

General Description

The Sanrise SRT03N023L 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 SRT03N023L break down voltage is 30V and it has a high rugged avalanche characteristic. The SRT03N023L is available in PDFN5*6 package.

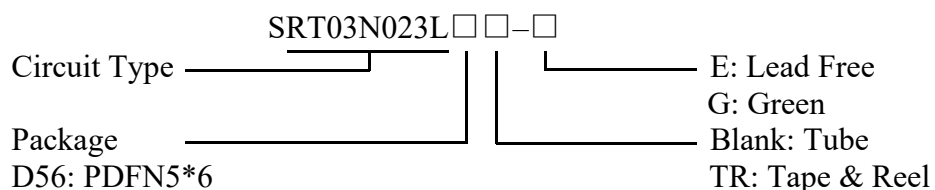
Features

- Ultra Low $R_{DS(ON)} = 2.3m\Omega @ V_{GS} = 10V$.
- Ultra Low Gate Charge, $Q_g = 38.6nC$ 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

Ordering Information



Symbol

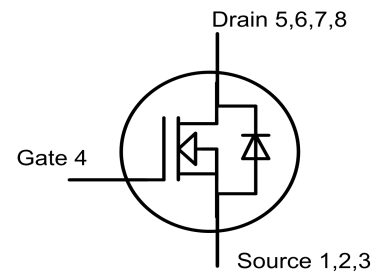
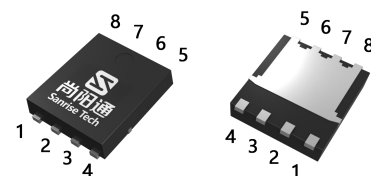


Figure 1 Symbol of SRT03N023L

Package Type



PDFN5*6

Figure 2 Package Types of SRT03N023L

Package	Part Number	Marking ID	Packing Type
PDFN5*6	SRT03N023LD56TR-G	SRT03N023LD56G	Tape & Reel

2.3mΩ, 30V, N-Channel Power MOSFET
SRT03N023L
Absolute Maximum Ratings

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DSS}	30	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current	$T_C=25^{\circ}C$	I_D	116	A
	$T_C=100^{\circ}C$		73	
Pulsed Drain Current (Note 2)		I_{DM}	464	A
Power Dissipation ($T_C = 25^{\circ}C$)		P_D	67	W
Avalanche Destructive Energy, Single Pulse (Note 4)		E_{AS_Limit}	225	mJ
Avalanche Energy, Single Pulse (Note 3)		E_{AS}	25	mJ
Avalanche Current, Repetitive (Note 2)		I_{AR}	20.0	A
Continuous Diode Forward Current		I_S	116	A
Diode Pulse Current		$I_{S,PULSE}$	464	A
Operating Junction Temperature		T_J	150	$^{\circ}C$
Storage Temperature		T_{STG}	-55 to 150	$^{\circ}C$
Lead Temperature (Soldering, 10 sec)		T_{LEAD}	260	$^{\circ}C$

Note:

- 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.
- Repetitive Rating: Pulse width limited by maximum junction temperature
- $I_{AS} = 10.0A$, $V_{DD} = 15V$, $R_G = 25\Omega$, Starting $T_J = 25^{\circ}C$
- $I_{AS_Limit} = 30.0A$, $V_{DD} = 15V$, $R_G = 25\Omega$, Starting $T_J = 25^{\circ}C$

Thermal Characteristics

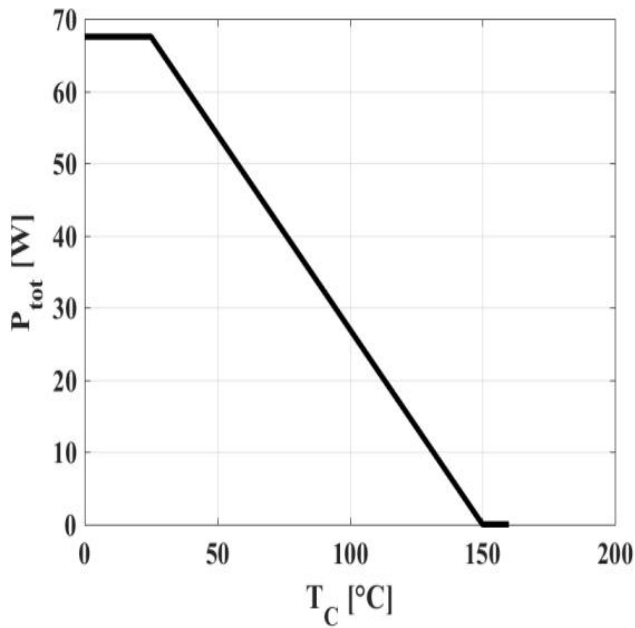
Parameter		Symbol	Min	Typ	Max	Unit
Thermal Resistance, Junction-to-Case	PDFN5*6	R_{thJC}			1.85	$^{\circ}C/W$

2.3mΩ, 30V, N-Channel Power MOSFET
SRT03N023L
Electrical Characteristics
 $T_J = 25^\circ\text{C}$, unless otherwise specified.

