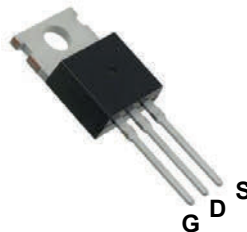
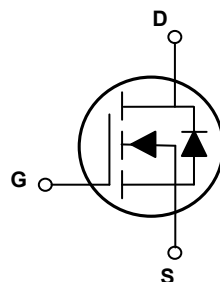


Main Product Characteristics

$V_{(BR)DSS}$	600V
$R_{DS(ON)}$	0.16 Ω (max.)
I_D	24A



TO-220



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 GSFH60R160 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}	± 30	V
Continuous Drain Current, @ Steady-State ($T_C=25^{\circ}\text{C}$)	I_D	24	A
Continuous Drain Current, @ Steady-State ($T_C=100^{\circ}\text{C}$)		15	A
Pulsed Drain Current	I_{DM}	96	A
Power Dissipation ($T_C=25^{\circ}\text{C}$)	P_D	180	W
		1.44	W/ $^{\circ}\text{C}$
Single Pulse Avalanche Energy ¹	E_{AS}	1060	mJ
Body Diode Reverse Voltage Slope ²	dv/dt	15	V/ns
MOS dv/dt Ruggedness ³	dv/dt	50	V/ns
Junction-to-Ambient (PCB Mounted, Steady-State)	$R_{\theta JA}$	62.5	$^{\circ}\text{C/W}$
Junction-to-Case	$R_{\theta JC}$	0.69	$^{\circ}\text{C/W}$
Operating Junction and Storage Temperature Range	T_J/T_{STG}	-55 to +150	$^{\circ}\text{C}$

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	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	600	-	-	V
Drain-to-Source Leakage Current	I_{DSS}	$V_{DS}=600V, V_{GS}=0V$	-	-	1	μA
Gate-to-Source Forward Leakage	I_{GSS}	$V_{DS}=0V, V_{GS}=30V$	-	-	100	nA
		$V_{DS}=0V, V_{GS}=-30V$	-	-	-100	
Static Drain-to-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=12A$	-	0.14	0.16	Ω
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	-	4.0	V
Dynamic and Switching Characteristics						
Input Capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=100V, F=1MHz$	-	1482	-	pF
Output Capacitance	C_{oss}		-	84	-	
Reverse Transfer Capacitance	C_{rss}		-	4.8	-	
Total Gate Charge ^{4,5}	Q_g	$I_D=24A, V_{DD}=480V, V_{GS}=10V$	-	50	-	nC
Gate-to-Source Charge ^{4,5}	Q_{gs}		-	13	-	
Gate-to-Drain ("Miller") Charge ^{4,5}	Q_{gd}		-	26	-	
Turn-on Delay Time ^{4,5}	$t_{d(on)}$	$V_{DD}=300V, V_{GS}=10V, R_G=25\Omega, I_D=24A$	-	21	-	nS
Rise Time ^{4,5}	t_r		-	74	-	
Turn-Off Delay Time ^{4,5}	$t_{d(off)}$		-	211	-	
Fall Time ^{4,5}	t_f		-	64	-	
Gate Resistance	R_g	$F=1MHz$	-	2.6	-	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.	-	-	24	A
Source Pulse Current	I_{SM}		-	-	96	A
Diode Forward Voltage	V_{SD}	$I_S=24A, V_{GS}=0V$	-	1.1	1.4	V
Reverse Recovery Time ²	T_{rr}	$I_F=24A, V_{DD}=50V, di_F/dt=100A/\mu s$	-	442	-	nS
Reverse Recovery Charge ²	Q_{rr}		-	7.0	-	μC

Note:

1. $L=79mH, I_{AS}=4.8A, V_{DD}=100V, R_g=25\Omega$, starting temperature $T_J=25^\circ\text{C}$.
2. $V_{DS}=0-400V, I_{SD}\leq I_S, T_J=25^\circ\text{C}$.
3. $V_{DS}=0-480V$.
4. Pulse Test : pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
5. Essentially independent of operating temperature.

