

General Description:

The LWN4004A4 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 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:

- DC-DC Converter
- Portable Equipment
- Power Management

100% DVDS Tested

100% Avalanche Tested



Package Marking and Ordering Information:

Marking	Part Number	Package	Packing	Qty.
N4004/LW A4/D.C.	LWN4004A4	TO-252	Reel	2500 Pcs

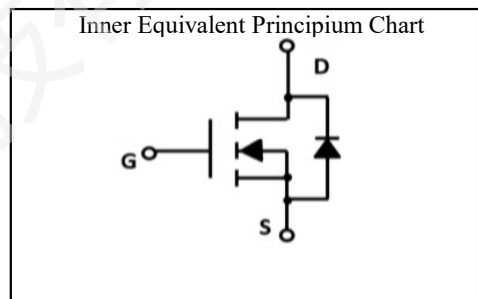
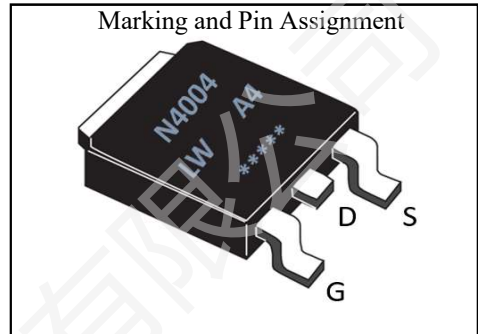
Absolute Maximum Ratings:

Symbol	Parameter		Value	Units
V_{DSS}	Drain-to-Source Voltage		40	V
I_D	Continuous Drain Current	$T_C=25^{\circ}\text{C}$	120	A
	Continuous Drain Current	$T_C=100^{\circ}\text{C}$	76	A
I_{DM}^{a1}	Pulsed Drain Current		480	A
V_{GS}	Gate-to-Source Voltage		± 20	V
P_D	Power Dissipation		96	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	1.3	$^{\circ}\text{C}/\text{W}$
$R_{\theta JA}^{a3}$	Thermal Resistance, Junction-to-Ambient	60	$^{\circ}\text{C}/\text{W}$

V_{DSS}	40	V
I_D	120	A
P_D	96	W
$R_{DS(ON) \text{ TYPE}}$	2.9	$\text{m}\Omega$



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

Static Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
V_{DSS}	Drain to Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	40	--	--	V
I_{DSS}	Drain to Source Leakage Current	$V_{DS}=40V, V_{GS}=0V$	--	--	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	1.75	2.2	V
$R_{DS(ON)1}$	Drain-to-Source On-Resistance	$V_{GS}=10V, I_D=20A$	--	2.9	4.0	$m\Omega$
$R_{DS(ON)2}$	Drain-to-Source On-Resistance	$V_{GS}=4.5V, I_D=15A$	--	3.7	7.0	$m\Omega$

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{GS} = 0V$	--	4603	--	pF
C_{oss}	Output Capacitance	$V_{DS} = 20V$	--	400	--	
C_{rss}	Reverse Transfer Capacitance	$f = 1.0MHz$	--	388	--	
R_G	Gate resistance	$V_{GS}=0V, V_{DS}=0V, f=1.0MHz$	--	2.0	--	Ω

