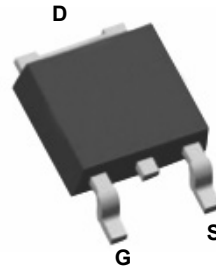
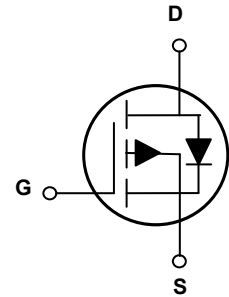


**Main Product Characteristics**

$V_{(BR)DSS}$	-60V
$R_{DS(ON)}$	12mΩ
$I_D$	-60A



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 GSFD6959 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** ( $T_C=25^{\circ}C$  unless otherwise specified)

Parameter	Symbol	Max.	Unit
Drain-Source Voltage	$V_{DS}$	-60	V
Gate-Source Voltage	$V_{GS}$	±20	V
Drain Current-Continuous ( $T_C=25^{\circ}C$ )	$I_D$	-60	A
Drain Current-Continuous ( $T_C=100^{\circ}C$ )		-38	
Drain Current-Pulsed <sup>1</sup>	$I_{DM}$	-240	A
Single Pulse Avalanche Energy <sup>2</sup>	$E_{AS}$	296	mJ
Single Pulse Avalanche Current <sup>2</sup>	$I_{AS}$	-77	A
Power Dissipation ( $T_C=25^{\circ}C$ )	$P_D$	102	W
Power Dissipation-Derate above 25°C		0.81	
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.23	°C/W
Operating Junction Temperature Range	$T_J$	-55 To +150	°C
Storage Temperature Range	$T_{STG}$	-55 To +150	°C

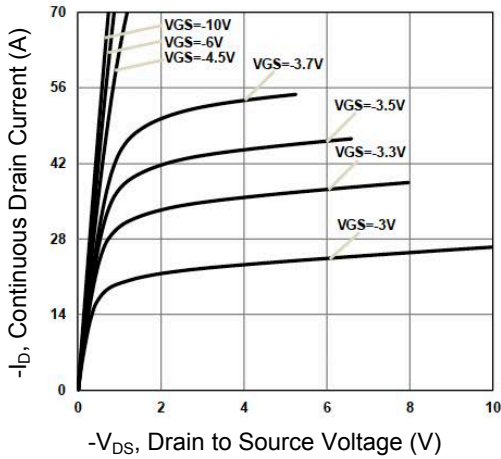
**Electrical Characteristics** ( $T_J=25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>On/Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-60	-	-	V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=-60V, V_{GS}=0V, T_J=25^\circ\text{C}$	-	-	-1	$\mu A$
		$V_{DS}=-48V, V_{GS}=0V, T_J=125^\circ\text{C}$	-	-	-10	$\mu A$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=-10V, I_D=-25A$	-	10	12	m $\Omega$
		$V_{GS}=-4.5V, I_D=-12A$	-	12.3	16	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=-250\mu A$	-1.2	-1.6	-2.5	V
Forward Transconductance	$g_{fs}$	$V_{DS}=-10V, I_D=-3A$	-	16	-	S
<b>Dynamic and Switching Characteristics</b>						
Total Gate Charge <sup>3,4</sup>	$Q_g$	$V_{DS}=-30V, I_D=-30A$ $V_{GS}=-10V$	-	106	160	nC
Gate-Source Charge <sup>3,4</sup>	$Q_{gs}$		-	18	30	
Gate-Drain Charge <sup>3,4</sup>	$Q_{gd}$		-	8.8	15	
Turn-On Delay Time <sup>3,4</sup>	$t_{d(on)}$	$V_{DD}=-30V, R_G=6\Omega$ $V_{GS}=-10V, I_D=-30A$	-	15	25	nS
Rise Time <sup>3,4</sup>	$t_r$		-	20	30	
Turn-Off Delay Time <sup>3,4</sup>	$t_{d(off)}$		-	40	60	
Fall Time <sup>3,4</sup>	$t_f$		-	50	75	
Input Capacitance	$C_{iss}$	$V_{DS}=-30V, V_{GS}=0V,$ $F=1\text{MHz}$	-	5600	8400	pF
Output Capacitance	$C_{oss}$		-	300	450	
Reverse Transfer Capacitance	$C_{rss}$		-	250	380	
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Continuous Source Current	$I_S$	$V_G=V_D=0V,$ Force Current	-	-	-60	A
Pulsed Source Current	$I_{SM}$		-	-	-120	A
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V,$ $I_S=-1A, T_J=25^\circ\text{C}$	-	-	-1	V
Reverse Recovery Time	$T_{rr}$	$V_R=-50V, I_S=-10A$ $dI/dt=100A/\mu s,$ $T_J=25^\circ\text{C}$	-	50	-	ns
Reverse Recovery Charge	$Q_{rr}$		-	45	-	nC

