SDM3416V

20V N-Channel MOSFETs

Rev 1.0

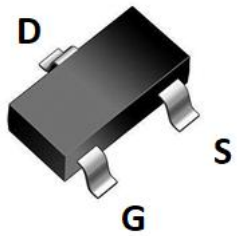
Feature

- ✧ Excellent $R_{DS(ON)}$
- ✧ Low Gate Charge
- ✧ High current Capability
- ✧ Green product RoHS compliant
- ✧ ESD Protected: 4kV

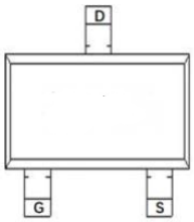
Product Summary

V_{DS}	20	V
$V_{GS(th)\_Typ}$	0.7	V
$R_{DS(ON)\_Typ}$ (@ V_{GS} =4.5V)	12	mΩ
I_D (at V_{GS} =4.5V) (1)	7	A

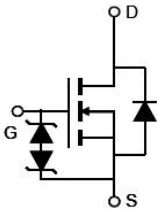
Type	Package	Marking	Outline	Media	Quantity (pcs)
SDM3416V	SOT23-3L	3416	Tape	7" Reel	3000



SOT23-3L top view



Pin Assignment



Schematic Diagram

Absolute Maximum Ratings (Rating at T_J=25℃ unless otherwise noted)

Parameter		Symbol	Maximum	Unit
Drain-Source Voltage		V_{DS}	20	V
Gate-Source Voltage		V_{GS}	±10	V
Continuous Drain Current (1)	T_A=25 ℃	I_D	7	A
	T_A=100 ℃		4.4	
Pulsed Drain Current (2)		I_{DM}	28	A
Maximum Body-Diode Continuous Current		I_S	7	A
Avalanche Current (3)		I_{AS}	6.5	A
Avalanche Energy (3)		E_{AS}	32	mJ
Power Dissipation (4)	T_A=25 ℃	P_D	1.3	W
	T_A=100 ℃		0.5	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to +150	℃

Electrical Characteristics (Rating at T_J=25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	I_D=250μA, V_{GS}=0V	20	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=20V, V_{GS}=0V	-	-	1	μA
		T_J=55°C	-	-	5	
I_{GSS}	Gate-Body Leakage Current	V_{DS}=0V, V_{GS} =±10V	-	-	±10	μA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}= V_{GS}, I_D=250μA	0.5	0.7	0.9	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=4.5V, I_D=4A	-	12	18	mΩ
		V_{GS}=2.5V, I_D=3A	-	15	22	
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=4A	-	13	-	S
V_{SD}	Diode Forward Voltage	I_S=4A, V_{GS}=0V	-	0.8	1	V
DYNAMIC PARAMETERS (5)						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=10V, f=1MHz	-	484	-	pF
C_{oss}	Output Capacitance		-	116	-	pF
C_{rss}	Reverse Transfer Capacitance		-	71	-	pF
R_g	Gate Resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz	-	161	-	Ω
SWITCHING PARAMETERS (5)						
Q_g	Total Gate Charge	V_{GS}=4.5V, V_{DS}=10V, I_D=6.5A	-	5.7	-	nC
Q_{gs}	Gate Source Charge		-	0.9	-	nC
Q_{gd}	Gate Drain Charge		-	2.1	-	nC
$t_{D(on)}$	Turn-On Delay Time	V_{GS}=4.5V,V_{DS}=10V, R_L=10Ω, R_G=6Ω, I_D=1A	-	3.3	-	ns
t_r	Turn-On Rise Time		-	5.3	-	ns
$t_{D(off)}$	Turn-Off Delay Time		-	17.5	-	ns
t_f	Turn-Off Fall Time		-	9.1	-	ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=1A, di/dt=100A/μs	-	7.5	-	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=1A, di/dt=100A/μs	-	1.3	-	nC

