

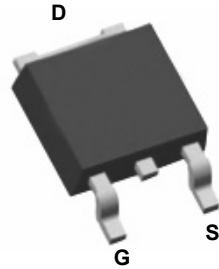


# THE DATASHEET OF SSFD3906

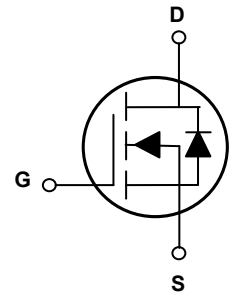


### Main Product Characteristics

$BV_{DSS}$	30V
$R_{DS(ON)}$	6m $\Omega$
$I_D$	80A



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 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	Max.	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	
Drain Current-Pulsed <sup>1</sup>	$I_{DM}$	320	A
Single Pulse Avalanche Energy <sup>2</sup>	$E_{AS}$	88	mJ
Single Pulse Avalanche Current <sup>2</sup>	$I_{AS}$	42	A
Power Dissipation ( $T_C=25^\circ\text{C}$ )	$P_D$	54	W
Power Dissipation-Derate above 25 $^\circ\text{C}$		0.43	
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	2.3	$^\circ\text{C}/\text{W}$
Operating Junction Temperature Range	$T_J$	-55 To +150	$^\circ\text{C}$
Storage Temperature Range	$T_{STG}$	-55 To +150	$^\circ\text{C}$

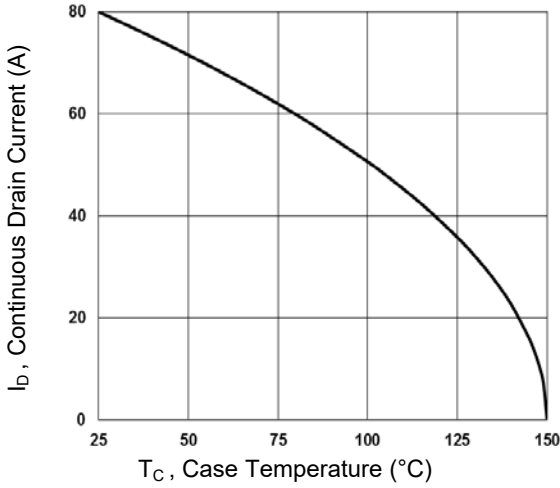
**Electrical Characteristics** ( $T_J=25^{\circ}\text{C}$  unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>On/Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
$BV_{DSS}$ Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	Reference to $25^{\circ}\text{C}$ , $I_D=1mA$	-	0.04	-	$V/^{\circ}\text{C}$
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=30V, V_{GS}=0V,$ $T_J=25^{\circ}\text{C}$	-	-	1	$\mu A$
		$V_{DS}=24V, V_{GS}=0V,$ $T_J=125^{\circ}\text{C}$	-	-	10	$\mu A$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
Static Drain-Source On-Resistance <sup>3</sup>	$R_{DS(ON)}$	$V_{GS}=10V, I_D=20A$	-	4.8	6	m $\Omega$
		$V_{GS}=4.5V, I_D=10A$	-	6.5	9	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	1	1.6	2.5	V
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}$		-	-4	-	mV/ $^{\circ}\text{C}$
Forward Transconductance	$g_{fs}$	$V_{DS}=10V, I_D=10A$	-	18	-	S
<b>Dynamic and Switching Characteristics</b>						
Total Gate Charge <sup>3,4</sup>	$Q_g$	$V_{DS}=15V, I_D=20A$ $V_{GS}=4.5V$	-	11.1	-	nC
Gate-Source Charge <sup>3,4</sup>	$Q_{gs}$		-	1.85	-	
Gate-Drain Charge <sup>3,4</sup>	$Q_{gd}$		-	6.8	-	
Turn-On Delay Time <sup>3,4</sup>	$t_{d(on)}$	$V_{DD}=15V, R_G=3.3\Omega$ $V_{GS}=10V, I_D=15A$	-	7.5	-	nS
Rise Time <sup>3,4</sup>	$t_r$		-	14.5	-	
Turn-Off Delay Time <sup>3,4</sup>	$t_{d(off)}$		-	35.2	-	
Fall Time <sup>3,4</sup>	$t_f$		-	9.6	-	
Input Capacitance	$C_{iss}$	$V_{DS}=25V, V_{GS}=0V,$ $F=1MHz$	-	1160	-	pF
Output Capacitance	$C_{oss}$		-	200	-	
Reverse Transfer Capacitance	$C_{rss}$		-	180	-	
Gate Resistance	$R_g$	$V_{GS}=0V, V_{DS}=0V,$ $F=1MHz$	-	2.5	-	$\Omega$
<b>Guaranteed Avalanche Energy</b>						
Single Pulse Avalanche Energy	$E_{AS}$	$V_{DD}=25V, L=0.1mH,$ $I_{AS}=20A$	20	-	-	mJ
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Continuous Source Current	$I_S$	$V_G=V_D=0V,$ Force Current	-	-	80	A
Pulsed Source Current <sup>3</sup>	$I_{SM}$		-	-	320	A
Diode Forward Voltage <sup>3</sup>	$V_{SD}$	$V_{GS}=0V, I_S=1A,$ $T_J=25^{\circ}\text{C}$	-	-	1	V

