9.5mΩ, 60V, N-Channel Power MOSFET SRT06N095L

General Description

The Sanrise SRT06N095L is a low voltage power MOSFET, fabricated using advanced split gate trench technology. The resulting device has extremely low on resistance, low gate charge and fast switching time, making it especially suitable for applications which require superior power density and synchronous rectification.

The SRT06N095L break down voltage is 60V and it has a high rugged avalanche characteristics.

The SRT06N095L is available in PDFN5*6 and SOP-8 and TO-252 and PDFN3.3*3.3 packages.

Features

- Optimized for Power Application, esp. Synchronous Rectifier
- Ultra Low $R_{DS(ON)}$

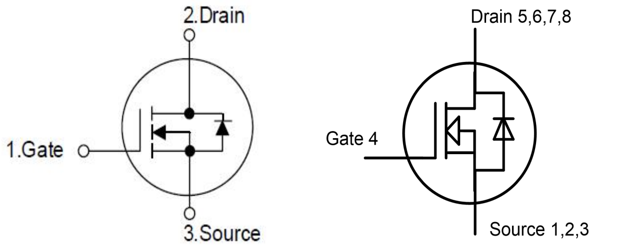
$R_{DS(ON)\_TYP}$ = 8.0mΩ,PDFN5*6@V_{GS} = 10V.
$R_{DS(ON)\_TYP}$ = 8.5mΩ,SOP8@V_{GS} = 10V.
$R_{DS(ON)\_TYP}$ = 9.0mΩ,TO-252@V_{GS} = 10V.
$R_{DS(ON)\_TYP}$ = 8.5mΩ, PDFN3.3*3.3@V_{GS} = 10V.

- Ultra Low Gate Charge, Qg=18.7nC typ.
- Fast switching capability
- Robust design with better EAS performance
- EMI Improved
- Non-automotive Qualified

Application

- PD
- Charger / Adapter
- DC/DC Converter
- Motor Driver

Symbol



TO-252 PDFN5*6 PDFN3.3*3.3 SOP-8

Figure 1 Symbol of SRT06N095L

Package Type

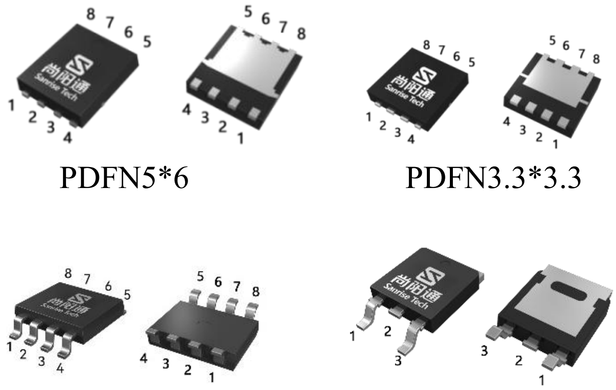


Figure 2 Package Type of SRT06N095L

Ordering Information

SRT06N095L□□-□

Circuit Type

Package
D56: PDFN5*6
M: SOP-8
D: TO-252
D33: PDFN3.3*3.3

E: Lead Free
G: Green

Blank: Tube
TR: Tape & Reel

Package	Part Number	Marking ID	Packing Type
PDFN5*6	SRT06N095LD56TR-G	SRT06N095LD56G	Tape & Reel
SOP-8	SRT06N095LMTR-G	06N095LMG	Tape & Reel
TO-252	SRT06N095LDTR-G	SRT06N095LDG	Tape & Reel
PDFN3.3*3.3	SRT06N095LD33TR-G	SRT06N095LD33G	Tape & Reel

Absolute Maximum Ratings

Parameter		Symbol	Rating		Unit
Drain-Source Voltage		V_{DSS}	60		V
Gate-Source Voltage		V_{GSS}	±20		V
Continuous Drain Current, Package Limited	T_C=25°C	I_D	PDFN5*6	44	A
	T_L=25°C		SOP8	14	
	T_C=25°C		TO-252	44	
	T_C=25°C		PDFN3.3*3.3	42	
	T_C=125°C		PDFN5*6	20	
	T_L=125°C		SOP8	6.2	
	T_C=125°C		TO-252	20	
	T_C=125°C		PDFN3.3*3.3	19	
Continuous Drain Current, Silicon	T_C=25°C		44		
Pulsed Drain Current (Note 2)		I_{DM}	PDFN5*6	176	A
			SOP8	56	
			TO-252	176	
			PDFN3.3*3.3	168	
Avalanche Energy, Single Pulse (Note 3)		E_{AS}	16		mJ
Avalanche Destructive Energy, Single Pulse (Note 4)		E_{AS_Limit}	100		mJ
Avalanche Energy, Repetitive (Note 2)		E_{AR}	0.1		mJ
Avalanche Current, Repetitive (Note 2)		I_{AR}	8.0		A
Continuous Diode Forward Current		I_S	44		A
Diode Pulse Current		$I_{S.PULSE}$	176		A
Max Power Dissipation		P_D	36.7		W
Operating Junction Temperature		T_J	150		°C
Storage Temperature		T_{STG}	-55 to 150		°C
Lead Temperature (Soldering, 10 sec)		T_{LEAD}	260		°C

Note:

1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.
2. Repetitive Rating: Pulse width limited by maximum junction temperature
3. I_{AS}= 8.0A, V_{DD}= 20V, R_G= 25Ω, Starting T_J= 25°C
4. I_{AS_Limit}= 20A, V_{DD}= 20V, R_G= 25Ω, Starting T_J= 25°C

Thermal Resistance

Parameter		Symbol	Min	Typ	Max	Unit
Thermal Resistance，Junction-to-Case	PDFN5*6	R_{thJC}			3.4	°C/W
Thermal Resistance，Junction-to-Lead	SOP8	R_{thJL}			32	
Thermal Resistance，Junction-to-Case	TO-252	R_{thJC}			3.2	
Thermal Resistance，Junction-to-Case	PDFN3.3*3.3	R_{thJC}			3.4	
Thermal Resistance，Junction-to-Ambient	PDFN5*6	R_{thJA}			50	
Thermal Resistance，Junction-to-Ambient	SOP8	R_{thJA}			80	
Thermal Resistance，Junction-to-Ambient	TO-252	R_{thJA}			62	
Thermal Resistance，Junction-to-Ambient	PDFN3.3*3.3	R_{thJA}			50	

Electrical Characteristics

T_J = 25℃, unless otherwise specified.

