

800V N-Channel MOSFET

Description

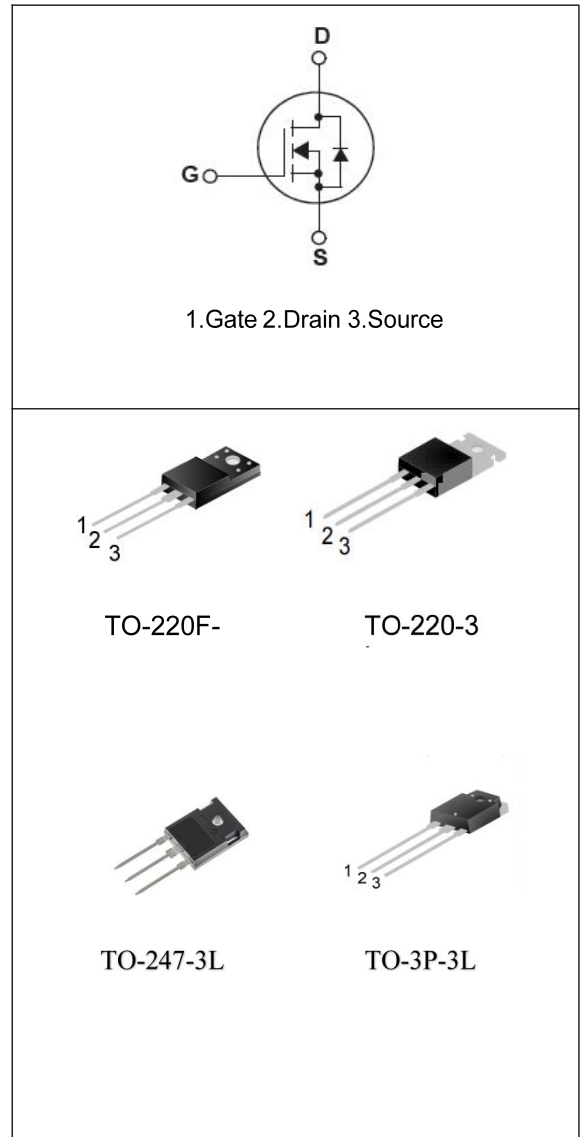
SSMOS-FET is new generation of high voltage MOSFET family that is utilizing an advanced charge balance mechanism for outstanding low on-resistance and lower gate charge performance.

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)=0.36Ω
- Ultra Low Gate Charge(typ.Qg=17.5nc)
- 100% avalanche tseted



Package Marking and Ordering Information:

Marking	Package	Part #	Hazardous Substance Control	Packing
SR80R380F	T0-220F-3L	SR80R380F	Pb free	Tube
SR80R380T	T0-220-3L	SR80R380T	Pb free	Tube
SR80R380G	TO-247-3L	SR80R380G	Pb free	Tube
SR80R380P	TO-3P-3L	SR80R380P	Pb free	Tube

Absolute Maximum Ratings

Symbol	Parameter	SR80R380T/G/P	SR80R380F	Unit
VDSS	Drain-Source Voltage	800		V
ID	Drain Current-Continuous(TC=25℃)	13.6*		A
	-Continuous(TC=100℃)	8.6*		
IDM	Drain Current-Pulsed(Note1)	40*		A
VGSS	Gate-Source Voltage	±30		V
EAS	Single Pulsed Avalanche Energy(Note2)	284		mJ
IAR	Avalanche Current(Note1)	2.4		A
EAR	Repetitive Avalanche Energy(Note1)	0.43		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℃)	104	32	W
TJ,TSTG	Operating and Storage Temperature Range	-55to+150		℃
TL	Maximun Lead Temperature for Soldring Purpose,1/8”from Case for 5 Seconds	300		℃

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

Thermal Characteristics

Symbol	Parameter	SR80R380T/G/P	SR80R380F	Unit
RθJC	Thermal Resistance,Junction-to-Case	1.5	3.9	℃/W
RθCS	Thermal Resistance,Case-to-Sink Typ	0.5	-	℃/W
RθJA	Thermal Resistance,Junction-to-Ambient	62	80	℃/W

