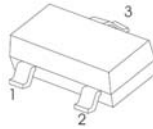


### FEATURE

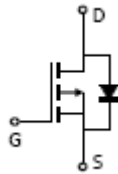
- High density cell design for low  $R_{DS(ON)}$
- Voltage controlled small signal switch
- Rugged and reliable
- High saturation current capability

### SOT-23

1. GATE
2. SOURCE
3. DRAIN

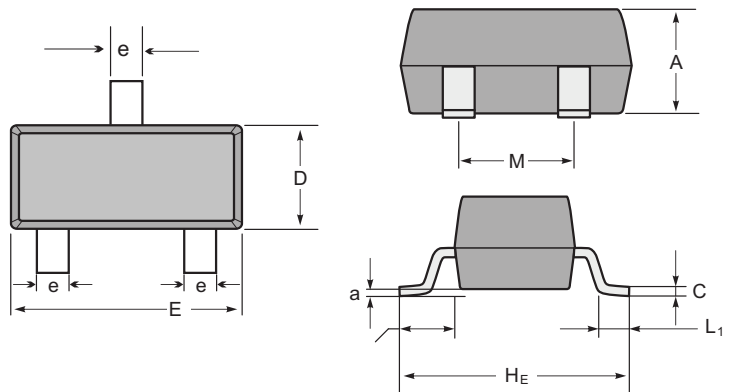


### Equivalent Circuit



### Marking

Type number	Marking code
SI2309	S9



SOT-23 mechanical data

UNIT		A	C	D	E	H <sub>E</sub>	e	M	L	L <sub>1</sub>	a
mm	max	1.1	0.15	1.4	3.0	2.6	0.5	1.95	0.55 (ref)	0.36 (ref)	0.0
	min	0.9	0.08	1.2	2.8	2.2	0.3	1.7			0.15
mil	max	43	6	55	118	102	20	77	22 (ref)	14 (ref)	0.0
	min	35	3	47	110	87	12	67			6

### ■ Absolute Maximum Ratings $T_a = 25^\circ\text{C}$

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DS}$	-60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current *1,*2 $T_a = 25^\circ\text{C}$ $T_a = 70^\circ\text{C}$	$I_D$	-1.25	A
		-0.85	
Pulsed Drain Current	$I_{DM}$	-8	
Avalanche Current $L=0.1\text{mH}$	$I_{AS}$	-5	
Power Dissipation *1,*2 $T_a = 25^\circ\text{C}$ $T_a = 70^\circ\text{C}$	$P_D$	1.25	W
		0.8	
Thermal Resistance.Junction- to-Ambient $t \leq 5$ sec Steady State *1	$R_{thJA}$	100	$^\circ\text{C/W}$
		166	
Thermal Resistance.Junction- to-Case *1	$R_{thJC}$	60	
Junction Temperature	$T_J$	150	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-55 to 150	

\*1 Surface Mounted on FR4 Board.

\*2  $t \leq 5$  sec.

# SI2309

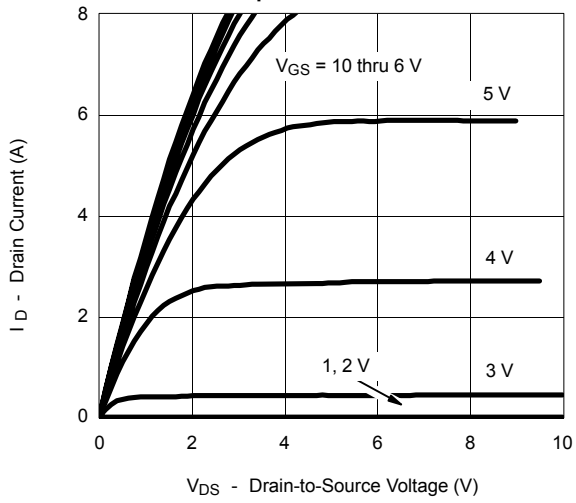
## ■ Electrical Characteristics Ta = 25 °C

