

General Description:

The LWS6040A4 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.

Features:

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

Applications:

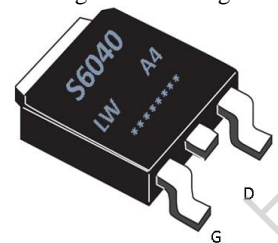
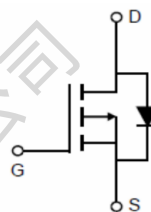
- Battery switching application
- Hard switched and high frequency circuits
- Power Management

100% DVDS Tested

100% Avalanche Tested



V_{DSS}	-60	V
I_D	-40	A
P_D	89	W
$R_{DS(ON)}$ TYPE	35	m Ω

Marking and Pin Assignment

Inner Equivalent Principium Chart

Package Marking and Ordering Information:

Marking	Part Number	Package	Packing	Qty.
S6040/LW A4/D.C.	LWS6040A4	TO-252	Reel	2500 Pcs

Absolute Maximum Ratings:

Symbol	Parameter	Value	Units
V_{DSS}	Drain-to-Source Voltage	-60	V
I_D	Continuous Drain Current	$T_C=25^\circ\text{C}$	-32
	Continuous Drain Current	$T_C=100^\circ\text{C}$	-20
I_{DM}^{a1}	Pulsed Drain Current	-128	A
V_{GS}	Gate-to-Source Voltage	± 20	V
P_D	Power Dissipation	89	W
E_{AS}^{a2}	Single pulse avalanche energy	90	mJ
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	1.4	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	47	$^\circ\text{C}/\text{W}$

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	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.3	-1.8	-2.3	V
$R_{DS(ON)1}$	Drain-to-Source On-Resistance	$V_{GS}=-10V, I_D=-20A$	--	35	46	$m\Omega$
$R_{DS(ON)2}$	Drain-to-Source On-Resistance	$V_{GS}=-4.5V, I_D=-10A$	--	42	52	$m\Omega$

