

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

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ.)
20	0.057 at $V_{GS} = 4.5$ V	2.9	3.5
	0.075 at $V_{GS} = 2.5$ V	2.6	

FEATURES

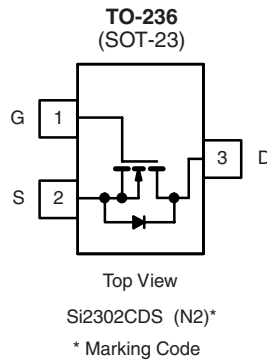
- Halogen-free Option Available
- TrenchFET[®] Power MOSFET

APPLICATIONS

- Load Switching for Portable Devices
- DC/DC Converter



RoHS
COMPLIANT



Ordering Information: Si2302CDS-T1-E3 (Lead (Pb)-free)
Si2302CDS-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	$T_A = 25$ °C	I_D	2.9	2.6	A
	$T_A = 70$ °C		2.3	2.1	
Pulsed Drain Current ^b		I_{DM}	10		
Continuous Source Current (Diode Conduction) ^a		I_S	0.72	0.6	
Power Dissipation ^a	$T_A = 25$ °C	P_D	0.86	0.71	W
	$T_A = 70$ °C		0.55	0.46	
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	$t \leq 5$ s	R_{thJA}	120	145	°C/W
	Steady State		140	175	
Maximum Junction-to-Foot	Steady State	R_{thJF}	62	78	

Notes:

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

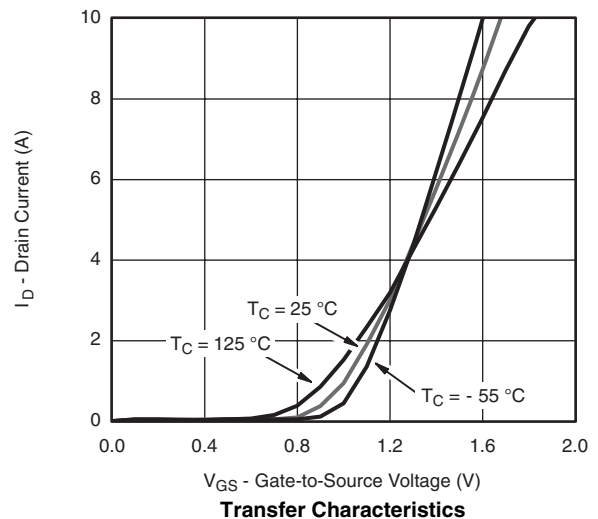
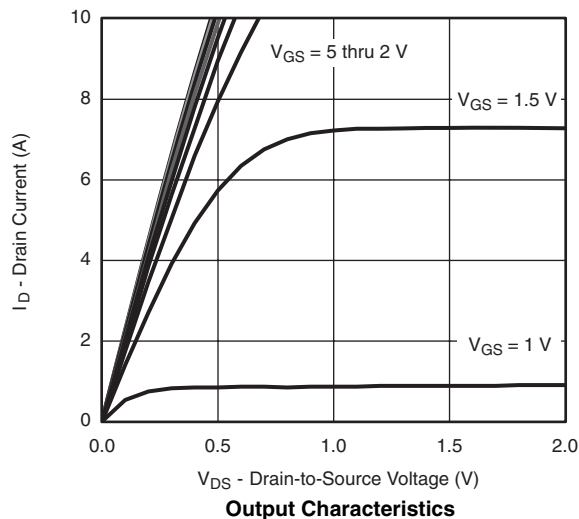
SPECIFICATIONS $T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	20			V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	0.40		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	$I_{D(on)}$	$V_{DS} \geq 10\text{ V}, V_{GS} = 4.5\text{ V}$	6			A
Drain-Source On-Resistance ^a	$R_{DS(on)}$	$V_{GS} = 4.5\text{ V}, I_D = 3.6\text{ A}$		0.045	0.057	Ω
		$V_{GS} = 2.5\text{ V}, I_D = 3.1\text{ A}$		0.056	0.075	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 5\text{ V}, I_D = 3.6\text{ A}$		13		S
Diode Forward Voltage	V_{SD}	$I_S = 0.95\text{ A}, V_{GS} = 0\text{ V}$		0.7	1.2	V
Dynamic^b						
Total Gate Charge	Q_g	$V_{DS} = 10\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 3.6\text{ A}$		3.5	5.5	nC
Gate-Source Charge	Q_{gs}			0.6		
Gate-Drain Charge	Q_{gd}			0.45		
Gate Resistance	R_g	$f = 1.0\text{ MHz}$	2.0	4.0	8.0	Ω
Switching						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 10\text{ V}, R_L = 2.78\text{ }\Omega$ $I_D \cong 3.6\text{ A}, V_{GEN} = 4.5\text{ V}, R_g = 1\text{ }\Omega$		8	15	ns
Rise Time	t_r			7	15	
Turn-Off Delay Time	$t_{d(off)}$			30	45	
Fall Time	t_f			7	15	
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = 3.6\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		8.5	15	nC
Body Diode Reverse Recovery Charge	Q_{rr}			2.0	4.0	

