

SDM021NU02S

20V N-Channel MOSFETs

Rev 1.0

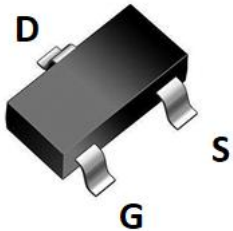
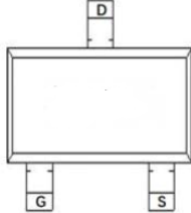
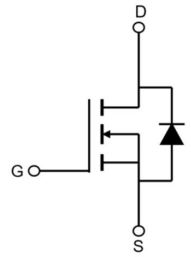
Feature

- ◇ Excellent $R_{DS(ON)}$
- ◇ Low Gate Charge
- ◇ High current Capability
- ◇ Green product RoHS compliant

Product Summary

V_{DS}	20	V
$V_{GS(th_Typ)}$	0.7	V
$R_{DS(ON)_Typ}$ (@ $V_{GS} = 4.5V$)	15	m Ω
I_D (at $V_{GS} = 4.5V$) ⁽¹⁾	6.5	A

Type	Package	Marking	Outline	Media	Quantity (pcs)
SDM021NU02S	SOT-23	021N02	Tape	7" Reel	3000

 <p>SOT-23 top view</p>	 <p>Pin Assignment</p>	 <p>Schematic Diagram</p>
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Absolute Maximum Ratings (Rating at $T_J=25^\circ C$ unless otherwise noted)

Parameter	Symbol	Maximum	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	± 12	V
Continuous Drain Current ⁽¹⁾	I_D	$T_A=25^\circ C$	6.5
		$T_A=100^\circ C$	4.1
Pulsed Drain Current ⁽²⁾	I_{DM}	26	A
Maximum Body-Diode Continuous Current	I_S	6.5	A
Avalanche Current ⁽³⁾	I_{AS}	13	A
Avalanche Energy ⁽³⁾	E_{AS}	17	mJ
Power Dissipation ⁽⁴⁾	P_D	$T_A=25^\circ C$	1.3
		$T_A=100^\circ C$	0.5
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ C$

Electrical Characteristics (Rating at $T_J=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	20	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=20\text{V}$, $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$	-	-	1 5	μA
I_{GSS}	Gate-Body Leakage Current	$V_{DS}=0\text{V}$, $V_{GS}=\pm 12\text{V}$	-	-	± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	0.5	0.7	1	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS}=4.5\text{V}$, $I_D=4\text{A}$	-	15	21	m Ω
		$V_{GS}=2.5\text{V}$, $I_D=3\text{A}$	-	18	30	
g_{FS}	Forward Transconductance	$V_{DS}=5\text{V}$, $I_D=4\text{A}$	-	10	-	S
V_{SD}	Diode Forward Voltage	$I_S=3\text{A}$, $V_{GS}=0\text{V}$	-	0.8	1	V
DYNAMIC PARAMETERS ⁽⁵⁾						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}$, $V_{DS}=10\text{V}$, $f=1\text{MHz}$	-	30	-	pF
C_{oss}	Output Capacitance		-	10	-	pF
C_{rss}	Reverse Transfer Capacitance		-	13	-	pF
R_g	Gate Resistance	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$	-	40	-	Ω
SWITCHING PARAMETERS ⁽⁵⁾						
Q_g	Total Gate Charge	$V_{GS}=4.5\text{V}$, $V_{DS}=10\text{V}$, $I_D=3\text{A}$	-	9.5	-	nC
Q_{gs}	Gate Source Charge		-	1.7	-	nC
Q_{gd}	Gate Drain Charge		-	2.1	-	nC
$t_{D(on)}$	Turn-On Delay Time	$V_{GS}=4.5\text{V}$, $V_{DS}=10\text{V}$, $I_D=3\text{A}$, $R_{GEN}=3\Omega$	-	3.9	-	ns
t_r	Turn-On Rise Time		-	17	-	ns
$t_{D(off)}$	Turn-Off Delay Time		-	105	-	ns
t_f	Turn-Off Fall Time		-	63	-	ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=3\text{A}$, $di/dt=100\text{A}/\mu\text{s}$	-	29	-	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=3\text{A}$, $di/dt=100\text{A}/\mu\text{s}$	-	7.1	-	nC

