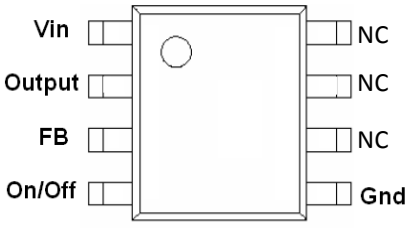
HN9612 Series
80V 200mA 150kHz Buch DC/DC Voltage converter

GENERAL DESCRIPTION

The HN9612 series of regulators are monolithic integrated circuits that provide all the active functions for a step-down (buck) switching regulator, capable of driving 200mA load with excellent line and load regulation. These devices are available in fixed output voltages of 5V, 12V, and an adjustable output version. Available in standard SO-8EP surface mount package.
External shutdown is included, featuring typically 30 µA standby current. The output switch includes cycle-by-cycle current limiting, as well as thermal shutdown, and protection from output short for full protection under fault conditions.

PIN CONFIGURATION



SO-8EP

PIN ASSIGNMENT

PIN	SO-8EP
1	Vin
2	Output
3	FB
4	On/Off
5	Gnd
6 to 8	N.C.

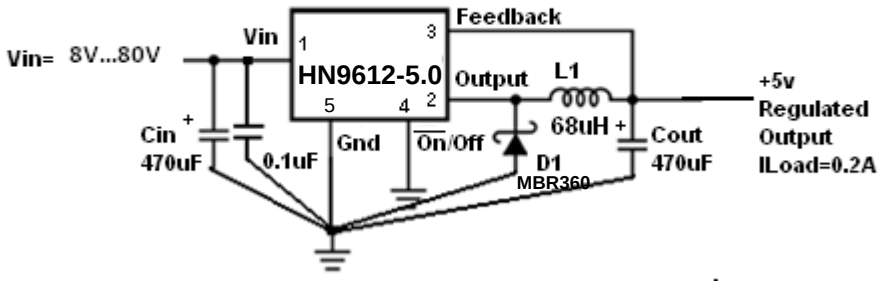
FEATURES

- 5V, 12V, and adjustable output versions
- Adjustable version output voltage range, 1.2V to 70V -4%...+5% max over line and load conditions
- Guaranteed 200mA output load current
- Input voltage range up to 80V
- Requires only 4 external components
- Excellent line and load regulation specifications
- 150 kHz fixed frequency internal oscillator
- Low power standby mode, I_{stb} typically 30 µA
- Thermal shutdown and current limit protection
- Output short protection by reduction of frequency by 5 times.

APPLICATIONS

- Simple high-efficiency step-down (buck) regulator
- Telecom / Networking Equipment
- Efficient pre-regulator for linear regulators
- On-card switching regulators
- Isolated Bias Supply

Typical Application (Fixed Output Version)



ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Ratings	Unit
Maximum supply voltage	V_{IN}	83	V
ON/OFF Pin input voltage	$V_{ON/OFF}$	-0.3 to 80, but ≤ Vin	V
FB (Feedback) pin voltage	V_{FB}	-0.3 to 25, but ≤ Vin	V
Output voltage to GND	V_{OUT}	-1	V
Power dissipation	P_D	Internally limited	W
Minimum ESD rating HBM (C=100pF, R=1.5k)	ESD	2.0	kV
Maximum junction temperature	$T_{J,max}$	150°C	°C

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Ratings	Unit
Temperature range	T_J	-40°C ≤ Tj ≤ +125°C	°C
Supply voltage	Vop	4.5 to 80	V
I_{LOAD}	I_{LOAD}	I_{LOAD} ≤ 0.2	A