Electrical Characteristics TC = 25°C unless otherwise noted

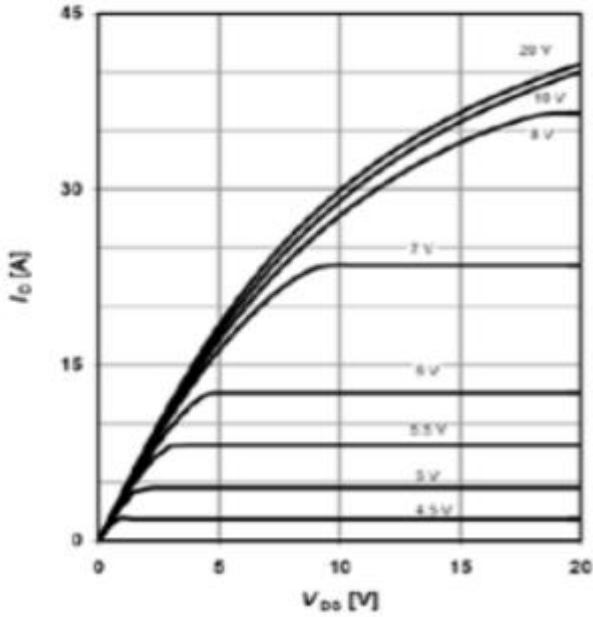
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Off Characteristics						
BVDSS	Drain-Source Breakdown Voltage	VGS=0V, ID=250uA Tj=25°C	800	-	-	V
		VGS=0V, ID=250uA Tj=150°C	-	850	-	V
BVDSS/TJ	Breakdown Voltage Temperature Coefficient	ID=250uA, Referenced to 25°C	-	0.6	-	V/°C
IDSS	Zero Gate Voltage Drain 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	-	-	-100	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=7.5A	-	0.36	0.41	Q
gFS	Forward Transconductance	VDS=40V, ID=15A	-	12	-	S
Dynamic Characteristics						
Ciss	Input Capacitance	VDS=25V, VGS=0V, f=1.0MHz	-	800	-	pF
Coss	Output Capacitance		-	230	-	pF
Crss	Reverse Transfer Capacitance		-	15	-	pF
Switching Characteristics						
td(on)	Turn-On Delay Time	VDS=400V, ID=7.5A RG=25Q, (Note4)	-	31	-	ns
tr	Turn-On Rise Time		-	19	-	ns
td(off)	Turn-Off Delay Time		-	91	-	ns
tf	Turn-Off Fall Time		-	20	-	ns
Qg	Total Gate Charge	VDS=450V, ID=7.5A VGS=10V, (Note4)	-	17.5	-	nc
Qgs	Gate-Source Charge		-	4.1	-	nc
Qgd	Gate-Drain Charge		-	7.1	-	nc
Drain-Source Diode Characteristics and Maximum Ratings						
IS	Maximum Continuous Drain-Source Diode Forward Current		-	-	14	A
ISM	Maximum Pulsed Drain-Source Diode Forward Current		-	-	40	A
VSD	Drain-Source Diode Forward voltage	VGS=0V, IS=15A	-	0.9	1.5	V
Trr	Reverse Recovery Time	VR=400V, VGS=0V IF=15A, dIF/dt=100A/us	-	600	-	ns
Qrr	Reverse Recovery Charge		-	9.7	-	uC
Irrm	Peak Reverse Recovery Current		-	25	-	A

NOTES:

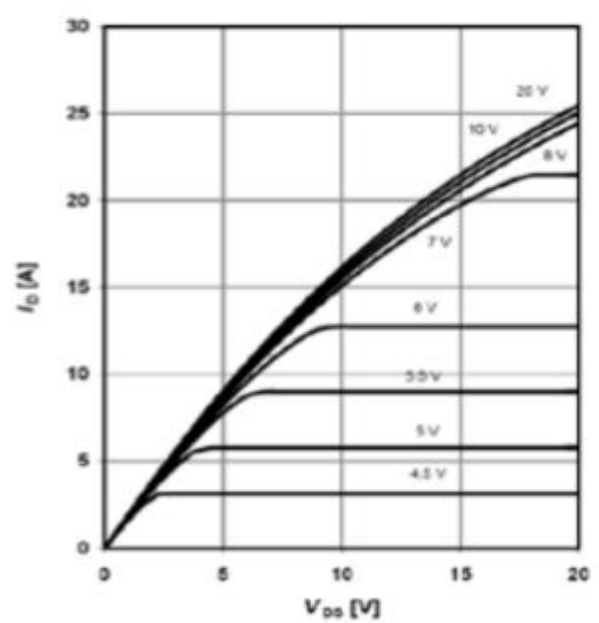
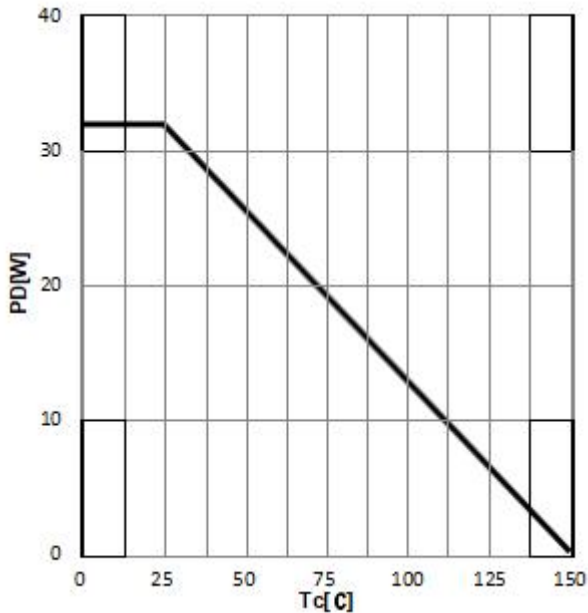
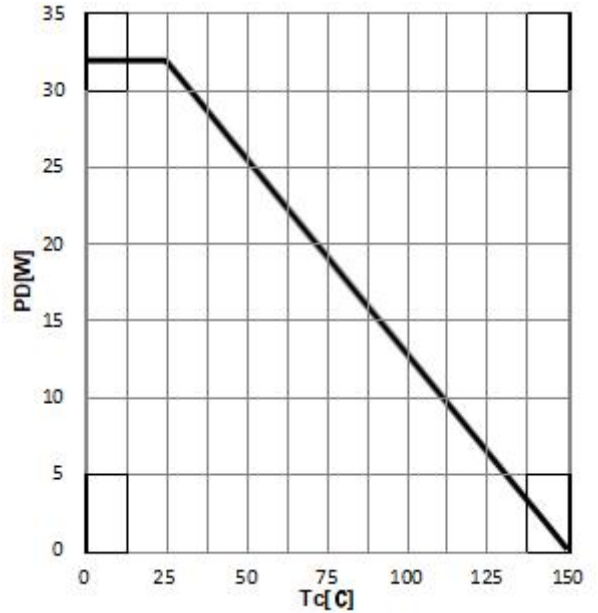
- 1.Repetitive Rating:Pulse width limited by maximum junction temperature.
- 2.IAS=2.4A,VDD=50V,Starting TJ=25°C.
- 3.ISD≤ID,di/dt≤200A/us,VDD≤BVDSS,Starting TJ=25°C.
- 4.Essentially Independent of Operating Temperature Typical Characteristics.

