GOOD-ARK SEMICONDUCTOR

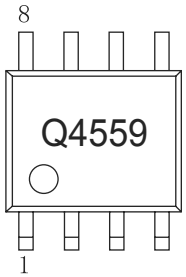
SSFQ4559

60V N-Channel + P-Channel Complementary MOSFET

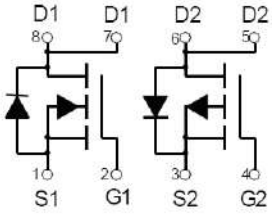
Main Product Characteristics

$V_{(BR)DSS}$	-60V	60V
$R_{DS(on)}$MAX	80mΩ@-10V	58mΩ@10V
	100mΩ@-4.5V	72mΩ@4.5V
I_D	-3.5A	4.5A

SOP-8



Marking and Pin Assignment



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 SSFQ4559 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}	60	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current[1]	I_D	4.5	A
Pulsed Drain Current (tp=10us)	I_{DM}	18	A
Continous Source-Drain Diode Current	I_S	4.5	A
P-Channel MOSFET			
Drain-Source Voltage	V_{DS}	-60	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current[1]	I_D	-3.5	A
Pulsed Drain Current (tp=10us)	I_{DM}	-14	A
Continous Source-Drain Diode Current	I_S	-3.5	A
Temperature and Thermal Resistance			
Power Dissipation	P_D	2	W
Thermal Resistance from Junction to Ambient[1]	$R_{\theta JA}$	62.5	℃/W
Junction Temperature	T_J	150	℃
Storage Temperature	T_{STG}	-55 to +150	℃
Lead Temperature for Soldering Purposes(1/8" from case for 10s)	T_L	260	℃

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	60	---	---	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} =60V,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	2.1	3	V
Drain-Source On-Resistance[2]	$R_{DS(on)}$	V_{GS} =10V, I_D =4.3A	---	40	58	mΩ
		V_{GS} =4.5V, I_D =3.9A	---	55	72	mΩ
Forward Tranconductance[2]	g_{FS}	V_{DS} =15V, I_D =4.3A	---	15	---	S
Diode Forward Voltage	V_{SD}	I_S=1.7A, V_{GS} = 0V	---	---	1.2	V
Dynamic Characteristics[4]						
Input Capacitance	C_{iss}	V_{DS} =15V,V_{GS} =0V,f =1MHz	---	665	---	pF
Output Capacitance	C_{oss}		---	75	---	pF
Reverse Transfer Capacitance	C_{rss}		---	40	---	pF
Gate Resistance	R_g	f=1MHz	---	---	3	Ω
Switching Characteristics[3,4]						
Turn-On Delay Time	$t_{d(on)}$	V_{GEN}=4.5V,V_{DD}=30V, I_D=3.4A, R_G=1Ω, R_L=8.8Ω	---	---	25	ns
Turn-On Rise Time	t_r		---	---	100	ns
Turn-Off Delay Time	$t_{d(off)}$		---	---	25	ns
Turn-Off Fall Time	t_f		---	---	15	ns
Total Gate Charge	Q_g	V_{DS}=30V,I_D=4.3A, V_{GS}=4.5V	---	---	9	nC
Gate-Source Charge	Q_{gs}		---	2.3	---	nC
Gate-Drain Charge	Q_{gd}		---	2.6	---	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	-60	---	---	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} =-60V,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	-2.8	-3	V
Drain-Source On-Resistance[2]	$R_{DS(on)}$	V_{GS} =-10V, I_D =-3.1A	---	60	80	m Ω
		V_{GS} =-4.5V, I_D =-0.2A	---	92	100	mΩ
Forward Tranconductance[2]	g_{FS}	V_{DS} =-15V, I_D =-3.1A	---	8.5	---	S
Diode Forward Voltage	V_{SD}	I_S=-2A, V_{GS} = 0V	---	---	-1.2	V
Dynamic Characteristics[4]						
Input Capacitance	C_{iss}	V_{DS} =-15V,V_{GS} =0V,f =1MHz	---	650	---	pF
Output Capacitance	C_{oss}		---	95	---	pF
Reverse Transfer Capacitance	C_{rss}		---	60	---	pF
Gate Resistance	R_g	f=1MHz	---	---	20	Ω
Switching Characteristics[3,4]						
Turn-On Delay Time	$t_{d(on)}$	V_{GEN}=-4.5V,V_{DD}=-30V, I_D=-2.4A,R_G=1Ω , R_L=12.5Ω	---	---	45	ns
Turn-On Rise Time	t_r		---	---	105	ns
Turn-Off Delay Time	$t_{d(off)}$		---	---	60	ns
Turn-Off Fall Time	t_f		---	---	45	ns
Total Gate Charge	Q_g	V_{DS}=-30V,I_D=-3.1A, V_{GS}=-4.5V	---	---	12	nC
Gate-Source Charge	Q_{gs}		---	2.2	---	nC
Gate-Drain Charge	Q_{gd}		---	3.7	---	nC

