



The Future of Analog IC Technology®

# EV26075EQ-00A

## Single-Cell 1A High Efficiency Cradle Charger Evaluation Board

### DESCRIPTION

The EV26075EQ-00A is an evaluation board for the MP26075, a linear, high performance, and high efficiency single cell Li-Ion or Li-polymer battery charger for AC adapter input in the plug-in, cradle charger applications.

For EV26075EQ-00A, the topology for AC-DC conversion is a flyback. HF0100 is the primacy side controller. MP26075 offers the feedback signal through a photo-coupler to control the flyback output voltage against the battery voltage to increases energy efficiency. For guaranteed safe operation, MP26075 controls power up sequencing. It ramps-up AC-Adapter firstly to limit inrush current when Adapter plug in.

The charging current of EV26075DQ-00A is set at 1A, which can be programmed by an external resistor (Rset).

### ELECTRICAL SPECIFICATION

| Parameter      | Symbol           | Value  | Units |
|----------------|------------------|--------|-------|
| Input Voltage  | AC IN            | 85~265 | V     |
| Charge Current | I <sub>CHG</sub> | 1      | A     |

### FEATURES

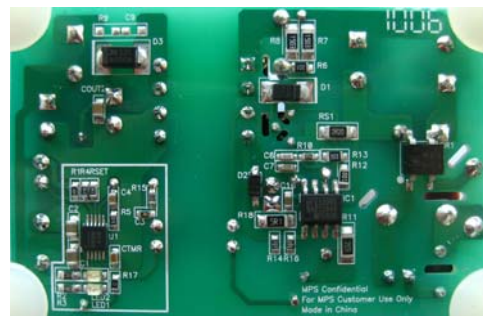
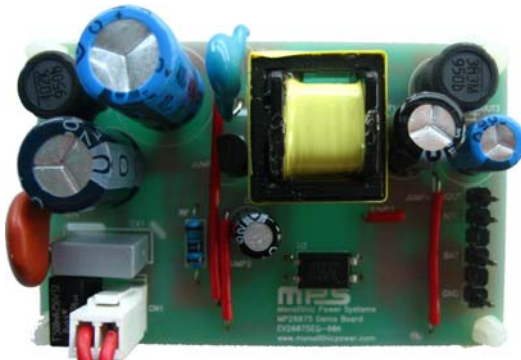
- Voltage control function for the fly-back controller
- High charge efficiency
- Low current pre-charge mode
- Controlled power-up sequencing
- Battery temperature monitoring
- Charge status indication
- Auto-Recharge
- Fault indications
- Internal timer
- Input/output OVP
- over temperature protection

### APPLICATIONS

- Cell Phones
- MP3 Players
- Smart Phones
- PDAs
- Digital Cameras

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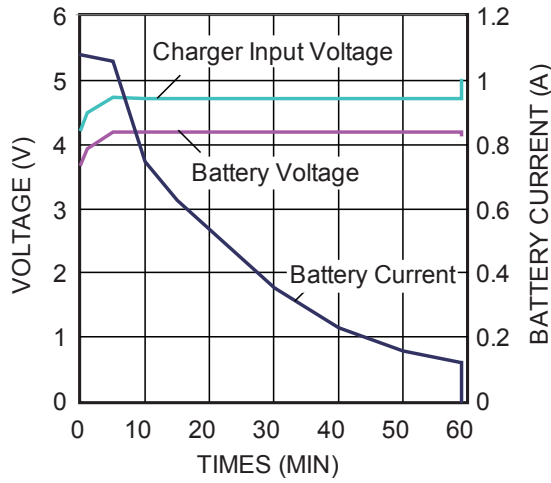
### EV26075EQ-00A EVALUATION BOARD



