

General Description

The Sanrise SRC65R800 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 SRC65R800 break down voltage is 650V and it has a high rugged avalanche characteristic.

The SRC65R800 is available in TO-220F, TO-252 packages.

Features

- Ultra Low $R_{DS(ON)} = 800m\Omega @ V_{GS} = 10V$.
- Ultra Low Gate Charge, $Q_g = 6.2nC$ typ.
- Intrinsic Fast-Recovery Body Diode
- Fast switching capability
- Robust design with better EAS performance
- Non-automotive Qualified

Application

- LED lighting
- Quick Charger

Symbol

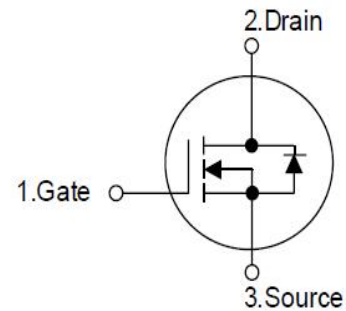
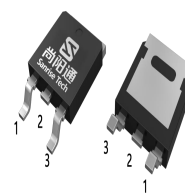
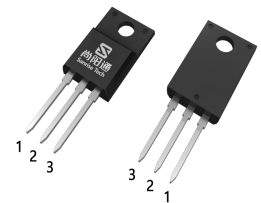


Figure 1 Symbol of SRC65R800

Package Type



TO-252



TO-220F

Figure 2 Package Types of SRC65R800

Ordering Information

SRC65R800□□-□		
Circuit Type	_____	E: Lead Free
Package	_____	G: Green
TF: TO-220F		Blank: Tube
D: TO-252		TR: Tape & Reel

Package	Part Number	Marking ID	Packing Type
TO-220F	SRC65R800TF-G	SRC65R800TFG	Tube
TO-252	SRC65R800DTR-G	SRC65R800DG	Tape & Reel

Absolute Maximum Ratings

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DS}	650	V
Gate-Source Voltage (static)		V_{GS}	± 20	V
Gate-Source Voltage (dynamic), AC ($f > 1$ Hz)		V_{GS}	± 30	V
Continuous Drain Current	$T_C = 25^\circ\text{C}$	I_D	3.9	A
			2.5	
	$T_C = 125^\circ\text{C}$		1.8	
Power Dissipation ($T_C = 25^\circ\text{C}$, TO-220F)		P_{tot}	20	W
Power Dissipation ($T_C = 25^\circ\text{C}$, TO-252)		P_{tot}	29	W
Pulsed Drain Current (Note 2)		I_{DM}	11.7	A
Avalanche Energy, Single Pulse (Note 3)		E_{AS}	80	mJ
Avalanche Energy, Repetitive (Note 2)		E_{AR}	0.1	mJ
Avalanche Current, Repetitive (Note 2)		I_{AR}	0.2	A
Continuous Diode Forward Current		I_S	3.9	A
Diode Pulse Current		$I_{S,PULSE}$	11.7	A
MOSFET dv/dt Ruggedness, $V_{DS} \leq 480\text{V}$		dv/dt	15	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. $I_{AS} = 3.0\text{A}$, $V_{DD} = 60\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$

Thermal Resistance

Parameter		Symbol	Min	Typ	Max	Unit
Thermal resistance, Junction-to-Case	TO-220F	R_{thJC}			6.0	$^\circ\text{C} / \text{W}$
	TO-252				4.2	
Thermal resistance, Junction-to-Ambient	TO-220F	R_{thJA}			80	$^\circ\text{C} / \text{W}$
	TO-252				62	

Electrical Characteristics

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

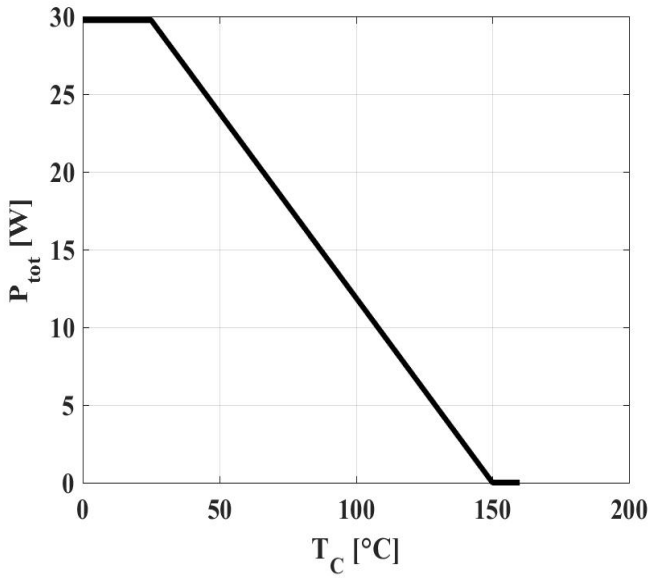
Parameter		Symbol	Test Conditions	Min	Typ	Max	Unit
Statistic Characteristics							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V, I _D =250uA	650			V
Zero Gate Voltage Drain Current		I _{DSS}	V _{DS} =650V, V _{GS} =0V			1	uA
Gate-Body Leakage Current	Forward	I _{GSSF}	V _{GS} =20V, V _{DS} =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 =0.8mA	2.5	3.5	4.5	V
Static Drain-Source On-Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =1.5A		0.67	0.8	Ω
Gate Resistance		R _G	f=1MHz, Open Drain		6.0		Ω
Dynamic Characteristics							
Input Capacitance		C _{ISS}	V _{DS} =50V, V _{GS} =0V, f=1MHz		293		pF
Output Capacitance		C _{OSS}			15		pF
Reverse Transfer Capacitance		C _{RSS}			0.4		
Effective output capacitance, energy related ^{NOTE5}		C _{O(er)}	V _{GS} =0V, V _{DS} =0...400V		8.8		pF
Effective output capacitance, time related ^{NOTE6}		C _{O(tr)}			55.6		
Turn-on Delay Time		t _{d(on)}	V _{DD} =400V, I _D =1.6A R _G =10Ω, V _{GS} =10V		6		ns
Rise Time		t _r			5		
Turn-off Delay Time		t _{d(off)}			40		
Fall Time		t _f			13		
Gate Charge Characteristics							
Gate to Source Charge		Q _{gs}	V _{DD} =480V, I _D =1.5A V _{GS} =0 to 10V		1.5		nC
Gate to Drain Charge		Q _{gd}			2.2		
Gate Charge Total		Q _g			6.2		
Gate Plateau Voltage		V _{plateau}			5.0		V
Reverse Diode Characteristics							
Drain-Source Diode Forward Voltage		V _{SD}	V _{GS} =0V, I _{SD} =1.5A		0.82	1.1	V
Reverse Recovery Time		t _{rr}	V _R =100V, I _F =1.5A dI _F /dt=100A/us		110		ns
Reverse Recovery Charge		Q _{rr}			0.45		uC
Peak Reverse Recovery Current		I _{rrm}			8.2		A

