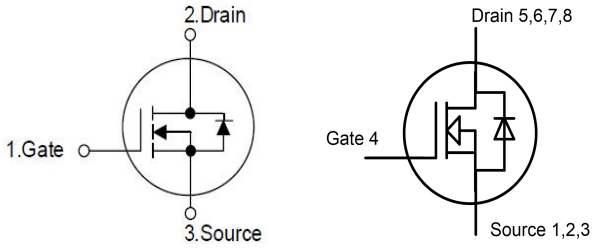
23mΩ, 100V, N-Channel Power MOSFET SRT10N230L

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 SOP-8 and TO-252 packages.

Symbol



TO-252 SOP-8

Figure 1 Symbol of SRT10N230L

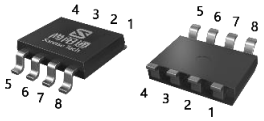
Features

- 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

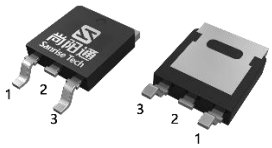
Application

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

Package Type



SOP-8



TO-252

Figure 2 Package Type of SRT10N230L

Ordering Information

SRT10N230L□□–□

Circuit Type

Package
D: TO-252
M: SOP-8

E: Lead Free
G: Green

Blank: Tube
TR: Tape & Reel

Package	Part Number	Marking ID	Packing Type
SOP-8	SRT10N230LMTR-G	10N230LMG	Tape & Reel
TO-252	SRT10N230LDTR-G	SRT10N230LDG	Tape&Reel

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

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=25ºC	I_D	TO-252	30	A
	T_A=25ºC		SOP8	5.9	
	T_C=100ºC		TO-252	19	
	T_A=100ºC		SOP8	3.7	
Pulsed Drain Current (Note 2)		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		ºC
Storage Temperature		T_{STG}	-55 to 150		ºC
Lead Temperature (Soldering, 10 sec)		T_{LEAD}	260		ºC

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-Lead	SOP8	R_{thJL}			25	ºC/W
Thermal Resistance，Junction-to-Case	TO-252	R_{thJC}			3.1	ºC/W
Thermal Resistance，Junction-to-Ambient	SOP8	R_{thJA}			80	ºC/W
Thermal Resistance，Junction-to-Ambient	TO-252	R_{thJA}			62	ºC/W

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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

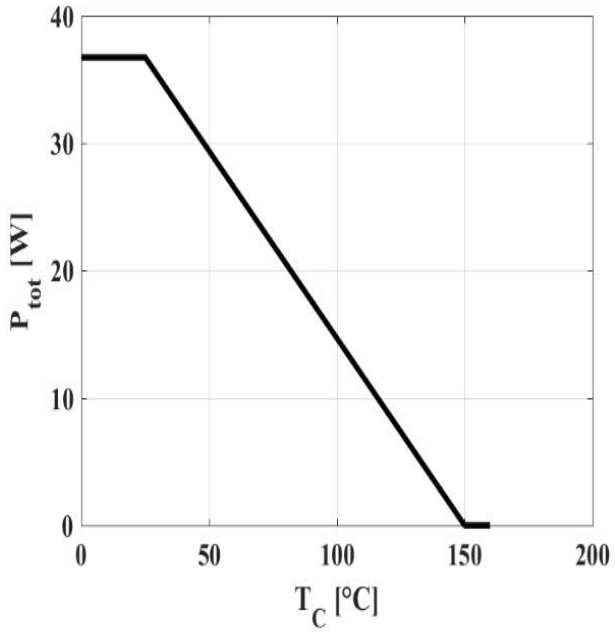
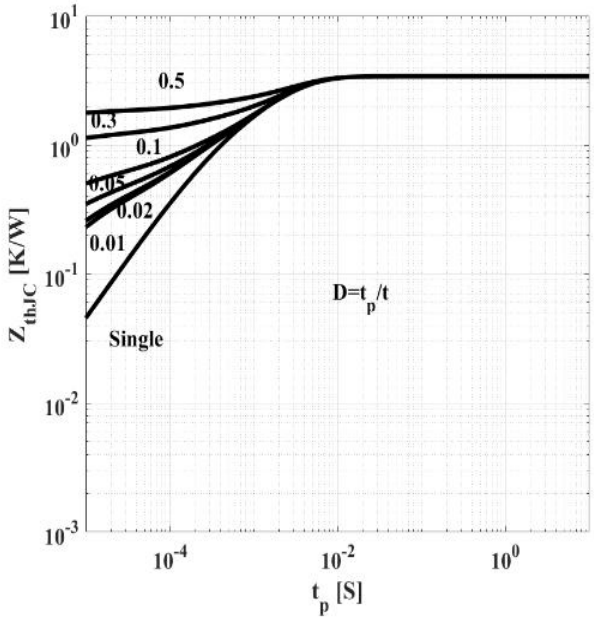
Figure 3: Power Dissipation	Figure 4: Max. Transient Thermal Impedance
	
