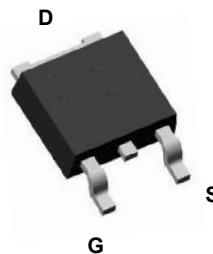
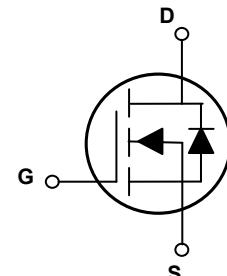


### Main Product Characteristics

$V_{(BR)DSS}$	800V
$R_{DS(ON)}$	0.42Ω (max.)
$I_D$	12A



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 GSFD80R420 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 ( $T_J=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Max.	Unit
Drain-Source Voltage	$V_{DS}$	800	V
Gate-Source Voltage	$V_{GS}$	$\pm 30$	V
Drain Current-Continuous, at Steady-State, ( $T_C=25^\circ\text{C}$ )	$I_D$	12	A
Drain Current-Continuous, at Steady-State, ( $T_C=100^\circ\text{C}$ )		7.6	
Drain Current-Pulsed	$I_{DM}$	48	A
Single Pulse Avalanche Energy <sup>1</sup>	$E_{AS}$	510	mJ
Power Dissipation ( $T_C=25^\circ\text{C}$ )	$P_D$	104	W
		0.83	W/ $^\circ\text{C}$
Body Diode Reverse Voltage Slope <sup>2</sup>	$dv/dt$	50	V/ns
MOS $dv/dt$ Ruggedness <sup>3</sup>	$dv/dt$	100	V/ns
Junction-to-Ambient (PCB Mounted, Steady-State)	$R_{\text{JA}}$	62	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	$R_{\text{JC}}$	1.2	$^\circ\text{C}/\text{W}$
Operating Junction Temperature Range	$T_J$	-55 To +150	$^\circ\text{C}$
Storage Temperature Range	$T_{STG}$	-55 To +150	$^\circ\text{C}$
Soldering Temperature	$T_{\text{Sld}}$	260	$^\circ\text{C}$

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>On / Off Characteristics</b>						
Drain-Source Breakdown Voltage	$\text{BV}_{\text{DSS}}$	$V_{\text{GS}}=0\text{V}, I_{\text{D}}=250\mu\text{A}$	800	-	-	V
Drain-Source Leakage Current	$I_{\text{DSS}}$	$V_{\text{DS}}=800\text{V}, V_{\text{GS}}=0\text{V}$ $T_J=25^\circ\text{C}$	-	-	1	$\mu\text{A}$
		$V_{\text{DS}}=800\text{V}, V_{\text{GS}}=0\text{V}$ $T_J=125^\circ\text{C}$	-	1	-	$\mu\text{A}$
Gate-Source Leakage Current	$I_{\text{GSS}}$	$V_{\text{GS}}=\pm 30\text{V}, V_{\text{DS}}=0\text{V}$	-	-	$\pm 100$	nA
Static Drain-Source On-Resistance	$R_{\text{DS}(\text{ON})}$	$V_{\text{GS}}=10\text{V}, I_{\text{D}}=6\text{A}$	-	0.36	0.42	$\Omega$
Gate Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{GS}}=V_{\text{DS}}, I_{\text{D}}=250\mu\text{A}$	2.4	-	4.6	V
<b>Dynamic and Switching Characteristics</b>						
Total Gate Charge <sup>4,5</sup>	$Q_g$	$V_{\text{DD}}=640\text{V}, I_{\text{D}}=12\text{A}, V_{\text{GS}}=10\text{V}$	-	30	-	nC
Gate-Source Charge <sup>4,5</sup>	$Q_{\text{gs}}$		-	9.5	-	
Gate-Drain ("Miller") Charge <sup>4,5</sup>	$Q_{\text{gd}}$		-	12	-	
Gate Plateau <sup>4,5</sup>	$V_{\text{plateau}}$		-	6.9	-	
Turn-On Delay Time <sup>4,5</sup>	$t_{\text{d}(\text{on})}$	$V_{\text{DD}}=400\text{V}, R_{\text{G}}=25\Omega, V_{\text{GS}}=10\text{V}, I_{\text{D}}=12\text{A}$	-	24	-	nS
Rise Time <sup>4,5</sup>	$t_r$		-	57	-	
Turn-Off Delay Time <sup>4,5</sup>	$t_{\text{d}(\text{off})}$		-	80	-	
Fall Time <sup>4,5</sup>	$t_f$		-	36	-	
Input Capacitance	$C_{\text{iss}}$	$V_{\text{DS}}=100\text{V}, V_{\text{GS}}=0\text{V}, F=1\text{MHz}$	-	1130	-	pF
Output Capacitance	$C_{\text{oss}}$		-	36	-	
Reverse Transfer Capacitance	$C_{\text{rss}}$		-	1.9	-	
Gate Resistance	$R_g$	$F=1\text{MHz}$	-	6.4	-	$\Omega$
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Continuous Source Current (Body Diode)	$I_s$	$T_c=25^\circ\text{C}$ , MOSFET symbol showing the integral reverse p-n junction diode.	-	-	12	A
Source Pulse Current	$I_{\text{s,pulse}}$		-	-	48	A
Diode Forward Voltage	$V_{\text{SD}}$	$V_{\text{GS}}=0\text{V}, I_{\text{s}}=12\text{A}$	-	-	1.4	V
Reverse Recovery Time <sup>4</sup>	$t_{\text{rr}}$	$V_{\text{GS}}=0\text{V}, I_{\text{s}}=12\text{A}, dI_F/dt=100\text{A}/\mu\text{s}$	-	391	-	nS
Reverse Recovery Charge <sup>4</sup>	$Q_{\text{rr}}$		-	4.5	-	uC
Reverse Recovery Peak Current <sup>4</sup>	$I_{\text{rrm}}$		-	23	-	A

