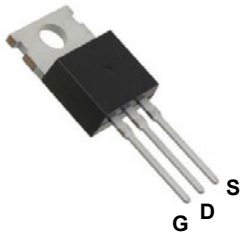
GOOD-ARK
SEMICONDUCTOR

GSFH5020

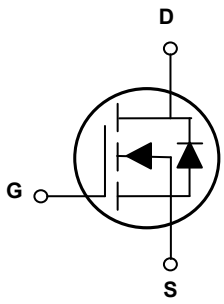
500V N-Channel MOSFET

Main Product Characteristics

$V_{(BR)DSS}$	500V
$R_{DS(ON)}$	0.19Ω
I_D	20A



TO-220



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 GSFH5020 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_{DSS}	500	V
Gate-Source Voltage	V_{GSS}	±30	V
Continuous Drain Current @ Steady-State[1], T_C=25°C	I_D	20	A
Continuous Drain Current @ Steady-State, T_C=100°C		13	A
Pulsed Drain Current[2]	I_{DM}	80	A
Single Pulsed Avalanche Energy[3]	E_{AS}	1596	mJ
Power Dissipation, T_A=25°C	P_D	252	W
Linear Derating Factor, T_A=25°C		2.02	W/°C
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.49	°C/W
Junction to Ambient (PCB Mounted, Steady-State)[4]	$R_{\theta JA}$	50	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

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

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
On/Off Characteristic						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=250μA	500	-	-	V
Drain- Source Leakage Current	I_{DSS}	V_{DS}=500V, V_{GS}=0V	-	-	1	uA
		T_J=125°C	-	-	50	
Gate-Source Forward Leakage	I_{GSS}	V_{GS}=±30V	-	-	±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	2.1	3	3.9	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS}=10V, I_D=10A	-	0.19	0.26	Ω
Gate Resistance	R_g	f=1.0MHz	-	5.6	-	Ω
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS}=25V, V_{GS}=0V, f=1.0MHz	-	2687	-	pF
Output Capacitance	C_{oss}		-	355	-	pF
Reverse Transfer Capacitance	C_{rss}		-	10.5	-	pF
Total Gate Charge	Q_g	V_{DS}=400V, I_D=20A, V_{GS}=10V	-	49.5	-	nC
Gate-Source Charge	Q_{gs}		-	14.3	-	nC
Gate-Drain (“Miller”) Charge	Q_{gd}		-	16.4	-	nC
Switching Characteristics						
Turn-On Delay Time	$t_{d(on)}$	V_{DS}=250V, I_D=20A, R_G=10Ω,V_{GS}=10V	-	27.2	-	nS
Turn-On Rise Time	t_r		-	47.5	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	78.2	-	nS
Turn-Off Fall Time	t_f		-	41.1	-	nS
Drain-Source Diode Characteristics and Maximum Ratings						
Continuous Source Current (Body Diode)	I_S	MOSFET symbol showing the integral reverse p-n junction diode.	-	-	20	A
Source Pulse Current (Body Diode)	I_{SM}		-	-	80	A
Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=20A	-	-	1.4	V
Reverse Recovery Time	t_{rr}	T_J=25°C, I_F=20A, dI_F/dt= 100A/μS	-	570	-	nS
Reverse Recovery Charge	Q_{rr}		-	5.4	-	μC

Notes:

1. Pulse Test: Pulse Width ≤ 300μs, 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-4PCB, 1 inch x 0.85 inch x 0.062 inch.

