



# **Dual P-Channel 2.5-V (G-S) MOSFET**

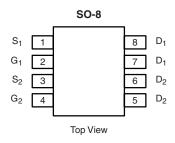
PRODUCT SUMMARY				
V <sub>DS</sub> (V)	$R_{DS(on)}\left(\Omega\right)$	I <sub>D</sub> (A)		
- 20	$0.032 \text{ at V}_{GS} = -4.5 \text{ V}$	- 6.5		
	0.050 at V <sub>GS</sub> = - 2.5 V	- 5.2		

### **FEATURES**

- Halogen-free According to IEC 61249-2-21 Definition
- Compliant to RoHS Directive 2002/95/EC

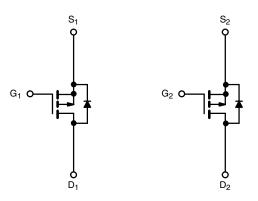






Ordering Information: Si4963BDY-T1-E3 (Lead (Pb)-free)

Si4963BDY-T1-GE3 (Lead (Pb)-free and Halogen-free)



P-Channel MOSFET

P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS T <sub>A</sub> = 25 °C, unless otherwise noted						
Parameter		Symbol	10 s	Steady State	Unit	
Drain-Source Voltage		V <sub>DS</sub>	- 20		V	
Gate-Source Voltage		V <sub>GS</sub>	± 12		V	
Continuous Drain Current /T 150 °C\2	T <sub>A</sub> = 25 °C	I <sub>D</sub>	- 6.5	- 4.9	_	
Continuous Drain Current (T <sub>J</sub> = 150 °C) <sup>a</sup>	T <sub>A</sub> = 70 °C		- 5.2	- 3.9		
Pulsed Drain Current		I <sub>DM</sub>	- 40		А	
Continuous Source Current (Diode Conduction) <sup>a</sup>	I <sub>S</sub>	- 1.7	- 0.9			
Mariana Barra Biraira di	T <sub>A</sub> = 25 °C	D_	2.0	1.1	W	
Maximum Power Dissipation <sup>a</sup>	T <sub>A</sub> = 70 °C	P <sub>D</sub>	1.3	0.7	l 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
Manifestore bounding to Aughing 18	t ≤ 10 s	$R_{thJA}$	58	62.5	
Maximum Junction-to-Ambient <sup>a</sup>	Steady State	□thJA	91	110	°C/W
Maximum Junction-to-Foot (Drain)	Steady State	$R_{thJF}$	34	40	

#### Notes:

a. Surface Mounted on 1" x 1" FR4 board.

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

## Vishay Siliconix



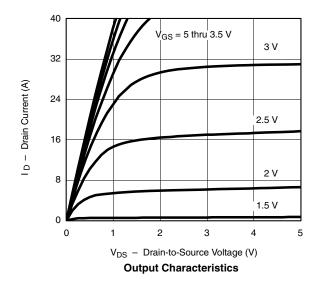
<b>SPECIFICATIONS</b> T <sub>J</sub> = 25 °C, unless otherwise noted							
Parameter	Symbol	Test Conditions Min.		Тур.	Max.	Unit	
Static							
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_{D} = -250 \mu A$ - 0.6			- 1.4	V	
Gate-Body Leakage	I <sub>GSS</sub>	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 12 \text{ V}$			± 100	nA	
Zava Cata Valtaga Drain Current	1	V <sub>DS</sub> = - 20 V, V <sub>GS</sub> = 0 V			- 1	μΑ	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = - 20 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55 °C			- 5		
On-State Drain Current <sup>a</sup>	On-State Drain Current <sup>a</sup> $I_{D(on)}$ $V_{DS} \le -5 \text{ V}, V_{GS} = -4.5 \text{ V}$		- 20			Α	
	ם	V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> = - 6.5 A		0.025	0.032	0	
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = - 2.5 V, I <sub>D</sub> = - 2 A		0.040	0.050	Ω	
Forward Transconductance <sup>a</sup>	9 <sub>fs</sub>	V <sub>DS</sub> = - 10 V, I <sub>D</sub> = - 6.5 A		18		S	
Diode Forward Voltage <sup>a</sup>	V <sub>SD</sub>	I <sub>S</sub> = - 1.7 A, V <sub>GS</sub> = 0 V		- 0.75	- 1.2	V	
Dynamic <sup>b</sup>							
Total Gate Charge	$Q_g$			14	21		
Gate-Source Charge	$Q_{gs}$	$V_{DS} = -10 \text{ V}, V_{GS} = -4.5 \text{ V}, I_{D} = -6.5 \text{ A}$		2.6		nC	
Gate-Drain Charge	Q <sub>gd</sub>			4.6			
Gate Resistance	R <sub>g</sub>	f = 1 MHz		8.3		Ω	
Turn-On Delay Time	t <sub>d(on)</sub>			30	45		
Rise Time	t <sub>r</sub>	$V_{DD}$ = - 10 V, $R_L$ = 10 $\Omega$		40	60		
Turn-Off Delay Time	t <sub>d(off)</sub>	$I_D \cong$ - 1 A, $V_{GEN}$ = - 4.5 V, $R_g$ = 6 $\Omega$		80	120	ns	
Fall Time	t <sub>f</sub>			55	85		
Source-Drain Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = - 1.7 A, dl/dt = 100 A/μs		40	80		