Note:

1.  $L=79\text{mH}, V_{\text{DD}}=100\text{V}, R_g=25\Omega$ , starting temperature  $T_J=25^\circ\text{C}$ .
2.  $V_{\text{DS}}=0 \text{ - } 400\text{V}, I_{\text{SD}} \leq I_s, T_J=25^\circ\text{C}$ .
3.  $V_{\text{DS}}=0 \text{ - } 480\text{V}$ .
4. Pulse test: pulse width  $\leq 300\text{us}$ , duty cycle  $\leq 2\%$ .
5. Essentially independent of operating temperature.

## Typical Electrical and Thermal Characteristic Curves

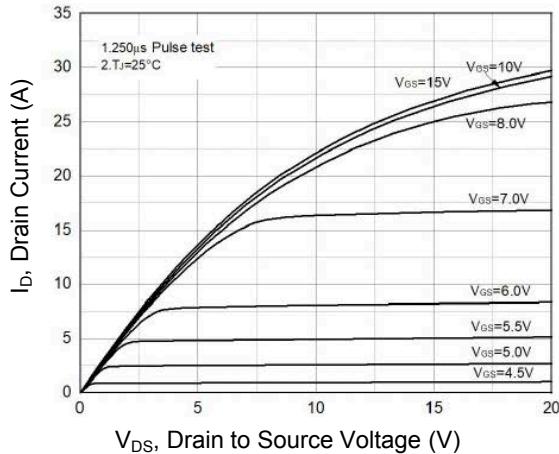


Figure 1. Typical Output Characteristics

