

Features

- Advanced trench process technology
- Extremely low on-resistance $R_{DS(on)}$
- Excellent $Q_g \times R_{DS(on)}$ product(FOM)
- Fast Switching
- High Ruggedness

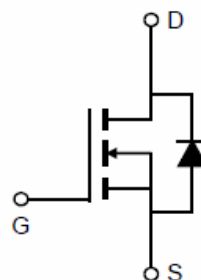
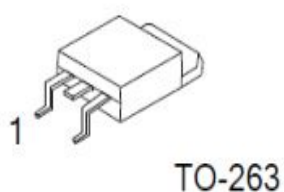
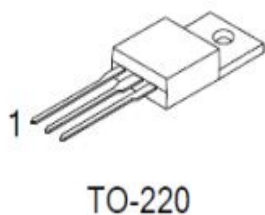
Product Summary

V _{DS}	85V
$R_{DS(on)}@V_{GS}=10V$	5.5 mΩ
I _D	120A

Application

- Motor Drives
- UPS (Uninterruptible Power Supplies)
- DC/DC converter
- General purpose applications

Part ID	Package Type	Marking
SFP120N85	TO-220	120N85
SFB120N85	TO-263	120N85



Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V _{DS}	85	V
Continuous drain current T _C = 25°C (Silicon limit) T _C = 25°C (Package limit) T _C = 100°C (Silicon limit)	I _D	138 120 87	A
Pulsed drain current T _C = 25°C, t _p limited by T _{jmax}	I _{D pulse}	480	
Avalanche energy, single pulse (L=1mH,R _g =25Ω, I _D =sweep(14A~46A))	E _{AS}	1000	mJ
Gate-emitter voltage	V _{GS}	±20	V
Power dissipation T _C = 25°C	P _{tot}	189	W
Operating junction and storage temperature	T _j , T _{stg}	-55...+150	°C

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 °C, unless otherwise specified

Parameter	Symbol	Test Condition	Value			Unit
			min.	typ.	max.	
Static Characteristic						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	85	95	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$ $T_j=25^{\circ}C$ $T_j=125^{\circ}C$	2.0 -	3.0	4.0 -	
Zero gate voltage drain current	I_{DSS}	$V_{DS}=85V, V_{GS}=0V$ $T_j=25^{\circ}C$ $T_j=125^{\circ}C$	- -	0.05 -	1 5	μA
Gate-source leakage current	I_{GSS}	$V_{GS}=20V, V_{DS}=0V$	-	1	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=50A,$ $T_j=25^{\circ}C$ $T_j=125^{\circ}C$	- -	4.6 -	5.5 -	m Ω
Transconductance	g_{fs}	$V_{DS}=5V, I_D=50A$	-	84.2	-	S

Dynamic Characteristic

Input Capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=40V,$ $f=1MHz$	-	3086	-	pF
Output Capacitance	C_{oss}		-	1057	-	
Reverse Transfer Capacitance	C_{rss}		-	26.0	-	
Gate Total Charge	Q_G	$V_{GS}=10V, V_{DS}=40V,$ $I_D=50A, f=1MHz$	-	55.0	-	nC
Gate-Source charge	Q_{gs}		-	15.0	-	
Gate-Drain charge	Q_{gd}		-	13.0	-	
Turn-on delay time	$t_{d(on)}$	$T_j=25^\circ C, V_{GS}=10V,$ $V_{DS}=40V, R_L=3\Omega$	-	20.1	-	ns
Rise time	t_r		-	38.9	-	
Turn-off delay time	$t_{d(off)}$		-	45.1	-	
Fall time	t_f		-	22.8	-	
Gate resistance	R_G	$V_{GS}=0V, V_{DS}=0V,$ $f=1MHz$	-	3.3	-	Ω

Body Diode Characteristic

Body Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_{SD}=50A$	-	0.95	1.4	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F=20A,$ $dI/dt=500A/\mu s$		60		ns
Body Diode Reverse Recovery Charge	Q_{rr}	$I_F=20A,$ $dI/dt=500A/\mu s$		560		nC

Typical Performance Characteristics

Figure 1. Typ. Output Characteristics ($T_J=25^\circ\text{C}$)