Parameter		Symbol	Test Conditions	Min	Typ	Max	Unit
Statistic Characteristics							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V, I_D=250uA	60			V
Zero Gate Voltage Drain Current		I_{DSS}	V_{DS}=60V, V_{GS}=0V			1	uA
Gate-Body Leakage Current	Forward	I_{GSSF}	V_{GS}=20V, V_{DS}=0V			100	nA
	Reverse	I_{GSSR}	V_{GS}=-20V, V_{DS}=0V			-100	
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=0.25mA	1.2	1.7	2.4	V
Static Drain-Source On-Resistance	PDFN5*6	$R_{DS(ON)}$	V_{GS}=10V, I_D=20A		8.0	9.5	mΩ
	SOP8				8.5	10.0	
	TO-252				9.0	10.5	
	PDFN3.3*3.3				8.5	10.0	
	PDFN5*6		V_{GS}=4.5V, I_D=10A		10.3	15	
	SOP8				10.8	15	
	TO-252				11.3	15	
	PDFN3.3*3.3				10.8	15	
Gate Resistance		R_G	f=1MHz, Open Drain		1.4		Ω
Dynamic Characteristics							
Input Capacitance		C_{ISS}	V_{DS}=30V, V_{GS}=0V, f=1MHz		1.08		nF
Output Capacitance		C_{OSS}			300		pF
Reverse Transfer Capacitance		C_{RSS}			13		pF
Effective output capacitance, energy related NOTE5		$C_{O(er)}$	V_{GS}=0V, V_{DS}=0…48V		300		pF
Effective output capacitance, time related NOTE6		$C_{O(tr)}$			420		
Turn-on Delay Time		$t_{d(on)}$	V_{DD}=30V, I_D=20A R_G=1.6Ω, V_{GS}=10V		5		ns
Rise Time		t_r			4		
Turn-off Delay Time		$t_{d(off)}$			18		
Fall Time		t_f			5		
Gate Charge Characteristics							
Gate to Source Charge		Q_{gs}	V_{DD}=30V, I_D=20A V_{GS}=0 to 10V		3.1		nC
Gate to Drain Charge		Q_{gd}			3.4		
Gate Charge Total		Q_g			18.7		
Gate Plateau Voltage		$V_{plateau}$			2.9		V
Gate Charge Total, sync FET		Q_g	V_{DD}=0.1V, V_{GS}=0 to 10V		16.4		nC
Reverse Diode Characteristics							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V, I_{SD}=20A		0.87	1.0	V
Reverse Recovery Time		t_{rr}	V_R=30V, I_F=20A dI$_F$/dt=100A/us		23		ns
Reverse Recovery Charge		Q_{rr}			17		nC
Peak Reverse Recovery Current		I_{rrm}			1.5		A

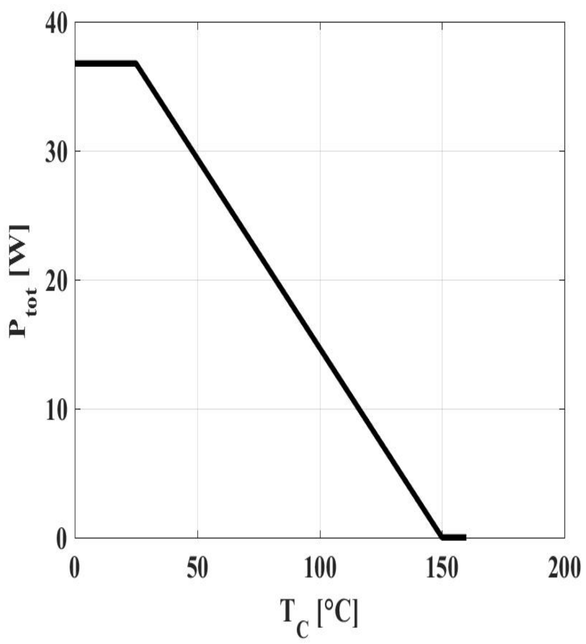
Note:

5. $C_{O(er)}$ is a fixed capacitance that gives the same stored energy as C_{OSS} while V_{DS} is rising from 0 to 48V

6. $C_{O(tr)}$ is a fixed capacitance that gives the same charging time as C_{OSS} while V_{DS} is rising from 0 to 48V

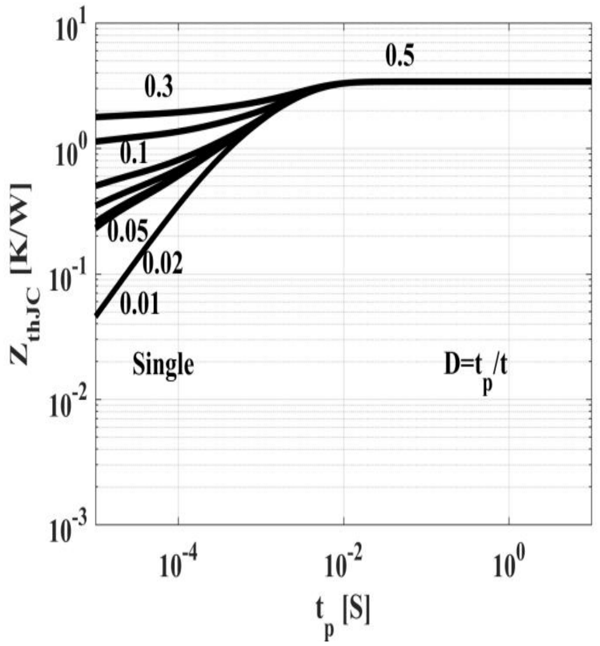
Typical Performance Characteristics (PDFN5*6)

