

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-Leadless package.

Features

- Ultra Low $R_{DS(ON)} = 68m\Omega @ V_{GS} = 10V$.
- $V_{ds@T_{jmax}} = 650V$.
- Ultra Low Gate Charge, $Q_g = 116nC$ typ.
- Fast switching capability
- Robust design with better EAS performance
- EMI Improved
- Non-automotive Qualified
- Ultra-fast body diode

Application

- Telecom Power
- Server Power
- High Power Application

Symbol

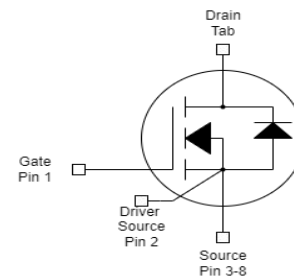
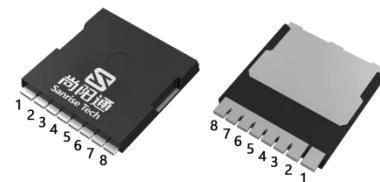


Figure 1 Symbol of SRC60R068BS

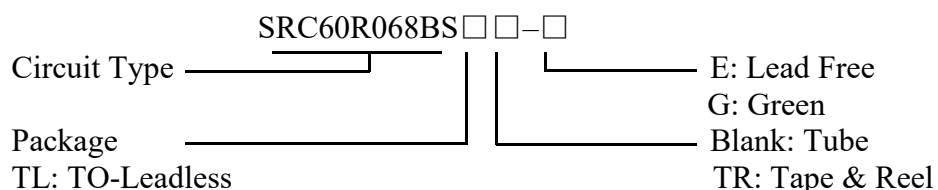
Package Type



TO-LL

Figure 2 Package Type of SRC60R068BS

Ordering Information



Package	Part Number		Marking ID		Packing Type
	Lead Free	Green	Lead Free	Green	
TO-LL	SRC60R068BSTLTR-E	SRC60R068BSTLTR-G	SRC60R068BSTLE	SRC60R068BSTLG	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(TO-LL, $T_c=25^{\circ}C$)		P_{tot}	357.1	W
Continuous Drain Current	$T_c=25^{\circ}C$	I_D	48	A
	$T_c=100^{\circ}C$		30.3	
	$T_c=125^{\circ}C$		21.5	
Pulsed Drain Current (Note 2)		I_{DM}	144	A
Avalanche Energy, Single Pulse (Note 3)		E_{AS}	125	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}	5.0	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	°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. $I_{AS} = 2.5A$, $V_{DD} = 60V$, $R_G = 25\Omega$, Starting $T_J = 25^{\circ}C$. Finish goods test condition.
4. $I_{AS} = 7A$, $V_{DD} = 60V$, $R_G = 25\Omega$, Starting $T_J = 25^{\circ}C$. Typical Eas.

Thermal characteristics

Parameter		Symbol	Min	Typ	Max	Unit
Thermal resistance, Junction-to-Case	TO-LL	R_{thJC}			0.35	°C/W
Thermal resistance, Junction-to-Ambient	TO-LL	R_{thJA}			58	°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}	$V_{GS}=0V, I_D=250\mu A$	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		
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}	$C_{O(er)}$	$V_{GS}=0V, V_{DS}=0\dots 400V$		94		pF	
Effective output capacitance, time related ^{NOTE6}	$C_{O(tr)}$				550		
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=400V, I_D=24A, R_G=10\Omega, V_{GS}=12V$		43.2		ns	
Rise Time	t_r				9.6		
Turn-off Delay Time	$t_{d(off)}$				69.6		
Fall Time	t_f				6.4		
Gate Charge Characteristics							
Gate to Source Charge	Q_{gs}	$V_{DD}=480V, I_D=24A, V_{GS}=0 \text{ to } 10V$		30.5		nC	
Gate to Drain Charge	Q_{gd}				66.8		
Gate Charge Total	Q_g				116		
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}	$V_R=400V, I_F=30A, dI_F/dt=130A/\mu s$		115		ns	
Reverse Recovery Charge	Q_{rr}				0.77		μC
Peak Reverse Recovery Current	I_{rrm}				11.7		A