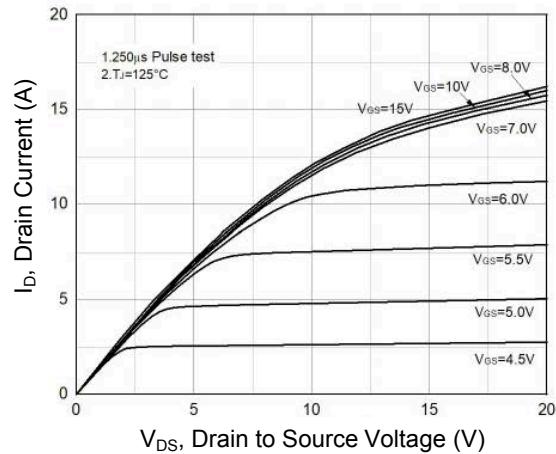


Figure 2. Typical Output Characteristics

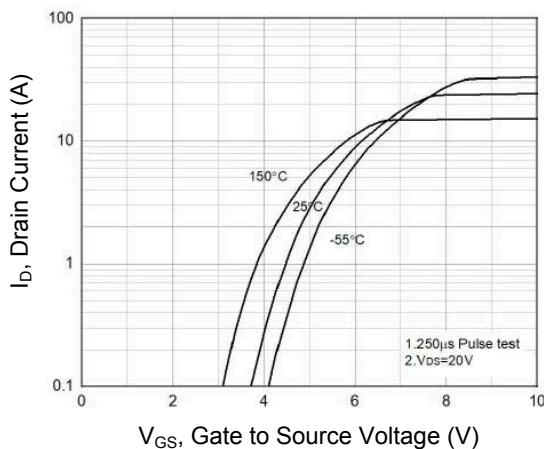


Figure 3. Typical Transfer Characteristics

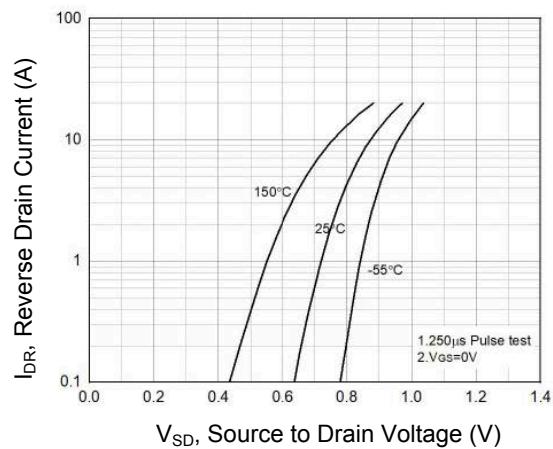


Figure 4. Body Diode Characteristics

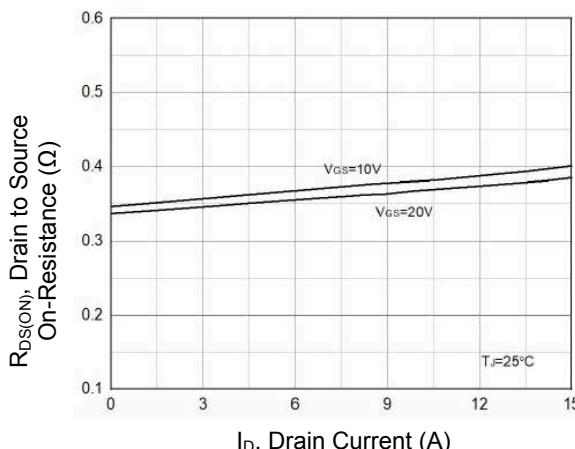


Figure 5.  $R_{DS(ON)}$  vs. Drain Current

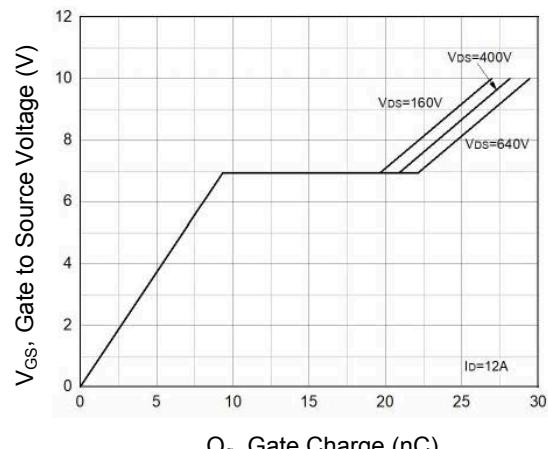


Figure 6. Gate Charge Characteristics

## Typical Electrical and Thermal Characteristic Curves

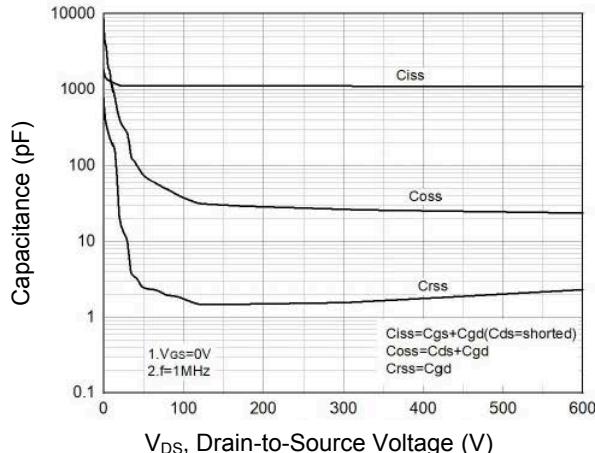


Figure 7. Capacitance Characteristics

