



**DATE: 30 December 2018**

**I.T.L. (PRODUCT TESTING) LTD.**

# **FCC Radio Test Report**

for

**Airobotics Inc.**

Equipment under test:

**Lora Remote Control RF Link**

**AO00059**

Tested by:

M. Zohar

Approved by:

D. Shidlow

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This report relates only to items tested.



## Lora Remote Control RF Link

AO00059

FCC ID: 2ARRW-A000059

This report concerns:	Original Grant:	X
	Class I Change:	
	Class II Change:	

Equipment type: Digital Transmission System

Limits used: 47CFR15 Section 15.247

Measurement procedure used is KDB 558074 D01 v03r0 and  
ANSI C63.10:2013

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## TABLE OF CONTENTS

<b>1.</b>	<b>GENERAL INFORMATION</b>	<b>5</b>
1.1	Administrative Information	5
1.2	List of Accreditations	6
1.3	Product Description	7
1.4	Test Methodology	7
1.5	Test Facility	7
1.6	Measurement Uncertainty	7
<b>2.</b>	<b>SYSTEM TEST CONFIGURATION</b>	<b>8</b>
2.1	Justification	8
2.2	EUT Exercise Software	8
2.3	Special Accessories	8
2.4	Equipment Modifications	9
2.5	Configuration of Tested System	9
<b>3.</b>	<b>CONDUCTED &amp; RADIATED MEASUREMENT TEST SET-UP PHOTOS</b>	<b>10</b>
<b>4.</b>	<b>6 DB MINIMUM BANDWIDTH</b>	<b>13</b>
4.1	Test Specification	13
4.2	Test Procedure	13
4.3	Test Limit	13
4.4	Test Results	13
4.5	Test Equipment Used; 6dB Bandwidth	15
<b>5.</b>	<b>MAXIMUM CONDUCTED OUTPUT POWER</b>	<b>16</b>
5.1	Test Specification	16
5.2	Test Procedure	16
5.3	Test Limit	16
5.4	Test Results	16
5.5	Test Equipment Used; Maximum Peak Power Output	18
<b>6.</b>	<b>BAND EDGE SPECTRUM</b>	<b>19</b>
6.1	Test Specification	19
6.2	Test Procedure	19
6.3	Test Limit	19
6.4	Test Results	19
6.5	Test Equipment Used; Band Edge	21
<b>7.</b>	<b>EMISSIONS IN NON-RESTRICTED FREQUENCY BANDS</b>	<b>22</b>
7.1	Test Specification	22
7.2	Test Procedure	22
7.3	Test Limit	22
7.4	Test Results	22
7.5	Test Instrumentation Used, Emission in Non Restricted Frequency Bands	24
<b>8.</b>	<b>EMISSIONS IN RESTRICTED FREQUENCY BANDS</b>	<b>25</b>
8.1	Test Specification	25
8.2	Test Procedure	25
8.3	Test Limit	26
8.4	Test Results	26
8.5	Test Instrumentation Used; Emissions in Restricted Frequency Bands	28
<b>9.</b>	<b>TRANSMITTED POWER DENSITY</b>	<b>29</b>
9.1	Test Specification	29
9.2	Test Procedure	29
9.3	Test Limit	29
9.4	Test Results	29
9.5	Test Equipment Used; Transmitted Power Density	31
<b>10.</b>	<b>ANTENNA GAIN/INFORMATION</b>	<b>32</b>



<b>11.</b>	<b>R.F EXPOSURE/SAFETY-----</b>	<b>33</b>
<b>12.</b>	<b>APPENDIX A - CORRECTION FACTORS -----</b>	<b>34</b>
12.1	Correction factors for RF OATS Cable 35m ITL #1879 .....	34
12.2	Correction factor for RF CABLE for Semi Anechoic Chamber.....	35
12.3	Correction factors for Active Loop Antenna .....	36
12.4	Correction factors for biconical antenna – ITL # 1356 .....	37
12.5	Correction factors for log periodic antenna – ITL # 1349.....	38
12.6	Correction factors for Double –Ridged Waveguide Horn ANTENNA.....	39
12.7	Correction factors for Horn Antenna .....	40



# 1. General Information

## 1.1 Administrative Information

Manufacturer:	Airobotics Inc.
Manufacturer's Address:	8340 E Raintree Dr., Scottsdale, Arizona, 85260 Phone: 408 620 7857
Manufacturer's Representative:	Issac Sela
Equipment Under Test (E.U.T):	Lora Remote Control RF Link
Equipment Model No.:	AO00059
Equipment Serial No.:	Not designated
Date of Receipt of E.U.T:	November 6, 2018
Start of Test:	November 6, 2018
End of Test:	November 7, 2018
Test Laboratory Location:	I.T.L (Product Testing) Ltd. 1 Batsheva St., Lod ISRAEL 7120101
Test Specifications:	FCC Part 15, Subpart C



## **1.2 List of Accreditations**

The EMC laboratory of I.T.L. is accredited by the following bodies:

1. The American Association for Laboratory Accreditation (A2LA) (U.S.A.), Certificate No. 1152.01.
2. The Federal Communications Commission (FCC) (U.S.A.), FCC Designation No. IL1005.
3. The Israel Ministry of the Environment (Israel), Registration No. 1104/01.
4. Industry Canada (Canada), IC File No.: 46405-4025; Site Nos. IC 4025A-1, IC 4025A-2.

I.T.L. Product Testing Ltd. is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this test report have been determined in accordance with I.T.L.'s terms of accreditation unless stated otherwise in the report.

### 1.3 **Product Description**

The AO00059 LoRa Remote control RF link is a UHF transmitter in the 902-928MHz ISM band. It used for manual control of Airobotics' Industrial drones during VLOS (Visual Line of Sight) operation.

Working voltage	12VDC
Mode of operation	Transceiver
Modulations	Lora
Assigned Frequency Range	902.0-928.0MHz
Operating Frequency Range	903.0-927.0MHz
Transmit power(conducted)	~20.0dBm
Antenna Gain	+2.0/+2.7 dBi
Modulation BW	~700.0kHz

### 1.4 **Test Methodology**

Both conducted and radiated testing was performed according to the procedures in KDB 558074 D01 v03r05 and ANSI C63.10: 2013. Radiated testing was performed at an antenna to EUT distance of 3 meters.

### 1.5 **Test Facility**

Emissions tests were performed at I.T.L.'s testing facility in Lod, Israel. I.T.L.'s EMC Laboratory is accredited by A2LA, certificate No. 1152.01 and its FCC Designation Number is IL1005.

### 1.6 **Measurement Uncertainty**

#### **Conducted Emission**

Conducted Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4)

0.15 – 30 MHz:

Expanded Uncertainty (95% Confidence, K=2):

± 3.44 dB

#### **Radiated Emission**

Radiated Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4) for open site:

30-1000MHz:

Expanded Uncertainty (95% Confidence, K=2):

± 4.96 dB

1 GHz to 6 GHz

Expanded Uncertainty (95% Confidence, K=2):

±5.19 dB

>6 GHz

Expanded Uncertainty (95% Confidence, K=2):

±5.51 dB

## 2. System Test Configuration

### 2.1 Justification

1. The E.U.T contains a sub 1GHz transceiver at 915MHz band (Lora technology).
2. The unit was evaluated while transmitting at the low channel (903.0MHz), the mid channel (915.0MHz) and the high channel (927.0MHz).
3. Conducted emission tests were performed with the E.U.T. antenna terminal connected by a RF cable to the Spectrum Analyzer through a 30dB external attenuator.
4. Final radiated emission for restricted bands test performed with the highest gain antenna type for maximum radiation.
5. Final radiated emission for restricted bands test was performed after exploratory emission testing that was performed in 3 orthogonal polarities to determine the “worst case” radiation.
6. As shown below, the worst case screening results was found on the Y axis.

