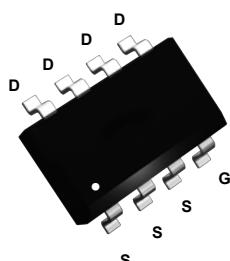
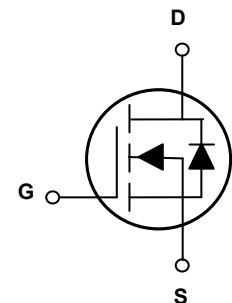


## Main Product Characteristics

BV <sub>DSS</sub>	30V
R <sub>DS(ON)</sub>	6mΩ
I <sub>D</sub>	20A



SOP-8



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 SSFQ3906 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 <sub>DS</sub>	30	V
Gate-Source Voltage	V <sub>GS</sub>	±20	V
Drain Current-Continuous ( $T_C=25^\circ\text{C}$ )	I <sub>D</sub>	20	A
Drain Current-Continuous ( $T_C=100^\circ\text{C}$ )		12.6	
Drain Current-Pulsed <sup>1</sup>	I <sub>DM</sub>	80	A
Power Dissipation ( $T_C=25^\circ\text{C}$ )	P <sub>D</sub>	5.4	W
Power Dissipation-Derate above 25°C		0.043	W/°C
Thermal Resistance, Junction-to-Ambient	R <sub>θJA</sub>	85	°C/W
Thermal Resistance, Junction-to-Case	R <sub>θJC</sub>	23	°C/W
Operating Junction Temperature Range	T <sub>J</sub>	-55 To +150	°C
Storage Temperature Range	T <sub>STG</sub>	-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	$\text{BV}_{\text{DSS}}$	$\text{V}_{\text{GS}}=0\text{V}, \text{I}_D=250\mu\text{A}$	30	-	-	V
$\text{BV}_{\text{DSS}}$ Temperature Coefficient	$\Delta \text{BV}_{\text{DSS}}/\Delta T_J$	Reference to $25^\circ\text{C}$ , $\text{I}_D=1\text{mA}$	-	0.04	-	$\text{mV}/^\circ\text{C}$
Drain-Source Leakage Current	$\text{I}_{\text{DSS}}$	$\text{V}_{\text{DS}}=30\text{V}, \text{V}_{\text{GS}}=0\text{V}, T_J=25^\circ\text{C}$	-	-	1	$\mu\text{A}$
		$\text{V}_{\text{DS}}=24\text{V}, \text{V}_{\text{GS}}=0\text{V}, T_J=125^\circ\text{C}$	-	-	10	$\mu\text{A}$
Gate-Source Leakage Current	$\text{I}_{\text{GSS}}$	$\text{V}_{\text{GS}}=\pm 20\text{V}, \text{V}_{\text{DS}}=0\text{V}$	-	-	$\pm 100$	nA
Static Drain-Source On-Resistance	$\text{R}_{\text{DS(ON)}}$	$\text{V}_{\text{GS}}=10\text{V}, \text{I}_D=10\text{A}$	-	5	6	$\text{m}\Omega$
		$\text{V}_{\text{GS}}=4.5\text{V}, \text{I}_D=5\text{A}$	-	6.5	9	$\text{m}\Omega$
Gate Threshold Voltage	$\text{V}_{\text{GS(th)}}$	$\text{V}_{\text{GS}}=\text{V}_{\text{DS}}, \text{I}_D=250\mu\text{A}$	1.2	1.6	2.5	V
$\text{V}_{\text{GS(th)}}$ Temperature Coefficient	$\Delta \text{V}_{\text{GS(th)}}$		-	-4	-	$\text{mV}/^\circ\text{C}$
Forward Transconductance	$\text{g}_{\text{fs}}$	$\text{V}_{\text{DS}}=10\text{V}, \text{I}_D=10\text{A}$	-	18	-	S
<b>Dynamic and Switching Characteristics</b>						
Total Gate Charge <sup>2,3</sup>	$\text{Q}_g$	$\text{V}_{\text{DS}}=15\text{V}, \text{I}_D=20\text{A}, \text{V}_{\text{GS}}=4.5\text{V}$	-	11.1	22	nC
Gate-Source Charge <sup>2,3</sup>	$\text{Q}_{\text{gs}}$		-	1.85	3.7	
Gate-Drain Charge <sup>2,3</sup>	$\text{Q}_{\text{gd}}$		-	6.8	13	
Turn-On Delay Time <sup>2,3</sup>	$\text{t}_{\text{d(on)}}$	$\text{V}_{\text{DD}}=15\text{V}, \text{R}_G=3.3\Omega, \text{V}_{\text{GS}}=10\text{V}, \text{I}_D=15\text{A}$	-	7.5	15	nS
Rise Time <sup>2,3</sup>	$\text{t}_r$		-	14.5	28	
Turn-Off Delay Time <sup>2,3</sup>	$\text{t}_{\text{d(off)}}$		-	35.2	60	
Fall Time <sup>2,3</sup>	$\text{t}_f$		-	9.6	19	
Input Capacitance	$\text{C}_{\text{iss}}$	$\text{V}_{\text{DS}}=25\text{V}, \text{V}_{\text{GS}}=0\text{V}, \text{F}=1\text{MHz}$	-	1160	1900	pF
Output Capacitance	$\text{C}_{\text{oss}}$		-	200	400	
Reverse Transfer Capacitance	$\text{C}_{\text{rss}}$		-	180	360	
Gate Resistance	$\text{R}_g$	$\text{V}_{\text{GS}}=0\text{V}, \text{V}_{\text{DS}}=0\text{V}, \text{F}=1\text{MHz}$	-	2.5	5	$\Omega$
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Continuous Source Current	$\text{I}_s$	$\text{V}_G=\text{V}_D=0\text{V}, \text{Force Current}$	-	-	20	A
Pulsed Source Current	$\text{I}_{\text{SM}}$		-	-	40	A
Diode Forward Voltage	$\text{V}_{\text{SD}}$	$\text{V}_{\text{GS}}=0\text{V}, \text{I}_s=1\text{A}, T_J=25^\circ\text{C}$	-	-	1	V

