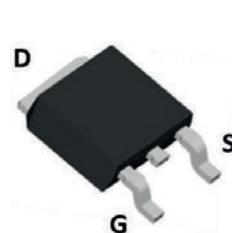
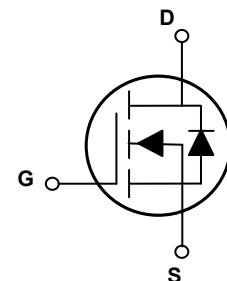


## Main Product Characteristics

$V_{(BR)DSS}$	100V
$R_{DS(ON)}$	21mΩ (max.)
$I_D$	45A



TO-252 (DPAK)



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 GSFD21010 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-to-Source Voltage	$V_{GS}$	±20	V
Continuous Drain Current, @ Steady-State ( $T_C=25^\circ\text{C}$ ) <sup>1</sup>	$I_D$	45	A
Continuous Drain Current, @ Steady-State ( $T_C=100^\circ\text{C}$ )		32	A
Pulsed Drain Current <sup>2</sup>	$I_{DM}$	180	A
Power Dissipation ( $T_C=25^\circ\text{C}$ )	$P_D$	60	W
Linear Derating Factor ( $T_C=25^\circ\text{C}$ )		0.48	W/°C
Single Pulse Avalanche Energy <sup>3</sup>	$E_{AS}$	81	mJ
Junction-to-Case	$R_{eJC}$	2.10	°C/W
Junction-to-Ambient (PCB Mounted, Steady-State) <sup>4</sup>	$R_{eJA}$	62.0	°C/W
Operating Junction and Storage Temperature Range	$T_J/T_{STG}$	-55 to + 150	°C

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>On / Off Characteristics</b>						
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	$\mu\text{A}$
		$T_J=125^\circ\text{C}$	-	-	20	
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	$R_{\text{DS}(\text{ON})}$	$V_{\text{GS}}=10\text{V}, I_D=33\text{A}$	-	18	21	$\text{m}\Omega$
		$V_{\text{GS}}=4.5\text{V}, I_D=16\text{A}$	-	26	36	
Gate Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{DS}}=V_{\text{GS}}, I_D=250\mu\text{A}$	1.0	1.8	3.0	V
<b>Dynamic and Switching Characteristics</b>						
Input Capacitance	$C_{\text{iss}}$	$V_{\text{GS}}=0\text{V}, V_{\text{DS}}=50\text{V}$ $f=1\text{MHz}$	-	1355	-	$\text{pF}$
Output Capacitance	$C_{\text{oss}}$		-	171	-	
Reverse Transfer Capacitance	$C_{\text{rss}}$		-	4	-	
Total Gate Charge	$Q_g$	$I_D=33\text{A}, V_{\text{DS}}=50\text{V},$ $V_{\text{GS}}=10\text{V}$	-	23	-	$\text{nC}$
Gate-to-Source Charge	$Q_{\text{gs}}$		-	10	-	
Gate-to-Drain ("Miller") Charge	$Q_{\text{gd}}$		-	4.9	-	
Turn-On Delay Time	$t_{\text{d}(\text{on})}$	$V_{\text{GS}}=10\text{V}, V_{\text{DS}}=50\text{V},$ $I_D=33\text{A}, R_{\text{GEN}}=2\Omega$	-	8.4	-	$\text{nS}$
Rise Time	$t_r$		-	28.5	-	
Turn-Off Delay Time	$t_{\text{d}(\text{off})}$		-	22.4	-	
Fall Time	$t_f$		-	7.8	-	
Gate Resistance	$R_g$	$f=1\text{MHz}$	-	2.2	-	$\Omega$
<b>Source-Drain Ratings and Characteristics</b>						
Continuous Source Current (Body Diode)	$I_s$	MOSFET symbol showing the integral reverse p-n junction diode.	-	-	45	A
Pulsed Source Current (Body Diode)	$I_{\text{SM}}$		-	-	180	A
Diode Forward Voltage	$V_{\text{SD}}$	$I_s=45\text{A}, V_{\text{GS}}=0\text{V}$	-	1.0	1.2	V
Reverse Recovery Time	$T_{\text{rr}}$	$T_J=25^\circ\text{C}, I_F=45\text{A},$ $di/dt=100\text{A}/\mu\text{s}$	-	56	-	nS
Reverse Recovery Charge	$Q_{\text{rr}}$		-	0.09	-	$\mu\text{C}$

