



AUBURN

UNIVERSITY

TAGGED CATEGORY PERFORMANCE SPECIFICATION

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VERSION 2

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Contact information:

ARC - RFID Lab
Auburn University
Auburn, AL 36849
rfidlab@auburn.edu



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1 TEST OVERVIEW

Equipment	ARC Benchmarking Equipment Document
Test process	ARC Benchmarking Methodology Document
Frequency	902 Mhz to 928 MHz in steps of 1 MHz
Distance between antennas and inlay	Antenna 1: 1.5 meter Antenna 2: 1.5 meter Antenna 3: 1.5 meter Antenna 4: 1.5 meter
Sensitivity at Receiver	-70 dB
Standard test configurations	Single Inlay on Cardstock Multi Inlay Proximity Test with 2.54cm Spacing (Please refer ARC Testing Methodology)
Custom test configurations	Single Inlay on Polybag Single Inlay between Two Polybags Single Inlay between Two Denim Articles Single Inlay between Ten Denim Articles Multi Inlay Proximity Test with Denim

2 DESCRIPTION OF CUSTOM TEST CONFIGURATIONS

2.1 Single Inlay on Polybag

The inlay is measured when applied on a polybag containing ten cotton articles. The bag is placed on the testing platform with the tagged side on the top as shown in Figure 1. The face of the tag is parallel to the face of antenna 4.



Figure 1: Single Inlay on Polybag

2.2 Single Inlay between Two Polybags

The inlay is measured when applied on a polybag containing ten cotton articles with another untagged bag placed on top of the tagged bag. Both the bags are placed on the testing platform as shown in Figure 2. The tagged bag is placed on the platform so that the inlay is on the top. The face of the inlay is parallel to the face of antenna 4.



Figure 2: Single Inlay between Two Polybags

2.3 Single Inlay between Two Denim Articles

The inlay is measured when applied on the pocket flasher of a denim article with another untagged denim article placed on top of the tagged denim. Both the articles are placed on the testing platform as shown in Figure 2. The tagged denim article is placed on the platform such that the inlay is on the top. The face of the inlay will be parallel to the face of antenna 4.



Figure 3: Single Inlay between Two Denim Articles

2.4 Single Inlay between Ten Denim Articles

The inlay is measured when applied on the pocket flasher of a denim article (inlay on top) in the center of a stack of 10 untagged denim articles. The final stack is 11 articles tall. All of the denim articles are placed on the testing platform as shown in Figure 3. The face of the inlay will be parallel to the face of antenna 4.

