

General Description

The Sanrise SRC65R080BT-GA 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 SRC65R080BT-GA break down voltage is 650V and it has a high rugged avalanche characteristics.

The SRC65R080BT-GA is available in TO-247 package.

Features

- Ultra Low $R_{DS(ON)} = 80m\Omega @ V_{GS} = 10V$.
- Ultra Low Gate Charge, $Q_g = 143nC$ typ.
- Fast switching capability
- Robust design with better EAS performance
- Qualified according to AEC Q101
- Green Product (RoHS compliant)
- Ultra-fast body diode

Application

- On-Board charger
- DC/DC Converter
- Auxiliary Inverter

Ordering Information

Circuit Type		SRC65R080B□□-□		
Package			E: Lead Free	
			G: Green	
T: TO-247			Blank: Tube	

Symbol

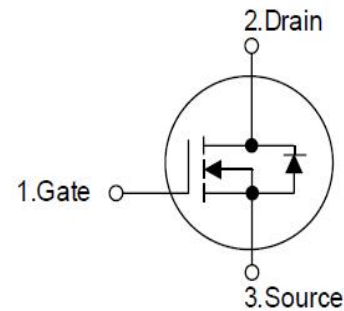


Figure 1 Symbol of SRC65R080BT-GA

Package Type

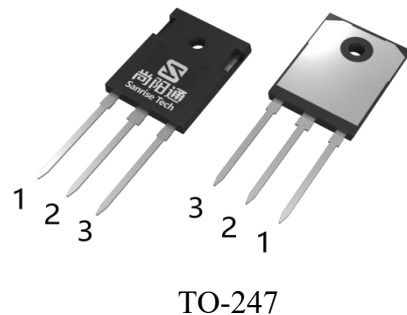


Figure 2 Package Type of SRC65R080BT-GA

Package	Part Number	Marking ID	Packing Type
TO-247	SRC65R080BT-GA	SRC65R080BTGA	Tube

Absolute Maximum Ratings

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DS}	650	V
Gate-Source Voltage (static)		V_{GSS}	±20	V
Gate-Source Voltage (dynamic), AC (f>1Hz)		V_{GSS}	±30	V
Power Dissipation (T _c =25°C, TO-247)		P _{tot}	378	W
Continuous Drain Current	T _c =25°C	I _D	42	A
	T _c =100°C		26	
	T _c =125°C		18	
Pulsed Drain Current (Note 2)		I _{DM}	126	A
Avalanche Energy, Single Pulse (Note 3)		E _{AS}	210	mJ
Avalanche Energy, Repetitive (Note 2)		E _{AR}	0.2	mJ
Avalanche Current, Repetitive (Note 2)		I _{AR}	2.5	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
Operating Junction Temperature		T _J	150	°C
Storage Temperature		T _{STG}	-55 to 150	°C
Lead Temperature (Soldering, 10 sec)		T _{LEAD}	260	°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}=2.5A, V_{DD}=60V, R_G=25Ω, Starting T_J=25°C

Thermal characteristics

Parameter		Symbol	Min	Typ	Max	Unit
Thermal resistance, Junction-to-Case	TO-247	R _{thJC}			0.33	°C /W
Thermal resistance, Junction-to-Ambient	TO-247	R _{thJA}			62	°C /W

