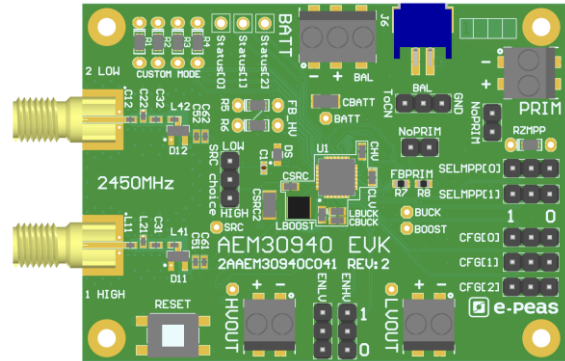


# AEM30940 RF 2.45 GHz Quick Start Guide EVK



## FEATURES

### Connectors

- 1 SMA connector for input power below -10dBm [LOW]
- 1 SMA connector for input power above -10dBm [HIGH]
- 1 screw connector + 1 JST connector for the Storage Element
- 1 screw connector for Primary Battery
- 1 screw connector for HVOUT LDO output (80mA @ 1.8 – 4.2 V)
- 1 screw connector for LVOU LDO output (20mA @ 1.2 or 1.8 V)

### Configuration

- 2 jumpers SELMMP[x] to define the MPPT ratio linked to the harvester technology
- 3 Jumpers CFG[x] to define the storage element protection levels
- 6 resistors footprint related to the custom mode (CFG[2:0]=000)
- 2 jumpers to enable/disable the internal LDOs
- 2 jumpers to define the primary battery minimum level
- 1 jumper to set the dual cell supercapacitor BAL feature
- 1 resistors footprint to use the ZMPP feature (constant impedance)

### Size

- 79mm x 49mm
- 4 x M2.5 Mounting holes

## SUPPORT PCB

### BOM around the AEM30940

| Designator | Description                                  | Quantity | Manufacturer | Part Number  |
|------------|--|----------|--------------|--|
| CBOOST     | Ceramic Cap 22 $\mu$ F, 10 V, 20%, X5R 0603  | 1        | Murata       | GRM188R61A226ME15D   |
| CBUCK      | Ceramic Cap 10 $\mu$ F, 10 V, 20%, X5R       | 1        | TDK          | C1608X5R1A106M080AC  |
| CHV        | Ceramic Cap 10 $\mu$ F, 10 V, 20%, X5R       | 1        | TDK          | C1608X5R1A106M080AC  |
| CLV        | Ceramic Cap 10 $\mu$ F, 10 V, 20%, X5R       | 1        | TDK          | C1608X5R1A106M080AC  |
| CSRC       | Ceramic Cap 10 $\mu$ F, 10 V, 20%, X5R       | 1        | TDK          | C1608X5R1A106M080AC  |
| LBOOST     | Power Inductor 10 $\mu$ H - 0.54 A - LPS4012 | 1        | Coilcraft    | LPS4012-103MR  |
|            | Power Inductor 10 $\mu$ H - 0.8 A - 3015     | 1        | Würth        | 744 040 321 00   |
| LBUCK      | Power Inductor 10 $\mu$ H - 0.25 A           | 1        | TDK          | MLZ1608M100WT  |
| U1         | AEM30940 - Symbol QFN28                      | 1        |              | order at <a href="mailto:sales@e-peas.com">sales@e-peas.com</a><br>or <a href="#">Where to buy</a> |

Matching network and RF rectifier schematic under NDA signature

Footprint & Symbol: Available on the [web product page](#)



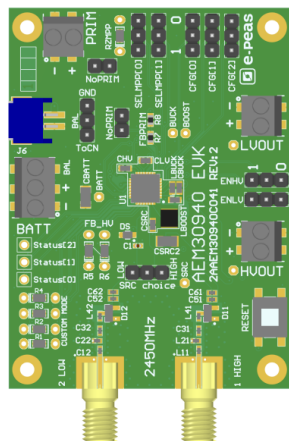


## STEP 1: AEM30940 Configuration

| SELMPP[1] | SELMPP[0] | Vmpp/Voc |
|-----------|-----------|----------|
| 0         | 0         | 50 %     |
| 0         | 1         | 65 %     |
| 1         | 0         | 80 %     |
| 1         | 1         | ZMPP     |

