

General Description

The Sanrise SRC60R125B 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 SRC60R125B break down voltage is 600V and it has a high rugged avalanche characteristics. The SRC60R125B is available in TO-247 package.

Features

- Ultra Low $R_{DS(ON)} = 125m\Omega @ V_{GS} = 10V$.
- Ultra Low Gate Charge, $Q_g = 57.3nC$ typ.
- Intrinsic Fast-Recovery Body Diode
- Fast switching capability
- Robust design with better EAS performance

Application

- EV Charger
- Sever / Telecom

Symbol

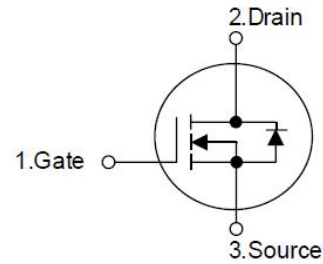


Figure 1 Symbol of SRC60R125B

Package Type

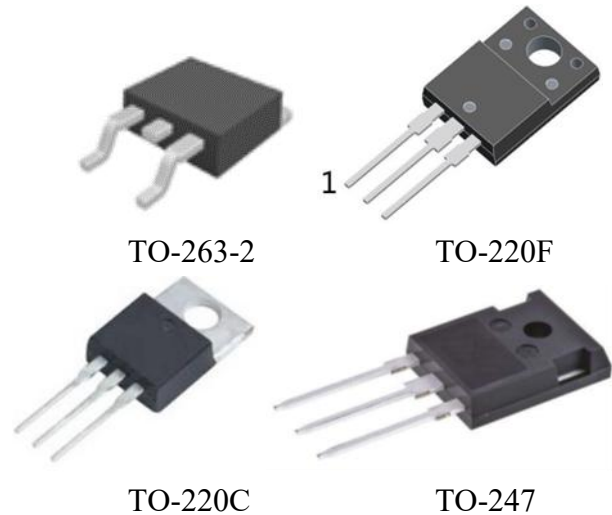


Figure 2 Package Type of SRC60R125B

Ordering Information

SRC60R125B□□-□		
Circuit Type	_____	E: Lead Free
Package	_____	G: Green
T: TO-247		Blank: Tube
S2: TO-263-2		TR: Tape & Reel
TF: TO-220F		
TC: TO-220C		

Package	Part Number	Marking ID	Packing Type
TO-247	SRC60R125BT-G	SRC60R125BTG	Tube
TO-263-2	SRC60R125BS2TR-G	SRC60R125BS2G	Tape & Reel
TO-220F	SRC60R125BTF-G	SRC60R125BTFG	Tube
TO-220C	SRC60R125BTC-G	SRC60R125BTCG	Tube

Absolute Maximum Ratings

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DSS}	600	V
Gate-Source Voltage (static)		V_{GSS}	±20	V
Gate-Source Voltage (dynamic), AC ($f > 1$ Hz)		V_{GSS}	±30	V
Continuous Drain Current	$T_C = 25^\circ\text{C}$	I_D	26.2	A
	$T_C = 125^\circ\text{C}$		11.7	
Pulsed Drain Current (Note 2)		I_{DM}	78.6	A
Avalanche Energy, Single Pulse (Note 3)		E_{AS}	340	mJ
Avalanche Energy, Repetitive (Note 2)		E_{AR}	0.4	mJ
Avalanche Current, Repetitive (Note 2)		I_{AR}	2.5	A
Continuous Diode Forward Current		I_S	26.2	A
Diode Pulse Current		$I_{S,PULSE}$	78.6	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:

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. $I_{AS} = 2.5\text{A}$, $V_{DD} = 60\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$

Thermal Resistance

Parameter		Symbol	Min	Typ	Max	Unit
Thermal resistance, Junction-to-Case	TO-220F	R_{thJC}			3.7	$^\circ\text{C} / \text{W}$
	TO-220C				0.69	
	TO-247				0.69	
	TO-263				0.69	
Thermal resistance, Junction-to-Ambient	TO-220F	R_{thJA}			80	$^\circ\text{C} / \text{W}$
	TO-220C				62	
	TO-247				62	
	TO-263				62	

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	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} =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 =0.25mA	3.0	4.0	5.0	V
Static Drain-Source On-Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =13A		106	125	mΩ
Gate Resistance		R _G	f=1MHz, Open Drain		1.5		Ω
Dynamic Characteristics							
Input Capacitance		C _{ISS}	V _{DS} =50V, V _{GS} =0V, f=1MHz		2.2		nF
Output Capacitance		C _{OSS}			88		pF
Reverse Transfer Capacitance		C _{RSS}			1.4		
Effective output capacitance, energy related ^{NOTE5}		C _{O(er)}	V _{GS} =0V, V _{DS} =0...400V		48.7		pF
Effective output capacitance, time related ^{NOTE6}		C _{O(tr)}			284.8		
Turn-on Delay Time		t _{d(on)}	V _{DD} =400V, I _D =13A R _G =5.3Ω, V _{GS} =10V		13		ns
Rise Time		t _r			11		
Turn-off Delay Time		t _{d(off)}			53		
Fall Time		t _f			6		
Gate Charge Characteristics							
Gate to Source Charge		Q _{gs}	V _{DD} =480V, I _D =13A V _{GS} =0 to 10V		13.6		nC
Gate to Drain Charge		Q _{gd}			28.0		
Gate Charge Total		Q _g			57.3		
Gate Plateau Voltage		V _{plateau}			6.1		V
Reverse Diode Characteristics							
Drain-Source Diode Forward Voltage		V _{SD}	V _{GS} =0V, I _{SD} =13A		0.9	1.1	V
Reverse Recovery Time		t _{rr}	V _R =100V, I _F =13A dI _F /dt=100A/us		122		ns
Reverse Recovery Charge		Q _{rr}			0.59		uC
Peak Reverse Recovery Current		I _{rrm}			9.6		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 400V

