Sanrise Tech

Datasheet

68mΩ, 650V, Super Junction N-Channel Power MOSFET SRC65R068BS

General Description

The Sanrise SRC65R068BS 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 SRC65R068BS break down voltage is 650V and it has a high rugged avalanche characteristics.

The SRC65R068BS is available in TO-263-7 package.

Features

- Ultra Low $R_{DS(ON)}$ = 68mΩ @ V_{GS} = 10V.
- Vds@Tjmax=700v.
- Ultra Low Gate Charge, Qg=110nC typ.
- Fast switching capability
- Robust design with better EAS performance
- EMI Improved
- Non-automotive Qualified
- Ultra-fast body diode

Application

- Telecom Power
- EV Charger
- High Power Application

Symbol

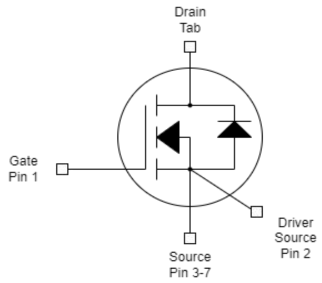
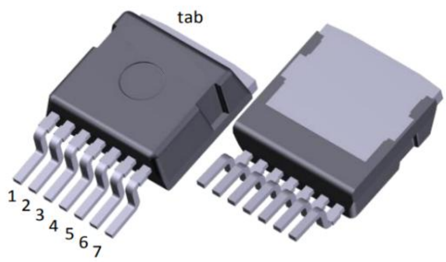


Figure 1 Symbol of SRC65R068BS

Package Type



TO-263-7

Figure 2 Package Type of SRC65R068BS

Ordering Information

SRC65R068BS□□-□

Circuit Type

Package
S7: TO-263-7

E: Lead Free
G: Green

Blank: Tube
TR: Tape & Reel

Package	Part Number		Marking ID		Packing Type
	Lead Free	Green	Lead Free	Green	
TO-263-7	SRC65R068BSS7TR-E	SRC65R068BSS7TR-G	SRC65R068BSS7E	SRC65R068BSS7G	Tape & Reel

Absolute Maximum Ratings[Note1]

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DSS}	650	V
Gate-Source Voltage		V_{GSS}	±30	V
Power Dissipation(Tc=25℃,TO-263-7）		P_{tot}	357.1	W
Continuous Drain Current	T_C=25ºC	I_D	48	A
	T_C=100ºC		30.3	
	T_C=125ºC		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}<=480V		dv/dt	80	V/ns
Reverse Diode dv/dt, V_{DS}<=480V, I_{SD}<=I_D		dv/dt	50	V/ns
ESD		HBM	>1000	V
Operating Junction Temperature		T_J	150	ºC
Storage Temperature		T_{STG}	-55 to 150	ºC
Lead Temperature (Soldering, 10 sec)		T_{LEAD}	260	ºC

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. Finish goods test condition.
4. I_{AS} = 7A, V_{DD} = 60V, R_G = 25Ω, Starting T_J = 25°C. Typical Eas.

Thermal characteristics

Parameter		Symbol	Min	Typ	Max	Unit
Thermal resistance, Junction-to-Case	TO-263-7	R_{thJC}			0.35	ºC /W
Thermal resistance, Junction-to-Ambient	TO-263-7	R_{thJA}			58	ºC /W

Electrical Characteristics

T_J = 25℃, 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}=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

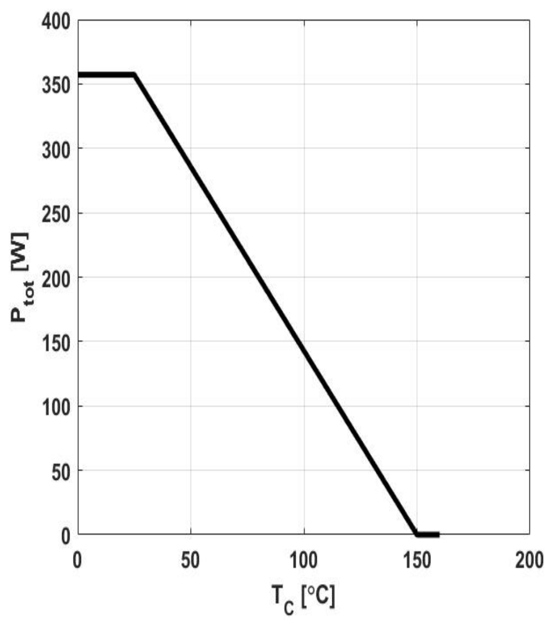
Note:

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 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

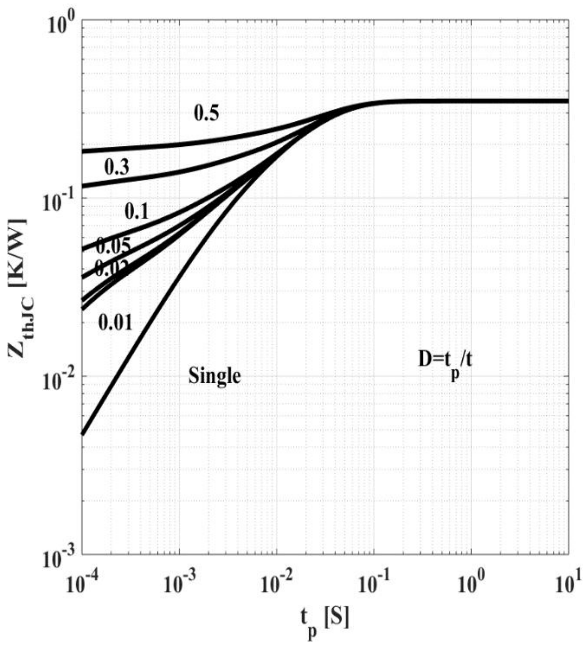
Typical Performance Characteristics

Figure 3: Power Dissipation



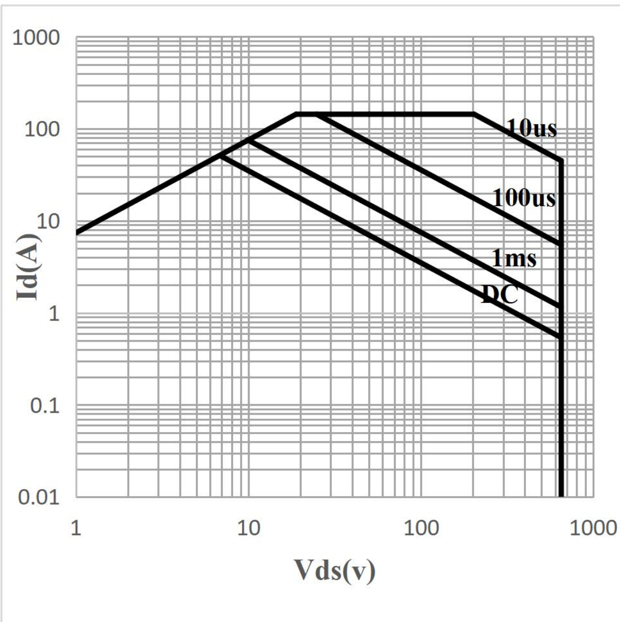
$P_{tot} = f(T_c)$;

Figure 4: Max. Transient Thermal Impedance



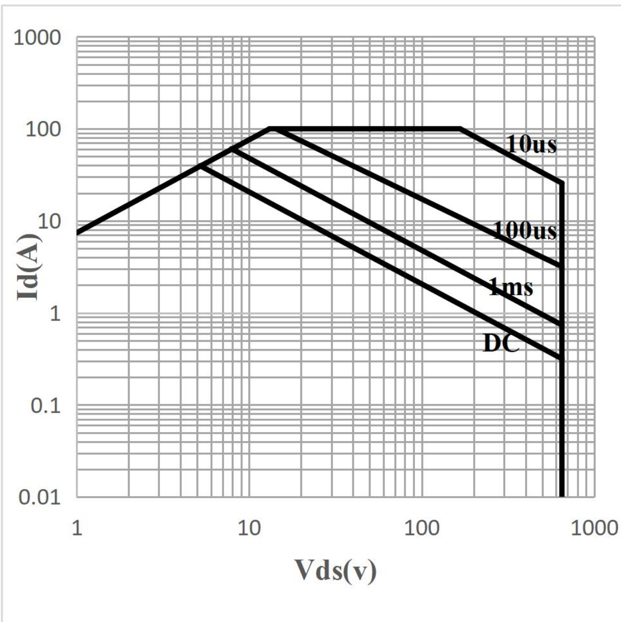
$Z_{(thJC)} = f(t_p)$; parameter: $D = t_p/T$;

