

**General Description:**

The LWS6040AD3 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 PDFN3.3\*3.3-8L, 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:**

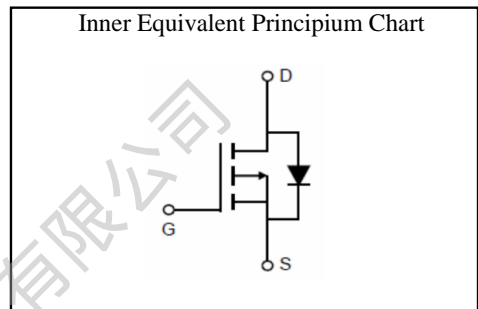
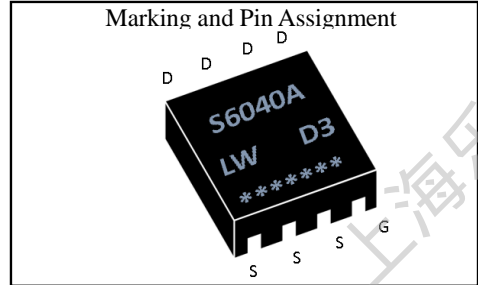
- Battery switching application
- Hard switched and high frequency circuits
- Power Management

**100% DVDS Tested**

**100% Avalanche Tested**



$V_{DSS}$	-60	V
$I_D$	-19	A
$P_D$	32	W
$R_{DS(ON)}$ TYPE	38	m $\Omega$


**Package Marking and Ordering Information:**

Marking	Part Number	Package	Packing	Qty.
S6040A/LW D3/D.C.	LWS6040AD3	PDFN3.3*3.3-8L	Reel	5000 Pcs

**Absolute Maximum Ratings:**

Symbol	Parameter	Value	Units
$V_{DSS}$	Drain-to-Source Voltage	-60	V
$I_D$	Continuous Drain Current	$T_C=25^\circ\text{C}$	-19
	Continuous Drain Current	$T_C=100^\circ\text{C}$	-12
$I_{DM}^{a1}$	Pulsed Drain Current	-76	A
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	V
$P_D$	Power Dissipation	32	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	3.9	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	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	$\mu A$
$I_{GSS(F)}$	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	$V_{GS}=-10V, I_D=-20A$	--	38	46	$m\Omega$
$R_{DS(ON)2}$	Drain-to-Source On-Resistance	$V_{GS}=-4.5V, I_D=-10A$	--	49	60	$m\Omega$

