

General Description:

The LWS6004A5 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-263, 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

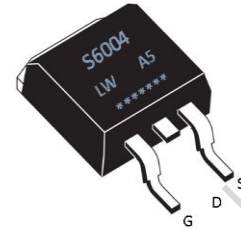
100% DVDS Tested

100% Avalanche Tested

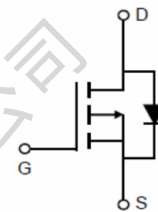


V_{DSS}	-60	V
I_D	-145	A
P_D	183	W
$R_{DS(ON)}$ TYPE	3.5	m Ω

Marking and Pin Assignment



Inner Equivalent Principium Chart



Package Marking and Ordering Information:

Marking	Part Number	Package	Packing	Qty.
S6004/LW A5/D.C.	LWS6004A5	TO-263	Reel	800 Pcs

Absolute Maximum Ratings:

Symbol	Parameter	Value	Units
V_{DSS}	Drain-to-Source Voltage	-60	V
I_D	Continuous Drain Current	$T_C=25^\circ\text{C}$	-145
	Continuous Drain Current	$T_C=100^\circ\text{C}$	-91
I_{DM}^{a1}	Pulsed Drain Current	-580	A
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}^{a2}	Single pulse avalanche energy	2058	mJ
P_D	Power Dissipation	183	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	0.68	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	60	$^\circ\text{C}/\text{W}$

Electrical Characteristic ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise specified):

Static Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
V_{DSS}	Drain to Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-60	--	--	V
I_{DSS}	Drain to Source Leakage Current	$V_{DS}=-60V, V_{GS}=0V$	--	--	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	$V_{DS}=V_{GS}, I_D=-250\mu A$	-2.0	-2.4	-2.8	V
$R_{DS(ON)}$	Drain-to-Source On-Resistance	$V_{GS}=-10V, I_D=-20A$	--	3.5	4.2	m Ω

