SR80R180

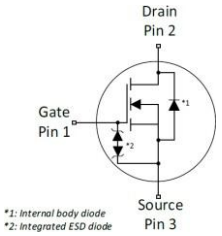
800V N-Channel Super-Junction MOSFET Gen-Ⅱ

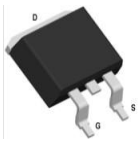
Description

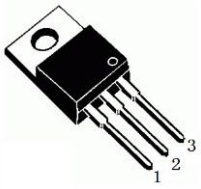
SJ-FET is new generation of high voltage MOSFET family that is utilizing an advanced charge balance mechanism for outstanding low on-resistance and lower gate charge performance.

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.




TO-263



TO-220T


TO-247

Features

•Multi-Epi process SJ-FET

•850V @TJ = 150 ℃

•Typ. RDS(on) = 0.16Ω

•Ultra Low Gate Charge (typ. Qg = 51nC)

•100% avalanche tested

Integrated Zener diode for high ESD robustnes

Package Marking and Ordering Information:

Marking	Package	Part #	Hazardous Substance Control	Packing
SR80R180S	T0-263-2L	SR80R180S	Pb free	Reel
SR80R180T	T0-220-3L	SR80R180T	Pb free	Tube
SR80R180G	TO-247-3L	SR80R180G	Pb free	Tube

Absolute Maximum Ratings

Symbol	Parameter	SR80R160T/S/G	Unit
V_{DSS}	Drain-Source Voltage	800	V
I_D	Drain Current -Continuous (TC = 25℃) -Continuous (TC = 100℃)	23* 14.5*	A
I_{DM}	Drain Current - Pulsed (Note 1)	69	A
V_{GSS}	Gate-Source voltage	±30	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	540	mJ
I_{AS}	Avalanche current, repetitive or not-repetitive (pulse width limited by Tj max)	6	A
dv/dt	Peak Diode Recovery dv/dt (Note 3)	15	V/ns
dVds/dt	Drain Source voltage slope (Vds=480V)	50	V/ns
P_D	Power Dissipation (TC = 25℃)	180	W
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	℃
T_L	Maximum Lead Temperature for Soldering Purpose, 1/16" from Case for 10 Seconds	260	℃

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

Thermal Characteristics

Symbol	Parameter	SR80R160T/S/G	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.68	℃/W
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink Typ.	0.5	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62	℃/W

Electrical Characteristics TC = 25℃ 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℃	800	-	-	V
		V_{GS} = 0V, I_D = 250μA,T_J = 150℃	850	-	-	V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature Coefficient	I_D = 250μA, Referenced to 25℃	-	0.75	-	V/℃
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 800V, V_{GS} = 0V -T_J = 125℃	-	- -	1 100	μA μA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 20V, V_{DS} = 0V	-	-	1	μA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -20V, V_{DS} = 0V	-	-	-1	μA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	3.0	4.0	5.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS} = 10V, I_D = 11A	-	0.16	0.18	Ω
Dynamic Characteristics						
Ciss	Input Capacitance	VDS = 50V, VGS = 0V, f = 1.0MHz	-	2475	-	pF
Coss	Output Capacitance		-	95	-	pF
Crss	Reverse Transfer Capacitance		-	3.2	-	pF
Eoss	Stored Energy in Output Capacitance	VDS = 0 to 600V,	-	9.4	-	μJ
Co(er)	Energy Related Output Capacitance	VGS = 0V	-	52	-	pF
Co(tr)	Time Related Output Capacitance		-	205	-	pF
Qg	Total Gate Charge		-	51	-	nC
Qgs	Gate-Source Charge	VDS = 600V, ID = 11A,	-	13.5	-	nC
Qgd	Gate-Drain Charge	VGS = 10V (Note 4)	-	18.6	-	nC
Vplateau	Gate plateau voltage		-	5.8	-	V
Rg	Gate resistance	f=1 MHz, open drain	-	6.5	-	Ω
Switching Characteristics						
td(on)	Turn-On Delay Time	VDS = 400V, ID = 11A RG = 4.7Ω,	-	27	-	ns
tr	Turn-On Rise Time	VGS = 10V	-	18	-	ns
td(off)	Turn-Off Delay Time	(Note 4)	-	89	-	ns
tf	Turn-Off Fall Time		-	15	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
IS	Maximum Continuous Drain-Source Diode Forward Current		-	-	23	A
ISM	Maximum Pulsed Drain-Source Diode Forward Current		-	-	69	A
VSD	Drain-Source Diode Forward Voltage	VGS = 0V, IS = 23A	-	0.9	1.4	V
trr	Reverse Recovery Time	VGS = 0V, VDS = 400V,	-	370	-	ns