Electrical Characteristics

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

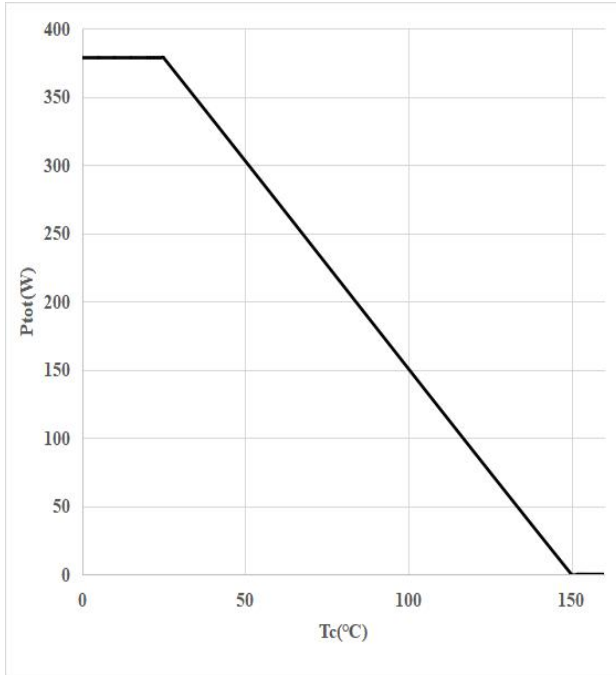
Parameter		Symbol	Test Conditions	Min	Typ	Max	Unit
Statistic Characteristics							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V, I _D =250uA	650			V
Zero Gate Voltage Drain Current		I _{DSS}	V _{DS} =650V, V _{GS} =0V			10	uA
Gate-Body Leakage Current	Forward	I _{GSSF}	V _{GS} =20V, V _{DS} =0V			100	nA
	Reverse	I _{GSSR}	V _{GS} =-20V, V _{DS} =0V			-100	nA
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} =V _{GS} , I _D =1.0mA	3.2	4.0	4.8	V
Static Drain-Source On-Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =24A		69	80	mΩ
Gate Resistance		R _G	f=1MHz, Open Drain		0.6		Ω
Dynamic Characteristics							
Input Capacitance		C _{ISS}	V _{DS} =400V, V _{GS} =0V, f=100KHz		3282		pF
Output Capacitance		C _{OSS}			81		
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 =3Ω, V _{GS} =12V		59		ns
Rise Time		t _r			18		
Turn-off Delay Time		t _{d(off)}			66		
Fall Time		t _f			9		
Gate Charge Characteristics							
Gate to Source Charge		Q _{gs}	V _{DD} =400V, I _D =24A V _{GS} =0 to 10V		37		nC
Gate to Drain Charge		Q _{gd}			76		
Gate Charge Total		Q _g			143		
Gate Plateau Voltage		V _{plateau}			7.0		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		150		ns
Reverse Recovery Charge		Q _{rr}			1.2		uC
Peak Reverse Recovery Current		I _{rrm}			15		A

Note:

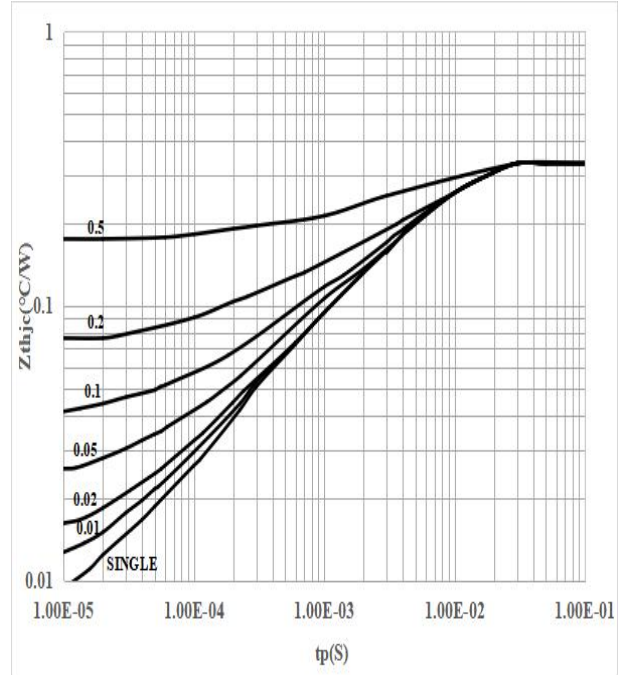
5. $C_{O(er)}$ is a fixed capacitance that gives the same stored energy as C_{OSS} while V_{DS} is rising from 0 to 480V

