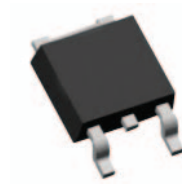
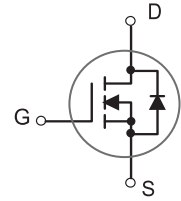


## Main Product Characteristics

$V_{(BR)DSS}$	30V
$R_{DS(ON)}$	6m $\Omega$ @ $V_{GS}=10V$
$I_D$	80A



TO-252 (DPAK)



Schematic Diagram

## Features and Benefits

- Advanced MOSFET process technology
- Ideal for load switch, hand-held devices and LED applications
- Low on-resistance with low gate charge
- Fast switching and reverse body recovery



## Description

The SSFD3906 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	Value	Unit
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current – Continuous ( $T_C=25^\circ\text{C}$ )	$I_D$	80	A
Drain Current – Continuous ( $T_C=100^\circ\text{C}$ )		51	A
Drain Current – Pulsed <sup>1</sup>	$I_{DM}$	320	A
Power Dissipation ( $T_C=25^\circ\text{C}$ )	$P_D$	54	W
Power Dissipation – Derate above $25^\circ\text{C}$	$P_D$	0.43	W/ $^\circ\text{C}$
Single Pulse Avalanche Energy <sup>2</sup>	$E_{AS}$	88	mJ
Single Pulse Avalanche Current <sup>2</sup>	$I_{AS}$	42	A
Storage Temperature Range	$T_{STG}$	-55 to +150	$^\circ\text{C}$
Operating Junction Temperature Range	$T_J$	-55 to +150	$^\circ\text{C}$

## Thermal Characteristics

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	---	62	$^\circ\text{C}/\text{W}$
Thermal Resistance Junction to Case	$R_{\theta JC}$	---	2.3	$^\circ\text{C}/\text{W}$

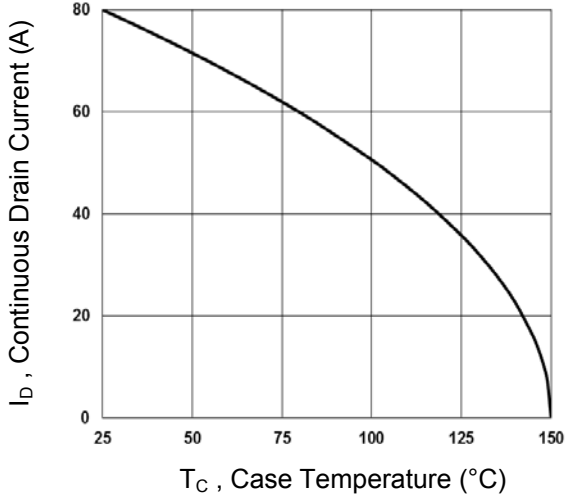
### Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	30	---	---	V
BV <sub>DSS</sub> Temperature Coefficient	ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	Reference to 25°C, I <sub>D</sub> =-1mA	---	0.04	---	V/°C
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	μA
		V <sub>DS</sub> =24V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C	---	---	10	μA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	---	---	±100	nA
<b>On Characteristics</b>						
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =20A	---	4.8	6	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A	---	6.5	9	
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =-250μA	1.0	1.6	2.5	V
V <sub>GS(th)</sub> Temperature Coefficient	ΔV <sub>GS(th)</sub>		---	-4	---	mV/°C
Forward Transconductance	g <sub>fs</sub>	V <sub>DS</sub> =10V, I <sub>S</sub> =10A	---	18	---	S
<b>Dynamic and Switching Characteristics</b>						
Total Gate Charge <sup>3, 4</sup>	Q <sub>g</sub>	V <sub>DS</sub> =15V, V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A	---	11.1	---	nC
Gate-Source Charge <sup>3, 4</sup>	Q <sub>gs</sub>		---	1.85	---	
Gate-Drain Charge <sup>3, 4</sup>	Q <sub>gd</sub>		---	6.8	---	
Turn-On Delay Time <sup>3, 4</sup>	T <sub>d(on)</sub>	V <sub>DD</sub> =15V, V <sub>GS</sub> =10V, R <sub>G</sub> =3.3Ω, I <sub>D</sub> =15A	---	7.5	---	nS
Rise Time <sup>3, 4</sup>	T <sub>r</sub>		---	14.5	---	
Turn-Off Delay Time <sup>3, 4</sup>	T <sub>d(off)</sub>		---	35.2	---	
Fall Time <sup>3, 4</sup>	T <sub>f</sub>		---	9.6	---	
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, F=1MHz	---	1160	---	pF
Output Capacitance	C <sub>oss</sub>		---	200	---	
Reverse Transfer Capacitance	C <sub>rss</sub>		---	180	---	
Gate Resistance	R <sub>g</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz	---	2.5	---	Ω
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Continuous Source Current	I <sub>S</sub>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	80	A
Pulsed Source Current	I <sub>SM</sub>		---	---	320	A
Diode Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =1A, T <sub>J</sub> =25°C	---	---	1	V

