



TESTING LABORATORY
CERTIFICATE # 4821.01



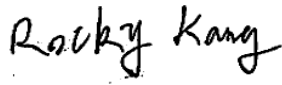
FCC PART 15.407 TEST REPORT

For

GDU-Tech Co., Ltd

11th floor, Tower 1, Novel Park, 4078 Dong Bin Road, Nanshan District, Shenzhen, China

FCC ID: 2AKIE-PD-SAGA-0302

Report Type: Original Report	Product Type: GDU SAGA
Report Number: RSZ181016810-00C	
Report Date: 2018-12-05	
Reviewed By: RF Engineer	Rocky Kang 
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *GDU-Tech Co., Ltd's* product, model number: *MGP01-SAGA* (FCC ID: *2AKIE-PD-SAGA-0302*) or the "EUT" in this report was a *GDU SAGA*, which was measured approximately: 720 mm (L) × 545 mm (W) × 108 mm (H), rated with input voltage: DC 14.8 V from battery or DC 17.4 V from adapter.

Adapter Information:

Model: CPD-BC01

Input: AC 100-240V, 50/60Hz, 1.5A

Output: DC 17.4V, 4A or DC 17.4V, 1A

**All measurement and test data in this report was gathered from production sample serial number: 181016810. (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2018-10-16.*

Objective

This type approval report is prepared on behalf of *GDU-Tech Co., Ltd* in accordance with Part 2-Subpart J, Part 15-Subparts A and E of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart E, section 15.203, 15.205, 15.209 and 15.407 rules.

Related Submittal(s)/Grant(s)

Submissions with the remote control unit of a system with FCC ID: 2AKIE-PD-RC01-0302 and FCC Part 15.247 DTS submissions with FCC ID: 2AKIE-PD-SAGA-0302.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Parameter		uncertainty
Occupied Channel Bandwidth		±5%
RF Output Power with Power meter		±0.5dB
RF conducted test with spectrum		±1.5dB
AC Power Lines Conducted Emissions		±1.95dB
Emissions, Radiated	Below 1GHz	±4.75dB
	Above 1GHz	±4.88dB
Temperature		-30~60 °C
Humidity		±6%
Supply voltages		±0.4%

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 342867, the FCC Designation No.: CN1221.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062B.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in an engineering mode, which was provided by manufacturer.

For 5740-5830MHz Band, 10 channels are provided to testing:

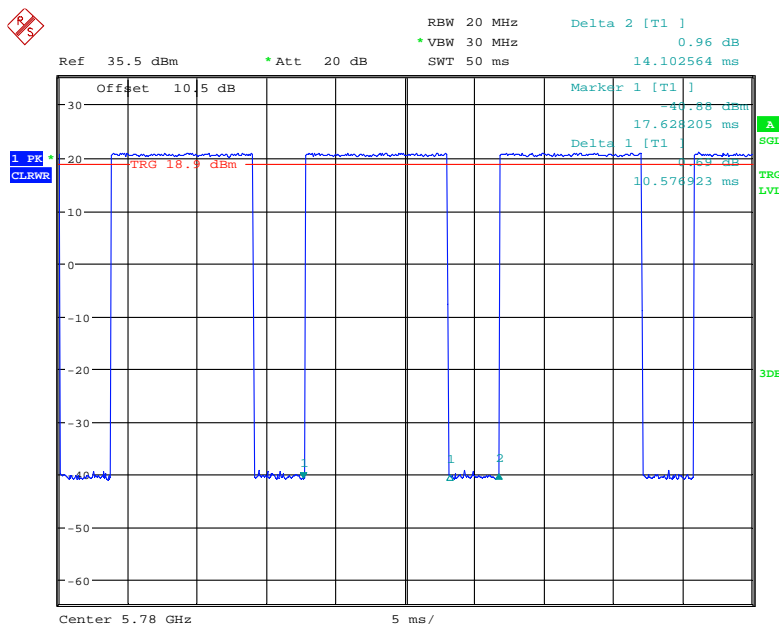
Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	5740	6	5790
2	5750	7	5800
3	5760	8	5810
4	5770	9	5820
5	5780	10	5830

Channel 1,5,10 was chosen for testing.

EUT Exercise Software

“ADB” command was used, power level is 21dBm.

Duty cycle



Date: 19.NOV.2018 22:34:38

Duty Cycle (%)	T(ms)	1/T(kHz)	VBW Setting	Duty Cycle factor (dB)
75	10.58	0.09	100Hz	1.25

Duty Cycle factor=10*log(1/ Duty Cycle)

Equipment Modifications

No modification was made to the EUT tested.

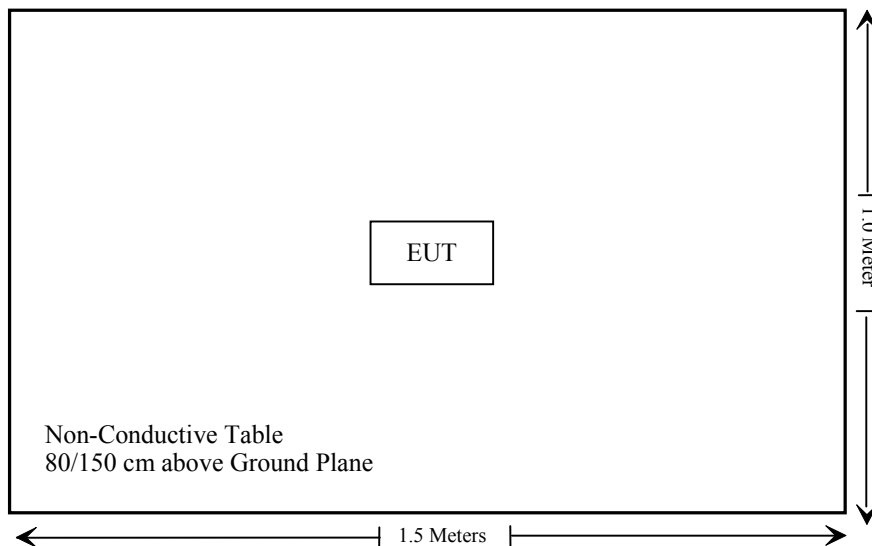
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
/	/	/	/

External I/O Cable

Cable Description	Length (m)	From Port	To
/	/	/	/

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1307 (b) (1) & §2.1091	Maximum Permissible exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.407(b)(6)& §15.207(a)	Conducted Emissions	Not Applicable
§15.205& §15.209 &§15.407(b) (4),(6),(7)	Undesirable Emission& Restricted Bands	Compliance
§15.407(b) (4)	Out Of Band Emission	Compliance
§15.407 (e)	6dB Bandwidth	Compliance
§15.407(a) (3)	Conducted Transmitter Output Power	Compliance
§15.407 (a) (3)	Power Spectral Density	Compliance

Not Applicable: The battery need be pulled out from EUT while it's been charging.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
A.H. System	Horn Antenna	SAS-200/571	135	2018-09-01	2021-08-31
Rohde & Schwarz	Signal Analyzer	FSEM	845987/005	2018-06-23	2019-06-23
Agilent	Spectrum Analyzer	8564E	3943A01781	2018-01-04	2019-01-04
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2017-12-22	2020-12-21
COM-POWER	Pre-amplifier	PA-122	181919	2018-05-22	2018-11-22
Sonoma instrument	Amplifier	310N	186238	2017-11-12	2018-11-12
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2018-01-11	2019-01-11
Ducommun technologies	RF Cable	UFA147A-2362-100100	MFR64639 231029-003	2018-08-01	2019-02-01
Ducommun technologies	RF Cable	104PEA	218124002	2018-05-21	2018-11-21
Ducommun technologies	RF Cable	RG-214	1	2018-05-21	2018-11-19
Ducommun technologies	RF Cable	RG-214	2	2018-05-22	2018-11-22
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-04	2017-12-29	2020-12-28
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-03	2017-12-29	2020-12-28
Heatsink Required	Amplifier	QLW-18405536-J0	15964001002	2018-08-01	2019-02-01
RF Conducted Test					
Rohde & Schwarz	Spectrum Analyzer	FSU26	200120	2017-12-24	2018-12-24
Agilent	USB wideband power meter	U2021XA	MY54250003	2018-06-23	2019-06-23
Ducommun technologies	RF Cable	RG-214	3	Each Time	
WEINSCHL	10dB Attenuator	5324	AU 3842	Each Time	

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

§1.1307 (b) (1) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 1.1307 (b)(1), 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for General Population/Uncontrolled Exposure

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (Minutes)
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

Result

Calculated Formulary:

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S = power density (in appropriate units, e.g. mW/cm²)

P = power input to the antenna (in appropriate units, e.g., mW).