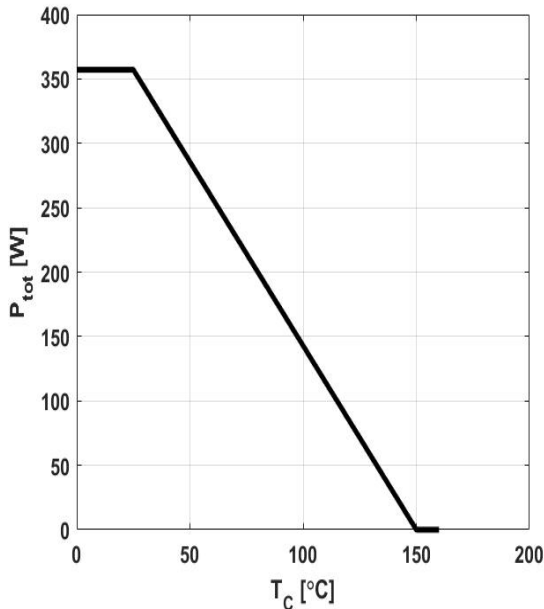
Note:

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

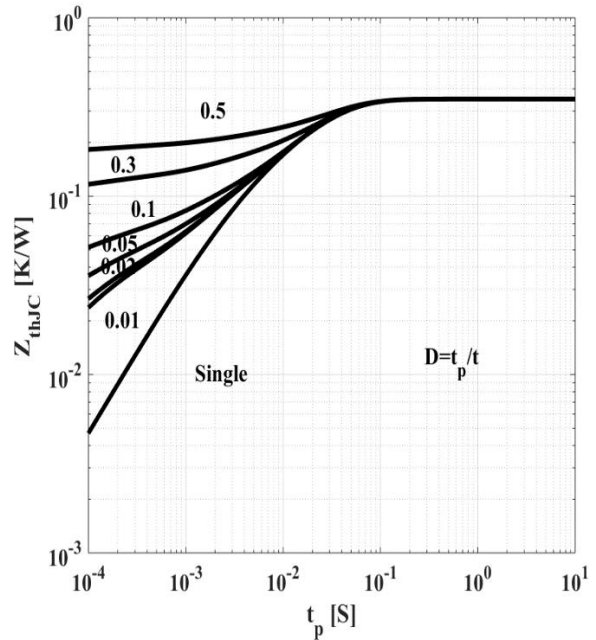
Typical Performance Characteristics

Figure 3: Power Dissipation



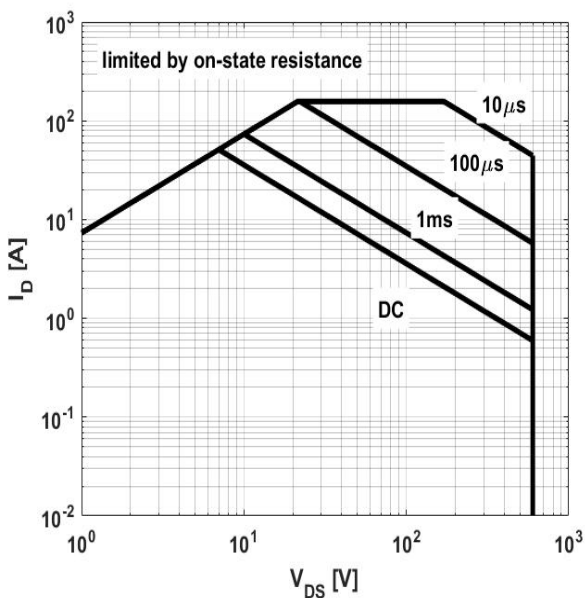
$$P_{tot} = f(T_c);$$

Figure 4: Max. Transient Thermal Impedance



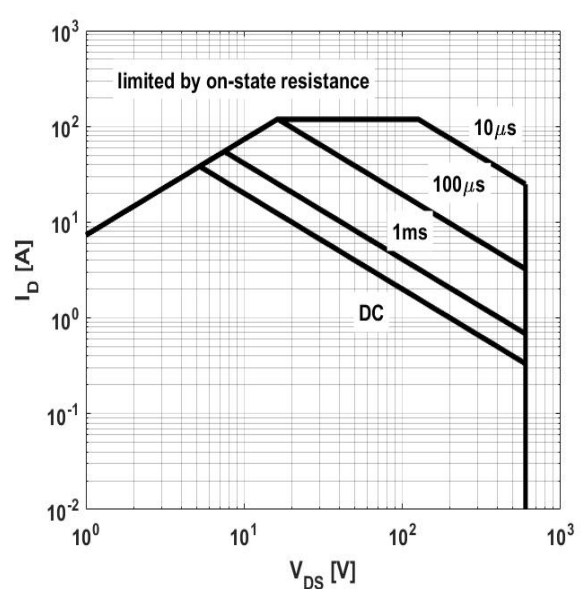
$$Z_{(th)JC} = f(t_p); \text{ parameter: } D = t_p/T;$$