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Statistic Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	30			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=30V, V_{GS}=0V$			1	μA
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	1.7	2.1	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=4.5V, I_D=20A$		2.6	3.5	$m\Omega$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=20A$		1.7	2.3	$m\Omega$
Gate Resistance	R_G	$f=1MHz, \text{Open Drain}$		1.8		Ω
Dynamic Characteristics						
Input Capacitance	C_{ISS}	$V_{DS}=15V, V_{GS}=0V, f=1MHz$		2.9		nF
Output Capacitance	C_{OSS}			640		pF
Reverse Transfer Capacitance	C_{RSS}			144		pF
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=15V, I_D=20A, R_G=1.6\Omega, V_{GS}=10V$		11		ns
Rise Time	t_r			8		
Turn-off Delay Time	$t_{d(off)}$			46		
Fall Time	t_f			8		
Gate Charge Characteristics						
Gate to Source Charge	Q_{gs}	$V_{DD}=15V, I_D=20A, V_{GS}=0 \text{ to } 10V$		5.3		nC
Gate to Drain Charge	Q_{gd}			5.0		
Gate Charge Total	Q_g			38.6		
Gate Plateau Voltage	$V_{plateau}$			2.8		V
Reverse Diode Characteristics						
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_{SD}=20A$		0.79	1.1	V
Reverse Recovery Time	t_{rr}	$V_R=15V, I_F=20A$		25		ns
Reverse Recovery Charge	Q_{rr}	$dI_F/dt=100A/\mu s$		50		nC

