

### Features

- Advanced trench process technology
- Fully characterized Avalanche voltage and current
- Good stability and uniformity with high EAS
- Fast Switching
- High Ruggedness

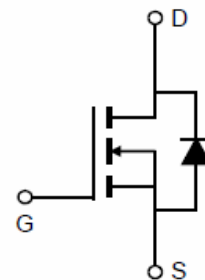
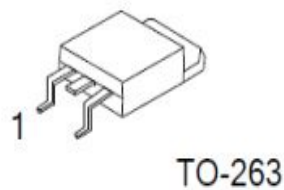
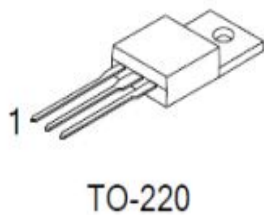
### Product Summary

V <sub>DS</sub>	80V
R <sub>DS(on)</sub> @V <sub>GS</sub> =10V	5.5 mΩ
I <sub>D</sub>	120A

### Application

- Power switching application
- UPS (Uninterruptible Power Supplies)
- DC/DC converter
- General purpose applications

Part ID	Package Type	Marking
SFP120N80B	TO-220	120N80B
SFB120N80B	TO-263	120N80B



### Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V <sub>DS</sub>	80	V
Continuous drain current T <sub>C</sub> = 25°C (Silicon limit)	I <sub>D</sub>	120	A
T <sub>C</sub> = 100°C (Silicon limit)		90	
Pulsed drain current T <sub>C</sub> = 25°C, t <sub>p</sub> limited by T <sub>jmax</sub>	I <sub>D pulse</sub>	450	
Avalanche energy, single pulse (L=1mH, R <sub>g</sub> =25Ω, I <sub>D</sub> =sweep(14A~46A))	E <sub>AS</sub>	1200	mJ
Gate-emitter voltage	V <sub>GS</sub>	±20	V
Power dissipation T <sub>C</sub> = 25°C	P <sub>tot</sub>	220	W
Operating junction and storage temperature	T <sub>j</sub> , T <sub>stg</sub>	-55...+150	°C

# SFP(B)120N80B

## Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal resistance, junction – case. Max	$R_{thJC}$	0.66	°C/W
Thermal resistance, junction – ambient. Max	$R_{thJA}$	62.0	

## Electrical Characteristic, at $T_j = 25\text{ }^\circ\text{C}$ , unless otherwise specified

Parameter	Symbol	Test Condition	Value			Unit
			min.	typ.	max.	
<b>Static Characteristic</b>						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	80	88	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$ $T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$	2.0 -	2.8	4.0 -	
Zero gate voltage drain current	$I_{DSS}$	$V_{DS}=80V, V_{GS}=0V$ $T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$	- -	0.05	1 5	$\mu A$
Gate-source leakage current	$I_{GSS}$	$V_{GS}=20V, V_{DS}=0V$	-	1	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=40A,$ $T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$	- -	5.5	6.5	$m\Omega$

## Dynamic Characteristic

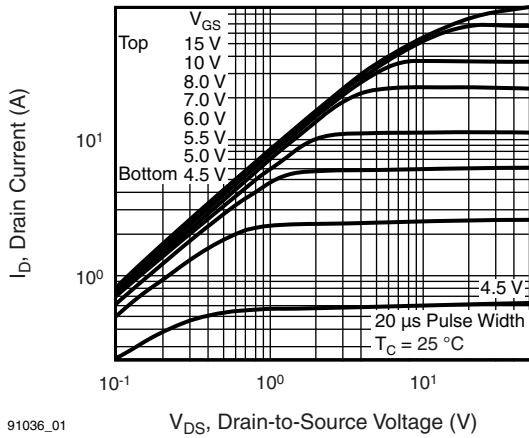
Input Capacitance	$C_{iss}$	$V_{GS}=0V, V_{DS}=25V,$ $f=1\text{MHz}$	-	5300	-	pF
Output Capacitance	$C_{oss}$		-	860	-	
Reverse Transfer Capacitance	$C_{rss}$		-	420		
Gate Total Charge	$Q_G$	$V_{GS}=10V, V_{DS}=30V,$ $I_D=30A, f=1\text{MHz}$	-	125	-	nC
Gate-Source charge	$Q_{gs}$		-	20.0	-	
Gate-Drain charge	$Q_{gd}$		-	45.0	-	
Turn-on delay time	$t_{d(on)}$	$T_j=25^\circ\text{C}, V_{GS}=10V,$ $V_{DS}=30V, R_L=15\Omega$	-	35.2	-	ns
Rise time	$t_r$		-	38.9	-	
Turn-off delay time	$t_{d(off)}$		-	45.1	-	
Fall time	$t_f$		-	22.8	-	

