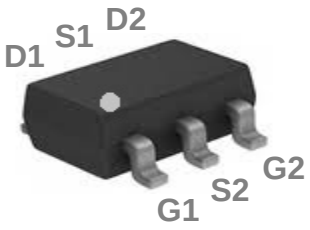
GOOD-ARK SEMICONDUCTOR

SSF2116

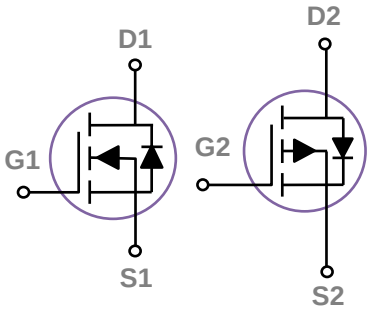
20V N-Channel and P-Channel Complementary MOSFET

Main Product Characteristics

Polarity	N-Ch	P-Ch
V_{DSS}	20V	-20V
R_{DSon}(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°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°C	3.8	-2.5	A
	Drain Current – Continuous (T_C=100°C)	2.3	-1.5	A
I_{DM}	Drain Current – Pulsed[1]	15.2	-10	A
P_D	Power Dissipation (T_C=25°C)	1.25	1.25	W
	Power Dissipation – Derate above 25°C	0.01	0.01	W/°C
T_{STG}	Storage Temperature Range	-55 to 150		°C
T_J	Operating Junction Temperature Range	-55 to 150		°C

Thermal Characteristics

Symbol	Parameter	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	100	°C/W

N-Channel Electrical Characteristics

(T_J=25°C unless otherwise specified)

Off Characteristics

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

On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=4.5V , I_D=3A	---	30	40	mΩ
		V_{GS}=2.5V , I_D=2A	---	42	55	mΩ
		V_{GS}=1.8V , I_D=1.5A	---	55	70	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	0.3	0.6	1	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-2	---	mV/°C
gfs	Forward Transconductance	V_{DS}=10V , I_D=2A	---	4.4	---	S

Dynamic and Switching Characteristics

Q_g	Total Gate Charge[2,3]	V_{DS}=10V , V_{GS}=4.5V , I_D=3A	---	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}=10V , V_{GS}=4.5V , R_G=25Ω I_D=1A	---	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}=15V , V_{GS}=0V , F=1MHz	---	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=0V , Force Current	---	---	3.8	A
I_{SM}	Pulsed Source Current		---	---	7.6	A
V_{SD}	Diode Forward Voltage	V_{GS}=0V , I_S=1A , T_J=25°C	---	---	1	V

Note :

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.

P-Channel Electrical Characteristics

(T_J=25°C unless otherwise specified)

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=-250uA	-20	---	---	V
$\triangle BV_{DSS}/\triangle T_J$	BV_{DSS} Temperature Coefficient	Reference to 25, =-1mA	---	-0.01	---	V/°C
I_{DSS}	Drain-Source Leakage Current	V_{DS}=-20V , V_{GS}=0V , T_J=25°C	---	---	-1	uA
		V_{DS}=-16V , V_{GS}=0V , T_J=125°C	---	---	-10	uA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±10V , V_{DS}=0V	---	---	±100	nA

On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=-4.5V , I_D=-3A	---	82	100	mΩ
		V_{GS}=-2.5V , I_D=-2A	---	125	140	mΩ
		V_{GS}=-1.8V , I_D=-1A	---	197	230	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =-250uA	-0.3	-0.6	-1.0	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	3	---	mV/°C
gfs	Forward Transconductance	V_{DS}=-10V , I_D=-1A	---	2.2	---	S

Dynamic and switching Characteristics

Q_g	Total Gate Charge[2,3]	V_{DS}=-10V , V_{GS}=-4.5V , I_D=-2A	---	4.8	10	nC
Q_{gs}	Gate-Source Charge[2,3]		---	0.5	1	
Q_{gd}	Gate-Drain Charge[2,3]		---	1.9	4	
$T_{d(on)}$	Turn-On Delay Time[2,3]	V_{DD}=-10V , V_{GS}=-4.5V , R_G=25Ω I_D=-1A	---	3.5	7	ns
T_r	Rise Time[2,3]		---	12.6	24	
$T_{d(off)}$	Turn-Off Delay Time[2,3]		---	32.6	62	
T_f	Fall Time[2,3]		---	8.4	16	
C_{iss}	Input Capacitance	V_{DS}=-15V , V_{GS}=0V , F=1MHz	---	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=0V , Force Current	---	---	-2.5	A
I_{SM}	Pulsed Source Current		---	---	-5	A
V_{SD}	Diode Forward Voltage	V_{GS}=0V , I_S=-1A , T_J=25°C	---	---	-1	V

Note :

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.