Typical Electrical and Thermal Characteristic Curves

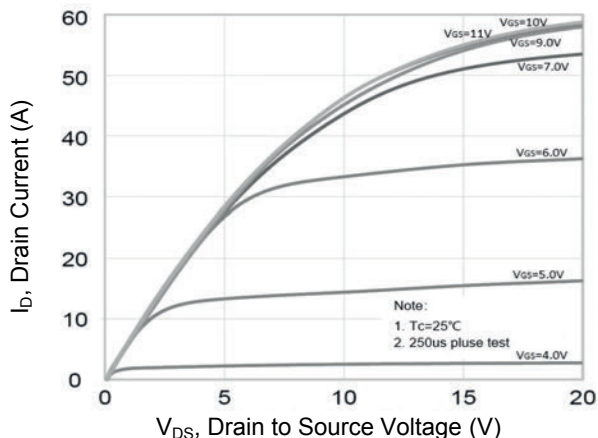


Figure 1. Typical Output Characteristics

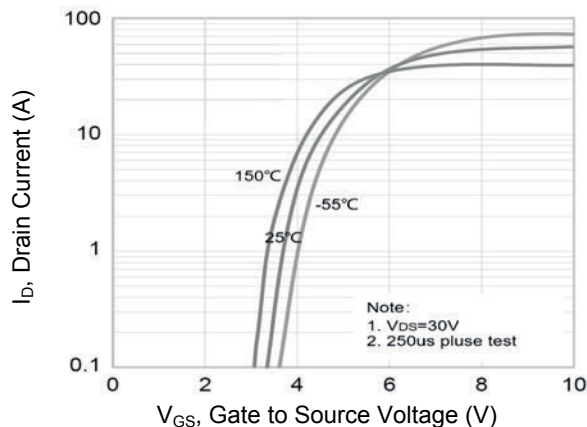


Figure 2. Transfer Characteristics

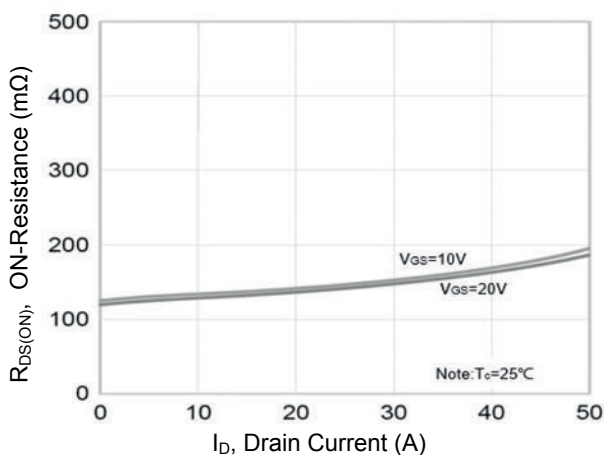


Figure 3. On-Resistance vs. Drain Current

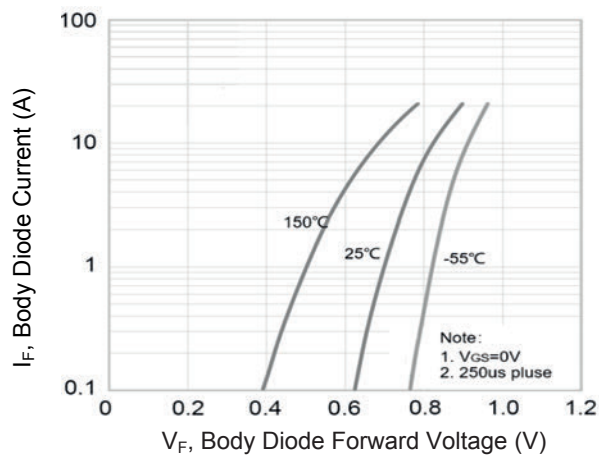


Figure 4. Body Diode Characteristics

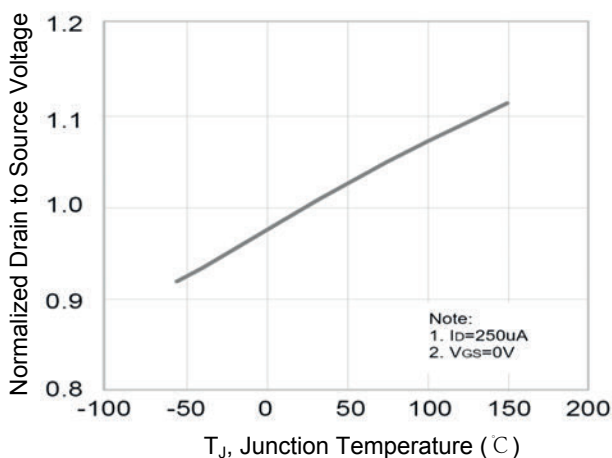


Figure 5. Normalized BV_{DSS} Vs. T_J

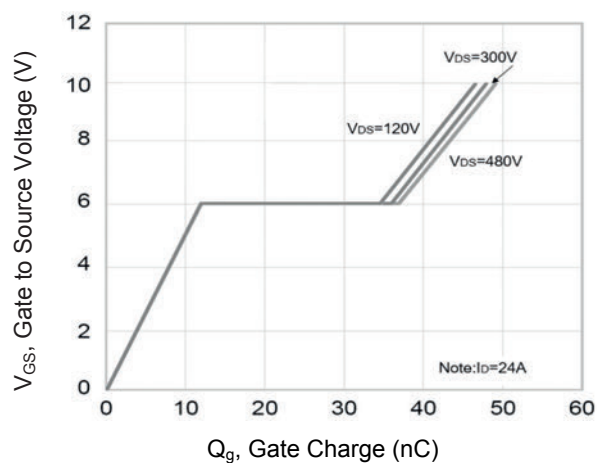


Figure 6. Gate Charge

Typical Electrical and Thermal Characteristic Curves

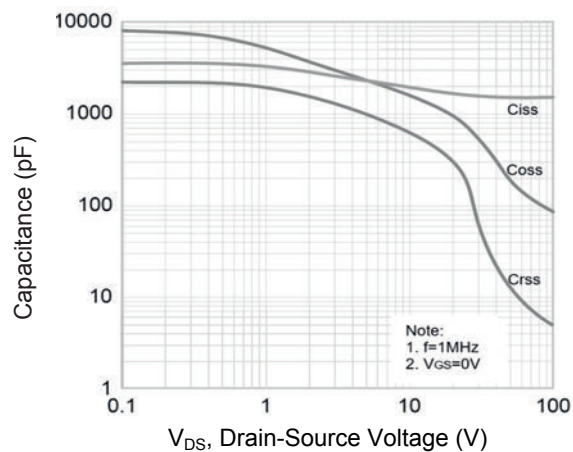


Figure 7. Capacitance Characteristics

