

Vishay Siliconix

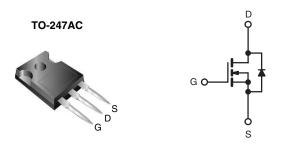
### **Power MOSFET**

PRODUCT SUMMARY					
V <sub>DS</sub> (V) at T <sub>J</sub> max.	560 V				
$R_{DS(on)}\left(\Omega\right)$	V <sub>GS</sub> = 10 V	0.38			
Q <sub>g</sub> (Max.) (nC)	68				
Q <sub>gs</sub> (nC)	17.6				
Q <sub>gd</sub> (nC)	21.8				
Configuration	Single				

#### **FEATURES**

- Low Figure-of-Merit Ron x Qg
- 100 % Avalanche Tested
- Gate Charge Improved
- $\bullet$  T<sub>rr</sub>/Q<sub>rr</sub> Improved
- Compliant to RoHS Directive 2002/95/EC





ORDERING INFORMATION	
Package	TO-247AC
Lead (Pb)-free	SiHG16N50C-E3

N-Channel MOSFET

<b>ABSOLUTE MAXIMUM RATINGS</b> $T_C = 25$ °C, unless otherwise noted						
PARAMETER			SYMBOL	LIMIT	UNIT	
Drain-Source Voltage			$V_{DS}$	500	V	
Gate-Source Voltage			$V_{GS}$	± 30	V	
Continuous Drain Current (T <sub>J</sub> = 150 °C) <sup>a</sup>	V <sub>GS</sub> at 10 V	T <sub>C</sub> = 25 °C	- I <sub>D</sub>	16		
	V <sub>GS</sub> at 10 V	T <sub>C</sub> = 100 °C		10	Α	
Pulsed Drain Current <sup>c</sup>			I <sub>DM</sub>	40		
Linear Derating Factor				2	W/°C	
Single Pulse Avalanche Energy <sup>b</sup>			E <sub>AS</sub>	320	mJ	
Maximum Power Dissipation			$P_{D}$	250	W	
Operating Junction and Storage Temperature Range			T <sub>J</sub> , T <sub>stg</sub>	- 55 to + 150	°C	
Soldering Recommendations (Peak Temperatu	re) <sup>d</sup> for	10 s		300		

#### Notes

- a. Limited by maximum junction temperature.
- b.  $V_{DD}$  = 50 V, starting  $T_J$  = 25 °C, L = 2.5 mH,  $R_g$  = 25  $\Omega$ ,  $I_{AS}$  = 16 A.
- c. Repetitive rating; pulse width limited by maximum junction temperature.
- d. 1.6 mm from case.

<sup>\*</sup> Pb containing terminations are not RoHS compliant, exemptions may apply

## SiHG16N50C

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THERMAL RESISTANCE RATINGS						
PARAMETER	SYMBOL	TYP.	MAX.	UNIT		
Maximum Junction-to-Ambient	R <sub>thJA</sub>	-	40	°C/W		
Maximum Junction-to-Case (Drain)	R <sub>thJC</sub>	=	0.5	C/VV		