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

Frequency (MHz)	Antenna Gain		Max Tune-Up Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
	(dBi)	(numeric)	(dBm)	(mW)			
5740-5830	2.0	1.58	27.0	501.19	20	0.16	1.0

Note: 2.4GHz or 5GHz Radio can't transmit simultaneously for this device.

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

Result: Compliance

FCC §15.203 – ANTENNA REQUIREMENT

Applicable Standard

According to § 15.203, 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 shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.407 (a), if the transmitting antennas of directional gain greater than 6dBi are used, the transmit power and power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT have two internal antennas arrangement, which ware permanently attached and the antenna gain is 2.0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliance.

§15.205 & §15.209 & §15.407(B) (4),(6),(7) – UNDESIRABLE EMISSION

Applicable Standard

FCC §15.407 (b) (4), (6), (7); §15.209; §15.205;

(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

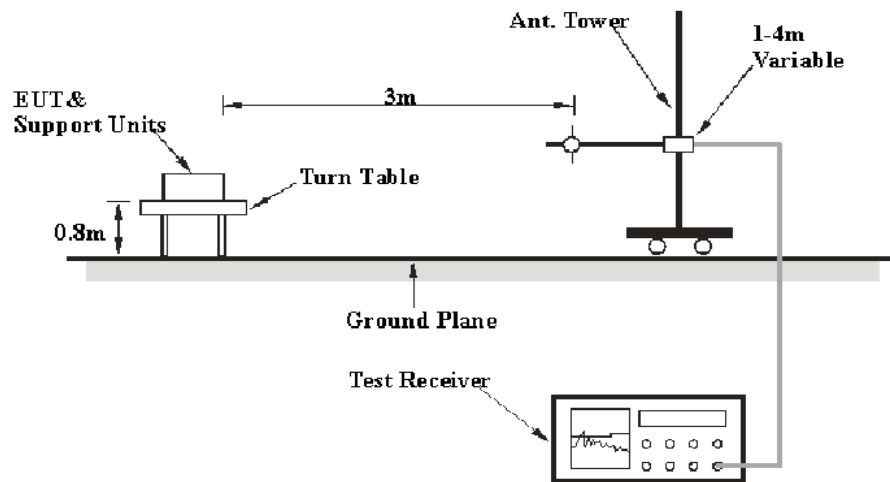
For transmitters operating in the 5.725-5.85 GHz band:

- (i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz 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 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 at the band edge.

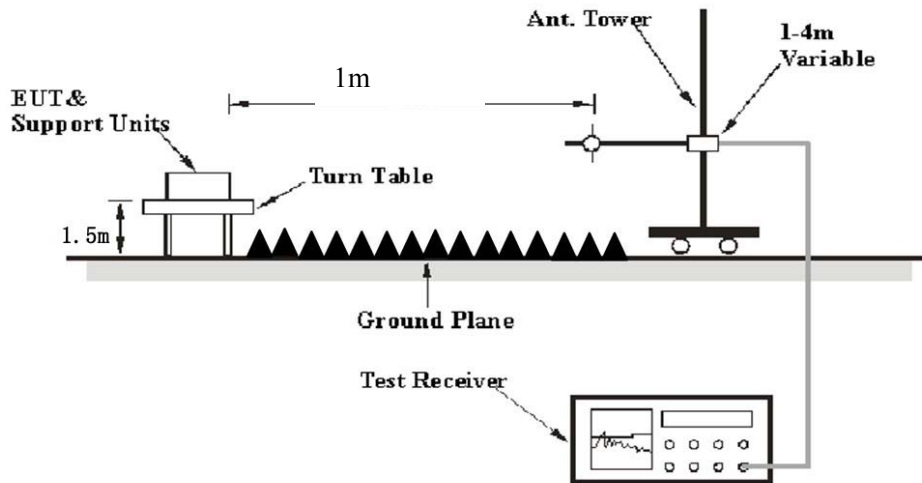
Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209.

EUT Setup

Below 1 GHz:



Above 1 GHz:



The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC 15.209 and FCC 15.407 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 40 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Measurements
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1 MHz	3 MHz	/	PK
	1MHz	10 Hz ^{Note 1}	/	Average
	1MHz	> 1/T ^{Note 2}	/	Average

Note 1: when duty cycle is no less than 98%

Note 2: when duty cycle is less than 98%

Test Procedure

Radiated Spurious Emission

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all the installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1GHz, peak and Average detection modes for frequencies above 1GHz.

According to ANSI C63.10-2013,9.4: For field strength measurements made at other than the distance at which the applicable limit is specified, extrapolate the measured field strength to the field strength at the distance specified by the limit using an inverse distance correction factor (20 dB/decade of distance). In some cases, a different distance correction factor may be required;

$$E_{\text{SpecLimit}} = E_{\text{Meas}} + 20 \log \left(\frac{d_{\text{Meas}}}{d_{\text{SpecLimit}}} \right)$$

where

$E_{\text{SpecLimit}}$ is the field strength of the emission at the distance specified by the limit, in dB μ V/m

E_{Meas} is the field strength of the emission at the measurement distance, in dB μ V/m

d_{Meas} is the measurement distance, in m

$d_{\text{SpecLimit}}$ is the distance specified by the limit, in m

So the extrapolation factor of 1m is $20 \cdot \log(1/3) = -9.5$ dB

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Results Summary

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level is in compliance with the limit if

$$L_m + U_{(L_m)} \leq L_{\text{lim}} + U_{\text{cispr}}$$

In BAEL, $U_{(L_m)}$ is less than U_{cispr} , if L_m is less than L_{lim} , it implies that the EUT complies with the limit.

Test Data

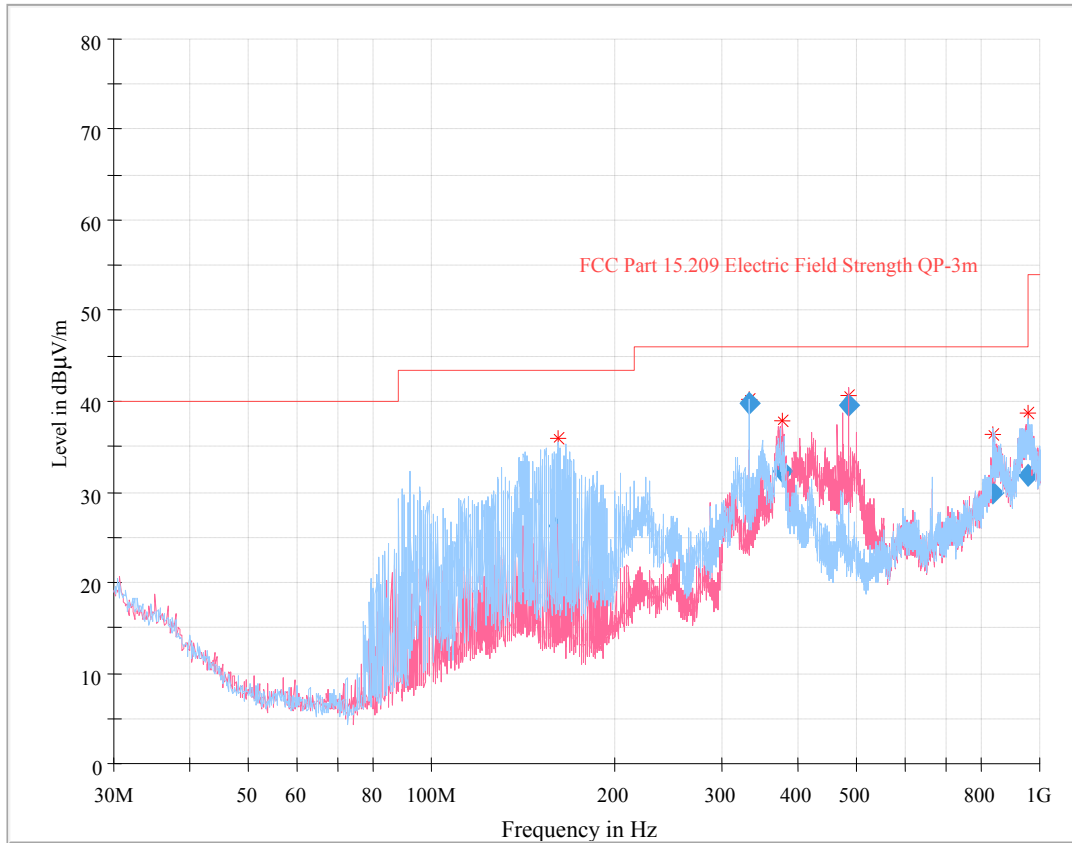
Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Shawn Xiao on 2018-10-24.

