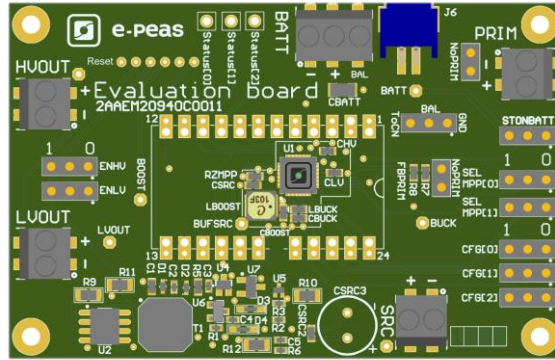


# AEM20940

## Quick Start Guide EVK



### FEATURES

#### Connectors

- 1 screw connector for Thermo-Electric Generator
- 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
- 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 AEM20940

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 47 $\mu$ F, 6.3 V, 20%, X5R	1	Murata	GRM188R60J476ME15D
LBOOST	Power Inductor 10 $\mu$ H - 0.54 A - LPD5030V	1	Coilcraft	LPD5030V-103MR
LBUCK	Power Inductor 10 $\mu$ H - 0.55 A - LPS4012	1	Würth	744 040 321 00
U1	AEM20940 - Symbol QFN28	1	TDK	MLZ1608M100WT
	External cold-start circuit <sup>1</sup>	1		order at <a href="mailto:sales@e-peas.com">sales@e-peas.com</a> or <a href="#">Where to buy</a> more details at <a href="mailto:support@e-peas.com">support@e-peas.com</a>

\*<sup>1</sup> Patented circuit

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





## STEP 1: AEM20940 Configuration



- **MPPT ratio:** SELMPP[0] – SELMPP[1]

SELMPP[1]	SELMPP[0]	Vmpp/Voc
0	0	50 %
0	1	55 %
1	0	75 %
1	1	ZMPP

- **Storage Element voltages protection:** CFG[2] – CFG[1] – CFG[0]

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 (2.2V by default with the jumper and OR R7 mounted)

- $100 \text{ k}\Omega \leq R_P \leq 500 \text{ k}\Omega$

- $R7 = \left( \frac{V_{prim\_min}}{4} * R_P \right) / 2.2 \text{ V}$

- $R9 = R_P - R7$

- **ZMPP resistors 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

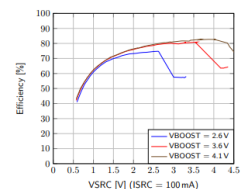
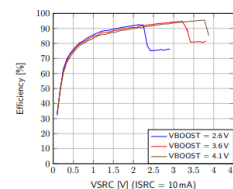
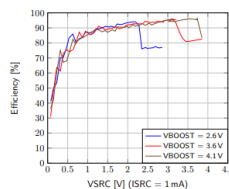
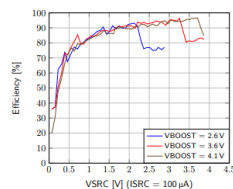
- **External coldstart circuit to enable coldstart at 60mV – 150 μV**

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

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

## STEP 4: Connect the Thermo-Electric Generator

- **Internal Boost efficiency Vs. input voltage:**



## 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 Vovdis or if the AEM is taking energy from the primary battery.
STATUS[0]	21	Logic output. Asserted when the LDOs can be enabled.

