

800V N-Channel MOSFET

Description

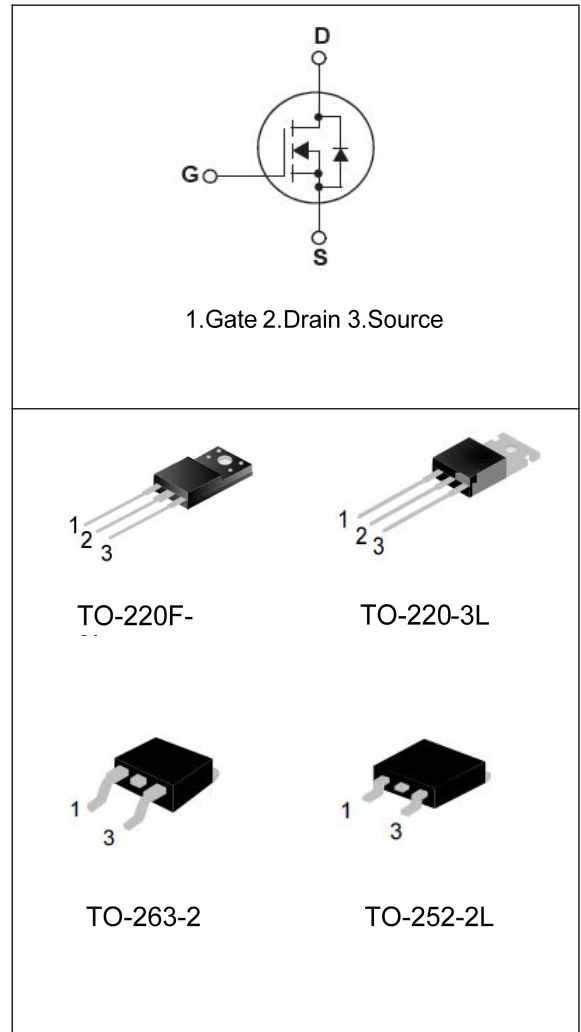
SJ-FET is new generation of high voltage MOSFET family that is utilizing an advanced charge balance mechanism for outstanding low on-resistance and lower gate charge performance.

This advanced technology has been tailored to minimize conduction loss, provide superior switching performance, and withstand extreme dv/dt rate and higher avalanche energy.

SJ-FET is suitable for various AC/DC power conversion in switching mode operation for higher efficiency.

Features

- Multi-Epi process SJ-FET
- 850V @TJ = 150°C
- Typ. RDS(on) = 0.48Ω
- Ultra Low Gate Charge (typ. Qg = 13nC)
- 100% avalanche tested



Package Marking and Ordering Information:

Marking	Package	Part #	Hazardous Substance Control	Packing
SR80R500F	T0-220F-3L	SR80R500F	Pb free	Tube
SR80R500T	T0-220-3L	SR80R500T	Pb free	Tube
SR80R500S	T0-263-2L	SR80R500S	Halogen free	Tube
SR80R500D	T0-252-2L	SR80R500D	Halogen free	Reel

Absolute Maximum Ratings

Symbol	Parameter	SR80R500T/S/D	SR80R500F	Unit
VDSS	Drain-Source Voltage	800		V
ID	Drain Current-Continuous(TC=25°C) -Continuous(TC=100°C)	10.5* 6.7*		A
IDM	Drain Current-Pulsed(Note1)	30*		A
VGSS	Gate-Source Voltage	±30		V
EAS	Single Pulsed Avalanche Energy(Note2)	210		mJ
IAR	Avalanche Current(Note1)	1.8		A
EAR	Repetitive Avalanche Energy(Note1)	0.32		mJ
DV/DT	Peak Diode Recovery DV/DT(Note3)	15		V/ns
DV/DS/DT	Drain Source Voltage Slope(Vds=640V)	50		V/ns
PD	Power Dissipation(TC=25°C)	83	31	W
TJ,TSTG	Operating and Storage Temperature Range	-55to+150		°C
TL	Maximum Lead Temperature for Soldering Purpose,1/8”from Case for 5 Seconds	300		°C

* Drain current limited by maximum junction temperature . Maximum duty cycle D=0.75.

Thermal Characteristics

Symbol	Parameter	SR80R500T/S/D	SR80R500F	Unit
RθJC	Thermal Resistance,Junction-to-Case	1.5	4.0	°C/W
RθCS	Thermal Resistance,Case-to-Sink Typ	0.5	-	°C/W
RθJA	Thermal Resistance,Junction-to-Ambient	62	80	°C/W

