

FCC TEST REPORT

Product Name: BGAN Class 2 Mobile User Equipment
Trade Mark: N/A
Model No.: Stylite 500
Add. Model No.: N/A
Report Number: 190611020RFC-1
Test Standards: FCC 47 CFR Part 25
FCC ID: 2AT37STYLITE500
Test Result: PASS
Date of Issue: July 26, 2019

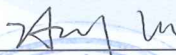
Prepared for:

Chengdu Spaceon Technology Co., Ltd.
No.88, Xinye Road, Scientific Industry Park, Chengdu Hi-tech
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Prepared by:

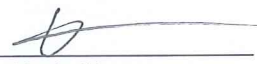
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Date: July 26, 2019

Version

Version No.	Date	Description
V1.0	July 26, 2019	Original

**Shenzhen UnionTrust Quality and Technology Co., Ltd.**

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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	Chengdu Spaceon Technology Co., Ltd.
Address of Applicant:	No.88, Xinye Road, Scientific Industry Park, Chengdu Hi-tech Industry Zone,Chendu,China
Manufacturer:	Chengdu Spaceon Technology Co., Ltd.
Address of Manufacturer:	No.88, Xinye Road, Scientific Industry Park, Chengdu Hi-tech Industry Zone,Chendu,China

1.2 EUT INFORMATION

Product Name:	BGAN Class 2 Mobile User Equipment	
Model No.:	Stylite 500	
Add. Model No.:	N/A	
Trade Mark:	N/A	
DUT Stage:	Identical Prototype	
EUT Supports Function:	MSS frequency bands	1626.5 MHz to 1660.5 MHz
Software Version:	v1.0	
Hardware Version:	v1.1	
Sample Received Date:	June 11, 2019	
Sample Tested Date:	July 6, 2019 to July 26, 2019	

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

Frequency Bands:	1626.5 MHz to 1660.5 MHz
Type of Modulation:	QPSK, Pi/4 QPSK, 16QAM, 32QAM, 64QAM
Nominated Bandwidth:	30 kHz/ 50 kHz/ 90 kHz/ 110 kHz/ 195 kHz/ 200 kHz
Antenna Type:	Helix antenna
Antenna Gain:	11 dBi
Maximum EIRP:	-6.34 dBW / 0.23 W
Normal Test Voltage:	11.1 Vdc
Extreme Test Voltage:	9.4 to 12.8Vdc
Extreme Test Temperature:	-20 °C to +50 °C

1.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

1) Support Equipment

Description	Manufacturer	Model No.	Serial Number	Supplied by
Notebook	Lenovo	E450	SL10G10780	UnionTrust
mouse	DELL	MS111	CN-011D3V-738	UnionTrust

2) Support Cable

Cable No.	Description	Connector	Length	Supplied by
1	Antenna Cable	SMA	0.6 Meter	UnionTrust

1.5 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China 518109
Telephone: +86 (0) 755 2823 0888
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1.6 TEST FACILITY

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L9069

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC/EN 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

A2LA-Lab Certificate No.: 4312.01

Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

ISED Wireless Device Testing Laboratories

CAB identifier: CN0032

FCC Accredited Lab.

Designation Number: CN1194

Test Firm Registration Number: 259480

1.7 DEVIATION FROM STANDARDS

No deviations from the applicable test standard were made during testing.

1.8 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.9 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

1.10 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Measurement Uncertainty
1	Frequency Tolerance	$\pm 6.3 \times 10^{-8}$
2	Occupied Bandwidth	$\pm 2.3 \%$
3	Radiated Spurious Emissions (30MHz-1GHz)	± 4.7 dB
4	Radiated Spurious Emissions (1GHz-18GHz)	± 5.1 dB
5	Equivalent Isotropic Radiated Power	Radiated: ± 5.1 dB (1GHz-18GHz) Conducted: ± 0.52 dB
6	Spurious Emissions at Antenna Terminals	± 1.48 dB
7	Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radio navigation-Satellite Service	Radiated: ± 5.1 dB (1GHz-18GHz) Conducted: ± 1.48 dB

2. TEST SUMMARY

FCC 47 CFR Part 25 Test Cases		
Test Item	Test Requirement	Result
Occupied Bandwidth	FCC 47 CFR Part 2.1049	PASS
Frequency Tolerance	FCC 47 CFR Part 25.202(d) FCC 47 CFR Part 2.1055	PASS
Spurious Emissions at Antenna Terminals	FCC 47 CFR Part 25.202(f)	PASS
Radiated Spurious Emissions	FCC 47 CFR Part 25.202(f)	PASS
Equivalent Isotropic Radiated Power	FCC 47 CFR Part 25.204	PASS
Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radio navigation-Satellite Service	FCC 47 CFR Part 25.216	PASS

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3. EQUIPMENT LIST

Radiated Emission Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
☒	3M Chamber & Accessory Equipment	ETS-LINDGREN	3M	N/A	Dec. 03, 2018	Dec. 03, 2021
☒	Receiver	R&S	ESIB26	100114	Nov. 24, 2018	Nov. 24, 2019
☐	Loop Antenna	ETS-LINDGREN	6502	00202525	Dec. 03, 2018	Dec. 03, 2019
☒	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Dec. 08, 2018	Dec. 08, 2019
☒	6dB Attenuator	Talent	RA6A5-N-18	18103001	Dec. 08, 2018	Dec. 08, 2019
☒	Preamplifier	HP	8447F	2805A02960	Nov. 24, 2018	Nov. 24, 2019
☐	Broadband Antenna (Pre-amplifier)	ETS-LINDGREN	3142E-PA	00201891	May 18, 2019	May 18, 2020
☐	6dB Attenuator	Talent	RA6A5-N-18	18103002	Nov. 24, 2018	Nov. 24, 2019
☐	Horn Antenna	ETS-LINDGREN	3117	00164202	Dec. 08, 2018	Dec. 08, 2019
☒	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201874	May 18, 2019	May 18, 2020
☒	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
☐	Highpass Filter (1.2GHz~18GHz)	Micro-Tronics	HPM50108	G552	Nov. 29, 2018	Nov. 29, 2019
☒	Highpass Filter (3GHz~18GHz)	Micro-Tronics	HPM50117	G005	Nov. 29, 2018	Nov. 29, 2019
☒	Test Software	Audix	e3	Software Version: 9.160323		

Conducted RF test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
☐	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	Nov. 24, 2018	Nov. 24, 2019
☒	EXA Spectrum Analyzer	KEYSIGHT	N9010B	MY57471561	Nov. 24, 2018	Nov. 24, 2019
☐	Receiver	R&S	ESR7	1316.3003K07-101181-K3	Nov. 24, 2018	Nov. 24, 2019
☒	DC Source	KIKUSUI	PWR400L	LK003024	Sep. 18, 2018	Sep. 18, 2019
☒	Temp & Humidity chamber	Espec	GL(U)04KA(W)	16921H201P3	Sep. 18, 2018	Sep. 18, 2019

4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

4.1.1 Normal or Extreme Test Conditions

Test Environment	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage (V)	Relative Humidity (%)
TN/VN	+15 to +35	11.1	20 to 75
TL/VL	-20	9.4	20 to 75
TH/VL	+50	9.4	20 to 75
TL/VH	-20	12.8	20 to 75
TH/VH	+50	12.8	20 to 75

Remark:

- The EUT just work in such extreme temperature of -20 °C to +50 °C and the extreme voltage of 9.4 V to 12.8 V, so here the EUT is tested in the temperature of -20 °C to +50 °C and the voltage of 9.4 V to 12.8 V.
- 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.

