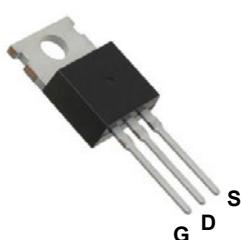
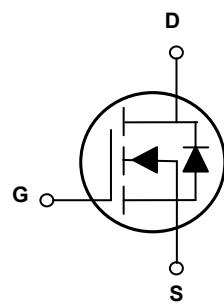


Main Product Characteristics

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



TO-220



Schematic Diagram

Features and Benefits

- Advanced MOSFET process technology
 - $\text{G}(\text{A})\text{A}$ & $\text{A}(\text{A})$
 - $\text{S}(\text{A})$
 - 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 ($T_C=25^\circ\text{C}$ 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 ¹ , $T_C=25^\circ C$	I_D	240	A
Continuous Drain Current @ Steady-State, $T_C=100^\circ C$		150	A
Pulsed Drain Current ²	I_{DM}	960	A
Single Pulsed Avalanche Energy ³	E_{AS}	610	mJ
Power Dissipation, $T_C=25^\circ C$	P_D	250	W
Power Dissipation, $T_C=100^\circ C$		170	
Linear Derating Factor, $T_C=25^\circ C$		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 and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Electrical Characteristics ($T_A=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
On/Off Characteristic						
Drain-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}}=0\text{V}, I_D=250\mu\text{A}$	40	-	-	V
Drain-Source Leakage Current	I_{DSS}	$V_{\text{DS}}=40\text{V}, V_{\text{GS}}=0\text{V}$	-	-	1	uA
		$T_J=125^\circ\text{C}$	-	-	50	
Gate-Source Forward Leakage	I_{GSS}	$V_{\text{GS}}=\pm 20\text{V}$	-	-	± 100	nA
Gate Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{DS}}=V_{\text{GS}}, I_D=250\mu\text{A}$	2.1	3.0	3.9	V
Static Drain-Source On-Resistance	$R_{\text{DS}(\text{on})}$	$V_{\text{GS}}=10\text{V}, I_D=100\text{A}$	-	2.2	2.7	mΩ
		$V_{\text{GS}}=6\text{V}, I_D=50\text{A}$	-	2.5	3.6	
Gate Resistance	R_g	f=1.0MHz	-	4.0	-	Ω
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{\text{DS}}=25\text{V}, V_{\text{GS}}=0\text{V}, f=1.0\text{MHz}$	-	5700	-	pF
Output Capacitance	C_{oss}		-	770	-	pF
Reverse Transfer Capacitance	C_{rss}		-	530	-	pF
Total Gate Charge	Q_g	$V_{\text{DD}}=32\text{V}, I_D=50\text{A}, V_{\text{GS}}=10\text{V}$	-	108	-	nC
Gate-Source Charge	Q_{gs}		-	34	-	nC
Gate-Drain ("Miller") Charge	Q_{gd}		-	30	-	nC
Switching Characteristics						
Turn-On Delay Time	$t_{\text{d}(\text{on})}$	$V_{\text{DD}}=20\text{V}, I_D=30\text{A}, R_{\text{GEN}}=2.7\Omega, V_{\text{GS}}=10\text{V}$	-	28	-	nS
Rise Time	t_r		-	89	-	nS
Turn-Off Delay Time	$t_{\text{d}(\text{off})}$		-	134	-	nS
Fall Time	t_f		-	116	-	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.	-	-	240	A
Pulsed Source Current (Body Diode)	I_{SM}	-	-	960	A	
Diode Forward Voltage	V_{SD}	$V_{\text{GS}}=0\text{V}, I_s=50\text{A}$	-	0.95	1.2	V
Reverse Recovery Time	t_{rr}	$T_J=25^\circ\text{C}, I_F=50\text{A}, \text{di}/\text{dt}=100\text{A}/\mu\text{s}$	-	29	-	nS
Reverse Recovery Charge	Q_{rr}		-	0.03	-	uC

Notes:

1. Pulse test: Pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.
2. Repetitive rating; pulse width limited by max. junction temperature.
3. $L=1\text{mH}, V_{\text{DD}}=38\text{V}, R_G=25\Omega, T_J=25^\circ\text{C}$.
4. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch.

