

SDM052G15D

150V SGT N-Channel MOSFETs

Rev A.0

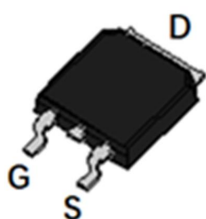
Feature

- ✧ 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

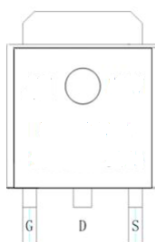
Product Summary

V_{DS}	150	V
$R_{DS(ON)}_{Typ}$ (at $V_{GS} = 10V$)	43	mΩ
$V_{GS(th)}_{Typ}$	3.2	V
I_D (at $V_{GS} = 10V$) ⁽¹⁾	20	A

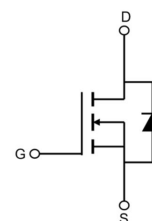
Type	Package	Marking	OUTLINE	Media	Quantity (pcs)
SDM052G15D	TO-252	M052G15	TAPING	13-inch Reel	2500



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}	± 20	V
Continuous Drain Current ⁽¹⁾	$T_C = 25^\circ C$	I_D	20	A
	$T_C = 100^\circ C$		12	
Pulsed Drain Current ⁽²⁾		I_{DM}	50	A
Avalanche Current ⁽³⁾		I_{AS}	16	A
Avalanche Energy ⁽³⁾		E_{AS}	13	mJ
Power Dissipation ⁽⁴⁾	$T_C = 25^\circ C$	P_D	63	W
	$T_C = 100^\circ C$		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
STATIC PARAMETERS						
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 5	μA
I_{GSS}	Gate-Body Leakage Current	$V_{DS}=0\text{V}$, $V_{GS}=\pm 20\text{V}$	-	-	± 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 Ω
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
DYNAMIC PARAMETERS ⁽⁵⁾						
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	-	Ω
SWITCHING PARAMETERS ⁽⁵⁾						
$Q_g(10\text{V})$	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

