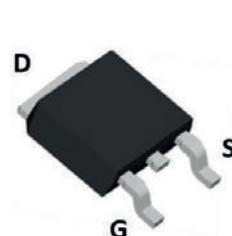
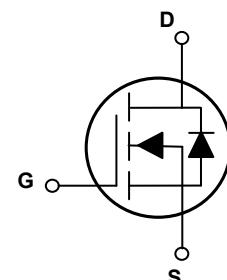


Main Product Characteristics

$V_{(BR)DSS}$	200V
$R_{DS(ON)}$	0.40Ω (max.)
I_D	9A



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 GSFD2009 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	Parameter.	Unit
Drain-Source Voltage	V_{DS}	200	V
Gate-to-Source Voltage	V_{GS}	± 30	V
Continuous Drain Current, @ Steady-State ($T_C=25^\circ\text{C}$)	I_D	9	A
Continuous Drain Current, @ Steady-State ($T_C=100^\circ\text{C}$)		5.7	A
Pulsed Drain Current ¹	I_{DM}	36	A
Power Dissipation ($T_C=25^\circ\text{C}$)	P_D	48	W
		0.39	W/°C
Single Pulse Avalanche Energy ²	E_{AS}	162	mJ
Avalanche Current ¹	I_{AR}	9.0	A
Repetitive Avalanche Energy ¹	E_{AR}	4.8	mJ
Peak Diode Recovery dv/dt^3	dv/dt	5.5	V/ns
Junction-to-Ambient (PCB Mounted, Steady-State)	$R_{\theta JA}$	62.5	°C/W
Junction-to-Case	$R_{\theta JC}$	2.58	°C/W
Operating Junction and Storage Temperature Range	T_J/T_{STG}	-55 to +150	°C
Maximum Lead Temperature for Soldering Purposes	T_L	300	°C

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
On / Off Characteristics						
Drain-to-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}}=0\text{V}, I_D=250\mu\text{A}$	200	-	-	V
Drain-to-Source Leakage Current	I_{DSS}	$V_{\text{DS}}=200\text{V}, V_{\text{GS}}=0\text{V}, T_C=25^\circ\text{C}$	-	-	1.0	μA
		$V_{\text{DS}}=160\text{V}, T_C=125^\circ\text{C}$	-	-	10	μA
Gate-to-Source Forward Leakage	I_{GSS}	$V_{\text{DS}}=0\text{V}, V_{\text{GS}}=30\text{V}$	-	-	100	nA
		$V_{\text{DS}}=0\text{V}, V_{\text{GS}}=-30\text{V}$	-	-	-100	
Static Drain-to-Source On-Resistance	$R_{\text{DS}(\text{ON})}$	$V_{\text{GS}}=10\text{V}, I_D=4.5\text{A}$	-	0.34	0.40	Ω
Gate Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{DS}}=V_{\text{GS}}, I_D=250\mu\text{A}$	2.0	-	4.0	V
Forward Transconductance ⁴	g_{fs}	$V_{\text{DS}}=40\text{V}, I_D=4.5\text{A}$	-	7.05	-	S
Dynamic and Switching Characteristics						
Input Capacitance	C_{iss}	$V_{\text{GS}}=0\text{V}, V_{\text{DS}}=25\text{V}, F=1\text{MHz}$	-	550	720	pF
Output Capacitance	C_{oss}		-	85	110	
Reverse Transfer Capacitance	C_{rss}		-	20	27	
Total Gate Charge ^{4,5}	Q_g	$I_D=9.0\text{A}, V_{\text{DS}}=160\text{V}, V_{\text{GS}}=10\text{V}$	-	20	29	nC
Gate-to-Source Charge ^{4,5}	Q_{gs}		-	3.6	-	
Gate-to-Drain ("Miller") Charge ^{4,5}	Q_{gd}		-	10.2	-	
Turn-on Delay Time ^{4,5}	$t_{\text{d}(\text{on})}$	$V_{\text{DD}}=100\text{V}, V_{\text{GS}}=10\text{V}, R_G=25\Omega, I_D=9.0\text{A}$	-	10	30	nS
Rise Time ^{4,5}	t_r		-	70	150	
Turn-Off Delay Time ^{4,5}	$t_{\text{d}(\text{off})}$		-	60	130	
Fall Time ^{4,5}	t_f		-	65	140	
Source-Drain Ratings and Characteristics						
Continuous Source Current (Body Diode)	I_S	$T_C=25^\circ\text{C}$, MOSFET symbol showing the integral reverse p-n junction diode.	-	-	9.0	A
Diode Pulse Current	I_{SM}		-	-	36	A
Diode Forward Voltage	V_{SD}	$I_S=9.0\text{A}, V_{\text{GS}}=0\text{V}$	-	-	1.5	V
Reverse Recovery Time ⁴	T_{rr}	$I_S=9.0\text{A}, V_{\text{GS}}=0\text{V}, d_{\text{IF}}/dt=100\text{A}/\mu\text{s}$	-	140	-	nS
Reverse Recovery Charge ⁴	Q_{rr}		-	0.87	-	μC

