TCT 通测检测
TESTING CENTRE TECHNOLOGY

TEST REPORT

FCC ID: 2AJAN-SMH100

Product:Hero 100 DAS

Model No.: SMH100

Additional Model No.: SMHW100

Trade Mark: Signifi Mobile

Report No.: TCT201116E005

Issued Date: November 21, 2020

Issued for:

Signifi Mobile Inc

1001 Rue Lenoir Suite A-414, Montreal, Quebec, H4C2Z6 , Canada

Issued By:

Shenzhen Tongce Testing Lab.

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1. Test Certification

Product:	Hero 100 DAS
Model No.:	SMH100
Additional Model:	SMHW100
Trade Mark:	Signifi Mobile
Applicant:	Signifi Mobile Inc
Address:	1001 Rue Lenoir Suite A-414, Montreal, Quebec, H4C2Z6 , Canada
Manufacturer:	/
Address:	/
Date of Test:	November 9, 2020 ~ November 21, 2020
Applicable Standards:	FCC CFR 47 PART 2/PART 27/PART 20.21; ANSI C63.26-2015; KDB 935210 D05 Indus Booster Basic Meas v01r04.

The above equipment has been tested by Shenzhen Tongce Testing Lab. and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Tested By: ***Date:*** ***November 21, 2020***

Rleo

Reviewed By: ***Date:*** ***November 21, 2020***

Beryl Zhao

Approved By: ***Date:*** ***November 21, 2020***

Tomsin

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2. Test Result Summary

Applied Standard: FCC CFR 47 PART 2/PART 27/PART 20.21		
FCC Rules	Description of Test	Result
§2.1047, §27.50(c), KDB 935210 D05 v01r04	Mean output power and amplifier gain	Compliant
KDB 935210 D05 v01r04	Out-of-band rejection	Compliant
§2.1049, KDB 935210 D05 v01r04	Occupied bandwidth and Input-versus-output signal comparison	Compliant
§2.1051, §27.53(g) KDB 935210 D05 v01r04	Out-of-band/block (including intermodulation) emissions	Compliant
§2.1051& §27.53(g) KDB 935210 D05 v01r04	Spurious emissions at antenna terminals	Compliant
§2.1053& §27.53(g) KDB 935210 D05 v01r04	Radiated spurious emissions	Compliant
§2.1055& §27.54 KDB 935210 D05 v01r04	Frequency tolerance	Not Applicable*
§ 2.1091	Maximum Permissible exposure (MPE)	See MPE Report

Note:

1. Compliant: Test item meets the requirement.

2. Fail: Test item does not meet the requirement.

3. N/A: Test case does not apply to the test object.

4. The test result judgment is decided by the limit of test standard.

5. the booster does not alter the input signal in any way.

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3. EUT Description

Product Name:	Hero 100 DAS
Model :	SMH100
Additional Model:	SMHW100
Trade Mark:	Signifi Mobile
Operation Frequency:	Band 12 Uplink: 698 MHz - 716MHz, Downlink: 728 MHz - 746MHz Band 14 Uplink: 788 MHz - 798MHz, Downlink: 758 MHz - 768MHz
Emission Designator:	G7D,W7D
FCC Classification:	Industrial Signal Booster(B2I)
Power Supply:	DC 12V⎓ 3.0A,36W
AC adapter:	Adapter Information: MODEL: GM53-120300-F INPUT: AC 100-240V,50/60Hz, 2.0A OUTPUT: DC 12V⎓ 3.0A,36W
Remark:	PCB board,same design and work diagrams of these model(s) are the same, So no additional models were tested.

Note: *The antenna gain listed in this report is provided by applicant, and the test laboratory is not responsible for this parameter.*

Mode	Frequency (MHz)	Antenna Gain(dBi)		
		Yagi antenna	Outdoor Panel Antenna	Cable loss (dB)
UP LINK	698-716	9.5	7.0	0.8
	788-798	9.5	7.0	0.8
Mode	Frequency (MHz)	Indoor Omni Antenna	Indoor Panel Antenna	Cable loss (dB)
DOWN LINK	728-746	3.0	7.0	1.7
	758 -768	3.0	7.0	1.7

4. General Information

4.1. Test environment

Operating Environment:	
Temperature:	25.3 °C
Humidity:	52.3 % RH
Atmospheric Pressure:	1010 mbar

4.2. Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Equipment	Model No.	Serial No.	FCC ID	Trade Name
/	/	/	/	/

5. Facilities and Accreditations

5.1. Facilities

The test facility is recognized, certified, or accredited by the following organizations:

- FCC - Registration No.: 645098
  Shenzhen Tongce Testing Lab
  The 3m Semi-anechoic chamber has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.
- IC - Registration No.: 10668A-1
  The 3m Semi-anechoic chamber of Shenzhen TCT Testing Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

5.2. Location

Shenzhen Tongce Testing Lab
Address: 1B/F., Building 1, Yibaolai Industrial Park, Qiaotou, Fuyong, Baoan District, Shenzhen, Guangdong, China
TEL: +86-755-27673339

5.3. Measurement Uncertainty

The reported uncertainty of measurement y ±U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

No.	Item	MU
1	Conducted Emission	±2.56dB
2	RF power, conducted	±0.12dB
3	Spurious emissions, conducted	±0.11dB
4	All emissions, radiated(<1G)	±3.92dB
5	All emissions, radiated(>1G)	±4.28dB
6	Temperature	±0.1 ℃
7	Humidity	±1.0%

6. Test Results and Measurement Data

6.1. MEAN OUTPUT POWER AND AMPLIFIER GAIN

Applicable Standard

According to § 27.50(c)
1) Fixed and base stations transmitting a signal with an emission bandwidth of 1 MHz or less must not exceed an effective radiated power (ERP) of 1000 watts and an antenna height of 305 m height above average terrain (HAAT), except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 1000 watts ERP in accordance with Table 1 of this section;
(2) Fixed and base stations located in a county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, and transmitting a signal with an emission bandwidth of 1 MHz or less must not exceed an ERP of 2000 watts and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 2000 watts ERP in accordance with Table 2 of this section;
(3) Fixed and base stations transmitting a signal with an emission bandwidth greater than 1 MHz must not exceed an ERP of 1000 watts/MHz and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 1000 watts/MHz ERP in accordance with Table 3 of this section;
(4) Fixed and base stations located in a county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, and transmitting a signal with an emission bandwidth greater than 1 MHz must not exceed an ERP of 2000 watts/MHz and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 2000 watts/MHz ERP in accordance with Table 4 of this section.

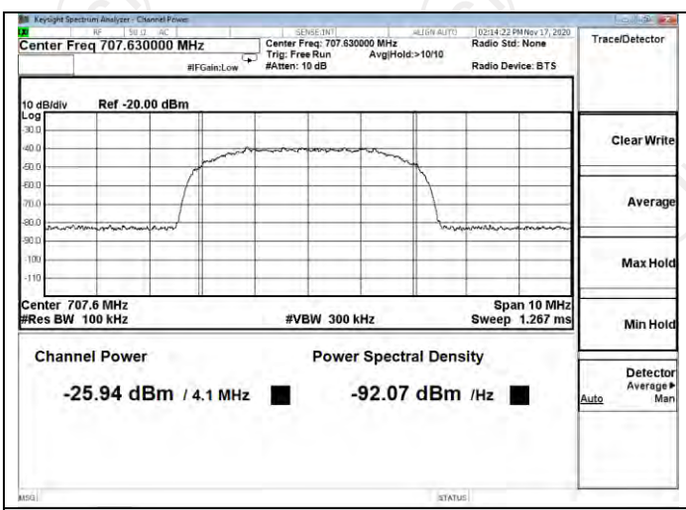
Test Procedure

According to 935210 D05 Indus Booster Basic Meas v01r04
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 (see 3.5.3 or 3.5.4 for power measurement guidance).
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.
Method 1: Power measurement with a spectrum or signal analyzer
Guidance for performing input/output power measurements using a spectrum or signal analyzer is provided in 5.2 of KDB Publication 971168.
Calculating the mean amplifier, booster, or repeater gain
NOTE– §§ 20.21 and 2.1033(c) do not require gain test data; inclusion of industrial booster gain test data in

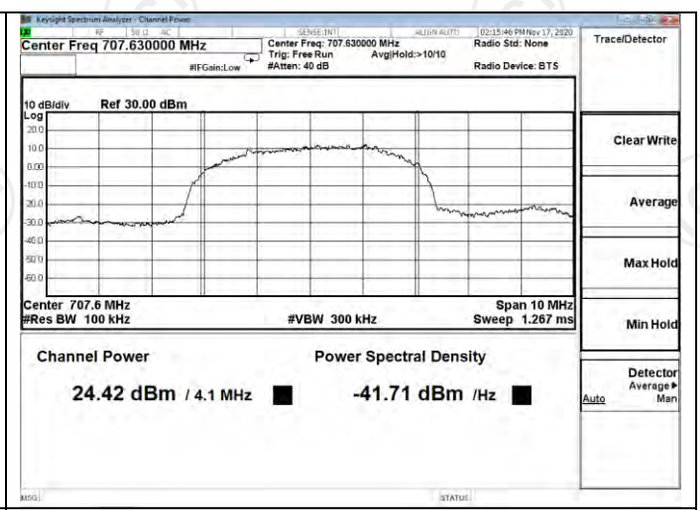
test reports submitted for FCC equipment authorization is optional.
After the mean input and output power levels have been measured as described above, the mean gain of the EUT can be determined from:
Gain (dB) = output power (dBm) − input power (dBm).
Report the mean gain for each authorized operating frequency band and each test signal stimulus.

Test Data

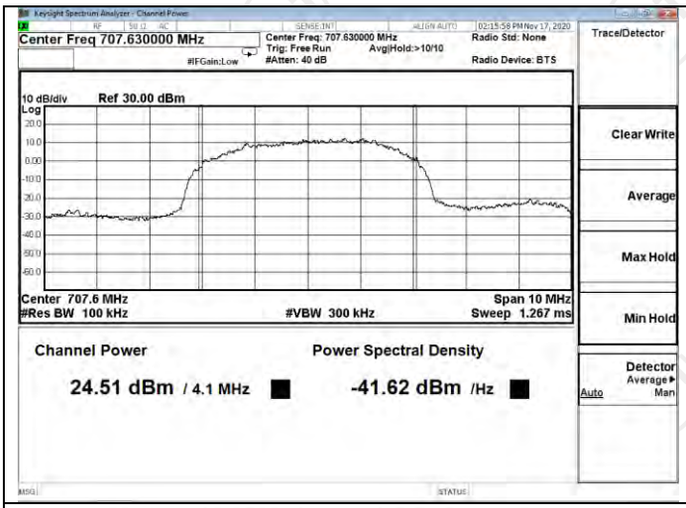
Mode	Frequency (MHz)	Signal Type	AGC threshold level (dBm)	Signal Level	Input Power (dBm)	Output Power (dBm)	Gain (dB)
Uplink	707.63	AWGN	-24.08	Pre-AGC	-25.940	24.420	50.360
				3dB above AGC	-22.940	**24.510**	47.450
		GSM	-25.02	Pre-AGC	-24.941	23.510	48.451
				3dB above AGC	-21.941	23.953	45.894
Downlink	739.56	AWGN	-41.5	Pre-AGC	-42.600	9.520	52.120
				3dB above AGC	-39.600	9.530	49.130
		GSM	-41.0	Pre-AGC	-41.071	9.253	50.324
				3dB above AGC	-38.071	**10.075**	48.146