4.1.2 Record of Normal Environment

Test Item	Temperature (°C)	Relative Humidity (%)	Pressure (kPa)	Tested by
Occupied Bandwidth	24.8	51	100.1	Hank Wu
Frequency Tolerance				
Spurious Emissions at Antenna Terminals				
Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radio navigation-Satellite Service				
Equivalent Isotropic Radiated Power	25.3	55	100.1	Andy Lin
Radiated Spurious Emissions				

4.2 TEST CHANNELS

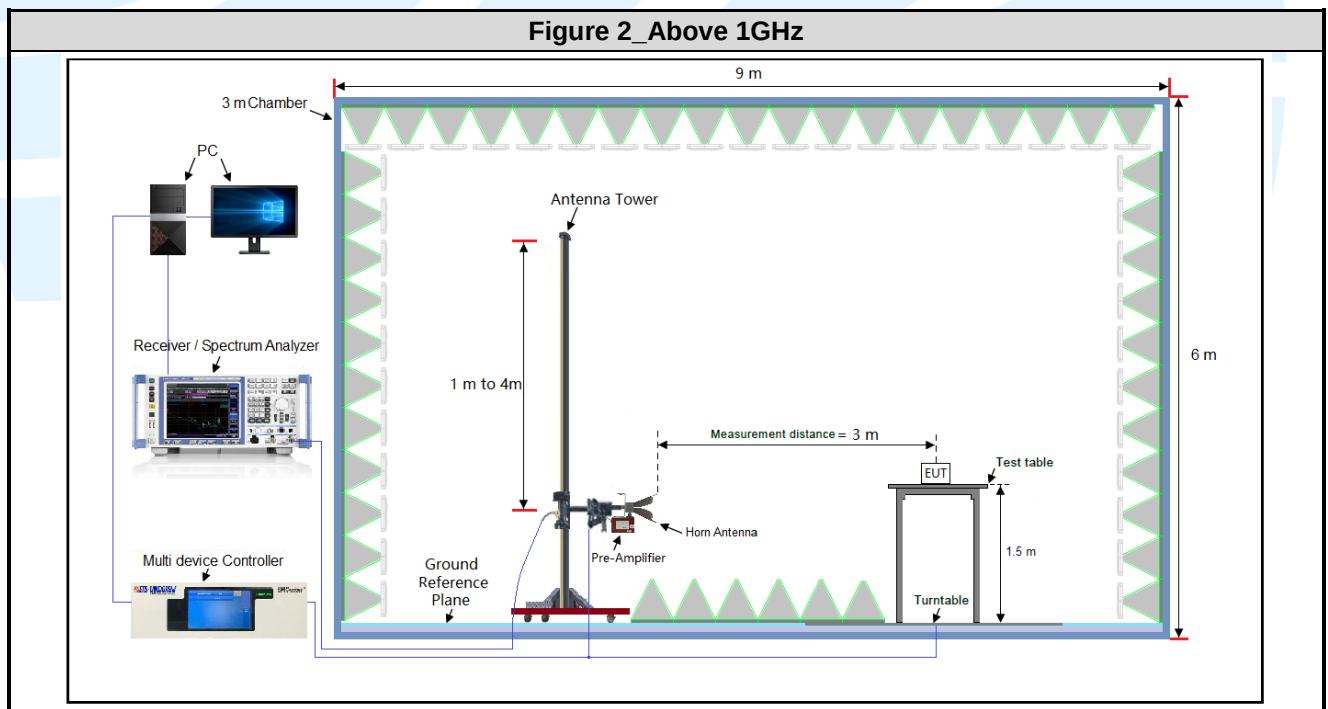
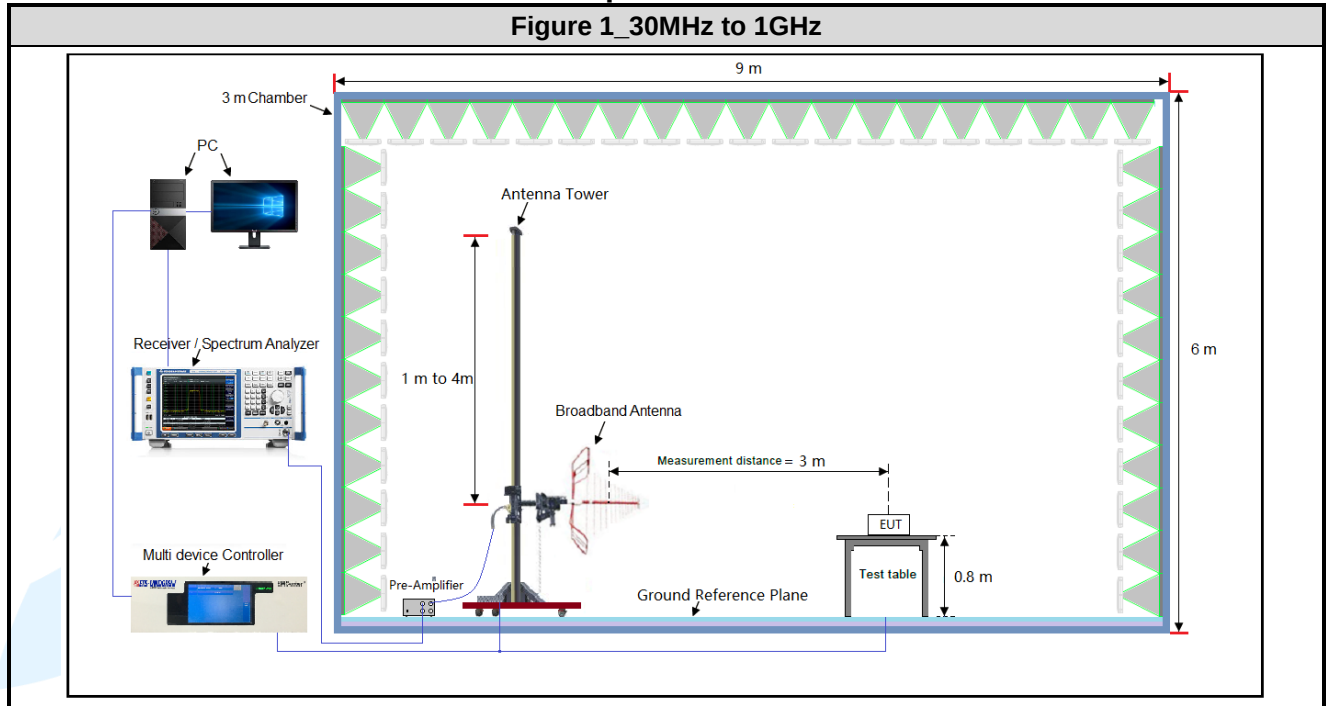
Test RF Channel Lists		
Lowest	Middle	Highest
1626.6 MHz	1643.5 MHz	1660.4 MHz

4.3 EUT TEST STATUS

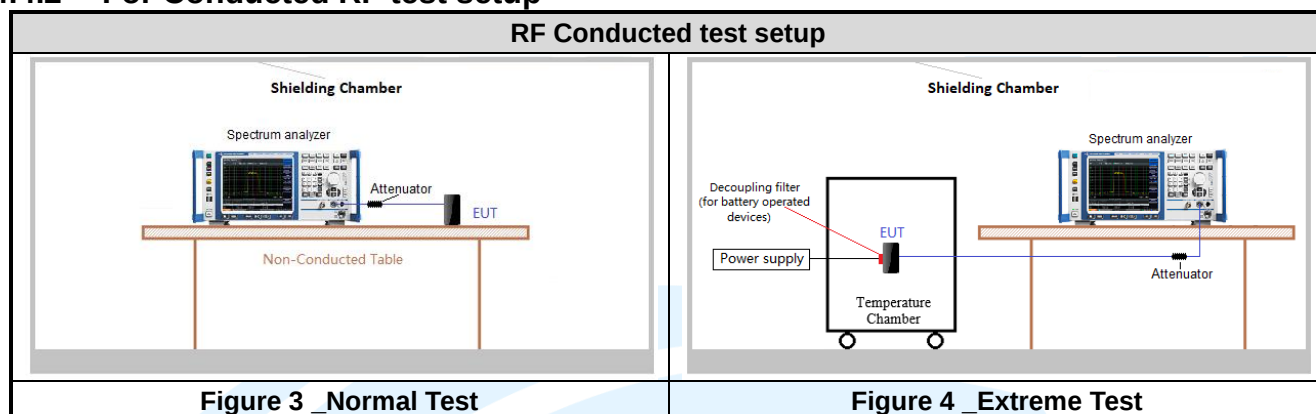
Description
1. Keep the EUT in continuously transmitting with modulation test single.
2. Keep the EUT in continuously transmitting with Un-modulation test single.

4.4 TEST SETUP

4.4.1 For Radiated Emissions test setup



4.4.2 For Conducted RF test setup



4.5 SYSTEM TEST CONFIGURATION

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, radiated emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario. It was powered by a 11.1Vdc battery. Only the worst case data were recorded in this test report.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. Therefore, all final radiated testing was performed with the EUT in (see table below) orientation.

