

General Description:

The LWS1H150A23 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 SOT-223, which accords with the ROHS standard and Halogen Free standard.

Features:

- Fast Switching
- Low Gate Charge and $R_{DS(ON)}$
- Low Reverse transfer capacitances

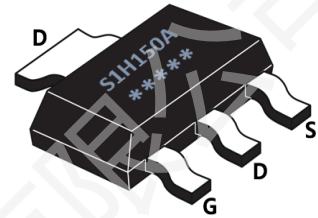
Applications:

- DC-DC Converter
- Portable Equipment
- Power Management

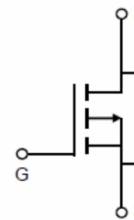


V_{DSS}	-100	V
I_D	-4.0	A
P_D	5.0	W
$R_{DS(ON)}$ TYPE	115	m Ω

Marking and Pin Assignment



Inner Equivalent Principle Chart



Package Marking and Ordering Information:

Marking	Part Number	Package	Packing	Qty.
S1H150A/D.C.	LWS1H150A23	SOT-223	Reel	2500 Pcs

Absolute Maximum Ratings:

Symbol	Parameter		Value	Units
V_{DSS}	Drain-to-Source Voltage		-100	V
I_D	Continuous Drain Current	$T_C=25^\circ\text{C}$	-4.0	A
	Continuous Drain Current	$T_C=100^\circ\text{C}$	-2.5	A
I_{DM}^{a1}	Pulsed Drain Current		-16	A
E_{AS}^{a2}	Single pulse avalanche energy		60	mJ
V_{GS}	Gate-to-Source Voltage		± 20	V
P_D	Power Dissipation		5.0	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
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	25	$^\circ\text{C/W}$
$R_{\theta JA}^{a3}$	Thermal Resistance, Junction-to-Ambient	70	$^\circ\text{C/W}$

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	$V_{GS}=0V, I_D=-250\mu A$	-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	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.2	-1.7	-2.2	V
$R_{DS(ON)1}$	Drain-to-Source On-Resistance	$V_{GS}=-10V, I_D=-5.0A$	--	115	150	m Ω
$R_{DS(ON)2}$	Drain-to-Source On-Resistance	$V_{GS}=-4.5V, I_D=-4.0A$	--	130	165	m Ω

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = -50V$ $f = 1.0MHz$	--	677	--	pF
C_{oss}	Output Capacitance		--	53.6	--	
C_{rss}	Reverse Transfer Capacitance		--	6.6	--	
R_g	Gate resistance	$V_{GS} = 0V, V_{DS}=0V, f=1MHz$	--	18	--	Ω

