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Report Template Version: V04
Report Template Revision Date: 2018-07-06

Test Report

Report No.: CQASZ20210801378E-04
Applicant: THINKCAR TECH CO., LTD.
Address of Applicant: 2606, building 4, phase II, TiananYungu, Gangtou community, Bantian, Longgang District, Shenzhen
Equipment Under Test (EUT):
Product: THINKTOOL mini, ThinkTool Platinum S6, ThinkTool Lite, THINKSCAN Max, MUCAR VO6, THINKSCAN Sensor, THINKSCAN Actuator
Model No.: TKT02, TK909, VO6, TK952, TK953
Teat Model No.: TKT02
Brand Name: THINKCAR, MUCAR
FCC ID: 2AUARTOOLMINI
Standards: 47 CFR Part 15, Subpart E
KDB 789033 D02 General UNII Test Procedures New Rules v02
KDB 558074 D01 Meas Guidance v05
Date of Receipt: 2021-08-18
Date of Test: 2021-08-18 to 2021-09-29
Date of Issue: 2021-10-27
Test Result: PASS*

*In the configuration tested, the EUT complied with the standards specified above

Tested By: Lewis Zhou
(Lewis Zhou)

Reviewed By: Rock Huang
(Rock Huang)

Approved By: Jack ai
(Jack ai)



1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20210801378E-04	Rev.01	Initial report	2021-10-27

2 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15 Subpart C Section 15.203	ANSI C63.10-2013; KDB789033	PASS
AC Power Line Conducted Emission	47 CFR Part 15 Subpart E Section 15.207	ANSI C63.10-2013; KDB789033	PASS
Maximum Conducted Output Power	47 CFR Part 15 Subpart C Section 15.407 (a)	ANSI C63.10-2013; KDB789033	PASS
Emission Bandwidth	47 CFR Part 15 Subpart C Section 15.407 (a)(e)	ANSI C63.10-2013; KDB789033	PASS
Maximum Power Spectral Density	47 CFR Part 15 Subpart E Section 15.407 (a)	ANSI C63.10-2013; KDB789033	PASS
Band Edge Measurements	47 CFR Part 15 Subpart C Section 15.209 &15.407(b)	ANSI C63.10-2013; KDB789033	PASS
Frequency stability	47 CFR Part 15 Subpart E Section 15.407 (g)	ANSI C63.10-2013; KDB789033	PASS
Operation in the absence of information to the transmit	47 CFR Part 15 Subpart E Section 15.407 (c)	47 CFR Part 15 Subpart E	PASS
Radiated Spurious Emissions	47 CFR Part 15 Subpart E Section 15.407 (b)	ANSI C63.10-2013; KDB789033	PASS

Remark:

The tested sample(s) and the sample information are provided by the client.

Tx: In this whole report Tx (or tx) means Transmitter.

Rx: In this whole report Rx (or rx) means Receiver.

RF: In this whole report RF means Radiated Frequency.

CH: In this whole report CH means channel.

Volt: In this whole report Volt means Voltage.

Temp: In this whole report Temp means Temperature.

Humid: In this whole report Humid means humidity.

Press: In this whole report Press means Pressure.

N/A: In this whole report not application

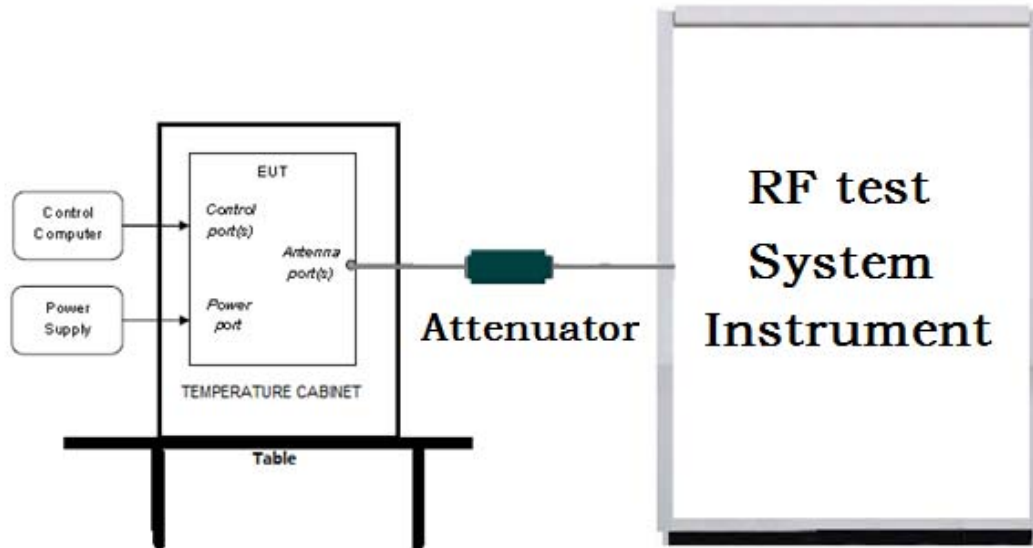
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4 Test Requirement

4.1 Test setup

4.1.1 For Conducted test setup



4.1.2 For Radiated Emissions test setup

Radiated Emissions setup:

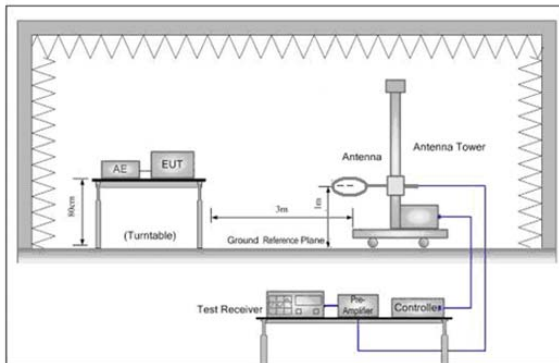


Figure 1. Below 30MHz

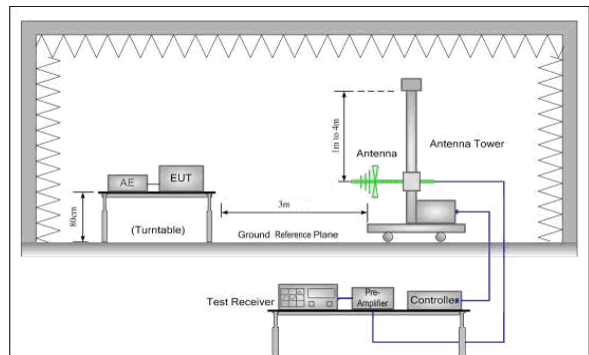


Figure 2. 30MHz to 1GHz

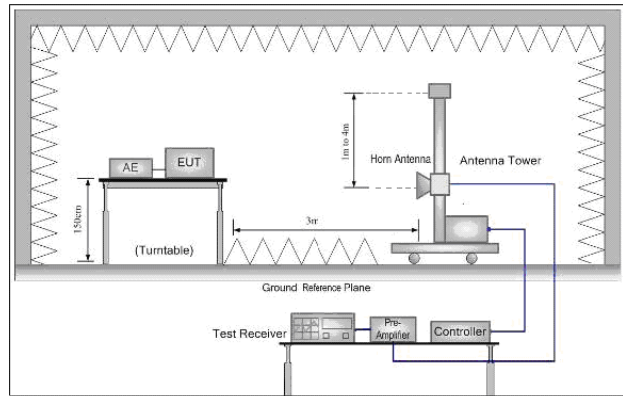
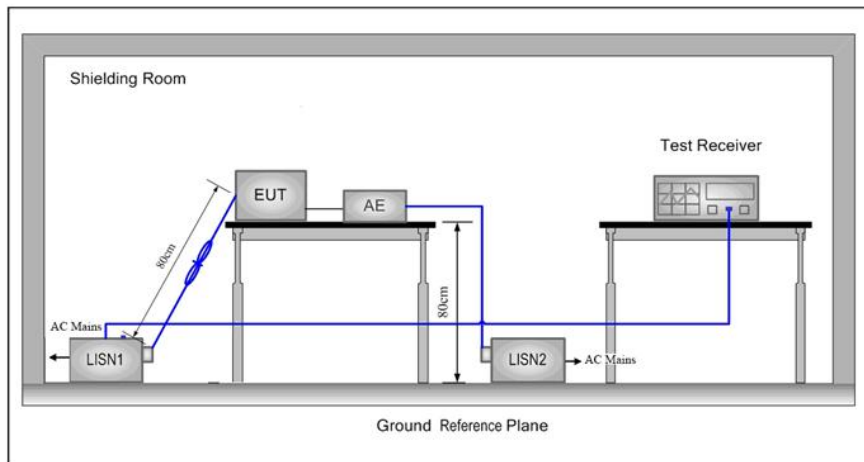


Figure 3. Above 1GHz

4.1.3 For Conducted Emissions test setup

Conducted Emissions setup



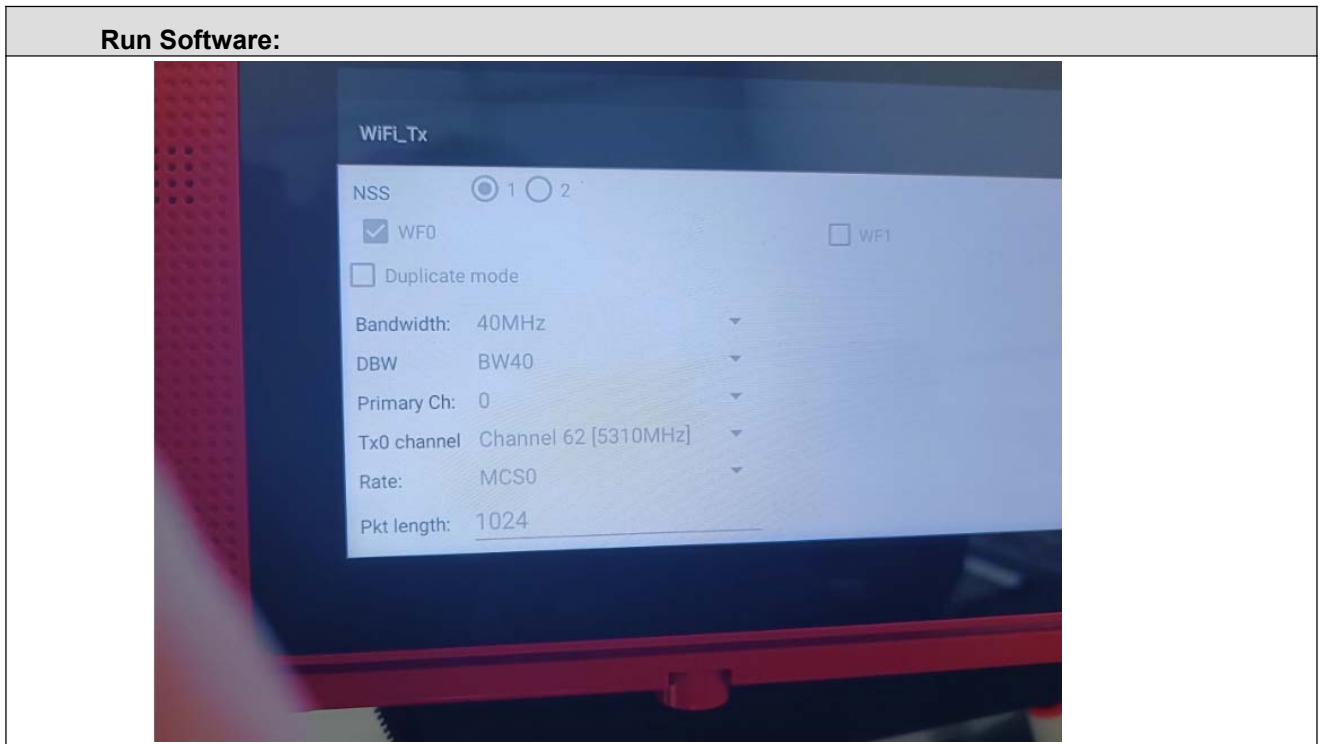
4.2 Test Environment

Operating Environment:		
Conducted Emissions:		
Temperature:	25.6 °C	
Humidity:	60 % RH	
Atmospheric Pressure:	1009 mbar	
Radiated Emissions:		
Temperature:	25.5 °C	
Humidity:	54 % RH	
Atmospheric Pressure:	1009mbar	
Radio conducted item test (RF Conducted test room):		
Temperature:	25.3 °C	
Humidity:	50 % RH	
Atmospheric Pressure:	1009 mbar	
Test Condition	Temperature (°C)	Voltage (V)
TN/VN	+15 to +35	7.6
TL/VL	0	6.84
TH/VL	50	6.84
TL/VH	0	8.36
TH/VH	50	8.36
Remark:		
1)The EUT just work in such extreme temperature of 0 °C to 50 °C and the extreme voltage of 6.84V to 8.36V, so here the EUT is tested in the temperature of 0 °C to 50 °C and the voltage of 6.84V to 8.36V.		
2)VN: Normal Voltage; TN: Normal Temperature;		
TL: Low Extreme Test Temperature; TH: High Extreme Test Temperature;		
VL: Low Extreme Test Voltage; VH: High Extreme Test Voltage.		

4.3 Test Condition

Test channel:

Test Mode	Tx/Rx	RF Channel		
		Low(L)	Middle(M)	High(H)
802.11a/n/ac(20M)	5150MHz ~5250 MHz	Channel 36	Channel 40	Channel 48
		5180MHz	5200MHz	5240MHz
802.11n/ac(40M)	5150MHz ~5250 MHz	Channel 38	N/A	Channel 46
		5190MHz	N/A	5230MHz
802.11ac(80M)	5150MHz ~5250 MHz	N/A	Channel 42	N/A
		N/A	5210MHz	N/A
802.11a/n/ac(20M)	5725MHz ~5850 MHz	Channel 149	Channel 157	Channel 165
		5745MHz	5785MHz	5825MHz
802.11n/ac(40M)	5725MHz ~5850 MHz	Channel 151	N/A	Channel 159
		5755MHz	N/A	5795MHz
802.11ac(80M)	5725MHz ~5850 MHz	N/A	Channel 155	N/A
		N/A	5775MHz	N/A



Test mode:

Pre-scan under all rate at lowest channel for Ant1

Through Pre-scan, 6Mbps is the worst case of 802.11a (20M); MCS0 is the worst case of 802.11n (20M); MCS0 is the worst case of 802.11ac (20M); MCS0 is the worst case of 802.11n(40M); MCS0 is the worst case of 802.11ac (40M); MCS0 is the worst case of 802.11ac(80M).

5 General Information

5.1 Client Information

Applicant:	THINKCAR TECH CO., LTD.
Address of Applicant:	2606, building 4, phase II, TiananYungu, Gangtou community, Bantian, Longgang District, Shenzhen
Manufacturer:	THINKCAR TECH CO., LTD.
Address of Manufacturer:	2606, building 4, phase II, TiananYungu, Gangtou community, Bantian, Longgang District, Shenzhen
Factory:	THINKCAR TECH CO., LTD.
Address of Factory:	2606, building 4, phase II, TiananYungu, Gangtou community, Bantian, Longgang District, Shenzhen

5.2 General Description of EUT

Product Name:	THINKTOOL mini, ThinkTool Platinum S6, ThinkTool Lite, THINKSCAN Max, MUCAR VO6, THINKSCAN Sensor, THINKSCAN Actuator
Model No.:	TKT02, TK909, VO6, TK952, TK953
Test Model No.:	TKT02
Trade Mark:	THINKCAR, MUCAR
Hardware Version:	BSK-Y8-V3
Software Version:	V1.1.6
Test sample SN:	988980001306V0
EUT Power Supply:	lithium battery:DC7.6V, 3150mAh, Charge by DC8.7V Adapter: MODEL: PSYB0502500 INPUT: 100-240V~50/60Hz 0.6A Max OUTPUT: 5V 2.5A, 12.5W
EUT Supports Radios application:	Bluetooth Dual mode: 2402-2480MHz 2.4GHz: Wi-Fi: 802.11b/g/n(HT20): 2412MHz~2462MHz; 802.11n(HT40): 2422MHz~2452MHz 5GHz: Wi-Fi: U-NII-1: 5.15-5.25GHz; U-NII-3: 5.725-5.850GHz
EUT Type:	Client devices

5.3 Product Specification subjective to this standard

Operation Frequency:	IEEE 802.11a/n/ac(20M): 5150MHz ~5250 MHz IEEE802.11n/ac(40M): 5150MHz ~5250 MHz IEEE802.11ac(80M): 5150MHz ~5250 MHz IEEE 802.11a/n/ac(20M): 5725MHz ~5850 MHz IEEE802.11n/ac(40M): 5725MHz ~5850 MHz IEEE802.11ac(80M): 5725MHz ~5850 MHz
Channel Numbers:	IEEE 802.11a/n/ac(20M): 5150MHz ~5250MHz/ 4 channel IEEE 802.11n/ac(40M): 5150MHz ~5250MHz/ 2 channel IEEE 802.11ac(80M): 5150MHz ~5250MHz/ 1 channel IEEE 802.11a/n/ac(20M): 5725MHz ~5850MHz/ 5 channel IEEE 802.11n/ac(40M): 5725MHz ~5850MHz/ 2 channel IEEE 802.11ac(80M): 5725MHz ~5850MHz/ 1 channel
Type of Modulation:	OFDM
Sample Type:	<input type="checkbox"/> Mobile <input checked="" type="checkbox"/> Portable <input type="checkbox"/> Fix Location
Test Software of EUT:	RF Test (manufacturer declare)
Antenna Type:	internal antenna with ipex connector
Antenna gain:	1.52dBi@5GHz: Wi-Fi: U-NII-1, 2.05dBi@5GHz: Wi-Fi: U-NII-3

Model No.: TKT02, TK909, VO6, TK952, TK953.

Only the model TKT02 was tested, since the electrical circuit design, layout, components used and internal wiring were identical for the above models, with difference being color of appearance and model name.

Operation Frequency each of channel

For 802.11a/n/ac(20M) Operation in the 5150MHz ~5250 MHz band			
Channel	Frequency	Channel	Frequency
36	5180MHz	44	5220MHz
40	5200MHz	48	5240MHz
For 802.11a/n/ac(20M) Operation in the 5725MHz ~5850 MHz band			
Channel	Frequency	Channel	Frequency
149	5745MHz	161	5805MHz
153	5765MHz	165	5825MHz
157	5785MHz	NA	NA

For 802.11n/ac(40M) Operation in the 5150MHz ~5250 MHz band			
Channel	Frequency	Channel	Frequency
38	5190MHz	46	5230MHz
For 802.11n/ac(40M) Operation in the 5725MHz ~5850 MHz band			
Channel	Frequency	Channel	Frequency
151	5755MHz	159	5795MHz

For 802.11ac(80M) Operation in the 5150MHz ~5250 MHz band			
Channel	Frequency	Channel	Frequency
42	5210MHz	NA	NA
For 802.11ac(80M) Operation in the 5725MHz ~5850 MHz band			
Channel	Frequency	Channel	Frequency
155	5775MHz	NA	NA

5.4 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.	Certification	Supplied by

5.5 Test Location

All tests were performed at:

Shenzhen Huaxia Testing Technology Co., Ltd.,

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua New District, Shenzhen, Guangdong, China

5.6 Test Facility

- **A2LA (Certificate No. 4742.01)**

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4742.01.

- **FCC Registration No.: 522263**

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.:522263

5.7 Deviation from Standards

None.

5.8 Abnormalities from Standard Conditions

None.

5.9 Other Information Requested by the Customer

None.

5.10 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Radio Frequency	3×10^{-8}
2	RF power, conducted	0.86dB
3	Radiated Spurious emission test	5.12dB (Below 1GHz)
		4.6dB (Above 1GHz)
4	Conduction emission	3.5dB (9kHz to 150kHz)
		3.1dB (150kHz to 30MHz)
5	Temperature test	0.8°C
6	Humidity test	2.0%
7	DC power voltages	0.5%

6 Equipment List

Test Equipment	Manufacturer	Model No.	Instrument No.	Calibration Date	Calibration Due Date
EMI Test Receiver	R&S	ESR7	CQA-005	2021/09/10	2022/09/09
Spectrum analyzer	R&S	FSU26	CQA-038	2021/09/10	2022/09/09
Spectrum analyzer	R&S	FSU40	CQA-075	2021/09/10	2022/09/09
Preamplifier	MITEQ	AFS4-00010300-18-10P-4	CQA-035	2021/09/10	2022/09/09
Preamplifier	MITEQ	AMF-6D-02001800-29-20P	CQA-036	2021/09/10	2022/09/09
Preamplifier	EMCI	EMC184055SE	CQA-089	2021/09/10	2022/09/09
Loop antenna	Schwarzbeck	FMZB1516	CQA-060	2021/09/16	2024/09/15
Bilog Antenna	R&S	HL562	CQA-011	2021/09/16	2024/09/15
Horn Antenna	R&S	HF906	CQA-012	2021/09/16	2024/09/15
Horn Antenna	Schwarzbeck	BBHA 9170	CQA-088	2021/09/16	2024/09/15
Coaxial Cable (Above 1GHz)	CQA	N/A	C007	2021/09/10	2022/09/09
Coaxial Cable (Below 1GHz)	CQA	N/A	C013	2021/09/10	2022/09/09
RF cable(9KHz~40GHz)	CQA	RF-01	CQA-079	2021/09/10	2022/09/09
Antenna Connector	CQA	RFC-01	CQA-080	2021/09/10	2022/09/09
Power Sensor	KEYSIGHT	U2021XA	CQA-30	2021/09/10	2022/09/09
N1918A Power Analysis Manager Power Panel	Agilent	N1918A	CQA-074	2021/09/10	2022/09/09
Power meter	R&S	NRVD	CQA-029	2021/09/10	2022/09/09
Power divider	MIDWEST	PWD-2533-02-SMA-79	CQA-067	2021/09/10	2022/09/09
EMI Test Receiver	R&S	ESR7	CQA-005	2021/09/10	2022/09/09
LISN	R&S	ENV216	CQA-003	2021/09/10	2022/09/09
Coaxial cable	CQA	N/A	CQA-C009	2021/09/10	2022/09/09
DC power	KEYSIGHT	E3631A	CQA-028	2021/09/10	2022/09/09

Test software:

	Manufacturer	Software brand
Radiated Emissions test software	Tonscend	JS1120-3
Conducted Emissions test software	Audix	e3
RF Conducted test software	Audix	e3

7 Radio Technical Requirements Specification

Reference documents for testing:

No.	Identity	Document Title
1	FCC Part15E	Subpart C-Intentional Radiators
2	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices
3	KDB 789033 D02 General U-NII Test Procedures New Rules v02r01	Guidelines for compliance testing of unlicensed national information infrastructure (U-NII) device part 15, subpart E
4	KDB 662911 D01 Multiple Transmitter Output v02r01	Emissions Testing of Transmitters with Multiple Outputs in the Same Band

Appendix A): Emission Bandwidth

26dB Emission bandwidth

Test Requirement: 47 CFR Part 15, Subpart C 15.407 (a)

Test Method: KDB 789033 D02 II C 1

6 dB bandwidth (5.725-5.85 GHz band)

Test Requirement 47 CFR Part 15, Subpart C 15.407 (e)