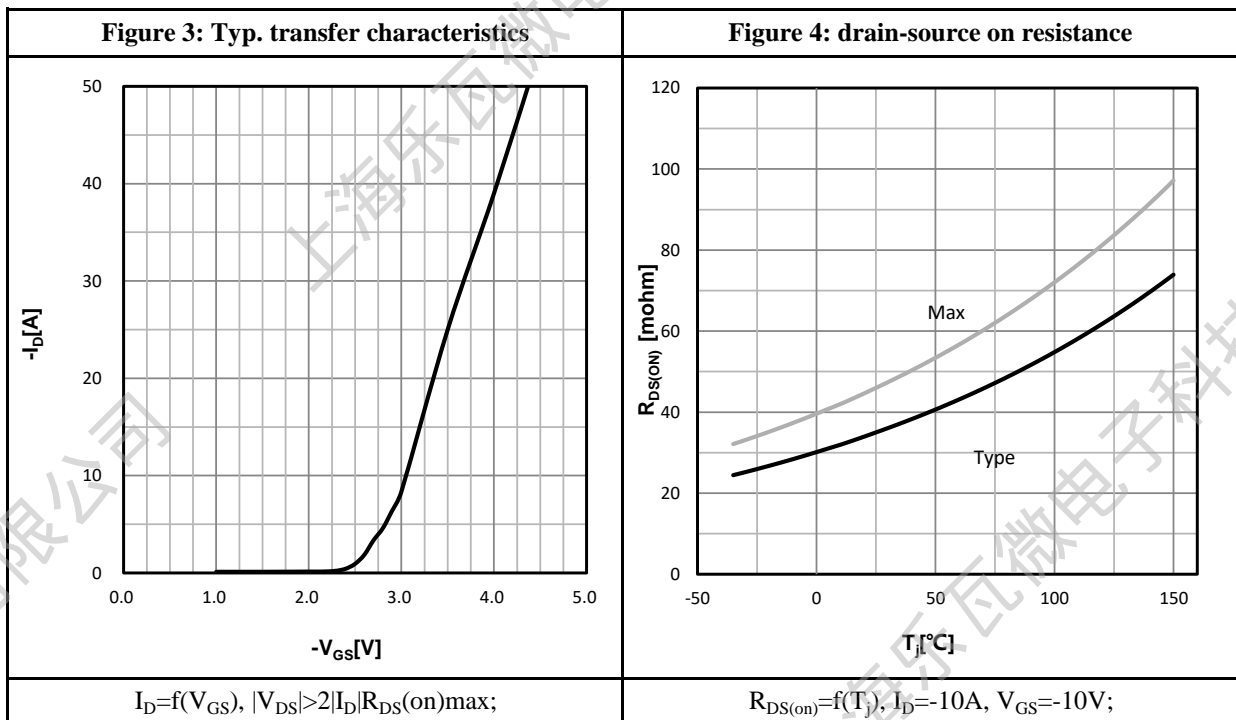
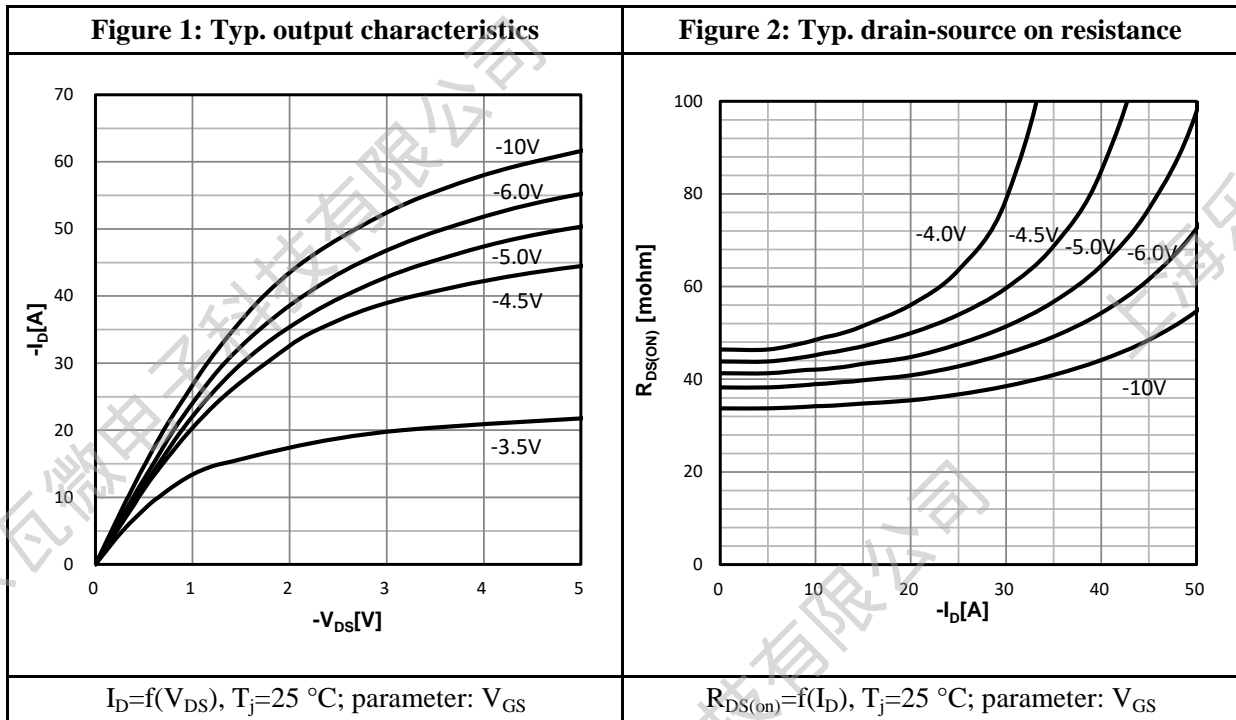
Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{GS} = 0V$	--	862	--	pF
C_{oss}	Output Capacitance	$V_{DS} = -30V$	--	163	--	
C_{rss}	Reverse Transfer Capacitance	$f = 1.0MHz$	--	8	--	
R_G	Gate resistance	$V_{GS}=0V, V_{DS}$ Open	--	13	--	Ω