EUT operation mode: Transmitting with two antennas simultaneously

30 MHz – 1 GHz: (High channel-worst case)



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna height (cm)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
161.869125	26.17	153.0	H	167.0	-14.5	43.50	17.33
331.997000	39.72	108.0	H	217.0	-10.8	46.00	6.28
376.766000	32.27	159.0	V	257.0	-10.6	46.00	13.73
484.809750	39.52	106.0	V	295.0	-7.5	46.00	6.48
837.701625	29.91	224.0	H	196.0	5.7	46.00	16.09
959.136500	31.79	400.0	H	98.0	9.3	46.00	14.21

1GHz ~ 40 GHz:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dB μ V/m) @1m	FCC Part 15.407/205/209	
	Reading (dB μ V) @1m	PK/QP/Ave.		Height (m)	Polar (H / V)			Limit (dB μ V/m) @1m	Margin (dB)
Low Channel									
5740.00	77.92	PK	123	2.4	H	42.78	120.70	/	/
5740.00	65.11	Ave.	123	2.4	H	42.78	107.89	/	/
5740.00	76.68	PK	265	1.4	V	42.78	119.46	/	/
5740.00	64.20	Ave.	265	1.4	V	42.78	106.98	/	/
5725.00	37.31	PK	284	1.3	H	42.78	80.09	131.7	51.61
5720.00	32.20	PK	284	1.3	H	42.78	74.98	120.3	45.32
5700.00	27.46	PK	34	1.9	H	42.78	70.24	114.7	44.46
11480.00	41.29	PK	291	1.0	H	24.17	65.46	83.5	18.04
11480.00	26.60	Ave.	291	1.0	H	24.17	50.77	63.5	12.73
Middle Channel									
5780.00	77.90	PK	237	2.3	H	42.92	120.82	/	/
5780.00	66.70	Ave.	237	2.3	H	42.92	109.62	/	/
5780.00	76.24	PK	257	1.7	V	42.92	119.16	/	/
5780.00	64.33	Ave.	257	1.7	V	42.92	107.25	/	/
11560.00	41.54	PK	251	2.0	H	23.10	64.64	83.5	18.86
11560.00	26.72	Ave.	251	2.0	H	23.10	49.82	63.5	13.68
High Channel									
5830.00	78.14	PK	45	1.8	H	42.92	121.06	/	/
5830.00	66.74	Ave.	45	1.8	H	42.92	109.66	/	/
5830.00	77.20	PK	64	1.7	V	42.92	120.12	/	/
5830.00	65.91	Ave.	64	1.7	V	42.92	108.83	/	/
5850.00	35.36	PK	192	1.7	H	42.87	78.23	131.7	53.47
5855.00	31.28	PK	192	1.7	H	42.87	74.15	120.3	46.15
5875.00	27.52	PK	289	1.1	H	42.87	70.39	114.7	44.31
11660.00	41.76	PK	203	1.4	H	22.37	64.13	83.5	19.37
11660.00	26.59	Ave.	203	1.4	H	22.37	48.96	63.5	14.54

Note:

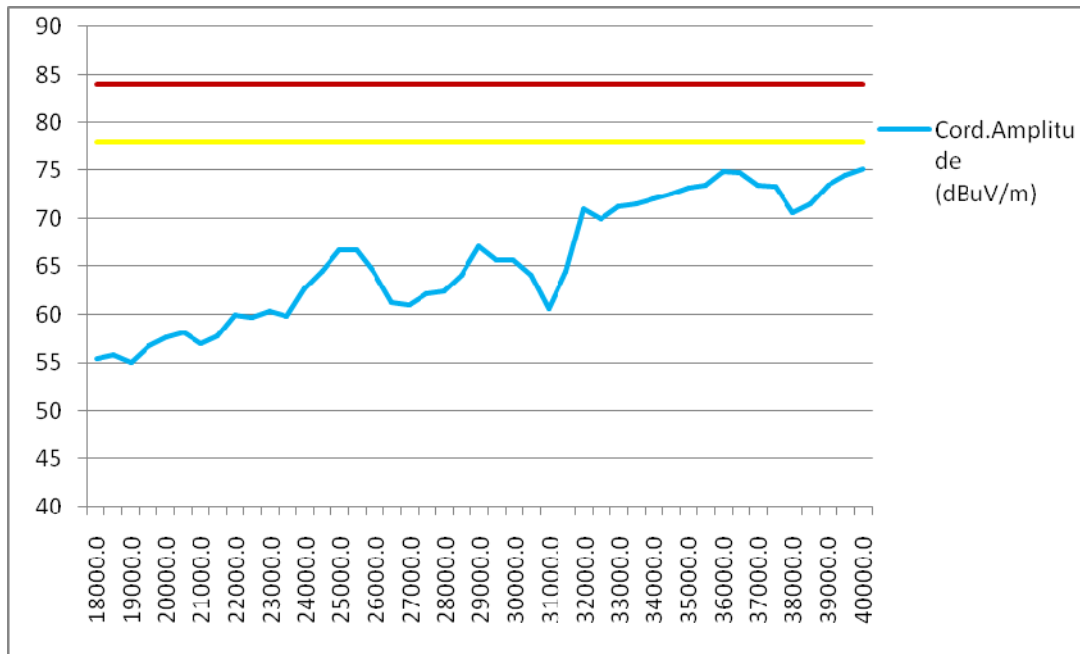
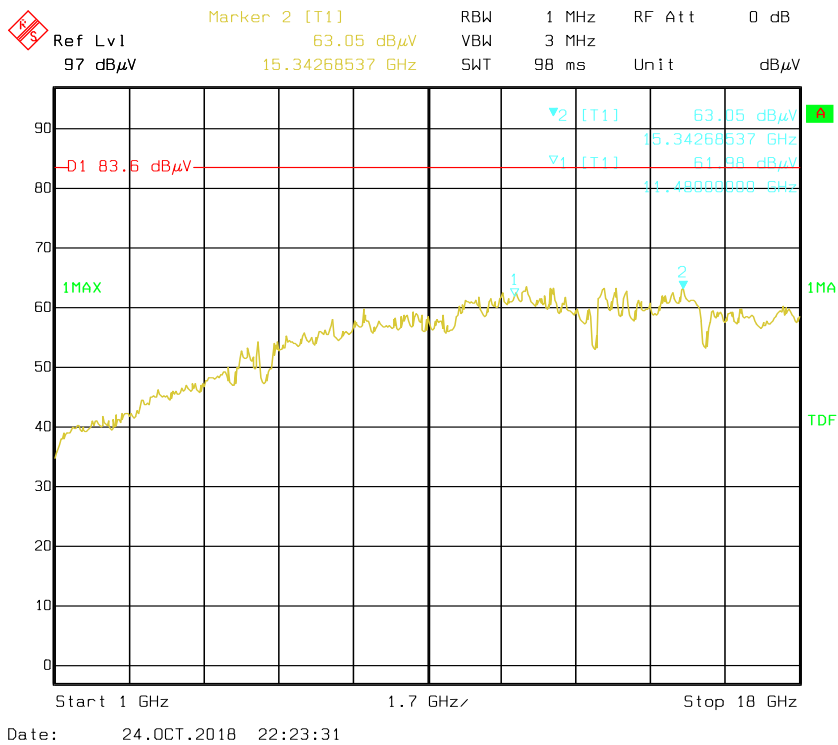
Corrected Amplitude = Corrected Factor + Reading

