WHITE PAPER

Photo courtesy of Powercast

Wireless Power + E Ink

Integrating wireless power technology into ePaper devices for carefree wireless charging

Maria Singer | Marketing and Sales Manager, Powercast Corporation

Written and produced by: Powercast Corporation®

Sponsored by: E Ink Corporation®

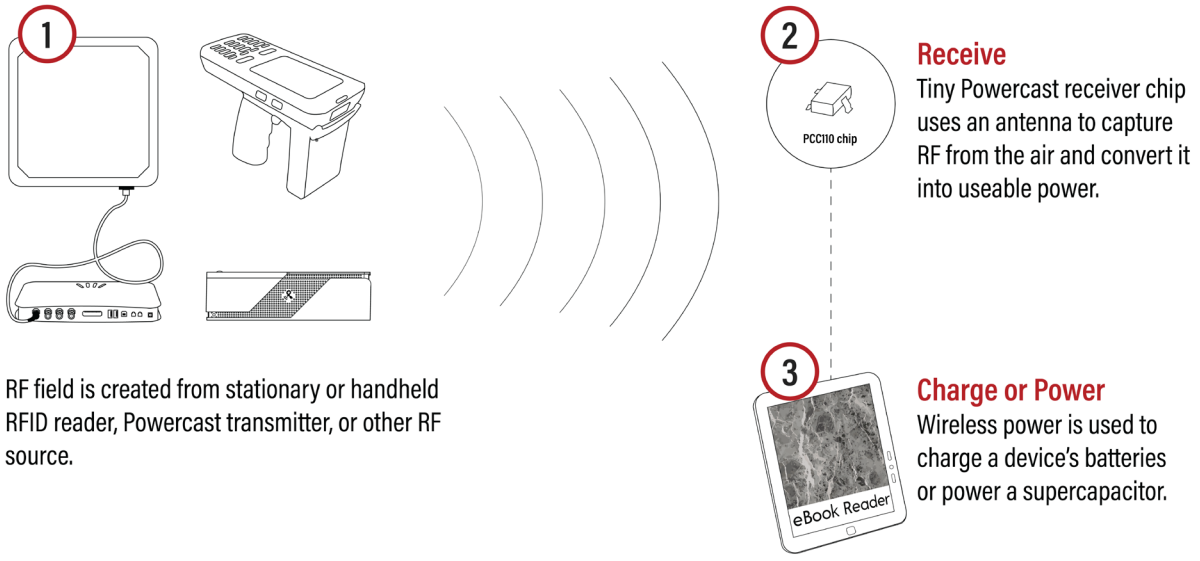
Wireless Power for ePaper Displays

E Ink's bi-stable ePaper screens offer the unique advantages of operating at extremely low power levels and requiring no additional power to maintain a written screen. The amount of power consumed can vary based on screen size and a variety of other factors, but due to the fact that such a miniscule amount of energy is needed for the rewrite process, devices utilizing E Ink screens can operate on very small batteries for extended periods of time.

Powercast's RF wireless power technology is inherently a low-power system which can send wireless power over significant distances, up to 24 meters. These systems operate in the US and Canada at a 1-Watt power output and the amount of power which is available to E Ink enabled devices increases as devices move closer to a power transmit unit. Even at long distances, however, Powercast technology trickle recharges batteries – sometimes extending the life of a battery indefinitely. Screens which require infrequent updates, such as electronic shelf edge labels, can even become completely battery-free with the implementation of a wireless power system. Pairing a wireless power solution with an E Ink screen can reduce or eliminate the need to recharge or replace batteries and even completely eliminate the need for batteries in some devices.