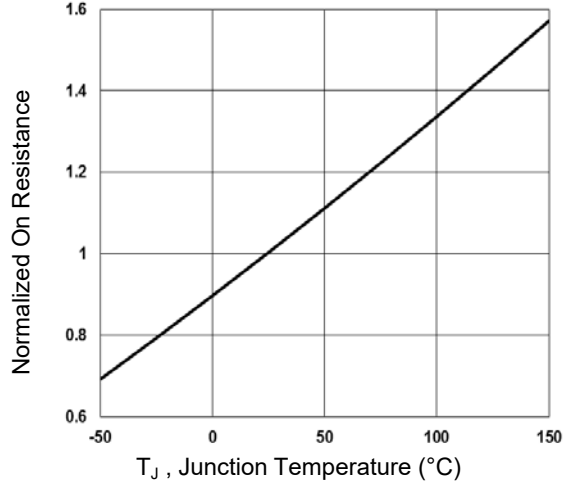
Note:

1. Repetitive rating: Pulsed width limited by maximum junction temperature.
2.  $V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=42A, R_G=25\Omega,$  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.

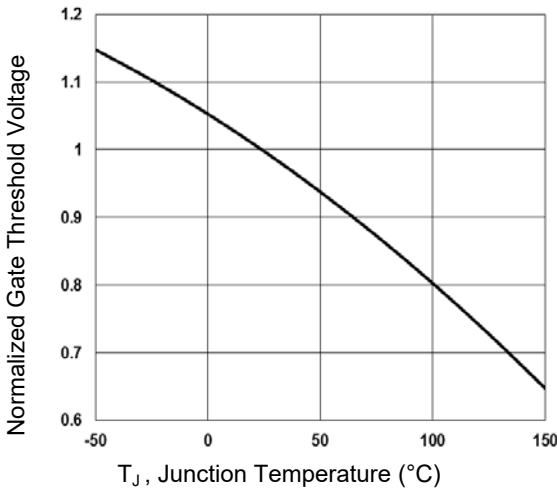
**Typical Electrical and Thermal Characteristic Curves**



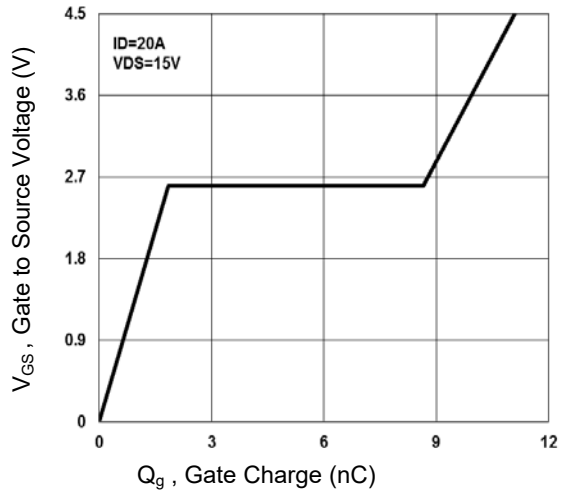
**Figure 1. Continuous Drain Current vs.  $T_C$**



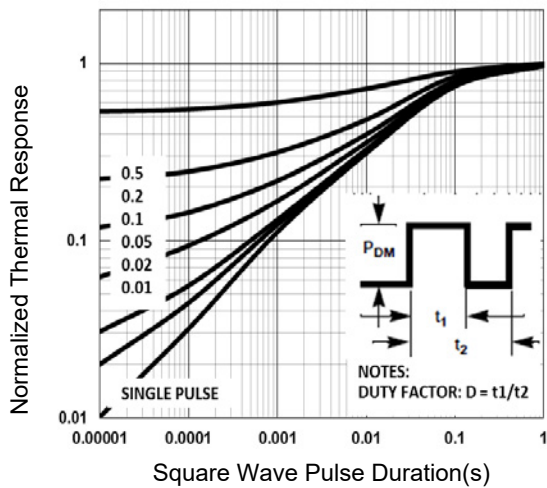
**Figure 2. Normalized  $R_{DS(ON)}$  vs.  $T_J$**



