

General Description

The Sanrise SRC60R037B 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 SRC60R037B break down voltage is 600V and it has a high rugged avalanche characteristics. The SRC60R037B is available in TO-247 package.

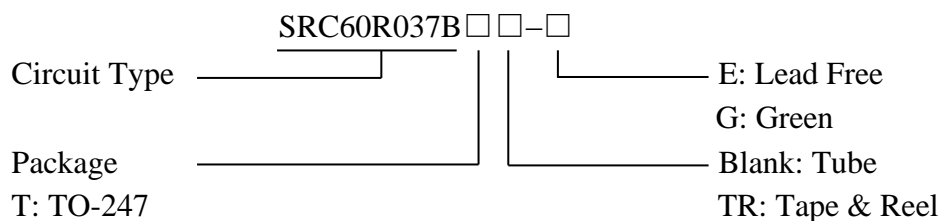
Features

- Ultra Low $R_{DS(ON)} = 37m\Omega @ V_{GS} = 10V$.
- Ultra Low Gate Charge, $Q_g = 182nC$ 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

Ordering Information



Symbol

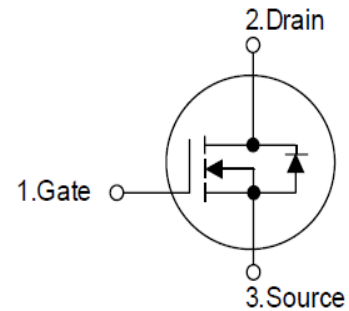


Figure 1 Symbol of SRC60R037B

Package Type



TO-247

Figure 2 Package Type of SRC60R037B

Package	Part Number		Marking ID		Packing Type
	Lead Free	Green	Lead Free	Green	
TO-247	SRC60R037BT-E	SRC60R037BT-G	SRC60R037BTE	SRC60R037BTG	Tube

Absolute Maximum Ratings

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DSS}	600	V
Gate-Source Voltage		V_{GSS}	±30	V
Continuous Drain Current	$T_C=25^{\circ}\text{C}$	I_D	76	A
	$T_C=125^{\circ}\text{C}$		34.2	
Pulsed Drain Current (Note 2)		I_{DM}	228	A
Avalanche Energy, Single Pulse (Note 3)		E_{AS}	900	mJ
Avalanche Energy, Repetitive (Note 2)		E_{AR}	0.9	mJ
Avalanche Current, Repetitive (Note 2)		I_{AR}	6.0	A
Continuous Diode Forward Current		I_S	76	A
Diode Pulse Current		$I_{S,PULSE}$	228	A
MOSFET dv/dt Ruggedness, $V_{DS}\leq 480\text{V}$		dv/dt	50	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:

- 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.
- Repetitive Rating: Pulse width limited by maximum junction temperature
- $I_{AS} = 6.0\text{A}$, $V_{DD} = 60\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^{\circ}\text{C}$

Parameter		Symbol	Min	Typ	Max	Unit
Thermal resistance, Junction-to-Case	TO-247	R_{thJC}			0.24	$^{\circ}\text{C}/\text{W}$
Thermal resistance, Junction-to-Ambient	TO-247	R_{thJA}			54	$^{\circ}\text{C}/\text{W}$

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}	$V_{GS}=0V, I_D=250\mu A$	600			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=600V, V_{GS}=0V$			10	μA
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	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=1.6mA$	3.2	4.0	4.8	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=38A$		33	37	mΩ
Gate Resistance	R_G	f=1MHz, Open Drain		0.7		Ω
Dynamic Characteristics						
Input Capacitance	C_{ISS}	$V_{DS}=50V, V_{GS}=0V, f=1MHz$		7200		pF
Output Capacitance	C_{OSS}			281.4		
Reverse Transfer Capacitance	C_{RSS}			4.7		
Effective output capacitance, energy related ^{NOTE5}	$C_{O(er)}$	$V_{GS}=0V, V_{DS}=0\dots 400V$		155.1		pF
Effective output capacitance, time related ^{NOTE6}	$C_{O(tr)}$			905.9		
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=400V, I_D=38A, R_G=3.3\Omega, V_{GS}=10V$		17		ns
Rise Time	t_r			6.6		
Turn-off Delay Time	$t_{d(off)}$			112		
Fall Time	t_f			4.3		
Gate Charge Characteristics						
Gate to Source Charge	Q_{gs}	$V_{DD}=480V, I_D=38A, V_{GS}=0 \text{ to } 10V$		46.3		nC
Gate to Drain Charge	Q_{gd}			92.2		
Gate Charge Total	Q_g			182		
Gate Plateau Voltage	$V_{plateau}$			6.5		V
Reverse Diode Characteristics						
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_{SD}=38A$		0.9	1.1	V
Reverse Recovery Time	t_{rr}	$V_R=100V, I_F=38A, dI_F/dt=100A/\mu s$		168		ns
Reverse Recovery Charge	Q_{rr}			1.17		μC
Peak Reverse Recovery Current	I_{rrm}			14.0		A

