

### DESCRIPTION

The EV2721-RH-00A is an evaluation board designed to demonstrate the capabilities of the MP2721, a highly integrated, 5A, switch-mode battery management device for single-cell Li-ion or Li-polymer batteries. The narrow-voltage DC (NVDC) power management structure provides a low-impedance power path that optimizes charging efficiency, reduces battery charging time, and extends battery life during discharging.

USB Battery Charging Specification 1.2 (BC1.2) and non-standard adaptor detection are supported by the input source type identification algorithm.

The I<sup>2</sup>C interface provides complete operating control, charging parameter configuration, and status/interrupt monitoring.

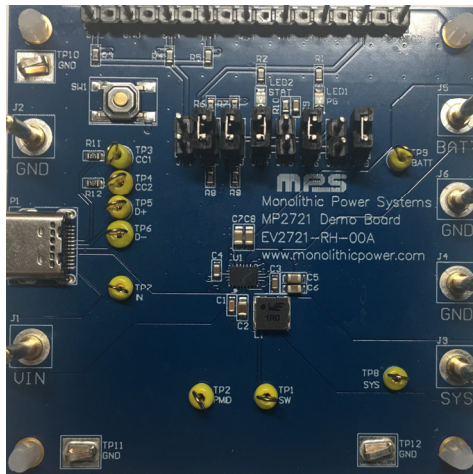
The MP2721 supports a fully customizable JEITA profile with configurable temperature windows and actions.

The EV2721-RH-00A supports input sources up to 16V, including standard USB host ports and high-voltage wall adapters with fast charge capability. The EV2721-RH-00A supports boost mode and On-The-Go (OTG) operation by supplying a voltage between 5V and 5.35V at the IN pin, with up to 3A of current.

### PERFORMANCE SUMMARY

| Parameters                                | Value      |
|-------------------------------------------|------------|
| Input voltage ( $V_{IN}$ ) supply         | 4V to 16V  |
| Battery voltage ( $V_{BATT}$ )            | 0V to 4.6V |
| Charge current ( $I_{CC}$ )               | 0A to 5A   |
| Input current ( $I_{IN}$ )                | 0A to 3.2A |
| Boost output current ( $I_{BOOST\_OUT}$ ) | 0A to 3A   |

### EVALUATION BOARD



LxWxH (6.3cmx6.3cmx1.3cm)

| Board Number  | MPS IC Number |
|---------------|---------------|
| EV2721-RH-00A | MP2721GRH     |

## QUICK START GUIDE

The EV2721-RH-00A evaluation board is designed for the MP2721. The layout of the EV2721-RH-00A accommodates most commonly used capacitors. The default function of this board is preset for charger mode, and the charge-full voltage is preset to 4.2V for a single-cell Li-ion battery.

Table 1 shows the input/output connections of the EV2721-RH-00A.

**Table 1: Input/Output Connections**

| Connectors  | Description                    |
|-------------|--------------------------------|
| J1/VIN      | Positive input source terminal |
| J2/GND      | Negative input source terminal |
| J3/SYS      | Positive system load terminal  |
| J4/GND      | Negative system load terminal  |
| J5/BATT     | Positive battery pack terminal |
| J6/GND      | Negative battery pack terminal |
| P1          | USB Type-C connector           |
| SCL/SDA/GND | I <sup>2</sup> C connector     |

Table 2 shows the jumper set-ups for the EV2721-RH-00A.

**Table 2: Jumper Installations**

| Jumper | Description                                                                    | Default |
|--------|--------------------------------------------------------------------------------|---------|
| JP1    | I <sup>2</sup> C pull up to VCC                                                | Off     |
| JP2    | NTC1 on board resistor divider                                                 | On      |
| JP3    | NTC2 on board resistor divider                                                 | On      |
| JP4    | LED indication for STAT/IB                                                     | On      |
| JP5    | IB resistor for STAT/IB. JP4 and JP5 should not be installed simultaneously    | Off     |
| JP6    | LED indication for PG/NTC2                                                     | On      |
| JP7    | NTC2 connection to PG/NTC2. JP6 and JP7 should not be installed simultaneously | Off     |
| JP8    | BATTSNS connection to BATT                                                     | On      |

