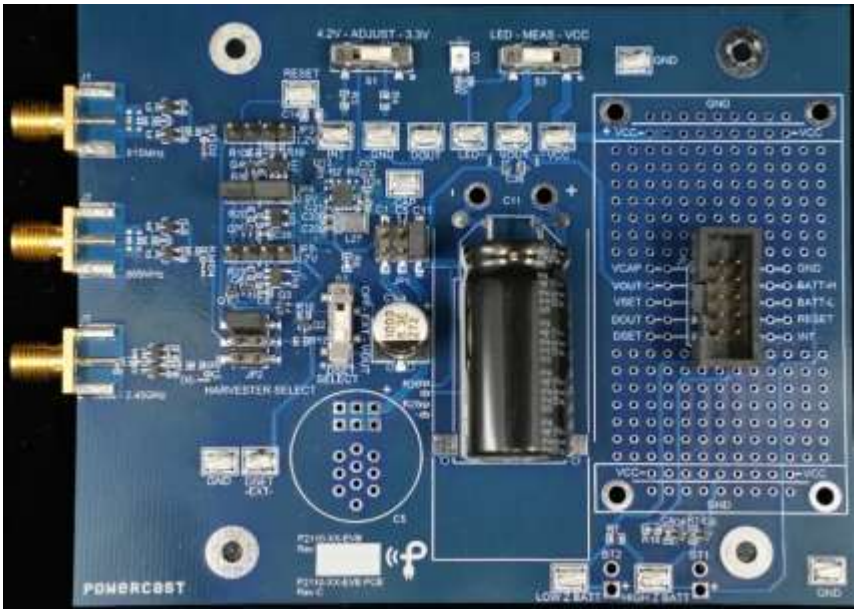
P2110-XX-EVB

Evaluation Board for PCC110 Powerharvester®

DESCRIPTION

The P2110-XX-EVB features the Powercast PCC110 Powerharvester® with support for three frequency bands to test. The EVB converts radio frequency (RF) energy into DC power and stores it in a capacitor to provide an intermittent, regulated voltage output.

The three frequency bands supported by this EVB are 915MHz, 868MHz, and 2.45GHz.



ORDERING INFORMATION AND ITEMS INCLUDED

The Evaluation Board (EVB) is orderable under part number P2110-XX-EVB.
The EVB requires a user-provided antenna. Powercast offers several options for the antennas:

Powercast Antenna Part Number	Frequency Band	Antenna Type
PA-915-01	915MHz	Patch
DA-915-01	915MHz	Dipole
PA-868-01	868MHz	Patch
DA-868-01	868MHz	Dipole
PA-2450-RM-01	2.45GHz	Patch
DA-2450-RM-01	2.45GHz	Dipole

© 2025 Powercast Corporation, All rights reserved.
+1 (412) 455-5800
www.powercastco.com / contact@powercastco.com

This EVB along with a user provided antenna needs to receive power from an RF source with sufficient transmit power. Test equipment, such as RF signal generators, can also be used to test any of the three frequency bands.

A DC block must be added if the antenna or test equipment being connected to the EVB is a DC short.

ABSOLUTE MAXIMUM RATINGS

T_A = 25°C, unless otherwise noted.

Parameter	Rating	Unit
RF Input Power	20	dBm
RF DC Voltage to GND	0	V
CAP	2.25	V
VOUT	5.5	V
VOUT Current	200	mA
DSET EXT	6	V
RESET	6	V
Operating Temperature Range	-40 to +85	°C
Storage Temperature Range	-40 to +100	°C

Exceeding the absolute maximum ratings may cause permanent damage to the device.

ESD CAUTION

This is an ESD (electrostatic discharge) sensitive device. Proper ESD precautions should be taken to avoid degradation or damage to the component.

© 2025 Powercast Corporation, All rights reserved.