Typical Performance Characteristics

Figuer1:On-Region Characteristics@25°C

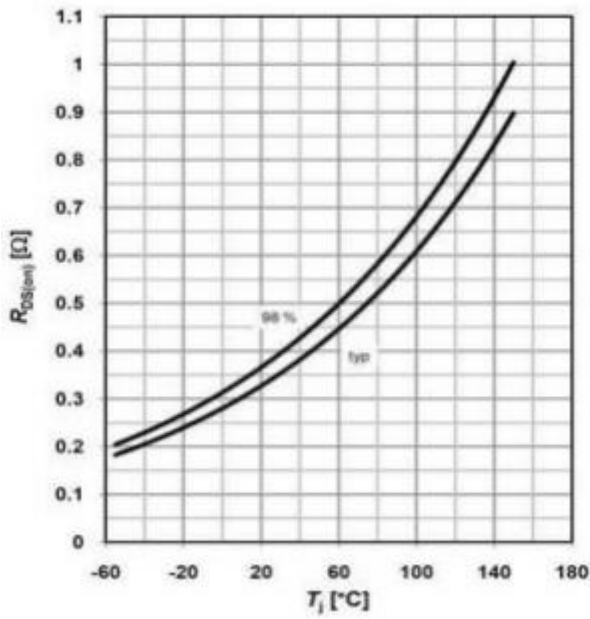


Figuer2:On-Region Characteristics@125°C

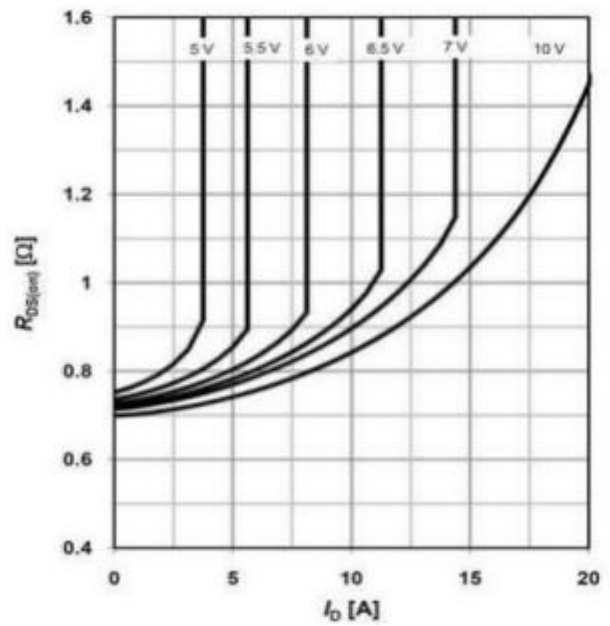

 Figuer3:Power Dissipation
 TO-220,TO-247

 Figuer4:Power Dissipation
 TO-220FullPAK


Typical Performance Characteristics

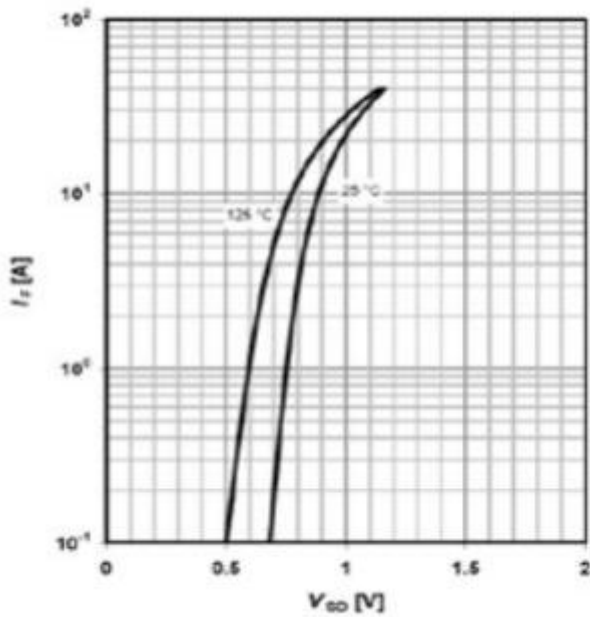
Figuer5:On-Resistance vs.
Junction Temperature



