FCC/IC Test Report

FOR:

Whistle Labs Inc.

Model Name:
Whistle 3

Product Description:
Pet GPS tracker and activity monitor.

FCC ID: S8W-W03A
IC ID: 10959A-W03A

Per:

47 CFR: Part 22, Part 24
RSS-132 Issue 3, RSS-133 Issue 6

Report #: EMC-WHIST-003-16001-FCC-22-24-Rev2

Date: Jan 3, 2017

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1. Assessment

The following device as further described in section 3 of this report was evaluated against the applicable criteria specified in the Code of Federal Regulations Title 47 parts 22, 24, 27 and 90 and relevant ISED standards RSS-132 Issue 3, RSS-133 Issue 6 and RSS-139 Issue 3, RSS-130, RSS199 Issue 2, RSS-195 Issue 2.

No deviations from the limits were ascertained.

Company Name	Product Description	Model #
Whistle Labs Inc.	Pet GPS tracker and activity monitor.	Whistle 3

Review:

Date	Section	Name	Signature
Jan 3, 2017	Compliance	Franz Engert (Compliance Services Manager)	

Responsible for evaluation and report:

Date	Section	Name	Signature
Jan 3, 2017	Compliance	James Donnellan (Sr. EMC Engineer)	James Donnellan Digitally signed by James Donnellan DN: cn=James Donnellan, c=US, o=Cetecom Inc., ou=Compliance, email=james.donnellan@cetecom.com Date: 2017.01.03 14:54:03 -08'00'

The test results of this test report relate exclusively to the test item specified in Section3.
CETECOM Inc. USA does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CETECOM Inc. USA.

2. Administrative Data

2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Street Address:	411 Dixon Landing Road
City/Zip Code	Milpitas, CA 95035
Country	USA
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Test Engineer	James Donnellan
Project Manager	Ruther Navarro

2.2 Identification of the Client

Applicant's Name:	Whistle Labs INC
Street Address:	1355 Market St. #210.
City/Zip Code	San Francisco, CA, 94103
Country	USA

2.3 Identification of the Manufacturer

Manufacturer's Name:	Whistle Labs INC
Manufacturers Address:	1355 Market St. #210.
City/Zip Code	San Francisco, CA, 94103
Country	USA

3. Equipment Under Test (EUT)

3.1 EUT Specifications

Model No:	Whistle 3
HW Version :	EVT 2
SW Version :	0.0.1-C150591-S
FCC-ID :	S8W-W03A
IC-ID:	10959-W03A
HVIN:	Pet GPS tracker and activity monitor.
PMN:	Whistle 3
Product Description:	A device to track pet location and monitor pet activities.
Module Information:	Telit UE866-N3G FCC ID: RI7UE866N3 IC: 5131A-UE866N3
Transceiver Technology / Type(s) of Modulation	WCDMA/UMTS: QPSK
TX Operating Frequency Ranges (MHz):	WCDMA/UMTS FDD BAND II : 1852.4MHz – 1907.6MHz WCDMA/UMTS FDD BAND V : 826.4MHz – 846.6MHz
Maximum AVG Conducted Output Power from Customer tune up procedure.	UMTS II 0.251W = 24 dBm UMTS V 0.251W = 24 dBm
Antenna info:	FPC Antenna. Gain 850 0.1db Gain 1900 -4dB
Rated Operating Voltage Range:	Dedicated Battery Pack (Li-ion) Vmin: 3.3VDC/ Vnom: 3.8VDC / Vmax: 4.4VDC (5V Charging Voltage)
Operating Temperature Range:	-20 ºC to 60 ºC
Other Radios included in the device	BTLE Wifi. GPS.
Sample Revision	☐Prototype ☐Production ■ Pre-Production

3.2 EUT Sample details

EUT #	Radio Serial Number	HW Version	SW Version	Notes/Comments
1	W03-000131	EVT 2	0.0.1-C150591-S	Radiated / Conducted Emissions Measurements

3.3 Accessory Equipment (AE) details

AE #	Type	Model	Manufacturer	Serial Number
1	A charging dock with a USB cable Connector	N/A	Whistle Labs Inc.	N/A

3.4 Ancillary Test Equipment (ATE) details

ATE #	Type	Model	Manufacturer	Serial Number
1	Laptop	Latitude	DELL	BW21LQ
2	AC Charger	PE98ED	Amazon	PA-1050-07AZ

4. Test Sample Configuration

Set-up #	EUT / AE used for set-up	Measurement	Comments
1	EUT #1	Power Verification	Setup to connect to antenna port with Pigtail.
2	EUT #1 + AE #1 + ATE2	Radiated Spurious Emissions	AE +1 + ATE2 used to charge unit when needed

5. Subject of Investigations

The objective of the measurements done by CETECOM Inc. was to evaluate the compliance of the device described under 3 against the relevant requirements specified in the Code of Federal Regulations Title 47 parts 22, 24 and relevant ISED standards RSS-132 Issue 3, and RSS-133 Issue 6

This evaluation is intended to support product certification under FCC ID: S8W-W03A and IC ID: 10959A-W03A

A power-verification was performed on the host device described under 3 with worst case settings from the modular report and all powers were found to be lower than in the report and grant. This verification is deemed sufficient to conclude that conducted measurement results from the modular report are valid for the host device under investigation.

Radiated spurious emissions have been tested to evaluate the integration of the module into the host product.

6. Measurement

6.1 Dates of Testing:

September 21, 2016 – Oct 14 2016

6.2 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus, with 95% confidence interval (in dB delta to result), based on a coverage factor k=1.

Radiated measurement

9 kHz to 30MHz	±2.5 dB (Magnetic Loop Antenna)
30 MHz to 3000 MHz	±2.0 dB (Biconilog Antenna)
3 GHz to 40 GHz	±2.3 dB (Horn Antenna)

Conducted measurement

150 kHz to 30 MHz	±0.7 dB (LISN)

RF conducted measurement ±0.5 dB

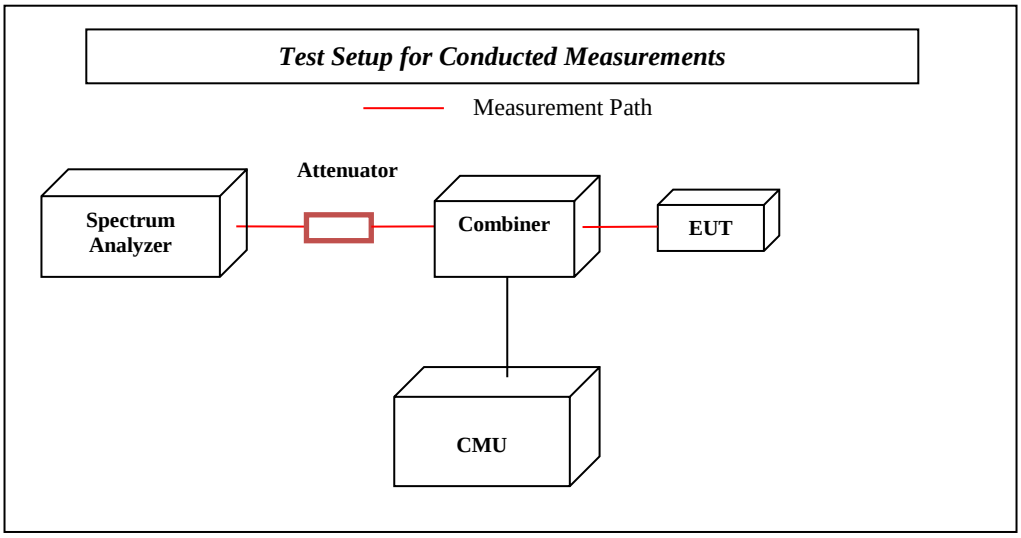
6.3 Environmental Conditions during Testing:

The following environmental conditions were maintained during the course of testing:

- Ambient Temperature: 20-25°C
- Relative humidity: 40-60%

6.4 Conducted Measurement Setup

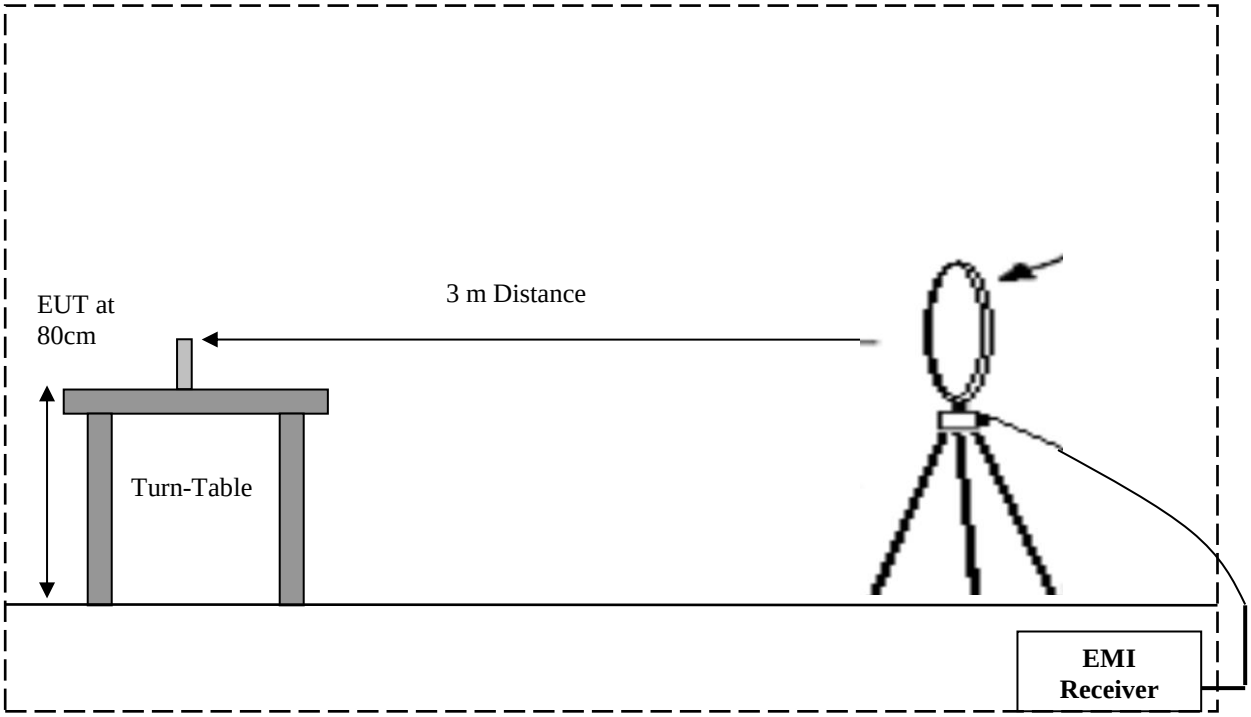
Testing is performed according to the guidelines provided in FCC publication (KDB) 971168 D01 v02r02 – "Measurement Guidance for Certification of Licensed Digital Transmitters" and according to relevant parts of ANSI/TIA-603-D-2010 and ANSI C63.26-2015 as detailed below.



