

General Description

The Sanrise SRC60R068BS 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 SRC60R068BS break down voltage is 600V and it has a high rugged avalanche characteristics. The SRC60R068BS is available in TO-263-7 package.

Features

- Ultra Low $R_{DS(ON)} = 68m\Omega @ V_{GS} = 10V$.
- $V_{ds@T_{jmax}} = 650V$.
- Ultra Low Gate Charge, $Q_g = 110nC$ typ.
- Fast switching capability
- Robust design with better EAS performance
- EMI Improved
- Qualified according to AEC Q101
- Green Product (RoHS compliant)
- Ultra-fast body diode

Application

- Telecom Power
- EV Charger
- High Power Application

Ordering Information

Circuit Type		SRC60R068BS	□	□	-GA
Package		S7: TO-263-7			
			A:	Automotive	
			G:	Green	
			Blank:	Tube	
			TR:	Tape & Reel	

Symbol

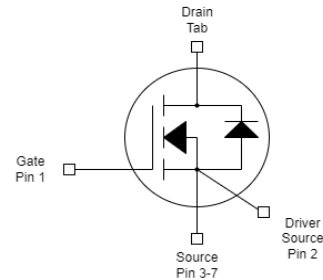
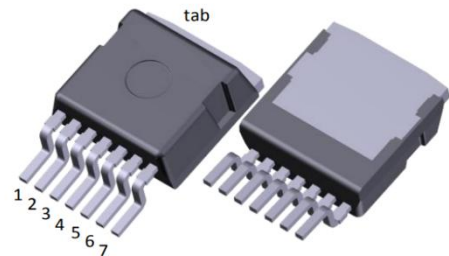


Figure 1 Symbol of SRC60R068BS

Package Type



TO-263-7

Figure 2 Package Type of SRC60R068BS

Package	Part Number	Marking ID	Packing Type
TO-263-7	SRC60R068BS S7 TR-GA	SRC60R068BS S7 GA	Tape & Reel

Absolute Maximum Ratings^{Note1}

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DSS}	600	V
Gate-Source Voltage		V_{GSS}	±30	V
Power Dissipation($T_c=25^{\circ}\text{C}$, TO-263-7)		P_{tot}	357.1	W
Continuous Drain Current	$T_c=25^{\circ}\text{C}$	I_D	48	A
	$T_c=100^{\circ}\text{C}$		30.3	
	$T_c=125^{\circ}\text{C}$		21.5	
Pulsed Drain Current (Note 2)		I_{DM}	144	A
Avalanche Energy, Single Pulse (Note 3)		E_{AS}	210	mJ
Avalanche Energy, Single Pulse (Note 4)		E_{AS}	1653	mJ
Avalanche Energy, Repetitive (Note 2)		E_{AR}	0.6	mJ
Avalanche Current, Repetitive (Note 2)		I_{AR}	2.5	A
Continuous Diode Forward Current		I_S	48	A
Diode Pulse Current		$I_{S,PULSE}$	144	A
MOSFET dv/dt Ruggedness, $V_{DS} \leq 480V$		dv/dt	80	V/ns
Reverse Diode dv/dt , $V_{DS} \leq 480V$, $I_{SD} \leq I_D$		dv/dt	50	V/ns
ESD		HBM	>1000	V
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. $I_{AS} = 2.5A$, $V_{DD} = 60V$, $R_G = 25\Omega$, Starting $T_J = 25^{\circ}\text{C}$. Finish goods test condition.
4. $I_{AS} = 7A$, $V_{DD} = 60V$, $R_G = 25\Omega$, Starting $T_J = 25^{\circ}\text{C}$. Typical Eas.

Thermal characteristics

Parameter		Symbol	Min	Typ	Max	Unit
Thermal resistance, Junction-to-Case	TO-263-7	R_{thJC}			0.35	$^{\circ}\text{C}/\text{W}$
Thermal resistance, Junction-to-Ambient	TO-263-7	R_{thJA}			58	$^{\circ}\text{C}/\text{W}$

