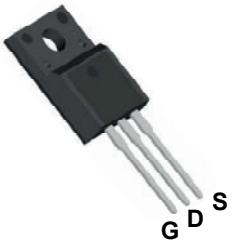
GOOD-ARK SEMICONDUCTOR

GSFU20N50

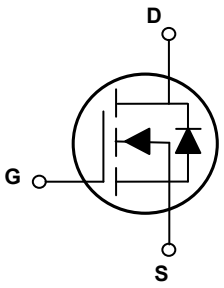
500V N-Channel MOSFET

Main Product Characteristics

$V_{(BR)DSS}$	500V
$R_{DS(ON)}$	0.26Ω (Max.)
I_D	20A



TO-220F



Schematic Diagram

Features and Benefits

- Advanced MOSFET process technology
- Ideal for high efficiency switched mode power supplies
- Low on-resistance with low gate charge
- Fast switching and reverse body recovery

Description

The GSFU20N50 utilizes the latest techniques to achieve high cell density and low on-resistance. These features make this device extremely efficient and reliable for use in high efficiency switch mode power supplies and a wide variety of other applications.

Absolute Maximum Ratings (T_C=25°C unless otherwise specified)

Parameter	Symbol	Max.	Unit
Drain-Source Voltage	V_{DS}	500	V
Gate-to-Source Voltage	V_{GS}	±30	V
Continuous Drain Current, @ Steady-State (T_C=25°C)[1]	I_D	20	A
Continuous Drain Current, @ Steady-State (T_C=100°C)		13	A
Pulsed Drain Current[2]	I_{DM}	80	A
Power Dissipation (T_A=25°C)	P_D	72	W
Linear Derating Factor (T_A=25°C)		0.58	W/°C
Single Pulse Avalanche Energy[3]	E_{AS}	1596	mJ
Junction-to-Case	$R_{\theta JC}$	1.74	°C/W
Junction-to-Ambient (PCB Mounted, Steady-State)[4]	$R_{\theta JA}$	50	°C/W
Operating Junction and Storage Temperature Range	T_J/T_{STG}	-55 to +150	°C

Electrical Characteristics (T_A=25°C unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
On / Off Characteristics						
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=250μA	500	-	-	V
Drain-to-Source Leakage Current	I_{DSS}	V_{DS}=500V, V_{GS}=0V	-	-	1	μA
		T_J=125°C	-	-	50	
Gate-to-Source Forward Leakage	I_{GSS}	V_{GS}=30V	-	-	100	nA
		V_{GS}=-30V	-	-	-100	
Static Drain-to-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=10A	-	0.19	0.26	Ω
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	2.1	3	3.9	V
Dynamic and Switching Characteristics						
Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS}=25V, f=1MHz	-	2687	-	pF
Output Capacitance	C_{oss}		-	355	-	
Reverse Transfer Capacitance	C_{rss}		-	10.5	-	
Total Gate Charge	Q_g	I_D=20A, V_{DS}=400V, V_{GS}=10V	-	49.5	-	nC
Gate-to-Source Charge	Q_{gs}		-	14.3	-	
Gate-to-Drain ("Miller") Charge	Q_{gd}		-	16.4	-	
Turn-on Delay Time	$t_{d(on)}$	V_{GS}=10V, V_{DS}=250V, R_G=10Ω, I_D=20A	-	27.2	-	nS
Rise Time	t_r		-	47.5	-	
Turn-Off Delay Time	$t_{d(off)}$		-	78.2	-	
Fall Time	t_f		-	41.1	-	
Gate Resistance	R_g	f=1MHz	-	5.6	-	Ω
Source-Drain Ratings and Characteristics						
Continuous Source Current (Body Diode)	I_S	MOSFET symbol showing the integral reverse p-n junction diode.	-	-	20	A
Pulsed Source Current (Body Diode)	I_{SM}		-	-	80	A
Diode Forward Voltage	V_{SD}	I_S=20A, V_{GS}=0V	-	-	1.4	V
Reverse Recovery Time	T_{rr}	T_J=25°C, I_F=20A, di/dt=100A/μs	-	570	-	nS
Reverse Recovery Charge	Q_{rr}		-	5.4	-	uC

Notes:

1. Pulse test: pulse width ≤ 300us, duty cycle ≤ 2%.
2. Repetitive rating; pulse width limited by max. junction temperature.
3. L=30mH, I_{AS}=9.9A, V_{DD}=50V, T_J=25°C.
4. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch.

