

## 2A SYNCHRONOUS BUCK SWITCHER WITH FET ON BOARD

ADVANCE DATA SHEET

Pb Free Product

### DESCRIPTION

The NX4125 is an integrated 2A monolithic step-down switching regulator with feedforward voltage mode control. It operates from an input voltage 2.5V to 5.5V which is ideal for the application with single cell Li-Ion battery as well as other 3.3V, 5V input bus supply applications. Switching frequency is fixed around 800kHz, small surface mount inductors and capacitors are allowed to use. Other features includes: Over current protection, Over voltage protection, Over temperature protection, <1uA shut-down current and power good indicator available. NX4125 is available in 10-pin MLPD package and 8-pin SOICP package.

### FEATURES

- Feedforward voltage mode control
- 800kHz switching frequency
- <1uA shut-down current
- Peak current limit with hiccup feature and over temperature protection
- Internal Digital Soft Start
- Over voltage protection
- Available in MLPD-10L and SOICP-8L package
- Power good indicator available
- Pb-free and RoHS compliant

### APPLICATIONS

- Li-Ion battery operated portable system
- Low voltage point of load application
- PDA and pocket PC computers
- Portable applications
- Broadband communication and networking

### TYPICAL APPLICATION

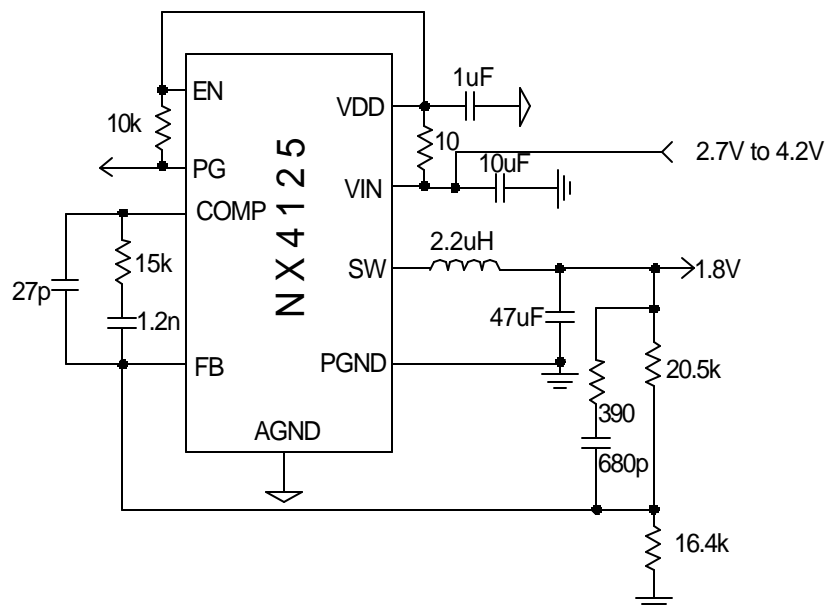


Figure1 - Typical application of NX4125

### ORDERING INFORMATION

Device	Temperature	Output Voltage	Package	Pb-Free
NX4125CMTR	-10 to 100°C	adjustable	MLPD-10L	Yes
NX4125CSTR	-10 to 100°C	adjustable	SOICP- 8L	Yes

## ABSOLUTE MAXIMUM RATINGS

VIN,EN,FB to GND .....	-0.3V to 5.5V
SW to GND .....	-1V to 5.5V
ESD Susceptibility .....	1kV
Storage Temperature Range .....	-55°C to 150°C
Operating Junction Temperature Range .....	-40°C to 125°C
VIN slew Rate .....	3V/uS

CAUTION: Stresses above those listed in "ABSOLUTE MAXIMUM RATINGS", may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

## PACKAGE INFORMATION

10-LEAD PLASTIC MLPD	8-LEAD PLASTIC SOICP(EXPOSED PAD)
$\theta_{JA} \approx 52^{\circ}\text{C/W}$	$\theta_{JA} \approx 55^{\circ}\text{C/W}$

## ELECTRICAL SPECIFICATIONS

Unless otherwise specified, these specifications apply over  $V_{IN}=V_{DD}=V_{EN}=3.3\text{V}$ , and  $T_A=-10^{\circ}\text{C}$  to  $100^{\circ}\text{C}$ . Typical values refer to  $T_A = 25^{\circ}\text{C}$ . Unless otherwise specified.

