



DATE: 12 December 2021

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

FCC/IC Radio Test Report

for
Amimon Ltd.

Equipment under test:

Draco TX

AMN41012

Tested by: 
M. Zohar

Approved by: 
D. Shidlovsky

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Measurement/Technical Report for

Amimon Ltd.

Draco TX

AMN41012

FCC ID: VQSA MN41012

IC: 7680A-AMN41012

This report concerns:

Original Grant:

Class I Permissive Change:

Class II Permissive Change: X

Equipment type:

FCC: (NII) Unlicensed National Information

Infrastructure TX

ISED: WLAN

Limits used:

47CFR15, Part 15, Subpart E, Section 15.407

RSS 247, Issue 2, February 2017, Section 5

RSS-Gen, Issue 5, April 2018

Measurement procedures used: KDB 789033 D02 v02, ANSI C63.10:2013, and RSS-Gen, Issue 5, April 2018.

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1. General Information

1.1 Administrative Information

Manufacturer:	Amimon Ltd.
Manufacturer's Address:	26 Zarhin St., Raanana 4366250, Israel
Manufacturer's Representative:	Gabi Nocham
Equipment Under Test (E.U.T):	Draco TX
Equipment PMN:	AMN41012
Equipment Serial No.:	Not designated
Equipment HVIN:	AMN41012/AMN41012EX
Equipment FVIN:	7.5.15
Date of Receipt of E.U.T:	December 27, 2020
Start of Test:	December 27, 2020
End of Test:	April 19, 2021
Test Laboratory Location:	I.T.L (Product Testing) Ltd. 1 Bat Sheva St., Lod 7120101, Israel
Test Specifications:	47CFR15, Part 15, Subpart E, Section 15.407 RSS 247, Issue 2, February 2017, Section 5 RSS-Gen, Issue 5, April 2018



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. Department of Innovation, Science and Economic Development (ISED) Canada, CAB identifier: IL1002

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 Draco system provides high-end, high performance wireless HD video connection that can operate in challenging unmanned environment.

The AMN41012 is the video source unit, which is connected to a camera to capture video signals and to transmit these signals to its companion device AMN42012, thus, creating a wireless video link.

The AMN42012 is the video display unit that receives the video information transmitted from AMN41012 unit and transfers the images to various types of computer monitors/displays. This enables the user or camera operator to monitor the video transmitted from the remote camera connected to the AMN41012.

1.4 Test Methodology

Both conducted and radiated testing were performed according to the procedures in KDB 789003 D02 v02, and ANSI C63.10: 2013, RSS-Gen, Issue 5, April 2018.

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 located 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 UNII 3 band transceiver that is certified for FCC/IC (see FCC ID: 2AHKN-5G2, IC: 26056-5G2).
2. The customer asks to add the 3 channels 5,750 MHz, 5,790 MHz, 5,830 MHz to the existing 5,755 MHz, 5,795 MHz channels (operation bandwidth of 40MHz).
3. This report destination is to check C2PC compliance, according to the agreed test plan between ITL lab and the TCB (Timco Engineering Inc.):

No	Country	Test & Report Required
1	US	UNII3 FCC Part 15E Frequency: 5725-5850MHz Added Channels: 5750MHz, 5790MHz, 5830MHz, to the existing 5755MHz, 5795MHz Low channel: 5750MHz; test BW, Pout, and worst-case spurious emissions (1 config) mid: 5790MHz test: Pout, PSD, BW; high: 5830MHz full test BW: 40MHz Modulation: OFDM 64QAM Ports: 2 TX chains or 4 chains Uncorrelated Chains Usage: Indoor and outdoor Access point at UNII3 Power: limitation by restricted band – ~23dBm conducted Antenna: 2dBi
	Canada	RSS-247, 40MHz Same as US for UNII3 Usage: indoor and outdoor

2.2 EUT Exercise Software

No special exercise software was used.

2.3 Special Accessories

No special accessories were used

2.4 Equipment Modifications

No modifications were necessary to achieve compliance.

2.5 Configuration of Tested System

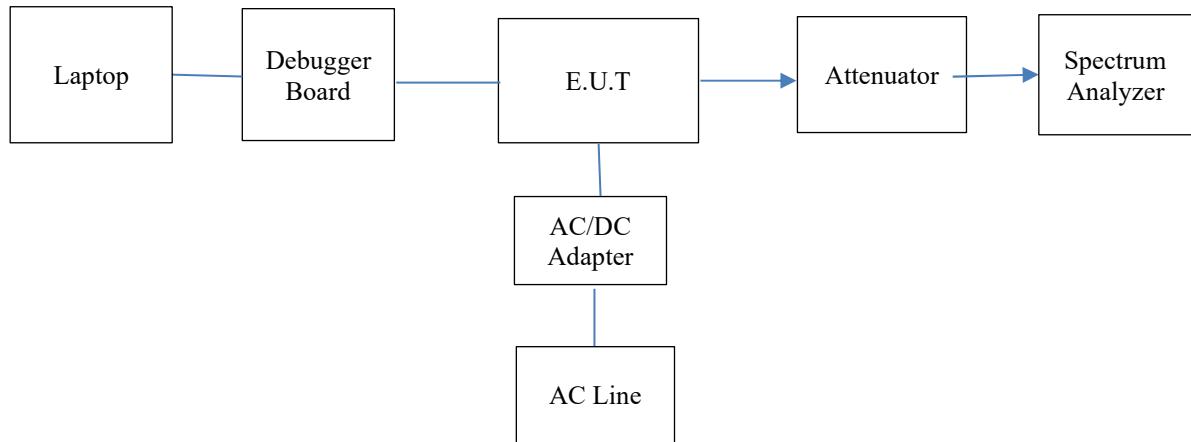


Figure 1. Configuration of Tested System - Conducted

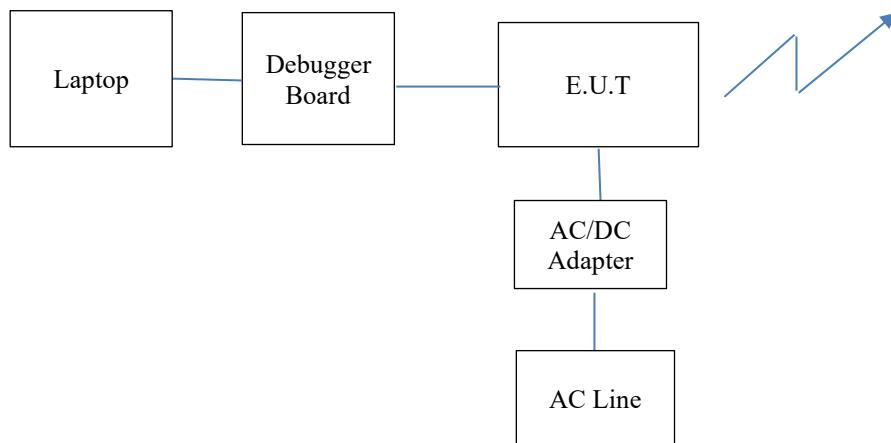


Figure 2. Configuration of Tested System - Radiated



3. Conducted and Radiated Measurement Test Setup Photos

See a separate file.



4. Conducted Emission from AC Mains

4.1 Test Specification

FCC Part 15, Subpart C, Section 15.207
RSS Gen, Issue 5, Clause 8.8

4.2 Test Procedure

(Temperature (22°C)/ Humidity (56%RH))

The E.U.T operation mode and test setup are as described in Section 2 of this report. In order to minimize background noise interference, the conducted emission testing was performed inside a shielded room, with the E.U.T placed on a 0.8 meter high wooden table, 0.4 meter from the room's vertical wall. In the case of a floor-standing E.U.T., it was placed on the horizontal ground plane.

The E.U.T was powered from 115 V AC / 60 Hz via 50 Ohm / 50 μ Hn Line Impedance Stabilization Network (LISN) on the phase and neutral lines. The LISN's were grounded to the shielded room ground plane (floor), and were kept at least 0.8 meters from the nearest boundary of the E.U.T.

The center of the E.U.T.'s AC cable was folded back and forth, in order to form a bundle less than 0.40 meters and a total cable length of 1 meter.

The effect of varying the position of the cables was investigated to find the configuration that produces maximum emission.

The emission voltages at the LISN's outputs were measured using a computerized receiver, complying with CISPR 16 requirements. The specification limits are loaded to the receiver and are displayed on the receiver's spectrum display.

The E.U.T was evaluated in TX operation mode.

A frequency scan between 0.15 and 30 MHz was performed at 9 kHz I.F. band width, using peak detection.

The spectral components having the highest level on each line were measured using a quasi-peak and average detector.

4.3 Test Limit

Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.



4.4 **Test Results**

JUDGEMENT: Passed by -9.37 dB

The margin between the emission levels and the specification limit is, in the worst case, -9.37 dB for the phase line at 24.018 MHz, and -9.88 dB at 24.018 MHz for the neutral line.

The EUT met the FCC Part 15, Subpart C specification requirements.

The details of the highest emissions are given in *Figure 3* to *Figure 6*.



Conducted Emission

E.U.T Description Draco TX
Type AMN41012
Serial Number: Not designated

Specification: FCC Part 15, Subpart C;
 RSS Gen, Issue 5, Clause 8.8
Lead: Phase
Detectors: Peak, Quasi-peak, Average
Power Operation AC/DC Adapter

EDIT PEAK LIST (Final Measurement Results)					
Trace1:	CE22BQP				
Trace2:	CE22BAP				
Trace3:	---				
TRACE	FREQUENCY	LEVEL dB μ V	DELTA	LIMIT	dB
1	Quasi Peak 170 kHz	36.91	-28.04		
2	Average 230 kHz	14.12	-38.32		
1	Quasi Peak 426 kHz	26.91	-30.41		
2	Average 426 kHz	20.87	-26.45		
2	Average 446 kHz	23.37	-23.57		
1	Quasi Peak 450 kHz	29.87	-26.99		
2	Average 966 kHz	18.19	-27.80		
1	Quasi Peak 1.122 MHz	22.58	-33.41		
1	Quasi Peak 1.35 MHz	20.88	-35.11		
2	Average 1.43 MHz	16.99	-29.00		
2	Average 2.202 MHz	15.18	-30.81		
1	Quasi Peak 2.97 MHz	19.33	-36.66		
1	Quasi Peak 3.71 MHz	19.59	-36.40		
2	Average 3.73 MHz	14.95	-31.05		
1	Quasi Peak 8.294 MHz	25.54	-34.45		
2	Average 8.434 MHz	19.56	-30.43		
1	Quasi Peak 11.022 MHz	24.30	-35.69		
2	Average 11.494 MHz	19.74	-30.25		
1	Quasi Peak 24.018 MHz	40.50	-19.49		
2	Average 24.018 MHz	40.62	-9.37		

Date: 27.DEC.2020 09:20:32

Figure 3. Detectors: Peak, Quasi-peak, Average

Note: Delta Limit 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.