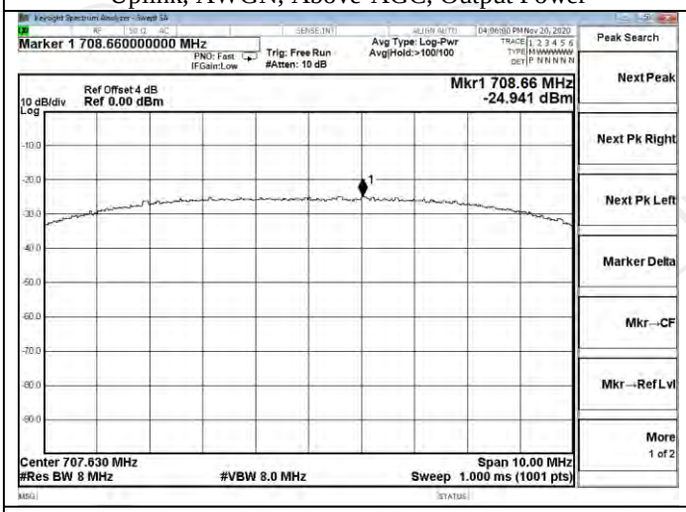
Uplink, AWGN, Pre-AGC, Output Power



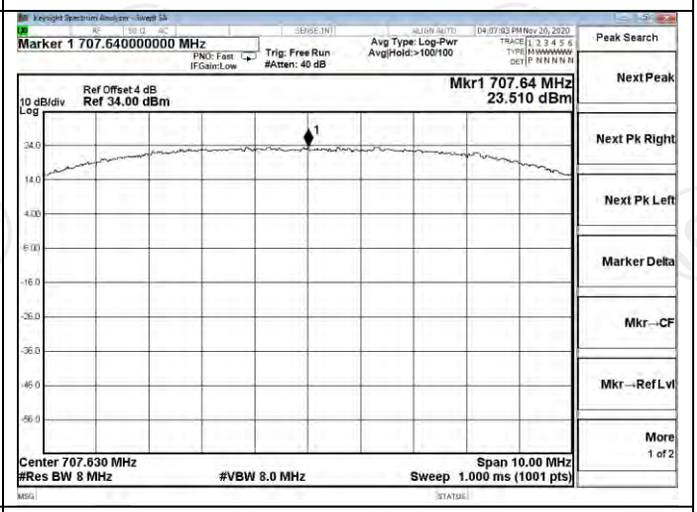
Uplink, AWGN, Pre-AGC, Output Power



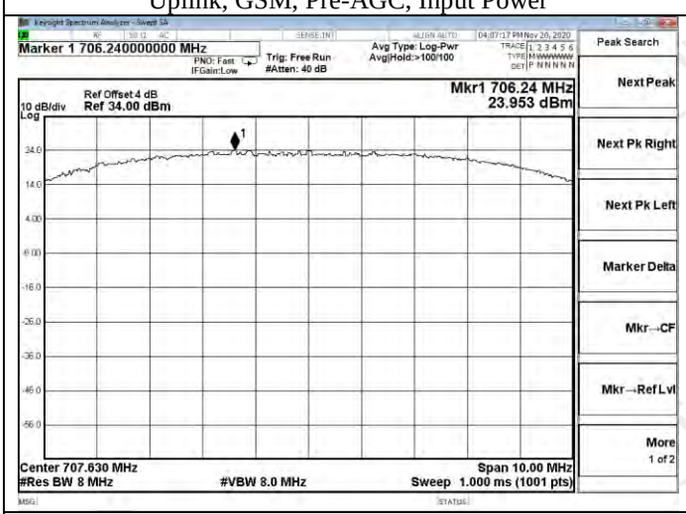
Uplink, AWGN, Above-AGC, Output Power



Uplink, GSM, Pre-AGC, Input Power

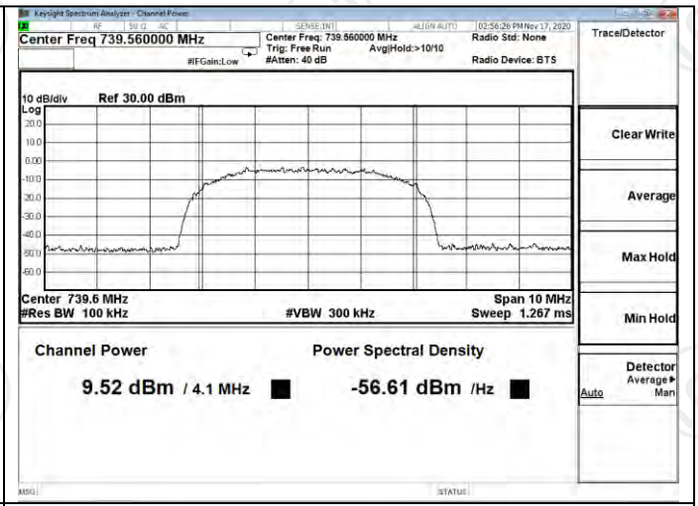


Uplink, GSM, Pre-AGC, Output Power

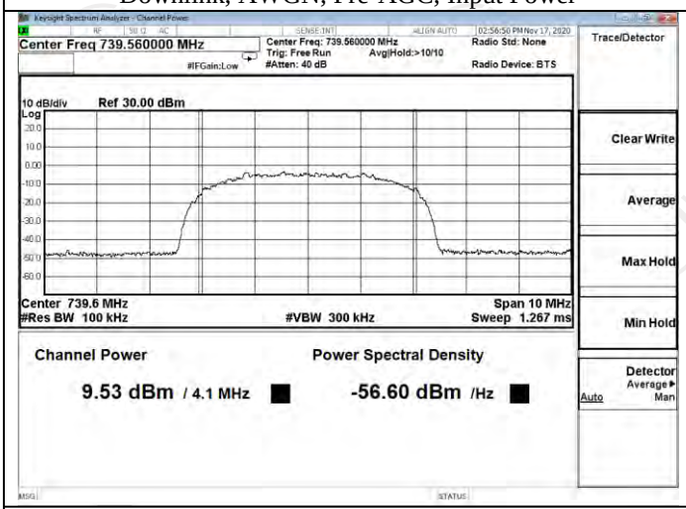


Uplink, GSM, Above-AGC, Output Power

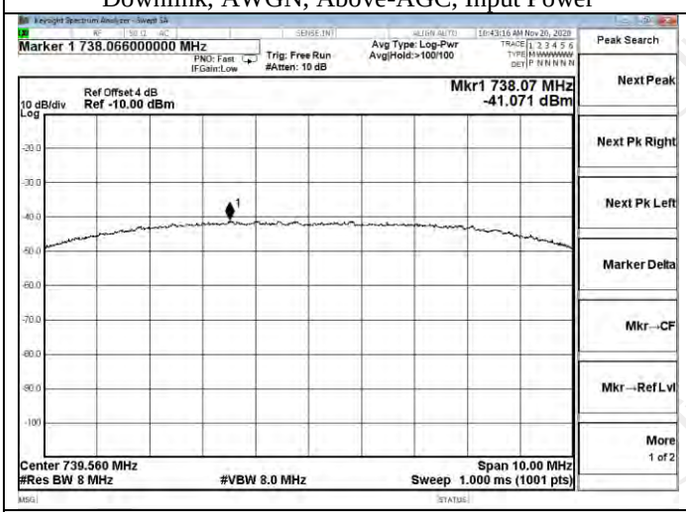
Downlink, AWGN, Pre-AGC, Input Power



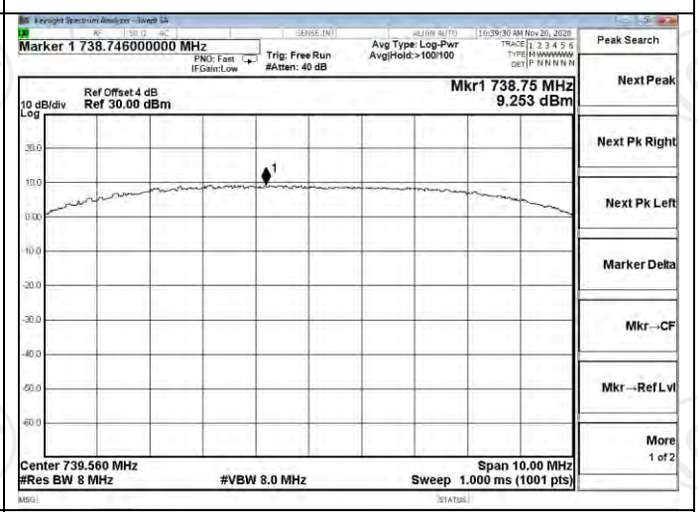
Downlink, AWGN, Pre-AGC, Output Power



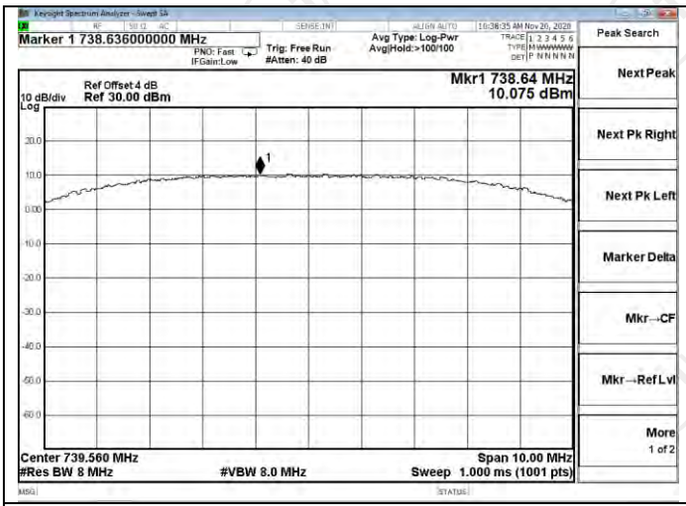
Downlink, AWGN, Above-AGC, Input Power



Downlink, GSM, Pre-AGC, Input Power



Downlink, GSM, Pre-AGC, Output Power



Downlink, GSM, Above-AGC, Output Power

6.2. OUT-OF-BAND REJECTION

Applicable Standard

According toKDB935210 D02 Signal Boosters Certification v04r02, Out-of-band rejection–testing for rejection of out-of-band signals may be appropriate. Alternatively, filter frequency response plots are acceptable.

Test Procedure

Adjust the internal gain control of the equipment under test to the maximum gain for which equipment certification is sought.

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.

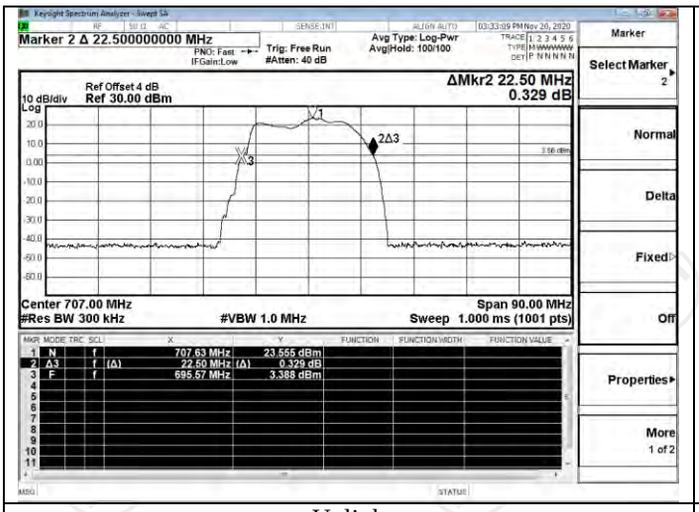
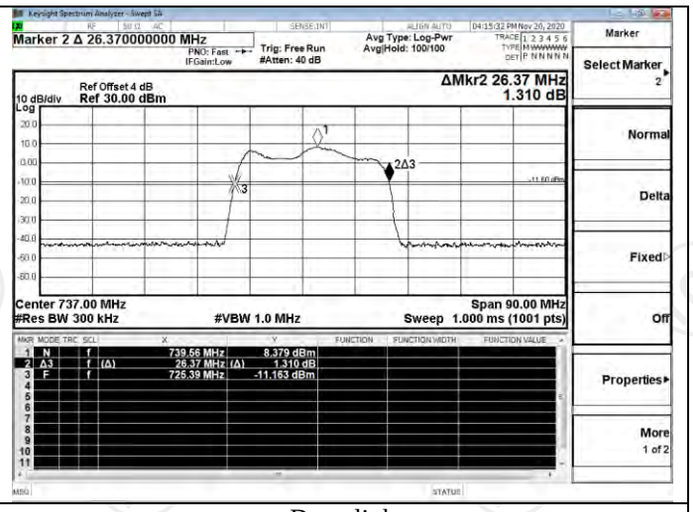
4) Number of points = SPAN/(RBW/2).

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 videobandwidth shall be set to ≥ 3 × RBW.

Test Data

	
Uplink	Downlink

6.3. OCCUPIED BANDWIDTH AND INPUT-VERSUS-OUTPUT SIGNAL COMPARISON

Applicable Standard

According to § 2.1049 and KDB935210 D02 Signal Boosters Certification v04r02,
Report worst case results for occupied bandwidth comparison and intermodulation tests done with and without any AGC circuitry activated, for devices so equipped.

Test Procedure

A 26 dB bandwidth measurement shall be performed on the input signal and the output signal (alternatively, the 99% OBW can be measured and used) to demonstrate compliance to the technical requirements specified in §90.219(e)(4)(i) and (ii). See KDB Publication 971168 for more information regarding measuring the OBW.
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 EBW or alternatively, 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 ≥ 3 × 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) Determine the reference value: Allow the trace to stabilize. Set the spectrum analyzer marker to the highest amplitude level of the displayed trace (this is the reference value) and record the associated frequency as f0.
l) 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 −26 dB down amplitude. The 2 dB emission bandwidth is the positive frequency difference between the two markers.
NOTE—The spectral envelope may cross the −26 dB down amplitude at multiple points. If so, the lowest or highest frequency shall be selected as the frequencies the furthest removed from the center frequency at which the spectral envelope crosses the −26 dB down amplitude point.

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

n) Compare the spectral plot of the input signal (determined from step m) to the output signal (determined from step l) 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.

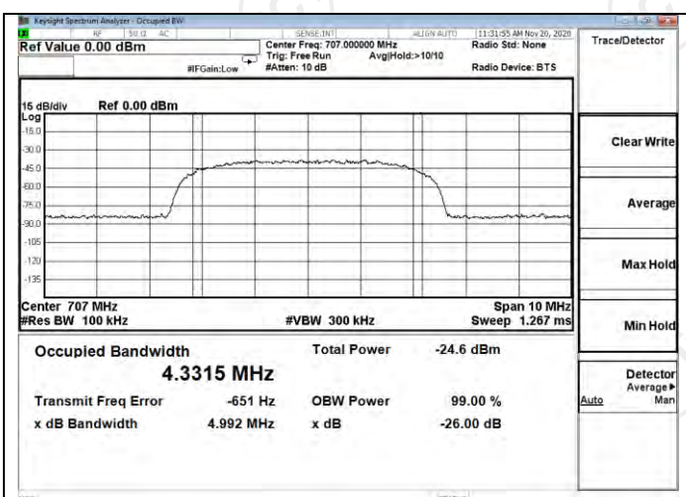
o) Repeat steps a) to n) with the signal generator set to the narrowband signal.

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

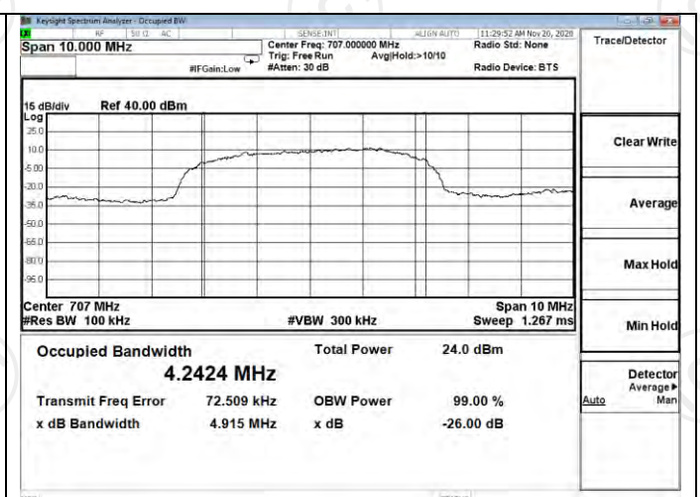
q) Repeat for all frequency bands authorized for use by the EUT.

