FCC PART 15.249

TEST REPORT

For

Hobbico,Inc.

2904 Research Road , Champaign, Illinos, United States

FCC ID: IYFAVX101

Report Type:	Product Name:
Original Report	AVX101 FPV Camera

Report Number:	RDG170612008-00
Report Date:	2018-01-22
Reviewed By:	Jerry Zhang EMC Manager
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

TABLE OF CONTENTS

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The ***Hobbico,Inc.***'s product, model number: ***AVX101 (FCC ID: IYFAVX101)*** (the "EUT") in this report was a ***AVX101 FPV Camera***, which was measured approximately: 11.8 cm (L) x 5.6 cm (W) x 2.3 cm (H), rated input voltage: DC 3.7V from battery.

All measurement and test data in this report was gathered from production sample serial number: 170612008 (Assigned by BACL, Dongguan). The EUT was received on 2017-07-14.

Objective

This type approval report is prepared on behalf of ***Hobbico,Inc.*** in accordance with Part 2-Subpart J, and Part 15-Subparts A and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Rules Part 15, Subpart C, and section 15.203, 15.205, 15.209 and 15.249 rules.

Related Submittal(s)/Grant(s)

No related submittal(s)/grant(s).

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 and Bay Area Compliance Laboratories Corp. (Dongguan).

Measurement Uncertainty

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.61dB
Power Spectral Density, conducted	±0.61 dB
Unwanted Emissions, radiated	30M~200MHz: 4.58 dB for Horizontal, 4.59 dB for Vertical 200M~1GHz: 4.83 dB for Horizontal, 5.85 dB for Vertical 1G~6GHz: 4.45 dB, 6G~18GHz: 5.23 dB
Unwanted Emissions, conducted	±1.5 dB
Temperature	±1℃
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%
AC Power Lines Conducted Emission	3.12 dB (150 kHz to 30 MHz)

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, 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. : 897218,the FCC Designation No. : CN1220.

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

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing in an engineering mode which was provided by the manufacturer.

For 5.8GHz band, 25 channels are provided:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	5740	10	5785	19	5830
2	5745	11	5790	20	5835
3	5750	12	5795	21	5840
4	5755	13	5800	22	5845
5	5760	14	5805	23	5850
6	5765	15	5810	24	5855
7	5770	16	5815	25	5860
8	5775	17	5820	/	/
9	5780	18	5825	/	/

3 channels were tested: 5740MHz, 5800MHz, 5860 MHz.

EUT Exercise Software

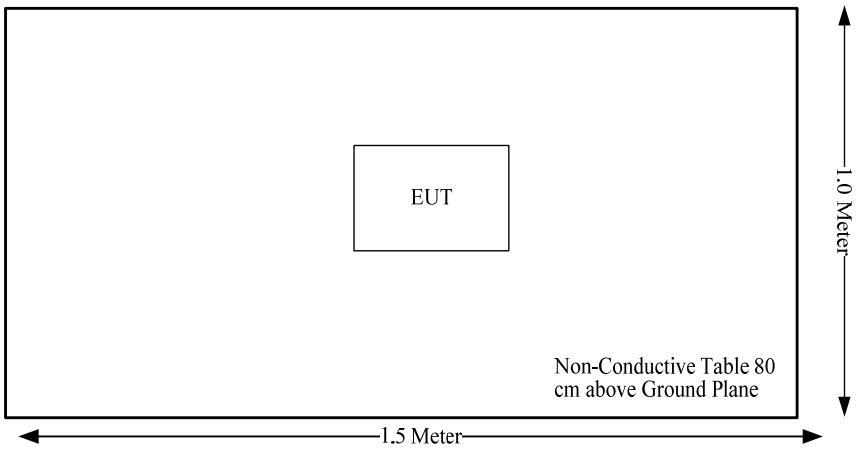
No Test software was used in test, the maximum power was configured by system default setting, the test modes and channels were changed by keys.

Equipment Modifications

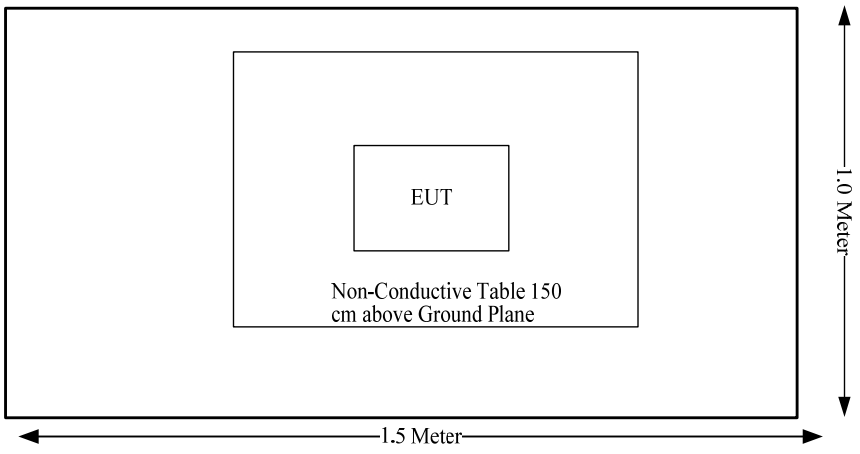
No modifications were made to the EUT.

Block Diagram of Test Setup

Radiation Emission Test Below 1GHz:



Radiation Emission Test Above 1GHz:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.207(a)	Conduction Emissions	Not Applicable
15.205, §15.209, §15.249	Radiated Emissions	Compliance
§15.215 (c)	20 dB Bandwidth	Compliance

Note:
Not Applicable: The EUT is battery operated equipment.

FCC§15.203 - ANTENNA REQUIREMENT

Applicable Standard

For intentional device, 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.

Antenna Connector Construction

The EUT has an external antenna with RP-SMA antenna, the antenna gain is 2.0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliant.

