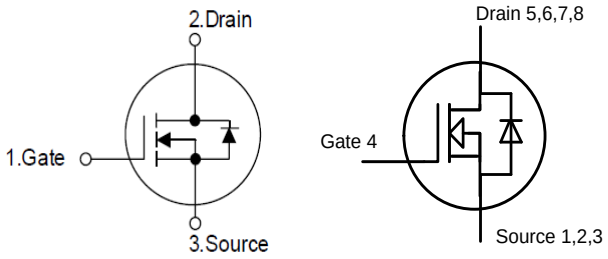
11mΩ, 150V, N-Channel Power MOSFET SRT15N110H

General Description

The Sanrise SRT15N110H 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 SRT15N110H break down voltage is 150V and it has a high rugged avalanche characteristics. The SRT15N110H is available in PDFN5*6 and TO-220C packages.

Symbol



TO-220C PDFN5*6

Figure 1 Symbol of SRT15N110H

Features

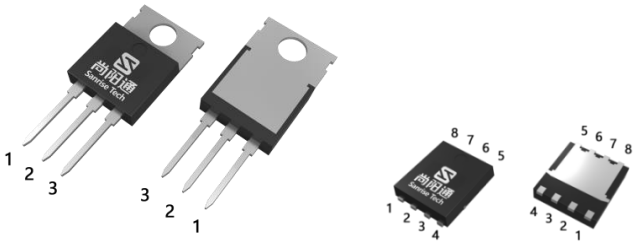
- Ultra Low

$R_{DS(ON)\_TYP}$ = 9.1mΩ, PDFN5*6 @V_{GS} = 10V.

$R_{DS(ON)\_TYP}$ = 10.3mΩ, TO-220C @V_{GS} = 10V.

- Ultra Low Gate Charge, Qg=40nC typ.
- Fast switching capability
- Robust design with better EAS performance
- EMI Improved
- Non-automotive Qualified

Package Type



TO-220C PDFN5*6

Figure 2 Package Type of SRT15N110H

Application

- Server/Telecom
- High Power Supply
- Solar
- UPS

Ordering Information

SRT15N110H□□–□

Circuit Type

Package

D56: PDFN5*6

TC: TO-220C

E: Lead Free

G: Green

Blank: Tube

TR: Tape & Reel

Package	Part Number		Marking ID		Packing Type
	Lead Free	Green	Lead Free	Green	
PDFN5*6	SRT15N110HD56TR-E	SRT15N110HD56TR-G	SRT15N110HD56E	SRT15N110HD56G	Tape & Reel
TO-220C	SRT15N110HTC-E	SRT15N110HTC-G	SRT15N110HTCE	SRT15N110HTCG	Tube

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Absolute Maximum Ratings

Parameter		Symbol	Rating		Unit
Drain-Source Voltage		V_{DSS}	150		V
Gate-Source Voltage		V_{GSS}	±20		V
Continuous Drain Current, Package Limited	T_C=25ºC	I_D	PDFN5*6	80	A
			TO-220C	78.5	
	T_C=100ºC		PDFN5*6	56	
			TO-220C	55.5	
Continuous Drain Current, Silicon	T_C=25ºC		PDFN5*6	80	
			TO-220C	78.5	
Pulsed Drain Current (Note 2)		I_{DM}	PDFN5*6	320	
			TO-220C	314	
Power Dissipation (T_C = 25°C)		P_D	157		W
Avalanche Destructive Energy, Single Pulse (Note 4)		E_{AS_Limit}	370		mJ
Avalanche Energy, Single Pulse (Note 3)		E_{AS}	81		mJ
Avalanche Energy, Repetitive (Note 2)		E_{AR}	0.1		mJ
Avalanche Current, Repetitive (Note 2)		I_{AR}	16		A
Continuous Diode Forward Current		I_S	80		A
Diode Pulse Current		$I_{S.PULSE}$	320		A
Operating Junction Temperature		T_J	175		ºC
Storage Temperature		T_{STG}	-55 to 175		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}= 18A, V_{DD}= 60V, R_G= 25Ω, Starting T_J= 25°C
4. I_{AS_Limit}= 38.5A, V_{DD} = 60V, 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}			0.95	ºC/W
	TO-220C				0.95	
Thermal Resistance， Junction-to-Ambient	PDFN5*6	R_{thJA}			50	
	TO-220C				62	

11mΩ, 150V, N-Channel Power MOSFET **SRT15N110H**

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	150			V
Zero Gate Voltage Drain Current		I_{DSS}	V_{DS}=150V, 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	2.0	3.0	4.0	V
Static Drain-Source On-Resistance	PDFN5*6	$R_{DS(ON)}$	V_{GS}=10V, I_D=60A		9.1	11	mΩ
	TO-220C				10.3	12.8	
Gate Resistance		R_G	f=1MHz, Open Drain		1.1		Ω
Dynamic Characteristics							
Input Capacitance		C_{ISS}	V_{DS}=50V, V_{GS}=0V, f=1MHz		2.25		nF
Output Capacitance		C_{OSS}			1.03		nF
Reverse Transfer Capacitance		C_{RSS}			18		pF
Effective output capacitance, energy related NOTE5		$C_{O(er)}$	V_{GS}=0V, V_{DS}=0…90V		28		nF
Effective output capacitance, time related NOTE6		$C_{O(tr)}$			0.9		
Turn-on Delay Time		$t_{d(on)}$	V_{DD}=75V, I_D=60A R_G=1.6Ω, V_{GS}=10V		9		nS
Rise Time		t_r			3		
Turn-off Delay Time		$t_{d(off)}$			15		
Fall Time		t_f			3		
Gate Charge Characteristics							
Gate to Source Charge		Q_{gs}	V_{DD}=75V, I_D=60A V_{GS}=0 to 10V		12.8		nC
Gate to Drain Charge		Q_{gd}			9.4		
Gate Charge Total		Q_g			40		
Gate Plateau Voltage		$V_{plateau}$			4.9		V
Gate Charge Total, sync FET		Q_g	V_{DD}=0.1V, V_{GS}=0 to 10V		33.4		nC
Reverse Diode Characteristics							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V, I_{SD}=60A		0.87	1.1	V
Reverse Recovery Time		t_{rr}	V_R=75V, I_F=60A dI$_F$/dt=100A/us		16		nS
Reverse Recovery Charge		Q_{rr}			15		nC
Peak Reverse Recovery Current		I_{rrm}			1.2		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 90V
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 90 V

