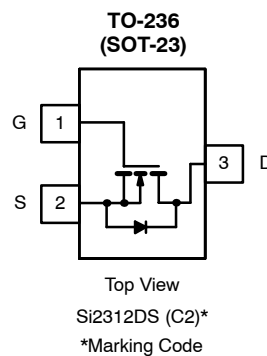




## N-Channel 20-V (D-S) MOSFET

**1.8-V Rated**

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



Ordering Information: Si2312DS-T1

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	$^\circ\text{C}/\text{W}$
		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

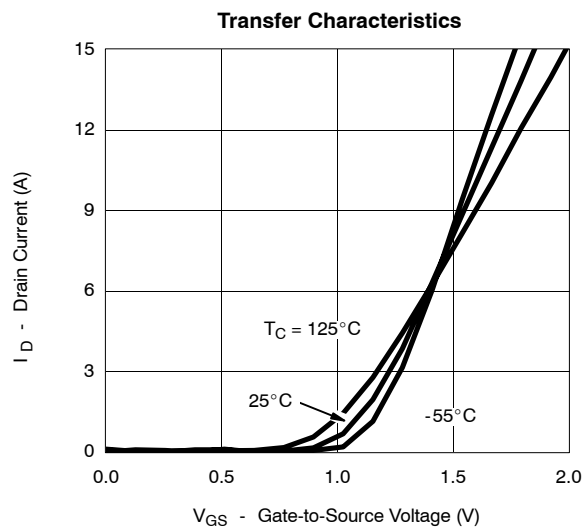
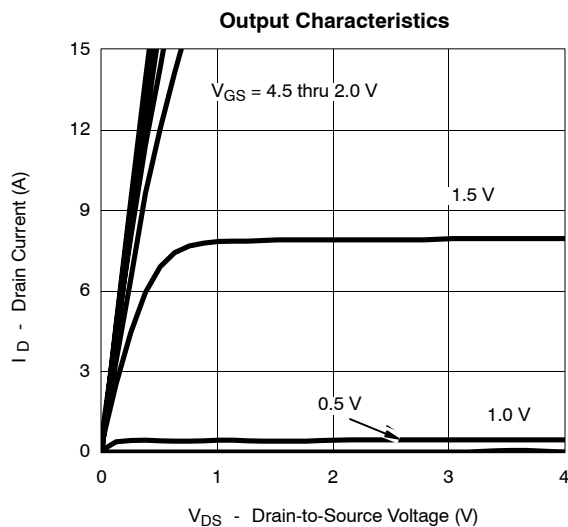
### SPECIFICATIONS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

Parameter	Symbol	Test Conditions	Limits			Unit
			Min	Typ	Max	
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	20			V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	0.45	0.65	0.85	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 8\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}$			1	$\mu\text{A}$
		$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}, T_J = 70^\circ\text{C}$			75	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq 10\text{ V}, V_{GS} = 4.5\text{ V}$	15			A
Drain-Source On-Resistance <sup>a</sup>	$r_{DS(on)}$	$V_{GS} = 4.5\text{ V}, I_D = 5.0\text{ A}$		0.027	0.033	$\Omega$
		$V_{GS} = 2.5\text{ V}, I_D = 4.5\text{ A}$		0.033	0.040	
		$V_{GS} = 1.8\text{ V}, I_D = 4.0\text{ A}$		0.042	0.051	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 15\text{ V}, I_D = 5.0\text{ A}$		40		S
Diode Forward Voltage	$V_{SD}$	$I_S = 1.0\text{ A}, V_{GS} = 0\text{ V}$		0.8	1.2	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = 10\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 5.0\text{ A}$		11.2	14.0	nC
Gate-Source Charge	$Q_{gs}$			1.4		
Gate-Drain Charge	$Q_{gd}$			2.2		
<b>Switching</b>						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 10\text{ V}, R_L = 10\ \Omega$ $I_D \cong 1.0\text{ A}, V_{GEN} = 4.5\text{ V}, R_G = 6\ \Omega$		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	$t_{rr}$	$I_F = 1.0\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		13	25	

