5.0mΩ, 30V, N-Channel Power MOSFET SRT03N050LD56TR-G

General Description

The Sanrise SRT03N050LD56TR-G uses advanced split gate trench technology. It has extremely low on resistance, low gate charge and fast switching time. This device is ideal for Motor driver, BMS, DC-DC converter and power management.

The SRT03N050LD56TR-G break down voltage is 30V and it has a high rugged avalanche characteristic.

The SRT03N050LD56TR-G is available in PDFN5*6 package.

Symbol

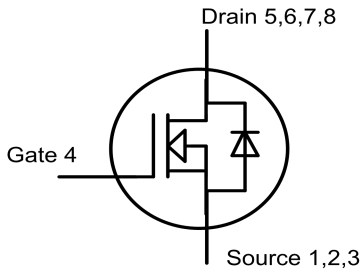


Figure 1 Symbol of SRT03N050LD56TR-G

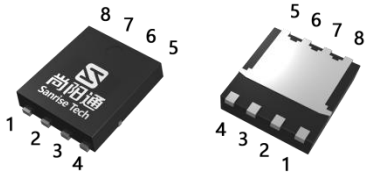
Features

- Ultra Low $R_{DS(ON)}$ = 3.8mΩ @ V_{GS} = 10V.
- Ultra Low Gate Charge, Qg=18.2nC typ.
- Fast switching capability
- Robust design with better EAS performance
- Non-automotive Qualified

Application

- Server / Telecom
- High Power Supply, such as DCDC converter
- Motor Driver, such as E-Tools
- BMS

Package Type



PDFN5*6

Figure 2 Package Types of SRT03N050LD56TR-G

Ordering Information

SRT03N050L□□–□

Circuit Type

Package
D56: PDFN5*6

E: Lead Free
G: Green

Blank: Tube
TR: Tape & Reel

Package	Part Number	Marking ID	Packing Type
PDFN5*6	SRT03N050LD56TR-G	SRT03N050LD56G	Tape & Reel

5.0mΩ, 30V, N-Channel Power MOSFET **SRT03N050LD56TR-G**

Absolute Maximum Ratings

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DSS}	30	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current	T_C=25ºC	I_D	55	A
	T_C=100ºC		35	
Pulsed Drain Current (Note 2)		I_{DM}	220	A
Power Dissipation (T_C = 25°C)		P_D	33	W
Avalanche Destructive Energy, Single Pulse (Note 4)		E_{AS_Limit}	121	mJ
Avalanche Energy, Single Pulse (Note 3)		E_{AS}	20	mJ
Avalanche Current, Repetitive (Note 2)		I_{AR}	9.0	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} = 9.0A, V_{DD} = 15V, R_G = 25Ω, Starting T_J = 25°C
4. I_{AS_Limit}= 22.0A, V_{DD} = 15V, R_G = 25Ω, Starting T_J = 25°C

Thermal Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Thermal Resistance，Junction-to-Case	R_{thJC}			3.8	ºC/W
Thermal Resistance，Junction-to-Ambient	R_{thJA}			50	

