

P-Channel 1.8-V (G-S) MOSFET

PRODUCT SUMMARY		
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
- 12	0.048 at $V_{GS} = - 4.5$ V	- 3.6
	0.062 at $V_{GS} = - 2.5$ V	- 3.2
	0.090 at $V_{GS} = - 1.8$ V	- 2.7

FEATURES

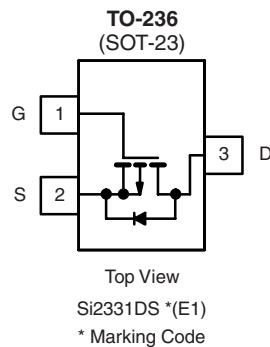
- Halogen-free Option Available
- TrenchFET[®] Power MOSFETS



RoHS
COMPLIANT

APPLICATIONS

- Load Switch
- PA Switch



Ordering Information: Si2331DS-T1-E3 (Lead (Pb)-free)
Si2331DS-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}	- 12		V
Gate-Source Voltage	V_{GS}	± 8		
Continuous Drain Current ($T_J = 150$ °C) ^a	I_D	$T_A = 25$ °C	- 3.6	- 3.2
		$T_A = 70$ °C	- 2.9	- 2.6
Pulsed Drain Current ^a	I_{DM}	- 12		A
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
		$T_A = 70$ °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	140	°C/W
	Steady State		140	175	
Maximum Junction-to-Foot (Drain)	Steady State	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>.

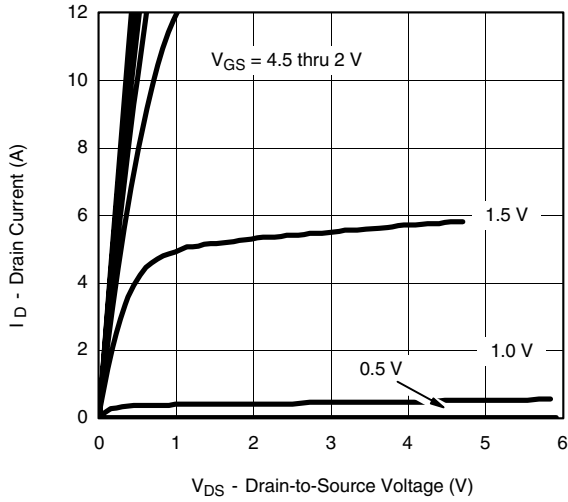
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}$, $I_D = -10\text{ }\mu\text{A}$	-12			V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = -250\text{ }\mu\text{A}$	-0.45		-0.90	
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}	$V_{DS} = -12\text{ V}$, $V_{GS} = 0\text{ V}$			-1	μA
		$V_{DS} = -12\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 55\text{ }^\circ\text{C}$			-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-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}$, $I_D = -3.6\text{ A}$		0.038	0.048	Ω
		$V_{GS} = -2.5\text{ V}$, $I_D = -3.2\text{ A}$		0.049	0.062	
		$V_{GS} = -1.8\text{ V}$, $I_D = -2.7\text{ A}$		0.070	0.090	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -5\text{ V}$, $I_D = -3.6\text{ A}$		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	$V_{DS} = -6\text{ V}$, $V_{GS} = -4.5\text{ V}$ $I_D \cong -3.6\text{ A}$		9	14	nC
Gate-Source Charge	Q_{gs}			1.3		
Gate-Drain Charge	Q_{gd}			2.5		
Input Capacitance	C_{iss}	$V_{DS} = -6\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$		780		pF
Output Capacitance	C_{oss}			290		
Reverse Transfer Capacitance	C_{rss}			210		
Switching^b						
Turn-On Time	$t_{d(on)}$	$V_{DD} = -6\text{ V}$, $R_L = 6\text{ }\Omega$ $I_D \cong -1.0\text{ A}$, $V_{GEN} = -4.5\text{ V}$ $R_G = 6\text{ }\Omega$		20	30	ns
	t_r			35	55	
Turn-Off Time	$t_{d(off)}$			65	100	
	t_f			50	75	

Notes:

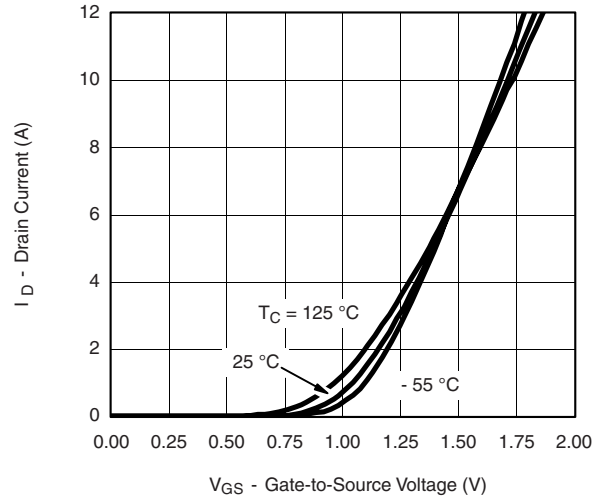
- a. For DESIGN AID ONLY, not subject to production testing.
b. Pulse test: $PW \leq 300\text{ }\mu\text{s}$ duty cycle $\leq 2\%$.
c. Switching time is essentially independent of operating temperature.

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.

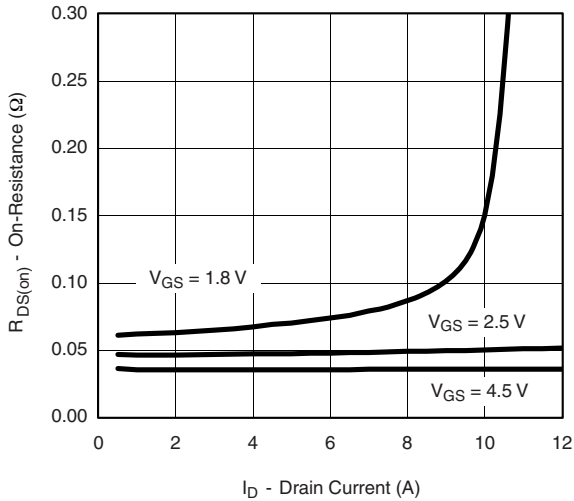
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



