23mΩ, 100V, N-Channel Power MOSFET SRT10N230L

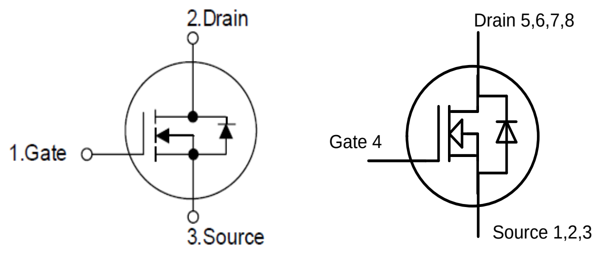
General Description

The Sanrise SRT10N230L 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 SRT10N230L break down voltage is 100V and it has a high rugged avalanche characteristics.

The SRT10N230L is available in DFN5*6 and SOP-8 and TO-252 packages.

Symbol



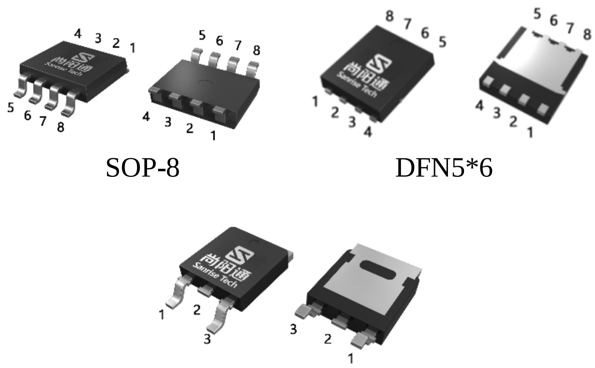
TO-252 PDFN5*6 SOP-8

Figure 1 Symbol of SRT10N230L

Features

- Ultra Low $R_{DS(ON)\_TYP}$ = 18.5mΩ@V_{GS} = 10V.
- Ultra Low Gate Charge, Qg=11.3nC typ.
- Fast switching capability
- Robust design with better EAS performance
- Features Add Non-automotive Qualified

Package Type



SOP-8 DFN5*6

TO-252

Figure 2 Package Type of SRT10N230L

Application

- Charger/Adapter
- DC/DC Power Supply
- E-Tools
- BMS

Ordering Information

SRT10N230L□□–□

- Circuit Type: SRT10N230L
- Package: D56: PDFN5*6; M: SOP-8; D: TO-252
- Blank: Tube; TR: Tape & Reel
- E: Lead Free; G: Green

Package	Part Number	Marking ID	Packing Type
	Green	Green	
SOP-8	SRT10N230LMTR-G	10N230LMG	Tape & Reel
PDFN5*6	SRT10N230LD56TR-G	SRT10N230LD56G	Tape & Reel
TO-252	SRT10N230LDTR-G	SRT10N230LDG	Tape&Reel

Absolute Maximum Ratings

Parameter		Symbol	Rating		Unit
Drain-Source Voltage		V_{DSS}	100		V
Gate-Source Voltage		V_{GSS}	±20		V
Continuous Drain Current	T_C=25°C	I_D	DFN5*6	29	A
	T_A=25°C		SOP8	5.9	
	T_C=25°C		TO-252	30	
	T_C=100°C		DFN5*6	18	
	T_A=100°C		SOP8	3.7	
	T_C=100°C		TO-252	19	
Pulsed Drain Current (Note 2) (DFN5*6)		I_{DM}	87		A
Power Dissipation (T_C = 25°C)		P_D	36		W
Avalanche Destructive Energy, Single Pulse (Note 4)		E_{AS_Limit}	56.25		mJ
Avalanche Energy, Single Pulse (Note 3)		E_{AS}	12.25		mJ
Avalanche Energy, Repetitive (Note 2)		E_{AR}	0.1		mJ
Avalanche Current, Repetitive (Note 2)		I_{AR}	13		A
Continuous Diode Forward Current		I_S	29		A
Diode Pulse Current		$I_{S.PULSE}$	87		A
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}= 7.0A, V_{DD}= 50V, R_G= 25Ω, Starting T_J= 25°C
4. I_{AS_Limit}= 15.0A, V_{DD}= 50V, 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}			25	°C/W
Thermal Resistance，Junction-to-Case	TO-252	R_{thJC}			3.1	°C/W
Thermal Resistance，Junction-to-Ambient	PDFN5*6	R_{thJA}			62	°C/W
Thermal Resistance，Junction-to-Ambient	SOP8	R_{thJA}			80	°C/W
Thermal Resistance，Junction-to-Ambient	TO-252	R_{thJA}			62	°C/W

Electrical Characteristics

T_J = 25℃, unless otherwise specified.