Test Data

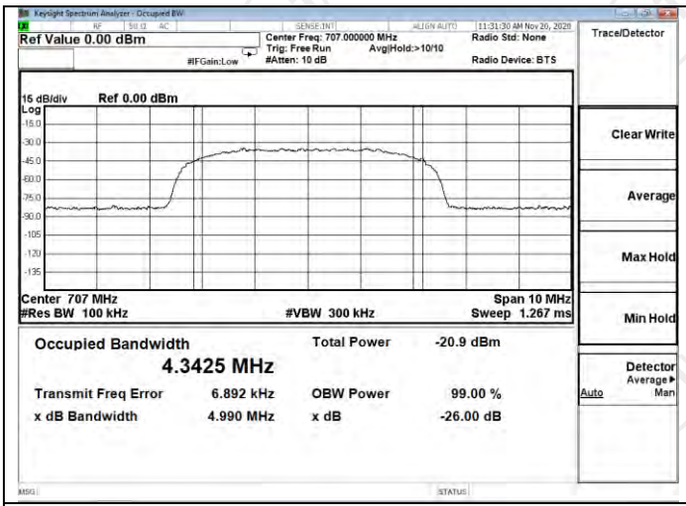
Mode	Signal Type	Signal Level	99% Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
			Input	Output	Input	Output
Uplink	AWGN	Pre-AGC	4.3315	4.2424	4.992	4.915
		3dB above AGC	4.3425	4.2217	4.990	4.912
	GSM	Pre-AGC	0.247	0.240	0.314	0.321
		3dB above AGC	0.246	0.243	0.314	0.312
Downlink	AWGN	Pre-AGC	4.3595	4.3434	4.999	4.986
		3dB above AGC	4.3654	4.3431	4.984	4.986
	GSM	Pre-AGC	0.237	0.237	0.300	0.312
		3dB above AGC	0.239	0.240	0.302	0.305



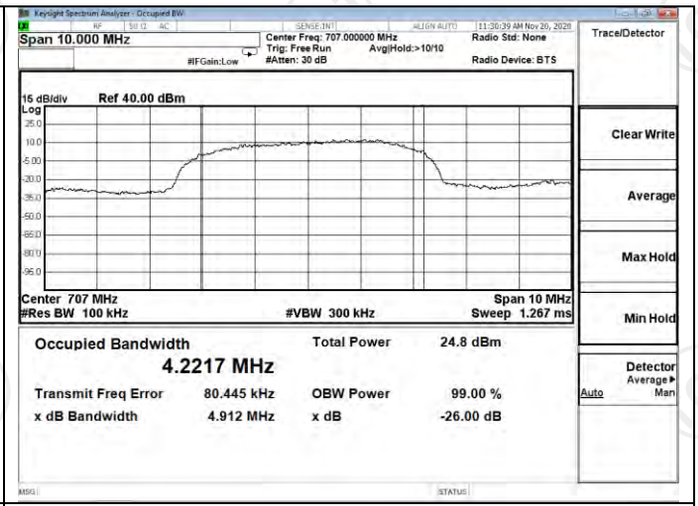
Uplink, AWGN, Pre-AGC, Input



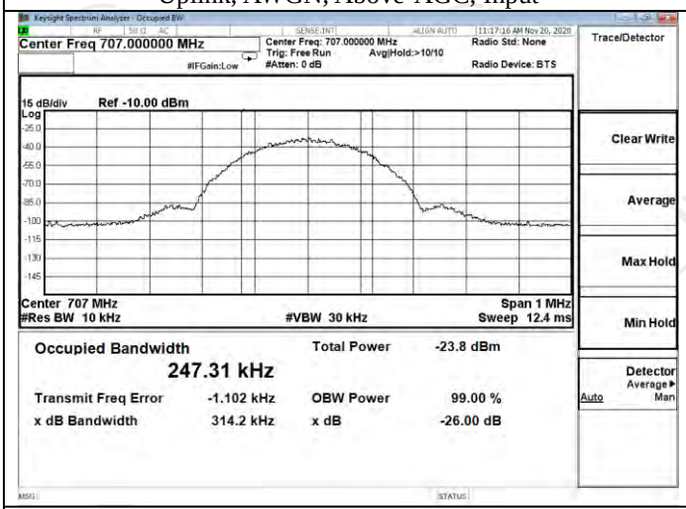
Uplink, AWGN, Pre-AGC, Output



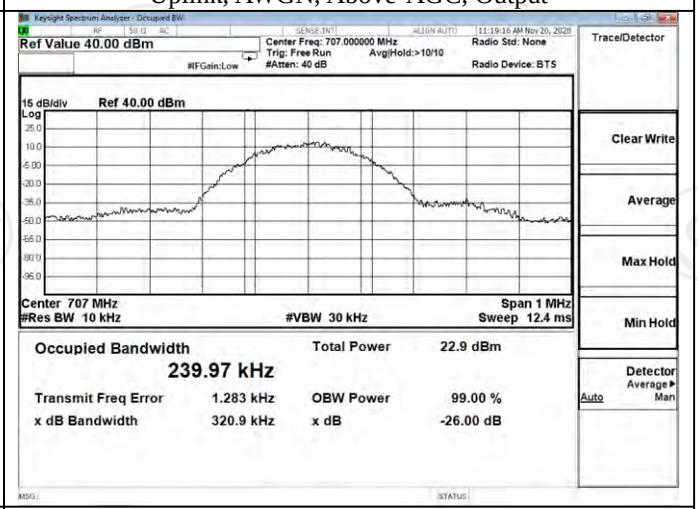
Uplink, AWGN, Above-AGC, Input



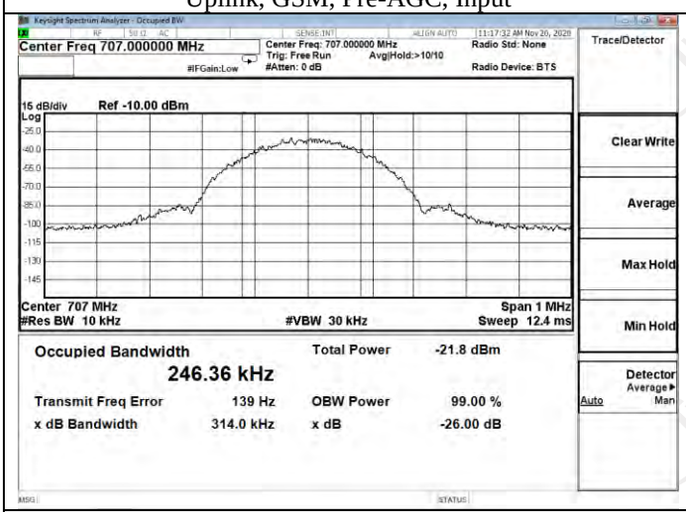
Uplink, AWGN, Above-AGC, Output



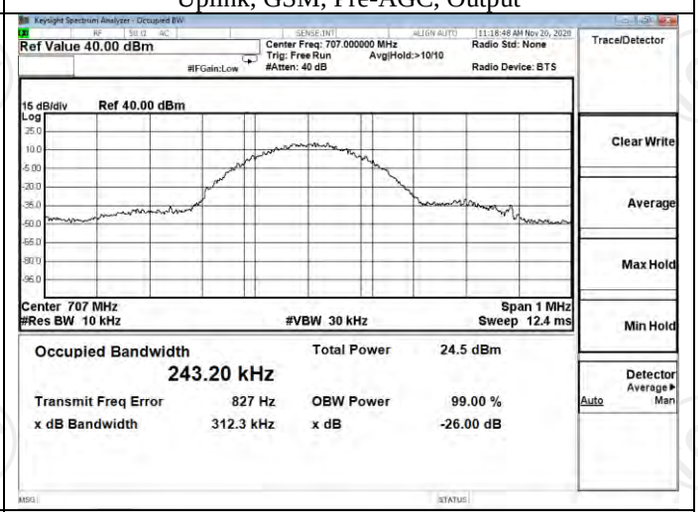
Uplink, GSM, Pre-AGC, Input



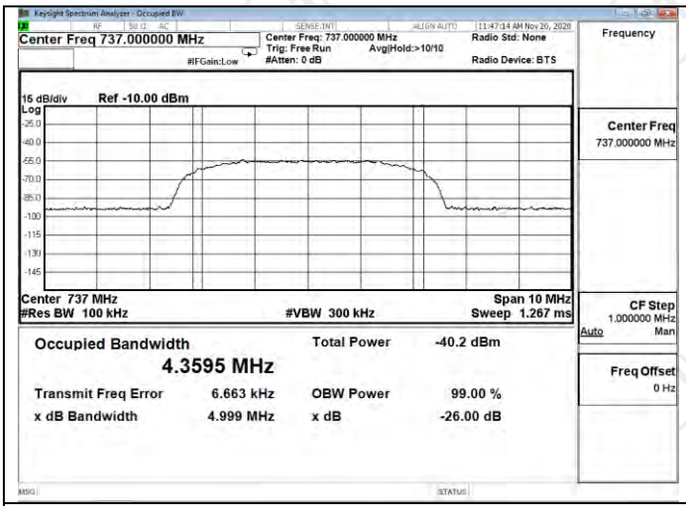
Uplink, GSM, Pre-AGC, Output



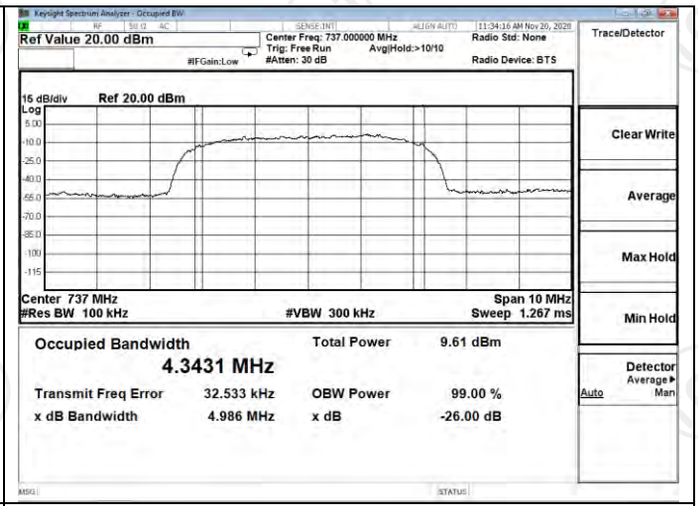
Uplink, GSM, Above-AGC, Input Power



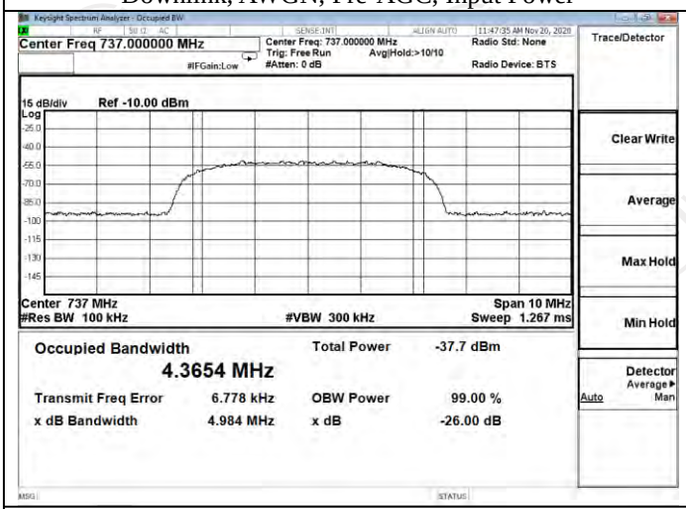
Uplink, GSM, Above-AGC, Output Power



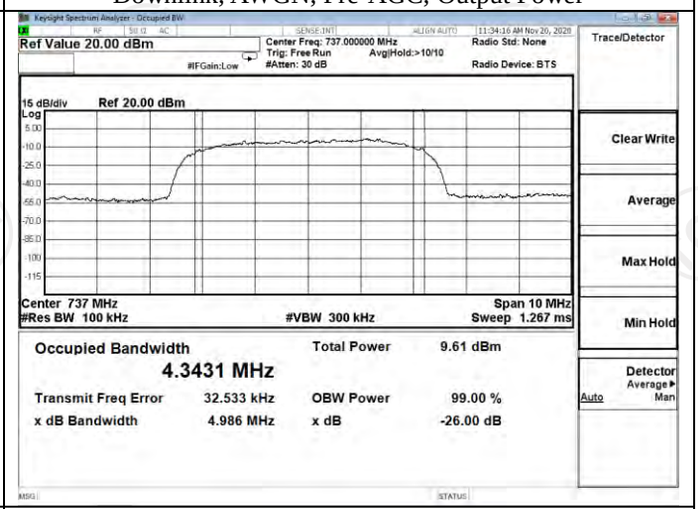
Downlink, AWGN, Pre-AGC, Input Power



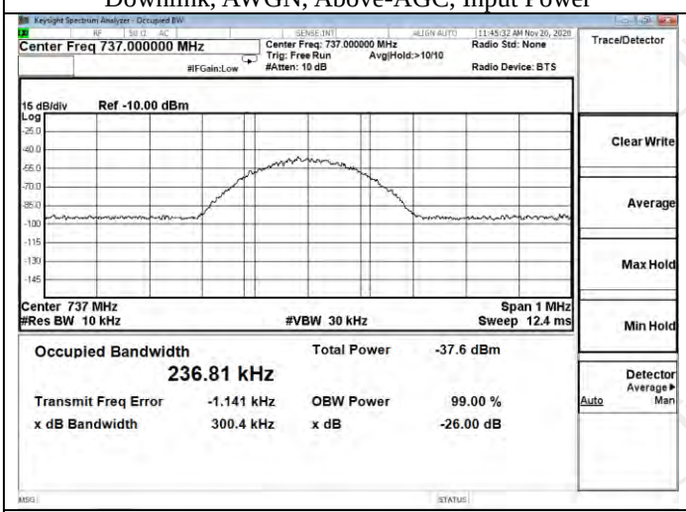
Downlink, AWGN, Pre-AGC, Output Power



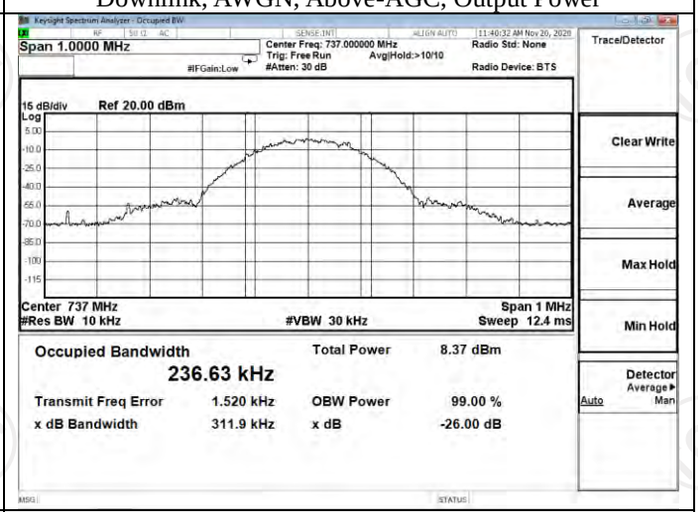
Downlink, AWGN, Above-AGC, Input Power



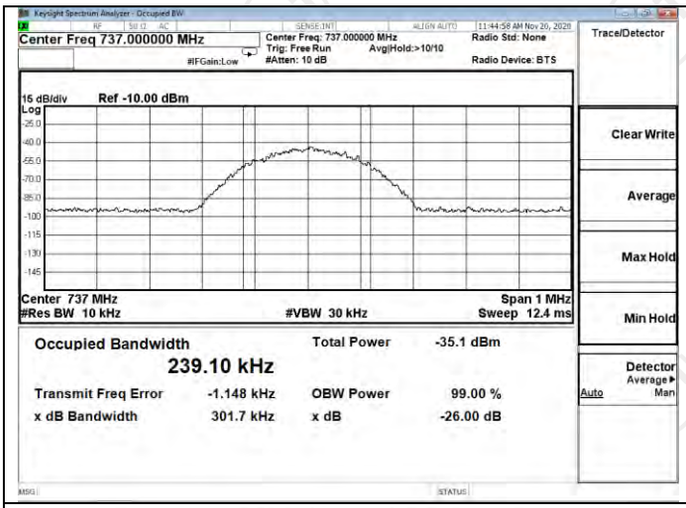
Downlink, AWGN, Above-AGC, Output Power



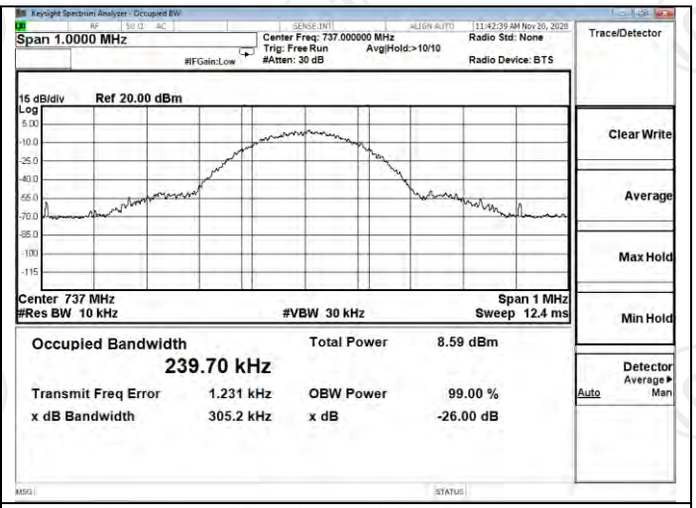
Downlink, GSM, Pre-AGC, Input Power



Downlink, GSM, Pre-AGC, Output Power



Downlink, GSM, Above-AGC, Input Power



Downlink, GSM, Above-AGC, Output Power

6.4. Out-of-band/block (including intermodulation)

Applicable Standards

According to §27.53(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed. KDB935210 D02 Signal Boosters Certification v04r02: Report worst case results for occupied bandwidth comparison and intermodulation tests done with and without any AGC circuitry activated, for devices so

Test Procedure

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).