Electrical Characteristics TC = 25°C unless otherwise note

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Off Characteristics						
BVDSS	Drain-Source Breakdown Voltage	VGS=0V, ID=250uA Tj=25°C	800	-	-	V
		VGS=0V, ID=250uA Tj=150°C	-	850	-	V
BVDSS/TJ	Breakdown Voltage Temperature Coefficient	ID=250uA, Referenced to 25°C	-	0.6	-	V/°C
IDSS	Zero Gate Voltage Drain Current	VDS=800V, VGS=0V TJ=150°C	-	- 10	1 -	uA uA
IGSSF	Gate-Body Leakage Current, Forward	VGS=30V, VDS=0V	-	-	100	nA
IGSSR	Gate-Body Leakage Current, Reverse	VGS=-30V, VDS=0V	-	-	-10 0	nA
On Characteristics						
VGS(th)	Gate Threshold Voltage	VDS=VGS, ID=250uA	2.5	3.5	4.5	V
RDS(on)	Static Drain-Source On-Resistance	VGS=10V, ID=5.5A (TO-220F/TO-220/TO-263)	-	0.48	0.52	Ω
		VGS=10V, ID=5.5A (TO-252)	-	0.55	0.55	Ω
gFS	Forward Transconductance	VDS=40V, ID=11A	-	-	-	S
Dynamic Characteristics						
Ciss	Input Capacitance	VDS=25V, VGS=0V, f=1.0MHz	-	630	-	pF
Coss	Output Capacitance		-	180	-	pF
Crss	Reverse Transfer Capacitance		-	11	-	pF
Switching Characteristics						
td(on)	Turn-On Delay Time	VDS=400V, ID=5.5A RG=25Q, (Note4)	-	28	-	ns
tr	Turn-On Rise Time		-	19	-	ns
td(off)	Turn-Off Delay Time		-	65	-	ns
tf	Turn-Off Fall Time		-	19	-	ns
Qg	Total Gate Charge	VDS=450V, ID=5.5A VGS=10V, (Note4)	-	13	-	nc
Qgs	Gate-Source Charge		-	3.4	-	nc
Qgd	Gate-Drain Charge		-	4.9	-	nc
Drain-Source Diode Characteristics and Maximum Ratings						
IS	Maximum Continuous Drain-Source Diode Forward Current		-	-	11	A
ISM	Maximum Pulsed Drain-Source Diode Forward Current		-	-	30	A
VSD	Drain-Source Diode Forward voltage	VGS=0V, IS=11A	-	0.9	1.5	V
Trr	Reverse Recovery Time	VR=400V, VGS=0V IF=11A, dIF/dt=100A/us	-	600	-	ns
Qrr	Reverse Recovery Charge		-	7.2	-	uC
Irrm	Peak Reverse Recovery Current		-	22	-	A

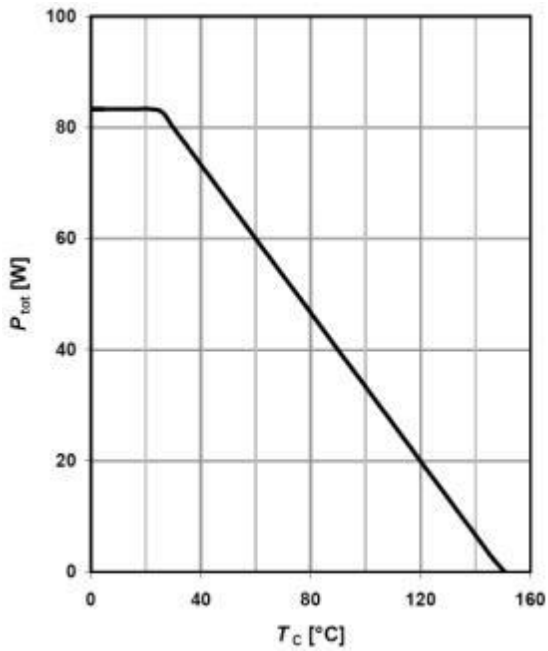
NOTES:

- 1.Repetitive Rating:Pulse width limited by maximum junction temperature.
- 2.IAS=1.8A,VDD=50V,Starting TJ=25°C.
- 3.ISD≤ID,di/dt≤200A/us,VDD≤BVDSS,Starting TJ=25°C.
- 4.Essentially Independent of Operating Temperature Typical Characteristics.

Typical Performance Characteristics

Power dissipation

PTOT=f (Tc);TO-220,TO-252,TO-263



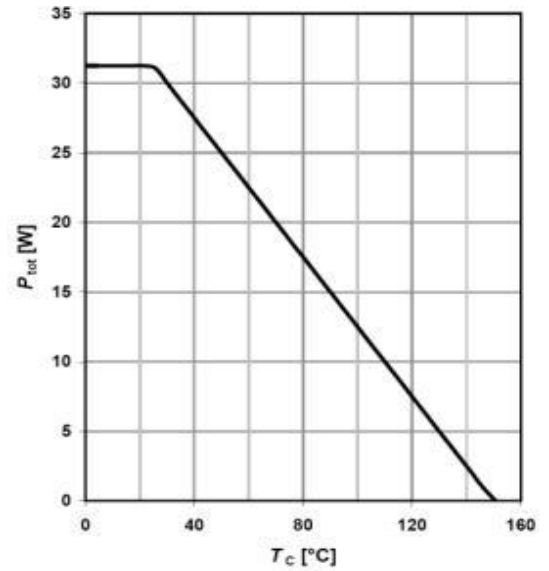
Safe Operating area $T_c=25^\circ\text{C}$

$I_D=f(V_{DS})$; $D=0$; parameter t_p ;