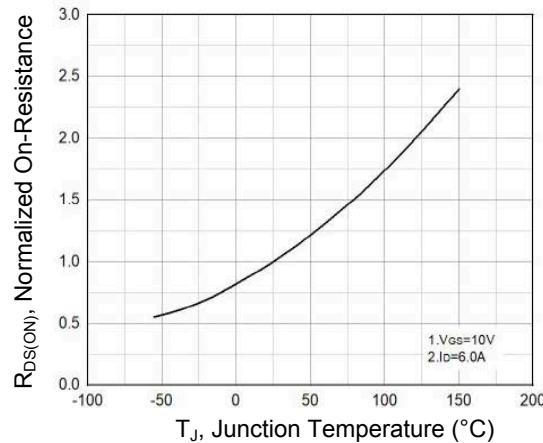


Figure 8. Normalized  $R_{DS(ON)}$  vs.  $T_J$

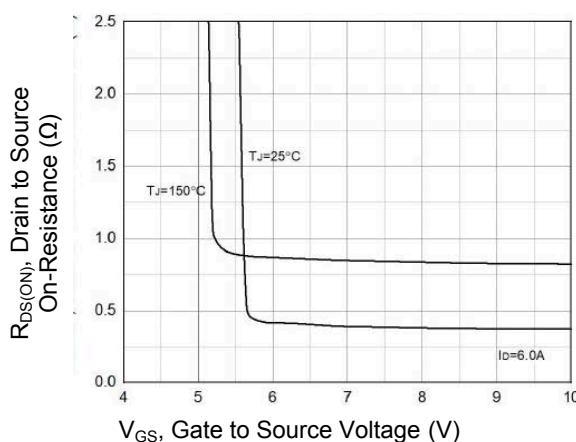


Figure 9. Normalized  $R_{DS(ON)}$  vs.  $V_{GS}$

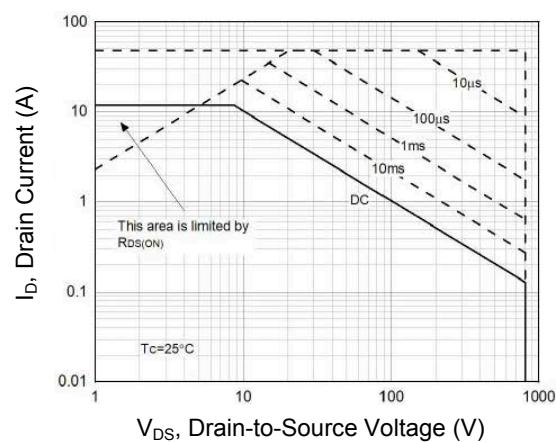


Figure 10. Safe Operation Area

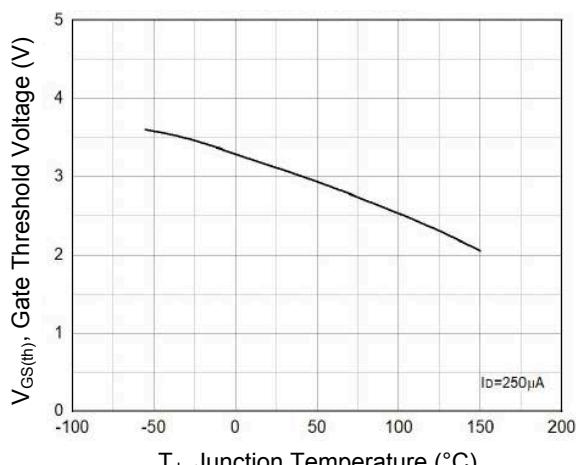


Figure 11. Gate Threshold Voltage vs.  $T_J$

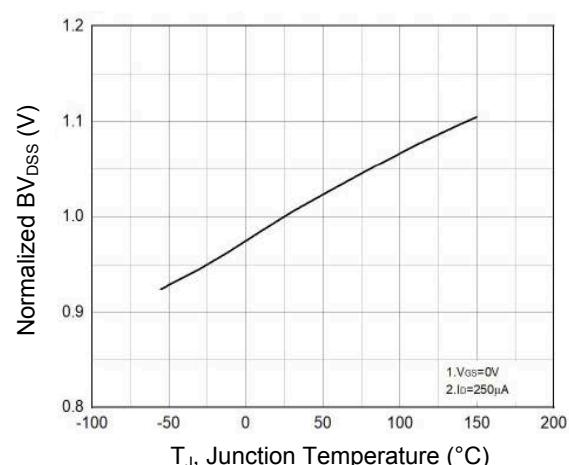


Figure 12. Normalized  $BV_{DSS}$  vs.  $T_J$

### Typical Electrical and Thermal Characteristic Curves

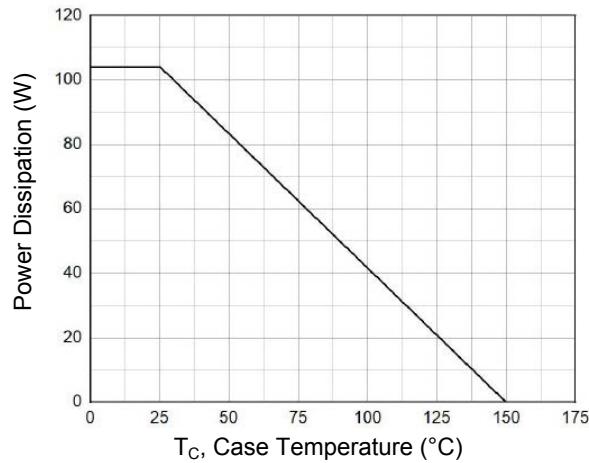
