30mΩ, 600V, Super Junction N-Channel Power MOSFET SRC60R030B

General Description

The Sanrise SRC60R030B 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 SRC60R030B break down voltage is 600V and it has a high rugged avalanche characteristics.

The SRC60R030B is available in TO-247, and TO-264 packages.

Features

- Ultra Low $R_{DS(ON)}$ = 30mΩ @ V_{GS} = 10V.
- Ultra Low Gate Charge, Qg=231nC typ.
- Intrinsic Fast-Recovery Body Diode
- Fast switching capability
- Robust design with better EAS performance

Application

- AC/DC Power Supply
- EV Charger
- Sever / Telecom
- Solar Inverter

Symbol

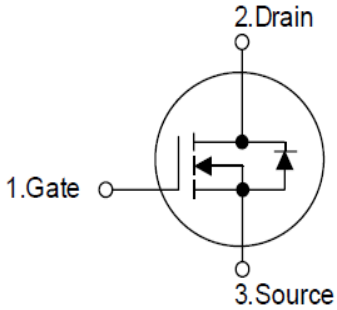


Figure 1 Symbol of SRC60R030B

Package Type

TO-247

TO-264

Figure 2 Package Types of SRC60R030B

Ordering Information

SRC60R030B□□–□

Circuit Type

Package
T: TO-247
K: TO-264

E: Lead Free
G: Green

Blank: Tube
TR: Tape & Reel

Package	Part Number		Marking ID		Packing Type
	Lead Free	Green	Lead Free	Green	
TO-264	SRC60R030BK-E	SRC60R030BK-G	SRC60R030BKE	SRC60R030BKG	Tube
TO-247	SRC60R030BT-E	SRC60R030BT-G	SRC60R030BTE	SRC60R030BTG	Tube

30mΩ, 600V, Super Junction N-Channel Power MOSFET SRC60R030B

Absolute Maximum Ratings

Parameter		Symbol	Rating	Unit
Drain-Source Voltage (Note2)		V_{DSS}	630	V
Gate-Source Voltage		V_{GSS}	±30	V
Continuous Drain Current	T_C=25ºC	I_D	100	A
	T_C=100ºC		63.3	
	T_C=125ºC		44.8	
Pulsed Drain Current (Note 3)		I_{DM}	300	A
Avalanche Energy, Single Pulse (Note 4)		E_{AS}	2200	mJ
Avalanche Energy, Repetitive (Note 3)		E_{AR}	2.3	mJ
Avalanche Current, Repetitive (Note 3)		I_{AR}	12	A
Continuous Diode Forward Current		I_S	100	A
Diode Pulse Current		$I_{S.PULSE}$	300	A
MOSFET dv/dt Ruggedness, V_{DS}<=480V		dv/dt	50	V/ns
Reverse Diode dv/dt, V_{DS}<=480V, I_{SD}<=I_D		dv/dt	50	V/ns
Power dissipation		Ptot	625	W
Mounting torque			98	Ncm
Operating Junction Temperature		T_J	150	ºC
Storage Temperature		T_{STG}	-55 to 150	ºC
Lead Temperature (Soldering, 10 sec)		T_{LEAD}	260	ºC
Insulation withstand voltage		V_{ISO}	NA	V

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. For Transient Voltage Spike.
3. Repetitive Rating: Pulse width limited by maximum junction temperature
4. I_{AS} = 12A, V_{DD} = 60V, R_G = 25Ω, Starting T_J = 25°C

Thermal characteristics

Parameter	Symbol	Package	Value (Max.)	Unit
Thermal resistance, junction - case	RthJC	TO-247	0.2	ºC /W
		TO-264	0.14	
Thermal resistance, junction – ambient (Leaded)	RthJA	TO-247	62	ºC /W
		TO-264	42	

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			-1.0	uA
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=2.4mA	2.7	3.5	4.3	V
Static Drain-Source On-Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=33.1A		26.0	30	mΩ
Gate Resistance		R_G	f=1MHz, Open Drain		1.1		Ω
Dynamic Characteristics							
Input Capacitance		C_{ISS}	V_{DS}=50V, V_{GS}=0V, f=1MHz		7200		pF
Output Capacitance		C_{OSS}			482		
Reverse Transfer Capacitance		C_{RSS}			10.8		
Effective output capacitance, energy related NOTE5		$C_{O(er)}$	V_{GS}=0V, V_{DS}=0…480V		248		pF
Effective output capacitance, time related NOTE6		$C_{O(tr)}$			1290		
Turn-on Delay Time		$t_{d(on)}$	V_{DD}=400V, I_D=50A R_G=1.8Ω, V_{GS}=10V		21		ns
Rise Time		t_r			30		
Turn-off Delay Time		$t_{d(off)}$			94		
Fall Time		t_f			12		
Gate Charge Characteristics							
Gate to Source Charge		Q_{gs}	V_{DD}=480V, I_D=50A V_{GS}=0 to 10V		55		nC
Gate to Drain Charge		Q_{gd}			78		
Gate Charge Total		Q_g			231		
Gate Plateau Voltage		$V_{plateau}$			6.0		V
Reverse Diode Characteristics							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V, I_{SD}=33.1A		0.91	1.1	V
Reverse Recovery Time		t_{rr}	V_R=100V, I_F=50A dI_F/dt=100A/us		176		ns
Reverse Recovery Charge		Q_{rr}			1.19		uC
Peak Reverse Recovery Current		I_{rrm}			13.5		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 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