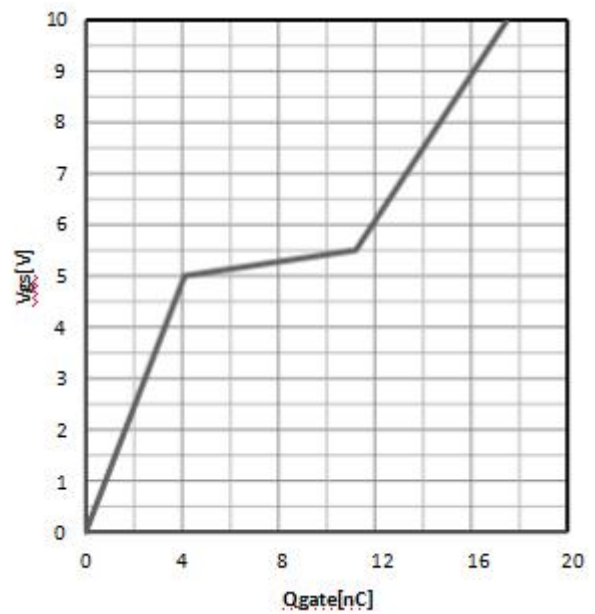
Figuer6:On-Resistance vs.
Drain Current, $T_j=125^{\circ}\text{C}$



