



Test Report No. 7012318226

For TAG&Find Wireless Solutions Ltd.

Equipment Under Test:

***Compact UNF RFID reader with BLE connectivity
GearEye RFID reader***

***Model: GearEye-A4
FCC ID: 2AXUS-GRY4***

***From The Standards Institution
Of Israel
Industry Division
Telematics Laboratory
EMC Section***



Certificate Number: AT-1359



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Title: GearEye RFID reader

Model: GearEye-A4

FCC ID: 2AXUS-GRY4

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1. Applicant information

Applicant:	TAG&Find Wireless Solutions Ltd.
Address:	Golda Meir 21, Haifa, 3498223, Israel.
Sample for test selected by:	The customer
The date of tests:	3, 8, 15 September 2020

Equipment under test information

Description of Equipment Under Test (EUT):	Compact UHF RFID reader with BLE connectivity GearEye RFID reader
Model:	GearEye-A4
Software version:	GearEye-A4-2.3.1
Hardware version:	GearEye-A4
Manufactured by:	TAG&Find Wireless Solutions Ltd.

2. Test performance

Location:	SII EMC Section
Purpose of test:	Apparatus compliance verification in accordance with emission requirements
Test specifications:	47CFR part 15.247, 15.207, 15.205, 15.209 and part 1 §1.1310

Reference Documents:

❖	CFR 47 FCC:	Rules and Regulations; Part 15. "Radio frequency devices"; <u>Subpart C</u> : "Intentional radiators" Section 15.205. "Restricted bands of operations", Section 15.209. "Radiated emission limits, general requirements". "Radiated Emission Limits, Additional Provisions"; Section 15.247. "Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz, 5725 - 5875 MHz".
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This Test Report contains 42 pages
and may be used only in full.

This Test Report applies only to the specimen tested and may not
be applied to other specimens of the same product.



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Normative References.

FCC 47 CFR Part 15, Subpart C	Radio Frequency Devices Subpart C – Intentional Radiators
ANSI C63.4: 2014	American National Standard for Method of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI C63.10: 2013	American National Standard for Testing of Unlicensed Wireless Devices.

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3. Summary of test

The EUT was found to be in compliance with requirements of: 47CFR Part 15, §§ 15.247, 15.205 and 15.207, 15.209.

Transmitter characteristics	Subclasses
Occupied bandwidth, channel frequency separation	15.247(a)(1)(i)
Maximum peak conducted output power	15.247(b)(2)
Number of hopping channels, average time of occupancy	15.247(a)(1)(i)
Out of band spurious emissions radiated	15.205, 15.247(d)
Conducted emissions on AC power line	15.207
Unwanted radiated emissions below 1 GHz	15.209

Electronics & Telematics
Laboratory

September 2020

Name: Eng. Yuri Rozenberg
Position: Head of EMC BranchName: Michael Feldman
Position: Test Engineer

The test equipment was calibrated according to its recommended procedures and is within the manufacturer's published limit of error.

The laboratory calibrates its standards by a third party (traceable to NIST, USA) on a regular basis according to equipment manufacturer requirements.

In the following table the uncertainty calculation is given.

Test description	Calculated uncertainty U_{LAB}
Conducted measurements	
Frequency error	37.6 Hz
Spurious emission	± 2.98 dB
Radiated emissions	
Electric field strength in a SAR at 3 m distance 30 MHz – 1.0 GHz	± 4.32 dB
Electric field strength in a FAR at 3 m distance 1.0 GHz – 18 GHz	± 4.47
Substitution measurements	
In a FAR at 3 m distance 1.0 GHz – 18 GHz	± 3.41 dB

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4. Equipment under test description.

*The customer provided description.

4.1 General description

The GearEye RFID transceiver (hereinafter: EUT) is tracking solution for organizes and locates items tagged with passive UHF RFID tags. The device consists of flex-rigid PCB with two RFID antennas, one is coaxial inside the outer cord, the other is wire antenna in the housing. Both antennas are used in different modes of scanning for tags. The device communicates with controlling iOS or Android host device via BLE 5.0. EUT powered from 3.6VDC Li-Ion rechargeable internal battery.

EUT technical characteristics

Transmitter technical characteristics.		Note
Assigned frequency range	902 MHz – 928 MHz	-
Operating frequency range	902.6 MHz – 927.6 MHz	-
Declare Occupied Bandwidth	<250 kHz	-
Spread spectrum technique used	Frequency hopping (FHSS)	-
Number of hops	51	-
Channel dwell time	306 msec	-
Type of modulation	PR-ASK	-
Type of antennas connection	No connectors. Antennas soldered on PCB.	-
Antenna information		
Type	Manufacturer	Antenna gain, dBi
Antenna 1: soldered external coaxial	Tag&Find	1.0
Antenna 2: soldered internal wire	Tag&Find	1.5

4.2 EUT configuration.

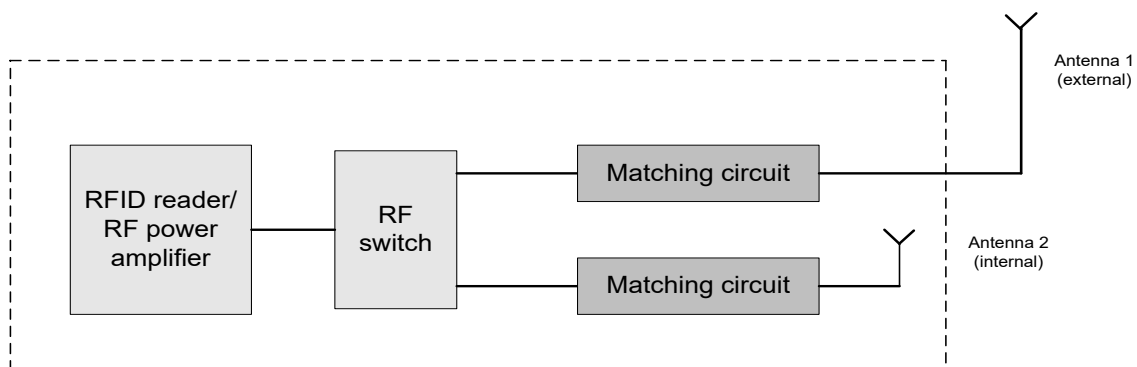


Figure 1. RFID module block diagram.

**Test report No: 7012318226****Page 7 of 42 Pages****Title: GearEye RFID reader****Model: GearEye-A4****FCC ID: 2AXUS-GRY4**Example of frequency hopping sequence.

No	Channel No	Frequency, MHz	No	Channel No	Frequency, MHz
1	17	911.1	27	35	920.1
2	24	914.6	28	31	918.1
3	20	912.6	29	9	907.1
4	49	927.1	30	34	919.6
5	0	902.6	31	25	915.1
6	2	903.6	32	26	915.6
7	23	914.1	33	4	904.6
8	38	921.6	34	11	908.1
9	41	923.1	35	15	910.1
10	50	927.6	36	36	920.6
11	46	925.6	37	19	912.1
12	30	917.6	38	1	903.1
13	6	905.6	39	39	922.1
14	44	924.6	40	42	923.6
15	45	925.1	41	7	906.1
16	48	926.6	42	29	917.1
17	18	911.6	43	12	908.6
18	32	918.6	44	21	913.1
19	27	916.1	45	37	921.1
20	47	926.1	46	22	913.6
21	3	904.1	47	5	905.1
22	10	907.6	48	8	906.6
23	14	909.6	49	13	909.1
24	40	922.6	50	28	916.6
25	43	924.1	51	33	919.1
26	16	910.6			

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FCC requirements	15.247(a)(1)(i)		
Operating Frequency Range	902.6 – 927.6 MHz		
Ambient Temperature	22 ⁰ C	Relative Humidity	57% Air Pressure 1010 hPa

Carrier frequency MHz	Measured 20 dB bandwidth, kHz	Reference to plots #
902.6	82.5	1
915.0	81.5	2
927.6	82.5	3

Frequency range MHz	Carrier frequency separation, kHz	Reference to plots #
902.6 – 927.6	500	4, 5

LIMIT

Operating frequency range, MHz	Channel carrier frequency separation.
902 - 928	25 kHz or 20 dB bandwidth, whichever is greater. Maximum allowed 20 dB bandwidth 500 kHz

TEST PROCEDURE

The measurements were performed in hopping transmission mode of operation for carrier (channel) frequency at bottom, middle and at the top of 902 – 928 MHz frequency band and maximum transmitting data rate.

TEST EQUIPMENT USED:

1	6	2	9	15		
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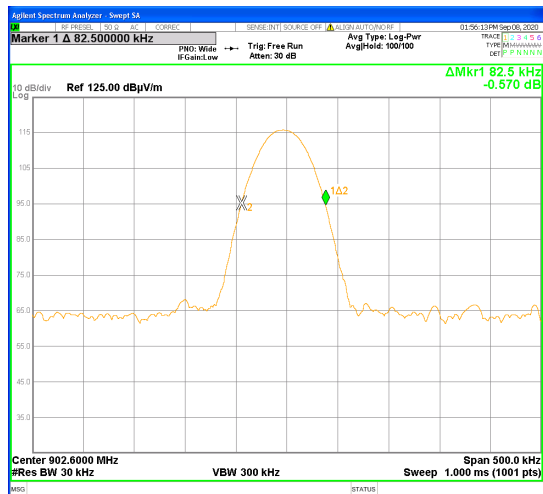
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Title: GearEye RFID reader

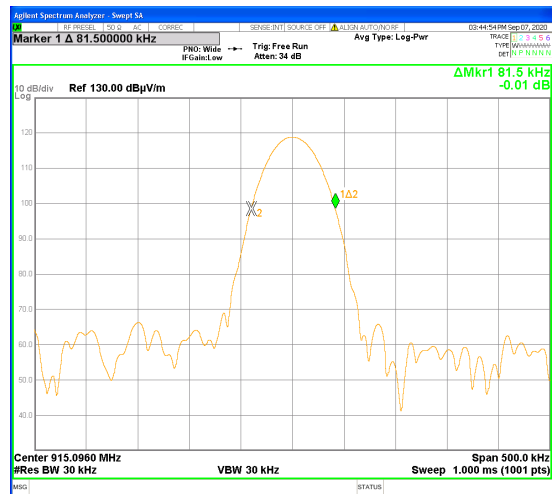
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FCC ID: 2AXUS-GRY4

