3.2mΩ, 45V, N-Channel Power MOSFET SRT045N032H

General Description

The Sanrise SRT045N032H 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 SRT045N032H break down voltage is 45V and it has a high rugged avalanche characteristics. The SRT045N032H is available in TO-220C package.

Symbol

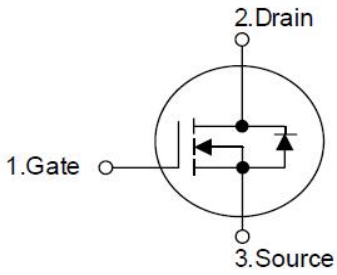
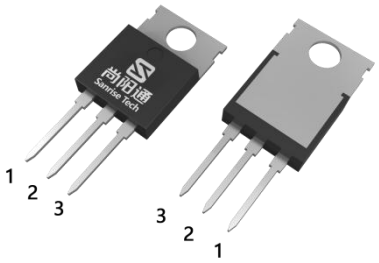


Figure 1 Symbol of SRT045N032H

Features

- Ultra Low $R_{DS(ON)\_TYP}$ = 2.65mΩ, V_{GS} = 10V.
- Ultra Low Gate Charge, Qg=32nC typ.
- Fast switching capability
- Robust design with better EAS performance
- EMI Improved

Package Type



TO-220C

Figure 2 Package Type of SRT045N032H

Application

- Server/Telecom
- High Power Supply
- E-Tools
- Motor Driver
- BMS

Ordering Information

SRT045N032H□□–□

Circuit Type

Package

TC: TO-220C

E: Lead Free

G: Green

Blank: Tube

TR: Tape & Reel

Package	Part Number	Marking ID	Packing Type
TO-220C	SRT045N032HTC-E	SRT045N032HTCE	Tape &Reel

3.2mΩ, 45V, N-Channel Power MOSFET **SRT045N032H**

Absolute Maximum Ratings

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DSS}	45	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current, Package Limited	T_C=25ºC	I_D	60	A
	T_C=125ºC		63	
Continuous Drain Current, Silicon	T_C=25ºC		129	
Pulsed Drain Current (Note 2)		I_{DM}	240	A
Avalanche Energy, Single Pulse (Note 3)		E_{AS}	155	mJ
Power Dissipation (T_C = 25°C)		P_D	113	W
Avalanche Destructive Energy, Single Pulse (Note 5)		E_{AS_Limit}	225	mJ
Avalanche Energy, Repetitive (Note 2)		E_{AR}	0.2	mJ
Avalanche Current, Repetitive (Note 2)		I_{AR}	20.0	A
Continuous Diode Forward Current		I_S	60	A
Diode Pulse Current		$I_{S.PULSE}$	240	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
4. I_{AS}= 12A, V_{DD}= 20V, R_G= 25Ω, Starting T_J= 25°C
5. I_{AS_Limit}= 30.0A, V_{DD}= 20V, R_G= 25Ω, Starting T_J= 25°C

Thermal Resistance

Parameter	Symbol	Min	Typ	Max	Unit
Thermal Resistance，Junction-to-Case	R_{thJC}			1.1	ºC/W
Thermal Resistance，Junction-to-Ambient	R_{thJA}			62	

Electrical Characteristics

T_J = 25℃, unless otherwise specified.

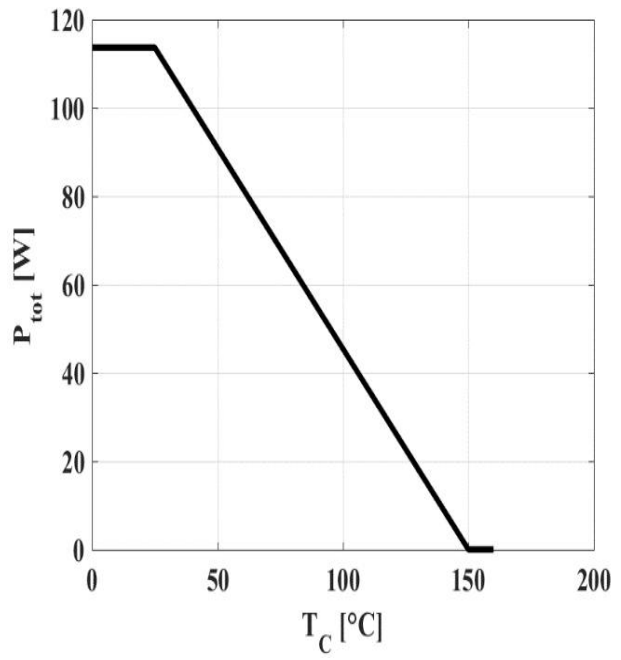
Parameter		Symbol	Test Conditions	Min	Typ	Max	Unit
Statistic Characteristics							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V, I_D=250uA	45			V
Zero Gate Voltage Drain Current		I_{DSS}	V_{DS}=45V, V_{GS}=0V			1	uA
Gate-Body Leakage Current	Forward	I_{GSSF}	V_{GS}=20V, V_{DS}=0V			200	nA
	Reverse	I_{GSSR}	V_{GS}=-20V, V_{DS}=0V			-200	
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		$R_{DS(ON)}$	V_{GS}=10V, I_D=35A		2.65	3.2	mΩ
Gate Resistance		R_G	f=1MHz, Open Drain		1.2		Ω
Dynamic Characteristics							
Input Capacitance		C_{ISS}	V_{DS}=20V, V_{GS}=0V, f=1MHz		2.3		nF
Output Capacitance		C_{OSS}			762		pF
Reverse Transfer Capacitance		C_{RSS}			48		pF
Effective output capacitance, energy related NOTE5		$C_{O(er)}$	V_{GS}=0V, V_{DS}=0…20V		1.2		nF
Effective output capacitance, time related NOTE6		$C_{O(tr)}$			1.5		
Turn-on Delay Time		$t_{d(on)}$	V_{DD}=20V, I_D=35A R_G=1.6Ω, V_{GS}=10V		8		ns
Rise Time		t_r			29		
Turn-off Delay Time		$t_{d(off)}$			31		
Fall Time		t_f			7		
Gate Charge Characteristics							
Gate to Source Charge		Q_{gs}	V_{DD}=20V, I_D=35A V_{GS}=0 to 10V		10.2		nC
Gate to Drain Charge		Q_{gd}			5.2		
Gate Charge Total		Q_g			32		
Gate Plateau Voltage		$V_{plateau}$			5.0		V
Gate Charge Total, sync FET		Q_g	V_{DD}=0.1V, V_{GS}=0 to 10V		29		nC
Reverse Diode Characteristics							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V, I_{SD}=35A		0.84	1.0	V
Reverse Recovery Time		t_{rr}	V_R=20V, I_F=35A dI$_F$/dt=100A/us		52		ns
Reverse Recovery Charge		Q_{rr}			91		nC
Peak Reverse Recovery Current		I_{rrm}			3.5		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 32V
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 32 V

