

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

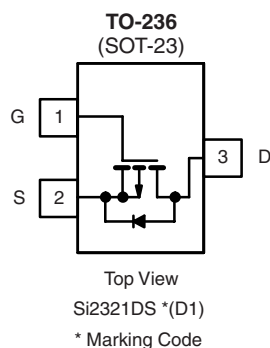
- Halogen-free Option Available
- TrenchFET® Power MOSFETS

APPLICATIONS

- Load Switch
- PA Switch



RoHS
COMPLIANT



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

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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	- 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	T _A = 25 °C	P _D	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	$t \leq 5$ s	R_{thJA}	115	°C/W
	Steady State		140	
Maximum Junction-to-Foot (Drain)	Steady State	R_{thJF}	60	

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>

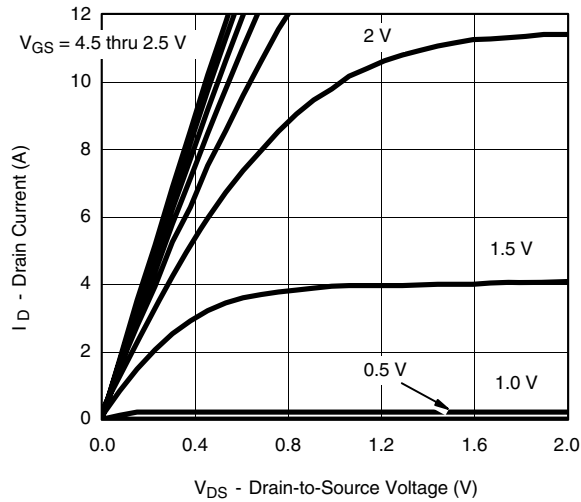
SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}} = 0\text{ V}$, $I_{\text{D}} = -10\text{ }\mu\text{A}$	- 20			V
Gate-Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{DS}} = V_{\text{GS}}$, $I_{\text{D}} = -250\text{ }\mu\text{A}$	- 0.40		- 0.90	
Gate-Body Leakage	I_{GSS}	$V_{\text{DS}} = 0\text{ V}$, $V_{\text{GS}} = \pm 8\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{\text{DS}} = 16\text{ V}$, $V_{\text{GS}} = 0\text{ V}$			- 1	μA
		$V_{\text{DS}} = 16\text{ V}$, $V_{\text{GS}} = 0\text{ V}$, $T_J = 55\text{ }^{\circ}\text{C}$			- 10	
On-State Drain Current ^a	$I_{\text{D}(\text{on})}$	$V_{\text{DS}} \leq -5\text{ V}$, $V_{\text{GS}} = -4.5\text{ V}$	- 6			A
Drain-Source On-Resistance ^a	$R_{\text{DS}(\text{on})}$	$V_{\text{GS}} = -4.5\text{ V}$, $I_{\text{D}} = -3.3\text{ A}$		0.044	0.057	Ω
		$V_{\text{GS}} = -2.5\text{ V}$, $I_{\text{D}} = -2.8\text{ A}$		0.061	0.076	
		$V_{\text{GS}} = -1.8\text{ V}$, $I_{\text{D}} = -2.3\text{ A}$		0.084	0.110	
Forward Transconductance ^a	g_{fs}	$V_{\text{DS}} = -5\text{ V}$, $I_{\text{D}} = -3.3\text{ A}$		3		S
Diode Forward Voltage	V_{SD}	$I_{\text{S}} = -1.6\text{ A}$, $V_{\text{GS}} = 0\text{ V}$			- 1.2	V
Dynamic ^b						
Total Gate Charge	Q_{g}	$V_{\text{DS}} = -6\text{ V}$, $V_{\text{GS}} = -4.5\text{ V}$ $I_{\text{D}} \cong -3.3\text{ A}$		8	13	nC
Gate-Source Charge	Q_{gs}			1.2		
Gate-Drain Charge	Q_{gd}			2.2		
Input Capacitance	C_{iss}	$V_{\text{DS}} = -6\text{ V}$, $V_{\text{GS}} = 0\text{ V}$, $f = 1\text{ MHz}$		715		pF
Output Capacitance	C_{oss}			170		
Reverse Transfer Capacitance	C_{rss}			120		
Switching ^b						
Turn-On Time	$t_{\text{d}(\text{on})}$	$V_{\text{DD}} = -6\text{ V}$, $R_{\text{L}} = 6\text{ }\Omega$ $I_{\text{D}} \cong -1.0\text{ A}$, $V_{\text{GEN}} = -4.5\text{ V}$ $R_{\text{G}} = 6\text{ }\Omega$		15	25	ns
	t_{r}			35	55	
Turn-Off Time	$t_{\text{d}(\text{off})}$			60	90	
	t_{f}			40	60	

