

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

PRODUCT SUMMARY		
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
- 20	0.057 at $V_{GS} = - 4.5$ V	- 3.3
	0.076 at $V_{GS} = - 2.5$ V	- 2.8
	0.110 at $V_{GS} = - 1.8$ V	- 2.3

FEATURES

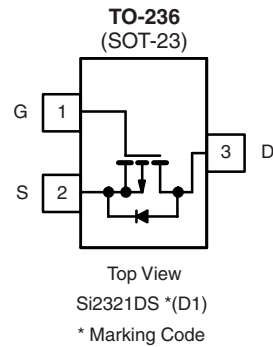
- Halogen-free Option Available
- TrenchFET[®] Power MOSFETS



RoHS
COMPLIANT

APPLICATIONS

- Load Switch
- PA Switch



Ordering Information: Si2321DS-T1-E3 (Lead (Pb)-free)
Si2321DS-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	- 3.3	- 2.9	A
		$T_A = 70$ °C	- 2.6	- 2.3	
Pulsed Drain Current	I_{DM}	- 12			
Continuous Source Current (Diode Conduction) ^a	I_S	- 0.74	- 0.59		
Power Dissipation ^a	P_D	$T_A = 25$ °C	0.89	0.71	W
		$T_A = 70$ °C	0.57	0.45	
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	115	140	°C/W
		Steady State	140	175	
Maximum Junction-to-Foot (Drain)	R_{thJF}	60	75		

Notes:

- a. Surface Mounted on FR4 board.
b. $t \leq 5$ s.

For SPICE model information via the Worldwide Web: <http://www.vishay.com/www/product/spice.htm>

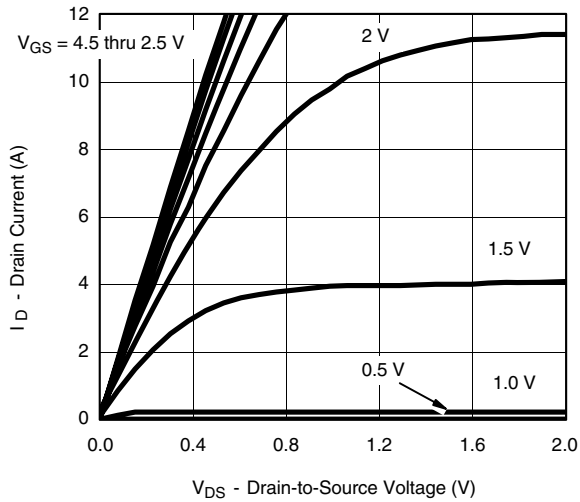
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = -10\text{ }\mu\text{A}$	-20			V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	-0.40		-0.90	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}	$V_{DS} = 16\text{ V}, V_{GS} = 0\text{ V}$			-1	μA
		$V_{DS} = 16\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			-10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \leq -5\text{ V}, V_{GS} = -4.5\text{ V}$	-6			A
Drain-Source On-Resistance ^a	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}, I_D = -3.3\text{ A}$		0.044	0.057	Ω
		$V_{GS} = -2.5\text{ V}, I_D = -2.8\text{ A}$		0.061	0.076	
		$V_{GS} = -1.8\text{ V}, I_D = -2.3\text{ A}$		0.084	0.110	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -5\text{ V}, I_D = -3.3\text{ A}$		3		S
Diode Forward Voltage	V_{SD}	$I_S = -1.6\text{ A}, V_{GS} = 0\text{ V}$			-1.2	V
Dynamic^b						
Total Gate Charge	Q_g	$V_{DS} = -6\text{ V}, V_{GS} = -4.5\text{ V}$ $I_D \cong -3.3\text{ A}$		8	13	nC
Gate-Source Charge	Q_{gs}			1.2		
Gate-Drain Charge	Q_{gd}			2.2		
Input Capacitance	C_{iss}	$V_{DS} = -6\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		715		pF
Output Capacitance	C_{oss}			170		
Reverse Transfer Capacitance	C_{rss}			120		
Switching^b						
Turn-On Time	$t_{d(on)}$	$V_{DD} = -6\text{ V}, R_L = 6\text{ }\Omega$ $I_D \cong -1.0\text{ A}, V_{GEN} = -4.5\text{ V}$ $R_G = 6\text{ }\Omega$		15	25	ns
	t_r			35	55	
Turn-Off Time	$t_{d(off)}$			60	90	
	t_f			40	60	