FCC§15.205, §15.209&§15.249- RADIATED EMISSIONS

Applicable Standard

As per FCC§15.249 (a), except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

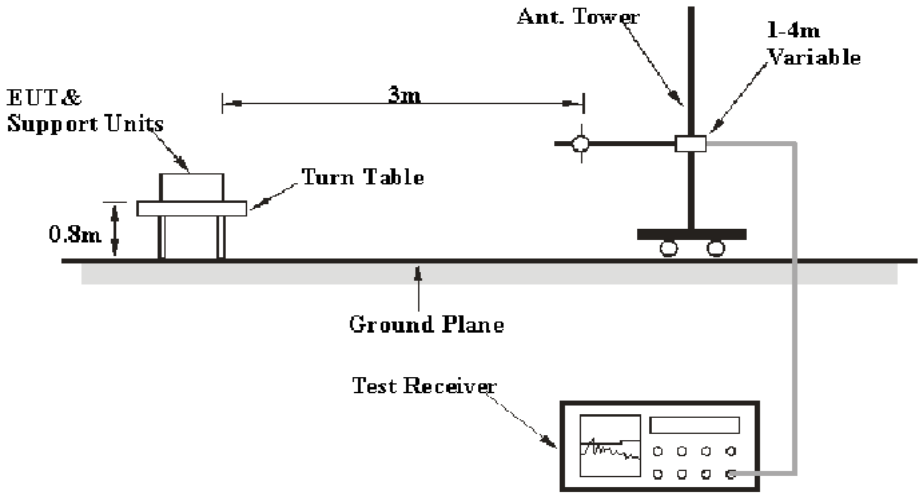
Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

As per FCC§15.249 (c), Field strength limits are specified at a distance of 3 meters.

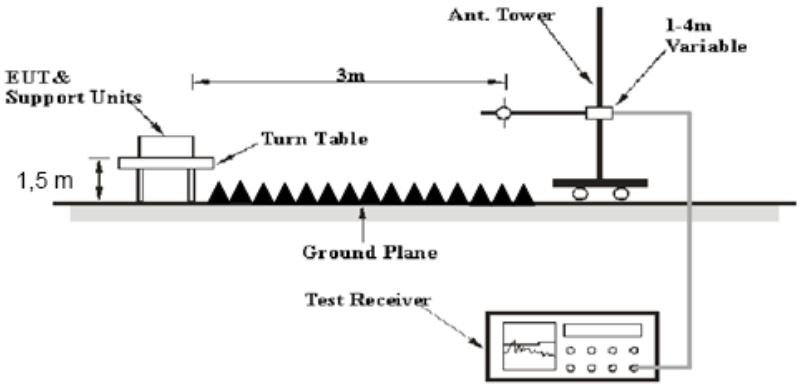
(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

EUT Setup

Below 1 GHz:



Above 1 GHz:



The radiated emission tests were performed in the 3 meters chamber test site for above 1GHz test and 10 meters chamber test site for below 1GHz test, using the setup accordance with the ANSI C63.10-2013 The specification used was the FCC 15.209/15.205 and FCC 15.249 limits.

Test Equipment 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	Measurement
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	AV

Test Procedure

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

All data was recorded in the Quasi-peak detection mode from 30 MHz to 1GHz, peak and average detection mode above 1 GHz.

According to C63.10, the above 1G test result shall be extrapolated to the specified distance using an extrapolation factor of 20dB/decade from 3m to 1.5m
Distance extrapolation factor =20 log (specific distance [3m]/test distance [1.5m]) dB
Extrapolation result = Corrected Amplitude (dBµV/m) - distance extrapolation factor (6dB)

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:

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - 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:

Margin = Limit –Corrected Amplitude

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2016-09-01	2017-08-31
Sunol Sciences	Antenna	JB3	A060611-1	2014-11-06	2017-11-05
HP	Amplifier	8447E	2434A02181	2016-09-01	2017-09-01
R&S	Spectrum Analyzer	FSP 38	100478	2016-12-08	2017-12-08
ETS-Lindgren	Horn Antenna	3115	000 527 35	2016-01-05	2019-01-04
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-02 1304	2017-06-16	2020-06-15
MITEQ	Amplifier	AFS42-00101800-25-S-42	2001271	2016-09-05	2017-09-05
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2016-09-06	2017-09-06
Sinoscite	Bandstop Filters	BSF5150-5850MN-0899-003	N/A	2017-05-06	2018-05-06
Unknown	Coaxial Cable	Chamber A-1	4m	2016-09-01	2017-09-01
Unknown	Coaxial Cable	Chamber B-1	0.75m	2016-09-01	2017-09-01
Unknown	Coaxial Cable	Chamber A-2	10m	2016-09-01	2017-09-01
Unknown	Coaxial Cable	Chamber B-2	8m	2016-09-01	2017-09-01
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
Chengdu Ouli	Band Rejection Filter	2400-2483.5	002	2016-09-05	2017-09-05