Notes:

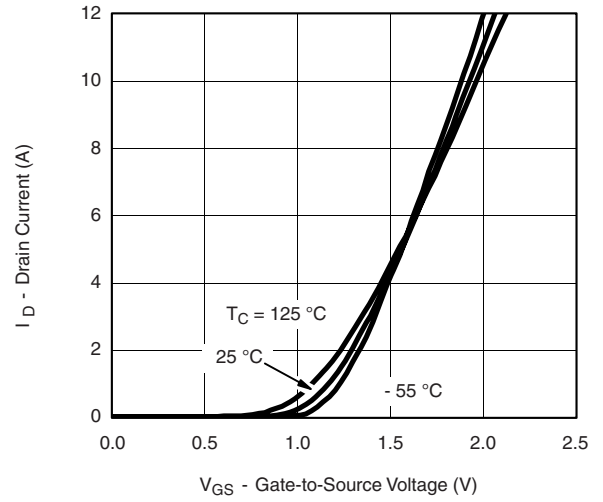
- a. For DESIGN AID ONLY, not subject to production testing.
b. Pulse test: $PW \leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
c. Switching time is essentially independent of operating temperature.

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.

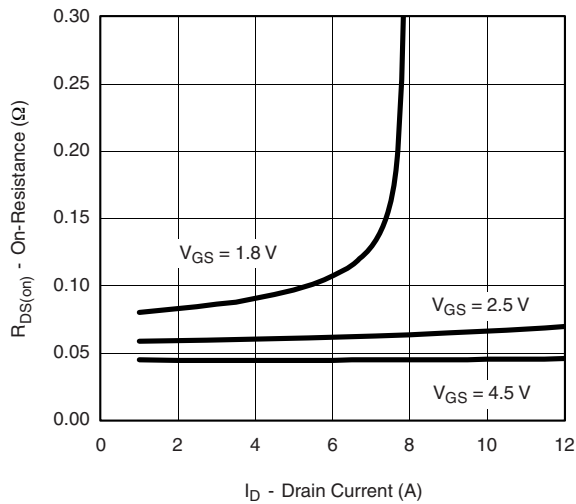
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



