

800V N-Channel Super-Junction MOSFET Gen-II

Description

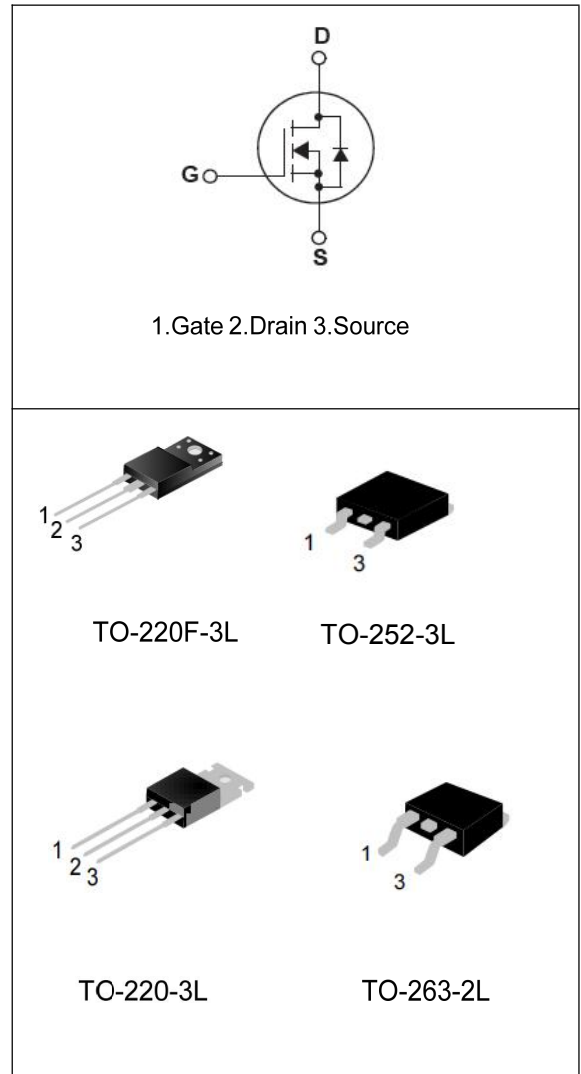
SJ-FET is new generation of high voltage MOSFET family that is utilizing an advanced charge balance mechanism for outstanding low on-resistance and lower gate charge performance.

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@ $T_J=150^{\circ}\text{C}$
- Typ.RDS(on)=1.1 Ω
- Ultra Low Gate Charge(typ.Qg=6.5nc)
- 100% avalanche tseted



Package Marking and Ordering Information:

Marking	Package	Part #	Hazardous Substance Control	Packing
SR80R1K3F	T0-220F-3L	SR80R1K3F	Pb free	Tube
SR80R1K3T	T0-220-3L	SR80R1K3T	Pb free	Tube
SR80R1K3D	TO-252-2L	SR80R1K3D	Halogen free	Reel
SR80R1K3S	TO-263-2L	SR80R1K3S	Pb free	Tube

Absolute Maximum Ratings

Symbol	Parameter	SR80R1K3T/D/S	SR80R1K3F	Unit
VDSS	Drain-Source Voltage	800		V
ID	Drain Current-Continuous (TC = 25°C) -Continuous (TC = 100°C)	4.4* 2.8*		A
IDM	Drain Current - Pulsed (Note 1)	12*		A
VGSS	Gate-Source voltage	±30		V
EAS	Single Pulsed Avalanche Energy (Note 2)	46		mJ
IAR	Avalanche Current (Note 1)	1		A
EAR	Repetitive Avalanche Energy (Note 1)	0.2		mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	15		V/ns
dVds/dt	Drain Source voltage slope (Vds=640V)	50		V/ns
PD	Power Dissipation (TC = 25°C)	37	26	W
TJ, TSTG	Operating and Storage Temperature Range	-55 to +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