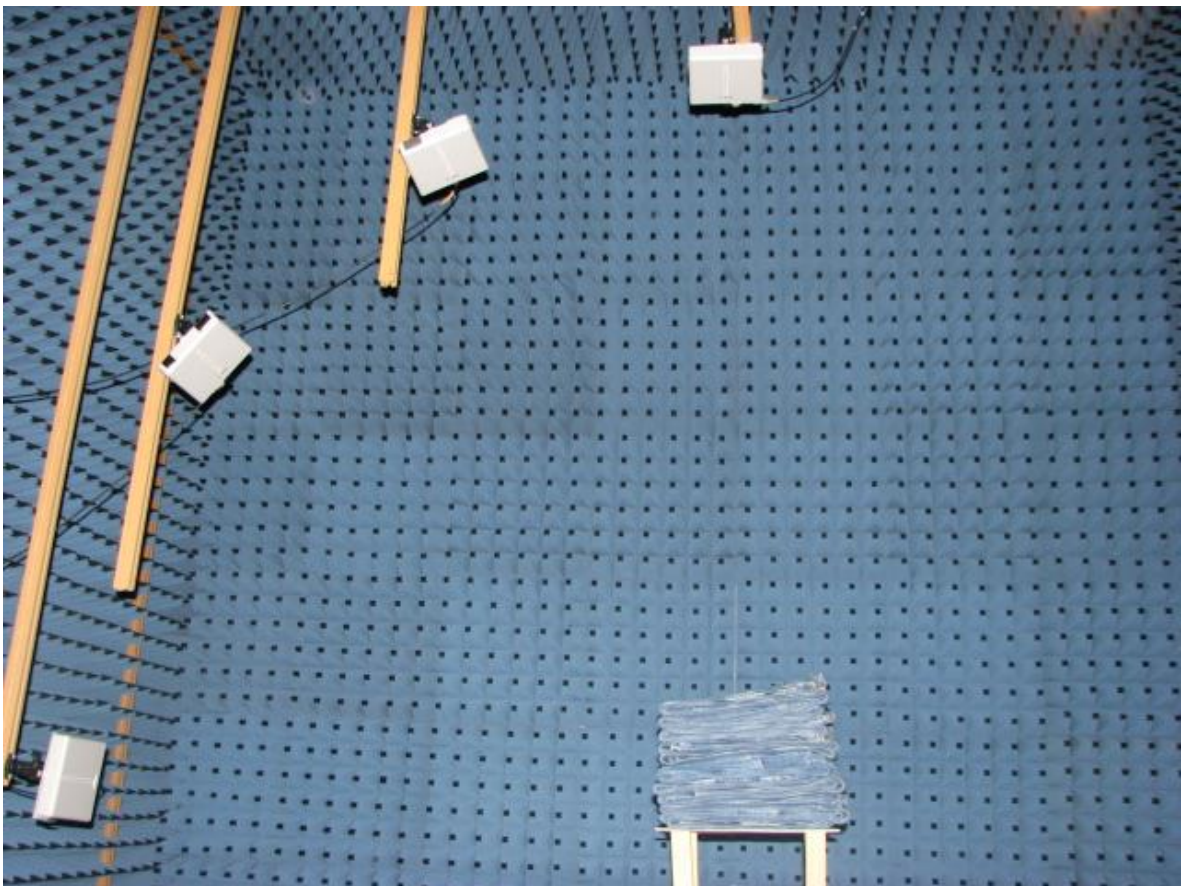


Figure 4: Single Inlay between Ten Denim Articles

2.5 Multi Inlay Proximity Test with Denim

The inlay is measured when applied on the pocket flasher of a denim article (inlay on top) in the center of a stack of 10 other tagged denim articles. All the denim articles are tagged with inlays of the same model. The final stack is 11 denim articles tall. All of the articles are placed on the testing platform as shown in Figure 4. The faces of the tags will be parallel to the face of antenna 4.



Figure 5: Multi Inlay Proximity Test with Denim



3 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.



3.1 Standard Test - Single Inlay on Cardstock

Position 0 Ant 1	Position 0: Ant 2	Position 0: Ant 3	Position 0: Ant 4
-9	-8.5	-8.5	-9
Position 30: Ant 1	Position 30: Ant 2	Position 30: Ant 3	Position 30: Ant 4
-7	-6.5	-6.5	-6.5
Position 60: Ant 1	Position 60: Ant 2	Position 60: Ant 3	Position 60: Ant 4
-1	-1	1	1
Position 120: Ant 1	Position 120: Ant 2	Position 120: Ant 3	Position 120: Ant 4
-1	-1	1	1
Position 150: Ant 1	Position 150: Ant 2	Position 150: Ant 3	Position 150: Ant 4
-7	-6.5	-6.5	-6.5
Position 180: Ant 1	Position 180: Ant 2	Position 180: Ant 3	Position 180: Ant 4
-9	-8.5	-8.5	-9
Position 210: Ant 1	Position 210: Ant 2	Position 210: Ant 3	Position 210: Ant 4
-7	-6.5	-6.5	-6.5
Position 240: Ant 1	Position 240: Ant 2	Position 240: Ant 3	Position 240: Ant 4
-1	-1	1	1
Position 300: Ant 1	Position 300: Ant 2	Position 300: Ant 3	Position 300: Ant 4
-1	-1	1	1
Position 330 Ant 1	Position 330: Ant 2	Position 330: Ant 3	Position 330: Ant 4
-7	-6.5	-6.5	-6.5



