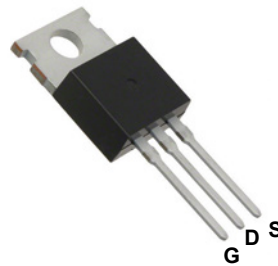
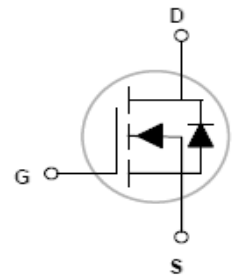


## Main Product Characteristics

$BV_{DSS}$	100V
$R_{DS(ON)}$	3.5m $\Omega$
$I_D$	160A



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 GSFH0970 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 supply 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	$V_{DS}$	100	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous( $T_C=25^\circ\text{C}$ ) (Chip Limitation)	$I_D$	160	A
Drain Current-Continuous( $T_C=100^\circ\text{C}$ ) (Chip Limitation)		100	A
Drain Current-Pulsed <sup>1</sup>	$I_{DM}$	640	A
Single Pulse Avalanche Energy <sup>2</sup>	$E_{AS}$	280	mJ
Single Pulse Avalanche Current <sup>2</sup>	$I_{AS}$	75	A
Power Dissipation( $T_C=25^\circ\text{C}$ )	$P_D$	208	W
Power Dissipation-Derate Above $25^\circ\text{C}$		1.66	W/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.6	$^\circ\text{C}/\text{W}$
Storage Temperature Range	$T_{STG}$	-50 To +150	$^\circ\text{C}$
Operating Junction Temperature Range	$T_J$	-50 To +150	$^\circ\text{C}$

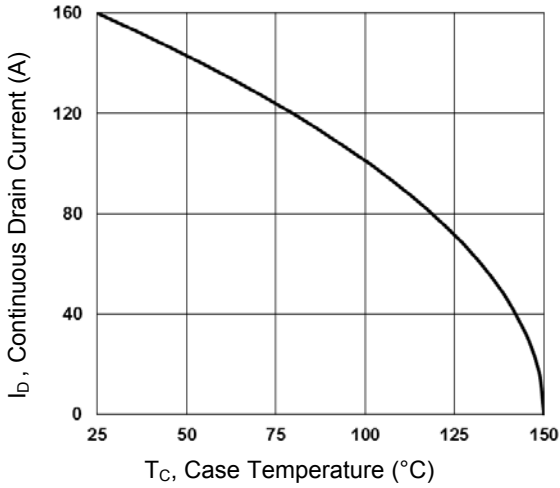

**Electrical Characteristics** ( $T_J=25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	100	-	-	V
$BV_{DSS}$ Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	Reference to $25^\circ\text{C}$ , $I_D=1mA$	-	0.05	-	$V/^\circ\text{C}$
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=100V, V_{GS}=0V,$ $T_J=25^\circ\text{C}$	-	-	1	$\mu A$
		$V_{DS}=80V, V_{GS}=0V,$ $T_J=125^\circ\text{C}$	-	-	10	$\mu A$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics</b>						
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=20A$	-	2.8	3.5	m $\Omega$
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.5	2.5	3.5	V
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}$		-	-5	-	mV/ $^\circ\text{C}$
Forward Transconductance	$g_{FS}$	$V_{DS}=10V, I_D=3A$	-	15	-	S
<b>Dynamic and Switching Characteristics</b>						
Total Gate Charge <sup>3,4</sup>	$Q_g$	$V_{DS}=80V, I_D=10A,$ $V_{GS}=10V$	-	295	450	nC
Gate-Source Charge <sup>3,4</sup>	$Q_{gs}$		-	70	140	
Gate-Drain Charge <sup>3,4</sup>	$Q_{gd}$		-	75	150	
Turn-On Delay Time <sup>3,4</sup>	$t_{d(on)}$	$V_{DD}=50V, R_G=6\Omega$ $V_{GS}=10V, I_D=1A$	-	66.2	120	nS
Rise Time <sup>3,4</sup>	$t_r$		-	79.6	160	
Turn-Off Delay Time <sup>3,4</sup>	$t_{d(off)}$		-	242	480	
Fall Time <sup>3,4</sup>	$t_f$		-	103	200	
Input Capacitance	$C_{iss}$	$V_{DS}=25V, V_{GS}=0V,$ $F=1MHz$	-	17800	26000	pF
Output Capacitance	$C_{oss}$		-	980	1900	
Reverse Transfer Capacitance	$C_{rss}$		-	78	150	
Gate Resistance	$R_g$	$V_{GS}=0V, V_{DS}=0V,$ $F=1MHz$	-	1.8	3.6	$\Omega$
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Continuous Source Current	$I_S$	$V_G=V_D=0V,$ Force Current	-	-	160	A
Pulsed Source Current	$I_{SM}$		-	-	320	A
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=1A,$ $T_J=25^\circ\text{C}$	-	-	1	V
Reverse Recovery Time	$T_{rr}$	$V_{GS}=0V, I_S=10A,$ $dI/dt=100A/\mu s,$ $T_J=25^\circ\text{C}$	-	64	-	nS
Reverse Recovery Charge	$Q_{rr}$		-	150	-	nC