Thermal Resistances

Symbol	Parameter	Typ	Max	Unit
$R_{\theta JC}$	Thermal resistance from junction to case	-	-	℃ /W
$R_{\theta JA}$	Thermal resistance from junction to ambient	-	94	℃ /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=0.5mH, VGS=8V, VDS=15V] while its value is limited by T_{J_Max}=150°C.
4. The power dissipation P_D is based on T_{J_Max}=150℃.
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

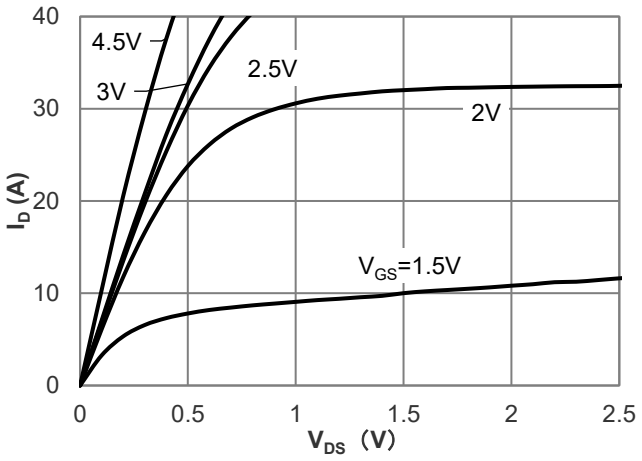


Figure 2: Transfer Characteristics

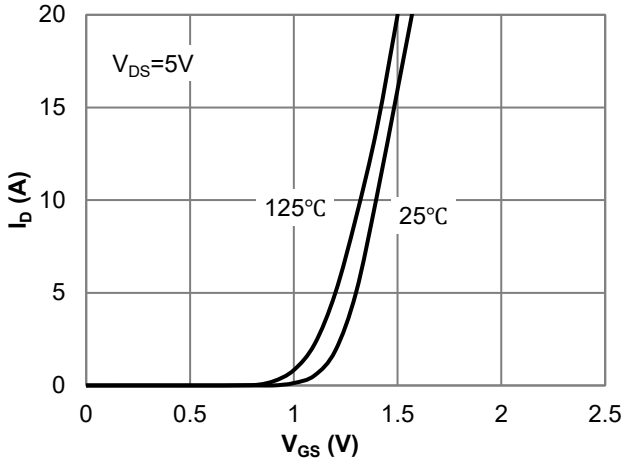


Figure 3: $R_{DS(ON)}$ vs. Drain Current

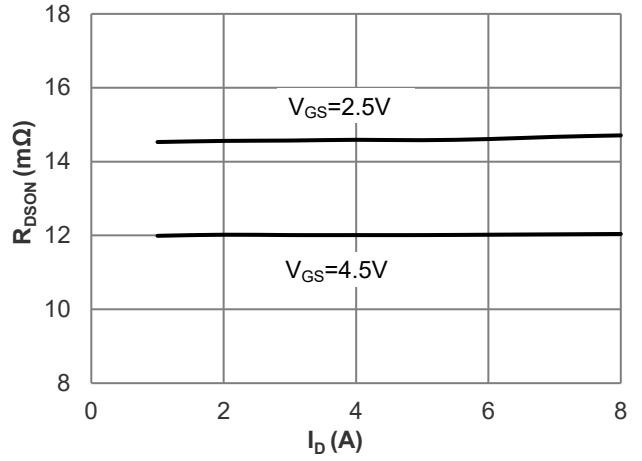


Figure 4: $R_{DS(ON)}$ vs. Junction Temperature

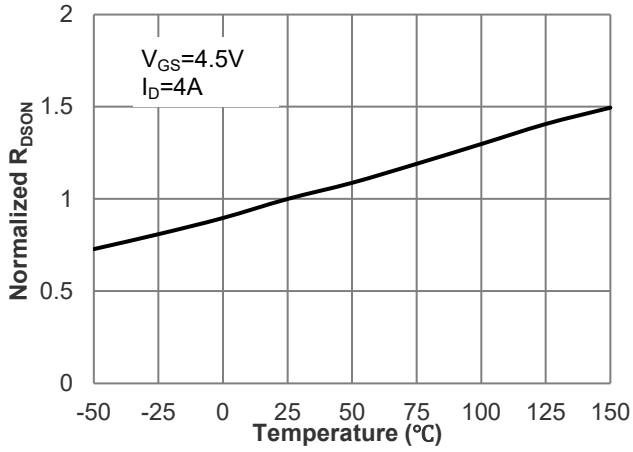


Figure 5: $R_{DS(ON)}$ vs. Gate-Source Voltage

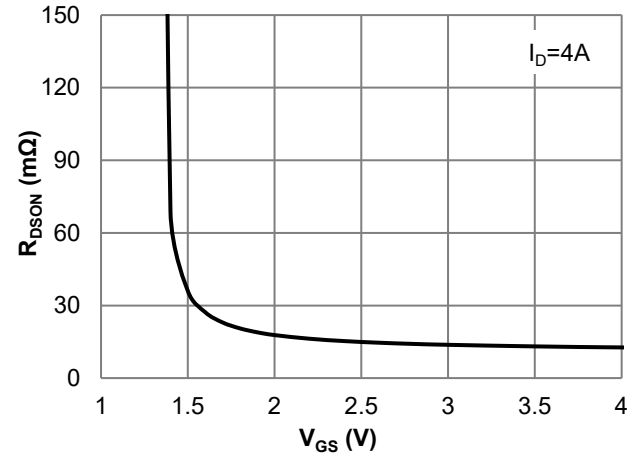
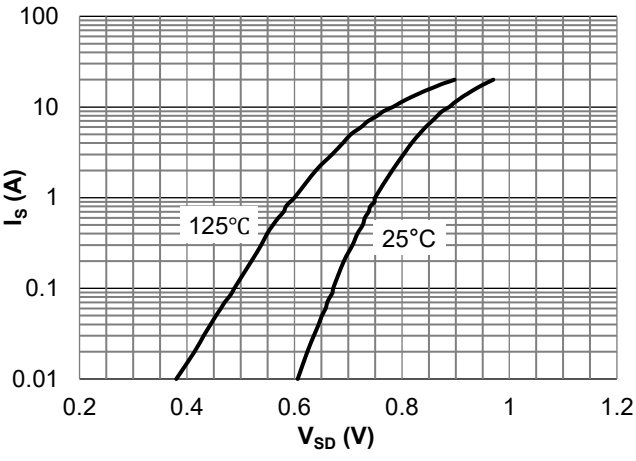


