

General Description:

The LW7002BM 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 SOT23, which accords with the ROHS standard and Halogen Free standard.

Features:

- Fast Switching
- Low Gate Charge and $R_{DS(ON)}$
- Low Reverse transfer capacitances
- ESD Rating: HBM $\geq 3000V$

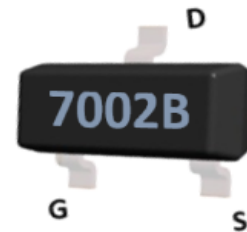
Applications:

- DC-DC Converter
- Portable Equipment
- Power Management

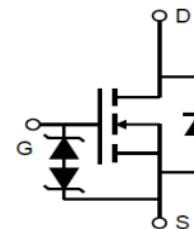


V_{DSS}	60	V
I_D	0.3	A
P_D	0.35	W
$R_{DS(ON)}$ TYPE	2.0	Ω

Marking and Pin Assignment



Inner Equivalent Principium Chart



Package Marking and Ordering Information:

Marking	Part Number	Package	Packing	Qty.
7002B	LW7002BM	SOT23	Reel	3000 Pcs

Absolute Maximum Ratings:

Symbol	Parameter		Value	Units
V_{DSS}	Drain-to-Source Voltage		60	V
I_D	Continuous Drain Current	$T_A=25^\circ C$	0.3	A
	Continuous Drain Current	$T_A=100^\circ C$	0.19	A
I_{DM}^{a1}	Pulsed Drain Current		1.2	A
V_{GS}	Gate-to-Source Voltage		± 20	V
P_D	Power Dissipation		0.35	W
T_J, T_{STG}	Operating Junction and Storage Temperature Range		150, -55 to 150	$^\circ C$
T_L	Maximum Temperature for Soldering		260	$^\circ C$

Thermal Characteristics:

Symbol	Parameter	Value	Units
$R_{\theta JA}^{a2}$	Thermal Resistance, Junction-to-Ambient	350	$^\circ C/W$

Electrical Characteristic ($T_J = 25\text{ }^{\circ}\text{C}$, 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	$V_{GS}=+20V, V_{DS}=0V$	--	--	2.5	μA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	$V_{GS}=-20V, V_{DS}=0V$	--	--	-2.5	μA
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.5	2.5	V
$R_{DS(ON)1}$	Drain-to-Source On-Resistance	$V_{GS}=10V, I_D=0.3A$	--	2.0	2.5	Ω
$R_{DS(ON)2}$	Drain-to-Source On-Resistance	$V_{GS}=4.5V, I_D=0.2A$	--	2.3	3.0	Ω