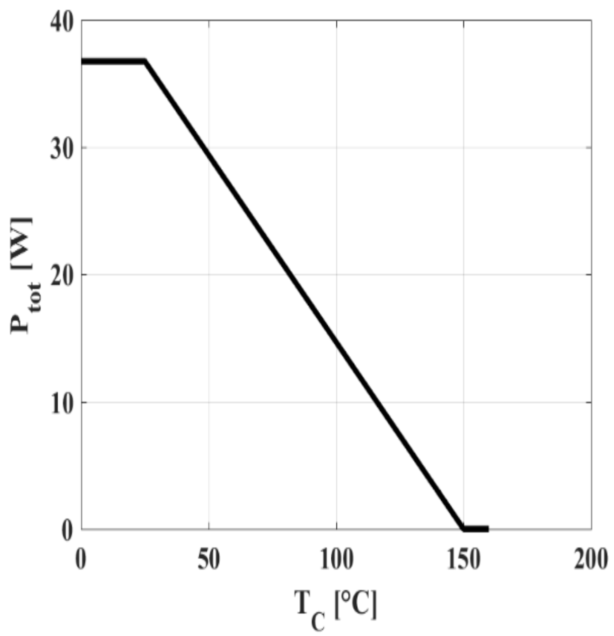
Parameter		Symbol	Test Conditions	Min	Typ	Max	Unit
Statistic Characteristics							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V, I_D=250uA	100			V
Zero Gate Voltage Drain Current		I_{DSS}	V_{DS}=100V, V_{GS}=0V			1	uA
Gate-Body Leakage Current	Forward	I_{GSSF}	V_{GS}=20V, V_{DS}=0V			100	nA
	Reverse	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	1.8	2.4	V
Static Drain-Source On-Resistance		$R_{DS(ON)}$	V_{GS}=4.5V, I_D=15A		25.9	34	mΩ
Static Drain-Source On-Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=15A		18.5	23	mΩ
Gate Resistance		R_G	f=1MHz, Open Drain		1.3		Ω
Dynamic Characteristics							
Input Capacitance		C_{ISS}	V_{DS}=50V, V_{GS}=0V, f=1MHz		749		pF
Output Capacitance		C_{OSS}			218		pF
Reverse Transfer Capacitance		C_{RSS}			4		pF
Effective output capacitance, energy related NOTE5		$C_{O(er)}$	V_{GS}=0V, V_{DS}=0…60V		295		pF
Effective output capacitance, time related NOTE6		$C_{O(tr)}$			347		
Turn-on Delay Time		$t_{d(on)}$	V_{DD}=50V, I_D=15A R_G=3.0Ω, V_{GS}=10V		5.6		nS
Rise Time		t_r			4.1		
Turn-off Delay Time		$t_{d(off)}$			12.1		
Fall Time		t_f			2.8		
Gate Charge Characteristics							
Gate to Source Charge		Q_{gs}	V_{DD}=50V, I_D=15A V_{GS}=0 to 4.5V		2.4		nC
Gate to Drain Charge		Q_{gd}			2.0		
Gate Charge Total		Q_g			5.6		
Gate Charge Total		Q_g	V_{DD}=50V, I_D=15A V_{GS}=0 to 10V		11.3		nC
Gate Charge Total, sync FET		Q_g	V_{DD}=0.1V, V_{GS}=0 to 10V		10.0		nC
Reverse Diode Characteristics							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V, I_{SD}=15A		0.9	1.1	V
Reverse Recovery Time		t_{rr}	V_R=50V, I_F=15A dI_F/dt=100A/us		21		nS
Reverse Recovery Charge		Q_{rr}			17		nC
Peak Reverse Recovery Current		I_{rrm}			1.6		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 60V
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 60 V

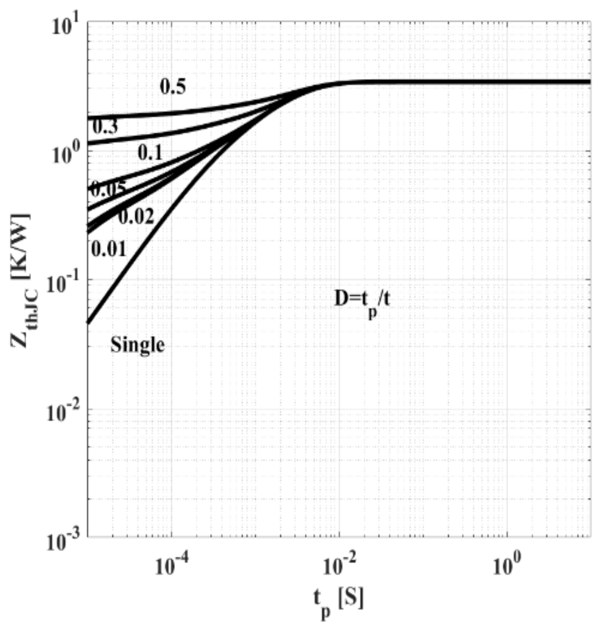
Typical Performance Characteristics

Figure 3: Power Dissipation



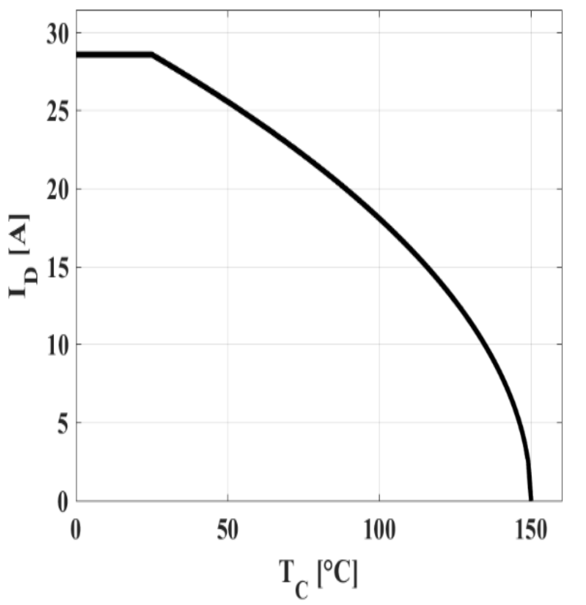
P_{tot}=f(T_c)(DFN5*6)

