

General Description:

The LWS1H5AQ 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 SOT89-3L, 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:

- Battery switching application
- Hard switched and high frequency circuits
- Power Management



Package Marking and Ordering Information:

Marking	Part Number	Package	Packing	Qty.
S1H5/LW AQ/D.C.	LWS1H5AQ	SOT89-3L	Reel	1000 Pcs

Absolute Maximum Ratings:

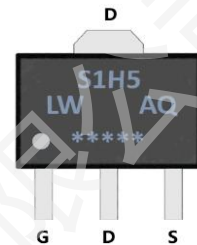
Symbol	Parameter		Value	Units
V_{DSS}	Drain-to-Source Voltage		-100	V
I_D	Continuous Drain Current	$T_A=25^{\circ}\text{C}$	-2.5	A
	Continuous Drain Current	$T_A=100^{\circ}\text{C}$	-1.6	A
I_{DM}^{a1}	Pulsed Drain Current		-10	A
V_{GS}	Gate-to-Source Voltage		± 20	V
P_D	Power Dissipation		3.0	W
T_J, 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:

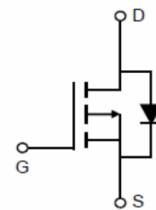
Symbol	Parameter	Value	Units
$R_{\theta JA}^{a2}$	Thermal Resistance, Junction-to-Ambient	41.6	$^{\circ}\text{C}/\text{W}$

V_{DSS}	-100	V
I_D	-2.5	A
P_D	3.0	W
$R_{DS(ON) \text{ TYPE}}$	140	$\text{m}\Omega$

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	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.3	-1.8	-2.3	V
$R_{DS(ON)1}$	Drain-to-Source On-Resistance	$V_{GS}=-10V, I_D=-2.0A$	--	140	260	m Ω
$R_{DS(ON)2}$	Drain-to-Source On-Resistance	$V_{GS}=-4.5V, I_D=-1.0A$	--	170	320	m Ω

