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NCP1523 Adjustable Output Voltage Step Down Converter Demonstration Board

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EVALUATION BOARD MANUAL

OVERVIEW

The NCP1523 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 2.3 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 automatic switching PWM/PFM mode (NCP1523FCT2G), it increases system efficiency at light load to save battery life.

Finally, it includes an integrated soft-start, cycle-by-cycle current limiting, and thermal shutdown protection. The NCP1523 is available in a space saving, 8 pin chip scale package.

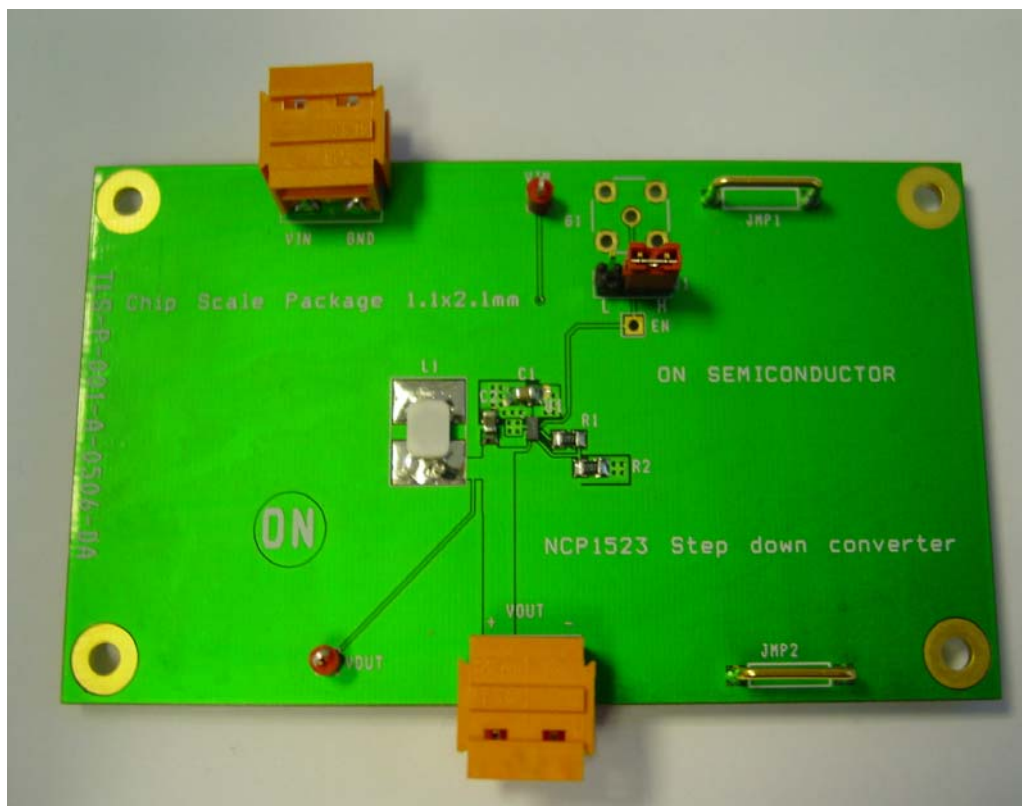


Figure 1. NCP1523 Board Picture

NCP1523GEVB/D

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Minimum Voltage All Pins	V_{MIN}	-0.3	V
Maximum Voltage All Pins (Note 1)	V_{MAX}	7	V
Maximum Voltage Enable, FB, LX	V_{MAX}	$V_{IN} + 0.3$	V
Thermal Resistance, Junction-to-Air	$R_{\theta JA}$	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 $T_A = 85^\circ\text{C}$ (Note 2)	I_U	± 100	mA
ESD Withstand Voltage (Note 3) 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. Latchup current maximum rating per JEDEC standard: JESD78.
3. 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/PowerSolutions/product.do?id=NCP1523>

NCP1523GEVB/D

INPUT POWER

Symbol	Switch Descriptions
V_{IN}	This is the positive connection for power supply
GND	This is the return connection for the power supply
JMP1, JMP2	Ground clip

SETUP

Symbol	Switch Descriptions
EN	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

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
V_{IN}	This is the test point of the input voltage
EN	This is the test point of the enable pin
V_{OUT}	This is the test point of the output voltage