Notes:

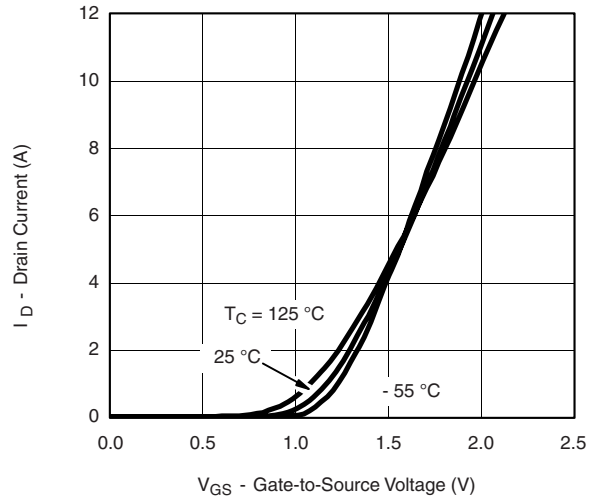
- a. For DESIGN AID ONLY, not subject to production testing.
b. Pulse test: $PW \leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
c. Switching time is essentially independent of operating temperature.

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.

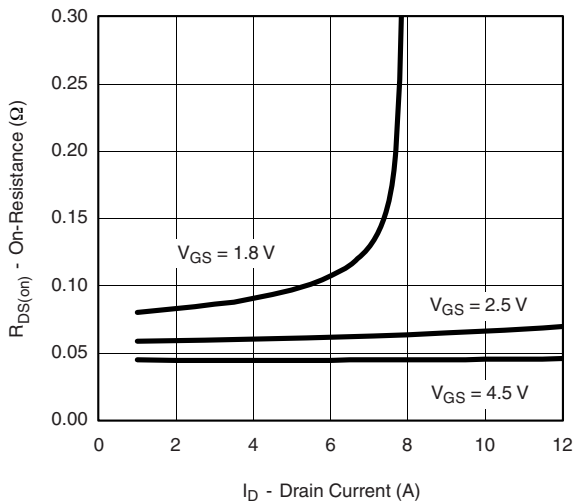
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



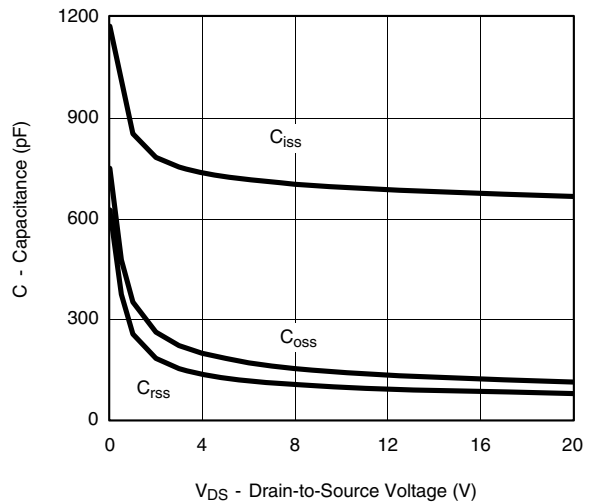
V_{GS} - Drain-to-Source Voltage (V)
Output Characteristics



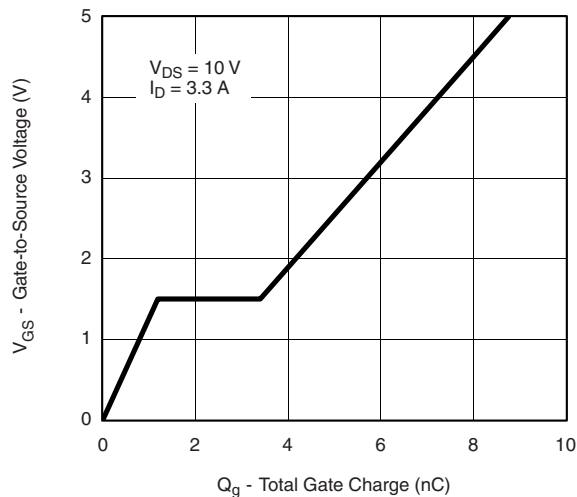
V_{GS} - Gate-to-Source Voltage (V)
Transfer Characteristics



