100mΩ, 600V, Super Junction N-Channel Power MOSFET SRC60R100BS

General Description

The Sanrise SRC60R100BS 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 SRC60R100BS break down voltage is 600V and it has a high rugged avalanche characteristics. The SRC60R100BS is available in PDFN8*8 package.

Features

- Ultra Low $R_{DS(ON)}$ = 100mΩ @ V_{GS} = 10V.
- Vds@Tjmax=650v.
- Ultra Low Gate Charge, Qg=104nC typ.
- Intrinsic Fast-Recovery Body Diode
- Fast switching capability
- Robust design with better EAS performance
- Non-automotive Qualified
- Ultra-fast body diode

Application

- AC/DC Power Supply
- EV Charger
- PC / Server / Telecom

Symbol

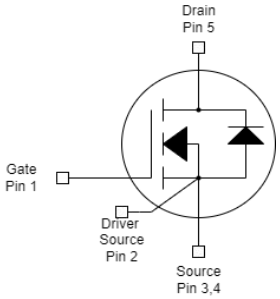
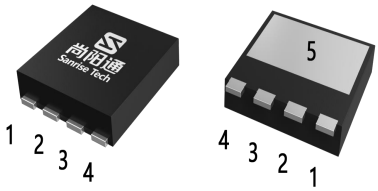


Figure 1 Symbol of SRC60R100BS

Package Type



PDFN8*8-4

Figure 2 Package Type of SRC60R100BS

Ordering Information

SRC60R100BS□□–□

Circuit Type

Package

D88: PDFN8*8-4

E: Lead Free

G: Green

Blank: Tube

TR: Tape & Reel

Package	Part Number	Marking ID	Packing Type
	Green	Green	
PDFN8*8-4	SRC60R100BSD88TR-G	SRC60R100BSD88G	Tape & Reel

100mΩ, 600V, Super Junction N-Channel Power MOSFET SRC60R100BS

Absolute Maximum Ratings

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DSS}	600	V
Gate-Source Voltage		V_{GSS}	±30	V
Gate-Source Voltage,AC(f>1 Hz)		V_{GSS}	±30	V
Continuous Drain Current	T_C=25ºC	I_D	42	A
	T_C=100ºC		26.4	
	T_C=125ºC		18.7	
Pulsed Drain Current (Note 2)		I_{DM}	126	A
Avalanche Energy, Single Pulse (Note 3)		E_{AS}	160	mJ
Avalanche Energy, Single Pulse (Note 4)		E_{AS}	1020	mJ
Avalanche Energy, Repetitive (Note 2)		E_{AR}	0.2	mJ
Avalanche Current, Repetitive (Note 2)		I_{AR}	2.2	A
Continuous Diode Forward Current		I_S	42	A
Diode Pulse Current		$I_{S.PULSE}$	126	A
MOSFET dv/dt Ruggedness, V_{DS}<=480V		dv/dt	80	V/ns
Reverse Diode dv/dt, V_{DS}<=480V, I_{SD}<=I_D		dv/dt	50	V/ns
Power Dissipation（Tc=25℃,PDFN8*8-4）		P_{tot}	255	W
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} = 2.2A, V_{DD} = 60V, R_G = 25Ω, Starting T_J = 25°C. Finish goods test condition.
4. I_{AS} = 5.5A, V_{DD} = 60V, R_G = 25Ω, Starting T_J = 25°C. Typical Eas.

Thermal Resistance

Parameter		Symbol	Min	Typ	Max	Unit
Thermal resistance, Junction-to-Case	PDFN8*8-4	R_{thJC}			0.49	ºC /W
Thermal resistance, Junction-to-Ambient	PDFN8*8-4	R_{thJA}			60	ºC /W

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	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	nA
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=800uA	3.0	4.0	5.0	V
Static Drain-Source On-Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=20A		74	100	mΩ
Gate Resistance		R_G	f=1MHz, Open Drain		0.7		Ω
Dynamic Characteristics							
Input Capacitance		C_{ISS}	V_{DS}=400V, V_{GS}=0V, f=100kHz		3373		pF
Output Capacitance		C_{OSS}			69.4		
Effective output capacitance, energy related NOTE5		$C_{O(er)}$	V_{GS}=0V, V_{DS}=0…480V		98.2		pF
Effective output capacitance, time related NOTE6		$C_{O(tr)}$			601		
Turn-on Delay Time		$t_{d(on)}$	V_{DD}=400V, I_D=20A R_G=3Ω, V_{GS}=10V		26		ns
Rise Time		t_r			28.4		
Turn-off Delay Time		$t_{d(off)}$			56		
Fall Time		t_f			7.2		
Gate Charge Characteristics							
Gate to Source Charge		Q_{gs}	V_{DD}=400V, I_D=20A V_{GS}=0 to 10V		30		nC
Gate to Drain Charge		Q_{gd}			50		
Gate Charge Total		Q_g			104		
Gate Plateau Voltage		$V_{plateau}$			6.6		V
Reverse Diode Characteristics							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V, I_{SD}=20A		0.9	1.1	V
Reverse Recovery Time		t_{rr}	V_R=400V, I_F=20A dI_F/dt=100A/us		169		ns
Reverse Recovery Charge		Q_{rr}			1.33		uC
Peak Reverse Recovery Current		I_{rrm}			14.2		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 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