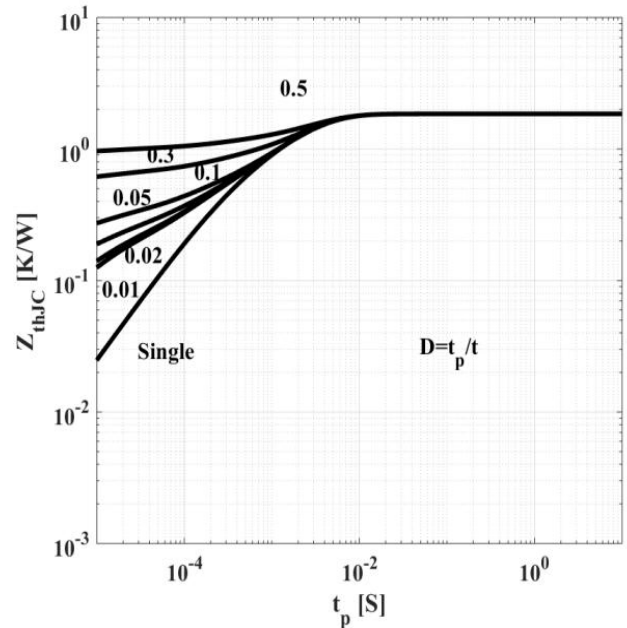
Typical Performance Characteristics

Figure 3: Power Dissipation



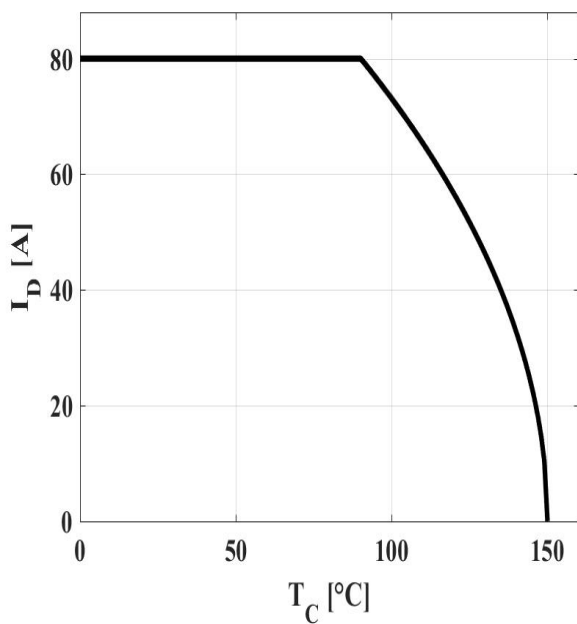
$$P_{tot} = f(T_C)$$

Figure 4: Max. Transient Thermal Impedance



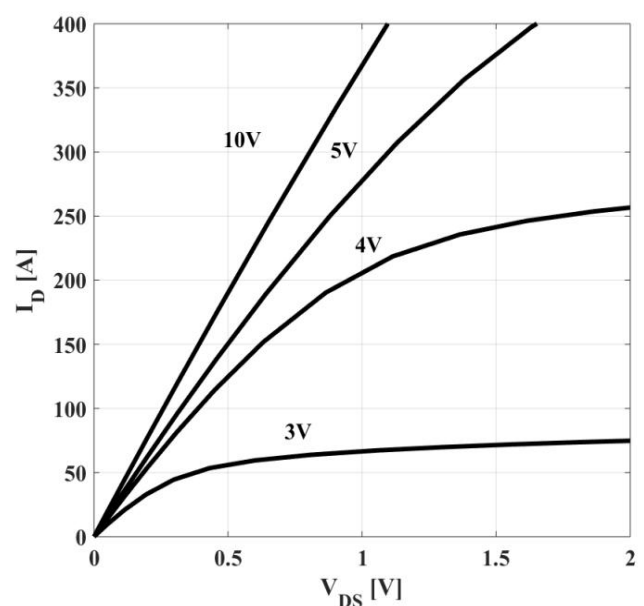
$$Z_{(thJC)} = f(t_p); \text{ parameter: } D = t_p/T$$

