

General Description:

The LWN6045A23 uses trench 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



Package Marking and Ordering Information:

Marking	Part Number	Package	Packing	Qty.
N6045A/D.C.	LWN6045A23	SOT-223	Reel	2500 Pcs

Absolute Maximum Ratings:

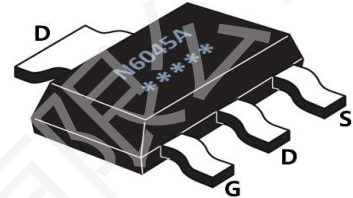
Symbol	Parameter		Value	Units
V_{DSS}	Drain-to-Source Voltage		60	V
I_D	Continuous Drain Current	$T_C=25^{\circ}\text{C}$	5.0	A
	Continuous Drain Current	$T_C=100^{\circ}\text{C}$	3.1	A
I_{DM}^{al}	Pulsed Drain Current		20	A
V_{GS}	Gate-to-Source Voltage		± 20	V
P_D	Power Dissipation		2.0	W
T_J, T_{STG}	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:

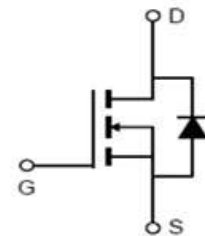
Symbol	Parameter	Value	Units
$R_{\theta JA}^{a3}$	Thermal Resistance, Junction-to-Ambient	62.5	$^{\circ}\text{C/W}$

V_{DSS}	60	V
I_D	5.0	A
P_D	2.0	W
$R_{DS(ON) \text{ TYPE}}$	33	$\text{m}\Omega$

Marking and Pin Assignment



Inner Equivalent Principium Chart



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	$V_{DS}=V_{GS}, I_D=250\mu A$	1.1	1.6	2.1	V
$R_{DS(ON)1}$	Drain-to-Source On-Resistance	$V_{GS}=10V, I_D=5.0A$	--	33	45	$m\Omega$
$R_{DS(ON)2}$	Drain-to-Source On-Resistance	$V_{GS}=4.5V, I_D=3.0A$	--	38	55	$m\Omega$