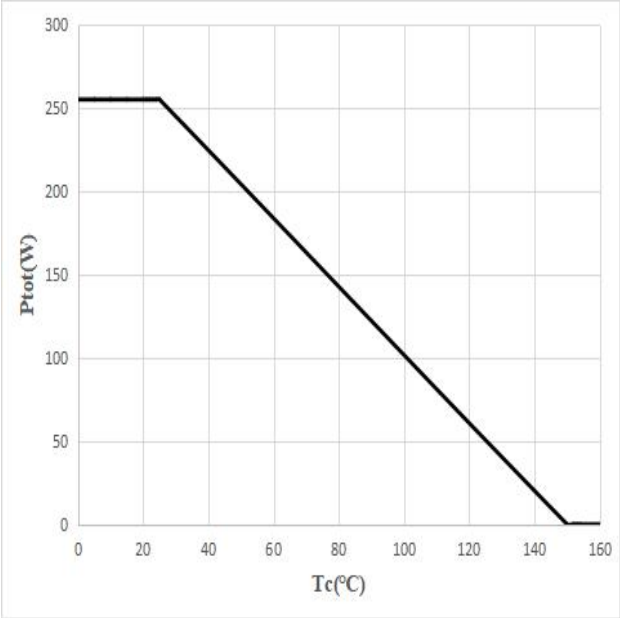
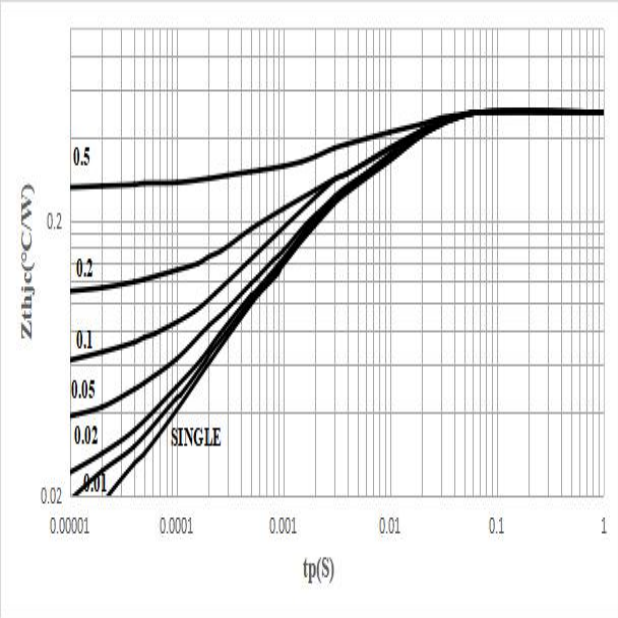
Figure 3: Power Dissipation	Figure 4: Max. Transient Thermal Impedance
	