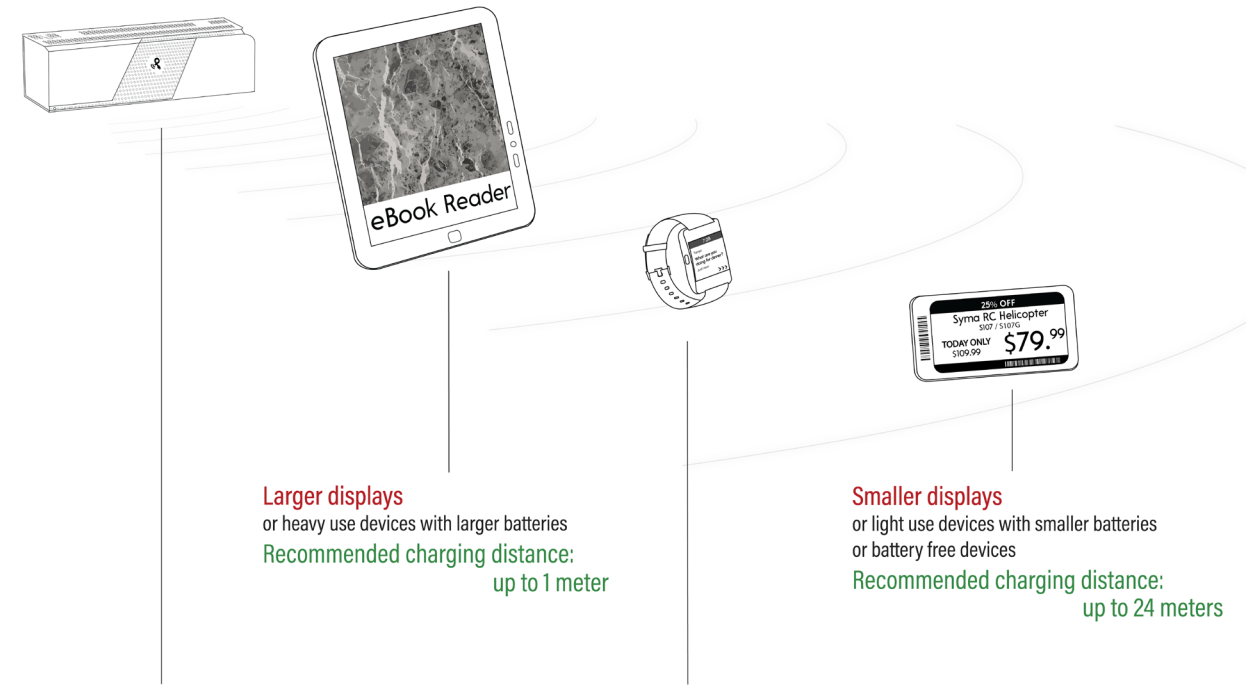
Wireless Power Transfer Explained

A wireless power system requires an RF power transmit source and Powercast's Powerharvester® RF-to-DC PCC110 converter chips with an antenna. While a Powercast power transmitter is recommended, utilizing existing RAIN RFID infrastructure is also a great option for a reliable power source. One or more end devices fitted with Powerharvester receiver chips can harvest wireless energy for recharging eReaders, updating pricing information on electronic shelf edge labels, writing content for eBadges and a wide range of other functions.



Distance and Screen Size

As a rule, more power is available at closer distances to a power source than there is available at farther distances. For this reason, it is recommended that more power hungry devices such as e-readers or smart watches be recharged at close distance to a power transmitter. Devices which are less power hungry or which require a screen update less frequently can operate effectively at much further distances from their power source – up to 80ft (24m).



Larger displays
or heavy use devices with larger batteries
Recommended charging distance:
up to 1 meter

Smaller displays
or light use devices with smaller batteries
or battery free devices
Recommended charging distance:
up to 24 meters

Power transmitter
Powercast transmitter, RFID reader
An RF source creates a field of wireless energy.

Smaller displays
or heavy use devices with smaller batteries
Recommended charging distance:
several meters

Wireless Power in Action

TAG® by British Airways

Photo courtesy of ViewTag

ViewTag (adopted as TAG® by British Airways in 2019) uses a 4.05” E ink Mobius™ bi-state display to display airline traveler information. It is a replacement for the traditional paper luggage tag, and removes the strain on landfills, reduces costs to airlines, and allows passengers to utilize an environmentally-friendly alternative to paper-based bag tags. All of the paper luggage tags printed in 2017 alone would wrap around the Earth 59 times – ViewTag is the responsible answer to that paper waste. Powercast partnered with ViewTag to create a long-lasting product that would hold up to the rigid standards set by IATA (the International Air Transport Association) and also standards set by individual airlines.

