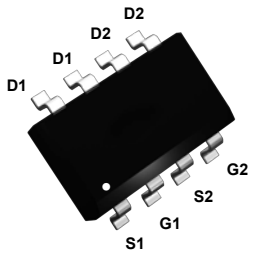
GOOD-ARK SEMICONDUCTOR

SSFQ4614

40V N-Channel + P-Channel Complementary MOSFET

Main Product Characteristics

$V_{(BR)DSS}$	-40V	40V
$R_{DS(on)}MAX$	35mΩ@-10V	19mΩ@10V
	45mΩ@-4.5V	29mΩ@4.5V
I_D	-7A	8A



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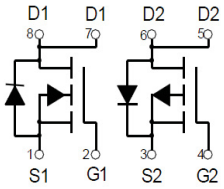


Schematic Diagram

Features and Benefits

- Advanced MOSFET process technology
- Ideal for battery operated systems, load switching, power converters and other general purpose applications
- Low on-resistance with low gate charge
- Fast switching and reverse body recovery

Description

The SSFQ4614 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_A=25°C unless otherwise specified)

Parameter	Symbol	Value	Unit
N-Channel MOSFET			
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current[1]	I_D	8	A
Pulsed Drain Current (tp=10us)	I_{DM}	32	A
Continous Source-Drain Diode Current	I_S	8	A
P-Channel MOSFET			
Drain-Source Voltage	V_{DS}	-40	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current[1]	I_D	-7	A
Pulsed Drain Current (tp=10us)	I_{DM}	-28	A
Continous Source-Drain Diode Current	I_S	-7	A
Temperature and Thermal Resistance			
Power Dissipation	P_D	2	W
Thermal Resistance from Junction to Ambient[1]	$R_{\theta JA}$	62.5	°C/W
Junction Temperature	T_J	150	°C
Storage Temperature	T_{STG}	-55 to +150	°C
Lead Temperature for Soldering Purposes(1/8" from case for 10 s)	T_L	260	°C

N-Channel Electrical Characteristics (T_A=25°C unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D =250μA	40	---	---	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} =40V,V_{GS} = 0V	---	---	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS} =±20V, V_{DS} = 0V	---	---	±100	nA
Gate Threshold Voltage[2]	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =250μA	1	1.5	2	V
Drain-Source On-Resistance[2]	$R_{DS(on)}$	V_{GS} =10V, I_D =8A	---	16	19	mΩ
		V_{GS} =4.5V, I_D =4A	---	24	29	mΩ
Forward Tranconductance[2]	g_{FS}	V_{DS} =5V, I_D =8A	---	10	---	S
Diode Forward Voltage	V_{SD}	I_S=8A, V_{GS} = 0V	---	---	1.2	V
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS} =20V,V_{GS} =0V,f =1MHz	---	415	---	pF
Output Capacitance	C_{oss}		---	112	---	pF
Reverse Transfer Capacitance	C_{rss}		---	11	---	pF
Switching Characteristics[3]						
Turn-On Delay Time	$t_{d(on)}$	V_{GEN}=10V,V_{DD}=20V, R_G=3Ω， R_L=2.5Ω	---	4	---	nS
Turn-On Rise Time	t_r		---	3	---	nS
Turn-Off Delay Time	$t_{d(off)}$		---	15	---	nS
Turn-Off Fall Time	t_f		---	2	---	nS
Total Gate Charge	Q_g	V_{DS}=20V,I_D=8A, V_{GS}=10V	---	12	---	nC
Gate-Source Charge	Q_{gs}		---	3.2	---	nC
Gate-Drain Charge	Q_{gd}		---	3.1	---	nC

