FCC EMI TEST REPORT

FCC ID	:	**GZ5NVG558**
Equipment	:	**Fixed Broadband Gateway**
Brand Name	:	**ARRIS**
Model Name	:	**NVG558H**
Applicant	:	**Arris** **101 Tournament Drive, Horsham PA, 19044**
Manufacturer	:	**Arris** **101 Tournament Drive, Horsham PA, 19044**
Standard	:	**FCC 47 CFR FCC Part 15 Subpart B Class B**

The product was received on Sep. 26, 2019 and testing was started from Sep. 26, 2019 and completed on Oct. 01, 2019. We, Sporton International (USA) Inc., would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI C63.4-2014 and has been in compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by A2LA or any agency of government.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (USA) Inc., the test report shall not be reproduced except in full.

Approved by: Ken Chen

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History of this test report

Report No.	Version	Description	Issued Date
FC190926002	01	Initial issue of report	Oct. 22, 2019

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.107	AC Conducted Emission	Pass	Under limit 15.19 dB at 0.481 MHz
3.2	15.109	Radiated Emission	Pass	Under limit 0.17 dB at 53.280 MHz for Quasi-Peak

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

1. General Description

1.1. Product Feature of Equipment Under Test

LTE, Wi-Fi 2.4GHz 802.11b/g/n, Wi-Fi 5GHz 802.11a/n/ac.

Product Specification subjective to this standard	
Integrated the WLAN Module	Brand Name: ARRIS Model Name: NVG5XDBAC FCC ID: PGR-NVG5XDBAC
Antenna Type	WWAN: Fixed Externa / Fixed Internal Antenna WLAN: PCB Antenna

Remark: All the tests were performed with Fixed Internal Antenna.

1.2. Modification of EUT

No modifications are made to the EUT during all test items.

1.3. Test Location

Test Site	Sporton International (USA) Inc.	
Test Site Location	1175 Montague Expressway, Milpitas, CA 95035 TEL : 408 9043300	
Test Site No.	**Sporton Site No.**	
	CO01-CA	03CH01-CA

1.4. Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC 47 CFR FCC Part 15 Subpart B
- ANSI C63.4-2014