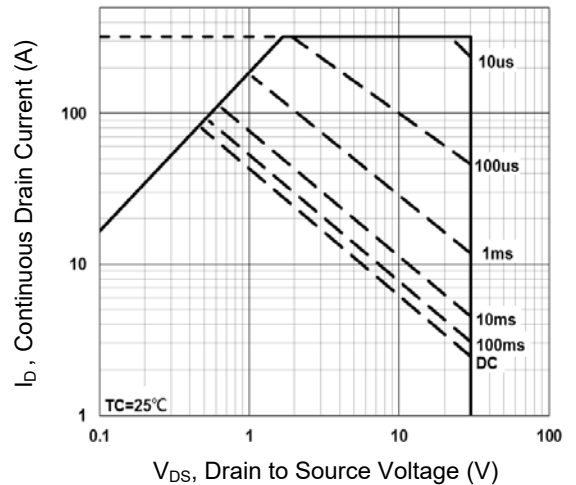
**Figure 3. Normalized  $V_{th}$  vs.  $T_J$**



**Figure 4. Gate Charge Waveform**

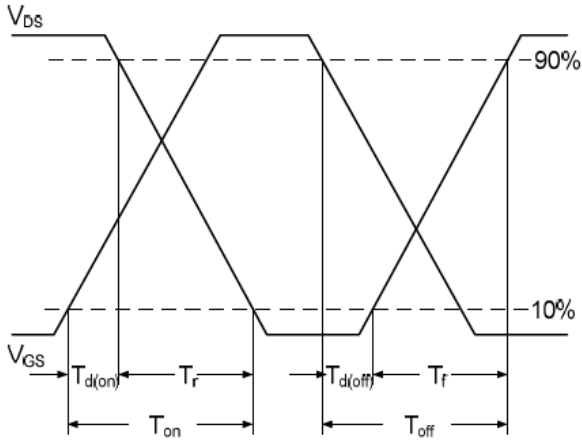


**Figure 5. Normalized Transient Impedance**

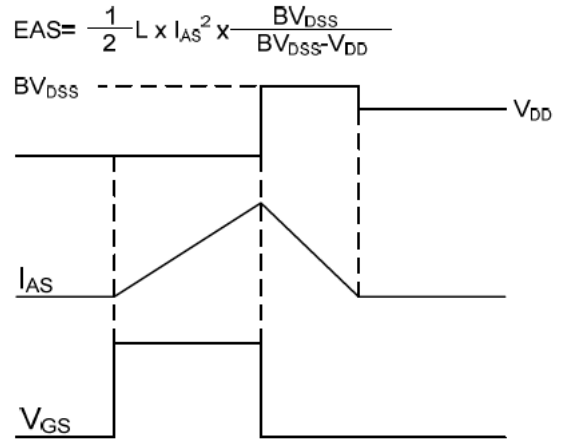


**Figure 6. Maximum Safe Operation Area**

**Typical Electrical and Thermal Characteristic Curves**

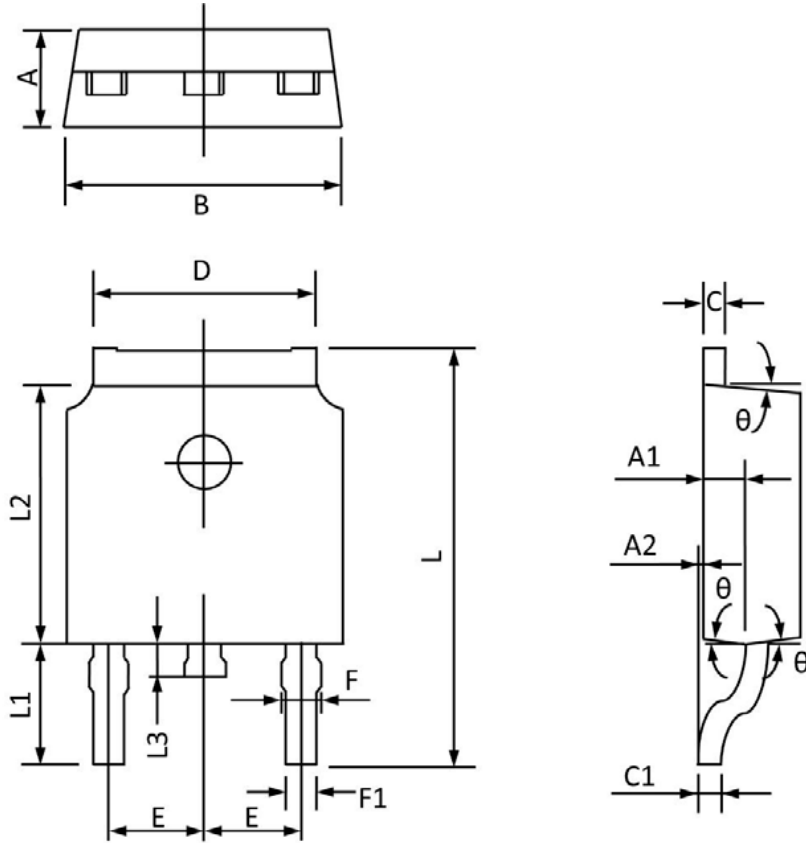


**Figure 7. Switching Time Waveform**



**Figure 8. EAS Waveform**

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



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

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