Electrical Characteristics

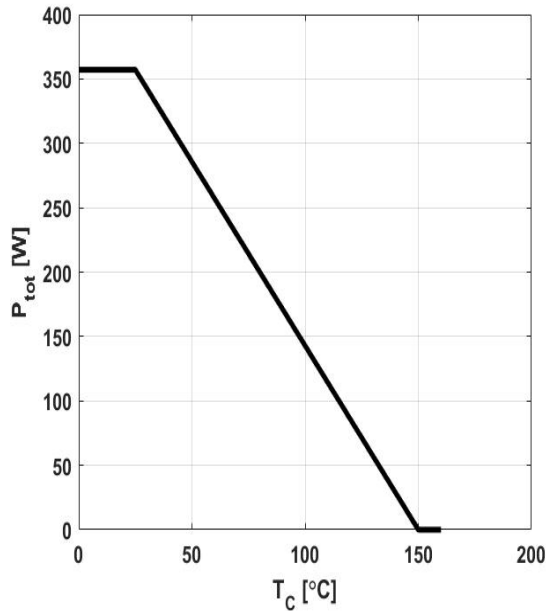
$T_J = 25^{\circ}\text{C}$, unless otherwise specified.

Parameter		Symbol	Test Conditions	Min	Typ	Max	Unit
Statistic Characteristics							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V, I _D =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			-100	
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} =V _{GS} , I _D =1.0mA	3.0	4.0	5.0	V
Static Drain-Source On-Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =24A		57	68	mΩ
Gate Resistance		R _G	f=1MHz, Open Drain		1.0		Ω
Dynamic Characteristics							
Input Capacitance		C _{ISS}	V _{DS} =50V, V _{GS} =0V, f=1MHz		4.3		nF
Output Capacitance		C _{OSS}			171		pF
Reverse Transfer Capacitance		C _{RSS}			2.8		pF
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		47		ns
Rise Time		t _r			14		
Turn-off Delay Time		t _{d(off)}			61		
Fall Time		t _f			8.8		
Gate Charge Characteristics							
Gate to Source Charge		Q _{gs}	V _{DD} =480V, I _D =24A V _{GS} =0 to 10V		28.1		nC
Gate to Drain Charge		Q _{gd}			56.0		
Gate Charge Total		Q _g			110		
Gate Plateau Voltage		V _{plateau}			6.5		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		141		ns
Reverse Recovery Charge		Q _{rr}			0.83		uC
Peak Reverse Recovery Current		I _{rrm}			11.8		A

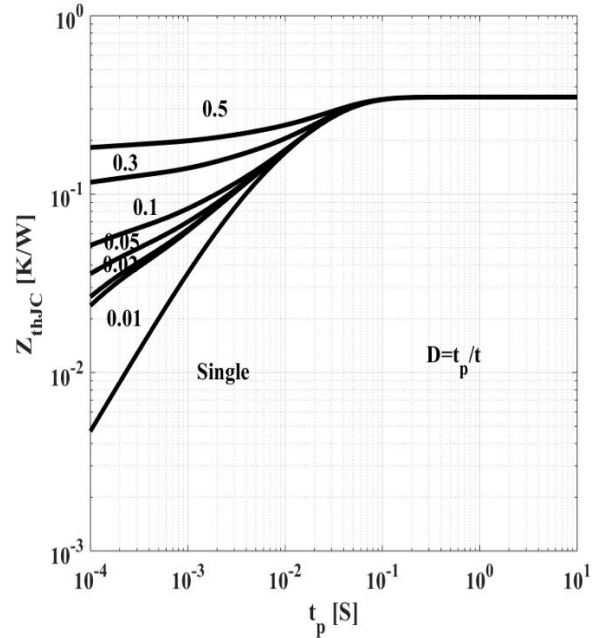
Note:

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

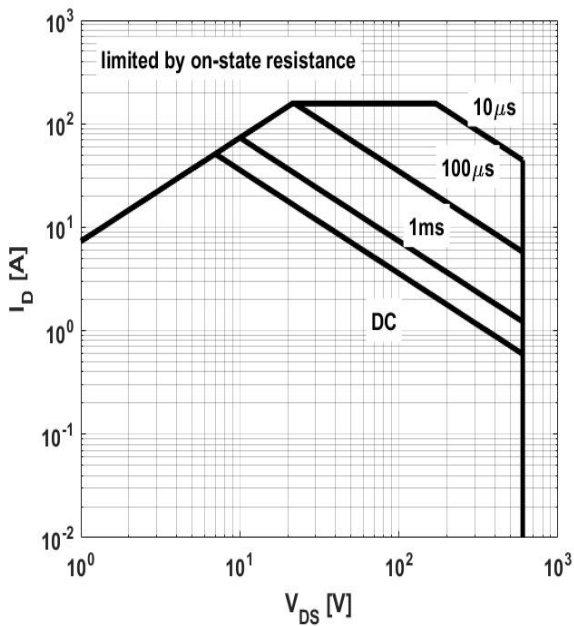
6. $C_{O(tr)}$ is a fixed capacitance that gives the same charging time as C_{OSS} while V_{DS} is rising from 0 to 400 V