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

2. Test Configuration of Equipment Under Test

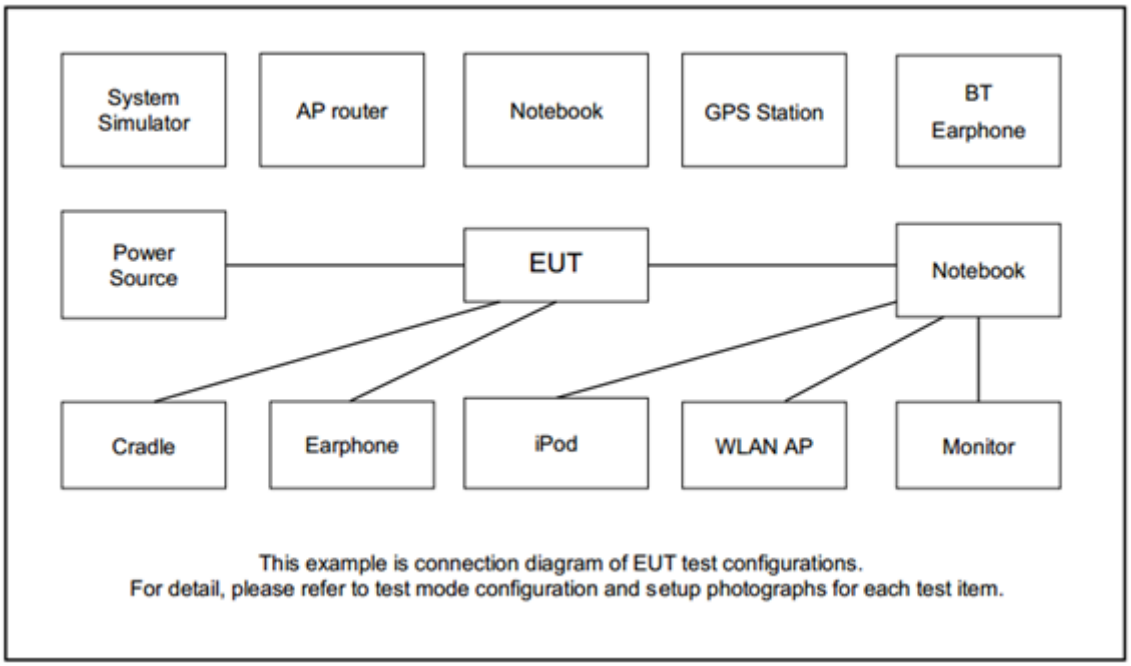
2.1. Test Mode

The EUT has been associated with peripherals pursuant to ANSI C63.4-2014 and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (30MHz to the 5th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

Test Items	Function Type
AC Conducted Emission	Mode 1: LTE Band 30 Idle + WLAN Idle + WAN Load + LAN Link + USB Load + RJ11 Link (Charging from Adapter) Mode 2: WLAN Idle + WAN Link + LAN Link + USB Load + RJ11 Link (Charging from Adapter)
Radiated Emissions	Mode 1: LTE Band 30 Idle + WLAN Idle + WAN Load + LAN Link + USB Load + RJ11 Link (Charging from Adapter) Mode 2: WLAN Idle + WAN Link + LAN Link + USB Load + RJ11 Link (Charging from Adapter)
Remark: **1.** The worst case of AC is mode 2; only the test data of this mode was reported. **2.** The worst case of RE is mode 1; only the test data of this mode was reported.	

2.2. Connection Diagram of Test System



2.3. Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m

2.4. EUT Operation Test Setup

The EUT was in LTE idle mode during the testing. The EUT was synchronized with the BCCH, and had been continuous receiving mode by setting paging reorganization of the system simulator.

1. Execute “Ping” and link with Notebook via RJ-45 Cable.
2. EUT links with Phone with RJ-11.

3. Test Result

3.1. Test of AC Conducted Emission Measurement

3.1.1. Limits of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

<Class B>

Frequency of emission (MHz)	Conducted limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