$P_{tot}=f(T_c)$(DFN5*6)	$Z_{(thJC)}=f(t_p)$;parameter:$D=t_p/T$ (DFN5*6)

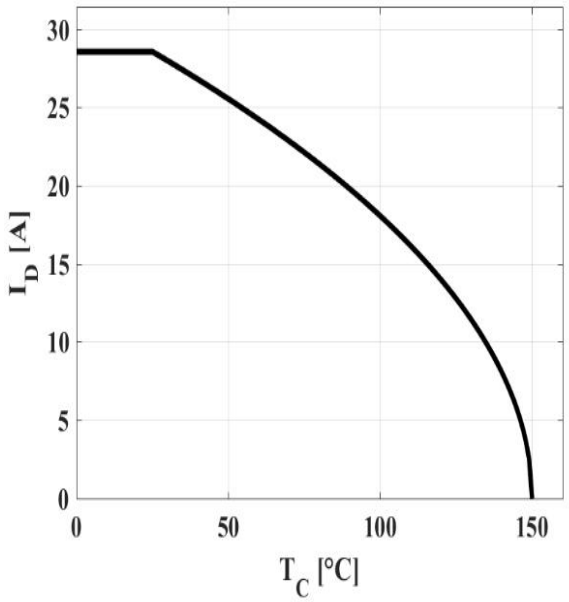
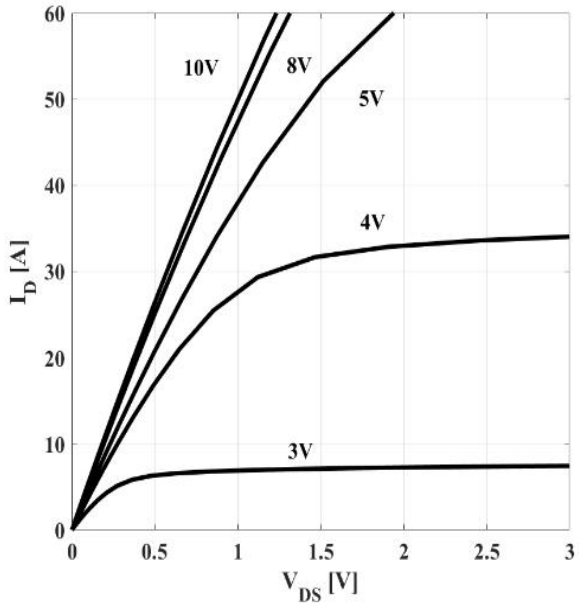
Figure5: Drain Current	Figure6: Typ. Output Characteristics
	
$dI_D=f(T_C)$;$V_{GS}\geq10V$(DFN5*6)	$I_D=f(V_{DS})$;Tj=25ºC; parameter:V_{GS}

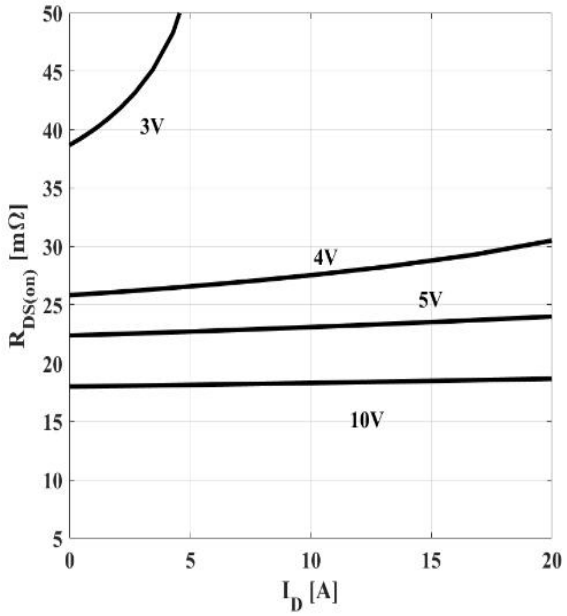
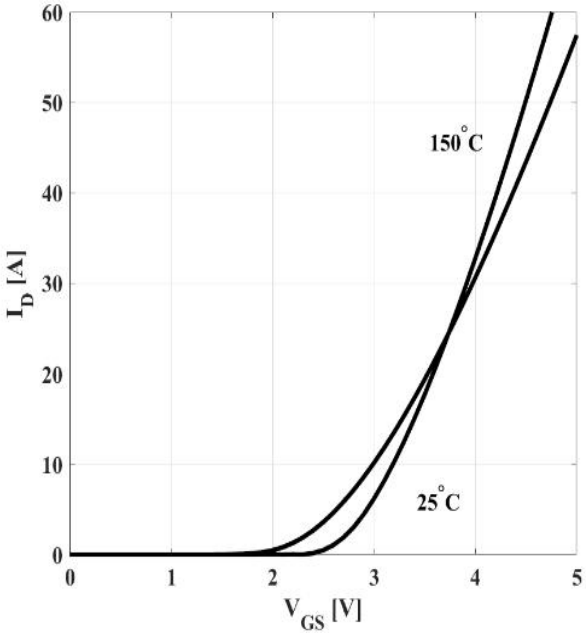
Figure7: Typ. Drain-Source On-State Resistance	Figure8: Typ. Transfer Characteristics
	