$P_{tot} = f(T_c)$	$Z_{(thJC)} = f(t_p)$; parameter: $D = t_p/T$

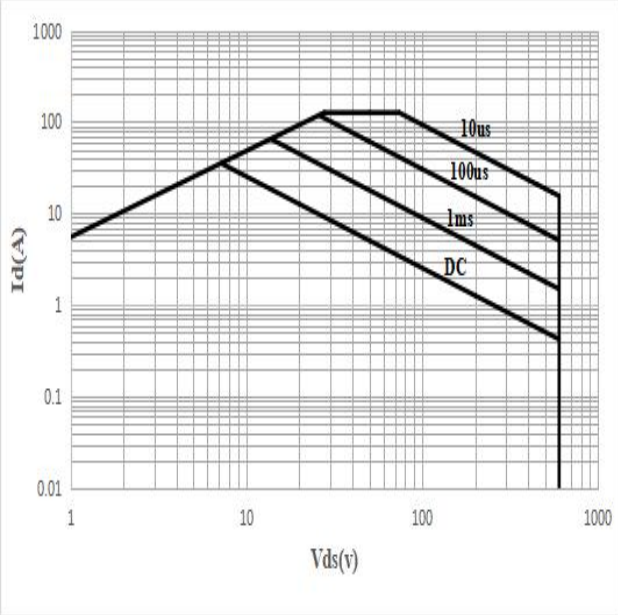
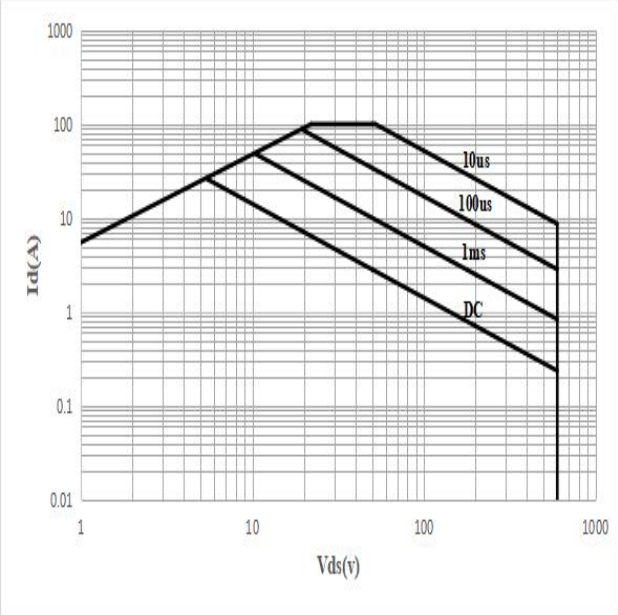
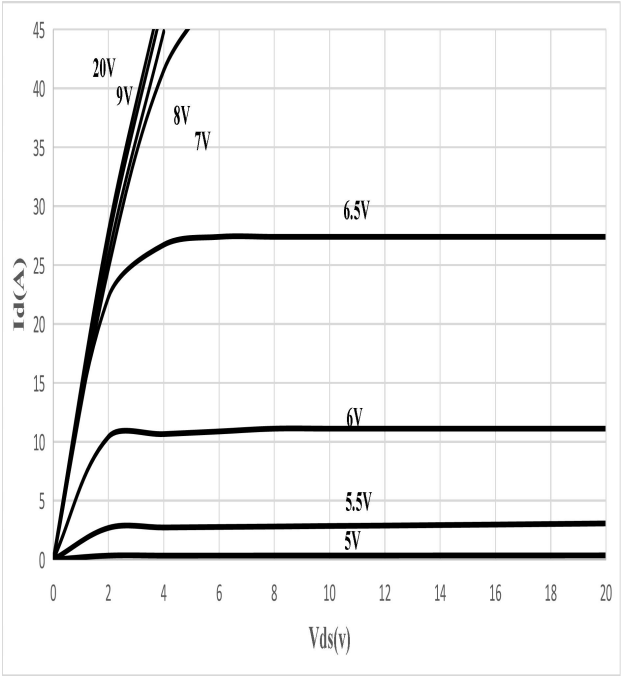
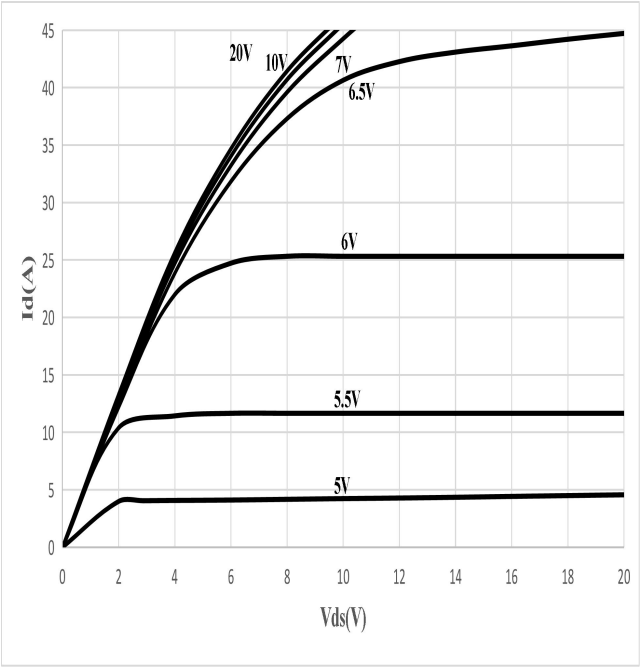
Figure 5: Safe Operating Area	Figure 6: Safe Operating Area
	
$I_D = f(V_{DS})$; T_c= 25ºC; V_{GS}>7V; parameter t_p	$I_D = f(V_{DS})$; T_c= 80ºC; V_{GS}>7V; parameter t_p

