FCC Test Report

Equipment	:	**GPON ONT**
Brand Name	:	ADTRAN
Model No.	:	**424RG3**
Contained FCC ID	:	**HDC424RG350X** **HDC414RG24X**
Standard	:	**47 CFR FCC Part 15**
Applicant	:	**Adtran** 901 Explorer Blvd., Huntsville, AL 35806, US
Manufacturer	:	**XAVi Technologies Corporation** 9F, No.129, Hsing Te Rd., Sanchung Dist., New Taipei City 241, Taiwan, R.O.C.

The product sample received on Jul. 21, 2016 and completely tested on Aug. 09, 2016. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by:

Kevin Liang / Assistant Manager

Testing Laboratory
1190

Table of Contents

1 CO-LOCATION 4

1.1 Information 4

1.2 Transmitter Radiated Unwanted Emissions 4

1.2.1 Transmitter Radiated Unwanted Emissions Limit 4
1.2.2 Measuring Instruments 5
1.2.3 Test Procedures 6
1.2.4 Test Setup 7
1.2.5 Results of Radiated Emissions (30 MHz – 1 GHz) 8
1.2.6 Results for Radiated Emissions (1 GHz - 10th Harmonic) 10

1.3 Test Equipment and Calibration Data 12

Revision History

Report No.	Version	Description	Issued Date
FR630718	Rev. 01	Initial issue of report	Sep. 29, 2016

1 CO-LOCATION

1.1 Information

Contained ID	1. HDC424RG350X for 5G Module 2. HDC414RG24X for 2.4G Module

1.2 Transmitter Radiated Unwanted Emissions

1.2.1 Transmitter Radiated Unwanted Emissions Limit

Restricted Band Emissions Limit			
Frequency Range (MHz)	**Field Strength (uV/m)**	**Field Strength (dBuV/m)**	**Measure Distance (m)**
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

Un-restricted Band Emissions Limit	
RF output power procedure	**Limit (dB)**
Peak output power procedure	20
Average output power procedure	30

Note 1: If the peak output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum measured in-band peak PSD level.

Note 2: If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured in-band average PSD level.

1.2.2 Measuring Instruments

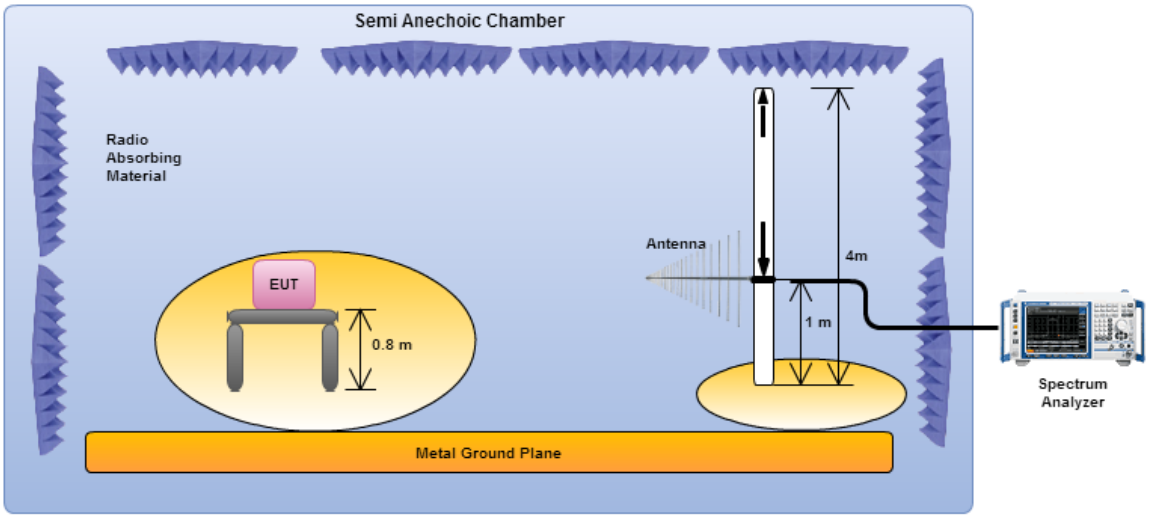
Refer a test equipment and calibration data table in this test report.