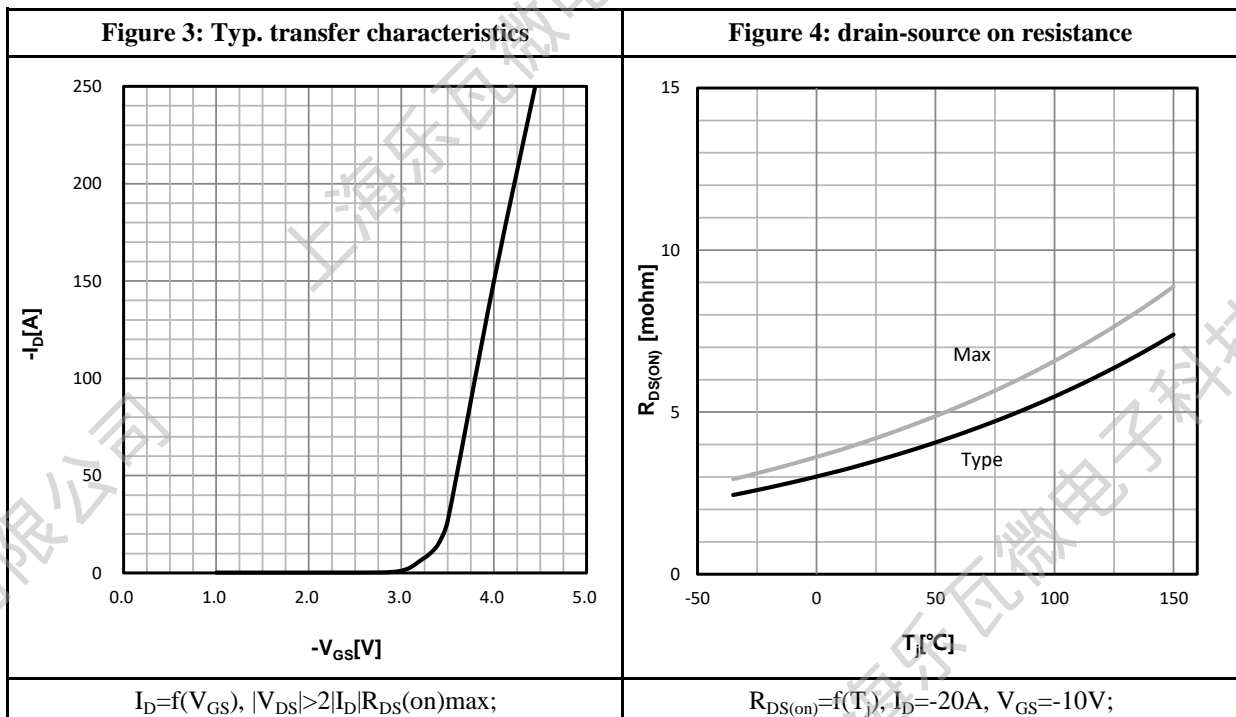
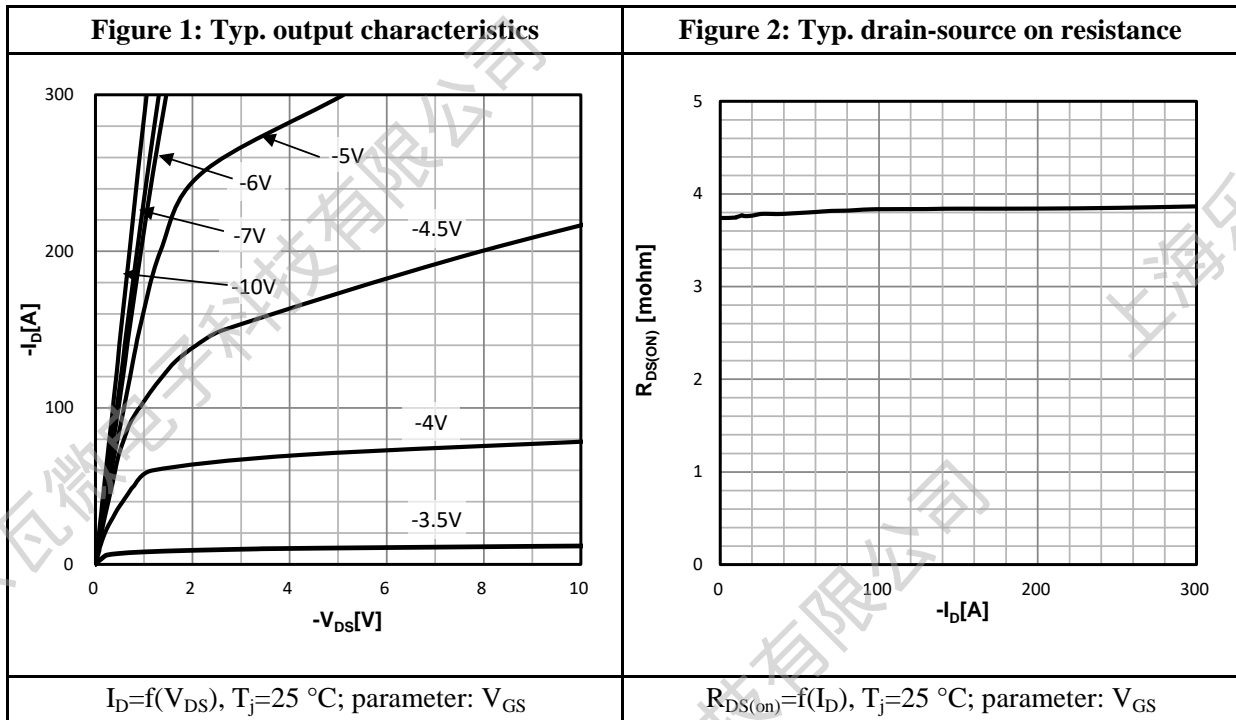
Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{GS} = 0V$	--	9123	--	pF
C_{oss}	Output Capacitance	$V_{DS} = -30V$	--	1583	--	
C_{rss}	Reverse Transfer Capacitance	$f = 1.0MHz$	--	86	--	
R_G	Gate resistance	$V_{GS}=0V, V_{DS}$ Open	--	2.5	--	Ω