Note:

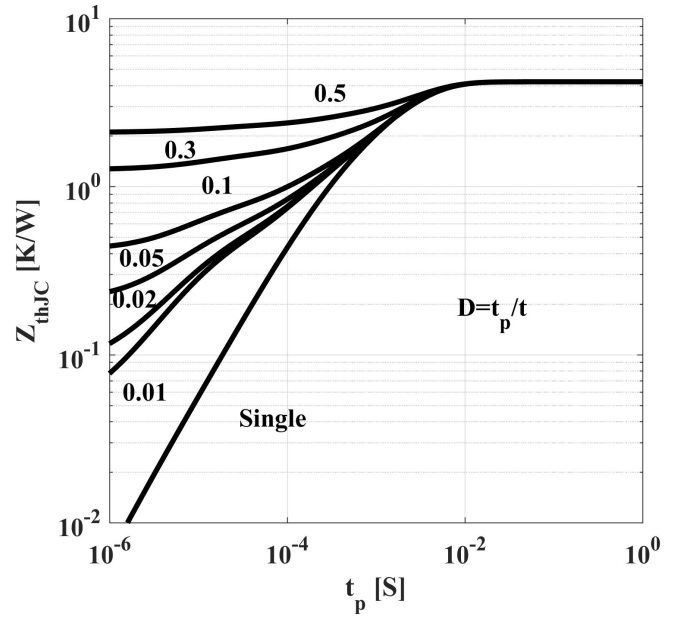
5. $C_{O(er)}$ is a fixed capacitance that gives the same stored energy as C_{OSS} while V_{DS} is rising from 0 to 400V

