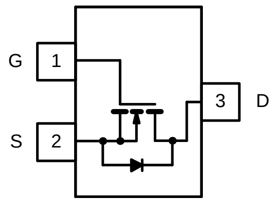
N-Channel 20-V (D-S) MOSFET

1.8-V Rated

PRODUCT SUMMARY		
V_{DS} (V)	$r_{DS(on)}$ (Ω)	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

TO-236
(SOT-23)



Top View

Si2312DS (C2)*

*Marking Code

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

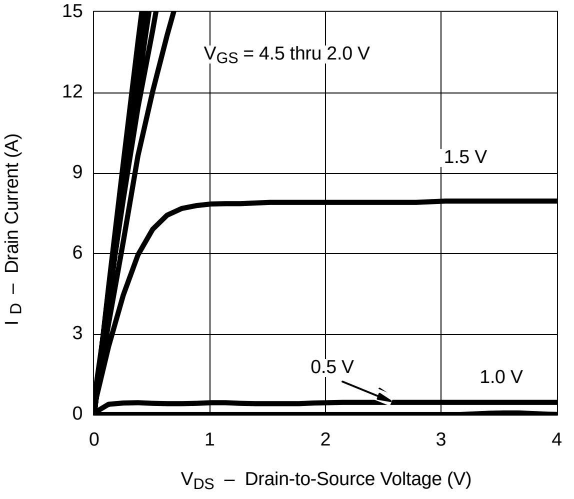
SPECIFICATIONS (T_A = 25°C UNLESS OTHERWISE NOTED)

Parameter	Symbol	Test Conditions	Limits			Unit
			Min	Typ	Max	
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			
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 8 V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 16 V, V_{GS} = 0 V			1	µA
		V_{DS} = 16 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	

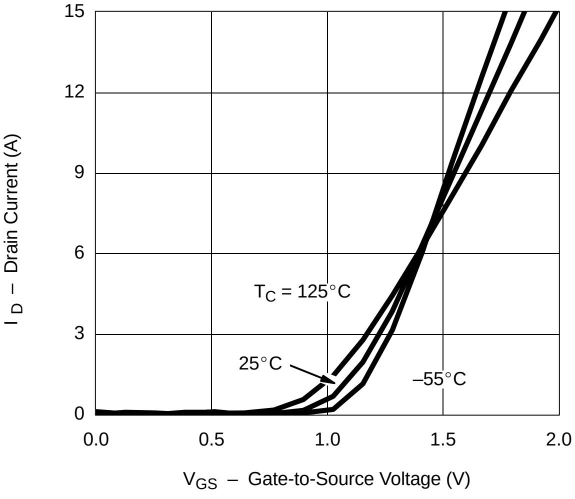
Notes
a. Pulse test: PW ≤ 300 µs duty cycle ≤ 2%.
b. Guaranteed by design, not subject to production testing.