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



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

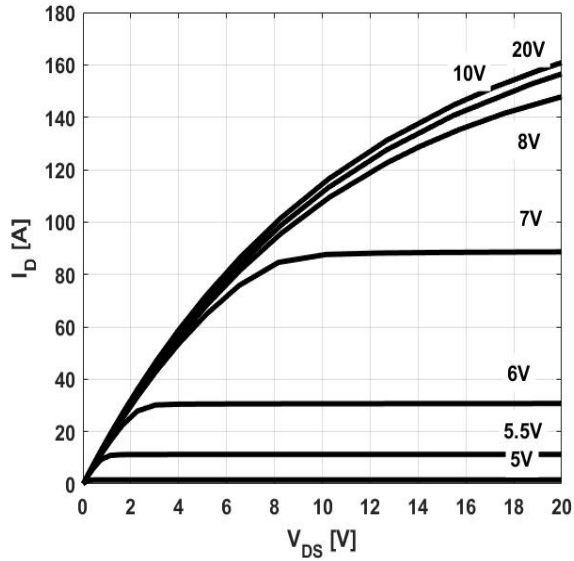
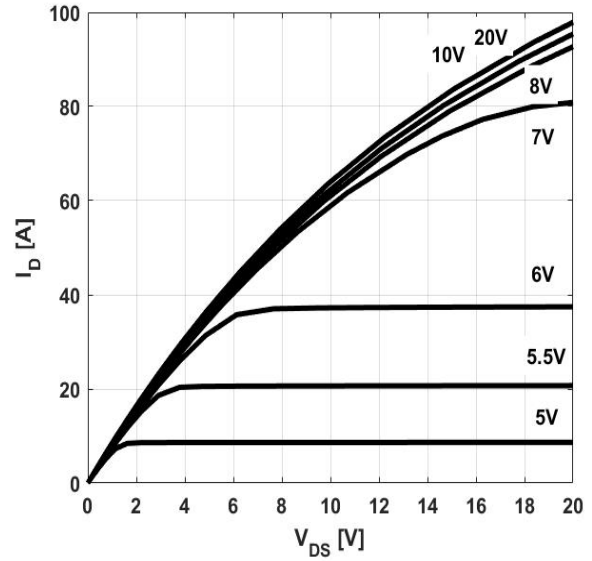
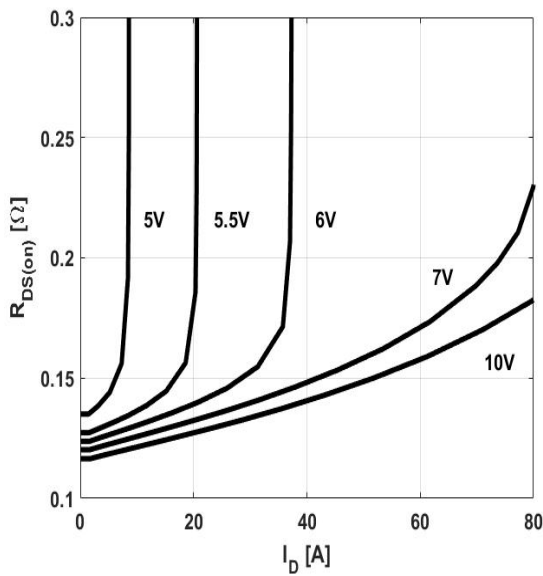
