

REPORT

FCC Certification

Applicant Name: ADRF Korea, inc	e.	Date of Issue: July 01, 2015 Test Site/Location:
Address: 5-5, Mojeon-Ri, Backsa-Myun, Korea	Icheon-City, Kyunggi-Do,	HCT CO., LTD., 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea Report No.: HCT-R-1507-F001
FCC ID:	N52-ADX-HPR-BT	
APPLICANT:	ADRF Korea, inc	
FCC Model(s):	ADX-HPR-BT46	
EUT Type:	DAS(Distributed Antenna Sy	/stem)
Frequency Ranges:	DL: 2496.0 MHz ~ 2690.0 M UL: 2496.0 MHz ~ 2690.0 M	1Hz 1Hz
Conducted Output Power:	DL: 50 W (47 dBm) UL: 0.1 mW (-10 dBm)	
Date of Test :	June 02, 2015 ~ June 18, 2	015
FCC Rules Part(s):	CFR 47, Part 27	

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Part 27 of the FCC Rules under normal use and maintenance.

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Approved\by : Sang Jun Lee Manager of RF Team

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Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-R-1507-F001	July 01, 2015	- First Approval Report



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1. CLIENT INFORMATION

The EUT has been tested by request of

	Company	ADRF Korea, inc 5-5, Mojeon-Ri, Backsa-Myun, Icheon-City, Kyunggi-Do, Korea
	Contact Point	Attention/ E-Mail: HK Song/ hk4464@adrftech.com Tel./ H.P. : +82-31-637-4435/ +82-10-3191-4773
	FCC ID:	N52-ADX-HPR-BT
	APPLICANT:	ADRF Korea, inc
	EUT Type:	DAS(Distributed Antenna System)
•	Model:	ADX-HPR-BT46
	Frequency Ranges:	DL: 2496.0 MHz ~ 2690.0 MHz UL: 2496.0 MHz ~ 2690.0 MHz
	Conducted Output Power	: DL: 50 W (47 dBm) UL: 0.1 mW (-10 dBm)
	Antenna Gain(s) :	3 dBi.
	FCC Rules Part(s):	CFR Title 47 Part 27
	Measurement standard(s)	: ANSI/TIA-603-C-2004, KDB 971168 D01 v02r02, KDB 935210 D02 v03, KDB 935210 D05 v01
	Place of Tests:	74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi do, Korea. (IC Recognition No. : 5944A-3)



2. FACILITIES AND ACCREDITATIONS

2.1. FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2003) and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated February 28, 2014 (Registration Number: 90661)

2.2. EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."



3. TEST SUMMARY

3.1. STANDARDS

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 27.

Description	Reference (FCC)	Results
Conducted RF Output Power	§2.1046; §27.50	Compliant
Occupied Bandwidth	§2.1049	Compliant
Out of Band Rejection	KDB 935210 D02 v03	Compliant
Spurious Emissions at Antenna Terminals	§2.1051, §27.53	Compliant
Radiated Spurious Emissions	§2.1053, §27.53	Compliant
Frequency Stability	§2.1055, §27.54	N/A The EUT does not perform frequency translation

3.2. MODE OF OPERATION DURING THE TEST

The EUT was operated in a manner representative of the typical usage of the equipment.

During all testing, system components were manipulated within the confines of typical usage to maximize each emission.

The device does not supply antenna(s) with the system, so the dummy loads were connected to the RF output ports for radiated spurious emission testing.

Test item & Modulation			
Item	Modulation		
Conducted RF Output Power	TD-LTE(20 MHz)		
Occupied Bandwidth	TD-LTE(20 MHz)		
Out of Band Rejection	Sinusoidal		
Spurious Emissions at Antenna Terminals	FD-LTE(20 MHz)		
Radiated Spurious Emissions	Sinusoidal		
Frequency Stability	Sinusoidal		

4. STANDARDS ENVIRONMENTAL TEST CONDITIONS

Temperature :	+ 15	°C to + 35 °C
Relative humidity:	30 % to 60 %	
Air pressure	860 mbar to 1 0	60 mbar



5. TEST EQUIPMENT

Manufacturer	Model / Equipment	Cal Interval	Calibration Date	Serial No.
Agilent	E4438C /Signal Generator	Annual	09/11/2014	MY42082646
Agilent	N5182A /Signal Generator	Annual	04/07/2015	MY50141649
NANGYEUL CO., LTD.	NY-THR18750/ Temperature and Humidity Chamber	Annual	10/29/2014	NY-2009012201A
Agilent	N9020A /Signal Analyzer	Annual	04/10/2015	US46220219
WEINSCHEL	67-30-33 / Fixed Attenuator	Annual	11/04/2014	BU5347
Weinschel	AF9003-69-31 / Step Attenuator	Annual	10/24/2014	11787
HD	MA240/ Antenna Position Tower	N/A	N/A	556
EMCO	1050/ Turn Table	N/A	N/A	114
HD GmbH	HD 100/ Controller	N/A	N/A	13
MITEQ	AMF-6D-001180-35-20P/AMP	Annual	09/04/2014	1081666
Schwarzbeck	BBHA 9120D/ Horn Antenna	Biennial	09/01/2014	147
Schwarzbeck	VULB 9160/TRILOG Antenna	Biennial	11/17/2014	3150



6. RF OUTPUT POWER

FCC Rules

Test Requirements:

§ 2.1046 Measurements required: RF power output:

§ 2.1046 (a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in §2.1033(c)(8). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

§ 2.1046 (b) For single sideband, independent sideband, and single channel, controlled carrier radiotelephone transmitters, the procedure specified in paragraph (a) of this section shall be employed and, in addition, the transmitter shall be modulated during the test as specified and as applicable in § 2.1046 (b) (1-5). In all tests, the input level of the modulating signal shall be such as to develop rated peak envelope power or carrier power, as appropriate, for the transmitter.

§ 2.1046 (c) For measurements conducted pursuant to paragraphs (a) and (b) of this section, all calculations and methods used by the applicant for determining carrier power or peak envelope power, as appropriate, on the basis of measured power in the radio frequency load attached to the transmitter output terminals shall be shown. Under the test conditions specified, no components of the emission spectrum shall exceed the limits specified in the applicable rule parts as necessary for meeting occupied bandwidth or emission limitations.

§ 27.50 Power limits and duty cycle.

(h) The following power limits shall apply in the BRS and EBS:

(1) Main, booster and base stations.

(i) The maximum EIRP of a main, booster or base station shall not exceed 33 dBW $10\log(X/Y)$ dBW, where X is the actual channel width in MHz and Y is either 6 MHz if prior to transition or the station is in the MBS following transition or 5.5 MHz if the station is in the LBS and UBS following transition, except as provided in paragraph (h)(1)(ii) of this section.

(ii) If a main or booster station sectorizes or otherwise uses one or more transmitting antennas with a non-omnidirectional horizontal plane radiation pattern, the maximum EIRP in dBW in a given direction shall be determined by the following formula: EIRP = 33 dBW 10 log(X/Y) dBW 10 log(360/beamwidth) dBW, where X is the actual channel width in MHz, Y is either (i) 6 MHz if prior to transition or the station is in the MBS following transition or (ii) 5.5 MHz if the station is in the LBS and UBS following transition, and beamwidth is the total horizontal plane beamwidth of the individual

transmitting antenna for the station or any sector measured at the half-power points.

Test Procedures:

Measurements were in accordance with the test methods section 3.5.2 of KDB 935210 D05 v01.

a) Connect a signal generator to the input of the EUT.

b) Configure to generate the AWGN (broadband) test signal.

c) The frequency of the signal generator shall be set to the frequency of (f0) as determined from 3.3.

d) Connect a spectrum analyzer or power meter to the output of the EUT using appropriate attenuation as necessary.

e) Set the signal generator output power to a level that produces an EUT output level that is just below the AGC threshold (see 3.2), but not more than 0.5 dB below.

f) Measure the output power of the EUT and record (Power measurement with a spectrum analyzer).

g) Remove the EUT from the measurement setup and using the same signal generator settings, repeat the power measurement on the input signal to the EUT and record as input power.

h) Repeat the procedure with the narrowband test signal.

i) Repeat the procedure for both test signals with input signal amplitude set to 3 dB above the AGC threshold level.

j) Repeat for all frequency bands authorized for use by the EUT.