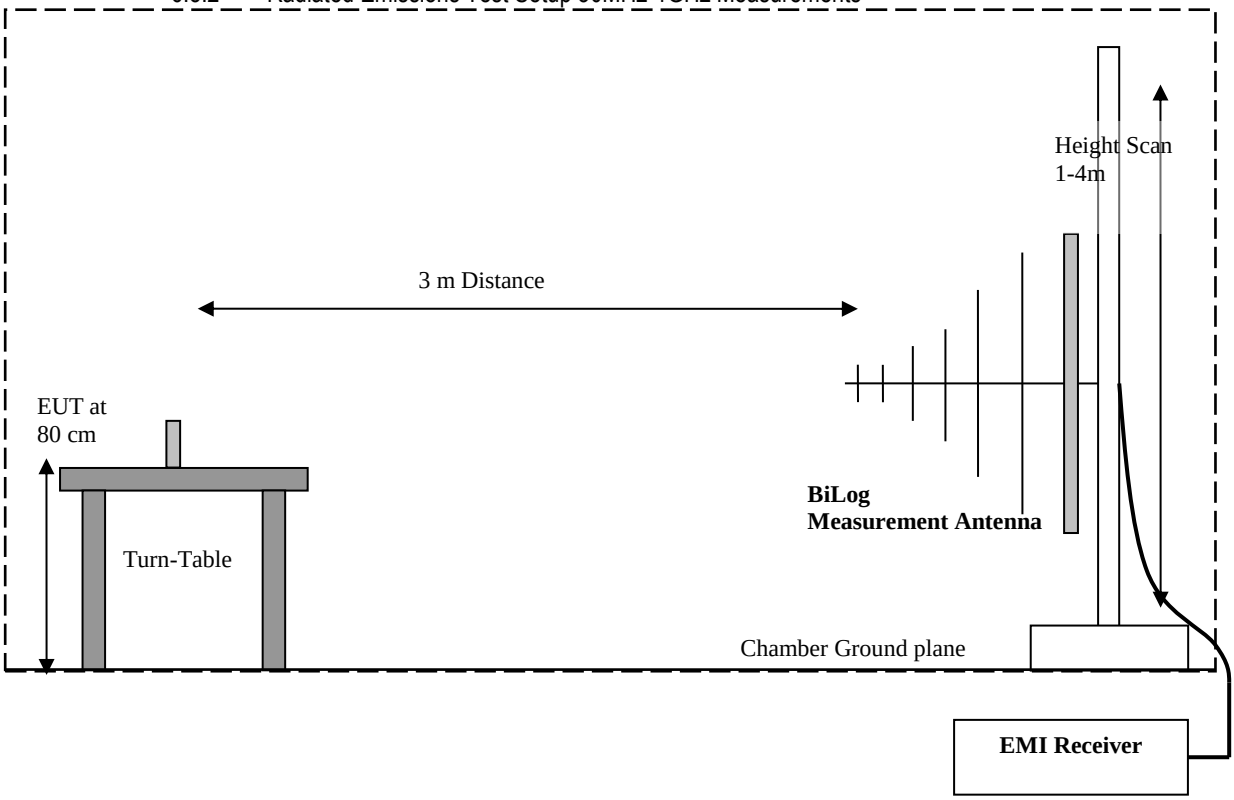
6.5 Radiated Measurement setup

- The exploratory measurement is accomplished by running a matrix of 16 sweeps over the required frequency range with R&S Test-SW EMC32 for 4 positions of the turntable, two orthogonal positions of the EUT and both antenna polarizations. This procedure exceeds the requirement of the above standards to cover the 3 orthogonal axis of the EUT. A max peak detector is utilized during the exploratory measurement. The Test-SW creates an overall maximum trace for all 12 sweeps and saves the settings for each point of this trace. The maximum trace is part of the test report.
- The 10 highest emissions are selected with an automatic algorithm of EMC32 searching for peaks in the noise floor and ensuring that broadband signals are not selected multiple times.
- The maxima are then put through the final measurement and again maximized in a 90deg range of the turntable, fine search in frequency domain and height scan between 1m and 4m.
- The above procedure is repeated for all possible ways of power supply to EUT and for all supported modulations.
- In case there are no emissions above noise floor level only the maximum trace is reported as described above.
- The results are split up into up to 4 frequency ranges due to antenna bandwidth restrictions. A magnetic loop is used from 9 kHz to 30 MHz, a Biconilog antenna is used from 30 MHz to 3 GHz, and two different horn antennas are used to cover frequencies up to 40 GHz.

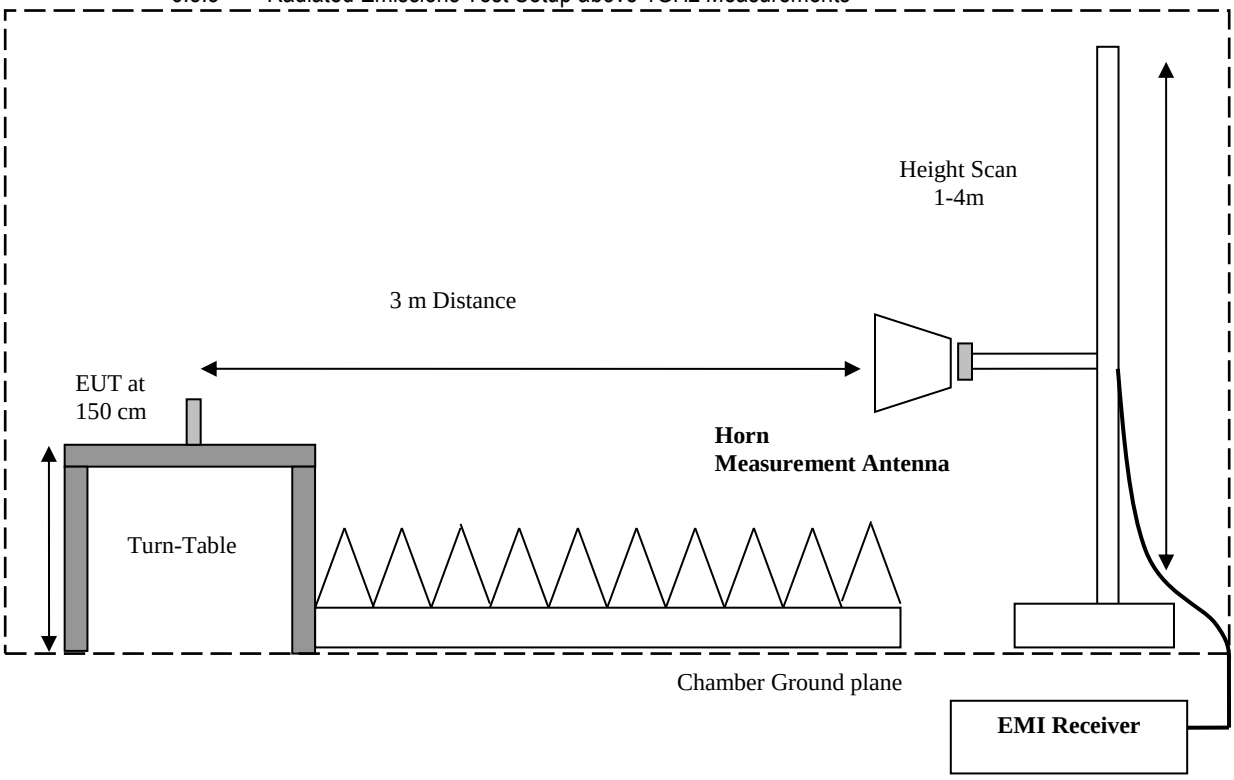
6.5.1 Radiated Emissions Test Setup below 30MHz Measurements



6.5.2 Radiated Emissions Test Setup 30MHz-1GHz Measurements



6.5.3 Radiated Emissions Test Setup above 1GHz Measurements



6.6 Sample Calculations for Field Strength Measurements.

Field Strength is calculated from the Spectrum Analyzer/ Receiver readings, taking into account the following parameters:

- Measured reading in dBµV.
- Cable Loss between the receiving antenna and SA in dB and
- Antenna Factor in dB/m

All radiated measurement plots in this report are taken from a test SW that calculates the Field Strength based on the following equation:

FS (dBµV/m) = Measured Value on SA (dBµV) - Cable Loss (dB) + Antenna Factor (dB/m)

Example:

Frequency (MHz)	Measured SA (dBµV)	Cable Loss (dB)	Antenna Factor Correction (dB)	Field Strength Result (dBµV/m)
1000	80.5	3.5	14	98.0

7 Measurement Results Summary

7.1 FCC 22, 24:

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046; §22.913 (a); §24.232 (a);	RF Output Power	Nominal	WCDMA RMC12.2kbps	■	☐	☐	☐	Complies
§2.1055 §22.355 §24.235	Frequency Stability	Nominal	WCDMA RMC12.2kbps	☐	☐	☐	■	Note 2
§2.1049 §22.917(b) §24.238	Occupied Bandwidth	Nominal	WCDMA RMC12.2kbps	☐	☐	☐	■	Note 2
§2.1051 §22.917	Band Edge Compliance	Nominal	WCDMA RMC12.2kbps	☐	☐	☐	■	Note 2
§2.1051 §22.917 §24.238	Conducted Spurious Emissions	Nominal	WCDMA RMC12.2kbps	☐	☐	☐	■	Note 2
§2.1053; §22.917(a); §24.238 (a);	Radiated Spurious Emissions	Nominal	WCDMA RMC12.2kbps	■	☐	☐	☐	Complies

Note 1: NA= Not Applicable; NP= Not Performed.
Note 2: Leveraged from FCC ID RI7UE866N3 module certification Test Report No.: 6-0608-14-1-4a: Dated 2015-04-09
As measured conducted powers on the EUT was less than those measured in the original module certification Test Report, it is appropriate to leverage those conducted measurements as they represent a worse case.

7.2 Canada RSS132, RSS133

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
RSS-132 Issue 3-5.4 RSS-133 Issue 6-6.4	RF Output Power	Nominal	WCDMA RMC12.2kbps	■	☐	☐	☐	Complies
RSS-132 5.3 RSS-133 6.3	Frequency Stability	Nominal	WCDMA RMC12.2kbps	☐	☐	☐	■	Note 2
RSS-132 5.2 RSS-133 6.2	Occupied Bandwidth	Nominal	WCDMA RMC12.2kbps	☐	☐	☐	■	Note 2
RSS-132 5.5 RSS-133 6.5	Band Edge Compliance	Nominal	WCDMA RMC12.2kbps	☐	☐	☐	■	Note 2
RSS-132 5.5 RSS-133 6.5	Conducted Spurious Emissions	Nominal	WCDMA RMC12.2kbps	☐	☐	☐	■	Note 2
RSS-132 Issue 3-5.5 RSS-133 Issue 6–6.5	Radiated Spurious Emissions	Nominal	WCDMA RMC12.2kbps	■	☐	☐	☐	Complies

Note 1: NA= Not Applicable; NP= Not Performed.
Note 2: Leveraged from FCC ID RI7UE866N3 module certification Test Report No.: 6-0608-14-1-4a: Dated 2015-04-09
As measured conducted powers on the EUT was less than those measured in the original module certification Test Report, it is appropriate to leverage those conducted measurements as they represent a worse case.

