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

TEST REPORT

For

Computer

Model: TREK-530

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.
Wugu Laboratory
No.11, Wugong 6th Rd., Wugu Dist.,
New Taipei City 24891, Taiwan. (R.O.C.)
http://www.ccsrf.com
Issued Date: April 20, 2018

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.
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Revision History

Rev.		Issue Date		Revisions	Effect Page	Revised By
00		April 20, 2018		Initial Issue	ALL	Allison Chen
01		August 21, 2018		1. Revised antenna type. 2. Revised description of KDB 971168 no. 3. Revised test data of average power in section 8.2. 4. Revised test procedure of antenna gain values of (dBd) to (dBi) in section 8.7. 5. Revised measurement equipment used in section 5.2.	P.5, 7-8, 13-17, 22, 25, 30, 35, 37	Allison Chen
02		August 29, 2018		1. Revised test procedure in section 8.7.	P.37	Allison Chen

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APPENDIX 1 - PHOTOGRAPHS OF EUT

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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: TREK-530

Date of Test: November 27, 2017 ~ April 19, 2018

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-603-E 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:

Sam Chuang
Manager
Compliance Certification Services Inc.

Tested by:

Kevin Kuo
Engineer
Compliance Certification Services Inc.

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2. EUT DESCRIPTION

Product	Computer
Model No.	TREK-530
Model Discrepancy	N/A
Trade Name	ADVANTECH
Received Date	September 8, 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
Transmit Power (ERP & EIRP Power)	WCDMA Band II: 26.57dBm WCDMA Band V: 26.23dBm
Antenna Gain	Dipole Antenna Band II: -0.4dBi Band V: 0.5dBi

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**	**4M16F9W**	**N/A**	**0.453**
	V	**826.4MHz ~ 846.6MHz**	**4M16F9W**	**0.419**	**N/A**

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3. TEST SUMMARY

FCC Standard Section	Report Section	Test Item	Result
-	2	Antenna Requirement	Pass
2.1046	8.1	Average Power	Pass
22.913(a), 24.232(c)	8.2	ERP and EIRP Measurement	Pass
2.1049	8.3	Occupied Bandwidth Measurement	Pass
22.917(a), 24.238(a)	8.4	Conducted Band Edge	Pass
22.913(d), 24.232(d)	8.5	Peak to Average Ratio	Pass
22.917(a), 24.238(a)	8.6	Conducted Spurious Emission	Pass
22.917(a), 24.238(a)	8.7	Spurious Radiation Measurement	Pass
2.1055, 22.355, 24.235	8.8	Frequency Stability v.s. temperature measurement	Pass

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4. TEST METHODOLOGY

Both conducted and radiated testing were performed according to TIA-603-E and FCC CFR 47, Part 2, Part 22 Subpart H and Part 24 Subpart E, KDB 971168 D01 Power Meas License Digital Systems.

4.1 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.

4.2 DESCRIPTION OF TEST MODES

The EUT had been tested under operating condition.
The EUT be set in maximum power transmission via call box during testing.

4.2.1 The worst mode of measurement

WCDMA Band II

Radiated Emission Measurement	
Test Condition	**Band edge, Emission for Unwanted and Fundamental**
DC Voltage	**12V**
Test Mode	**Mode 1: EUT power by Power Supply.**
Worst Mode	☒ **Mode 1** ☐ **Mode 2** ☐ **Mode 3** ☐ **Mode 4**
Position	☐ **P**laced in fixed position. ☐ **P**laced in fixed position at X-Plane (E2-Plane) ☐ **P**laced in fixed position at Y-Plane (E1-Plane) ☒ **P**laced 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 (Z-Plane) were recorded in this report.

WCDMA Band V

Radiated Emission Measurement	
Test Condition	**Band edge, Emission for Unwanted and Fundamental**
DC Voltage	**12V**
Test Mode	**Mode 1: EUT power by Power Supply.**
Worst Mode	☒ **Mode 1** ☐ **Mode 2** ☐ **Mode 3** ☐ **Mode 4**
Position	☐ **P**laced in fixed position. ☐ **P**laced in fixed position at X-Plane (E2-Plane) ☒ **P**laced in fixed position at Y-Plane (E1-Plane) ☐ **P**laced 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 (Y-Plane) were recorded in this report.