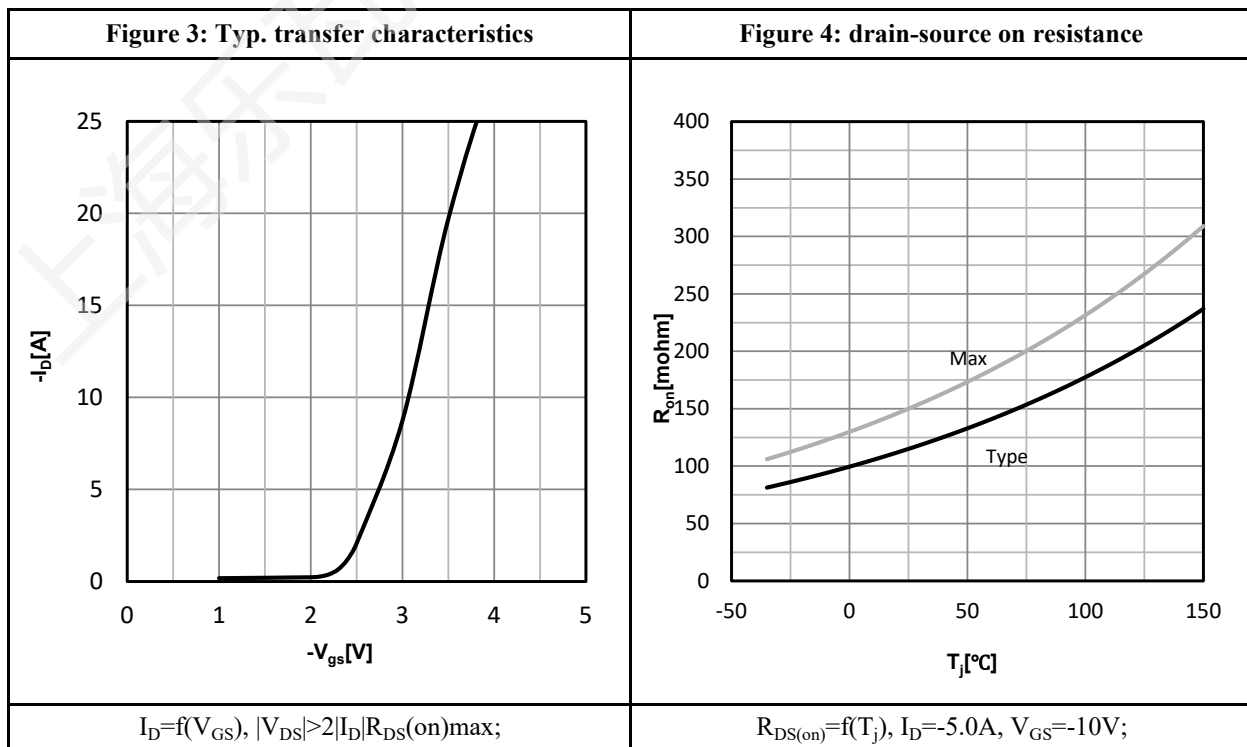
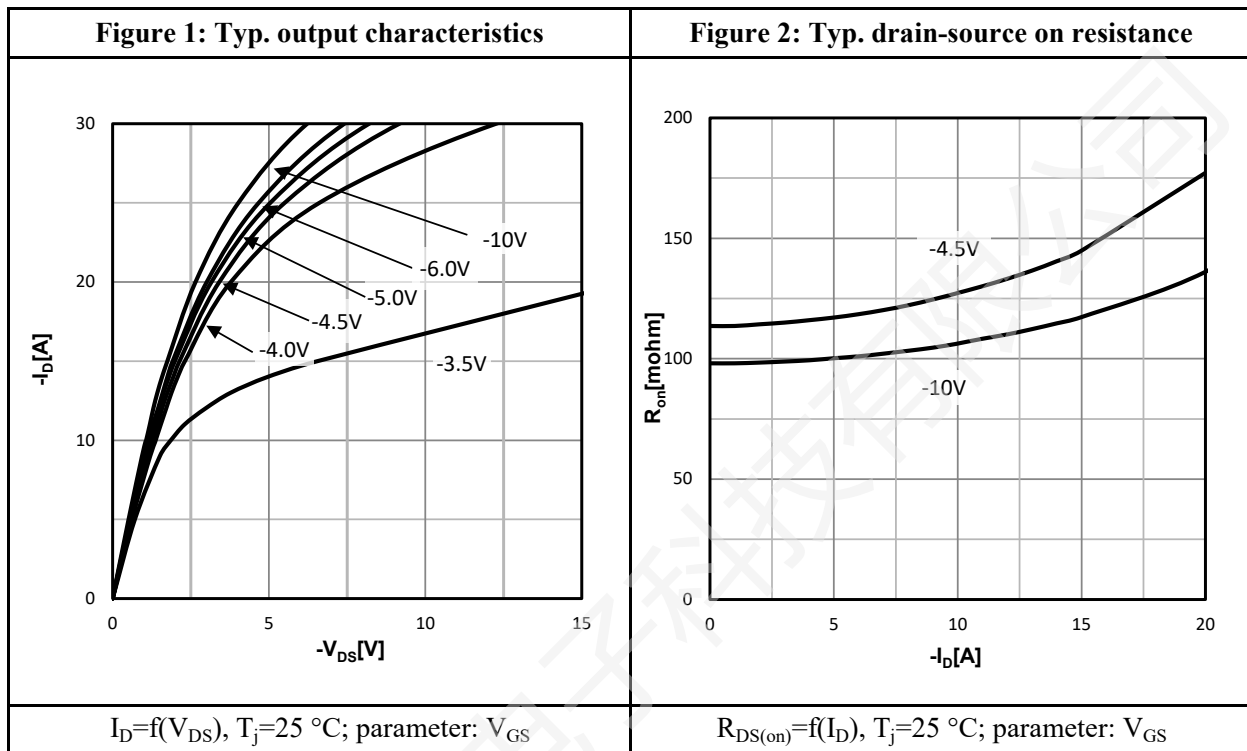
Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D = -5.0A$ $V_{DS} = -50V$ $V_{GS} = -10V$ $R_G = 5.0\Omega$	--	5.9	--	ns
t_r	Rise Time		--	3.7	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	40	--	
t_f	Fall Time		--	25	--	
Q_g	Total Gate Charge	$V_{GS} = -10V$ $V_{DS} = -50V$ $I_D = -5.0A$	--	12.2	--	nC
Q_{gs}	Gate Source Charge		--	2.3	--	
Q_{gd}	Gate Drain Charge		--	1.9	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
I_S	Diode Forward Current	$T_C = 25\text{ }^{\circ}\text{C}$	--	--	-4.0	A
V_{SD}	Diode Forward Voltage	$I_S = -5.0A, V_{GS} = 0V$	--	--	-1.2	V
t_{rr}	Reverse Recovery time	$I_S = -5.0A, V_{DD} = -50V$ $dI/dt = 100A/\mu s$	--	66	--	ns
Q_{rr}	Reverse Recovery Charge		--	214	--	nC

