

General Description

The Sanrise SRC65R032FB 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 SRC65R032FB break down voltage is 650V and it has a high rugged avalanche characteristics. The SRC65R032FB is available in TO-247 package.

Features

- Ultra Low $R_{DS(ON)} = 32m\Omega @ V_{GS} = 10V$.
- Ultra Low Gate Charge, $Q_g = 124.1nC$ typ.
- Fast switching capability
- Robust design with better EAS performance
- Low Q_{rr}
- Non-automotive Qualified

Application

- EV Charger
- High Power Application
- High Performance Application

Ordering Information

Circuit Type		SRC65R032FB□□-□			
Package				E: Lead Free	
				G: Green	
T: TO-247				Blank: Tube	

Symbol

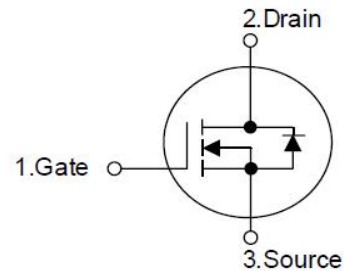


Figure 1 Symbol of SRC65R032FB

Package Type



TO-247

Figure 2 Package Type of SRC65R032FB

Package	Part Number		Marking ID		Packing Type
	Lead Free	Green	Lead Free	Green	
TO-247	SRC65R032FBT-E	SRC65R032FBT-G	SRC65R032FBTE	SRC65R032FBTG	Tube

Absolute Maximum Ratings^{Note 1}

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DSS}	650	V
Gate-Source Voltage (static)		V_{GSS}	±20	V
Gate-Source Voltage (dynamic), AC ($f > 1$ Hz)		V_{GSS}	±30	V
Power Dissipation(TO-247, $T_c = 25^\circ\text{C}$)		P_{tot}	595.2	W
Continuous Drain Current	$T_c = 25^\circ\text{C}$	I_D	88	A
	$T_c = 100^\circ\text{C}$		55.7	
	$T_c = 125^\circ\text{C}$		39.4	
Pulsed Drain Current (Note 2)		I_{DM}	264	A
Avalanche Energy, Single Pulse (Note 3)		E_{AS}	200	mJ
Avalanche Energy, Repetitive (Note 2)		E_{AR}	1.0	mJ
Avalanche Current, Repetitive (Note 2)		I_{AR}	6.4	A
Continuous Diode Forward Current		I_S	88	A
Diode Pulse Current		$I_{S,PULSE}$	264	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
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. $I_{AS} = 6.4\text{A}$, $V_{DD} = 60\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$

Thermal characteristics

Parameter		Symbol	Min	Typ	Max	Unit
Thermal resistance, Junction-to-Case	TO-247	R_{thJC}			0.21	$^\circ\text{C/W}$
Thermal resistance, Junction-to-Ambient	TO-247	R_{thJA}			54	$^\circ\text{C/W}$

