SDM56AG04LV

40V SGT N-Channel MOSFETs

Rev B.0

Feature

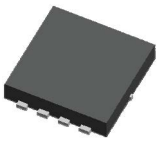
- Ultra-low $R_{DS(ON)}$
- Low Gate Charge
- High current Capability
- Enhanced body diode performance.
- Green product (RoHS compliant);100% lead free
- 100% UIS Tested, 100% Rg Tested
- AEC-Q101 qualified

Product Summary

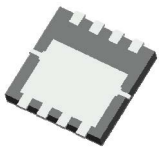
V_{DS}	40	V
$R_{DS(ON)\_Typ}$ (at V_{GS} =10V)	4.5	mΩ
$R_{DS(ON)\_Typ}$ (at V_{GS} =4.5V)	5.9	mΩ
I_D (at V_{GS} =10V) (1)	55	A

Type	Package	Marking	Outline	Media	Quantity (pcs)
SDM56AG04LV	PDFN3.3x3.3-8L	SL0406A	Tape	13-inch Reel	5000

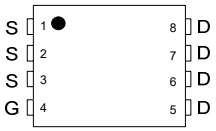
Top View

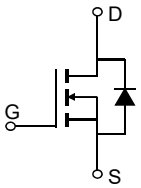


Bottom View



Pin Configuration
Top View





Absolute Maximum Ratings (Rating at T_A=25°C unless otherwise noted)

Parameter		Symbol	Maximum	Unit
Drain-Source Voltage		V_{DS}	40	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current (1)	T_C=25°C	I_D	55	A
	T_C=100°C		35	
Pulsed Drain Current (2)		I_{DM}	190	A
Avalanche Current (3)		I_{AS}	27	A
Avalanche Energy (3)		E_{AS}	36	mJ
Power Dissipation (4)	T_C=25°C	P_D	28	W
	T_C=100°C		11.1	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	I_D=250μA, V_{GS} =0V	40	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=40V, V_{GS} =0V	-	-	1	μA
		T_J=55°C	-	-	5	
I_{GSS}	Gate-Body Leakage Current	V_{DS}=0V, V_{GS} =±20V	-	-	±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}= V_{GS}, I_D=250μA	1.2	1.7	2.5	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=20A	-	4.5	5.6	mΩ
		V_{GS}=4.5V, I_D=15A	-	5.9	7.8	mΩ
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=20A	-	74	-	S
V_{SD}	Diode Forward Voltage	I_S=1A, V_{GS}=0V	-	0.69	1.0	V
I_S	Maximum Body-Diode Continuous Current		-	-	28	A
DYNAMIC PARAMETERS (5)						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=20V, f=1MHz	-	1203	-	pF
C_{oss}	Output Capacitance		-	535	-	pF
C_{rss}	Reverse Transfer Capacitance		-	51	-	pF
R_g	Gate Resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz	-	1.8	-	Ω
SWITCHING PARAMETERS (5)						
Q_g(10V)	Total Gate Charge	V_{GS}=0~10V, V_{DS}=20V, I_D=20A	-	17.5	-	nC
Q_g(4.5V)	Total Gate Charge		-	9.3	-	nC
Q_{gs}	Gate Source Charge		-	3.1	-	nC
Q_{gd}	Gate Drain Charge		-	4.3	-	nC
$t_{D(on)}$	Turn-On Delay Time	V_{GS}=10V,V_{DS}=20V,R_L=1.0Ω , R_{GEN}=6Ω	-	4.7	-	ns
t_r	Turn-On Rise Time		-	8.3	-	ns
$t_{D(off)}$	Turn-Off Delay Time		-	25	-	ns
t_f	Turn-Off Fall Time		-	15.3	-	ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=20A, di/dt=100A/μs	-	51	-	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=20A, di/dt=100A/μs	-	41	-	nC

Thermal Resistances

Symbol	Parameter	Typ	Max	Unit
$R_{\theta JC}$	Thermal resistance from junction to case	3.5	4.5	°C /W
$R_{\theta JA}$	Thermal resistance from junction to ambient	55	70	°C /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°C.

3. This single-pulse measurement was taken under the following condition [L=100μH, V_{GS}=10V, V_{DS}=20V] while its value is limited by T_{J_Max}=150°C.