Figure 5: Drain Current

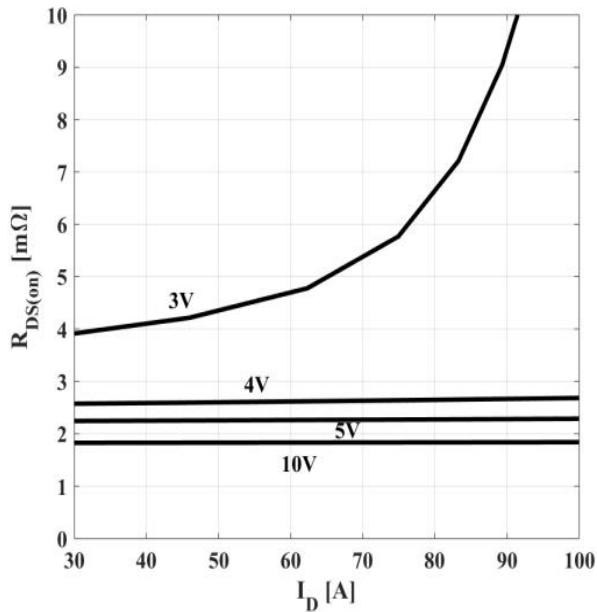


$$I_D = f(T_C); V_{GS} \geq 10V$$

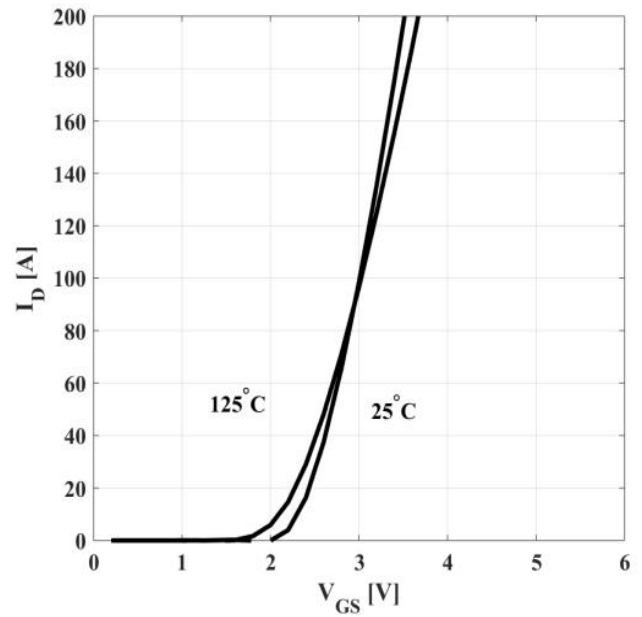
Figure 6: Typ. Output Characteristics



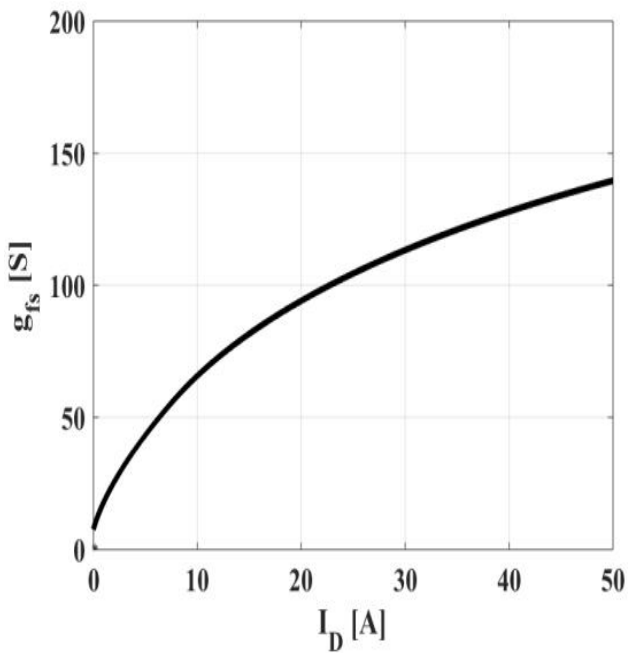
$$I_D = f(V_{DS}); T_j = 25^\circ C; \text{ parameter: } V_{GS}$$

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


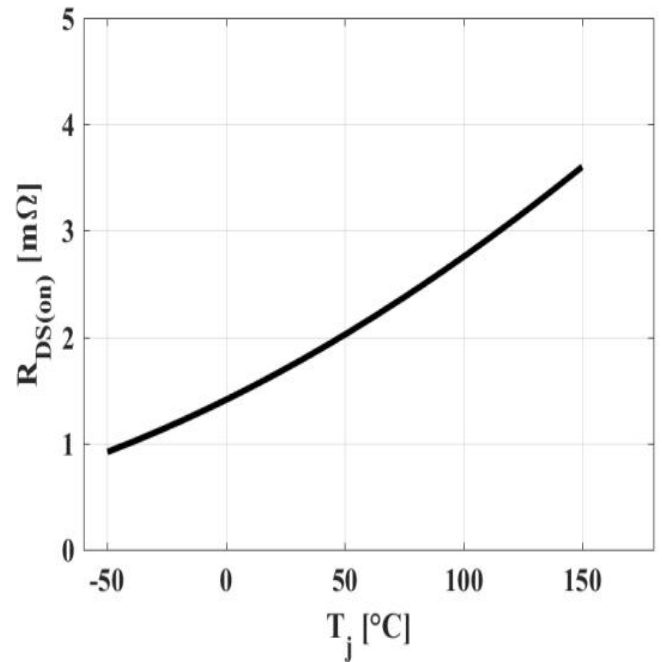
$$R_{DS(ON)} = f(I_D); T_j = 25^\circ C; \text{parameter: } V_{GS}$$