Figure 7: Typ. Output Characteristics



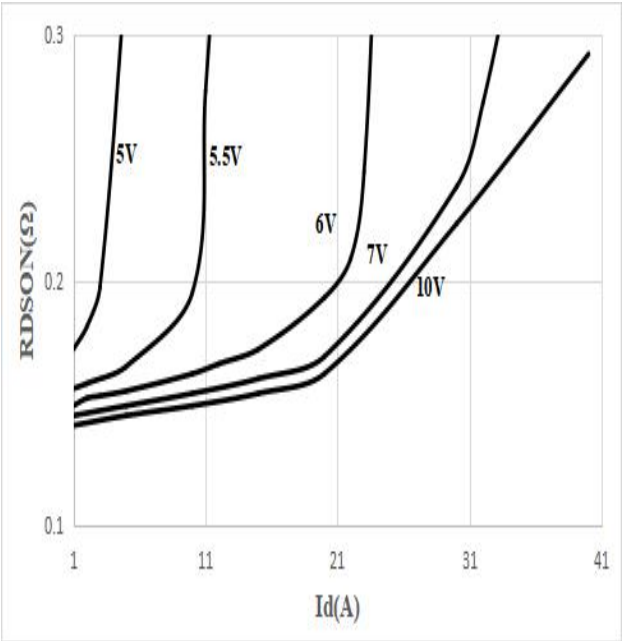
$I_D = f(V_{DS})$; Tj= 25ºC; parameter: V_{GS}

Figure 8: Typ. Output Characteristics



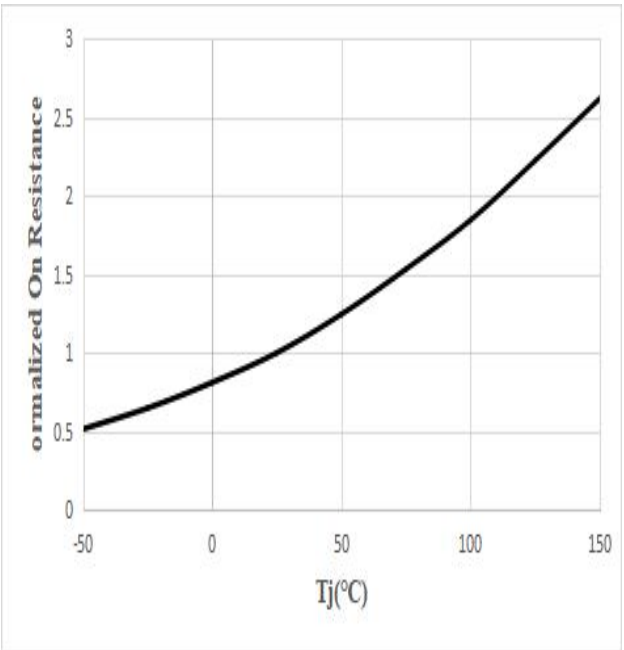
$I_D = f(V_{DS})$; T_j= 125ºC; parameter: V_{GS}

Figure 9: Typ. Drain-Source On-State Resistance



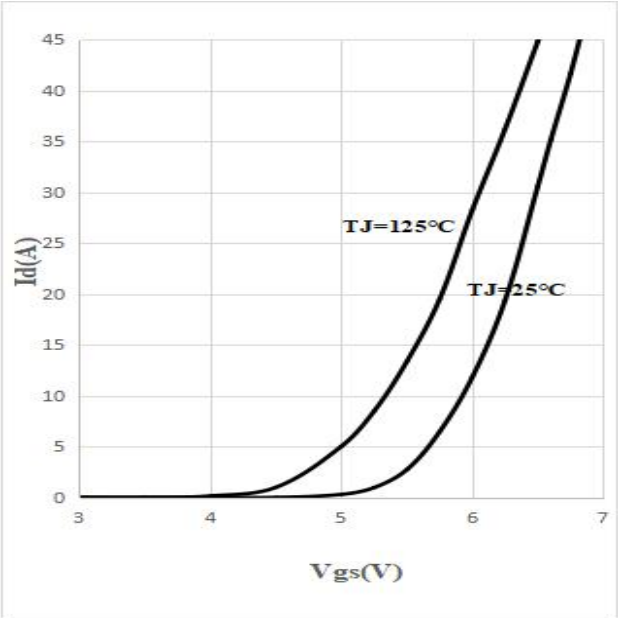
$R_{DS(ON)} = f(I_D)$; T_j=125ºC; parameter: V_{GS}

