AUBURN

UNIVERSITY

RFID LAB

# TAGGED CATEGORY PERFORMANCE SPECIFICATION

**P**

**VERSION 0.8**



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# 1. TEST SPECIFICATION

## 1.1 Test Overview

| | |
|---|---|
| Prerequisite | ARC Quality certification of inlay manufacturer |
| Equipment | ARC Benchmarking Equipment Document |
| Test process | ARC Benchmarking Methodology |
| Distance between antennas and inlay | Antenna 1: 1.5 meter<br>Antenna 2: 1.5 meter<br>Antenna 3: 1.5 meter<br>Antenna 4: 1.5 meter |
| Test configurations | Single Inlay on Cardstock<br>Single Inlay on one Battery<br>Single Inlay between two Batteries |

## 1.2 Description of Test Configurations

### 1.2.1 Single Inlay on one Battery

The inlay is measured when applied to the top of the battery. The battery is placed on the testing platform with the tagged side on the top as shown in Figure 1. The face of the inlay will be parallel to the face of antenna 4.

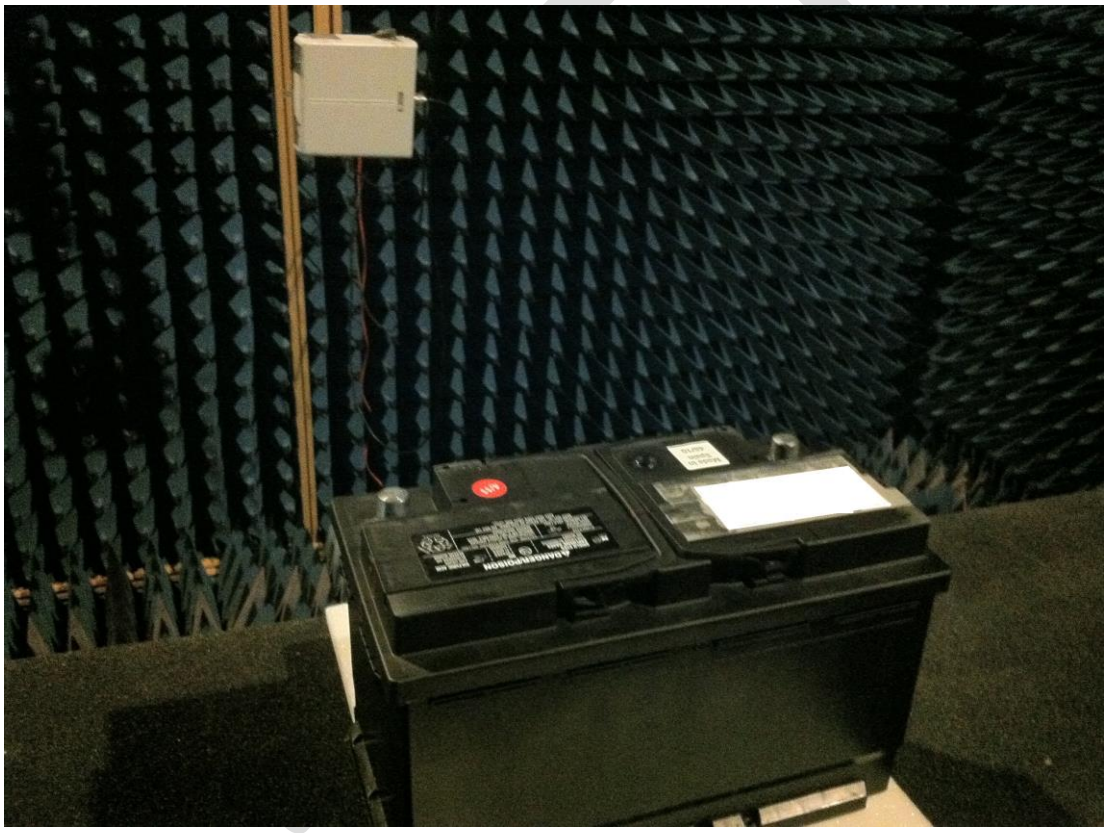

**Figure 1: Single Inlay on one Battery**

### 1.2.2 Single Inlay between two Batteries

The inlay is measured when applied to the top of the battery with another untagged battery placed on top of it. There is a separation of 4 inches between the batteries. The first battery is placed on the testing platform with the tagged side on the top as shown in Figure 2. The face of the inlay will be parallel to the face of antenna 4. The second battery is placed on top of the first battery as shown in Figure 3.