Figuer7:Body-Diode Characteristics

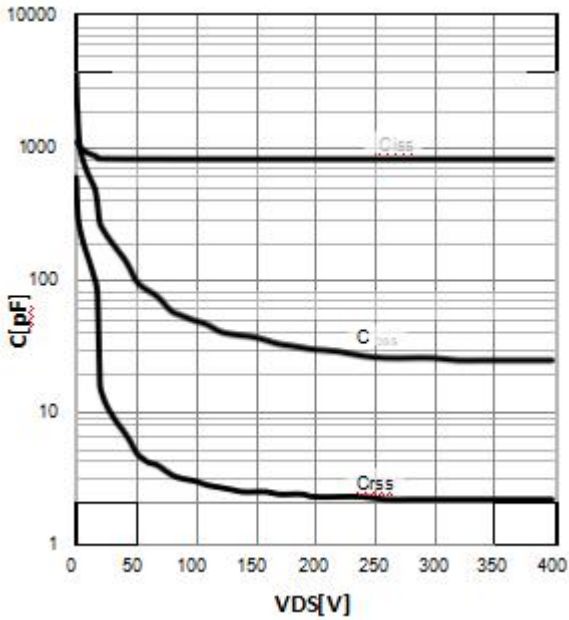


Figuer8:Gate-Charge Characteristics

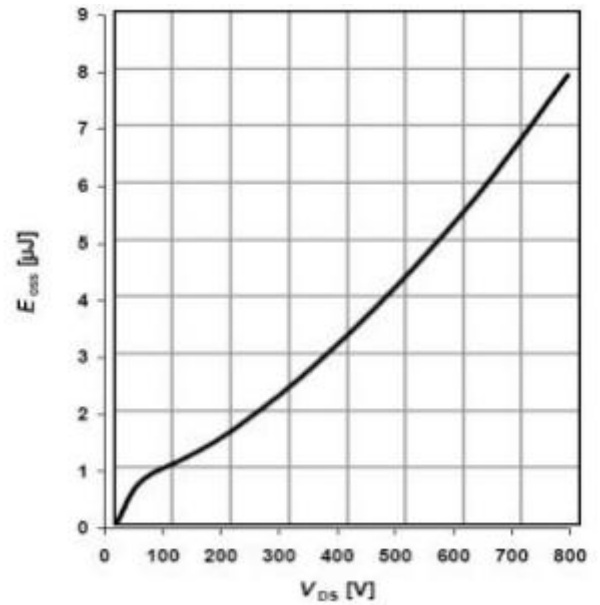


Typical Performance Characteristics

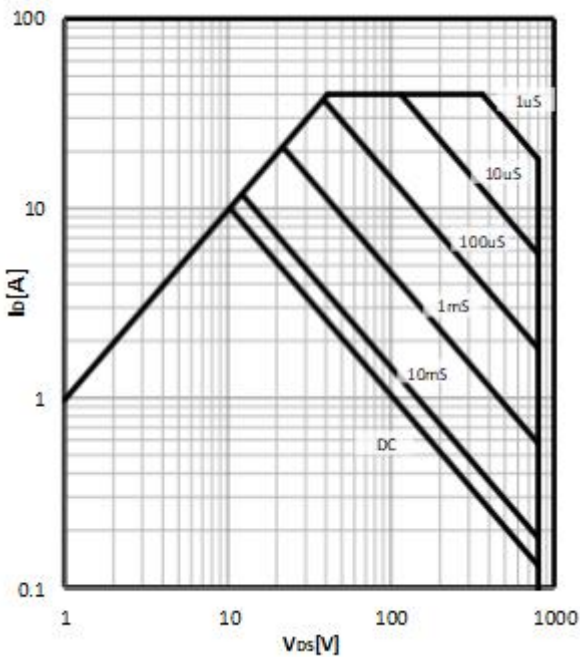
Figuer9:Capacitance Characteristics



Figuer10:Coss stored Energy

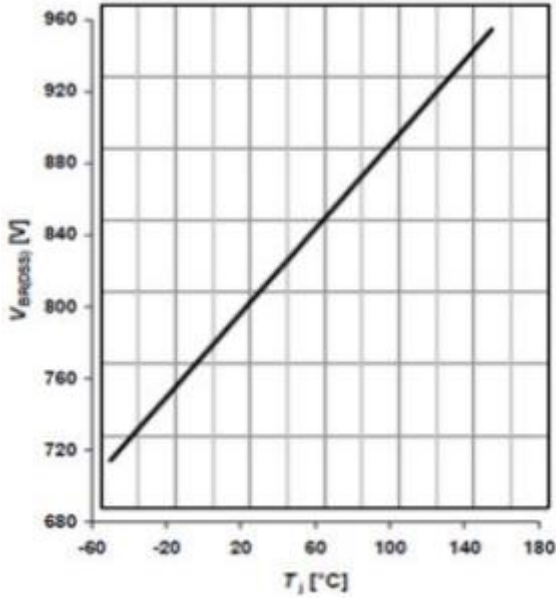
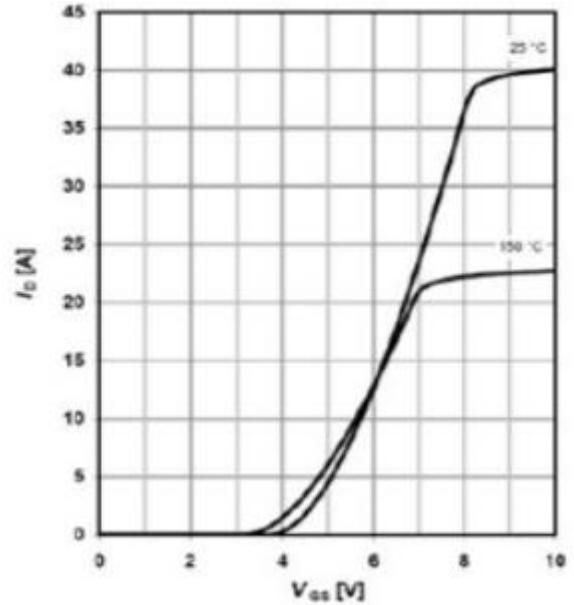
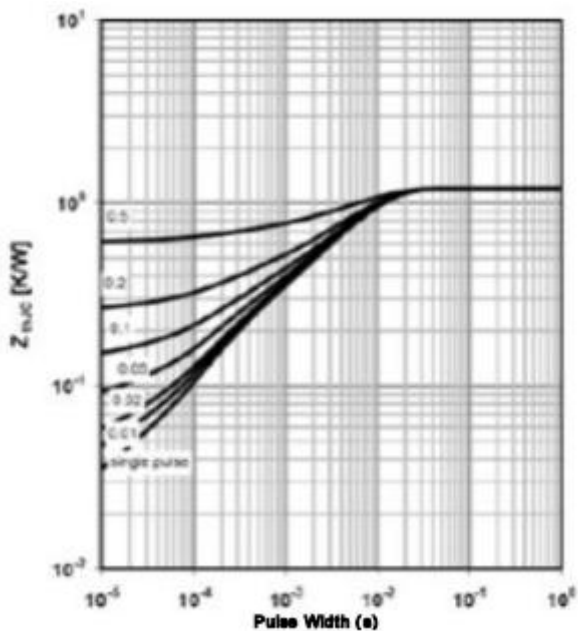
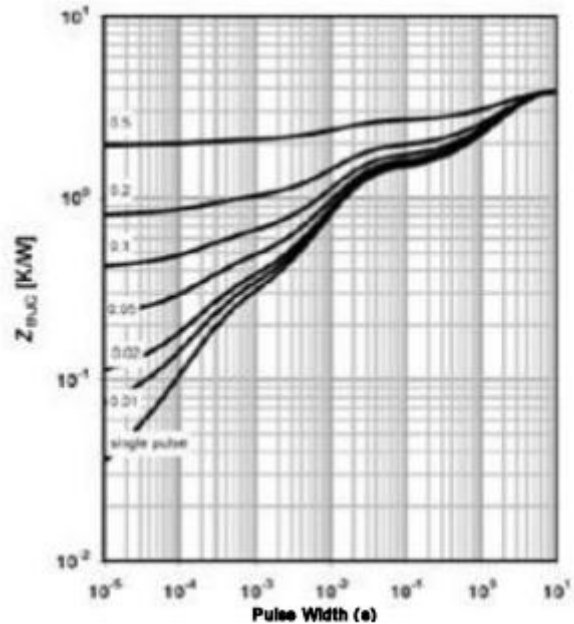


Figuer11:Maximum Forward Biased Safe Operating Area
Tc=25°C, TO-220,TO-247



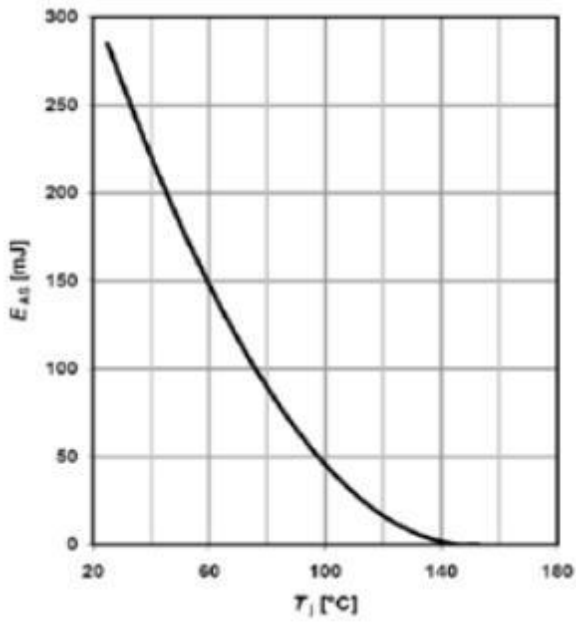
Figuer12:Maximum Forward Biased Safe Operating Area
Tc=25°C, TO-220 FullPAK

