

P-Channel 60-V (D-S) MOSFET

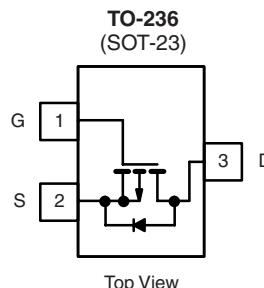
PRODUCT SUMMARY		
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
- 60	0.340 at $V_{GS} = - 10$ V	- 1.25
	0.550 at $V_{GS} = - 4.5$ V	- 1

FEATURES

- Halogen-free According to IEC 61249-2-21 Available
- TrenchFET® Power MOSFET



RoHS*
COMPLIANT
HALOGEN
FREE
Available



Top View

Si2309DS (A9)*

* Marking Code

Ordering Information: Si2309DS-T1

Si2309DS-T1-E3 (Lead (Pb)-free)

Si2309DS-T1-GE3 (Lead (Pb)-free and Halogen-free)

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted				
Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	V_{DS}	- 60	V	
Gate-Source Voltage	V_{GS}	± 20		
Continuous Drain Current ($T_J = 150$ °C) ^{a, b}	I_D ($T_A = 25$ °C)	- 1.25	A	
	I_D ($T_A = 70$ °C)	- 0.85		
Pulsed Drain Current	I_{DM}	- 8	A	
Avalanche Current	I_{AS}	- 5		
Maximum Power Dissipation ^{a, b}	P_D ($T_A = 25$ °C)	1.25	W	
	P_D ($T_A = 70$ °C)	0.8		
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	°C	

THERMAL RESISTANCE RATINGS				
Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^a	$t \leq 5$ s	R_{thJA}	100	°C/W
	Steady State	R_{thJA}	130	
Maximum Junction-to-Lead ^a	Steady State	R_{thJL}	45	60

Notes:

a. Surface Mounted on FR4 board.

b. $t \leq 5$ s.

* Pb containing terminations are not RoHS compliant, exemptions may apply.

SPECIFICATIONS $T_J = 25^\circ\text{C}$, unless otherwise noted

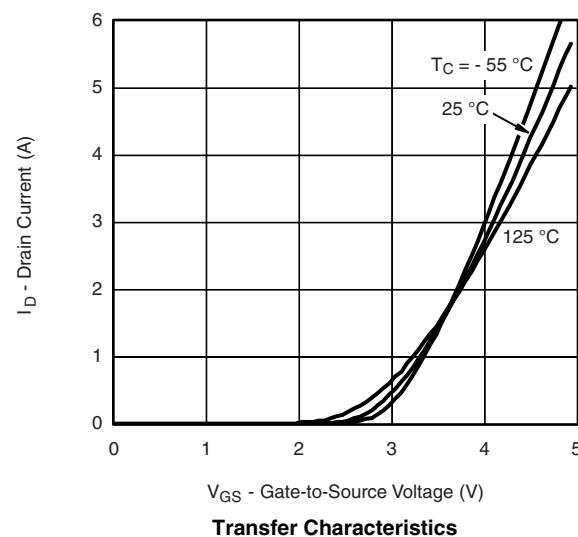
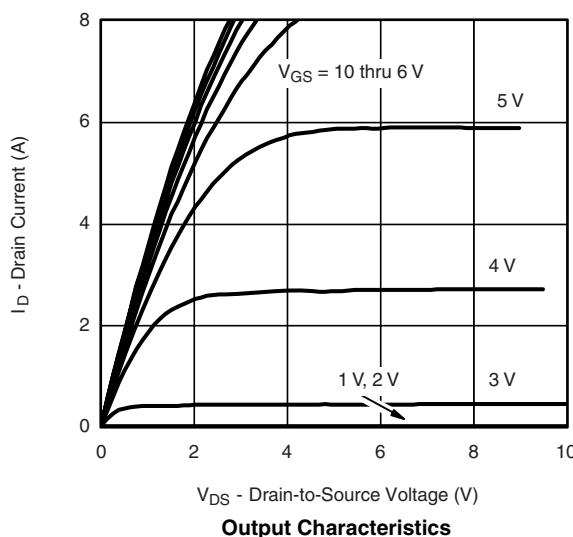
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$V_{\text{DS}} = 0 \text{ V}$, $I_D = -250 \mu\text{A}$	- 60			V