Electrical Characteristics

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

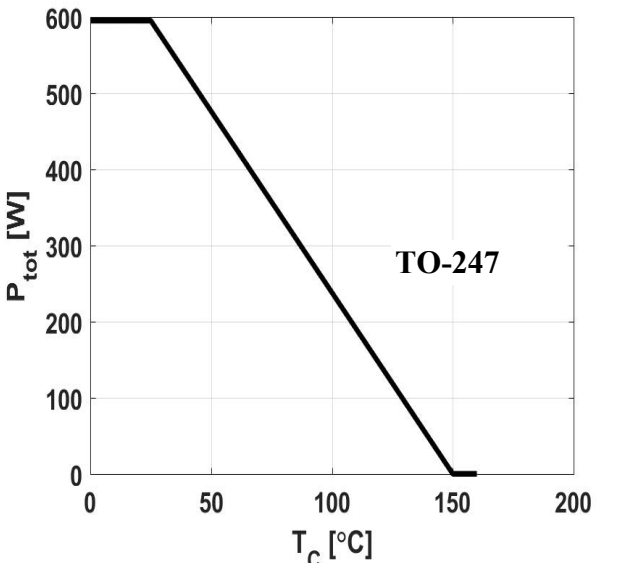
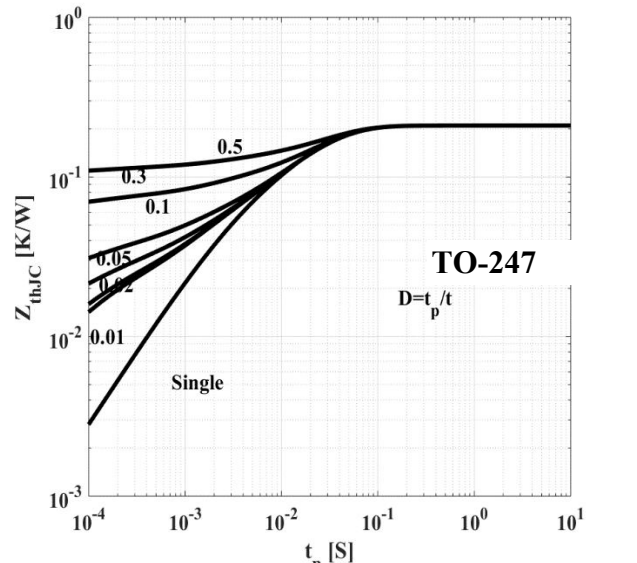
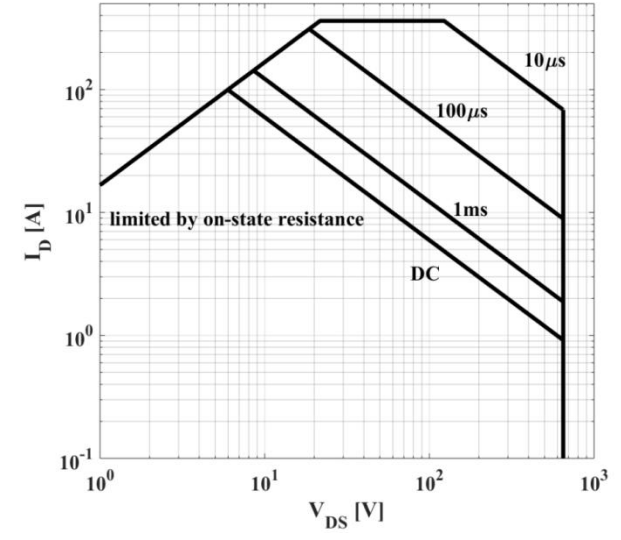
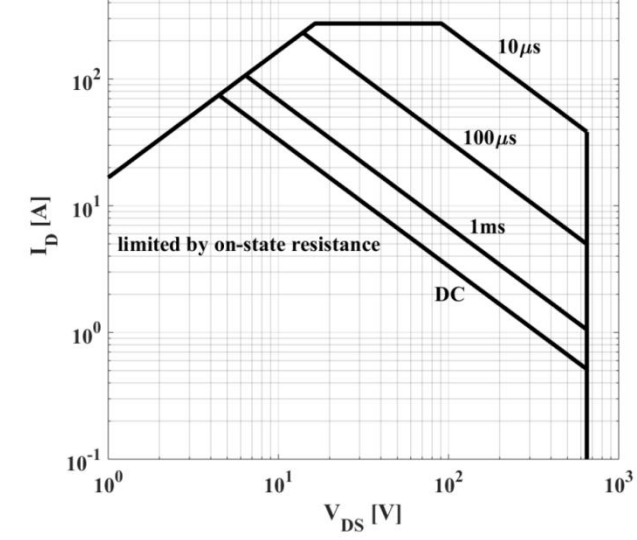
Parameter		Symbol	Test Conditions	Min	Typ	Max	Unit
Statistic Characteristics							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V, I _D =250uA	650			V
Zero Gate Voltage Drain Current		I _{DSS}	V _{DS} =650V, V _{GS} =0V			10	uA
Gate-Body Leakage Current	Forward	I _{GSSF}	V _{GS} =20V, V _{DS} =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 =2.2mA	3.0	4.0	5.0	V
Static Drain-Source On-Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =34A		27	32	mΩ
Gate Resistance		R _G	f=1MHz, Open Drain		2.0		Ω
Dynamic Characteristics							
Input Capacitance		C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1MHz		8.3		nF
Output Capacitance		C _{OSS}			8.3		nF
Reverse Transfer Capacitance		C _{RSS}			300		pF
Effective output capacitance, energy related ^{NOTE5}		C _{O(er)}	V _{GS} =0V, V _{DS} =0...400V		222.4		pF
Effective output capacitance, time related ^{NOTE6}		C _{O(tr)}			1354		
Turn-on Delay Time		t _{d(on)}	V _{DD} =400V, I _D =34A R _G =3.3Ω, V _{GS} =10V		21		ns
Rise Time		t _r			13		
Turn-off Delay Time		t _{d(off)}			71		
Fall Time		t _f			4.5		
Gate Charge Characteristics							
Gate to Source Charge		Q _{gs}	V _{DD} =480V, I _D =34A V _{GS} =0 to 10V		58.5		nC
Gate to Drain Charge		Q _{gd}			33.7		
Gate Charge Total		Q _g			124.1		
Gate Plateau Voltage		V _{plateau}			6.5		V
Reverse Diode Characteristics							
Drain-Source Diode Forward Voltage		V _{SD}	V _{GS} =0V, I _{SD} =34A		0.9	1.1	V
Reverse Recovery Time		t _{rr}	V _R =400V, I _F =34A dI _F /dt=100A/us		175		ns
Reverse Recovery Charge		Q _{rr}			1.28		uC
Peak Reverse Recovery Current		I _{rrm}			14.6		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  $P_{tot} = f(T_c)$	Figure 4: Max. Transient Thermal Impedance  $Z_{(th)JC} = f(t_p)$; parameter: $D = t_p / T$
Figure 5: Safe Operating Area  $I_D = f(V_{DS})$; $T_c = 25^\circ\text{C}$; $V_{GS} > 7\text{V}$; parameter t_p	Figure 6: Safe Operating Area  $I_D = f(V_{DS})$; $T_c = 80^\circ\text{C}$; $V_{GS} > 7\text{V}$; parameter t_p