Figure 3: Power Dissipation



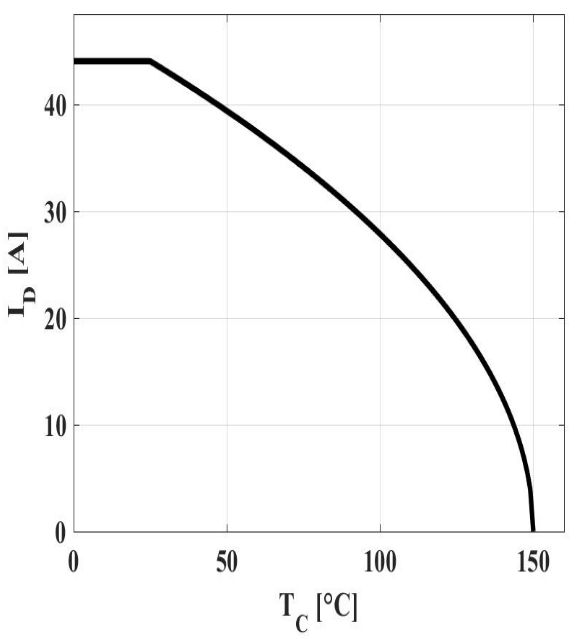
$P_{tot}=f(T_c)$

Figure 4: Max. Transient Thermal Impedance



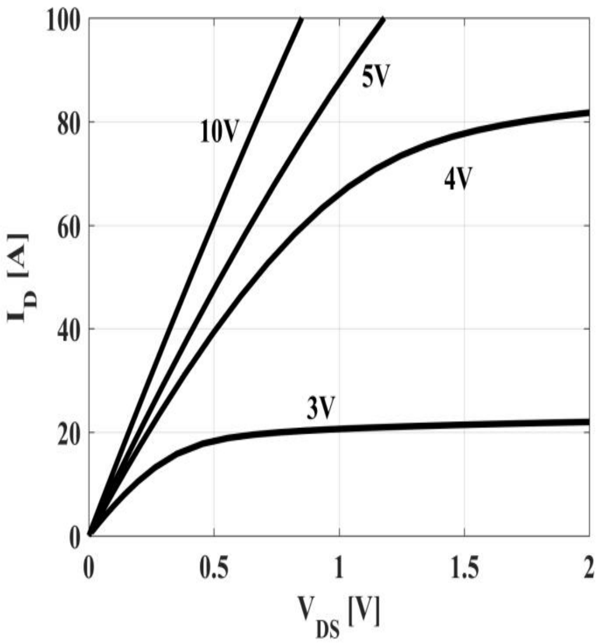
$Z_{(thJC)}=f(t_p)$; parameter: $D=t_p/T$

Figure5: Drain Current



$I_D=f(T_C)$;$V_{GS}\geq 10V$

Figure6: Typ. Output Characteristics



$I_D=f(V_{DS})$;Tj=25°C; parameter: V_{GS}

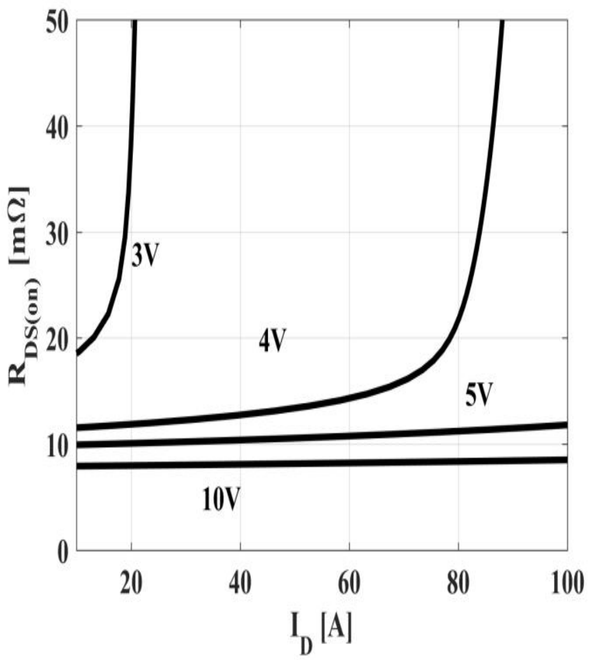
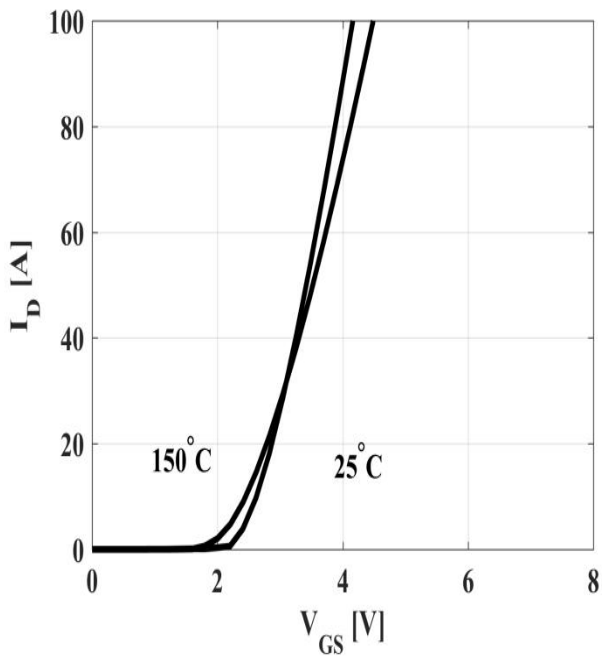
Figure7: Typ. Drain-Source On-State Resistance	Figure8: Typ. Transfer Characteristics
	
$R_{DS(ON)}=f(I_D)$;$T_j=25°C$; parameter: V_{GS}	$I_D=f(V_{GS})$; $\|V_{DS}\|>2\|I_D\|R_{DS(on)max}$; parameter: T_j