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 400

Typical Performance Characteristics

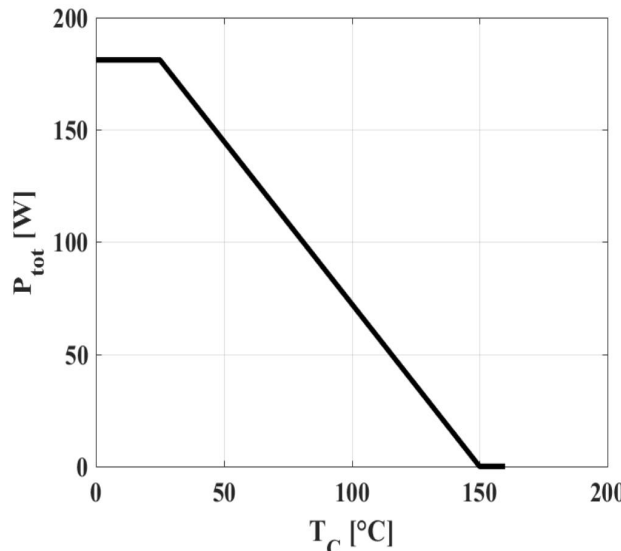
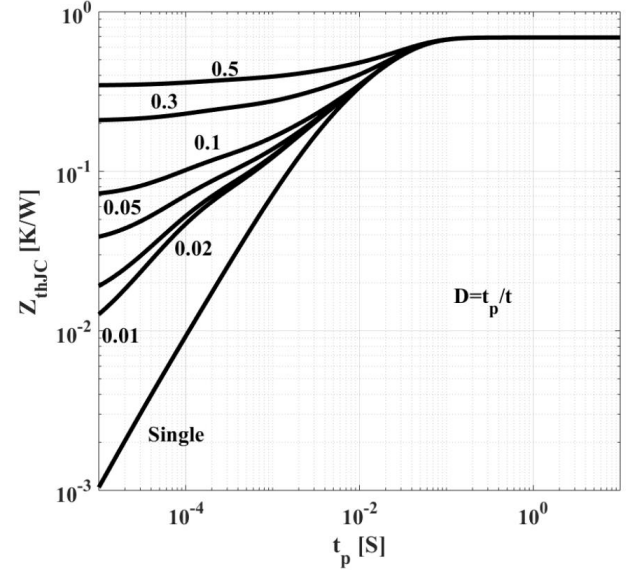
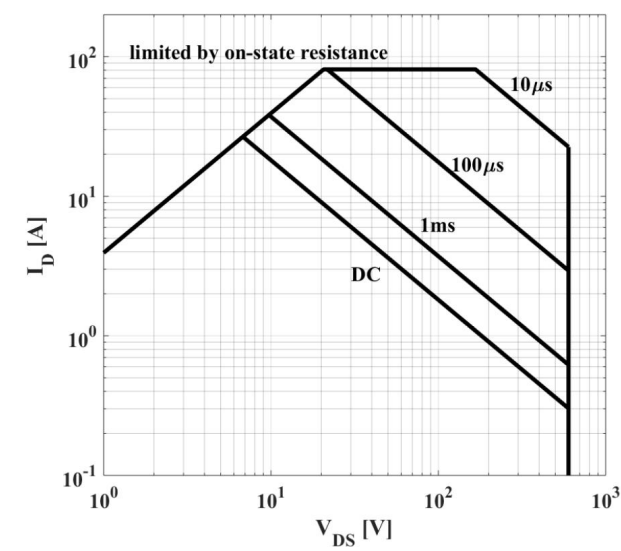
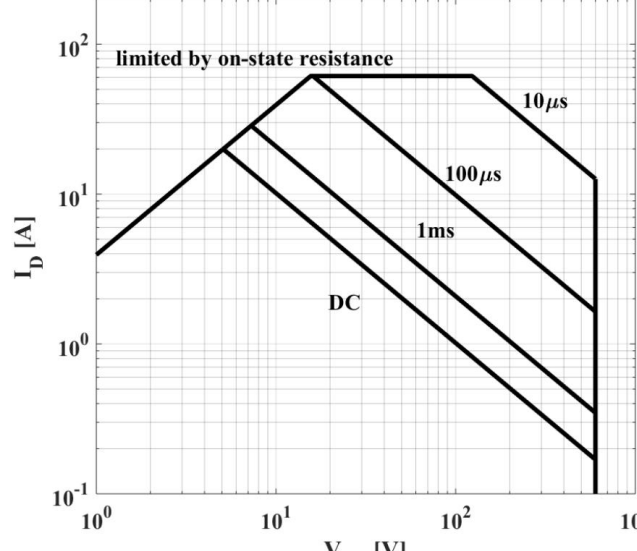
Figure 3: Power Dissipation  $P_{tot} = f(T_c)$	Figure 4: Max. Transient Thermal Impedance  $Z_{thJC} = f(t_p)$; parameter: $D = t_p/T$
Figure 5: Safe Operating Area  $I_D = f(V_{DS})$; $T_c = 25^\circ\text{C}$; $V_{GS} > 7\text{V}$; parameter t_p	Figure 6: Safe Operating Area  $I_D = f(V_{DS})$; $T_c = 80^\circ\text{C}$; $V_{GS} > 7\text{V}$; parameter t_p