Typical Performance Characteristics
Figure 3: Power Dissipation


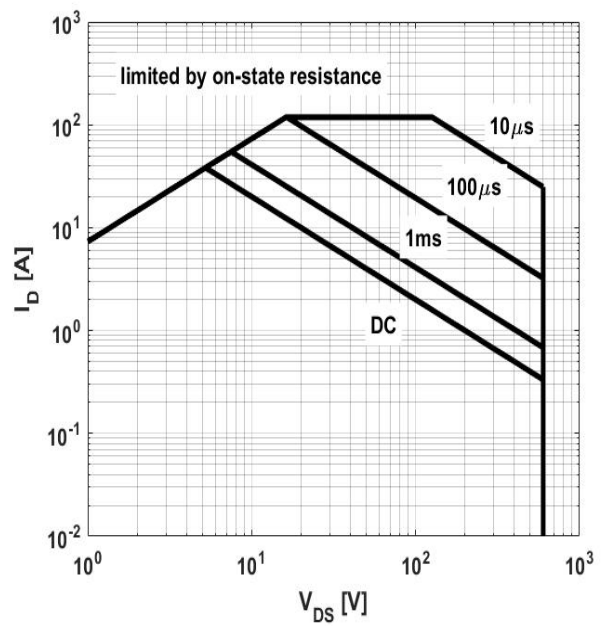
$$P_{tot} = f(T_c);$$

Figure 4: Max. Transient Thermal Impedance


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

Figure 5: Safe Operating Area


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

Figure 6: Safe Operating Area


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