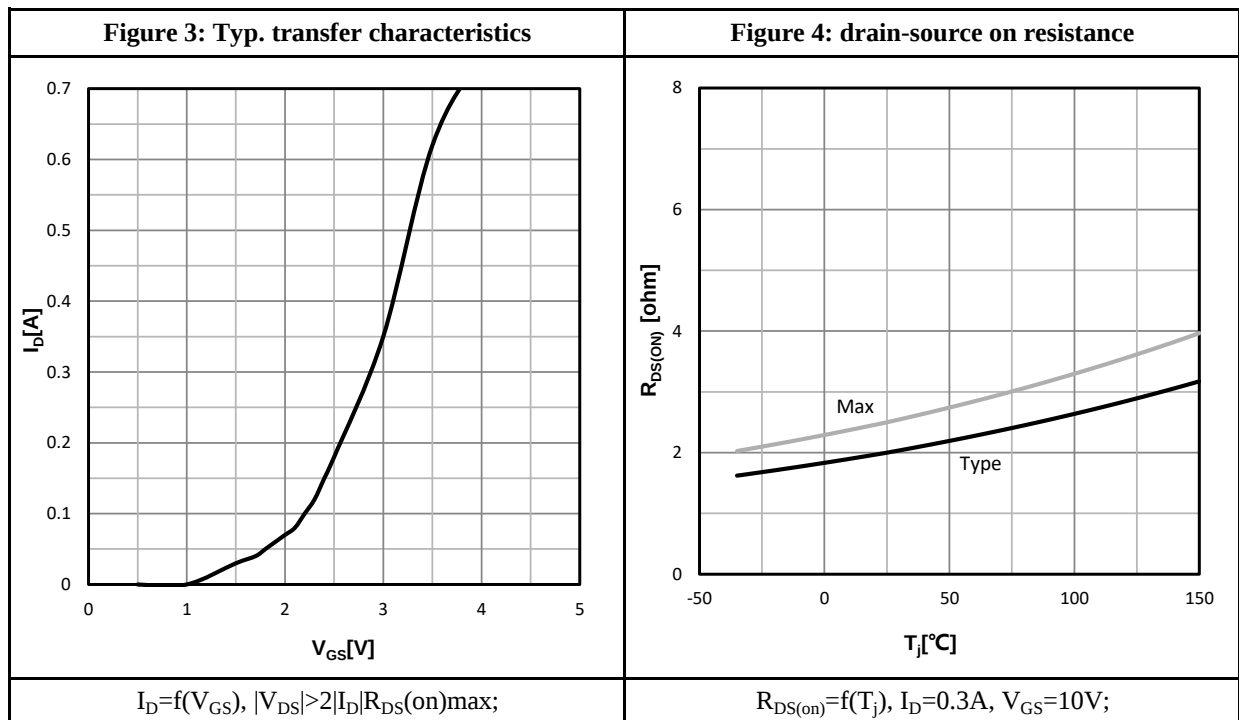
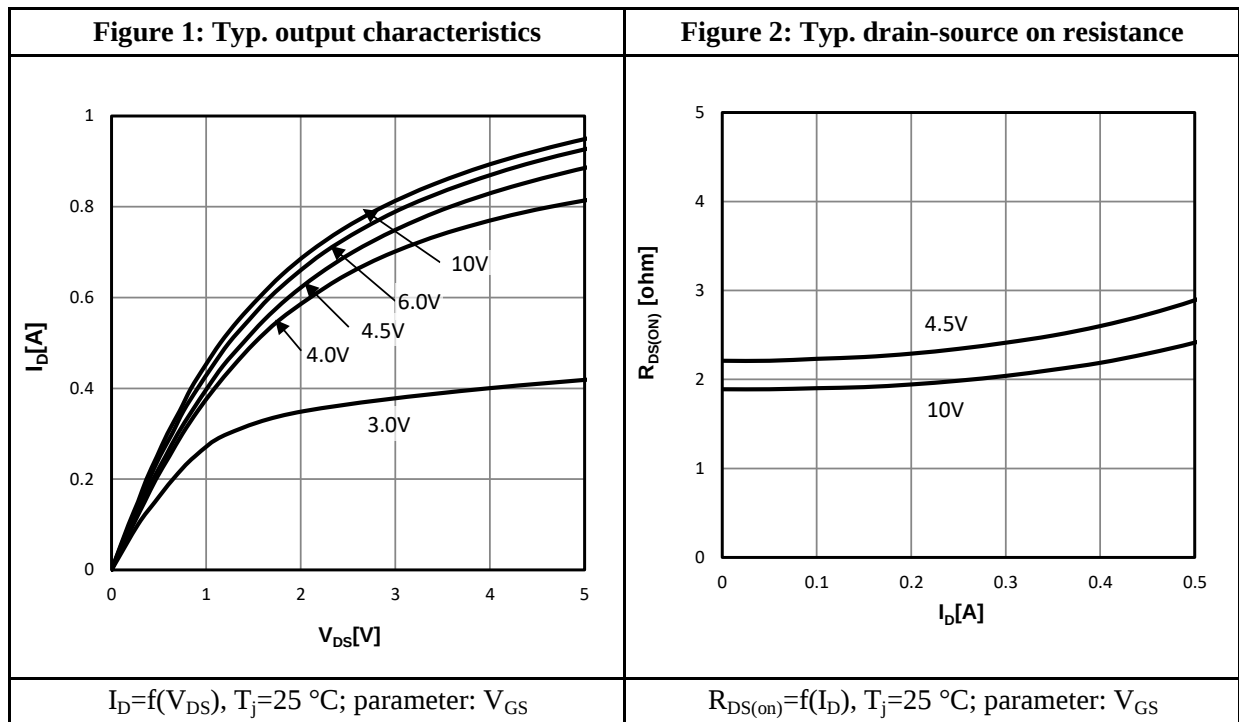
Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{GS}=0V$	--	13.6	--	pF
C_{oss}	Output Capacitance	$V_{DS}=30V$	--	6.4	--	
C_{rss}	Reverse Transfer Capacitance	$f=1.0MHz$	--	2.0	--	
R_G	Gate resistance	$V_{GS}=0V, V_{DS}=0V, f=1MHz$	--	42	--	Ω

