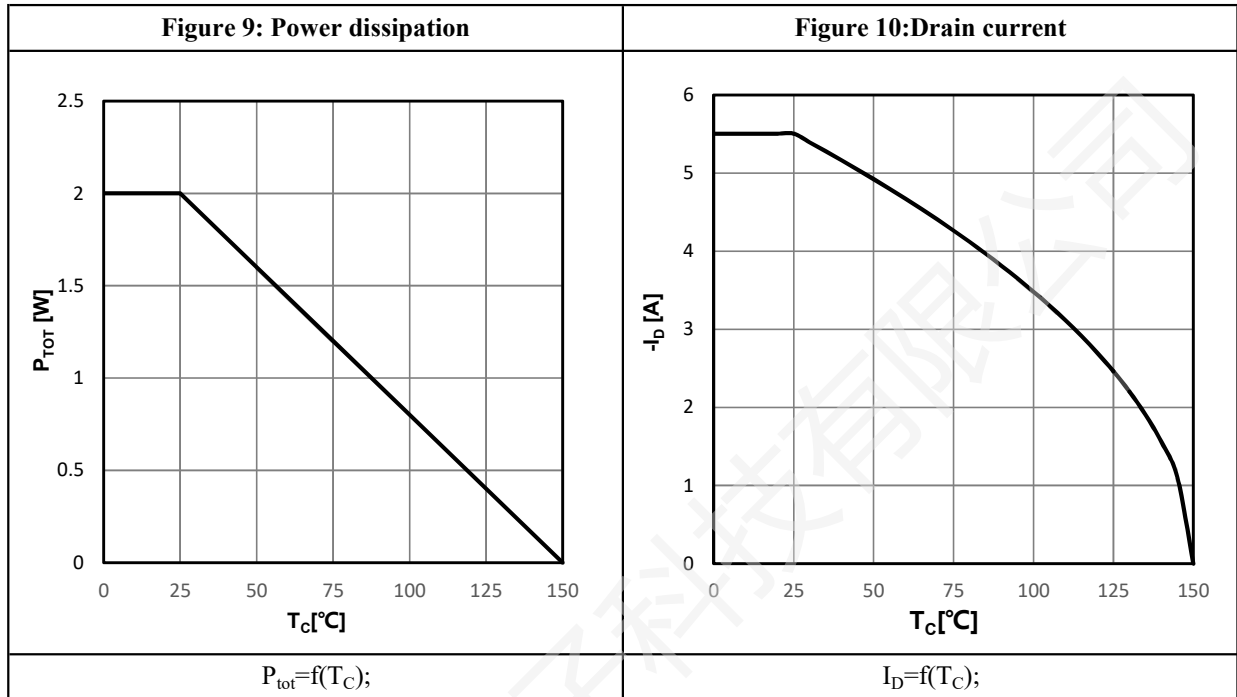
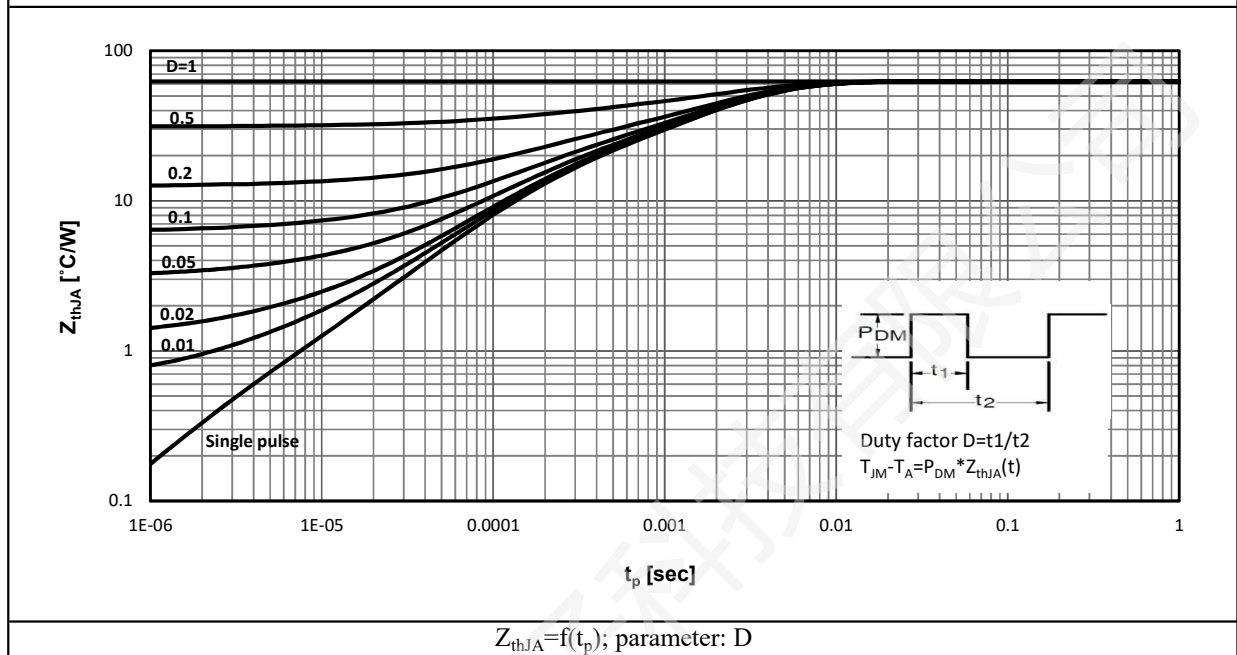


