

RoHS

COMPLIANT

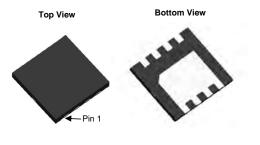
HALOGEN FREE

# SM3412NHQG-VB Datasheet

N-Channel 30 V (D-S) MOSFET

PRODUCT SUMMARY					
V <sub>DS</sub> (V)	<b>R<sub>DS(on)</sub> (</b> Ω)	I <sub>D</sub> (A)	Q <sub>g</sub> (Typ.)		
30	0.0018 at V <sub>GS</sub> = 10 V	70	22.5 nC		
50	0.0025 at $V_{GS}$ = 4.5 V	60	22.5110		

#### DFN 3x3 EP

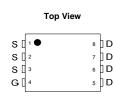


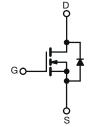
### **FEATURES**

- Halogen-free According to IEC 61249-2-21 Definition
- Trench Gen IV Power MOSFET
- 100 % R<sub>a</sub> and UIS Tested
- Compliant to RoHS Directive 2002/95/EC

#### **APPLICATIONS**

- Switch Mode Power Supplies
- Personal Computers and Servers
- **Telecom Bricks**
- VRM's and POL







ABSOLUTE MAXIMUM RATIN Parameter	Symbol	Limit	Unit	
			Unit	
Drain-Source Voltage	V <sub>DS</sub>	30	V	
Gate-Source Voltage		V <sub>GS</sub>	+ 20, - 16	v
	T <sub>C</sub> = 25 °C		70	
Continuous Drain Current (T 150 °C)	T <sub>C</sub> = 70 °C	1_	50	
Continuous Drain Current ( $T_J = 150 \ ^{\circ}C$ )	T <sub>A</sub> = 25 °C	I <sub>D</sub>	30.9 <sup>a, b</sup>	
	T <sub>A</sub> = 70 °C		28.3 <sup>a, b</sup>	•
Pulsed Drain Current (t = 300 µs)		I <sub>DM</sub>	80	A
Continuous Source-Drain Diode Current	T <sub>C</sub> = 25 °C		40 <sup>g</sup>	
Commuous Source-Drain Diode Current	T <sub>A</sub> = 25 °C	I <sub>S</sub>	3.3 <sup>a, b</sup>	
Single Pulse Avalanche Current		I <sub>AS</sub>	20	
Single Pulse Avalanche Energy	L = 0.1 mH	E <sub>AS</sub>	20	mJ
	T <sub>C</sub> = 25 °C		52	
Maximum Dawar Dissinction	T <sub>C</sub> = 70 °C	Р	43	w
Maximum Power Dissipation	T <sub>A</sub> = 25 °C	PD	3.7 <sup>a, b</sup>	VV
	T <sub>A</sub> = 70 °C		3.1 <sup>a, b</sup>	
Operating Junction and Storage Temperature Range		T <sub>J</sub> , T <sub>stg</sub>	- 55 to 150	°C
Soldering Recommendations (Peak Tempera		260		

#### THERMAL RESISTANCE BATINGS

Parameter		Symbol	Typical	Maximum	Unit	
Maximum Junction-to-Ambient <sup>a, e</sup>	t ≤ 10 s	R <sub>thJA</sub>	24	33	°C/W	
Maximum Junction-to-Case (Drain)	Steady State	R <sub>thJC</sub>	1.9	2.4	0/11	

#### Notes:

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

b. t = 10 s.

c. The DFN 3 x 3 is a leadless package. The end of the lead terminal is exposed opper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.

d. Rework conditions: manual soldering with a soldering iron is not recommended for leadless components.
e. Maximum under steady state conditions is 81 °C/W.

f. Based on  $T_C = 25 \degree C$ . g. Package limited.