Orientation	Frequency	3 <sup>rd</sup> Harmonic	4 <sup>th</sup> Harmonic
	(MHz)	(dBuV/m)	(dBuV/m)
X axis	903.0	61.5	60.1
	915.0	66.4	60.3
	927.0	62.0	60.1
Y axis	<b>903.0</b>	<b>65.1</b>	<b>60.3</b>
	<b>915.0</b>	<b>67.0</b>	<b>60.3</b>
	<b>927.0</b>	<b>62.8</b>	<b>60.5</b>
Z axis	903.0	63.2	60.2
	915.0	66.1	60.4
	927.0	61.6	60.3

Figure 1. Screening Results

### 2.2 EUT Exercise Software

No special exercise software was used.

### 2.3 Special Accessories

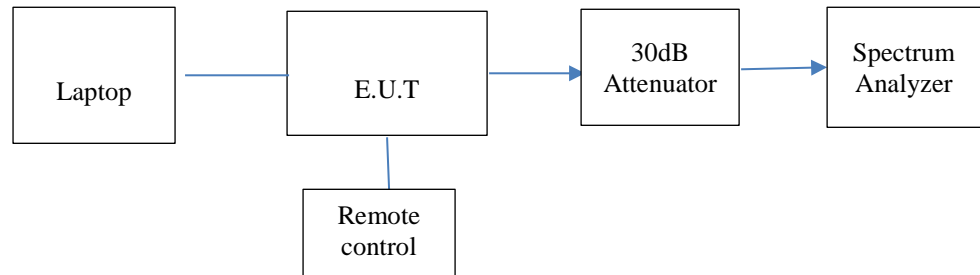
Equipment	Manufacturer	Part #	Serial #
Laptop	Lenovo	T410	N/A
AC/DC adapter	Lenovo	42t4430	N/A
Remote Control	Futaba	T14SG	N/A



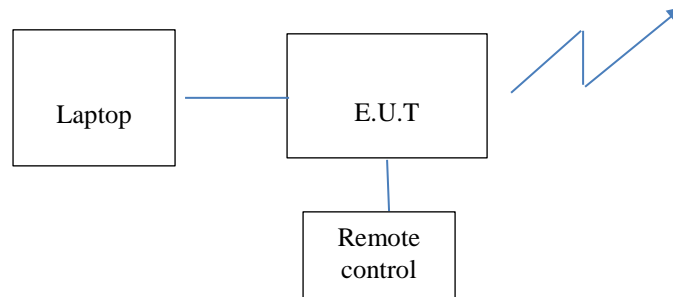
## 2.4 *Equipment Modifications*

No modifications were necessary in order to achieve compliance.