Qrr	Reverse Recovery Charge	IS = 11A, dIF/dt =100A/μs	-	5.0	-	μC
Irrm	Peak Reverse Recovery Current		-	26	-	A

NOTES:

1.Repetitive Rating: Pulse width limited by maximum junction temperature

2.ID=IAS, VDD=100V, L=30mH，Starting TJ=25 ℃

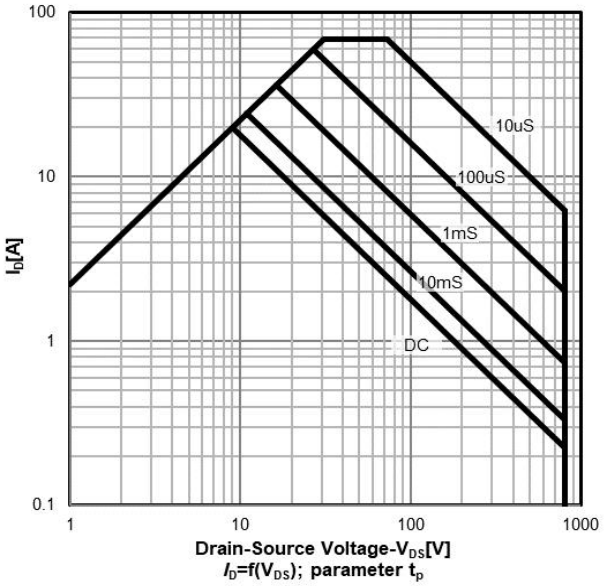
3.ISD≤ID, di/dt ≤ 200A/us, VDD ≤ BVDSS, Starting TJ = 25 ℃