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D=0.3A$	--	11	--	ns
t_r	Rise Time	$V_{DS}=30V$	--	52	--	
$t_{d(OFF)}$	Turn-Off Delay Time	$V_{GS}=10V$	--	18	--	
t_f	Fall Time	$R_G=10\Omega$	--	9	--	
Q_g	Total Gate Charge	$V_{GS}=10V$	--	1.74	--	nC
Q_{gs}	Gate to Source Charge	$V_{DS}=30V$	--	0.44	--	
Q_{gd}	Gate to Drain Charge	$I_D=0.3A$	--	0.17	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
I_S	Diode Forward Current	$T_A=25\text{ }^{\circ}\text{C}$	--	--	0.3	A
V_{SD}	Diode Forward Voltage	$I_S=0.3A, V_{GS}=0V$	--	--	1.2	V

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

a2: Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm² (one layer, 70 μm thick) copper area for drain connection.

Characteristics Curve:


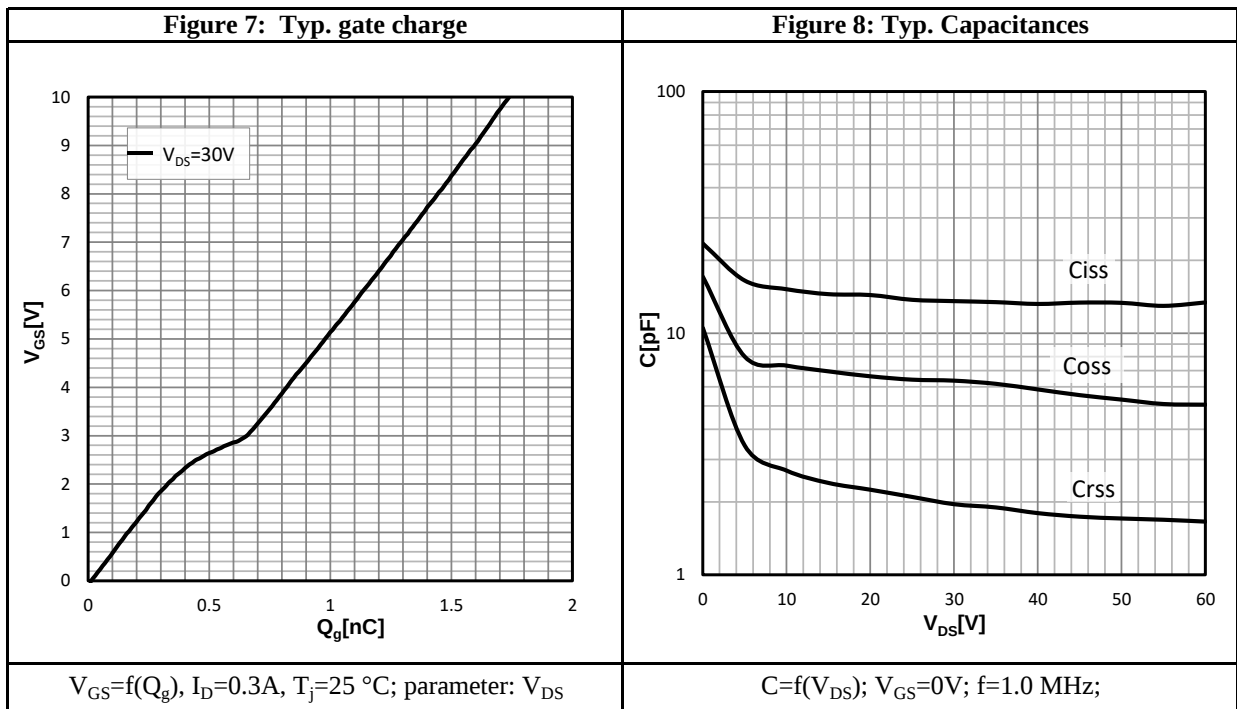
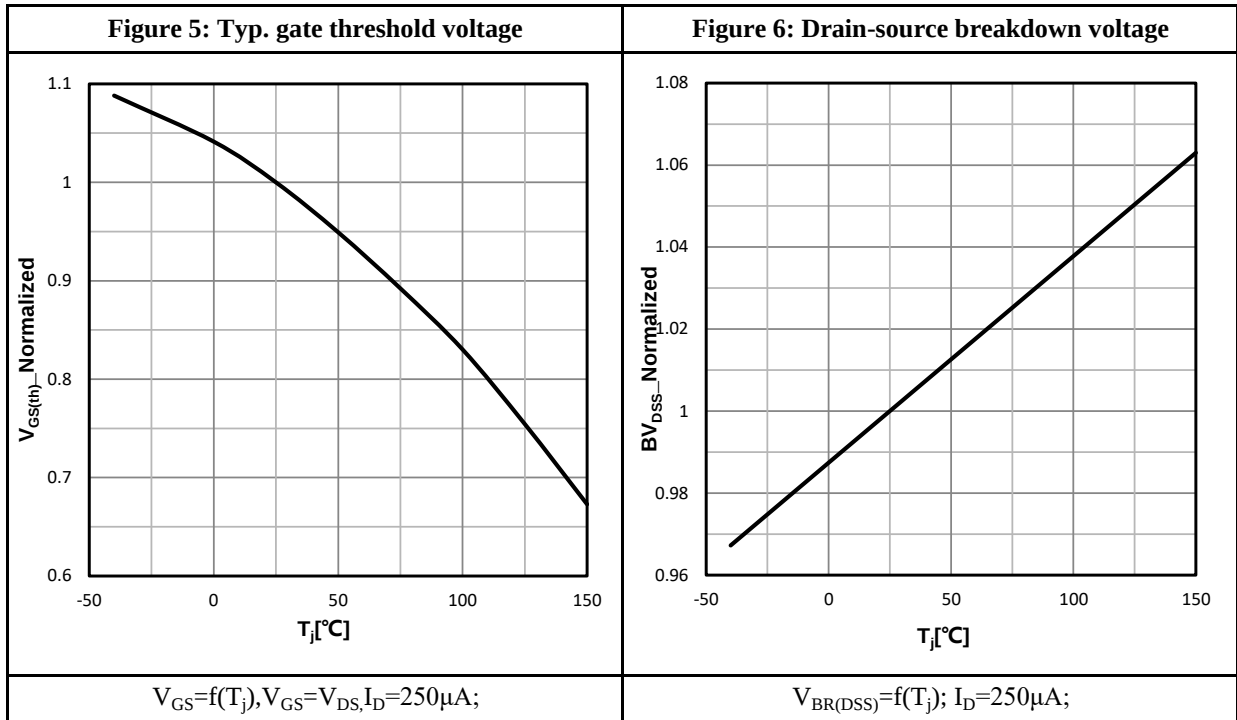
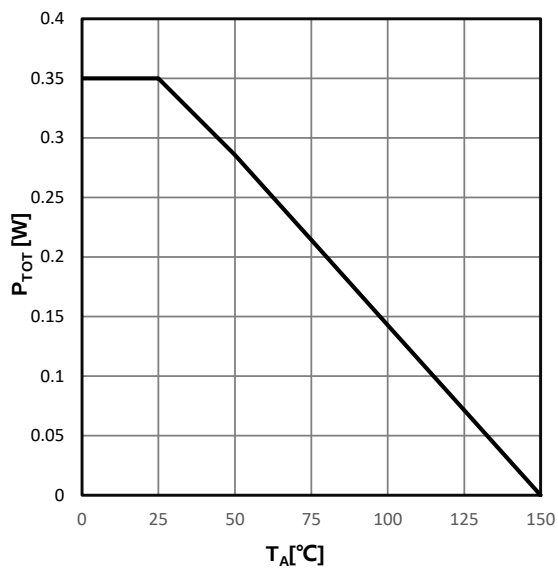
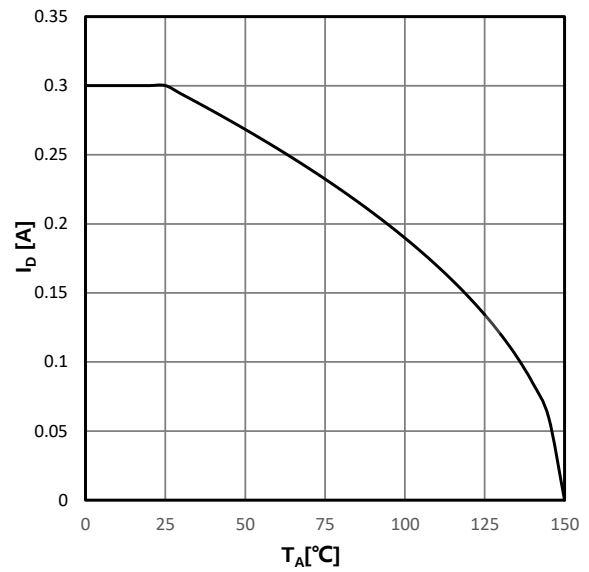
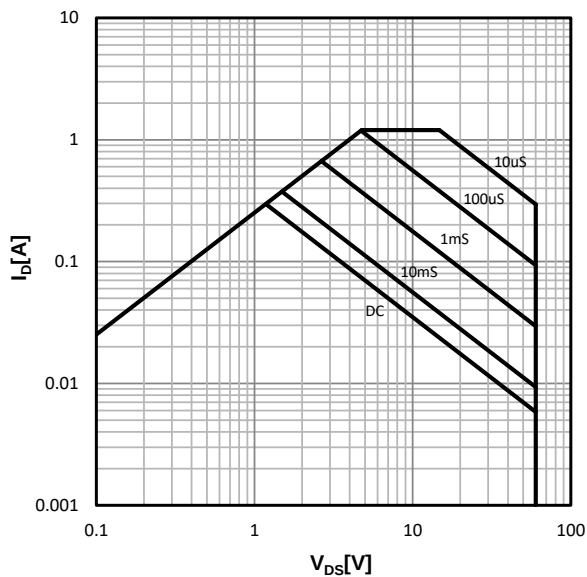