$R_{DS(ON)}$=f(I_D);T_j=25ºC; parameter:V_{GS}	I_D=f(V_{GS}); |V_{DS}|>2|I_D|$R_{DS(on)max}$; parameter: T_j

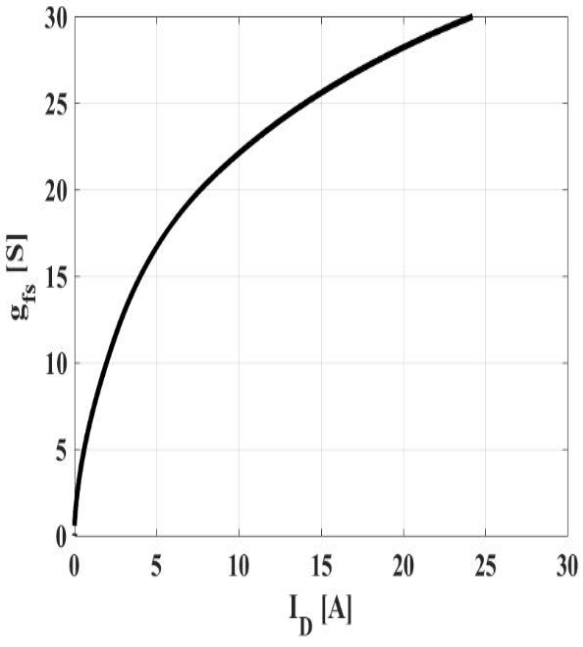
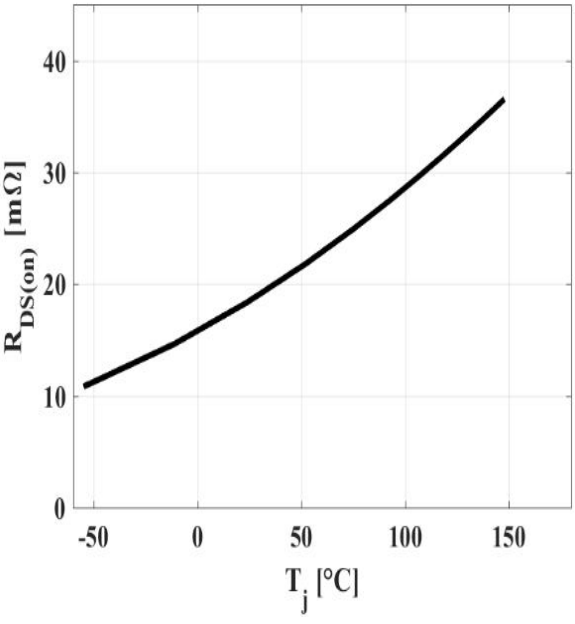
Figure9: Typ. Forward Transconductance	Figure10: Typ. Drain-Source On-State Resistance
	