Figure 5: Safe Operating Area



$I_D = f(V_{DS})$; T_c= 25ºC; V_{GS}>7V; parameter t_p

Figure 6: Safe Operating Area



$I_D = f(V_{DS})$; T_c= 80ºC; V_{GS}>7V; parameter t_p

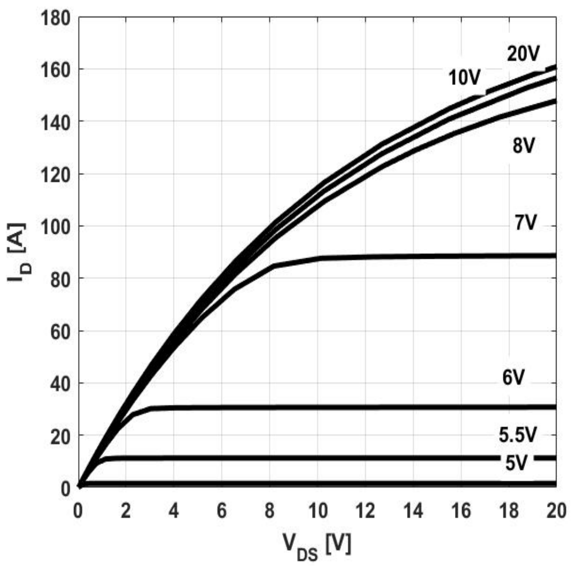
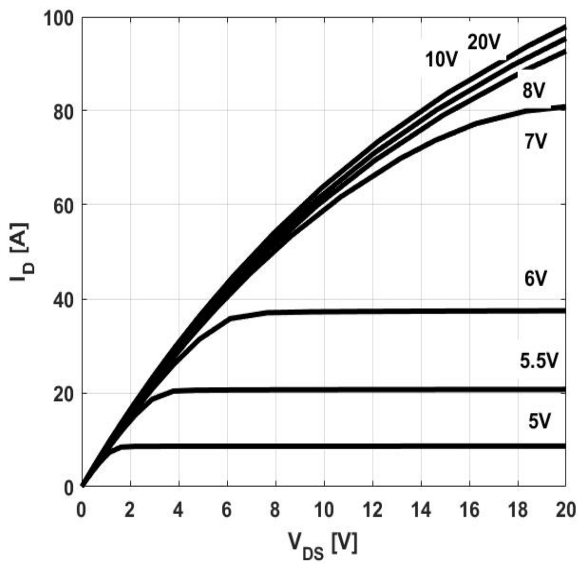
Figure 7: Typ. Output Characteristics	Figure 8: Typ. Output Characteristics
	
$I_D = f(V_{DS})$; Tj= 25ºC; parameter: V_{GS}	$I_D = f(V_{DS})$; T_j= 125ºC; parameter: V_{GS}

