

FCC 47 CFR PART 22 SUBPART H AND PART 24 SUBPART E

TEST REPORT

For

Computer

Model: DMS-SJ03

Trade Name: ADVANTECH

Issued to

**Advantech Co.Ltd.
No.1, Alley 20, Lane 26, Rueiguang Road, Neihu District, Taipei 114,
Taiwan, R.O.C.**

Issued by

**Compliance Certification Services Inc.
(Hsinchu Lab)
No.989-1, Wenshan Rd., Shangshan Village, Qionglin Township,
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Issued Date: September 21, 2017**



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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	September 21, 2017	Initial Issue	ALL	Allison Chen
01	December 4, 2017	1. Revised section 7.2.	P.12	Angel Cheng

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1. TEST RESULT CERTIFICATION

Applicant: Advantech Co.Ltd.
No.1, Alley 20, Lane 26, Rueiguang Road, Neihu District,
Taipei 114, Taiwan, R.O.C.

Manufacturer: Advantech Co.Ltd.
No.1, Alley 20, Lane 26, Rueiguang Road, Neihu District,
Taipei 114, Taiwan, R.O.C.

Equipment Under Test: Computer

Trade Name: ADVANTECH

Model: DMS-SJ03

Date of Test: August 10 ~ 14, 2017

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 22 Subpart H & Part 24 Subpart E	No non-compliance noted

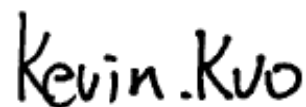
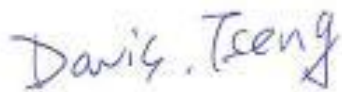
We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in TIA/EIA-603-D: 2010 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rule FCC PART 22 Subpart H and PART 24 Subpart E

The test results of this report relate only to the tested sample identified in this report.

Approved by:

Tested by:



Davis Tseng
Sr. Engineer
Compliance Certification Services Inc.

Kevin Kuo
Engineer
Compliance Certification Services Inc.

2. EUT DESCRIPTION

Product	Computer
Model No.	DMS-SJ03
Model Discrepancy	N/A
Trade Name	ADVANTECH
Received Date	August 31, 2017
Power Supply	Powered from host device: DC 12V
Frequency Range	WCDMA Band II: 1852.4 ~ 1907.6 MHz WCDMA Band V: 826.4 ~ 846.6MHz
Antenna Gain	PIFA Antenna WCDMA band II: 3.46 dBi WCDMA band V: 3.24 dBi

Remark:

1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.

Emission Designator					
System	Band	Frequency Range(MHz)	Emission Designator (99% OBW)	Maximum ERP (W)	Maximum EIRP (W)
WCDMA 12.2K RMC	II	1852.4MHz ~1907.6MHz	4M15F9W	N/A	0.397
	V	826.4MHz ~ 846.6MHz	4M13F9W	0.591	N/A

3. TEST METHODOLOGY

Both conducted and radiated testing were performed according to TIA/EIA-603-D: 2010 and FCC CFR 47, Part 2, Part 22 Subpart H and Part 24 Subpart E

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.2 DESCRIPTION OF TEST MODES

The EUT (model: DMS-SJ03) had been tested under operating condition.

The EUT be set in maximum power transmission via call box during testing.

3.2.1 The worst mode of measurement

Radiated Emission Measurement	
Test Condition	Band edge, Emission for Unwanted and Fundamental
Voltage/Hz	DC 12V
Test Mode	Mode 1: EUT power by DC Source via cable.
Worst Mode	☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4
Position	☐ Placed in fixed position. ☒ Placed in fixed position at X-Plane (E2-Plane) ☐ Placed in fixed position at Y-Plane (E1-Plane) ☐ Placed in fixed position at Z-Plane (H-Plane)

Remark:

1. The worst mode was record in this test report.
2. The EUT pre-scanned in three axis ,X,Y, Z and two polarity, Horizontal and Vertical for radiated measurement. The worst case (X-Plane) were recorded in this report.

4. INSTRUMENT CALIBRATION

4.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

4.2 MEASUREMENT EQUIPMENT USED

Equipment Used for Emissions Measurement

Remark: Each piece of equipment is scheduled for calibration once a year.

Conducted Emissions Test Site					
Name of Equipment	Manufacturer	Model	Serial Number	Cal Date	Cal Due
Base Station	R&S	CMU 200	101245	07/29/2017	07/25/2018
Spectrum Analyzer	R&S	FSV 40	101073	10/05/2016	10/04/2017
Spectrum Analyzer	R&S	FSU 20Hz....26.5GHz	100258	07/27/2017	07/26/2018

Wugu 966 Chamber A					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Base Station	Agilent	8960/E5515C	MY48363204	07/26/2017	07/25/2018
Bi-Log Antenna	TESEQ	CBL 6112D	35404	08/07/2017	08/06/2018
Double Ridged BroadBand Horn Antenna	SCHWARZBE CK	BBHA 9120 D	9120D-285	04/25/2017	04/24/2018
Horn Antenna	COM-POWER	AH-840	03077	12/02/2016	12/01/2017
Pre-Amplifier	EMCI	EMC001625	980243	04/11/2017	04/10/2018
Pre-Amplifier	COM-POWER	PAM-118A	551043	04/11/2017	04/10/2018
PSA Series Spectrum Analyzer	Agilent	E4446A	MY48250064	04/20/2017	04/19/2018

4.3 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
3M Semi Anechoic Chamber / 30M~200M	+/- 4.0138
3M Semi Anechoic Chamber / 200M~1000M	+/- 3.9483
3M Semi Anechoic Chamber / 1G~8G	+/- 2.5975
3M Semi Anechoic Chamber / 8G~18G	+/- 2.6112
3M Semi Anechoic Chamber / 18G~26G	+/- 2.7389
3M Semi Anechoic Chamber / 26G~40G	+/- 2.9683

Remark: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

- ☐ No.199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.
- ☐ No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan, R.O.C
- ☐ No.81-1, Lane 210, Bade 2nd Rd., Lujhu Township, Taoyuan County 33841, Taiwan, R.O.C
- ☒ No.989-1, Wenshan Rd., Shangshan Village, Qionglin Township, Hsinchu County 30741, Taiwan, R.O.C

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

5.2 EQUIPMENT

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

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

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."

6. SETUP OF EQUIPMENT UNDER TEST

6.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix I for the actual connections between EUT and support equipment.

6.2 SUPPORT EQUIPMENT

No	Equipment	Brand	Model	Series No.	FCC ID	Data Cable
1	DC Power Source	Agilent	E3640A	N/A	N/A	DC Cable 1.5m shielding
2	NB(D)	ASUS	A8J	R31018	N/A	N/A

Remark:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

7. FCC PART 22 & 24 REQUIREMENTS

7.1 AVERAGE POWER

Test Procedures

CONDUCTED POWER MEASUREMENT:

1. The transmitter output power was connected to the call box.
2. Set EUT at maximum output power via call box.
3. Set Call box at lowest, middle and highest channels for each band and modulation.

Test results

No non-compliance noted.

TEST DATA

WCDMA

Band	Mode	UL/DL Channel No.	Frequency(MHz)	Average power(dBm)	Output Power (W)
WCDMA Band II	Rel 99	9262/9662	1852.4	22.97	0.19815
		9400/9800	1880.0	23.17	0.20749
		9538/9983	1907.6	23.05	0.20184
WCDMA Band V	Rel 99	4132/4157	826.4	23.62	0.23014
		4182/4407	836.4	23.68	0.23335
		4233/4458	846.6	23.93	0.24717

7.2 ERP & EIRP MEASUREMENT

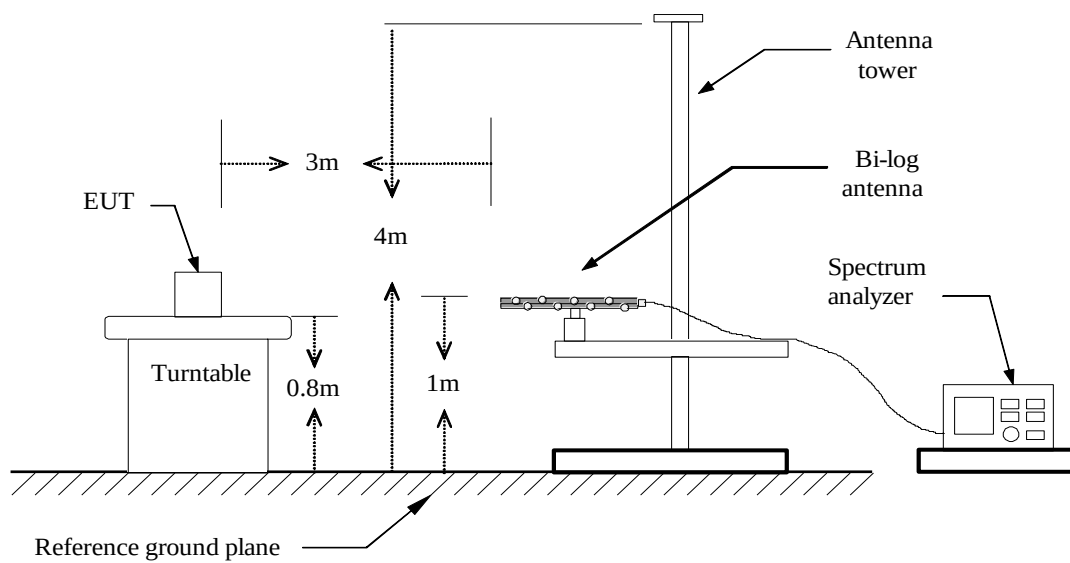
LIMIT

According to FCC 22.913(a): The Effective Radiated Power (ERP) of mobile transmitters must not exceed 7 Watts.

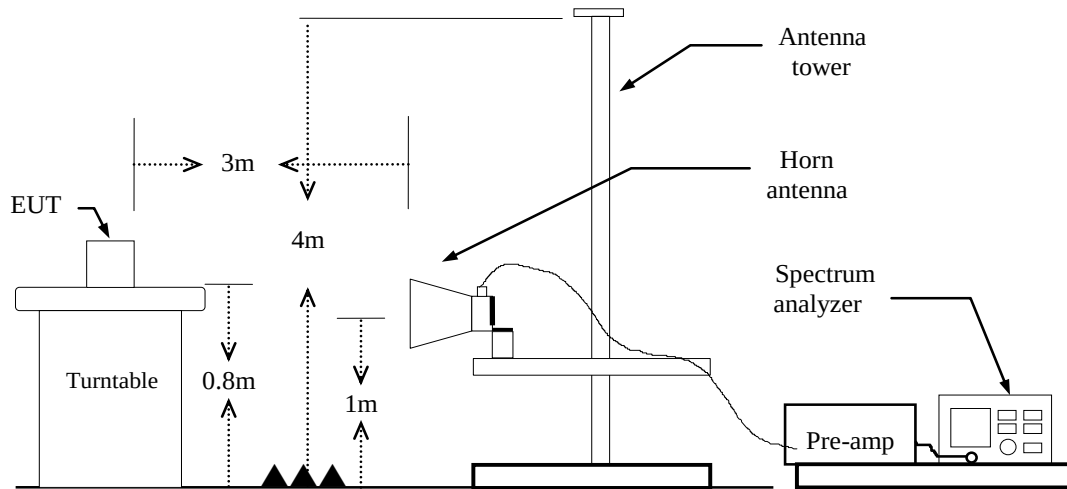
According to FCC 24.232(c): The equivalent Isotropic Radiated Power (EIRP) must not exceed 2 Watts.

Test Configuration

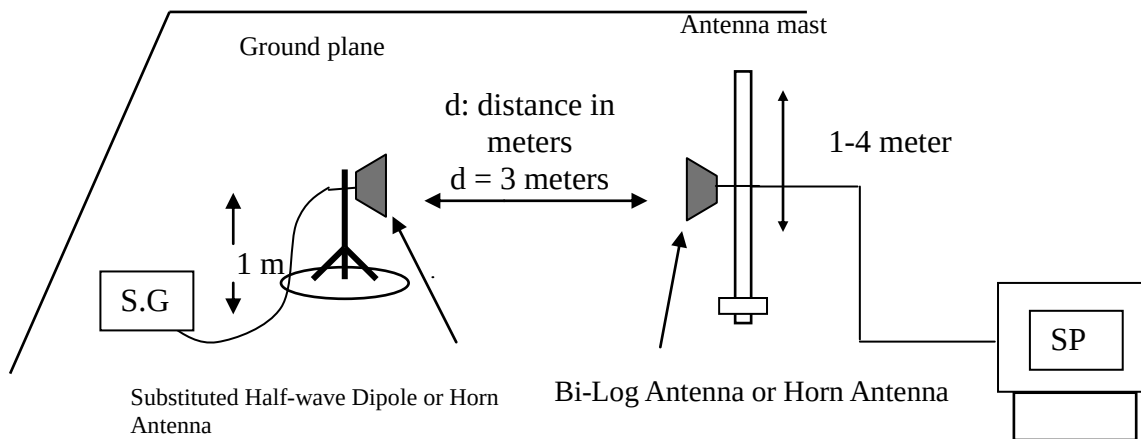
Below 1 GHz



Above 1 GHz



For Substituted Method Test Set-UP



TEST PROCEDURE

1. The EUT was placed on a non-conductive rotating platform (0.8m for below 1G and above 1G) in a semi-chamber. The radiated emission at the fundamental frequency was measured at 3m and SA with RMS detector per section 5, KDB 971168 D01.
2. During the measurement, the call box parameters were set to get the maximum output power of the EUT. The maximum emission was recorded from spectrum analyzer power level (LVL) from 360 degrees rotation of turntable and the test antenna raised and lowered over a range from 1m to 4m in both horizontally and vertically polarized orientations.
3. EIRP was measured method according to TIA/EIA-603-D:2010. The EUT was replaced by the substitution antenna at same location, and then record the maximum Analyzer reading through raised and lowered the test antenna.

$$\text{ERP} = \text{S.G. output (dBm)} + \text{Antenna Gain (dBi)} - \text{Cable (dB)} - 2.15$$

$$\text{EIRP} = \text{S.G. output (dBm)} + \text{Antenna Gain (dBi)} - \text{Cable (dB)}$$

TEST RESULTS

No non-compliance noted.

WCDMA 12.2K RMC

Test Mode	Channel	Vertical		Horizontal	
		EIRP(dBm)	EIRP(W)	EIRP(dBm)	EIRP(W)
WCDMA 12.2K RMC (Band II)	Lowest	18.20	0.066	25.82	0.381
	Middle	19.24	0.083	25.99	0.397
	Highest	16.89	0.048	25.51	0.355

Test Mode	Channel	Vertical		Horizontal	
		ERP(dBm)	ERP(W)	ERP(dBm)	ERP(W)
WCDMA 12.2K RMC (Band V)	Lowest	18.84	0.076	26.10	0.407
	Middle	16.53	0.044	27.72	0.591
	Highest	22.29	0.169	27.42	0.552

7.3 OCCUPIED BANDWIDTH MEASUREMENT

Limits

For Reporting purpose only.

