

General Description:

The LWS1H45A9 uses advanced SGT 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 TO-220F, 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.
S1H45/LW A9/D.C.	LWS1H45A9	TO-220F	Tube	50 Pcs

Absolute Maximum Ratings:

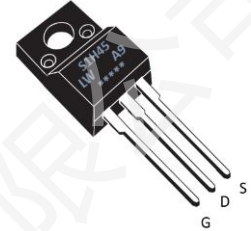
Symbol	Parameter		Value	Units
V_{DSS}	Drain-to-Source Voltage		-100	V
I_D	Continuous Drain Current	$T_C=25^{\circ}C$	-20	A
	Continuous Drain Current	$T_C=100^{\circ}C$	-13	A
I_{DM}^{a1}	Pulsed Drain Current		-80	A
E_{AS}^{a2}	Single pulse avalanche energy		225	mJ
V_{GS}	Gate-to-Source Voltage		± 20	V
P_D	Power Dissipation		42	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:

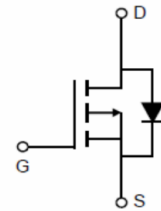
Symbol	Parameter	Value	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	3.0	$^{\circ}C/W$
$R_{\theta JA}^{a3}$	Thermal Resistance, Junction-to-Ambient	50	$^{\circ}C/W$

V_{DSS}	-100	V
I_D	-20	A
P_D	42	W
$R_{DS(ON) \text{ TYPE}}$	45	m Ω

Marking and Pin Assignment



Inner Equivalent Principium Chart



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	$V_{GS}=0V, I_D=-250\mu A$	-100	--	--	V
I_{DSS}	Drain to Source Leakage Current	$V_{DS}=-100V, V_{GS}=0V$	--	--	-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	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.5	-2.0	-2.5	V
$R_{DS(ON)1}$	Drain-to-Source On-Resistance	$V_{GS}=-10V, I_D=-20A$	--	45	60	m Ω
$R_{DS(ON)2}$	Drain-to-Source On-Resistance	$V_{GS}=-4.5V, I_D=-10A$	--	55	75	m Ω

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{GS}=0V$	--	2100	--	pF
C_{oss}	Output Capacitance	$V_{DS}=-50V$	--	168	--	
C_{rss}	Reverse Transfer Capacitance	$f=1.0MHz$	--	26	--	
R_G	Gate resistance	$V_{GS}=0V, V_{DS}=0V, f=1MHz$	--	2.8	--	Ω