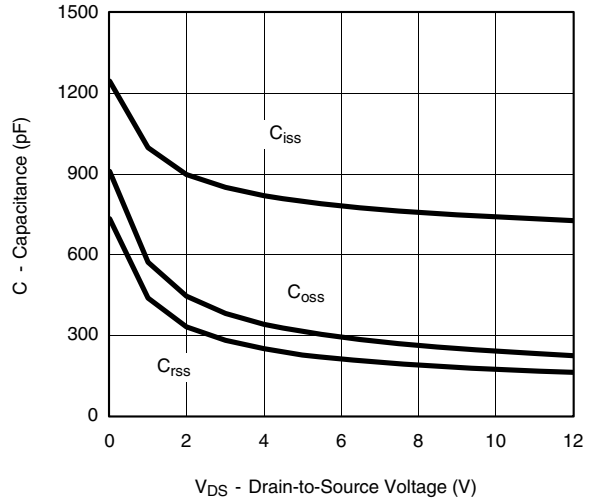
Output Characteristics



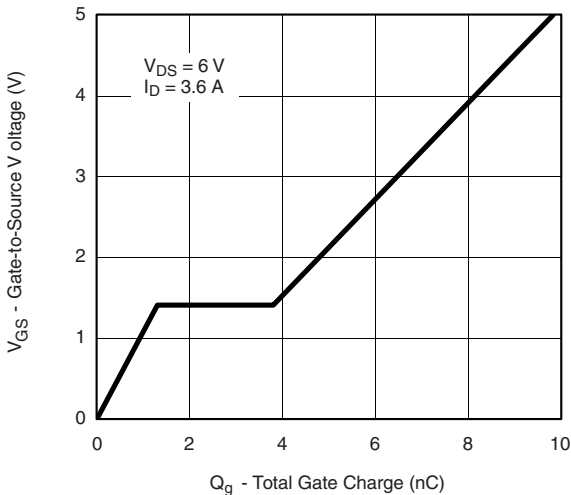
Transfer Characteristics



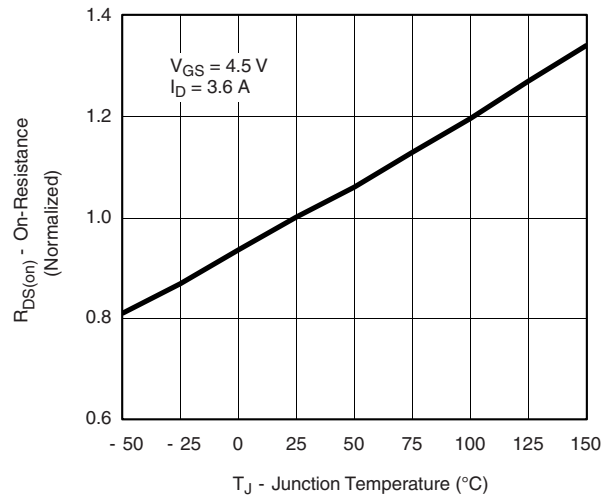
On-Resistance vs. Drain Current



Capacitance

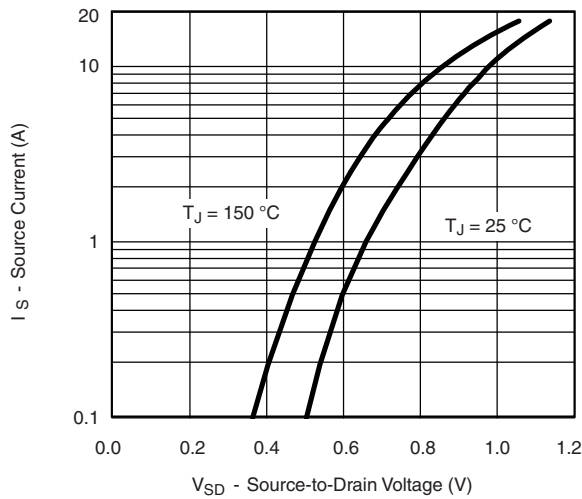


Gate Charge

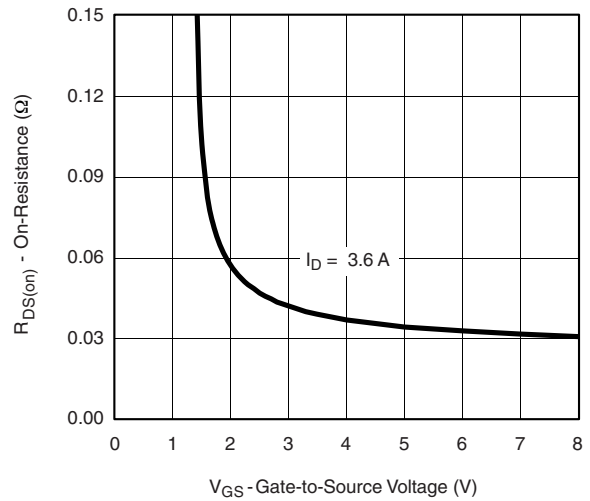


On-Resistance vs. Junction Temperature

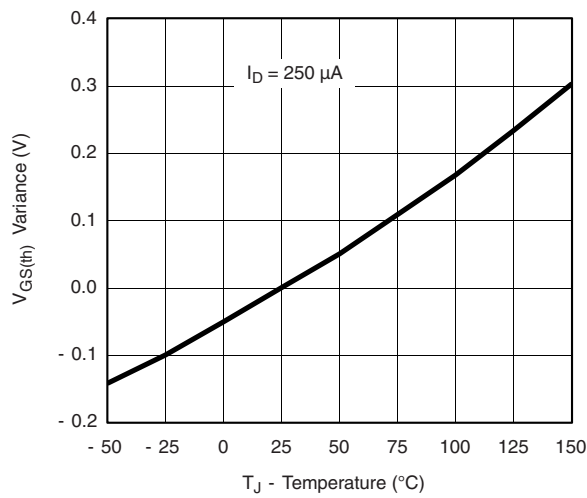
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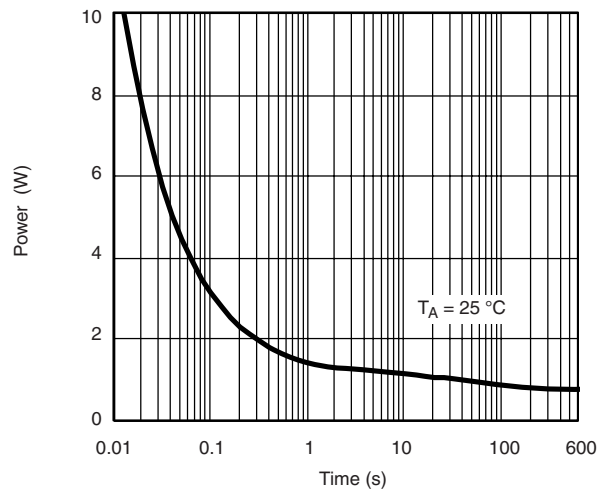
Source-Drain Diode Forward Voltage