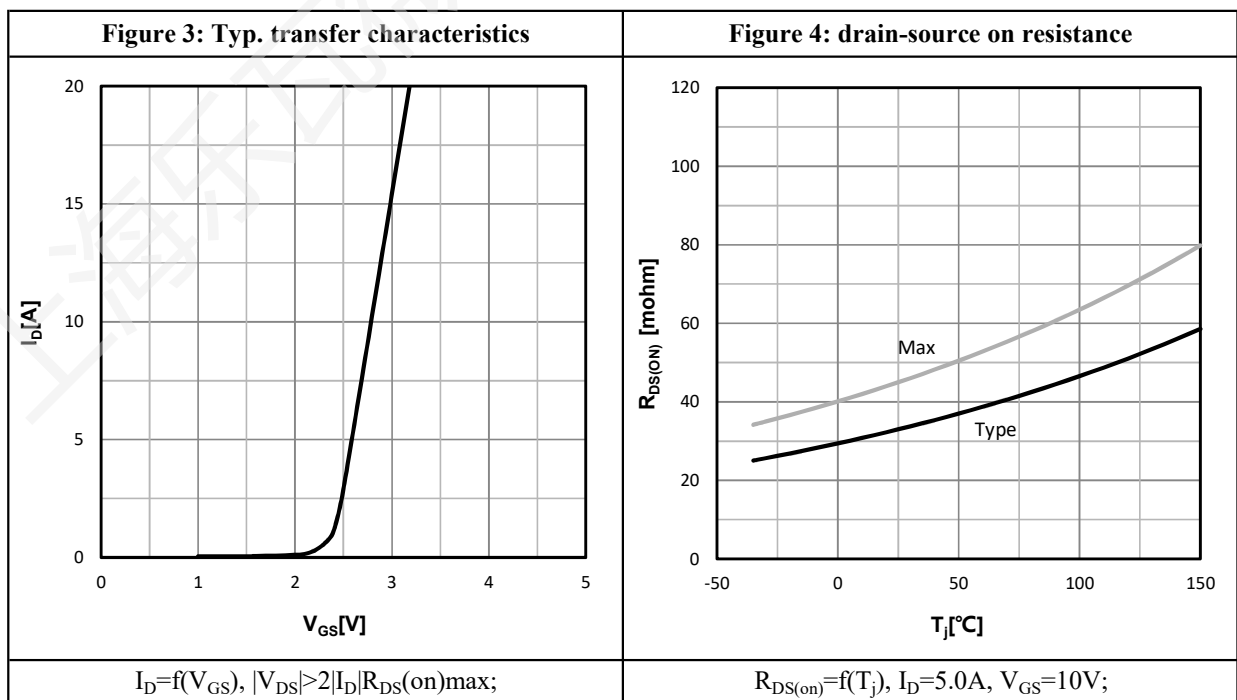
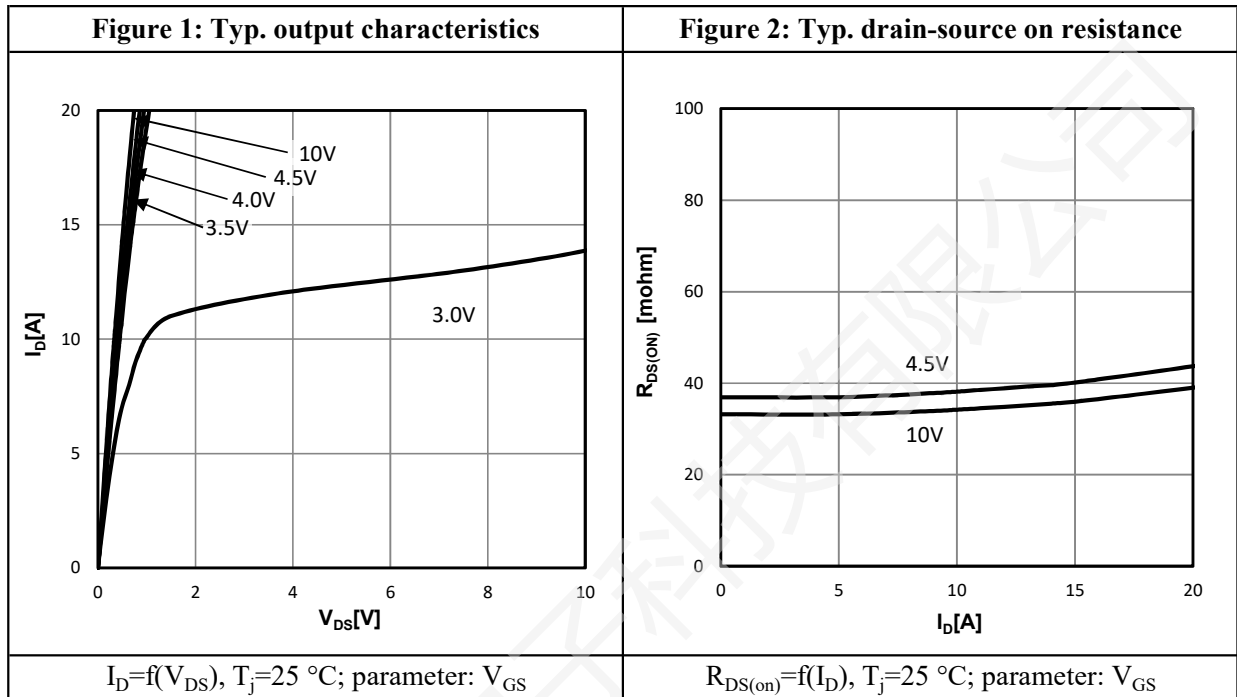
Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{GS} = 0V$	--	971	--	pF
C_{oss}	Output Capacitance	$V_{DS} = 30V$	--	40	--	
C_{rss}	Reverse Transfer Capacitance	$f = 1.0MHz$	--	37	--	
R_G	Gate resistance	$V_{GS}=0V, V_{DS}=0V, f=1.0MHz$	--	1.4	--	Ω