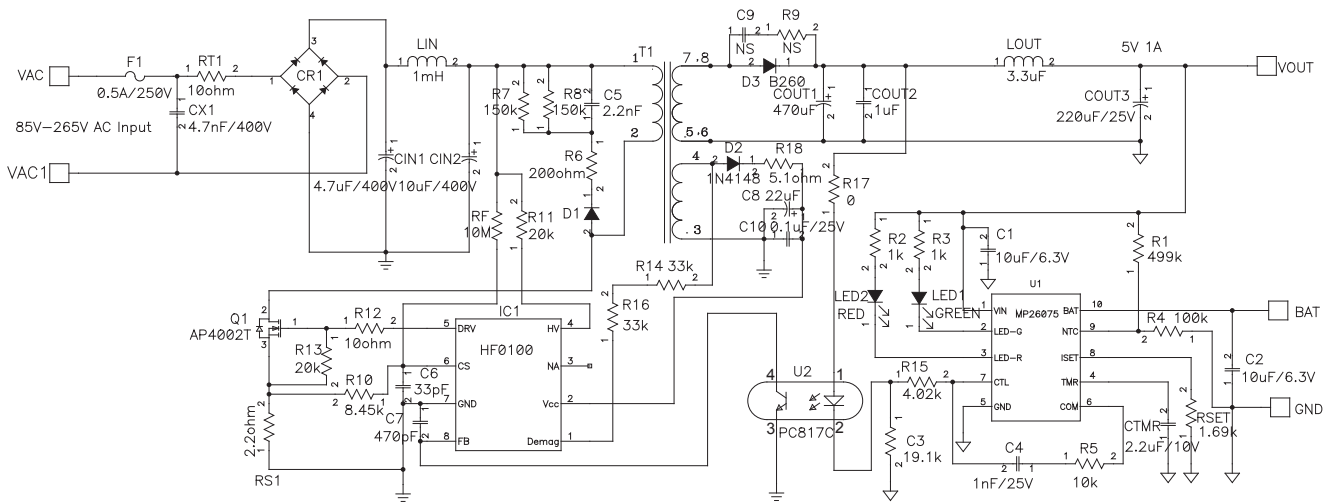
(L x W x H) 2.23" x 1.54" x 0.84"  
(5.66cm x 3.91cm x 2.13cm)

| Board Number  | MPS IC Number |
|---------------|---------------|
| EV26075EQ-00A | MP26075EQ     |