Figure 8: Typ. Transfer Characteristics


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

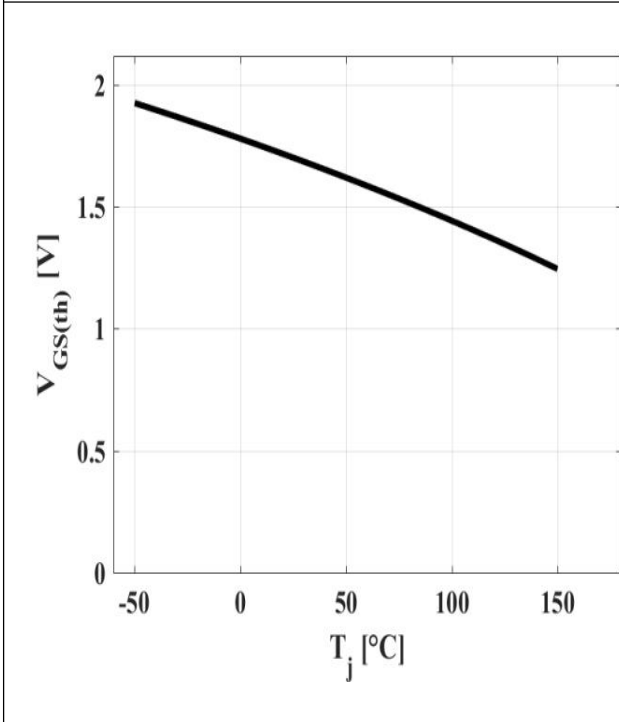
Figure 9: Typ. Forward Transconductance


$$g_{fs} = f(I_D); T_j = 25^\circ C$$

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


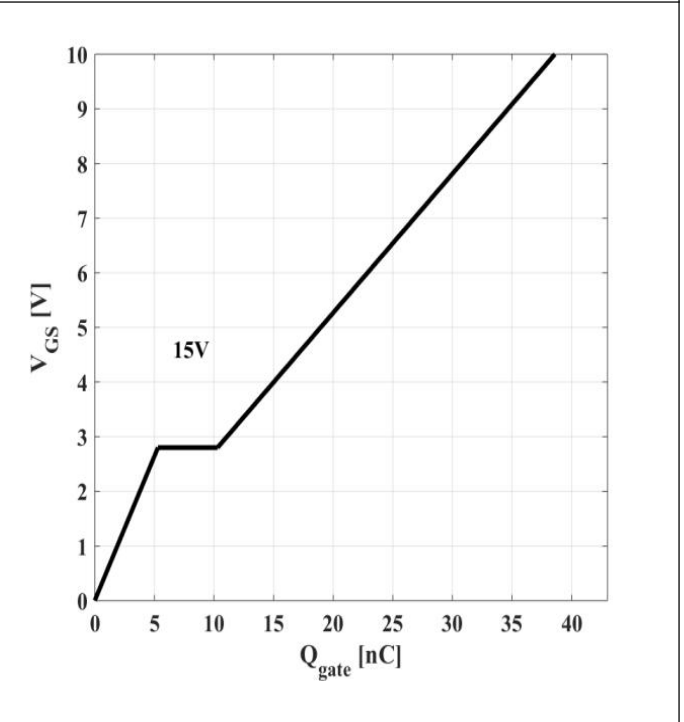
$$R_{DS(ON)} = f(T_j); I_D = 20A; V_{GS} = 10V$$

Figure 11: Typ. Gate Threshold Voltage



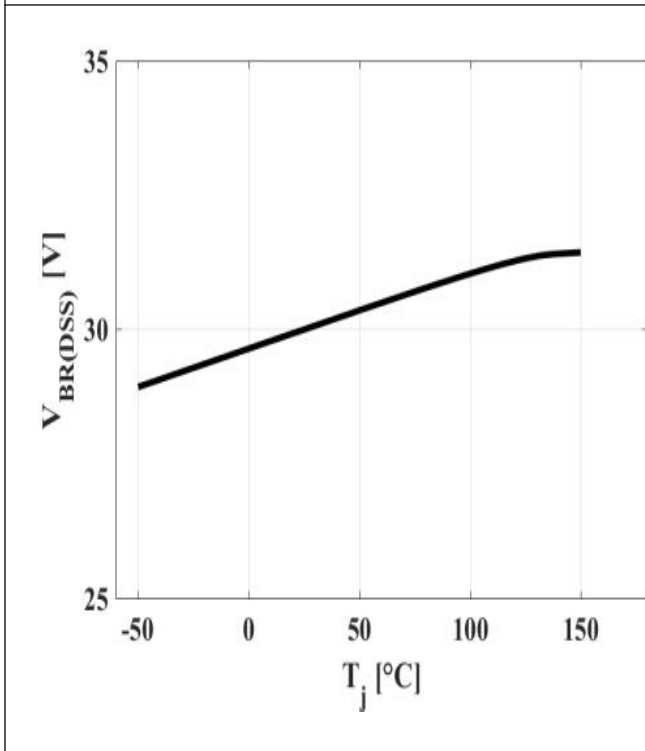
$$V_{GS(th)}=f(T_j); V_{GS}=V_{DS}; I_{DS}=250\mu A$$

Figure 12: Typ. Gate Charge



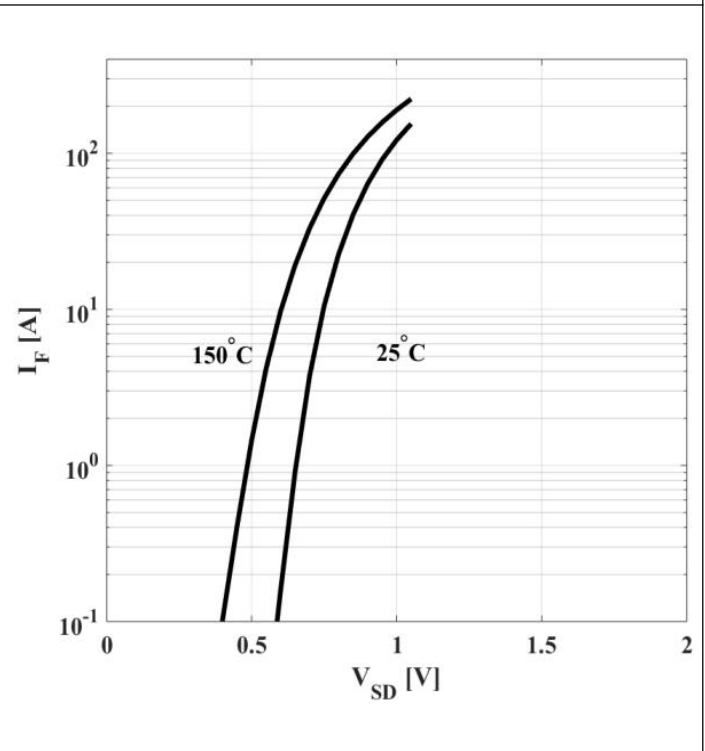
$$V_{GS}=f(Q_{gate}), I_D=20A \text{ pulsed}$$