Parameter	Symbol	Test Conditions	Min.	Тур.	Max.	Unit	
Static							
Drain-Source Breakdown Voltage	V <sub>DS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	30			V	
V <sub>DS</sub> Temperature Coefficient	∆V <sub>DS</sub> /T <sub>J</sub>	•		14			
V <sub>GS(th)</sub> Temperature Coefficient	$\Delta V_{GS(th)}/T_J$	I <sub>D</sub> = 250 μA		- 5.5		mV/°C	
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	$V_{DS} = V_{GS}$ , $I_D = 250 \ \mu A$	1.1		2.2	V	
Gate-Source Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = + 20 V, - 16 V			± 100	nA	
		$V_{DS} = 30 \text{ V}, \text{ V}_{GS} = 0 \text{ V}$			1	μΑ	
Zero Gate Voltage Drain Current	IDSS	$V_{DS} = 30 \text{ V}, \text{ V}_{GS} = 0 \text{ V}, \text{ T}_{J} = 55 ^{\circ}\text{C}$			10		
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	$V_{DS} \ge 5$ V, $V_{GS} = 10$ V	40			А	
	D	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 15 A		0.0018		-	
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	$V_{GS} = 4.5 \text{ V}, I_{D} = 10 \text{ A}$		0.0025		Ω	
Forward Transconductance <sup>a</sup>	9 <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 15 A		105		S	
Dynamic <sup>b</sup>	<u> </u>						
Input Capacitance	C <sub>iss</sub>			3050		pF	
Output Capacitance	C <sub>oss</sub>			1040			
Reverse Transfer Capacitance	C <sub>rss</sub>	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V, f = 1 MHz		79			
C <sub>rss</sub> /C <sub>iss</sub> Ratio				0.022	0.044		
Tabal Qada Qhanna	Q <sub>g</sub> —	$V_{DS} = 15 \text{ V}, V_{GS} = 10 \text{ V}, I_{D} = 10 \text{ A}$		51	77		
Total Gate Charge				22.5	34		
Gate-Source Charge	Q <sub>gs</sub>	$V_{DS}$ = 15 V, $V_{GS}$ = 4.5 V, $I_{D}$ = 10 A		8.6		nC	
Gate-Drain Charge	Q <sub>gd</sub>			4			
Output Charge	Q <sub>oss</sub>	$V_{DS} = 15 \text{ V}, V_{GS} = 0 \text{ V}$		30.5			
Gate Resistance	R <sub>g</sub>	f = 1 MHz	0.3	1.25	2.5	Ω	
Turn-On Delay Time	t <sub>d(on)</sub>			24	48	-	
Rise Time	t <sub>r</sub>	$V_{DD}$ = 15 V, $R_L$ = 1.5 $\Omega$		17	34		
Turn-Off Delay Time	t <sub>d(off)</sub>	$\text{I}_\text{D}\cong$ 10 A, $\text{V}_\text{GEN}$ = 4.5 V, $\text{R}_\text{g}$ = 1 $\Omega$		25	50		
Fall Time	t <sub>f</sub>			10	20		
Turn-On Delay Time	t <sub>d(on)</sub>			12	24	- ns - -	
Rise Time	t <sub>r</sub>	$V_{DD}$ = 15 V, $R_L$ = 1.5 $\Omega$		10	20		
Turn-Off Delay Time	t <sub>d(off)</sub>	$I_D \cong$ 10 A, $V_{GEN}$ = 10 V, $R_g$ = 1 $\Omega$		30	60		
Fall Time	t <sub>f</sub>			8	16		
Drain-Source Body Diode Characteristic	cs						
Continuous Source-Drain Diode Current	۱ <sub>S</sub>	T <sub>C</sub> = 25 °C			40	•	
Pulse Diode Forward Current	I <sub>SM</sub>				80	A	
Body Diode Voltage	V <sub>SD</sub>	$I_{S} = 5 \text{ A}, V_{GS} = 0 \text{ V}$		0.73	1.1	V	
Body Diode Reverse Recovery Time	t <sub>rr</sub>			36	70	ns	
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>	I <sub>F</sub> = 10 A, dl/dt = 100 A/μs, T <sub>.I</sub> = 25 °C		24	48	nC	
Reverse Recovery Fall Time	t <sub>a</sub>	$F = 10 \text{ A}, \text{ u/ut} = 100 \text{ A/} \mu\text{s}, T_{\text{J}} = 25 ^{\circ}\text{C}$		16		- ns	
Reverse Recovery Rise Time	t <sub>b</sub>			20			

