FCC RADIO TEST REPORT

FCC ID	:	**GZ5NVG558HX**
Equipment	:	**Fixed Broadband Gateway**
Brand Name	:	**ARRIS**
Model Name	:	**NVG558HX**
Applicant	:	**Arris** **2500 Walsh Ave. Santa Clara, California 95051, United States**
Manufacturer	:	**Arris** **101 Tournament Drive, Horsham PA, 19044**
Standard	:	**FCC 47 CFR Part 2, and 90(S)**

The product was received on Sep. 11, 2020 and testing was started from Sep. 14, 2020 and completed on Oct. 04, 2020. 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 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.

Neil Kao

Approved by: Neil Kao

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
FG190926002-04C	01	Initial issue of report	Oct. 07, 2020

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	§2.1046 §90.635	Conducted Output Power and Effective Radiated Power	Pass	-
-	-	Peak-to-Average Ratio	-	See note
-	§2.1049 §90.209	Occupied Bandwidth and 26dB Bandwidth	-	See note
-	§2.1051 §90.691	Emission masks – In-band emissions	-	See note
-	§2.1051 §90.691	Emission masks – Out of band emissions	-	See note
-	§2.1055 §90.213	Frequency Stability for Temperature & Voltage	-	See note
3.2	§2.1053 §90.691	Field Strength of Spurious Radiation	Pass	Under limit 42.08 dB at 3258.000 MHz

Note: The module (Model: EM12-G) makes no difference after verifying output power, this report reuses test data from the module report.

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 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.**	
	TH01-CA	03CH01-CA
Test Engineer	Andy Kao	Janssen Wongso and Peter Liao
Temperature	23.5~23.6°C	21~25℃
Relative Humidity	44.1~44.6%	52~56%

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:

- FCC 47 CFR Part 2, 90
- ANSI / TIA-603-E
- ANSI C63.26-2015
- FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- FCC KDB 412172 D01 Determining ERP and EIRP v01r01
- FCC KDB 414788 D01 Radiated Test Site v01r01
- Interim Guidance for Equipment Authorization of Devices with Channel Bandwidths Combined Across Two Contiguous Service Rule Allocations OET/Lab/EACB, June 6, 2013

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

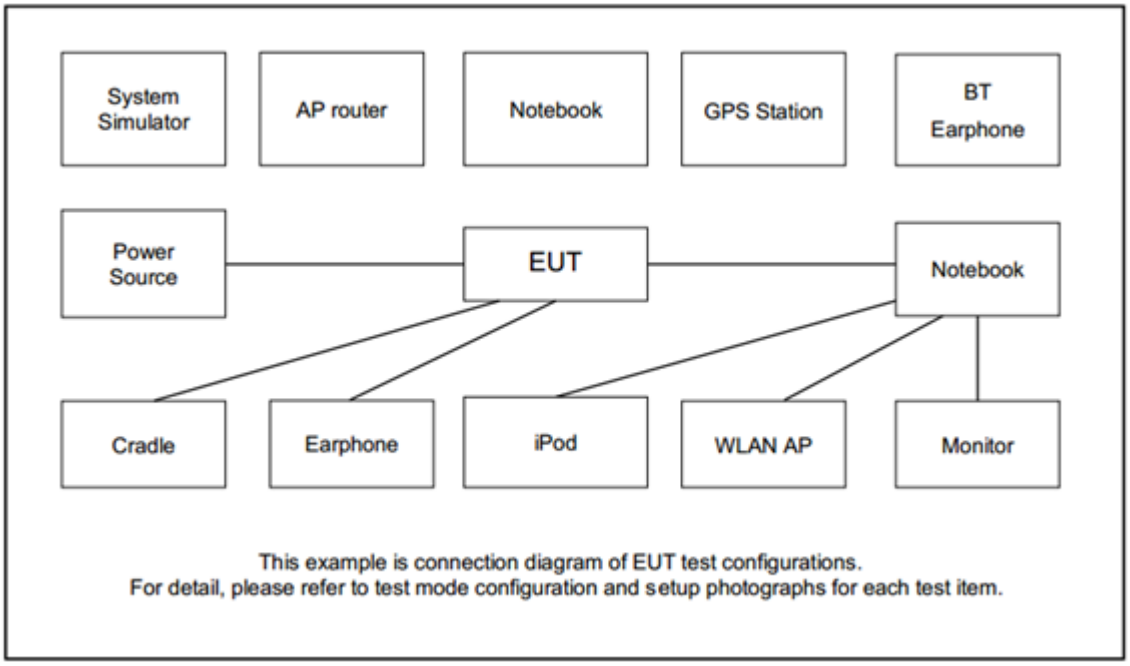
During all testing, EUT is in link mode with base station emulator at maximum power level.