Typical Performance Characteristics

 Figuer13:Break Down vs.
 Junction Temperature

 Figuer14:Typical transfer
 charactrnistics

 Figuer15:Maximum Transient Thermal
 Impedance TO-220,TO-247

 Figuer16:Maximum Transient Thermal
 Impedance TO-220 FullPAK


Typical Performance Characteristics

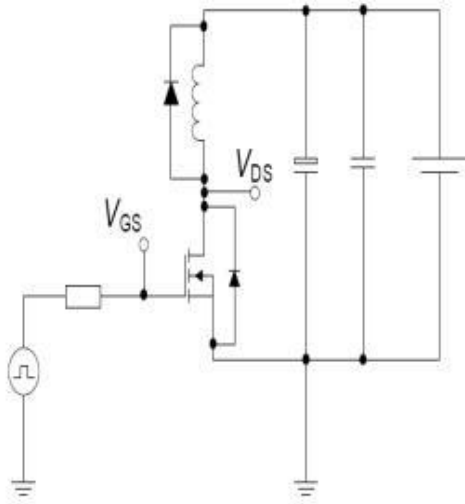
Figuer17:Avalanche energy



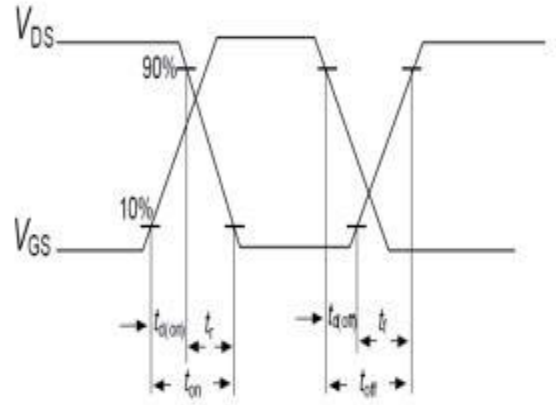
Test circuits

Switching times test circuit and waveform for inductive load

Switching times test circuit for inductive load

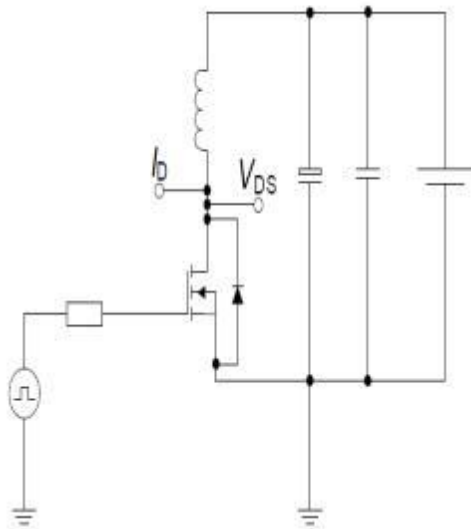


Switching time waveform

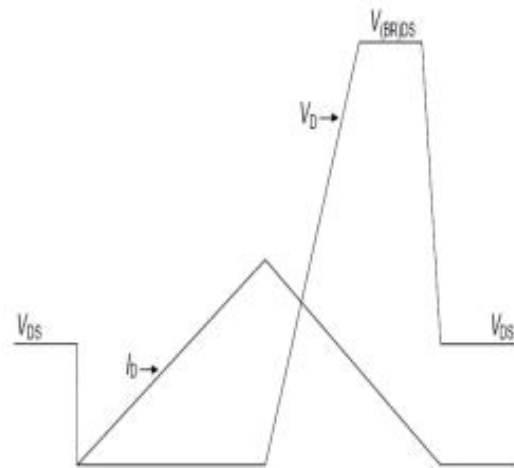


Unclamped inductive load test circuit waveform

Unclamped inductive load test circuit



Unclamped inductive waveform

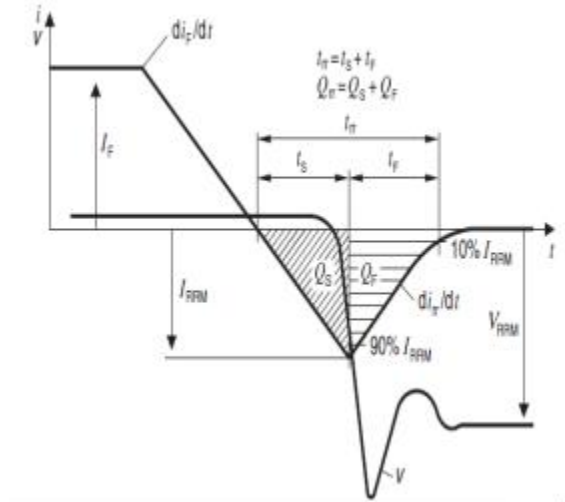
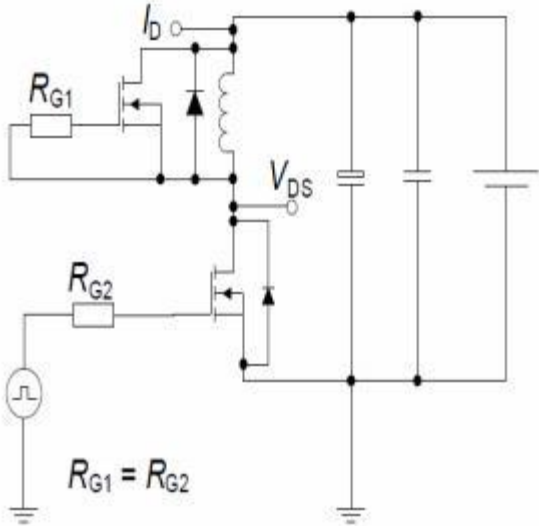