Notes :

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

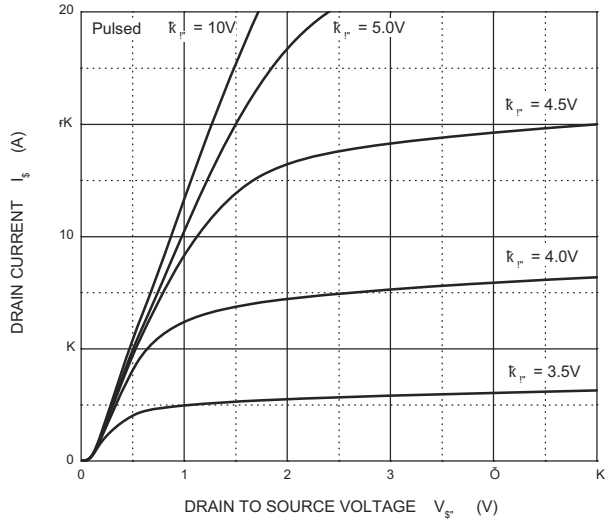
2. Pulse Test : Pulse width=300μs, duty cycle≤2%.

3. Switching characteristics are independent of operating junction temperature.

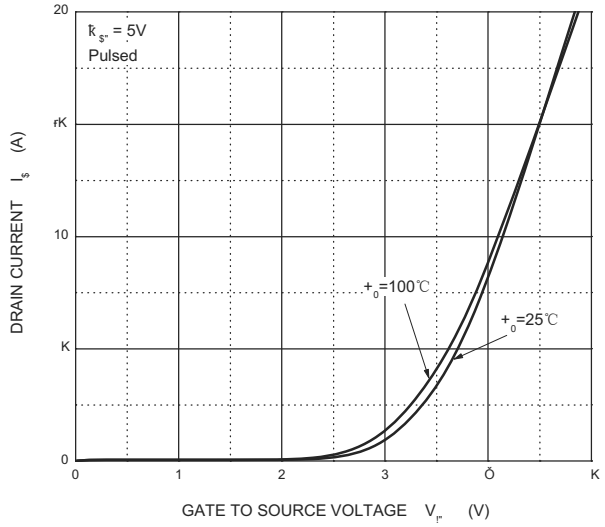
4. Graranted by design，not subject to producting.