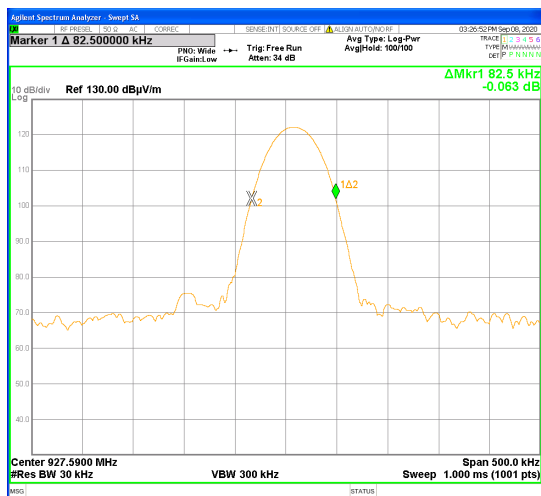
OBW test



Plot # 1



Plot # 2



Plot # 3



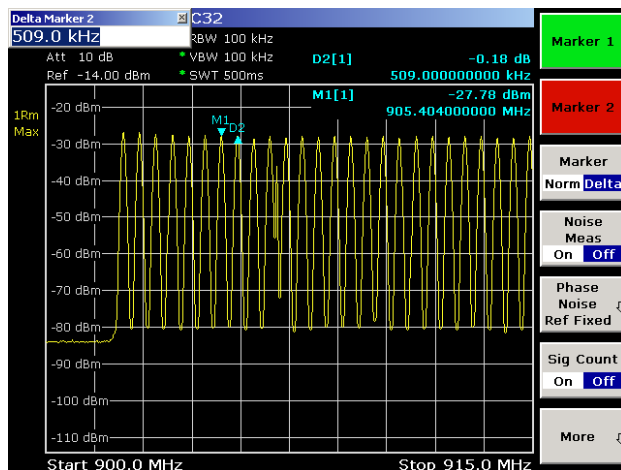
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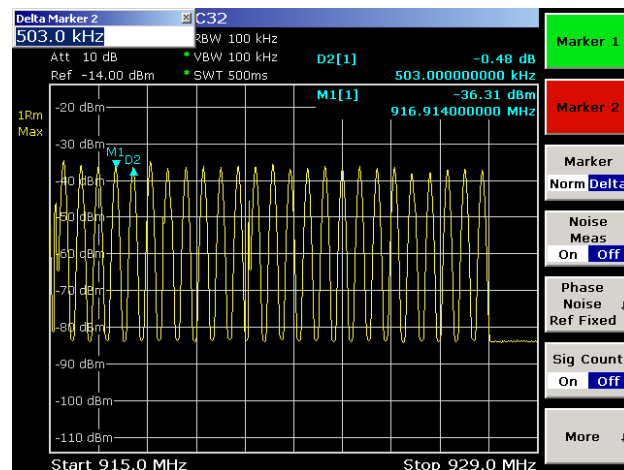
Title: GearEye RFID reader

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Plot # 4. Hopping channels separation



Plot # 5. Hopping channels separation

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5.1.2 Maximum peak conducted output power test.

FCC requirement	15.247(b)(2)		
Operating Frequency Band	902.6 – 927.6 MHz		
Ambient Temperature	22 ⁰ C	Relative Humidity	57% Air Pressure 1010 hPa

Antenna 1.

Carrier frequency, MHz	Field strength, dBμV/m	**EIR power, dBm	*Conducted output power, dBm	Conducted power limit, dBm	Reference to plot #
902.6	119.4	24.2	23.2	30	6
915.1	121.6	26.4	25.4	30	7
927.6	122.9	27.7	26.7	30	8

*The maximum conducted output power = EIR power – Antenna gain. Antenna gain = 1.0 dBi.

**EIR power = E Field strength (dBμV/m@3m) - 95.2

Antenna 2.

Carrier frequency, MHz	Field strength, dBμV/m	**EIR power, dBm	*Conducted output power, dBm	Conducted power limit, dBm	Reference to plot #
902.6	115.6	20.4	18.9	30	9
915.1	116.6	21.4	19.9	30	10
927.6	117.9	22.7	21.2	30	11

*The maximum conducted output power = EIR power – Antenna gain. Antenna gain = 1.5 dBi.

**EIR power = E Field strength (dBμV/m@3m) - 95.2

Measured field straight level was converted to EIR power level. The measurement of EIRP provided after verification according to substitution test method. EUT was replaced by generator and substitution antenna. Result calculated from generator output level, substitution antenna gain and loss of connected cable was used for EIRP calculation. Transmitter was operated in continuous transmit mode at bottom, middle and top of the 902 - 928 MHz frequency band.

LIMIT

Operating frequency band, MHz	Maximum output power
902 - 928	For systems employing at least 50 hopping channels 1W (30 dBm).

TEST EQUIPMENT USED:

1	6	8	9	14	17	
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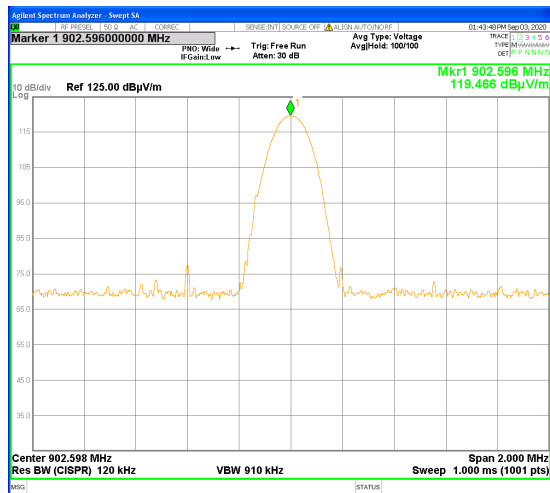
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Model: GearEye-A4

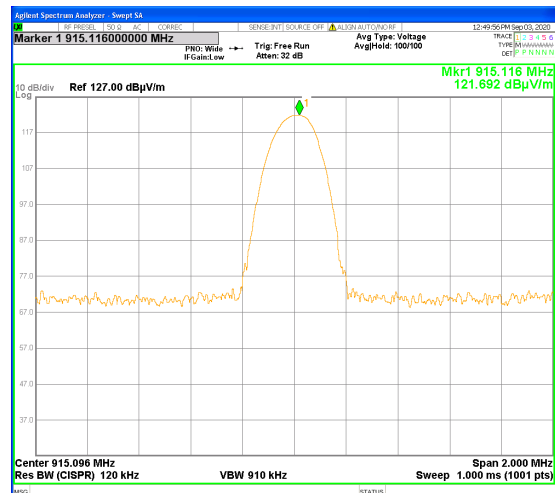
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FCC ID: 2AXUS-GRY4

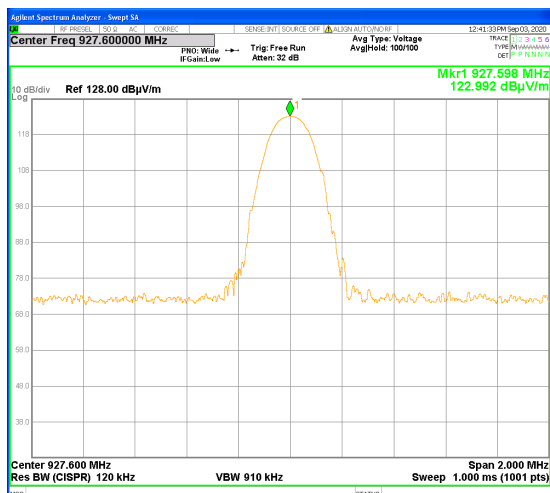
Antenna 1.



Plot # 6.



Plot # 7.



Plot # 8.



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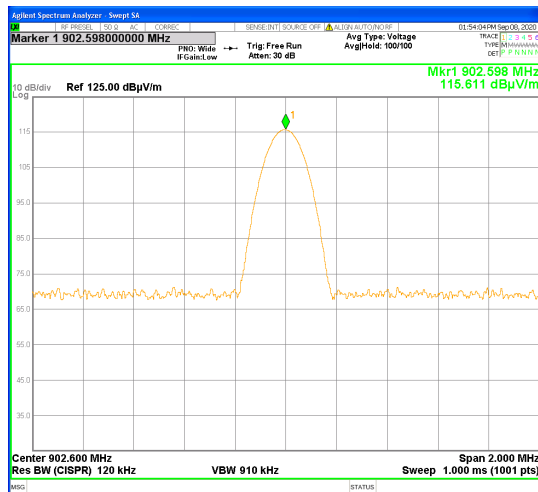
Title: GearEye RFID reader

Model: GearEye-A4

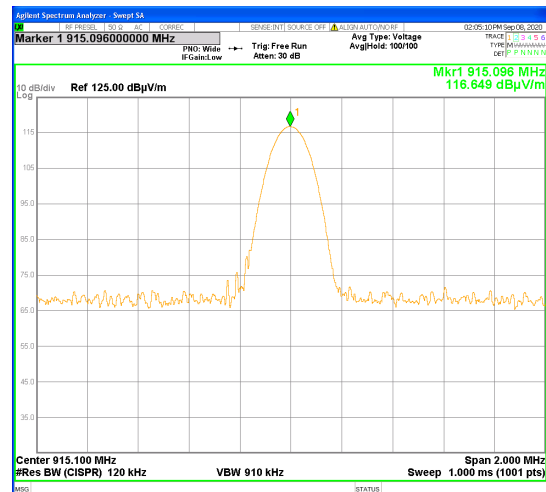
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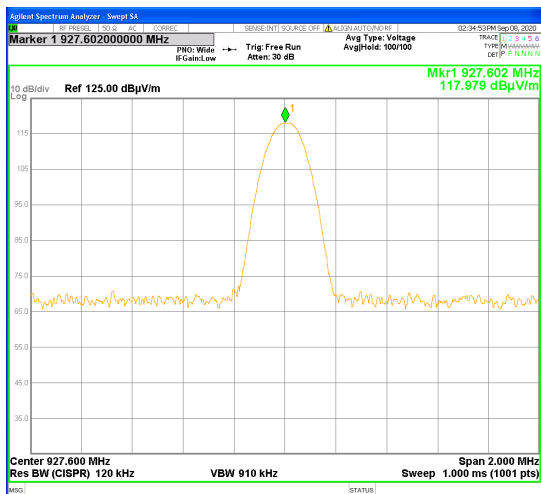
Antenna 2.