TEST PROCEDURES

KDB 971168 v02r02 - Section 4.2

1. The occupied bandwidth was measured with the spectrum analyzer at the lowest, middle and highest channels in each band and different modulation. The 99% and -26dB bandwidth was measured and recorded.
2. RBW = 1-5% of the expected OBW
3. VBW $\geq 3 \times$ RBW
4. Detector = Peak
5. Trace mode = max. hold

TEST RESULTS

No non-compliance noted

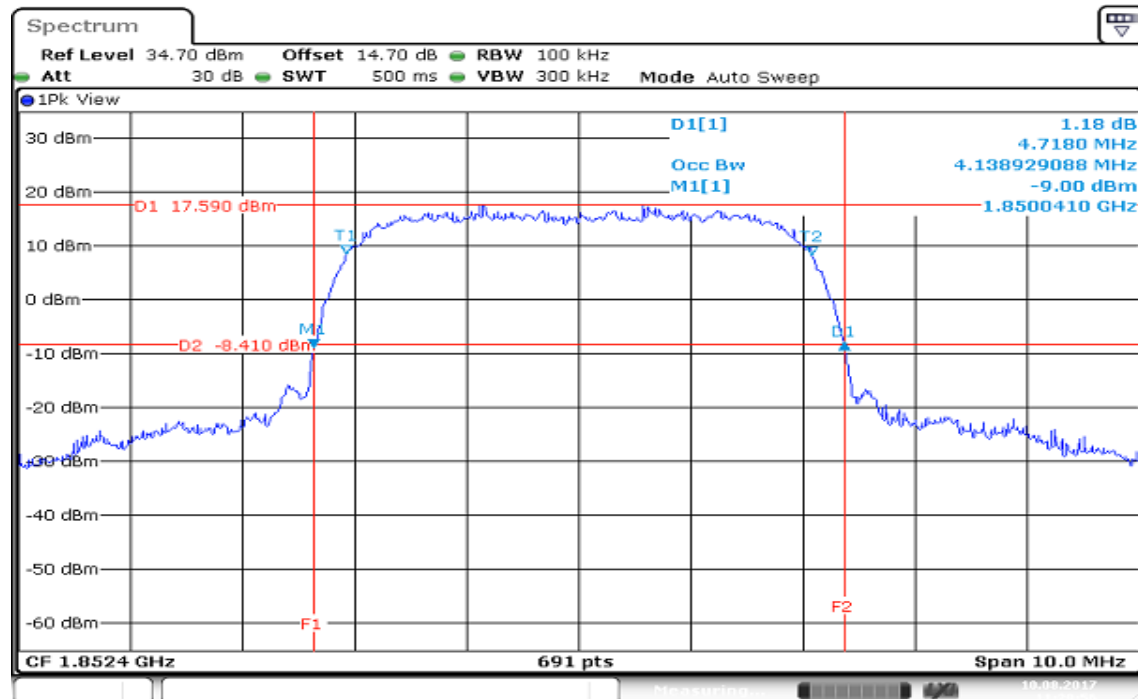
Test Data

Test Mode	CH	Frequency (MHz)	99% Bandwidth (MHz)	26 dB Bandwidth (MHz)
WCDMA 12.2k RMC (Band II)	Lowest	1852.4	4.1389	1.8500
	Middle	1880.0	4.1534	1.8776
	Highest	1907.6	4.1389	1.9052
WCDMA 12.2k RMC (Band V)	Lowest	826.4	4.1389	4.7320
	Middle	836.4	4.1389	4.7030
	Highest	846.6	4.1099	4.6890

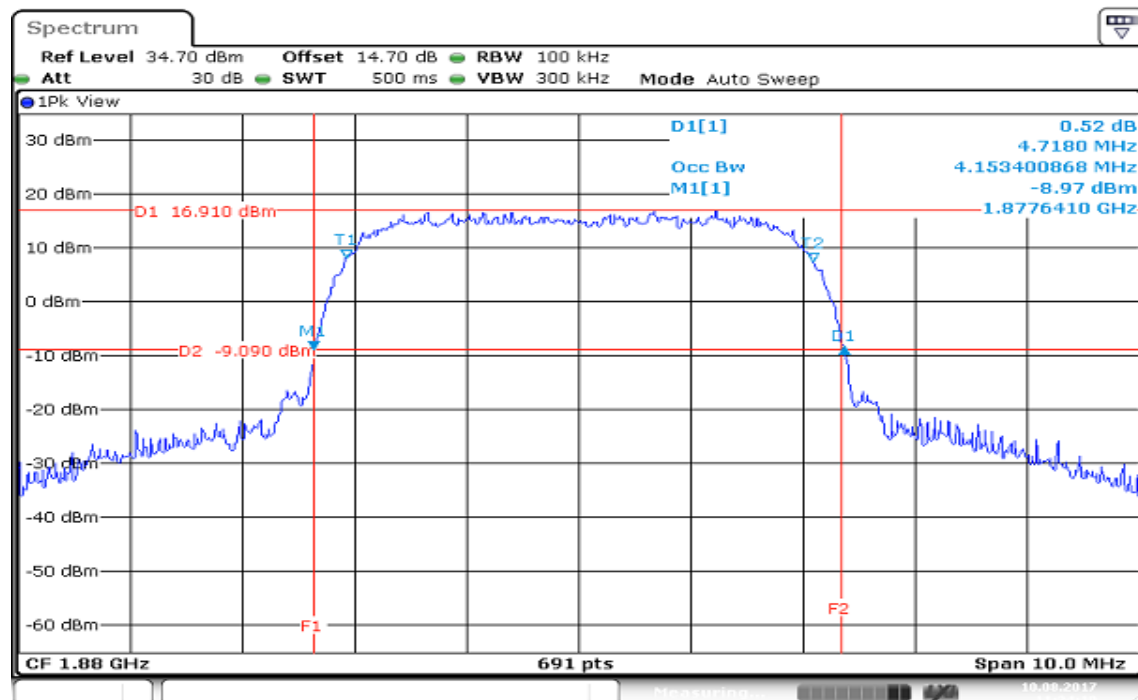
Test Plot

WCDMA 12.2k RMC (Band II)

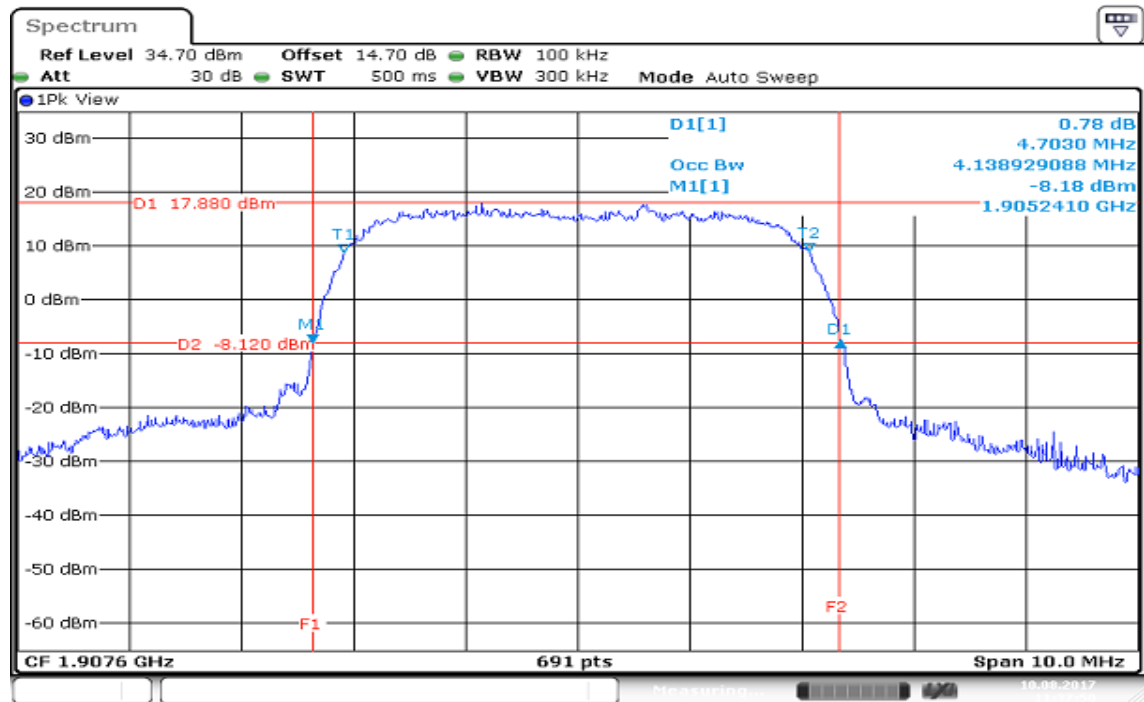
Low CH



Mid CH



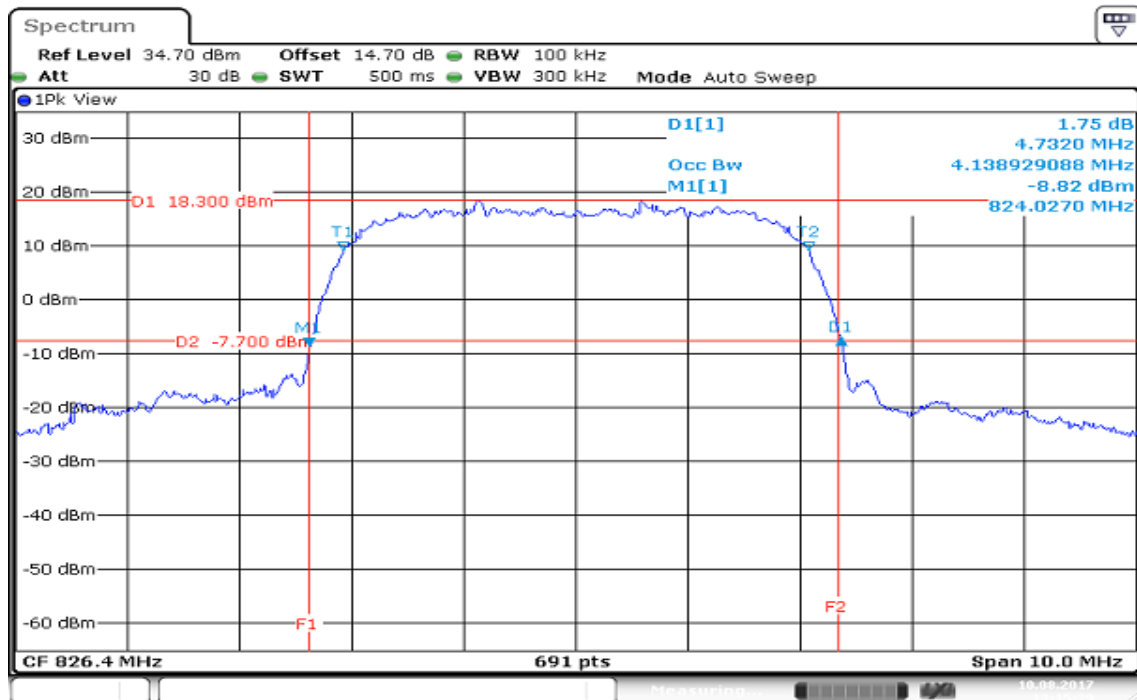
High CH



Date: 10 AUG 2017 11:27:50

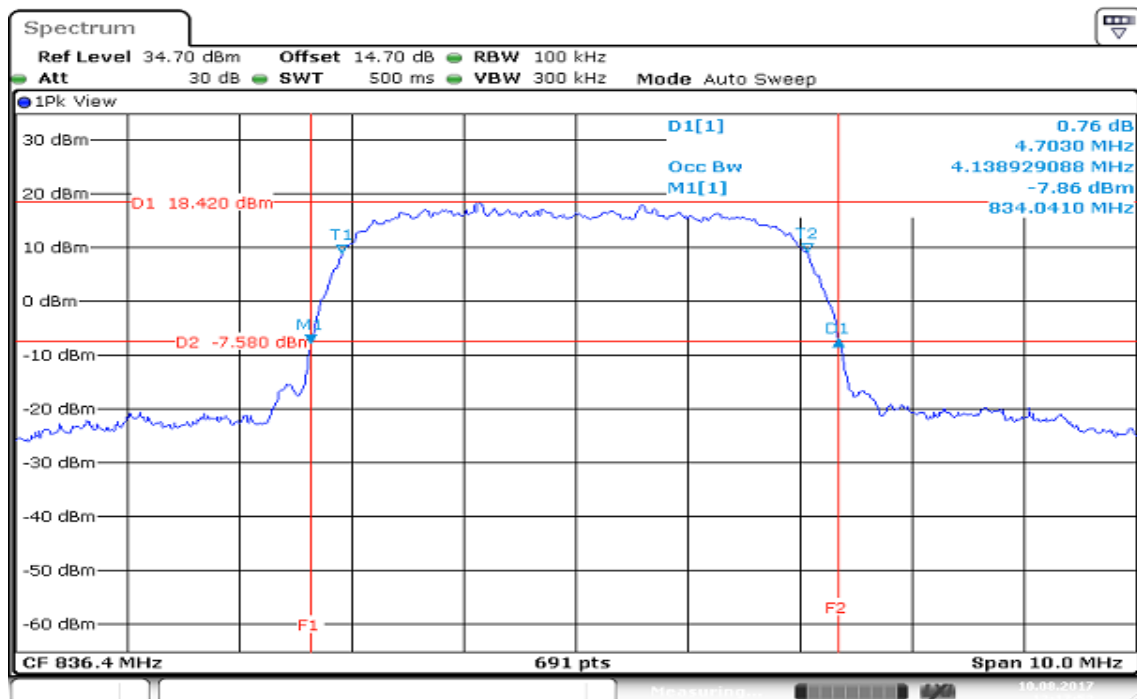
WCDMA 12.2k RMC (Band V)

Low CH



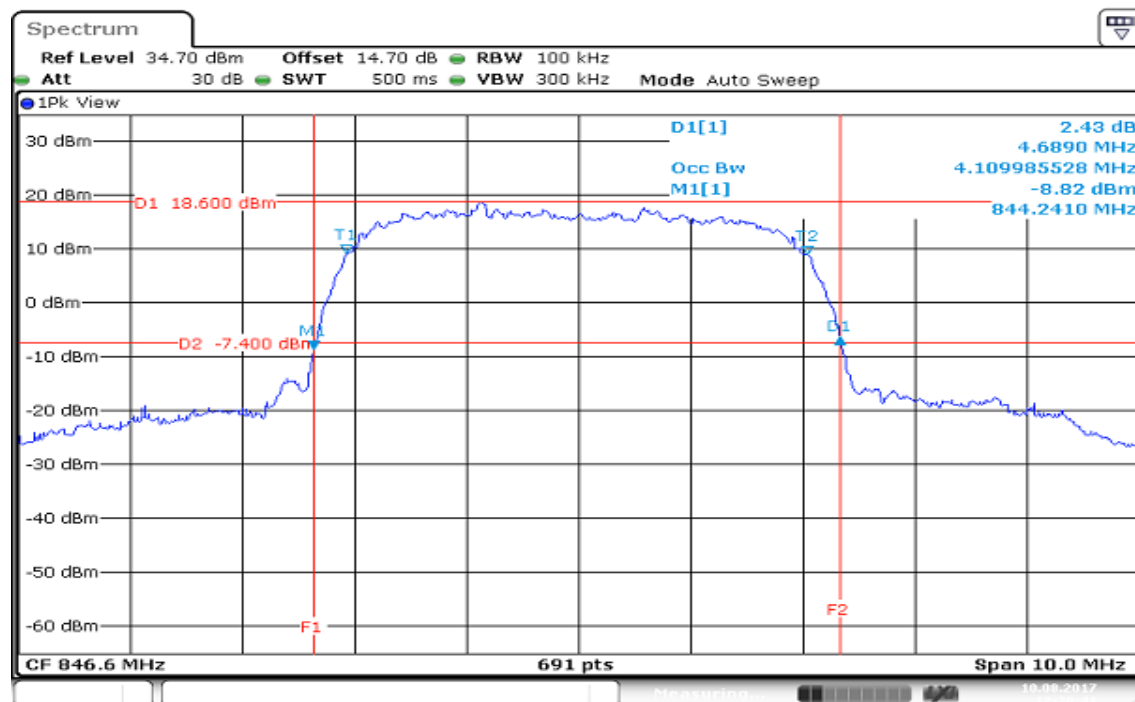
Date: 10 AUG 2017 13:15:30

Mid CH



Date: 10 AUG 2017 13:17:53

High CH



Date: 10 AUG 2017 13:20:42

7.4 CONDUCTED BANDEDG MEASUREMENT

Limit

FCC §22.917(a), Band 5

For operations in the 824-849 MHz band, 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.

FCC §24.238(a), Band 2

For operations in the 1850-1910 and 1930-1950 MHz band, 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.

TEST PROCEDURE

According to KDB 971168 D01, section 6.0

1. The EUT was connected to spectrum analyzer and call box.
2. The RF output of EUT was connected to the spectrum analyzer.
3. Start and stop frequency were set such that the band edge would be placed in the center of the plot
4. Span was set large enough so as to capture all out of band emissions near the band edge
5. Set the spectrum analyzer, RBW=100kHz, VBW=300kHz.
6. Record the Band edge emission.

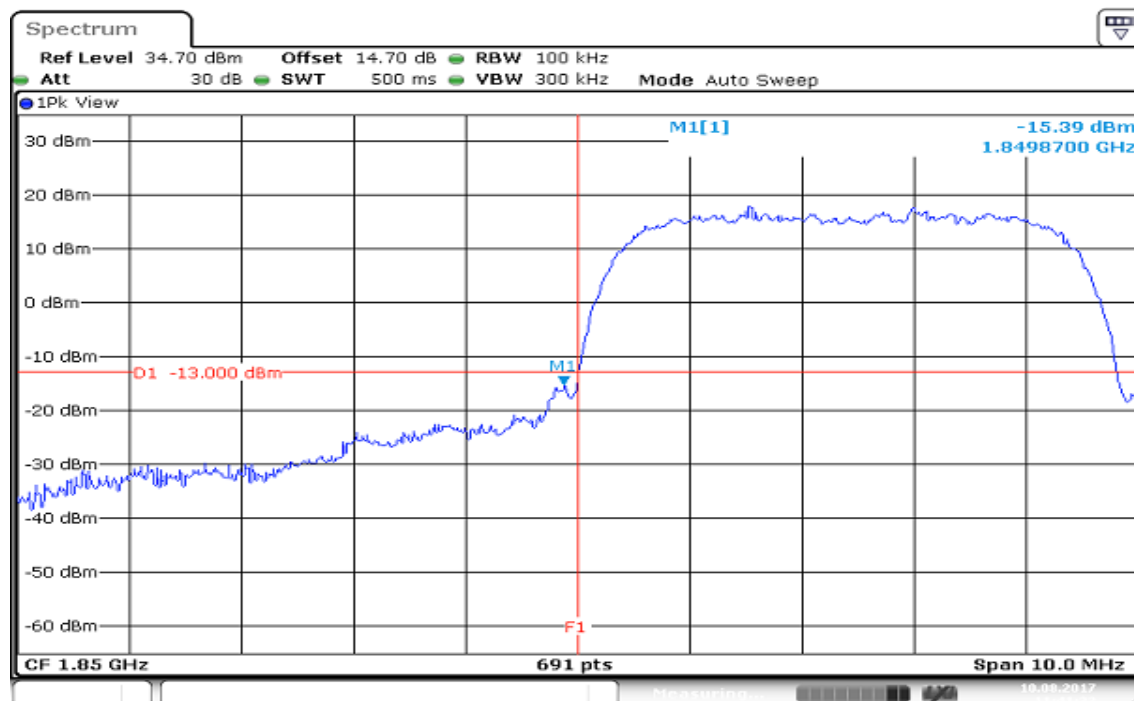
TEST RESULTS

No non-compliance noted.