FUNCTIONAL DESCRIPTION

POWER HARVESTING

The P2110-XX-EVB has 3 SMA input connectors to harvest from 3 different frequency bands. An antenna or conducted RF input signal can be connected to any of these 3 frequency bands. The maximum RF input signal is 20dBm. If the antenna or RF input is a DC short, a DC block must also be used. The JP2 HARVESTER SELECT jumper must be jumpered to match the RF input being used (JP2 top row 1 = J1 RF input, JP2 middle row 2 = J2 RF input, JP2 bottom row 3 = J3 RF input). JP2 connects the harvested RF input signal to the rest of the EVB. After JP2 the harvested signal will charge a storage capacitor. The storage capacitor being charged can be selected via the JP1 jumper and the voltage across the storage capacitor can be monitored via the CAP test point. Once the storage capacitor reaches a certain voltage threshold, the boost converter on the EVB will be enabled. The voltage threshold on the capacitor at which the boost converter is enabled can be adjusted via the JP3, JP4, and JP5 jumpers (note 2 jumpers must be used for each of the JP3, JP4 and JP5 locations). The boost converter enable can be monitored via the INT test point. Once the boost converter is enabled it will output a regulated voltage. This boost converter regulated output voltage can be adjusted via the S1 switch and can be monitored via the VOUT test point. When the voltage on the storage capacitor falls below a certain threshold the boost converter will automatically be disabled.

ADDITIONAL FEATURES

The boost converter regulated output voltage can be routed to an LED or to different test points via the S3 switch.

The harvested RF input signal can be routed to a 287ohm load resistor via the S2 switch. This allows the user to measure a relative DC value for received signal strength and interpret data if the RF input signal is on-off-keying for communications.

The table below describes the RF inputs, switches, jumpers, and test points:

Function	Description
RF input to harvest and charge the storage capacitor	**Selectable via JP2 jumper:** • J1 – 915MHz center frequency • J2 – 868MHz center frequency • J3 – 2.45GHz center frequency

© 2025 Powercast Corporation, All rights reserved.

Storage Capacitor being charged for the boost converter input	**Selectable via JP1 jumper:** • C1 – 1000uF • C5 – Can be added by the user • C11 – 15mF
Storage capacitor charge voltage threshold to enable the boost converter	**Selectable via JP3, 4, and 5 jumpers:** • JP3 – 1.2V (best RF to DC efficiency) • JP4 – 0.9V • JP5 – 0.7V (best RF input sensitivity)
Boost converter regulated output voltage	**Selectable via S1 switch:** • 4.2V – Boost output voltage of 4.2V • ADJUST – Adjustable output via R4 added by the user $V_{OUT} = \frac{500000}{R_4} + 3.309$ • 3.3V – Boost output voltage of 3.3V
Boost converter output load	**Selectable via S3 switch, it will adjust where the boost output VOUT is connected:** • LED – Connects the boost output to LED D3 • VCC – Connects the boost output to the VCC, LOW Z BATT, and HIGH Z BATT test points • MEAS – allows the user to put a current sense in series between VOUT and VCC test points. Note that in this configuration VOUT is disconnected from VCC and as a result to measure the current, a series current sense can be placed between the VOUT and VCC test points.
Data output	**Selectable via S2 switch:** • OFF – Harvested RF input signal charges the storage capacitor like normal • EXT – Harvested RF input signal is connected to a 287ohm resistive load when the user drives the DSET EXT signal to 3V (can be used to measure relative received signal strength or on-off-keying communication data from the RF input by monitoring the DOUT test point). Note that in this configuration the storage capacitors are disconnected from the harvested RF input and as a result there will be no boost output. • VOUT - Harvested RF input signal is connected to a 287ohm resistive load when the boost converter output is enabled (can be used to measure relative received signal strength or on-off-keying

© 2025 Powercast Corporation, All rights reserved.