PARAMETER	SYM	Test Condition	Min	TYP	MAX	Units
<b>Reference Voltage</b>						
Ref Voltage	$V_{REF}$			0.8		V
<b>Supply Voltage</b>						
VIN,VDD Input Voltage	$V_{CC}$		2.5		5.5	V
Supply Current	$I_{DD}$ (shutdown)	EN=GND,VIN=VDD=5V			1	uA
	$I_{DD}$ (pwm)	EN=VDD=VIN		7		mA
<b>VIN UVLO</b>						
VIN start threshold voltage				2.4		V
Hysteresis				0.2		V
<b>Oscillator (Rt)</b>						
Frequency	$F_S$			800		kHz
Max Duty Cycle			100			%
Min ON time				70		nS

PARAMETER	SYM	Test Condition	Min	TYP	MAX	Units
Ramp-Amplitude Voltage	$V_{RAMP}$	Vin=5V		1		V
Ramp/Vin Gain				0.2		V/V
<b>Error Amplifiers</b>						
Feedback Input Bias Current				50		uA
<b>Enable</b>						
En low Threshold voltage					0.4	V
En high Threshold voltage			1.4			V
<b>SS</b>						
Soft Start time	Tss			0.853		mS
<b>Current Limit</b>						
Current Limit Threshold				3.5		A
Current limit leading edge		Note1		70		nS
Current Limit response time				200		nS
<b>Thermal Shutdown</b>						
Thermal shutdown trip point		Note1		165		°C
Hysteresis		Note1		20		°C
<b>Internal Switch</b>						
Rdson of Control FET		VDD=5V		70		mohm
Rdson of Synchronous FET				70		mohm
<b>Power Good(Pgood)</b>						
Threshold Voltage as % of Vref		FB ramping up		90		%
Hysteresis				5		%
<b>Over Voltage</b>						
Over Voltage Trip Point				130		%Vref
Hysteresis				45		%Vref
<b>Output Voltage</b>						
Line Regulation		VIN=2.5V to 5.5V IOU=0A VOUT=1.8V		0.1		%V
Load Regulation		VIN=3.3V, VOUT=1.8V, IOU=0 to 2A		0.5		%

Note. 1. Guaranteed by design and bench test verification, not tested in the final test.

## PIN DESCRIPTIONS

PIN #	PIN SYMBOL	PIN DESCRIPTION
1	AGND	Control circuitry ground.
2	PGND	Ground Connection for Chip. Connect PGND with large copper areas to the input and output supply returns, and negative terminals of the input and output capacitors.
3	SW	SW output. Junction of the internal high-side, low-side power MOSFETs and output inductor.
4	VIN	Power pin for the power stage. A 10uF ceramic cap is suggested to decoupled from this pin to power ground.
5	VDD	Power pin for the control circuitry.
6	EN	Enable Input. Set this pin to gnd or less than 0.4V will shut down the regulator. Set this pin above 1.4V, the regulator will be in operation.
7	PG	Power good goes high when the FB pin voltage above 90% Vref.
8	NC	Not used pin.
9	FB	Error amplifier inverting input. Connect to an external resistor divider.
10	COMP	This pin is the output of the error amplifier and together with FB pin is used to compensate the voltage control feedback loop.