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 × 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.

l) 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.

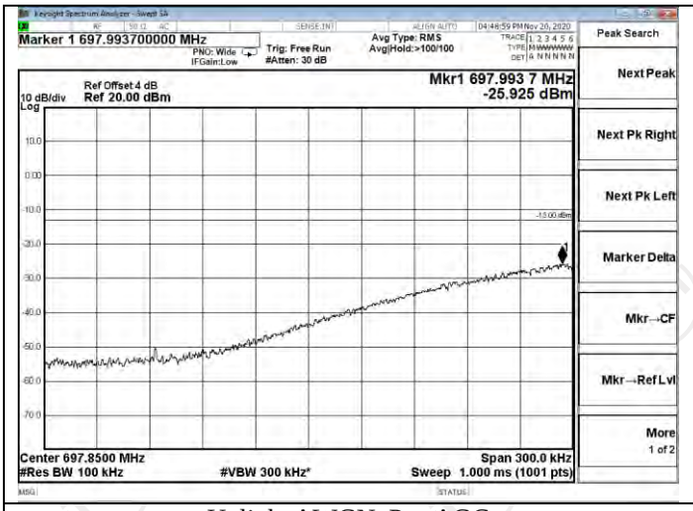
q) Repeat steps k) to n).

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.

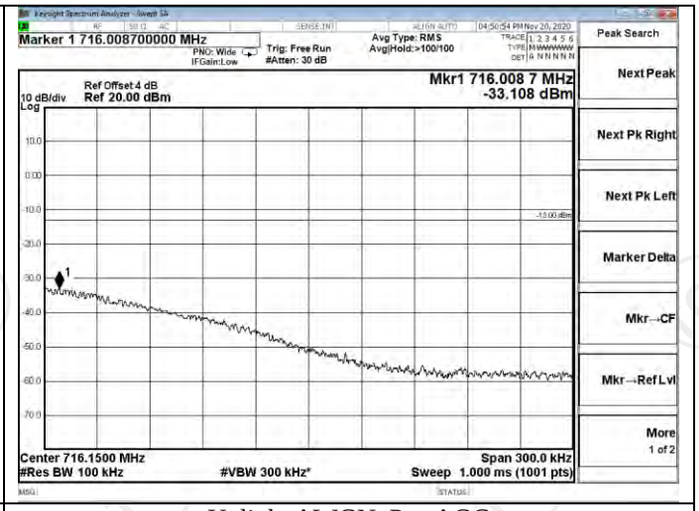
s) Repeat steps a) to r) with the narrowband test signal.