1.2.3 Test Procedures

Test Method			
☒	Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).		
☒	The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].		
☒	For the transmitter unwanted emissions shall be measured using following options below:		
	☒	Refer as FCC KDB 558074, clause 10.1 for unwanted emissions into non-restricted bands.	
	☒	Refer as FCC KDB 558074, clause 10.2 for unwanted emissions into restricted bands.	
		☐	Refer as FCC KDB 558074, clause 10.2.3.3 and 8.2.1 Option 1 (spectral trace averaging)
		☐	Refer as FCC KDB 558074, clause 10.2.3.3 and 8.2.1 Option 2 (slow sweep speed).
		☒	Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time.
		☐	Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions.
		☒	Refer as FCC KDB 558074, clause 10.2.3.2 and 8.1.1 measurement procedure peak limit.
		☐	Refer as FCC KDB 558074, clause 10.2.3.1 measurement procedure Quasi-Peak limit.
☒	For radiated measurement, refer as FCC KDB 558074, clause 10.2.1.		
	☒	Refer as ANSI C63.10, clause 6.4 for radiated emissions below 30 MHz and test distance is 3m.	
	☒	Refer as ANSI C63.10, clause 6.5 for radiated emissions 30 MHz to 1 GHz and test distance is 3m.	
	☒	Refer as ANSI C63.10, clause 6.6 for radiated emissions above 1 GHz and test distance is 3m.	
☐	For conducted and cabinet radiation measurement, refer as FCC KDB 558074, clause 10.2.2.		
	☐	For conducted unwanted emissions into non-restricted bands (relative emission limits). Devices with multiple transmit chains: Refer as FCC KDB 662911, when testing out-of-band and spurious emissions against relative emission limits, tests may be performed on each output individually without summing or adding 10 log(N) if the measurements are made relative to the in-band emissions on the individual outputs.	
	☐	For conducted unwanted emissions into restricted bands (absolute emission limits). Devices with multiple transmit chains using options given below: (1) Measure and sum the spectra across the outputs or (2) Measure and add 10 log(N) dB	

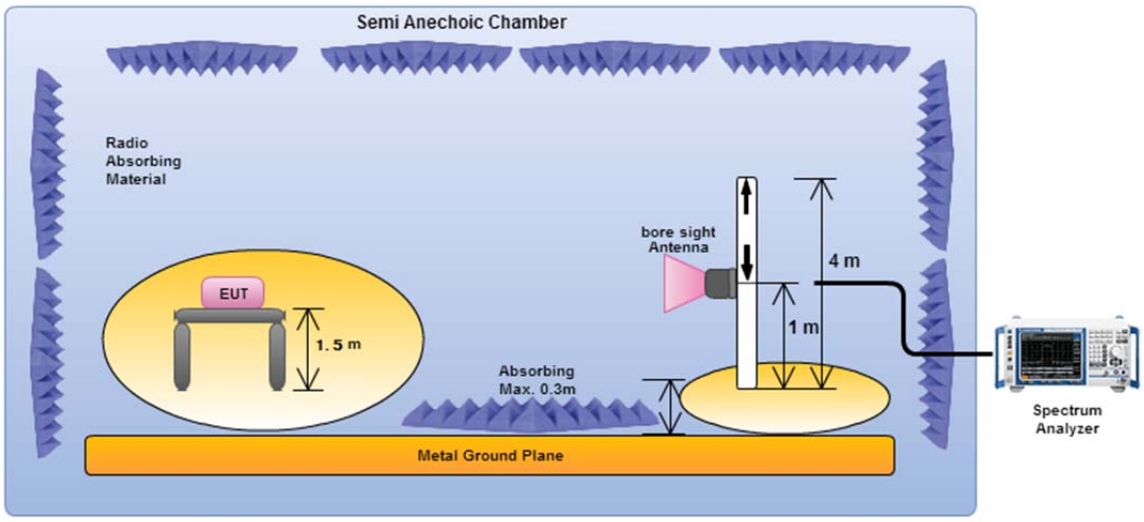
1.2.4 Test Setup

Transmitter Radiated Unwanted Emissions (Below 1 GHz)



Electric field tests shall be performed in the frequency range of 30 MHz to 1000 MHz using a calibrated bi-log antenna.