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D = 5.0A$	--	8.0	--	ns
t_r	Rise Time	$V_{DS} = 30V$	--	3.6	--	
$t_{d(OFF)}$	Turn-Off Delay Time	$V_{GS} = 10V$	--	19.2	--	
t_f	Fall Time	$R_G = 3.0\Omega$	--	3.2	--	
Q_g	Total Gate Charge	$V_{GS} = 10V$	--	23	--	nC
Q_{gs}	Gate Source Charge	$V_{DS} = 30V$	--	2.7	--	
Q_{gd}	Gate Drain Charge	$I_D = 5.0A$	--	5.0	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
I_S	Diode Forward Current	$T_C = 25\text{ }^{\circ}\text{C}$	--	--	5.0	A
V_{SD}	Diode Forward Voltage	$I_S = 5.0A, V_{GS} = 0V$	--	--	1.2	V

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

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

Characteristics Curve:


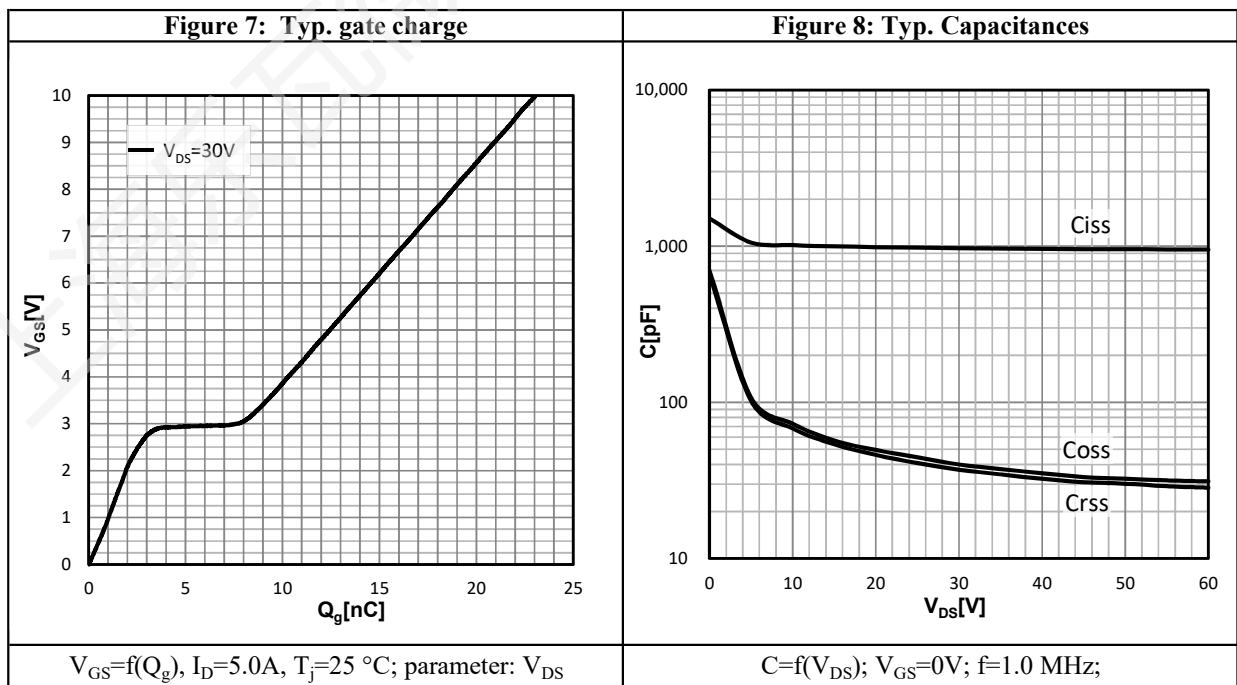
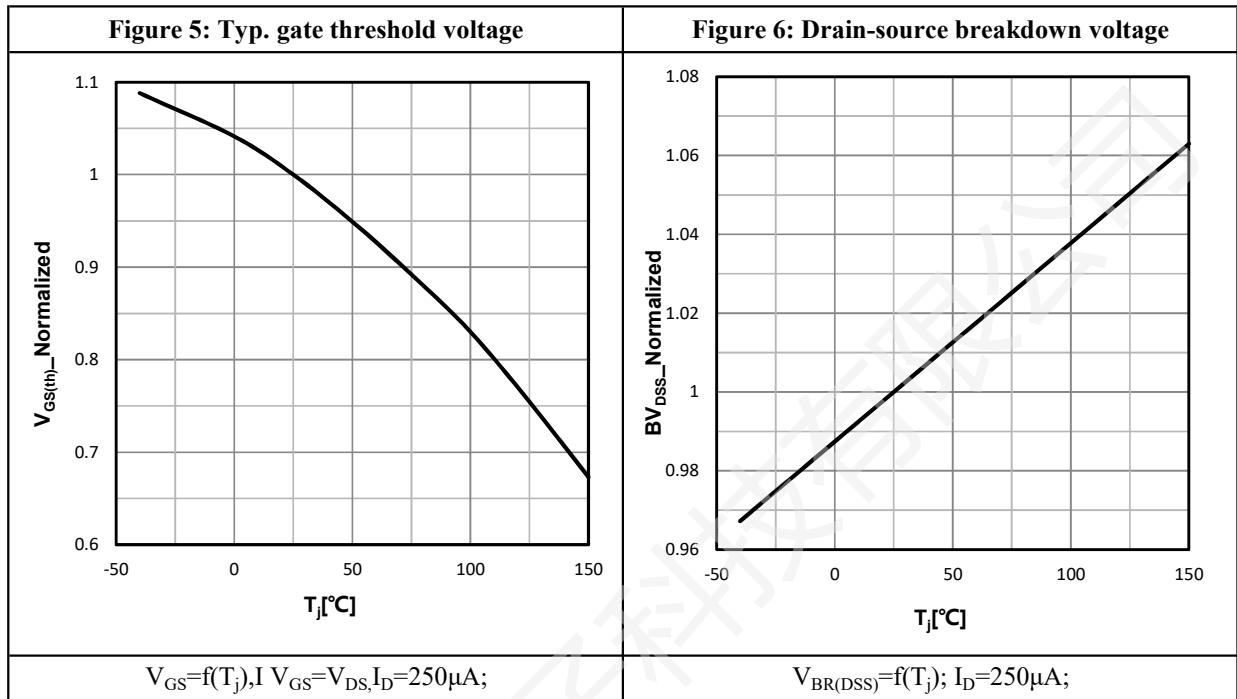
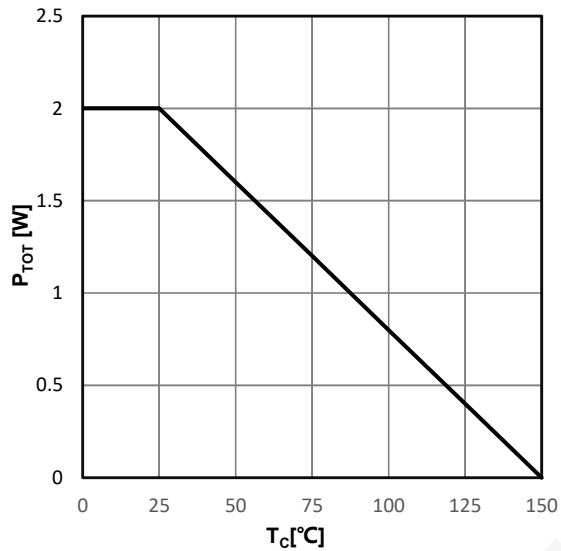
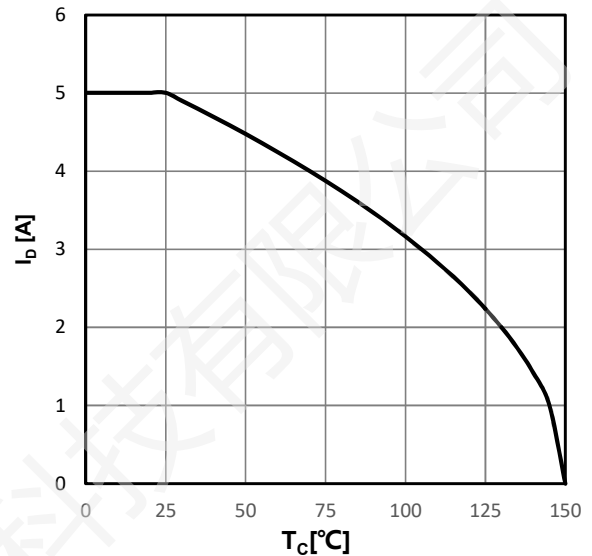
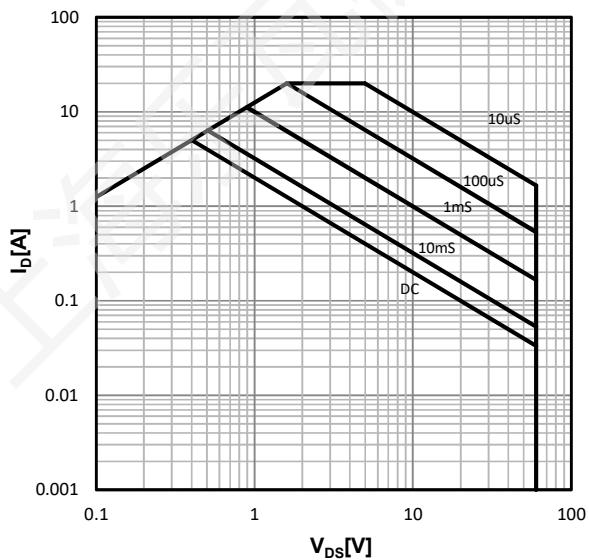


