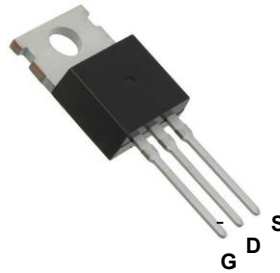
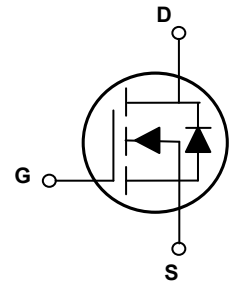


### Main Product Characteristics

$BV_{DSS}$	100V
$R_{DS(ON)}$	3.4m $\Omega$
$I_D$	175A



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 GSFH10176 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 supply 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-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous ( $T_C=25^{\circ}\text{C}$ )	$I_D$	175	A
Drain Current-Continuous ( $T_C=100^{\circ}\text{C}$ )		100	
Drain Current-Pulsed <sup>1</sup>	$I_{DM}$	700	A
Single Pulse Avalanche Energy <sup>2</sup>	$E_{AS}$	1250	mJ
Single Pulse Avalanche Current <sup>2</sup>	$I_{AS}$	50	A
Power Dissipation ( $T_C=25^{\circ}\text{C}$ )	$P_D$	290	W
Power Dissipation-De-rate above 25 $^{\circ}\text{C}$		2.32	
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62	$^{\circ}\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.43	$^{\circ}\text{C}/\text{W}$
Operating Junction Temperature Range	$T_J$	-55 To +150	$^{\circ}\text{C}$
Storage Temperature Range	$T_{STG}$	-55 To +150	$^{\circ}\text{C}$

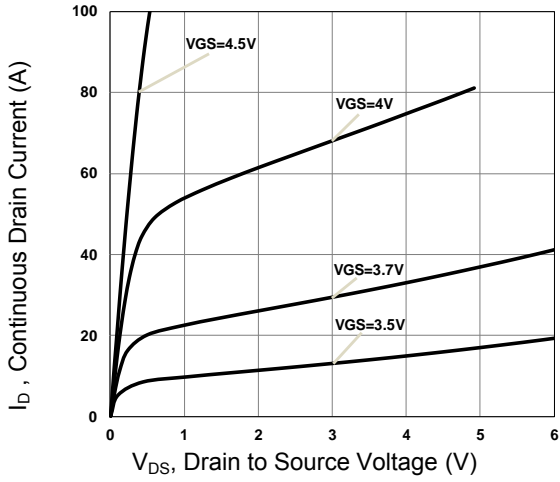
**Electrical Characteristics** ( $T_J=25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>On/Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	100	-	-	V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=80V, V_{GS}=0V, T_J=25^\circ\text{C}$	-	-	1	$\mu A$
		$V_{DS}=80V, V_{GS}=0V, T_J=85^\circ\text{C}$	-	-	10	$\mu A$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=20A$	-	2.8	3.4	m $\Omega$
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	2	2.7	4	V
Forward Transconductance	$g_{fs}$	$V_{DS}=10V, I_D=3A$	-	18	-	S
<b>Dynamic and Switching Characteristics</b>						
Total Gate Charge <sup>3,4</sup>	$Q_g$	$V_{DS}=50V, I_D=80A, V_{GS}=10V$	-	92	135	nC
Gate-Source Charge <sup>3,4</sup>	$Q_{gs}$		-	19	30	
Gate-Drain Charge <sup>3,4</sup>	$Q_{gd}$		-	27	40	
Turn-On Delay Time <sup>3,4</sup>	$t_{d(on)}$	$V_{DD}=50V, R_G=6\Omega, V_{GS}=10V, I_D=80A$	-	20	30	nS
Rise Time <sup>3,4</sup>	$t_r$		-	15	23	
Turn-Off Delay Time <sup>3,4</sup>	$t_{d(off)}$		-	60	90	
Fall Time <sup>3,4</sup>	$t_f$		-	130	195	
Input Capacitance	$C_{iss}$	$V_{DS}=50V, V_{GS}=0V, F=1\text{MHz}$	-	5600	8400	pF
Output Capacitance	$C_{oss}$		-	1200	1800	
Reverse Transfer Capacitance	$C_{rss}$		-	6	9	
Gate Resistance	$R_g$	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	-	2	-	$\Omega$
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Continuous Source Current	$I_S$	$V_G=V_D=0V, \text{Force Current}$	-	-	175	A
Pulsed Source Current	$I_{SM}$		-	-	350	A
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	-	-	1	V
Reverse Recovery Time	$t_{rr}$	$V_R=100V, I_S=10A, di/dt=100A/\mu s, T_J=25^\circ\text{C}$	-	210	-	nS
Reverse Recovery Charge	$Q_{rr}$		-	600	-	nC

