N-Channel 20-V (D-S) MOSFET

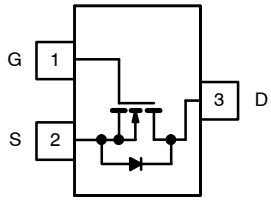
PRODUCT SUMMARY			
V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ)
20	0.033 @ V_{GS} = 4.5 V	4.9	11.2
	0.040 @ V_{GS} = 2.5 V	4.4	
	0.051 @ V_{GS} = 1.8 V	3.9	

FEATURES

- 1.8-V Rated
- RoHS Compliant

Pb-free Available

TO-236
(SOT-23)



Top View

Si2312DS (C2)*

*Marking Code

Ordering Information: Si2312DS-T1
Si2312DS-T1—E3 (Lead (Pb)-Free)

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C UNLESS OTHERWISE NOTED)

Parameter		Symbol	5 sec	Steady State	Unit
Drain-Source Voltage		V_{DS}	20		V
Gate-Source Voltage		V_{GS}	±8		
Continuous Drain Current (T_J = 150°C)[a]	T_A= 25°C	I_D	4.9	3.77	A
	T_A= 70°C		3.9	3.0	
Pulsed Drain Current[b]		I_{DM}	15		
Avalanche Current[b]	L = 0.1 mH	I_{AS}	15		
Single Avalanche Energy		E_{AS}	11.25		mJ
Continuous Source Current (Diode Conduction)[a]		I_S	1.0		A
Power Dissipation[a]	T_A= 25°C	P_D	1.25	0.75	W
	T_A= 70°C		0.80	0.48	
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 ≤ 5 sec	R_{thJA}	75	100	°C/W
	Steady State		120	166	
Maximum Junction-to-Foot	Steady State	R_{thJF}	40	50	

Notes
a. Surface Mounted on 1" x 1" FR4 Board.
b. Pulse width limited by maximum junction temperature

SPECIFICATIONS (T_A = 25°C UNLESS OTHERWISE NOTED)

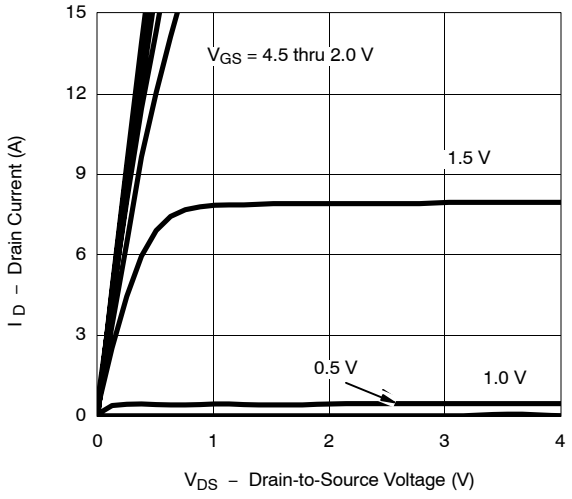
Parameter	Symbol	Test Conditions	Limits Min	Limits Typ	Limits Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 µA	20			V
Gate-Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	0.45	0.65	0.85	V
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±8 V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 20 V, V_{GS} = 0 V			1	µA
		V_{DS} = 20 V, V_{GS} = 0 V, T_J = 70°C			75	
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} ≥ 10 V, V_{GS} = 4.5 V	15			A
Drain-Source On-Resistance[a]	$r_{DS(on)}$	V_{GS} = 4.5 V, I_D = 5.0 A		0.027	0.033	Ω
		V_{GS} = 2.5 V, I_D = 4.5 A		0.033	0.040	
		V_{GS} = 1.8 V, I_D = 4.0 A		0.042	0.051	
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 5.0 A		40		S
Diode Forward Voltage	V_{SD}	I_S = 1.0 A, V_{GS} = 0 V		0.8	1.2	V
Dynamic[b]						
Total Gate Charge	Q_g	V_{DS} = 10 V, V_{GS} = 4.5 V, I_D = 5.0 A		11.2	14.0	nC
Gate-Source Charge	Q_{gs}			1.4		
Gate-Drain Charge	Q_{gd}			2.2		
Switching						
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 10 V, R_L = 10 Ω I_D ≅ 1.0 A, V_{GEN} = 4.5 V, R_g = 6 Ω		15	25	ns
Rise Time	t_r			40	60	
Turn-Off Delay Time	$t_{d(off)}$			48	70	
Fall-Time	t_f			31	45	
Source-Drain Reverse Recovery Time	t_{rr}	I_F = 1.0 A, di/dt = 100 A/µs		13	25	