## Body Diode Characteristic

Body Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_{SD}=40A$	-	0.75	1.2	V
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F=40A,$ $dI/dt=100A/\mu s$		60		ns
Body Diode Reverse Recovery Charge	$Q_{rr}$	$I_F=40A,$ $dI/dt=100A/\mu s$		76		nC

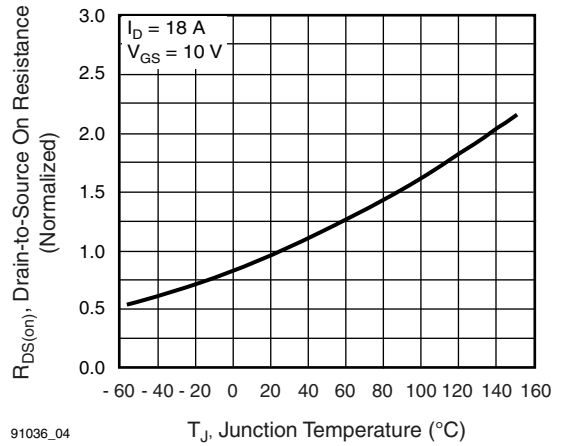
Typical Performance Characteristics

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



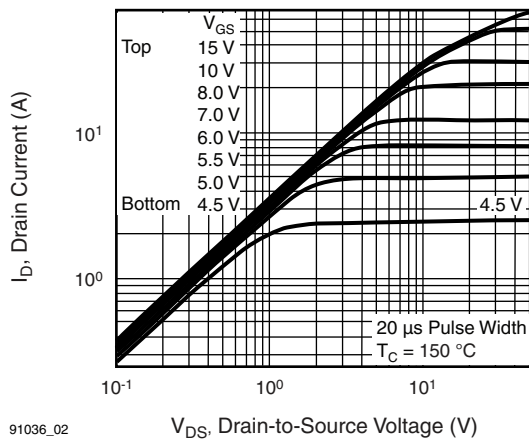
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Fig. 1 - Typical Output Characteristics,  $T_C = 25\text{ }^\circ\text{C}$



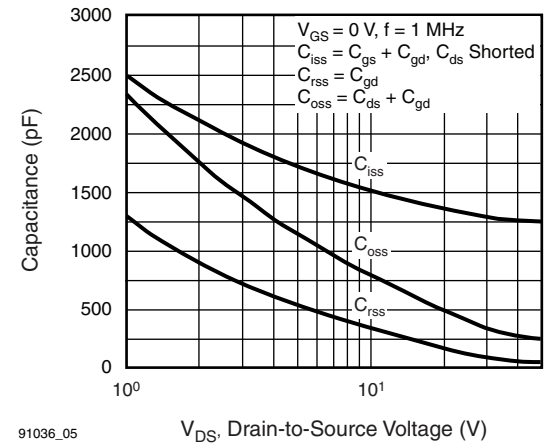
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Fig. 4 - Normalized On-Resistance vs. Temperature