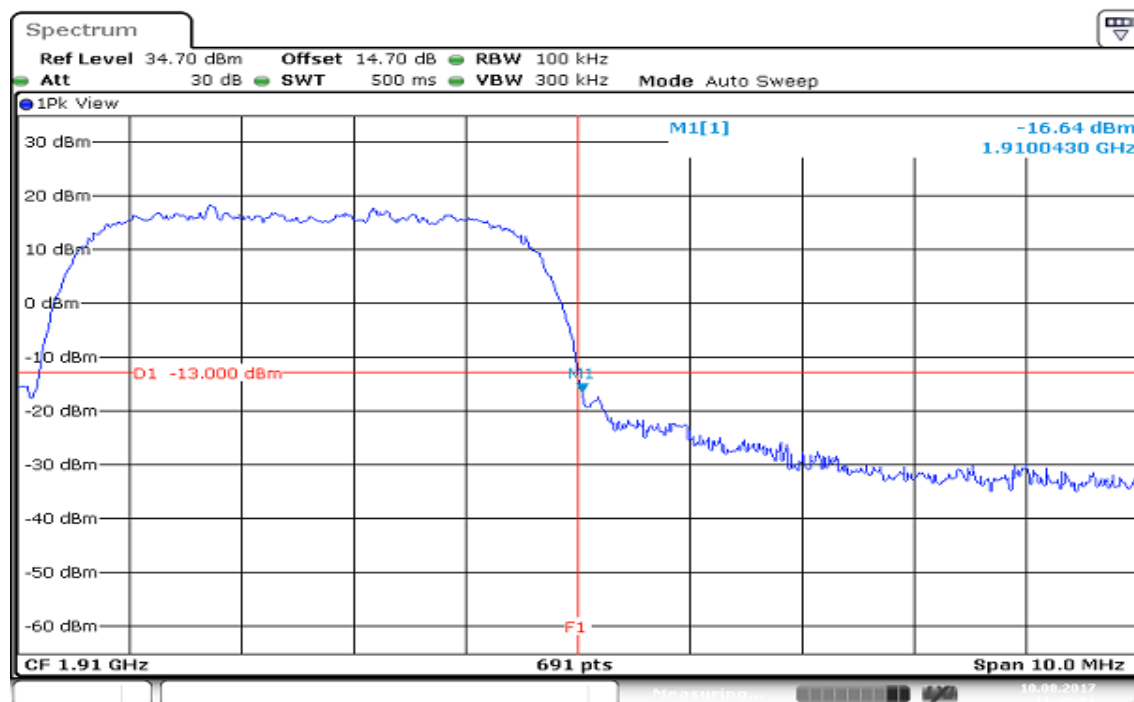
Test Data

WCDMA 12.2k RMC (Band II)

Low CH

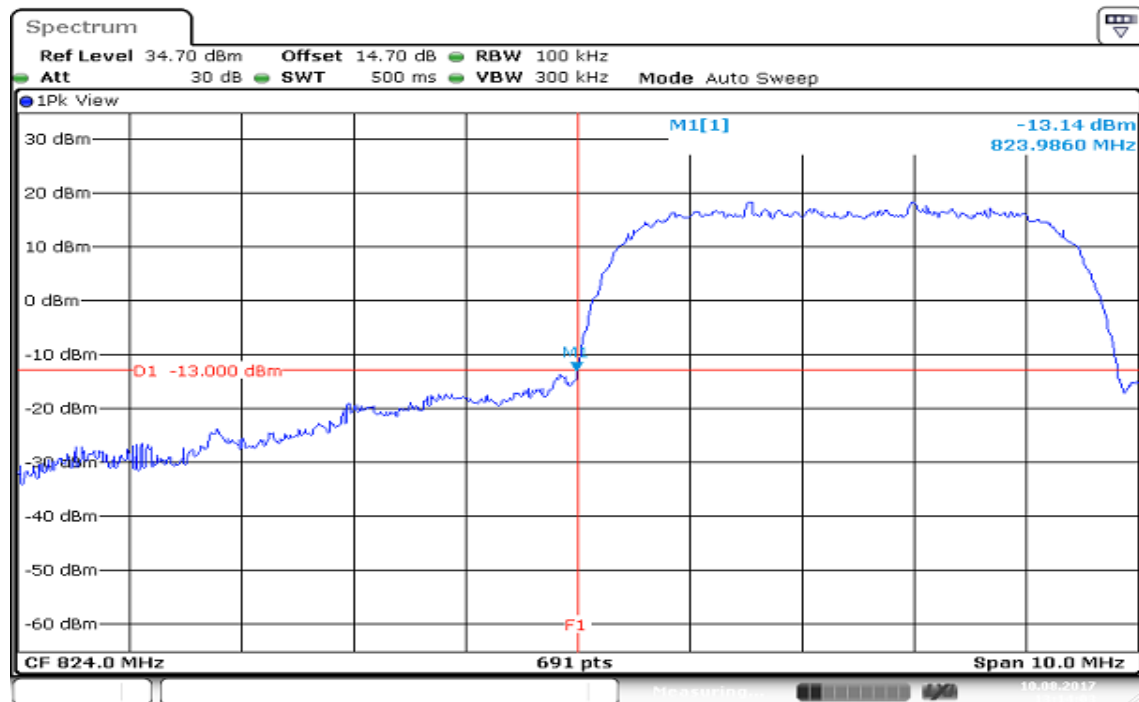


High CH

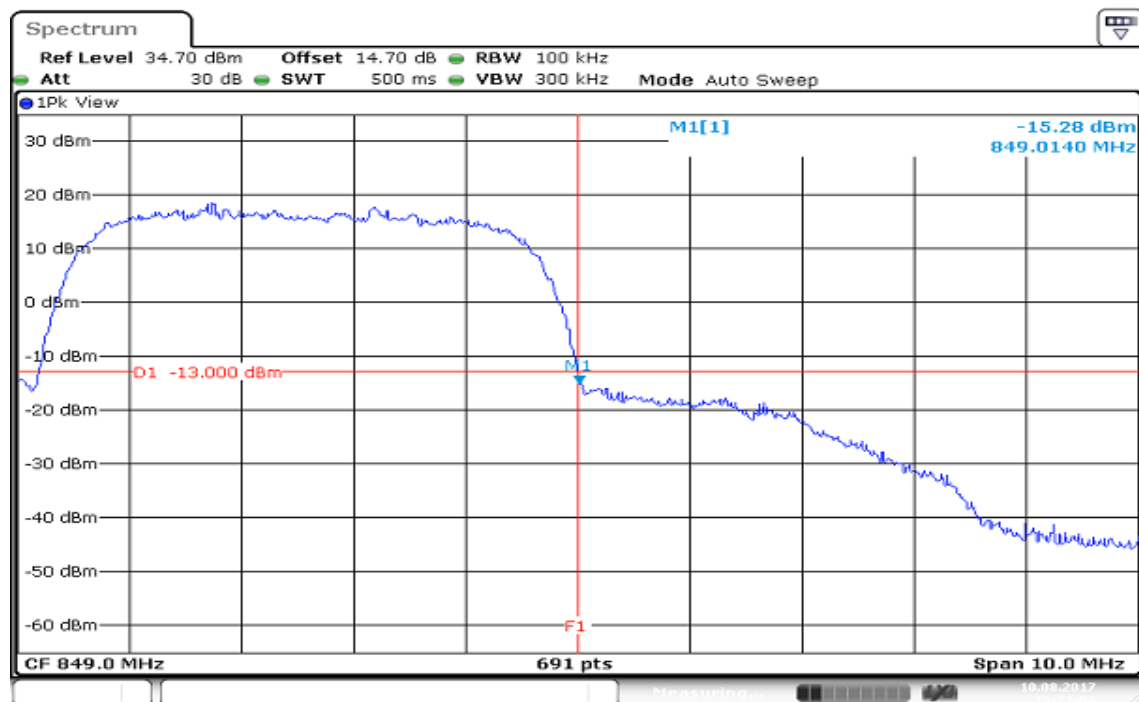


WCDMA 12.2k RMC (Band V)

Low CH



High CH



7.5 PEAK TO AVERAGE RATIO

Limit

FCC §22.913(d), Band 5

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

FCC §24.232(d), Band 2

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

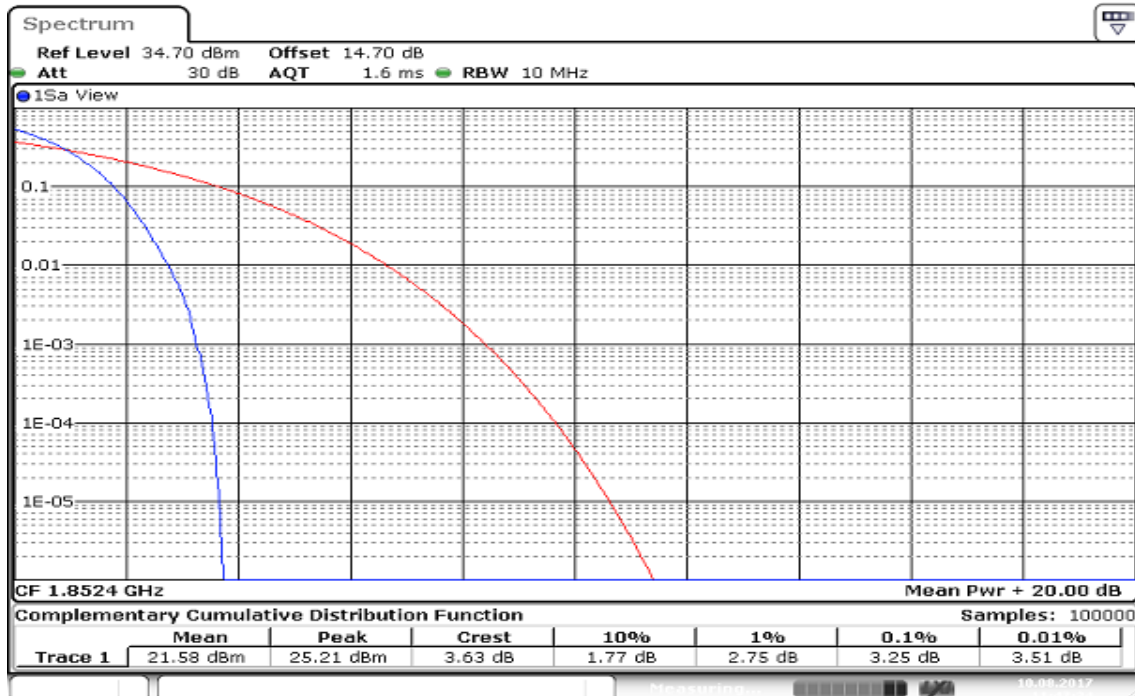
Test Procedures

1. Set resolution/measurement bandwidth $\geq$ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1%.

Test Data

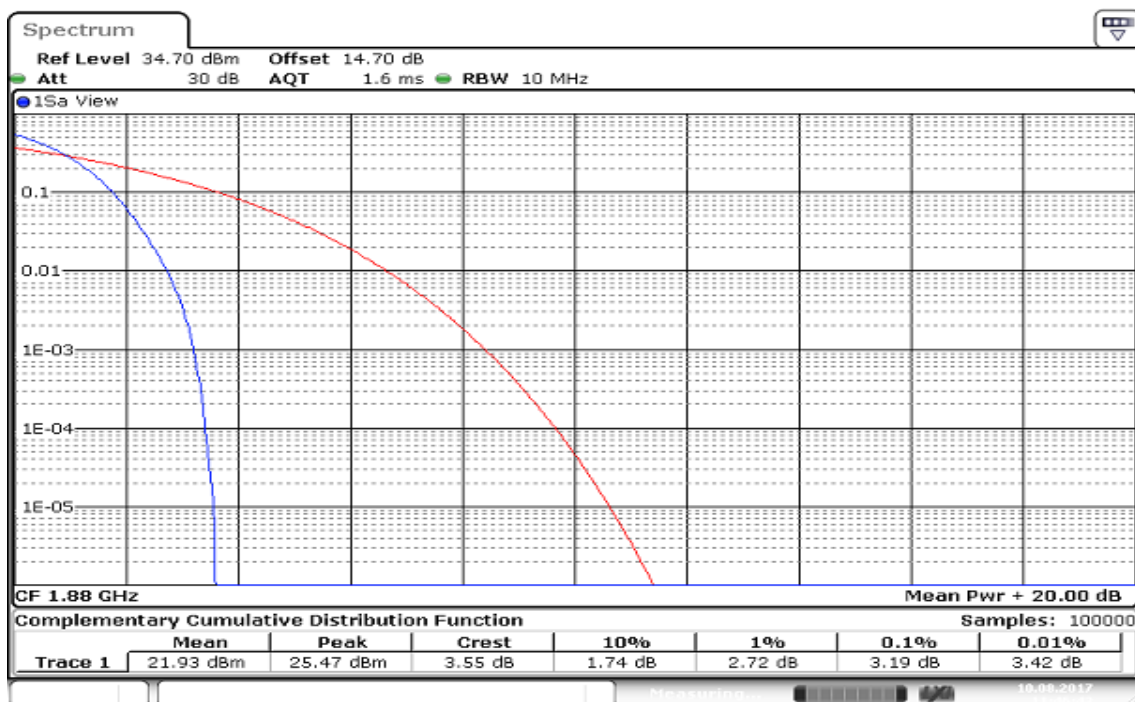
WCDMA 12.2k RMC (Band II)

