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# EV171-S-00A

## Small, Universal Input Non-Isolated Off-Line Regulator Evaluation Board

### DESCRIPTION

The EV171-S-00A Evaluation Board is designed to demonstrate the capabilities of MP171. The MP171 is a primary-side constant voltage regulator providing accurate constant voltage (CV) regulation without Opto-coupler. It supports Buck, Buck-Boost, Boost and Flyback topologies.

The EV171-S-00A Evaluation Board is designed as Buck application. EV171-S-00A typically drives 5V/50mA load from 85VAC to 265VAC, at 60/50Hz.

The EV171-S-00A has an excellent efficiency and meets 2kV IEC61000-4-5 surge immunity and EN55022 conducted EMI requirements. MP171 features various protections, including thermal shutdown (TSD), VCC under-voltage lockout (UVLO), over-load protection (OLP), short-circuit protection (SCP), and open loop protection.

MP171 is available in TSOT23-5 and SOIC8 package.

### ELECTRICAL SPECIFICATION

| Parameter      | Symbol    | Value     | Units |
|----------------|-----------|-----------|-------|
| Input Voltage  | $V_{IN}$  | 85 to 265 | VAC   |
| Output Voltage | $V_{OUT}$ | 5         | V     |
| Output Current | $I_{OUT}$ | 50        | mA    |

### FEATURES

- Primary-Side non-isolated Constant Voltage (CV) control
- Integrated 700V MOSFET
- <100mW no-load power consumption
- Peak-Current control with peak current compression
- Low VCC operating current
- Limited maximum frequency
- Frequency foldback
- Multiple protections: SCP, OLP, open-loop protection, TSD, and VCC UVLO
- Low cost and simple external circuit
- Internally biased VCC

### APPLICATIONS

- Home appliance, and consumer electronics
- Home automation
- Standby power

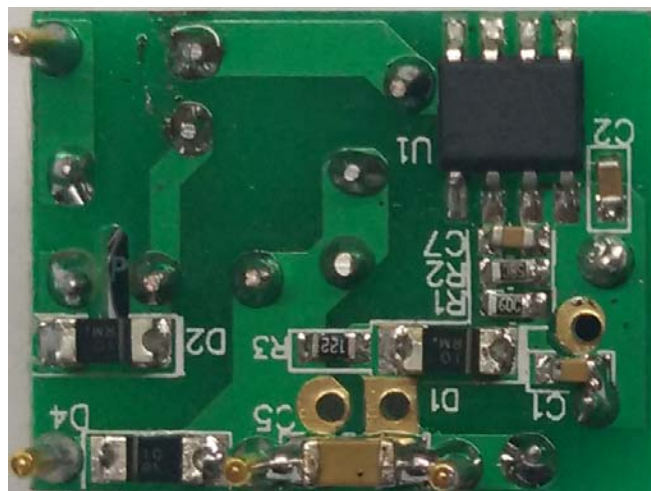
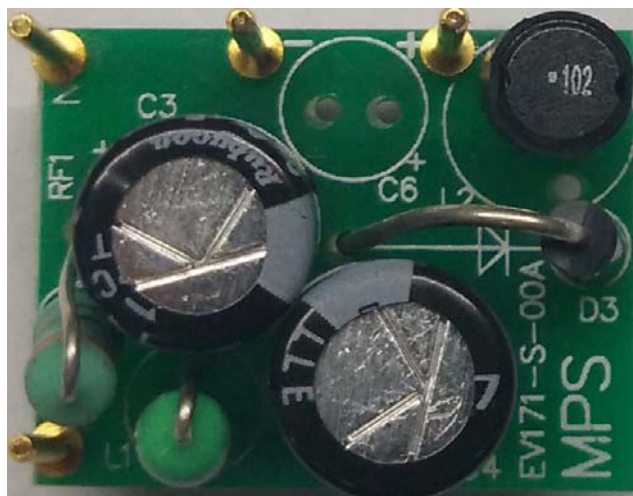
All MPS parts are lead-free, halogen free, and adhere to the RoHS directive. For MPS green status, please visit MPS website under Quality Assurance.