Figure 9: Power dissipation


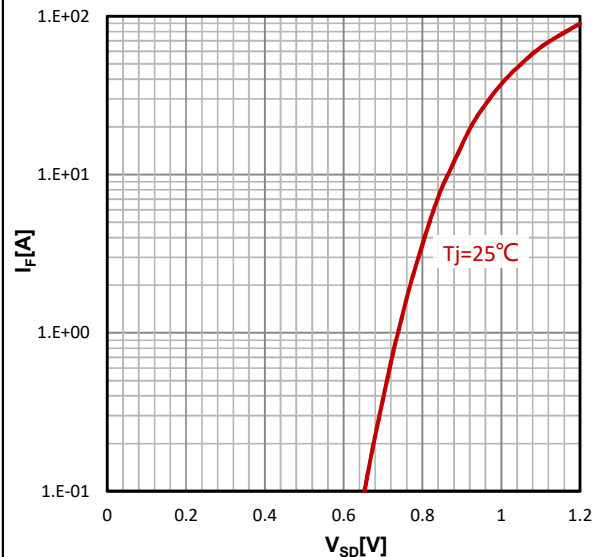
$$P_{tot}=f(T_C);$$

Figure 10: Drain current


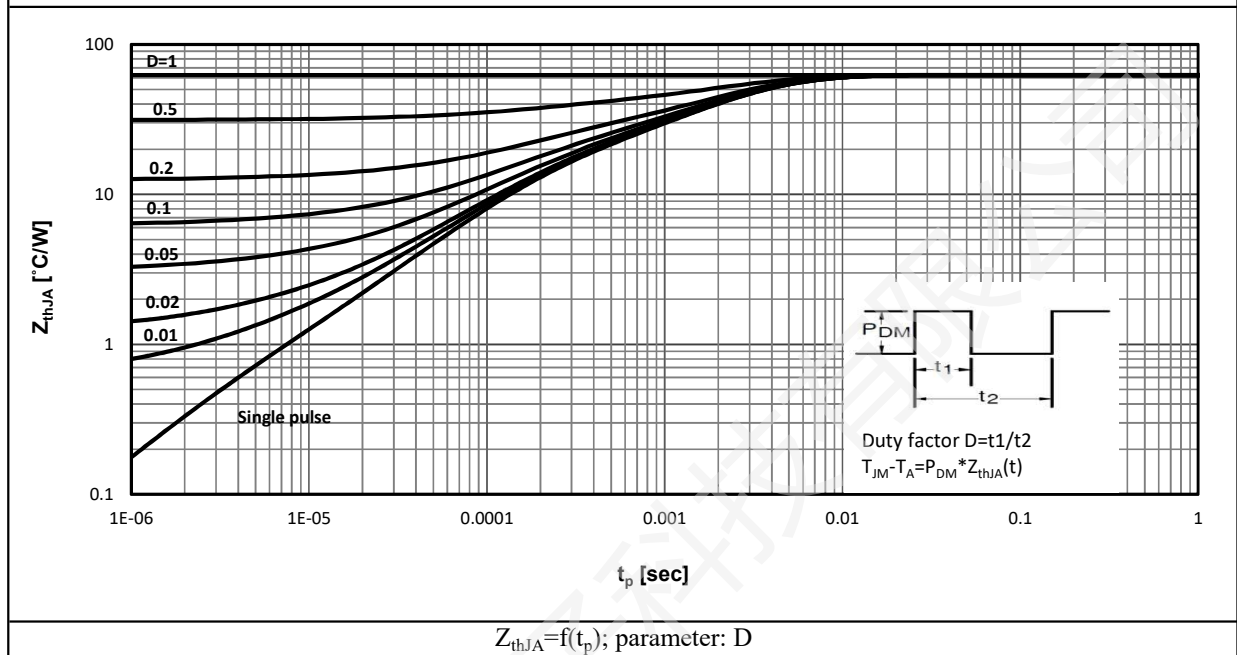