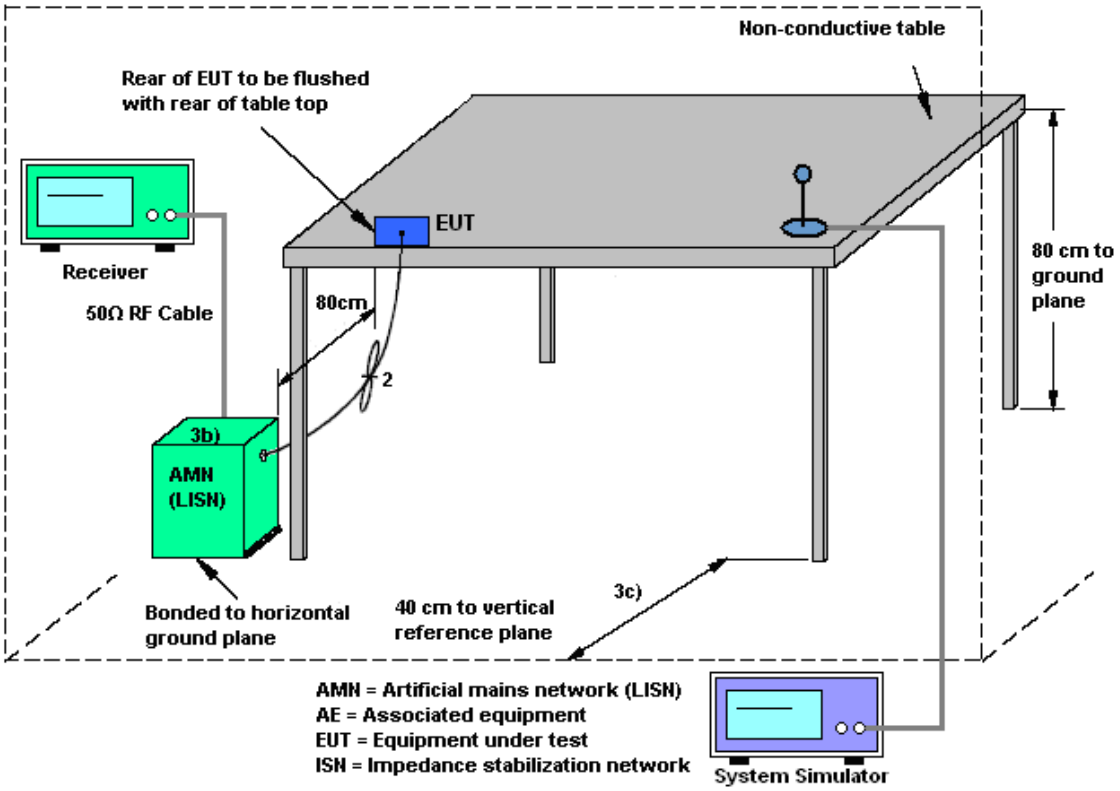
3.1.2. Measuring Instruments

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

3.1.3. Test Procedure

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

3.1.4. Test Setup



3.1.5. Test Result of AC Conducted Emission

Please refer to Appendix A.

3.2. Test of Radiated Emission Measurement

3.2.1. Limit of Radiated Emission

The emissions from an unintentional radiator shall not exceed the field strength levels specified in the following table:

<Class B>

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.2.2. Measuring Instruments

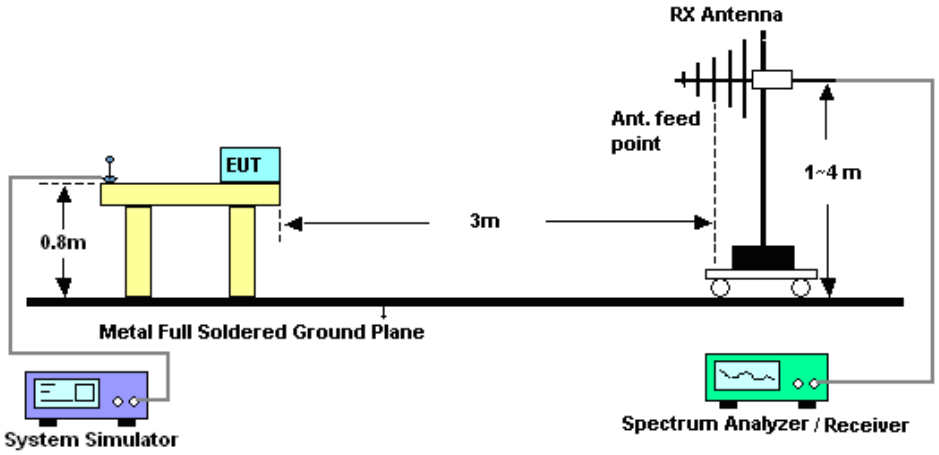
Refer a test equipment and calibration data table in this test report.

3.2.3. Test Procedures

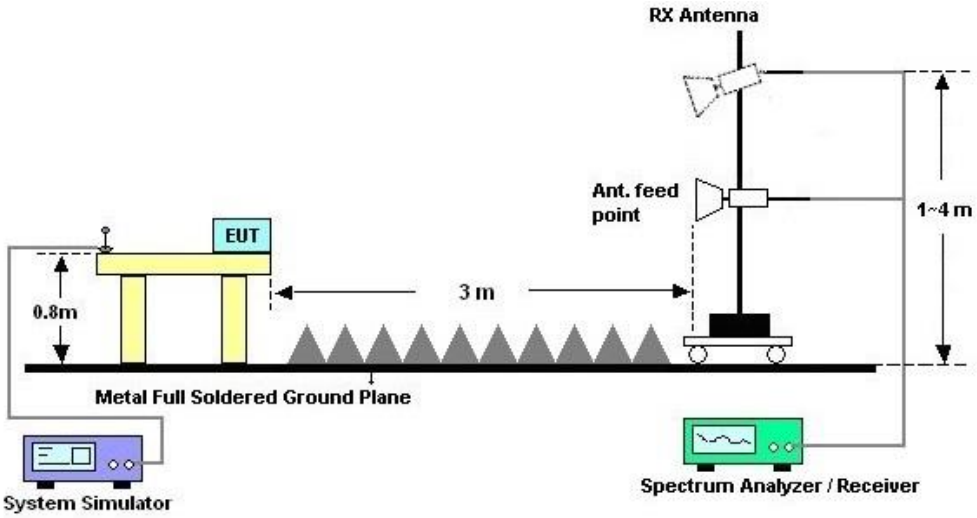
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna is a Bi-Log antenna and its height is adjusted between one to four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode (RBW=120kHz/VBW=300kHz for frequency below 1GHz; RBW=1MHz VBW=3MHz (Peak), RBW=1MHz/VBW=10Hz (Average) for frequency above 1GHz).
7. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, peak values of EUT will be reported. Otherwise, the emission will be repeated by using the quasi-peak method and reported.
8. Emission level (dBμV/m) = 20 log Emission level (μV/m)
9. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

