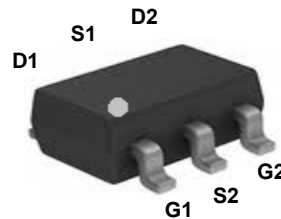
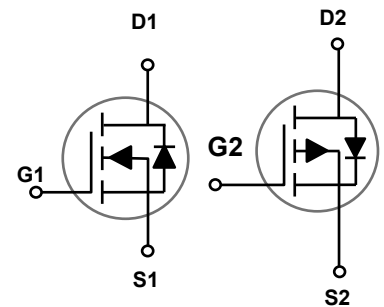


### Main Product Characteristics

Polarity	N-Ch	P-Ch
$V_{DSS}$	20V	-20V
$R_{DS(ON)(Max.)}$	40m $\Omega$	100m $\Omega$
$I_D$	3.8A	-2.5A



SOT-23-6L



Schematic Diagram

### Features and Benefits

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



### Description

The SSF2116 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)

Symbol	Parameter	N-Channel	P-Channel	Unit
$V_{DS}$	Drain-Source Voltage	20	-20	V
$V_{GS}$	Gate-Source Voltage	$\pm 10$	$\pm 10$	V
$I_D$	Drain Current – Continuous ( $T_C=25^\circ\text{C}$ )	3.8	-2.5	A
	Drain Current – Continuous ( $T_C=100^\circ\text{C}$ )	2.3	-1.5	A
$I_{DM}$	Drain Current – Pulsed <sup>1</sup>	15.2	-10	A
$P_D$	Power Dissipation ( $T_C=25^\circ\text{C}$ )	1.25	1.25	W
	Power Dissipation – Derate above $25^\circ\text{C}$	0.01	0.01	W/ $^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-55 to +150		$^\circ\text{C}$
$T_J$	Operating Junction Temperature Range	-55 to +150		$^\circ\text{C}$

### Thermal Characteristics

Symbol	Parameter	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	100	$^\circ\text{C}/\text{W}$

### N-Channel Electrical Characteristics ( $T_J=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	20	---	---	V
$BV_{DSS}$ Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	Reference to $25^\circ\text{C}$ , $I_D=1\text{mA}$	---	0.02	---	$V/^\circ\text{C}$
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=20V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	1	$\mu\text{A}$
		$V_{DS}=16V, V_{GS}=0V, T_J=125^\circ\text{C}$	---	---	10	$\mu\text{A}$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 10V, V_{DS}=0V$	---	---	$\pm 100$	nA
<b>On Characteristics</b>						
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=4.5V, I_D=3A$	---	30	40	m $\Omega$
		$V_{GS}=2.5V, I_D=2A$	---	42	55	
		$V_{GS}=1.8V, I_D=1.5A$	---	55	70	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	0.3	0.6	1	V
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}$		---	-2	---	mV/ $^\circ\text{C}$
Forward Transconductance	$g_{fs}$	$V_{DS}=10V, I_D=2A$	---	4.4	---	S
<b>Dynamic and Switching Characteristics</b>						
Total Gate Charge <sup>2, 3</sup>	$Q_g$	$V_{DS}=10V, V_{GS}=4.5V, I_D=3A$	---	5.8	10	nC
Gate-Source Charge <sup>2, 3</sup>	$Q_{gs}$		---	0.6	1.5	
Gate-Drain Charge <sup>2, 3</sup>	$Q_{gd}$		---	1.5	3	
Turn-On Delay Time <sup>2, 3</sup>	$T_{d(on)}$	$V_{DD}=10V, V_{GS}=4.5V, R_G=25\Omega, I_D=1A$	---	2.9	6	nS
Rise Time <sup>2, 3</sup>	$T_r$		---	8.4	16	
Turn-Off Delay Time <sup>2, 3</sup>	$T_{d(off)}$		---	19.2	38	
Fall Time <sup>2, 3</sup>	$T_f$		---	5.6	12	
Input Capacitance	$C_{iss}$	$V_{DS}=15V, V_{GS}=0V, F=1\text{MHz}$	---	315	600	pF
Output Capacitance	$C_{oss}$		---	50	80	
Reverse Transfer Capacitance	$C_{rss}$		---	40	60	
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Continuous Source Current	$I_S$	$V_G=V_D=0V, \text{Force Current}$	---	---	3.8	A
Pulsed Source Current	$I_{SM}$		---	---	7.6	A
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	---	---	1	V

**Notes:**

1. Repetitive Rating: Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed, pulse width  $\leq 300\mu\text{s}$ , duty cycle  $\leq 2\%$ .
3. Essentially independent of operating temperature.

