

Features

- Uses advanced SGT MOSFET technology
- Extremely low on-resistance $R_{DS(on)}$
- High Ruggedness
- 100% Avalanche Tested

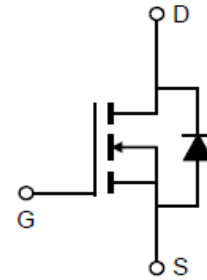
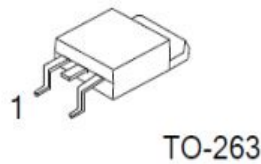
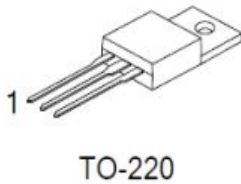
Application

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

Product Summary

VDS	85V
$R_{DS(on)@VGS=10V}$	3.0 mΩ
I_D	190A

Part ID	Package Type	Marking
SFP190N85	TO-220	190N85
SFB190N85	TO-263	190N85



Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	85	V
Continuous drain current $T_C = 25^\circ\text{C}$ (Package limit) $T_C = 100^\circ\text{C}$ (Package limit)	I_D	190 150	A
Pulsed drain current $T_C = 25^\circ\text{C}$, t_p limited by T_{jmax}	$I_{D\ pulse}$	570	
Avalanche energy, single pulse (L=0.033mH, VDS=80V)	E_{AS}	600	mJ
Gate-emitter voltage	V_{GS}	±20	V
Power dissipation $T_C = 25^\circ\text{C}$	P_{tot}	230	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}	0.55	°C/W
Thermal resistance, junction – ambient. Max	R_{thJA}	62.0	

Electrical Characteristic, at T_j = 25 °C, unless otherwise specified

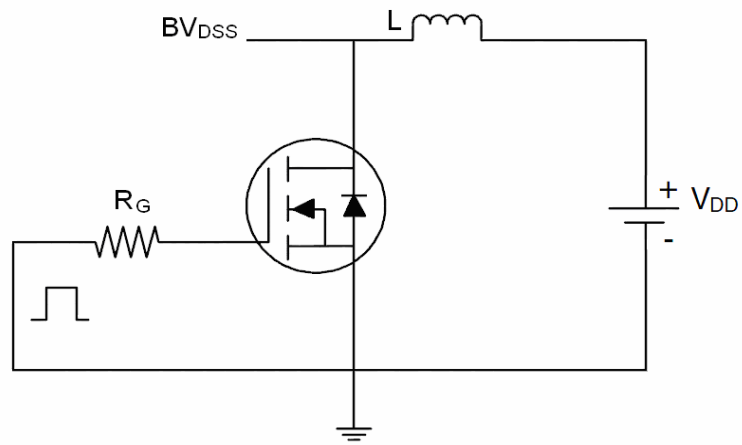
Parameter	Symbol	Test Condition	Value			Unit
			min.	typ.	max.	
Static Characteristic						
Drain-source breakdown voltage	V _{(BR)DSS}	V _{GS} =0V, I _D =250uA	85	95	-	V
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250uA T _j =25°C T _j =125°C	2.0 -	3.0	4.0 -	
Zero gate voltage drain current	I _{DSS}	V _{DS} =80V, V _{GS} =0V T _j =25°C T _j =125°C	- -	0.05	1 5	μA
Gate-source leakage current	I _{GSS}	V _{GS} =20V, V _{DS} =0V	-	20	100	nA
Drain-source on-state resistance	R _{DS(on)}	V _{GS} =10V, I _D =50A, T _j =25°C T _j =125°C	- -	2.8	4.0 -	mΩ
Gate resistance	R _G	V _{GS} =0V, V _{DS} =0V, f=1MHz	- -	3.3	- -	Ω