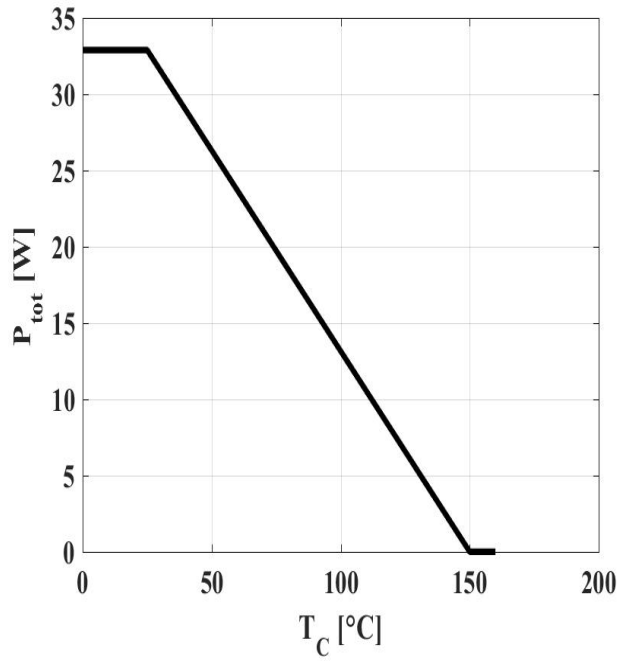
Electrical Characteristics

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	30			V
Zero Gate Voltage Drain Current		I_{DSS}	V_{DS}=30V, 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	1.0	1.6	2.2	V
Static Drain-Source On-Resistance		$R_{DS(ON)}$	V_{GS}=4.5V, I_D=20A		5.5	8.0	mΩ
Static Drain-Source On-Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=20A		3.8	5.0	mΩ
Gate Resistance		R_G	f=1MHz, Open Drain		2.6		Ω
Dynamic Characteristics							
Input Capacitance		C_{ISS}	V_{DS}=15V, V_{GS}=0V, f=1MHz		1.4		nF
Output Capacitance		C_{OSS}			300		pF
Reverse Transfer Capacitance		C_{RSS}			70		pF
Turn-on Delay Time		$t_{d(on)}$	V_{DD}=15V, I_D=20A R_G=1.6Ω, V_{GS}=10V		6		ns
Rise Time		t_r			4		
Turn-off Delay Time		$t_{d(off)}$			19		
Fall Time		t_f			4		
Gate Charge Characteristics							
Gate to Source Charge		Q_{gs}	V_{DD}=15V, I_D=20A V_{GS}=0 to 10V		2.5		nC
Gate to Drain Charge		Q_{gd}			2.4		
Gate Charge Total		Q_g			18.2		
Gate Plateau Voltage		$V_{plateau}$			2.8		V
Reverse Diode Characteristics							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V, I_{SD}=20A		0.81	1.1	V
Reverse Recovery Time		t_{rr}	V_R=15V, I_F=20A dI$_F$/dt=100A/us		18		ns
Reverse Recovery Charge		Q_{rr}			11		nC