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

Test Data

Environmental Conditions

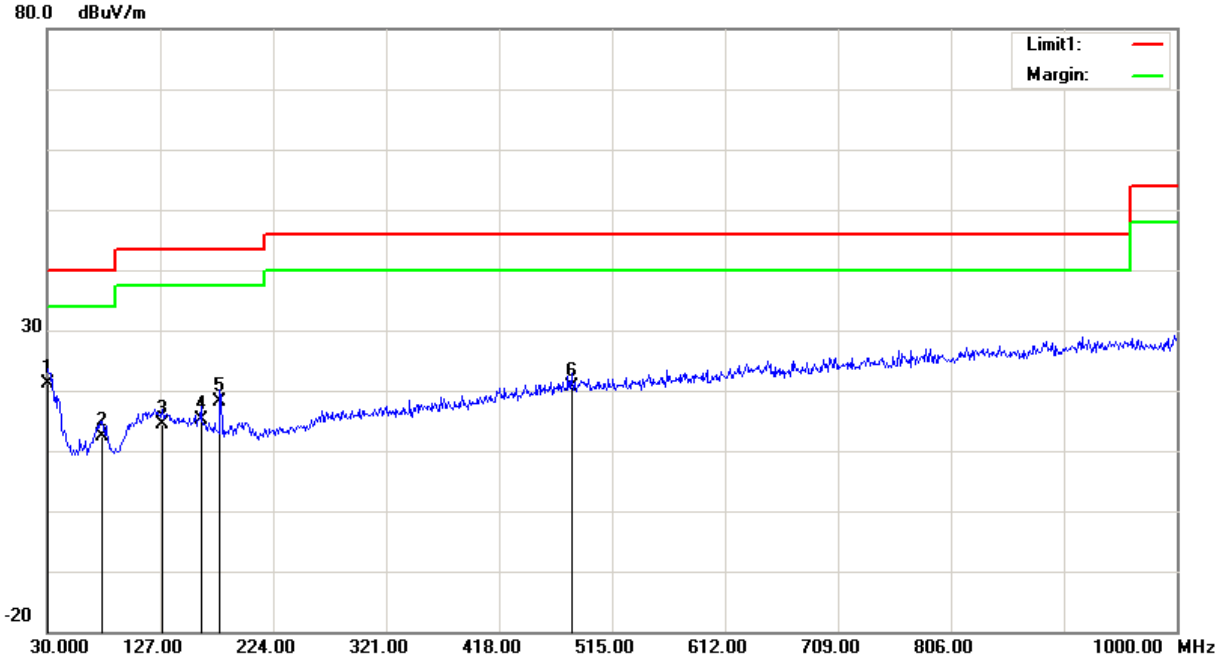
Temperature:	27.6 °C
Relative Humidity:	52 %
ATM Pressure:	100 kPa

The testing was performed by Steven Zuo on 2017-07-24

Test Mode: Transmitting

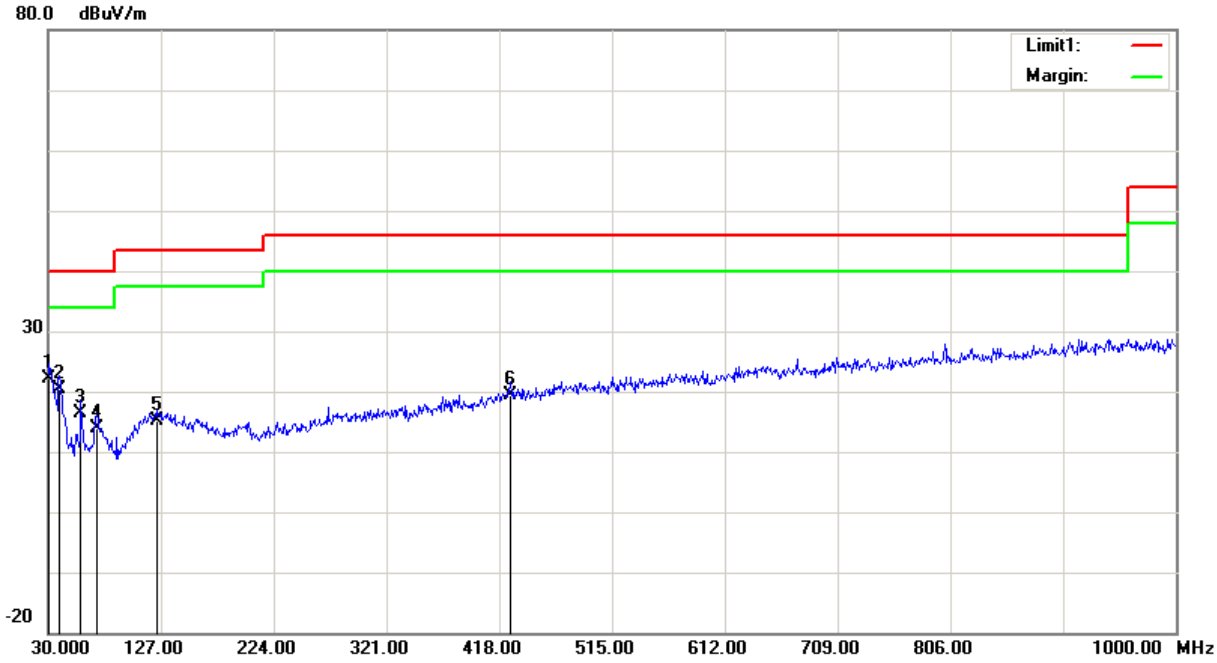
1) 30MHz-1GHz(Middle channel was the worst)**:**

Horizontal:



Frequency (MHz)	Receiver Reading (dBuV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
30.0000	19.60	QP	1.60	21.20	40.00	18.80
76.5600	23.37	QP	-11.07	12.30	40.00	27.70
128.9400	19.62	QP	-5.12	14.50	43.50	29.00
161.9200	21.75	QP	-6.65	15.10	43.50	28.40
178.4100	25.96	QP	-7.76	18.20	43.50	25.30
480.0800	21.44	QP	-0.84	20.60	46.00	25.40

Vertical:

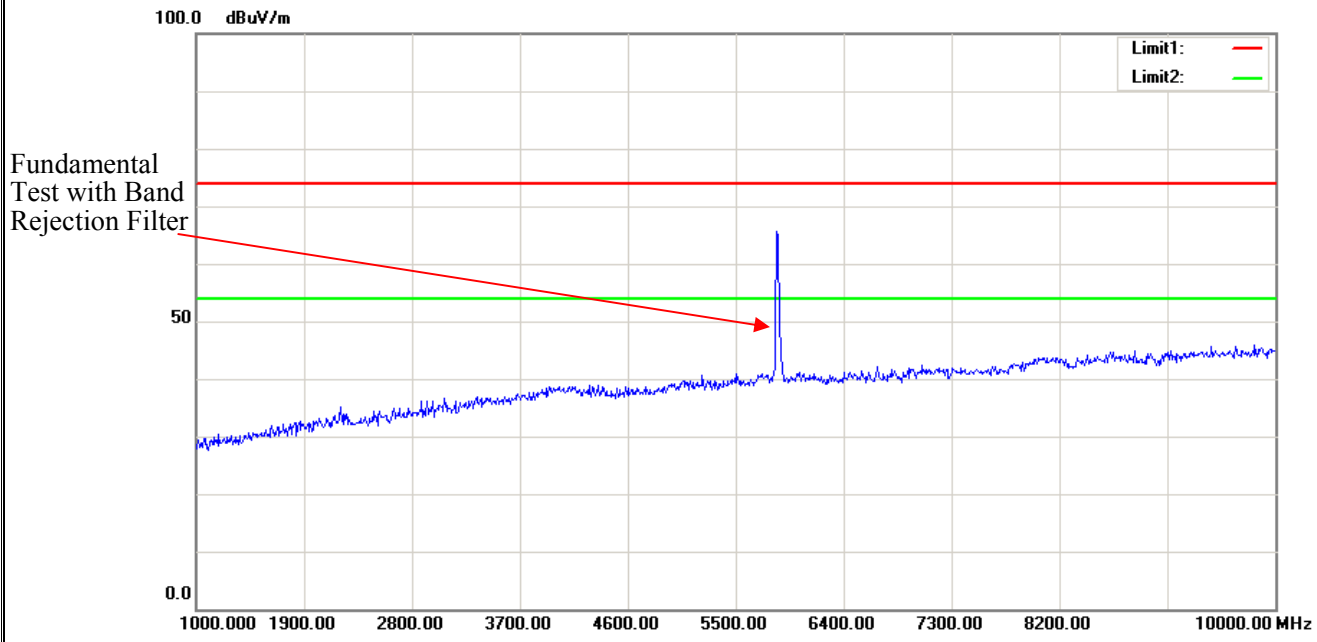


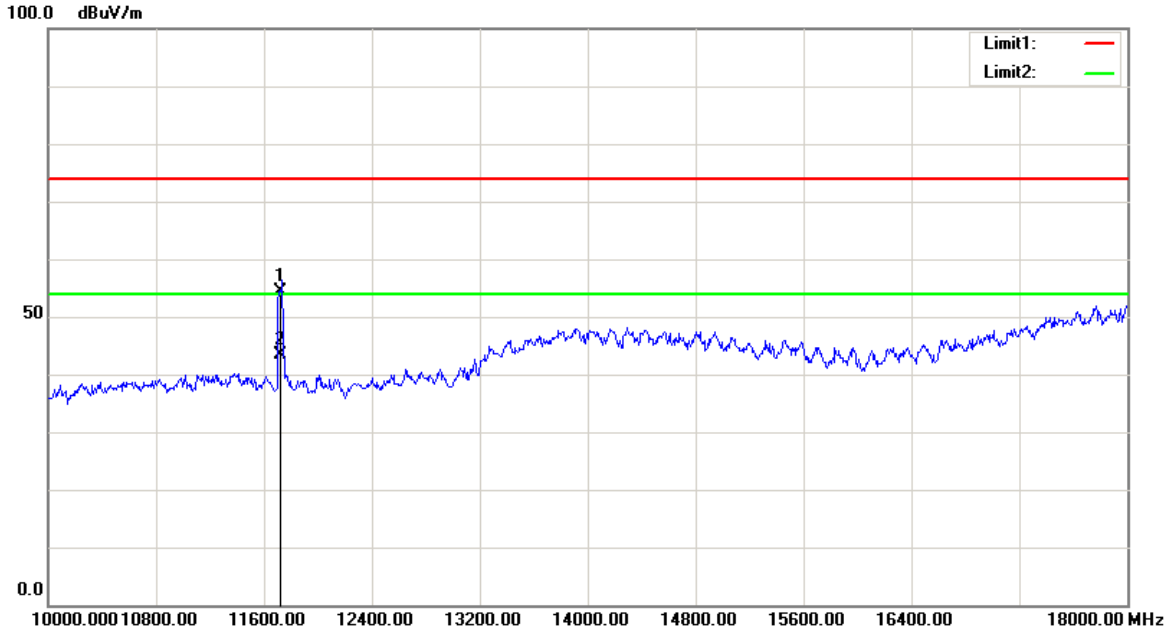
Frequency (MHz)	Receiver Reading (dBuV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
30.9700	21.26	QP	0.94	22.20	40.00	17.80
39.7000	26.06	QP	-5.66	20.40	40.00	19.60
58.1300	28.84	QP	-12.44	16.40	40.00	23.60
71.7100	25.18	QP	-11.18	14.00	40.00	26.00
123.1200	20.09	QP	-4.89	15.20	43.50	28.30
427.7000	21.50	QP	-2.00	19.50	46.00	26.50

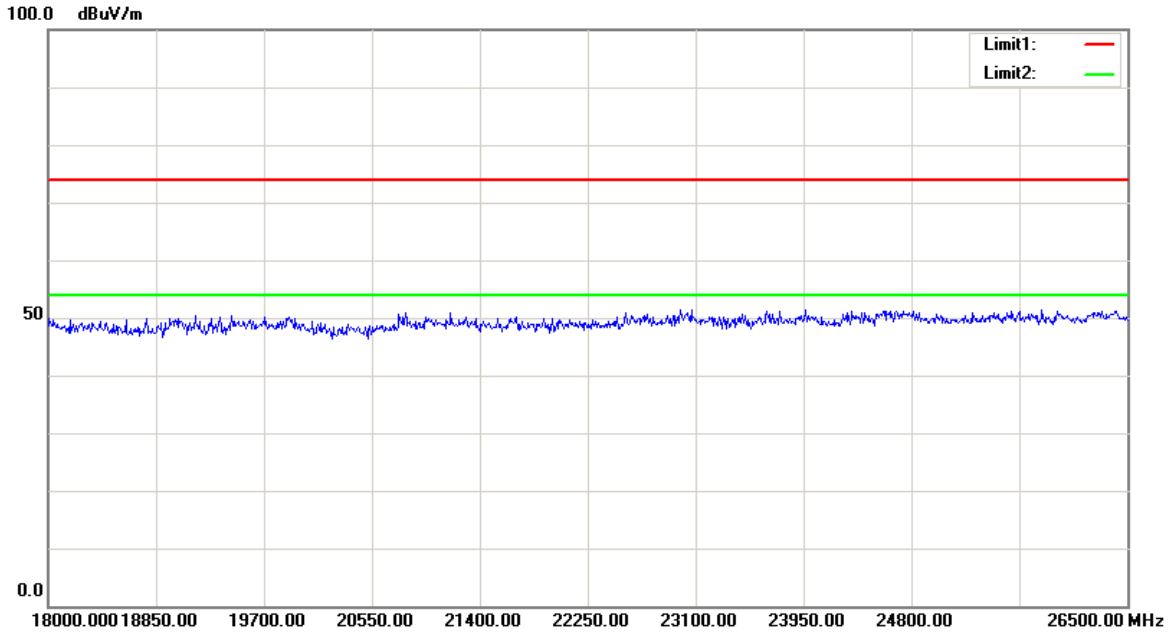
1GHz-40GHz(Test at 1.5m distance)