Dynamic Characteristics

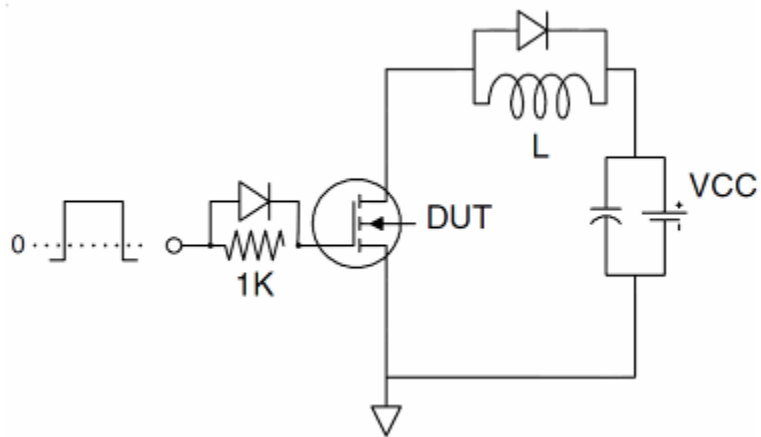
Input Capacitance	C _{ISS}	V _{DS} =25V, V _{GS} =0V, F=1.0MHz	-	11000	-	PF
Output Capacitance	C _{OSS}		-	914	-	PF
Reverse Transfer Capacitance	C _{rss}		-	695	-	PF
Switching Characteristics						
Turn-on Delay Time	t _{d(on)}	V _{DD} =38V, I _D =40A V _{GS} =10V, R _{GEN} =1.2Ω ^(Note2)	-	23	-	nS
Turn-on Rise Time	t _r		-	190	-	nS
Turn-Off Delay Time	t _{d(off)}		-	130	-	nS
Turn-Off Fall Time	t _f		-	120	-	nS
Total Gate Charge	Q _g	V _{DS} =60V, I _D =40A, V _{GS} =10V ^(Note2)	-	250	-	nC
Gate-Source Charge	Q _{gs}		-	48	-	nC
Gate-Drain Charge	Q _{gd}		-	98	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =40A	-	-	1.2	V
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F = 40A di/dt = 100A/μs ^(Note2)	-	63	-	nS
Reverse Recovery Charge	Q _{rr}		-	98	-	nC
Forward Turn-On Time	t _{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Test Circuit