g_{fs}=f(I_D); T_j=25℃	$R_{DS(ON)}$=f(T_j);I_D=15A;V_{GS}=10V

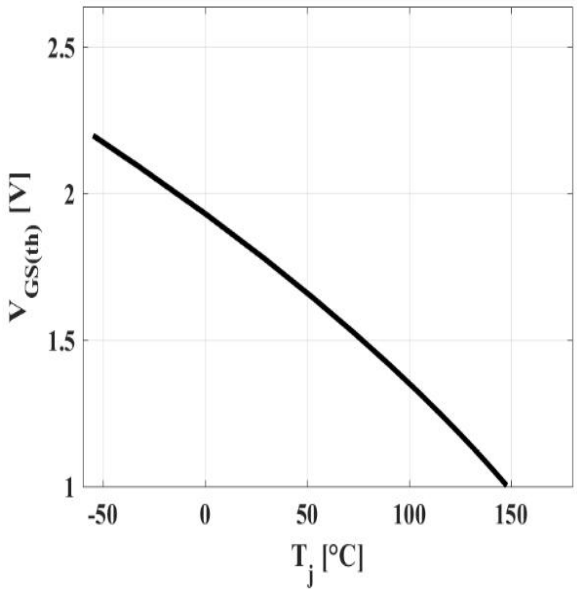
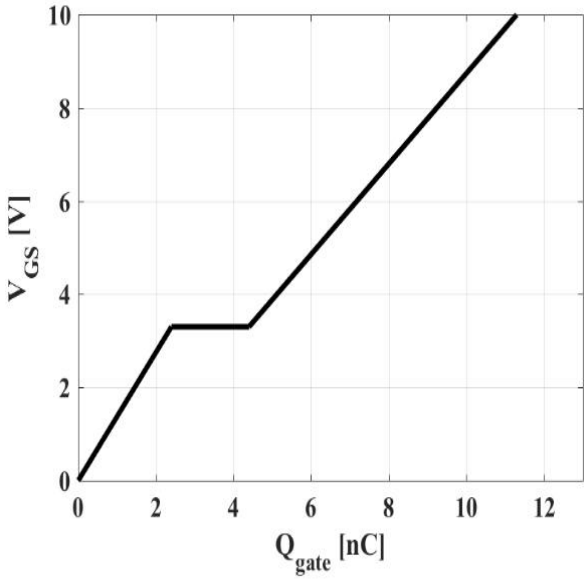
Figure11: Typ.Gate Threshold Voltage	Figure 12: Typ. Gate Charge
	
$V_{GS(th)}=f(T_j)$; $V_{GS}=V_{DS}$; $I_{DS}=250\mu A$	$V_{GS}= f(Q_{gate})$, $I_D=15A$ pulsed