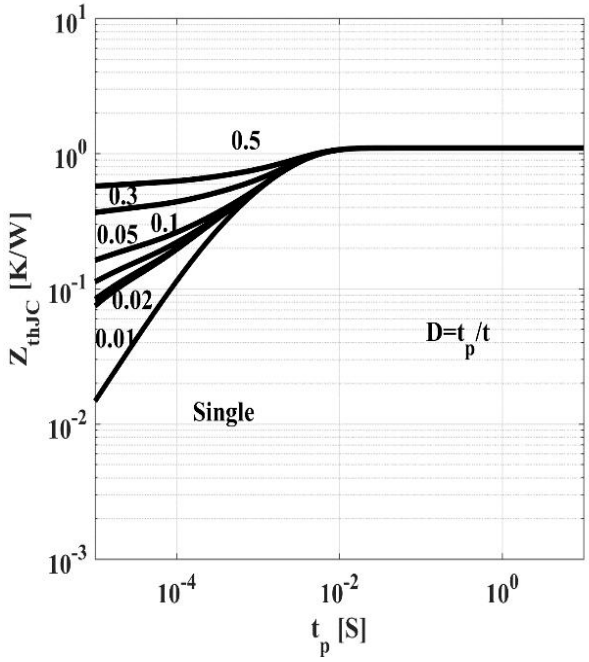
Typical Performance Characteristics

Figure 3: Power Dissipation



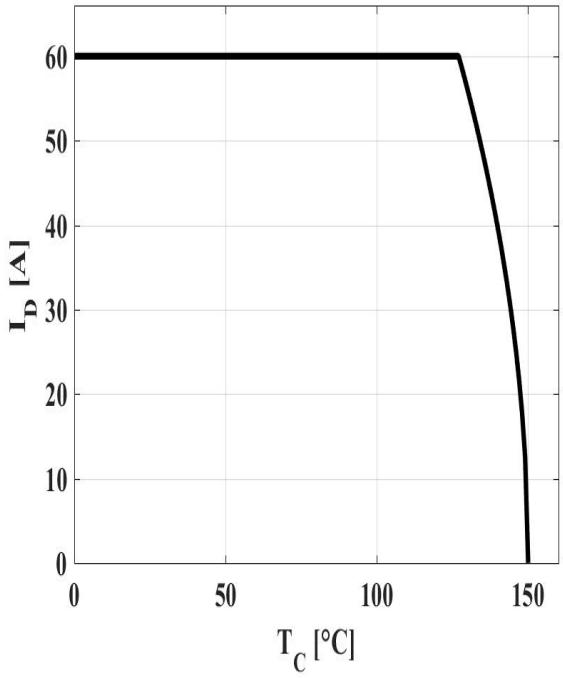
$P_{tot}=f(T_c)$

Figure 4: Max. Transient Thermal Impedance



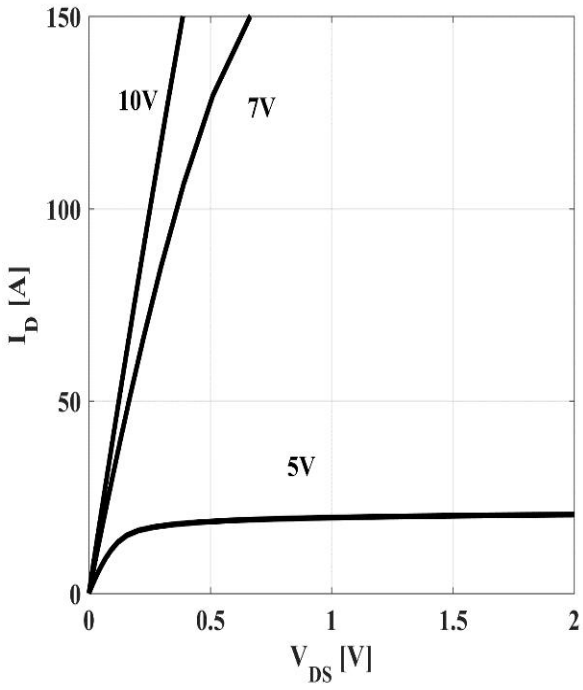
$Z_{(thJC)}=f(t_p)$; parameter: $D=t_p/T$