Power measurement Method :

Guidance for performing input/output power measurements using a spectrum or signal analyzer is provided in 5.2 of KDB Publication 971168.



Block Diagram 1. RF Power Output Test Setup



Test Results:

Input Signal Input Level (dBm)		Maximum Amp Gain	
	DL : -13.9 dBm DL : 60 dB		
	UL : -40.0 dBm	DL : 30 dB	

[Downlink]

	Ohennel	Frequency	Output Power	
	Channel	(MHz)	(dBm)	(W)
AGC Threshold	Low	2506.0	46.11	40.832
	Middle	2593.0	46.12	40.926
	High	2680.0	46.30	42.658

	Ohennel	Frequency		Output Power	
	Channel	(MHz)	(dBm)	(W)	
'+3dBm above the AGC threshold	Low	2506.0	46.30	42.658	
	Middle	2593.0	46.44	44.055	
	High	2680.0	46.42	43.853	



[Uplink]

		Frequency (MHz)	Output Power	
	Channel		(dBm)	(mW)
AGC threshold	Low	2506.0	-10.35	0.0923
	Middle	2593.0	-9.86	0.1033
	High	2680.0	-9.43	0.1140



Plots of RF Output Power [Downlink]



[AGC threshold Downlink Low]

[AGC threshold Downlink Middle]





[AGC threshold Downlink High]



['+3dBm above the AGC threshold Downlink Low]







['+3dBm above the AGC threshold Downlink Middle]

['+3dBm above the AGC threshold Downlink High]





Plots of RF Output Power [Uplink]



[AGC threshold Uplink Low]

[AGC threshold Uplink Middle]





[AGC threshold Uplink High]





7. OCCUPIED BANDWIDTH

FCC Rules

Test Requirement(s): § 2.1049 Measurements required: Occupied bandwidth:

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to

0.5 percent of the total mean power radiated by a given emission shall be measured

under the specified conditions of § 2.1049 (a) through (i) as applicable.

Test Procedures:

Measurements were in accordance with the test methods section 3.4 of KDB 935210 D05 v01 and section 4.2 of KDB 971168 D01 v02r02.

Test is 99% OBW measured and used.

a) Connect a signal generator to the input of the EUT.

b) Configure the signal generator to transmit the AWGN signal.

c) Configure the signal amplitude to be just below the AGC threshold level (see 3.2), but not more than 0.5 dB below.

d) Connect a spectrum analyzer to the output of the EUT using appropriate attenuation.

e) Set the spectrum analyzer center frequency to the center frequency of the operational band under test. The span range of the spectrum analyzer shall be between 2 times to 5 times the OBW.

f) The nominal resolution bandwidth (RBW) shall be in the range of 1% to 5 % of the anticipated OBW, and the VBW shall be \geq 3 \times RBW.

g) Set the reference level of the instrument as required to preclude the signal from exceeding the maximum spectrum analyzer input mixer level for linear operation. In general, the peak of the spectral envelope must be more than [10 log (OBW / RBW)] below the reference level.

NOTE—Steps f) and g) may require iteration to enable adjustments within the specified tolerances. h) The noise floor of the spectrum analyzer at the selected RBW shall be at least 36 dB below the reference level.

i) Set spectrum analyzer detection function to positive peak.

j) Set the trace mode to max hold.

k) Use the 99 % power bandwidth function of the spectrum analyzer (if available) and report the measured bandwidth.

I) Repeat steps e) to k) with the input signal connected directly to the spectrum analyzer (i.e., input signal measurement).

m) Compare the spectral plot of the input signal (determined from step I) to the output signal (determined from step k) to affirm that they are similar (in passband and rolloff characteristic features and relative spectral locations), and include plot(s) and descriptions in test report.

n) Repeat for all frequency bands authorized for use by the EUT.



Test Results: The EUT complies with the requirements of this section.

Input Signal	Input Level (dBm)	Maximum Amp Gain		
	DL : -13.9 dBm	DL : 60 dB		
ID-LIE 20 MHZ	UL : -40.0 dBm	DL : 30 dB		



[Downlink Output]

	Channel	Frequency (MHz)	OBW (MHz)
	Low	2506.0	17.939
LTE 20 MHz	Middle	2593.0	17.931
	High	2680.0	17.934

[Downlink Input]

	Channel	Frequency (MHz)	OBW (MHz)
	Low	2506.0	17.927
LTE 20 MHz	Middle	2593.0	17.937
	High	2680.0	17.918

[Uplink Output]

	Channel	Frequency (MHz)	OBW (MHz)
	Low	2506.0	17.923
LTE 20 MHz	Middle	2593.0	17.932
	High	2680.0	17.941

[Uplink Input]

	Channel	Frequency (MHz)	OBW (MHz)
	Low	2506.0	17.925
LTE 20 MHz	Middle	2593.0	17.932
	High	2680.0	17.932



Plots of Occupied Bandwidth [Downlink] [Output LTE Downlink 20 MHz Low]



[Output LTE Downlink 20 MHz Middle]







[Output LTE Downlink 20 MHz High]

[Input LTE Downlink 20 MHz Low]







[Input LTE Downlink 20 MHz Middle]

[Input LTE Downlink 20 MHz High]





Plots of Occupied Bandwidth [Uplink]

[Output LTE Uplink 20 MHz Low]



[Output LTE Uplink 20 MHz Middle]





[Output LTE Uplink 20 MHz High]



[Input LTE Uplink 20 MHz Low]







[Input LTE Uplink 20 MHz Middle]

[Input LTE Uplink 20 MHz High]





8. Out of Band Rejection

Test Requirement(s): KDB 935210 D02 v03

Out of Band Rejection – Test for rejection of out of band signals. Filter freq. response plots are acceptable.

Test Procedures:

Measurements were in accordance with the test methods section 3.3 of KDB 935210 D05 v01.

a) Connect a signal generator to the input of the EUT.

b) Configure a swept CW signal with the following parameters:

1) Frequency range = ± 250 % of the passband from the center of the passband.

2) Level = a sufficient level to affirm that the out-of-band rejection is > 20 dB above the noise floor and will not engage the AGC during the entire sweep.

3) Dwell time = approx. 10 ms.

4) Number of points = SPAN/(RBW/2).

c) Connect a spectrum analyzer to the output of the EUT using appropriate attenuation.

d) Set the span of the spectrum analyzer to the same as the frequency range of the signal generator.

e) Set the resolution bandwidth of the spectrum analyzer to be 1 % to 5 % of the passband and the video bandwidth shall be set to \geq 3 \times RBW.

f) Set the detector to Peak Max-Hold and wait for the spectrum analyzer's spectral display to fill.

g) Place a marker to the peak of the frequency response and record this frequency as f0.

h) Place two markers, one at the lowest and the other at the highest frequency of the envelope

of the spectral display such that each marker is at or slightly below the -20 dB down amplitude

to determine the 20 dB bandwidth. Capture the frequency response of the EUT.

Input Level (dBm)	Maximum Amp Gain
Input Signal : Sinusoidal	
DL : -13.9 dBm	DL : 60 dB
UL : -40.0 dBm	DL : 30 dB

Test Results: The EUT complies with the requirements of this section.



[Downlink]

20 dB point frequency (MHz)	Output power (dBm)	Gain (dB)	
2473.69 MHz			
~	46.15	60.05	
2711.34 MHz			

[Uplink]

20 dB point frequency (MHz)	Output power (dBm)	Gain (dB)
2473.69 MHz		
~	-11.00	29.01
2710.37 MHz		



Plots of Passband Gain and Bandwidth & Out of Band Rejection [Downlink]



[Uplink]



9. SPURIOUS AND HARMONIC EMISSION AT ANTENNA TERMINAL

FCC Rules

Test Requirement(s): § 2.1051 Measurements required: Spurious emissions at antenna terminals:

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in § 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

§ 27.53 Emission limits

(m) For BRS and EBS stations, the power of any emissions outside the licensee's frequency bands of operation shall be attenuated below the transmitter power (P) measured in watts in accordance with the standards below. If a licensee has multiple contiguous channels, out-of-band emissions shall be measured from the upper and lower edges of the contiguous channels.