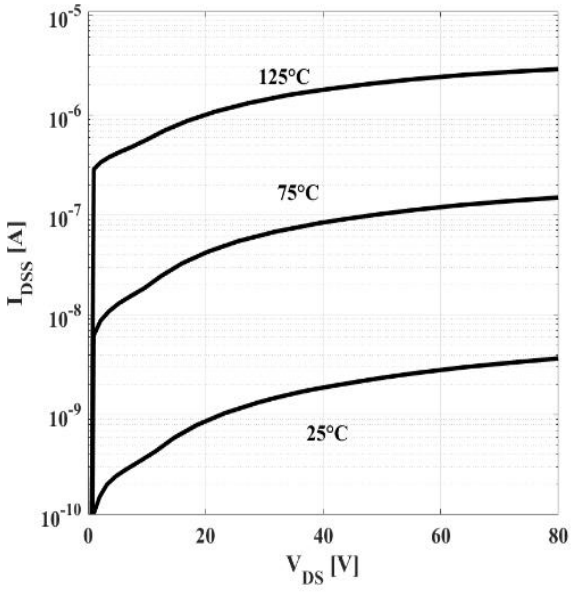
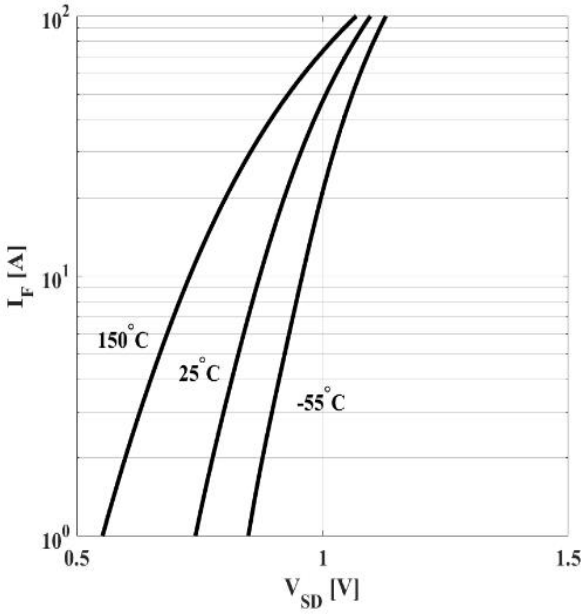
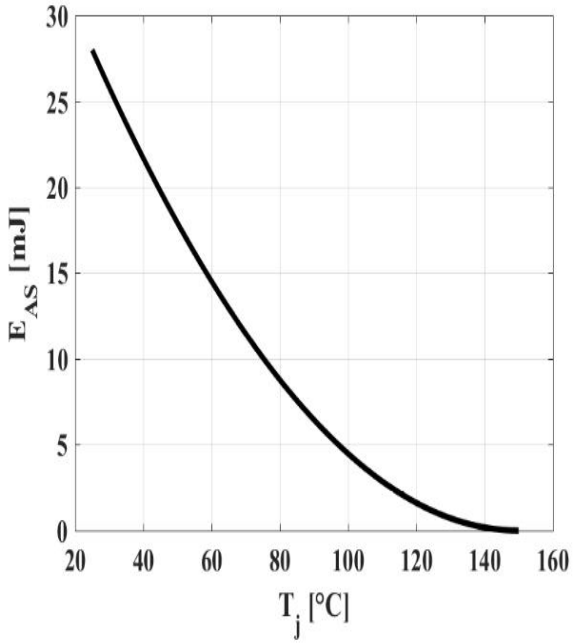
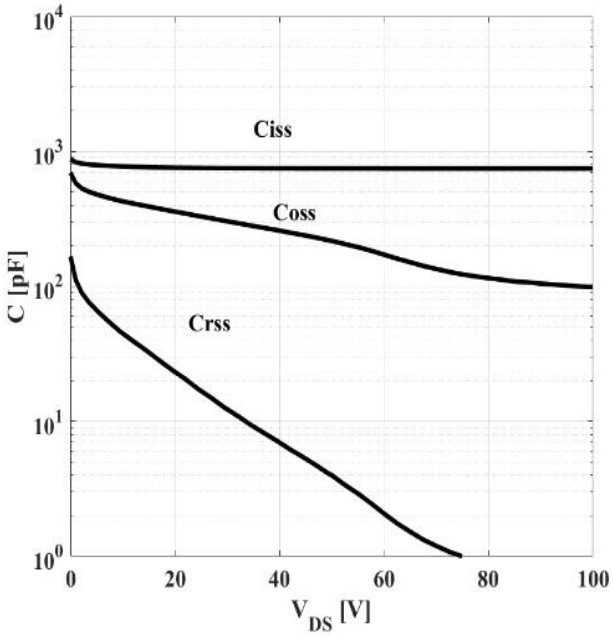
Figure 13: Drain-Source Leakage Current	Figure 14: Forward Characteristics of Reverse Diode
	