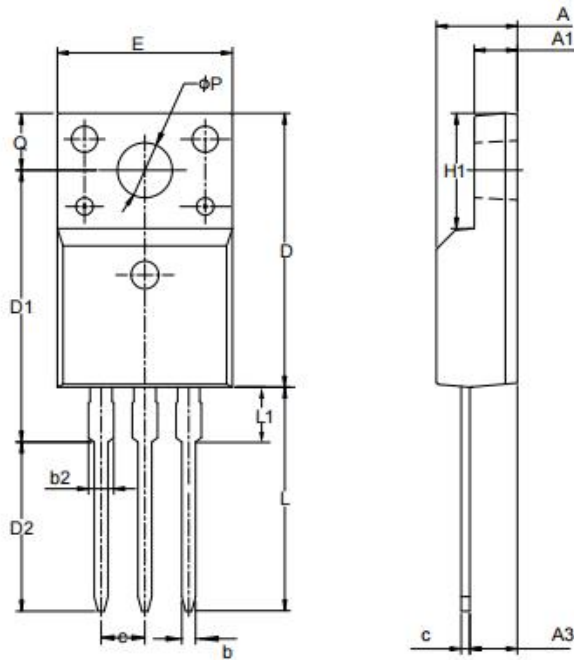
Test circuits

Test circuit and waveform for diode characteristics

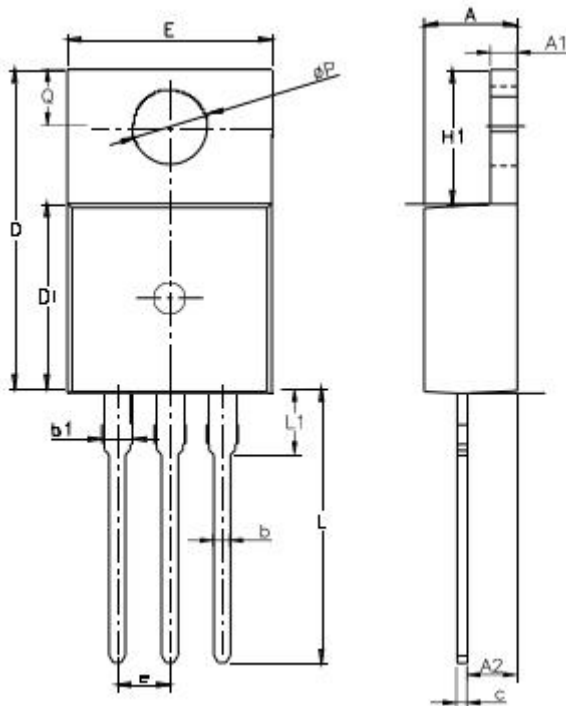
Test circuit for diode characteristics

Diode recovery waveform



Package Outline
TO-220 Full PAK


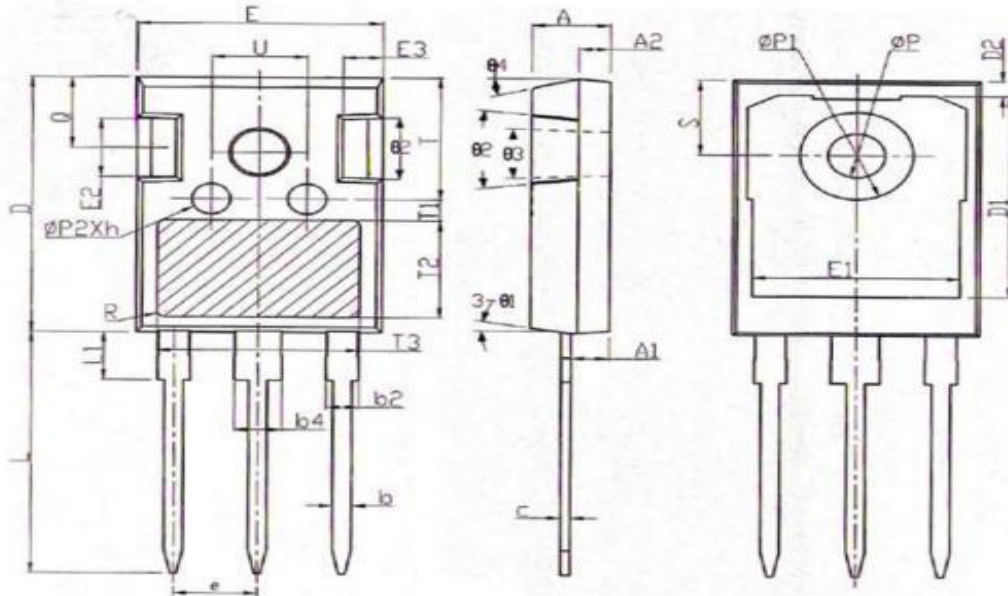
COMMON DIMENSIONS			
Items	Values(mm)		
	MIN	NOM	MAX
A	4.42	4.7	5.02
A1	2.3	2.54	2.8
A3	2.5	2.76	3.1
b	0.7	0.8	0.9
b2	--	--	1.47
c	0.35	0.5	0.65
D	15.25	15.87	16.25
D1	15.3	15.75	16.3
D2	9.3	9.8	10.3
E	9.73	10.16	10.36
e	2.54BSC		
H1	6.4	6.68	7
L	12.48	12.98	13.48
L1	--	--	3.5
øP	3	3.18	3.4
Q	3.05	3.3	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
øP	3.4	3.7	3.9
Q	2.6		3.2