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

a2: $V_{DD} = -50V, L = 1.0mH, R_g = 25\Omega$, Starting $T_J = 25\text{ }^{\circ}\text{C}$

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

Characteristics Curve:


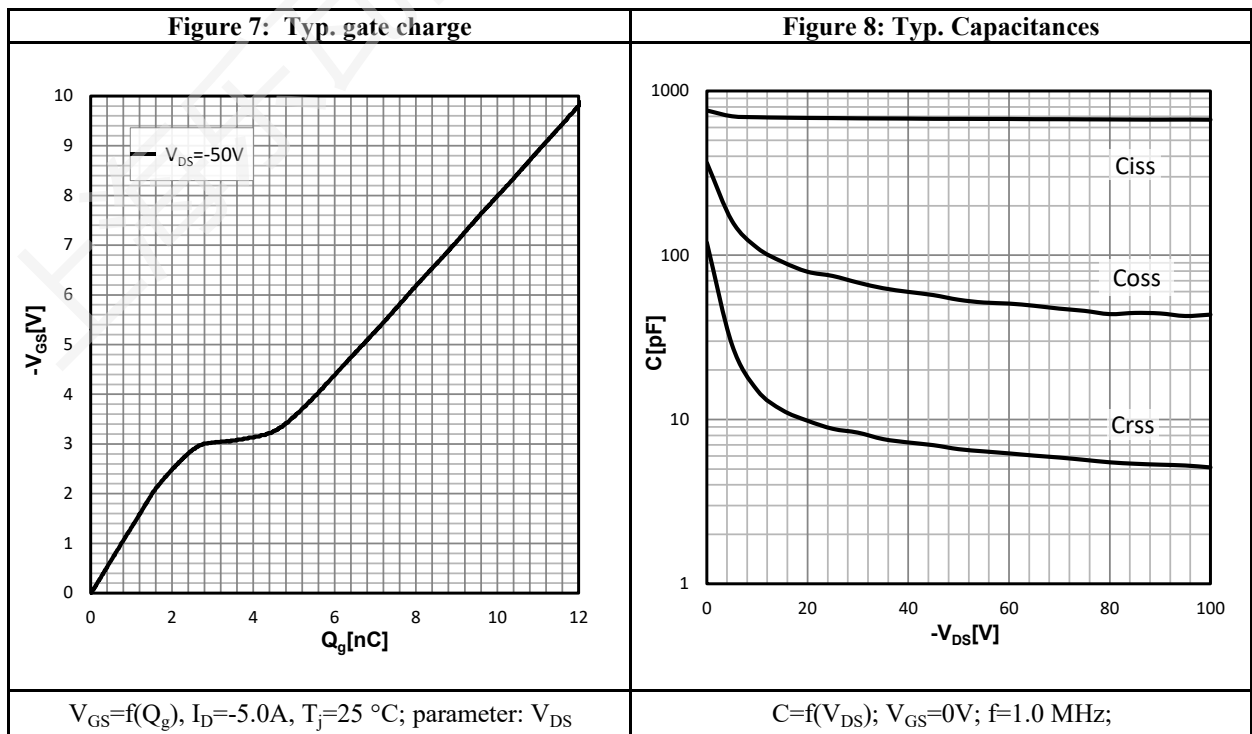
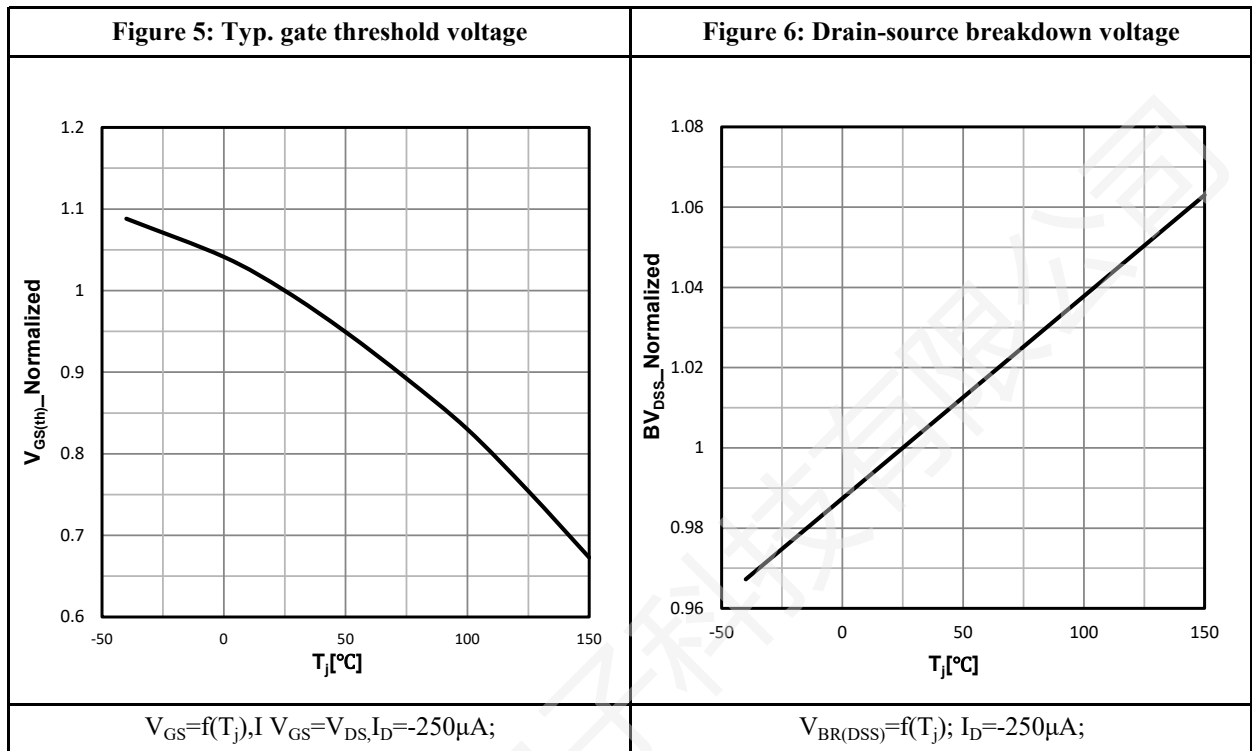
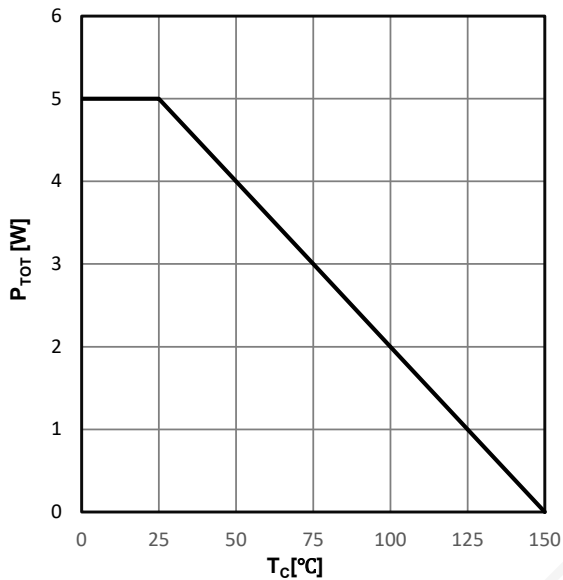
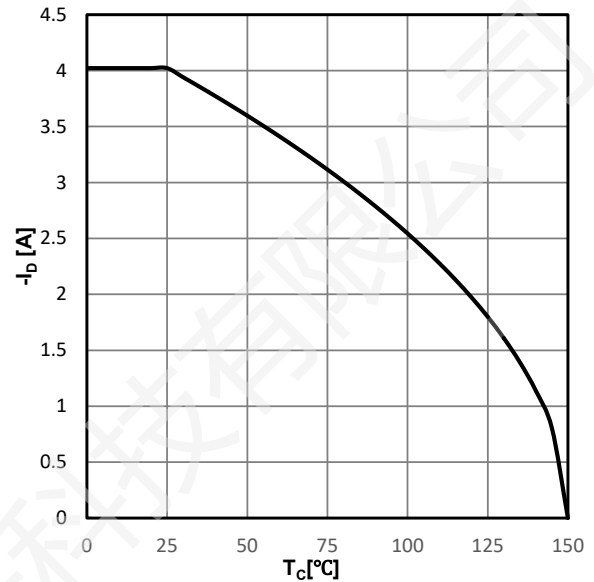
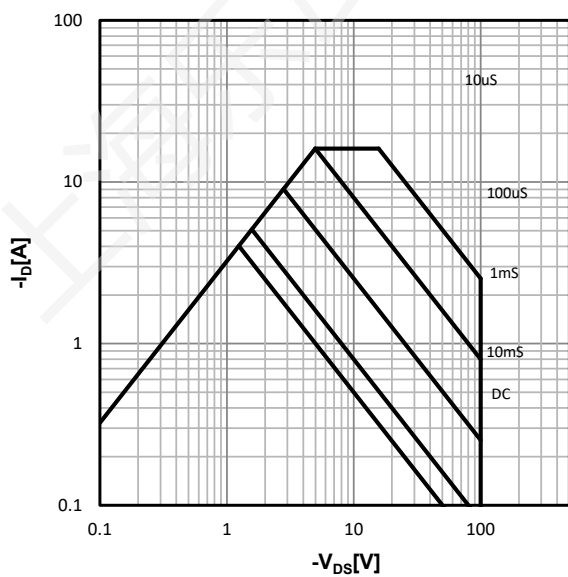