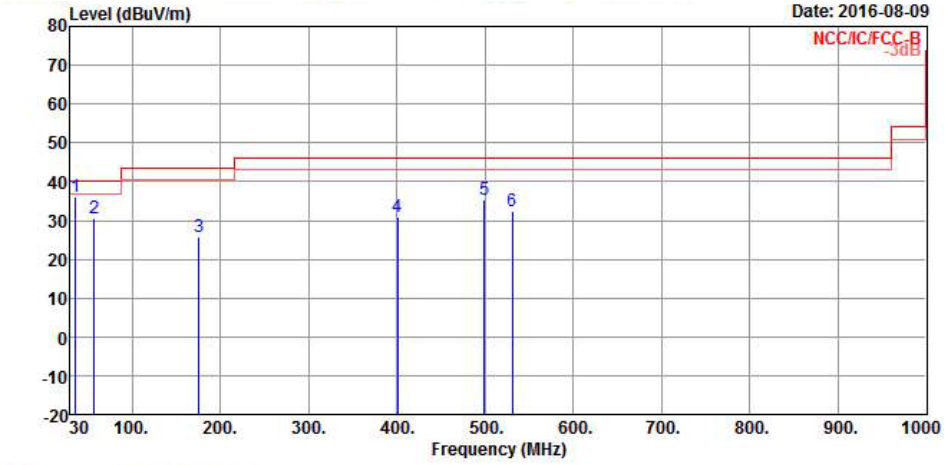
Transmitter Radiated Unwanted Emissions (Above 1 GHz)



Electric field tests shall be performed in the frequency range of 1 GHz to 10th harmonic of highest fundamental frequency or 40 GHz using a calibrated horn antenna.

1.2.5 Results of Radiated Emissions (30 MHz – 1 GHz)

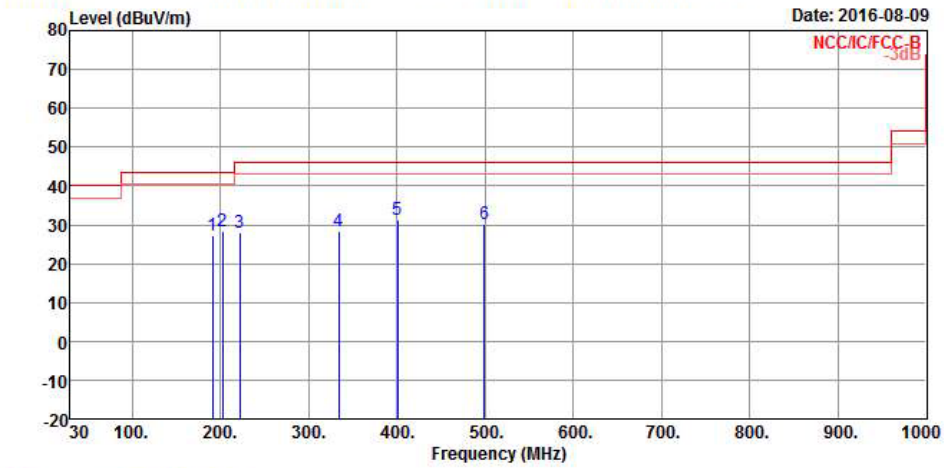
Transmitter Radiated Unwanted Emissions (Below 1 GHz)			
Operating Mode	Transmit Mode	**Polarization**	V
Operating Function	2.4GHz WiFi TX HT20 (2437MHz) + 5GHz WiFi TX VHT20 band 1 (5240MHz)		