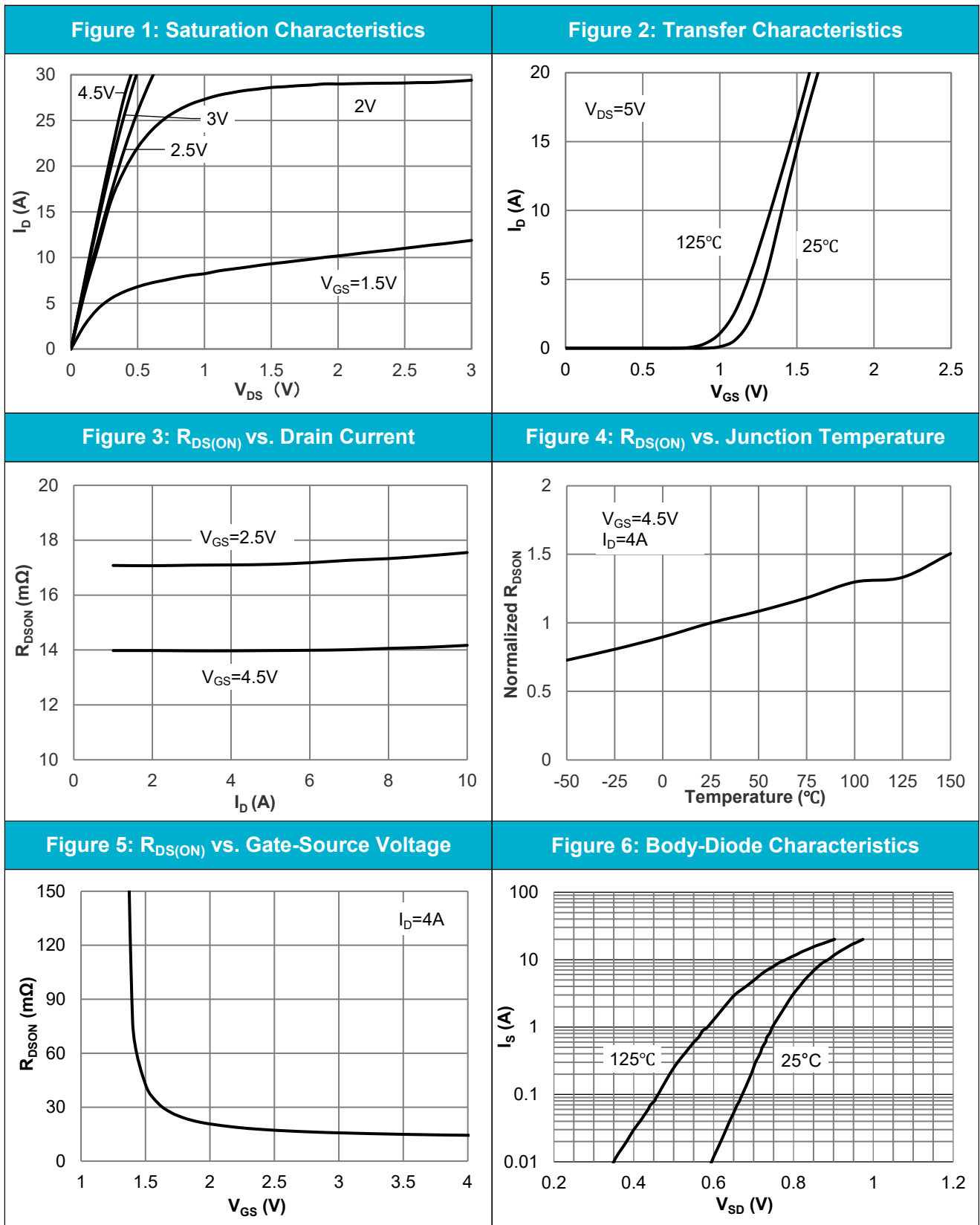
Thermal Resistances

Symbol	Parameter	Typ	Max	Unit
$R_{\theta JC}$	Thermal resistance from junction to case	-	-	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal resistance from junction to ambient	-	94	$^\circ\text{C}/\text{W}$