Typical Electrical and Thermal Characteristic Curves

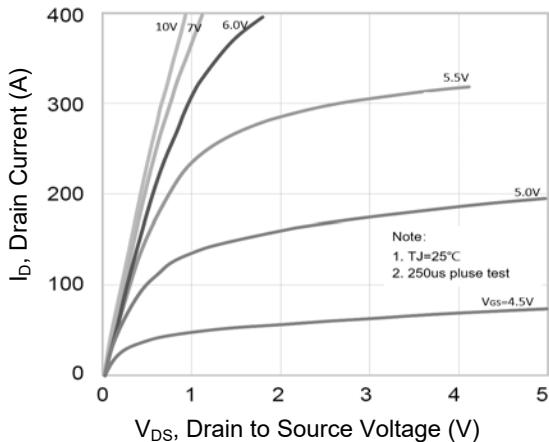


Figure 1. Output Characteristics

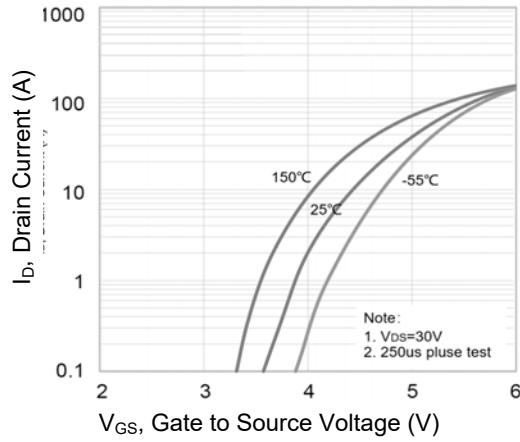


Figure 2. Transfer Characteristics

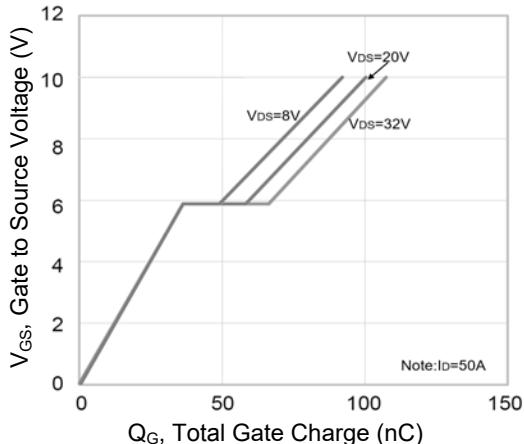


Figure 3. Gate Charge

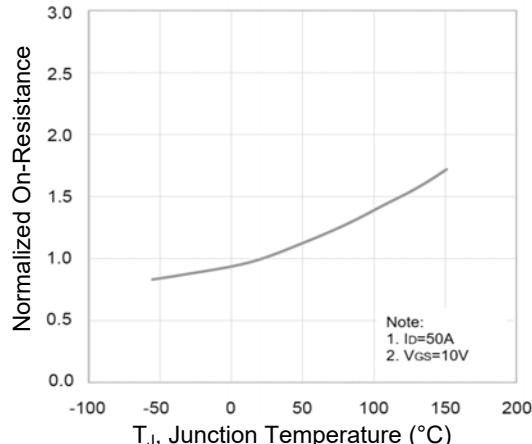


Figure 4. Normalized $R_{DS(\text{ON})}$ vs. T_J

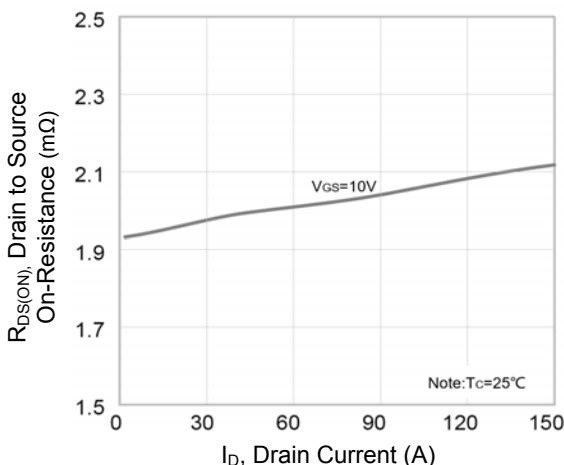


Figure 5. $R_{DS(\text{ON})}$ vs. Drain Current

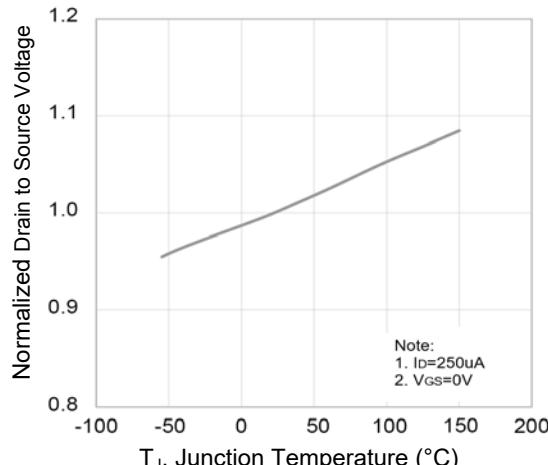