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

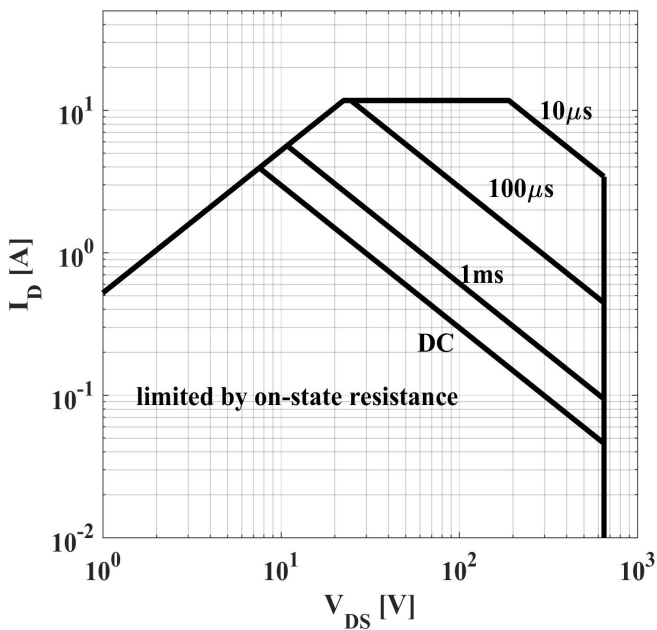
Typical Performance Characteristics

Figure 3: Power Dissipation


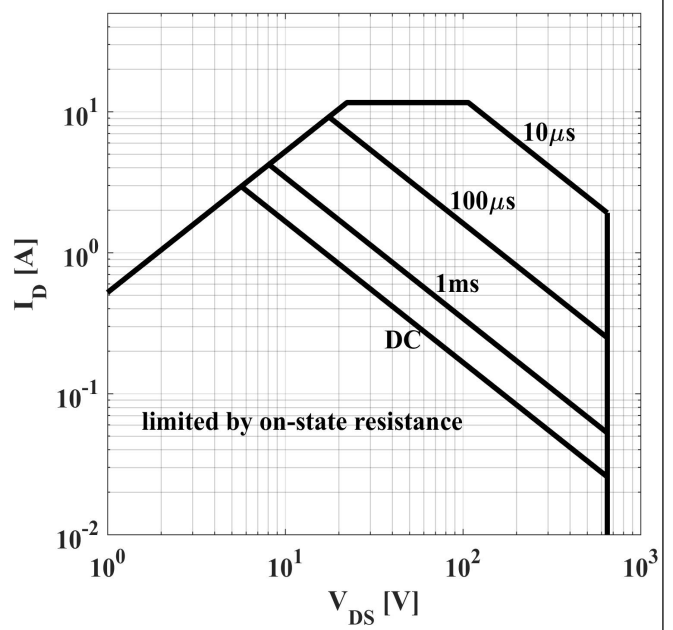
$$P_{tot} = f(T_c)$$

Figure 4: Max. Transient Thermal Impedance


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

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


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

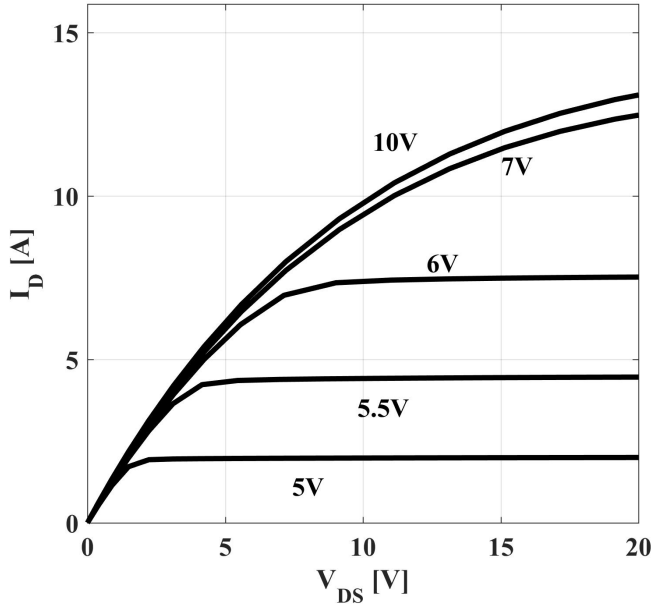
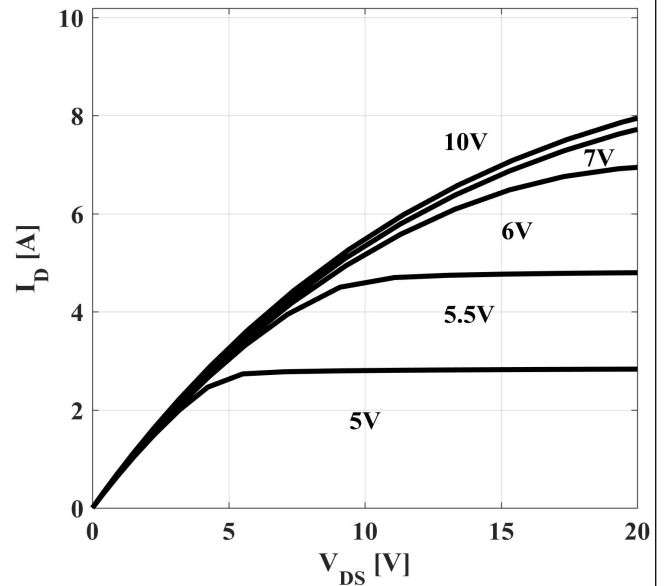
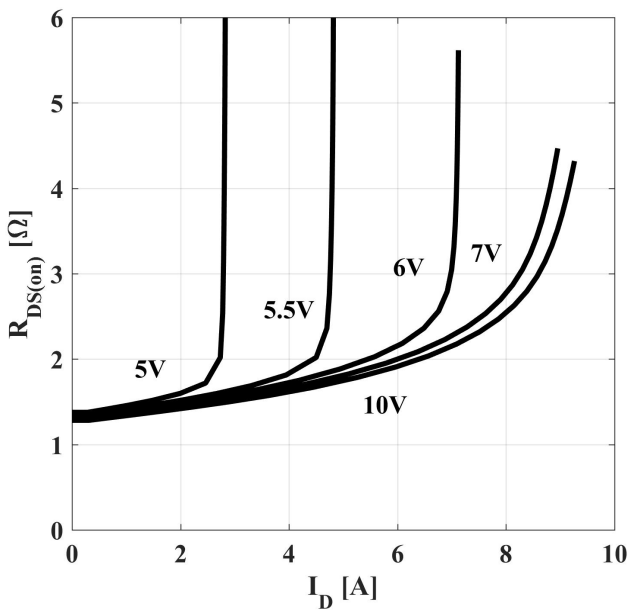
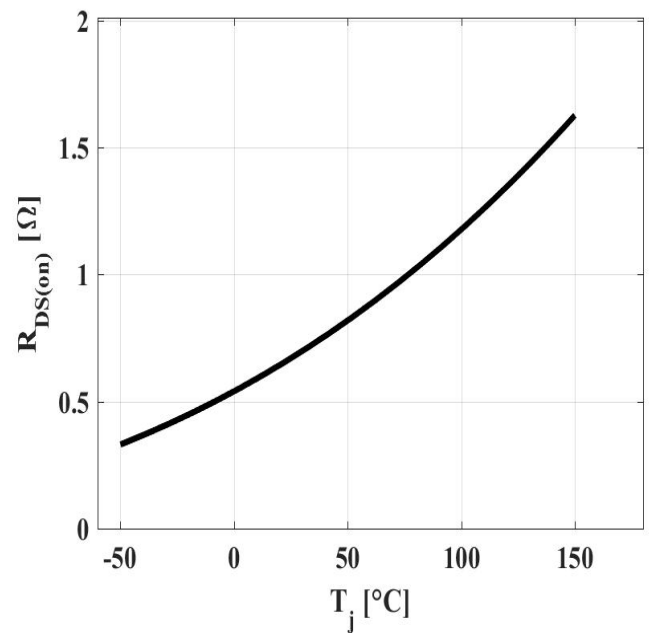
Figure 7: Typ. Output Characteristics