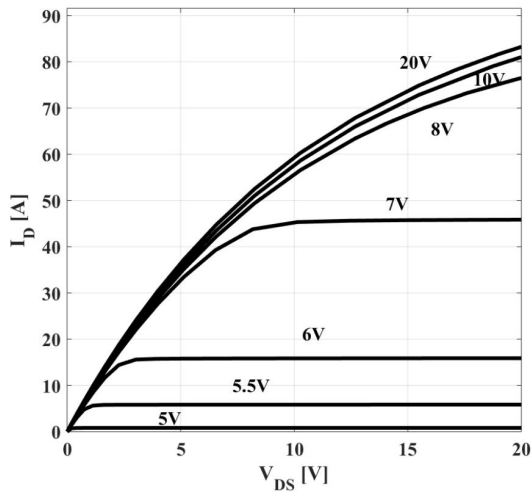
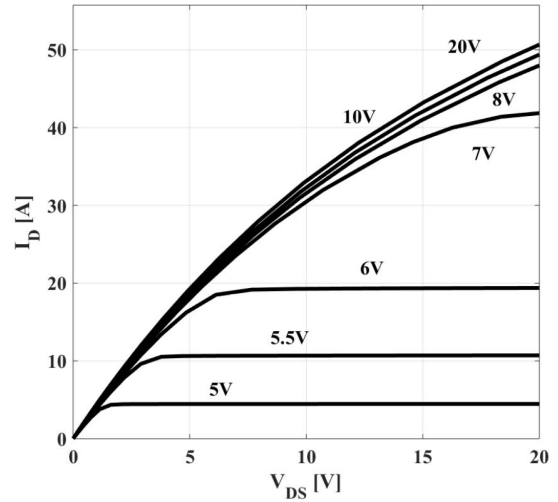
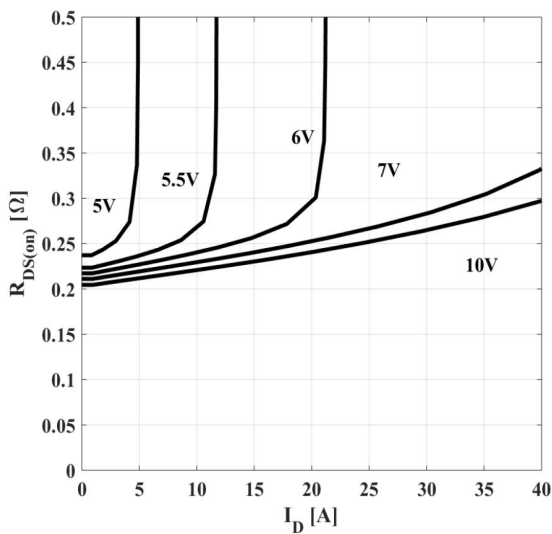
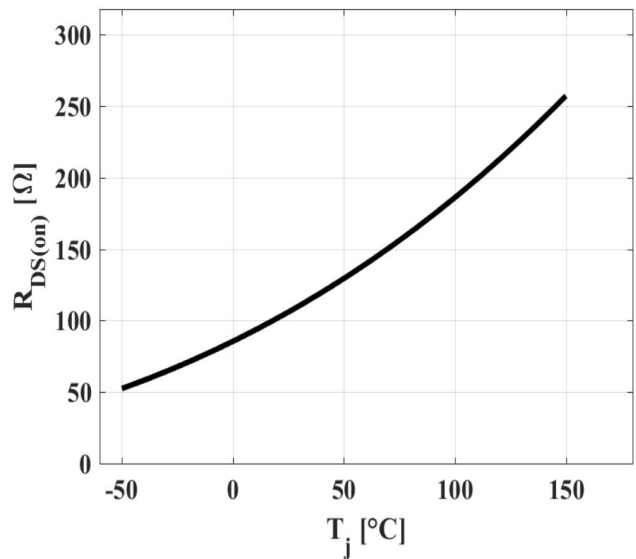
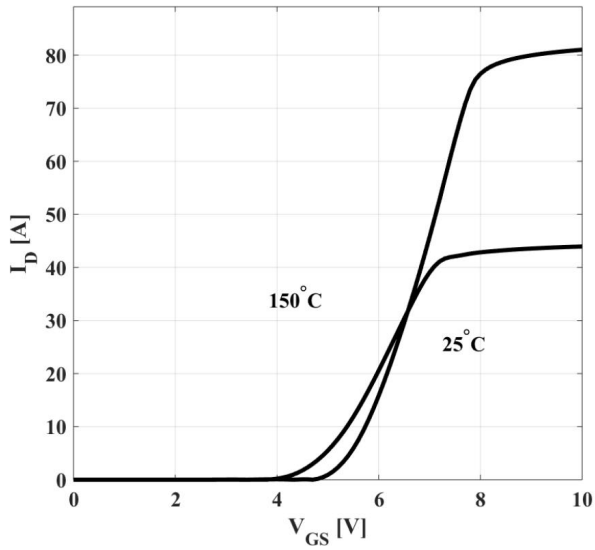
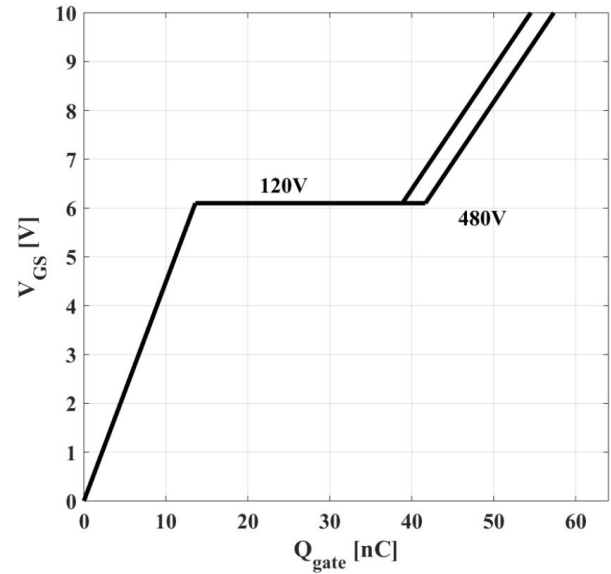
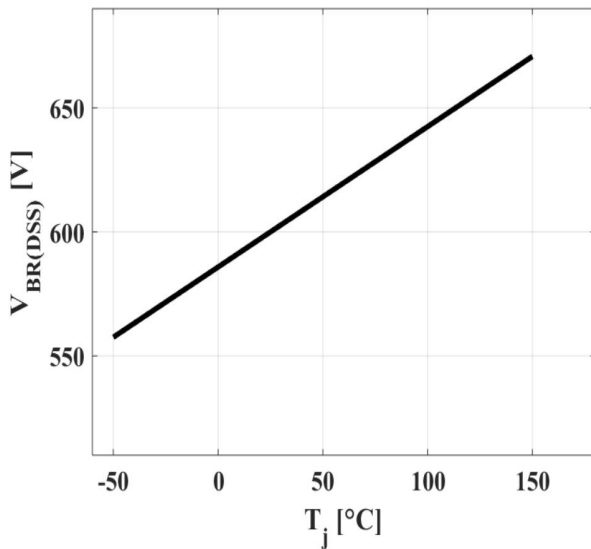
Figure 7: Typ. Output Characteristics