4.Essentially Independent of Operating Temperature Typical Characteristics

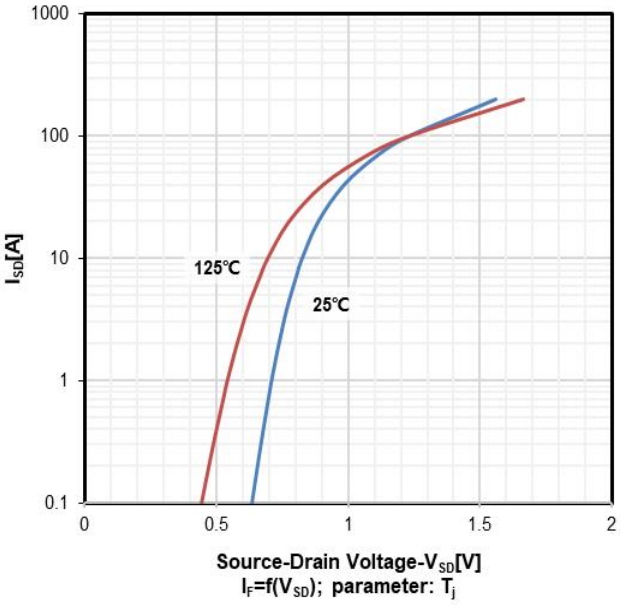
Typical Performance Characteristics

Typ.Safe operating area TC=25 ℃

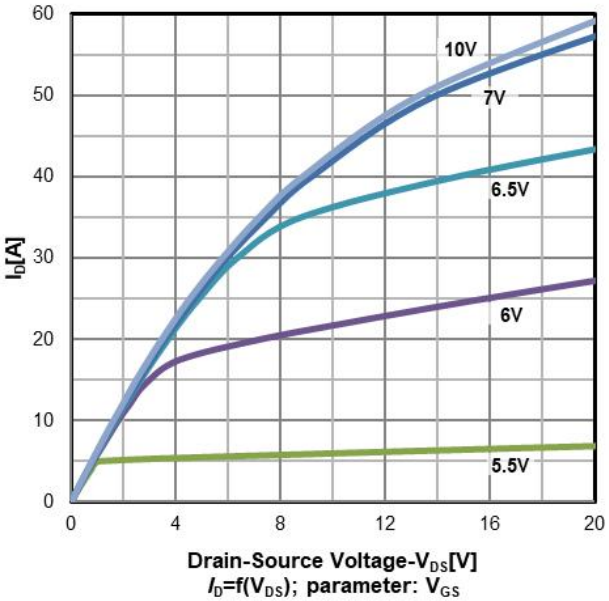
TO-220/TO-263/TO-247



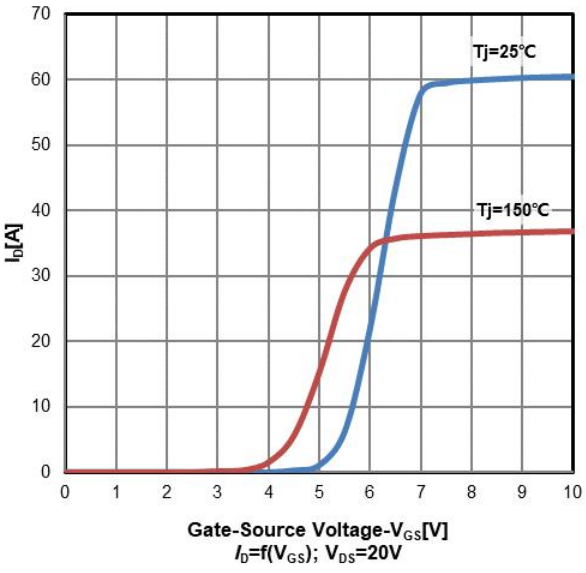
Typ.Forward characteristics of reverse diode