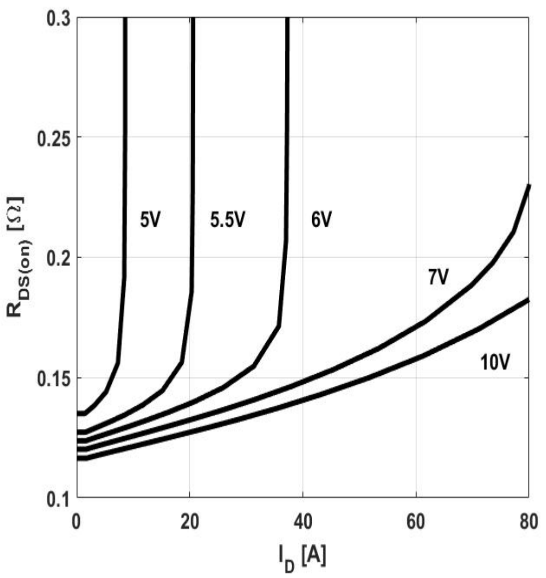
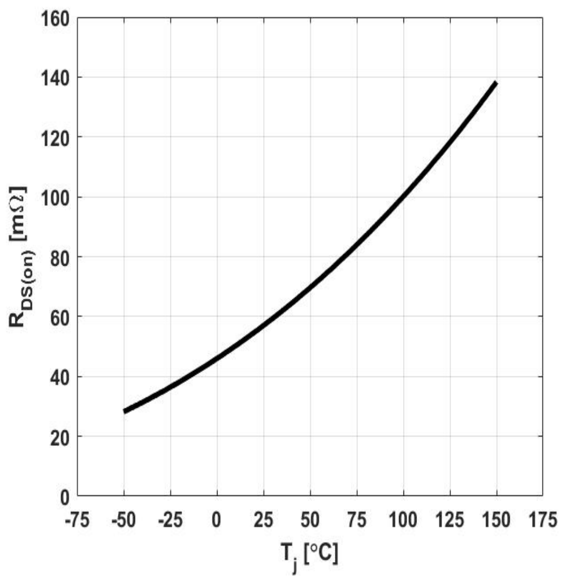
Figure 9: Typ. Drain-Source On-State Resistance	Figure 10: Typ. Drain-Source On-State Resistance
	
$R_{DS(ON)} = f(I_D)$; T_j=125ºC; parameter: V_{GS}	$R_{DS(ON)} = f(T_j)$; I_D=24A; V_{GS}=10V

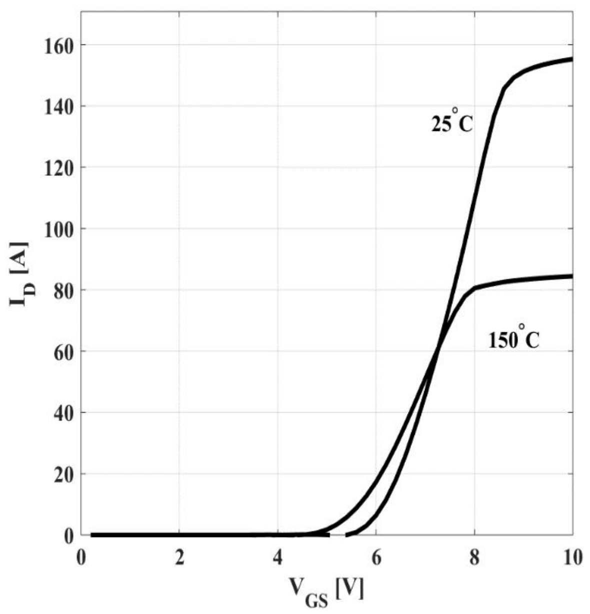
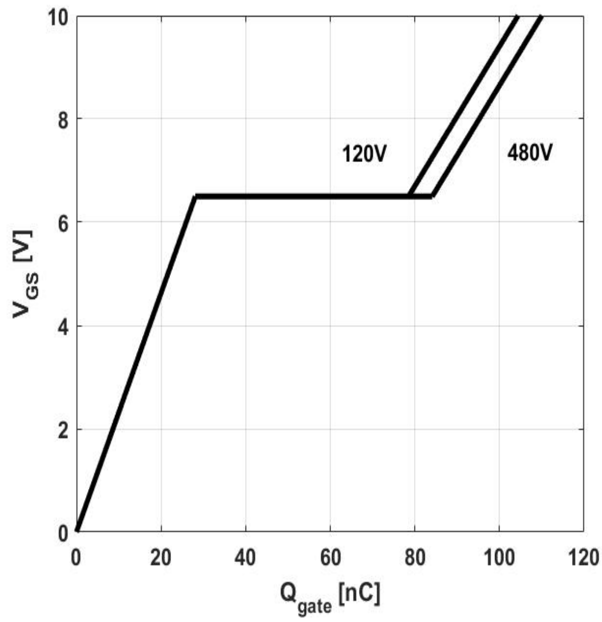
Figure 11: Typ. Transfer Characteristics	Figure 12: Typ. Gate Charge
	