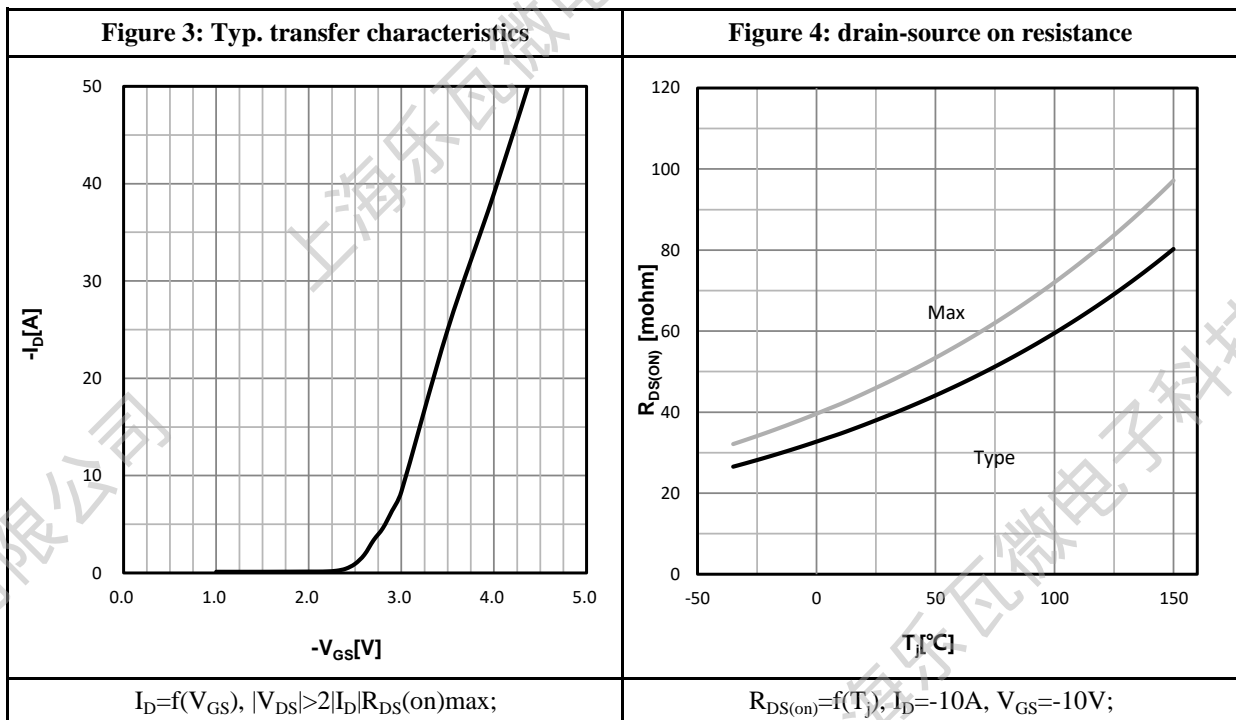
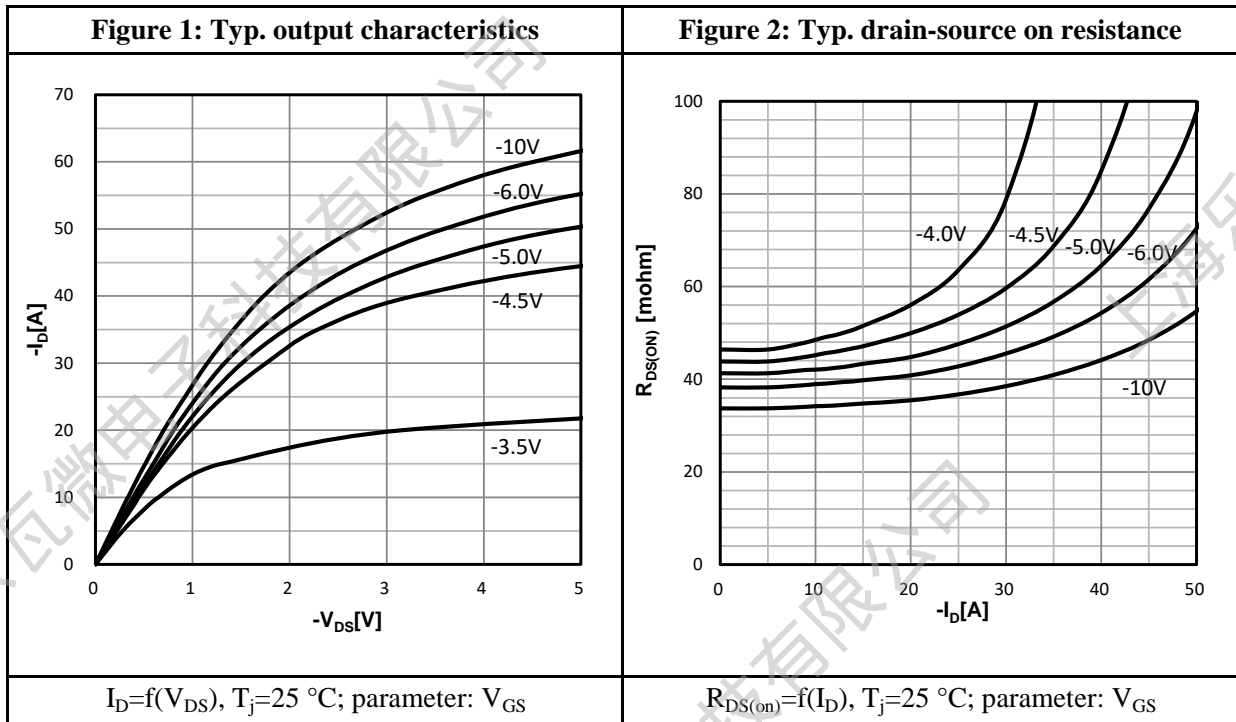
Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$C_{iss}$	Input Capacitance	$V_{GS} = 0V$	--	862	--	pF
$C_{oss}$	Output Capacitance	$V_{DS} = -30V$	--	163	--	
$C_{rss}$	Reverse Transfer Capacitance	$f = 1.0MHz$	--	8	--	
$R_G$	Gate resistance	$V_{GS}=0V,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