Figure 6. Normalized BV_{DSS} vs. T_J

Typical Electrical and Thermal Characteristic Curves

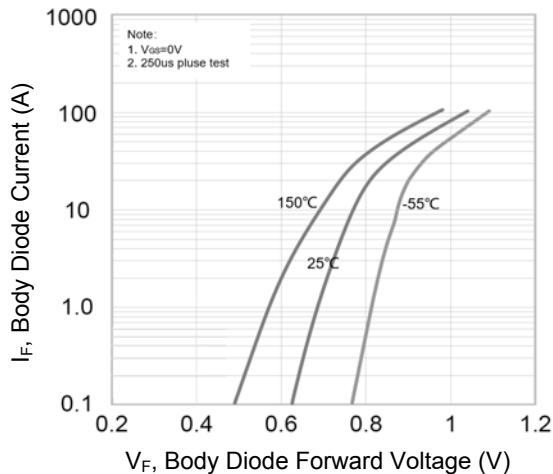


Figure 7. Body Diode Characteristics

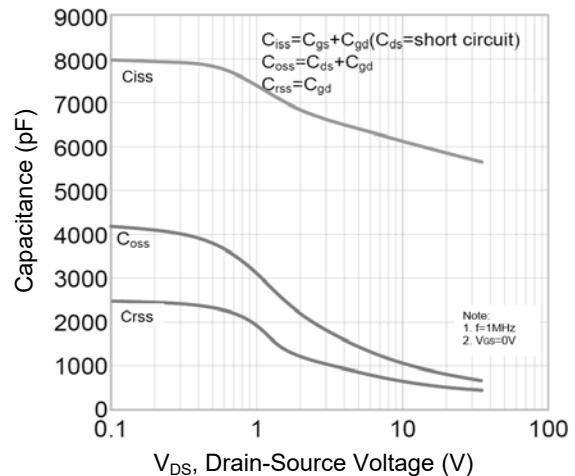


Figure 8. Capacitance Characteristics

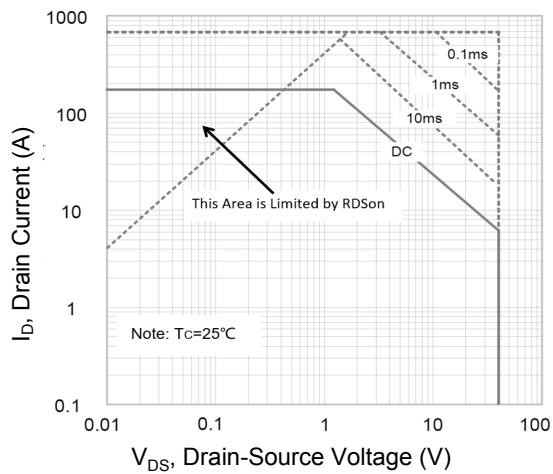
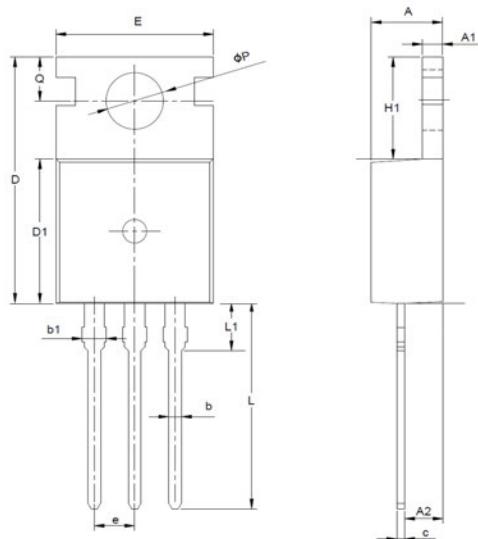


Figure 9. Safe Operation Area

Package Outline Dimensions (TO-220)



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	4.300	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