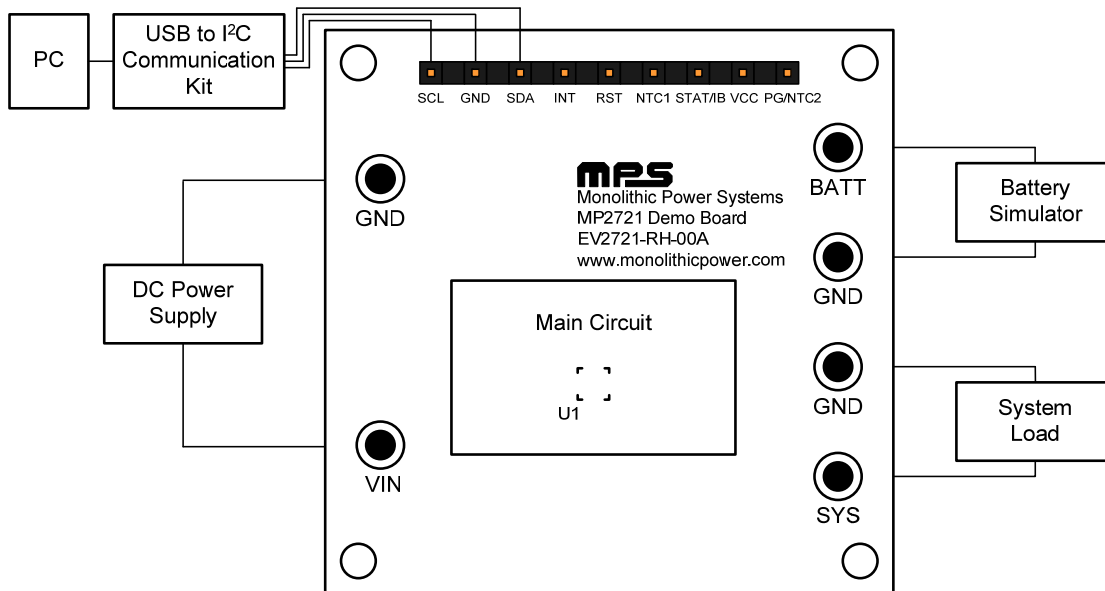
### Evaluation Platform Preparation

1. The MP2721 evaluation software must be properly installed on the computer.
2. Prepare the USB-to-I<sup>2</sup>C communication interface (EVKT-USBI2C-02) (See Figure 1).