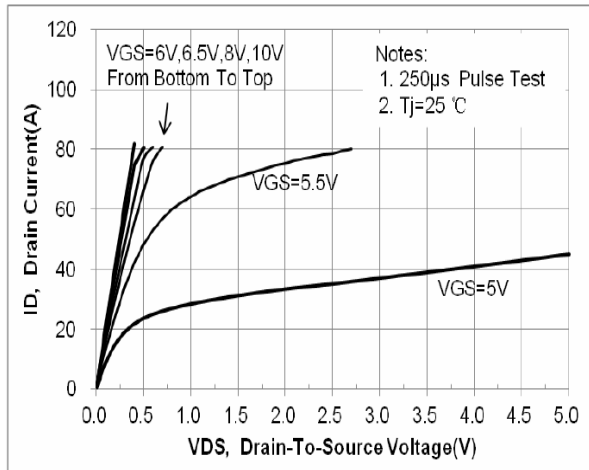


Figure 2. Transfer Characteristics (Junction Temperature)

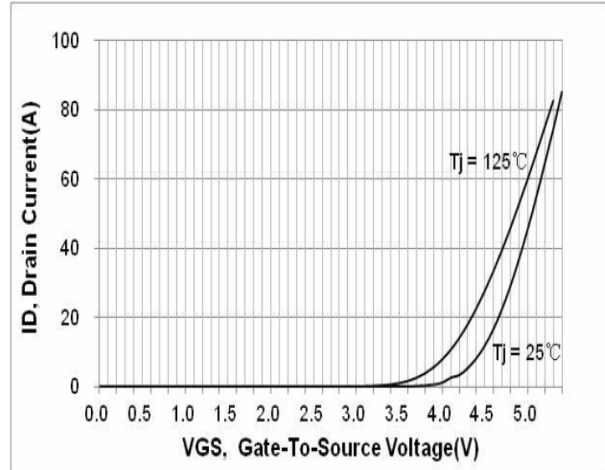


Figure 3. On-Resistance vs. Drain Current and Gate Voltage Figure

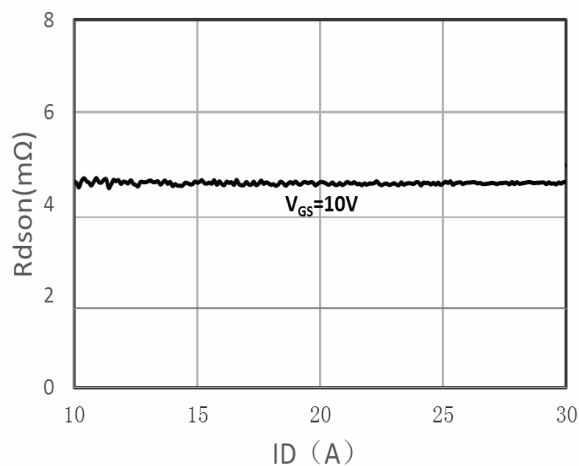


Figure 4. On-Resistance vs. Junction Temperature

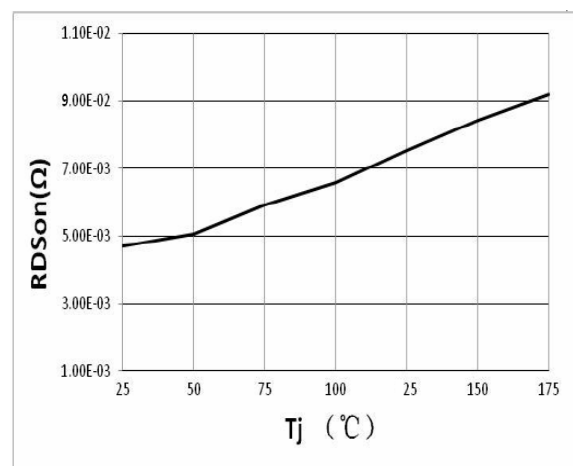


Figure 5. On-Resistance vs. Gate-Source Voltage (Junction Temperature)

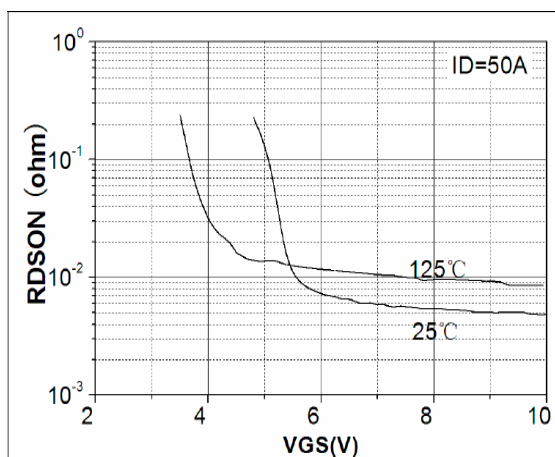


Figure 6. Body-Diode Characteristics (Junction Temperature)