Typical Characteristic Curves-N-Channel

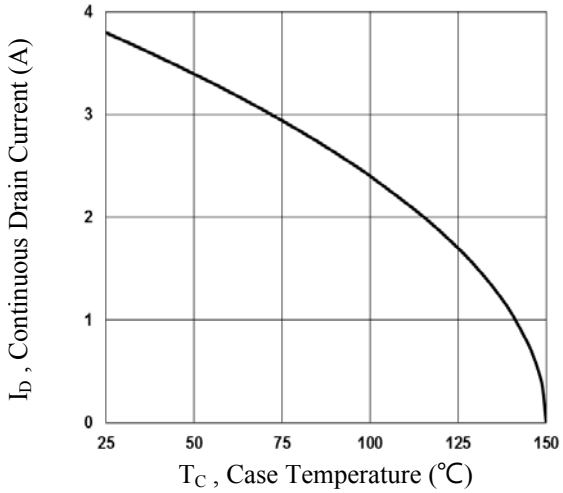


Fig.1 Continuous Drain Current vs. T_C

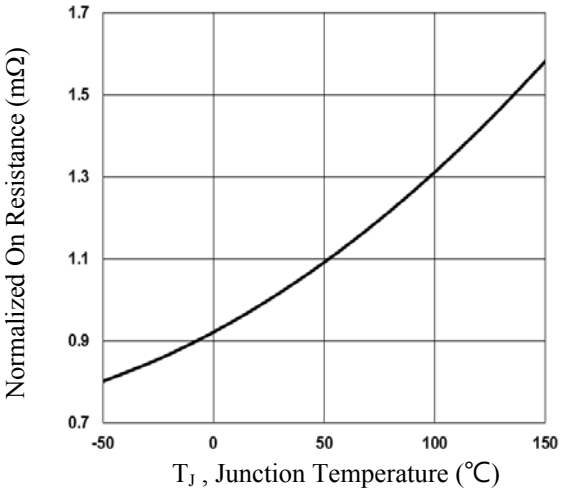


Fig.2 Normalized RDSON vs. T_J

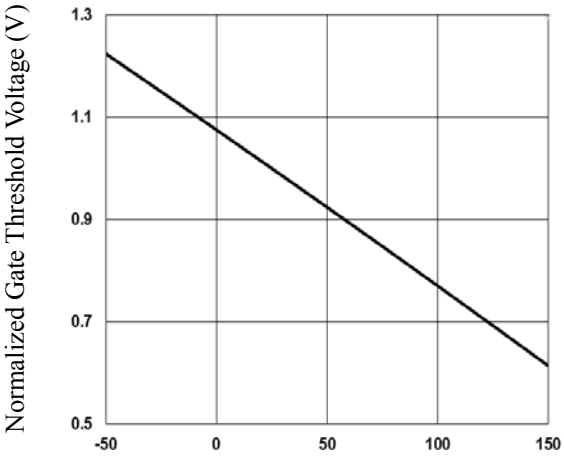


Fig.3 Normalized V_{th} vs. T_J

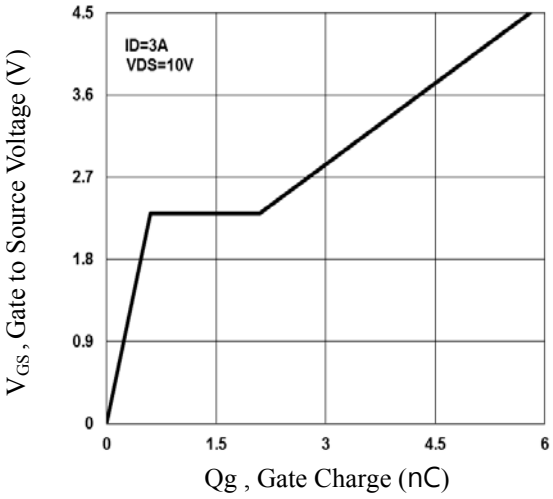


Fig.4 Gate Charge Waveform

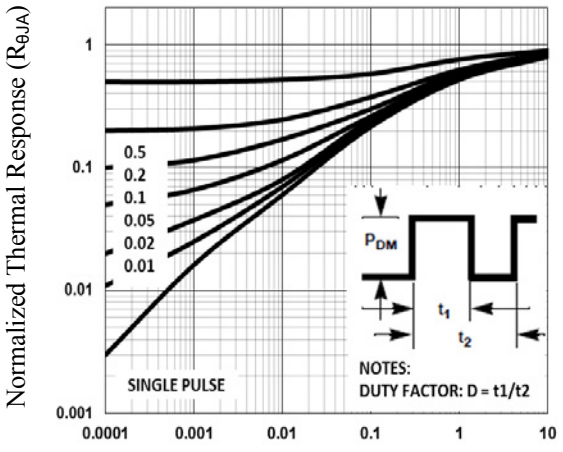


