

General Description

The Sanrise SRC60R075BS is a high voltage power MOSFET, fabricated using advanced super junction 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 outstanding efficiency.

The SRC60R075BS break down voltage is 600V and it has a high rugged avalanche characteristics. The SRC60R075BS is available in PDFN8*8 package.

Features

- Ultra Low $R_{DS(ON)} = 75m\Omega @ V_{GS} = 10V$.
- Ultra Low Gate Charge, $Q_g = 110nC$ typ.
- Fast switching capability
- Robust design with better EAS performance
- EMI Improved
- Non-automotive Qualified

Application

- Telecom Power
- EV Charger
- High Power Application

Ordering Information

SRC60R075BS□□-□		
Circuit Type	_____	E: Lead Free
Package	_____	G: Green
D88: PDFN8*8-4		Blank: Tube
		TR: Tape & Reel

Symbol

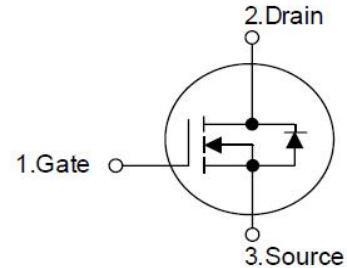
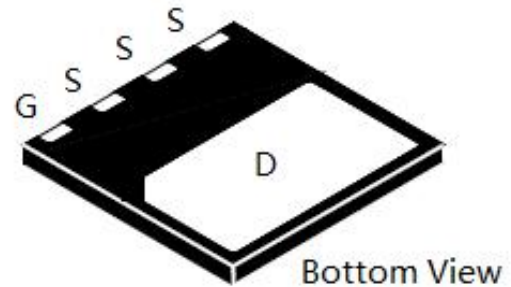


Figure 1 Symbol of SRC60R075BS

Package Type



PDFN8*8-4

Figure 2 Package Type of SRC60R075BS

Package	Part Number	Marking ID	Packing Type
	Green	Green	
PDFN8*8-4	SRC60R075BSD88TR-G	SRC60R075BSD88G	Tape & Reel

Absolute Maximum Ratings^{Note 1}

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DS}	600	V
Gate-Source Voltage (static)		V_{GSS}	±20	V
Gate-Source Voltage (dynamic), AC ($f > 1$ Hz)		V_{GSS}	±30	V
Continuous Drain Current	$T_C = 25^\circ\text{C}$	I_D	48	A
	$T_C = 125^\circ\text{C}$		21.5	
Pulsed Drain Current (Note 2)		I_{DM}	144	A
Avalanche Energy, Single Pulse (Note 3)		E_{AS}	125	mJ
Avalanche Energy, Repetitive (Note 2)		E_{AR}	0.6	mJ
Avalanche Current, Repetitive (Note 2)		I_{AR}	5.0	A
Continuous Diode Forward Current		I_S	48	A
Diode Pulse Current		$I_{S,PULSE}$	144	A
MOSFET dv/dt Ruggedness, $V_{DS} \leq 480\text{V}$		dv/dt	80	V/ns
Reverse Diode dv/dt , $V_{DS} \leq 480\text{V}$, $I_{SD} \leq I_D$		dv/dt	50	V/ns
Power Dissipation ($T_C = 25^\circ\text{C}$)		P_{tot}	357	W
Operating Junction Temperature		T_J	150	$^\circ\text{C}$
Storage Temperature		T_{STG}	-55 to 150	$^\circ\text{C}$
Lead Temperature (Soldering, 10 sec)		T_{LEAD}	260	$^\circ\text{C}$

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. $I_{AS} = 5\text{A}$, $V_{DD} = 60\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$

Thermal characteristics

Parameter		Symbol	Min	Typ	Max	Unit
Thermal resistance, Junction-to-Case	PDFN8*8-4	R_{thJC}			0.35	$^\circ\text{C/W}$
Thermal resistance, Junction-to-Ambient	PDFN8*8-4	R_{thJA}			58	$^\circ\text{C/W}$

Electrical Characteristics

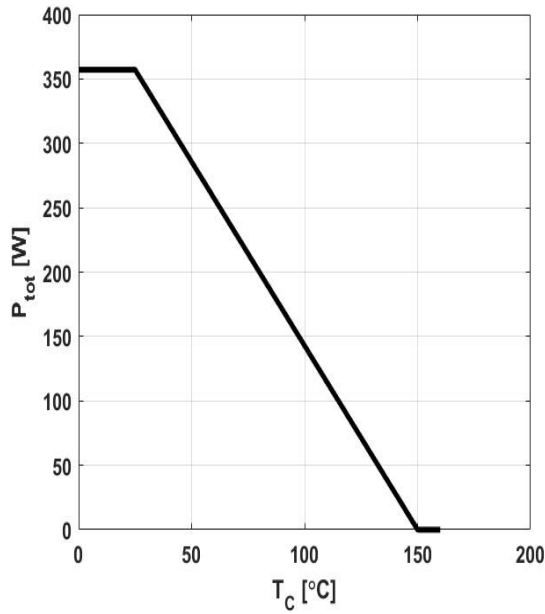
$T_J = 25^{\circ}\text{C}$, unless otherwise specified.