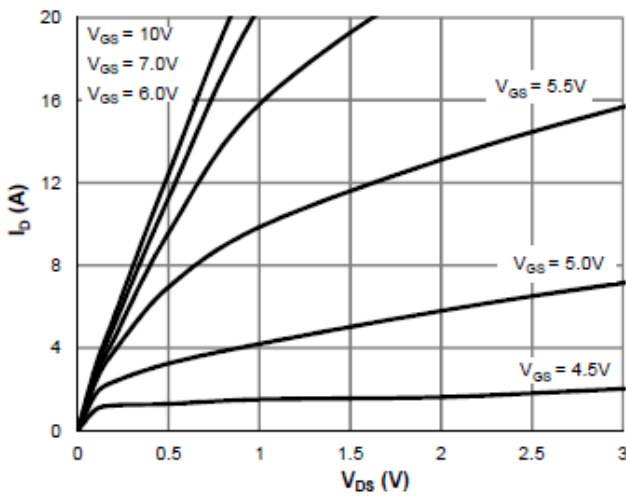


Figure 2: Transfer Characteristics

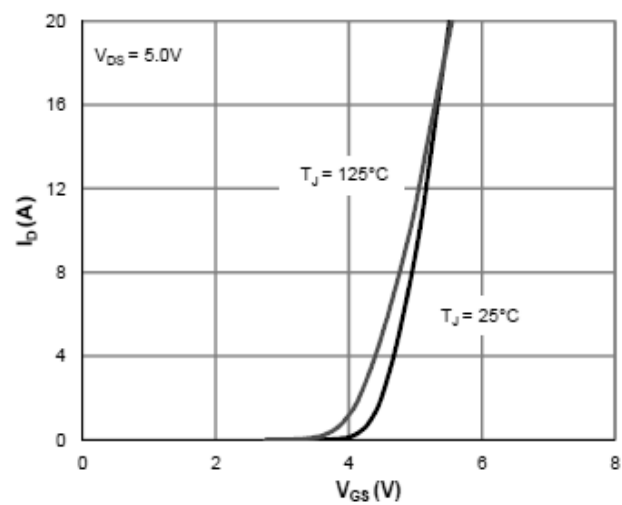
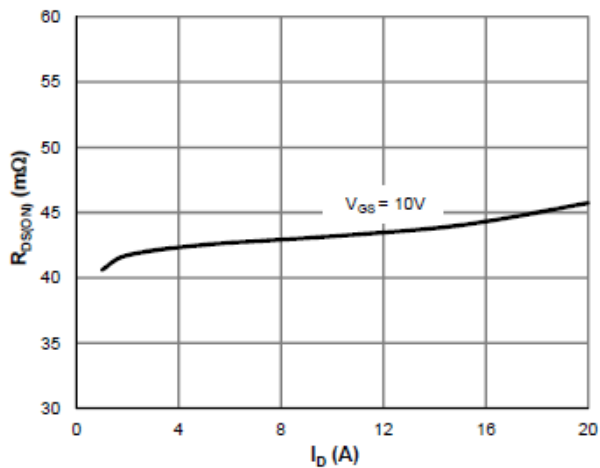
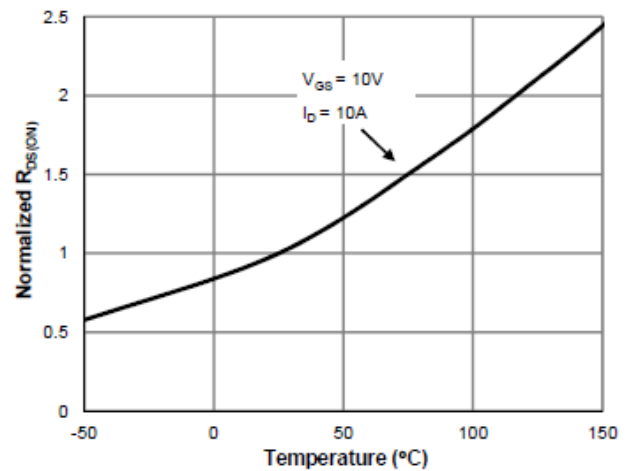
Figure 3: $R_{DS(ON)}$ vs. Drain CurrentFigure 4: $R_{DS(ON)}$ vs. Junction Temperature

Figure 5: Body-Diode Characteristics

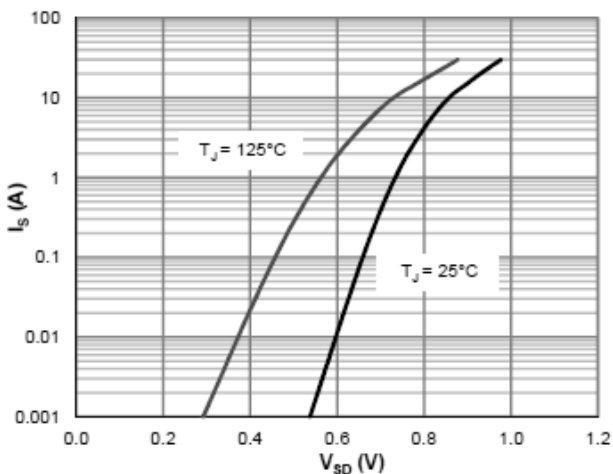
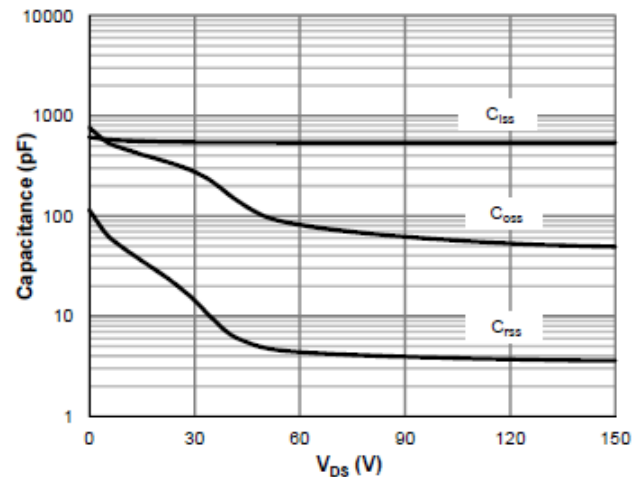