Figure 9: Power dissipation


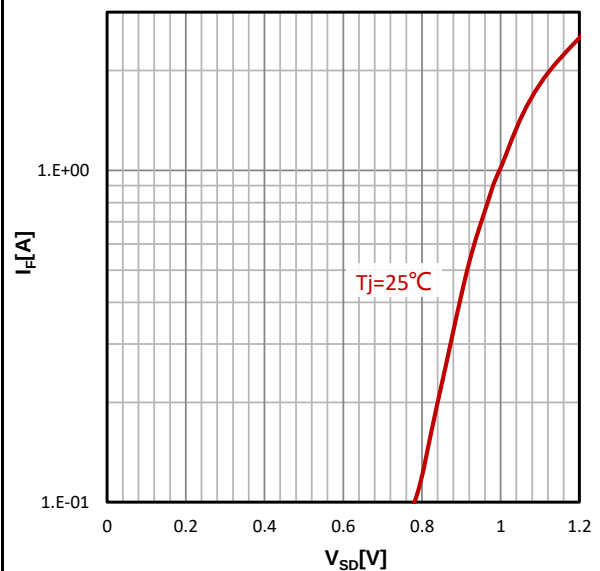
$$P_{tot}=f(T_A);$$

Figure 10: Drain current


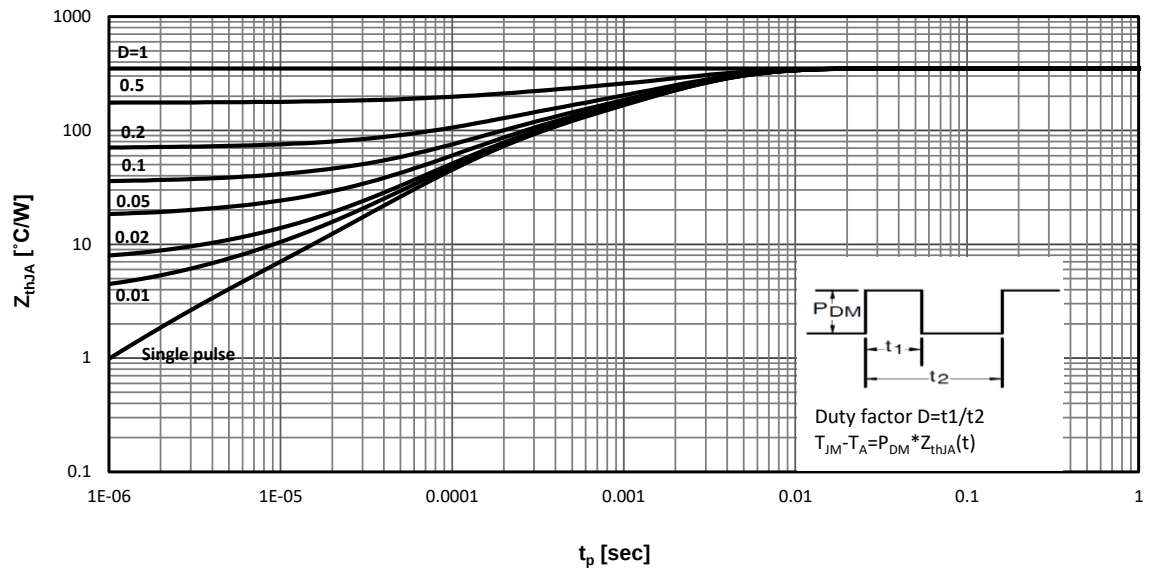
$$I_D=f(T_A);$$

Figure 11: Safe operating area