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

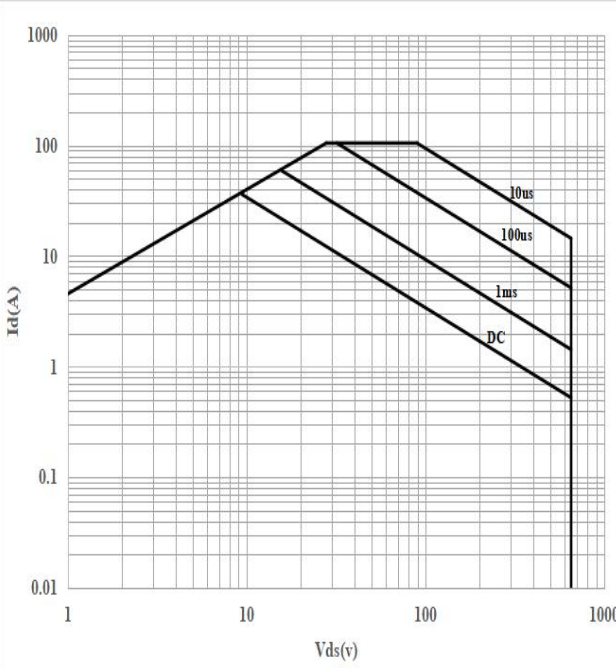
Typical Performance Characteristics

Figure 3: Power Dissipation


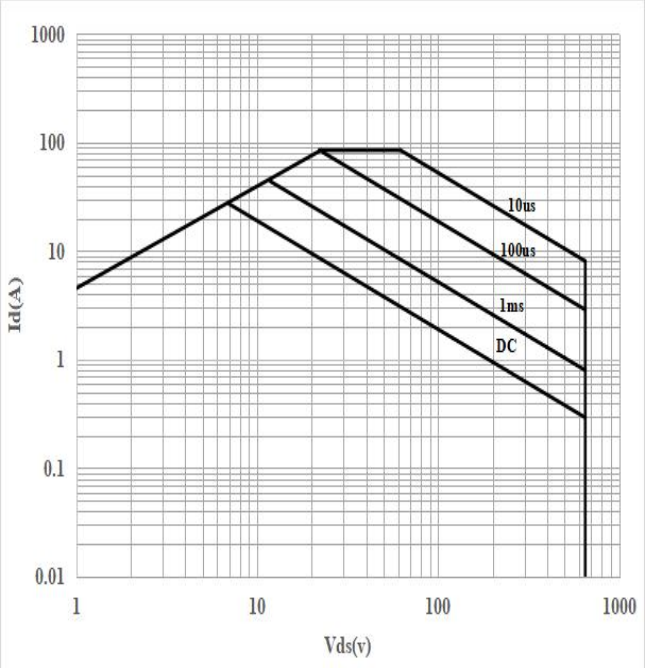
$$P_{\text{tot}} = f(T_c)$$

Figure 4: Max. Transient Thermal Impedance