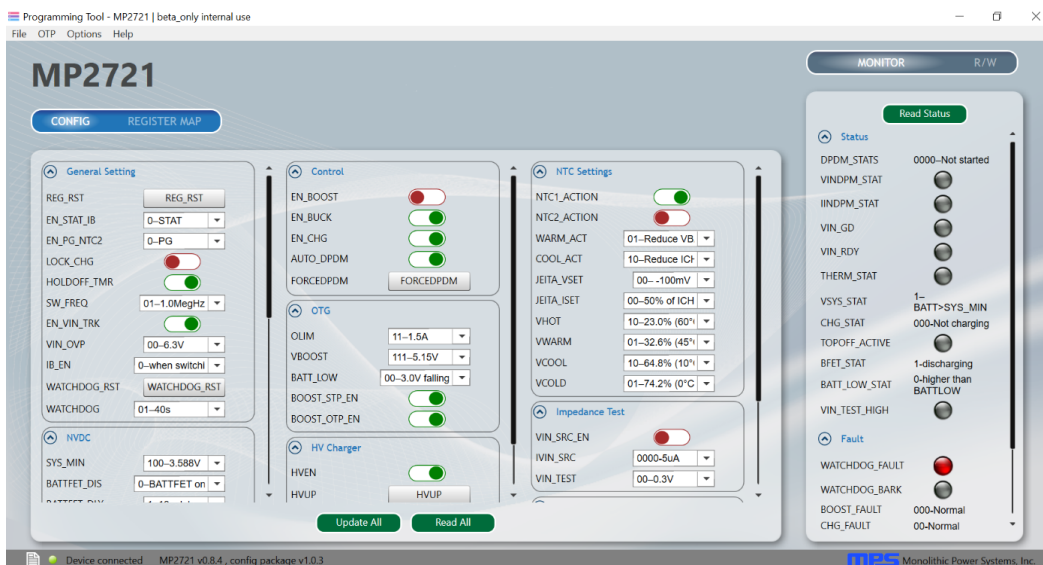


**Figure 1: USB to I<sup>2</sup>C Communication Interface**

3. Configure the test set-up for the MP2721 (see Figure 2 on page 3).


**Figure 2: Measurement Equipment Set-Up**
**Start-Up Procedure**

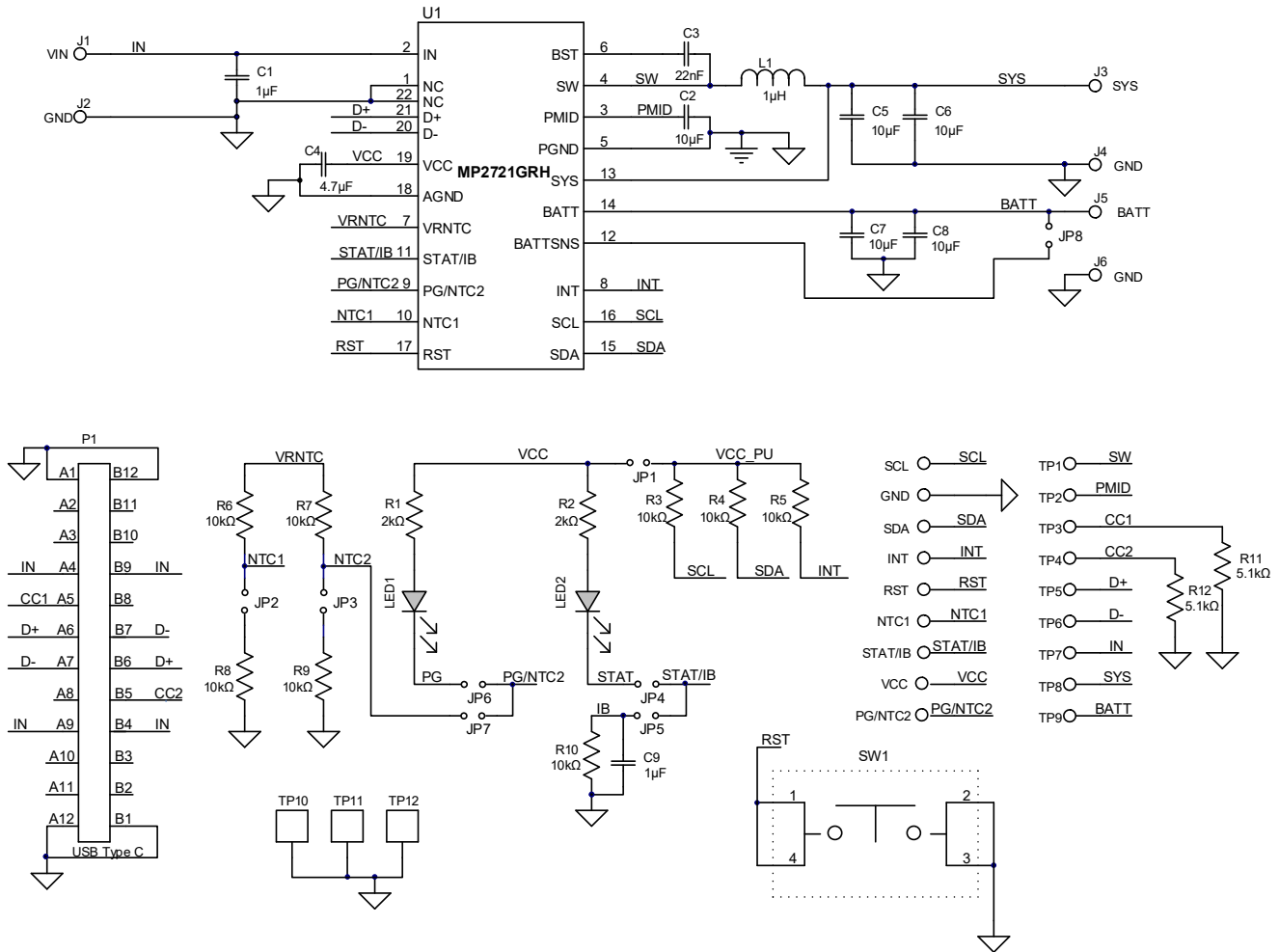
1. Set the battery simulator output to 3.8V with a charge/discharge current limit at 6A, then turn off the battery simulator. Connect the battery simulator to BATT and GND.
2. Set the DC power source output to 5V with an output current limit at 5A, then turn off the DC power source. Connect the DC power source to VIN and GND.
3. Connect the system load (typically an e-load device) to SYS and GND, then set the system load to 0A.
4. Turn on the battery simulator.
5. Turn on the DC power source.
6. If necessary, turn on the system load.
7. Launch the MP2721 evaluation software. Figure 3 shows the GUI software’s main window.