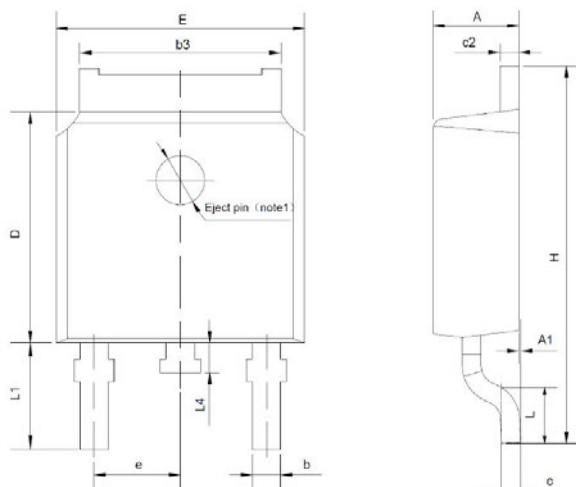


Figure 13. Power Dissipation vs.  $T_c$

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



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	2.100	2.500	0.083	0.098
A1	0.000	0.127	0.000	0.005
b	0.660	0.890	0.026	0.035
b3	5.100	5.460	0.200	0.215
c	0.450	0.650	0.018	0.026
c2	0.450	0.650	0.018	0.026
D	5.800	6.400	0.228	0.252
E	6.300	6.900	0.248	0.272
e	2.300 TYP		0.091 TYP	
H	9.600	10.600	0.378	0.417
L	1.400	1.700	0.055	0.067
L1	2.900 REF		0.114 REF	
L4	0.600	1.000	0.024	0.039