N-Channel Typical Electrical and Thermal Characteristic Curves

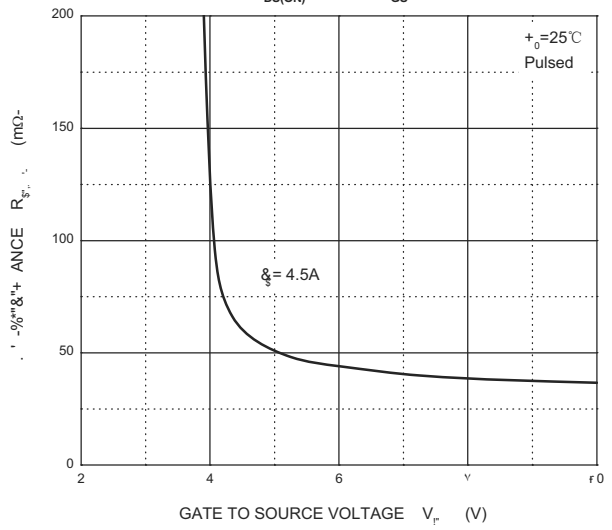
Output Characteristics



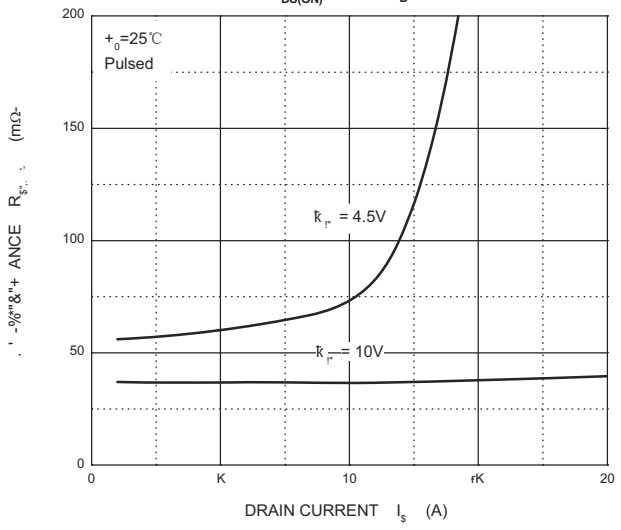
Transfer Characteristics



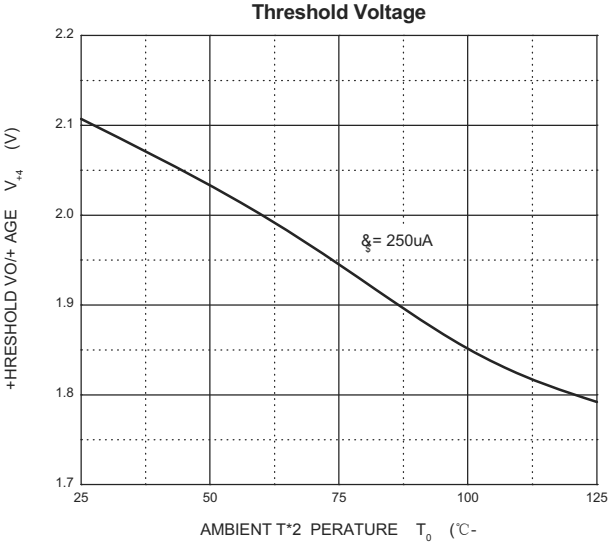
$R_{DS(ON)}$ —— V_{GS}



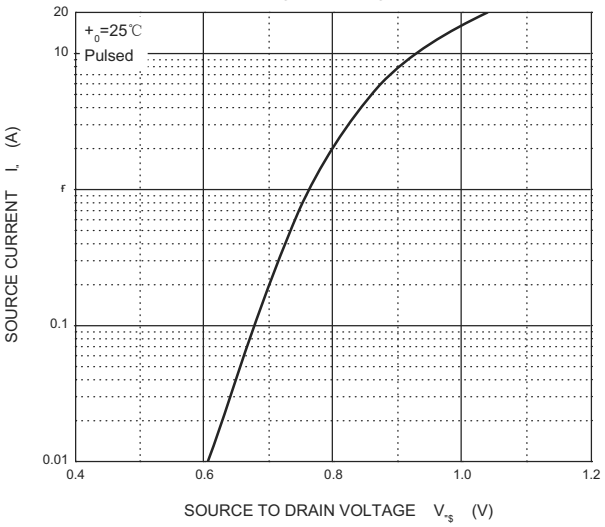
