



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 : FCC 47 CFR Part 2, Part 27(D)

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



Table of Contents

History of this test report	3
Summary of Test Result	4
1 General Description.....	5
1.1 Product Feature of Equipment Under Test	5
1.2 Modification of EUT	5
1.3 Testing Site.....	5
1.4 Applied Standards	5
2 Test Configuration of Equipment Under Test.....	6
2.1 Test Mode.....	6
2.2 Connection Diagram of Test System	7
2.3 Support Unit used in test configuration and system.....	7
2.4 Frequency List of Low/Middle/High Channels.....	7
3 Conducted Test Items	8
3.1 Measuring Instruments.....	8
3.2 Conducted Output Power Measurement and EIRP Measurement	9
4 Radiated Test Items	10
4.1 Measuring Instruments.....	10
4.2 Radiated Spurious Emission Measurement.....	11
5 List of Measuring Equipment	12
6 Uncertainty of Evaluation.....	13
Appendix A. Test Results of Conducted Test	
Appendix B. Test Results of EIRP and Radiated Test	
Appendix C. Test Setup Photographs	



History of this test report

Report No.	Version	Description	Issued Date
FG190926002D	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 and Effective Isotropic Radiated Power	Reporting only	-
4.2	§2.1053 §27.53 (a)(4)	Radiated Spurious Emission	Pass	Under limit 6.45 dB at 13833.000 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 27(D)
- ♦ ANSI / TIA-603-E
- ♦ FCC KDB 971168 Power Meas License Digital Systems D01 v03r01

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.

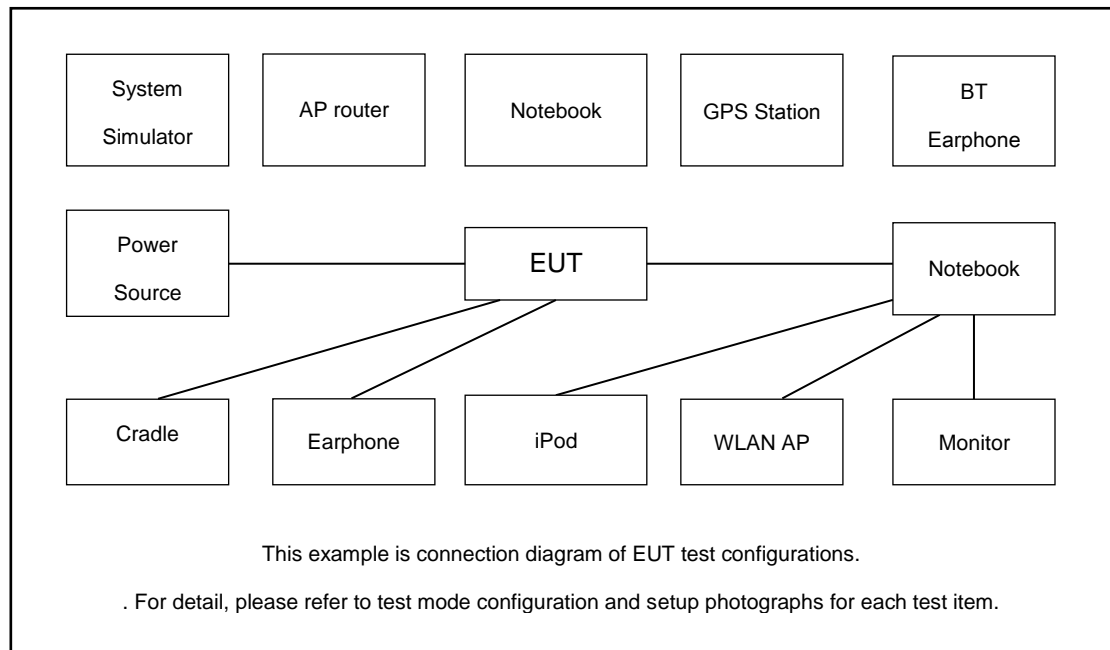
2 Test Configuration of Equipment Under Test

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.

Test Items	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	30	-	-	v	v	-	-	v	v	-	v	v	v	v	v	v
Radiated Spurious Emission	30	-	-		v	-	-	v			v			-	v	
Remark	<ol style="list-style-type: none"> The mark "v" means that this configuration is chosen for testing The mark "-" means that this bandwidth is not supported. 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 30 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
10	Channel	-	27710	-
	Frequency	-	2310	-

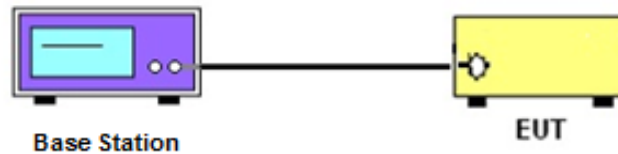
3 Conducted Test Items

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 Measurement and EIRP Measurement

3.2.1 Description of the Conducted Output Power Measurement and EIRP 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.