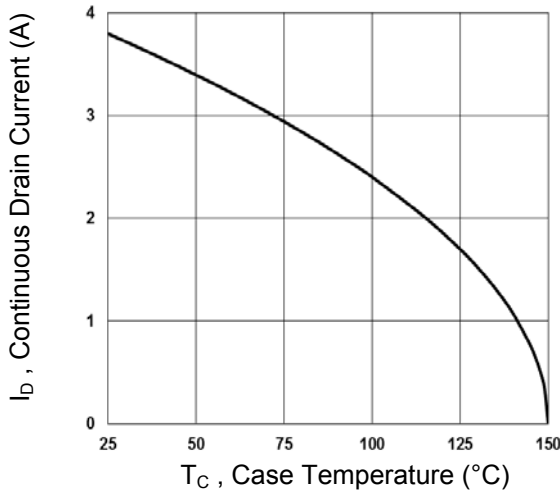
### P-Channel Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise specified)

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> =-250uA	-20	---	---	V
BV <sub>DSS</sub> Temperature Coefficient	ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	Reference to 25°C , I <sub>D</sub> =-1mA	---	-0.01	---	V/°C
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =-20V , V <sub>GS</sub> =0V , T <sub>J</sub> =25°C	---	---	-1	uA
		V <sub>DS</sub> =-16V , V <sub>GS</sub> =0V , T <sub>J</sub> =125°C	---	---	-10	uA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±10V , 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> =-4.5V , I <sub>D</sub> =-3A	---	82	100	mΩ
		V <sub>GS</sub> =-2.5V , I <sub>D</sub> =-2A	---	125	140	
		V <sub>GS</sub> =-1.8V , I <sub>D</sub> =-1A	---	197	230	
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =-250uA	-0.3	-0.6	-1.0	V
V <sub>GS(th)</sub> Temperature Coefficient	ΔV <sub>GS(th)</sub>		---	3	---	mV/°C
Forward Transconductance	g <sub>fs</sub>	V <sub>DS</sub> =-10V , I <sub>D</sub> =-1A	---	2.2	---	S
<b>Dynamic and Switching Characteristics</b>						
Total Gate Charge <sup>2, 3</sup>	Q <sub>g</sub>	V <sub>DS</sub> =-10V , V <sub>GS</sub> =-4.5V , I <sub>D</sub> =-2A	---	4.8	10	nC
Gate-Source Charge <sup>2, 3</sup>	Q <sub>gs</sub>		---	0.5	1	
Gate-Drain Charge <sup>2, 3</sup>	Q <sub>gd</sub>		---	1.9	4	
Turn-On Delay Time <sup>2, 3</sup>	T <sub>d(on)</sub>	V <sub>DD</sub> =-10V , V <sub>GS</sub> =-4.5V , R <sub>G</sub> =25Ω , I <sub>D</sub> =-1A	---	3.5	7	nS
Rise Time <sup>2, 3</sup>	T <sub>r</sub>		---	12.6	24	
Turn-Off Delay Time <sup>2, 3</sup>	T <sub>d(off)</sub>		---	32.6	62	
Fall Time <sup>2, 3</sup>	T <sub>f</sub>		---	8.4	16	
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =-15V , V <sub>GS</sub> =0V , F=1MHz	---	350	510	pF
Output Capacitance	C <sub>oss</sub>		---	65	95	
Reverse Transfer Capacitance	C <sub>rss</sub>		---	50	75	
<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	---	---	-2.5	A
Pulsed Source Current	I <sub>SM</sub>		---	---	-5	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

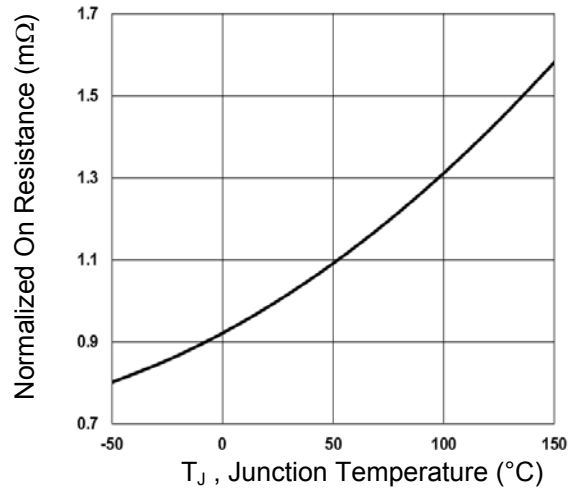
**Notes:**

1. Repetitive Rating: Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed, pulse width ≤ 300uS, duty cycle ≤ 2%.
3. Essentially independent of operating temperature.