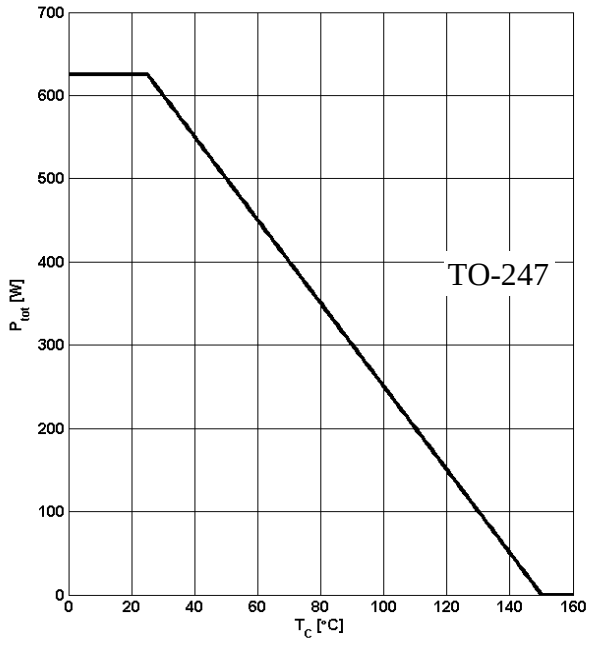
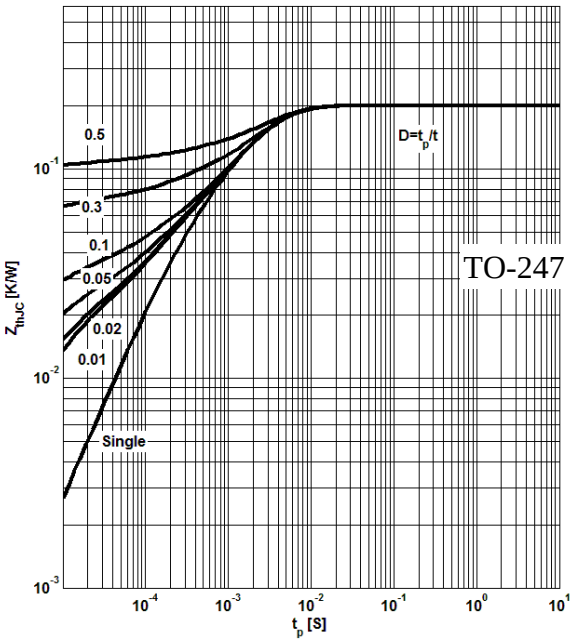
Figure 3: Power Dissipation	Figure 4: Max. Transient Thermal Impedance
	
