energous

Wireless Energy Harvesting Evaluation Kit

QUICK START GUIDE

e-peas
semiconductors

This guide helps users to setup and operate the Wireless Energy Harvesting Evaluation Kit, which demonstrates the Energous® wireless energy harvesting system.

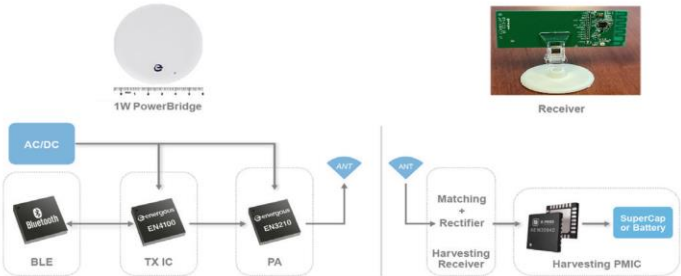

Figure 1: System Diagram

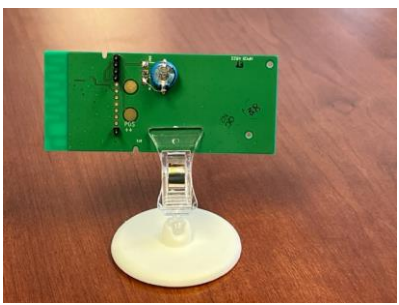

Figure 1a: Energous Harvesting Board (Single Board Solution e-Peas + Meander Line Ant)

Box Contents

- 1W PowerBridge Transmitter with mounting plate (1)
- EN Harv_Mod (AEM30940 Evaluation Board with stand) (1)
- Mounted 100K ohm resistor, 10 mF SuperCap
- 5V/1A USB power adapter and USB-A to USB-C cable

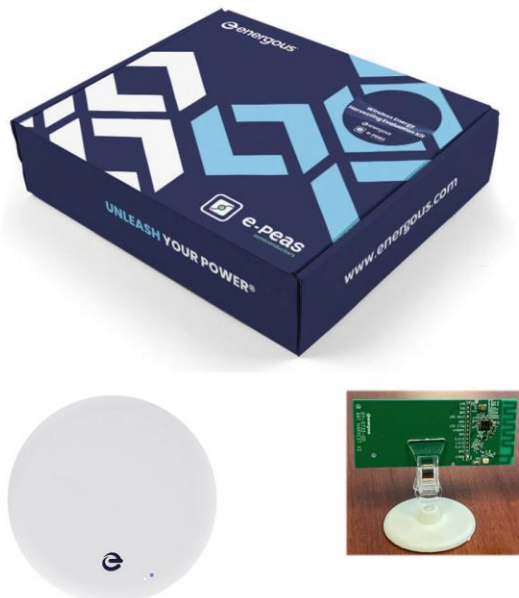

Figure 2: EVK Box and Contents

1. Setup the PowerBridge

- Connect the USB cable to the PowerBridge Transmitter and the power supply.
- Mount the PowerBridge on a stand, a wall, or a ceiling using the keyhole screw mounts or with the included optional mounting plate. Position it in such a way that it points towards the intended area of operation.

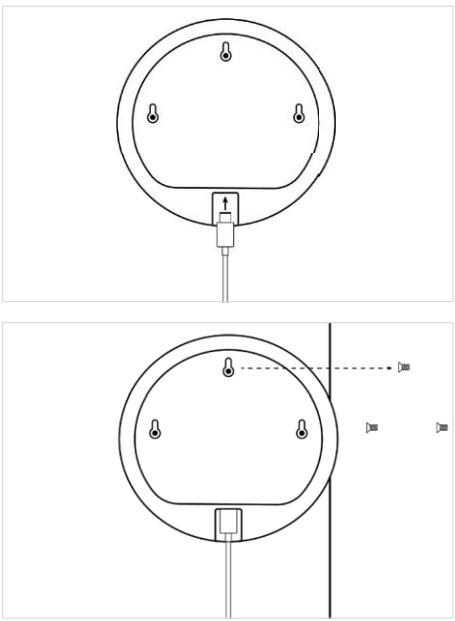

Figure 3: Mounting Diagram

Setup the PowerBridge Cont'd.