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

Figure 5: Safe Operating Area


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

Figure 6: Safe Operating Area


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

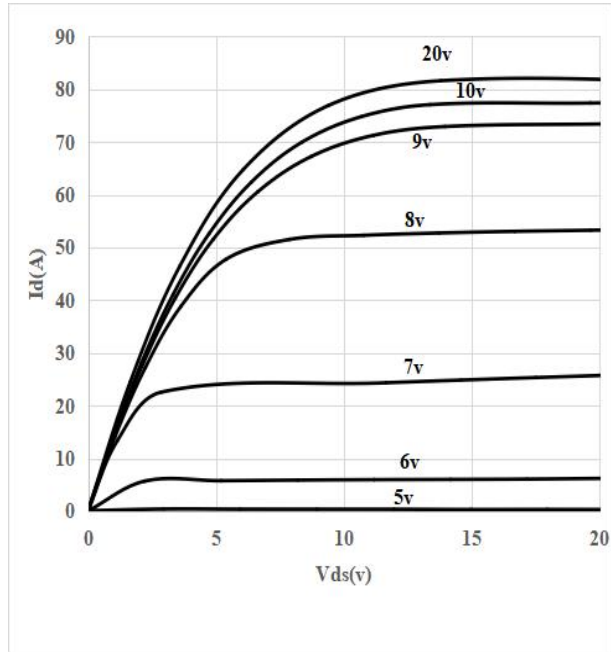