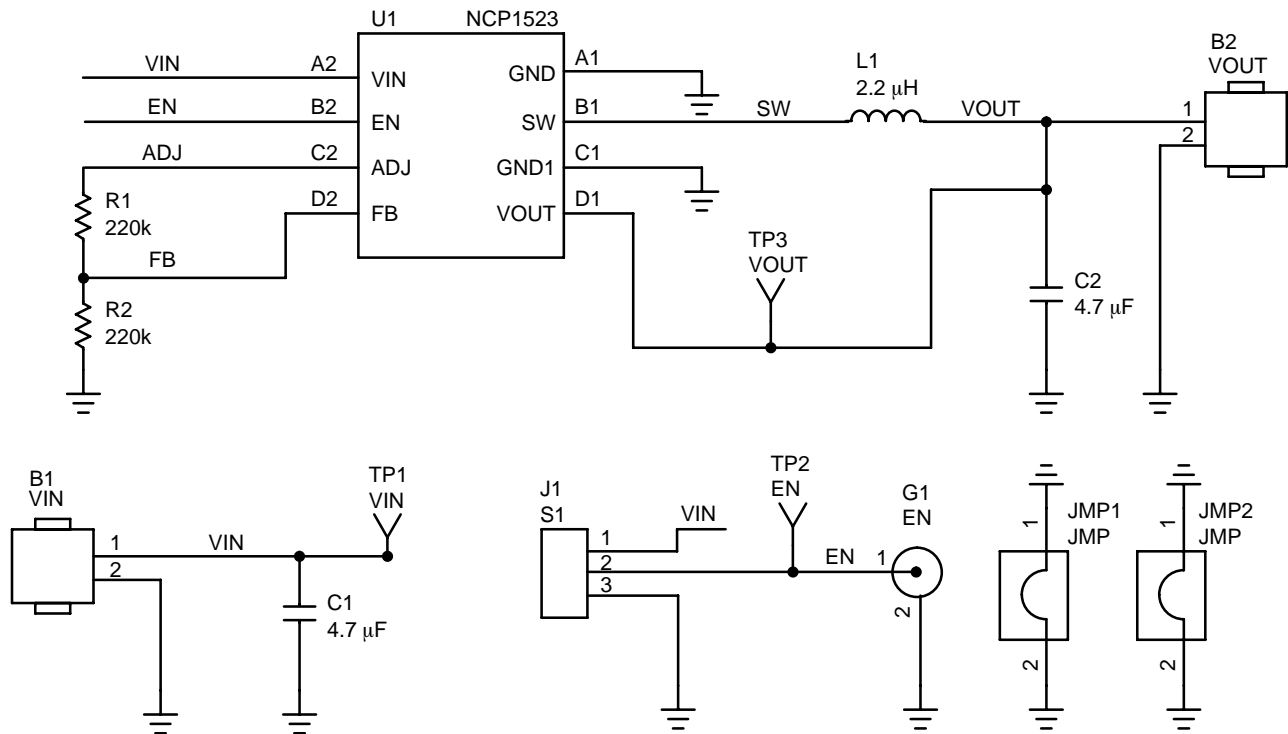


Figure 2. NCP1523 Board Schematic

NCP1523GEVB/D

NCP1523 TEST PROCEDURE

Equipment Needed

- Power Supply
- Digital Volt Meter
- Digital Amp Meter

Test

1. Jumper EN 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} . The DC current measurement on V_{in} line should be around 0.3 μ A.
4. Close EN connector. The DC current measurement on V_{in} line should be around 60 μ A.
5. Measure the output voltage between V_{OUT+} and V_{OUT-} connectors. You should see around 1.2 V voltage operation.
6. Remove the EN jumper. The DC current measurement on V_{in} line should be back around 0.3 μ A.

Table 1. NCP1523 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	NCP1523
C1, C2	2	Ceramic capacitor	4.7 μ F, 10 V, X5R	0.1	0805	Murata	GRM219R61A475KE19D
R1, R2	2	SMD resistor	220k	0.05	0805	std	std
L1	1	Inductor	2.2 μ H	0.2	1605	Coilcraft	DO1605T-222MLB
B1, B2	2	Male SL5.08/2/90B + Female BLZ5.08/2/90B Connector I/O	NA	NA	NA	Weidmuller	1510360000 + 1555060000
J1	1	3 Pin Jumper Header	NA	NA	2.54 mm	TYCO/AMP	5-826629-0
JMP1, JMP2	2	Jumper for GND	NA	NA	10.16 mm	Harwin	D3082-01
TP1, TP2, TP3	3	Test point	NA	NA	NA	std	std
G1	0*	SMB Connector	NA	NA	NA	Radiall	R114665000
PCB	1	88.9 x 61.1 x 1.6 mm 4 Layers	NA	NA	NA	Any	TLS-P-001-A-0506-DA