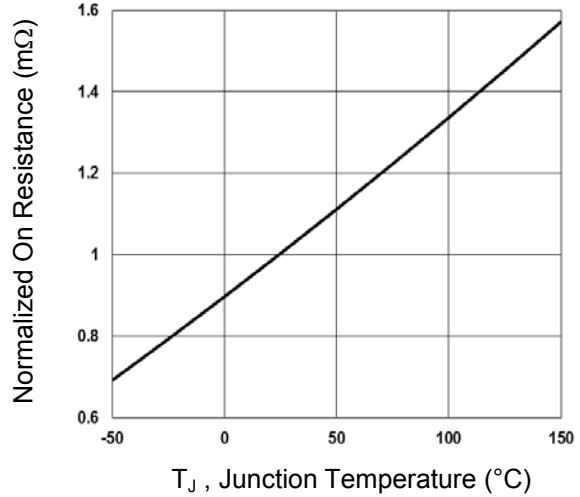
#### Notes:

1. Repetitive Rating: Pulsed width limited by maximum junction temperature.
2. V<sub>DD</sub>=25V, V<sub>GS</sub>=10V, L=0.1mH, I<sub>AS</sub>=42A, R<sub>G</sub>=25Ω, Starting T<sub>J</sub>=25°C.
3. The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%.
4. Essentially independent of operating temperature.

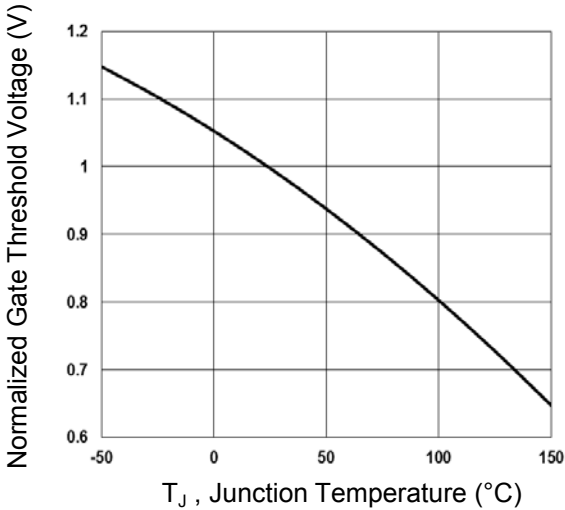
**Typical Electrical and Thermal Characteristic Curves**



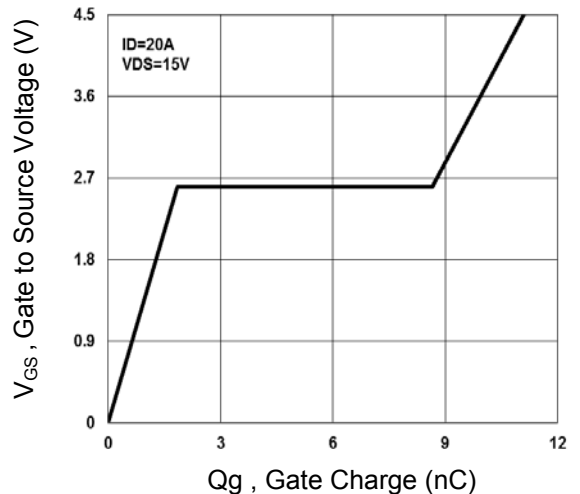
**Fig.1 Continuous Drain Current vs.  $T_C$**



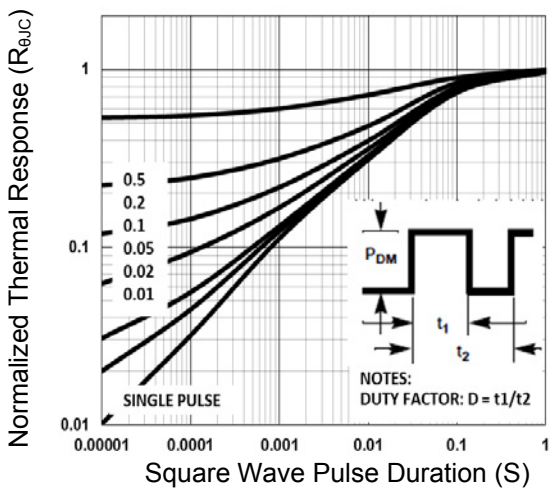
**Fig.2 Normalized  $R_{DS(ON)}$  vs.  $T_J$**



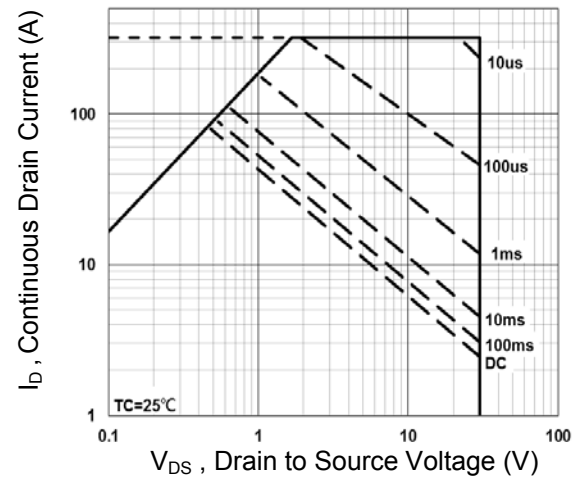
**Fig.3 Normalized  $V_{th}$  vs.  $T_J$**