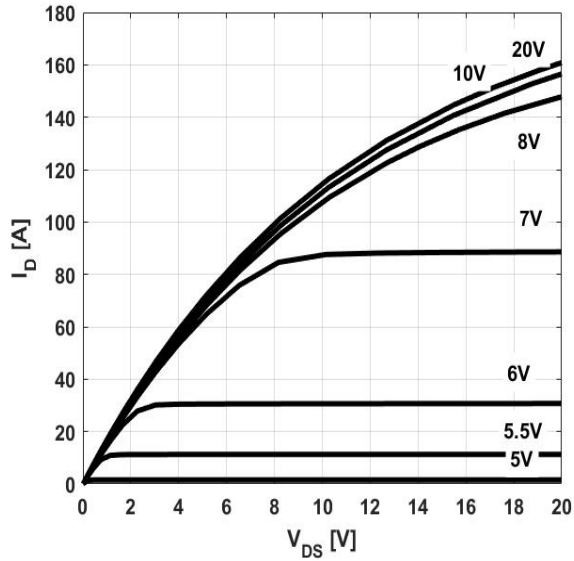
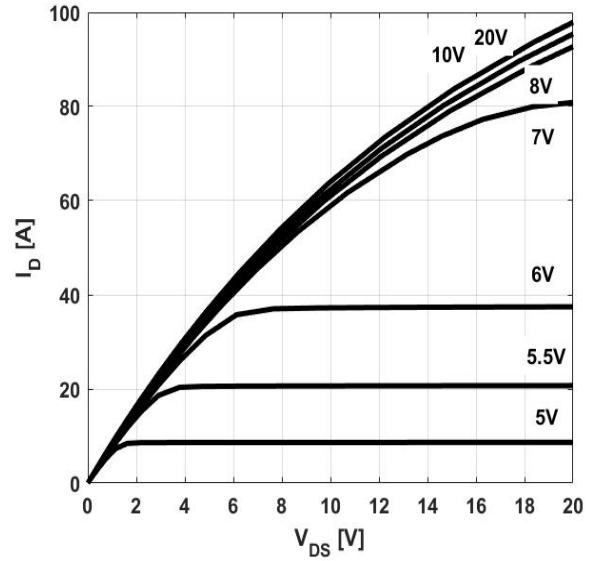
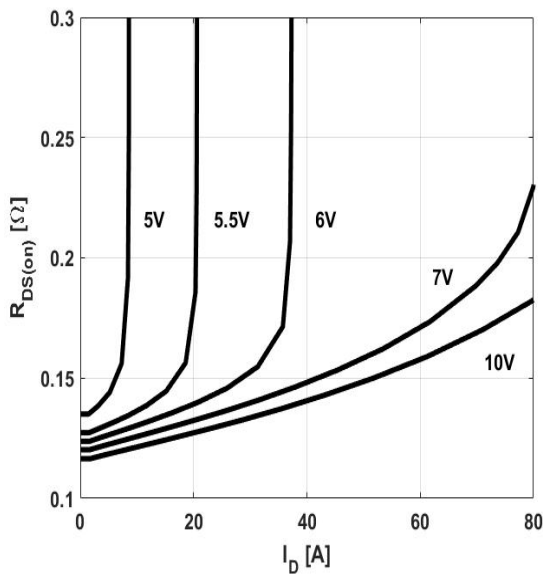
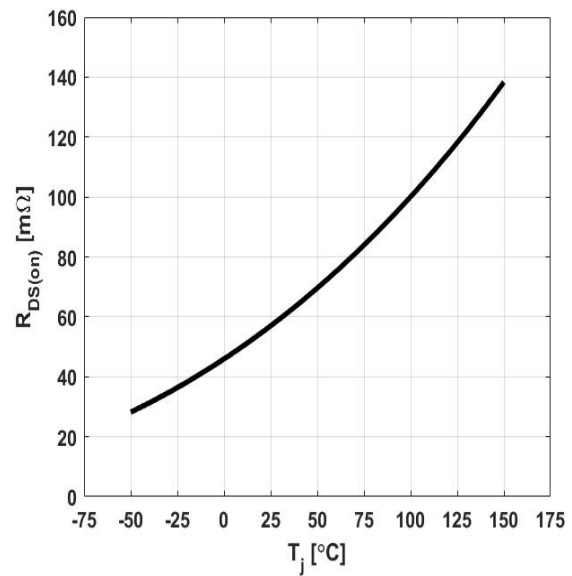
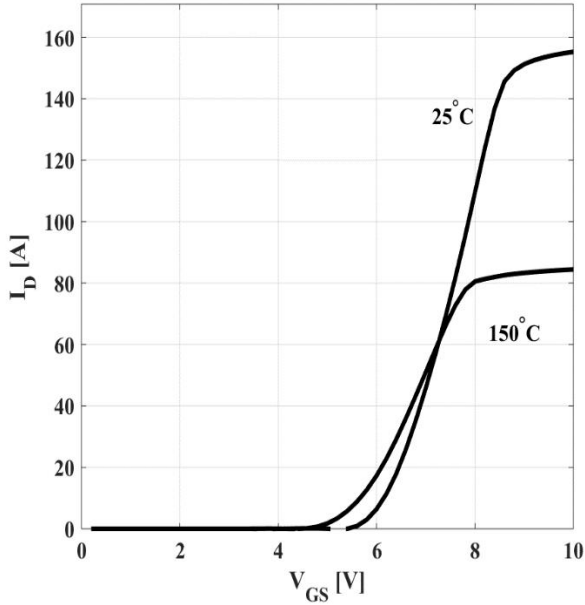
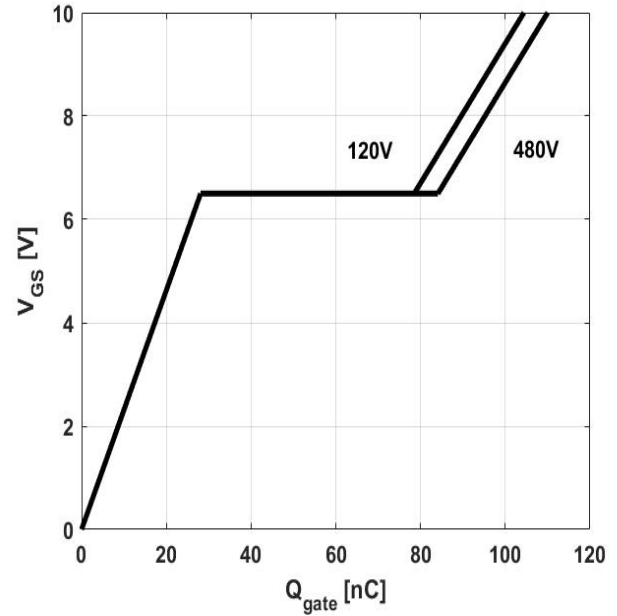
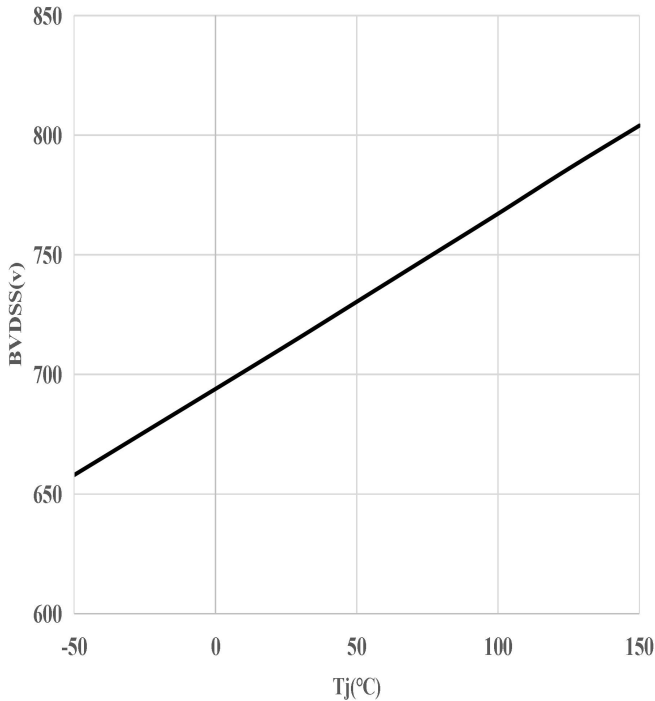
68mΩ, 600V, Super Junction N-Channel Power MOSFET
SRC60R068BS
Figure 7: Typ. Output Characteristics