Figure 9: Power dissipation


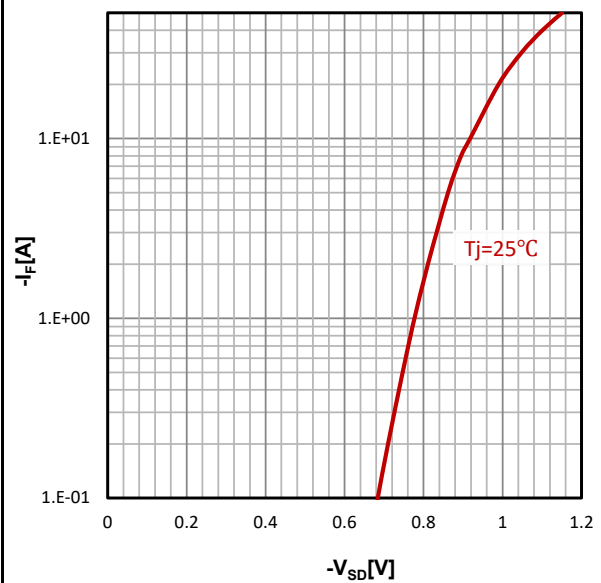
$$P_{tot}=f(T_C);$$

Figure 10: Drain current


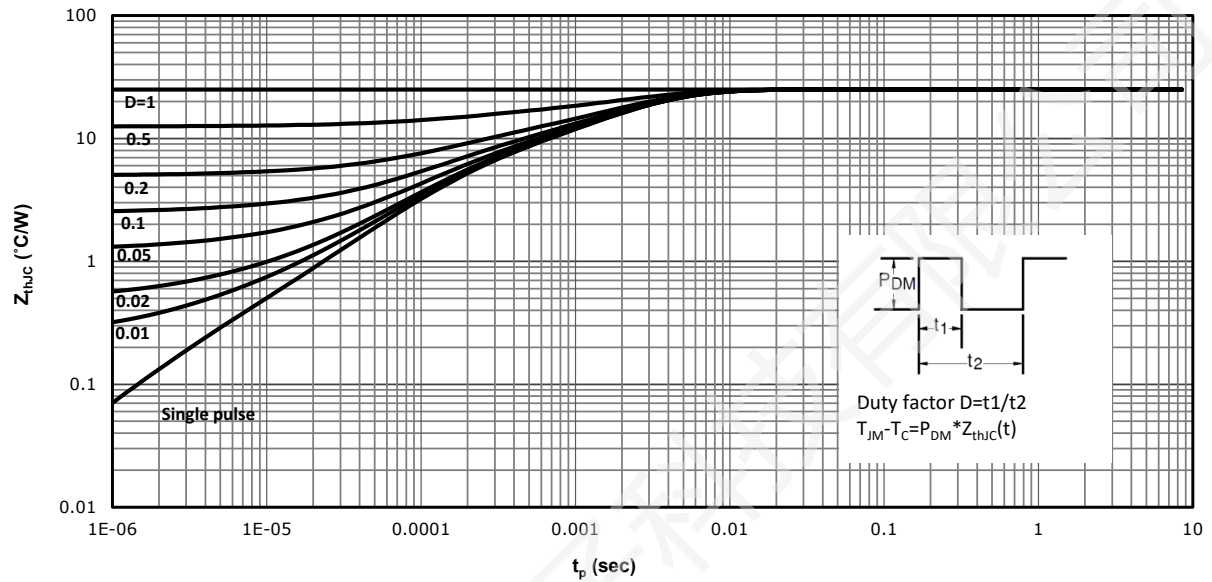
