

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

PRODUCT SUMMARY

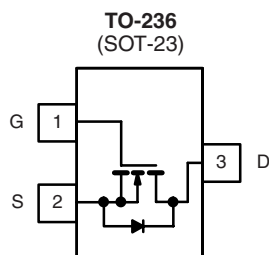
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ.)
20	0.057 at $V_{GS} = 4.5$ V	2.9	3.5
	0.075 at $V_{GS} = 2.5$ V	2.6	

FEATURES

- Halogen-free Option Available
- TrenchFET® Power MOSFET

APPLICATIONS

- Load Switching for Portable Devices
- DC/DC Converter


RoHS
COMPLIANT


Top View

Si2302CDS (N2)*

* Marking Code

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	I_D	2.9	2.6	A
		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	P_D	0.86	0.71	W
		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	R_{thJA}	120	145	°C/W
		140	175	
Maximum Junction-to-Foot	R_{thJF}	62	78	

Notes:

a. Surface Mounted on 1" x 1" FR4 board.

b. Pulse width limited by maximum junction temperature.

SPECIFICATIONS $T_A = 25^\circ\text{C}$, unless otherwise noted

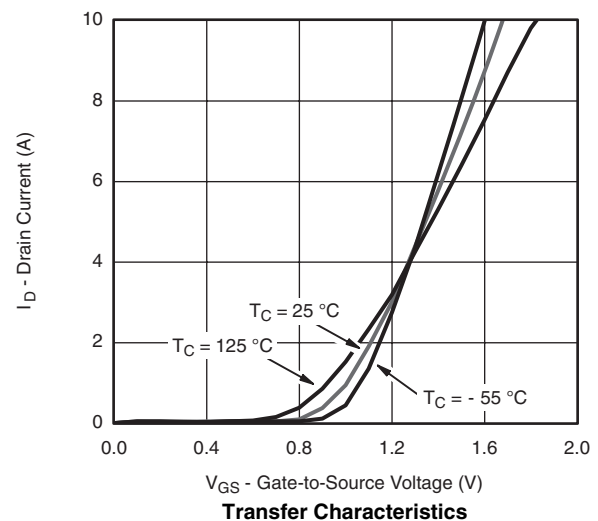
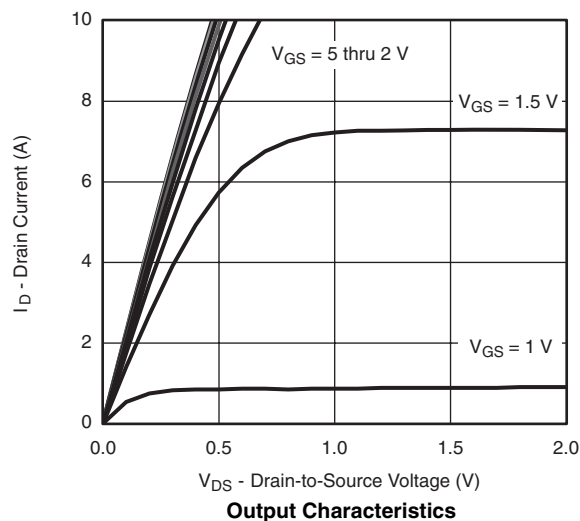
Parameter	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{A}$	20			V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	0.40		0.85	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 8\text{ V}$			± 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:

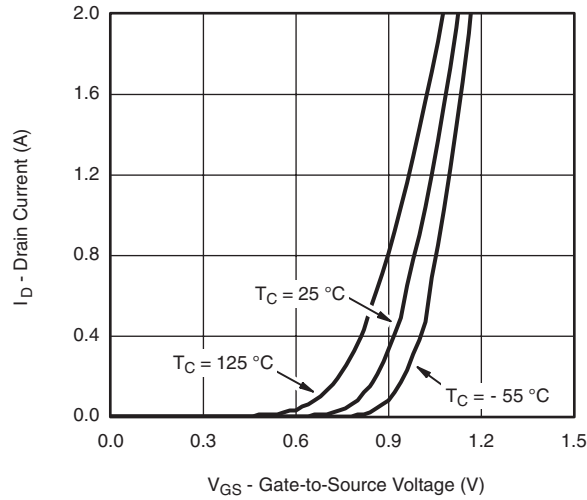
a. Pulse test: Pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

