

# NCP1081SPCGEVB

## Compact, high efficiency, 30 W Reference platform with the NCP1081 Evaluation Board User's Manual



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### EVAL BOARD USER'S MANUAL

#### Board Details

The NCP1081SPCGEVB implements a PoE power splitter that converts the voltage on the Ethernet cable to a lower voltage. The board is equipped with 2 RJ45 connectors, one connector serves as the data and power input and the other connector is the data output. Ethernet data is untouched by the board and simply forwarded.

#### Warnings

Close to the switching MOSFET voltages on the board may exceed 200 V (@250 kHz). Temperature of board and its components may exceed 85°C during normal operation. The Evaluation board was designed to operate correctly under these conditions.

The input voltage should never exceed 57 V nor should the evaluation board be loaded with loads higher than the specified 30 W. Exceeding the specified input and output values could permanently damage the board.

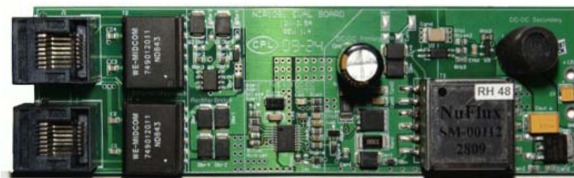


Figure 1. Front Side of EVB

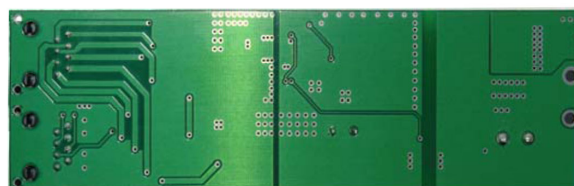


Figure 2. Back Side of EVB

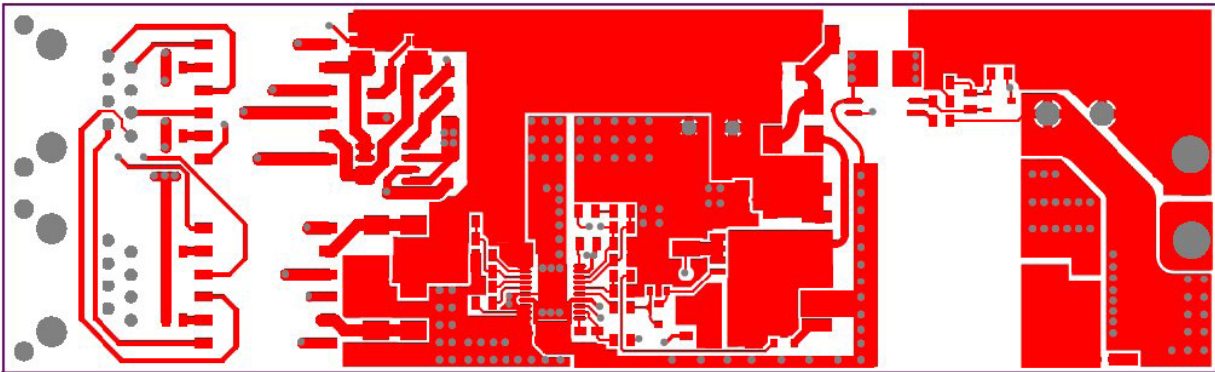
Table 1. EVALUATION BOARD SPECIFICATIONS

| Characteristic           | Min | Typ | Max | Unit |
|--------------------------|-----|-----|-----|------|
| Input Voltage, PoE Input | 36  | –   | 57  | V    |
| Output Voltage           | –   | 12  | –   | V    |
| Output Current           | –   | –   | 2.5 | A    |
| Oscillator Frequency     | –   | 250 | –   | kHz  |
| Output Ripple            | –   | –   | 170 | mV   |
| Efficiency               | –   | –   | 88  | %    |