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


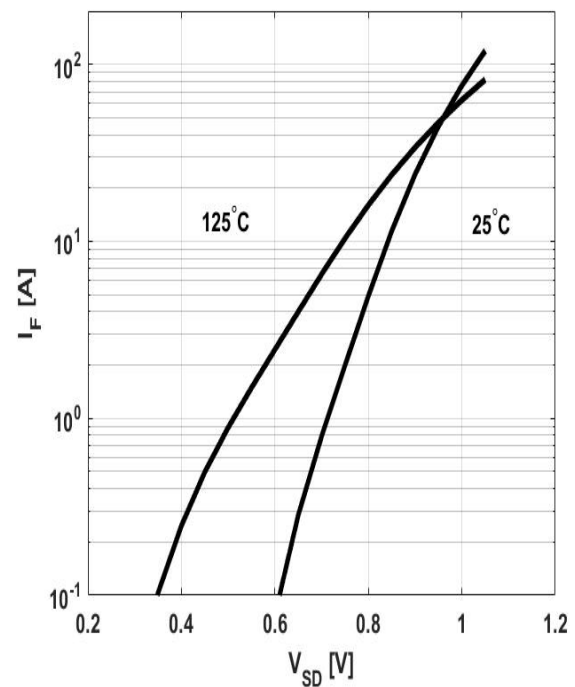
$$I_D = f(V_{GS}); V_{DS} = 20V$$

Figure 12: Typ. Gate Charge


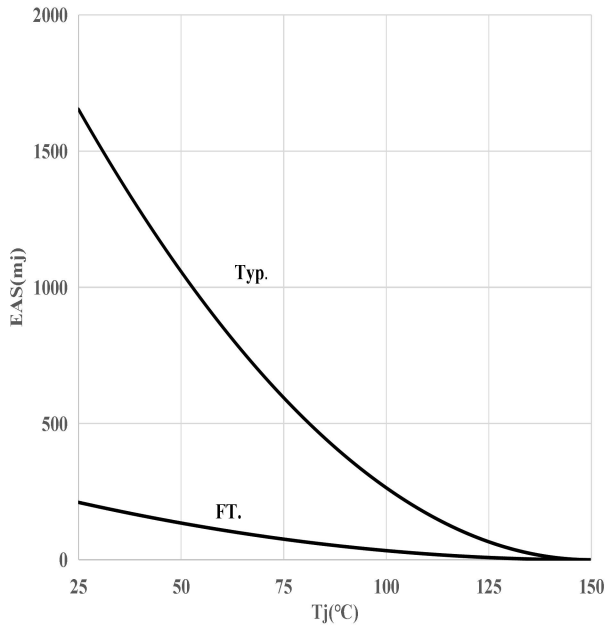
$$V_{GS} = f(Q_{gate}), I_D = 24A \text{ pulsed}$$