Figure 4: Max. Transient Thermal Impedance



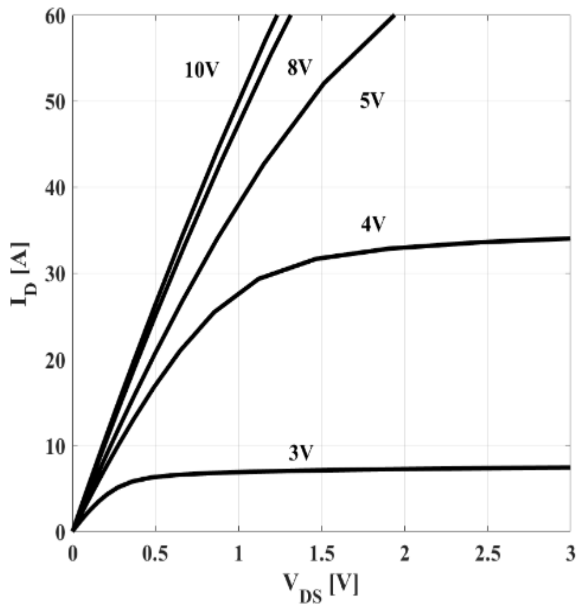
Z($_{thJC}$)=f(t_p);parameter:D=t_p/T (DFN5*6)

Figure5: Drain Current



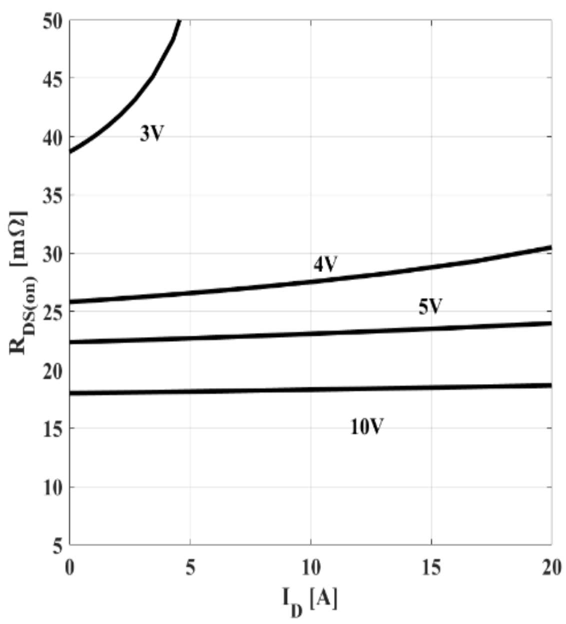
dI_D=f(T_C);V_{GS}≥10V(DFN5*6)

Figure6: Typ. Output Characteristics



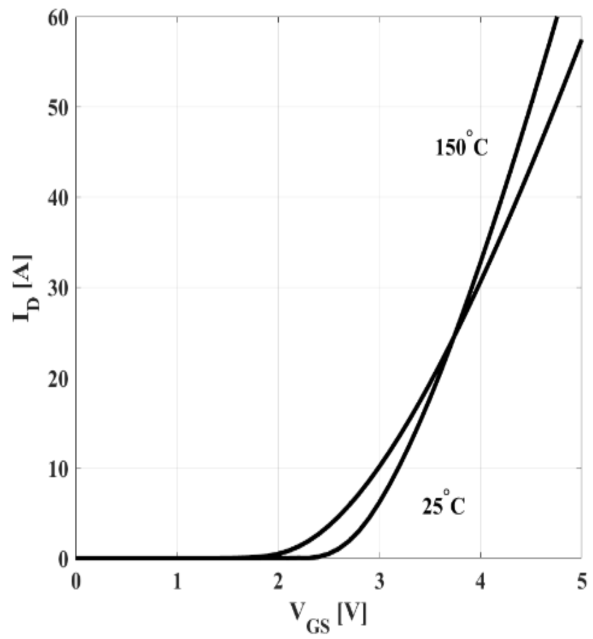
I_D=f(V_{DS});Tj=25°C; parameter:V_{GS}

Figure7: Typ. Drain-Source On-State Resistance



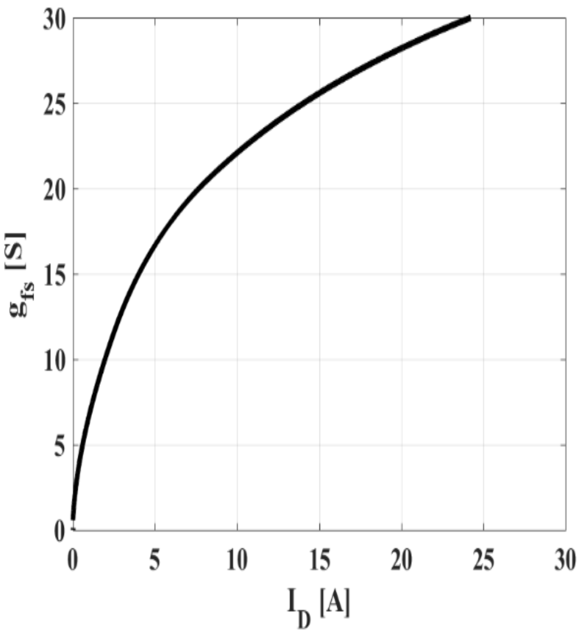
$R_{DS(ON)}=f(I_D)$;$T_j=25°C$; parameter:V_{GS}