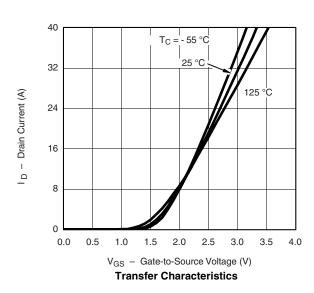
#### Notes:

- 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.

## TYPICAL CHARACTERISTICS 25 °C unless otherwise noted



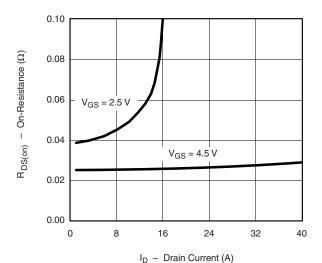




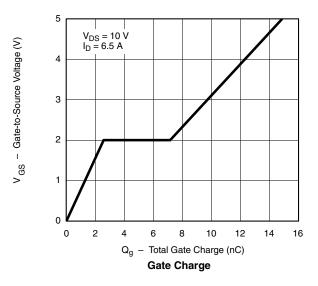


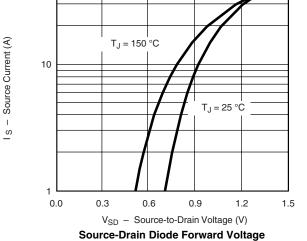


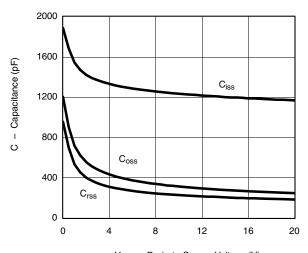
## TYPICAL CHARACTERISTICS 25 °C unless otherwise noted



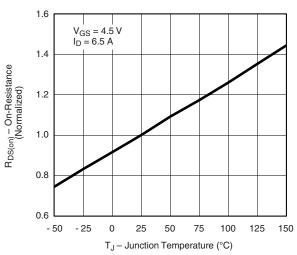
#### **On-Resistance vs. Drain Current**



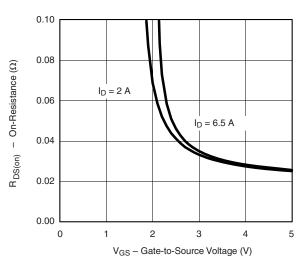




V<sub>DS</sub> - Drain-to-Source Voltage (V) **Capacitance** 



On-Resistance vs. Junction Temperature



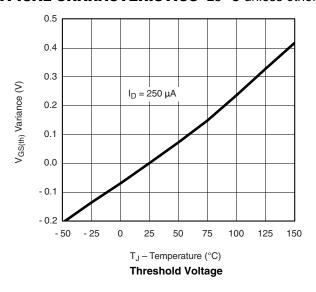
On-Resistance vs. Gate-to-Source Voltage