8 RF Output Power

8.1 Reference

Measurement according to KDB 971168 D01 Power Meas License Digital Systems v02r02, and according to relevant parts of ANSI/TIA-603-D-2010 and ANSI C63.26-2015.

8.2 Limits:

8.2.1 UMTS V

FCC Part 22.913
The effective radiated power (ERP) of mobile transmitters must not exceed 7 Watts (38.45dBm).
EIRP Limit 40.6dBm

RSS-132 Issue 3
The transmitter output power shall be measured in terms of average power. The equivalent isotropically radiated power (e.i.r.p.) for mobile equipment shall not exceed 11.5 watts. Refer to SRSP-503 for base station e.i.r.p. limits.
In addition, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time using a signal corresponding to the highest PAPR during periods of continuous transmission.
EIRP Limit 40.6dBm

8.2.2 UMTS II

FCC Part 24.232 (c), (d), (e)
(c) Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

(d) Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph
(e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

(e) Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

EIRP Limit 33dBm

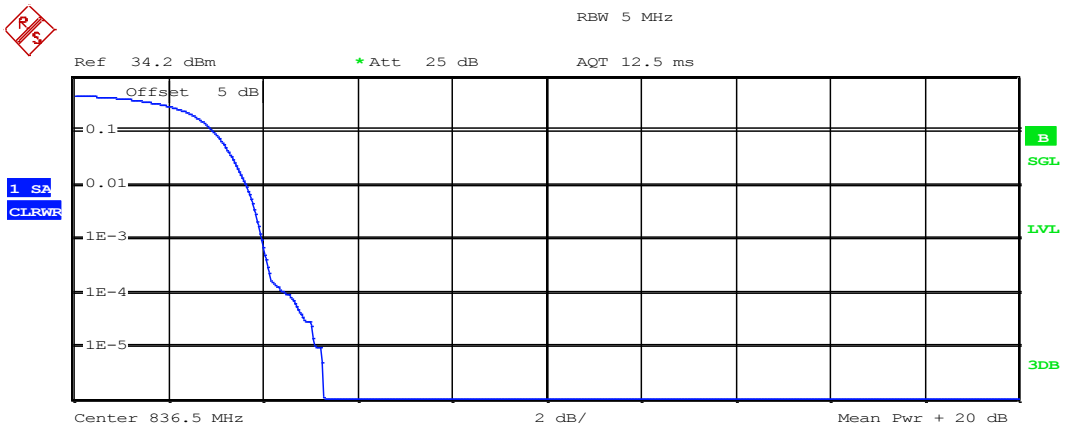
RSS-133 Issue 6
The equivalent isotropically radiated power (e.i.r.p.) for transmitters shall not exceed the limits given in SRSP-510. Moreover, base station transmitters operating in the band 1930-1995 MHz shall not have output power exceeding 100 watts.
In addition, the transmitter's peak-to-average power ratio (PAPR) shall not exceed 13 dB for more than 0.1% of the time using a signal corresponding to the highest PAPR during periods of continuous transmission.
SRSP 510 - 5.1.2 Mobile Stations
Mobile stations and hand-held portables are limited to 2 watts maximum e.i.r.p. The equipment shall employ means to limit the power to the minimum necessary for successful communication.
EIRP Limit 33dBm

8.3 Summary Measurement Result:

Band	Frequency (MHz)	Channel	Measured conducted RMS power [dBm]	Maximum RMS conducted power from grant [dBm]	Margin to grant (dB)	Antenna Gain	EIRP RMS [dBm] with worst case gain	Limit [dBm]
UMTS FDD II	1900	Mid	20.31	24.15	3.84	-4.0	16.31	33
UMTS FDD V	850	Mid	20.34	23.65	3.35	0.1	20.35	38.45

8.4 Plots:

UMTS Band V



Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 7.1MHz

	Trace 1
Mean	20.31 dBm
Peak	25.59 dBm
Crest	5.28 dB
10 %	2.92 dB
1 %	3.62 dB
.1 %	3.97 dB
.01 %	4.49 dB

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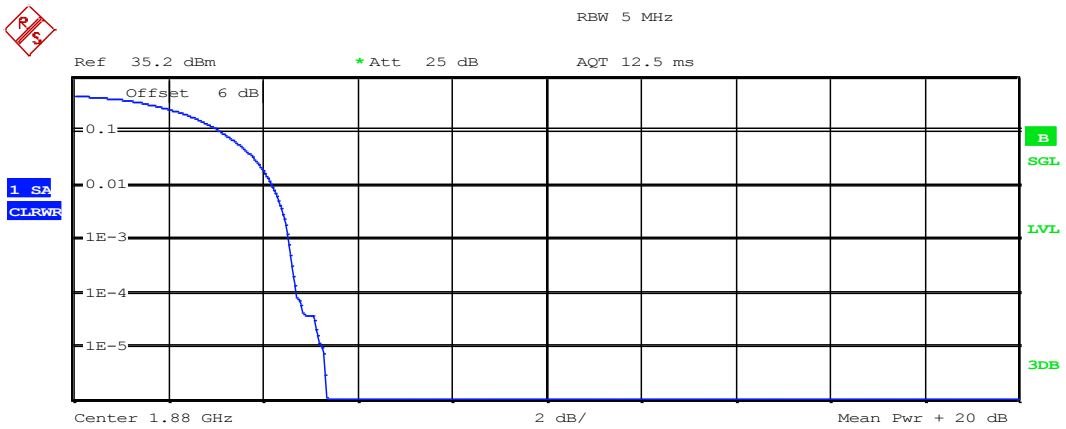
UMTS Band II



Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 7.1MHz

	Trace 1
Mean	20.34 dBm
Peak	25.67 dBm
Crest	5.33 dB
10 %	3.08 dB
1 %	4.17 dB
.1 %	4.55 dB
.01 %	4.71 dB

Date: 19.OCT.2016 15:24:16

9 Radiated Spurious Emissions

9.1 Reference

Measurement according to KDB 971168 D01 Power Meas License Digital Systems v02r02, and according to relevant parts of ANSI/TIA-603-D-2010 and ANSI C63.26-2015.

Spectrum Analyzer Settings

Frequency Range	9kHz – 150kHz	150kHz – 30MHz	30MHz – 1 GHz	1 – 40 GHz
Resolution Bandwidth	200Hz	9kHz	100 kHz	1 MHz
Video Bandwidth	1kHz	30kHz	100 kHz	1 MHz
Detector	Peak	Peak	Peak	Peak
Trace Mode	Max Hold	Max Hold	Max Hold	Max Hold
Sweep Time	Auto	Auto	Auto	Auto

9.2 Limits:

9.2.1 UMTS II

FCC Part 24.238 (a)

Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

RSS133- 6.5.1

Equipment shall comply with the limits in (i) and (ii) below.

In the 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 $\log_{10}$p(watts).

After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 $\log_{10}$p(watts). If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.

EIRP Limit -13dBm

9.2.2 UMTS V

FCC Part 22.917 (a)

Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

RSS-132 - 5.5

Mobile and base station equipment shall comply with the limits in (i) and (ii) below.

In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10p (watts).

After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10 p (watts). If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.

EIRP Limit -13dBm

9.3 Test plan

Radiated Emissions for UMTS measured at RMC12.2k because this setting delivers maximum power according to report on file for FCC-ID.

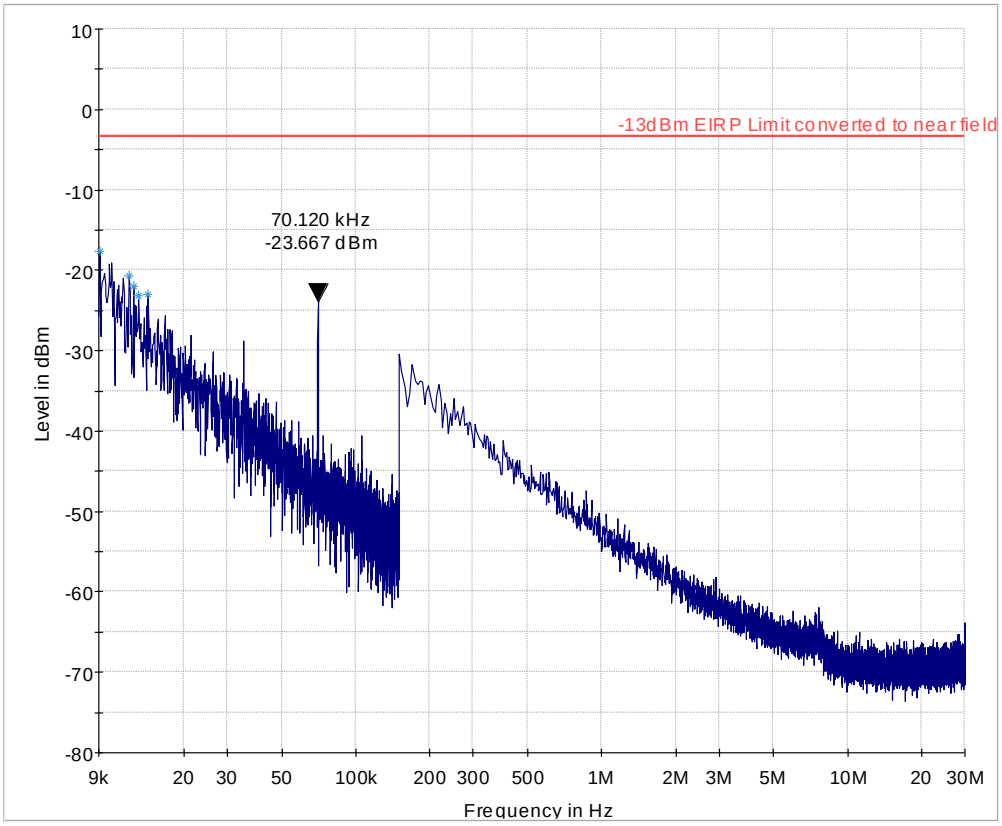
Frequencies below 30MHz and frequencies above 18GHz have only been investigated for mid channel. For the frequency range between 1GHz and 18GHz low mid and high channel have been investigated.