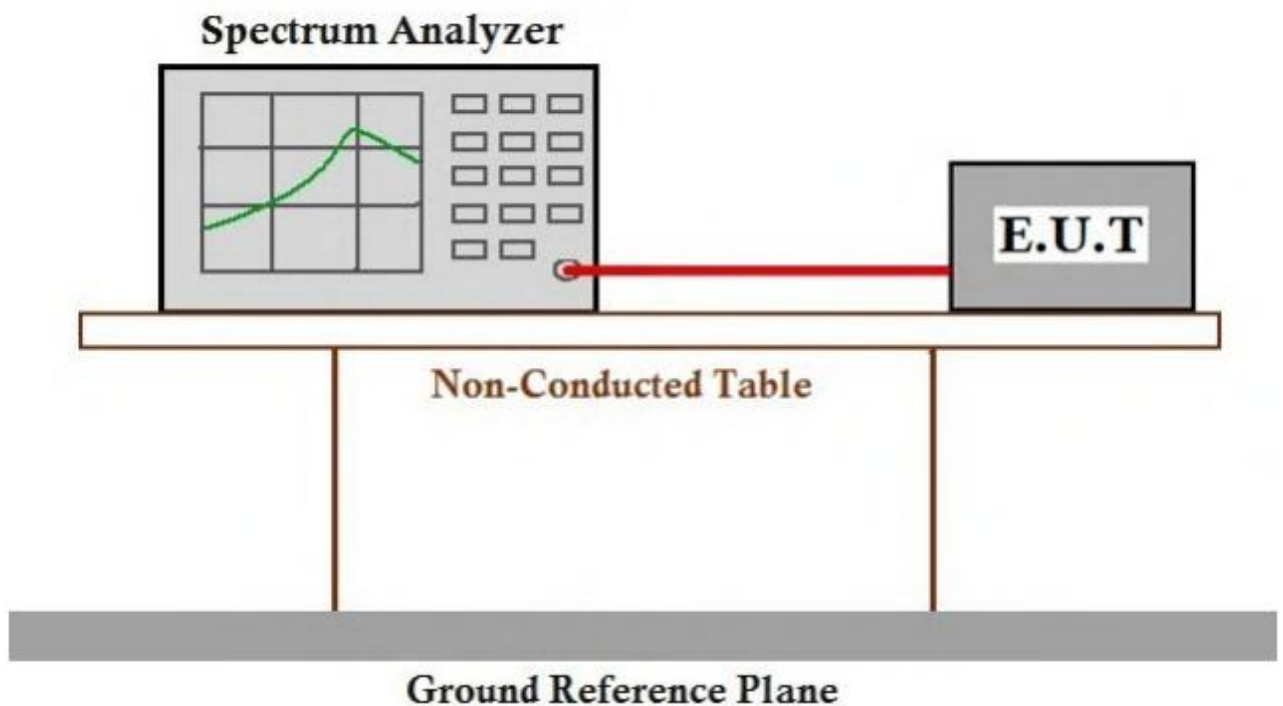
Test Method: KDB 789033 D02 II C 2

Limit: ≥ 500 kHz

Test Procedure:

- a) Set RBW = approximately 1% of the emission bandwidth.
- b) Set the VBW > RBW.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

Test Setup Diagram

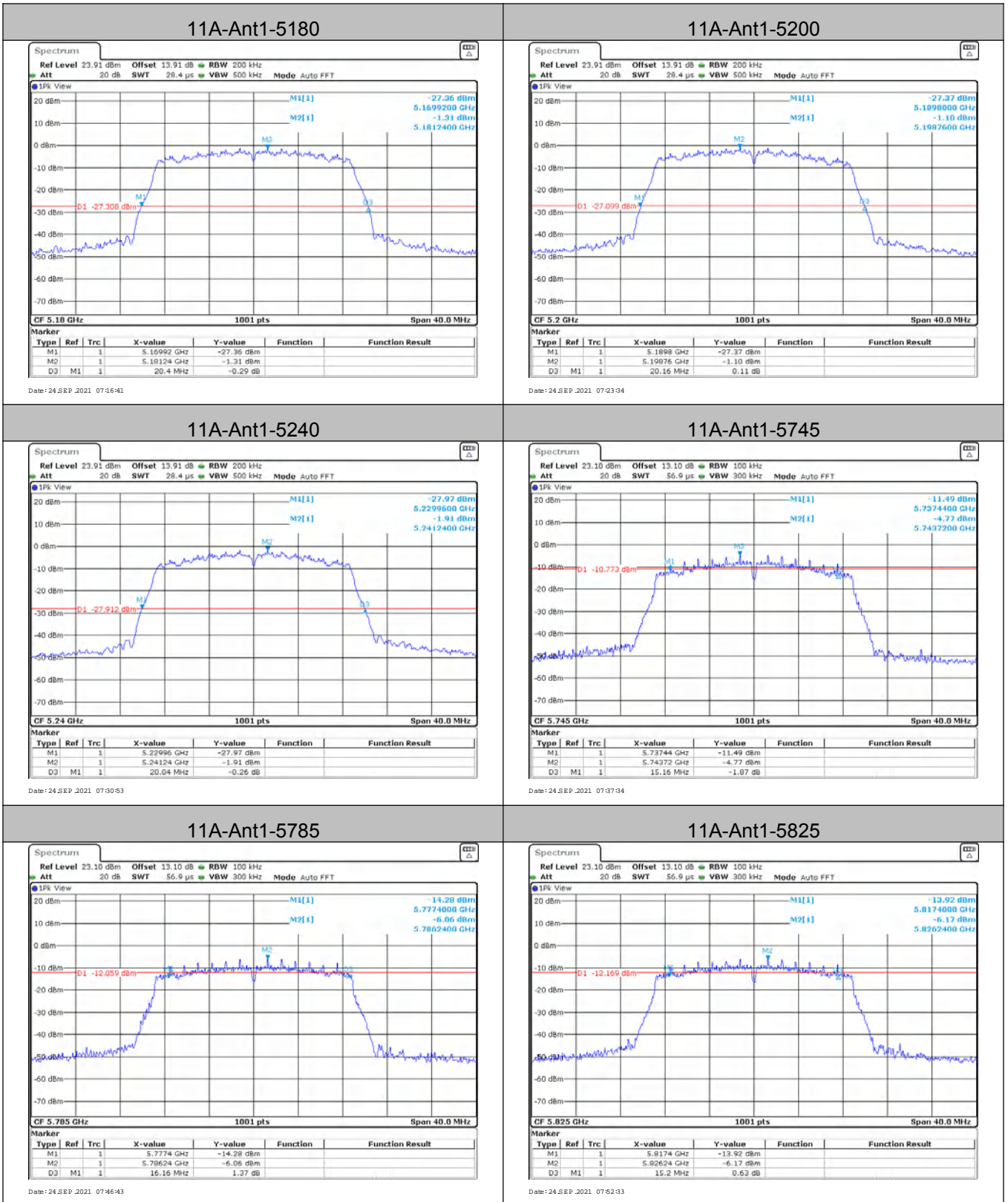


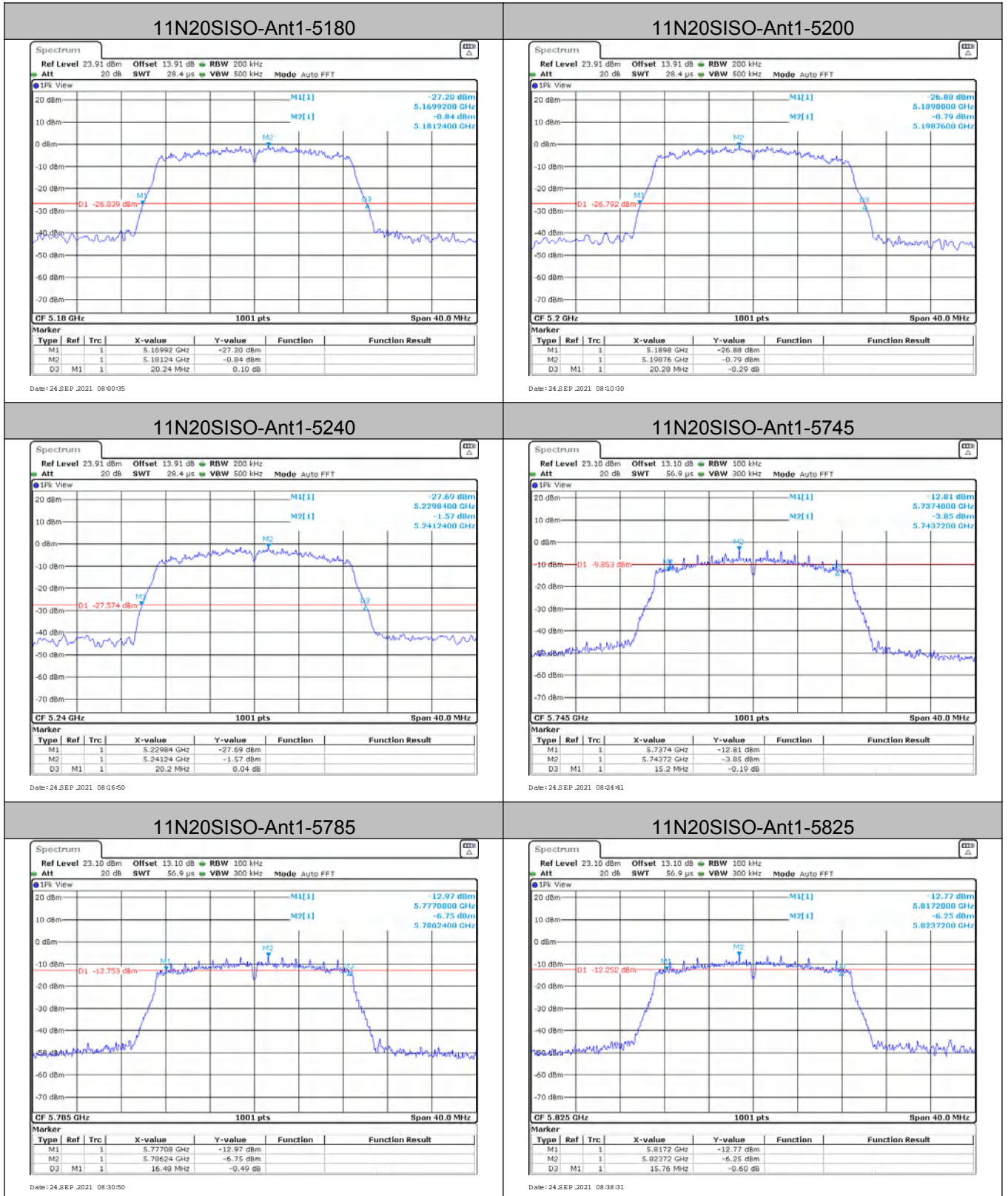
Result Table

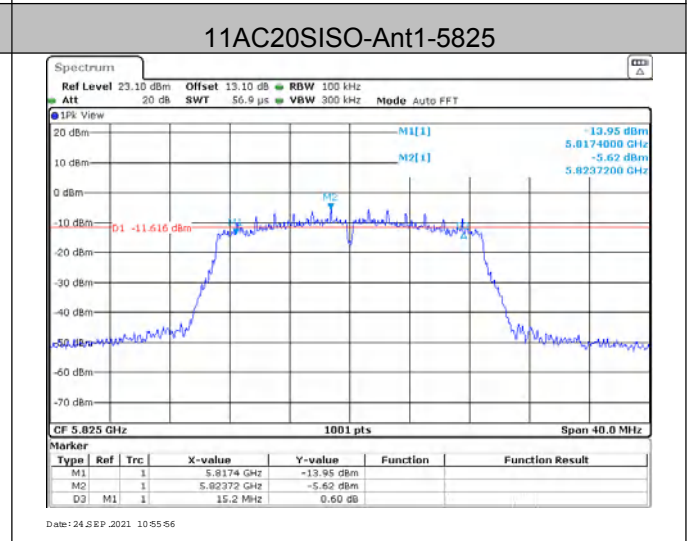
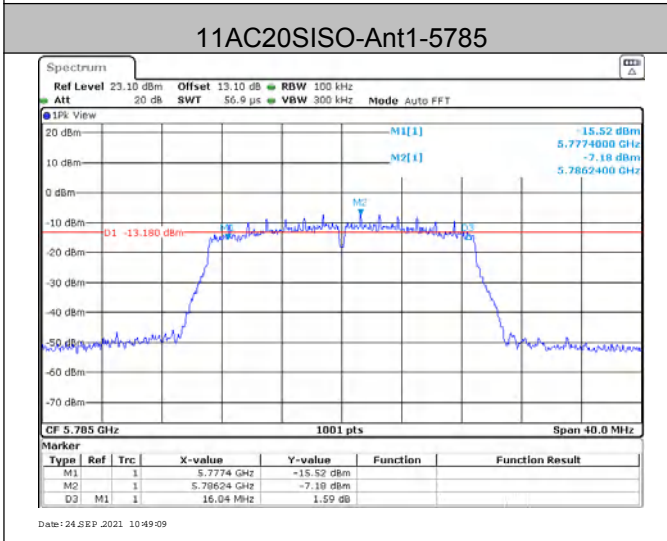
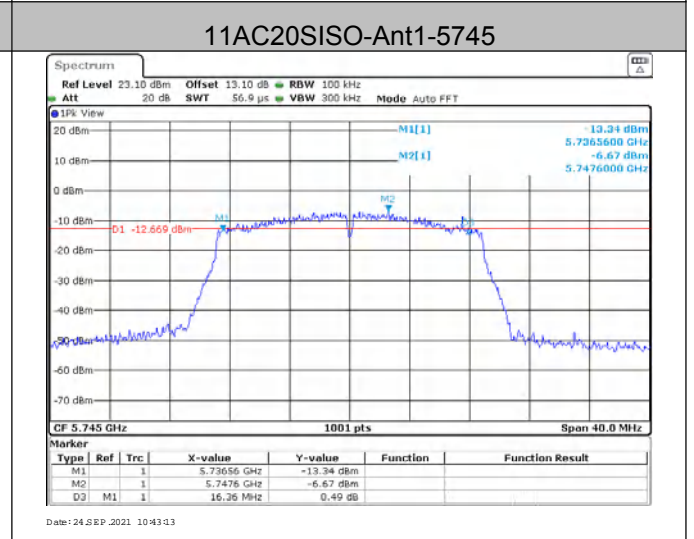
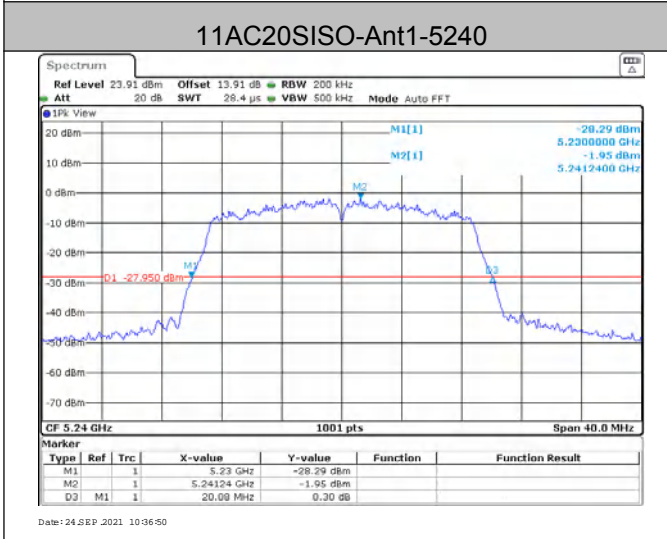
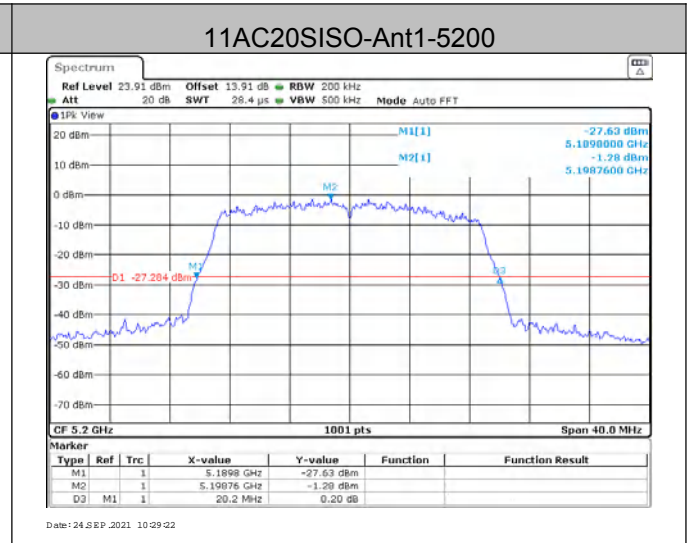
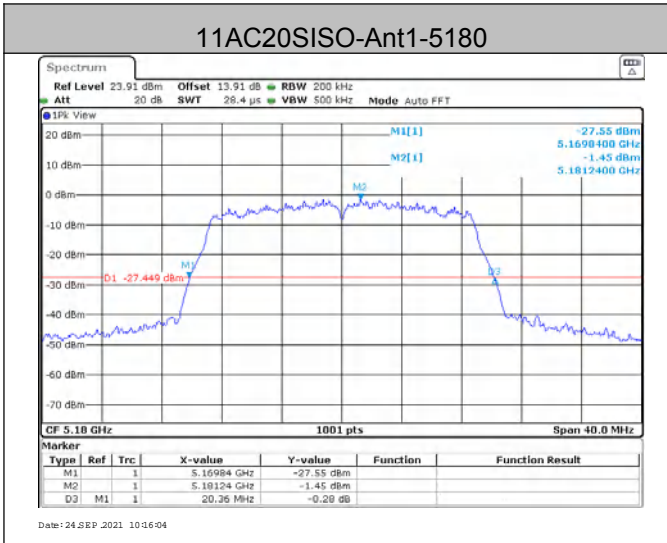
Test Mode	Antenna	Channel	EBW[MHz]	Verdict
11A	Ant1	5180	20.4	PASS
11A	Ant1	5200	20.16	PASS
11A	Ant1	5240	20.04	PASS
11A	Ant1	5745	15.16	PASS
11A	Ant1	5785	16.16	PASS
11A	Ant1	5825	15.2	PASS
11N20	Ant1	5180	20.24	PASS
11N20	Ant1	5200	20.28	PASS
11N20	Ant1	5240	20.2	PASS
11N20	Ant1	5745	15.2	PASS
11N20	Ant1	5785	16.48	PASS
11N20	Ant1	5825	15.76	PASS
11N40	Ant1	5190	40.24	PASS
11N40	Ant1	5230	40.64	PASS
11N40	Ant1	5755	35.2	PASS
11N40	Ant1	5795	35.2	PASS
11AC20	Ant1	5180	20.36	PASS
11AC20	Ant1	5200	20.2	PASS
11AC20	Ant1	5240	20.08	PASS
11AC20	Ant1	5745	16.36	PASS
11AC20	Ant1	5785	16.04	PASS
11AC20	Ant1	5825	15.2	PASS
11AC40	Ant1	5190	40.4	PASS
11AC40	Ant1	5230	40.32	PASS
11AC40	Ant1	5755	35.28	PASS
11AC40	Ant1	5795	35.2	PASS
11AC80	Ant1	5210	79.68	PASS
11AC80	Ant1	5775	75.52	PASS

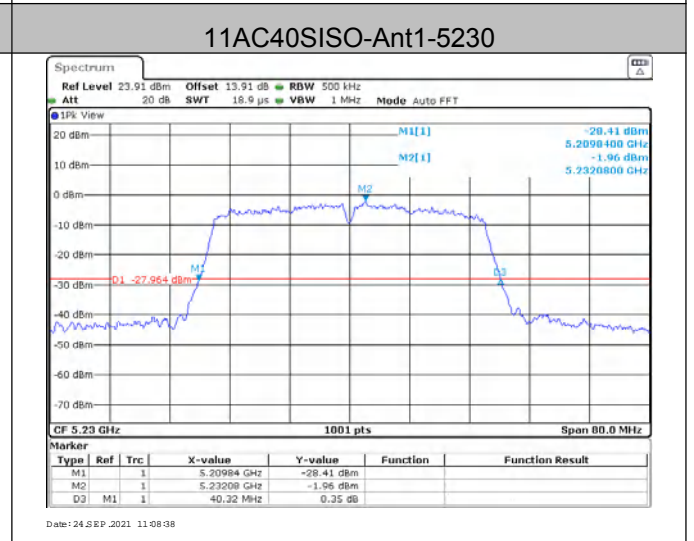
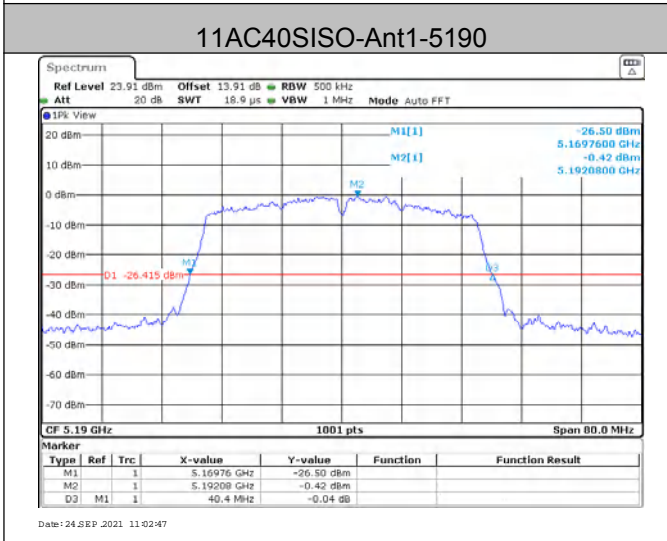
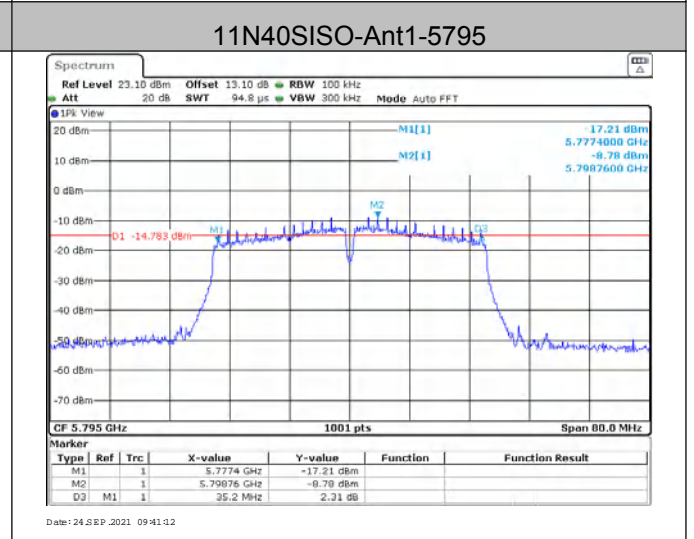
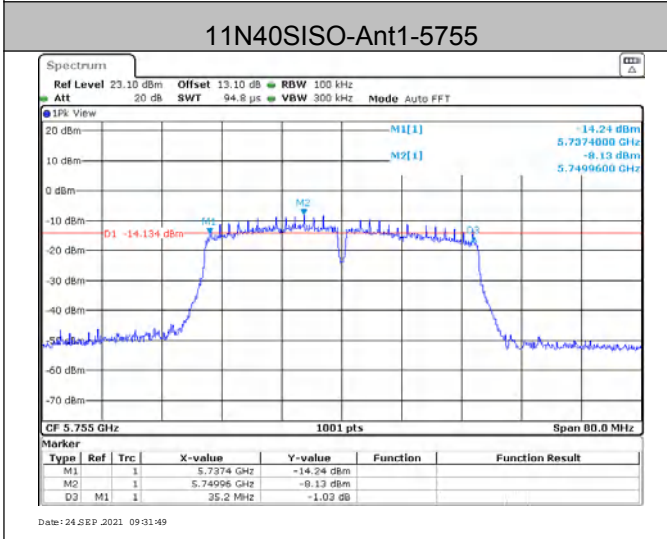
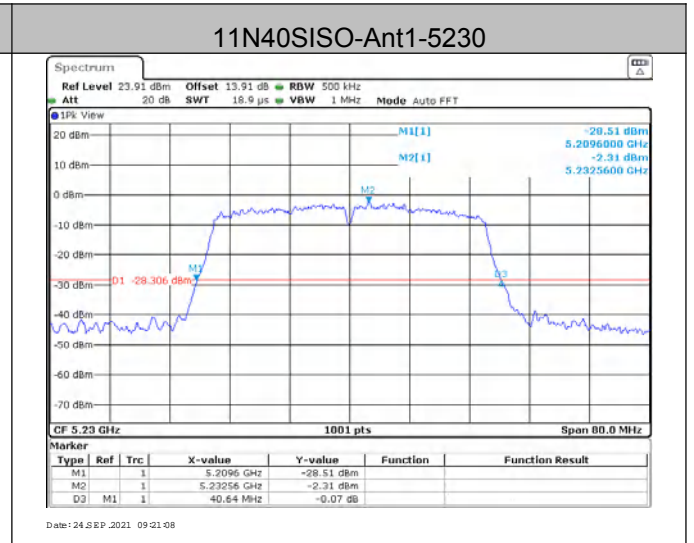
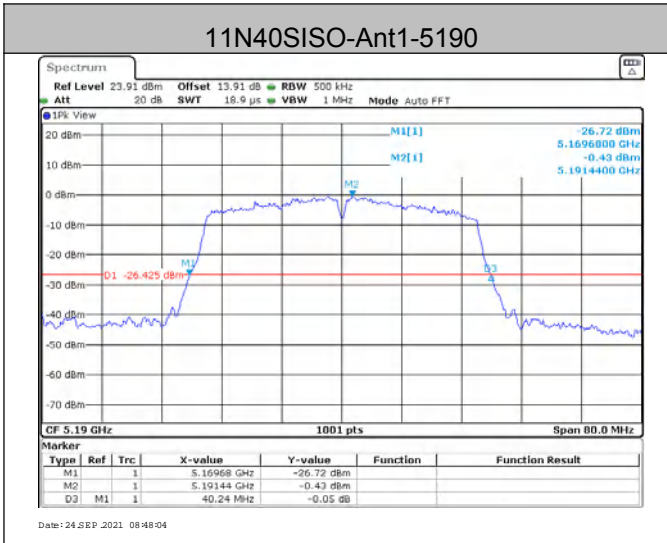
Test Graph