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5. INSTRUMENT CALIBRATION

5.1 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.

5.2 MEASUREMENT EQUIPMENT USED

Equipment Used for Emissions Measurement

Wugu fully Chamber					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Signal Analyzer	Agilent	E4407B	MY44212686	04/07/2017	04/06/2018
Pre-Amplifier	EMEC	EM01M62G	60570	08/01/2017	07/31/2018
Bilog Antenna	Sunol Sciences	JB1	A052609	03/17/2017	03/16/2018
Horn Antenna	SCHWARZBECK	BBHA 9120D	779	03/08/2017	03/07/2018
Pre-Amplifier	Anritsu	MH648A	M89145	06/27/2017	06/26/2018
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R
Filter	N/A	800-1G	N/A	07/20/2017	07/19/2018
Filter	N/A	1800-2000	N/A	07/20/2017	07/19/2018
WWAN signal cable	HUBER SUHNER	SUCOFLEX 104PEA	33960	07/31/2017	07/30/2018
Base Station	R&S	CMU 200	101245	07/29/2017	07/25/2018

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	10/02/2017	10/01/2018
Spectrum Analyzer	Keysight	N9010B	MY55460167	06/14/2017	06/13/2018
Thermostatic/Hrgrosatic Chamber	TAICHY	MHG-150LF	930619	10/11/2017	10/10/2018
Directional Coupler	Agilent	87301D	MY44350252	07/25/2017	07/24/2018
SUCOFLEX Cable	HUBER SUHNER	SUCOFLEX 104PEA	25157	07/31/2017	07/30/2018
Divider	Solvang Technology	2-18GHz 4Way	STI08-0015	07/26/2017	07/25/2018

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5.3 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.*

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6. FACILITIES AND ACCREDITATIONS

6.1 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

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

6.2 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.

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.”

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7. SETUP OF EQUIPMENT UNDER TEST

7.1 SETUP CONFIGURATION OF EUT

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

7.2 SUPPORT EQUIPMENT

No	Equipment	Brand	Model	Series No.	FCC ID	Data Cable
1	DC Power Source	GWINSTEK	SPS-3610	N/A	N/A	DC Cable 1.5m shielding
2	NB	ASUS	M5200AE	N/A	PD9WM3B2100	RS232 to USB Cable 1.5m

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.*

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8. FCC PART 22 & 24 REQUIREMENTS

8.1 AVERAGE POWER

Test Procedures

According to FCC Part 2.1046.

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	Data Rate or Sub-test	UL/DL Channel No.	Frequency(MHz)	Average power(dBm)	Output Power (W)
WCDMA Band II	RMC 12.2Kbps	9262/9662	1852.4	22.8	0.19055
		9400/9800	1880.0	22.7	0.18621
		9538/9938	1907.6	22.6	0.18197
WCDMA Band V	RMC 12.2Kbps	4132/4357	826.4	22.8	0.19055
		4183/4408	836.6	22.8	0.19055
		4233/4458	846.6	23.0	0.19953

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HSDPA

Band	Data Rate or Sub-test	UL/DL Channel No.	Frequency(MHz)	Average power(dBm)	Output Power (W)
HSDPA II	1	9262/9662	1852.4	22.9	0.19498
		9400/9800	1880.0	22.8	0.19055
		9538/9938	1907.6	22.7	0.18621
	3	9262/9662	1852.4	21.8	0.15136
		9400/9800	1880.0	21.7	0.14791
		9538/9938	1907.6	21.6	0.14454
	4	9262/9662	1852.4	21.2	0.13183
		9400/9800	1880.0	21.1	0.12882
		9538/9938	1907.6	21.0	0.12589
HSDPA V	1	4132/4357	826.4	22.8	0.19055
		4183/4408	836.6	22.8	0.19055
		4233/4458	846.6	22.9	0.19498
	2	4132/4357	826.4	22.3	0.16982
		4183/4408	836.6	22.3	0.16982
		4233/4458	846.6	22.4	0.17378
	3	4132/4357	826.4	21.8	0.15136
		4183/4408	836.6	21.8	0.15136
		4233/4458	846.6	21.9	0.15488
	4	4132/4357	826.4	21.8	0.15136
		4183/4408	836.6	21.8	0.15136
		4233/4458	846.6	21.9	0.15488