9.4 Summary Measurement result:

Channel	EUT Operating Mode	Scan Frequency	Limit [dBm] converted to 3m	Result	Frequency of highest emission [MHz]	Highest Emission [dBm]
Mid	WCDMA FDD V	9kHz – 30MHz	-13	Pass	0.070	-23.7
Low	WCDMA FDD V	30MHz – 1 GHz	-13	Pass	824	-37.9
Mid	WCDMA FDD V	30MHz – 1 GHz	-13	Pass	-	NF
High	WCDMA FDD V	30MHz – 1 GHz	-13	Pass	-	NF
Low	WCDMA FDD V	1GHz – 9GHz	-13	Pass	1655	-32.67
Mid	WCDMA FDD V	1GHz – 9GHz	-13	Pass	1675	-31.39
High	WCDMA FDD V	1GHz – 9GHz	-13	Pass	1695	-31.61
Mid	WCDMA FDD II	9kHz – 30MHz	-13	Pass	0.070	-22.3
Low	WCDMA FDD II	30MHz – 1 GHz	-13	Pass	159.0	-67.5
Mid	WCDMA FDD II	30MHz – 1 GHz	-13	Pass	-	NF
High	WCDMA FDD II	30MHz – 1 GHz	-13	Pass	-	NF
Low	WCDMA FDD II	1GHz – 3GHz	-13	Pass	-	NF
Mid	WCDMA FDD II	1GHz – 3GHz	-13	Pass	-	NF
High	WCDMA FDD II	1GHz – 3GHz	-13	Pass	-	NF
Low	WCDMA FDD II	3GHz – 18GHz	-13	Pass	3707.0	-48.0
Mid	WCDMA FDD II	3GHz – 18GHz	-13	Pass	5636.0	-49.0
High	WCDMA FDD II	3GHz – 18GHz	-13	Pass	3813.0	-50.49
Mid	WCDMA FDD II	18GHz – 22GHz	-13	Pass	19967.9	-35.44

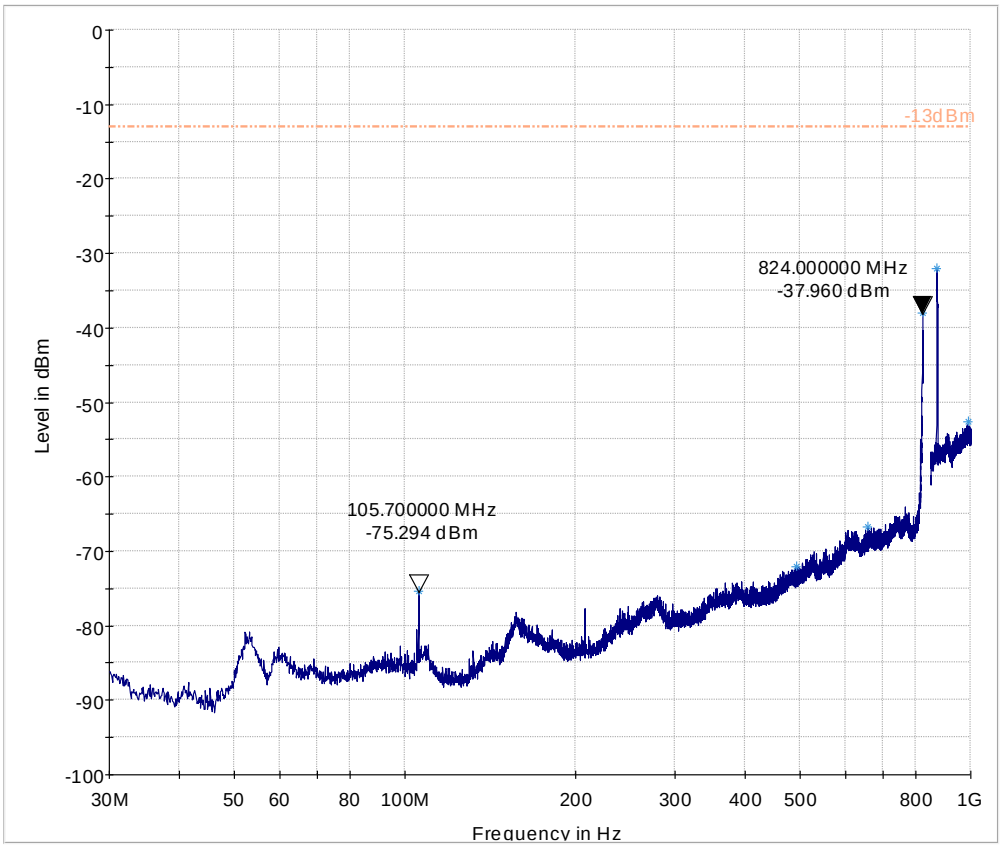
9.5 Measurement Plots WCDMA/UMTS FDD V

9.5.1 9 kHz – 30MHz, Ch. Mid



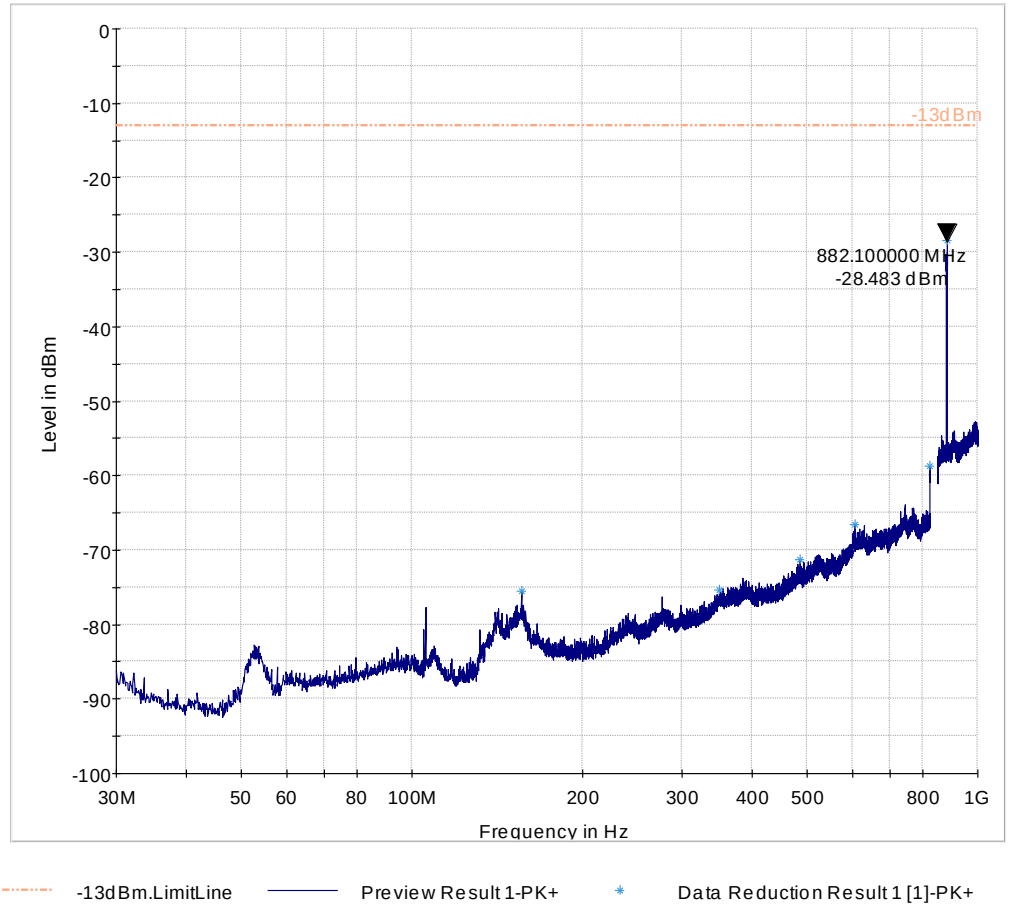
-13dBm EIRP Limit converted to near field — Preview Result 1-PK+
* Data Reduction Result 1 [1]-PK+