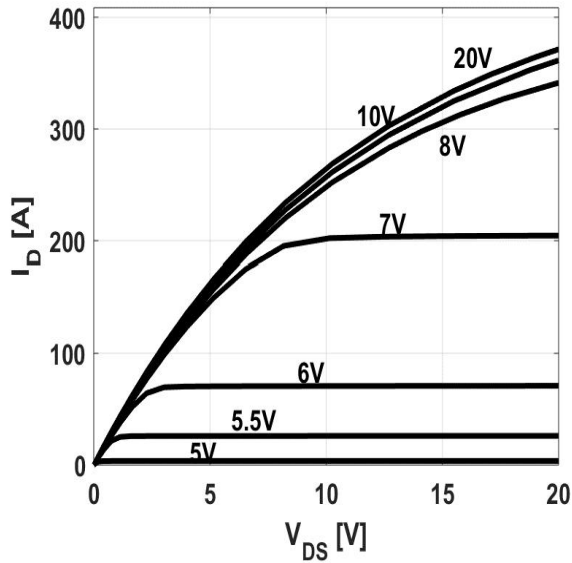
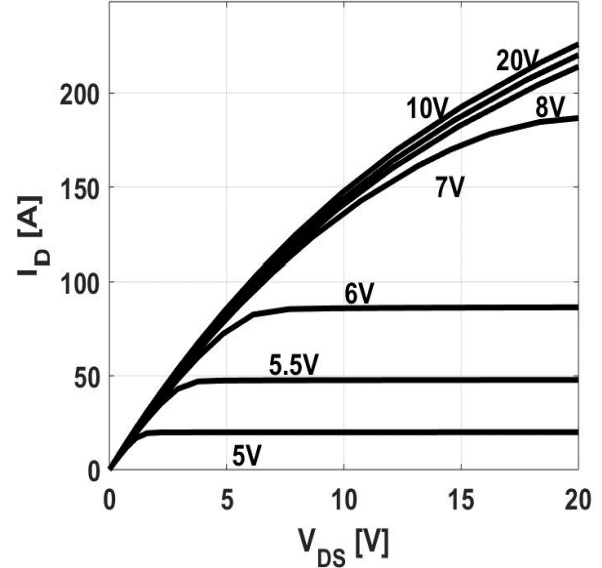
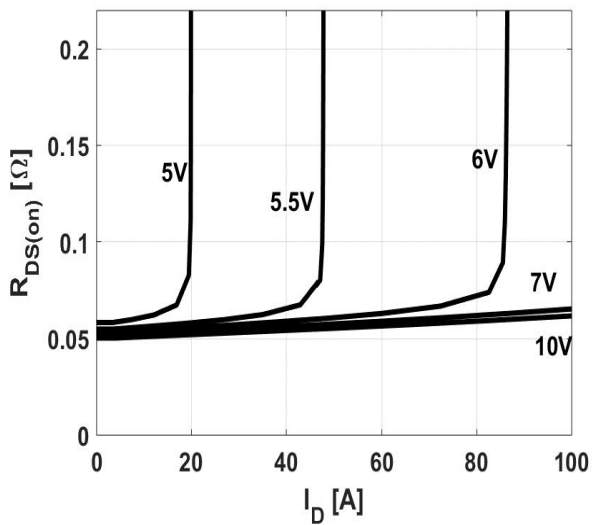
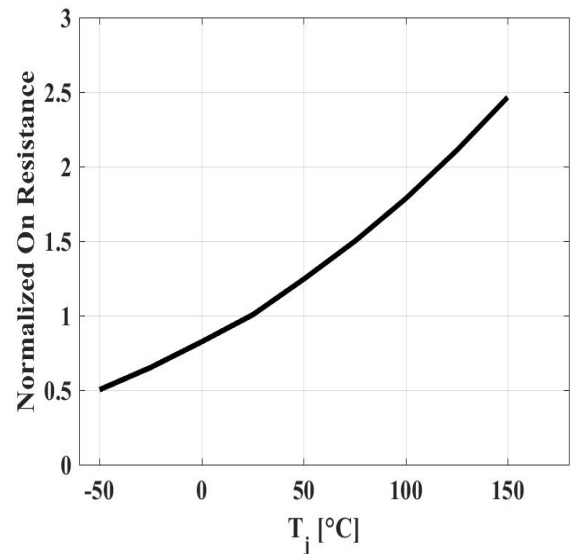
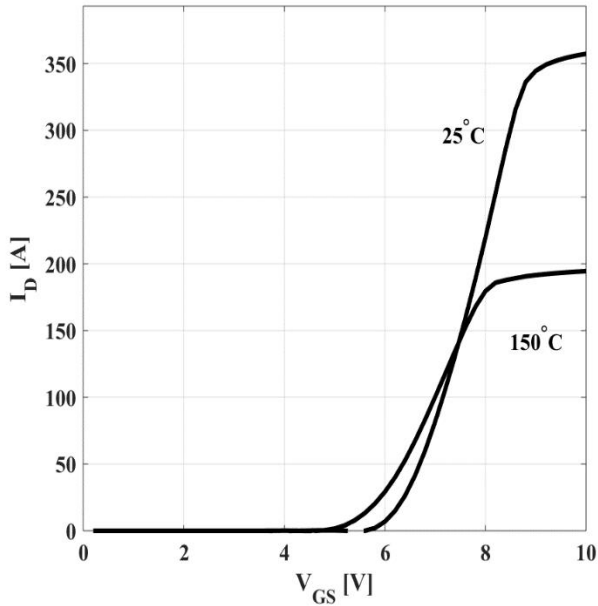
