



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

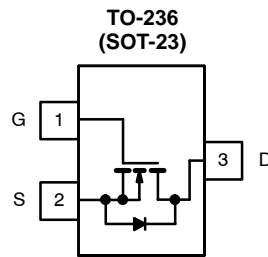
PRODUCT SUMMARY			
$V_{DS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)	$Q_g$ (Typ)
20	0.033 @ $V_{GS} = 4.5$ V	4.9	11.2
	0.040 @ $V_{GS} = 2.5$ V	4.4	
	0.051 @ $V_{GS} = 1.8$ V	3.9	

**FEATURES**

- 1.8-V Rated
- RoHS Compliant



Pb-free Available



Top View  
Si2312DS (C2)\*  
\*Marking Code

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

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)					
Parameter	Symbol	5 sec	Steady State	Unit	
Drain-Source Voltage	$V_{DS}$	20		V	
Gate-Source Voltage	$V_{GS}$	$\pm 8$			
Continuous Drain Current ( $T_J = 150^\circ\text{C}$ ) <sup>a</sup>	$I_D$	$T_A = 25^\circ\text{C}$	4.9	3.77	A
		$T_A = 70^\circ\text{C}$	3.9	3.0	
Pulsed Drain Current <sup>b</sup>	$I_{DM}$	15			
Avalanche Current <sup>b</sup>	$I_{AS}$	15			
Single Avalanche Energy	$E_{AS}$	L = 0.1 mH	11.25		mJ
Continuous Source Current (Diode Conduction) <sup>a</sup>			$I_S$	1.0	
Power Dissipation <sup>a</sup>	$P_D$	$T_A = 25^\circ\text{C}$	1.25	0.75	W
		$T_A = 70^\circ\text{C}$	0.80	0.48	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to 150		$^\circ\text{C}$	

THERMAL RESISTANCE RATINGS					
Parameter	Symbol	Typical	Maximum	Unit	
Maximum Junction-to-Ambient <sup>a</sup>	$R_{thJA}$	$t \leq 5$ sec	75	100	$^\circ\text{C/W}$
		Steady State	120	166	
Maximum Junction-to-Foot	$R_{thJF}$	40	50		

**Notes**

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



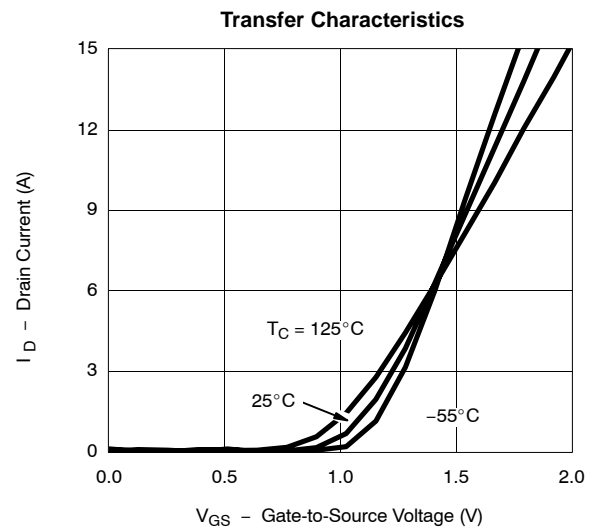
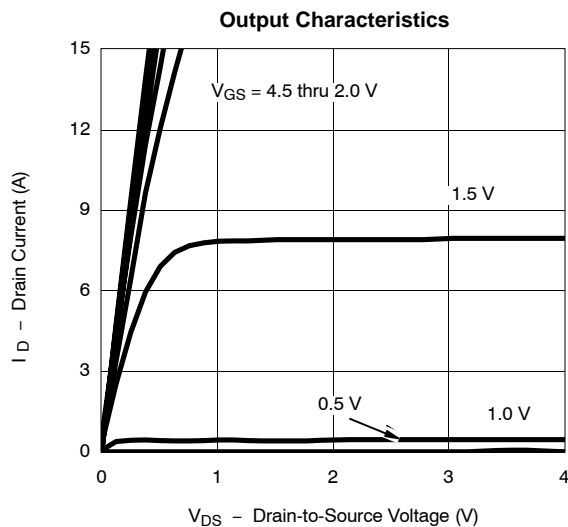
SPECIFICATIONS (T <sub>A</sub> = 25 °C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Conditions	Limits			Unit
			Min	Typ	Max	
<b>Static</b>						
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	20			V
Gate-Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	0.45	0.65	0.85	
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 8 V			± 100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 20 V, V <sub>GS</sub> = 0 V			1	μA
		V <sub>DS</sub> = 20 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 70 °C			75	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> ≥ 10 V, V <sub>GS</sub> = 4.5 V	15			A
Drain-Source On-Resistance <sup>a</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 5.0 A		0.027	0.033	Ω
		V <sub>GS</sub> = 2.5 V, I <sub>D</sub> = 4.5 A		0.033	0.040	
		V <sub>GS</sub> = 1.8 V, I <sub>D</sub> = 4.0 A		0.042	0.051	
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 5.0 A		40		S
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> = 1.0 A, V <sub>GS</sub> = 0 V		0.8	1.2	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 5.0 A		11.2	14.0	nC
Gate-Source Charge	Q <sub>gs</sub>			1.4		
Gate-Drain Charge	Q <sub>gd</sub>			2.2		
<b>Switching</b>						
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = 10 V, R <sub>L</sub> = 10 Ω I <sub>D</sub> ≅ 1.0 A, V <sub>GEN</sub> = 4.5 V, R <sub>g</sub> = 6 Ω		15	25	ns
Rise Time	t <sub>r</sub>			40	60	
Turn-Off Delay Time	t <sub>d(off)</sub>			48	70	
Fall-Time	t <sub>f</sub>			31	45	
Source-Drain Reverse Recovery Time	t <sub>rr</sub>		I <sub>F</sub> = 1.0 A, di/dt = 100 A/μs		13	