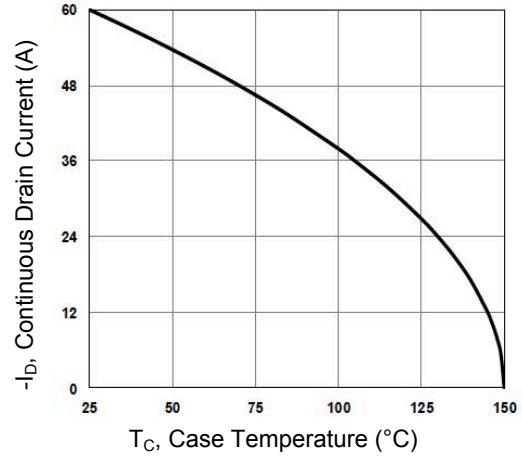
Note:

1. Repetitive Rating: Pulsed width limited by maximum junction temperature.
2.  $V_{DD}=-25V, V_{GS}=-10V, L=0.1\text{mH}, I_{AS}=-77A, R_G=25\Omega,$  Starting  $T_J=25^\circ\text{C}$ .
3. The data tested by pulsed, pulse width  $\leq 300\mu s,$  duty cycle  $\leq 2\%$ .
4. Essentially independent of operating temperature.

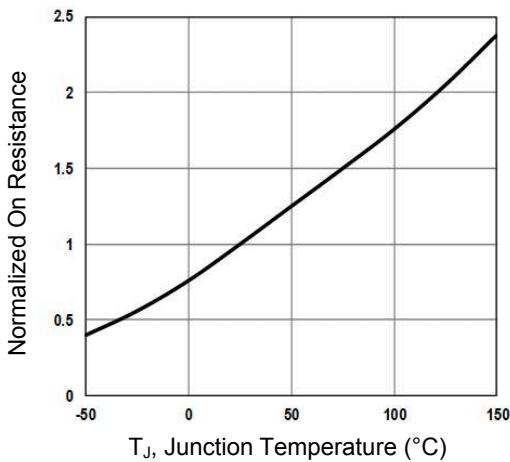
**Typical Electrical and Thermal Characteristic Curves**



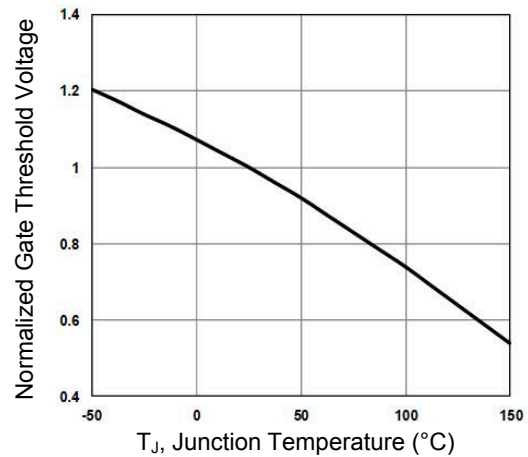
**Figure 1. Typical Output Characteristics**



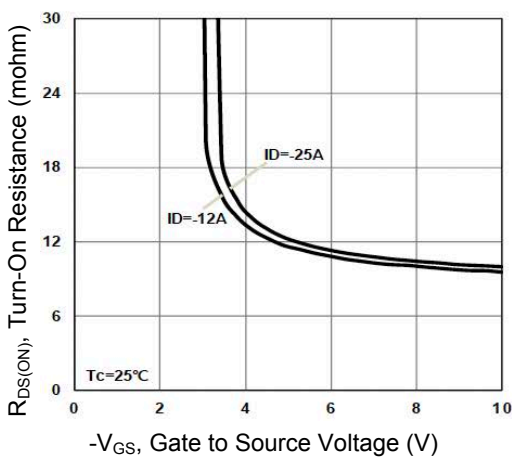
**Figure 2. Continuous Drain Current vs.  $T_C$**



