NCP1523BGEVB

NCP1523B Adjustable Output Voltage Step Down Converter Evaluation Board User's Manual

ON Semiconductor®

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EVAL BOARD USER'S MANUAL

Overview

The NCP1523B step−down PWM DC−DC converter is optimized for portable applications powered from one cell Li−ion or three cell Alkaline/NiCd/NiMH batteries.

The device is available in an adjustable output voltage from 0.9 V to 3.3 V. It uses synchronous rectification to increase efficiency and reduce external part count. The device also has a built−in 3 MHz (nominal) oscillator which reduces component size by allowing a small inductor and capacitors. Available in PWM mode only (NCP1523BFCT2G), it offers a very efficient load transient solution.

Finally, it includes an integrated soft−start, cycle−by−cycle current limiting, and thermal shutdown protection. The NCP1523B is available in a space saving, 8 pin chip scale package.

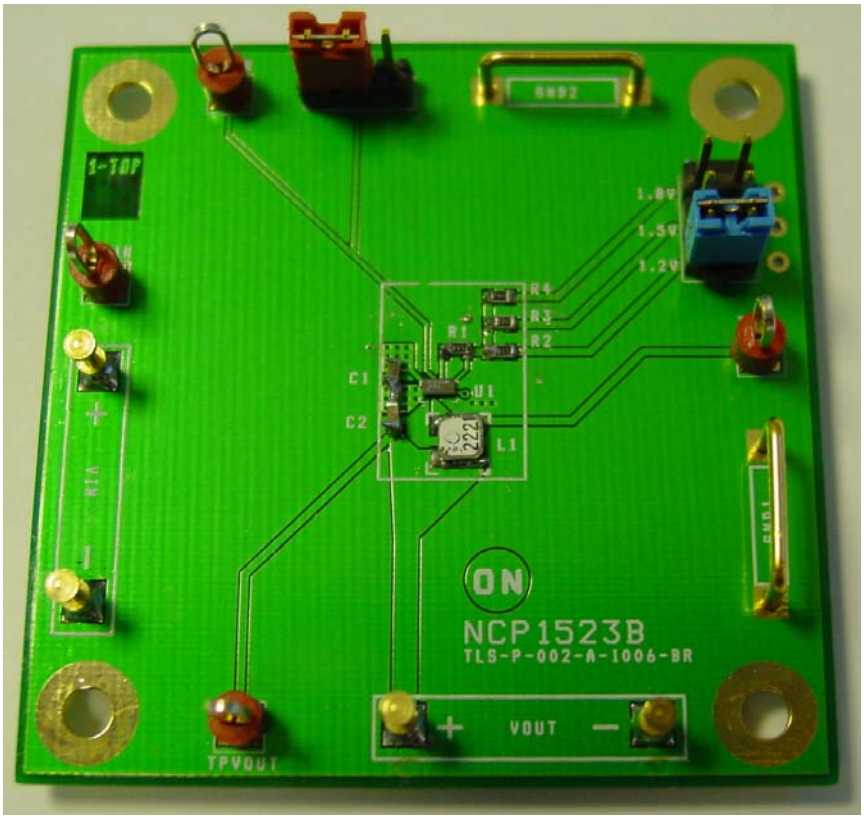

Figure 1. NCP1523B Board Picture

MAXIMUM RATINGS

Rating	Symbol	Value	Units
Minimum Voltage All Pins	V_{MIN}	−0.3	V
Maximum Voltage All Pins (Note 1)	V_{MAX}	7	V
Maximum Voltage Enable, FB, SW	V_{MAX}	V_{IN} + 0.3	V
Thermal Resistance, Junction−to−Air (Note 2)	$R_{\theta JA}$	159	°C/W
Operating Ambient Temperature Range	T_A	−40 to 85	°C
Storage Temperature Range	T_{STG}	−55 to 150	°C
Junction Operating Temperature	T_J	−40 to 125	°C
Latch−up Current Maximum Rating T_A = 85°C (Note 3)	L_U	±100	mA
ESD Withstand Voltage (Note 4) Human Body Model Machine Model	V_{ESD}	 2.0 200	 kV V

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. According to JEDEC standard JESD22−A108B
2. For the 8−Pin Chip Scale Package, the $R_{\theta JA}$ is highly dependent of the PCB heatsink area. $R_{\theta JA}$ = 159°C/W with 50 mm^2 PCB heatsink area.
3. Latchup current maximum rating per JEDEC standard: JESD78.
4. This device series contains ESD protection and exceeds the following tests:
   Human Body Model (HBM) ±2.0 kV per JEDEC standard: JESD22−A114
   Machine Model (MM) ±200 V per JEDEC standard: JESD22−A115

ELECTRICAL CHARACTERISTICS

For Electrical Characteristic, please see our NCP1523 datasheet available on our website.
http://www.onsemi.com