Note:

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

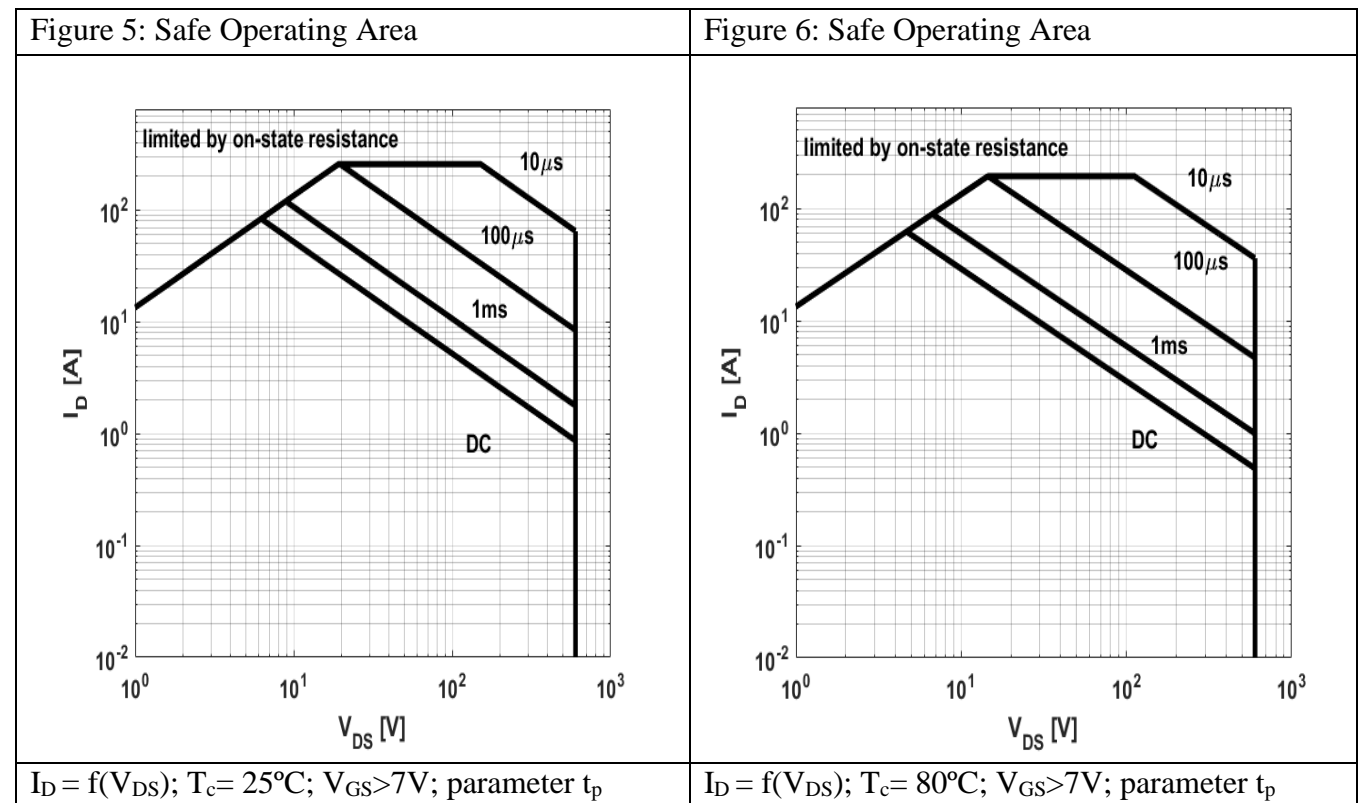