Low CH



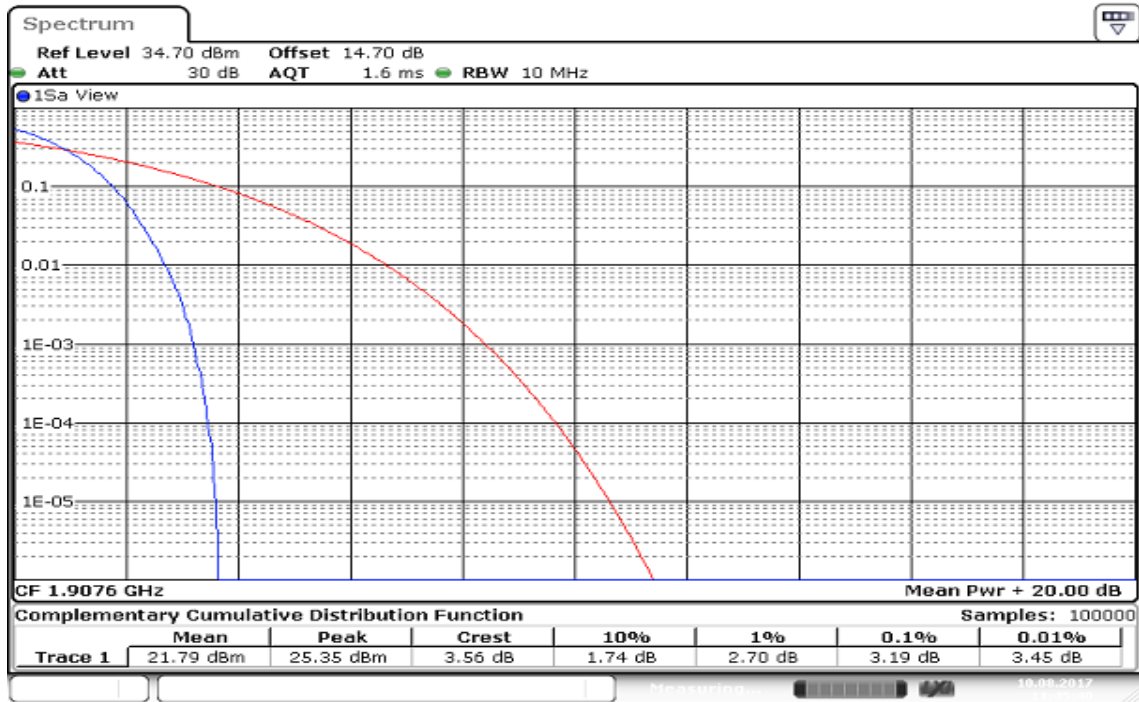
Date: 10 AUG 2017 11:47:24

Mid CH



Date: 10 AUG 2017 11:46:43

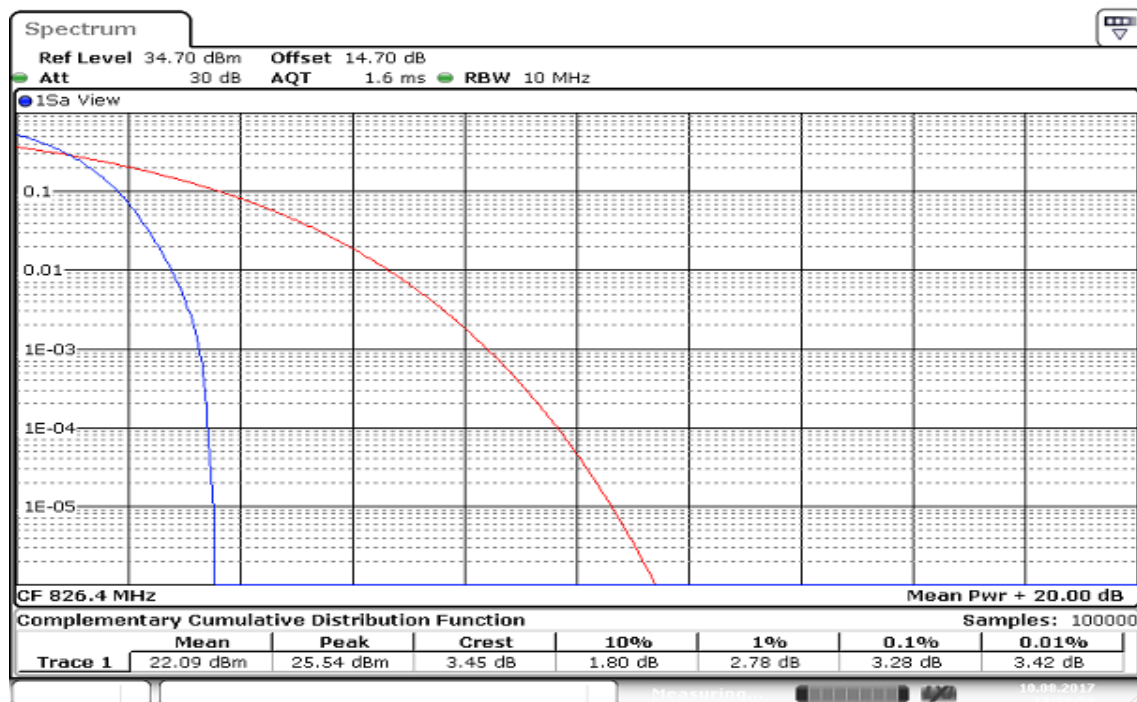
High CH



Date: 10 AUG 2017 11:45:40

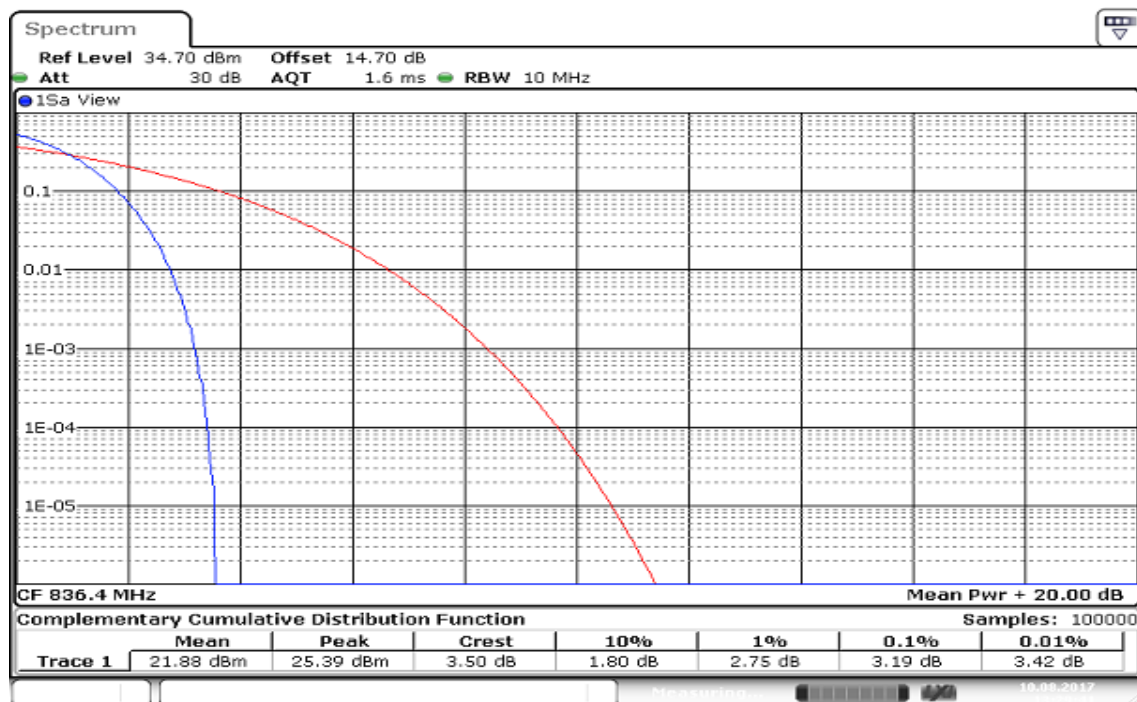
WCDMA 12.2k RMC (Band V)

Low CH



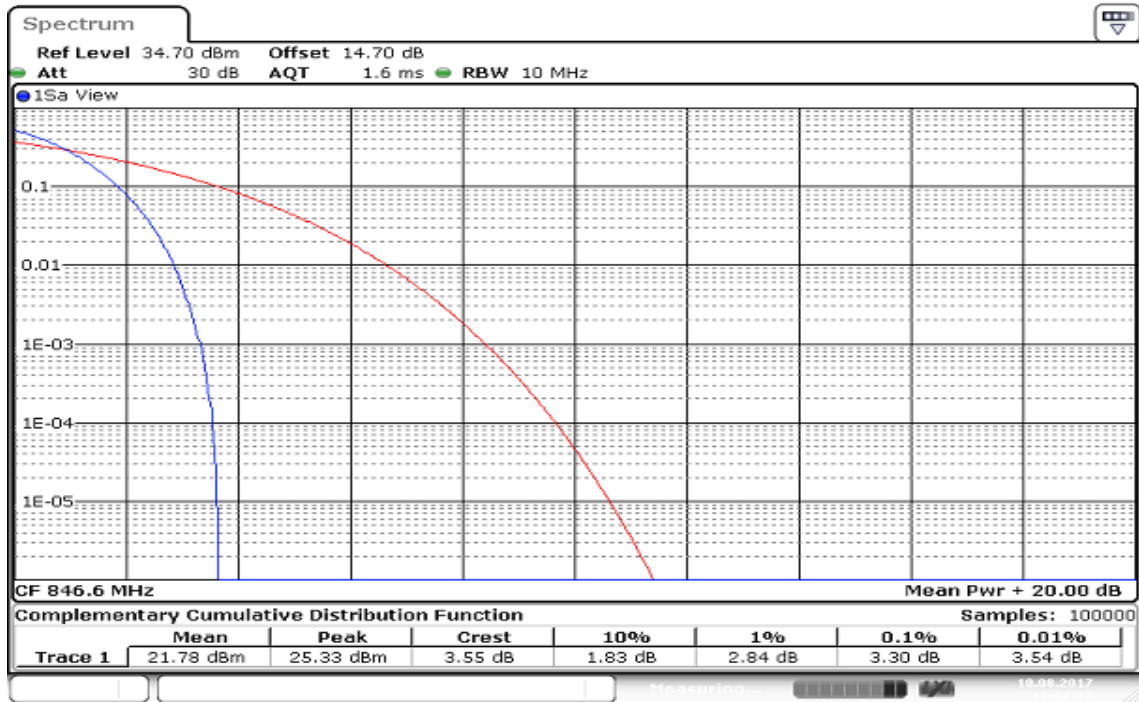
Date: 10.AUG.2017 13:28:59

Mid CH



Date: 10.AUG.2017 13:29:41

High CH



Date: 10 AUG 2017 13:30:26

7.6 CONDUCTED SPURIOUS EMISSIONS

Limit

FCC §22.917(a), Band 5

For operations in the 824-849 MHz band, 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.

FCC §24.238(a), Band 2

For operations in the 1850-1910 and 1930-1950 MHz band, 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.

Test Procedures

According to KDB 971168 D01, section 6.0

1. The EUT was connected to spectrum analyzer and call box.
2. The RF output of EUT was connected to the spectrum analyzer.
3. Set the spectrum analyzer, RBW=1MHz, VBW=3MHz.
4. Record the maximum spurious emission.
5. The fundamental frequency should be excluded against the limit in operating band.

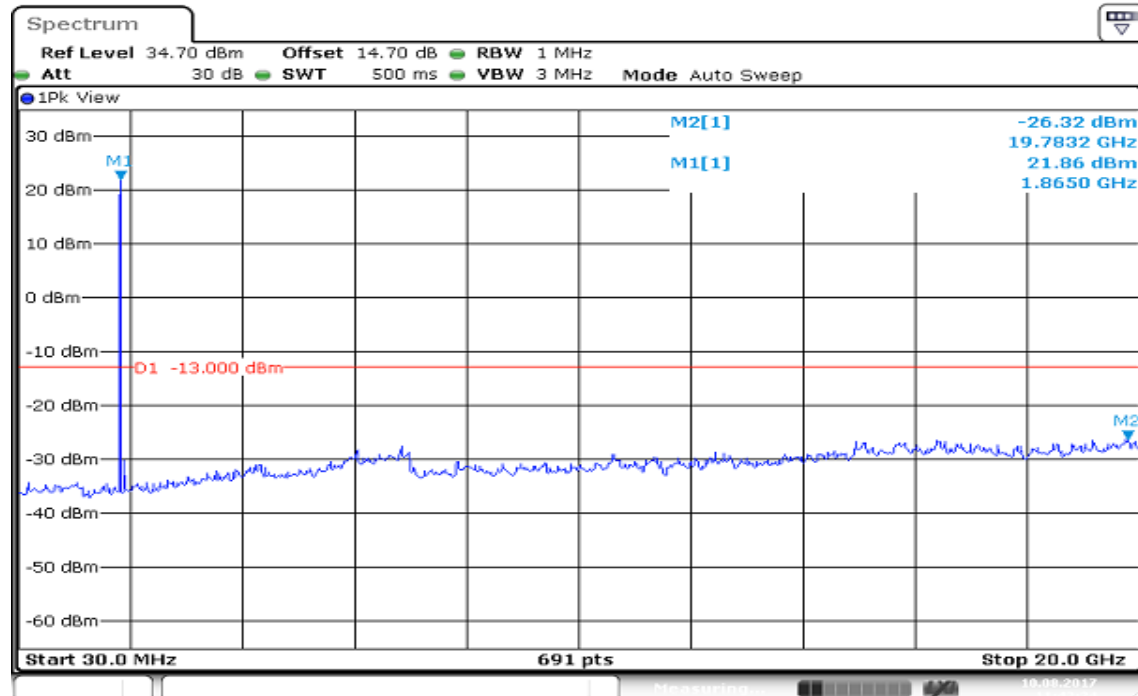
TEST RESULTS

No non-compliance noted

Test Data

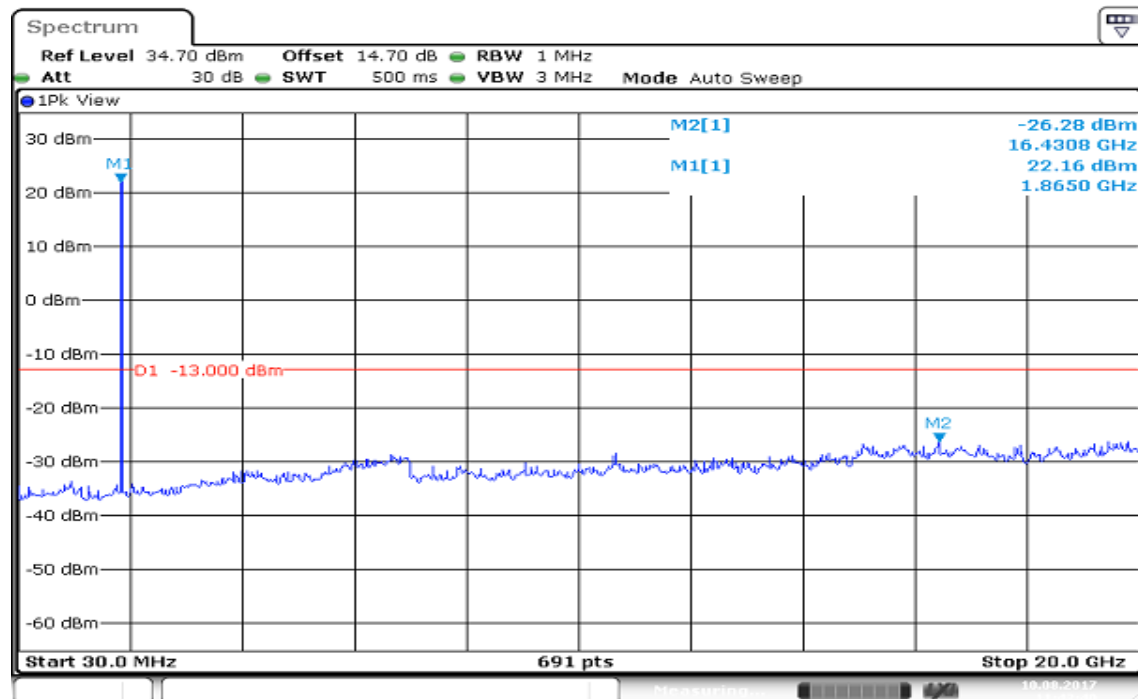
WCDMA 12.2k RMC (Band II)