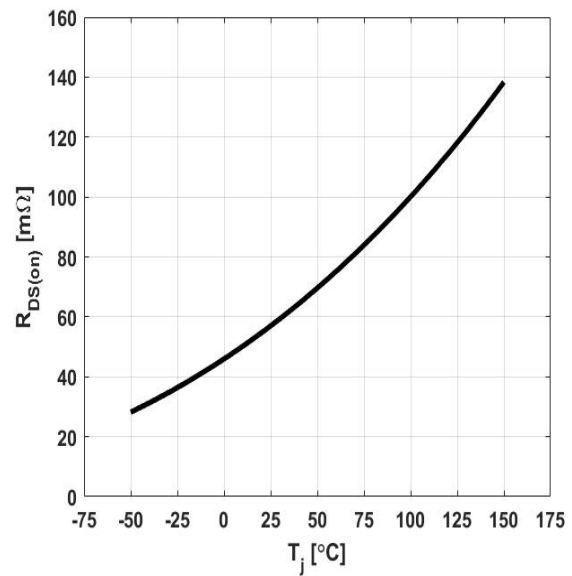
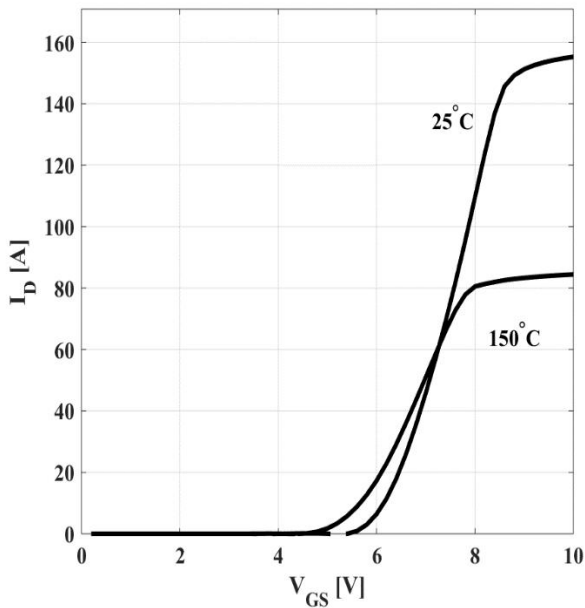
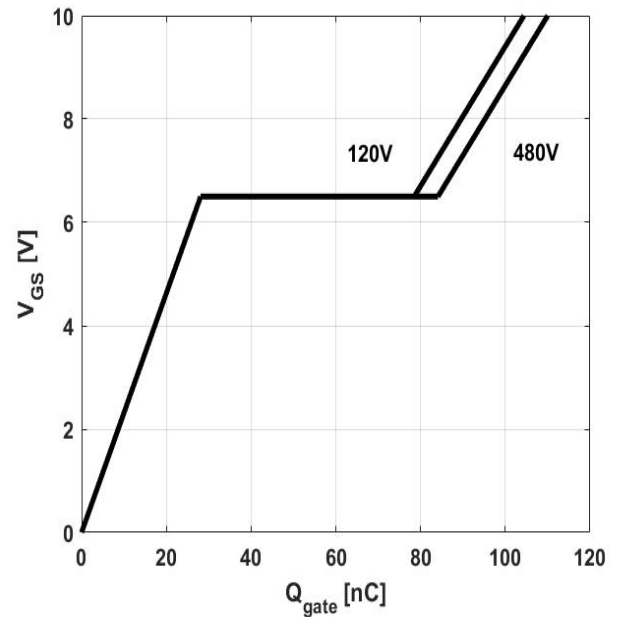
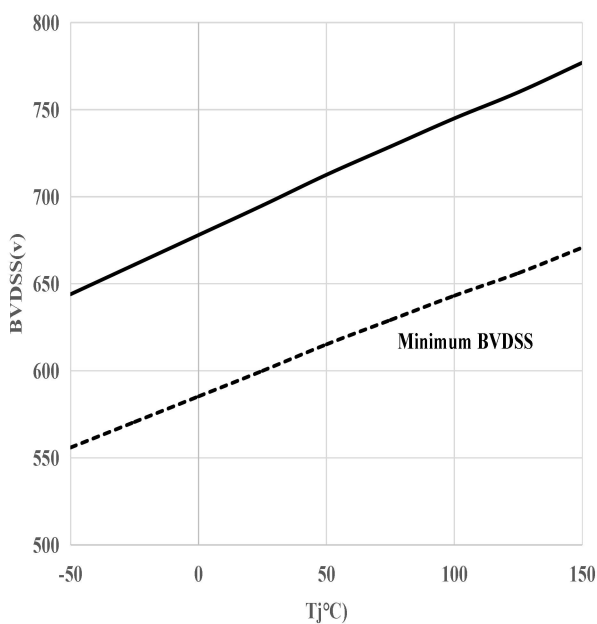
Figure 7: Typ. Output Characteristics