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

 $R_{DS(ON)} = f(T_j); I_D = 13\text{A}; V_{GS} = 10\text{V}$

Figure 11: Typ. Transfer Characteristics


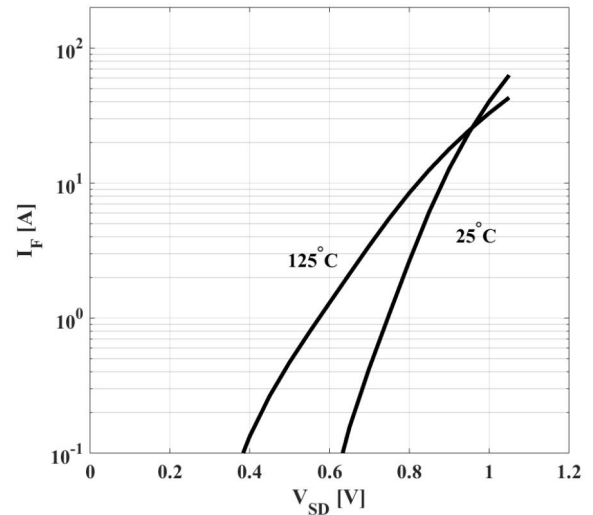
$$I_D = f(V_{GS}); V_{DS} = 20V$$

Figure 12: Typ. Gate Charge


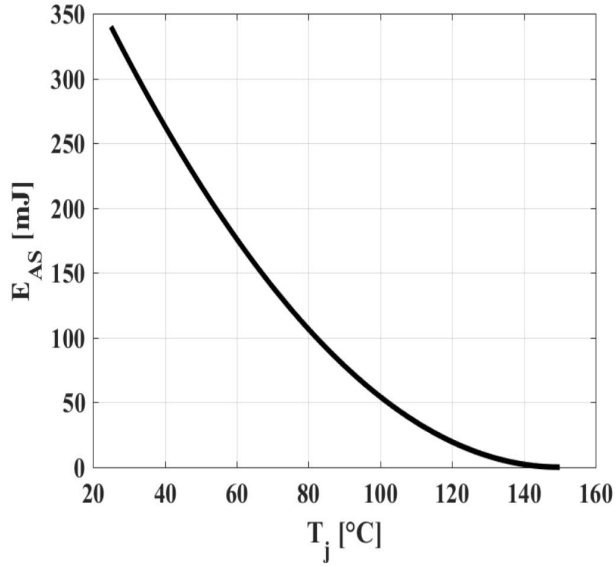
$$V_{GS} = f(Q_{gate}), I_D = 13A \text{ pulsed}$$