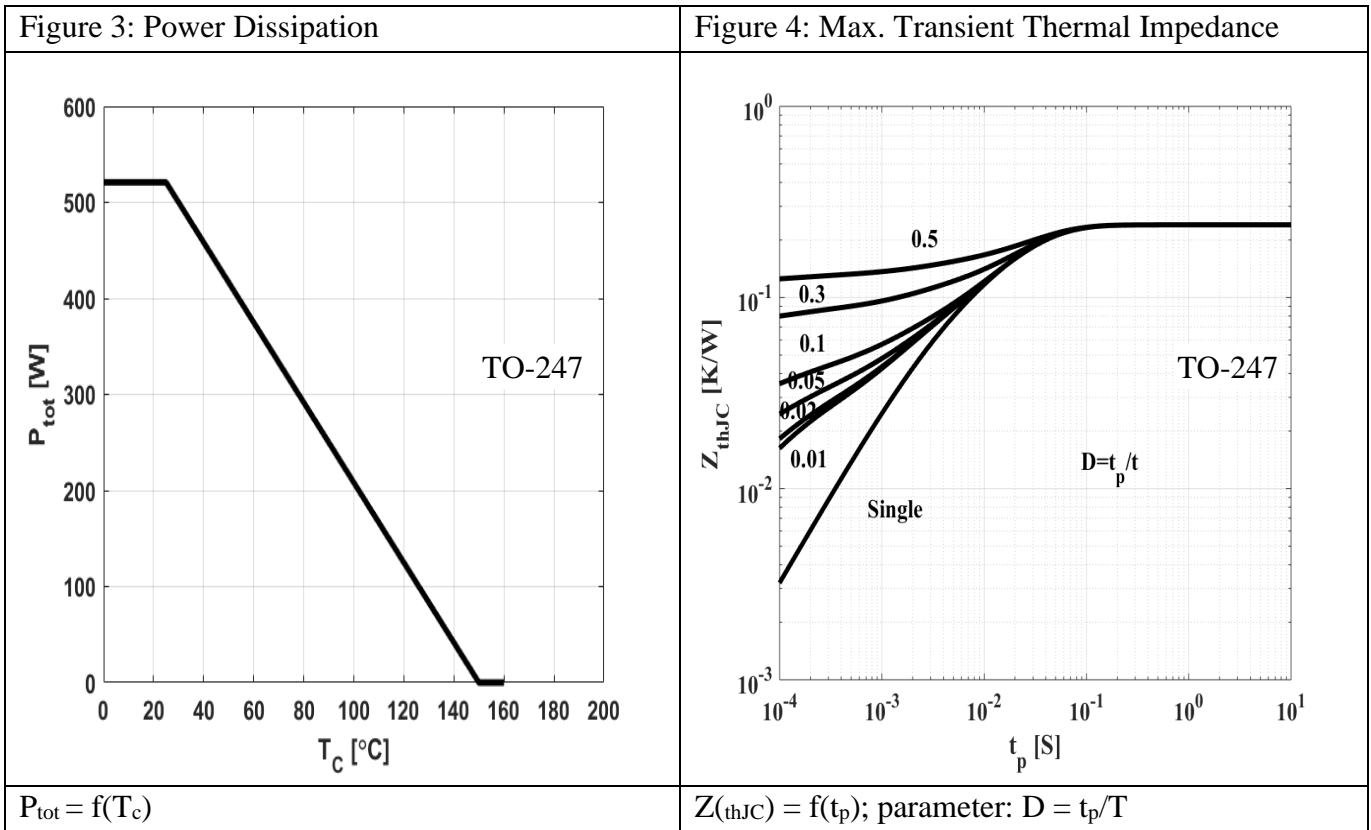
Typical Performance Characteristics