4. The power dissipation P_D is based on T_{J_Max}=150°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

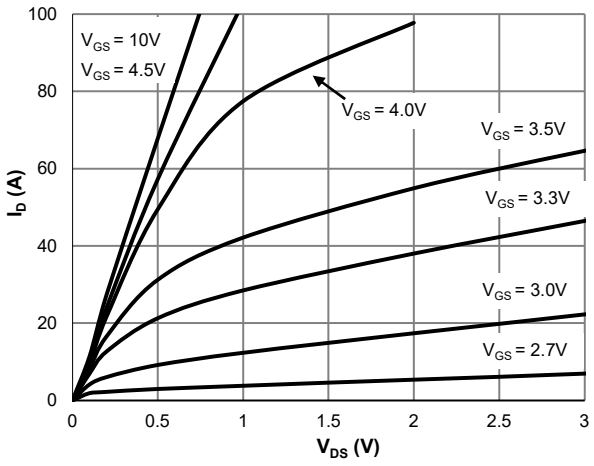


Figure 2: Transfer Characteristics

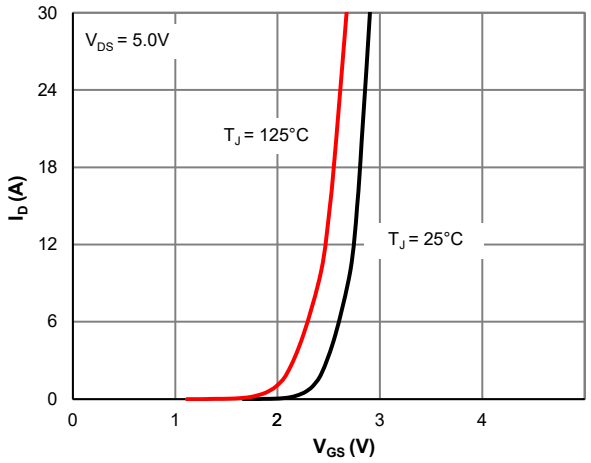


Figure 3: $R_{DS(ON)}$ vs. Drain Current

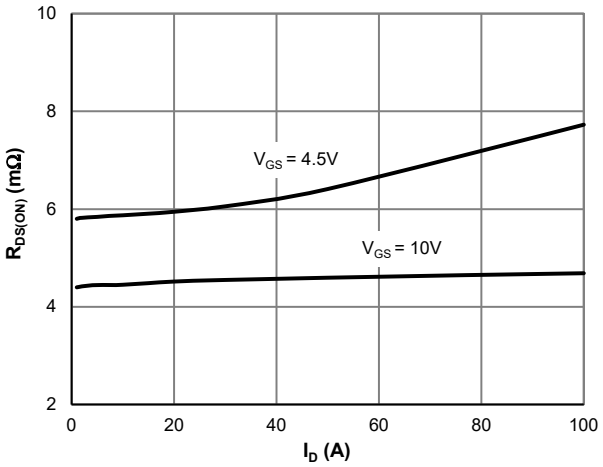


Figure 4: $R_{DS(ON)}$ vs. Junction Temperature

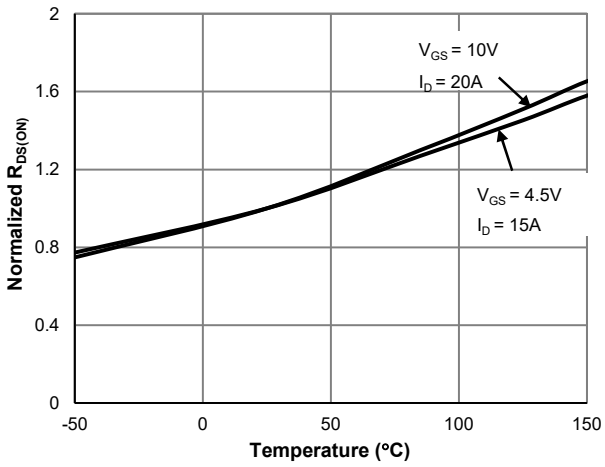


Figure 5: Body-Diode Characteristics

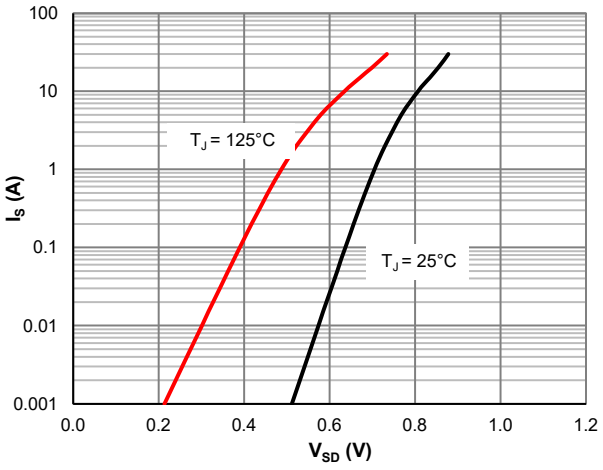
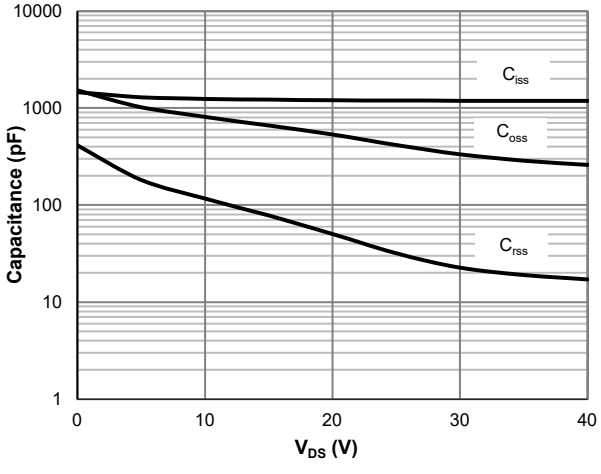