Figure 13: Drain-Source Breakdown Voltage


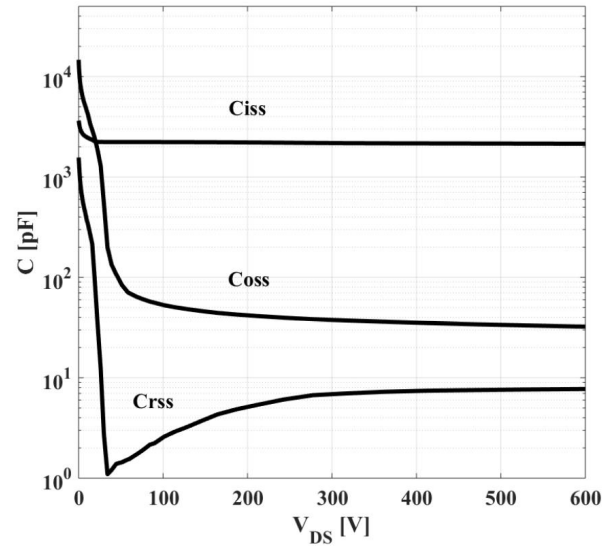
$$V_{BR(DSS)} = f(T_j); I_D = 1mA$$

Figure 14: Forward Characteristics of Reverse Diode


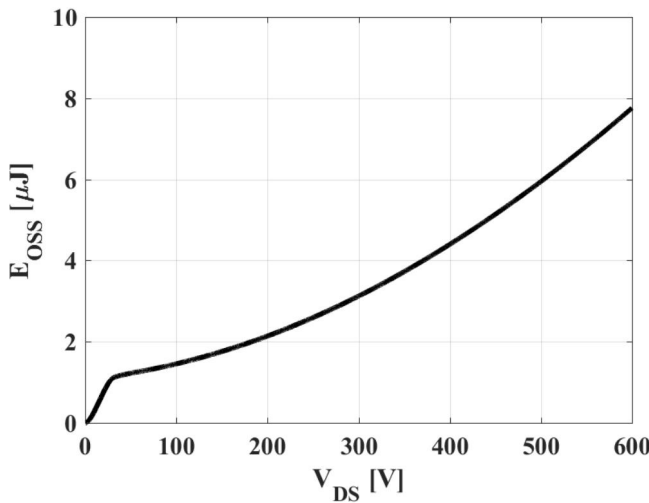
$$I_F = f(V_{SD}); \text{parameter: } T_j$$

Figure 15: Avalanche Energy


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

Figure 16: Typ. Capacitances


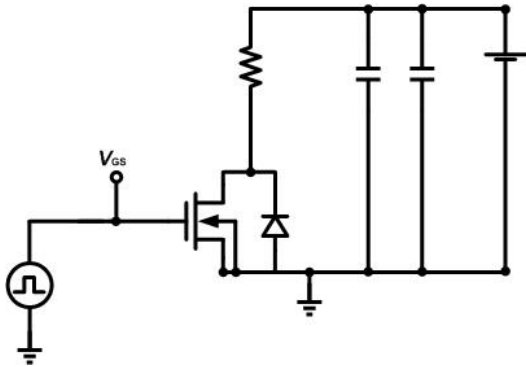
$$C=f(V_{DS}); V_{GS}=0; f=1MHz$$

Figure 17: Coss Stored Energy


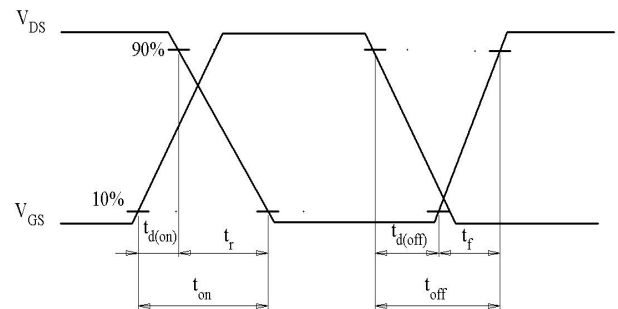
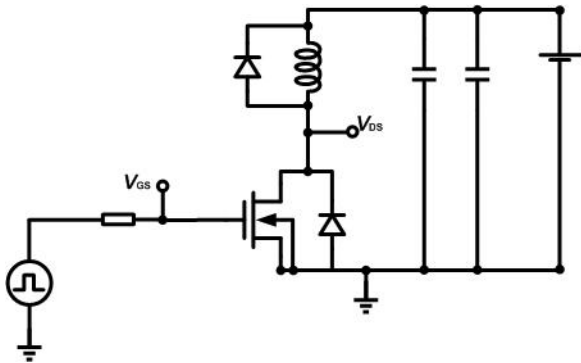
$$E_{OSS}=f(V_{DS})$$