Figure 13: Drain-Source Breakdown Voltage


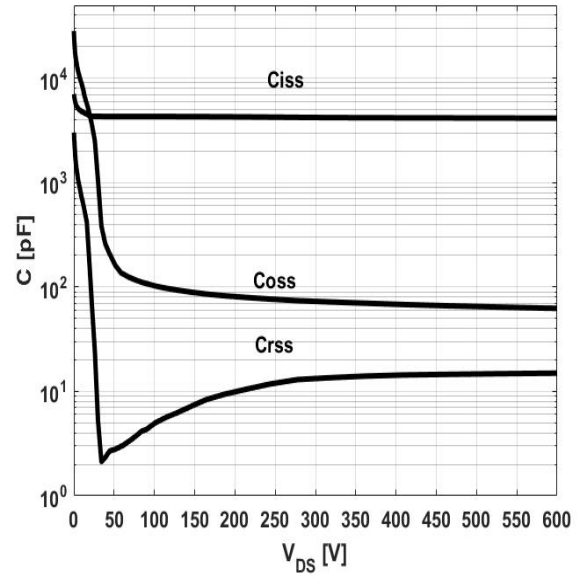
$$V_{BR(DSS)} = f(T_j); I_D = 10mA$$

Figure 14: Forward Characteristics of Reverse Diode


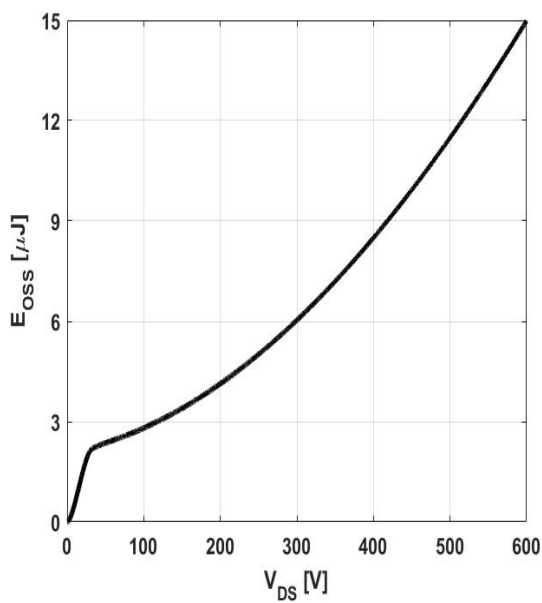
$$I_F = f(V_{SD}); \text{parameter: } T_j$$

Figure 15: Avalanche Energy


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

Figure 16: Typ. Capacitances


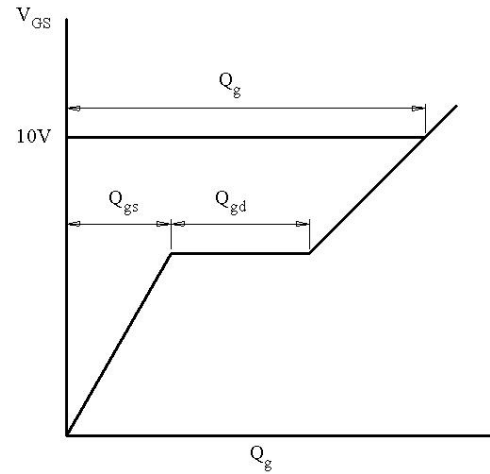
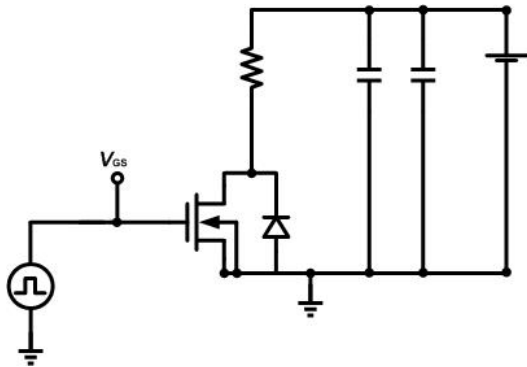
$$C=f(V_{DS}); V_{GS}=0; f=1MHz$$