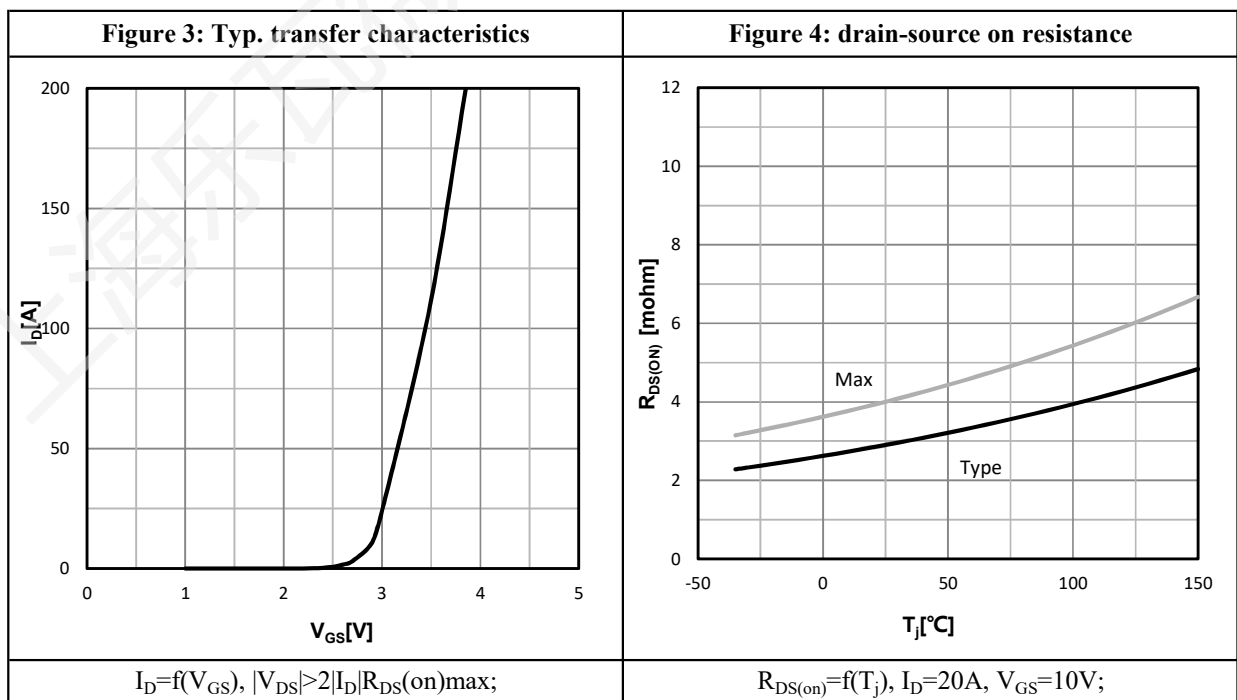
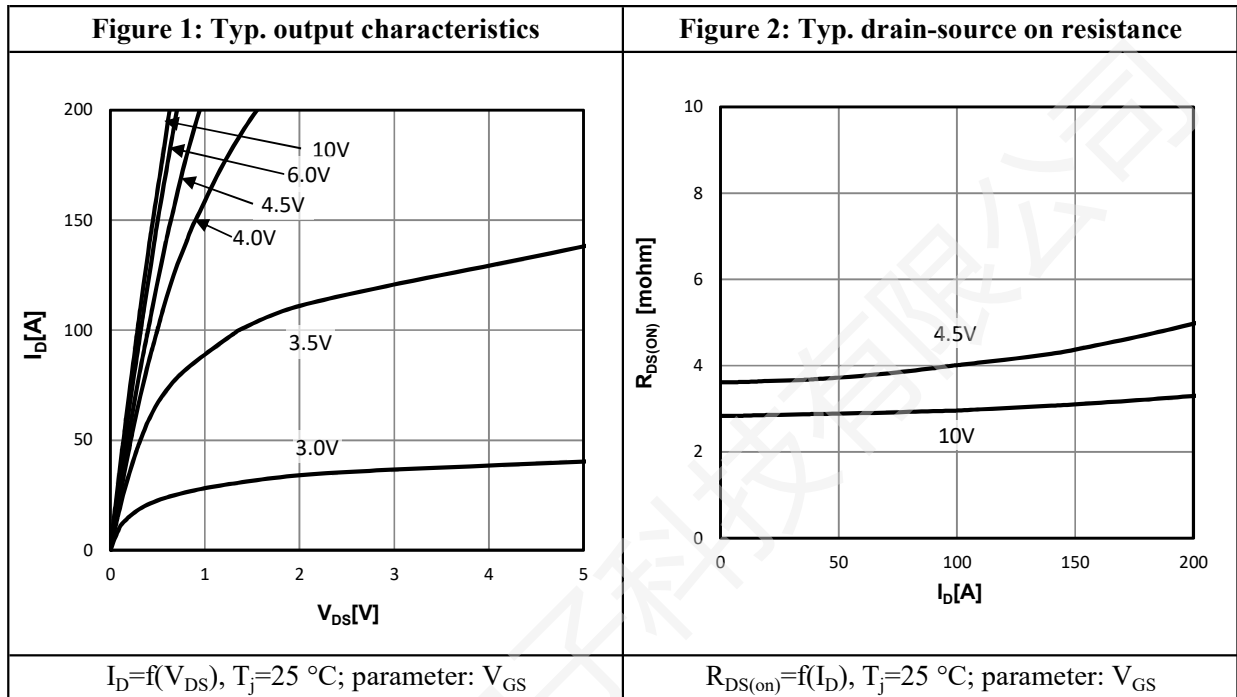
Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D = 20A$	--	25	--	ns
t_r	Rise Time	$V_{DS} = 20V$	--	35	--	
$t_{d(OFF)}$	Turn-Off Delay Time	$V_{GS} = 10V$	--	120	--	
t_f	Fall Time	$R_G = 10\Omega$	--	30	--	
Q_g	Total Gate Charge	$V_{GS} = 10V$	--	108	--	nC
Q_{gs}	Gate Source Charge	$V_{DS} = 20V$	--	13	--	
Q_{gd}	Gate Drain Charge	$I_D = 20A$	--	24	--	