Typ. output characteristics Tj=25 ℃

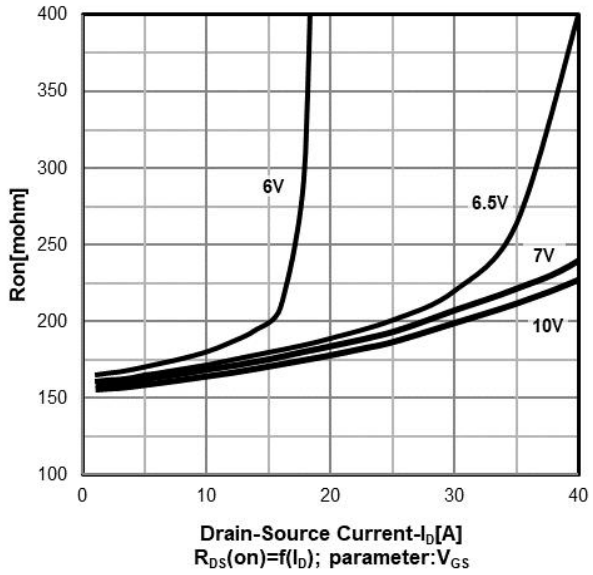


Typ.Transfer characteristics

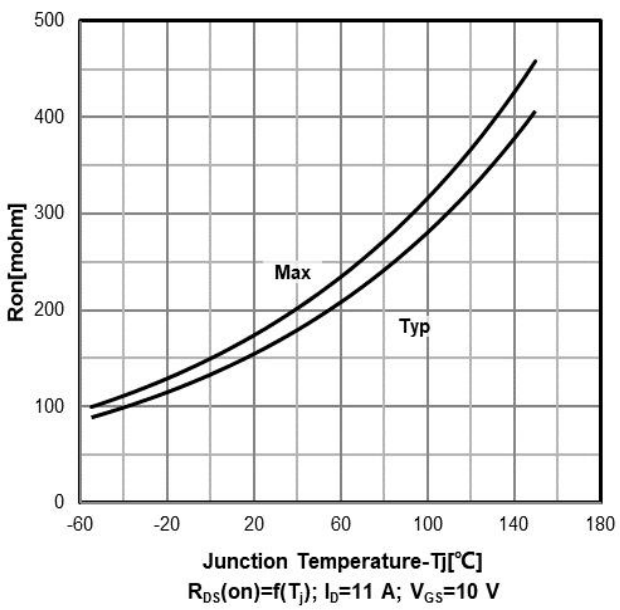


Typical Performance Characteristics

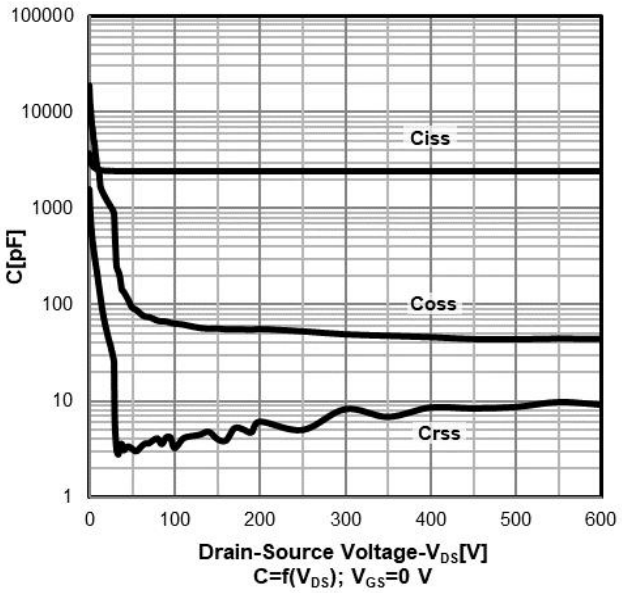
Typ. drain-source on-state resistance



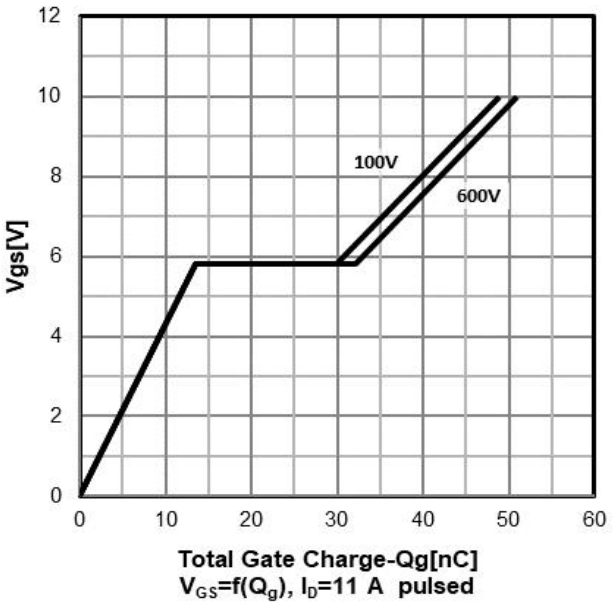
Typ.On-resistance vs temperature



Typ. capacitances

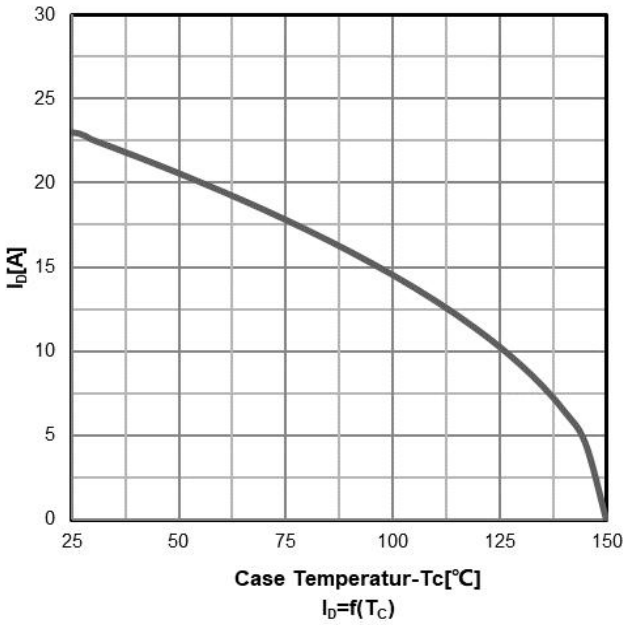