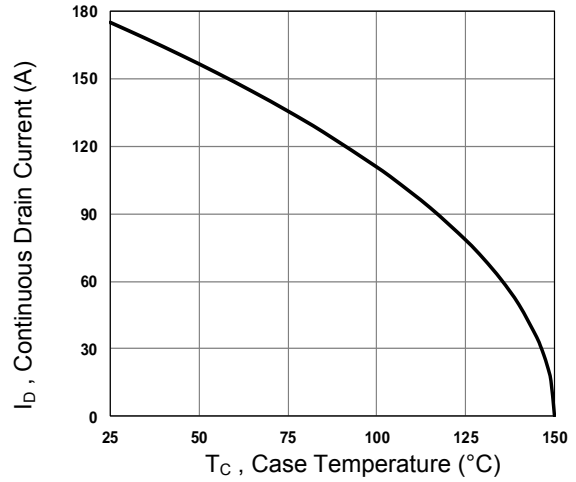
Note:

1. Repetitive rating: Pulsed width limited by maximum junction temperature.
2.  $V_{DD}=50V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=50A, R_G=25\Omega$ , starting  $T_J=25^\circ\text{C}$ .
3. Pulse test: pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .
4. Essentially independent of operating temperature.

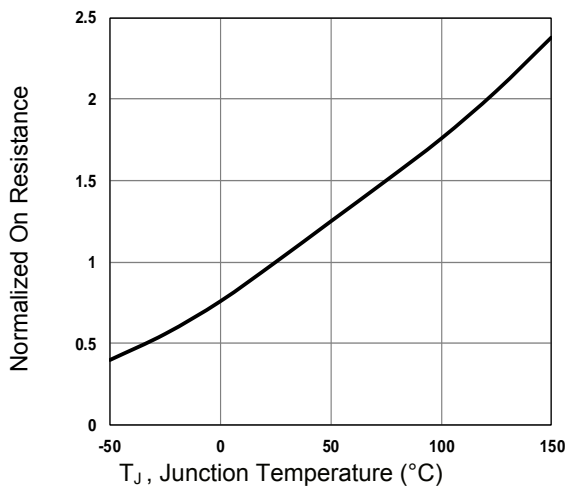
**Typical Electrical and Thermal Characteristic Curves**



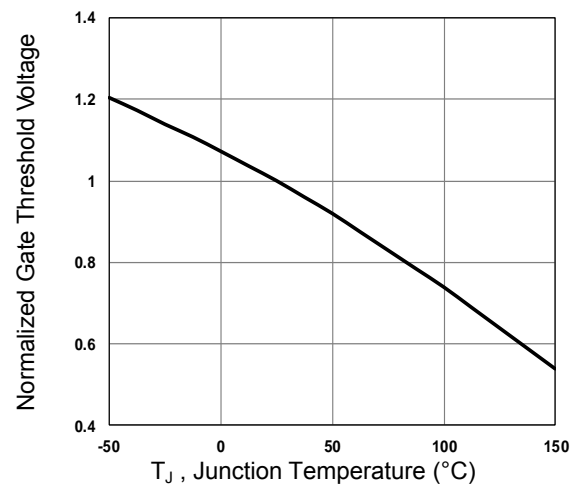
**Figure 1. Typical Output Characteristics**



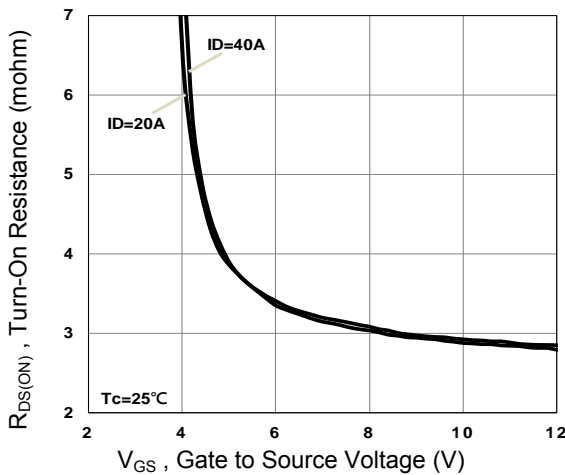
**Figure 2. Continuous Drain Current vs.  $T_C$**