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**Warning:** Although this board is designed to satisfy safety requirements, the engineering prototype has not been agency approved. Therefore, all testing should be performed using an isolation transformer to provide the AC input to the prototype board.

## EV171-S-00A EVALUATION BOARD



(L x W x H) 17mm x 22mm x 17mm

| Board Number | MPS IC Number |
|--------------|---------------|
| EV171-S-00A  | MP171GS       |

## EVALUATION BOARD SCHEMATIC

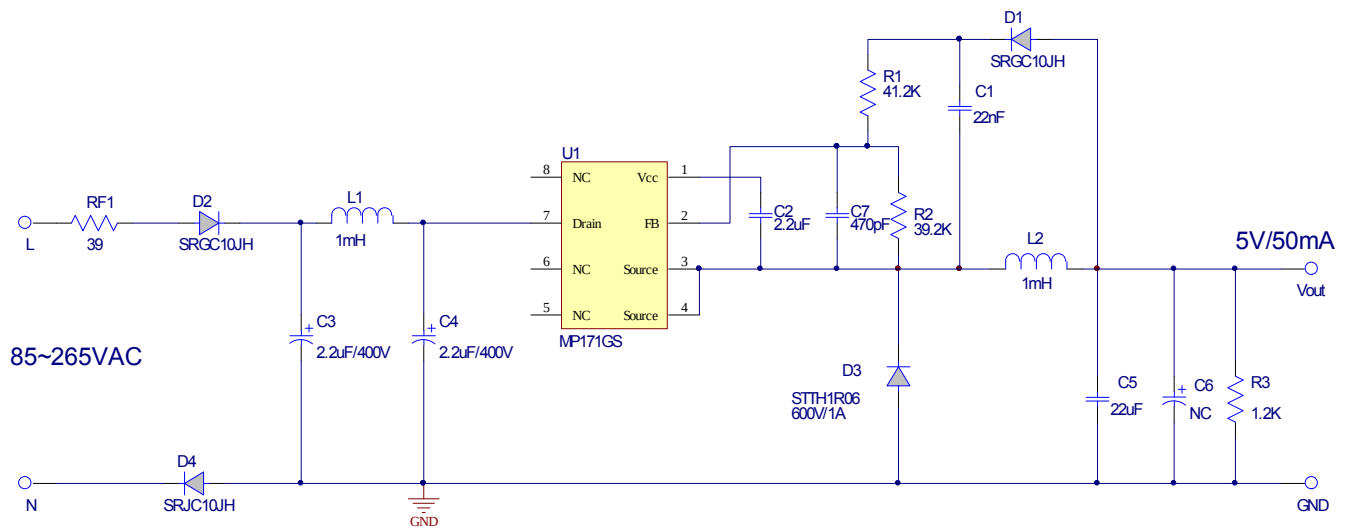


Figure 1—Schematic

## PCB LAYOUT (SINGLE-SIDED)

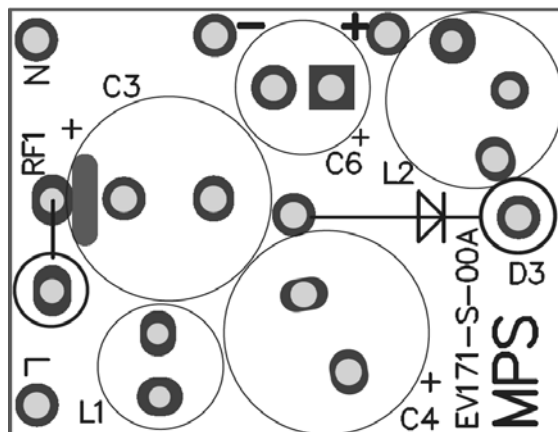


Figure 2—Top Layer

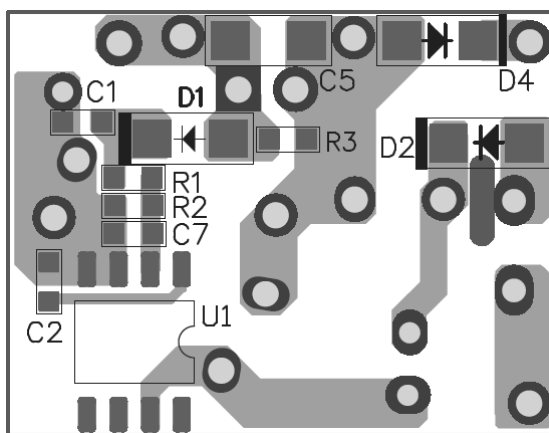


Figure 3—Bottom Layer

## BILL OF MATERIALS

| Qty | Ref           | Value    | Description                     | Package | Manufacture | Manufacture_PN     |
|-----|---------------|----------|---------------------------------|---------|-------------|--------------------|
| 1   | C1            | 22nF     | Ceramic Capacitor;<br>16V; X7R  | 0603    | muRata      | GRM188R71C223KA01D |
| 1   | C2            | 2.2uF    | Ceramic Capacitor;<br>10V; X7R  | 0603    | muRata      | GRM188R71A225KE15D |
| 2   | C3, C4        | 2.2uF    | Electrolytic Capacitor;<br>400V | DIP     | Rubycon     | 400LLE2R2MEFC      |
| 1   | C5            | 22uF     | Ceramic Capacitor;<br>25V; X5R  | 1206    | muRata      | GRM31CR61E226KE15  |
| 1   | C7            | 470pF    | Ceramic Capacitor;<br>50V; X7R  | 0603    | TDK         | C1608X7R1H471K     |
| 3   | D1,<br>D2, D4 | SRGC10MH | Diode; 1000V; 1A                | 1206    | ZOWIE       | SRGC10MH           |
| 1   | D3            | STTH1R06 | Diode; 600V; 1A                 | DO-41   | ST          | STTH1R06           |
| 1   | L1            | 1mH      | Inductor; 17.4Ω;<br>100mA       | DIP     | Any         | CKL0410-102        |
| 1   | L2            | 1mH      | Inductor; 6Ω; 250mA             | DIP     | Wurth       | 7447462102         |
