



FCC RADIO 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 : 47 CFR Part 2,

The product was received on Sep. 26, 2019 and testing was started from Oct. 03, 2019 and completed on Oct. 10, 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 / TIA-603-E 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 partial 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

Sporton International (USA) Inc.
1175 Montague Expressway, Milpitas, CA 95035



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History of this test report

Report No.	Version	Description	Issued Date
FG190926002B	01	Initial issue of report	Oct. 22, 2019

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.2	§2.1046	Conducted Output Power	Reporting only	-
	§90.542 (a)(7)	Effective Radiated Power	Pass	-
4.2	§2.1053 §90.543 (e)(3) §90.543 (f)	Radiated Spurious Emission	Pass	Under limit 19.94 dB at 1568.000 MHz

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

Product Specification subjective to this standard	
Antenna Type	WWAN: Fixed External Antenna / Fixed Internal Antenna

1.2 Modification of EUT

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

1.3 Testing Site

Test Site	Sporton International (USA) Inc.	
Test Site Location	1175 Montague Expressway, Milpitas, CA 95035 TEL : 408 9043300	
Test Site No.	Sporton Site No.	
	03CH01-CA	SAR01-CA
Test Engineer	Eric Jeng	Steven
Temperature	20°C	22.4°C
Relative Humidity	38.5%	47%

Note: The test site complies with ANSI C63.4 2014 requirement.

1.4 Applied Standards

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

- ♦ ANSI C63.26-2015
- ♦ 47 CFR Part 2, Part 90(R)
- ♦ ANSI / TIA-603-E
- ♦ FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- ♦ FCC KDB 412172 D01 Determining ERP and EIRP v01r01

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

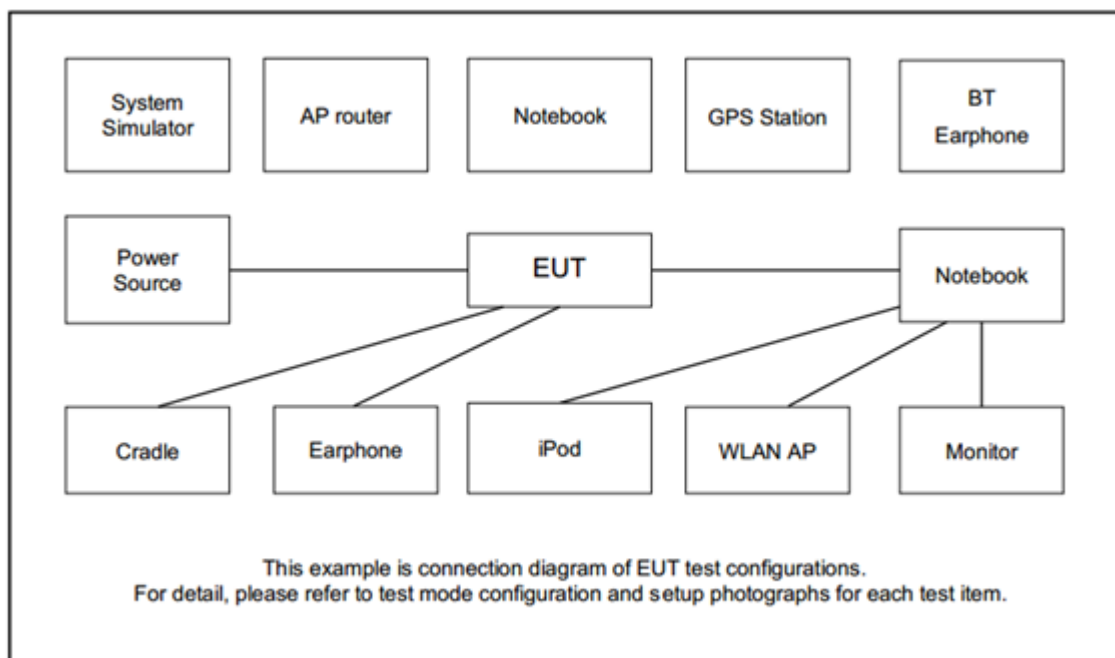
2.1 Test Mode

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas. License Digital Systems v03r01 with maximum output power.