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

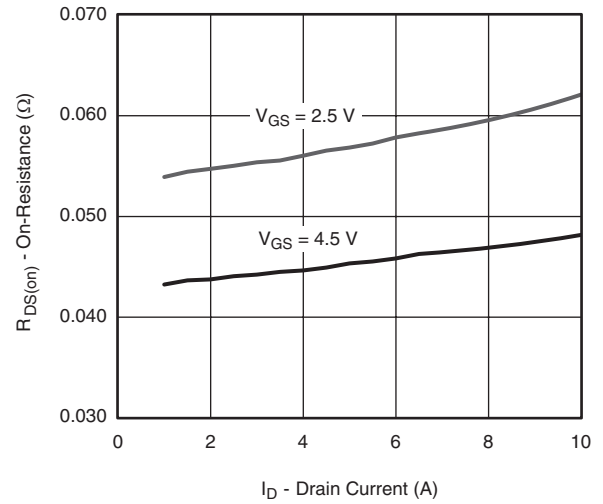
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

TYPICAL CHARACTERISTICS 25°C , unless otherwise noted

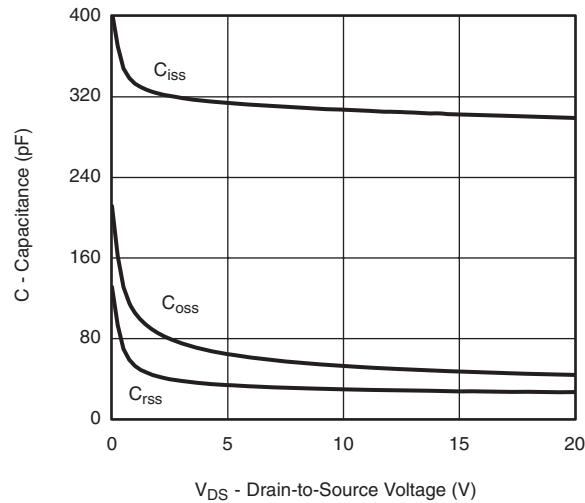
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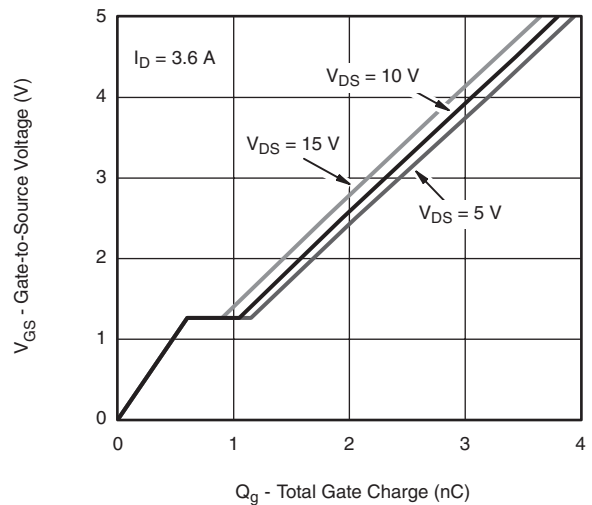
Transfer Characteristics