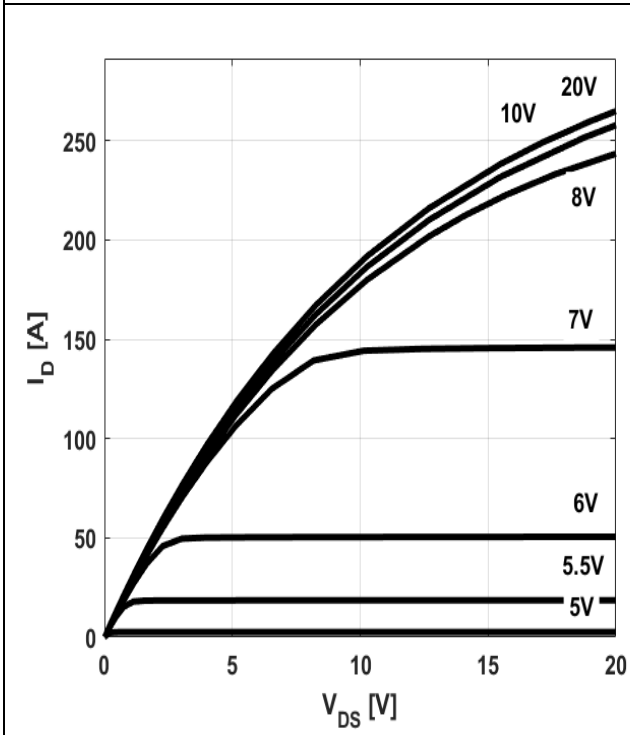
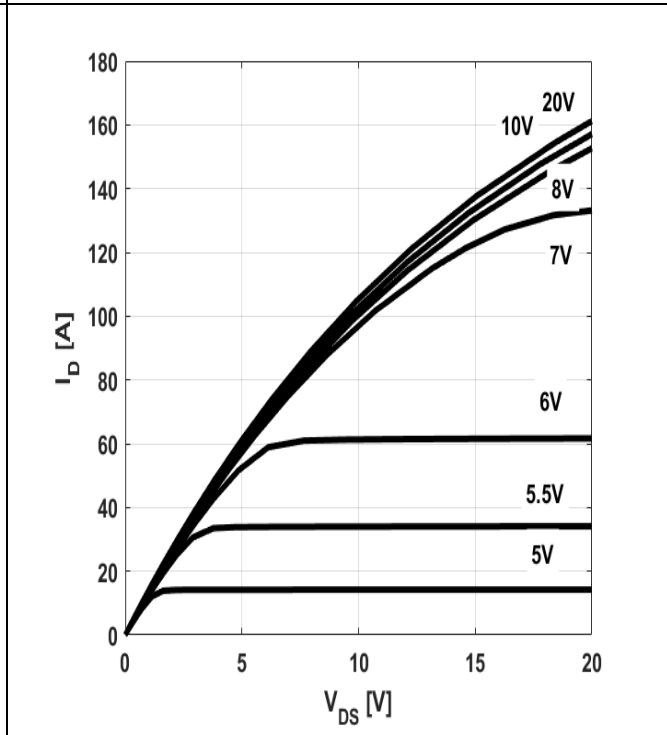
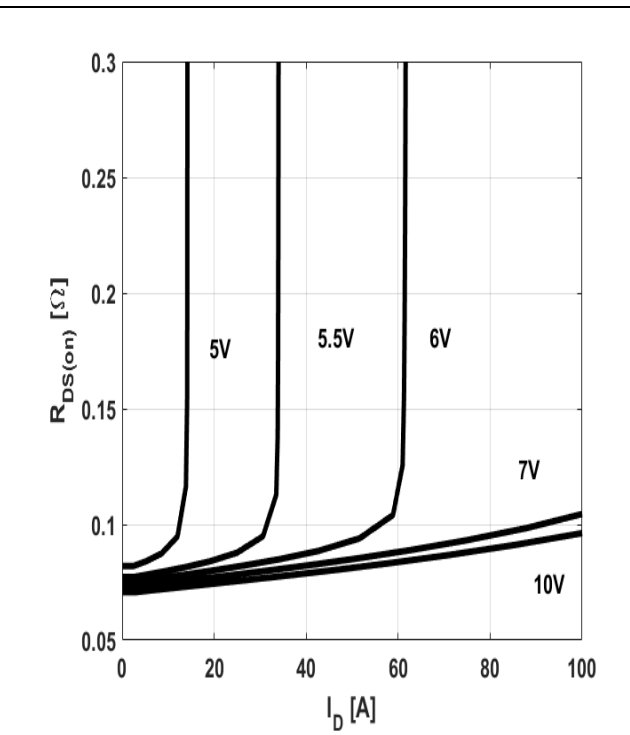
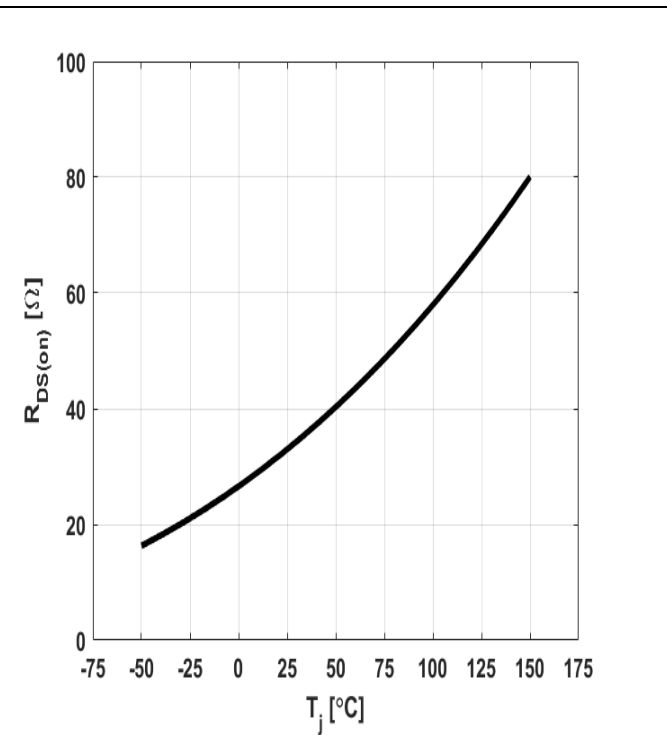