Notes

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

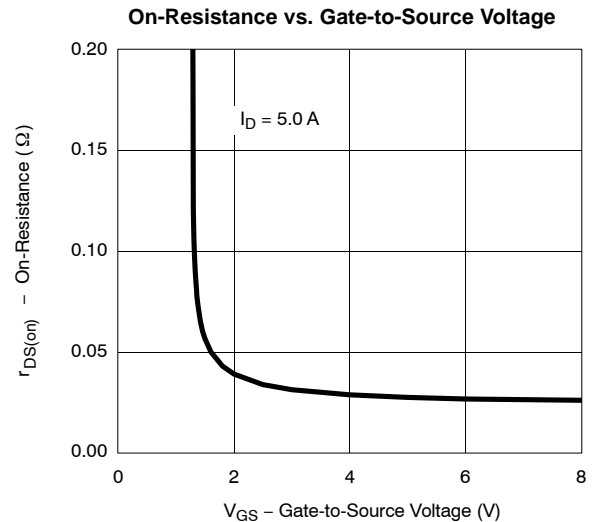
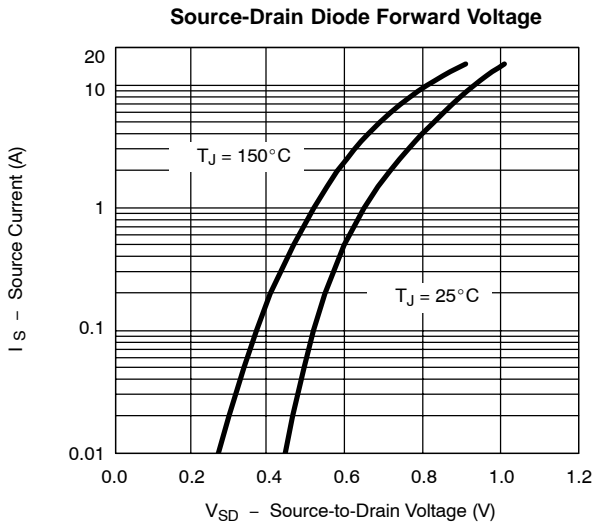
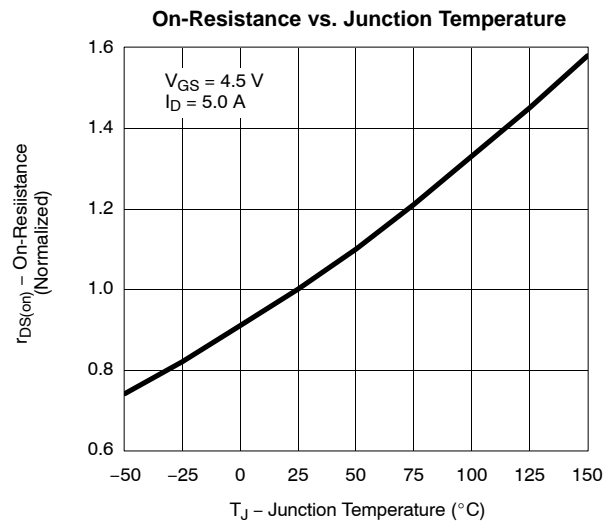