Test Circuits

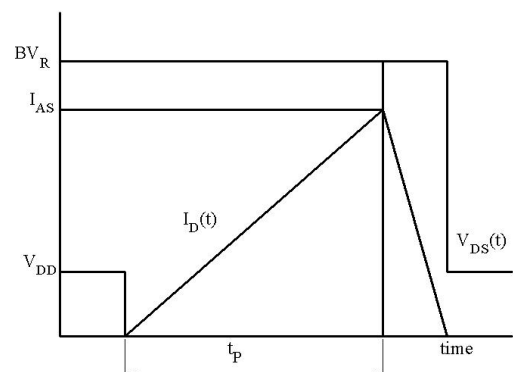
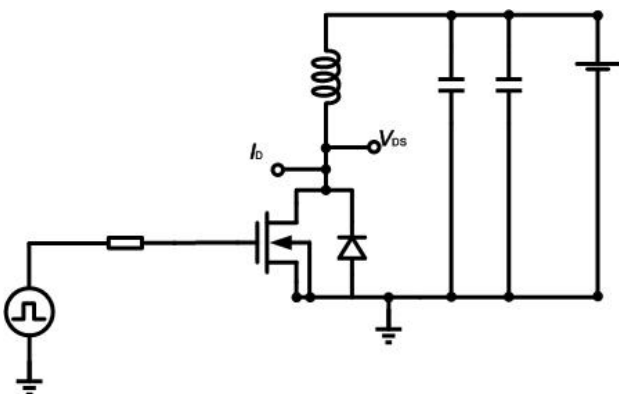
1. Gate Charge Test Circuit & Waveform



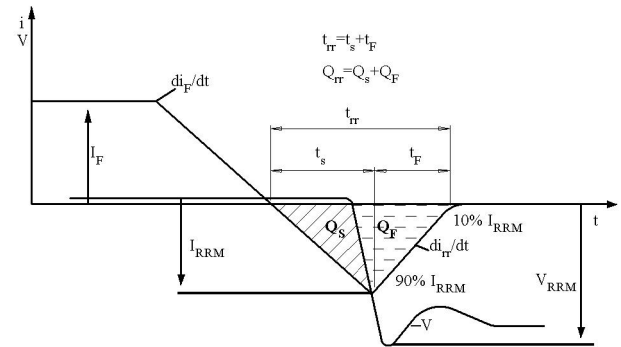
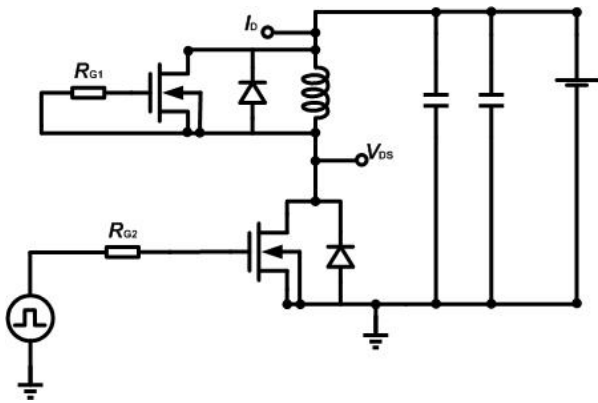
2. Switch Time Test Circuit