9.5.2 30MHz - 1GHz, Ch. Low

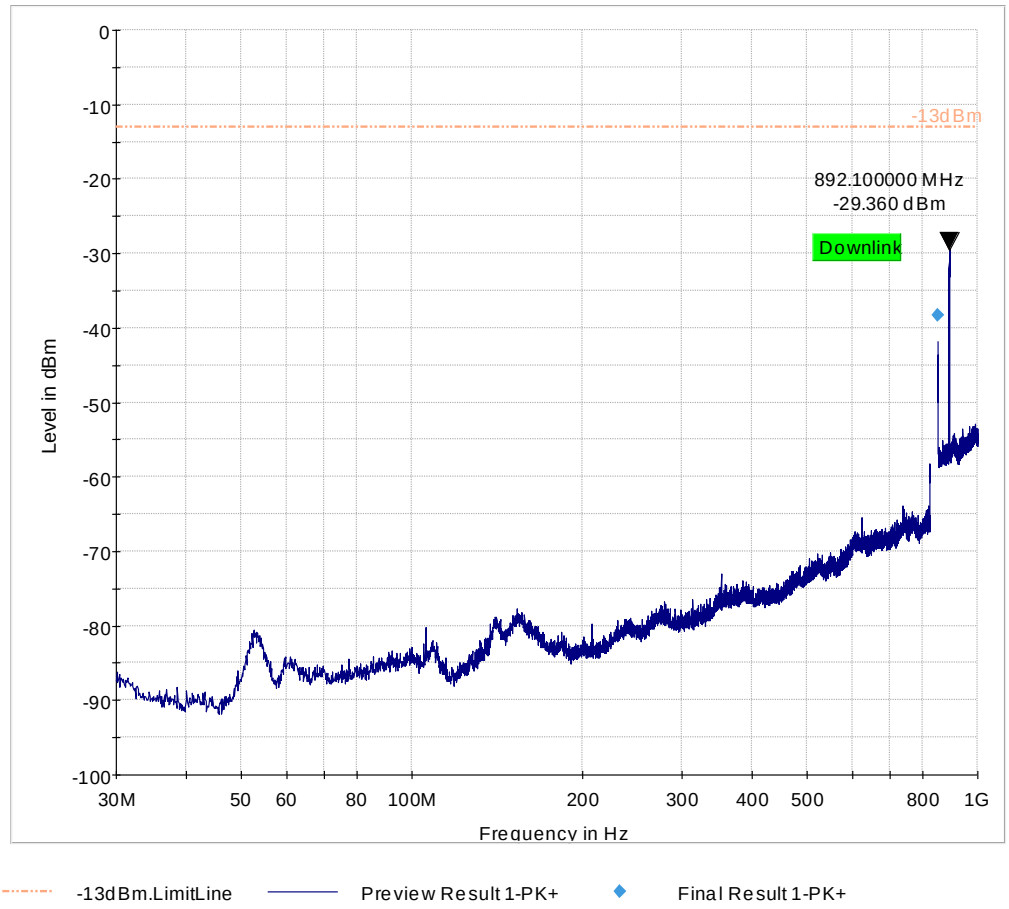


-13dBm.LimitLine Preview Result 1-PK+ Data Reduction Result 1 [1]-PK+

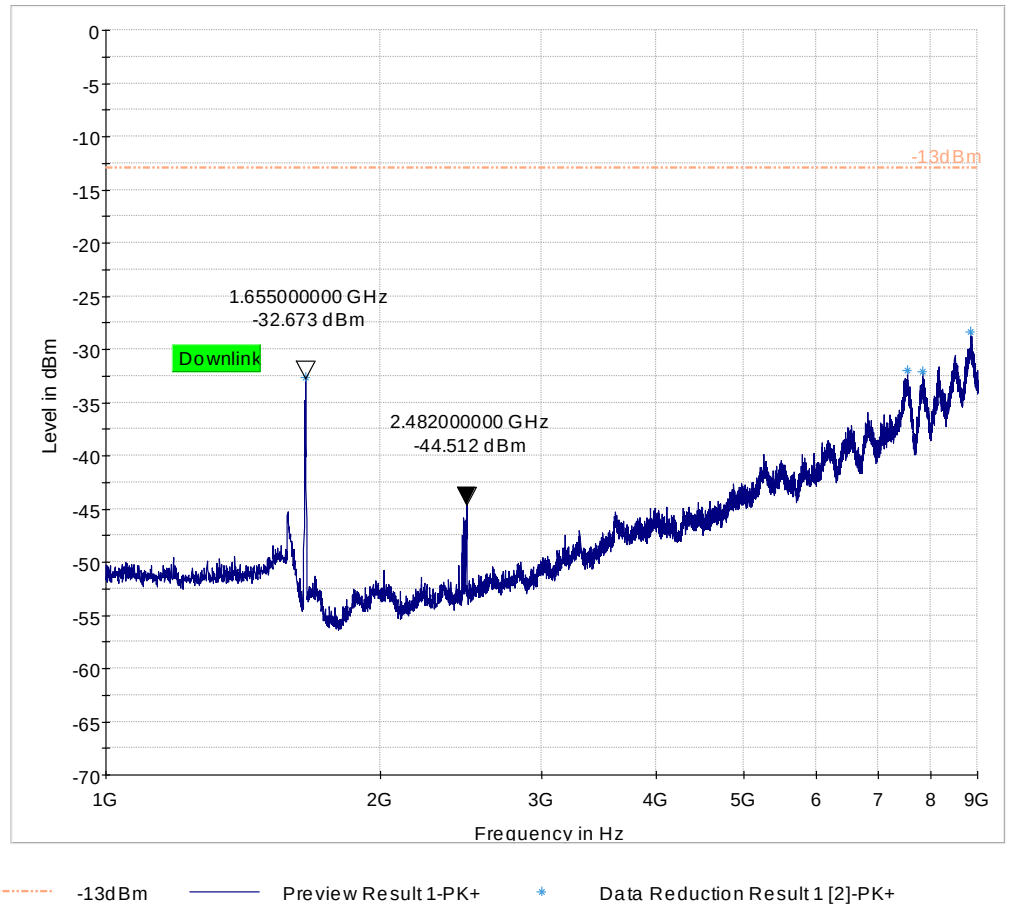
9.5.3 30MHz - 1GHz, Ch. Mid



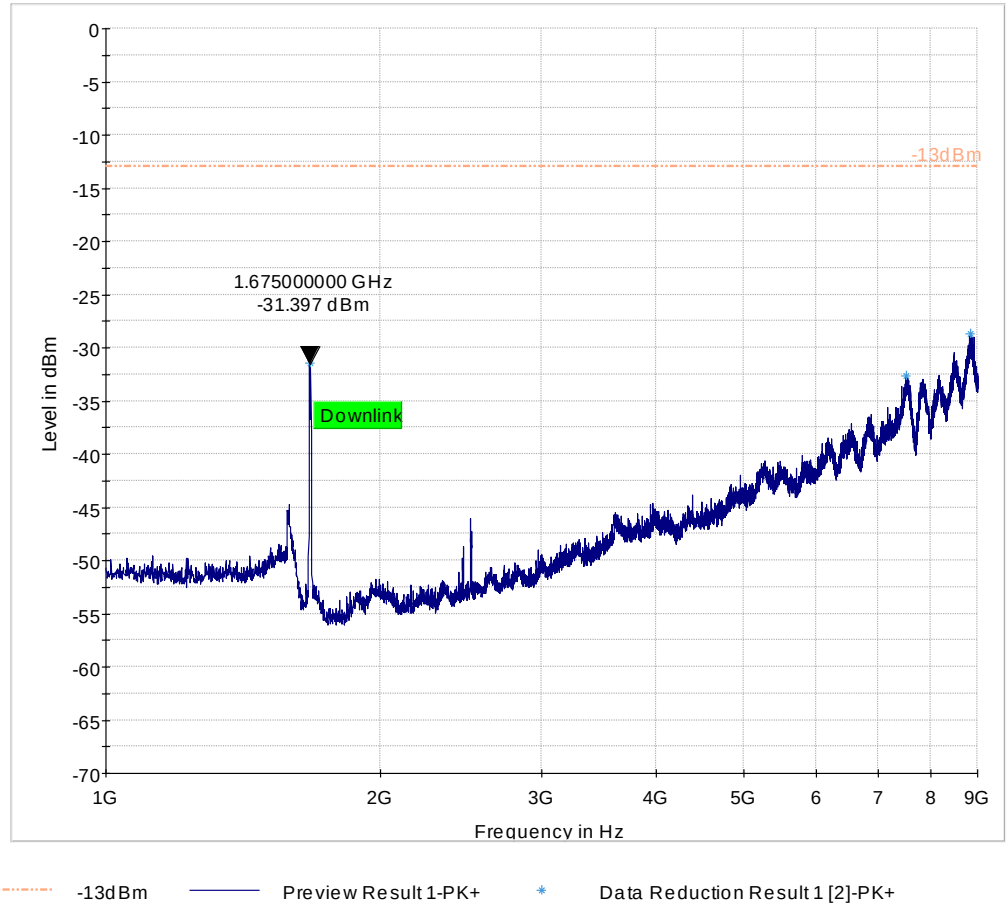
9.5.4 30MHz - 1GHz, Ch. High



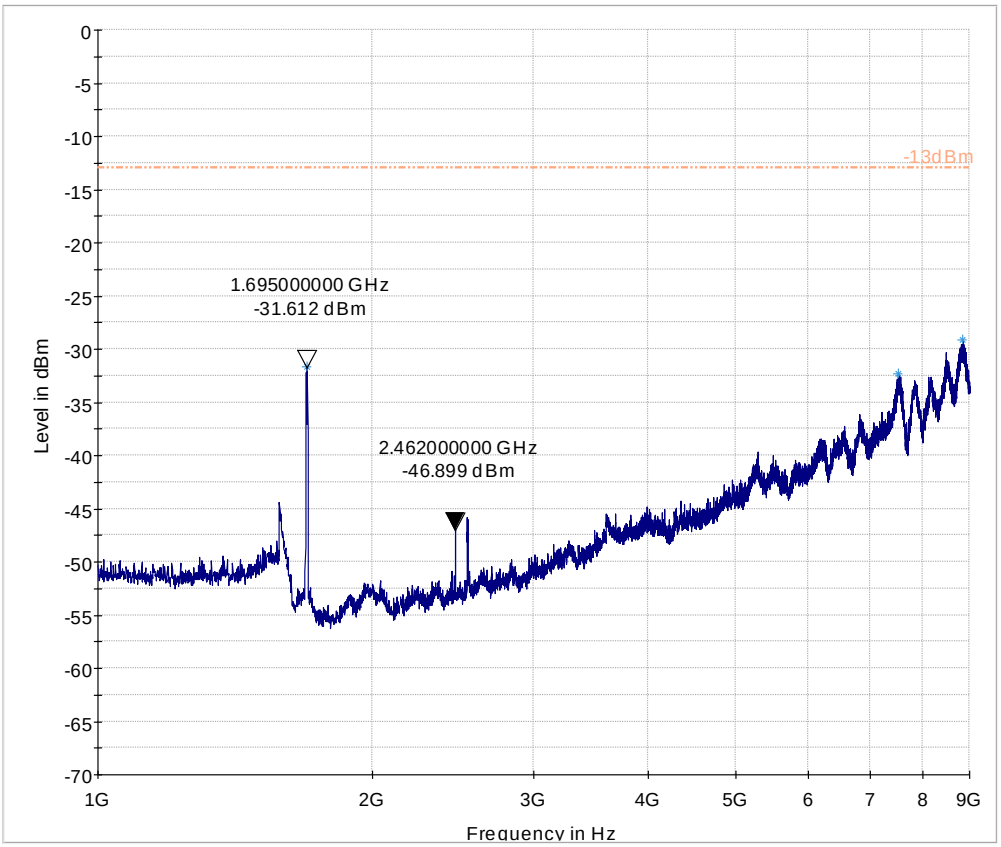
9.5.5 1 – 9 GHz, Ch. Low



9.5.6 3GHz – 18GHz, Ch. Low