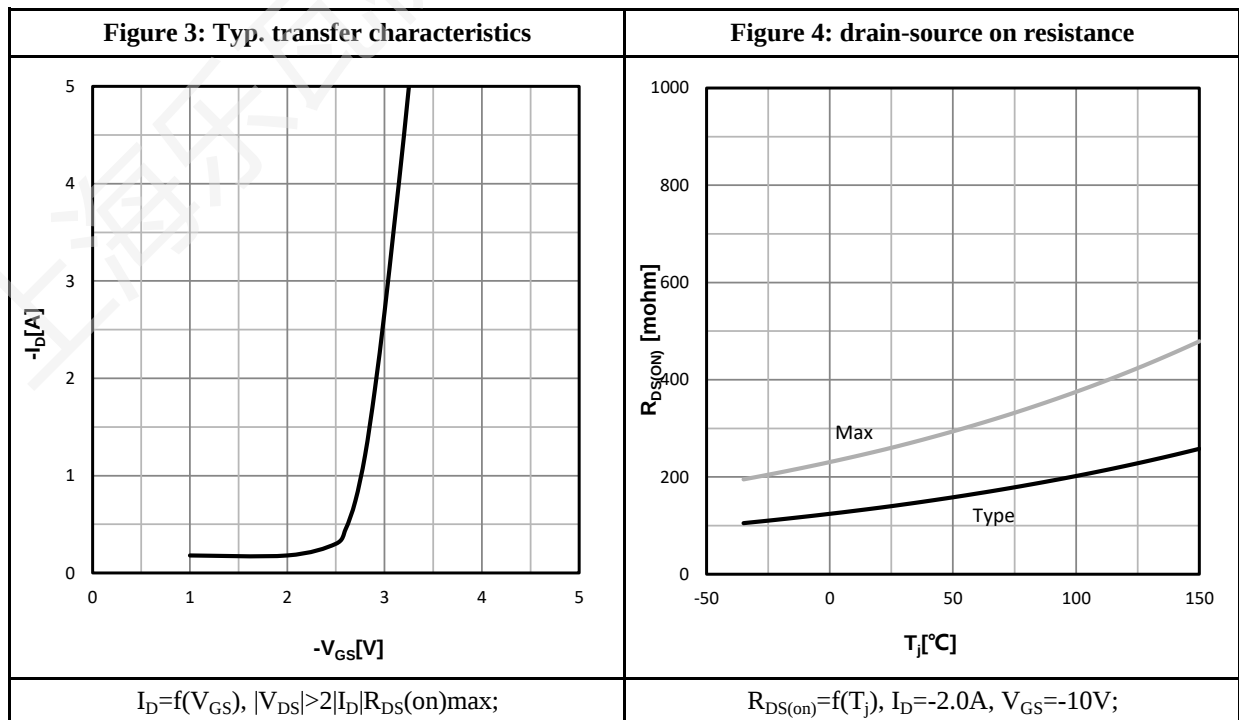
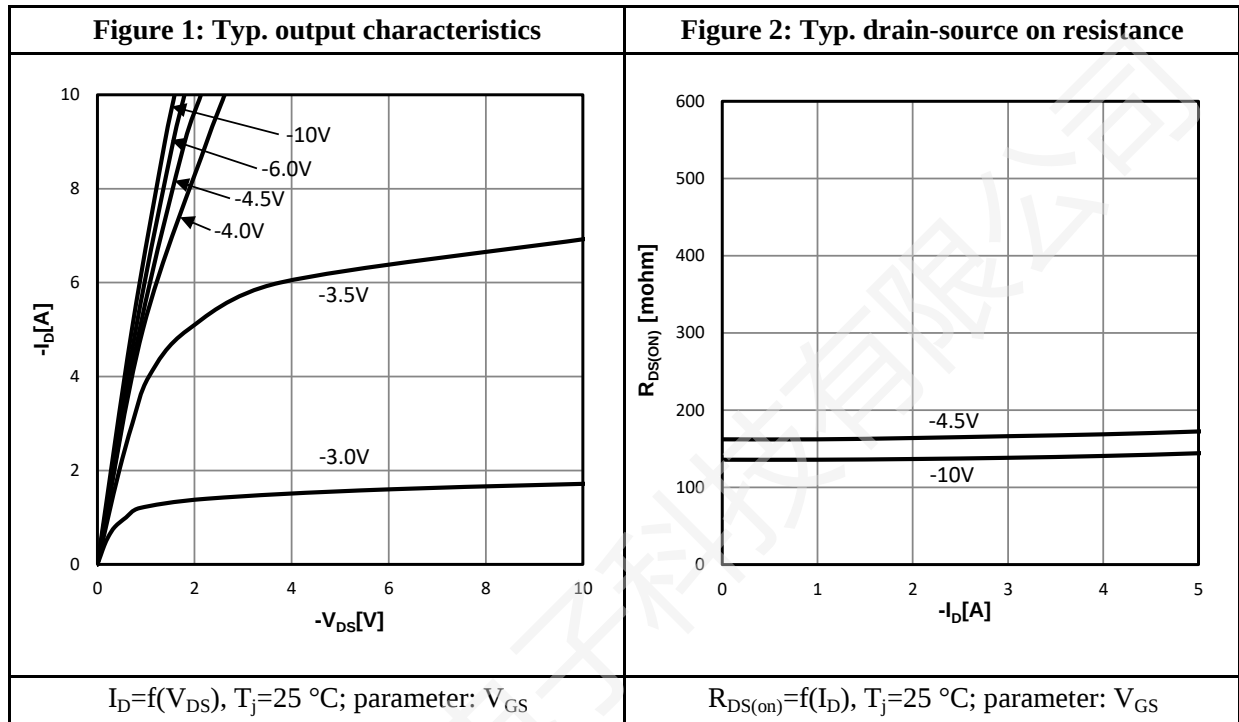
Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{GS}=0V$	--	451	--	pF
C_{oss}	Output Capacitance	$V_{DS}=-50V$	--	40	--	
C_{rss}	Reverse Transfer Capacitance	$f=1.0MHz$	--	5.9	--	
R_G	Gate resistance	$V_{GS}=0V, V_{DS}=0V, f=1MHz$	--	23	--	Ω