Parameter		Symbol	Test Conditions	Min	Typ	Max	Unit
Statistic Characteristics							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V, I _D =250uA	600			V
Zero Gate Voltage Drain Current		I _{DSS}	V _{DS} =600V, V _{GS} =0V			10	uA
Gate-Body Leakage Current	Forward	I _{GSSF}	V _{GS} =30V, V _{DS} =0V			100	nA
	Reverse	I _{GSSR}	V _{GS} =-30V, V _{DS} =0V			-100	
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} =V _{GS} , I _D =5.0mA	3.7	4.3	5.3	V
Static Drain-Source On-Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =24A		65	75	mΩ
Gate Resistance		R _G	f=1MHz, Open Drain	0.11	0.55	5.0	Ω
Dynamic Characteristics							
Input Capacitance		C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1MHz	2.6	4.32	6.6	nF
Output Capacitance		C _{OSS}		1	2.8	8	nF
Reverse Transfer Capacitance		C _{RSS}		10	33	300	pF
Effective output capacitance, energy related ^{NOTE5}		C _{O(er)}	V _{GS} =0V, V _{DS} =0...400V		94		pF
Effective output capacitance, time related ^{NOTE6}		C _{O(tr)}			550		
Turn-on Delay Time		t _{d(on)}	V _{DD} =400V, I _D =24A R _G =3.3Ω, V _{GS} =10V		16		ns
Rise Time		t _r			6.0		
Turn-off Delay Time		t _{d(off)}			98		
Fall Time		t _f			4.0		
Gate Charge Characteristics							
Gate to Source Charge		Q _{gs}	V _{DD} =480V, I _D =24A V _{GS} =0 to 10V		28.1		nC
Gate to Drain Charge		Q _{gd}			56.0		
Gate Charge Total		Q _g			110	160	
Gate Plateau Voltage		V _{plateau}			6.5		V
Reverse Diode Characteristics							
Drain-Source Diode Forward Voltage		V _{SD}	V _{GS} =0V, I _{SD} =24A		0.9	1.1	V
Reverse Recovery Time		t _{rr}	V _R =400V, I _F =24A dI _F /dt=100A/us		141	200	ns
Reverse Recovery Charge		Q _{rr}			0.83	1.66	uC
Peak Reverse Recovery Current		I _{rrm}			11.8		A

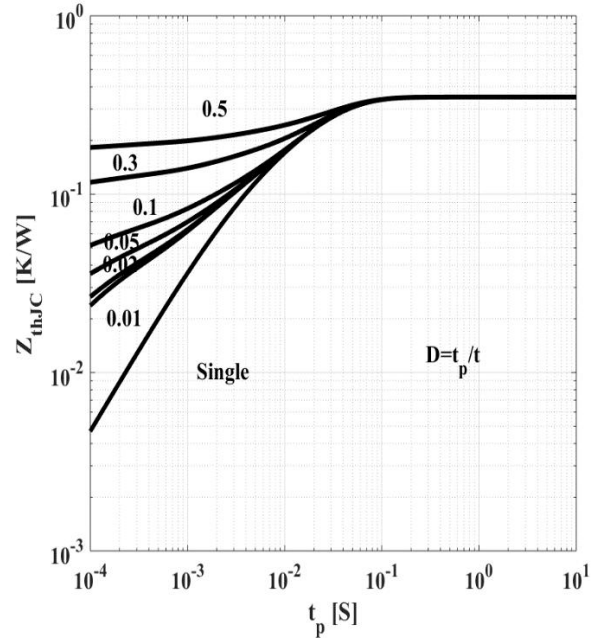
Note:

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 480V

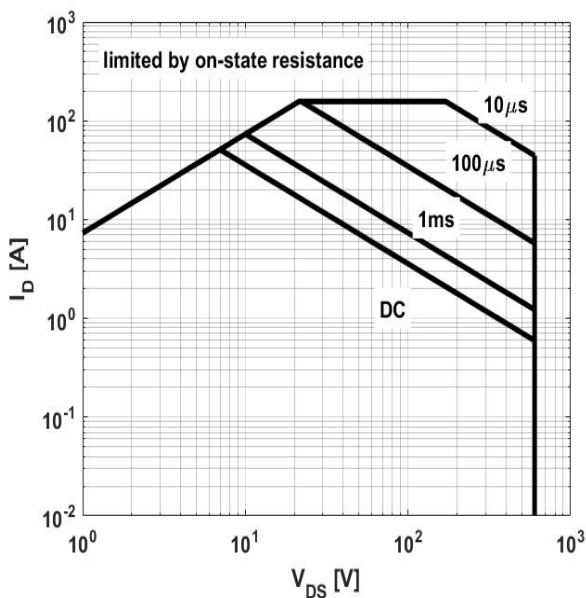
6. $C_{O(tr)}$ is a fixed capacitance that gives the same charging time as C_{OSS} while V_{DS} is rising from 0 to 480 V