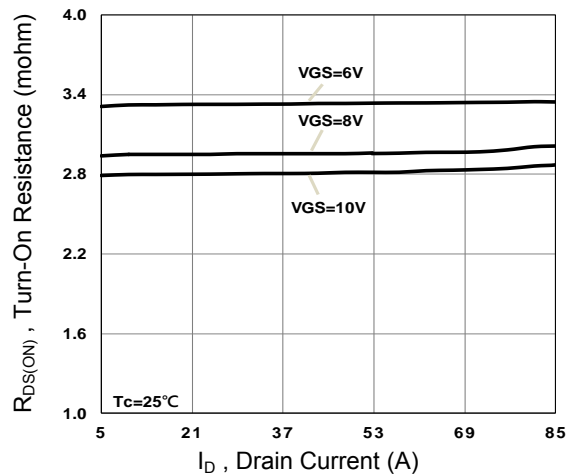
**Figure 3. Normalized  $R_{DS(ON)}$  vs.  $T_J$**



**Figure 4. Normalized  $V_{th}$  vs.  $T_J$**

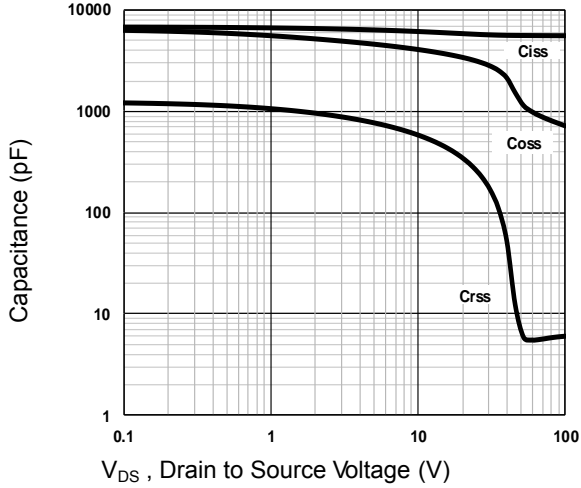


**Figure 5. Turn-On Resistance vs.  $V_{GS}$**

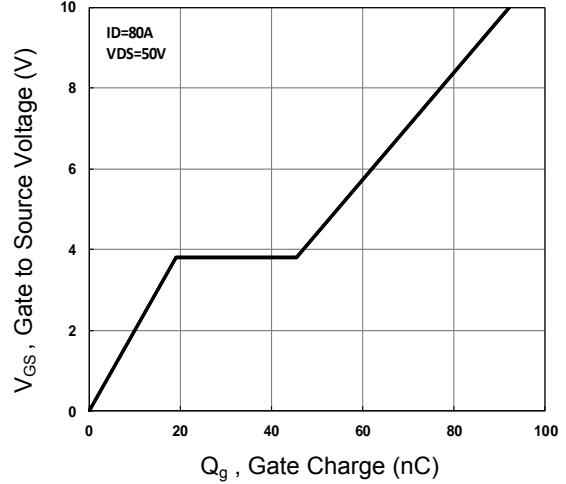


**Figure 6. Turn-On Resistance vs.  $I_D$**

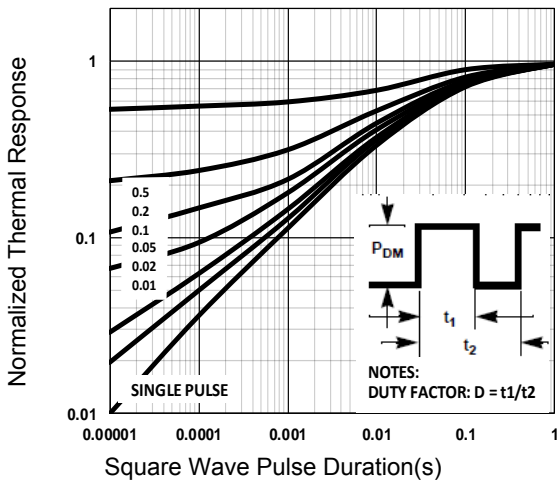
**Typical Electrical and Thermal Characteristic Curves**



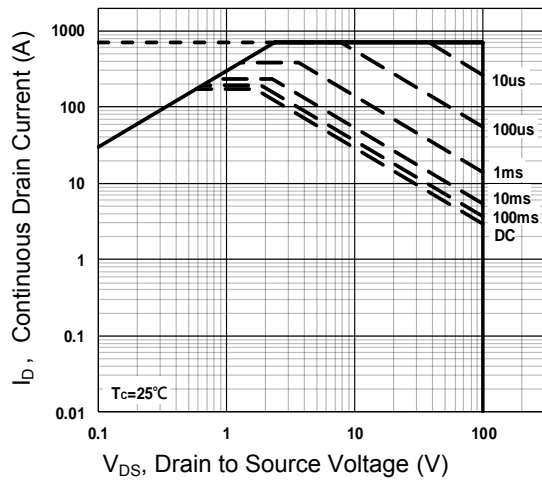
**Figure 7. Capacitance Characteristics**