Notes:

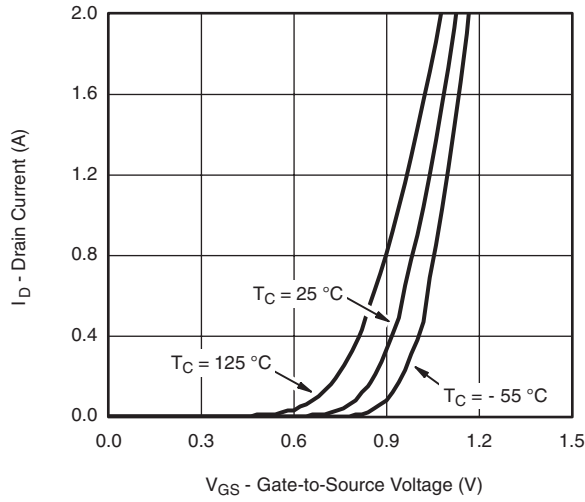
- a. Pulse test: Pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- b. Guaranteed by design, not subject to production testing.

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.

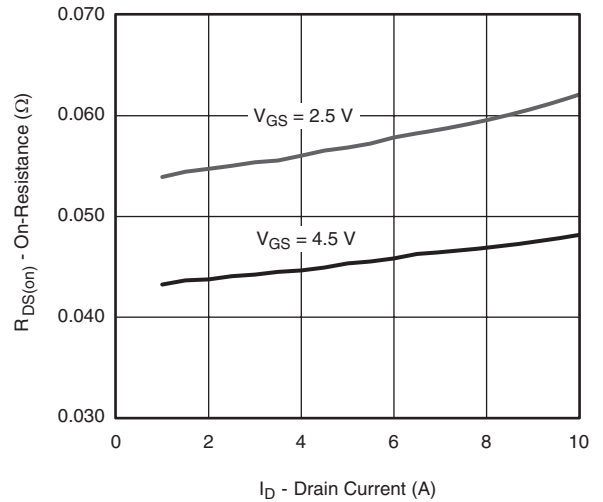
TYPICAL CHARACTERISTICS $25\text{ }^\circ\text{C}$, unless otherwise noted



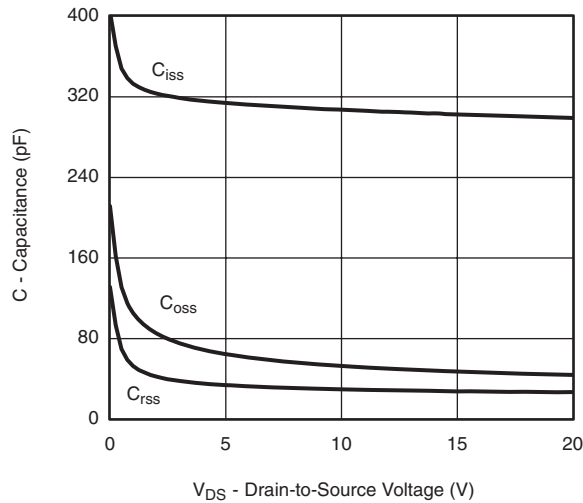
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