Frequency	Mode	Antenna Port	Worst-case axis positioning
Above 1GHz	1TX	Chain 0	Y axis

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION

5.1 REFERENCE DOCUMENTS FOR TESTING

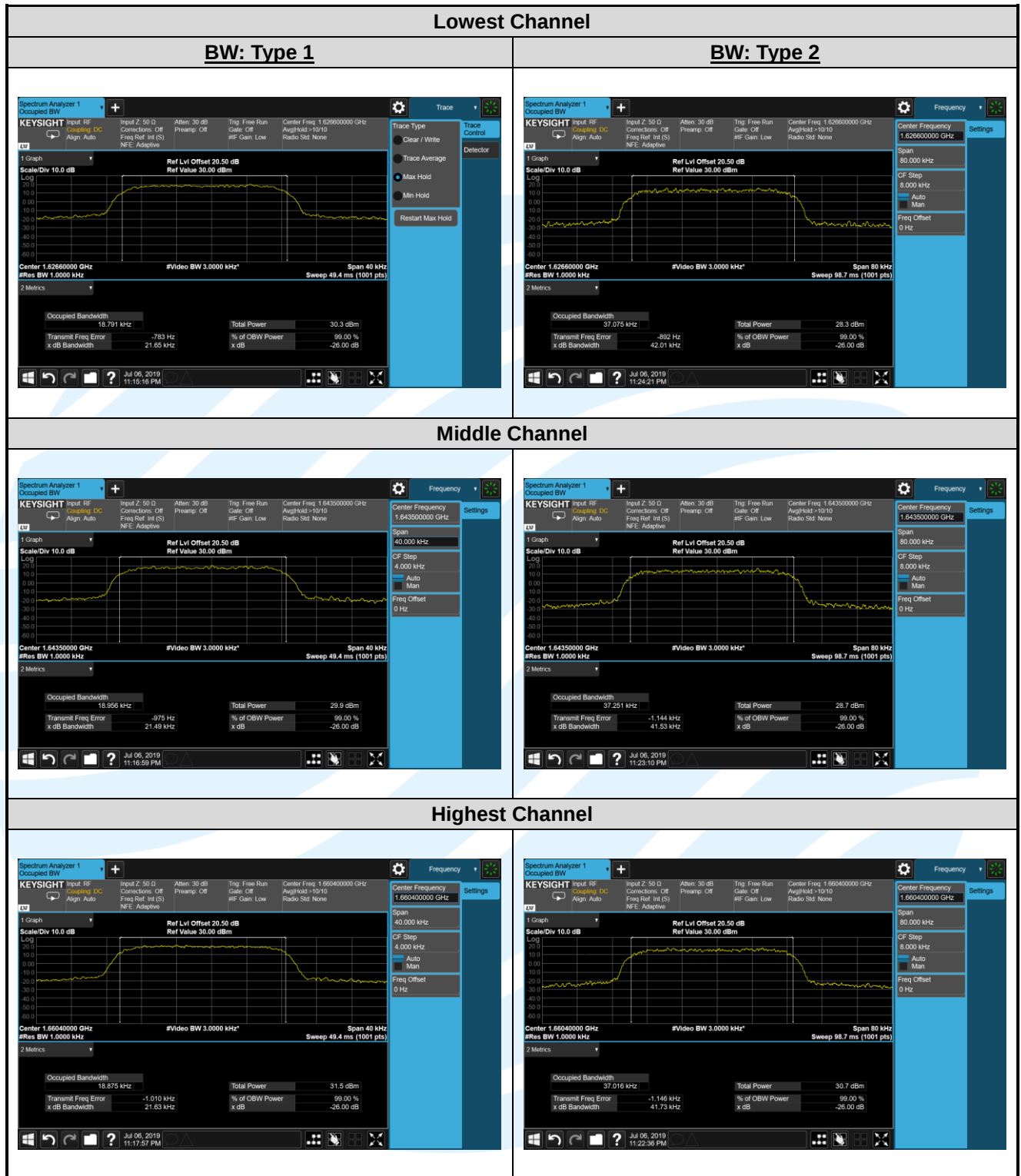
No.	Identity	Document Title
1	FCC 47 CFR Part 2	Frequency allocations and radio treaty matters; general rules and regulations
2	FCC 47 CFR Part 25	Satellite Communications
3	ANSI C63.26-2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