NCP1523GEVB/D

PCB LAYOUT

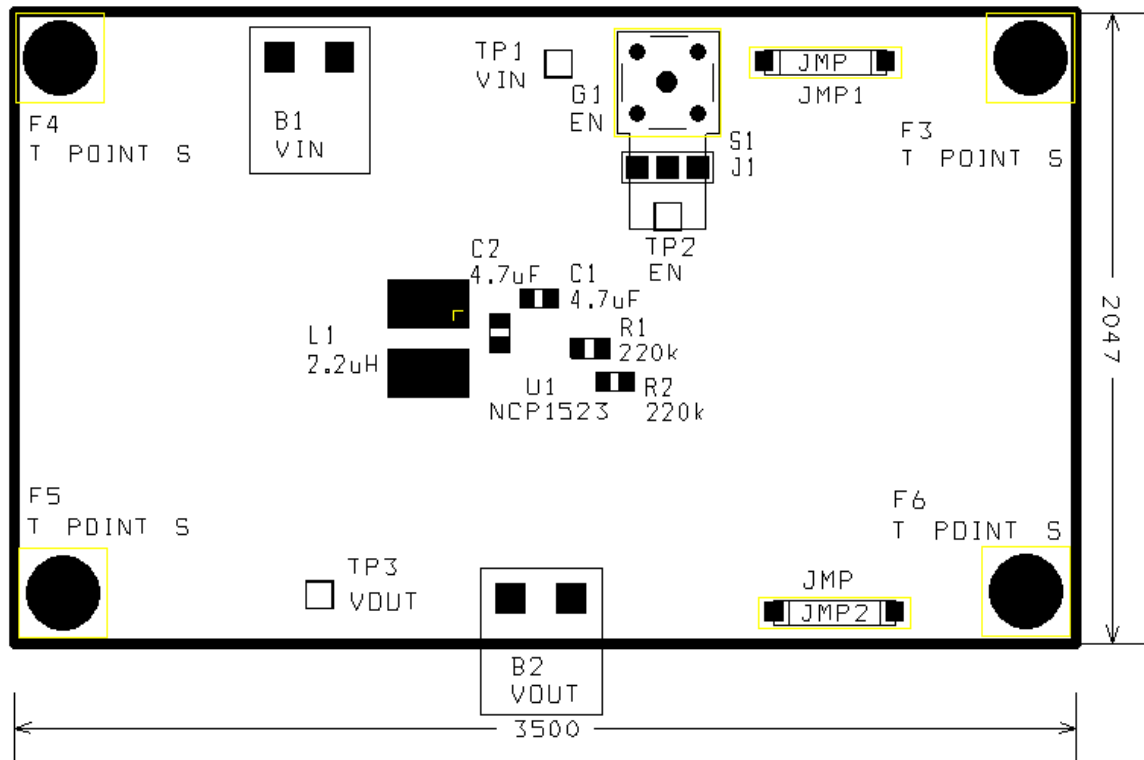


Figure 3. NCP1523 Assembly Layer

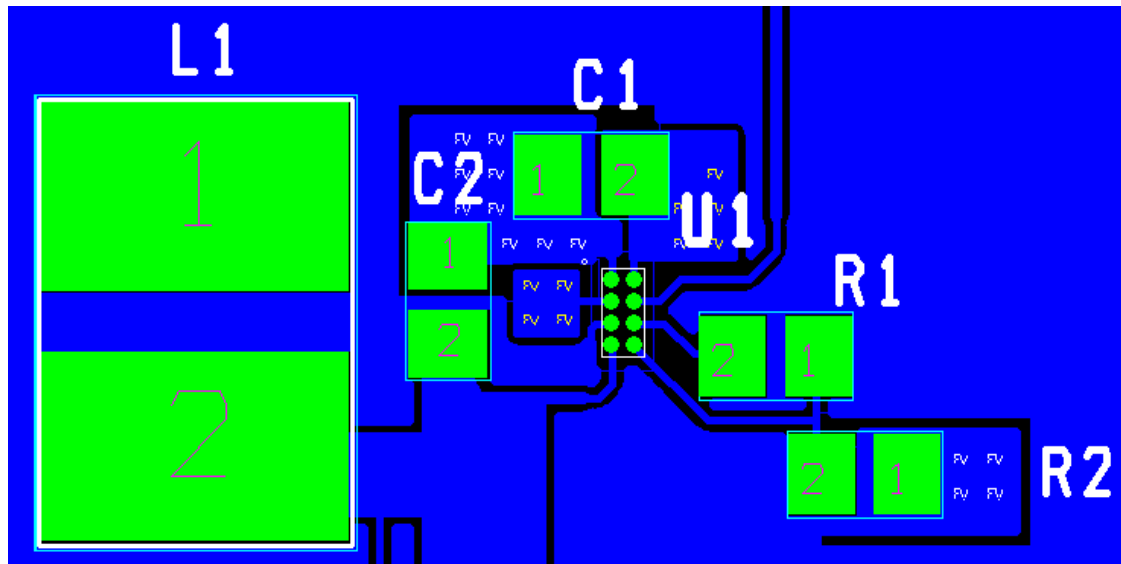


Figure 4. NCP1523 Layout

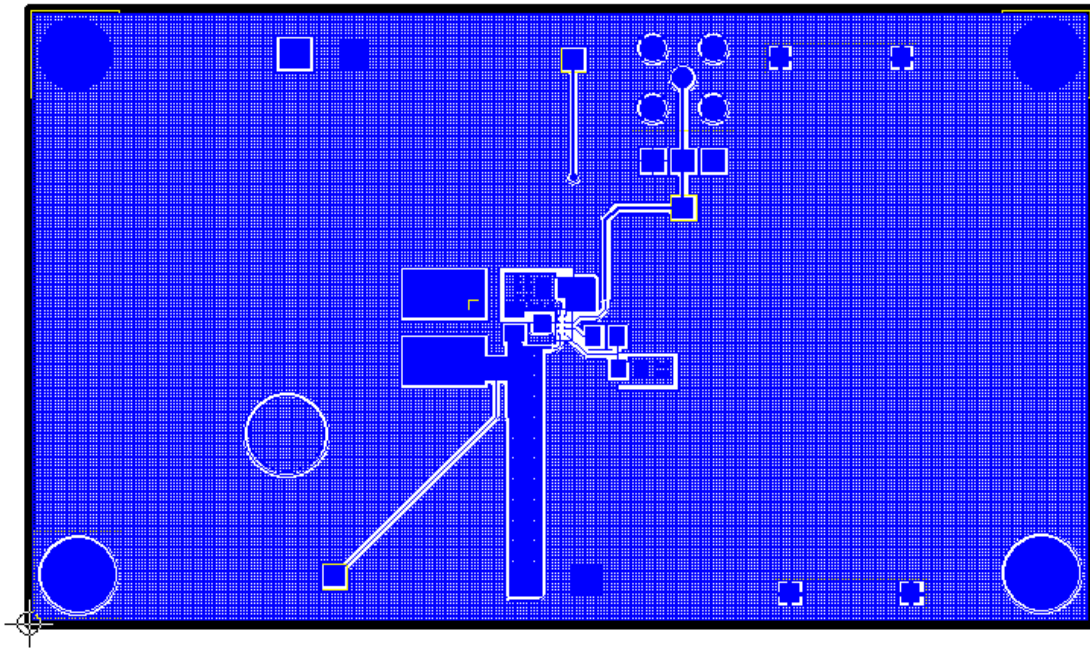