Notes:

1. Computed continuous current assumes the condition of T_{J_Max} while the actual continuous depends on the thermal & electro-mechanical application board design.
2. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
3. This single-pulse measurement was taken under the following condition [$L=0.1\text{mH}$, $V_{GS}=10\text{V}$, $V_{DS}=10\text{V}$] while its value is limited by $T_{J_Max}=150^\circ\text{C}$.
4. The power dissipation P_D is based on $T_{J_Max}=150^\circ\text{C}$.
5. This value is guaranteed by design hence it is not included in the production test.

Typical Electrical and Thermal Characteristics



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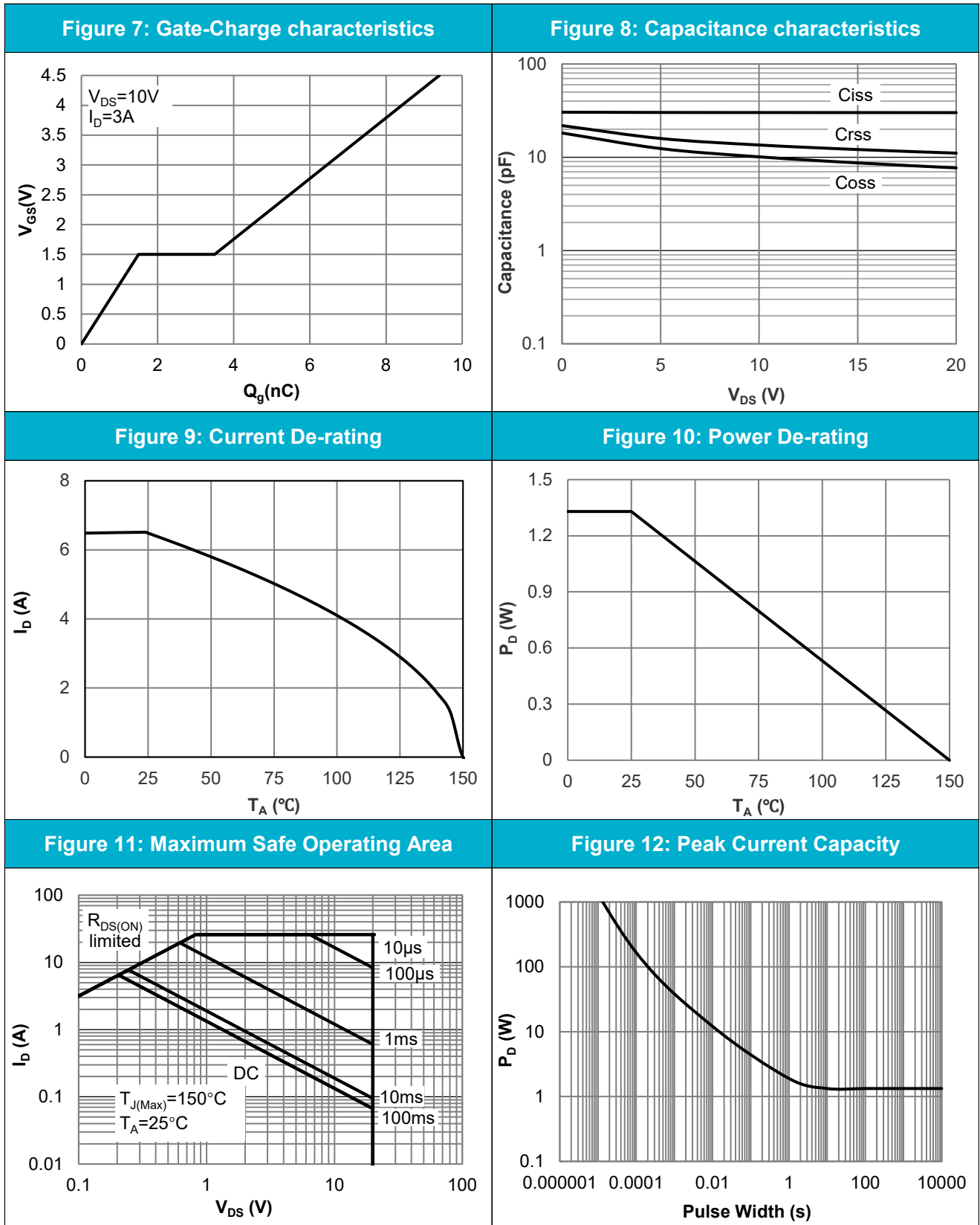
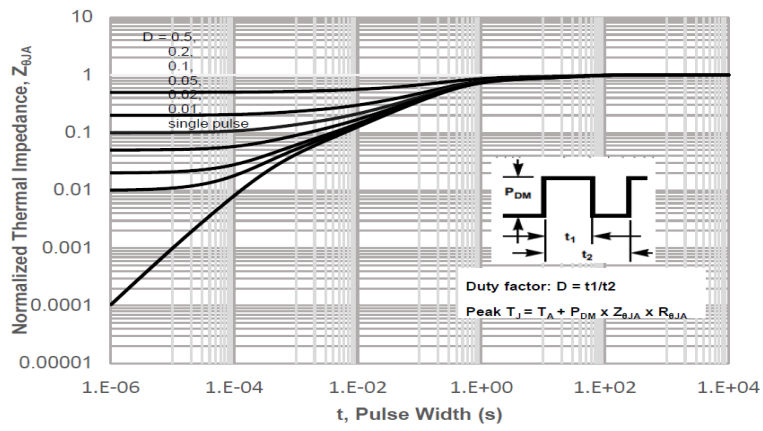