Typical Performance Characteristics

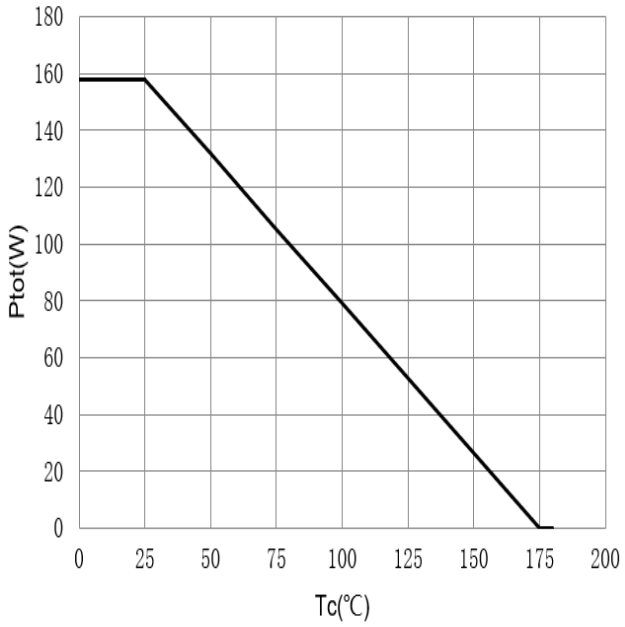
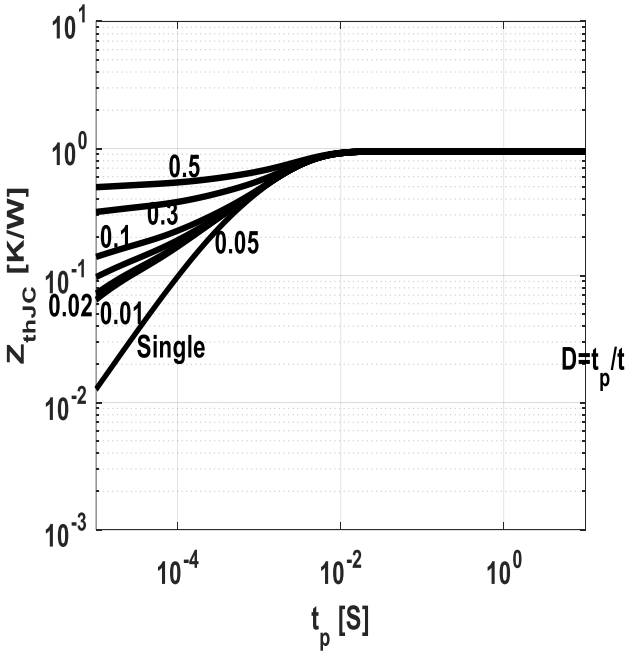
Figure 3: Power Dissipation	Figure 4: Max. Transient Thermal Impedance
	