Corrected Factor=Antenna factor (RX) + Cable Loss – Amplifier Factor

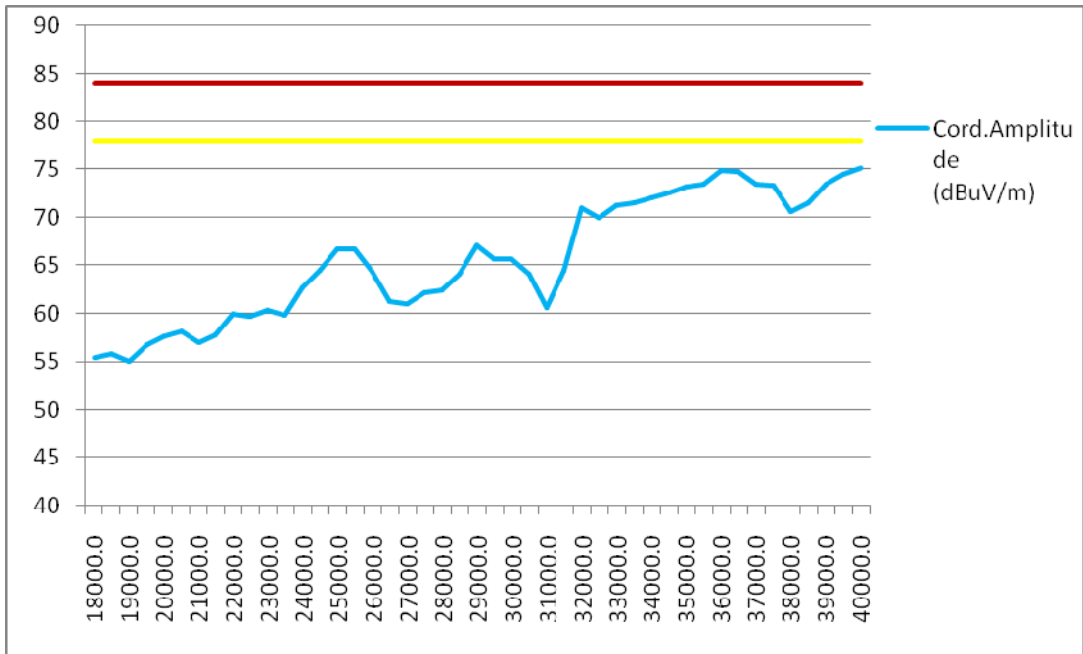
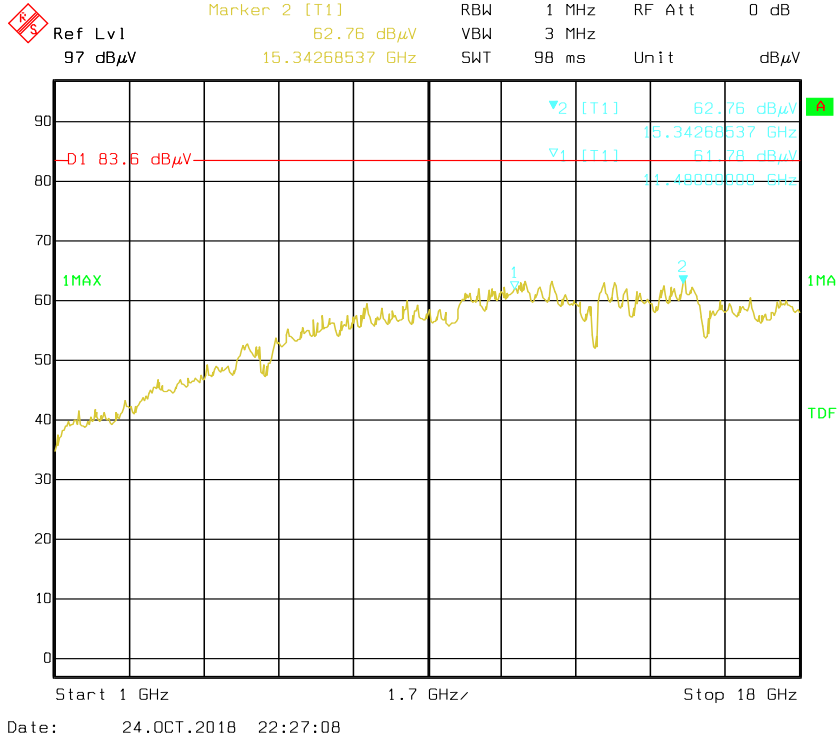
Margin = Limit- Corr. Amplitude

All other spurious emissions are 20 dB below the limit or are on the system noise floor level.

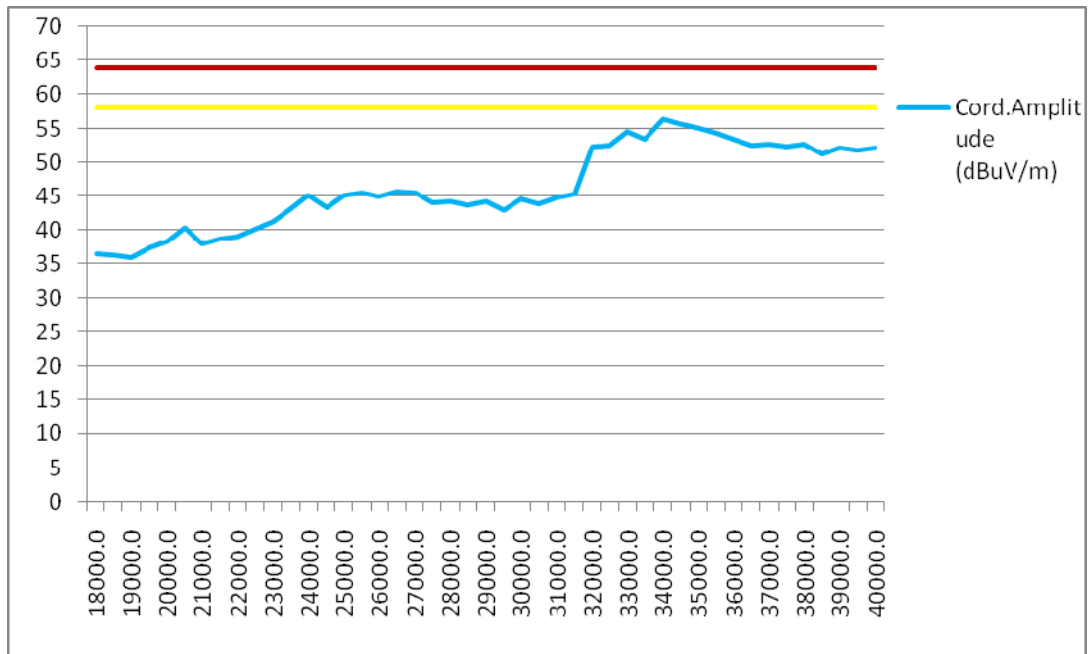
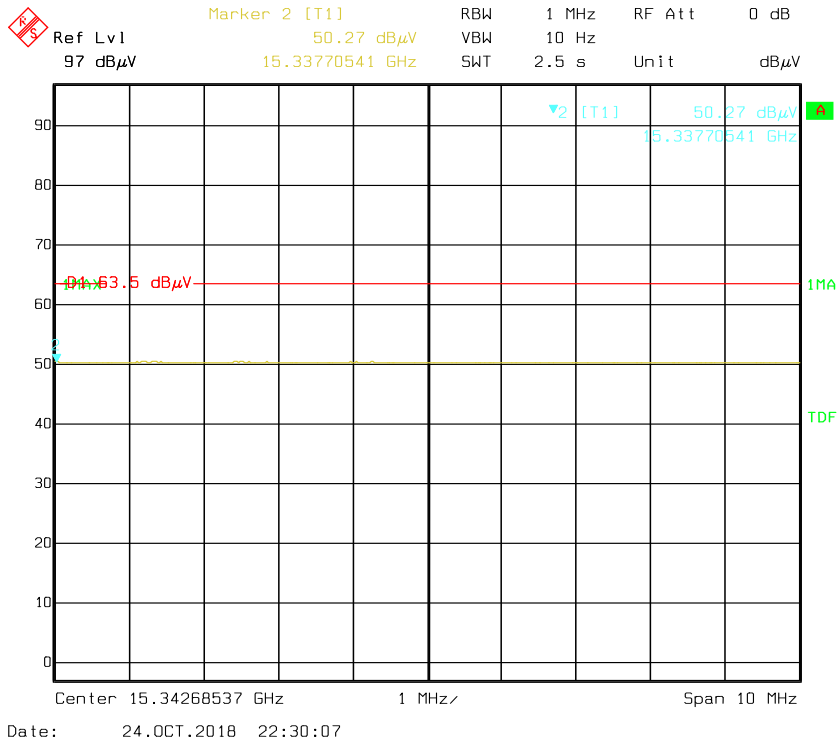
Pre-scan with High channel Peak
Horizontal