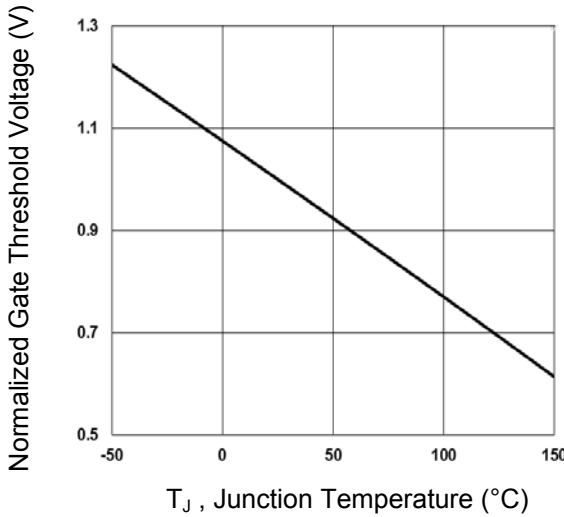
**N-Channel Typical Characteristic Curves**



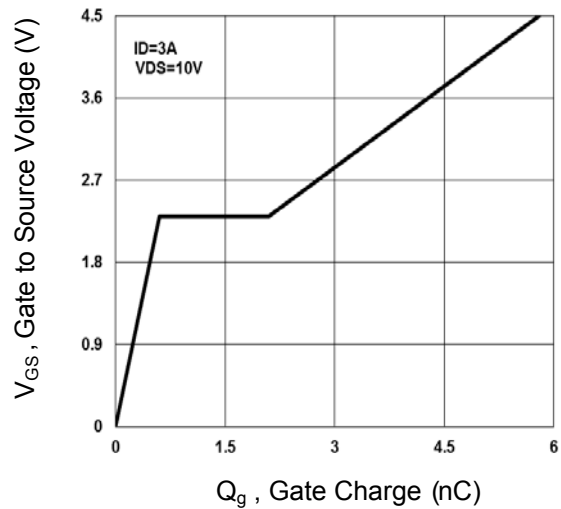
**Fig.1 Continuous Drain Current vs.  $T_C$**



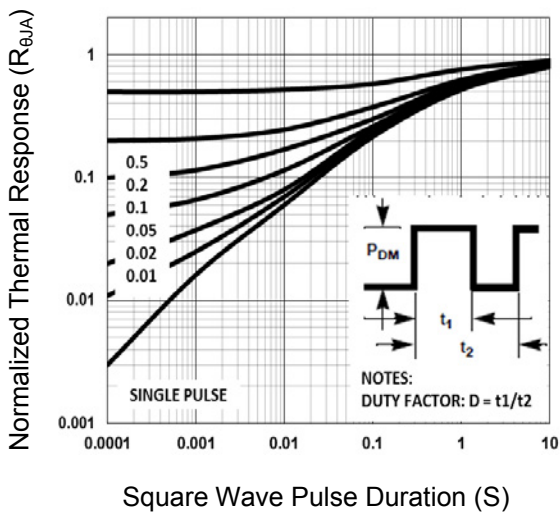
**Fig.2 Normalized  $R_{DS(ON)}$  vs.  $T_J$**



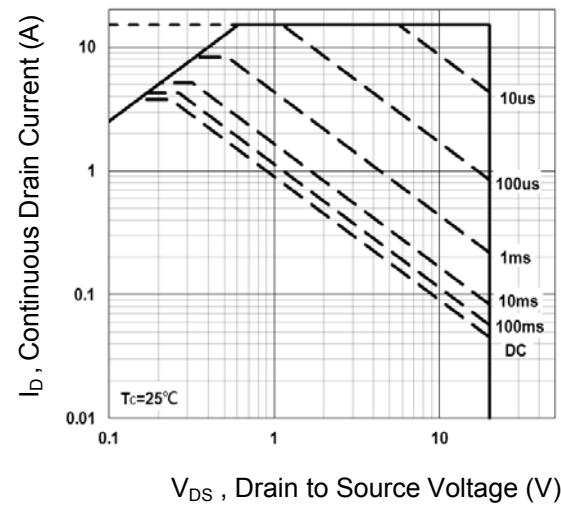
**Fig.3 Normalized  $V_{th}$  vs.  $T_J$**