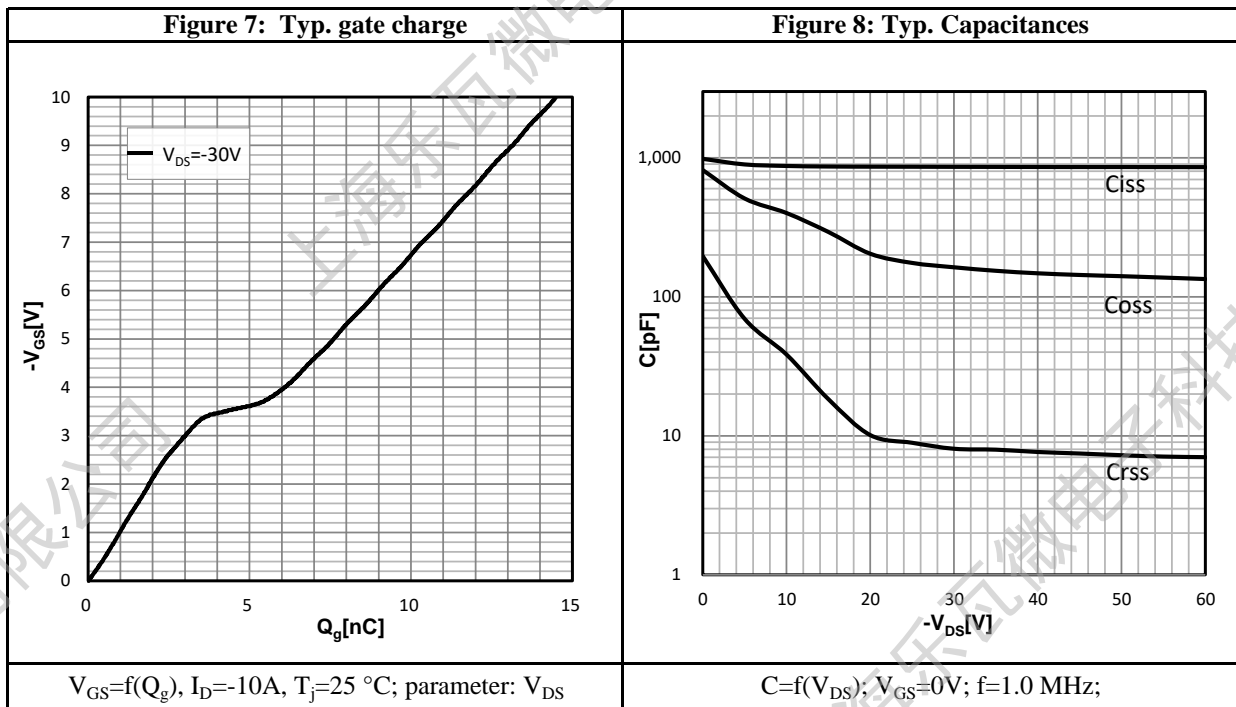
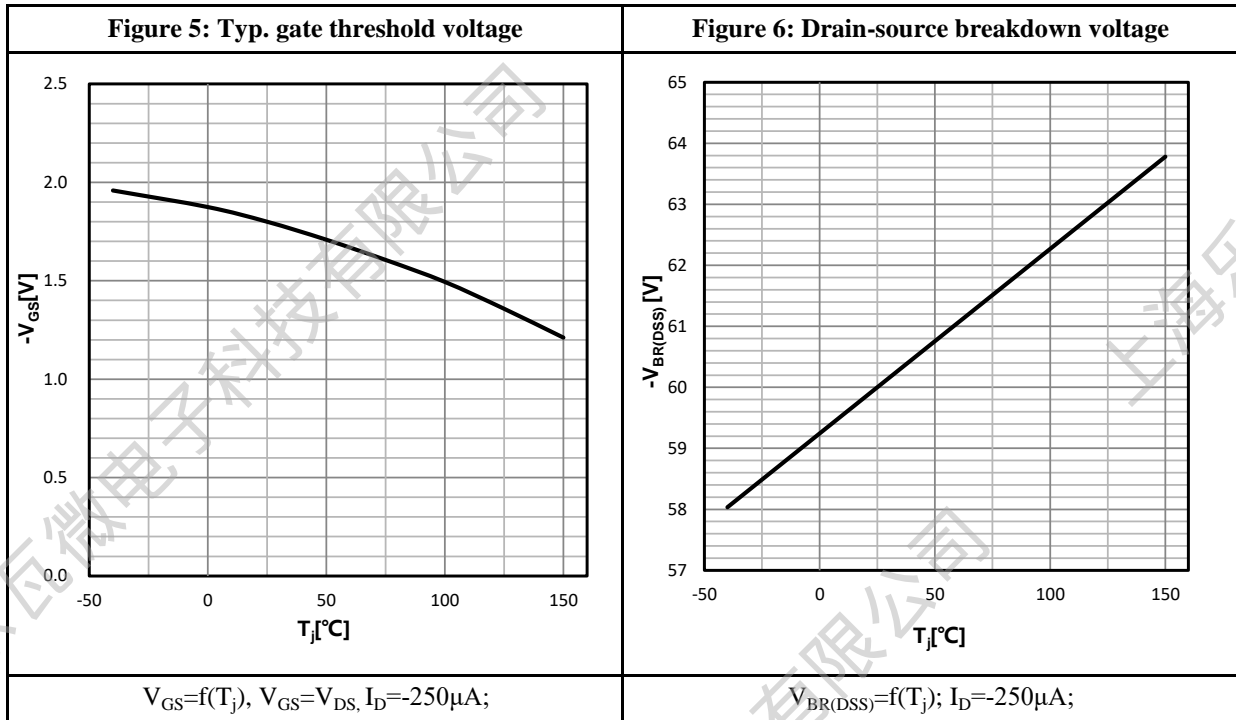
Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D = -10A$	--	10	--	ns
t_r	Rise Time	$V_{DS} = -30V$	--	6	--	
$t_{d(OFF)}$	Turn-Off Delay Time	$V_{GS} = -10V$	--	23	--	
t_f	Fall Time	$R_G = 3\Omega$	--	11	--	
Q_g	Total Gate Charge	$V_{GS} = -10V$	--	14.4	--	nC
Q_{gs}	Gate Source Charge	$V_{DS} = -30V$	--	3.3	--	
Q_{gd}	Gate Drain Charge	$I_D = -10A$	--	1.8	--	