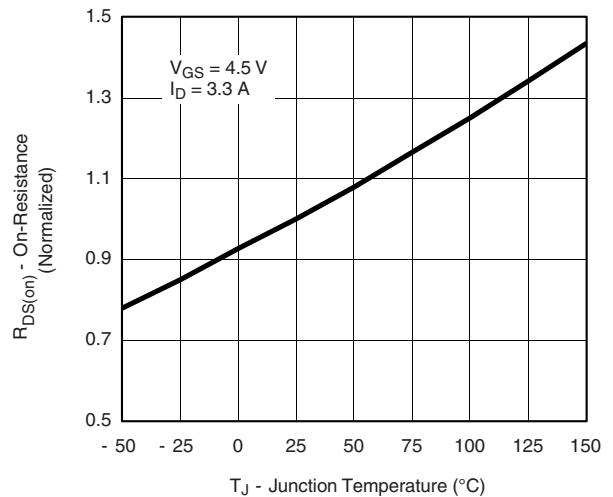
I_D - Drain Current (A)
On-Resistance vs. Drain Current



V_{DS} - Drain-to-Source Voltage (V)
Capacitance

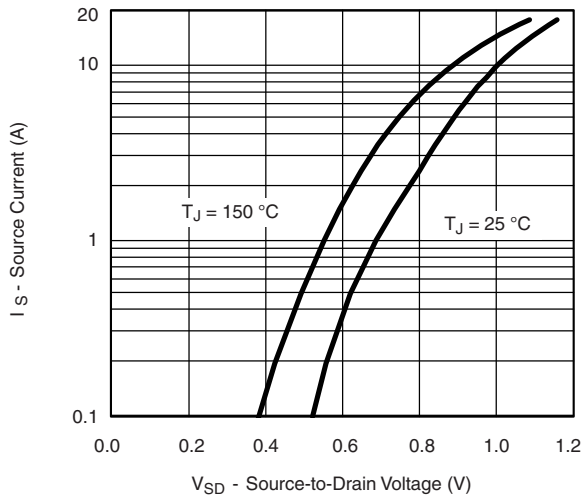


Q_g - Total Gate Charge (nC)
Gate Charge

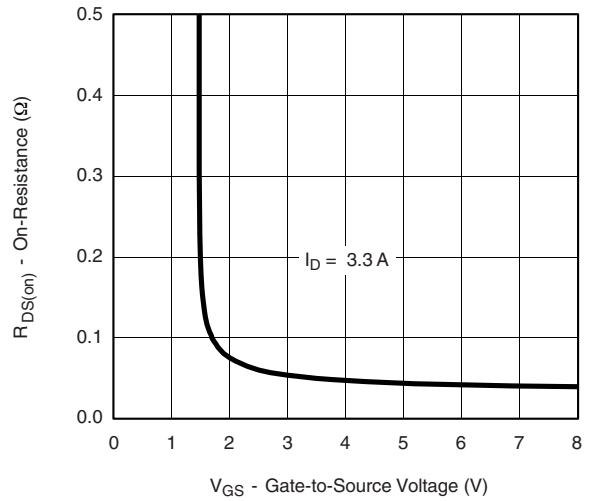


T_J - Junction Temperature (°C)
Normalized On-Resistance vs. Junction Temperature

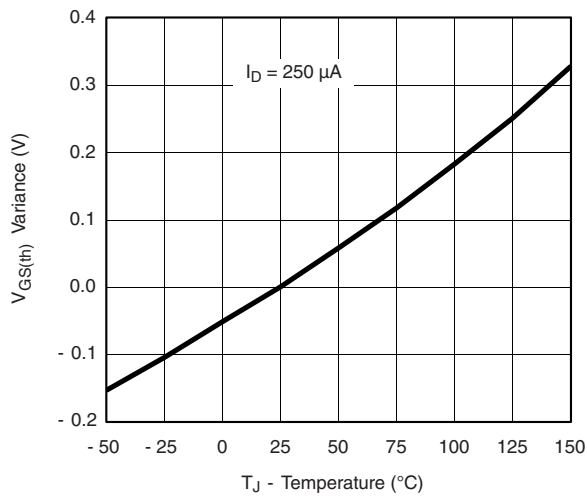
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