According to KDB 412172 D01 Power Approach,

$EIRP = P_T + G_T - L_C$, 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 the system simulator.
2. Set EUT at maximum power through the system simulator.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure and record the power level from the system simulator.

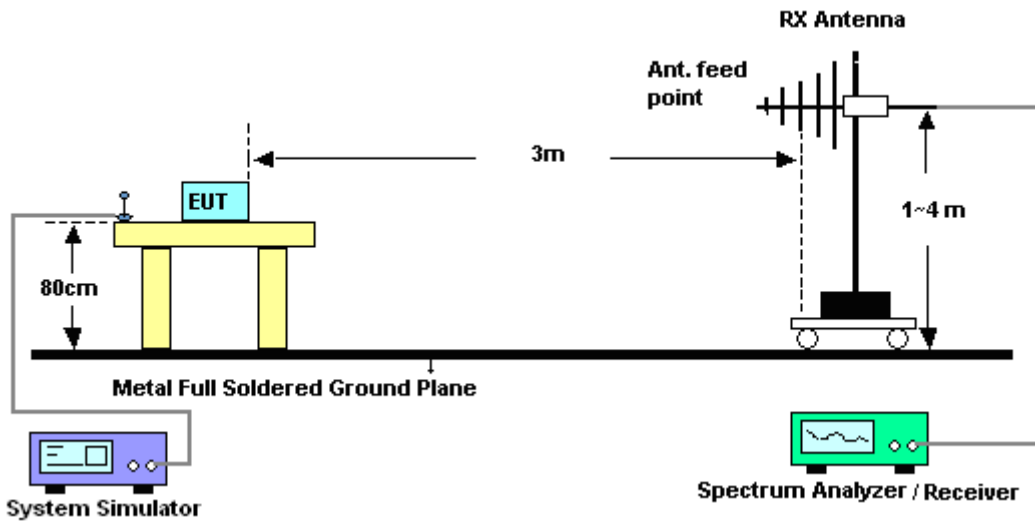
4 Radiated Test Items

4.1 Measuring Instruments

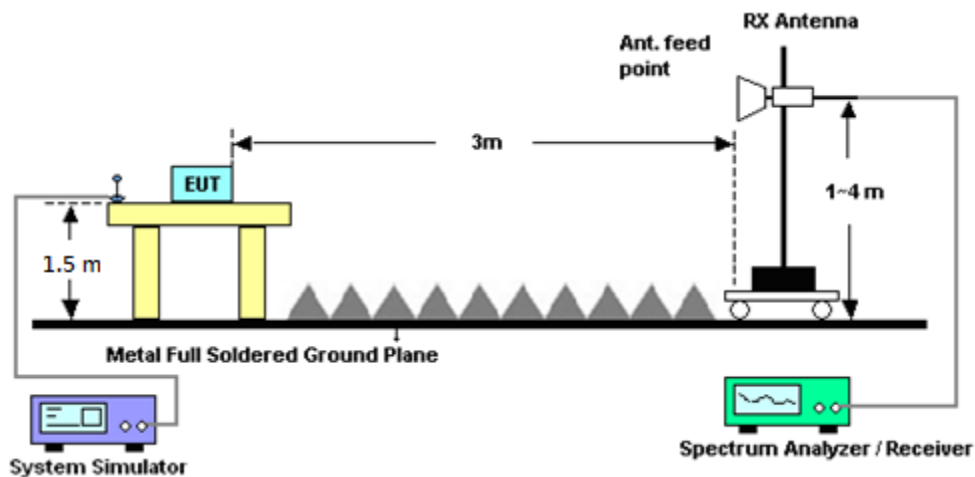
See list of measuring instruments of this test report.