$$I_D=f(T_C);$$

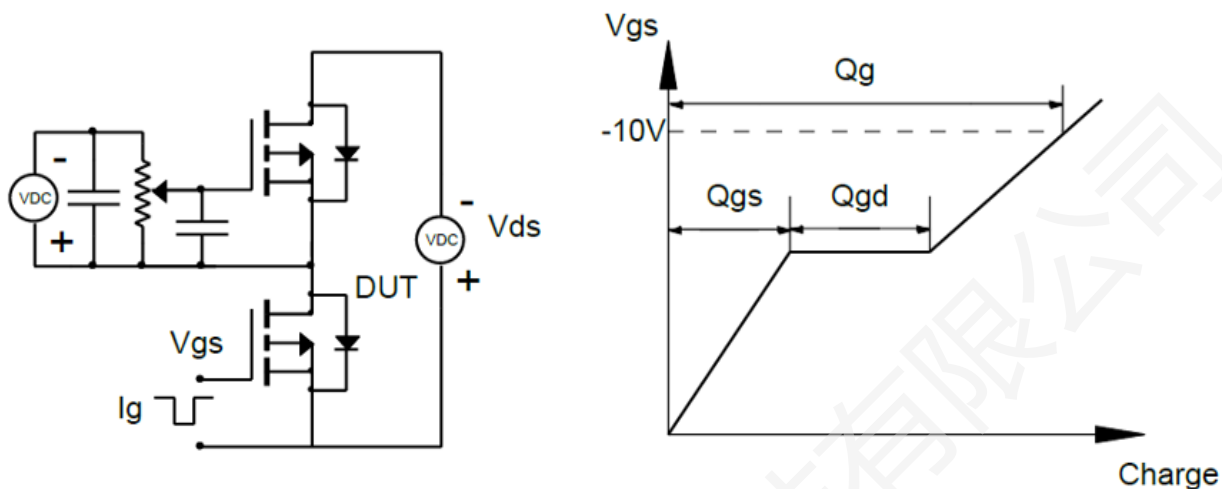
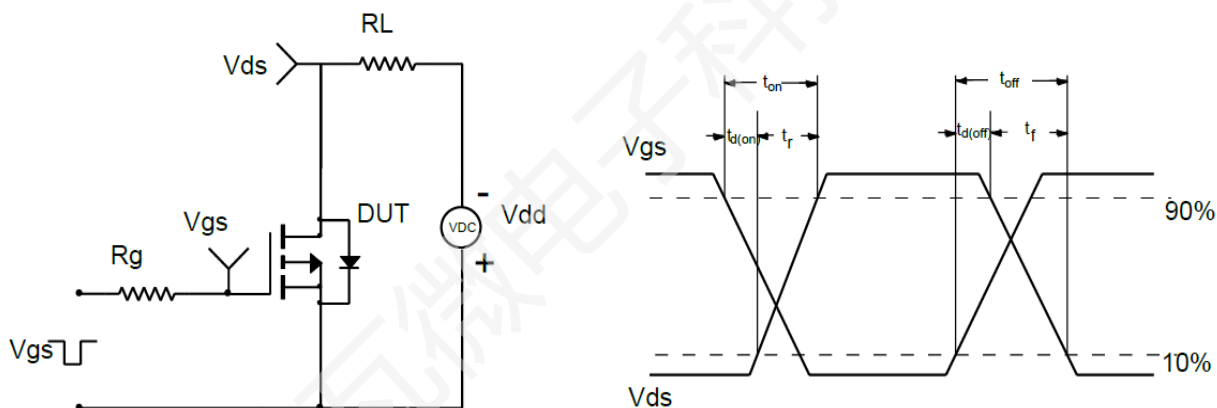
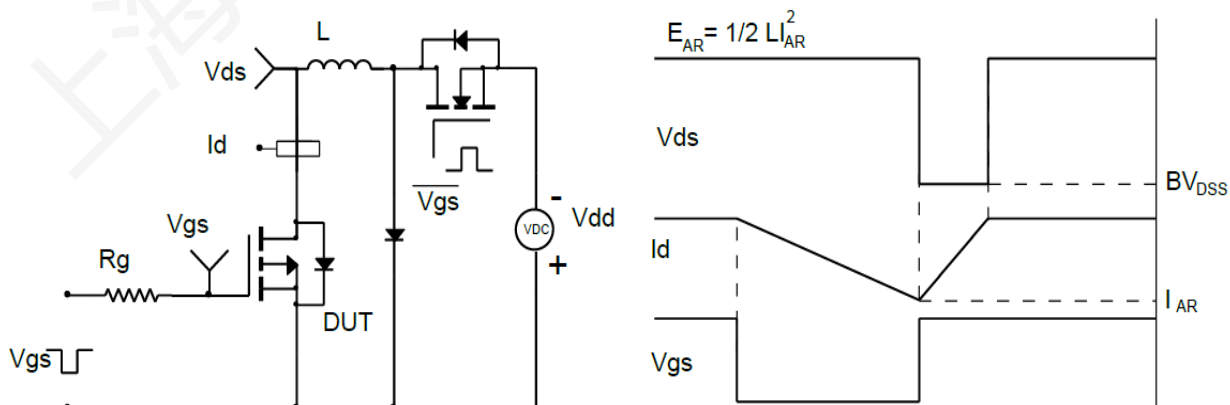
Figure 11: Safe operating area