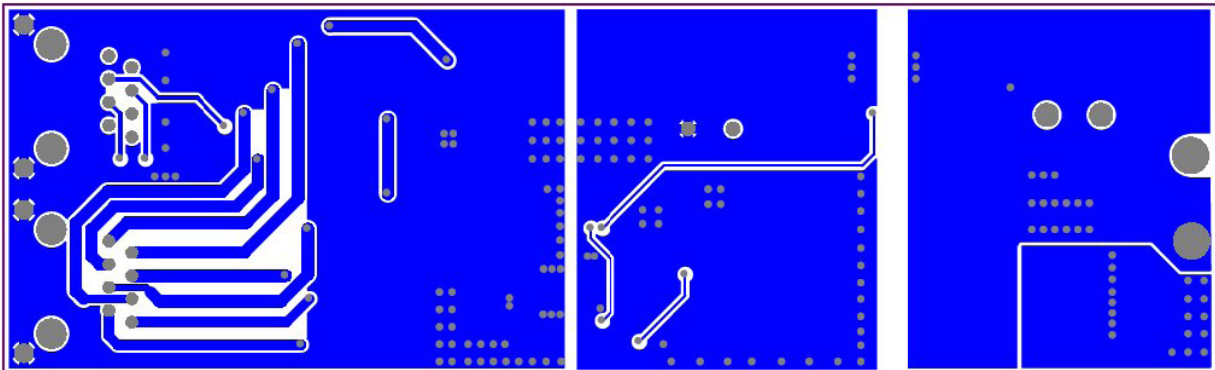
# NCP1081SPCGEVB

**Table 2. BOARD CONNECTOR DESCRIPTION**

| Connector | Pin | Description                                      |
|-----------|-----|--|
| J4        | 1   | TX+/BI_DA+, Data and Power Input, Pair 1, Mode A |
|           | 2   | TX-/BI_DA-, Data and Power Input, Pair 1, Mode A |
|           | 3   | RX+/BI_DB+, Data and Power Input, Pair 2, Mode A |
|           | 4   | NC/BI_DC+, Data and Power Input, Pair 1, Mode B  |
|           | 5   | NC/BI_DC+, Data and Power Input, Pair 1, Mode B  |
|           | 6   | RX-/BI_DB-, Data and Power Input, Pair 2, Mode A |
|           | 7   | NC/BI_DD+, Data and Power Input, Pair 2, Mode B  |
|           | 8   | NC/BI_DD-, Data and Power Input, Pair 2, Mode B  |
| J1        | 1   | TX+/BI_DA+, Data Output                          |
|           | 2   | TX-/BI_DA-, Data Output                          |
|           | 3   | RX+/BI_DB+, Data Output                          |
|           | 4   | NC/BI_DC+, Data Output                           |
|           | 5   | NC/BI_DC+, Data Output                           |
|           | 6   | RX-/BI_DB-, Data Output                          |
|           | 7   | NC/BI_DD+, Data Output                           |
|           | 8   | NC/BI_DD-, Data Output                           |
| JOUT      | 12V | 12 V Regulated Output                            |
|           | GND | GND Regulated Output                             |
|           | 3   | 12 V Regulated Output                            |