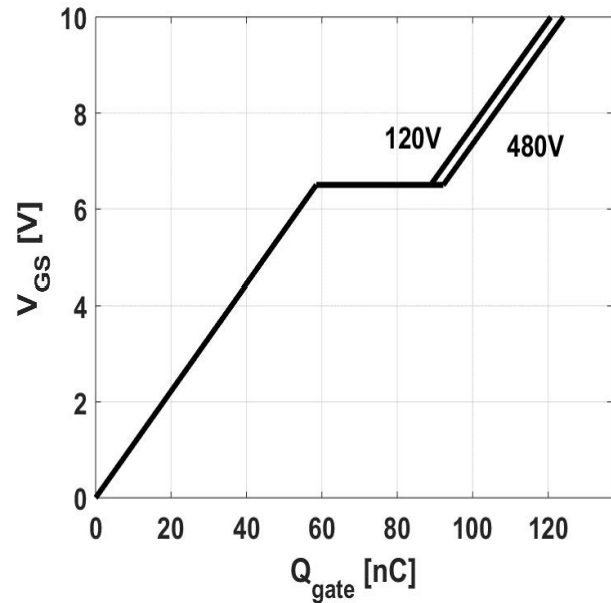
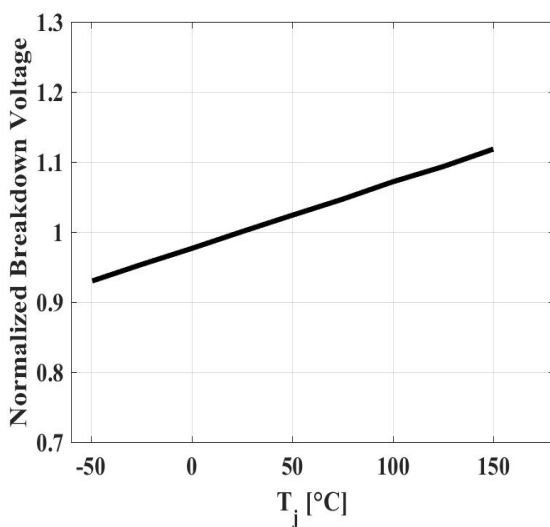
32mΩ, 650V, Super Junction N-Channel Power MOSFET
SRC65R032FB
Figure 7: Typ. Output Characteristics