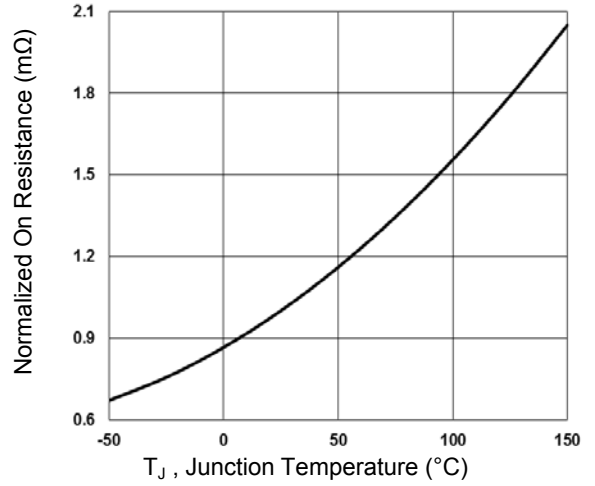
Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2.  $V_{DD}=50V, V_{GS}=10V, L=0.1mH, I_{AS}=75A, R_G=25\Omega$  Starting  $T_J=25^\circ\text{C}$
3. The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$ .
4. Essentially independent of operating temperature.

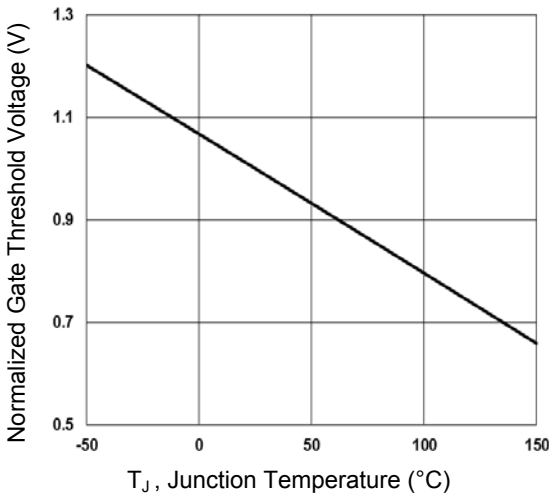
**Typical Electrical and Thermal Characteristic Curves**