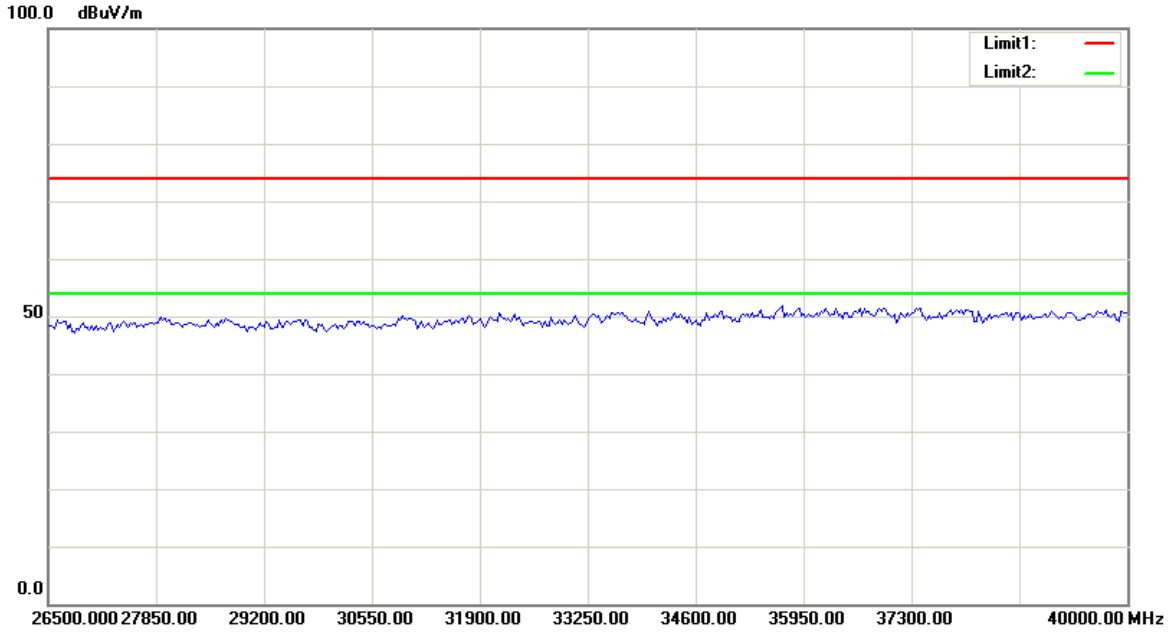
Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Extrapolation Result dBμV/m	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB/m)						
Low Channel:5740 MHz										
5740	39.63	PK	H	34.20	4.68	0.00	78.51	72.51	114.00	41.49
5740	26.93	AV	H	34.20	4.68	0.00	65.81	59.81	94.00	34.19
5740	49.26	PK	V	34.20	4.68	0.00	88.14	82.14	114.00	31.86
5740	37.27	AV	V	34.20	4.68	0.00	76.15	70.15	94.00	23.85
5725	27.64	PK	V	34.19	4.67	0.00	66.50	60.50	74.00	13.50
5725	14.75	AV	V	34.19	4.67	0.00	53.61	47.61	54.00	6.39
11480	58.78	PK	V	38.98	6.85	36.61	68.00	62.00	74.00	12.00
11480	46.56	AV	V	38.98	6.85	36.61	55.78	49.78	54.00	4.22
17220	48.15	PK	V	41.48	8.68	36.99	61.32	55.32	74.00	18.68
17220	35.23	AV	V	41.48	8.68	36.99	48.40	42.40	54.00	11.60
6886	46.69	PK	V	34.97	5.31	35.90	51.07	45.07	74.00	28.93
6886	31.64	AV	V	34.97	5.31	35.90	36.02	30.02	54.00	23.98
Middle Channel:5800 MHz										
5800	39.65	PK	H	34.22	4.72	0.00	78.59	72.59	114.00	41.41
5800	26.96	AV	H	34.22	4.72	0.00	65.90	59.90	94.00	34.10
5800	49.25	PK	V	34.22	4.72	0.00	88.19	82.19	114.00	31.81
5800	37.29	AV	V	34.22	4.72	0.00	76.23	70.23	94.00	23.77
11600	58.75	PK	V	39.00	6.88	36.62	68.01	62.01	74.00	11.99
11600	46.54	AV	V	39.00	6.88	36.62	55.80	49.80	54.00	4.20
17400	48.37	PK	V	42.52	8.66	36.73	62.82	56.82	74.00	17.18
17400	35.31	AV	V	42.52	8.66	36.73	49.76	43.76	54.00	10.24
6795	48.15	PK	V	34.79	5.30	35.86	52.38	46.38	74.00	27.62
6795	35.24	AV	V	34.79	5.30	35.86	39.47	33.47	54.00	20.53
7882	46.73	PK	V	36.73	5.82	36.07	53.21	47.21	74.00	26.79
7882	31.63	AV	V	36.73	5.82	36.07	38.11	32.11	54.00	21.89
High Channel:5860 MHz										
5860	39.66	PK	H	34.24	4.65	0.00	78.55	72.55	114.00	41.45
5860	26.94	AV	H	34.24	4.65	0.00	65.83	59.83	94.00	34.17
5860	49.27	PK	V	34.24	4.65	0.00	88.16	82.16	114.00	31.84
5860	37.28	AV	V	34.24	4.65	0.00	76.17	70.17	94.00	23.83
5875	27.26	PK	V	34.25	4.64	0.00	66.15	60.15	74.00	13.85
5875	14.89	AV	V	34.25	4.64	0.00	53.78	47.78	54.00	6.22
11720	58.77	PK	V	39.00	6.91	36.64	68.04	62.04	74.00	11.96
11720	46.58	AV	V	39.00	6.91	36.64	55.85	49.85	54.00	4.15
17580	48.56	PK	V	43.60	8.73	36.48	64.41	58.41	74.00	15.59
17580	35.29	AV	V	43.60	8.73	36.48	51.14	45.14	54.00	8.86
7335	46.72	PK	V	36.07	5.53	35.98	52.34	46.34	74.00	27.66
7335	31.66	AV	V	36.07	5.53	35.98	37.28	31.28	54.00	22.72