INPUT POWER

Symbol	Switch Descriptions
V_{IN+}	This is the positive connection for power supply
V_{IN-}	This is the return connection for the power supply
GND1, GND2	Ground clip

SETUP

Symbol	Switch Descriptions
ENABLE	To enable the buck converter, connect a shorting jumper between ENABLE−1 and ENABLE−2 To disable the buck converter, connect a shorting jumper between ENABLE−3 and ENABLE−2
SELECT	A shorting jumper must be used to select an output voltage of 1.2 V, 1.5 V or 1.8 V

OUTPUT POWER

Symbol	Switch Descriptions
V_{OUT+}	This is the positive connection of the output voltage
V_{OUT-}	This is the return connection of the output voltage

TEST POINT

Symbol	Switch Descriptions
TPVIN	This is the test point of the input voltage
TPEN	This is the test point of the enable pin
TPLX	This is the test point of the inductor voltage
TPVOUT	This is the test point of the output voltage

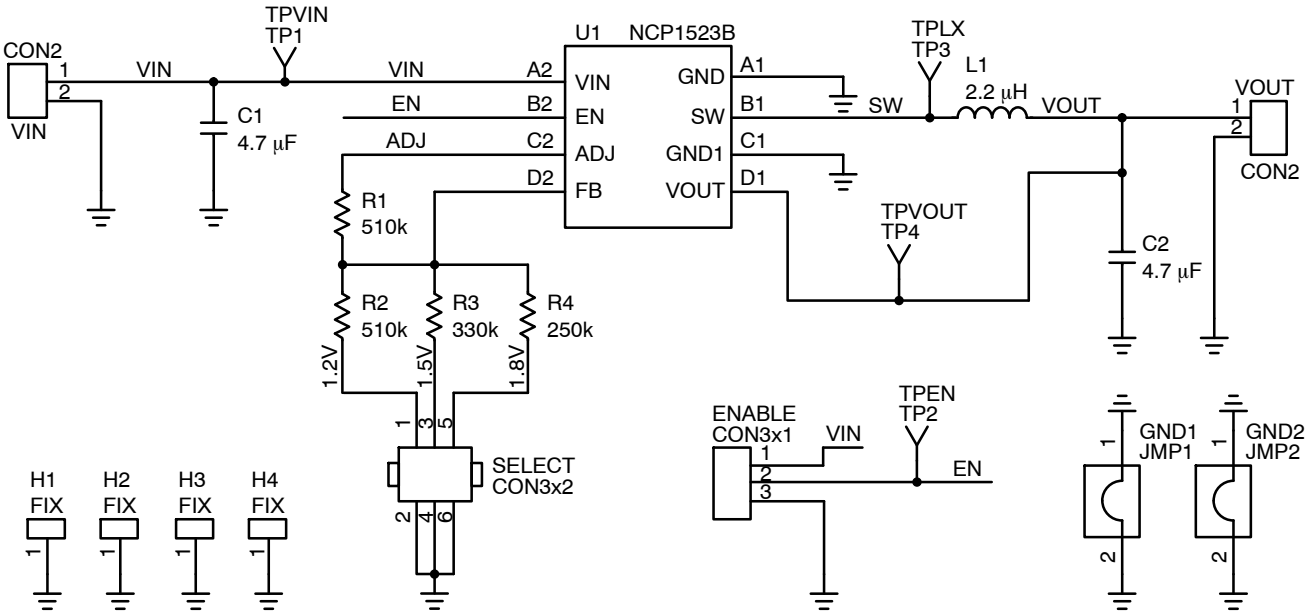

Figure 2. NCP1523B Board Schematic

NCP1523B TEST PROCEDURE

Equipment Needed

- Power Supply
- Digital Volt Meter
- Digital Amp Meter

Test

1. Jumper ENABLE should be open.
2. Set the power supply to 3.6 V and the current limit of at least 800 mA.
3. Connect the power supply connector to connectors V_{IN+} and V_{IN-}. The DC current measurement on V_{in} line should be around 0.3 μA.
4. Close ENABLE connector. The DC current measurement on V_{in} line should be around 3 mA.
5. Measure the output voltage between V_{OUT+} and V_{OUT-} connectors. You should see around 1.2 V voltage operation.
6. Remove the ENABLE jumper. The DC current measurement on V_{in} line should be back around 0.3 μA.