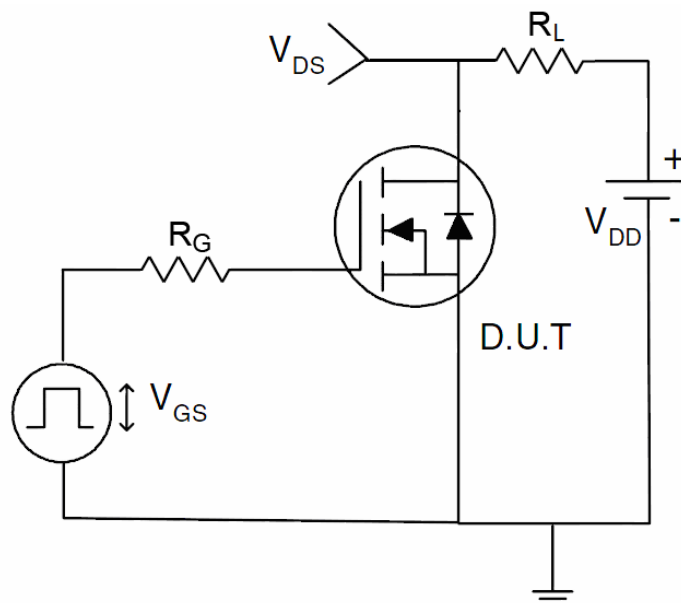
1) E_{AS} test Circuit



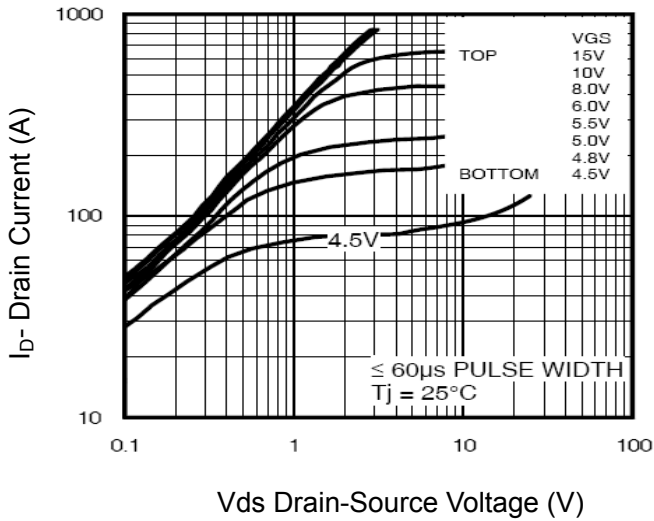
2) Gate charge test Circuit



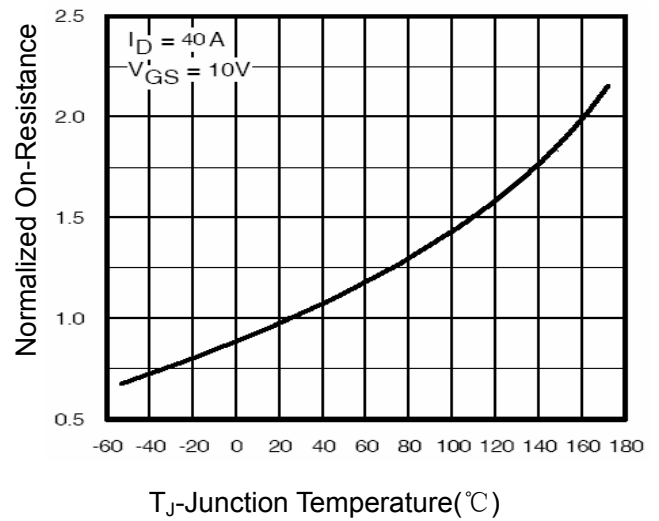
3) Switch Time Test Circuit



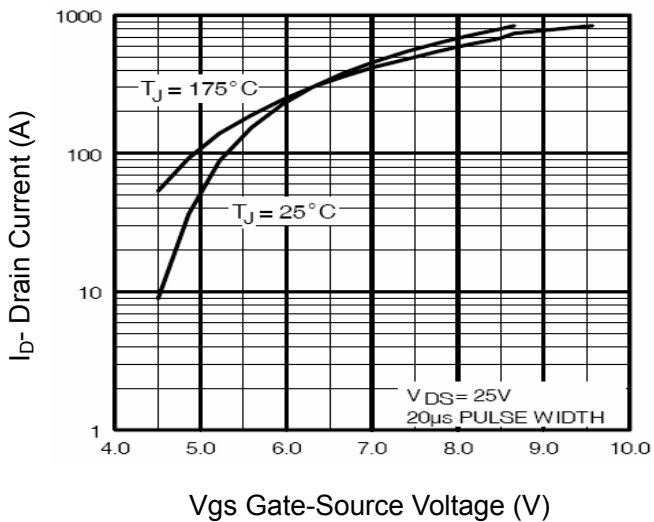
Typical Electrical and Thermal Characteristics



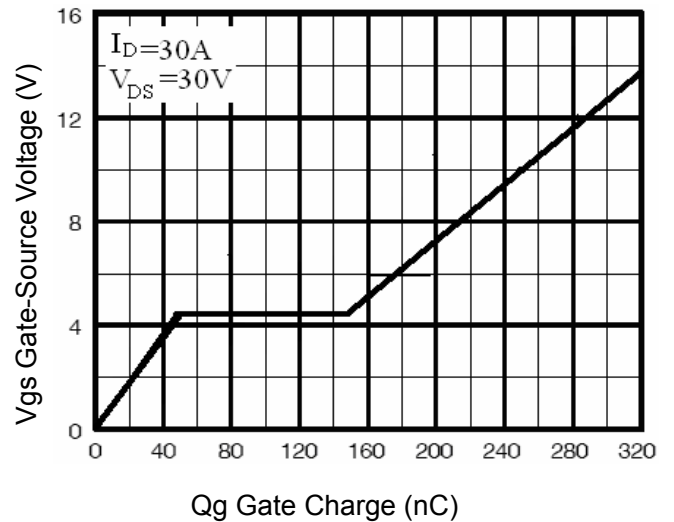
Vds Drain-Source Voltage (V)
Figure 1 Output Characteristics