Typical Performance Characteristics
Figure 3: Power Dissipation


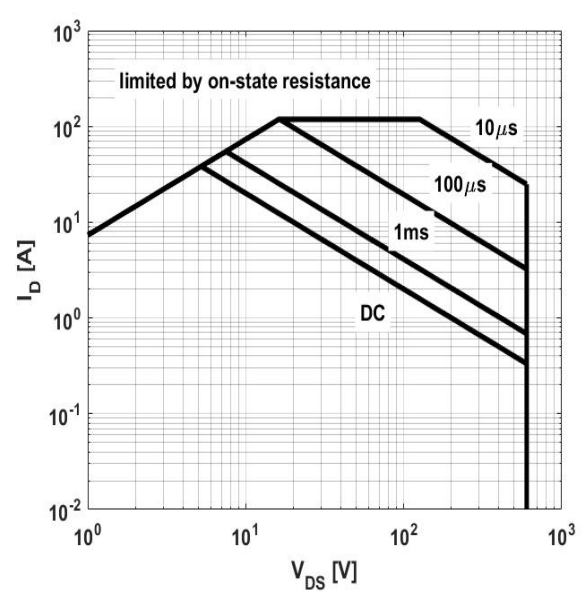
$$P_{tot} = f(T_c); \text{TO-247}$$

Figure 4: Max. Transient Thermal Impedance


$$Z_{thJC} = f(t_p); \text{parameter: } D = t_p/T; \text{TO-247}$$

Figure 5: Safe Operating Area


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

Figure 6: Safe Operating Area


$$I_D = f(V_{DS}); T_c = 80^\circ\text{C}; V_{GS} > 7\text{V}; \text{parameter } t_p$$