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


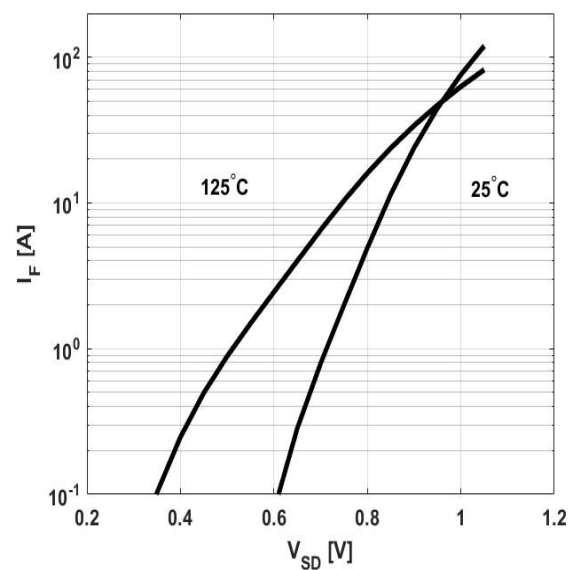
$$I_D = f(V_{GS}); V_{DS} = 20V$$

Figure 12: Typ. Gate Charge


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

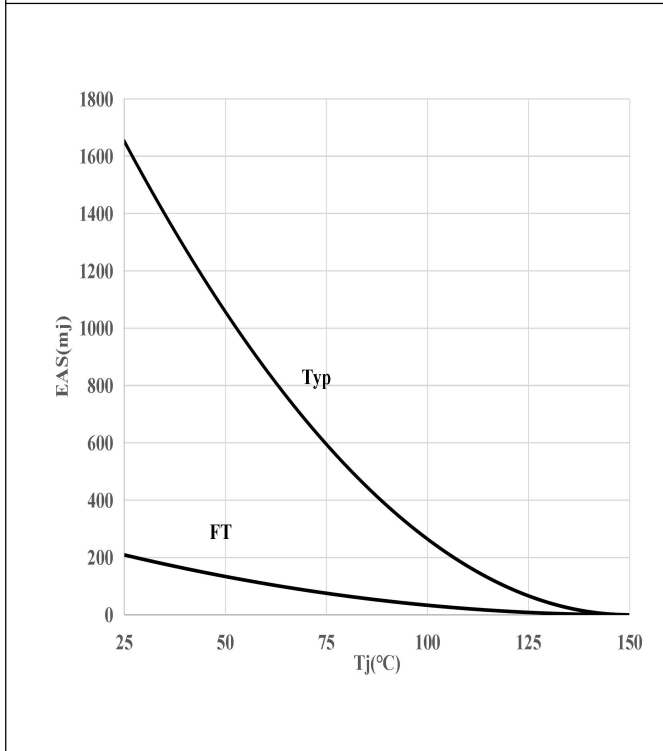
Figure 13: Drain-Source Breakdown Voltage


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

Figure 14: Forward Characteristics of Reverse Diode


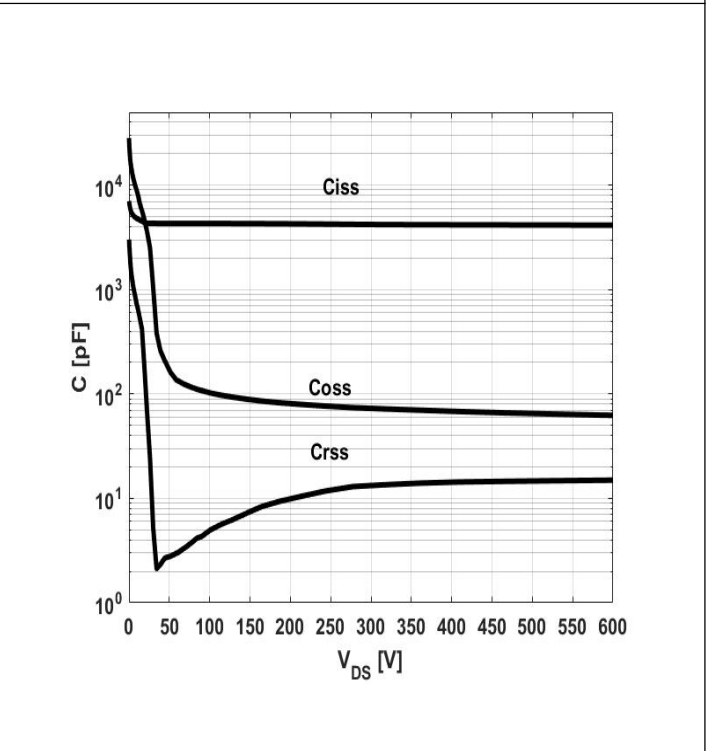
$$I_F = f(V_{SD}); \text{parameter: } T_j$$