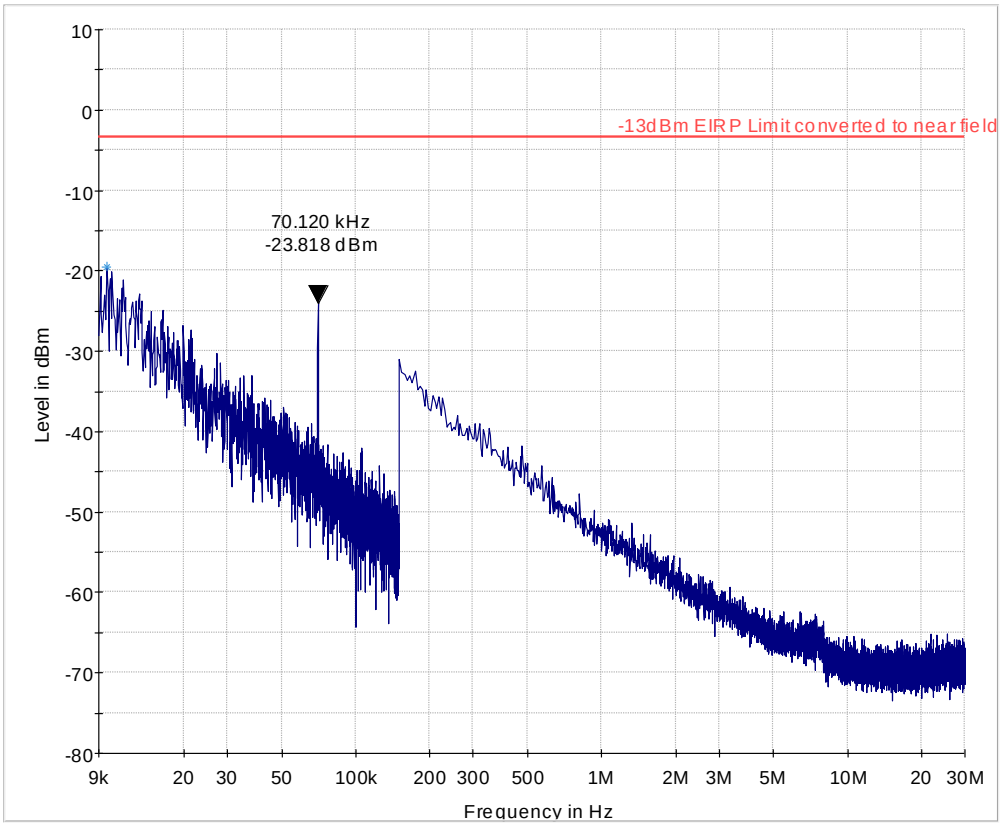
9.5.7 1GHz - 3GHz, Ch. Mid



-13dBm Preview Result 1-PK+ Data Reduction Result 1 [2]-PK+

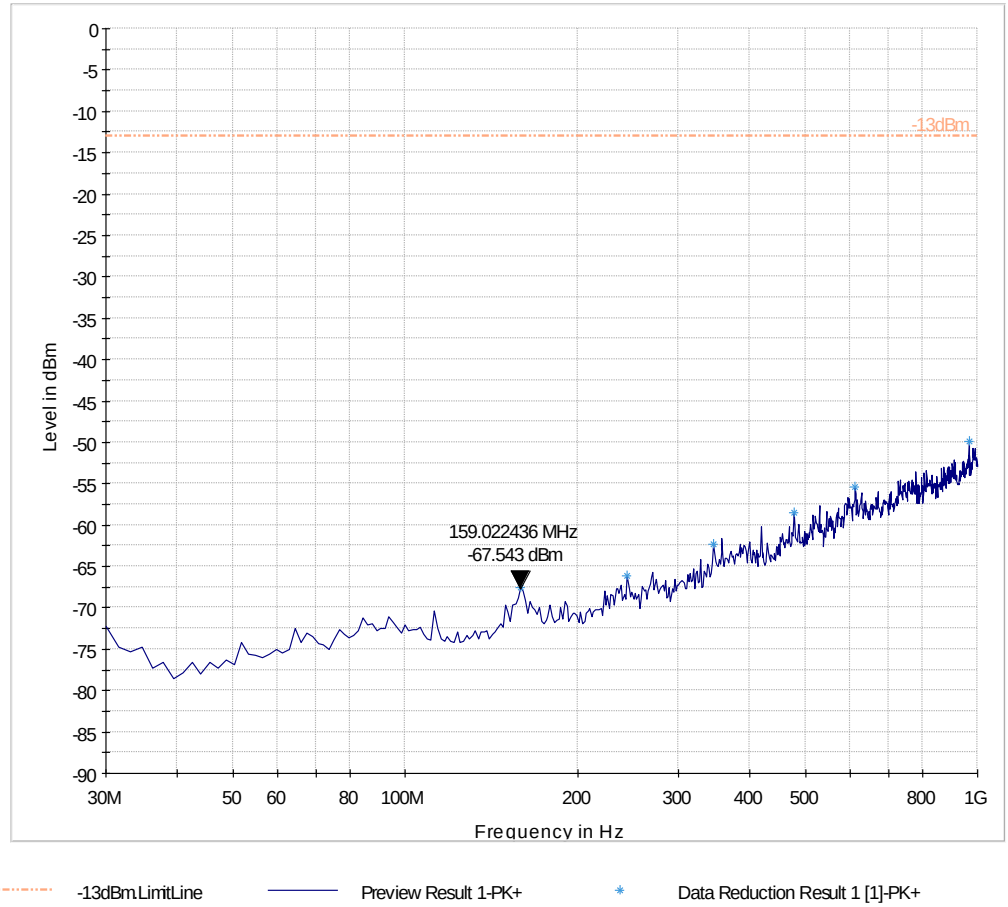
9.6 Measurement Plots WCDMA/UMTS FDD II

9.6.1 9 kHz – 30MHz, Ch. Mid

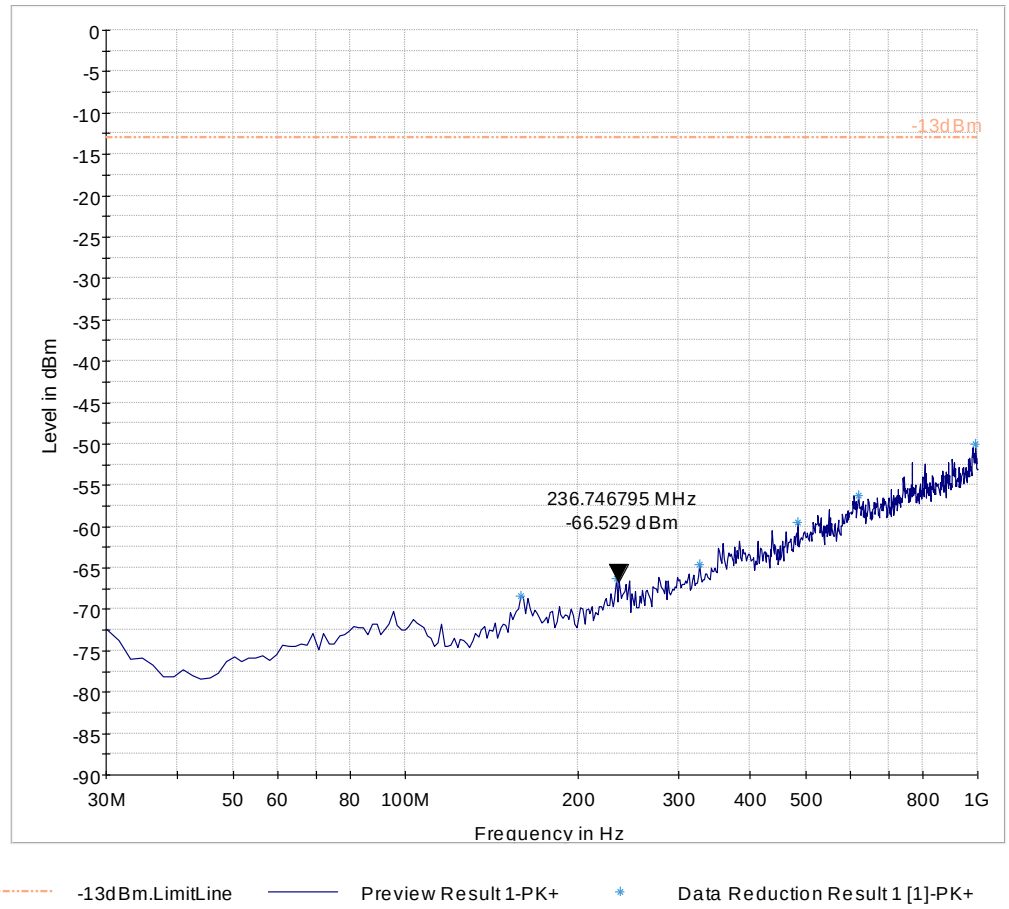


-13dBm EIRP Limit converted to near field — Preview Result 1-PK+
* Data Reduction Result 1 [1]-PK+