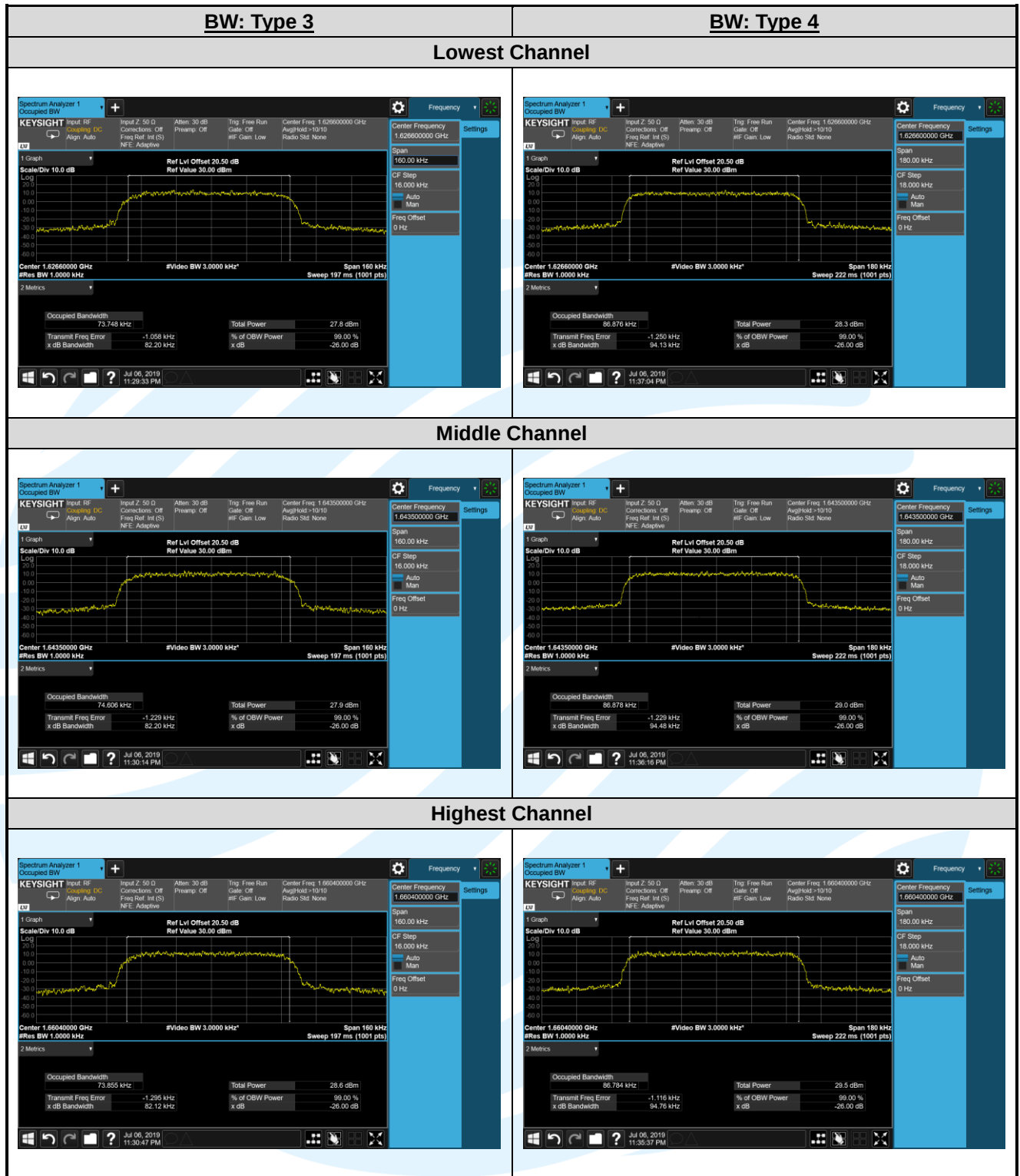
5.2 OCCUPIED BANDWIDTH

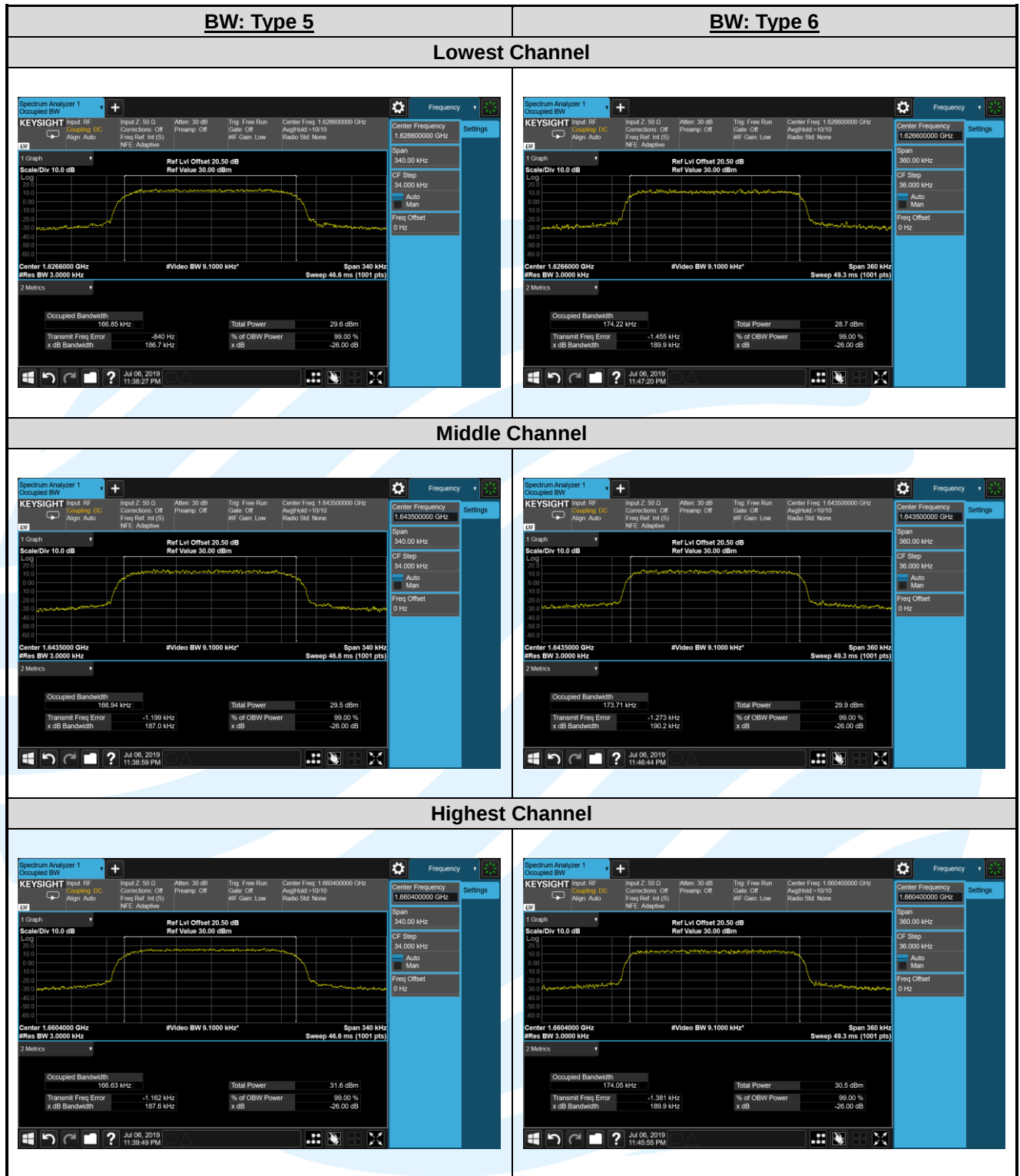
Test Requirement: FCC 47 CFR Part 2.1049
Test Method: FCC 47 CFR Part 2.1049
Limit: None specified.
Test Setup: Refer to section 4.4.2 for details.
Instruments Used: Refer to section 3 for details
Test Results:

BW	Channel	Frequency	Occupied Bandwidth (kHz)
Type 1	Lowest	1626.6 MHz	18.791
	Middle	1643.5 MHz	18.956
	Highest	1660.4 MHz	18.875
Type 2	Lowest	1626.6 MHz	37.075
	Middle	1643.5 MHz	37.251
	Highest	1660.4 MHz	37.016
Type 3	Lowest	1626.6 MHz	73.748
	Middle	1643.5 MHz	74.606
	Highest	1660.4 MHz	73.855
Type 4	Lowest	1626.6 MHz	86.876
	Middle	1643.5 MHz	86.878
	Highest	1660.4 MHz	86.784
Type 5	Lowest	1626.6 MHz	166.85
	Middle	1643.5 MHz	166.94
	Highest	1660.4 MHz	166.63
Type 6	Lowest	1626.6 MHz	174.22
	Middle	1643.5 MHz	173.71
	Highest	1660.4 MHz	174.05

The test plots as follows:







5.3 FREQUENCY TOLERANCE

Test Requirement: FCC 47 CFR Part 25.202(d)

Test Method: FCC 47 CFR Part 2.1055

Limit: The carrier frequency of each earth station transmitter authorized in these services shall be maintained within 0.001 percent (10 ppm) of the reference frequency.

Test Setup: Refer to section 4.4.2 for details.

Instruments Used: Refer to section 3 for details

Test Results:

Frequency	Voltage	Temperature	Measured value	Deviation		Limit	Results
(MHz)	(Vdc)	(°C)	(MHz)	(%)	(ppm)	(%)	
1643.5	VL	TN	1643.498778	-0.000074	-0.74	0.001	Pass
	VN		1643.498772	-0.000075	-0.75	0.001	Pass
	VH		1643.498764	-0.000075	-0.75	0.001	Pass
	VN	50	1643.498771	-0.000075	-0.75	0.001	Pass
		40	1643.498767	-0.000075	-0.75	0.001	Pass
		30	1643.498762	-0.000075	-0.75	0.001	Pass
		20	1643.498761	-0.000075	-0.75	0.001	Pass
		10	1643.498767	-0.000075	-0.75	0.001	Pass
		0	1643.498762	-0.000075	-0.75	0.001	Pass
		-10	1643.498765	-0.000075	-0.75	0.001	Pass
		-20	1643.498766	-0.000075	-0.75	0.001	Pass

5.4 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Requirement: FCC 47 CFR Part 25.202(f)

Test Method: KDB 971168 D01v03r01, clause 6

The authorized emissions bandwidth used for measurements below was declared by the manufacturer as 30 kHz/ 50 kHz/ 90 kHz/ 100 kHz/ 190 kHz/ 200 kHz.

Measurements have been made in a bandwidth greater than 4 kHz which was considered worst case.

Limit: (1) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: 25 dB;

(2) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: 35 dB;

(3) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 250 percent of the authorized bandwidth: An amount equal to 43 dB plus 10 times the logarithm (to the base 10) of the transmitter power in watts;

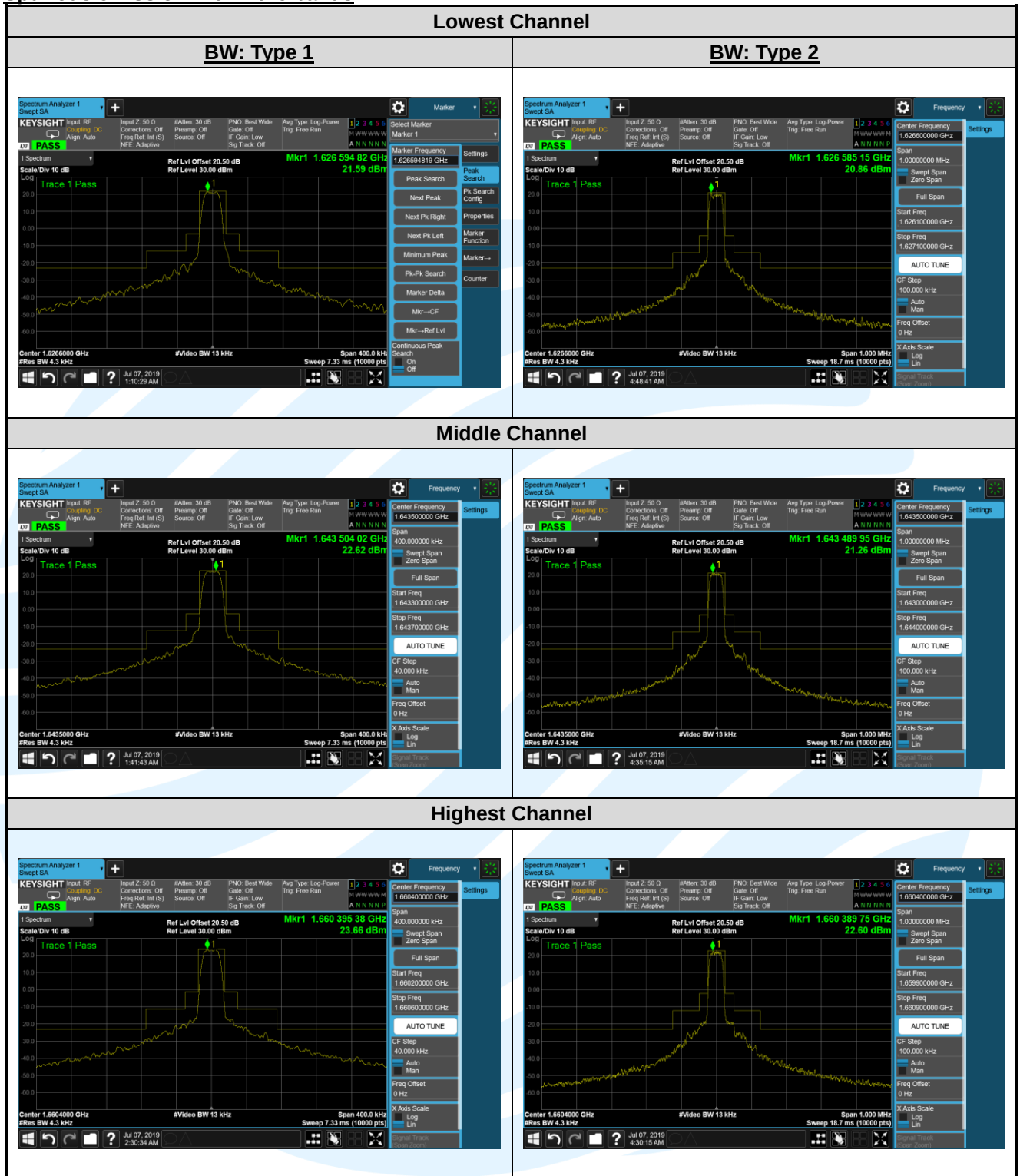
(4) In any event, when an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in paragraphs (f) (1), (2) and (3) of this section.