$$I_D=f(T_C);$$

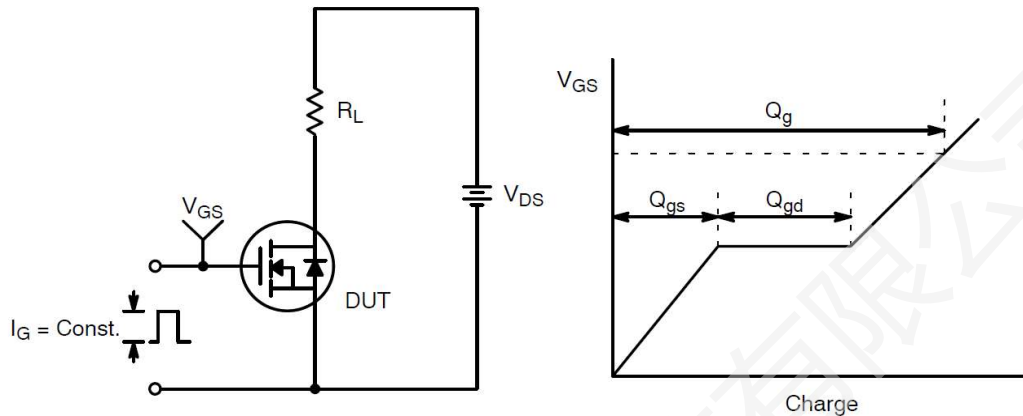
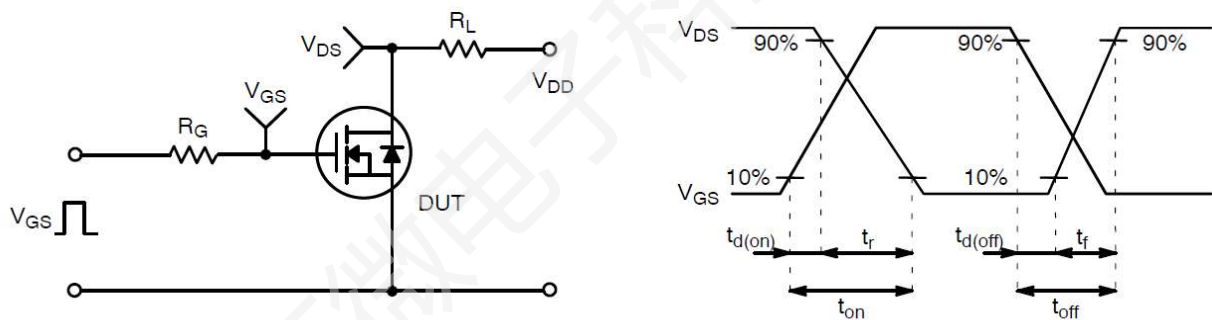
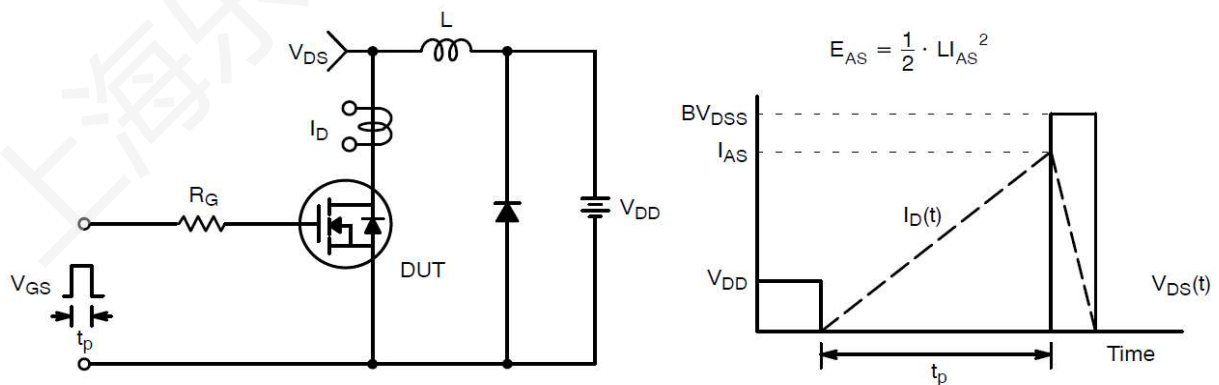
Figure 11: Safe operating area


