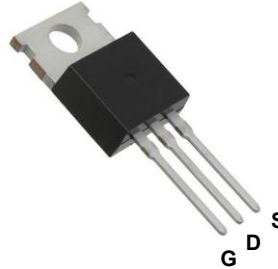
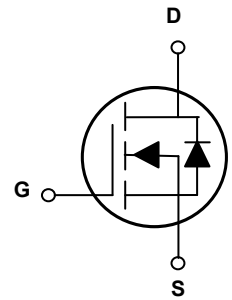


### Main Product Characteristics

$BV_{DSS}$	500V
$R_{DS(ON)}$	0.8Ω
$I_D$	9A



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 GSFH5010 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 ( $T_C=25^{\circ}C$ unless otherwise specified)

Parameter	Symbol	Max.	Unit
Drain-Source Voltage	$V_{DS}$	500	V
Gate-Source Voltage	$V_{GS}$	±30	V
Drain Current-Continuous ( $T_C=25^{\circ}C$ )	$I_D$	9	A
Drain Current-Continuous ( $T_C=100^{\circ}C$ )		5.7	
Drain Current-Pulsed <sup>1</sup>	$I_{DM}$	36	A
Single Pulse Avalanche Energy <sup>2</sup>	$E_{AS}$	550	mJ
Single Pulse Avalanche Current <sup>2</sup>	$I_{AS}$	10.5	A
Power Dissipation ( $T_C=25^{\circ}C$ )	$P_D$	89	W
Power Dissipation-Derate above 25°C		0.71	
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.4	°C/W
Operating Junction Temperature Range	$T_J$	-55 To +150	°C
Storage Temperature Range	$T_{STG}$	-55 To +150	°C

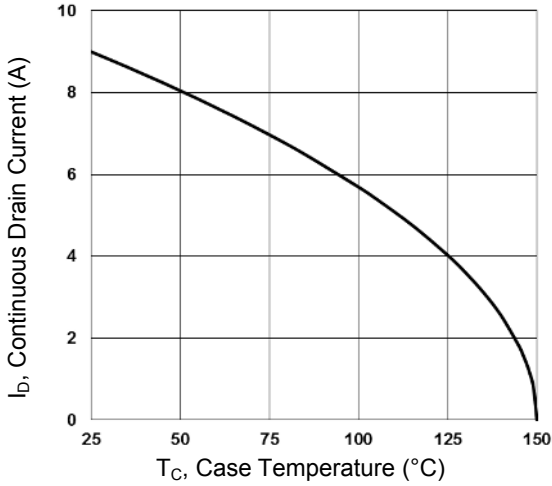
**Electrical Characteristics** ( $T_J=25^{\circ}\text{C}$  unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>On / Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	500	-	-	V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=500V, V_{GS}=0V, T_J=25^{\circ}\text{C}$	-	-	1	$\mu A$
		$V_{DS}=400V, V_{GS}=0V, T_J=100^{\circ}\text{C}$	-	-	10	$\mu A$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 30V, V_{DS}=0V$	-	-	$\pm 100$	nA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=4A$	-	0.65	0.8	$\Omega$
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	2	3	4	V
Forward Transconductance	$g_{fs}$	$V_{DS}=30V, I_D=2A$	-	10	-	S
<b>Dynamic and Switching Characteristics</b>						
Total Gate Charge <sup>3,4</sup>	$Q_g$	$V_{DS}=400V, I_D=4A, V_{GS}=10V$	-	28	42	nC
Gate-Source Charge <sup>3,4</sup>	$Q_{gs}$		-	5.4	10	
Gate-Drain Charge <sup>3,4</sup>	$Q_{gd}$		-	10.2	15	
Turn-On Delay Time <sup>3,4</sup>	$t_{d(on)}$	$V_{DD}=250V, R_G=25\Omega, V_{GS}=10V, I_D=4A$	-	21	42	nS
Rise Time <sup>3,4</sup>	$t_r$		-	27	54	
Turn-Off Delay Time <sup>3,4</sup>	$t_{d(off)}$		-	54	108	
Fall Time <sup>3,4</sup>	$t_f$		-	20	40	
Input Capacitance	$C_{iss}$	$V_{DS}=25V, V_{GS}=0V, F=1\text{MHz}$	-	920	1800	pF
Output Capacitance	$C_{oss}$		-	103	200	
Reverse Transfer Capacitance	$C_{rss}$		-	15	30	
Gate Resistance	$R_g$	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	-	2.4	4.8	$\Omega$
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Continuous Source Current	$I_S$	$V_G=V_D=0V,$	-	-	9	A
Pulsed Source Current	$I_{SM}$	Force Current	-	-	18	A
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=1A, T_J=25^{\circ}\text{C}$	-	-	1	V