(2) For digital base stations, the attenuation shall be not less than 43 10 log (P) dB, unless a documented interference complaint is received from an adjacent channel licensee with an overlapping Geographic Service Area. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS No. 1 on the same terms and conditions as adjacent channel BRS or EBS licensees. Provided that a documented interference complaint cannot be mutually resolved between the parties prior to the applicable deadline, then the following additional attenuation requirements shall apply:

(i) If a pre-existing base station suffers harmful interference from emissions caused by a new or modified base station located 1.5 km or more away, within 24 hours of the receipt of a documented interference complaint the licensee of the new or modified base station must attenuate its emissions by at least 67 10 log (P) dB measured at 3 megahertz, above or below, from the channel edge of its frequency block and shall immediately notify the complaining licensee upon implementation of the additional attenuation. No later than 60 days after the implementation of such additional attenuation, the licensee of the complaining base station must attenuate its base station emissions by at least 67 10 log (P) dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the new or modified base station.
(ii) If a pre-existing base station suffers harmful interference from emissions caused by

a new or modified base station located less than 1.5 km away, within 24 hours of

receipt of a documented interference complaint the licensee of the new or modified base station must attenuate its emissions by at least 67 10 log (P)–20 log (Dkm/1.5) dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the complaining licensee, or if both base stations are co-located, limit its undesired signal level at the pre-existing base station receiver(s) to no more than –107 dBm measured in a 5.5 megahertz bandwidth and shall immediately notify the complaining licensee upon such reduction in the undesired signal level. No later than 60 days after such reduction in the undesired signal level. No later than must attenuate its base station emissions by at least 67 10 log (P) dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the new or modified base station.

(iii) If a new or modified base station suffers harmful interference from emissions caused by a pre-existing base station located 1.5 km or more away, within 60 days of receipt of a documented interference complaint the licensee of each base station must attenuate its base station emissions by at least 67 10 log (P) dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the other licensee.

(iv) If a new or modified base station suffers harmful interference from emissions caused by a pre-existing base station located less than 1.5 km away, within 60 days of receipt of a documented interference complaint: (a) The licensee of the new or modified base station must attenuate its OOBE by at least 67 10 log (P)–20 log (Dkm/1.5) measured 3 megahertz above or below, from the channel edge of its frequency block of the other licensee, or if the base stations are co-located, limit its undesired signal level at the other base station receiver(s) to no more than –107 dBm measured in a 5.5-megahertz bandwidth; and (b) the licensee causing the interference must attenuate its emissions by at least 67 10 log (P) dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the channel edge of its frequency block of the channel edge of its frequency block of the new or modified base station.

(v) For all fixed digital user stations, the attenuation factor shall be not less than 43 10 log (P) dB at the channel edge.

(4) For mobile digital stations, the attenuation factor shall be not less than $40 + 10 \log$ (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, $43 + 10 \log$ (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that $43 + 10 \log$ (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit

a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

Test Procedures: Measurements were in accordance with the test methods section 3.5.2 of KDB 935210 D05 v01.

1. General

Spurious emissions shall be measured using a single test signal sequentially tuned to the low, middle and high channels or frequencies within each authorized frequency band of operation.

Out-of-band/block emissions (including intermodulation products) shall be measured under each of the following two stimulus conditions:

a) two adjacent test signals sequentially tuned to the lower and upper frequency band/block edges;

b) a single test signal, sequentially tuned to the lowest and highest frequencies or channels within the frequency band/block under examination.

NOTE—Single channel boosters that cannot accommodate two simultaneous signals within the passband, can be excluded from the test stipulated in step a).

2. EUT out-of-band/block emissions conducted measurement

a) Connect a signal generator to the input of the EUT.

NOTE—If the signal generator is not capable of generating two modulated carriers simultaneously, then two discrete signal generators can be connected with an appropriate combining network to support the two-tone test.

b) Set the signal generator to produce two AWGN signals as previously described (e.g., 4.1 MHz OBW).

c) Set the center frequencies such that the AWGN signals occupy adjacent channels, as defined by industry standards such as 3GPP or 3GPP2, at the upper edge of the frequency band or block of interest.

d) Set the composite power levels such that the input signal is just below the AGC threshold (see 3.2), but not more than 0.5 dB below. The composite power can be measured using the procedures provided in KDB Publication 971168, but it will be necessary to expand the power integration bandwidth so as to include both of the transmit channels. Alternatively, the composite power can be measured using an average power meter as described in KDB Publication 971168.

e) Connect a spectrum analyzer to the output of the EUT using appropriate attenuation as necessary.

f) Set the RBW = reference bandwidth in the applicable rule section for the supported frequency band (typically 1 % of the emission bandwidth, 100 kHz, or 1 MHz)



g) Set the VBW = $3 \times RBW$.

h) Set the detector to power averaging (rms) detector.

i) Set the Sweep time = auto-couple.

j) Set the analyzer start frequency to the upper block edge frequency and the stop frequency to the upper block edge frequency plus 300 kHz or 3 MHz for frequencies below and above 1 GHz, respectively.

k) Trace average at least 100 traces in power averaging (i.e., rms) mode.

I) Use the marker function to find the maximum power level.

m) Capture the spectrum analyzer trace of the power level for inclusion in the test report.

n) Repeat the procedure with the composite input power level set to 3 dB above the AGC threshold.

o) Reset the input signals frequencies to the lower edge of the frequency block or band under examination.

p) Reset the spectrum analyzer start frequency to the lower block edge frequency minus 300 kHz, or 3 MHz (for frequencies below and above 1 GHz, respectively), and the stop frequency to the lower band or block edge frequency.

q) Repeat steps k) to n).

r) Repeat steps a) to q) with the signal generator configured for a single test signal tuned as close as possible to the block edges.

s) Repeat steps a) to r) with the narrowband test signal.

t) Repeat steps a) to s) for all authorized frequency bands or blocks used by the EUT.

3. EUT spurious emissions conducted measurement

a) Connect a signal generator to the input of the EUT.

b) Set the signal generator to produce the broadband test signal as previously described (e.g., 4.1 MHz OBW AWGN).

c) Set the center frequency of the test signal to the lowest available channel within the frequency band or block.

d) Set the EUT input power to a level that is just below the AGC threshold (see 3.2), but not more than 0.5 dB below.

e) Connect a spectrum analyzer to the output of the EUT using appropriate attenuation as necessary.

f) Set the RBW = reference bandwidth in the applicable rule section for the supported frequency band of operation (e.g., reference bandwidth is typically 100 kHz or 1 MHz).

g) Set the VBW \geq 3 \times RBW.

h) Set the Sweep time = auto-couple.

i) Set the analyzer start frequency to the lowest radio frequency signal generated in the



equipment, without going below 9 kHz, and the stop frequency to the lower band/block edge frequency minus 100 kHz or 1 MHz, as specified in the applicable rule part. NOTE—The number of measurement points in each sweep must be \geq (2 \times span/RBW) which may require that the measurement range defined by the start and stop frequencies be subdivided, depending on the available number of measurement points provided by the spectrum analyzer.

j) Select the power averaging (rms) detector function.

k) Trace average at least 10 traces in power averaging (i.e., rms) mode.