Worst Case plots(High channel)
Horizonal:



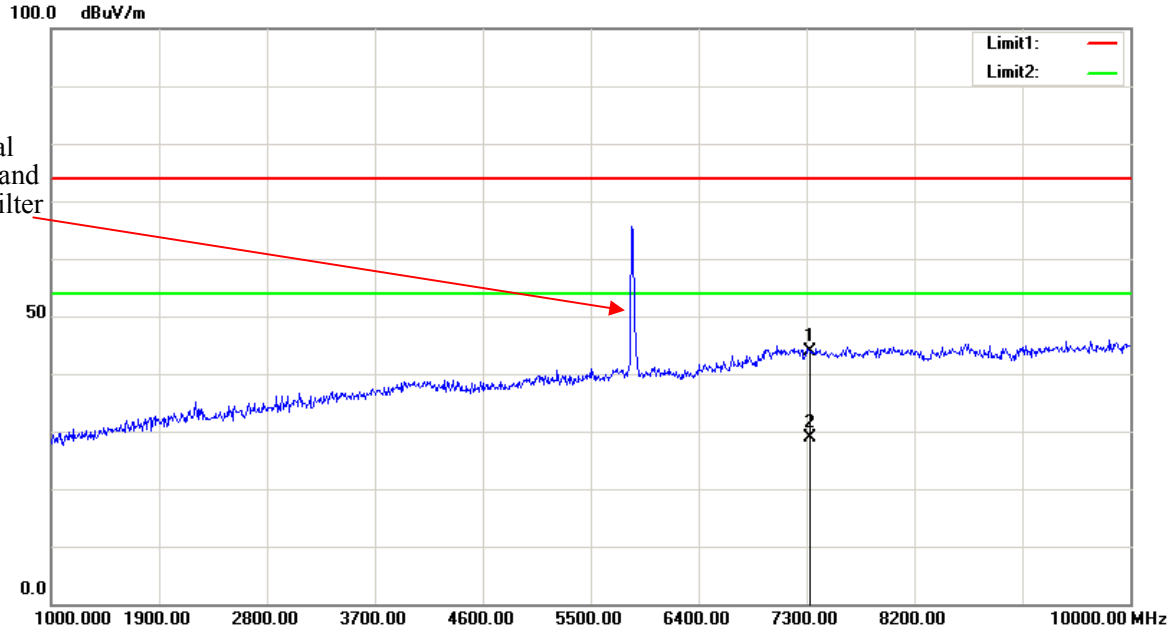


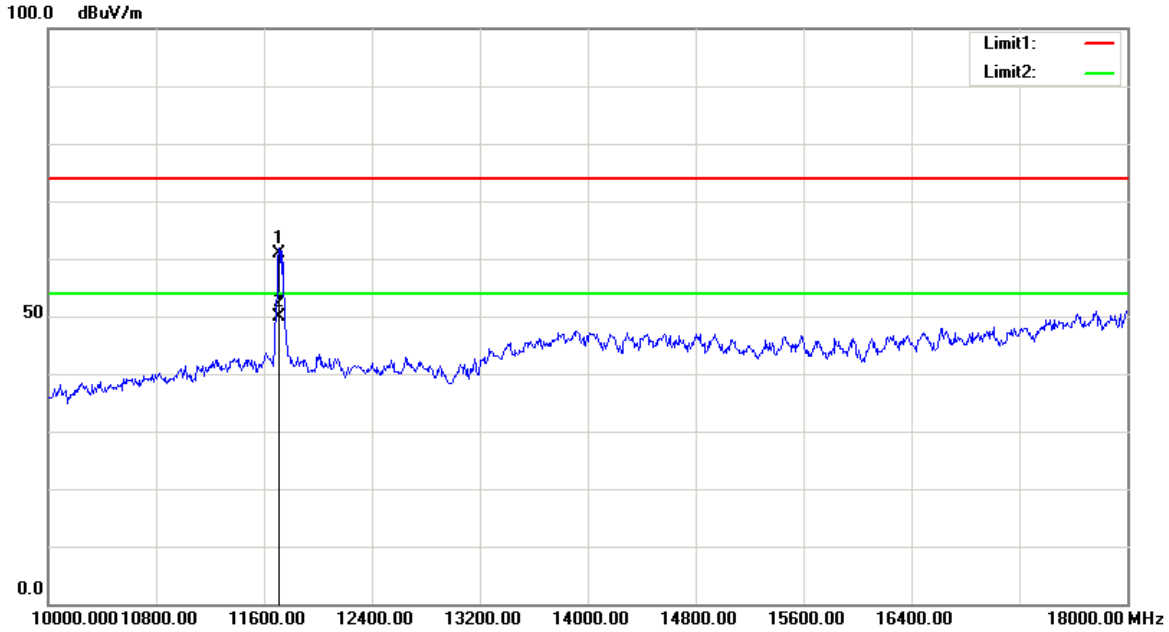

100.0 dBuV/m
Limit1:
Limit2:
50
0.0
18000.000 18850.00 19700.00 20550.00 21400.00 22250.00 23100.00 23950.00 24800.00 26500.00 MHz