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

 $R_{DS(ON)} = f(T_j); I_D = 34\text{A}; V_{GS} = 10\text{V}$

Figure 11: Typ. Transfer Characteristics


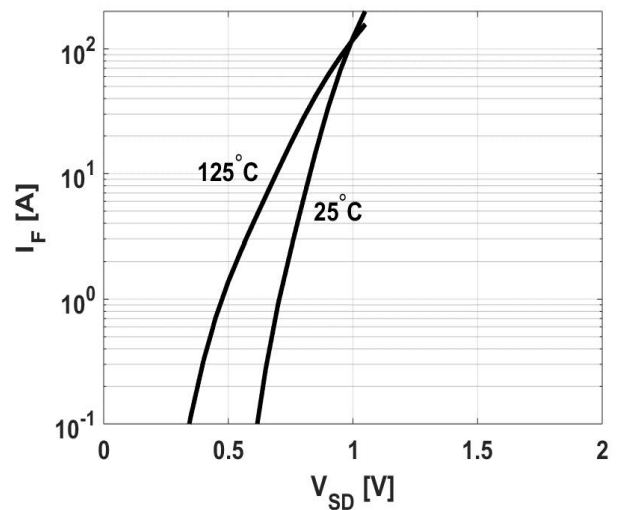
$$I_D = f(V_{GS}); V_{DS} = 20V$$

Figure 12: Typ. Gate Charge


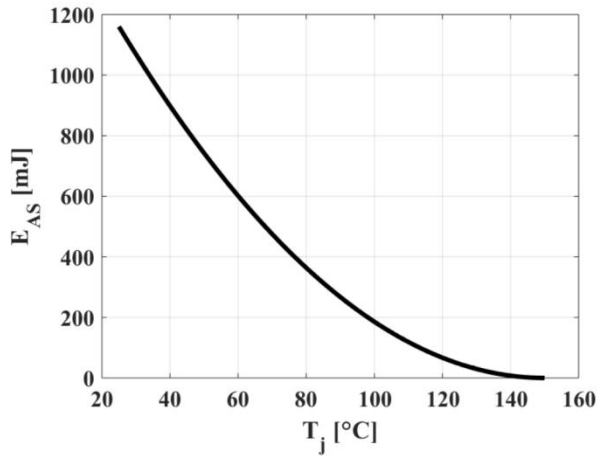
$$V_{GS} = f(Q_{gate}), I_D = 34A \text{ pulsed}$$