 Use the peak marker function to identify the highest amplitude level over each measured frequency range. Record the frequency and amplitude and capture a plot for inclusion in the test report.

m) Reset the analyzer start frequency to the upper band/block edge frequency plus 100 kHz or 1 MHz, as specified in the applicable rule part, and the analyzer stop frequency to 10 times the highest frequency of the fundamental emission (see §2.1057). Note that the number of measurement points in each sweep must be \geq (2 × span/RBW) which may require that the measurement range defined by the start and stop frequencies be subdivided, depending on the available number of measurement points provided by the spectrum analyzer.

n) Trace average at least 10 traces in power averaging (i.e., rms) mode.

o) Use the peak marker function to identify the highest amplitude level over each of the measured frequency ranges. Record the frequency and amplitude and capture a plot for inclusion in the test report and provide tabular data, if required.

p) Repeat the procedure with the input test signals tuned to a middle band/block frequency/channel and then a high band/block frequency/channel.

q) Repeat entire procedure with the narrowband test signal.

r) Repeat for all authorized frequency bands/blocks used by the EUT.

Test Results: The EUT complies with the requirements of this section. There were no Detectable Spurious emissions for this EUT.



Plots of Spurious Emission [Downlink) Conducted Spurious Emissions (9 kHz – 150 kHz) [LTE Downlink 20 MHz Low]



[LTE Downlink 20 MHz Middle]





[LTE Downlink 20 MHz High]





Plots of Spurious Emission

Conducted Spurious Emissions (9 kHz - 150 kHz)



[Downlink Low]

[Downlink Middle]





📕 Agilent Spectrum Analyzer - Swept SA 11:06:04 AM Jun 04, 2015 ALIGN AU Avg Type: RMS Avg|Hold: 10/10 AUTO Frequency Freg 9.000 kHz TRACE 1 2 3 4 5 TYPE MWWWW DET A N N N N Start Trig: Free Run #Atten: 14 dB PNO: Wide IFGain:Low Auto Tune Mkr1 12.384 kHz -30.859 dBm Ref Offset 41.16 dB Ref 20.00 dBm 10 dB/div Loa **Center Freq** 79.500 kHz Start Freq 9.000 kHz Stop Freq 1 150.000 kHz The fail Jalah Ller hy https://www.patrongly.com/ CF Step 14.100000 MHz Auto Man wheether the share and the second states and the second second states and the second second second second second TTT W Will **Freq Offset** 0 Hz Start 9.00 kHz #Res BW 1.0 kHz Stop 150.00 kHz #Sweep 400.0 ms (1001 pts) #VBW 3.0 kHz* DC Coupled

[Downlink High]

[Uplink Low]





[Uplink Middle]



[Uplink High]





Conducted Spurious Emissions (150 kHz - 30 MHz)



[Downlink Low]

[Downlink Middle]





[Downlink High]

鱦 Agilent Spectrum Analyzer - Swept SA					
₩ RF 50 Ω ▲ DC Start Freq 150.000 kHz	SEN Trig: Fro		ALIGN AUTO 11:10:34 / : RMS TRAC	M Jun 04, 2015	Frequency
Ref Offset 41.16 dB 10 dB/div Ref 20.00 dBm	PNO: Fast Ing: Free IFGain:Low #Atten: 14	4 dB	Mkr1 ⁻ -33.7	732 kHz 29 dBm	Auto Tune
10.0					Center Freq 15.075000 MHz
-10.0				-13.00 dBm	Start Freq 150.000 kHz
-20.0 -30.0 - 1					Stop Freq 30.000000 MHz
-40.0	Hall be a boat to to ad	tellor to to all to to the			CF Step 14.100000 MHz Auto <u>Man</u>
-60.0	n na shekara in san san san san san san san san san sa	na pri na pri Na pri na pri Na pri na pri	panalor piten yang piten yang barang piten yang piten yang piten yang piten yang piten yang piten yang piten y Piten yang piten yang p Piten yang piten yang p	en balen († 1944) Spanski pinski pinski Stanis	Freq Offset 0 Hz
Start 150 kHz #Res BW 10 kHz	#VBW 30 kHz*	#	Stop 3 Sweep 400.0 ms (0.00 MHz 6001 pts)	
MSG			STATUS 🚹 DC COU	pled	

[Uplink Low]





[Uplink Middle]

W RF SO 2000 SENSE:NT AUG NUTO 02:35:11 PMJuni 12,2015 Frequency Start Freq 150.000 KHz PNO: Fast - Frequency Trig: Free Run Avg Type: RMS Trig: 2 9:35 Trig: Free Run Avg Type: RMS Trig: Free Run Avg Type: RMS Trig: 7 Pree Run Avg Type: RMS Avg Type: RMS Auto Tune 0 dB/div Ref Offset 12.63 dB Mkr1 155 KHz -70.327 dBm Isone Is	🊺 Ag	ilent Spectru	ım Analyzer - Sw	ept SA									- 0 ×
Auto Tune PNC: Fast +	<mark>.x</mark> Star	t Freq	RF 50 9	₽ <u>≜</u> dc kHz		SEI			ALIGN AUTO	02:35:11 P TRAC	M Jun 12, 2015	Free	quency
10 dB/div Ref 0.00 dBm 10.021 dBm 10 dB/div Ref 0.00 dBm 13006m 10 dB/div 13006m 13006m 10 dB/div 13006m 13006m 10 dB/div 13006m 13006m 200 13006m 13006m 2			Ref Offset 1	2.63 dB	PNO: Fast ++ IFGain:Low	#Atten: 1	0 dB	Avginoid	10/10	Mkr1	155 kHz	A	uto Tune
100 1300 dBm 200 1400 dBm <td>10 dE Log</td> <td>3/div</td> <td>Ref 0.00 d</td> <td>IBM</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>-70.5</td> <td></td> <td></td> <td></td>	10 dE Log	3/div	Ref 0.00 d	IBM						-70.5			
200 Start Freq 300 Start Freq 400 Start Freq 400 Stop Freq	-10.0										-13.00 dBm	Се 15.0	e nter Freq 75000 MHz
300 Start Freq 400 Start Freq 400 Stop Freq 500 Stop Freq 600 Stop Freq 1 Stop Freq 700 Stop Freq 1 Stop Freq 800 Stop Freq 800 Stop Freq 1 Stop Freq 30.00000 MHz 1 Stop Freq 30.0000 MHz 1 Stop Freq 30.0000 MHz 1 Stop Freq 30.000 MHz Start 150 kHz Stop Stop Stop Stop MHz #Pres BW 10 kHz #VBW 30 kHz*	-20.0												
400 Image: Stop Freq 30.00000 MHz 500 Image: Stop Freq 30.00000 MHz 600 Image: Stop Freq 30.00000 MHz 700 Image: Stop Freq 30.00000 MHz 600 Image: Stop Freq 30.00000 MHz 700 Image: Stop Freq 30.00000 MHz 600 Image: Stop Freq 30.000 MHz 600 Image: Stop Freq 30.000 MHz 600 Image: Stop Freq 30.000 MHz 600 Image: Stop 30.00 Mz 600 Image: Stop 30.00 Mz	-30.0											1	Start Freq 50.000 kHz
-500 -600 -600 -700	-40.0											30.0	Stop Freq
-600 1	-50.0											00.0	00000 111 12
-80.0 Freq Offset -90.0 -90.0 -90.0 <td>-60.0</td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>14.0 Auto</td> <td>CF Step 00000 MHz <u>Man</u></td>	-60.0	1										14.0 Auto	CF Step 00000 MHz <u>Man</u>
-50 0 -50 0 -5												_	
-30.0 Start 150 kHz Stop 30.00 MHz #V/BW 30 kHz* Stop 30.00 MHz	-80.0											FI	eq Offset 0 Hz
Start 150 kHz Stop 30.00 MHz #Res BW 10 kHz #VBW 30 kHz* Sween 368.4 ms (6001 nts)	-90.0	H	tolleg stiller och toda Tysk far te for te trage	nder de this telle Program (spin) (s		tali te bija si kang Kang sejal menter ji	hanan fallan fila Marijan katika fila		da da da seta da Programa da seta da seta	teleni en las territ Plat el la gille en la			
	Star #Re	t 150 ki s BW 1	Hz 0 kHz		#VBIA	30 kHz*			Sween_3	Stop 3	0.00 MHz 6001 nts)		
MSG STATUS (DC Coupled	MSG		o 14112		# U BN				STATUS	DC Cou	pled		