P-Channel Electrical Characteristics (T_A=25°C unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D =-250μA	-40	---	---	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} =-40V,V_{GS} = 0V	---	---	-1	μ
Gate-Body Leakage Current	I_{GSS}	V_{GS} =±20V, V_{DS} = 0V	---	---	±100	nA
Gate Threshold Voltage[2]	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =-250μA	-1	-1.5	-2	V
Drain-Source On-Resistance[2]	$R_{DS(on)}$	V_{GS} =-10V, I_D =-8A	---	30	35	mΩ
		V_{GS} =-4.5V, I_D =-4A	---	40	45	mΩ
Forward Tranconductance[2]	g_{FS}	V_{DS} =-5V, I_D =-8A	---	16	---	S
Diode Forward Voltage	V_{SD}	I_S=-10A, V_{GS} = 0V	---	---	-1.2	V
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS} =-20V,V_{GS} =0V,f =1MHz	---	520	---	pF
Output Capacitance	C_{oss}		---	100	---	pF
Reverse Transfer Capacitance	C_{rss}		---	65	---	pF
Switching Characteristics[3]						
Turn-On Delay Time	$t_{d(on)}$	V_{GEN}=-10V,V_{DD}=-20V, R_G=6Ω , R_L=2.3Ω	---	7.5	---	nS
Turn-On Rise Time	t_r		---	5.5	---	nS
Turn-Off Delay Time	$t_{d(off)}$		---	19	---	nS
Turn-Off Fall Time	t_f		---	7	---	nS
Total Gate Charge	Q_g	V_{DS}=-20V,I_D=-8A, V_{GS}=-10V	---	13	---	nC
Gate-Source Charge	Q_{gs}		---	3.8	---	nC
Gate-Drain Charge	Q_{gd}		---	3.1	---	nC

Notes :

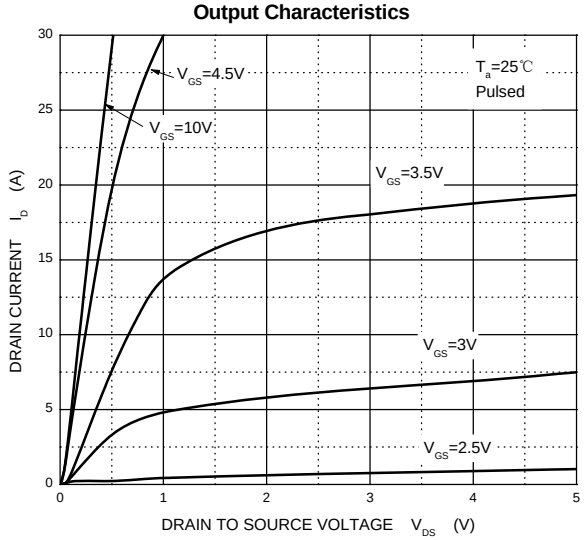
1.Surface mounted on FR4 board using the minimum recommended pad size.

2. Pulse Test : Pulse width=300μS, duty cycle≤2%.

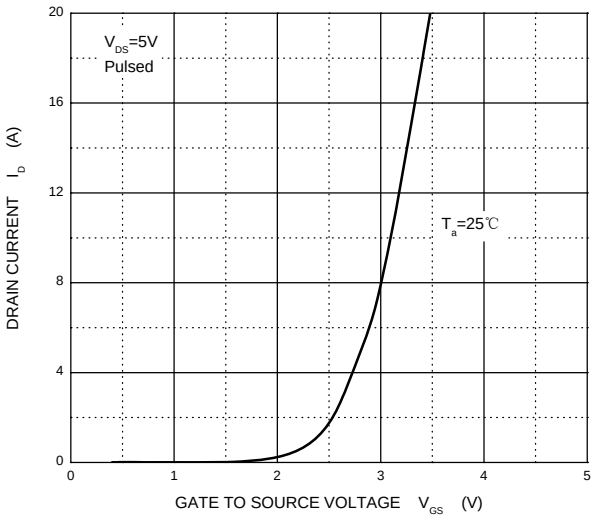
3. Switching characteristics are independent of operating junction temperature.