ELECTRICAL CHARACTERISTICS

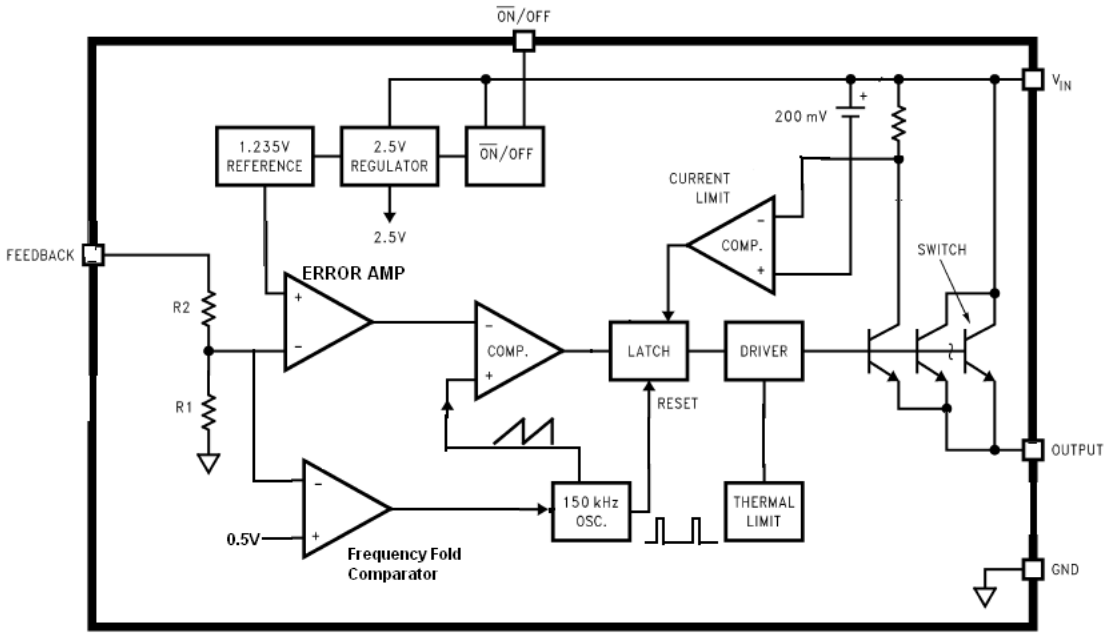
Unless otherwise specified, V_{IN}=12V for the 5V and adjustable versions, V_{IN}=18V for 12V version. I_{LOAD}=0.2A.

The * denotes the specifications, which apply over full operating temperature range T_J = -40 to +125°C.

Parameter	Symbol	Conditions	*	Min	Typ	Max	Unit
SYSTEM PARAMETERS Test Circuit Figure 1							
Output Voltage HN9612-5.0	V_{OUT}	8V ≤ V_{IN} ≤ 80V, I_{LOAD}= 0.2A		4.80	5.00	5.25	V
			*	4.75		5.30	
Output Voltage HN9612-12		15V ≤ V_{IN} ≤ 80V, I_{LOAD}= 0.2A		11.52	12.00	12.60	
			*	11.40		12.72	
Output Voltage HN9612-adj		8V ≤ V_{IN} ≤ 80V, I_{LOAD}= 0.2A		1.180	1.230	1.293	
			*	1.167		1.305	
Line Regulation	Line Reg	8V ≤ V_{IN} ≤ 80V, I_{LOAD} = 0.2A			0.5		%
Load Regulation	Load Reg	10mA≤ I_{LOAD} ≤ 0.2A, V_{IN} = 12V			0.5		%
DEVICE PARAMETERS							
Quiescent current	I_Q	V_{IN}=80V, V_{FB}=12V force driver off			5	8	mA
Feedback bias current	I_{FB}	V_{FB}=1.3V (Adjustable version only)		-150	-50		nA
			*	-300			
Shutdown supply current	I_{STB}	$V_{ON/OFF}$=5V, V_{IN}=80V			30	280	μA
			*			330	
Oscillator frequency	F_{OSC}			135	150	165	kHz
			*	125		175	
Oscillator frequency of Short Circuit Protect (SCP)	F_{SCP}	When V_{OUT}<40% from nominal, I_{OUT}= CL			40		kHz
Max. duty cycle	$DC_{(Max)}$	V_{FB}=0V force driver on	*	100			%
Min. duty cycle	$DC_{(Min)}$	V_{FB}=12V force driver off (V_{FB}=15V for 12V version)	*			0	%
Current limit	CL	Peak current. No outside circuit. V_{FB}=0V		0.55	0.8	1.1	A
			*	0.5		1.3	
Saturation voltage	V_{SAT}	I_{OUT}=0.2A. No outside circuit. V_{FB}=0V			1.05	1.25	V
			*			1.45	
Output leakage current	I_L	V_{OUT}=0V. No outside circuit. V_{FB}=12V		-300	-50		μA
Output leakage current	I_{L1}	V_{OUT}=-1V. No outside circuit. V_{FB}=12V		-30	-4		mA
ON/OFF input threshold	V_{TH}		*	0.6	1.3	2.0	V
ON/OFF input current	I_H	$V_{ON/OFF}$=2.5V		-5	-0.1	5	μA