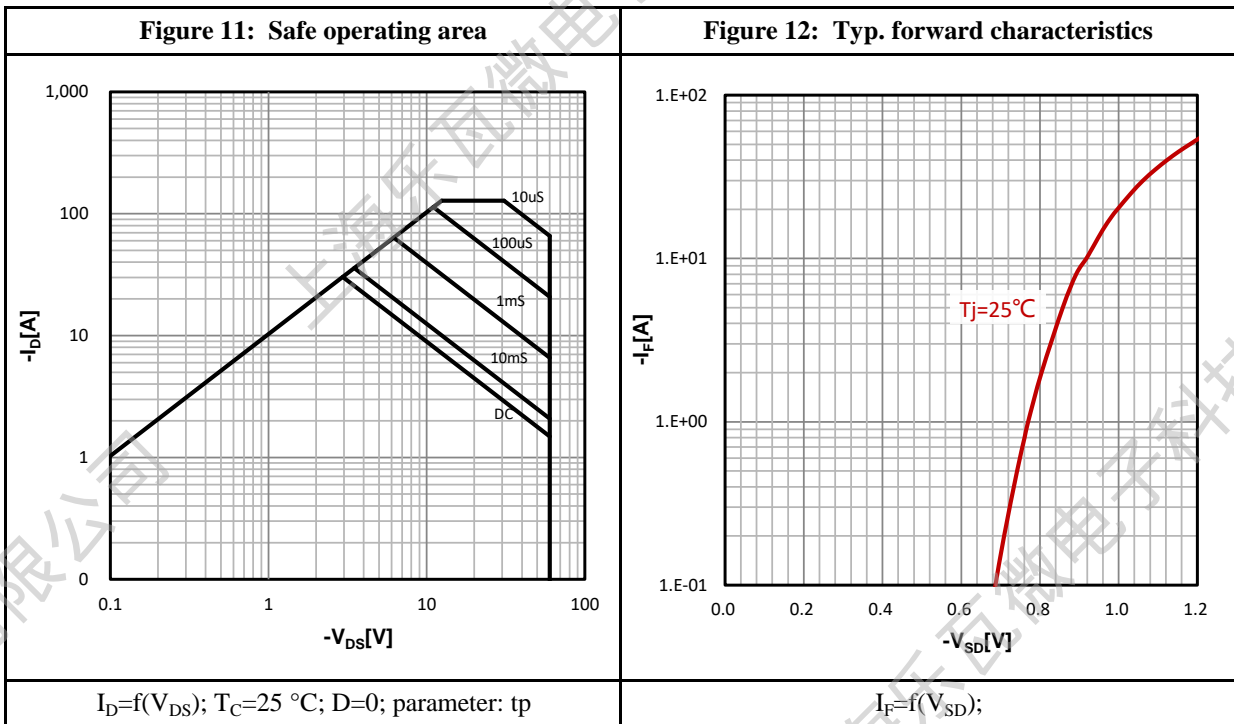
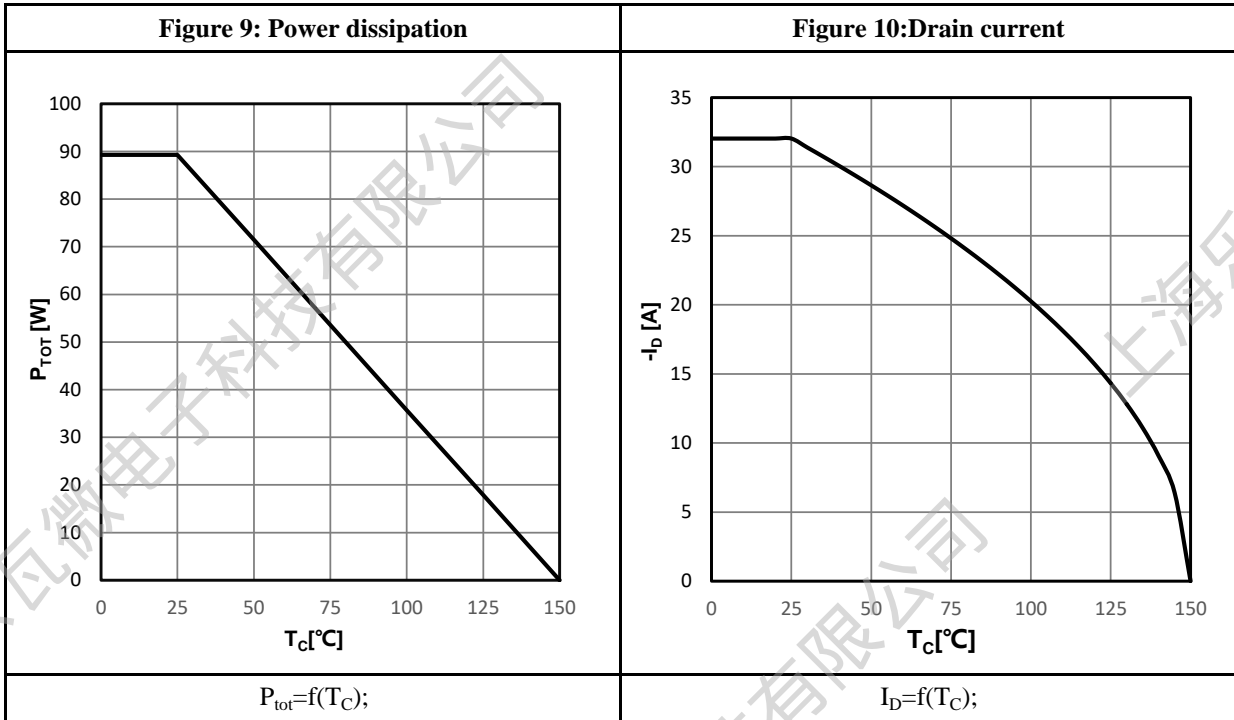
Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
I_S	Diode Forward Current	$T_C = 25\text{ }^\circ\text{C}$	--	--	-32	A
I_{SM}	Diode Pluse Current		--	--	-128	A
V_{SD}	Diode Forward Voltage	$I_S = -10A, V_{GS} = 0V$	--	--	-1.2	V
t_{rr}	Reverse Recovery time	$I_S = -10A, V_{DD} = -30V,$	--	18	--	ns
Q_{rr}	Reverse Recovery Charge	$dI/dt = 100A/us$	--	27	--	nC