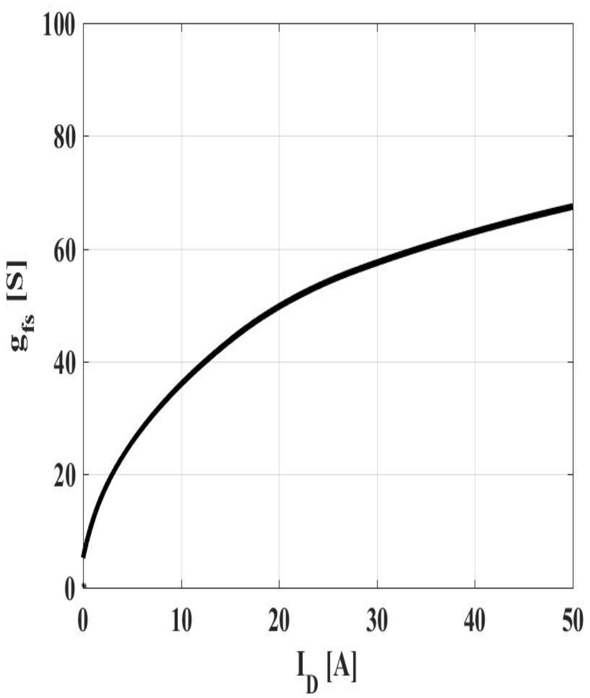
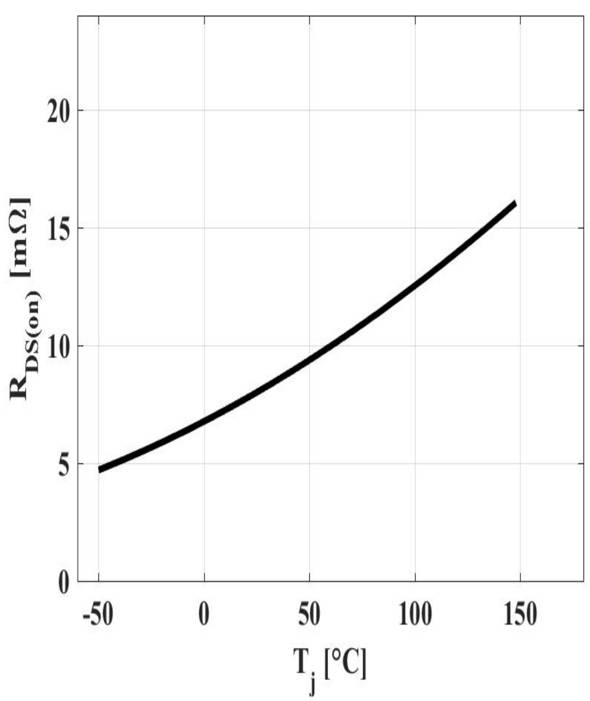
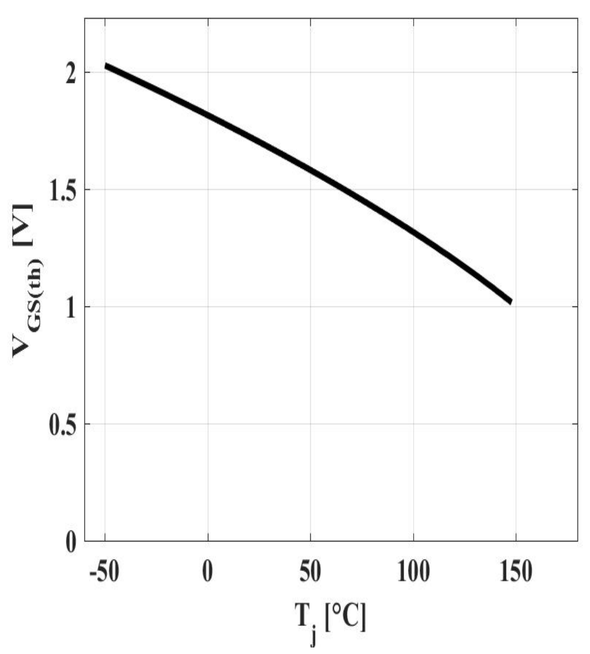
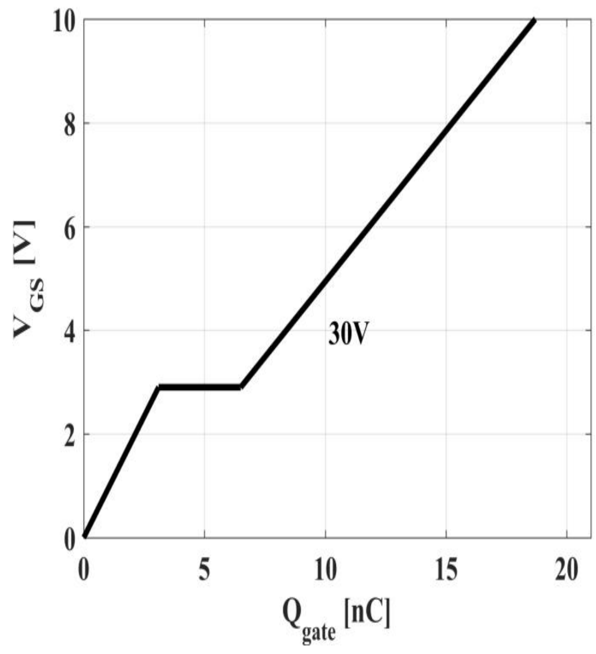
Figure9: Typ. Forward Transconductance	Figure10: Typ. Drain-Source On-State Resistance
	
$g_{fs}=f(I_D)$; $T_j=25°C$	$R_{DS(ON)}=f(T_j)$;$I_D=20A$;$V_{GS}=10V$

Figure11: Typ. Gate Threshold Voltage



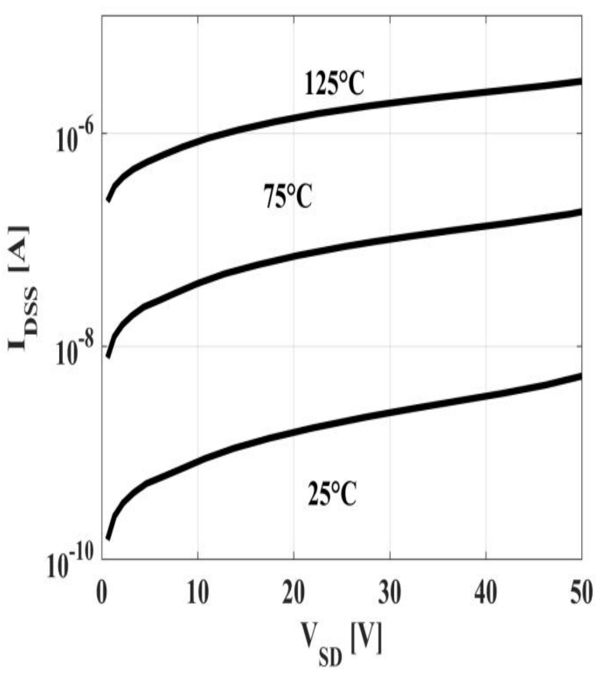
$V_{GS(th)}=f(T_j)$; $V_{GS}=V_{DS}$; $I_{DS}=250\mu A$