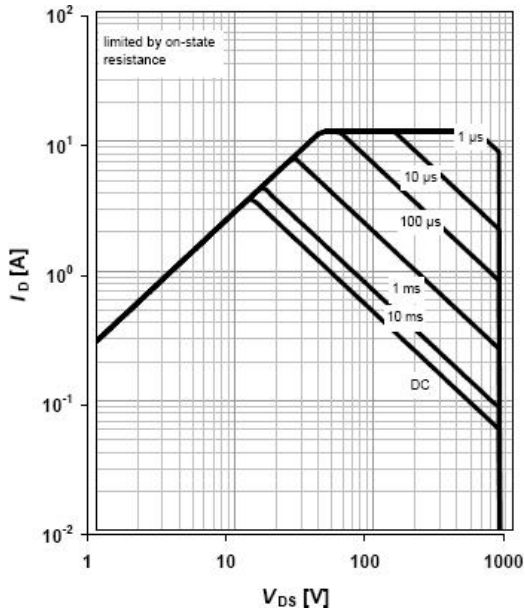
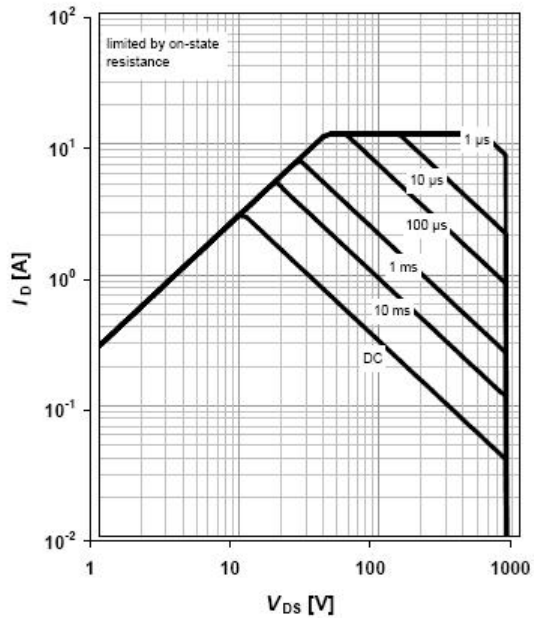
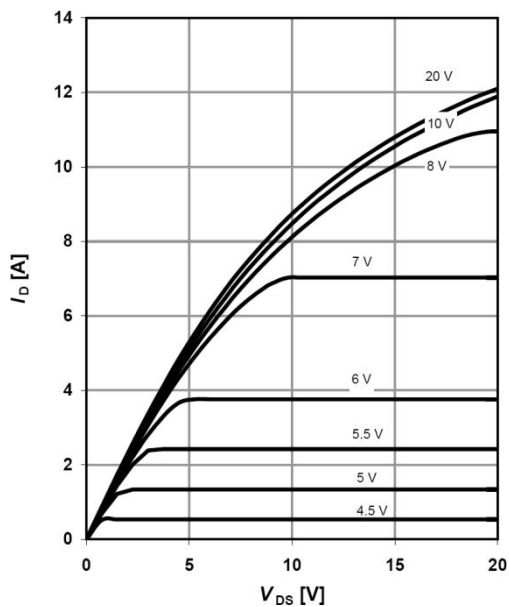
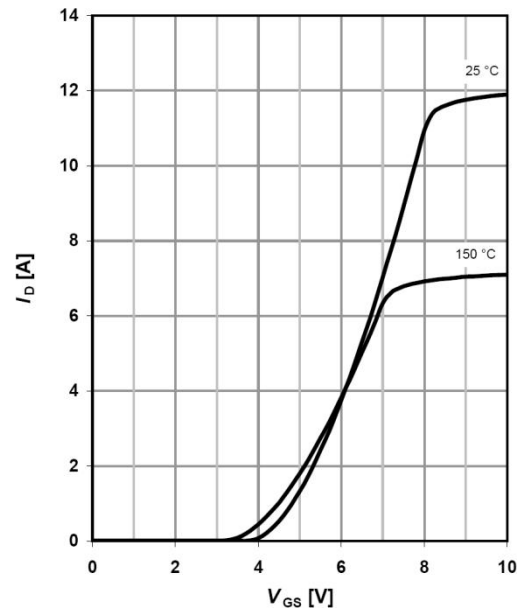
Symbol	Parameter	SR80R1K3T/D/S	SR80R1K3F	Unit
RθJC	Thermal Resistance, Junction-to-Case	3.41	4.9	°C/W
RθCS	Thermal Resistance, Case-to-Sink Typ.	0.5	-	°C/W
RθJA	Thermal Resistance, Junction-to-Ambient	62	80	°C/W