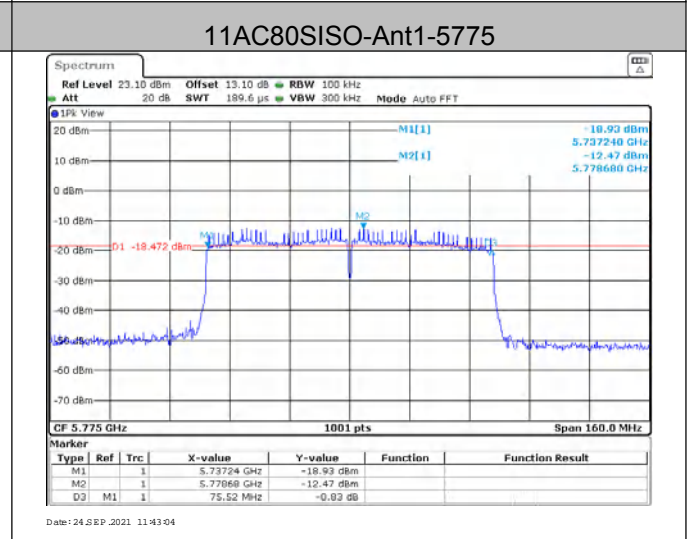
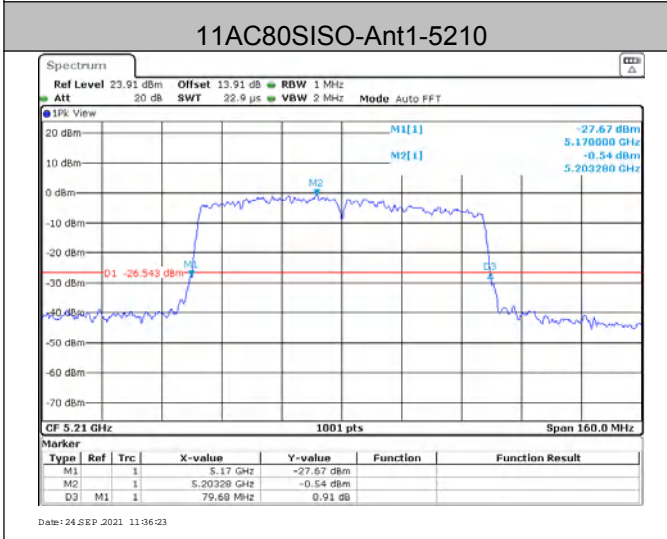
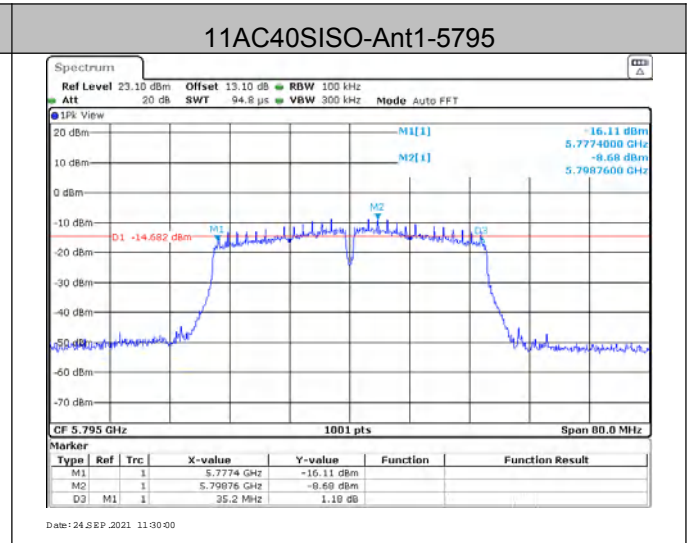
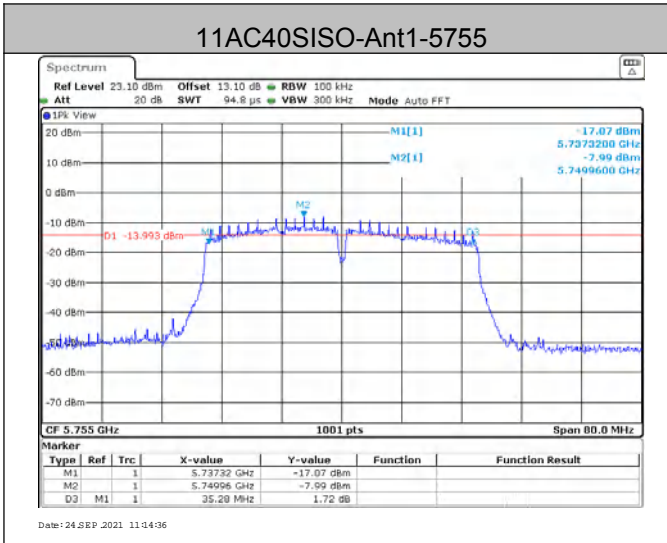
EBW:











Appendix B): Maximum Conduct Output Power

1.Duty Cycle (x)

Test Requirement KDB 789033 D02 II B 1

Test Method: KDB 789033 II B 1

Test Procedure:

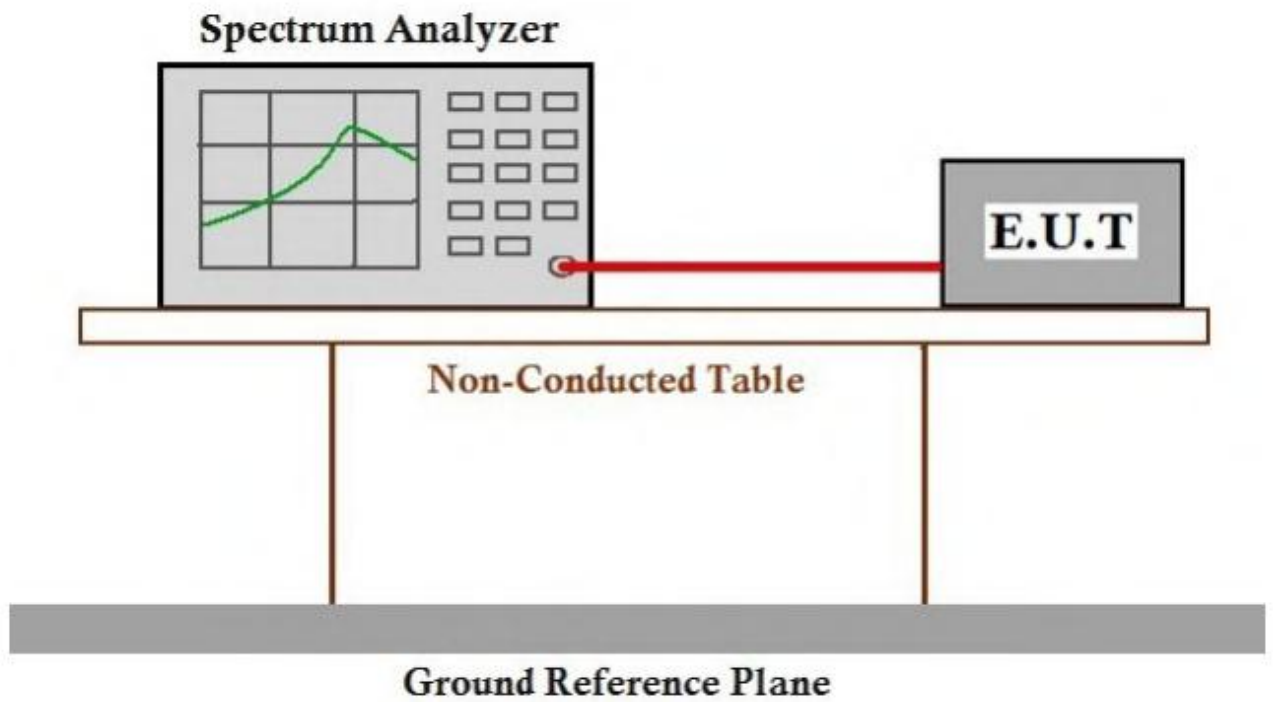
Set RBW = 20MHz

Set VBW = 40MHz

Set detector = peak.

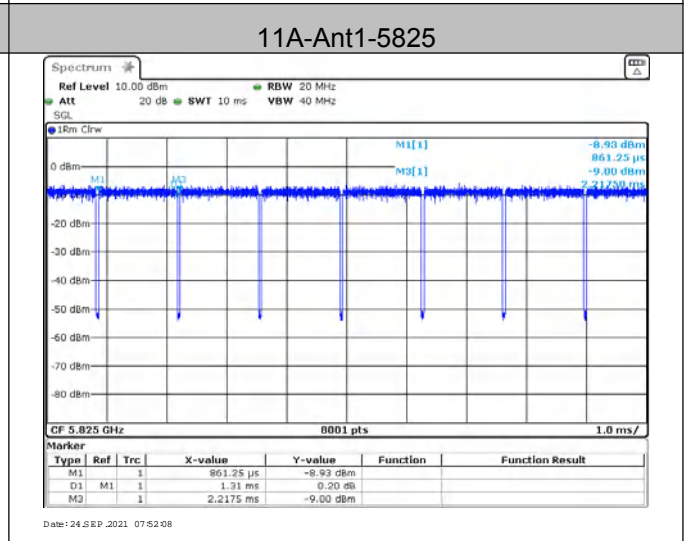
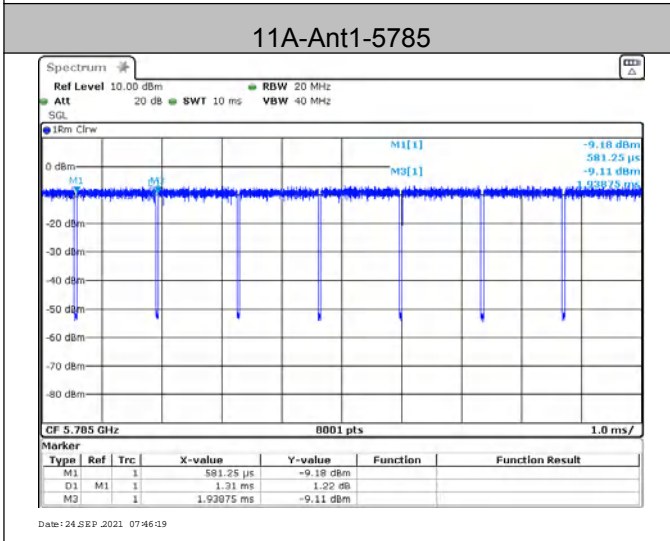
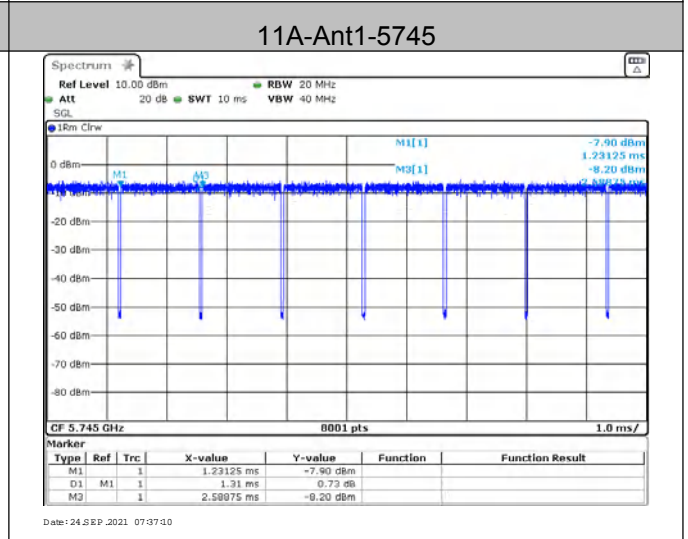
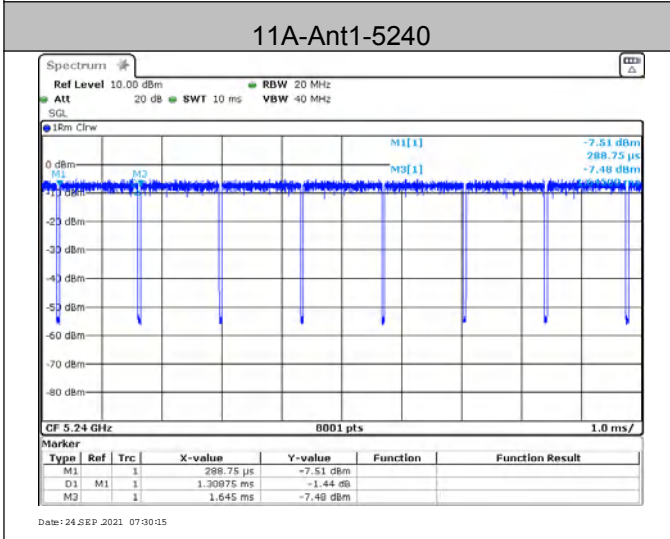
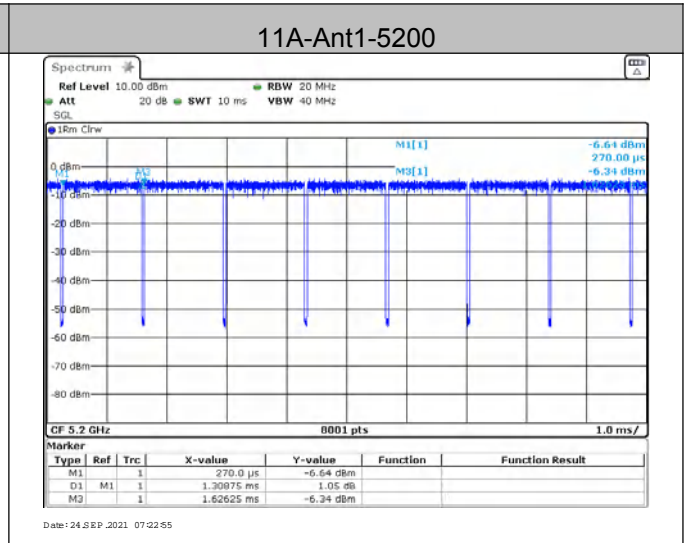
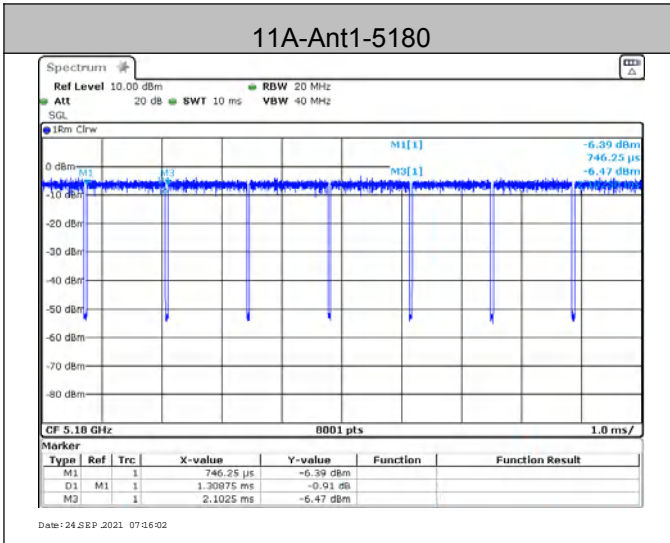
Set span =0Hz

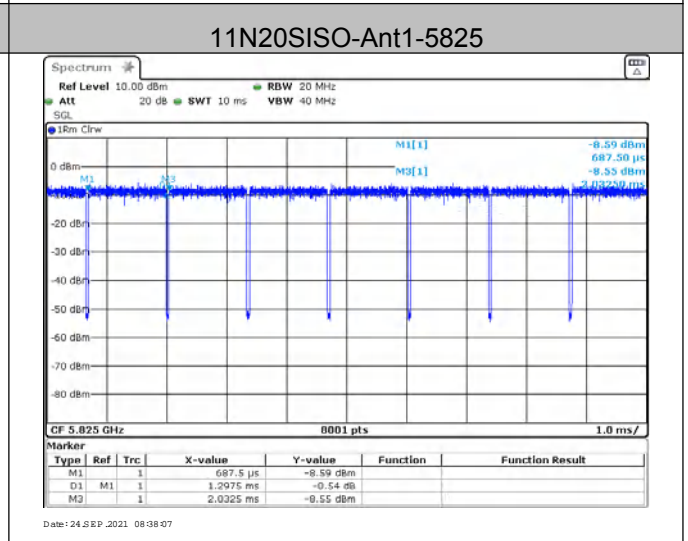
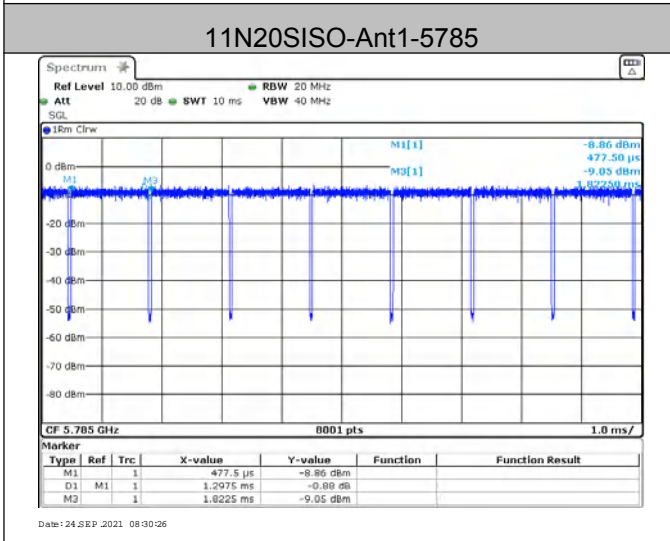
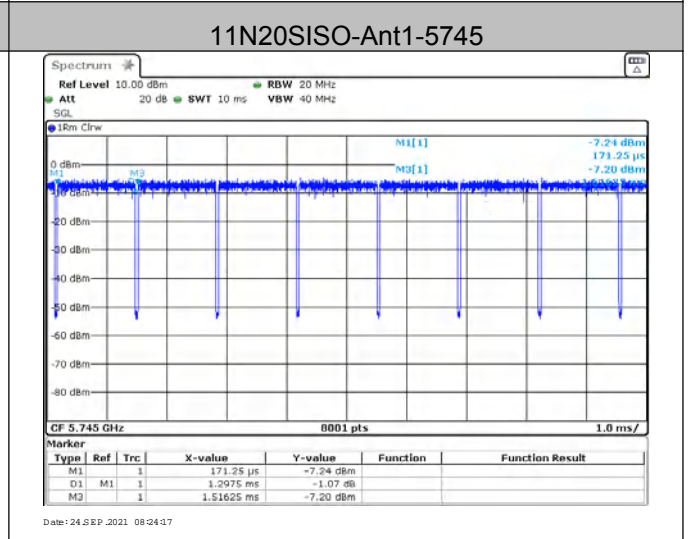
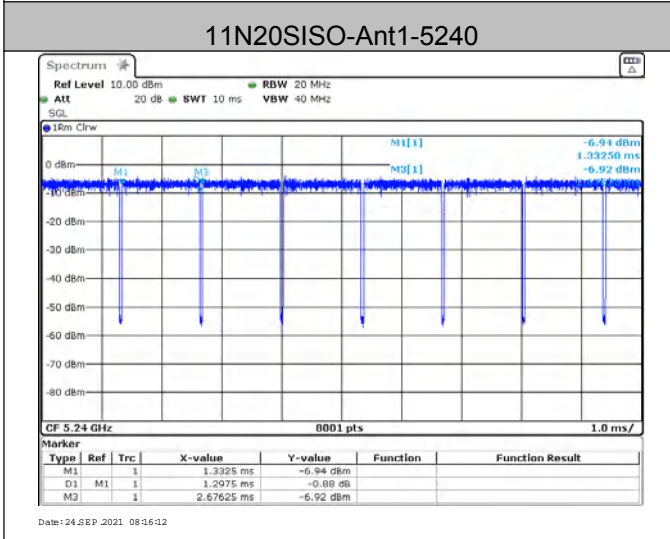
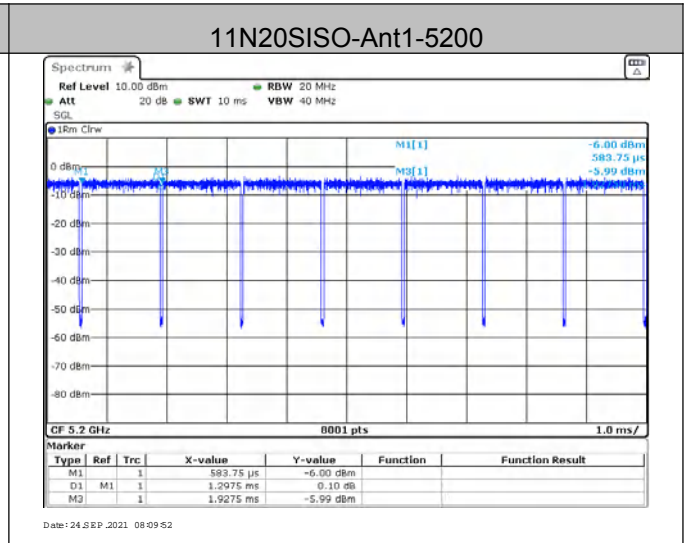
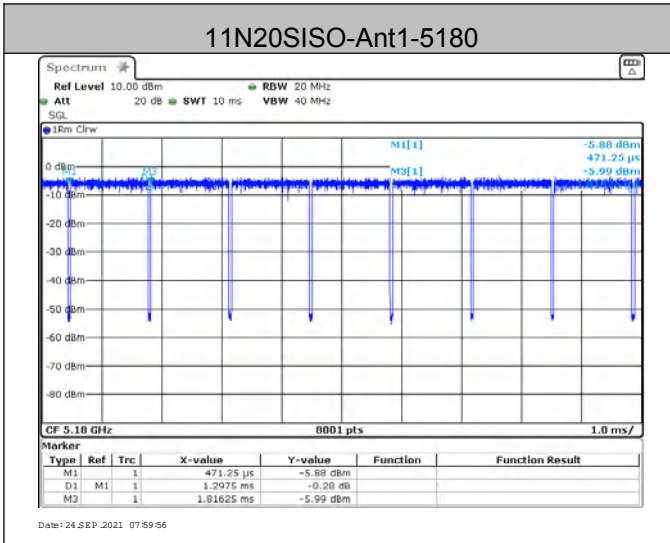
Test Setup Diagram