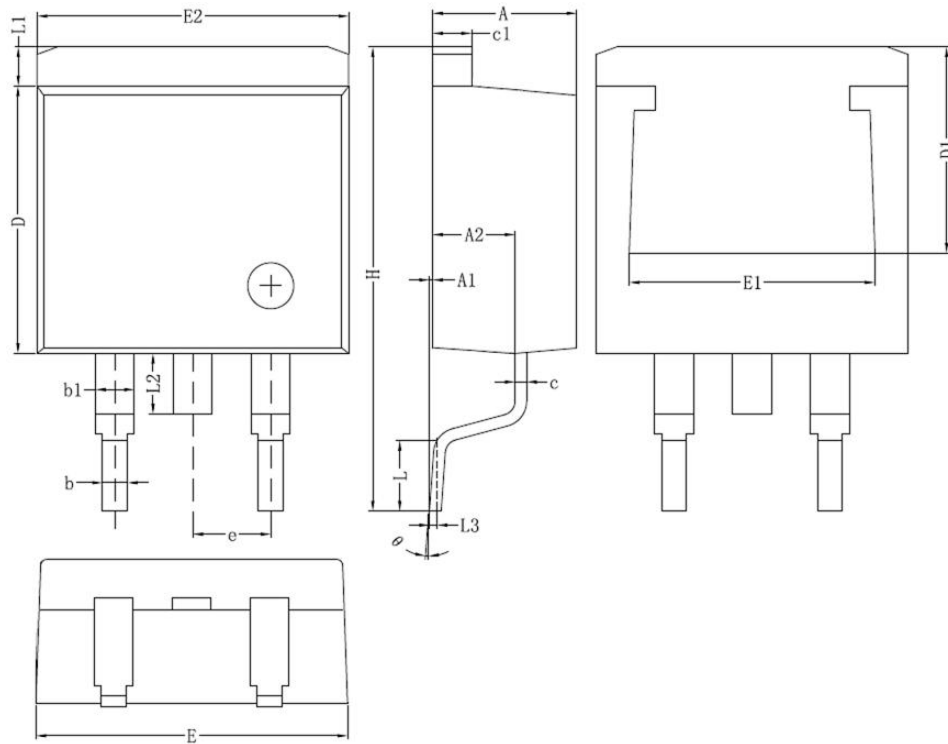


3. Unclaimed Inductive Switching Test Circuit & Waveforms

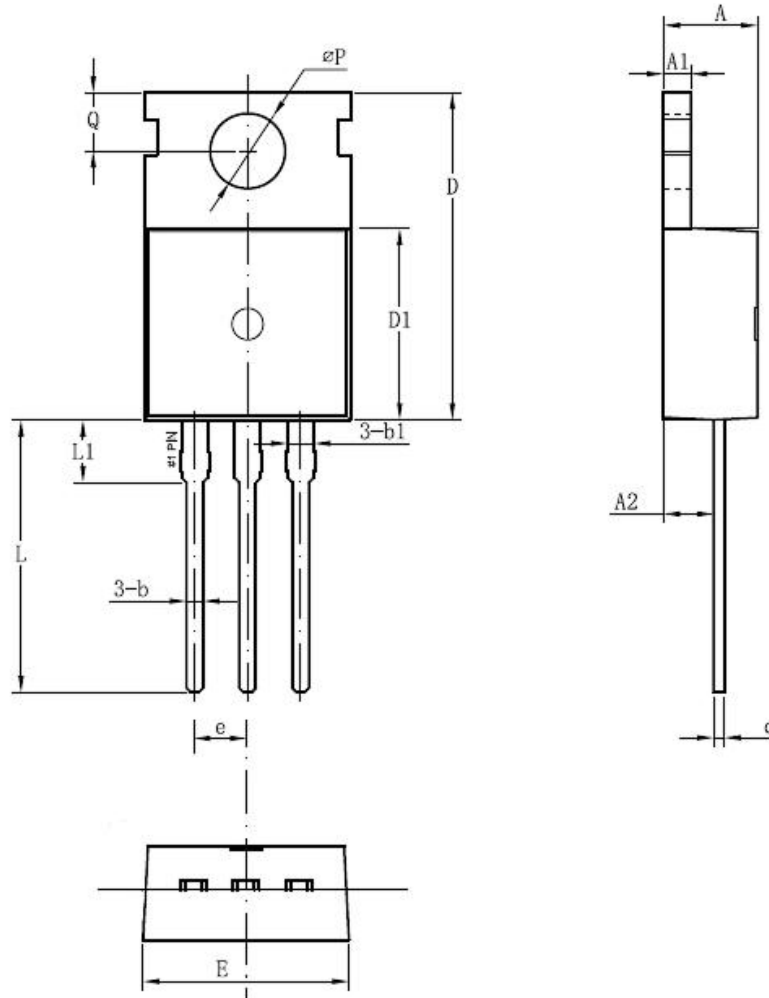


4. Test Circuit and Waveform for Diode Characteristics

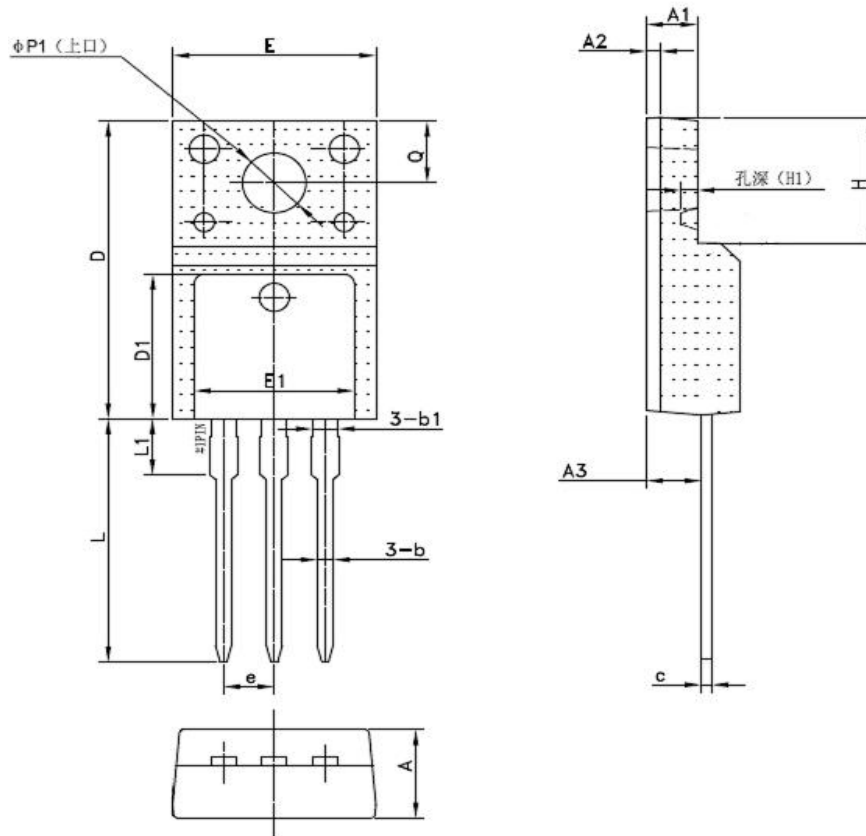


Mechanical Dimensions
TO-263-2
Unit: mm


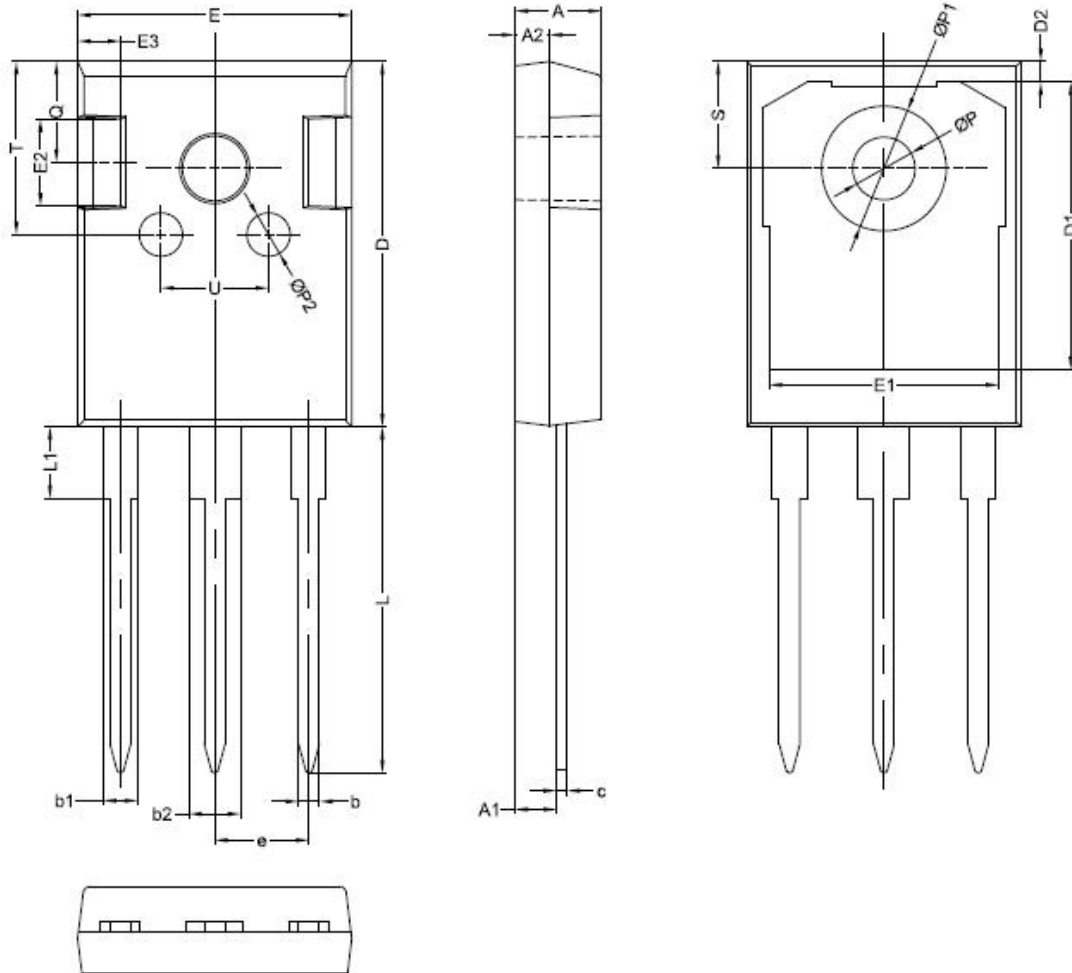
Symbol	Dimensions(mm)		
	Min.	Typ.	Max.
A	4.30	4.60	4.85
A1	0.00	0.10	0.25
A2	2.59	2.69	2.89
b	0.70	0.81	0.96
b1	-	1.27	-
c	0.36	0.40	0.61
c1	1.15	1.27	1.40
D	8.55	-	9.40
D1	6.40	-	-
E	9.80	10.10	10.31
E1	7.60	-	-
E2	9.80	10.00	10.20
e	2.54(BSC)		
H	14.70	15.20	16.00
L	2.00	2.30	2.84
L1	1.00	1.27	1.40
L2	-	-	2.20
L3	-	0.25	-
θ	0°	-	8°

Mechanical Dimensions (Continued)
TO-220C
Unit: mm


Symbol	Dimensions(mm)		
	Min.	Typ.	Max.
A	4.30	4.50	4.70