### Charge Curve



### EVALUATION BOARD SCHEMATIC



**EV26075DQ-00A BILL OF MATERIALS**

| Qty | Ref     | Value        | Description                               | Package | Manufacturer | Manufacturer P/N   |
|-----|---------|--------------|-------------------------------------------|---------|--------------|--------------------|
| 2   | C1, C2  | 10 $\mu$ F   | Ceramic Cap ,6.3V, X5R                    | 0805    | KYOCERA      | CM21X5R106K06AT    |
| 1   | C4      | 1nF          | Ceramic Cap ,50V, X7R                     | 0603    | Murata       | GRM188R71H102KA01D |
| 1   | C5      | 2.2nF        | 250V Film capacitor                       | DIP     | Murata       | DE1E3KX222MA4BL01  |
| 1   | C6      | 33pF         | Ceramic Cap, 50V, C0G                     | 0603    | Murata       | GRM1885C1H330JA01  |
| 1   | C7      | 470pF        | Ceramic Cap ,50V, X7R                     | 0603    | Murata       | GRM188R71H471KA01D |
| 1   | C8      | 22 $\mu$ F   | Electrolytic Cap ,22 $\mu$ F,50V          | DIP     | Jianghai(江海) | CD281L-50V22       |
| 1   | C9      | NS           |                                           |         |              |                    |
| 1   | C10     | 0.1 $\mu$ F  | Ceramic Cap, 50V, X7R                     | 0603    | Murata       | GRM188R71H104KA93D |
| 1   | CIN1    | 4.7 $\mu$ F  | 4.7 $\mu$ F 400V                          | DIP     | Jianghai(江海) | CD263-400V4.7      |
| 1   | CIN2    | 10 $\mu$ F   | 10 $\mu$ F 400V                           | DIP     | Jianghai(江海) | CD110-400V10       |
| 1   | COUT1   | 470 $\mu$ F  | Electrolytic Cap ,470 $\mu$ F,6.3V        | DIP     | Jianghai(江海) | CD287-6.3V470      |
| 1   | COUT2   | 1 $\mu$ F    | Ceramic Cap, 6.3V, X5R                    | 0805    | Murata       | GRM188R60J105KA0   |
| 1   | COUT3   | 220 $\mu$ F  | Electrolytic Cap ,220 $\mu$ F,10V         | DIP     | Jianghai(江海) | CD110-10V220       |
| 1   | CR1     | RH06         | Rectifier 0.5A. 600V peak reverse voltage | Minidip | DIODES       | RH06               |
| 1   | CTMR    | 2.2 $\mu$ F  | Ceramic Cap ,10V, X7R                     | 0603    | Murata       | GRM188R71A225KE1   |
| 1   | CX1     | 4.7nF        | Film capacitor                            | DIP     | Vishay       | BFC33820472        |
| 1   | C3      | 19.1k        | Film Res., 1%                             | 0603    | Yageo        | RC0603FR-0719K1L   |
| 1   | R1      | 499k         | Film Res., 1%                             | 0603    | Yageo        | RC0603FR-07499KL   |
| 2   | R2, R3  | 1k           | Film Res., 5%                             | 0805    | Yageo        | RC0805JR-071KL     |
| 1   | R4      | 100k         | Film Res., 1%                             | 0603    | Yageo        | RC0603FR-07100KL   |
| 1   | R5      | 10k          | Film Res., 1%                             | 0603    | Yageo        | RC0603FR-0710KL    |
| 1   | R6      | 200 $\Omega$ | Film Res., 5%                             | 0805    | Any          |                    |
| 2   | R7,R8   | 150k         | Film Res., 1%                             | 1206    | Panasonic    | ERJ8ENF1503V       |
| 1   | R9      | NS           |                                           |         |              |                    |
| 1   | R10     | 8.45k        | Film Res., 1%                             | 0603    | Yageo        | RC0603FR-078K45L   |
| 1   | R11     | 20k          | Film Res., 5%                             | 1206    | LIZ          | CR1206J40203G      |
| 1   | R12     | 10 $\Omega$  | Film Res., 5%                             | 0805    | LIZ          | CR05T05NJ10R       |
| 1   | R13     | 20k          | Film Res., 5%                             | 0805    | Yageo        | RC0805JR-0720KL    |
| 2   | R14,R16 | 33k          | Film Res., 1%                             | 0603    | Yageo        | RC0603FR-0733RL    |
| 1   | R15     | 4.02k        | Film Res., 1%                             | 0603    | Yageo        | RC0603FR-074K02L   |
| 1   | R17     | 0            | Film Res., 5%                             | 0603    | Any          |                    |
| 1   | R18     | 5.1 $\Omega$ | Film Res., 5%                             | 1206    | Yageo        | RC1206JR-075R1     |