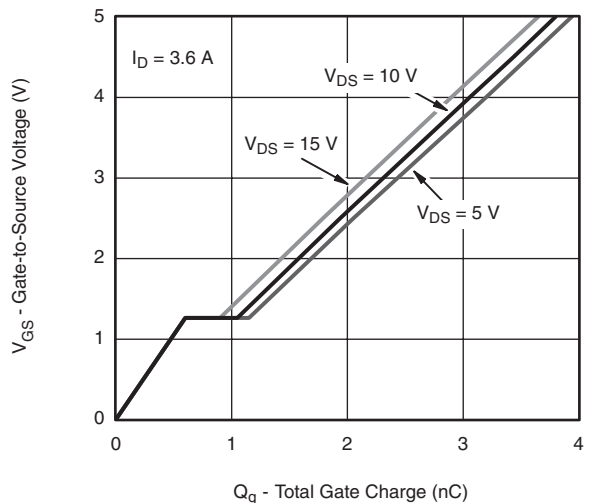
Transfer Characteristics



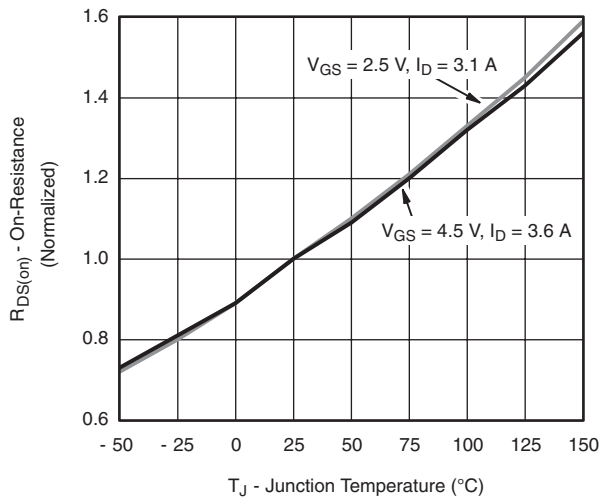
On-Resistance vs. Drain Current



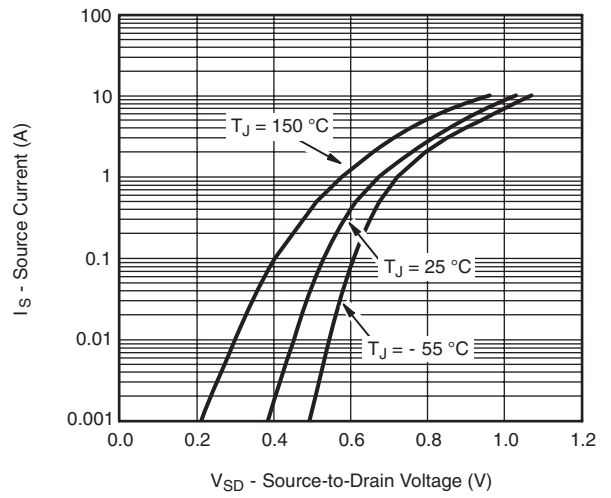
Capacitance



Gate Charge

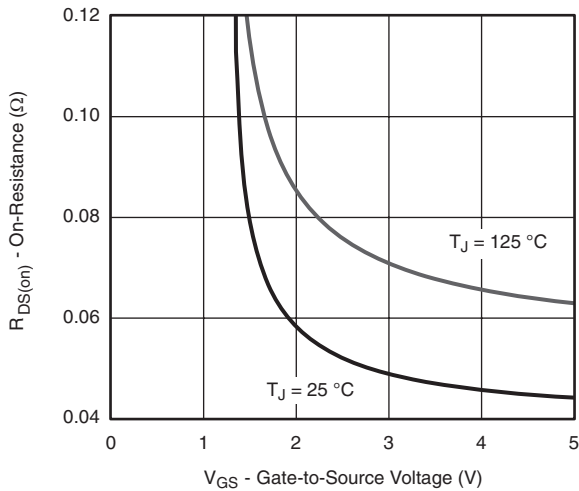


On-Resistance vs. Junction Temperature

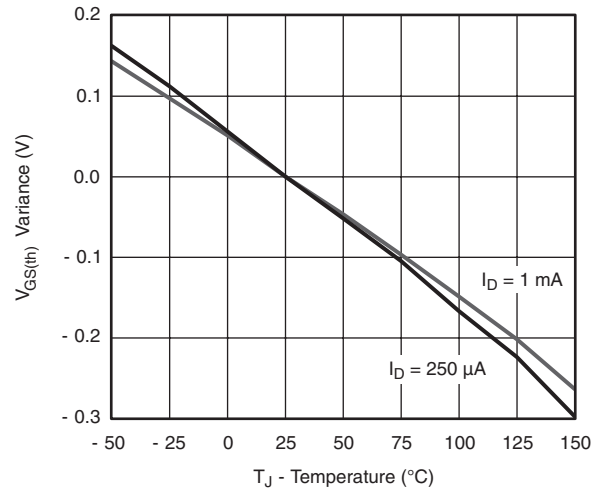


Source-Drain Diode Forward Voltage

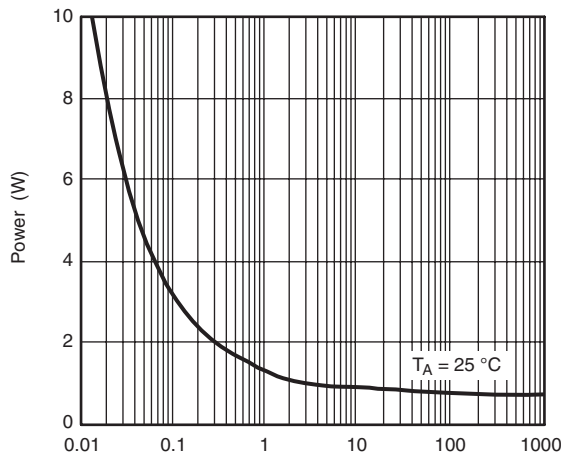
