

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

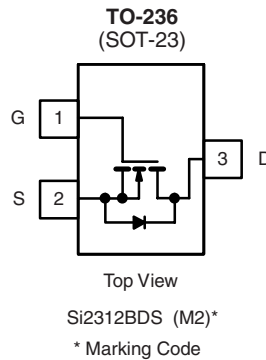
PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ.)
20	0.031 at $V_{GS} = 4.5$ V	5.0	7.5
	0.037 at $V_{GS} = 2.5$ V	4.6	
	0.047 at $V_{GS} = 1.8$ V	4.1	

FEATURES

- Halogen-free Option Available
- TrenchFET[®] Power MOSFET
- 100 % R_g Tested



RoHS
COMPLIANT



Ordering Information: Si2312BDS-T1-E3 (Lead (Pb)-free)
Si2312BDS-T1-GE3 (Lead (Pb)-free and Halogen-free)

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted					
Parameter	Symbol	5 s	Steady State	Unit	
Drain-Source Voltage	V_{DS}	20		V	
Gate-Source Voltage	V_{GS}	± 8			
Continuous Drain Current ($T_J = 150$ °C) ^a	I_D	$T_A = 25$ °C	5.0	3.9	A
		$T_A = 70$ °C	4.0	3.1	
Pulsed Drain Current ^b	I_{DM}	15			
Avalanche Current ^b	I_{AS}	13			
Single Avalanche Energy	E_{AS}	8.45		mJ	
Continuous Source Current (Diode Conduction) ^a	I_S	1.0	0.63	A	
Power Dissipation ^a	P_D	$T_A = 25$ °C	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	R_{thJA}	$t \leq 5$ s	80	100	°C/W
		Steady State	120	166	
Maximum Junction-to-Foot	R_{thJF}	50	60		

Notes:

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



SPECIFICATIONS $T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	20			V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	0.45		0.85	V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 8\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}, T_J = 70\text{ }^\circ\text{C}$			75	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 10\text{ V}, V_{GS} = 4.5\text{ V}$	15			A
Drain-Source On-Resistance ^a	$R_{DS(on)}$	$V_{GS} = 4.5\text{ V}, I_D = 5.0\text{ A}$		0.025	0.031	Ω
		$V_{GS} = 2.5\text{ V}, I_D = 4.6\text{ A}$		0.030	0.037	
		$V_{GS} = 1.8\text{ V}, I_D = 4.1\text{ A}$		0.036	0.047	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 5.0\text{ A}$		30		S
Diode Forward Voltage	V_{SD}	$I_S = 1.0\text{ A}, V_{GS} = 0\text{ V}$		0.8	1.2	V
Dynamic^b						
Total Gate Charge	Q_g	$V_{DS} = 10\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 5.0\text{ A}$		7.5	12	nC
Gate-Source Charge	Q_{gs}			1.4		
Gate-Drain Charge	Q_{gd}			1.2		
Gate Resistance	R_g	$f = 1.0\text{ MHz}$	1.1	2.2	3.3	Ω
Switching						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 10\text{ V}, R_L = 10\text{ }\Omega$ $I_D \cong 1.0\text{ A}, V_{GEN} = 4.5\text{ V}, R_g = 6\text{ }\Omega$		9	15	ns
Rise Time	t_r			30	45	
Turn-Off Delay Time	$t_{d(off)}$			35	55	
Fall Time	t_f			10	15	
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = 1.0\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		13	25	nC
Body Diode Reverse Recovery Charge	Q_{rr}			4.5	7	