Figure 13: Drain-Source Breakdown Voltage


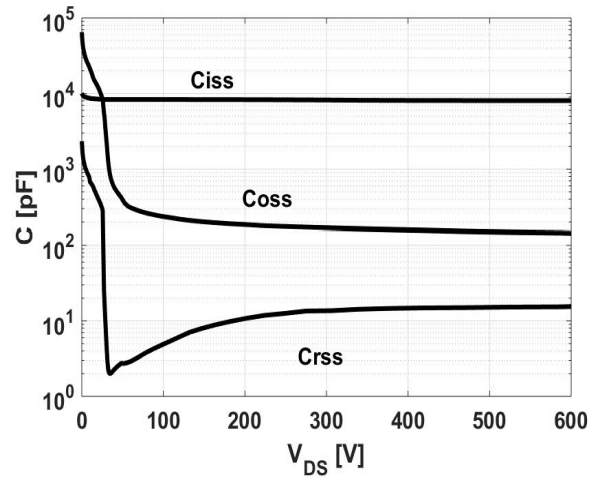
$$V_{BR(DSS)} = f(T_j); I_D = 10mA$$

Figure 14: Forward Characteristics of Reverse Diode


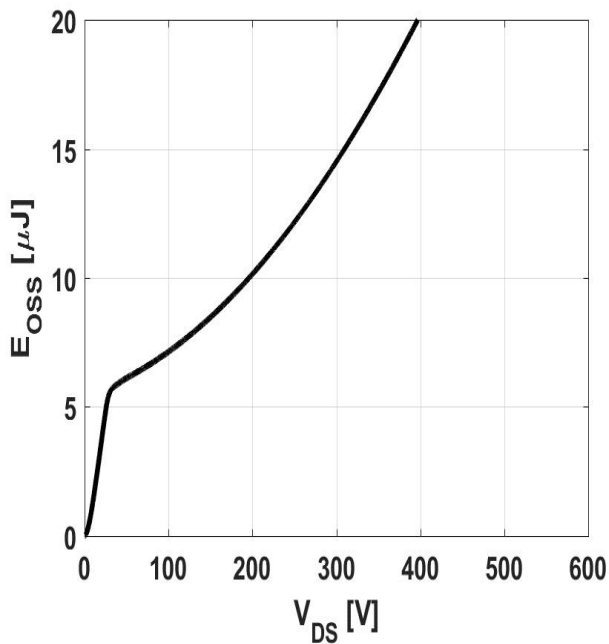
$$I_F = f(V_{SD}); \text{parameter: } T_j$$

Figure 15: Avalanche Energy


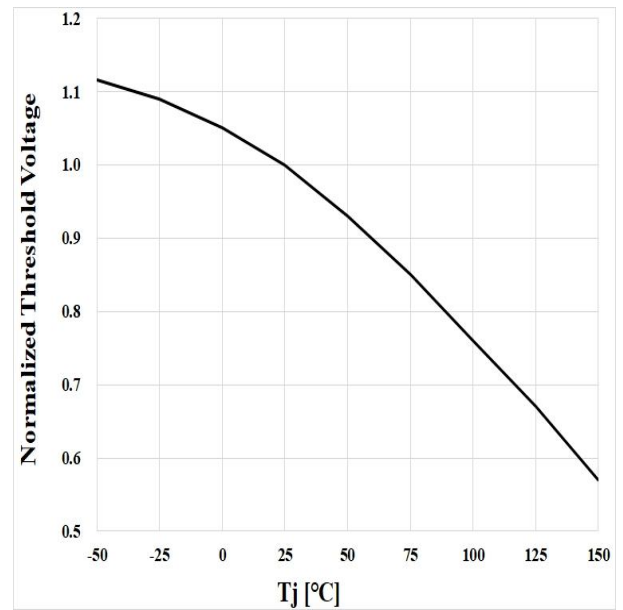
$$E_{AS}=f(T_j); I_D=7.5A; V_{DD}=60V$$

Figure 16: Typ. Capacitances


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

Figure 17: Coss Stored Energy


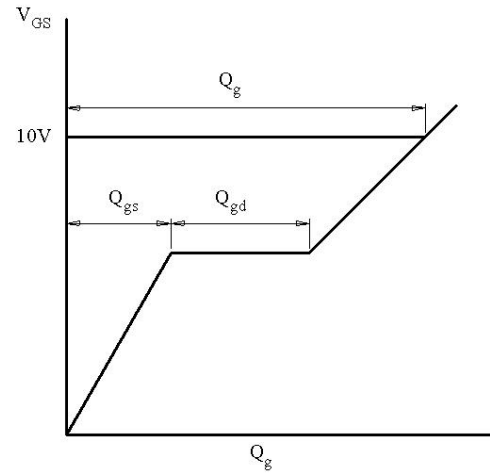
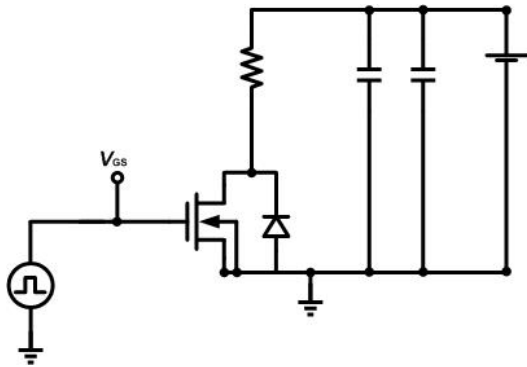
$$E_{OSS}=f(V_{DS})$$