$P_{tot}=f(T_c)$	$Z(_{thJC})=f(t_p)$;parameter:$D=t_p/T$

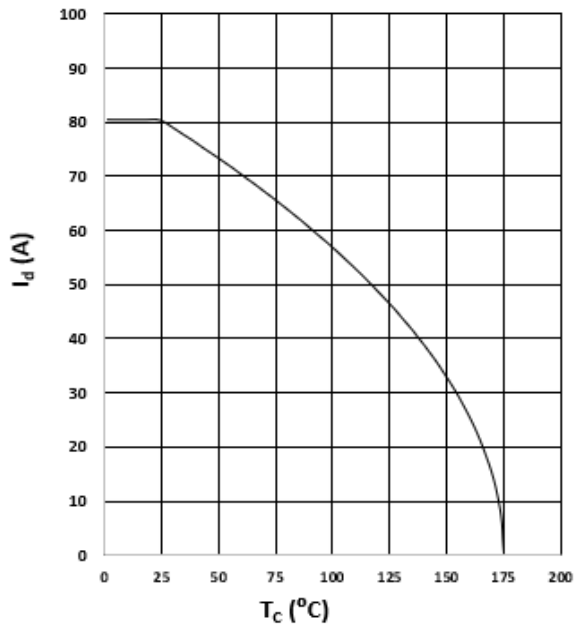
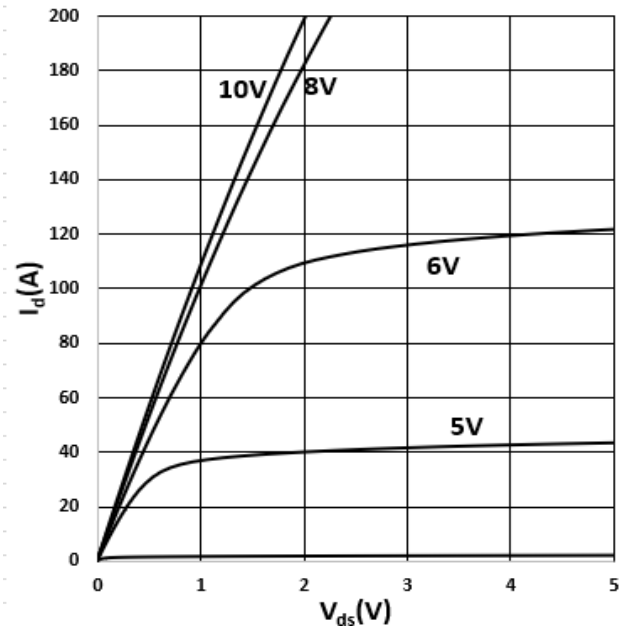
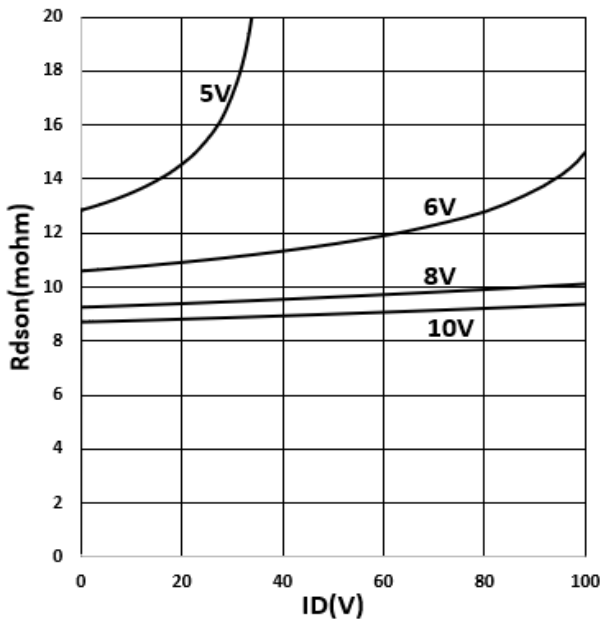
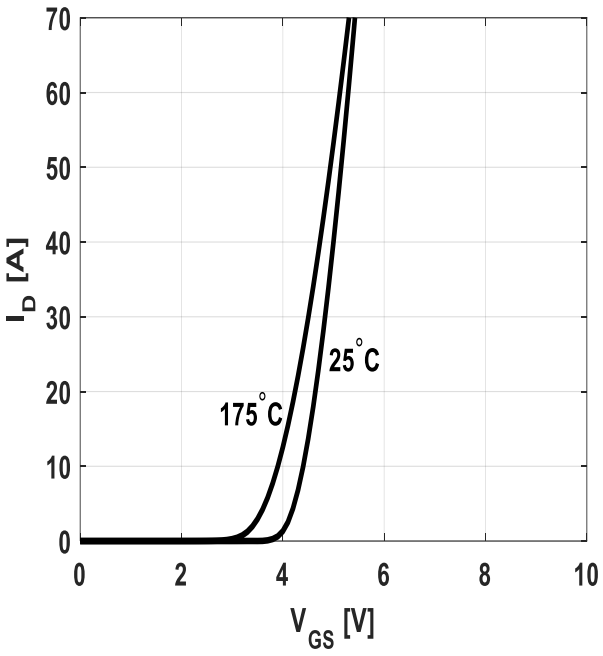
Figure5: Drain Current	Figure6: Typ. Output Characteristics
	
$I_D=f(T_C)$;$V_{GS}\geq 10V$	$I_D=f(V_{DS})$;Tj=25ºC; parameter:V_{GS}

Figure7: Typ. Drain-Source On-State Resistance



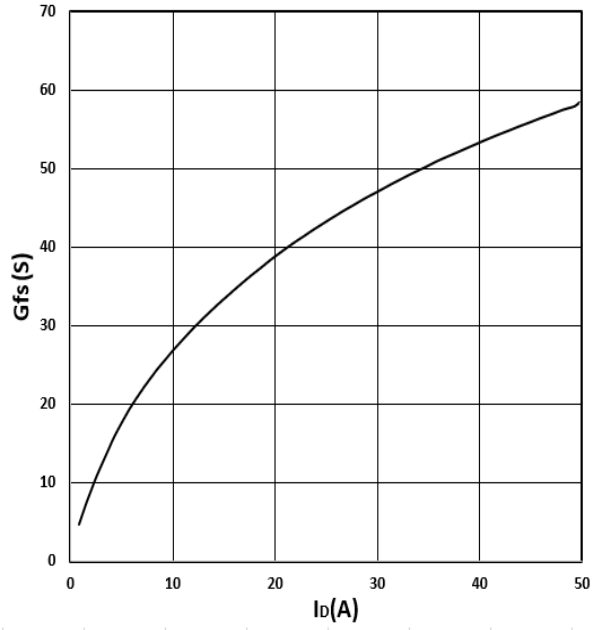
$R_{DS(ON)}=f(I_D)$;T_j=25ºC; parameter: V_{GS}

Figure8: Typ. Transfer Characteristics



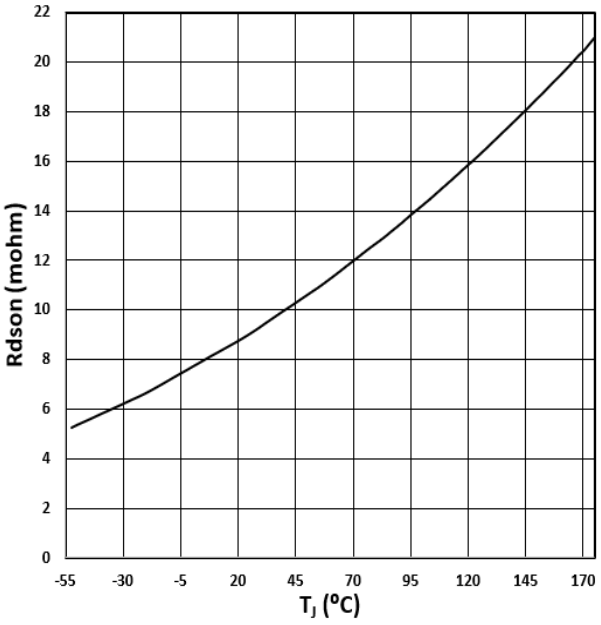
$I_D=f(V_{GS})$; $|V_{DS}|>2|I_D|R_{DS(on)max}$; parameter: T_j