Figure5: Drain Current



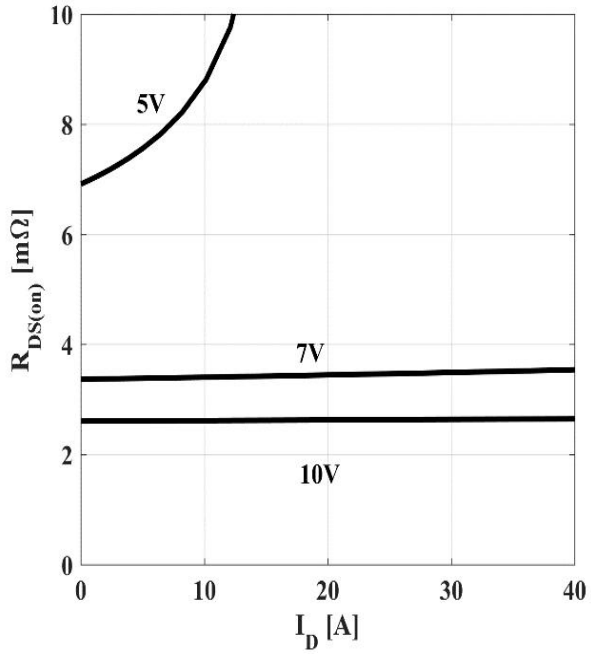
$I_D=f(T_C)$;$V_{GS}\geq 10V$

Figure6: Typ. Output Characteristics



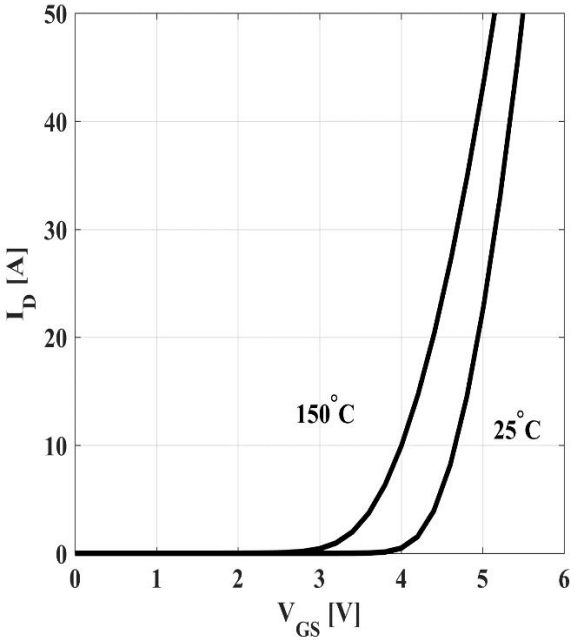
$I_D=f(V_{DS})$;Tj=25°C; parameter: V_{GS}

Figure7: Typ. Drain-Source On-State Resistance



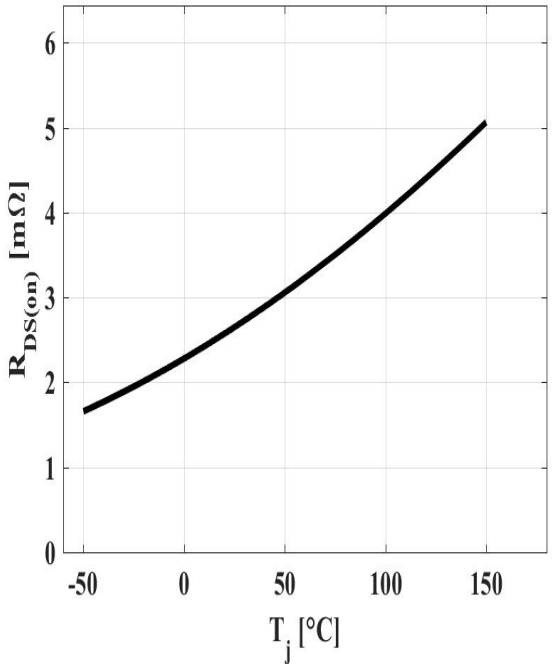
$R_{DS(ON)}$=f(I_D);T_j=25ºC; parameter: V_{GS}