$R_{DS(ON)}$ —— I_D



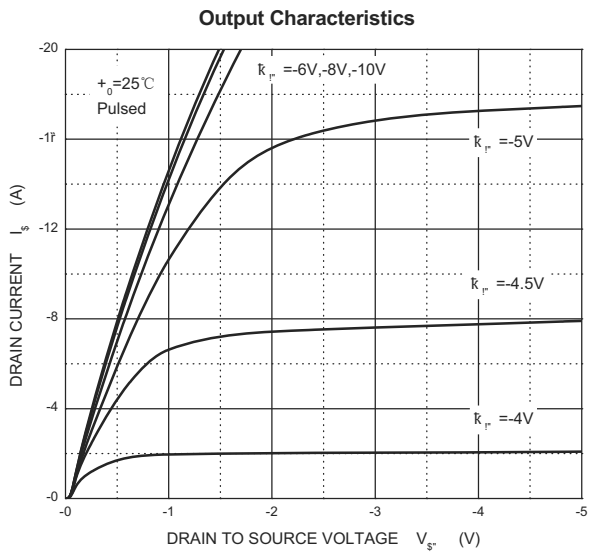
Threshold Voltage

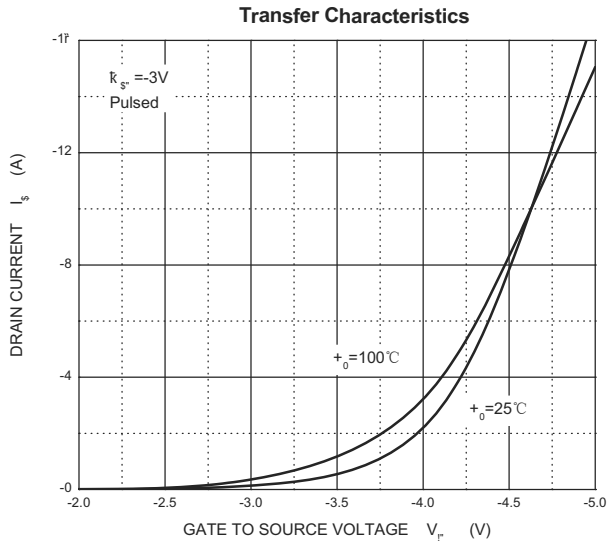


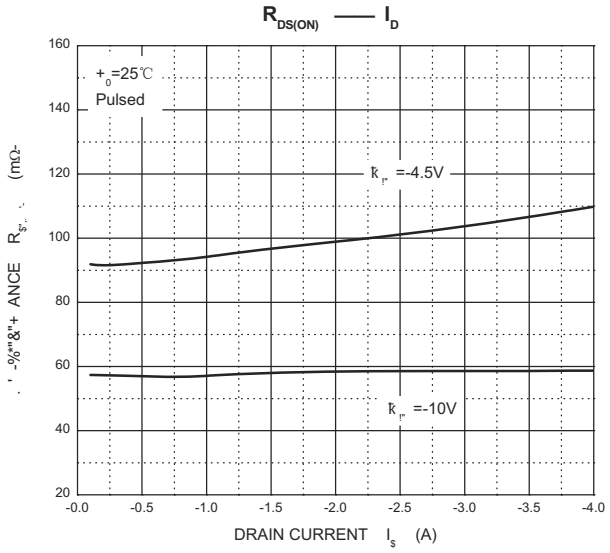
I_S —— V_{SD}

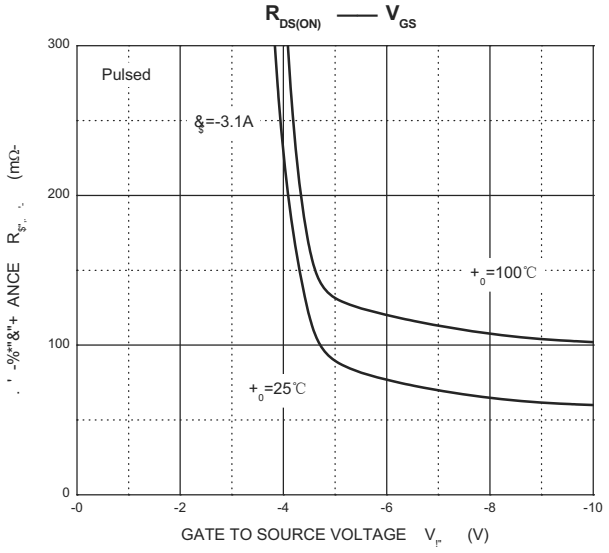


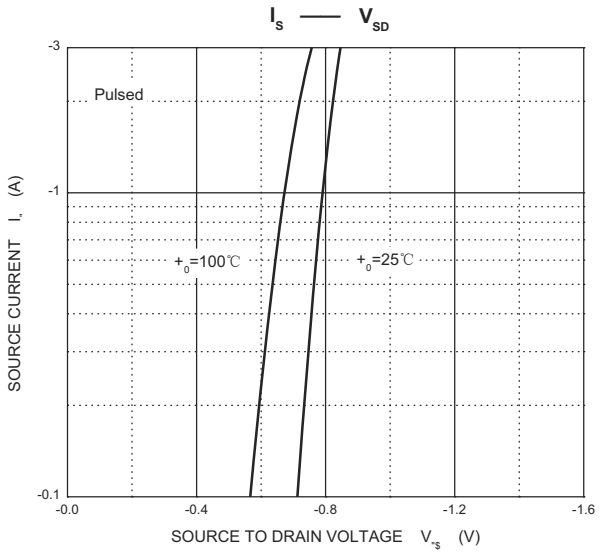