ON/OFF input current	I_L	$V_{ON/OFF}$=0.5V		-1	-0.01	1	μA
Thermal shutdown temperature	T_{SD}	T_J	*		160		°C

BLOCK DIAGRAM



For ADJ Version
R1=open, R2=0

TEST CIRCUIT AND LAYOUT GUIDELINES

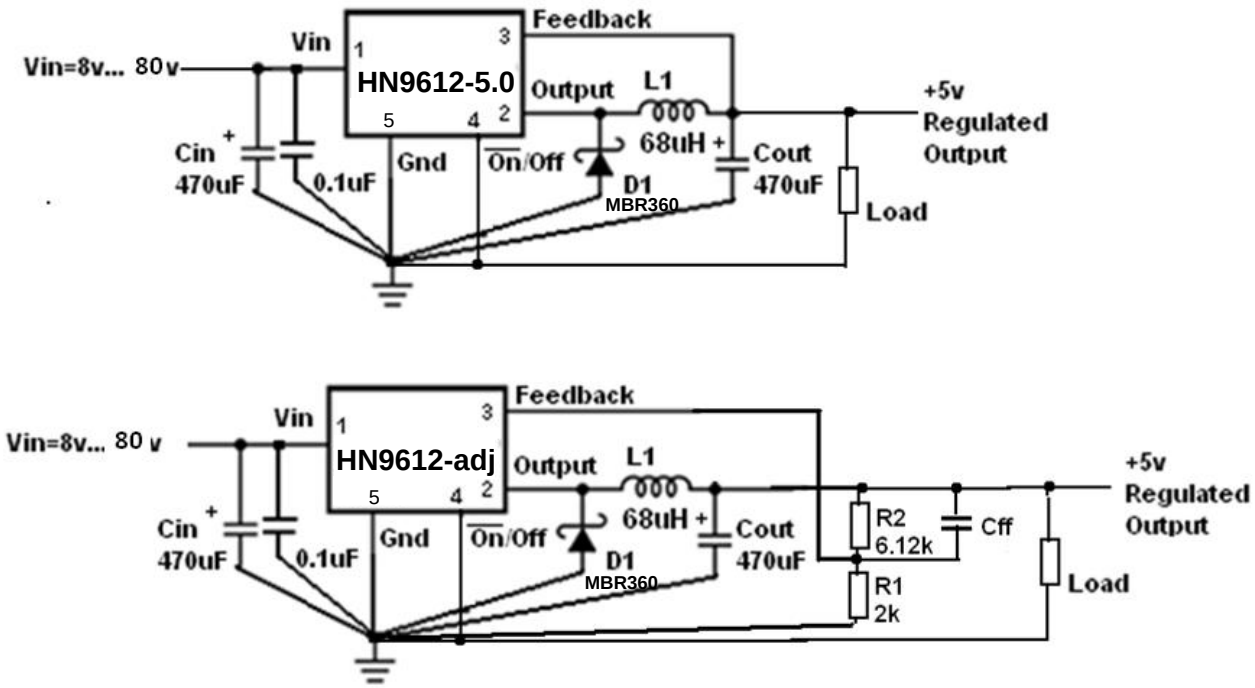


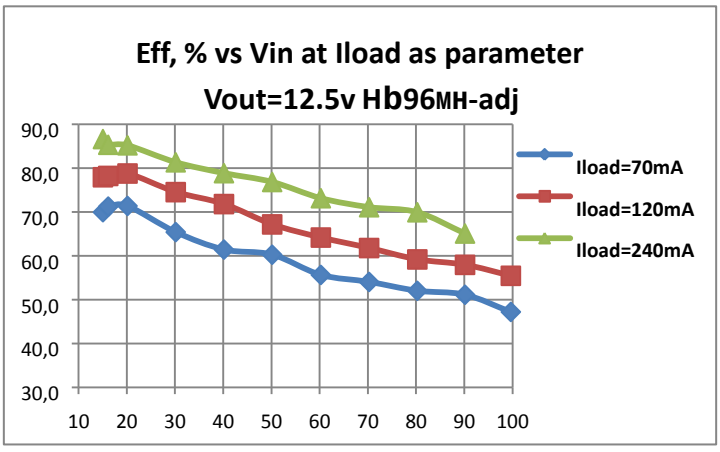
FIGURE 1

Vout =Vref*(1+R2/R1), where Vref=1.23V; R1 between 1k and 5k.