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



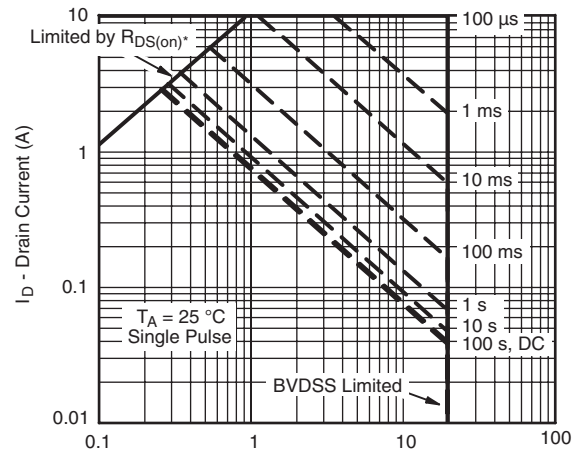
On-Resistance vs. Gate-to-Source Voltage



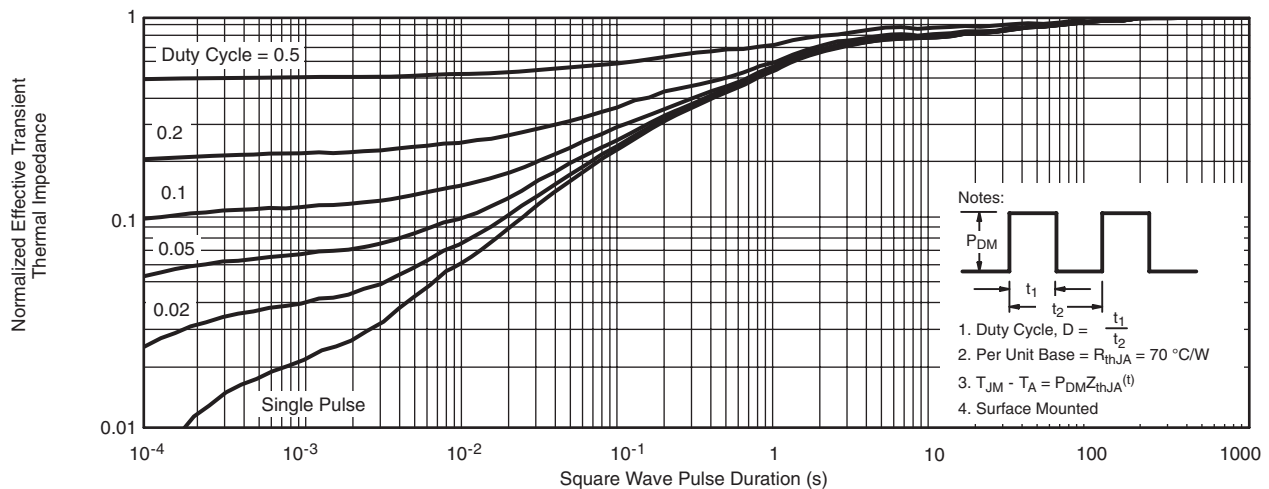
Threshold Voltage



Single Pulse Power



* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified
Safe Operating Area, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Ambient

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