Conducted Emission

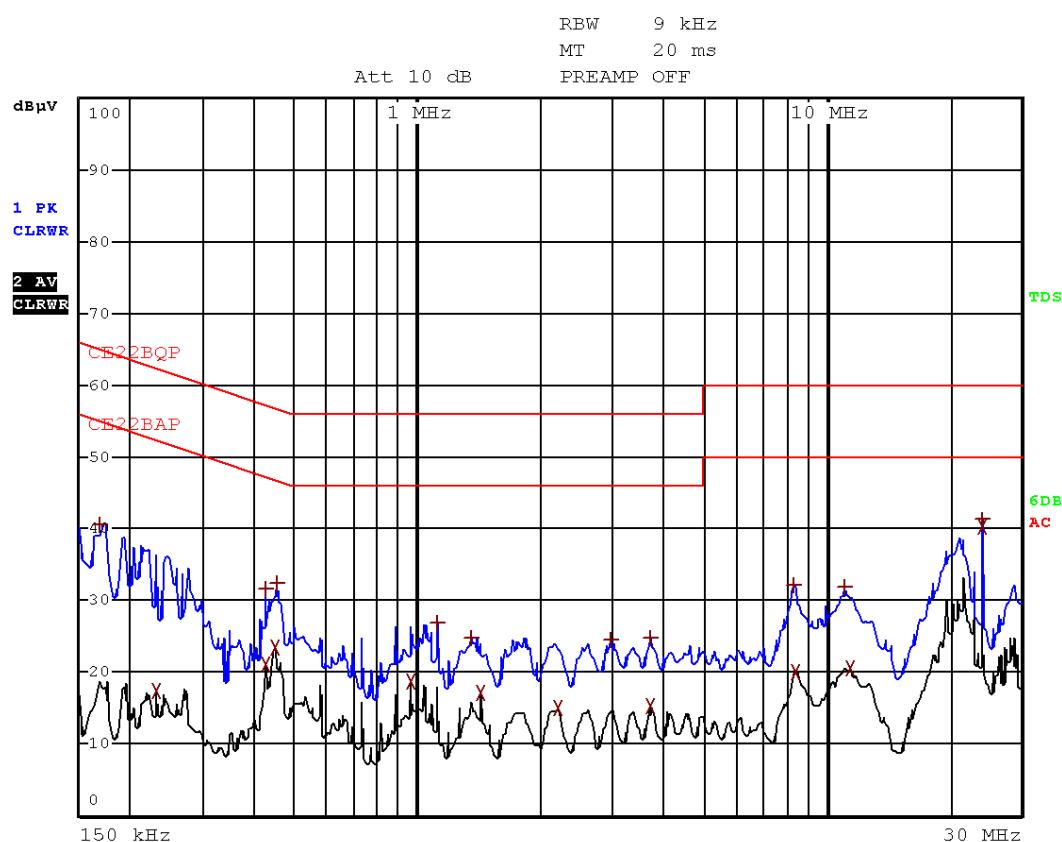
E.U.T Description Draco TX
Type AMN41012
Serial Number: Not designated

Specification: FCC Part 15, Subpart C;
 RSS Gen, Issue 5, Clause 8.8

Lead: Phase

Detectors: Peak, Quasi-peak, Average

Power Operation AC/DC Adapter



Date: 27.DEC.2020 09:18:39

Figure 4. Detectors: Peak, Quasi-peak, Average



Conducted Emission

E.U.T Description Draco TX
Type AMN41012
Serial Number: Not designated

Specification: FCC Part 15, Subpart C;
 RSS Gen, Issue 5, Clause 8.8
Lead: Neutral
Detectors: Peak, Quasi-peak, Average
Power Operation AC/DC Adapter

EDIT PEAK LIST (Final Measurement Results)					
Trace1:	CE22BQP				
Trace2:	CE22BAP				
Trace3:	---				
TRACE	FREQUENCY	LEVEL dB μ V	DELTA	LIMIT dB	
1	Quasi Peak 150 kHz	37.92	-28.07		
2	Average 242 kHz	16.77	-35.25		
1	Quasi Peak 266 kHz	29.31	-31.92		
2	Average 426 kHz	17.02	-30.31		
2	Average 450 kHz	22.46	-24.41		
1	Quasi Peak 462 kHz	27.84	-28.81		
1	Quasi Peak 1.034 MHz	19.41	-36.58		
2	Average 1.042 MHz	14.67	-31.32		
1	Quasi Peak 1.41 MHz	18.82	-37.17		
2	Average 1.43 MHz	13.96	-32.04		
2	Average 2.626 MHz	13.90	-32.09		
1	Quasi Peak 2.662 MHz	18.97	-37.02		
1	Quasi Peak 4.102 MHz	19.28	-36.71		
2	Average 4.174 MHz	14.56	-31.43		
1	Quasi Peak 8.326 MHz	26.17	-33.82		
2	Average 8.406 MHz	19.94	-30.05		
2	Average 11.082 MHz	19.89	-30.10		
1	Quasi Peak 11.194 MHz	25.11	-34.88		
1	Quasi Peak 24.018 MHz	39.99	-20.00		
2	Average 24.018 MHz	40.11	-9.88		

Date: 27.DEC.2020 09:42:20

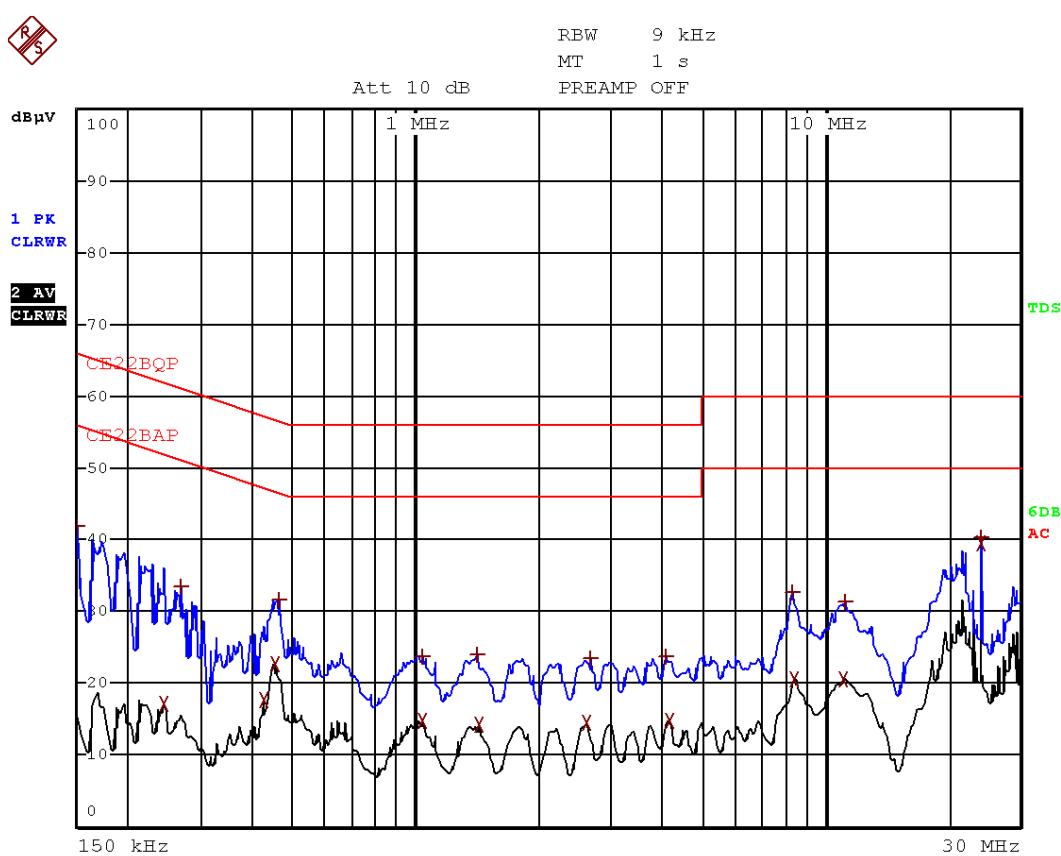
Figure 5. Detectors: Peak, Quasi-peak, Average

Note: Delta Limit 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.

Conducted Emission

E.U.T Description Draco TX
Type AMN41012
Serial Number: Not designated

Specification: FCC Part 15, Subpart C;
 RSS Gen, Issue 5, Clause 8.8
Lead: Neutral
Detectors: Peak, Quasi-peak, Average
Power Operation AC/DC Adapter



Date: 27.DEC.2020 09:31:48

Figure 6 Detectors: Peak, Quasi-peak, Average



4.5 Test Equipment Used; Conducted Emission

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
LISN	Fischer	FCC-LISN-25A	127	October 28, 2020	October 28, 2021
Transient Limiter	HP	11947A	3107A03042	July 12, 2020	July 12, 2021
EMI Receiver	Rohde & Schwarz	ESCI7	100724	February 23, 2020	February 23, 2021
Cable CE Chamber 5M	Telrad	RJ214	-	October 28, 2020	October 28, 2021

Figure 7 Test Equipment Used

5. Maximum Conducted Output Power

5.1 Test Specification

FCC, Part 15, Subpart E, Section 407(a)(3)

RSS 247, Issue 2, Section 6.2.4

5.2 Test Procedure

(Temperature (20°C)/ Humidity (56%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=31.5 dB). Special attention was taken to prevent Spectrum Analyzer RF input overload.

Spectrum setting done according KDB 789033 d02 v01, method SA-1 instructions (section 2.b).

5.3 FCC and ISED Test Limit

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1W provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.4 Test Results

BW	Operation Frequency	Port 1 Reading	Port 2 Reading	Total Power*	Antenna Gain	EIRP	Limit	Margin
(MHz)	(MHz)	(dBm)	(dBm)	(dBm)	(dBi)	(dBm)	(dBm)	(dB)
40.0	5750.0	17.37	18.31	20.9	2.0	22.9	30.0	-7.1
	5790.0	18.44	17.92	21.2	2.0	23.2	30.0	-6.8
	5830.0	18.15	18.32	21.2	2.0	23.2	30.0	-6.8

*Note: total power (dBm)= $10 \log [port1(mW)+port2(mW)]$

Figure 8 Test Results 2TX mode

BW	Operation Frequency	Port 1 Reading	Port 2 Reading	Port 3 Reading	Port 4 Reading	Total Power*	Antenna Gain	EIRP	Limit	Margin
(MHz)	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBi)	(dBm)	(dBm)	(dB)
40.0	5750.0	15.9	15.6	14.65	13.98	21.1	2.0	23.1	30.0	-6.9
	5790.0	16.34	16.0	14.35	13.54	21.2	2.0	23.2	30.0	-6.8
	5830.0	15.15	15.5	15.01	15.04	21.2	2.0	23.2	30.0	-6.8