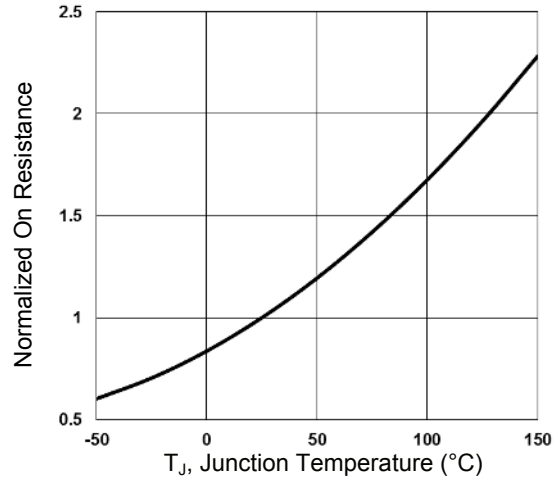
Note:

1. Repetitive rating: Pulsed width limited by maximum junction temperature.
2.  $V_{DD}=50V, V_{GS}=10V, L=10\text{mH}, I_{AS}=10.5A, R_G=25\Omega,$  starting  $T_J=25^{\circ}\text{C}$ .
3. Pulse test: pulse width  $\leq 300\mu s,$  duty cycle  $\leq 2\%$ .
4. Essentially independent of operating temperature.

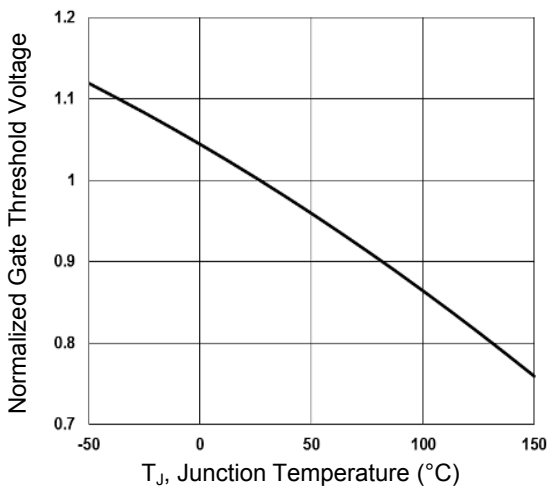
**Typical Electrical and Thermal Characteristic Curves**



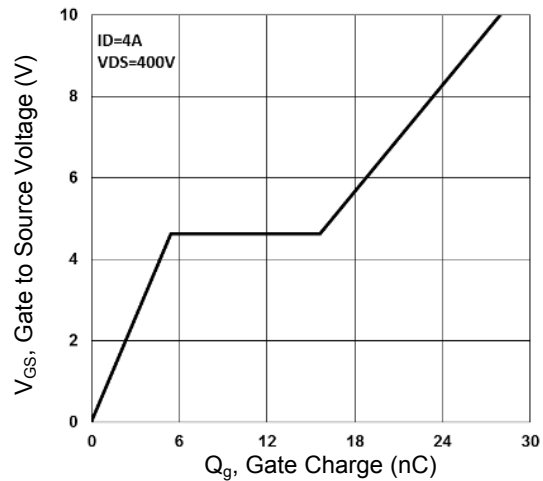
**Figure 1. Continuous Drain Current vs.  $T_C$**



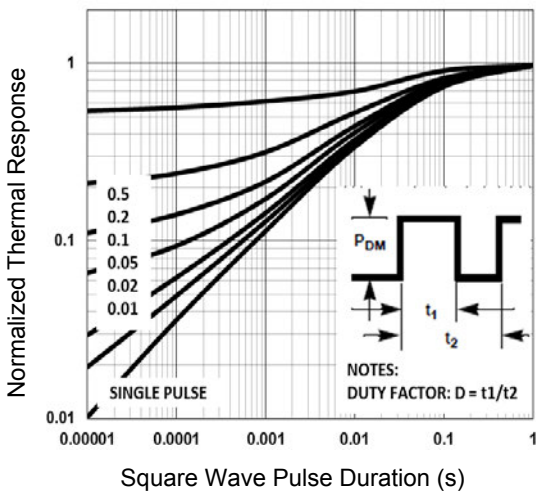
**Figure 2. Normalized  $R_{DS(on)}$  vs.  $T_J$**



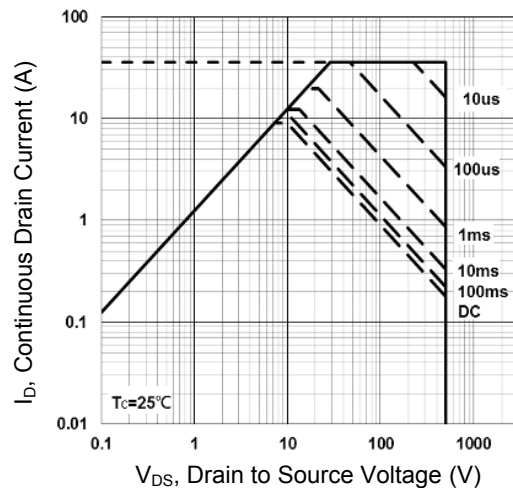
**Figure 3. Normalized  $V_{th}$  vs.  $T_J$**