$I_{DSS}=f(V_{DS})$; $V_{GS}=0V$; parameter: T_j	$I_F=f(V_{SD})$; parameter: T_j

Figure 15: Avalanche Energy



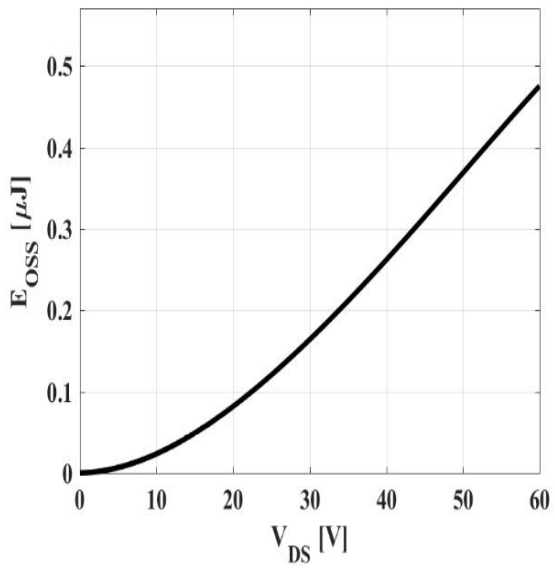
$E_{AS}=f(T_j)$;I_D=13.0A; V_{DD}=50V

Figure 16: Typ. Capacitances



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

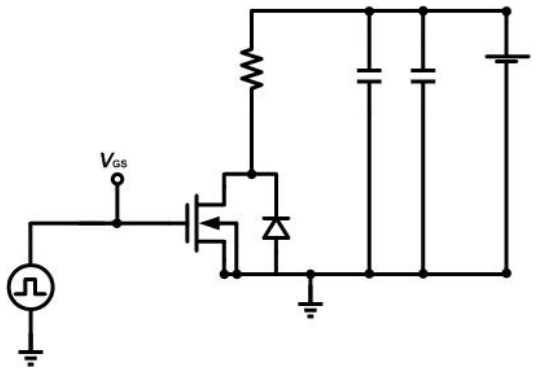
Figure 17: C_{OSS} Stored Energy

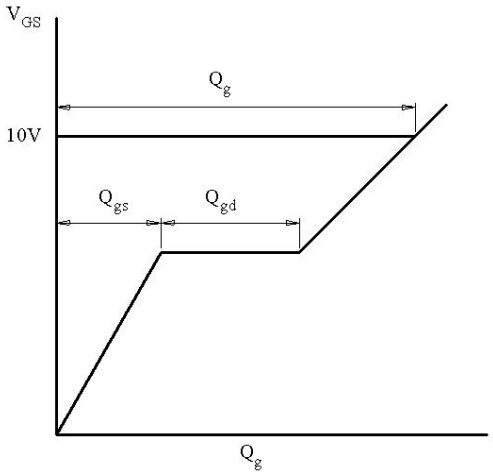


$E_{OSS}=f(V_{DS})$

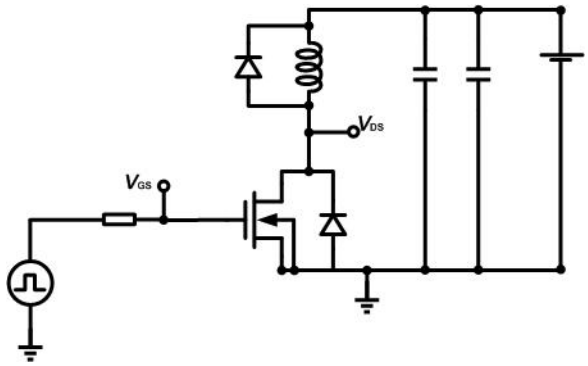
Test Circuits

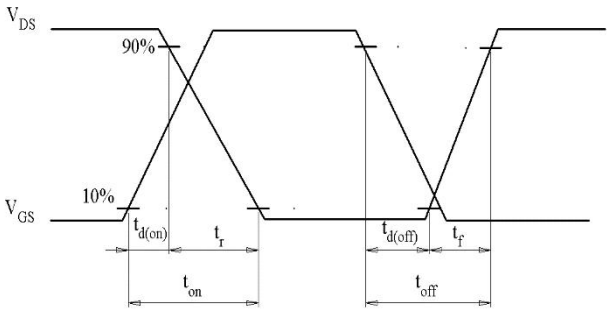
1. Gate Charge Test Circuit & Waveform



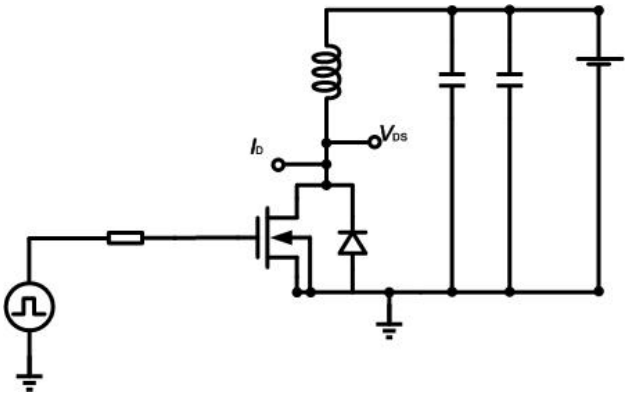


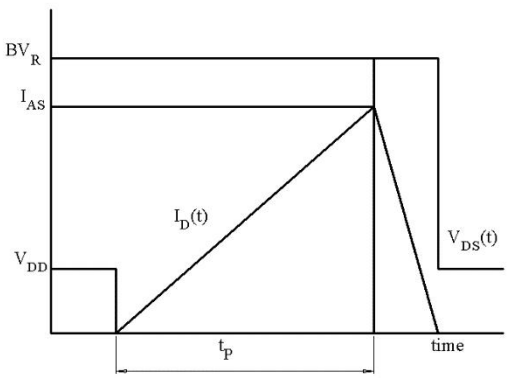
2. Switch Time Test Circuit



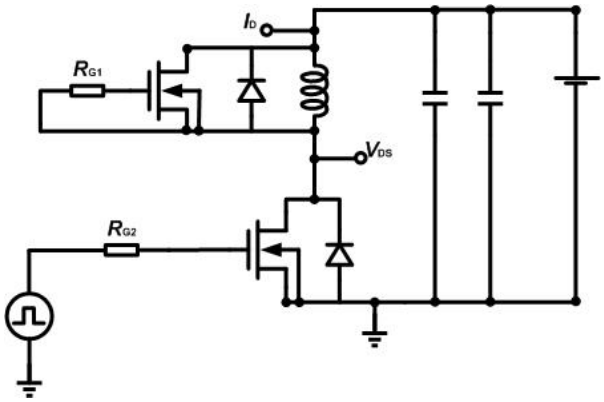


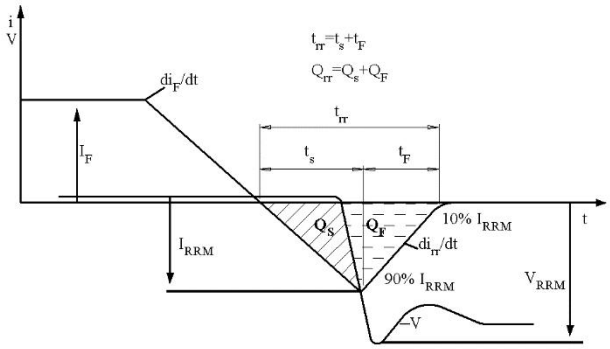
3. Unclamped Inductive Switching Test Circuit & Waveforms