Typ. gate charge characteristics

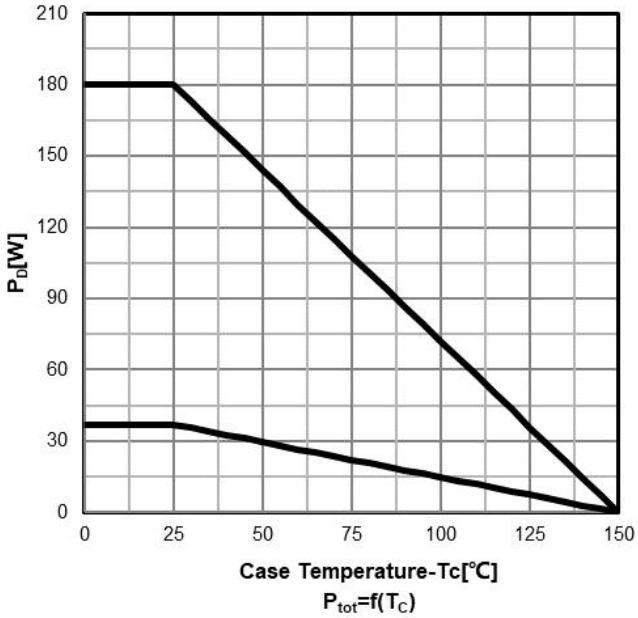


Typical Performance Characteristics

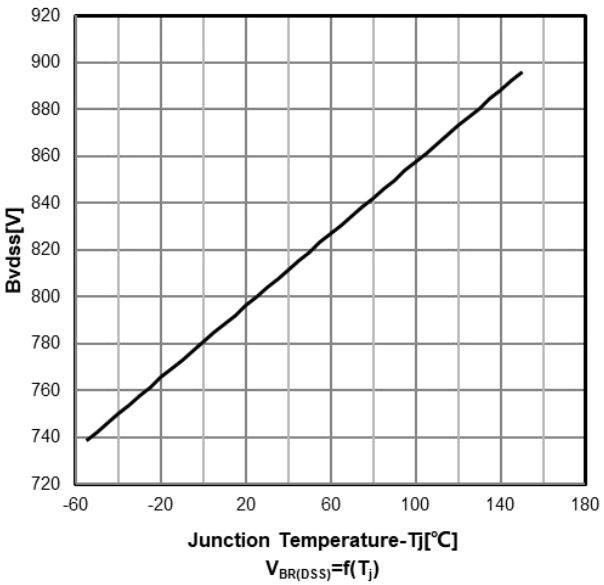
Typ.Drain current vs temperature



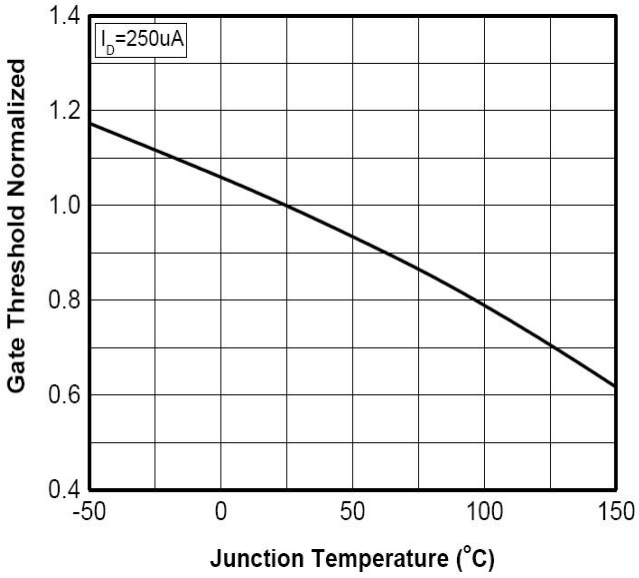
Typ.Power dissipation



Typ.Drain-source breakdown voltage

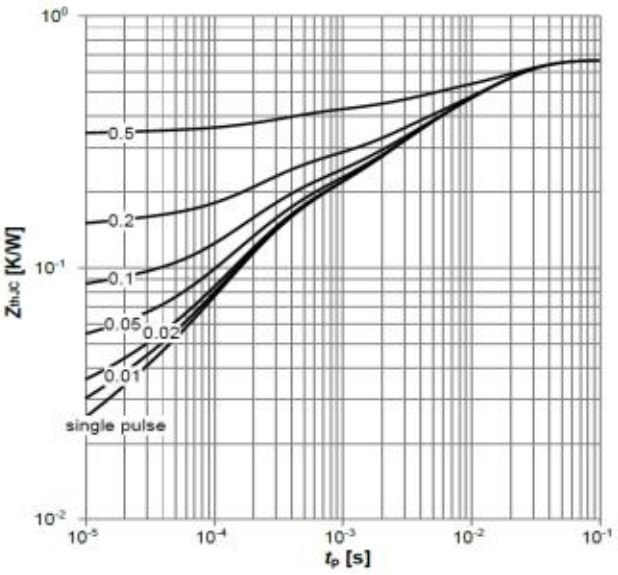


Typ.Normalized VGS(th) characteristics