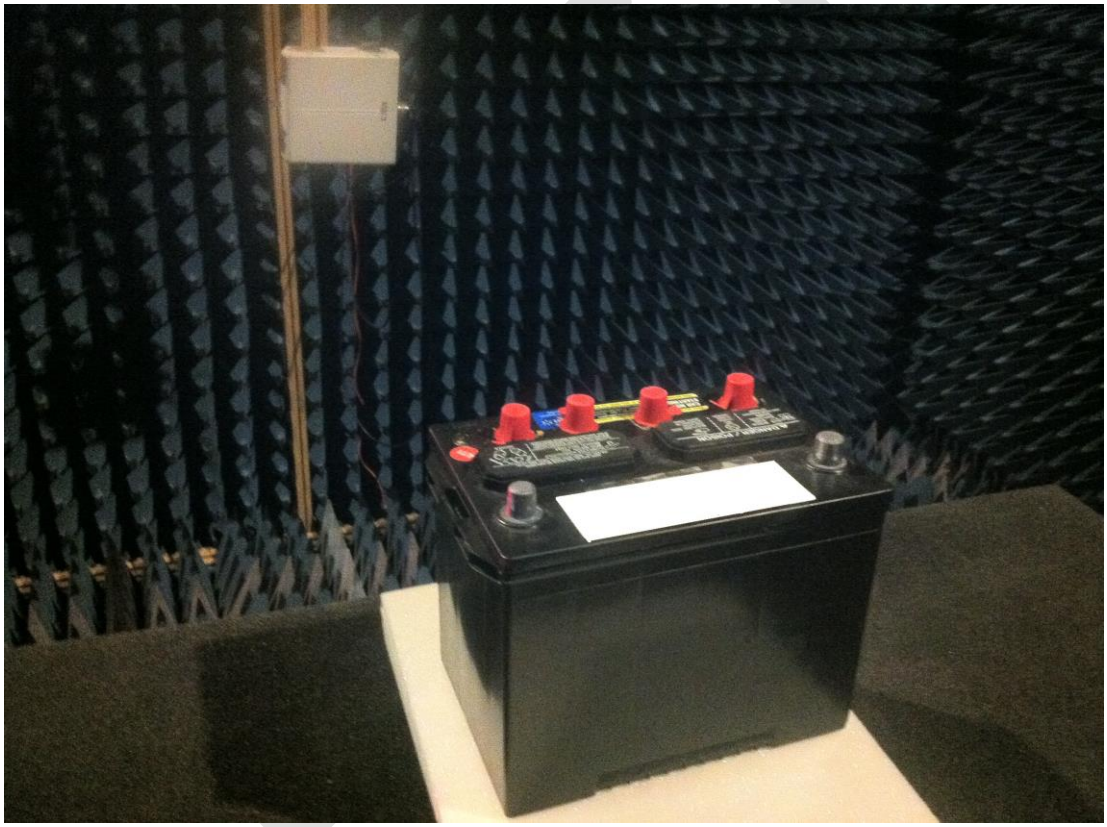

**Figure 2: Single Inlay on the first Battery**

**Figure 3: Single Inlay between two Batteries**

## 2 READ SENSITIVITY

The inlay should meet the following read sensitivity (dBm) requirements in the following test configurations through the frequency range. All of the inlay samples tested should meet the minimum requirements. It is noted that the sensitivity is calculated at the tag by calibrating the measured power at the transmitter with the loss/gain during transmission.

### 2.1 Single Inlay on Cardstock

Frequency 902 MHz to 928 MHz in steps of 1 MHz

| Position 0 Ant 1 | Position 0: Ant 2 | Position 0: Ant 3 | Position 0: Ant 4 |
|---|---|---|---|
| -13 | -13 | -12.5 | -12.5 |
| Position 30: Ant 1 | Position 30: Ant 2 | Position 30: Ant 3 | Position 30: Ant 4 |
| -11.5 | -11.5 | -11 | -11 |
| Position 60: Ant 1 | Position 60: Ant 2 | Position 60: Ant 3 | Position 60: Ant 4 |
| -6.5 | -6.5 | -5.5 | -5 |
| Position 120: Ant 1 | Position 120: Ant 2 | Position 120: Ant 3 | Position 120: Ant 4 |
| -6.5 | -6.5 | -5.5 | -5 |
| Position 150: Ant 1 | Position 150: Ant 2 | Position 150: Ant 3 | Position 150: Ant 4 |
| -11.5 | -11.5 | -11 | -11 |
| Position 180: Ant 1 | Position 180: Ant 2 | Position180: Ant 3 | Position 180: Ant 4 |
| -13 | -13 | -12.5 | -12.5 |
| Position 210: Ant 1 | Position 210: Ant 2 | Position 210: Ant 3 | Position 210: Ant 4 |
| -11.5 | -11.5 | -11 | -11 |
| Position 240: Ant 1 | Position 240: Ant 2 | Position 240: Ant 3 | Position 240: Ant 4 |
| -6.5 | -6.5 | -5.5 | -5 |
| Position 300: Ant 1 | Position 300: Ant 2 | Position 300: Ant 3 | Position 300: Ant 4 |
| -6.5 | -6.5 | -5.5 | -5 |
| Position 330: Ant 1 | Position 330: Ant 2 | Position 330: Ant 3 | Position 330: Ant 4 |
| -11.5 | -11.5 | -11 | -11 |