**EV26075DQ-00A BILL OF MATERIALS (continued)**

| Qty | Ref  | Value        | Description                                                                                                    | Package          | Manufacturer       | Manufacturer P/N     |
|-----|------|--------------|----------------------------------------------------------------------------------------------------------------|------------------|--------------------|----------------------|
| 1   | RF   | 10M          | Film Res., 1%                                                                                                  | DIP              | Any                |                      |
| 1   | RS1  | 2.2Ω         | Film Res., 1%                                                                                                  | 1206             | Any                |                      |
| 1   | RSET | 1.69k        | Film Res., 1%                                                                                                  | 0603             | Yageo              | RC0603FR-071K69L     |
| 1   | RT1  | 10Ω          | Res., 15%                                                                                                      | DIP              | Murata             | NTPAA100LDNBO        |
| 1   | D1   | RS1J         | 600V,1A                                                                                                        | SMA              | DIODES             | RS1J                 |
| 1   | D2   | 1N4148       | 0.15A,75V                                                                                                      | SOD-123          | DIODES             | 1N4148               |
| 1   | D3   | B260A        | 2A,60V                                                                                                         | SMA              | DIODES             | B260A                |
| 1   | F1   | 0.5A         | SS-5-500mA,<br>0.5A fuse,250VAC                                                                                | DIP              | COOPER<br>BUSSMANN | SS-5-500mA           |
| 1   | LED1 | LED<br>GREEN | LED GREEN                                                                                                      | 0805             | BRTLED             | BL-HGB35A-TRB        |
| 1   | LED2 | LED RED      | LED RED                                                                                                        | 0805             | BRTLED             | BL-HUF35A-TRB        |
| 1   | LIN  | 1mH          | Filter inductor.<br>1000μH,max<br>current:0.16A,<br>2.96Ω DCR                                                  | DIP              | TOKO               | 8RHB2#822LY-102K     |
| 1   | LOUT | 3.3μH        | Filter inductor.3.3uH,<br>max dc current:2.66A,<br>0.025Ω DCR                                                  | DIP              | TOKO               | 8RHB2#822LY-<br>3R3M |
| 1   | Q1   | AP4002T      | 600V,0.4A,Rds-on:5Ω                                                                                            | TO-92            | Apec               | AP4002T              |
| 1   | T1   | EE16         | Lp:1.755mH,<br>Np:117turns(1 strand,<br>0.18mm), Ns:9turns(3<br>strand,0.3mm),<br>Naux:20(1 strand,<br>0.18mm) | EE16<br>(8 pins) |                    |                      |
| 1   | IC1  | HF0100HS     | QR controller                                                                                                  | SOIC8            | MPS                | HF0100HS             |
| 1   | U1   | MP26075      | Cradle charger                                                                                                 | QFN10            | MPS                | MP26075EQ            |
| 1   | U2   | PC817C       | Photo coupler                                                                                                  | DIP              | Sharp              | PC817C               |