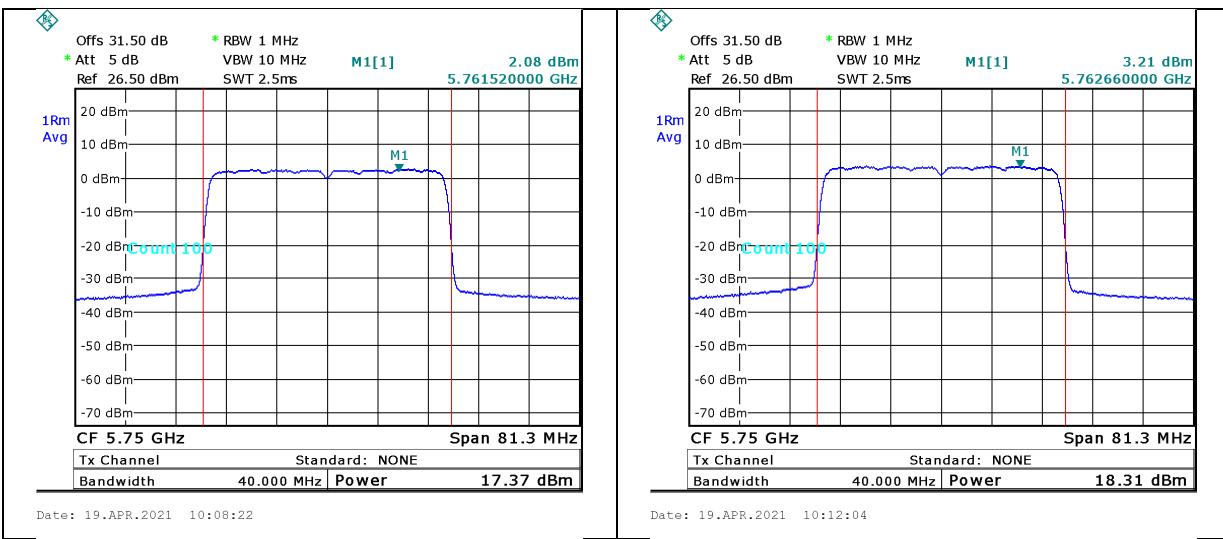
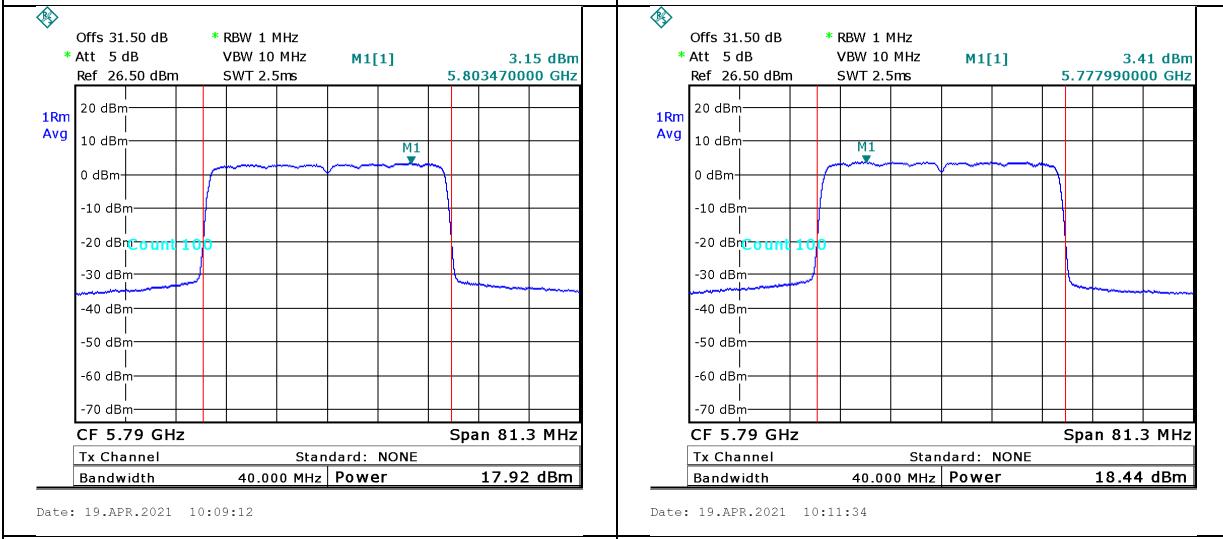
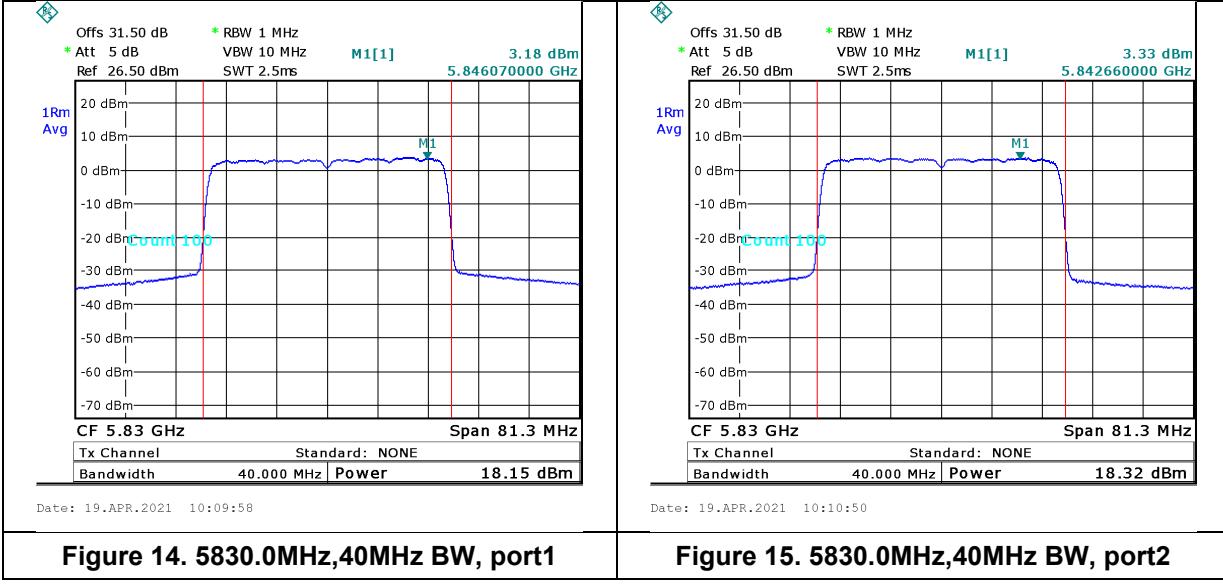
*Note: total power (dBm)= $10 \log [port1(mW)+port2(mW)+port3(mW)+port4(mW)]$

Figure 9 Test Results 4TX mode

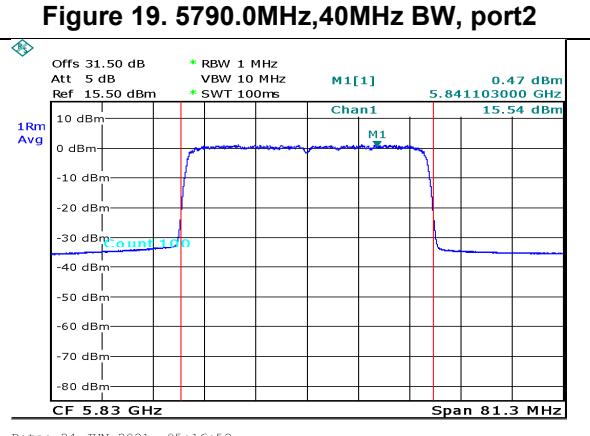
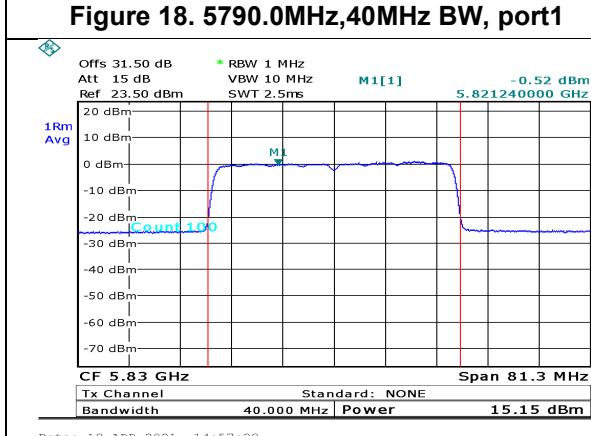
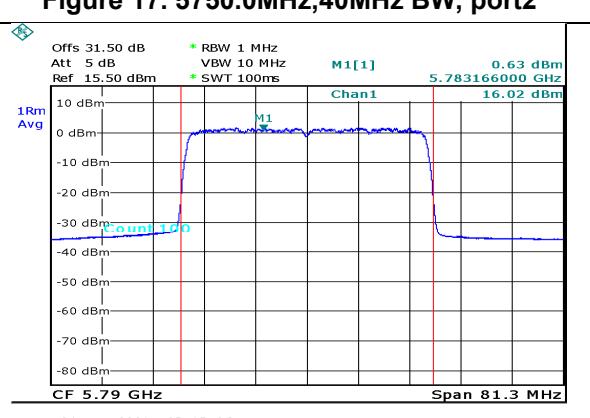
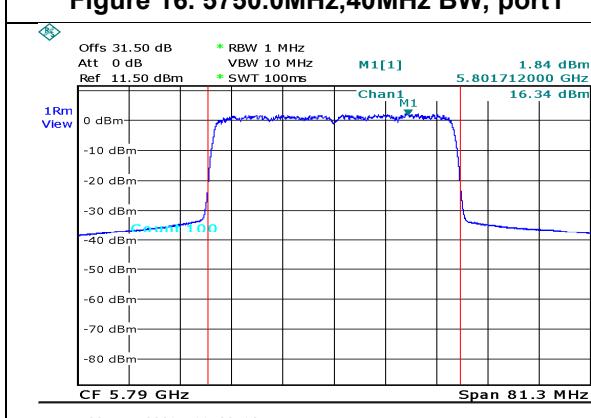
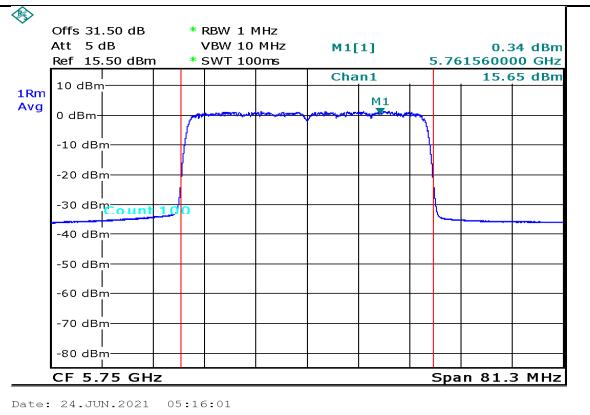
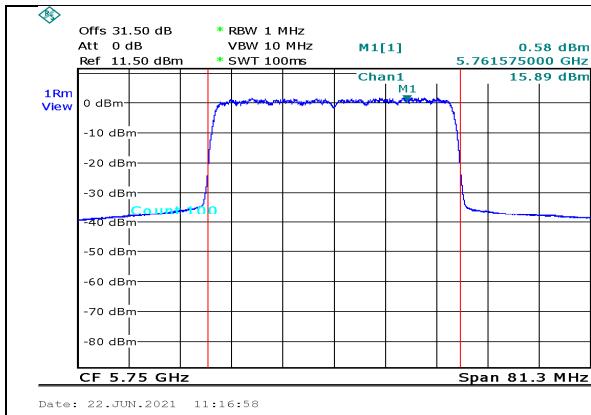
JUDGMENT: Passed by 6.8dB

For additional information see Figure 10 to Figure 27.



2TX mode:**Figure 10. 5750.0MHz,40MHz BW, port1****Figure 11. 5750.0MHz,40MHz BW, port2****Figure 12. 5790.0MHz,40MHz BW, port1****Figure 13. 5790.0MHz,40MHz BW, port2****Figure 14. 5830.0MHz,40MHz BW, port1****Figure 15. 5830.0MHz,40MHz BW, port2**



4TX mode:

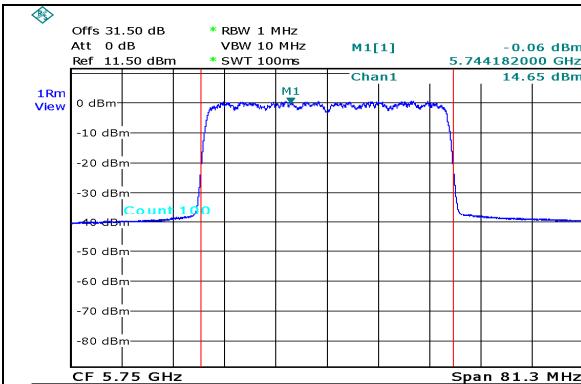


Figure 22. 5750.0MHz,40MHz BW, port3

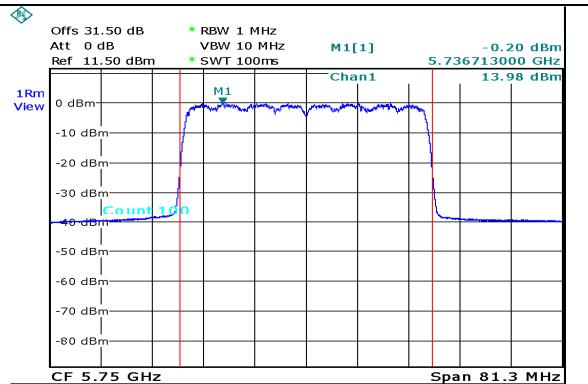


Figure 23. 5750.0MHz,40MHz BW, port4

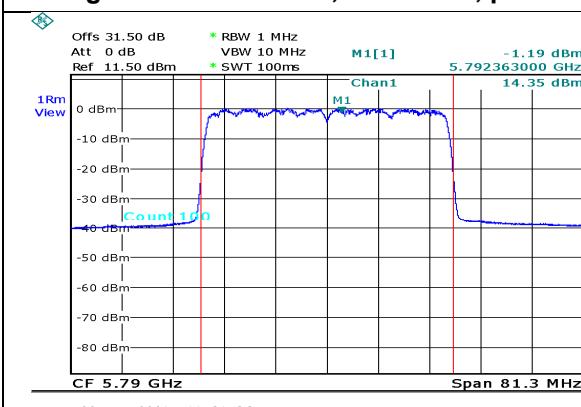


Figure 24. 5790.0MHz,40MHz BW, port3

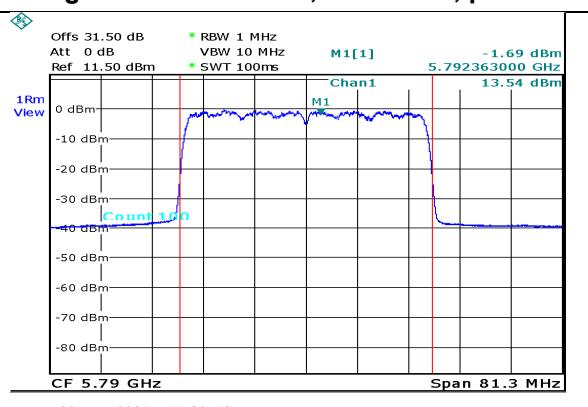


Figure 25. 5790.0MHz,40MHz BW, port4

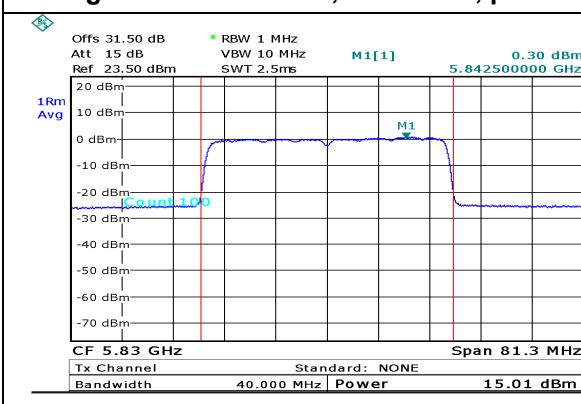


Figure 26. 5830.0MHz,40MHz BW, port3

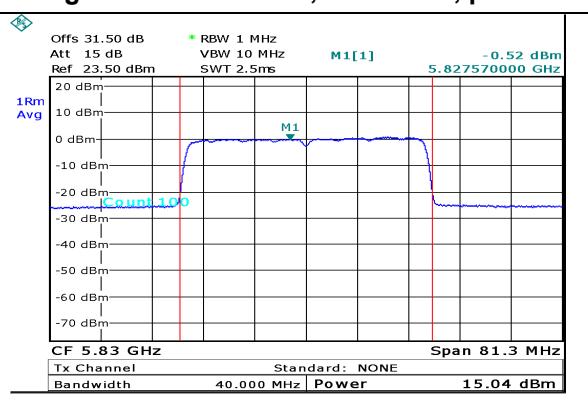


Figure 27. 5830.0MHz,40MHz BW, port4



5.5 Test Equipment Used; Maximum Peak Power Output

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	Rohde & Schwarz	FSL6	100194	February 23, 2020	February 23, 2021
Low Loss cable	Huber Shunner	Sucofelex	27504/4PEA	August 23, 2020	August 23, 2021
30 dB attenuator	MCL	BW-S30W5	533	August 23, 2020	August 23, 2021

Figure 28 Test Equipment Used

6. Maximum Power Spectral Density (PSD)

6.1 Test Specification

FCC, Part 15, Subpart E, Section 407(a)(3)

RSS 247, Issue 2, Section 6.2.4

6.2 Test Procedure

(Temperature (22°C)/ Humidity (56%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= 31.5dB). Special attention was taken to prevent Spectrum Analyzer RF input overload. Spectrum setting done according KDB 789033 d02 v01 instructions (section F).

6.3 FCC and ISED Test Limit

In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

6.4 Test Results

BW	Operation Frequency	PSD@RBW=1MHz		Total Reading*	Limit	Margin
		Port 1 Reading	Port 2 Reading			
(MHz)	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
40.0	5750.0	2.1	3.2	2.6	30.0	-27.4
	5790.0	3.1	3.4	3.2	30.0	-26.8
	5830.0	3.2	3.3	3.2	30.0	-26.8

*Note: total reading (dBm)= $10 \log [port1(mW)+port2(mW)]$, total reading includes factor of conversion RBW 1MHz to 500kHz which is 3dB.

**Note: RBW Conversion factor was calculated as the following equation: $10\log(500kHz/1MHz) = -3dB$

Figure 29 Test Results 2TX mode

BW	Operation Frequency	PSD@RBW=1MHz				Total Reading*	Limit	Margin
		Port 1 Reading	Port 2 Reading	Port 3 Reading	Port 4 Reading			
(MHz)	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(mW)	(W)	
40.0	5750.0	0.6	0.34	-0.06	-0.2	3.2	30.0	-26.8
	5790.0	1.84	0.63	-1.19	-1.69	3.2	30.0	-26.8
	5830.0	-0.52	0.47	0.3	-0.52	3.0	30.0	-27.0

*Note: total reading (dBm)= $10 \log [port1(mW)+port2(mW)+port3(mW)+port4(mW)]$ total reading includes factor of conversion RBW 1MHz to 500kHz which is 3dB

**Note: RBW Conversion factor was calculated as the following equation: $10\log(500kHz/1MHz) = -3dB$

Figure 30 Test Results 4TX mode

JUDGMENT: Passed by 996 mW

For additional information see *Figure 31* to *Figure 48*.

2TX mode:

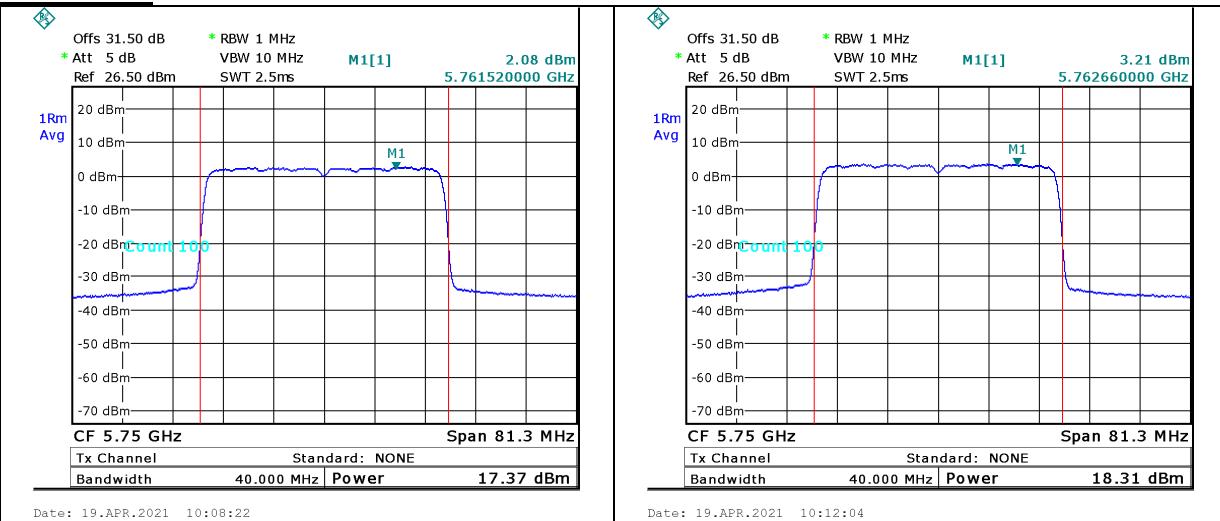


Figure 31. 5750.0MHz,40MHz BW, port1

Figure 32. 5750.0MHz,40MHz BW, port2

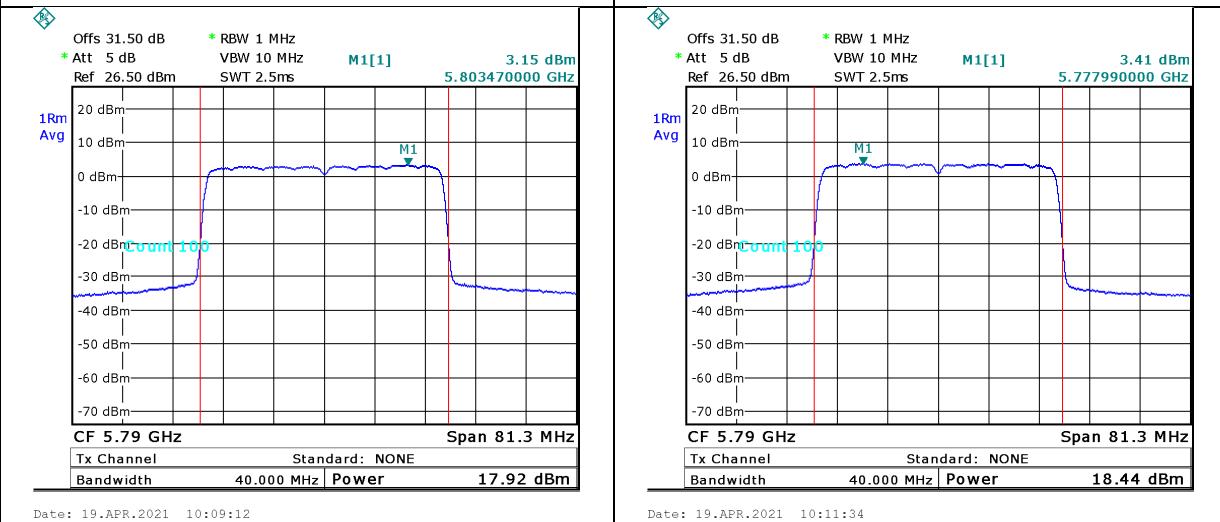


Figure 33. 5790.0MHz,40MHz BW, port1

Figure 34. 5790.0MHz,40MHz BW, port2

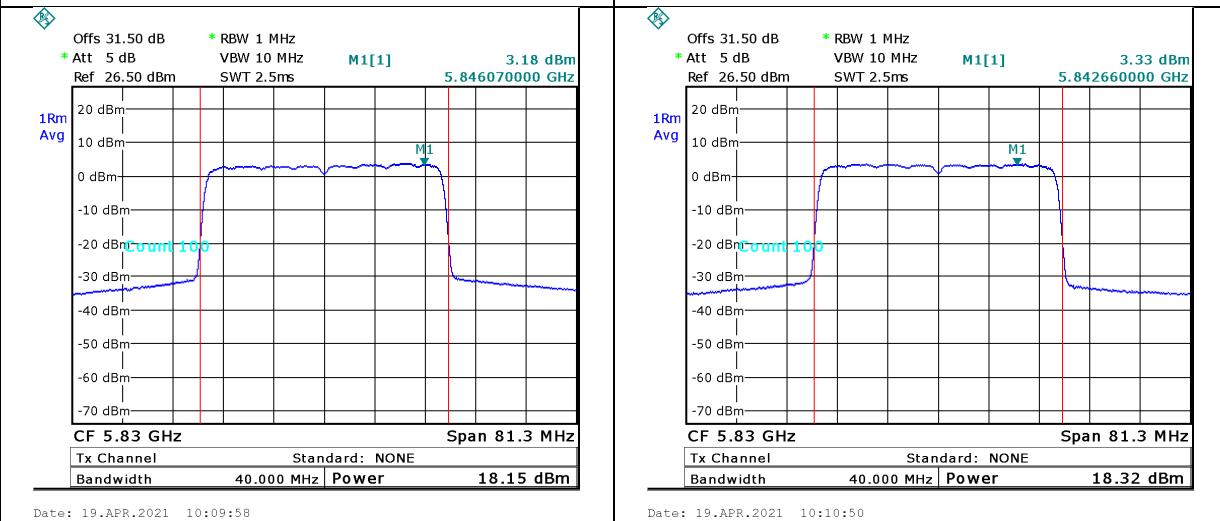


Figure 35. 5830.0MHz,40MHz BW, port1

Figure 36. 5830.0MHz,40MHz BW, port2

4TX mode:

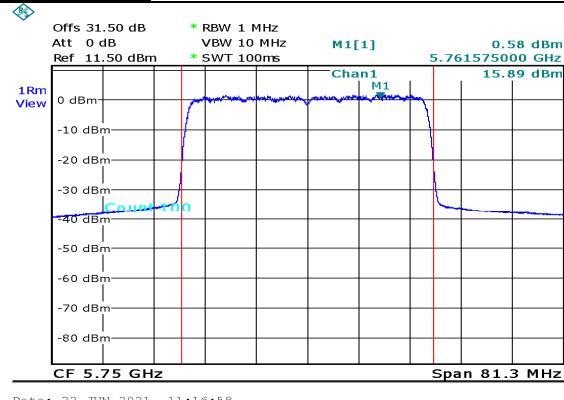


Figure 37. 5750.0MHz,40MHz BW, port1

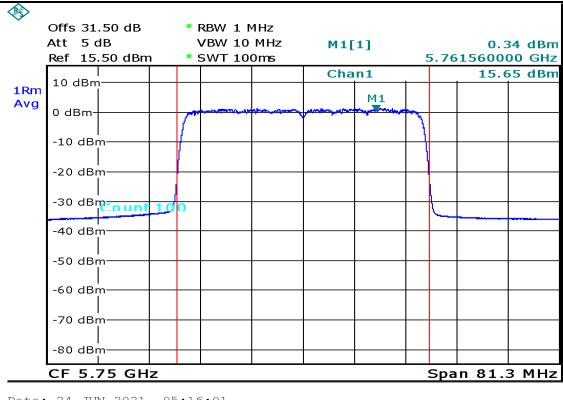


Figure 38. 5750.0MHz,40MHz BW, port2

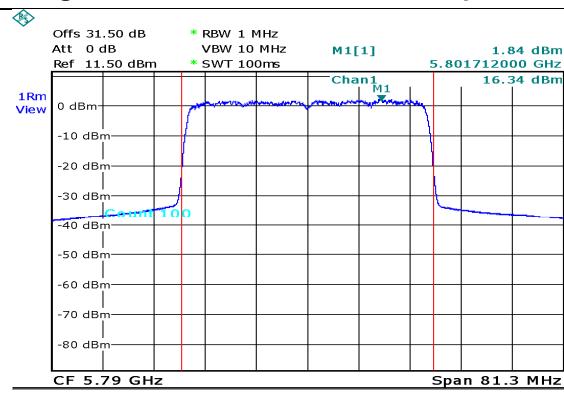


Figure 39. 5790.0MHz,40MHz BW, port1

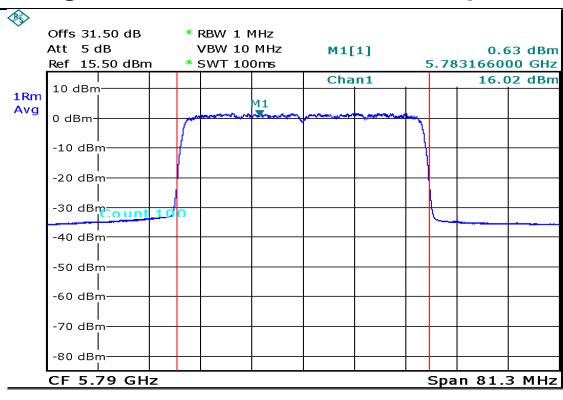


Figure 40. 5790.0MHz,40MHz BW, port2

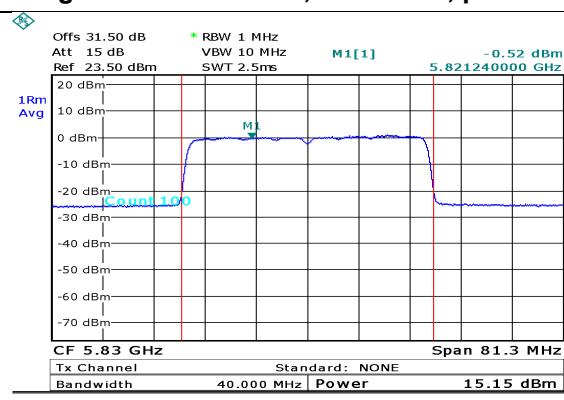


Figure 41. 5830.0MHz,40MHz BW, port1

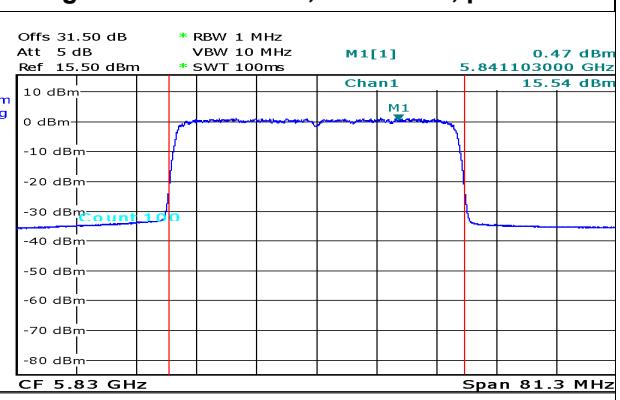


Figure 42. 5830.0MHz,40MHz BW, port2

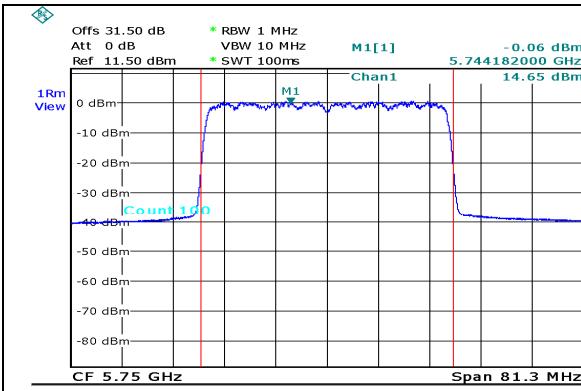


Figure 43. 5750.0MHz,40MHz BW, port3

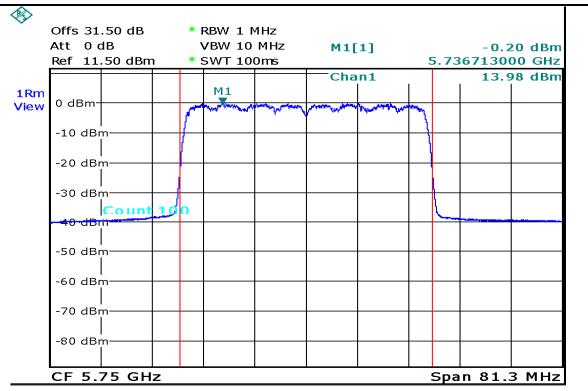


Figure 44. 5750.0MHz,40MHz BW, port4

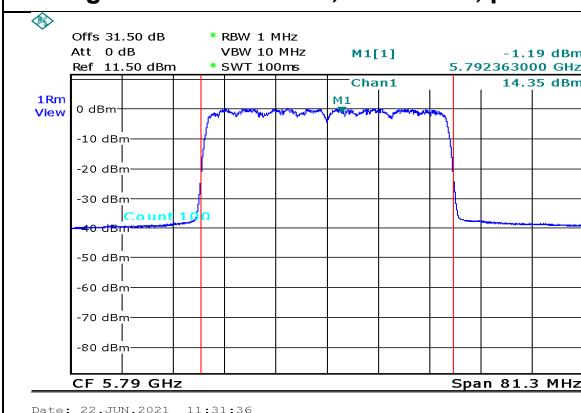


Figure 45. 5790.0MHz,40MHz BW, port3

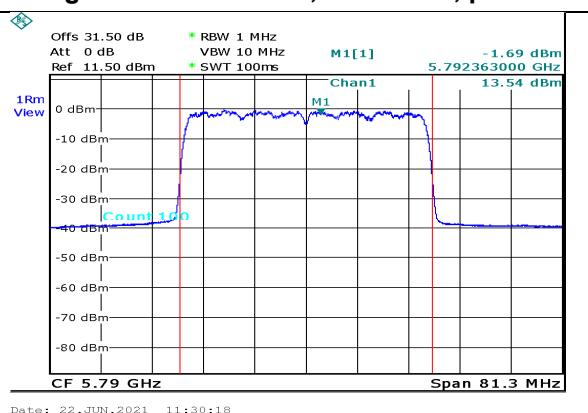


Figure 46. 5790.0MHz,40MHz BW, port4

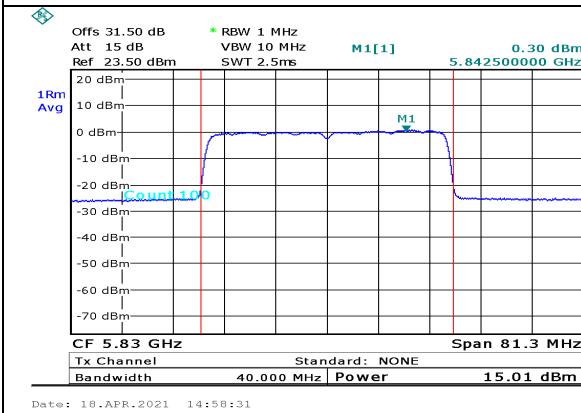


Figure 47. 5830.0MHz,40MHz BW, port3

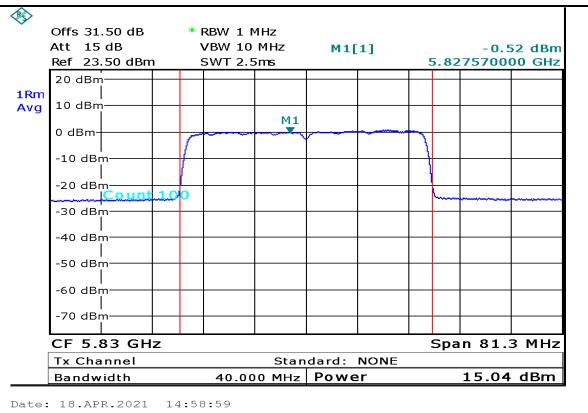


Figure 48. 5830.0MHz,40MHz BW, port4



6.5 Test Equipment Used; Transmitted Power Density

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	Rohde & Schwarz	FSL6	100194	February 23, 2020	February 23, 2021
Low Loss cable	Huber Shunner	Sucofelex	27504/4PEA	August 23, 2020	August 23, 2021
30 dB attenuator	MCL	BW-S30W5	533	August 23, 2020	August 23, 2021

Figure 49 Test Equipment Used



7. Undesirable/Unwanted Emissions

7.1 Test Specification

Part 15, Subpart E, 15.407(b)

RSS 247, Issue 2, Section 6.2.4.2, RSS-Gen, Issue 5: 2018, Section 8.9

7.2 Test Procedure

(Temperature (22°C)/ Humidity (56%RH))

Testing was performed for both Radiated Emission for Emissions in the Non-Restricted Bands & in the Restricted Bands:

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 0.009-30MHz 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 30-1000MHz was scanned and the list of the highest emissions was verified and updated accordingly.

