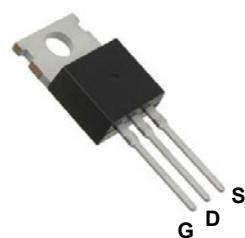
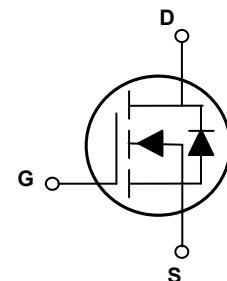


## Main Product Characteristics

$V_{(BR)DSS}$	100V
$R_{DS(ON)}$	3.1mΩ (max.)
$I_D$	180A



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 GSFH3R110 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	$V_{DS}$	100	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous, at Steady-State, ( $T_c=25^\circ\text{C}$ ) <sup>1</sup>	$I_D$	180	A
Drain Current-Continuous, at Steady-State, ( $T_c=100^\circ\text{C}$ )		128	
Drain Current-Pulsed <sup>2</sup>	$I_{DM}$	720	A
Single Pulse Avalanche Energy <sup>3</sup>	$E_{AS}$	961	mJ
Power Dissipation ( $T_c=25^\circ\text{C}$ )	$P_D$	224	W
Linear Derating Factor ( $T_c=25^\circ\text{C}$ )		1.8	W/ $^\circ\text{C}$
Junction-to-Ambient (PCB Mounted, Steady-State) <sup>4</sup>	$R_{\theta JA}$	62.5	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.56	$^\circ\text{C}/\text{W}$
Operating Junction Temperature Range	$T_J$	-55 To +150	$^\circ\text{C}$
Storage Temperature Range	$T_{STG}$	-55 To +150	$^\circ\text{C}$



# GSFH3R110

100V N-Channel MOSFET

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>On / Off Characteristics</b>						
Drain-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}}=0\text{V}, I_D=250\mu\text{A}$	100	-	-	V
Drain-Source Leakage Current	$I_{\text{DSS}}$	$V_{\text{DS}}=100\text{V}, V_{\text{GS}}=0\text{V}$	-	-	1	$\mu\text{A}$
		$T_J=125^\circ\text{C}$	-	-	20	
Gate-Source Forward Leakage	$I_{\text{GSS}}$	$V_{\text{GS}}=20\text{V}$	-	-	100	$\text{nA}$
		$V_{\text{GS}}=-20\text{V}$	-	-	-100	
Static Drain-Source On-Resistance	$R_{\text{DS}(\text{ON})}$	$V_{\text{GS}}=10\text{V}, I_D=90\text{A}$	-	2.4	3.1	$\text{m}\Omega$
Gate Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{GS}}=V_{\text{DS}}, I_D=250\mu\text{A}$	2.1	3	3.9	V
<b>Dynamic and Switching Characteristics</b>						
Total Gate Charge	$Q_g$	$V_{\text{DS}}=50\text{V}, I_D=90\text{A}, V_{\text{GS}}=10\text{V}$	-	165	-	$\text{nC}$
Gate-Source Charge	$Q_{gs}$		-	61	-	
Gate-Drain ("Miller") Charge	$Q_{gd}$		-	40	-	
Turn-On Delay Time	$t_{\text{d}(\text{on})}$	$V_{\text{DS}}=50\text{V}, R_{\text{GEN}}=3\Omega, V_{\text{GS}}=10\text{V}, I_D=90\text{A}$	-	33	-	$\text{nS}$
Rise Time	$t_r$		-	46	-	
Turn-Off Delay Time	$t_{\text{d}(\text{off})}$		-	119	-	
Fall Time	$t_f$		-	44	-	
Input Capacitance	$C_{\text{iss}}$	$V_{\text{DS}}=50\text{V}, V_{\text{GS}}=0\text{V}, F=1\text{MHz}$	-	10430	-	$\text{pF}$
Output Capacitance	$C_{\text{oss}}$		-	1263	-	
Reverse Transfer Capacitance	$C_{\text{rss}}$		-	35	-	
Gate Resistance	$R_g$	$F=1\text{MHz}$	-	2.2	-	$\Omega$
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Continuous Source Current (Body Diode)	$I_S$	MOSFET symbol showing the integral reverse p-n junction diode.	-	-	180	A
Pulsed Source Current (Body Diode)	$I_{\text{SM}}$	-	-	720	A	
Diode Forward Voltage	$V_{\text{SD}}$	$V_{\text{GS}}=0\text{V}, I_S=90\text{A}$	-	1	1.2	V
Reverse Recovery Time	$t_{rr}$	$T_J=25^\circ\text{C}, I_F=90\text{A}, \text{di/dt}=100\text{A}/\mu\text{s}$	-	85	-	ns
Reverse Recovery Charge	$Q_{rr}$		-	0.26	-	$\mu\text{C}$

Note:

1. Pulse test: pulse width  $\leq 300\mu\text{s}$ , duty cycle  $\leq 2\%$ .
2. Repetitive rating: Pulsed width limited by maximum junction temperature.
3.  $L=0.5\text{mH}, V_{\text{DD}}=80\text{V}, I_{\text{AS}}=62\text{A}, T_J=25^\circ\text{C}$ .
4. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch.