**Figure 3: MP2721 Evaluation Software**

**GUI Operating Instructions**

1. Ensure that all the connections are successful, including the connection between the USB-to-I<sup>2</sup>C communication interface and the EV2721-RH-00A. Successful connections are indicated in green on the lower-left side of the GUI window (see Figure 3 on page 3). The program is ready to be run once all of the connections are successful.
2. After all connections are successful, click the “Read All” button to update the GUI to the default settings.
3. After modifying any settings with the GUI, click the “Update All” button to write the setting to the MP2721’s registers.

**EVALUATION BOARD SCHEMATIC**



**Figure 4: Evaluation Board Schematic**

**EV2721-RH-00A BILL OF MATERIALS**

| Qty | Ref                                                  | Value         | Description                                                      | Package              | Manufacturer | Manufacturer PN     |
|-----|------------------------------------------------------|---------------|------------------------------------------------------------------|----------------------|--------------|---------------------|
| 1   | C1                                                   | 1 $\mu$ F     | Ceramic capacitor, 25V, X7R                                      | 0603                 | Murata       | GRM188R71E105K A12D |
| 1   | C2                                                   | 10 $\mu$ F    | Ceramic capacitor, 25V, X5R                                      | 0805                 | Murata       | GRM21BR61E106K A73  |
| 1   | C3                                                   | 22nF          | Ceramic capacitor, 100V, X7R                                     | 0603                 | Murata       | GRM188R72A223K AC4D |
| 1   | C4                                                   | 4.7 $\mu$ F   | Ceramic capacitor, 16V, X7R                                      | 0603                 | Murata       | GRM188R61C475K AAJD |
| 4   | C5, C6, C7, C8                                       | 10 $\mu$ F    | Ceramic capacitor, 16V, X5R                                      | 0805                 | Murata       | GRM21BR61C106K E15L |
| 1   | C9                                                   | 1 $\mu$ F     | Ceramic capacitor, 16V, X7R                                      | 0603                 | Murata       | GRM188R71C105K A12D |
| 1   | L1                                                   | 1 $\mu$ H     | Inductor, R <sub>DC</sub> = 12m $\Omega$ , I <sub>SAT</sub> = 9A | SMD                  | Würth        | 78438356010         |
| 2   | R1, R2                                               | 2k $\Omega$   | Film resistor, 1%                                                | 0603                 | Yageo        | RC0603FR-072KL      |
| 3   | R3, R4, R5                                           | 10k $\Omega$  | Film resistor, 5%                                                | 0603                 | Yageo        | RC0603JR-0710K      |
| 5   | R6, R7, R8, R9, R10                                  | 10k $\Omega$  | Film resistor, 1%                                                | 0603                 | Yageo        | RC0603FR-0710KL     |
| 2   | R11, R12                                             | 5.1k $\Omega$ | Film resistor, 1%                                                | 0603                 | Yageo        | RC0603FR-075K1L     |
| 1   | LED1                                                 | Red           | Red LED                                                          | 0805                 | Bright LED   | F3D02R-4A           |
| 1   | LED2                                                 | Green         | Green LED                                                        | 0805                 | Bright LED   | F3D02HG-1A          |
| 1   | SW1                                                  | 4mmx10mm      | Push button                                                      | SMD                  | Any          |                     |
| 1   | P1                                                   | 5A            | Type-C connector                                                 | SMD                  | Any          |                     |
| 6   | J1, J2, J3, J4, J5, J6                               | 2mm           | Connector                                                        | DIP                  | Any          |                     |
| 9   | TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9          | Test point    | Test point yellow                                                | DIP                  | Any          |                     |
| 3   | TP10, TP11, TP12                                     | Test point    | Test point ground                                                | SMD                  | Any          |                     |
| 9   | GND, INT, NTC1, PG/NTC2, RST, SCL, SDA, STAT/IB, VCC | 2.54mm        | Row connector                                                    | DIP                  | Any          |                     |
| 8   | JP1, JP2, JP3, JP4, JP5, JP6, JP7, JP8               | 2.54mm        | Row connector                                                    | DIP                  | Any          |                     |
| 5   | JP2, JP3, JP4, JP6, JP8                              | 2.54mm        | Shunt                                                            | DIP                  | Any          |                     |
| 1   | U1                                                   | MP2721        | I <sup>2</sup> C-controlled, 1-cell, 5A, NVDC switching charger  | QFN-22 (2.5mmx3.5mm) | MPS          | MP2721GRH           |