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

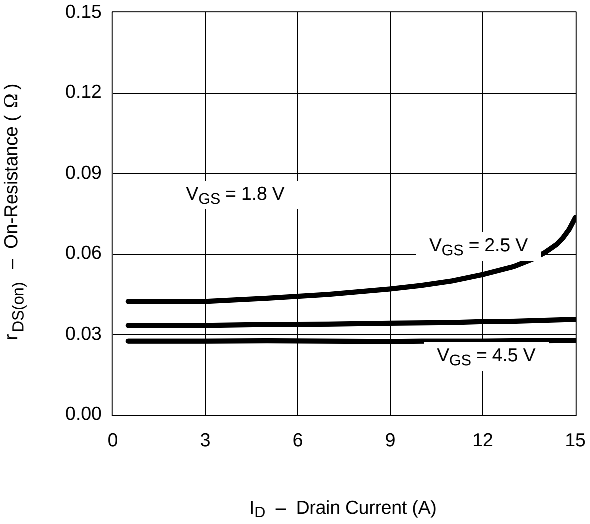
Output Characteristics

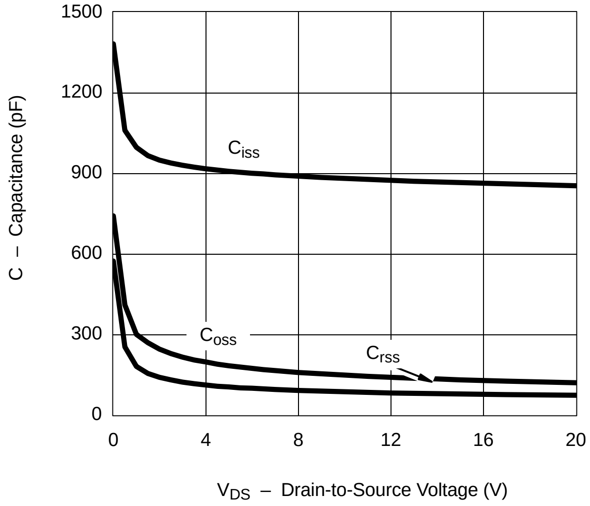


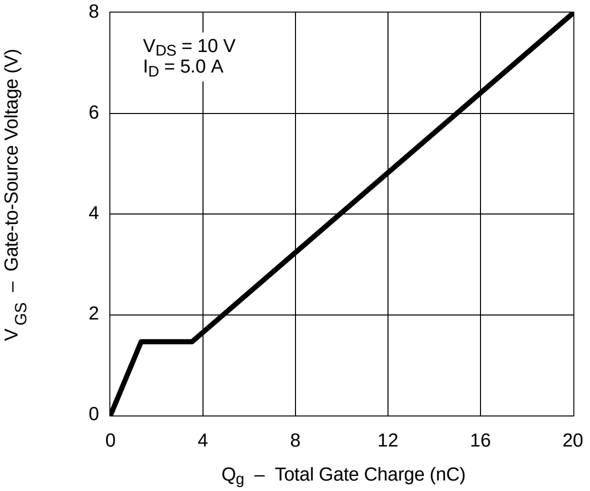
Transfer Characteristics

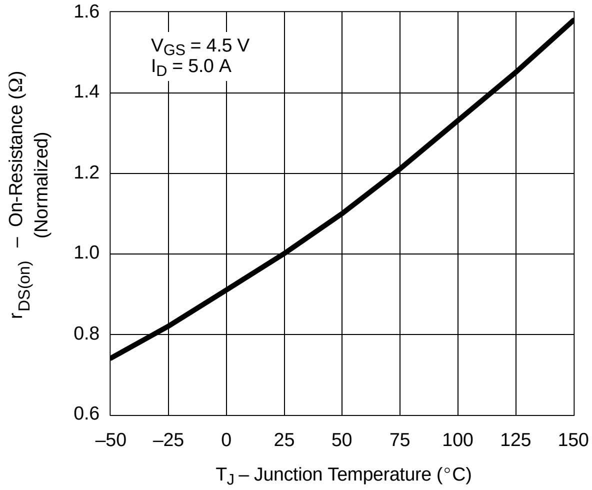


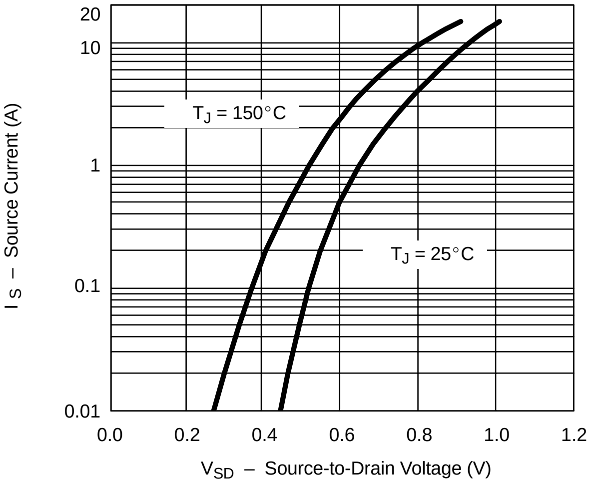
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

