

**Vishay Siliconix** 

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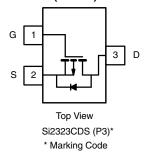
COMPLIANT HALOGEN

FREE

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

MOSFET PRODUCT SUMMARY					
V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A) <sup>a</sup>	Q <sub>g</sub> (Typ.)		
	0.039 at V <sub>GS</sub> = -4.5 V	-6 <sup>e</sup>			
-20	0.050 at V <sub>GS</sub> = -2.5 V	-5.8	9 nC		
	0.063 at V <sub>GS</sub> = -1.8 V	-5.1			



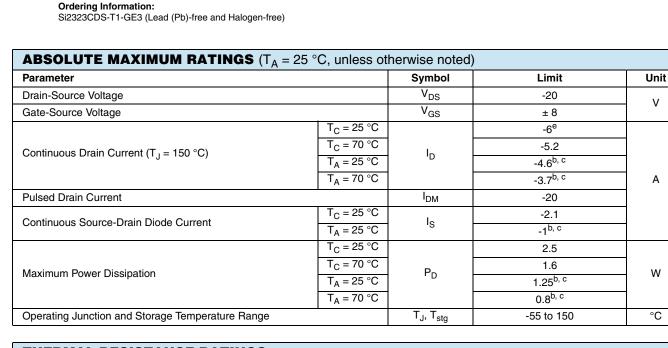


#### **FEATURES**

- TrenchFET<sup>®</sup> Power MOSFET
- 100 % R<sub>g</sub> Tested
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

#### **APPLICATIONS**

- Load Switch
- PA Switch
- **DC/DC** Converters



THERMAL RESISTANCE RATINGS						
Parameter		Symbol	Typical	Maximum	Unit	
Maximum Junction-to-Ambient <sup>b, d</sup>	≤ 5 s	R <sub>thJA</sub>	75	100	°C/W	
Maximum Junction-to-Foot (Drain)	Steady State	R <sub>thJF</sub>	40	50	C/W	

Notes:

a. Based on T<sub>C</sub> = 25 °C.

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b. Surface mounted on 1" x 1" FR4 board.

c. t = 5 s.

d. Maximum under steady state conditions is 166 °C/W.

e. Package limited.

For technical questions, contact: pmostechsupport@vishav.com

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MOSFET SPECIFICATIONS	(T <sub>J</sub> = 25 °C	, unless otherwise noted)					
Parameter	Symbol	Test Conditions	Min.	Тур.	Max.	Unit	
Static					_		
Drain-Source Breakdown Voltage	V <sub>DS</sub>	$V_{DS} = 0 V, I_{D} = -250 \mu A$	-20			V	
V <sub>DS</sub> Temperature Coefficient	$\Delta V_{DS}/T_{J}$	L _ 250 HA		-14		mV/°C	
V <sub>GS(th)</sub> Temperature Coefficient	$\Delta V_{GS(th)}/T_J$	I <sub>D</sub> = -250 μA		2.4			
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	$V_{DS} = V_{GS}$ , $I_D = -250 \ \mu A$	-0.4		-1	V	
Gate-Source Leakage	I <sub>GSS</sub>	$V_{DS} = 0 V$ , $V_{GS} = \pm 8 V$			± 100	nA	
Zero Gate Voltage Drain Current	lace	$V_{DS} = -20 V, V_{GS} = 0 V$			-1		
Zero Gale Vollage Diam Current	IDSS	$V_{DS}$ = -20 V, $V_{GS}$ = 0 V, $T_{J}$ = 55 °C			-10	- μΑ	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	$V_{DS}$ $\leq$ -5 V, $V_{GS}$ = -4.5 V	-20			Α	
		V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -4.6 A		0.032	0.039		
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = -2.5 V, I <sub>D</sub> = -4.1 A		0.041	0.050	Ω	
		V <sub>GS</sub> = -1.8 V, I <sub>D</sub> = -3.6 A		0.050	0.063		
Forward Transconductance <sup>a</sup>	9 <sub>fs</sub>	V <sub>DS</sub> = -5 V, I <sub>D</sub> = -4.6 A		20		S	
Dynamic <sup>b</sup>	I						
Input Capacitance	C <sub>iss</sub>			1090		pF	
Output Capacitance	C <sub>oss</sub>	$V_{DS}$ = -10 V, $V_{GS}$ = 0 V, f = 1 MHz		155			
Reverse Transfer Capacitance	C <sub>rss</sub>			135			
Tatal Cata Obarra		$V_{DS}$ = -10 V, $V_{GS}$ = -4.5 V, $I_{D}$ = -4.6 A		16	25		
Total Gate Charge	Qg		9.3	15			
Gate-Source Charge	Q <sub>gs</sub>	$V_{DS}$ = -10 V, $V_{GS}$ = -2.5 V, $I_{D}$ = -4.6 A		2.5		nC	
Gate-Drain Charge	Q <sub>gd</sub>			3.2			
Gate Resistance	R <sub>g</sub>	f = 1 MHz	0.8	4.1	8.2	Ω	
Turn-On Delay Time	t <sub>d(on)</sub>			15	23		
Rise Time	t <sub>r</sub>	$V_{DD}$ = -10 V, $R_L$ = 2.7 $\Omega$		23	35	ns	
Turn-Off Delay Time	t <sub>d(off)</sub>	$\rm I_D$ = -3.7 A, $\rm V_{GEN}$ = -4.5 V, $\rm R_g$ = 1 $\Omega$		40	60		
Fall Time	t <sub>f</sub>			12	20		
Drain-Source Body Diode Characteristi	cs						
Continuous Source-Drain Diode Current	۱ <sub>S</sub>	T <sub>C</sub> = 25 °C			-2.1	A	
Pulse Diode Forward Current <sup>a</sup>	I <sub>SM</sub>			l l	-20		
Body Diode Voltage	V <sub>SD</sub>	I <sub>S</sub> = -3.7 A		-0.8	-1.2	V	
Body Diode Reverse Recovery Time	t <sub>rr</sub>			30	45	ns	
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>			20	40	nC	
Reverse Recovery Fall Time	t <sub>a</sub>	$I_F = -3.7 \text{ A}, \text{ dI/dt} = 100 \text{ A/}\mu\text{s}, \text{ T}_J = 25 ^\circ\text{C}$		17			
-	-					ns	