### PCB LAYOUT

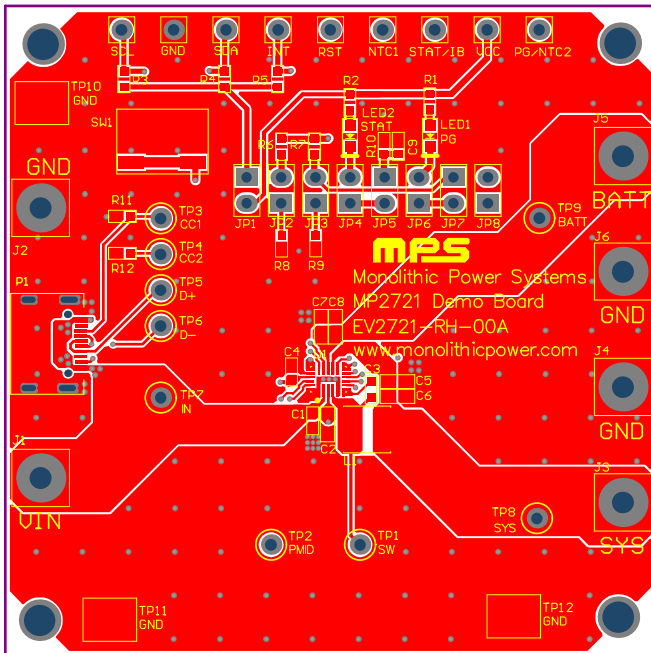


Figure 5: Top Layer

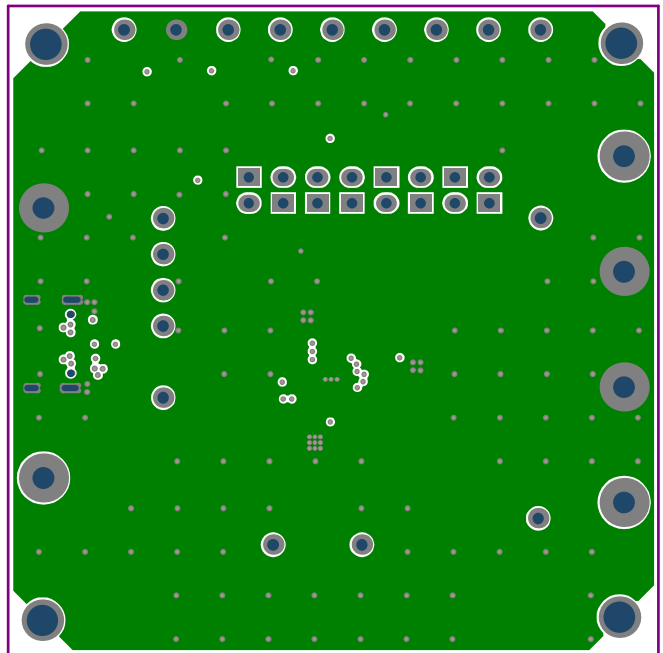


Figure 6: Middle Layer 1

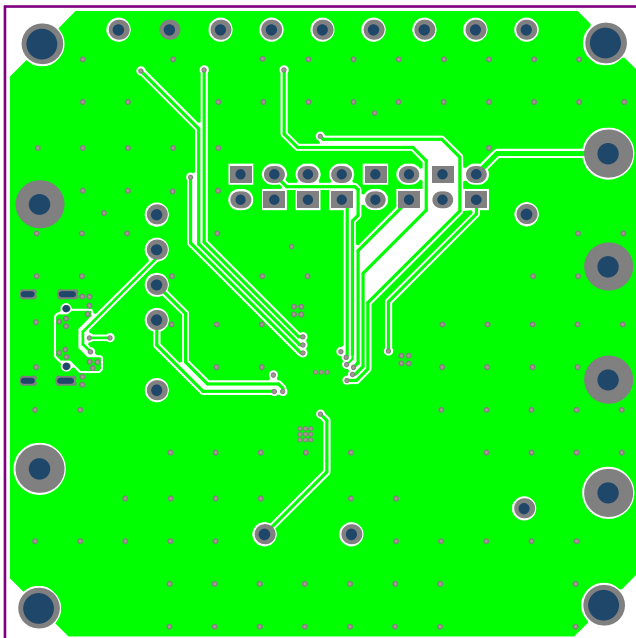


Figure 7: Middle Layer 2

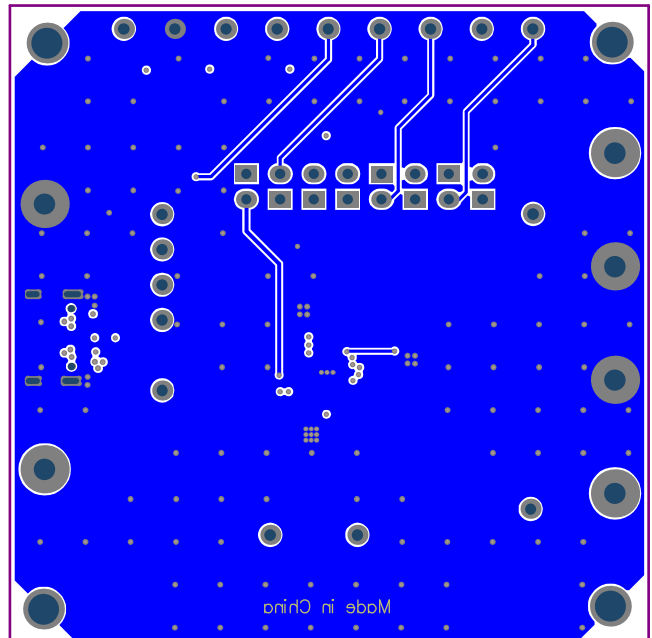


Figure 8: Bottom Layer



## REVISION HISTORY

| Revision # | Revision Date | Description                        | Pages Updated |
|------------|---------------|------------------------------------|---------------|
| 1.0        | 10/14/2021    | Initial Release                    | -             |
| 1.1        | 2/2/2023      | Changed BST capacitor (C3) to 22nF | 5-6           |

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