Figure8: Typ. Transfer Characteristics



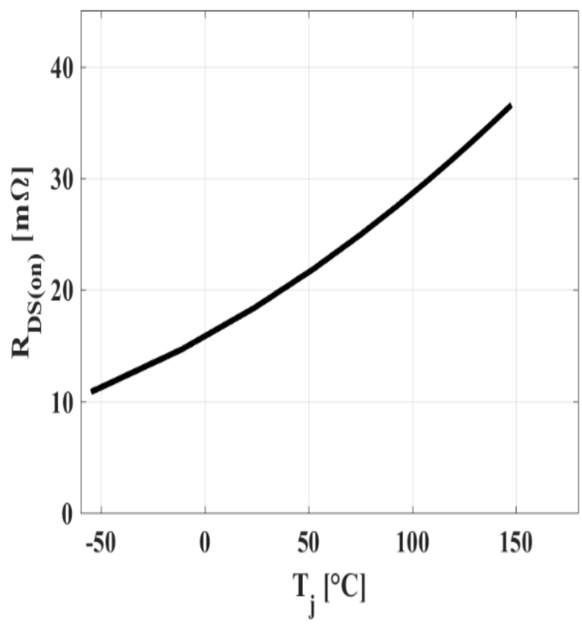
$I_D=f(V_{GS})$; $|V_{DS}|>2|I_D|R_{DS(on)max}$; parameter: T_j

Figure9: Typ. Forward Transconductance



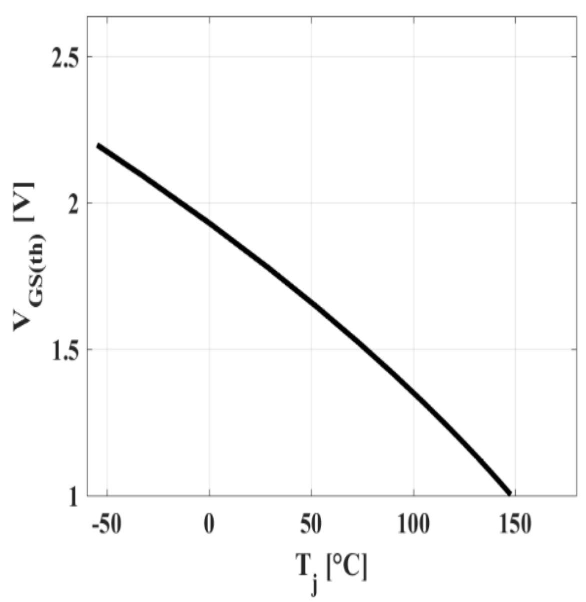
$g_{fs}=f(I_D)$; $T_j=25°C$

Figure10: Typ. Drain-Source On-State Resistance



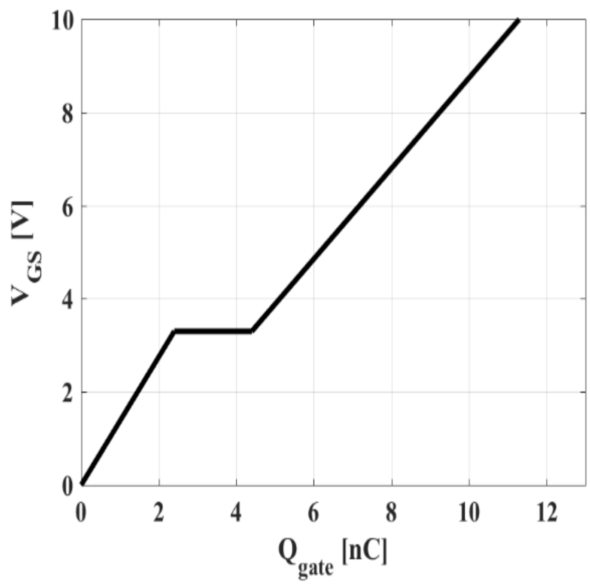
$R_{DS(ON)}=f(T_j)$;$I_D=15A$;$V_{GS}=10V$

Figure11: Typ.Gate Threshold Voltage



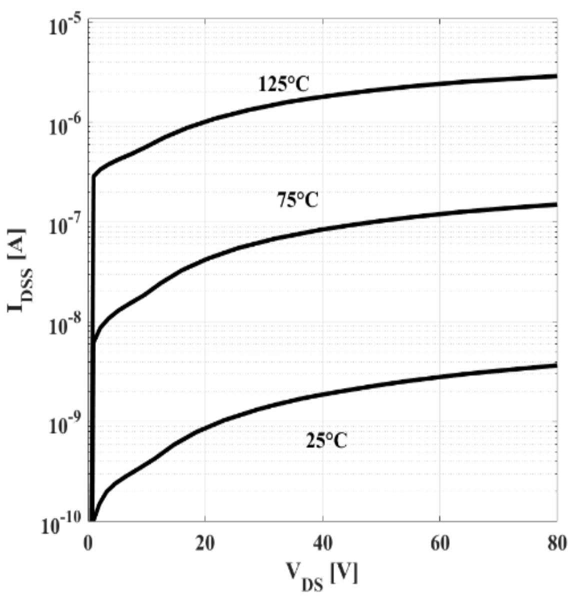
$V_{GS(th)}$=f(T_j); V_{GS}=V_{DS}; I_{DS}=250µA

