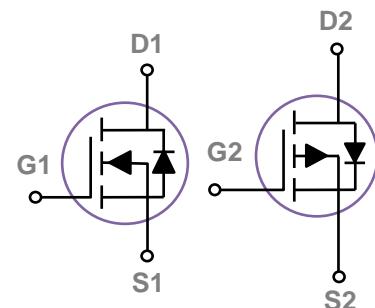


Main Product Characteristics

Polarity	N-Ch	P-Ch
V_{DSS}	20V	-20V
$R_{DSon}(\text{max.})$	40mΩ	100mΩ
I_D	3.8A	-2.5A



SOT-23-6L



Schematic Diagram

Features and Benefits

- Advanced MOSFET process technology
- Ideal for DC-DC converter, power management in portable battery, computer, printer, cellular and general purpose applications
- Low on-resistance with low gate charge
- Fast switching and reverse body recovery



Description

The SSF2116 utilizes the latest processing techniques to achieve high cell density and low on-resistance. These features make this device extremely efficient and reliable for use in DC-DC converter, power management in portable battery, computer, printer, cellular and general purpose 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	± 10	± 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 ¹	15.2	-10	A
P_D	Power Dissipation ($T_C=25^\circ\text{C}$)	1.25	1.25	W
	Power Dissipation – Derate above 25°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	$^\circ\text{C/W}$

N-Channel Electrical Characteristics

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

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0\text{V}$, $I_D=250\mu\text{A}$	20	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BV_{DSS} Temperature Coefficient	Reference to 25°C , $I_D=1\text{mA}$	---	0.02	---	$\text{V}/^\circ\text{C}$
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=20\text{V}$, $V_{GS}=0\text{V}$, $T_J=25^\circ\text{C}$	---	---	1	μA
		$V_{DS}=16\text{V}$, $V_{GS}=0\text{V}$, $T_J=125^\circ\text{C}$	---	---	10	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 10\text{V}$, $V_{DS}=0\text{V}$	---	---	± 100	nA

On Characteristics

$R_{DS(\text{ON})}$	Static Drain-Source On-Resistance	$V_{GS}=4.5\text{V}$, $I_D=3\text{A}$	---	30	40	$\text{m}\Omega$
		$V_{GS}=2.5\text{V}$, $I_D=2\text{A}$	---	42	55	$\text{m}\Omega$
		$V_{GS}=1.8\text{V}$, $I_D=1.5\text{A}$	---	55	70	$\text{m}\Omega$
$V_{GS(\text{th})}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D = 250\mu\text{A}$	0.3	0.6	1	V
$\Delta V_{GS(\text{th})}$	$V_{GS(\text{th})}$ Temperature Coefficient		---	-2	---	$\text{mV}/^\circ\text{C}$
g_{fs}	Forward Transconductance	$V_{DS}=10\text{V}$, $I_D=2\text{A}$	---	4.4	---	S

Dynamic and Switching Characteristics

Q_g	Total Gate Charge ^{2,3}	$V_{DS}=10\text{V}$, $V_{GS}=4.5\text{V}$, $I_D=3\text{A}$	---	5.8	10	nC
Q_{gs}	Gate-Source Charge ^{2,3}		---	0.6	1.5	
Q_{gd}	Gate-Drain Charge ^{2,3}		---	1.5	3	
$T_{d(on)}$	Turn-On Delay Time ^{2,3}	$V_{DD}=10\text{V}$, $V_{GS}=4.5\text{V}$, $R_G=25\Omega$ $I_D=1\text{A}$	---	2.9	6	ns
T_r	Rise Time ^{2,3}		---	8.4	16	
$T_{d(off)}$	Turn-Off Delay Time ^{2,3}		---	19.2	38	
T_f	Fall Time ^{2,3}		---	5.6	12	
C_{iss}	Input Capacitance	$V_{DS}=15\text{V}$, $V_{GS}=0\text{V}$, $F=1\text{MHz}$	---	315	600	pF
C_{oss}	Output Capacitance		---	50	80	
C_{rss}	Reverse Transfer Capacitance		---	40	60	

Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_s	Continuous Source Current	$V_G=V_D=0\text{V}$, Force Current	---	---	3.8	A
I_{SM}	Pulsed Source Current		---	---	7.6	A
V_{SD}	Diode Forward Voltage	$V_{GS}=0\text{V}$, $I_s=1\text{A}$, $T_J=25^\circ\text{C}$	---	---	1	V