Figure 6: Capacitance characteristics



Typical Electrical and Thermal Characteristics

Figure 7: Current De-rating

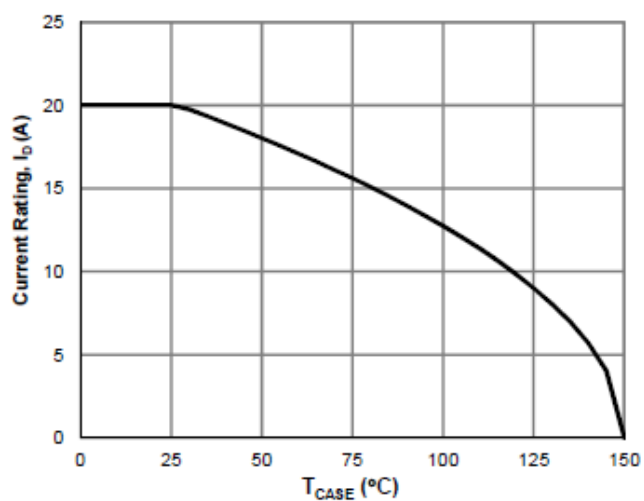


Figure 8: Power De-rating

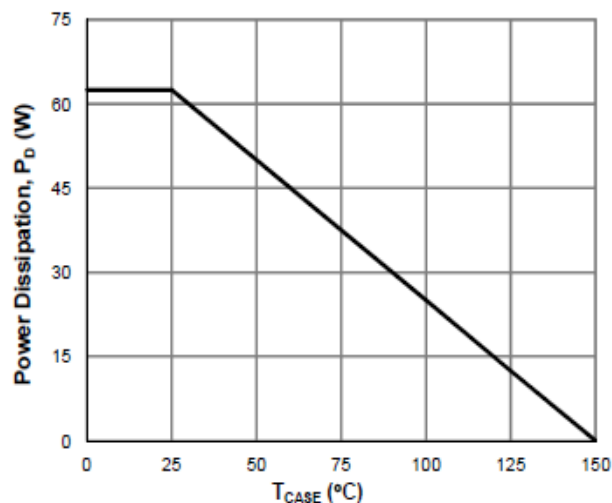


Figure 9: Maximum Safe Operating Area