Note:

1. Repetitive rating: Pulsed width limited by maximum junction temperature.
2. Pulse test: pulse width  $\leq 300\text{us}$ , duty cycle  $\leq 2\%$ .
3. Essentially independent of operation temperature.

## Typical Electrical and Thermal Characteristic Curves

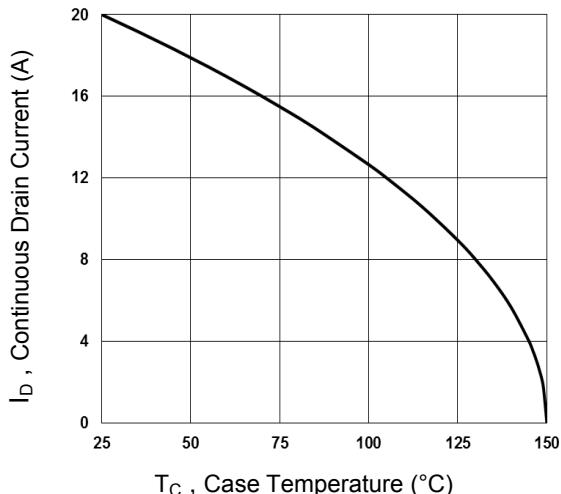


Figure 1. Continuous Drain Current vs. T<sub>C</sub>

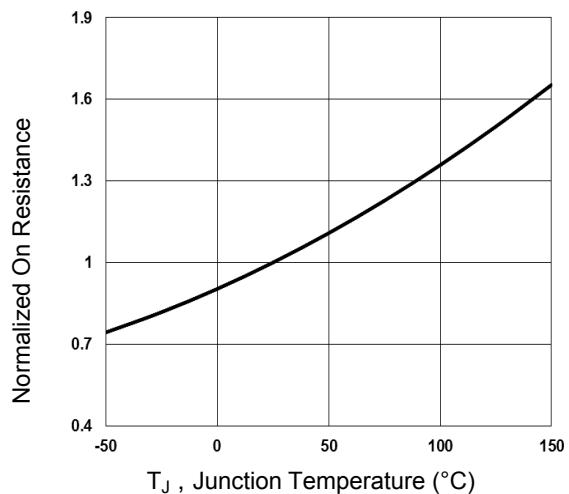


Figure 2. Normalized R<sub>DS(ON)</sub> vs. T<sub>J</sub>