Plot # 9.



Plot # 10.



Plot # 11.

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FCC requirements	15.247(a)(1)(i)		
Operating Frequency Range	902.6 – 927.6 MHz		
Ambient Temperature	22 ⁰ C	Relative Humidity	57% Air Pressure 1010 hPa

Frequency band, MHz	Number of hopping frequencies	Average time of occupancy*	Reference to plots #
902 - 928	51	306 msec	12 - 15

* The average time of occupancy was calculated as follow:
Three transmissions of 102 msec pulse duration = 306 msec.

LIMIT

902 – 928 MHz band	Number of hopping channels	Average time of occupancy
OBW < 250 kHz	≥ 50 channels	≤ 0.4 s within the period of 20 sec.

TEST PROCEDURE

The test was performed in hopping transmission mode of operation for carrier (channel) frequency at bottom, middle and at the top of 902 – 928 MHz frequency band and maximum transmitting data rate.

TEST EQUIPMENT USED:

2	9	15	17			
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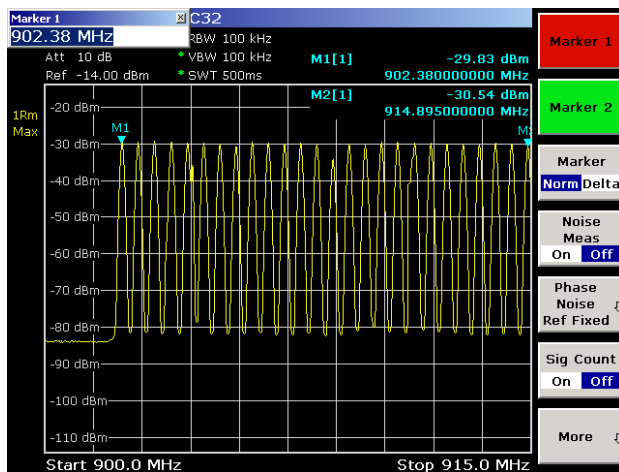
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Title: GearEye RFID reader

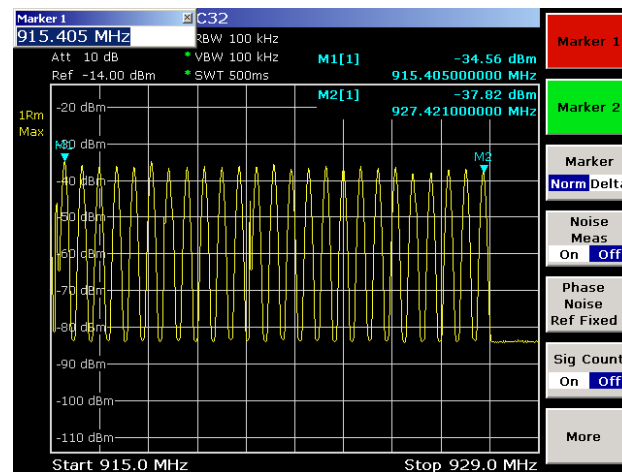
Model: GearEye-A4

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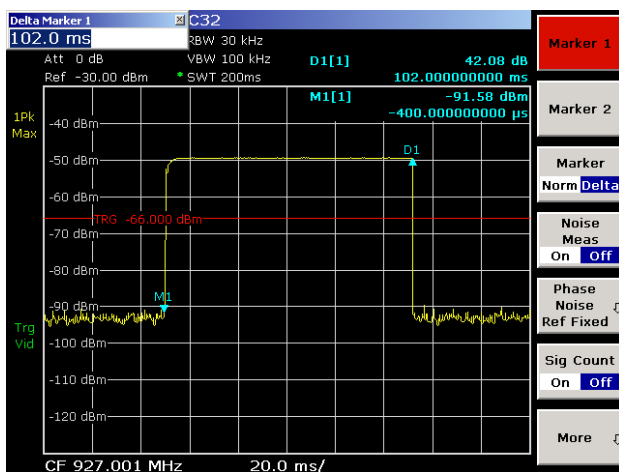
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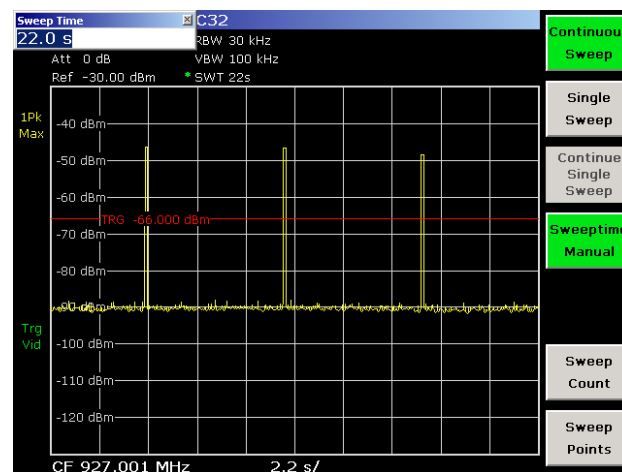
Plot # 12. Hopping channels.



Plot # 13. Hopping channels.



Plot # 14. One transmission duration.



Plot # 15. Average time of occupancy

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Method of measurement	ANSI 63.10 §§ 6.5, 6.6		
Operating Frequency Range	902.6 – 927.6 MHz		
Ambient Temperature	23 ⁰ C	Relative Humidity	56% Air Pressure 1011 hPa

The frequency spectrum was investigated from the lowest radio frequency signal generated in the equipment and up to ten harmonics. The test was performed for both antenna 1 and antenna 2 separately. For the test results refer to tables and plots in this section. Emission results in 30 – 902 MHz frequency band present in section 6.

Antenna 1.Carrier frequency 902.6 MHz

Frequency, MHz	Radiated emissions, dBμV/m	Peak limit, dBμV/m	Avg limit, dBμV/m	Margin, dB	Note	Reference to plot#
902.0	75.0	101.6	-	>20	Detector peak	17
973.9	42.6	-	54.0	11.4	Detector peak	18
1805	49.1	101.8	-	>20	Detector peak	19
2707.8	53.8	74.0	-	>20	Detector peak	20
2707.8	48.9	-	54.0	5.1	Detector average	20
8488.0	55.7	74.0	-	18.3	Detector peak	21
8488.0	44.3	-	54.0	9.7	Detector average	21

Carrier frequency 915.0 MHz

Frequency, MHz	Radiated emissions, dBμV/m	Peak limit, dBμV/m	Avg limit, dBμV/m	Margin, dB	Note	Reference to plot#
902.0	72.1	101.8	-	>20	Detector peak	23
960.8	44.6	-	54.0	9.4	Detector peak	24
1831.0	53.7	101.8	-	>20	Detector peak	25
2745.3	54.8	74.0	-	19.2	Detector peak	26
2745.3	47.5	-	54	6.5	Detector average	26
7668.0	55.0	74.0	-	19.0	Detector peak	27
7668.0	44.7	-	54.0	9.3	Detector average	27

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Carrier frequency 927.6 MHz

Frequency, MHz	Radiated emissions, dB μ V/m	Peak limit, dB μ V/m	Avg limit, dB μ V/m	Margin, dB	Note	Reference to plot#
928.0	76.7	102.3	-	>20	Detector peak	29
960.8	43.8	-	54.0	10.2	Detector peak	30
2782.7	55.5	74	-	18.5	Detector peak	32
2782.7	51.6	-	54.0	2.4	Detector average.	32
3710.5	56.6	74	-	17.4	Detector peak	33
3710.4	49.1	-	54	4.9	Detector average.	33
7420.8	55.4	74	-	17.6	Detector peak	35
7420.8	48.5	-	54	5.5	Detector average.	35
8348.3	58.2	74	-	15.8	Detector peak	36
8348.3	51.3	-	54	2.7	Detector average.	36

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Antenna 2.

Carrier frequency 902.6 MHz

Frequency, MHz	Radiated emissions, dB μ V/m	Peak limit, dB μ V/m	Avg limit, dB μ V/m	Margin, dB	Note	Reference to plot#
902.0	72.6	96.2	-	>20	Detector peak	38
995.0	42.4	-	54.0	11.6	Detector peak	39
1805.0	50.8	96.2	-	>20	Detector peak	40
2707.9	55.4	74.0	-	18.6	Detector peak	41
2707.8	47.3	-	54.0	6.7	Detector average	41
3610.4	50.3	74.0	-	>20	Detector peak	42
3610.3	42.1	-	54.0	11.9	Detector average	42

Carrier frequency 915.0 MHz

Frequency, MHz	Radiated emissions, dB μ V/m	Peak limit, dB μ V/m	Avg limit, dB μ V/m	Margin, dB	Note	Reference to plot#
902.0	72.0	95.0	-	>20	Detector peak	45
969.2	41.3	-	54.0	12.7	Detector peak	46
2745.0	54.1	74.0	-	19.9	Detector peak	48
2745.0	48.9	-	54	5.1	Detector average	48
3660.3	47.0	74.0		19.0	Detector peak	49
3660.3	40.4		54.0	13.6	Detector average	49

Carrier frequency 927.6 MHz

Frequency, MHz	Radiated emissions, dB μ V/m	Peak limit, dB μ V/m	Avg limit, dB μ V/m	Margin, dB	Note	Reference to plot#
928.0	71.9	98.0	-	>20	Detector peak	52
962.6	41.0	-	54.0	13.0	Detector peak	53
2782.8	60.0	74	-	14.0	Detector peak	55
2782.8	53.6	-	54.0	0.4	Detector average.	55
3710.5	56.6	74	-	17.4	Detector peak	56
3710.4	40.7	-	54	13.3	Detector average.	56

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The measurements were performed in hopping transmission mode of operation for carrier (channel) frequency at bottom, middle and at the top of 902 – 928 MHz frequency band and maximum transmitting data rate. To find maximum radiation the turntable was rotated 360°, measuring antenna height was changed from 1 to 4 m, and the antenna polarization was changed from vertical to horizontal.

LIMIT

In any 100 kHz bandwidth outside the frequency band the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below in band highest level desired power. Radiated emissions, which fall in the restricted bands, must comply with the radiated emissions limit specified in section 15.205(c).