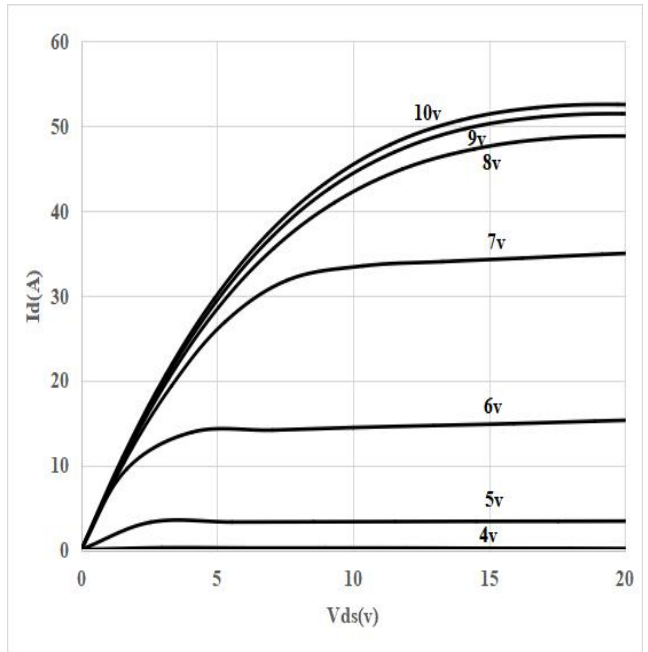
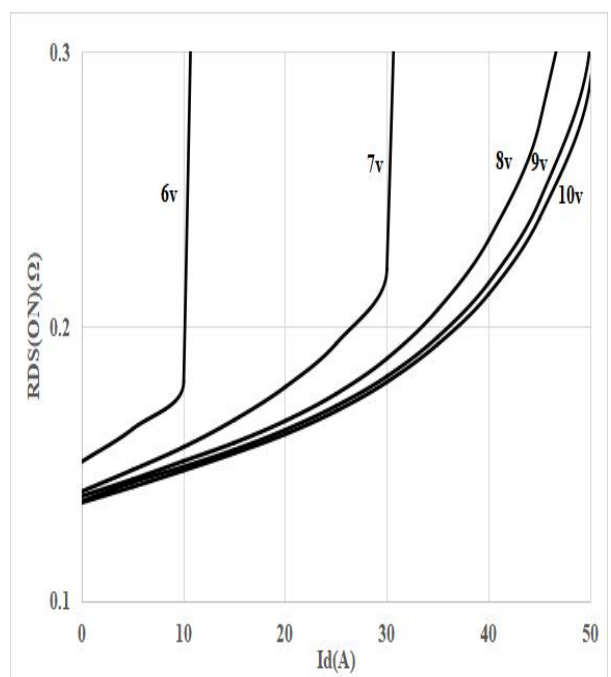
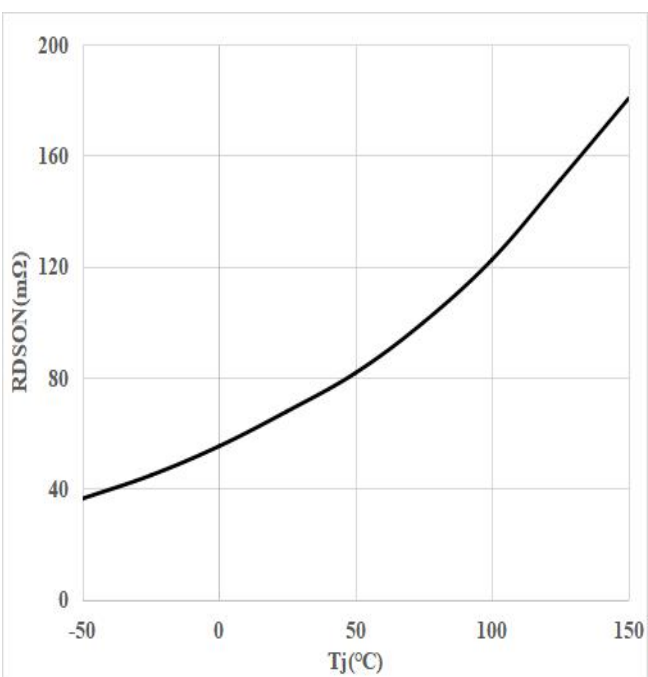
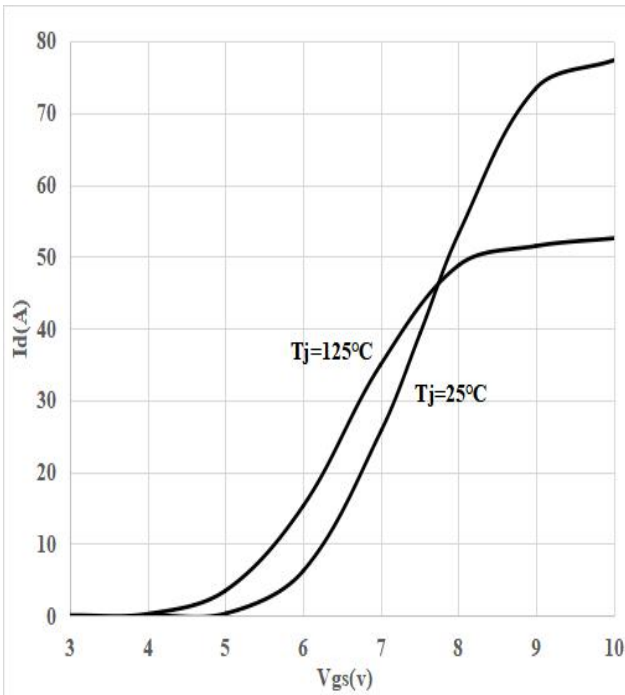
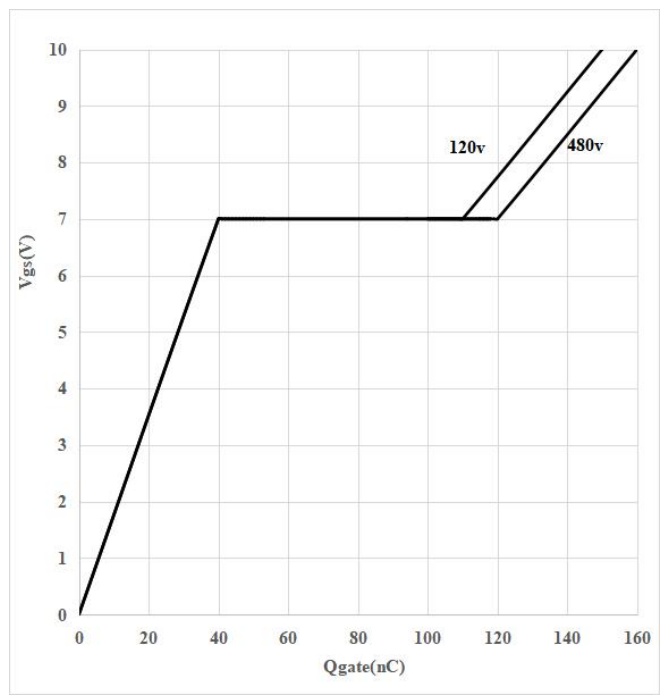
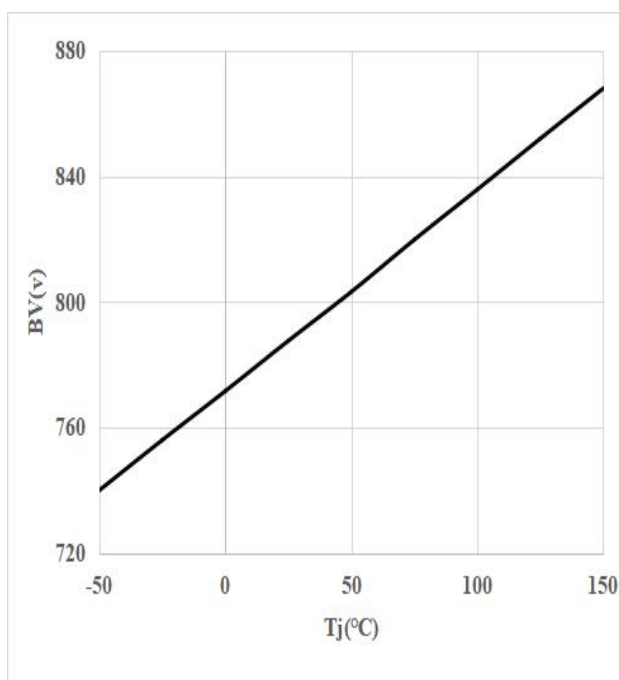
Figure 7: Typ. Output Characteristics