For measurements between 1-40GHz:

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 1.0-40.0 GHz was scanned.

Evaluation was performed for 40.0 MHz BW transmissions.

The highest radiations are described in the tables below.

7.3 FCC&ISED Test Limits

Frequency ranges from band edge (MHz)	EIRP limit		EIRP limit
	(dBm/MHz)	(dB μ V/m/MHz@3m)	(dB μ V/m/MHz@3m)
±5.0	27.0 decreasing linearly to 15.6	122.2 decreasing linearly to 110.8	
±5.0±25.0	15.6 decreasing linearly to 10.0	110.0 decreasing linearly to 105.2	
±25.0±75.0	10.0 decreasing linearly to -27.0	105.2 decreasing linearly to 68.2	
±75.0	-27.0.0	68.2	

Figure 50 FCC and IC Non-Restricted Band Limits

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)	Field strength (dB μ V/m)	Field strength* (dB μ V/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 51 FCC Restricted Band Limits

Frequency (MHz)	Magnetic Field strength (microampere/meter)	Measurement distance (meters)	Magnetic Field strength (dB μ A/m)	Magnetic Field strength* (dB μ A/m) @3m
0.009-0.490	6.37/F(kHz)	300	-3.0-(-37.7)	77.0-42.2
0.490-1.705	63.7/F(kHz)	30	-17.7-(-28.5)	22.3-11.4
1.705-30.0	0.08	30	-21.9	18.0
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)	Field strength (dB μ V/m)	Field strength* (dB μ V/m) @3m
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 52 IC Restricted Band Limits

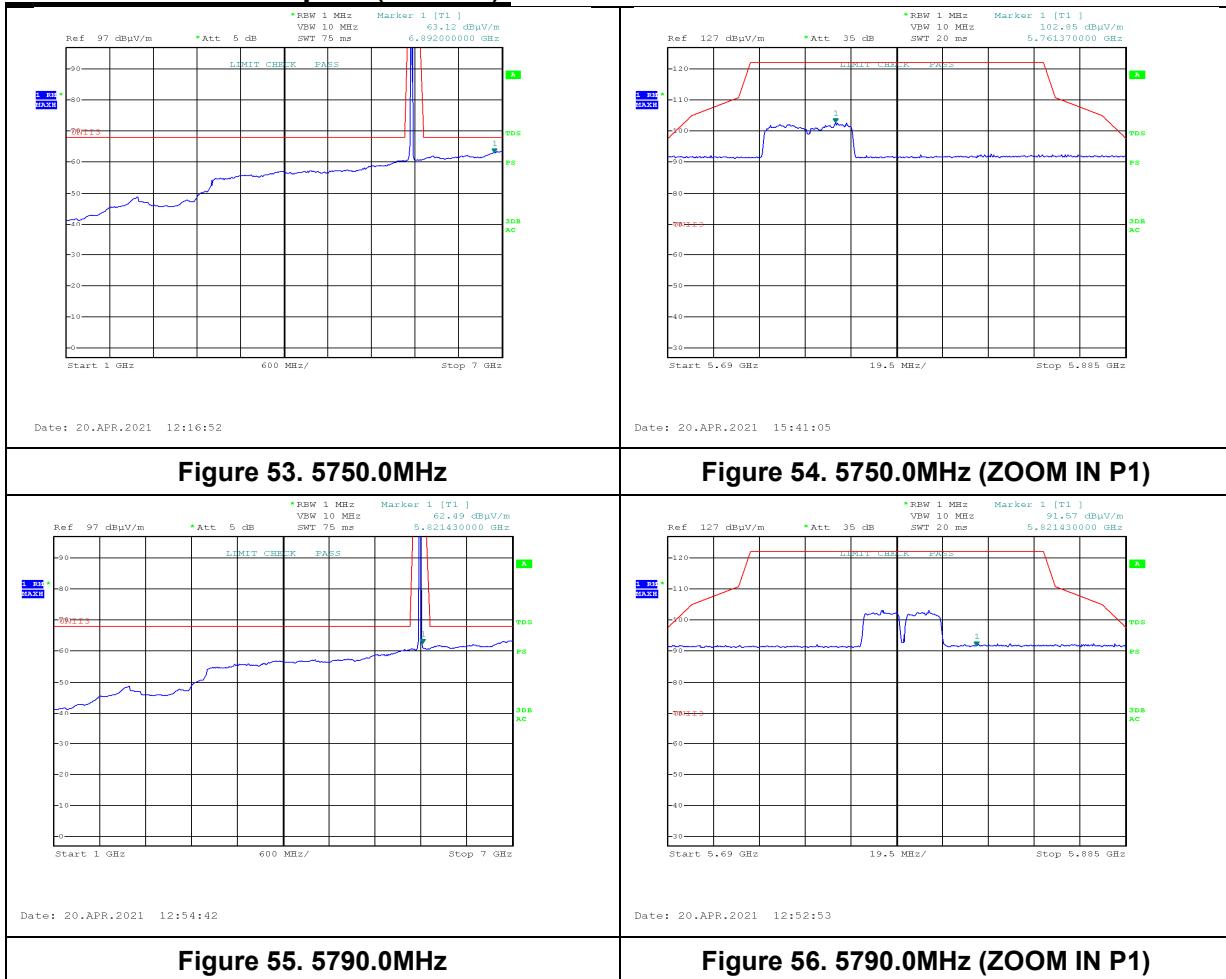
7.4 Test Results

JUDGEMENT: Passed

The EUT met the requirements of the Part 15, Subpart E, 15.407(b)
RSS 247, Issue 2, Section 6.2.4.2, RSS-Gen, Issue 5: 2018, Section 8.9 specification.
For additional information see *Figure 53* to *Figure 61*.

2TX mode

Non-Restricted Band plots (vertical):



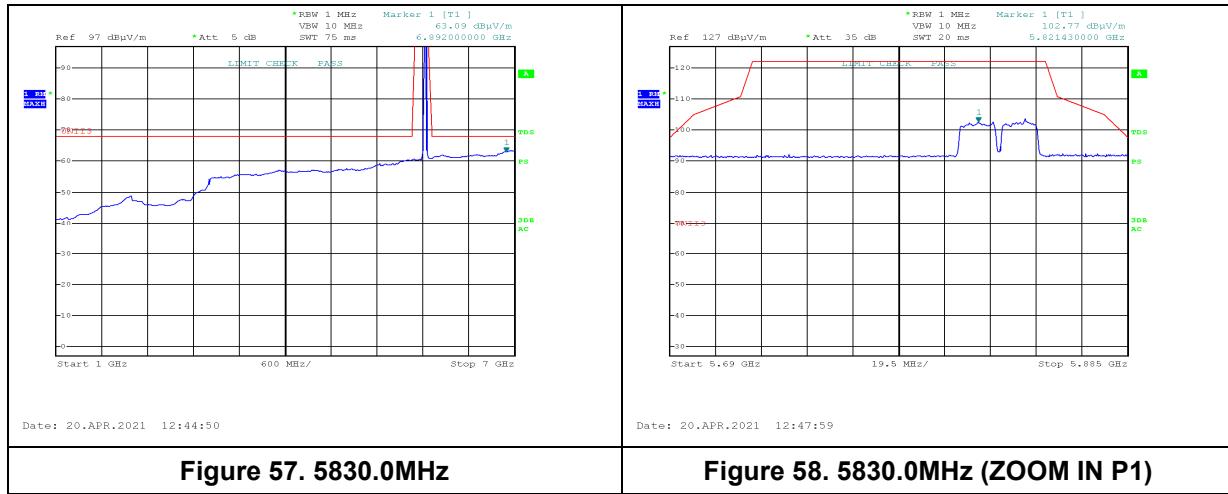


Figure 57. 5830.0MHz

Figure 58. 5830.0MHz (ZOOM IN P1)

Non-Restricted Band plots (horizontal):



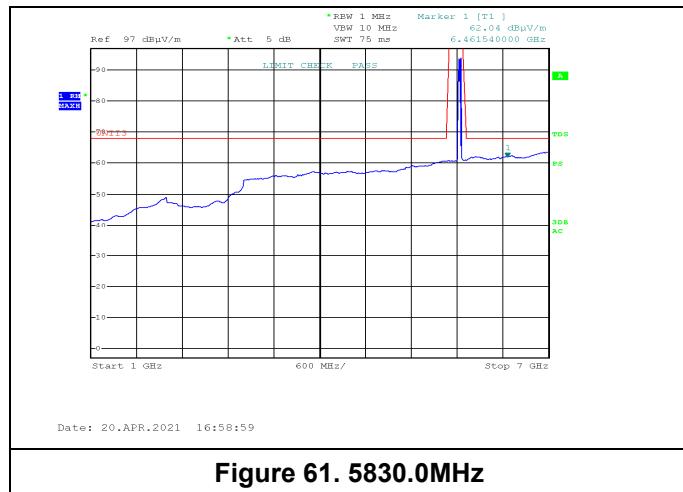


Figure 61. 5830.0MHz



Radiated Emission

Specifications: Part 15, Subpart E, 15.407(b) RSS 247,
Issue 2, Section 6.2.4.2; RSS-Gen, Issue 5: 2018, Section 8.9

Antenna Polarization: Horizontal/Vertical

Frequency Range: 9kHz to 40.0 GHz

Antenna Distance: 3m

Detector: Peak, Average

Operation Frequency	Freq.	Pol	Peak Reading	Peak Limit	Peak Margin	Average Reading	Average Limit	Average Margin
(MHz)	(MHz)	(H/V)	(dB μ V/m)	(dB μ V/m)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)
5750.0								
5790.0								
5830.0								
			No emissions detected above the spectrum analyzer noise level which have at least 10dB margin below the limit					

Figure 62. Radiated Emission Results for 40MHz BW

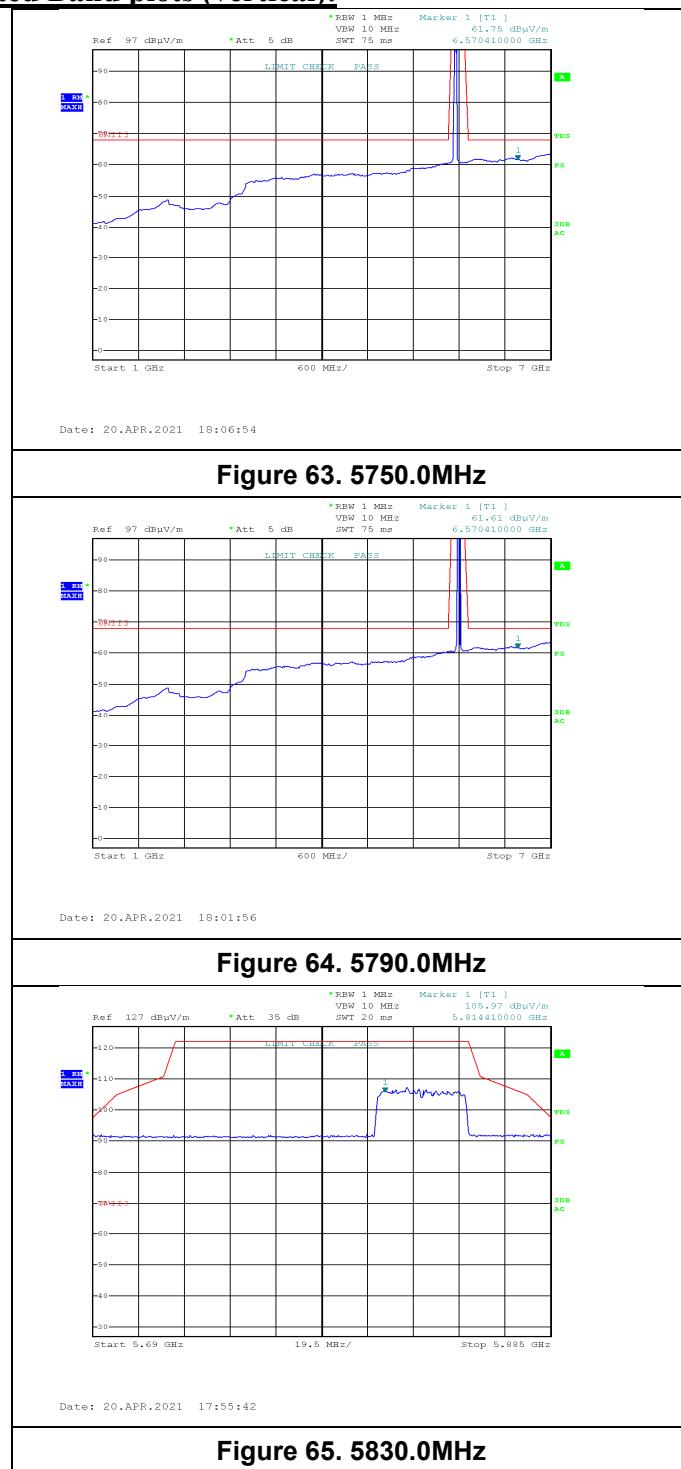
Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

“Peak Amp” includes correction factor.