## 2.5 *Configuration of Tested System*



**Figure 2. Configuration of Tested System Conducted**



**Figure 3. Configuration of Tested System Radiated**

### 3. Conducted & Radiated Measurement Test Set-Up Photos

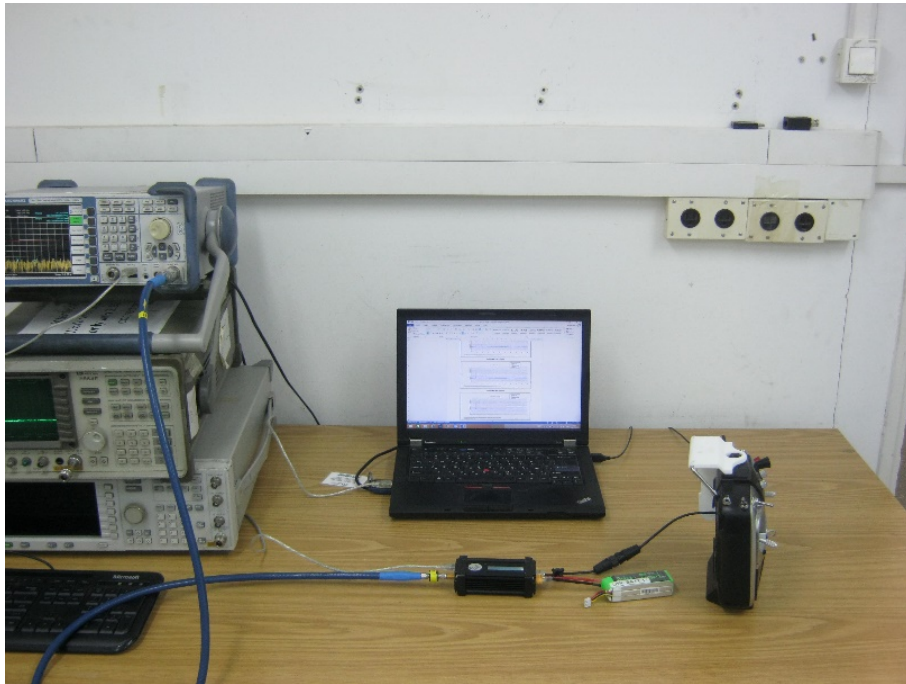


Figure 4. Conducted Emission Test

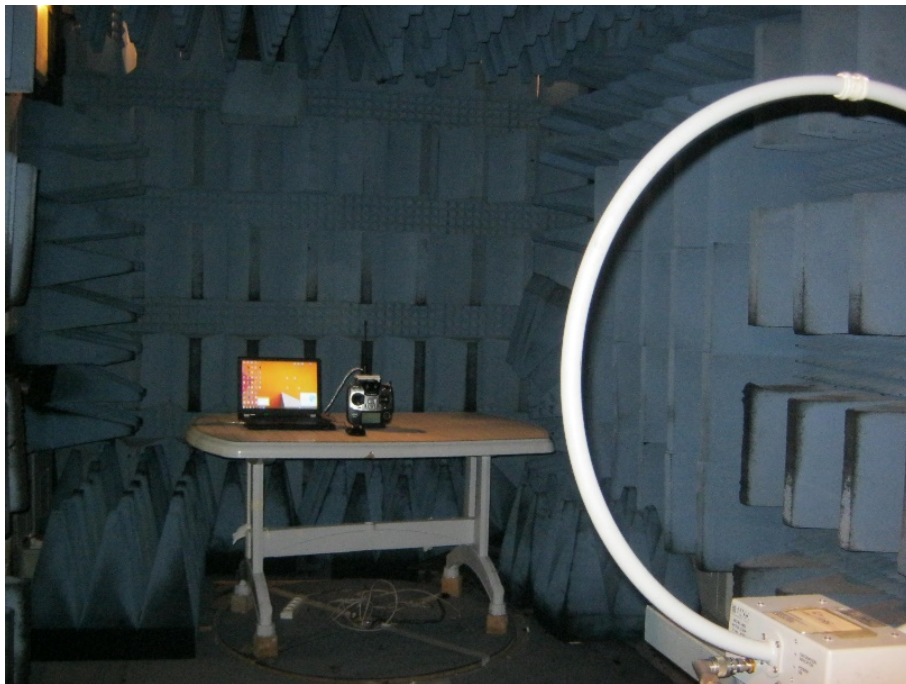


Figure 5. Radiated Emission Test, 0.009-30MHz

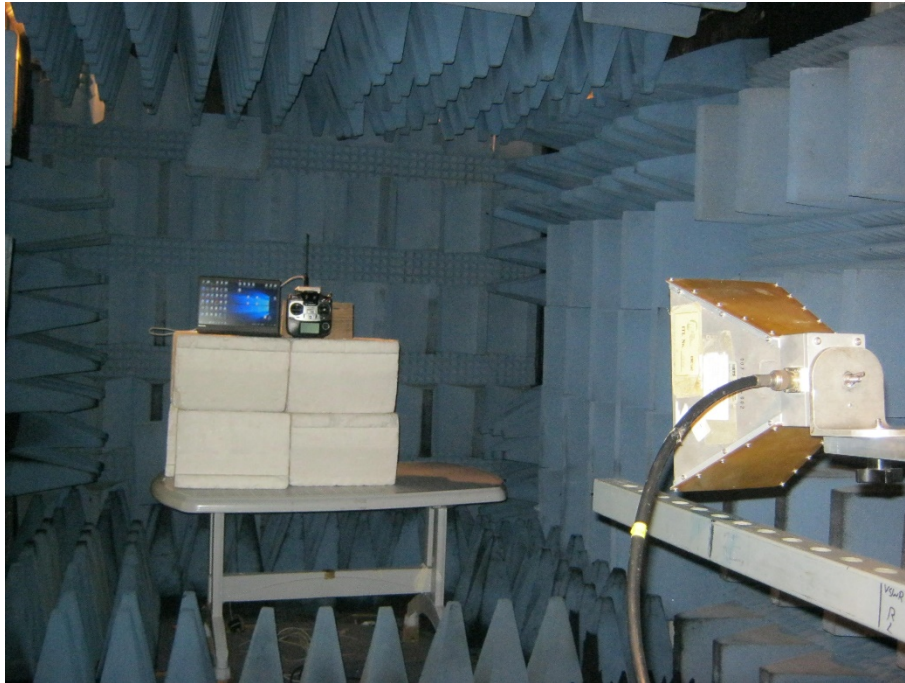


**Figure 6. Radiated Emission Test, 30-200MHz**



**Figure 7. Radiated Emission Test, 200-1000MHz**





**Figure 8. Radiated Emission Test, 1-10GHz**

## 4. 6 dB Minimum Bandwidth

### 4.1 Test Specification

FCC Part 15, Subpart C, Section 247(a)(2)

### 4.2 Test Procedure

(Temperature (22°C)/ Humidity (55%RH))

The E.U.T operation mode and test set-up are as described in Section 2 of this report.

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator and an appropriate coaxial cable (total loss=30.5 dB). Special attention was taken to prevent Spectrum Analyzer RF input overload.

The spectrum bandwidth of the E.U.T. at the point of 6 dB below maximum peak power was measured and recorded.

The RBW was set to 100 kHz.

### 4.3 Test Limit

Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

### 4.4 Test Results

Protocol Type	Operation Frequency	Reading	Limit
	(MHz)	(kHz)	(kHz)
Lora	903.0	718.6	>500.0
	915.0	694.6	>500.0
	927.0	714.6	>500.0

**Figure 9 6 dB Minimum Bandwidth**

JUDGEMENT: Passed

For additional information see *Figure 10* to *Figure 12*.

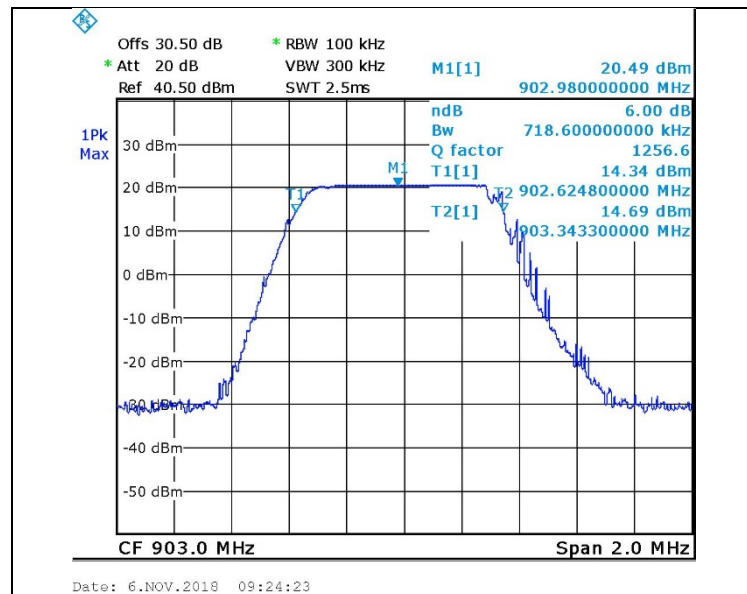


Figure 10. Low Channel

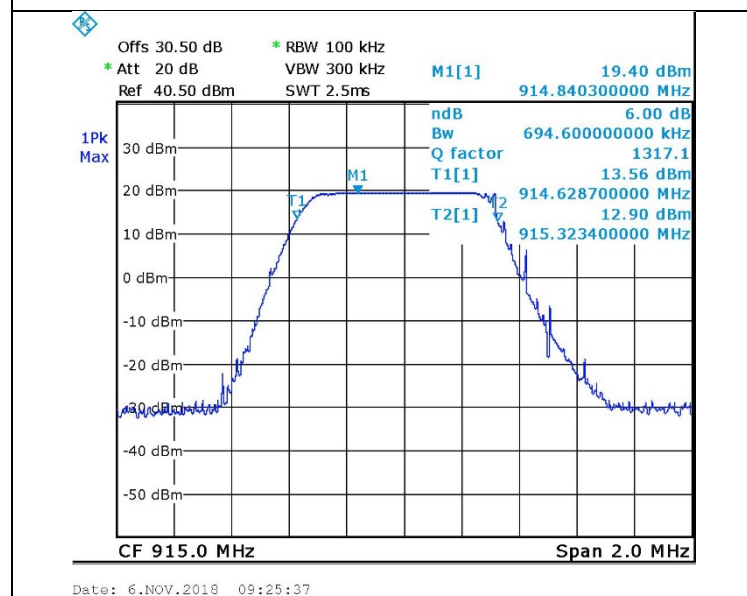


Figure 11. Mid Channel

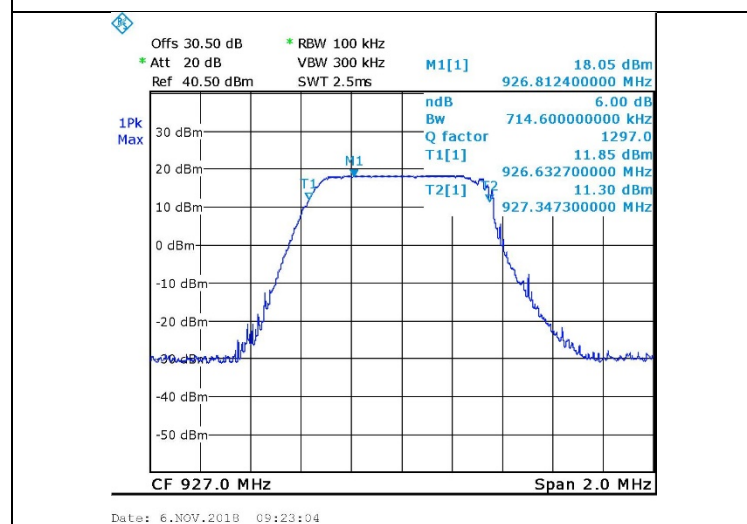


Figure 12. High Channel



#### 4.5 *Test Equipment Used; 6dB Bandwidth*

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	R&S	FSL6	100194	February 19, 2018	February 19, 2019
30dB Attenuator	MCL	BW-S30W5	533	October 1, 2018	October 31, 2019
RF Cable	Huber Suner	Sucofelex	28239/4PEA	October 1, 2018	October 31, 2019