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. 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

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

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{\text{GS}}=0\text{V}$, $I_D=-250\mu\text{A}$	-20	---	---	V
$\Delta \text{BV}_{\text{DSS}}/\Delta T_J$	BV_{DSS} Temperature Coefficient	Reference to 25, $=-1\text{mA}$	---	-0.01	---	$\text{V}/^\circ\text{C}$
I_{DSS}	Drain-Source Leakage Current	$V_{\text{DS}}=-20\text{V}$, $V_{\text{GS}}=0\text{V}$, $T_J=25^\circ\text{C}$	---	---	-1	μA
		$V_{\text{DS}}=-16\text{V}$, $V_{\text{GS}}=0\text{V}$, $T_J=125^\circ\text{C}$	---	---	-10	μA
I_{GSS}	Gate-Source Leakage Current	$V_{\text{GS}}=\pm 10\text{V}$, $V_{\text{DS}}=0\text{V}$	---	---	± 100	nA

On Characteristics

$R_{\text{DS(ON)}}$	Static Drain-Source On-Resistance	$V_{\text{GS}}=-4.5\text{V}$, $I_D=-3\text{A}$	---	82	100	$\text{m}\Omega$
		$V_{\text{GS}}=-2.5\text{V}$, $I_D=-2\text{A}$	---	125	140	$\text{m}\Omega$
		$V_{\text{GS}}=-1.8\text{V}$, $I_D=-1\text{A}$	---	197	230	$\text{m}\Omega$
$V_{\text{GS(th)}}$	Gate Threshold Voltage	$V_{\text{GS}}=V_{\text{DS}}$, $I_D = -250\mu\text{A}$	-0.3	-0.6	-1.0	V
$\Delta V_{\text{GS(th)}}$	$V_{\text{GS(th)}}$ Temperature Coefficient		---	3	---	$\text{mV}/^\circ\text{C}$
g_{fs}	Forward Transconductance	$V_{\text{DS}}=-10\text{V}$, $I_D=-1\text{A}$	---	2.2	---	S

Dynamic and switching Characteristics

Q_g	Total Gate Charge ^{2,3}	$V_{\text{DS}}=-10\text{V}$, $V_{\text{GS}}=-4.5\text{V}$, $I_D=-2\text{A}$	---	4.8	10	nC
Q_{gs}	Gate-Source Charge ^{2,3}		---	0.5	1	
Q_{gd}	Gate-Drain Charge ^{2,3}		---	1.9	4	
$T_{\text{d(on)}}$	Turn-On Delay Time ^{2,3}	$V_{\text{DD}}=-10\text{V}$, $V_{\text{GS}}=-4.5\text{V}$, $R_G=25\Omega$	---	3.5	7	ns
T_r	Rise Time ^{2,3}		---	12.6	24	
$T_{\text{d(off)}}$	Turn-Off Delay Time ^{2,3}		---	32.6	62	
T_f	Fall Time ^{2,3}		---	8.4	16	
C_{iss}	Input Capacitance	$V_{\text{DS}}=-15\text{V}$, $V_{\text{GS}}=0\text{V}$, $F=1\text{MHz}$	---	350	510	pF
C_{oss}	Output Capacitance		---	65	95	
C_{rss}	Reverse Transfer Capacitance		---	50	75	

Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_s	Continuous Source Current	$V_G=V_D=0\text{V}$, Force Current	---	---	-2.5	A
I_{SM}	Pulsed Source Current		---	---	-5	A
V_{SD}	Diode Forward Voltage	$V_{\text{GS}}=0\text{V}$, $I_s=-1\text{A}$, $T_J=25^\circ\text{C}$	---	---	-1	V

Note :