$I_D = f(V_{GS})$; $V_{DS} = 20V$	$V_{GS}= f(Q_{gate})$, $I_D= 24A$ pulsed

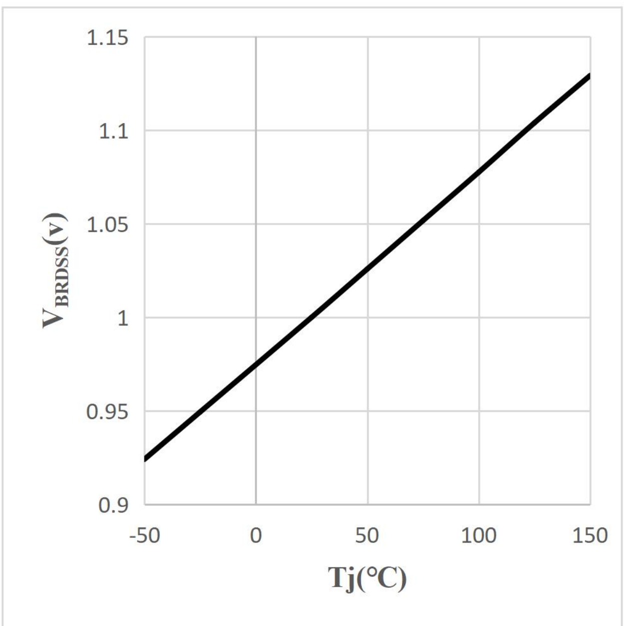
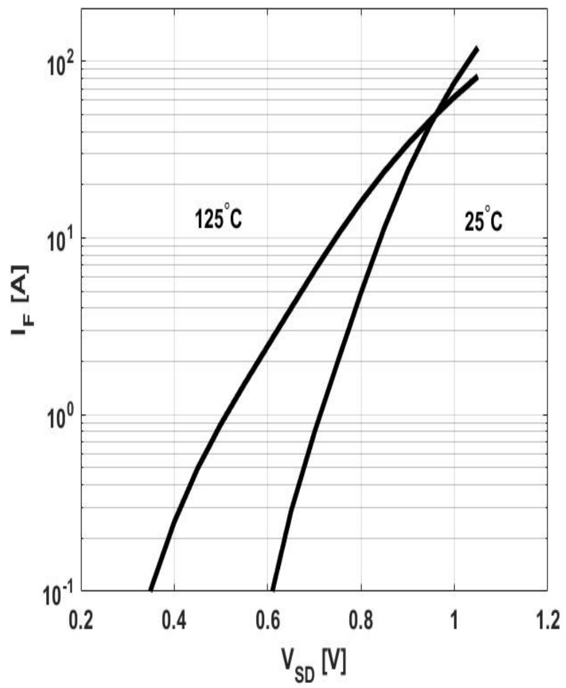
Figure 13: Drain-Source Breakdown Voltage	Figure 14: Forward Characteristics of Reverse Diode
	
