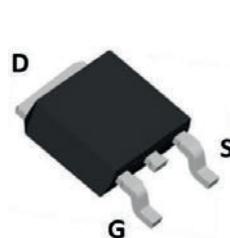
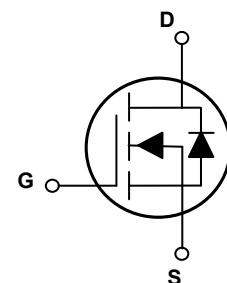


Main Product Characteristics

$V_{(BR)DSS}$	600V
$R_{DS(ON)}$	0.19Ω (max.)
I_D	20A



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 GSFD60R190 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}	600	V
Gate-to-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current, @ Steady-State ($T_C=25^\circ\text{C}$)	I_D	20	A
Continuous Drain Current, @ Steady-State ($T_C=100^\circ\text{C}$)		12	A
Pulsed Drain Current	I_{DM}	80	A
Power Dissipation ($T_C=25^\circ\text{C}$)	P_D	120	W
		0.96	W/°C
Single Pulse Avalanche Energy ¹	E_{AS}	470	mJ
Body Diode Reverse Voltage Slope ²	dv/dt	15	V/ns
MOS dv/dt Reggedness ³	dv/dt	50	V/ns
Junction-to-Ambient (PCB Mounted, Steady-State)	$R_{\theta JA}$	62.5	°C/W
Junction-to-Case	$R_{\theta JC}$	1.04	°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
On / Off Characteristics						
Drain-to-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}}=0\text{V}, I_D=250\mu\text{A}$	600	-	-	V
Drain-to-Source Leakage Current	I_{DSS}	$V_{\text{DS}}=600\text{V}, V_{\text{GS}}=0\text{V}$	-	-	1	μA
Gate-to-Source Forward Leakage	I_{GSS}	$V_{\text{DS}}=0\text{V}, V_{\text{GS}}=20\text{V}$	-	-	100	nA
		$V_{\text{DS}}=0\text{V}, V_{\text{GS}}=-20\text{V}$	-	-	-100	
Static Drain-to-Source On-Resistance	$R_{\text{DS}(\text{ON})}$	$V_{\text{GS}}=10\text{V}, I_D=10\text{A}, T_J=25^\circ\text{C}$	-	0.16	0.19	Ω
		$V_{\text{GS}}=10\text{V}, I_D=10\text{A}, T_J=125^\circ\text{C}$	-	0.31	-	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
Dynamic and Switching Characteristics						
Input Capacitance	C_{iss}	$V_{\text{GS}}=0\text{V}, V_{\text{DS}}=100\text{V}, f=1\text{MHz}$	-	1174	-	pF
Output Capacitance	C_{oss}		-	52	-	
Reverse Transfer Capacitance	C_{rss}		-	1.2	-	
Total Gate Charge ^{4,5}	Q_g	$I_D=20\text{A}, V_{\text{DD}}=480\text{V}, V_{\text{GS}}=10\text{V}$	-	31	-	nC
Gate-to-Source Charge ^{4,5}	Q_{gs}		-	9.6	-	
Gate-to-Drain ("Miller") Charge ^{4,5}	Q_{gd}		-	14	-	
Gate-to-Platesu Voltage ^{4,5}	V_{plateau}		-	7.1	-	V
Turn-On Delay Time ^{4,5}	$t_{\text{d}(\text{on})}$	$V_{\text{DD}}=300\text{V}, V_{\text{GS}}=10\text{V}, R_G=24\Omega, I_D=20\text{A}$	-	22	-	nS
Rise Time ^{4,5}	t_r		-	50	-	
Turn-Off Delay Time ^{4,5}	$t_{\text{d}(\text{off})}$		-	78	-	
Fall Time ^{4,5}	t_f		-	38	-	
Gate Resistance	R_g	$f=1\text{MHz}$	-	4.6	-	Ω
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.	-	-	20	A
Source Pulse Current	I_{SM}		-	-	80	A
Diode Forward Voltage	V_{SD}	$I_S=20\text{A}, V_{\text{GS}}=0\text{V}$	-	-	1.2	V
Reverse Recovery Time ⁴	T_{rr}	$I_F=20\text{A}, V_{\text{DD}}=50\text{V}, dI_F/dt=100\text{A/us}$	-	289	-	nS
Reverse Recovery Charge ⁴	Q_{rr}		-	4.2	-	μC
Reverse Recovery Peak Current ⁴	I_{rrm}		-	28	-	A

Note:

1. $L=79\text{mH}, I_{AS}=3.2\text{A}, V_{\text{DD}}=100\text{V}$, starting temperature $T_J=25^\circ\text{C}$.
2. $V_{\text{DS}}=0-400\text{V}, I_{\text{SD}}<=20\text{A}, T_J=25^\circ\text{C}$.
3. $V_{\text{DS}}=0-480\text{V}$.
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