A1	1.20	1.30	1.40
A2	2.20	2.40	2.60
b	0.70	0.80	0.95
b1	-	1.27	-
c	0.40	0.50	0.65
D	15.20	15.70	16.20
D1	9.00	9.20	9.40
E	9.70	10.00	10.20
e	2.54(BSC)		
L	12.60	13.08	13.60
L1	-	3.00	-
ϕP	3.50	3.60	3.80
Q	2.60	2.80	3.00

Mechanical Dimensions (Continued)
TO-220F
Unit: mm


Symbol	Dimensions(mm)		
	Min.	Typ.	Max.
A	4.30	4.70	4.90
A1	2.34	2.54	2.90
A2	-	0.70	-
A3	2.56	2.76	2.96
b	0.55	-	0.95
b1	-	1.28	-
c	0.42	0.50	0.70
D	14.70	-	16.07
D1	-	7.70	-
E	9.96	10.16	10.36
E1	-	8.00	-
e	2.54(BSC)		
H	-	6.70	-
(H1)	-	(0.81)	-
L	12.48	12.98	13.50
L1	-	2.93	-
ΦP1	-	3.18	-
Q	2.90	3.30	3.50

Mechanical Dimensions
TO-247
Unit: mm


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



Shenzhen Sanrise Technology Co., LTD

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