Figure 12: Typ. Gate Charge



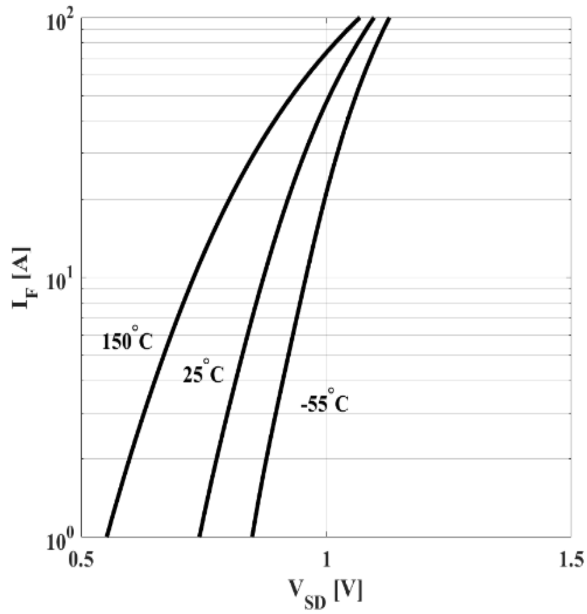
V_{GS}= f(Q_{gate}), I_D=15A pulsed

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

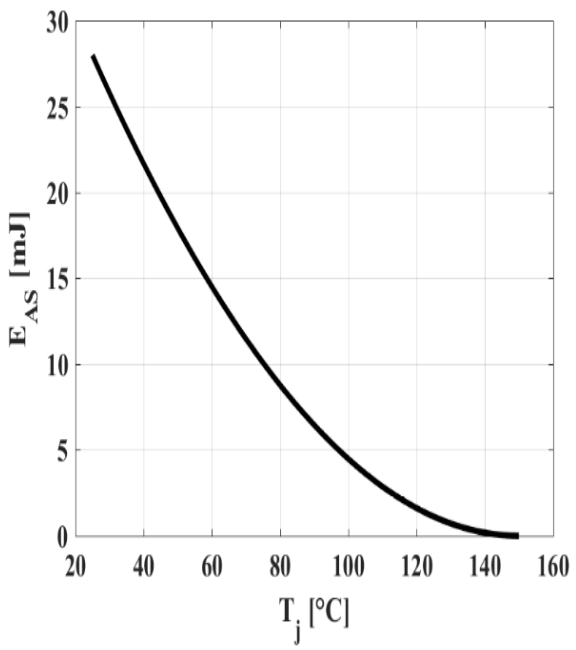
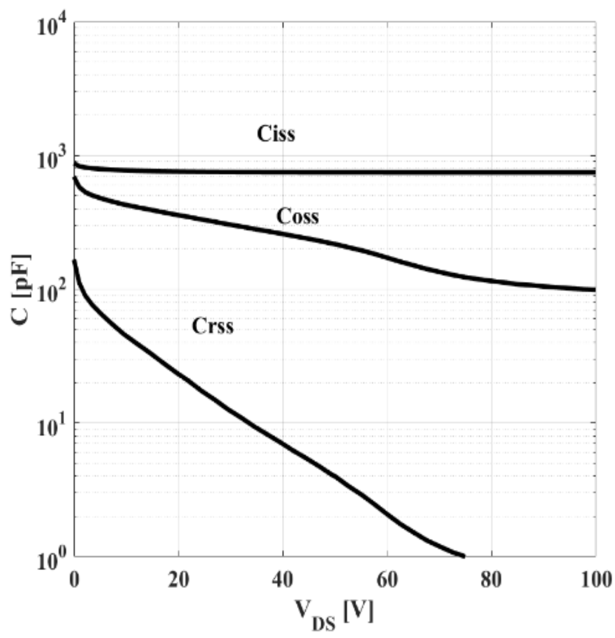
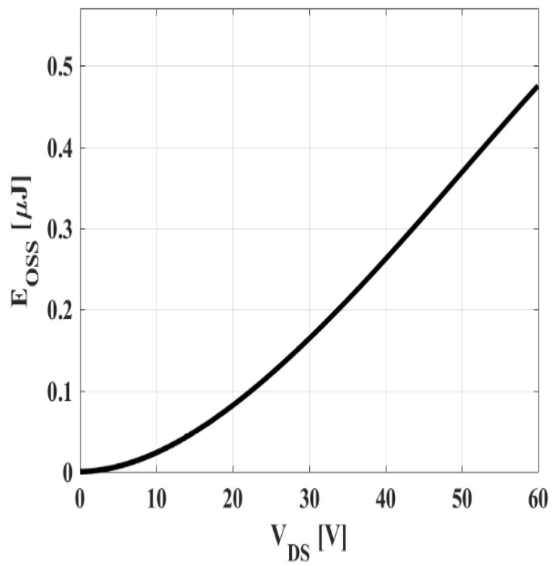
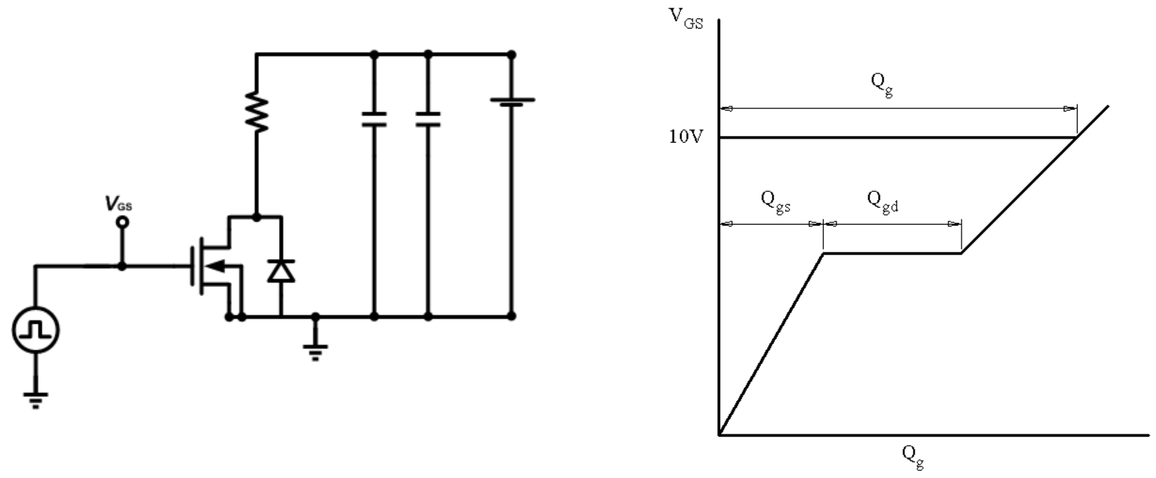
Figure 15: Avalanche Energy	Figure 16: Typ. Capacitances
	