TEST SUMMARY

All emissions outside of the 902 - 928 MHz band were found below 15.247(d) limit.

TEST EQUIPMENT USED:

1	2	3	6	13	16	
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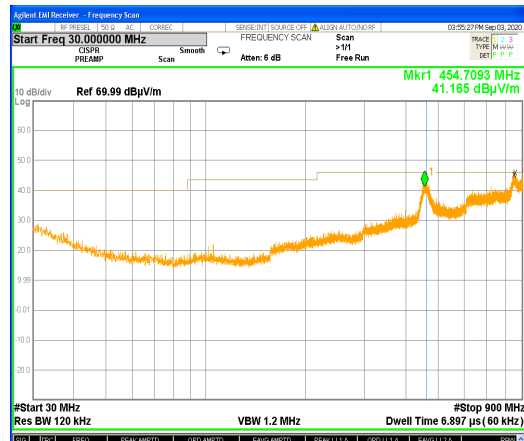
Model: GearEye-A4

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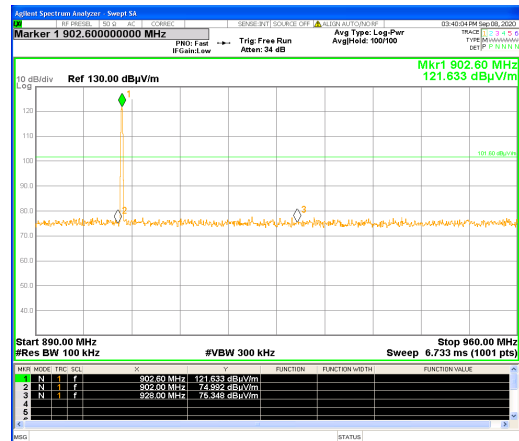
FCC ID: 2AXUS-GRY4

Antenna 1.

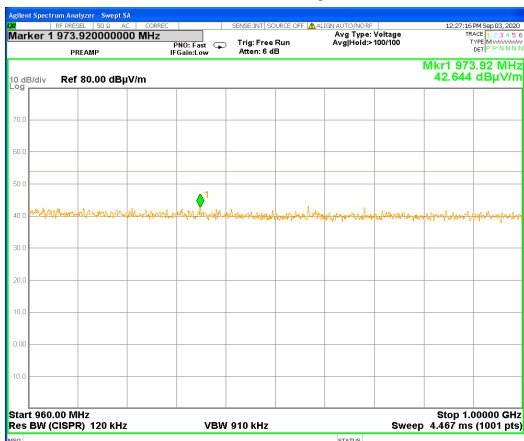
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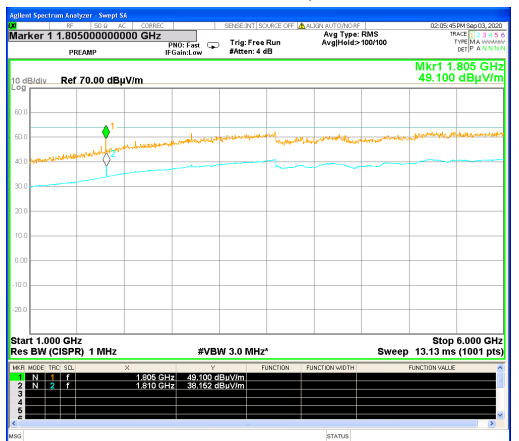
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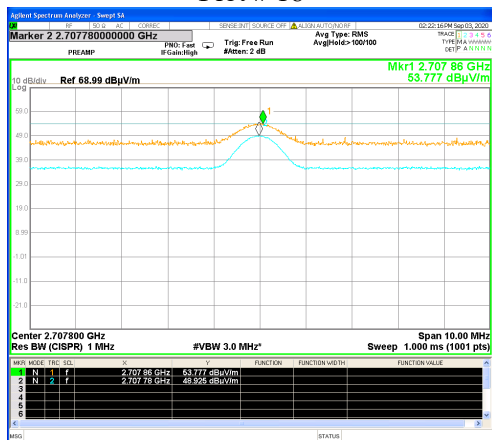
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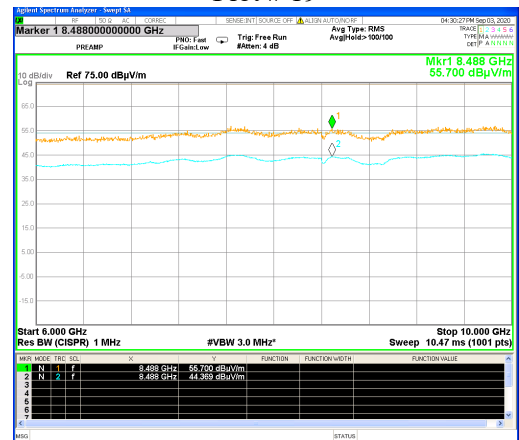
Plot # 18



Plot # 19



Plot # 20



Plot # 21



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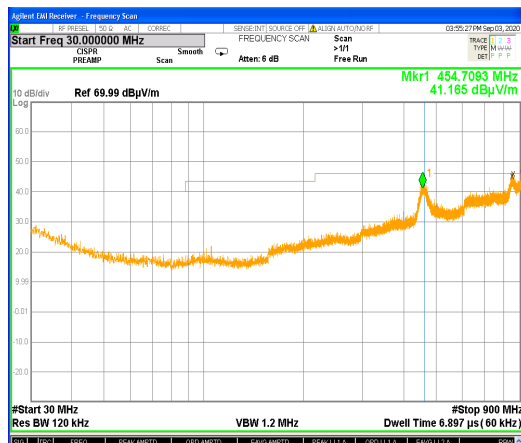
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Model: GearEye-A4

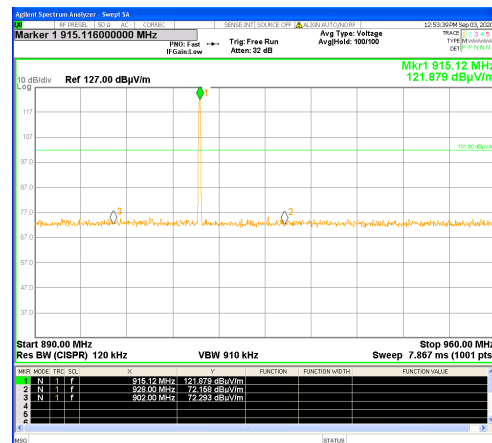
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FCC ID: 2AXUS-GRY4

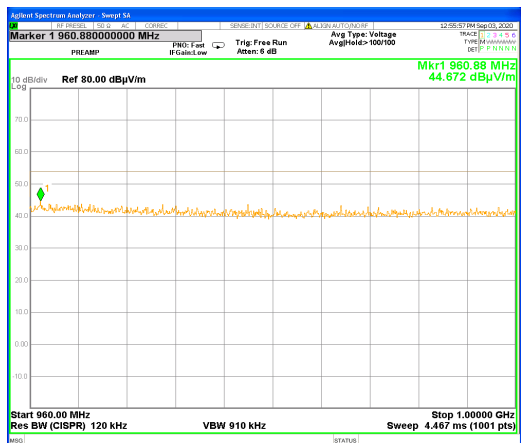
Carrier frequency – 915.0 MHz.