Typical Electrical and Thermal Characteristic Curves

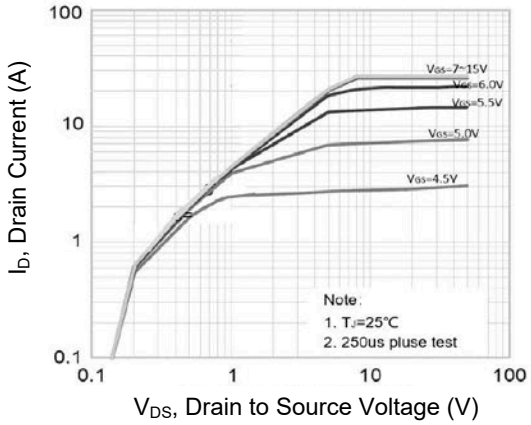


Figure 1. Output Characteristics

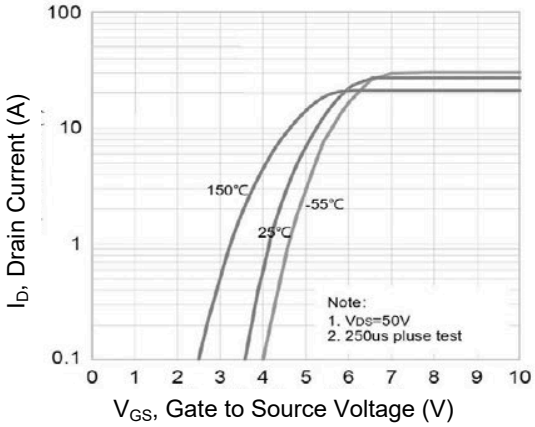


Figure 2. Transfer Characteristics

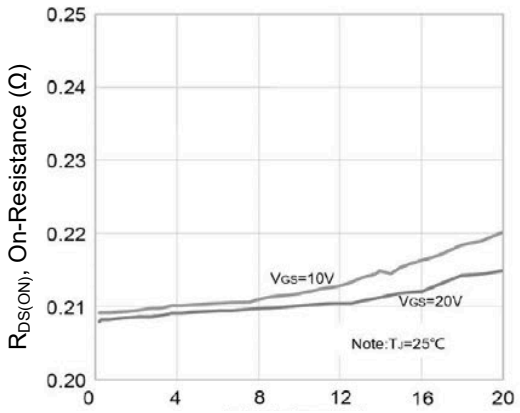


Figure 3. $R_{DS(ON)}$ vs. Drain Current

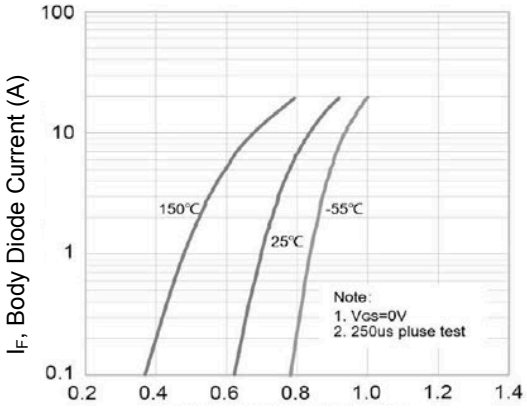


Figure 4. Body Diode Characteristics

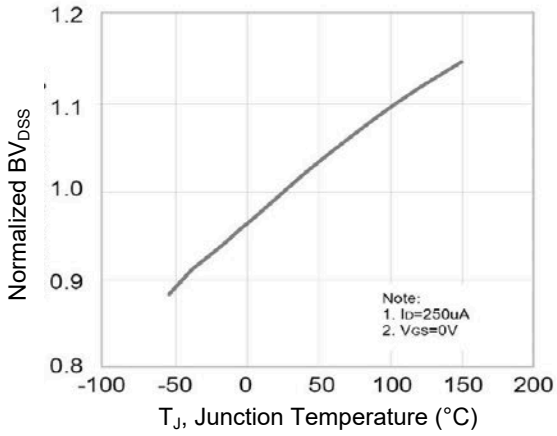


Figure 5. Normalized BV_{DSS} vs. Junction Temperature

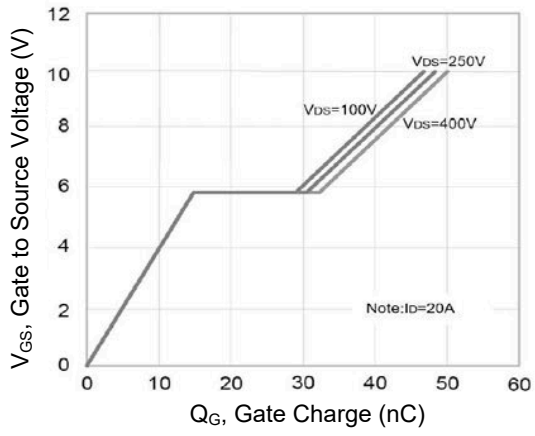


Figure 6. Gate Charge

Typical Electrical and Thermal Characteristic Curves

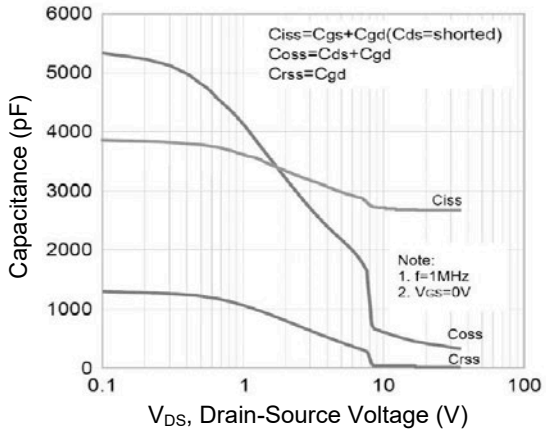


Figure 7. Capacitance Characteristics

