10mΩ, 100V, N-Channel Power MOSFET SRT10N120

General Description

The Sanrise SRT10N120 uses advanced split gate trench technology. It has extremely low on resistance, low gate charge and fast switching time. This device is ideal for high frequency switching and synchronous rectification.

The SRT10N120 break down voltage is 100V and it has a high rugged avalanche characteristics.

The SRT10N120 is available in SOP-8, TO-252, PDFN5*6-8, TO-251, TO-220C packages.

Features

- BV_{DSS} = 100V, I_D = 11.5A
- Low On Resistance
  $R_{DS(ON)\_TYP}$ = 10mΩ @ V_{GS} = 10V.
  $R_{DS(ON)\_TYP}$ = 13mΩ @ V_{GS} = 4.5V.
- Ultra Low Gate Charge, Qg=40nC typ.
- Fast switching capability
- Robust design with better EAS performance
- 100% UIS Tested

Application

- Synchronous Rectification for Power Supply
- DC/DC Converters
- BMS

Symbol

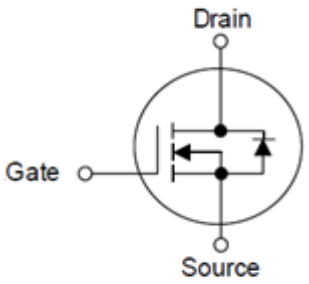
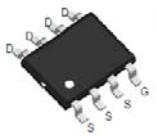


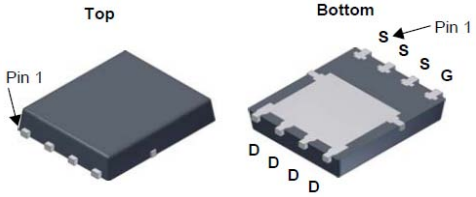
Figure 1 Symbol of SRT10N120

Package Type



SOP-8

TO-252



PDFN5*6-8

TO-251

TO-220C

Figure 2 Package Types of SRT10N120

Ordering Information

SRT10N120□□–□

Circuit Type

Package

M: SOP-8
D: TO-252
D56: PDFN5*6-8
D1: TO-251
TC: TO-220C

E: Lead Free
G: Green

Blank: Tube
TR: Tape & Reel

10mΩ, 100V, N-Channel Power MOSFET SRT10N120

Package	Part Number		Marking ID		Packing Type
	Lead Free	Green	Lead Free	Green	
SOP-8	SRT10N120MTR-E	SRT10N120MTR-G	10N120ME	10N120MG	Tape & Reel
TO-252	SRT10N120DTR-E	SRT10N120DTR-G	SRT10N120DE	SRT10N120DG	Tape & Reel
PDFN5*6-8	SRT10N120D56TR-E	SRT10N120D56TR-G	SRT10N120D56E	SRT10N120D56G	Tape & Reel
TO-251	SRT10N120D1-E	SRT10N120D1-G	SRT10N120D1E	SRT10N120D1G	Tube
TO-220C	SRT10N120TC-E	SRT10N120TC-G	SRT10N120TCE	SRT10N120TCG	Tube

10mΩ, 100V, N-Channel Power MOSFET SRT10N120

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	SOP-8	11.5	A
			TO-252	58	
			PDFN5*6	53	
			TO-251	57	
			TO-220C	58	
	T_C=125ºC		SOP-8	5	
			TO-252	26	
			PDFN5*6	24	
			TO-251	25	
			TO-220C	26	
Pulsed Drain Current (Note 2)		I_{DM}	45		A
Avalanche Current, Repetitive (Note 2)		I_{AR}	20		A
Avalanche Energy, Single Pulse (Note 3)		E_{AS}	20		mJ
VDS Spike (10us)		V_{SPIKE}	120		V
Operating Junction Temperature		T_J	150		ºC
Storage Temperature		T_{STG}	-55 ~ 150		ºC
Lead Temperature (Soldering, 10 sec)		T_{LEAD}	300		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} = 20A, V_{DD} = 60V, L=0.1mH, R_G = 25Ω, Starting T_J = 25°C

Thermal Resistance

Parameter		Symbol	Min	Typ	Max	Unit
Thermal Resistance， Junction-to-Case	SOP-8	R_{thJC}			25	ºC/W
	TO-252				1.3	
	PDFN5*6				1.6	
	TO-251				1.4	
	TO-220C				1.3	
Thermal Resistance， Junction-to-Ambient	SOP-8	R_{thJA}			75	
	TO-252				75	
	PDFN5*6				75	
	TO-251				75	
	TO-220C				62	