Figure 17: C_{OSS} Stored Energy


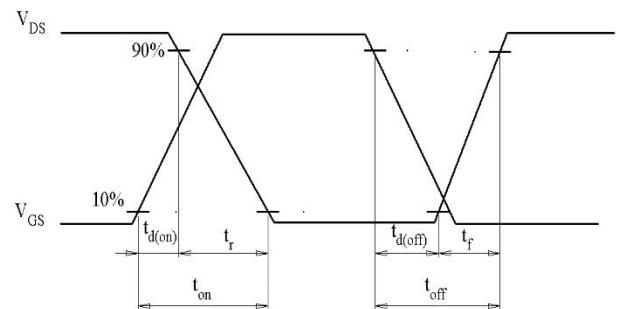
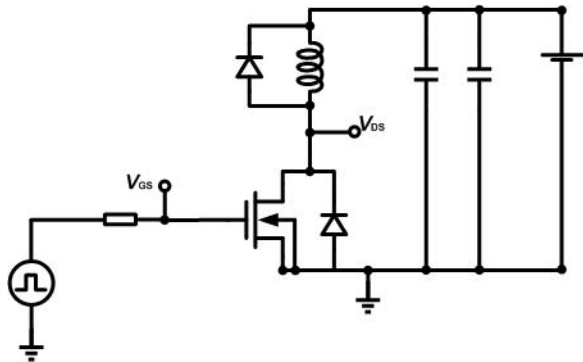
$$E_{OSS}=f(V_{DS})$$

Test Circuits

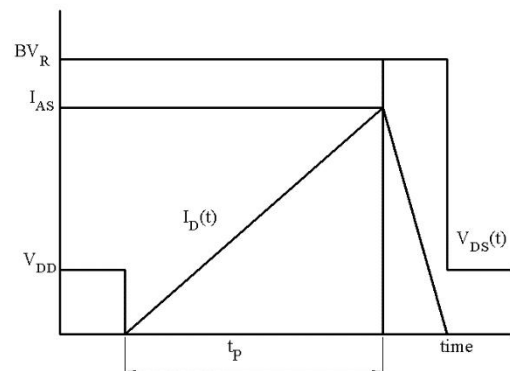
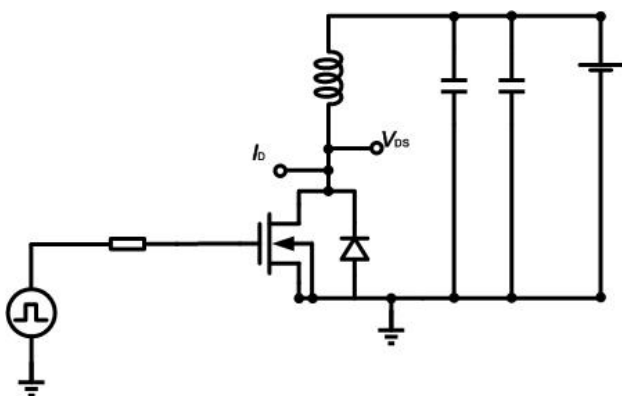
1. Gate Charge Test Circuit & Waveform



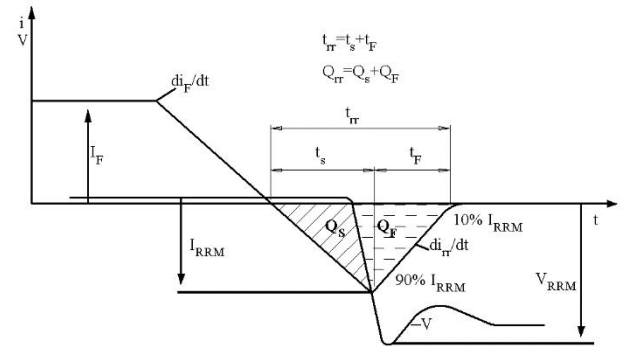
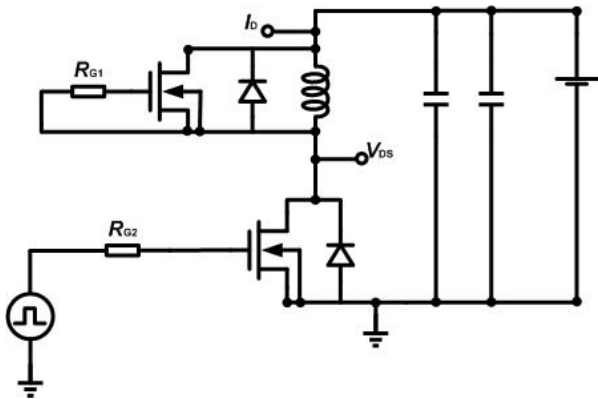
2. Switch Time Test Circuit