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V <sub>DSS</sub>	I <sub>D</sub> =-250 μ A, V <sub>GS</sub> =0V	-60			V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =-48V, V <sub>GS</sub> =0V			-1	μ A
		V <sub>DS</sub> =-48V, V <sub>GS</sub> =0V, T <sub>J</sub> =125 °C			-50	
Gate-Body leakage current	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V			±100	nA
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> I <sub>D</sub> =-250 μ A	-1		-3	V
Static Drain-Source On-Resistance *1	R <sub>DS(on)</sub>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-1.25A		160	340	m Ω
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-1A			550	
On state drain current *1	I <sub>D(ON)</sub>	V <sub>GS</sub> =-4.5V, V <sub>DS</sub> =-10V	-6			A
Forward Transconductance *1	g <sub>FS</sub>	V <sub>DS</sub> =-4.5V, I <sub>D</sub> =-1A		1.9		S
Total Gate Charge	Q <sub>g</sub>	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-30V, I <sub>D</sub> =-1.25A		5.4	12	nC
Gate Source Charge	Q <sub>gs</sub>			1.15		
Gate Drain Charge	Q <sub>gd</sub>			0.92		
Turn-On DelayTime	t <sub>d(on)</sub>	V <sub>GS</sub> =-4.5V, V <sub>DS</sub> =-30V, R <sub>L</sub> =30 Ω, R <sub>GEN</sub> =6 Ω  I <sub>D</sub> =-1A		10.5	20	ns
Turn-On Rise Time	t <sub>r</sub>			11.5	20	
Turn-Off DelayTime	t <sub>d(off)</sub>			15.5	30	
Turn-Off Fall Time	t <sub>f</sub>			7.5	15	
Body Diode Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> =-1.25A, di/dt=100A/ μ s		30	55	
Maximum Body-Diode Continuous Current	I <sub>S</sub>				-1.25	A
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =-1.25A, V <sub>GS</sub> =0V		-0.82	-1.2	V

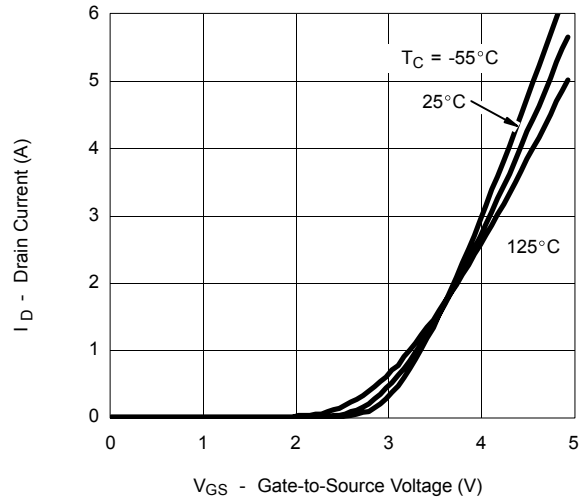
\*1 Pulse test; pulse width ≤ 300us, duty cycle ≤ 2%.