10mΩ, 100V, N-Channel Power MOSFET SRT10N120

Electrical Characteristics

T_J = 25ºC, 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	nA
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250uA	1.2	1.9	2.5	V
Static Drain-Source On-Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=11.5A		10	12	mΩ
			V_{GS}=4.5V, I_D=5.0A		13	16	mΩ
Dynamic Characteristics							
Input Capacitance		C_{ISS}	V_{DS}=50V, V_{GS}=0V, f=1MHz		2580		pF
Output Capacitance		C_{OSS}			260		
Reverse Transfer Capacitance		C_{RSS}			66		
Gate Resistance		R_G	f=1MHz, Open Drain		3.2		Ω
Turn-on Delay Time		$t_{d(on)}$	V_{DD}=50V, I_D=11.5A R_G=4.7Ω, V_{GS}=10V		15		ns
Rise Time		t_r			35		
Turn-off Delay Time		$t_{d(off)}$			55		
Fall Time		t_f			84		
Gate Charge Characteristics							
Gate to Source Charge		Q_{gs}	V_{DD}=50V, I_D=11.5A V_{GS}=0 to 10V		5.5		nC
Gate to Drain Charge		Q_{gd}			11.5		
Gate Charge Total		Q_g			40		
Gate Plateau Voltage		$V_{plateau}$			3.3		V
Reverse Diode Characteristics							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V, I_{SD}=11.5A		0.81	1.0	V
Reverse Recovery Time		t_{rr}	V_R=50V, I_F=11.5A dI$_F$/dt=100A/us		50		ns
Reverse Recovery Charge		Q_{rr}			75		nC
Peak Reverse Recovery Current		I_{rrm}			2.2		A

Typical Performance Characteristics

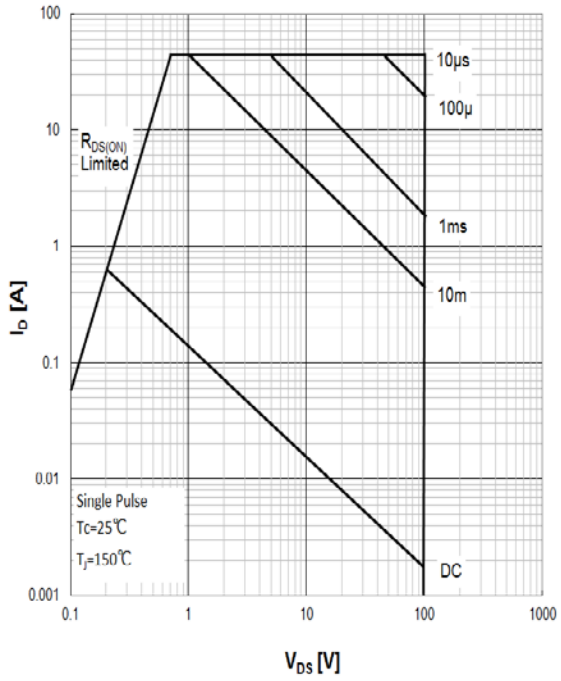
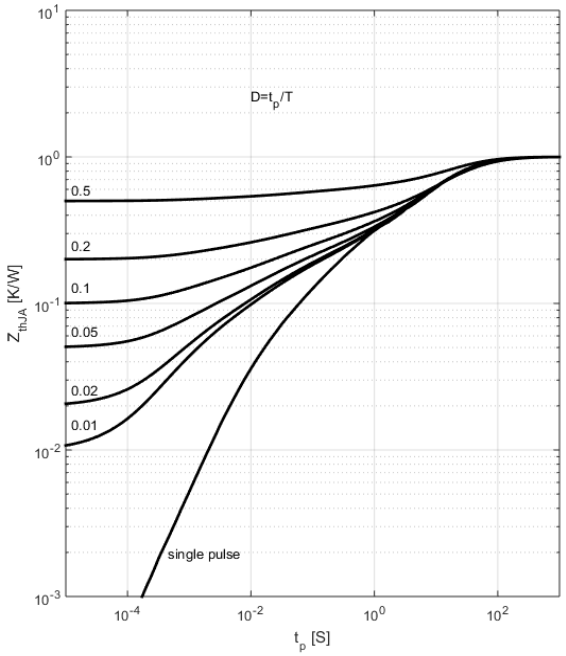
Figure 3: Max. Forward Safe Operating Area	Figure 4: Normalized Transient Thermal impedance
	
I_D=f(V_{DS}); Tc=25℃; V_{GS}＞7.0V; parameter t_p	Z($_{thJC}$) = f(t_p); parameter: D = t_p/T

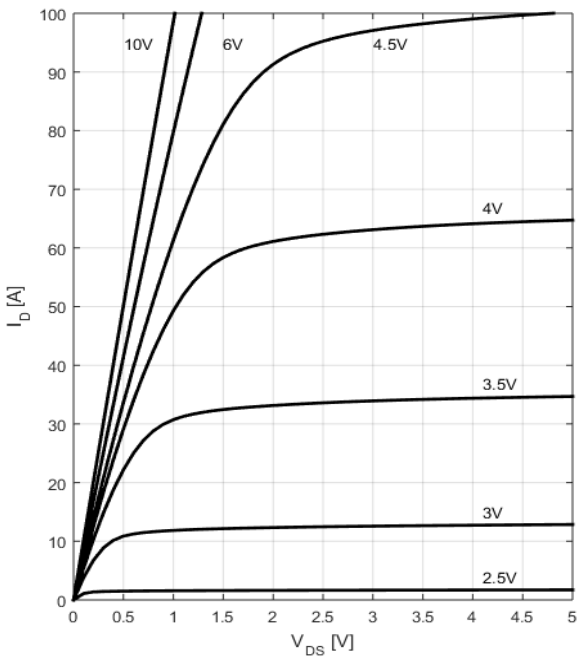
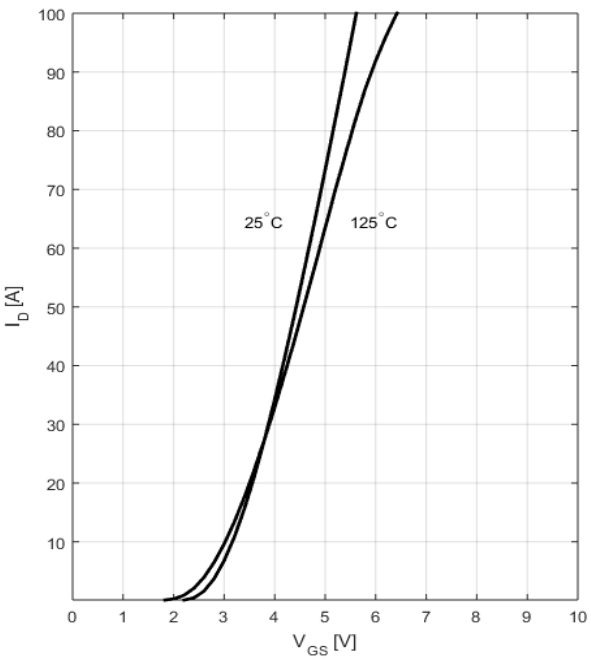
Figure 5: Typ. Output Characteristics	Figure 6: Typ. Transfer Characteristics
	