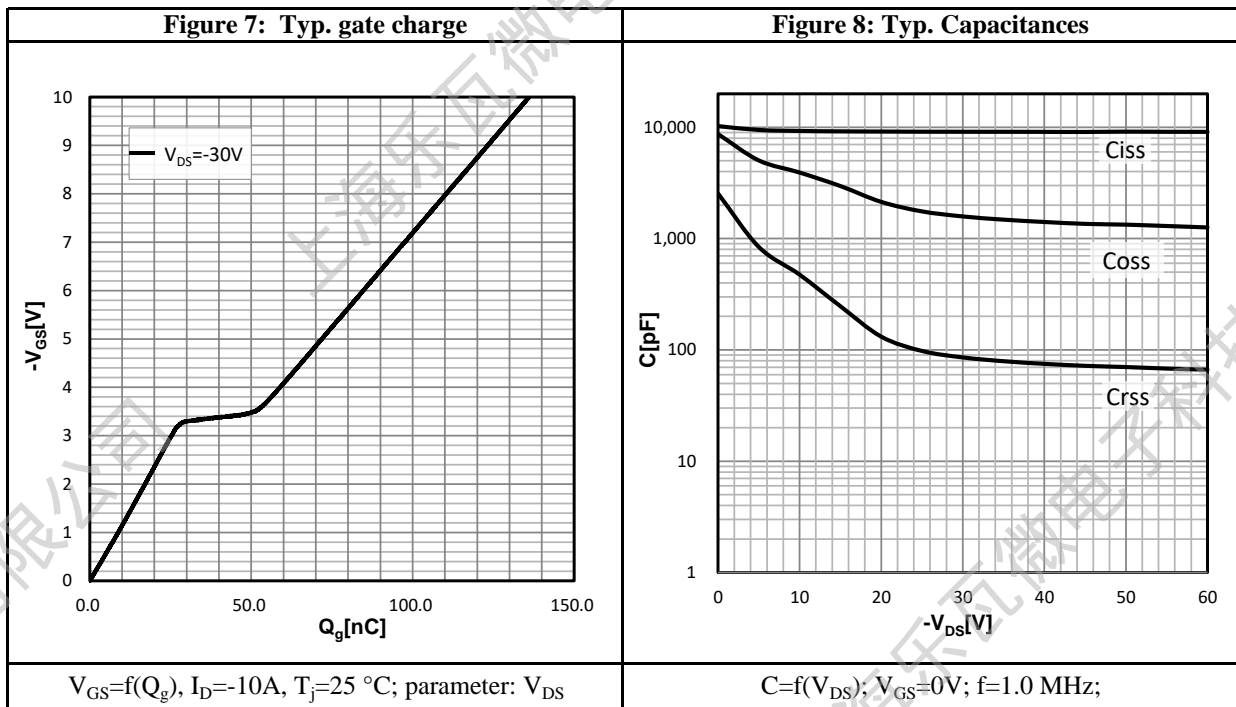
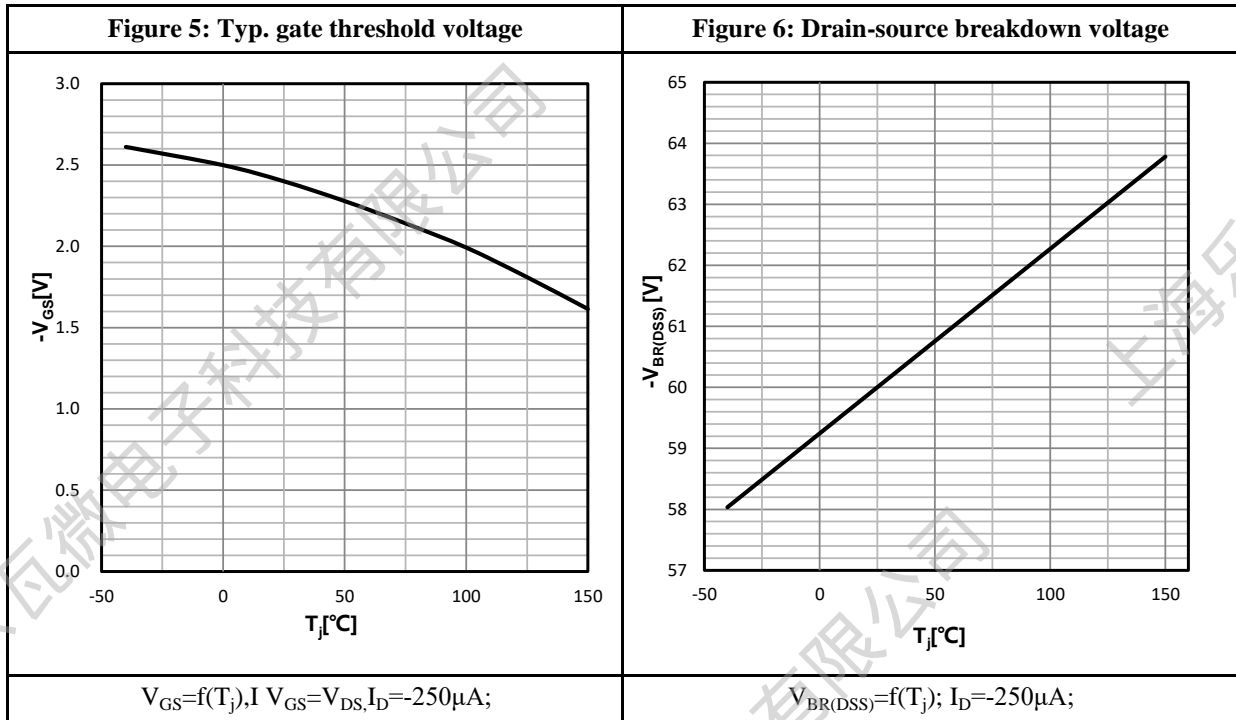
Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D = -10A$	--	70	--	ns
t_r	Rise Time	$V_{DS} = -30V$	--	45	--	
$t_{d(OFF)}$	Turn-Off Delay Time	$V_{GS} = -10V$	--	165	--	
t_f	Fall Time	$R_G = 3\Omega$	--	50	--	
Q_g	Total Gate Charge	$V_{GS} = -10V$	--	135	--	nC
Q_{gs}	Gate Source Charge	$V_{DS} = -30V$	--	28	--	
Q_{gd}	Gate Drain Charge	$I_D = -10A$	--	22	--	