PARAMETER	SYMBOL	TEST	MIN.	TYP.	MAX.	UNIT	
Static		•					
Drain-Source Breakdown Voltage	V <sub>DS</sub>	$V_{GS} = 0$	500	-	-	V	
V <sub>DS</sub> Temperature Coefficient	$\Delta V_{DS}/T_{J}$	Reference t	Reference to 25 °C, I <sub>D</sub> = 1 mA			-	V/°C
Gate-Source Threshold Voltage (N)	V <sub>GS(th)</sub>	$V_{DS} = V$	<sub>GS</sub> , I <sub>D</sub> = 250 μA	3.0	-	5.0	V
Gate-Source Leakage	I <sub>GSS</sub>	$V_{GS} = \pm 30 \text{ V}$		1	-	± 100	nA
Zara Cata Valtaga Drain Current		$V_{DS} = 50$	V <sub>DS</sub> = 500 V, V <sub>GS</sub> = 0 V		-	50	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	$V_{DS} = 400 \text{ V}, \text{ V}$	<sub>GS</sub> = 0 V, T <sub>J</sub> = 125 °C	-	-	250	μA
Drain-Source On-State Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V	I <sub>D</sub> = 8 A	-	0.317	0.38	Ω
Forward Transconductancea	9 <sub>fs</sub>	V <sub>DS</sub> =	50 V, I <sub>D</sub> = 3 A	-	3	-	S
Dynamic							
Input Capacitance	$C_{iss}$	$V_{GS} = 0 \text{ V},$ $V_{DS} = 25 \text{ V},$ $f = 1.0 \text{ MHz}$		1	1900	-	pF
Output Capacitance	C <sub>oss</sub>			-	230	-	
Reverse Transfer Capacitance	$C_{rss}$			1	24	-	
Total Gate Charge	$Q_g$		/ I <sub>D</sub> = 16 A, V <sub>DS</sub> = 400 V	-	45	68	nC
Gate-Source Charge	Q <sub>gs</sub>	V <sub>GS</sub> = 10 V		1	18	-	
Gate-Drain Charge	Q <sub>gd</sub>				22	-	
Turn-On Delay Time	t <sub>d(on)</sub>			-	27	-	
Rise Time	t <sub>r</sub>	$V_{DD} = 2$	$V_{DD} = 250 \text{ V}, I_D = 16 \text{ A},$		156	-	- ns
Turn-Off Delay Time	t <sub>d(off)</sub>	$R_g = 9.1 \Omega, V_{GS} = 10 V$		-	29	-	
Fall Time	t <sub>f</sub>			-	31	-	
Gate Input Resistance	R <sub>g</sub>	f = 1 MHz, open drain		-	1.6	-	Ω
Drain-Source Body Diode Characteristic	s						
Continuous Source-Drain Diode Current	I <sub>S</sub>	MOSFET symbol showing the	MOSFET symbol showing the		-	16	^
Pulsed Diode Forward Current	I <sub>SM</sub>	integral reverse p - n junction diode		-	-	30	A
Body Diode Voltage	V <sub>SD</sub>	T <sub>J</sub> = 25 °C, I <sub>S</sub> = 10 A, V <sub>GS</sub> = 0 V		-	-	1.8	V
Body Diode Reverse Recovery Time	t <sub>rr</sub>	$T_J = 25 ^{\circ}\text{C}, I_F = I_S, dI/dt = 100 \text{A/}\mu\text{s}, V_R = 20 \text{V}$		-	555	-	ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>			-	5.5	-	μC
Body Diode Reverse Recovery Current	I <sub>RRM</sub>			-	18	-	A

#### Note

• The information shown here is a preliminary product proposal, not a commercial product data sheet. Vishay Siliconix is not committed to produce this or any similar product. This information should not be used for design purposes, nor construed as an offer to furnish or sell such products.



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

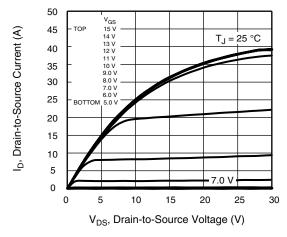


Fig. 1 - Typical Output Characteristics

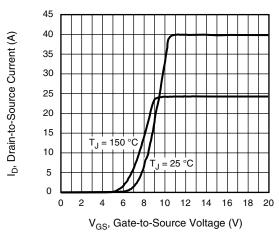


Fig. 3 - Typical Transfer Characteristics

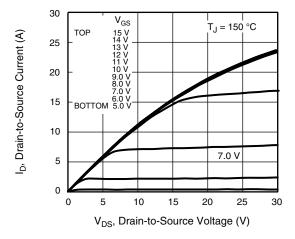


Fig. 2 - Typical Output Characteristics

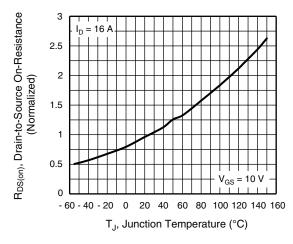


Fig. 4 - Normalized On-Resistance vs. Temperature

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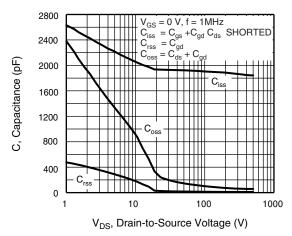