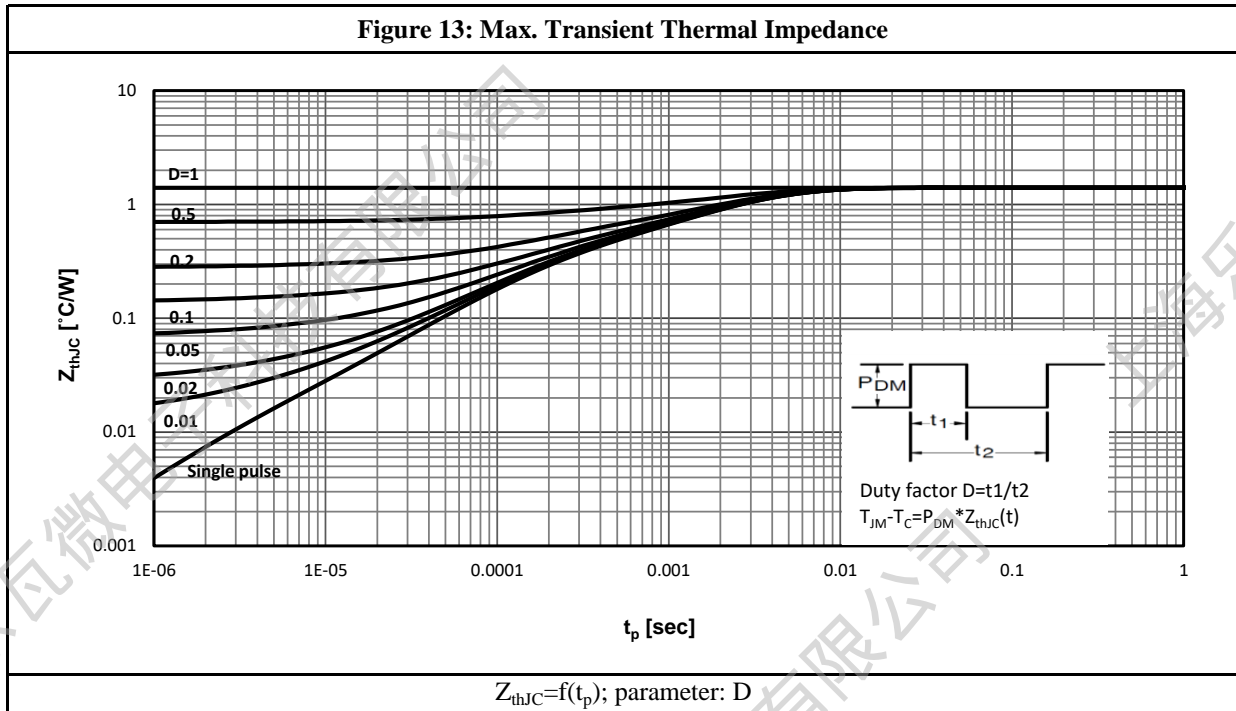
a1: Repetitive rating; pulse width limited by maximum junction temperature