Notes:

a. Pulse test; pulse width  $\leq$  300  $\mu s,$  duty cycle  $\leq$  2 %.

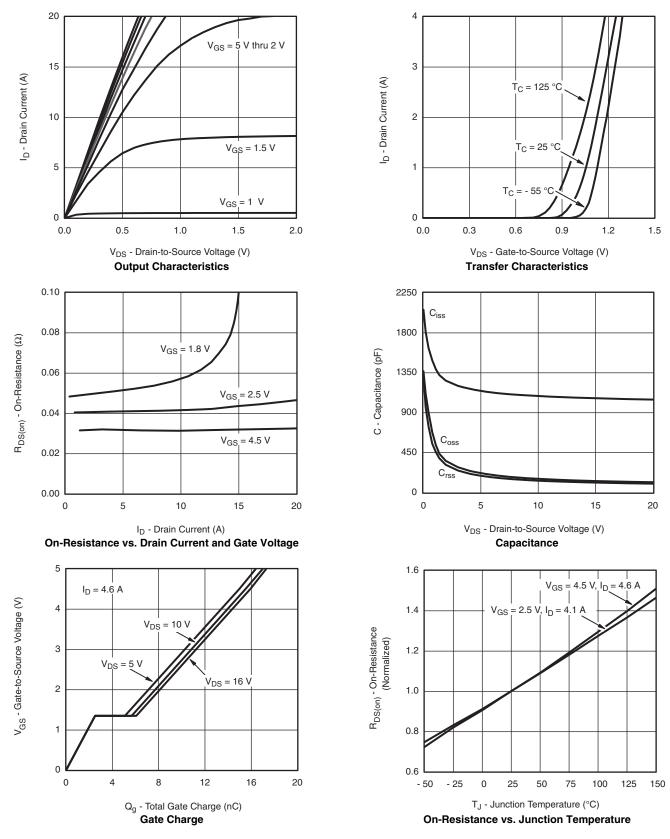
b. Guaranteed by design, not subject to production testing.

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.