$P_{tot} = f(T_C)$	$Z_{(thJC)} = f(t_p)$; parameter: $D = t_p/T$

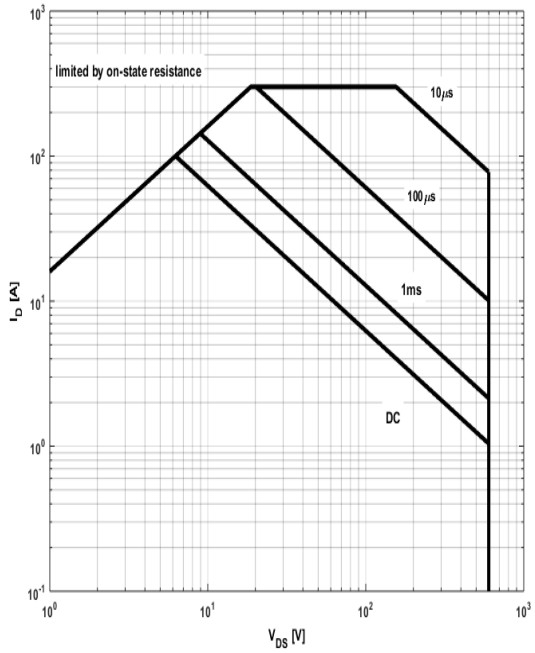
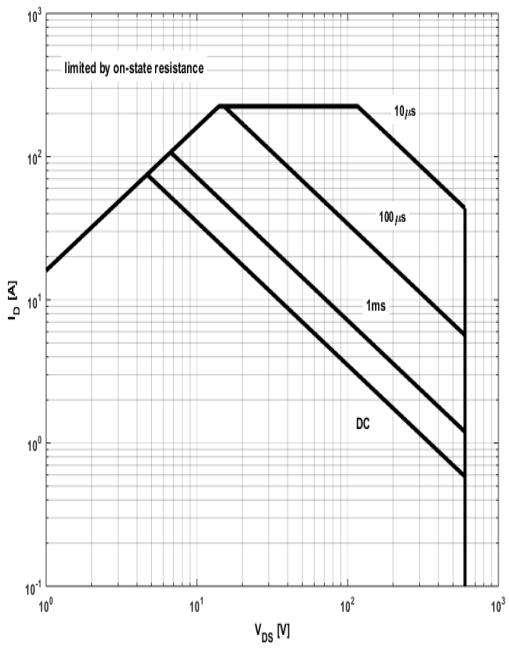
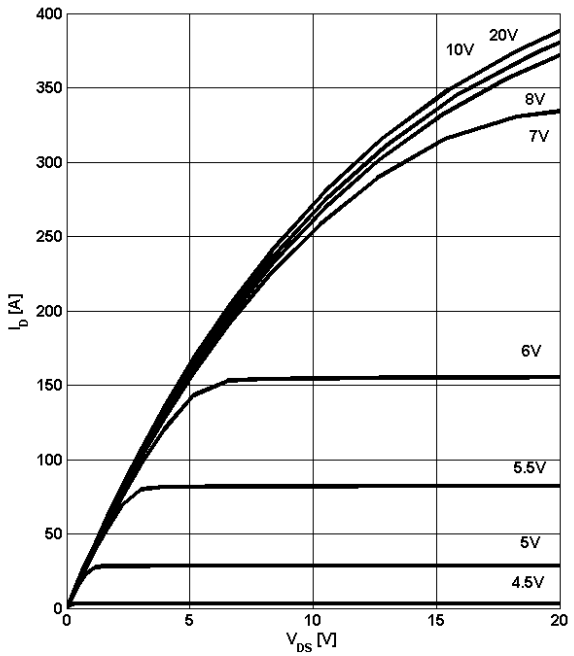
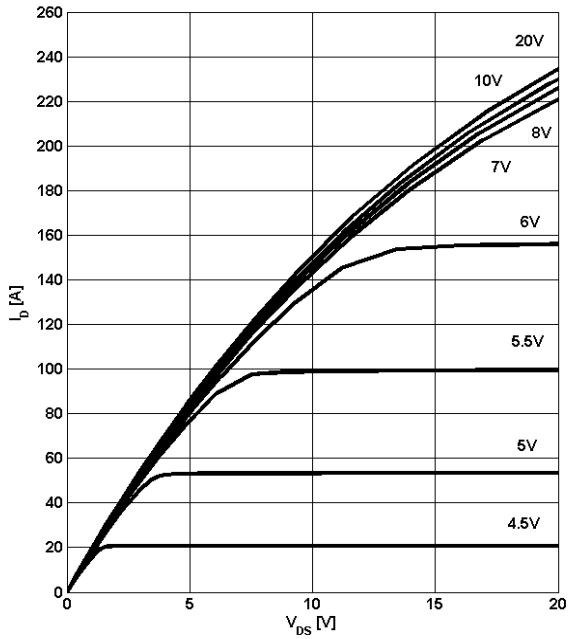
Figure 5: Safe Operating Area	Figure 6: Safe Operating Area
	
$I_D = f(V_{DS})$; T_c= 25ºC; V_{GS}>7V; parameter t_p	$I_D = f(V_{DS})$; T_c= 80ºC; V_{GS}>7V; parameter t_p

Figure 7: Typ. Output Characteristics



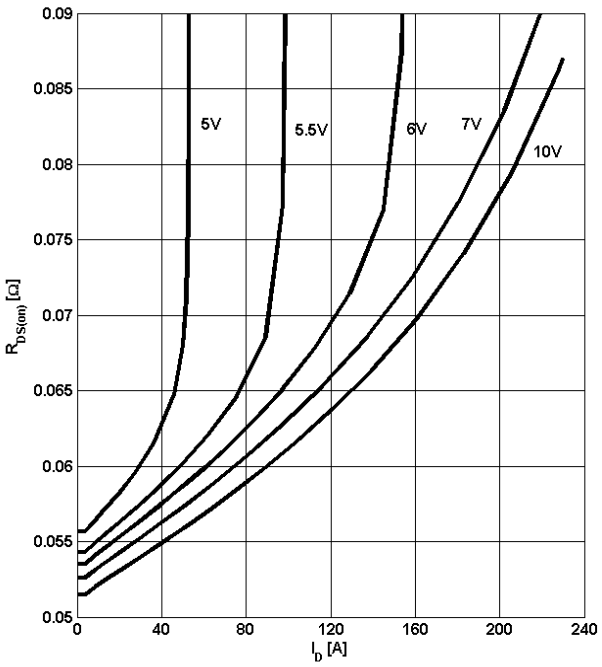
$I_D = f(V_{DS})$; Tj= 25ºC; parameter: V_{GS}

Figure 8: Typ. Output Characteristics



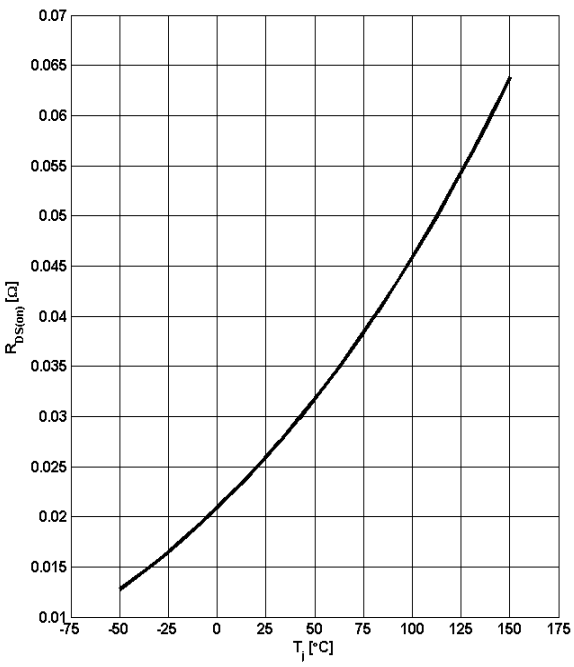
$I_D = f(V_{DS})$; T_j= 125ºC; parameter: V_{GS}