[Uplink High]





Conducted Spurious Emissions (30 MHz – 1 GHz)



[Downlink Low]

[Downlink Middle]





[Downlink High]

🊺 Ag	ilent Spect	rum Analyzer - Sw	vept SA								
<mark>.x</mark> Sta	t Fred	RF 50	Ω AC DO MHz		SEI			ALIGN AUTO) 11:19:15 / TRAC	AM Jun 04, 2015	Frequency
10 dl	3/div	Ref Offset 4 Ref 20.00	1.16 dB dBm	PNO: Fast ↔ IFGain:Low	#Atten: 1	4 dB	Avginoid		Mkr1 962 -39.7	.02 MHz 19 dBm	Auto Tune
10.0											Center Freq 515.000000 MHz
0.00 -10.0										-13.00 dBm	Start Freq 30.000000 MHz
-20.0 -30.0											Stop Freq 1.000000000 GHz
-40.0	dhaadallaada Marcallaada		lihanda seguta lagi Malana seguta se	Angles (pales and a spirit of a start	ndag kan bi kata ya spo Pantasi ya kata ya spo	allenten fallen gibbe Pånskom faktorise	n fa shi ka shi ka shi Ta fa shi ka sa sa shi ka shi f	eperatu baldara itali Appata ata kara ata	land librard mainteile Margania ann an Anna	1 Martine and south	CF Step 14.100000 MHz Auto <u>Man</u>
-50.0											Freq Offset 0 Hz
-70.0 Star	t 30.0	MHz							Stop 1.	0000 GHz	
#Re ^{MSG}	s BW 1	100 KHz		#VBV	7 300 kHz	*	#S	stat	400.0 ms (2 rus	20001 pts)	

[Uplink Low]





[Uplink Middle]

🔰 Agilent Spectrum Analyzer - Swept SA			
RF 50 Ω AC Start Freq 30.000000 MHz		ALIGN AUTO 02:38:25 PM Jun 12, 201 Avg Type: RMS TRACE 2 3 4 5 AvglHold: 10/10 TYPE A WARAAW	5 Frequency
Ref Offset 12.63 dB 10 dB/div Ref 0.00 dBm	IFGain:Low #Atten: 10 dB	Mkr1 954.41 MH -57.830 dBn	Auto Tune
-10.0		-13.00 dB	Center Freq 515.000000 MHz
-30.0			Start Freq 30.000000 MHz
-40.0			Stop Freq 1.000000000 GHz
-60.0 <mark></mark>	ang na ling ng n	en feren herren en herren feren feren en herren en herren herren herren herren herren herren herren herren her An herren herren efter en herren feren er herren h	CF Step 14.000000 MHz Auto <u>Man</u>
-80.0			Freq Offset 0 Hz
-90.0 Start 30.0 MHz		Stop 1.0000 GH:	
#Res BW 8 MHz	#VBW 300 kHz*	Sweep 1.333 ms (20001 pts status	»

[Uplink High]





Conducted Spurious Emissions (1 GHz – 12.75 GHz)

[Downlink Low]

鱦 Agilent Spe	ctrum Analyzer - Swept SA					
	RF 50 Ω AC		SENSE:INT	ALIGN AUTO	08:38:30 PM Jun 03, 2015	Frequency
Start Fre	eq 1.000000000 G	PNO: Fast ++ IFGain:Low	 Trig: Free Run #Atten: 16 dB 	Avg Type: RMS Avg Hold: 500/500		
10 dB/div	Ref Offset 41.16 dB Ref 25.16 dBm			Mł	(r1 2.489 72 GHz -16.205 dBm	Auto Tune
15.2						Center Freq 1.746500000 GHz
-4.84						Start Freq 1.000000000 GHz
-14.8					-13.000	Stop Freq 2.493000000 GHz
-34.8						CF Step 4.000000 MHz Auto <u>Man</u>
-54.8						Freq Offset 0 Hz
-64.8	000 GHz				Stop 2.4930 GHz	
#Res BW	1.0 MHz	#VBW	3.0 MHz*	Sweep	2.000 ms (5001 pts)	
MSG				STAT	US	





[Downlink Middle]