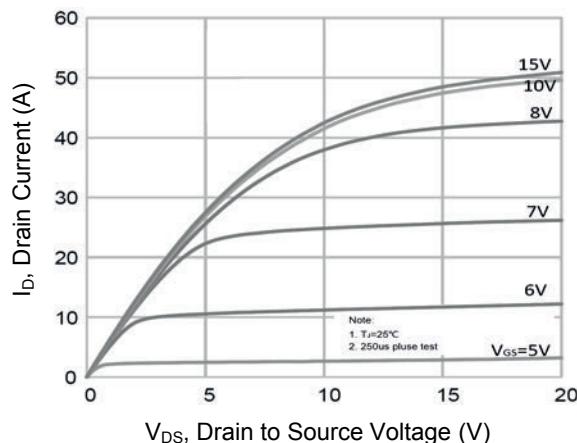


Figure 1. Typical Output Characteristics

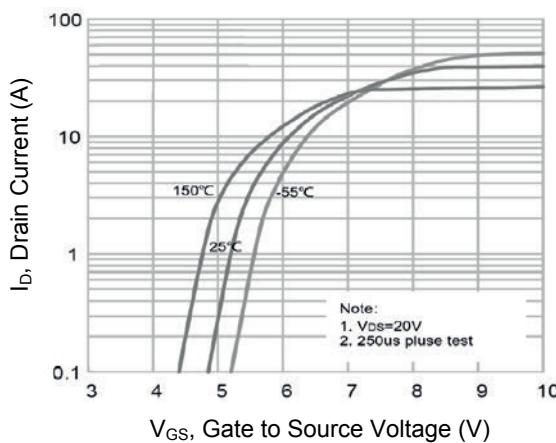


Figure 2. Transfer Characteristics

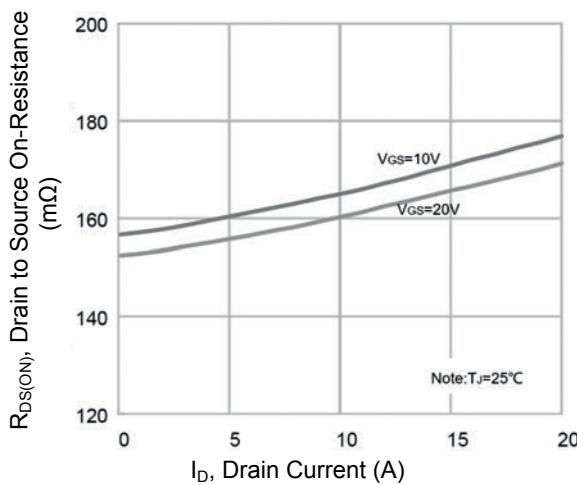


Figure 3. $R_{DS(ON)}$ Vs. Drain Current

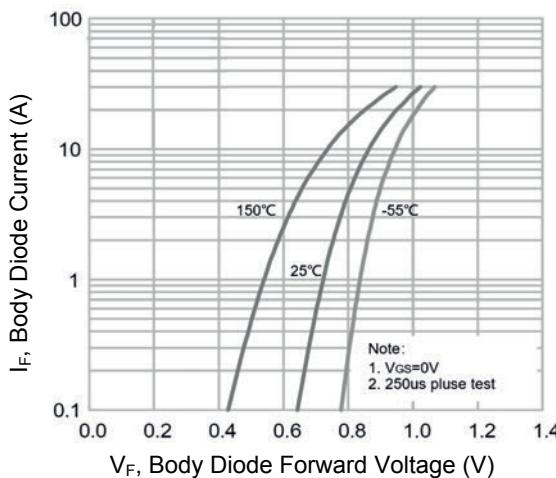


Figure 4. Body Diode Characteristics

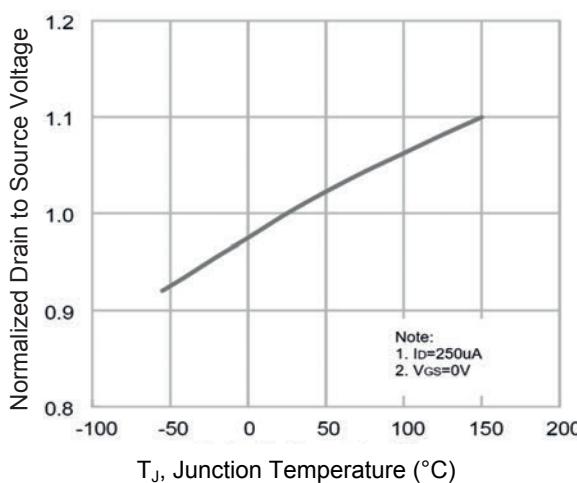


Figure 5. Normalized BV_{DSS} Vs. T_J

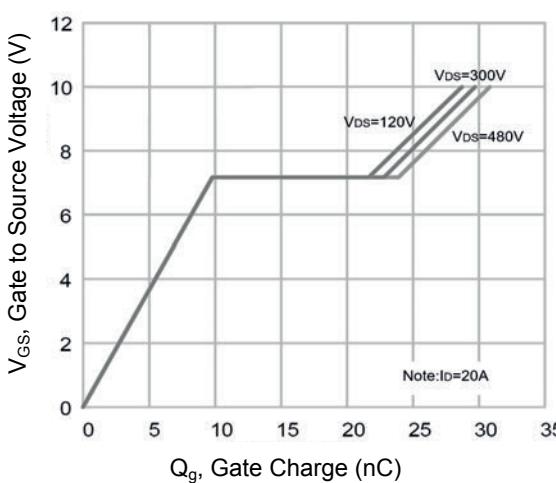


Figure 6. Gate Charge