**Figure 13 Test Equipment Used**

## 5. Maximum Conducted Output Power

### 5.1 Test Specification

FCC, Part 15, Subpart C, Section 247(b)(3)

### 5.2 Test Procedure

(Temperature (22°C)/ Humidity (55%RH))

The E.U.T operation mode and test set-up are as described in Section 2 of this report.

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator and an appropriate coaxial cable (total loss=30.5 dB). Special attention was taken to prevent Spectrum Analyzer RF input overload.

### 5.3 Test Limit

The maximum peak conducted output power of the intentional radiator for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt.

### 5.4 Test Results

Protocol Type	Operation Frequency	Power	Power	Limit	Margin
	(MHz)	(dBm)	(mW)	(mW)	(mW)
Lora	903.0	20.5	112.0	1000.0	-888.0
	915.0	19.4	87.1	1000.0	-912.9
	927.0	18.3	67.6	1000.0	-932.4

Figure 14 Maximum Peak Power Output

JUDGEMENT: Passed by 888.0 mW

For additional information see *Figure 15* to *Figure 17*.



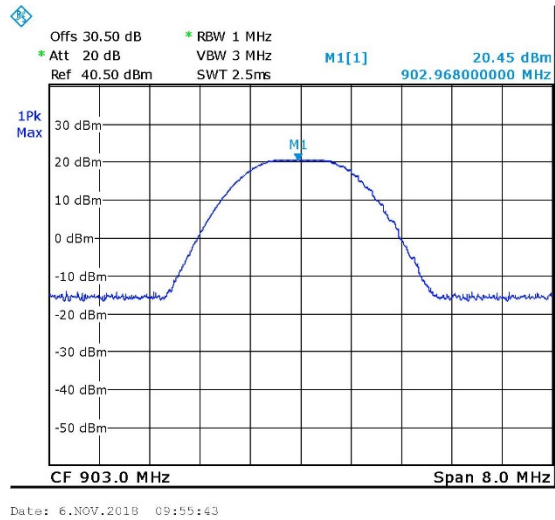


Figure 15. Low Channel

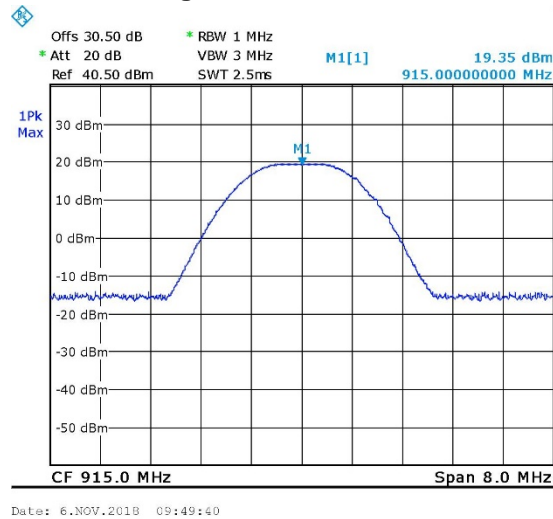


Figure 16. Mid Channel

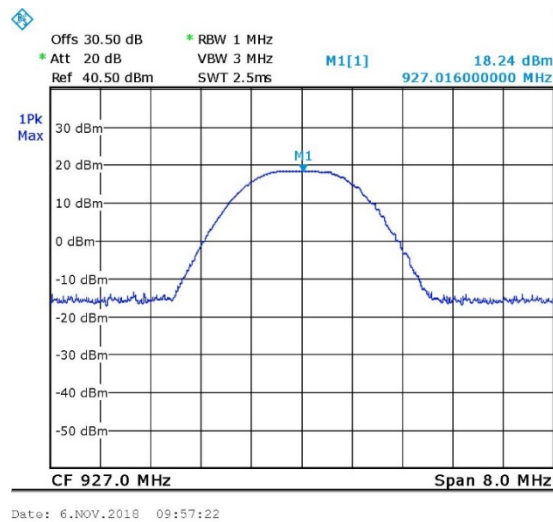


Figure 17. High Channel



### 5.5 *Test Equipment Used; Maximum Peak Power Output*

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	R&S	FSL6	100194	February 19, 2018	February 19, 2019
30dB Attenuator	MCL	BW-S30W5	533	October 1, 2018	October 31, 2019
RF Cable	Huber Suner	Sucofelex	28239/4PE A	October 1, 2018	October 31, 2019

**Figure 18 Test Equipment Used**

## 6. Band Edge Spectrum

### 6.1 Test Specification

FCC, Part 15, Subpart C, Section 247(d)

### 6.2 Test Procedure

(Temperature (22°C)/ Humidity (55%RH))

The E.U.T operation mode and test set-up are as described in Section 2 of this report.

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator and an appropriate coaxial cable (loss=30.5 dB). Special attention was taken to prevent Spectrum Analyzer RF input overload.

The RBW was set to 100 kHz.

### 6.3 Test Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

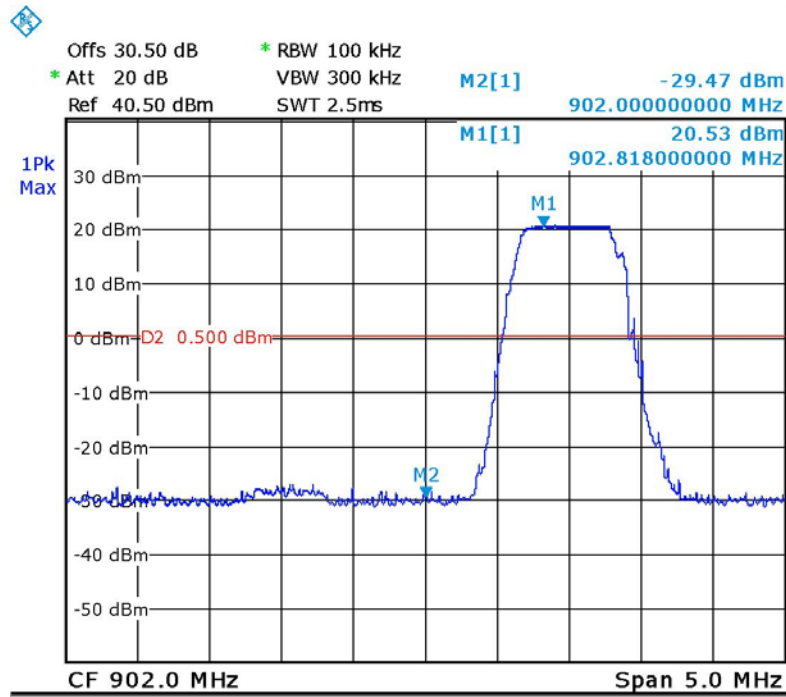
### 6.4 Test Results

Protocol Type	Operation Frequency	Band Edge Frequency	Spectrum Level	Limit	Margin
	(MHz)	(MHz)	(dBm)	(dBm)	(dB)
Lora	903.0	902.0	-29.4	+0.5	-29.9
	927.0	928.0	-29.4	-1.7	-27.7