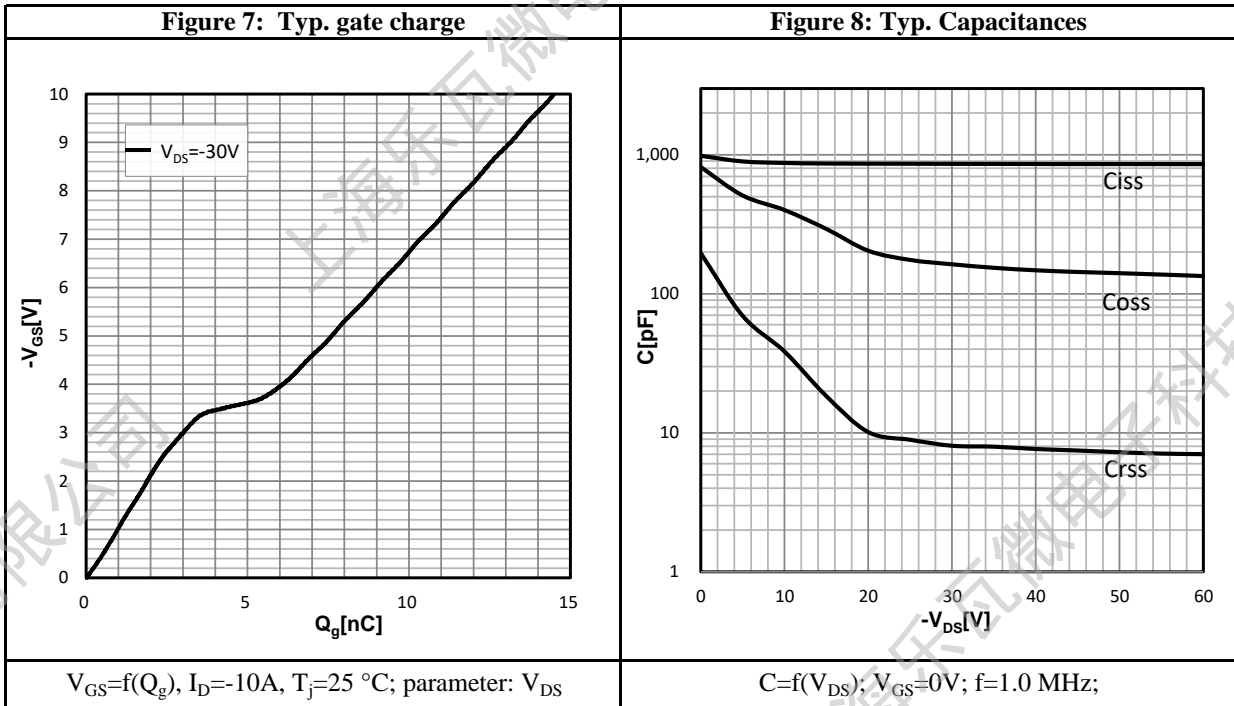
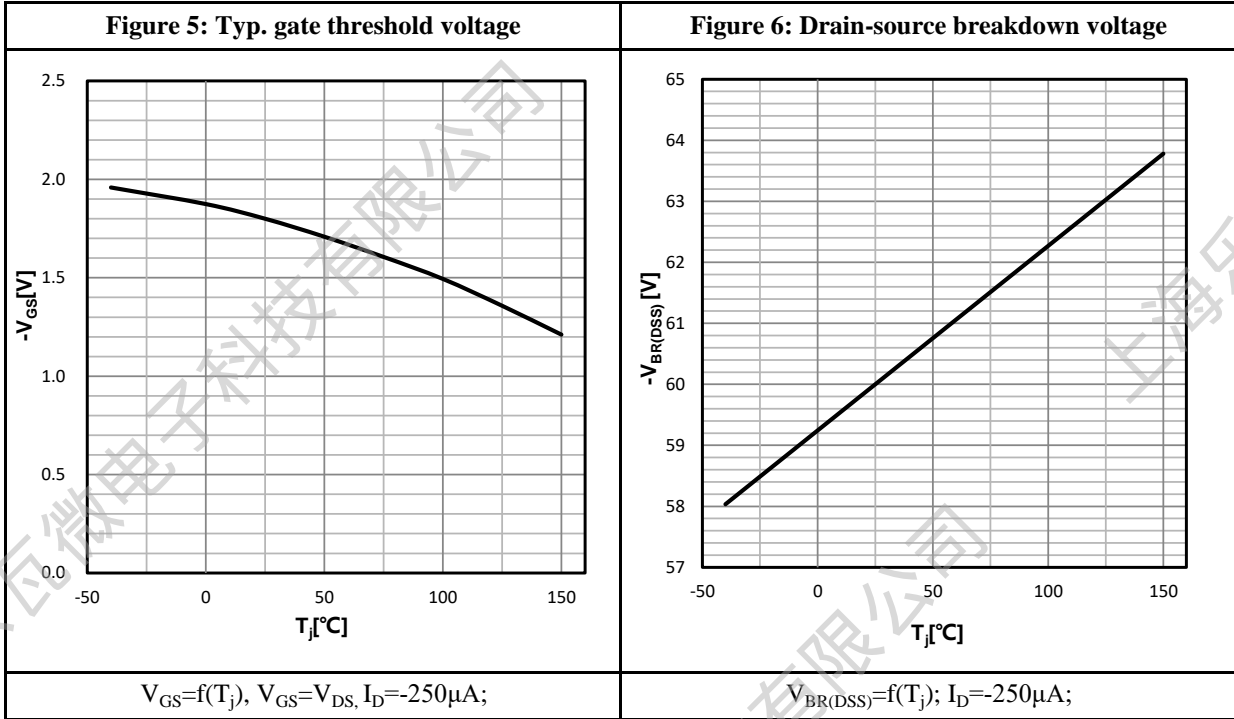
Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D = -10A$	--	10	--	ns
$t_r$	Rise Time	$V_{DS} = -30V$	--	6	--	
$t_{d(OFF)}$	Turn-Off Delay Time	$V_{GS} = -10V$	--	23	--	
$t_f$	Fall Time	$R_G = 3\Omega$	--	11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

