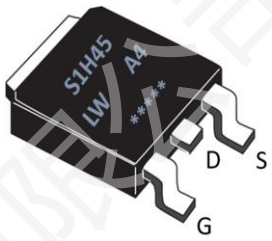
General Description:

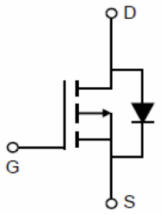
The LWS1H45A4 uses advanced SGT technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications. The package form is TO-252, which accords with the ROHS standard and Halogen Free standard.

V_{DSS}	-100	V
I_D	-32	A
P_D	89	W
$R_{DS(ON)\ TYPE}$	45	mΩ

Marking and Pin Assignment



Inner Equivalent Principium Chart



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

RoHS HF

Package Marking and Ordering Information:

Marking	Part Number	Package	Packing	Qty.
S1H45/LW A4/D.C.	LWS1H45A4	TO-252	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℃	-32	A
	Continuous Drain Current	T_C=100℃	-20	A
I_{DM} [a1]	Pulsed Drain Current		-128	A
E_{AS} [a2]	Single pulse avalanche energy		225	mJ
V_{GS}	Gate-to-Source Voltage		±20	V
P_D	Power Dissipation		89	W
T_J, T_{STG}	Operating Junction and Storage Temperature Range		150, -55 to 150	℃
T_L	Maximum Temperature for Soldering		260	℃

Thermal Characteristics:

Symbol	Parameter	Value	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	1.4	℃/W
$R_{\theta JA}$ [a3]	Thermal Resistance, Junction-to-Ambient	102	℃/W

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Electrical Characteristic (T_J = 25 °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=-250μA	-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=-250μA	-1.5	-2.0	-2.5	V
$R_{DS(ON)1}$	Drain-to-Source On-Resistance	V_{GS}=-10V, I_D=-20A	--	45	60	mΩ
$R_{DS(ON)2}$	Drain-to-Source On-Resistance	V_{GS}=-4.5V, I_D=-10A	--	55	75	mΩ

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	V_{GS} =0V V_{DS} =-50V f =1.0MHz	--	2100	--	pF
C_{oss}	Output Capacitance		--	168	--	
C_{rss}	Reverse Transfer Capacitance		--	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 V_{DS} =-50V V_{GS} =-10V R_G =5.0Ω	--	8.2	--	ns
t_r	Rise Time		--	19.6	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	62.8	--	
t_f	Fall Time		--	41.4	--	
Q_g	Total Gate Charge	V_{GS} =-10V V_{DS} =-50V I_D =-20A	--	38	--	nC
Q_{gs}	Gate to Source Charge		--	6.4	--	
Q_{gd}	Gate to Drain Charge		--	6.8	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
I_S	Diode Forward Current	T_C=25 °C	--	--	-32	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 dI/dt=100A/μs	--	68	--	ns
Q_{rr}	Reverse Recovery Charge		--	200	--	nC

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

a2：V_{DD}=-50V,L=0.5mH, R_G=25Ω, Starting T_J=25 ℃

a3：Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm^2 (one layer, 70 μm thick) copper area for drain connection.

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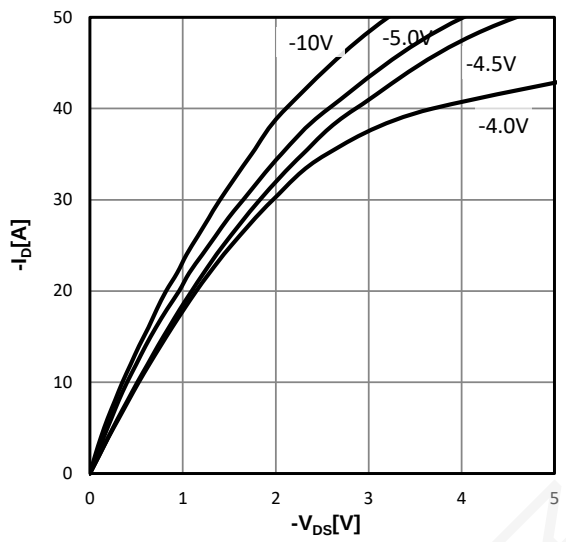
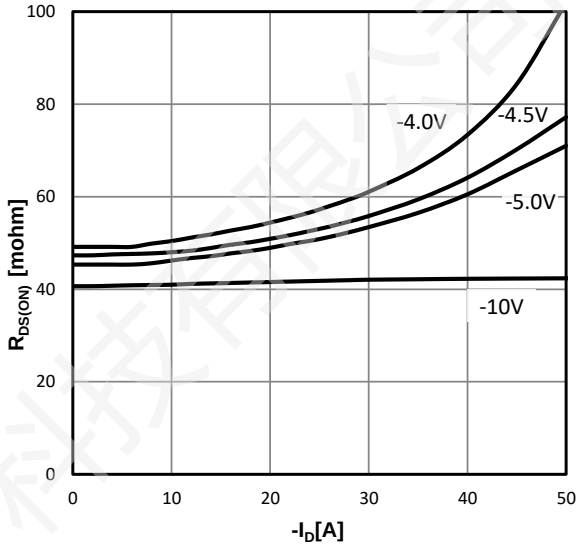
Characteristics Curve:

Figure 1: Typ. output characteristics



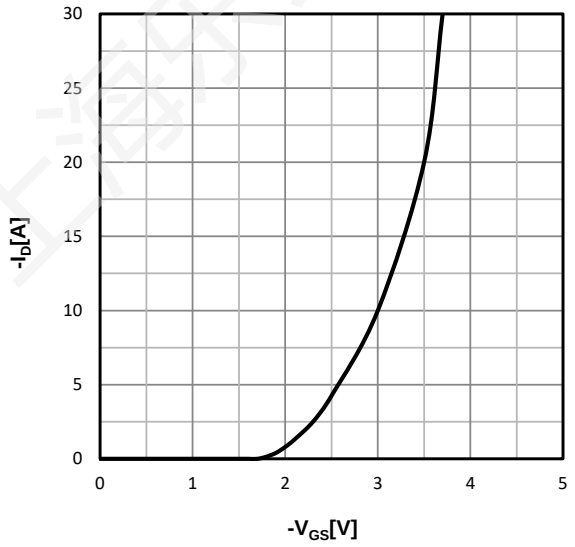
$I_D=f(V_{DS})$, T_j=25 °C; parameter: V_{GS}

Figure 2: Typ. drain-source on resistance



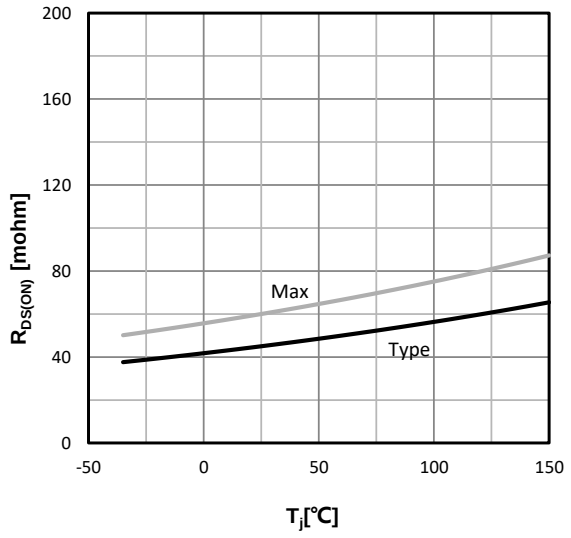
$R_{DS(on)}=f(I_D)$, T_j=25 °C; parameter: V_{GS}

Figure 3: Typ. transfer characteristics



$I_D=f(V_{GS})$, $|V_{DS}|>2|I_D|R_{DS}(on)max$;

Figure 4: drain-source on resistance



$R_{DS(on)}=f(T_j)$, I_D=-20A, V_{GS}=-10V;