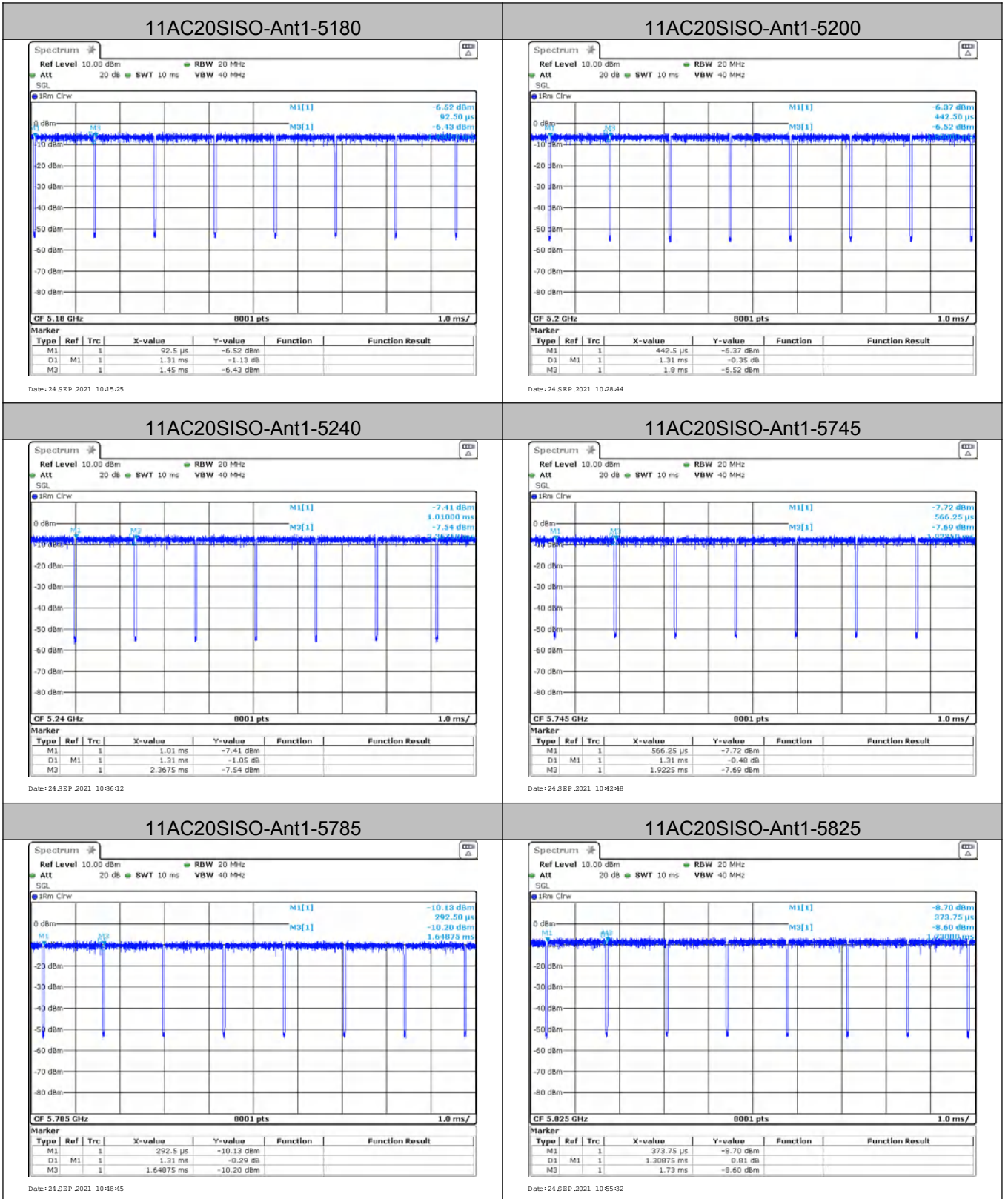


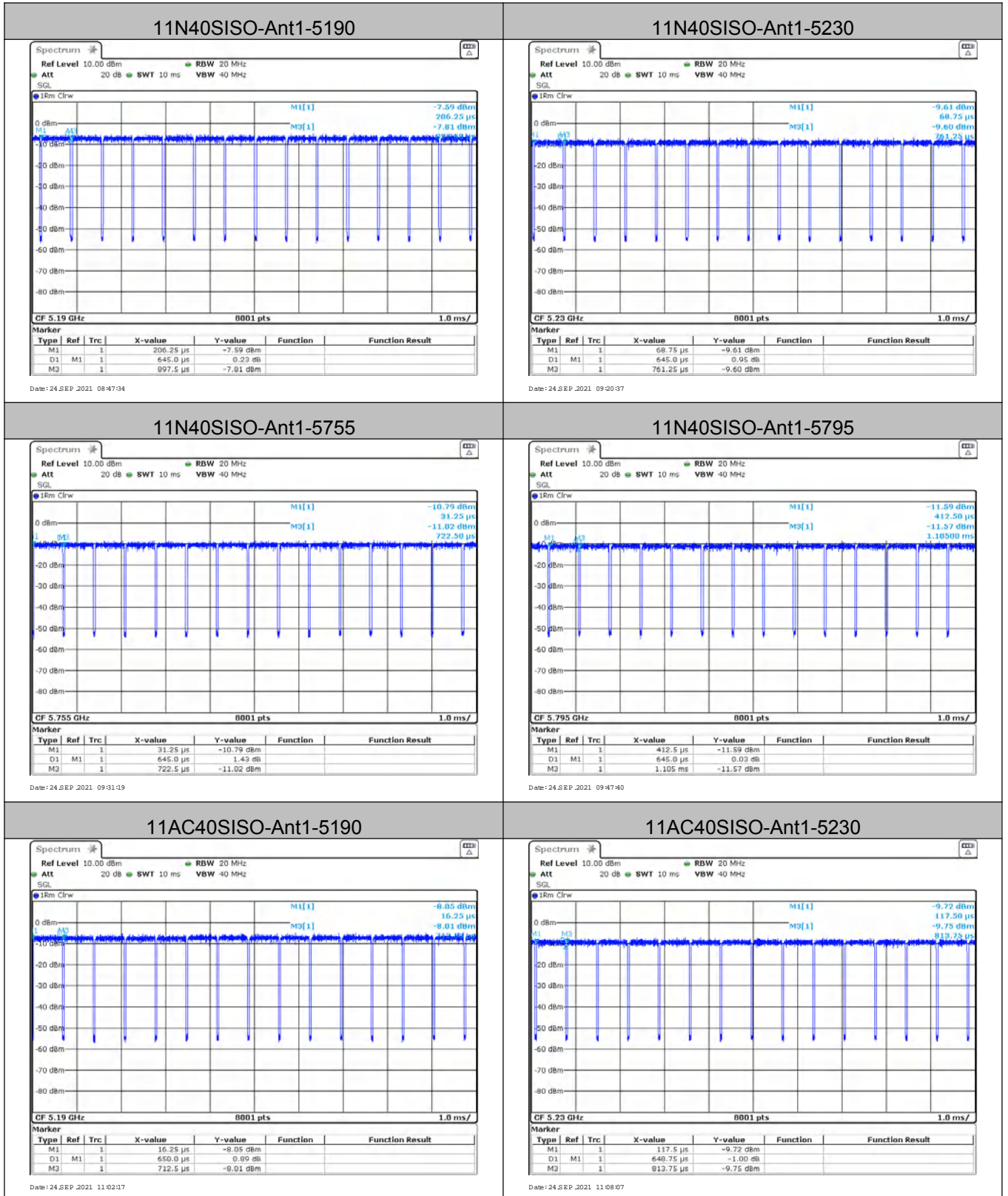
Measurement Data

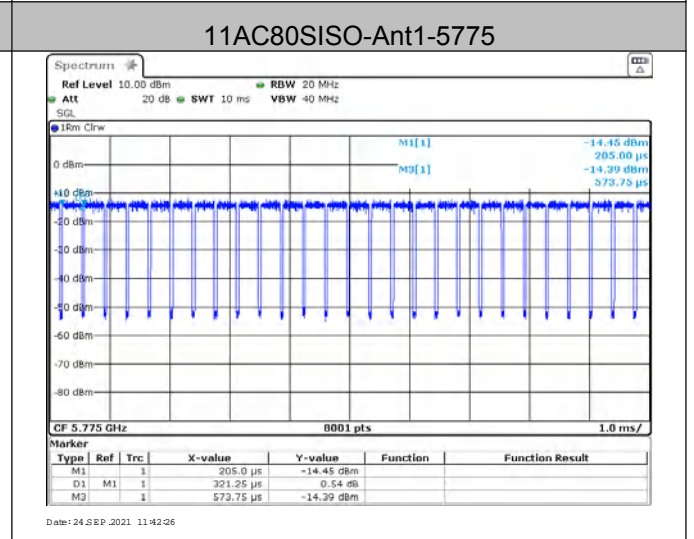
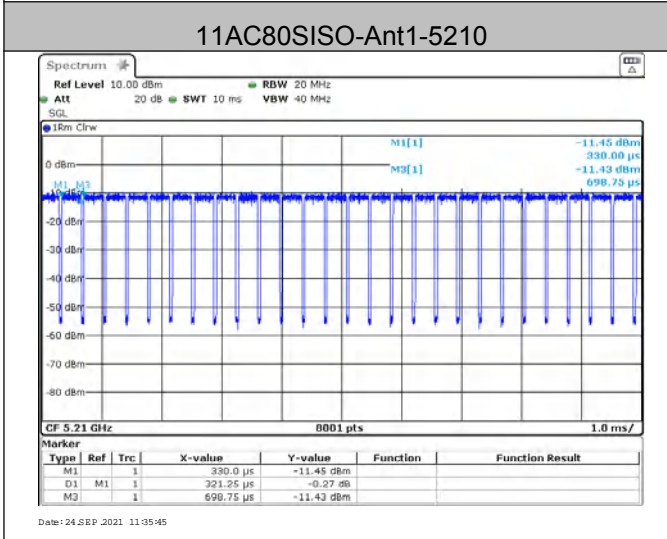
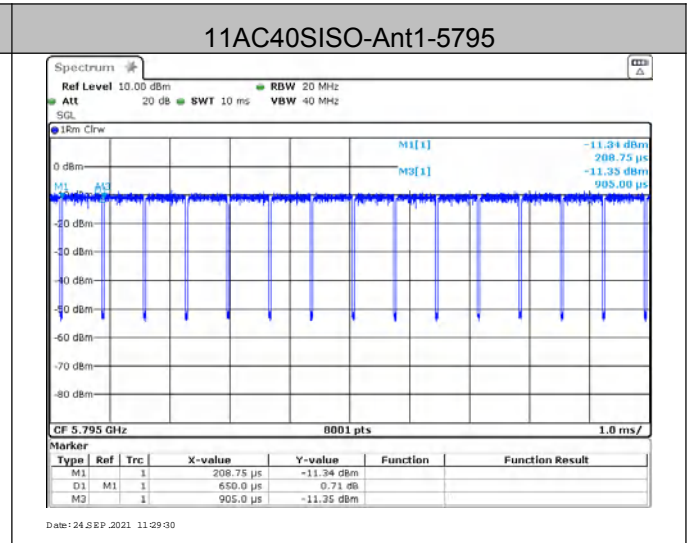
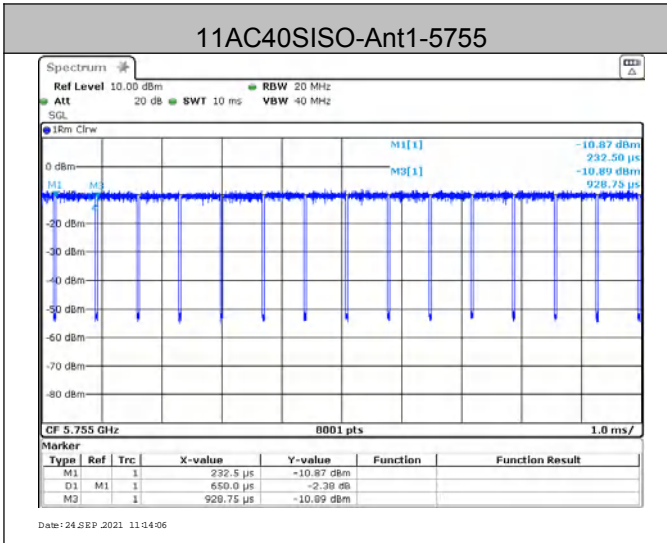
Test Mode	Antenna	Channel	Duty Cycle[%]	10log(1/x) Factor[dB]
11A	Ant1	5180	96.48	0.16
11A	Ant1	5200	96.48	0.16
11A	Ant1	5240	96.48	0.16
11A	Ant1	5745	96.5	0.15
11A	Ant1	5785	96.5	0.15
11A	Ant1	5825	96.59	0.15
11N20	Ant1	5180	96.56	0.15
11N20	Ant1	5200	96.56	0.15
11N20	Ant1	5240	96.56	0.15
11N20	Ant1	5745	96.56	0.15
11N20	Ant1	5785	96.56	0.15
11N20	Ant1	5825	96.56	0.15
11AC20	Ant1	5180	96.5	0.15
11AC20	Ant1	5200	96.5	0.15
11AC20	Ant1	5240	96.5	0.15
11AC20	Ant1	5745	96.59	0.15
11AC20	Ant1	5785	96.59	0.15
11AC20	Ant1	5825	96.49	0.15
11N40	Ant1	5190	93.30	0.30
11N40	Ant1	5230	93.14	0.31
11N40	Ant1	5755	93.30	0.30
11N40	Ant1	5795	93.14	0.31
11AC40	Ant1	5190	93.36	0.30
11AC40	Ant1	5230	93.18	0.31
11AC40	Ant1	5755	93.36	0.30
11AC40	Ant1	5795	93.36	0.30
11AC80	Ant1	5210	87.12	0.60
11AC80	Ant1	5775	87.12	0.60











2. Maximum Conducted Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.407 (a)

Test Method: KDB 789033 D02 II E

Limit:

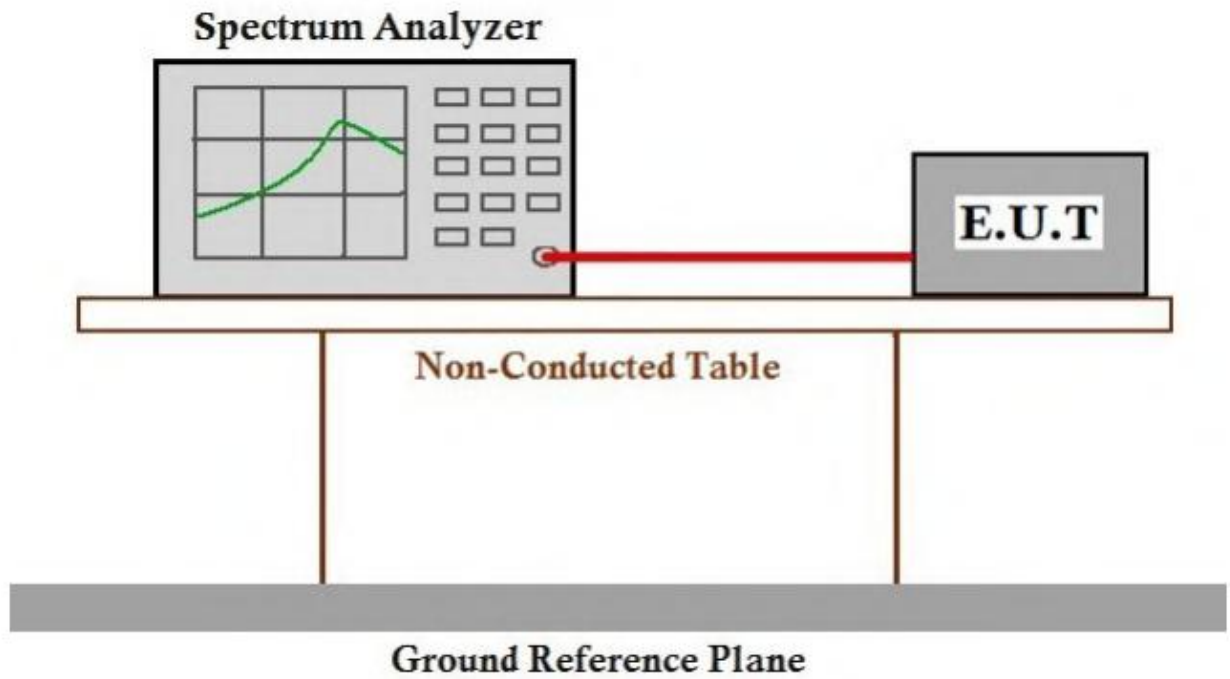
Frequency band(MHz)	Limit
5150-5250	≤1W(30dBm) for master device
	≤250mW(24dBm) for client device
5250-5350	≤250mW(24dBm) for client device or 11dBm+10logB*
5470-5725	≤250mW(24dBm) for client device or 11dBm+10logB*
5725-5850	≤1W(30dBm)
Remark:	* Where B is the 26dB emission bandwidth in MHz. The maximum conducted output power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage.

Test Procedure:

Method SA-2 (trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction).

- (1) Set RBW = 1 MHz.
- (2) Set VBW ≥ 3 MHz.
- (3) Detector = power average
- (4) Sweep time = auto.
- (5) Add duty cycle to the measured average power.

Test Setup Diagram



Measurement Data

Test Mode	Antenna	Channel	Meas.Level [dBm]	Av.Power [dBm]	Limit [dBm]	Verdict
11A	Ant1	5180	9.66	9.82	24	PASS
11A	Ant1	5200	9.6	9.76	24	PASS
11A	Ant1	5240	9.13	9.29	24	PASS
11A	Ant1	5745	9.09	9.24	30	PASS
11A	Ant1	5785	8.45	8.60	30	PASS
11A	Ant1	5825	8.07	8.22	30	PASS
11N20	Ant1	5180	9.19	9.34	24	PASS
11N20	Ant1	5200	9.27	9.42	24	PASS
11N20	Ant1	5240	9.11	9.26	24	PASS
11N20	Ant1	5745	7.98	8.13	30	PASS
11N20	Ant1	5785	8.11	8.26	30	PASS
11N20	Ant1	5825	7.96	8.11	30	PASS
11AC20	Ant1	5180	9.43	9.58	24	PASS
11AC20	Ant1	5200	9.23	9.38	24	PASS
11AC20	Ant1	5240	8.72	8.87	24	PASS
11AC20	Ant1	5745	8.35	8.50	30	PASS
11AC20	Ant1	5785	8.43	8.58	30	PASS
11AC20	Ant1	5825	7.95	8.10	30	PASS
11N40	Ant1	5190	9.45	9.75	24	PASS
11N40	Ant1	5230	9.11	9.42	24	PASS
11N40	Ant1	5755	8.66	8.96	30	PASS
11N40	Ant1	5795	7.98	8.29	30	PASS
11AC40	Ant1	5190	9.34	9.64	24	PASS
11AC40	Ant1	5230	8.92	9.23	24	PASS
11AC40	Ant1	5755	8.4	8.70	30	PASS
11AC40	Ant1	5795	7.61	7.91	30	PASS
11AC80	Ant1	5210	8.76	9.36	24	PASS
11AC80	Ant1	5775	7.74	8.34	30	PASS

Remark:

 $Av.Power = Meas.Level + 10 \log(1/duty\ cycle)$
 $E.i.r.p = Av.Power + G$,

G = antenna gain in dBi.

Appendix C): Maximum Power Spectral Density

Test Requirement 47 CFR Part 15, Subpart C 15.407 (a)

Test Method: KDB 789033 D02 II F

Test Procedure:

For 5150-5725MHz:

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on operation frequency individually.
3. Set RBW = 1MHz.
4. Set the VBW $\geq 3 \times$ RBW. Detector = Peak. Trace mode = max hold.

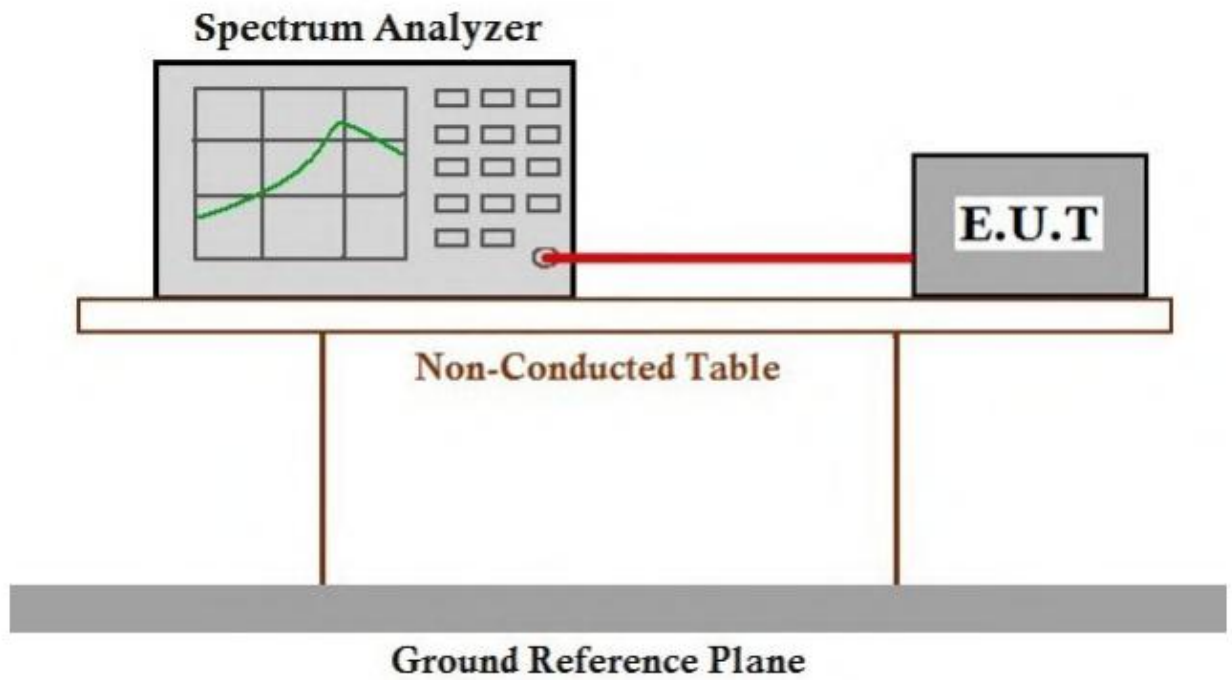
For 5725-5850MHz:

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on operation frequency individually.
3. Set RBW = 500KHz.
4. Set the VBW $\geq 3 \times$ RBW. Detector = Peak. Trace mode = max hold.