Low CH



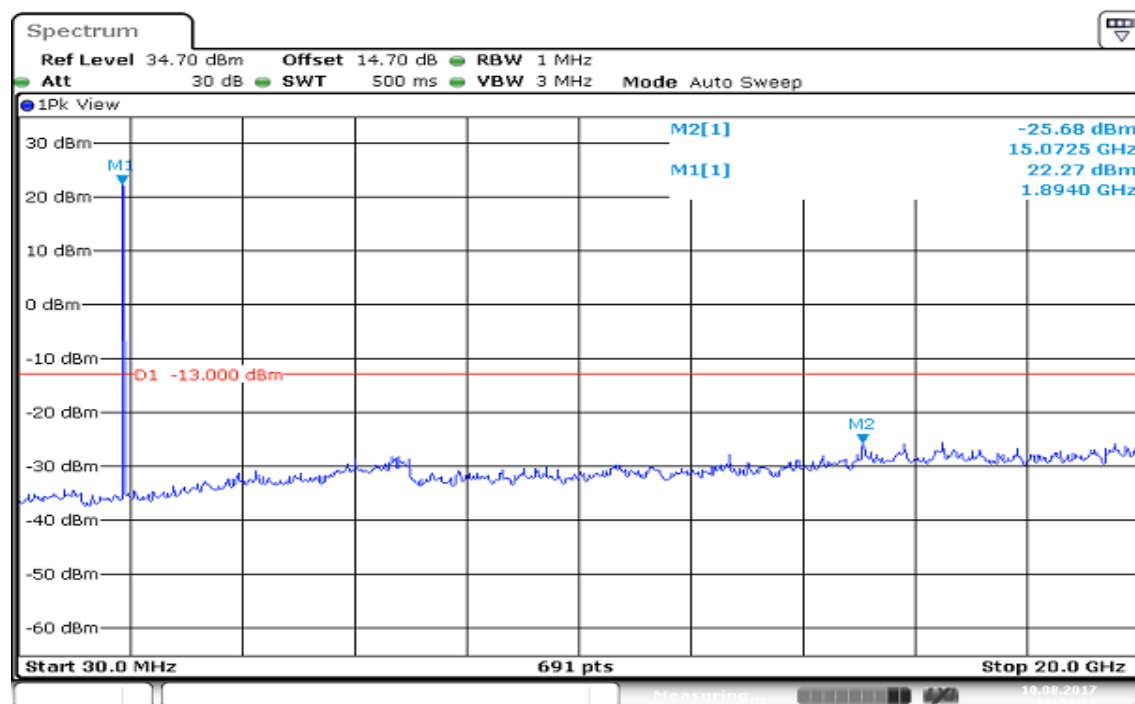
Date: 10 AUG 2017 11:42:24

Mid CH



Date: 10 AUG 2017 11:43:40

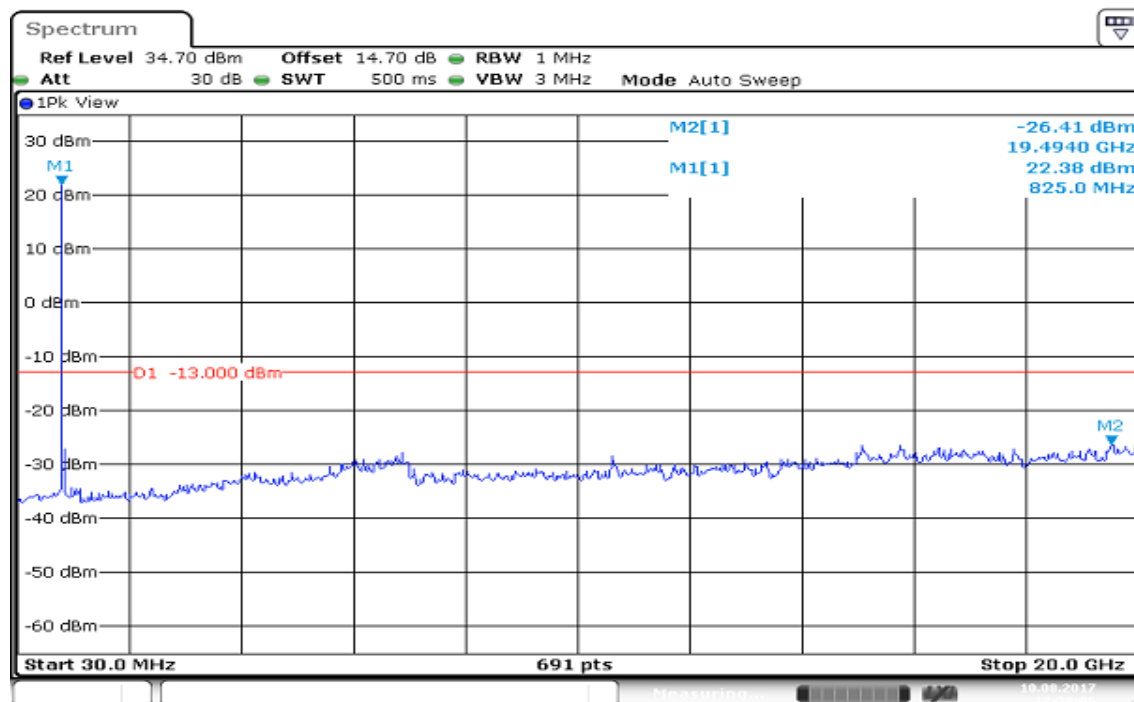
High CH



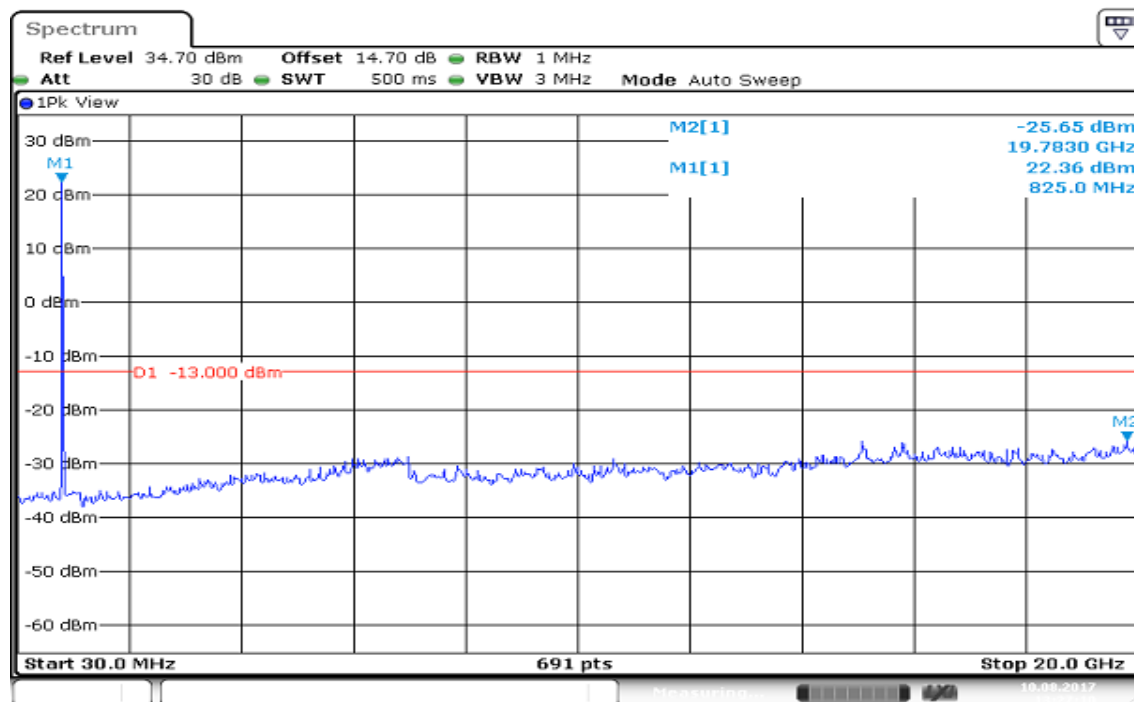
Date: 10 AUG 2017 11:44:27

WCDMA 12.2k RMC (Band V)

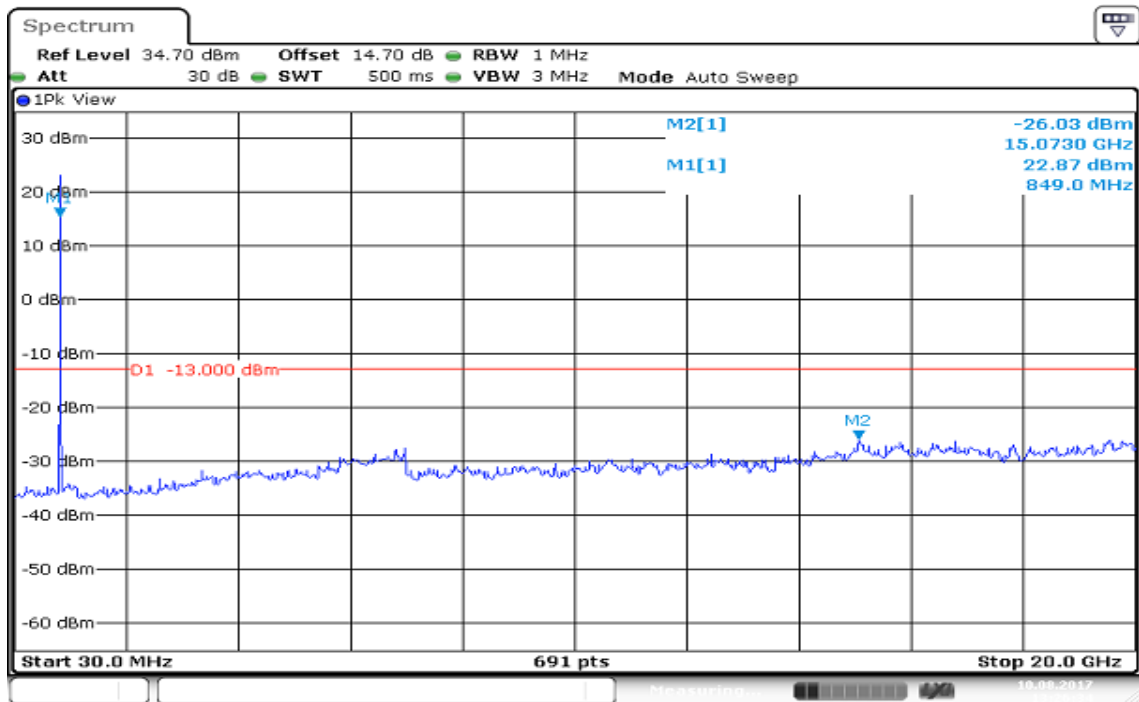
Low CH



Mid CH



High CH



Date: 10 AUG 2017 13:26:25

7.7 SPURIOUS RADIATION MEASUREMENT

Limit

FCC §22.917(a), Band 5

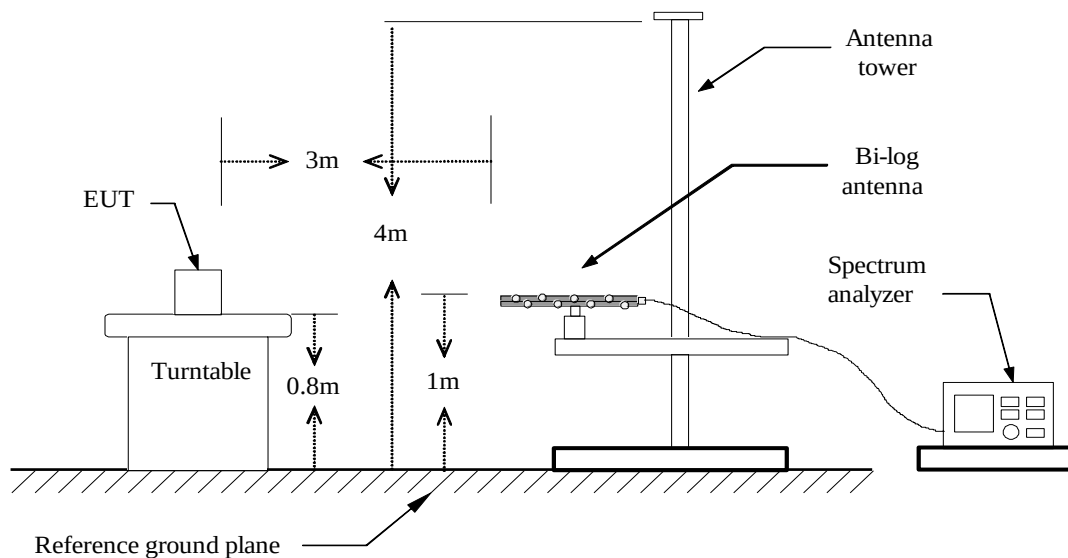
For operations in the 824-849 MHz band, out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

FCC §24.238(a), Band 2

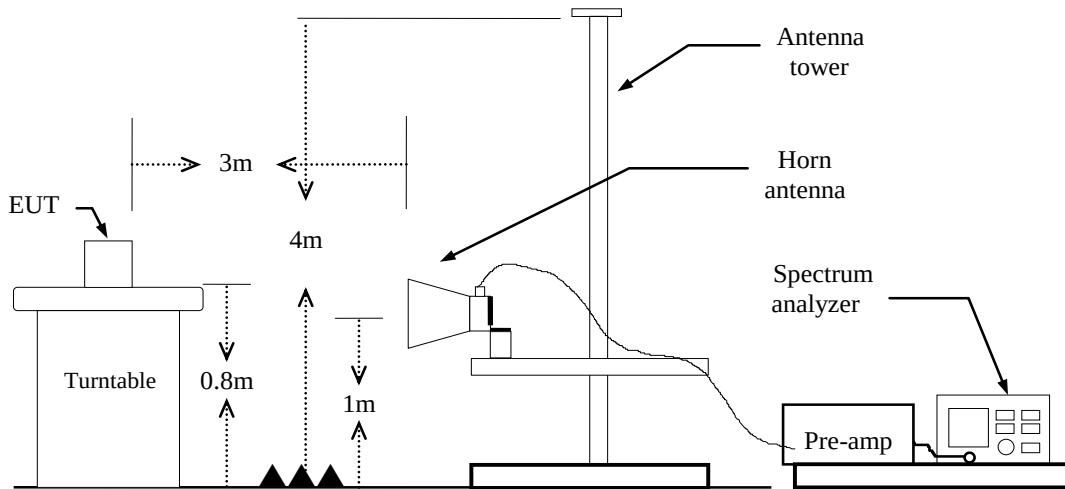
For operations in the 1850-1910 and 1930-1950 MHz band, out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

Test Configuration

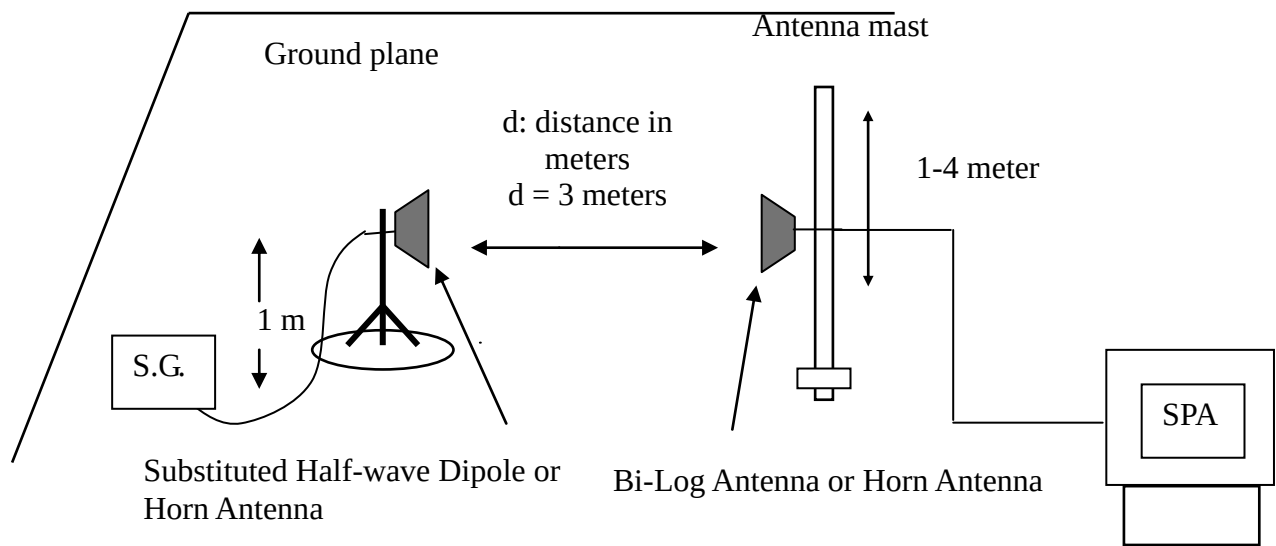
Below 1 GHz



Above 1 GHz



Substituted Method Test Set-up



TEST PROCEDURE

1. According to KDB 971168 D01. section 5.8 and TIA-603-D:2010 section 2.2.12.
2. The EUT was placed on a turntable
 - (1) Below 1G : 0.8m
 - (2) Above 1G : 0.8m
 - (3) EUT set 3m from the receiving antenna
 - (4) The table was rotated 360 degrees of the highest spurious emission to determine the position.
3. Set the spectrum analyzer , RBW=1MHz, VBW=3MHz.
4. A horn antenna was driven by a signal generator.
5. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission

ERP = S.G. output (dBm) + Antenna Gain (dBd) – Cable (dB)

EIRP = S.G. output (dBm) + Antenna Gain (dBi) – Cable (dB)

TEST RESULTS

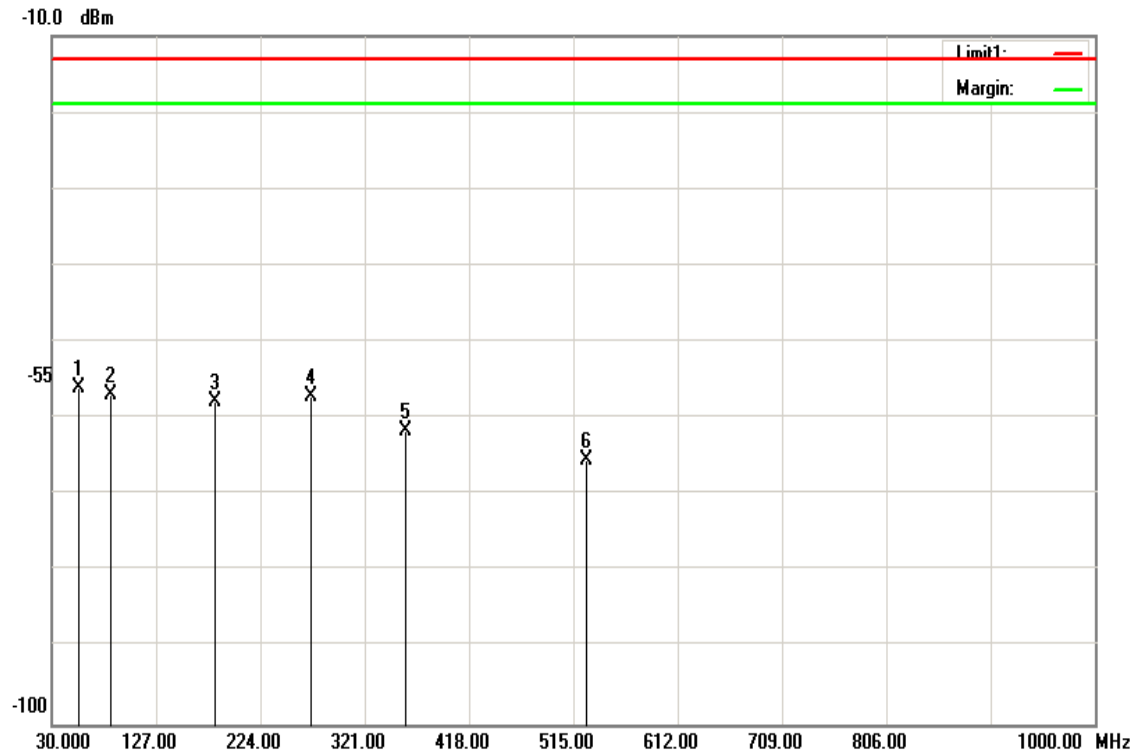
Refer to the attached tabular data sheets.