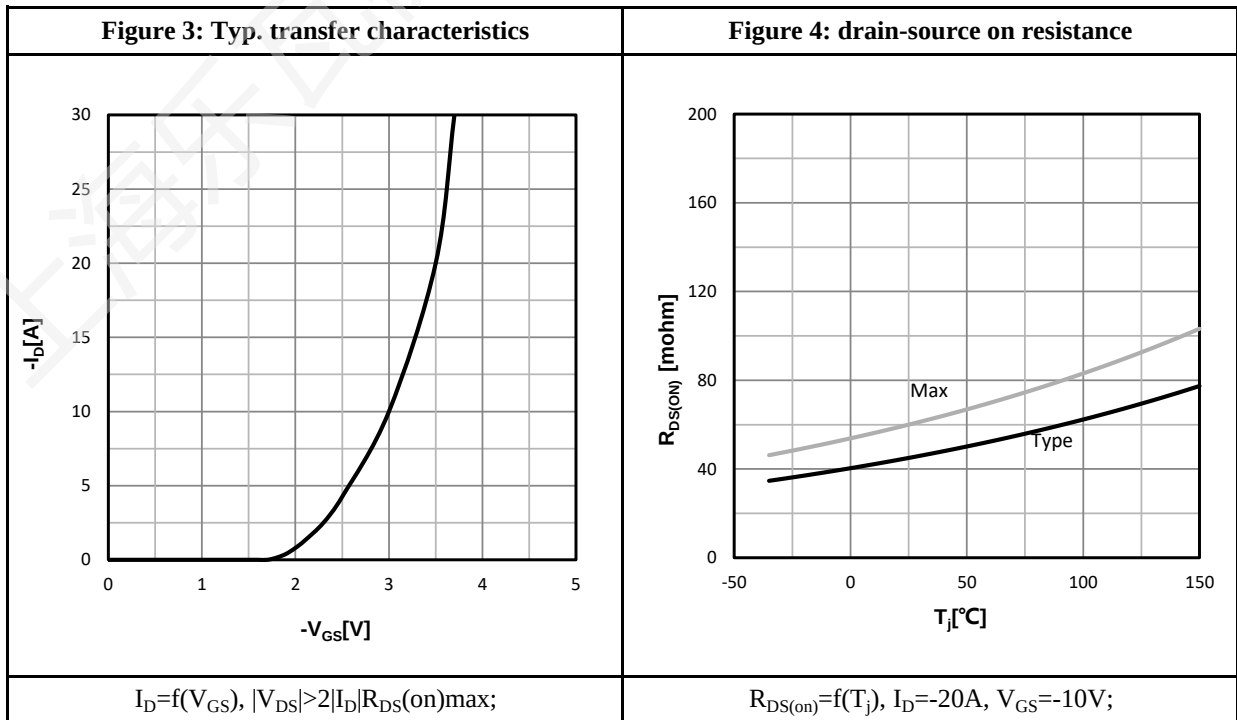
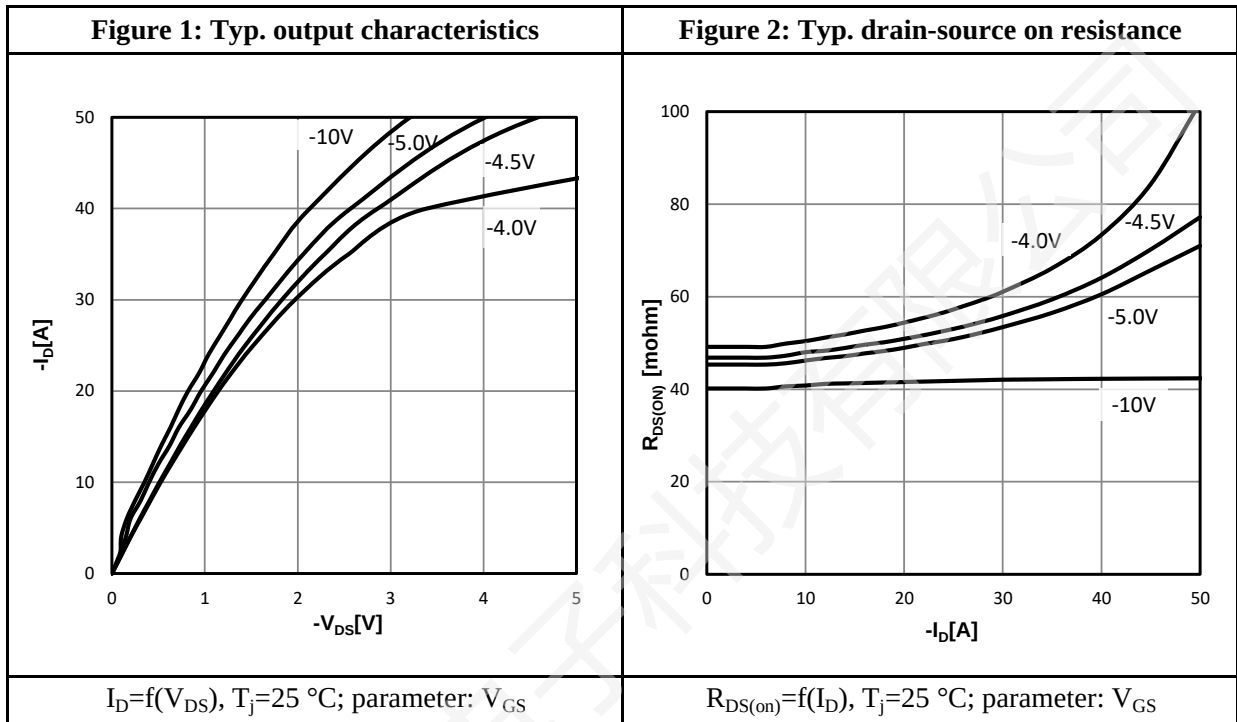
Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D=-20A$	--	8.2	--	ns
t_r	Rise Time	$V_{DS}=-50V$	--	19.6	--	
$t_{d(OFF)}$	Turn-Off Delay Time	$V_{GS}=-10V$	--	62.8	--	
t_f	Fall Time	$R_G=5.0\Omega$	--	41.4	--	
Q_g	Total Gate Charge	$V_{GS}=-10V$	--	38	--	nC
Q_{gs}	Gate to Source Charge	$V_{DS}=-50V$	--	6.4	--	
Q_{gd}	Gate to Drain Charge	$I_D=-20A$	--	6.8	--	