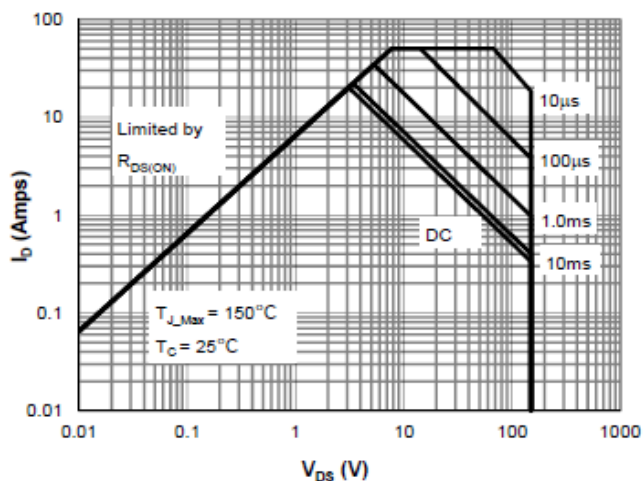


Figure 10: Single Pulse Power Rating, Junction-to-Case

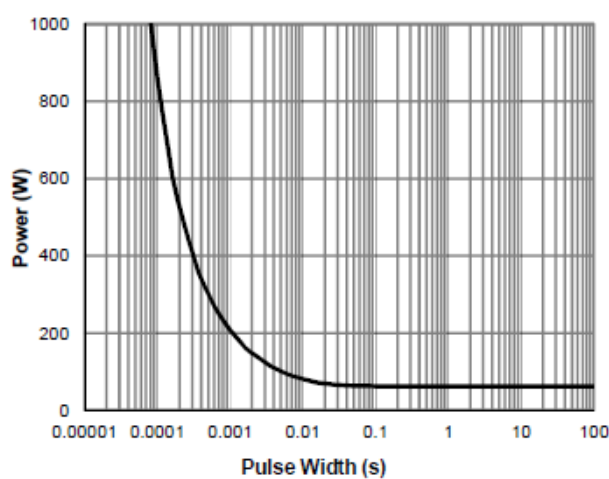
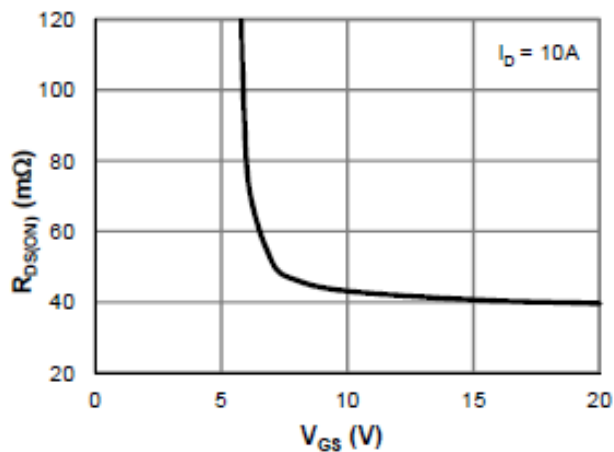
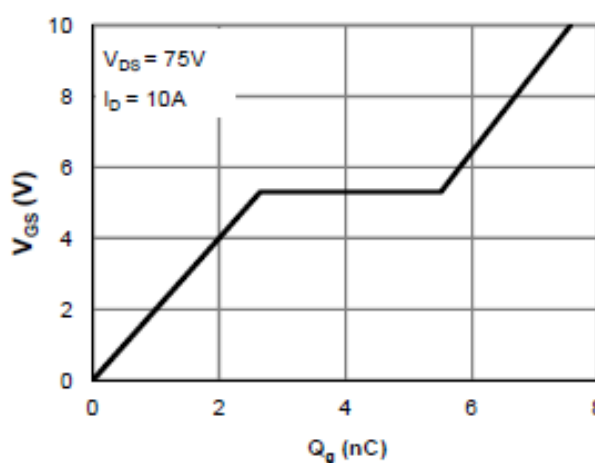
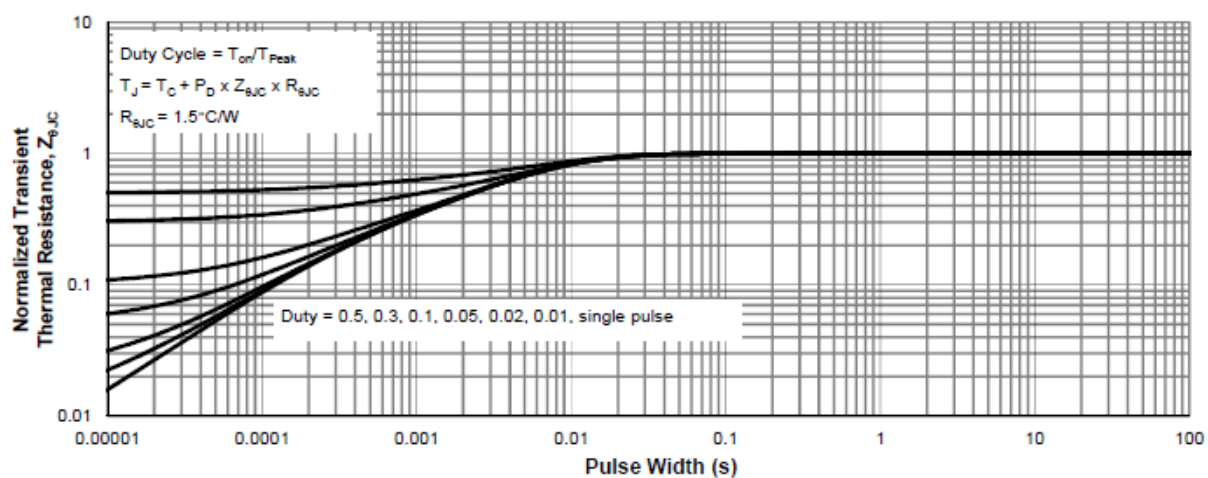
Figure 11: $R_{DS(ON)}$ vs. Gate-Source Voltage