Radiated Spurious Emission Measurement Result / Below 1GHz

Operation Mode: WCDMA 12.2k RMC
Band II / TX /Mid CH **Test Date:** August 14, 2017

Temperature: 21°C **Tested by:** Kevin Kuo

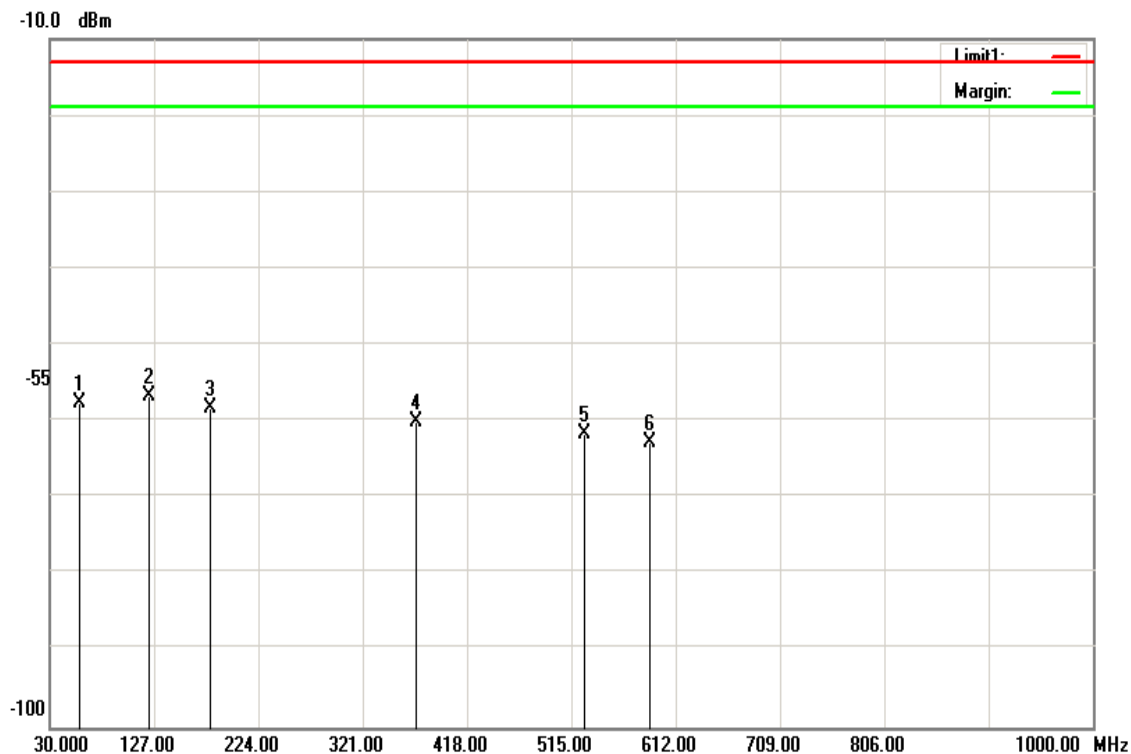
Humidity: 52 % RH **Polarity:** Ver.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
55.2200	-54.33	-1.78	-56.11	-13.00	-43.11	V
84.3200	-57.34	0.41	-56.93	-13.00	-43.93	V
181.3200	-61.82	4.1	-57.72	-13.00	-44.72	V
270.5600	-64.26	7.19	-57.07	-13.00	-44.07	V
358.8300	-68.83	7.14	-61.69	-13.00	-48.69	V
527.6100	-72.35	6.83	-65.52	-13.00	-52.52	V

Operation Mode: WCDMA 12.2k RMC
Band II / TX /Mid CH
Temperature: 21°C
Humidity: 52 % RH

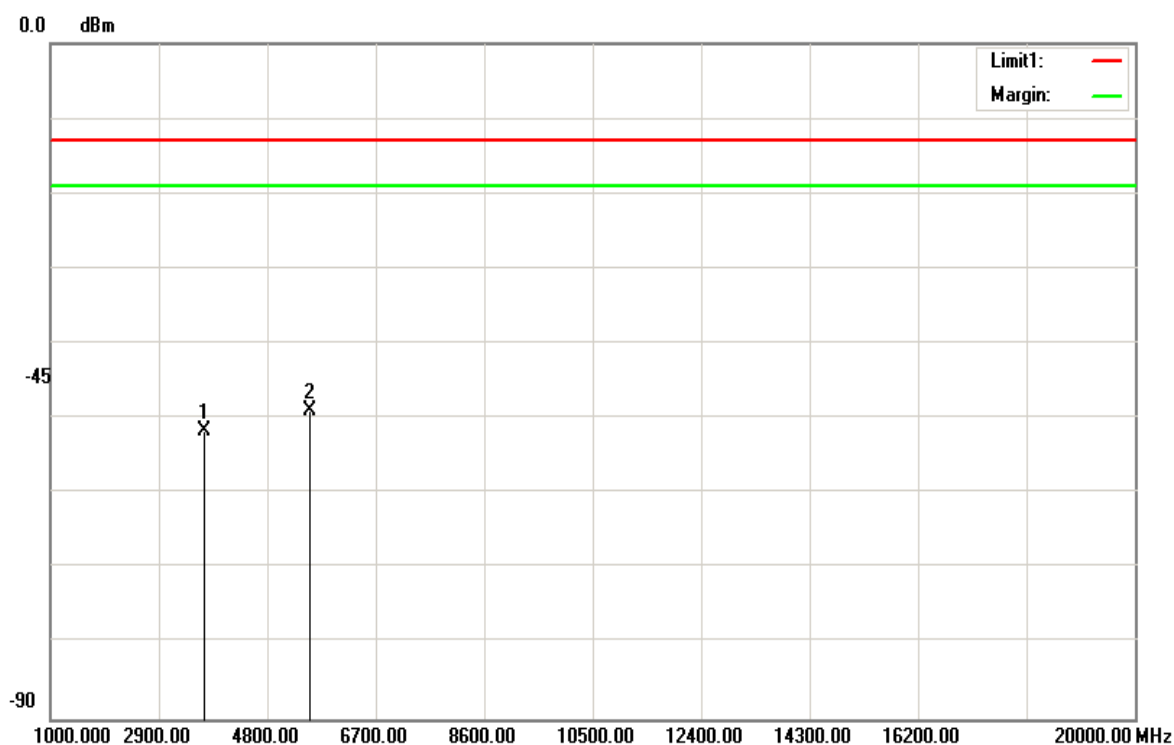
Test Date: August 14, 2017
Tested by: Kevin Kuo
Polarity: Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
58.1300	-56.03	-1.49	-57.52	-13.00	-44.52	H
122.1500	-57.67	0.93	-56.74	-13.00	-43.74	H
179.3800	-62.31	3.95	-58.36	-13.00	-45.36	H
370.4700	-67.32	7.18	-60.14	-13.00	-47.14	H
527.6100	-68.45	6.83	-61.62	-13.00	-48.62	H
587.7500	-63.29	0.49	-62.80	-13.00	-49.80	H

Above 1GHz

Operation Mode: WCDMA 12.2k RMC
 Band II / TX / Low CH
 Test Date: August 14, 2017
Temperature: 21°C
 Tested by: Kevin Kuo
Humidity: 52 % RH
 Polarity: Ver.

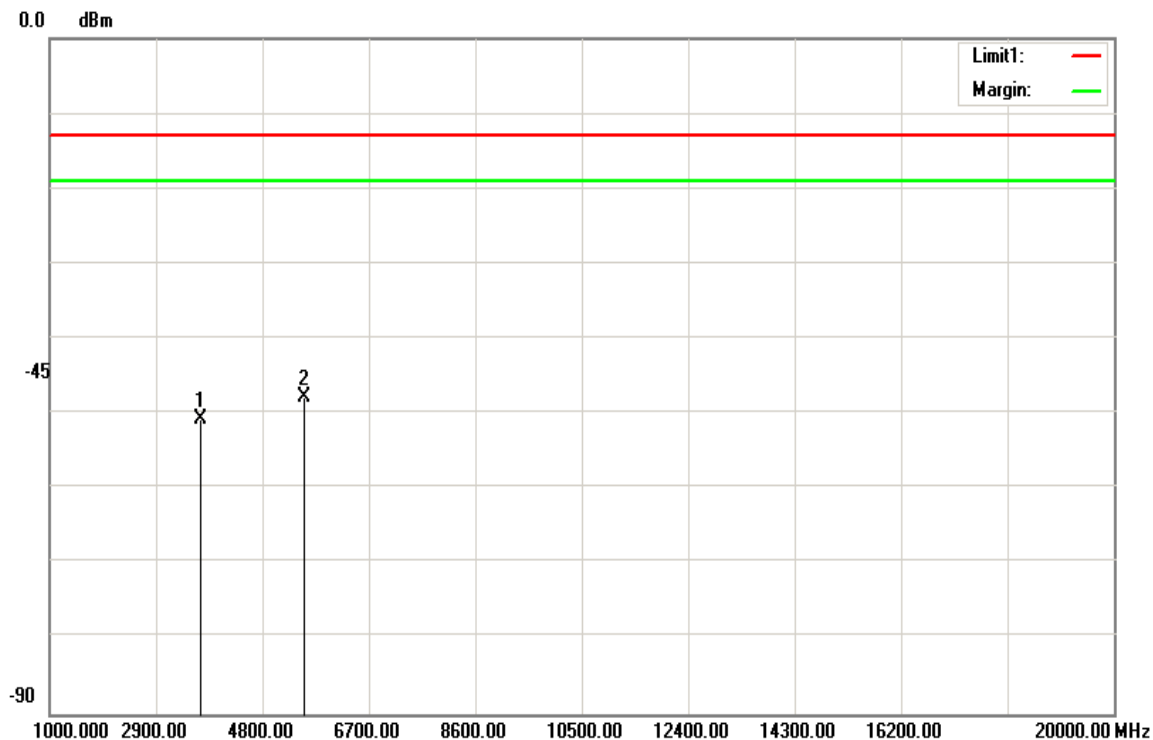


Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
3704.000	-64.16	12.54	-51.62	-13.00	-38.62	V
5557.000	-61.86	12.88	-48.98	-13.00	-35.98	V
N/A						

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

Operation Mode: WCDMA 12.2k RMC
 Band II / TX / Low CH **Test Date:** August 14, 2017
Temperature: 21°C **Tested by:** Kevin Kuo
Humidity: 52 % RH **Polarity:** Hor.

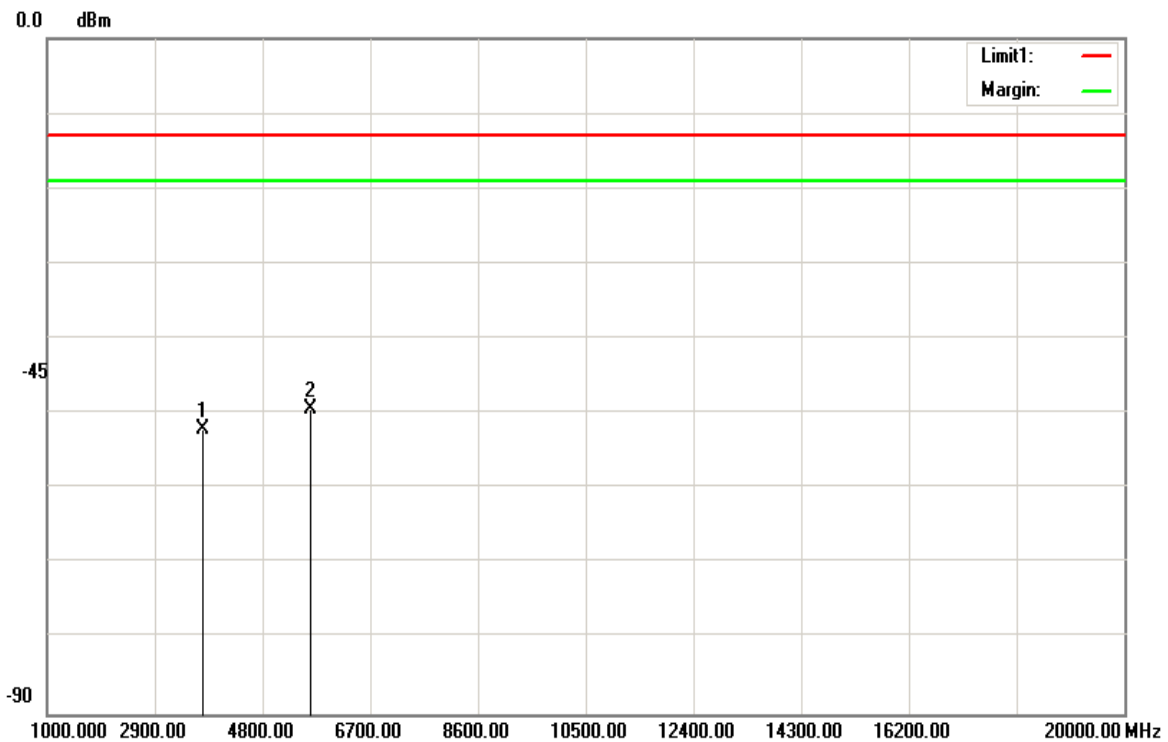


Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
3704.000	-63.3	12.54	-50.76	-13.00	-37.76	H
5557.000	-60.79	12.88	-47.91	-13.00	-34.91	H
N/A						

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

Operation Mode: WCDMA 12.2k RMC
 Band II / TX / Mid CH **Test Date:** August 14, 2017
Temperature: 21°C **Tested by:** Kevin Kuo
Humidity: 52 % RH **Polarity:** Ver.

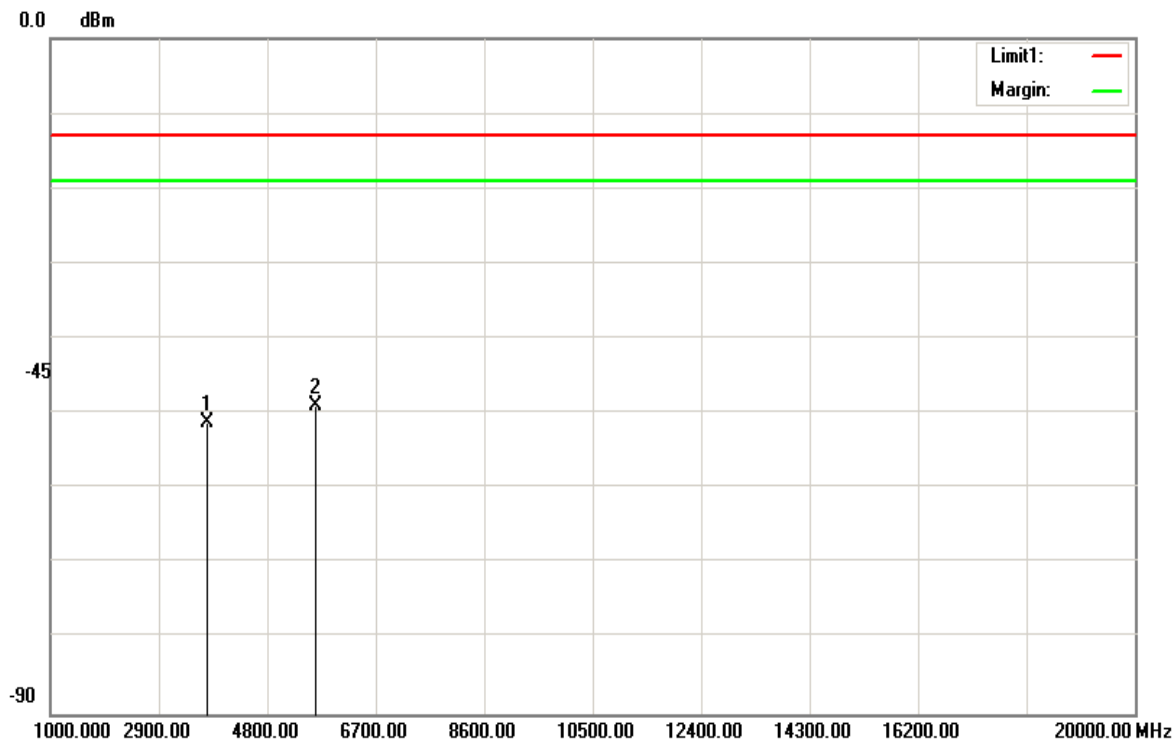


Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
3760.000	-64.61	12.55	-52.06	-13.00	-39.06	V
5640.000	-62.25	12.84	-49.41	-13.00	-36.41	V
N/A						

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

Operation Mode: WCDMA 12.2k RMC
 Band II / TX / Mid CH **Test Date:** August 14, 2017
Temperature: 21°C **Tested by:** Kevin Kuo
Humidity: 52 % RH **Polarity:** Hor.

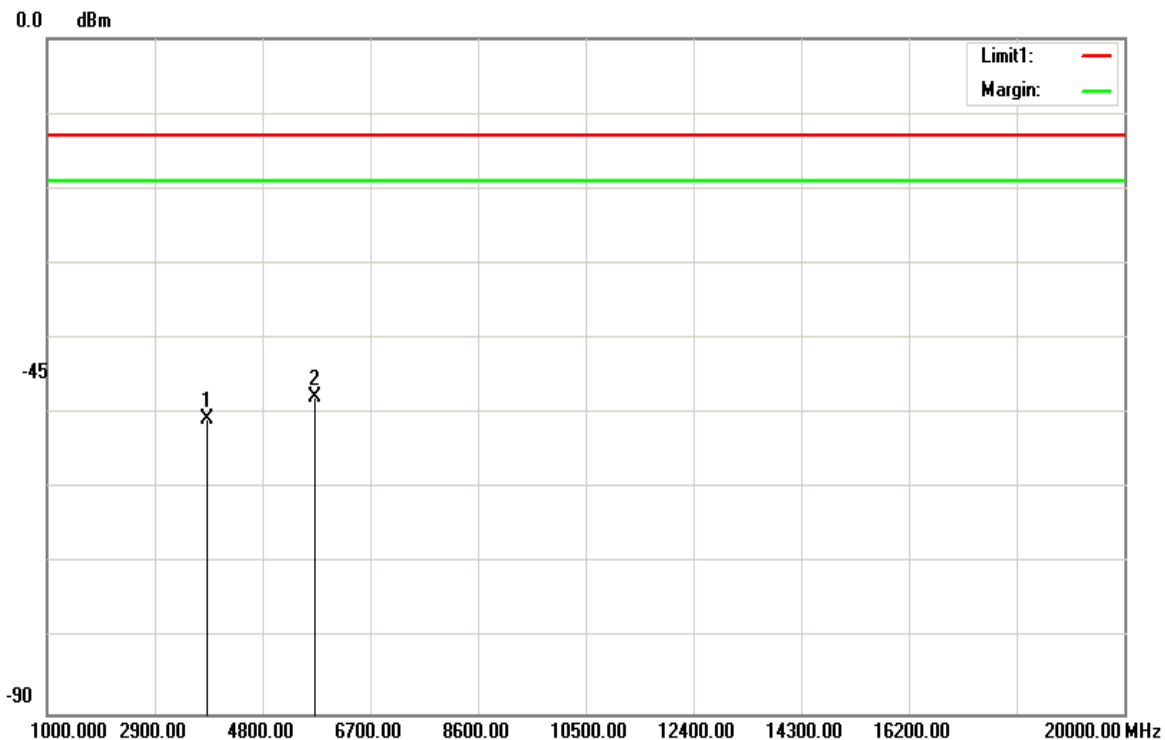


Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
3760.000	-63.73	12.55	-51.18	-13.00	-38.18	H
5640.000	-61.82	12.84	-48.98	-13.00	-35.98	H
N/A						

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

Operation Mode: WCDMA 12.2k RMC
 Band II / TX / High CH **Test Date:** August 14, 2017
Temperature: 21°C **Tested by:** Kevin Kuo
Humidity: 52 % RH **Polarity:** Ver.