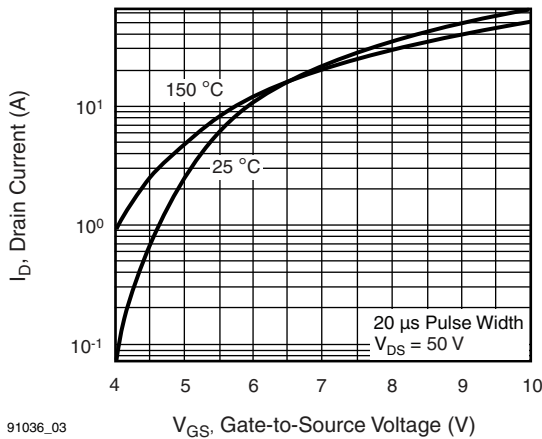
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Fig. 2 - Typical Output Characteristics,  $T_C = 150\text{ }^\circ\text{C}$



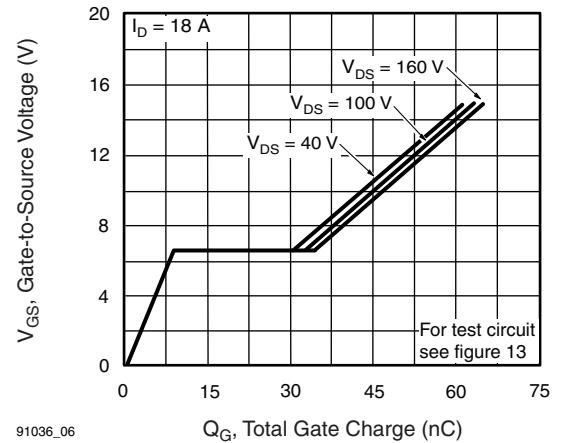
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Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage



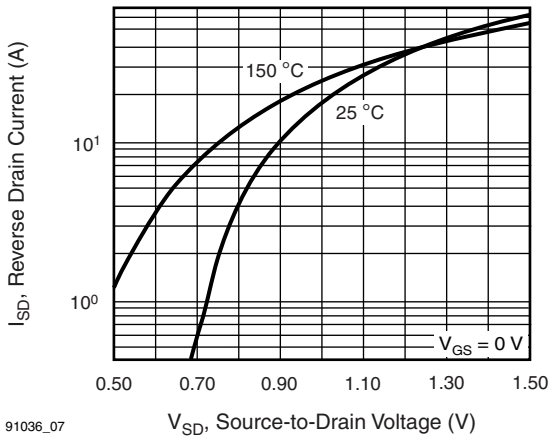
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Fig. 3 - Typical Transfer Characteristics



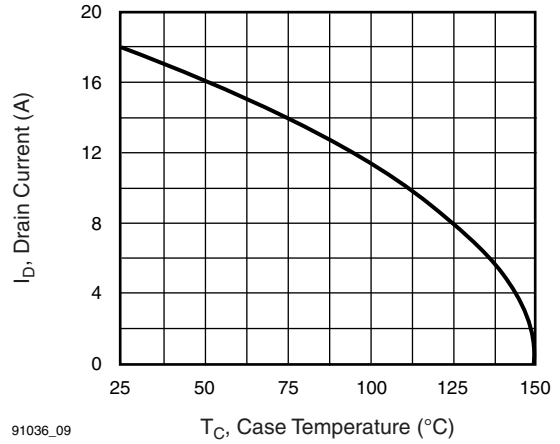
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Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage



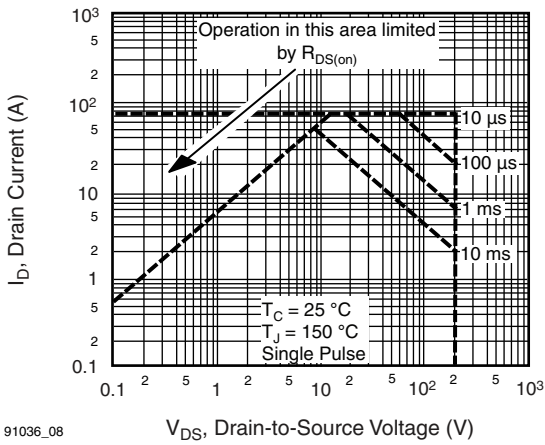
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Fig. 7 - Typical Source-Drain Diode Forward Voltage