3.2.4. Test Setup of Radiated Emission

For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.2.5. Test Result of Radiated Emission

Please refer to Appendix B.

4. List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
LISN	TESEQ	NNB51	47407	N/A	Jun. 26, 2019	Oct. 01, 2019	Jun. 25, 2020	Conduction (CO01-CA)
EMI Test Receiver	R&S	ESR7	102177	9KHz~7GHz	Jun. 27, 2019	Oct. 01, 2019	Jun. 26, 2020	Conduction (CO01-CA)
Pulse limiter with 10dB attenuation	R&S	VTSD 9561-F N	9561-F-N00412	N/A	Jun. 11, 2019	Oct. 01, 2019	Jun. 10, 2020	Conduction (CO01-CA)
Test Software	EMC32	N/A	N/A	N/A	N/A	Oct. 01, 2019	N/A	Conduction (CO01-CA)
Bilog Antenna	TESEQ	6111D	50391	30MHz~1GHz	Jun. 26, 2019	Sep. 26, 2019	Jun. 25, 2020	Radiation (03CH01-CA)
Horn Antenna	SCHWARZBECK	BBHA 9120D	02140	1GHz~18GHz	Aug. 19, 2019	Sep. 26, 2019	Aug. 18, 2020	Radiation (03CH01-CA)
Amplifier	SONOMA	310N	372241	N/A	Jul. 26, 2019	Sep. 26, 2019	Jul. 25, 2020	Radiation (03CH01-CA)
Preamplifier	Jet-Power	JPA0118-55-303	1710001800055007	1GHz~18GHz	Apr. 01, 2019	Sep. 26, 2019	Mar. 31, 2020	Radiation (03CH01-CA)
Preamplifier	Keysight	83017A	MY53270323	1GHz~26.5GHz	Jul. 26, 2019	Sep. 26, 2019	Jul. 25, 2020	Radiation (03CH01-CA)
EMI Test Receiver	R&S	ESU26	100049	20Hz~26.5GHz	Jul. 31, 2019	Sep. 26, 2019	Jul. 30, 2020	Radiation (03CH01-CA)
Filter	Wainwright	WLK12-1200-1272-11000-40SS	SN1	1.2G Low Pass	Aug. 02, 2019	Sep. 26, 2019	Aug. 01, 2020	Radiation (03CH01-CA)
Filter	Wainwright	WHKX12-2700-3000-18000-60ST	SN9	3G High pass	Aug. 02, 2019	Sep. 26, 2019	Aug. 01, 2020	Radiation (03CH01-CA)
Filter	Wainwright	WHKX8-5872.5-6750-18000-40ST	SN8	6.75 High pass	Aug. 02, 2019	Sep. 26, 2019	Aug. 01, 2020	Radiation (03CH01-CA)
Notch Filter	Wainwright	WRCJV10-2375-2400-2483-2508-40SS	SN4	Notch Filter	Aug. 02, 2019	Sep. 26, 2019	Aug. 01, 2020	Radiation (03CH01-CA)
Notch Filter	Wainwright	WRCJV12-5120-5150-5350-5380-40SS	SN14	Notch Filter	Aug. 02, 2019	Sep. 26, 2019	Aug. 01, 2020	Radiation (03CH01-CA)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	Sep. 26, 2019	N/A	Radiation (03CH01-CA)
Turn Table	ChainTek	T-200-S-1	N/A	0~360 Degree	N/A	Sep. 26, 2019	N/A	Radiation (03CH01-CA)

5. Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**1.7**

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.4**

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

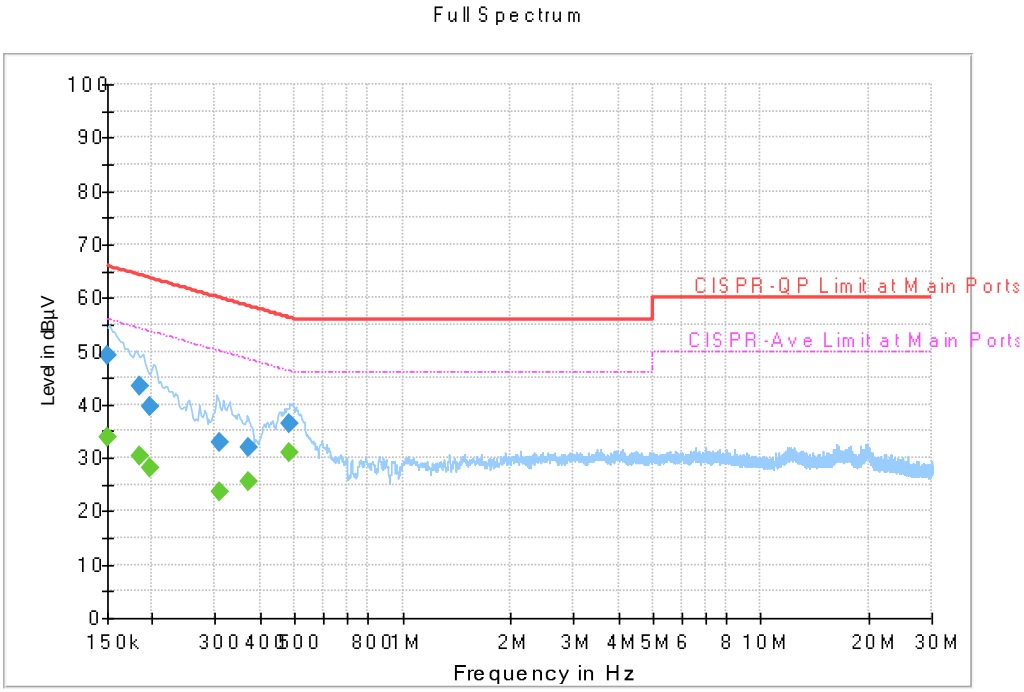
Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**6.5**

Appendix A. AC Conducted Emission Test Results

Test Engineer :	Eric Jeng	**Temperature :**	22~25℃
		Relative Humidity :	42~48%

EUT Information

Test Site :	CO01-CA
Project No :	190926002
TestMode :	Mode 2
Test Voltage :	120Vac/60Hz
Phase :	Line