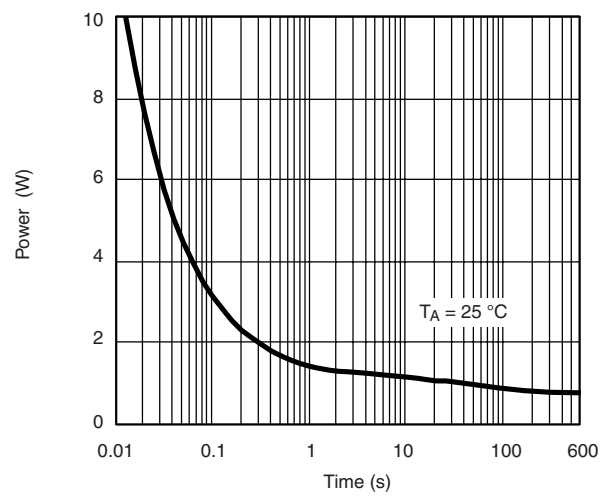
Source-Drain Diode Forward Voltage



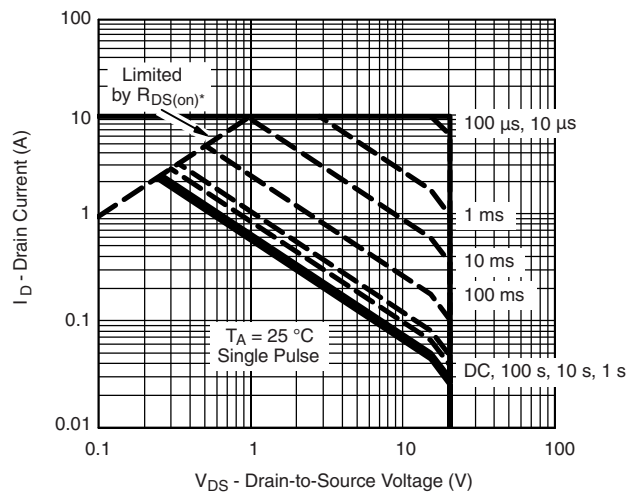
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



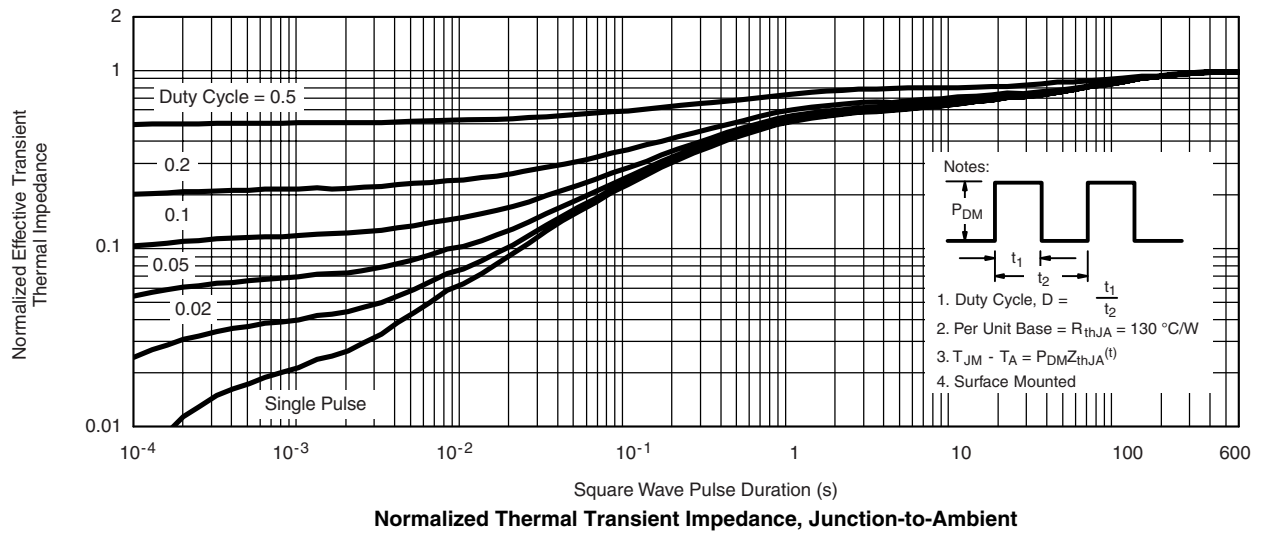
Single Pulse Power



* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



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