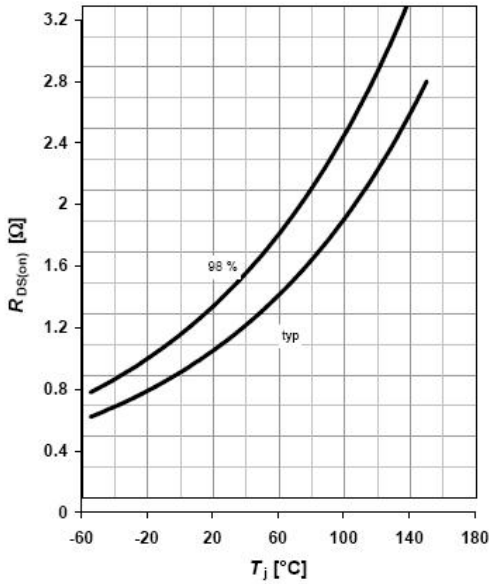
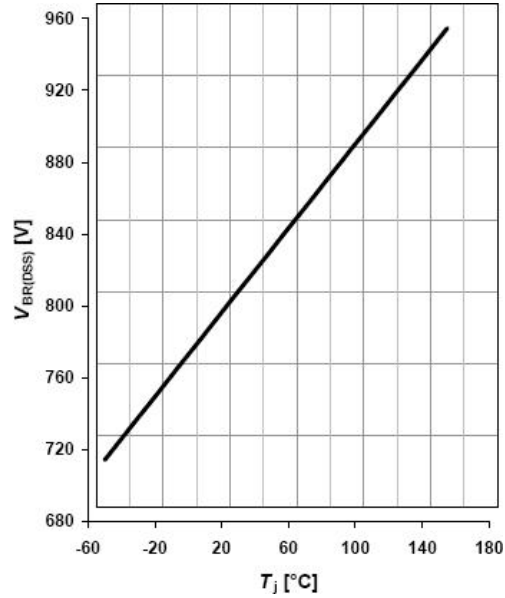
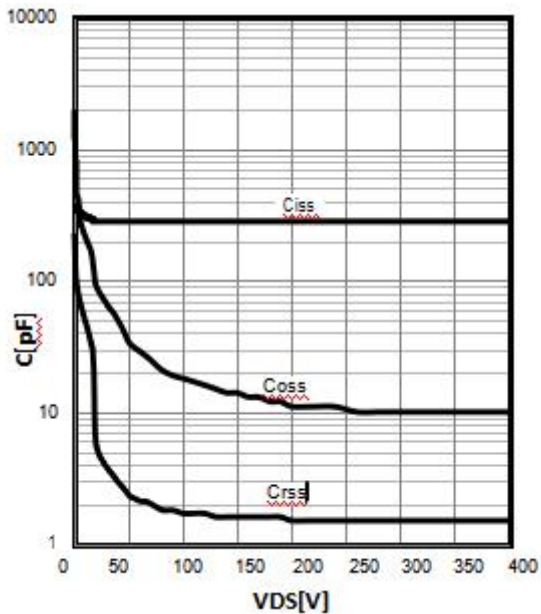
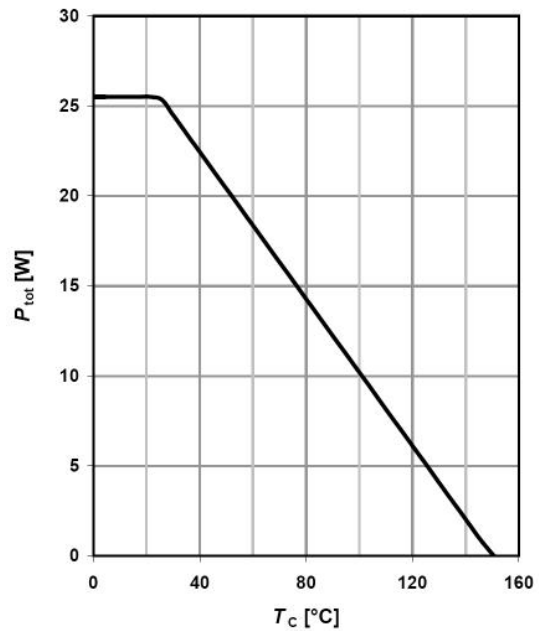
Electrical Characteristics TC = 25°C unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = 250μA, T _J = 25°C	800	-	-	V
		V _{GS} = 0V, I _D = 250μA, T _J = 150°C	-	850	-	V
ΔBV _{DSS} / ΔT _J	Breakdown Voltage Temperature Coefficient	I _D = 250μA, Referenced to 25°C	-	0.6	-	V/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 800V, V _{GS} = 0V -T _J = 150°C	-	-10	1	μA μA
I _{GSSF}	Gate-Body Leakage Current, Forward	V _{GS} = 30V, V _{DS} = 0V	-	-	100	nA
I _{GSSR}	Gate-Body Leakage Current, Reverse	V _{GS} = -30V, V _{DS} = 0V	-	-	-100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	2.5	3.5	4.5	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 10V, I _D = 2.5A	-	1.1	1.3	Ω
g _{FS}	Forward Transconductance	V _{DS} = 40V, I _D = 5A	-	4	-	S
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = 25V, V _{GS} = 0V, f = 1MHz	-	290	-	pF
C _{oss}	Output Capacitance		-	88	-	pF
C _{rss}	Reverse Transfer Capacitance		-	8	-	pF
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DD} = 400V, I _D = 2.5A, R _G = 25Ω(Note 4)	-	19	-	ns
t _r	Turn-On Rise Time		-	19	-	ns
t _{d(off)}	Turn-Off Delay Time		-	36	-	ns
t _f	Turn-Off Fall Time		-	21	-	ns
Q _g	Total Gate Charge	V _{DS} = 450V, I _D = 2.5A, V _{GS} = 10V (Note 4)	-	6.5	-	nC
Q _{gs}	Gate-Source Charge		-	1.5	-	nC
Q _{gd}	Gate-Drain Charge		-	2.6	-	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain-Source Diode Forward Current		-	-	4.5	A
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current		-	-	14	A
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0V, I _S = 5A	-	0.9	1.5	V
t _{rr}	Reverse Recovery Time	V _r = 400V, V _{GS} = 0V, I _F = 5A, dI _F /dt = 100A/μs	-	550	-	ns
Q _{rr}	Reverse Recovery Charge		-	3.8	-	μC
I _{rrm}	Peak reverse recovery Current		-	12	-	A