3.2 Standard Test - Multi Inlay Proximity Test with 2.54 cm Spacing

Position 0 Ant 1	Position 0: Ant 2	Position 0: Ant 3	Position 0: Ant 4
1	-4	-6	-1
Position 30: Ant 1	Position 30: Ant 2	Position 30: Ant 3	Position 30: Ant 4
5	-2	-4	2
Position 60: Ant 1	Position 60: Ant 2	Position 60: Ant 3	Position 60: Ant 4
NA	NA	NA	NA
Position 120: Ant 1	Position 120: Ant 2	Position 120: Ant 3	Position 120: Ant 4
NA	NA	NA	NA
Position 150: Ant 1	Position 150: Ant 2	Position 150: Ant 3	Position 150: Ant 4
5	-2	-4	2
Position 180: Ant 1	Position 180: Ant 2	Position 180: Ant 3	Position 180: Ant 4
1	-4	-6	-1
Position 210: Ant 1	Position 210: Ant 2	Position 210: Ant 3	Position 210: Ant 4
5	-2	-4	2
Position 240: Ant 1	Position 240: Ant 2	Position 240: Ant 3	Position 240: Ant 4
NA	NA	NA	NA
Position 300: Ant 1	Position 300: Ant 2	Position 300: Ant 3	Position 300: Ant 4
NA	NA	NA	NA
Position 330 Ant 1	Position 330: Ant 2	Position 330: Ant 3	Position 330: Ant 4
5	-2	-4	2



3.3 Custom Test - Single Inlay on Polybag

Position 0 Ant 1	Position 0: Ant 2	Position 0: Ant 3	Position 0: Ant 4
-8.5	-8	-7.5	-8
Position 30: Ant 1	Position 30: Ant 2	Position 30: Ant 3	Position 30: Ant 4
-6	-5.5	-5	-5
Position 60: Ant 1	Position 60: Ant 2	Position 60: Ant 3	Position 60: Ant 4
NA	NA	NA	NA
Position 120: Ant 1	Position 120: Ant 2	Position 120: Ant 3	Position 120: Ant 4
NA	NA	NA	NA
Position 150: Ant 1	Position 150: Ant 2	Position 150: Ant 3	Position 150: Ant 4
-6	-5.5	-5	-5
Position 180: Ant 1	Position 180: Ant 2	Position 180: Ant 3	Position 180: Ant 4
-8.5	-8	-7.5	-8
Position 210: Ant 1	Position 210: Ant 2	Position 210: Ant 3	Position 210: Ant 4
-6	-5.5	-5	-5
Position 240: Ant 1	Position 240: Ant 2	Position 240: Ant 3	Position 240: Ant 4
NA	NA	NA	NA
Position 300: Ant 1	Position 300: Ant 2	Position 300: Ant 3	Position 300: Ant 4
NA	NA	NA	NA
Position 330 Ant 1	Position 330: Ant 2	Position 330: Ant 3	Position 330: Ant 4
-6	-5.5	-5	-5



3.4 Custom Test - Single Inlay between Two Polybags

Position 0 Ant 1	Position 0: Ant 2	Position 0: Ant 3	Position 0: Ant 4
-9	-8	-8	-8.5
Position 30: Ant 1	Position 30: Ant 2	Position 30: Ant 3	Position 30: Ant 4
-6.5	-6	-5	-6
Position 60: Ant 1	Position 60: Ant 2	Position 60: Ant 3	Position 60: Ant 4
NA	NA	NA	NA
Position 120: Ant 1	Position 120: Ant 2	Position 120: Ant 3	Position 120: Ant 4
NA	NA	NA	NA
Position 150: Ant 1	Position 150: Ant 2	Position 150: Ant 3	Position 150: Ant 4
-6.5	-6	-5	-6
Position 180: Ant 1	Position 180: Ant 2	Position 180: Ant 3	Position 180: Ant 4
-9	-8	-8	-8.5
Position 210: Ant 1	Position 210: Ant 2	Position 210: Ant 3	Position 210: Ant 4
-6.5	-6	-5	-6
Position 240: Ant 1	Position 240: Ant 2	Position 240: Ant 3	Position 240: Ant 4
NA	NA	NA	NA
Position 300: Ant 1	Position 300: Ant 2	Position 300: Ant 3	Position 300: Ant 4
NA	NA	NA	NA
Position 330 Ant 1	Position 330: Ant 2	Position 330: Ant 3	Position 330: Ant 4
-6.5	-6	-5	-6