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=33.1A; V_{GS}=10V

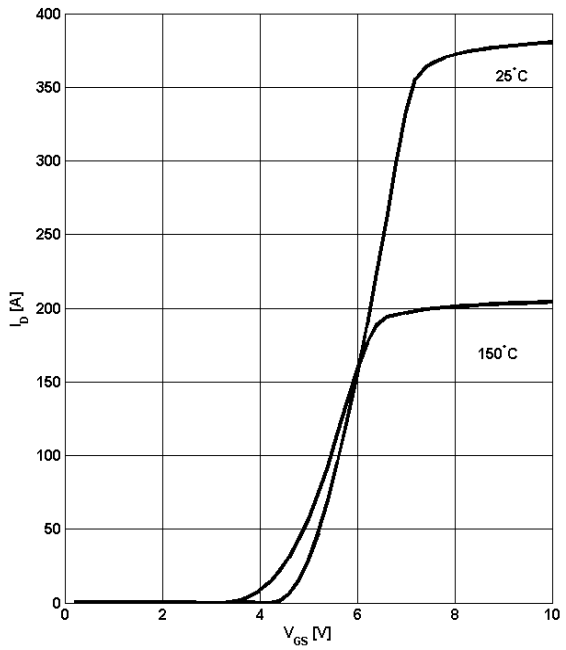
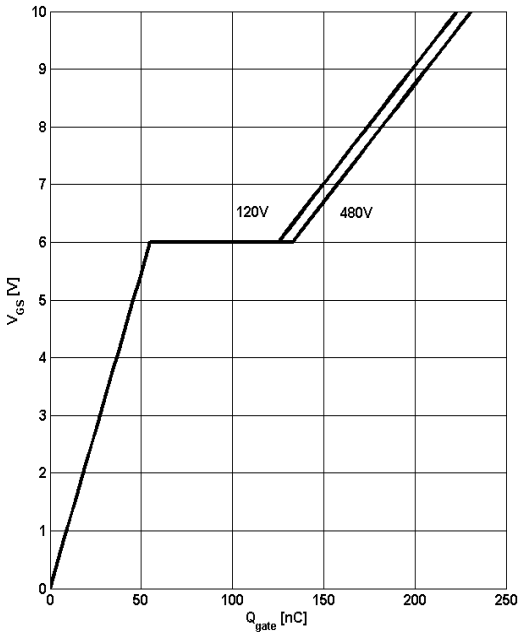
Figure 11: Typ. Transfer Characteristics	Figure 12: Typ. Gate Charge
	