I_D = f(V_{DS}); Tj= 25ºC; parameter: V_{GS}	I_D = f(V_{GS}); V_{DS}=5V

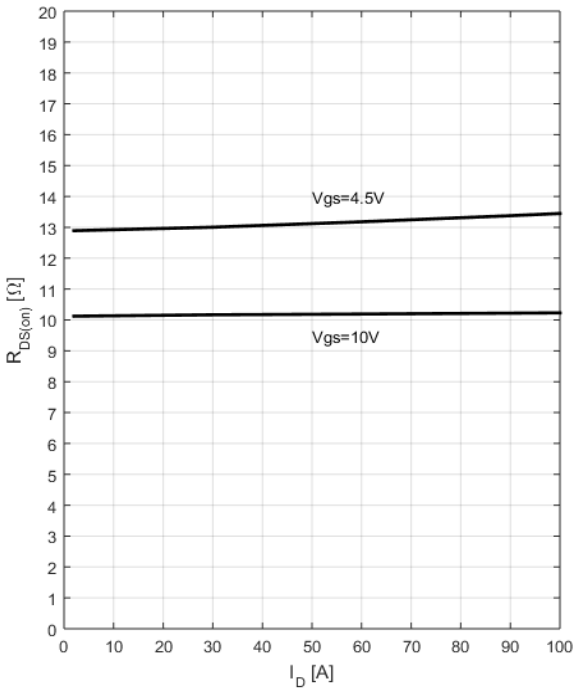
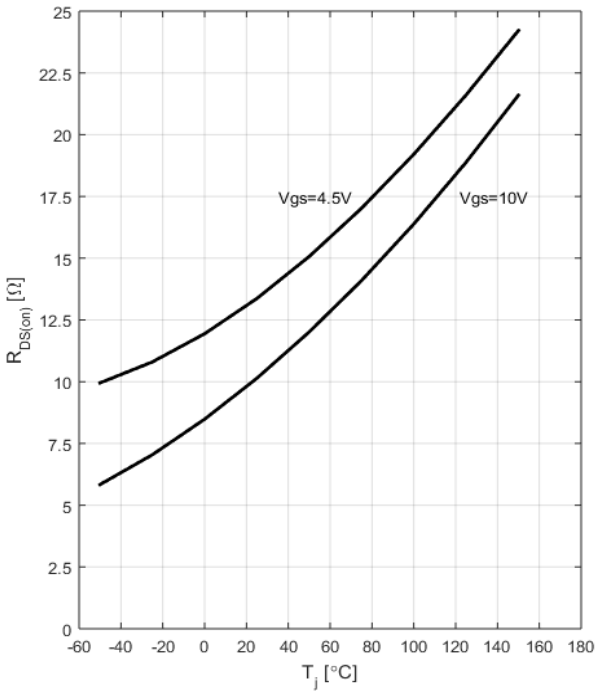
Figure 7: Typ. Drain-Source On-State Resistance	Figure 8: Typ. Drain-Source On-State Resistance
	
$R_{DS(ON)}$ =f(I_D); T_j=25ºC; parameter: V_{GS}	$R_{DS(ON)}$=f(T_j); I_D=11.5A(9.5A)@V_{GS}=10V(4.5V)