NOTES:

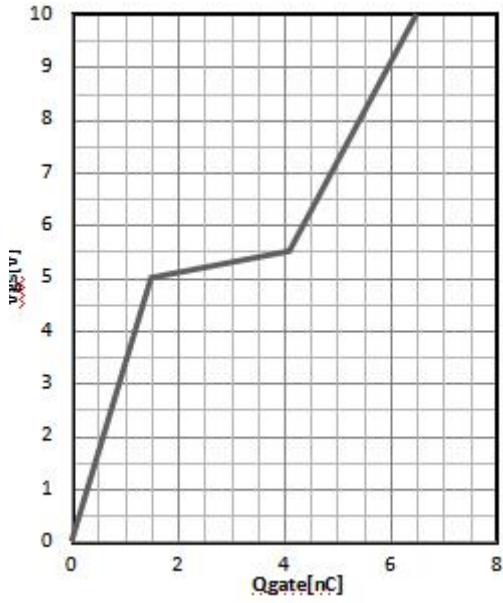
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. I_D=I_{AS}, V_{DD}=50V, Starting T_J=25°C.
3. I_{SD}≤I_D, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C.
4. Essentially Independent of Operating Temperature Typical Characteristics.

Typical Performance Characteristics
Typ1.Safe operating area TC=25°C
TO-220,TO-252,TO-263

Typ2.Safe operating area TC=25°C
TO-220FullPAK

Typ3.output characteristics T_j=25 °C

Typ4. transfer characteristics


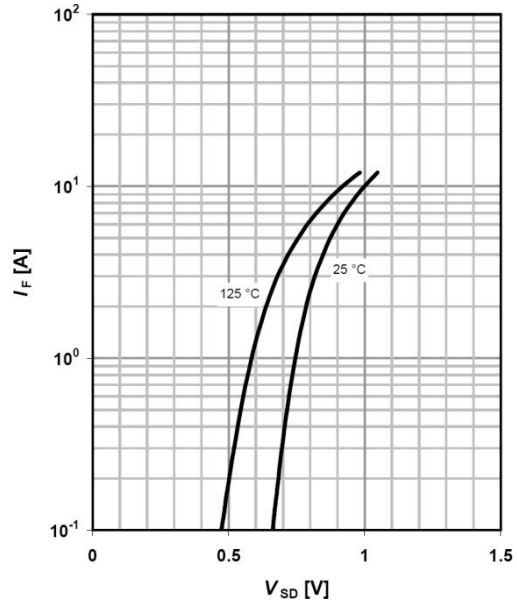
Typical Performance Characteristics
Typ5. Drain-source on-state resistance