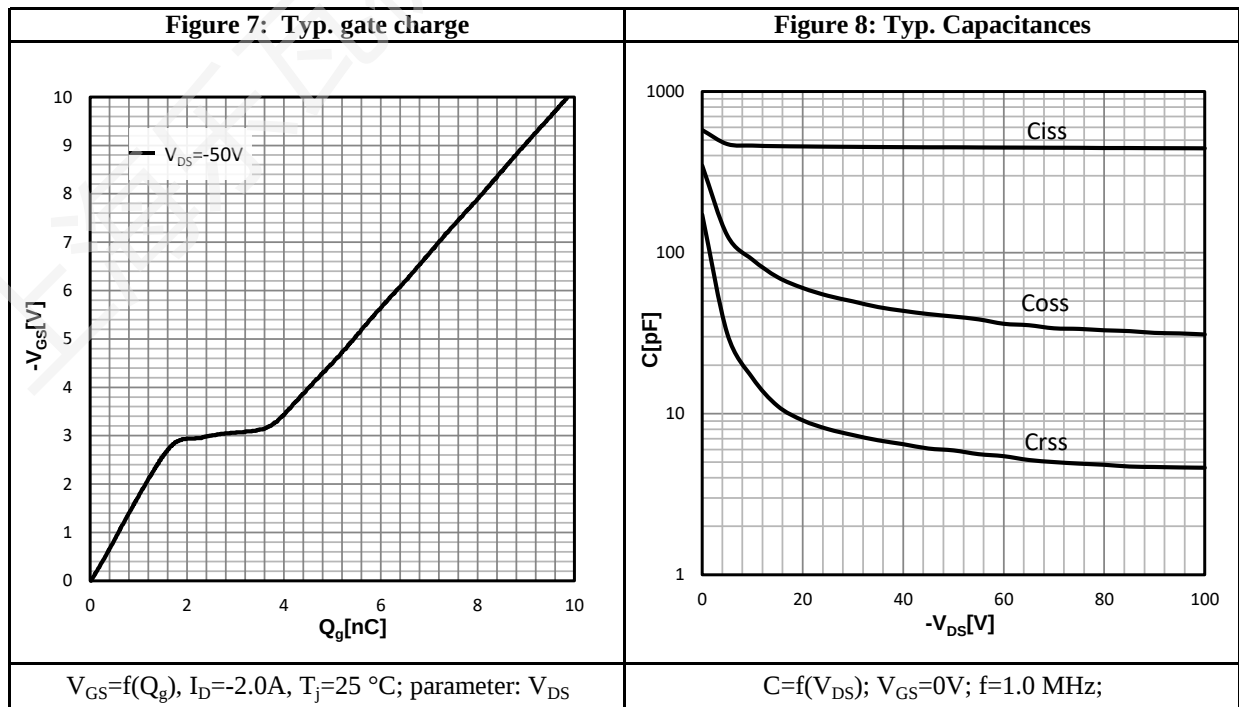
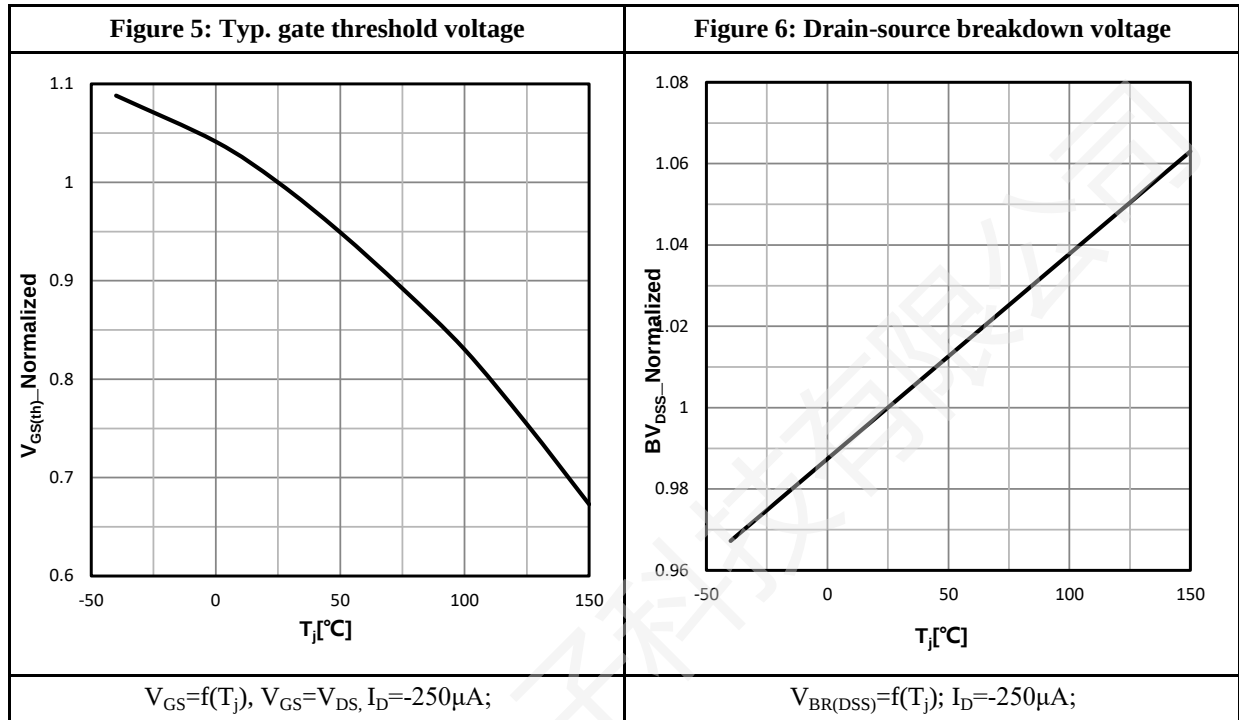
Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D=-2.0A$	--	15	--	ns
t_r	Rise Time	$V_{DS}=-50V$	--	35	--	
$t_{d(OFF)}$	Turn-Off Delay Time	$V_{GS}=-10V$	--	100	--	
t_f	Fall Time	$R_G=1.0\Omega$	--	35	--	
Q_g	Total Gate Charge	$V_{GS}=-10V$	--	9.9	--	nC
Q_{gs}	Gate to Source Charge	$V_{DS}=-50V$	--	1.9	--	
Q_{gd}	Gate to Drain Charge	$I_D=-2.0A$	--	1.8	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
I_S	Diode Forward Current	$T_A=25\text{ }^{\circ}\text{C}$	--	--	-2.5	A
V_{SD}	Diode Forward Voltage	$I_S=-2.0A, V_{GS}=0V$	--	--	-1.2	V