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

Frequency range investigated for radiated emission is 30 MHz to 9000 MHz.

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
E.R.P.	26	v	v	v	v	v	-	v	v		v	v	v	v	v	v
Radiated Spurious Emission	26		v	v	v	v	-	v			v			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. LTE Band26 transmit frequency for part22 rule is 824MHz-849MHz, for part90 rule is 814MHz-824MHz. ERP over 15MHz bandwidth complies the ERP limit line of part22 rule, therefore ERP of the partial frequency spectrum which falls within part 22 also complies.															

2.2 Connection Diagram of Test System



This example is connection diagram of EUT test configurations.
For detail, please refer to test mode configuration and setup photographs for each test item.

2.3 Support Unit used in test configuration and system

Item	Equipment	Brand 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 26 Channel and Frequency List				
BW [MHz]	**Channel/Frequency(MHz)**	**Lowest**	**Middle**	**Highest**
15	Channel	26765	-	-
	Frequency	821.5	-	-
10	Channel	-	26740	-
	Frequency	-	819	-
5	Channel	26715	26740	26765
	Frequency	816.5	819	821.5
3	Channel	26705	26740	26775
	Frequency	815.5	819	822.5

3 Conducted Test Items

3.1 Conducted Output Power Measurement and ERP Measurement

3.1.1 Description of the Conducted Output Power Measurement and ERP Measurement

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

The ERP of mobile transmitters must not exceed 7 Watts for LTE Band 26.

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

3.1.2 Test Procedures

1. The transmitter output port was connected to the system simulator.
2. Set EUT at maximum power through 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.

3.2 Field Strength of Spurious Radiation Measurement

3.2.1 Description of Field Strength of Spurious Radiated Measurement

The radiated spurious emission was measured by substitution method according to ANSI / TIA-603-E. The power of any emission FCC Part 90.691 on any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth at least 43 + 10 log (P) dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

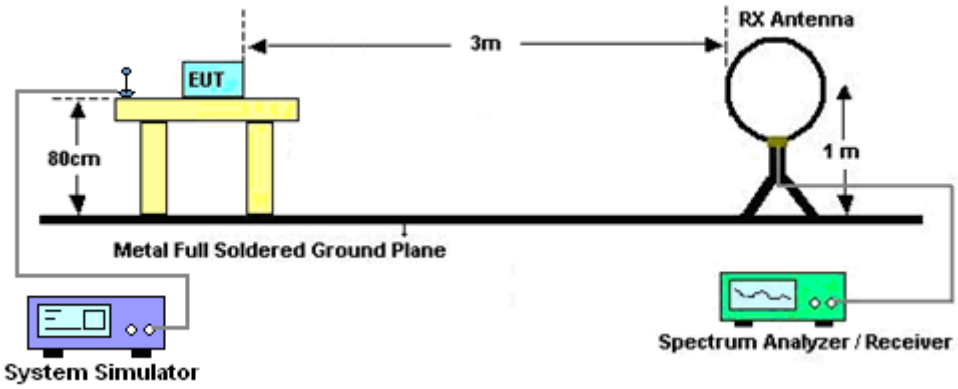
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least $43+10\log_{10}(P[Watts])$ dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