🏓 Ag	jilent Spect	rum Analyzer - Sw	ept SA								
	Eros	RF 50 9			SEI	NSE:INT			05:58:24 P	M Jun 03, 2015	Frequency
Sta	tt Frec	1.000000		NO:Fast ↔	Trig: Free #Atten: 1	e Run 6 dB	Avg Hold:	100/100	TYP	E A WWWWW A NNNN	
				Gumeen				Mkr	1 2 491	21 GHz	Auto Tune
10 di	B/div	Ref Offset 4 Ref 25.16	1.16 dB dBm						-25.7	29 dBm	
Log											
											Center Freq
15.2											1.746500000 GHz
5.40											
5.16											Start Freq
4.04											1.000000000 GHz
-4.04											
-14.8										-13.00 dBm	
											Stop Freq
-24.8											2.493000000 GHZ
										Λ	
-34.8		وملان ومعادر المحمد	بأرةوه بالدواري حرواري	h had a second second second				a ging ta di si gin di ta da	targit)adak kalerta gitt	a particular and a particular	CF Step
											Auto Man
-44.8	<u> </u>										
											Erea Offset
-54.8											
											0112
-64.8											
Star	t 1.000	0 GHz							Stop 2.4	930 GHz	
#Re	s BW 1	.0 MHz		#VBW	/ 3.0 MHz	*		Sweep 2	.000 ms (5001 pts)	
MSG								STATUS			
the state											
🂓 Ag	jilent Spect	rum Analyzer - Swo RF 50 S	ept SA		SEI	NSE:INT		ALIGN AUTO	08:43:00 F	M Jun 03, 2015	
⊯ ^{Ag} ⊮ Star	jilent Spect	rum Analyzer - Sw RF 50 ۵ 2.693000	ept SA 2 AC 1000 GHz	1	SEI	NSE:INT	Avg Type	ALIGN AUTO	08:43:00 F	M Jun 03, 2015	Frequency
🏴 Ag <mark>M</mark> Star	rt Frec	rum Analyzer - Swi RF 50 G 2.693000	ept SA 2 AC 0000 GHz 1 1	PNO: Fast ↔	→ Trig: Free #Atten: 1	NSE:INT e Run 6 dB	Avg Type Avg Hold	ALIGN AUTO E: RMS E: 100/100	08:43:00 F TRAC TYF DE	M Jun 03, 2015 E 1 2 3 4 5 6 A WWWWW T A N N N N N	Frequency
₩ Ag <mark>W</mark> Star	rt Frec	RF 50 S 2.693000	ept SA 2 AC 1000 GHz 1 116 dB	PNO: Fast ↔ Gain:Low	Trig: Free #Atten: 1	NSE:INT e Run 6 dB	Avg Type Avg Hold	ALIGN AUTO 2: RMS 2: 100/100 Mkr	08:43:00 F TRAC TYF DE 1 26.14	MJun 03, 2015 E 1 2 3 4 5 6 A WWWWW T A N N N N N 7 1 GHz	Frequency Auto Tune
₩ Ag X Star	rt Frec	Ref Offset 4 Ref 25.16	ept SA 2 AC 1000 GHz F IF 1.16 dB dBm	PNO: Fast ↔ Gain:Low	→ Trig: Free #Atten: 1	NSE:INT PRun 6 dB	Avg Type Avg Hold	ALIGN AUTO 2: RMS 2: 100/100 Mkr	08:43:00 F TRAC TYF DE 1 26.14 - 18.9	MJun 03, 2015 E 1 2 3 4 5 6 A WWWW A NNNNN 7 1 GHz 71 dBm	Frequency Auto Tune
Mag Mag Star 10 df Log	rt Frec	RF 50 G 2.693000 Ref Offset 4' Ref 25.16	ept SA 2 AC 0000 GHz I I 1.16 dB dBm	PNO: Fast ↔ Gain:Low	Trig: Free #Atten: 1	NSE:INT	Avg Type Avg Hold	ALIGN AUTO 12: RMS 100/100 Mkr	08:43:00 F TRAC TYF DE 1 26.14 -18.9	MJun 03, 2015 E 1 2 3 4 5 6 A WWWWW T A NNNNN 7 1 GHz 71 dBm	Frequency Auto Tune
Mag Mag Star 10 di Log	rt Frec	um Analyzer - Swing RF 50 G 2.693000 Ref Offset 4' Ref 25.16	ept SA 2 AC 10000 GHz F II 1.16 dB dBm	NO: Fast •Gain:Low	→ Trig: Fre #Atten: 1	NSE:INT	Avg Type Avg Hold	ALIGN AUTO 2: RMS : 100/100 MKr	08:43:00 F TRAC TYF DE 1 26.14 - 18.9	MJun 03, 2015 E 1 2 3 4 5 6 E A WWWWW T A NN N N 7 1 GHz 71 dBm	Frequency Auto Tune Center Freq
Mag M Star 10 dB Log	B/div	um Analyzer - Sw RF 50 <u>5</u> 2.6930000 Ref Offset 4' Ref 25.16	ept SA 2 AC 0000 GHz F II.16 dB dBm	NO: Fast FGain:Low	Trig: Free #Atten: 1	e Run 6 dB	Avg Type Avg Hold	ALIGN AUTO 12: RMS 100/100 MKr	08:43:00 F TRAC TYF DE 1 26.14 -18.9	MJun 03, 2015 E 2 3 4 5 6 E A WWWWW T A NNNN 7 1 GHz 71 dBm	Frequency Auto Tune Center Freq 14.59650000 GHz
Ag K Star 10 dB Log 15.2 5 16	nilent Spect	um Analyzer - Sw RF 50 £ 2.6930000 Ref Offset 4' Ref 25.16	ept SA 2 AC 0000 GHz I 1.16 dB dBm	PNO: Fast Gain:Low	Trig: Free #Atten: 1	vse:INT ₽ Run 6 dB	Avg Type Avg Hold	ALIGN AUTO :: RMS : 100/100 Mkr	08:43:00 F TRAC TYF DE 1 26.14 -18.9	MJun 03, 2015 E 1 2 3 4 5 6 WWWWW T A NNNNN 7 1 GHz 71 dBm	Frequency Auto Tune Center Freq 14.596500000 GHz
Ag J 10 dl 15.2 5.16	rt Fred	um Analyzer - Sw RF 50 £ 2.693000 Ref Offset 4 Ref 25.16	ept SA 2 AC 0000 GHz I I.16 dB dBm	PNO: Fast Gain:Low	Trig: Free #Atten: 1	se:INT a Run 6 dB	Avg Type Avg Hold	ALIGN AUTO 11 RMS 100/100 Mkr	08:43:00 F TRAC TYF DE 1 26.14 -18.9	MJun 03, 2015 E 1 2 3 4 5 6 WWWWW T A NNNN 7 1 GHz 71 dBm	Frequency Auto Tune Center Freq 14.59650000 GHz Start Freq
Ag (X) Star 10 dB Log 15.2 5.16 -4.84	pilent Spect	um Analyzer - Sw RF 50 2 2.693000 Ref Offset 4 Ref 25.16	ept SA 2 AC 10000 GHz 11 11.16 dB dBm	PNO: Fast ↔ Gain:Low	- Trig: Fre #Atten: 1	vse:INT e Run 6 dB	Avg Type Avg Hold	ALIGN AUTO E: RMS 100/100 MKr	08:43:00 F TRAC TV DF 1 26.14 -18.9	MJun 03, 2015 E 12 23 4 5 6 A WANNEY TANNNN TANNNN 7 1 GHz 71 dBm	Frequency Auto Tune Center Freq 14.596500000 GHz Start Freq 2.693000000 GHz
Ag ()// Star 10 dl Log 15.2 5.16 -4.84	B/div	um Analyzer - Sw RF 50 2 2.693000 Ref Offset 4 Ref 25.16	ept SA 2 AC 10000 GHz 11 1.16 dB dBm	PNO: Fast ↔ Gain:Low	- Trig: Free #Atten: 1	e Run 6 dB	Avg Type Avg Hold	ALIGN AUTO E RMS 100/100 Mkr	08:43:00 F TRAC TV 0F 1 26.14 -18.9	MJun 03, 2015 E 1 2 3 4 5 6 A WYNNWY T A NNNN 7 1 GHz 71 dBm	Frequency Auto Tune Center Freq 14.59650000 GHz Start Freq 2.69300000 GHz
Ag JO Star 10 dl Log 15.2 -4.84 -4.84	B/div	um Analyzer - Sw RF 50 2 2.693000 Ref Offset 4 Ref 25.16	ept SA 2 AC 10000 GHz 11 1.16 dB dBm	PNO: Fast ↔ Gain:Low	- Trig: Free #Atten: 1	se:int	Avg Type Avg Hold	ALIGN AUTO E RMS 100/100 Mkr	08:43:00 F TRAC TV DF 1 26.14 -18.9	MJun 03, 2015 E 12 23 4 5 6 A WWWW TA NNNN T 1 GHz 71 dBm	Frequency Auto Tune Center Freq 14.59650000 GHz Start Freq 2.69300000 GHz
Ag Star 10 de 15.2 5.16 -4.84 -14.8	B/div	um Analyzer - Sw RF 50 (2 2.693000) Ref Offset 4 Ref 25.16	ept SA 2 AC 1000 GHz 11 1.16 dB dBm	PNO: Fast ↔ Gain:Low	- Trig: Free #Atten: 1	se:int	Avg Type Avg Hold	ALIGN AUTO E RMS 100/100 Mkr	08:43:00 F TRAC TV DF 1 26.14 -18.9	MJun 03, 2015 E 12 23 4 5 6 A WANNEY T A NNNN T A NNNNN T 1 GHz T 1 dBm	Frequency Auto Tune Center Freq 14.596500000 GHz Start Freq 2.693000000 GHz