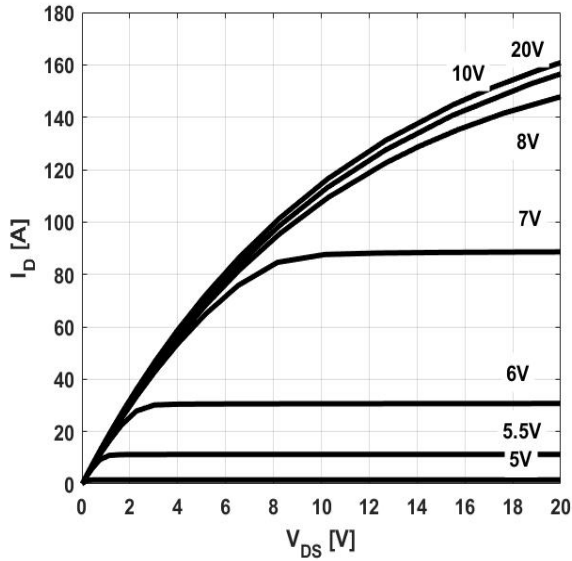
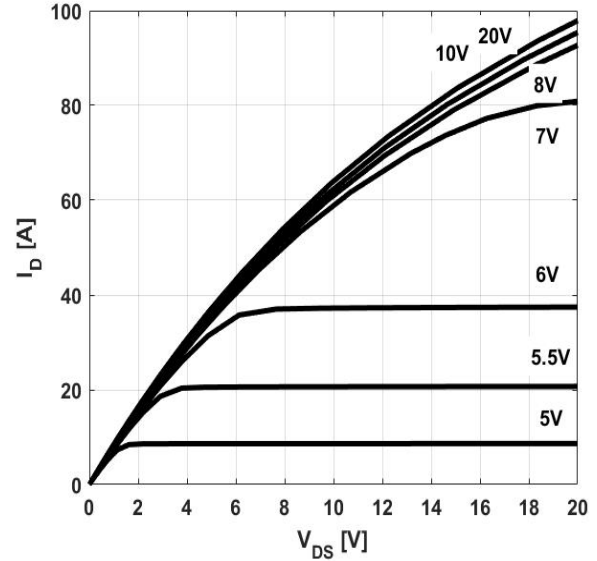
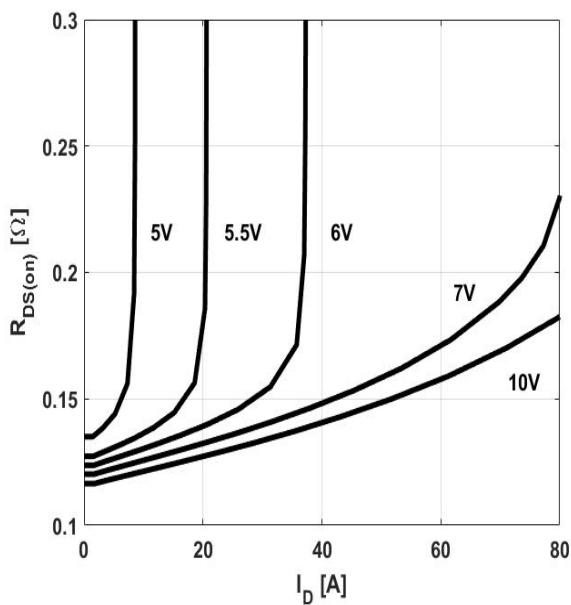
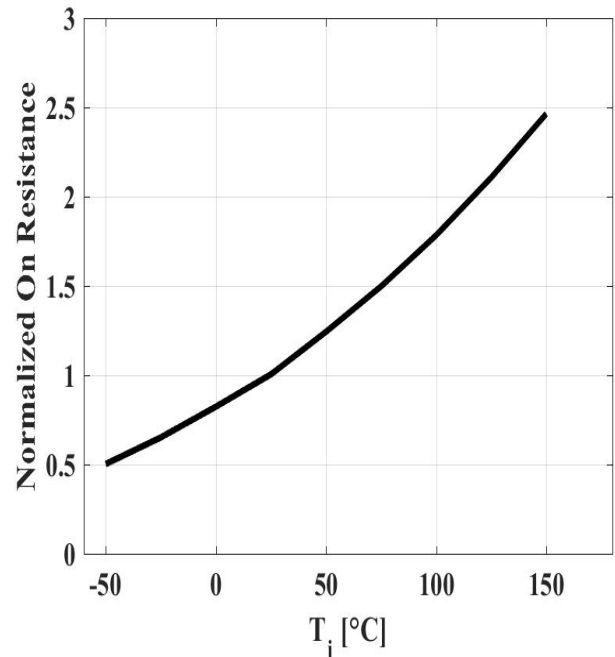
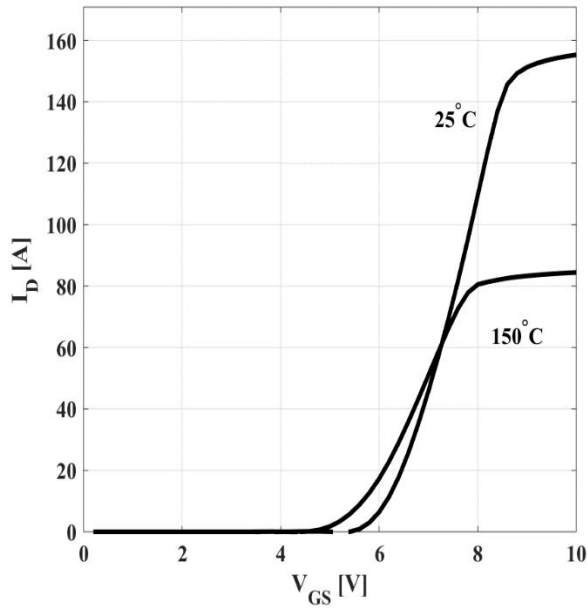
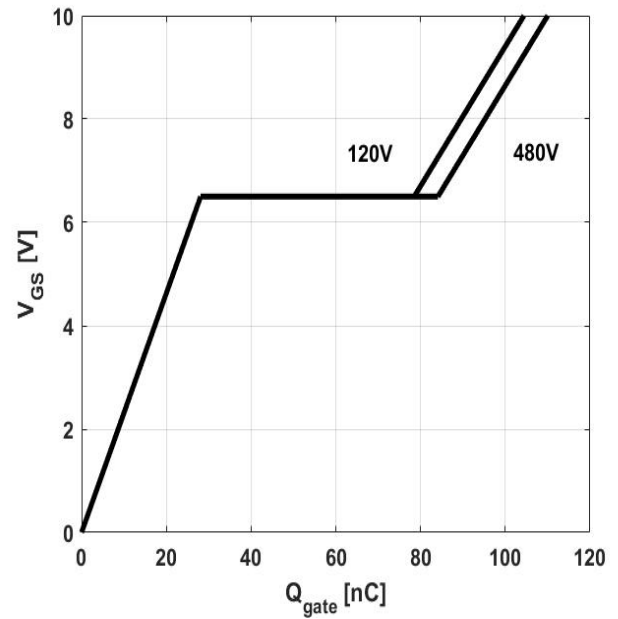
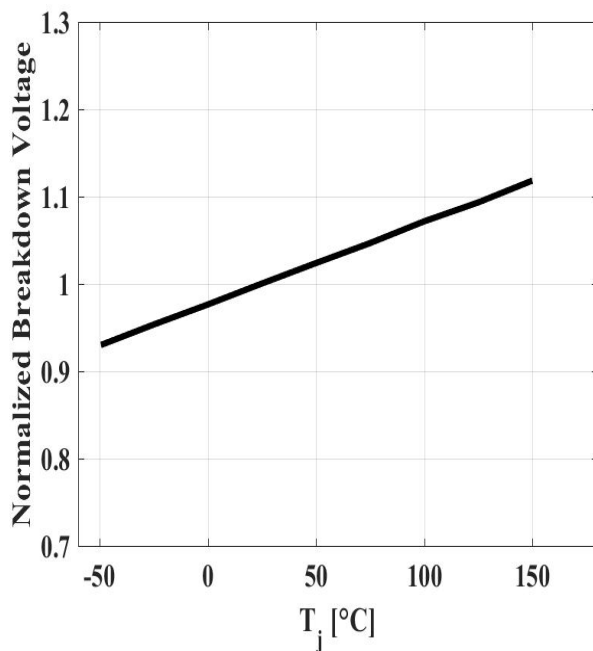
75mΩ, 600V, Super Junction N-Channel Power MOSFET
SRC60R075BS
Figure 7: Typ. Output Characteristics