| 1   | R1            | 41.2K    | Film Resistor; 1%               | 0603    | Yageo       | RC0603FR-0741K2L   |
| 1   | R2            | 39.2K    | Film Resistor; 1%               | 0603    | Yageo       | RC0603FR-0739K2L   |
| 1   | R3            | 1.2K     | Film Resistor; 1%               | 0603    | Yageo       | RC0603FR-071K2L    |
| 1   | RF1           | 39       | Fuse Resistor; 5%; 1W           | DIP     | Yageo       | FKN1WSJT-50-39R    |
| 1   | U1            | MP171    | Buck Regulator                  | SOIC8   | MPS         | MP171GS            |

## **CIRCUIT DESCRIPTION**

The EV171-S-00A is configured in a buck topology to demonstrate the performance of MP171. MP171 is a primary side controller which provides accurate constant voltage. It simplifies the schematic and minimizes the BOM cost.

FR1 is used to protect circuit from component failure or some excessive short events; also it can restrain the inrush current.

C3, L1 and C4 compose CLC filter to meet the conducted EMI standard EN55022. C3 is also used for energy storage and protecting against line surge.

With FR1, C3 and C4 used, EV171-S-00A meets 2kV IEC61000-4-5 surge immunity standard.

C1 is the sample-hold capacitor used for reflecting output voltage. R1 and R2 are resistor divider for detecting output voltage by sampling voltage on C1.

D3 is the freewheeling diode. For universal voltage applications, use a diode with a 600V reverse block voltage. Fast recovery diode or ultra fast diode is recommended for better efficiency and reliable operation.

C5 is the output capacitors for 5V output. R3 is dummy load to lower the output voltage of 5V rail at no load condition.

## QUICK START GUIDE

1. Preset power supply to  $85\text{VAC} \leq V_{\text{IN}} \leq 265\text{VAC}$ .
2. Turn power supply off.
3. Connect the Line and Neutral terminals of the power supply output to L and N port.
4. Connect load positive and negative terminals to corresponding + and - outputs.
5. Turn power supply on after making connections.

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