Figure 13: Max. Transient Thermal Impedance


P-Channel Test Circuit & Waveform:

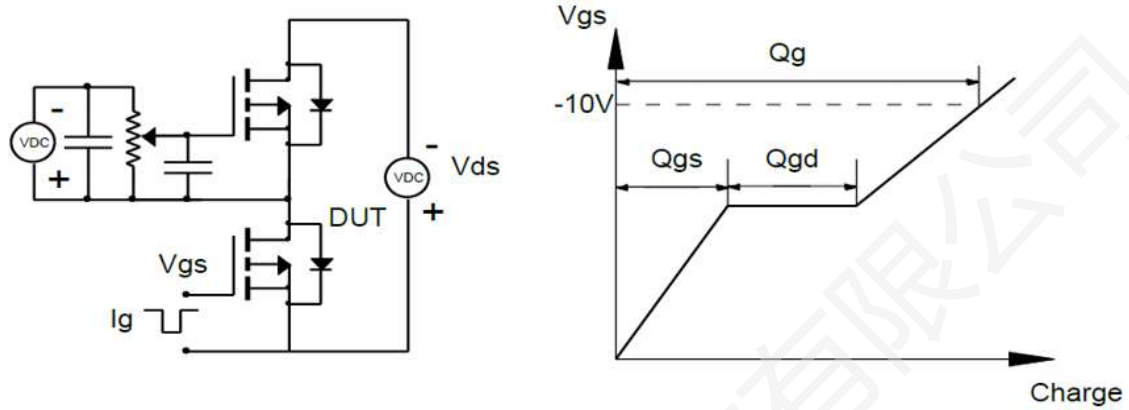


Figure 14: Gate Charge Test Circuit & Waveform

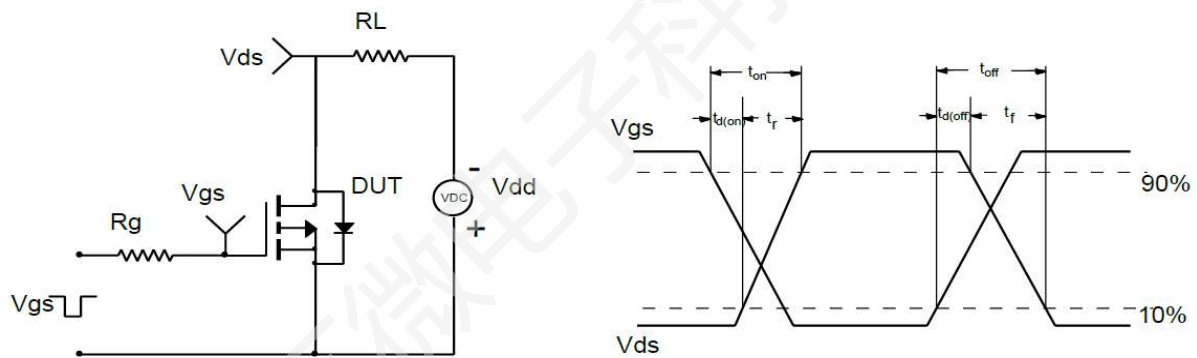


Figure 15: Resistive Switching Test Circuit & Waveforms

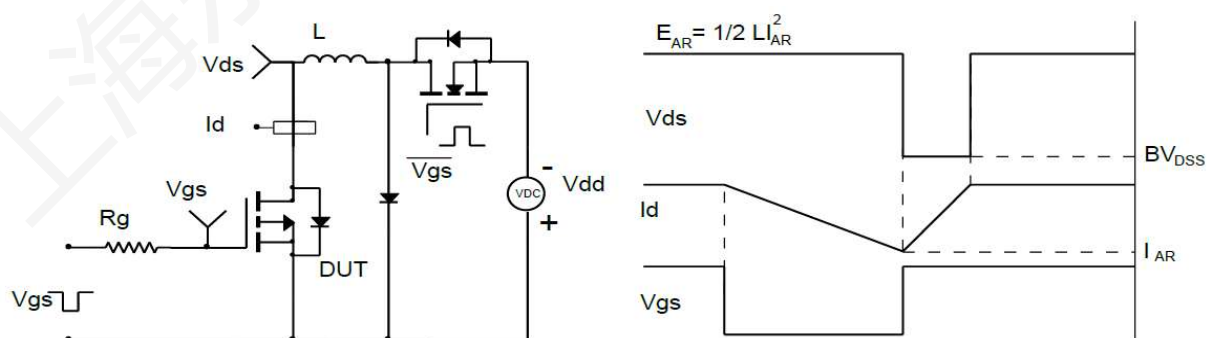