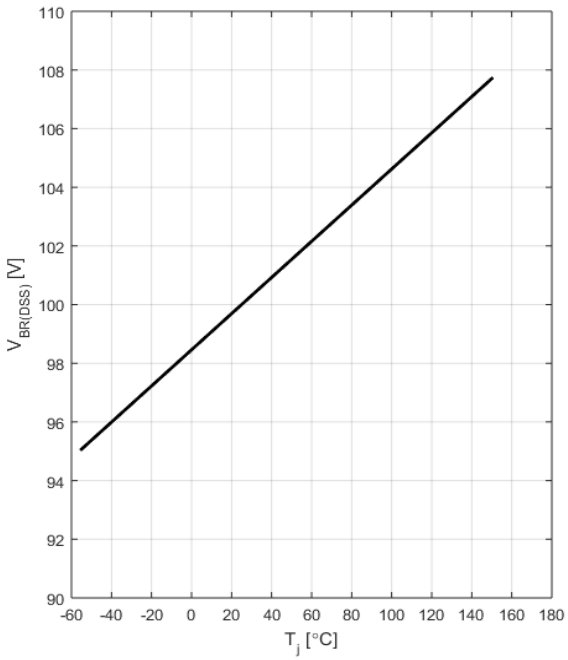
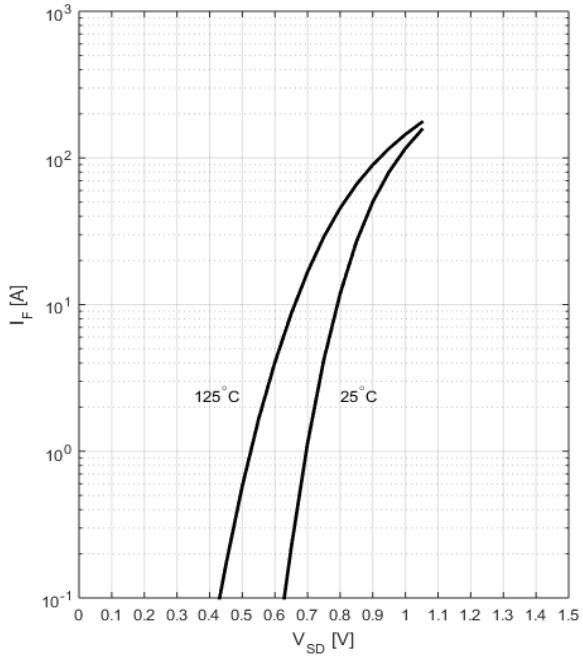
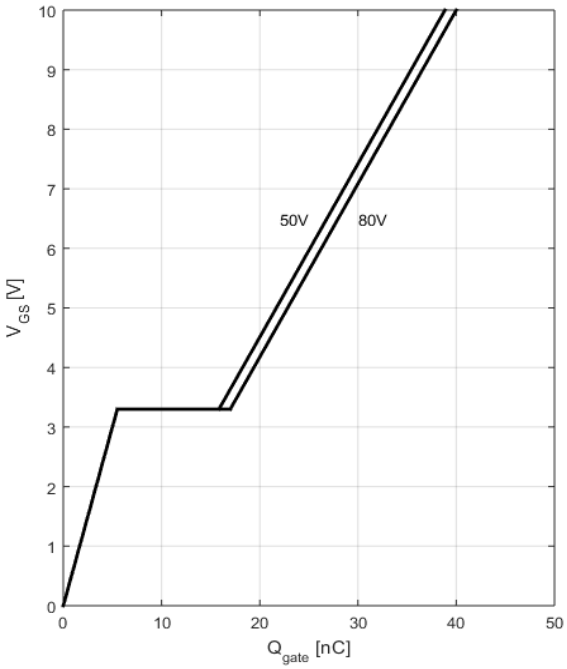
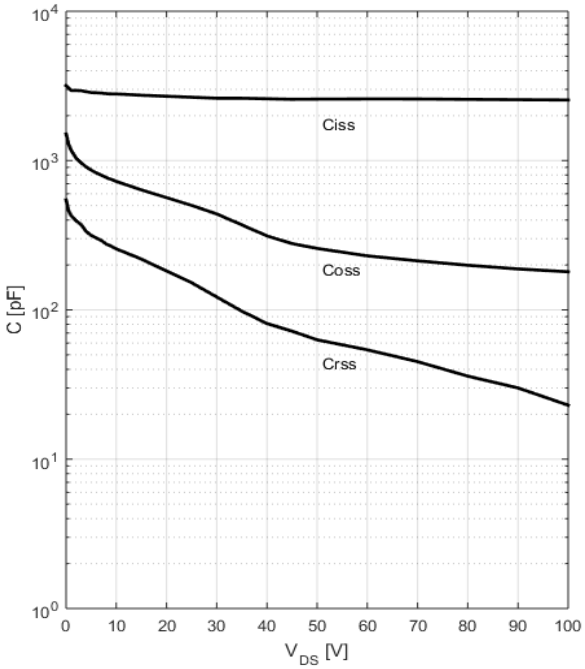
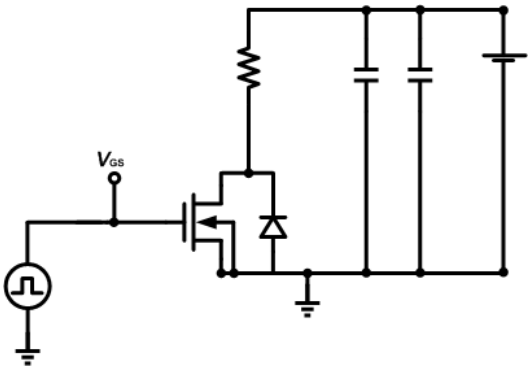
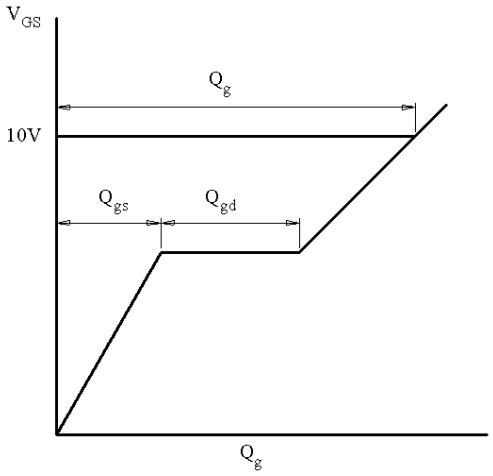
Figure 9: Drain-Source Breakdown Voltage	Figure 10: Forward Characteristics of Reverse Diode
	