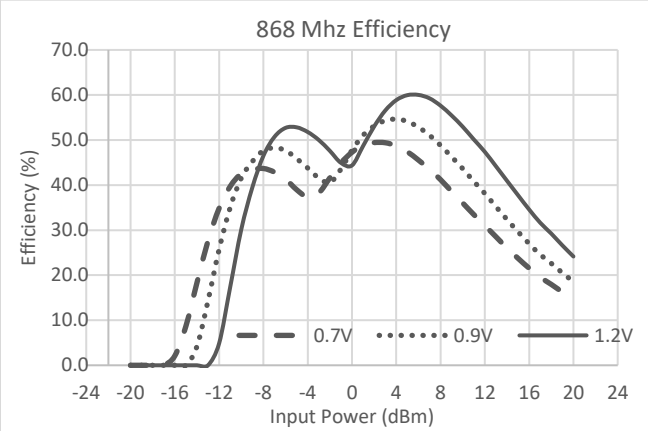
	communication data from the RF input by monitoring the DOUT test point). Note that in this configuration the storage capacitor will be charged by the harvested RF input while the boost converter output is not enabled, however while the boost converter output is enabled the storage capacitors are disconnected from the harvested RF input.
Test points	• GND – ground • CAP – voltage on the capacitor being charged by the harvested RF input • INT – boost converter enabled • VOUT – boost converter regulated output voltage • LED – voltage across the LED, which is the boost converter output voltage when S3 is set to LED • VCC – boost converter output voltage when S3 is set to VCC • HIGH Z BATT – boost converter output voltage when S3 is set to VCC and when INT is enabling the boost converter • LOW Z BATT – same as HIGH Z BATT but through a series 49.9ohm resistor to limit the current (can be used for battery charging- every time the boost converter is enabled it will charge the battery with the charge current being limited by the 49.9ohm resistor) • DSET EXT – External 3V signal from the user to route the harvested DC input signal through a 287ohm load resistor to measure DOUT • DOUT – Harvested DC input signal across a 287ohm load resistor when DSET is enabled (can be used to measure relative received signal strength or on-off-keying communication data from the RF input) • RESET - External signal from the user to override the boost enable signal and disable the boost
Prototype area	J7 and various test pads for prototyping

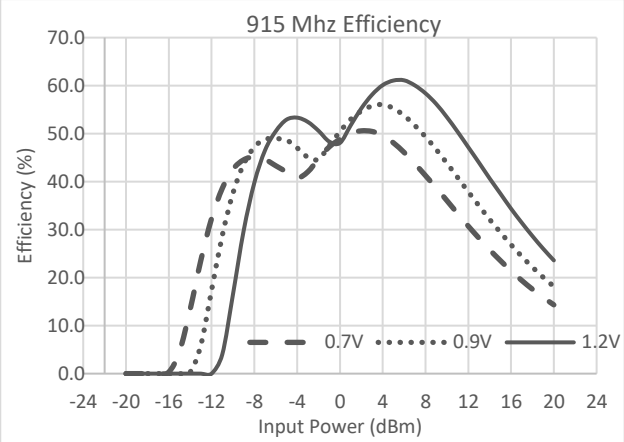
© 2025 Powercast Corporation, All rights reserved.

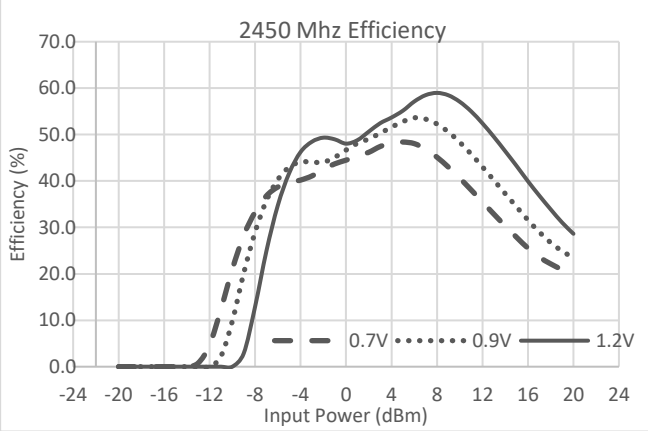
TYPICAL PERFORMANCE GRAPHS

T_A = 25°C, unless otherwise noted

Typical RF to DC conversion efficiency of the EVB for each of the three frequency bands at each of the three storage capacitor DC voltage thresholds