Figure 13: Normalized Maximum Transient Thermal Impedance



Test Circuit

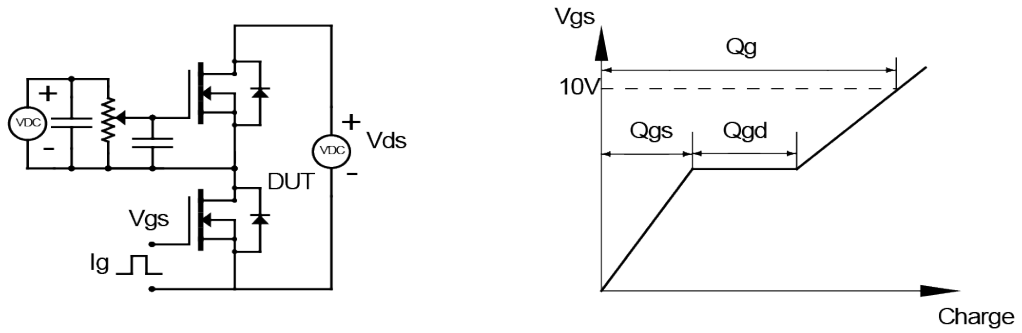


Figure1: Gate Charge Test Circuit & Waveforms

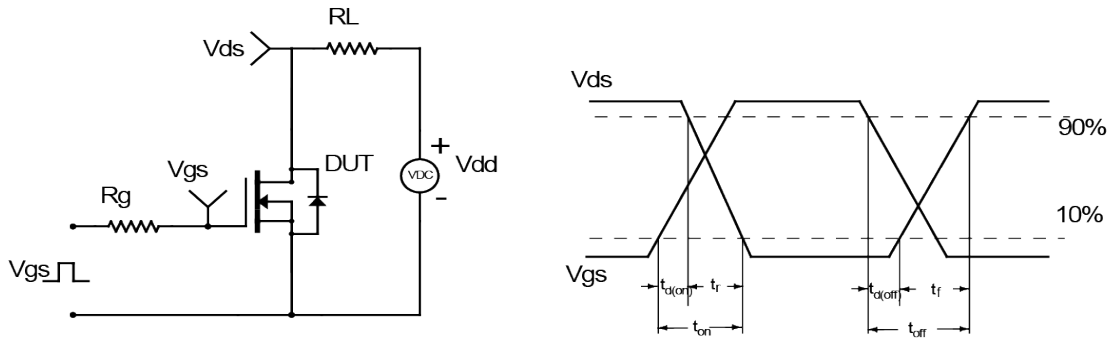


Figure2: Resistive Switching Test Circuit & Waveforms