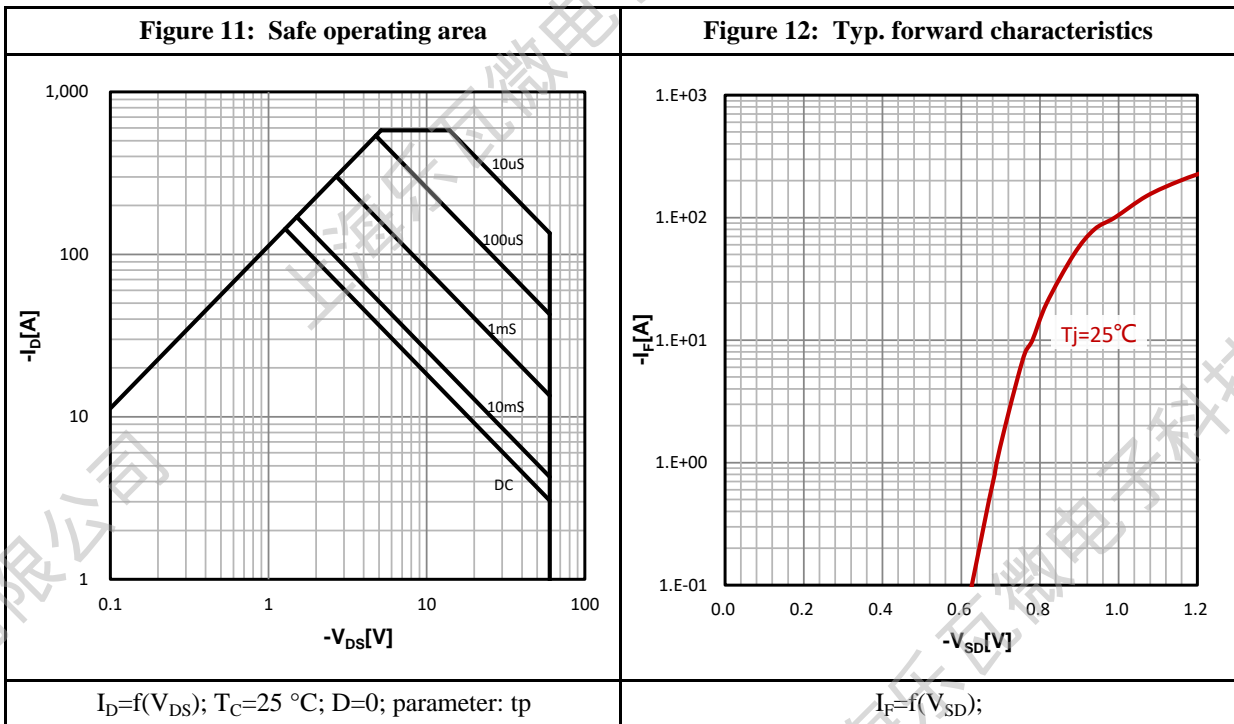
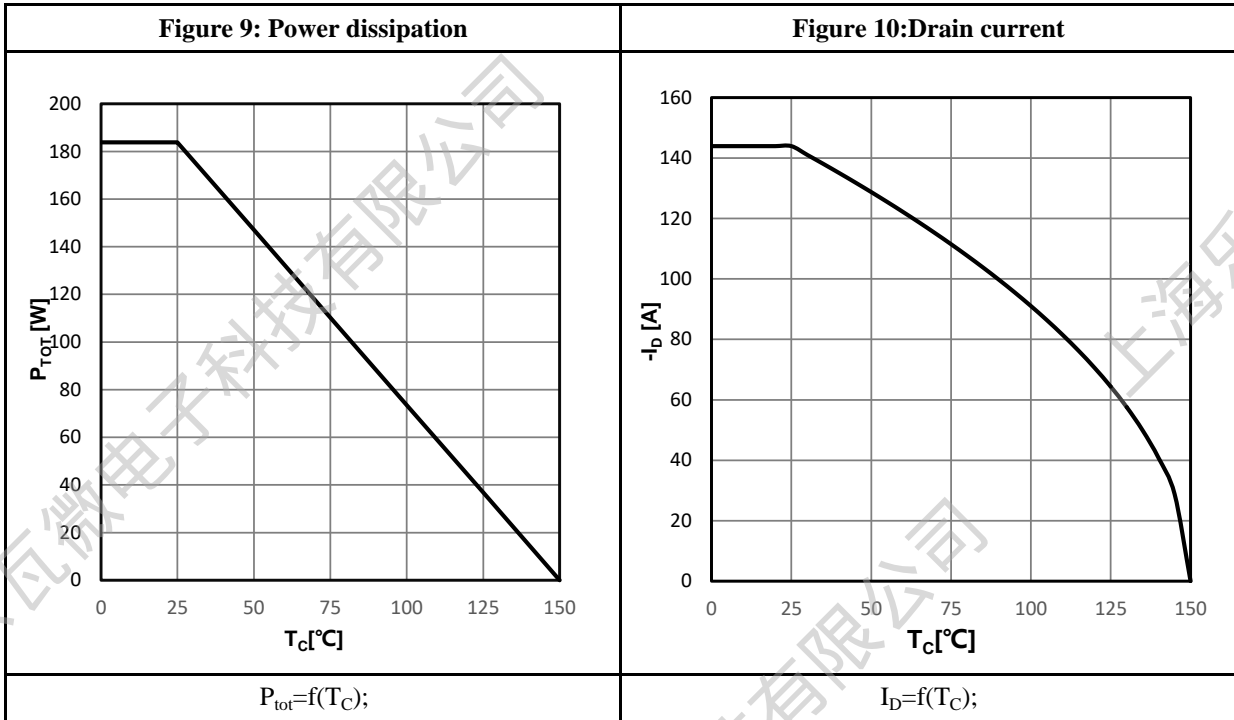
Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
I_S	Diode Forward Current	$T_C = 25\text{ }^\circ\text{C}$	--	--	-145	A
V_{SD}	Diode Forward Voltage	$I_S = -20A, V_{GS} = 0V$	--	--	-1.2	V
t_{rr}	Reverse Recovery time	$I_S = -10A, V_{DD} = -30V,$	--	45	--	ns
Q_{rr}	Reverse Recovery Charge	$dI/dt = 100A/\mu s$	--	100	--	nC