**Figure 3. Layout (Top)**



**Figure 4. Layout (Bottom)**

# NCP1081SPCGEVB

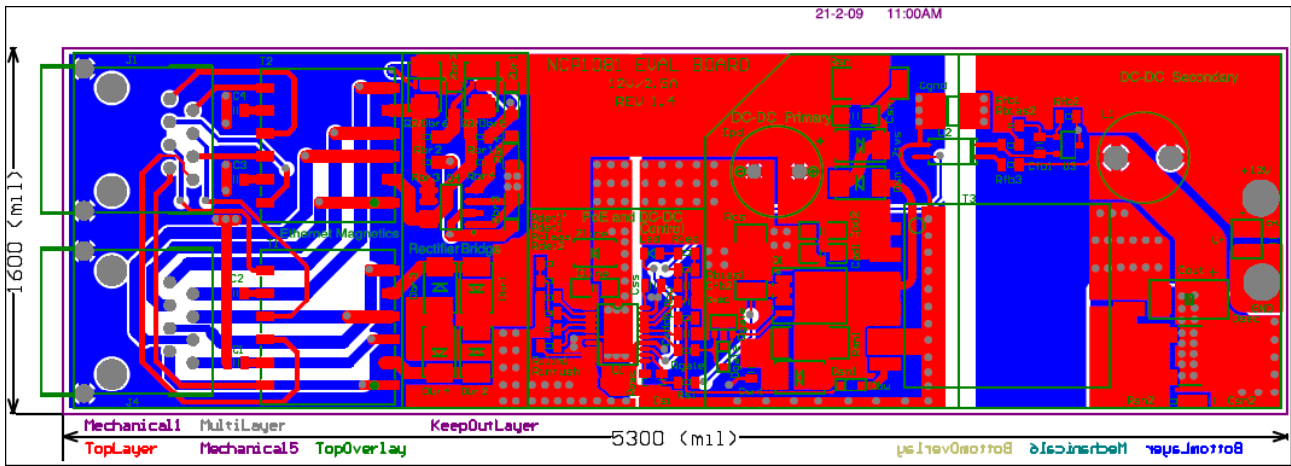


Figure 5. All Layers and Dimensions

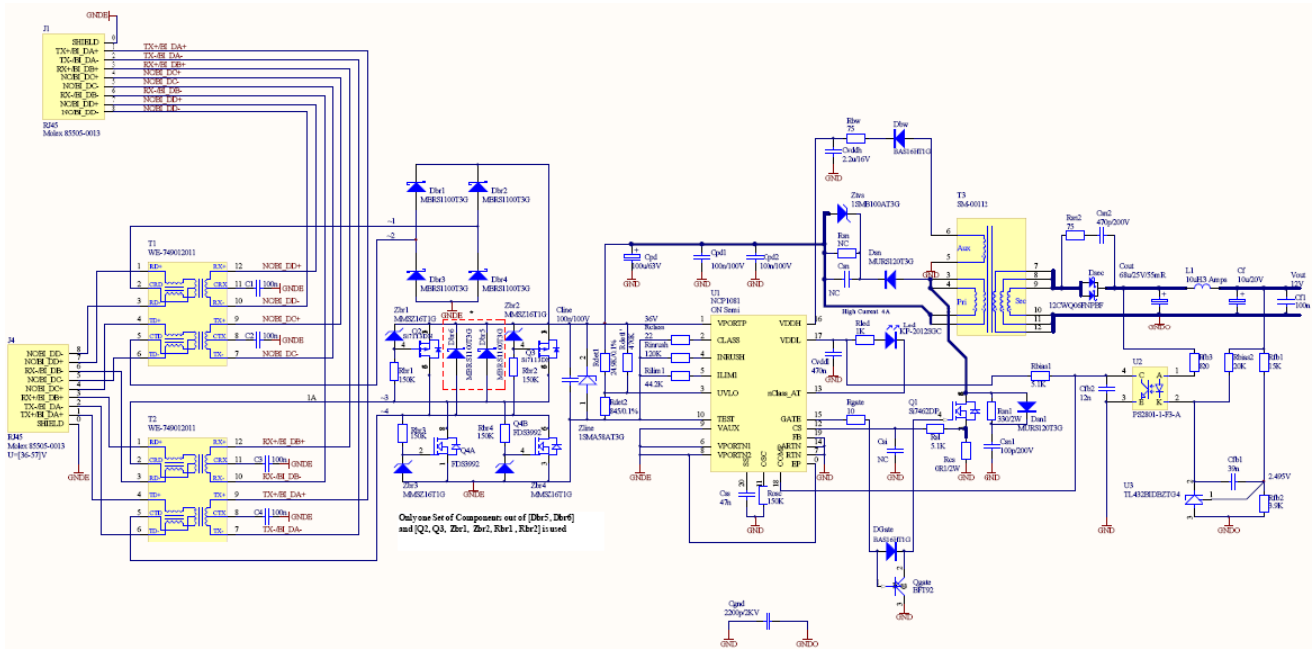


Figure 6. Schematic

# NCP1081SPCGEVB

**Table 3. BILL OF MATERIALS**

| Designator                          | Quantity | Description   | Value         | Tolerance        | Footprint          | Manufacturer                 | Manufacturer Part Number | Substitution Allowed | Lead Free |
|-------------------------------------|----------|---|---------------|------------------|--------------------|------------------------------|--------------------------|----------------------|-----------|
| U1                                  | 1        | Power over Ethernet controller                                    | NCP1081       |                  | TSSOPEP 20         | ON Semiconductor             | NCP1081DEG               | No                   | Yes       |
| C1, C2, C3, C4, Cf1                 | 5        | Capacitor SMD   | 100n/50V      | 10%              | 0805-C-S           | Walsin                       | 0805B104K500CT           | Yes                  | Yes       |
| Cf                                  | 1        | Capacitor Polar   | 10u/20V       | 10%              | C-TANT-B           | AVX                          | TAJB106K020R             | Yes                  | Yes       |
| Cfb1                                | 1        | Capacitor SMD   | 39n/50V       | 10%              | 0805-C-S           | AVX                          | 08055C393KAT2A           | Yes                  | Yes       |
| Cfb2                                | 1        | Capacitor SMD   | 12n/50V       | 10%              | 0805-C-S           | AVX                          | 08055C123KAT2A           | Yes                  | Yes       |
| Cgnd                                | 1        | Capacitor SMD   | 2200p/2kV     | 10%              | 1812               | Walsin                       | 1812B222K202LT           | Yes                  | Yes       |
| Cline, Cpd1, Cpd2                   | 3        | Capacitor SMD   | 100n/100V     | 10%              | 1206-C             | AVX                          | 12061C104KAT2A           | Yes                  | Yes       |
| Cout                                | 1        | Capacitor Polar   | 68u/25V/5 5mR | 10%              | C-TANT-E           | AVX                          | TPME686K025R0055         | No                   | Yes       |
| Cpd                                 | 1        | Capacitor Polar   | 100u/63V      | 20%              | CRD10.0L 17.0RM5.0 | Hitano                       | EXR101M63                | No                   | Yes       |
| Csn1                                | 1        | Capacitor SMD   | 100p/200V     | 10%              | 0805-C-S           | AVX                          | 08052A101JAT2A           | Yes                  | Yes       |
| Csn2                                | 1        | Capacitor SMD   | 470p/200V     | 10%              | 0805-C-S           | AVX                          | 08052C47KJAT2A           | Yes                  | Yes       |