Figure 15: Avalanche Energy



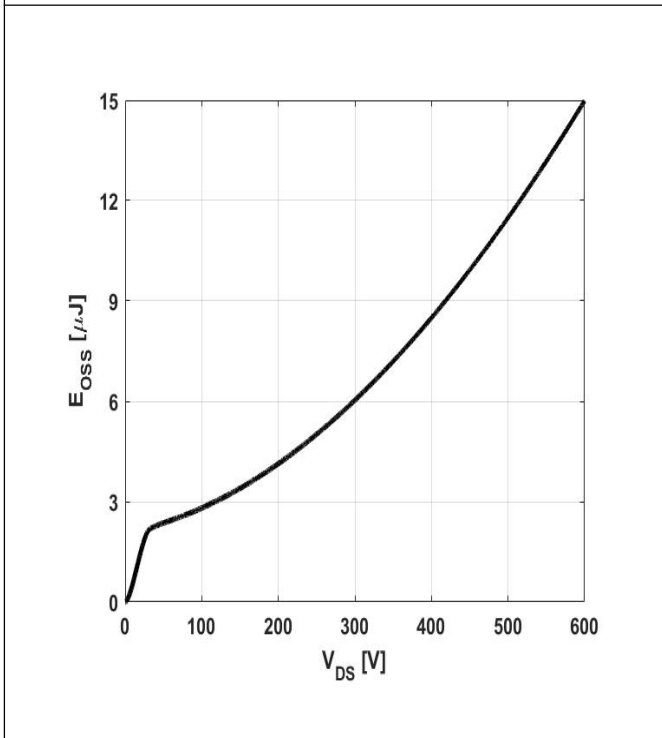
$E_{AS}=f(T_j); V_{DD}=60V$

Figure 16: Typ. Capacitances

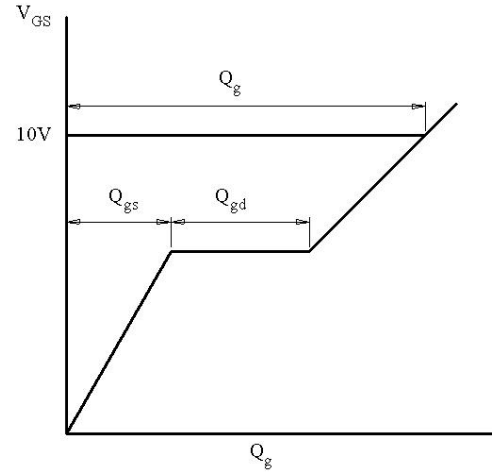
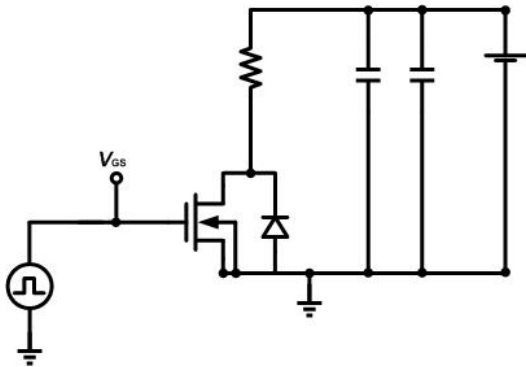
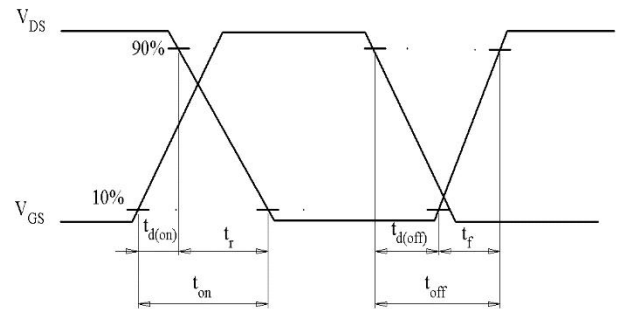