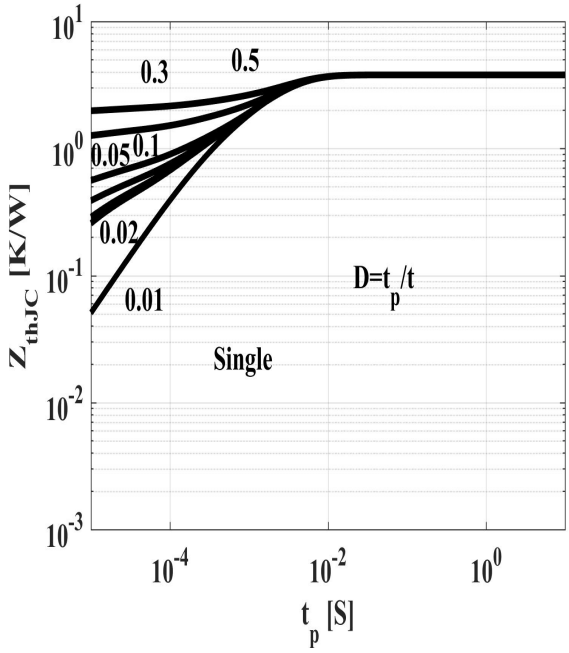
Typical Performance Characteristics

Figure 3: Power Dissipation



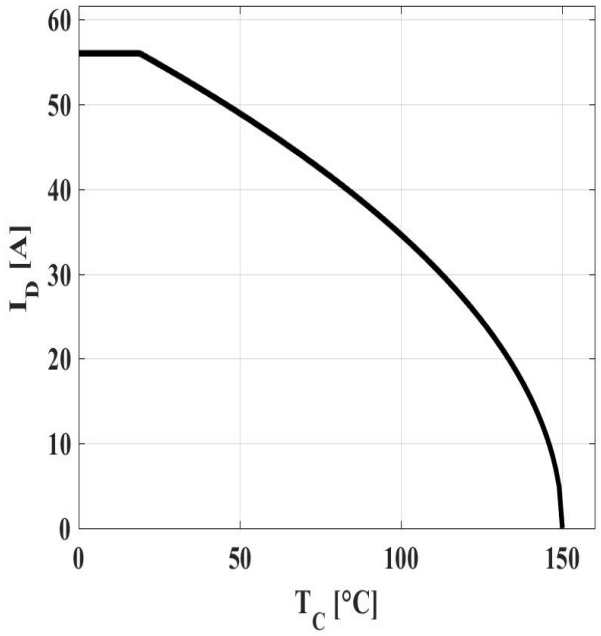
$P_{tot} = f(T_c)$

Figure 4: Max. Transient Thermal Impedance



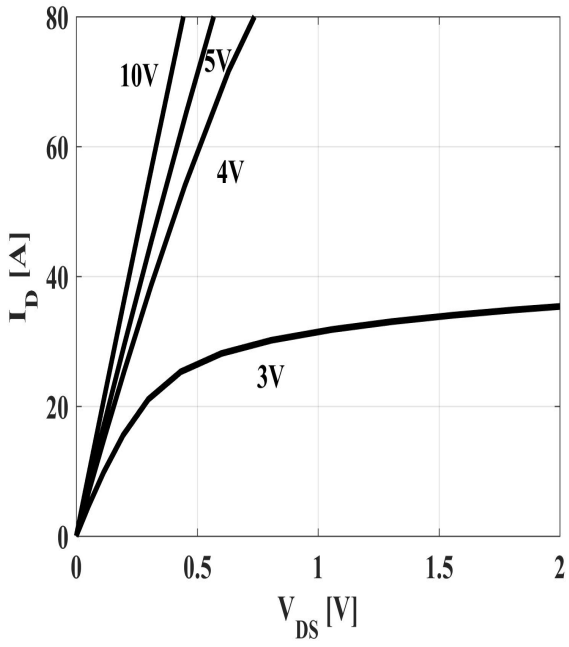
$Z(_{thJC}) = f(t_p)$; parameter: $D = t_p/T$

Figure 5: Drain Current



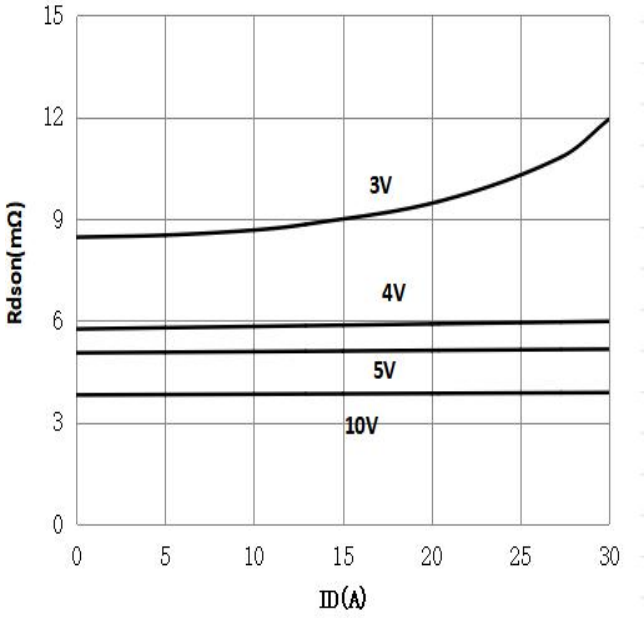
$I_D = f(T_C)$; $V_{GS} \geq 10V$

Figure 6: Typ. Output Characteristics



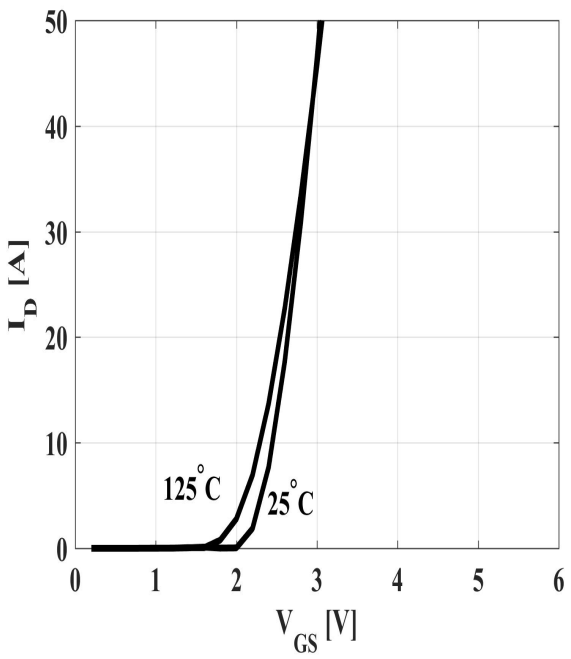
$I_D = f(V_{DS})$; Tj= 25°C; parameter: V_{GS}