Figure 6: Body-Diode Characteristics



Typical Electrical and Thermal Characteristics

Figure 7: Gate-Charge characteristics

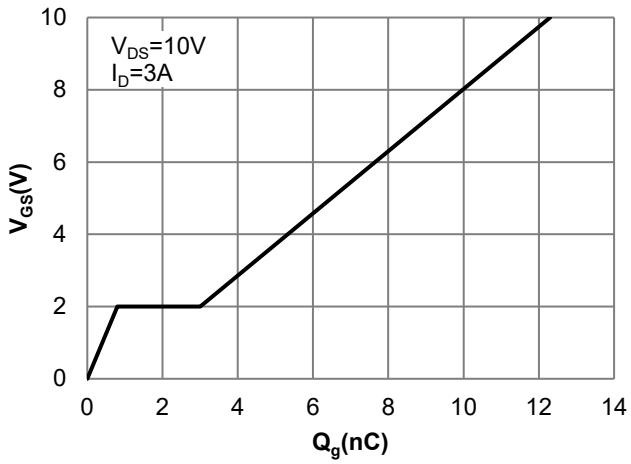


Figure 8: Capacitance characteristics

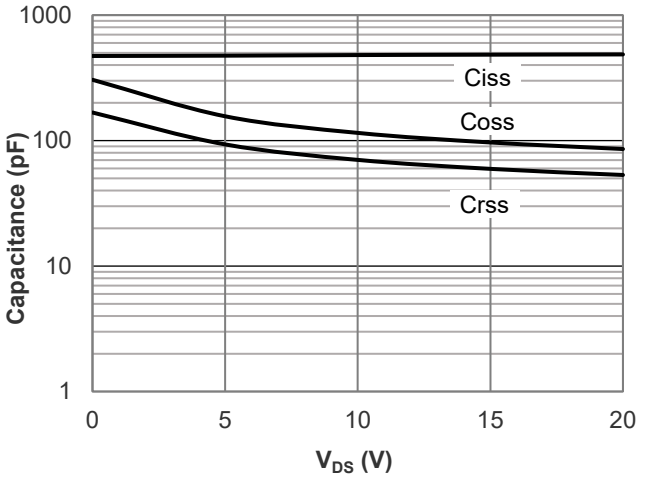


Figure 9: Current De-rating