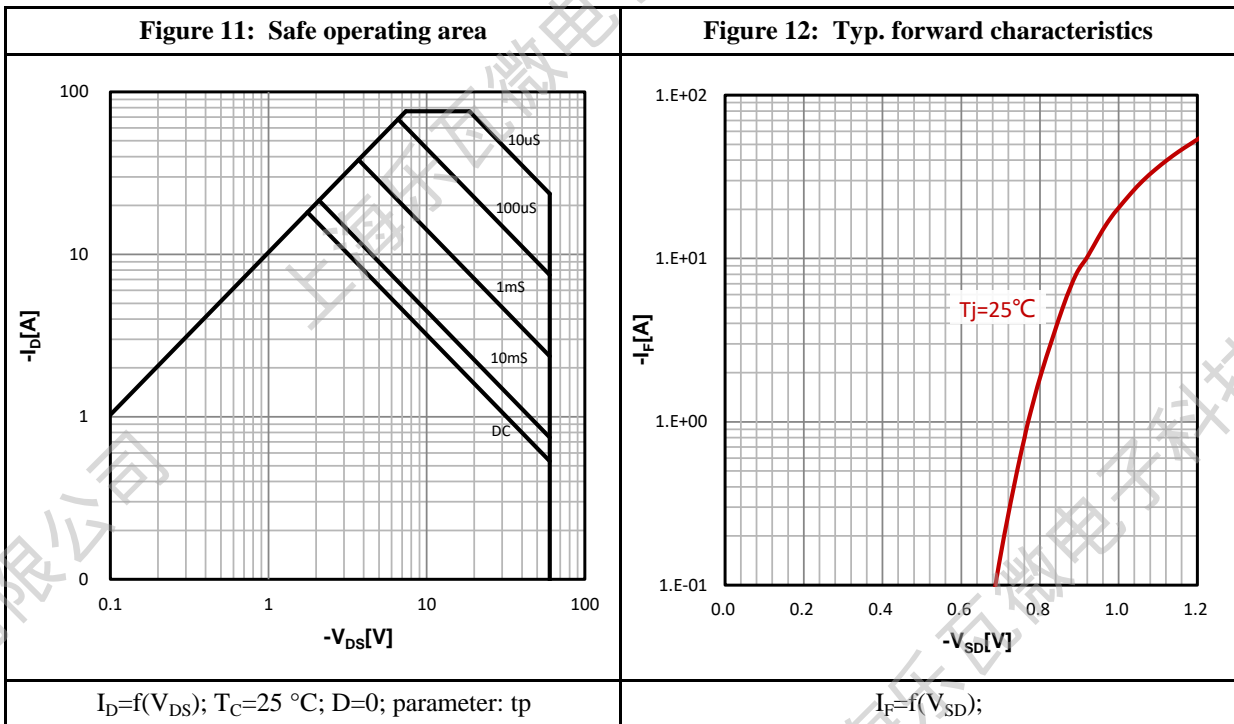
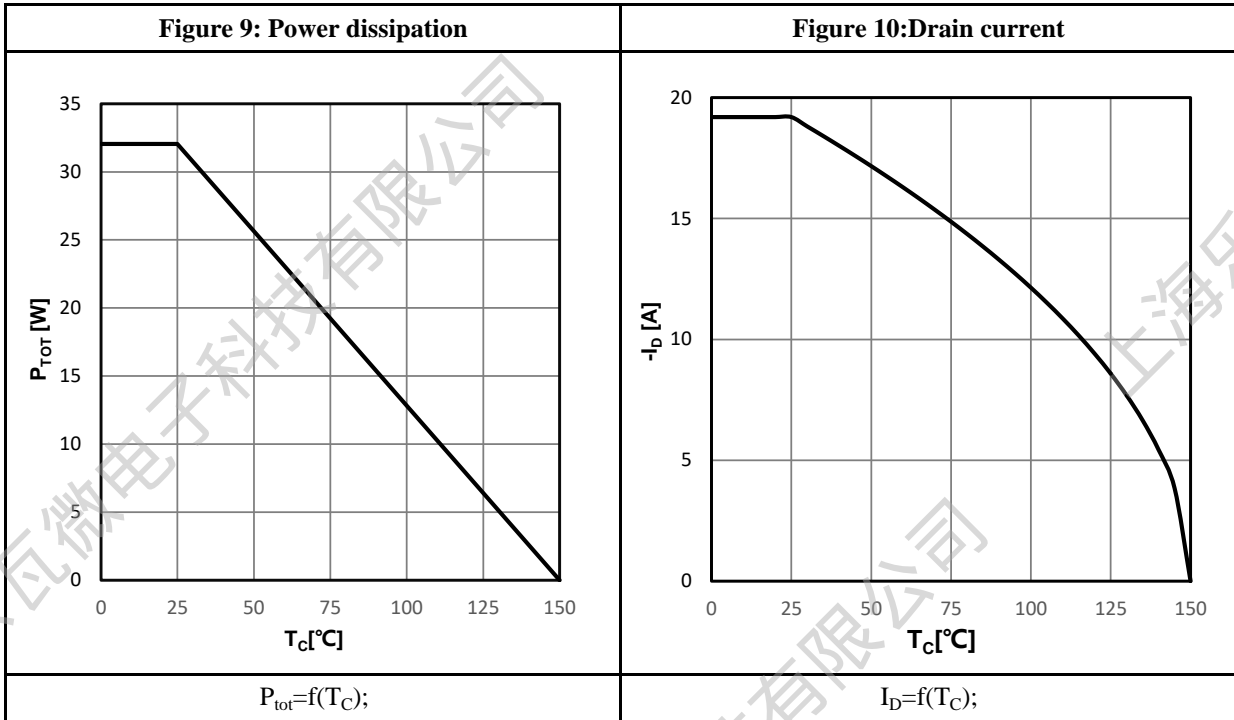
Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$I_S$	Diode Forward Current	$T_C = 25\text{ }^\circ\text{C}$	--	--	-19	A
$I_{SM}$	Diode Pulse Current		--	--	-76	A
$V_{SD}$	Diode Forward Voltage	$I_S = -10A, V_{GS} = 0V$	--	--	-1.2	V
$t_{rr}$	Reverse Recovery time	$I_S = -10A, V_{DD} = -30V,$	--	18	--	ns
$Q_{rr}$	Reverse Recovery Charge	$dI/dt = 100A/us$	--	27	--	nC