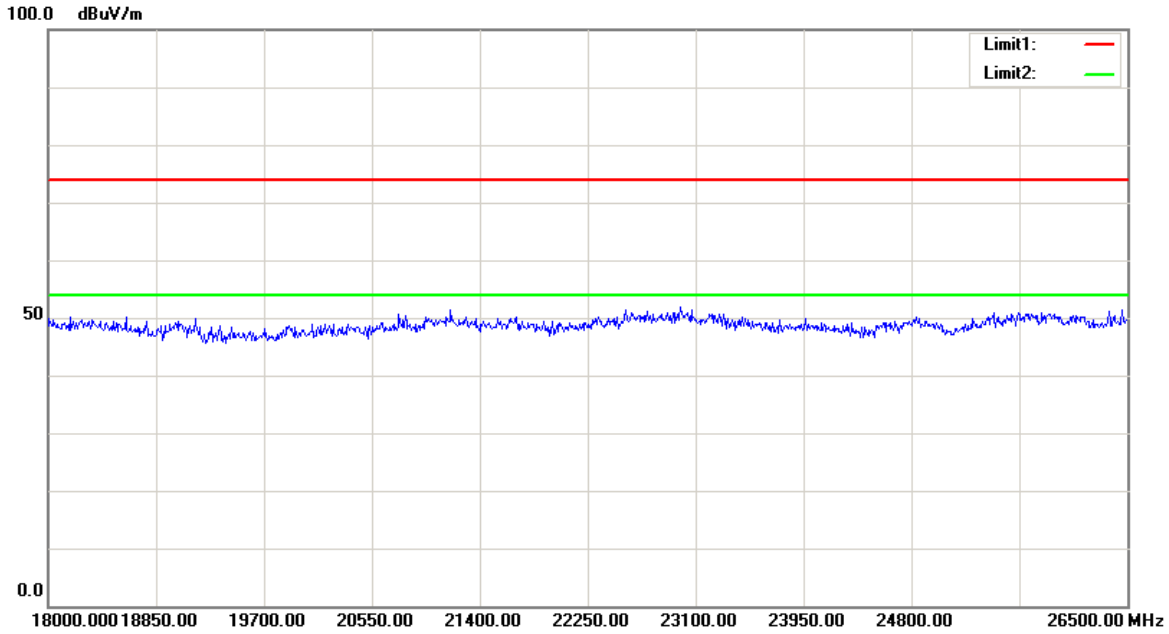

100.0 dBuV/m
Limit1:
Limit2:
50
0.0
26500.000 27850.00 29200.00 30550.00 31900.00 33250.00 34600.00 35950.00 37300.00 40000.00 MHz

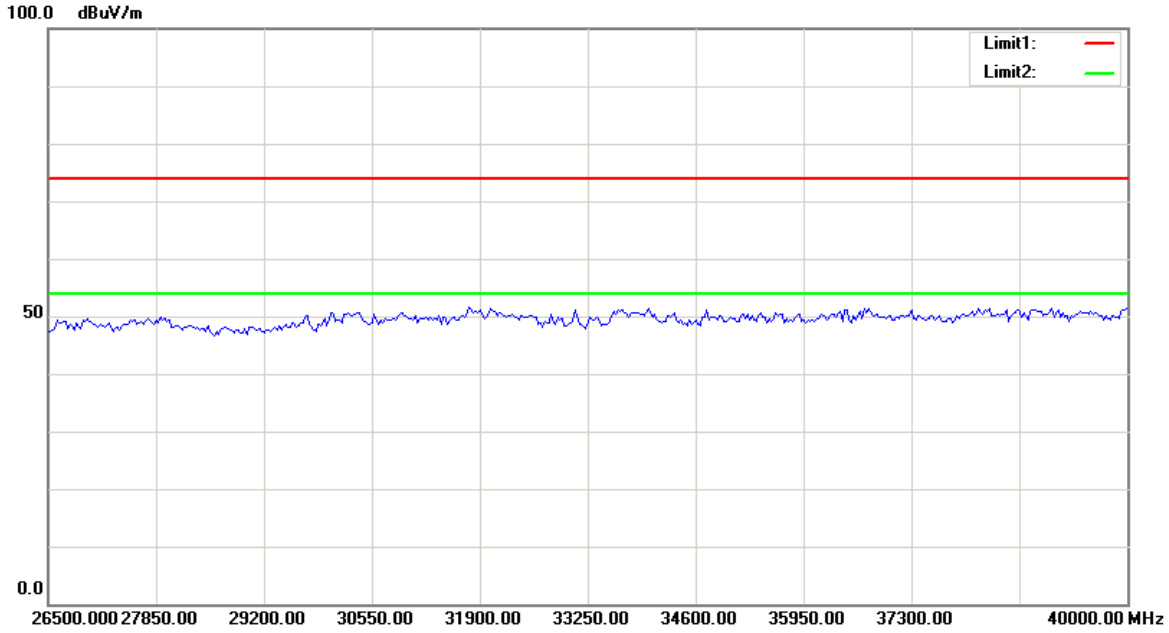
Vertical:

Fundamental Test with Band Rejection Filter






100.0 dBuV/m
Limit1:
Limit2:
50
0.0
18000.000 18850.00 19700.00 20550.00 21400.00 22250.00 23100.00 23950.00 24800.00 26500.00 MHz


100.0 dBuV/m
Limit1:
Limit2:
50
0.0
26500.000 27850.00 29200.00 30550.00 31900.00 33250.00 34600.00 35950.00 37300.00 40000.00 MHz

FCC §15.215(c) – 20 dB BANDWIDTH TESTING

Applicable Standard

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
3. Repeat above procedures until all frequencies measured were complete.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2016-12-08	2017-12-08
Unknown	Coaxial Cable	0.1m	C-1	Each Time	/

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

Test Data

Environmental Conditions

Temperature:	24.5 °C
Relative Humidity:	66 %
ATM Pressure:	99.8 kPa

The testing was performed by Sun Zhong on 2017-07-26.