P-Channel Typical Electrical and Thermal Characteristic Curves

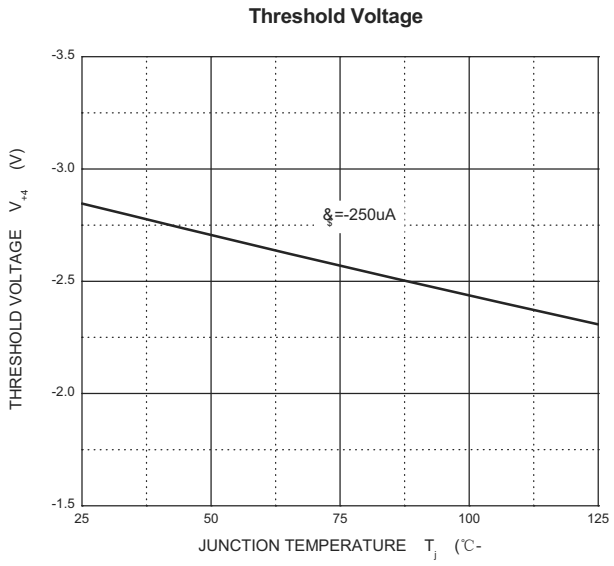




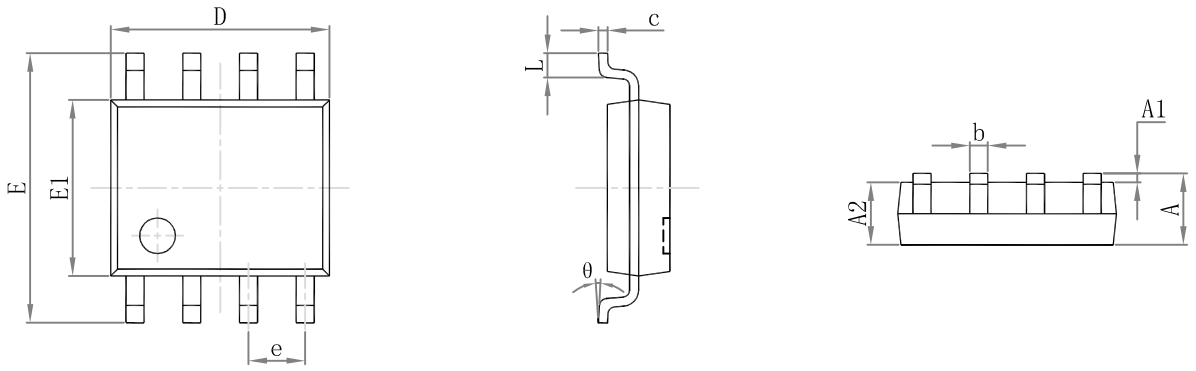






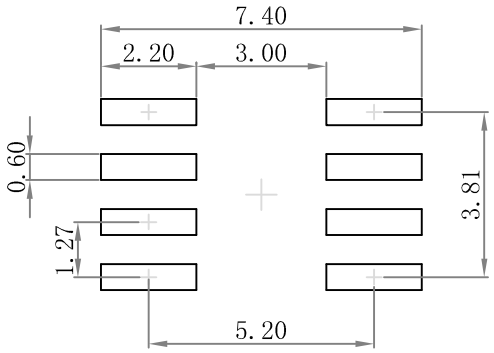


Package Outline Dimensions SOP-8



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.