Table 1. NCP1523B BILL OF MATERIAL

Designator	Qty.	Description	Value	Tolerance	Footprint	Manufacturer	Manufacturer Part Number
U1	1	IC, Converter, DC/DC	NA	NA	8−Pin Flip Chip	ON Semiconductor	NCP1523B
C1, C2	2	Ceramic Capacitor	4.7 μF, 6.3V, X5R	10%	0603	Murata	GRM188R60J475KE19D
R1, R2	2	SMD Resistor	510k	1%	0603	std	std
R3	1	SMD Resistor	330k	1%	0603	std	std
R4	1	SMD Resistor	240k	1%	0603	std	std
L1	1	Inductor	2.2 μH	30%	1210	Coilcraft	LPS3008−222NL
V_{IN}, V_{OUT}	4	Connector	NA	NA	NA	Kontek Comatel Cambion	3110014000500 160−1724−02−05−00
ENABLE	1	3 Pin Jumper Header	NA	NA	2.54mm	TYCO/AMP Molex / Waldom	5−826629−0 90120−0160
SELECT	1	3x2 Pin Jumper Header	NA	NA	2.54mm	TYCO/AMP Molex / Waldom	4731955180470 90131−0140
GND1, GND2	2	Jumper for GND	NA	NA	10.16mm	Harwin Molex / Waldom	D3082−01 90120−0160
TPEN, TPLX, TPVIN, TPVOUT	4	Test Point Type 3	NA	NA	f 1.60mm	Keystone	5010
PCB	1	50.8x50.8x1.0 mm 4 Layers	NA	NA	NA	Any	TLS−P−002−A−1006−BR