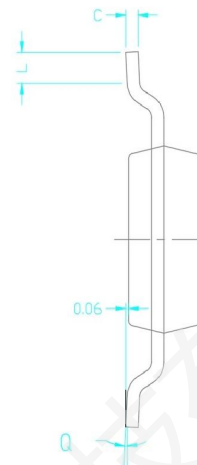
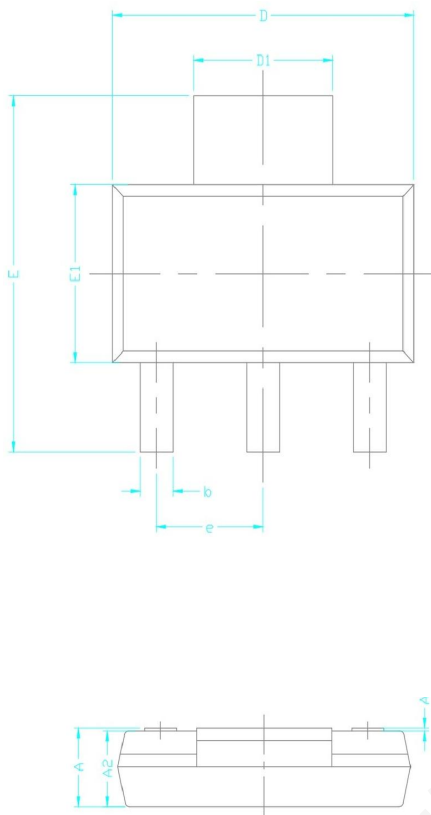
$$I_D=f(V_{DS}); T_C=25\text{ }^{\circ}\text{C}; D=0; \text{parameter: tp}$$

Figure 12: Typ. forward characteristics


$$I_F=f(V_{SD});$$

Figure 13: Max. Transient Thermal Impedance

 $Z_{thJC} = f(t_p)$; 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

Package Outline:


COMMON DIMENSION (MM)			
PKG	TO-223		
Symbol	MIN	NOM	MAX
A	1.520	1.580	1.720
A1	0.010	0.060	0.150
A2	1.470	1.520	1.570
b	0.660	0.710	0.800
C	0.250	0.280	0.350
D	6.500	6.600	6.750
D1	2.900	3.000	3.100
E	6.700	7.000	7.300
E1	3.300	3.500	3.700
L	0.750 REF		
e	2.300 REF		
Q	0°	4°	10°

Revision History:

Revision	Date	Descriptions
Rev 1.0	Apr.2024	Initial Version

Disclaimer:

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