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

Typical Characteristic Curves-N-Channel

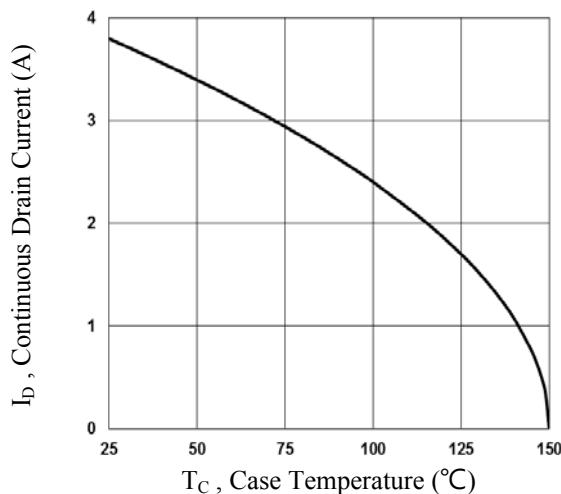


Fig.1 Continuous Drain Current vs. T_c

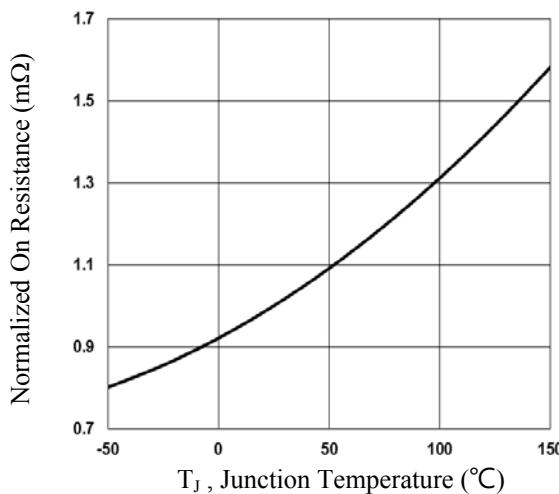


Fig.2 Normalized R_{DS(on)} vs. T_j

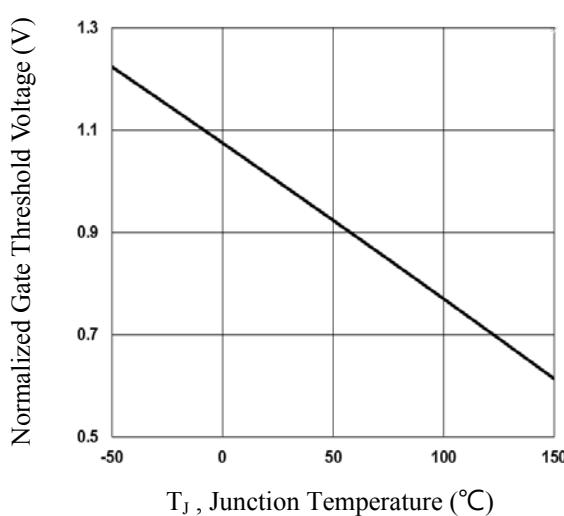


Fig.3 Normalized V_{th} vs. T_j

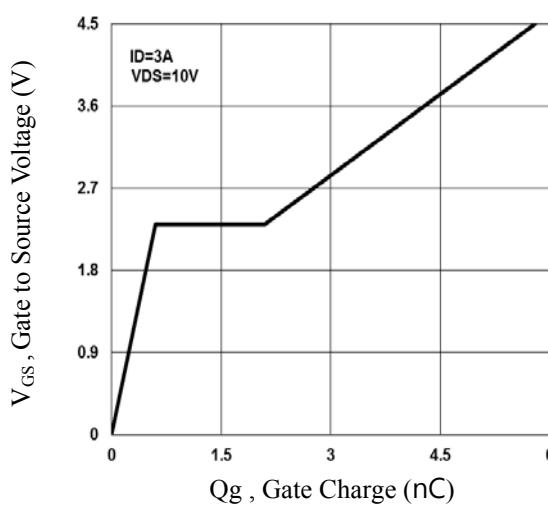


Fig.4 Gate Charge Waveform

