

## SDM052G15D

### 150V SGT N-Channel MOSFETs

Rev A.0

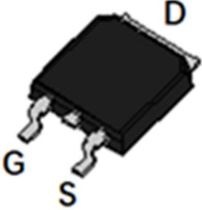
#### Feature

- ✧ Low  $R_{DS(ON)}$
- ✧ Low Gate Charge
- ✧ High current Capability
- ✧ Enhanced body diode performance.
- ✧ Green product (Rohs compliant), lead free
- ✧ 100% UIS Tested, 100% Rg Tested
- ✧ AEC-Q101 qualified

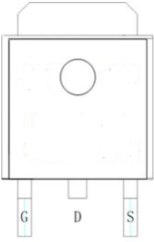
#### Product Summary

$V_{DS}$	150	V
$R_{DS(ON)_{Typ}}$ (at $V_{GS} = 10V$ )	43	m $\Omega$
$V_{GS(th)_{Typ}}$	3.2	V
$I_D$ (at $V_{GS} = 10V$ ) <sup>(1)</sup>	20	A

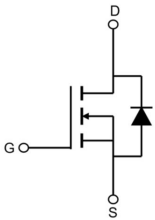
Type	Package	Marking	OUTLINE	Media	Quantity (pcs)
SDM052G15D	TO-252	M052G15	TAPING	13-inch Reel	2500



**TO-252 top view**



**Pin Assignment**



**Schematic Diagram**

#### Absolute Maximum Ratings (Rating at $T_A=25^\circ C$ unless otherwise noted)

Parameter	Symbol	Maximum	Unit
Drain-Source Voltage	$V_{DS}$	150	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>(1)</sup>	$I_D$	$T_C=25^\circ C$	20
		$T_C=100^\circ C$	12
Pulsed Drain Current <sup>(2)</sup>	$I_{DM}$	50	A
Avalanche Current <sup>(3)</sup>	$I_{AS}$	16	A
Avalanche Energy <sup>(3)</sup>	$E_{AS}$	13	mJ
Power Dissipation <sup>(4)</sup>	$P_D$	$T_C=25^\circ C$	63
		$T_C=100^\circ C$	25
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
<b>STATIC PARAMETERS</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$I_D=250\mu\text{A}$ , $V_{GS}=0\text{V}$	150	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=120\text{V}$ , $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$	-	-	1	$\mu\text{A}$
			-	-	5	
$I_{GSS}$	Gate-Body Leakage Current	$V_{DS}=0\text{V}$ , $V_{GS}=\pm 20\text{V}$	-	-	$\pm 100$	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$ , $I_D=250\mu\text{A}$	2.5	3.2	4.5	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}$ , $I_D=10\text{A}$	-	43	52	m $\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS}=5\text{V}$ , $I_D=10\text{A}$	-	22	-	S
$V_{SD}$	Diode Forward Voltage	$I_S=1\text{A}$ , $V_{GS}=0\text{V}$	-	0.73	1.0	V
$I_S$	Maximum Body-Diode Continuous Current		-	-	63	A
<b>DYNAMIC PARAMETERS</b> <sup>(5)</sup>						
$C_{iss}$	Input Capacitance	$V_{GS}=0\text{V}$ , $V_{DS}=75\text{V}$ , $f=1\text{MHz}$	-	541	-	pF
$C_{oss}$	Output Capacitance		-	67	-	pF
$C_{rss}$	Reverse Transfer Capacitance		-	4.3	-	pF
$R_g$	Gate Resistance	$V_{GS}=0\text{V}$ , $V_{DS}=0\text{V}$ , $f=1\text{MHz}$	-	1.1	-	$\Omega$
<b>SWITCHING PARAMETERS</b> <sup>(5)</sup>						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=0\sim 10\text{V}$ , $V_{DS}=75\text{V}$ , $I_D=10\text{A}$	-	7.7	-	nC
$Q_g(6.0\text{V})$	Total Gate Charge		-	5.7	-	nC
$Q_{gs}$	Gate Source Charge		-	2.5	-	nC
$Q_{gd}$	Gate Drain Charge		-	2.7	-	nC
$t_{D(on)}$	Turn-On Delay Time	$V_{GS}=10\text{V}$ , $V_{DS}=75\text{V}$ , $R_L=7.5\Omega$ , $R_{GEN}=6.0\Omega$	-	10.5	-	ns
$t_r$	Turn-On Rise Time		-	17.5	-	ns
$t_{D(off)}$	Turn-Off Delay Time		-	21	-	ns
$t_f$	Turn-Off Fall Time		-	6.3	-	ns
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F=10\text{A}$ , $di/dt=100\text{A}/\mu\text{s}$	-	67	-	ns
$Q_{rr}$	Body Diode Reverse Recovery Charge	$I_F=10\text{A}$ , $di/dt=100\text{A}/\mu\text{s}$	-	93	-	nC

