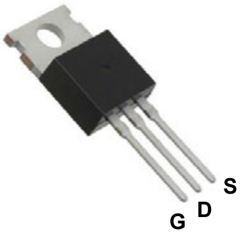
GOOD-ARK
SEMICONDUCTOR

GSFH4003

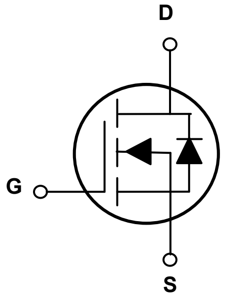
40V N-Channel MOSFET

Main Product Characteristics

$V_{(BR)DSS}$	40V
$R_{DS(ON)}$	2.7mΩ (Max.)
I_D	240A



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 GSFH4003 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}	30	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current @ Steady-State (T_C=25°C)[1]	I_D	240	A
Continuous Drain Current @ Steady-State, T_C=100°C		150	A
Pulsed Drain Current[2]	I_{DM}	960	A
Single Pulsed Avalanche Energy[3]	E_{AS}	610	mJ
Power Dissipation, T_C=25°C	P_D	250	W
Power Dissipation, T_C=100°C		170	
Linear Derating Factor, T_C=25°C		2.0	W/°C
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.5	°C/W
Junction to Ambient (PCB Mounted, Steady-State)[4]	$R_{\theta JA}$	62.0	°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	Test Condition	Min.	Typ.	Max.	Unit
On / Off Characteristic						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=250μA	40	-	-	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=40V, V_{GS}=0V	-	-	1	uA
		T_J=125°C	-	-	50	
Gate-Source Forward Leakage	I_{GSS}	V_{GS}=±20V	-	-	±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	2.1	3.0	3.9	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=100A	-	2.2	2.7	mΩ
		V_{GS}=6V, I_D=50A	-	2.5	3.6	
Dynamic and Switching Characteristics						
Input Capacitance	C_{iss}	V_{DS}=25V, V_{GS}=0V, f=1.0MHz	-	5700	-	pF
Output Capacitance	C_{oss}		-	770	-	pF
Reverse Transfer Capacitance	C_{rss}		-	530	-	pF
Total Gate Charge	Q_g	V_{DD}=32V, I_D=50A, V_{GS}=10V	-	108	-	nC
Gate-Source Charge	Q_{gs}		-	34	-	nC
Gate-Drain ("Miller") Charge	Q_{gd}		-	30	-	nC
Turn-On Delay Time	$T_{d(on)}$	V_{DD}=20V, I_D=30A, R_{GEN}=2.7Ω, V_{GS}=10V	-	28	-	nS
Rise Time	T_r		-	89	-	nS
Turn-Off Delay Time	$T_{d(off)}$		-	134	-	nS
Fall Time	T_f		-	116	-	nS
Gate Resistance	R_g	f=1.0MHz	-	4.0	-	Ω
Drain-Source Diode Characteristics and Maximum Ratings						
Continuous Source Current (Body Diode)	I_S	MOSFET symbol showing the integral reverse p-n junction diode.	-	-	240	A
Pulsed Source Current (Body Diode)	I_{SM}		-	-	960	A
Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=50A	-	0.95	1.2	V
Reverse Recovery Time	t_{rr}	T_J=25°C, I_F=50A, di/dt=100A/μS	-	29	-	nS
Reverse Recovery Charge	Q_{rr}		-	0.03	-	uC

Notes:

1. Pulse test: Pulse width ≤ 300us, duty cycle ≤ 2%.
2. Repetitive rating: Pulse width limited by max. junction temperature.
3. L=1mH, V_{DD}=38V, R_g=25Ω, 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