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



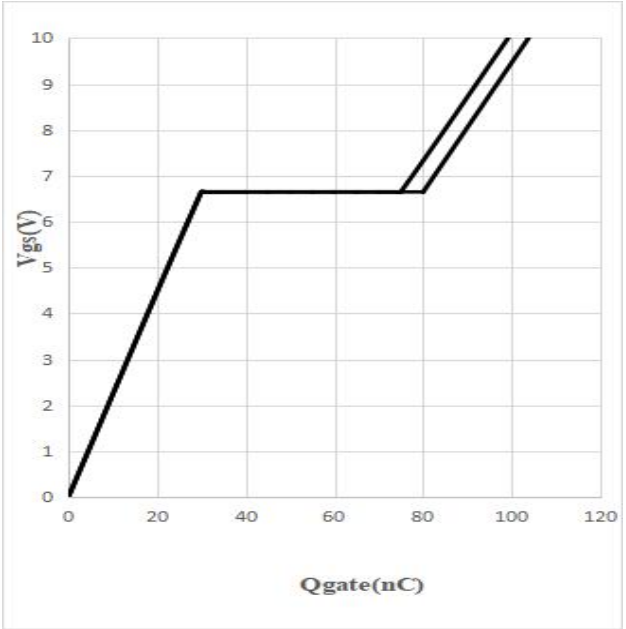
$R_{DS(ON)} = f(T_j)$; I_D=20A; V_{GS}=10V

Figure 11: Typ. Transfer Characteristics



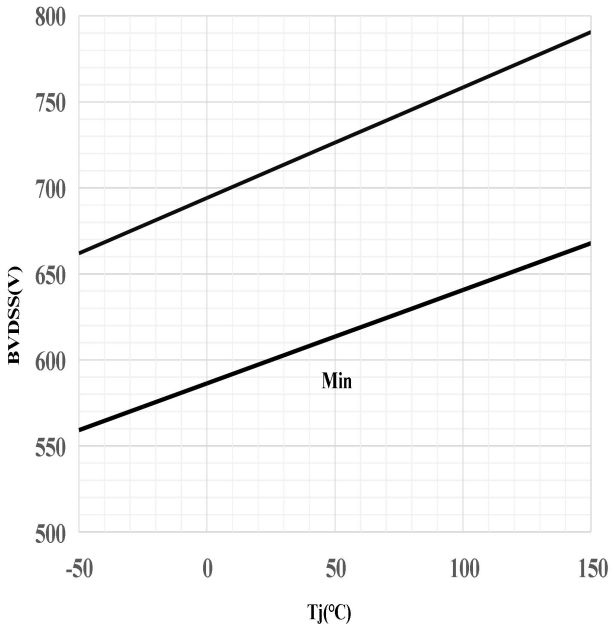
$I_D = f(V_{GS})$; $V_{DS} = 20V$

Figure 12: Typ. Gate Charge



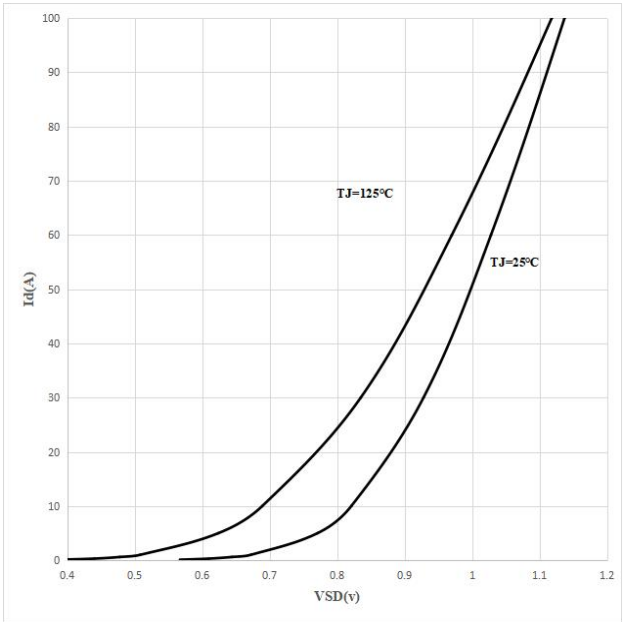
$V_{GS} = f(Q_{gate})$, $I_D = 20A$ pulsed