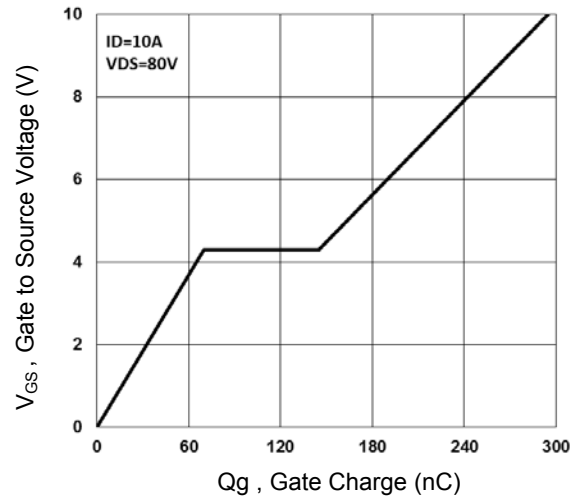
**Figure 1. Continuous Drain Current vs.  $T_c$**



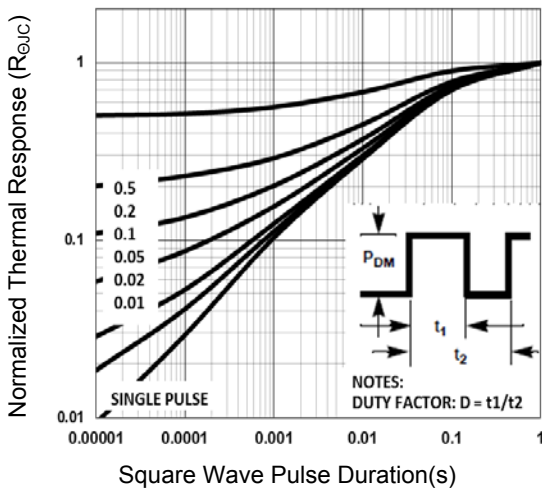
**Figure 2. Normalized  $R_{DS(on)}$  vs.  $T_j$**



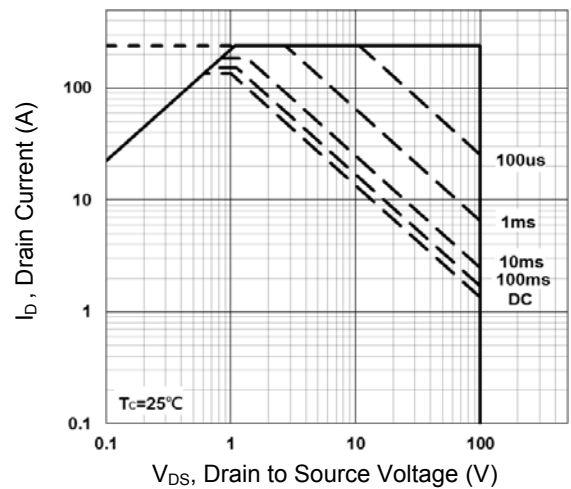
**Figure 3. Normalized  $V_{th}$  vs.  $T_j$**