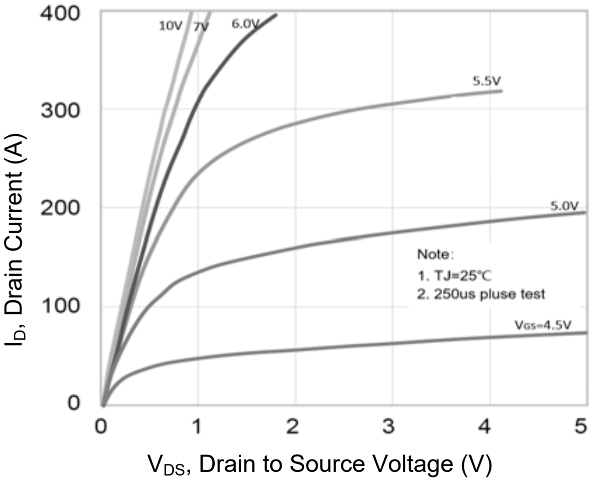


Figure 1. Output Characteristics

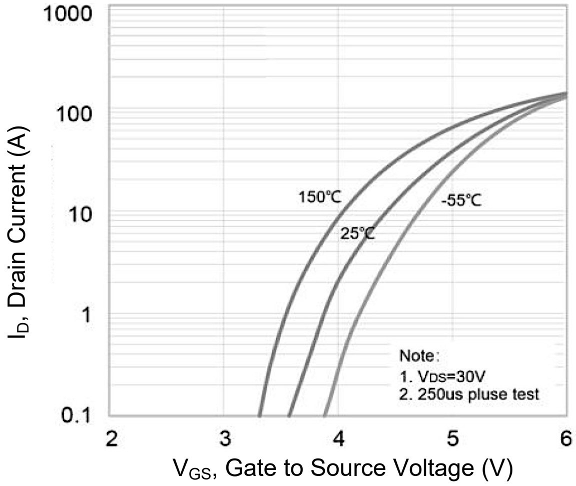


Figure 2. Transfer Characteristics

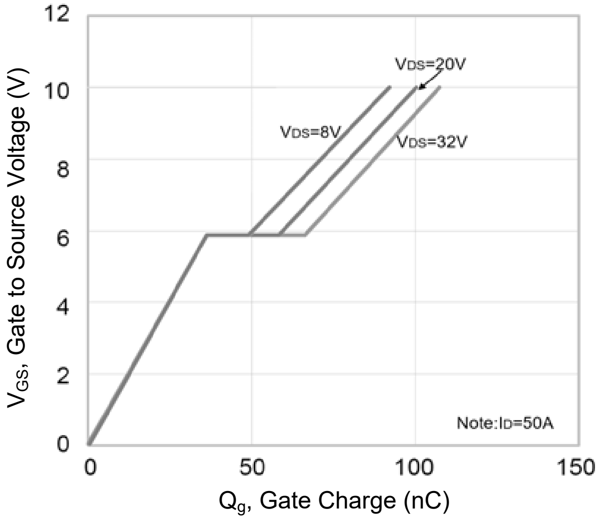


Figure 3. Gate Charge

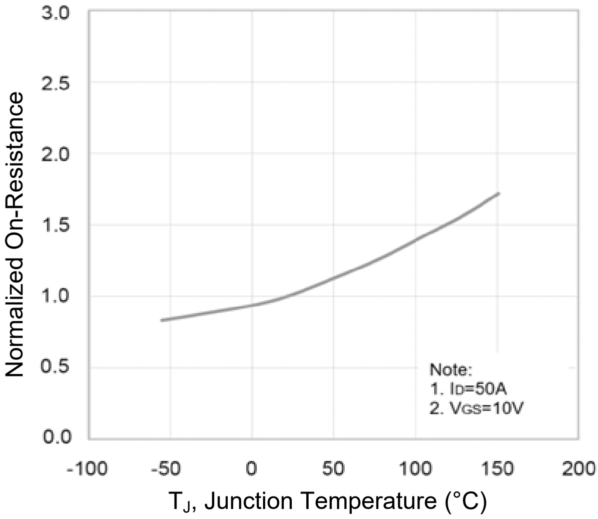


Figure 4. Normalized $R_{DS(ON)}$ vs. T_J

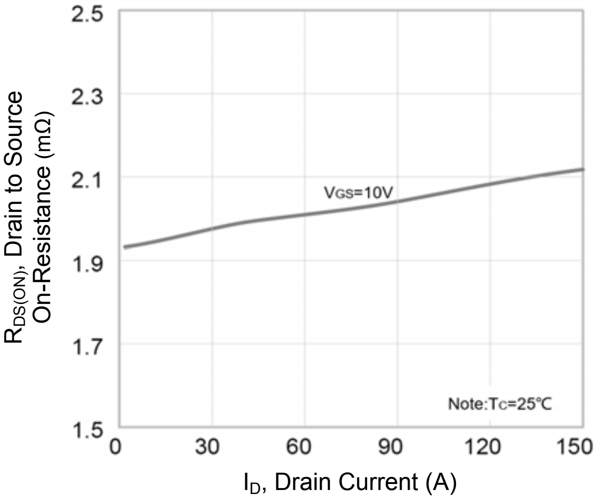


Figure 5. $R_{DS(ON)}$ vs. Drain Current

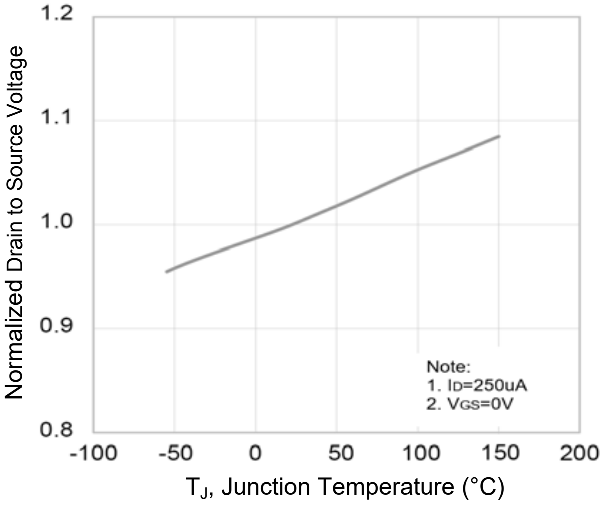


Figure 6. Normalized BV_{DSS} vs. T_J