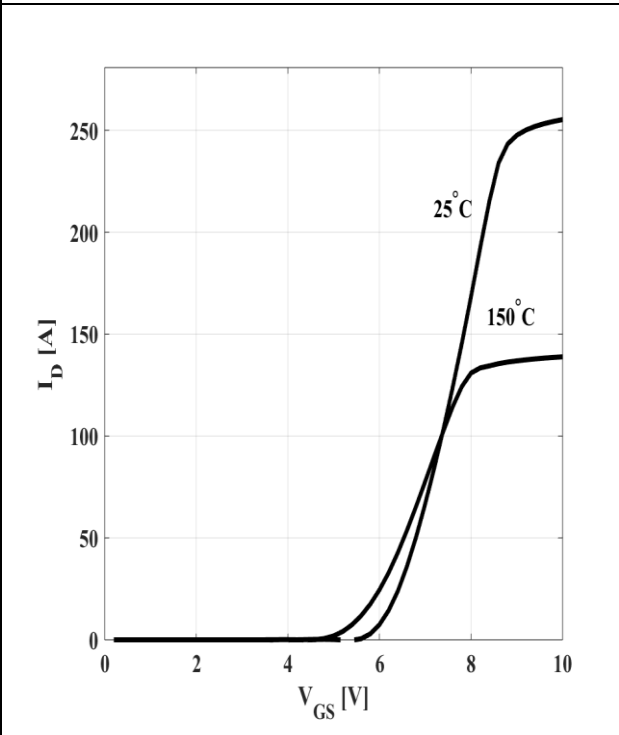
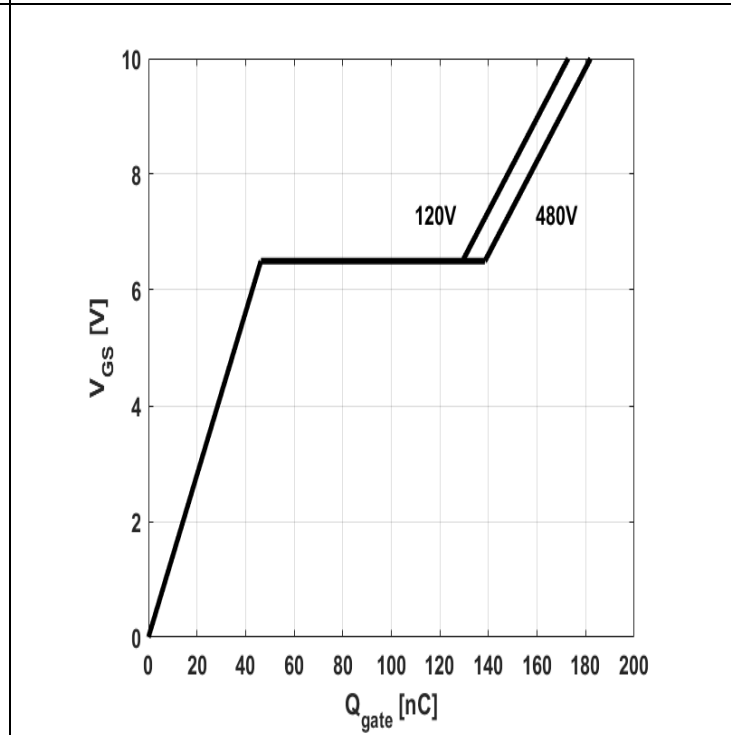
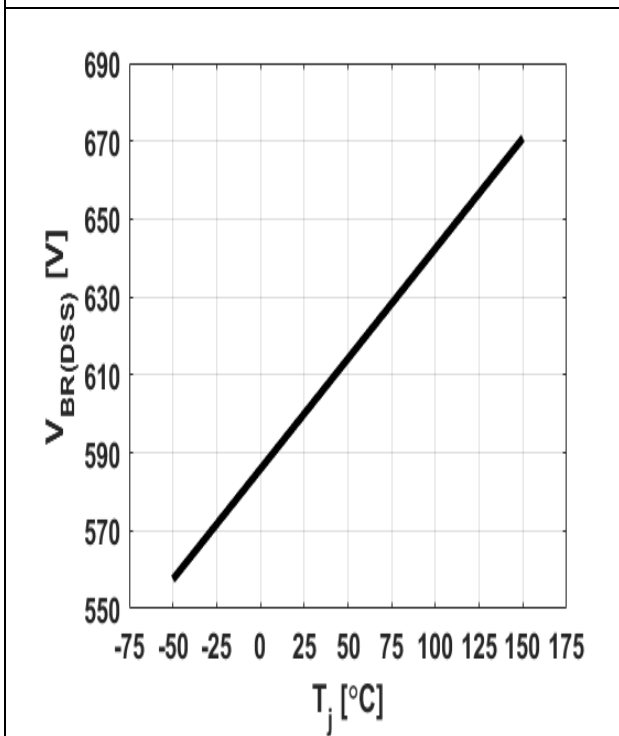
Figure 7: Typ. Output Characteristics