Note:

1. Pulse width limited by maximum junction temperature.
2. $L=4\text{mH}, I_{AS}=9.0\text{A}, V_{DD}=50\text{V}, R_G=25\Omega$, starting $T_J=25^\circ\text{C}$.
3. $I_{SD} \leq 9.0\text{A}, d_{\text{IF}}/dt \leq 200\text{A}/\mu\text{s}, V_{DD} \leq BV_{\text{DSS}}$, starting $T_J=25^\circ\text{C}$.
4. Pulse test: pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.
5. Essentially independent of operating temperature.

Typical Electrical and Thermal Characteristic Curves

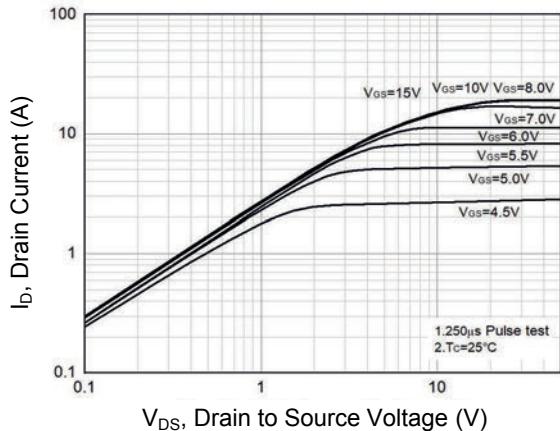


Figure 1. Typical Output Characteristics

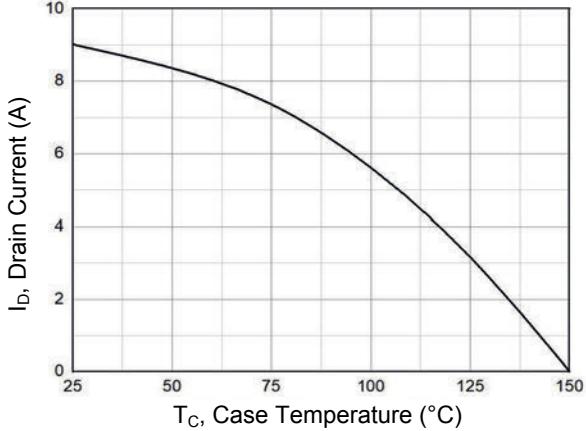


Figure 2. Drain Current vs. T_c