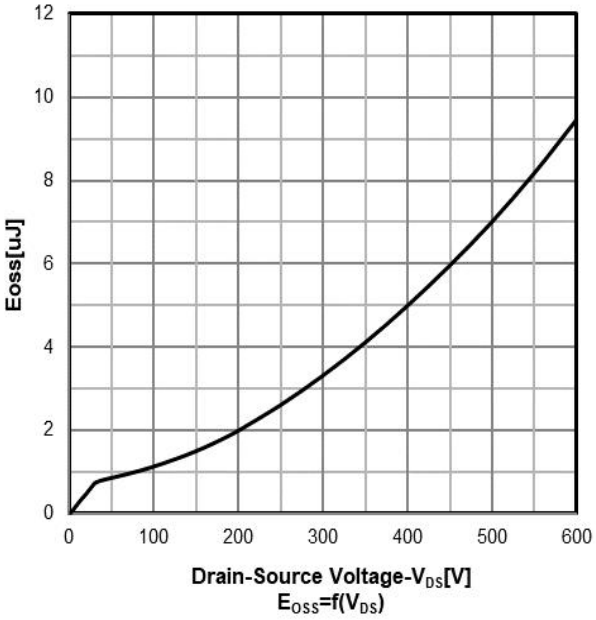


Typical Performance Characteristics

Max. transient thermal impedance TO-220/TO-252

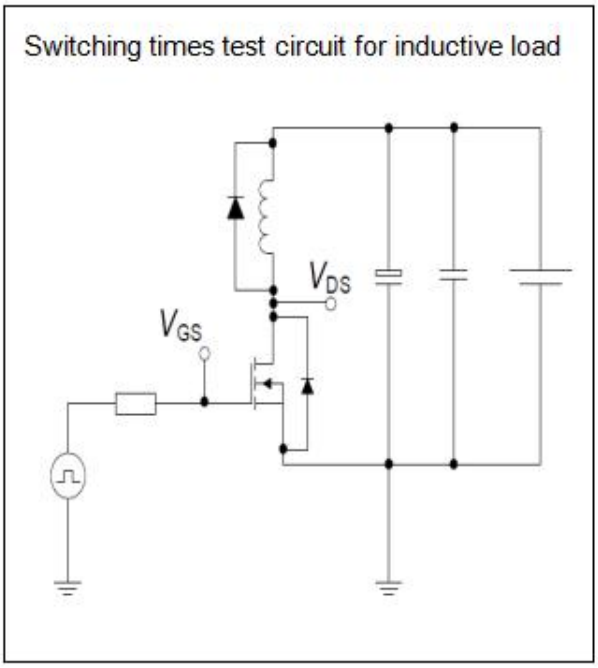


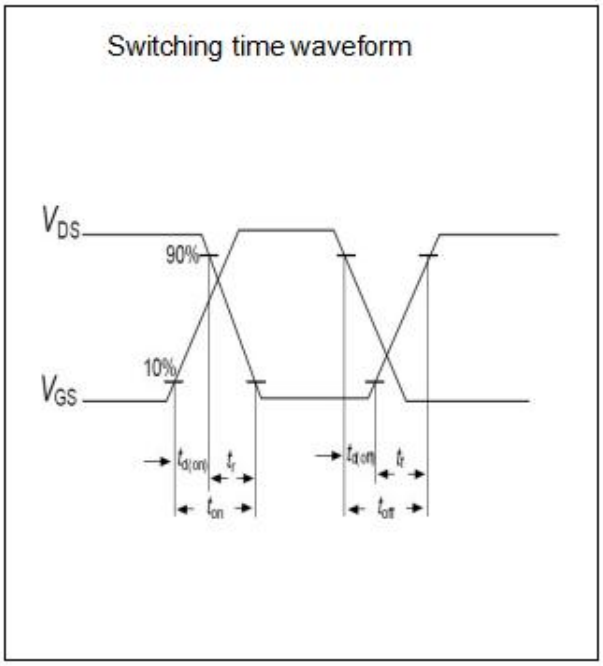
Typ.Coss stored energy



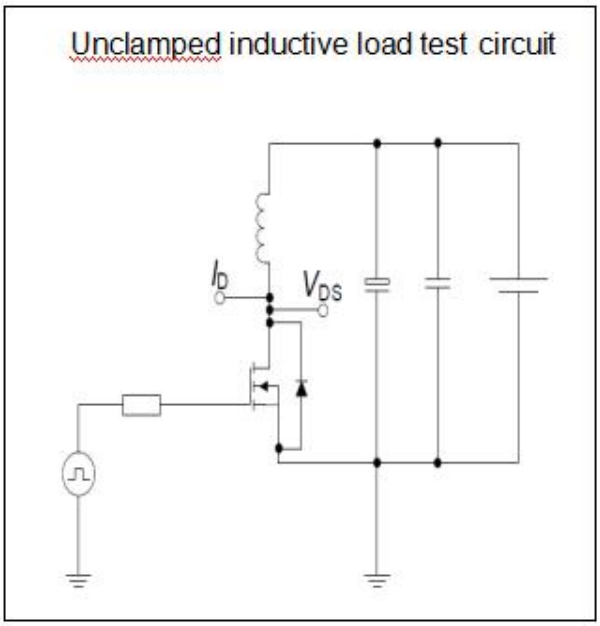
Test circuits

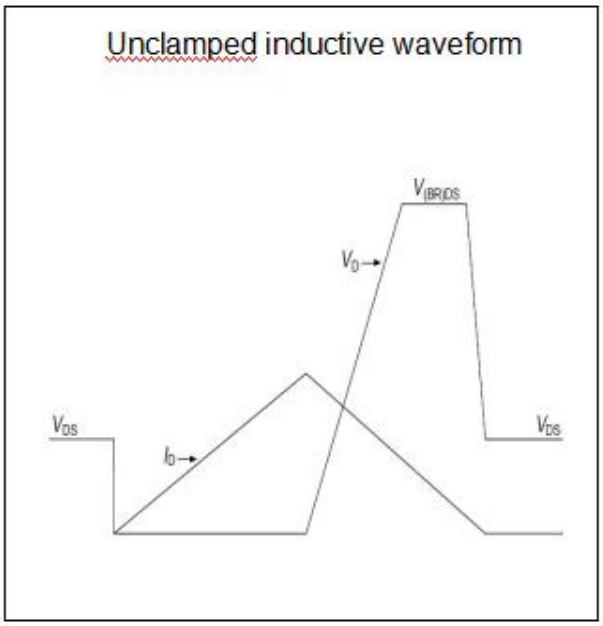
Switching times test circuit and waveform for inductive load