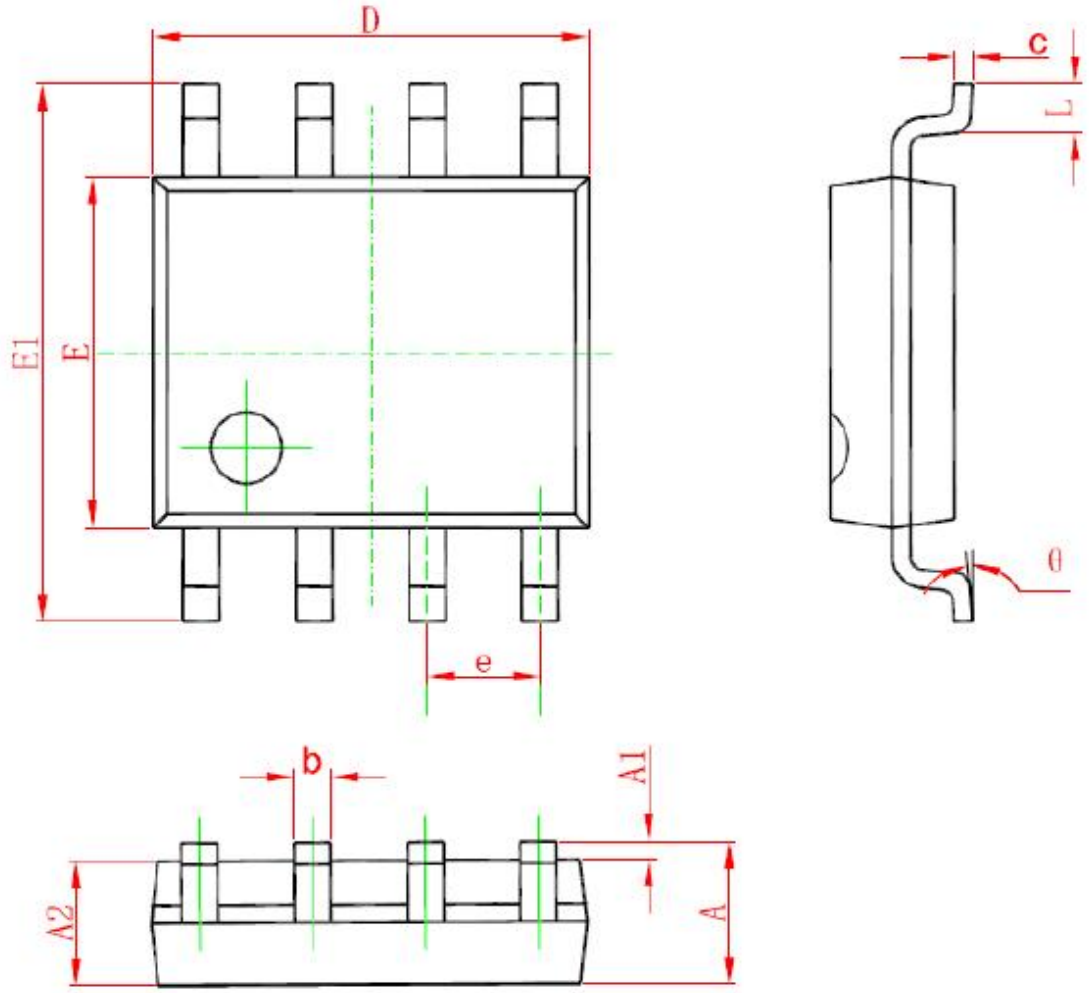
4. Test Circuit and Waveform for Diode Characteristics