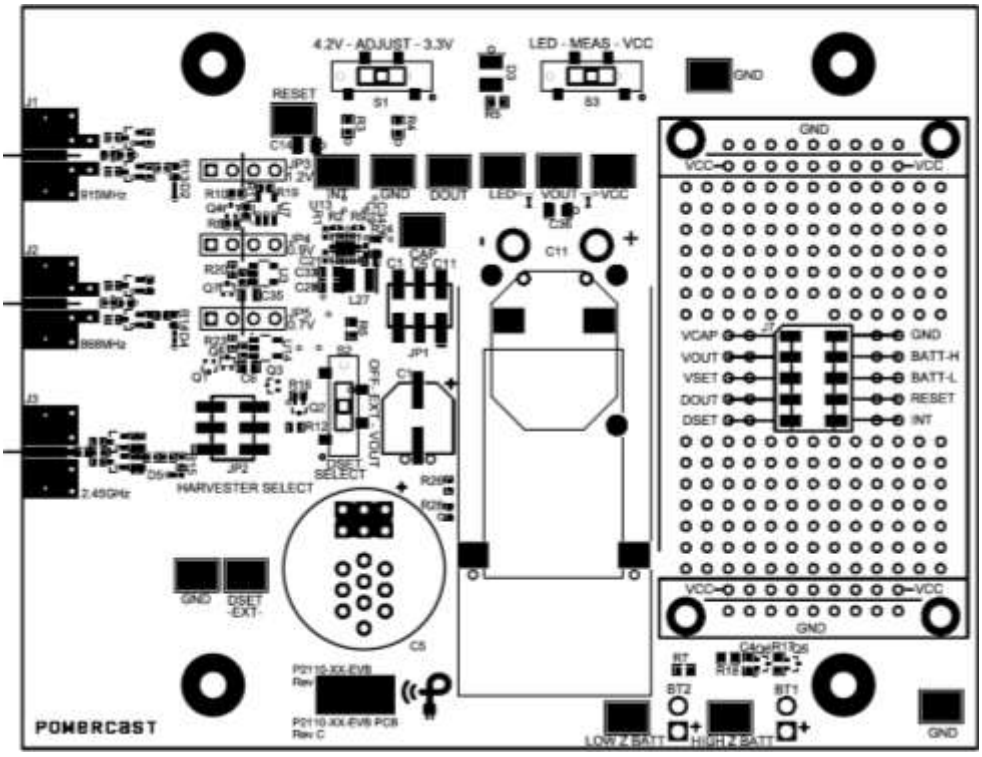






© 2025 Powercast Corporation, All rights reserved.

EVALUATION BOARD LAYOUT



© 2025 Powercast Corporation, All rights reserved.

IMPORTANT NOTICES

Information furnished by Powercast Corporation (Powercast) is believed to be accurate and reliable. However, no responsibility is assumed by Powercast for its use, nor for any infringements of patents or other rights of third parties that may result from its use. Specifications are subject to change without notice.

No license is granted by implication or otherwise under any patent or patent rights of Powercast. Trademarks and registered trademarks are the property of their respective owners.

CRITICAL APPLICATIONS DISCLAIMER

POWERCAST PRODUCTS (INCLUDING HARDWARE AND/OR SOFTWARE) ARE NOT DESIGNED OR INTENDED TO BE FAIL-SAFE, FAULT TOLERANT OR FOR USE IN ANY APPLICATION THAT COULD LEAD TO DEATH, PERSONAL INJURY OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE (INDIVIDUALLY AND COLLECTIVELY, "CRITICAL APPLICATIONS"), SUCH AS LIFE-SUPPORT OR SAFETY DEVICES OR SYSTEMS, CLASS III MEDICAL DEVICES, NUCLEAR FACILITIES, APPLICATIONS THAT AFFECT CONTROL OF A VEHICLE OR AIRCRAFT, APPLICATIONS RELATED TO THE DEPLOYMENT OF AIRBAGS, OR ANY OTHER CRITICAL APPLICATIONS. CUSTOMER AGREES, PRIOR TO USING OR DISTRIBUTING ANY SYSTEMS THAT INCORPORATE POWERCAST PRODUCTS, TO THOROUGHLY TEST THE SAME FOR SAFETY PURPOSES. CUSTOMER ASSUMES THE SOLE RISK AND LIABILITY OF ANY USE OF POWERCAST PRODUCTS IN CRITICAL APPLICATIONS, SUBJECT ONLY TO APPLICABLE LAWS AND REGULATIONS GOVERNING LIMITATIONS ON PRODUCT LIABILITY.

Powercast warrants its products in accordance with Powercast's standard warranty available at www.powercastco.com/terms-conditions

POWERCAST®

Wireless Power for a Wireless World®

Powercast Corporation

620 Alpha Drive, Suite 1
Pittsburgh, PA, USA 15238
www.powercastco.com
contact@powercastco.com
+1 (412)-455-5800

© 2025 Powercast Corporation, All rights reserved.