Figure 6: Capacitance characteristics



Typical Electrical and Thermal Characteristics

Figure 7: Current De-rating

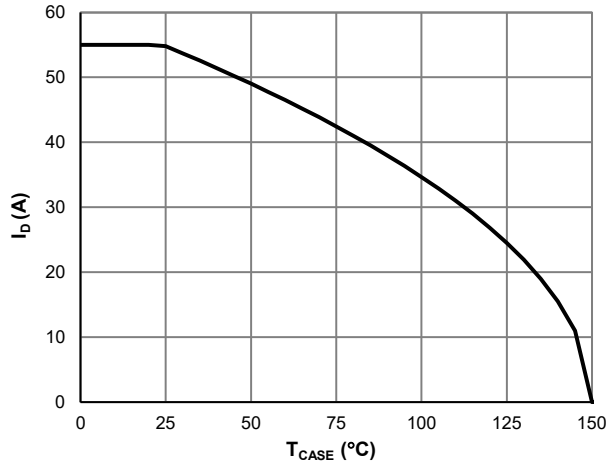


Figure 8: Power De-rating

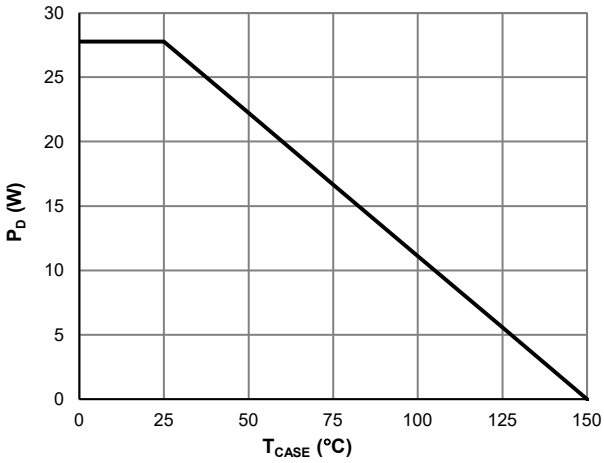


Figure 9: Maximum Safe Operating Area

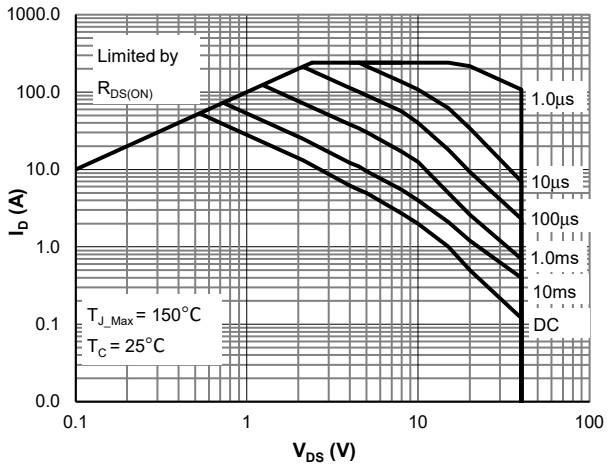