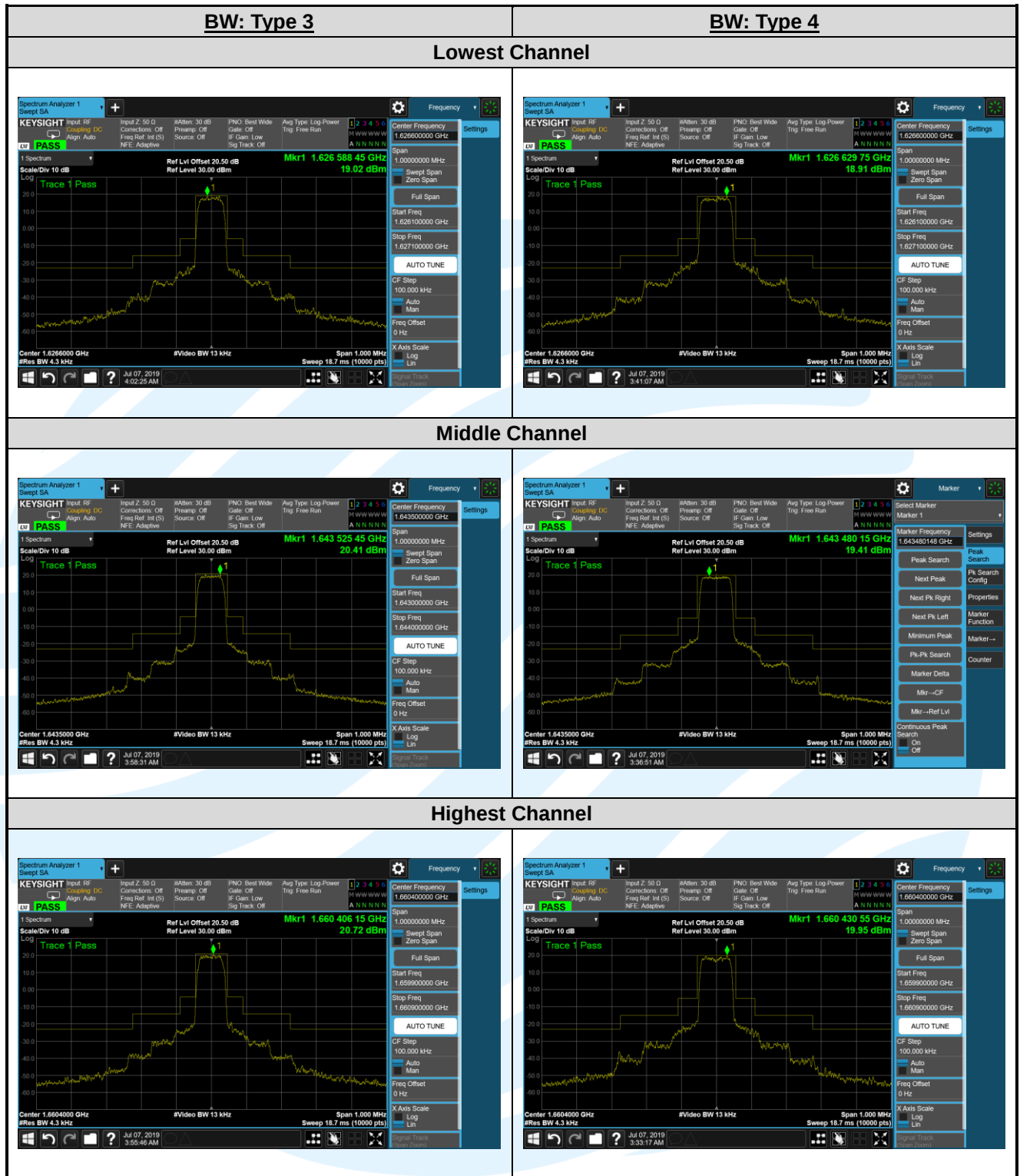
Test Setup: Refer to section 4.4.2 for details.

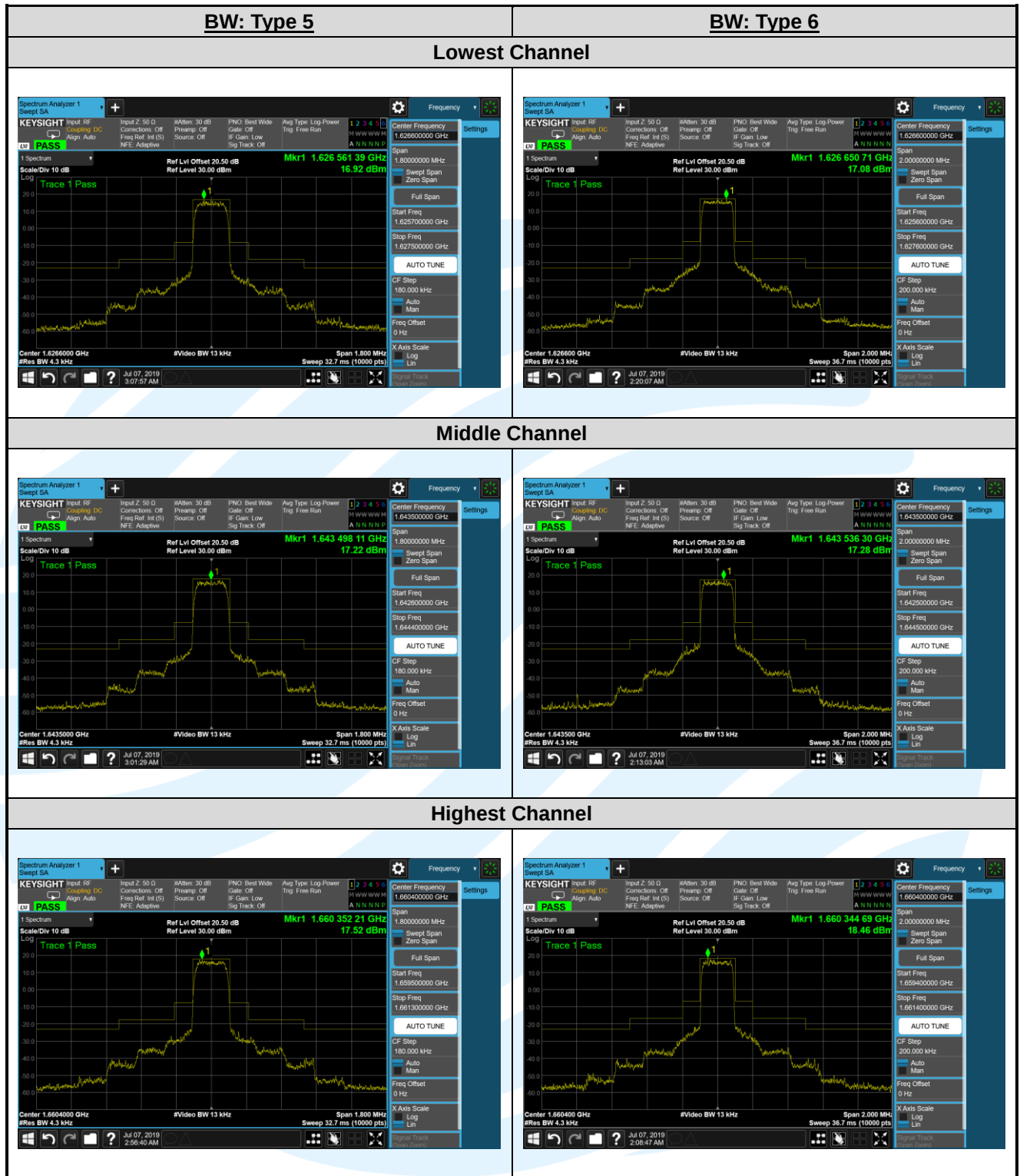
Instruments Used: Refer to section 3 for details

Test Results:

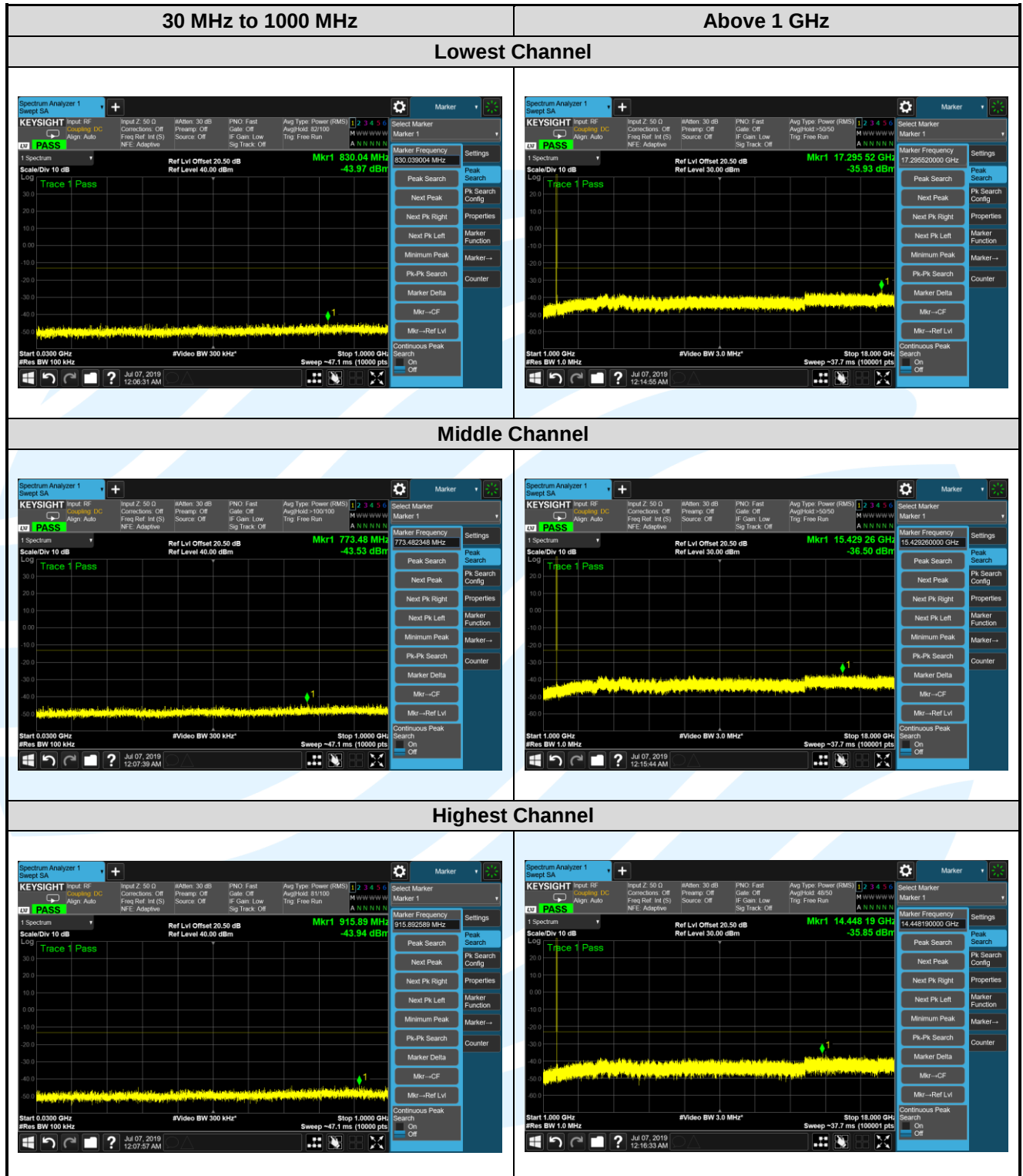
Spurious emission within the bands



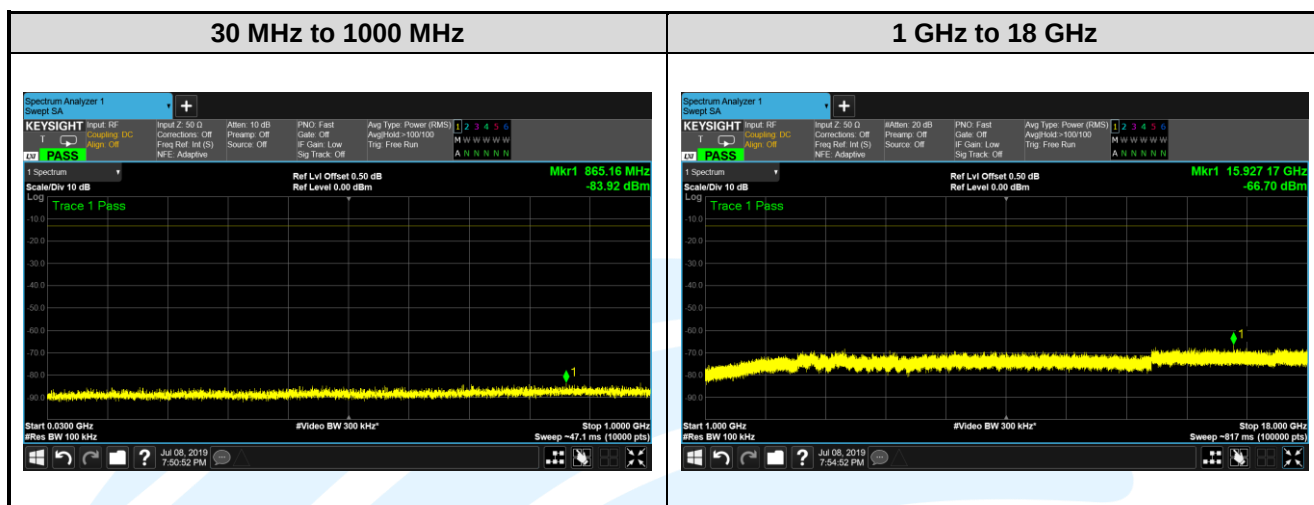




Spurious emissions outside the bands: Carrier ON
Worst results: Type 1



Spurious emissions outside the bands: Carrier OFF



5.5 RADIATED SPURIOUS EMISSIONS

Test Requirement: FCC 47 CFR Part 25.202(f)

Test Method: ANSI C63.26-2015, clause 5.5

Limit:

(1) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: 25 dB;

(2) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: 35 dB;

(3) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 250 percent of the authorized bandwidth: An amount equal to 43 dB plus 10 times the logarithm (to the base 10) of the transmitter power in watts;

(4) In any event, when an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in paragraphs (f) (1), (2) and (3) of this section.

Test Setup: Refer to section 4.4.1 for details.

Instruments Used: Refer to section 3 for details

Test Results: Pass

Carrier ON, worst results: Type 1

Lowest Channel

No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Antenna Polaxis
1	3253.20	-56.04	31.74	-24.30	-13.00	-11.30	Horizontal
2	4879.80	-71.49	35.77	-35.72	-13.00	-22.72	Horizontal
3	3253.20	-52.92	33.09	-19.83	-13.00	-6.83	Vertical
4	4879.80	-69.60	36.77	-32.83	-13.00	-19.83	Vertical

Middle Channel

No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Antenna Polaxis
1	3287.00	-62.50	41.86	-20.64	-13.00	-7.64	Horizontal
2	4930.50	-80.86	45.81	-35.05	-13.00	-22.05	Horizontal
3	3287.00	-65.55	43.18	-22.37	-13.00	-9.37	Vertical
4	4930.50	-80.72	46.81	-33.91	-13.00	-20.91	Vertical

Highest Channel

No.	Frequency (MHz)	Reading (dBm)	Correction factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Antenna Polaxis
1	3320.80	-53.28	31.98	-21.30	-13.00	-8.30	Horizontal
2	4981.20	-69.75	69.75		-13.00	13.00	Horizontal
3	3320.80	-53.42	33.29	-20.13	-13.00	-7.13	Vertical
4	4981.20	-69.60	36.84	-32.76	-13.00	-19.76	Vertical

5.6 EQUIVALENT ISOTROPIC RADIATED POWER

Test Requirement: FCC 47 CFR Part 25.204

Test Method: KDB 971168 D01v03r01, clause 5.2

Limit:
 + 40 dBW in any 4 kHz band for $\theta \leq 0^\circ$
 + 40 + 3 θ dBW in any 4 kHz band for $0^\circ < \theta \leq 5^\circ$

where θ is the angle of elevation of the horizon viewed from the center of radiation of the antenna of the earth station and measured in degrees as positive above the horizontal plane and negative below it.

Test Setup: Refer to section 4.4.2 for details.