Figure8: Typ. Transfer Characteristics



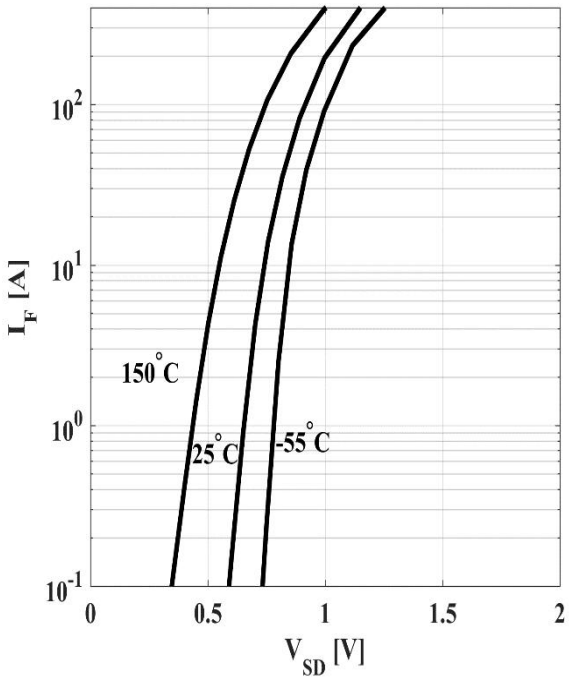
I_D=f(V_{GS}); |V_{DS}|>2|I_D|$R_{DS(on)max}$; parameter: T_j