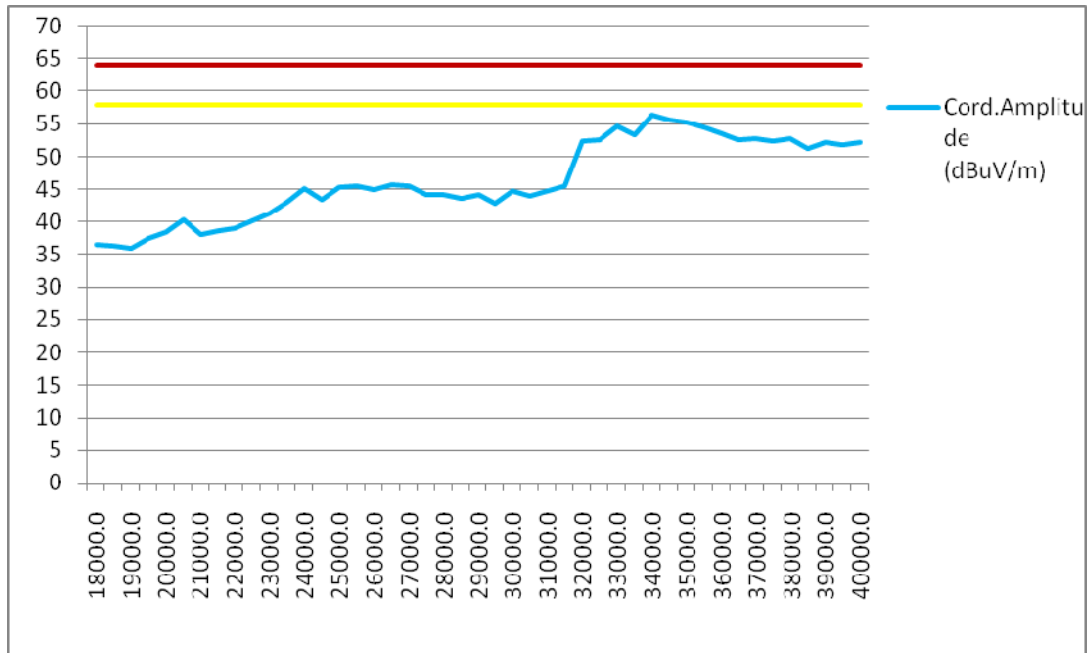
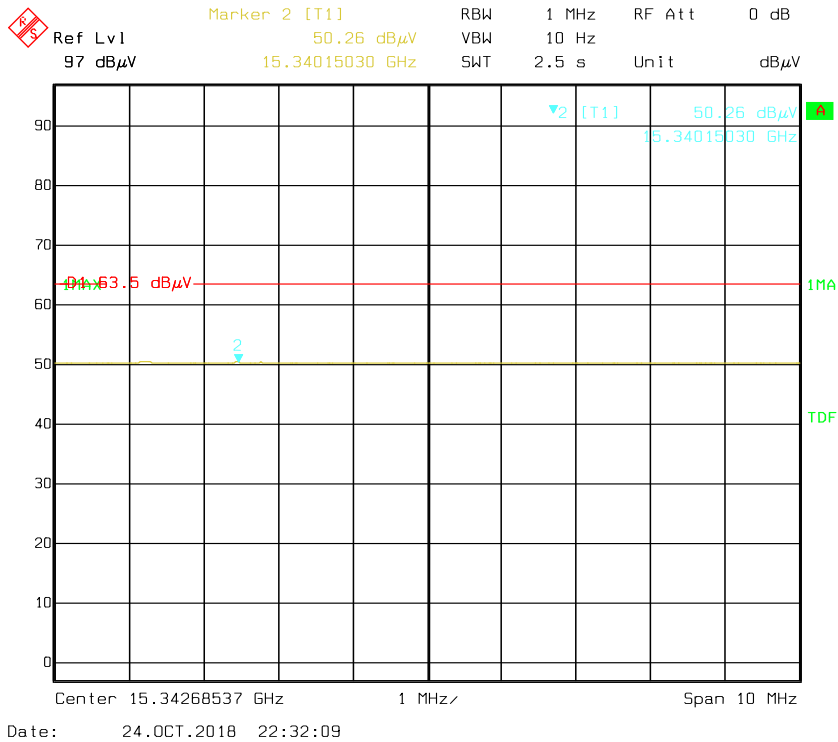
Vertical



Horizontal- Average



Vertical- Average



§15.407(B) (4) –OUT OF BAND EMISSION

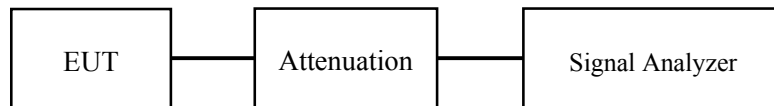
Applicable Standard

FCC §15.407 (b) (4);

For transmitters operating in the 5.725–5.825 GHz band: All emissions shall be limited to a level of –27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz 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 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 at the band edge.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. The Resolution bandwidth is set to 1MHz, The Video bandwidth is set to ≥ 1MHz, report the peak value out of the oprating band.
3. Repeat above procedures until all frequencies measured were complete.



Test Data

Environmental Conditions

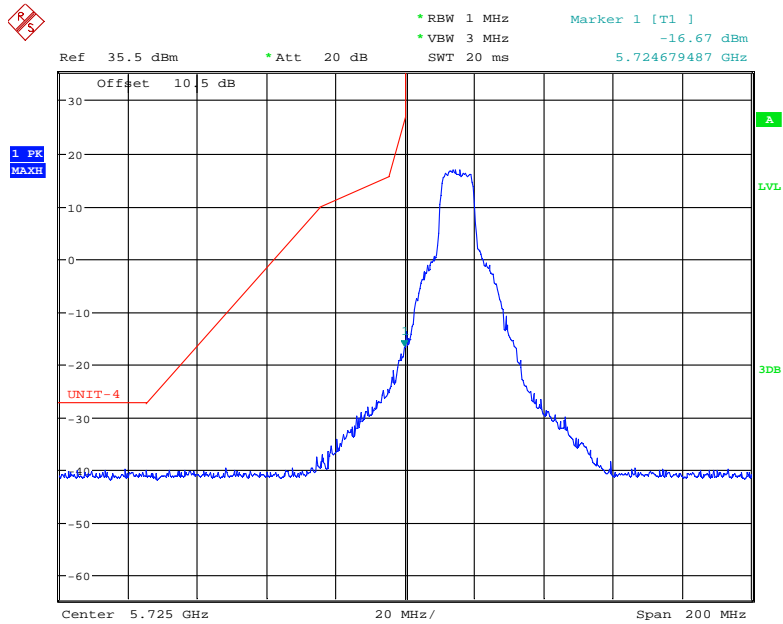
Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Shawn Xiao on 2018-11-19.

EUT operation mode: Transmitting

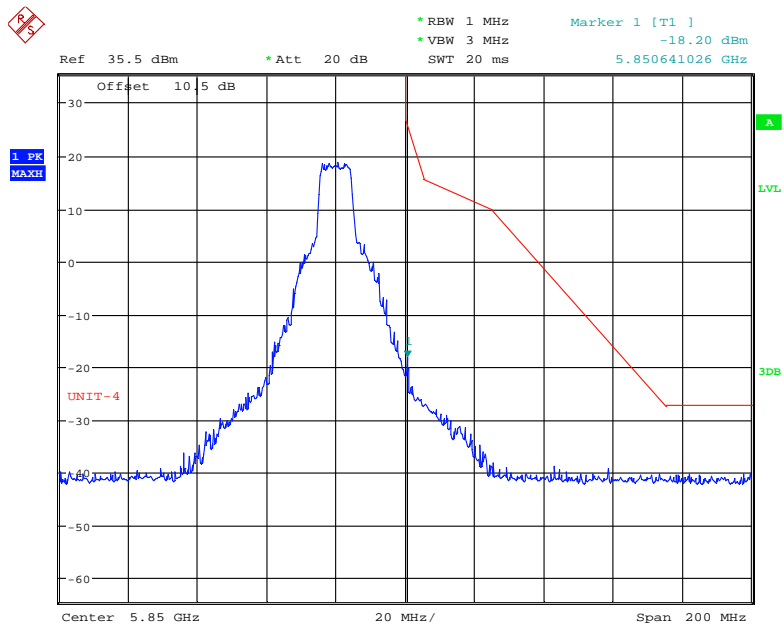
Note: All the emission under the limit more than 5dB (The antenn gain is 2dB), comply with the requirement of the MIMO transmission.