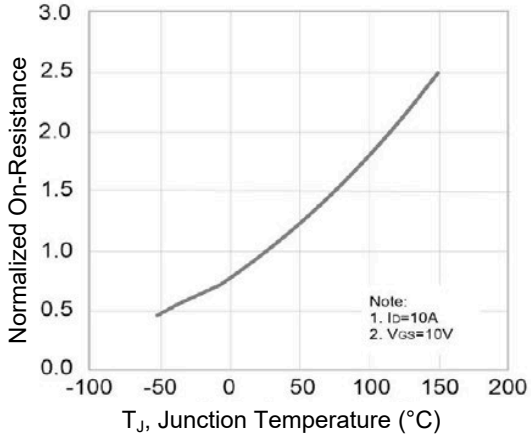


Figure 8. Normalized $R_{DS(ON)}$ vs. T_J

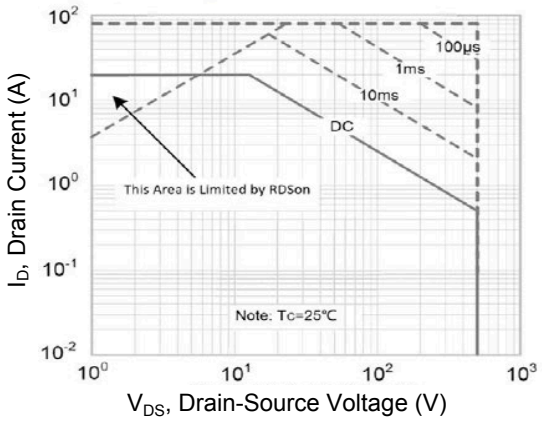
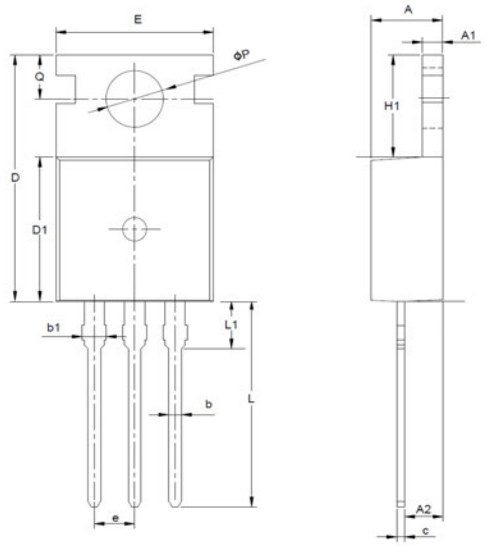


Figure 9. Safe Operation Area

Package Outline Dimensions (TO-220)



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	4.300	4.700	0.169	0.186
A1	1.000	1.500	0.039	0.059
A2	1.800	2.800	0.071	0.110
b	0.600	1.000	0.024	0.039
b1	1.000	1.600	0.039	0.063
c	0.300	0.700	0.012	0.028
D	15.100	16.100	0.594	0.634
D1	8.100	10.000	0.319	0.394
E	9.600	10.400	0.378	0.410
e	2.540 BSC		0.100 BSC	
H1	6.100	7.000	0.240	0.276
L	12.600	13.600	0.496	0.535
L1	-	3.950	-	0.156
ΦP	3.400	3.900	0.134	0.154
Q	2.600	3.200	0.102	0.126