 $I_D = f(V_{DS}); T_j = 25^\circ\text{C}; \text{parameter: } V_{GS}$
Figure 8: Typ. Output Characteristics

 $I_D = f(V_{DS}); T_j = 125^\circ\text{C}; \text{parameter: } V_{GS}$
Figure 9: Typ. Drain-Source On-State Resistance

 $R_{DS(ON)} = f(I_D); T_j = 125^\circ\text{C}; \text{parameter: } V_{GS}$
Figure 10: Typ. Drain-Source On-State Resistance

 $R_{DS(ON)} = f(T_j); I_D = 24\text{A}; V_{GS} = 10\text{V}$

Figure 11: Typ. Transfer Characteristics


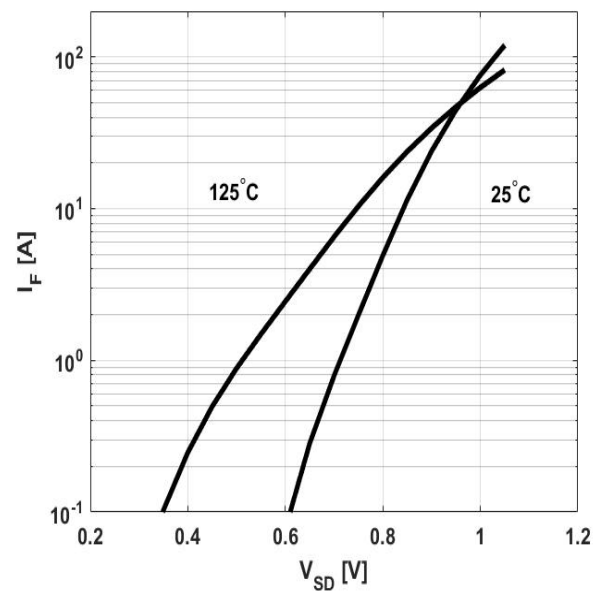
$$I_D = f(V_{GS}); V_{DS} = 20V$$

Figure 12: Typ. Gate Charge


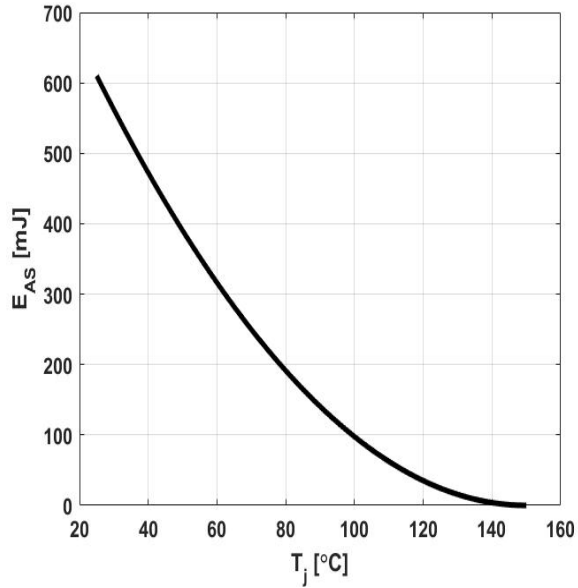
$$V_{GS} = f(Q_{gate}), I_D = 24A \text{ pulsed}$$