Figure 18: Threshold Voltage


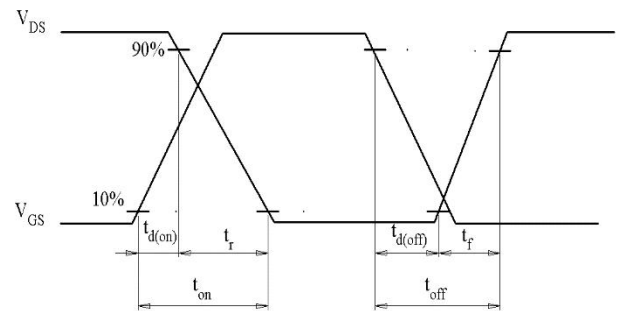
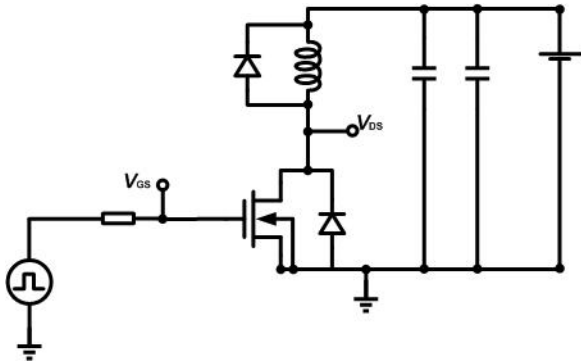
$$V_{th}=f(T_j)$$

Test Circuits

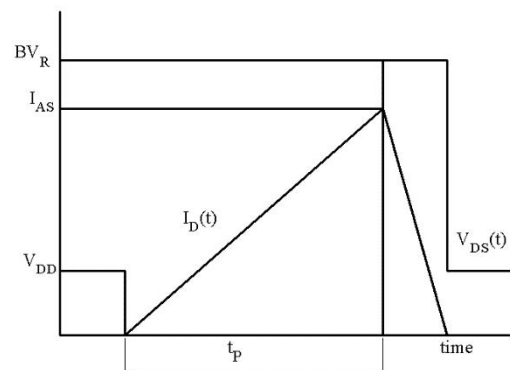
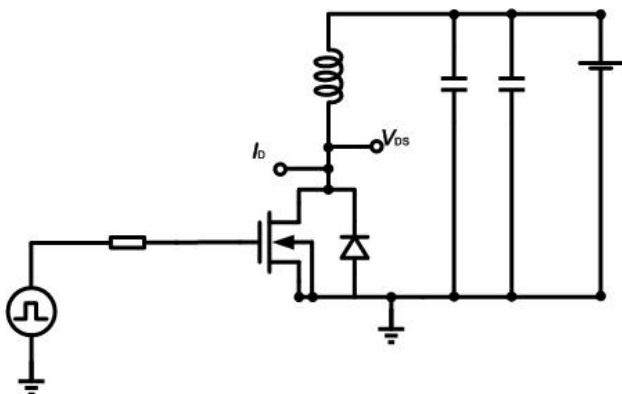
1. Gate Charge Test Circuit & Waveform



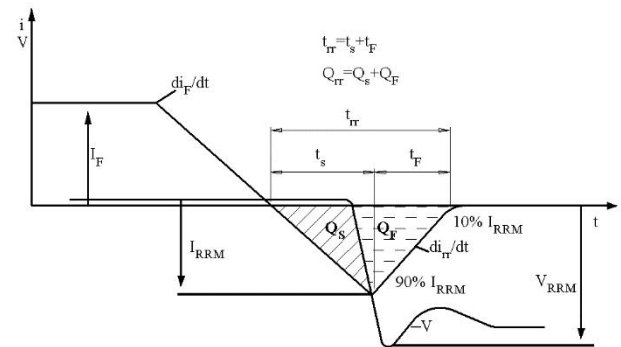
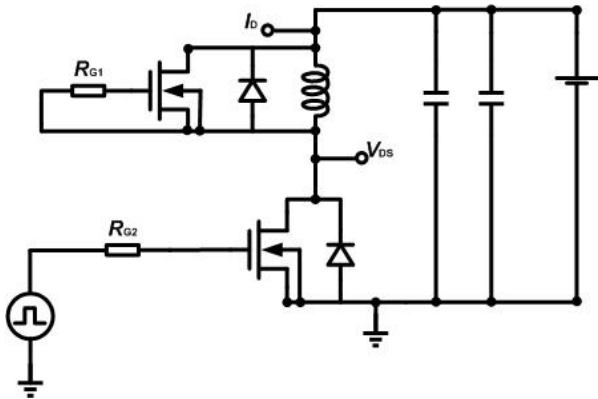
2. Switch Time Test Circuit