TO-220,TO-252,TO-263

Power dissipation

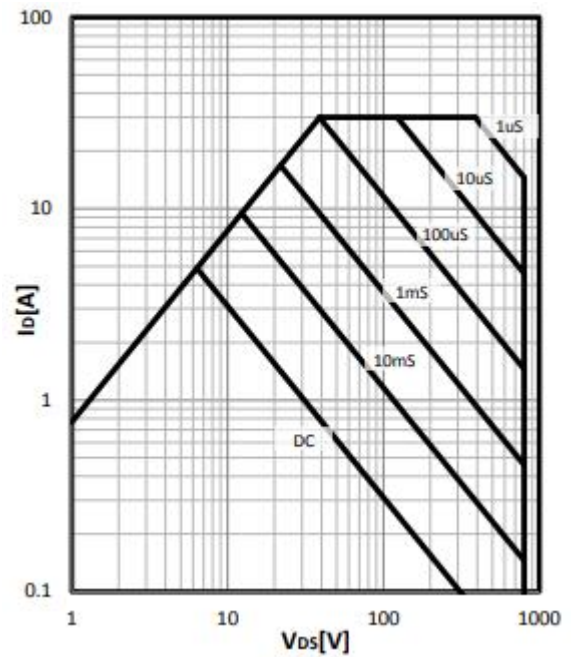
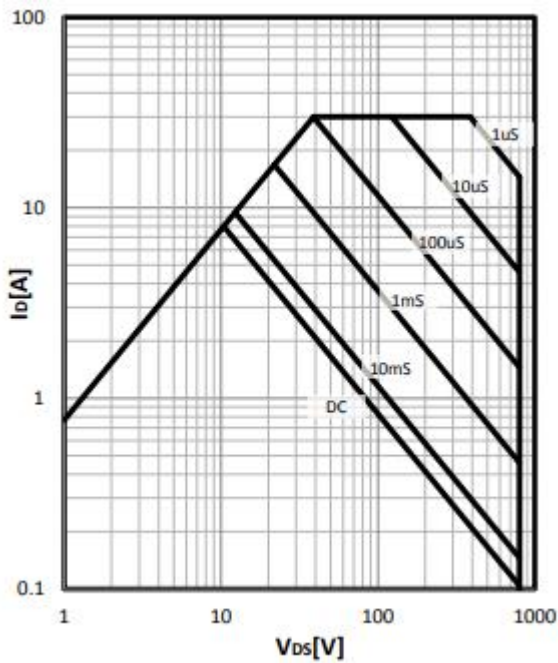
PTOT=f (Tc);TO-220FullPAK



Safe Operating area $T_c=25^\circ\text{C}$

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TO-220FullPAK



Typical Performance Characteristics

Max.Transient thermal impedance

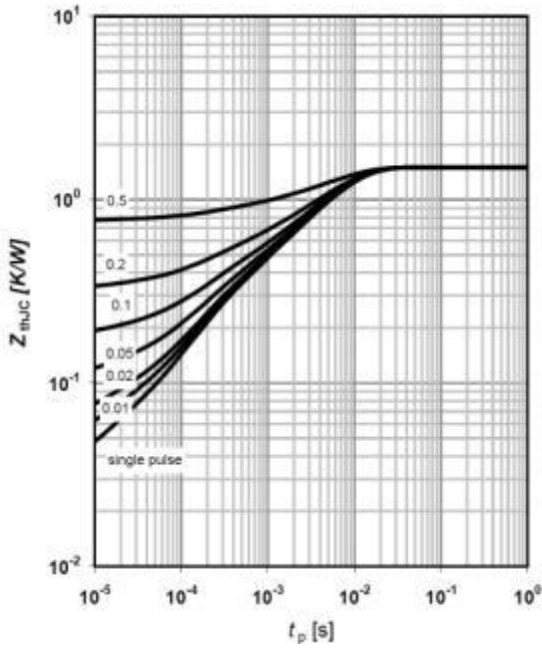
 $Z_{thJC}=f(t_p)$;Parameter: $D=tp/T$;

TO-220,TO-252,TO-263

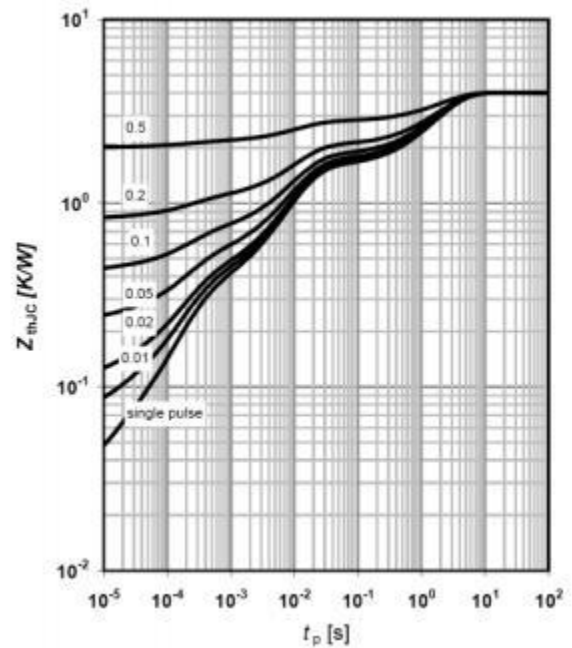
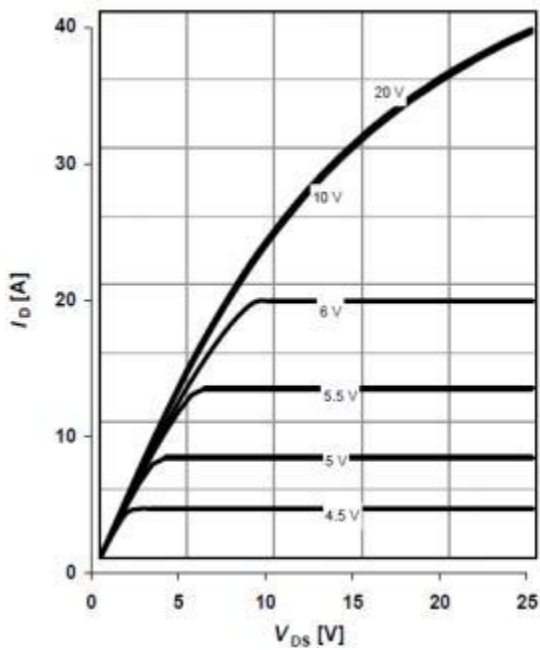
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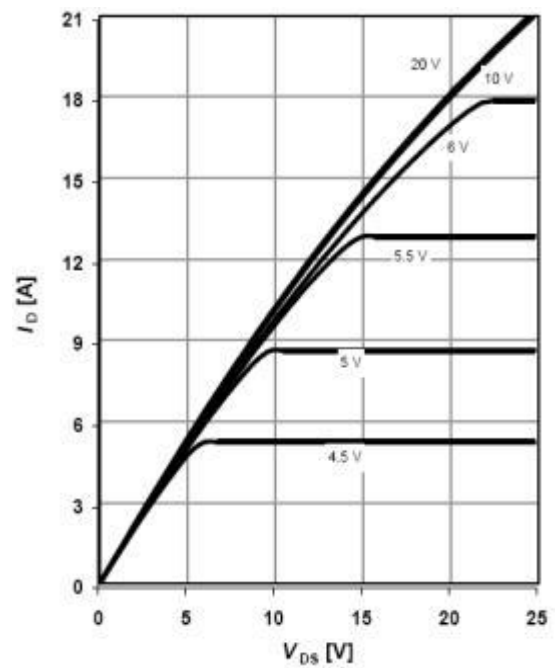
TO-220FullPAK