# RATING AND CHARACTERISTIC CURVES (SI2309)

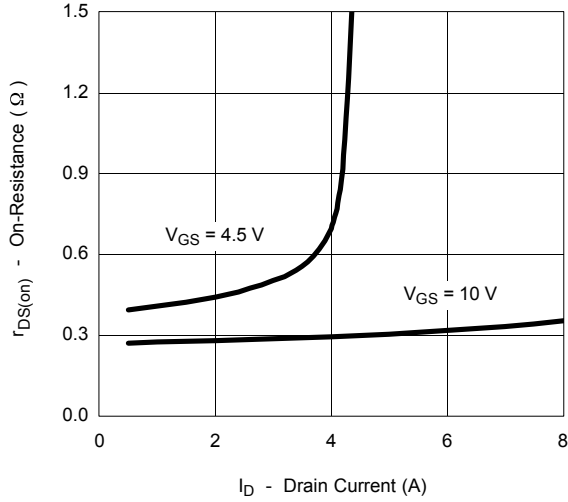
**Output Characteristics**



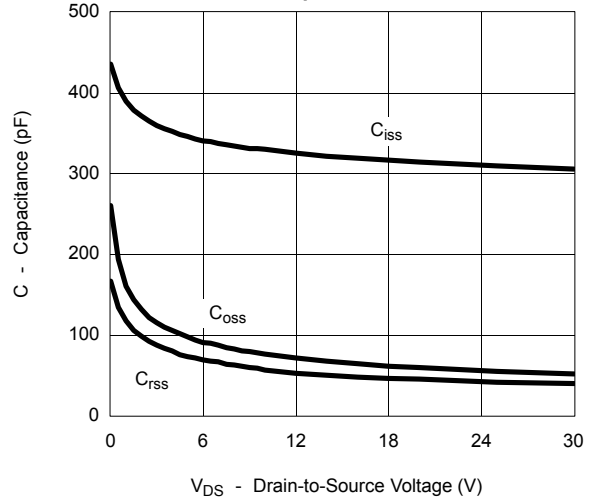
**Transfer Characteristics**



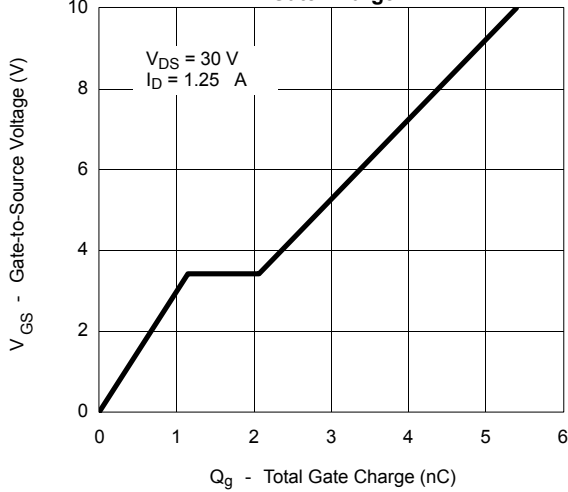
**On-Resistance vs. Drain Current**



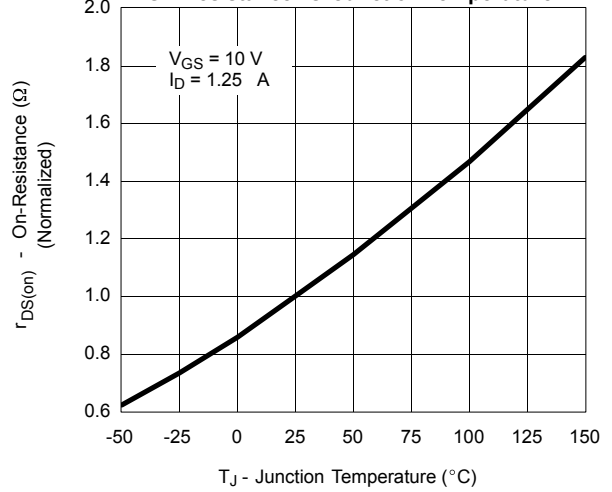
**Capacitance**



**Gate Charge**

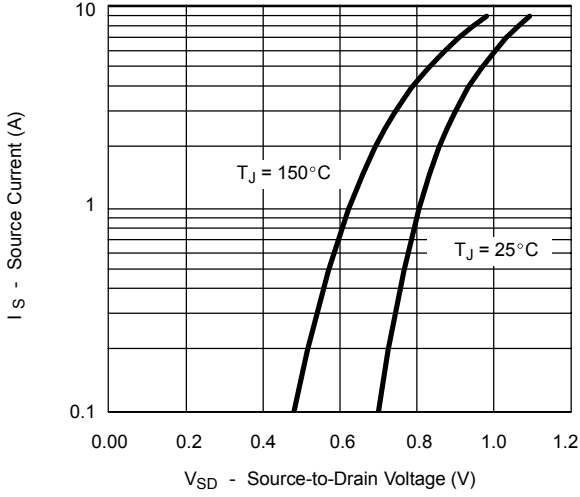