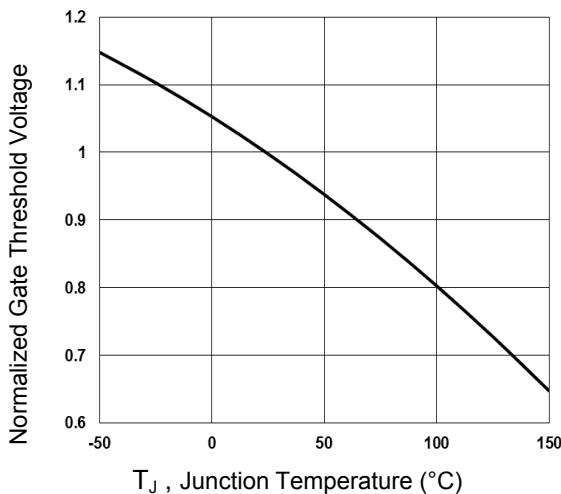


Figure 3. Normalized V<sub>th</sub> vs. T<sub>J</sub>

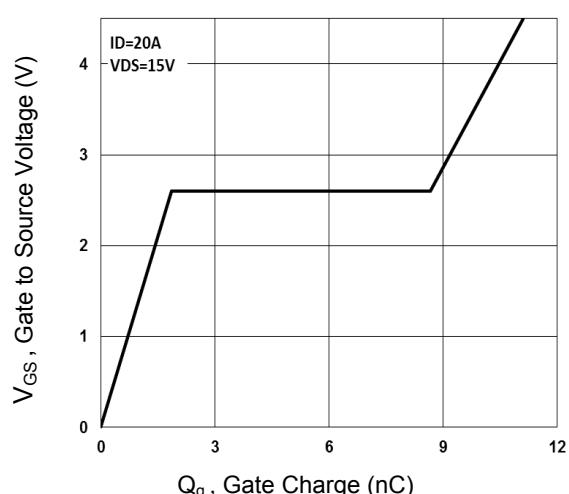


Figure 4. Gate Charge Waveform

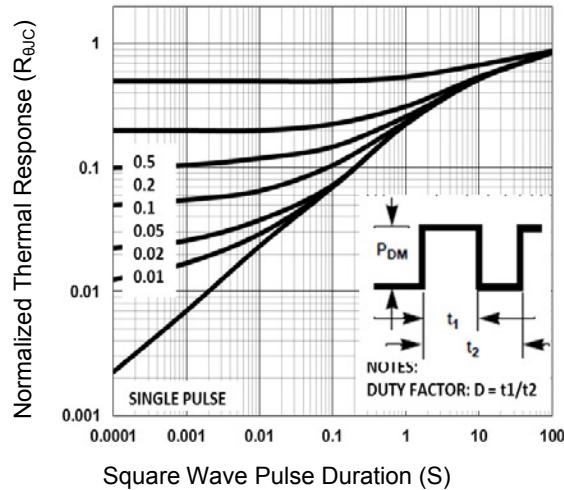


Figure 5. Normalized Transient Impedance

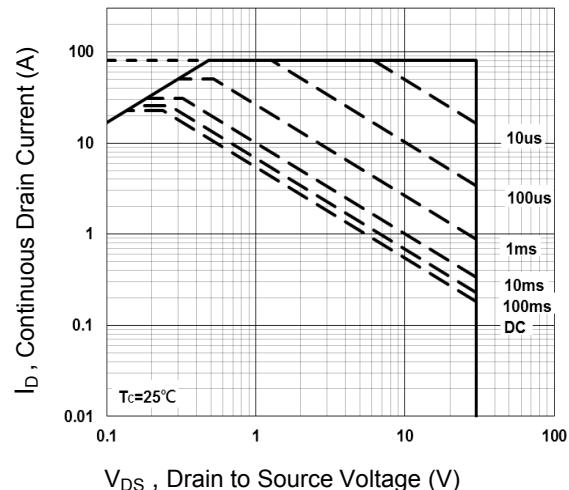


Figure 6. Maximum Safe Operation Area

## Typical Electrical and Thermal Characteristic Curves

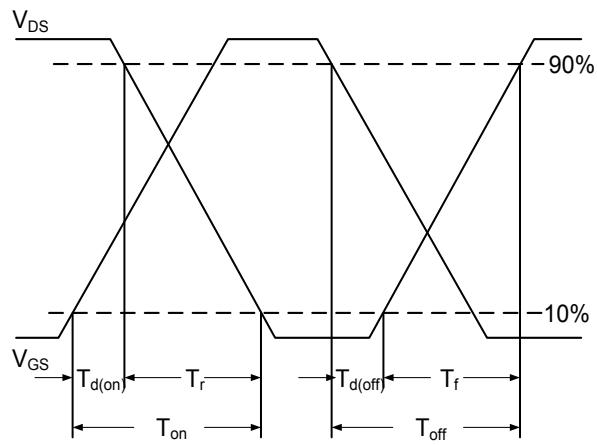


Figure 7. Switching Time Waveform