Limit:

Frequency band(MHz)	Limit
5150-5250	≤ 17 dBm in 1MHz for master device
	≤ 11 dBm in 1MHz for client device
5250-5350	≤ 11 dBm in 1MHz for client device
5470-5725	≤ 11 dBm in 1MHz for client device
5725-5850	≤ 30 dBm in 500 kHz
Remark:	The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test.

Test Setup Diagram

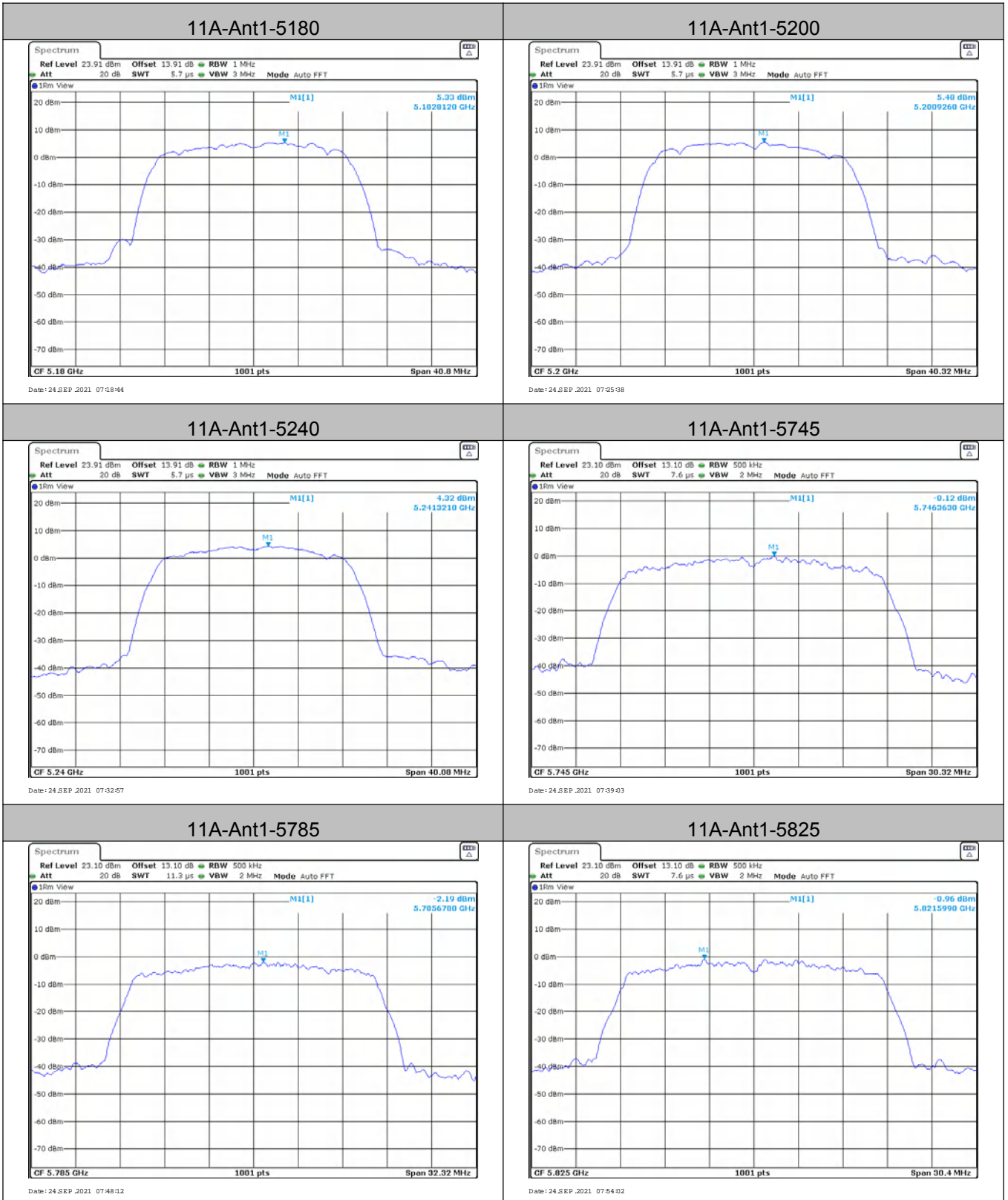


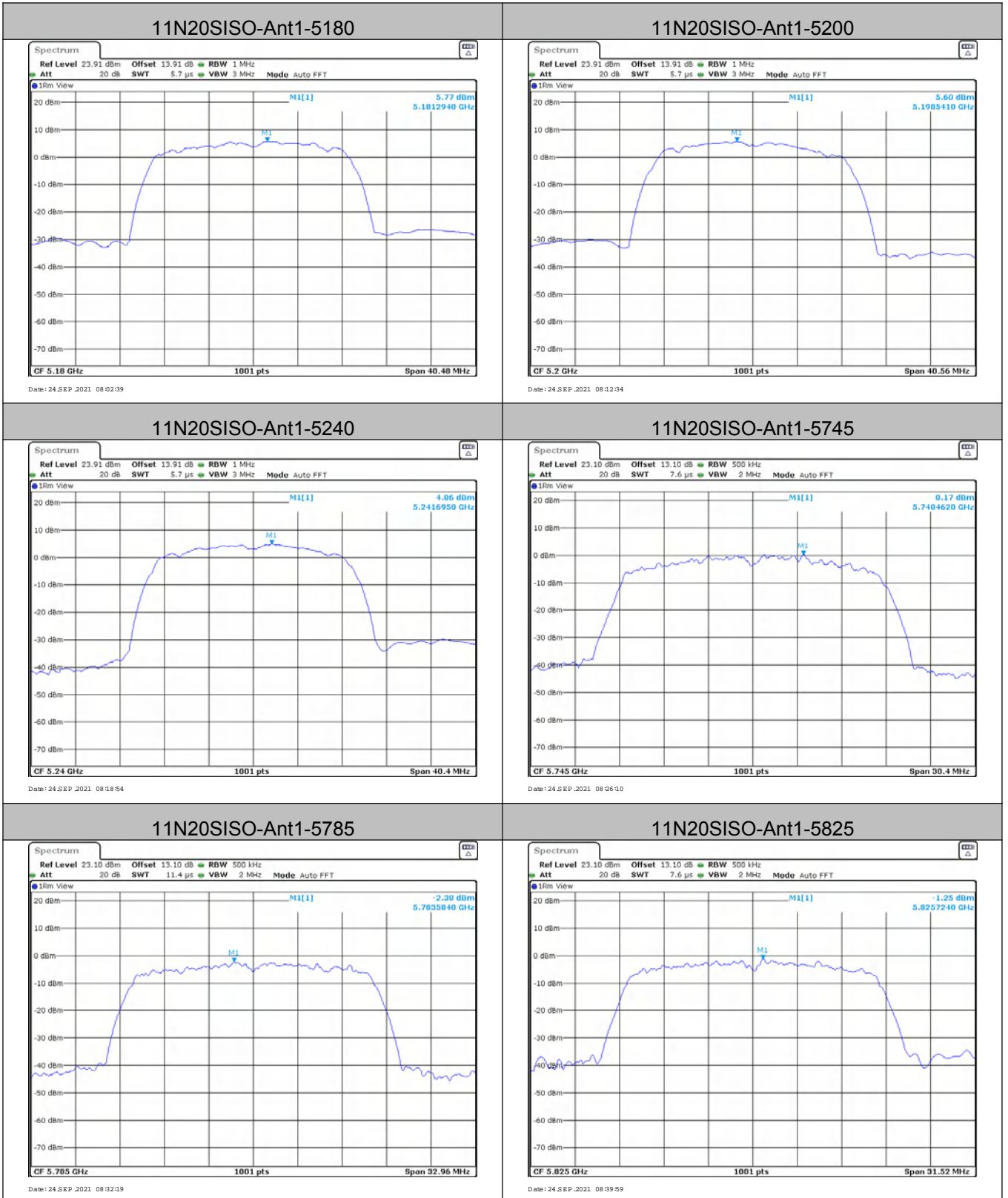
Result Table

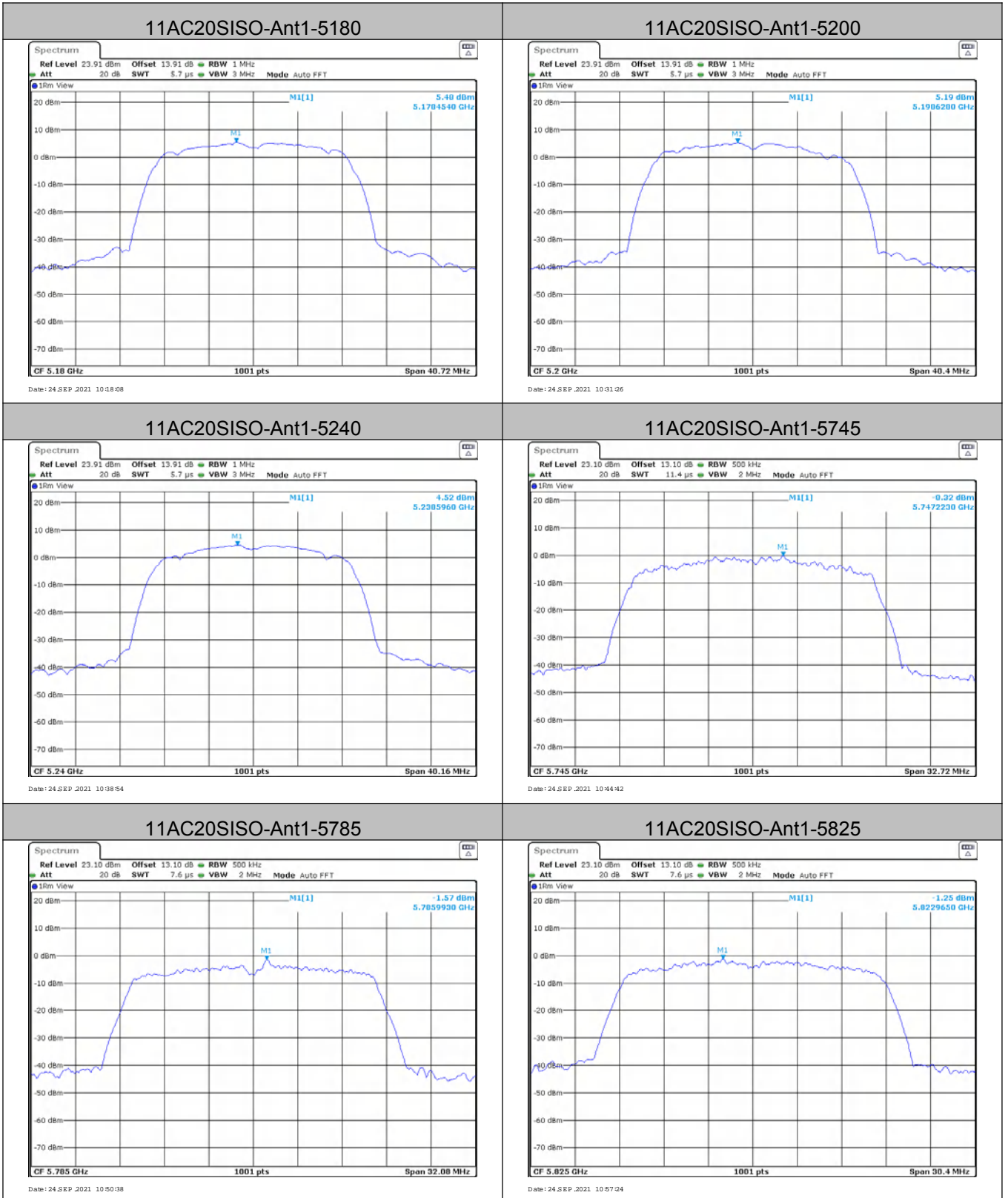
Test Mode	Antenna	Channel	Meas.Level [dBm]	Duty Cycle Factor [dB]	PSD [dBm/MHz]	Limit [dBm/MHz]	Verdict
11A	Ant1	5180	5.33	0.16	5.49	11.00	PASS
11A	Ant1	5200	5.48	0.16	5.64	11.00	PASS
11A	Ant1	5240	4.32	0.16	4.48	11.00	PASS
11N20	Ant1	5180	5.77	0.15	5.92	11.00	PASS
11N20	Ant1	5200	5.60	0.15	5.75	11.00	PASS
11N20	Ant1	5240	4.86	0.15	5.01	11.00	PASS
11N40	Ant1	5190	3.30	0.3	3.6	11.00	PASS
11N40	Ant1	5230	0.82	0.31	1.13	11.00	PASS
11AC20	Ant1	5180	5.48	0.15	5.63	11.00	PASS
11AC20	Ant1	5200	5.19	0.15	5.34	11.00	PASS
11AC20	Ant1	5240	4.52	0.15	4.67	11.00	PASS
11AC40	Ant1	5190	3.46	0.3	3.76	11.00	PASS
11AC40	Ant1	5230	1.02	0.31	1.33	11.00	PASS
11AC80	Ant1	5210	-0.32	0.6	0.28	11.00	PASS
Test Mode	Antenna	Channel	Meas.Level [dBm]	Duty Cycle Factor [dB]	PSD [dBm/500KHz]	Limit [dBm/500kHz]	Verdict
11A	Ant1	5745	-0.12	0.15	0.03	30.00	PASS
11A	Ant1	5785	-2.19	0.15	-2.04	30.00	PASS
11A	Ant1	5825	-0.96	0.15	-0.81	30.00	PASS
11N20	Ant1	5745	0.17	0.15	0.32	30.00	PASS
11N20	Ant1	5785	-2.38	0.15	-2.23	30.00	PASS
11N20	Ant1	5825	-1.25	0.15	-1.1	30.00	PASS
11N40	Ant1	5755	-3.86	0.3	-3.56	30.00	PASS
11N40	Ant1	5795	-4.82	0.31	-4.51	30.00	PASS
11AC20	Ant1	5745	-0.32	0.15	-0.17	30.00	PASS
11AC20	Ant1	5785	-1.59	0.15	-1.44	30.00	PASS
11AC20	Ant1	5825	-1.25	0.15	-1.1	30.00	PASS
11AC40	Ant1	5755	-4.27	0.30	-3.97	30.00	PASS
11AC40	Ant1	5795	-4.40	0.30	-4.1	30.00	PASS
11AC80	Ant1	5775	-8.76	0.60	-8.16	30.00	PASS

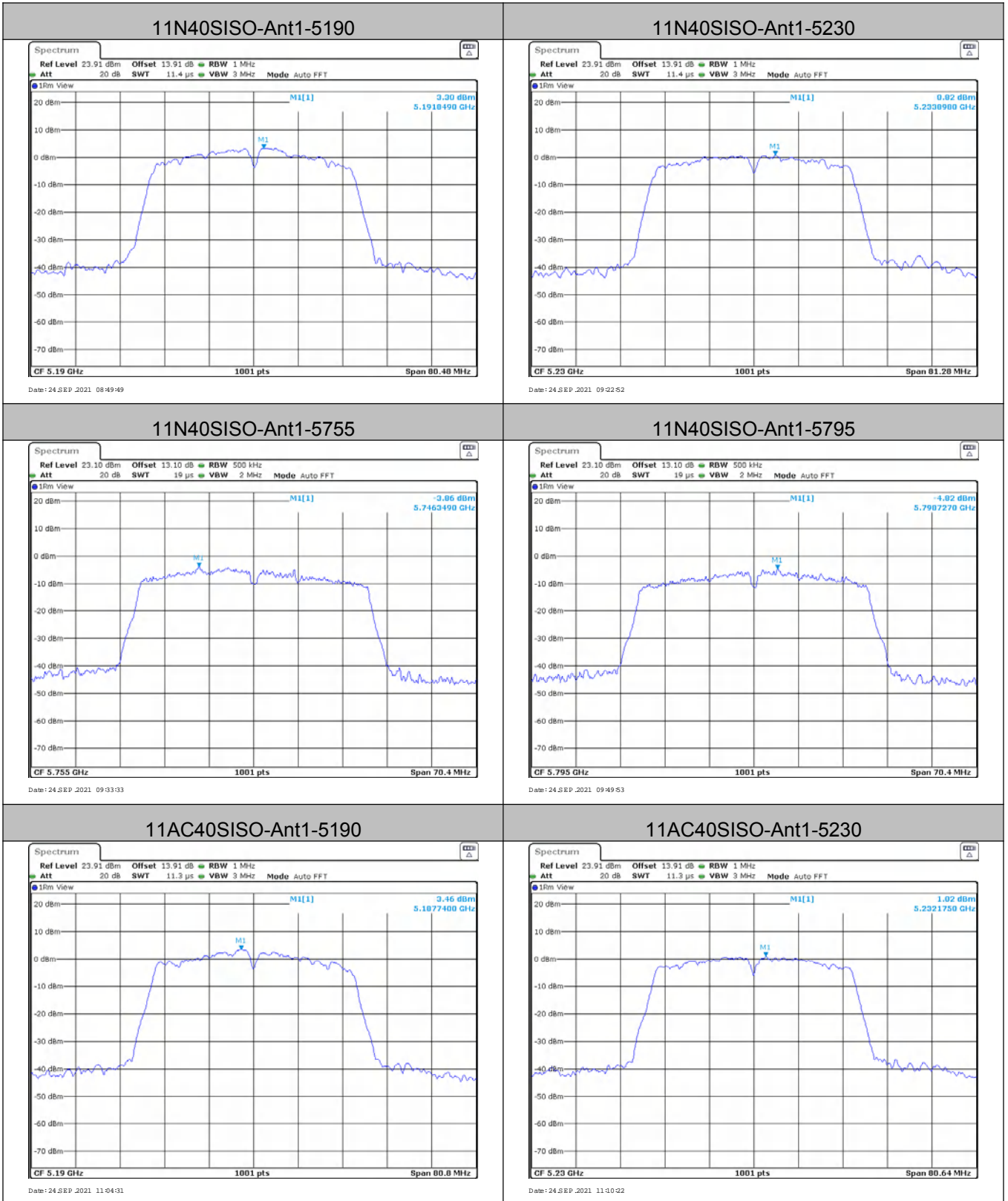
Remark:

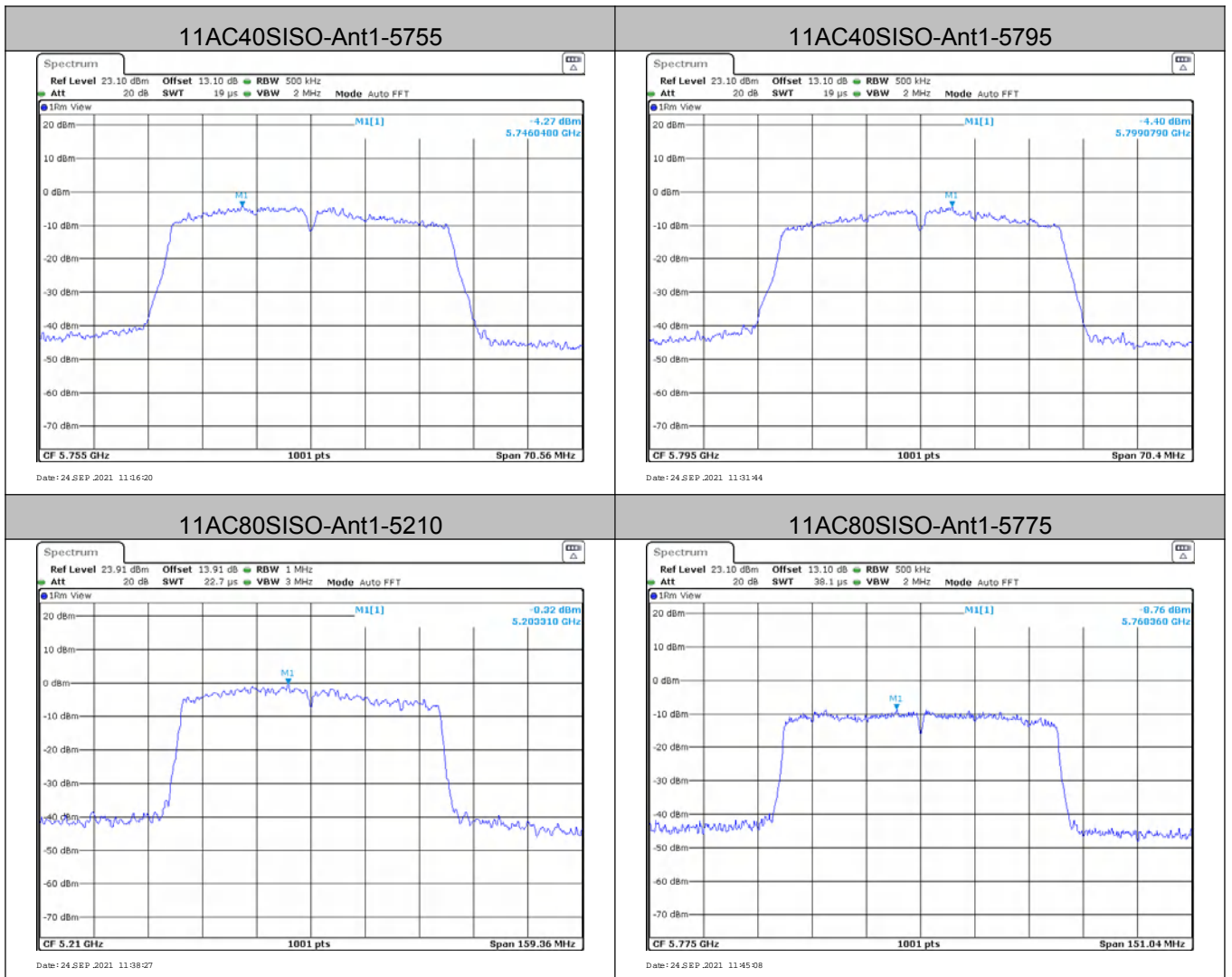
PSD = Meas PSD + Duty Cycle Factor











Appendix D): Band Edge Measurements

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.407(b)