$E_{AS}=f(T_j);I_D=13.0A;\ V_{DD}=50V$	$C=f(V_{DS});\ V_{GS}=0;\ f=1MHz$

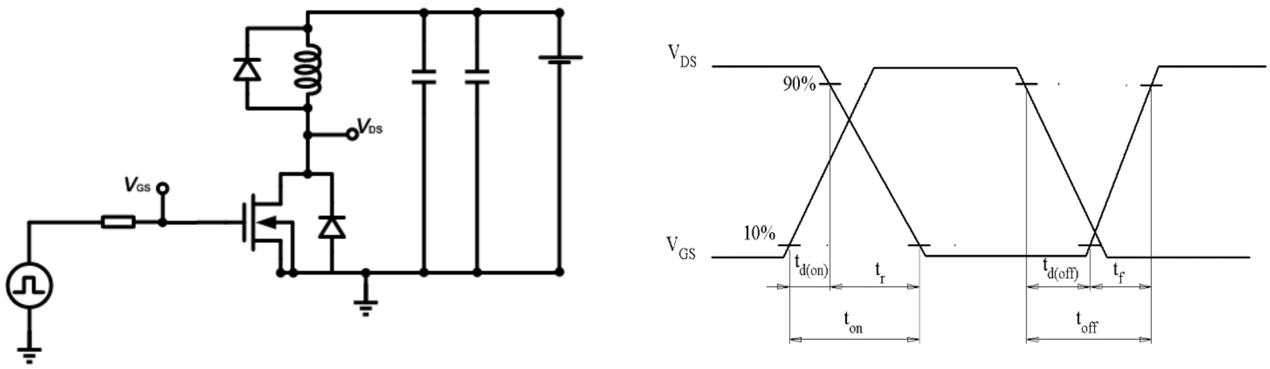
Figure 17: C_{OSS} Stored Energy

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

Test Circuits

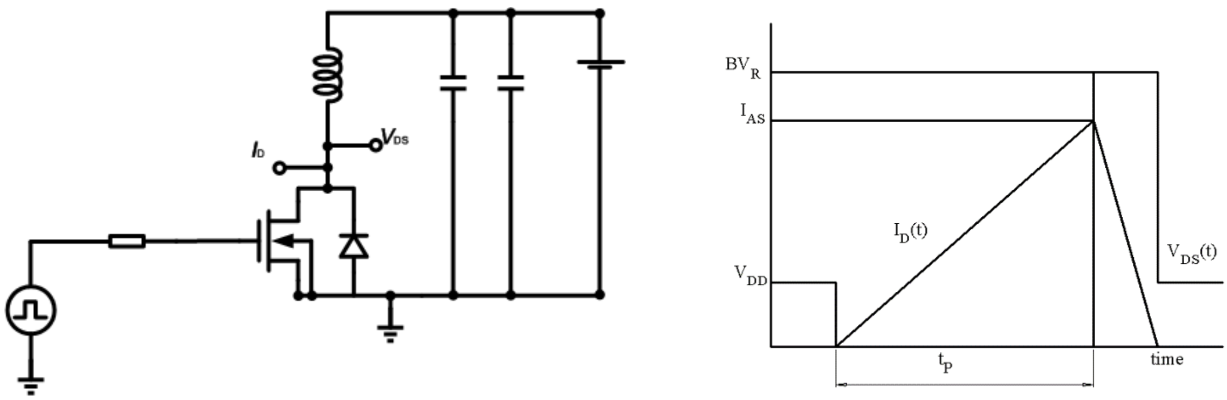
1. Gate Charge Test Circuit & Waveform