## BLOCK DIAGRAM

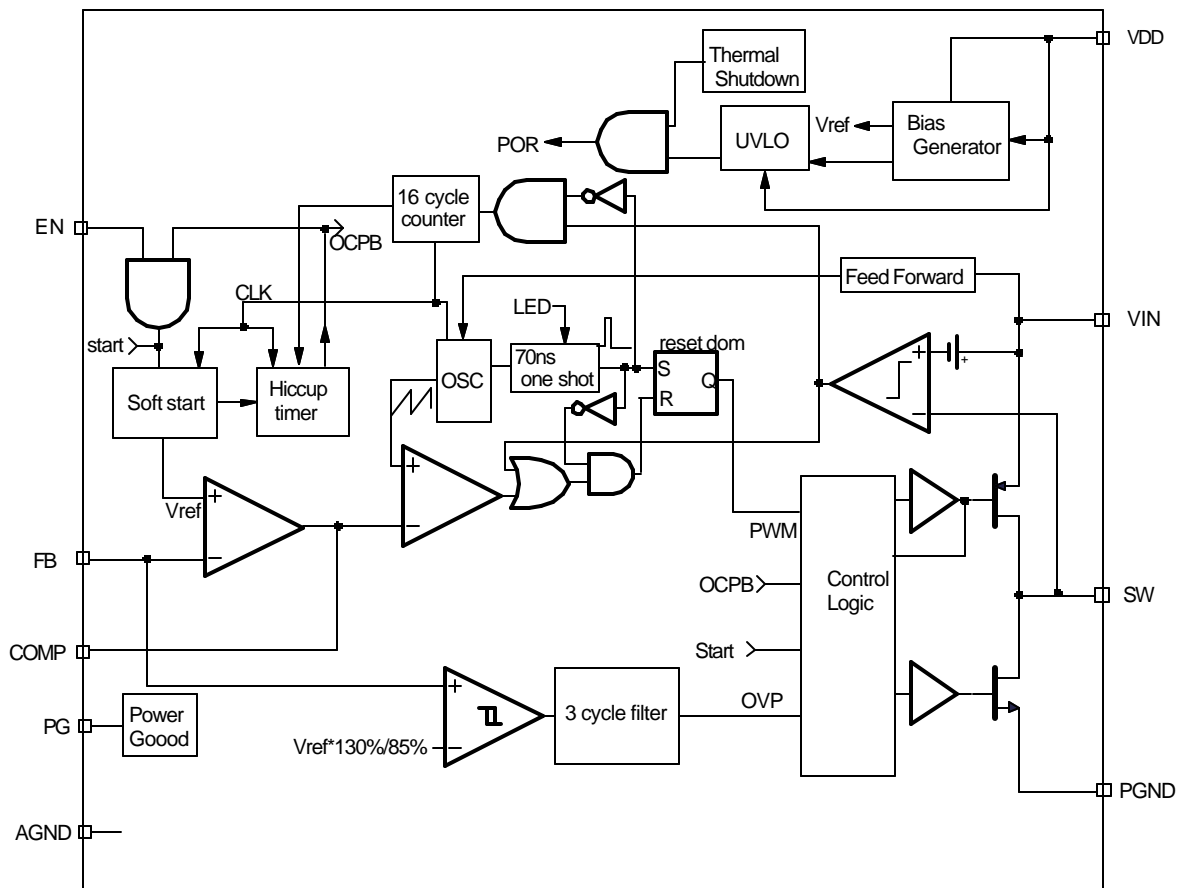


Figure 2 - Simplified block diagram of the NX4125

## Demo board Waveform

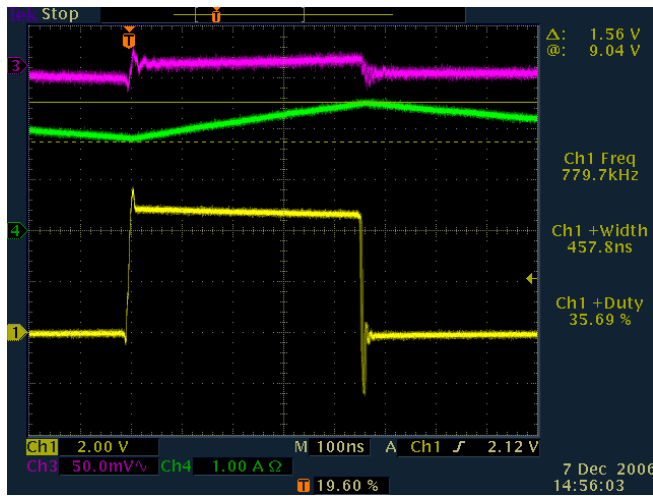


Figure 3: Sw and ripple (VIN=5V, VOUT=1.5V)