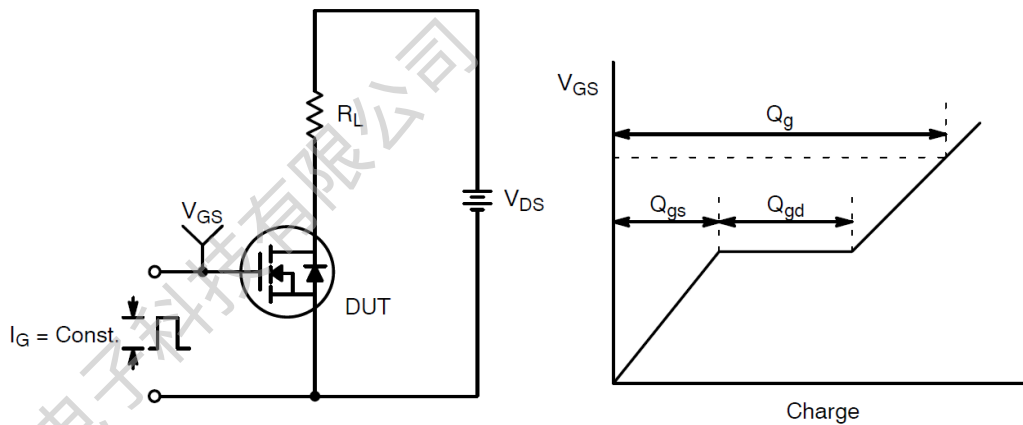
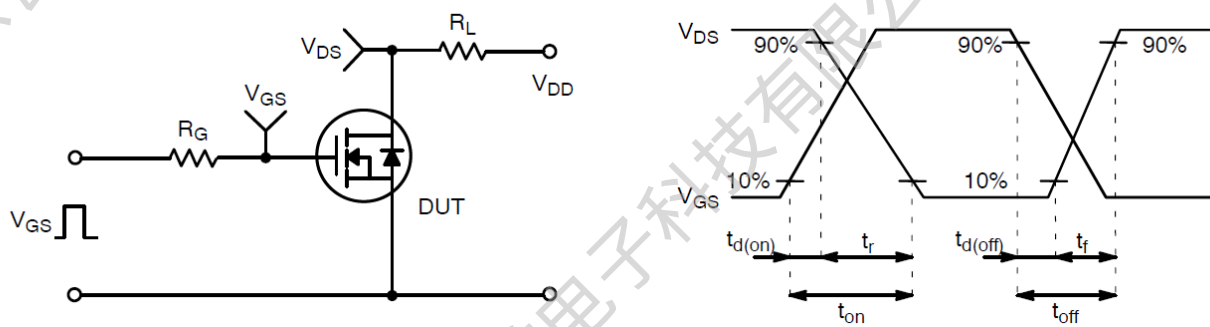
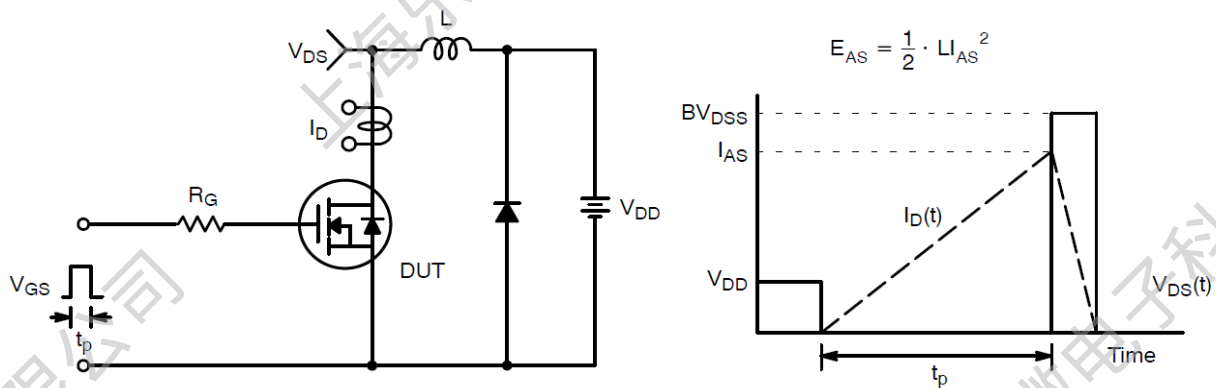
a2: $V_{DD} = -30V, L = 1.0mH, R_G = 25\Omega,$ Starting $T_j = 25\text{ }^\circ\text{C}$