**Thermal Resistances**

Symbol	Parameter	Typ	Max	Unit
$R_{\theta JC}$	Thermal resistance from junction to case	1.5	2.0	$^{\circ}\text{C} / \text{W}$
$R_{\theta JA}$	Thermal resistance from junction to ambient	45	55	$^{\circ}\text{C} / \text{W}$

**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. This single-pulse measurement was taken under  $T_{J\_Max}=150^{\circ}\text{C}$ .
3. This single-pulse measurement was taken under the following condition [ $L=100\mu\text{H}$ ,  $V_{GS}=10\text{V}$ ,  $V_{DS}=75\text{V}$ ] 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

Figure 1: Saturation Characteristics      Figure 2: Transfer Characteristics

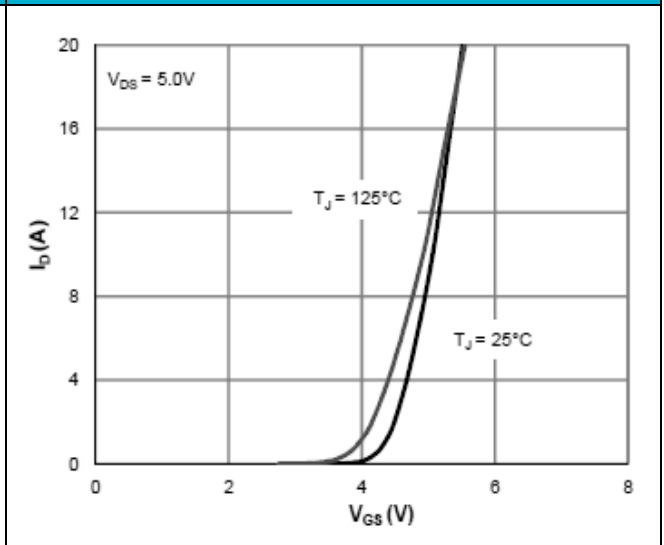
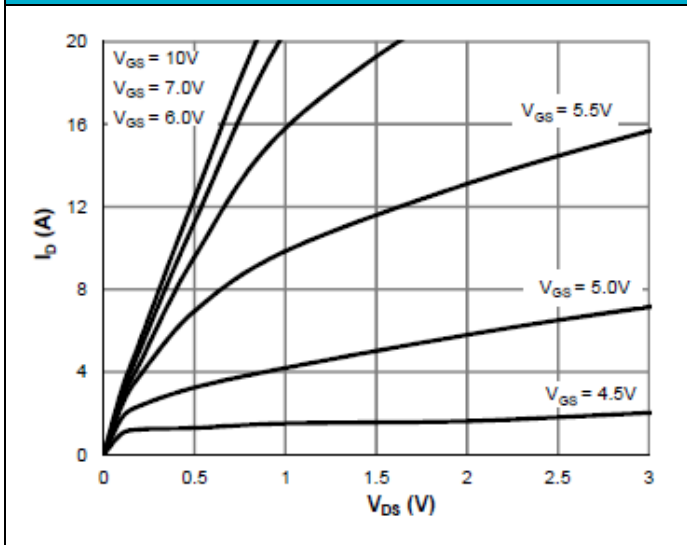


