energous

Wireless Energy Harvesting Evaluation Kit

QUICK START GUIDE

e-peas
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Quick Start Guide

This guide will help you to setup and operate your EVK, demonstrating the capabilities of wireless energy harvesting.

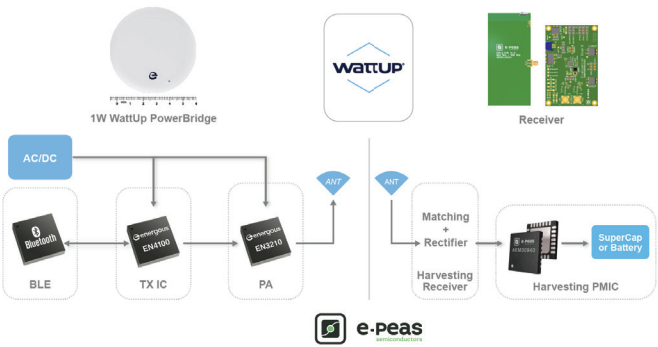

Figure 1: System Diagram

Box Contents

- 1W WattUp PowerBridge Transmitter w/ mounting plate (1)
- AEM30940 Evaluation Board (1)
- EP112 Antenna Evaluation Board (1)
- SMA to SMA adapter, 100K ohm resistor, 10mF supercap
- 5V/1A USB power adapter and USB-A to -C cable

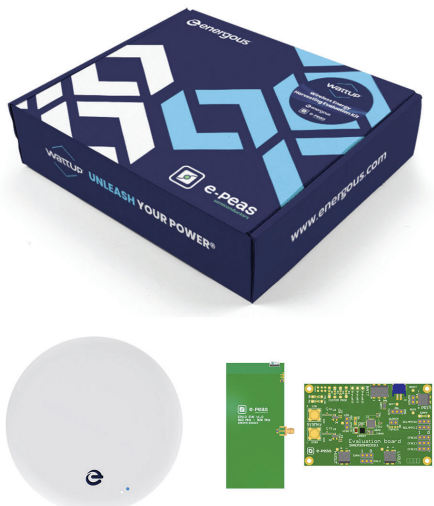

Figure 2: EVK Box and Contents

1. Setup the Powerbridge

- Connect the USB cable to the PowerBridge Transmitter and the power supply.
- Mount the WattUp PowerBridge to a stand, a wall, or ceiling using the keyhole screw mounts or with included optional mounting plate in a position pointing towards the intended area of operation.

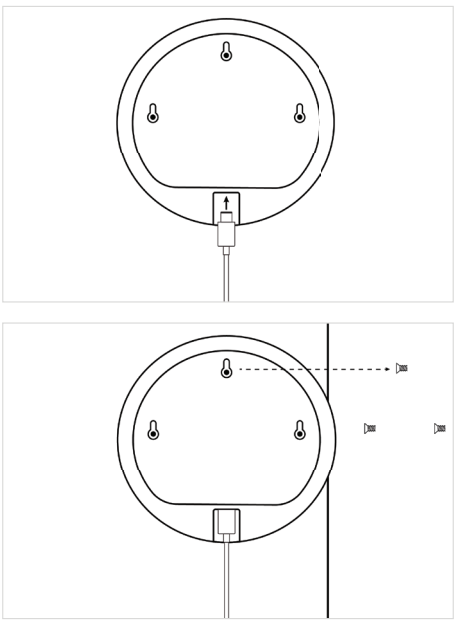

Figure 3: Mounting Diagram

Setup the Powerbridge Cont'd.

- Plug in the WattUp PowerBridge power supply.
- After power-on, the Blue LED flashes for 30s to indicate that the WattUp PowerBridge is running.
- The WattUp PowerBridge starts RF power transmission automatically at 918MHz and the white LED will turn on solid.

Figure 4: Wattup PowerBridge Front

2. The Rx Setup

- AEM30940 jumper defaults: SELMPP: 00, CFG: 101 and RF Path: Low (Be sure not to assemble the Rx right next to the Tx as it could get a very high input signal)
- Connect the 100K ohm resistor to the HVOUT terminals. This will cause a 25uA current draw once HVOUT LDO is enabled emulating an IoT sensor in operation.
- Connect the 10mF supercap to the secondary storage element terminal.
- Connect the EP112 Ant board to J2 of AEM30940 eval board with supplied SMA thru connector.

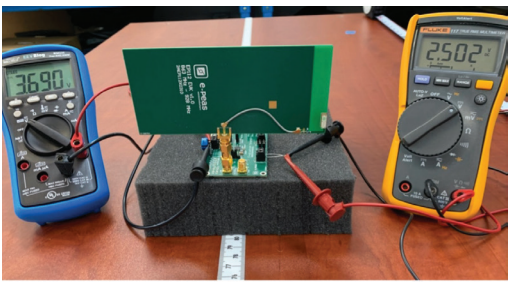

Figure 5: Rx Setup

- Position the boards 1.5m-2m in front of the PowerBridge.
- The supercap is now getting charged, use DMM to monitor voltage across the supercap terminals.
- Once the supercap voltage reaches 3.7V, the HVOUT and LVOUT LDOs will be enabled and can be monitored with DMM.

3. Performance Summary

The Tx is configured with a circular polarized antenna that has a ±35˚ beam width and will transmit at 918MHz. The Rx is setup with the 100K ohm resistor load and 10mF supercap which mimics a BLE IoT sensor. Once the voltage on the supercap reaches 3.7V, the AEM30940 LDOs are enabled and a current draw of 25uA will happen across the resistor.

If the Rx is ≤2m away from the PowerBridge, it should stay in continuous operation where you should see constant 2.5V out of HVOUT and the supercap voltage will charge up to 4.1V or stay close to the 3.7V level if you are at a range where you are harvesting just enough power to compensate for the 25uA load.

Figure 6: System Test Setup

Moving the Rx setup >2m away from the PowerBridge will put the Rx into duty cycle operation. Meaning, the supercap will eventually discharge to 3V disabling the AEM30940 LDOs and allowing the supercap to charge up to 3.7V again to re-enable the AEM30940 LDOs.

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 20cm 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 22cm 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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