Figure 12: Typ. Gate Charge



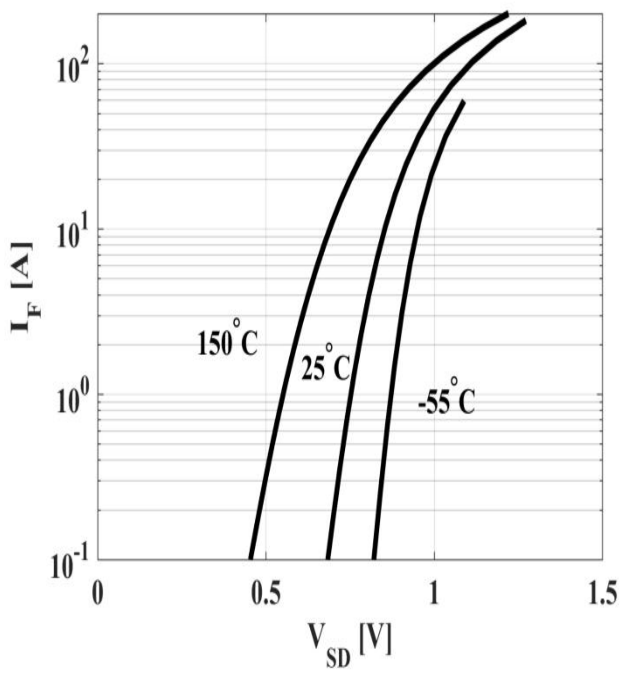
$V_{GS}= f(Q_{gate})$, $I_D=20A$ pulsed

Figure 13: Drain-Source Leakage Current



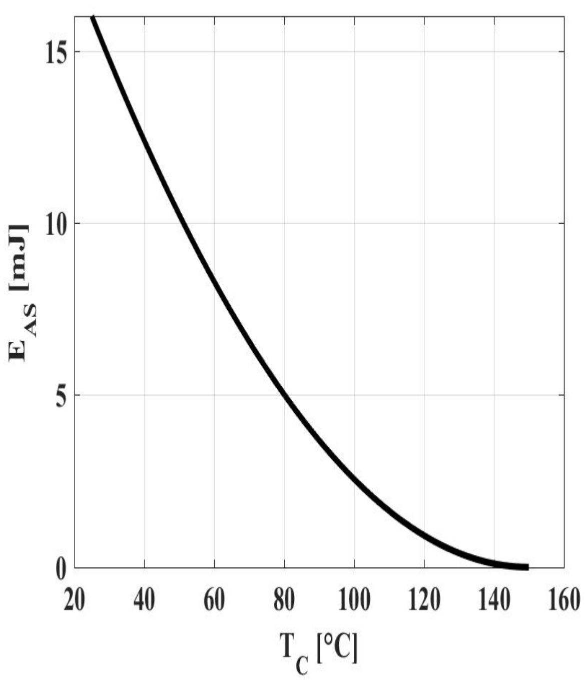
$I_{DSS}=f(V_{DS})$; $V_{GS}=0V$; parameter: T_j

Figure 14: Forward Characteristics of Reverse Diode



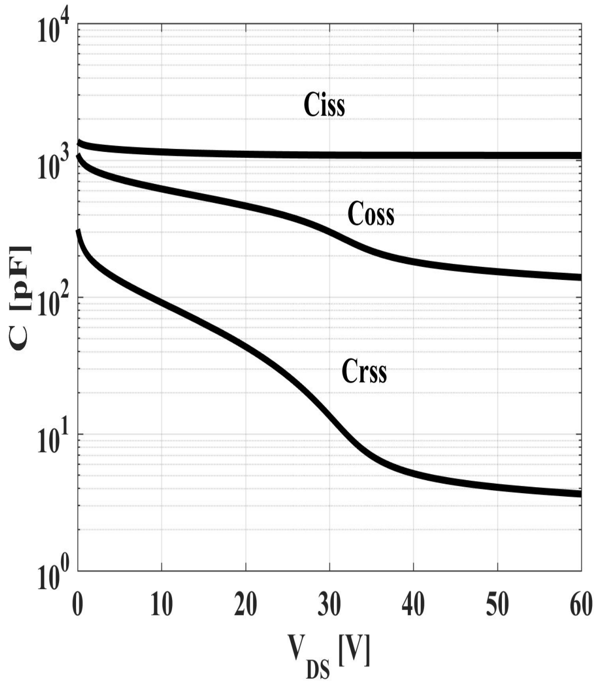
$I_F=f(V_{SD})$; parameter: T_j

Figure 15: Avalanche Energy



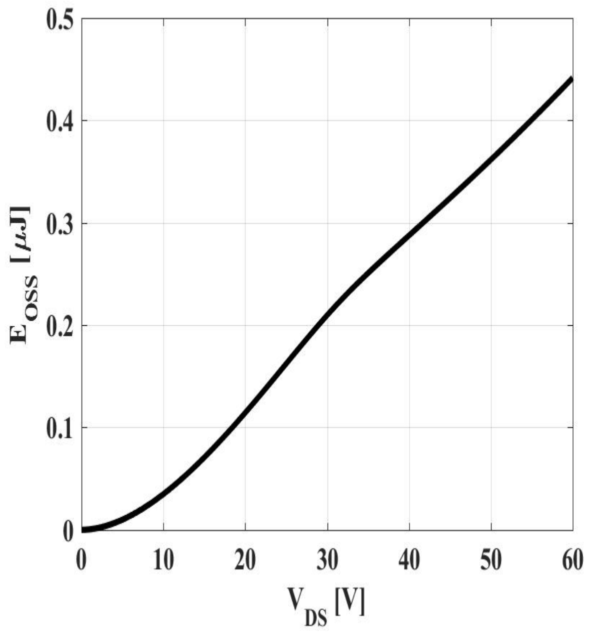
E_{AS}=f(T_j);I_D=8.0A; V_{DD}=20V

Figure 16: Typ. Capacitances



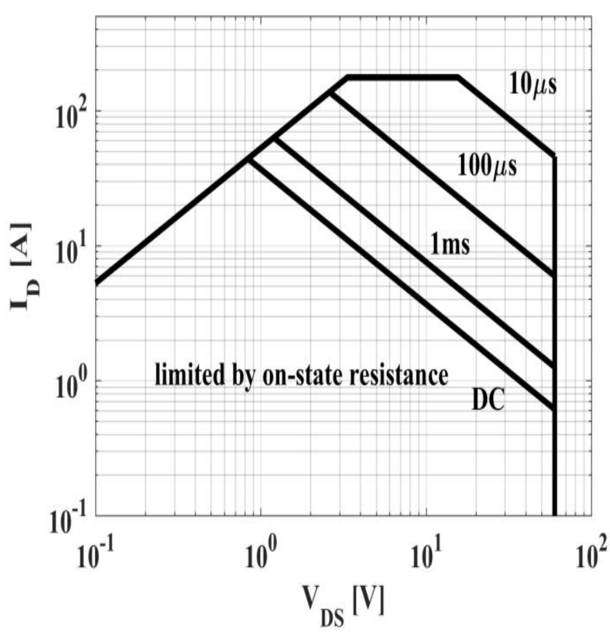
C=f(V_{DS}); V_{GS}=0; f=1MHz

Figure 17: C_{OSS} Stored Energy



E_{OSS}=f(V_{DS})