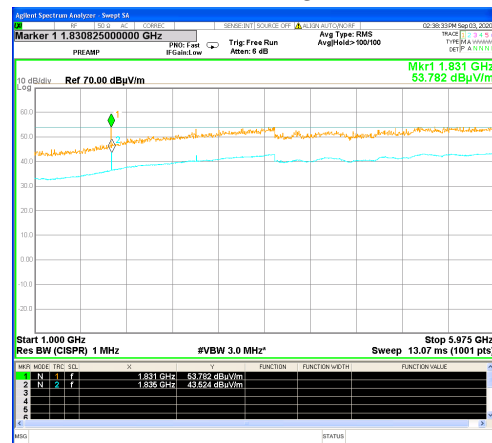
Plot # 22



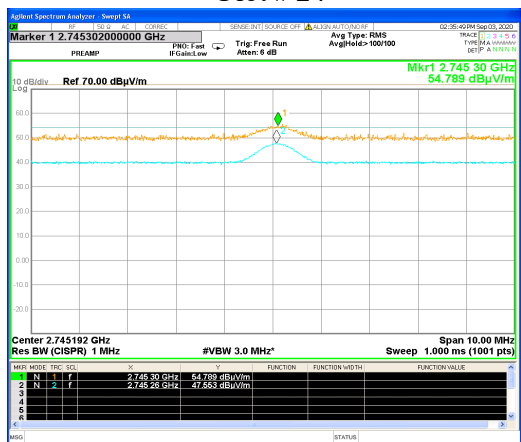
Plot # 23



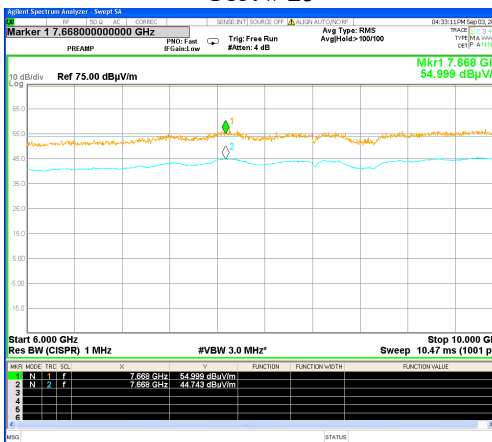
Plot # 24



Plot # 25



Plot # 26



Plot # 27



Test report No: 7012318226

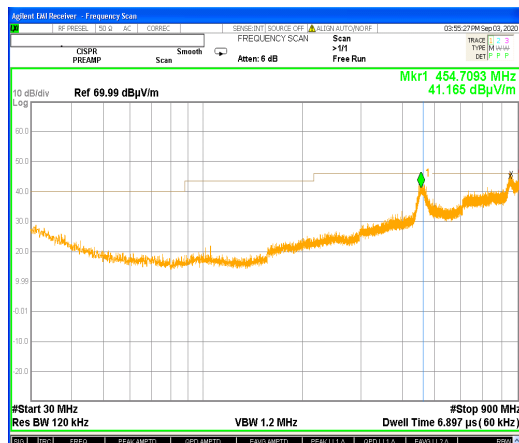
Title: GearEye RFID reader

Model: GearEye-A4

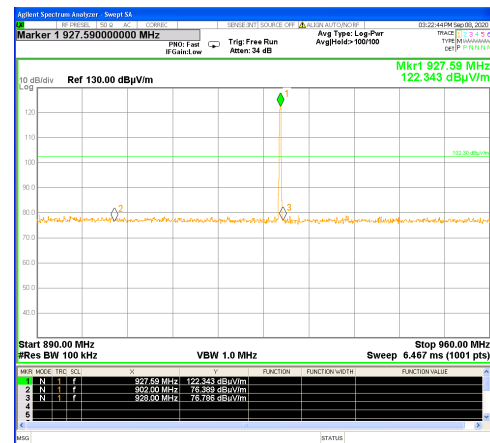
Page 22 of 42 Pages

FCC ID: 2AXUS-GRY4

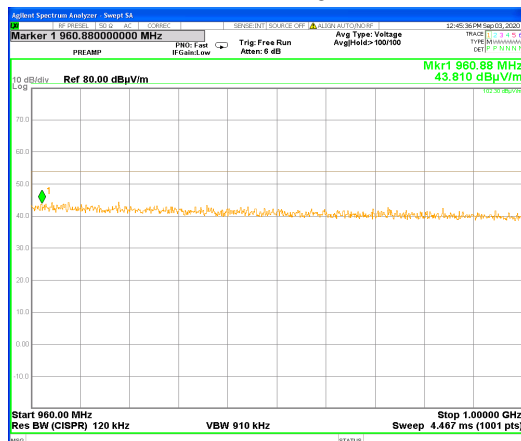
Carrier frequency 927.6 MHz



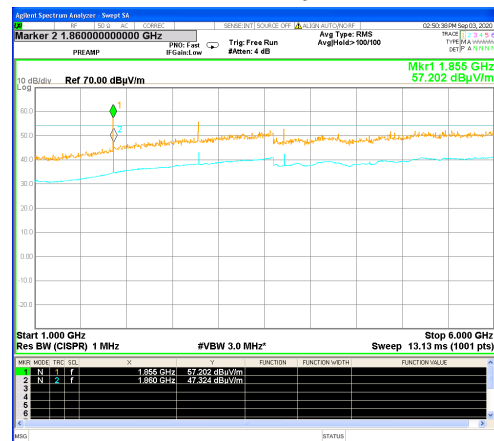
Plot # 28



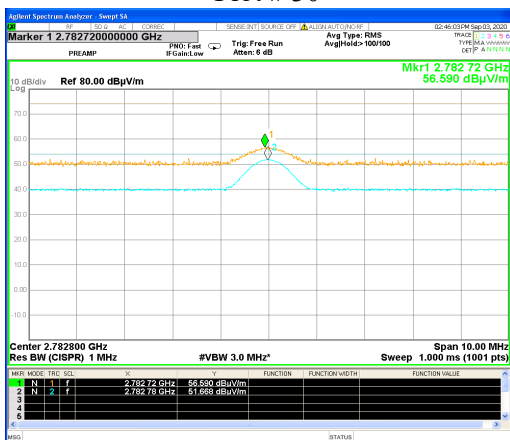
Plot # 29



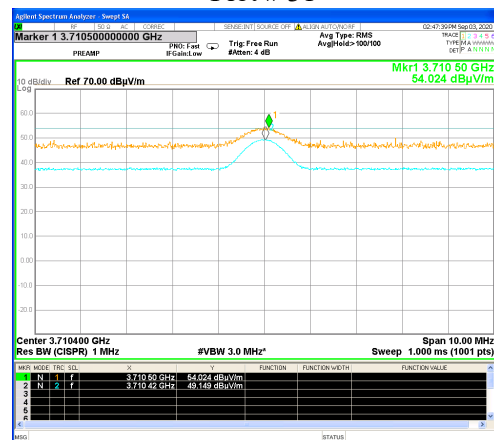
Plot # 30



Plot # 31



Plot # 32



Plot # 33



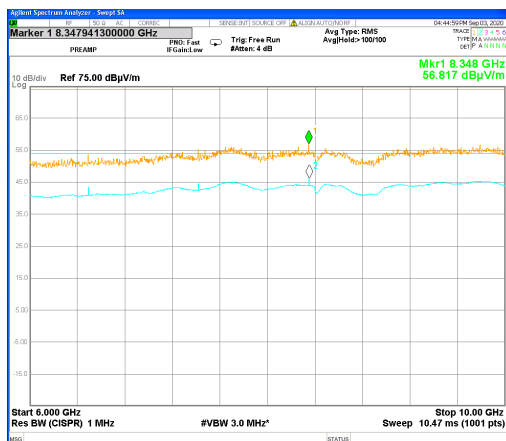
Test report No: 7012318226

Title: GearEye RFID reader

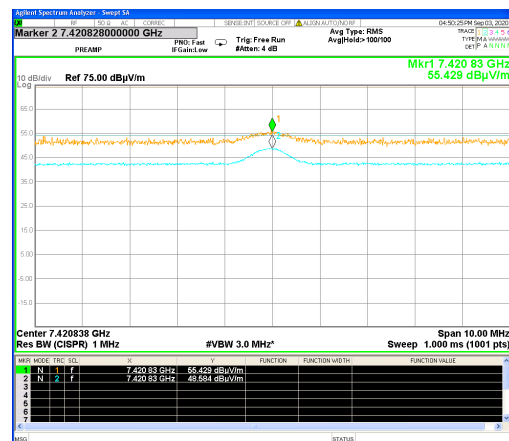
Model: GearEye-A4

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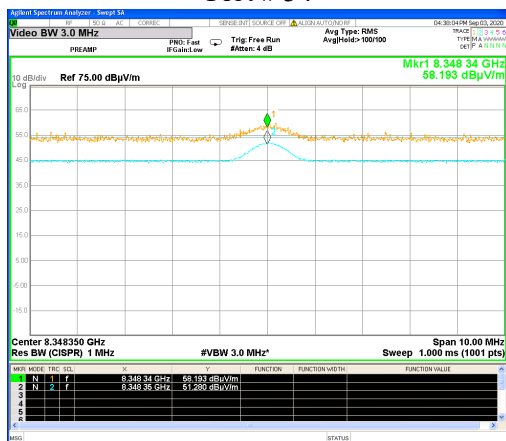
FCC ID: 2AXUS-GRY4



Plot # 34



Plot # 35



Plot # 36



Test report No: 7012318226

Title: GearEye RFID reader

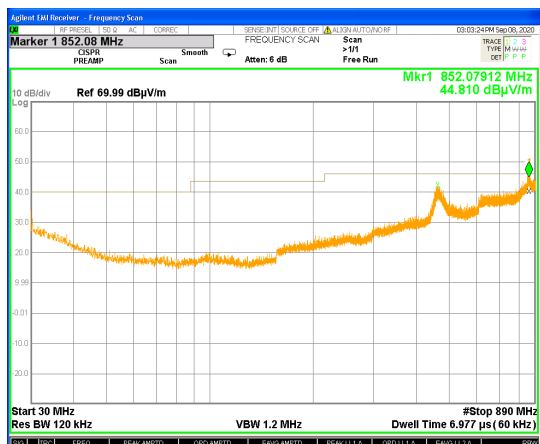
Model: GearEye-A4

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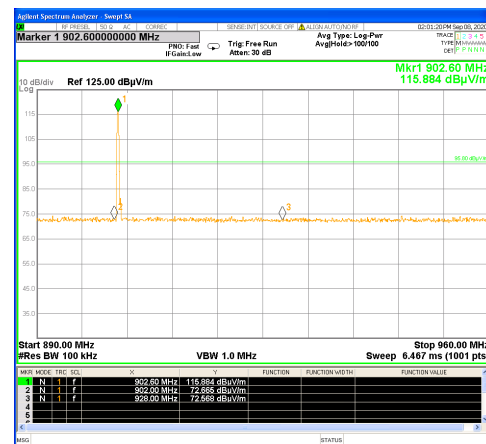
FCC ID: 2AXUS-GRY4

Antenna 2.