### PRINTED CIRCUIT BOARD LAYOUT

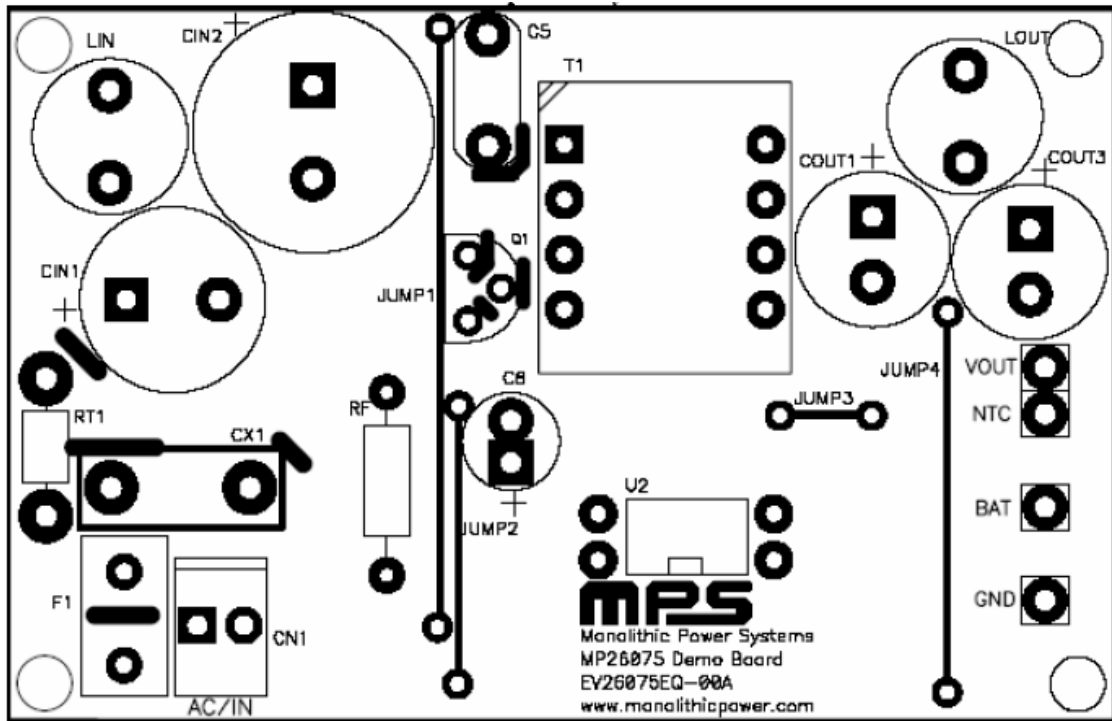
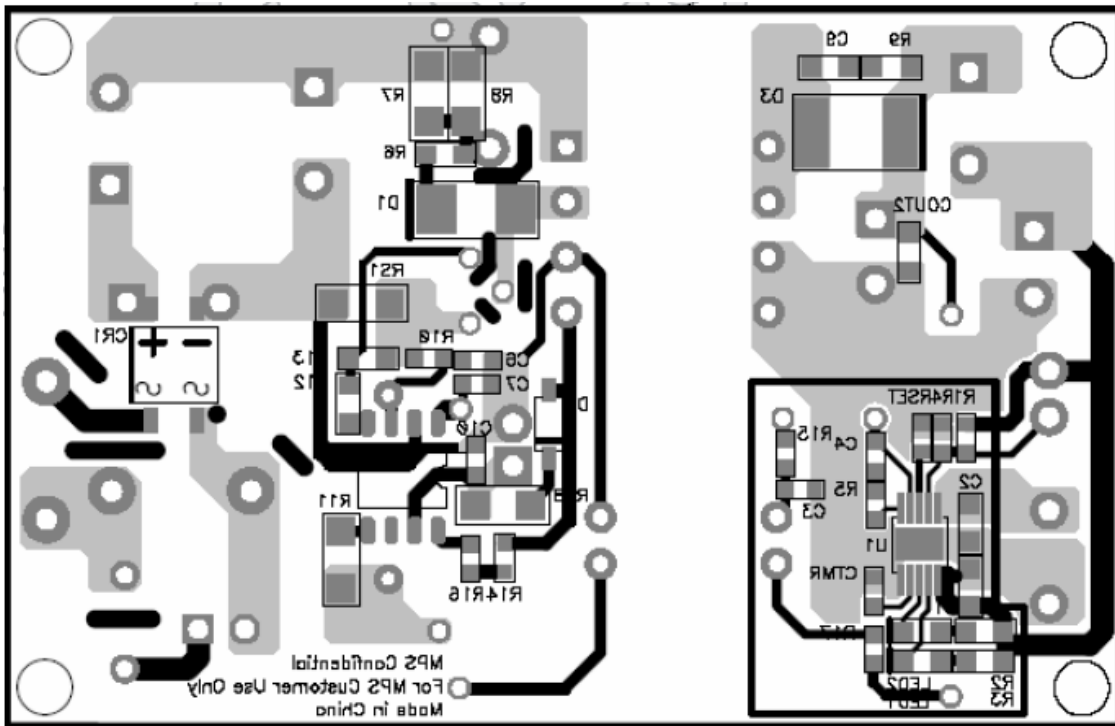


Figure 1—Top Silk



**QUICK START GUIDE**

1. Connect the positive terminal of the battery to BAT pin, and connect the negative terminal of the battery to GND pin.
2. Connect the AC Line terminals to CN1 port.
3. Turn the power supply on. The board will automatically startup.
4. The output voltage on this board is preset to 4.2V (for a single cell battery). The board layout accommodates most commonly used capacitors.
5. LEDs indicate the charge status and fault condition.

| LED-Red | LED-Green | Status        |
|---------|-----------|---------------|
| Off     | Off       | Fault/toggle  |
| On      | Off       | Normal charge |
| Off     | On        | End of charge |

6. The charging Current is set at 1A, it can be programmed by RSET.

$$I_{CHG} = \frac{1.23}{RSET(k)} \times 1400(mA)$$

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