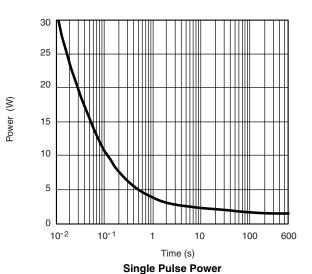
40

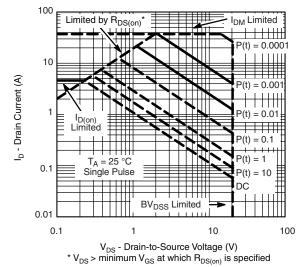
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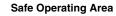
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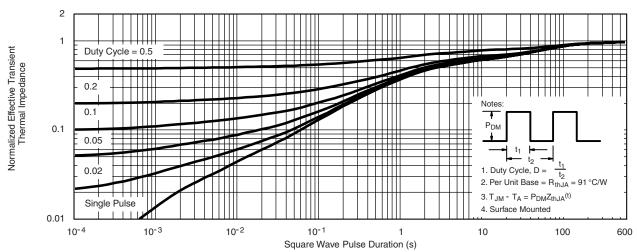
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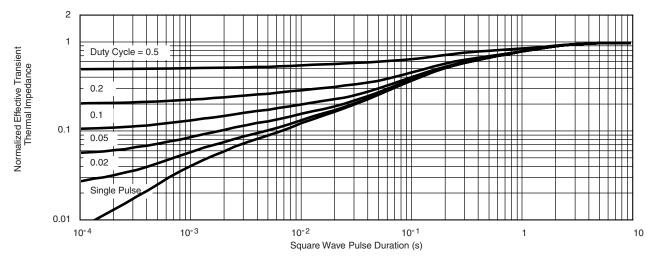




Normalized Thermal Transient Impedance, Junction-to-Ambient



## TYPICAL CHARACTERISTICS 25 °C unless otherwise noted

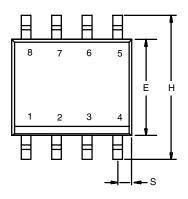


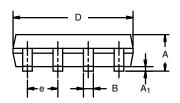
Normalized Thermal Transient Impedance, Junction-to-Foot

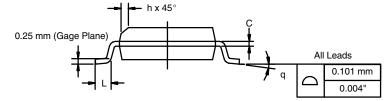
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SOIC (NARROW): 8-LEAD JEDEC Part Number: MS-012







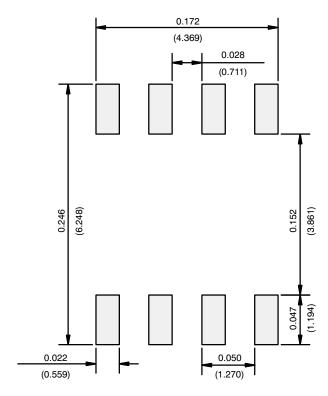
	MILLIM	IETERS	INC	HES	
DIM	Min	Max	Min	Max	
Α	1.35	1.75	0.053	0.069	
A <sub>1</sub>	0.10	0.20	0.004	0.008	
В	0.35	0.51	0.014	0.020	
С	0.19	0.25	0.0075	0.010	
D	4.80	5.00	0.189	0.196	
Е	3.80	4.00	0.150	0.157	
е	1.27	BSC	0.050 BSC		
Н	5.80	6.20	0.228	0.244	
h	0.25	0.50	0.010	0.020	
L	0.50	0.93	0.020	0.037	
q	0°	8°	0°	8°	
S	0.44	0.64	0.018	0.026	
ECN: C-06527-Rev. I. 11-Sep-06					

DWG: 5498

Document Number: 71192 www.vishay.com 11-Sep-06



## **RECOMMENDED MINIMUM PADS FOR SO-8**



Recommended Minimum Pads Dimensions in Inches/(mm)

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