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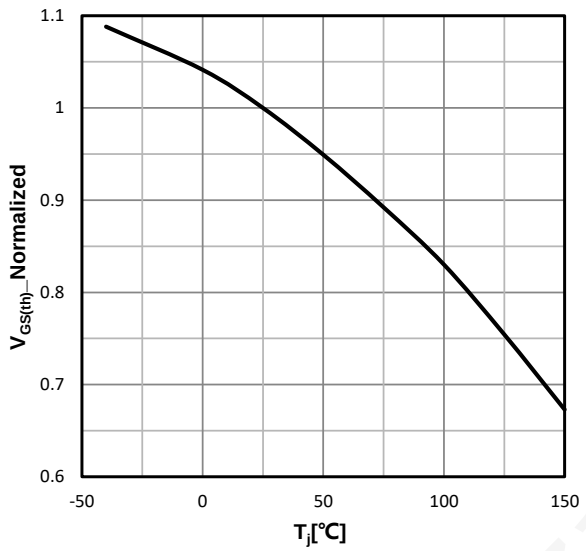
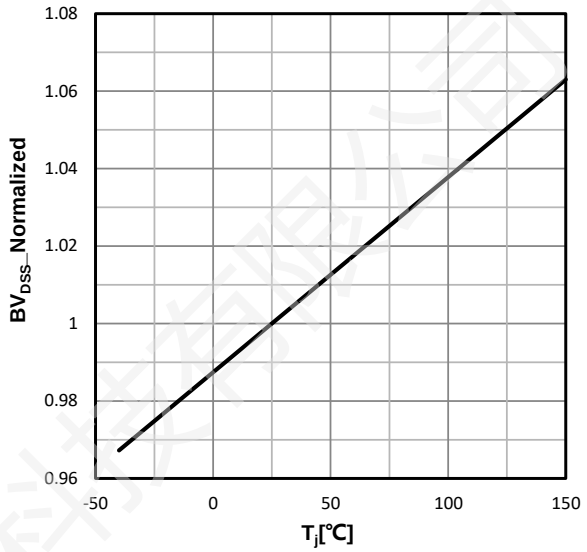
Figure 5: Typ. gate threshold voltage



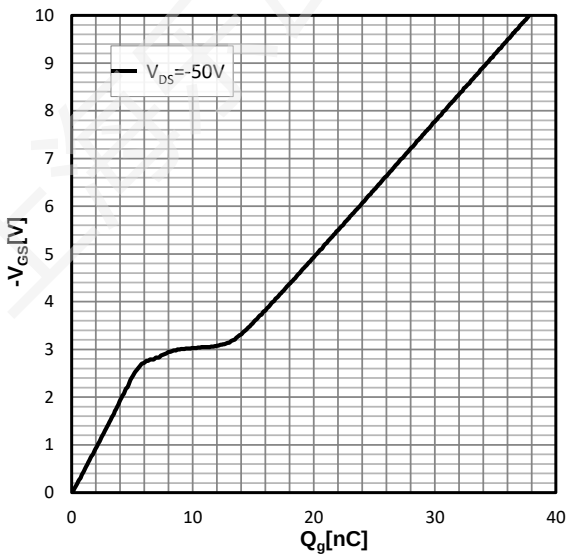
$V_{GS}=f(T_j)$,$V_{GS}=V_{DS}$,I_D=-250μA;

Figure 6: Drain-source breakdown voltage



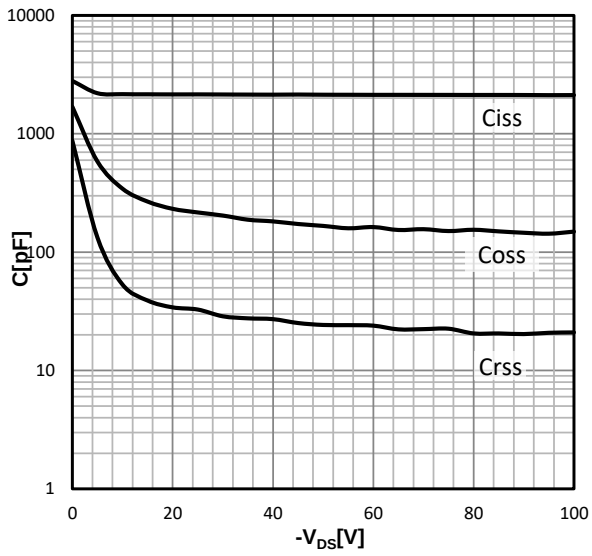
$V_{BR(DSS)}=f(T_j)$; I_D=-250μA;

Figure 7: Typ. gate charge



$V_{GS}=f(Q_g)$, I_D=-20A, T_j=25 °C; parameter: V_{DS}

Figure 8: Typ. Capacitances



$C=f(V_{DS})$; V_{GS}=0V; f=1.0 MHz;