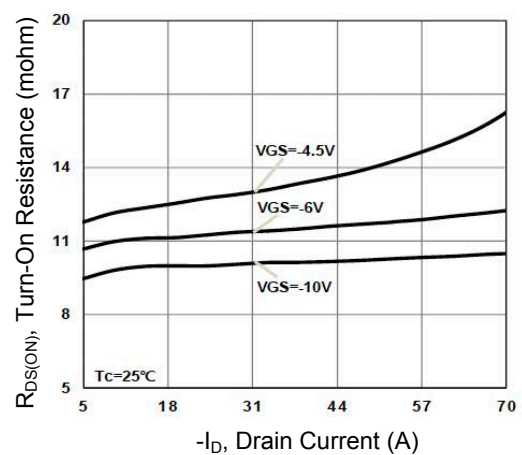
**Figure 3. Normalized  $R_{DS(on)}$  vs.  $T_J$**



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

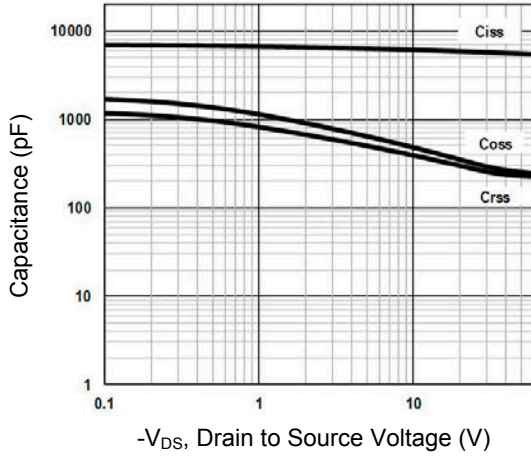


**Figure 5. Turn-On Resistance vs.  $V_{GS}$**

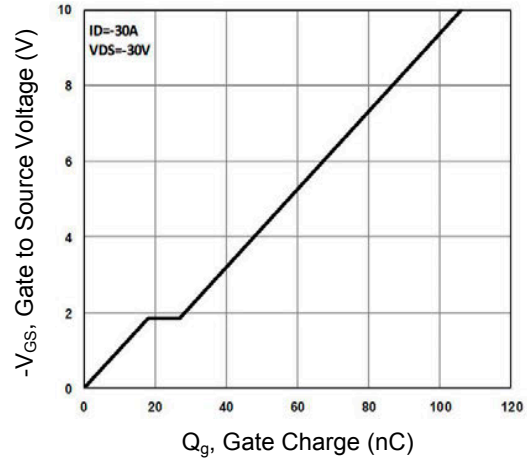


**Figure 6. Turn-on Resistance vs.  $I_D$**

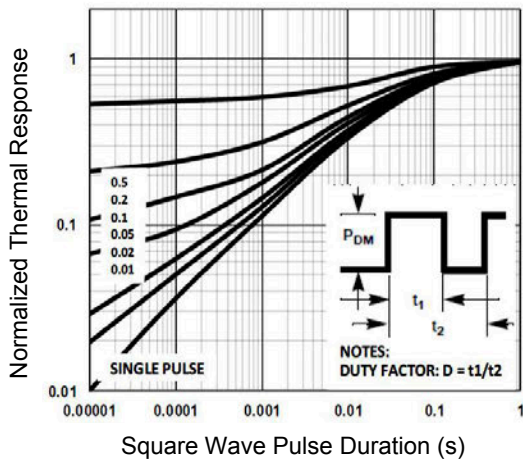
**Typical Electrical and Thermal Characteristic Curves**



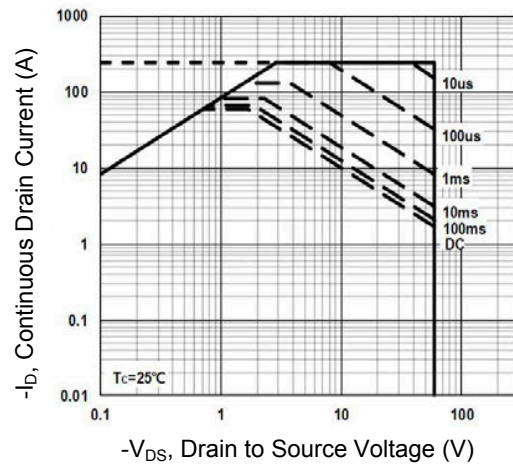
**Figure 7. Capacitance Characteristics**