Note:

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.  $L=0.5\text{mH}, V_{\text{DD}}=80\text{V}, I_{\text{AS}}=18\text{A}, R_G=25\Omega, T_J=25^\circ\text{C}$ .
4. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch.

## Typical Electrical and Thermal Characteristic Curves

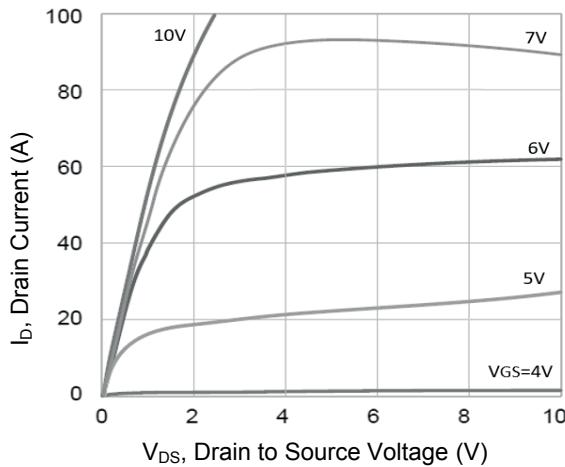


Figure 1. Output Characteristics

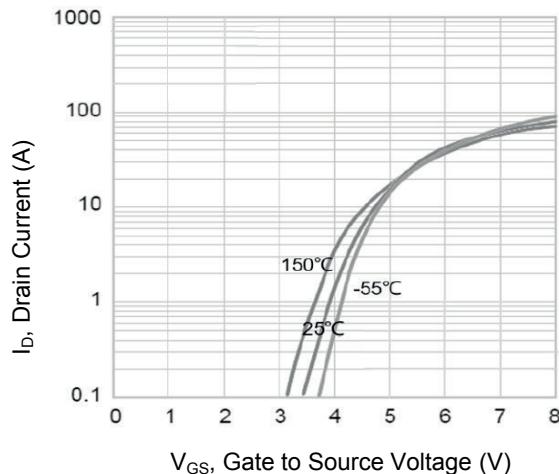


