

SI2309

P-Channel MOSFET

Features

- $V_{DS} = -60V$
- $I_D = -2.0A$
- $R_{DS(ON)} @ V_{GS} = -10V, TYP = 170m\Omega$
- $R_{DS(ON)} @ V_{GS} = -4.5V, TYP = 200m\Omega$

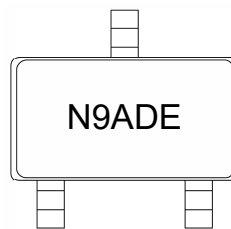
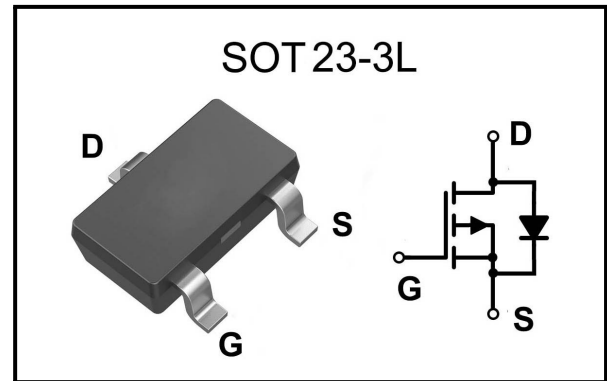
Description

- Advanced trench process technology
- High Density Cell Design For Ultra Low On-Resistance
- SOT23-3L for Surface Mount Package.

Applications

- Load Switch
- High Speed line Driver
- Switching Circuits

Marking



Ordering information

Order code	Package	Marking	Base qty	Delivery mode
SI2309	SOT23-3L	N9ADE	3K	Tape and reel

Absolute Maximum Ratings (@ $T_A = 25^\circ C$ unless otherwise noted)

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source Voltage	-60	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Continuous Drain Current	-2	A
I_{DM}	Pulsed Drain Current ⁽¹⁾	-8	A
P_D	Maximum Power Dissipation ⁽²⁾	$T_A = 25^\circ C$	1
		$T_A = 75^\circ C$	0.8
T_J, T_{stg}	Operating Junction and Storage Temperature Range	-50 to + 150	$^\circ C$
$R_{\theta JA}$	Junction-to-Ambient Thermal Resistance (PCB mounted) ⁽²⁾	100	$^\circ C/W$
	Junction-to-Ambient Thermal Resistance (PCB mounted) ⁽³⁾	166	$^\circ C/W$

Notes: (1) Pulse width limited by maximum junction temperature.

(2) Surface Mounted on FR4 Board, $t \leq 5$ sec.

(3) Surface Mounted on FR4 Board.

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Specifications are subject to change without notice.

Please refer to <http://www.born-tw.com> for current information. Revision: 2022-Jan-1-A



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Electrical Characteristics @ $T_A=25^{\circ}\text{C}$ unless otherwise noted

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
Static Electrical Characteristics @ T _J =25°C (unless otherwise stated)						
BV _{DS}	Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = -250uA	-60	—	—	V
I _{DSS}	Zero Gate Voltage	V _{DS} = -60V, V _{GS} = 0V, T _A =25°C	—	—	-1	uA
	Drain Current	V _{DS} = -60V, V _{GS} = 0V, T _A =125°C	—	—	-100	
I _{GSS}	Gate Body Leakage	V _{GS} = ±20V, V _{DS} = 0V	—	—	±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = -250uA	-1.0	-1.8	-2.5	V
R _{DS(on)}	Drain-Source On-State	V _{GS} = -10V, I _D = -2A	—	170	220	mΩ
	Resistance ⁽²⁾	V _{GS} = -4.5V, I _D = -1A	—	200	300	
Dynamic Electrical Characteristics @ T _J =25°C (unless otherwise stated)						
C _{iss}	Input Capacitance	V _{DS} = -30V, V _{GS} = 0V, f = 1.0MHZ	—	310	—	pF
C _{oss}	Output Capacitance		—	22	—	
C _{rss}	Reverse Transfer Capacitance		—	15	—	
Q _g	Total Gate Charge	V _{DS} = -30V I _D = -2A, V _{GS} = -10V	—	5.4	—	nC
Q _{gs}	Gate-Source Charge		—	1.1	—	
Q _{gd}	Gate-Drain Charge		—	1.6	—	
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DD} = -30V, I _D = -2A, V _{GS} = -10V, R _G = 3.3Ω	—	41	—	ns
t _r	Turn-On Rise Time		—	22	—	
t _{d(off)}	Turn-Off Delay Time		—	25	—	
t _f	Turn-Off Fall Time		—	32	—	
Source Drain Diode Characteristics						
I _S	Max. Diode Forward Current	T _A =25°C	—	—	-2.0	A
V _{SD}	Diode Forward Voltage ⁽²⁾	I _S = -2A, V _{GS} = 0V, T _J =25°C	—	-0.84	-1.2	V