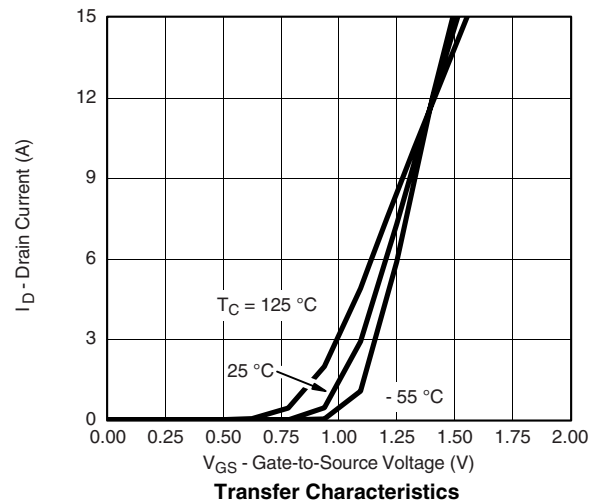
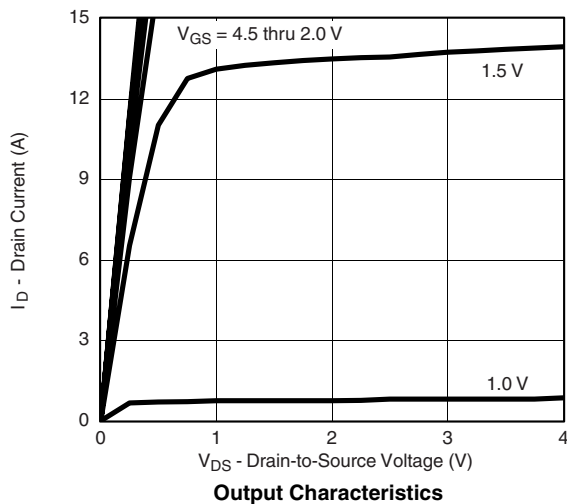
Notes:

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

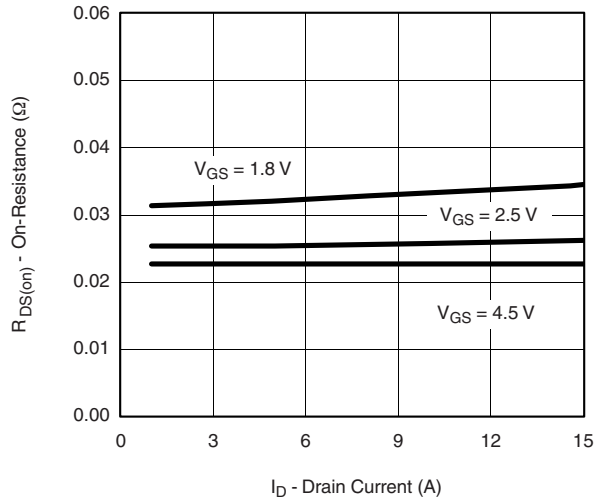
b. Guaranteed by design, not subject to production testing.

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.

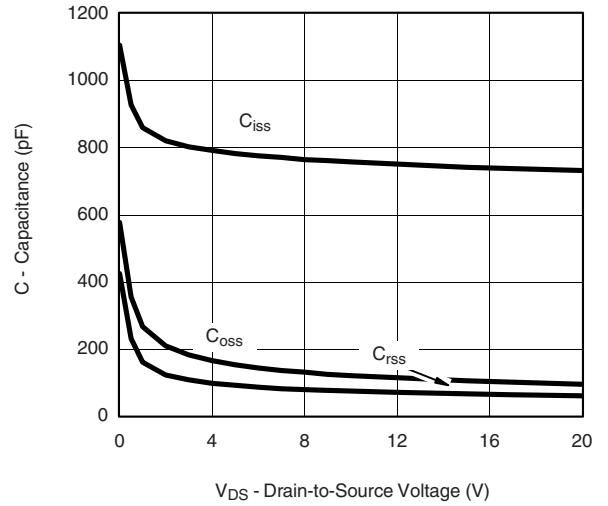
TYPICAL CHARACTERISTICS $25\text{ }^\circ\text{C}$, unless otherwise noted