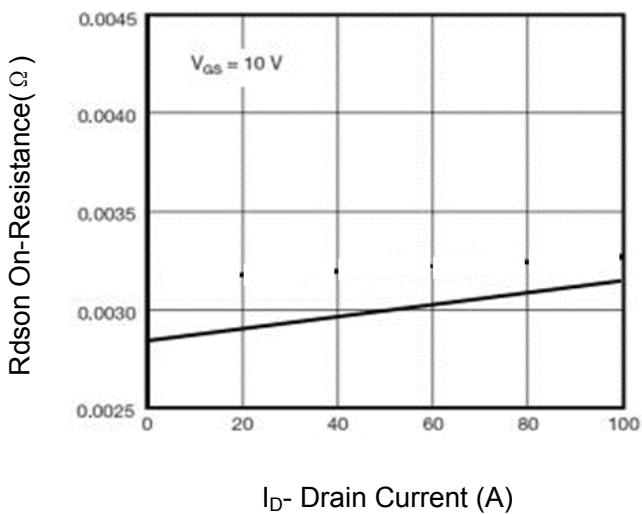
T_J-Junction Temperature(°C)
Figure 4 Rdson-Junction Temperature



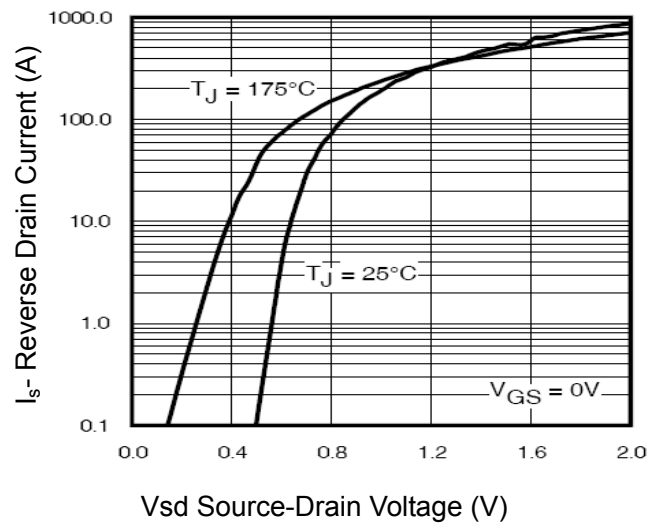
Vgs Gate-Source Voltage (V)
Figure 2 Transfer Characteristics