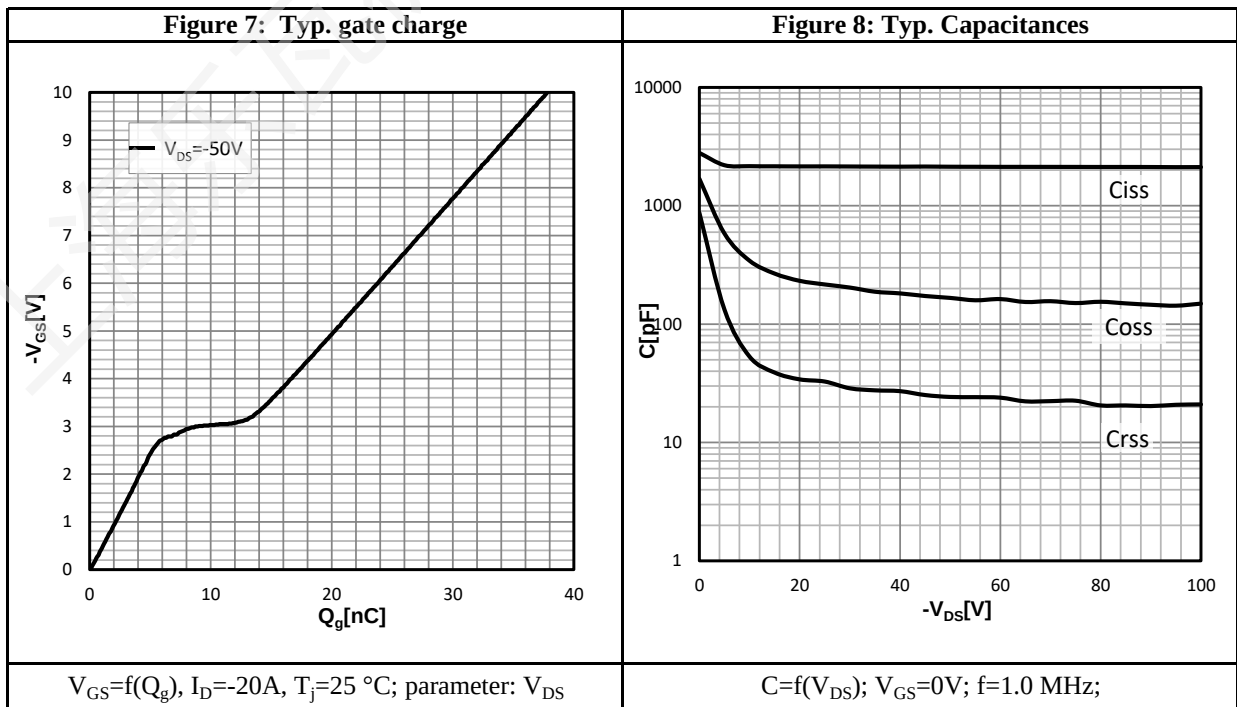
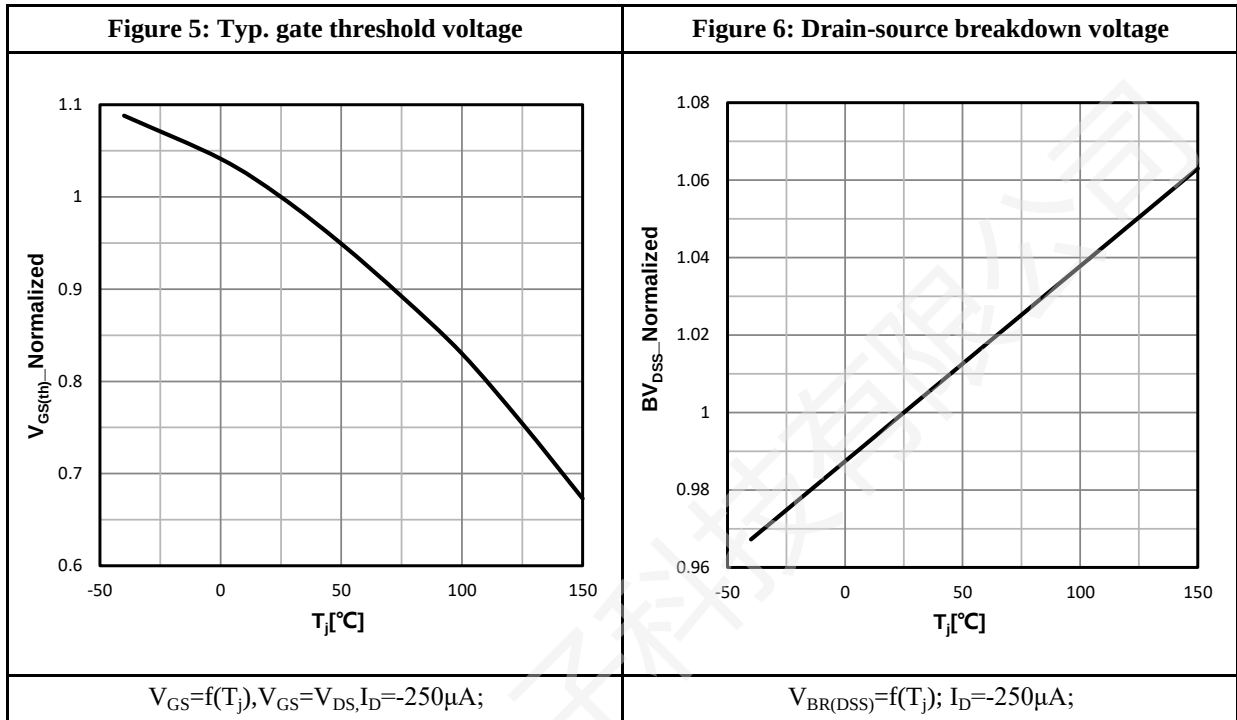
Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
I_S	Diode Forward Current	$T_C=25\text{ }^{\circ}\text{C}$	--	--	-20	A
V_{SD}	Diode Forward Voltage	$I_S=-20A, V_{GS}=0V$	--	--	-1.2	V
t_{rr}	Reverse Recovery Time	$I_S=-20A, V_{DD}=-50V$	--	68	--	ns
Q_{rr}	Reverse Recovery Charge	$dI/dt=100A/\mu s$	--	200	--	nC