Figure 7: Typ. Drain-Source On-State Resistance



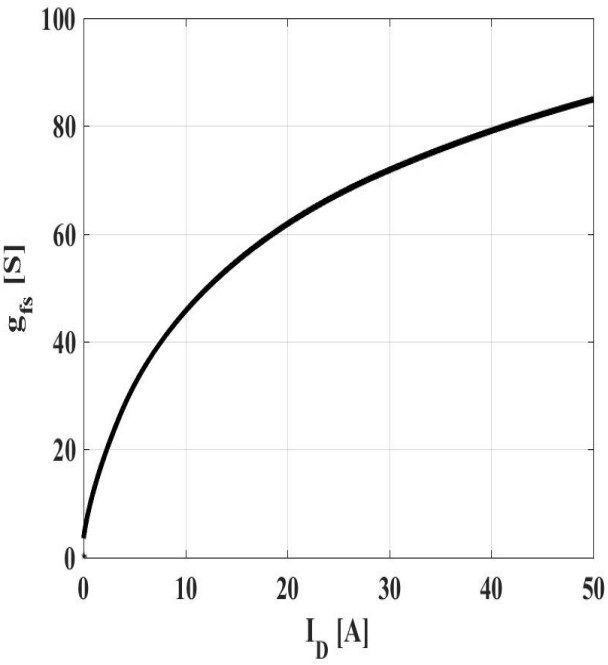
$R_{DS(ON)}$ =f(I_D); T_j=25℃; parameter: V_{GS}

Figure 8: Typ. Transfer Characteristics



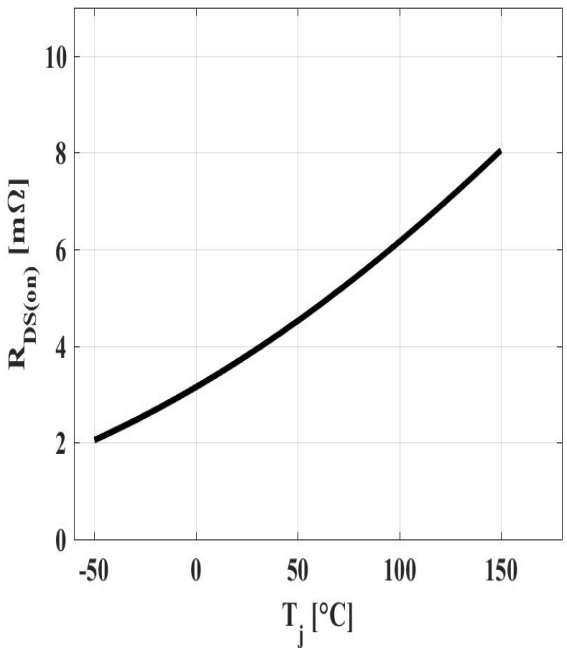
I_D = f(V_{GS}); |V_{DS}| >2|I_D|$R_{DS(on)max}$; parameter: T_j