 $I_d = f(V_{ds}); T_j = 25^\circ\text{C}; \text{parameter: } V_{gs}$
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


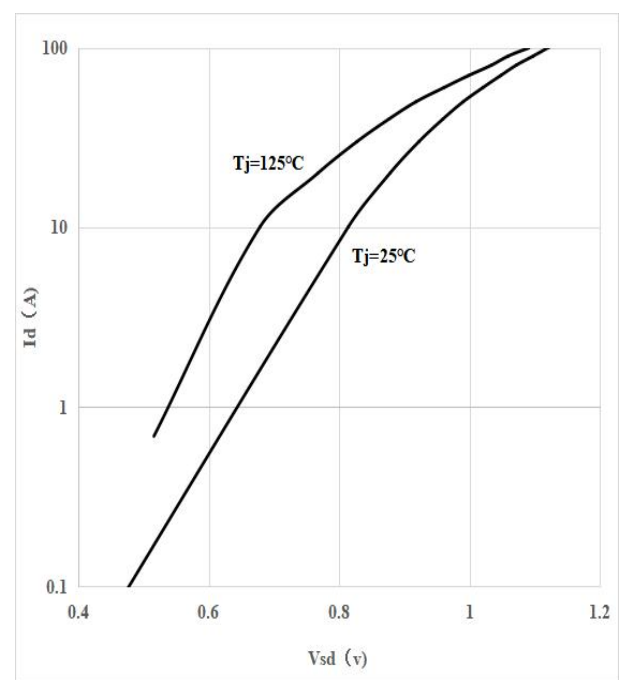
$$I_D = f(V_{GS}); V_{DS} = 20V$$

Figure 12: Typ. Gate Charge


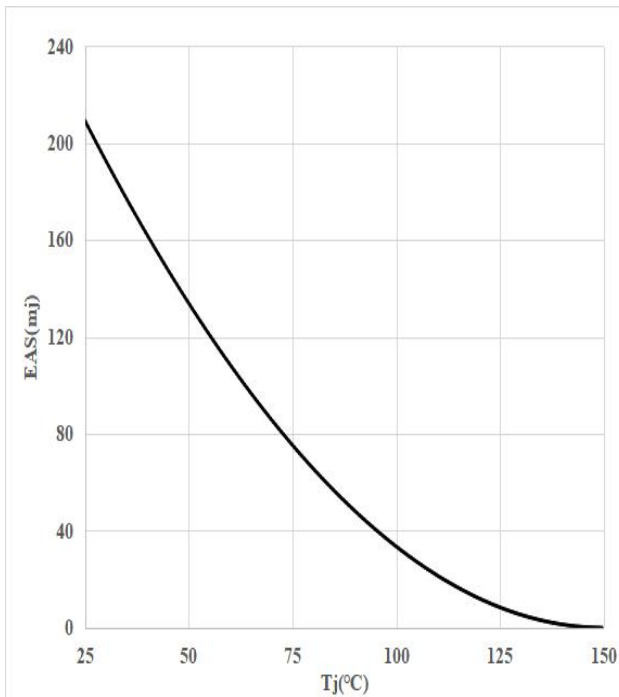
$$V_{GS} = f(Q_{gate}), I_D = 24A \text{ pulsed}$$

Figure 13: Drain-Source Breakdown Voltage


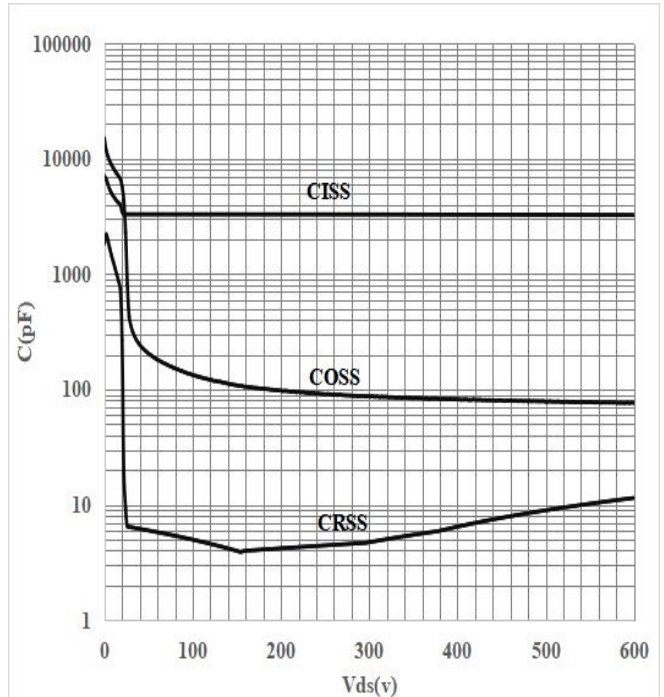
$$V_{BR(DSS)} = f(T_j); I_D = 10mA$$

Figure 14: Forward Characteristics of Reverse Diode


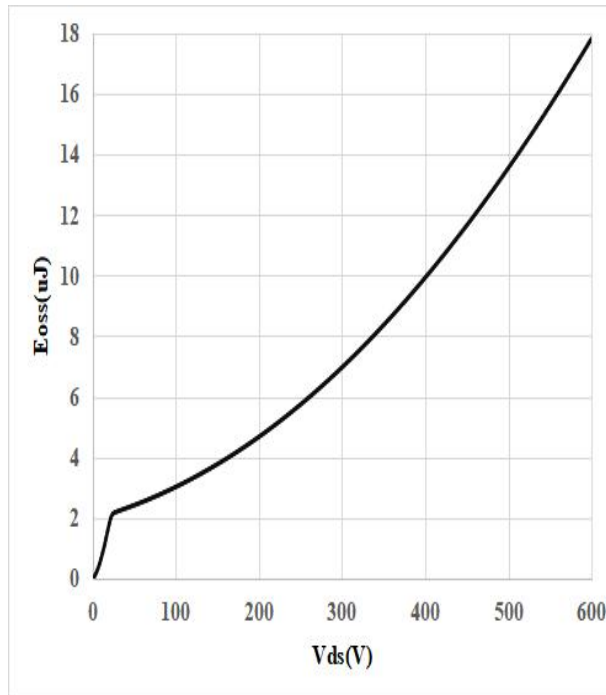
$$I_F = f(V_{SD}); \text{parameter: } T_j$$