**Figure 4. Gate Charge Characteristics**

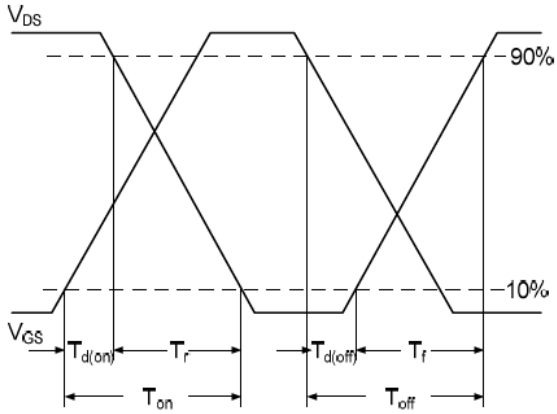


**Figure 5. Normalized Transient Impedance**

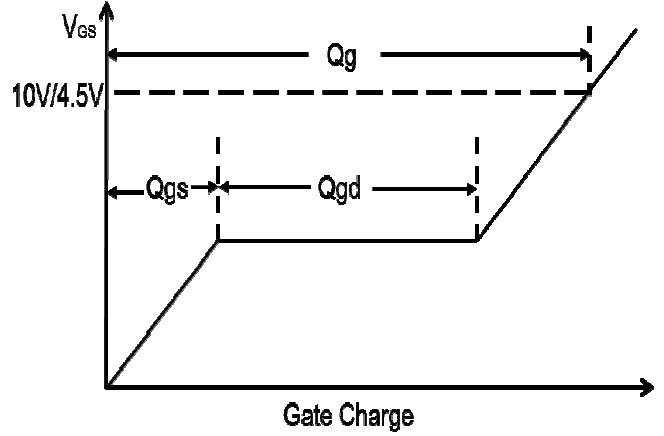


**Figure 6. Maximum Safe Operation Area**

**Typical Electrical and Thermal Characteristic Curves**

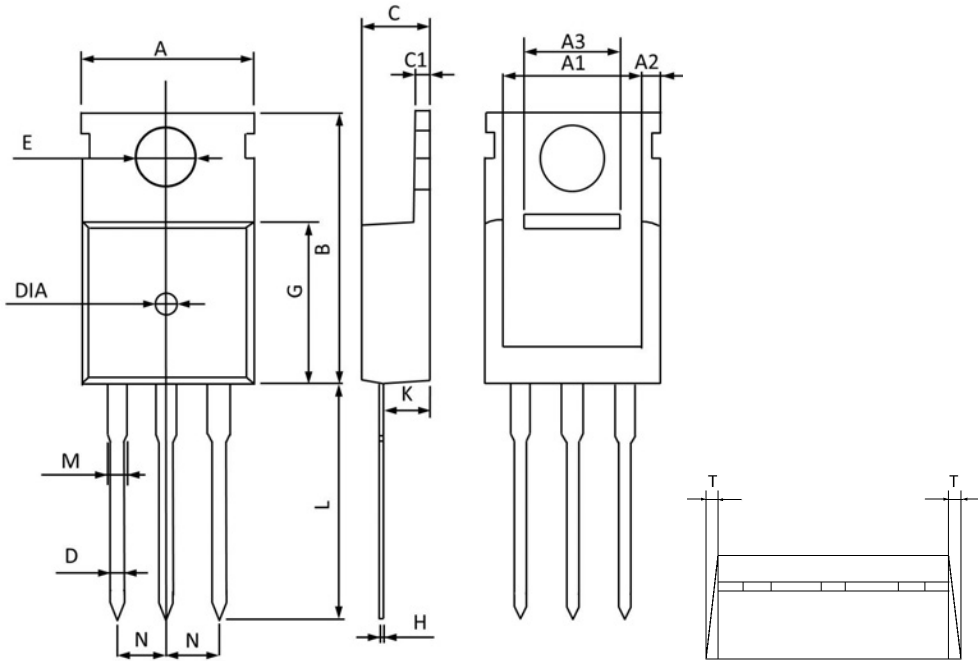


**Figure 7. Switching Time Waveform**



**Figure 8. Gate Charge Waveform**

**Package Outline Dimensions (TO-220)**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	10.300	9.700	0.406	0.382
A1	8.840	8.440	0.348	0.332
A2	1.250	1.050	0.049	0.041
A3	5.300	5.100	0.209	0.201
B	16.200	15.400	0.638	0.606
C	4.680	4.280	0.184	0.169
C1	1.500	1.100	0.059	0.043
D	1.000	0.600	0.039	0.024
E	3.800	3.400	0.150	0.134
G	9.300	8.700	0.366	0.343
H	0.600	0.400	0.024	0.016
K	2.700	2.100	0.106	0.083
L	13.600	12.800	0.535	0.504
M	1.500	1.100	0.059	0.043
N	2.590	2.490	0.102	0.098
T	W0.35		W0.014	
DIA	Φ1.5 TYP.	deep0.2 TYP.	Φ0.059 TYP.	deep0.008 TYP.