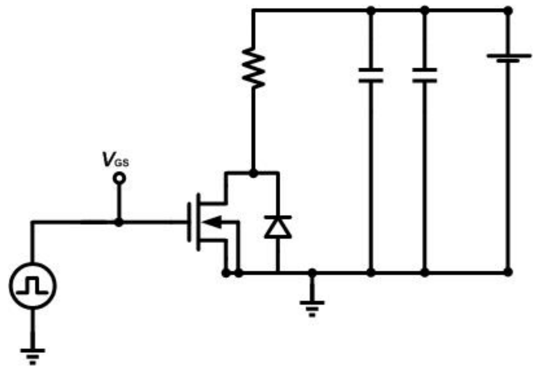
Figure 18: Safe Operating Area

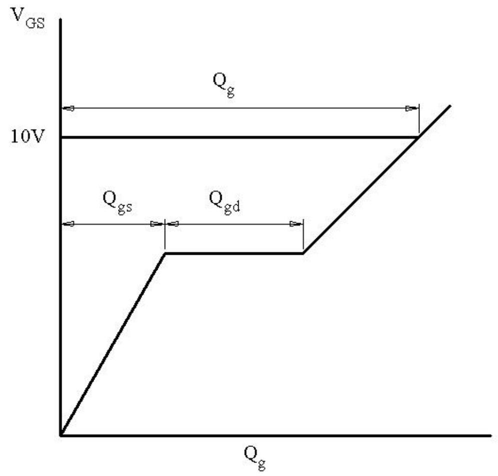


I_D = f(V_{DS}); T_c= 25ºC; V_{GS}>7V; parameter t_p

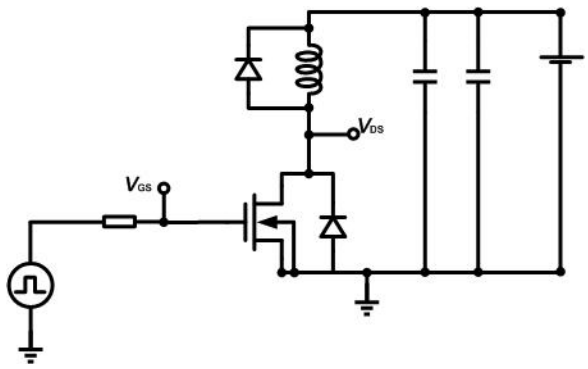
Test Circuits

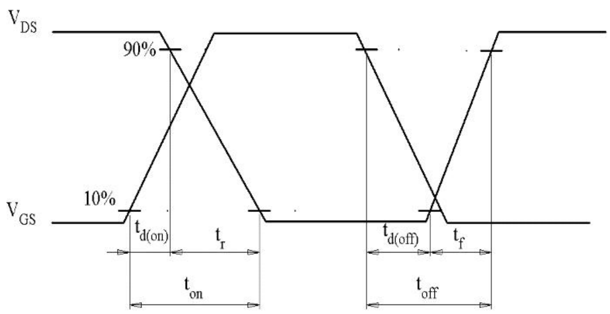
1. Gate Charge Test Circuit & Waveform



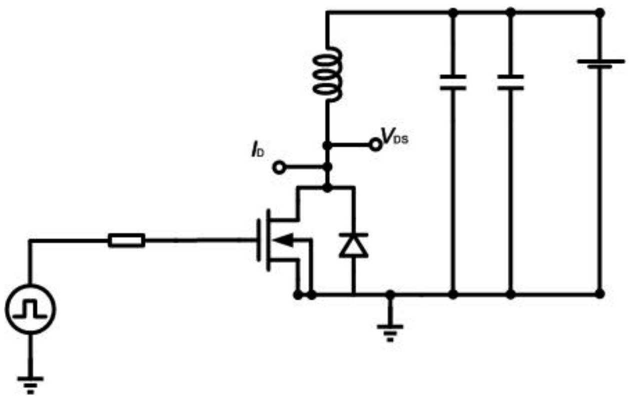


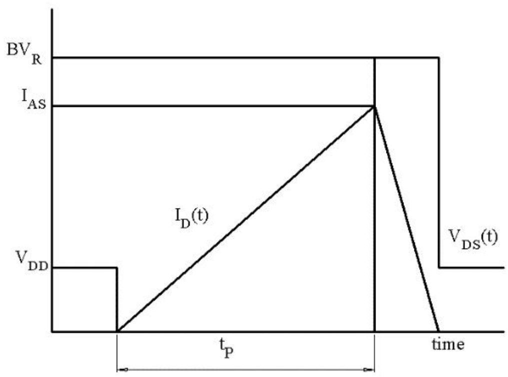
2. Switch Time Test Circuit



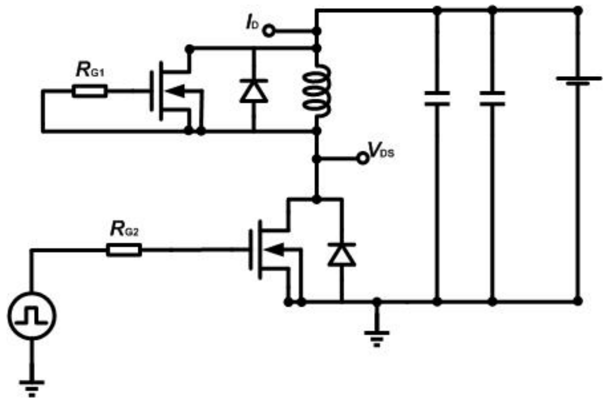


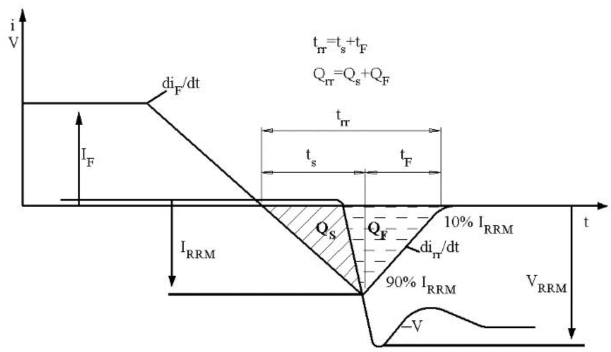
3. Unclamped Inductive Switching Test Circuit & Waveforms





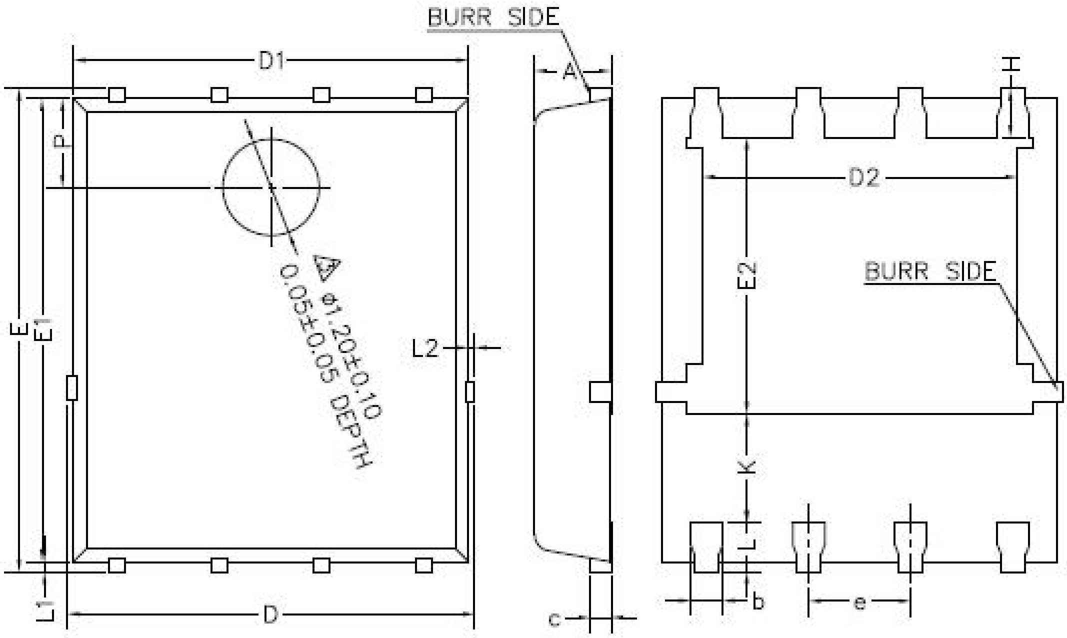
4. Test Circuit and Waveform for Diode Characteristics