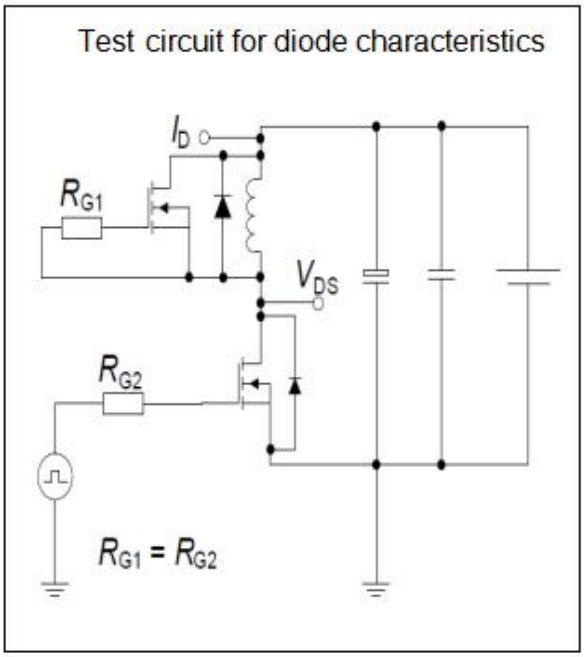
Unclamped inductive load test circuit and waveform

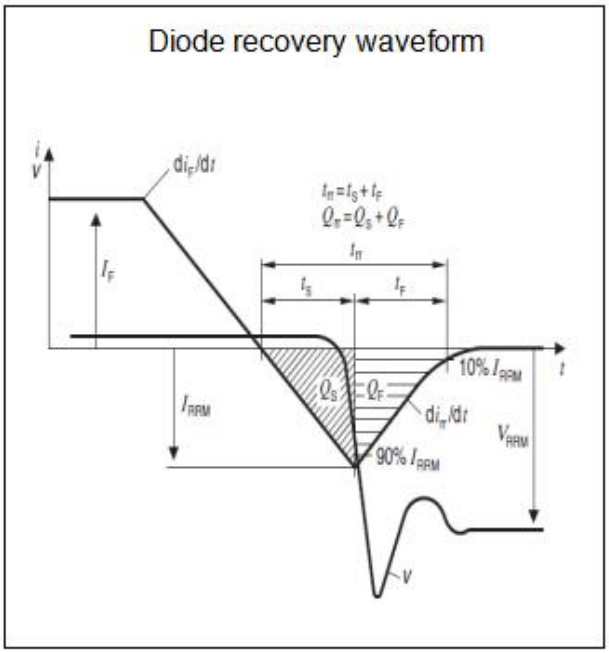




Test circuits

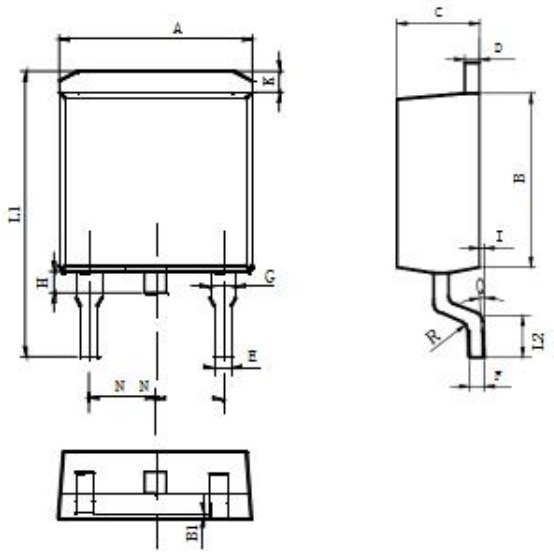
Test circuit and waveform for diode characteristics