For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y plane) were recorded in this report.

Conducted Test Cases	Band	Bandwidth (MHz)						Modulation			RB #			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full	L	M	H
Max. Output Power	14	-	-	V	V	-	-	V	V	V	V	V	V	V	V	V
E.R.P	14	-	-	V	V	-	-	V	V	V	V			V	V	V
Radiated Spurious Emission	14	Worst Case												V	V	V
Remark	1. The mark “v” means that this configuration is chosen for testing 2. The mark “-” means that this bandwidth is not supported. 3. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported.															

2.2 Connection Diagram of Test System



2.3 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m

2.4 Frequency List of Low/Middle/High Channels

LTE Band 14 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
10	Channel	-	23330	-
	Frequency	-	793	-
5	Channel	23305	23330	23355
	Frequency	790.5	793	795.5

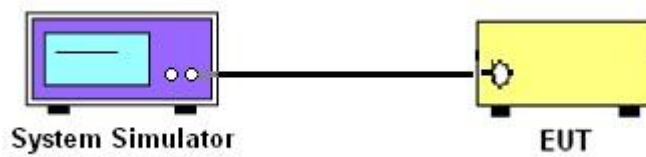
3 Conducted Test Items

3.1 Measuring Instruments

See list of measuring instruments of this test report.

3.1.1 Test Setup

3.1.2 Conducted Output Power



3.1.3 Test Result of Conducted Test

Please refer to Appendix A.

3.2 Conducted Output Power and ERP

3.2.1 Description of the Conducted Output Power Measurement and ERP Measurement

A base station simulator was used to establish communication with the EUT. Its parameters were set to transmit the maximum power on the EUT. The measured power in the radio frequency on the transmitter output terminals shall be reported.

The ERP of mobile transmitters must not exceed 3 Watts for LTE Band 14.

According to KDB 412172 D01 Power Approach,

$EIRP = P_T + G_T - L_C$, $ERP = EIRP - 2.15$, where

P_T = transmitter output power in dBm

G_T = gain of the transmitting antenna in dBi

L_C = signal attenuation in the connecting cable between the transmitter and antenna in dB

3.2.2 Test Procedures

1. The transmitter output port was connected to base station.
2. Set EUT at maximum power through base station.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure and record the power level from the system simulator.