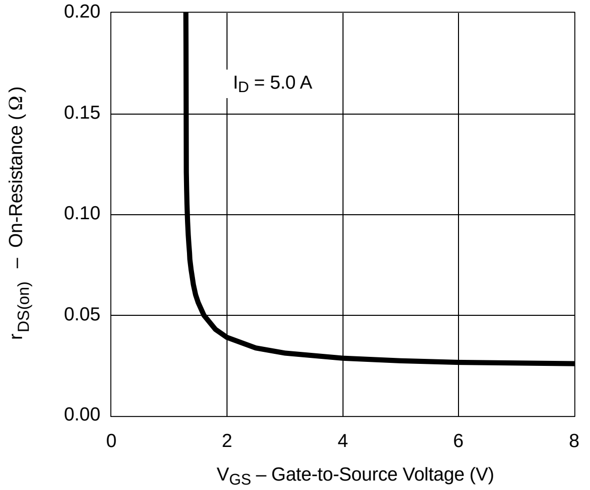

On-Resistance vs. Drain Current


Capacitance

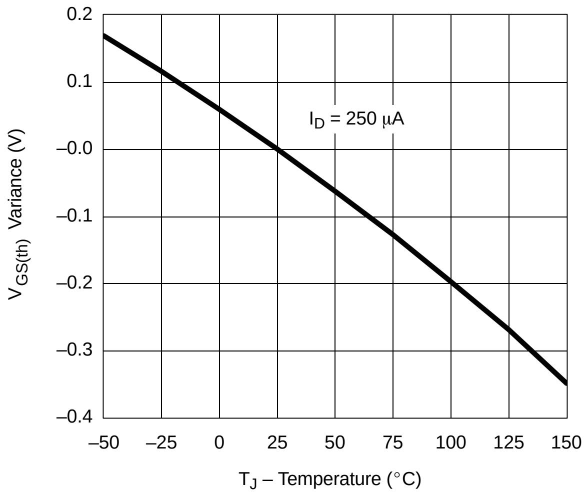

Gate Charge

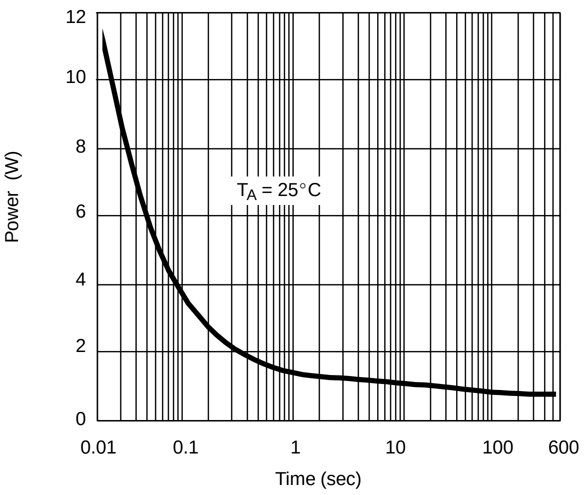

On-Resistance vs. Junction Temperature

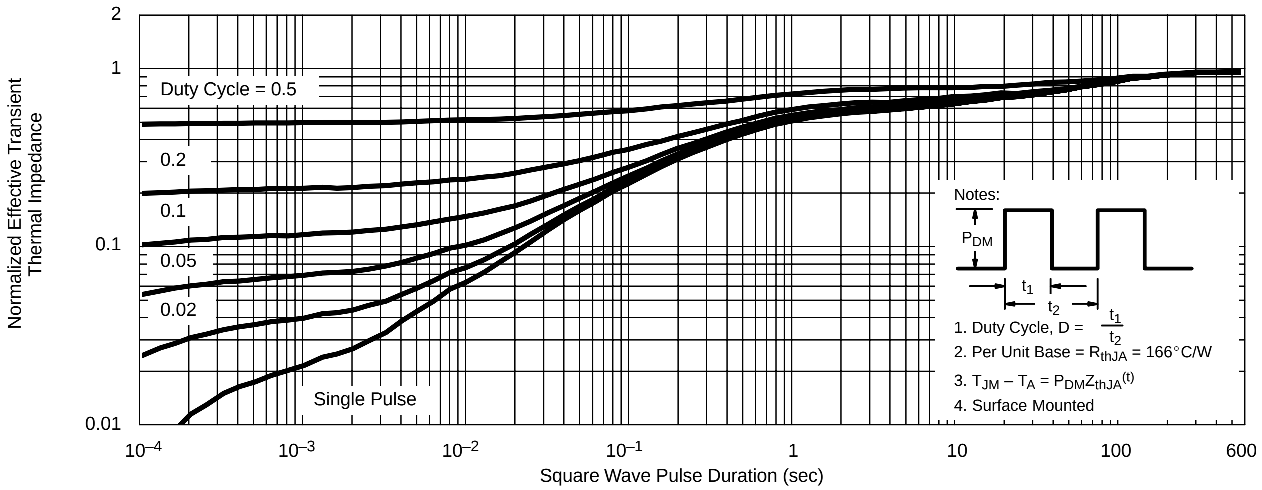

Source-Drain Diode Forward Voltage


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