Figure 13: Drain-Source Breakdown Voltage

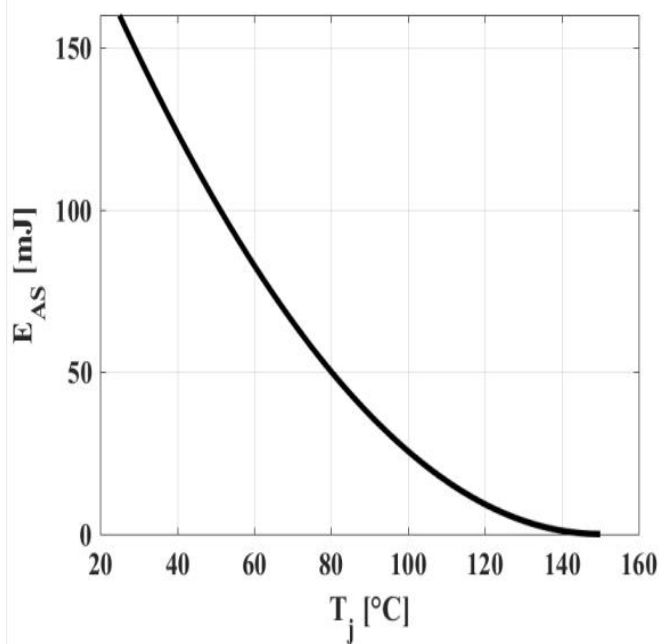


$$V_{BR(DSS)}=f(T_j); I_D=1mA$$

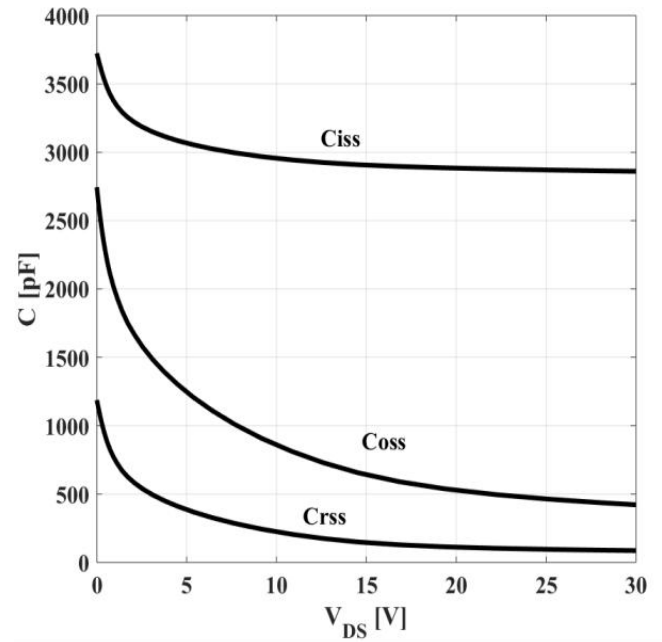
Figure 14: Forward Characteristics of Reverse Diode



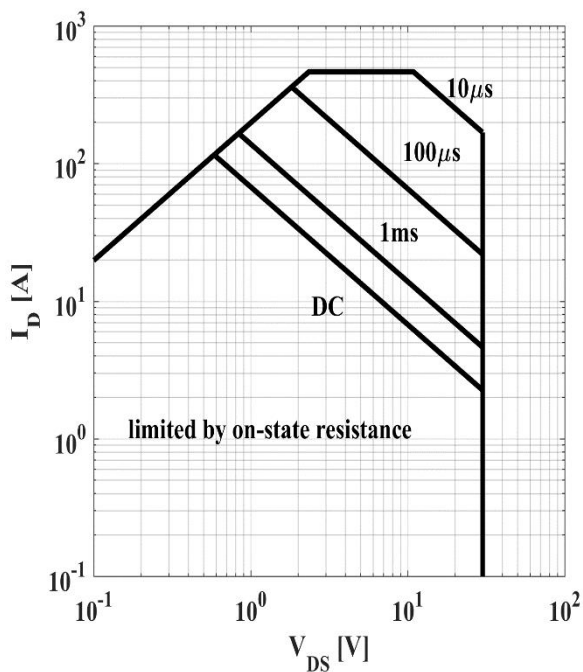
$$I_F=f(V_{SD}); \text{parameter: } T_j$$