Typ.output characteristics

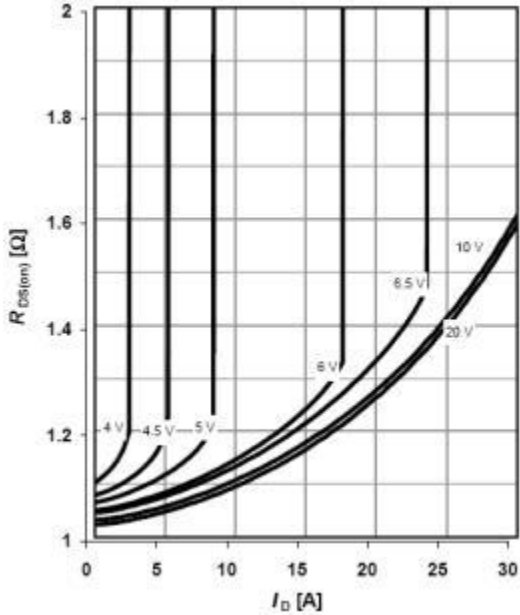
 $I_D=f(v_{ds})$; $T_j=25^{\circ}C$; $tp=10ps$;parameter:VGS


Typ.output characteristics

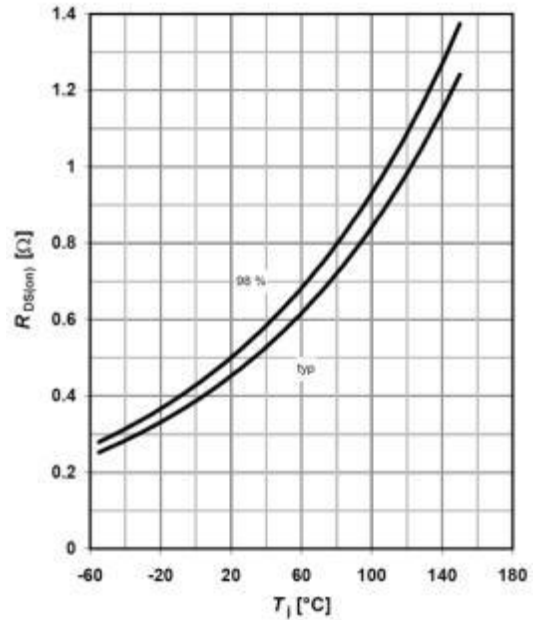
 $I_D=f(v_{ds})$; $T_j=150^{\circ}C$; $tp=10ps$;parameter:VGS