Figure 2. Transfer Characteristics

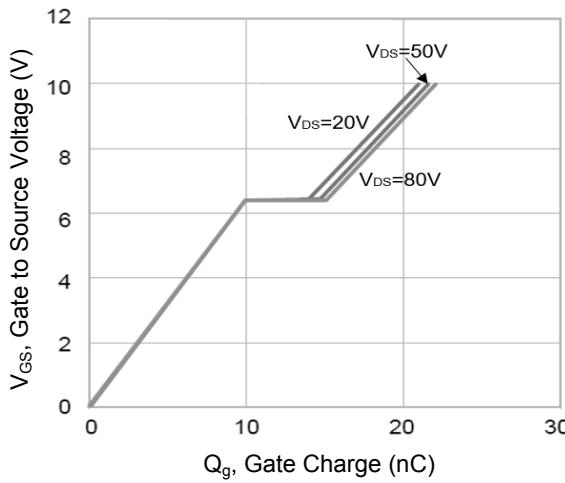


Figure 3. Gate Charge

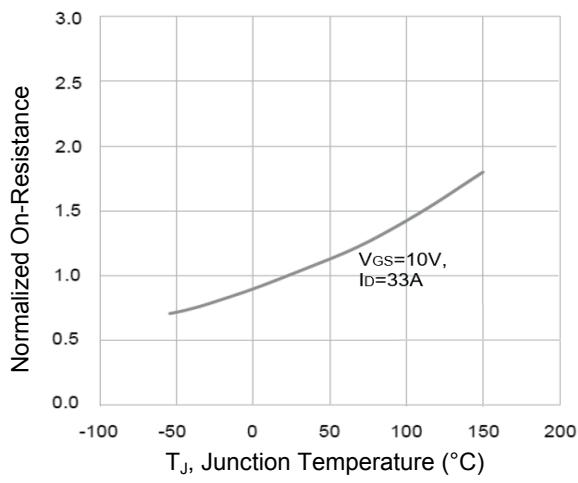


Figure 4. Normalized  $R_{DS(\text{ON})}$  Vs.  $T_J$

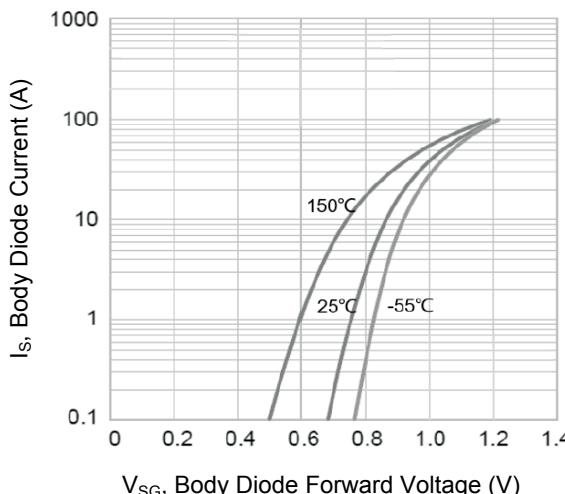


Figure 5. Body Diode Characteristics

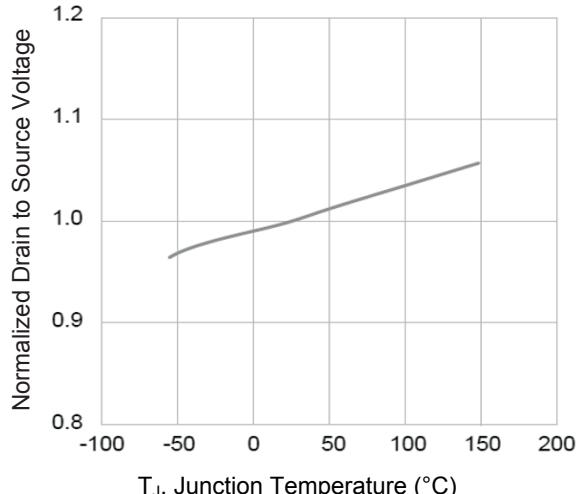
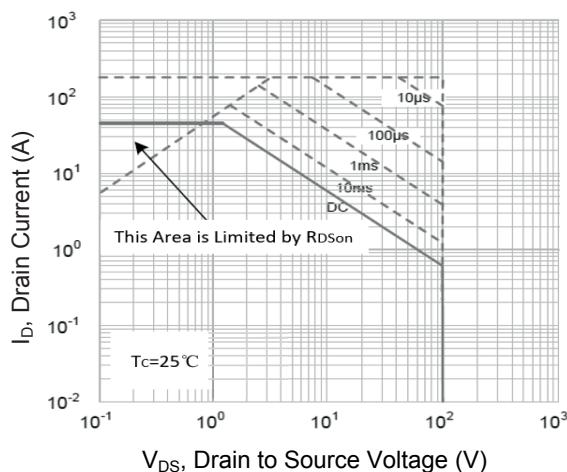
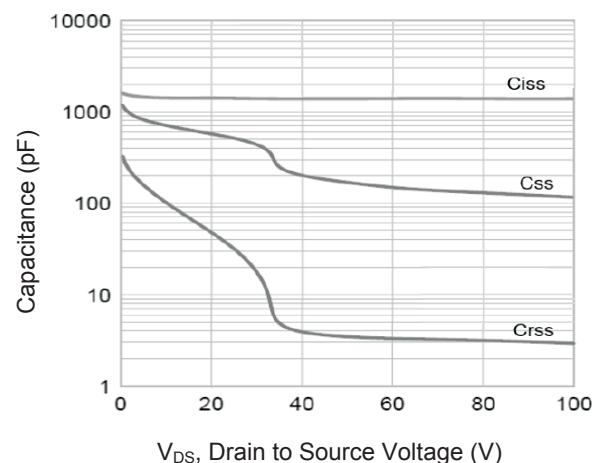