E Ink’s bi-stable displays allow devices the option of entering into a sleep mode once the screen has been written, since no additional power is required to maintain a written screen. A classic sleep mode still requires a trickle discharge of energy from the battery while the device awaits the next screen update command. Therefore, after a long while, embedded batteries will still fully discharge despite not being used for more than a few screen updates.

Powercast’s RF harvesting technology allows ViewTag to enter a mode of complete dormancy to preserve the battery when not being used for a screen update. The tag remains dormant until it detects and harvests RF from nearby airport RFID equipment, at which time it will update the screen if the tag is not already displaying the passenger’s current itinerary. Eliminating the issue of trickle discharge by harvesting RF energy enables the tag to be reused for over 3000 flights on a single battery.

Device Use Cases Explained

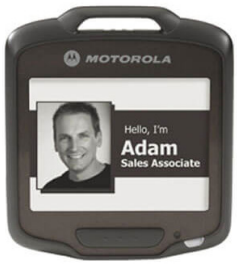
Digital Signage in Retail

Electronic shelf-edge label companies can easily leverage existing retail RFID infrastructure to enable rechargeable or battery-free ePaper displays. Other in-store devices such as point-of-purchase displays, interactive advertising displays and more can be wirelessly recharged or even become completely battery-free using a Powercast wireless power soultion.

Benefits include:

- Deliver power and update screen in a single action
- Minimize strain on landfills generated from replaceable batteries
- Easy integration into existing price tag form factor
- Leverage existing RFID infrastructure as a wireless power delivery system
- Reduce product cost by eliminating costly communication radio

Secure Credentials



Visitor badges, employee nametags or access control cards – maintain security standards and display information accurately without worrying about a dead battery.

Benefits include:

- Bulk recharging option
- Battery free screen updates possible
- Eliminate paper waste generated from traditional badges

Consumer Electronics

eReaders

Larger devices such as e-readers with ePaper screens are perfect candidates for wireless charging.

Benefits include:

- No specific alignment required
- ‘Set it and forget it’ carefree wireless charging
- Battery constantly topping off when not in use
- Perfect for countertop or nightstand recharging zone
- Easier waterproof designs

Smart Watches

Smart watches utilizing ePaper screens offer longer battery lives than those with LCD screens. Integration of a wireless charging option can significantly lengthen the periods between wired charging or even eliminate the need to ever plug it in again.

Benefits include:

- No specific alignment required
- ‘Set it and forget it’ carefree wireless charging
- Perfect for countertop or nightstand recharging zone
- Easier waterproof designs

About Powercast

Powercast, established in 2003, is the leading provider of RF-based wireless power technologies that work in the far field (up to 24 m or 80 feet) to provide power-over-distance, eliminate or reduce the need for batteries, and power or charge devices without wires and connectors. Founded with the vision of enabling untethered devices powered over the air, Powercast continues to create the most efficient, safe and highest power harvesting technology achievable while complying with the FCC and other global standards. Powercast's IP portfolio includes 62 patents worldwide and 38 patents pending.

www.powercastco.com

About E Ink

E Ink is the originator, pioneer and commercial leader in ePaper technology. The company delivers its advanced display products to the world's most influential brands and manufacturers, enabling them to install extremely durable, low power displays in previously impossible or unimaginable applications and environments.

E Ink encompasses the combined E Ink Corporation, which was spun out of the MIT Media Lab in 1997 to commercialize electronic ink and EPD technology, and Prime View International, which was established in 1992 as the first TFT LCD company in Taiwan, focusing on high quality small-to-medium sized TFT LCDs. In 2009, Prime View acquired E Ink Corporation to further integrate and expand the EPD supply chain and the new combined companies were branded as E Ink.

E Ink's corporate philosophy centers around delivering revolutionary products, excellent user experiences, and environmental benefits through advanced technology development.

www.eink.com

E Ink...We Make Surfaces Smarter

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