Figure 15: Avalanche Energy


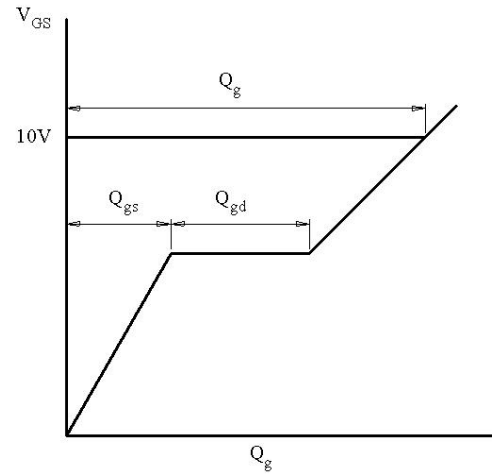
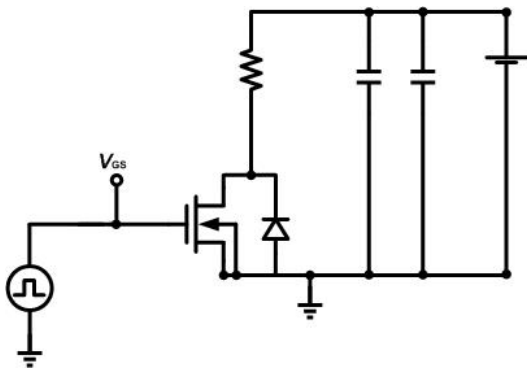
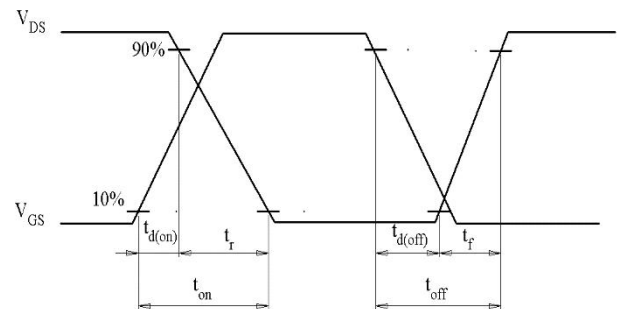
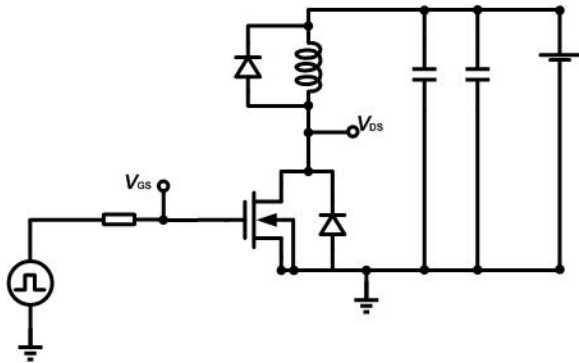
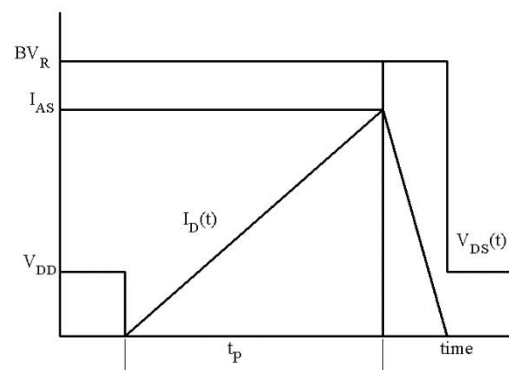
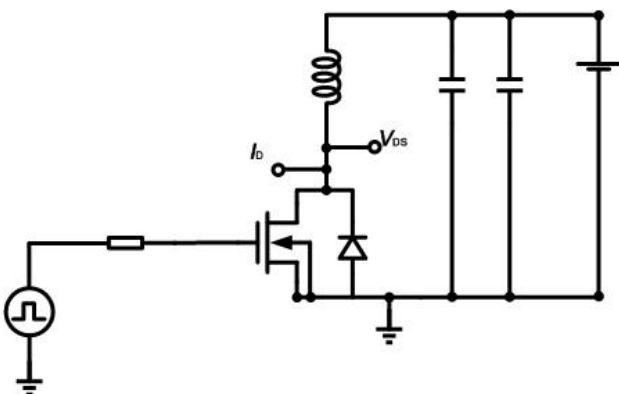
$$E_{AS}=f(T_j); I_D=20.0A; V_{DD}=15V$$