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

 $R_{DS(ON)} = f(T_j); I_D = 1.5\text{A}; V_{GS} = 10\text{V}$

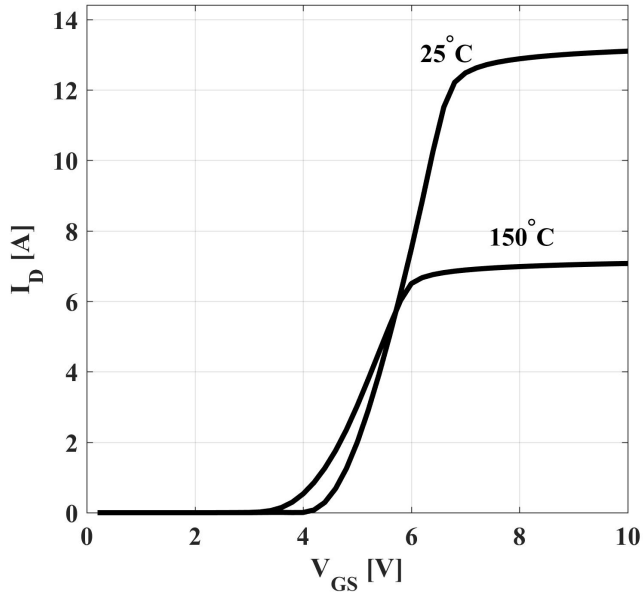
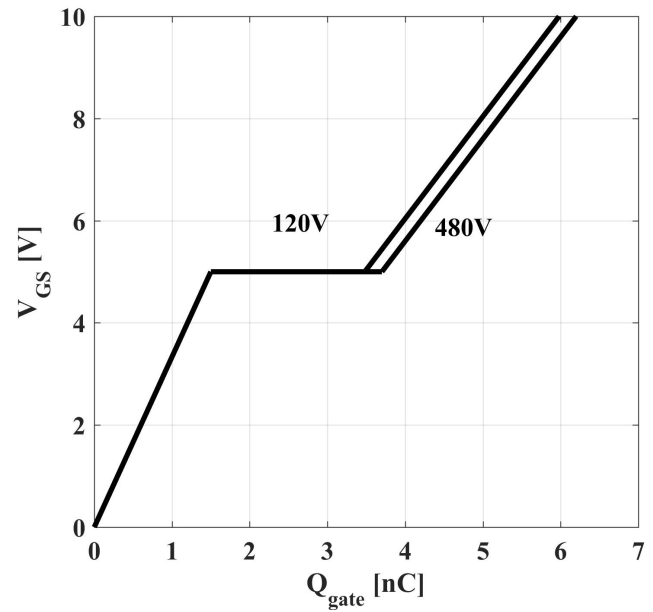
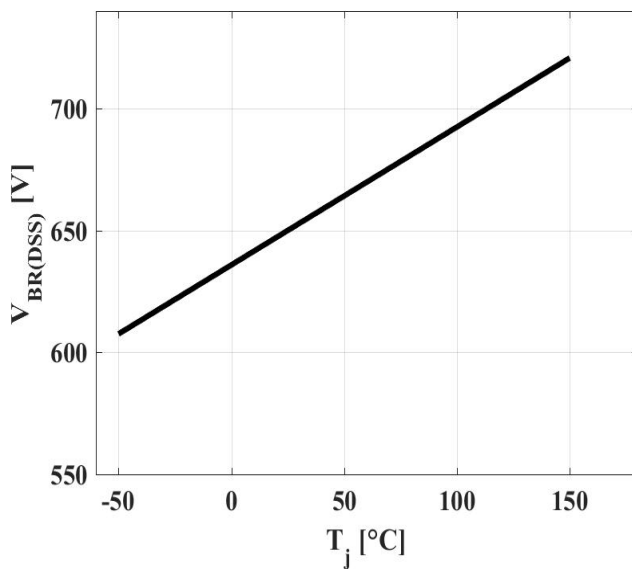
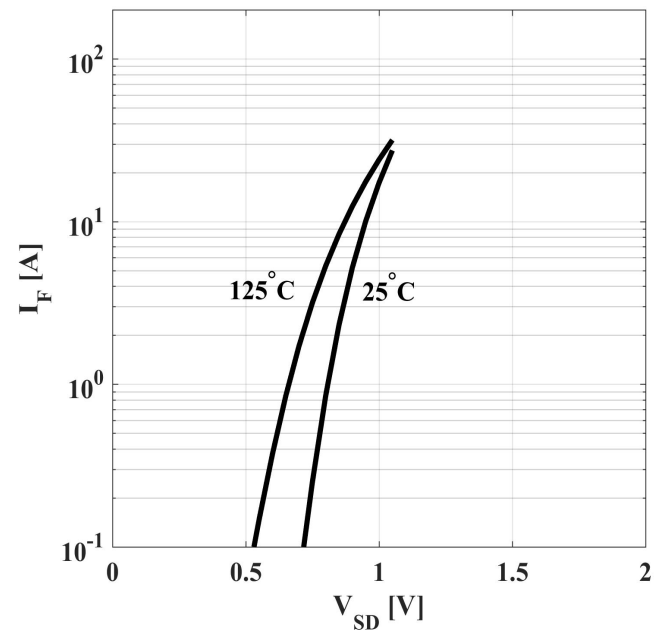
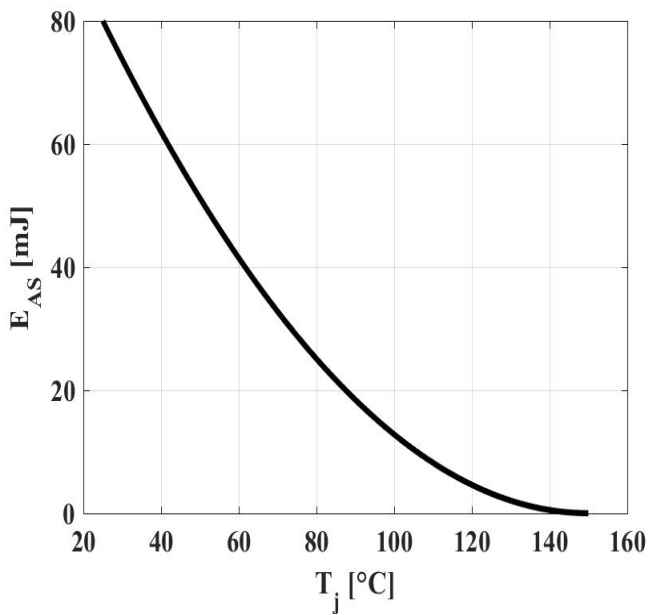
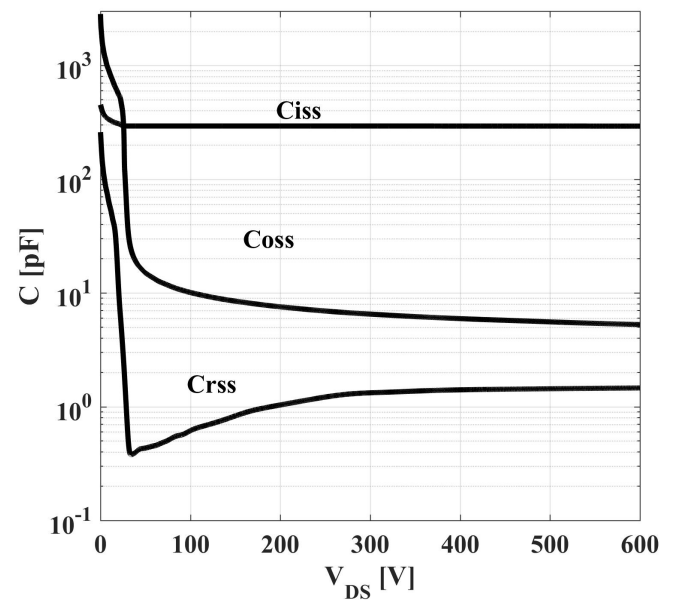
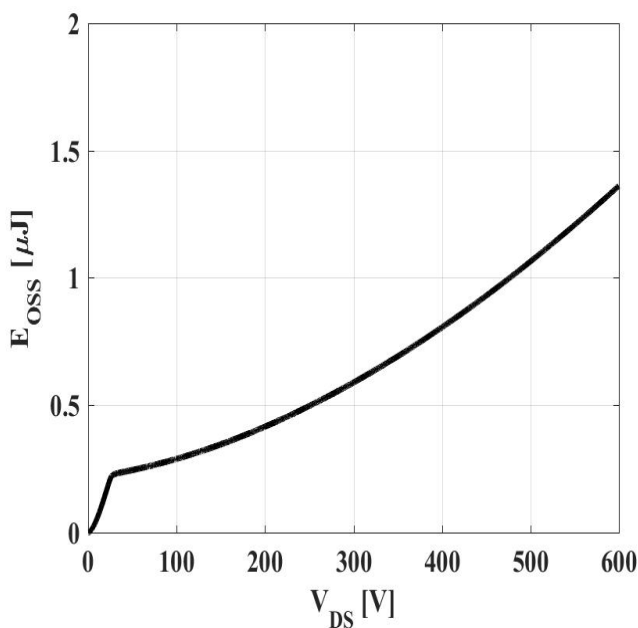
Figure 11: Typ. Transfer Characteristics