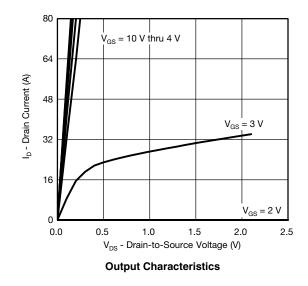
Notes:

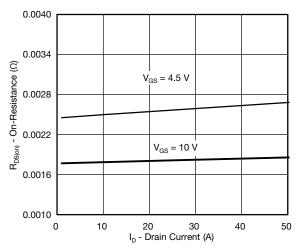
a. Pulse test; pulse width  $\leq$  300  $\mu s,$  duty cycle  $\leq$  2 % b. Guaranteed by design, not subject to production testing.

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.

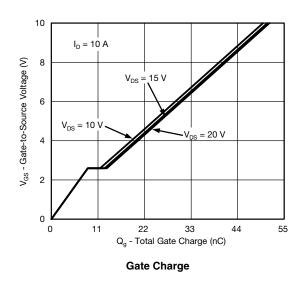
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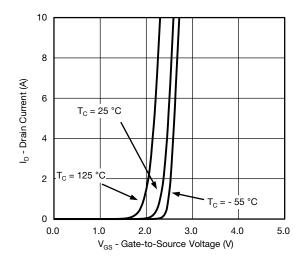




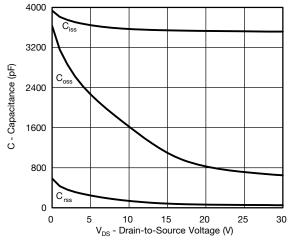


**On-Resistance vs. Drain Current and Gate Voltage** 

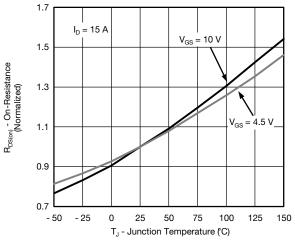




**Transfer Characteristics** 

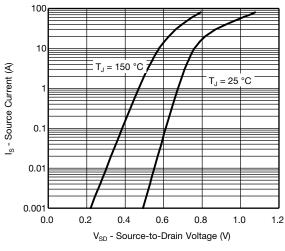


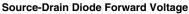
Capacitance

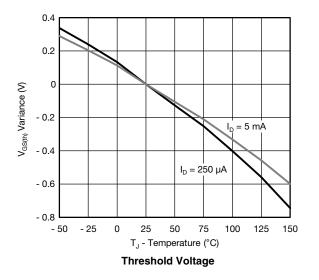


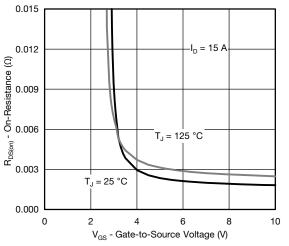
**On-Resistance vs. Junction Temperature** 