Figure 15: Avalanche Energy


$$E_{AS}=f(T_J); I_D=2.5A; V_{DD}=60V$$

Figure 16: Typ. Capacitances


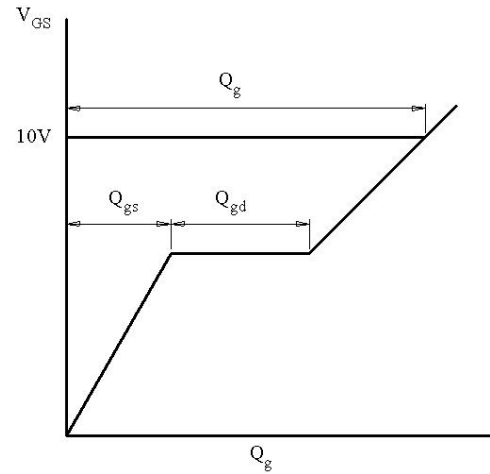
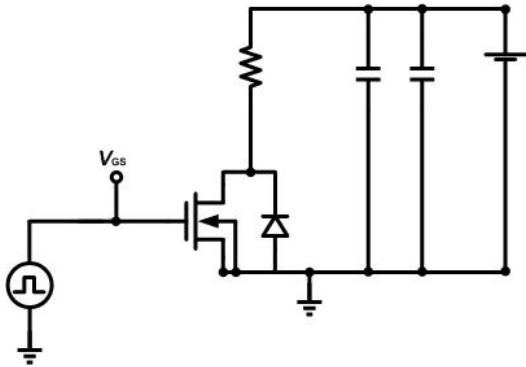
$$C=f(V_{DS}); V_{GS}=0; f=100KHz$$

Figure 17: Coss Stored Energy


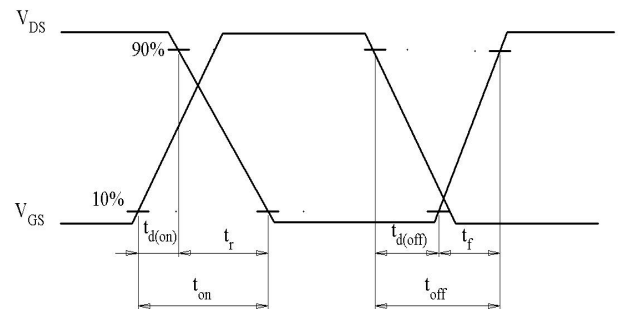
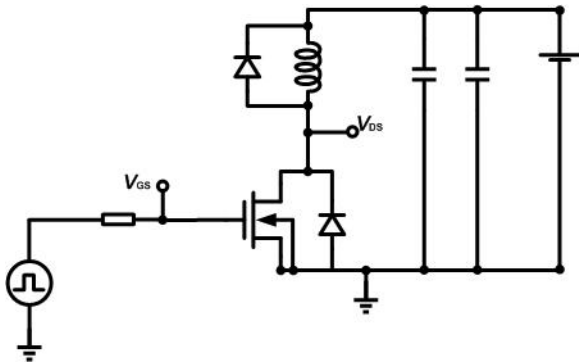
$$E_{OSS}=f(V_{DS})$$

Test Circuits

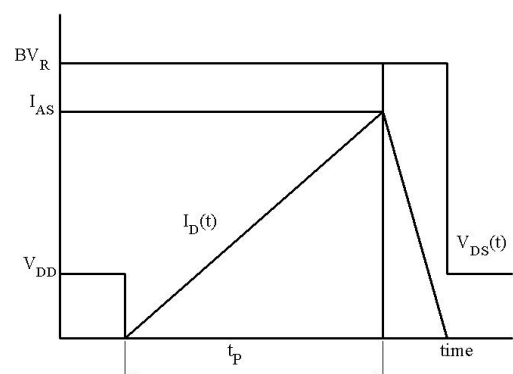
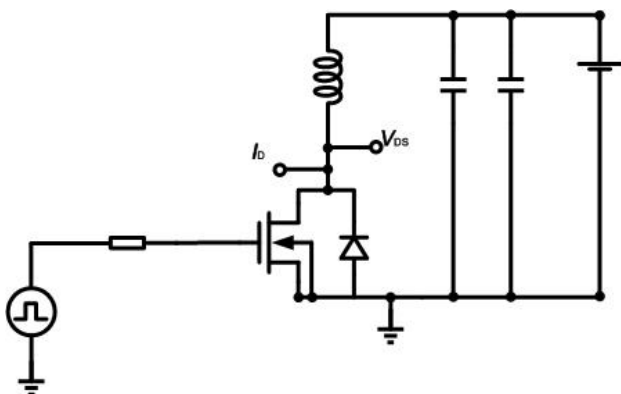
1. Gate Charge Test Circuit & Waveform