Figure9: Typ. Drain-Source On-State Resistance



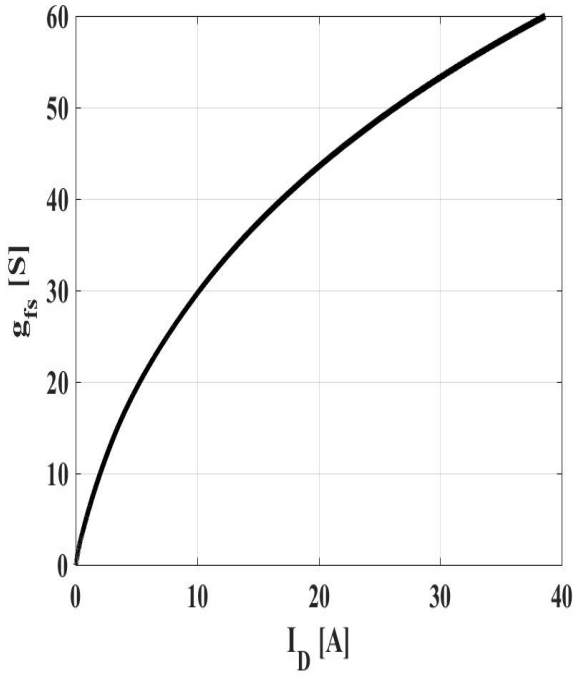
$R_{DS(ON)}$=f(T_j);I_D=35A;V_{GS}=10V

Figure 10: Forward Characteristics of Reverse Diode



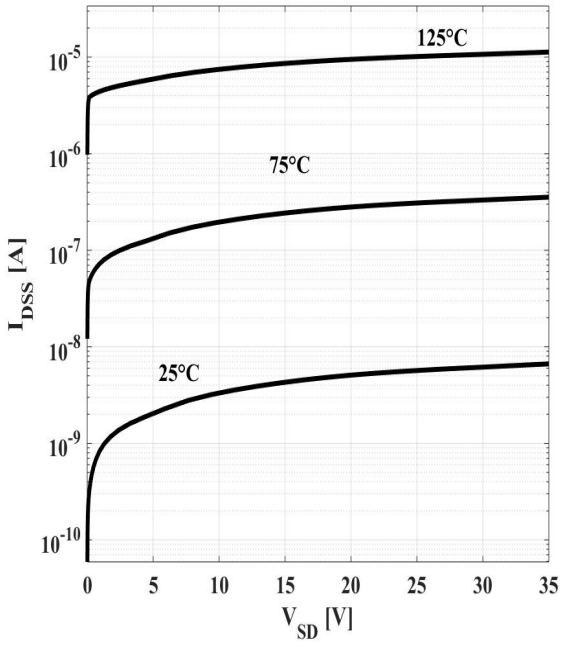
I_F=f(V_{SD}); parameter: T_j

Figure11: Typ. Forward Transconductance



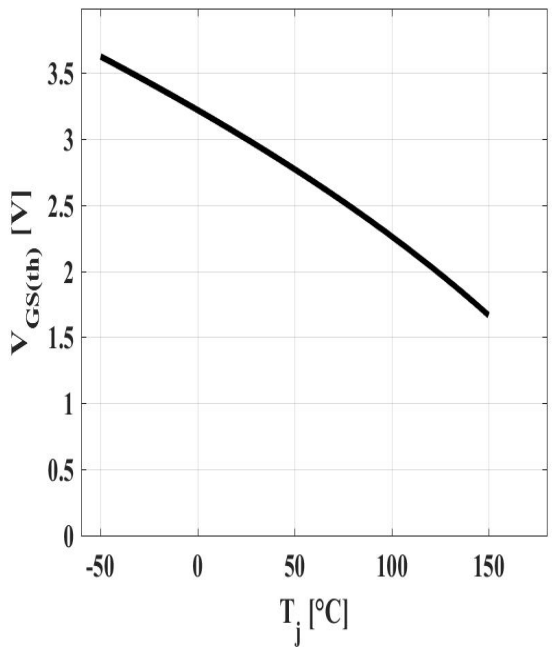
$g_{fs}=f(I_D)$; T_j=25°C

Figure 12: Drain-Source Leakage Current



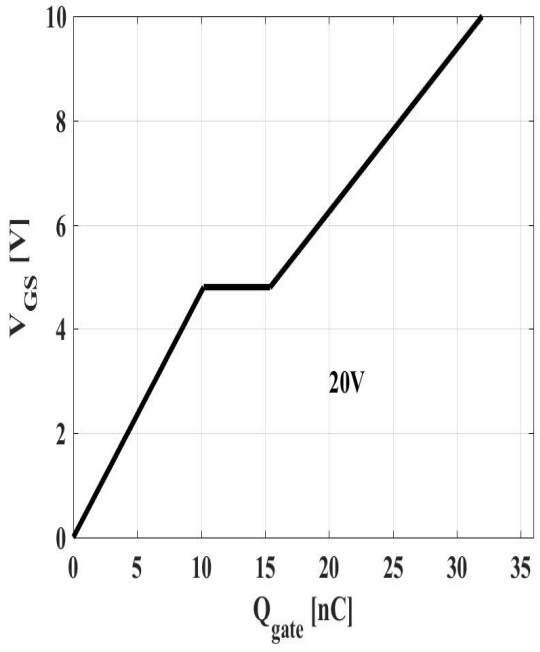
$I_{DSS}=f(V_{DS})$; V_{GS}=0V; parameter: T_j

Figure13: Typ. Gate Threshold Voltage



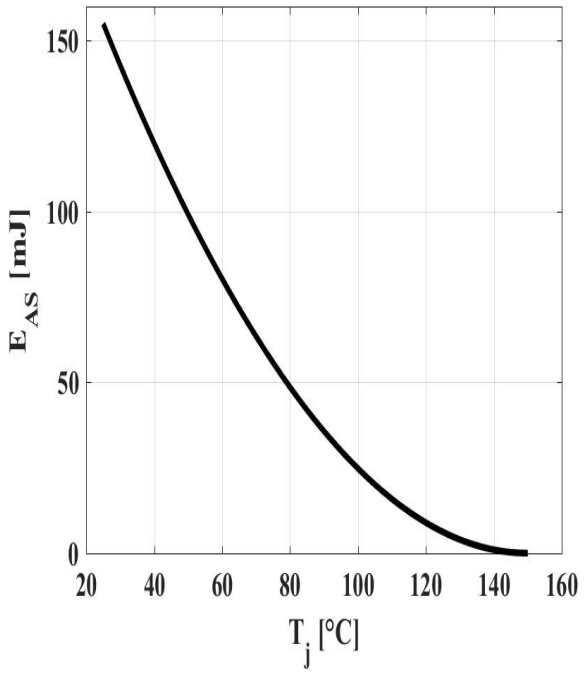
$V_{GS(th)}=f(T_j)$; $V_{GS}=V_{DS}$; I_{DS}=250μA