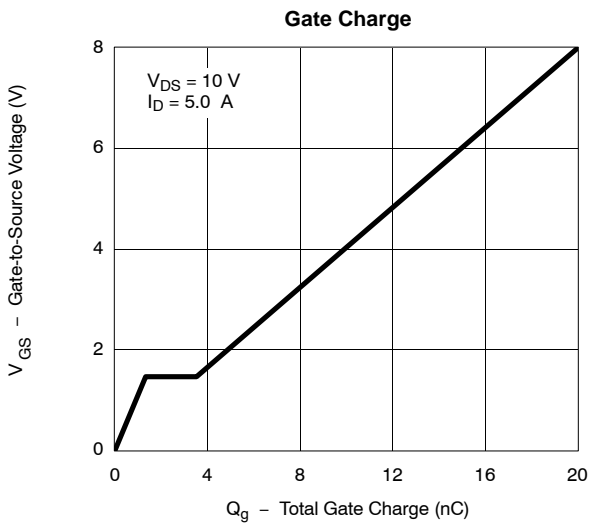
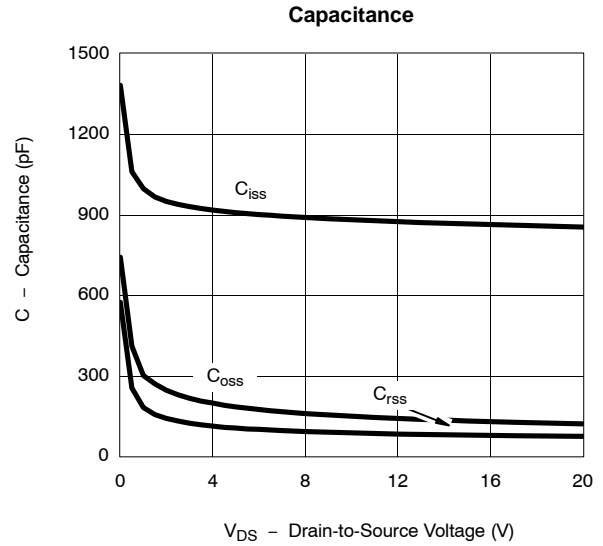
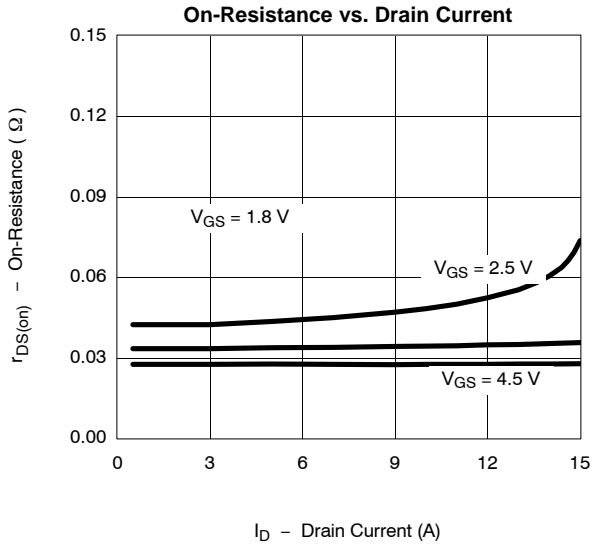
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

**TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)**

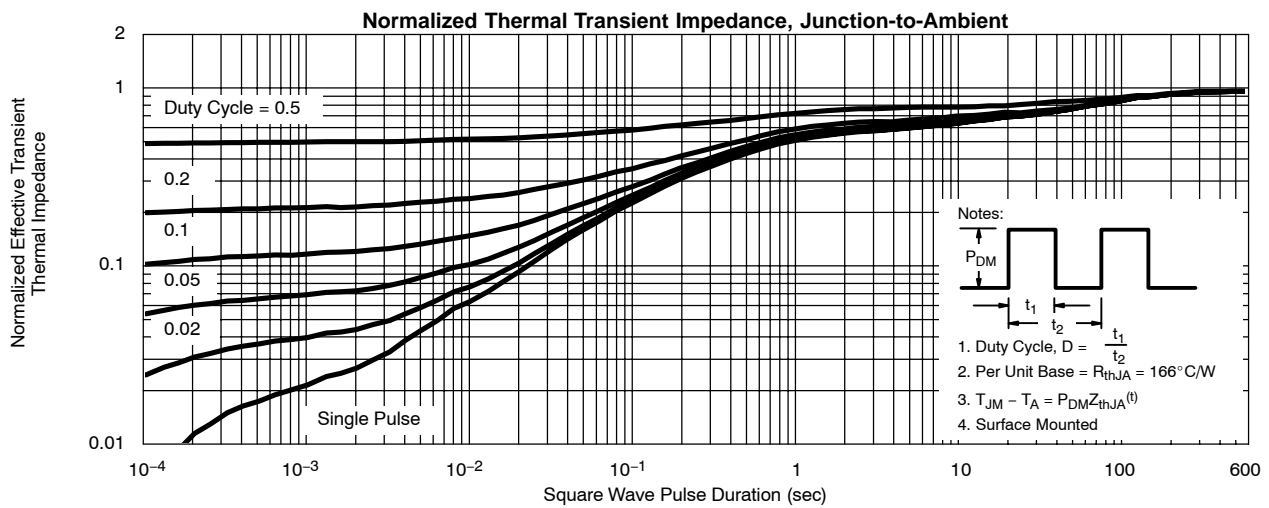
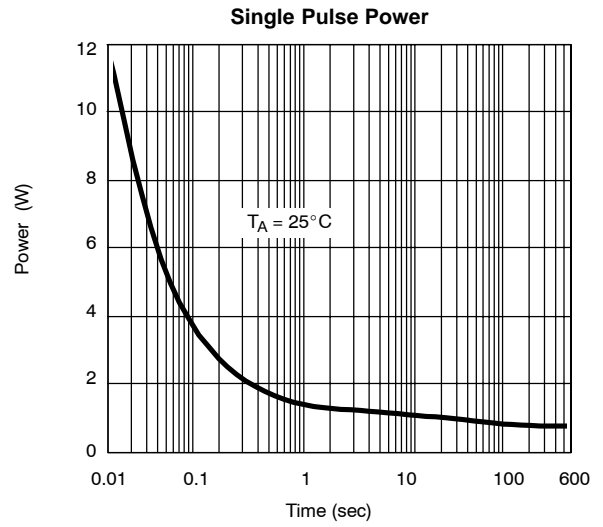
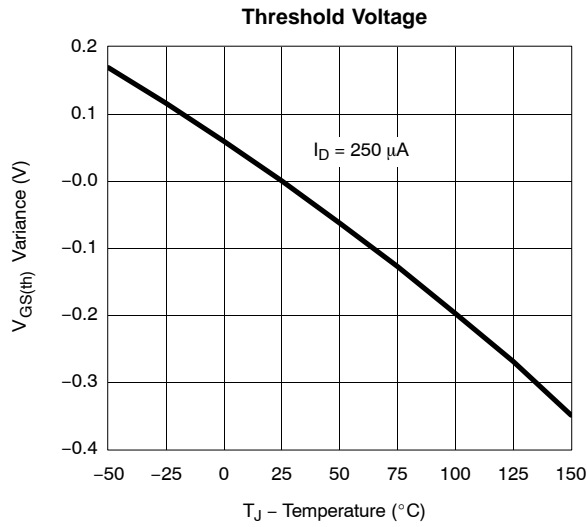




**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**



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