Figure 3: R\_DS(ON) vs. Drain Current

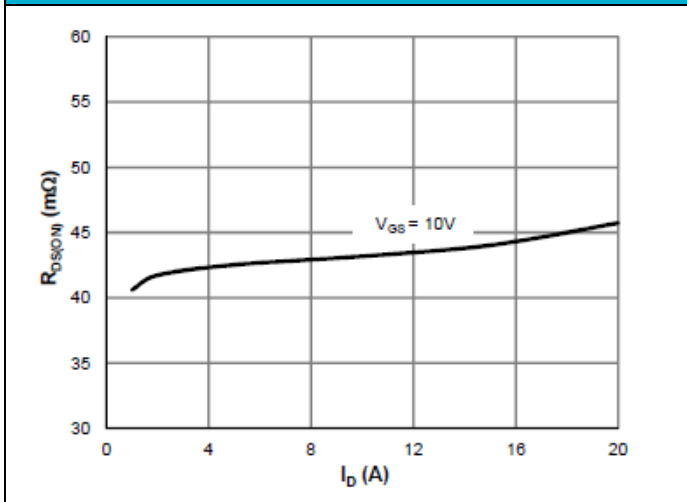


Figure 4: R\_DS(ON) vs. Junction Temperature

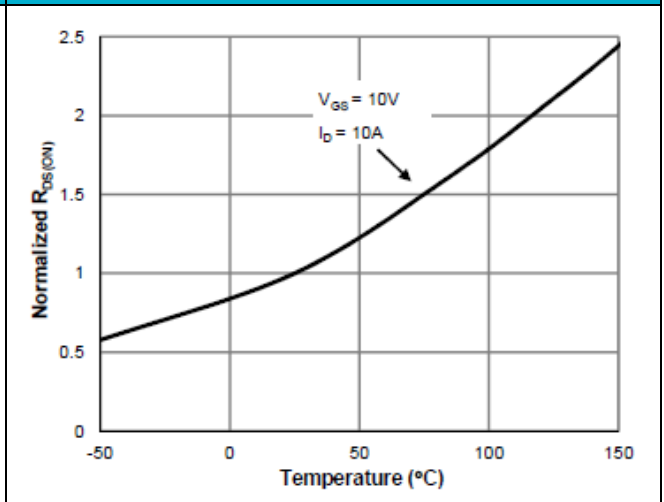