Antenna 0, Band Edge, Left Side



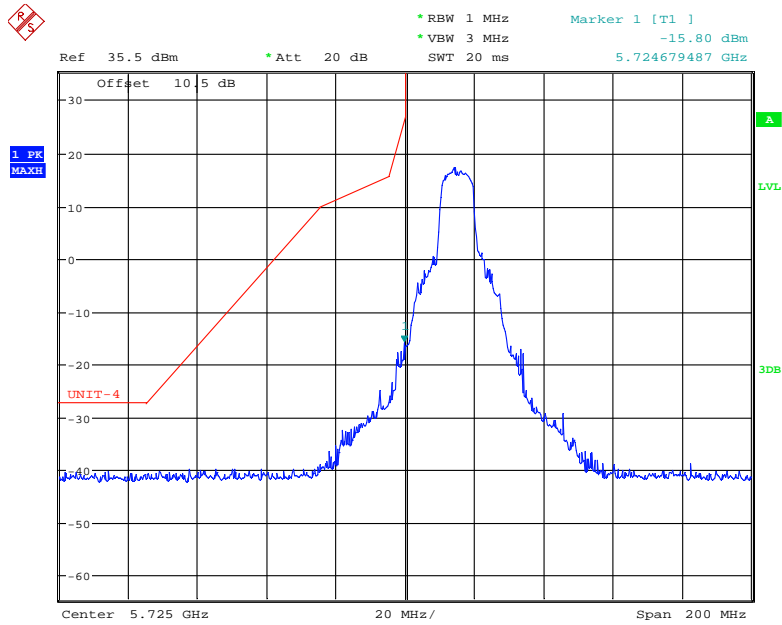
Date: 19.NOV.2018 22:25:47

Antenna 0, Band Edge, Right Side



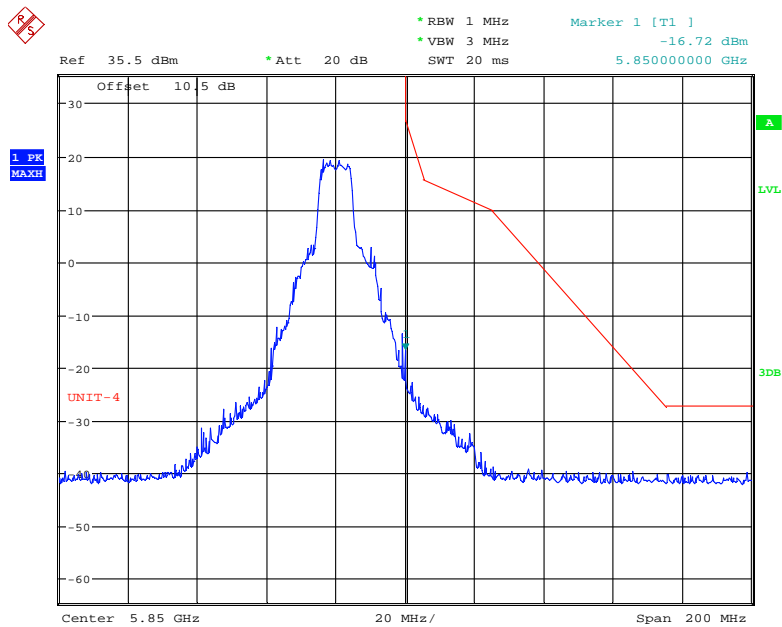
Date: 19.NOV.2018 22:27:47

Antenna 1, Band Edge, Left Side



Date: 19.NOV.2018 22:49:55

Antenna 1, Band Edge, Right Side



Date: 19.NOV.2018 22:47:42

FCC §15.407(e) – 6dB EMISSION BANDWIDTH

Applicable Standard

The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.85 GHz band are made over a reference bandwidth of 500 kHz or the 26 dB emission bandwidth of the device, whichever is less. A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full reference bandwidth.

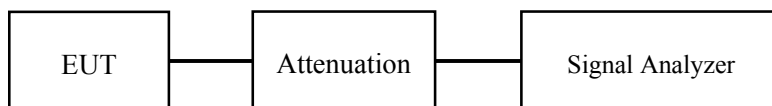
Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

Test Procedure

Minimum Emission Bandwidth for the band 5.725-5.85 GHz

Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.725-5.85 GHz. The following procedure shall be used for measuring this bandwidth:

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.



Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Shawn Xiao on 2018-11-19.

EUT operation mode: Transmitting

Test Result: Pass; please refer to the following tables and plots.

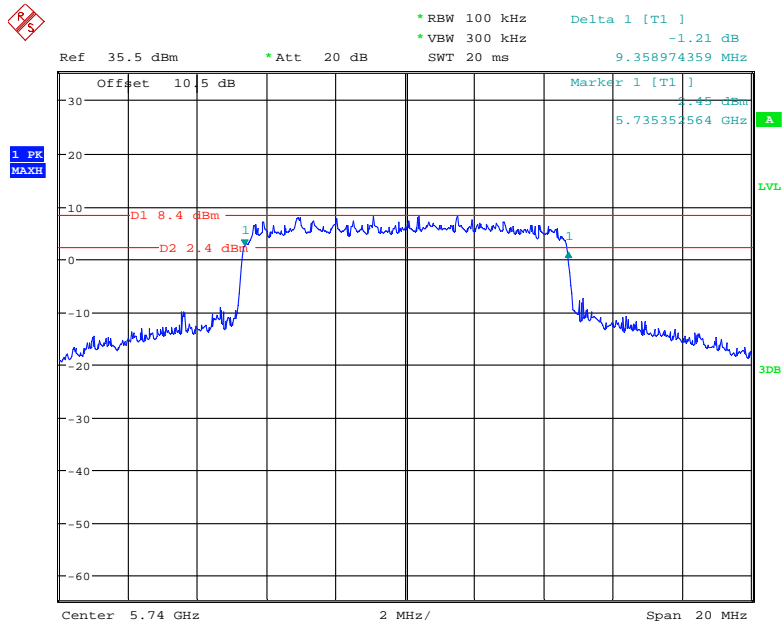
Antenna 0

Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (kHz)
5740	9.359	≥ 500
5780	9.359	≥ 500
5830	9.391	≥ 500

Antenna 1

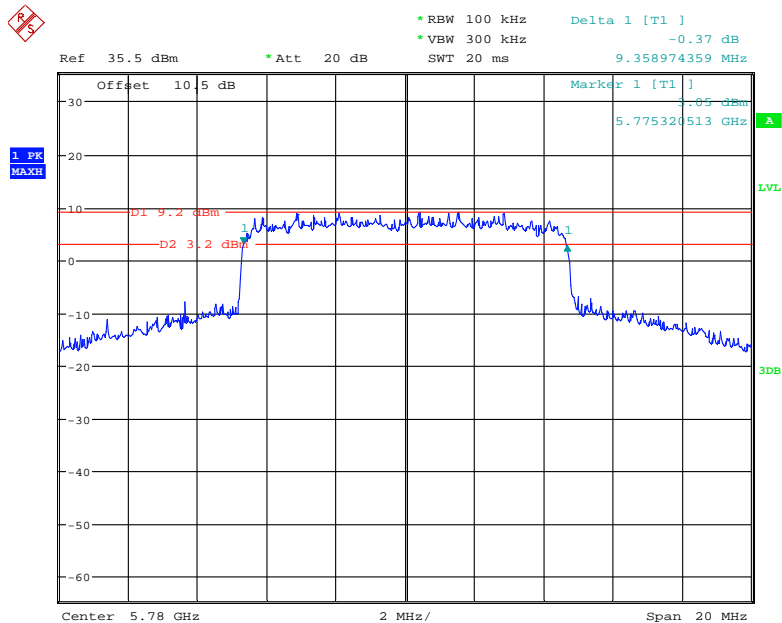
Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (kHz)
5740	9.391	≥ 500
5780	9.359	≥ 500
5830	9.391	≥ 500