Figure 19 Band Edge Spectrum

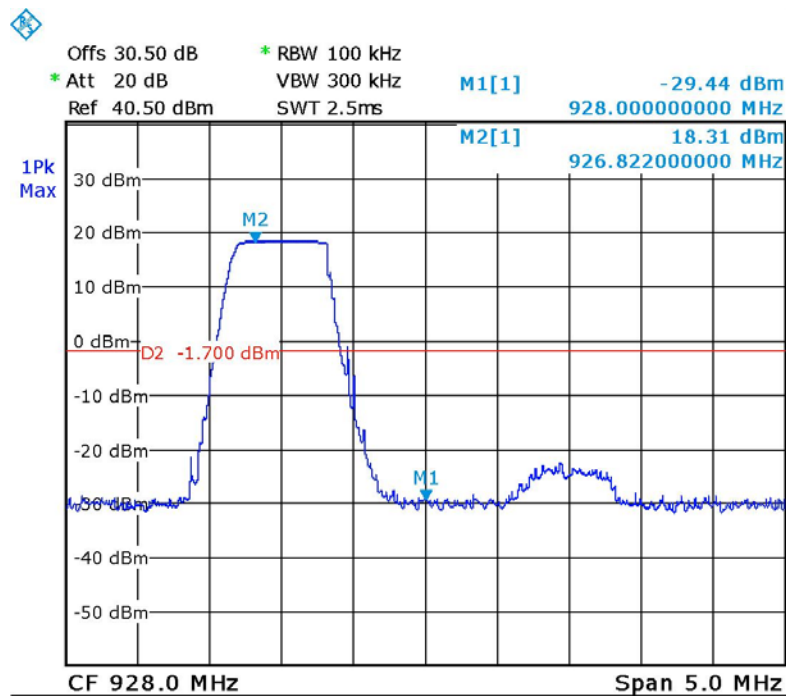
JUDGEMENT: Passed by 27.7 dB

For additional information see *Figure 20* and *Figure 21*.



Date: 6.NOV.2018 10:29:59

Figure 20 Band Edge - Low



Date: 6.NOV.2018 10:32:14

Figure 21 Band Edge - High



## 6.5 Test Equipment Used; Band Edge

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	R&S	FSL6	100194	February 19, 2018	February 19, 2019
30dB Attenuator	MCL	BW-S30W5	533	October 1, 2018	October 31, 2019
RF Cable	Huber Suner	Sucofelex	28239/4PE A	October 1, 2018	October 31, 2019

**Figure 22 Test Equipment Used**

## 7. Emissions in Non-Restricted Frequency Bands

### 7.1 **Test Specification**

FCC, Part 15, Subpart C, Section 247(d)

### 7.2 **Test Procedure**

(Temperature (22°C)/ Humidity (55%RH))

The E.U.T. operation mode and test set-up are as described in Section 2 of this report.

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator and an appropriate coaxial cable (max total loss=34.0 dB).

Special attention was taken to prevent Spectrum Analyzer RF input overload.

RBW was set to 100 kHz, detector set to max peak and trace to “max hold”.

### 7.3 **Test Limit**

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

### 7.4 **Test Results**

JUDGEMENT: Passed

The EUT met the requirements of the F.C.C. Part 15, Subpart C, Section 247(d) specification.