N-Channel Typical Electrical and Thermal Characteristic Curves

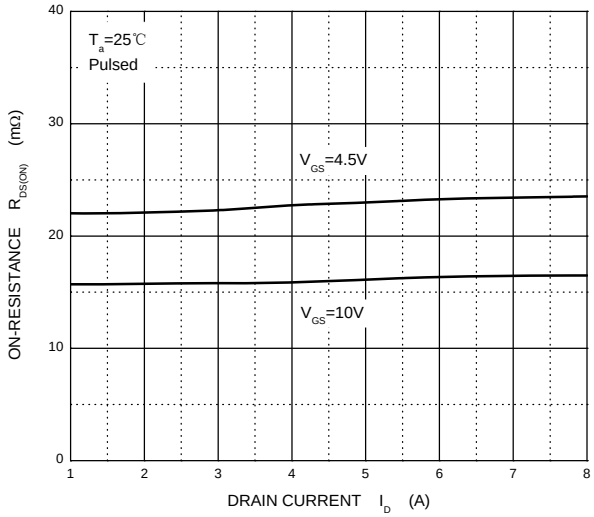
Output Characteristics



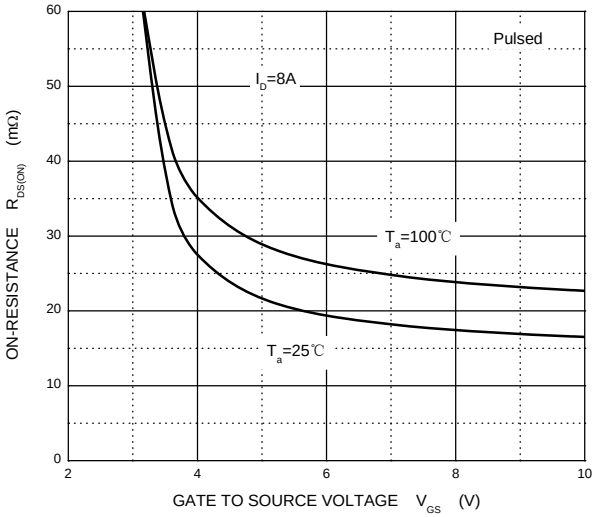
Transfer Characteristics



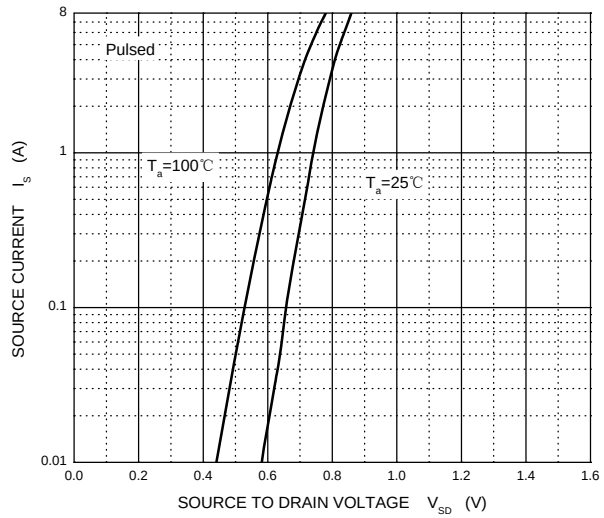
$R_{DS(ON)}$ —— I_D



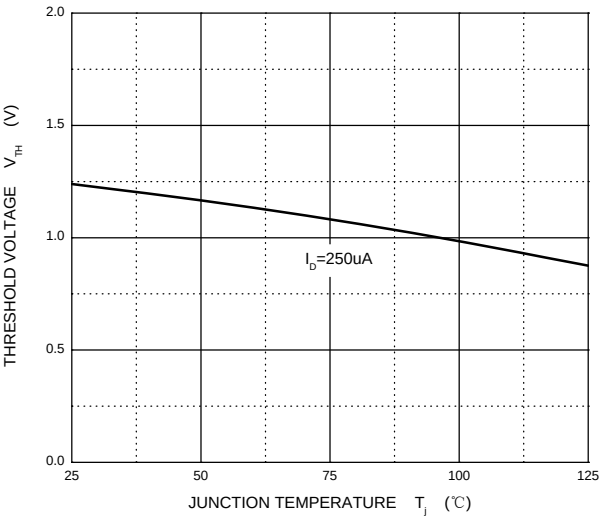
$R_{DS(ON)}$ —— V_{GS}



I_S —— V_{SD}

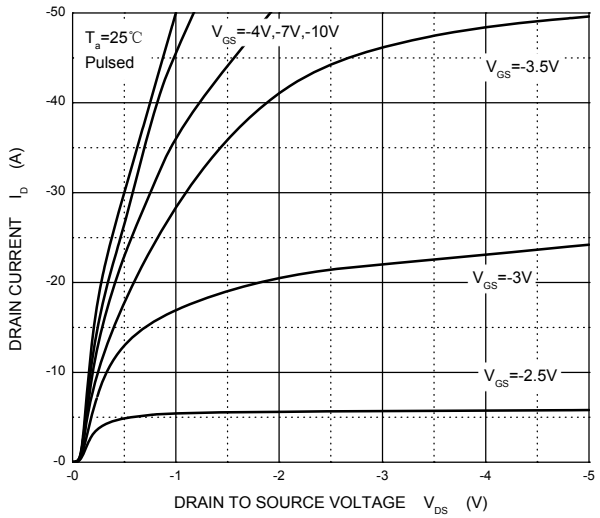


Threshold Voltage

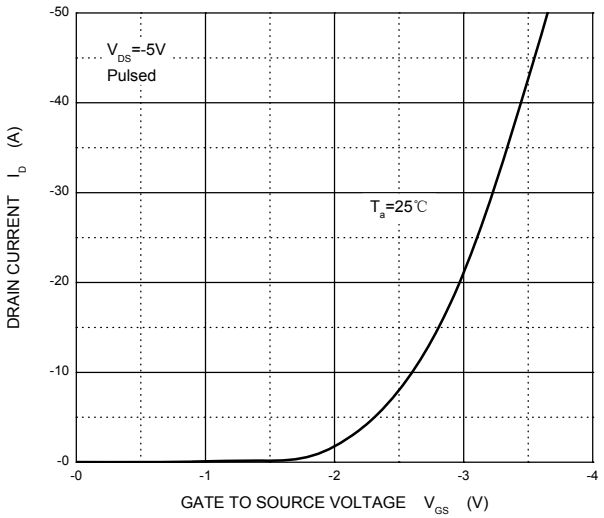