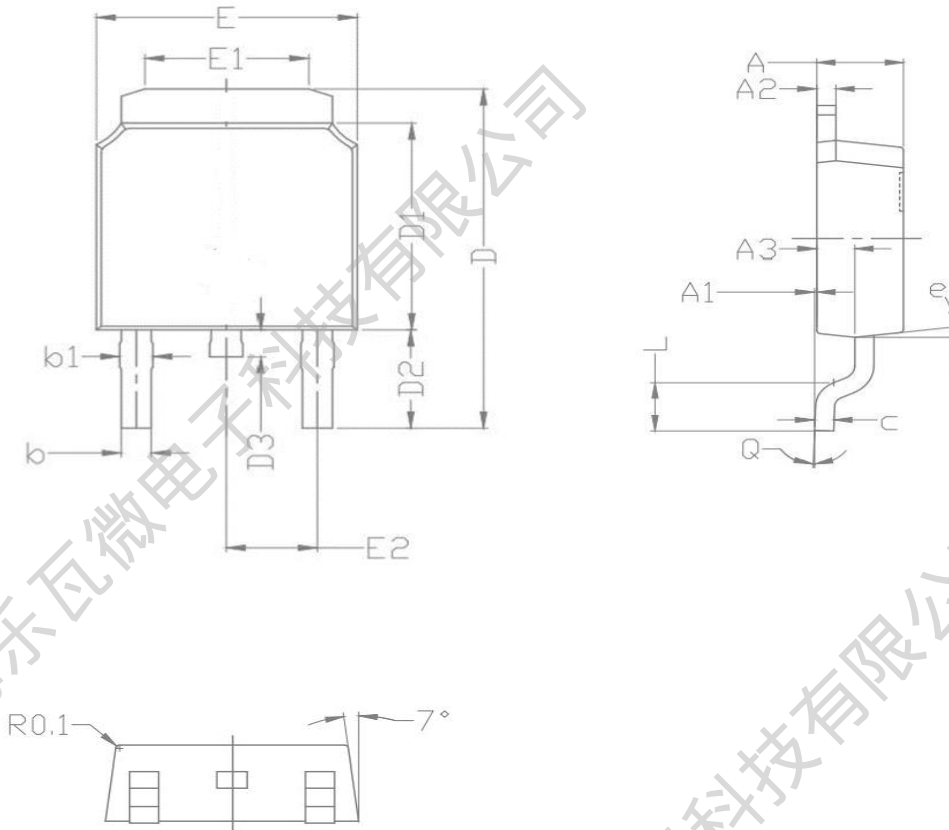
Characteristics Curve:








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:


COMMON			
PKG	TO-252-2L		
Symbol	Min	Nom	Max
A	2.200	2.300	2.400
A1	0.000	0.075	0.150
A2	0.500	0.508	0.550
A3	0.960	1.010	1.060
b	0.740	0.760	0.800
b1	0.880	0.900	0.950
C	0.500	0.508	0.550
D	9.800	10.025	10.350
D1	6.050	6.100	6.180
D2	2.850	2.900	2.950
D3	0.600	0.800	1.000
E	6.550	6.600	6.700
E1	4.050	4.130	4.200
E2	2.25	2.286	2.3
L	1.400	1.500	1.600
e	7°		
Q	0°	2°	5°

Revision History:

Revison	Date	Descriptions
Rev 1.0	Jan.2023	Initial Version

Disclaimer:

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