Typical Electrical and Thermal Characteristic Curves

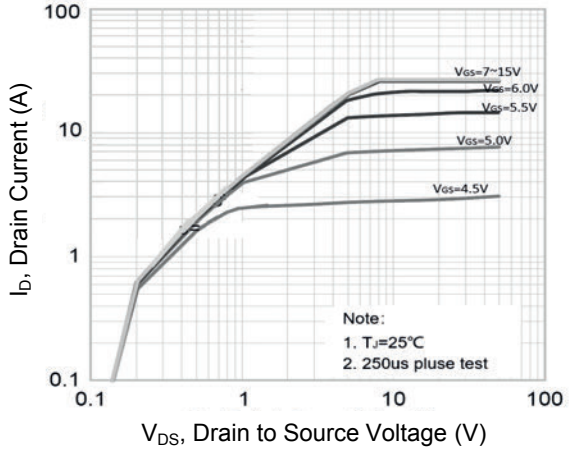


Figure 1. Typical Output Characteristics

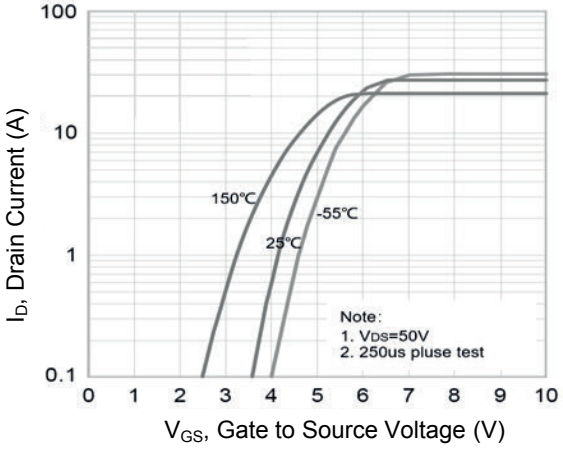


Figure 2. Transfer Characteristics

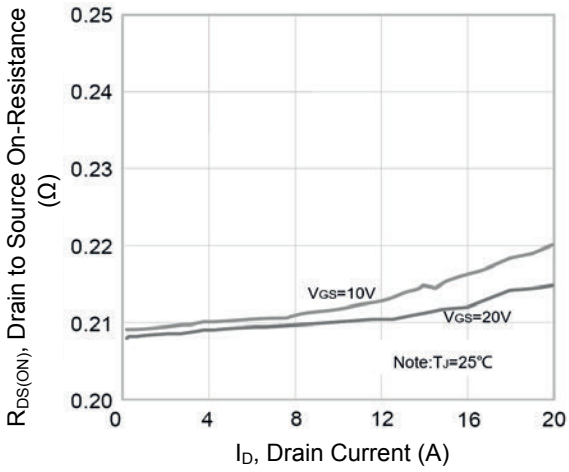


Figure 3. $R_{DS(ON)}$ vs. Drain Current

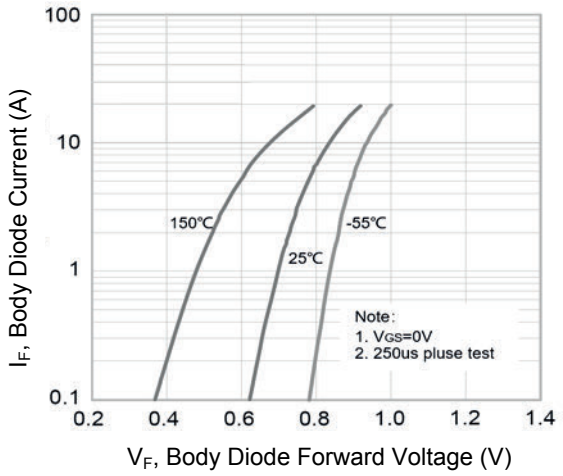


Figure 4. Body Diode Characteristics

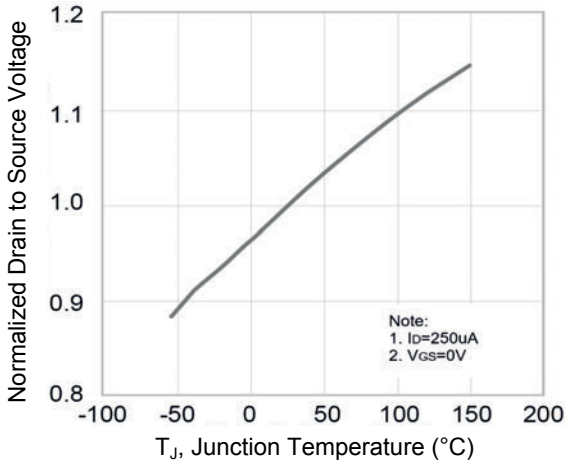


Figure 5. Normalized BV_{DSS} Vs. T_J

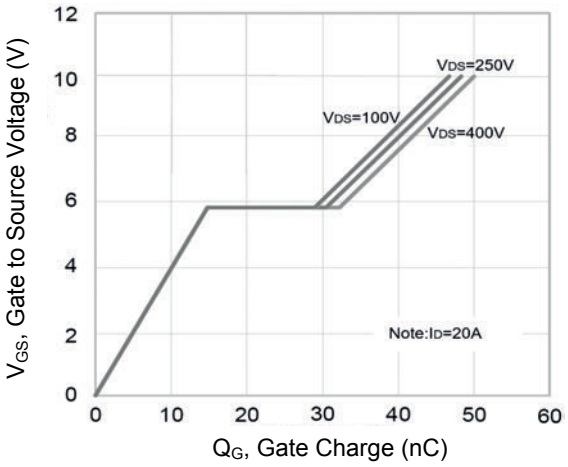


Figure 6. Gate Charge

Typical Electrical and Thermal Characteristic Curves

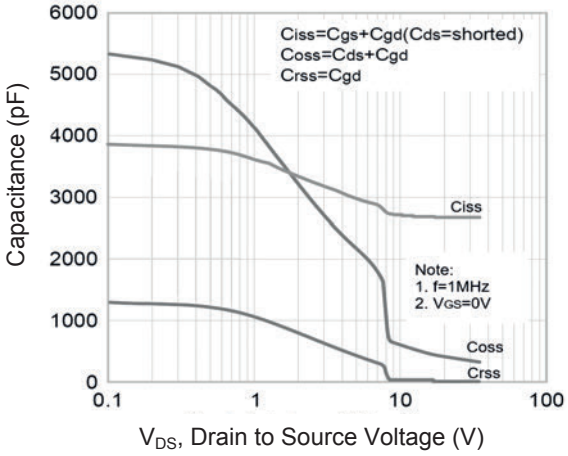


Figure 7. Capacitance Characteristics

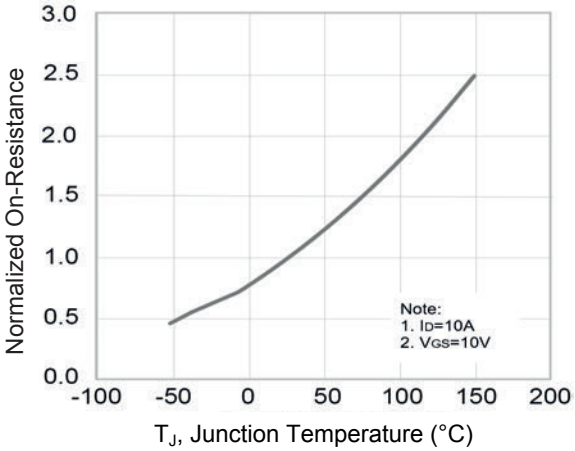