P-Channel Typical Electrical and Thermal Characteristic Curves

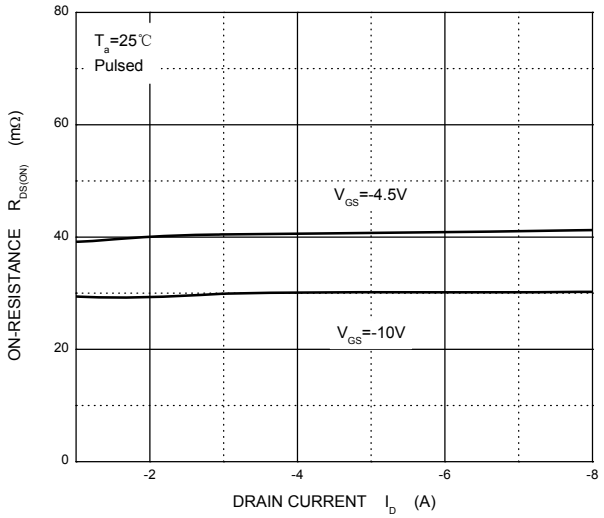
Output Characteristics



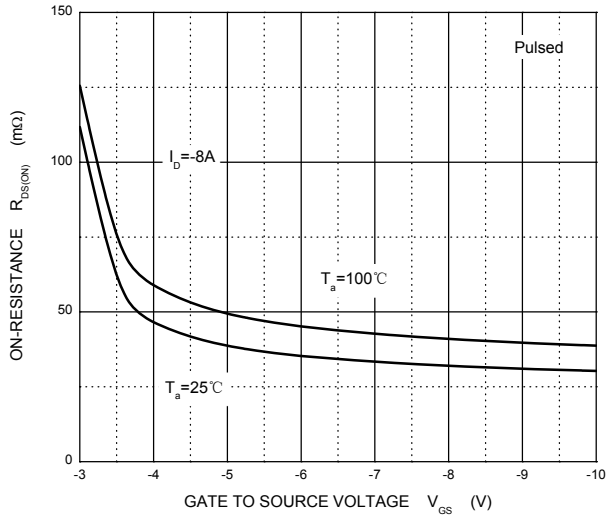
Transfer Characteristics



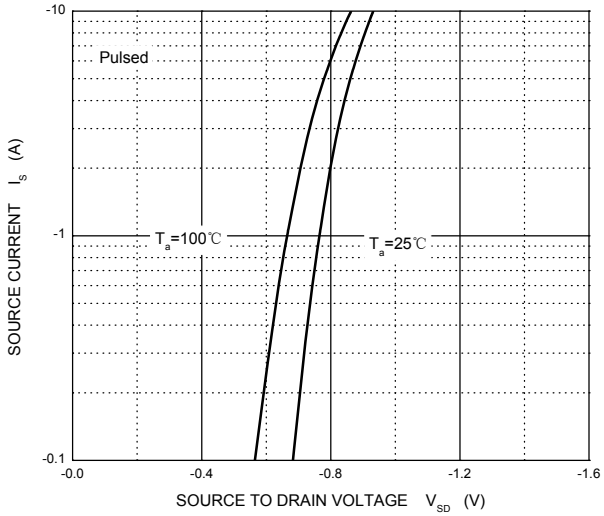
$R_{DS(ON)}$ —— I_D



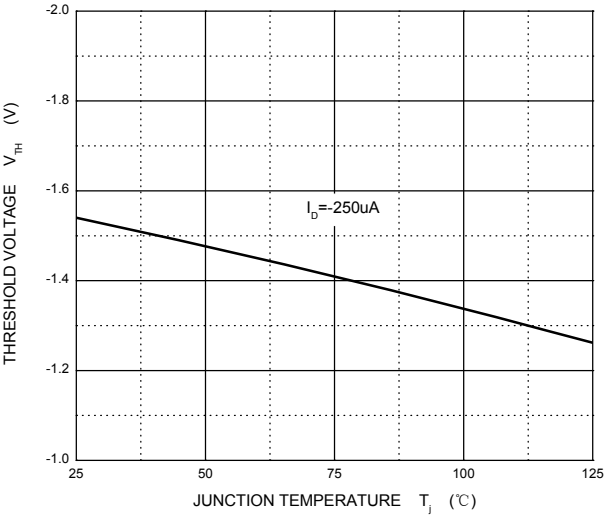
$R_{DS(ON)}$ —— V_{GS}



I_S —— V_{SD}



Threshold Voltage



Package Outline Dimensions