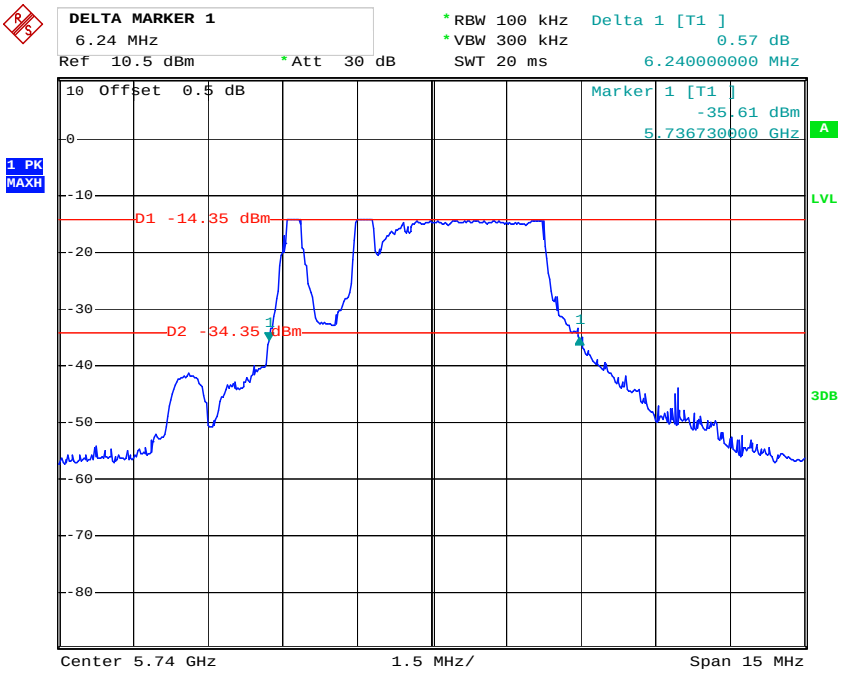
Test Result: Compliant.

Please refer to following tables and plots

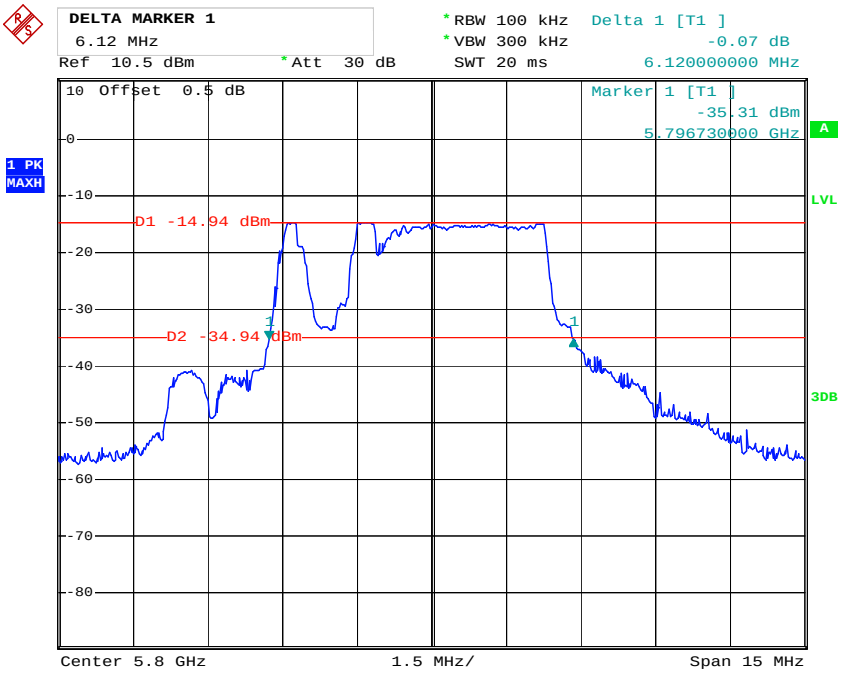
Test Mode: Transmitting

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
Low	5740	6.24
Middle	5800	6.12
High	5860	6.63

Low Channel



Middle Channel



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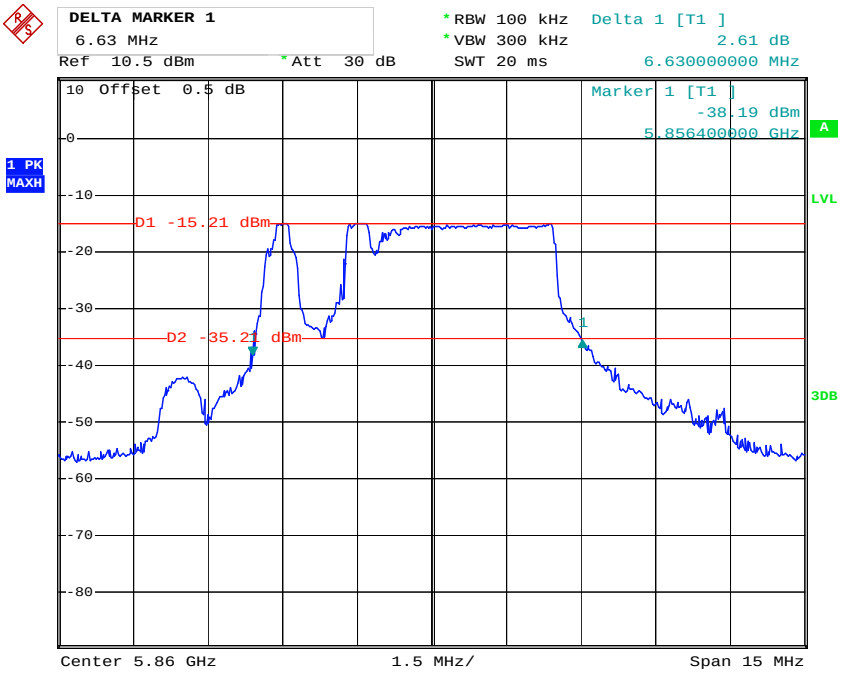
High Channel



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