$I_D = f(V_{GS})$; $V_{DS} = 20V$	$V_{GS}= f(Q_{gate})$, $I_D= 50A$ pulsed

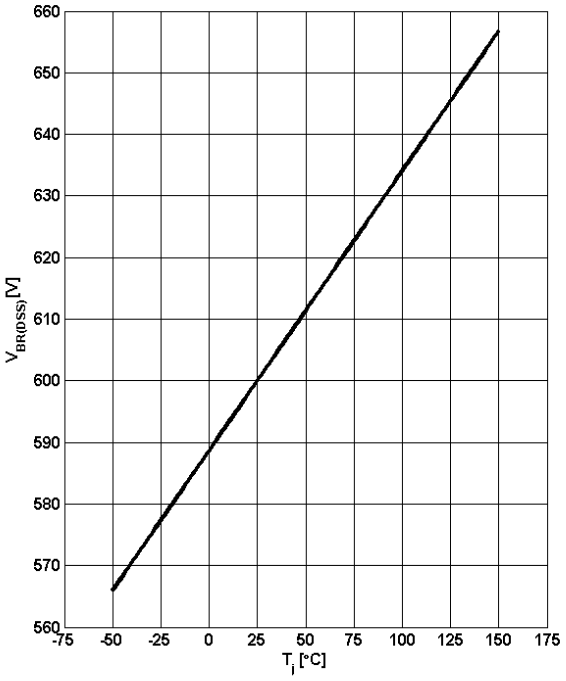
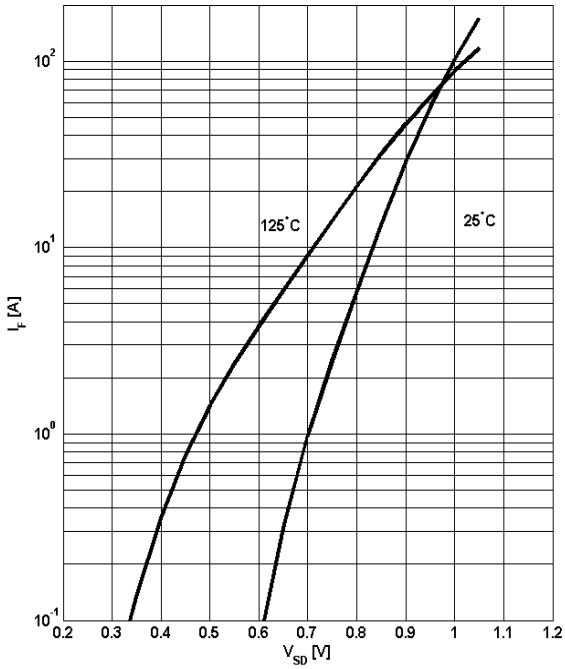
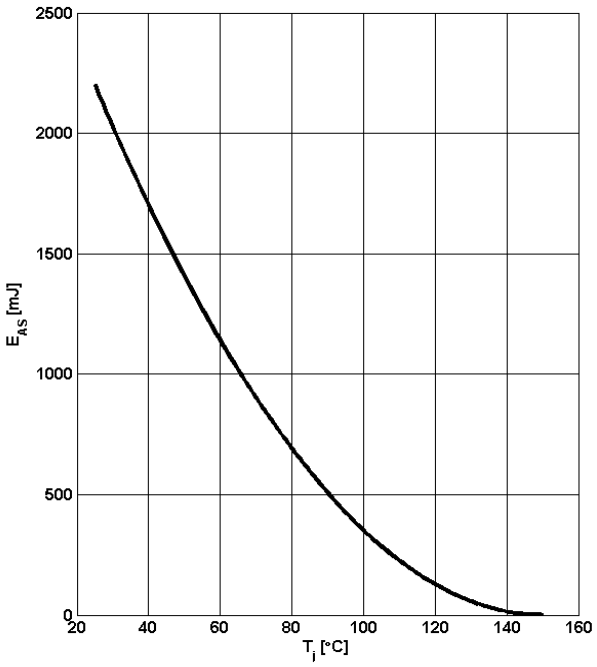
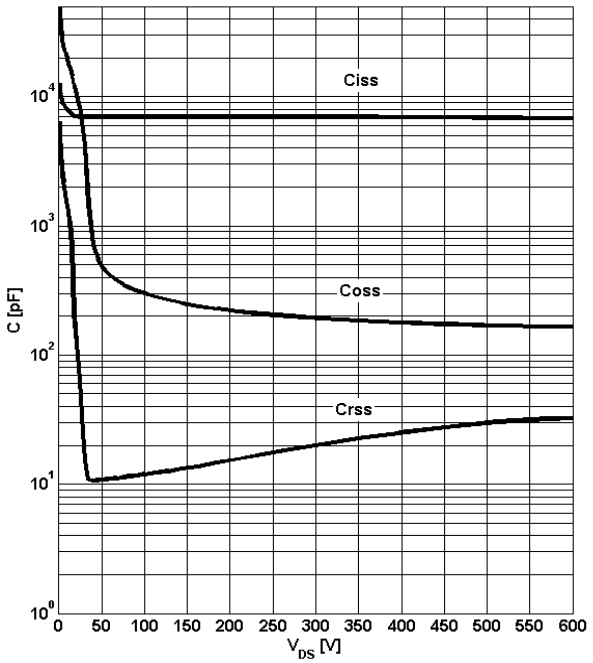
Figure 13: Drain-Source Breakdown Voltage	Figure 14: Forward Characteristics of Reverse Diode
	