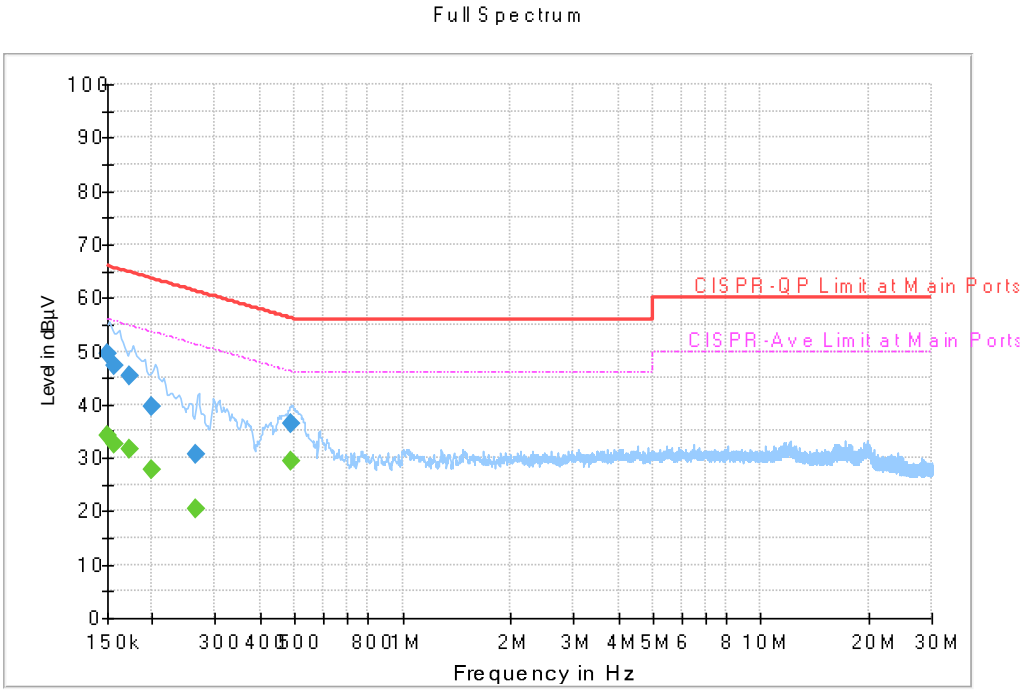


Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.150473	---	33.96	55.97	22.01	L1	OFF	20.0
0.150473	49.19	---	65.97	16.78	L1	OFF	20.0
0.184380	---	30.46	54.29	23.83	L1	OFF	20.0
0.184380	43.37	---	64.29	20.92	L1	OFF	20.0
0.197250	---	27.97	53.73	25.76	L1	OFF	20.0
0.197250	39.61	---	63.73	24.12	L1	OFF	20.0
0.307500	---	23.77	50.04	26.27	L1	OFF	20.0
0.307500	32.85	---	60.04	27.19	L1	OFF	20.0
0.372750	---	25.63	48.44	22.81	L1	OFF	20.0
0.372750	32.08	---	58.44	26.36	L1	OFF	20.0
0.480840	---	31.14	46.33	15.19	L1	OFF	20.0
0.480840	36.54	---	56.33	19.79	L1	OFF	20.0

EUT Information

Test Site :	CO01-CA
Project No :	190926002
Test Mode :	Mode 2
Test Voltage :	120Vac/60Hz
Phase :	Neutral