| Css                                 | 1        | Capacitor SMD   | 47n/50V       | 10%              | 0805-C-S           | AVX                          | 08055C473KAT2A           | Yes                  | Yes       |
| Cvddh                               | 1        | Capacitor SMD   | 2.2u/16V      | (+80%) to (-20%) | 0805-C-S           | AVX                          | 0805YC225MAT2A           | Yes                  | Yes       |
| Cvddl                               | 1        | Capacitor SMD   | 470n/50V      | 10%              | 0805-C-S           | AVX                          | 08055C474KAZ2A           | No                   | Yes       |
| T3                                  | 1        | PoE Plus Transformer  | SM-00112      |                  | EFD20              | NUFLUX                       | SM-00112                 | No                   | Yes       |
| Dbr1, Dbr2, Dbr3, Dbr4, Dbr5, Dbr6, | 6        | SMD Schottky Rectifier  | MBRS110 0T3G  |                  | 403A-03            | ON Semiconductor             | MBRS1100T3G              | No                   | Yes       |
| Dbw, Dgate                          | 2        | SMD Switching Diode   | BAS16HT 1G    |                  | SOD323             | ON Semiconductor             | BAS16HT1G                | Yes                  | Yes       |
| Dsec                                | 1        | SMD Schottky Rectifier  | 12CWQ06 FNPBF |                  | DPAK               | Vishay                       | 12CWQ06FNPBF             | No                   | Yes       |
| Dsn, Dsn1                           | 2        | SMD Ultrafast Rectifiers  | MURS120 T3G   |                  | 403A-03            | ON Semiconductor             | MURS120T3G               | No                   | Yes       |
| Zbr3, Zbr4                          | 2        | SMD Zener   | MMSZ16T 1G    |                  | SOD123             | ON Semiconductor             | MMSZ16T1G                | Yes                  | Yes       |
| Zline                               | 1        | SMD TVS Zener   | 1SMA58A T3G   |                  | SMA                | ON Semiconductor / Multicomp | 1SMA58AT3G / SMAJ58A     | Yes                  | Yes       |
| Ztvs                                | 1        | SMD TVS Zener   | 1SMB100 AT3G  |                  | 403A-03            | ON Semiconductor / Multicomp | 1SMB100AT3G / SMAJ58A    | Yes                  | Yes       |
| J1, J4                              | 2        | 8 Position 8 Contact (8P8C) modular jack communications connector | RJ45          |                  | 95501-288 1        | MOLEX                        | 95501-2881               | Yes                  | Yes       |
| L1                                  | 1        | Drum Core Choke   | 10uH/3A       |                  | 10X12              | Prismatic                    | 9404037403               | No                   | Yes       |

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**Table 3. BILL OF MATERIALS**