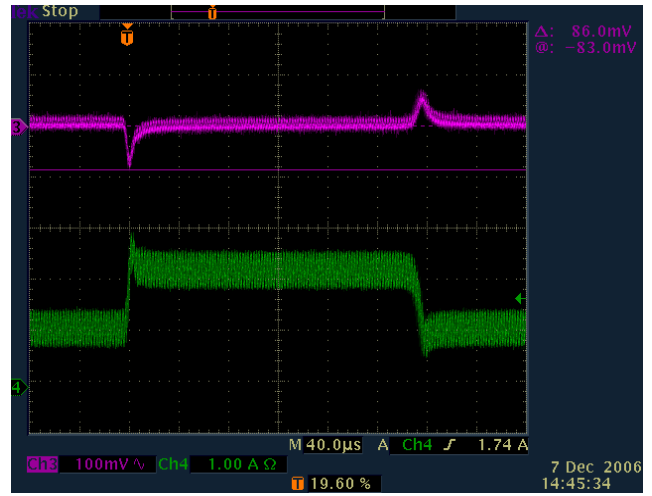


Figure 4: Dynamic response (VIN=5V, VOUT=3.3V)

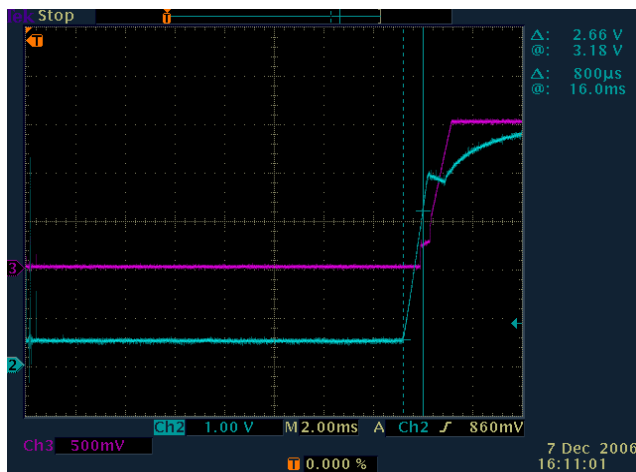


Figure 5: Startup

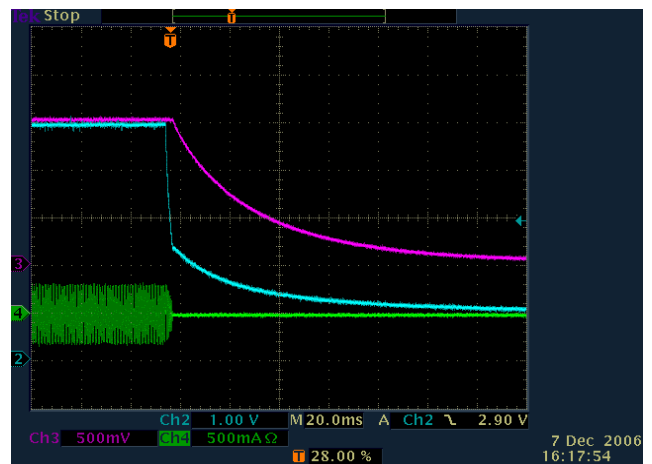


Figure 6: Turnoff