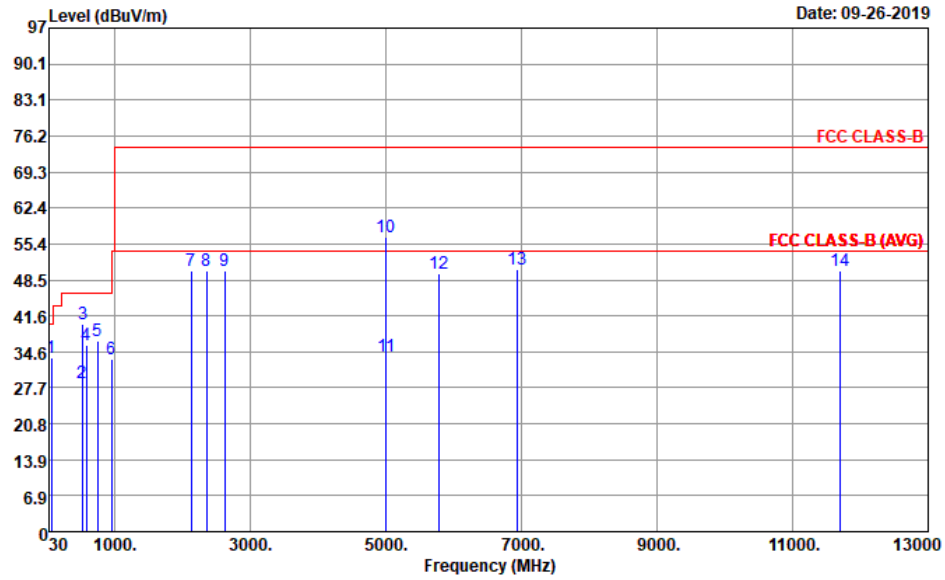


Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.150810	---	34.13	55.96	21.83	N	OFF	20.0
0.150810	49.37	---	65.96	16.59	N	OFF	20.0
0.156750	---	32.72	55.63	22.91	N	OFF	20.0
0.156750	47.31	---	65.63	18.32	N	OFF	20.0
0.172500	---	31.50	54.84	23.34	N	OFF	20.0
0.172500	45.29	---	64.84	19.55	N	OFF	20.0
0.199500	---	27.86	53.63	25.77	N	OFF	20.0
0.199500	39.50	---	63.63	24.13	N	OFF	20.0
0.264750	---	20.33	51.28	30.95	N	OFF	20.0
0.264750	30.72	---	61.28	30.56	N	OFF	20.0
0.487500	---	29.33	46.21	16.88	N	OFF	20.0
0.487500	36.39	---	56.21	19.82	N	OFF	20.0

Appendix B. Radiated Emission Test Result

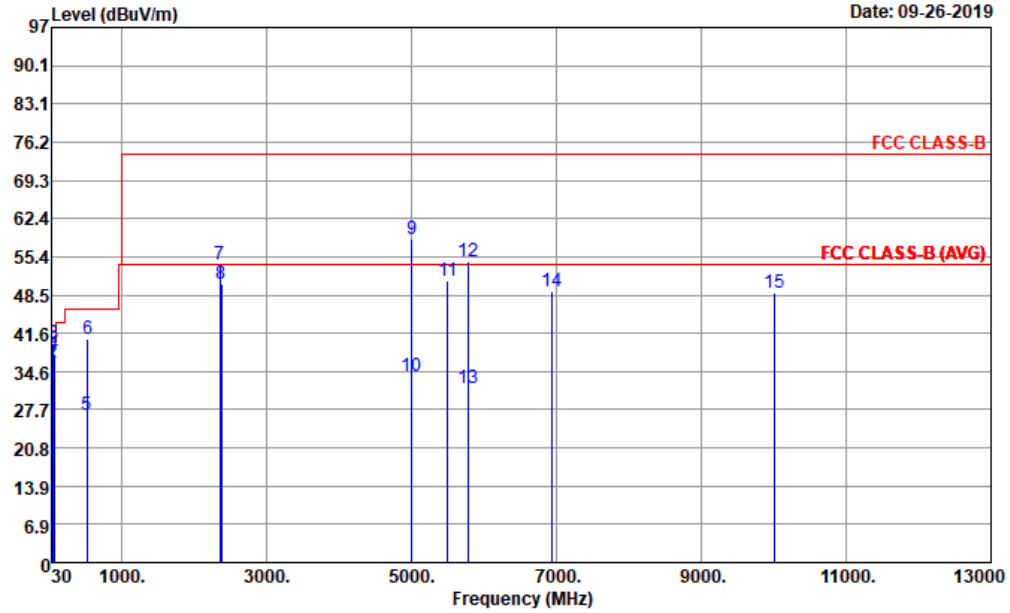
Test Engineer :	Eric Jeng	**Temperature :**	22~25°C
		Relative Humidity :	42~48%
Test Distance :	3m	**Polarization :**	Horizontal
Remark :	#8 is system simulator signal which can be ignored.		