$V_{BR(DSS)}=f(T_j)$; $I_D=10mA$	$I_F=f(V_{SD})$; parameter: T_j

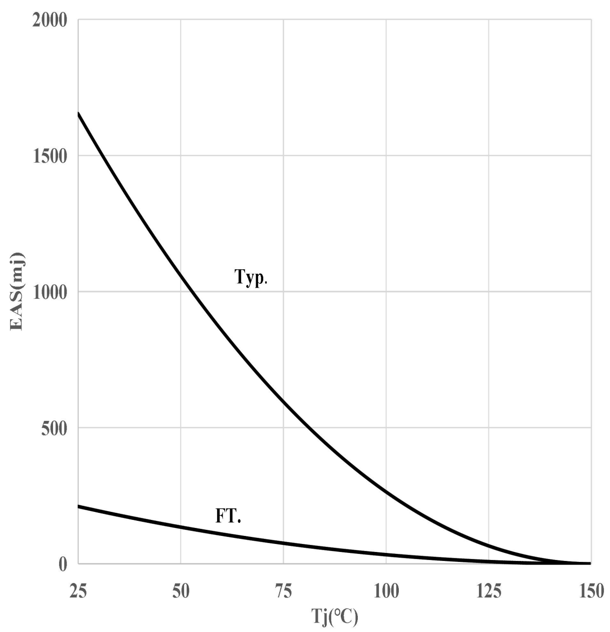
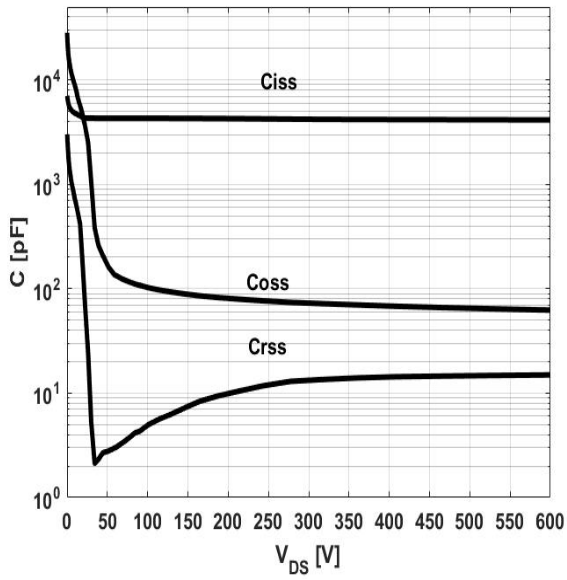
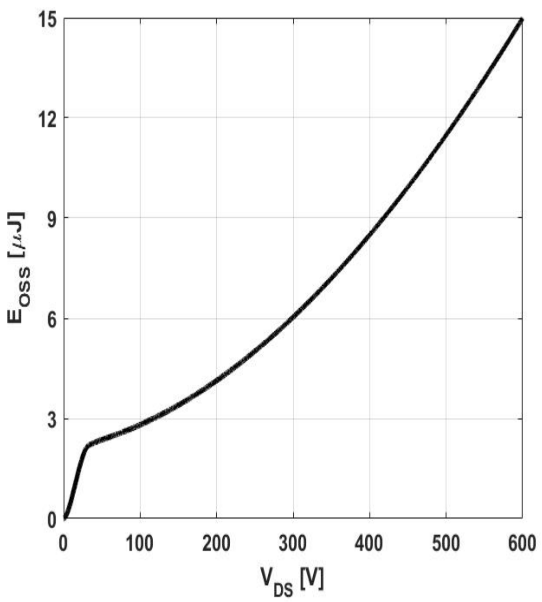
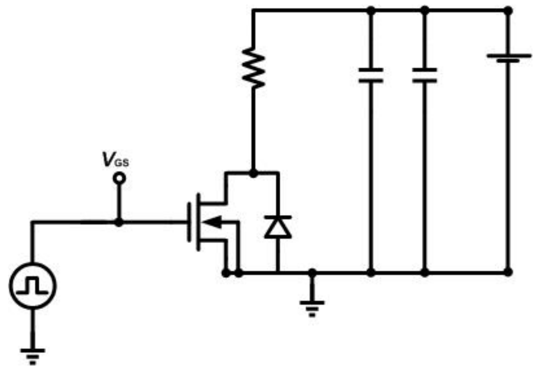
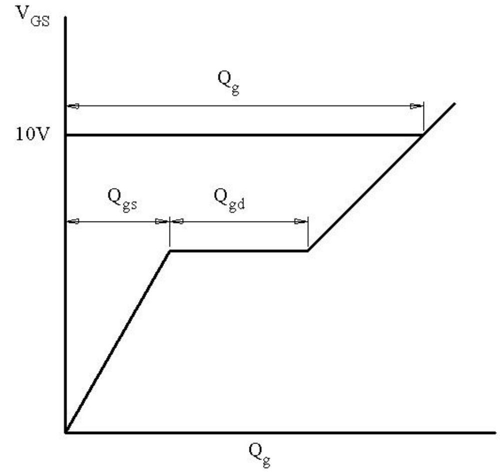
Figure 15: Avalanche Energy	Figure 16: Typ. Capacitances
	