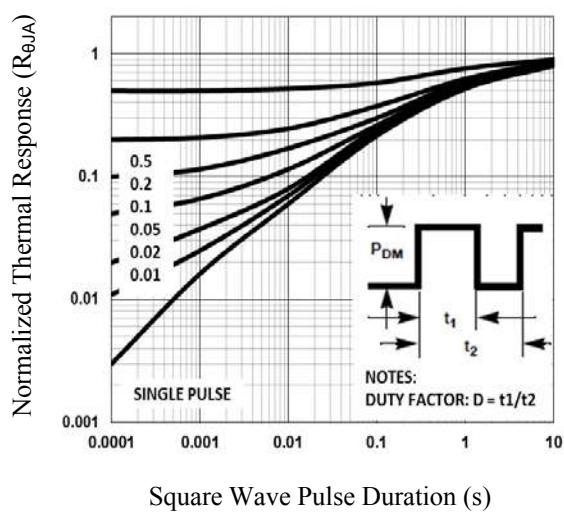


Fig.5 Normalized Transient Impedance

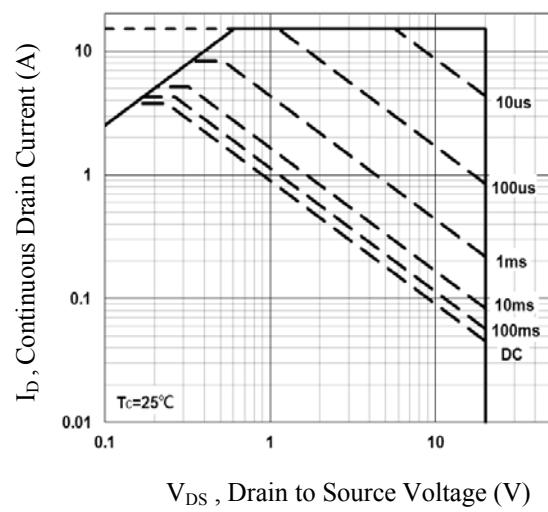


Fig.6 Maximum Safe Operation Area

Typical Characteristic Curves-P-Channel

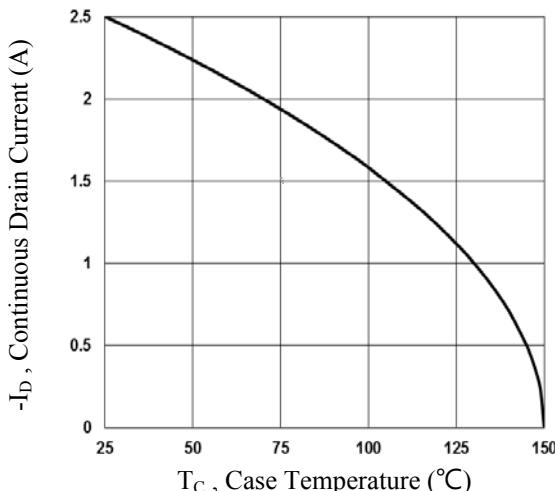


Fig.7 Continuous Drain Current vs. T_C

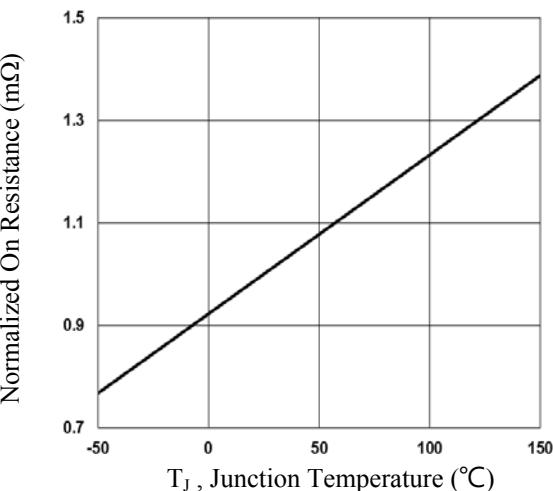


Fig.8 Normalized R_{DSON} vs. T_J

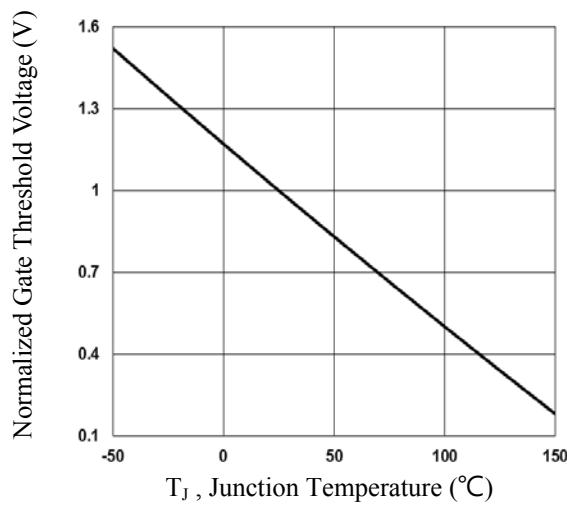