Note(1) :Pulse width limited by maximum allowable junction temperature

(2) :Pulse test: pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$



Typical Performance Characteristics($T_J = 25^\circ\text{C}$, unless otherwise noted)

Figure 1 :Typical Output Characteristics

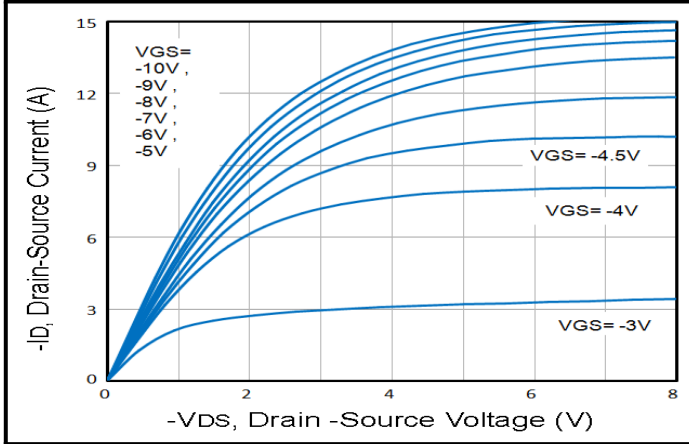


Figure 3 :Typical Transfer Characteristics

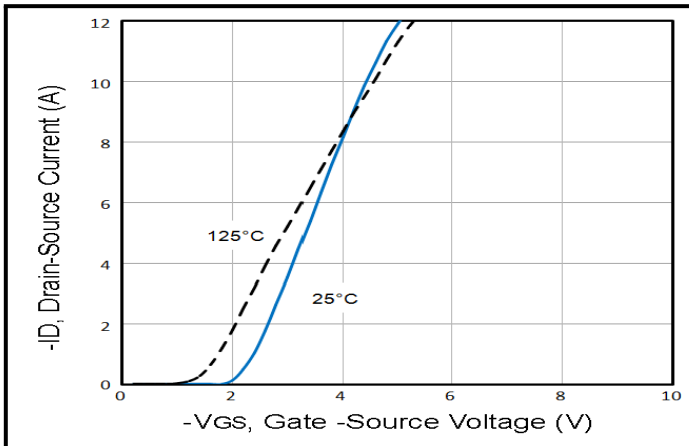


Figure 5 :Typical Source-Drain Diode Forward Voltage

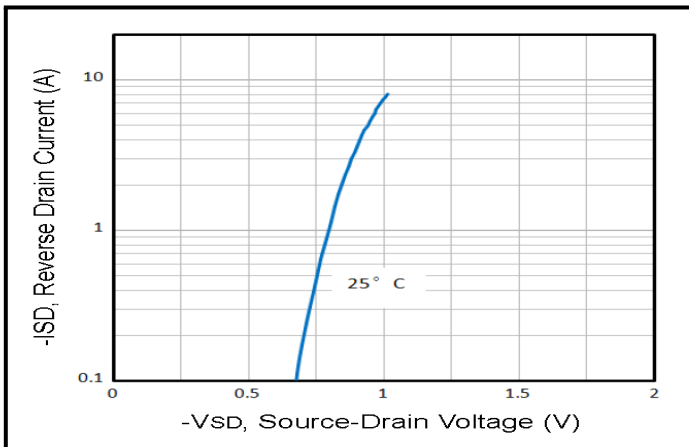


Figure 2 :Normalized Threshold Voltage Vs. Temperature

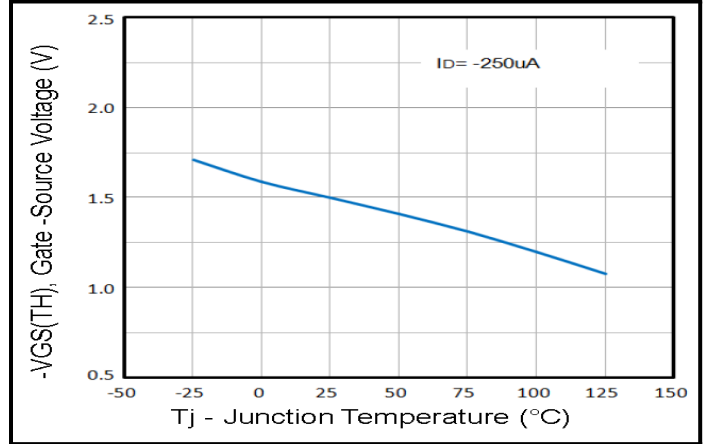


Figure 4 :Drain -Source Voltage vs Gate -Source Voltage

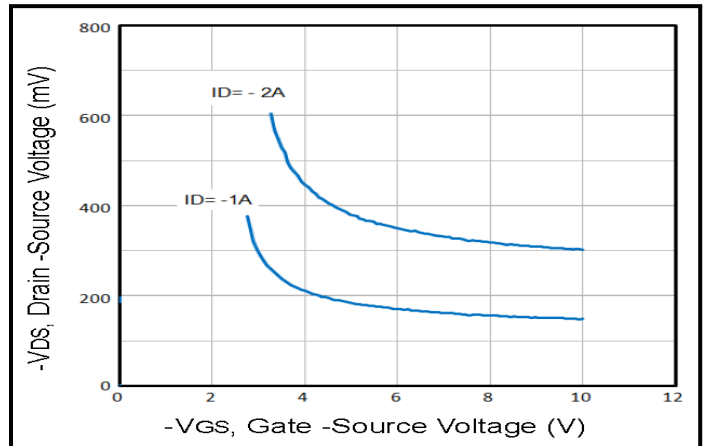
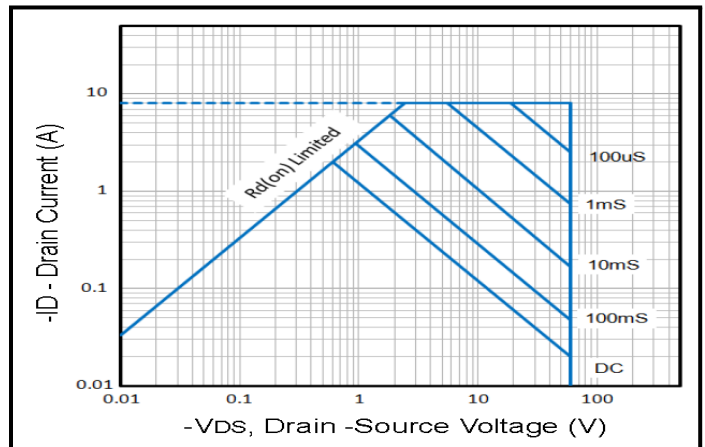


Figure 6 : Maximum Safe Operating Area



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Figure 7 :Typical Capacitance Vs. Drain-Source Voltage