E_{AS}=f(T_j); V_{DD}=60V	C=f(V_{DS}); V_{GS}=0; f=1MHz

Figure 17: C_{OSS} Stored Energy

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

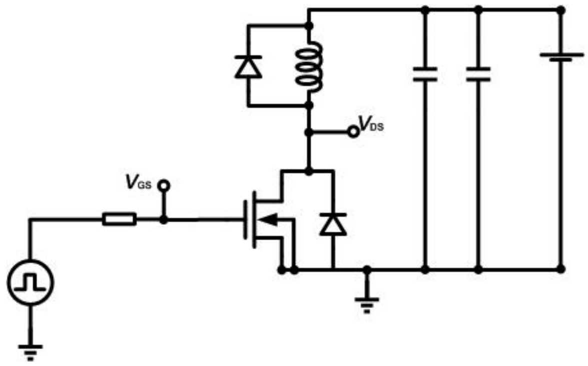
Test Circuits

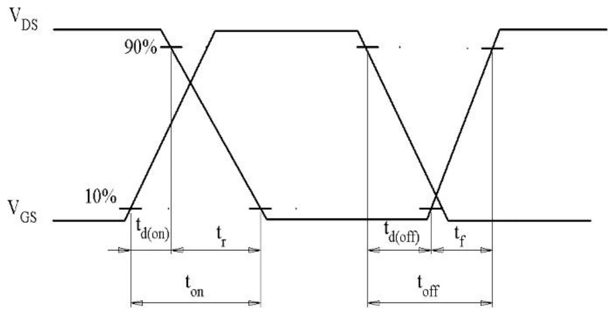
1. Gate Charge Test Circuit & Waveform



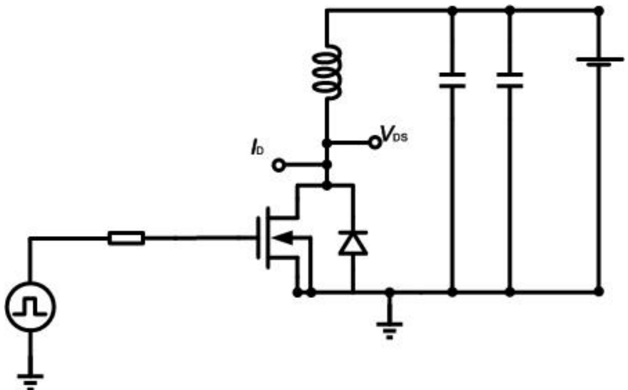


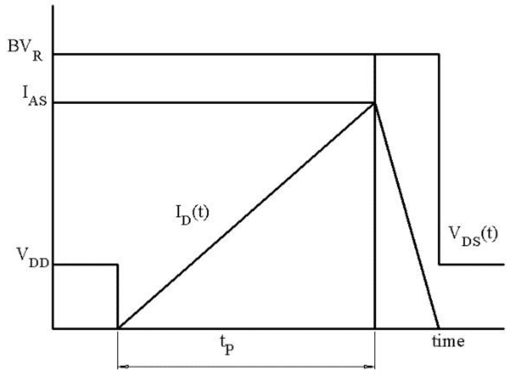
2. Switch Time Test Circuit



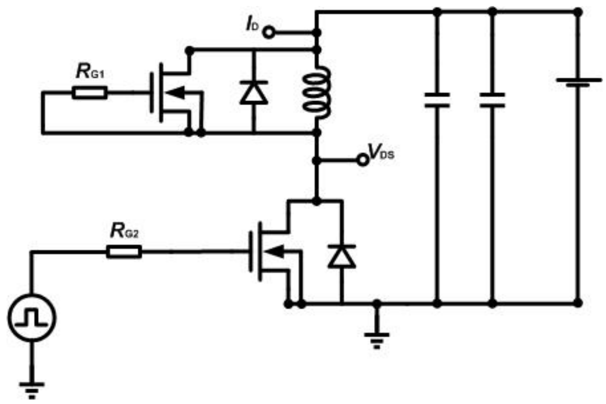


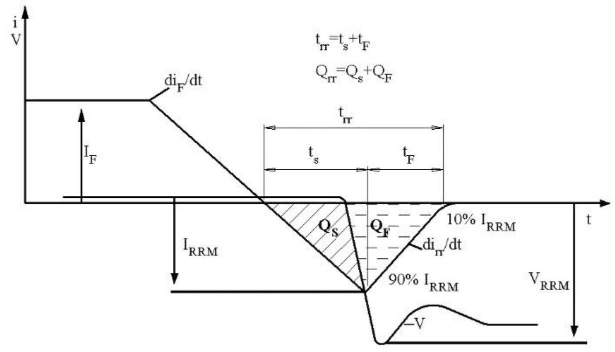
3. Unclaimed Inductive Switching Test Circuit & Waveforms