Gate Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{DS}} = V_{\text{GS}}$, $I_D = -250 \mu\text{A}$	- 1			
Gate-Body Leakage	I_{GSS}	$V_{\text{DS}} = 0 \text{ V}$, $V_{\text{GS}} = \pm 20 \text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{\text{DS}} = -48 \text{ V}$, $V_{\text{GS}} = 0 \text{ V}$			- 1	μA
		$V_{\text{DS}} = -48 \text{ V}$, $V_{\text{GS}} = 0 \text{ V}$, $T_J = 125^\circ\text{C}$			- 50	
On-State Drain Current ^a	$I_{\text{D}(\text{on})}$	$V_{\text{DS}} \geq -4.5 \text{ V}$, $V_{\text{GS}} = -10 \text{ V}$	- 6			A
Drain-Source On-State Resistance ^a	$R_{\text{DS}(\text{on})}$	$V_{\text{GS}} = -10 \text{ V}$, $I_D = -1.25 \text{ A}$		0.275	0.340	Ω
		$V_{\text{GS}} = -4.5 \text{ V}$, $I_D = -1 \text{ A}$		0.406	0.550	
Forward Transconductance ^a	g_{fs}	$V_{\text{DS}} = -4.5 \text{ V}$, $I_D = -1 \text{ A}$		1.9		S
Dynamic^b						
Total Gate Charge	Q_g	$V_{\text{DS}} = -30 \text{ V}$, $V_{\text{GS}} = -10 \text{ V}$, $I_D = -1.25 \text{ A}$		5.4	12	nC
Gate-Source Charge	Q_{gs}			1.15		
Gate-Drain Charge	Q_{gd}			0.92		
Turn-On Delay Time	$t_{\text{d}(\text{on})}$	$V_{\text{DD}} = -30 \text{ V}$, $R_L = 30 \Omega$ $I_D \geq -1 \text{ A}$, $V_{\text{GEN}} = -4.5 \text{ V}$, $R_G = 6 \Omega$		10.5	20	ns
Rise Time	t_r			11.5	20	
Turn-Off Delay Time	$t_{\text{d}(\text{off})}$			15.5	30	
Fall Time	t_f			7.5	15	
Source-Drain Rating Characteristics^b						
Continuous Current	I_S				- 1.25	A
Pulsed Current	I_{SM}				- 8	
Diode Forward Voltage ^a	V_{SD}	$I_S = -1.25 \text{ A}$, $V_{\text{GS}} = 0 \text{ V}$		- 0.82	- 1.2	V
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = -1.25 \text{ A}$, $dI/dt = 100 \text{ A}/\mu\text{s}$		30	55	ns