| Designator       | Quantity | Description                               | Value                    | Tolerance | Footprint         | Manufacturer      | Manufacturer Part Number | Substitution Allowed | Lead Free |
|------------------|----------|---|--------------------------|-----------|-------------------|-------------------|--------------------------|----------------------|-----------|
| Led              | 1        | LED                                       | KP-2012S GC              |           | 0805-D-S          | EVERLIGHT         | 17-21SYGC/S530-E2/TR8    | Yes                  | Yes       |
| Q1               | 1        | MOSFET N-CHANNEL                          | Si7462DP                 |           | SOPP8             | Vishay Siliconix  | Si7462DP                 | No                   | Yes       |
| Q4               | 1        | MOSFET N-CHANNEL                          | FDS3992                  |           | SO-8              | Fairchild         | FDS3992                  | No                   | Yes       |
| Qgate            | 1        | Transistor PNP                            | BFT92                    |           | SOT23             | Philips           | BFT92                    | Yes                  | Yes       |
| Rbias 1, Rsl     | 2        | Resistor SMD                              | 5.1k                     | 5%        | 0805-R-S          | Walsin            | WR08X512JTL              | Yes                  | Yes       |
| Rbias 2          | 1        | Resistor SMD                              | 20k                      | 1%        | 0805-R-S          | Walsin            | WR08X2002FTL             | Yes                  | Yes       |
| Rbr3, Rbr4, Rosc | 3        | Resistor SMD                              | 150k                     | 1%        | 0805-R-S          | Walsin            | WR08X1503FTL             | Yes                  | Yes       |
| Rbw, Rsn2        | 2        | Resistor SMD                              | 75                       | 1%        | 0805-R-S          | Walsin            | WR08X750JTL              | Yes                  | Yes       |
| Rclas s          | 1        | Resistor SMD                              | 30.1                     | 1%        | 0805-R-S          | Yageo             | RC0805FR-0730R1L         | Yes                  | Yes       |
| Rcs              | 1        | Resistor SMD                              | 0.1/3W                   | 1%        | 2512-S            | Bourns            | CRA2512-FZ-R100ELF       | Yes                  | Yes       |
| Rdet1            | 1        | Resistor SMD                              | 24.9k                    | 1%        | 0805-R-S          | Walsin            | WR08X2492FTL             | Yes                  | Yes       |
| Rdet2            | 1        | Resistor SMD                              | 845                      | 1%        | 0805-R-S          | Yageo             | RC0805FR-07845RL         | Yes                  | Yes       |
| Rfb1             | 1        | Resistor SMD                              | 15k                      | 1%        | 0805-R-S          | Walsin            | WR08X1502FTL             | Yes                  | Yes       |
| Rfb2             | 1        | Resistor SMD                              | 3.92k                    | 1%        | 0805-R-S          | Walsin            | WR08X3921FTL             | Yes                  | Yes       |
| Rfb3             | 1        | Resistor SMD                              | 820                      | 1%        | 0805-R-S          | Yageo             | RC0805FR-07820RL         | Yes                  | Yes       |
| Rgate            | 1        | Resistor SMD                              | 10                       | 1%        | 0805-R-S          | Walsin            | WR08X10R0FTL             | Yes                  | Yes       |
| Rilim1           | 1        | Resistor SMD                              | 44.2K                    | 1%        | 0805-R-S          | Walsin            | WR08X4422FTL             | Yes                  | Yes       |
| Rinru sh         | 1        | Resistor SMD                              | 121k                     | 1%        | 0805-R-S          | Walsin            | WR08X1213FTL             | Yes                  | Yes       |
| Rled             | 1        | Resistor SMD                              | 1k                       | 5%        | 0805-R-S          | Yageo             | RC080JR-07KL             | Yes                  | Yes       |
| Rsn1             | 1        | Resistor SMD                              | 330E /1W                 | 5%        | 2512-S            | Walsin            | WR25X331JTL              | Yes                  | Yes       |
| T1, T2           | 2        | WE-LAN SMD-10/100 BASE T                  | POE+ 350uH OCL 720mA IDC | 2%        | SMD               | Würth-Elektronik  | 749012011                | No                   | Yes       |
| U2               | 1        | HIGH ISOLATION VOLTAGE SSOP PHOTOCOUP LER | PS2801-1-F3-A            |           | SSOP4             | CEL               | PS2801-1                 | No                   | Yes       |
| U3               | 1        | Programmable Shunt Voltage Reference      | TL432BID BZTG4           |           | SOT23             | Texas-Instruments | TL432BIDBZTG4            | No                   | Yes       |
| Csi              | 1        | Capacitor                                 | NC                       |           | 0805-C-S          |                   |                          |                      |           |
| Csn              | 1        | Capacitor                                 | NC                       |           | 1206-C            |                   |                          |                      |           |
| Zbr1, Zbr2       | 2        | SMD Zener                                 | NC                       |           | SOD123            | ON Semiconductor  | MMSZ16T1G                |                      |           |
| Rbr1, Rbr2       | 2        | Resistor SMD                              | NC                       |           | 0805-R-S          |                   |                          |                      |           |
| Rdet1            | 1        | Resistor SMD                              | NC                       |           | 0805-R-S          |                   |                          |                      |           |
| Rsn              | 1        | Resistor SMD                              | NC                       |           | 2512-S            |                   |                          |                      |           |
| Q2, Q3           | 2        | P-Channel 30V (D-S) MOSFET                | NC                       |           | POWERP ACK 1212-8 | Vishay            | Si7113                   |                      |           |

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