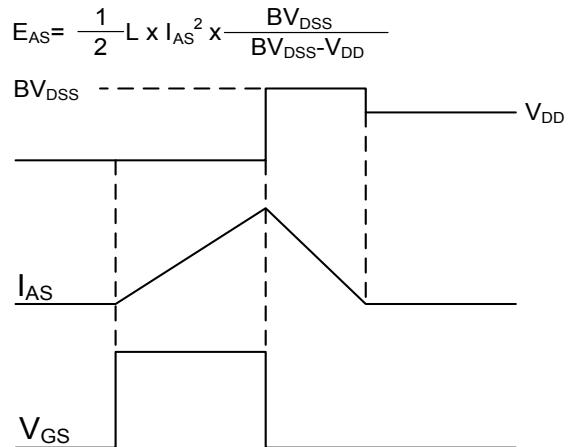
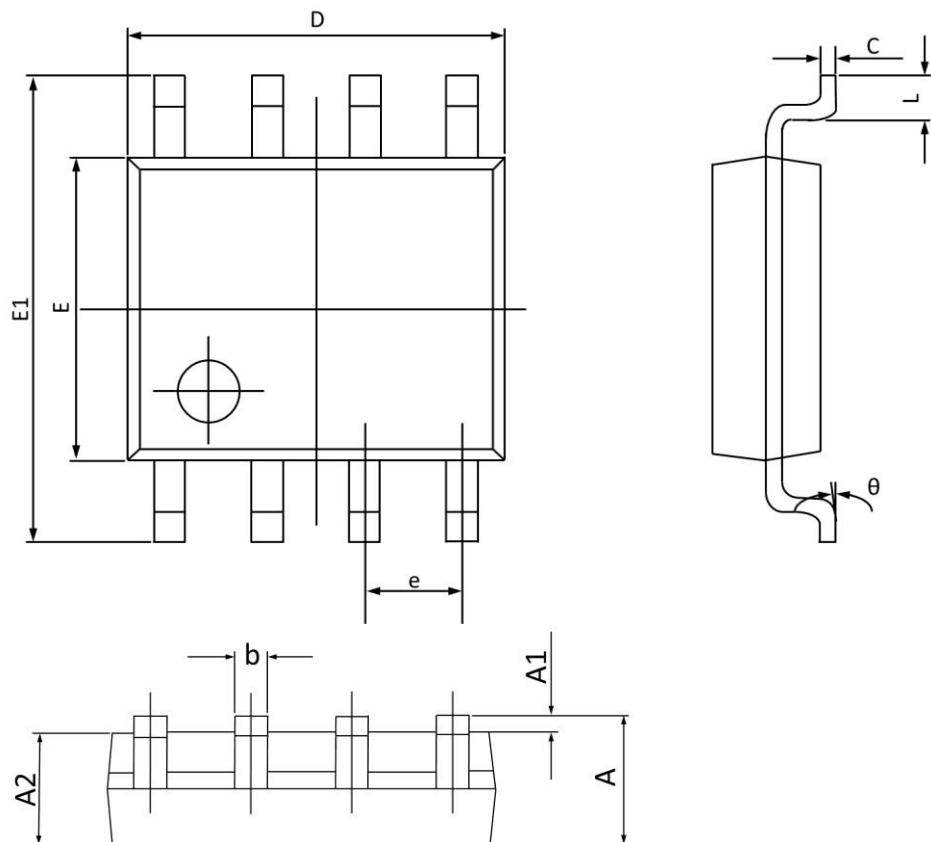


Figure 8.  $E_{AS}$  Waveform

## Package Outline Dimensions

## SOP-8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	1.750	1.350	0.069	0.053
A1	0.250	0.100	0.010	0.004
A2	1.500	1.300	0.059	0.051
b	0.490	0.350	0.019	0.014
C	0.260	0.190	0.010	0.007
D	5.100	4.700	0.201	0.185
E	4.100	3.700	0.161	0.146
E1	6.200	5.800	0.244	0.228
e	1.27BSC		0.05BSC	
L	0.900	0.400	0.035	0.016
θ	8°	0°	8°	0°