Figure 10: Single Pulse Power Rating, Junction-to-Case

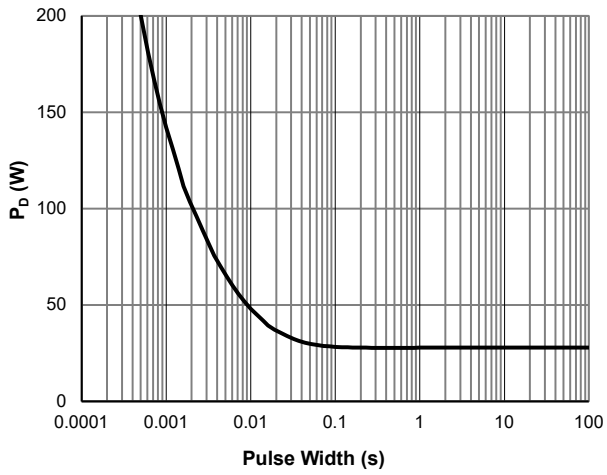


Figure 11: $R_{DS(ON)}$ vs. Gate-Source Voltage

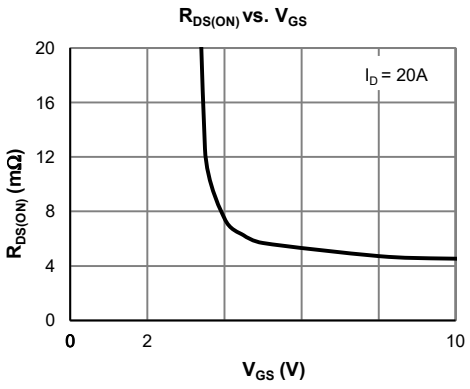
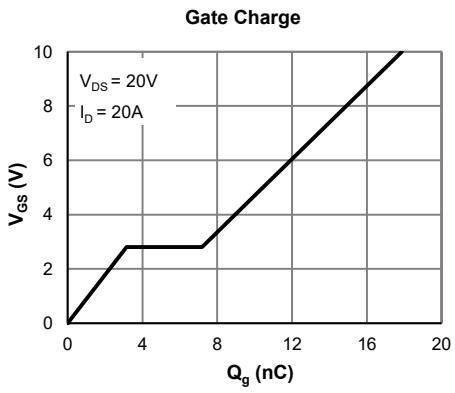
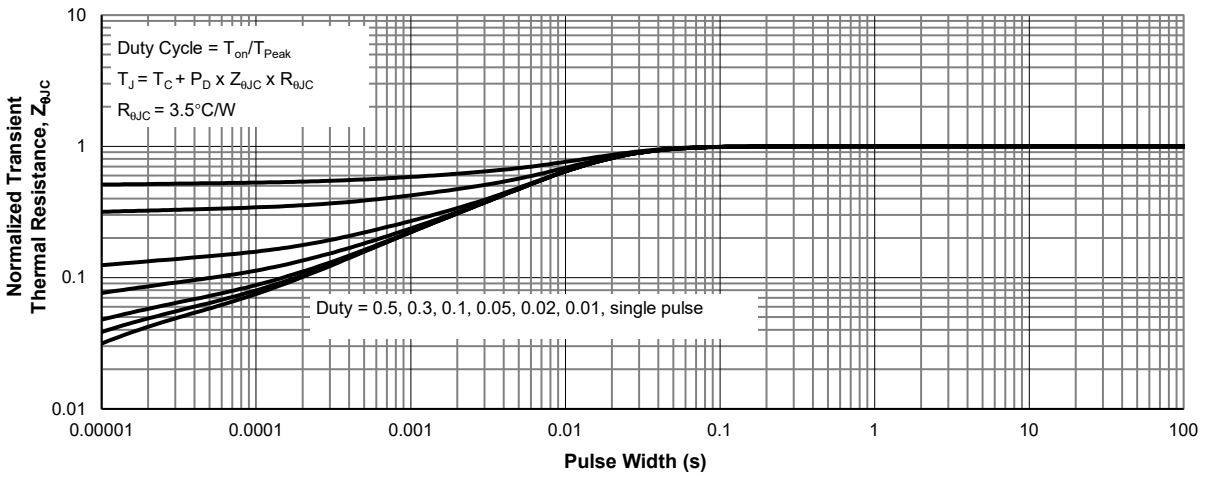