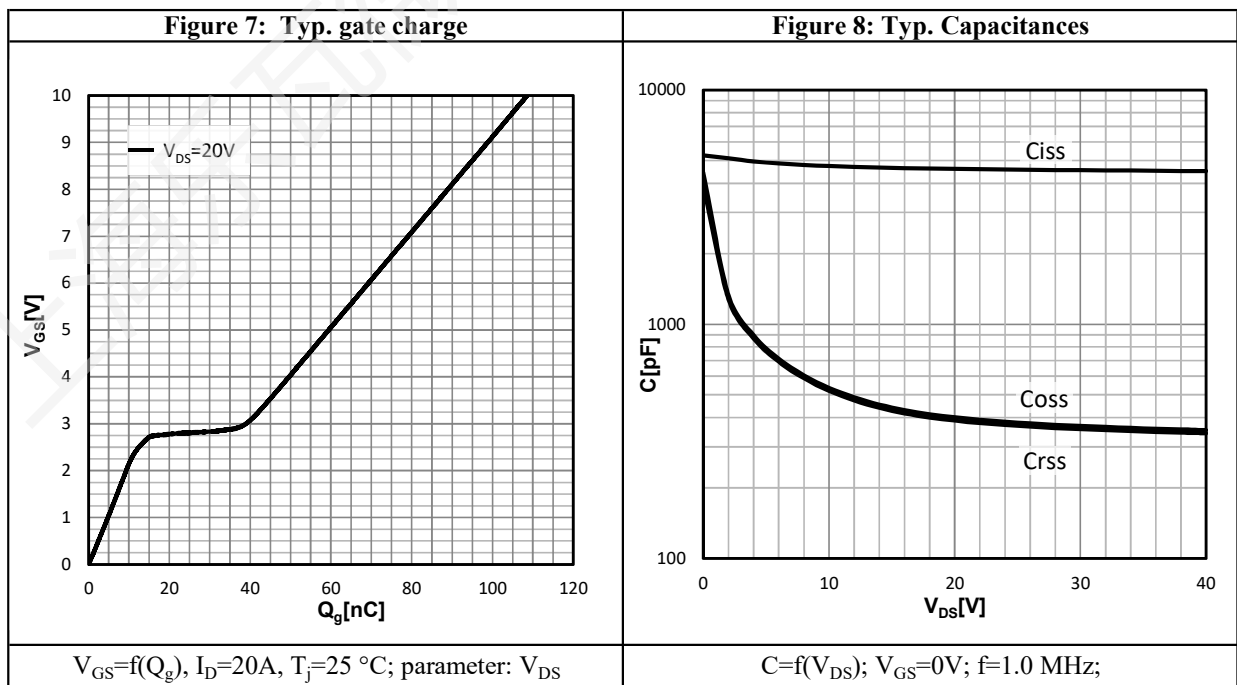
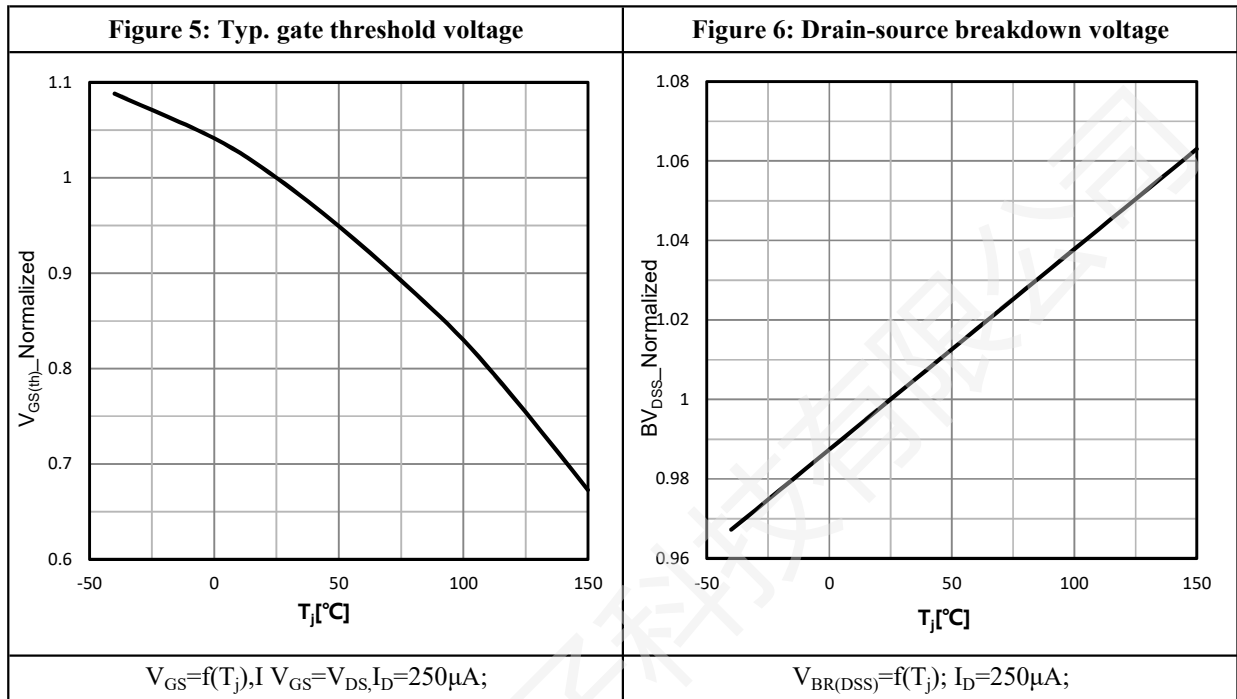
Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
I_S	Diode Forward Current	$T_C = 25\text{ }^{\circ}\text{C}$	--	--	120	A
V_{SD}	Diode Forward Voltage	$I_S=20A, V_{GS}=0V$	--	--	1.2	V