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

a2: $V_{DD}=-50V, L=0.5mH, R_G=25\Omega$, 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.

Characteristics Curve:




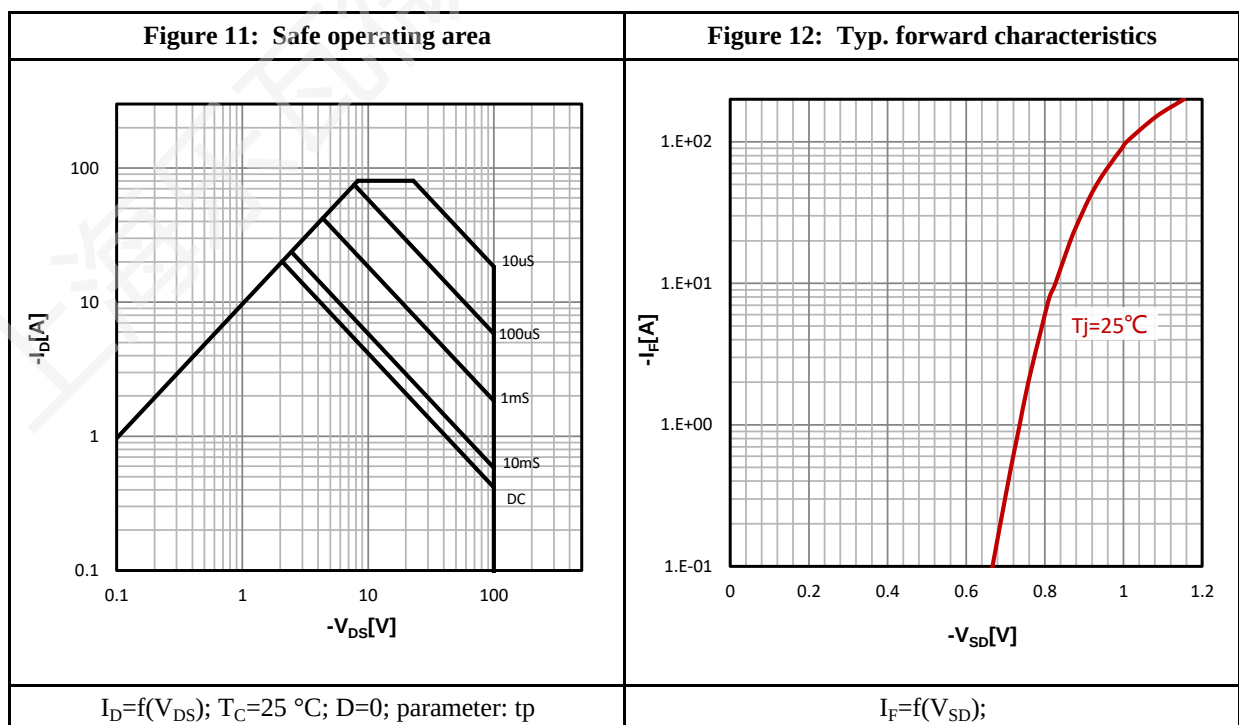
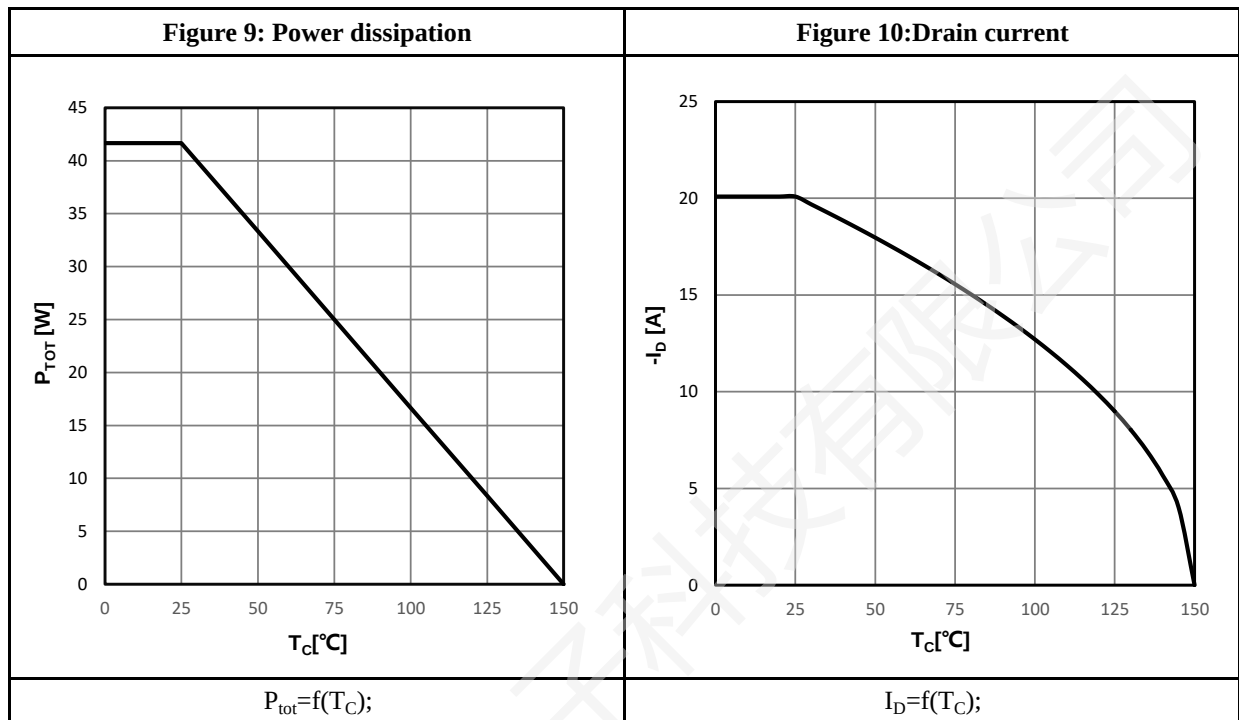