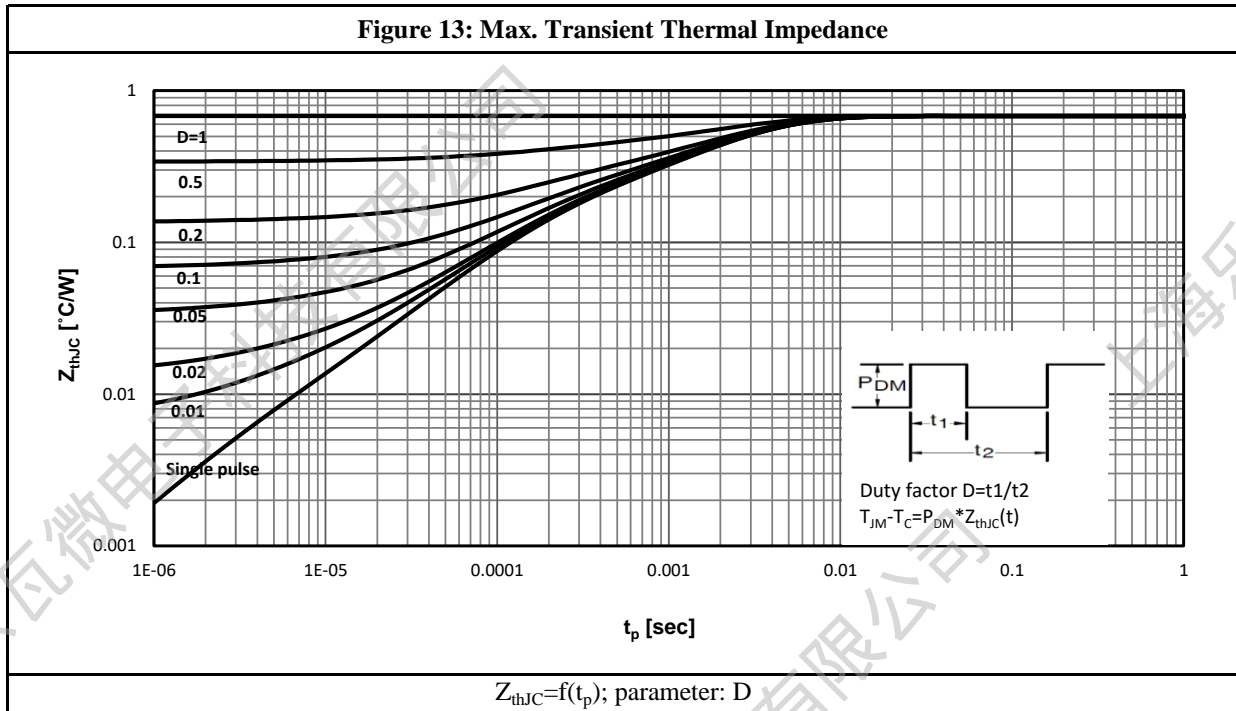
a1: Repetitive rating; pulse width limited by maximum junction temperature