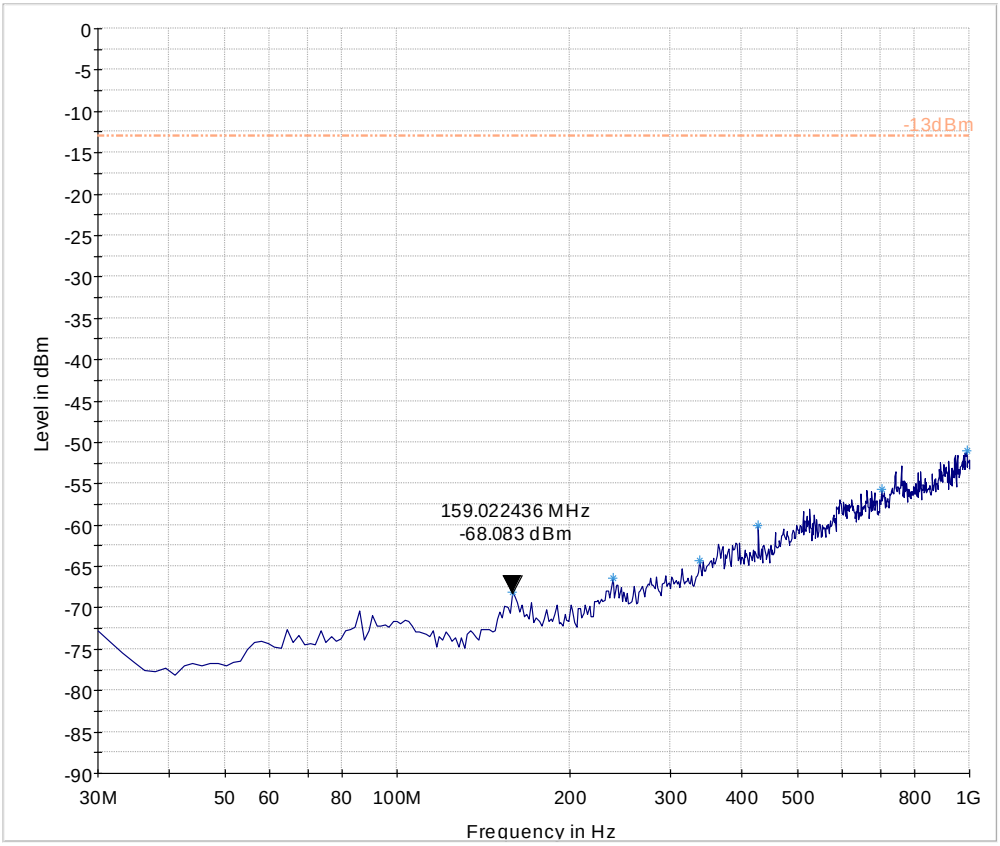
9.6.2 30MHz – 1GHz, Ch. Low



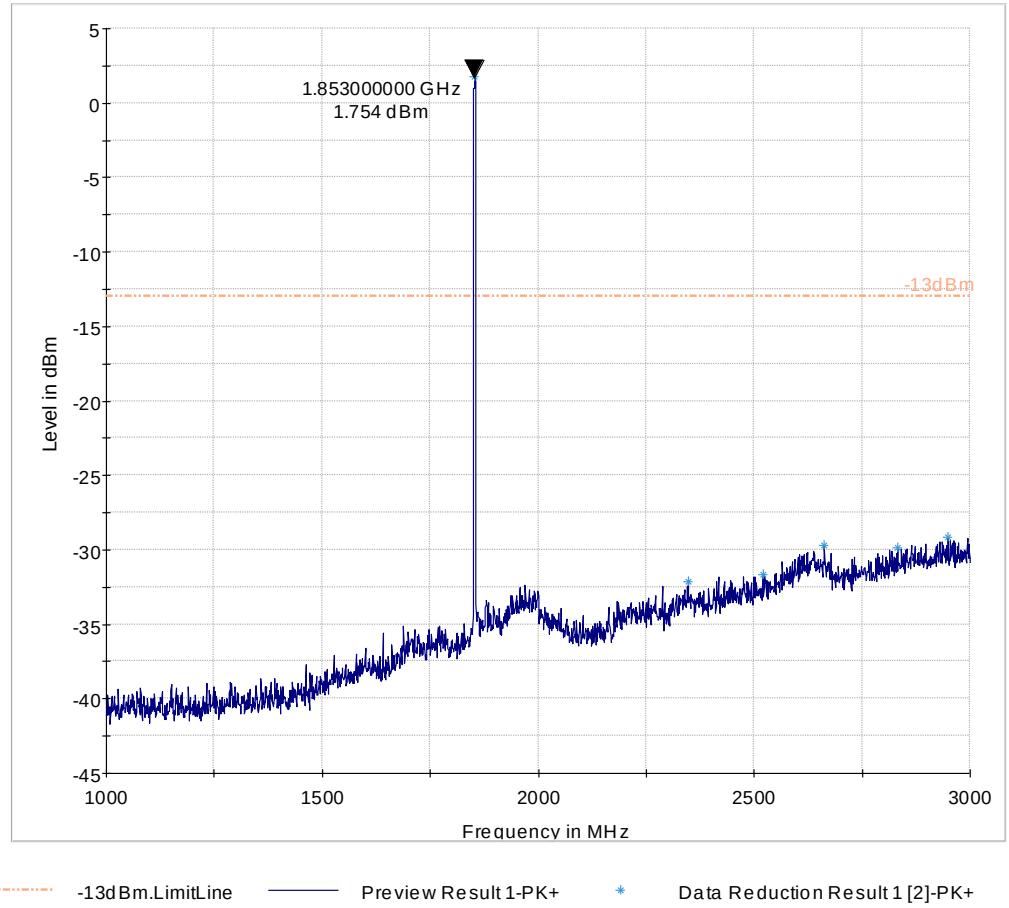
9.6.3 30MHz – 1GHz, Ch. Mid



9.6.4 30MHz – 1GHz, Ch. High

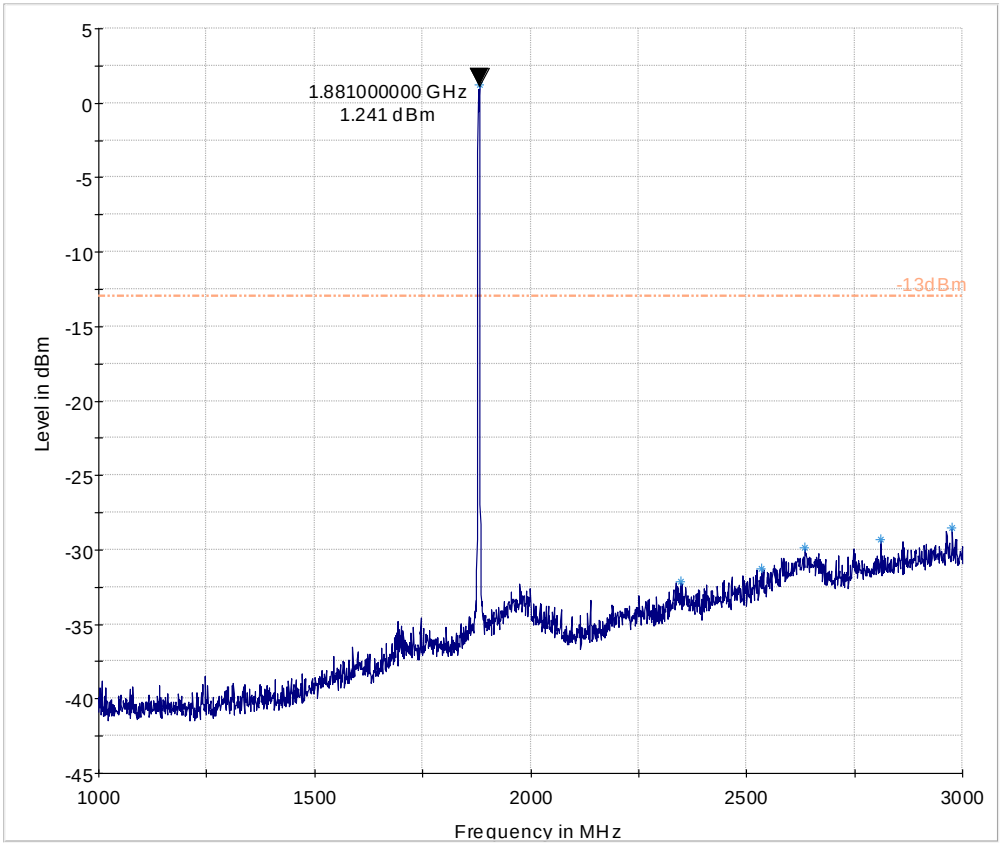


9.6.5 1GHz – 3GHz, Ch. Low



Note: The emission above the limit is the Tx Signal

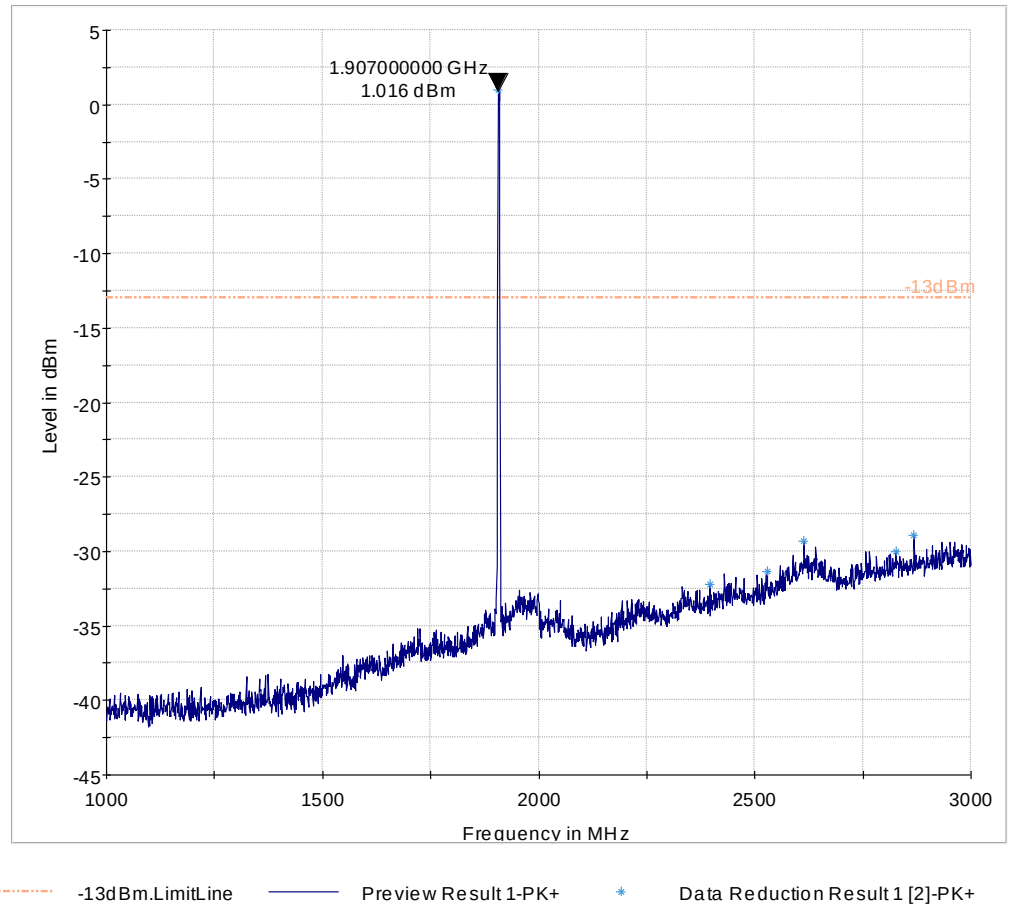
9.6.6 1GHz – 3GHz, Ch. Mid



-13dBm.LimitLine Preview Result 1-PK+ Data Reduction Result 1 [2]-PK+

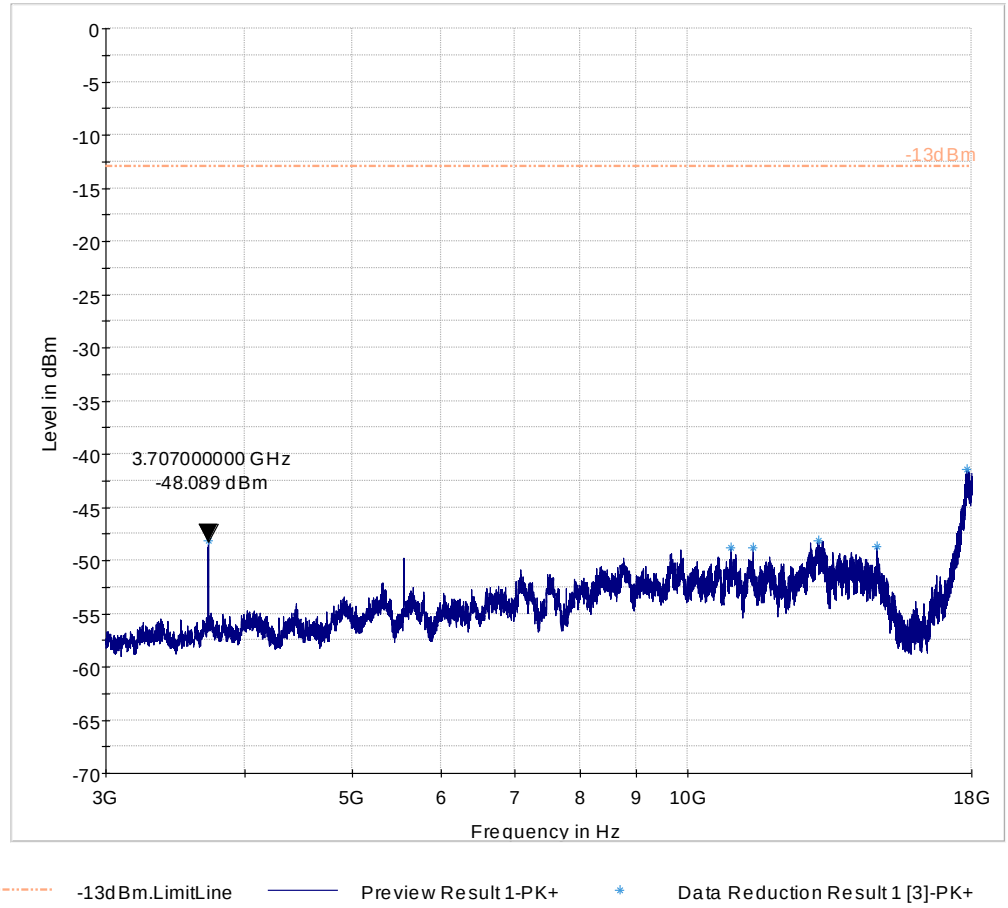
Note: The emission above the limit is the Tx Signal