- Plug in the PowerBridge Transmitter power supply.
- After power-on, the blue LED flashes for 30 seconds to indicate that the PowerBridge is running.
- The PowerBridge starts RF power transmission automatically in 918 MHz and the white LED turns on solid.

Figure 4: PowerBridge Front

2. The Rx Setup

- AEM30940 defaults: SELMPP = 00, CFG = 101, and Low RF Path.
- Do not place the Rx right next to the Tx, as this can cause potentially damaging high input power.
- 100K ohm resistor to the HVOUT terminals is connected. This causes a 25 µA current draw when HVOUT LDO is enabled, emulating an IoT sensor in operation.
- The 10 mF SuperCap storage element is connected.

Figure 5: Rx Setup

- Position the Rx board 1.5m to 2m from the PowerBridge.
- The SuperCap is now charging. Use a DMM to monitor the voltage across the SuperCap (headers are marked)
- When the SuperCap voltage reaches 3.7V, the HVOUT and LVOUT LDO are enabled, and can be monitored with a DMM (headers are marked).

3. Performance Summary

The Tx is configured with a circular polarized antenna that has a ±35˚ beam width and transmits at 918 MHz.

- The Rx is setup with the 10 mF SuperCap and 100K ohm resistor load, which mimics a BLE IoT sensor.
- When the voltage on the SuperCap reaches 3.7V the AEM30940 LDOs enable and a current draw of 25 µA occurs through the resistor.

1. If the Rx is ≤ 2m away from the PowerBridge, it should stay in **continuous (net positive)** operation.
2. HVOUT will remain at in at 2.5V and the SuperCap voltage will charge up to 4.1V or stay close to 3.7V if the distance can harvest enough power to compensate for the 25 µA load.
3. Moving the Rx setup >2m away from the PowerBridge Tx puts the Rx into Duty Cycle Operation, where the SuperCap eventually discharges to 3V, the AEM30940 disables the LDOs, and the SuperCap again charges up to 3.7V. At 3.7V the AEM30940 re-enables LDOs.

Figure 6: System Test Setup

4. Additional Information

- Scan the QR codes below for more information on this kit

Figure 7: AEM30940 Web Page

Figure 8: EVK User Guide

Figure 9: AEM30940 Datasheet

Figure 10: EP112 Datasheet

FCC Regulatory Information

FCC ID: 2ADNG-VN25 Model: VN25

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1) This device may not cause harmful interference; and
2) This device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy; and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the equipment being interfered with.
- Increase the separation between the charger and the equipment subject to interference.
- Connect the equipment into an outlet on a circuit different from that to which the charger is connected.
- Consult the dealer or an experienced radio/TV/electronics technician for help.

CAUTION: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Regulatory Information Cont'd.

VN25 RF wireless charger complies with FCC RF radiation exposure limits for an uncontrolled environment in accordance with FCC Rule Part 2.1093. The Wireless charger transmitter is designed to be installed on the ceiling or on a side wall and must be installed accordingly to ensure a minimum 20 cm separation distance from persons.

IC: 23686-VN25, Model: VN25

This device complies with Industry Canada's licence-exempt RSSs. Operation is subject to the following two conditions:

1) This device may not cause interference; and
2) This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1) l'appareil ne doit pas produire de brouillage;
2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

VN25 RF wireless charger complies with ISED radiation exposure limits. The Wireless charger transmitter is designed to be installed on the ceiling or on a side wall and must be installed accordingly to ensure a minimum 22 cm separation distance from persons.

Le chargeur sans fil RF VN25 est conforme aux limites d'exposition aux rayonnements ISED. L'émetteur du chargeur sans fil est conçu pour être installé au plafond ou sur un mur latéral et doit être installé en conséquence pour assurer une distance de séparation minimale de 22 cm des personnes.

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