**Fig.4 Gate Charge Waveform**

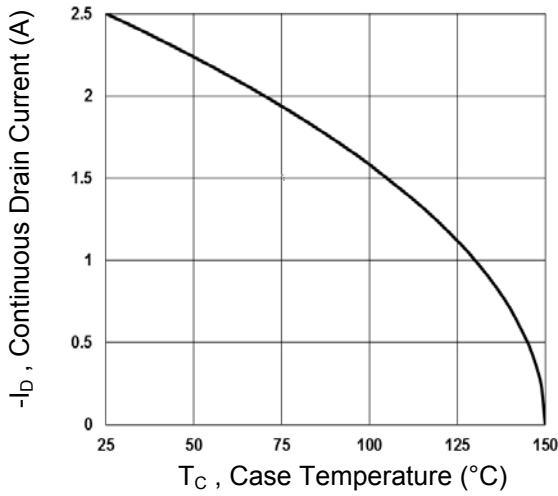


**Fig.5 Normalized Transient Impedance**

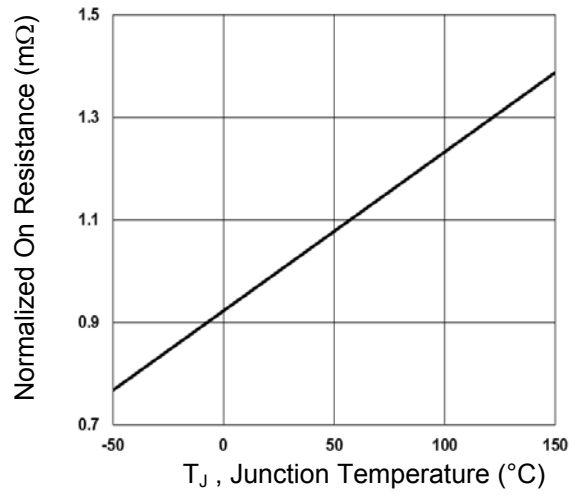


**Fig.6 Maximum Safe Operation Area**

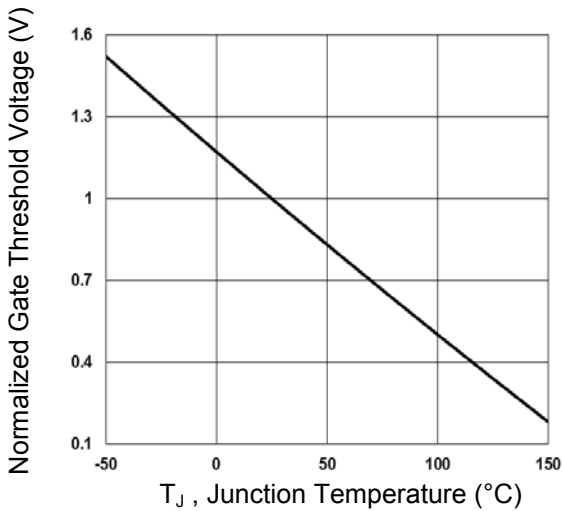
**P-Channel Typical Characteristic Curves**



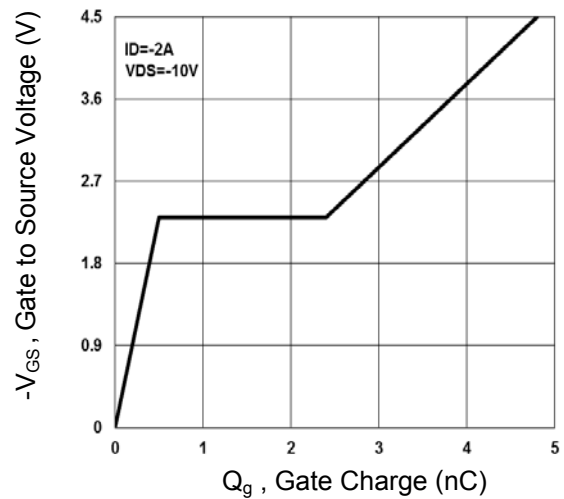
**Fig.7 Continuous Drain Current vs.  $T_c$**