3.2.2 Test Procedures

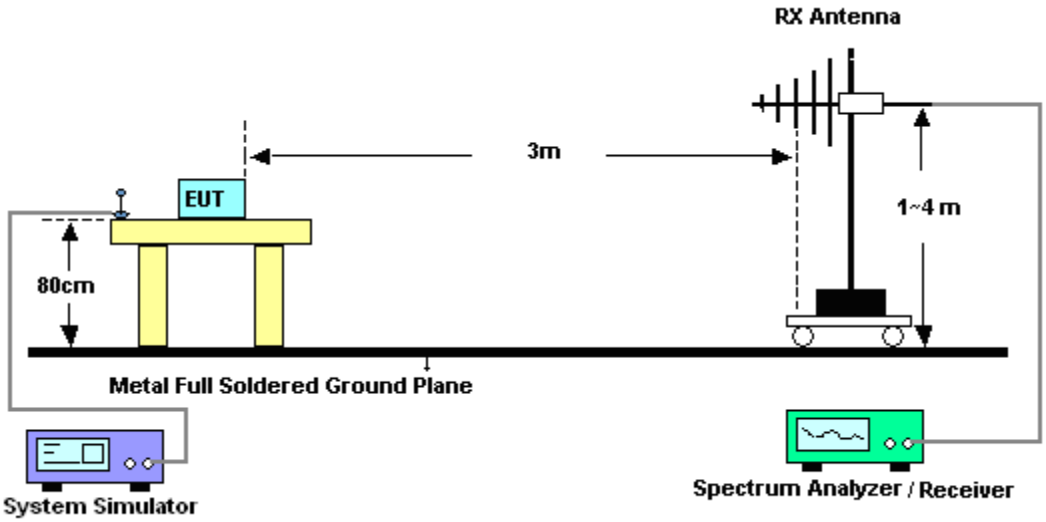
1. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position 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. For testing below 1GHz, make the measurement with the spectrum analyzer's RBW = 100 kHz, VBW = 3MHz, Sweep = 500ms, Taking the record of maximum spurious emission.
6. For testing above 1GHz, make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, Sweep = 500ms, 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.
9. Taking the record of output power at antenna port.
10. Repeat step 7 to step 8 for another polarization.
11. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
12. ERP (dBm) = EIRP - 2.15
13. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
14. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)

3.2.3 Test Setup

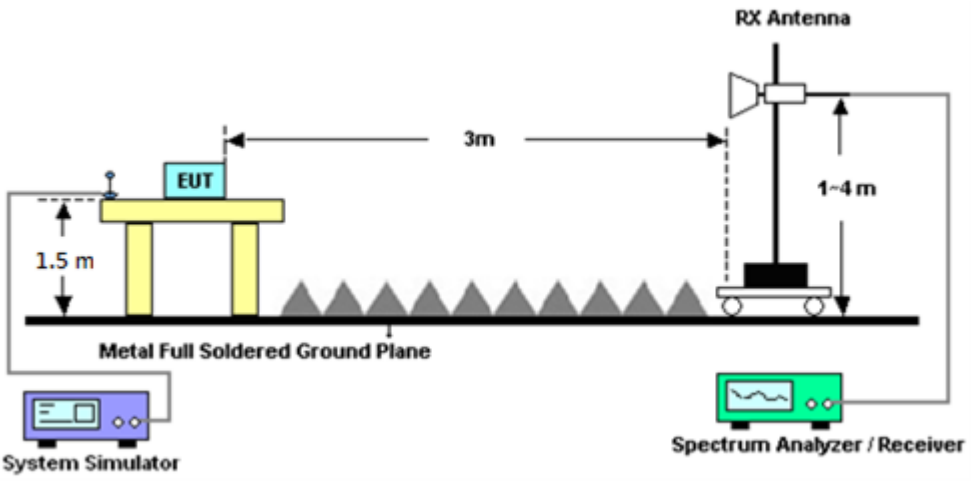
For radiated test below 30MHz



For radiated test from 30MHz to 1GHz



For radiated test above 1GHz



3.2.4 Test Result of Field Strength of Spurious Radiated

Please refer to Appendix A.

Note:

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.