3.5 Custom Test - Single Inlay between Two Denim Articles

Position 0 Ant 1	Position 0: Ant 2	Position 0: Ant 3	Position 0: Ant 4
-10.5	-9	-9.5	-9.5
Position 30: Ant 1	Position 30: Ant 2	Position 30: Ant 3	Position 30: Ant 4
-8	-7	-7	-7.5
Position 60: Ant 1	Position 60: Ant 2	Position 60: Ant 3	Position 60: Ant 4
-1	-0.5	-0.5	2
Position 120: Ant 1	Position 120: Ant 2	Position 120: Ant 3	Position 120: Ant 4
-1	-0.5	-0.5	2
Position 150: Ant 1	Position 150: Ant 2	Position 150: Ant 3	Position 150: Ant 4
-8	-7	-7	-7.5
Position 180: Ant 1	Position 180: Ant 2	Position 180: Ant 3	Position 180: Ant 4
-10.5	-9	-9.5	-9.5
Position 210: Ant 1	Position 210: Ant 2	Position 210: Ant 3	Position 210: Ant 4
-8	-7	-7	-7.5
Position 240: Ant 1	Position 240: Ant 2	Position 240: Ant 3	Position 240: Ant 4
-1	-0.5	-0.5	2
Position 300: Ant 1	Position 300: Ant 2	Position 300: Ant 3	Position 300: Ant 4
-1	-0.5	-0.5	2
Position 330 Ant 1	Position 330: Ant 2	Position 330: Ant 3	Position 330: Ant 4
-8	-7	-7	-7.5



3.6 Custom Test - Single Inlay between Ten Denim Articles

Position 0 Ant 1	Position 0: Ant 2	Position 0: Ant 3	Position 0: Ant 4
-9.5	-7.5	-8	-7.5
Position 30: Ant 1	Position 30: Ant 2	Position 30: Ant 3	Position 30: Ant 4
-6	-5	-4.5	-5
Position 60: Ant 1	Position 60: Ant 2	Position 60: Ant 3	Position 60: Ant 4
NA	NA	NA	NA
Position 120: Ant 1	Position 120: Ant 2	Position 120: Ant 3	Position 120: Ant 4
NA	NA	NA	NA
Position 150: Ant 1	Position 150: Ant 2	Position 150: Ant 3	Position 150: Ant 4
-6	-5	-4.5	-5
Position 180: Ant 1	Position 180: Ant 2	Position 180: Ant 3	Position 180: Ant 4
-9.5	-7.5	-8	-7.5
Position 210: Ant 1	Position 210: Ant 2	Position 210: Ant 3	Position 210: Ant 4
-6	-5	-4.5	-5
Position 240: Ant 1	Position 240: Ant 2	Position 240: Ant 3	Position 240: Ant 4
NA	NA	NA	NA
Position 300: Ant 1	Position 300: Ant 2	Position 300: Ant 3	Position 300: Ant 4
NA	NA	NA	NA
Position 330 Ant 1	Position 330: Ant 2	Position 330: Ant 3	Position 330: Ant 4
-6	-5	-4.5	-5