**On-Resistance vs. Junction Temperature**

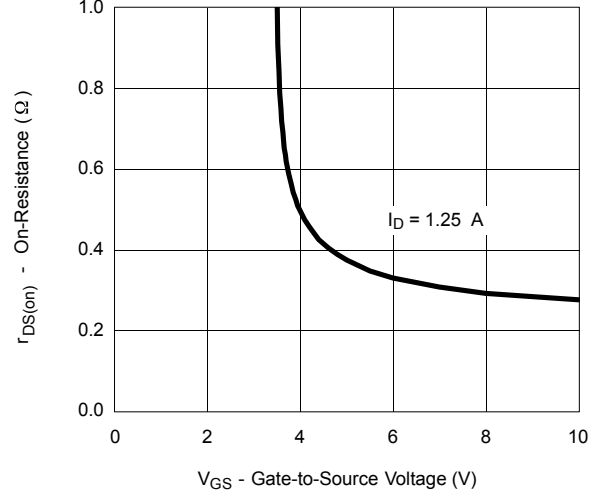


# RATING AND CHARACTERISTIC CURVES (SI2309)

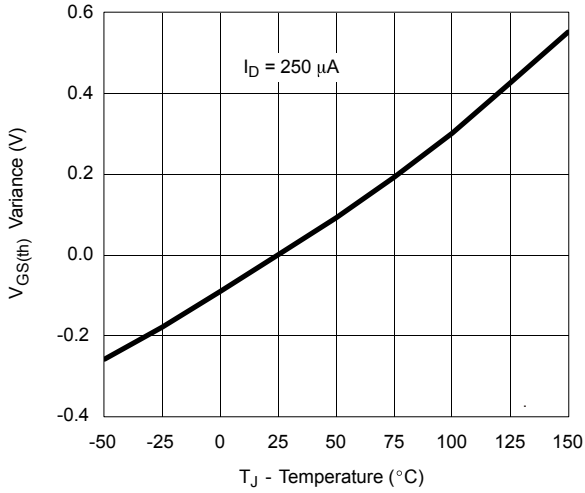
Source-Drain Diode Forward Voltage



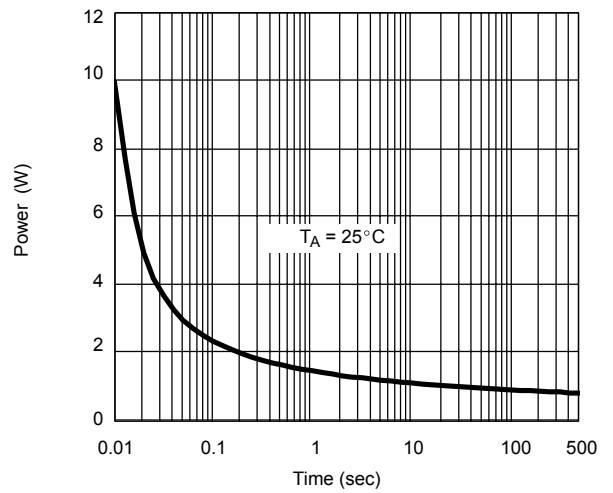
On-Resistance vs. Gate-to-Source Voltage



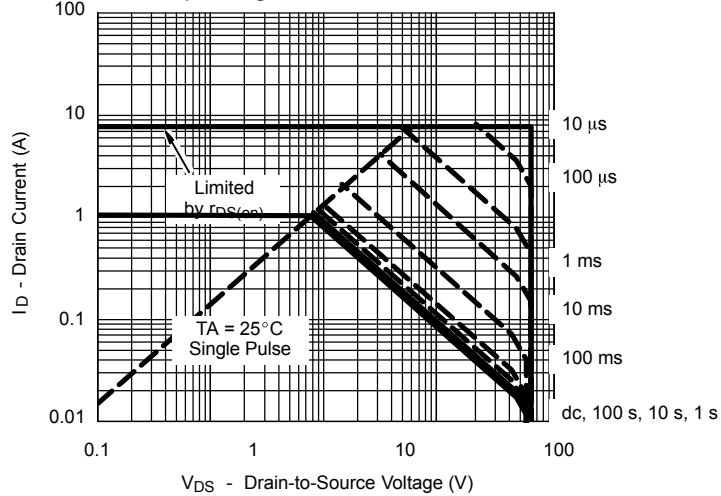
Threshold Voltage



Single Pulse Power



Safe Operating Area, Junction-to-Ambient



# RATING AND CHARACTERISTIC CURVES (SI2309)

