

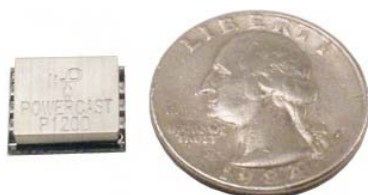
Powerharvester™ Modules

PRODUCT DATA SHEET

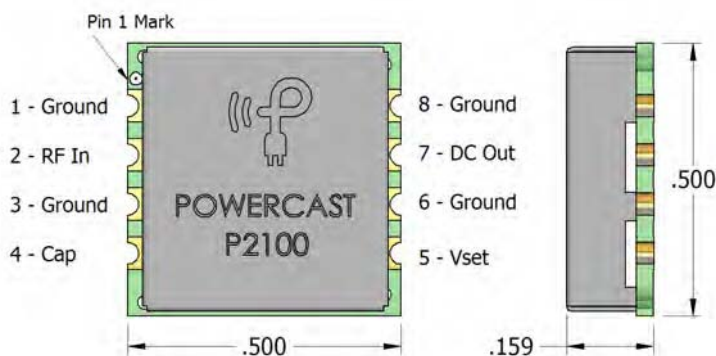
The P1100, P1200, and P2100 are high efficiency RF energy harvesting devices that convert received RF energy into DC power. Powercast™ RF harvesting technology can be used for multiple frequencies and can be used to generate standard or custom output voltages. Batteries or other energy storage devices can be recharged in close proximity or remotely, or low power devices can be driven directly from the received power.

Applications:

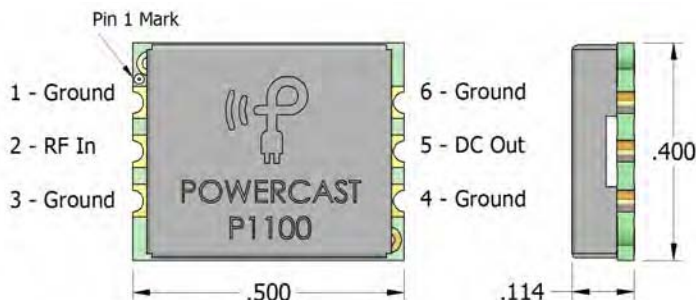
- Remote battery trickle charging
- Contact-free battery charging
- Low power wireless sensors
- Battery-free wireless sensors
- Low power electronics



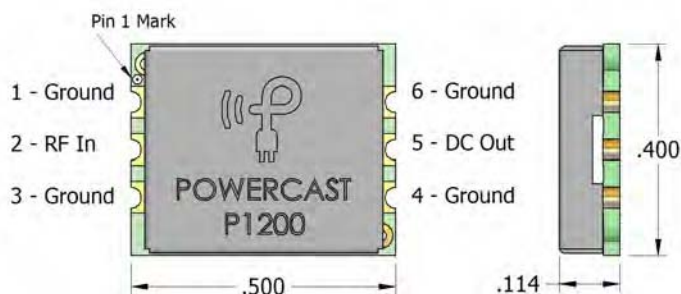
Size comparison of P1200 to U.S. quarter