Typical Electrical and Thermal Characteristic Curves

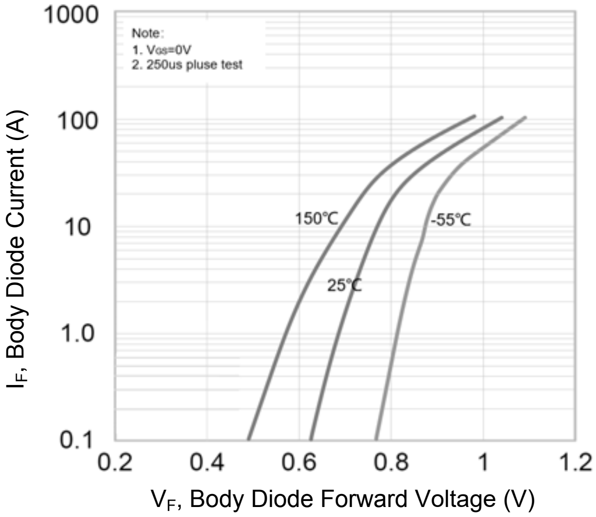


Figure 7. Body Diode Characteristics

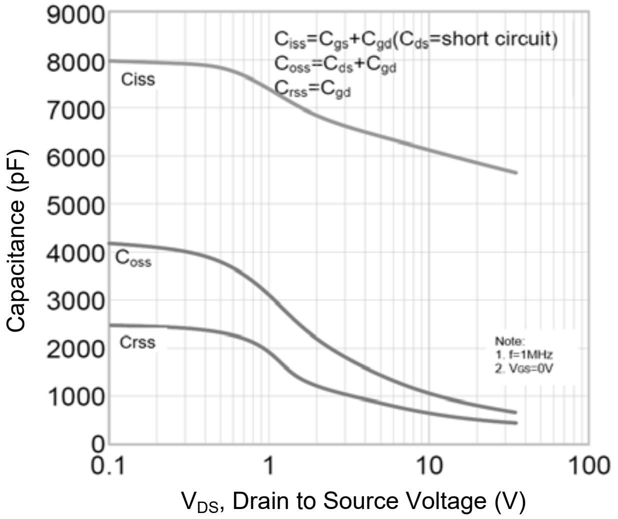


Figure 8. Capacitance Characteristics

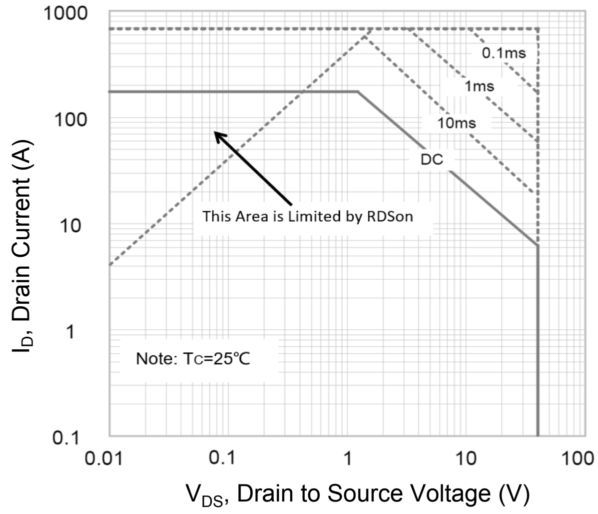
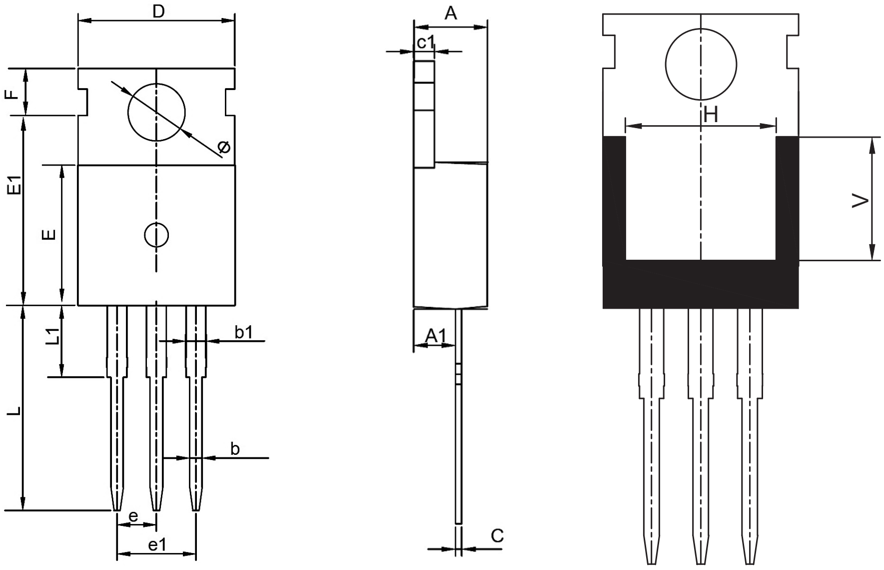


Figure 9. Safe Operation Area

Package Outline Dimensions (TO-220)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.25	2.70	0.089	0.106
b	0.71	0.91	0.028	0.036
b1	1.17	1.37	0.046	0.054
C	0.33	0.65	0.013	0.026
c1	1.20	1.40	0.047	0.055
D	9.91	10.25	0.390	0.404
E	8.95	9.75	0.352	0.384
E1	12.65	13.00	0.498	0.512
e	2.54 TPY		0.984 TPY	
e1	4.98	5.18	0.196	0.204
F	2.65	2.95	0.104	0.116
H	7.90	8.10	0.311	0.319
L	12.90	13.40	0.508	0.528
L1	2.68	3.25	0.106	0.128
V	6.90 REF		0.272 REF	
Φ	3.40	3.80	0.134	0.150

Order Information

Device	Package	Marking	Packaging	SPQ
GSFH4003	TO-220	H4003	Tube	50 Pcs / Tube