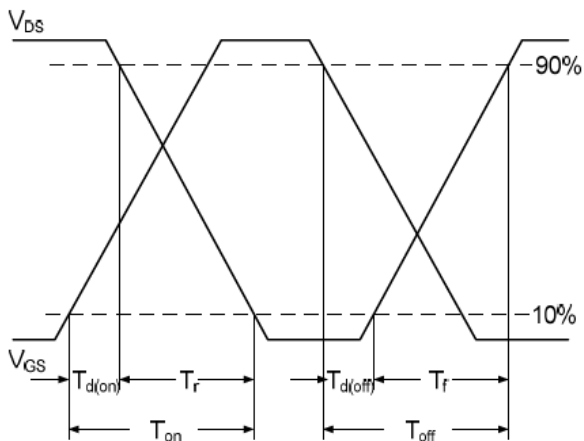
**Figure 8. Gate Charge Characteristics**



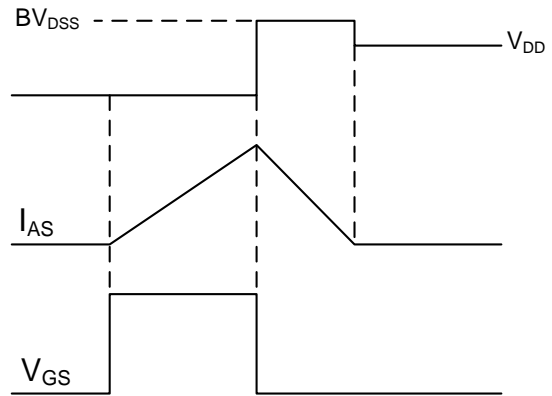
**Figure 9. Normalized Transient Impedance**



**Figure 10. Maximum Safe Operation Area**

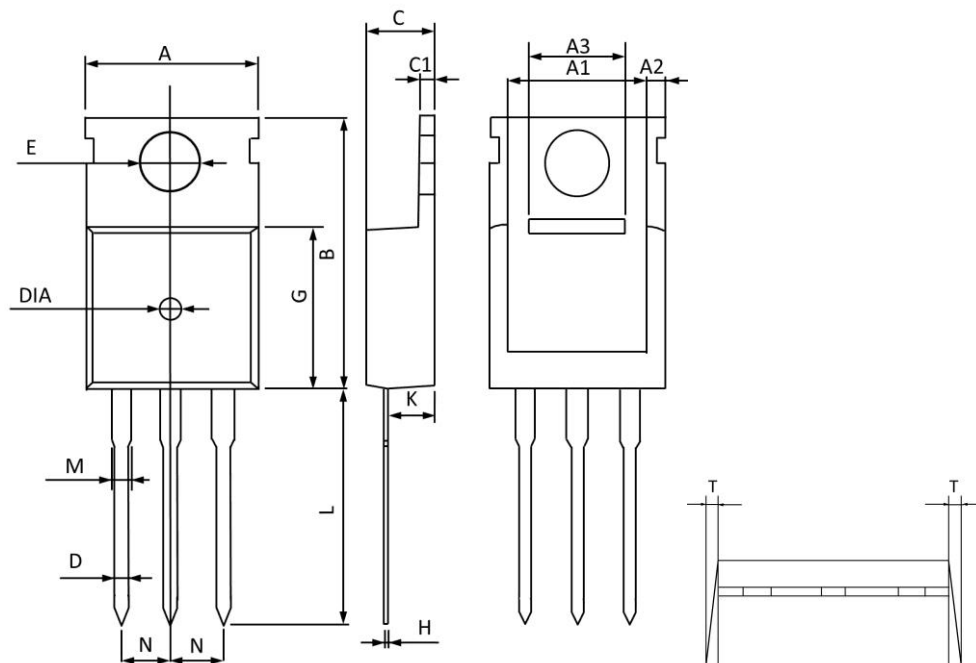


**Figure 11. Switching Time Waveform**



**Figure 12. EAS Waveform**

**Package Outline Dimensions TO-220**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	10.300	9.700	0.406	0.382
A1	8.840	8.440	0.348	0.332
A2	1.250	1.050	0.049	0.041
A3	5.300	5.100	0.209	0.201
B	16.200	15.400	0.638	0.606
C	4.680	4.280	0.184	0.169
C1	1.500	1.100	0.059	0.043
D	1.000	0.600	0.039	0.024
E	3.800	3.400	0.150	0.134
G	9.300	8.700	0.366	0.343
H	0.600	0.400	0.024	0.016
K	2.700	2.100	0.106	0.083
L	13.600	12.800	0.535	0.504
M	1.500	1.100	0.059	0.043
N	2.590	2.490	0.102	0.098
T	W0.35		W0.014	
DIA	Φ1.5 TYP.	deep0.2 TYP.	Φ0.059 TYP.	deep0.008 TYP.