Figure 8. Normalized $R_{DS(ON)}$ vs. T_J

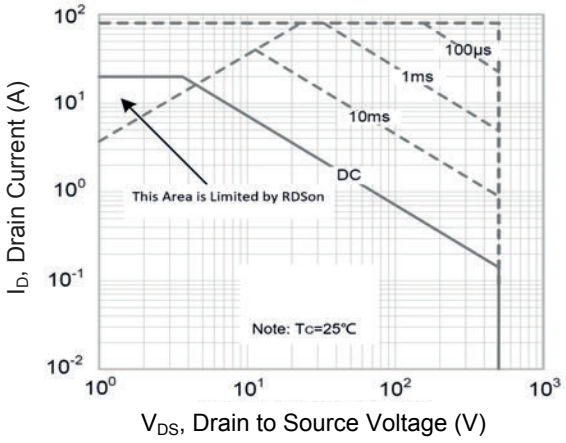
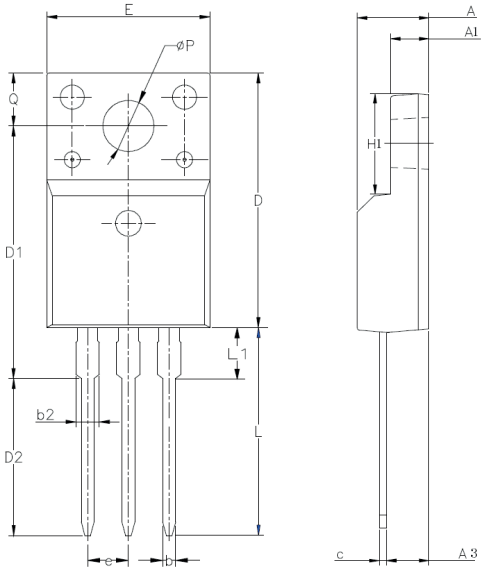


Figure 9. Safe Operation Area

Package Outline Dimensions (TO-220F)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.42	5.02	0.174	0.198
A1	2.30	2.80	0.091	0.110
A3	2.50	3.10	0.098	0.122
b	0.55	0.85	0.020	0.033
b2	-	1.29	-	0.051
c	0.35	0.65	0.014	0.026
D	15.25	16.25	0.600	0.640
D1	13.97	14.97	0.550	0.589
D2	10.58	11.58	0.417	0.456
E	9.73	10.36	0.383	0.408
e	2.54 BCS		0.10 BCS	
H1	6.40	7.00	0.252	0.276
L	12.48	13.48	0.491	0.531
L1	-	2.00	-	0.079
ΦP	3.00	3.40	0.118	0.134
Q	3.05	3.55	0.120	0.140

Order Information

Device	Package	Marking	Carrier	Quantity
GSFU20N50	TO-220F	U20N50	Tape & Reel	50pcs / Tube