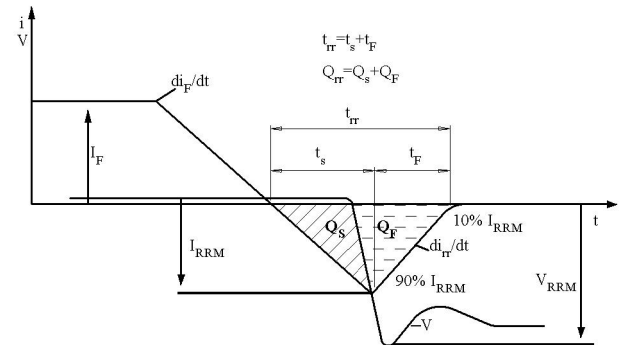
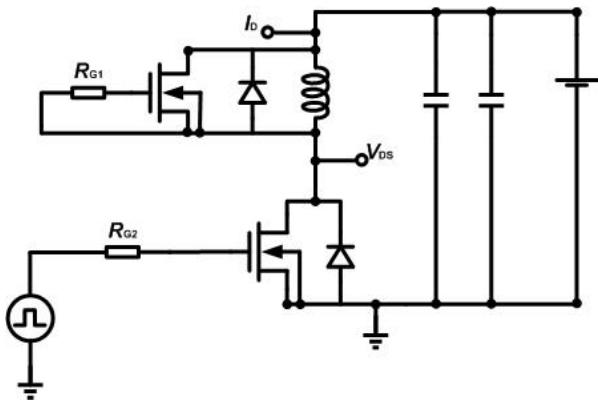
2. Switch Time Test Circuit

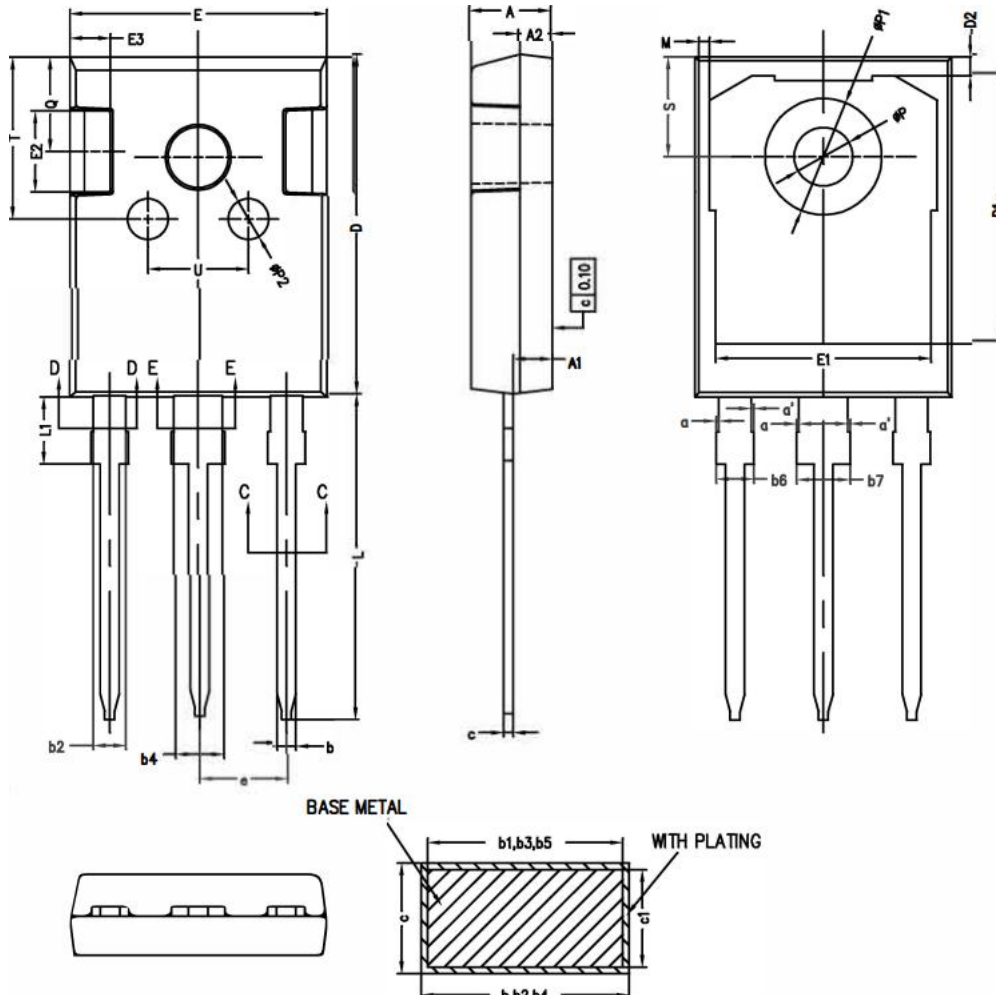


3. Unclaimed Inductive Switching Test Circuit & Waveforms



4. Test Circuit and Waveform for Diode Characteristics



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	-



Shenzhen Sanrise Technology Co., LTD

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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

Sanrise Technology Limited Company

Rm.401, Building B, No. 666, Zhangheng Road,
Zhangjiang Hi-Tech Park, Shanghai, P.R.China

Tel: +86-21-68825918