$V_{BR(DSS)}=f(T_j)$; $I_D=10mA$	$I_F=f(V_{SD})$; parameter: T_j

Figure 15: Avalanche Energy



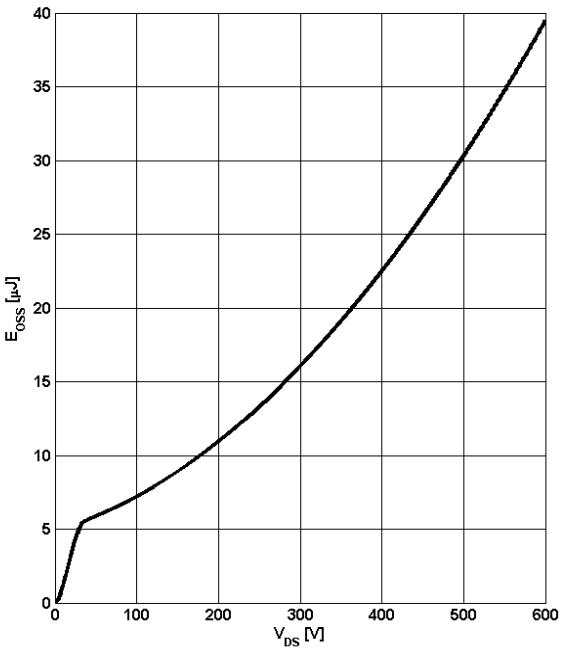
$E_{AS}=f(T_j)$; I_D=12A; V_{DD}=60V

Figure 16: Typ. Capacitances



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

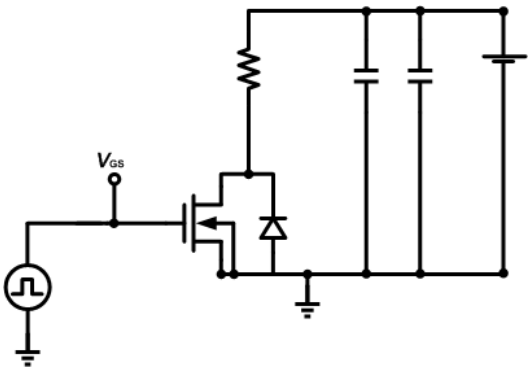
Figure 17: C_{OSS} Stored Energy

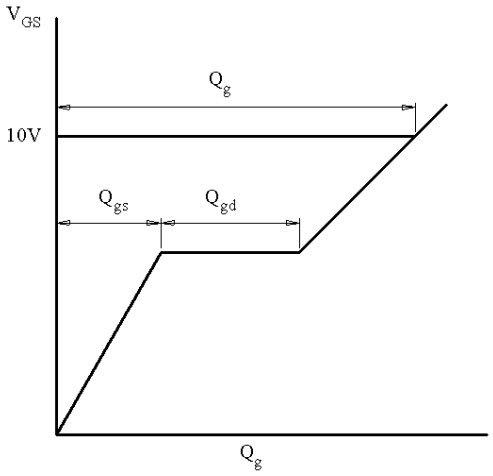


$E_{OSS}=f(V_{DS})$

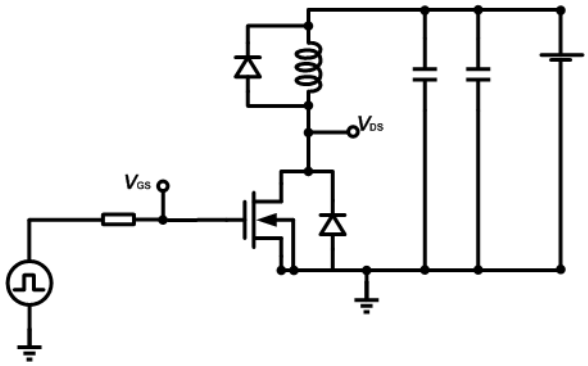
Test Circuits

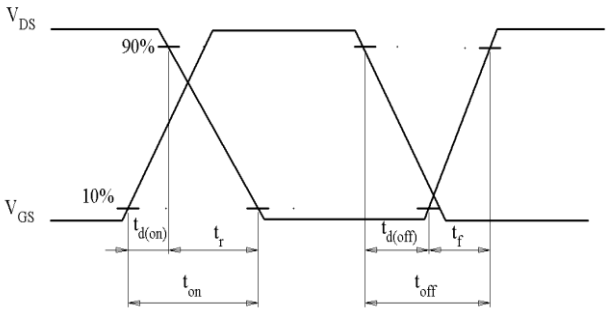
1. Gate Charge Test Circuit & Waveform



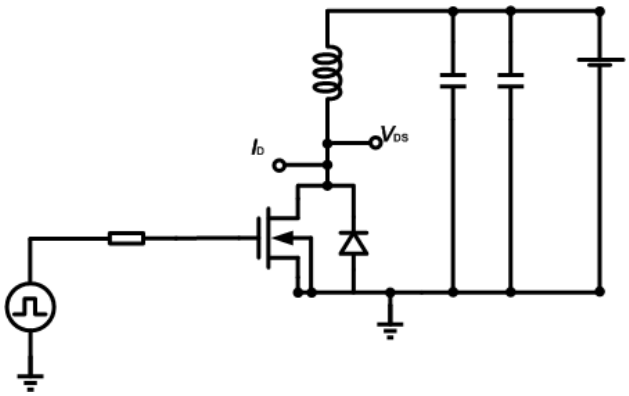


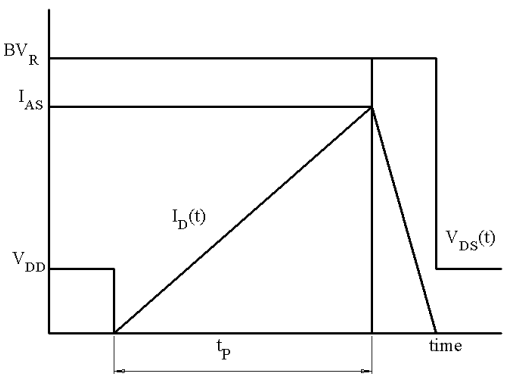
2. Switch Time Test Circuit



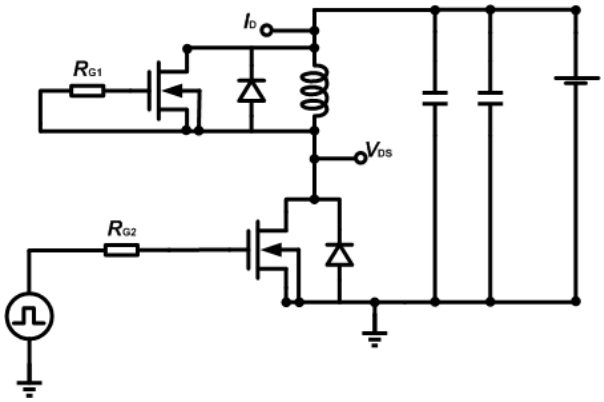


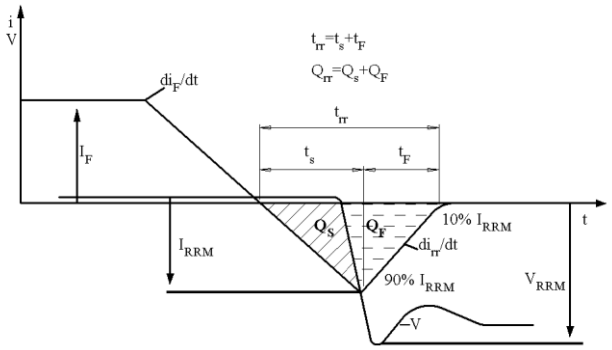
3. Unclaimed Inductive Switching Test Circuit & Waveforms