Figure 14: Typ. Gate Charge



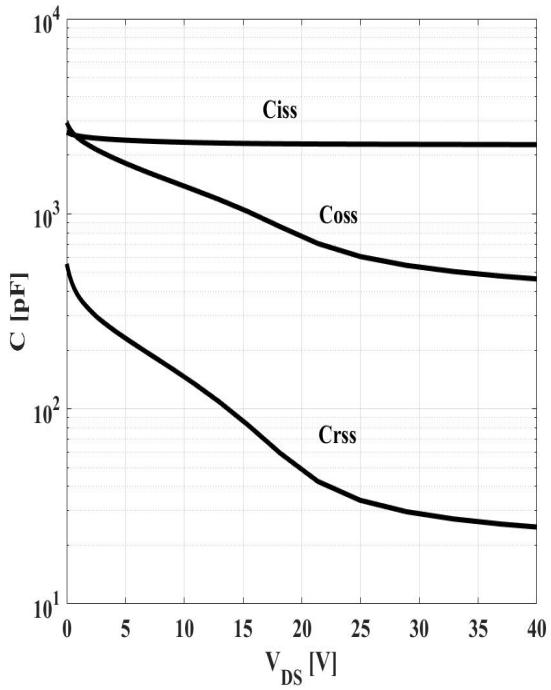
$V_{GS}= f(Q_{gate})$, I_D=35A pulsed

Figure 15: Avalanche Energy



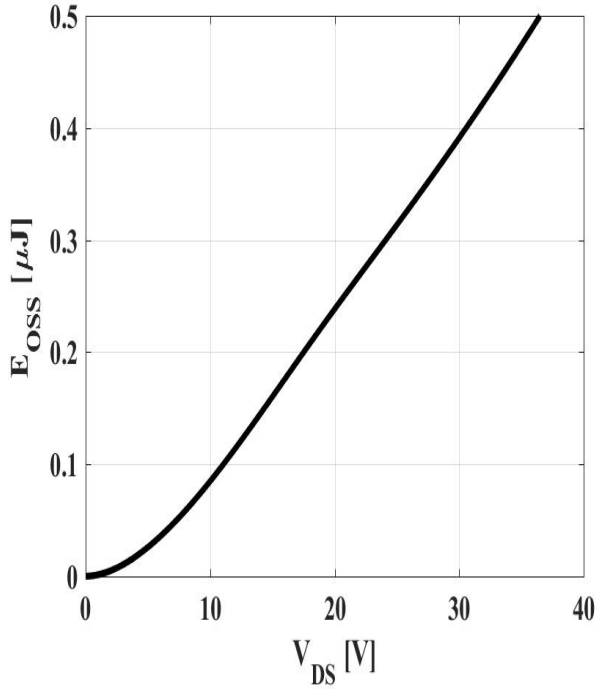
$E_{AS}=f(T_j)$;I_D=20.0A; V_{DD}=20V

Figure 16: Typ. Capacitances



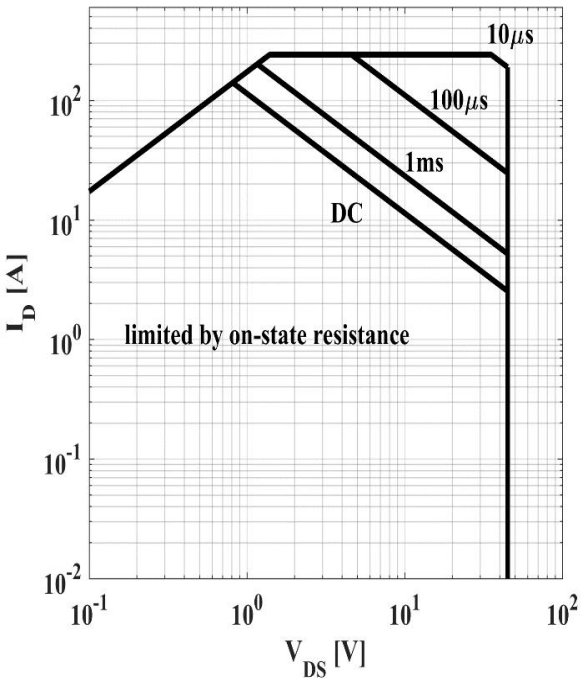
$C=f(V_{DS})$; V_{GS}=0; f=1MHz

Figure 17: C_{OSS} Stored Energy



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

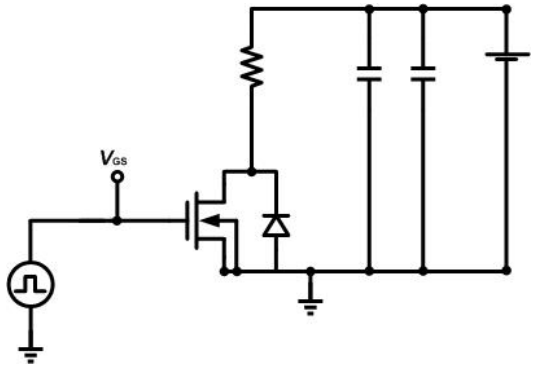
Figure 18: Safe Operating Area