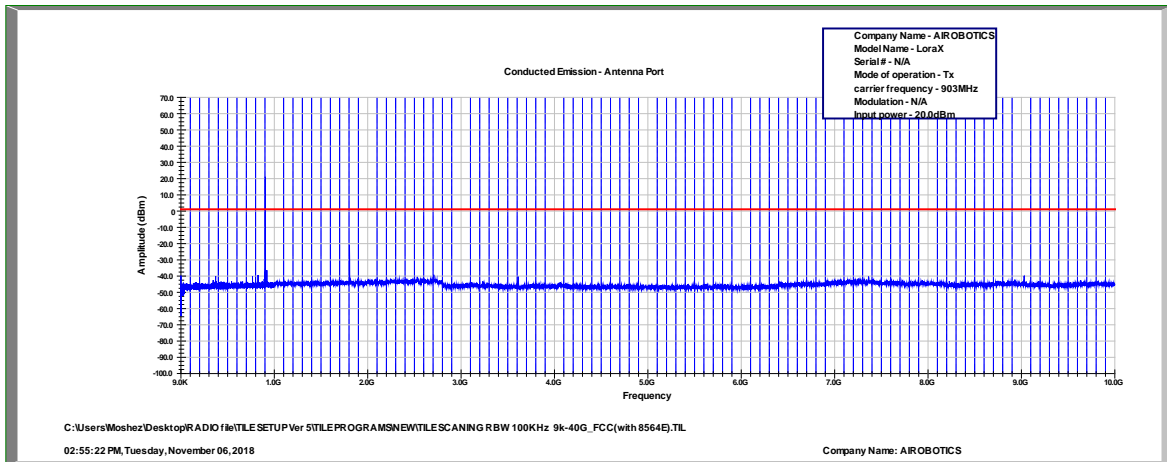


Figure 23 Low Channel

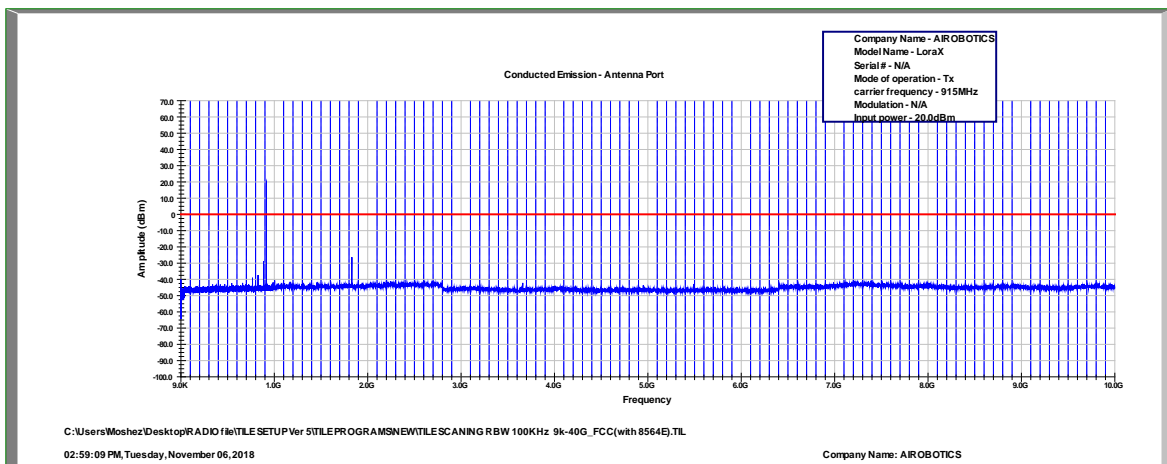


Figure 24 Mid Channel

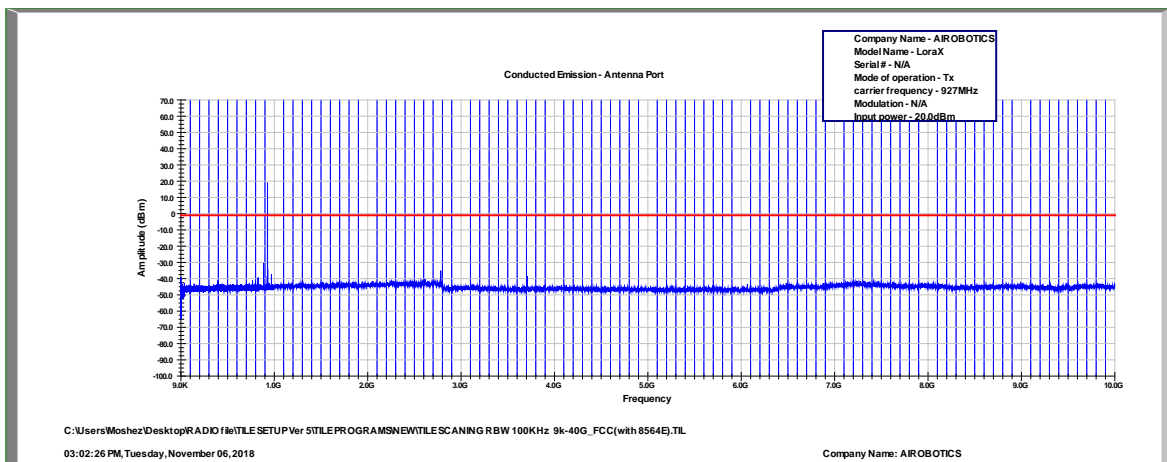


Figure 25 High Channel

Note: All peaks in plots are the fundamental transmission frequency.



**7.5 Test Instrumentation Used, Emission in Non Restricted Frequency Bands**

<b>Instrument</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Serial No.</b>	<b>Last Calibration Date</b>	<b>Next Calibration Due</b>
Spectrum Analyzer	R&S	FSL6	100194	February 19, 2018	February 19, 2019
30dB Attenuator	MCL	BW-S30W5	533	October 1, 2018	October 31, 2019
RF Cable	Huber Suner	Sucofelex	28239/4PEA	October 1, 2018	October 31, 2019

**Figure 26 Test Equipment Used**



## 8. Emissions in Restricted Frequency Bands

### 8.1 Test Specification

FCC Part 15, Subpart C, Sections 15.209, 15.205, 15.247(d)

### 8.2 Test Procedure

(Temperature (23°C)/ Humidity (55%RH))

The E.U.T. operation mode and test set-up are as described in Section 2 of this report.

#### **For measurements between 0.009-30MHz:**

The E.U.T was tested inside the shielded room and placed on a non-metallic table, 0.8 meters above the ground. The emissions were measured at a distance of 3 meters. The readings were maximized by the turntable azimuth between 0-360°, and the antenna polarization.

The frequency range 0.009MHz-30MHz was scanned.

#### **For measurements between 30-1000MHz:**

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The emissions were measured at a distance of 3 meters. The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization. The frequency range 30MHz -1000MHz was scanned and the list of the highest emissions was verified and updated accordingly.

#### **For measurements between 1GHz-10GHz:**

The E.U.T was tested inside the shielded room and placed on a non-metallic table, 1.5 meters above the ground. The emissions were measured at a distance of 3 meters. The readings were maximized by the turntable azimuth between 0-360°, and the antenna polarization.

The frequency range 1GHz -10GHz was scanned.

The highest radiation is described in the tables below.

The levels of the emissions within the frequency ranges of the restricted bands (Section 15.205 of FCC Part 15) were compared to the limits of the table in Section 15.209 (a), General Requirements.

### 8.3 Test Limit

Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)	Field strength* (dBμV/m)	Field strength* (dBμV/m)@3m
0.009-0.490	2400/F(kHz)	300	48.5-13.8	128.5-73.8
0.490-1.705	24000/F(kHz)	30	33.8-23.0	73.8-63.0
1.705-30.0	30	30	29.5	69.5
30-88	100	3	40.0	40.0
88-216	150	3	43.5	43.5
216-960	200	3	46.0	46.0
Above 960	500	3	54.0	54.0

\*The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector. For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

**Figure 27 Table of Limits**

### 8.4 Test Results

JUDGEMENT: Passed by 0.9 dB

For the operation frequency of 903 MHz, the margin between the emission level and the specification limit is in the worst case 2.3 dB at the frequency of 2709.0 MHz, vertical polarization.

For the operation frequency of 915 MHz, the margin between the emission level and the specification limit is in the worst case 0.9 dB at the frequency of 2745.0 MHz, vertical polarization.

For the operation frequency of 927 MHz, the margin between the emission level and the specification limit is in the worst case 3.3 dB at the frequency of 3708.0 MHz, vertical polarization.

The EUT met the requirements of the F.C.C. Part 15, Subpart C Sections 15.209, 15.205, 15.247(d) specifications.

The details of the highest emissions are given in *Figure 28*.

## Radiated Emission

E.U.T Description Lora Remote Control RF Link  
Type AO00059  
Serial Number: Not designated

Specifications: FCC, Part 15, Subpart C, Sections 15.209, 15.205, 15.247(d)

Antenna Polarization: Horizontal/Vertical Frequency Range: 9 kHz to 10.0 GHz  
Protocol type: Lora Detector: Peak, Average

Operation Frequency	Freq.	Pol	Peak Reading	Peak Limit	Peak Margin	Average Reading	Average Limit	Average Margin
(MHz)	(MHz)	(H/V)	(dBμV/m)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
903.0	2709.0	V	65.1	74.0	-8.9	51.7	54.0	-2.3
	2709.0	H	60.3	74.0	-13.7	45.1	54.0	-8.9
	3612.0	V	61.0	74.0	-13.0	50.1	54.0	-3.9
	3612.0	H	61.3	74.0	-12.7	50.5	54.0	-3.5
915.0	2745.0	V	67.0	74.0	-7.0	53.1	54.0	-0.9
	2745.0	H	63.3	74.0	-10.7	49.3	54.0	-4.7
	3660.0	V	61.2	74.0	-12.8	50.1	54.0	-3.9
	3660.0	H	61.1	74.0	-12.9	50.0	54.0	-4.0
927.0	2781.0	V	60.8	74.0	-13.2	48.3	54.0	-5.7
	2781.0	H	62.8	74.0	-11.2	50.0	54.0	-4.0
	3708.0	V	62.0	74.0	-12.0	50.7	54.0	-3.3
	3708.0	H	61.6	74.0	-12.4	50.4	54.0	-3.6

**Figure 28. Radiated Emission Results**

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

“Peak Amp” includes correction factor.