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

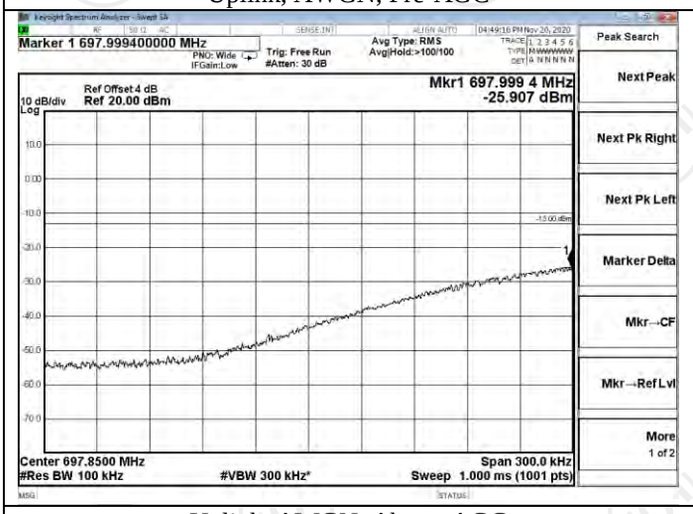
Test Data



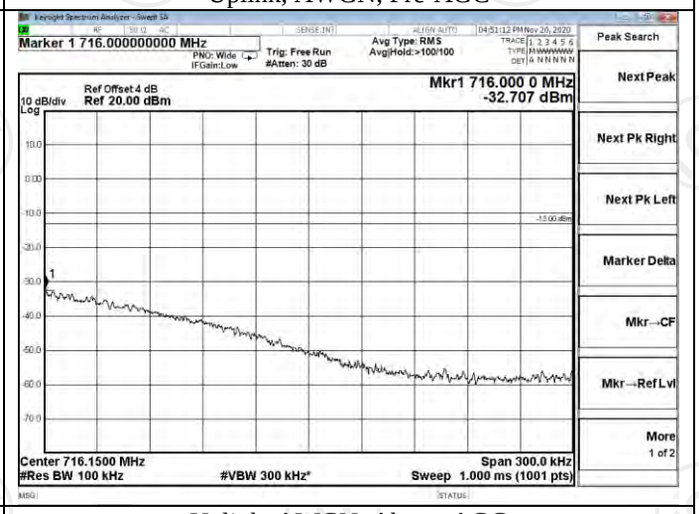
Uplink, AWGN, Pre-AGC



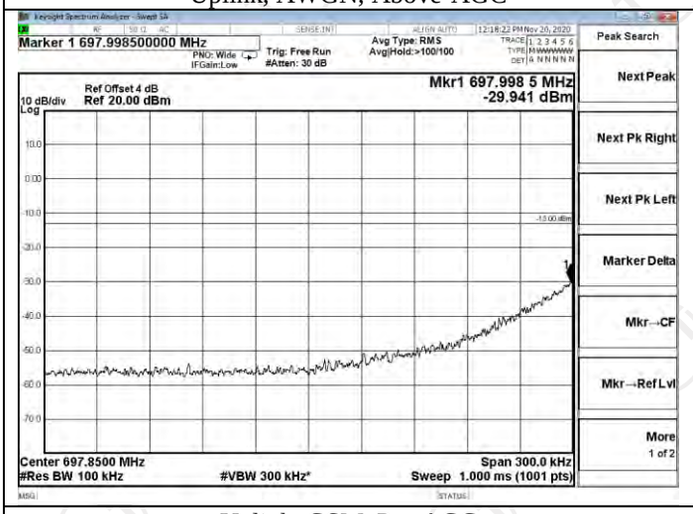
Uplink, AWGN, Pre-AGC



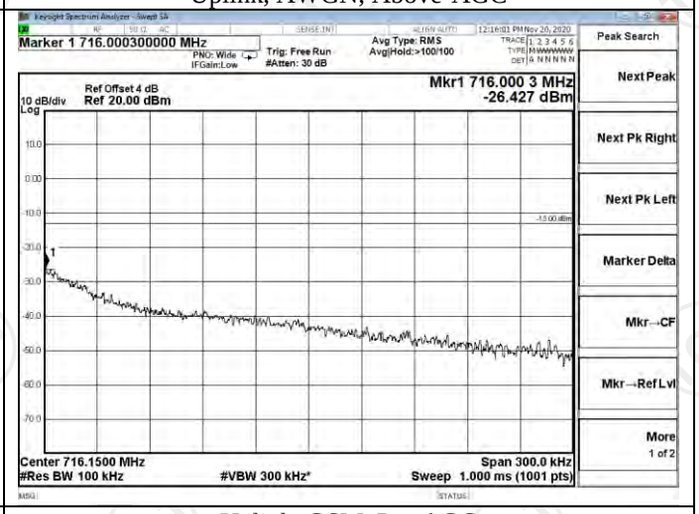
Uplink, AWGN, Above-AGC



Uplink, AWGN, Above-AGC

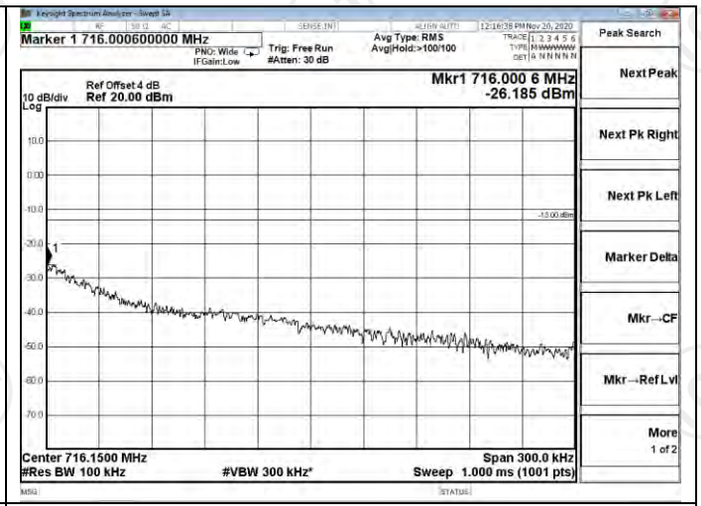


Uplink, GSM, Pre-AGC

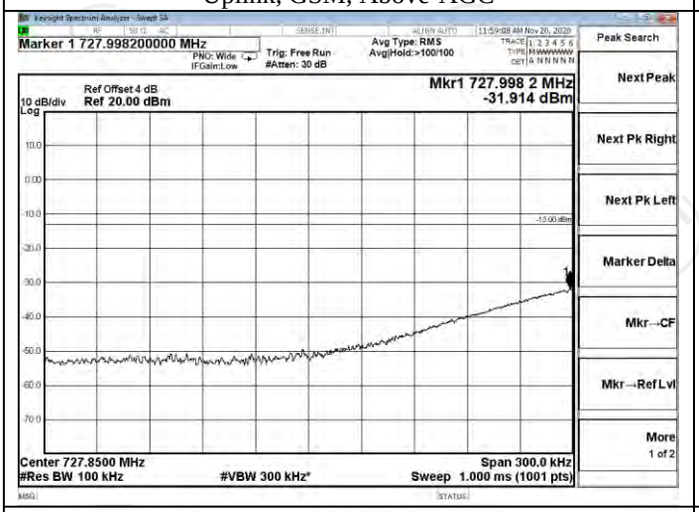


Uplink, GSM, Pre-AGC

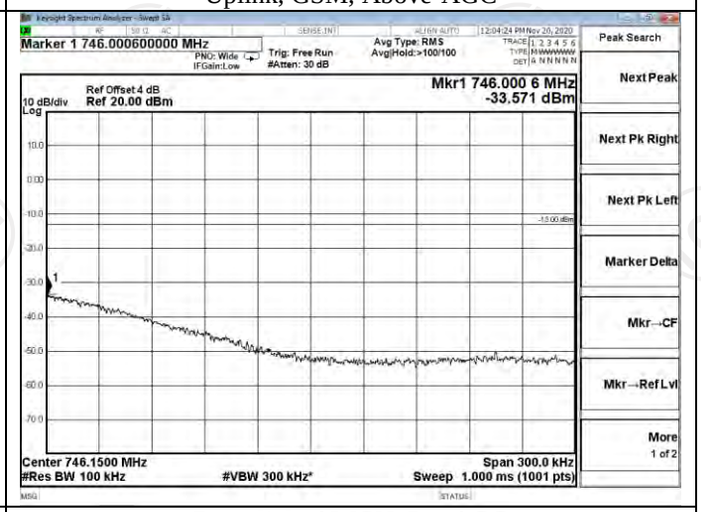
Uplink, GSM, Above-AGC



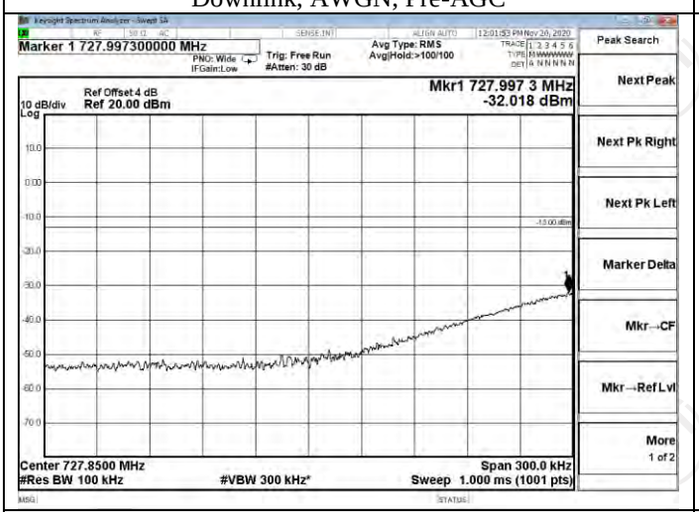
Uplink, GSM, Above-AGC



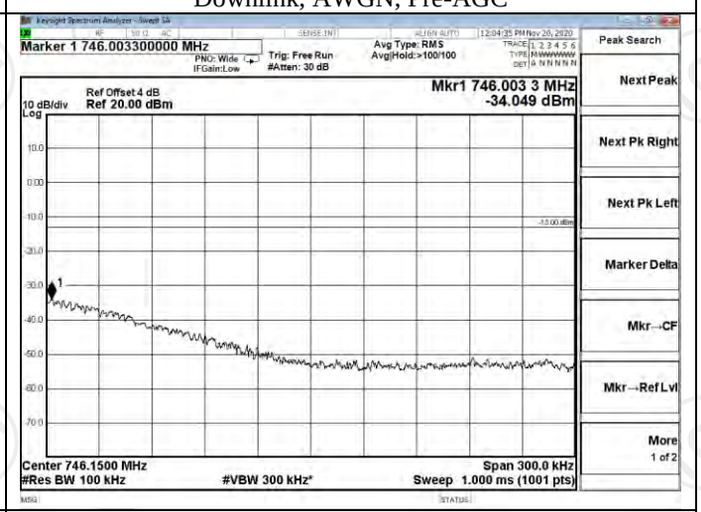
Downlink, AWGN, Pre-AGC



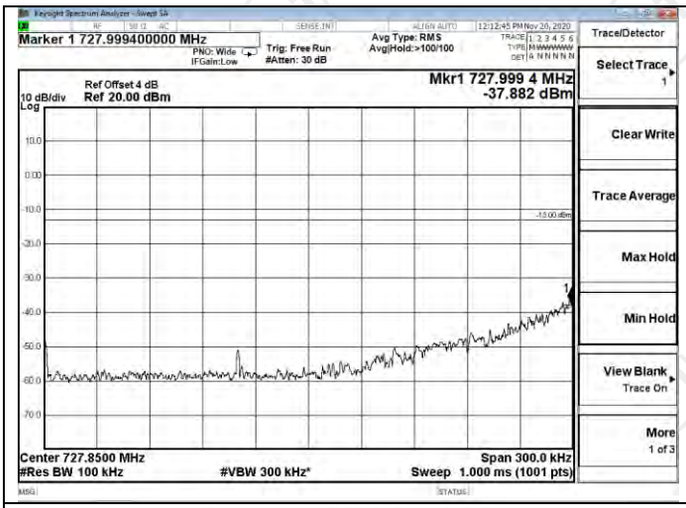
Downlink, AWGN, Pre-AGC



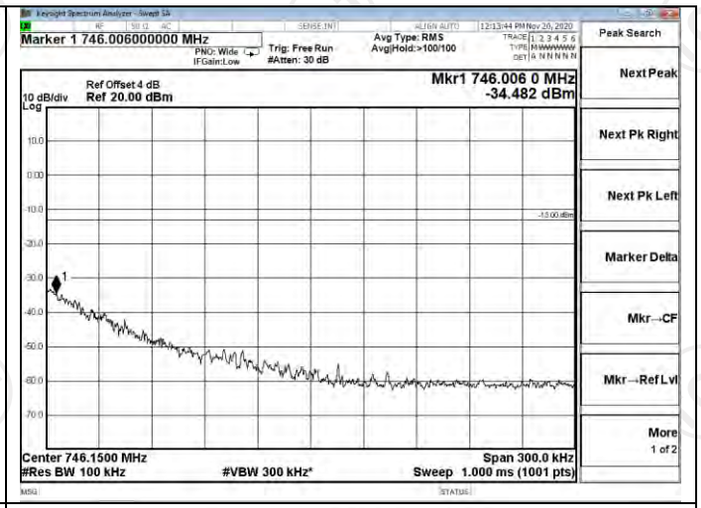
Downlink, AWGN, Above-AGC



Downlink, AWGN, Above-AGC



Downlink, GSM, Pre-AGC



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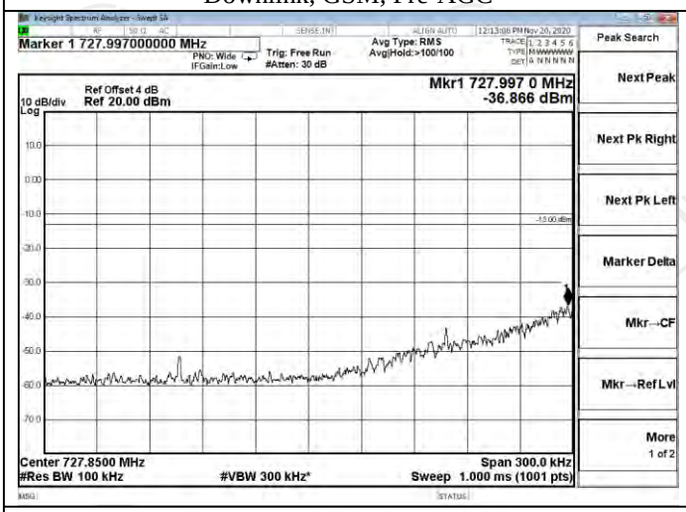
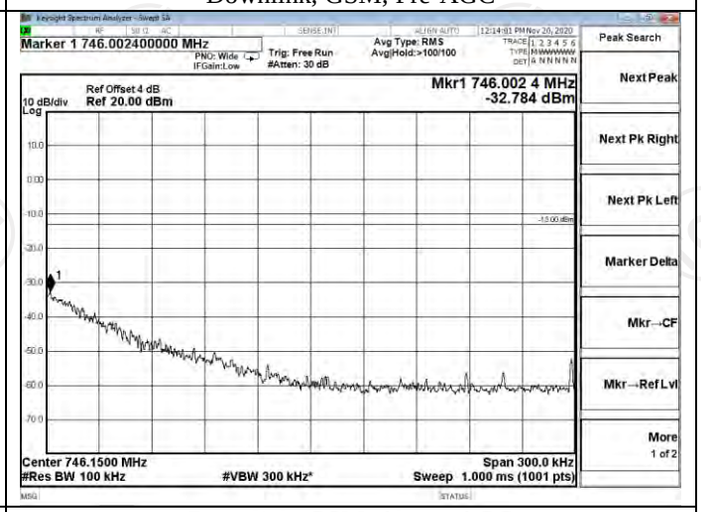


Downlink, GSM, Above-AGC



Downlink, GSM, Above-AGC

6.5. Spurious emissions at antenna terminal

Applicable Standards

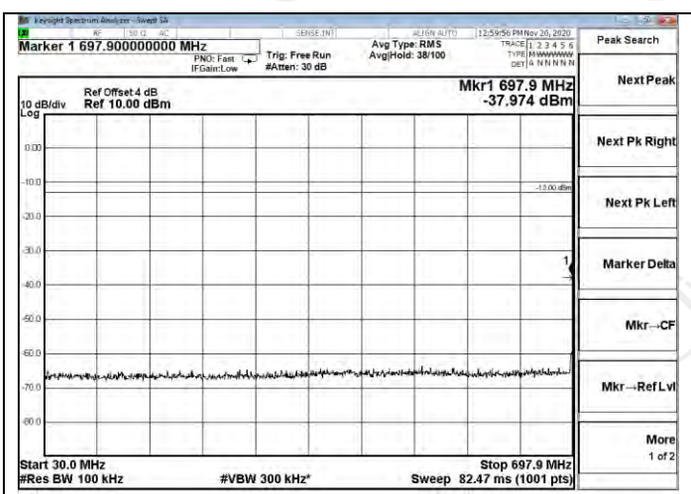
According to §2.1051 Measurements required: Spurious emissions at antenna terminals.
According to §27.53(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

Test Procedure

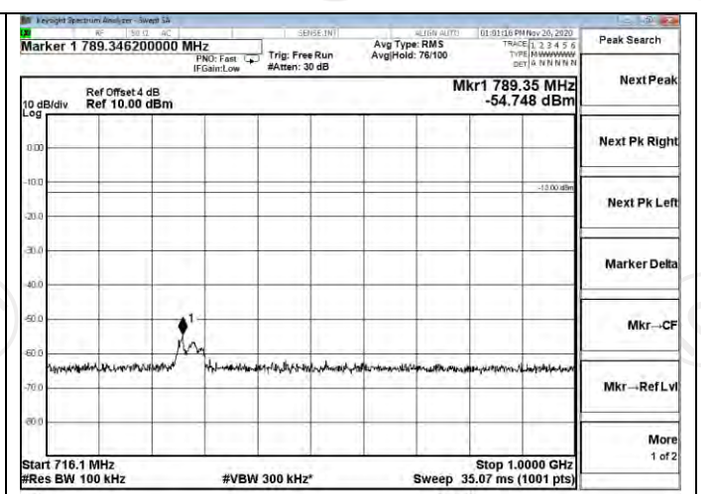
KDB 935210 D05 Indus Booster Basic Meas v01r04, Clause 3.6.3:
a) Connect a signal generator to the input of the EUT.
b) Set the signal generator to produce the broadband test signal as previously described (e.g., 4.1 MHz OBW AWGN).
c) Set the center frequency of the test signal to the lowest available 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 ≥ 3 × 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 ≥ (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.
j) Select the power averaging (rms) detector function.
k) Trace average at least 10 traces in power averaging (i.e., rms) mode.
l) 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 ≥ (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.

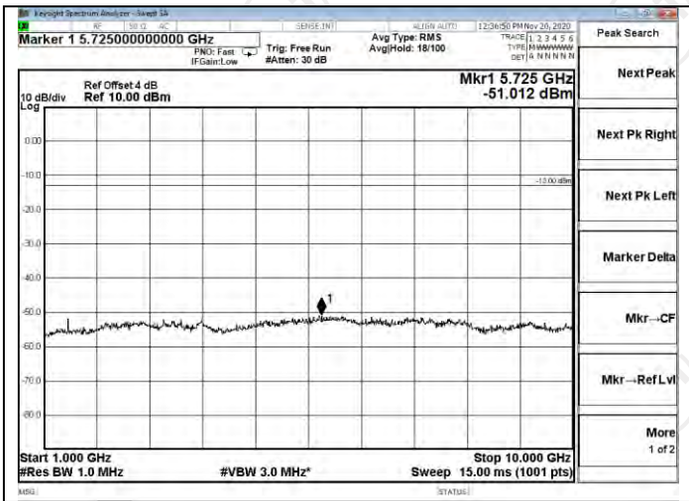
Test Data



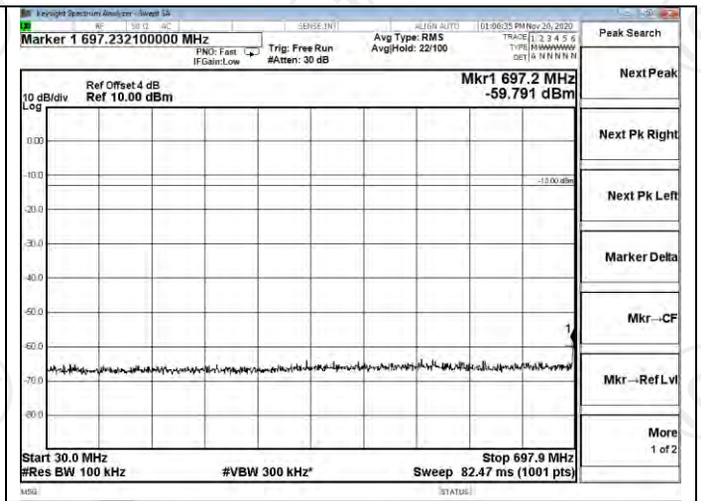
Uplink, AWGN, Low Channel, Pre-AGC(30M~697.9MHz)



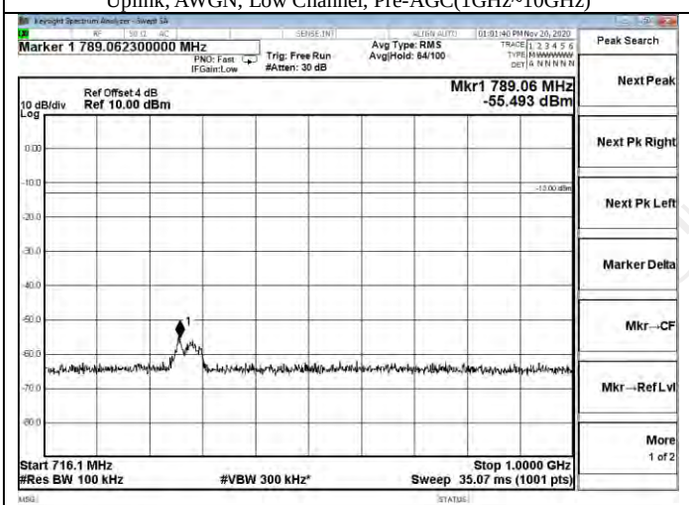
Uplink, AWGN, Low Channel, Pre-AGC(716.1MHz~1GHz)



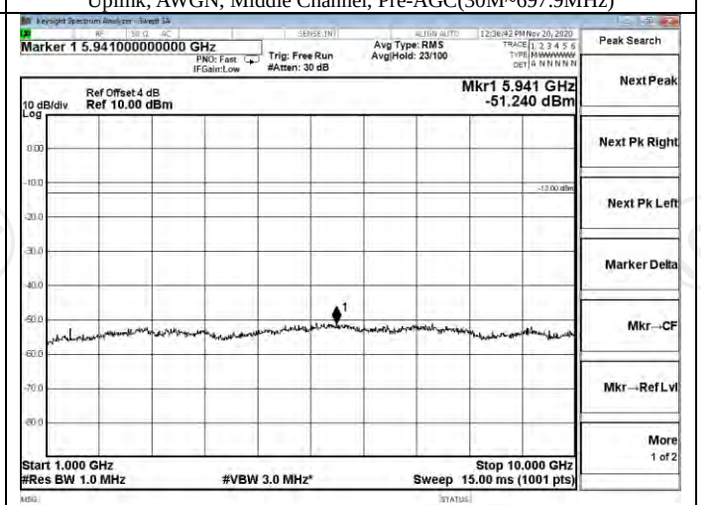
Uplink, AWGN, Low Channel, Pre-AGC(1GHz~10GHz)



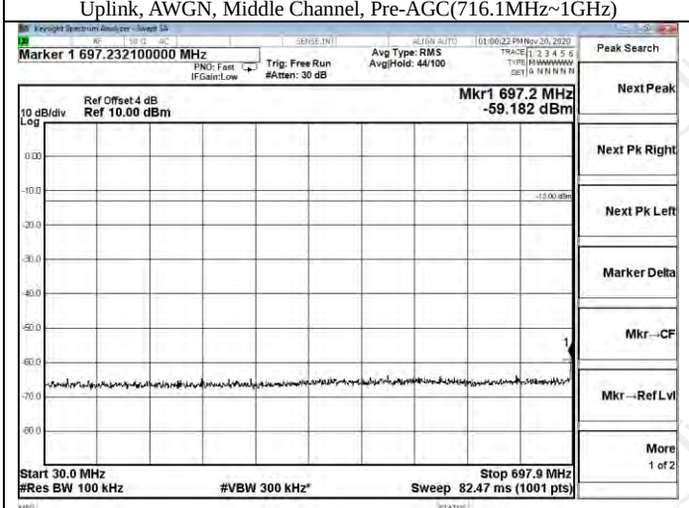
Uplink, AWGN, Middle Channel, Pre-AGC(30M~697.9MHz)