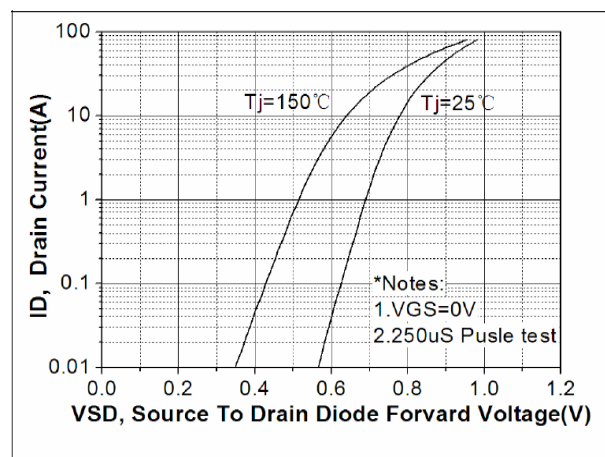


Figure 7. Gate-Charge Characteristics

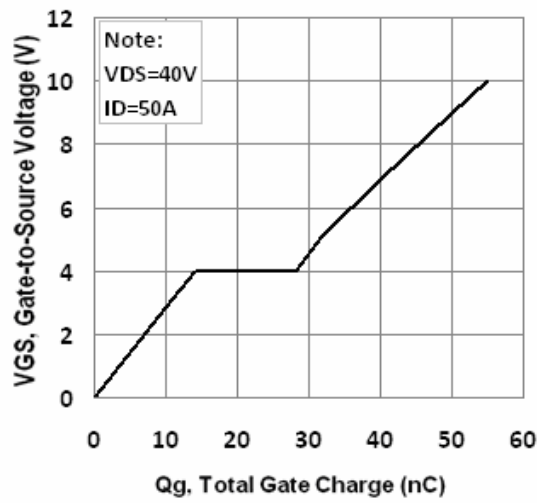


Figure 8. Capacitance Characteristics

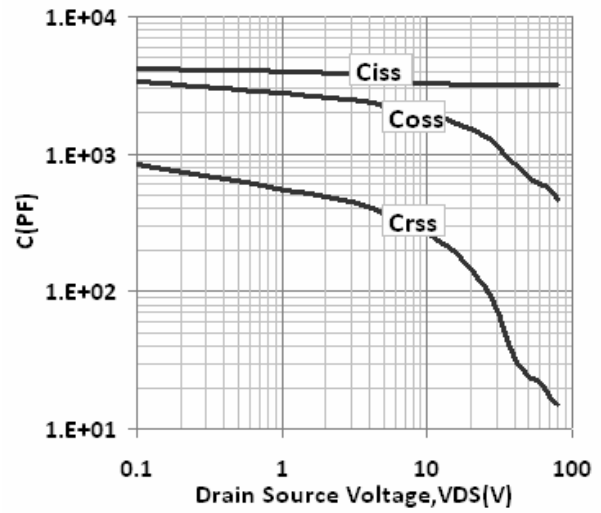


Figure 9: Normalized Maximum Transient Thermal Impedance (R_{thJC})