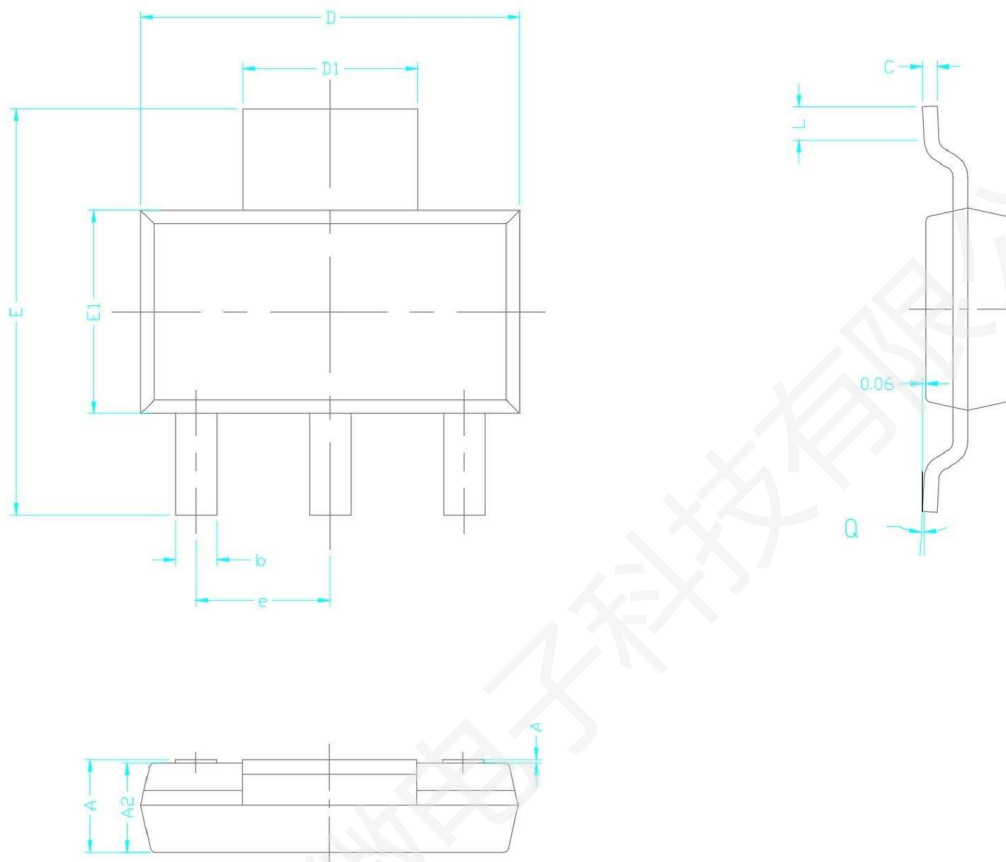
$$I_D=f(V_{DS}); T_C=25\text{ }^{\circ}\text{C}; D=0; \text{parameter: tp}$$

Figure 12: Typ. forward characteristics


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

Figure 13: Max. Transient Thermal Impedance


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	July.2025	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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