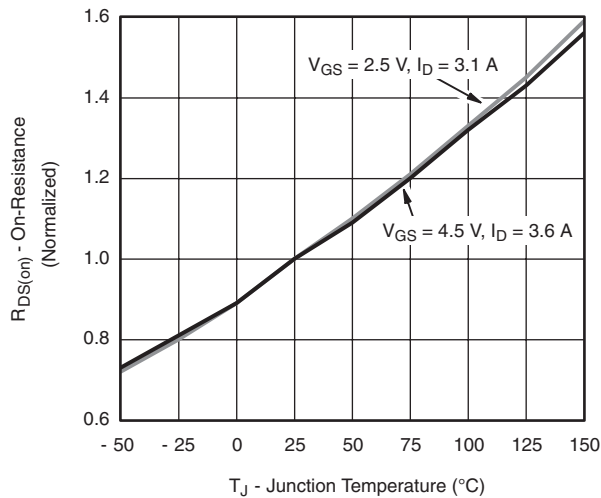
On-Resistance vs. Drain Current



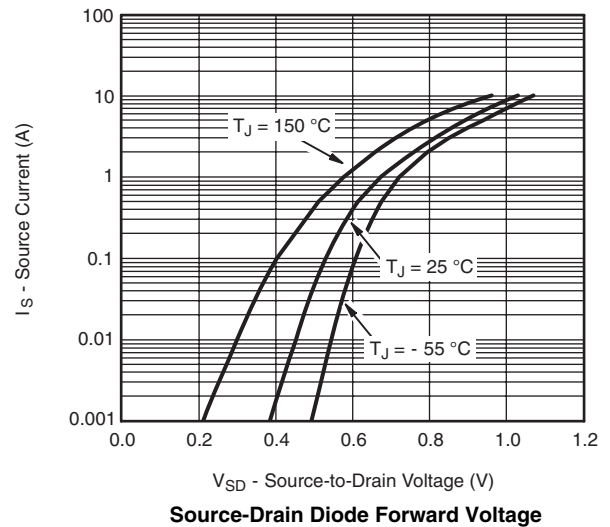
Capacitance



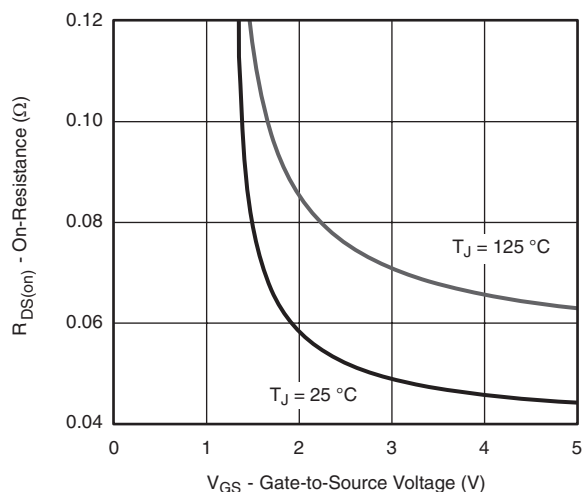
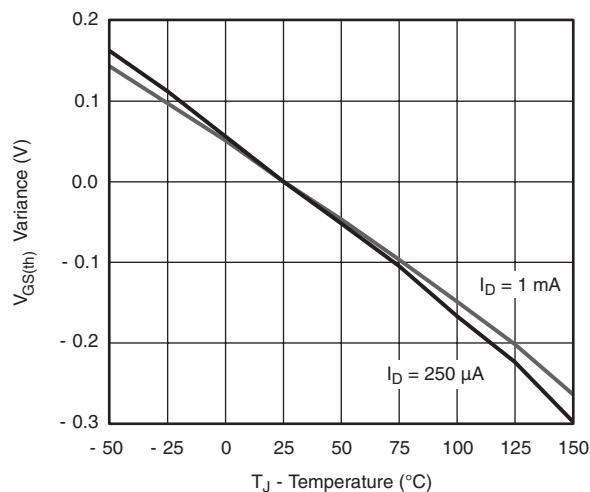
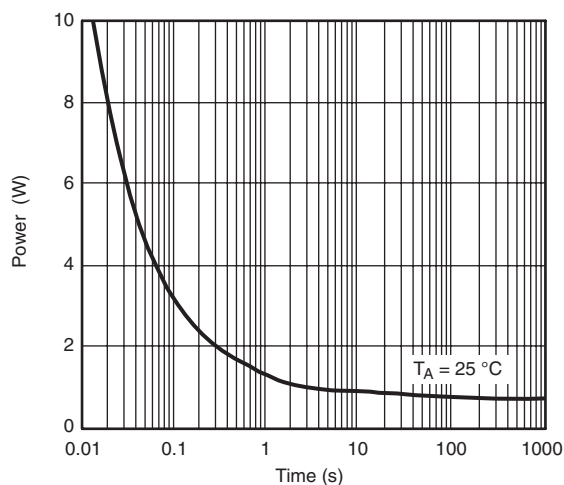
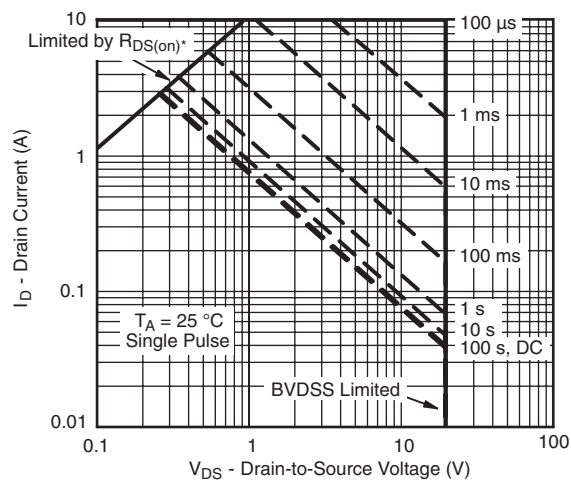
Gate Charge