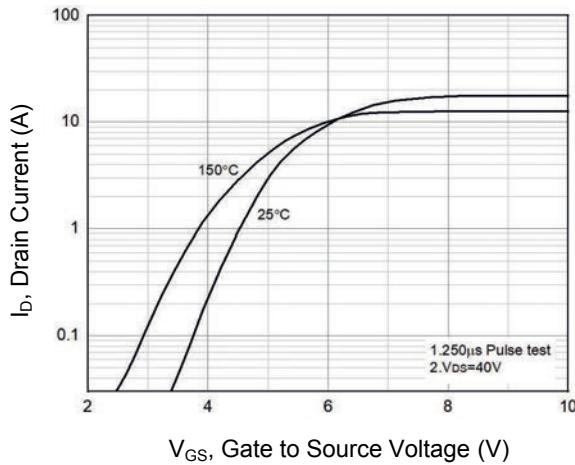


Figure 3. Transfer Characteristics

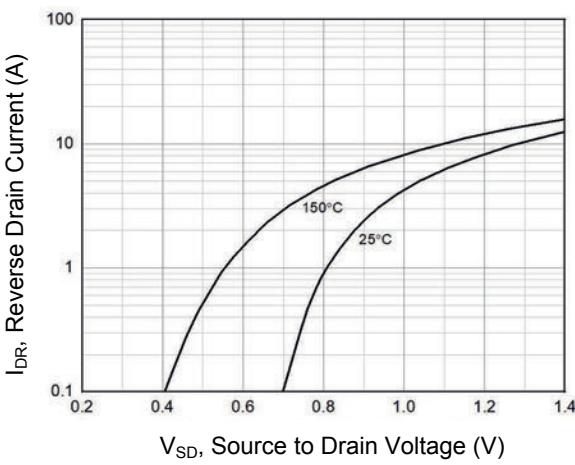


Figure 4. Body Diode Characteristics

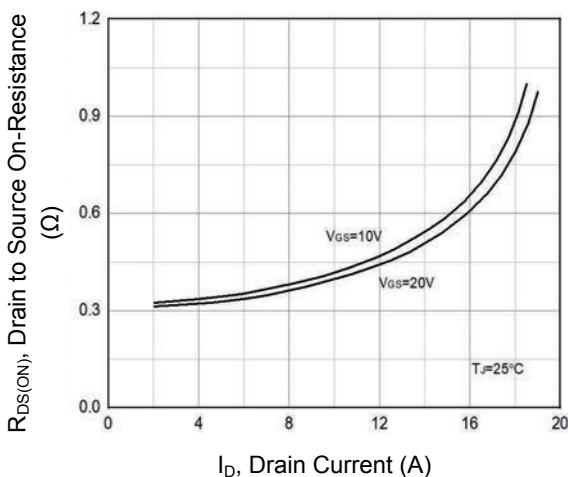


Figure 5. $R_{DS(\text{ON})}$ Vs. Drain Current

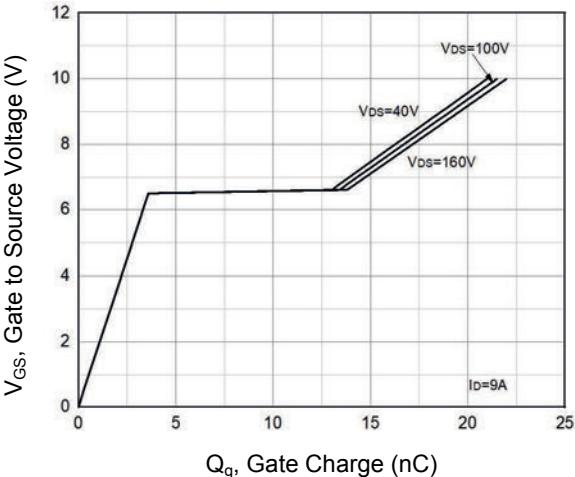


Figure 6. Gate Charge Characteristics

Typical Electrical and Thermal Characteristic Curves

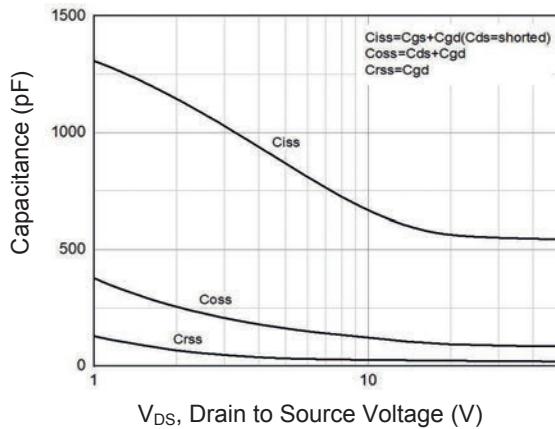


Figure 7. Capacitance Characteristics

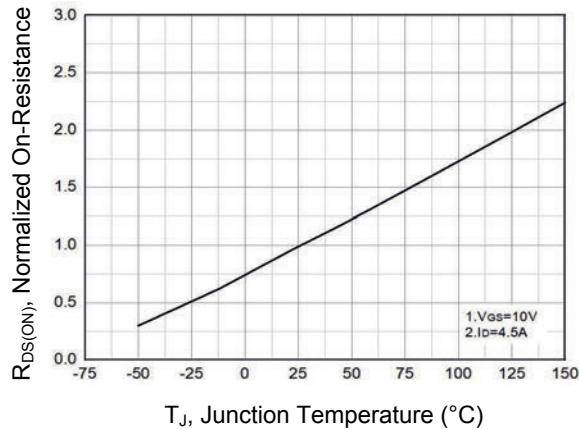


Figure 8. Normalized $R_{DS(ON)}$ Vs. T_J

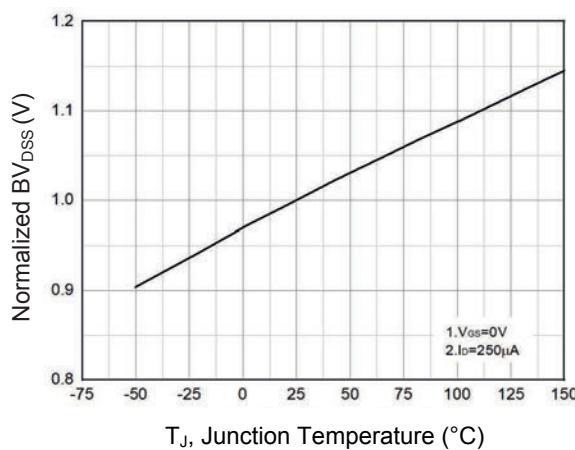