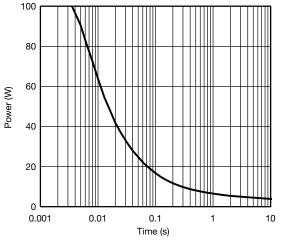




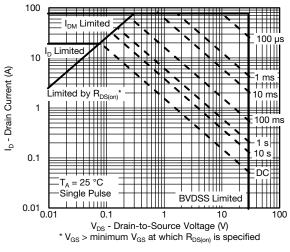




On-Resistance vs. Gate-to-Source Voltage

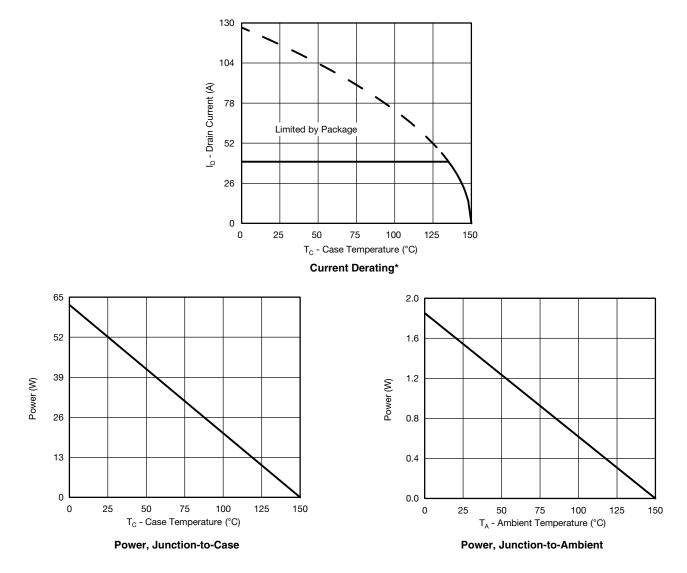


Single Pulse Power, Junction-to-Ambient



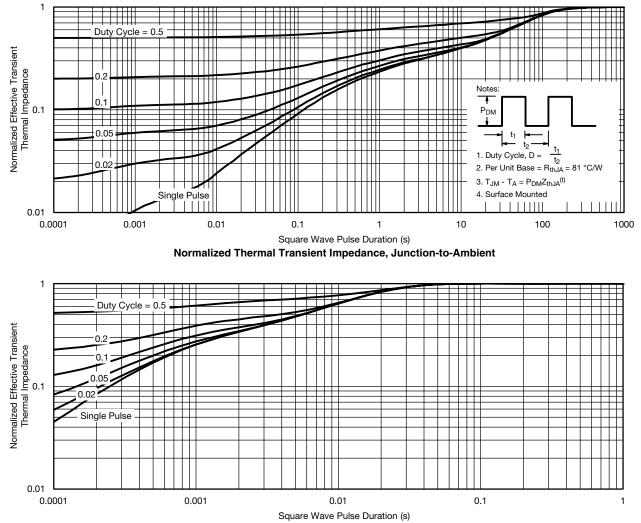
Safe Operating Area, Junction-to-Ambient





\* 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.

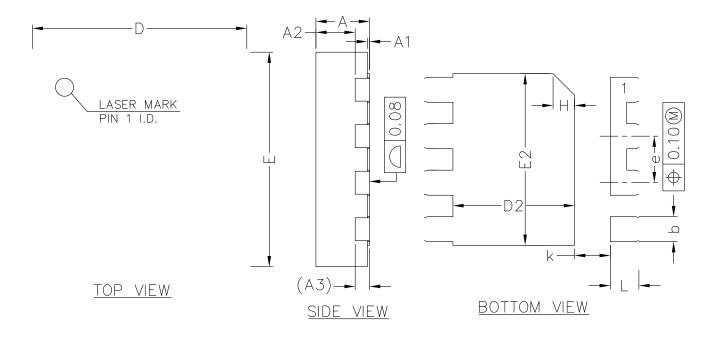




Normalized Thermal Transient Impedance, Junction-to-Case

## SM3412NHQG-VB

WBsemi www.VBsemi.com





<u>SIDE VIEW</u>

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SYMBOL	MIN	NOM	MAX		
А	0.70	0.75	0.80		
A1	0.00	0.02	0.05		
A2	0.50	0.55	0.60		
A3	0.20REF				
b	0.30	0.35	0.40		
D	2.90	3.00	3.10		
E	2.90	3.00	3.10		
D2	1.60	1.70	1.80		
E2	2.30	2.40	2.50		
е	0.55	0.65	0.75		
K	0.40	0.50	0.60		
L	0.35	0.40	0.45		

## COMMON DIMENSIONS (UNITS OF MEASURE=MILLIMETER)



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