Figure 9: Typ. Forward Transconductance



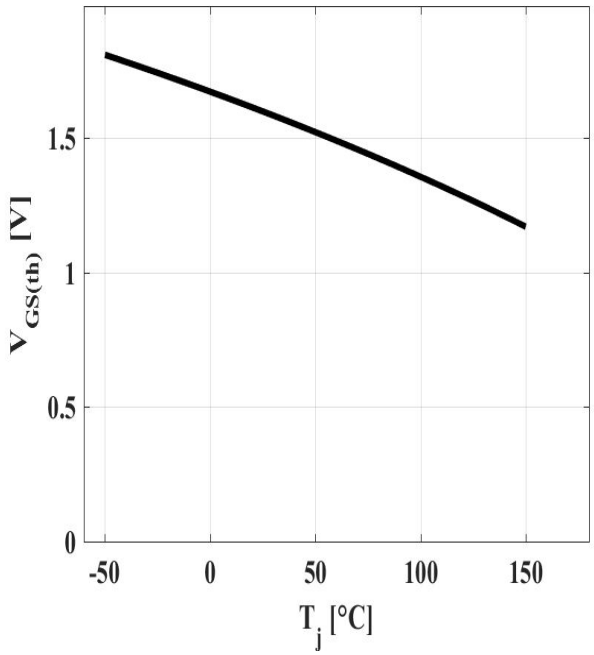
g_{fs}=f(I_D); T_j=25°C

Figure 10: Typ. Drain-Source On-State Resistance



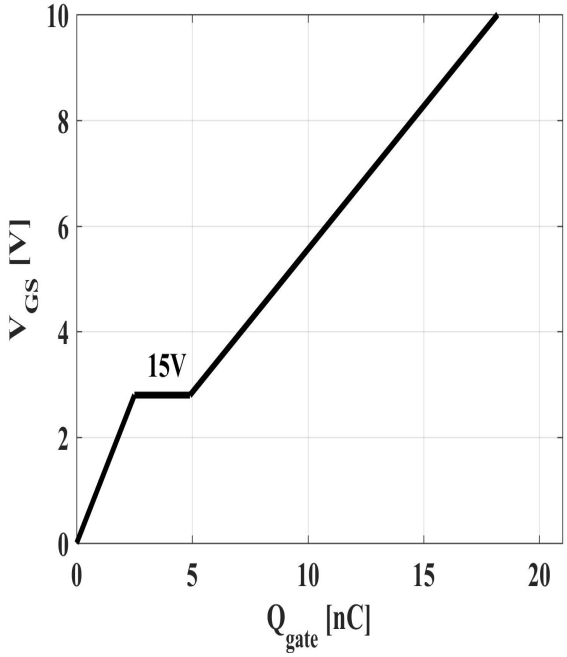
$R_{DS(ON)}$=f(T_j); I_D=50A; V_{GS}=10V

Figure 11: Typ. Gate Threshold Voltage



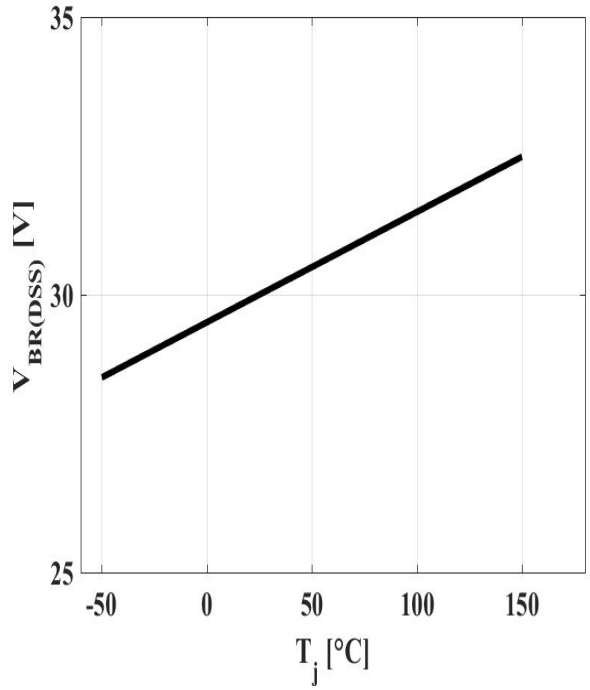
$V_{GS(th)}=f(T_j)$; $V_{GS}=V_{DS}$; $I_{DS}=250\mu A$

Figure 12: Typ. Gate Charge



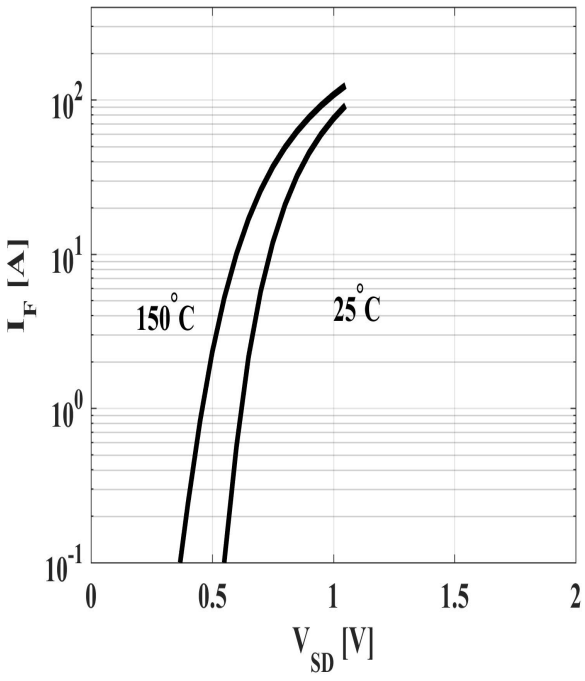
$V_{GS}= f(Q_{gate})$, $I_D= 50A$ pulsed