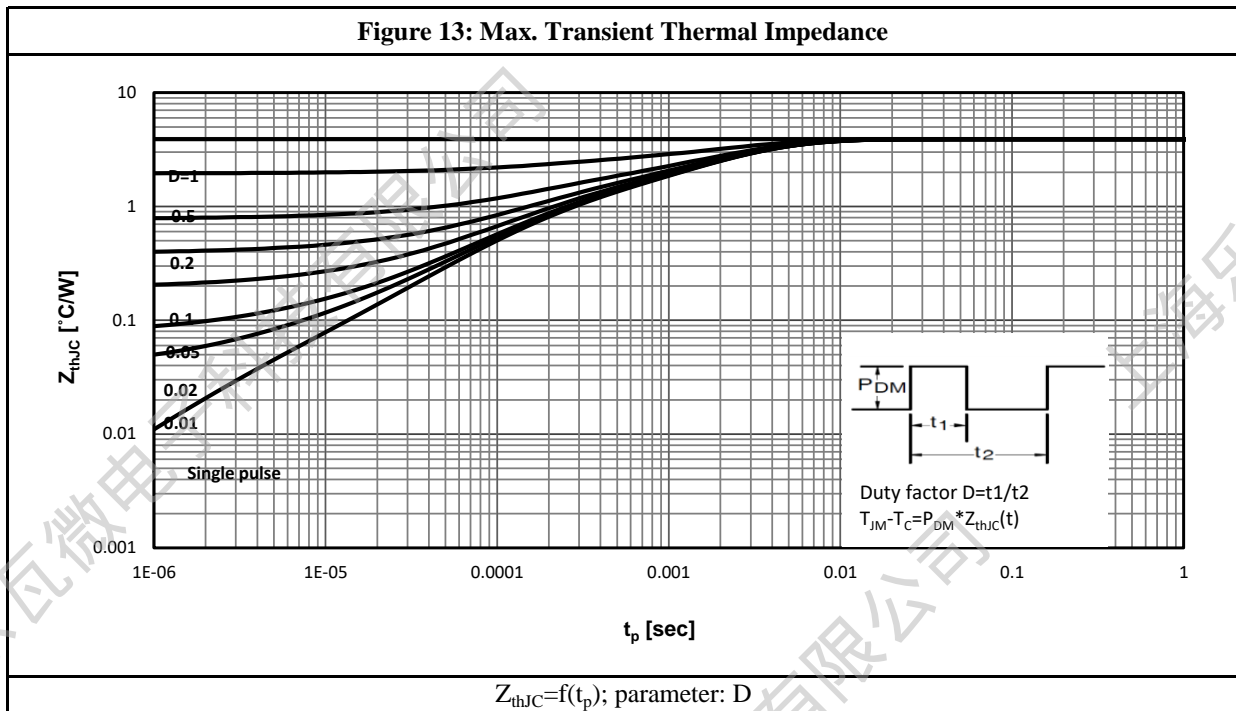
a1: Repetitive rating; pulse width limited by maximum junction temperature