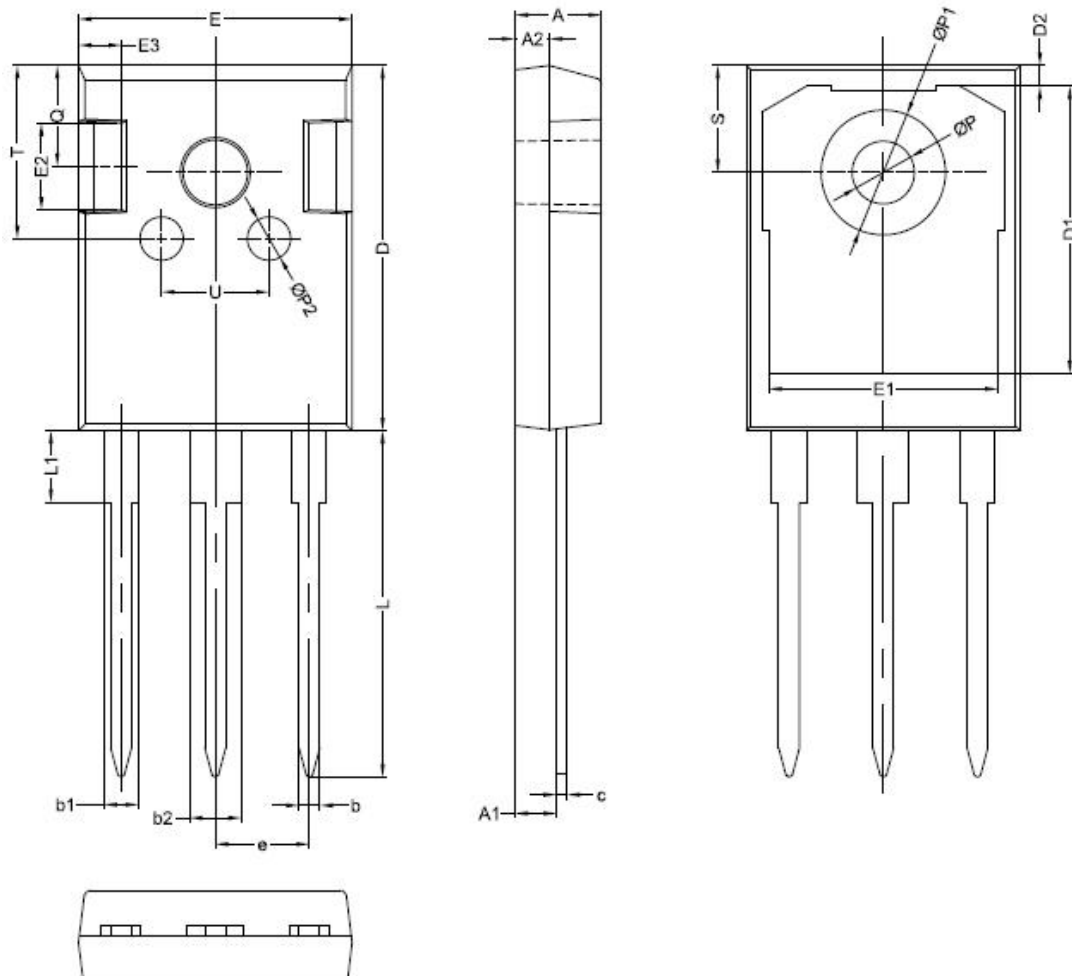


3. Unclaimed Inductive Switching Test Circuit & Waveforms



4. Test Circuit and Waveform for Diode Characteristics



Mechanical Dimensions
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	-



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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