age

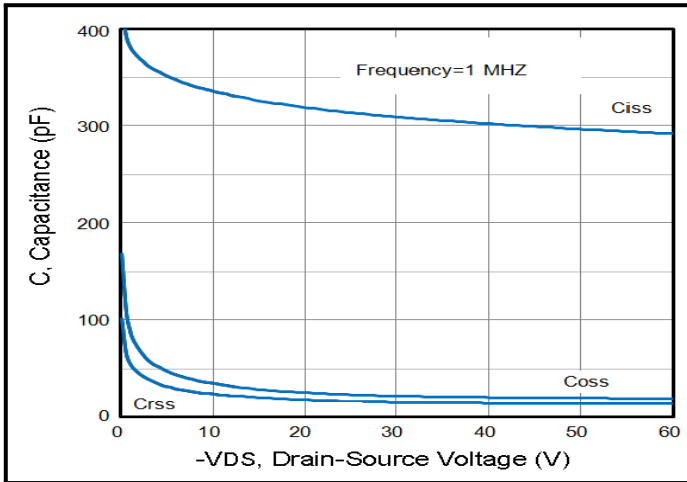


Figure 8 :Typical Gate Charge Vs. Gate-Source Voltage

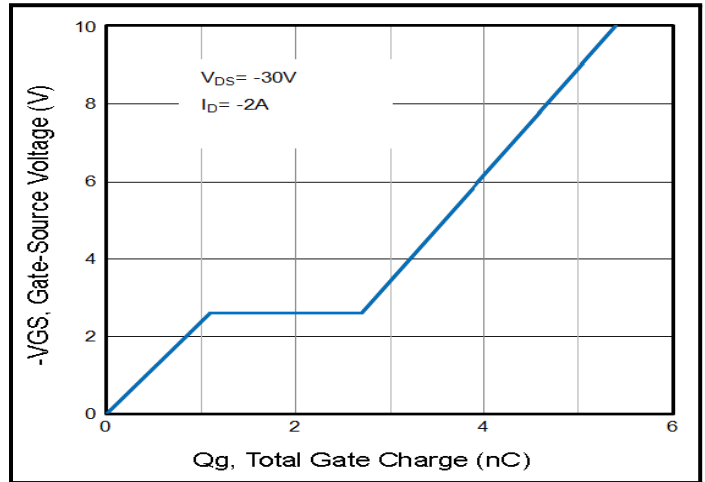
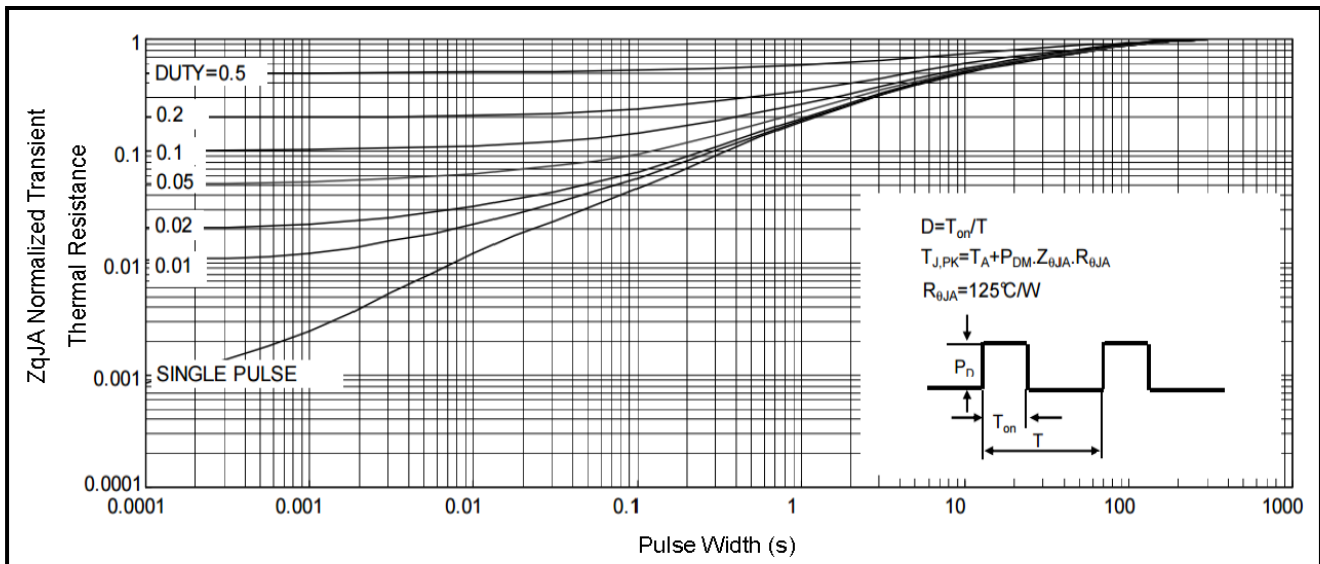


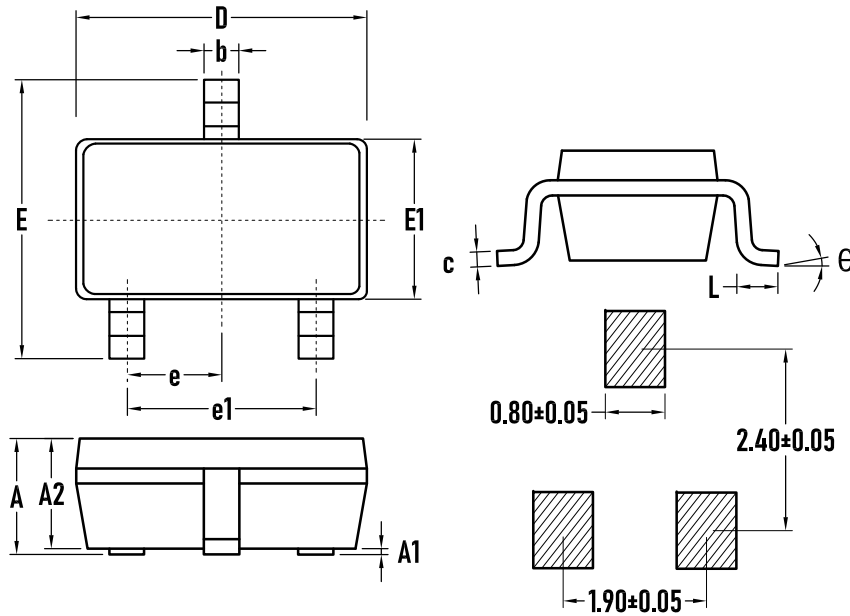
Figure 9 :Normalized Maximum Transient Thermal Impedance



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Outline Drawing - SOT23-3L



SYMBOL	MILLIMETER		Inches	
	MIN.	MAX.	MIN.	MAX.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E1	1.500	1.700	0.059	0.067
E	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