Instruments Used: Refer to section 3 for details

Test Results: Pass

BW	Channel	EIRP		Limit (dBW)
		(dBm)	(dBW)	
Type 1	Lowest	21.59	-8.41	40
	Middle	22.62	-7.38	40
	Highest	23.66	-6.34	40
Type 2	Lowest	20.86	-9.14	40
	Middle	21.26	-8.74	40
	Highest	22.60	-7.4	40
Type 3	Lowest	19.02	-10.98	40
	Middle	20.41	-9.59	40
	Highest	20.72	-9.28	40
Type 4	Lowest	18.91	-11.09	40
	Middle	19.41	-10.59	40
	Highest	19.95	-10.05	40
Type 5	Lowest	16.92	-13.08	40
	Middle	17.22	-12.78	40
	Highest	17.52	-12.48	40
Type 6	Lowest	17.08	-12.92	40
	Middle	17.28	-12.72	40
	Highest	18.46	-11.54	40

5.7 LIMITS ON EMISSIONS FROM MOBILE EARTH STATIONS FOR PROTECTION OF AERONAUTICAL RADIO NAVIGATION-SATELLITE SERVICE

Test Requirement: FCC 47 CFR Part 25.216

Test Method: ANSI C63.26-2015, clause 5.7

Limits:

25.216 (c) The e.i.r.p. density of emissions from mobile earth stations placed in service after July 21, 2002 with assigned uplink frequencies between 1610 MHz and 1660.5 MHz shall not exceed -70 dBW/MHz, averaged over any 2 millisecond active transmission interval, in the band 1559-1605 MHz. The e.i.r.p. of discrete emissions of less than 700 Hz bandwidth from such stations shall not exceed -80 dBW, averaged over any 2 millisecond active transmission interval, in the 1559-1605 MHz band.

25.216 (i) The e.i.r.p density of carrier-off state emissions from mobile earth stations manufactured more than six months after Federal Register publication of the rule changes adopted in FCC 03-283 with assigned uplink frequencies between 1 and 3 GHz shall not exceed -80 dBW/MHz in the 1559-1610 MHz band averaged over any two millisecond interval.

Test Setup: Refer to section 4.4.2 for details.

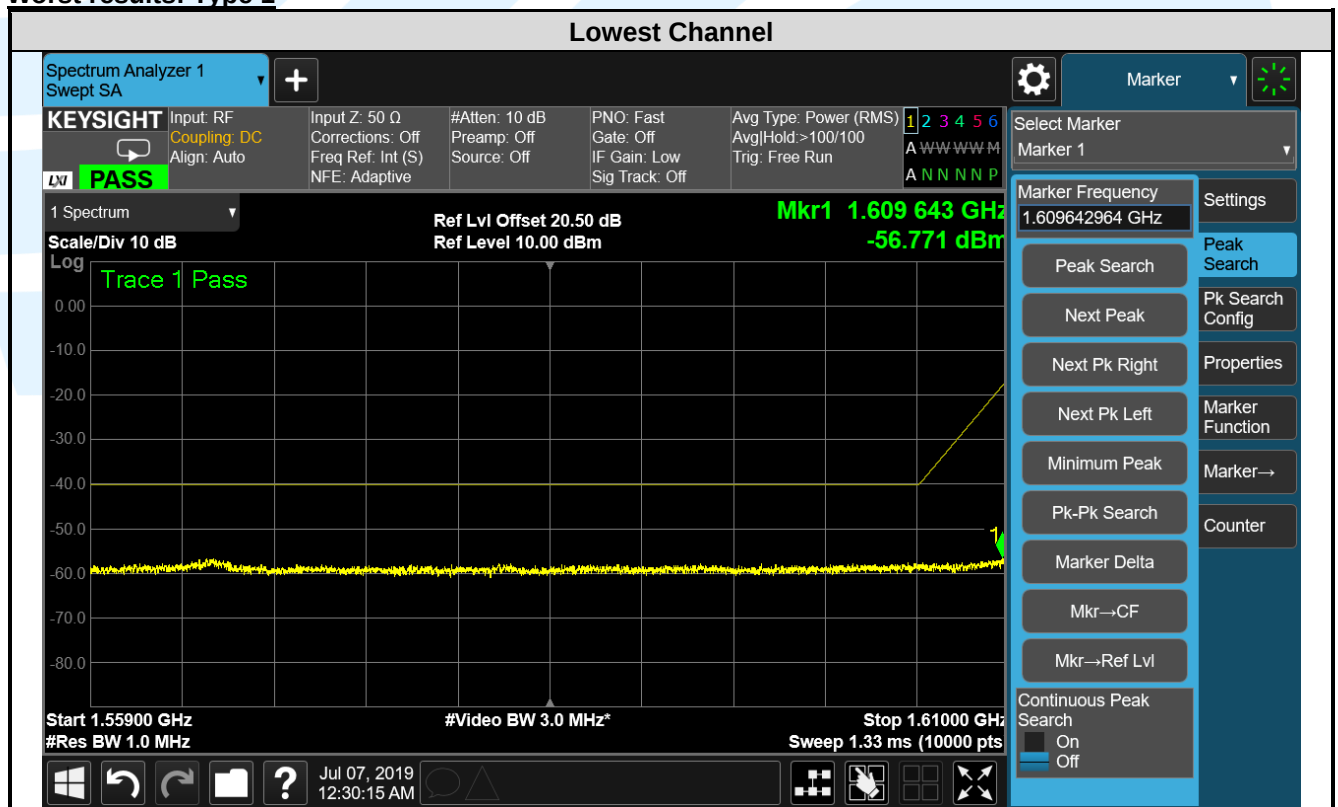
Equipment Used: Refer to section 3 for details.

Test Results: Pass

Broadband Emission Results

Carrier ON

Worst results: Type 1



No.	Frequency	Level		Limit
	(MHz)	(dBm)	(dBW)	(dBW)
1	1609.643	-56.771	-86.771	-70

Shenzhen UnionTrust Quality and Technology Co., Ltd.

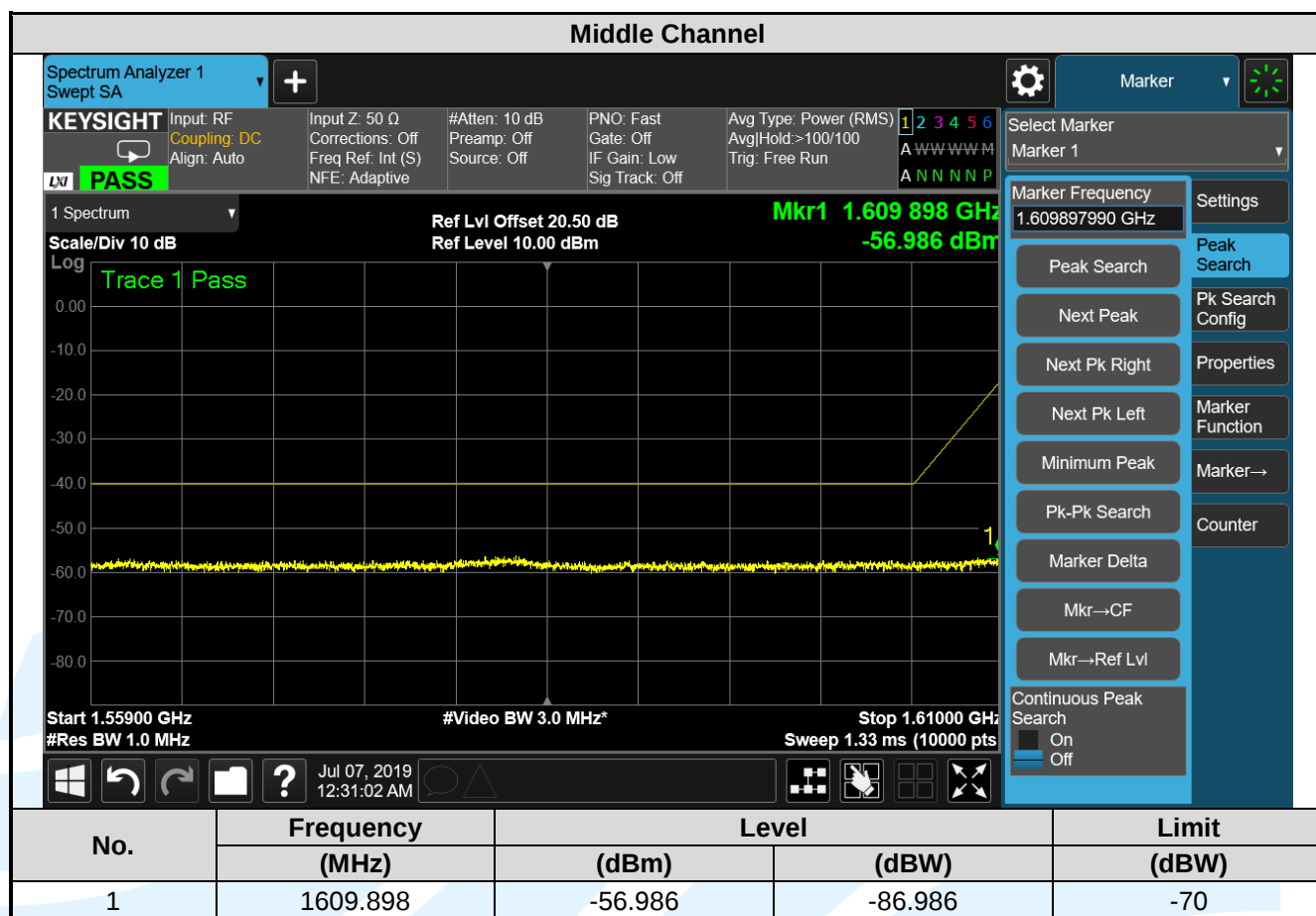
Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China