## Typical Electrical and Thermal Characteristic Curves

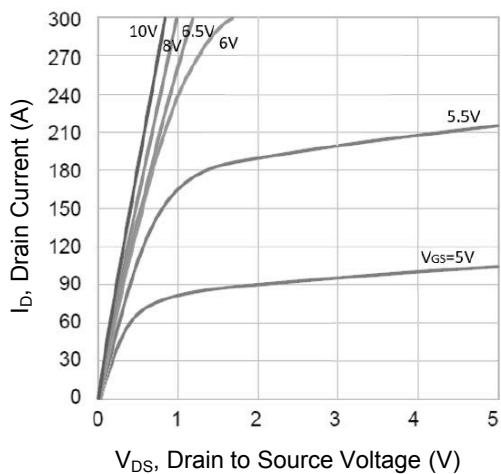


Figure 1. Typical Output Characteristics

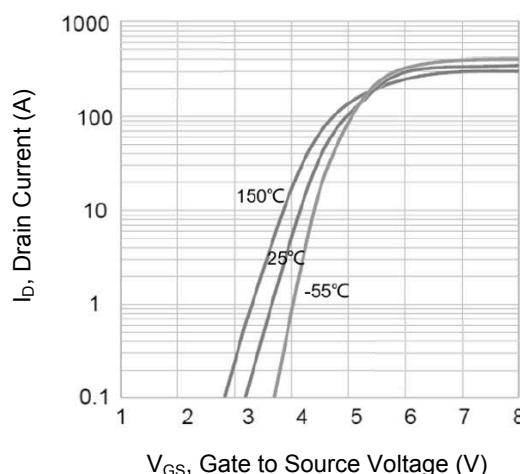


Figure 2. Typical Transfer Characteristics

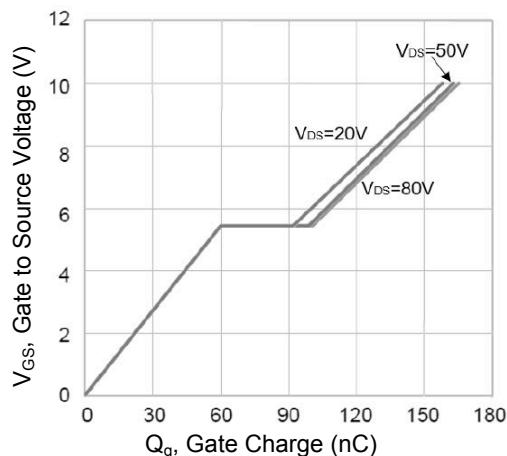


Figure 3. Gate Charge Characteristics

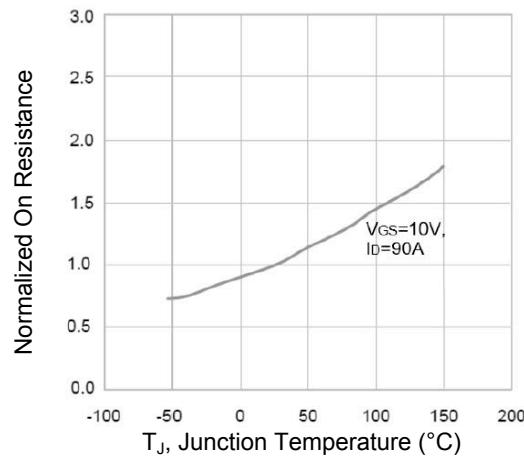


Figure 4. Normalized On-Resistance vs. Junction Temperature

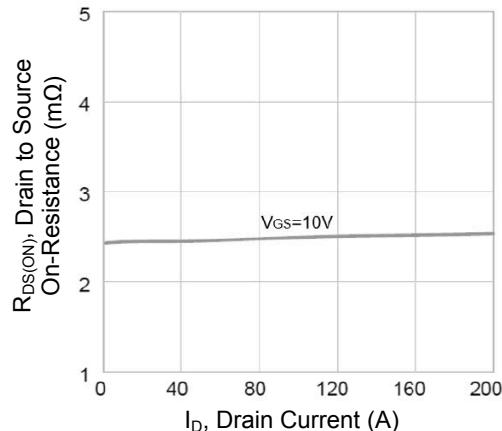


Figure 5. On Resistance vs. Drain Current

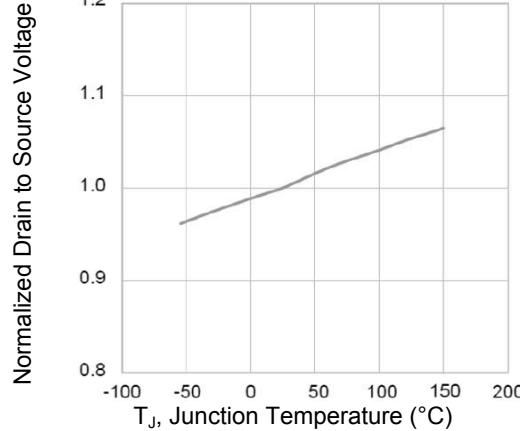


Figure 6. Normalized  $BV_{DSS}$  vs. Junction Temperature