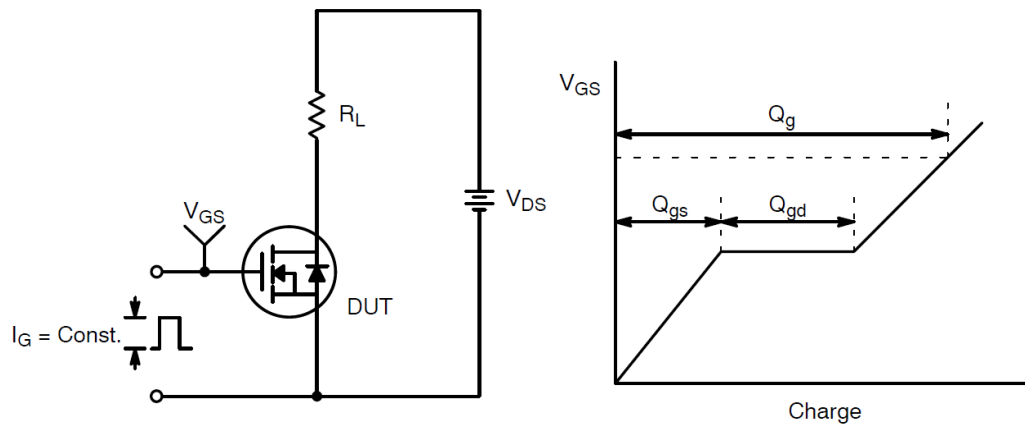
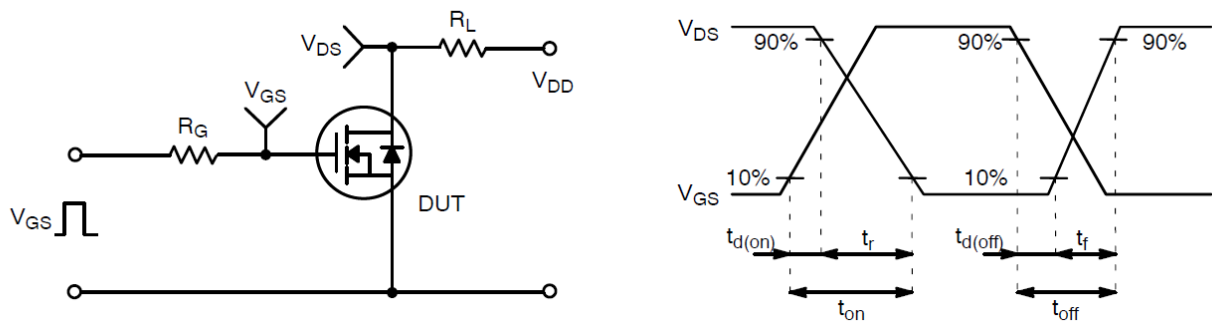
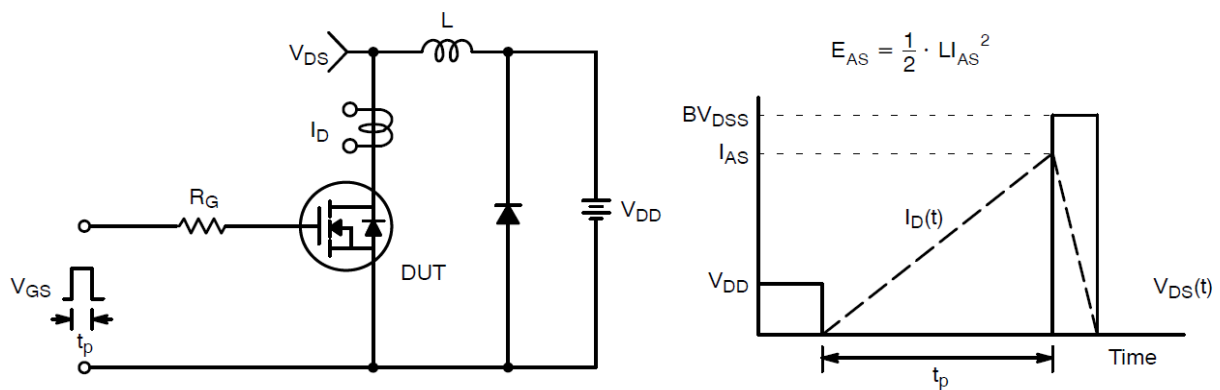
$$I_D=f(V_{DS}); T_A=25\text{ }^{\circ}\text{C}; D=0; \text{ parameter: tp}$$