Figure 13: Drain-Source Breakdown Voltage


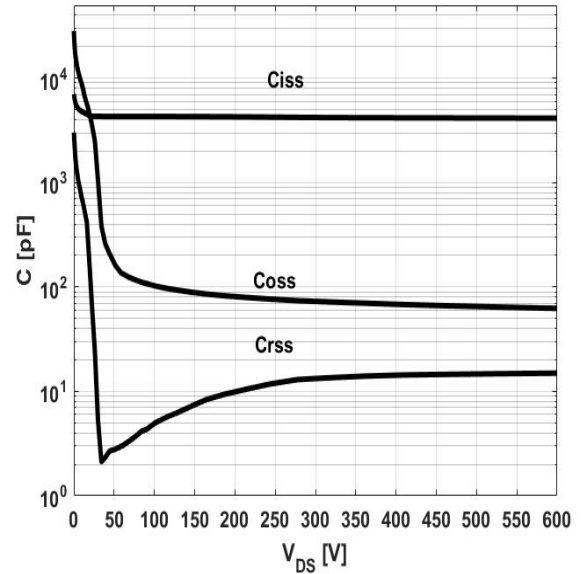
$$V_{BR(DSS)} = f(T_j); I_D = 1mA$$

Figure 14: Forward Characteristics of Reverse Diode


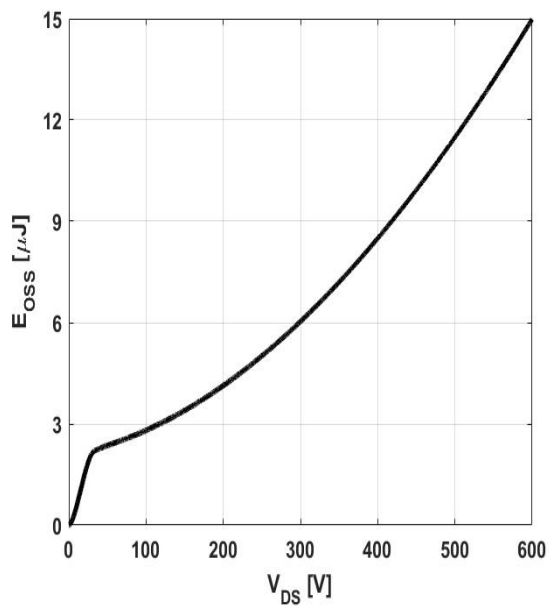
$$I_F = f(V_{SD}); \text{parameter: } T_j$$

75mΩ, 600V, Super Junction N-Channel Power MOSFET
SRC60R075BS
Figure 15: Avalanche Energy


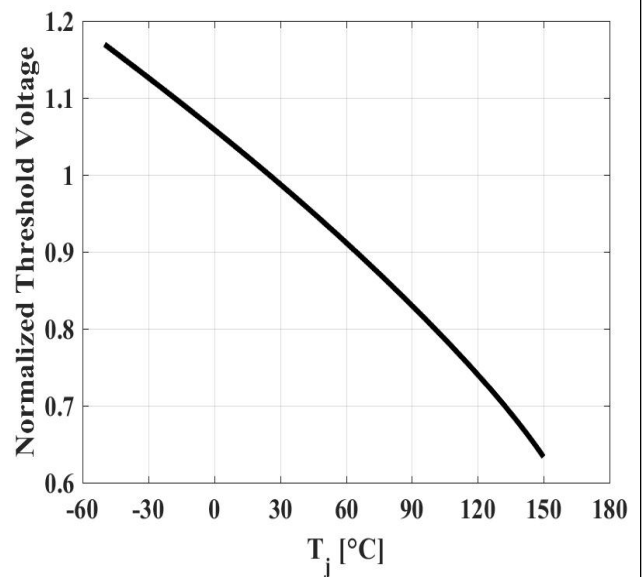
$$E_{AS}=f(T_J); I_D=4.8A; V_{DD}=60V$$

Figure 16: Typ. Capacitances


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

Figure 17: C_{OSS} Stored Energy


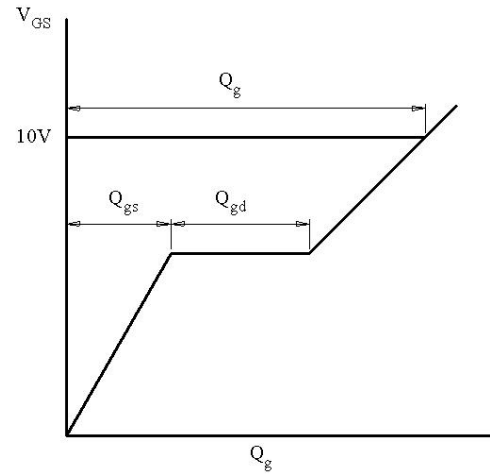
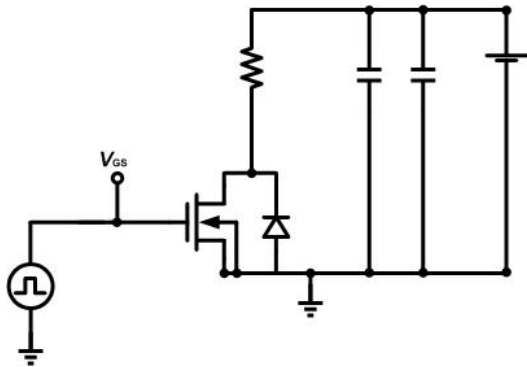
$$E_{OSS}=f(V_{DS})$$