**Notes**

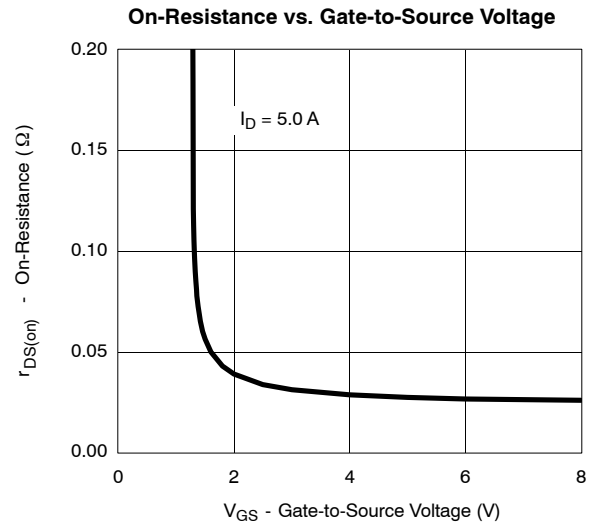
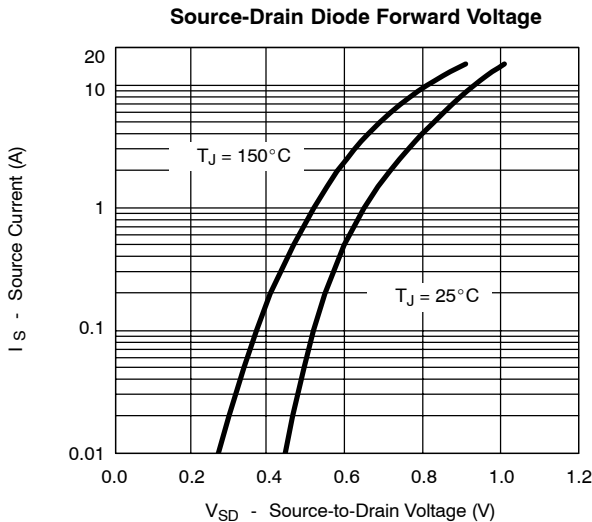
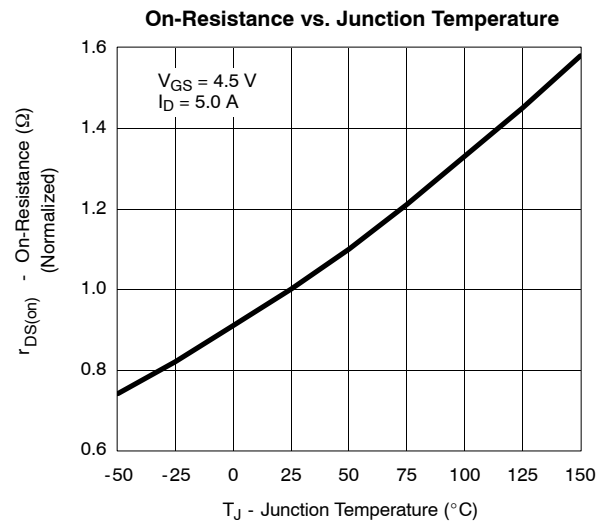
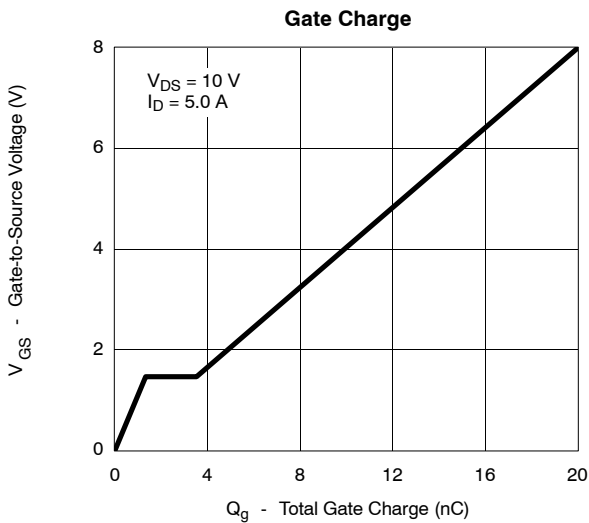
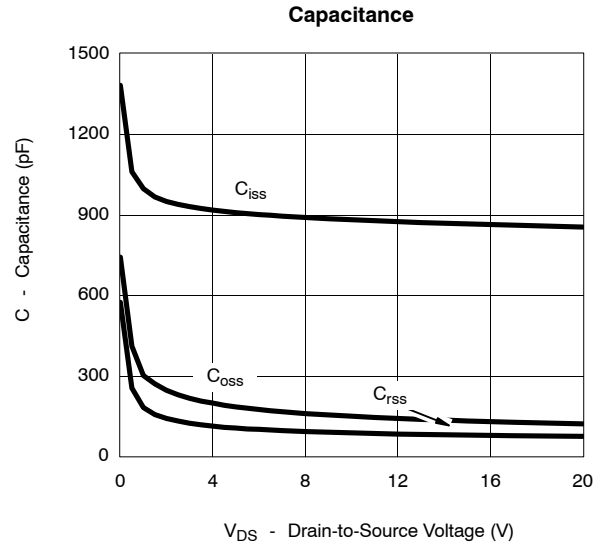
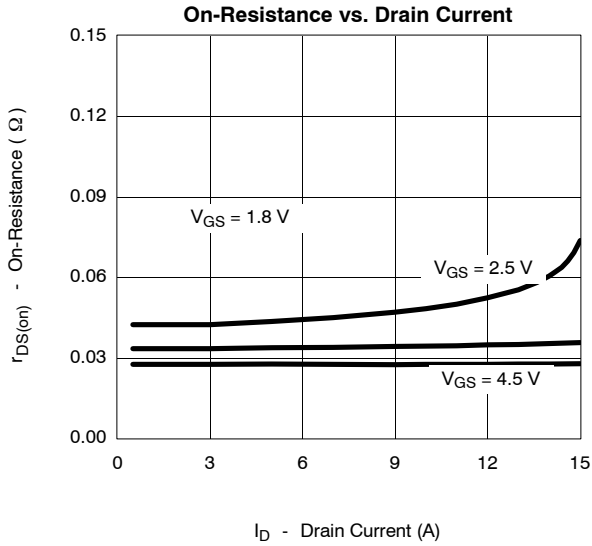
- a. Pulse test:  $PW \leq 300\ \mu\text{s}$  duty cycle  $\leq 2\%$ .
- b. Guaranteed by design, not subject to production testing.

### TYPICAL CHARACTERISTICS ( $25^\circ\text{C}$ UNLESS NOTED)





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



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