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

 $R_{DS(ON)} = f(T_j); I_D = 38\text{A}; V_{GS} = 10\text{V}$

Figure 11: Typ. Transfer Characteristics


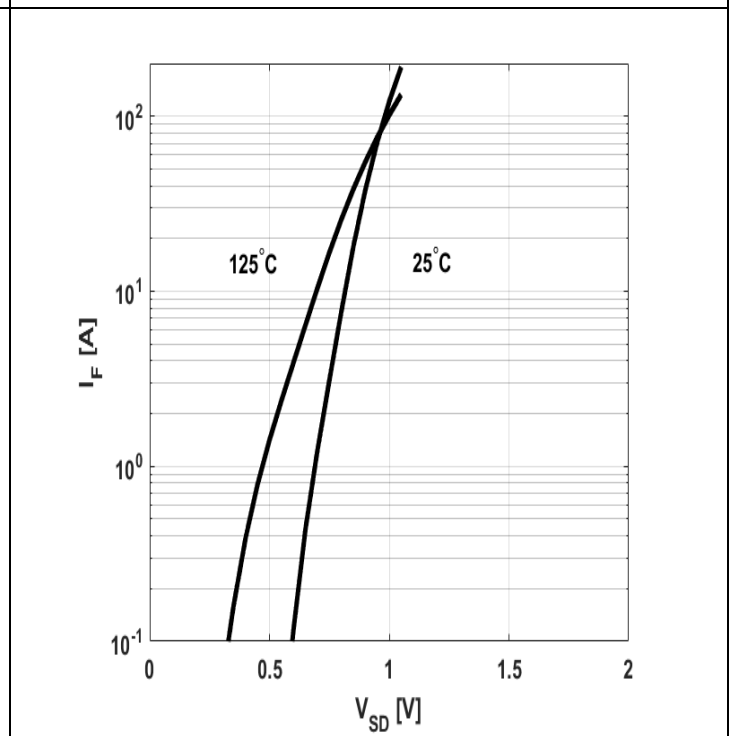
$$I_D = f(V_{GS}); V_{DS} = 20V$$

Figure 12: Typ. Gate Charge


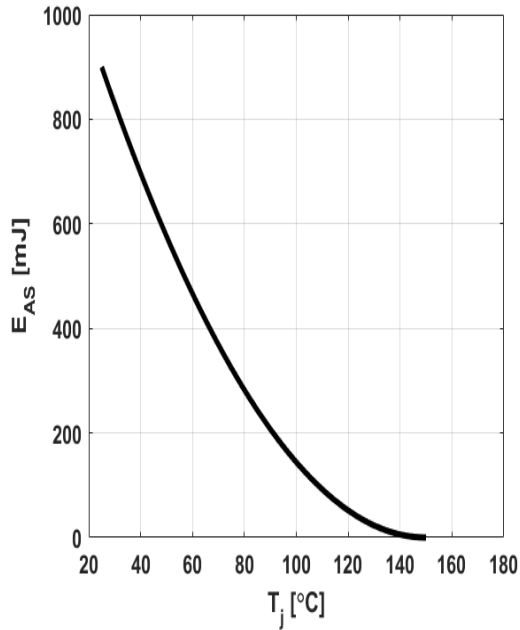
$$V_{GS} = f(Q_{gate}), I_D = 38A \text{ pulsed}$$

Figure 13: Drain-Source Breakdown Voltage


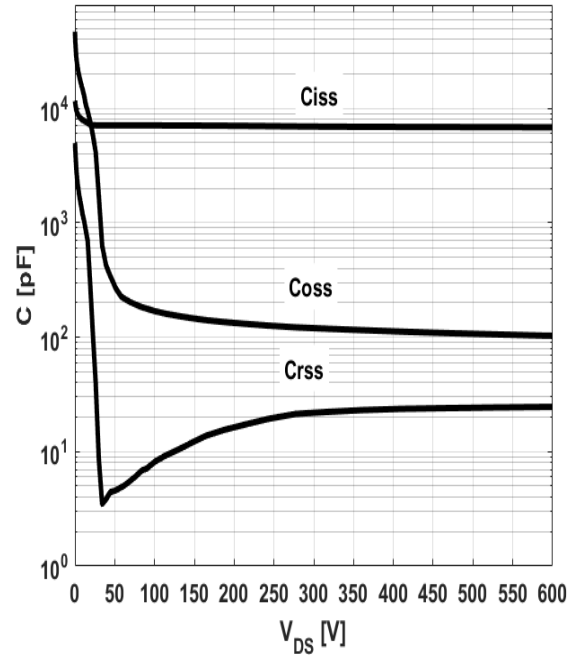
$$V_{BR(DSS)} = f(T_j); I_D = 10mA$$

Figure 14: Forward Characteristics of Reverse Diode


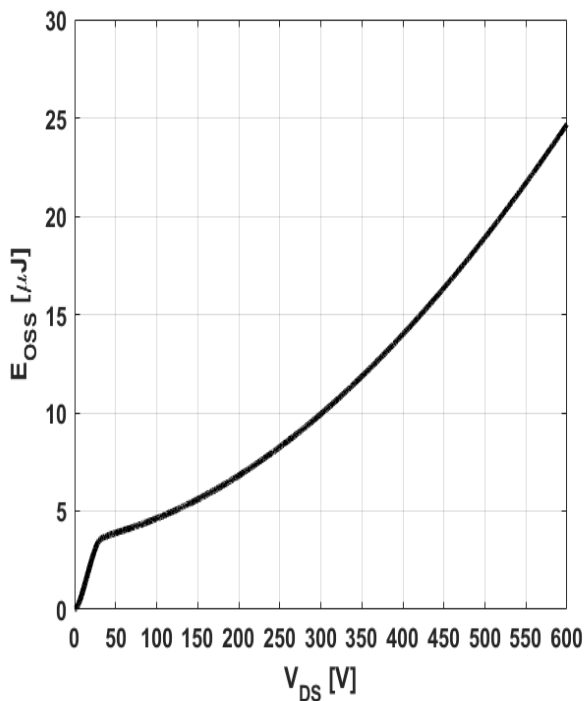
$$I_F = f(V_{SD}); \text{parameter: } T_j$$