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

a2: $V_{DD}=20V, L=0.1mH, R_G=25\Omega$, Starting $T_J=25\text{ }^{\circ}\text{C}$

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

Characteristics Curve:




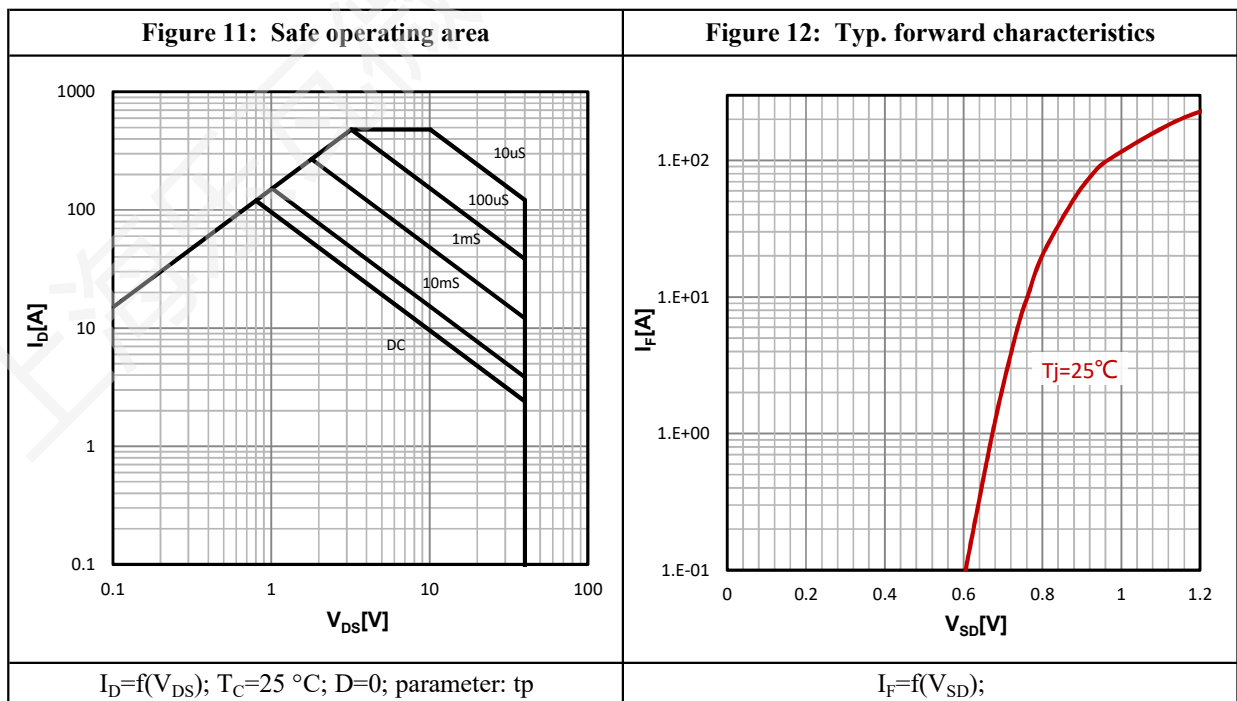
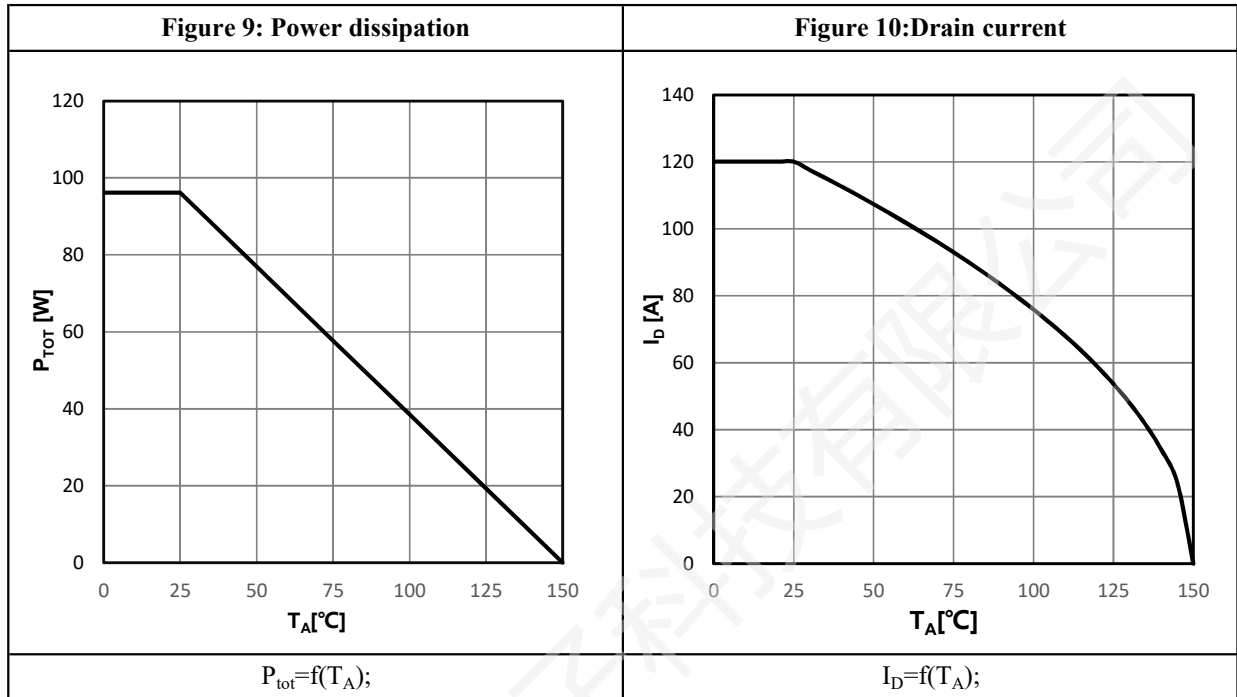
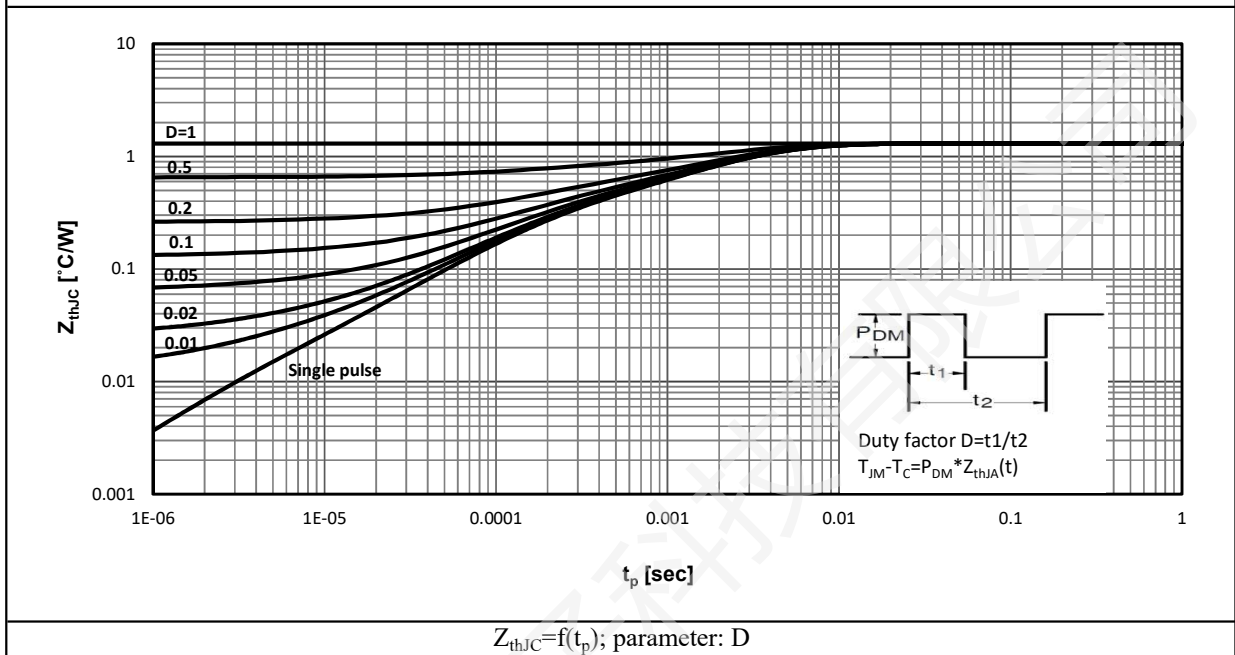
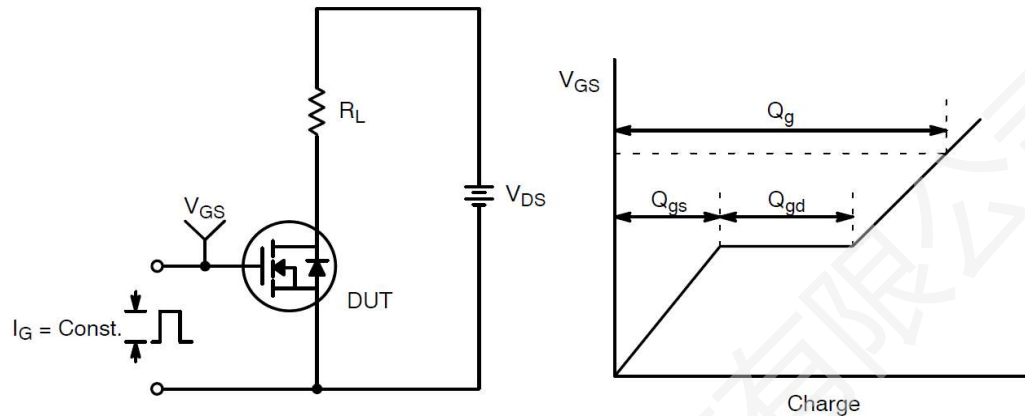
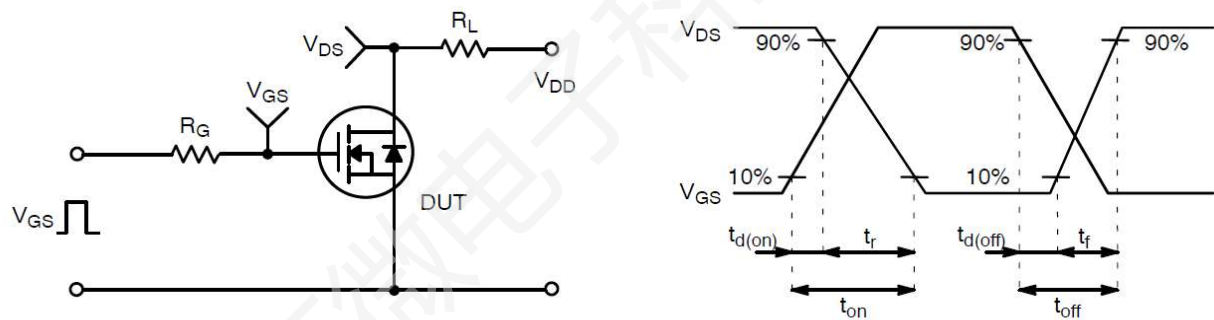