Typ6. Drain-source breakdown voltage

Typ7. capacitances

Typ8. Power dissipation


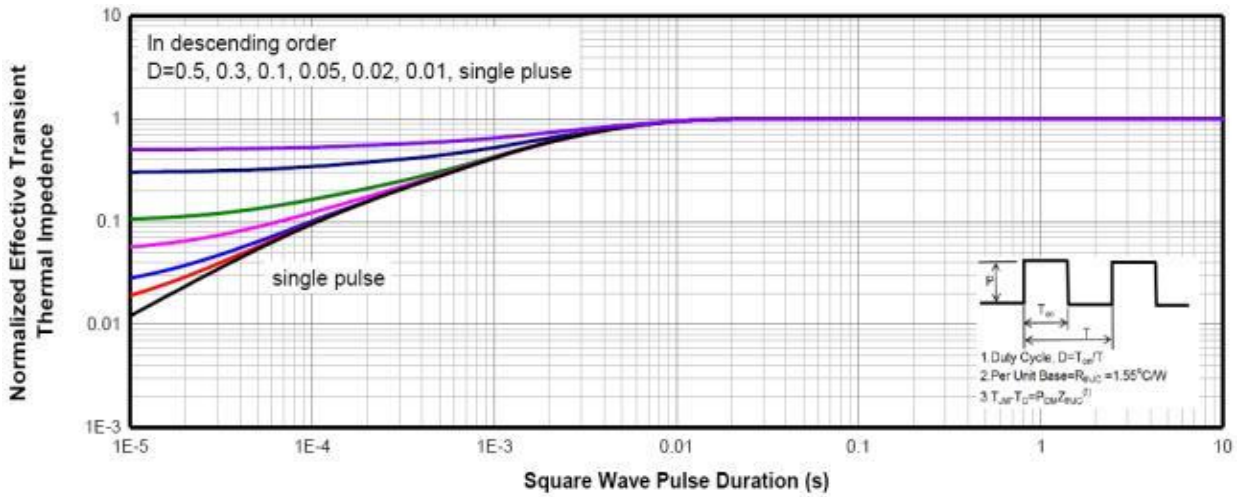
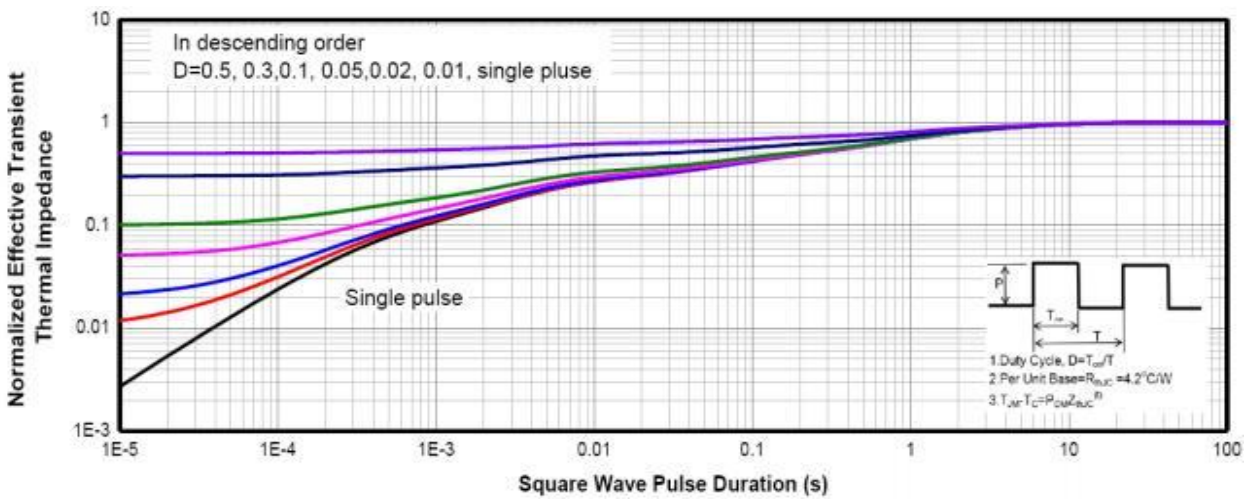
Typical Performance Characteristics