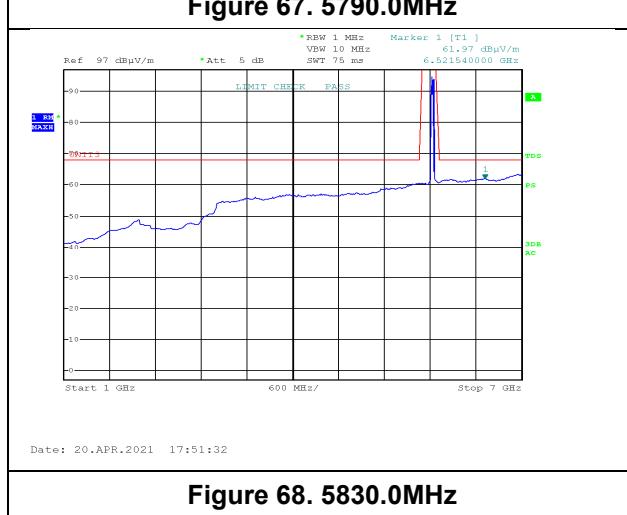
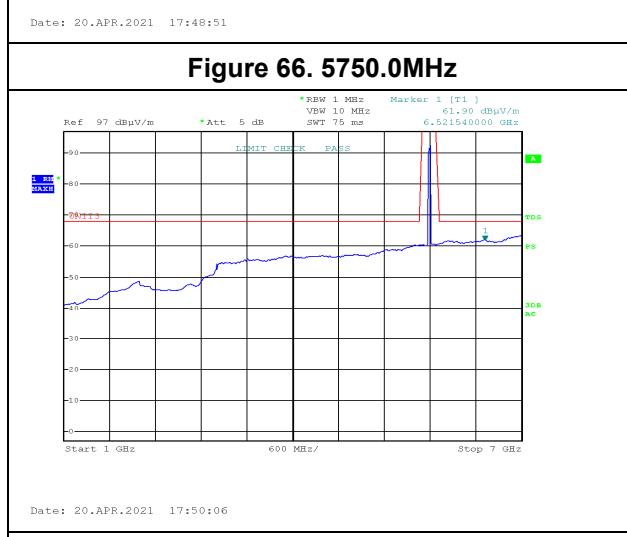
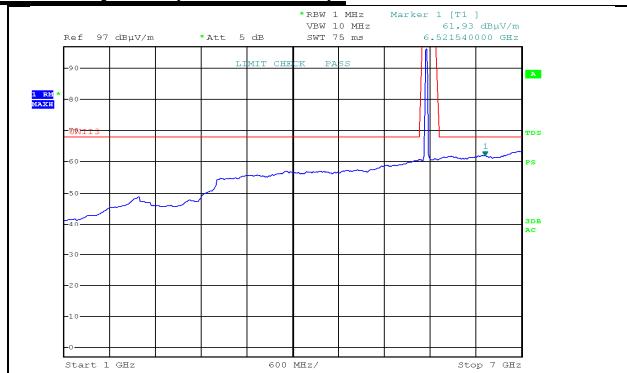
** “Correction Factor” = Antenna Factor + Cable Loss- Low Noise Amplifier Gain*

4TX mode

Non-Restricted Band plots (vertical):



Non-Restricted Band plots (horizontal):





Radiated Emission

Specifications: Part 15, Subpart E, 15.407(b) RSS 247,
Issue 2, Section 6.2.4.2; RSS-Gen, Issue 5: 2018, Section 8.9

Antenna Polarization: Horizontal/Vertical

Frequency Range: 9kHz to 40.0 GHz

Antenna Distance: 3m

Detector: Peak, Average

Operation Frequency (MHz)	Freq. (MHz)	Pol (H/V)	Peak Reading (dB μ V/m)	Peak Limit (dB μ V/m)	Peak Margin (dB)	Average Reading (dB μ V/m)	Average Limit (dB μ V/m)	Average Margin (dB)
5750.0								
5790.0								
5830.0								

Figure 69. Radiated Emission Results for 40MHz BW

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*

7.5 Test Instrumentation Used, Undesirable Emissions

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
EMI Receiver	R&S	ESCI7	100724	February 23, 2020	February 23, 2021
EMI Receiver	HP	8542E	3906A00276	February 24, 2020	February 24, 2021
RF Filter Section	HP	85420E	3705A00248	February 24, 2020	February 24, 2021
EMC Analyzer	HP	8593 EM	3826A00265	February 22, 2020	February 22, 2021
Active Loop Antenna	EMCO	6502	9506-2950	May 03, 2020	May 03, 2021
Biconical Antenna	EMCO	3110B	9912-3337	April 27, 2020	April 27, 2021
Log Periodic Antenna	EMCO	3146	9505-4081	April 27, 2020	April 27, 2022
Horn Antenna	ETS	3115	29845	August 13, 2018	August 13, 2021
Horn Antenna	ARA	SWH-28	1007	April 27, 2020	April 27, 2022
MicroWave System Amplifier	HP	83006A	3104A00589	August 23, 2020	August 23, 2021
RF Cable Chamber	Commscope ORS	0623 WBC-400	G020132	August 23, 2020	August 23, 2021
RF Cable Oats	EIM	RG214-11N(X2)	-	August 04, 2020	August 04, 2021
Filter Band Pass 4-20 GHz	Meuro	MFL040120H50	902252	November 02, 2020	November 02, 2021
Full 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 70 Test Equipment Used

8. Occupied Bandwidth

8.1 Test Specification

FCC, Part 2, Sub part J, Section 2.1049

RSS-Gen, Issue 5: 2014, Section 6.6

8.2 Test Procedure

(Temperature (22°C)/ Humidity (56%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= 31.5dB). Special attention was taken to prevent Spectrum Analyzer RF input overload.

The RBW set to the range of 1% -5% of the OBW. The span was set to 1.5-5 times of the OBW. 99% occupied bandwidth function was set on.

8.3 Test Limit

N/A

8.4 Test Results

Declared EBW [MHz]	Operation Frequency (MHz)	Reading (MHz)
40.0	5750.0	38.0
40.0	5790.0	38.0
40.0	5830.0	38.0

Note: All reading were taken from the second port of the EUT

Figure 71. Bandwidth Test Results

JUDGEMENT: N/A

See additional information in *Figure 72* to *Figure 74*.

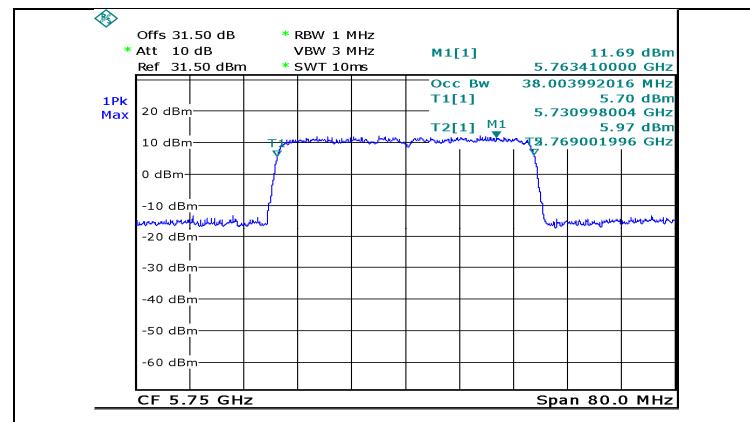


Figure 72. 5750.0 MHz

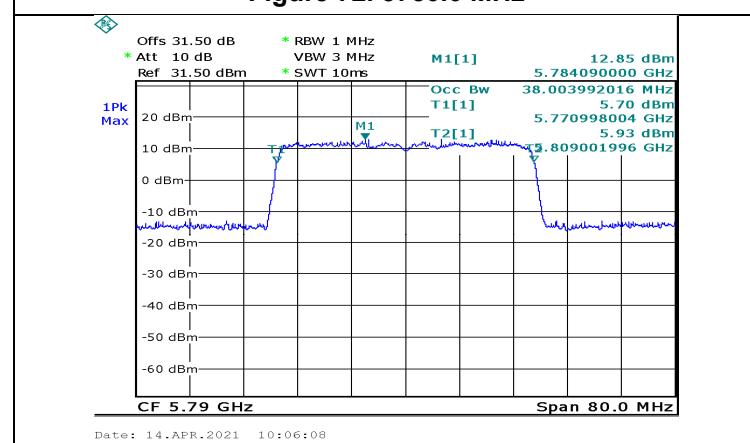


Figure 73. 5790.0 MHz

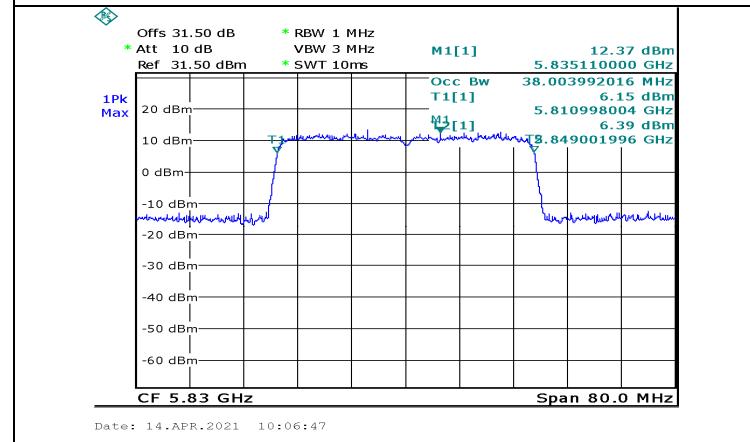


Figure 74. 5830.0 MHz



8.5 Test Equipment Used; Occupied Bandwidth

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	Rohde & Schwarz	FSL6	100194	February 23, 2020	February 23, 2021
Low Loss cable	Huber Shunner	Sucofelex	27504/4PEA	August 23, 2020	August 23, 2021
30 dB attenuator	MCL	BW-S30W5	533	August 23, 2020	August 23, 2021

Figure 75 Test Equipment Used

9. 26dB Bandwidth

9.1 Test Specification

FCC, Part 2, Sub part J, Section 2.1049

RSS-Gen, Issue 5: 2014, Section 6.6

9.2 Test Procedure

(Temperature (22°C)/ Humidity (56%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= 22.0dB). Special attention was taken to prevent Spectrum Analyzer RF input overload.

The RBW set to the range of 1% of the EBW.

9.3 Test Limit

N/A

9.4 Test Results

Declared EBW [MHz]	Operation Frequency (MHz)	Reading (MHz)
40.0	5750.0	41.04
40.0	5790.0	41.2
40.0	5830.0	40.88

Figure 76. Bandwidth Test Results

JUDGEMENT: N/A

See additional information in *Figure 77* to *Figure 79*.