Antenna 0, 5740 MHz



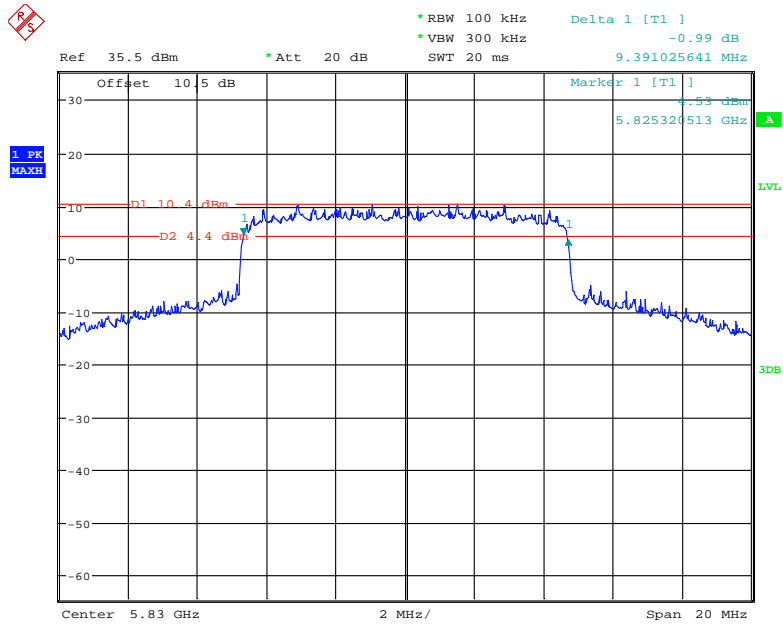
Date: 19.NOV.2018 22:23:12

Antenna 0, 5780 MHz



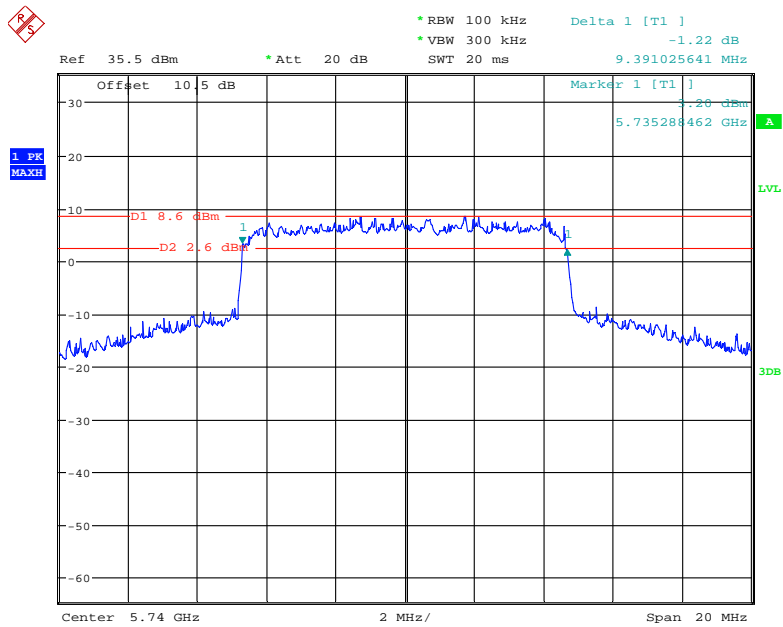
Date: 19.NOV.2018 22:20:34

Antenna 0, 5830 MHz



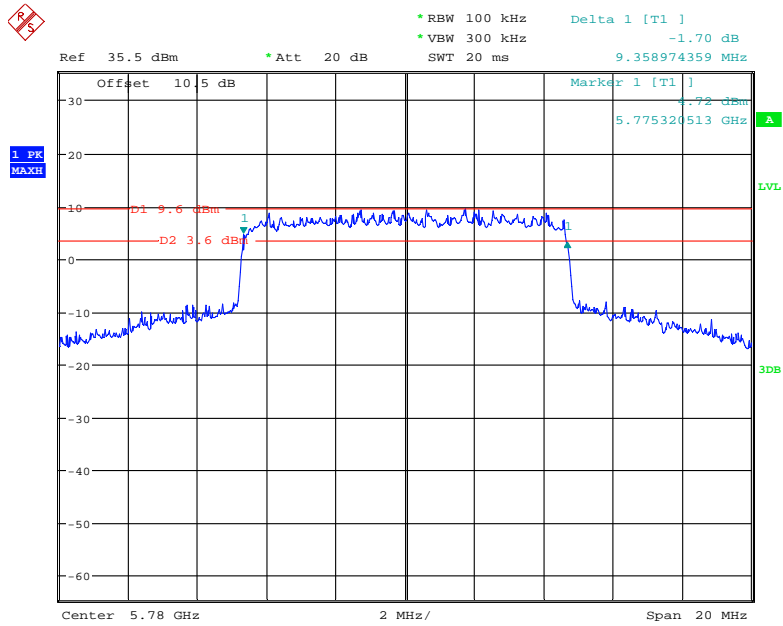
Date: 19.NOV.2018 22:18:49

Antenna 1, 5740 MHz



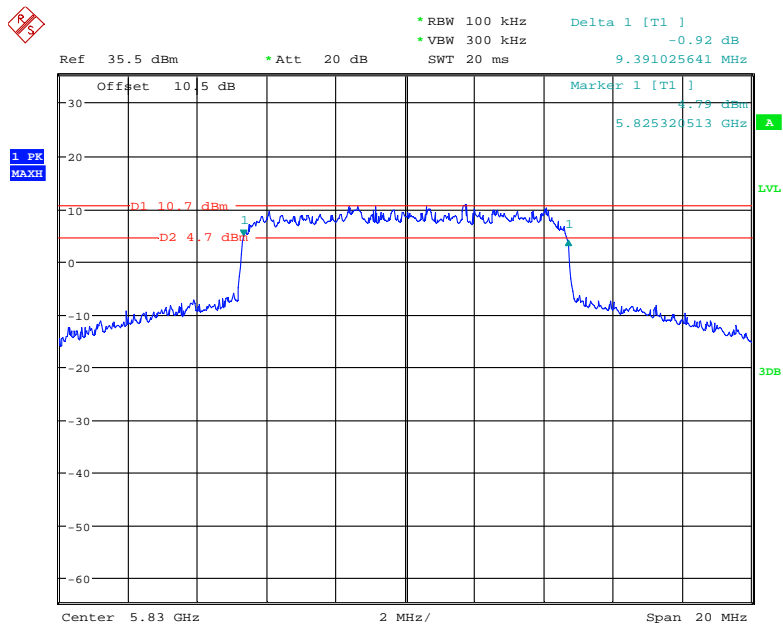
Date: 19.NOV.2018 22:51:23

Antenna 1, 5780 MHz



Date: 19.NOV.2018 22:52:55

Antenna 1, 5830 MHz



Date: 19.NOV.2018 22:54:41

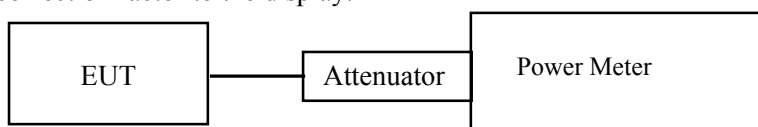
FCC §15.407(a) (3) – CONDUCTED TRANSMITTER OUTPUT POWER

Applicable Standard

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. 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, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.
3. Add a correction factor to the display.



Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Shawn Xiao on 2018-11-19.

EUT operation mode: Transmitting

Test Result: Pass

Please refer to the following tables.

Frequency (MHz)	Antenna Port	Output Power (dBm)	Duty cycle factor (dB)	Total Power (dBm)	Limit (dBm)
5740	0	20.44	1.25	24.94	30
	1	20.90			
5780	0	21.22	1.25	25.96	
	1	22.14			
5830	0	22.07	1.25	26.82	
	1	23.00			

FCC §15.407(a) (3) - POWER SPECTRAL DENSITY

Applicable Standard

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. 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, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

Test Procedure

For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, “provided that the measured power is integrated over the full reference bandwidth” to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 kHz bandwidth, the following adjustments to the procedures apply:

- a) Set RBW $\geq 1/T$, where T is defined in section II.B.1.a).
- b) Set VBW ≥ 3 RBW.
- c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add $10 \log(500 \text{ kHz/RBW})$ to the measured result, whereas RBW (< 500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
- d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add $10 \log(1\text{MHz/RBW})$ to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.
- e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Shawn Xiao on 2018-12-04.

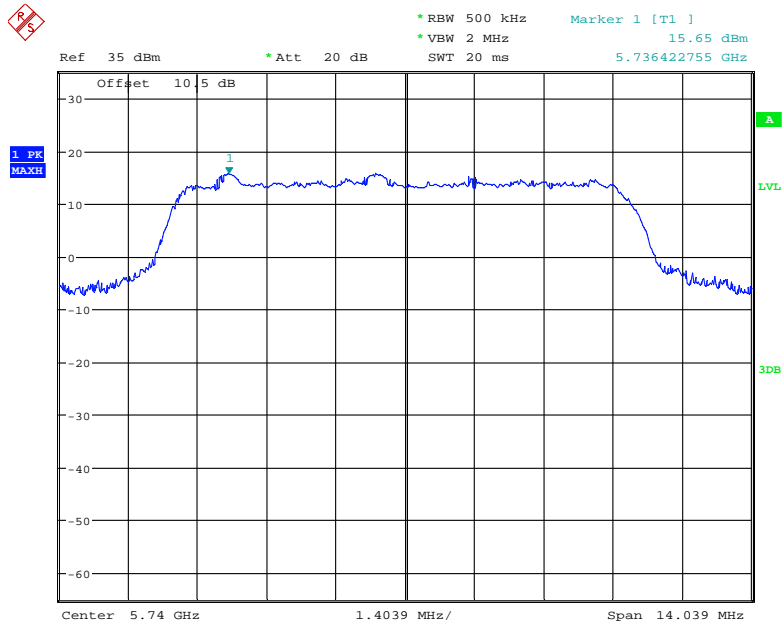
EUT operation mode: Transmitting

Test Result: Pass

Please refer to the following tables and plots.