Figure9: Typ. Forward Transconductance



$g_{fs}=f(I_D)$; T_j=25℃

Figure10: Typ. Drain-Source On-State Resistance



$R_{DS(ON)}=f(T_j)$;I_D=60A;V_{GS}=10V

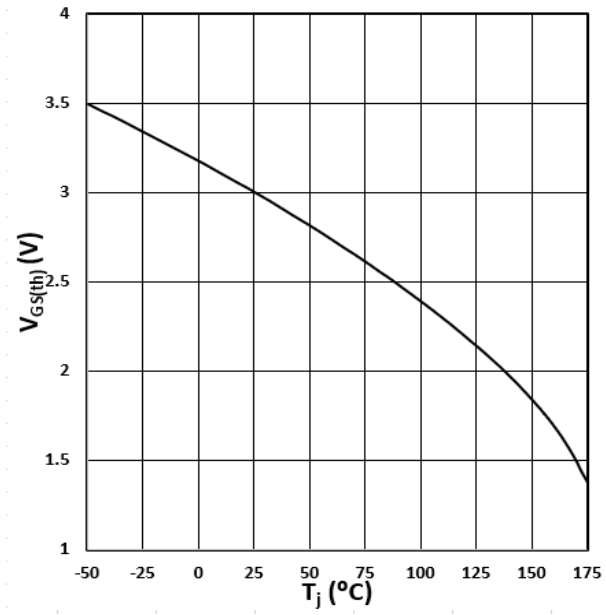
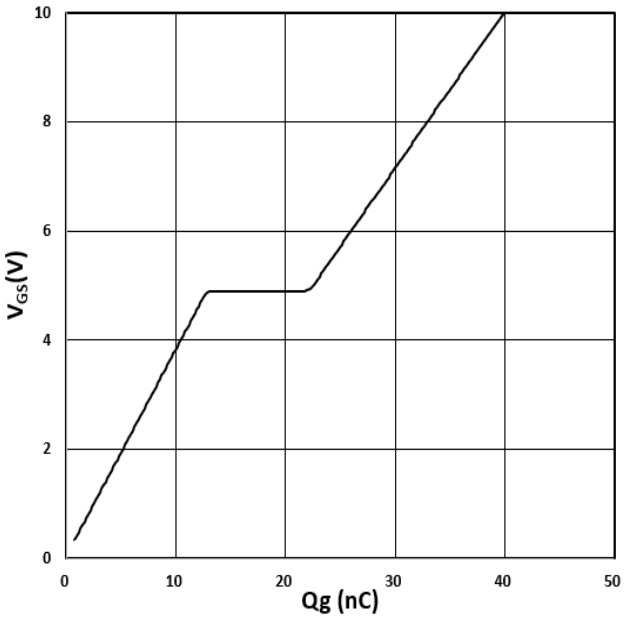
Figure11: Typ.Gate Threshold Voltage	Figure 12: Typ. Gate Charge
	
$V_{GS(th)}=f(T_j)$; $V_{GS}=V_{DS}$; $I_{DS}=250\mu A$	$V_{GS}= f(Q_{gate})$, $I_D=60A$ pulsed