P2100 Powerharvester Module



P1100 Powerharvester Module



P1200 Powerharvester Module

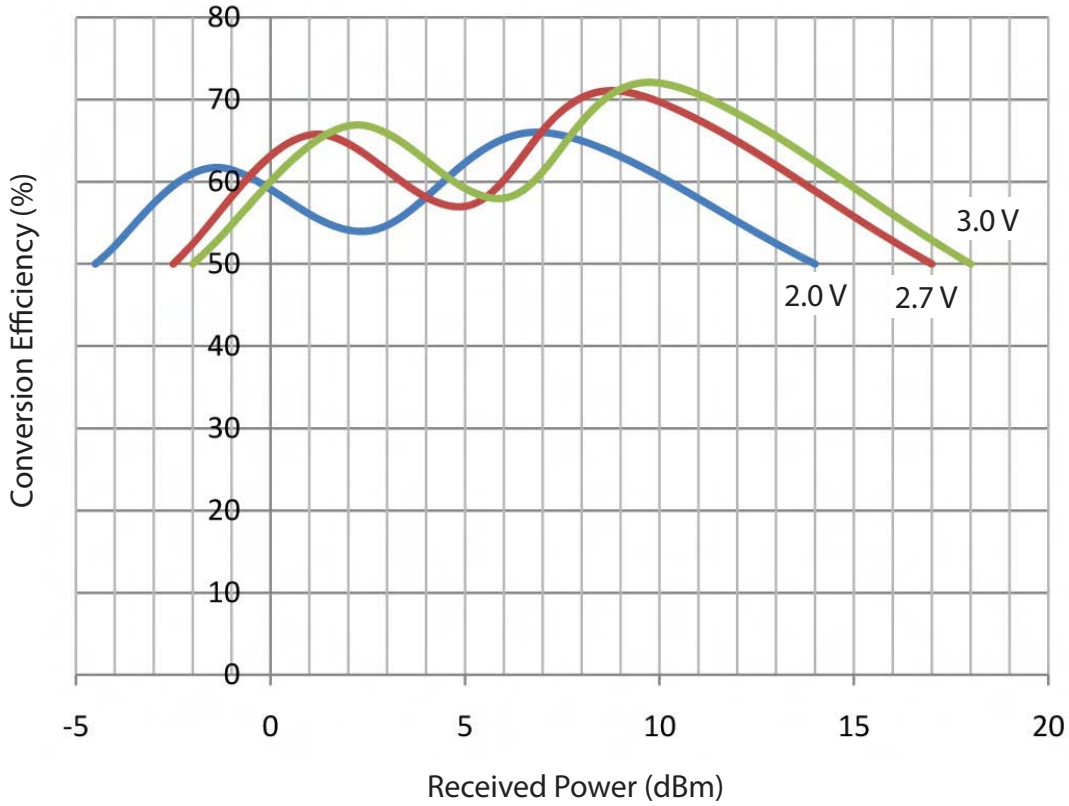
Features	Benefits
Low power consumption	Increased range and operation in environments with low RF energy
High conversion efficiency	Provides RF to DC power conversion up to 70%
Wide efficiency range	Maintains power conversion efficiency over a wide range of input power
Internally matched to 50 ohms	Can use standard antennas
Small size modules	Can be integrated into many existing devices
Over-voltage protection (P1100 and P1200)	Protects batteries from being overcharged
Charge and Fire (P2100)	Convert RF energy and store into variable voltage storage devices (e.g. capacitors) for intermittent, battery-free operation
Configurable output voltage (P2100)	Can set the output voltage to the desired value with a single external resistor