Agg A	B/div	um Analyzer - Sw RF 50 (2 2.693000) Ref Offset 4' Ref 25.16	ept SA 2 AC 1000 GHz 11 1.16 dB dBm	NO: Fast ↔ Gain:Low	- Trig: Free #Atten: 1	se:int a Run 6 dB	Avg Type Avg Hold	ALIGN AUTO E RMS 100/100 Mkr	08:43:00 F TRAC TYV DF 1 26.14 -18.9	MJun 03, 2015 E 12 23 4 5 6 A WWNWW T A NNNN 7 1 GHz 71 dBm	Frequency Auto Tune Center Freq 14.59650000 GHz Start Freq 2.69300000 GHz
Age A	B/div	um Analyzer - Sw RF 50 (2 2.693000) Ref Offset 4' Ref 25.16	ept SA 2 AC 1000 GHz 11 1.16 dB dBm	PNO: Fast ↔ Gain:Low	Trig: Free #Atten: 1	se:int	Avg Type Avg Hold	ALIGN AUTO E RMS 100/100 MKr	08:43:00 F TRAC TYV DF 1 26.14 -18.9	MJun 03, 2015 E 12 23 4 5 6 A WYNNWY T A NNNNN 7 1 GHz 71 dBm	Frequency Auto Tune Center Freq 14.59650000 GHz Start Freq 2.69300000 GHz
Age A	B/div	um Analyzer - Sw RF 50 (2 2.693000) Ref Offset 4' Ref 25.16	ept SA 2 AC 1000 GHz 11 1.16 dB dBm	PNO: Fast ↔ Gain:Low	Trig: Free #Atten: 1	se:int e Run 6 dB	Avg Type Avg Hold	ALIGN AUTO E RMS 100/100 MKr	08:43:00 F TRAC TYV DF 1 26.14 -18.9	MJun 03, 2015 E 12 23 4 5 6 A WWNWW T A NNNN 7 1 GHz 71 dBm	Frequency Auto Tune Center Freq 14.596500000 GHz Start Freq 2.693000000 GHz Stop Freq 26.50000000 GHz
Age A	B/div	um Analyzer - Sw RF 50 (2 2.693000) Ref Offset 4' Ref 25.16	ept SA 2 AC 1000 GHz 11 1.16 dB dBm	PNO: Fast ↔ Gain:Low	Trig: Free #Atten: 1	se:int e Run 6 dB	Avg Type Avg Hold	ALIGN AUTO E: RMS 100/100 MKr	08:43:00 F TRAC TYV DF 1 26.14 -18.9	MJun 03, 2015 E 12 23 4 5 6 A WYNNWY T A NNNNN 7 1 GHz 71 dBm	Frequency Auto Tune Center Freq 14.596500000 GHz 2.693000000 GHz Stop Freq 26.50000000 GHz CF Step 4.00000 MHz Auto Man
Example Agency A	B/div	um Analyzer - Sw RF 50 (2 2.693000) Ref Offset 4' Ref 25.16	ept SA 2 AC 1000 GHz 11 1.16 dB dBm	PNO: Fast ↔ Gain:Low	Trig: Free #Atten: 1	se:int e Run 6 dB	Avg Type Avg Hold	ALIGN AUTO E: RMS 100/100 MKr	08:43:00 F TRAC TYV DF 1 26.14 -18.9	MJun 03, 2015 E 12 23 4 5 6 A WYNNWY T A NNNNN 7 1 GHz 71 dBm	Frequency Auto Tune Center Freq 14.596500000 GHz 2.693000000 GHz 26.500000000 GHz 4.000000 MHz Auto Man
Example Agence A	B/div	um Analyzer - Sw RF 50 (2 2.693000) Ref Offset 4' Ref 25.16	ept SA 2 AC 1000 GHz 11 1.16 dB dBm	PNO: Fast ↔ Gain:Low	Trig: Free #Atten: 1	se:int e Run 6 dB	Avg Type Avg Hold	ALIGN AUTO E RMS 100/100 MKr	08:43:00 F TRAC TYV DF 1 26.14 -18.9	MJun 03, 2015 E 12 23 4 5 6 A WYNNWY T A NNNN 7 1 GHz 71 dBm	Frequency Auto Tune Center Freq 14.596500000 GHz 2.693000000 GHz 26.500000000 GHz 4.000000 MHz Auto Man
App 2 A	B/div	um Analyzer - Sw RF 50 (2 2.693000) Ref Offset 4' Ref 25.16	ept SA 2 AC 1000 GHz 11.16 dB dBm	PNO: Fast ↔ Gain:Low	Trig: Free #Atten: 1	se:int e Run 6 dB	Avg Type Avg Hold:	ALIGN AUTO E RMS 100/100 MKr	08:43:00 F TRAC TYV DF 1 26.14 -18.9	MJun 03, 2015 E 12 23 4 5 6 A WWNWW T A NNNN 7 1 GHz 71 dBm	Frequency Auto Tune Center Freq 14.596500000 GHz 2.693000000 GHz 26.50000000 GHz 4.000000 MHz Auto Man Freq Offset 0 Hz
Agg IN Star 15.2 5.16 -4.84 -14.8 -24.8 -34.8 -34.8 -44.8 -54.8	Bidiv	um Analyzer - Sw RF 50 (2 2.693000) Ref Offset 4' Ref 25.16	ept SA 2 AC 1000 GHz 11.16 dB dBm	PNO: Fast ↔ Gain:Low	Trig: Free #Atten: 1	se:int e Run 6 dB	Avg Type Avg Hold:	ALIGN AUTO E RMS 100/100 MKr	08:43:00 F TRAC TYV DF 1 26.14 -18.9	MJun 03, 2015 E 12 23 4 5 6 A WANNIN T A NNNN 7 1 GHz 71 dBm	Frequency Auto Tune Center Freq 14.596500000 GHz 2.693000000 GHz 26.500000000 GHz 4.000000 MHz Auto Man Freq Offset 0 Hz
Agg IV Star 15.2 5.16 -4.84 -4.84 -4.84 -4.84 -4.84 -34.8 -34.8 -34.8 -54.8 -54.8	Bidiv	um Analyzer - Sw RF 50 (2 2.693000) Ref Offset 4' Ref 25.16	ept SA 2 AC 1000 GHz 11.16 dB dBm	PNO: Fast ↔ Gain:Low	Trig: Free #Atten: 1	se:int e Run 6 dB	Avg Type Avg Hold:	ALIGN AUTO E RMS 100/100 MKr	08:43:00 F TRAC TYV DF 1 26.14 -18.9	MJun 03, 2015 E 12 23 4 5 6 A WWNWW T A NNNN 7 1 GHz 71 dBm	Frequency Auto Tune Center Freq 14.596500000 GHz 2.693000000 GHz 26.50000000 GHz 4.000000 MHz Auto Man Freq Offset 0 Hz
Agg IV Star 15.2 5.16 -4.84 -4.84 -4.84 -4.84 -44.8 -54.8 -64.8	Bidiv	um Analyzer - Sw RF 50 (2 2.693000) Ref Offset 4' Ref 25.16	ept SA 2 AC 1000 GHz 11.16 dB dBm	PNO: Fast ↔ Gain:Low	Trig: Free #Atten: 1	se:int e Run 6 dB	Avg Type Avg Hold:	ALIGN AUTO E RMS 100/100 MKr	08:43:00 F TRAC TYV DF 1 26.14 -18.9	MJun 03, 2015 E 12 23 4 5 6 A WANNIN T A NNNN 7 1 GHz 71 dBm	Frequency Auto Tune Center Freq 14.596500000 GHz 2.693000000 GHz 26.50000000 GHz 4.000000 MHz Auto Man Freq Offset 0 Hz
Agg IV Star 15.2 5.16 -4.84 -14.8 -24.8 -34.8 -44.8 -54.8 -54.8 -54.8 Star Star Star	Bidiv	um Analyzer - Sw RF 50 (2 2.693000) Ref Offset 4' Ref 25.16 	ept SA 2 AC 1000 GHz 11.16 dB dBm	PNO: Fast ↔ Gain:Low	Trig: Free #Atten: 1	se:int e Run 6 dB	Avg Type Avg Hold:	ALIGN AUTO E RMS 100/100 MKr	08:43:00 F TRAC TYP 0F 1 26.14 -18.9	MJun 03, 2015 E 12 3.4 5 6 A WINNIN T A NINNIN T 1 GHz T 1 dBm -13 00 effin -13 00 effin 6.50 GHz	Frequency Auto Tune Center Freq 14.596500000 GHz 2.693000000 GHz 26.50000000 GHz 4.000000 MHz Auto Man Freq Offset 0 Hz
Star 10 dł Star 15.2 5.16 -4.84 -4.84 -4.84 -4.84 -4.84 -4.84 -54.8 Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star Star	B/div	um Analyzer - Sw RF 50 (2 2.693000) Ref Offset 4' Ref 25.16 .0 GHz .0 MHz	ept SA 2 AC 1000 GHz 11.16 dB dBm	PNO: Fast ↔ Gain:Low	Trig: Free #Atten: 1	xSE:INT	Avg Type Avg Hold:	ALIGN AUTO E RMS 100/100 Mkr	08:43:00 F TRAC TYP 1 26.14 -18.9	MJun 03, 2015 E 12 3 4 5 6 A WINNIN T A NINNIN T A NINNIN T 1 GHz T 1 dBm -1300 effin -1300 effin -1	Frequency Auto Tune Center Freq 14.596500000 GHz 2.693000000 GHz 26.500000000 GHz Auto CF Step 4.000000 MHz Auto Man Freq Offset 0 Hz