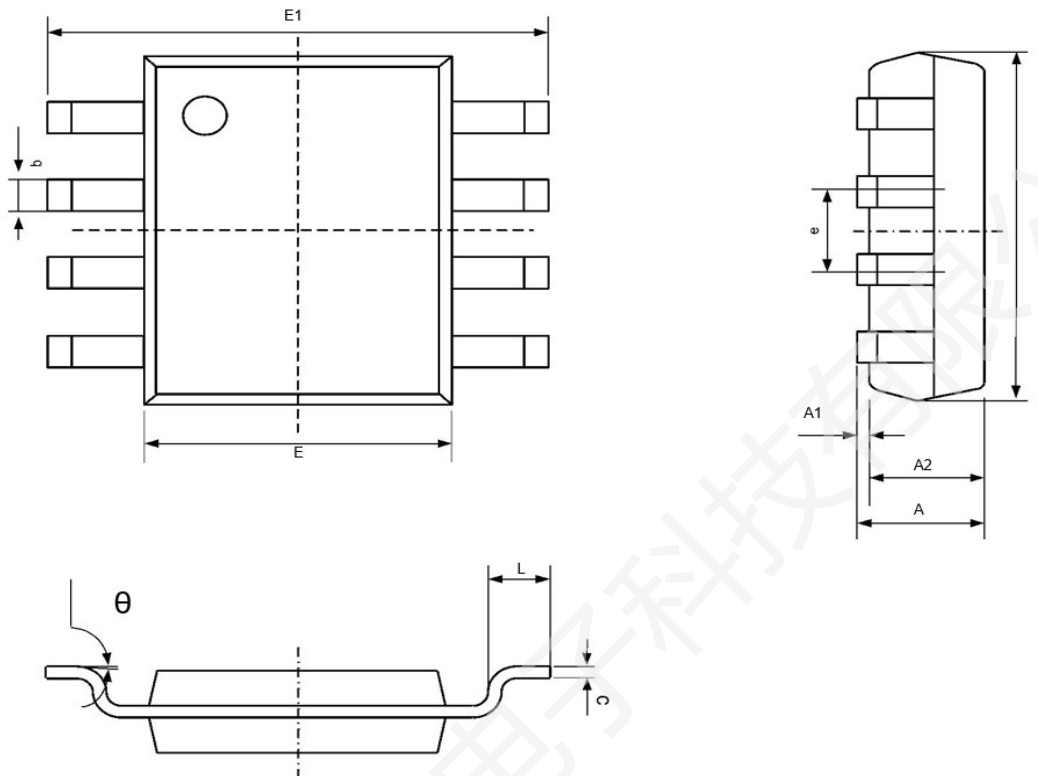


Figure 16: Unclamped Inductive Switching Test Circuit & Waveforms

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	Jun.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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