 $I_D = f(V_{GS}); V_{DS} = 20V$
Figure 12: Typ. Gate Charge

 $V_{GS} = f(Q_{gate}), I_D = 1.5A \text{ pulsed}$
Figure 13: Drain-Source Breakdown Voltage

 $\text{Minimum } V_{BR(DSS)} = f(T_j); I_D = 1mA$
Figure 14: Forward Characteristics of Reverse Diode

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

Figure 15: Avalanche Energy


$$E_{AS}=f(T_j); I_D=0.2A; V_{DD}=60V$$

Figure 16: Typ. Capacitances


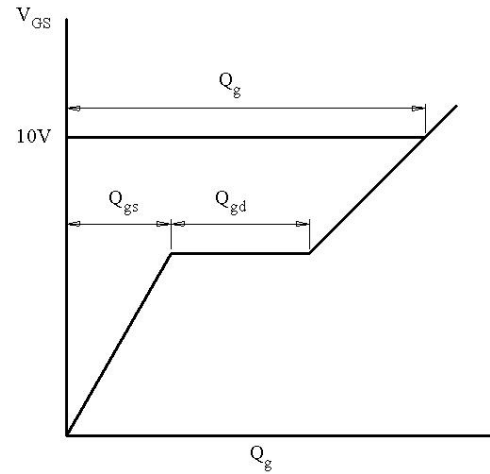
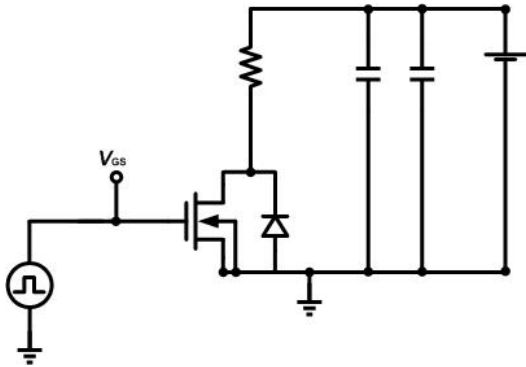
$$C=f(V_{DS}); V_{GS}=0; f=1MHz$$

Figure 17: Coss Stored Energy


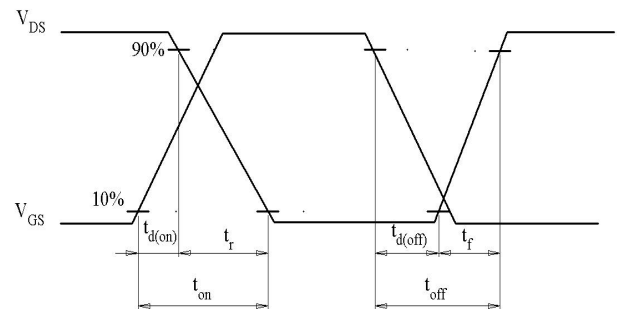
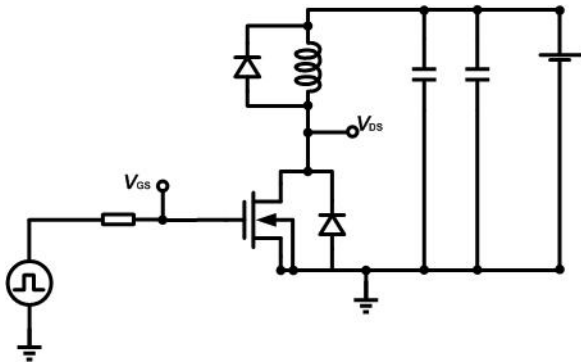
$$E_{OSS}=f(V_{DS})$$

