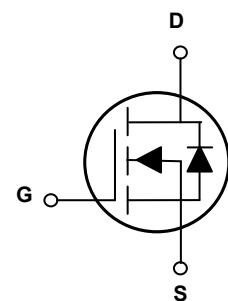
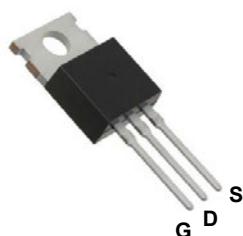


## Main Product Characteristics

$V_{(BR)DSS}$	100V
$R_{DS(ON)}$	85mΩ (Typ.)
$I_D$	15A



TO-220

Schematic Diagram

## Features and Benefits

- Optimized the cell structure
- Low on-resistance and low gate charge
- Featuring low switching and drive losses
- Fast switching and reverse body recovery
- High ruggedness and robustness



## Description

The GSFH10110 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 ( $T_A=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Max.	Unit
Drain-Source Voltage	$V_{DS}$	100	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current @ Steady-State <sup>1</sup> , $T_A=25^\circ\text{C}$	$I_D$	15	A
Continuous Drain Current @ Steady-State, $T_A=100^\circ\text{C}$		9.5	A
Pulsed Drain Current <sup>2</sup>	$I_{DM}$	60	A
Single Pulsed Avalanche Energy <sup>3</sup>	$E_{AS}$	11	mJ
Power Dissipation, $T_A=25^\circ\text{C}$	$P_D$	34	W
Linear Derating Factor, $T_A=25^\circ\text{C}$		0.19	W/ $^\circ\text{C}$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	4.4	$^\circ\text{C}/\text{W}$
Junction to Ambient (PCB Mounted, Steady-State) <sup>4</sup>	$R_{\theta JA}$	62	$^\circ\text{C}/\text{W}$
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +175	$^\circ\text{C}$

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-to-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}}=0\text{V}, I_D=250\mu\text{A}$	100	-	-	V
Drain-to-Source Leakage Current	$I_{\text{DSS}}$	$V_{\text{DS}}=100\text{V}, V_{\text{GS}}=0\text{V}$	-	-	1	$\mu\text{A}$
		$T_J=125^\circ\text{C}$	-	-	50	
Gate-to-Source Forward Leakage	$I_{\text{GSS}}$	$V_{\text{GS}}=20\text{V}$	-	-	100	$\text{nA}$
		$V_{\text{GS}}=-20\text{V}$	-	-	-100	
Static Drain-to-Source On-Resistance	$R_{\text{DS}(\text{on})}$	$V_{\text{GS}}=10\text{V}, I_D=9\text{A}$	-	84	106	$\text{m}\Omega$
		$V_{\text{GS}}=6\text{V}, I_D=3\text{A}$	-	92	110	
Gate Resistance	$R_g$	$f=1\text{MHz}$	-	1.4	-	$\Omega$
Gate Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{DS}}=V_{\text{GS}}, I_D=250\mu\text{A}$	1.1	1.8	2.9	V
Forward Transconductance	$g_{\text{fs}}$	$V_{\text{DS}}=10\text{V}, I_D=9\text{A}$	-	15	-	S
Input Capacitance	$C_{\text{iss}}$	$V_{\text{GS}}=0\text{V}, V_{\text{DS}}=50\text{V}, f=1\text{MHz}$	-	446	-	$\text{pF}$
Output Capacitance	$C_{\text{oss}}$		-	57	-	
Reverse transfer capacitance	$C_{\text{rss}}$		-	2.8	-	
Total Gate Charge	$Q_g$	$I_D=10\text{A}, V_{\text{DS}}=50\text{V}, V_{\text{GS}}=10\text{V}$	-	8.2	-	$\text{nC}$
Gate-to-Source Charge	$Q_{\text{gs}}$		-	2.8	-	
Gate-to-Drain("Miller") Charge	$Q_{\text{gd}}$		-	1.6	-	
Turn-on Delay Time	$t_{\text{d}(\text{on})}$	$V_{\text{GS}}=10\text{V}, V_{\text{DS}}=50\text{V}, R_L=5\Omega, R_{\text{GEN}}=3\Omega$	-	2.6	-	$\text{nS}$
Rise Time	$t_r$		-	22	-	
Turn-Off Delay Time	$t_{\text{d}(\text{off})}$		-	8.4	-	
Fall Time	$t_f$		-	12	--	