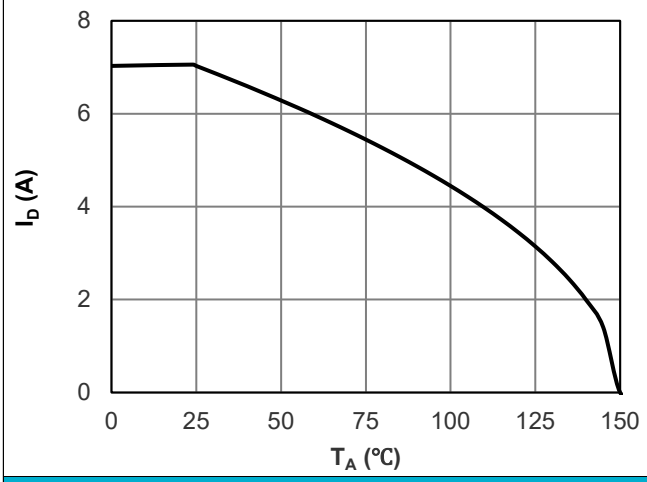


Figure 10: Power De-rating

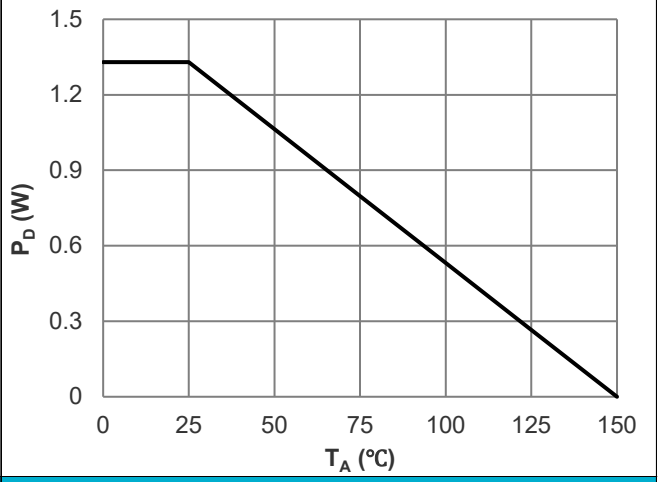


Figure 11: Maximum Safe Operating Area

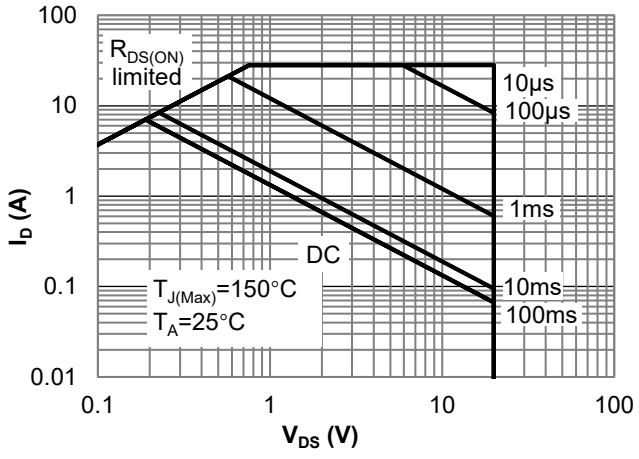
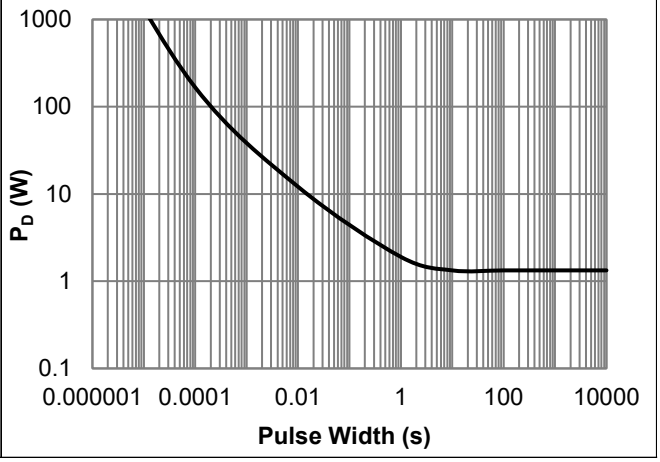
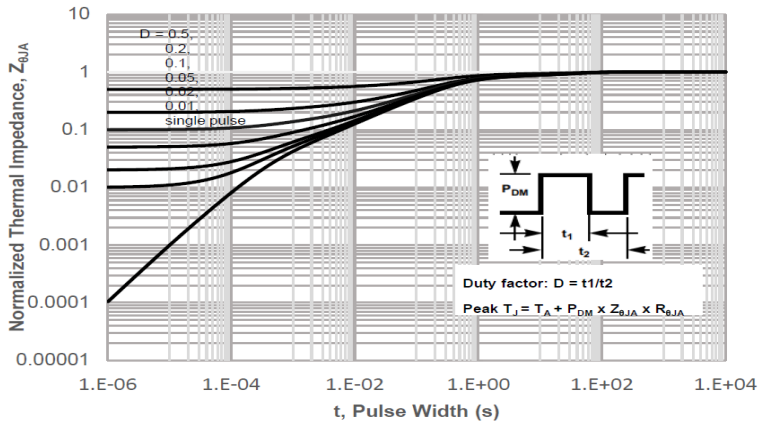