Figure 13: Drain-Source Breakdown Voltage



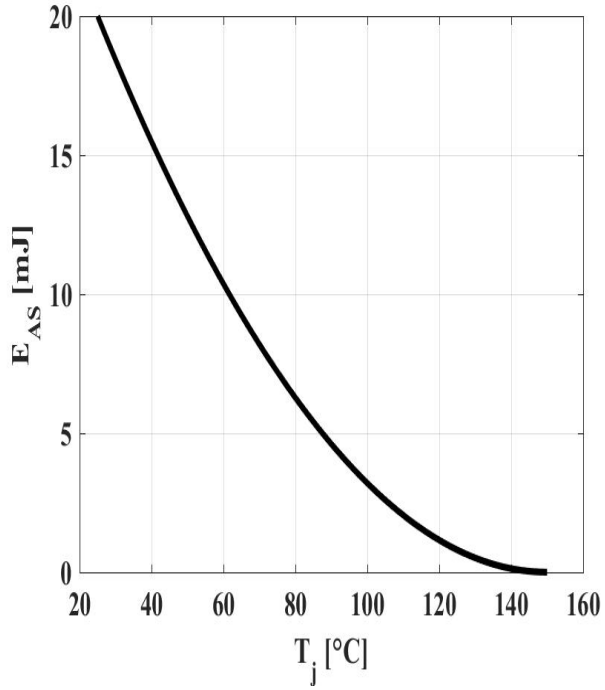
$V_{BR(DSS)}=f(T_j)$; $I_D=1mA$

Figure 14: Forward Characteristics of Reverse Diode



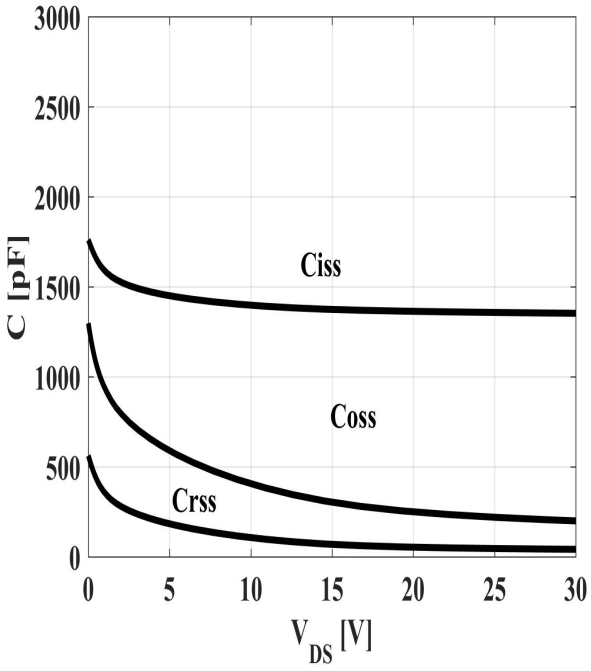
$I_F=f(V_{SD})$; parameter: T_j

Figure 15: Avalanche Energy



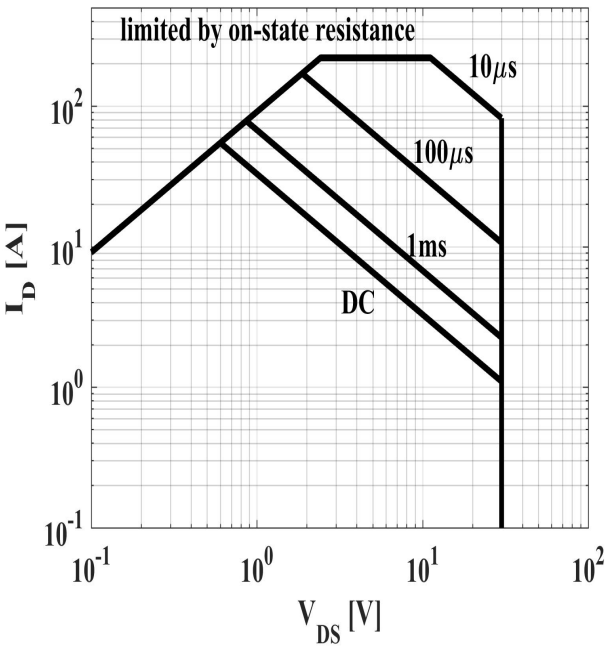
$E_{AS}=f(T_j)$; I_D=15.0A; V_{DD}=15V

Figure 16: Typ. Capacitances



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

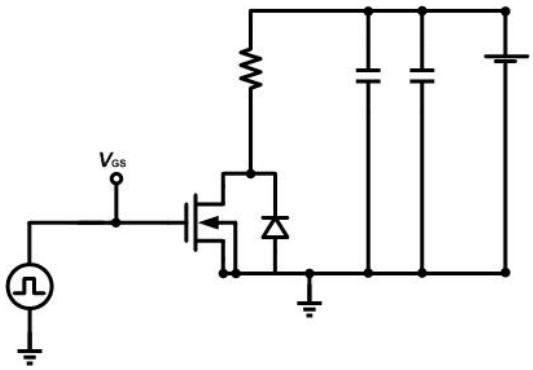
