HIGH-VOLTAGE POWER MOSFETs

SiHP12N50C, SiHB12N50C, SiHF12N50C

500-V N-Channel Power MOSFETs in TO-220AB, TO-220 FULLPAK, and D²PAK Packages

FEATURES

- Maximum $R_{DS(on)}$ of 0.555 Ω at V_{GS} = 10 V
- Low gate charge, Q_g max = 48 nC
- $R_{DS(on)}$ * Q_g FOM of 26.64 Ω-nC
- 100 % avalanche tested
- Improved T_{rr} / Q_{rr}
- Compliant to RoHS Directive 2002/95/EC

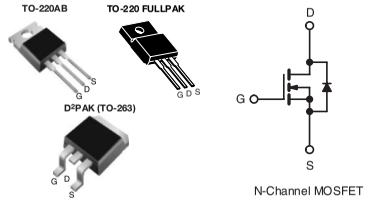
APPLICATIONS

- PFC boost circuit
- PWM half-bridge
- LLC topology

Datasheet is available on our web site at www.vishay.com
for SiHP12N50C, SiHB12N50C, SiHF12N50C - http://www.vishay.com/doc?91388

Power MOSFET

PRODUCT SUMMARY		
V_{DS} (V) at T_J max.	560 V	
$R_{DS(on)}$ (Ω)	V_{GS} = 10 V	0.555
Q_g (Max.) (nC)	48	
Q_{gs} (nC)	12	
Q_{gd} (nC)	15	
Configuration	Single	



N-Channel MOSFET

FEATURES

- Low Figure-of-Merit R_{on} x Q_g
- 100 % Avalanche Tested
- Gate Charge Improved
- T_{rr}/Q_{rr} Improved
- Compliant to RoHS Directive 2002/95/EC

Available
RoHS* COMPLIANT

ORDERING INFORMATION			
Package	TO-220AB	D²PAK (TO-263)	TO-220 FULLPAK
Lead (Pb)-free	SiHP12N50C-E3	SiHB12N50C-E3	SiHF12N50C-E3

ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C, unless otherwise noted)

PARAMETER			SYMBOL	LIMIT TO220-AB D²PAK (TO-263)	LIMIT TO-220 FULLPAK	UNIT
Drain-Source Voltage			V_{DS}	500		V
Gate-Source Voltage			V_{GS}	± 30		
Continuous Drain Current (T_J = 150 °C)[a]	V_{GS} at 10 V	T_C = 25 °C	I_D	12		A
		T_C = 100 °C		7.5		
Pulsed Drain Current[c]			I_{DM}	28		
Linear Derating Factor				1.67	0.28	W/°C
Single Pulse Avalanche Energy[b]			E_{AS}	180		mJ
Maximum Power Dissipation			P_D	208	36	W
Operating Junction and Storage Temperature Range			T_J, T_{stg}	- 55 to + 150		°C
Soldering Recommendations (Peak Temperature)[d]	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 Ω, I_{AS} = 12 A.
c. Repetitive rating; pulse width limited by maximum junction temperature.
d. 1.6 mm from case.

* Pb containing terminations are not RoHS compliant, exemptions may apply

THERMAL RESISTANCE RATINGS				
PARAMETER	SYMBOL	TO220-AB D²PAK (TO-263)	TO-220 FULLPAK	UNIT
Maximum Junction-to-Ambient	R_{thJA}	62	65	°C/W
Maximum Junction-to-Case (Drain)	R_{thJC}	0.6	3.5	
Junction-to-Ambient (PCB mount)[a]	R_{thJA}	40	-	

Note
a. When mounted on 1" square PCB (FR-4 or G-10 material).

SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 µA		500	-	-	V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to 25 °C, I_D = 1 mA		-	0.6	-	V/°C
Gate-Source Threshold Voltage (N)	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA		3.0	-	5.0	V
Gate-Source Leakage	I_{GSS}	V_{GS} = ± 30 V		-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 500 V, V_{GS} = 0 V		-	-	50	µA
		V_{DS} = 400 V, V_{GS} = 0 V, T_J = 125 °C		-	-	250	
Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS} = 10 V	I_D = 4 A	-	0.46	0.555	Ω
Forward Transconductance	g_{fs}	V_{DS} = 50 V, I_D = 3 A		-	3	-	S
Dynamic							
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1.0 MHz		-	1375	-	pF
Output Capacitance	C_{oss}			-	165	-	
Reverse Transfer Capacitance	C_{rss}			-	17	-	
Total Gate Charge	Q_g	V_{GS} = 10 V	I_D = 10 A, V_{DS} = 400 V	-	32	48	nC
Gate-Source Charge	Q_{gs}			-	12	-	
Gate-Drain Charge	Q_{gd}			-	15	-	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 250 V, I_D = 10 A, R_g = 4.3 Ω, V_{GS} = 10 V		-	18	-	ns
Rise Time	t_r			-	35	-	
Turn-Off Delay Time	$t_{d(off)}$			-	23	-	
Fall Time	t_f			-	6	-	
Gate Input Resistance	R_g	f = 1 MHz, open drain		-	1.1	-	Ω
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I_S	MOSFET symbol showing the integral reverse p - n junction diode		-	-	12	A
Pulsed Diode Forward Current	I_{SM}			-	-	28	
Body Diode Voltage	V_{SD}	T_J = 25 °C, I_S = 10 A, V_{GS} = 0 V		-	-	1.8	V
Body Diode Reverse Recovery Time	t_{rr}	T_J = 25 °C, I_F = I_S, dI/dt = 100 A/µs, V_R = 20 V		-	580	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}			-	4.3	-	µC
Body Diode Reverse Recovery Current	I_{RRM}			-	13	-	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.

Revision 26-Apr-10

Build Vishay into your Design