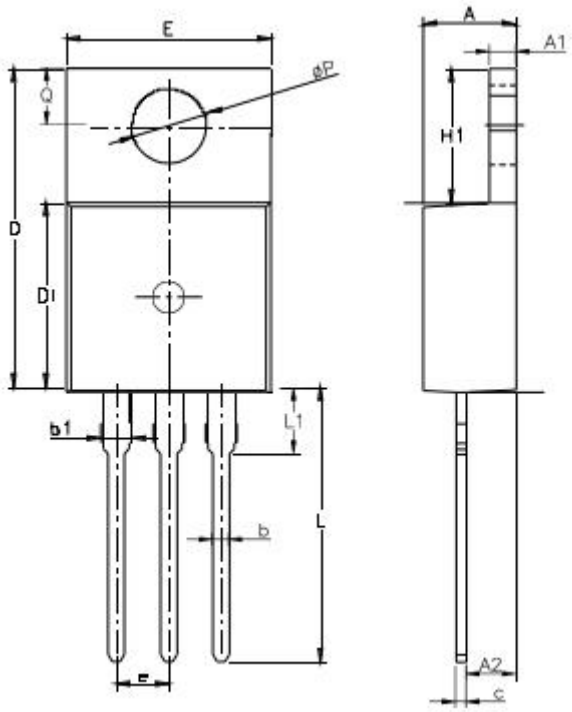
Package Outline

TO-263-2L



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

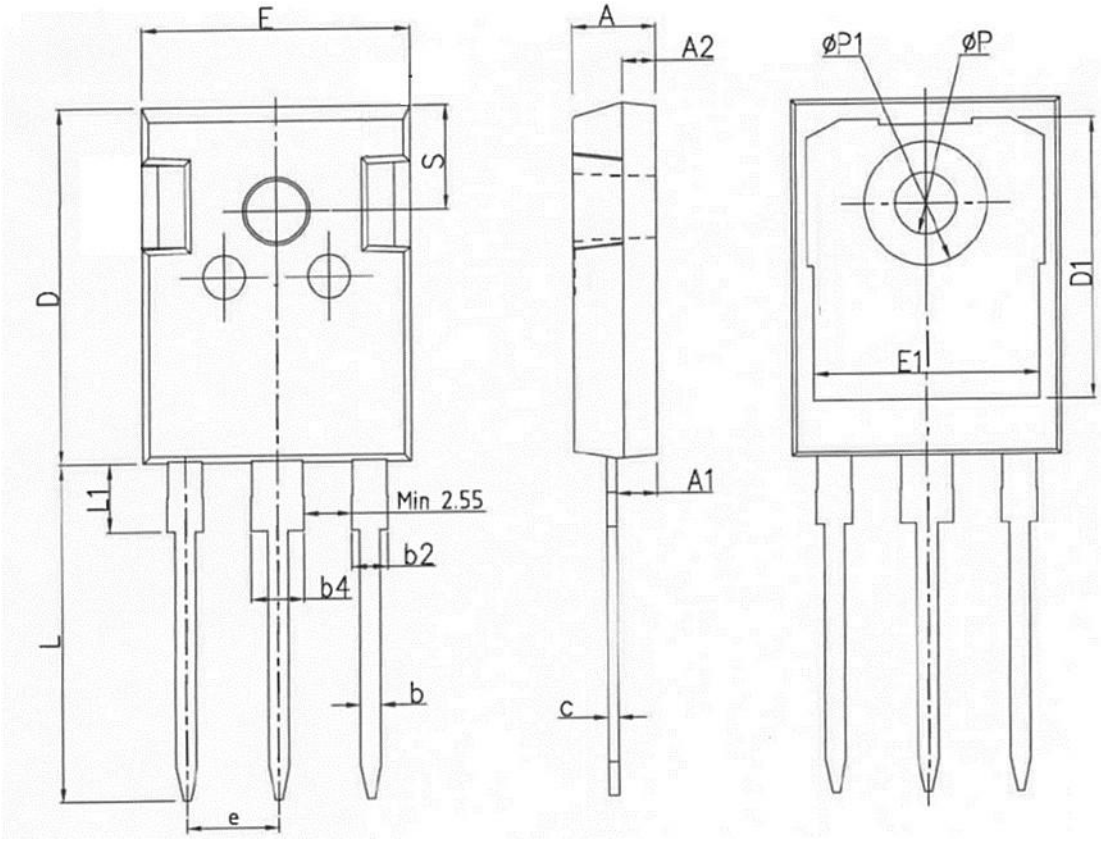
TO-220-3L



COMMON DIMENSIONS			
Items	Values(mm)		
	MIN	NOM	WAX
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-247-3L



SYMBOL	UNIT(mm)		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.20	2.40	2.60
A2	1.85	2.00	2.15
b	1.10	1.20	1.35
b2	1.91	2.04	2.21
b4	2.91	3.04	3.21
c	0.50	0.60	0.75
D	20.70	21.00	21.30
D1	16.20	16.55	16.90
E	15.50	15.80	16.10
E1	13.00	13.30	13.60
e	5.44BSC		
L	19.60	19.95	20.30
L1	-	-	4.30
ΦP	3.40	3.60	3.80
ΦP1	-	-	7.50
S	6.15BSC		