4. Test Circuit and Waveform for Diode Characteristics

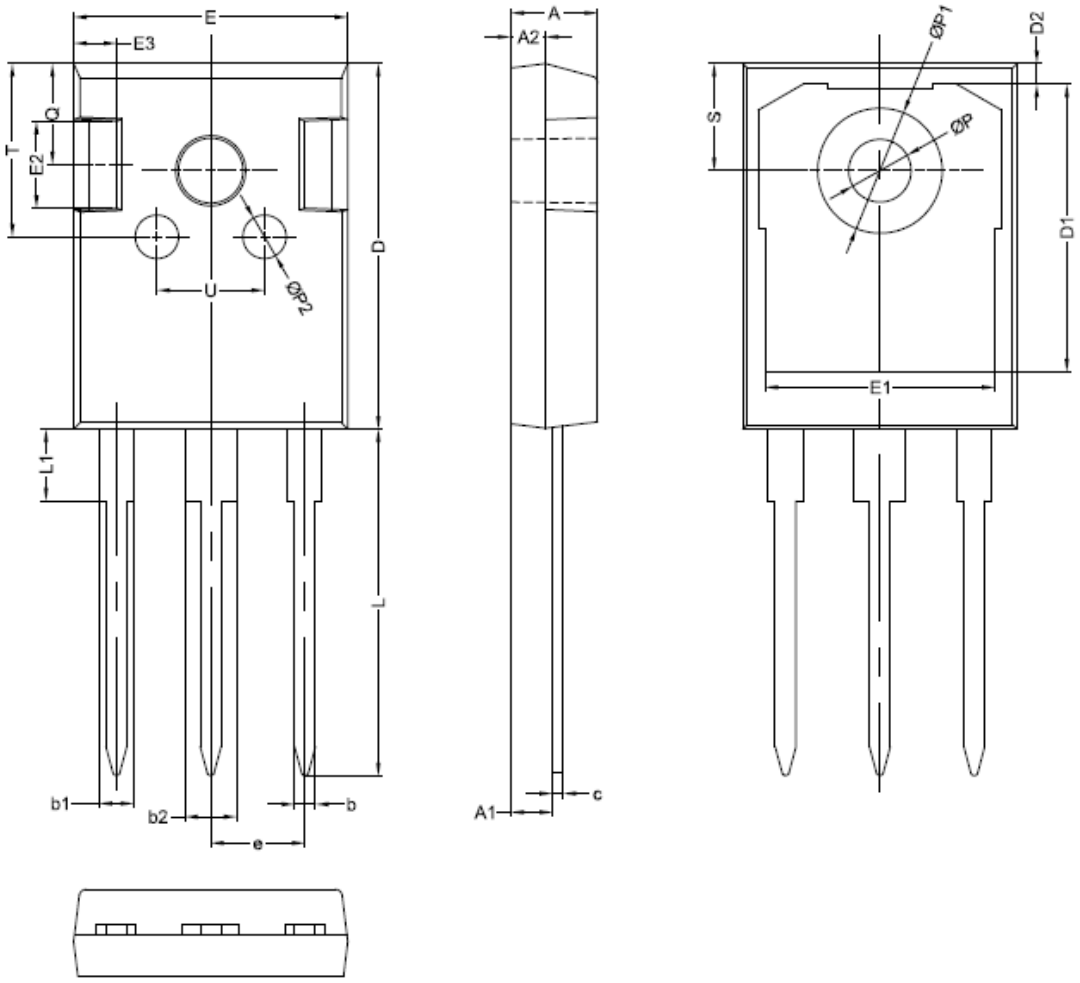




30mΩ, 600V, Super Junction N-Channel Power MOSFET SRC60R030B

Mechanical Dimensions

TO-247 **Unit: mm**

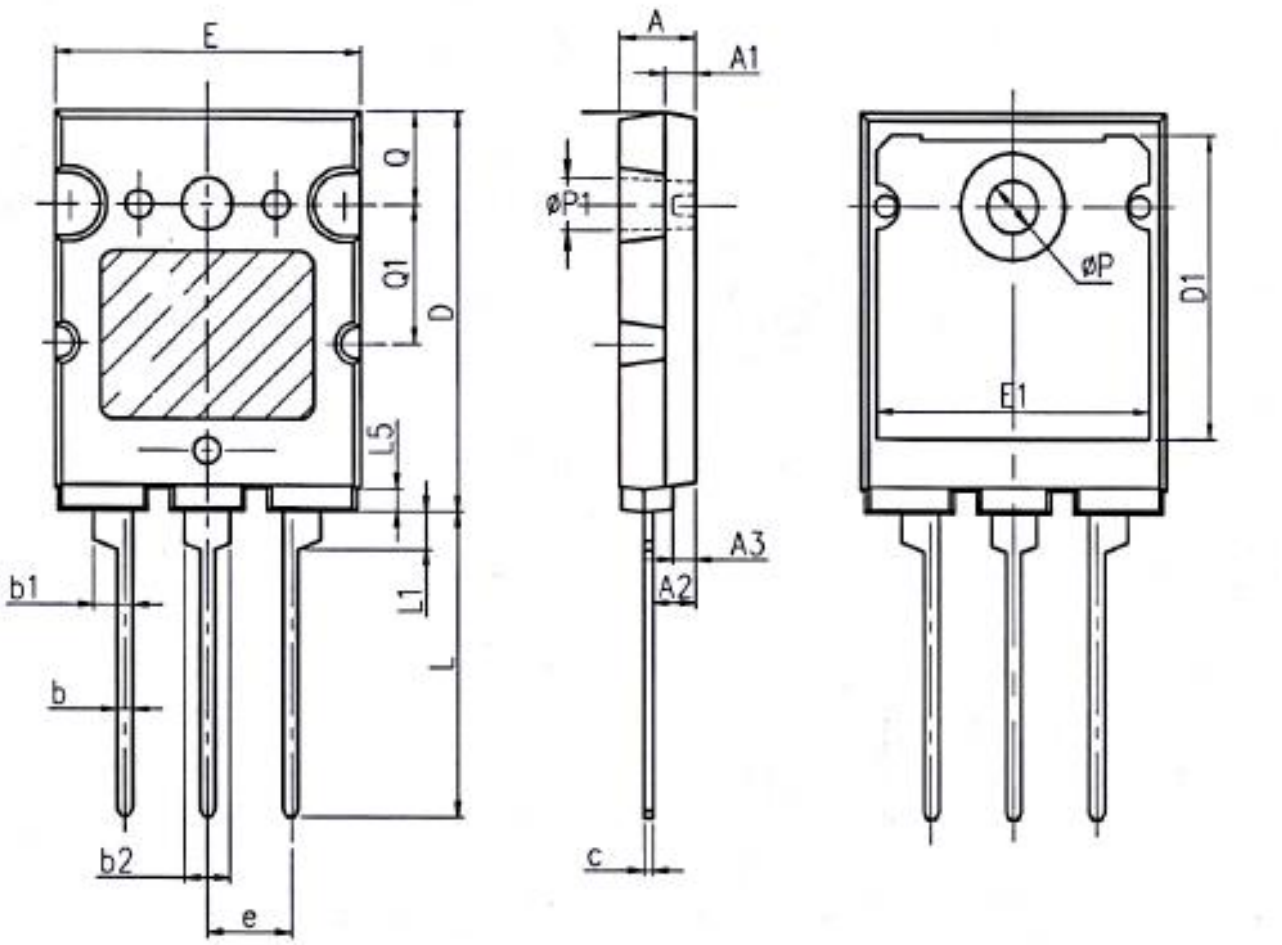


Symbol	Dimensions(mm)			Symbol	Dimensions(mm)		
	Min.	Typ.	Max.		Min.	Typ.	Max.
A	4.80	5.00	5.20	E2	-	5.00	-
A1	2.21	2.41	2.61	E3	-	2.50	-
A2	1.90	2.00	2.10	e	5.44(BSC)		
b	1.10	1.20	1.35	L	19.42	19.92	20.42
b1	-	2.00	-	L1	-	4.13	-
b2	-	3.00	-	P	3.50	3.60	3.70
c	0.55	0.60	0.75	P1	-	-	7.40
D	20.80	21.00	21.20	P2	-	2.50	-
D1	-	16.55	-	Q	-	5.80	-
D2	-	1.20	-	S	6.05	6.15	6.25
E	15.60	15.80	16.00	T	-	10.00	-
E1	-	13.30	-	U	-	6.20	-

30mΩ, 600V, Super Junction N-Channel Power MOSFET SRC60R030B

Mechanical Dimensions

TO-264 **Unit: mm**



Symbol	Dimensions(mm)			Symbol	Dimensions(mm)		
	Min.	Typ.	Max.		Min.	Typ.	Max.
A	4.80	5.00	5.20	e	5.45 TYP		