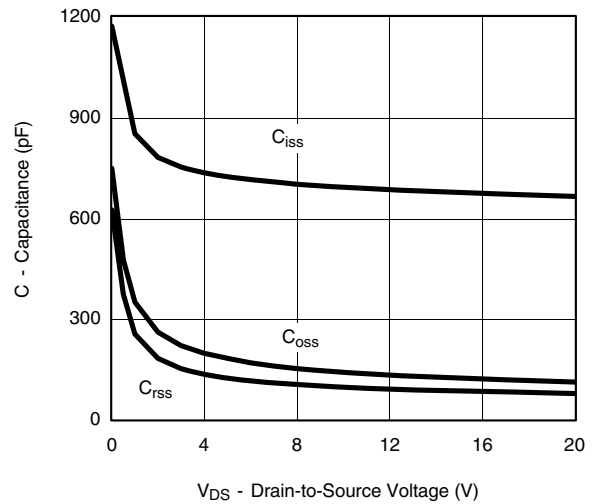
Output Characteristics



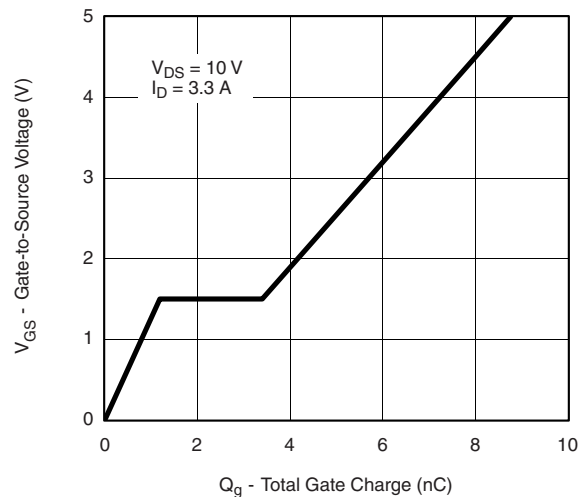
Transfer Characteristics



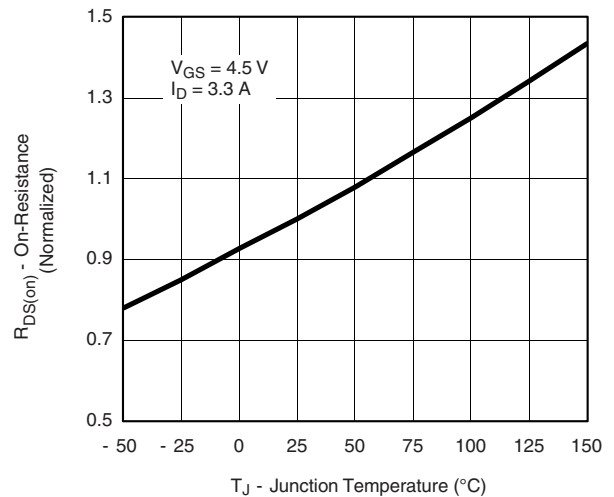
On-Resistance vs. Drain Current



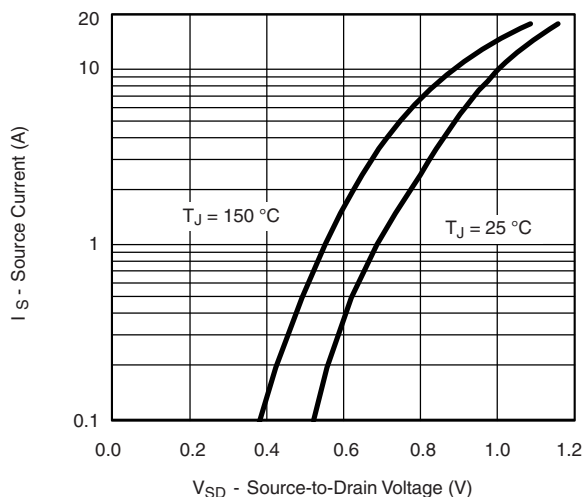
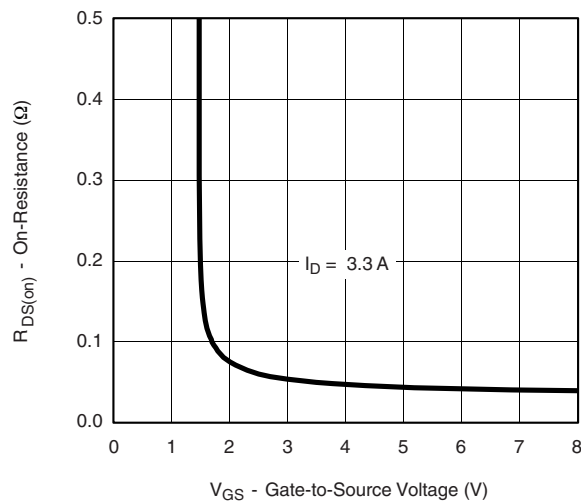
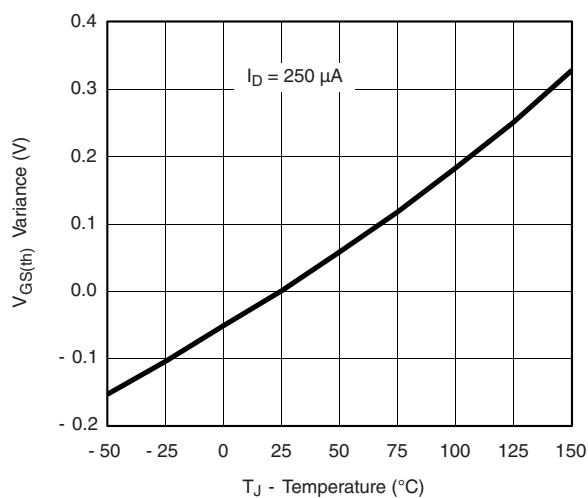
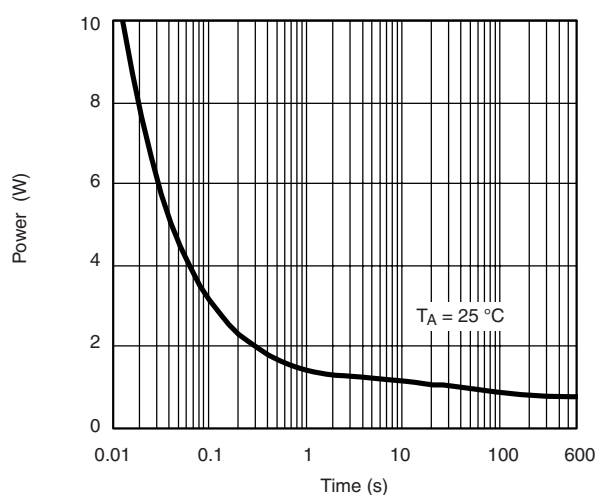
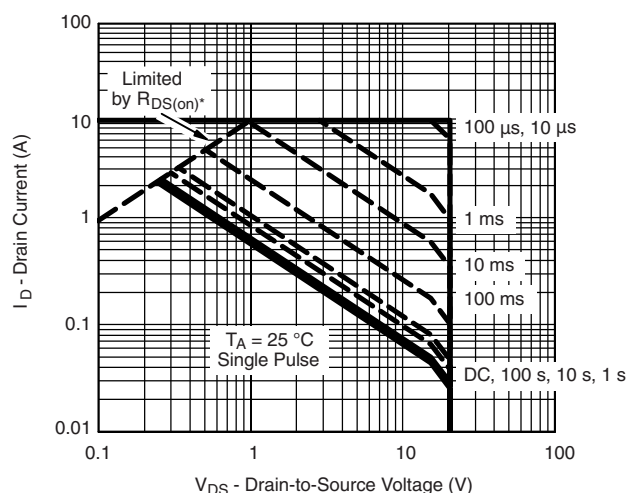
Capacitance