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HSUPA

Band	Data Rate or Sub-test	UL/DL Channel No.	Frequency(MHz)	Average power(dBm)	Output Power (W)
HSUPA II	1	9262/9662	1852.4	22.8	0.19055
		9400/9800	1880.0	22.7	0.18621
		9538/9938	1907.6	22.6	0.18197
	3	9262/9662	1852.4	21.8	0.15136
		9400/9800	1880.0	21.7	0.14791
		9538/9938	1907.6	21.6	0.14454
	4	9262/9662	1852.4	20.7	0.11749
		9400/9800	1880.0	20.6	0.11482
		9538/9938	1907.6	20.5	0.11220
	5	9262/9662	1852.4	22.8	0.19055
		9400/9800	1880.0	22.7	0.18621
		9538/9938	1907.6	22.6	0.18197
HSUPA V	1	4132/4357	826.4	22.8	0.19055
		4183/4408	836.6	22.8	0.19055
		4233/4458	846.6	23.0	0.19953
	2	4132/4357	826.4	20.8	0.12023
		4183/4408	836.6	20.8	0.12023
		4233/4458	846.6	21.0	0.12589
	3	4132/4357	826.4	21.8	0.15136
		4183/4408	836.6	21.8	0.15136
		4233/4458	846.6	22.0	0.15849
	4	4132/4357	826.4	20.8	0.12023
		4183/4408	836.6	20.8	0.12023
		4233/4458	846.6	21.0	0.12589
	5	4132/4357	826.4	22.8	0.19055
		4183/4408	836.6	22.8	0.19055
		4233/4458	846.6	23.0	0.19953

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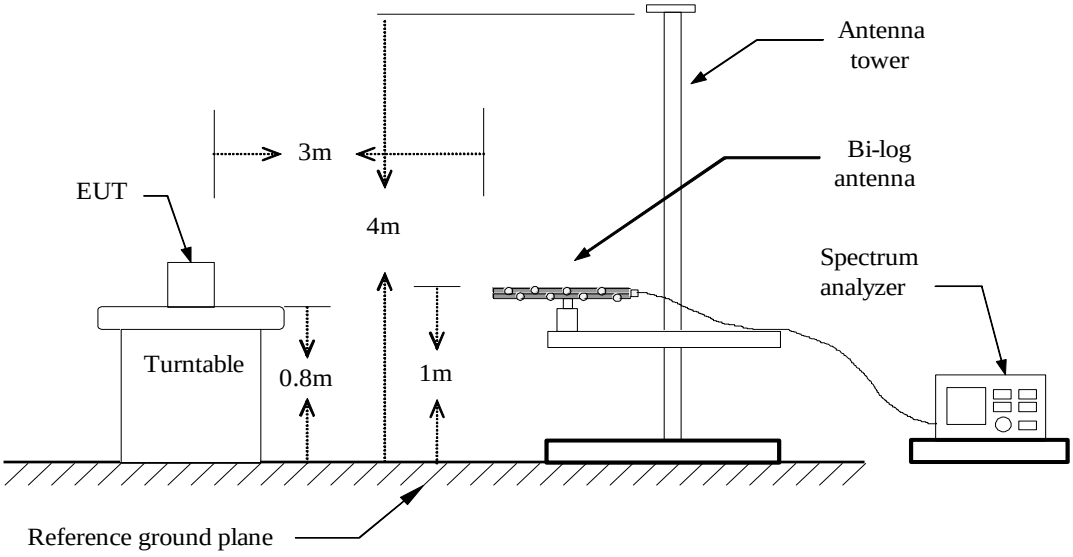
8.2 ERP & EIRP MEASUREMENT