Mechanical Dimensions

SOP-8 **Unit: mm**

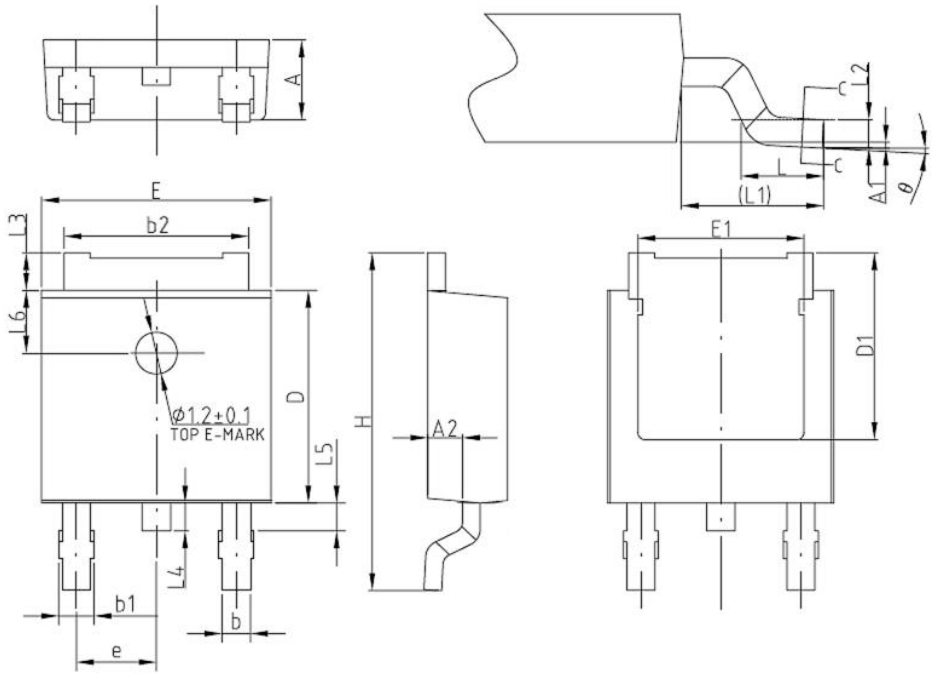


Symbol	Dimensions(mm)		
	Min.	Typ.	Max.
A	1.35	1.55	1.75
A1	0.05	0.15	0.25
A2	1.25	1.40	1.65
b	0.31	-	0.51
c	0.10	-	0.26
D	4.70	4.90	5.15
E	3.70	3.90	4.10
E1	5.80	6.00	6.20
e	1.27(BSC)		
L	0.40	-	1.27
θ	0°	-	8°

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

Mechanical Dimensions

TO-252 **Unit: mm**

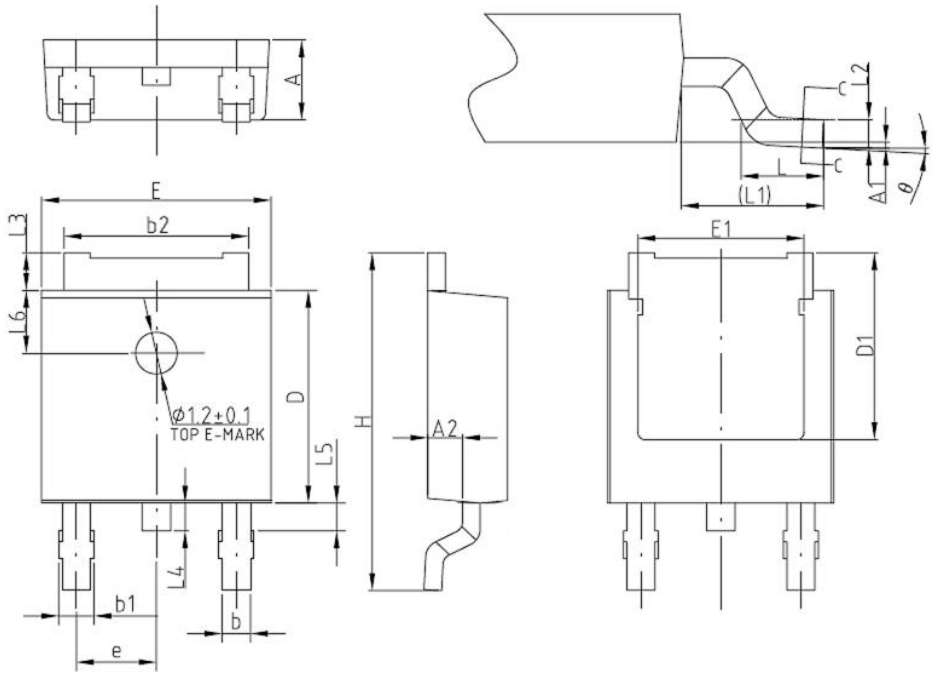


Symbol	Dimensions(mm)		
	Min.	Typ.	Max.
A	2.20	2.30	2.40
A1	0	-	0.10
A2	0.90	1.00	1.17
b	0.70	0.76	0.90
b1	0.77	-	1.10
b2	5.13	5.33	5.46
c	0.45	-	0.60
D	5.95	6.10	6.25
D1	-	5.30	-
E	6.45	6.60	6.75
E1	-	4.80	-
e	2.286(BSC)		
H	9.70	10.10	10.40
L	1.25	1.50	1.75
L1	-	2.90	-
L2	-	0.51	-
L3	0.90	-	1.25
L4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

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

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°

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

Sanrise Technology Limited Company

http://www.sanrise-tech.com

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