\* “Correction Factor” = Antenna Factor + Cable Loss- Low Noise Amplifier Gain



## 8.5 Test Instrumentation Used; Emissions in Restricted Frequency Bands

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
EMI Receiver	R&S	ESCI7	100724	February 19, 2018	February 19, 2019
EMI Receiver	HP	8542E	3906A00276	February 19, 2018	February 19, 2019
RF Filter Section	HP	85420E	3705A00248	February 19, 2018	February 19, 2019
Spectrum Analyzer	HP	8593EM	3536A00120 ADI	February 20, 2018	February 20, 2019
Biconical Antenna	EMCO	3110B	9912-3337	May 15, 2017	May 15, 2019
Log Periodic Antenna	EMCO	3146	9505-4081	May 31, 2018	May 31, 2019
Horn Antenna	ETS	3115	29845	May 31, 2018	May 31 2021
Active Loop Antenna	EMCO	6502	9506-2950	October 19, 2018	October 31, 2019
MicroWave System Amplifier	HP	83006A	3104A00589	October 1, 2018	October 31, 2019
Low Noise Amplifier 1GHz-18GHz	Miteq	AFSX4- 02001800-50-8P	-	October 1, 2018	October 31, 2019
RF Cable Chamber	Commscope ORS	0623 WBC- 400	G020132-	October 1, 2018	October 31, 2019
RF Cable Oats	EIM	RG214- 11N(X2)	-	August 13, 2018	August 31, 2019
High Pass Band Filter	Meuro	MFL040120H5 0	902252	October 1, 2018	October 31, 2019
Semi Anechoic Civil Chamber	ETS	S81	SL 11643	NCR	NCR
Antenna Mast	ETS	2070-2	9608-1497	NCR	NCR
Turntable	ETS	2087	-	NCR	NCR
Mast & Table Controller	ETS/EMCO	2090	9608-1456	NCR	NCR

Figure 29 Test Equipment Used

## 9. Transmitted Power Density

### 9.1 Test Specification

FCC, Part 15, Subpart C, Section 247(e)

### 9.2 Test Procedure

(Temperature (22°C)/ Humidity (55%RH))

The E.U.T operation mode and test set-up are as described in Section 2 of this report.

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator and an appropriate coaxial cable (total loss= 30.5dB). Special attention was taken to prevent Spectrum Analyzer RF input overload.

The spectrum analyzer was set to 3 kHz RBW.

### 9.3 Test Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

### 9.4 Test Results

Protocol Type	Operation Frequency	PSD Reading	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Lora	903.0	7.6	8.0	-0.4
	915.0	7.1	8.0	-0.9
	927.0	5.8	8.0	-2.2

Figure 30 Test Results

JUDGEMENT: Passed by 0.4dB

For additional information see *Figure 31* to *Figure 33*.

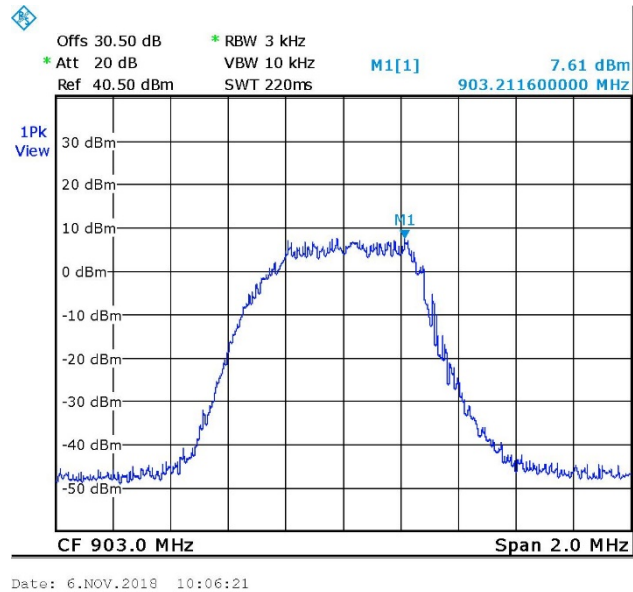


Figure 31. Low Channel

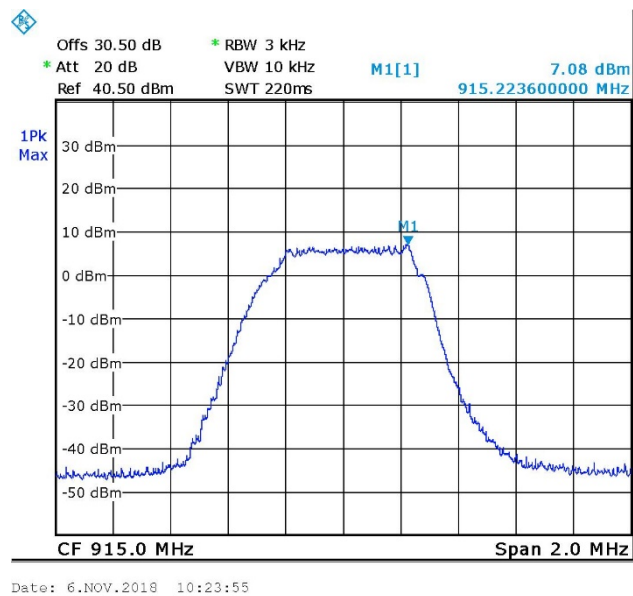


Figure 32. Mid Channel

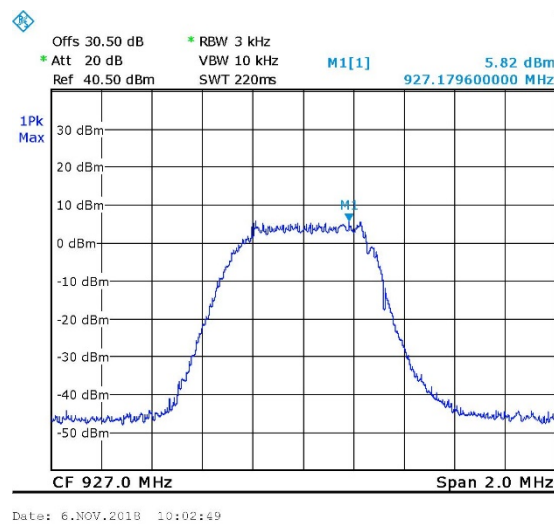


Figure 33. High Channel



**9.5 Test Equipment Used; Transmitted Power Density**

<b>Instrument</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Serial No.</b>	<b>Last Calibration Date</b>	<b>Next Calibration Due</b>
Spectrum Analyzer	R&S	FSL6	100194	February 19, 2018	February 19, 2019
30dB Attenuator	MCL	BW-S30W5	533	October 1, 2018	October 31, 2019
RF Cable	Huber Suner	Sucofelex	28239/4PE A	October 1, 2018	October 31, 2019

**Figure 34 Test Equipment Used**

## 10. Antenna Gain/Information

Taoglas: 2.7 dBi gain, wire


Nearson: 2.0 dBi gain, wire



### SPECIFICATION

Part No.	: FW.95.B.SMA.M
Description	: Meteor ISM Band 915Mhz Flexible Whip Monopole Antenna SMA(M) Straight
Features	: External 915MHz Monopole Antenna Designed for Outdoor Use Over 60% high efficiency* 2.71 dBi high peak gain* Robust Inner Steel Core Antenna Length: 226mm SMA Type(M) Straight Connector IP65 dust and water-resistant *Tested on 30cm*30cm Ground Plane RoHS ✓



TITLE	900 MHz ISM Band Straight Antenna -463 Model		Rev. Date	SHEET
			02/03/06	1 of 1
UNIT	DWG. NO.	S463XX-915		
In.(mm)				
SCALE				
none				

<http://www.nearson.com>

<http://www.nearson.com>

#### Electrical Properties:

Frequency Range:	902~928 MHz
Impedance:	50Ω nominal
VSWR:	<2.0:1
Gain:	2 dBi
Radiation:	Omni
Polarization:	Vertical
Wave:	½ wave



## 11. R.F Exposure/Safety

The typical placement of the E.U.T. is hand held. The typical distance between the E.U.T. and the user is 6cm. See photo on following page.