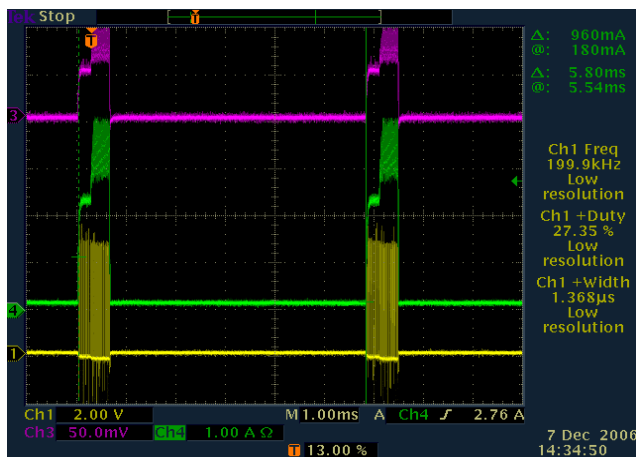


Figure 7: Short protection

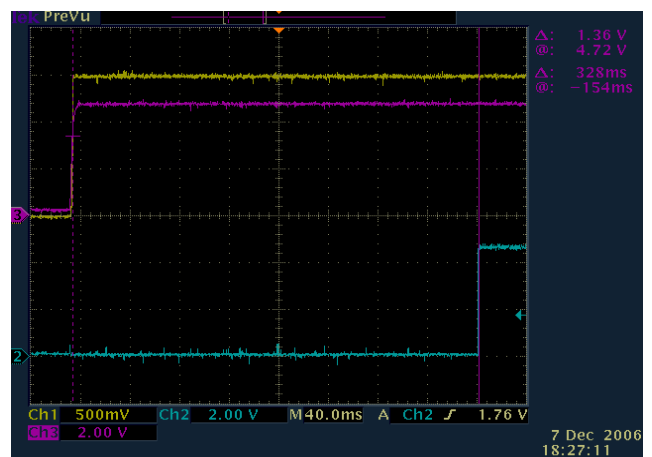


Figure 8: Pgood delay(Ch2 pgood)

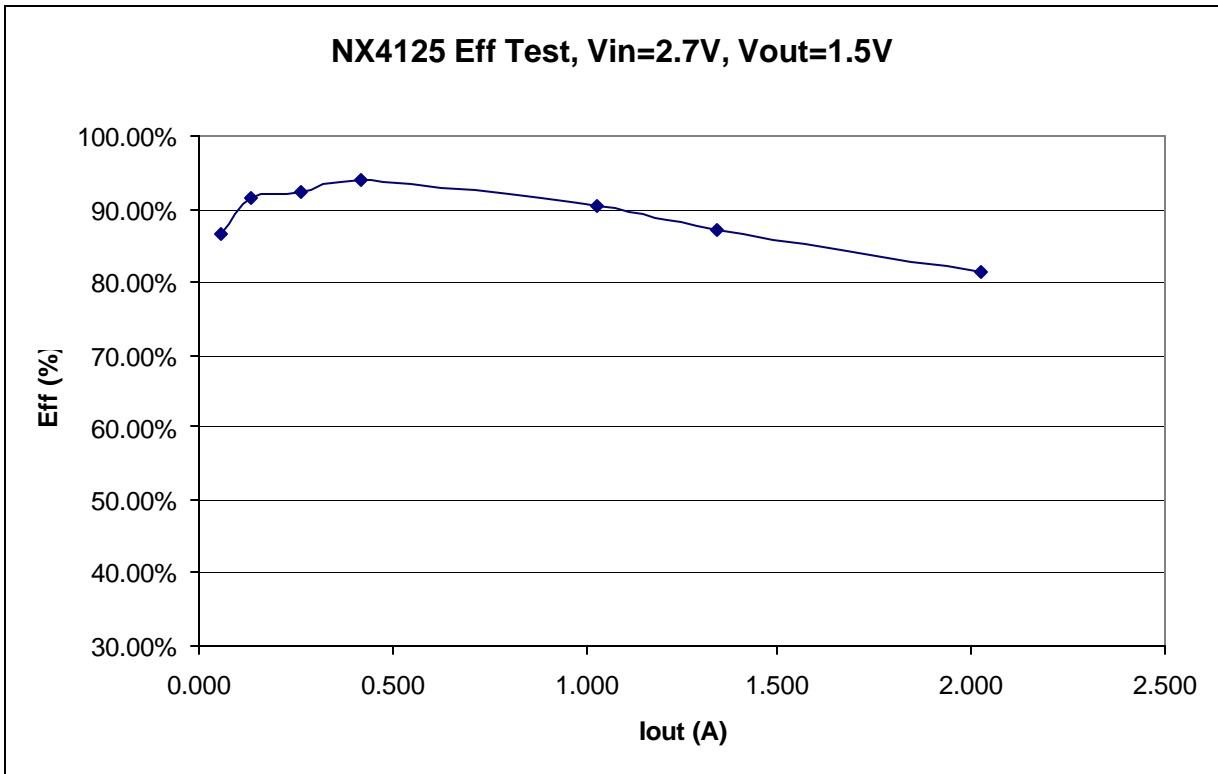


Figure 9: Efficiency