LIMIT

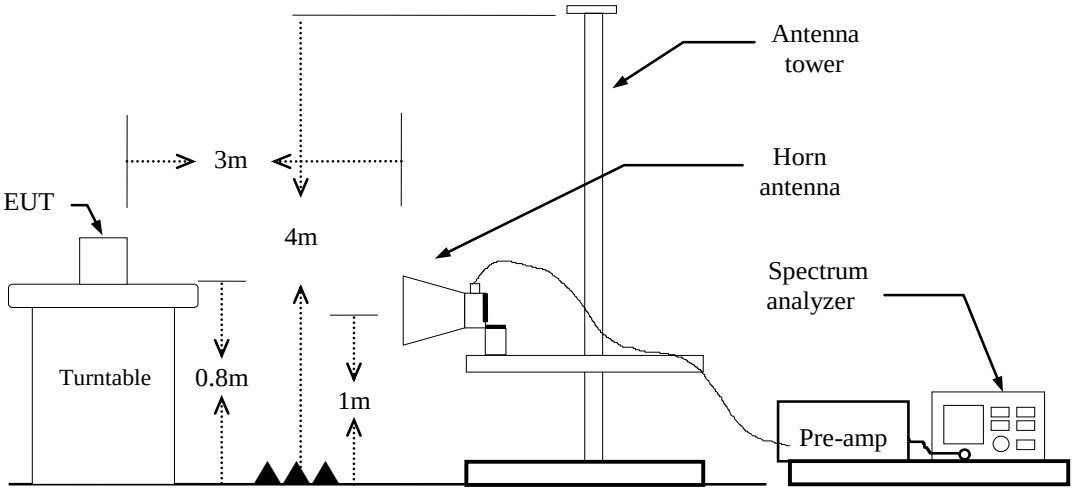
According to FCC 22.913(a): The Effective Radiated Power (ERP) of mobile transmitters must not exceed 7 Watts.
According to FCC 24.232(c): The equivalent Isotropic Radiated Power (EIRP) must not exceed 2 Watts.

Test Configuration

Below 1 GHz



Above 1 GHz



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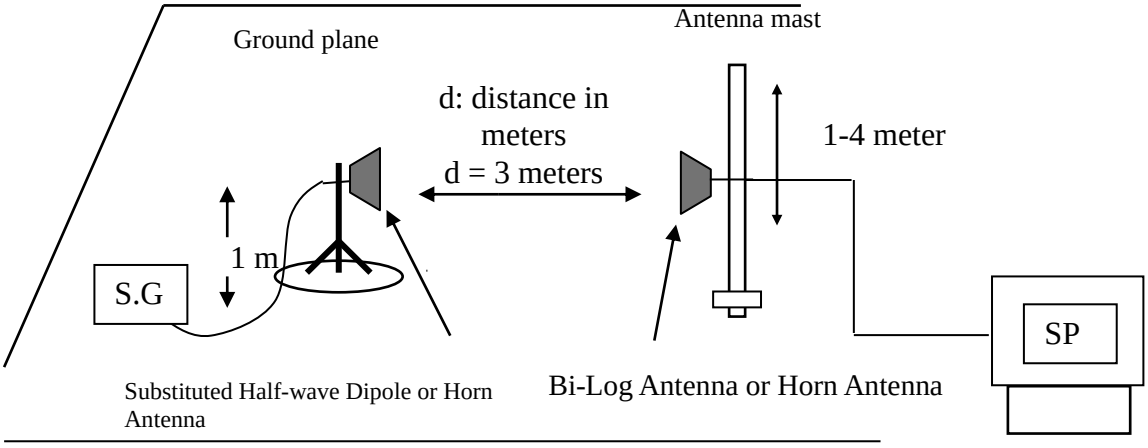
For Substituted Method Test Set-UP



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 Power Meas License Digital Systems.