Test Method: KDB 789033 D02 II G

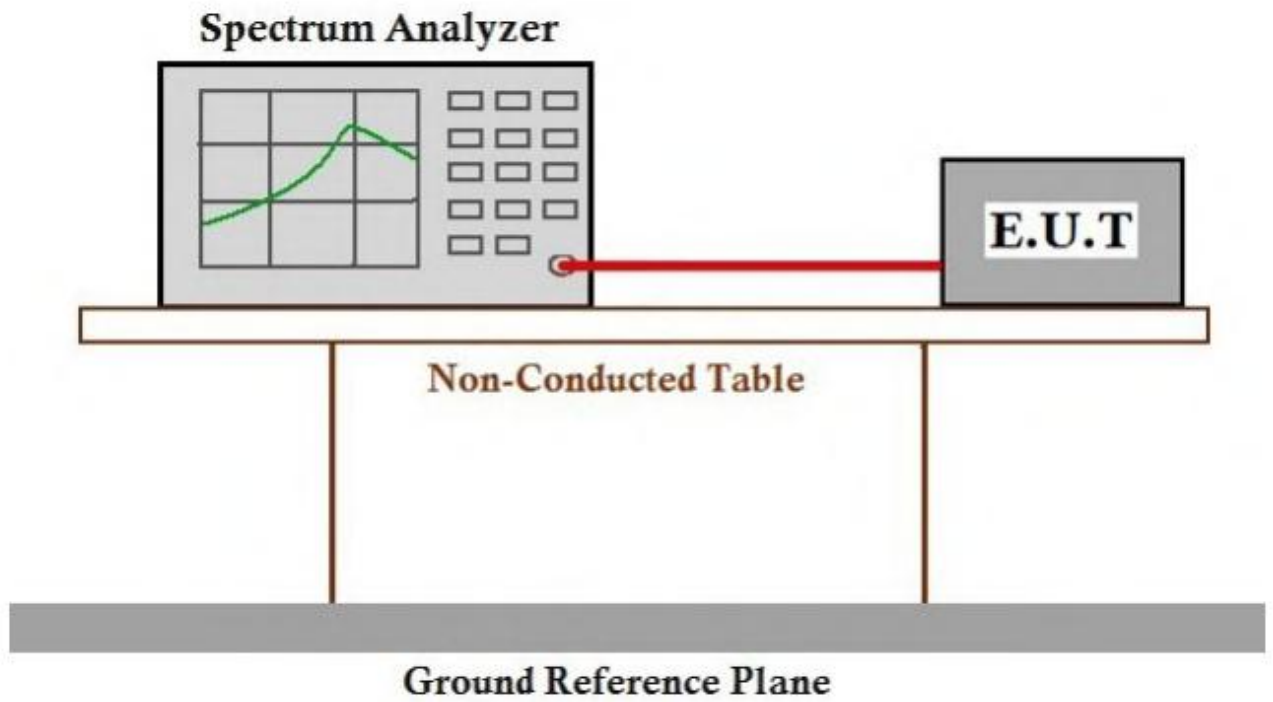
Test Procedure:

1. The EUT operates at transmitting mode. The operate channel is tested to verify the largest transmission and spurious emissions power at the continuous transmission mode.
2. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
 - (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
 - (b) AVERAGE: RBW=1MHz ; VBW=1/on time(1KHz) / Sweep=AUTO

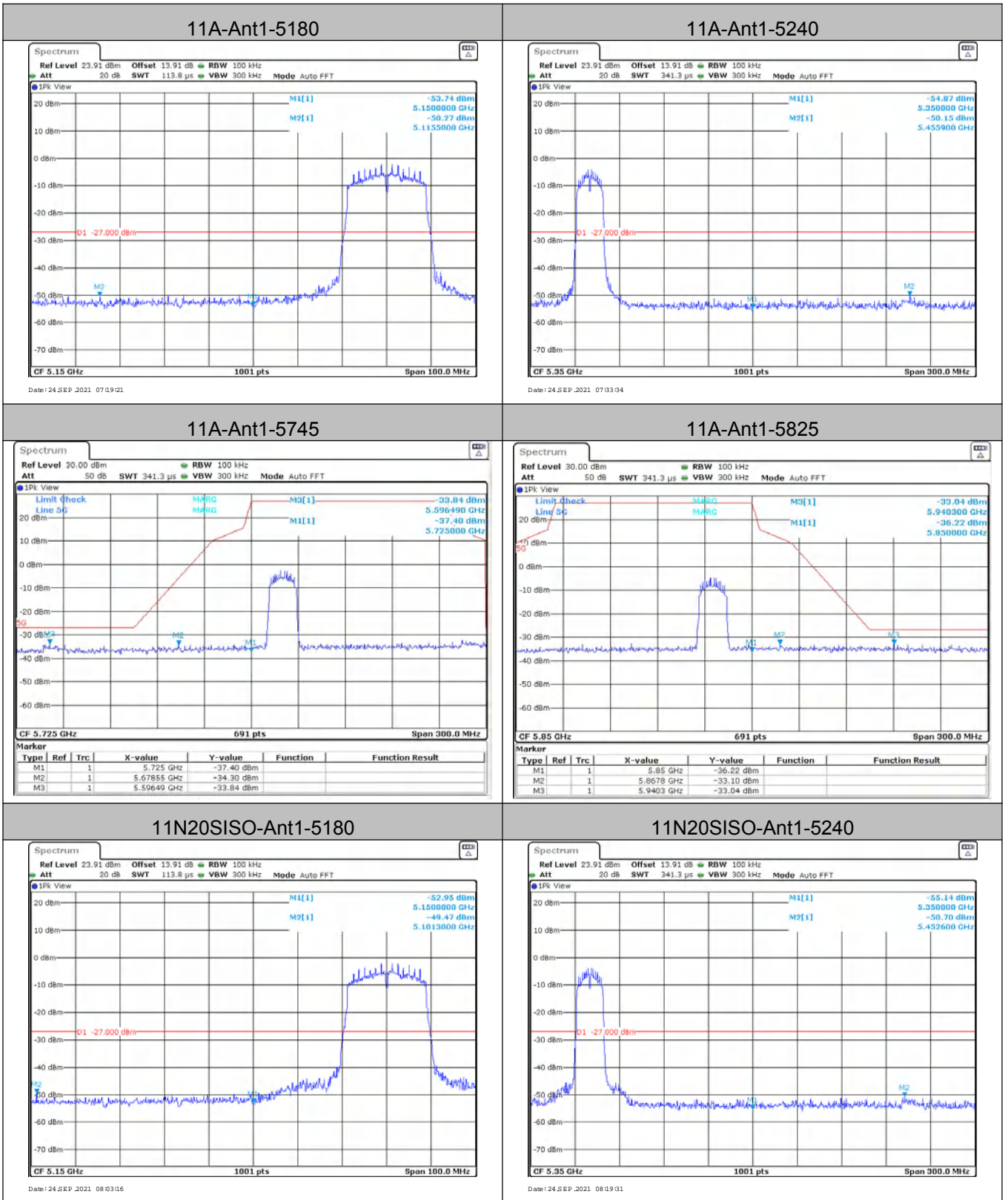
Limit:

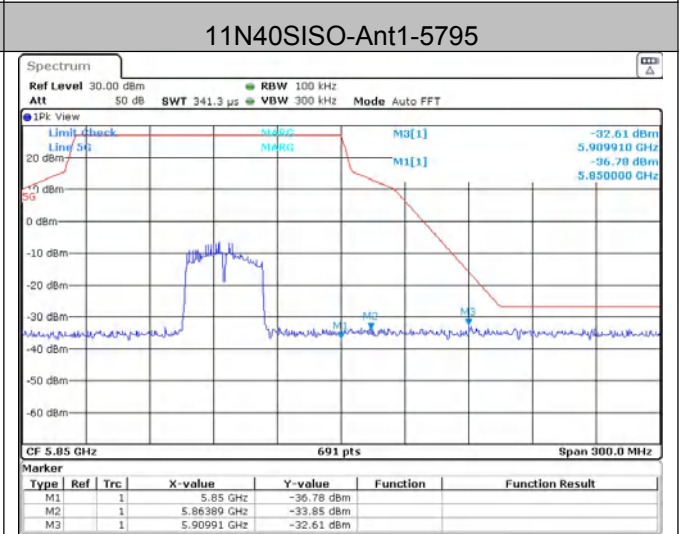
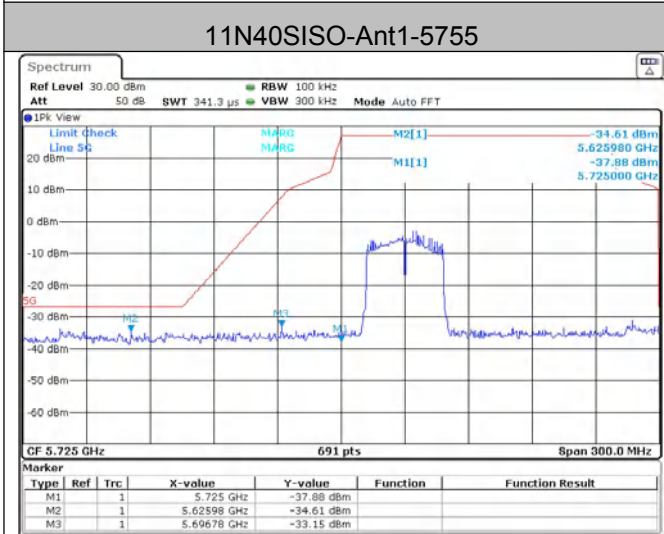
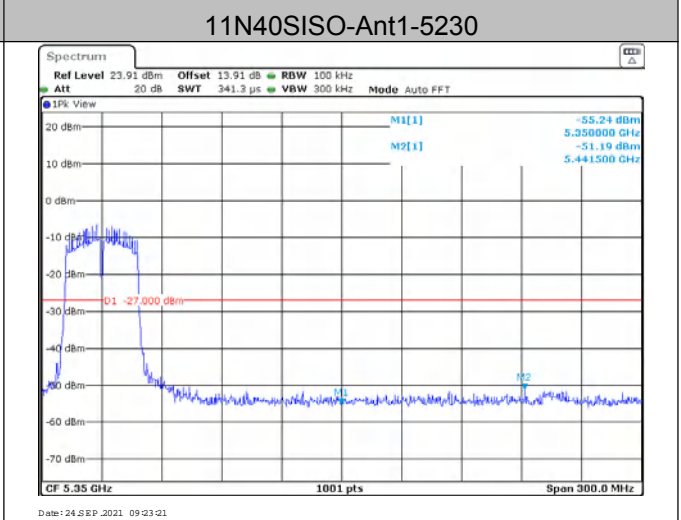
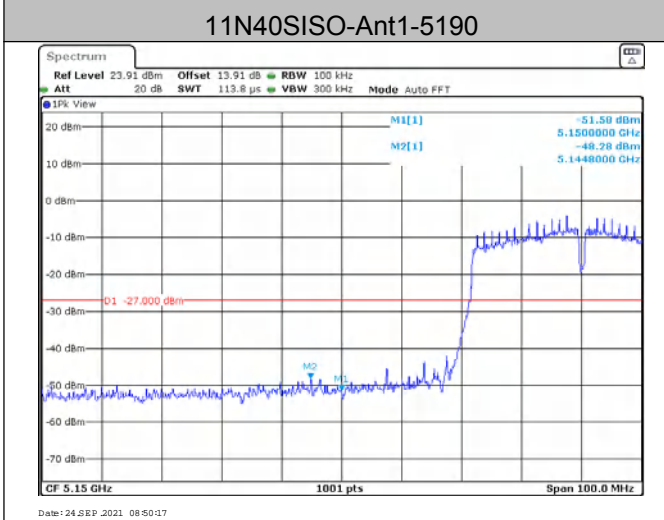
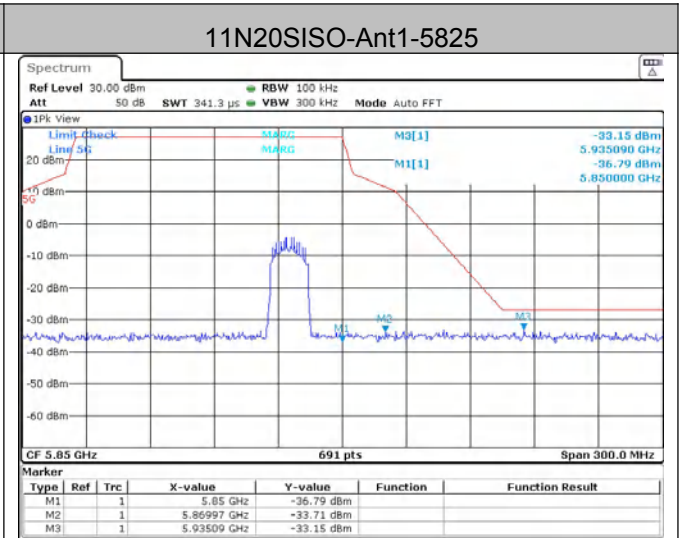
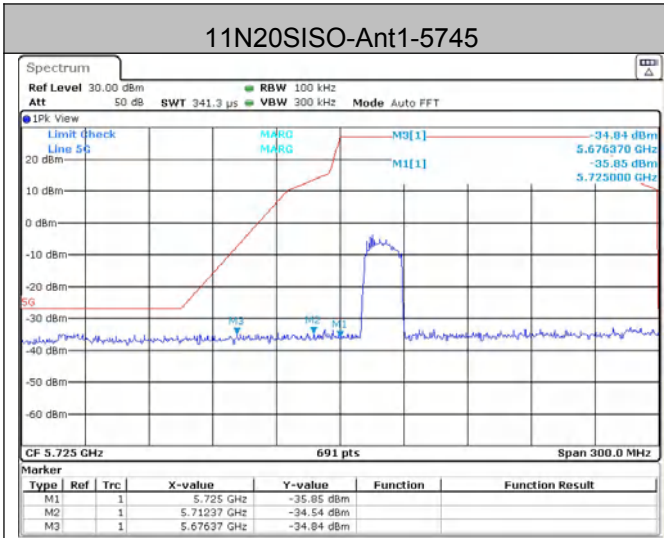
For transmitters operating in the 5.15-5.25 GHz band:	All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz (68.2dBuV/m).
For transmitters operating in the 5.25-5.35 GHz band:	All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz (68.2dBuV/m).
For transmitters operating in the 5.47-5.725 GHz band:	All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz (68.2dBuV/m).
For transmitters operating in the 5.725-5.85 GHz band:	(i) All emissions shall be limited to a level of -27 dBm/MHz (68.2dBuV/m) at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz (105.2dBuV/m) at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz (110.8dBuV/m) at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz (122.2dBuV/m) at the band edge.

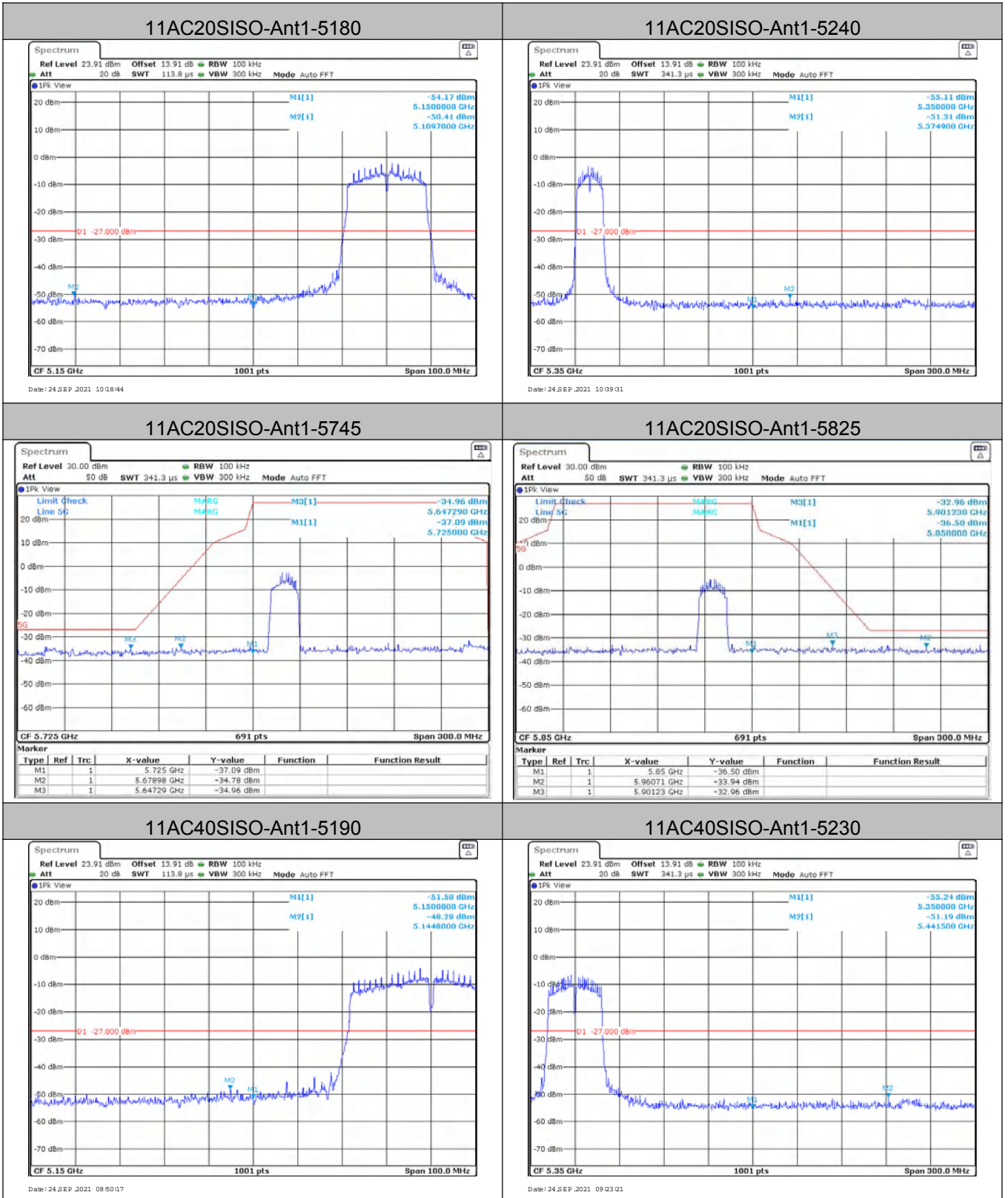
Test Setup Diagram

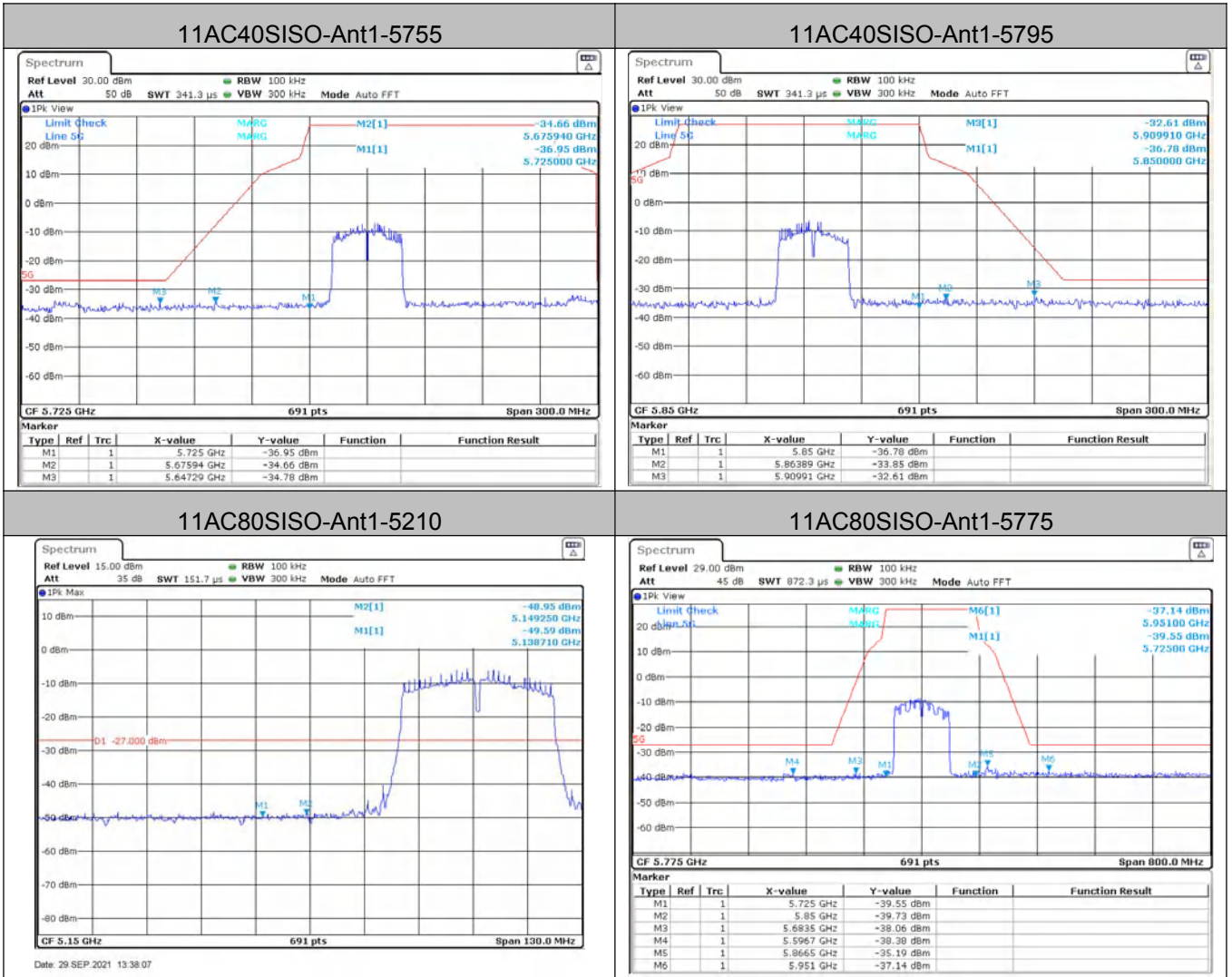


Test Result:









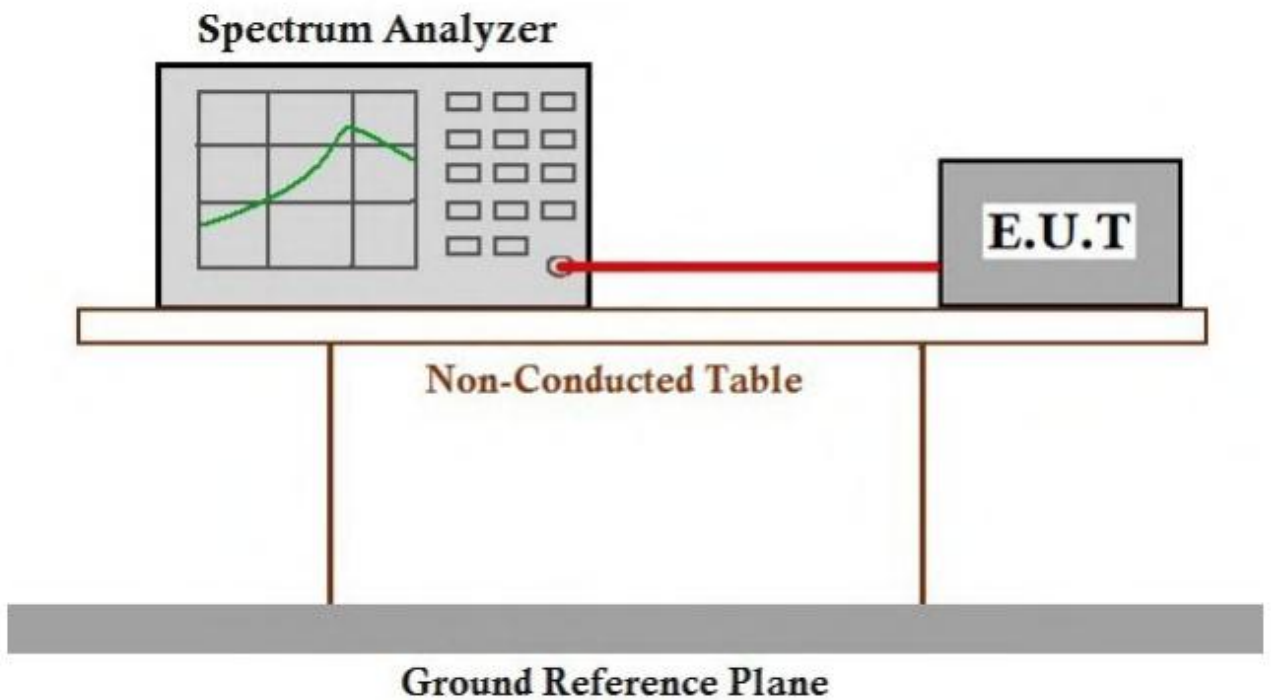
Appendix E): Frequency Stability

Test Requirement 47 CFR Part 15, Subpart C 15.407 (g)

Test Method: ANSI C63.10 (2013) Section 6.8

Limit: The frequency tolerance shall be maintained within the band of operation frequency over a temperature variation of 0 degrees to 35 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

Test Setup Diagram



Measurement Data

Frequency Stability Versus Temp.			
Operating Frequency: 5240 MHz			
Temp	Voltage	Measured Frequency	Frequency Drift
(°C)		(MHz)	(ppm)
50	VN	5240.03	5.72519
40		5240.02	3.81679
30		5240.01	1.90840
20		5240.02	3.81679
10		5240.02	3.81679
0		5240.01	1.90840
-10		5240.02	3.81679
-20		5240.03	5.72519

Frequency Stability Versus Temp.			
Operating Frequency: 5210 MHz			
Temp.	Voltage	Measured Frequency	Frequency Drift
		(MHz)	(ppm)
TN	VL	5210.00	0.00000
	VN	5210.03	5.75816
	VH	5210.02	3.83877

Note: All the modulation and channels had been tested, but only the worst data recorded in the report.