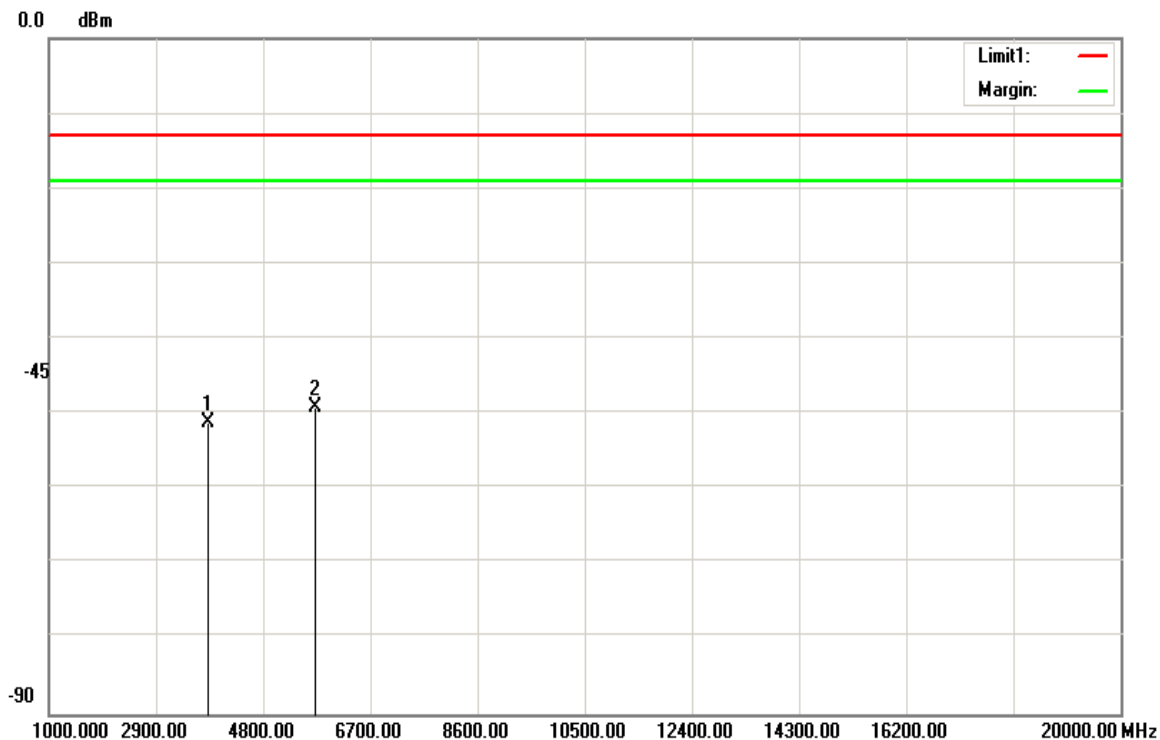


Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
3814.000	-63.27	12.56	-50.71	-13.00	-37.71	V
5721.000	-60.55	12.81	-47.74	-13.00	-34.74	V
N/A						

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

Operation Mode: WCDMA 12.2k RMC
 Band II / TX / High CH **Test Date:** August 14, 2017
Temperature: 21°C **Tested by:** Kevin Kuo
Humidity: 52 % RH **Polarity:** Hor.



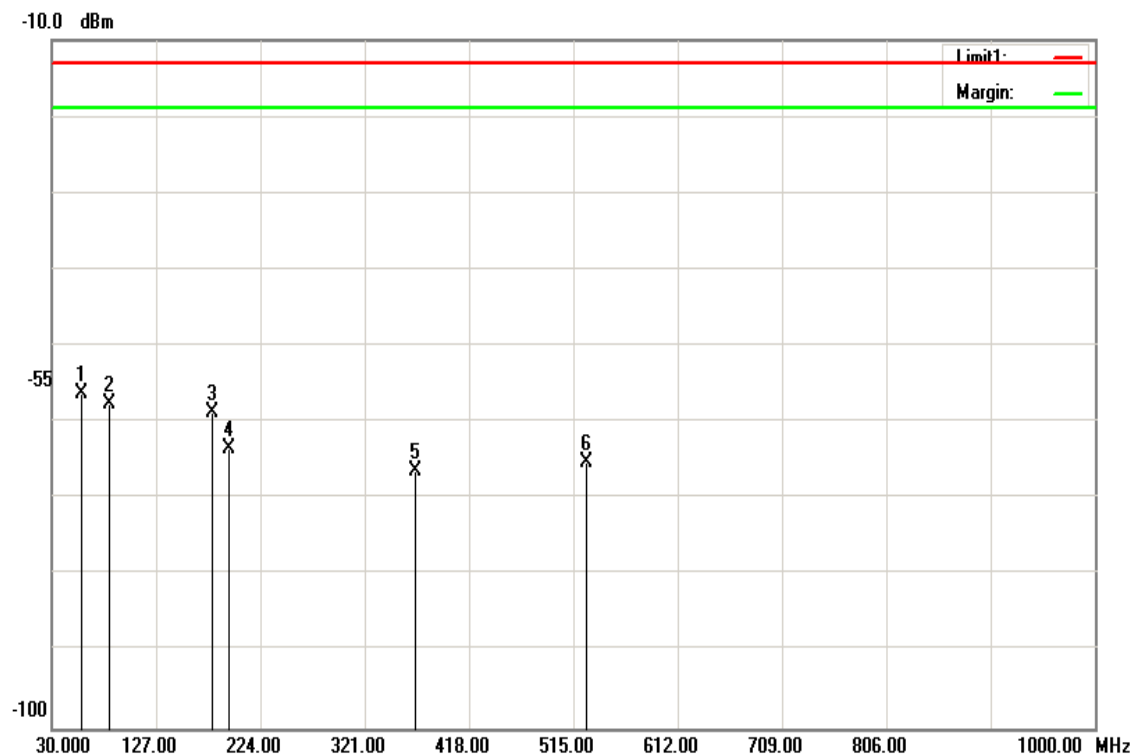
Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
3814.000	-63.69	12.56	-51.13	-13.00	-38.13	H
5721.000	-61.95	12.81	-49.14	-13.00	-36.14	H
N/A						

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

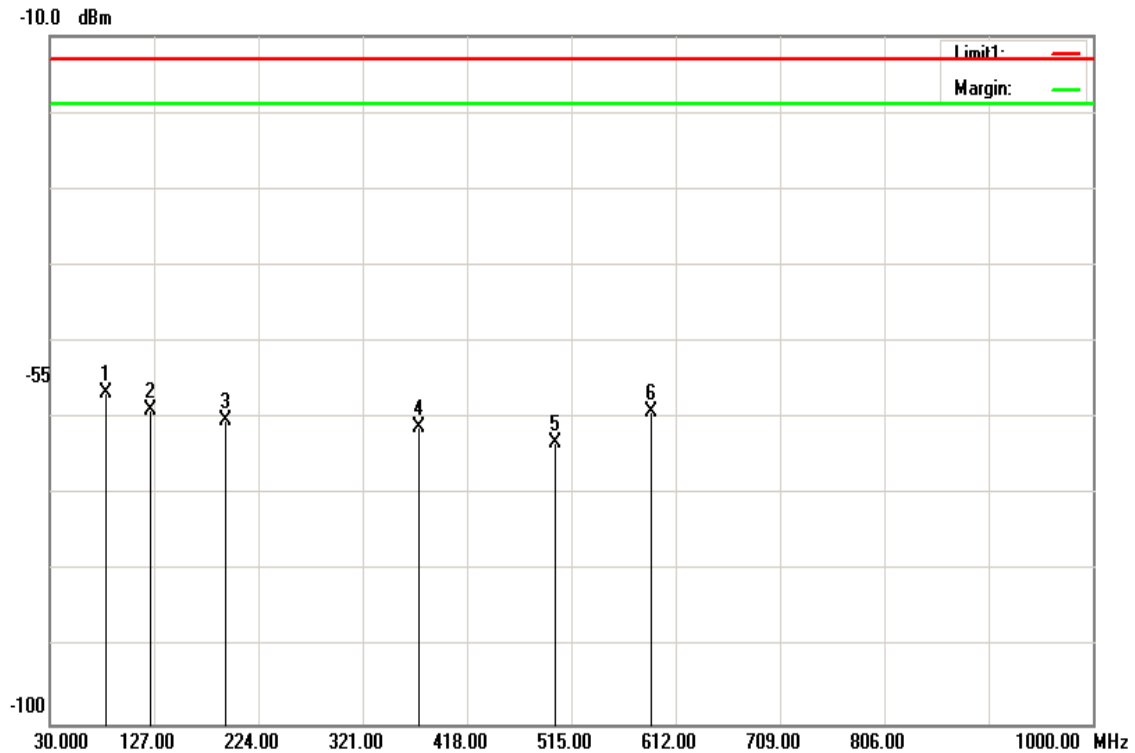
Radiated Spurious Emission Measurement Result / Below 1GHz

Operation Mode: WCDMA 12.2k RMC
 Band V / TX /Mid CH
Test Date: August 14, 2017
Temperature: 21°C
Tested by: Kevin Kuo
Humidity: 52 % RH
Polarity: Ver.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
57.1600	-54.57	-1.58	-56.15	-13.00	-43.15	V
83.3500	-57.92	0.43	-57.49	-13.00	-44.49	V
179.3800	-62.74	3.95	-58.79	-13.00	-45.79	V
194.9000	-67.57	4.1	-63.47	-13.00	-50.47	V
367.5600	-73.57	7.17	-66.40	-13.00	-53.40	V
527.6100	-71.97	6.83	-65.14	-13.00	-52.14	V

Operation Mode: WCDMA 12.2k RMC
 Band V / TX /Mid CH
Test Date: August 14, 2017
Temperature: 21°C
Tested by: Kevin Kuo
Humidity: 52 % RH
Polarity: Hor.



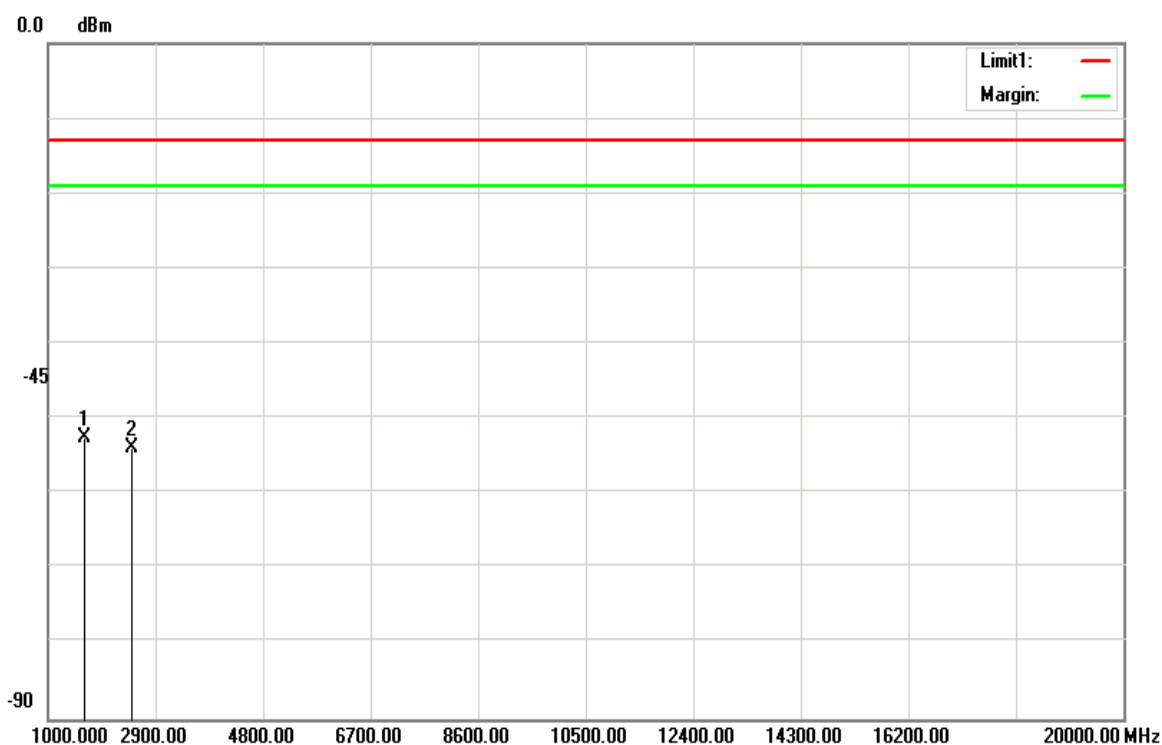
Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
82.3800	-57.19	0.45	-56.74	-13.00	-43.74	H
123.1200	-59.83	0.95	-58.88	-13.00	-45.88	H
193.9300	-64.39	4.1	-60.29	-13.00	-47.29	H
373.3800	-68.27	7.19	-61.08	-13.00	-48.08	H
500.4500	-70.03	6.8	-63.23	-13.00	-50.23	H
589.6900	-59.24	0.16	-59.08	-13.00	-46.08	H

Above 1GHz

Operation Mode: WCDMA 12.2k RMC
 Band V / TX / Low CH
 Test Date: August 14, 2017

Temperature: 21°C
 Tested by: Kevin Kuo

Humidity: 52 % RH
 Polarity: Ver.

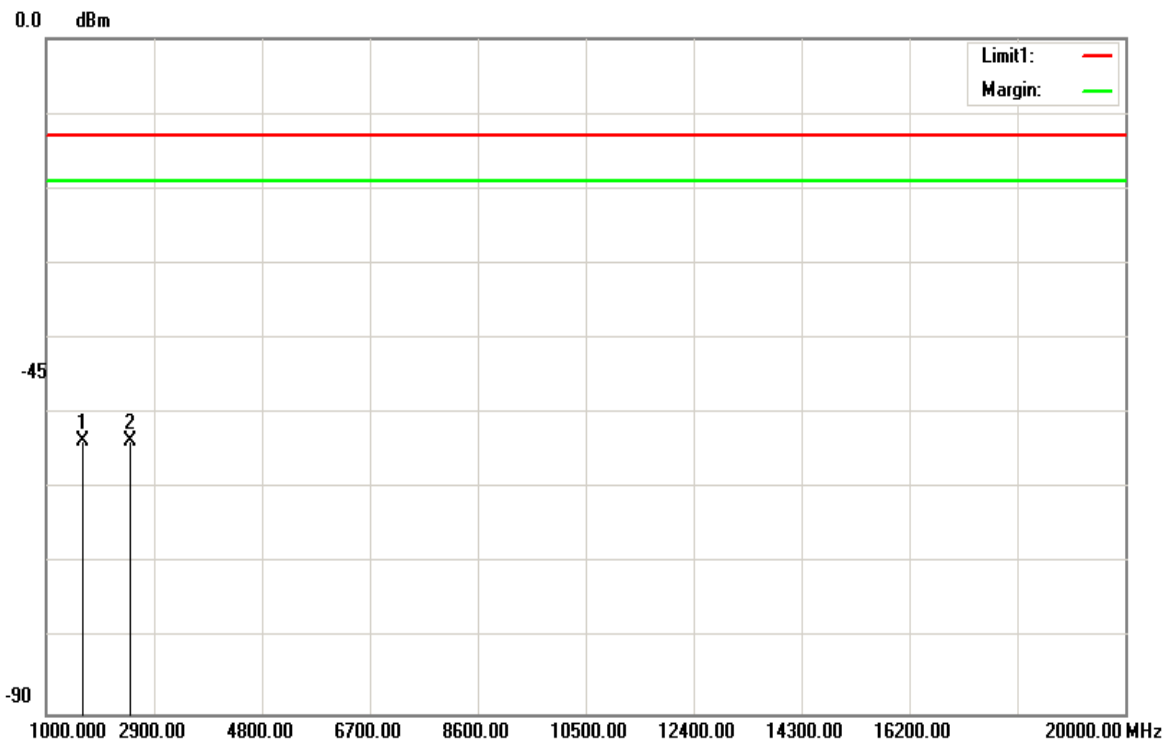


Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1652.000	-54.05	1.52	-52.53	-13.00	-39.53	V
2479.000	-55.64	1.83	-53.81	-13.00	-40.81	V
N/A						

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

Operation Mode: WCDMA 12.2k RMC
 Band V / TX / Low CH **Test Date:** August 14, 2017
Temperature: 21°C **Tested by:** Kevin Kuo
Humidity: 52 % RH **Polarity:** Hor.