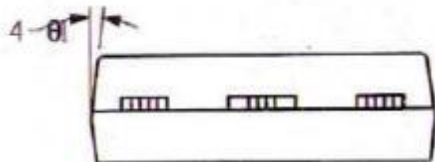
Package Outline

TO-247-3L



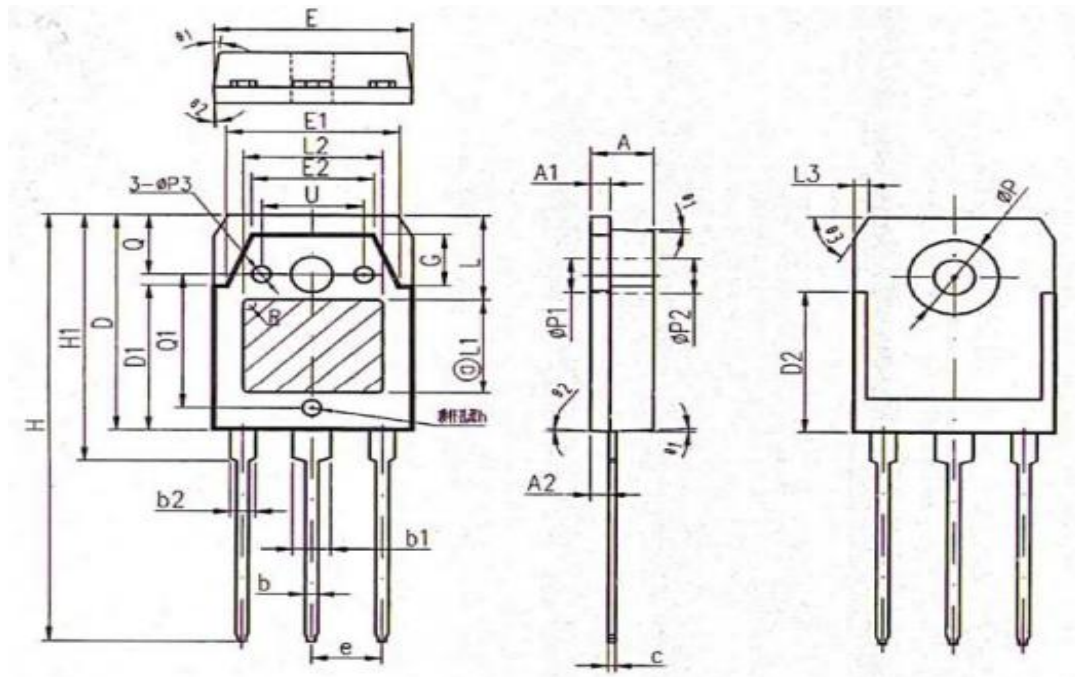
COMMON DIMENSIONS

SYMBOL	MM		
	MIN	NOM	MAX
A	4.90	5.00	5.10
A1	2.31	2.41	2.51
A2	1.90	2.00	2.10
b	1.16	1.21	1.26
b2	1.96	2.01	2.06
b4	2.96	3.01	3.06
c	0.59	0.61	0.66
D	20.90	21.00	21.10
D1	16.25	16.55	16.85
D2	1.05	1.20	1.35
E	15.90	15.80	15.90
E1	13.10	13.30	13.50
E2	4.90	5.00	5.10
E3	2.40	2.50	2.60
e	5.44BSC		
h	0.05	0.10	0.15
L	19.80	19.92	20.10
L1	—	—	4.30
phiP	3.50	3.60	3.70
phiP1	—	—	7.30
phiP2	2.40	2.50	2.60
Q	5.60	5.80	6.00
S	6.15BSC		
R	0.50REF		
T	9.80	—	10.20
T1	1.65REF		
T2	8.00REF		
T3	12.80REF		
U	6.00	—	6.40
theta1	6°	7°	8°
theta2	4°	5°	6°
theta3	1°	—	1.5°
theta4	14°	15°	16°



Package Outline

TO-3P-3L



COMMON DIMENSIONS

SYMBOL	MM		
	MIN	NOM	MAX
A	4.60	4.80	5.00
A1	1.40	1.50	1.60
A2	1.33	1.38	1.43
b	0.80	1.00	1.20
b1	2.80	3.00	3.20
b2	1.80	2.00	2.20
c	0.50REF	0.60	0.70
D	19.75	19.90	20.05
D1	13.90	13.90	14.10
D2	12.9REF		
E	15.40	15.60	15.80
E1	13.40	13.60	13.80
E2	9.40REF	9.60	9.80
e	5.45TYP		
G	4.60	4.80	5.00
H	40.30	40.50	40.70
H1	23.20	23.40	23.60
h	0.05	0.10	0.15
L	7.40TYP		
L1	9.00TYP		
L2	11.00TYP		
L3	1.00REF		
øP	6.90	7.00	7.10
øP1	3.20REF		
øP2	3.50REF		
øP3	1.40	1.50	1.60
R	0.50REF		
Q	5.00REF		
Q1	12.56	12.76	12.96
U	7.80	8.00	8.20
Ø1	5°	7°	9°
Ø2	1°	3°	5°
Ø3	60°REF		