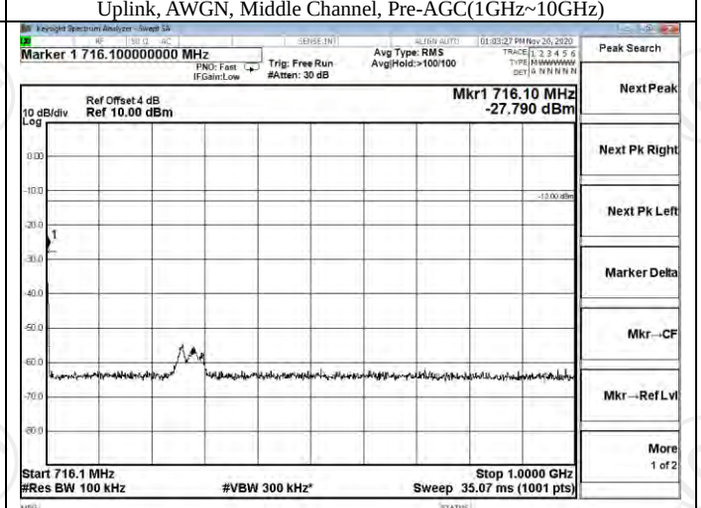
Uplink, AWGN, Middle Channel, Pre-AGC(716.1MHz~1GHz)



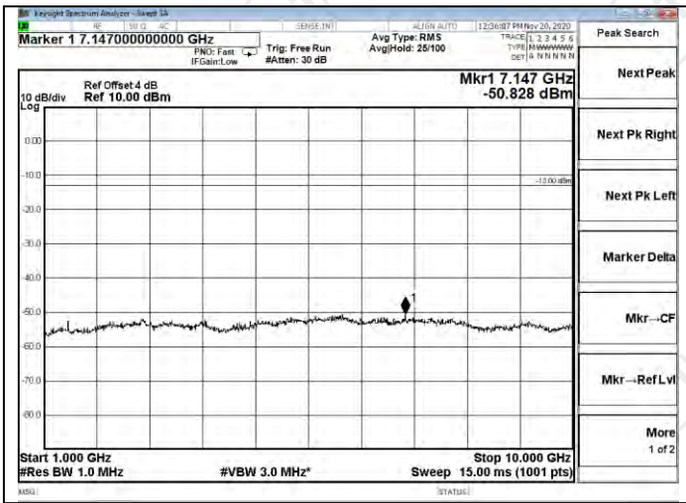
Uplink, AWGN, Middle Channel, Pre-AGC(1GHz~10GHz)



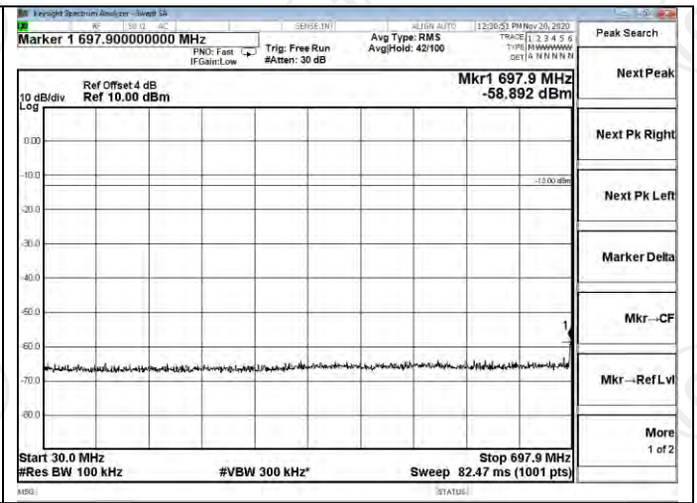
Uplink, AWGN, High Channel, Pre-AGC(30M~697.9MHz)



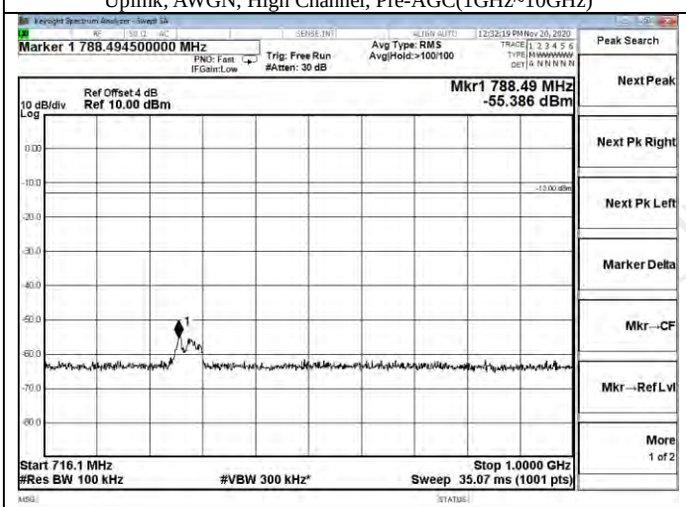
Uplink, AWGN, High Channel, Pre-AGC(716.1MHz~1GHz)



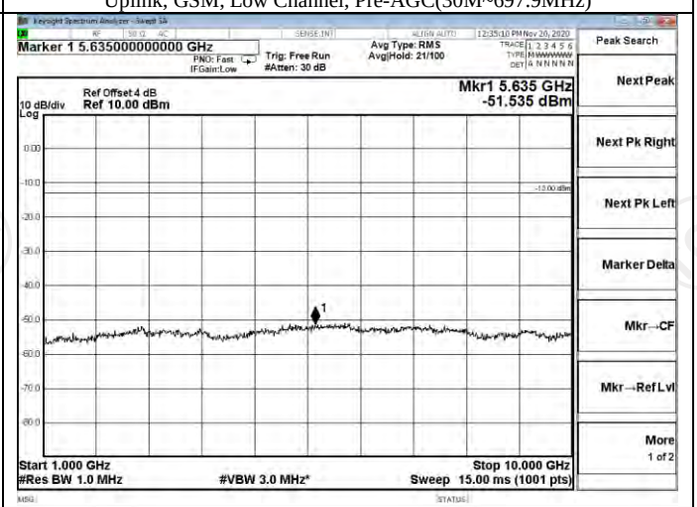
Uplink, AWGN, High Channel, Pre-AGC(1GHz~10GHz)



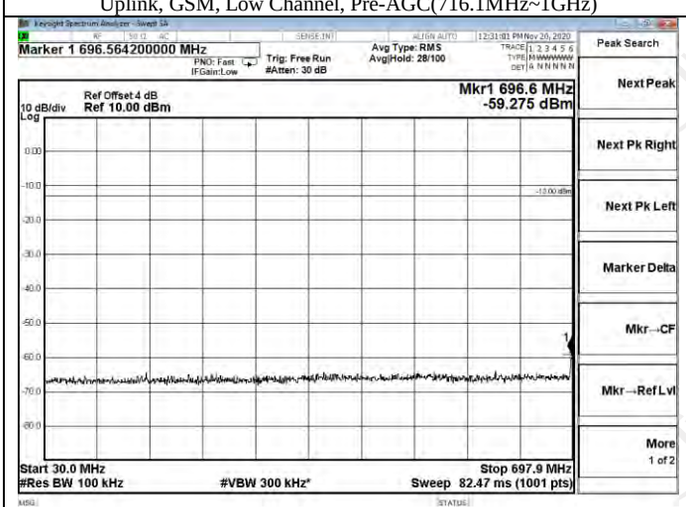
Uplink, GSM, Low Channel, Pre-AGC(30M~697.9MHz)



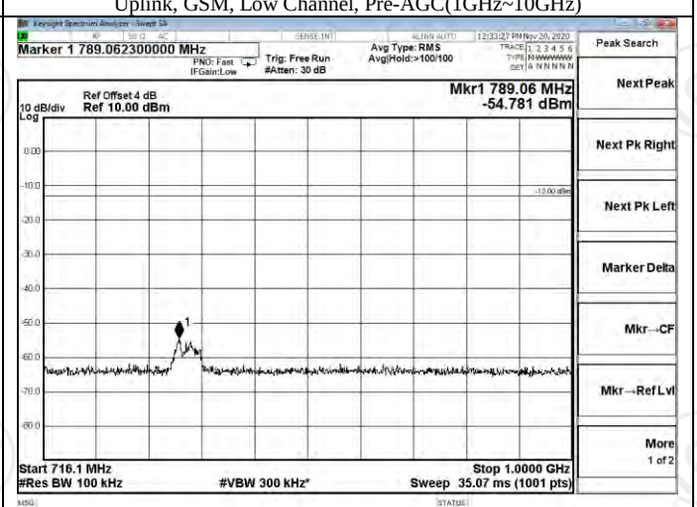
Uplink, GSM, Low Channel, Pre-AGC(716.1MHz~1GHz)



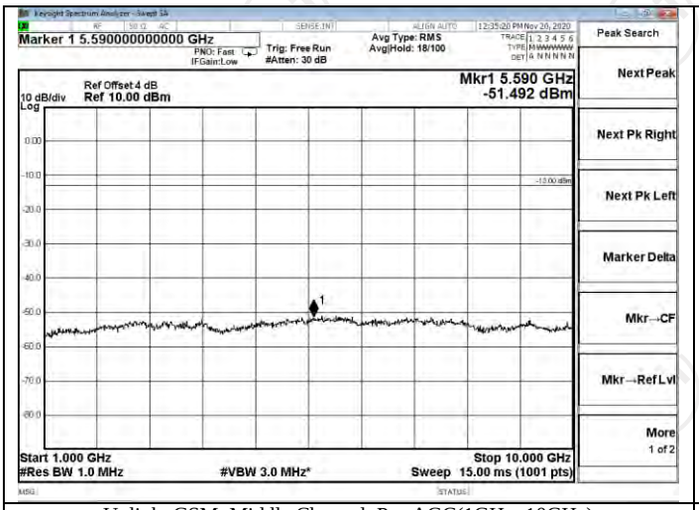
Uplink, GSM, Low Channel, Pre-AGC(1GHz~10GHz)



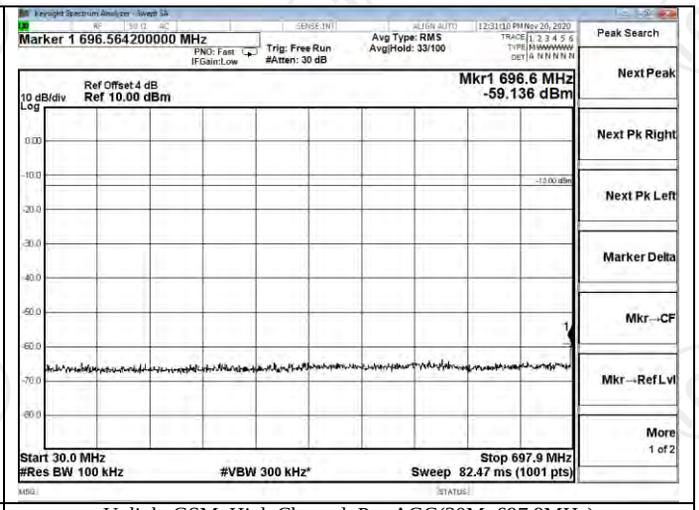
Uplink, GSM, Middle Channel, Pre-AGC(30M~697.9MHz)



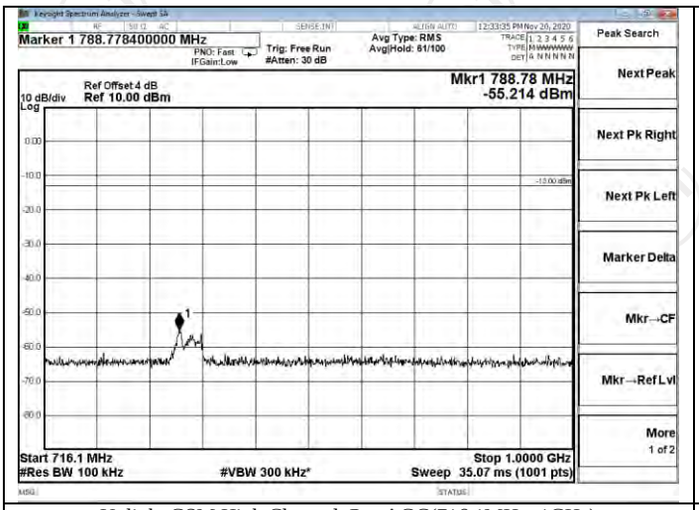
Uplink, GSM, Middle Channel, Pre-AGC(716.1MHz~1GHz)



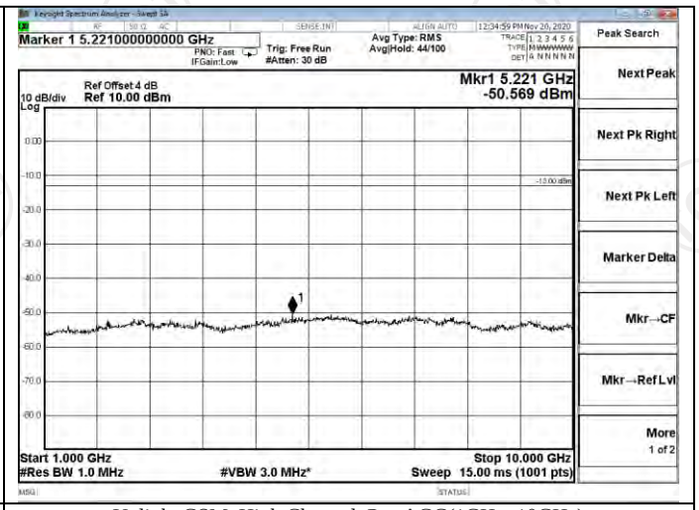
Uplink, GSM, Middle Channel, Pre-AGC(1GHz~10GHz)



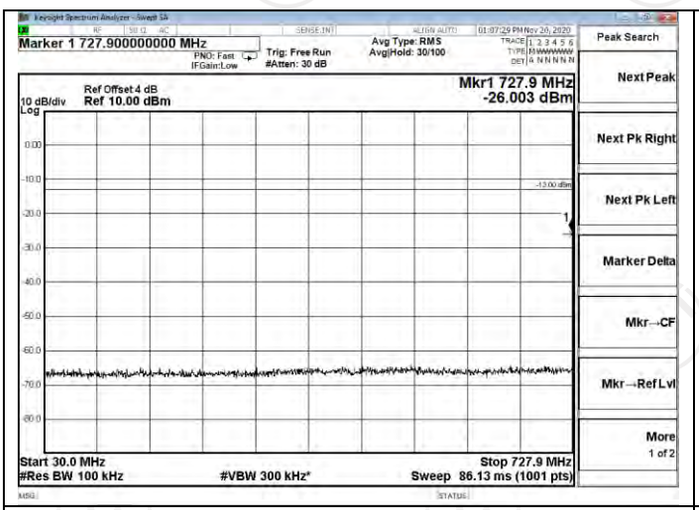
Uplink, GSM, High Channel, Pre-AGC(30M~697.9MHz)