Fig.5 Normalized Transient Impedance

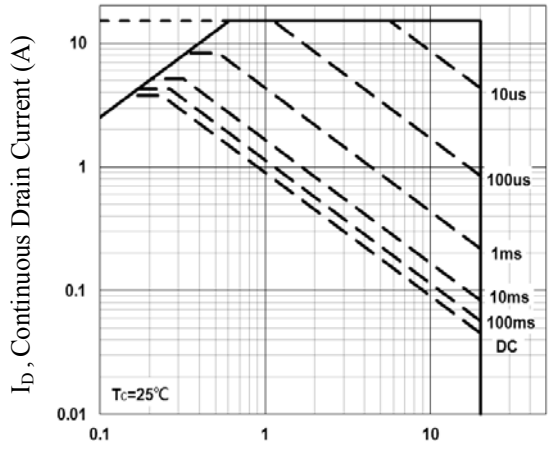


Fig.6 Maximum Safe Operation Area

Typical Characteristic Curves-P-Channel

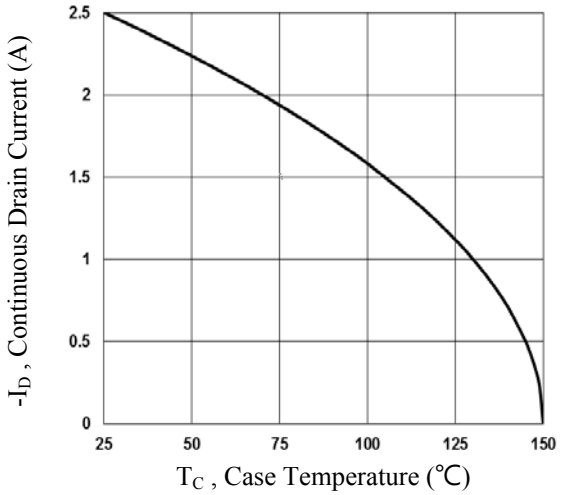


Fig.7 Continuous Drain Current vs. T_C

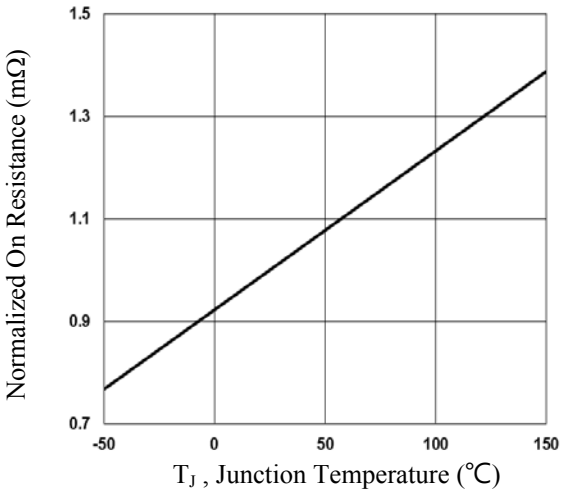


Fig.8 Normalized RDSON vs. T_J

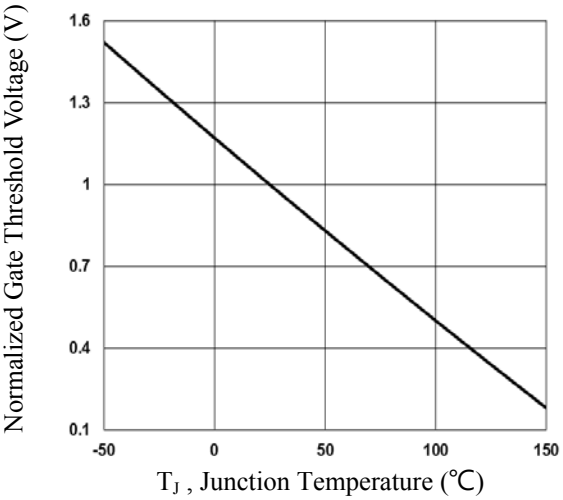