Notes
a. Pulse test: PW ≤300 µs duty cycle ≤2%.
b. Guaranteed by design, not subject to production testing.

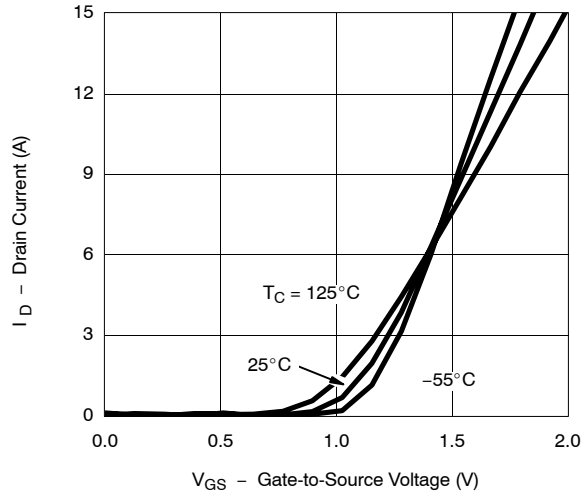
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

Output Characteristics

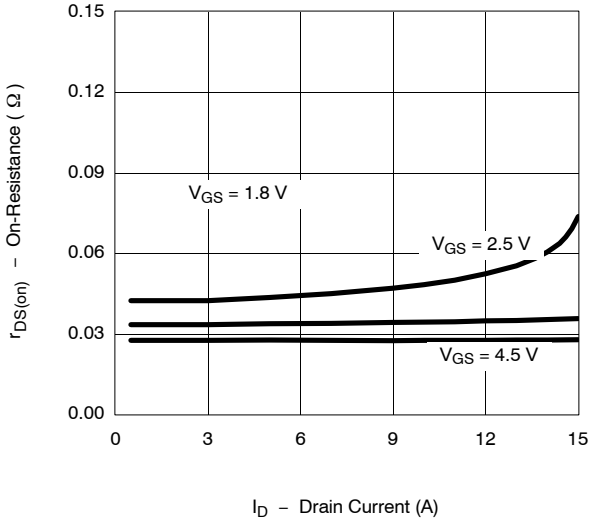


Transfer Characteristics

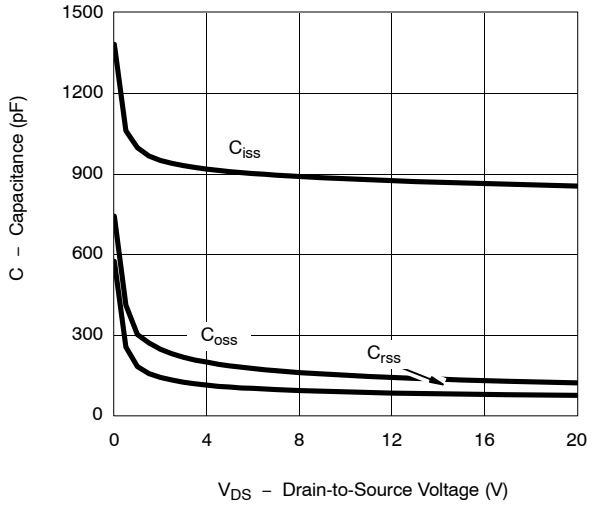