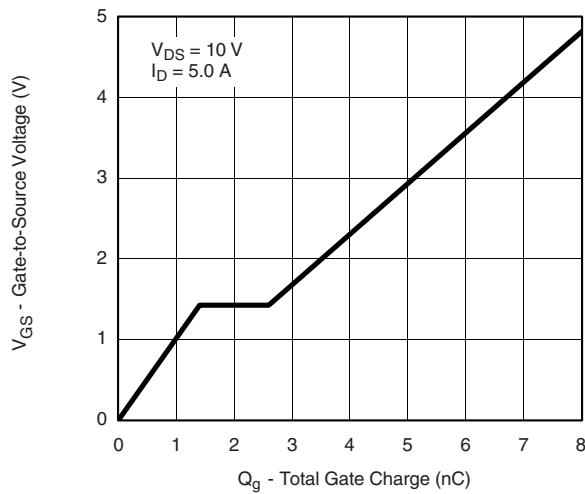
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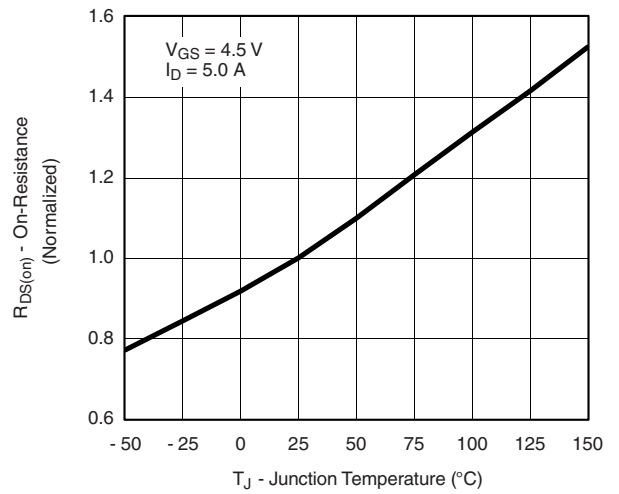
On-Resistance vs. Drain Current