Figure 5: Body-Diode Characteristics

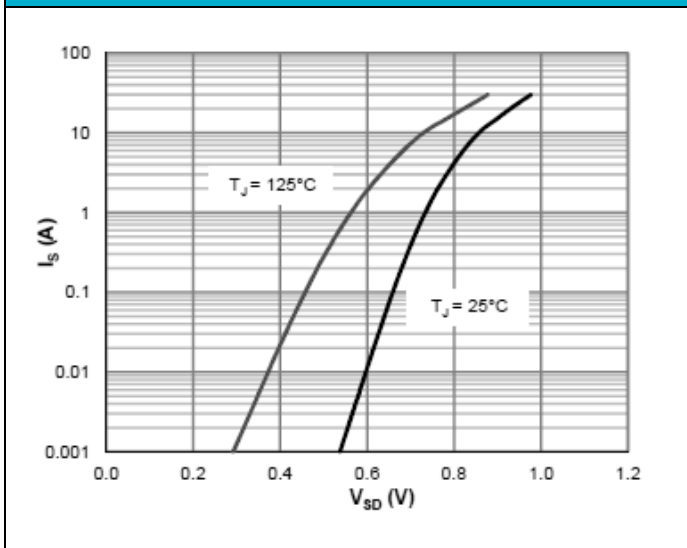
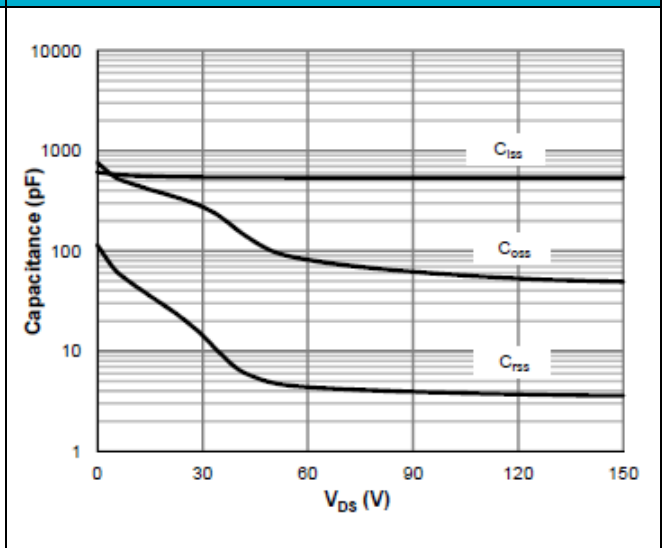
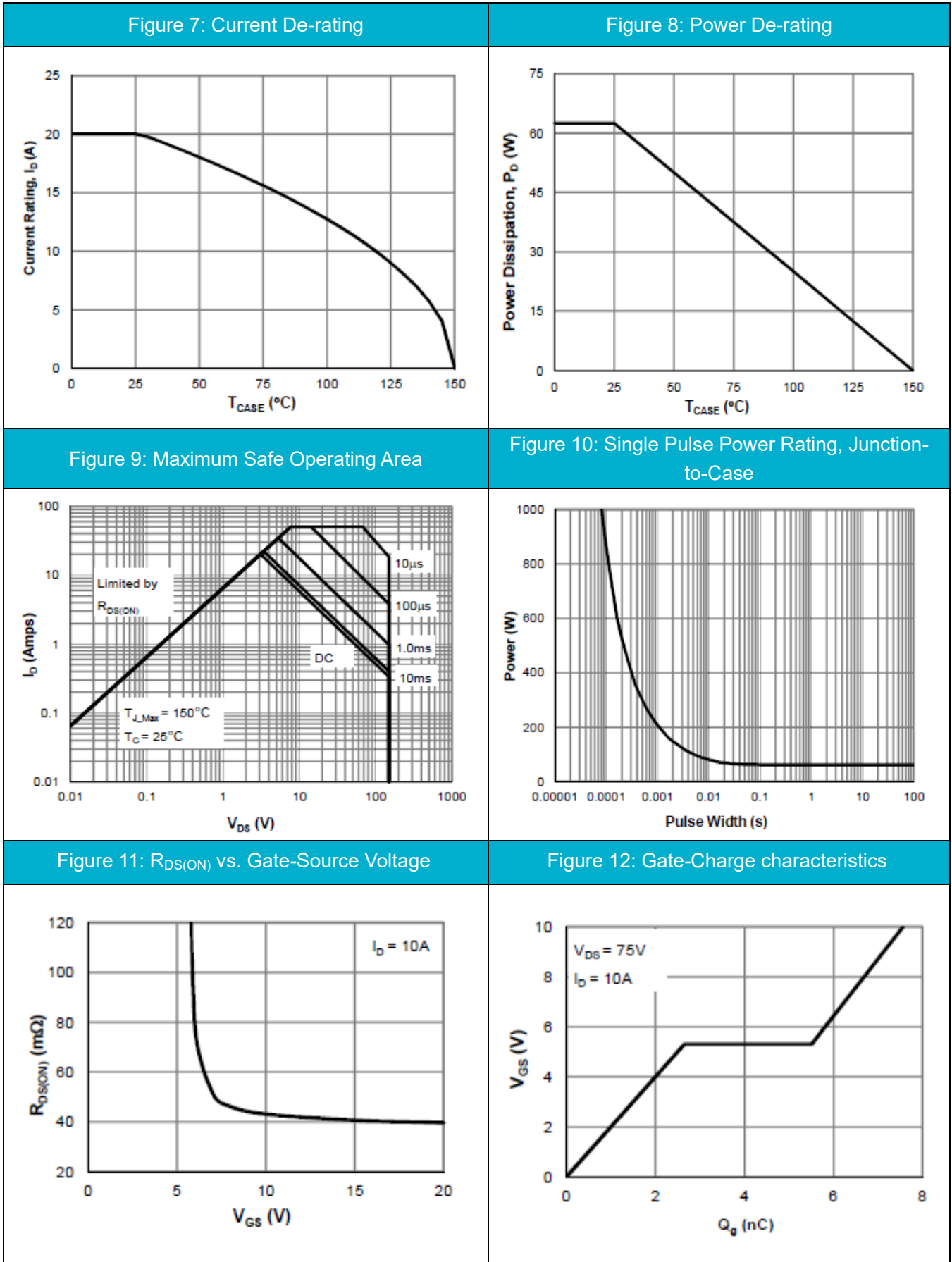