Typical Performance Characteristics

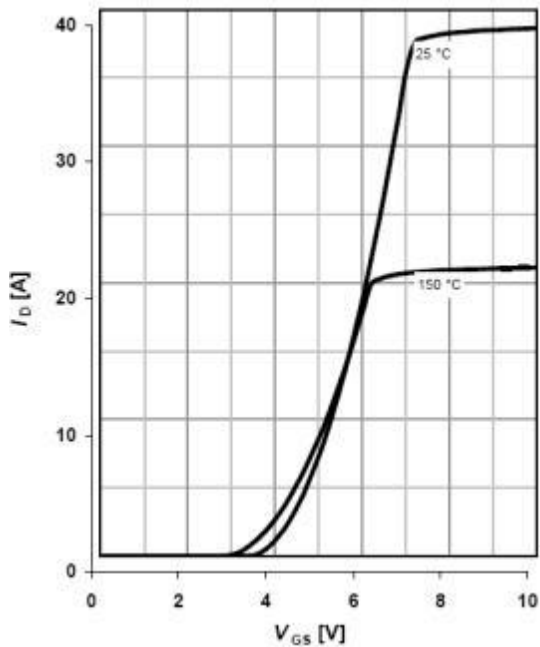
Typ.drain-source on-state resistance

 $R_{DS(on)}=f(I_D); T_j=150^\circ\text{C}; \text{parameter: } V_{GS}$


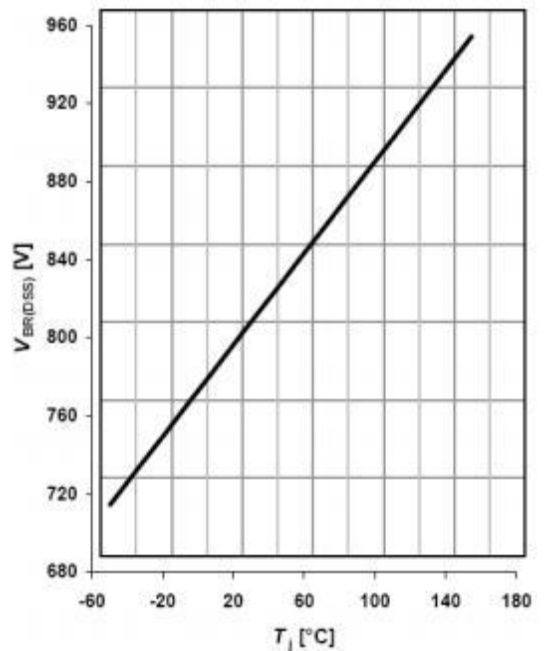
Drain-sorce on-state resistance

 $R_{DS(on)}=f(T_j); I_D=5.5\text{A}; V_{GS}=10\text{V}$


Typ.transfer characteristics

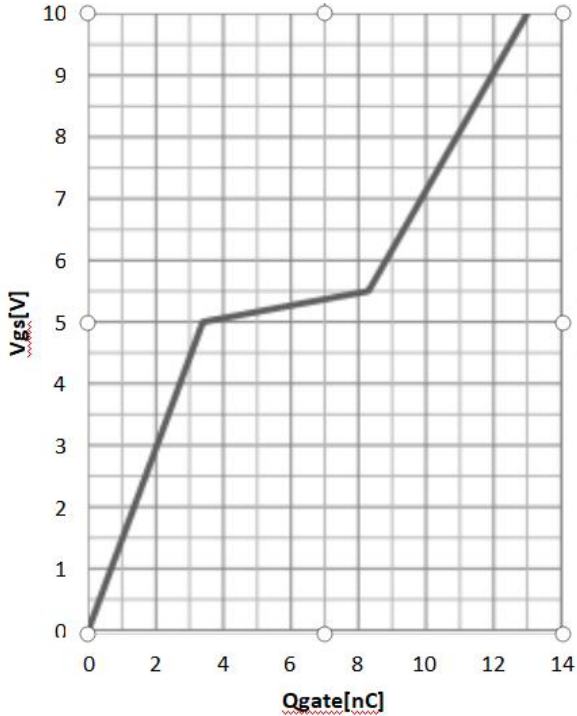
 $I_D=f(V_{DS}); V_{DS}>2; R_{DS(on)}\text{max}; t_p=10\text{ps}; \text{parameter: } T_j$


Drain-source breakdown voltage

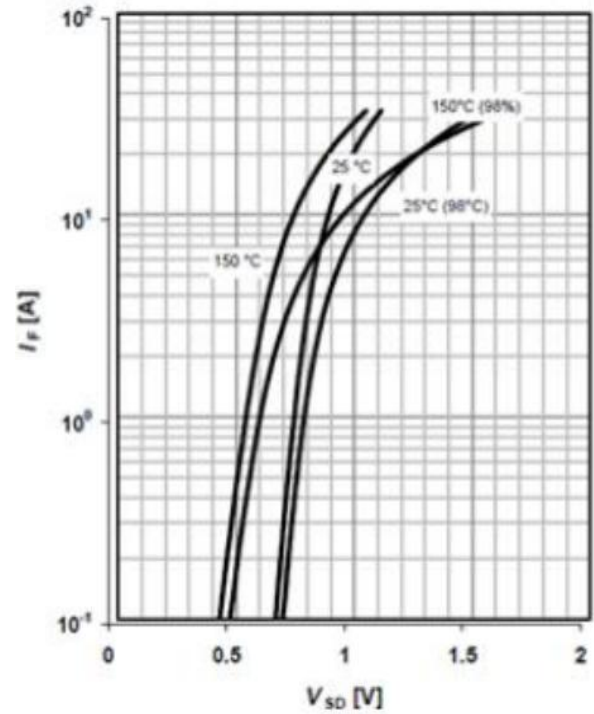
 $V_{BR(DSS)}=f(T_j); I_D=0.25\text{mA}$