Figure 6. Normalized  $BV_{DSS}$  Vs.  $T_J$

### Typical Electrical and Thermal Characteristic Curves

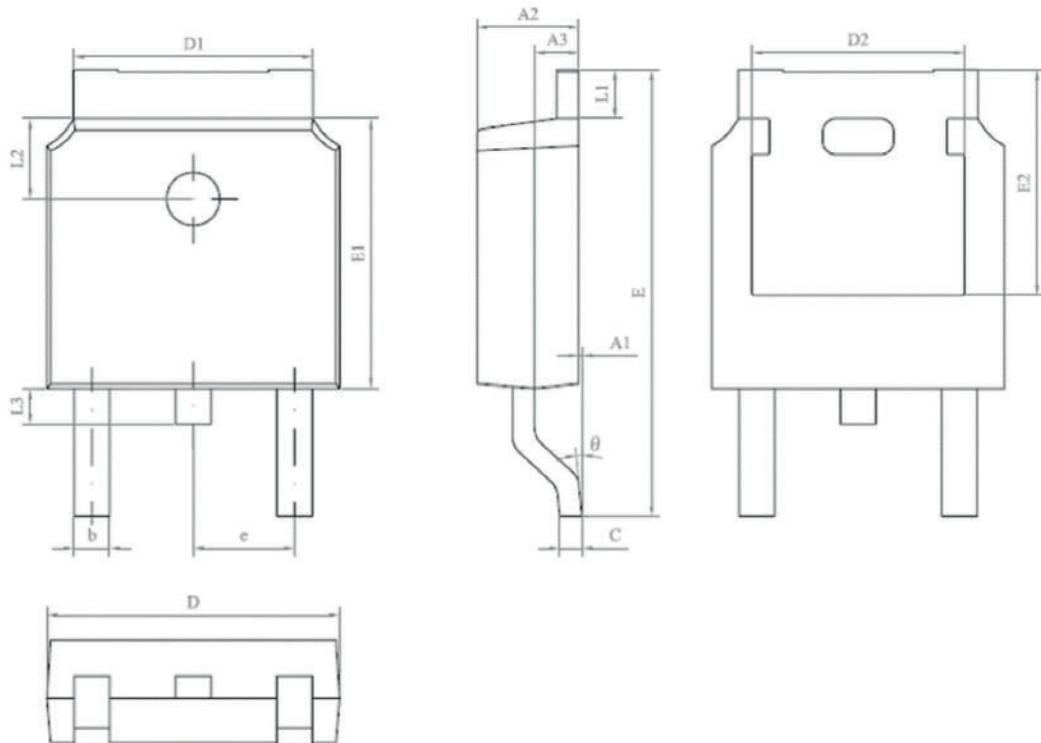


**Figure 7. Safe Operation Area**



**Figure 8. Capacitance Characteristics**

**Package Outline Dimensions TO-252(DPAK)**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A1	0.00	0.10	0.000	0.004
A2	2.20	2.40	0.087	0.094
A3	0.09	1.10	0.004	0.043
b	0.75	0.85	0.030	0.033
C	0.50	0.60	0.020	0.024
D	6.50	6.70	0.256	0.264
D1	5.30	5.50	0.209	0.217
D2	4.70	4.90	0.185	0.193
E	9.90	10.30	0.390	0.406
E1	6.00	6.20	0.236	0.244
E2	5.00	5.20	0.197	0.205
e	2.20	2.40	0.087	0.094
L1	0.90	1.25	0.035	0.049
L2	1.70	1.90	0.067	0.075
L3	0.60	1.00	0.024	0.039
θ	0°	8°	0°	8°