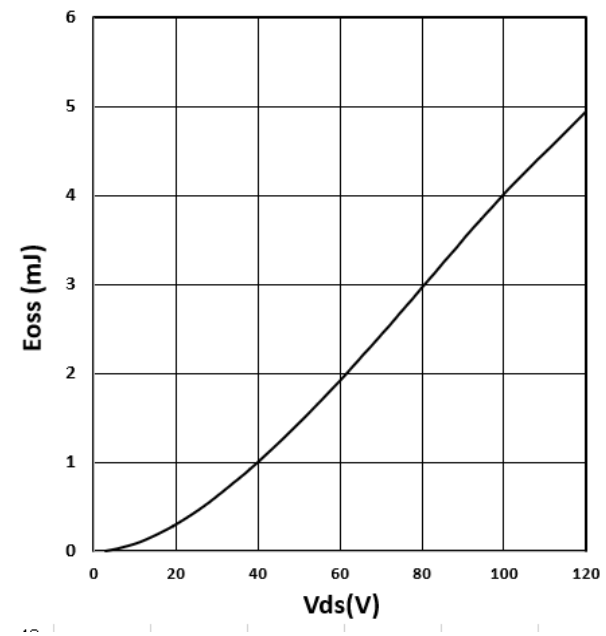
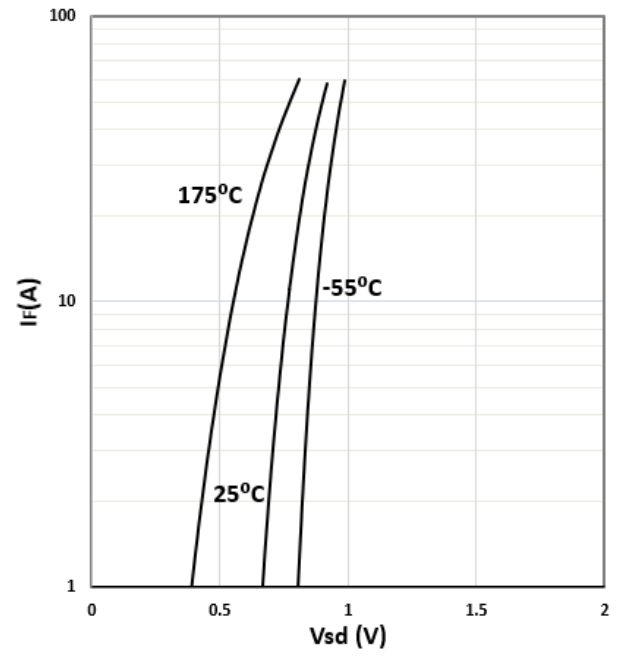
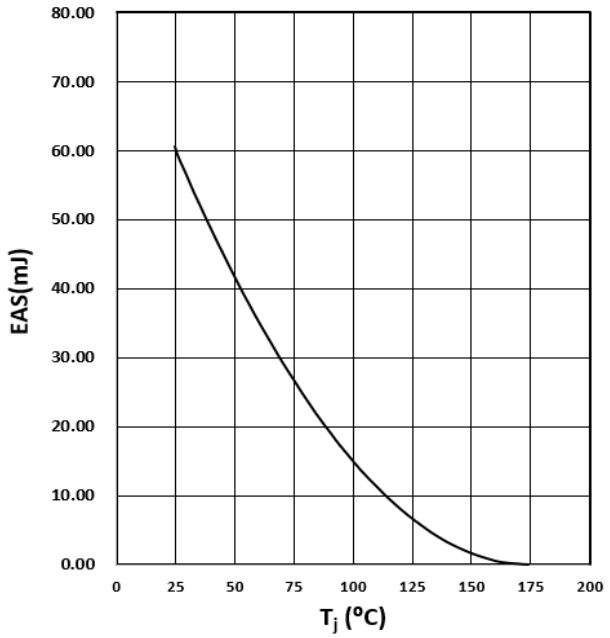
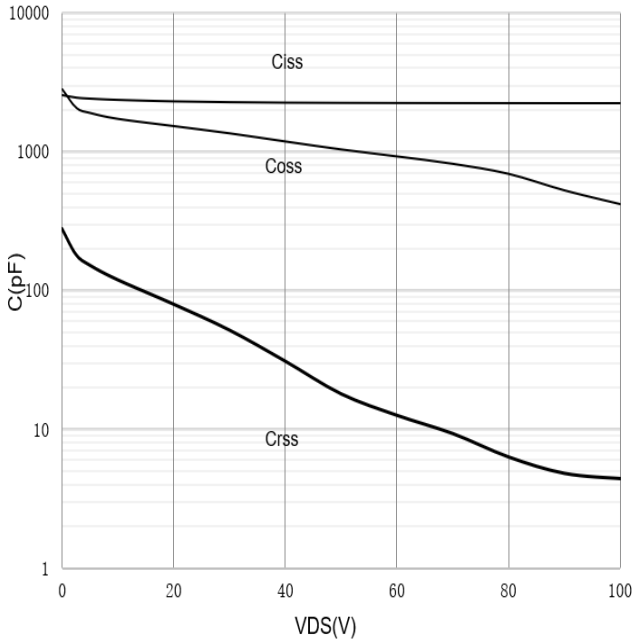
Figure 13: C_{OSS} Stored Energy	Figure 14: Forward Characteristics of Reverse Diode
	