Figure 6: Capacitance characteristics

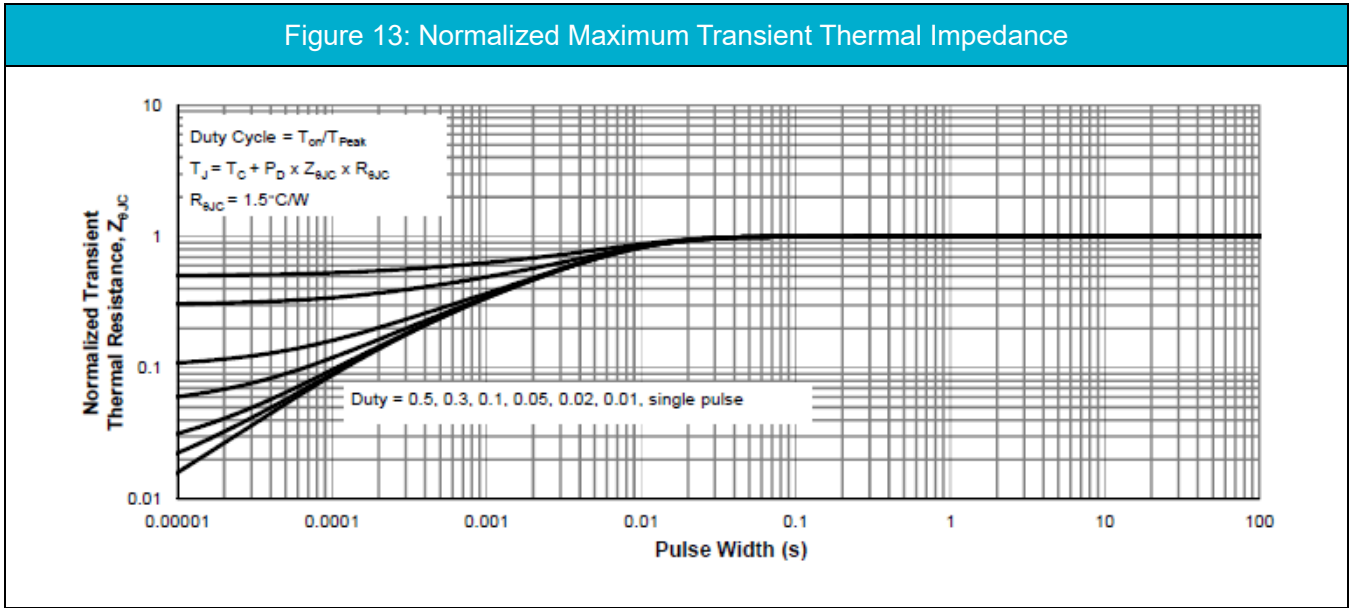


Typical Electrical and Thermal Characteristics



Typical Electrical and Thermal Characteristics

Figure 13: Normalized Maximum Transient Thermal Impedance



Test Circuit

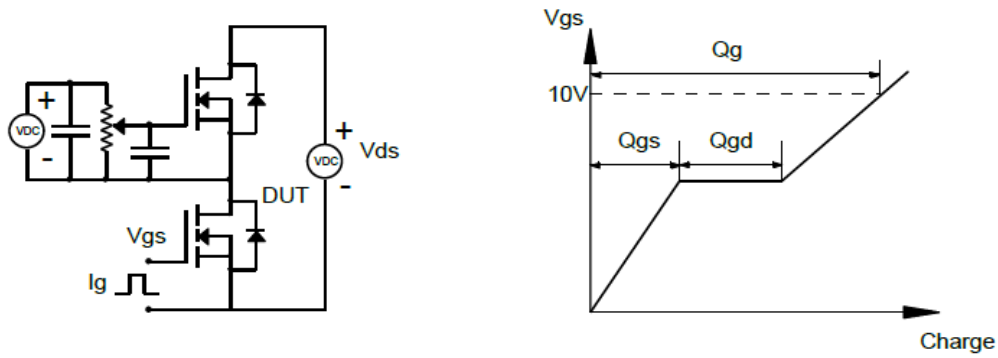


Figure1: Gate Charge Test Circuit & Waveforms

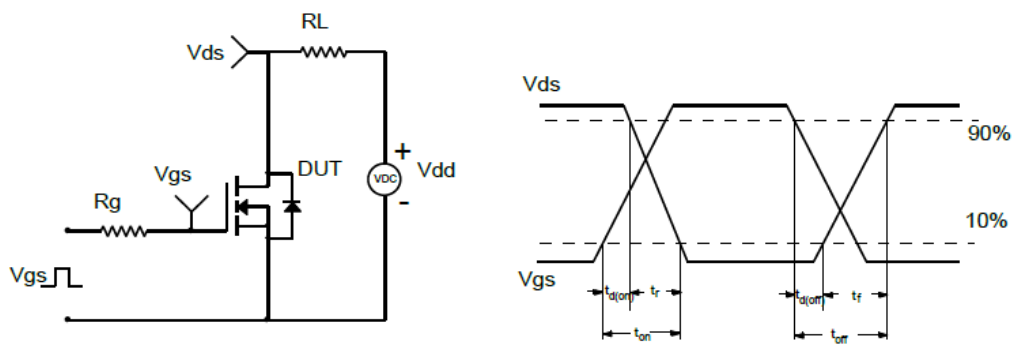


Figure2: Resistive Switching Test Circuit & Waveforms

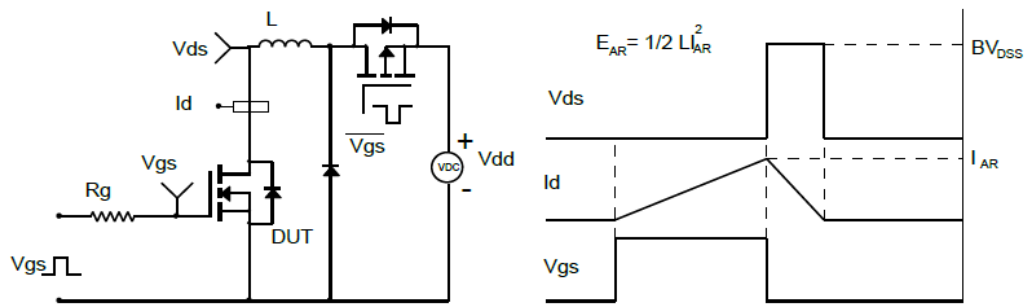