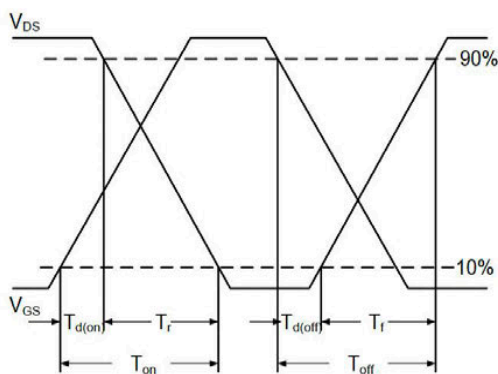
**Figure 8. Gate Charge Characteristics**



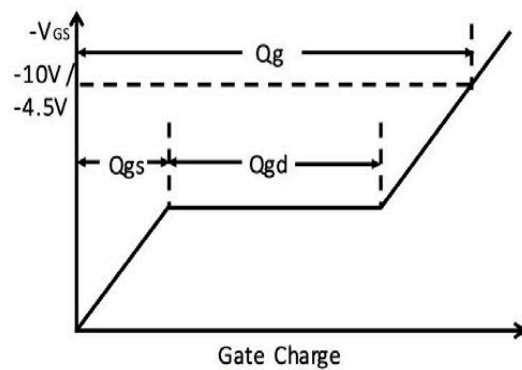
**Figure 9. Normalized Transient Impedance**



**Figure 10. Maximum Safe Operation Area**

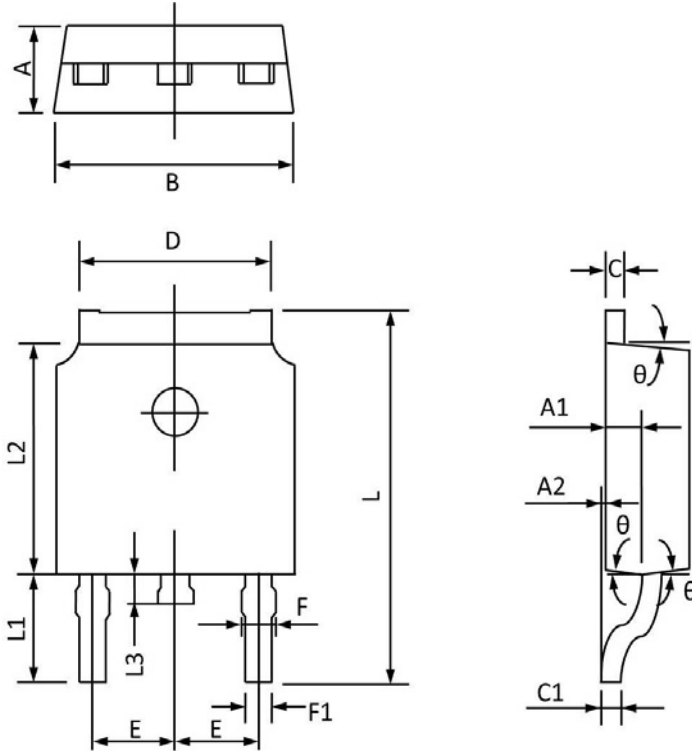


**Figure 11. Switching Time Waveform**



**Figure 12. Gate Charge Waveform**

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



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	2.150	2.450	0.085	0.096
A1	0.910	1.200	0.036	0.047
A2	0.000	0.150	0.000	0.006
B	6.300	6.800	0.248	0.268
C	0.350	0.580	0.014	0.023
C1	0.380	0.550	0.015	0.022
D	5.100	5.500	0.201	0.217
E	2.000	2.390	0.079	0.094
F	0.600	0.940	0.024	0.037
F1	0.500	0.860	0.020	0.034
L	9.400	10.400	0.370	0.409
L1	2.400	3.000	0.094	0.118
L2	5.300	6.200	0.209	0.244
L3	0.600	1.200	0.024	0.047
θ	3°	9°	3°	9°