Test Circuits

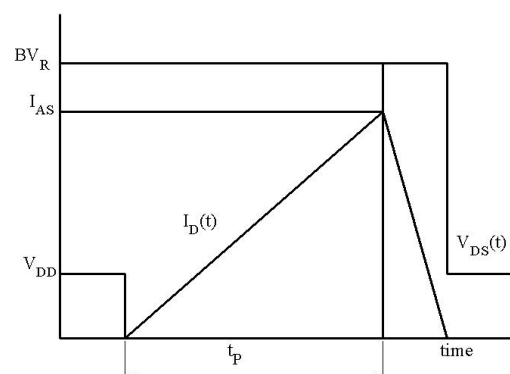
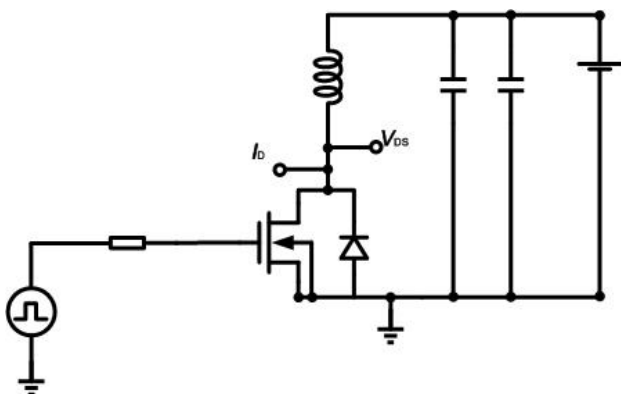
1. Gate Charge Test Circuit & Waveform



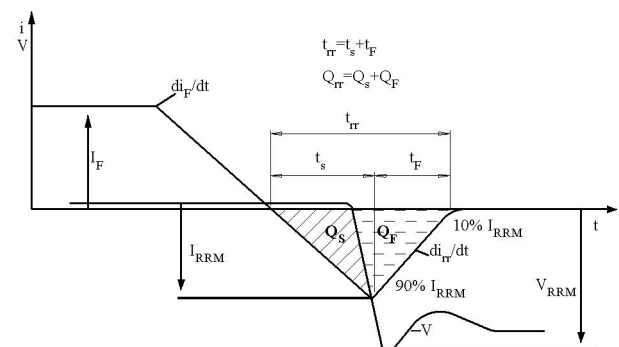
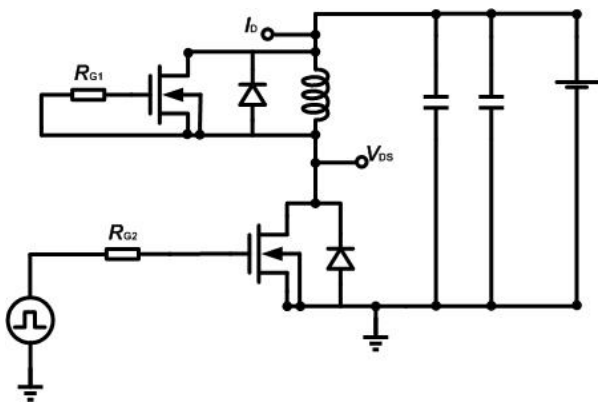
2. Switch Time Test Circuit