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

a2: 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:




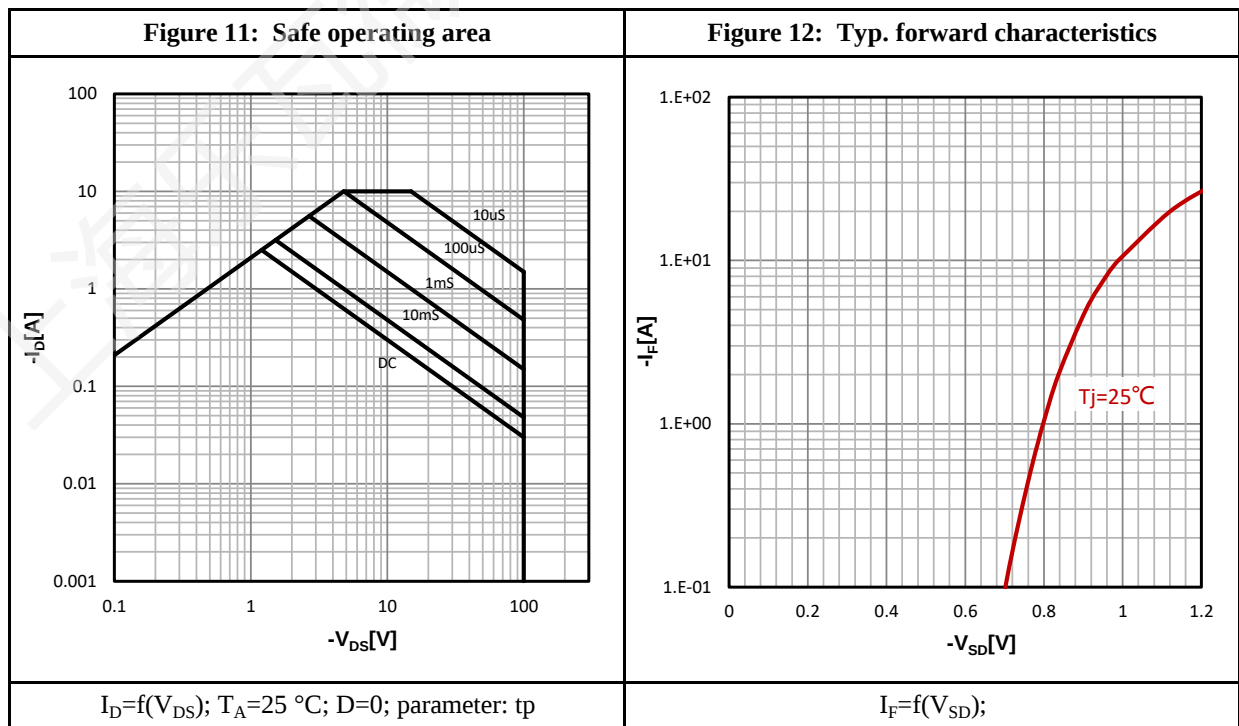
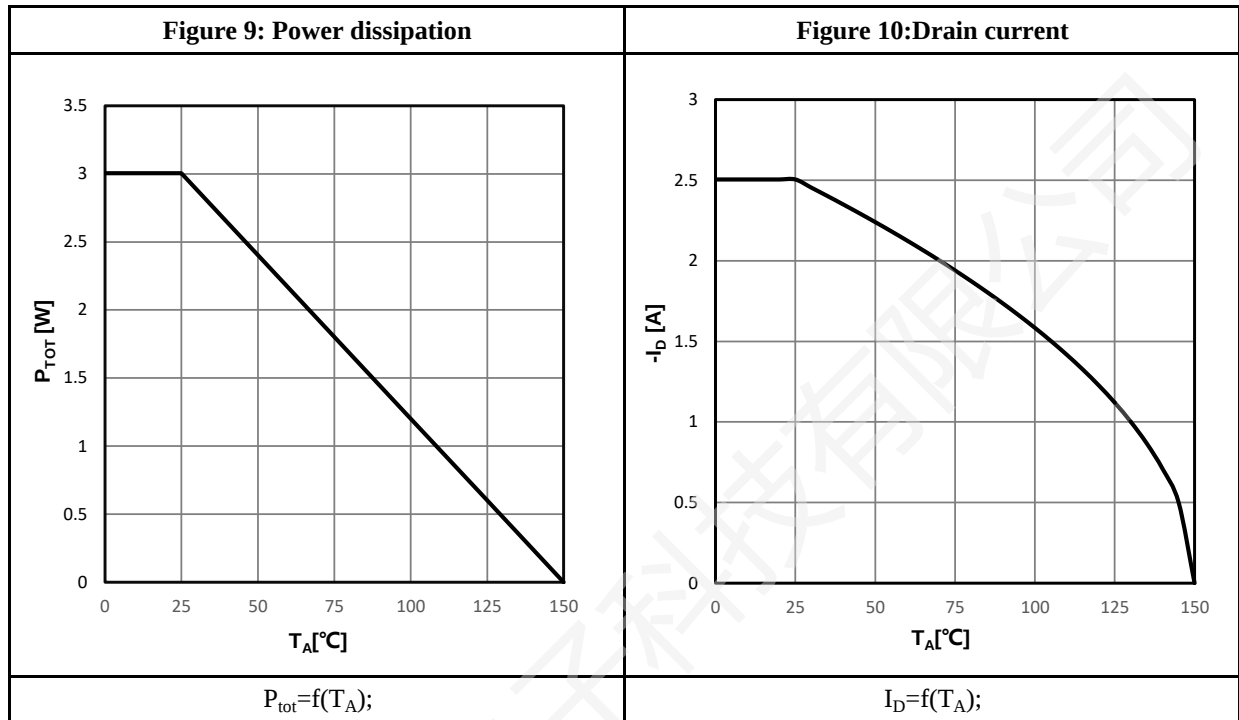
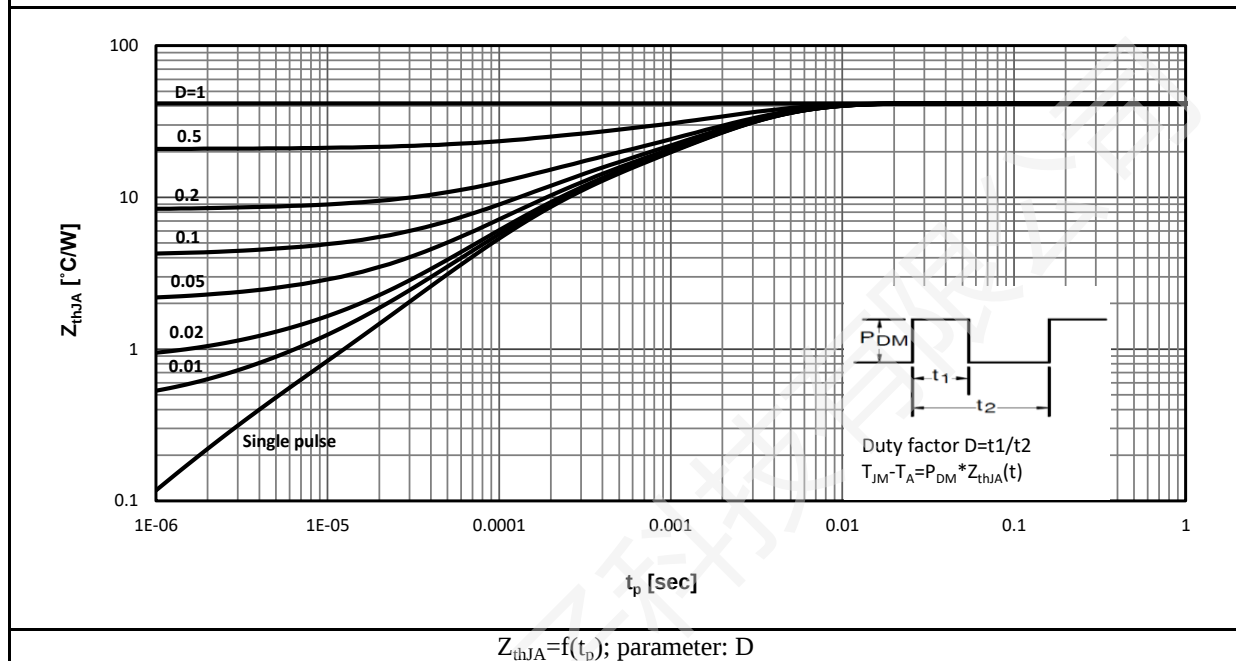