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	35.820	36.04	-3.96	40.00	40.72	22.01	0.85	27.54	Peak
2	57.160	30.67	-9.33	40.00	43.84	13.21	1.10	27.48	Peak
3	175.500	25.93	-17.57	43.50	35.13	15.74	2.10	27.04	Peak
4	400.540	30.83	-15.17	46.00	31.93	22.37	3.24	26.71	Peak
5	499.480	35.41	-10.59	46.00	35.84	23.80	3.56	27.79	Peak
6	530.520	32.54	-13.46	46.00	32.47	24.33	3.61	27.87	Peak

Note 1: “>20 dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

Transmitter Radiated Unwanted Emissions (Below 1 GHz)			
Operating Mode	Transmit Mode	**Polarization**	H
Operating Function	2.4GHz WiFi TX HT20 (2437MHz) + 5GHz WiFi TX VHT20 band 1 (5240MHz)		

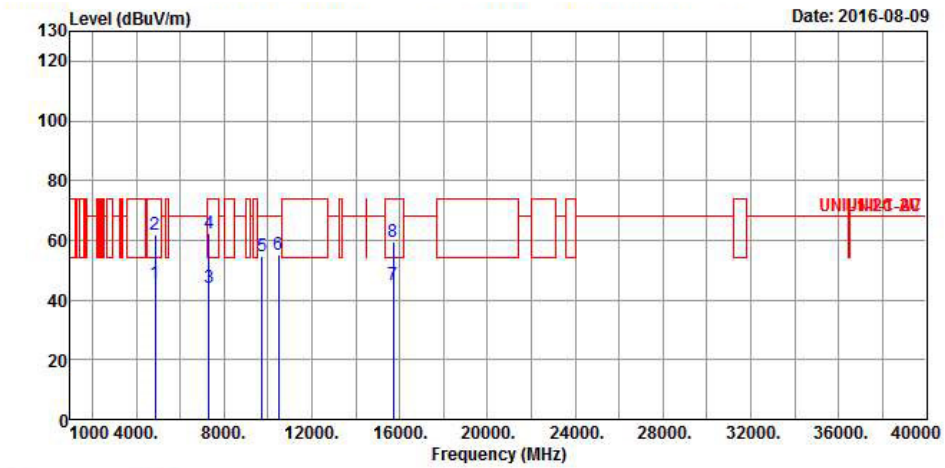


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	191.020	27.24	-16.26	43.50	36.35	15.64	2.21	26.96	Peak
2	202.660	28.47	-15.03	43.50	36.75	16.34	2.29	26.91	Peak
3	222.060	27.80	-18.20	46.00	35.84	16.47	2.36	26.87	Peak
4	334.580	28.18	-17.82	46.00	31.13	20.81	2.94	26.70	Peak
5	400.540	31.34	-14.66	46.00	32.44	22.37	3.24	26.71	Peak
6	499.480	30.31	-15.69	46.00	30.74	23.80	3.56	27.79	Peak