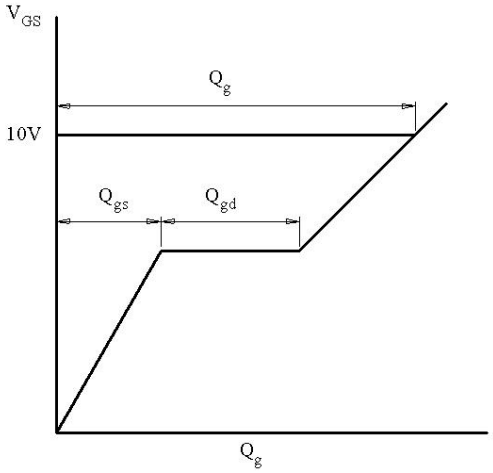


$I_D = f(V_{DS})$; T_c= 25ºC; V_{GS}>7V; parameter t_p

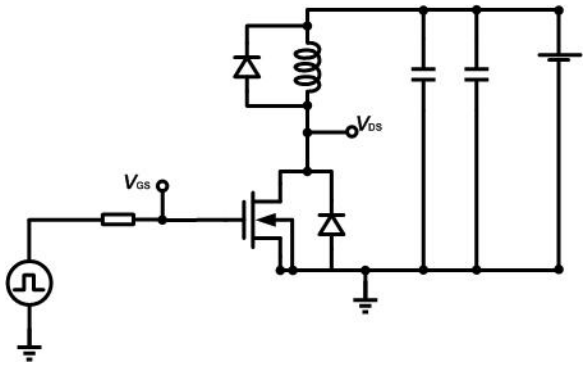
Test Circuits

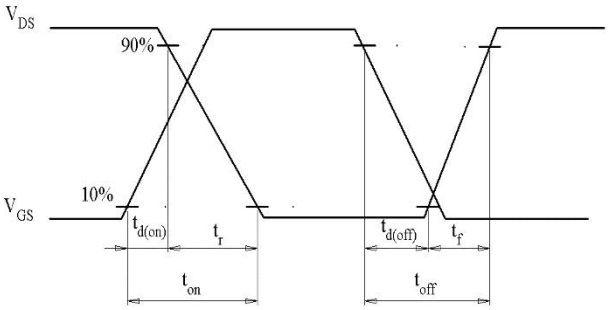
1. Gate Charge Test Circuit & Waveform



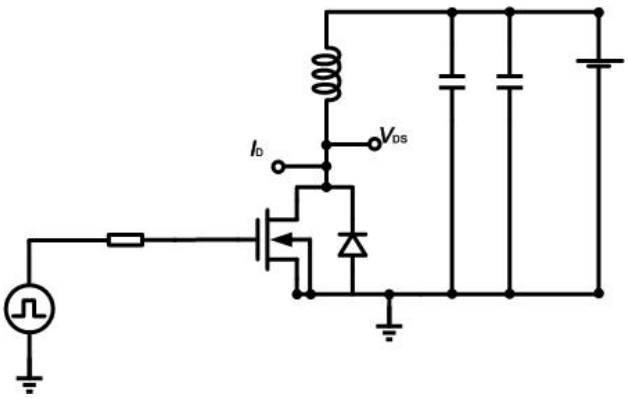


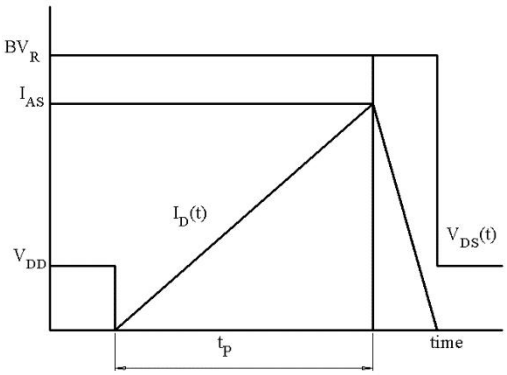
2. Switch Time Test Circuit



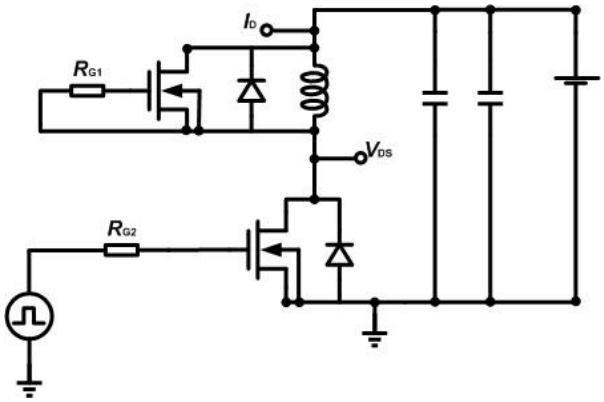


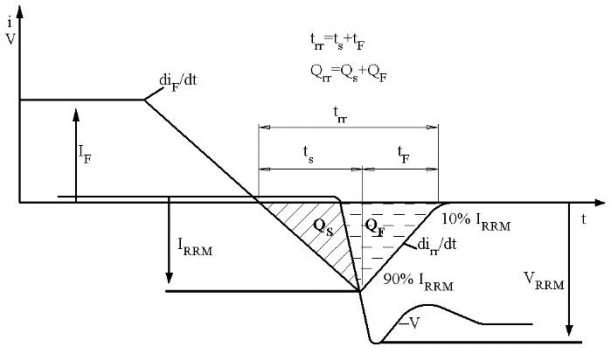
3. Unclamped Inductive Switching Test Circuit & Waveforms