$V_{BR(DSS)}$=f(T_j); I_D=1mA	I_F=f(V_{SD}); parameter: T_j

Figure 11: Typ. Gate Charge	Figure 12: Typ. Capacitances
	
V_{GS}= f(Q_{gate}), I_D= 11.5A pulsed	C=f(V_{DS}); V_{GS}=0; f=1MHz

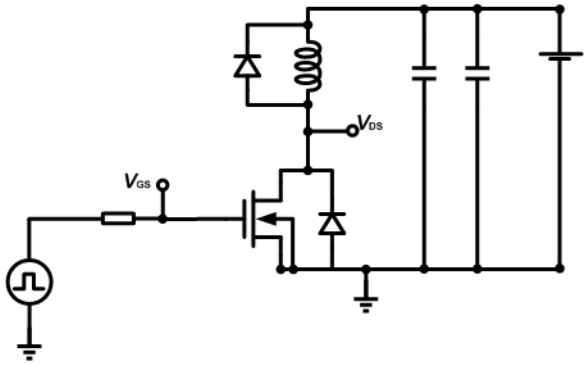
Test Circuits

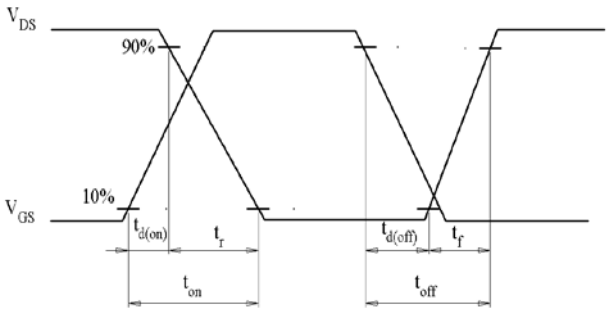
1. Gate Charge Test Circuit & Waveform



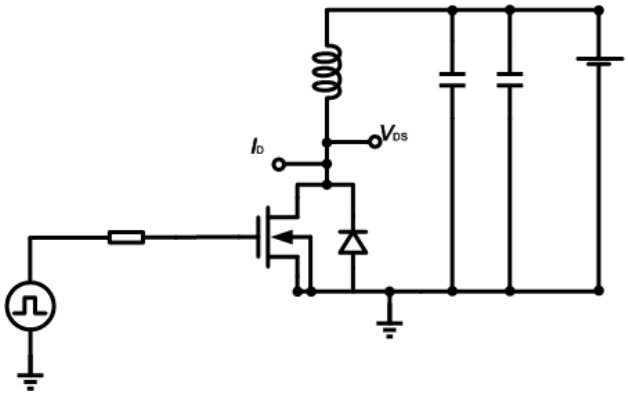


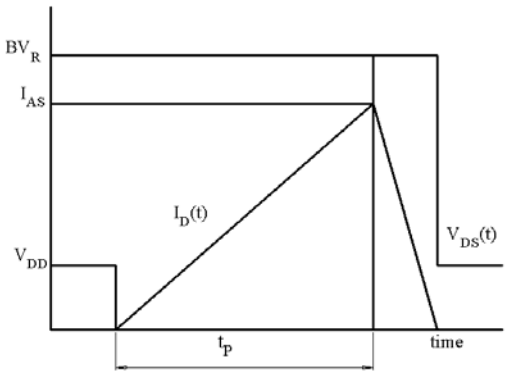
2. Switch Time Test Circuit



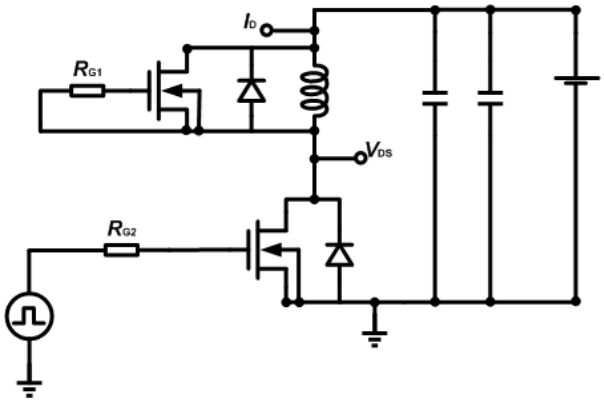


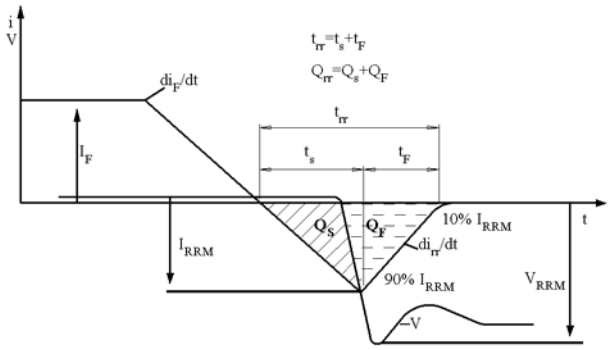
3. Unclaimed Inductive Switching Test Circuit & Waveforms