Typical Performance Characteristics

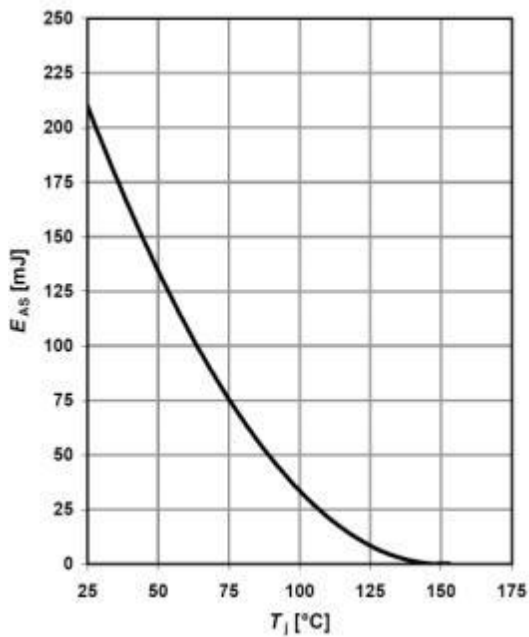
Typ. Gate charge

 $V_{GS}=f(Q_{gate}); I_D=5.5A$ pulsed


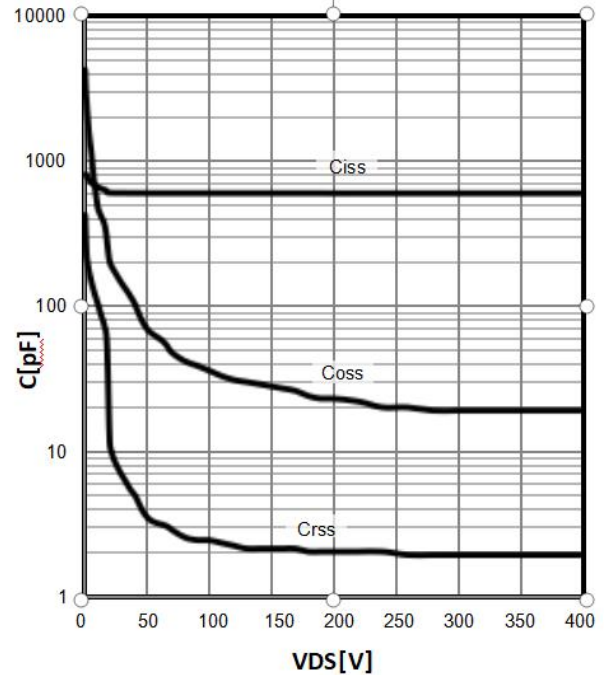
Forward characteristics of reverse diode

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


Typ. Avalanche energy

 $E_{AS}=f(T_j); V_{DD}=50V$


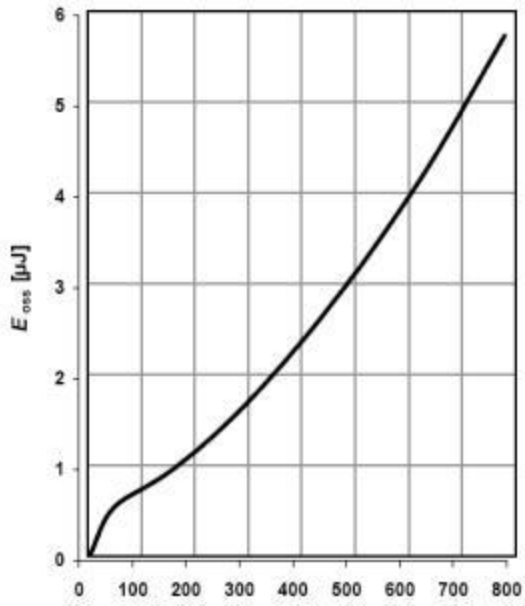
Typ. Capacitances

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


Typical Performance Characteristics

Typ. Coss stored energy

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

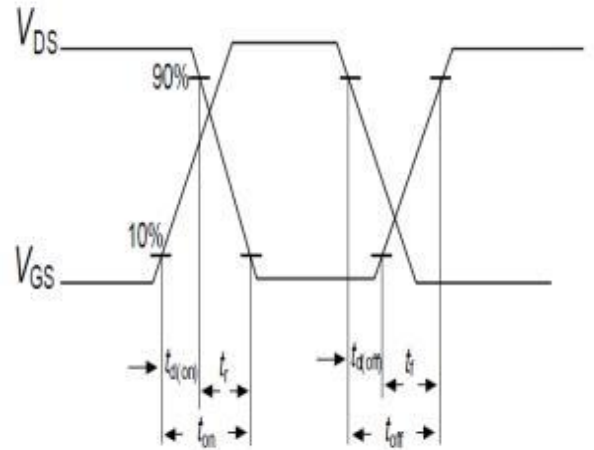
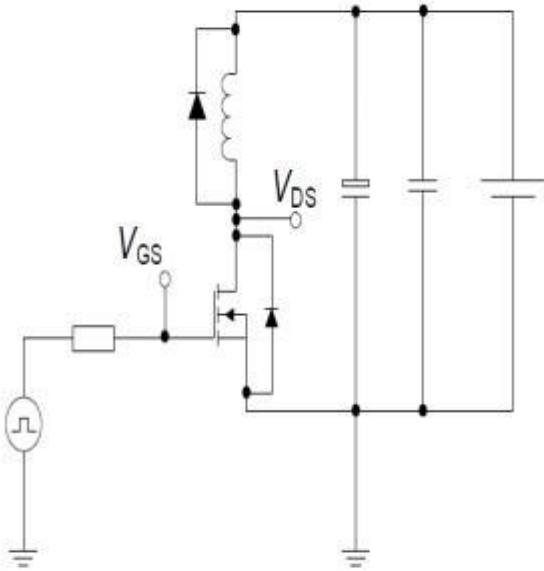