$E_{OSS}=f(V_{DS})$	$I_F=f(V_{SD})$; parameter: T_j

Figure 15: Avalanche Energy



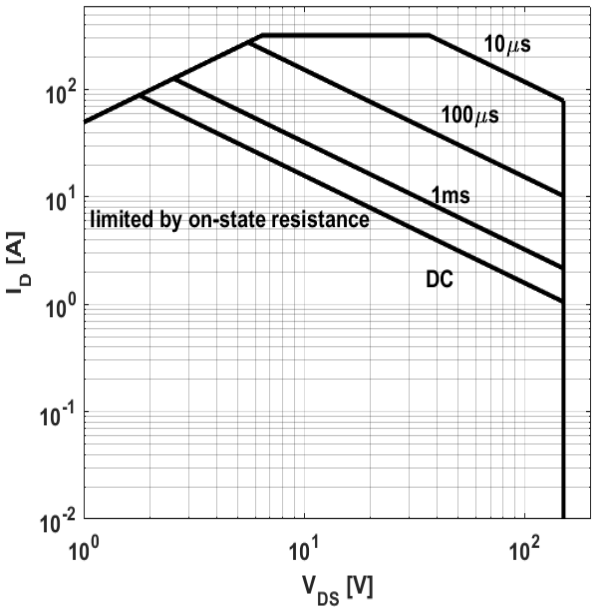
$E_{AS}=f(T_j)$;I_D=40.0A; V_{DD}=75V

Figure 16: Typ. Capacitances



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

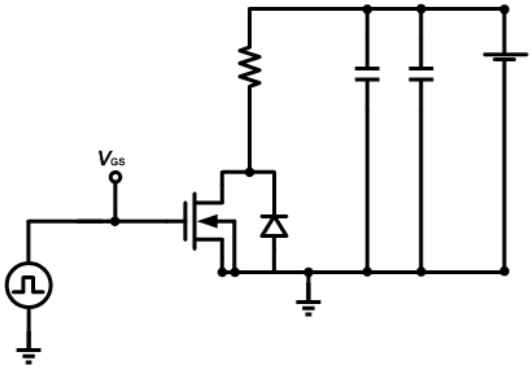
Figure 17: Safe Operating Area

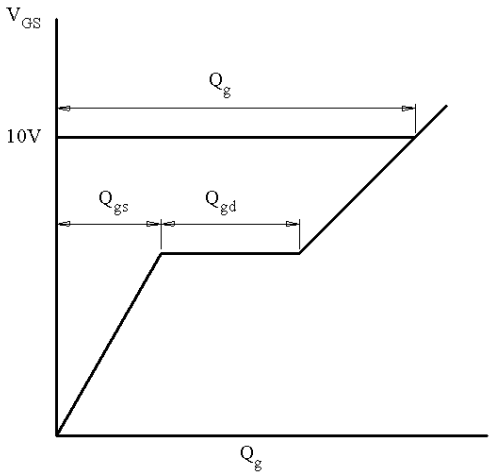


I_D = f(V_{DS}); T_c= 25ºC; V_{GS}>7V; parameter t_p

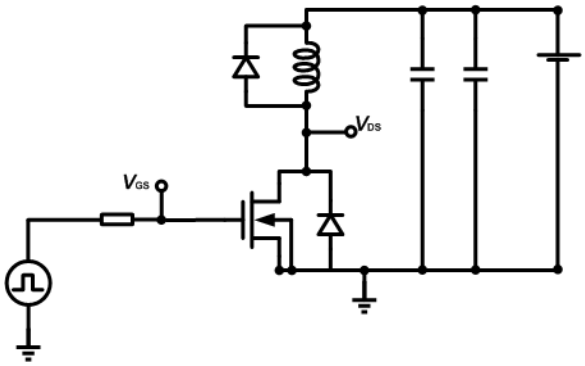
Test Circuits

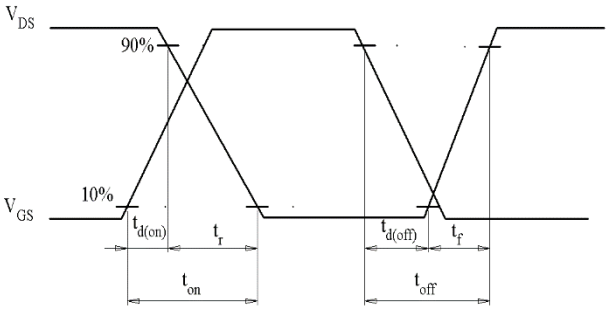
1. Gate Charge Test Circuit & Waveform



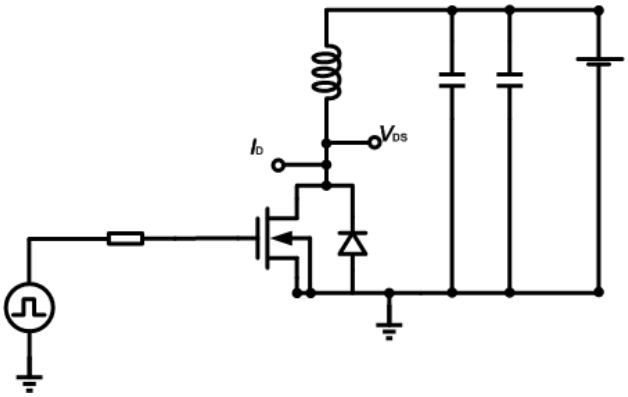


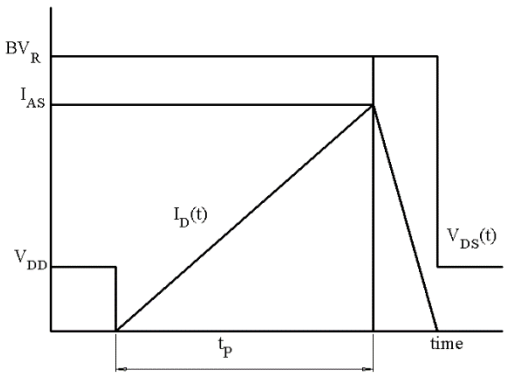
2. Switch Time Test Circuit



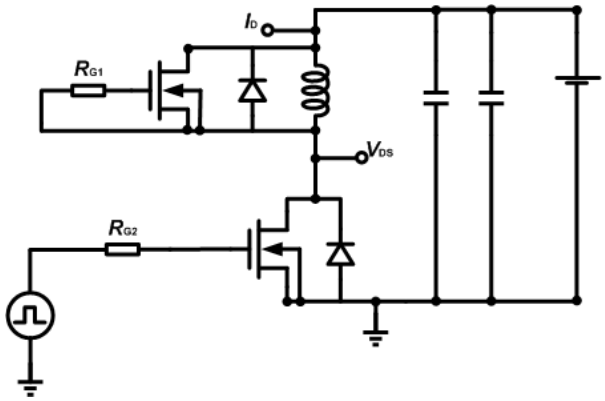


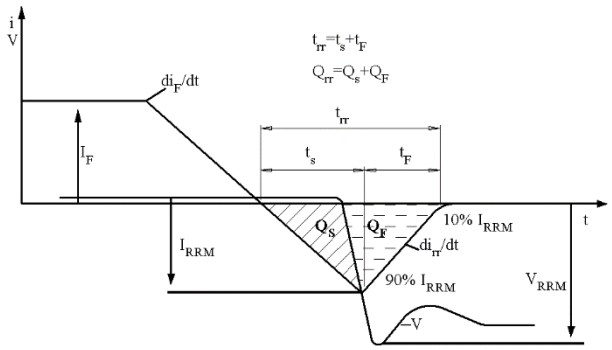
3. Unclamped Inductive Switching Test Circuit & Waveforms