**Source-Drain Ratings and Characteristics**

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Continuous Source Current (Body Diode)	$I_S$	MOSFET symbol showing the integral reverse p-n junction diode.	-	-	15	A
Pulsed Source Current (Body Diode)	$I_{\text{SM}}$		-	-	60	A
Diode Forward Voltage	$V_{\text{SD}}$	$I_S=10\text{A}, V_{\text{GS}}=0\text{V}$	-	1	1.3	V
Reverse Recovery Time	$t_{\text{rr}}$	$I_S=10\text{A}, V_{\text{GS}}=0\text{V}, d_I/d_t=100\text{A}/\text{us}$	-	46	-	nS
Reverse Recovery Charge	$Q_{\text{rr}}$		-	40	-	nC

Notes:

1. Pulse test: Pulse width  $\leq 300\text{us}$ , duty cycle  $\leq 2\%$ .
2. Repetitive rating; pulse width limited by max. junction temperature.
3.  $L=0.5\text{mH}, R_G=25\Omega, V_{\text{DD}}=80\text{V}, I_{\text{AS}}=6.5\text{A}, T_J=25^\circ\text{C}$ .
4. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch.

## Typical Electrical and Thermal Characteristic Curves

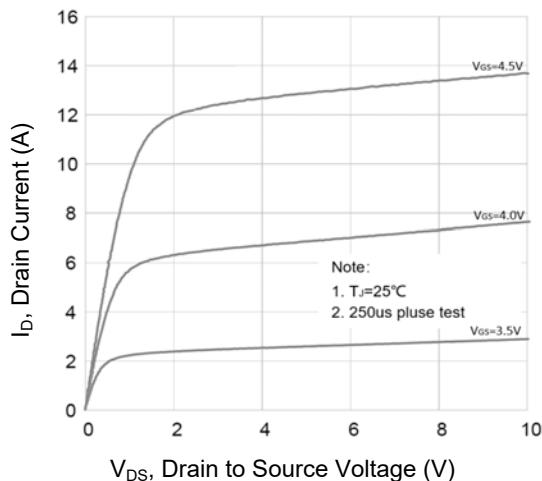


Figure 1. Output Characteristics

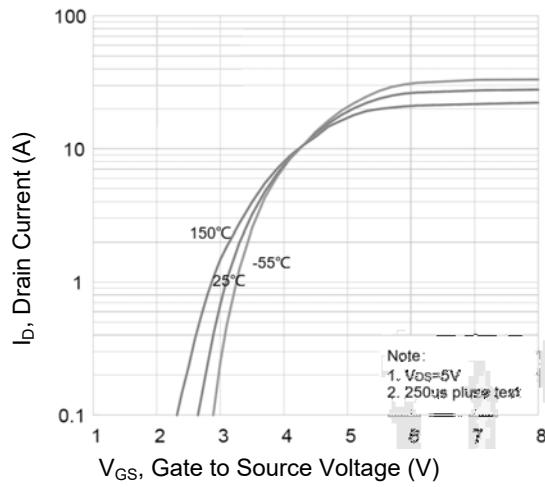


Figure 2. Transfer Characteristics

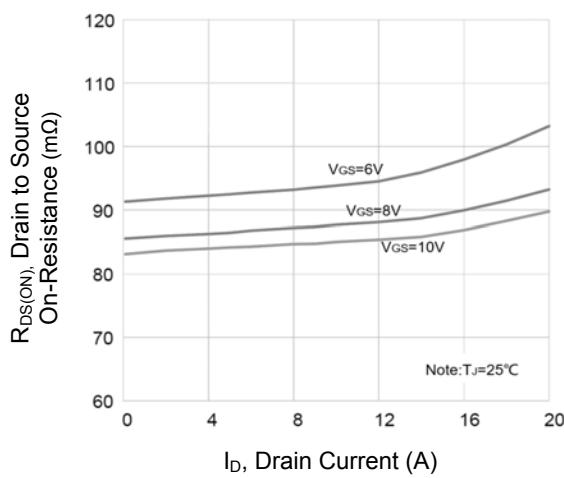


Figure 3.  $R_{DS(ON)}$  vs. Drain Current