Figure 15: Avalanche Energy


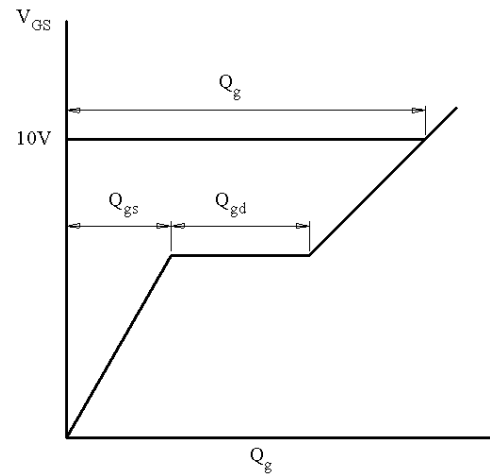
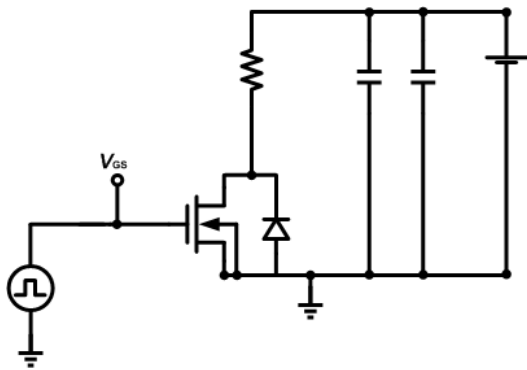
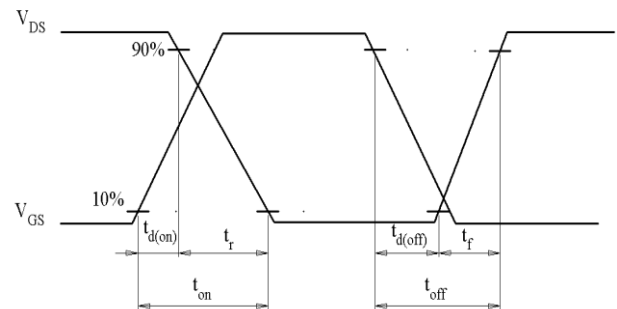
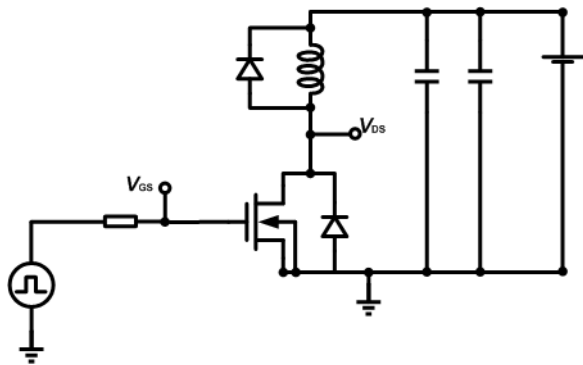
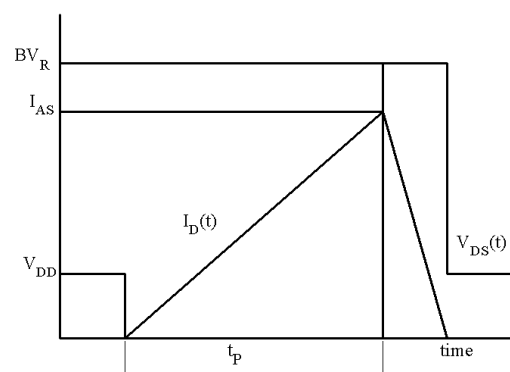
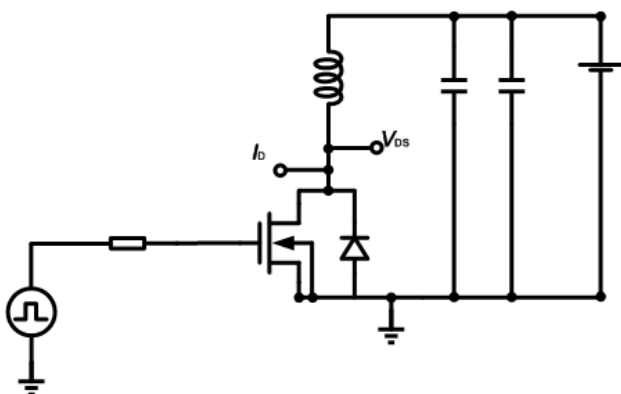
$$E_{AS}=f(T_j); I_D=6.0A; V_{DD}=60V$$