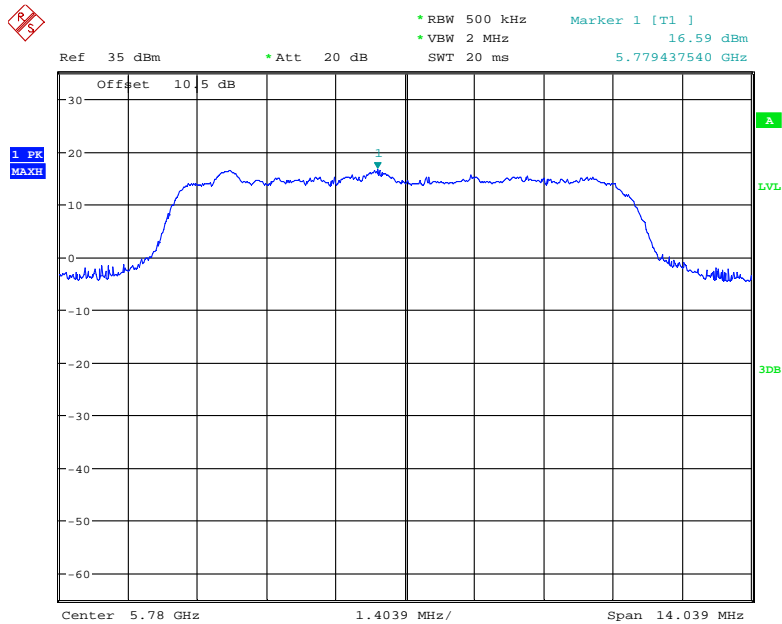
Frequency (MHz)	Antenna Port	Power Spectral Density (dBm/500kHz)	Total Power Spectral Density (dBm/500kHz)	Duty cycle factor (dB)	Power Spectral Density (dBm/500kHz)	Limit (dBm/500kHz)
5740	0	15.65	18.85	1.25	20.10	30
	1	16.03				
5780	0	16.59	19.40	1.25	20.65	
	1	16.18				
5830	0	15.57	18.53	1.25	19.78	
	1	15.47				

Antenna 0, Power Spectral Density, 5740 MHz



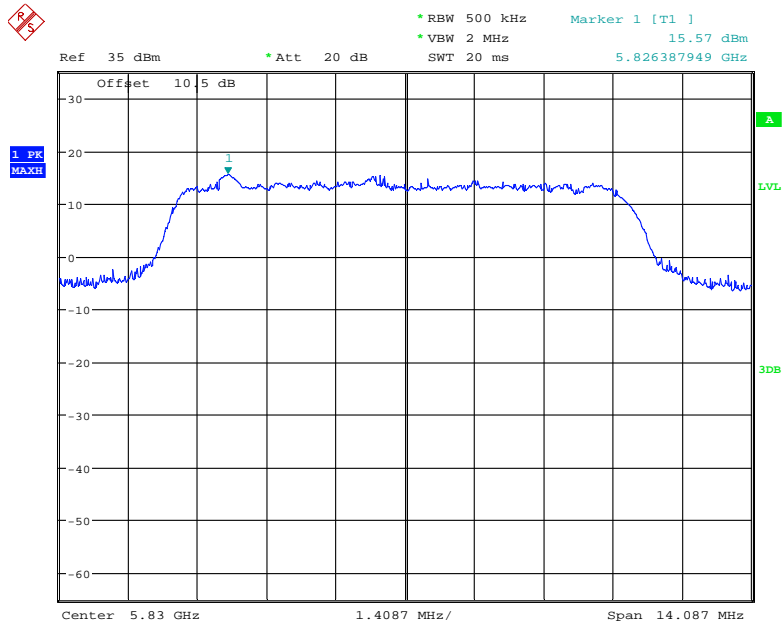
Date: 4.DEC.2018 13:23:01

Antenna 0, Power Spectral Density, 5780 MHz



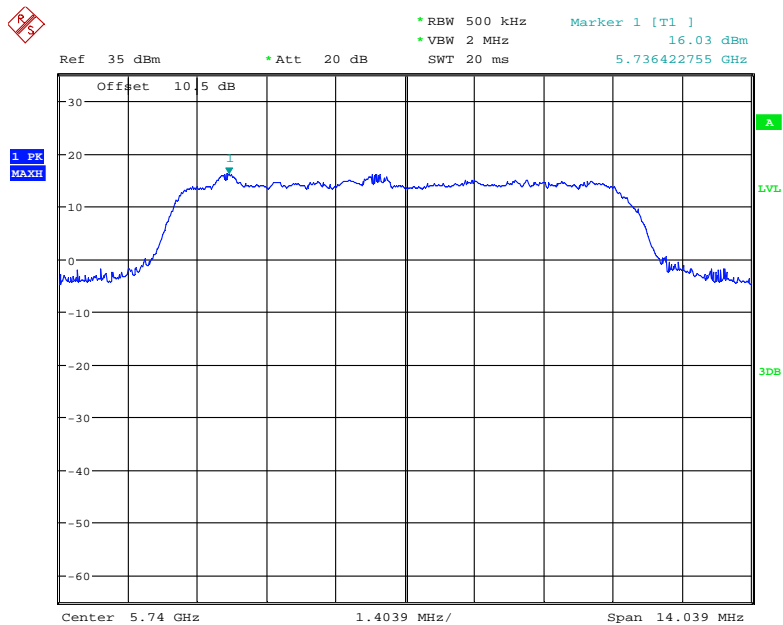
Date: 4.DEC.2018 13:30:19

Antenna 0, Power Spectral Density, 5830 MHz



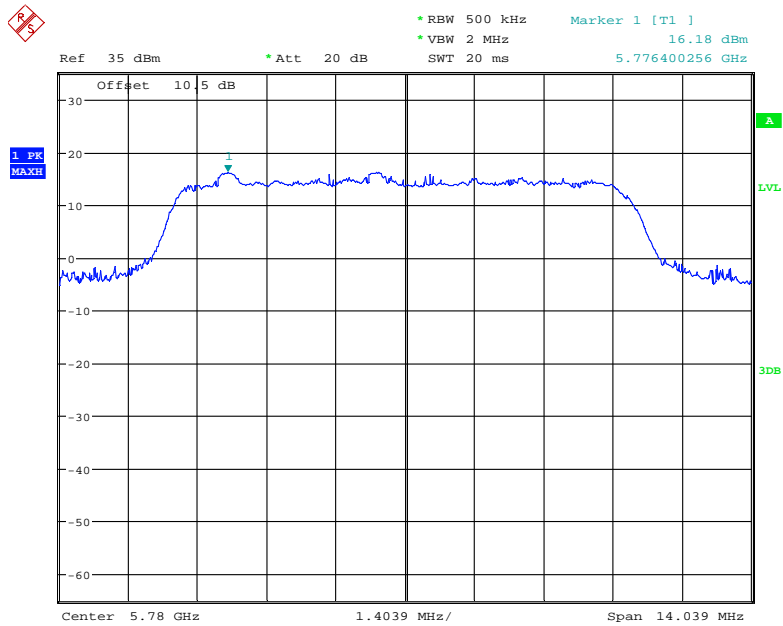
Date: 4.DEC.2018 13:32:08

Antenna 1, Power Spectral Density, 5740 MHz



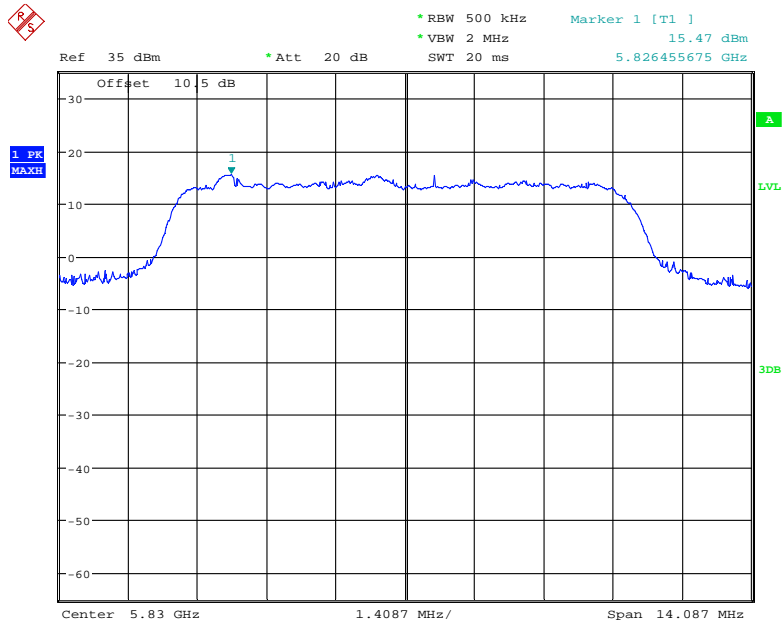
Date: 4.DEC.2018 13:40:41

Antenna 1, Power Spectral Density, 5780 MHz



Date: 4.DEC.2018 13:37:51

Antenna 1, Power Spectral Density, 5830 MHz



Date: 4.DEC.2018 13:35:19

***** END OF REPORT *****