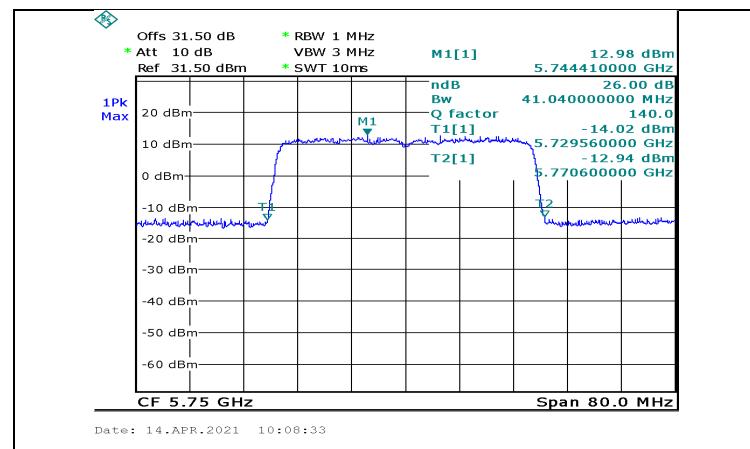


Figure 77. 5750.0 MHz

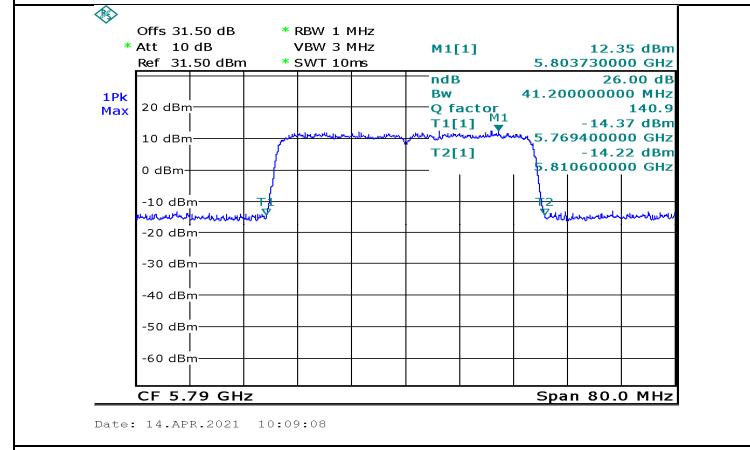


Figure 78. 5790.0 MHz

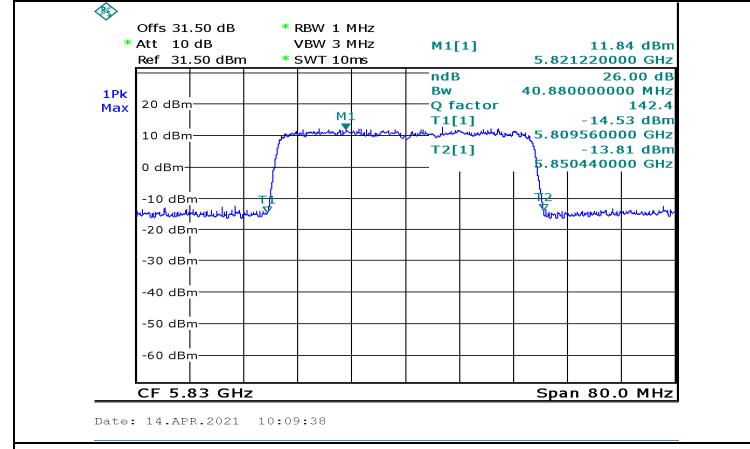


Figure 79. 5830.0 MHz



9.5 Test Equipment Used; 26dB Bandwidth

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	Rohde & Schwarz	FSL6	100194	February 23, 2020	February 23, 2021
Low Loss cable	Huber Shunner	Sucofelex	27504/4PEA	August 23, 2020	August 23, 2021
30 dB attenuator	MCL	BW-S30W5	533	August 23, 2020	August 23, 2021

Figure 80 Test Equipment Used

10. 6 dB Minimum Bandwidth

10.1 Test Specification

FCC Part 15, Subpart E, Section 407(e)

RSS 247, Issue 2, Section 6.2.4

10.2 Test Procedure

(Temperature (22°C)/ Humidity (61%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=32.0 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.

10.3 Test Limit

For systems using digital modulation techniques that operate in the 5725-5850 MHz band. The minimum 6 dB bandwidth shall be at least 500 kHz.

10.4 Test Results

Operation Frequency (MHz)	Reading (MHz)	Limit (kHz)
5750.0	38.0	>500.0
5790.0	38.0	>500.0
5830.0	37.52	>500.0

Figure 81 6 dB Minimum Bandwidth

JUDGEMENT: Passed

For additional information see *Figure 82* to *Figure 84*.

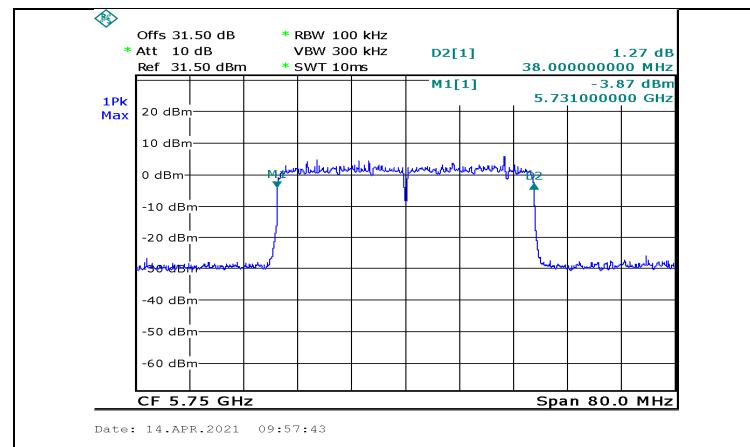


Figure 82. 5750.0 MHz

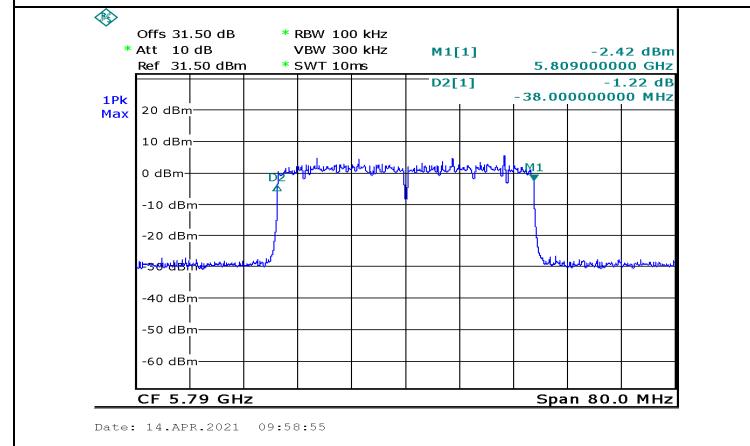


Figure 83. 5790.0 MHz

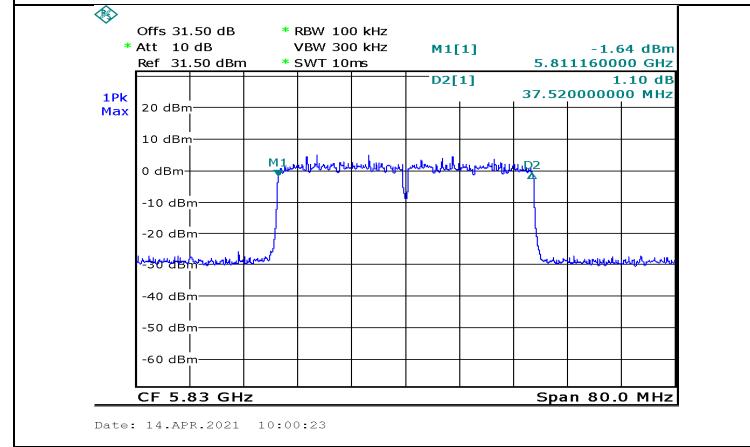


Figure 84. 5830.0 MHz



10.5 Test Equipment Used; 6dB Bandwidth

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	Rohde & Schwarz	FSL6	100194	February 23, 2020	February 23, 2021
Low Loss cable	Huber Shunner	Sucofelex	27504/4PEA	August 23, 2020	August 23, 2021
30 dB attenuator	MCL	BW-S30W5	533	August 23, 2020	August 23, 2021

Figure 85 Test Equipment Used



11. Antenna Gain/Information

11.1 Test Specification

FCC, Part 15, Subpart B. section 212 (a)(iv)

11.2 Test Limit

The modular transmitter must comply with the antenna and transmission system requirements of §§15.203, 15.204(b) and 15.204(c). The antenna must either be permanently attached or employ a “unique” antenna coupler (at all connections between the module and the antenna, including the cable).

11.3 Test Results

Judgment: Passed

2dBi antenna with RP-SMA connector type

Model	Type	Antenna Gain	Impedance
VT5-7.5G-R-1	dipole	2dBi	50Ω
WSS002	dipole	2dBi	50Ω



12. APPENDIX A - CORRECTION FACTORS

12.1 For ITL #1911 OATS RF Cable

Frequency (MHz)	Cable Loss (dB)	Frequency (MHz)	Cable Loss (dB)
1.0	0.5	450.00	5.83
10.00	1.0	500.00	6.33
20.00	1.34	550.00	6.67
30.00	1.5	600.00	6.83
50.00	1.83	650.00	7.17
100.00	2.67	700.00	7.66
150.00	3.17	750.00	7.83
200.00	3.83	800.00	8.16
250.00	4.17	850.00	8.5
300.00	4.5	900.00	8.83
350.00	5.17	950.00	8.84
400.00	5.5	1000.00	9.0



12.2 For ITL #1840 Anechoic Chamber RF Cable

Frequency (MHz)	Cable Loss (dB)	Frequency (MHz)	Cable Loss (dB)
1000.0	-1.4	10000.0	-6.0
1500.0	-1.7	10500.0	-6.2
2000.0	-2.0	11000.0	-6.2
2500.0	-2.3	11500.0	-6.0
3000.0	-2.6	12000.0	-6.0
3500.0	-2.8	12500.0	-6.1
4000.0	-3.1	13000.0	-6.3
4500.0	-3.3	13500.0	-6.5
5000.0	-3.6	14000.0	-6.7
5500.0	-3.7	14500.0	-7.0
6000.0	-4.0	15000.0	-7.3
6500.0	-4.4	15500.0	-7.5
7000.0	-4.7	16000.0	-7.6
7500.0	-4.8	16500.0	-8.0
8000.0	-5.0	17000.0	-8.0
8500.0	-5.1	17500.0	-8.1
9000.0	-5.6	18000.0	-8.2
9500.0	-5.8		



12.3 For ITL # 1075 Active Loop Antenna

Frequency (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	-40.0	11.5
3	-40.0	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	11.0
10	-40.5	11.0
20	-41.5	10.0
30	-43.5	8.0



12.4 For ITL #1356 Biconical Antenna

Frequency (MHz)	AF (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 For ITL # 1349 Log Periodic Antenna

Frequency (MHz)	AF (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 For ITL # 1352 1-18 GHz Horn Antenna

Frequency (MHz)	AF (dB/m)	Frequency (MHz)	AF (dB/m)
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 For ITL # 1353 18-26.5 GHz Horn Antenna**CALIBRATION DATA****3 m distance**

Frequency MHZ	Measured antenna factor dB/m
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

¹⁾ The antenna factor shall be added to receiver reading in dB μ V to obtain field strength in dB μ V/m.



12.8 For ITL # 1777 26.5-40 GHz Horn Antenna

