Transitioning to the ThingMagic USB *Plus+* RFID Reader
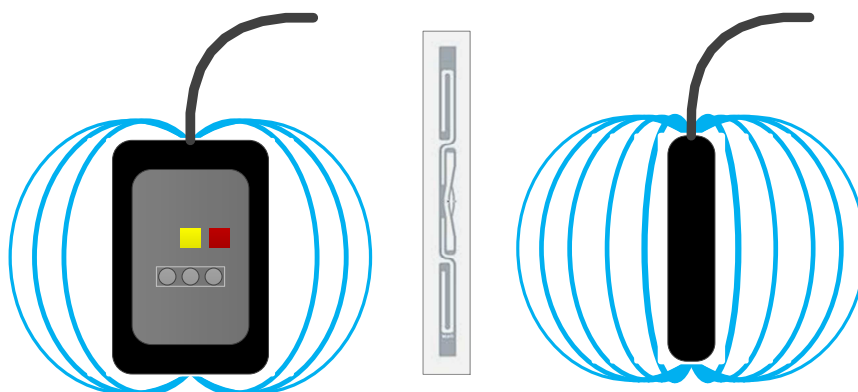
By Dan Ratner

Introduction

The ThingMagic USB RFID Reader (part number USB-5EC) is a proven design used around the world and is ideal for applications that require reading and writing of EPC Global Gen2 tags on a desktop, workstation or in areas where space is limited. The USB reader is controlled and powered by a host PC or laptop through a USB interface and is commonly used in applications such as RFID tag commissioning, manufacturing WIP, document tracking, library book check in/out, retail point of sale, event and hospitality services, hospital patient workflows, and more.

Trimble's ThingMagic division has recently upgraded the "USB Reader" and is calling the improved version, the "USB *Plus+* Reader*".* The *Plus+* reader is identical in all respects to the original reader but one: the *Plus+* reader contains a new, higher performance antenna. This application note provides performance information for both versions and offers advice for making a seamless transition from one version to another. Note: The ordering part number (USB-5EC) for the improved *Plus+* version will remain the same as the original.

How does the performance differ between the two versions?

The radiation pattern (that is, relative read distance for any direction) of both the original and *Plus+* USB versions are nearly identical, with the *Plus+* version having proportionally greater read distance in all directions. Both versions read tags best if the tags are aligned with the long side of the reader. The blue lines, below, represent the radiation pattern around the reader:
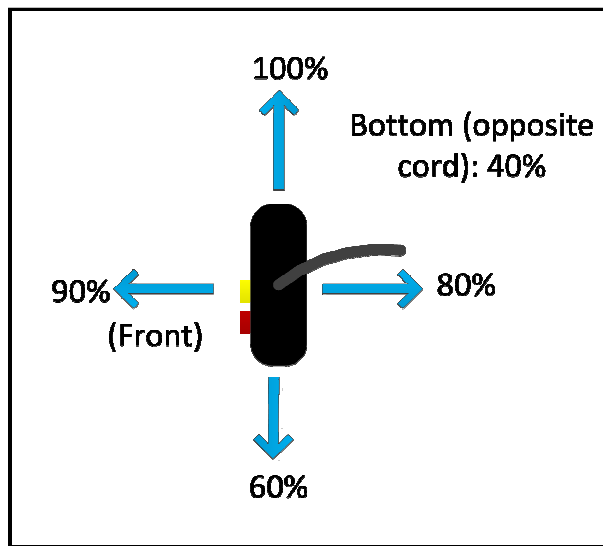

Front View   Best Tag Orientation   Side View

The radiation pattern is not completely symmetrical on all sides. Looking down on the reader (with the cord facing up), the read distance from each face of the reader is as shown here:

Top (cord-side) View

Read distance is dependent on tag sensitivity and orientation. Typical tag read performance by regions is shown in the following table:

Region	USB *Plus+* Version	Original USB Version
North America (902-928 MHz)	3 Feet (0.91 m)	1.1 Feet (0.34 m)
EU (865-868 MHz)	3 Feet (0.91 m)	1.7 Feet (0.52 m)

Larger tags will read to a longer distance, smaller tags will read to a shorter distance. For example, the USB *Plus+* read distance with a good folded-dipole tag (these are around 3.5 inches long by 0.5 inches wide = 9 cm x 1.3 cm) is 4 feet (1.2 meters) in both the North America and EU frequency bands.

How do I make the USB *Plus+* version perform like the Original USB?
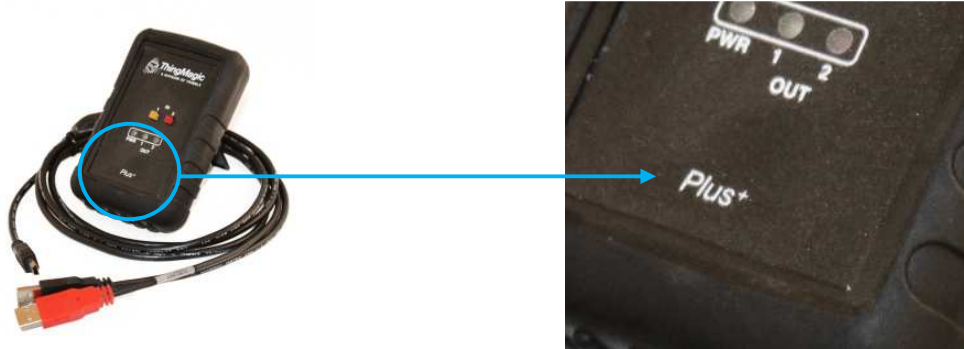
Based on measurements with a variety of tags, we have determined that you will achieve approximately the same read distance with the USB *Plus+* reader as you have been seeing with the original version if you do the following:

- In the North American region: Reduce the transmit output power by 8 dB
- In the EU region: Reduce the transmit output power by 4 dB

For example, if you are currently operating at full power (+23 dBm) in the North American region with the original reader and wish to create the same read field with the USB *Plus+* reader, you would reduce the transmit level to +15 dBm.

How do I distinguish one version from the other?

Physically, the new USB *Plus+* reader is distinguished by its name appearing on the front label:

If you have a mix of original and USB *Plus+* versions, you will need a way for your applications to distinguish between them in order to set the RF transmit power appropriately. The .NET MercuryAPI allows you to obtain the Configuration Parameter "/reader/version/productID" from the reader. This value is different for each reader:

- *Original USB Reader*: /reader/version/productID = 1
- *USB Plus+ Reader:* /reader/version/productID = 4

If you are using the C or Java API, or for further assistance, please contact ThingMagic Support at support@thingmagic.com.