4 List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Radio Communication Analyze	Anritsu	MT8820C	6201300652	N/A	Jul. 21, 2020	Sep. 14, 2020~ Oct. 04, 2020	Jul. 20, 2021	Conducted (TH01-CA)
Spectrum Analyzer	Rohde & Schwarz	FSV13	101559	10Hz~13.6GHz	Jun. 17, 2020	Sep. 14, 2020~ Oct. 04, 2020	Jun. 16, 2021	Conducted (TH01-CA)
Bilog Antenna	TESEQ	6111D	50391	30MHz~1GHz	Jul. 06, 2020	Sep. 14, 2020~ Oct. 04, 2020	Jul. 05, 2021	Radiation (03CH01-CA)
Horn Antenna	SCHWARZBECK	BBHA 9120D	01894	1GHz~18GHz	Jul. 13, 2020	Sep. 14, 2020~ Oct. 04, 2020	Jul. 12, 2021	Radiation (03CH01-CA)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA9170	00841	18GHz~40GHz	Aug. 27, 2020	Sep. 14, 2020~ Oct. 04, 2020	Aug. 26, 2021	Radiation (03CH01-CA)
Preamplifier	SONOMA	310N	372241	N/A	Jul. 28, 2020	Sep. 14, 2020~ Oct. 04, 2020	Jul. 27, 2021	Radiation (03CH01-CA)
Preamplifier	Keysight	83017A	MY53270321	1GHz~26.5GHz	Aug. 28, 2020	Sep. 14, 2020~ Oct. 04, 2020	Aug. 27, 2021	Radiation (03CH01-CA)
Preamplifier	Jet-Power	JPA0118-55-303	1710001800055004	1GHz~18GHz	Aug. 07, 2020	Sep. 14, 2020~ Oct. 04, 2020	Aug. 06, 2021	Radiation (03CH01-CA)
Preamplifier	EMEC	EMC18G40G	060725	18G-40G	Aug. 07, 2020	Sep. 14, 2020~ Oct. 04, 2020	Aug. 06, 2021	Radiation (03CH01-CA)
Spectrum Analyzer	R&S	FSV40	101545	40GHz	Jun. 26, 2020	Sep. 14, 2020~ Oct. 04, 2020	Jun. 25, 2021	Radiation (03CH01-CA)
Hygrometer	TESTO	608-H1	45142559	N/A	Aug. 05, 2020	Sep. 14, 2020~ Oct. 04, 2020	Aug. 04, 2021	Radiation (03CH01-CA)
Signal Generator	Rohde & Schwarz	SMF100A	105544	9kHz~44GHz	Jun. 09, 2020	Sep. 14, 2020~ Oct. 04, 2020	Jun. 08, 2021	Radiation (03CH01-CA)
Horn Antenna	SCHWARZBECK	BBHA 9120D	02140	N/A	Aug. 28, 2020	Sep. 14, 2020~ Oct. 04, 2020	Aug. 27, 2021	Radiation (03CH01-CA)
Controller	Chaintek	EM-1000	060881	N/A	N/A	Sep. 14, 2020~ Oct. 04, 2020	N/A	Radiation (03CH01-CA)
Software	Audix	E3	N/A	N/A	N/A	Sep. 14, 2020~ Oct. 04, 2020	N/A	Radiation (03CH01-CA)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**3.46**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**3.70**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**3.74**

Appendix A. Test Results of ERP and Radiated Test

ERP

LTE Band 26 / 1.4MHz (Average)							
Channel	Mode	RB		Conducted		ERP	
		Size	Offset	Power (dBm)	Power (Watts)	ERP(dBm)	ERP(W)
Lowest	QPSK	3	1	22.79	0.1901	23.94	0.2477
Middle		1	3	22.75	0.1884	23.90	0.2455
Highest		3	3	22.71	0.1866	23.86	0.2432
Lowest	16QAM	1	0	22.19	0.1656	23.34	0.2158
Middle		1	5	22.25	0.1679	23.40	0.2188
Highest		1	0	22.20	0.1660	23.35	0.2163
Limit	ERP < 100W			Result		PASS	

LTE Band 26 / 3MHz (Average)							
Channel	Mode	RB		Conducted		ERP	
		Size	Offset	Power (dBm)	Power (Watts)	ERP(dBm)	ERP(W)
Middle	QPSK	1	0	22.79	0.1901	23.94	0.2477
Middle	16QAM	1	8	22.02	0.1592	23.17	0.2075
Limit	ERP < 100W			Result		PASS	

LTE Band 26 / 5MHz (Average)							
Channel	Mode	RB		Conducted		ERP	
		Size	Offset	Power (dBm)	Power (Watts)	ERP(dBm)	ERP(W)
Middle	QPSK	1	0	22.74	0.1879	23.89	0.2449
Middle	16QAM	1	12	22.34	0.1714	23.49	0.2234
Limit	ERP < 100W			Result		PASS	

LTE Band 26 / 10MHz (Channel 26740)							
Channel	Mode	RB		Conducted		ERP	
		Size	Offset	Power (dBm)	Power (Watts)	ERP(dBm)	ERP(W)
Middle	QPSK	1	0	22.75	0.1884	23.90	0.2455
Middle	16QAM	1	0	22.49	0.1774	23.64	0.2312
Limit	ERP < 100W			Result		PASS	

LTE Band 26 / 15MHz (Channel 26765) (GT - LC = 3.3 dB)							
Channel	Mode	RB		Conducted		ERP	
		Size	Offset	Power (dBm)	Power (Watts)	ERP(dBm)	ERP(W)
Lowest	QPSK	1	0	23.37	0.2173	24.52	0.2831
Lowest	16QAM	1	0	22.67	0.1849	23.82	0.2410
Limit	ERP < 100W			Result		PASS	