Qg Gate Charge (nC)
Figure 5 Gate Charge



I_D- Drain Current (A)
Figure 3 Rdson- Drain Current



Vsd Source-Drain Voltage (V)
Figure 6 Source- Drain Diode Forward

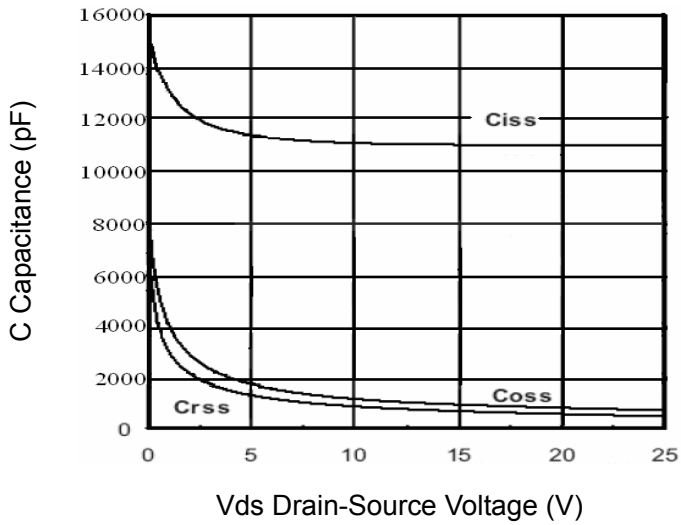


Figure 7 Capacitance vs Vds

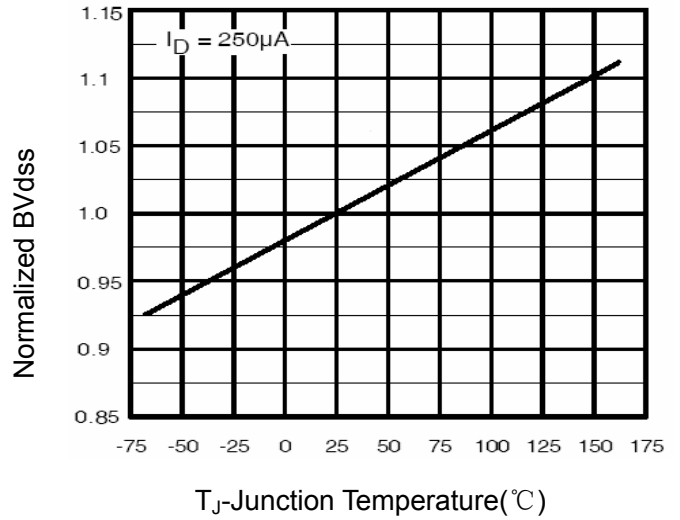


Figure 9 BV_{DSS} vs Junction Temperature

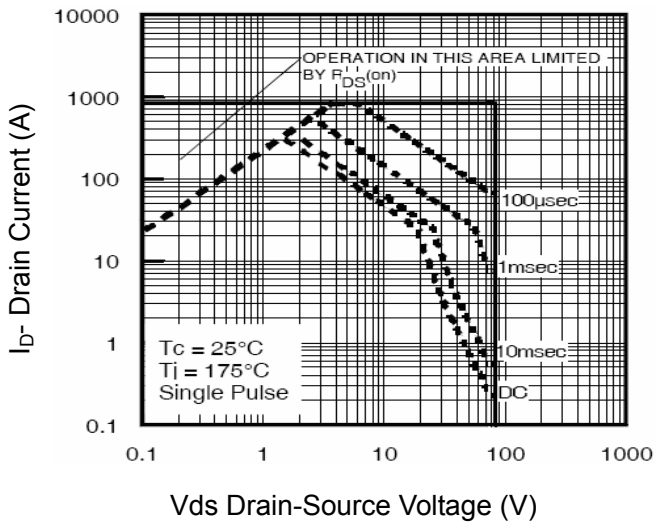


Figure 8 Safe Operation Area

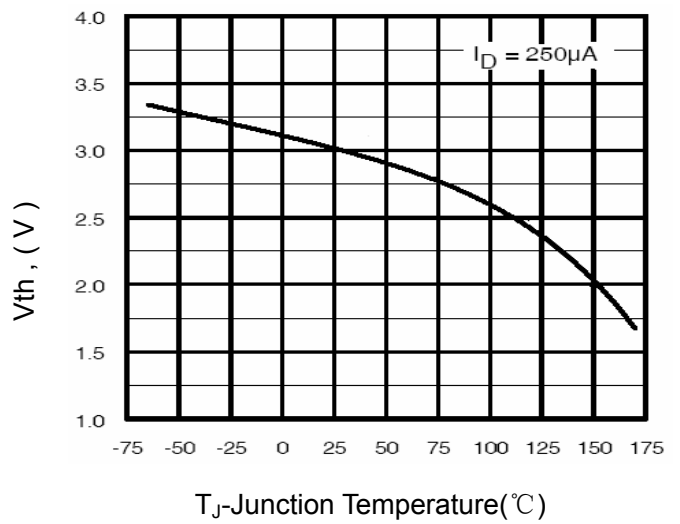
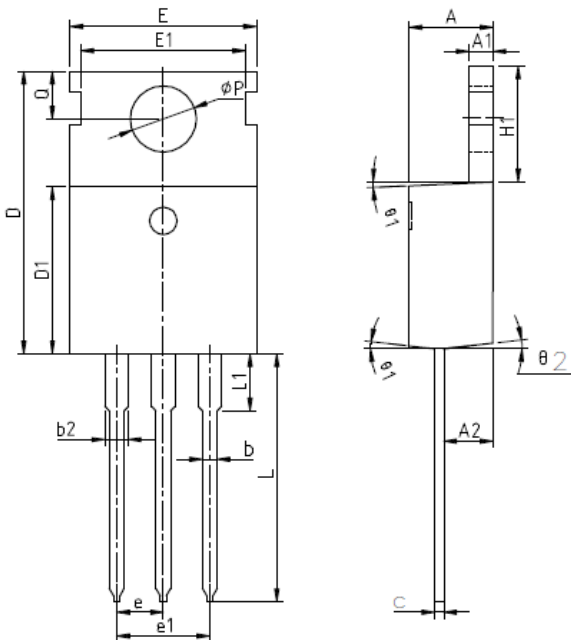


Figure 10 V_{GS(th)} vs Junction Temperature

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
θ 1	4°	7°	10°
θ 2	0°	3°	6°

TO-263