Test circuits

Switching times test circuit and waveform for inductive load

Switching times test circuit for inductive load

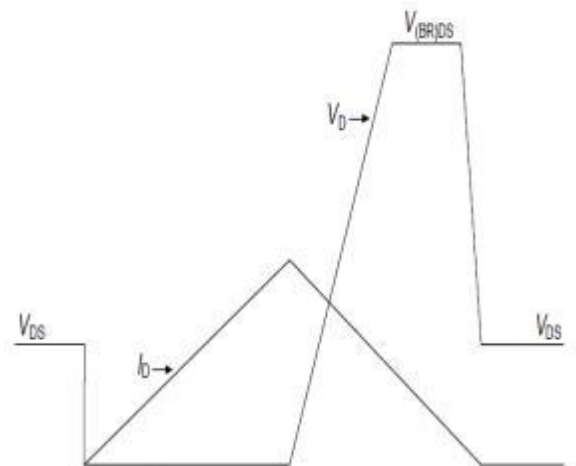
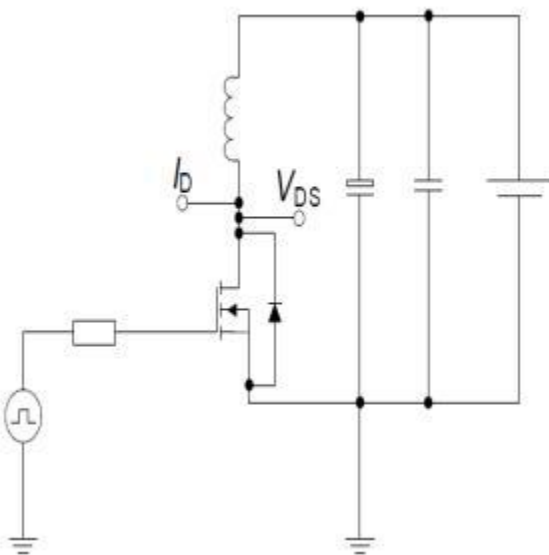
Switching time waveform