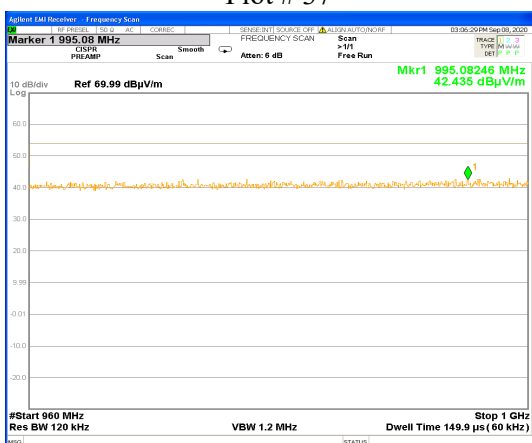
Carrier frequency – 902.6 MHz



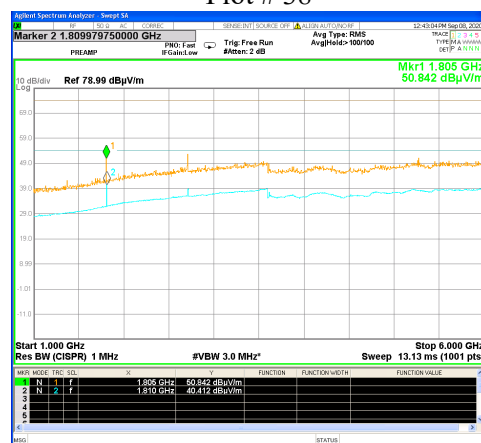
Plot # 37



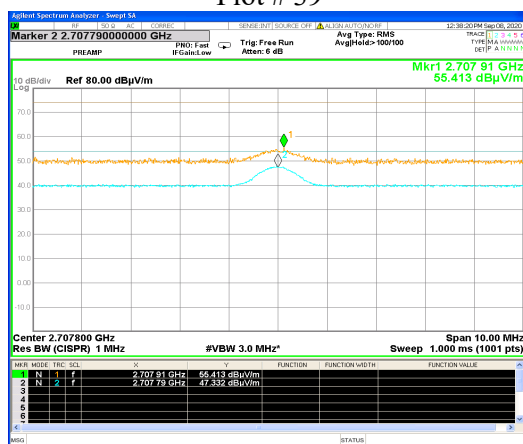
Plot # 38



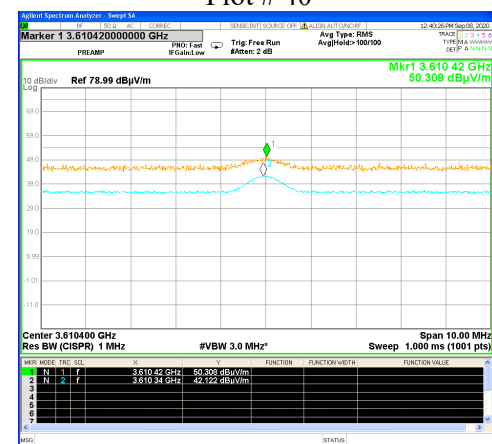
Plot # 39



Plot # 40



Plot # 41



Plot # 42



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Title: GearEye RFID reader

Model: GearEye-A4

FCC ID: 2AXUS-GRY4



Plot # 43

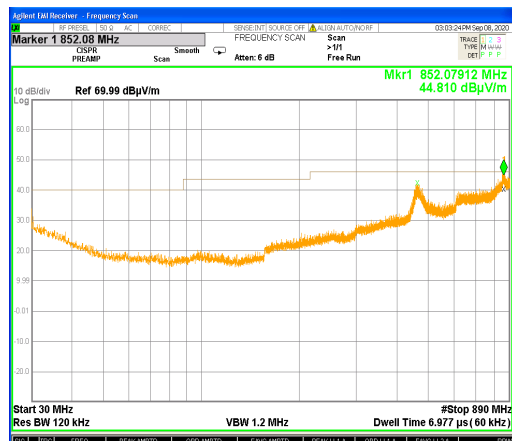


Test report No: 7012318226
Title: GearEye RFID reader
Model: GearEye-A4

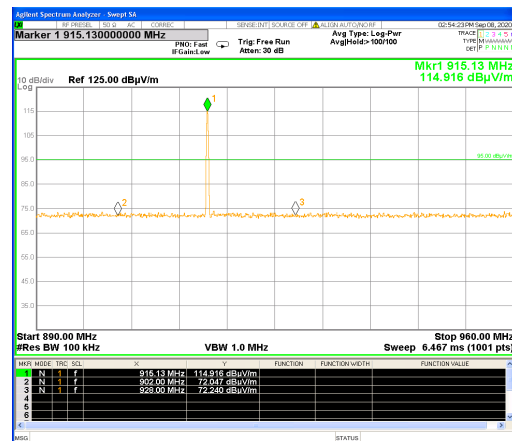
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FCC ID: 2AXUS-GRY4

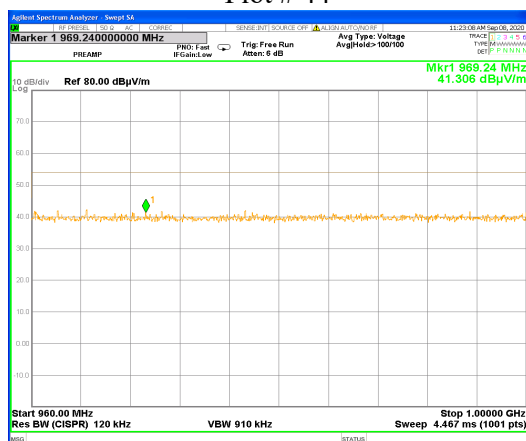
Carrier frequency – 915.0 MHz.



Plot # 44



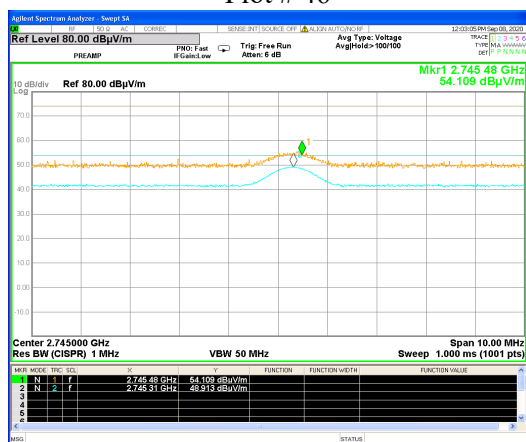
Plot # 45



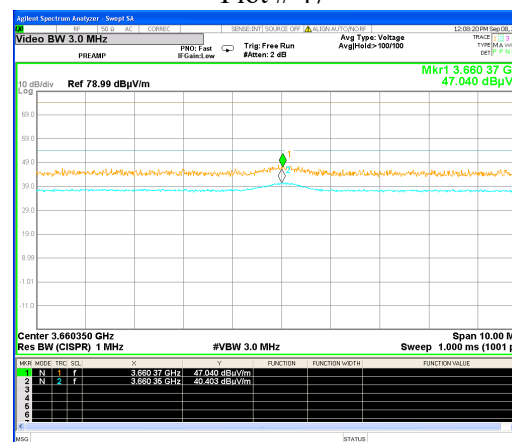
Plot # 46



Plot # 47



Plot # 48



Plot # 49



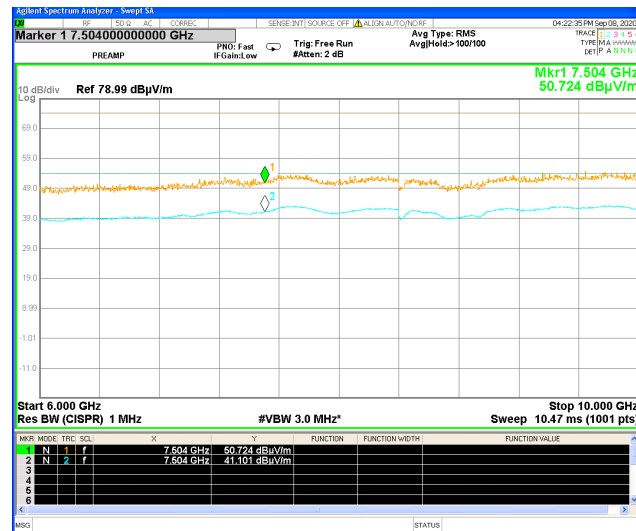
Test report No: 7012318226

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Title: GearEye RFID reader

Model: GearEye-A4

FCC ID: 2AXUS-GRY4



Plot # 50



Test report No: 7012318226

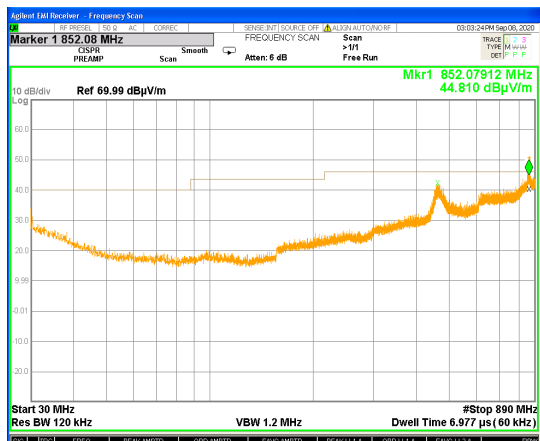
Title: GearEye RFID reader

Model: GearEye-A4

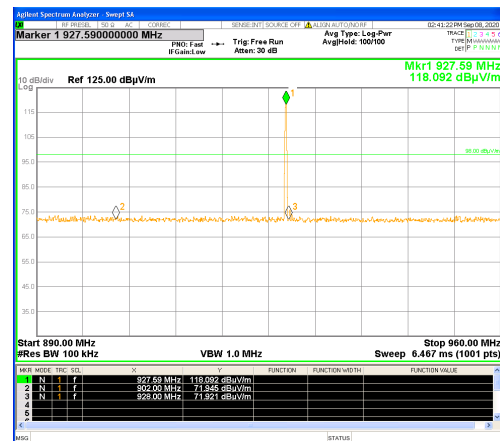
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FCC ID: 2AXUS-GRY4