**Figure 4. Gate Charge Characteristics**

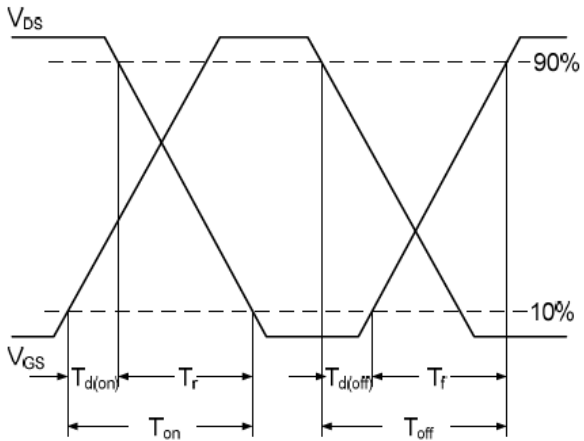


**Figure 5. Normalized Transient Impedance**

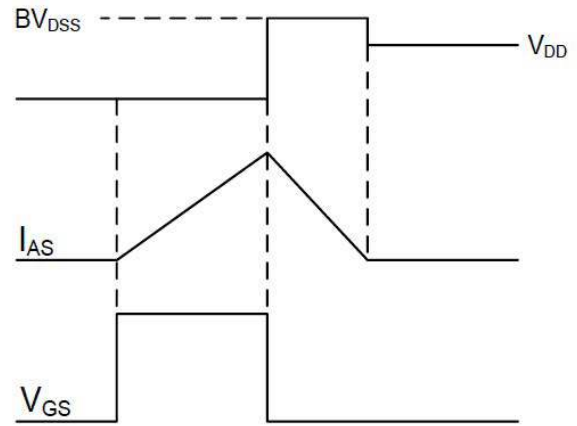


**Figure 6. Maximum Safe Operation Area**

**Typical Electrical and Thermal Characteristic Curves**

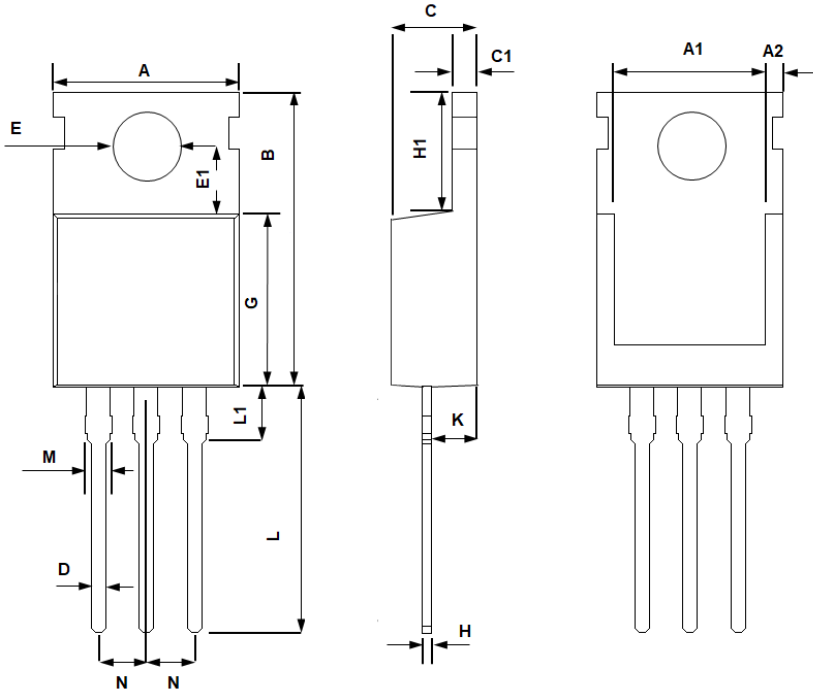


**Figure 7. Switching Time Waveform**



**Figure 8. EAS Waveform**

**Package Outline Dimensions TO-220**



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	9.700	10.400	0.382	0.409
A1	7.400	8.900	0.291	0.350
A2	0.800	1.400	0.031	0.055
B	14.500	16.500	0.571	0.650
C	4.200	4.750	0.165	0.187
C1	1.100	1.500	0.043	0.059
D	0.600	1.000	0.024	0.039
E	3.300	4.000	0.130	0.157
E1	3.400	3.800	0.134	0.150
G	8.400	9.400	0.331	0.370
H	0.200	0.600	0.008	0.024
H1	6.200	6.850	0.244	0.270
K	2.100	2.850	0.083	0.112
L	12.500	14.000	0.492	0.551
L1	2.700	4.000	0.106	0.157
M	1.100	1.750	0.043	0.069
N	2.440	2.640	0.096	0.104