Figure 9. Normalized BV_{DSS} Vs. T_J

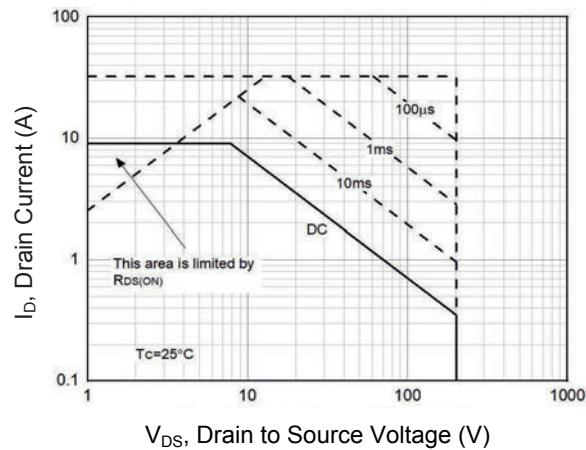


Figure 10. Safe Operation Area

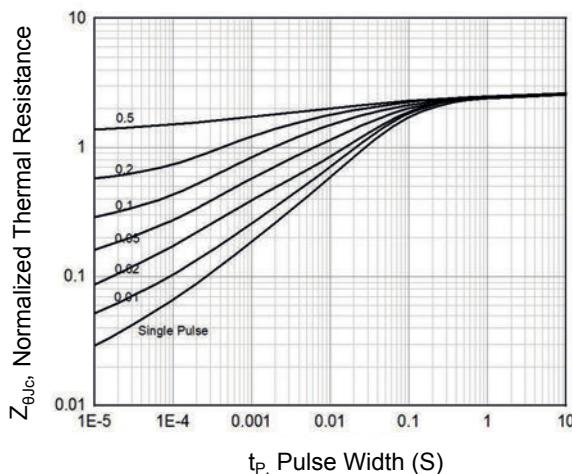
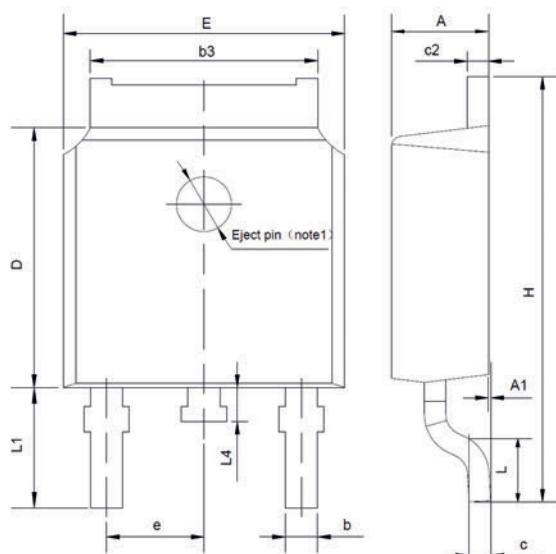


Figure 11. Transient Thermal Impedance Vs. t_p

Package Outline Dimensions TO-252(DPAK)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.10	2.50	0.083	0.098
A1	0.00	0.13	0.000	0.005
b	0.66	0.89	0.026	0.035
b3	5.10	5.46	0.201	0.215
c	0.45	0.65	0.018	0.026
c2	0.45	0.65	0.018	0.026
D	5.80	6.40	0.228	0.252
E	6.30	6.90	0.248	0.272
e	2.30 TYP		0.091 TYP	
H	9.60	10.60	0.378	0.417
L	1.40	1.70	0.055	0.067
L1	2.90 REF		0.114 REF	
L4	0.60	1.00	0.024	0.039