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

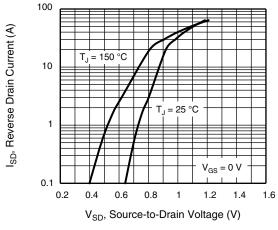


Fig. 7 - Typical Source-Drain Diode Forward Voltage

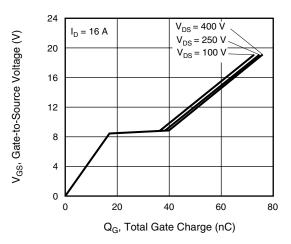


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

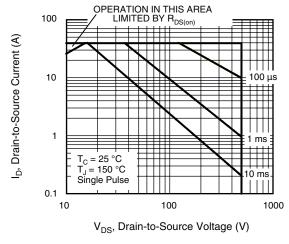


Fig. 8 - Maximum Safe Operating Area

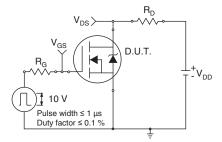


Fig. 9a - Switching Time Test Circuit

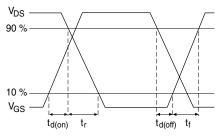


Fig. 9b - Switching Time Waveforms



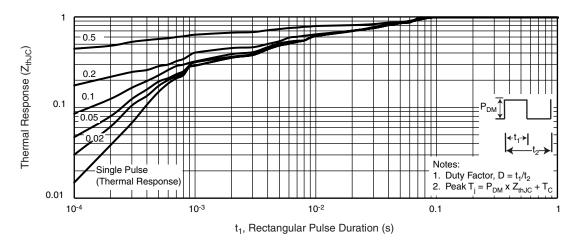


Fig. 10 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

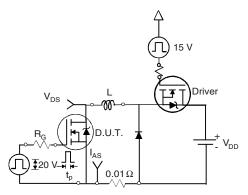


Fig. 11a - Unclamped Inductive Test Circuit

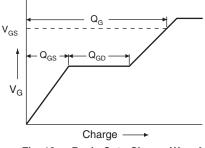


Fig. 12a - Basic Gate Charge Waveform

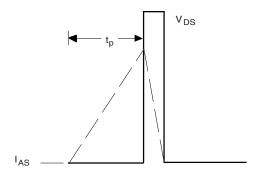


Fig. 11b - Unclamped Inductive Waveforms

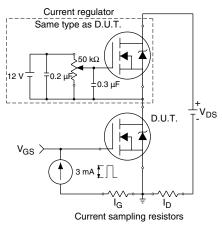
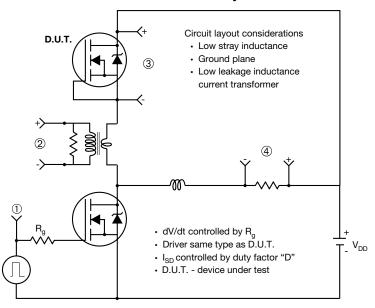


Fig. 12b - Gate Charge Test Circuit

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#### Peak Diode Recovery dV/dt Test Circuit



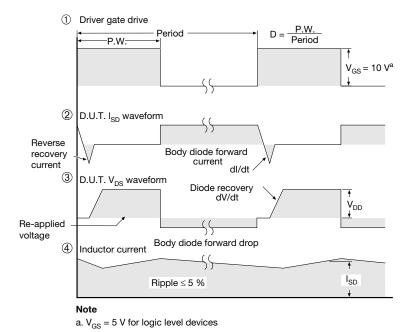


Fig. 13 - For N-Channel

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Revision: 13-Jun-16 1 Document Number: 91000

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