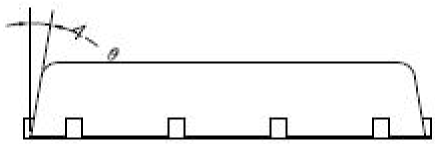




Mechanical Dimensions

PDFN5*6-8 **Unit: mm**

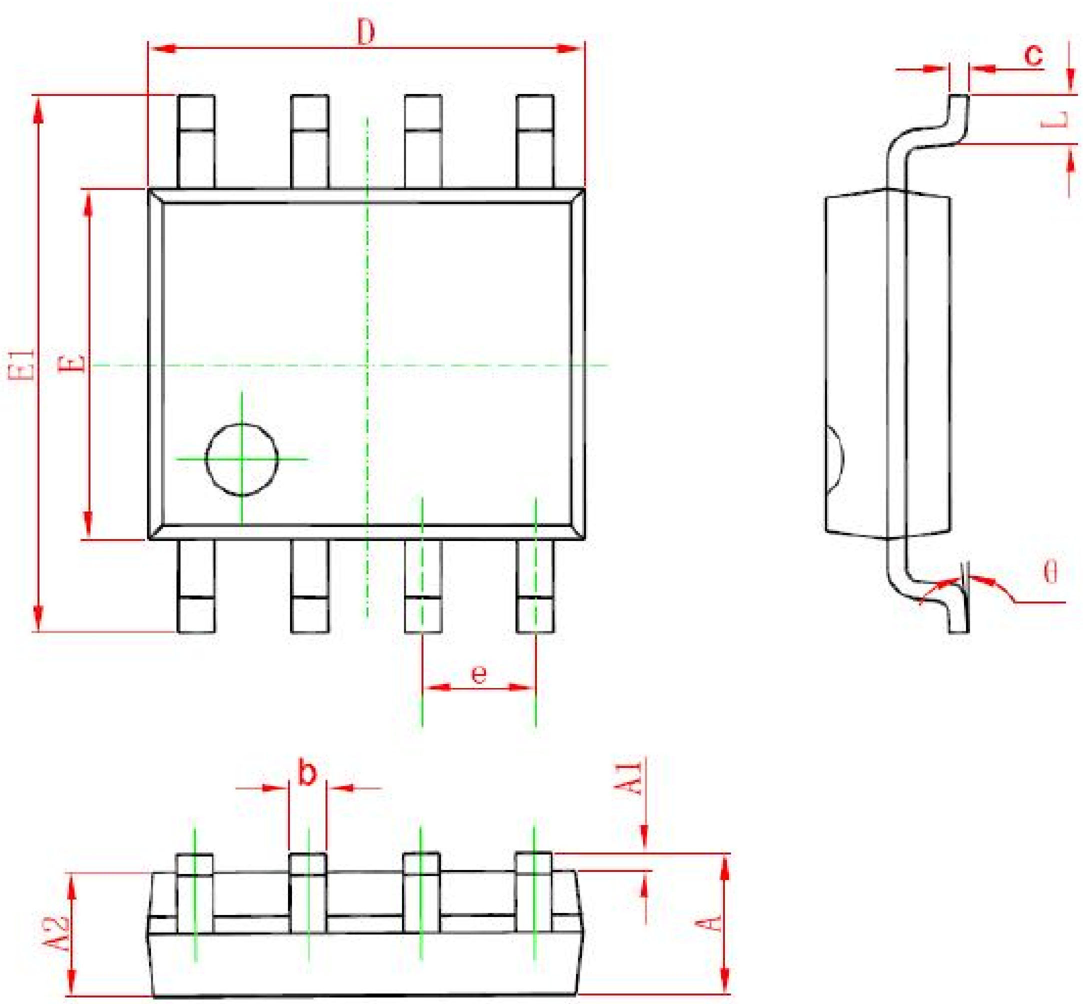




Symbol	Dimensions(mm)		
	Min.	Typ.	Max.
A	0.90	1.10	1.20
b	0.35	0.40	0.45
c	0.21	0.25	0.34
D			5.10
D1	4,80	4.90	5.00
D2	3.91	4.01	4.11
e	1.17	1.27	1.37
E	5.90	6.00	6.10
E1	5.70	5.75	5.80
E2	3.34	3.44	3.54
H	0.51	0.61	0.71
K	1.10		
L	0.51	0.61	0.71
L1	0.06	0.13	0.20
L2			0.10
P	1.00	1.10	1.20
θ	8º	10º	12º