Radiated Spurious Emission

LTE Band 26

LTE Band 26 / 3MHz / QPSK									
Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Low	1628	-61.54	-13	-48.54	-74.39	-66.81	1.09	8.51	H
	2443	-56.19	-13	-43.19	-73.51	-63.20	1.33	10.50	H
	3257	-55.49	-13	-42.49	-75.38	-63.61	1.54	11.82	H
	1628	-61.94	-13	-48.94	-74.12	-67.21	1.09	8.51	V
	2443	-56.58	-13	-43.58	-73.53	-63.59	1.33	10.50	V
	3257	-55.92	-13	-42.92	-75.53	-64.04	1.54	11.82	V
Middle	1636	-61.20	-13	-48.20	-74.06	-66.49	1.09	8.54	H
	2455	-55.59	-13	-42.59	-72.87	-62.62	1.34	10.52	H
	3272	-55.19	-13	-42.19	-75.01	-63.35	1.55	11.85	H
	1636	-61.53	-13	-48.53	-73.73	-66.82	1.09	8.54	V
	2455	-55.83	-13	-42.83	-72.72	-62.86	1.34	10.52	V
	3272	-55.48	-13	-42.48	-75.03	-63.64	1.55	11.85	V
High	1642	-61.38	-13	-48.38	-74.25	-68.84	1.09	8.55	H
	2464	-56.19	-13	-43.19	-73.44	-65.39	1.34	10.54	H
	3285	-55.39	-13	-42.39	-75.16	-65.72	1.55	11.88	H
	1642	-61.89	-13	-48.89	-74.11	-69.35	1.09	8.55	V
	2464	-56.61	-13	-43.61	-73.45	-65.81	1.34	10.54	V
	3285	-55.82	-13	-42.82	-75.32	-66.15	1.55	11.88	V

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

LTE Band 26 / 5MHz / QPSK									
Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Low	1629	-60.88	-13	-47.88	-73.73	-66.15	1.09	8.51	H
	2443	-55.94	-13	-42.94	-73.26	-62.95	1.33	10.50	H
	3257	-55.51	-13	-42.51	-75.4	-63.63	1.54	11.82	H
	1629	-61.73	-13	-48.73	-73.91	-67.00	1.09	8.51	V
	2443	-56.22	-13	-43.22	-73.16	-63.23	1.33	10.50	V
	3257	-55.81	-13	-42.81	-75.42	-63.93	1.54	11.82	V
Middle	1634	-61.06	-13	-48.06	-73.92	-66.35	1.09	8.53	H
	2450	-55.99	-13	-42.99	-73.29	-63.01	1.34	10.51	H
	3267	-55.12	-13	-42.12	-74.96	-63.27	1.54	11.84	H
	1634	-61.76	-13	-48.76	-73.96	-67.05	1.09	8.53	V
	2450	-55.83	-13	-42.83	-72.73	-62.85	1.34	10.51	V
	3267	-55.49	-13	-42.49	-75.06	-63.64	1.54	11.84	V
High	1639	-60.96	-13	-47.96	-73.82	-68.41	1.09	8.54	H
	2458	-55.88	-13	-42.88	-73.15	-65.07	1.34	10.52	H
	3277	-55.65	-13	-42.65	-75.45	-65.97	1.55	11.86	H
	1639	-62.05	-13	-49.05	-74.25	-69.5	1.09	8.54	V
	2458	-56.60	-13	-43.60	-73.47	-65.79	1.34	10.52	V
	3277	-56.10	-13	-43.10	-75.64	-66.42	1.55	11.86	V

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

LTE Band 26 / 10MHz / QPSK									
Channel	Frequency (MHz)	ERP (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	1629	-60.83	-13	-47.83	-73.68	-66.10	1.09	8.51	H
	2444	-56.12	-13	-43.12	-73.44	-63.14	1.33	10.50	H
	3258	-55.08	-13	-42.08	-74.97	-63.21	1.54	11.82	H
	1629	-61.55	-13	-48.55	-73.73	-66.82	1.09	8.51	V
	2444	-56.20	-13	-43.20	-73.14	-63.22	1.33	10.50	V
	3258	-55.58	-13	-42.58	-75.2	-63.71	1.54	11.82	V

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

LTE Band 26 / 15MHz / QPSK									
Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Low	1630	-60.97	-13	-47.97	-73.82	-66.25	1.09	8.52	H
	2444	-55.93	-13	-42.93	-73.24	-62.95	1.33	10.50	H
	3259	-55.22	-13	-42.22	-75.11	-63.35	1.54	11.82	H
	1630	-61.42	-13	-48.42	-73.6	-66.70	1.09	8.52	V
	2444	-56.66	-13	-43.66	-73.6	-63.68	1.33	10.50	V
	3259	-55.78	-13	-42.78	-75.39	-63.91	1.54	11.82	V

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