3. Unclaimed Inductive Switching Test Circuit & Waveforms



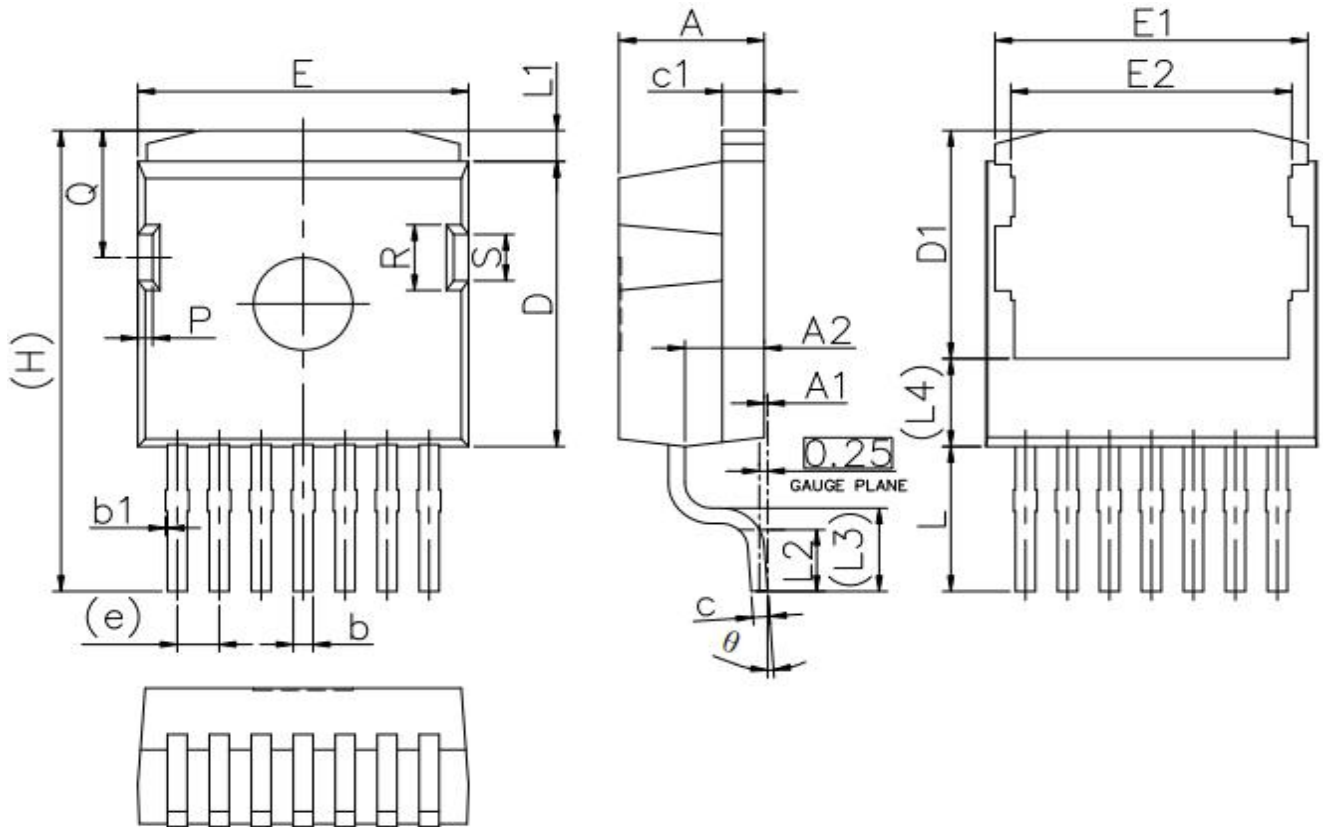
4. Test Circuit and Waveform for Diode Characteristics



Mechanical Dimensions

TO-263-7

Unit: mm



Symbol	Dimensions(mm)			Symbol	Dimensions(mm)		
	Min.	Typ.	Max.		Min.	Typ.	Max.
A	4.300	4.400	4.500	E2	8.400	8.500	8.600
A1	0.000	0.100	0.200	e	1.270 REF.		
A2	2.300	2.400	2.500	H	15.000 REF.		
b	0.500	0.600	0.700	L	4.200	4.700	5.200
b1	0.000	0.075	0.150	L1	0.700	1.000	1.300
c	0.400	0.500	0.600	L2	1.700	2.000	2.300
c1	1.170	1.270	1.370	L3	2.700 REF.		
D	9.050	9.250	9.450	L4	2.850 REF.		
D1	7.300	7.400	7.500	P	0.350	0.450	0.550
E	9.800	10.000	10.200	Q	4.020	4.120	4.220
E1	9.360	9.460	9.560	R	2.030	2.130	2.230
S	1.400	1.500	1.600	θ	0°	4°	8°



Shenzhen Sanrise Technology Co., LTD

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