Figure 13: Drain-Source Breakdown Voltage



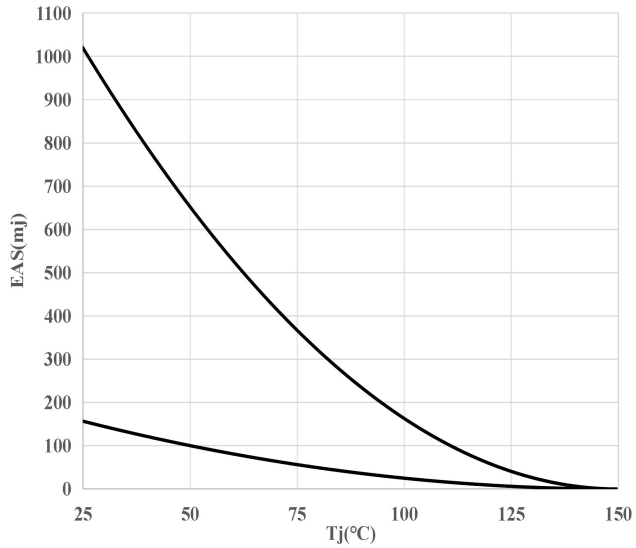
$V_{BR(DSS)}=f(T_j)$; $I_D=10mA$

Figure 14: Forward Characteristics of Reverse Diode



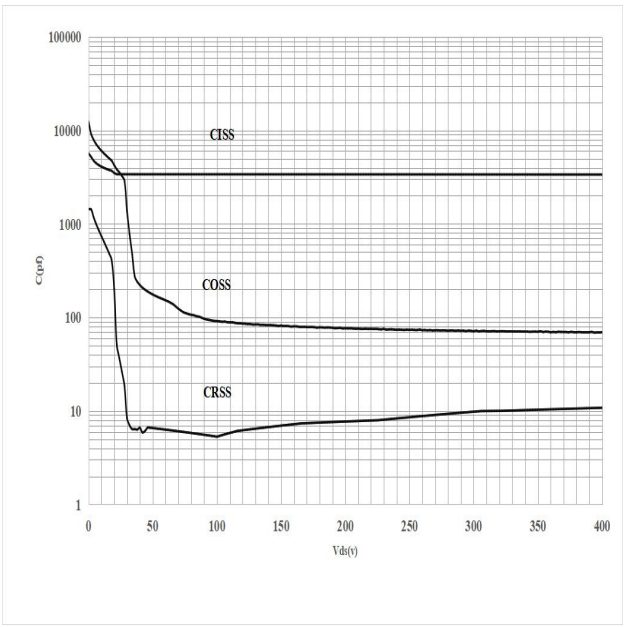
$I_F=f(V_{SD})$; parameter: T_j

Figure 15: Avalanche Energy



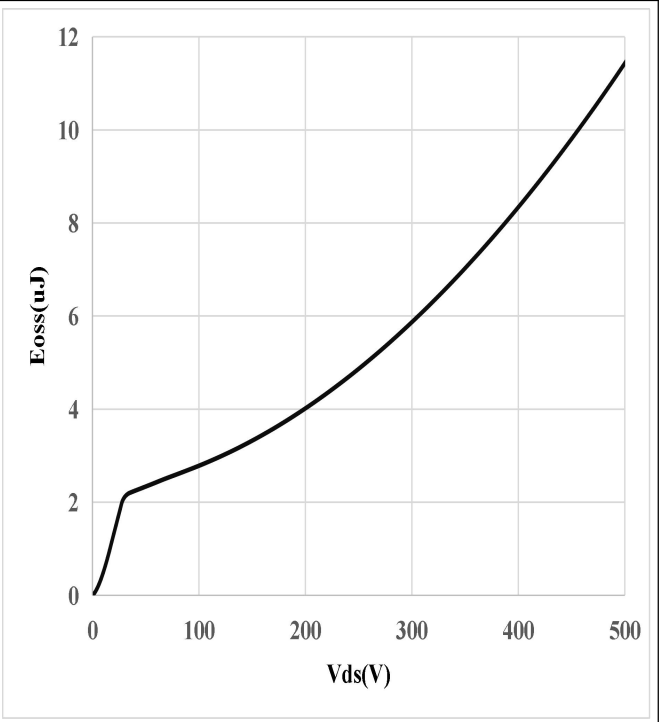
$E_{AS}=f(T_j)$; $V_{DD}=60V$

Figure 16: Typ. Capacitances



$C=f(V_{DS})$; $V_{GS}=0$; f=100kHz

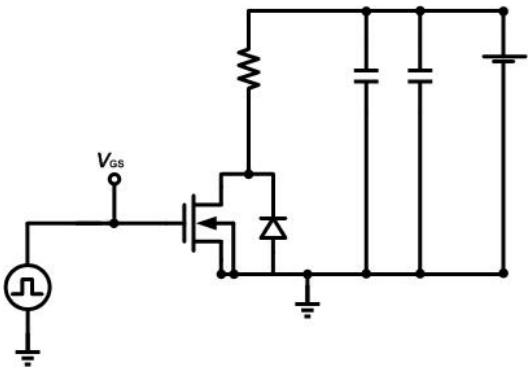
Figure 17: C_{OSS} Stored Energy