Typical Electrical and Thermal Characteristic Curves

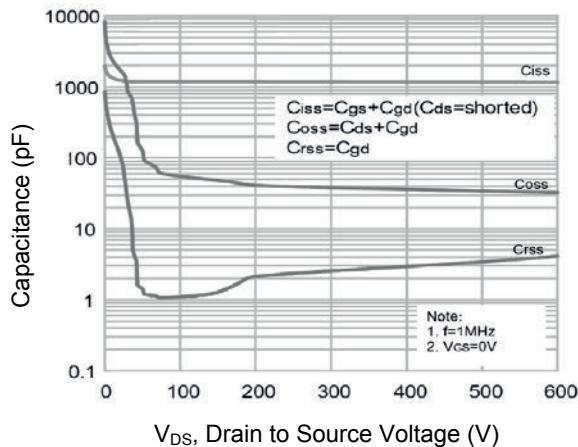


Figure 7. Capacitance Characteristics

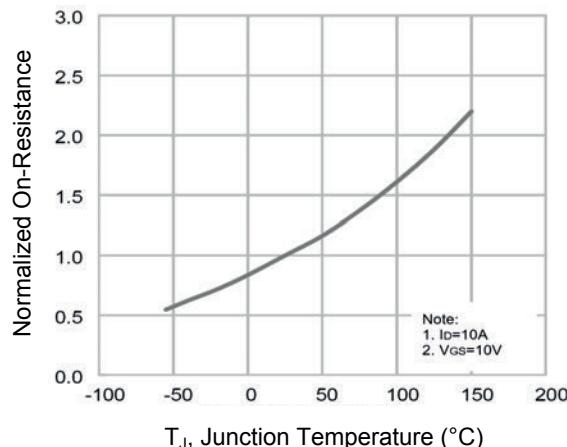


Figure 8. Normalized $R_{DS(\text{ON})}$ Vs. T_J

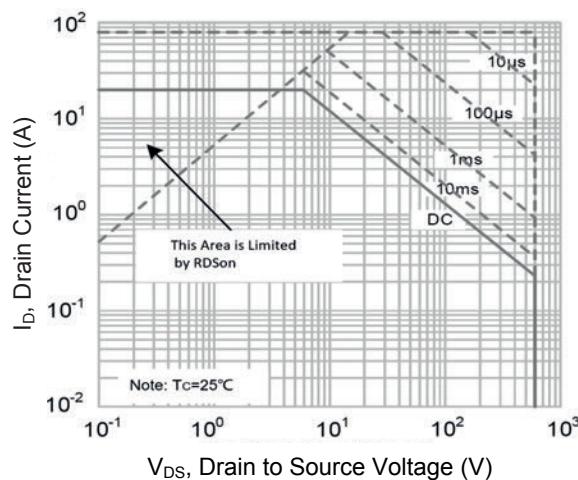
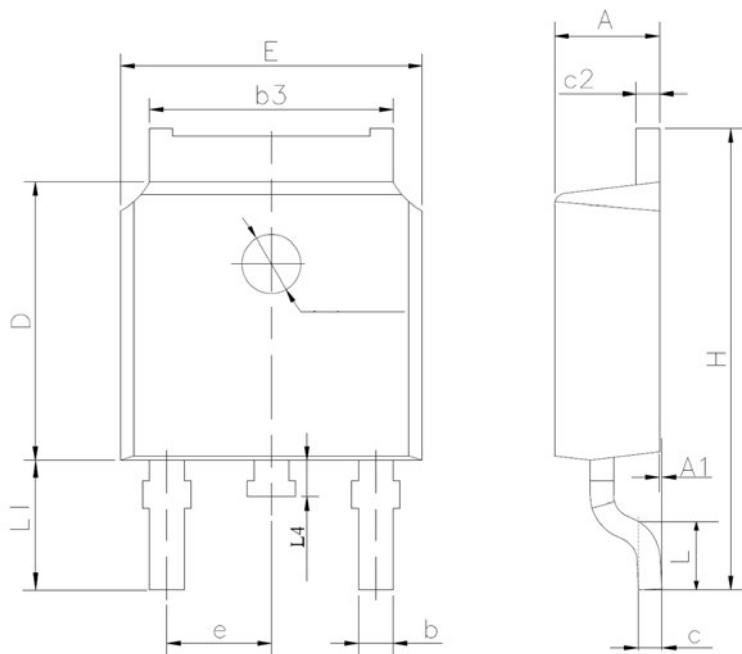


Figure 9. Safe Operation Area

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	0.201	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