- **MPPT ratio:** SELMPP0 – SELMPP1
- **Storage Element voltages protection:** CFG2 – CFG1 – CFG0

| Configuration pins |        |        | Storage element threshold voltages          |        |        | LDOs output voltages |       | Typical use                |  |
|--------------------|--------|--------|---|--------|--------|----------------------|-------|----------------------------|--|
| CFG[2]             | CFG[1] | CFG[0] | Vovch                                       | Vchrdy | Vovdis | Vhv                  | Vlv   |                            |  |
| 1                  | 1      | 1      | 4.12 V                                      | 3.67 V | 3.60 V | 3.3 V                | 1.8 V | Li-ion battery             |  |
| 1                  | 1      | 0      | 4.12 V                                      | 4.04 V | 3.60 V | 3.3 V                | 1.8 V | Solid state battery        |  |
| 1                  | 0      | 1      | 4.12 V                                      | 3.67 V | 3.01 V | 2.5 V                | 1.8 V | Li-ion/NiMH battery        |  |
| 1                  | 0      | 0      | 2.70 V                                      | 2.30 V | 2.20 V | 1.8 V                | 1.2 V | Single-cell supercapacitor |  |
| 0                  | 1      | 1      | 4.50 V                                      | 3.67 V | 2.80 V | 2.5 V                | 1.8 V | Dual-cell supercapacitor   |  |
| 0                  | 1      | 0      | 4.50 V                                      | 3.92 V | 3.60 V | 3.3 V                | 1.8 V | Dual-cell supercapacitor   |  |
| 0                  | 0      | 1      | 3.63 V                                      | 3.10 V | 2.80 V | 2.5 V                | 1.8 V | LiFePO4 battery            |  |
| 0                  | 0      | 0      | Custom mode - Programmable through R1 to R6 |        |        |                      |       | 1.8 V                      |  |



- **BAL option:** Select “ToCn” for dual-cells supercapacitor and “GND” for any other storage
- **PRIM option:** Connect both jumpers “NoPRIM” or remove them if a primary battery is connected. Define the lower limit voltage on the primary battery using R7 and R8:
  - $100\text{ k}\Omega \leq R_P \leq 500\text{ k}\Omega$
  - $R7 = \left( \frac{V_{prim\_min}}{4} * R_P \right) / 2.2\text{ V}$
  - $R9 = R_P - R7$

### ZMPP resistor footprint

- **LDOs Outputs Voltages:** ENHV (HVOUT) – ENLV (LVOUT)

| ENLV | ENHV | LV output | HV output |
|------|------|-----------|-----------|
| 1    | 1    | Enabled   | Enabled   |
| 1    | 0    | Enabled   | Disabled  |
| 0    | 1    | Disabled  | Enabled   |
| 0    | 0    | Disabled  | Disabled  |

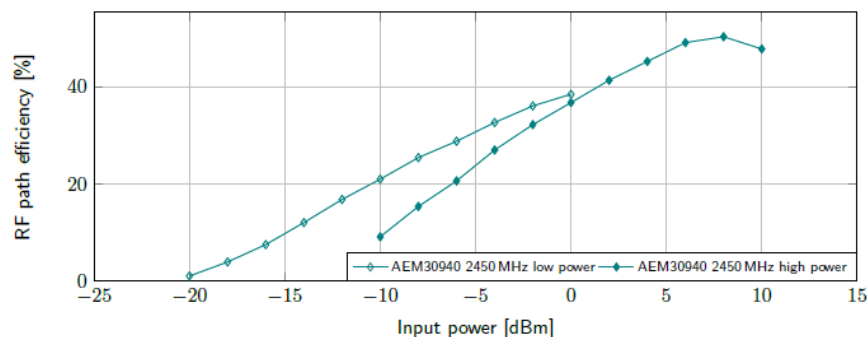
- **MATCHING NETWORK + RF RECTIFIER:** one matching for LOW input power (< -10 dBm) and another matching for HIGH input power (< +20 dBm)

## STEP 2: Connect the Storage Element (and the Primary Battery)

## STEP 3: Connect the Load(s) to HVOUT / LVOUT

## STEP 4: Connect the antenna to the SMA connector

- **Overall efficiency from the antenna to the storage element:**



## STEP 5: Check the Status

| Status pins |    |  |
|-------------|----|--|
| STATUS[2]   | 19 | Logic output. Asserted when the AEM performs a MPP evaluation.   |
| STATUS[1]   | 20 | Logic output. Asserted if the battery voltage falls below <b>Vovdis</b> or if the AEM is taking energy from the primary battery. |
| STATUS[0]   | 21 | Logic output. Asserted when the LDOs can be enabled.   |