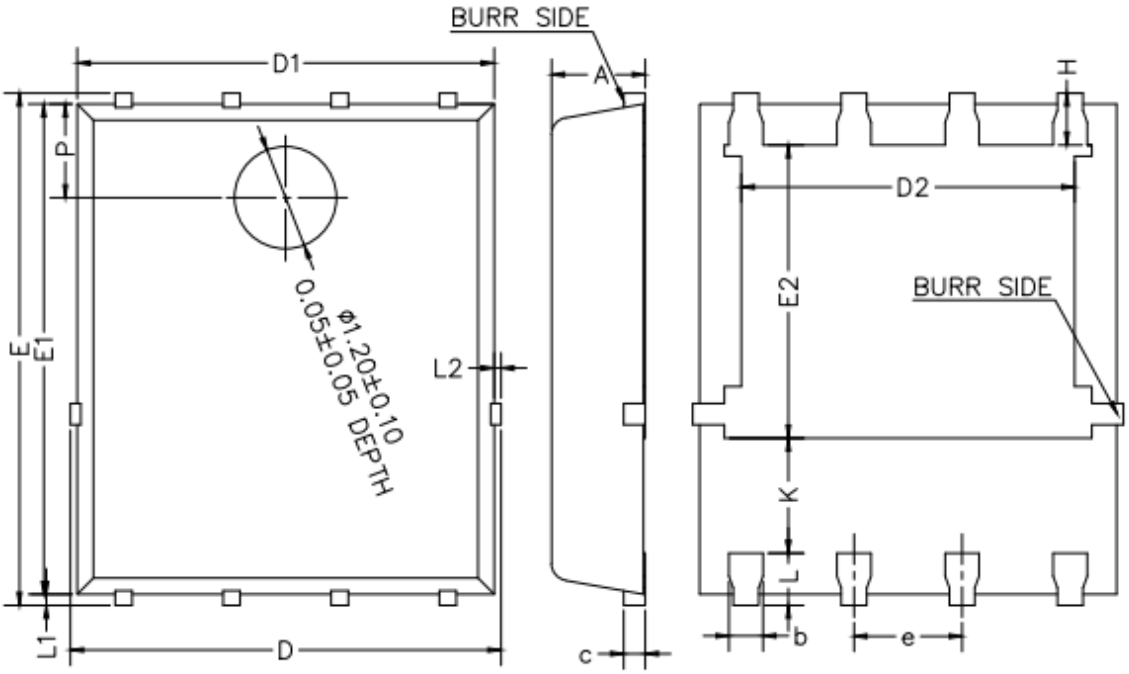
4. Test Circuit and Waveform for Diode Characteristics





Mechanical Dimensions (Continued)

DFN5*6-8 **Unit: mm**



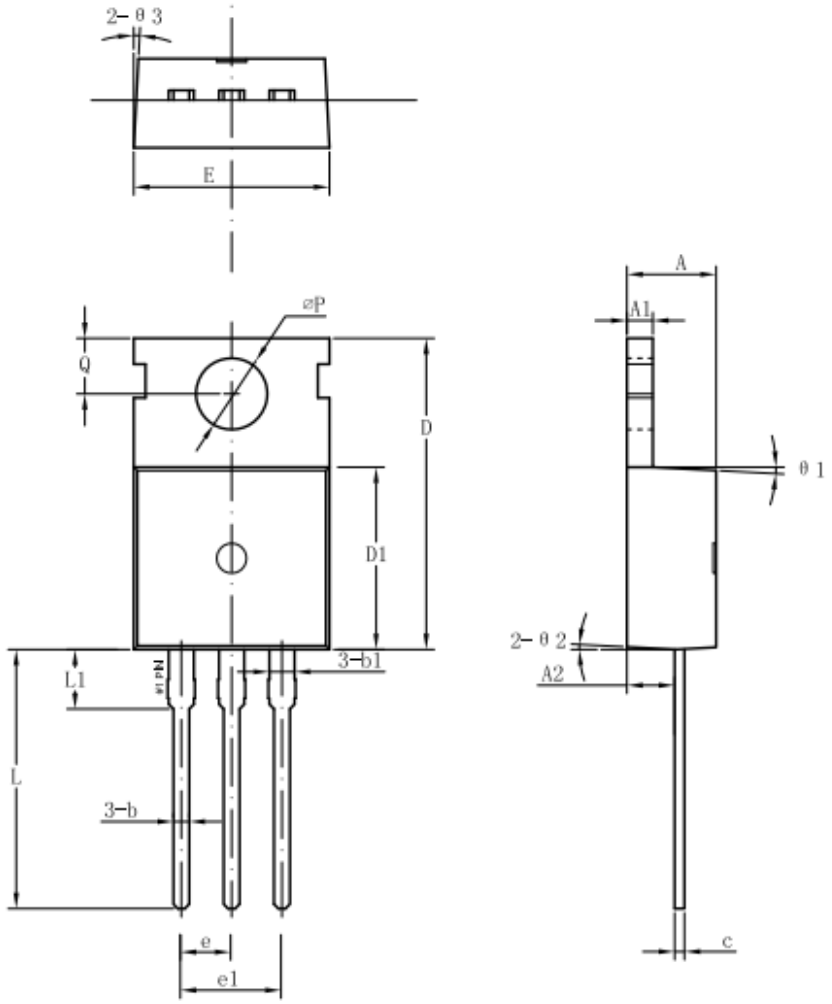
Symbol	Dimensions (mm)			Symbol	Dimensions (mm)		
	Min.	Typ.	Max.		Min.	Typ.	Max.
A	0.90	1.10	1.20	E2	3.18	-	3.54
b	0.35	0.40	0.45	H	0.51	0.61	0.71
c	0.21	0.25	0.34	K	1.10	-	-
D	-	-	5.10	L	0.51	0.61	0.71
D1	4.80	4.90	5.00	L1	0.06	0.13	0.20
D2	3.82	-	4.11	L2	-	-	0.10
e	1.17	1.27	1.37	P	1.00	1.10	1.20
E	5.90	6.00	6.10	θ	8°	10°	12°
E1	5.70	5.75	5.80				

11mΩ, 150V, N-Channel Power MOSFET SRT15N110H

Mechanical Dimensions

TO-220C(Package1)