Site : 03CH01-CA
Condition : FCC CLASS-B 3m HORN 9120D-HF_02140 HORIZONTAL
: RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Project : 190926002
EUT : FIXED BROADBAND GATEWAY
POWER : AVR 120V / 60 Hz
Model : NVG558H
Plane : EUT_With Adapter
: LTE_Band30_BW 10M_CH27710_1RB0 QPSK
: Wifi 2.4G Ch01 + Wifi 5G Ch36 Idle
: Lan port to NB (LAN Test)

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	64.92	33.56	-6.44	40.00	52.26	11.89	1.45	32.45	---	---	Peak
2	523.73	28.51	-17.49	46.00	33.70	23.97	3.47	32.75	100	355	QP
3	533.43	39.96	-6.04	46.00	45.10	24.00	3.52	32.76	100	264	QP
4	578.05	35.82	-10.18	46.00	38.84	25.94	3.75	32.82	---	---	Peak
5	746.83	36.76	-9.24	46.00	36.99	28.04	4.05	32.56	---	---	Peak
6	954.41	33.17	-12.83	46.00	28.27	30.98	4.65	31.18	---	---	Peak
7	2126.00	50.35	-23.65	74.00	47.42	27.54	6.52	31.31	---	---	Peak
8	2355.00			74.00	46.55	27.79	6.90	31.19	---	---	Peak
9	2626.00	50.23	-23.77	74.00	45.81	27.80	7.34	31.04	---	---	Peak
10	5000.00	56.71	-17.29	74.00	69.70	31.60	10.33	56.62	100	303	Peak
11	5000.00	33.91	-20.09	54.00	46.90	31.60	10.33	56.62	100	303	Average
12	5788.00	49.66	-24.34	74.00	61.75	32.25	11.39	57.10	---	---	Peak
13	6948.00	50.50	-23.50	74.00	58.70	35.09	12.03	57.02	---	---	Peak
14	11698.00	50.29	-23.71	74.00	54.42	39.75	15.58	59.85	---	---	Peak

Test Engineer :	Eric Jeng	**Temperature :**	22~25°C
		Relative Humidity :	42~48%
Test Distance :	3m	**Polarization :**	Vertical
Remark :	#7 is system simulator signal which can be ignored.		



Site : 03CH01-CA
Condition : FCC CLASS-B 3m HORN 9120D-HF_02140 VERTICAL
: RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Project : 190926002
EUT : FIXED BROADBAND GATEWAY
POWER : AVR 120V / 60 Hz
Model : NVG558H
Plane : EUT_With Adapter
: LTE_Band30_BW 10M_CH27710_1RB0 QPSK
: Wifi 2.4G Ch01 + Wifi 5G Ch36 Idle
: Lan port to NB (LAN Test)

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	30.97	36.25	-3.75	40.00	43.21	24.32	1.16	32.50	100	0	QP
2	41.64	36.18	-3.82	40.00	48.70	18.62	1.27	32.48	100	0	QP
3	53.28	39.83	-0.17	40.00	57.71	12.89	1.38	32.46	100	223	QP
4	63.95	37.71	-2.29	40.00	56.50	11.80	1.44	32.45	100	360	QP
5	523.73	26.71	-19.29	46.00	31.90	23.97	3.47	32.75	100	360	QP
6	533.43	40.56	-5.44	46.00	45.70	24.00	3.52	32.76	100	323	QP
7	2355.00			74.00	50.17	27.89	6.90	31.19	---	---	Peak
8	2376.00	50.44	-23.56	74.00	46.70	27.77	6.93	31.18	---	---	Peak
9	5000.00	58.56	-15.44	74.00	71.46	31.69	10.33	56.62	110	0	Peak
10	5000.00	33.80	-20.20	54.00	46.70	31.69	10.33	56.62	110	0	Average
11	5500.00	50.94	-23.06	74.00	62.81	32.01	11.00	57.01	---	---	Peak
12	5788.00	54.48	-19.52	74.00	66.58	32.24	11.39	57.10	186	0	Peak
13	5788.00	31.48	-22.52	54.00	43.58	32.24	11.39	57.10	186	0	Average
14	6948.00	49.14	-24.86	74.00	57.35	35.08	12.03	57.02	---	---	Peak

Test Engineer :	Eric Jeng	**Temperature :**	22~25°C
		Relative Humidity :	42~48%
Test Distance :	3m	**Polarization :**	Vertical

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
15	10000.00	48.98	-25.02	74.00	53.12	38.82	14.72	58.15	---	---	Peak