Figure 12: Gate-Charge characteristics



Typical Electrical and Thermal Characteristics

Figure 13: Normalized Maximum Transient Thermal Impedance



Test Circuit

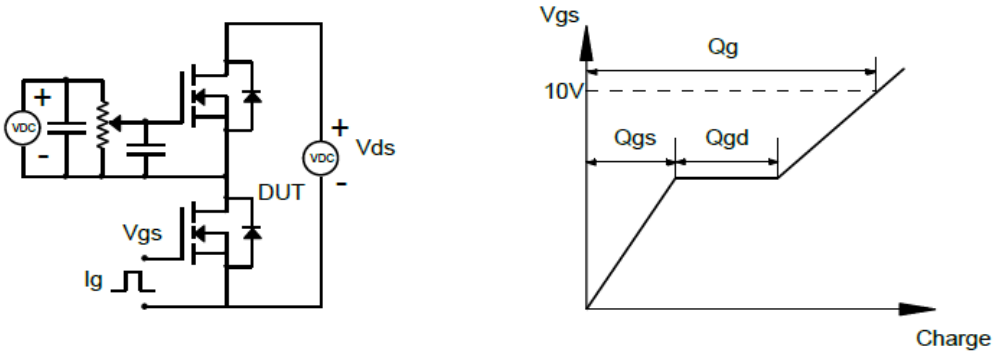


Figure1: Gate Charge Test Circuit & Waveforms

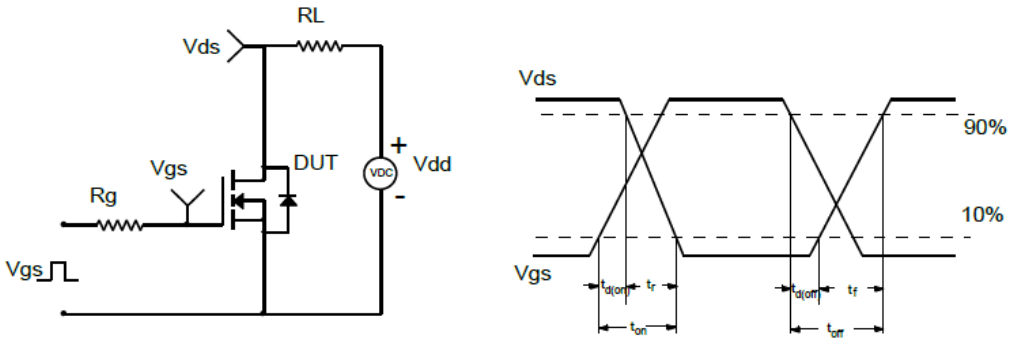


Figure2: Resistive Switching Test Circuit & Waveforms

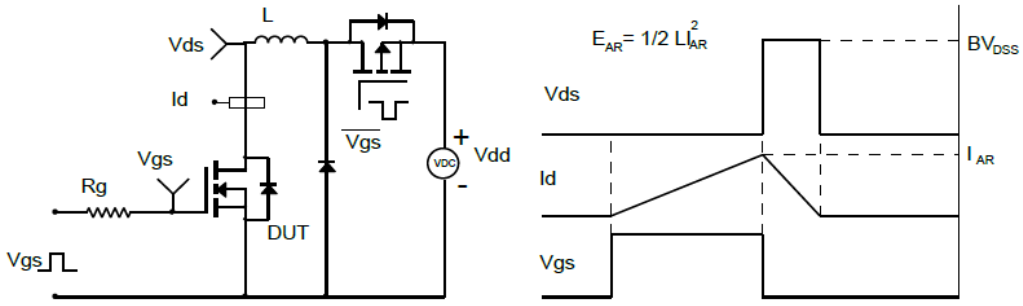


Figure3: Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

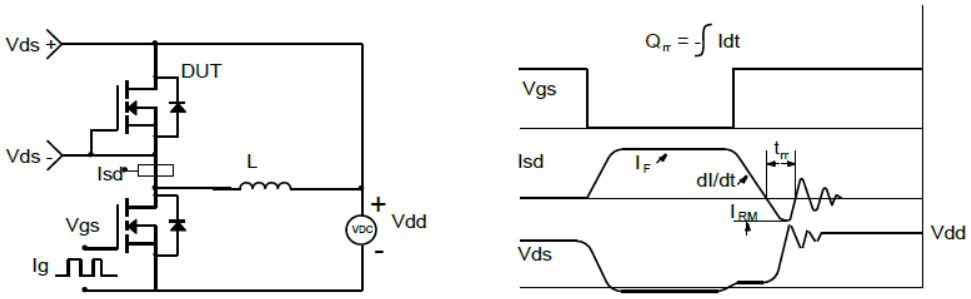
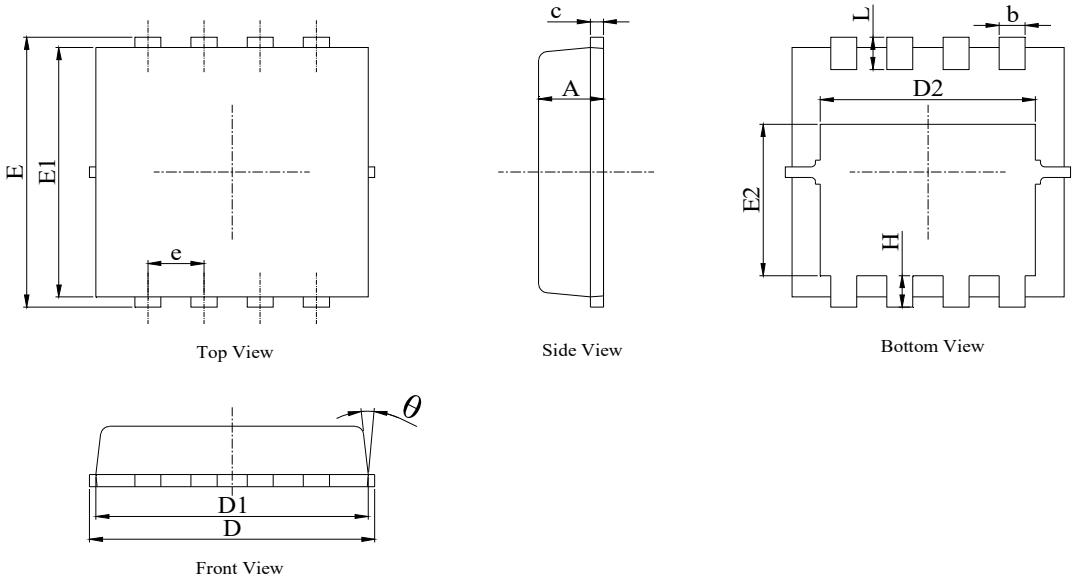