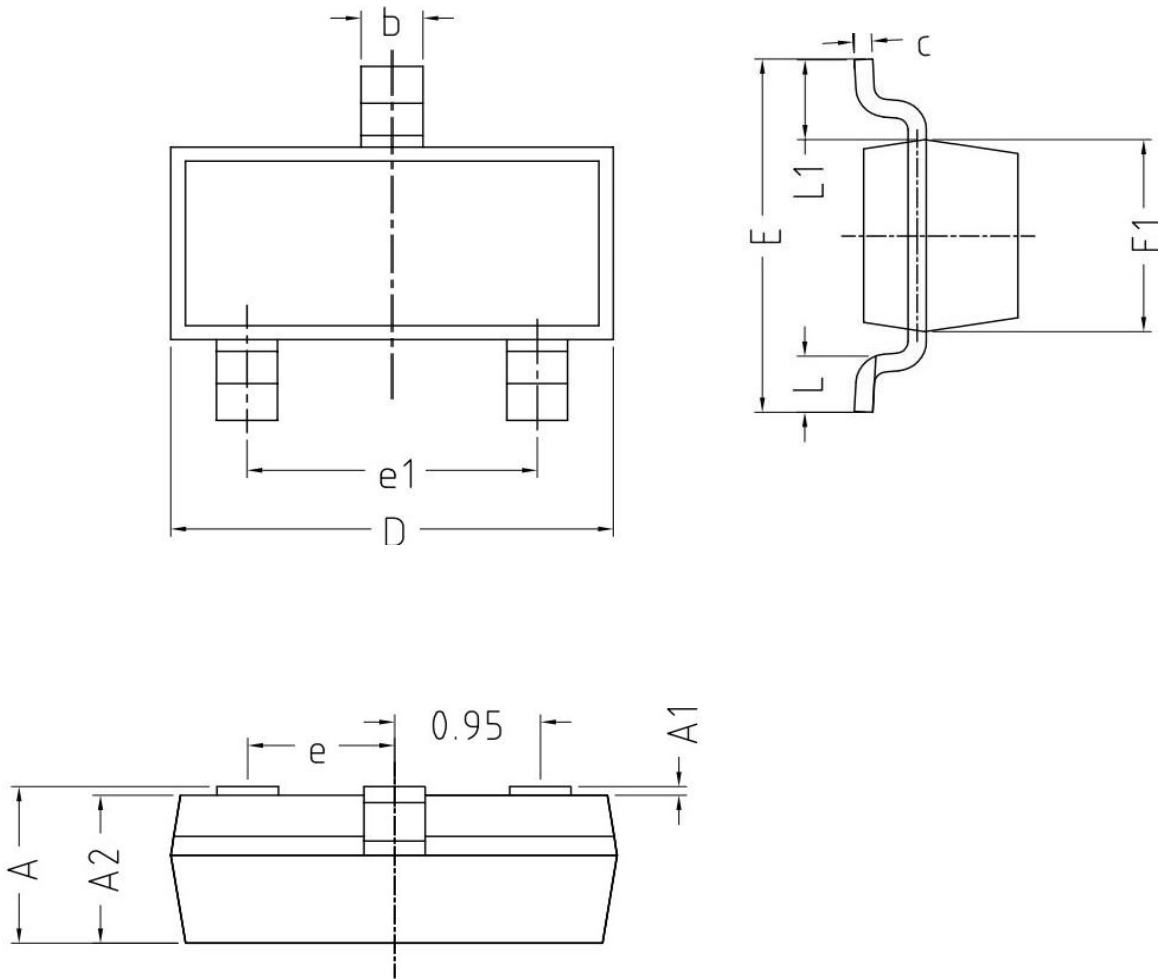
Figure 12: Typ. forward characteristics


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

Figure 13: Max. Transient Thermal Impedance


$$Z_{thJA} = f(t_p); \text{ parameter: } D$$

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 IN DIMENSION (MM)			
Symbol	Min.	Nom.	Max.
A	0.900	1.050	1.150
A1	0.000	0.050	0.100
A2	0.900	1.000	1.050
b	0.300	0.400	0.500
C	0.100	0.175	0.250
D	2.800	2.900	3.000
E	2.250	2.400	2.550
E1	1.200	1.300	1.400
e	0.950 TYP		
e1	1.800	1.900	2.000
L	0.290	0.395	0.500
L1	0.550REF		

Revision History:

Revison	Date	Descriptions
Rev 1.1	June.2024	“Typical Performance Characteristics” Update
Rev 1.0	July.2017	Initial Version

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Mailing Address: Unit 02&04&05, 10th Floor, Building 5, No.666 Shengxia Road, No.122 Yindong Road,
China (Shanghai) Pilot Free Trade Zone
Shanghai Lewa Micro-electronics Technology Co., Ltd