Unit: mm



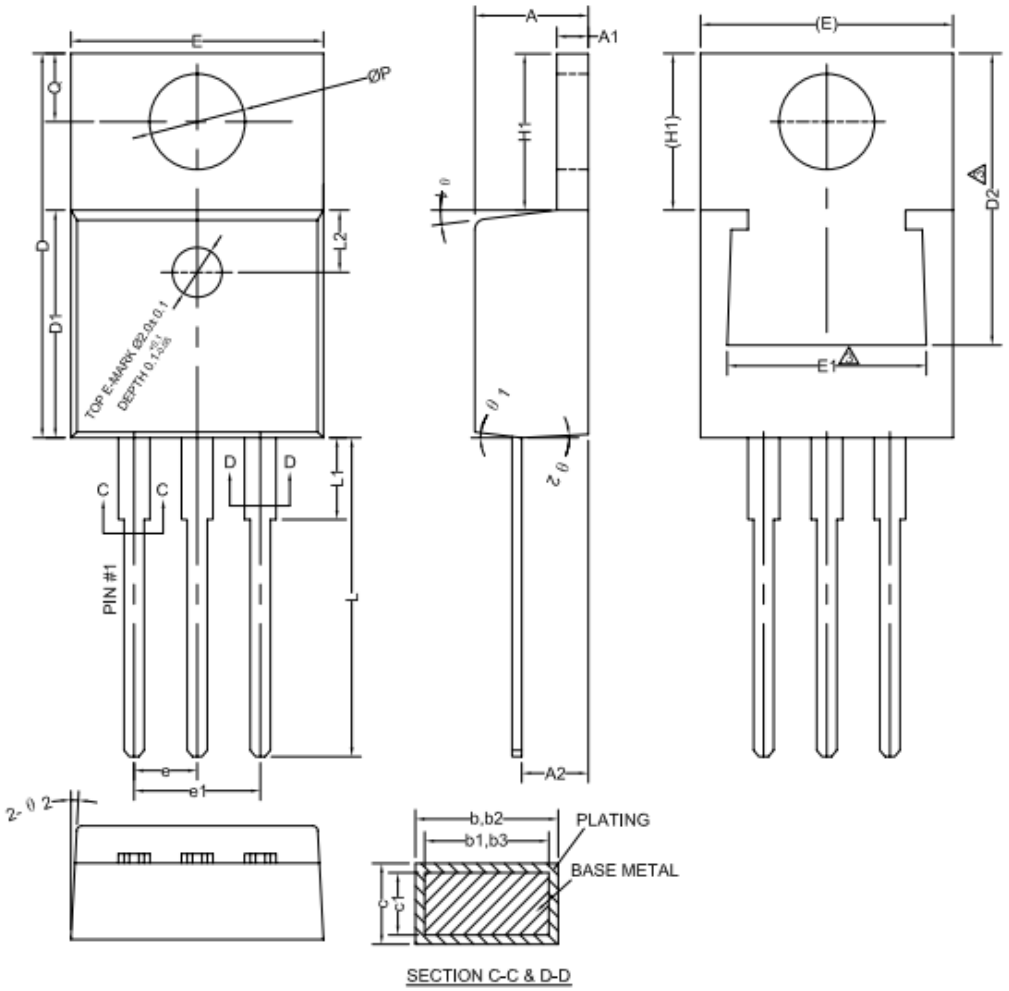
Symbol	Dimensions(mm)			Symbol	Dimensions(mm)		
	Min.	Typ.	Max.		Min.	Typ.	Max.
A	4.30	4.50	4.70	e	-	2.54	-
A1	1.25	1.30	1.40	e1	-	5.08	-
A2	2.20	2.40	2.60	L	12.60	13.08	13.60
b	0.70	0.80	0.95	L1	-	3.00	-
b1	-	1.27	-	ΦP	3.50	3.60	3.80
c	0.40	0.50	0.65	Q	2.60	2.80	3.00
D	15.20	15.70	16.20	Θ1	-	3°	-
D1	9.00	9.20	9.40	Θ2	-	3°	-
E	9.70	10.00	10.10	Θ3	-	3°	-

11mΩ, 150V, N-Channel Power MOSFET SRT15N110H

Mechanical Dimensions

TO-220C(Package2)

Unit: mm



Symbol	Dimensions(mm)			Symbol	Dimensions(mm)		
	Min.	Typ.	Max.		Min.	Typ.	Max.
A	4.40	4.57	4.70	E	9.96	10.16	10.36
A1	1.22	-	1.32	E1	6.86	-	8.89
A2	2.59	2.69	2.79	e	2.44	2.54	2.64
b	0.77	-	0.90	e1	4.98	5.08	5.18
b1	0.76	0.81	0.86	H1	6.10	6.30	6.50
b2	1.23	-	1.36	L	12.70	-	13.12
b3	1.22	1.27	1.32	L1	-	-	3.90
c	0.34	-	0.47	L2	-	2.50REF	-
c1	0.33	0.38	0.43	ΦP	3.80	3.84	3.88
D	15.15	15.45	15.75	Q	2.60	-	2.90
D1	9.05	9.15	9.25	θ1	5°	7°	9°
D2	11.40	-	12.88	θ2	1°	3°	5°

11mΩ, 150V, N-Channel Power MOSFET SRT15N110H

Sanrise Technology Limited Company

http://www.sanrise-tech.com

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Main Site:

- Headquarter

Shenzhen Sanrise Technology Co., LTD.

A1206, Skyworth building, No. 008, gaoxinnan 1st Road, Gaoxin District, Yuehai street,, Nanshan District, ShenZhen, P.R.China

Tel: +86-755-22953335

Fax: +86-755-22916878

- Shanghai Office

Sanrise Technology Limited Company

Rm.401, Building B, No. 666, Zhangheng Road, Zhangjiang Hi-Tech Park, Shanghai, P.R.China

Tel: +86-21-68825918