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 Measurement

4.2.1 Description of Radiated Spurious Emission Measurement

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 $70 + 10 \log(P)$ dB. 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 height for frequency below 1GHz and 1.5 meter height for frequency above 1GHz respectively above ground.
2. The EUT was set 3 meters from the receiving antenna 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 1m to 4m to search the maximum spurious emission for both horizontal and vertical polarizations.
5. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
7. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.

$$\text{EIRP (dBm)} = \text{S.G. Power} - \text{Tx Cable Loss} + \text{Tx Antenna Gain}$$

$$\text{ERP (dBm)} = \text{EIRP} - 2.15$$

9. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

The limit line is derived from $70 + 10\log(P)$ dB below the transmitter power P(Watts)

$$= P(W) - [70 + 10\log(P)] \text{ (dB)}$$

$$= [30 + 10\log(P)] \text{ (dBm)} - [70 + 10\log(P)] \text{ (dB)}$$

$$= -40\text{dBm}.$$



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% ($U = 2Uc(y)$)	3.36
---	------

Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.59
---	------

Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.20
---	------



Appendix A. Test Results of Conducted Test

Conducted Output Power(Average power)

LTE Band 30 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
10	1	0	QPSK	-	20.49	-
10	1	25			20.26	
10	1	49			19.96	
10	25	0			19.37	
10	25	12			19.28	
10	25	25			19.13	
10	50	0			19.28	
10	1	0	16-QAM	-	19.43	-
10	1	25			19.40	
10	1	49			19.29	
10	25	0			18.45	
10	25	12			18.41	
10	25	25			18.23	
10	50	0			18.40	
5	1	0	QPSK	20.42	20.29	20.25
5	1	12		20.32	20.20	20.04
5	1	24		20.21	20.05	19.91
5	12	0		19.39	19.28	19.21
5	12	7		19.29	19.27	19.10
5	12	13		19.18	19.24	19.04
5	25	0		19.24	19.26	19.09
5	1	0	16-QAM	19.70	19.66	19.60
5	1	12		19.66	19.57	19.34
5	1	24		19.53	19.40	19.24
5	12	0		18.48	18.45	18.34
5	12	7		18.35	18.37	18.28
5	12	13		18.31	18.32	18.18
5	25	0		18.34	18.34	18.20



Appendix B. Test Results of EIRP and Radiated Test

EIRP

<Reporting Only>

LTE Band 30 / 5MHz (Average) (GT - LC = 5.5 dB)							
Channel	Mode	RB		Conducted		EIRP	
		Size	Offset	Power (dBm)	Power (Watts)	EIRP(dBm)	EIRP(W)
Lowest	QPSK	1	0	20.42	0.1102	25.92	0.3908
Middle		1	0	20.29	0.1069	25.79	0.3793
Highest		1	0	20.25	0.1059	25.75	0.3758
Lowest	16QAM	1	0	19.70	0.0933	25.20	0.3311
Middle		1	0	19.66	0.0925	25.16	0.3281
Highest		1	0	19.60	0.0912	25.10	0.3236

LTE Band 30 / 10MHz (Average) (GT - LC = 5.5 dB)							
Channel	Mode	RB		Conducted		EIRP	
		Size	Offset	Power (dBm)	Power (Watts)	EIRP(dBm)	EIRP(W)
Lowest	QPSK	-	-	-	-	-	-
Middle		1	0	20.49	0.1119	25.99	0.3972
Highest		-	-	-	-	-	-
Lowest	16QAM	-	-	-	-	-	-
Middle		1	0	19.43	0.0877	24.93	0.3112
Highest		-	-	-	-	-	-

**Radiated Spurious Emission****Part 27D LTE Band 30**

LTE Band 30 / 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	4608	-48.61	-40	-8.61	-45.42	-59.34	1.87	12.60	H
	6918	-48.34	-40	-8.34	-50.26	-57.92	2.31	11.88	H
	9225	-46.55	-40	-6.55	-42.09	-55.61	2.70	11.77	H
	11529	-49.74	-40	-9.74	-54.71	-58.15	3.06	11.47	H
	13833	-46.45	-40	-6.45	-52.56	-55.55	3.30	12.40	H
	16137	-50.73	-40	-10.73	-60.81	-63.69	3.78	16.73	H
	4608	-52.83	-40	-12.83	-50	-63.56	1.87	12.60	V
	6918	-55.68	-40	-15.68	-57.97	-65.26	2.31	11.88	V
	9225	-47.76	-40	-7.76	-53.14	-56.82	2.70	11.77	V
	11529	-48.48	-40	-8.48	-54.19	-56.89	3.06	11.47	V
	13833	-53.39	-40	-13.39	-59.66	-62.49	3.30	12.40	V
	16137	-54.38	-40	-14.38	-63.6	-67.34	3.78	16.73	V

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