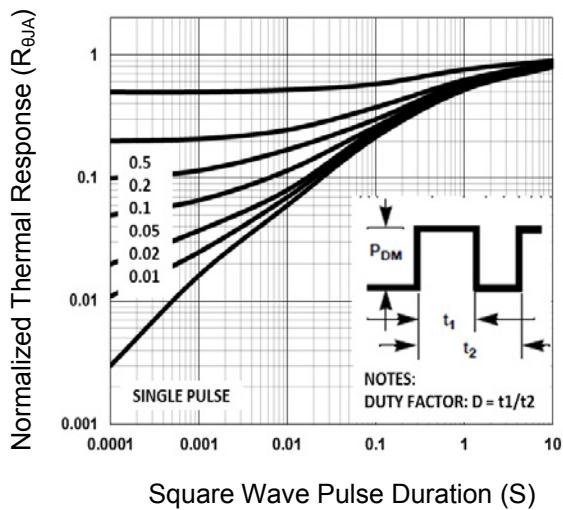
**Fig.8 Normalized  $R_{DS(ON)}$  vs.  $T_j$**



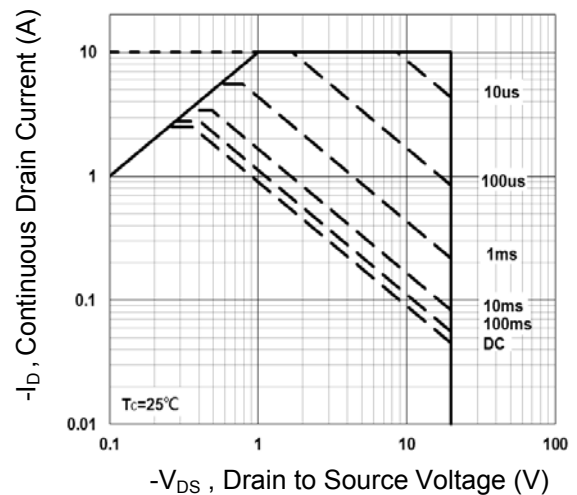
**Fig.9 Normalized  $V_{th}$  vs.  $T_j$**



**Fig.10 Gate Charge Waveform**



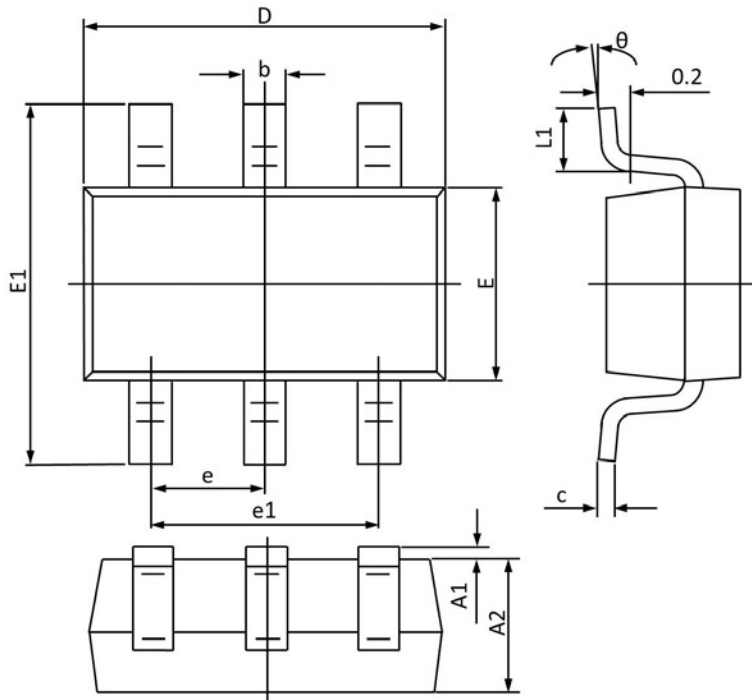
**Fig.11 Normalized Transient Impedance**



**Fig.12 Maximum Safe Operation Area**

## Package Outline Dimensions

SOT-23-6L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A1	0.000	0.100	0.000	0.004
A2	1.000	1.200	0.040	0.047
b	0.300	0.500	0.012	0.019
c	0.047	0.207	0.002	0.008
D	2.800	3.000	0.110	0.118
E	1.500	1.800	0.059	0.070
E1	2.600	3.000	0.103	0.118
e	0.950 TYP		0.037 TYP	
e1	1.900 TYP		0.075 TYP	
L1	0.250	0.550	0.010	0.021
theta	0°	8°	0°	8°