## Si2323CDS Vishay Siliconix

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



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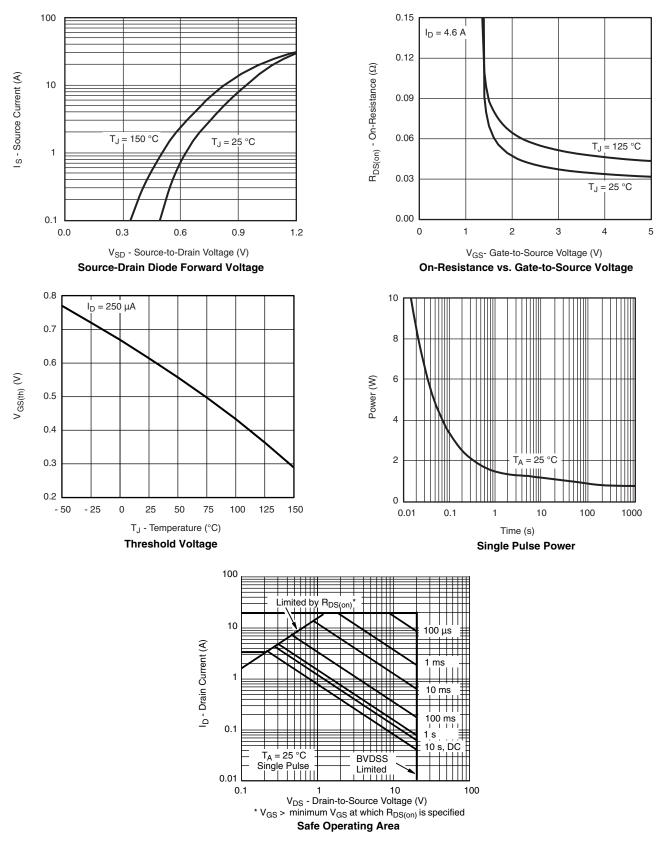
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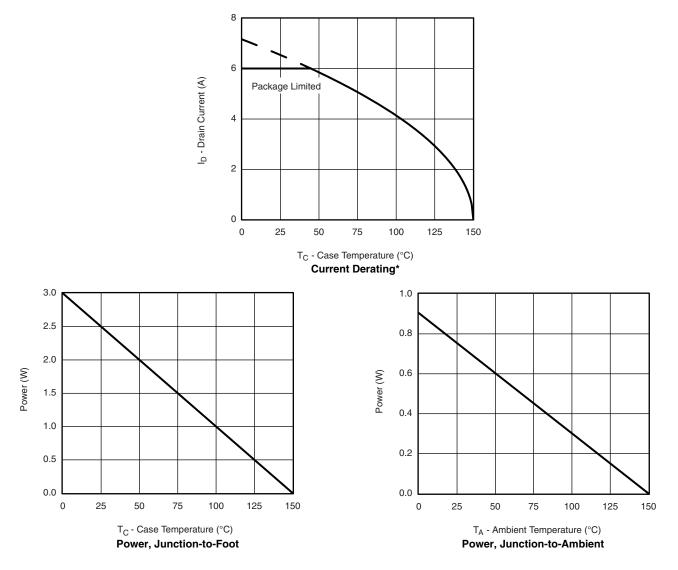


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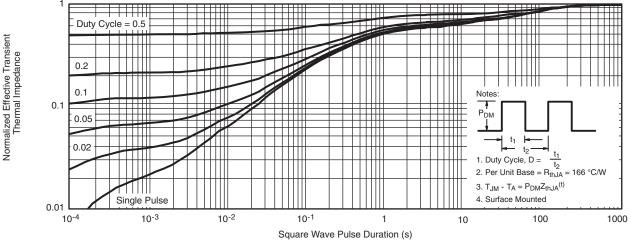


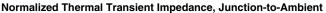
\* The power dissipation  $P_D$  is based on  $T_{J(max.)} = 150$  °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

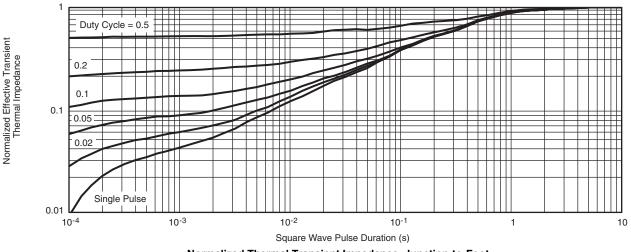


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#### TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)







#### Normalized Thermal Transient Impedance, Junction-to-Foot

Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see <a href="http://www.vishay.com/ppg?65700">www.vishay.com/ppg?65700</a>.

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# Package Information

Vishay Siliconix

### SOT-23 (TO-236): 3-LEAD







Dim	MILLIMETERS		INCHES		
	Min	Max	Min	Мах	
Α	0.89	1.12	0.035	0.044	
A <sub>1</sub>	0.01	0.10	0.0004	0.004	
A <sub>2</sub>	0.88	1.02	0.0346	0.040	
b	0.35	0.50	0.014	0.020	
С	0.085	0.18	0.003	0.007	
D	2.80	3.04	0.110	0.120	
E	2.10	2.64	0.083	0.104	
E <sub>1</sub>	1.20	1.40	0.047	0.055	
е	0.95 BSC		0.0374 Ref		
e <sub>1</sub>	1.90 BSC		0.0748 Ref		
L	0.40	0.60	0.016	0.024	
L <sub>1</sub>	0.64 Ref		0.025 Ref		
S	0.50 Ref		0.020 Ref		
q	3°	8°	3°	8°	



# Application Note 826

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#### **RECOMMENDED MINIMUM PADS FOR SOT-23**



Recommended Minimum Pads Dimensions in Inches/(mm)

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