Figure3: Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

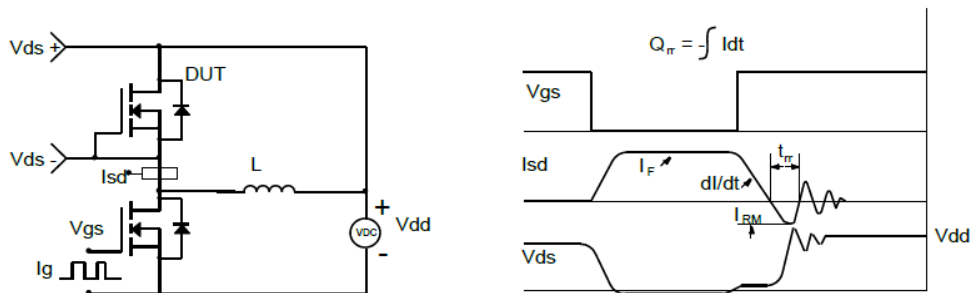
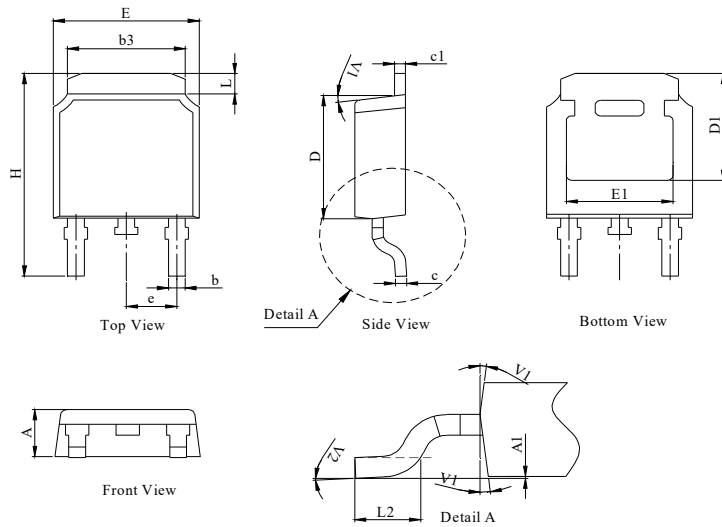


Figure4: Diode Recovery Test Circuit & Waveforms

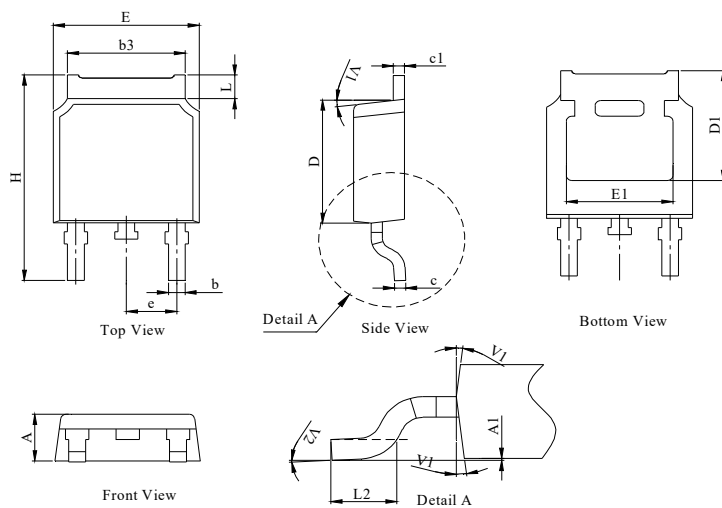
## TO-252 Package Information

### Package Outline



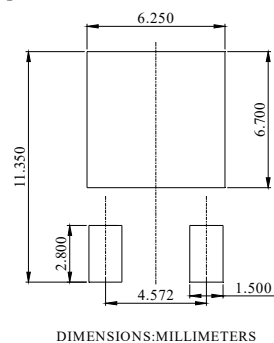
DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	2.18	2.30	2.39
A1	0	--	0.13
b	0.64	0.76	0.89
c	0.40	0.50	0.61
c1	0.46	0.50	0.58
D	5.97	6.10	6.23
D1	5.05	--	--
E	6.35	6.60	6.73
E1	4.32	--	--
b3	5.21	5.38	5.55
e	2.29 BSC		
H	9.40	10.00	10.40
L	0.89	--	1.27
L2	1.40	--	1.78
V1	7° REF		
V2	0°	--	6°

### Package Outline Type-B



DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	2.10	2.30	2.40
A1	0	--	0.13
b	0.66	0.76	0.86
b3	5.21	5.38	5.55
c	0.40	0.50	0.60
c1	0.44	0.50	0.58
D	5.90	6.10	6.30
D1	5.30REF		
E	6.40	6.60	6.80
E1	4.63	-	-
e	2.29 BSC		
H	9.50	10.00	10.70
L	1.09	--	1.21
L2	1.35	--	1.65
V1	7° REF		
V2	0°	--	6°

### Recommended Soldering Footprint





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