Note 1: “>20 dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

1.2.6 Results for Radiated Emissions (1 GHz - 10th Harmonic)

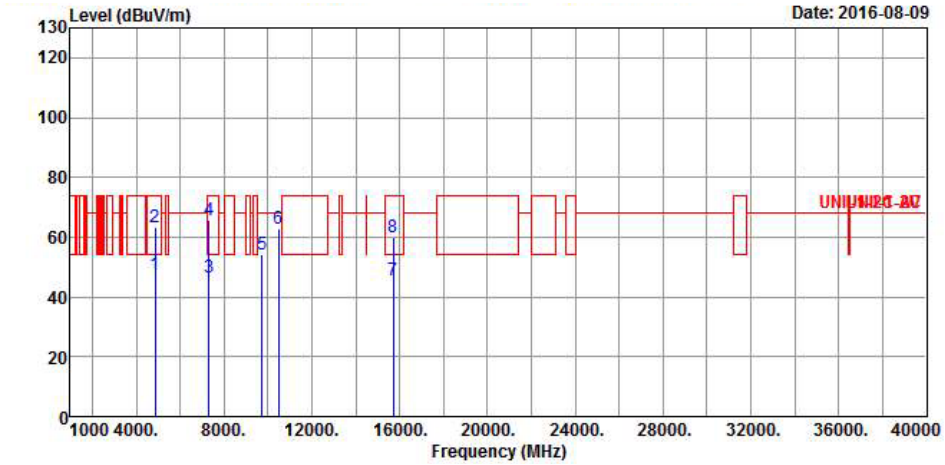
Transmitter Radiated Unwanted Emissions (Above 1 GHz)			
Operating Mode	Transmit Mode	**Polarization**	V
Operating Function	2.4GHz WiFi TX HT20 (2437MHz) + 5GHz WiFi TX VHT20 band 1 (5240MHz)		



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4874.000	45.81	-8.19	54.00	43.68	31.22	5.49	34.58	Average
2	4874.000	61.99	-12.01	74.00	59.86	31.22	5.49	34.58	Peak
3	7311.000	44.21	-9.79	54.00	36.25	35.85	7.02	34.91	Average
4	7311.000	62.38	-11.62	74.00	54.42	35.85	7.02	34.91	Peak
5	9748.000	54.85	-13.35	68.20	43.19	38.75	8.20	35.29	Peak
6	10480.000	55.07	-13.13	68.20	42.10	39.38	8.55	34.96	Peak
7	15720.000	45.30	-8.70	54.00	31.70	37.87	10.75	35.02	Average
8	15720.000	59.65	-14.35	74.00	46.05	37.87	10.75	35.02	Peak

Note 1: “>20 dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Transmitter Radiated Unwanted Emissions (Above 1 GHz)			
Operating Mode	Transmit Mode	**Polarization**	H
Operating Function	2.4GHz WiFi TX HT20 (2437MHz) + 5GHz WiFi TX VHT20 band 1 (5240MHz)		



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4874.000	47.66	-6.34	54.00	45.53	31.22	5.49	34.58	Average
2	4874.000	63.25	-10.75	74.00	61.12	31.22	5.49	34.58	Peak
3	7311.000	46.70	-7.30	54.00	38.74	35.85	7.02	34.91	Average
4	7311.000	65.69	-8.31	74.00	57.73	35.85	7.02	34.91	Peak
5	9748.000	54.08	-14.12	68.20	42.42	38.75	8.20	35.29	Peak
6	10480.000	62.72	-5.48	68.20	49.75	39.38	8.55	34.96	Peak
7	15720.000	45.65	-8.35	54.00	32.05	37.87	10.75	35.02	Average
8	15720.000	59.73	-14.27	74.00	46.13	37.87	10.75	35.02	Peak

Note 1: “>20 dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

1.3 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30 MHz ~ 1 GHz 3m	28/11/2015	27/11/2016
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	1 GHz ~ 18 GHz 3m	16/12/2015	15/12/2016
Amplifier	HP	8447D	2944A08033	10 kHz ~ 1.3 GHz	10/05/2016	09/05/2017
Amplifier	Agilent	8449B	3008A02120	1 GHz ~ 26.5 GHz	02/09/2015	01/09/2016
Amplifier	MITEQ	JS44-18004000-33-8P	1840917	18 GHz ~ 40 GHz	02/06/2015	01/06/2017
Spectrum	R&S	FSV40	101513	9 kHz ~ 40 GHz	16/02/2016	15/02/2017
Bilog Antenna	SCHAFFNER	CBL 6112D	22237	30 MHz ~ 1 GHz	18/09/2015	17/09/2016
Horn Antenna	SCHWARZBECK	BBHA9120D	1531	1 GHz ~ 18 GHz	22/04/2016	21/04/2017
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	18 GHz ~ 40 GHz	29/01/2016	28/01/2017