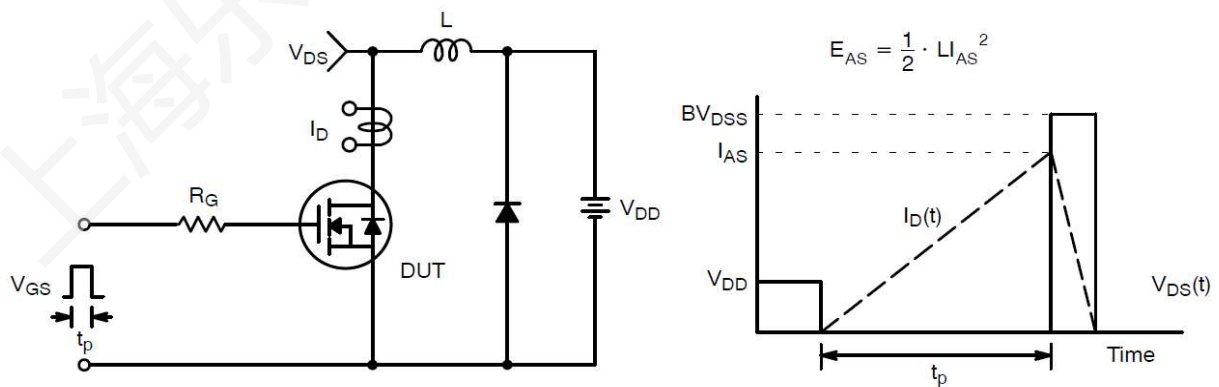
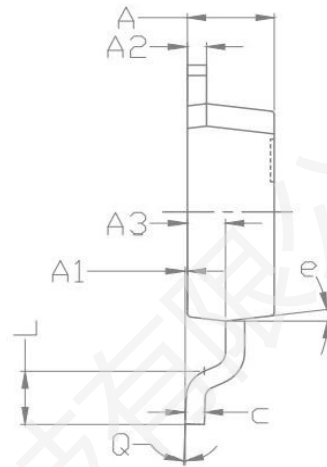
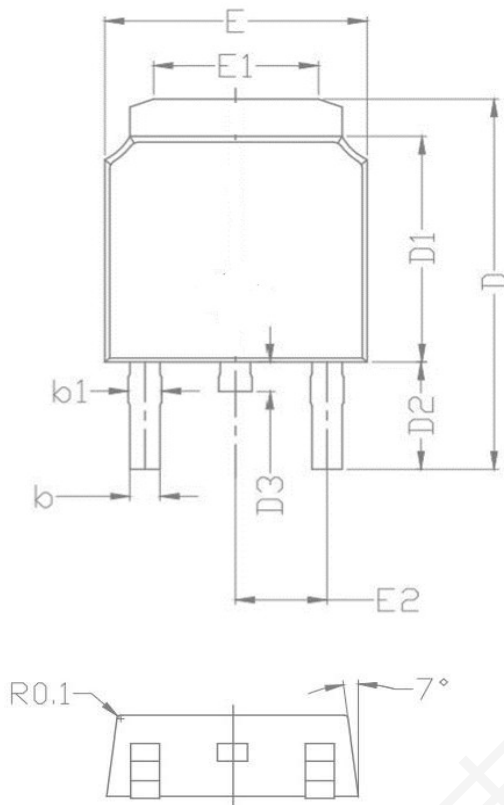


Figure 13: Max. Transient Thermal Impedance


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			
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°

Revision History:

Revision	Date	Descriptions
Rev 1.1	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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