9.6.7 1GHz – 3GHz, Ch. High

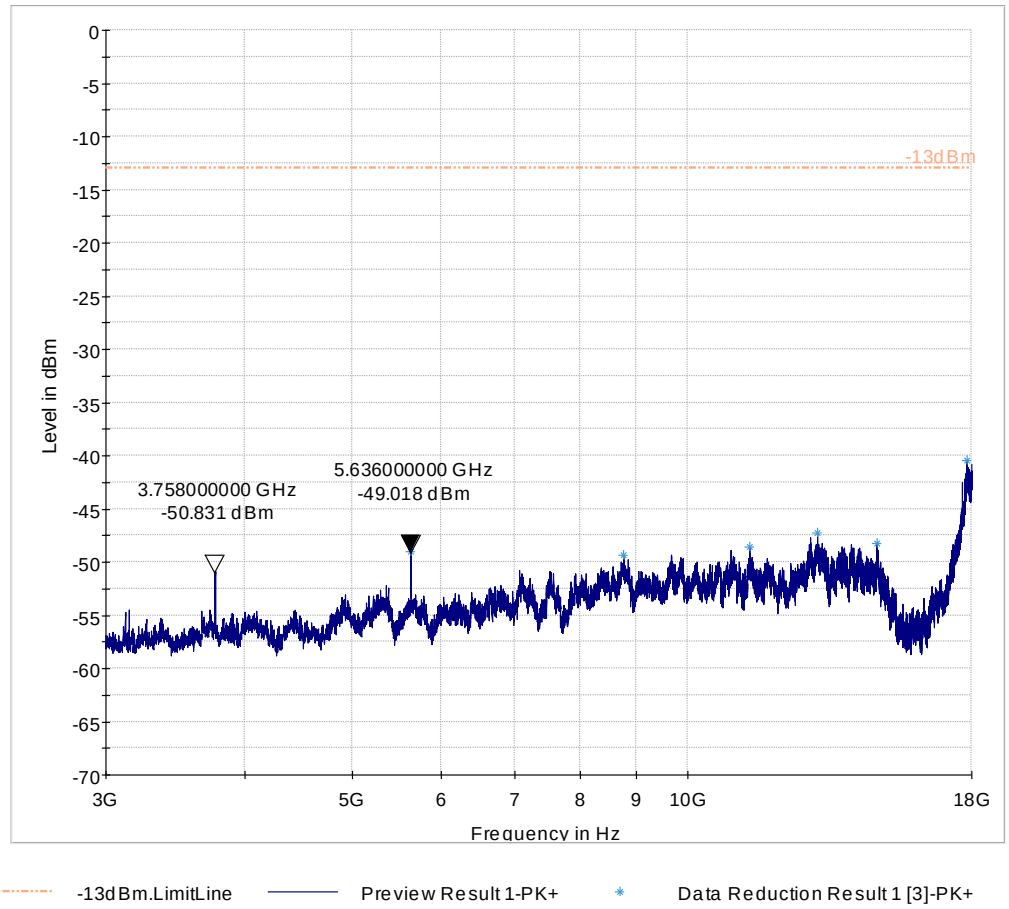


Note: The emission above the limit is the Tx Signal.

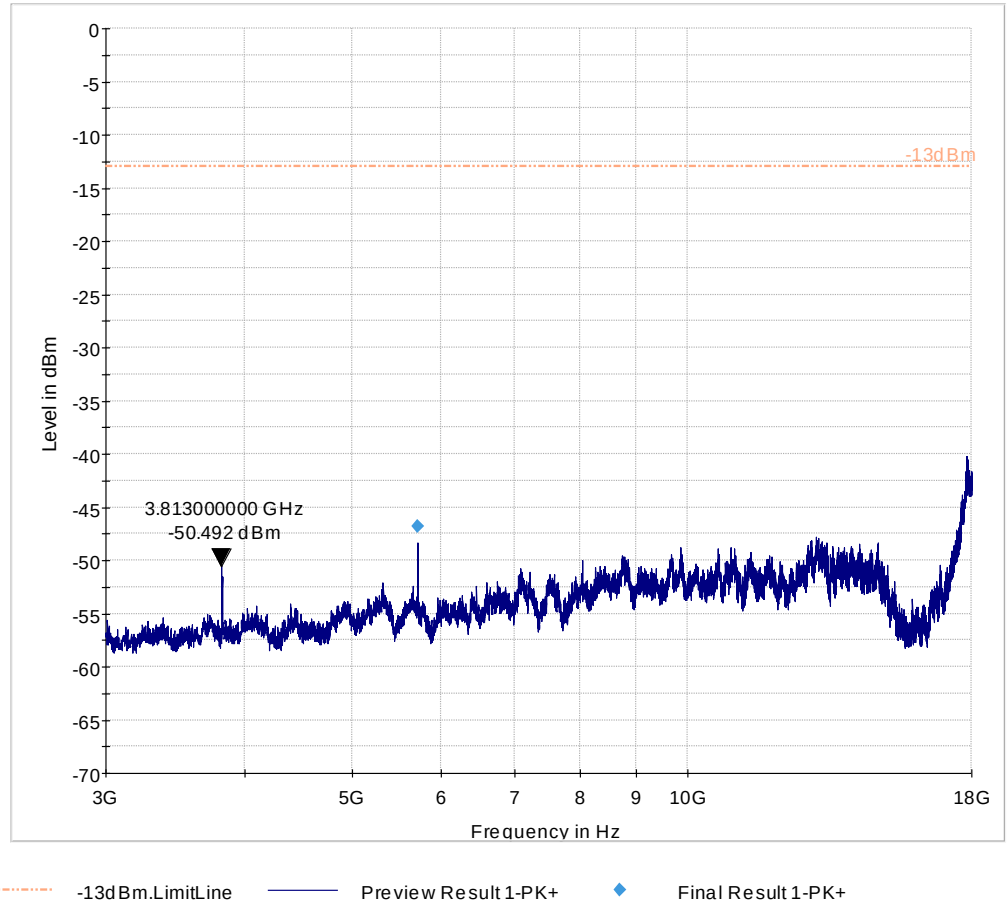
9.6.8 3GHz – 18GHz, Ch. Low



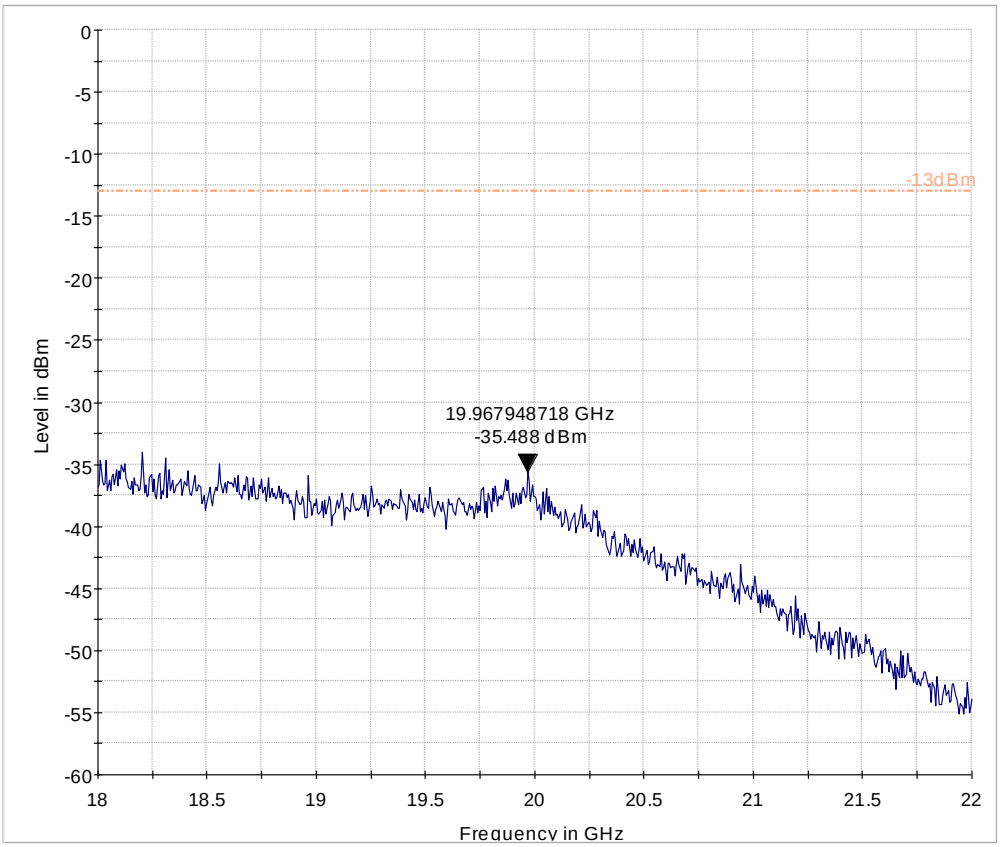
9.6.9 3GHz – 18GHz, Ch. Mid



9.6.10 3GHz – 18GHz, Ch. High



9.6.11 18GHz – 22GHz, Ch. Mid



-13dBm Preview Result 1-PK+

7. Test Setup Photos

Setup photos are included in supporting file name: “EMC-WHIST-003-16001-TestSetupPhotos.pdf”

8. Test Equipment and Ancillaries Used For Testing

Item Name	Equipment Type	Manufacturer	Model	Serial #	Calibration Cycle	Last Calibration Date
Antenna Loop 6512	Loop (Passive)	ETS Lindgren	6512	00164698	3 years	7/22/2014
Antenna Biconilog 3142E	Biconlog Antenna	EMCO	3142E	166067	3 years	6/14/2014
Antenna Horn 3115 SN 35111	Horn Antenna	EMCO	3115	35111	3 years	7/24/2015
Antenna Horn 3116	Horn Antenna	ETS Lindgren	3116	70497	3 years	7/22/2015
LISN FCC-LISN-50-25-2-08	LISN	FCC	FCC-LISN-50-25-2-08	8014	2 Years	3/26/2015
Digital Barometer	Compact Digital Barometer	Control Company	35519-055	91119547	2 Years	4/7/2015
Spectrum Analyzer FSU26 #2	Spectrum Analyzer	R&S	FSU26	200065	3 years	7/4/2015
Digital Radio Comm. Tester CMU 200 #1	Digital Radio Comm. Tester	R&S	CMU 200 #1	101821	2 Years	7/4/2015
Thermometer Humidity TM320	Thermometer Humidity	Dickson	AY1072	0528	1 Year	11/02/2016

Equipment used meets the measurement uncertainty requirements as required per applicable standards for 95% confidence levels. Calibration due dates, unless defined specifically, falls on the last day of the month. Items indicated “N/A” for cal status either do not specifically require calibration or is internally characterized before use.

9. Revision History

Date	Report Name	Changes to report	Report prepared by
Dec 13, 2016	EMC-WHIST-003-16001-FCC-22-24	Initial Version	James Donnellan
Dec 22, 2016	EMC-WHIST-003-16001-FCC-22-24-Rev1	Based on Feedback. Updated references to ANSI/TIA-603-D-2010 page 10, 17 and 21. Updated note on table for page 15 and table on page 44.	James Donnellan
Jan 3, 2017	EMC-WHIST-003-16001-FCC-22-24-Rev2	Updated references to ANSI C63.26-2015 page 10, 17 and 21.	James Donnellan