4. Test Circuit and Waveform for Diode Characteristics

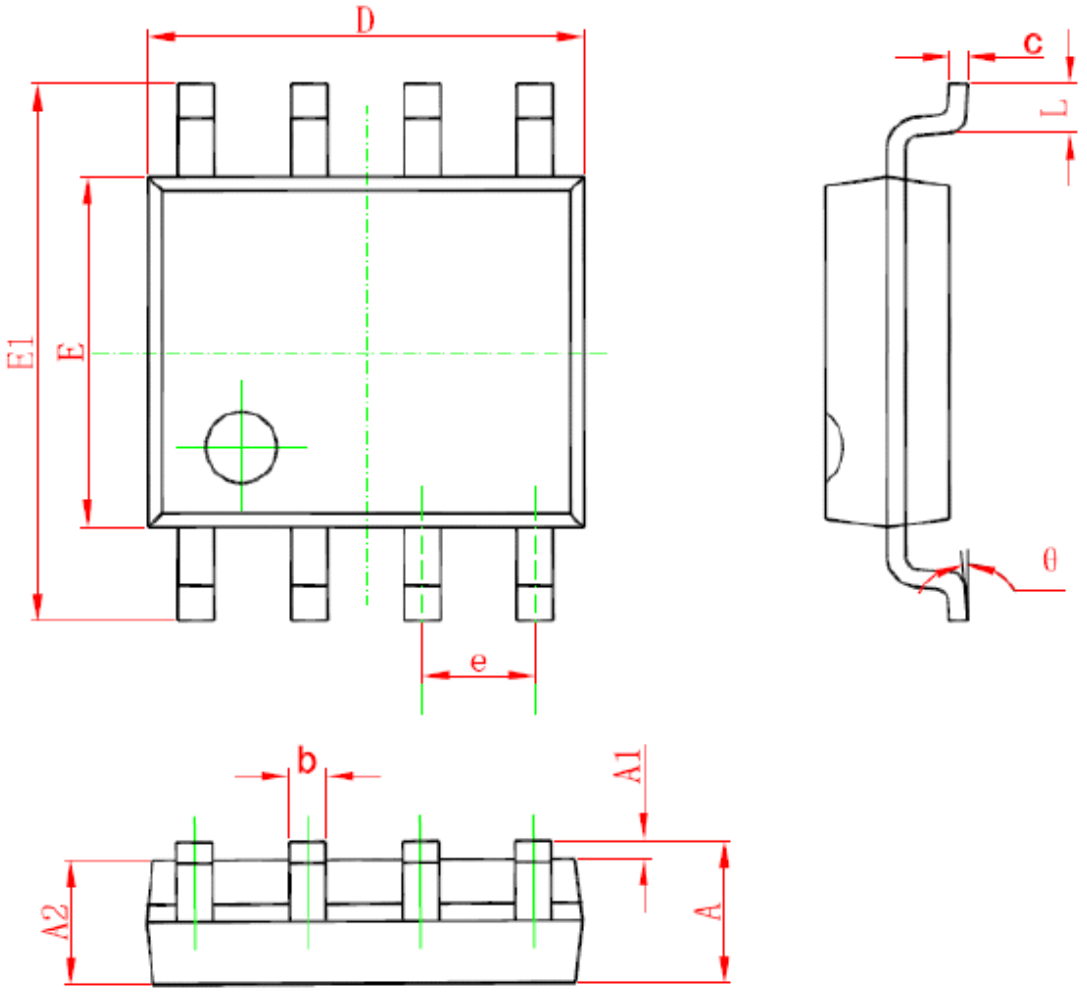




10mΩ, 100V, N-Channel Power MOSFET SRT10N120

Mechanical Dimensions

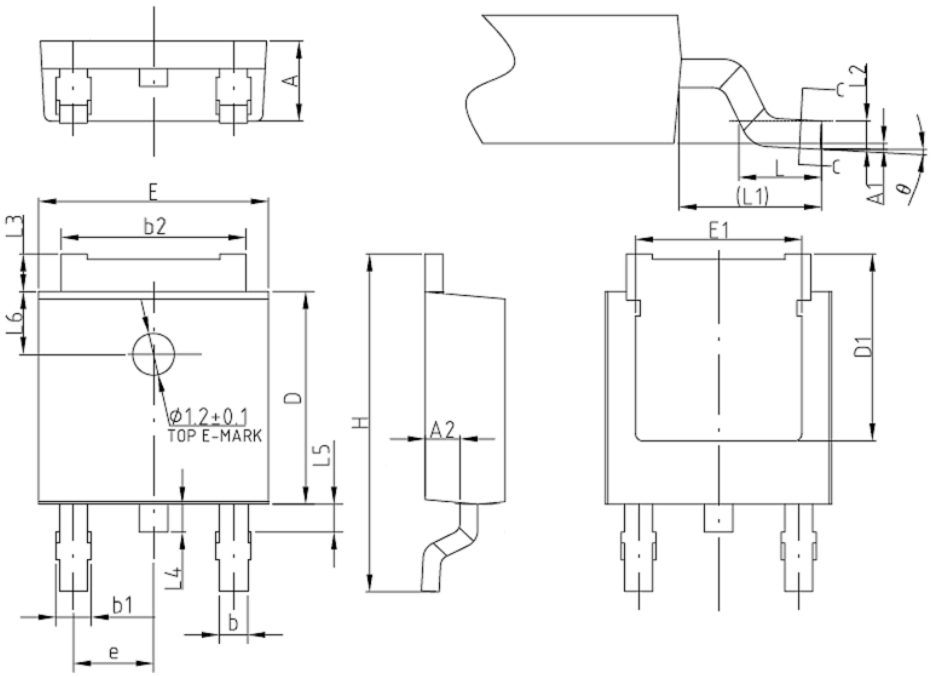
SOP-8 **Unit: mm**



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 (Continued)