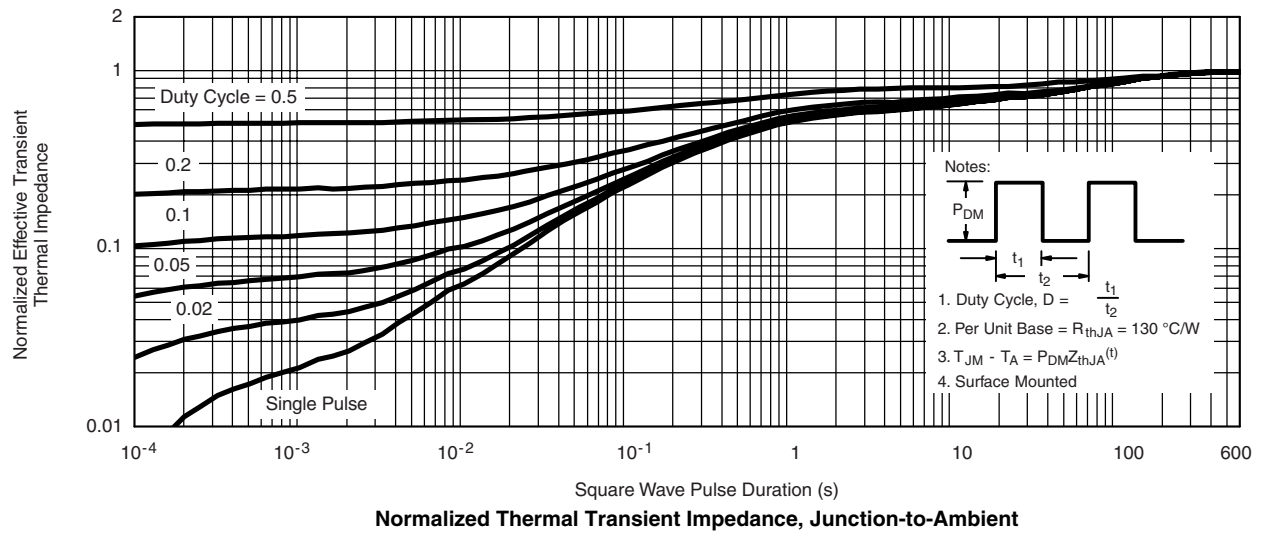
Gate Charge



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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