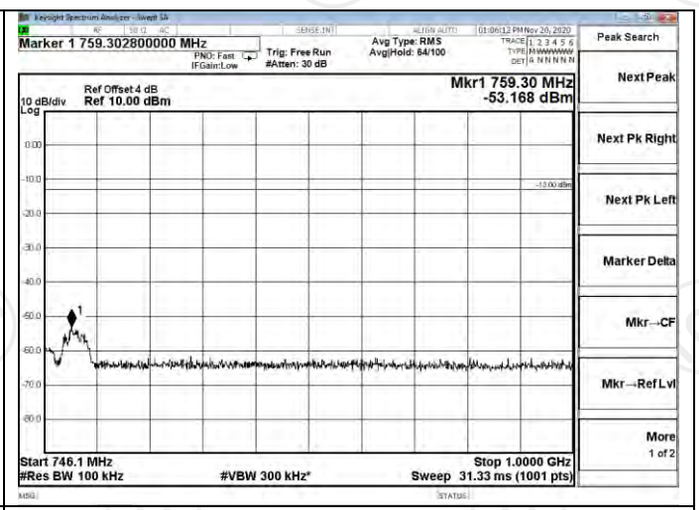
Uplink, GSM,High Channel, Pre-AGC(716.1MHz~1GHz)



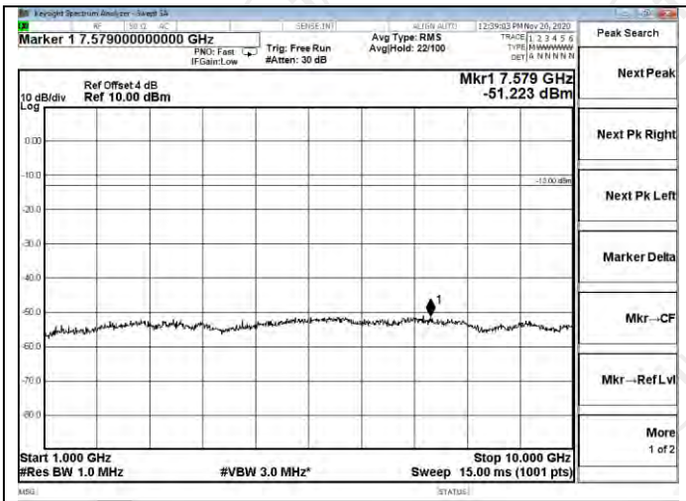
Uplink, GSM, High Channel, Pre-AGC(1GHz~10GHz)



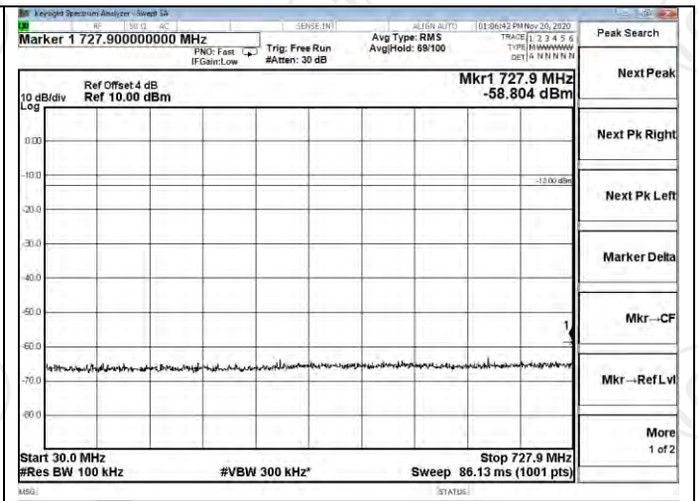
Downlink, AWGN, Low Channel, Pre-AGC(30M~727.9MHz)



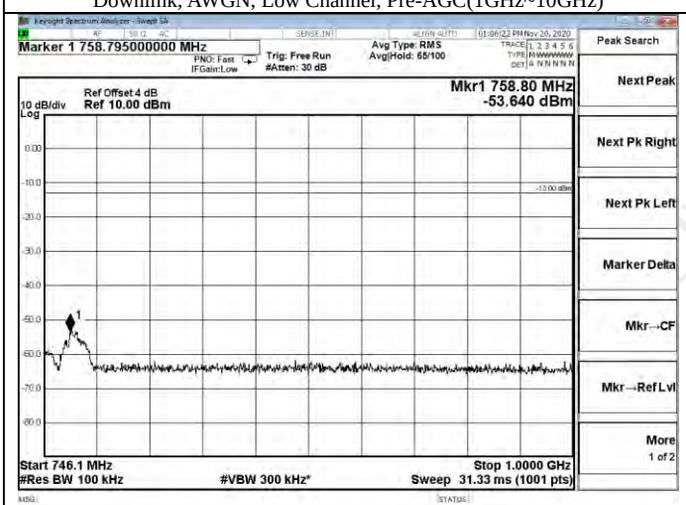
Downlink, AWGN, Low Channel, Pre-AGC(746.1MHz~1GHz)



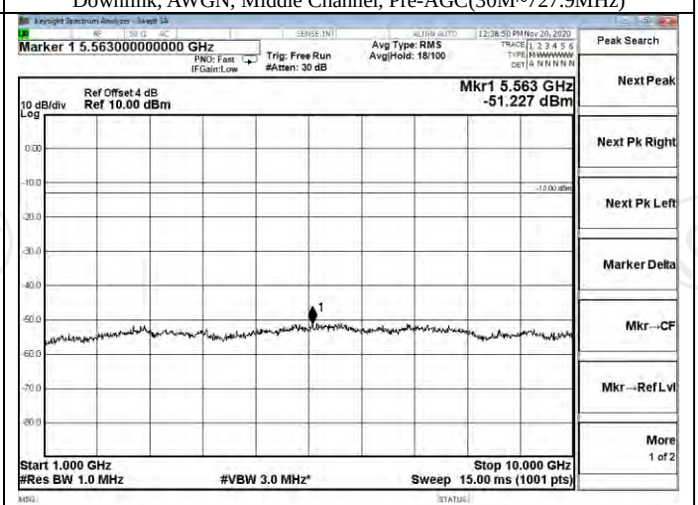
Downlink, AWGN, Low Channel, Pre-AGC(1GHz~10GHz)



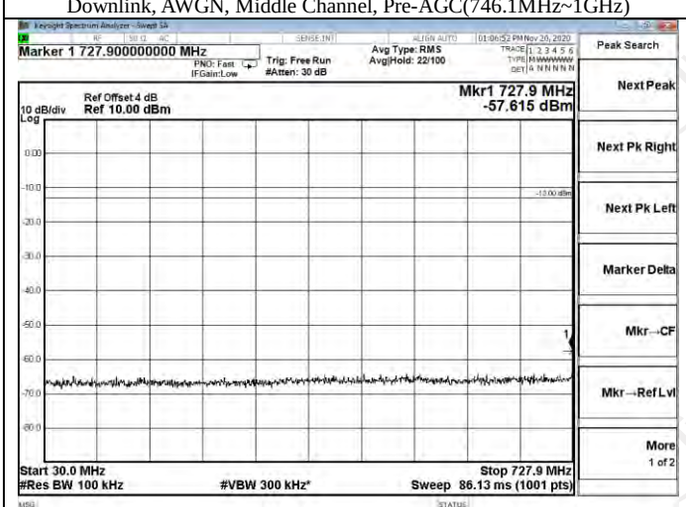
Downlink, AWGN, Middle Channel, Pre-AGC(30M~727.9MHz)



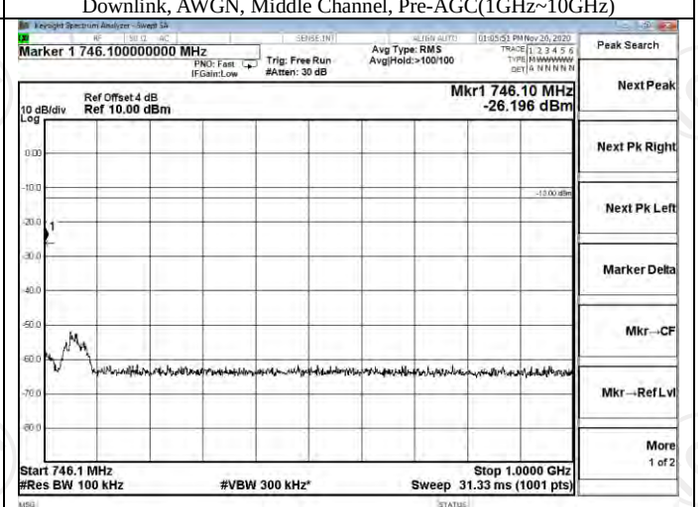
Downlink, AWGN, Middle Channel, Pre-AGC(746.1MHz~1GHz)



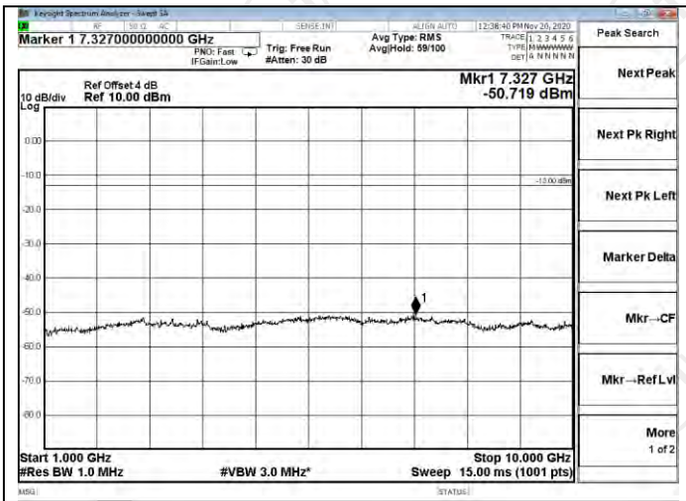
Downlink, AWGN, Middle Channel, Pre-AGC(1GHz~10GHz)



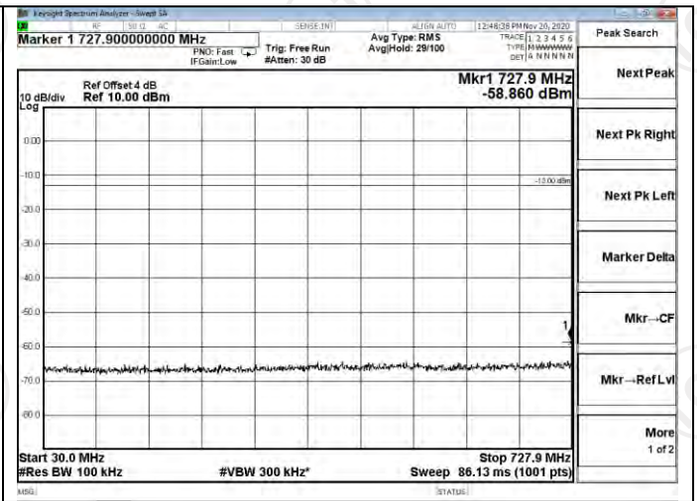
Downlink, AWGN, High Channel, Pre-AGC(30M~727.9MHz)



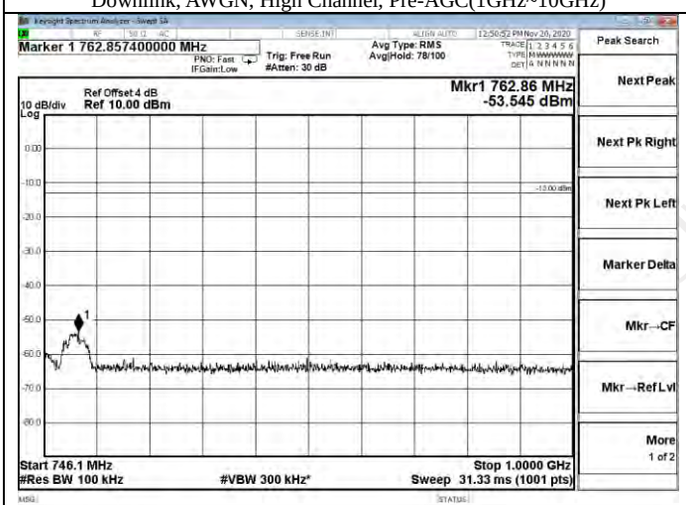
Downlink, AWGN, High Channel, Pre-AGC(746.1MHz~1GHz)



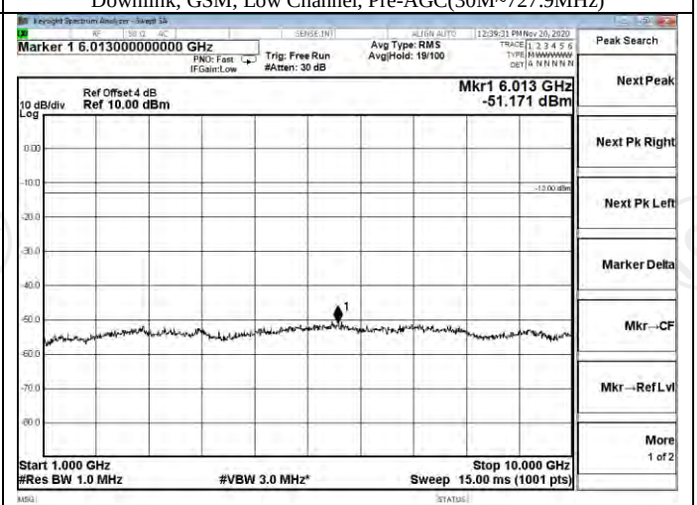
Downlink, AWGN, High Channel, Pre-AGC(1GHz~10GHz)



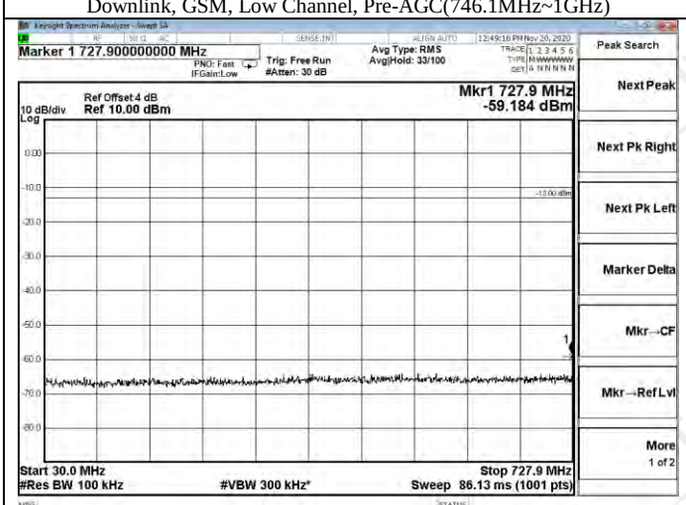
Downlink, GSM, Low Channel, Pre-AGC(30M~727.9MHz)