Fig.9 Normalized V_{th} vs. T_J

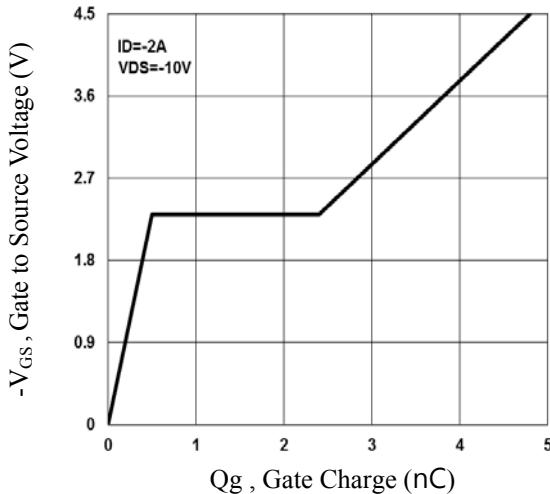


Fig.10 Gate Charge Waveform

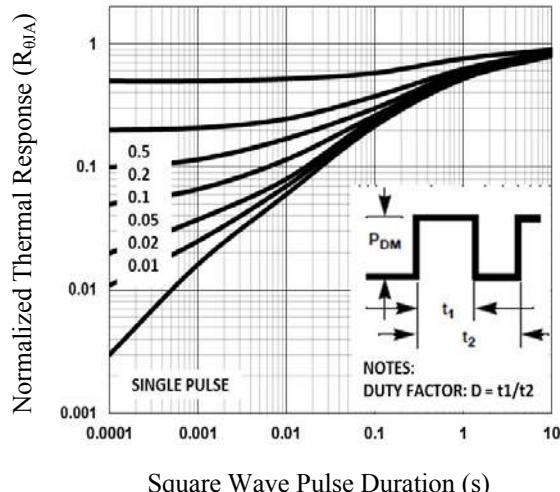


Fig.11 Normalized Transient Impedance

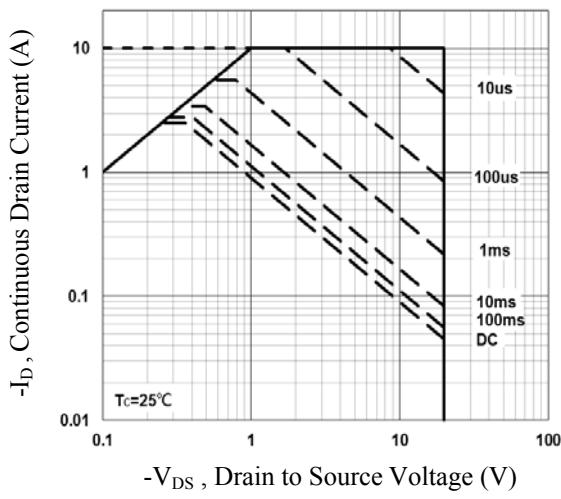
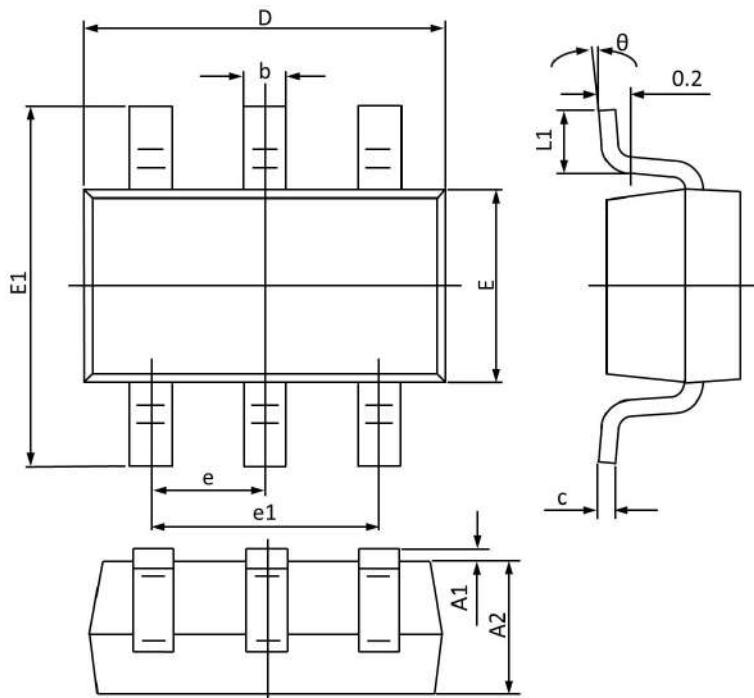


Fig.12 Maximum Safe Operation Area

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
θ	0°	8°	0°	8°