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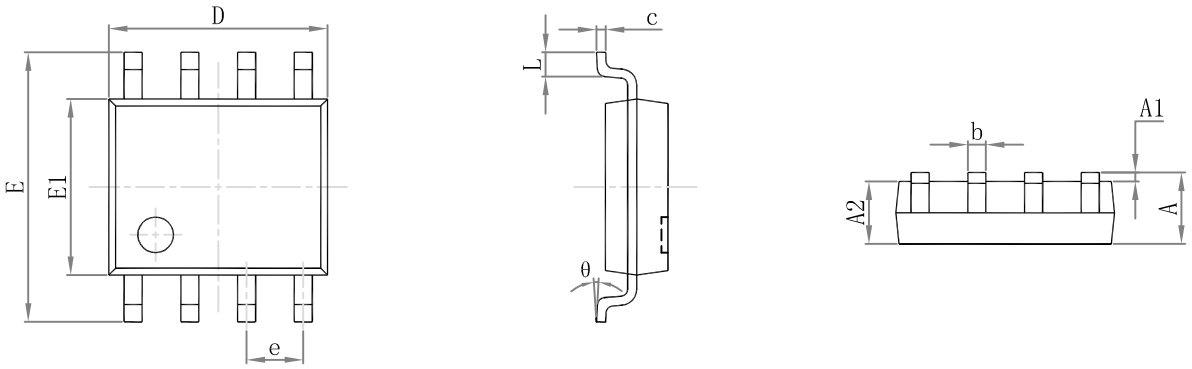
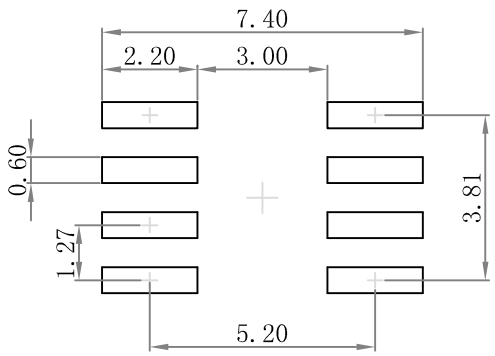


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.800	5.000	0.189	0.197
e	1.270（BSC）		0.050（BSC）	
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

Suggested Pad Layout



Note:
1.Controlling dimension:in millimeters.
2.General tolerance:± 0.05mm.
3.The pad layout is for reference purposes only.