Unclamped inductive load test circuit waveform

Unclamped inductive load test circuit

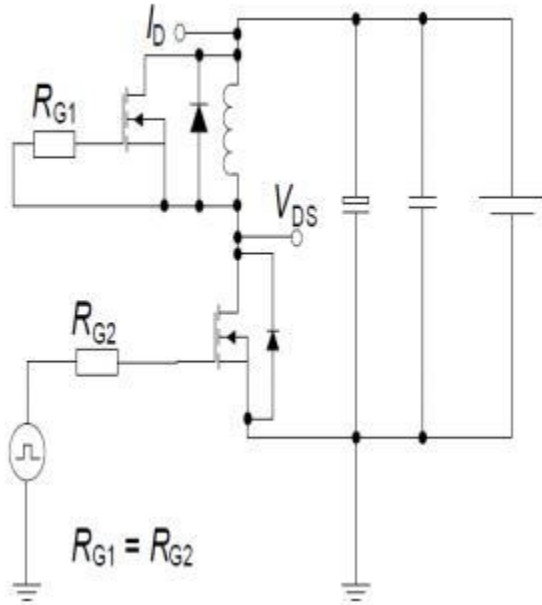
Unclamped inductive waveform



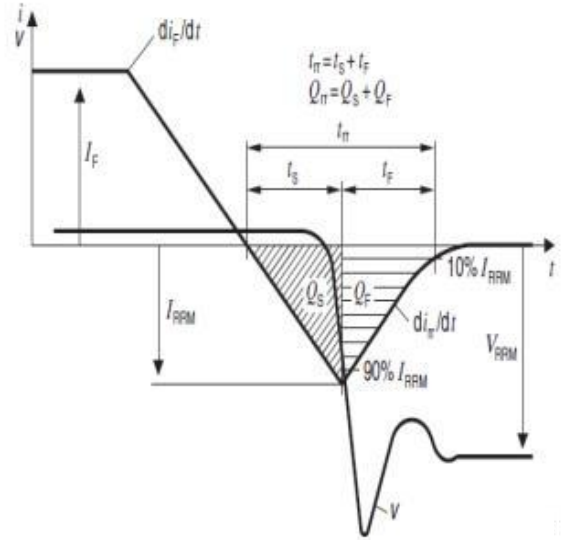
Test circuits

Test circuit and waveform for diode characteristics

Test circuit for diode characteristics

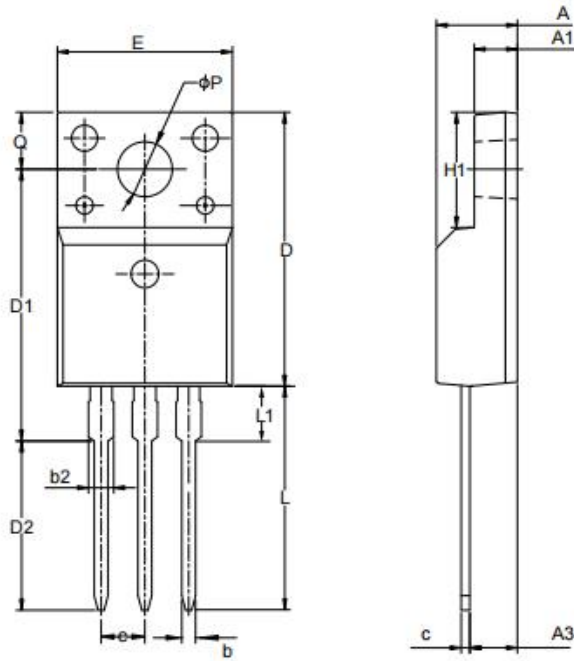


Diode recovery waveform

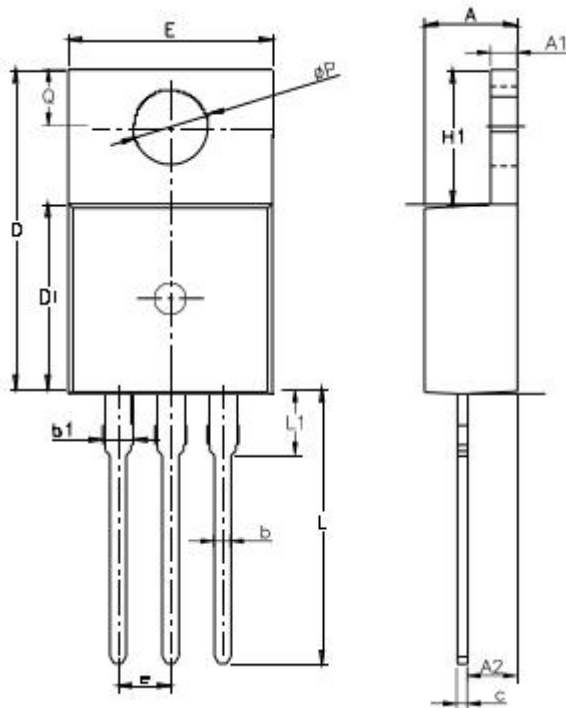


Package Outline

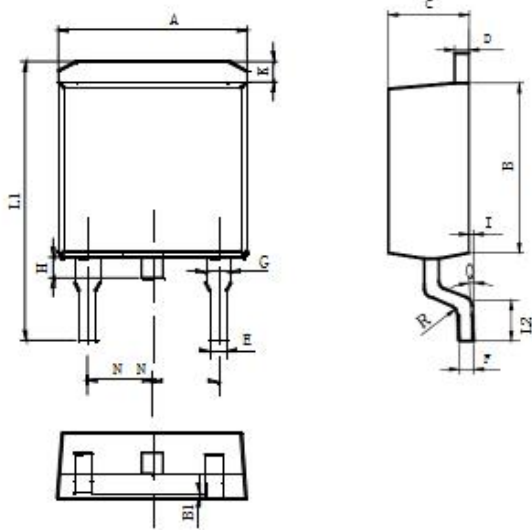
TO-220 Full PAK



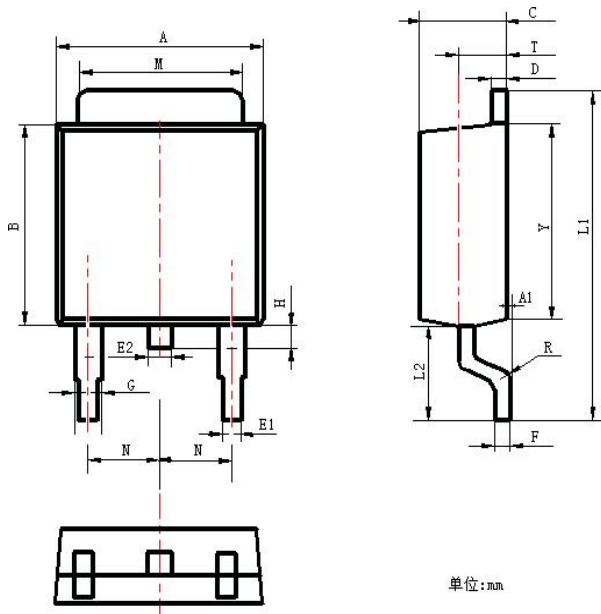
COMMON DIMENSIONS			
Items	Values(mm)		
	MIN	NOM	MAX
A	4.42	4.7	5.02
A1	2.3	2.54	2.8
A3	2.5	2.76	3.1
b	0.7	0.8	0.9
b2	--	--	1.47
c	0.35	0.5	0.65
D	15.25	15.87	16.25
D1	15.3	15.75	16.3
D2	9.3	9.8	10.3
E	9.73	10.16	10.36
e	2.54BSC		
H1	6.4	6.68	7
L	12.48	12.98	13.48
L1	--	--	3.5
øP	3	3.18	3.4
Q	3.05	3.3	3.55

TO-220-3L


COMMON DIMENSIONS			
Items	Values(mm)		
	MIN	NOM	MAX
A	4.3	4.5	4.7
A1	1	1.3	1.5
A2	1.8	2.4	2.8
b	0.6	0.8	1
b1	1	-	1.6
c	0.3	-	0.7
D	15.1	15.7	16.1
D1	8.1	9.2	10
F	9.6	9.9	10.4
e	2.54BSC		
H1	6.1	6.5	7
L	12.6	13.08	13.6
L1			3.95
ΦP	3.4	3.7	3.9
Q	2.6		3.2

Package Outline
TO-263-2L


COMMON DIMENSIONS			
Items	Values(mm)		
	MIN	NOW	MAX
A	9.8	10	10.4
B	8.9	9.6	9.5
B1	0	-	0.1
C	4.4	4.5	4.8
D	1.16	1.4	1.5
E	0.7	0.75	0.95
F	0.3	0.45	0.6
G	1.07	1.38	1.47
H	1.3	-	1.8
K	0.95	1	1.37
L1	14.5	15.2	16.5
L2	1.6	2	2.3
I	0	-	0.2
Q	0°	3°	8°
R	0.4		
N	2.35	2.4	2.7

TO-252-2L


单位:mm

COMMON DIMENSIONS			
Items	Values(mm)		
	MIN	NOW	MAX
A	6.3	6.5	6.9
A1	0	-	0.16
B	5.7	-	6.3
C	2.1	2.3	2.5
D	0.3	0.5	0.7
E1	0.6	0.65	0.9
E2	0.7	0.65	1
F	0.3	0.5	0.6
G	0.7	0.9	1.2
L1	9.6	10	10.5
L2	2.7	-	3.1
H	0.4	-	1
M	5.1	5.2	5.5
N	2.09	2.2	2.49
R	0.3		
T	1.4	-	1.6
Y	5.1	5.9	6.3