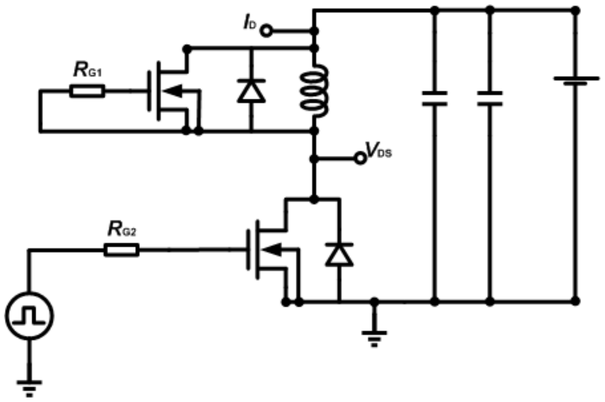
2. Switch Time Test Circuit

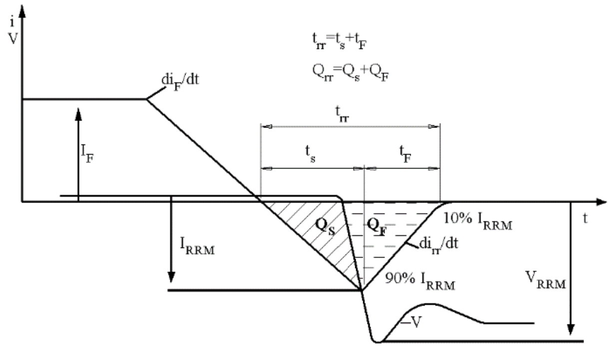


3. Unclamped Inductive Switching Test Circuit & Waveforms



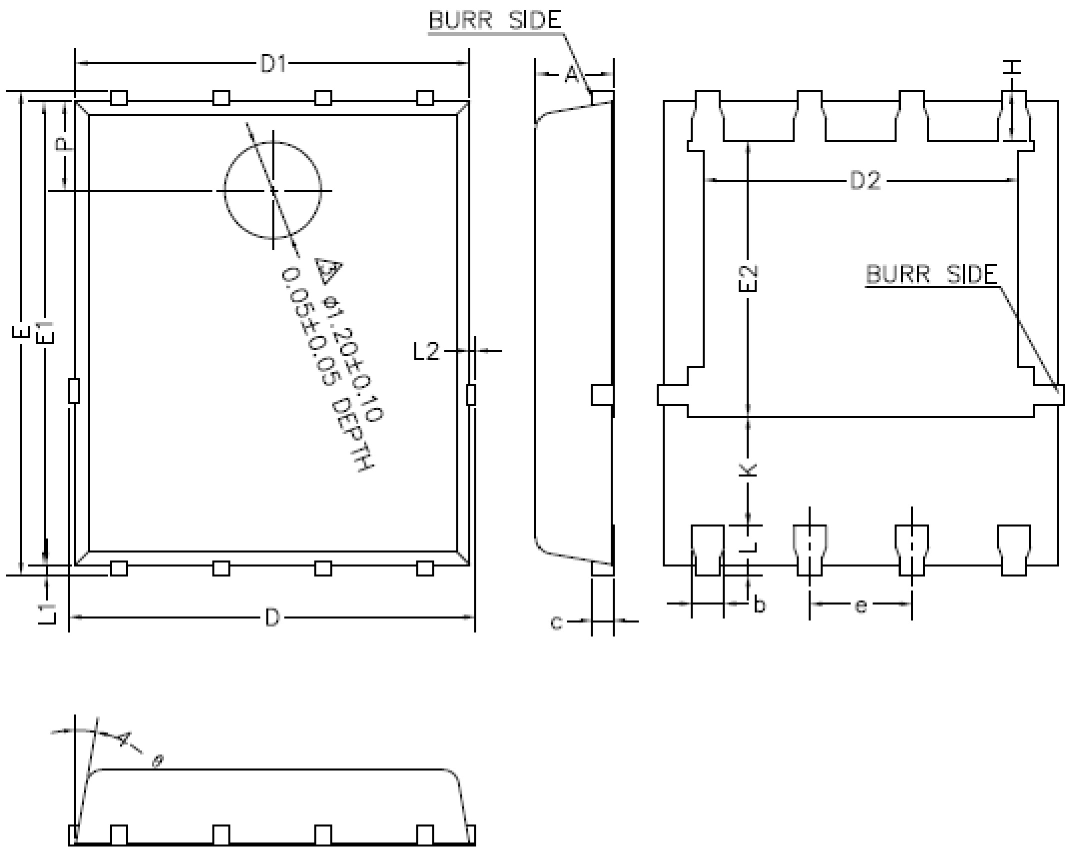
4. Test Circuit and Waveform for Diode Characteristics