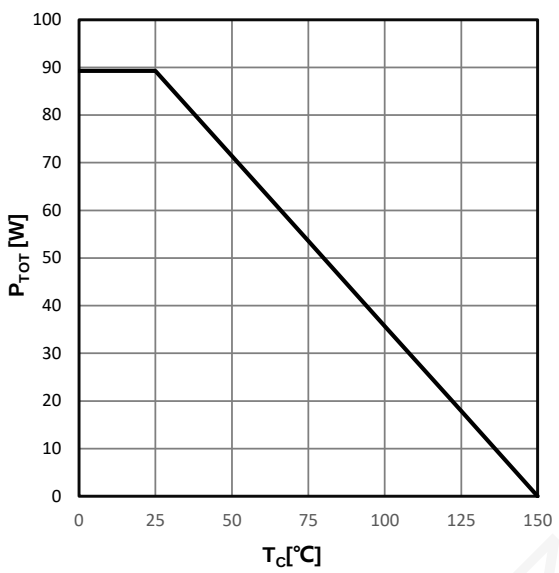
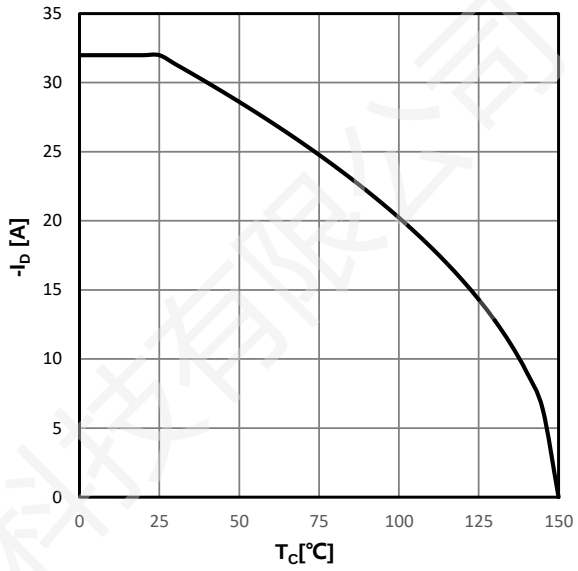
Figure 9: Power dissipation	Figure 10:Drain current
	
$P_{tot}=f(T_C)$;	$I_D=f(T_C)$;

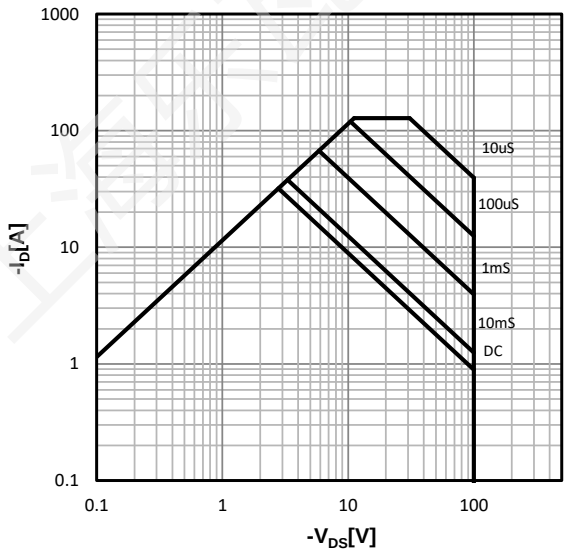
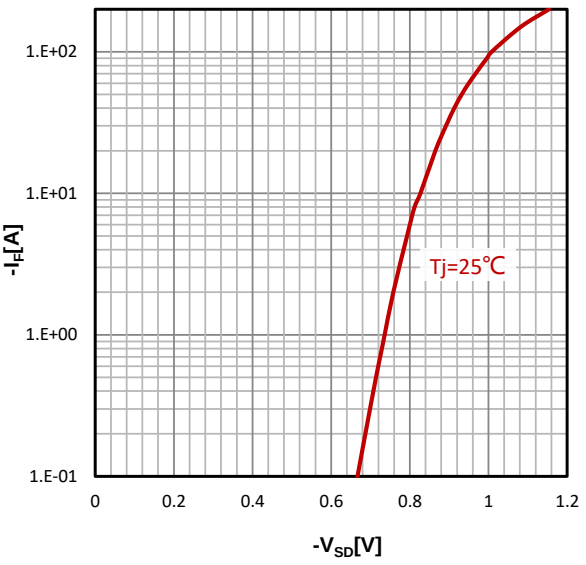
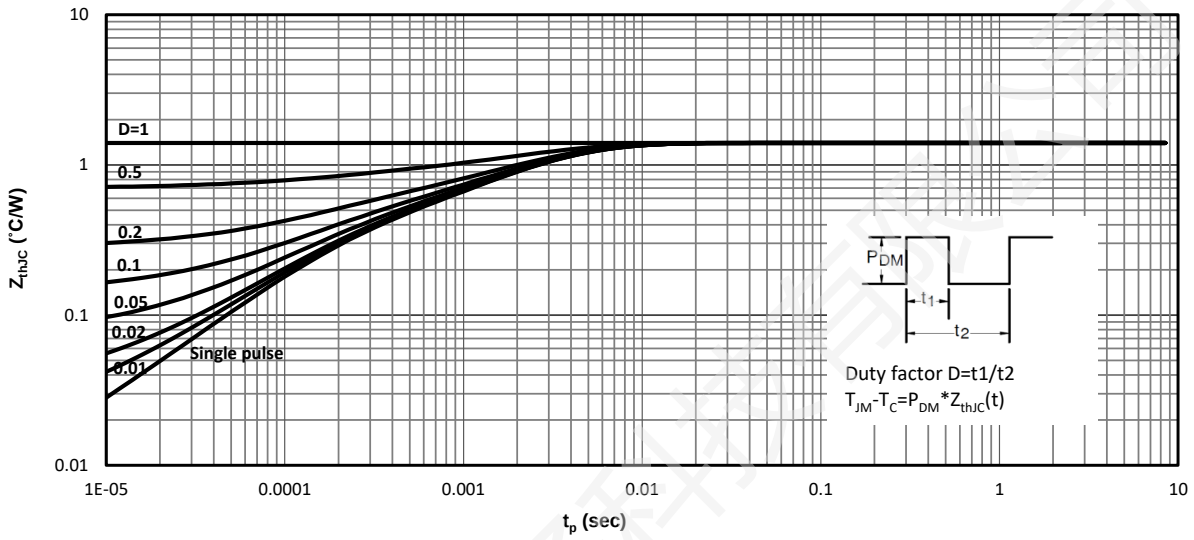
Figure 11: Safe operating area	Figure 12: Typ. forward characteristics
	