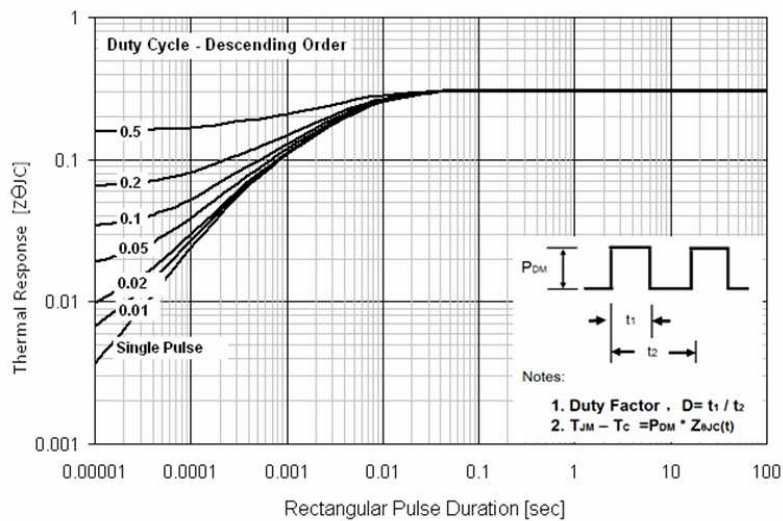
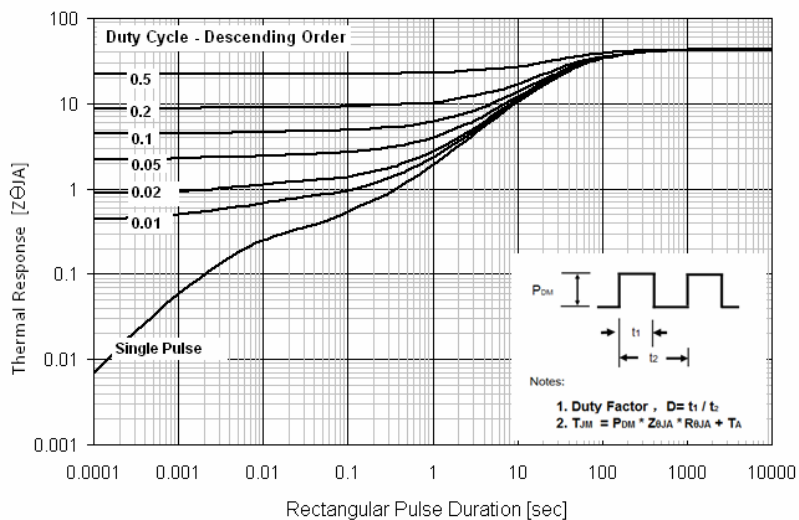
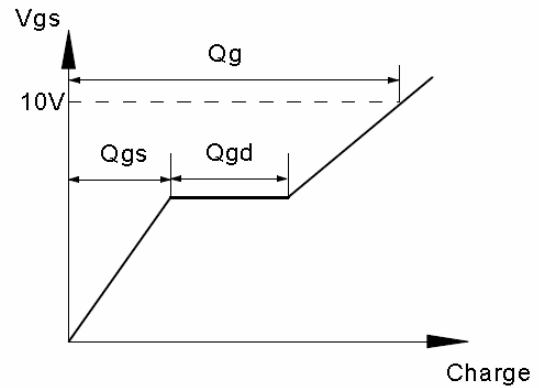
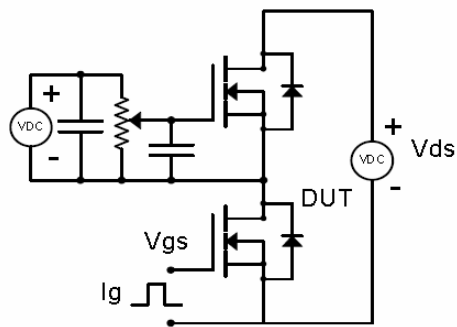


Figure 10: Normalized Maximum Transient Thermal Impedance (R_{thJA})

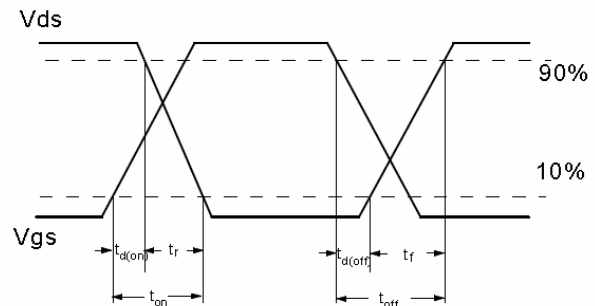
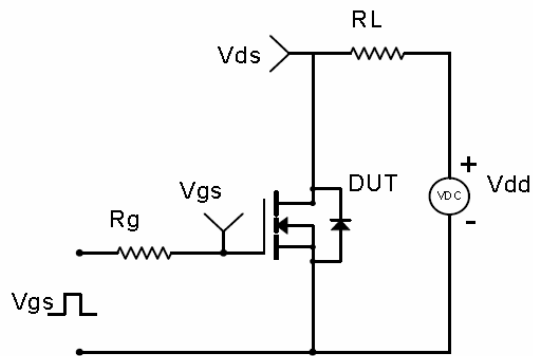


Test Circuit & Waveform

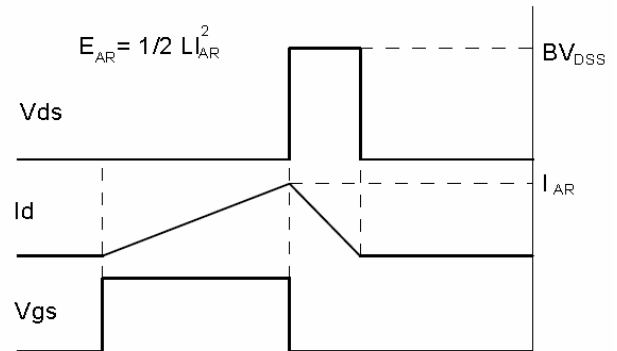
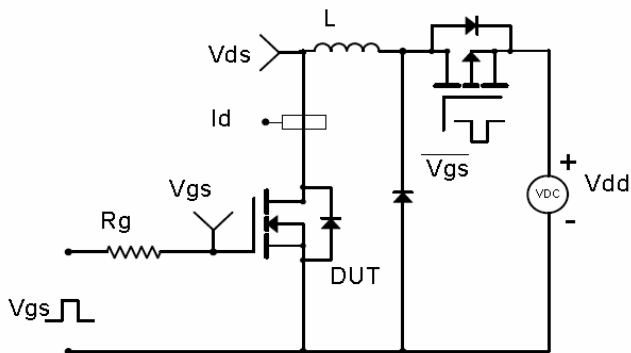
Gate Charge Test Circuit & Waveform