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🊺 Agiler	nt Spectrum Analyzer - Swept SA					
L <mark>XI</mark>	RF 50 Ω AC		SENSE:INT	ALIGN AUTO	06:02:18 PM Jun 03, 2015	Frequency
Start	Freq 1.0000000000	PNO: Fast +++ IFGain:Low	Trig: Free Run #Atten: 16 dB	Avg Hold: 100/100		
10 dB/c	Ref Offset 41.16 dB div Ref 25.16 dBm	6		Mkr	1 2.492 70 GHz -25.589 dBm	Auto Tune
15.2						Center Freq 1.746500000 GHz
-4.84					10.00 - 5	Start Freq 1.000000000 GHz
-14.8					-13.00 dbm	Stop Freq 2.493000000 GHz
-34.8	en en senten parten de la sente de la s La sente de la s	a per la serie de la constant de la const			en internet of the being and the set of the set of the set	CF Step 14.000 kHz Auto <u>Man</u>
-44.8						Freq Offset 0 Hz
-64.8	1.0000 GHz				Stop 2.4930 GHz	
#Res	BW 1.0 MHz	#VBW 3	3.0 MHz*	Sweep 2	2.000 ms (5001 pts)	





[Uplink Low]



[Uplink Middle]





[Uplink High]





Intermodulation Spurious Emissions



[Downlink Low]

[Downlink High]

🊺 Agi	ilent Spect	rum Analyzer - Sw	ept SA								
<mark>.∦</mark> Star	t Erec	RF 50 9		-17	SEN	ISE:INT		ALIGN AUTO	02:57:05 I TRAC	PM Jun 15, 2015	Frequency
Otal		12.030000	5000 GI	PNO: Wide ++ IFGain:Low	Trig: Free #Atten: 14	e Run 4 dB	Avg Hold	: 500/500	TY D		
10 dE	3/div	Ref Offset 4 Ref 25.16	1.16 dB dBm					Mkr	1 2.690 0 -15.8	075 GHz 35 dBm	Auto Tune
15.2											Center Freq 2.691500000 GHz
5.16 -4.84											Start Freq 2.69000000 GHz
-14.8	1 		~~~~~~	mann	Muguna	- Myrrowan	Aman			-13.00 dBm	Stop Freq 2.693000000 GHz
-24.8 -34.8											CF Step 4.000000 MHz Auto <u>Man</u>
-54.8											Freq Offset 0 Hz
-64.8											
Star #Res	5 BW 2	2000 GHz 200 kHz		#VBW	/ 620 kHz	*	#	Sweep	Stop 2.69 1.000 ms	3000 GHz (1001 pts)	
MSG								STAT	rus		



[Uplink Low]

🔰 Agilent Spectrum Analyzer - Swept SA				
⊠ RF 50 Ω AC Start Freq 2.493000000 G	HZ Trig: Free R	INT ALIGN AUT Avg Type: RMS un AvalHold: 500/500	TRACE 1 2 3 4 5 6 TYPE A WWWW	Frequency
Ref Offset 12.63 dB 10 dB/div Ref 10.00 dBm	IFGain:Low #Atten: 10 d	B Mk	r1 2.495 952 GHz -70.013 dBm	Auto Tune
0.00				Center Freq 2.494500000 GHz
-20.0			-13.00 dBm	Start Freq 2.493000000 GHz
-30.0				Stop Freq 2.496000000 GHz
-60.0				CF Step 14.000000 MHz Auto <u>Man</u>
-70.0	her grand and the grand and th			Freq Offset 0 Hz
Start 2.493000 GHz #Res BW 200 kHz	#VBW 620 <u>kHz*</u>	#Sweep	Stop 2.496000 GHz 1.000 ms (100 <u>1 pts)</u>	
MSG		STA	ATUS	

[Uplink High]





Band Edge

[Downlink Low]



[Downlink High]

🊺 Ag	ilent Specti	um Analyzer - Sw	ept SA								
<mark>LXI</mark> Stor	t Eroc	RF 50 9		-	SEN	ISE:INT		ALIGN AUTO	04:40:40 I	M Jun 03, 2015	Frequency
Sta	t Frec	2.090000	000 GH	PNO: Wide ↔ IFGain:Low	Trig: Free #Atten: 14	e Run 4 dB	Avg Hold	: 500/500	TY D		
10 de	3/div	Ref Offset 4 Ref 41.16	1.16 dB dBm					Mkr	1 2.690 0 -15.0	018 GHz 34 dBm	Auto I une
31.2											Center Freq 2.691500000 GHz
21.2 11.2											Start Freq 2.690000000 GHz
1.16 -8.84											Stop Freq 2.693000000 GHz
-18.8	wann r	WMM-Mpr	Lange States	Manapaga	Mulan	ry William March	- Marinalahan	der der der	www.w.J.a.www.	-13.00 dBm	CF Step 4.000000 MHz Auto <u>Man</u>
-28.8 -38.8											Freq Offset 0 Hz
-48.8 Star	1 2.690	000 GHz							Stop 2.69	3000 GHz	
#Re	s BW 2	00 kHz		#VBW	620 kHz	\$		Sweep	1.000 ms	1001 pts)	
MSG								STAT	US		



[Uplink Low]

🔰 Agilent Spectrum Analyzer - Swept SA				
RF 50 Ω AC Start Freq 2.493000000	GHz SENSE	AVG Type: RMS	02:22:24 PM Jun 12, 2015 TRACE 1 2 3 4 5 6	Frequency
Ref Offset 12.63 dE	PNO: Wide \rightarrow Thg. Free R IFGain:Low#Atten: 10 d	B Mkr	1 2.495 976 GHz -67.705 dBm	Auto Tune
-10.0			-13.00 dBm	Center Freq 2.494500000 GHz
-20.0				Start Freq 2.493000000 GHz
-40.0				Stop Freq 2.496000000 GHz
-60.0			mp	CF Step 14.000000 MHz Auto <u>Man</u>
-80.0				Freq Offset 0 Hz
Start 2.493000 GHz #Res BW 200 kHz	#VBW 620 kHz*	Sween	Stop 2.496000 GHz	
MSG		STAT	rus	

[Uplink High]





10. RADIATED SPURIOUS EMISSIONS

Test Requirement(s): § 2.1053 Measurements required: Field strength of spurious radiation.

§ 2.1053 (a) Measurements shall be made to detect spurious emissions that may be Radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of § 2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from half-wave dipole antennas.

§ 2.1053 (b): The measurements specified in paragraph (a) of this section shall be made for the following equipment:

(1) Those in which the spurious emissions are required to be 60 dB or more below the mean power of the transmitter.

(2) All equipment operating on frequencies higher than 25 MHz.

(3) All equipment where the antenna is an integral part of, and attached directly to The transmitter.

(4) Other types of equipment as required, when deemed necessary by the Commission.

Emission limit

On any frequency outside the operating band, the power of any emission shall be attenuated outside the band below the transmitter power(P) by at least 43 + 10 log (P) dB;

Test Procedures: As required by 47 CFR 2.1053, field strength of radiated spurious measurements were made in accordance with the procedures of ANSI/TIA-603-C-2004 "Land Mobile FM or PM Communications Equipment Measurement and Performance Standards".

Radiated emission measurements were performed inside a 3 meter semi-anechoic chamber.



Model: ADX-HPR-BT46

The EUT was set at a distance of 3m from the receiving antenna. The EUT's RF ports were terminated to 500hm load. The EUT was set to transmit at the low, mid and high channels of the transmitter frequency range at its maximum power level. The EUT was rotated about 360 and the receiving antenna scanned from 1-3m in order to capture the maximum emission. A calibrated antenna source was positioned in place of the EUT and the previously recorded signal was duplicated. The maximum EIRP of the emission was calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps were carried. out with the receiving antenna in both vertical and horizontal polarization. Harmonic emissions up to the 10th or 40GHz, whichever was the lesser, were investigated.

Radiated Spurious Emissions Test Setup





Test Result:

Note.

Input signal is the CW signal.

Harmonics were not found.

[Downlink]

Tx Freq.(MHz)		<u>Substitute</u>	Ant. Gain			ERP	Margin	
	Freq.(MHz)	Level	(dBd)	C.L	Pol.	(dBm)	(dB)	
		<u>[dBm]</u>						
2506.0								
2593.0	No Peak Found							
2680.0								