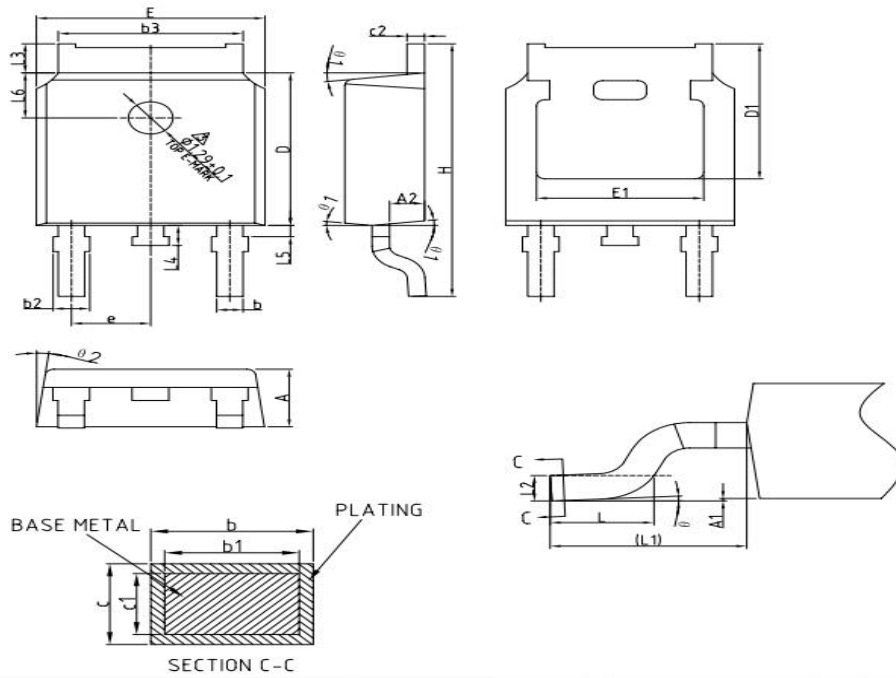


3. Unclaimed Inductive Switching Test Circuit & Waveforms

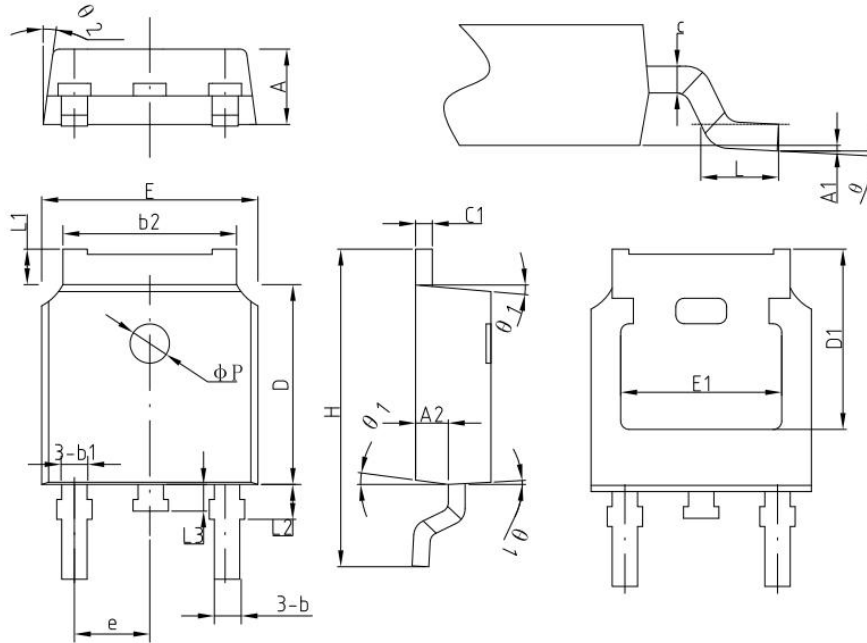


4. Test Circuit and Waveform for Diode Characteristics



Mechanical Dimensions
TO-252 (Package 1)
Unit: mm


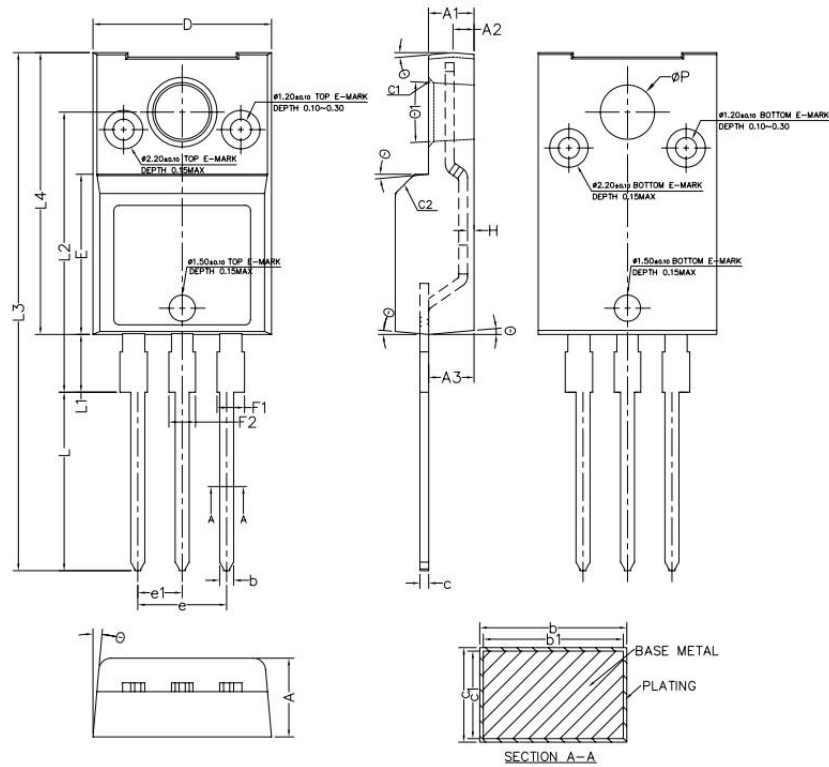
Symbol	Dimensions(mm)		
	Min.	Typ.	Max.
A	2.20	2.30	2.38
A1	0	-	0.10
A2	0.90	1.01	1.10
b	0.72	-	0.85
b1	0.71	0.76	0.81
b2	0.72	-	0.90
b3	5.13	5.33	5.46
c	0.47	-	0.60
c1	0.46	0.51	0.56
C2	0.47	-	0.60
D	6.0	6.10	6.20
D1	5.25	-	-
E	6.50	6.60	6.70
E1	4.70	-	-
e	2.186	2.286	2.386
H	9.80	10.10	10.40
L	1.40	1.50	1.70
L1	2.90REF		
L2	0.51BSC		
L3	0.90	-	1.25
L4	0.60	0.80	1.00
L5	0.15	-	0.75
L6	1.80REF		
Θ	0°	-	8°
Θ1	5°	7°	9°
Θ2	5°	7°	9°

Mechanical Dimensions
TO-252 (Package 2)
Unit: mm


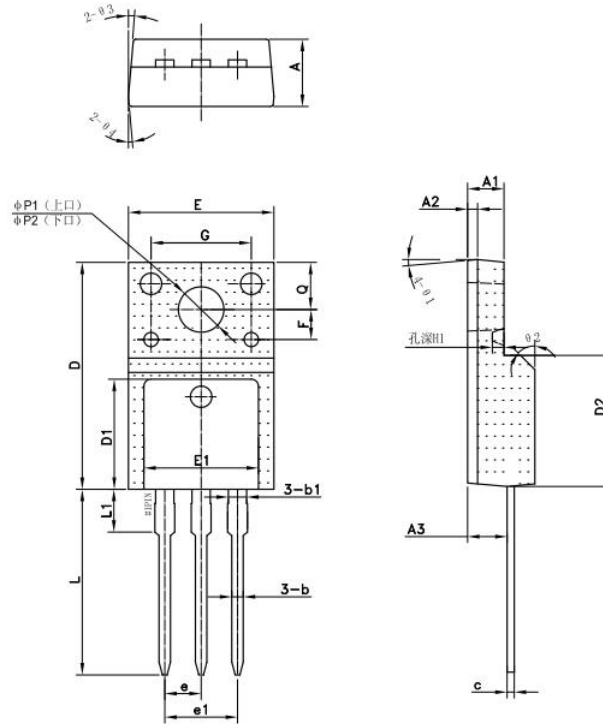
Symbol	Dimensions(mm)		
	Min.	Typ.	Max.
A	2.20	2.30	2.38
A1	0	-	0.127
A2	0.90	1.01	1.10
b	0.635	0.76	0.86
b1	-	0.76	-
b2	5.2	5.33	5.46
c	0.47	0.50	0.60
c1	0.47	0.50	0.60
D	6.0	6.10	6.20
D1	-	5.30	-
E	6.50	6.60	6.70
E1	-	4.83	-
e	2.286(BSC)		
H	9.70	10.10	10.40
L	1.40	1.50	1.70
L1	0.90	-	1.25
L2	-	1.0	-
L3	-	0.8	-
φP	-	1.2	-
Θ	0°	-	8°
Θ1	5°	7°	9°
Θ2	5°	7°	9°