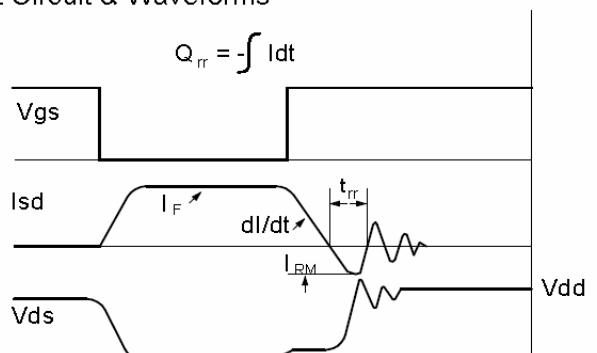
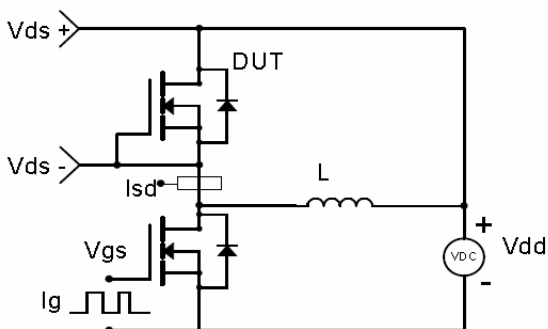
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

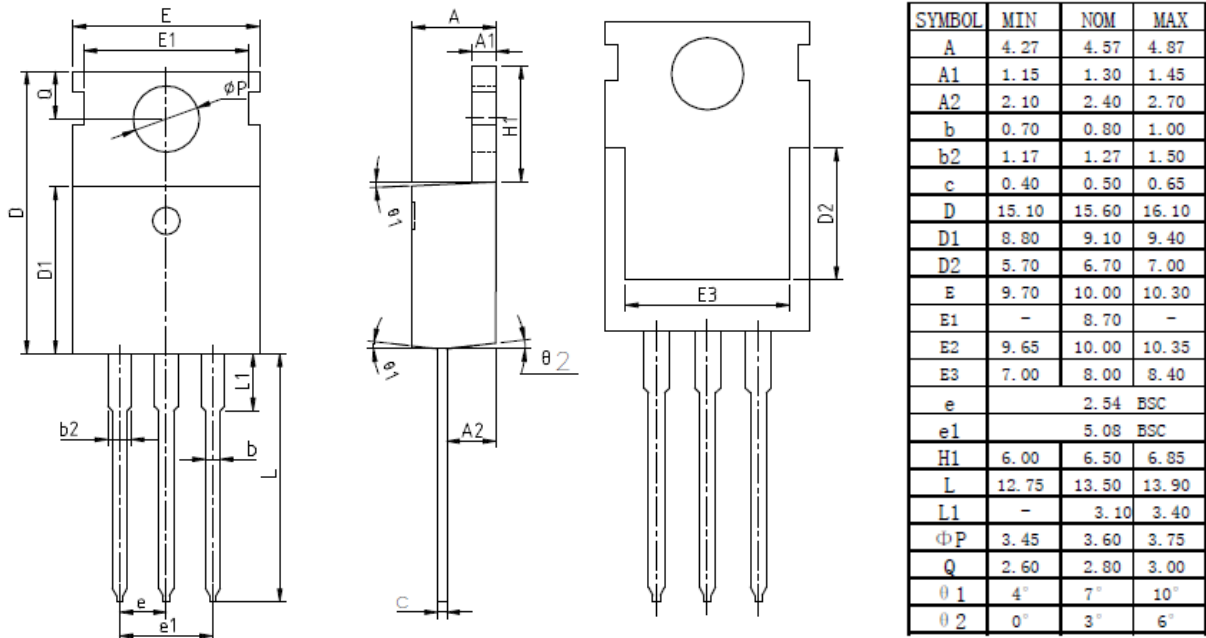


Diode Recovery Test Circuit & Waveforms



PACKAGE DIMENSION

TO-220



TO-263