## 2.2 Single Inlay on one Battery

Frequency 902 MHz to 928 MHz in steps of 1 MHz

| Position 0 Ant 1 | Position 0: Ant 2 | Position 0: Ant 3 | Position 0: Ant 4 |
|---|---|---|---|
| -8.5 | -11.5 | -13.5 | -15 |
| Position 30: Ant 1 | Position 30: Ant 2 | Position 30: Ant 3 | Position 30: Ant 4 |
| -7.5 | -11 | -13.5 | -14.5 |
| Position 60: Ant 1 | Position 60: Ant 2 | Position 60: Ant 3 | Position 60: Ant 4 |
| -3 | -8 | -11 | -10 |
| Position 120: Ant 1 | Position 120: Ant 2 | Position 120: Ant 3 | Position 120: Ant 4 |
| -5 | -6 | -8 | -9 |
| Position 150: Ant 1 | Position 150: Ant 2 | Position 150: Ant 3 | Position 150: Ant 4 |
| -8 | -11.5 | -13.5 | -14.5 |
| Position 180: Ant 1 | Position 180: Ant 2 | Position180: Ant 3 | Position 180: Ant 4 |
| -9.5 | -12.5 | -13 | -15 |
| Position 210 Ant 1 | Position 210: Ant 2 | Position 210: Ant 3 | Position 210: Ant 4 |
| -8 | -11.5 | -13.5 | -14.5 |
| Position 240: Ant 1 | Position 240: Ant 2 | Position 240: Ant 3 | Position 240: Ant 4 |
| -5 | -6 | -8 | -9 |
| Position 300: Ant 1 | Position 300: Ant 2 | Position 300: Ant 3 | Position 300: Ant 4 |
| -3 | -8 | -11 | -10 |
| Position 330: Ant 1 | Position 330: Ant 2 | Position 330: Ant 3 | Position 330: Ant 4 |
| -7.5 | -11 | -13.5 | -14.5 |

### 2.3 Single Inlay between two Batteries

Frequency 902 MHz to 928 MHz in steps of 1 MHz

| Position 0 Ant 1 | Position 30: Ant 1 | Position 150: Ant 1 | Position 180: Ant 1 |
|---|---|---|---|
| -2 | -2 | -12 | -12 |

## 3. READ BACKSCATTER

The inlay should meet the following read backscatter (dBm) requirements in the following test configurations through the entire frequency range. The backscatter value in this section is the minimum backscatter that should be observed at the corresponding minimum read sensitivity value in section 2. All the tagged item samples tested should meet the minimum requirements. It is noted that the backscatter is calculated at the tag by calibrating the measured power at the receiver with the loss/gain during transmission.

### 3.1 Single Inlay on one Battery

Frequency 902 MHz to 928 MHz in steps of 1 MHz

| Position 0 Ant 1 | Position 0: Ant 2 | Position 0: Ant 3 | Position 0: Ant 4 |
|---|---|---|---|
| *-17.5* | *-15* | *-10.5* | *-11* |
| Position 30: Ant 1 | Position 30: Ant 2 | Position 30: Ant 3 | Position 30: Ant 4 |
| *-18* | *-15* | *-11.5* | *-12.5* |
| Position 60: Ant 1 | Position 60: Ant 2 | Position 60: Ant 3 | Position 60: Ant 4 |
| *-22.5* | *-18* | *-15.5* | *-16.5* |
| Position 120: Ant 1 | Position 120: Ant 2 | Position 120: Ant 3 | Position 120: Ant 4 |
| *-21* | *-20.5* | *-17.5* | *-18* |
| Position 150: Ant 1 | Position 150: Ant 2 | Position 150: Ant 3 | Position 150: Ant 4 |
| *-18* | *-15* | *-13* | *-12* |
| Position 180: Ant 1 | Position 180: Ant 2 | Position180: Ant 3 | Position 180: Ant 4 |
| *-16* | *-13.5* | *-10* | *-10* |
| Position 210 Ant 1 | Position 210: Ant 2 | Position 210: Ant 3 | Position 210: Ant 4 |
| *-18* | *-15* | *-13* | *-12* |
| Position 240: Ant 1 | Position 240: Ant 2 | Position 240: Ant 3 | Position 240: Ant 4 |
| *-21* | *-20.5* | *-17.5* | *-18* |
| Position 300: Ant 1 | Position 300: Ant 2 | Position 300: Ant 3 | Position 300: Ant 4 |
| *-22.5* | *-18* | *-15.5* | *-16.5* |
| Position 330: Ant 1 | Position 330: Ant 2 | Position 330: Ant 3 | Position 330: Ant 4 |
| *-18* | *-15* | *-11.5* | *-12.5* |

### 3.2 Single Inlay between two Batteries

Frequency 902 MHz to 928 MHz in steps of 1 MHz

| Position 0 Ant 1 | Position 30: Ant 1 | Position 150: Ant 1 | Position 180: Ant 1 |
|---|---|---|---|
| *-23* | *-24* | *-12* | *-8* |