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Fig. 9 - Maximum Drain Current vs. Case Temperature



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Fig. 8 - Maximum Safe Operating Area

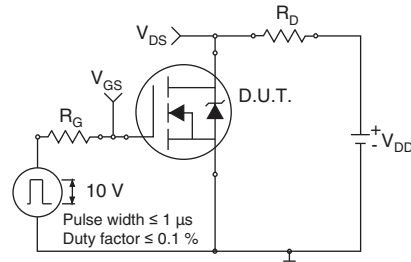


Fig. 10a - Switching Time Test Circuit

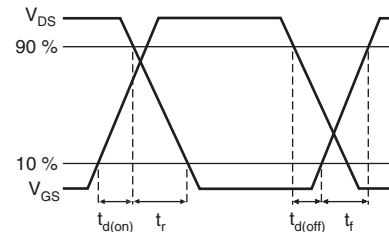


Fig. 10b - Switching Time Waveforms

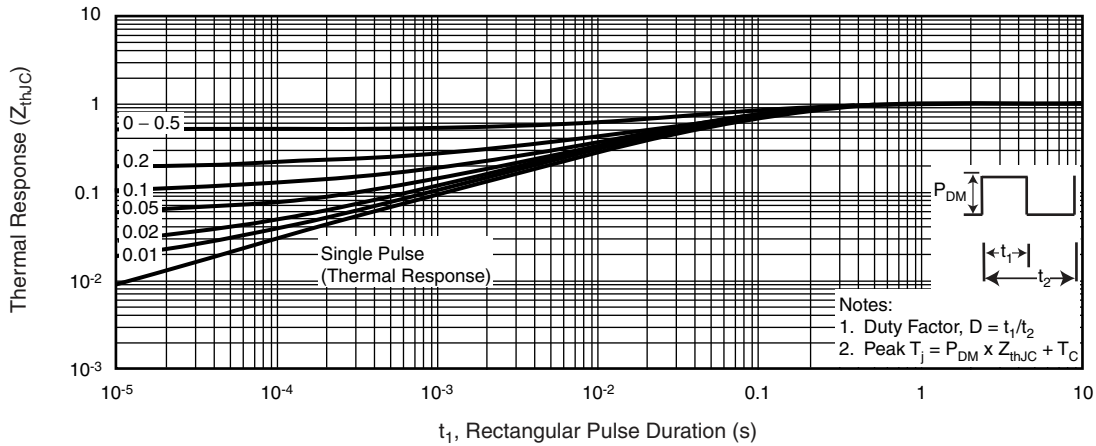


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

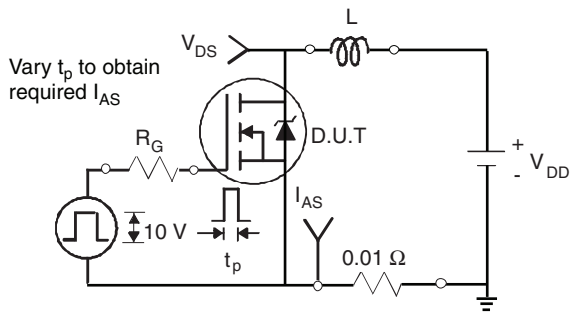


Fig. 12a - Unclamped Inductive Test Circuit

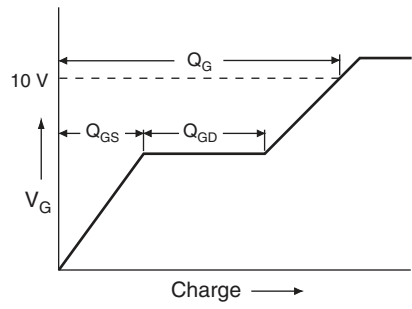


Fig. 13a - Basic Gate Charge Waveform

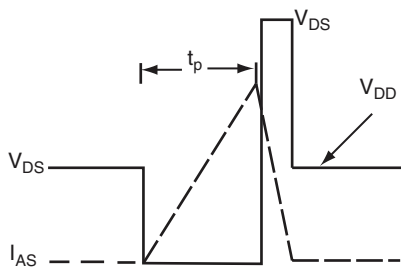


Fig. 12b - Unclamped Inductive Waveforms

