

Vishay Siliconix

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

PRODUCT SUMMARY				
V <sub>DS</sub> (V)	<b>R<sub>DS(on)</sub> (Ω)</b>	I <sub>D</sub> (A)		
- 12	0.048 at V <sub>GS</sub> = - 4.5 V	- 3.6		
	0.062 at V <sub>GS</sub> = - 2.5 V	- 3.2		
	0.090 at V <sub>GS</sub> = - 1.8 V	- 2.7		

#### **FEATURES**

- Halogen-free Option Available
- TrenchFET<sup>®</sup> Power MOSFETS

#### **APPLICATIONS**

- Load Switch
- PA Switch



## TO-236 (SOT-23) G 1 S 2 Top View Si2331DS \*(E1) \* Marking Code

Ordering Information: Si2331DS-T1-E3 (Lead (Pb)-free) Si2331DS-T1-GE3 (Lead (Pb)-free and Halogen-free)

<b>ABSOLUTE MAXIMUM RATINGS</b>	T <sub>A</sub> = 25 °C, unle	ss otherwise r	noted			
Parameter		Symbol	5 s	Steady State	Unit	
Drain-Source Voltage		V <sub>DS</sub>	- 12		V	
Gate-Source Voltage		V <sub>GS</sub>	± 8			
	T <sub>A</sub> = 25 °C	– I <sub>D</sub>	- 3.6	- 3.2		
Continuous Drain Current $(T_J = 150 \ ^{\circ}C)^a$	T <sub>A</sub> = 70 °C		- 2.9	- 2.6		
Pulsed Drain Current <sup>a</sup>		I <sub>DM</sub>	- 12		А	
Continuous Source Current (Diode Conduction) <sup>a</sup>		۱ <sub>S</sub>	- 0.74	- 0.59		
	T <sub>A</sub> = 25 °C	– P <sub>D</sub>	0.89	0.71	W	
Power Dissipation <sup>a</sup>	T <sub>A</sub> = 70 °C		0.57	0.45	vv	
Operating Junction and Storage Temperature Range		T <sub>J</sub> , T <sub>stg</sub>	- 55 to 150		°C	

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Manimum lungting to Angliand	t ≤ 5 s	- R <sub>thJA</sub> R <sub>thJF</sub>	115	140	
Maximum Junction-to-Ambient <sup>a</sup>	Steady State		140	175	°C/W
Maximum Junction-to-Foot (Drain)	Steady State		60	75	

Notes:

a. Surface Mounted on FR4 board.

b.  $t \le 5 s$ .

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

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<b>SPECIFICATIONS</b> $T_J = 25$ °	C, unless o	therwise noted					
			Limits				
Parameter	Symbol	Test Conditions	Min.	Тур.	Max.	Unit	
Static	-,,						
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	$V_{GS} = 0 V$ , $I_D = -10 \mu A$	- 12			v	
Gate-Threshold Voltage	V <sub>GS(th)</sub>	$V_{DS} = V_{GS}, I_D = -250 \ \mu A$	- 0.45		- 0.90		
Gate-Body Leakage	I <sub>GSS</sub>	$V_{DS} = 0 V, V_{GS} = \pm 8 V$			± 100	nA	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	$V_{DS} = -12 \text{ V}, \text{ V}_{GS} = 0 \text{ V}$			- 1	uA	
		$V_{DS}$ = - 12 V, $V_{GS}$ = 0 V, $T_{J}$ = 55 °C			- 10		
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	$V_{DS} \leq$ - 5 V, $V_{GS}$ = - 4.5 V	- 6			А	
		$V_{GS} = -4.5 \text{ V}, \text{ I}_{D} = -3.6 \text{ A}$		0.038	0.048	Ω	
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	$V_{GS} = -2.5 \text{ V}, \text{ I}_{D} = -3.2 \text{ A}$		0.049	0.062		
		V <sub>GS</sub> = - 1.8 V, I <sub>D</sub> = - 2.7 A		0.070	0.090		
Forward Transconductance <sup>a</sup>	9 <sub>fs</sub>	$V_{DS} = -5 V, I_{D} = -3.6 A$		3		S	
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> = - 1.6 A, V <sub>GS</sub> = 0 V			- 1.2	V	
Dynamic <sup>b</sup>	- <b>I</b>						
Total Gate Charge	Qg			9	14	nC	
Gate-Source Charge	Q <sub>gs</sub>	$V_{DS} = -6 V, V_{GS} = -4.5 V$ $I_{D} \cong -3.6 A$		1.3			
Gate-Drain Charge	Q <sub>gd</sub>	ID = - 3.0 A		2.5			
Input Capacitance	C <sub>iss</sub>			780		pF	
Output Capacitance	C <sub>oss</sub>	V <sub>DS</sub> = - 6 V, V <sub>GS</sub> = 0 V, f = 1 MHz		290			
Reverse Transfer Capacitance	C <sub>rss</sub>			210			
Switching <sup>b</sup>	· ·						
Turn-On Time	t <sub>d(on)</sub>			20	30	ns	
	t <sub>r</sub>	$V_{DD} = -6 \text{ V}, \text{ R}_{L} = 6 \Omega$		35	55		
Turn-Off Time	t <sub>d(off)</sub>	$I_D \cong$ - 1.0 A, $V_{GEN}$ = - 4.5 V R <sub>G</sub> = 6 $\Omega$		65	100		
	t <sub>f</sub>	ng - 0 32		50	75		

Notes:

a. For DESIGN AID ONLY, not subject to production testing.

b. Pulse test: PW  $\leq$  300  $\mu s$  duty cycle  $\leq$  2 %.