3.7 Custom Test - Multi Inlay Proximity Test with Denim

Position 0 Ant 1	Position 0: Ant 2	Position 0: Ant 3	Position 0: Ant 4
-1	-5	-6	-3.5
Position 30: Ant 1	Position 30: Ant 2	Position 30: Ant 3	Position 30: Ant 4
2	-1.5	-3	-3
Position 60: Ant 1	Position 60: Ant 2	Position 60: Ant 3	Position 60: Ant 4
NA	NA	NA	NA
Position 120: Ant 1	Position 120: Ant 2	Position 120: Ant 3	Position 120: Ant 4
NA	NA	NA	NA
Position 150: Ant 1	Position 150: Ant 2	Position 150: Ant 3	Position 150: Ant 4
2	-1.5	-3	-3
Position 180: Ant 1	Position 180: Ant 2	Position 180: Ant 3	Position 180: Ant 4
-1	-5	-6	-3.5
Position 210: Ant 1	Position 210: Ant 2	Position 210: Ant 3	Position 210: Ant 4
2	-1.5	-3	-3
Position 240: Ant 1	Position 240: Ant 2	Position 240: Ant 3	Position 240: Ant 4
NA	NA	NA	NA
Position 300: Ant 1	Position 300: Ant 2	Position 300: Ant 3	Position 300: Ant 4
NA	NA	NA	NA
Position 330 Ant 1	Position 330: Ant 2	Position 330: Ant 3	Position 330: Ant 4
2	-1.5	-3	-3



4. 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 the table below is the minimum backscatter that should be observed at the corresponding minimum read sensitivity value in section 3. All of 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



4.1 Standard Test - Single Inlay on Cardstock

Position 0 Ant 1	Position 0: Ant 2	Position 0: Ant 3	Position 0: Ant 4
-26	-27	-27	-26
Position 30: Ant 1	Position 30: Ant 2	Position 30: Ant 3	Position 30: Ant 4
-30	-31	-31.5	-30.5
Position 60: Ant 1	Position 60: Ant 2	Position 60: Ant 3	Position 60: Ant 4
NA	NA	NA	NA
Position 120: Ant 1	Position 120: Ant 2	Position 120: Ant 3	Position 120: Ant 4
NA	NA	NA	NA
Position 150: Ant 1	Position 150: Ant 2	Position 150: Ant 3	Position 150: Ant 4
-30	-31	-31.5	-30.5
Position 180: Ant 1	Position 180: Ant 2	Position 180: Ant 3	Position 180: Ant 4
-26	-27	-27	-26
Position 210: Ant 1	Position 210: Ant 2	Position 210: Ant 3	Position 210: Ant 4
-30	-31	-31.5	-30.5
Position 240: Ant 1	Position 240: Ant 2	Position 240: Ant 3	Position 240: Ant 4
NA	NA	NA	NA
Position 300: Ant 1	Position 300: Ant 2	Position 300: Ant 3	Position 300: Ant 4
NA	NA	NA	NA
Position 330 Ant 1	Position 330: Ant 2	Position 330: Ant 3	Position 330: Ant 4
-30	-31	-31.5	-30.5



4.2 Custom Test - Single Inlay between Two Denim Articles

Position 0 Ant 1	Position 0: Ant 2	Position 0: Ant 3	Position 0: Ant 4
-24	-28	-28	-26
Position 30: Ant 1	Position 30: Ant 2	Position 30: Ant 3	Position 30: Ant 4
-28	-32	-33	-31
Position 60: Ant 1	Position 60: Ant 2	Position 60: Ant 3	Position 60: Ant 4
NA	NA	NA	NA
Position 120: Ant 1	Position 120: Ant 2	Position 120: Ant 3	Position 120: Ant 4
NA	NA	NA	NA
Position 150: Ant 1	Position 150: Ant 2	Position 150: Ant 3	Position 150: Ant 4
-28	-32	-33	-31
Position 180: Ant 1	Position 180: Ant 2	Position 180: Ant 3	Position 180: Ant 4
-24	-28	-28	-26
Position 210: Ant 1	Position 210: Ant 2	Position 210: Ant 3	Position 210: Ant 4
-28	-32	-33	-31
Position 240: Ant 1	Position 240: Ant 2	Position 240: Ant 3	Position 240: Ant 4
NA	NA	NA	NA
Position 300: Ant 1	Position 300: Ant 2	Position 300: Ant 3	Position 300: Ant 4
NA	NA	NA	NA
Position 330 Ant 1	Position 330: Ant 2	Position 330: Ant 3	Position 330: Ant 4
-28	-32	-33	-31



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