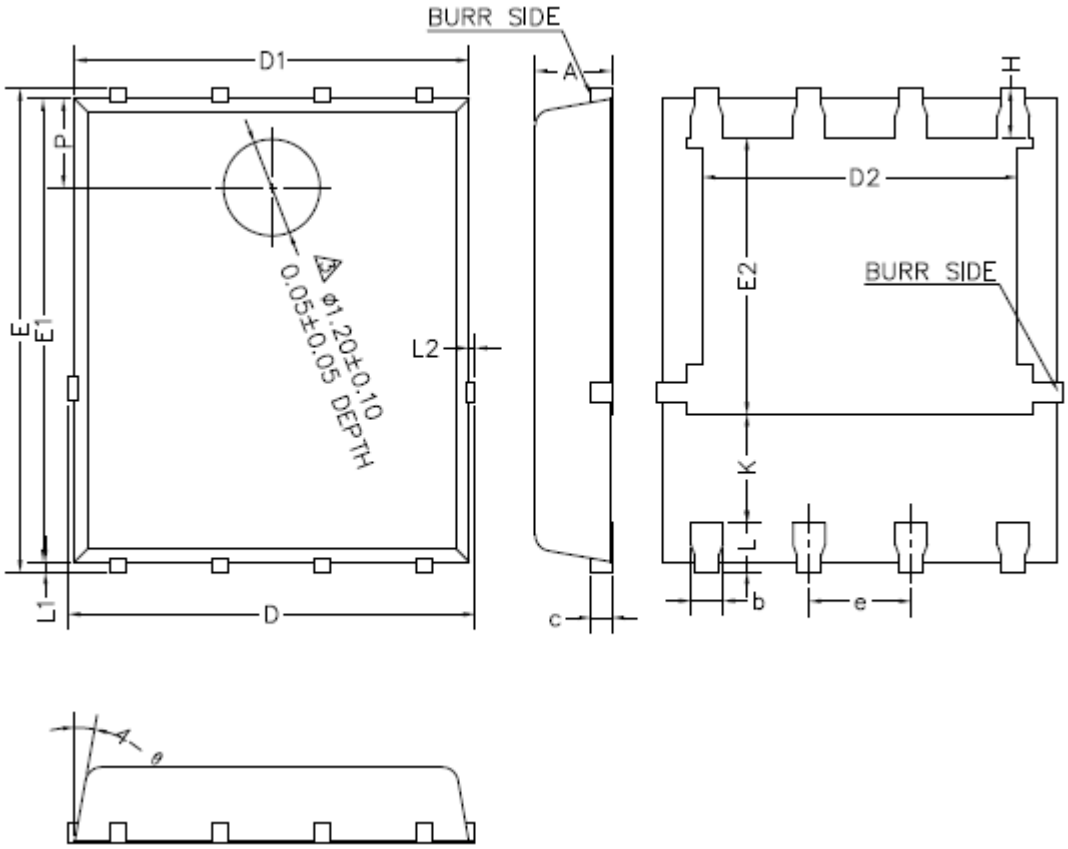
TO-252 **Unit: mm**



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 (Continued)

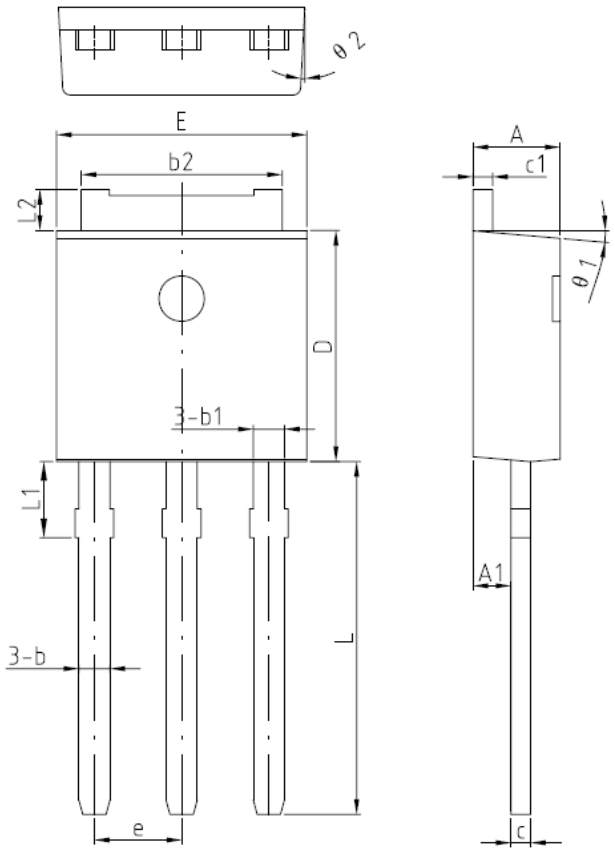
PDFN5*6-8 **Unit: mm**



Symbol	Dimensions(mm)		
	Min.	Typ.	Max.
A	0.90	0.95	1.00
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	3.82	3.96	4.11
e	1.17	1.27	1.37
E	5.90	6.00	6.10
E1	5.70	5.75	5.80
E2	3.18	3.36	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	8°	10°	12°