Fig.9 Normalized V_{th} vs. T_J

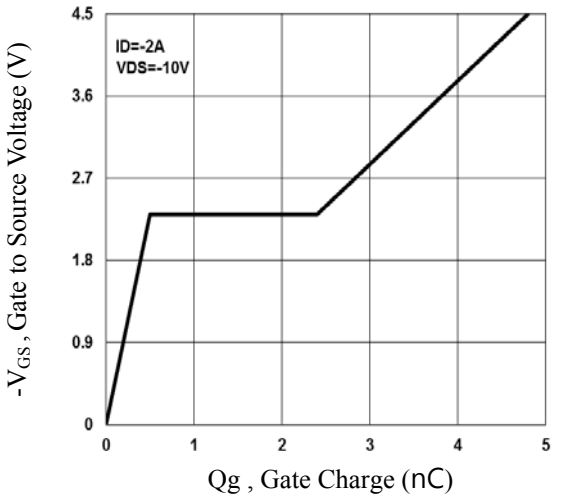


Fig.10 Gate Charge Waveform

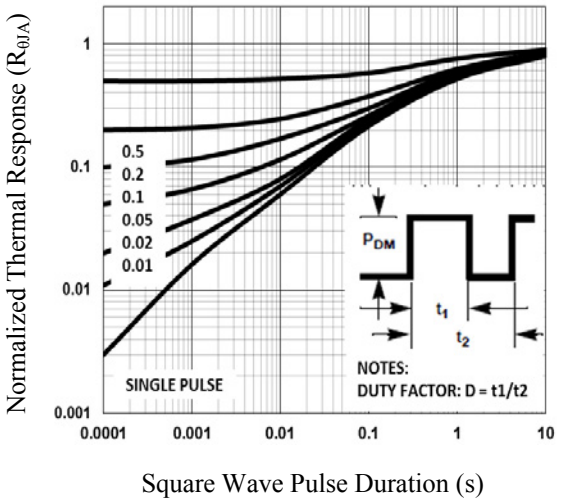


Fig.11 Normalized Transient Impedance

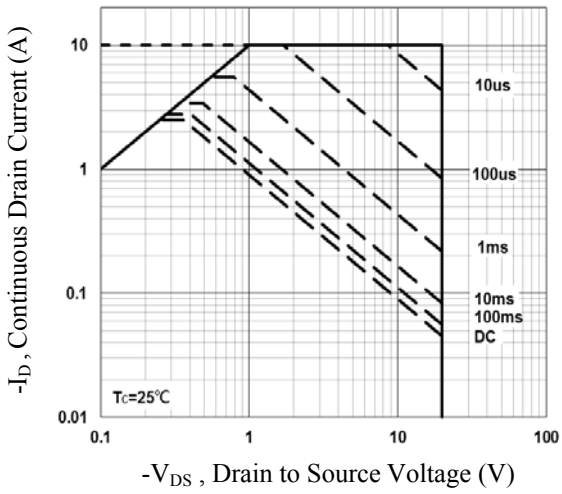
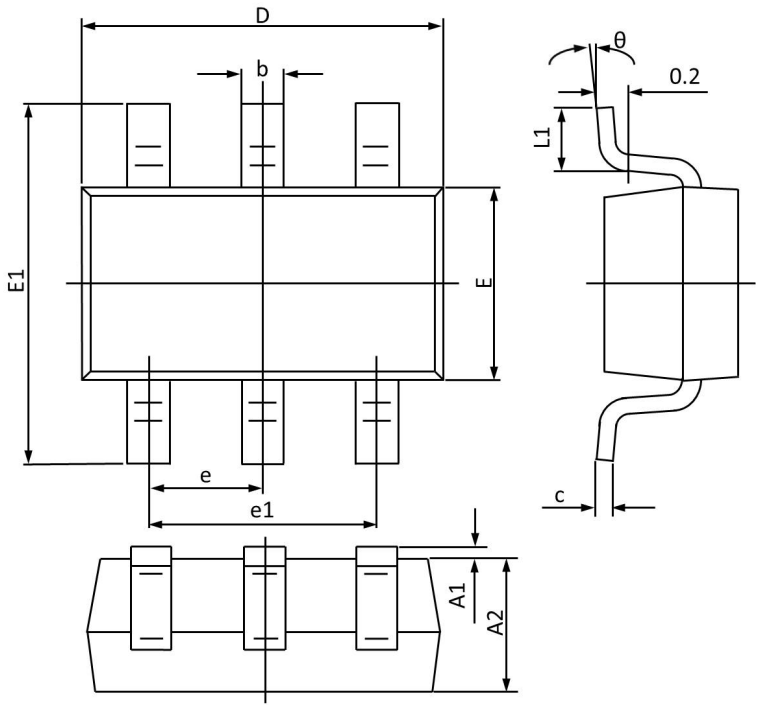


Fig.12 Maximum Safe Operation Area

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°