Mechanical Dimensions

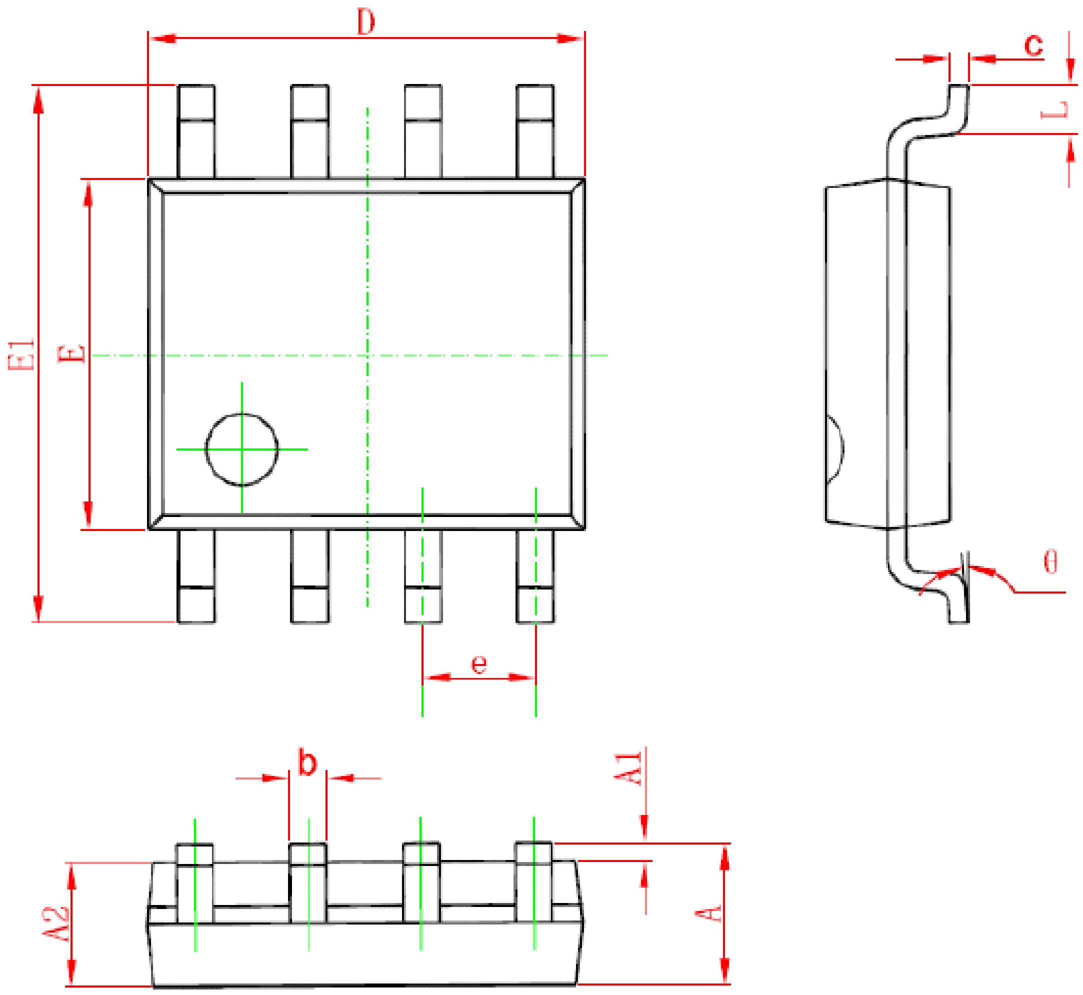
PDFN5*6-8 **Unit: mm**



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

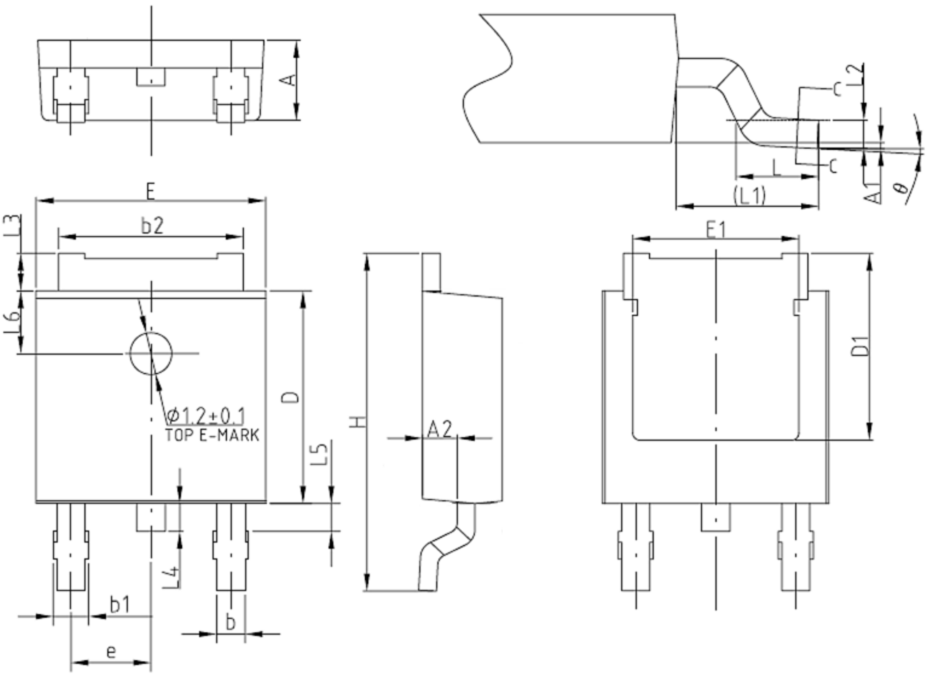
SOP-8 **Unit: mm**



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

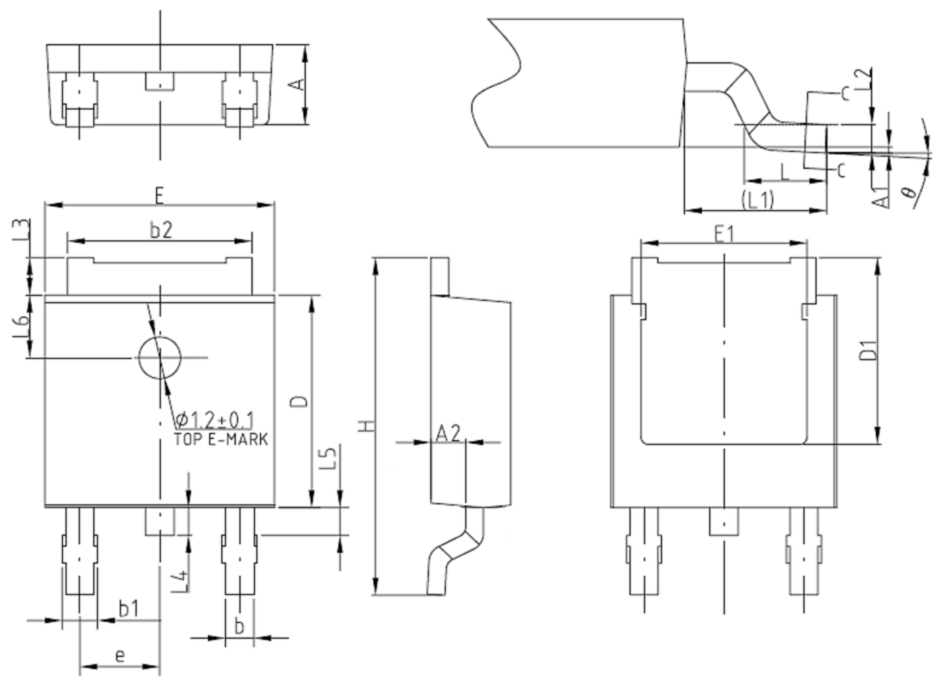
TO-252 **Unit: mm**



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

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°

TM
Sanrise Tech
尚阳通

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