Appendix F): Antenna Requirement

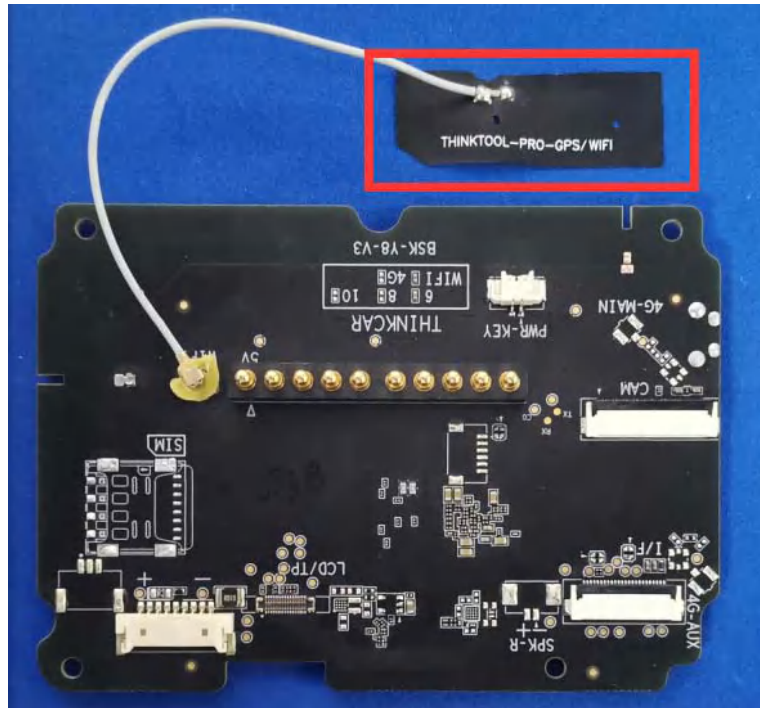
15.203 requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.407(a)(1) (2) requirement:

The conducted output power limit specified in paragraph (a) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (a) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power and the peak power spectral density shall be reduced by the by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:



The antenna is internal antenna with ipex connector. The best case gain of the 5G WiFi antenna is 1.52dBi@Band 1, 2.05dBi@Band 4.

Appendix G): Operation in the absence of information to the transmit

15.407(c) requirement:

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.

Operation in the absence of information to the transmit

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ASK message transmitting from remote device and verify whether it shall resend or discontinue transmission. (manufacturer declare)

Appendix H): AC Power Line Conducted Emission

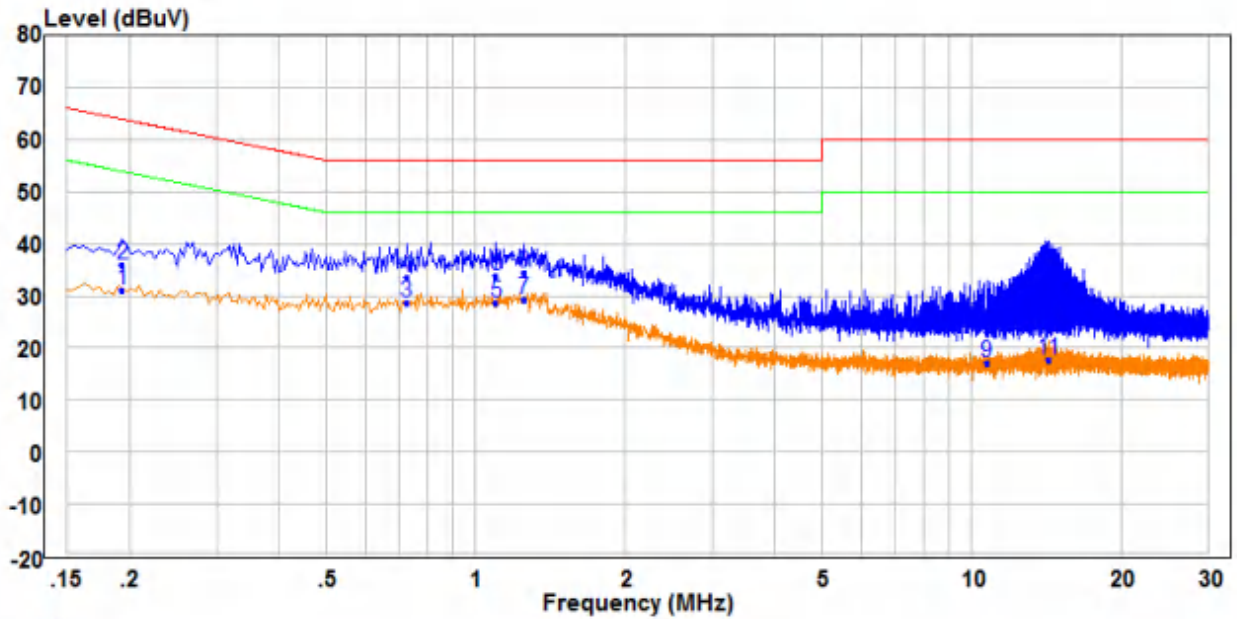
<p>Test Procedure:</p>	<p>Test frequency range :150KHz-30MHz</p> <ol style="list-style-type: none"> 1)The mains terminal disturbance voltage test was conducted in a shielded room. 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded. 3)The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2. 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement. 														
<p>Limit:</p>	<table border="1" data-bbox="499 1037 1367 1256"> <thead> <tr> <th rowspan="2">Frequency range (MHz)</th> <th colspan="2">Limit (dBμV)</th> </tr> <tr> <th>Quasi-peak</th> <th>Average</th> </tr> </thead> <tbody> <tr> <td>0.15-0.5</td> <td>66 to 56*</td> <td>56 to 46*</td> </tr> <tr> <td>0.5-5</td> <td>56</td> <td>46</td> </tr> <tr> <td>5-30</td> <td>60</td> <td>50</td> </tr> </tbody> </table> <p>* The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz. NOTE : The lower limit is applicable at the transition frequency</p>	Frequency range (MHz)	Limit (dBμV)		Quasi-peak	Average	0.15-0.5	66 to 56*	56 to 46*	0.5-5	56	46	5-30	60	50
Frequency range (MHz)	Limit (dBμV)														
	Quasi-peak	Average													
0.15-0.5	66 to 56*	56 to 46*													
0.5-5	56	46													
5-30	60	50													

Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

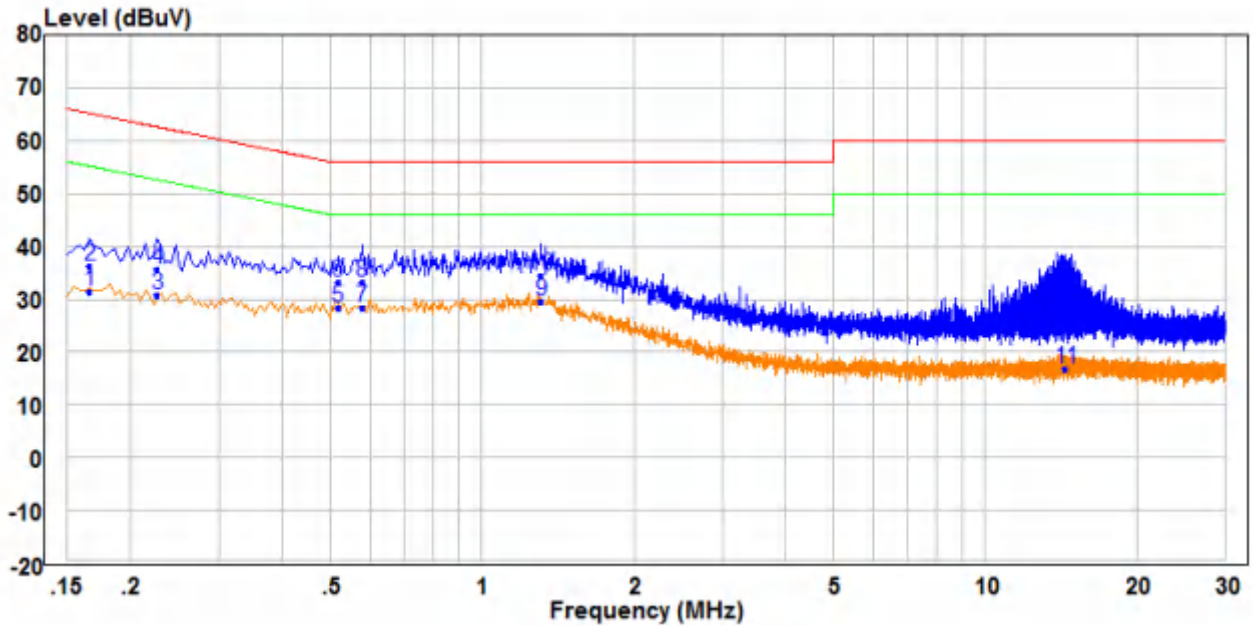
Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Live line:



	Read Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB		
1	0.194	21.53	9.49	31.02	53.86	-22.84	Average	Line
2	0.194	26.39	9.49	35.88	63.86	-27.98	QP	Line
3	0.726	18.78	9.84	28.62	46.00	-17.38	Average	Line
4	0.726	23.80	9.84	33.64	56.00	-22.36	QP	Line
5	1.098	19.27	9.52	28.79	46.00	-17.21	Average	Line
6	1.098	24.38	9.52	33.90	56.00	-22.10	QP	Line
7 PP	1.250	19.68	9.52	29.20	46.00	-16.80	Average	Line
8 QP	1.250	24.87	9.52	34.39	56.00	-21.61	QP	Line
9	10.721	7.20	9.83	17.03	50.00	-32.97	Average	Line
10	10.721	13.17	9.83	23.00	60.00	-37.00	QP	Line
11	14.281	7.76	9.88	17.64	50.00	-32.36	Average	Line
12	14.281	20.80	9.88	30.68	60.00	-29.32	QP	Line

Neutral line:



	Read Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB		
1	0.166	22.03	9.48	31.51	55.16	-23.65	Average	Neutral
2	0.166	26.74	9.48	36.22	65.16	-28.94	QP	Neutral
3	0.226	21.19	9.48	30.67	52.60	-21.93	Average	Neutral
4	0.226	26.18	9.48	35.66	62.60	-26.94	QP	Neutral
5	0.518	18.78	9.61	28.39	46.00	-17.61	Average	Neutral
6	0.518	23.59	9.61	33.20	56.00	-22.80	QP	Neutral
7	0.578	18.61	9.69	28.30	46.00	-17.70	Average	Neutral
8	0.578	23.52	9.69	33.21	56.00	-22.79	QP	Neutral
9 PP	1.310	19.90	9.72	29.62	46.00	-16.38	Average	Neutral
10 QP	1.310	24.70	9.72	34.42	56.00	-21.58	QP	Neutral
11	14.437	6.99	9.93	16.92	50.00	-33.08	Average	Neutral
12	14.437	17.76	9.93	27.69	60.00	-32.31	QP	Neutral

Notes:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.
3. The 6Mbps of rate of 802.11A_5240 is the worst case, only the worst data recorded in the report.

Appendix I): Restricted bands around fundamental frequency (Radiated Emission)

Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Peak	1MHz	10Hz	Average
Test Procedure:	<p>Below 1GHz test procedure as below:</p> <ol style="list-style-type: none"> The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable was turned from 0 degrees to 360 degrees to find the maximum reading. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel <p>Above 1GHz test procedure as below:</p> <ol style="list-style-type: none"> Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre). Test the EUT in the lowest channel , the Highest channel The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case. Repeat above procedures until all frequencies measured was complete. 				
Limit:	Frequency	Limit (dB μ V/m @3cm)	Remark		
	30MHz-88MHz	40.0	Quasi-peak Value		
	88MHz-216MHz	43.5	Quasi-peak Value		
	216MHz-960MHz	46.0	Quasi-peak Value		
	960MHz-1GHz	54.0	Quasi-peak Value		
	Above 1GHz	54.0	Average Value		
		74.0	Peak Value		

Test plot as follows:

Worse case mode:		802.11a(6Mbps)		Test channel:		36	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5150.00	56.61	-3.63	52.98	74	-21.02	peak	H
5150.00	42.63	-3.63	39.00	54	-15.00	AVG	H
5150.00	56.91	-3.63	53.28	74	-20.72	peak	V
5150.00	43.79	-3.63	40.16	54	-13.84	AVG	V

Worse case mode:		802.11a(6Mbps)		Test channel:		48	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5350.00	58.62	-3.59	55.03	74	-18.97	peak	H
5350.00	41.76	-3.59	38.17	54	-15.83	AVG	H
5350.00	57.20	-3.59	53.61	74	-20.39	peak	V
5350.00	44.31	-3.59	40.72	54	-13.28	AVG	V

Worse case mode:		802.11a(6Mbps)		Test channel:		149	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5725	56.5	-3.44	53.06	74	-20.94	peak	H
5725	45.97	-3.44	42.53	54	-11.47	AV	H
5725	56.66	-3.44	53.22	74	-20.78	peak	V
5725	45.54	-3.44	42.1	54	-11.9	AV	V

Worse case mode:		802.11a(6Mbps)		Test channel:		165	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5850	58.52	-3.42	55.1	74	-18.9	peak	H
5850	47.99	-3.42	44.57	54	-9.43	AV	H
5850	52.36	-3.42	48.94	74	-25.06	peak	V
5850	43.24	-3.42	39.82	54	-14.18	AV	V

Worse case mode:		802.11n(HT20)(6.5Mbps)		Test channel:		36	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5150.00	57.58	-3.63	53.95	74	-20.05	peak	H
5150.00	42.07	-3.63	38.44	54	-15.56	AVG	H
5150.00	57.34	-3.63	53.71	74	-20.29	peak	V
5150.00	42.12	-3.63	38.49	54	-15.51	AVG	V

Worse case mode:		802.11n(HT20)(6.5Mbps)		Test channel:		48	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5350.00	55.84	-3.59	52.25	74	-21.75	peak	H
5350.00	43.90	-3.59	40.31	54	-13.69	AVG	H
5350.00	57.99	-3.59	54.40	74	-19.60	peak	V
5350.00	43.13	-3.59	39.54	54	-14.46	AVG	V

Worse case mode:		802.11n(HT20)(6.5Mbps)		Test channel:		149	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5725	57.16	-3.44	53.72	74	-20.28	peak	H
5725	46.63	-3.44	43.19	54	-10.81	AV	H
5725	50.58	-3.44	47.14	74	-26.86	peak	V
5725	41.46	-3.44	38.02	54	-15.98	AV	V

Worse case mode:		802.11n(HT20)(6.5Mbps)		Test channel:		165	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5850	58.52	-3.42	55.1	74	-18.9	peak	H
5850	47.99	-3.42	44.57	54	-9.43	AV	H
5850	51.94	-3.42	48.52	74	-25.48	peak	V
5850	42.82	-3.42	39.4	54	-14.6	AV	V

Worse case mode:		802.11n(HT40)(13.5Mbps)		Test channel:		38	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5150	58.51	-3.63	54.88	74	-19.12	peak	H
5150	41.73	-3.63	38.10	54	-15.90	AVG	H
5150	56.04	-3.63	52.41	74	-21.59	peak	V
5150	44.04	-3.63	40.41	54	-13.59	AVG	V

Worse case mode:		802.11n(HT40)(13.5Mbps)		Test channel:		46	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5350.00	57.27	-3.59	53.68	74	-20.32	peak	H
5350.00	44.11	-3.59	40.52	54	-13.48	AVG	H
5350.00	55.79	-3.59	52.20	74	-21.80	peak	V
5350.00	41.99	-3.59	38.40	54	-15.60	AVG	V

Worse case mode:		802.11n(HT40)(13.5Mbps)		Test channel:		151	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5725	57.41	-3.44	53.97	74	-20.03	peak	H
5725	46.88	-3.44	43.44	54	-10.56	AV	H
5725	50.83	-3.44	47.39	74	-26.61	peak	V
5725	41.71	-3.44	38.27	54	-15.73	AV	V

Worse case mode:		802.11n(HT40)(13.5Mbps)		Test channel:		159	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5850	56.81	-3.42	53.39	74	-20.61	peak	H
5850	46.28	-3.42	42.86	54	-11.14	AV	H
5850	50.23	-3.42	46.81	74	-27.19	peak	V
5850	41.11	-3.42	37.69	54	-16.31	AV	V

Worse case mode:		802.11ac(HT20)(6.5Mbps)		Test channel:		36	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5150.00	56.70	-3.63	53.07	74	-20.93	peak	H
5150.00	44.17	-3.63	40.54	54	-13.46	AVG	H
5150.00	58.57	-3.63	54.94	74	-19.06	peak	V
5150.00	44.64	-3.63	41.01	54	-12.99	AVG	V

Worse case mode:		802.11ac(HT20)(6.5Mbps)		Test channel:		48	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5350.00	56.20	-3.59	52.61	74	-21.39	peak	H
5350.00	43.43	-3.59	39.84	54	-14.16	AVG	H
5350.00	57.43	-3.59	53.84	74	-20.16	peak	V
5350.00	44.46	-3.59	40.87	54	-13.13	AVG	V

Worse case mode:		802.11ac(HT20)(6.5Mbps)		Test channel:		149	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5725	56.43	-3.44	52.99	74	-21.01	peak	H
5725	45.9	-3.44	42.46	54	-11.54	AV	H
5725	49.85	-3.44	46.41	74	-27.59	peak	V
5725	40.73	-3.44	37.29	54	-16.71	AV	V

Worse case mode:		802.11ac(HT20)(6.5Mbps)		Test channel:		165	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5850	55.38	-3.42	51.96	74	-22.04	peak	H
5850	44.85	-3.42	41.43	54	-12.57	AV	H
5850	48.8	-3.42	45.38	74	-28.62	peak	V
5850	39.68	-3.42	36.26	54	-17.74	AV	V

Worse case mode:		802.11ac(VHT40)(13.5Mbps)		Test channel:		38	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5150.00	56.00	-3.63	52.37	74	-21.63	peak	H
5150.00	44.50	-3.63	40.87	54	-13.13	AVG	H
5150.00	56.97	-3.63	53.34	74	-20.66	peak	V
5150.00	43.52	-3.63	39.89	54	-14.11	AVG	V

Worse case mode:		802.11ac(VHT40)(13.5Mbps)		Test channel:		46	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5350.00	58.65	-3.59	55.06	74	-18.94	peak	H
5350.00	44.57	-3.59	40.98	54	-13.02	AVG	H
5350.00	56.40	-3.59	52.81	74	-21.19	peak	V
5350.00	42.38	-3.59	38.79	54	-15.21	AVG	V

Worse case mode:		802.11ac(VHT40)(13.5Mbps)		Test channel:		151	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5725	58.24	-3.44	54.8	74	-19.2	peak	H
5725	47.71	-3.44	44.27	54	-9.73	AV	H
5725	51.66	-3.44	48.22	74	-25.78	peak	V
5725	42.54	-3.44	39.1	54	-14.9	AV	V

Worse case mode:		802.11ac(VHT40)(13.5Mbps)		Test channel:		159	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5850	56.49	-3.42	53.07	74	-20.93	peak	H
5850	45.96	-3.42	42.54	54	-11.46	AV	H
5850	49.91	-3.42	46.49	74	-27.51	peak	V
5850	40.79	-3.42	37.37	54	-16.63	AV	V

Worse case mode:		802.11ac(VHT80)(29.3Mbps)		Test channel:		42	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5150.00	58.63	-3.63	55.00	74	-19.00	peak	H
5150.00	43.71	-3.63	40.08	54	-13.92	AVG	H
5150.00	56.98	-3.63	53.35	74	-20.65	peak	V
5150.00	41.82	-3.63	38.19	54	-15.81	AVG	V
5350.00	56.44	-3.59	52.85	74	-21.15	peak	H
5350.00	42.82	-3.59	39.23	54	-14.77	AVG	H
5350.00	57.55	-3.59	53.96	74	-20.04	peak	V
5350.00	44.16	-3.59	40.57	54	-13.43	AVG	V

Worse case mode:		802.11ac(VHT80)(29.3Mbps)		Test channel:		155	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5725	58.69	-3.44	55.25	74	-18.75	peak	H
5725	48.16	-3.44	44.72	54	-9.28	AV	H
5725	52.11	-3.44	48.67	74	-25.33	peak	V
5725	42.99	-3.44	39.55	54	-14.45	AV	V
5850	57.44	-3.42	54.02	74	-19.98	peak	H
5850	46.91	-3.42	43.49	54	-10.51	AV	H
5850	50.86	-3.42	47.44	74	-26.56	peak	V
5850	41.74	-3.42	38.32	54	-15.68	AV	V

Note:

1) Through Pre-scan transmitting mode with all kind of modulation and data rate, Only the worst case is recorded in the report.