Figure4: Diode Recovery Test Circuit & Waveforms

PDFN3.3x3.3-8L Package Information

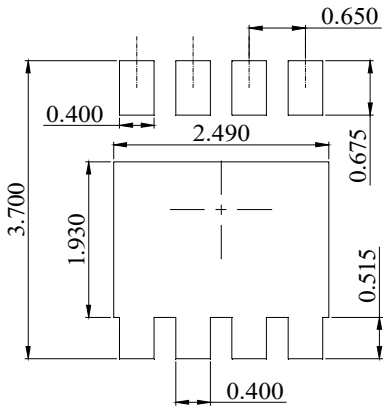
Package Outline



NOTES:
1. Dimension and tolerance per ASME Y14.5M, 1994.
2. All dimensions in millimeter (angle in degree).
3. Dimensions D1 and E1 do not include mold flash protrusions or gate burrs.

DIM.	MILLIMETER	
	MIN.	MAX.
A	0.70	0.85
b	0.25	0.35
c	0.10	0.25
D	3.15	3.40
D1	3.00	3.25
D2	2.25	2.59
E	3.20	3.45
E1	3.00	3.22
E2	1.48	1.98
e	0.65 BSC	
H	0.30	0.58
L	0.25	0.50
θ	---	15°

Recommend Footprint



DIMENSIONS: MILLIMETERS