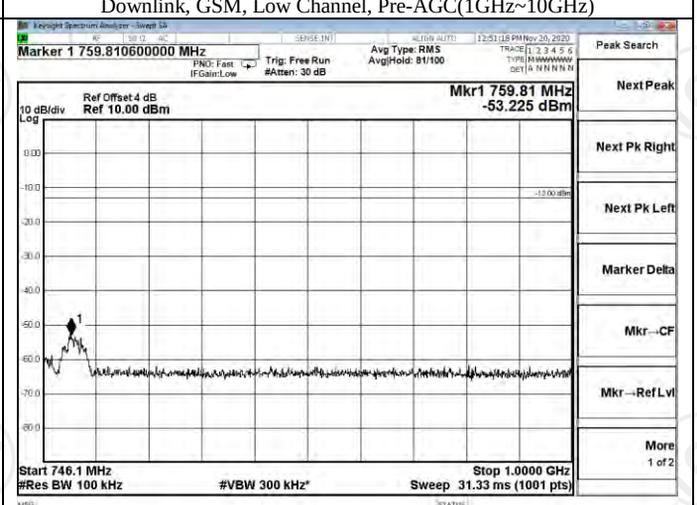
Downlink, GSM, Low Channel, Pre-AGC(746.1MHz~1GHz)



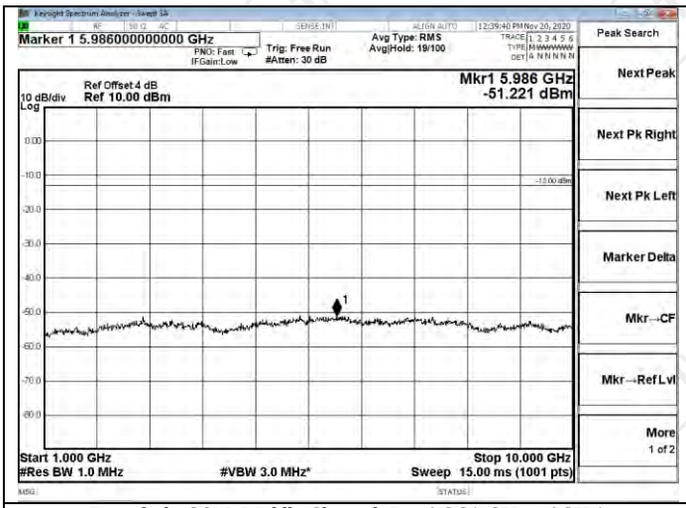
Downlink, GSM, Low Channel, Pre-AGC(1GHz~10GHz)



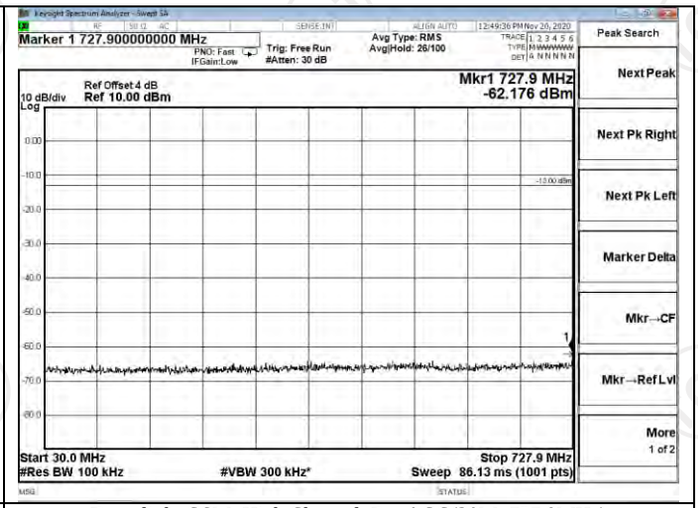
Downlink, GSM, Middle Channel, Pre-AGC(30M~727.9MHz)



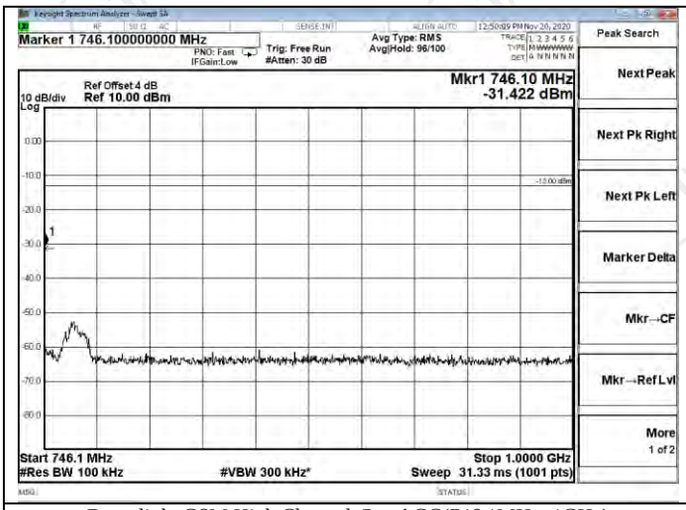
Downlink, GSM, Middle Channel, Pre-AGC(746.1MHz~1GHz)



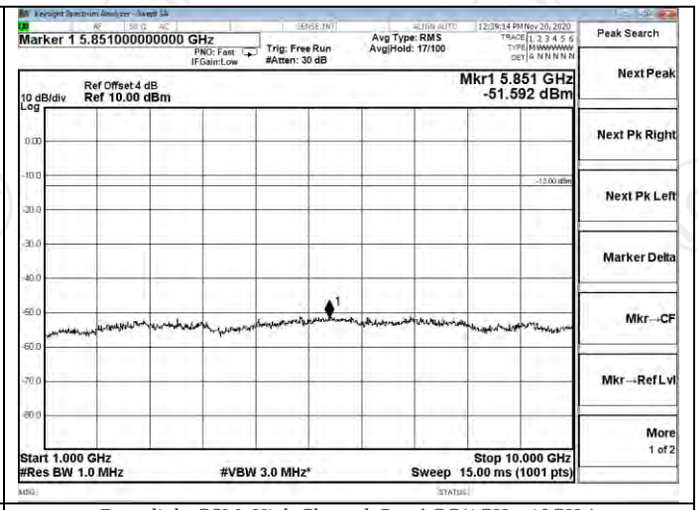
Downlink, GSM, Middle Channel, Pre-AGC(1GHz~10GHz)



Downlink, GSM, High Channel, Pre-AGC(30M~727.9MHz)



Downlink, GSM,High Channel, Pre-AGC(746.1MHz~1GHz)



Downlink, GSM, High Channel, Pre-AGC(1GHz~10GHz)

6.6 RADIATED SPURIOUS EMISSIONS

Applicable Standards

According to §2.1053 Measurements required: Field strength of spurious radiation.
According to §27.53(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

Test Procedure

1.EUT was placed on a 1.50 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.50m. Detected emissions were maximized at each frequency by rotating the EUT through 360 °and

adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
2.A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3.The EUT is then put into continuously transmitting mode at its maximum power level during the test.Set Test Receiver RBW=1MHz,VBW=3MHz for above 1GHz,RBW=120KHz,VBW=300KHz for below 1GHz,, And the maximum value of the receiver should be recorded as (Pr).
4.The EUT shall be replaced by a substitution antenna.In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
5.A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (Pcl) and the Substitution Antenna Gain (Ga) should be recorded after test.
The measurement results are obtained as described below:
Power(EIRP)=PMea- Pcl + Ga
6.This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
7.ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dBi.
8.In order to make sure test results more clearly,we set frequency range as follows table:

Frequency	Channel	Frequency Range	Verdict
LTE FDD Band 12	Low	9KHz -8GHz	PASS
	Middle	9KHz -8GHz	PASS
	High	9KHz -8GHz	PASS

Test Data

Uplink, Test Frequency 701.5MHz

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Convert Factor	Peak ERP (dBm)	Limit (dBm)	Polarization
113.2	-42.43	3.23	3.00	3.25	2.15	-44.56	-13.00	H
1403.2	-40.78	5.26	3.00	9.88	2.15	-38.31	-13.00	H
2104.6	-55.66	6.11	3.00	11.36	2.15	-52.56	-13.00	H
145.3	-40.20	4.62	3.00	3.62	2.15	-43.35	-13.00	V
1403.2	-45.87	5.26	3.00	9.88	2.15	-43.40	-13.00	V
2104.6	-53.73	6.11	3.00	11.36	2.15	-50.63	-13.00	V

Uplink, Test Frequency 707.5MHz

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Convert Factor	Peak ERP (dBm)	Limit (dBm)	Polarization
126.5	-44.47	4.62	3.00	3.57	2.15	-47.67	-13.00	H
1415.6	-44.55	5.32	3.00	10.03	2.15	-41.99	-13.00	H

2122.8	-54.70	6.19	3.00	11.41	2.15	-51.63	-13.00	H
154.3	-40.55	4.62	3.00	3.36	2.15	-43.96	-13.00	V
1415.6	-44.89	5.32	3.00	10.03	2.15	-42.33	-13.00	V
2122.8	-52.60	6.19	3.00	11.41	2.15	-49.53	-13.00	V

Uplink, Test Frequency 713.5MHz

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Convert Factor	Peak ERP (dBm)	Limit (dBm)	Polarization
153.2	-44.98	4.62	3.00	3.67	2.15	-48.08	-13.00	H
1427.3	-41.80	5.36	3.00	9.62	2.15	-39.69	-13.00	H
2140.8	-53.47	6.24	3.00	11.46	2.15	-50.40	-13.00	H
165.3	-42.18	4.62	3.00	3.52	2.15	-45.43	-13.00	V
1427.3	-45.94	5.36	3.00	9.62	2.15	-43.83	-13.00	V
2140.8	-51.85	6.24	3.00	11.46	2.15	-48.78	-13.00	V

Downlink, Test Frequency 731.5MHz

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Convert Factor	Peak ERP (dBm)	Limit (dBm)	Polarization
236.3	-43.48	4.62	3.00	3.83	2.15	-46.42	-13.00	H
1463.2	-44.20	4.62	3.00	9.81	2.15	-41.16	-13.00	H
2194.7	-49.46	5.94	3.00	10.86	2.15	-46.69	-13.00	H
158.3	-43.40	4.62	3.00	3.53	2.15	-46.64	-13.00	V
1463.2	-42.13	4.62	3.00	9.81	2.15	-39.09	-13.00	V
2194.7	-53.13	5.94	3.00	10.86	2.15	-50.36	-13.00	V

Downlink, Test Frequency737.5MHz

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Convert Factor	Peak ERP (dBm)	Limit (dBm)	Polarization
165.5	-41.93	4.62	3.00	3.73	2.15	-44.97	-13.00	H
1475.3	-45.72	4.63	3.00	9.84	2.15	-42.66	-13.00	H
2212.6	-53.76	5.94	3.00	10.86	2.15	-50.99	-13.00	H
186.3	-45.25	4.62	3.00	3.55	2.15	-48.47	-13.00	V
1475.3	-45.58	4.63	3.00	9.84	2.15	-42.52	-13.00	V
2212.6	-53.30	5.94	3.00	10.86	2.15	-50.53	-13.00	V

Downlink, Test Frequency 743.5MHz

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Convert Factor	Peak ERP (dBm)	Limit (dBm)	Polarization
125.3	-44.19	4.62	3.00	3.54	2.15	-47.42	-13.00	H
1487.3	-45.99	4.65	3.00	9.9	2.15	-42.89	-13.00	H
2230.8	-46.94	5.95	3.00	10.91	2.15	-44.13	-13.00	H
169.3	-45.22	4.62	3.00	3.66	2.15	-48.33	-13.00	V
1487.3	-45.58	4.65	3.00	9.9	2.15	-42.48	-13.00	V
2230.8	-52.29	5.95	3.00	10.91	2.15	-49.48	-13.00	V

Note:For Outdoor Antenna（SYN-BY-9D),Indoor Antenna(SYN-IPA-8D);Outdoor Antenna（SYN-OPA-8D),Indoor Antenna(SYN-CA-3D) were estimated ,the report recorded the worst result of Outdoor Antenna（SYN-BY-9D),Indoor Antenna(SYN-IPA-8D)

7. Test Instruments

Name	Model No.	Manufacturer	Date of Cal.	Due Date
EMI Test Receiver	ESIB7	R&S	Jul. 28, 2020	Jul. 27, 2021
Spectrum Analyzer	N9020A	Agilent	Sep. 11, 2020	Sep. 10, 2021
Amplifier	8447D	HP	Sep. 08, 2020	Sep. 08, 2021
Amplifier	EM30265	EM Electronics Corporation CO.,LTD	Sep. 08, 2020	Sep. 08, 2021
Broadband Antenna	VULB9163	Schwarzbeck	Sep. 06, 2020	Sep. 05, 2021
Horn Antenna	BBHA 9120D	Schwarzbeck	Sep. 06, 2020	Sep. 05, 2021
Coax cable (9KHz-40GHz)	RE-high-02	TCT	Sep. 08, 2020	Sep. 07, 2021
Coax cable (9KHz-40GHz)	RE-high-04	TCT	Sep. 08, 2020	Sep. 07, 2021
Loop antenna	ZN30900A	ZHINAN	Sep. 11, 2020	Sep. 10, 2021
Signal Generator	N5182A	Agilent	Sep. 11, 2020	Sep. 10, 2021
Signal Generator	Agilent	E4421B	Jul. 27, 2020	Jul. 26, 2021
RF Combiner	SUNVNDN	SUD-CS0800	Sep. 11, 2020	Sep. 10, 2021
Attenuator	50FP-006-H3	JFW	Sep. 11, 2020	Sep. 10, 2021
Band Pass Filter	4CS10-781.5/E12.2-O/O	N/A	Sep. 11, 2020	Sep. 10, 2021
Band Pass Filter	4CS10-751.5/E12-O/O	N/A	Sep. 11, 2020	Sep. 10, 2021
1 dB step Attenuator	8494B	N/A	Sep. 11, 2020	Sep. 10, 2021
10dB step Attenuator	8496B	N/A	Sep. 11, 2020	Sep. 10, 2021
RF Coupler	722-10-1.500V	N/A	Sep. 11, 2020	Sep. 10, 2021
Band Pass Filter	4CS10-781.5/E12.2-O/O	N/A	Sep. 11, 2020	Sep. 10, 2021

8. TEST SETUP PHOTOGRAPHS OF EUT

Please refer to separated files for Test Setup Photos of the EUT.

9. EXTERIOR PHOTOGRAPHS OF EUT

Please refer to separated files for External Photos of the EUT.

10. INTERIOR PHOTOGRAPHS OF EUT

Please refer to separated files for Internal Photos of the EUT.

********END OF REPORT********