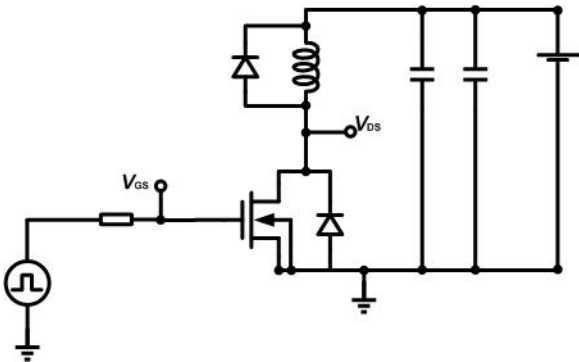
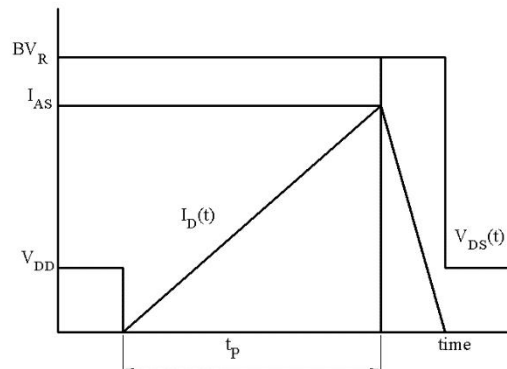
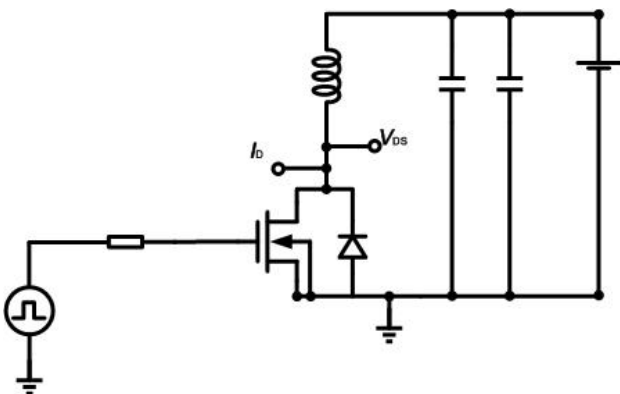


$C=f(V_{DS}); V_{GS}=0; f=1MHz$

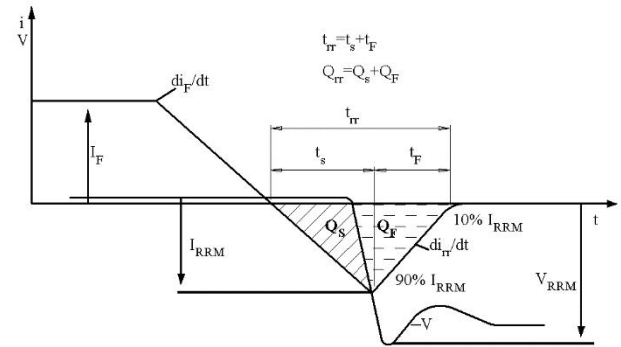
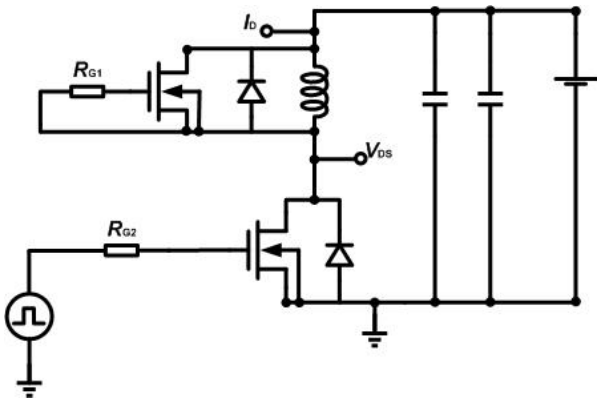
Figure 17: Coss Stored Energy