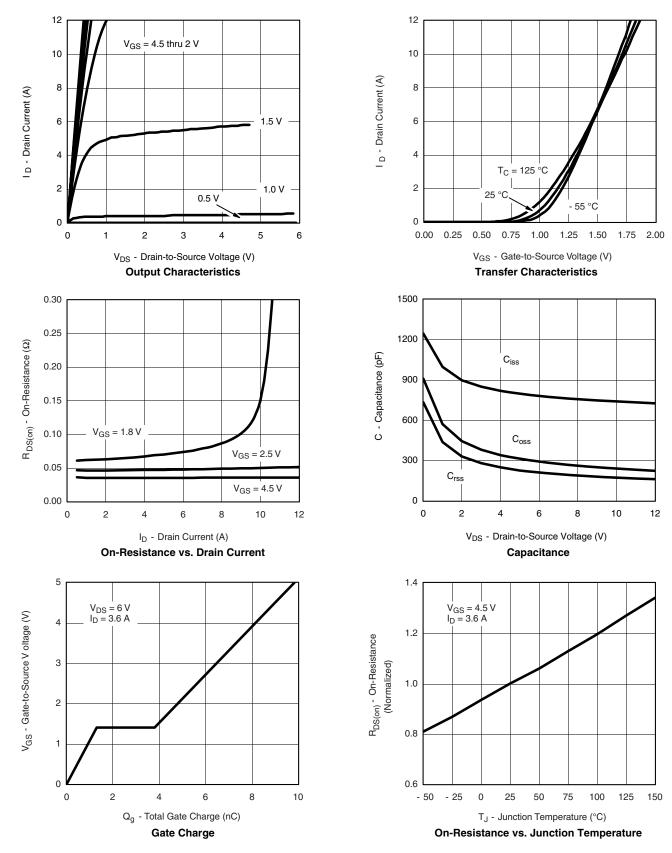
c. Switching time is essentially independent of operating temperature.

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.



## Si2331DS Vishay Siliconix

#### TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



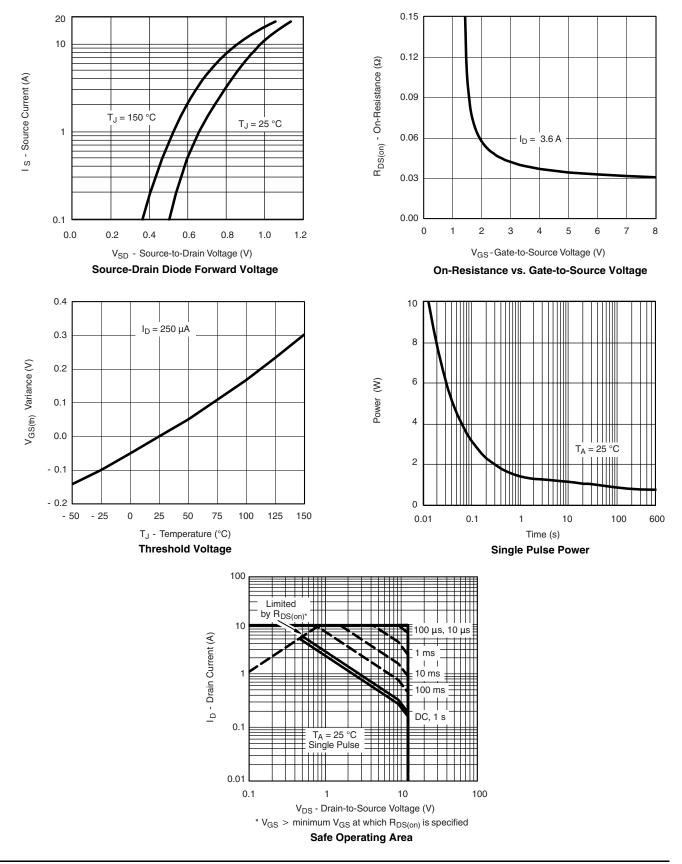
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# Si2331DS

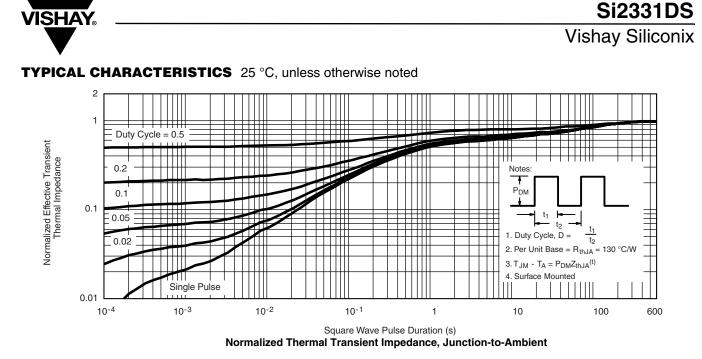
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### TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



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