A1	2.00 REF			L	19.50	20.00	20.50
A2	2.50	2.80	3.10	L1	2.30	2.50	2.70
A3	1.50 REF			L5	1.35 REF		
b	0.90	1.00	1.25	ΦP	3.00	3.20	3.40
b1	2.30	2.50	2.75	ΦP1	3.20	3.40	3.60
b2	2.80	3.00	3.20	Q	5.80	6.00	6.20
c	0.50	0.60	0.85	Q1	8.80	9.00	9.20
D	25.70	26.00	26.30				
D1	19.00	-	-				
E	19.50	20.00	20.50				
E1	16.00	-	-				

30mΩ, 600V, Super Junction N-Channel Power MOSFET SRC60R030B

Sanrise Technology Limited Company

http://www.sanrise-tech.com

IMPORTANT NOTICE

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

Main Site:

- Headquarter

Sanrise Technology Limited Company

Rm.601~603, Building B, SDG Information Port, No.2, Kefeng Road, Science & Technology Park, Nanshan District, ShenZhen, P.R.China

Tel: +86-755-22953335

Fax: +86-755-22916878

- Shanghai Office

Sanrise Technology Limited Company

Rm.702, Building A, No. 666, Zhangheng Road, Zhangjiang Hi-Tech Park, Shanghai, P.R.China

Tel: +86-21-68825918