Figure 12: Peak Current Capacity



Typical Electrical and Thermal Characteristics

Figure 13: Normalized Maximum Transient Thermal Impedance



Test Circuit

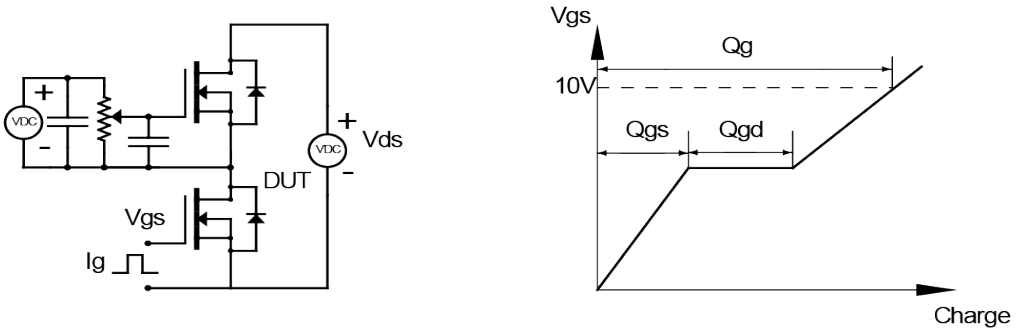


Figure1: Gate Charge Test Circuit & Waveforms

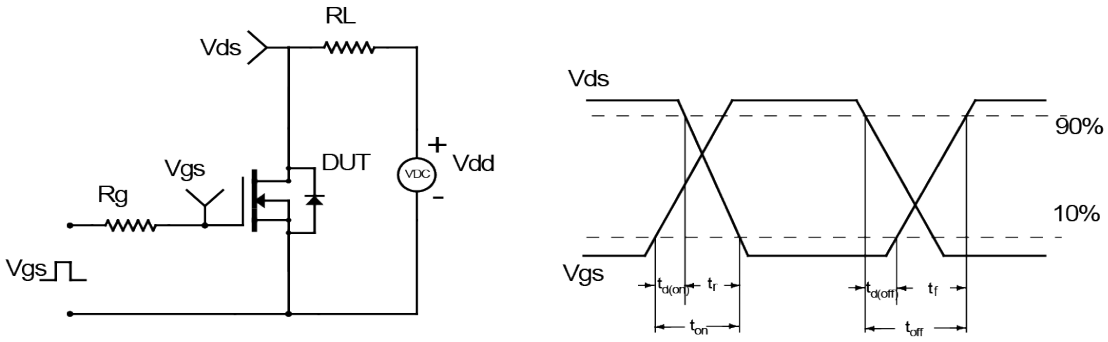


Figure2: Resistive Switching Test Circuit & Waveforms

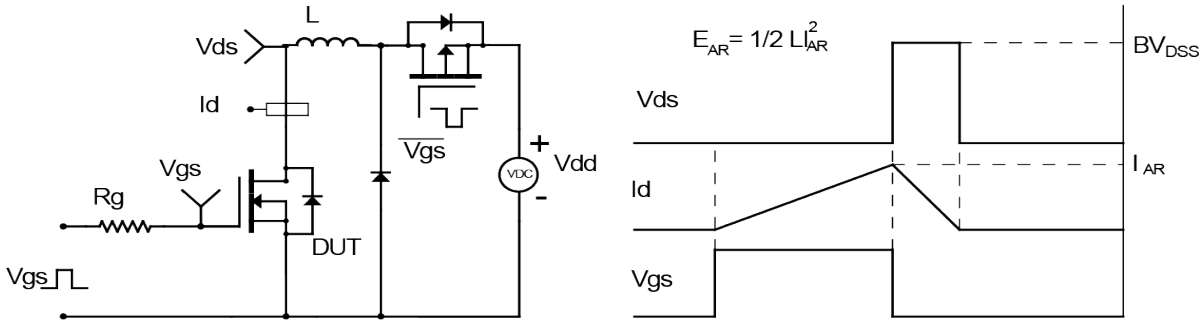


Figure3: Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