Figure 17: Safe Operating Area

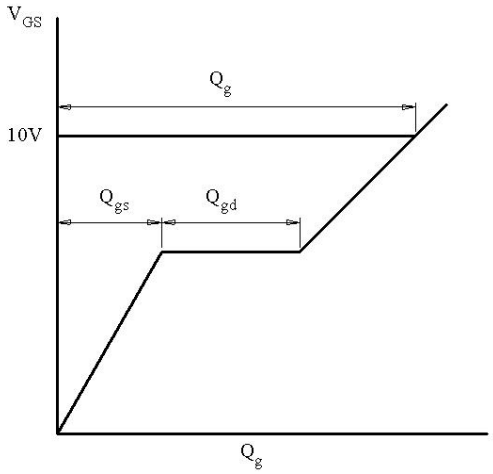


$I_D=f(V_{DS})$; T_C=25ºC; V_{GS}>7V; parameter: t_p

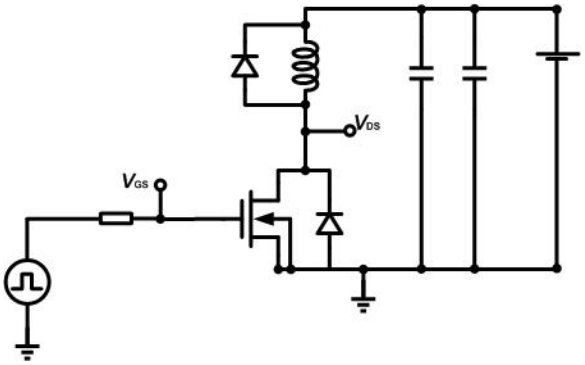
Test Circuits

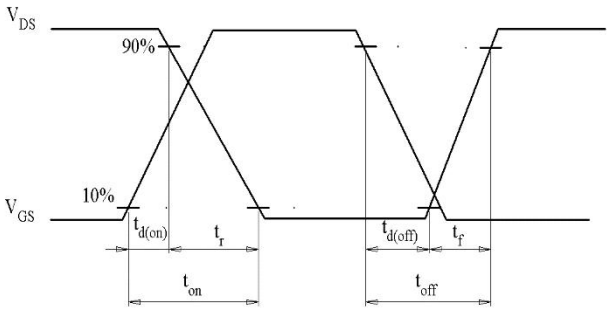
1. Gate Charge Test Circuit & Waveform



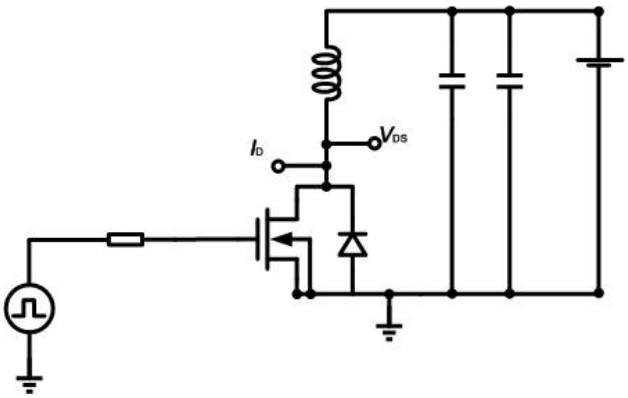


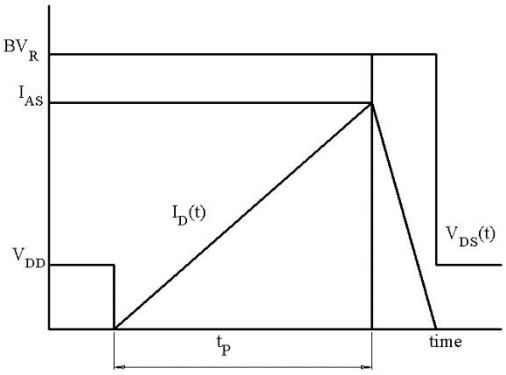
2. Switch Time Test Circuit



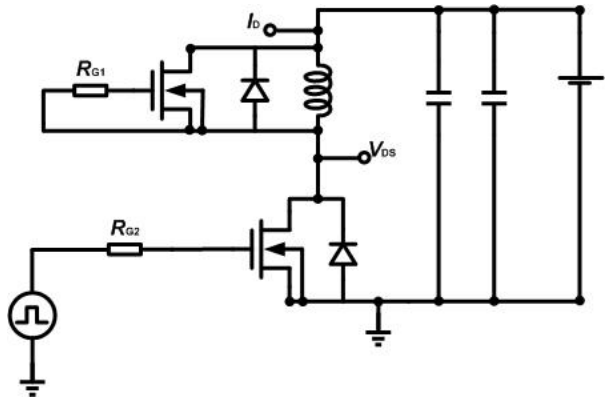


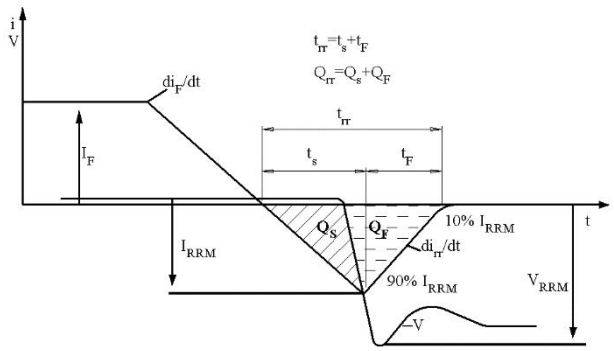