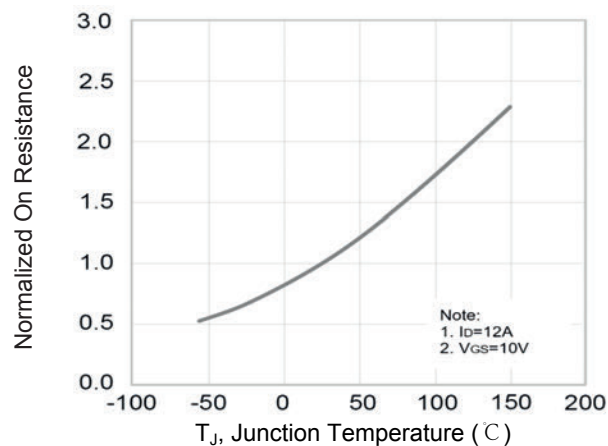


Figure 8. Normalized On-Resistance Vs. T_J

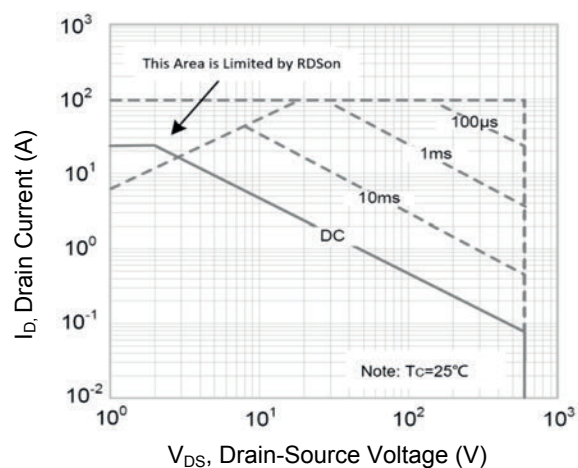
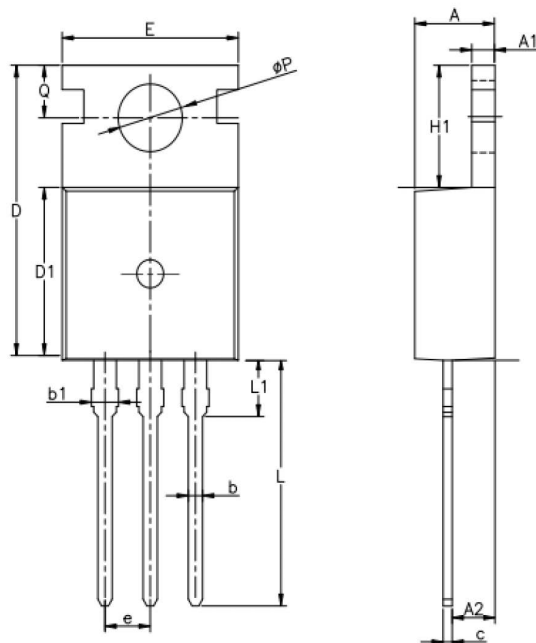


Figure 9. Safe Operation Area

Package Outline Dimensions (TO-220)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	4.300	4.700	0.169	0.185
A1	1.000	1.500	0.039	0.059
A2	1.800	2.800	0.071	0.110
b	0.600	1.000	0.024	0.039
b1	1.000	1.600	0.039	0.063
c	0.300	0.700	0.012	0.028
D	15.100	16.100	0.594	0.634
D1	8.100	10.000	0.319	0.394
E	9.600	10.400	0.378	0.409
e	2.540 BSC		0.100 BSC	
H1	6.100	7.000	0.240	0.276
L	12.600	13.600	0.496	0.535
L1	-	3.950	-	0.156
ϕP	3.400	3.900	0.134	0.154
Q	2.600	3.200	0.102	0.126