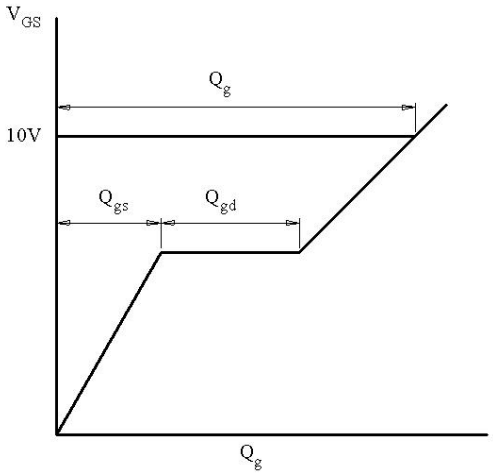


$E_{OSS}=f(V_{DS})$

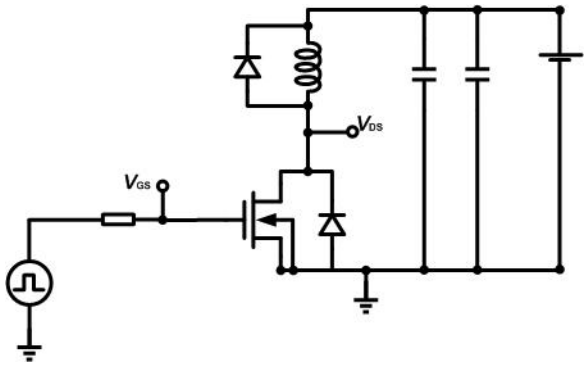
Test Circuits

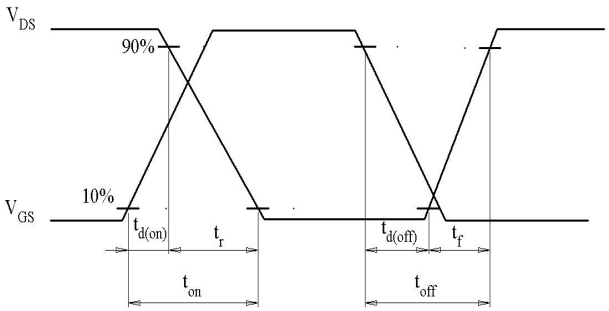
1. Gate Charge Test Circuit & Waveform



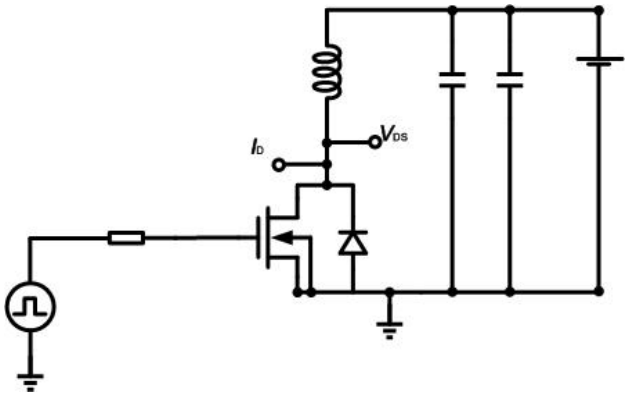


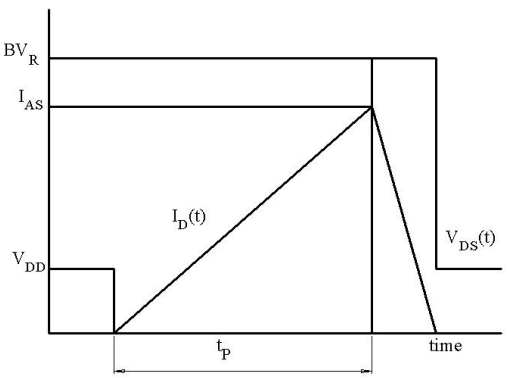
2. Switch Time Test Circuit



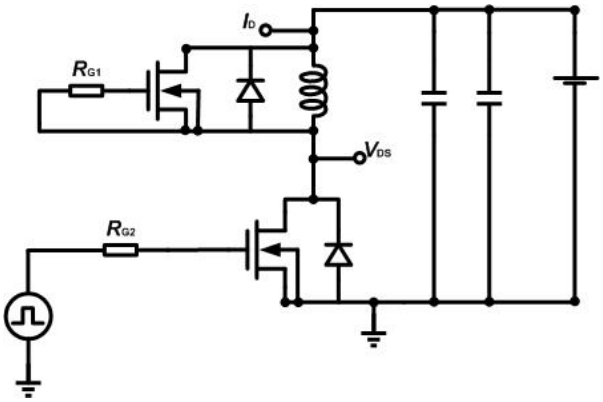


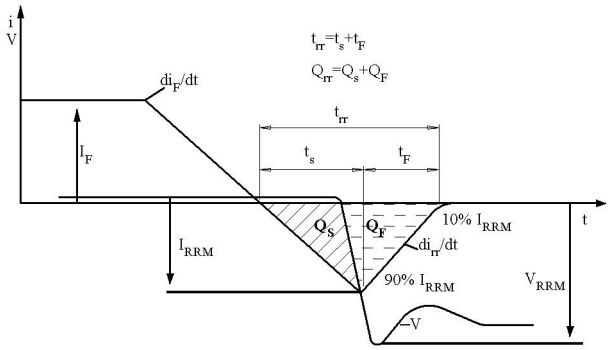
3. Unclaimed Inductive Switching Test Circuit & Waveforms