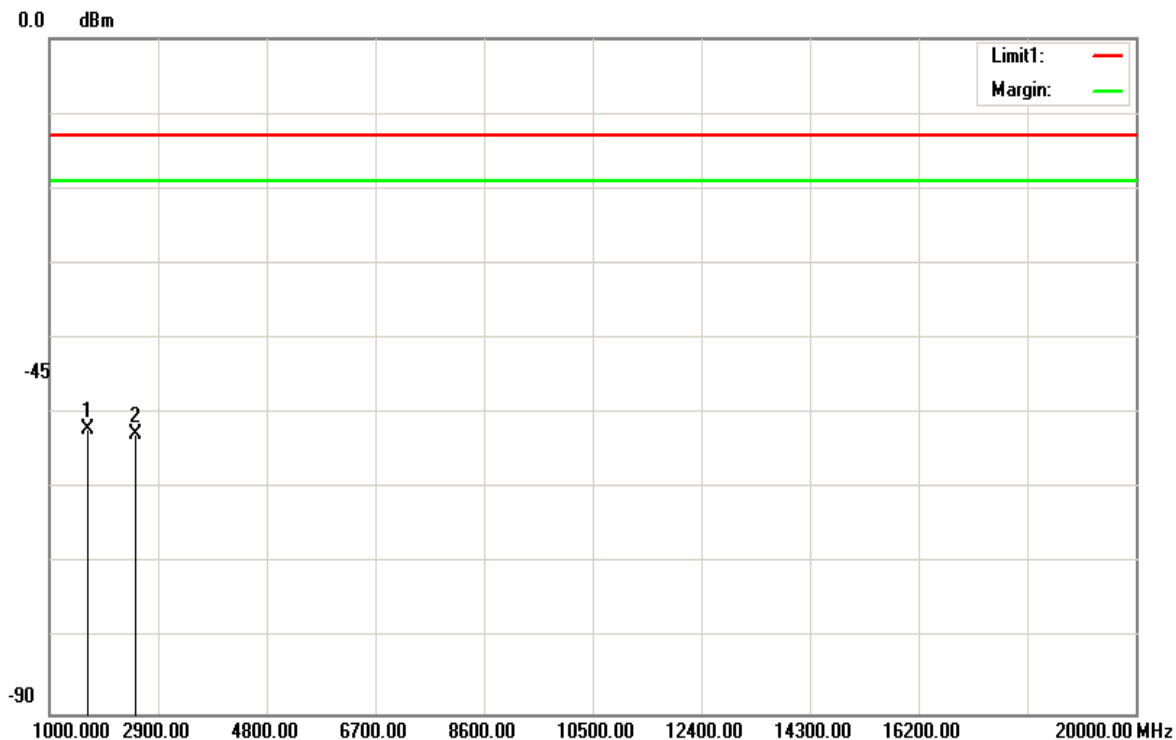


Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1652.000	-55.1	1.52	-53.58	-13.00	-40.58	H
2479.000	-55.59	1.83	-53.76	-13.00	-40.76	H
N/A						

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

Operation Mode: WCDMA 12.2k RMC
 Band V / TX / Mid CH **Test Date:** August 14, 2017
Temperature: 21°C **Tested by:** Kevin Kuo
Humidity: 52 % RH **Polarity:** Ver.

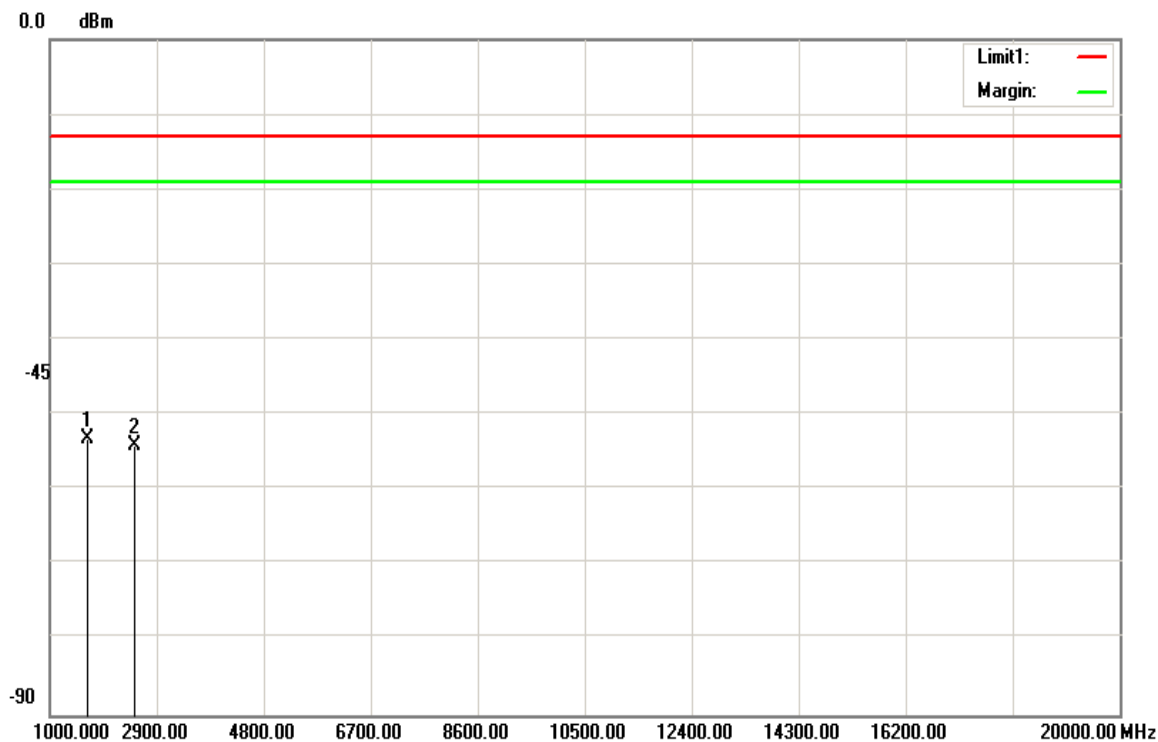


Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1672.000	-53.55	1.52	-52.03	-13.00	-39.03	V
2509.000	-54.89	2.02	-52.87	-13.00	-39.87	V
N/A						

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

Operation Mode: WCDMA 12.2k RMC
 Band V / TX / Mid CH **Test Date:** August 14, 2017
 4182
Temperature: 21°C **Tested by:** Kevin Kuo
Humidity: 52 % RH **Polarity:** Hor.

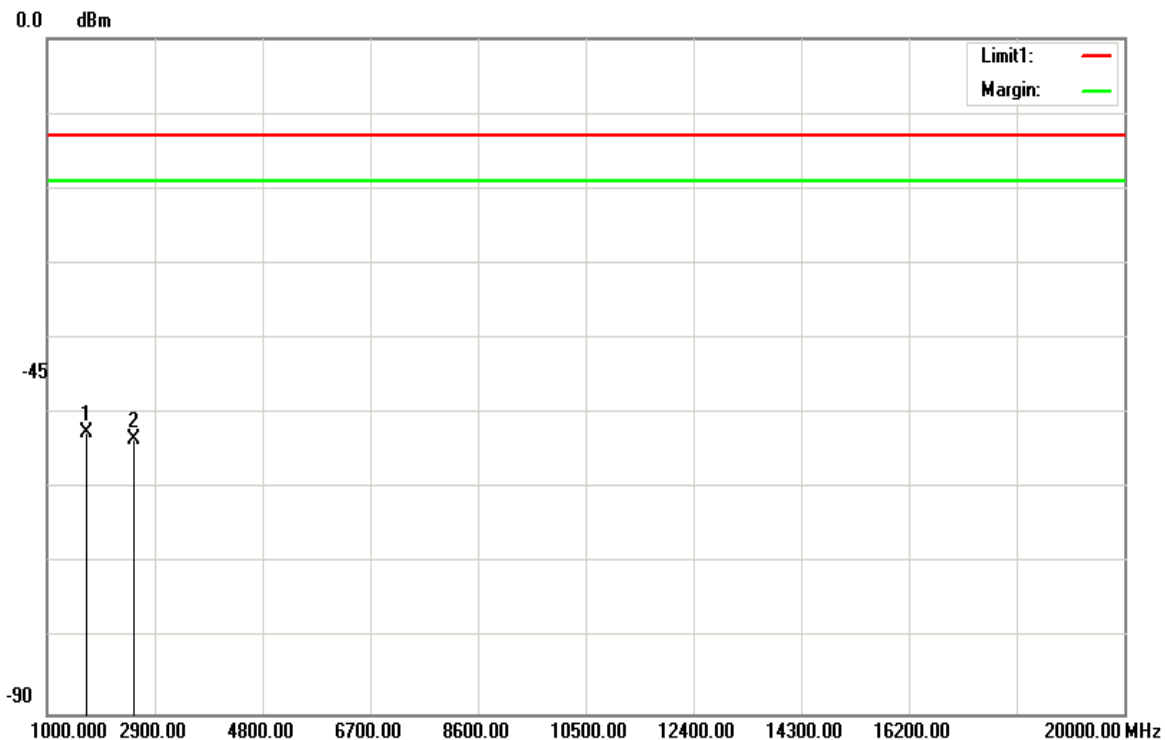


Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1672.000	-54.84	1.52	-53.32	-13.00	-40.32	H
2509.000	-56.23	2.02	-54.21	-13.00	-41.21	H
N/A						

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

Operation Mode: WCDMA 12.2k RMC
 Band V / TX /High CH **Test Date:** August 14, 2017
Temperature: 21°C **Tested by:** Kevin Kuo
Humidity: 52 % RH **Polarity:** Ver.

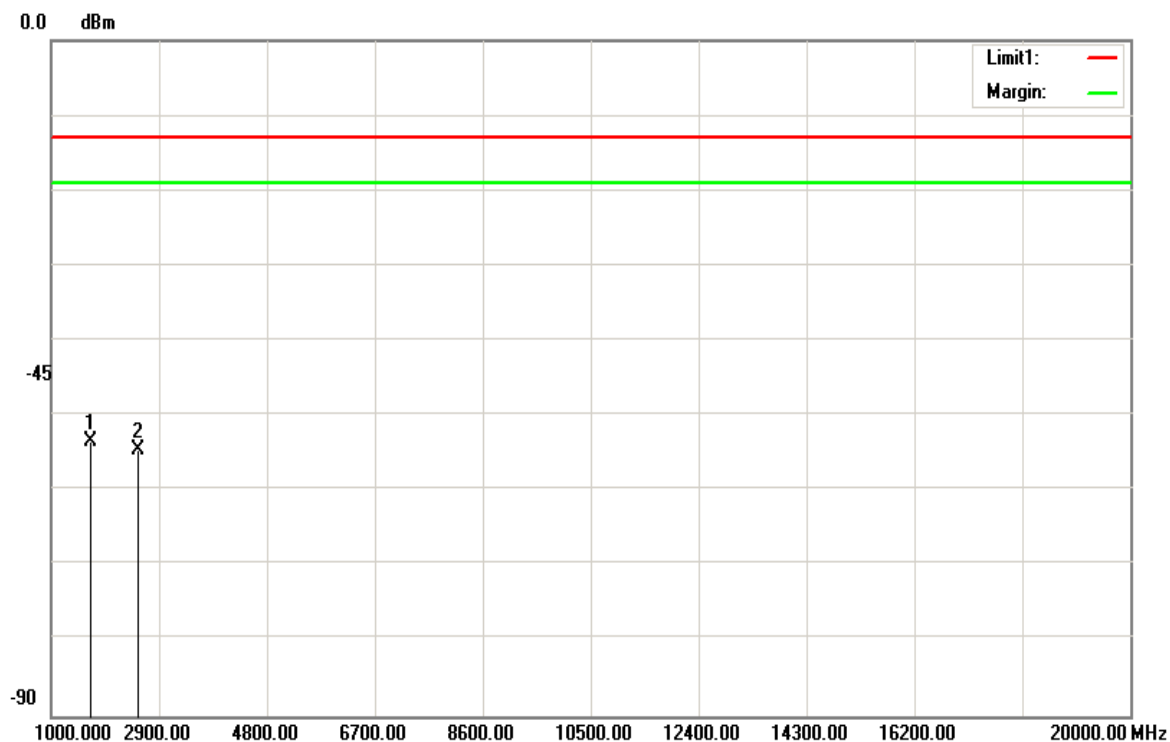


Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1693.000	-53.98	1.51	-52.47	-13.00	-39.47	V
2539.000	-56.08	2.58	-53.50	-13.00	-40.50	V
N/A						

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

Operation Mode: WCDMA 12.2k RMC
 Band V / TX /High CH **Test Date:** August 14, 2017
Temperature: 21°C **Tested by:** Kevin Kuo
Humidity: 52 % RH **Polarity:** Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1693.000	-54.89	1.51	-53.38	-13.00	-40.38	H
2539.000	-57.17	2.58	-54.59	-13.00	-41.59	H
N/A						

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

7.8 FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT

LIMIT

According to FCC §2.1055, FCC §22.355, .FCC §24.235.

Test Procedure

Use Anritsu 8820 with frequency Error measurement capability.

Temp = -30 to +50°C , Voltage= 85% to 115% of the nominal value for AC powered equipment. Frequency Tolerance: +/-2.5 ppm

NOTE: The frequency error was recorded frequency error from the communication simulator.

TEST RESULTS

No non-compliance noted.

Reference Frequency: WCDMA 12.2k RMC Band II Low Channel 1852.4 MHz				
Limit: 2.5 ppm = 4631 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Error(Hz)	Frequency Error (ppm)	Limit (ppm)
12	50	-4.00	-0.0022	+/- 2.5
12	40	-2.00	-0.0011	
12	30	-4.00	-0.0022	
12	20	-5.00	-0.0027	
12	10	-2.00	-0.0011	
12	0	-3.00	-0.0016	
12	-10	-6.00	-0.0032	
12	-20	-4.00	-0.0022	

Reference Frequency: WCDMA 12.2k RMC Band II Mid Channel 1880 MHz				
Limit: 2.5 ppm = 4700 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Error(Hz)	Frequency Error (ppm)	Limit (ppm)
12	50	-4.00	-0.002128	+/- 2.5
12	40	-3.00	-0.001596	
12	30	-6.00	-0.003191	
12	20	-7.00	-0.003723	
12	10	-6.00	-0.003191	
12	0	-5.00	-0.002660	
12	-10	-7.00	-0.003723	
12	-20	-5.00	-0.002660	

Reference Frequency: WCDMA 12.2k RMC Band II High Channel 1907.6 MHz				
Limit: 2.5 ppm = 4769 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Error(Hz)	Frequency Error (ppm)	Limit (ppm)
12	50	-13.00	-0.0068	+/- 2.5
12	40	-10.00	-0.0052	
12	30	-11.00	-0.0058	
12	20	-10.00	-0.0052	
12	10	-12.00	-0.0063	
12	0	-10.00	-0.0052	
12	-10	-11.00	-0.0058	
12	-20	-10.00	-0.0052	

Reference Frequency: WCDMA 12.2k RMC Band V Low Channel 826.4 MHz				
Limit: 2.5 ppm = 2066 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Error(Hz)	Frequency Error (ppm)	Limit (ppm)
12	50	0.00	0.0000	+/- 2.5
12	40	1.00	0.0012	
12	30	2.00	0.0024	
12	20	2.00	0.0024	
12	10	0.00	0.0000	
12	0	2.00	0.0024	
12	-10	3.00	0.0036	
12	-20	1.00	0.0012	

Reference Frequency: WCDMA 12.2k RMC Band V Mid Channel 836.6 MHz				
Limit: 2.5 ppm = 2091.5 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Error(Hz)	Frequency Error (ppm)	Limit (ppm)
12	50	2.00	0.0024	+/- 2.5
12	40	3.00	0.0036	
12	30	0.00	0.0000	
12	20	1.00	0.0012	
12	10	1.00	0.0012	
12	0	1.00	0.0012	
12	-10	2.00	0.0024	
12	-20	0.00	0.0000	

Reference Frequency: WCDMA 12.2k RMC Band V High Channel 846.6 MHz				
Limit: 2.5 ppm = 2116.5 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Error(Hz)	Frequency Error (ppm)	Limit (ppm)
12	50	0.00	0.0000	+/- 2.5
12	40	-2.00	-0.0024	
12	30	-1.00	-0.0012	
12	20	0.00	0.0000	
12	10	-1.00	-0.0012	
12	0	-1.00	-0.0012	
12	-10	0.00	0.0000	
12	-20	-2.00	-0.0024	

FREQUENCY STABILITY V.S. VOLTAGE MEASUREMENT:

Reference Frequency: WCDMA 12.2k RMC Band II Low Channel 1852.4 MHz				
Limit: 2.5 ppm = 4631Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Error(Hz)	Frequency Error (ppm)	Limit (ppm)
10.2	20	-4.00	-0.0022	+/- 2.5
12		-5.00	-0.0027	
13.8		-5.00	-0.0027	

Reference Frequency: WCDMA 12.2k RMC Band II Mid Channel 1880 MHz				
Limit: 2.5 ppm = 4700Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Error(Hz)	Frequency Error (ppm)	Limit (ppm)
10.2	20	-6.00	-0.0032	+/- 2.5
12		-7.00	-0.0037	
13.8		-7.00	-0.0037	

Reference Frequency: WCDMA 12.2k RMC Band II High Channel 1907.6 MHz				
Limit: 2.5 ppm = 4769Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Error(Hz)	Frequency Error (ppm)	Limit (ppm)
10.2	20	-12.00	-0.0063	+/- 2.5
12		-10.00	-0.0052	
13.8		-10.00	-0.0052	

Reference Frequency: WCDMA 12.2k RMC Band V Mid Channel 826.4 MHz				
Limit: 2.5 ppm = 2066Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Error(Hz)	Frequency Error (ppm)	Limit (ppm)
10.2	20	1.00	0.0012	+/- 2.5
12		2.00	0.0024	
13.8		1.00	0.0012	

Reference Frequency: WCDMA 12.2k RMC Band V Mid Channel 836.6 MHz				
Limit: 2.5 ppm = 2091.5Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Error(Hz)	Frequency Error (ppm)	Limit (ppm)
10.2	20	0.00	0.0000	+/- 2.5
12		1.00	0.0012	
13.8		1.00	0.0012	

Reference Frequency: WCDMA 12.2k RMC Band V Mid Channel 846.6 MHz				
Limit: 2.5 ppm = 2116.5Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Error(Hz)	Frequency Error (ppm)	Limit (ppm)
10.2	20	0.00	0.0000	+/- 2.5
12		0.00	0.0000	
13.8		-1.00	-0.0012	