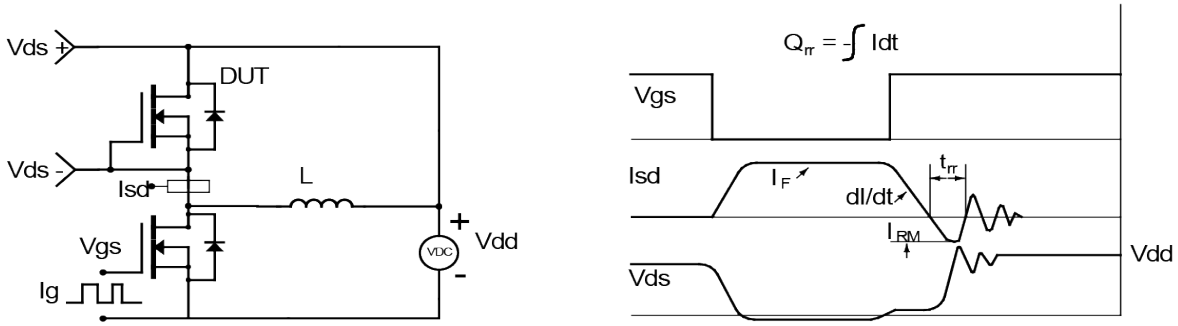
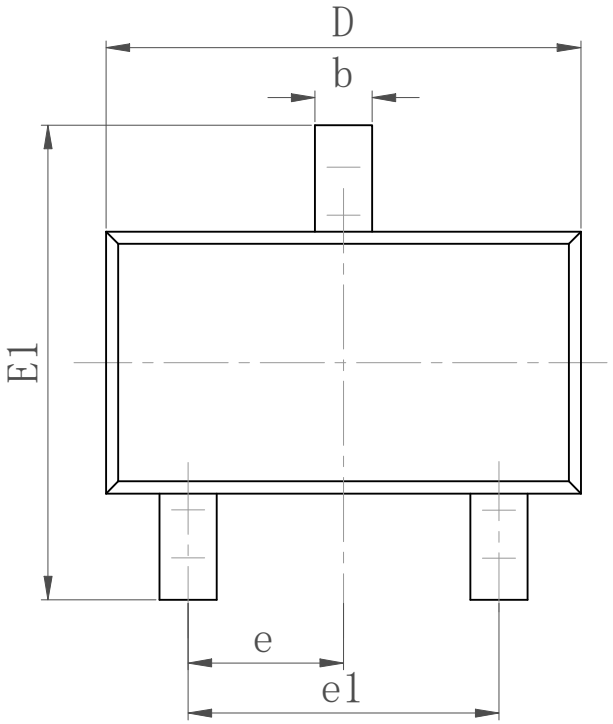
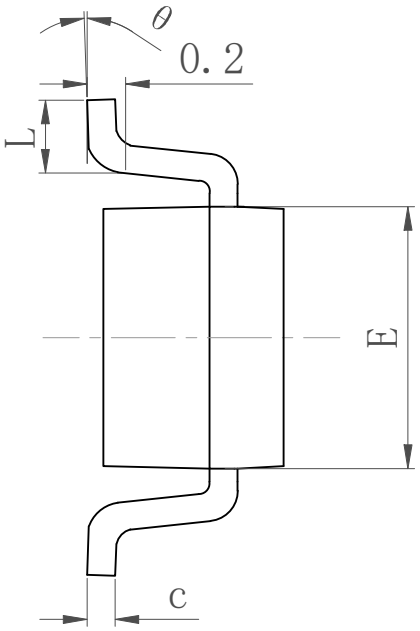


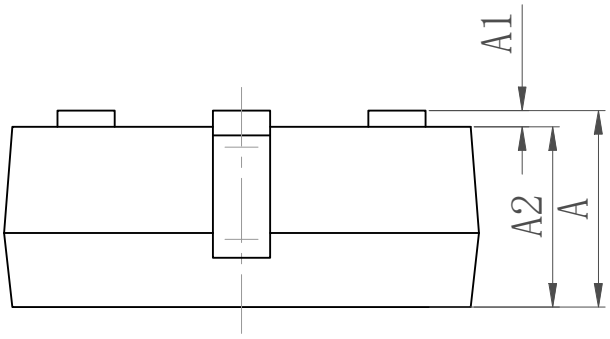
Figure4: Diode Recovery Test Circuit & Waveforms



TOP VIEW



SIDE VIEW



SIDE VIEW

SYMBOL	MILLIMETER	
	MIN	MAX
A	1.050	1.250
A1	0.000	0.100
A2	1.050	1.150
b	0.300	0.500
c	0.150	0.190
D	2.820	3.020
E	1.500	1.700
E1	2.650	2.950
e	0.950(BSC)	
e1	1.800	2.000
L	0.300	0.500
θ	0°	8°