3. Unclaimed Inductive Switching Test Circuit & Waveforms





4. Test Circuit and Waveform for Diode Characteristics

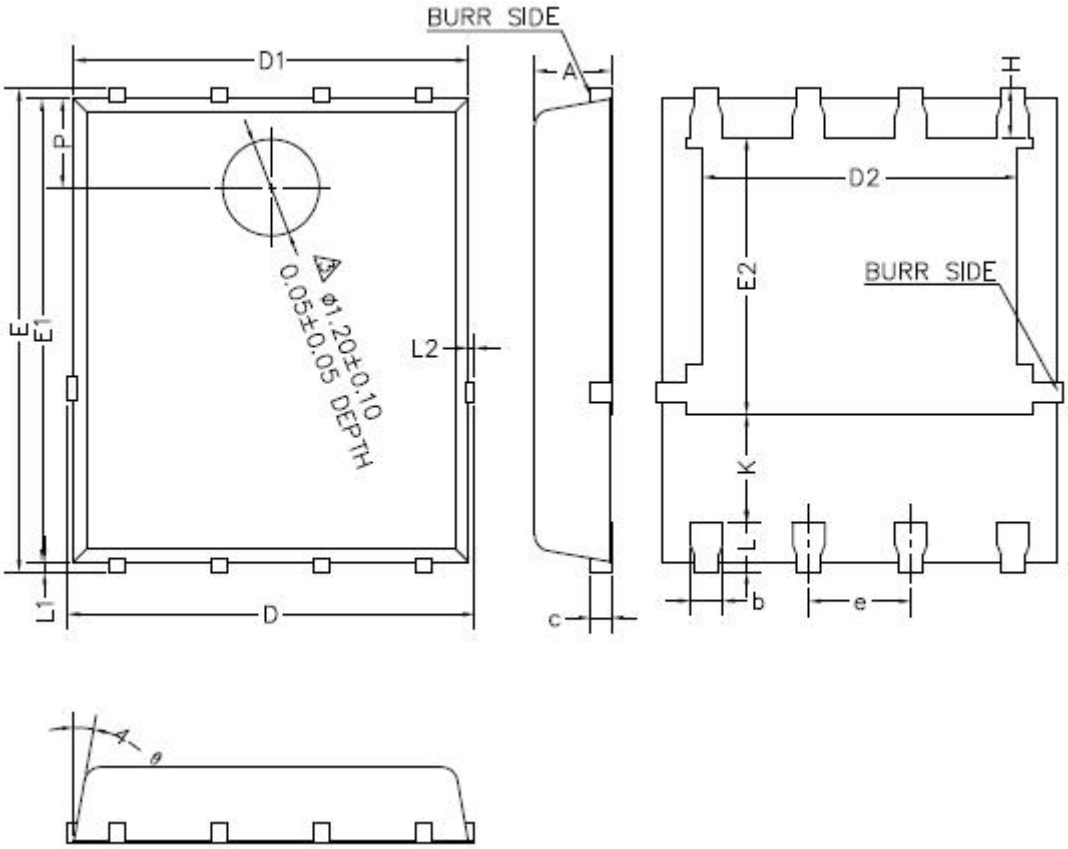




5.0mΩ, 30V, N-Channel Power MOSFET **SRT03N050LD56TR-G**

Mechanical Dimension

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	8°	10°	12°

5.0mΩ, 30V, N-Channel Power MOSFET SRT03N050LD56TR-G

Sanrise Technology Limited Company

http://www.sanrise-tech.com

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