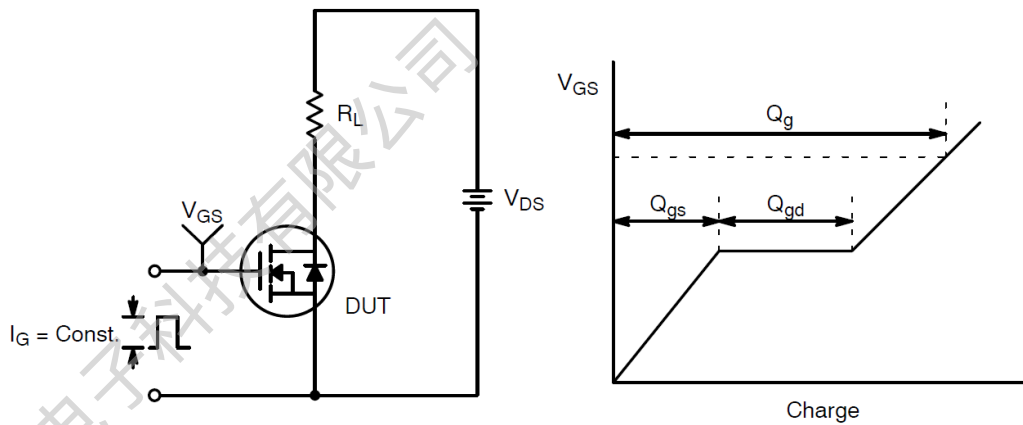
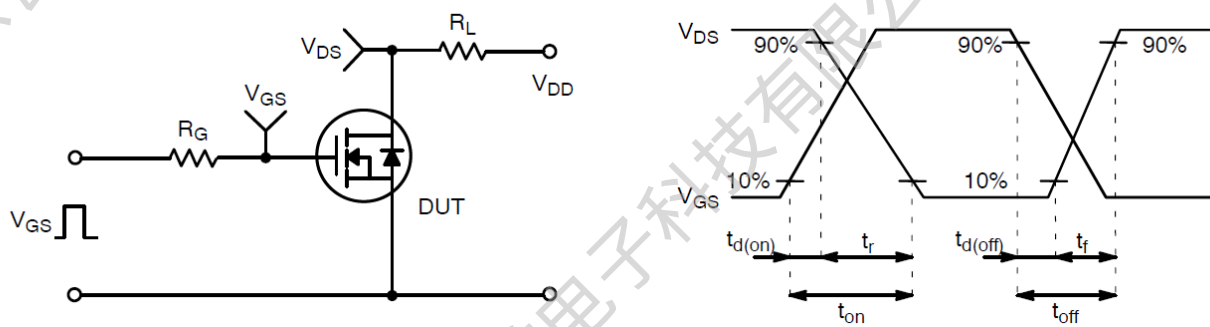
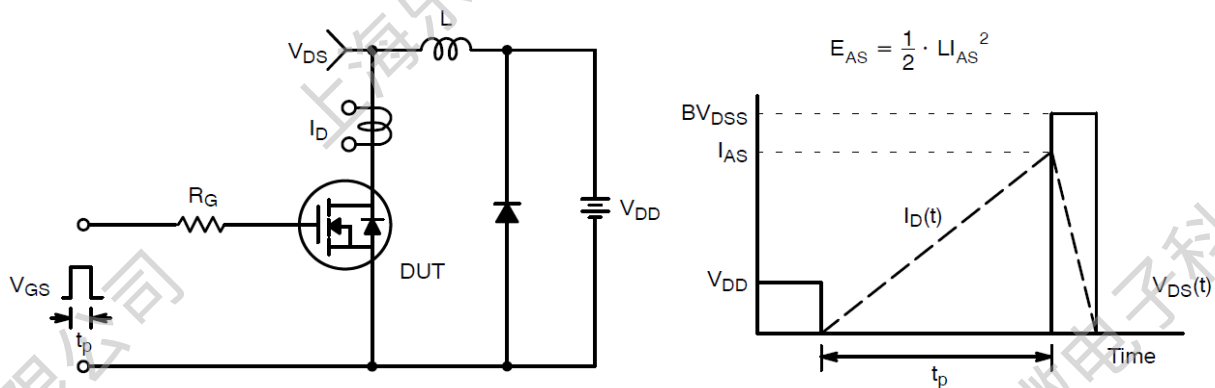
a2:  $V_{DD} = -30V, L = 1.0mH, R_G = 25\Omega$ , Starting  $T_j = 25\text{ }^\circ\text{C}$