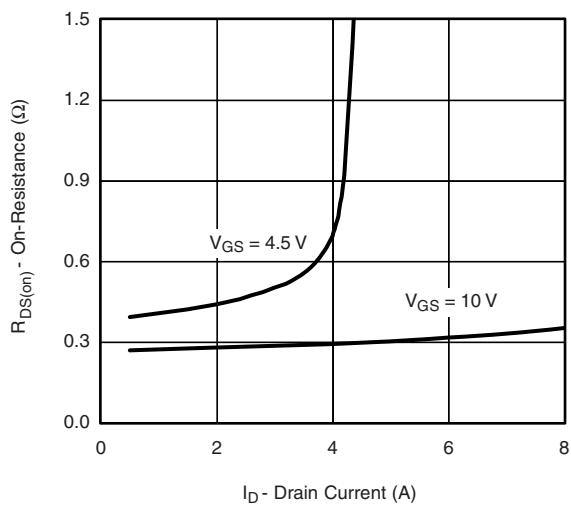
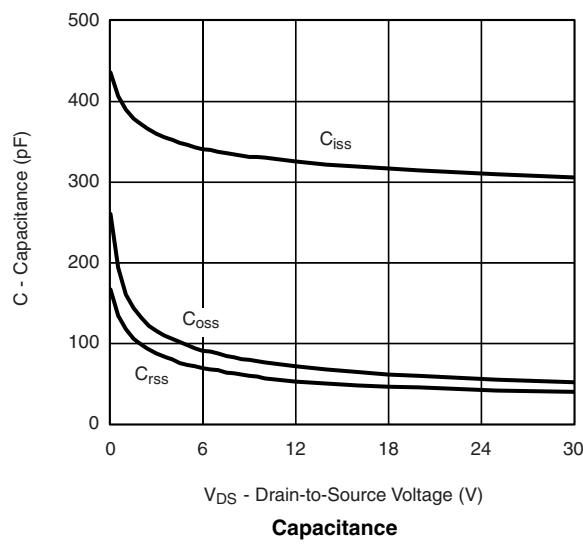
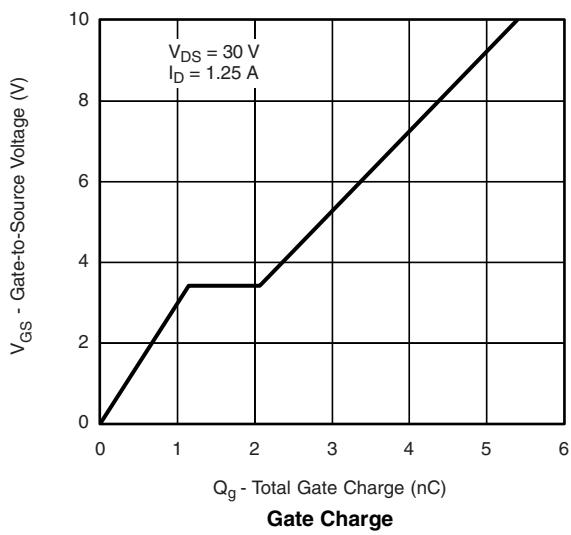
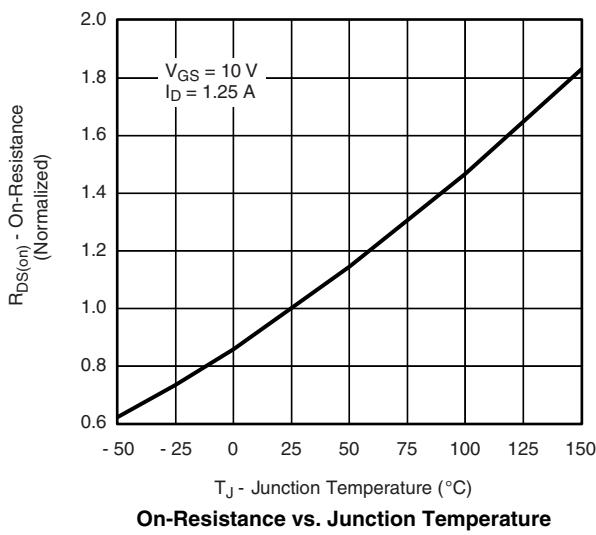
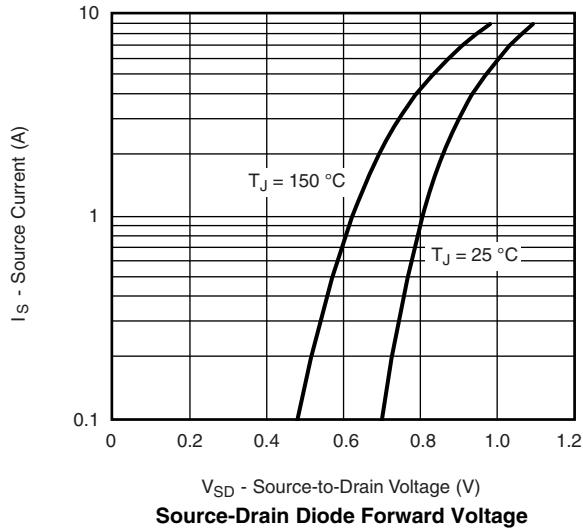
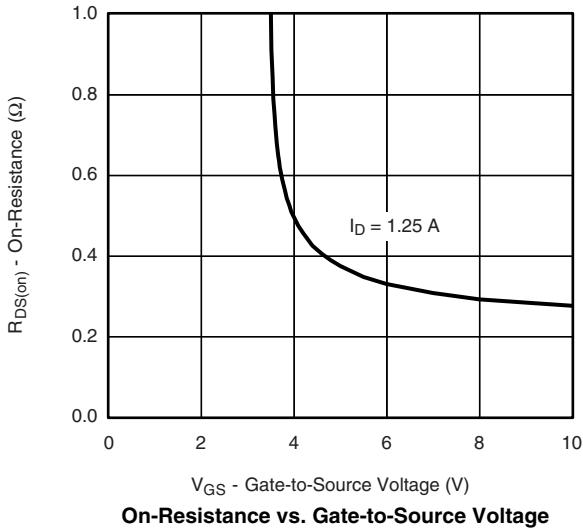
Notes:

a. Pulse test; pulse width $\leq 300 \mu\text{s}$, duty cycle $\leq 2\%$.

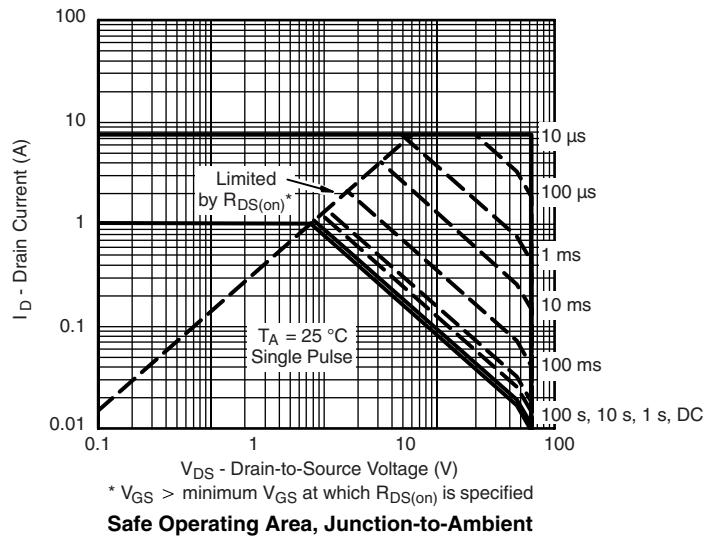
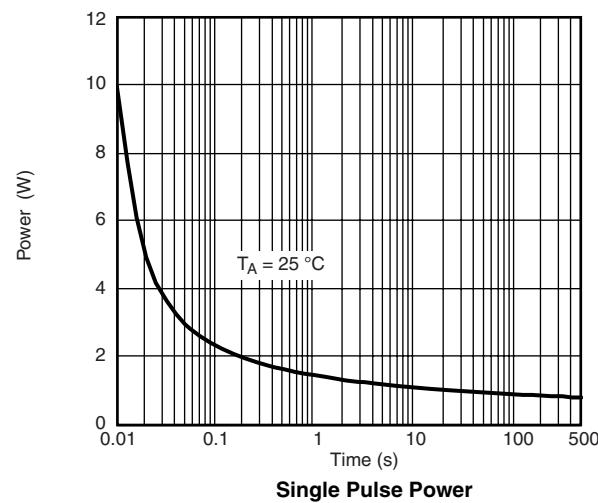
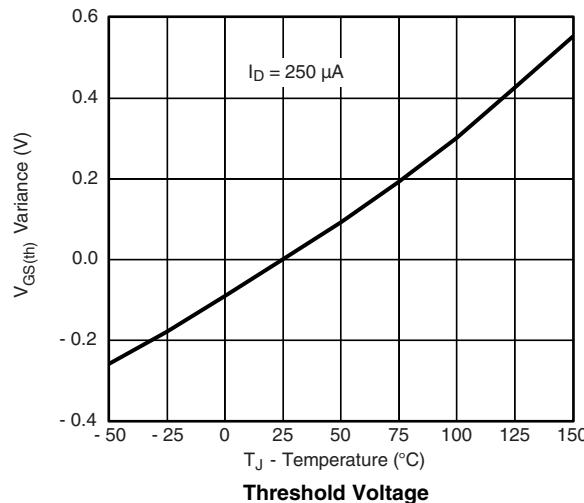
b. Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

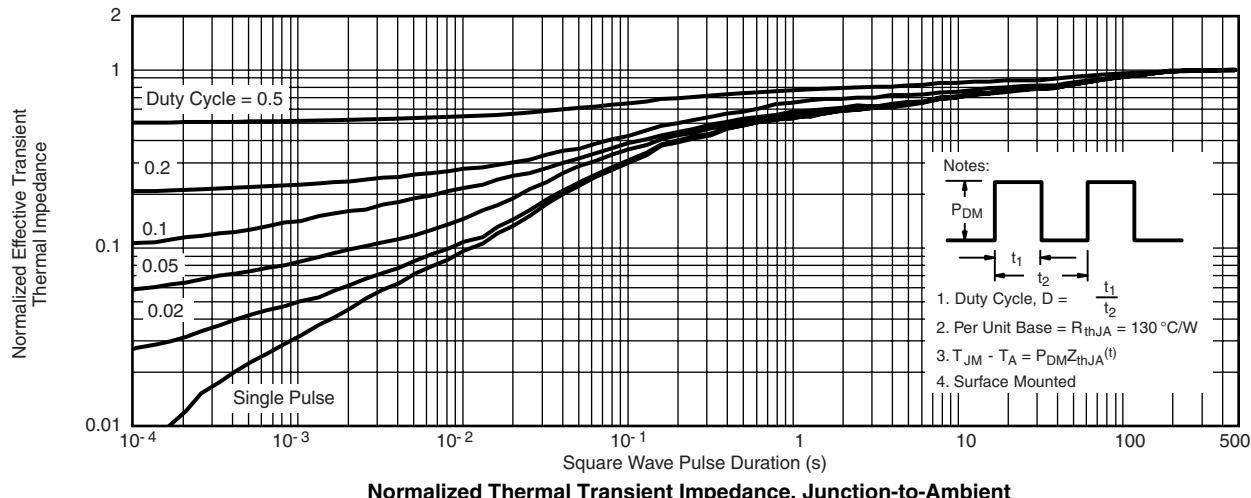
TYPICAL CHARACTERISTICS 25°C , unless otherwise noted

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On-Resistance vs. Drain Current

Capacitance

Gate Charge

On-Resistance vs. Junction Temperature

Source-Drain Diode Forward Voltage

On-Resistance vs. Gate-to-Source Voltage

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Safe Operating Area, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Ambient

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