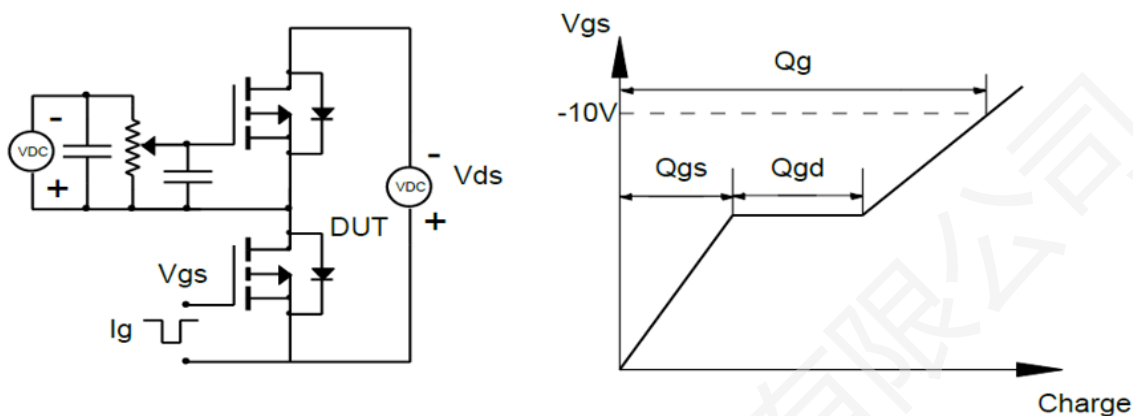
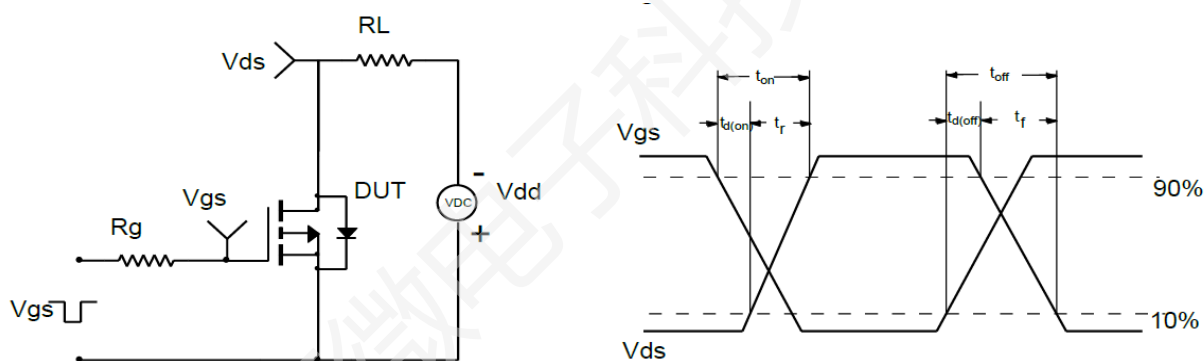
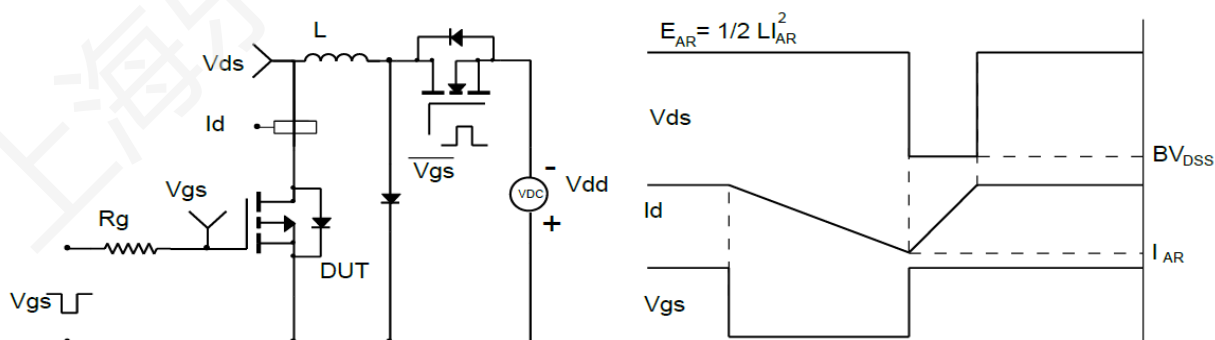
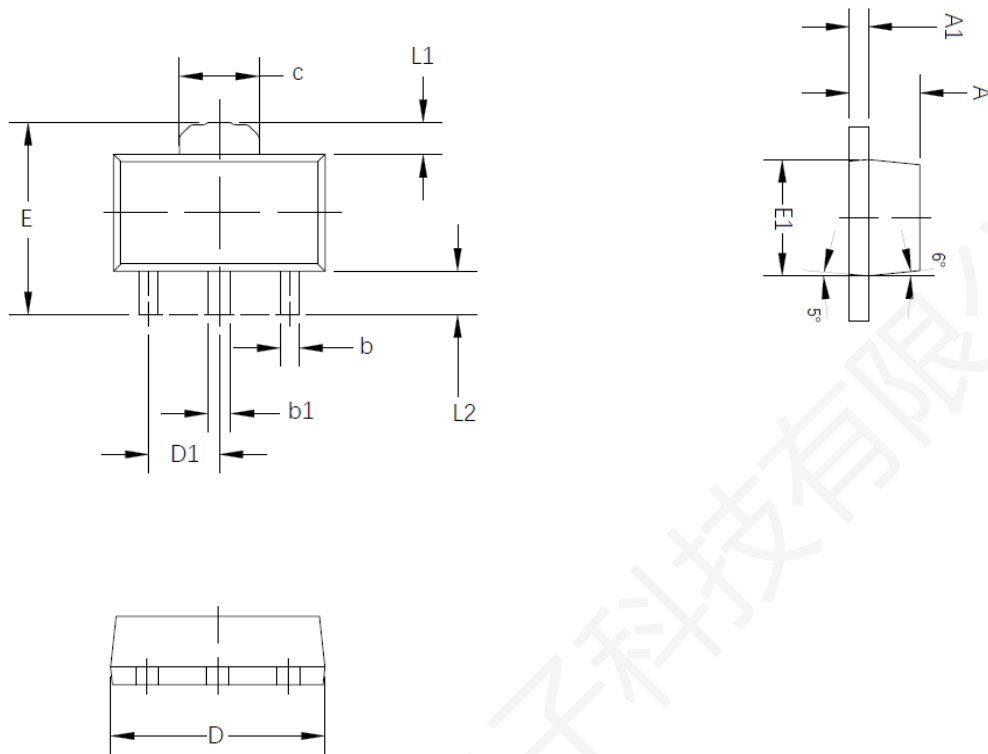


Figure 13: Max. Transient Thermal Impedance


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:


COMMON DIMENSION (MM)			
PKG	SOT89-3L		
Symbol	MIN	NOM	MAX
A	1.450	1.500	1.550
A1	0.350	0.400	0.450
b	0.350	0.430	0.500
b1	0.430	0.500	0.570
C	1.650	1.700	1.750
D	4.450	4.550	4.700
D1	1.470	1.500	1.550
E	4.100	4.200	4.300
E1	2.450	2.550	2.650
L1	0.630	0.700	0.770
L2	0.900	0.950	1.000

Revision History:

Revison	Date	Descriptions
Rev 1.0	Feb, 2025	Initial Version

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