Typ9.gate charge characteristics



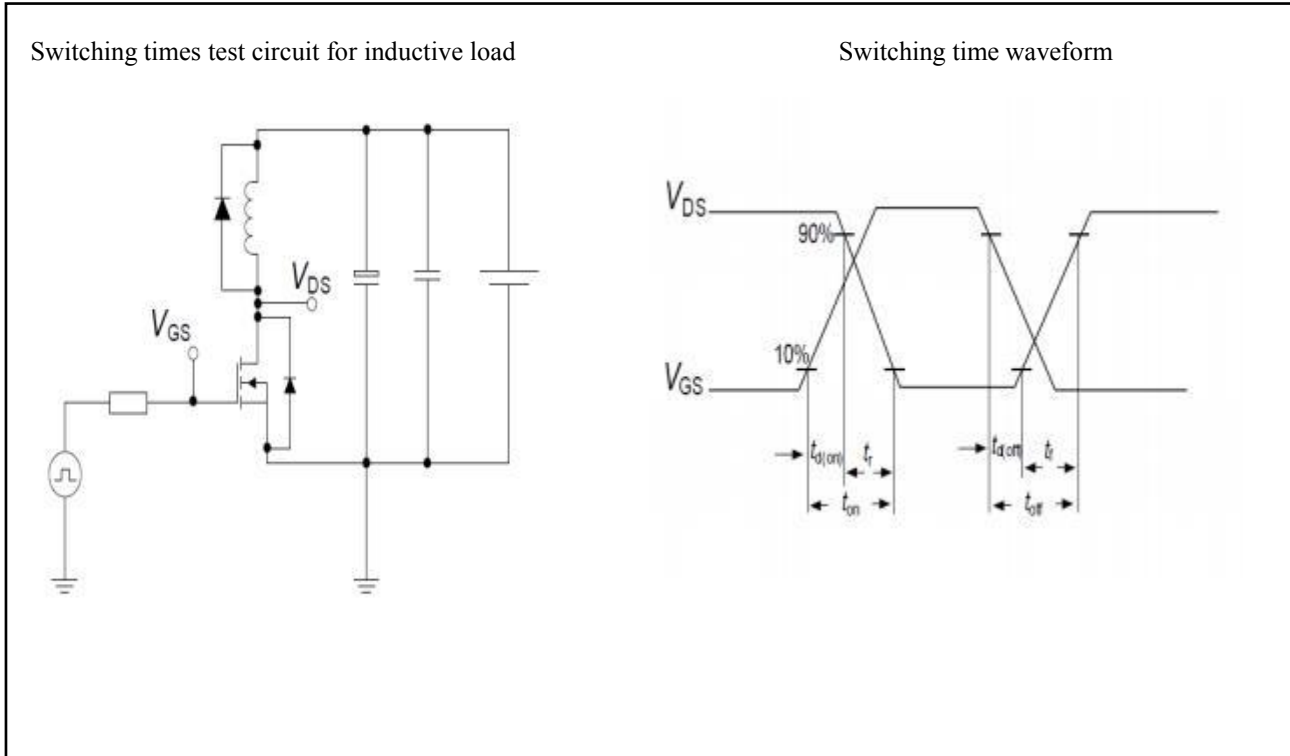
Typ10.Forward characteristics of reverse diode



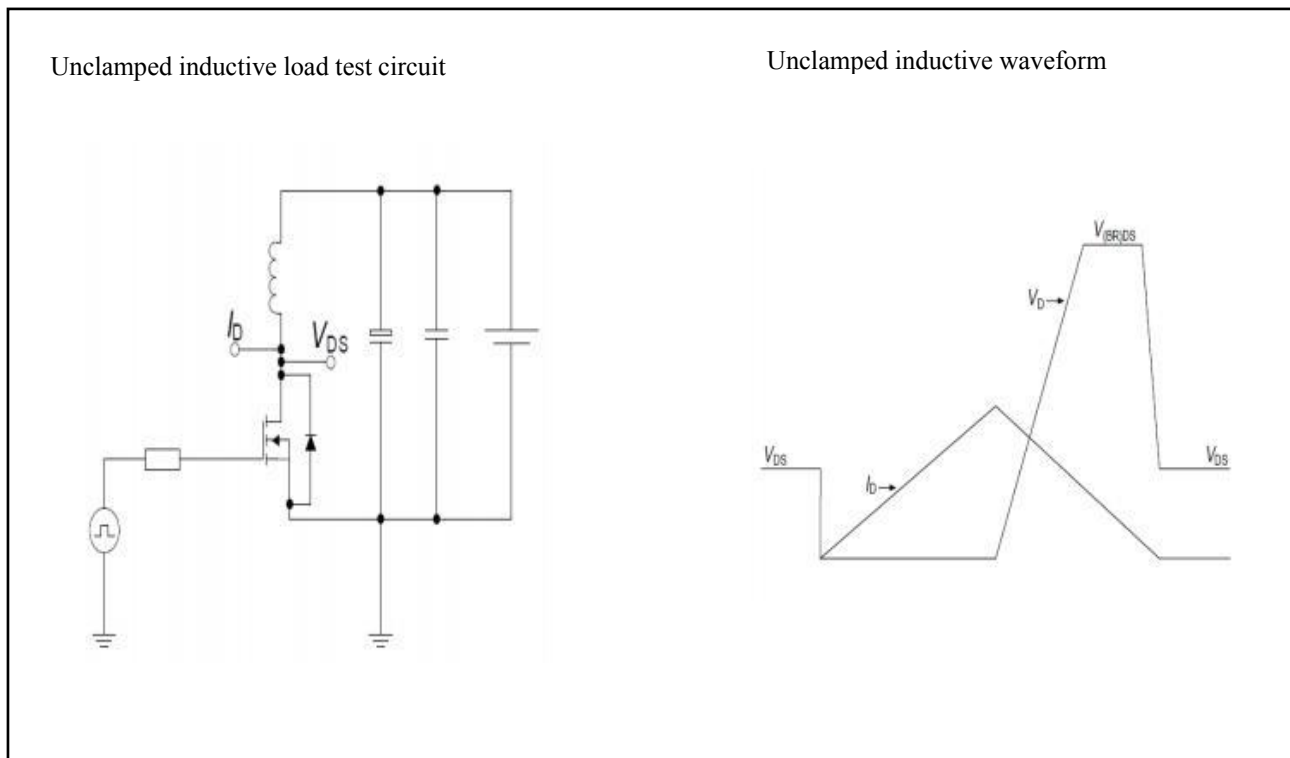
Typical Performance Characteristics
Max. transient thermal impedance
TO-220,TO-252,TO-263