Figure 18: Threshold Voltage


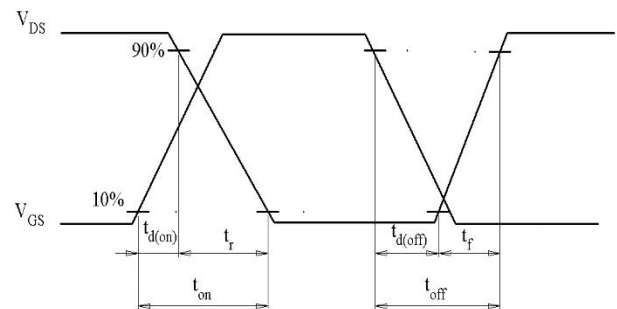
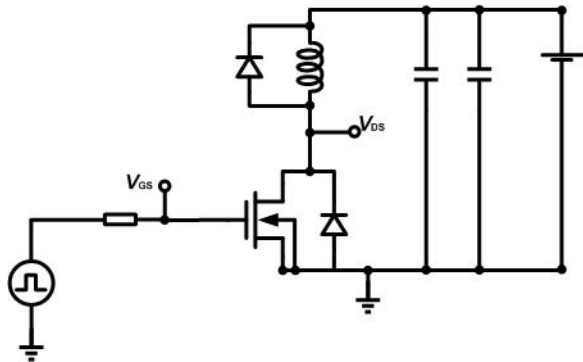
$$V_{th}=f(T_J)$$

Test Circuits

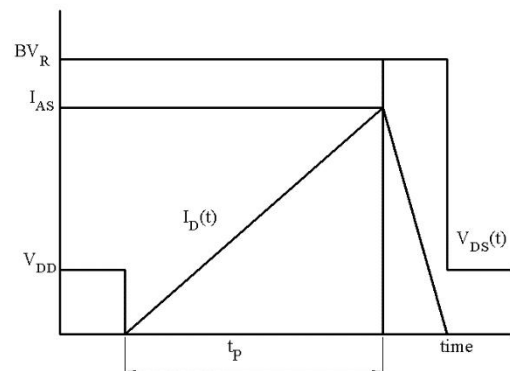
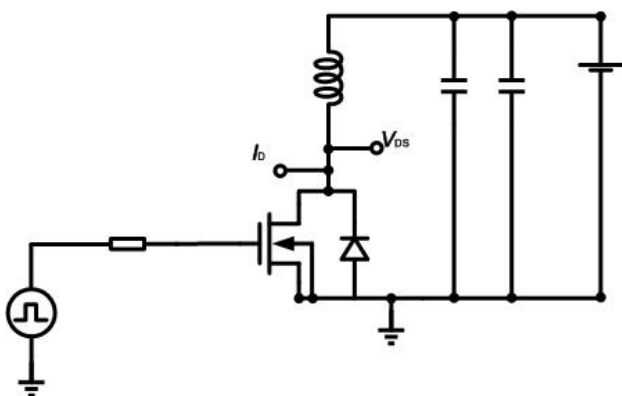
1. Gate Charge Test Circuit & Waveform



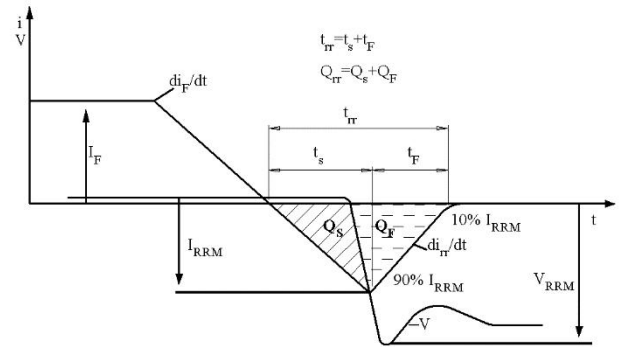
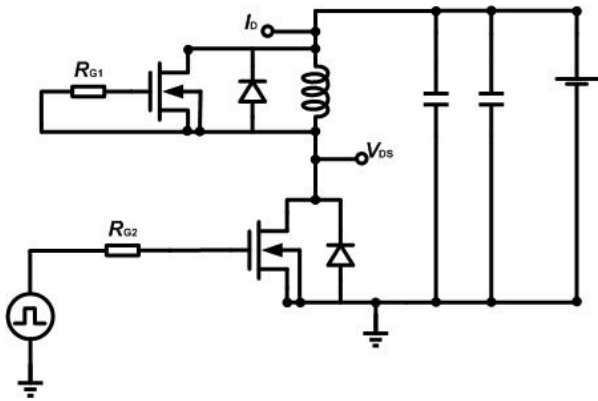
2. Switch Time Test Circuit