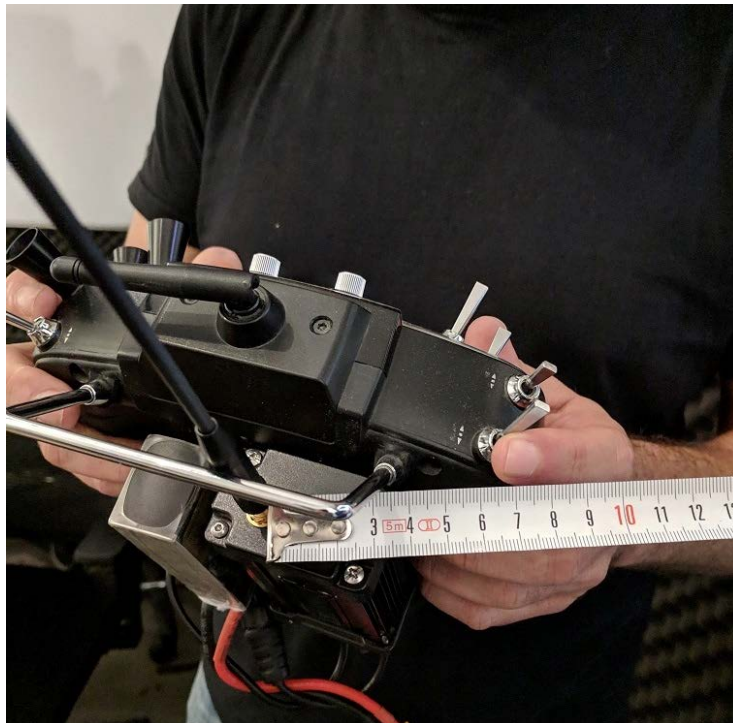
SAR Testing Exclusion Based on Section 4.3.1 and Appendix A of KDB447498 D01 V05 used as guidance as follows:

Peak power output at 903.0 MHz =20.5 dBm =112.0mW

$$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] * [\sqrt{f(\text{GHz})}] =$$

$$112.0/60 * 0.95 = 1.96$$
 this value is less than 3.0 for 1-g SAR and  $\leq 7.5$  for 10-g extremity SAR.

The SAR measurement is not necessary.





## 12. APPENDIX A - CORRECTION FACTORS

### 12.1 Correction factors for

**RF OATS Cable 35m ITL #1879**

Frequency (MHz)	Cable loss (dB)
30.0	1.1
50.0	1.1
100.0	1.7
150.0	2.1
200.0	2.5
250.0	2.7
300.0	2.9
350.0	3.1
400.0	3.5
450.0	3.7
500.0	3.9
550.0	4.0
600.0	4.2
650.0	4.4
700.0	4.9
750.0	5.0
800.0	5.0
850.0	4.9
900.0	5.0
950.0	5.1
1000.0	5.4



**12.2 Correction factor for RF CABLE for Semi Anechoic Chamber**  
**ITL # 1841**

FREQ (MHz)	LOSS (dB)
1000.0	1.5
2000.0	2.1
3000.0	2.7
4000.0	3.1
5000.0	3.5
6000.0	4.1
7000.0	4.6
8000.0	4.9
9000.0	5.7
10000.0	5.7
11000.0	6.1
12000.0	6.1
13000.0	6.2
14000.0	6.7
15000.0	7.4
16000.0	7.5
17000.0	7.9
18000.0	8.1
19000.0	8.8
20000.0	9.1

**NOTES:**

- 1. The cable is manufactured by Commscope*
- 2. The cable type is 0623 WBC-400, serial # G020132 and 10m long*



### 12.3 Correction factors for Active Loop Antenna

**Model 6502 S/N 9506-2950**

**ITL # 1075:**

f(MHz)	MAF(dBs/m)	AF(dB/m)
0.01	-33.1	18.4
0.02	-37.2	14.3
0.03	-38.2	13.3
0.05	-39.8	11.7
0.1	-40.1	11.4
0.2	-40.3	11.2
0.3	-40.3	11.2
0.5	-40.3	11.2
0.7	-40.3	11.2
1	-40.1	11.4
2	-40	11.5
3	-40	11.5
4	-40.1	11.4
5	-40.2	11.3
6	-40.4	11.1
7	-40.4	11.1
8	-40.4	11.1
9	-40.5	11
10	-40.5	11
20	-41.5	10
30	-43.5	8



**12.4 Correction factors for biconical antenna – ITL # 1356**

**Model: EMCO 3110B**

**Serial No.:9912-3337**

Frequency	ITL 1356 AF
[MHz]	[dB/m]
30	13.00
35	10.89
40	10.59
45	10.63
50	10.12
60	9.26
70	7.74
80	6.63
90	8.23
100	11.12
120	13.16
140	13.07
160	14.80
180	16.95
200	17.17



## 12.5 *Correction factors for log periodic antenna – ITL # 1349*

**Model: EMCO 3146**

**Serial No.:9505-4081**

Frequency	ITL 1349 AF
[MHz]	[dB/m]
200	11.58
250	12.04
300	14.76
400	15.55
500	17.85
600	18.66
700	20.87
800	21.15
900	22.32
1000	24.22



**12.6 Correction factors for Double –Ridged Waveguide  
Horn ANTENNA**

**Model: 3115**

**Serial number:29845**

**3 meter range; ITL # 1352**

<b>FREQUENCY</b>	<b>AFE</b>		<b>FREQUENCY</b>	<b>AFE</b>
<b>(GHz)</b>	<b>(dB/m)</b>		<b>(GHz)</b>	<b>(dB/m)</b>
0.75	25		9.5	38
1.0	23.5		10.0	38.5
1.5	26.0		10.5	38.5
2.0	29.0		11.0	38.5
2.5	27.5		11.5	38.5
3.0	30.0		12.0	38.0
3.5	31.5		12.5	38.5
4.0	32.5		13.0	40.0
4.5	32.5		13.5	41.0
5.0	33.0		14.0	40.0
5.5	35.0		14.5	39.0
6.0	36.5		15.0	38.0
6.5	36.5		15.5	37.5
7.0	37.5		16.0	37.5
7.5	37.5		16.5	39.0
8.0	37.5		17.0	40.0
8.5	38.0		17.5	42.0
9.0	37.5		18.0	42.5



## 12.7 Correction factors for

## Horn Antenna

Model: SWH-28  
at 3 meter range.  
ITL #:1353

### CALIBRATION DATA

#### 3 m distance

Frequency, MHz	Measured antenna factor, dB/m <sup>1)</sup>
18000	32.4
18500	32.0
19000	32.3
19500	32.4
20000	32.3
20500	32.8
21000	32.8
21500	32.7
22000	33.1
22500	33.0
23000	33.1
23500	33.8
24000	33.5
24500	33.5
25000	33.8
25500	33.9
26000	34.2
26500	34.7

<sup>1)</sup> The antenna factor shall be added to receiver reading in dB $\mu$ V to obtain field strength in dB $\mu$ V/m.