Max. transient thermal impedance
TO-220FullPAK


Test circuits

Switching times test circuit and waveform for inductive load

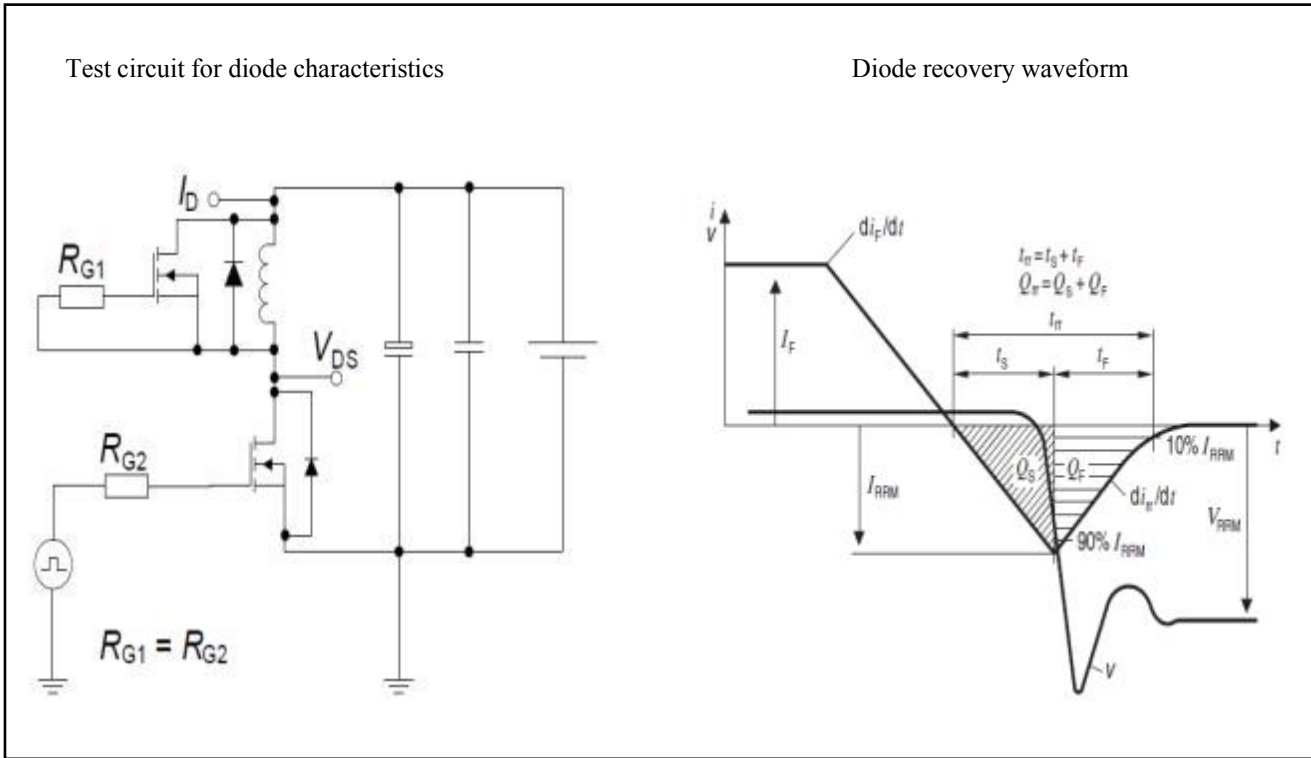


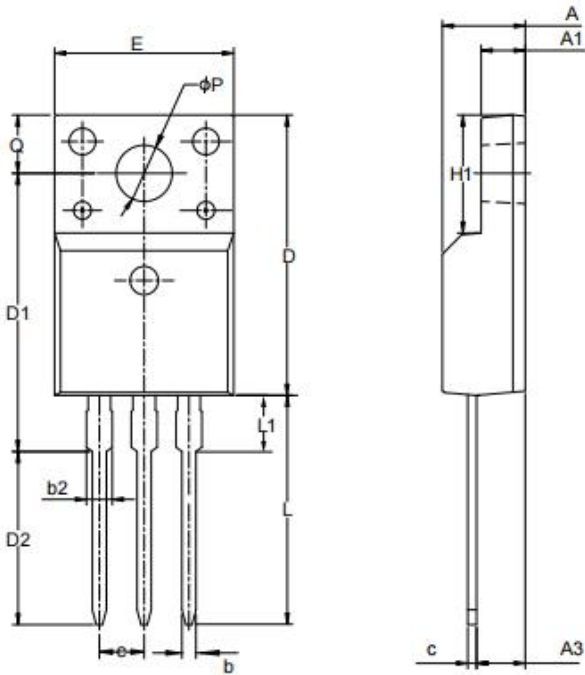
Unclamped inductive load test circuit and waveform



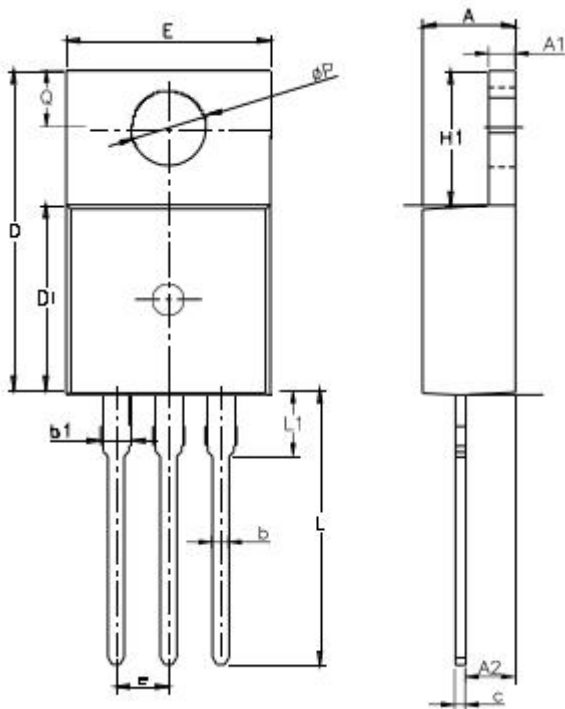
Test circuits

Test circuit and waveform for diode characteristics

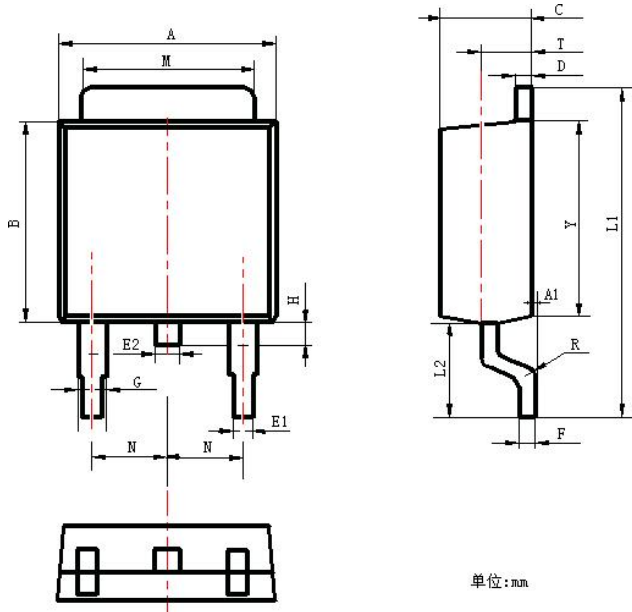


Package Outline
TO-220 Full PAK


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
ϕP	3	3.18	3.4
Q	3.05	3.3	3.55

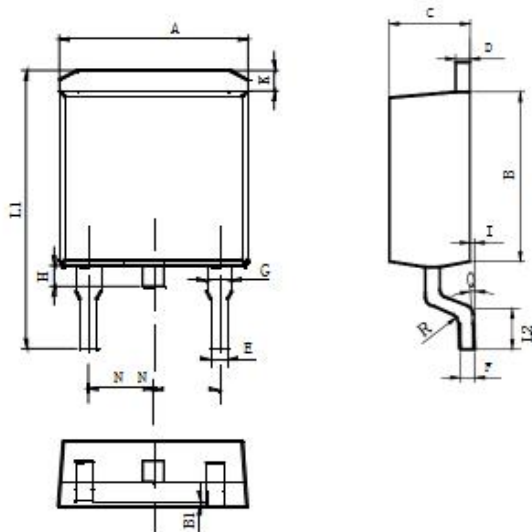
TO-220 -3L


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-252-2L


单位: mm

Items	Values(mm)		
	MIN	NOM	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

TO-263-3L


Items	Values(mm)		
	MIN	NOM	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