Mechanical Dimensions
TO-220F (Package 1)

Unit: mm



Symbol	Dimensions(mm)		
	Min.	Typ.	Max.
A	4.40	4.50	4.60
A1	2.50	2.60	2.70
A2	1.10	1.20	1.30
A3	2.49	2.59	2.69
b	0.76	-	0.89
b1	0.75	0.80	0.85
c	0.46	-	0.59
c1	0.45	0.50	0.55
C1	0.20	0.30	0.40
C2	1.00	1.10	1.20
D	10.10	10.20	10.30
E	9.05	9.15	9.25
e	4.98	5.08	5.18
e1	2.44	2.54	2.64
F1	1.22	-	1.60
F2	1.17	-	1.55
H	0.32	0.37	0.42
L	10.00	10.20	10.40
L1	3.15	3.30	3.45
L2	15.85	16.00	16.15
L3	29.30	29.60	29.90
L4	16.00	16.10	16.20
P	3.00	3.10	3.20
θ	3°	5°	7°
θ1	4°	6°	8°

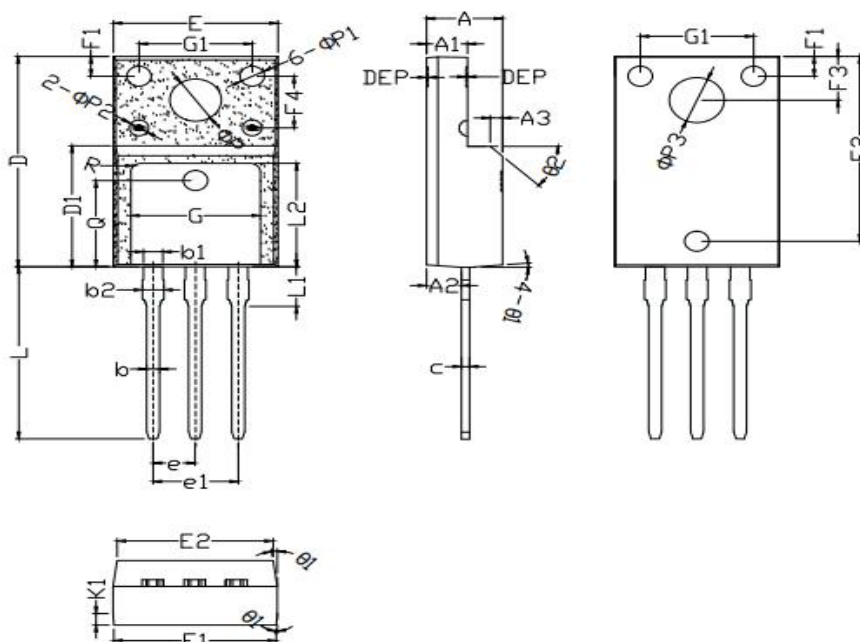
Mechanical Dimensions
TO-220F (Package 2)
Unit: mm


Symbol	Dimensions(mm)		
	Min.	Typ.	Max.
A	4.50	4.70	4.90
A1	2.34	2.54	2.70
A2	-	0.70	-
A3	2.56	2.76	2.96
b	0.70	0.80	0.95
b1	-	1.28	-
c	0.45	0.50	0.65
D	15.67	15.87	16.07
D1	-	7.70	-
D2	-	9.12	-
E	9.96	10.16	10.36
E1	-	8.00	-
e	2.54		
e1		5.08	
F		2.1	
G		7	
H1	-	0.81	-
L	12.48	12.98	13.20
L1	-	2.93	-
ΦP1 (上口)	2.98	3.18	3.38
ΦP2 (下口)	3.20	3.40	3.60
Q	3.10	3.30	3.50
θ1		5°	
θ2		45°	
θ2		5°	
θ3		5°	

Mechanical Dimensions

TO-220F (Package 3)

Unit: mm



Symbol	Dimensions(mm)		
	Min.	Typ.	Max.
A	4.50	4.70	4.90
A1	2.34	2.54	2.74
A2	2.60	2.80	2.95
A3	1.0REF		
b	0.75	0.80	0.85
b1	1.18	1.20	1.24
b2	1.18	1.24	1.30
c	0.45	0.50	0.55
D	15.67	15.87	16.07
D1	9.04	9.12	9.20
E	10.00	10.16	10.30
E1	9.94	10.06	10.30
E2	9.40	9.50	9.60
e	2.50	2.54	2.58
e1	5.08REF		
L	12.78	12.98	13.18
L1	2.70	2.92	3.20
L2	7.70	7.80	7.90
Q	6.50REF		
ΦP	3.08	3.18	3.28
ΦP1	1.45	1.55	1.65
ΦP2	0.95	1.15	1.35
ΦP3	3.30	3.40	3.50
θ1	3°	5°	7°
θ2	42°	45°	48°
F1	1.40	1.50	1.60
F2	13.80	13.90	14.00
F3	3.20	3.30	3.40
F4	3.70	3.90	4.10
G	7.80	8.00	8.20
G1	6.90	7.00	7.10
K1	0.65	0.70	0.75



Shenzhen Sanrise Technology Co., LTD

<http://www.sanrise-tech.com>

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