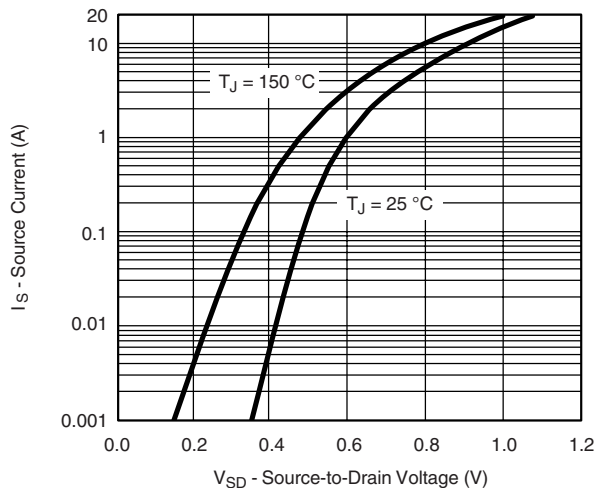
Capacitance



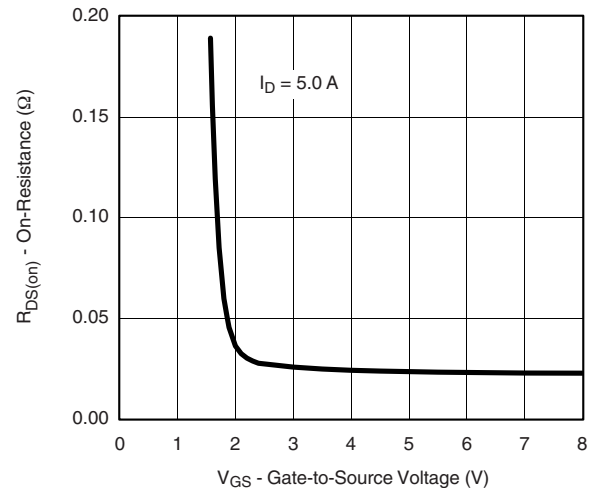
Gate Charge



On-Resistance vs. Junction Temperature

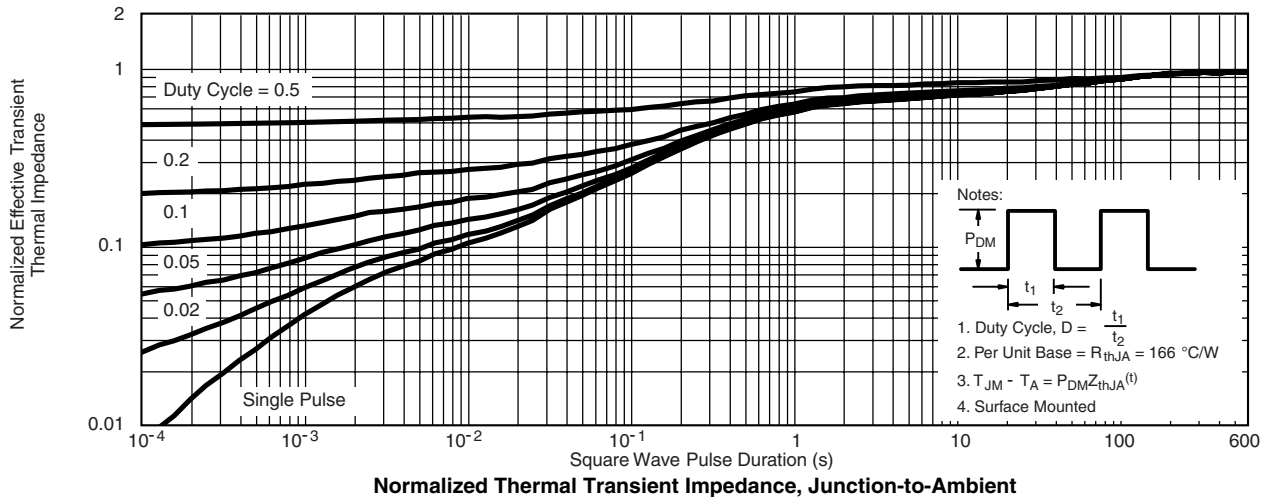
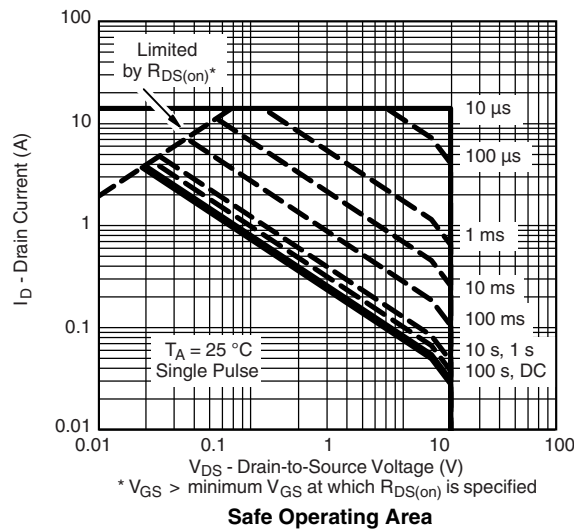
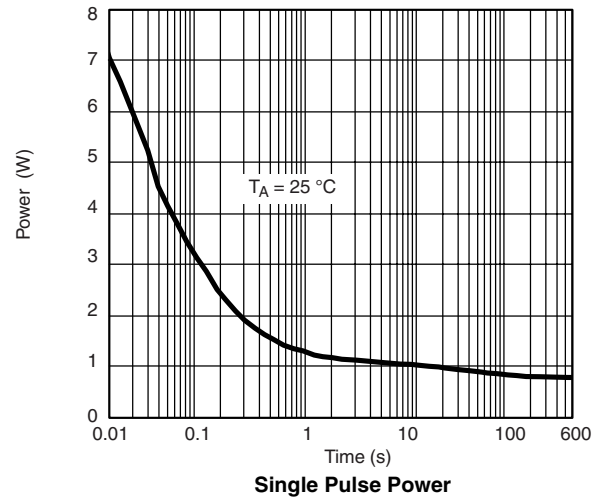
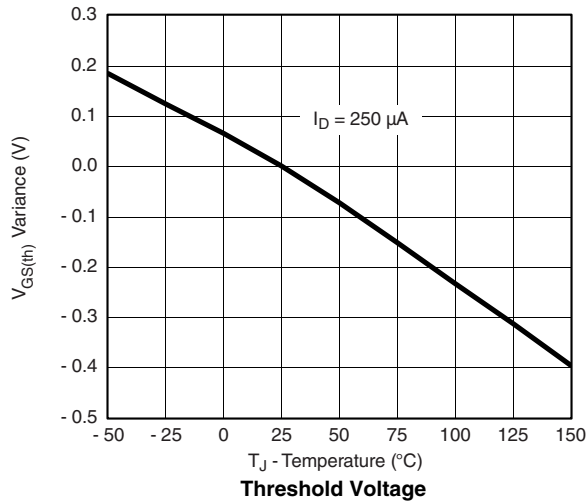


Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



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