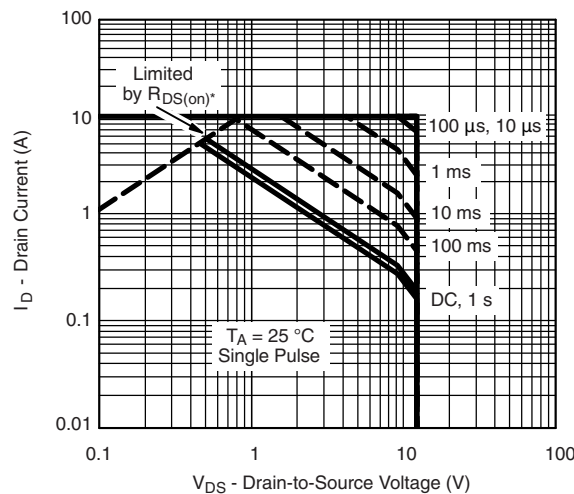
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



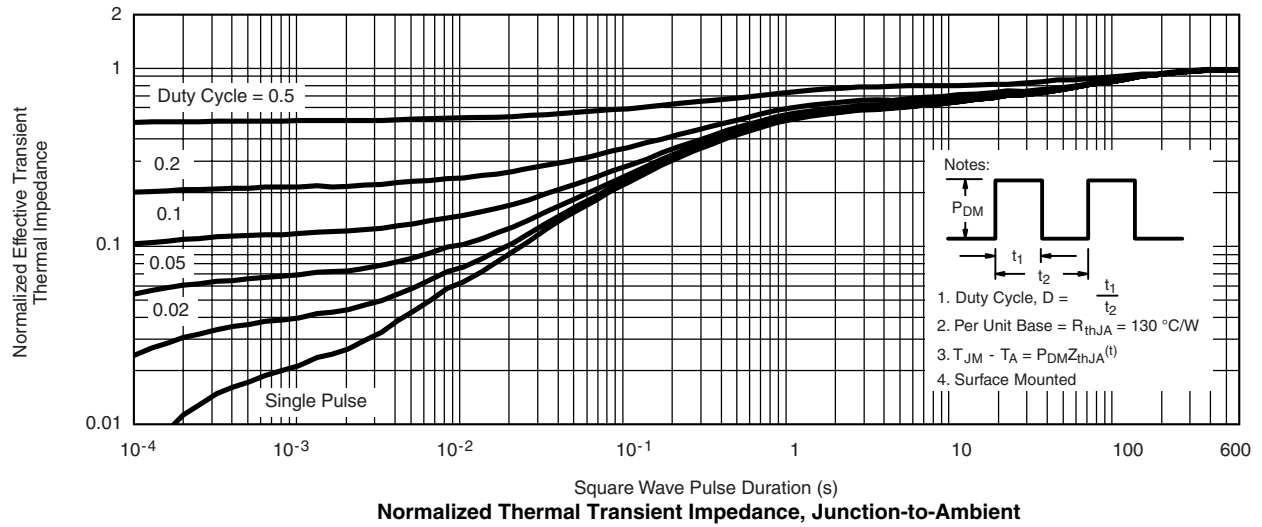
Single Pulse Power



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

Safe Operating Area

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



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