Version 2.0 - Updated 4/2009

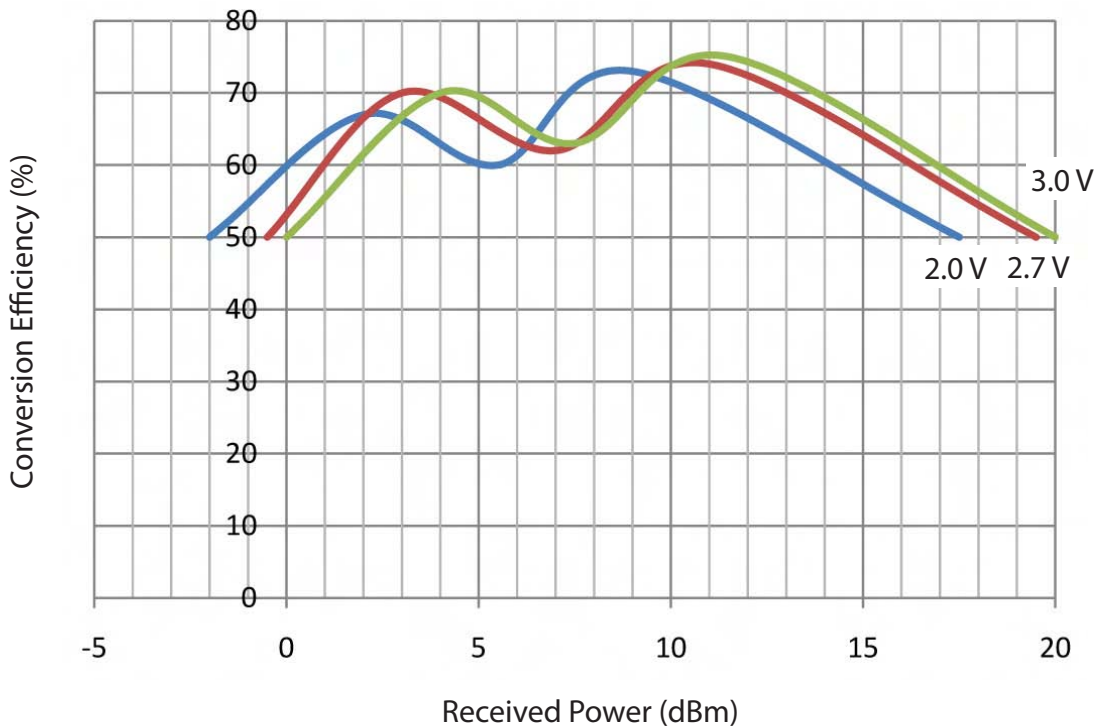
Powercast is a leader in wireless power with the ability to develop energy harvesting systems for a new class of wirelessly powered sensors, battery recharging, and low wattage lighting.



P1100 Powerharvester™ Module



P1200 Powerharvester™ Module



Model	P1100	P1200	P2100
Application	Rechargeable Alkaline battery recharging (2 series cells)	Lithium Ion battery recharging (single cell)	Non-battery energy storage, charge and fire operation
Radio Frequency	902-928 MHz	902-928 MHz	902-928 MHz
Recommended operating input	0 to 20 dBm	0 to 20 dBm	-10 to 10 dBm
Absolute Max input	23 dBm	23 dBm	23 dBm
Voltage Out	3.3 V (Max)	4.2 V (Max)	3.3 V nominal, user configurable, 5.25 V max
Absolute Maximum Voltage on DC output pin	3.3 V	4.2 V	6.0 V
Power Out	≤100 mW continuous	≤100mW continuous	262.5mW peak output ≤10mW (charge to capacitors)
Dimensions (mils)	500 x 400 x 114	500 x 400 x 114	500 x 500 x 159
Pins	6	6	8
Mounting	Surface mount	Surface mount	Surface mount
Impedance	50 ohms	50 ohms	50 ohms
Operating Temp*	-20 to 60 C	-20 to 60 C	-20 to 60 C

*Preliminary, subject to change

P2100 Output Voltage Selection

The P2100 charges a storage device (e.g. capacitors) to a voltage of 1.2 volts and then connects to an external load until the charge drops to 1.05 volts. The output voltage for Pin 7 can be configured by adding an external resistor to increase or decrease the output voltage.

Output Voltage	R2	R3	
2.8V	787 KΩ	—	<p>To decrease the output voltage: $V_{out} = 1.195 \times (1 + (1.779 \times R2) / (249K + R2))$ $R2 = (249K \times (V_{out} - 1.195)) / (3.32 - V_{out})$</p> <p>To increase the output voltage: $V_{out} = 3.32 \times (1 + (896K/R3))$ $R3 = (3.32 \times 89.6K) / (V_{out} - 3.32)$</p>
2.9V	1.0 MΩ	—	
3.0V	1.5 MΩ	—	
3.3V	—	—	
3.6V	—	1.0 MΩ	
3.8V	—	604 KΩ	
4.0V	—	432 KΩ	
4.2V	—	332 KΩ	
5.0V	—	174 KΩ	

To decrease the output voltage, use resistor R2 to connect Pin 5 (Vset) and the output of Pin 7 (DC Out).

To increase the output voltage, use resistor R3 to connect Pin 5 (Vset) to Ground.

R2 and R3 are not to be used simultaneously.