PCB LAYOUT

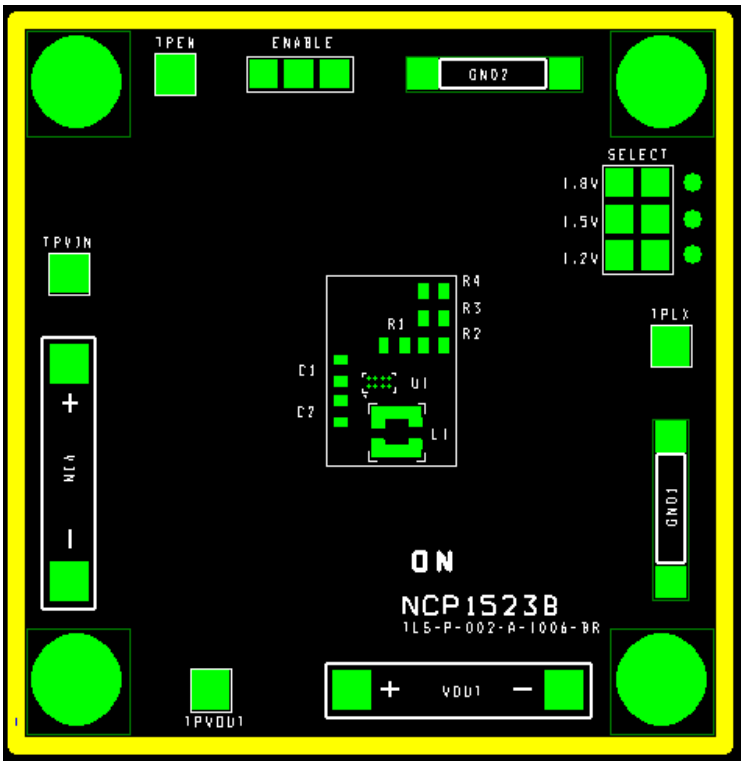

Figure 3. NCP1523B Assembly Layer

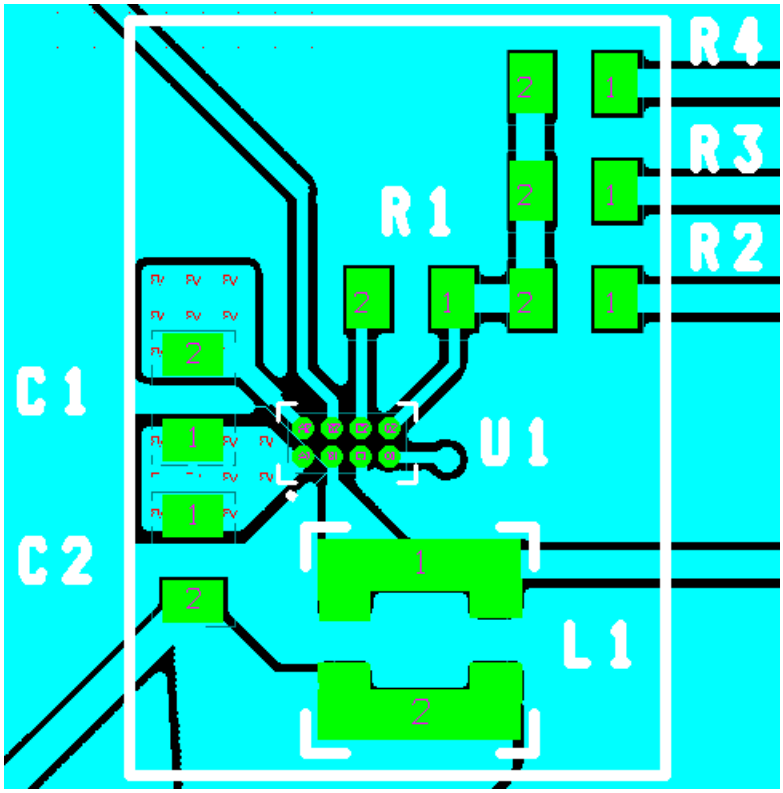

Figure 4. NCP1523B Layout

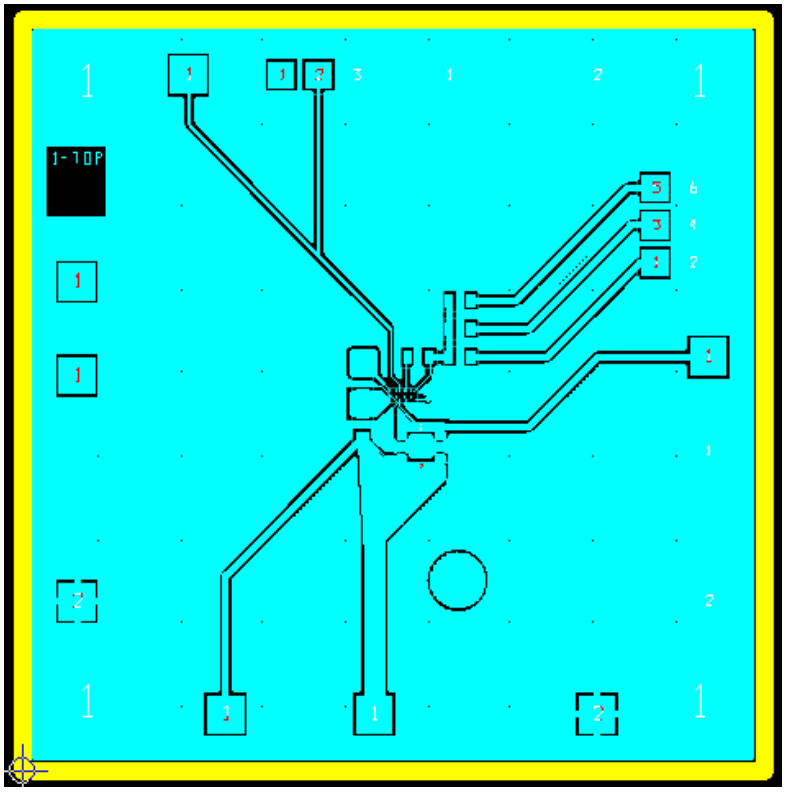

Figure 5. NCP1523B Top Layer Routing

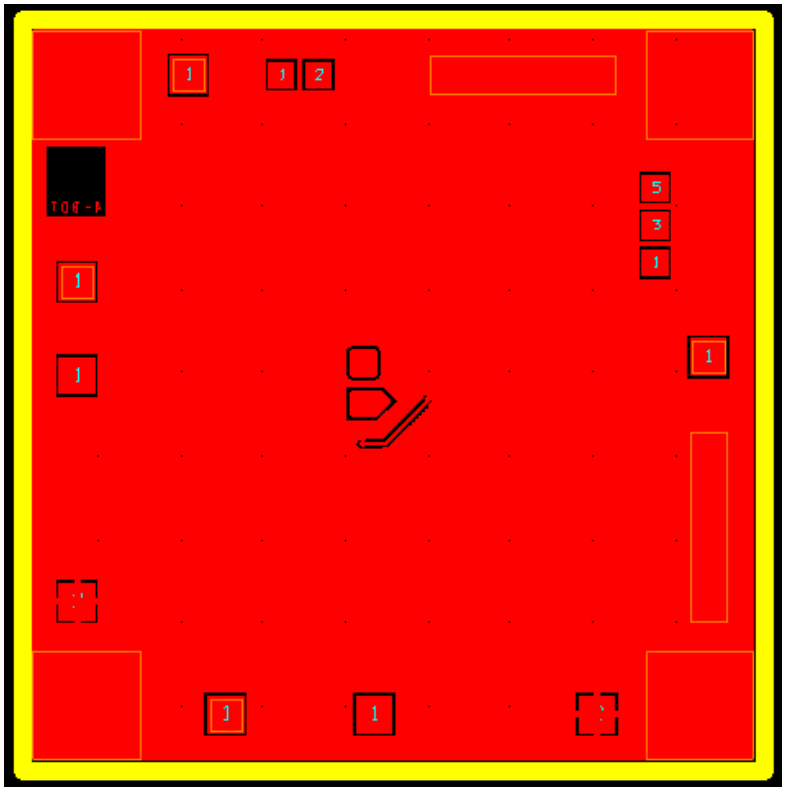

Figure 6. NCP1523B Bottom Layer Routing

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