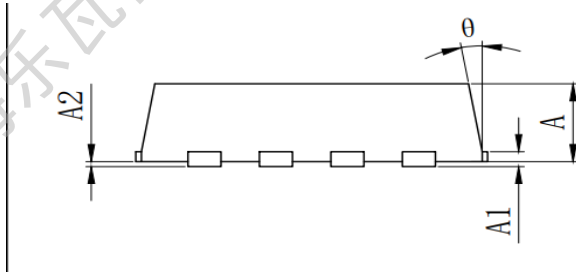
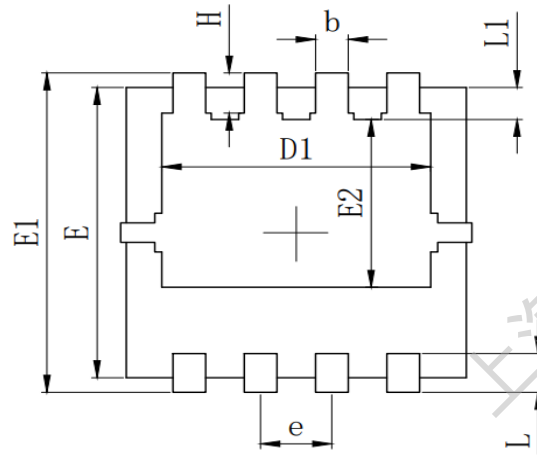
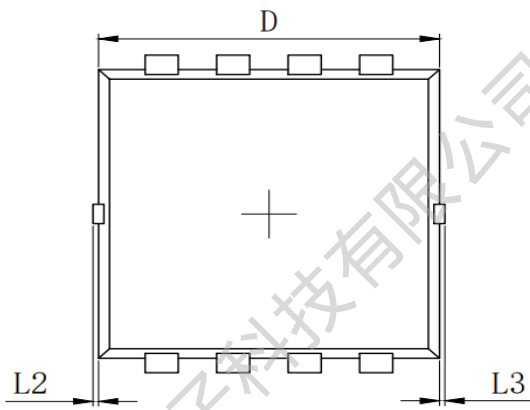
**Characteristics Curve:**








**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:**


Symbol	MILLIMETER		
	Min	Nom	Max
A	0.700	0.800	0.900
A1	0.152 REF		
A2	0~0.05		
D	3.000	3.100	3.200
D1	2.300	2.450	2.600
E	2.900	3.000	3.100
E1	3.150	3.300	3.450
E2	1.535	1.735	1.935
b	0.200	0.300	0.400
e	0.550	0.650	0.750
L	0.300	0.400	0.500
L1	0.180	0.330	0.480
L2	0~0.100		
L3	0~0.100		
H	0.315	0.415	0.515
$\theta$	8°	10°	12°



**Revision History:**

<b>Revison</b>	<b>Date</b>	<b>Descriptions</b>
Rev 1.0	Jan.2023	Initial Version

**Disclaimer:**

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