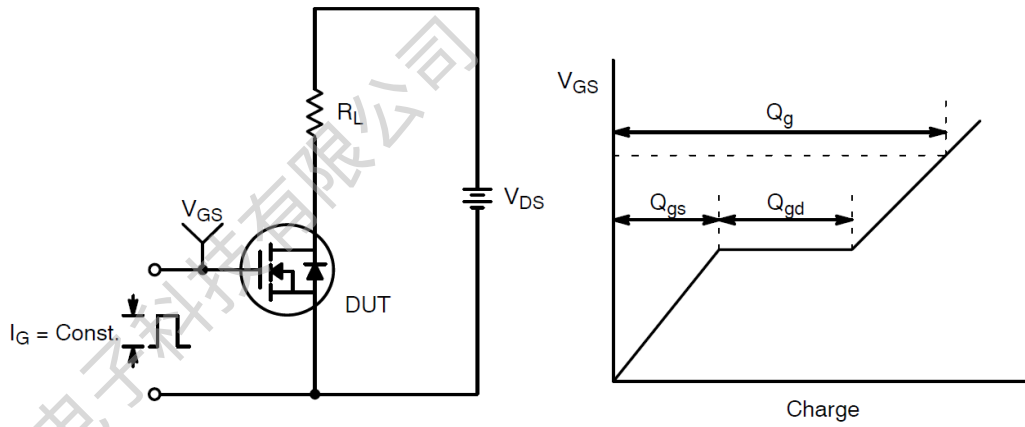
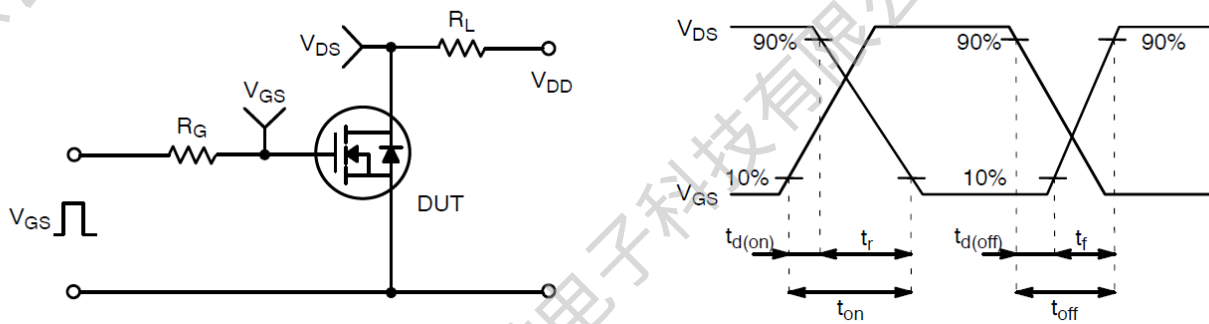
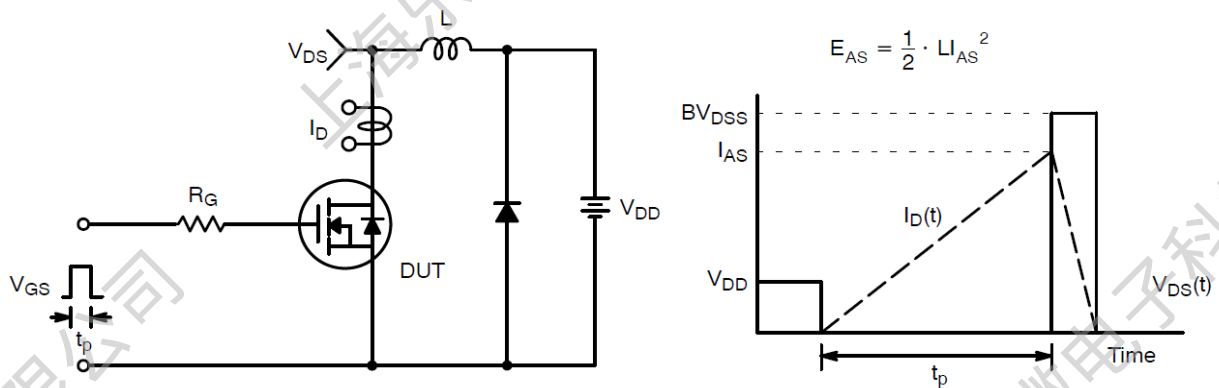
a2: $L=5.0mH, R_G=25\Omega, \text{Starting } T_j=25\text{ }^\circ\text{C}$