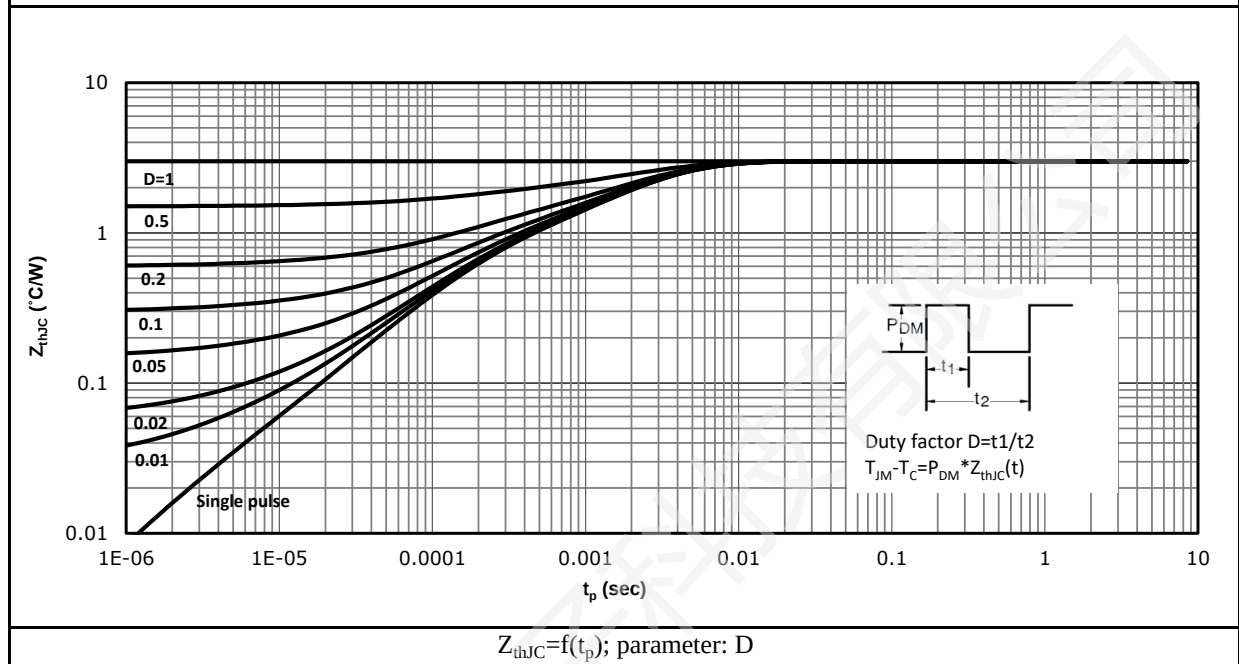
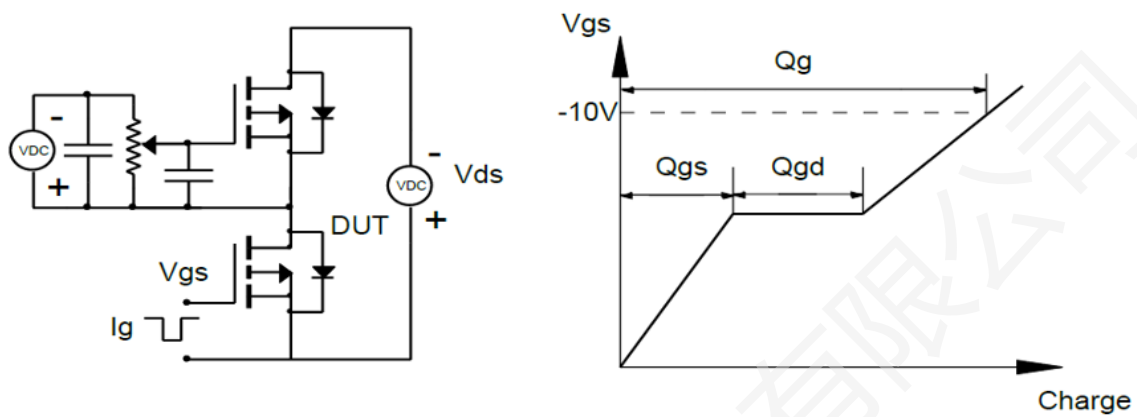
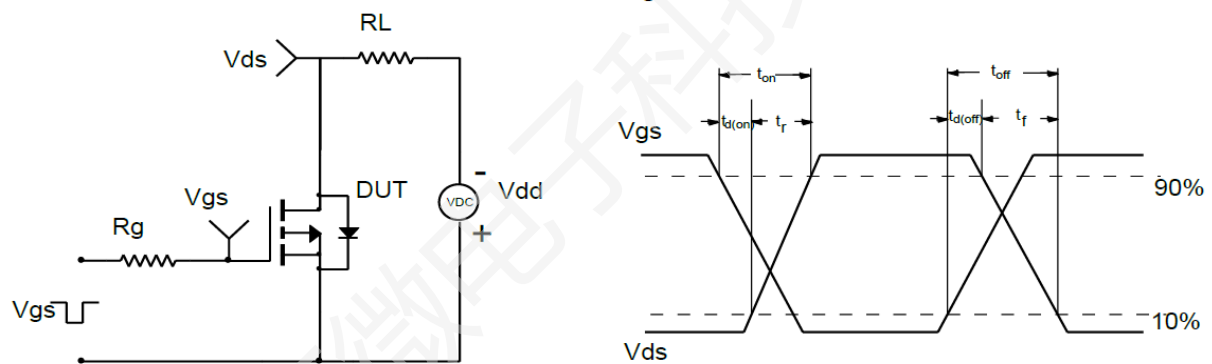
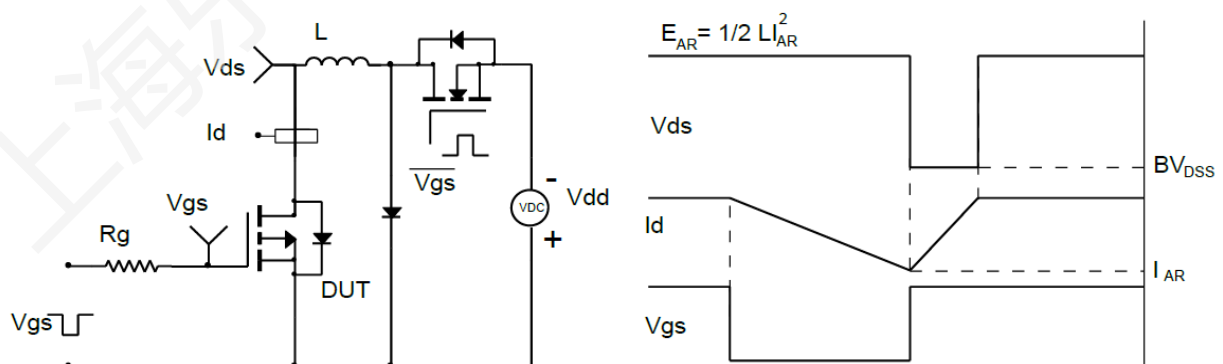
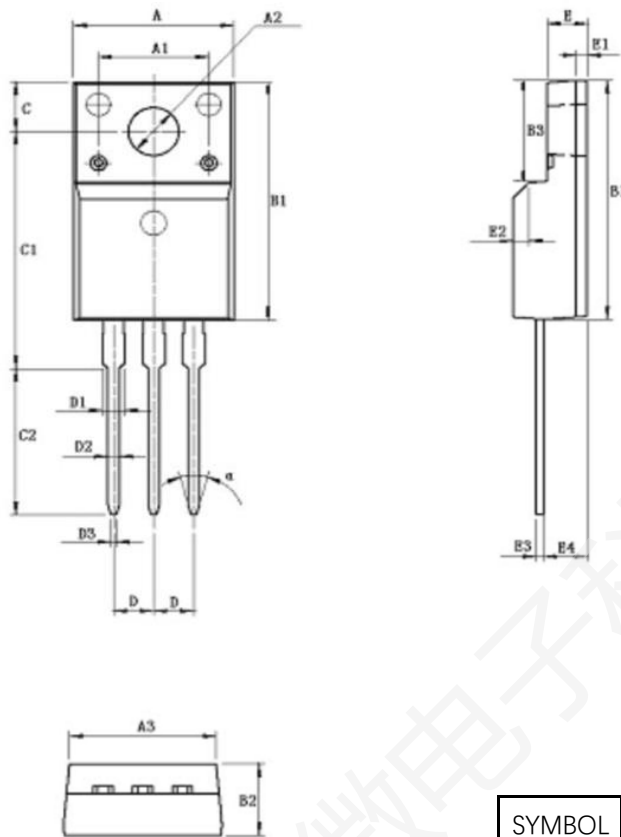


Figure 13: Max. Transient Thermal Impedance


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

Package Outline:


SYMBOL	MILLIMETER	
	MIN	MAX
A	9.90	10.36
A1	7.00	
A2	3.08	3.28
A3	9.25	9.65
B1	15.40	16.40
B2	4.40	5.00
B3	6.20	6.80
C	3.05	3.55
C1	15.20	16.00
C2	9.75	10.15
D	2.54	
D1	1.08	1.48
D2	0.70	0.90
D3	0.28	0.48
E	2.25	2.85
E1	0.70	
E2	1.0x45°	
E3	0.36	0.65
E4	2.55	2.95
a	30°	

Revision History:

Revision	Date	Descriptions
Rev 1.0	Dec.2022	Initial Version

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