Figure 16: Typ. Capacitances


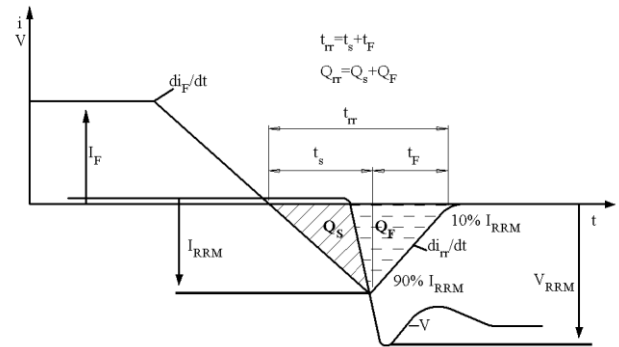
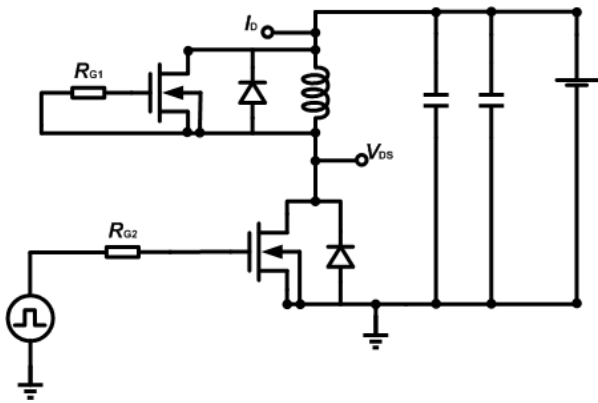
$$C=f(V_{DS}); V_{GS}=0; f=1MHz$$

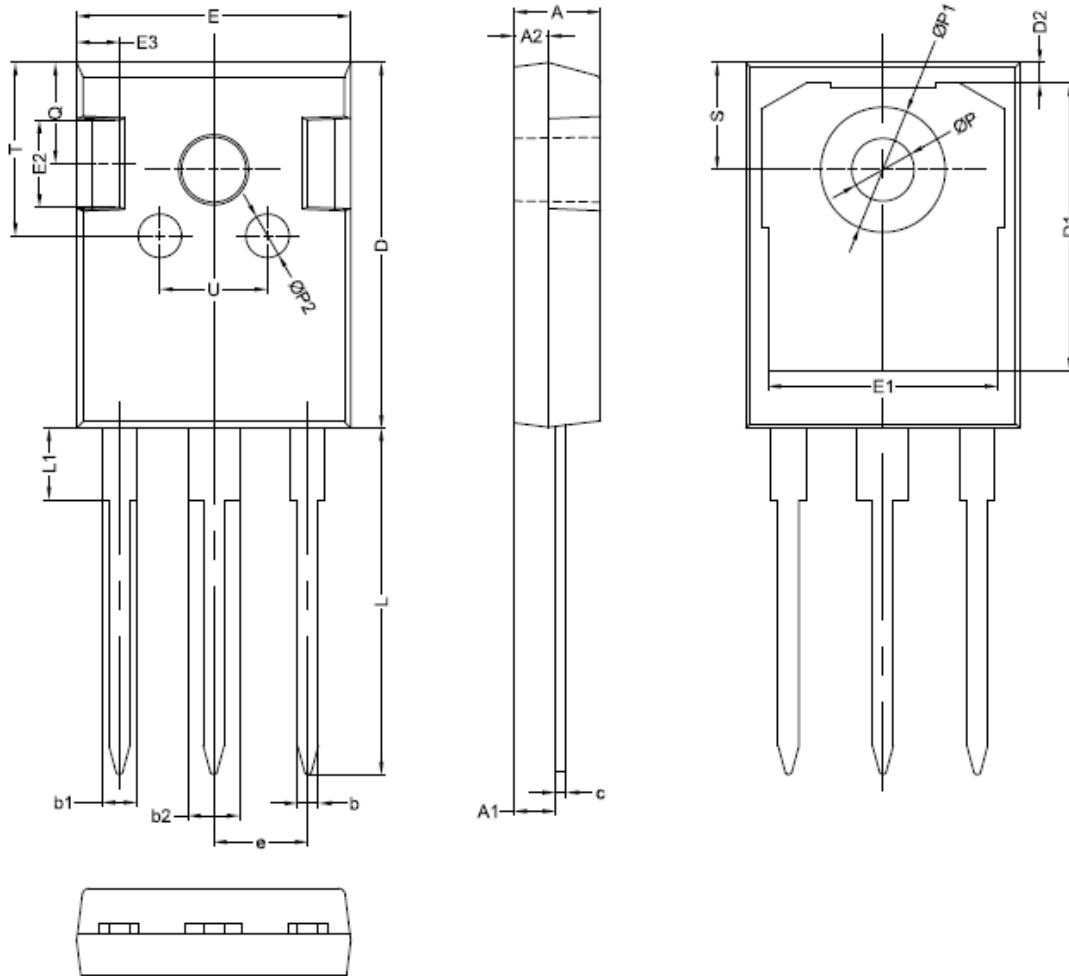
Figure 17: Coss Stored Energy


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

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	-



Sanrise Technology Limited Company

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