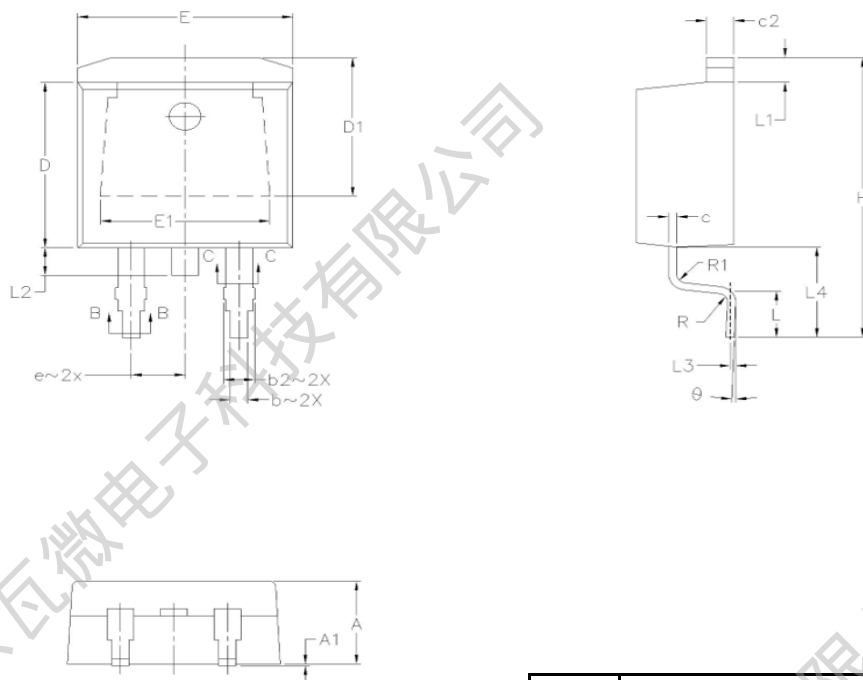
Characteristics Curve:








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	COMMON			
	MM		INCH	
	Min	Max	MIN	Max
A	4.064	4.826	0.160	0.190
A1	0.000	0.254	0.000	0.010
b	0.508	0.991	0.020	0.039
b1	0.508	0.889	0.020	0.035
b2	1.143	1.778	0.045	0.070
b3	1.143	1.727	0.045	0.068
c	0.381	0.737	0.015	0.029
c1	0.381	0.584	0.015	0.023
c2	1.143	1.651	0.045	0.065
D	8.382	9.652	0.330	0.380
D1	6.858	—	0.270	—
E	9.652	10.668	0.380	0.420
E1	6.223	—	0.245	—
e	2.540 BSC		0.100 BSC	
H	14.605	15.875	0.575	0.625
L	1.778	2.794	0.070	0.110
L1	—	1.676	—	0.066
L2	—	1.778	—	0.070
L3	0.254 BSC		0.010 BSC	
L4	4.780	5.280	0.188	0.208
R	0.460 TYP		0.018 TYP	
R1	0.461 TYP		0.019 TYP	
θ	0°	8°	0°	8°

Revision History:

Revison	Date	Descriptions
Rev 1.0	Apr.2023	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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