4. Test Circuit and Waveform for Diode Characteristics

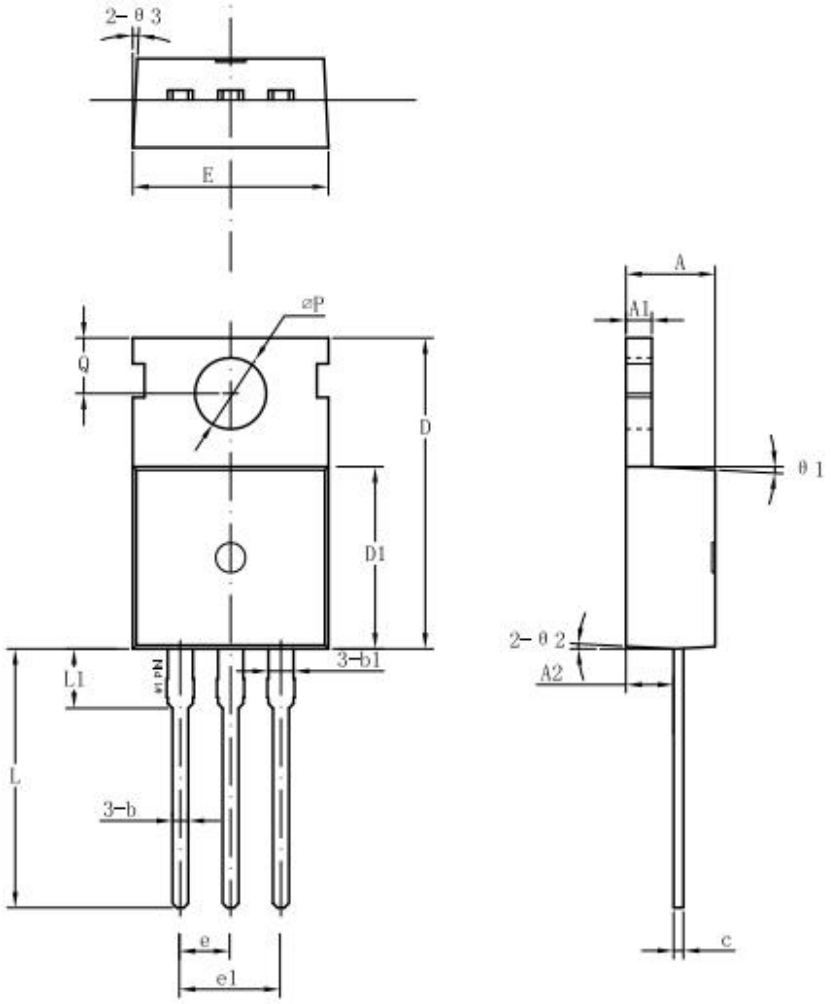




3.2mΩ, 45V, N-Channel Power MOSFET SRT045N032H

Mechanical Dimensions

TO-220C(Package1) **Unit: mm**

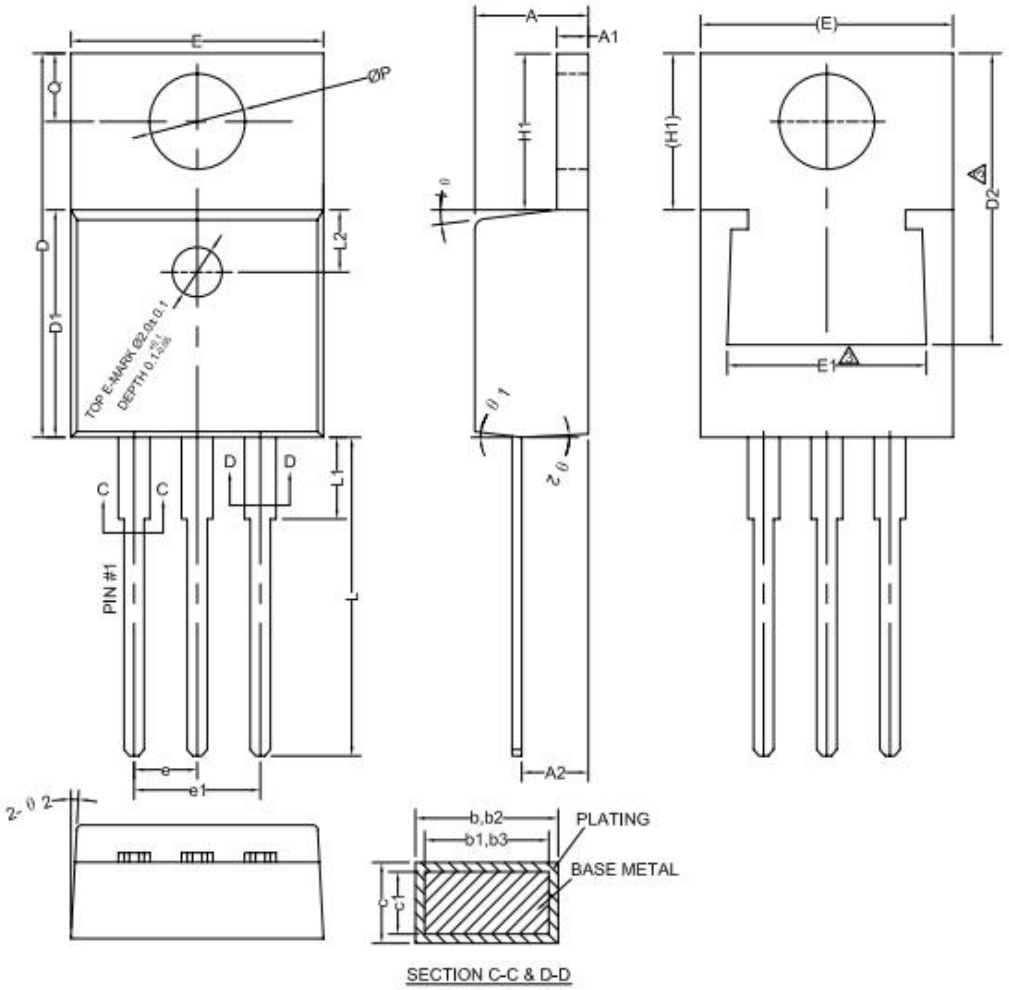


Symbol	Dimensions(mm)			Symbol	Dimensions(mm)		
	Min.	Typ.	Max.		Min.	Typ.	Max.
A	4.30	4.50	4.70	e	-	2.54	-
A1	1.25	1.30	1.40	e1	-	5.08	-
A2	2.20	2.40	2.60	L	12.60	13.08	13.60
b	0.70	0.80	0.95	L1	-	3.00	-
b1	-	1.27	-	ΦP	3.50	3.60	3.80
c	0.40	0.50	0.65	Q	2.60	2.80	3.00
D	15.20	15.70	16.20	Θ1	-	3°	-
D1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

3.2mΩ, 45V, N-Channel Power MOSFET SRT045N032H

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°

3.2mΩ, 45V, N-Channel Power MOSFET SRT045N032H

Sanrise Technology Limited Company

http://www.sanrise-tech.com

IMPORTANT NOTICE

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

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