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

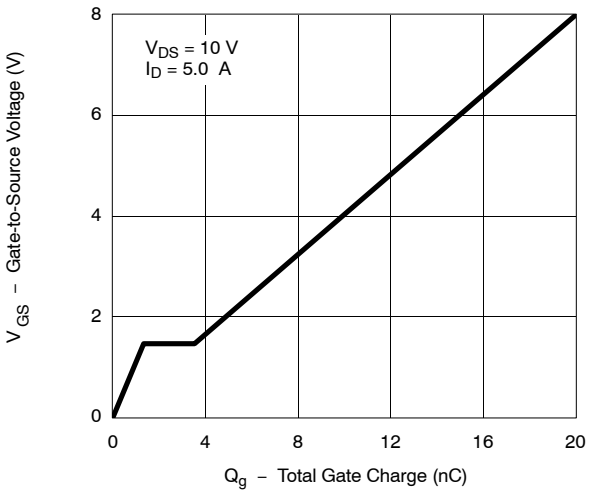
On-Resistance vs. Drain Current



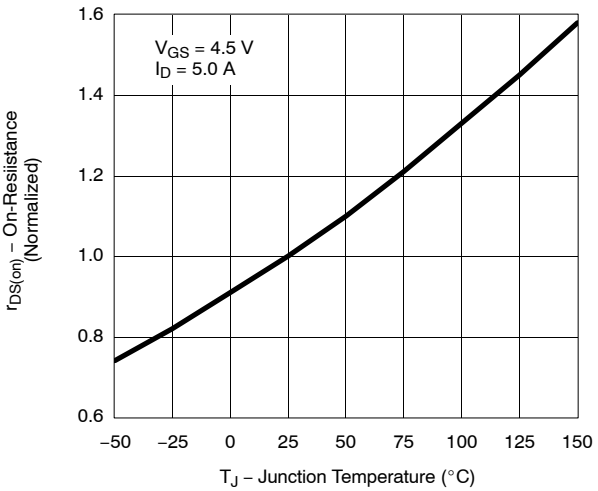
Capacitance



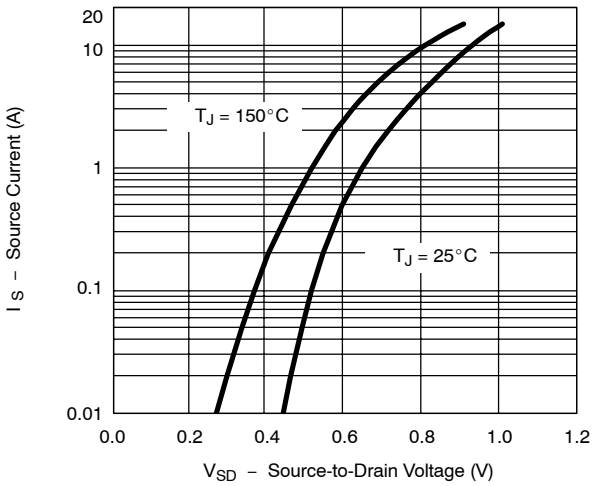
Gate Charge



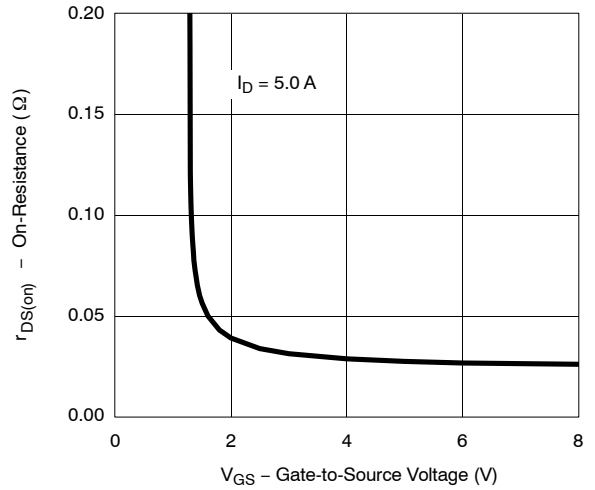
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage

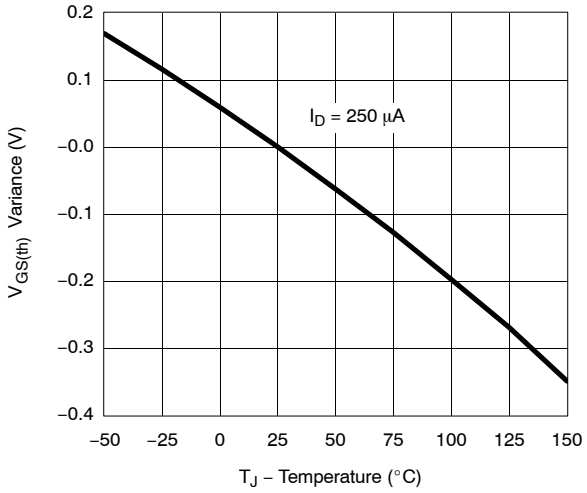


On-Resistance vs. Gate-to-Source Voltage

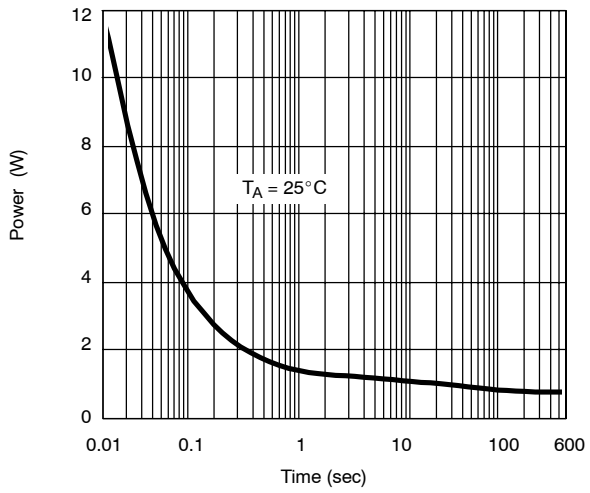


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

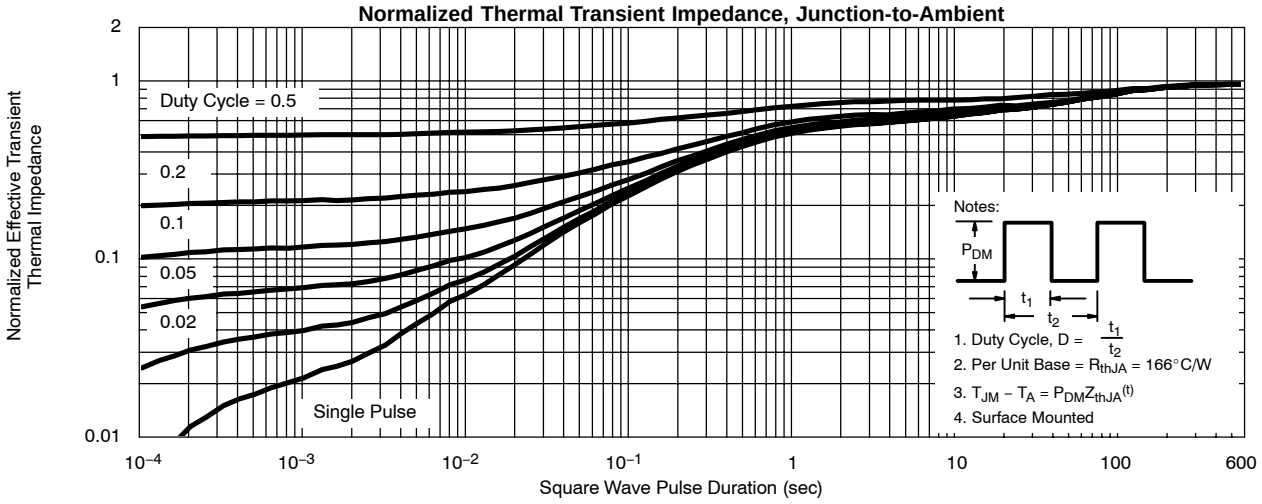
Threshold Voltage



Single Pulse Power



Normalized Thermal Transient Impedance, Junction-to-Ambient



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