4. Test Circuit and Waveform for Diode Characteristics

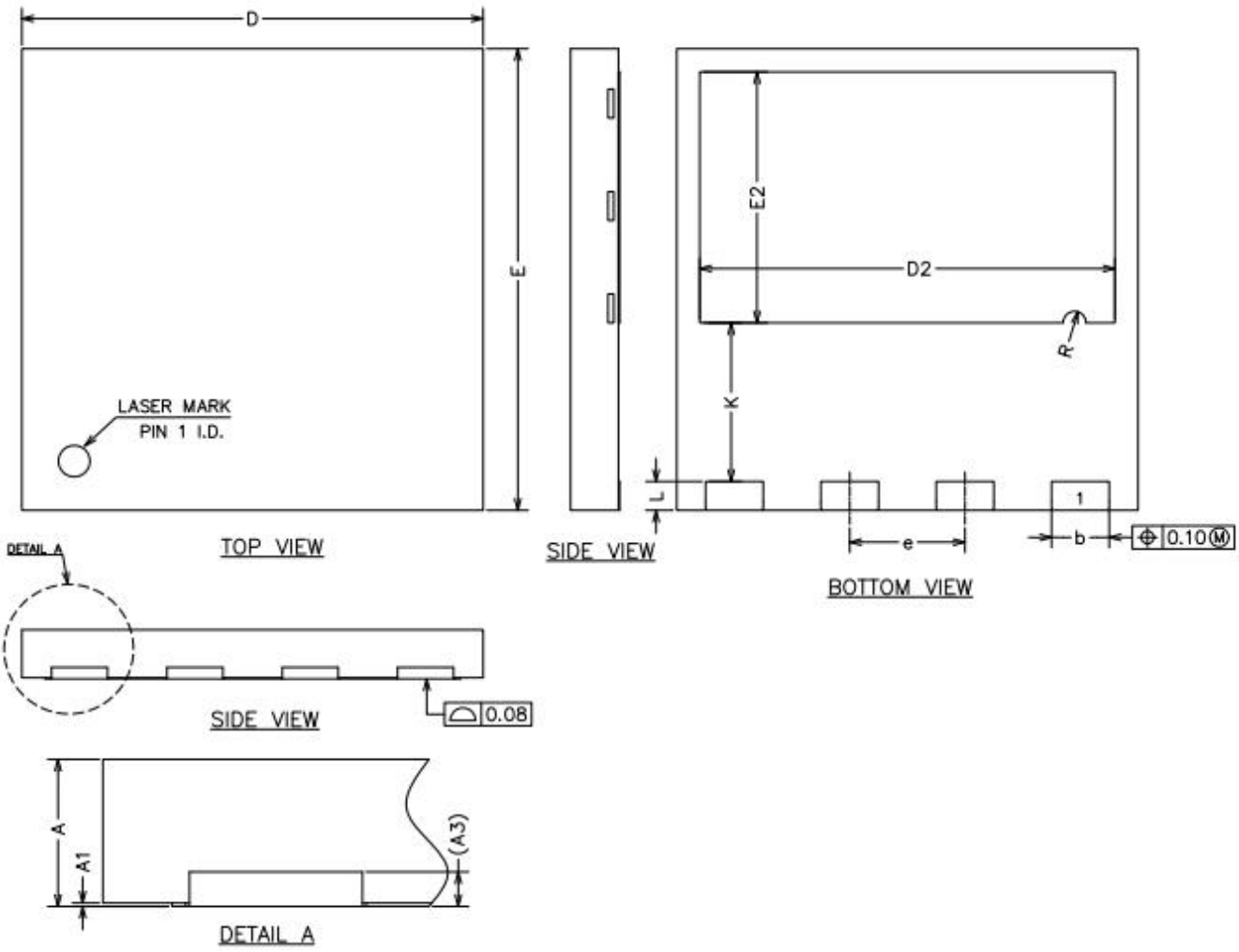




100mΩ, 600V, Super Junction N-Channel Power MOSFET SRC60R100BS

Mechanical Dimensions

PDFN8*8-4 **Unit: mm**



Symbol	Dimensions(mm)			Symbol	Dimensions(mm)		
	Min.	Typ.	Max.		Min.	Typ.	Max.
A	0.80	0.85	0.90	D2	7.10	7.20	7.30
A1	0.00	0.02	0.05	E2	4.25	4.35	4.45
A3	-	0.20REF	-	e	1.90	2.00	2.10
b	0.90	1.00	1.10	K	2.65	2.75	2.85
D	7.90	8.00	8.10	L	0.40	0.50	0.60
E	7.90	8.00	8.10	R	-	0.20REF	-

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Sanrise Tech™

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