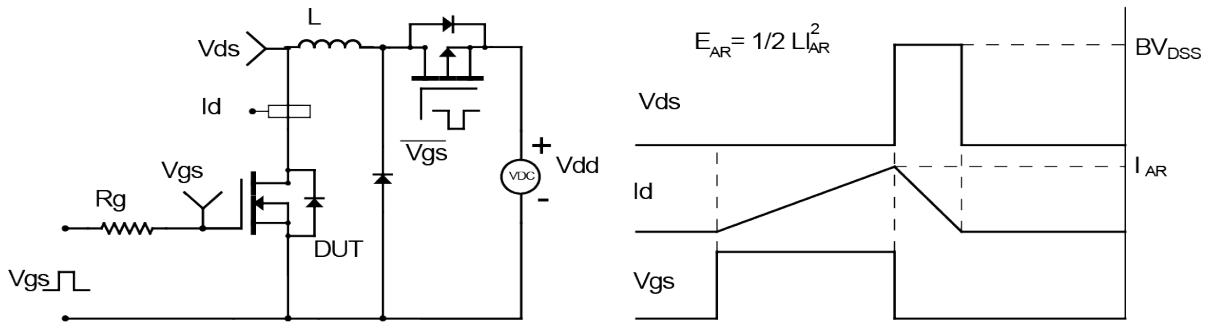


Figure3: Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

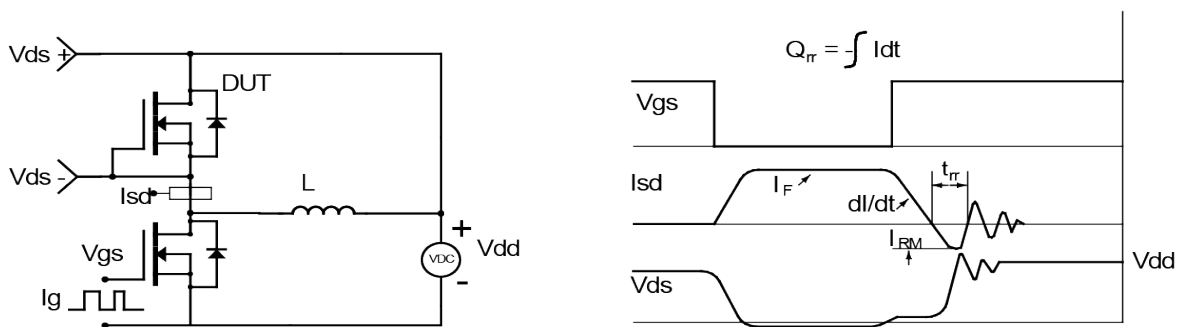
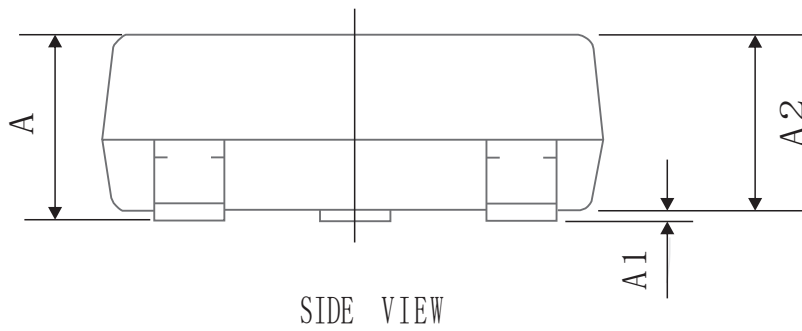
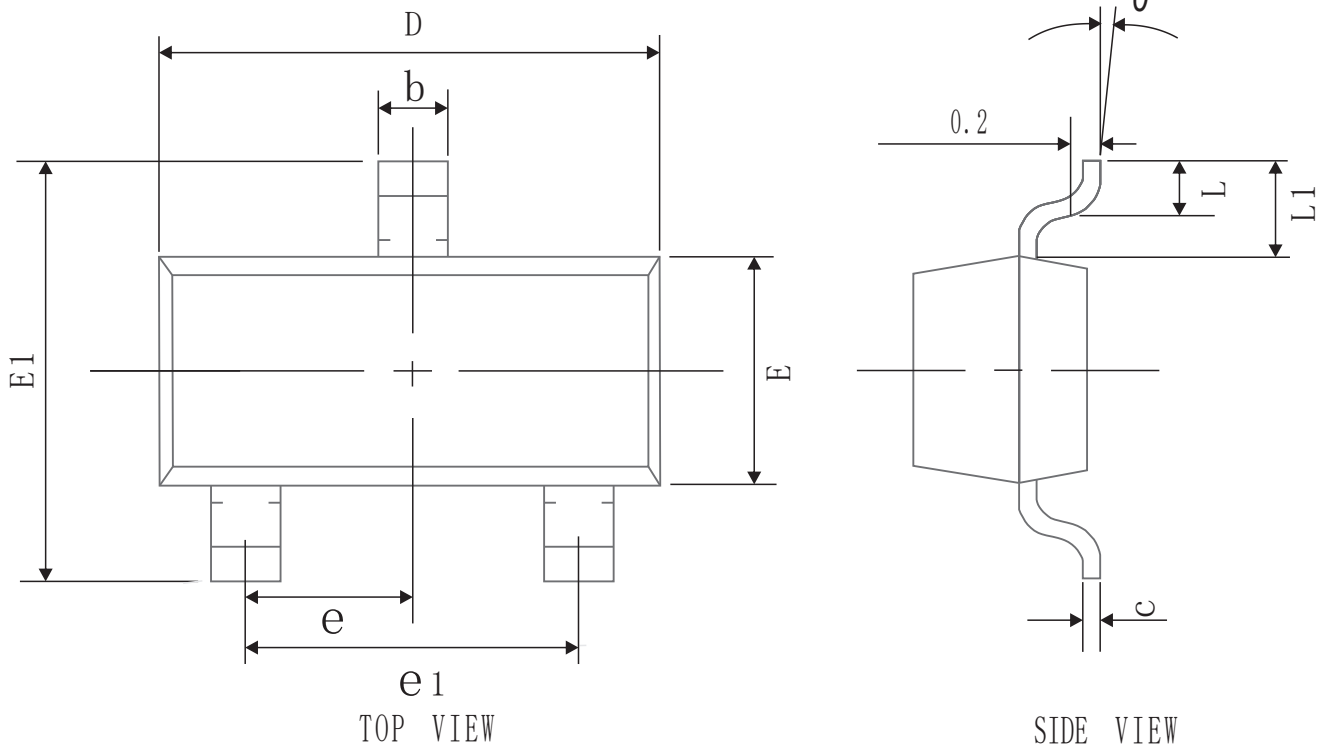


Figure4: Diode Recovery Test Circuit & Waveforms

SOT-23 Package Information



SYMBOL	MIN	NOM	MAX
A	0.90	.05	.20
A1	0.00	.05	.10
A2	0.90	.00	.10
b	0.30	.40	.50
c	0.08	.10	.15
D	2.80	.90	.00
E	1.20	.30	.40
E1	2.30	.40	.50
L	0.30	.40	.50
θ	0°	5°	0°
L1	0.55 REF		
e	0.95 BSC		
e1	1.90 REF		