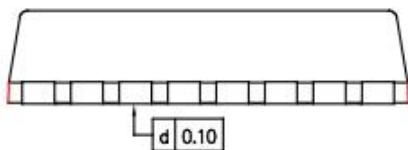
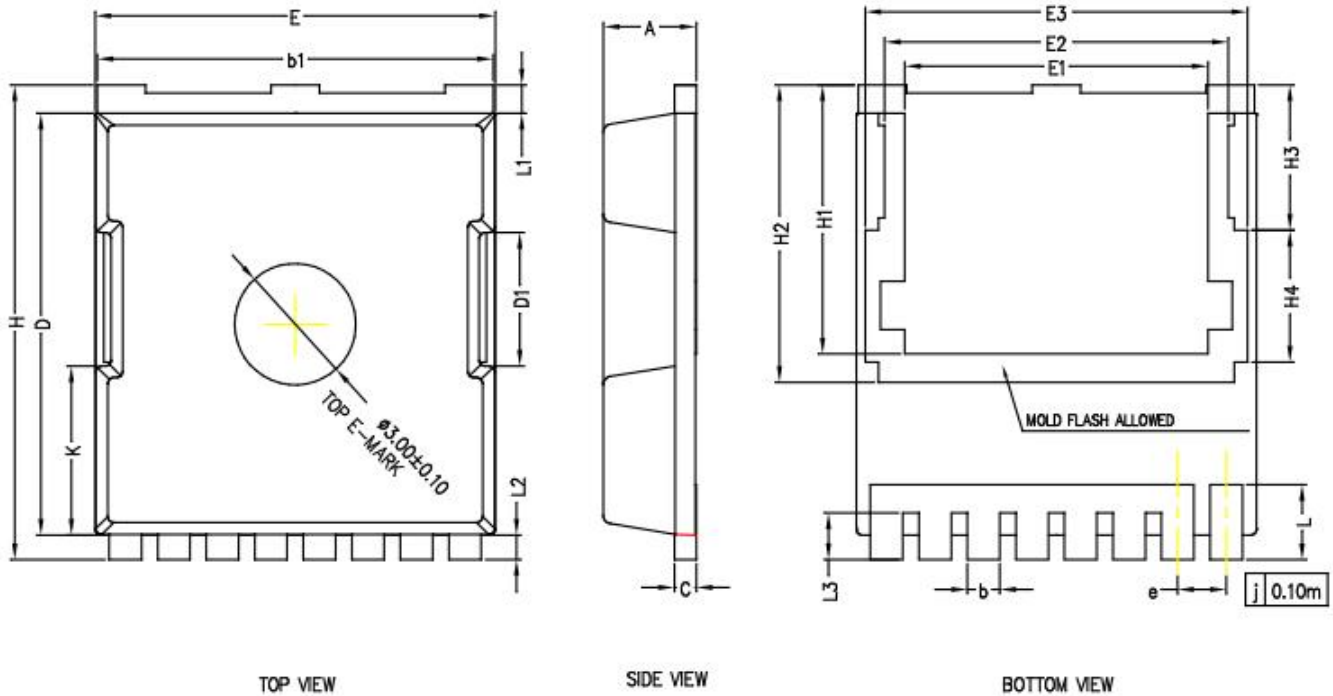


$E_{oss}=f(V_{DS})$

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 Dimension
TO-Leadless
Unit: mm


Symbol	Dimensions(mm)			Symbol	Dimensions(mm)		
	Min.	Typ.	Max.		Min.	Typ.	Max.
A	2.20	2.30	2.40	H1	6.55	6.65	6.75
b	0.70	0.80	0.90	H2	7.20	7.35	7.50
b1	9.70	9.80	9.90	H3	3.44	3.59	3.74
c	0.40	0.50	0.60	H4	3.11	3.26	3.41
D	10.28	10.43	10.58	K	4.03	4.18	4.33
D1	3.15	3.30	3.45	L	1.60	1.85	2.10
E	9.70	9.90	10.10	L1	0.55	0.70	0.85
E1	7.35	7.50	7.65	L2	0.45	0.60	0.75
E2	8.35	8.50	8.65	L3	1.00	1.15	1.30
E3	9.31	9.46	9.61	H	11.48	11.73	11.88
e	1.10	1.20	1.30				



Shenzhen Sanrise Technology Co., LTD

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