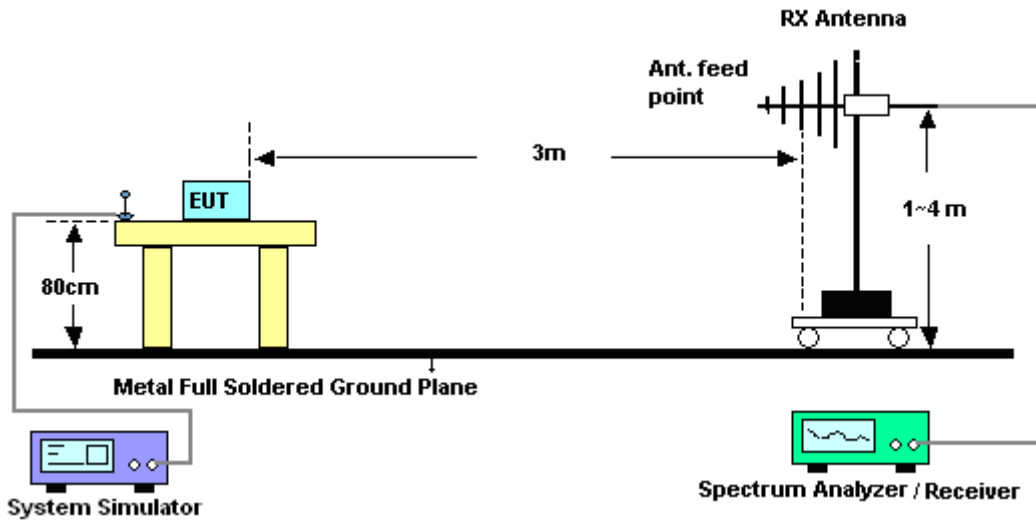
4 Radiated Test Items

4.1 Measuring Instruments

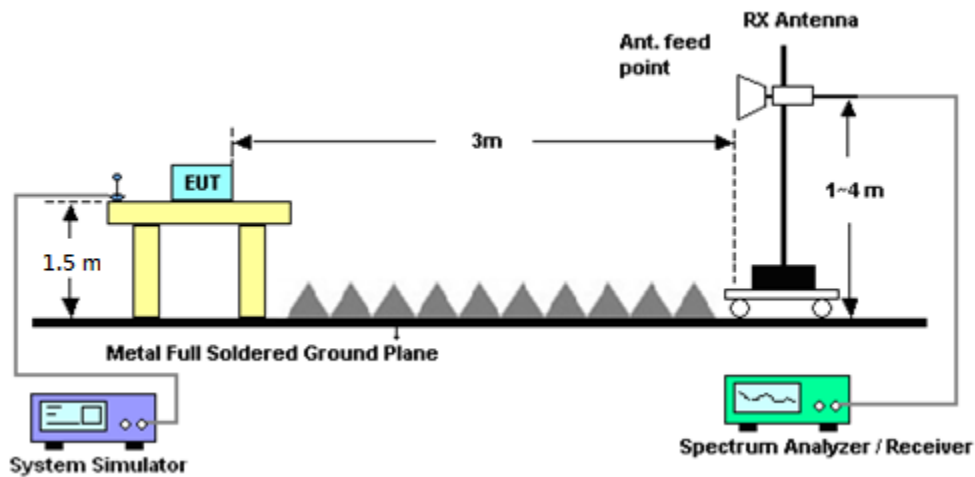
See list of measuring instruments of this test report.

4.1.1 Test Setup

For radiated test from 30MHz to 1GHz



For radiated test above 1GHz



4.1.2 Test Result of Radiated Test

Please refer to Appendix B.



4.2 Radiated Spurious Emission

4.2.1 Description of Radiated Spurious Emission

The radiated spurious emission was measured by substitution method according to ANSI / TIA-603-E. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB.

For operations in the 758-775 MHz and 788-805 MHz bands, all emissions including harmonics in the band 1559–1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

4.2.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 7 and ANSI / TIA-603-E Section 2.2.12.

1. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, Sweep = 500ms, Taking the record of maximum spurious emission.
6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.
10. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
11. The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)



5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Horn Antenna	SCHWARZBECK	BBHA 9120D	02140	1GHz~18GHz	Aug. 19, 2019	Oct. 03, 2019	Aug. 18, 2020	Radiation (03CH01-CA)
Bilog Antenna	TESEQ	6111D	50391	30MHz~1GHz	Jun. 26, 2019	Oct. 03, 2019	Jun. 25, 2020	Radiation (03CH01-CA)
Preamplifier	Jet-Power	JPA0118-55-303	1710001800055007	1GHz~18GHz	Apr. 01, 2019	Oct. 03, 2019	Mar. 31, 2020	Radiation (03CH01-CA)
Preamplifier	Keysight	83017A	MY53270323	1GHz~26.5GHz	Jul. 26, 2019	Oct. 03, 2019	Jul. 25, 2020	Radiation (03CH01-CA)
Amplifier	SONOMA	310N	372241	N/A	Jul. 26, 2019	Oct. 03, 2019	Jul. 25, 2020	Radiation (03CH01-CA)
EMI Test Receiver	R&S	ESU26	100049	20Hz~26.5GHz	Jul. 31, 2019	Oct. 03, 2019	Jul. 30, 2020	Radiation (03CH01-CA)
Filter	Wainwright	WHKX12-2700-3000-18000-60ST	SN9	3G High pass	Aug. 02, 2019	Oct. 03, 2019	Aug. 01, 2020	Radiation (03CH01-CA)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	Oct. 03, 2019	N/A	Radiation (03CH01-CA)
Turn Table	ChainTek	T-200-S-1	N/A	0~360 Degree	N/A	Oct. 03, 2019	N/A	Radiation (03CH01-CA)
Radio Communication Analyzer	Anritsu	MT8820C	6201300652	30MHz-2.7GHz, 3.4GHz-3.8GHz	Apr. 09, 2019	Oct. 10, 2019	Apr. 08, 2020	Conducted (SAR01-CA)