$I_D=f(V_{DS})$; T_C=25 °C; D=0; parameter: tp	$I_F=f(V_{SD})$;

Figure 13: Max. Transient Thermal Impedance



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

Test Circuit & Waveform:

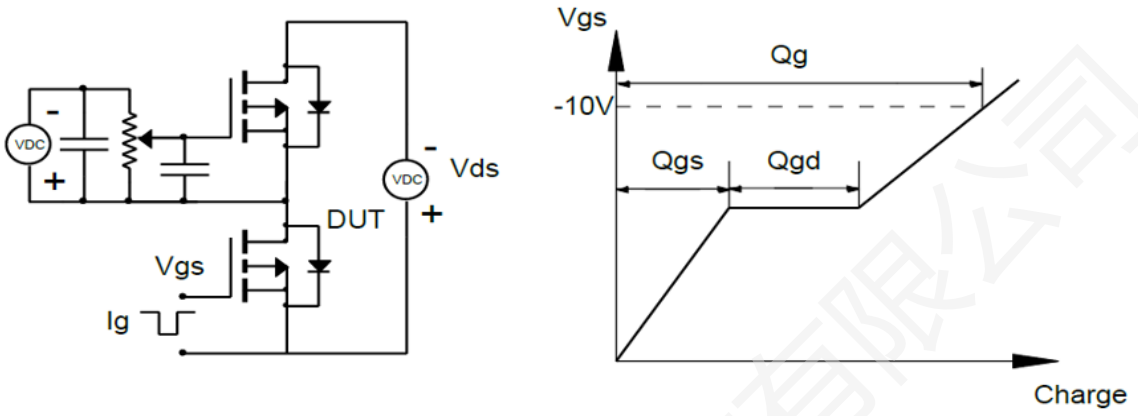


Figure 14: Gate Charge Test Circuit & Waveform

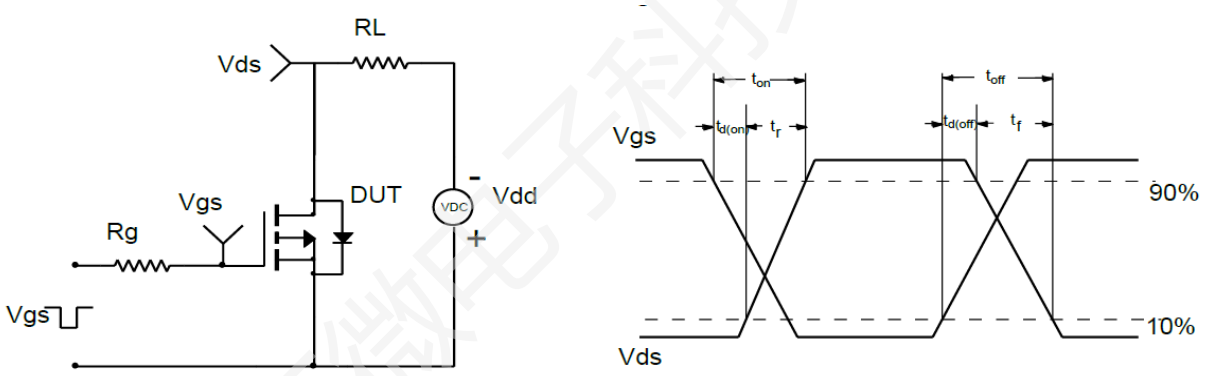


Figure 15: Resistive Switching Test Circuit & Waveforms

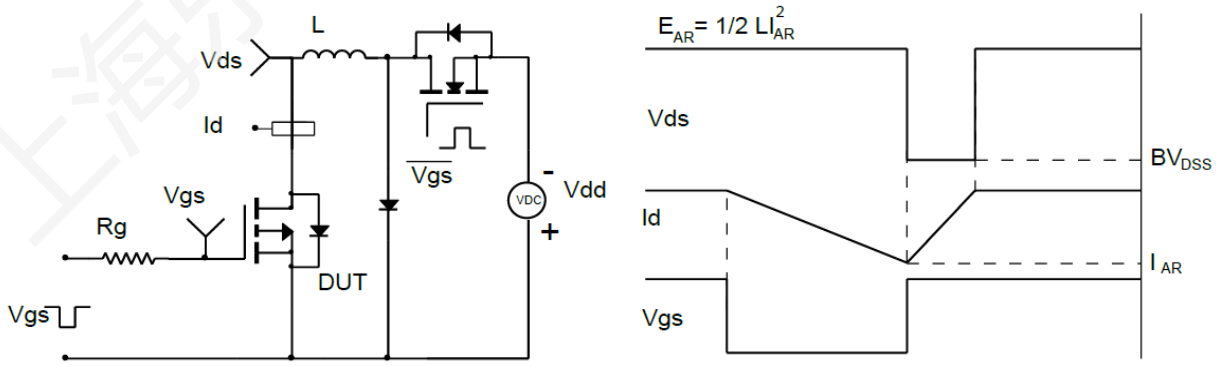
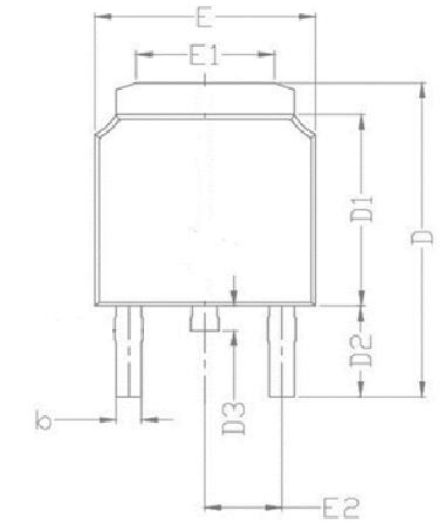
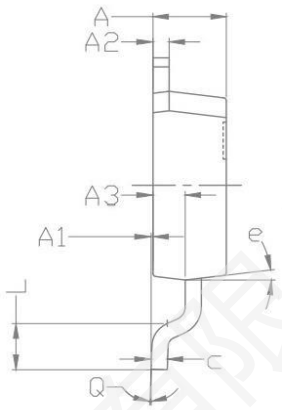
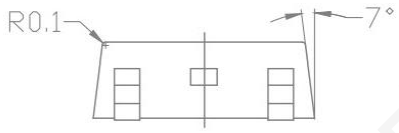


Figure 16: Unclamped Inductive Switching Test Circuit & Waveforms

Package Outline:







COMMON			
PKG	**TO-252**		
Symbol	**Min**	**Nom**	**Max**
A	2.200	2.300	2.400
A1	0.000	0.075	0.150
A2	0.460	0.525	0.590
A3	0.960	1.010	1.060
b	0.640	0.720	0.800
C	0.450	0.515	0.580
D	9.800	10.025	10.350
D1	6.000	6.100	6.200
D2	2.850	2.900	3.100
D3	0.490	0.800	1.000
E	6.400	6.550	6.700
E1	4.050	4.130	4.600
E2	2.250	2.286	2.300
L	1.400	1.550	1.700
e	7°	8°	9°
Q	0°	5°	10°

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Revision History:

Revison	Date	Descriptions
Rev 1.1	Jan.2023	Formal Version
Rev 1.0	Dec.2022	Initial Version

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