For minimal inductance and ground loops, the wires indicated by heavy lines should be wide printed circuit traces and kept as short as possible. Keep the FEEDBACK wiring away from the inductor flux. Cff~1 to 10nF – as option.

It is necessary to use inductor L1 on current 1.5…2.0A and with a resistance jf inductor RL<0.1 Ohm

APPLICATION DATA



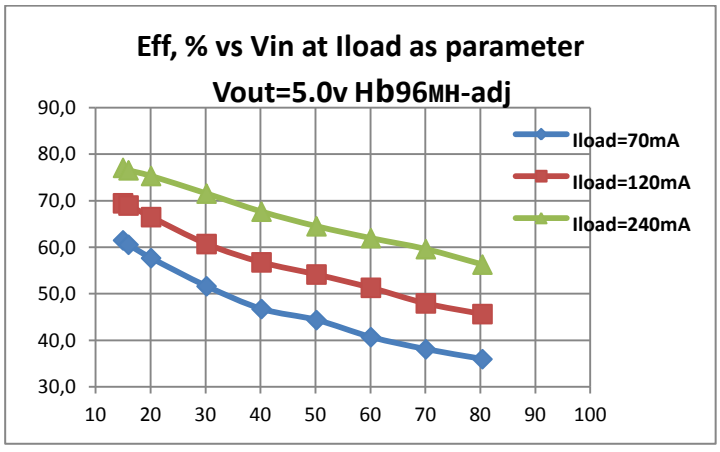
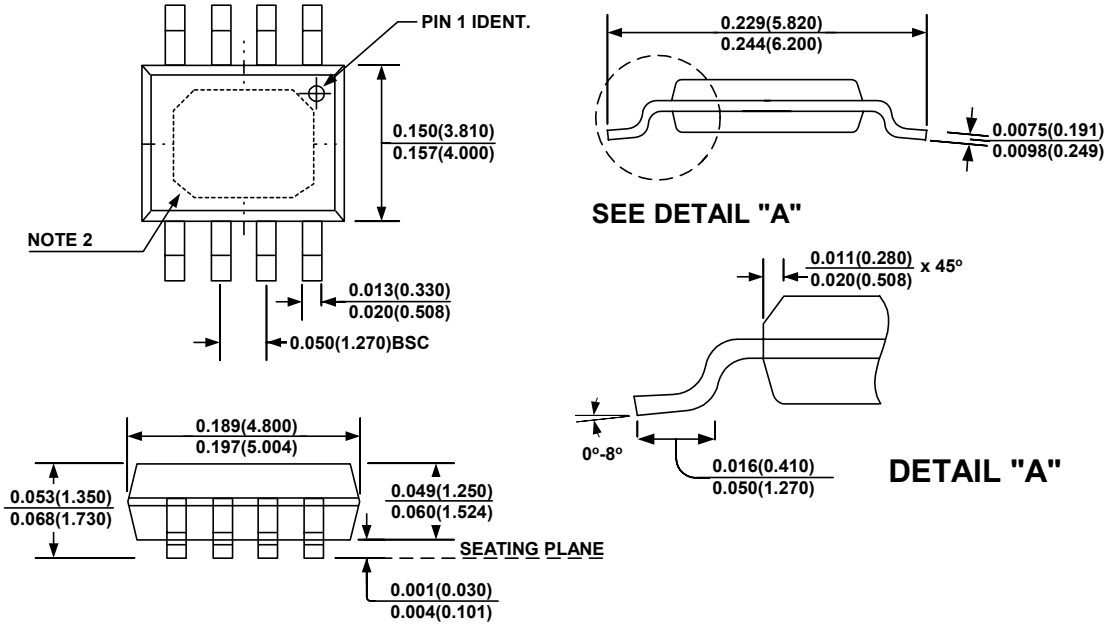


FIGURE 2. Efficiency vs Vin

Package

ESOP8
(Exposed Pad)



NOTE:
1) Control dimension is in inches. Dimension in bracket is millimeters.
2) Exposed Pad Option Only (N-Package) ; 2.55+/- 0.25mm x 3.38 +/- 0.44mm.
Recommended Solder Board Area: 2.80mm x 3.82mm = 10.7mm^2 (16.6mil^2)