Figure 12: Gate-Charge characteristics



Typical Electrical and Thermal Characteristics

Figure 13: Normalized Maximum Transient Thermal Impedance



Test Circuit

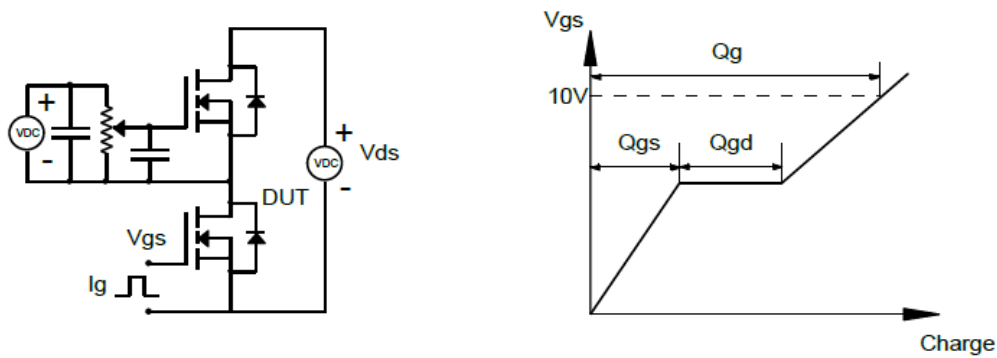


Figure1: Gate Charge Test Circuit & Waveforms

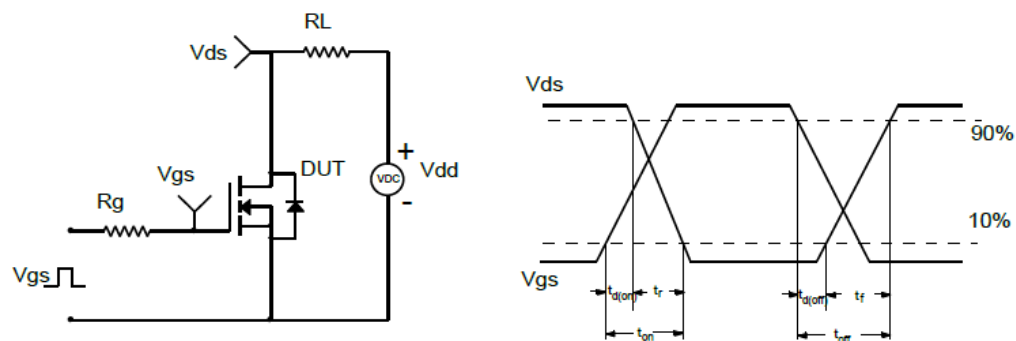


Figure2: Resistive Switching Test Circuit & Waveforms