**Fig.4 Gate Charge Waveform**

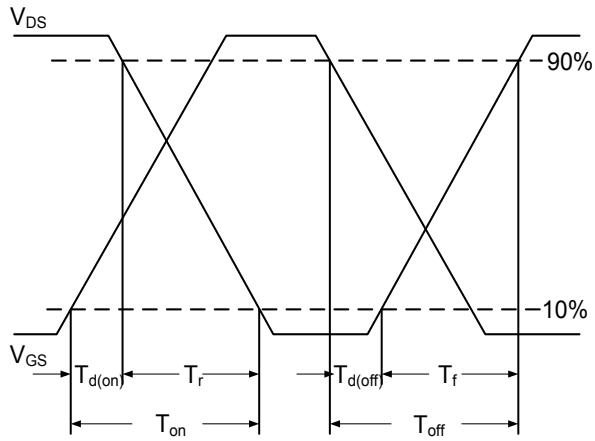


**Fig.5 Normalized Transient Impedance**

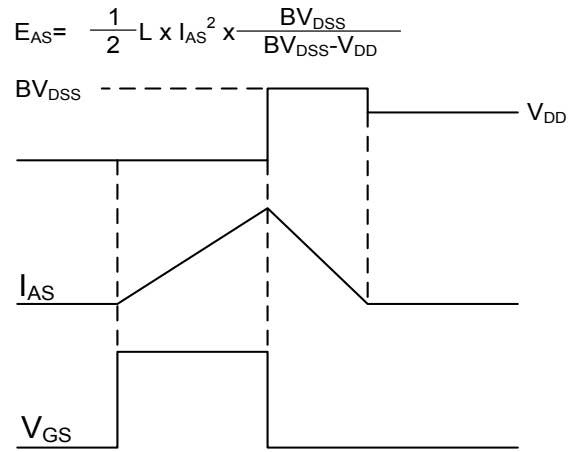


**Fig.6 Maximum Safe Operation Area**

**Typical Electrical and Thermal Characteristic Curves**



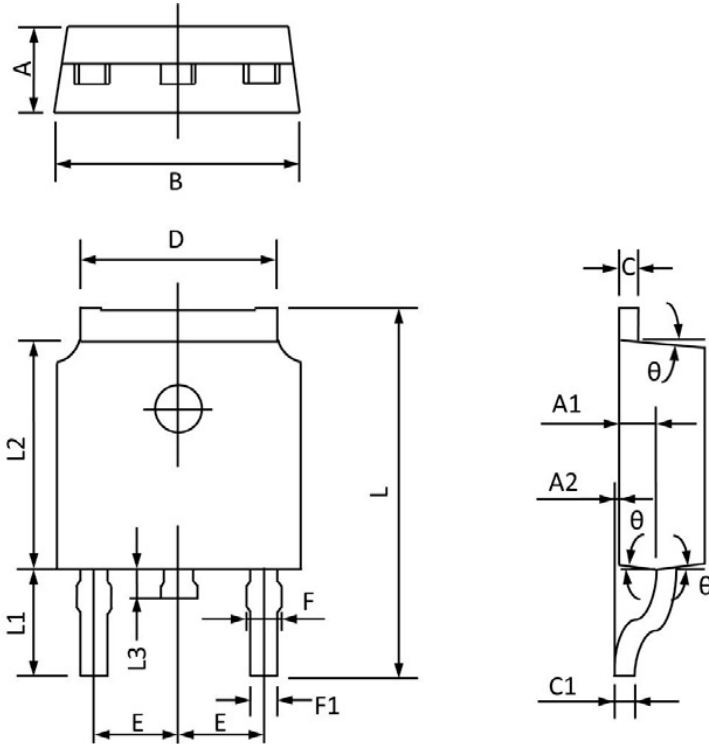
**Fig.7 Switching Time Waveform**



**Fig.8  $E_{AS}$  Waveform**

**Package Outline Dimensions**

**TO-252 (DPAK)**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	2.20	2.40	0.087	0.094
A1	0.91	1.11	0.036	0.044
A2	0.00	0.15	0.000	0.006
B	6.50	6.70	0.256	0.264
C	0.46	0.580	0.018	0.230
C1	0.46	0.580	0.018	0.030
D	5.10	5.46	0.201	0.215
E	2.186	2.386	0.086	0.094
F	0.74	0.94	0.029	0.037
F1	0.660	0.860	0.026	0.034
L	9.80	10.40	0.386	0.409
L1	2.9REF		0.114REF	
L2	6.00	6.20	0.236	0.244
L3	0.60	1.00	0.024	0.039
θ	3°	9°	3°	9°