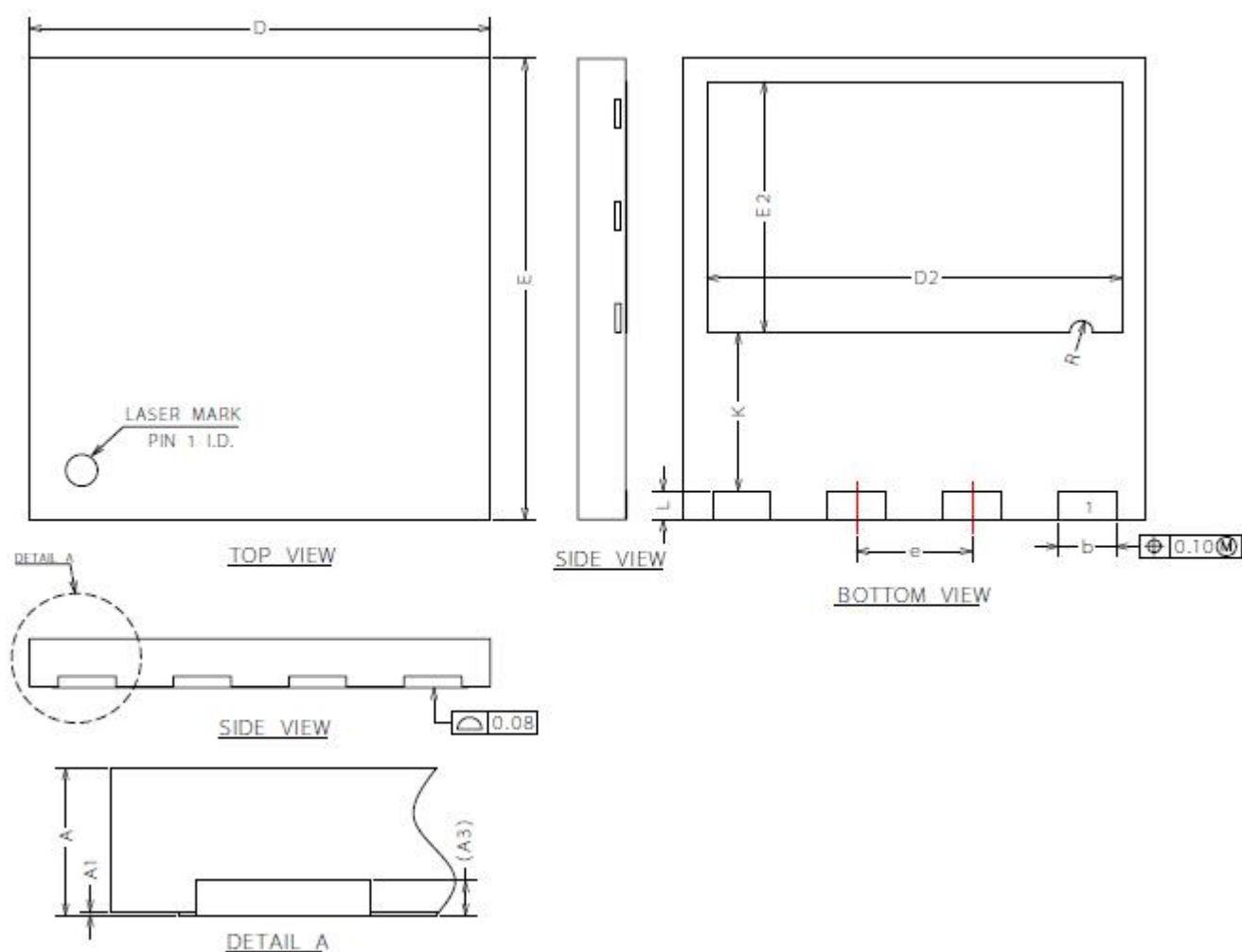


3. Unclaimed Inductive Switching Test Circuit & Waveforms



4. Test Circuit and Waveform for Diode Characteristics



Mechanical Dimensions
PDFN8*8-4
Unit: mm


Symbol	Dimensions(mm)		
	Min.	Typ.	Max.
A	0.80	0.85	0.90
A1	0.00	0.02	0.05
A3	0.20REF		
b	0.90	1.00	1.10
D	7.90	8.00	8.10
D2	7.10	7.20	7.30
E	7.90	8.00	8.10
E2	4.25	4.35	4.45
e	2.00(BSC)		
K	2.65	2.75	2.85
L	0.40	0.50	0.60
R	0.20REF		



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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

Shenzhen Sanrise Technology Co., LTD
Rm.401, Building B, No. 666, Zhangheng Road,
Zhangjiang Hi-Tech Park, Shanghai, P.R.China
Tel: +86-21-68825918