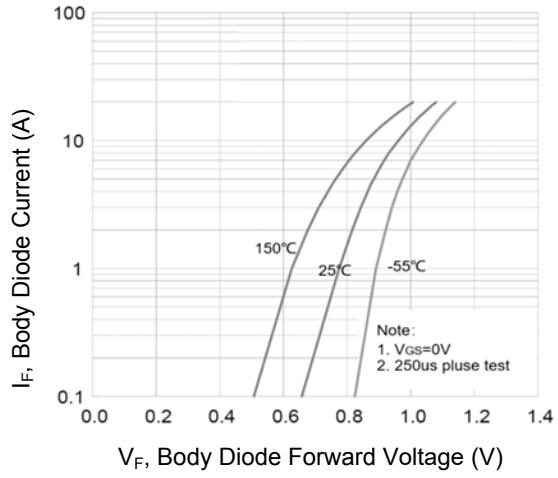


Figure 4. Body Diode Characteristics

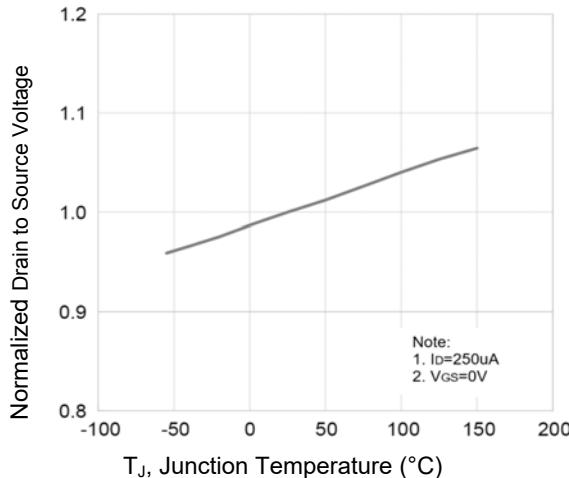


Figure 5. Normalized  $BV_{DSS}$  vs.  $T_J$

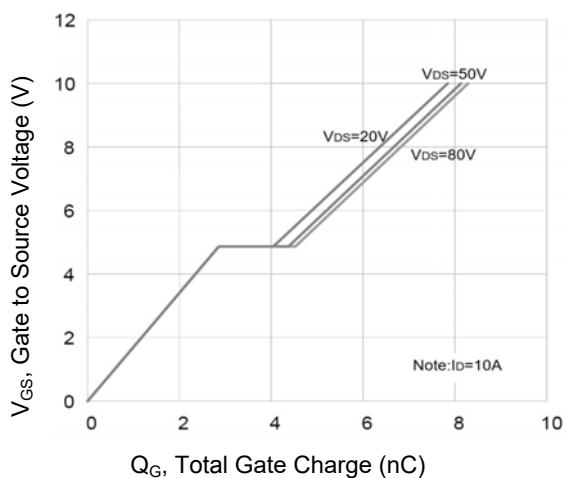
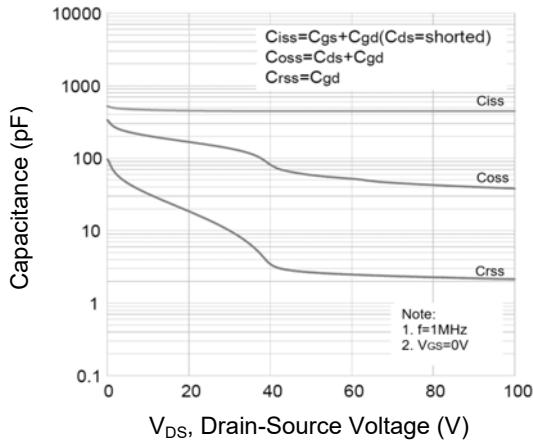
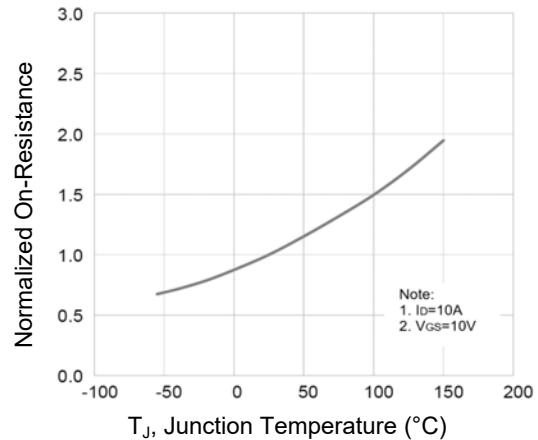


Figure 6. Gate Charge

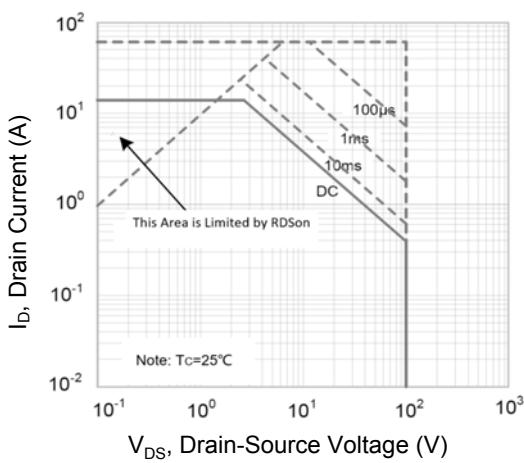
## Typical Electrical and Thermal Characteristic Curves



**Figure 7. Capacitance Characteristics**

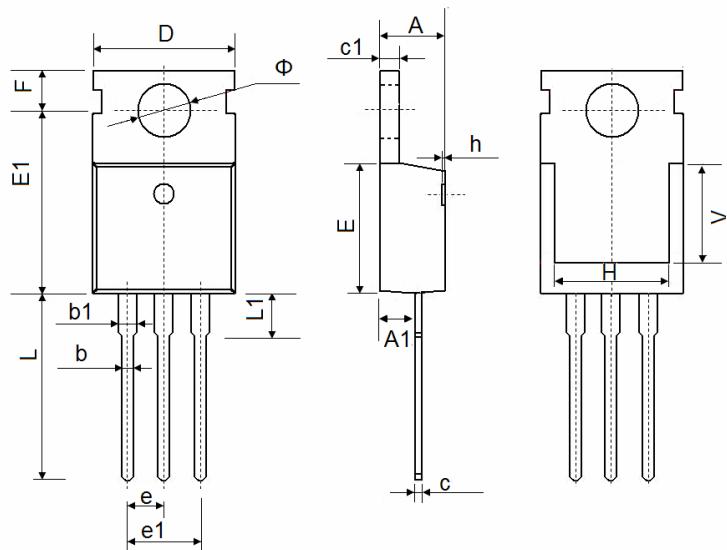


**Figure 8. Normalized  $R_{DS(ON)}$  vs.  $T_J$**



**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