Mechanical Dimensions (Continued)

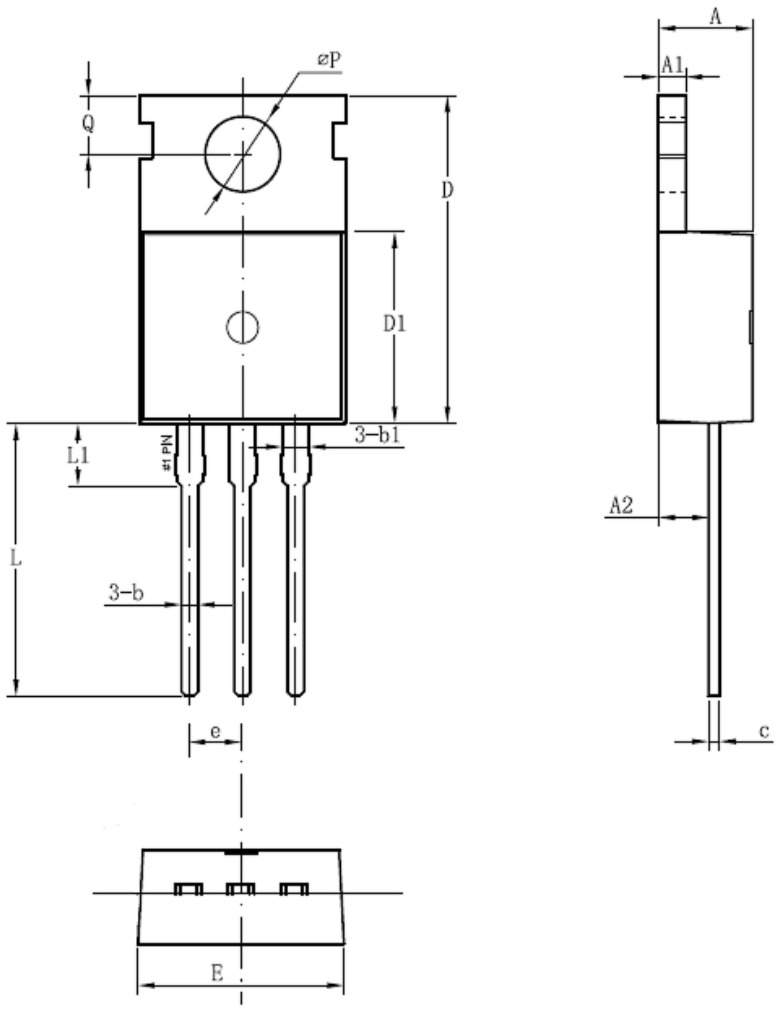
TO-251 **Unit: mm**



Symbol	Dimensions(mm)		
	Min.	Typ.	Max.
A	2.20	2.30	2.40
A1	0.90	1.01	1.17
b	0.50	-	0.91
b1	-	0.81	-
b2	5.13	5.33	5.46
c	0.46	0.50	0.60
c1	0.46	0.50	0.60
D	5.95	6.10	6.25
E	6.45	6.60	6.75
e	2.286(BSC)		
L	9.00	9.30	9.60
L1	-	2.00	-
L2	0.90	-	1.25
θ1	-	5°	-
θ2	-	3°	-

Mechanical Dimensions (Continued)

TO-220C **Unit: mm**



Symbol	Dimensions(mm)		
	Min.	Typ.	Max.
A	4.30	4.50	4.70
A1	1.20	1.30	1.40
A2	2.20	2.40	2.60
b	0.70	0.80	0.95
b1	-	1.27	-
c	0.40	0.50	0.65
D	15.20	15.70	16.20
D1	9.00	9.20	9.40
E	9.70	10.00	10.20
e	2.54(BSC)		
L	12.60	13.08	13.60
L1	-	3.00	-
ΦP	3.50	3.60	3.80
Q	2.60	2.80	3.00

10mΩ, 100V, N-Channel Power MOSFET SRT10N120

Sanrise Technology Limited Company

http://www.sanrise-tech.com

IMPORTANT NOTICE

Sanrise Technology Limited Company reserves the right to make changes without further notice to any products or specifications herein. Sanrise Technology Limited Company does not assume any responsibility for use of any its products for any particular purpose, nor does Sanrise Technology Limited Company assume any liability arising out of the application or use of any its products or circuits. Sanrise Technology Limited Company does not convey any license under its patent rights or other rights nor the rights of others.

Main Site:

- Headquarter

Sanrise Technology Limited Company

Rm.601~603, Building B, SDG Information Port, No.2, Kefeng Road, Science & Technology Park, Nanshan District, ShenZhen, China

Tel: +86-755-22953335

Fax: +86-755-22916878

- Shanghai Office

Sanrise Technology Limited Company

No. 1159, Cailun Road, Zhangjiang HiTech Park, Pudong District, Shanghai, China

Tel: +86-21-51355061