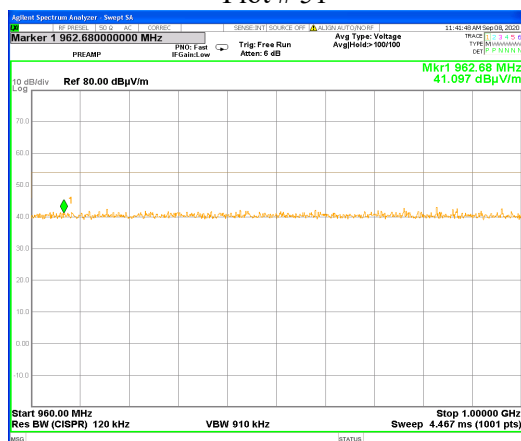
Carrier frequency 927.6 MHz



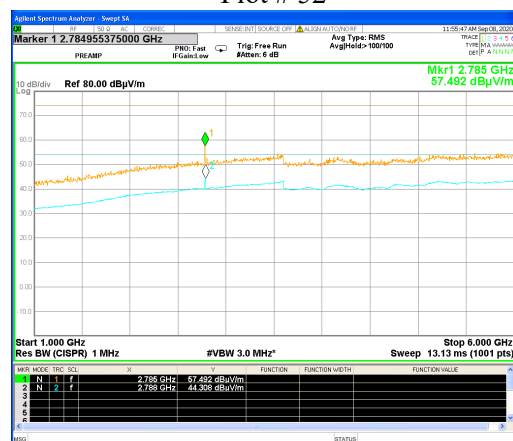
Plot # 51



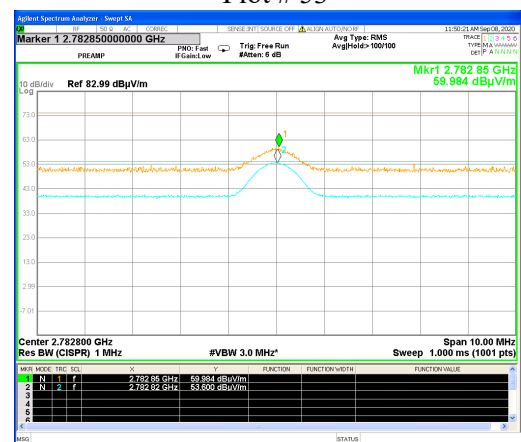
Plot # 52



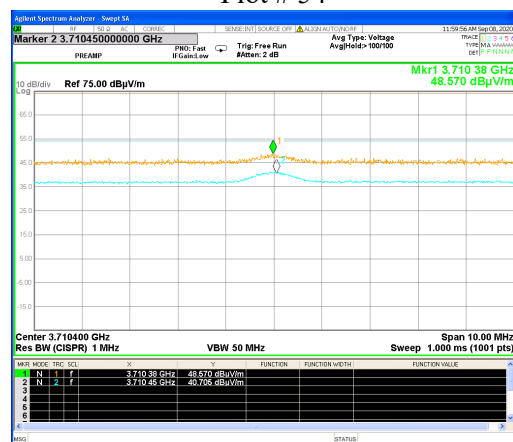
Plot # 53



Plot # 54



Plot # 55



Plot # 56



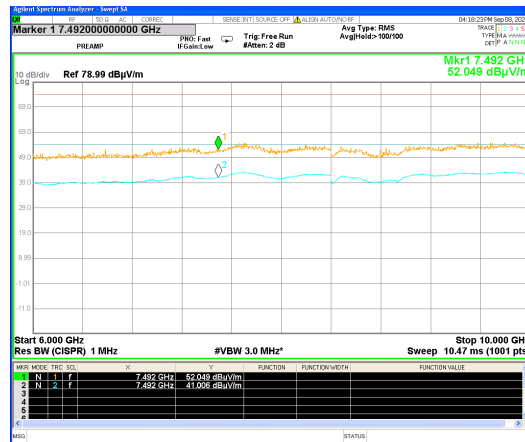
Test report No: 7012318226

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Title: GearEye RFID reader

Model: GearEye-A4

FCC ID: 2AXUS-GRY4



Plot # 57

**Test report No: 7012318226****Page 30 of 42 Pages****Title: GearEye RFID reader****Model: GearEye-A4****FCC ID: 2AXUS-GRY4****6. Radiated emissions test according to §15.209.**

Method of measurement	ANSI 63.10 §§ 6.4, 6.5		
Operating Frequency Range	902.6 – 927.6 MHz		
Ambient Temperature	23 ⁰ C	Relative Humidity	58% Air Pressure 1009 hPa

TEST DESCRIPTION:

The measurements were performed in semi anechoic chamber at 3 m test distance. The transmitter was placed on the turn - table. The Biconilog antenna was used in 30 to 1000 MHz frequency range. The frequency range was investigated and the measurements were performed at each frequency at which the signal was 10 dB below the limit or less. The level was maximized by initially rotating turntable through 360°, varying the antenna height between 1 m and 4 m, rerouting EUT cables and changing antenna polarization from vertical to horizontal.

REQUIREMENTS:

EUT radiated emission shall not exceed value required in section 15.209

TEST RESULT:

Test results are presented in the table in this section.



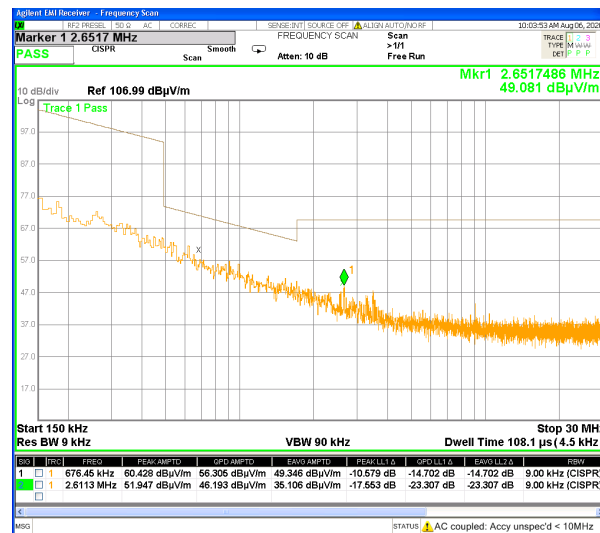
Test report No: 7012318226

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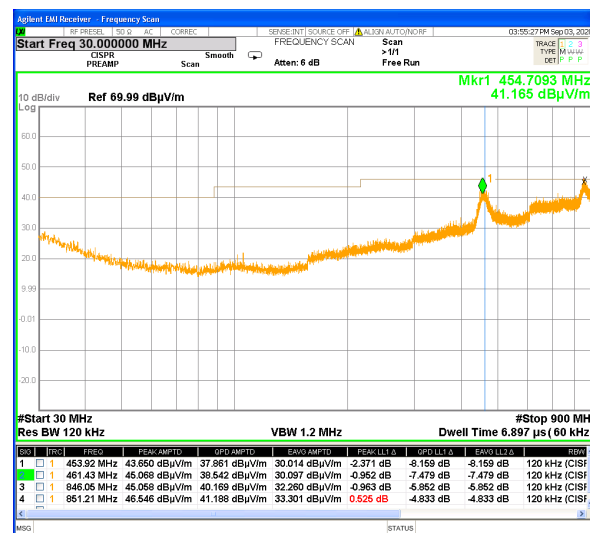
Title: GearEye RFID reader

Model: GearEye-A4

FCC ID: 2AXUS-GRY4



Plot # 58. Investigation result in 0.15 – 30 MHz frequency range.



Plot # 59. Investigation result in 30 - 900 MHz frequency range.

**Test report No: 7012318226****Page 32 of 42 Pages****Title: GearEye RFID reader****Model: GearEye-A4****FCC ID: 2AXUS-GRY4****Radiated emission test results.**

Frequency (MHz)	Antenna Polariz V/H	Turn- table Angle (°)	Antenna Height (m)	Emission Level Note 1 dB μ V/m	Limit @ 3m dB μ V/m	Margin Note 2 dB	Verdict
453.9	H	116	1.0	37.8	46.0	8.2	Pass
461.4	H	142	1.0	38.5	46.0	7.5	Pass
846.0	H	124	1.0	40.1	46.0	5.9	Pass
851.2	H	129	1.0	41.2	46.0	4.8	Pass

Note 1: Emission level = E Reading (dB μ V) + Cable loss (dB) + Antenna Factor (dB/m).
For Cable Loss and Antenna Factor refer to Appendix 2.

Note 2: Margin (dB) = Limit (dB μ V/m) – Emission level (dB μ V/m)

TEST EQUIPMENT USED:

1	6	13				
---	---	----	--	--	--	--

**Test report No: 7012318226****Page 33 of 42 Pages****Title: GearEye RFID reader****Model: GearEye-A4****FCC ID: 2AXUS-GRY4****7. Conducted emissions test according to § 15.207.**

Method of measurement	ANSI 63.10 § 6.2		
Ambient Temperature	23 ⁰ C	Relative Humidity	54% Air Pressure 1010 hPa

Frequency, MHz	Class B equipment, dB (µV)	
	QP	AVRG
0.15 - 0.5	66 - 56*	56 - 46*
0.5 - 5	56	46
5 - 30	60	50

* Decreases linearly with the logarithm of the frequency.

TEST PROCEDURE

EUT was connected to 120VAC main via auxiliary 5VDC power supply.

The EUT was placed on a table in shielded room at a height 80 cm from floor and 40 cm from the vertical reference plane and at more than 80 cm from any other metal surfaces.

The measurements were performed at mains terminals by means of LISN, connected to spectrum analyzer in the frequency range as referred to in the table above. The measurements were made with quasi-peak (CISPR) and average detectors. The position of the EUT cables was varied to determine maximum emission level.

TEST RESULTS:

Test results present at plots # 60 for line Phase and # 61 for line Neutral.

TEST EQUIPMENT USED:

1	11	12				
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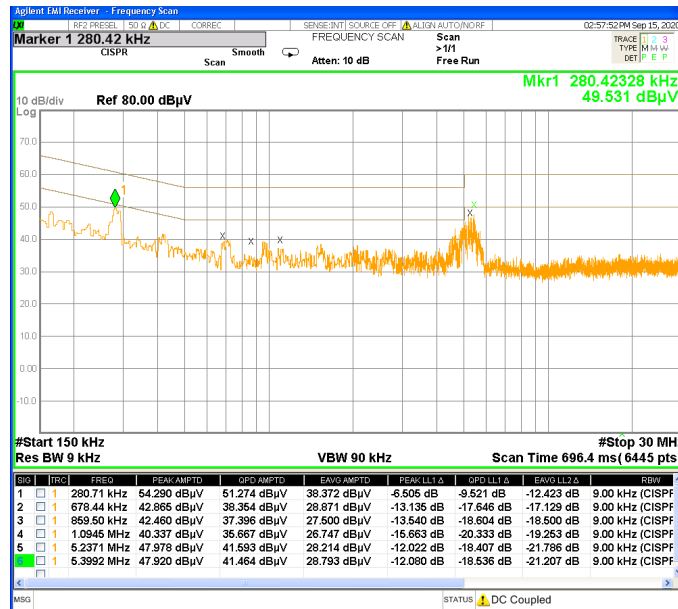
Test report No: 7012318226

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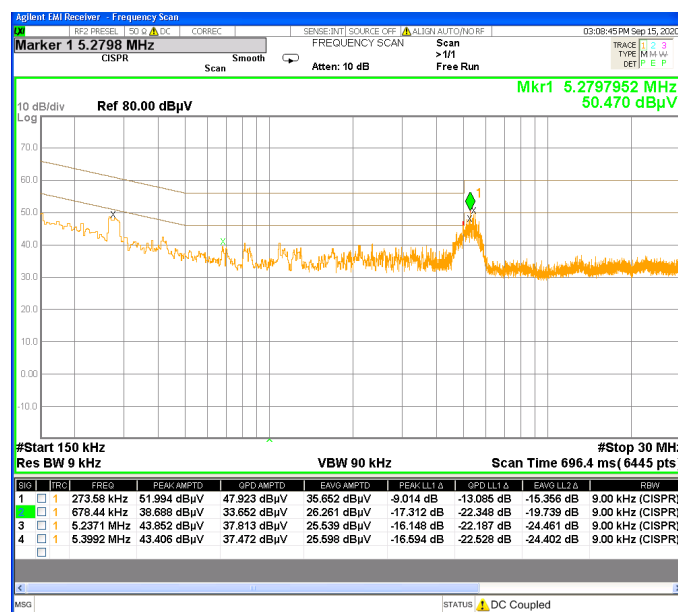
Title: GearEye RFID reader