Figure 16: Typ. Capacitances


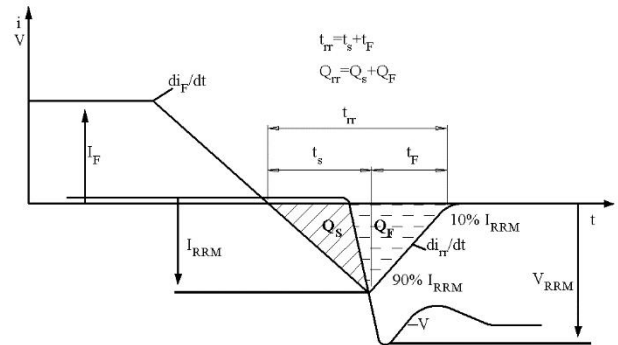
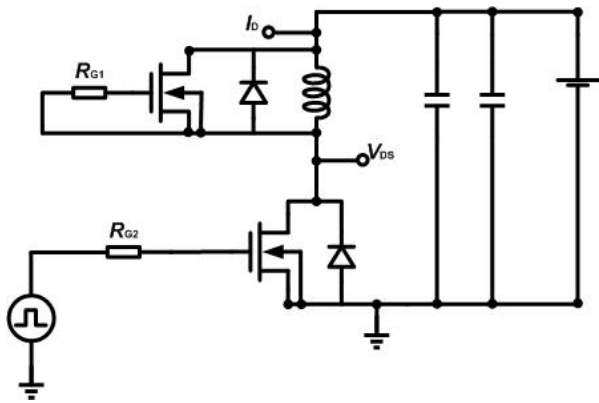
$$C=f(V_{DS}); V_{GS}=0; f=1MHz$$

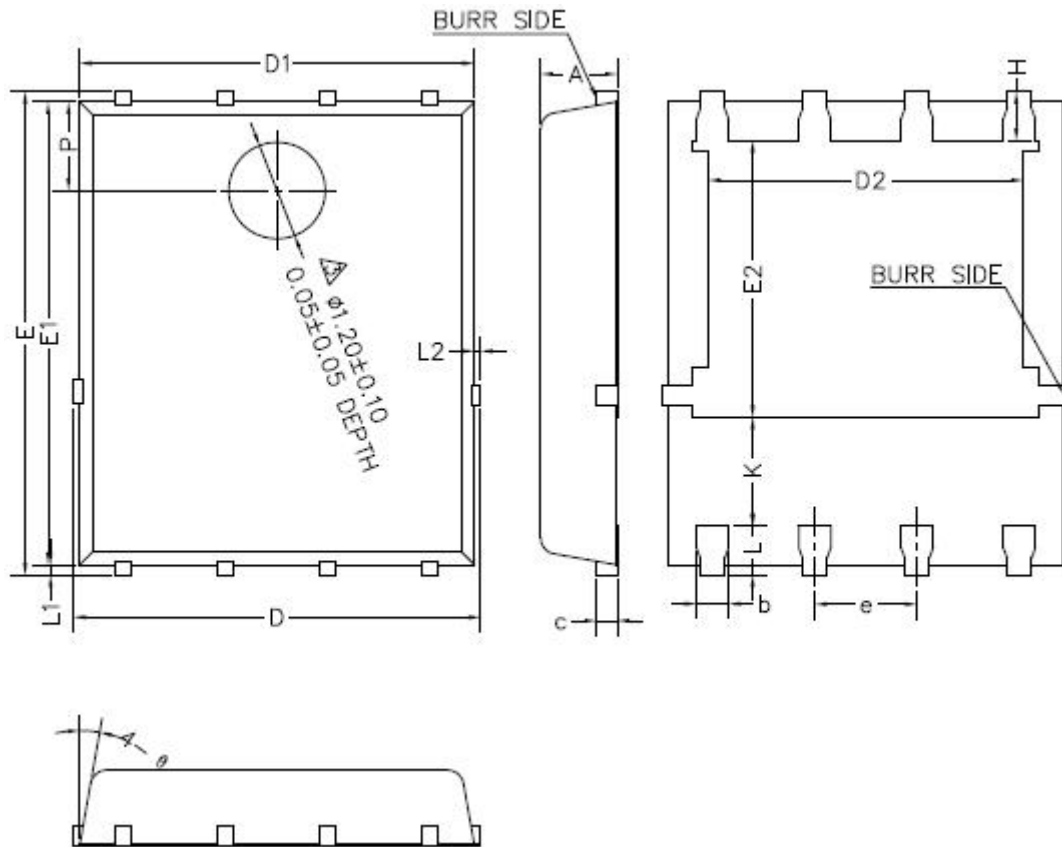
Figure 17: Safe Operating Area


$$I_D=f(V_{DS}); T_C=25^{\circ}C; V_{GS}>7V; \text{parameter: } t_p$$

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



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°



Sanrise Technology Limited Company

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