## Typical Electrical and Thermal Characteristic Curves

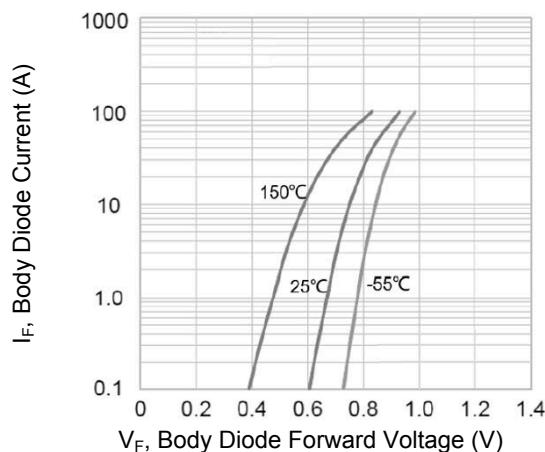


Figure 7. Body Diode Characteristics

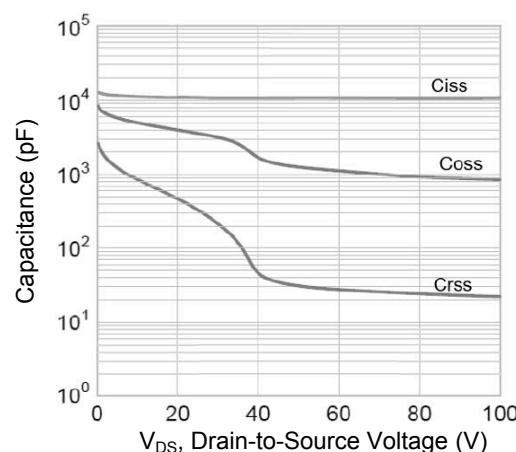


Figure 8. Transfer Characteristics

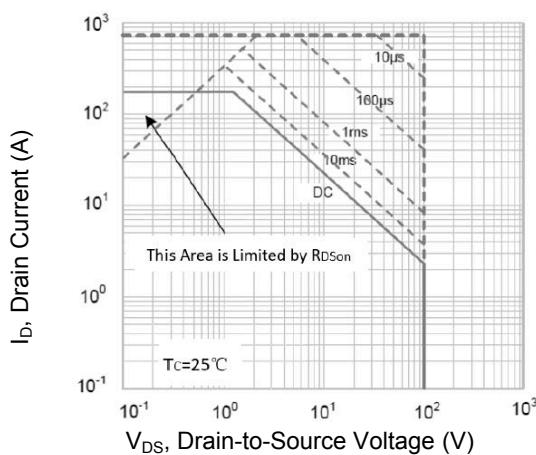
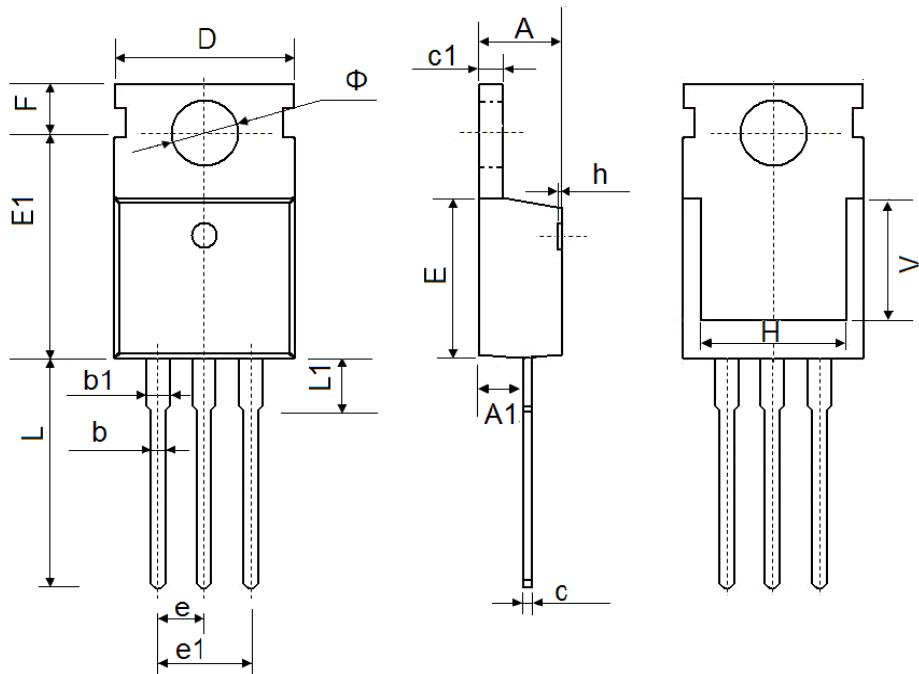


Figure 9. Safe Operation Area

### Package Outline Dimensions (TO-220)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	9.910	10.250	0.390	0.404
E	8.950	9.750	0.352	0.384
E1	12.650	12.950	0.498	0.510
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	6.900 REF.		0.276 REF.	
Φ	3.400	3.800	0.134	0.150