Mechanical Dimensions

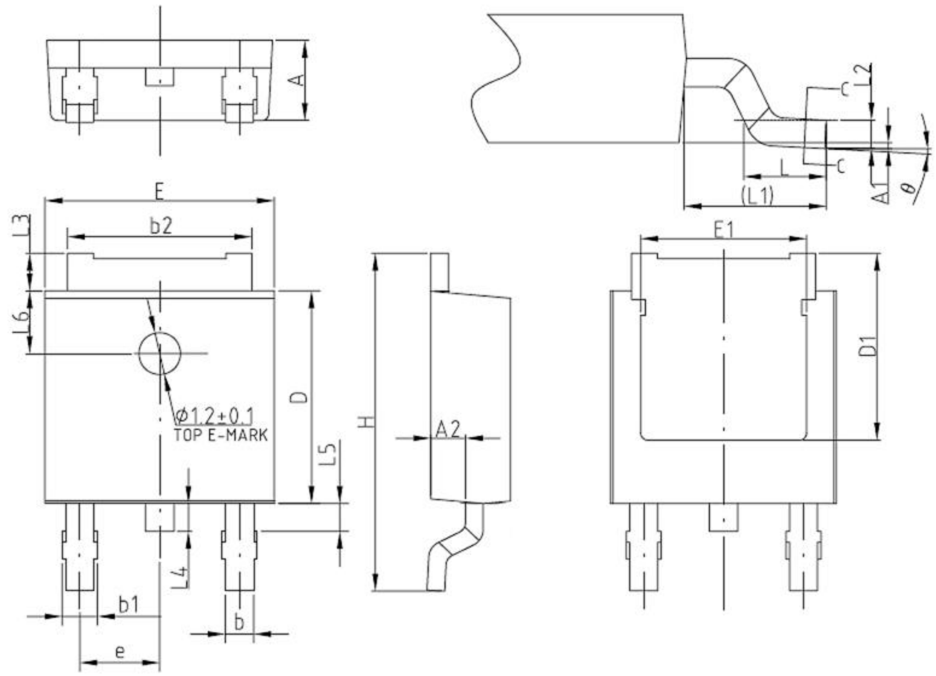
SOP-8 **Unit: mm**



Symbol	Dimensions(mm)		
	Min.	Typ.	Max.
A	1.35	1.55	1.75
A1	0.05	0.15	0.25
A2	1.25	1.40	1.65
b	0.31	-	0.51
c	0.10	-	0.26
D	4.70	4.90	5.15
E	3.70	3.90	4.10
E1	5.80	6.00	6.20
e	1.27(BSC)		
L	0.40	-	1.27
θ	0°	-	8°

Mechanical Dimensions

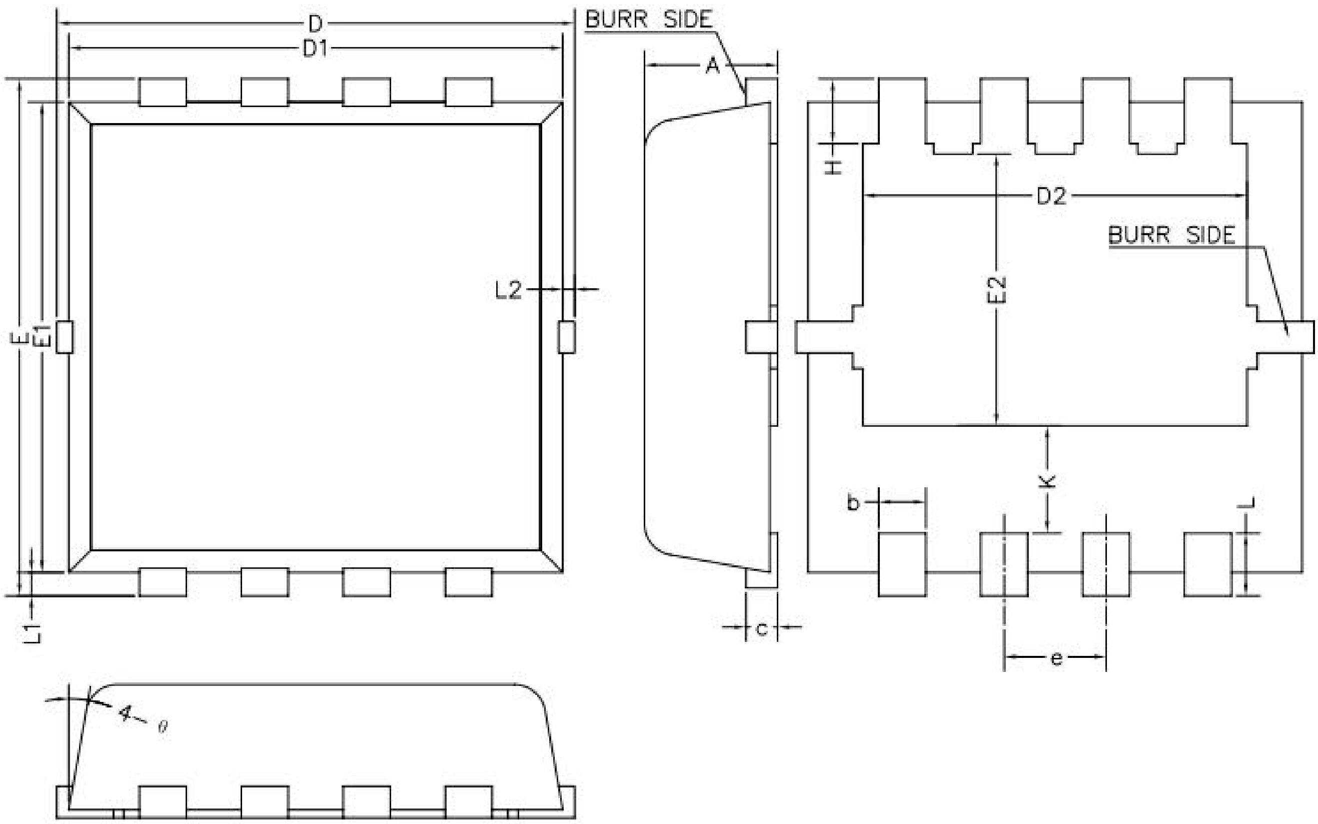
TO-252 **Unit: mm**



Symbol	Dimensions(mm)		
	Min.	Typ.	Max.
A	2.20	2.30	2.40
A1	0	-	0.10
A2	0.90	1.00	1.17
b	0.70	0.76	0.90
b1	0.77	-	1.10
b2	5.13	5.33	5.46
c	0.45	-	0.60
D	5.95	6.10	6.25
D1	-	5.30	-
E	6.45	6.60	6.75
E1	-	4.80	-
e	2.286(BSC)		
H	9.70	10.10	10.40
L	1.25	1.50	1.75
L1	-	2.90	-
L2	-	0.51	-
L3	0.90	-	1.25
L4	-	0.80	-
L5	-	1.00	-
L6	-	1.80	-
θ	0°	-	8°

Mechanical Dimensions

PDFN3.3*3.3-8 **Unit: mm**



Symbol	Dimensions (mm)			Symbol	Dimensions (mm)		
	Min.	Typ.	Max.		Min.	Typ.	Max.
A	0.70	0.80	0.90	E1	2.90	3.00	3.10
b	0.25	0.30	0.35	E2	1.64	1.74	1.84
c	0.14	0.15	0.20	H	0.32	0.42	0.52
D	3.10	3.30	3.50	K	0.59	0.69	0.79
D1	3.05	3.15	3.25	L	0.25	0.40	0.55
D2	2.35	2.45	2.55	L1	0.10	0.15	0.20
e	0.55	0.65	0.75	L2	-	-	0.15
E	3.10	3.30	3.50	θ	8°	10°	12°

TM
Sanrise Tech
尚阳通

Sanrise Technology Limited Company

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IMPORTANT NOTICE

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