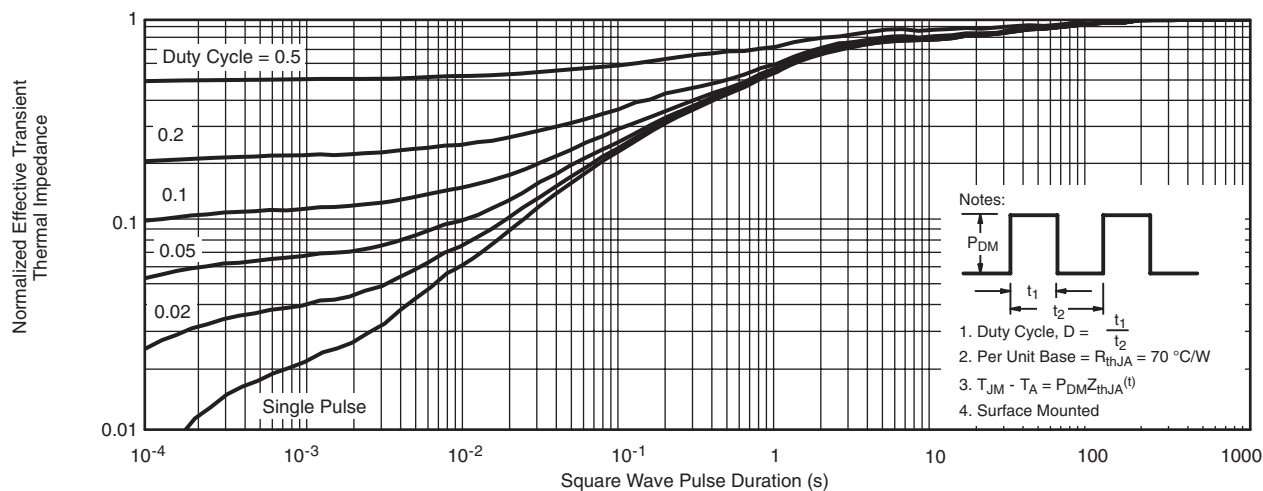
On-Resistance vs. Junction Temperature



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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