2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading - Correct Factor

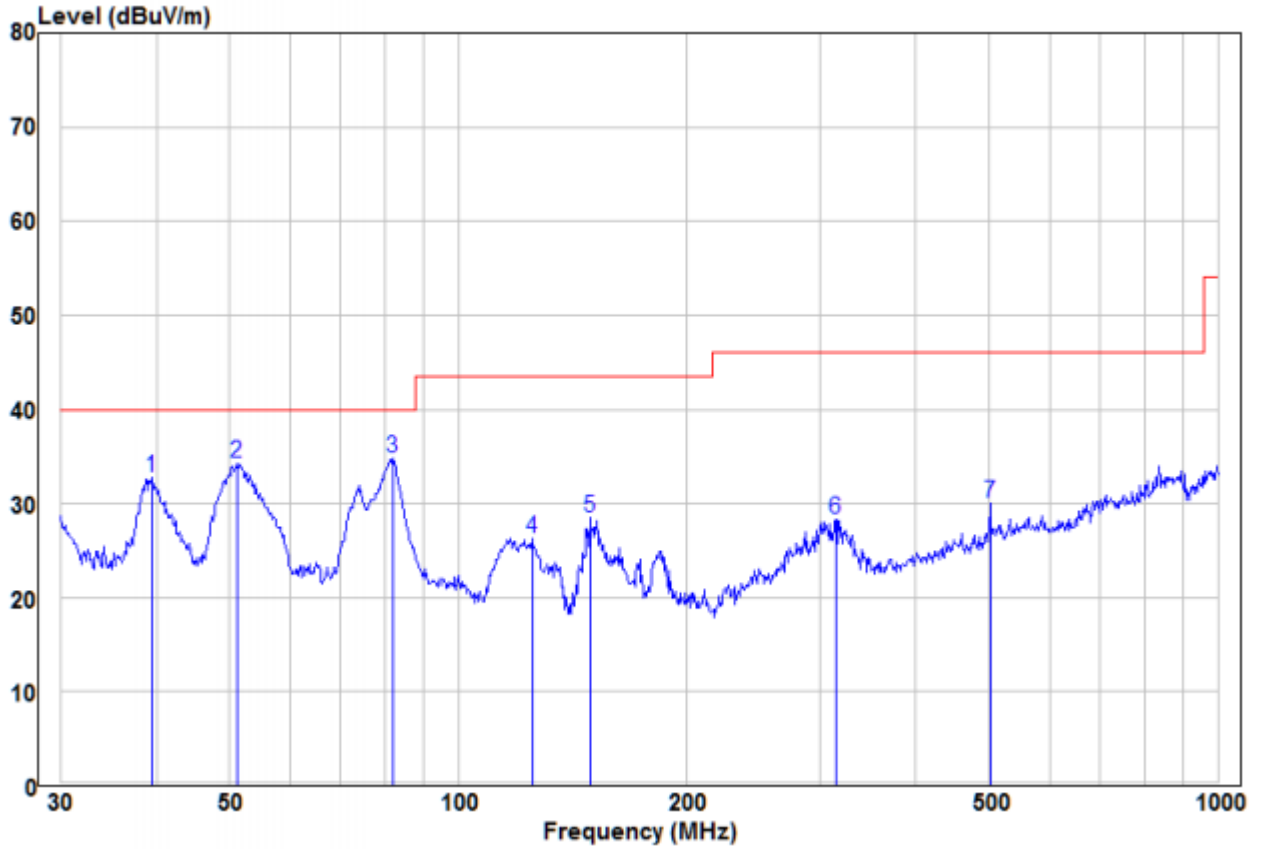
Correct Factor = Preamplifier Factor - Antenna Factor - Cable Factor

Appendix J): Radiated Spurious Emissions

Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
	0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
	0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
	0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
	0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
Peak		1MHz	10Hz	Average	
Test Procedure:					
<p>Below 1GHz test procedure as below:</p> <ol style="list-style-type: none"> The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. <p>Above 1GHz test procedure as below:</p> <ol style="list-style-type: none"> Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre) Test the EUT in the lowest channel ,the middle channel ,the Highest channel The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case. Repeat above procedures until all frequencies measured was complete. 					
Limit:	Frequency	Field strength (microvolt/meter)	Limit (dB μ V/cm)	Remark	Measurement distance (cm)
	0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz-30MHz	30	-	-	30
	30MHz-88MHz	100	40.0	Quasi-peak	3
	88MHz-216MHz	150	43.5	Quasi-peak	3
	216MHz-960MHz	200	46.0	Quasi-peak	3
	960MHz-1GHz	500	54.0	Quasi-peak	3
	Above 1GHz	500	54.0	Average	3
	Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.				
Test result:	PASS				

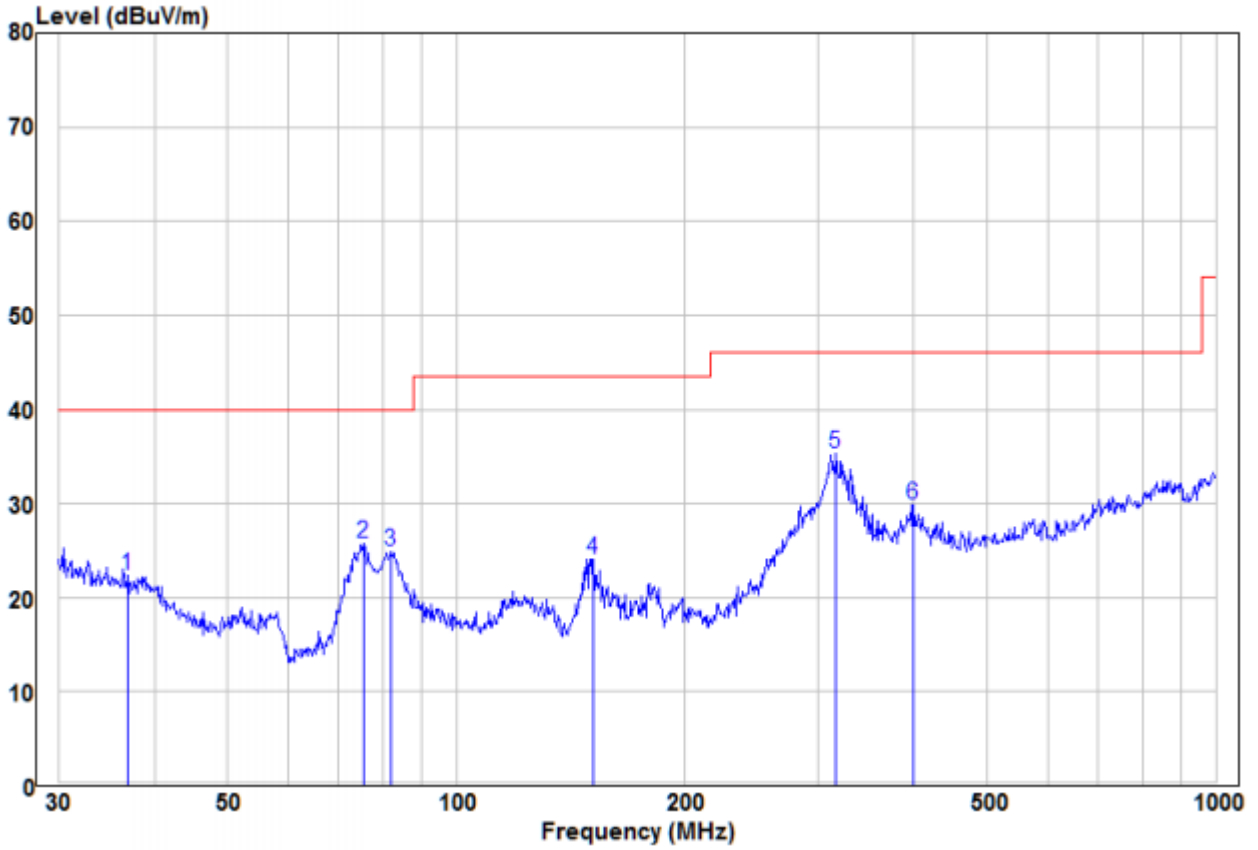
Test Data:
Radiated Emission below 1GHz

30MHz~1GHz		
Test mode:	Transmitting (802.11a 36CH)	Vertical



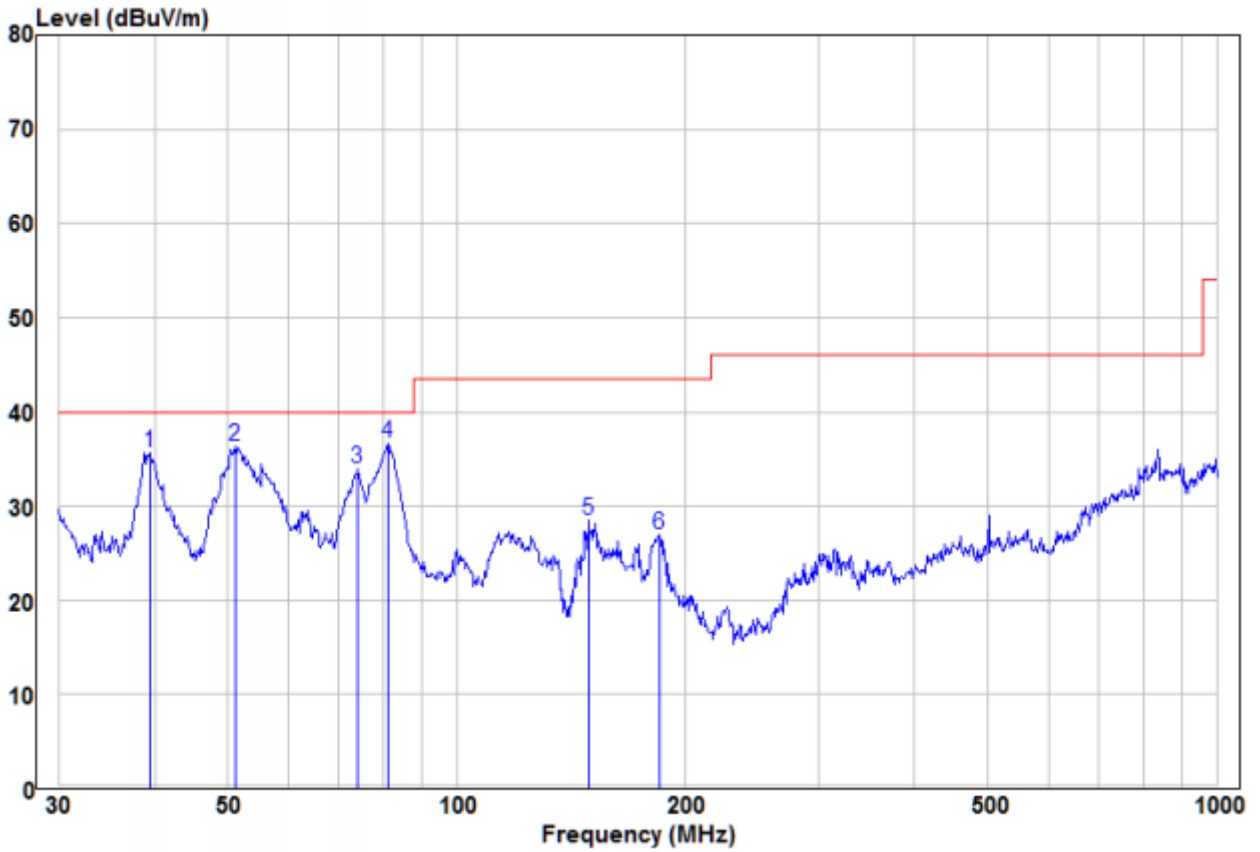
	Read Freq	Read Level	Factor	Limit Level	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
1	39.58	19.76	12.95	32.71	40.00	-7.29 Peak	VERTICAL
2	51.12	26.43	7.85	34.28	40.00	-5.72 Peak	VERTICAL
3 pp	82.07	25.03	9.83	34.86	40.00	-5.14 Peak	VERTICAL
4	125.01	15.77	10.51	26.28	43.50	-17.22 Peak	VERTICAL
5	148.96	19.99	8.43	28.42	43.50	-15.08 Peak	VERTICAL
6	314.38	14.28	14.08	28.36	46.00	-17.64 Peak	VERTICAL
7	501.18	11.66	18.29	29.95	46.00	-16.05 Peak	VERTICAL

Test mode:	Transmitting (802.11a 36CH)	Horizontal
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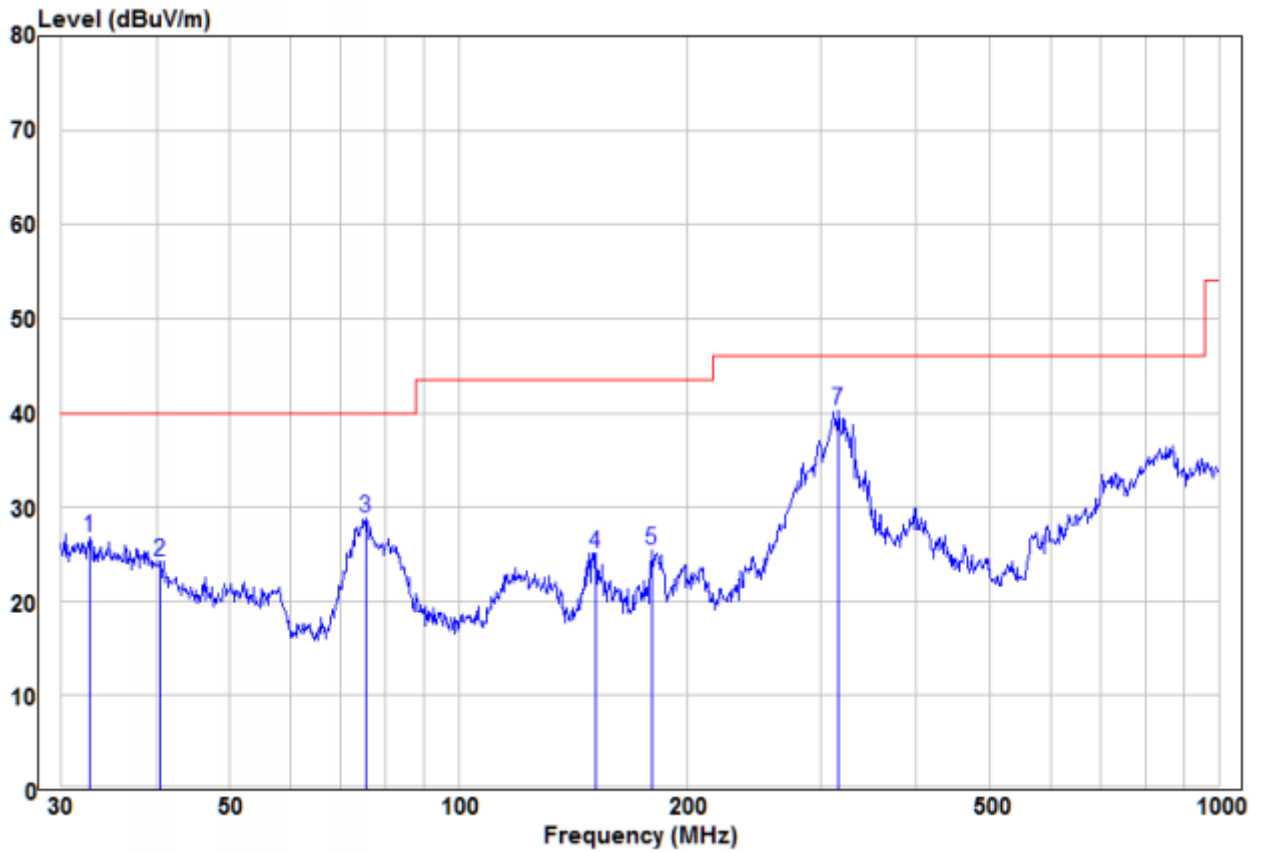
	Read Freq	Read Level	Factor	Limit Level	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
1	36.90	8.37	13.92	22.29	40.00	-17.71 Peak	HORIZONTAL
2	75.45	16.72	9.04	25.76	40.00	-14.24 Peak	HORIZONTAL
3	82.07	15.14	9.83	24.97	40.00	-15.03 Peak	HORIZONTAL
4	151.60	15.72	8.36	24.08	43.50	-19.42 Peak	HORIZONTAL
5 pp	316.59	21.20	14.13	35.33	46.00	-10.67 Peak	HORIZONTAL
6	399.03	14.74	15.13	29.87	46.00	-16.13 Peak	HORIZONTAL

30MHz~1GHz		
Test mode:	Transmitting (802.11a 149CH)	Vertical



	Read Freq	Read Level	Read Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	39.58	22.76	12.95	35.71	40.00	-4.29	Peak	VERTICAL
2	51.12	28.43	7.85	36.28	40.00	-3.72	Peak	VERTICAL
3	74.14	25.08	8.83	33.91	40.00	-6.09	Peak	VERTICAL
4 pp	81.21	26.86	9.81	36.67	40.00	-3.33	Peak	VERTICAL
5	148.96	19.99	8.43	28.42	43.50	-15.08	Peak	VERTICAL
6	184.49	18.82	8.17	26.99	43.50	-16.51	Peak	VERTICAL

Test mode:	Transmitting (802.11a 149CH)	Horizontal
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	Read Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	32.75	11.66	15.19	26.85	40.00	-13.15	Peak	HORIZONTAL
2	40.42	11.58	12.60	24.18	40.00	-15.82	Peak	HORIZONTAL
3	75.45	19.72	9.04	28.76	40.00	-11.24	Peak	HORIZONTAL
4	151.60	16.72	8.36	25.08	43.50	-18.42	Peak	HORIZONTAL
5	180.02	17.14	8.34	25.48	43.50	-18.02	Peak	HORIZONTAL
6	180.02-507.34		8.34-499.00		43.50-542.50		Peak	HORIZONTAL
7 pp	316.59	26.20	14.13	40.33	46.00	-5.67	Peak	HORIZONTAL

Transmitter Emission above 1GHz

Test mode:		802.11a(6Mbps)		Test channel:		36 CH	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
10360	51.089	2.26	53.349	74	-20.651	peak	H
10360	42.429	2.26	44.689	54	-9.311	AVG	H
15540	53.63	3.75	57.38	74	-16.62	peak	H
15540	41.74	3.75	45.49	54	-8.51	AVG	H
10360	49.619	2.26	51.879	74	-22.121	peak	V
10360	41.799	2.26	44.059	54	-9.941	AVG	V
15540	51.839	3.75	55.589	74	-18.411	peak	V
15540	42.509	3.75	46.259	54	-7.741	AVG	V

Test mode:		802.11a(6Mbps)		Test channel:		48 CH	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
10480	50.24	2.31	52.55	74	-21.45	peak	H
10480	30.08	2.31	32.39	54	-21.61	AVG	H
15720	49.92	3.79	53.71	74	-20.29	peak	H
15720	29.58	3.79	33.37	54	-20.63	AVG	H
10480	48.97	2.31	51.28	74	-22.72	peak	V
10480	30.81	2.31	33.12	54	-20.88	AVG	V
15720	50.49	3.79	54.28	74	-19.72	peak	V
15720	30.51	3.79	34.30	54	-19.70	AVG	V

Test mode:		802.11a(6Mbps)		Test channel:		149	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
11490	47.36	2.54	49.9	68.2	-18.3	peak	H
11490	38.66	2.54	41.2	54	-12.8	AVG	H
17235	49.49	3.94	53.43	68.2	-14.77	peak	H
17235	39.33	3.94	43.27	54	-10.73	AVG	H
11490	49.29	2.54	51.83	68.2	-16.37	peak	V
11490	41.48	2.54	44.02	54	-9.98	AVG	V
17235	48.11	3.94	52.05	68.2	-16.15	peak	V
17235	38.78	3.94	42.72	54	-11.28	AVG	V

Test mode:		802.11a(6Mbps)		Test channel:		165	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
11650	49.15	2.58	51.73	68.2	-16.47	peak	H
11650	39.66	2.58	42.24	54	-11.76	AVG	H
17475	52.02	4.02	56.04	68.2	-12.16	peak	H
17475	40.41	4.02	44.43	54	-9.57	AVG	H
11650	49.59	2.58	52.17	68.2	-16.03	peak	V
11650	40.88	2.58	43.46	54	-10.54	AVG	V
17475	49.28	4.02	53.3	68.2	-14.9	peak	V
17475	39.63	4.02	43.65	54	-10.35	AVG	V

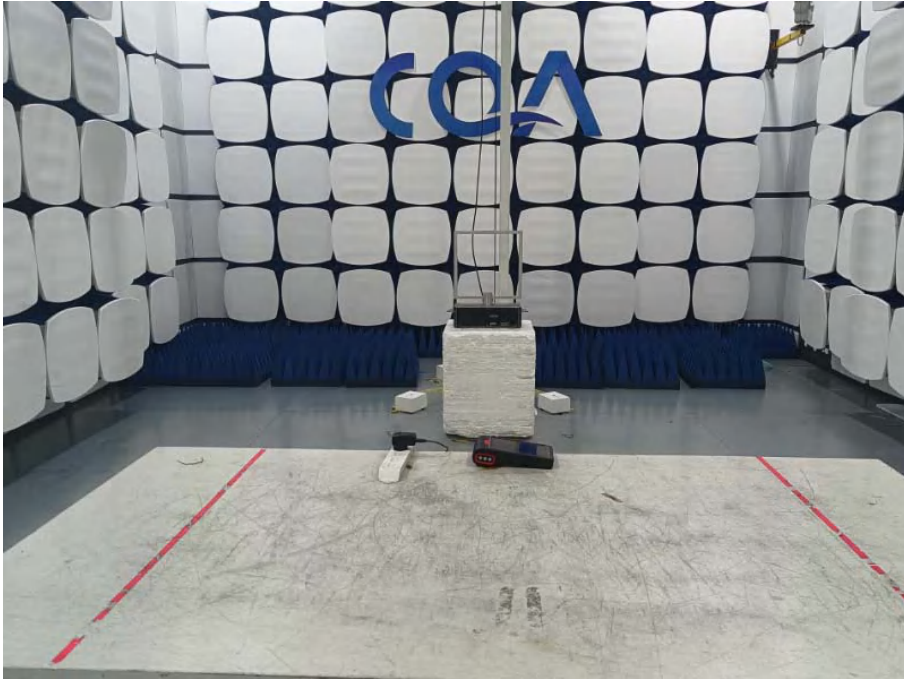
Remark:

- 1) The 802.11a 6Mbps of rate is the worst case, only the worst data recorded in the report.
- 2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor
- 3) Scan from 9kHz to 40GHz, The disturbance above 18GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

8 Photographs - EUT Test Setup

8.1 Radiated Spurious Emission

9kHz~30MHz:



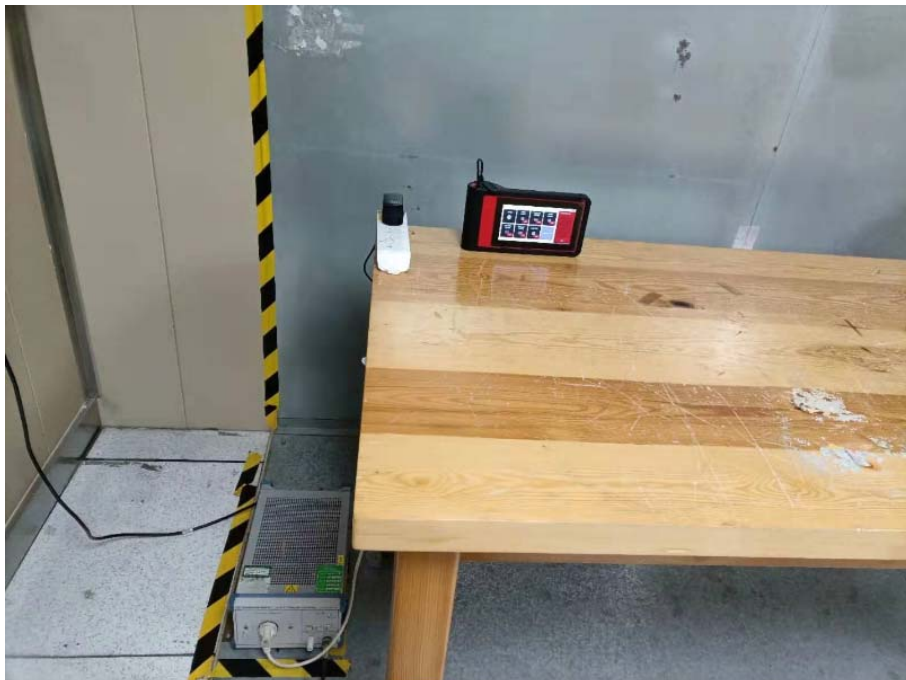
30MHz~1GHz:



Above 1GHz:



8.2 Conducted Emission



*** End of Report ***