6 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	3.36
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Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	3.59
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Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	4.20
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Appendix A. Test Results of Conducted Test

Conducted Output Power(Average power)

LTE Band 14 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
10	1	0	QPSK		21.00	
10	1	25			20.88	
10	1	49			20.74	
10	25	0			20.00	
10	25	12			19.95	
10	25	25			19.86	
10	50	0			19.93	
10	1	0	16-QAM		20.32	
10	1	25			20.25	
10	1	49			20.09	
10	25	0			19.11	
10	25	12			19.05	
10	25	25			18.96	
10	50	0			19.03	
5	1	0	QPSK	20.92	20.86	20.80
5	1	12		20.80	20.79	20.86
5	1	24		20.62	20.70	20.68
5	12	0		19.89	19.86	19.92
5	12	7		19.91	19.80	19.88
5	12	13		19.86	19.80	19.84
5	25	0		19.90	19.76	19.80
5	1	0	16-QAM	20.29	20.19	20.21
5	1	12		20.05	20.18	20.18
5	1	24		20.05	20.05	19.98
5	12	0		19.11	19.03	19.11
5	12	7		19.01	19.00	19.05
5	12	13		18.81	18.89	18.76
5	25	0		18.84	18.88	18.99



Appendix B. Test Results of ERP and Radiated Test

ERP

LTE Band 14 / 5MHz (Average) (GT - LC = 2.8 dB)							
Channel	Mode	RB		Conducted		ERP	
		Size	Offset	EIRP(dBm)	EIRP(W)	ERP(dBm)	ERP(W)
Lowest	QPSK	1	0	20.92	0.1236	21.57	0.1435
Middle		1	0	20.86	0.1219	21.51	0.1416
Highest		1	0	20.80	0.1202	21.45	0.1396
Lowest	16QAM	1	0	20.29	0.1069	20.94	0.1242
Middle		1	0	20.19	0.1045	20.84	0.1213
Highest		1	0	20.21	0.1050	20.86	0.1219
Limit	ERP < 3W			Result		PASS	

LTE Band 14 / 10MHz (Average) (GT - LC = 2.8 dB)							
Channel	Mode	RB		Conducted		ERP	
		Size	Offset	EIRP(dBm)	EIRP(W)	ERP(dBm)	ERP(W)
Lowest	QPSK	-	-	-	-	-	-
Middle		1	0	21.00	0.1259	21.65	0.1462
Highest		-	-	-	-	-	-
Lowest	16QAM	-	-	-	-	-	-
Middle		1	0	20.32	0.1076	20.97	0.1250
Highest		-	-	-	-	-	-
Limit	ERP < 3W			Result		PASS	

**Radiated Spurious Emission****LTE Band 14**

LTE Band 14 / 10MHz / QPSK									
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	1568	-62.09	-42.15	-19.94	-73.63	-67.19	1.07	8.32	H
	2352	-58.15	-13	-45.15	-74.72	-65.03	1.31	10.33	H
	3136	-56.26	-13	-43.26	-75.09	-64.13	1.51	11.53	H
	3920	-53.66	-13	-40.66	-75.46	-62.57	1.68	12.74	H
	1568	-62.87	-42.15	-20.72	-73.67	-67.97	1.07	8.32	V
	2352	-58.25	-13	-45.25	-74.55	-65.13	1.31	10.33	V
	3136	-56.54	-13	-43.54	-75.09	-64.41	1.51	11.53	V
	3920	-54.06	-13	-41.06	-75.35	-62.97	1.68	12.74	V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.