Figure 5. NCP1523 Top Layer Routing

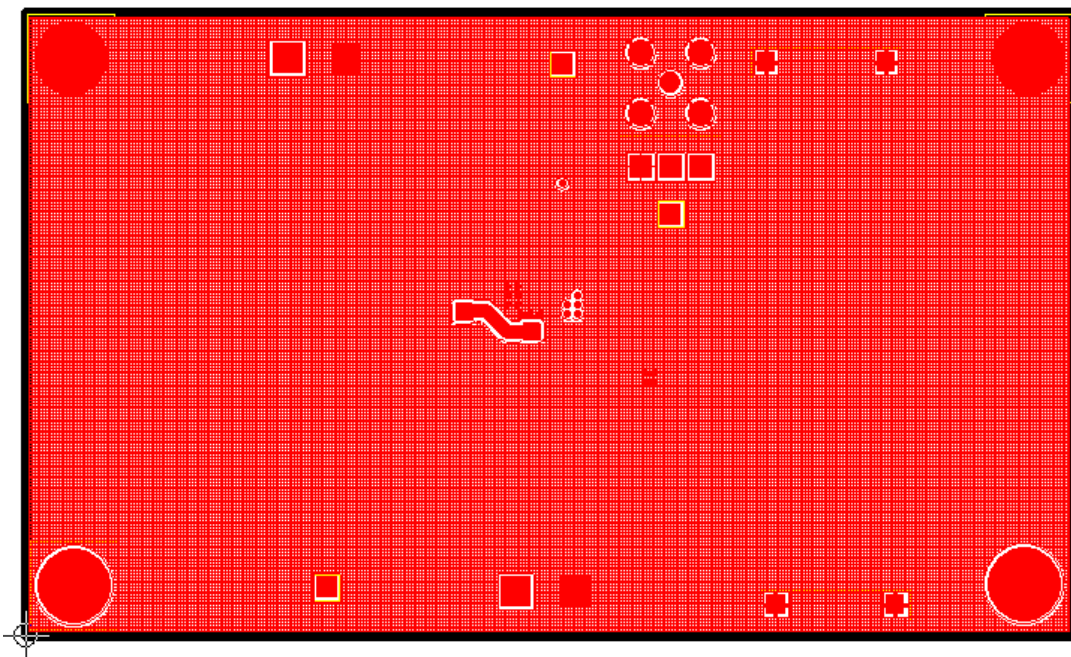



Figure 6. NCP1523 Bottom Layer Routing

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