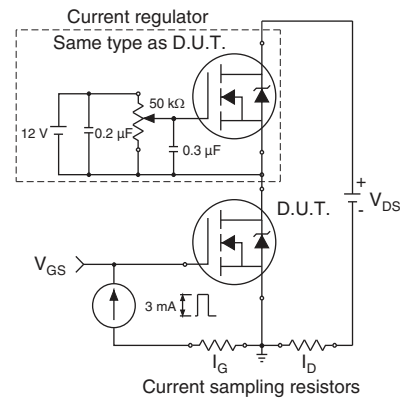
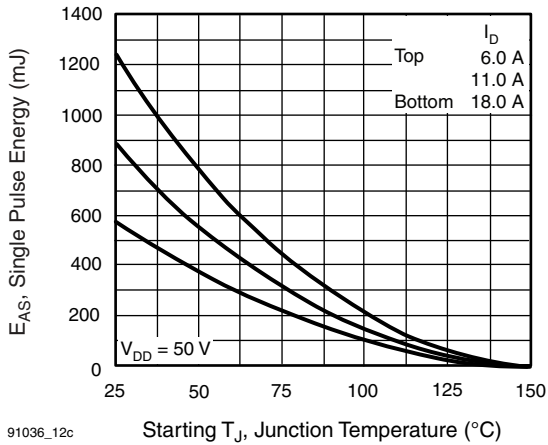
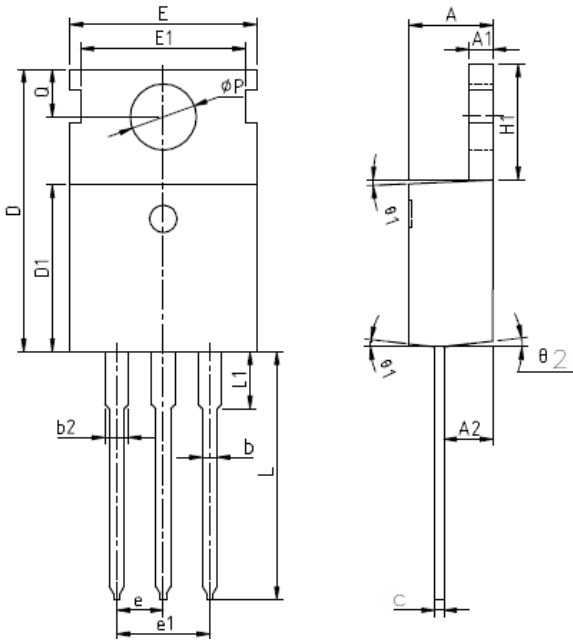


Fig. 13b - Gate Charge Test Circuit



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Fig. 12c - Maximum Avalanche Energy vs. Drain Current

**PACKAGE DIMENSION**
**TO-220**


SYMBOL	MIN	NOM	MAX
A	4.27	4.57	4.87
A1	1.15	1.30	1.45
A2	2.10	2.40	2.70
b	0.70	0.80	1.00
b2	1.17	1.27	1.50
c	0.40	0.50	0.65
D	15.10	15.60	16.10
D1	8.80	9.10	9.40
D2	5.70	6.70	7.00
E	9.70	10.00	10.30
E1	-	8.70	-
E2	9.65	10.00	10.35
E3	7.00	8.00	8.40
e	2.54 BSC		
e1	5.08 BSC		
H1	6.00	6.50	6.85
L	12.75	13.50	13.90
L1	-	3.10	3.40
ΦP	3.45	3.60	3.75
Q	2.60	2.80	3.00
θ1	4°	7°	10°
θ2	0°	3°	6°

**TO-263**