Model: GearEye-A4

FCC ID: 2AXUS-GRY4



Plot # 60. AC line conducted emissions test. Line Phase



Plot # 61. AC line conducted emissions test. Line Neutral

Test report No: 7012318226**Page 35 of 42 Pages****Title:** GearEye RFID reader**Model:** GearEye-A4**FCC ID:** 2AXUS-GRY4**8. APPENDIX A. Photo of the test setups.****Antenna 1 test****Antenna 1 test****Antenna 2 test**

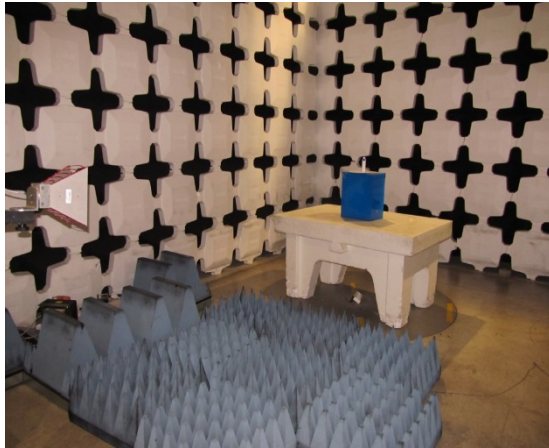
Test report No: 7012318226

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Title: GearEye RFID reader

Model: GearEye-A4

FCC ID: 2AXUS-GRY4



Antenna 2 test



Antenna 2 test

**Test report No: 7012318226****Page 37 of 42 Pages****Title: GearEye RFID reader****Model: GearEye-A4****FCC ID: 2AXUS-GRY4****9. APPENDIX B. Test equipment.****Test equipment used**

No	Description	Manufacturer information			Due Calibration date
		Name	Model	Serial No	
1	MXE EMI Receiver 20 Hz -26.5 GHz	Agilent	N9038A	MY52130048	June 2021
2	Cable RF 1.5 m	Midwest Microwave	LCSX10079	10-11-004	October 2020
3	Double Ridged Guide Antenna 0.75 – 18 GHz	ETS-Lindgren	3115	00143138	March 2021
4	Broadband Horn antenna 15 – 40 GHz	Schwarzbeck Mess-Electronik	BBHA 9170	9170-341	March 2021
5	Double Ridged Waveguide Horn Antenna 1 – 18 GHz	ETS-Lindgren	3117	00139055	March 2021
6	Antenna Biconilog 26 – 6000 MHz	ETS-Lindgren	31142D	0146490	March 2021
7	Spectrum analyzer 20 Hz-40 GHz	Rohde&Schwarz	ESU 40	100168	November 2020
8	MXG Signal Generator 100 KHz - 20 GHz	Agilent	N5183A	6501148	December 2020
9	Attenuator 3 dB DC – 12.4 GHz	HP	8491A	50469	October 2020
10	USB preamplifier 2 GHz – 50 GHz	Keysight	U7227F	MY55380004	January 2021
11	LISN 9 kHz – 30 MHz	Fischer Custom	FCC - LISN -50-25- 2	4025	February 2021
12	Transient limiter 0.009-200 MHz	HP	11947A	3107105	August 2021
13	Cable RF 5m	Harbour Industries	Neoflex LLEF142	1802	July 2021
14	Cable RF 0.5m	Huber-Suhner	Multiplex 141	520201	October 2020
15	Spectrum analyzer 9 kHz-6 GHz	Rohde&Schwarz	FSL	101027	August 2021
16	Active Loop antenna 1.0 kHz – 30 MHz	ETS-Lindgren	6507	00144641	December 2020
17	Dipole Antenna 400 – 1000 MHz	Compliance Design Inc.	Roberts Antenna 4	SII4929	December 2020

**Test report No: 7012318226****Page 38 of 42 Pages****Title: GearEye RFID reader****Model: GearEye-A4****FCC ID: 2AXUS-GRY4****Cable Loss (Mast 6 m set cable.)**

Point	Frequency (MHz)	Cable Loss (dB)	Point	Frequency (MHz)	Cable Loss (dB)
1	30	0.3	21	1000	2.5
2	50	0.4	22	1100	2.6
3	100	0.6	23	1200	2.8
4	150	0.8	24	1300	2.9
5	200	1.0	25	1400	3.1
6	250	1.1	26	1500	3.2
7	300	1.2	27	1600	3.3
8	350	1.3	28	1700	3.5
9	400	1.5	29	1800	3.6
10	450	1.6	30	1900	3.7
11	500	1.7	31	2000	3.9
12	550	1.8	32	2100	4.0
13	600	1.9	33	2200	4.1
14	650	1.9	34	2300	4.2
15	700	2.0	35	2400	4.4
16	750	2.1	36	2500	4.6
17	800	2.1	37	2600	4.7
18	850	2.2	38	2700	4.8
19	900	2.3	39	2800	4.9
20	950	2.4	40	2900	5.0

**Test report No: 7012318226****Page 39 of 42 Pages****Title: GearEye RFID reader****Model: GearEye-A4****FCC ID: 2AXUS-GRY4****Antenna factor****Biconilog Antenna, ETS-Lindgren mod. 31142D, S/N: 0146490 3m calibration.**

f / MHz	AF / dB/m	f / MHz	AF / dB/m	f / MHz	AF / dB/m
30	18.7	250	12.0	2750	31.0
35	15.7	300	13.8	3000	31.2
40	12.9	400	16.2	3250	32.7
45	10.6	500	18.6	3500	34.5
50	9.0	600	20.2	3750	34.3
60	7.3	700	21.8	4000	34.5
70	7.7	800	22.9	4250	35.3
80	8.2	900	24.1	4500	35.5
90	9.2	1000	24.8	4750	36.1
100	9.4	1250	26.9	5000	37.4
120	8.5	1500	30.2	5250	38.4
140	8.5	1750	28.5	5000	39.9
160	9.1	2000	28.9	5750	38.2
180	10.5	2250	29.8	6000	39.1
200	10.9	2500	32.5		

**Test report No: 7012318226****Page 40 of 42 Pages****Title: GearEye RFID reader****Model: GearEye-A4****FCC ID: 2AXUS-GRY4****Antenna Factor****Double Ridged Guide Antenna mfr ETS-Lindgren model 3115 1m calibration**

Point	Frequency (MHz)	Antenna Factor (dB/m)
1	1000	23.7
2	1500	25.5
3	2000	28.5
4	2500	28.1
5	3000	29.6
6	3500	31.1
7	4000	32.5
8	4500	32.5
9	5000	33.5
10	5500	34.7
11	6000	36.1
12	6500	36.5
13	7000	37.3
14	7500	38.0
15	8000	37.3
16	8500	37.9
17	9000	38.1
18	9500	38.5
19	10000	38.7
20	10500	38.8
21	11000	38.6
22	11500	38.8
23	12000	38.9
24	12500	39.3
25	13000	40.2
26	13500	40.6
27	14000	40.6
28	14500	40.4
29	15000	39.6
30	15500	39.5
31	16000	39.8
32	16500	40.4
33	17000	41.3
34	17500	42.6
35	18000	43.2

Cable Loss**Type: Neoflex LLEF142; Ser.No.1802; 5 m length**

Point	Frequency (GHz)	Cable Loss (dB)
0	0.0-1.0	1.3
1	1.0 – 3.0	2.4
2	3.0 – 5.0	3.2
3	5.0-7.0	4.0
4	7.0-9.0	4.4
5	9.0-10.0	4.7
6	10.0-12.0	5.2
7	12.0-14.0	5.9
8	14.0-16.0	6.1
9	16.2-18.00	6.6

**Test report No: 7012318226****Page 41 of 42 Pages****Title: GearEye RFID reader****Model: GearEye-A4****FCC ID: 2AXUS-GRY4**

Antenna Factor
Broadband Horn Antenna model BBHA 9170 1m calibration

Point	Frequency (GHz)	Antenna Factor (dB/m)
1	15.0	38.5
2	16.0	37.7
3	17.0	38.1
4	18.0	37.9
5	19.0	38.0
6	20.0	38.0
7	21.0	37.9
8	22.0	38.2
9	23.0	39.6
10	24.0	39.6
11	25.0	39.3
12	26.0	39.5
13	27.0	39.6
14	28.0	39.6
15	30.0	40.1
16	32.0	41.2
17	34.0	41.5
18	35.0	41.9
19	36.0	42.2
20	38.0	43.8
21	40.0	43.2

Antenna Factor
For Antenna Loop MFR ETS Lindgren, Type/Model 6507, S/N: 00144641

No.	Frequency MHz	Magnetic antenna factor, dBS/m	Electric antenna factor, dB/m
1	9	-21.5	30.0
2	10	-22.0	29.5
3	20	-27.7	23.8
4	50	-32.2	19.4
5	75	-33.0	18.5
6	100	-33.4	18.2
7	150	-33.6	17.9
8	250	-33.7	17.9
9	500	-33.8	17.8
10	750	-33.8	17.7
11	1000	-33.8	17.7
12	2000	-33.7	17.9
13	3000	-33.8	17.8
14	4000	-34.0	17.5
15	5000	-34.3	17.2
16	10000	-35.2	16.4
17	15000	-35.8	15.8
18	20000	-36.0	15.6
19	25000	-36.2	15.3
20	30000	-36.4	15.2



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Title: GearEye RFID reader

Model: GearEye-A4

FCC ID: 2AXUS-GRY4

10. APPENDIX C. Abbreviations and acronyms.

The following abbreviations and acronyms are applicable to this test report:

AC	alternating current
cm	centimeter
dB	decibel
dBm	decibel referred to one milliwatt
dB(μ V)	decibel referred to one microvolt
dB(μ V/m)	decibel referred to one microvolt per meter
EBW	emission bandwidth.
EMC	electromagnetic compatibility
EUT	equipment under test
GHz	gigahertz
H	height
Hz	hertz
kHz	kilohertz
L	length
LNA	low noise amplifier
m	meter
Mbps	megabit per second
MHz	megahertz
NA	not applicable
OFDM	Orthogonal Frequency Division Multiple Access
PRBS	pseudo random binary sequence
QP	quasi-peak
RF	radio frequency
RE	radiated emission
SA	spectrum analyzer
rms	root mean square
W	width

End of the document