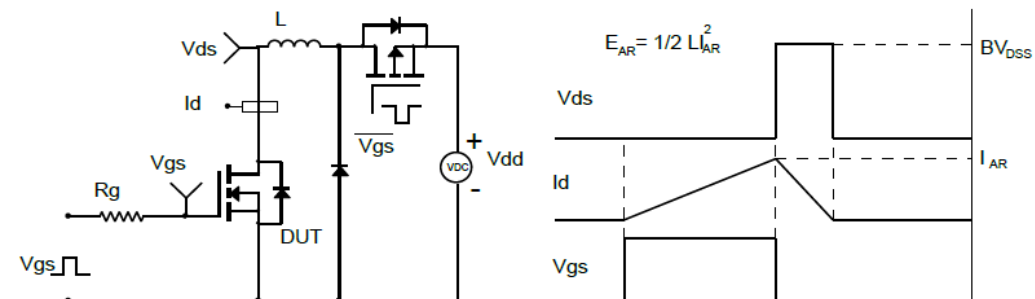


Figure3: Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

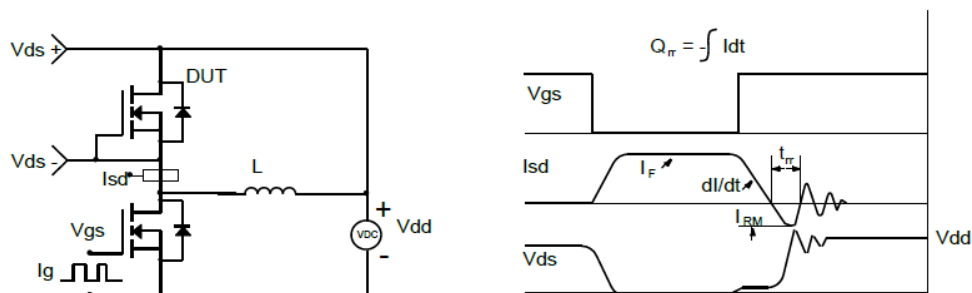
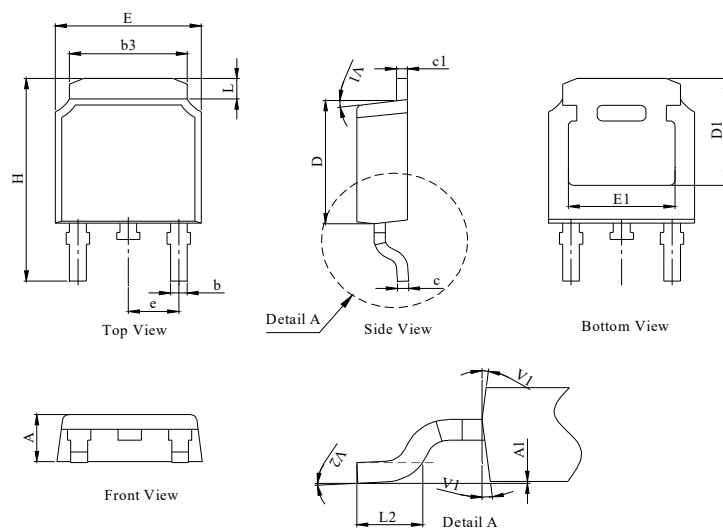


Figure4: Diode Recovery Test Circuit & Waveforms

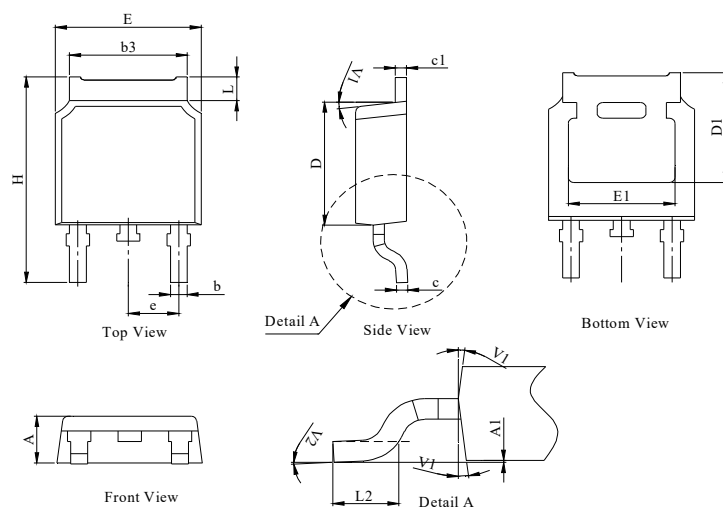
TO-252 Package Information

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