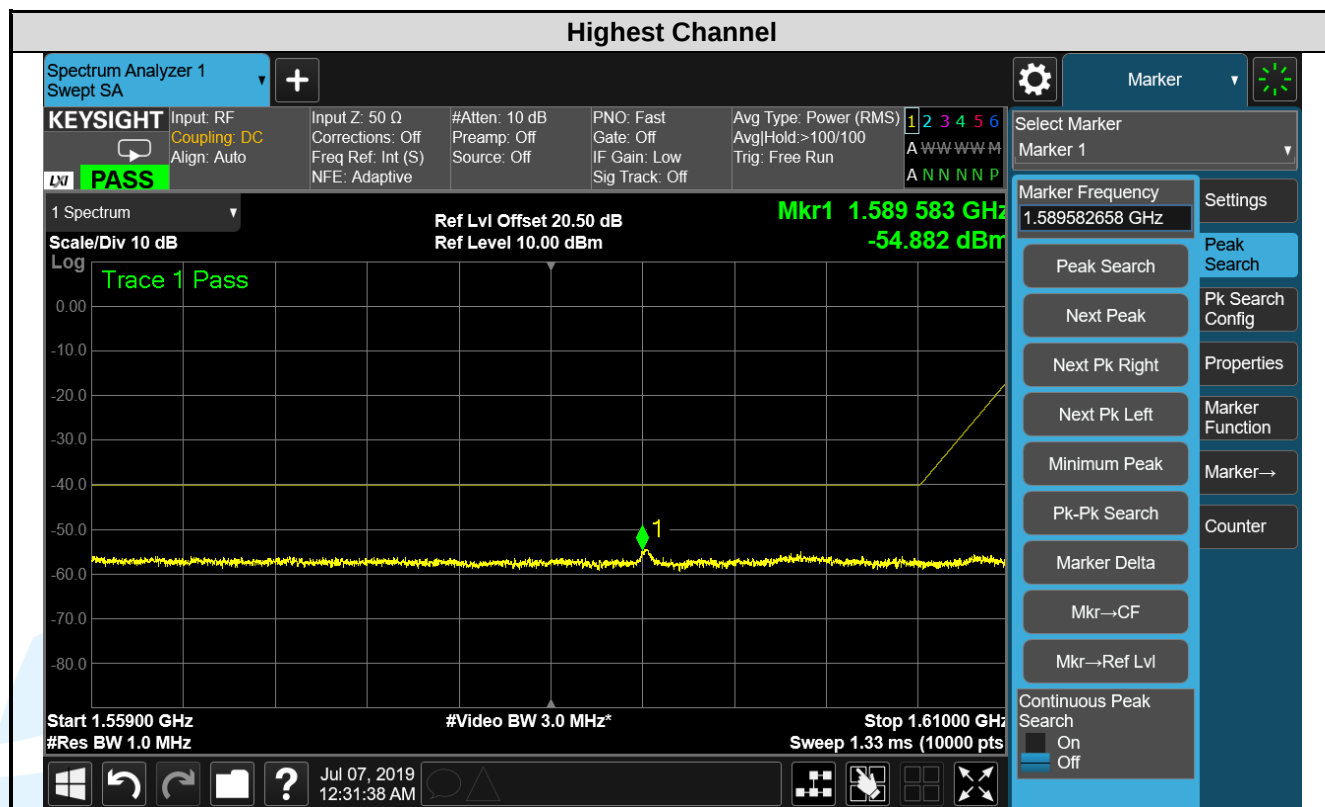
Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

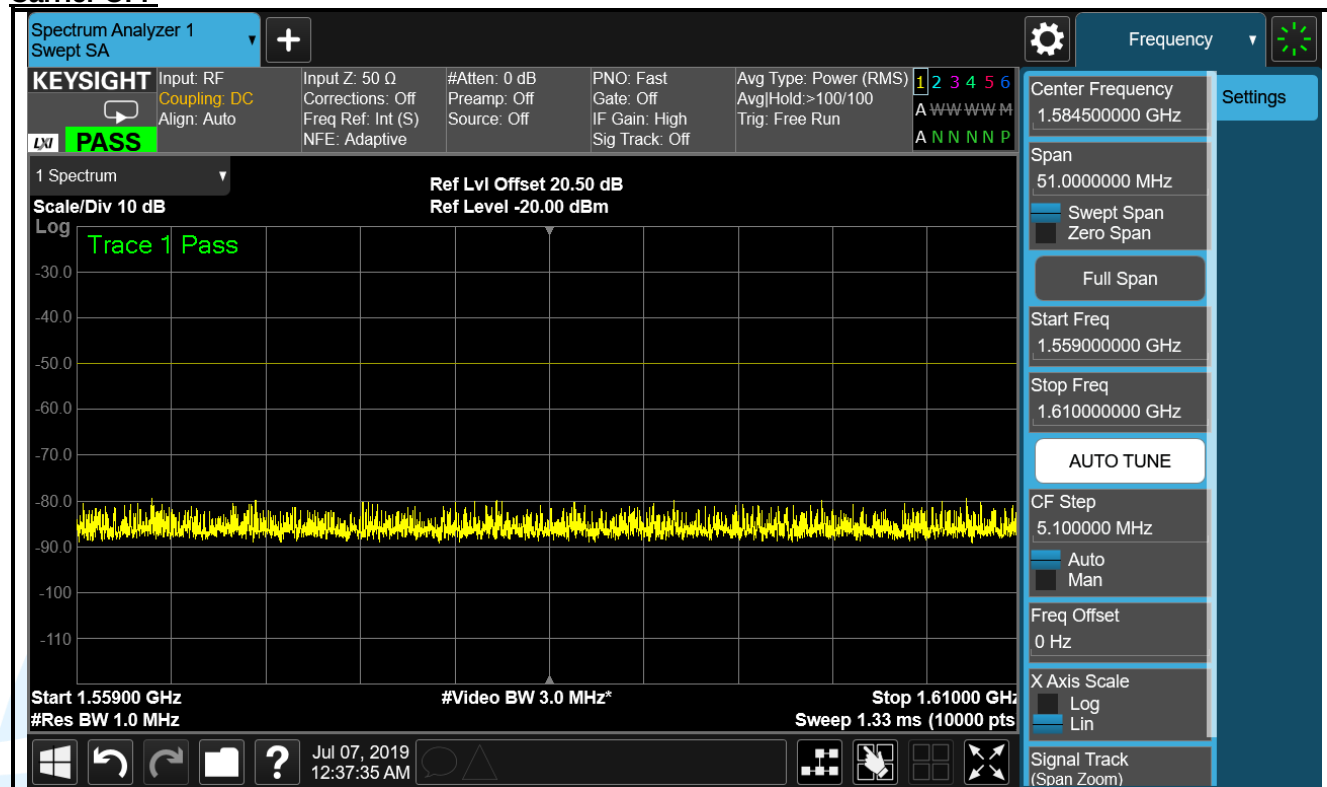
[Http://www.uttlab.com](http://www.uttlab.com)





No.	Frequency	Level		Limit
	(MHz)	(dBm)	(dBW)	(dBW)
1	1589.583	-54.882	-84.882	-70

Carrier OFF



No.	Frequency	Level		Limit
	(MHz)	(dBm)	(dBW)	(dBW)
1	*	*	*	-80

*No emissions were detected within 10 dB of the limit.

Discrete Emission Results

Carrier ON

Lowest Channel				
No.	Frequency	Level		Results
	(MHz)	(dBm)	(dBW)	
1	*	*	*	Pass

Middle Channel				
No.	Frequency	Level		Results
	(MHz)	(dBm)	(dBW)	
1	*	*	*	Pass

Highest Channel				
No.	Frequency	Level		Results
	(MHz)	(dBm)	(dBW)	
1	*	*	*	Pass

*No emissions were detected within 10 dB of the limit.

Carrier OFF

No.	Frequency	Level		Results
	(MHz)	(dBm)	(dBW)	
1	*	*	*	Pass

*No emissions were detected within 10 dB of the limit.

APPENDIX 1 PHOTOS OF TEST SETUP

See test photos attached in Appendix 1 for the actual connections between Product and support equipment.

APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photos.

*** End of Report ***

The test report is effective only with both signature and specialized stamp. The result(s) shown in this report refer only to the sample(s) tested. Without written approval of UnionTrust, this report can't be reproduced except in full.