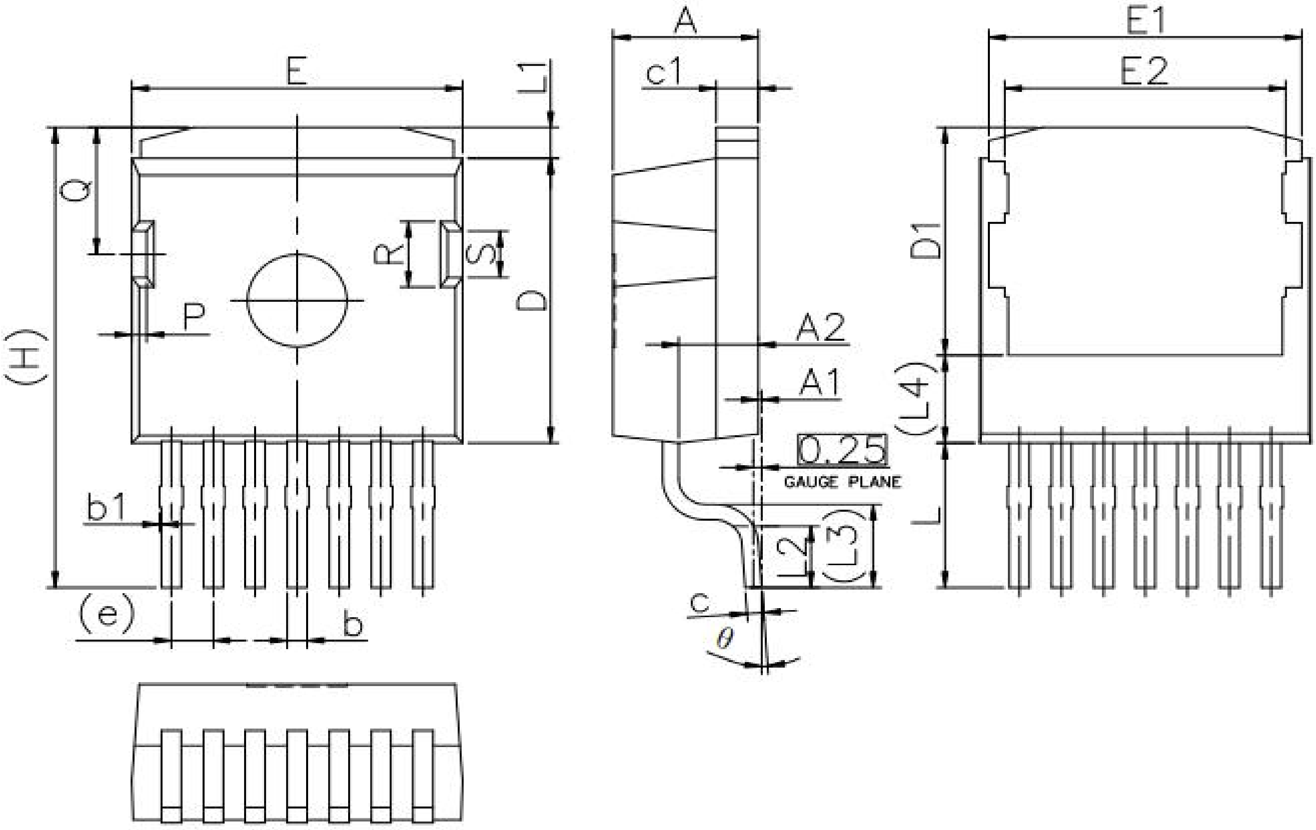
4. Test Circuit and Waveform for Diode Characteristics





Mechanical Dimensions

TO-263-7 **Unit: mm**



Symbol	Dimensions(mm) Min.	Typ.	Max.	Symbol	Dimensions(mm) 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°

TM

Sanrise Tech

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IMPORTANT NOTICE

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