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-E. 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.

ERP = S.G. output (dBm) + Antenna Gain (dBi) – Cable (dB) - 2.15
EIRP = S.G. output (dBm) + Antenna Gain (dBi) – 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	17.40	0.054	26.57	0.453
	Middle	14.65	0.029	25.62	0.364
	Highest	16.93	0.049	25.22	0.332

Test Mode	Channel	Vertical		Horizontal	
		ERP(dBm)	ERP(W)	ERP(dBm)	ERP(W)
WCDMA 12.2K RMC (Band V)	Lowest	24.50	0.281	25.34	0.341
	Middle	24.09	0.256	26.23	0.419
	Highest	25.04	0.319	26.09	0.406

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8.3 OCCUPIED BANDWIDTH MEASUREMENT

Limits

For Reporting purpose only.

TEST PROCEDURES

KDB 971168 D01 Power Meas License Digital Systems

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 ≥ 3 x 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	4.1678	4.6740
	Middle	1880.0	4.1678	4.6740
	Highest	1907.6	4.1678	4.6740
WCDMA 12.2k RMC (Band V)	Lowest	826.4	4.1678	4.6740
	Middle	836.4	4.1534	4.6600
	Highest	846.6	4.1534	4.6740

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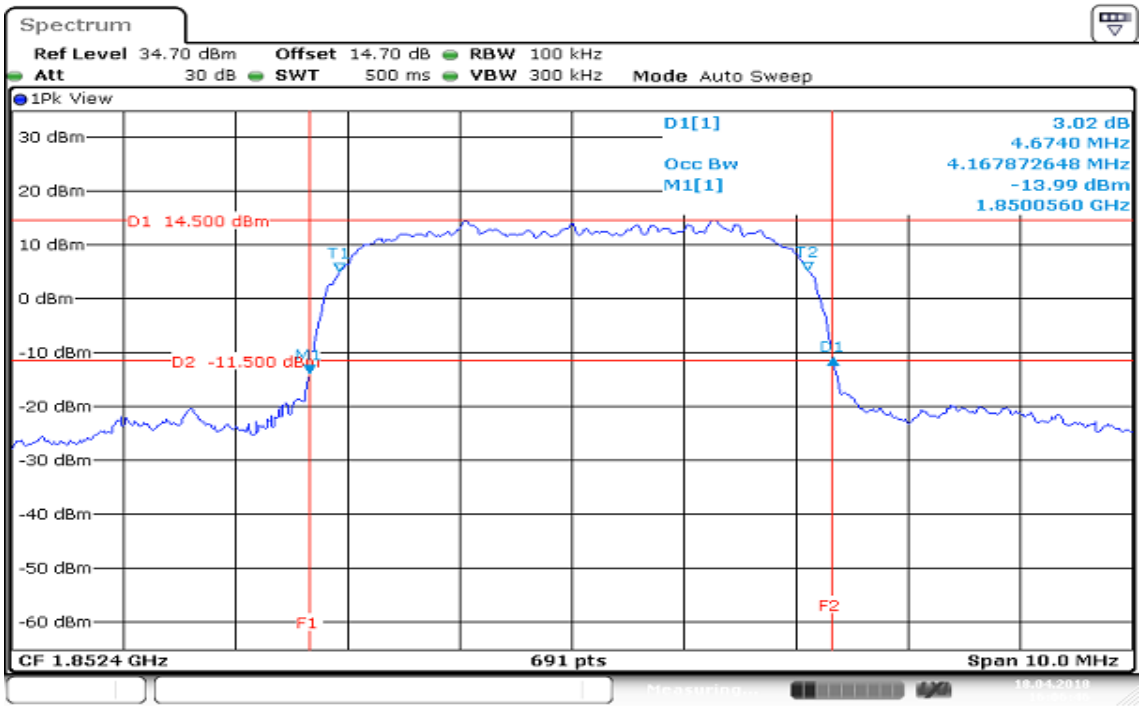
Test Plot

WCDMA 12.2k RMC (Band II)

Low CH



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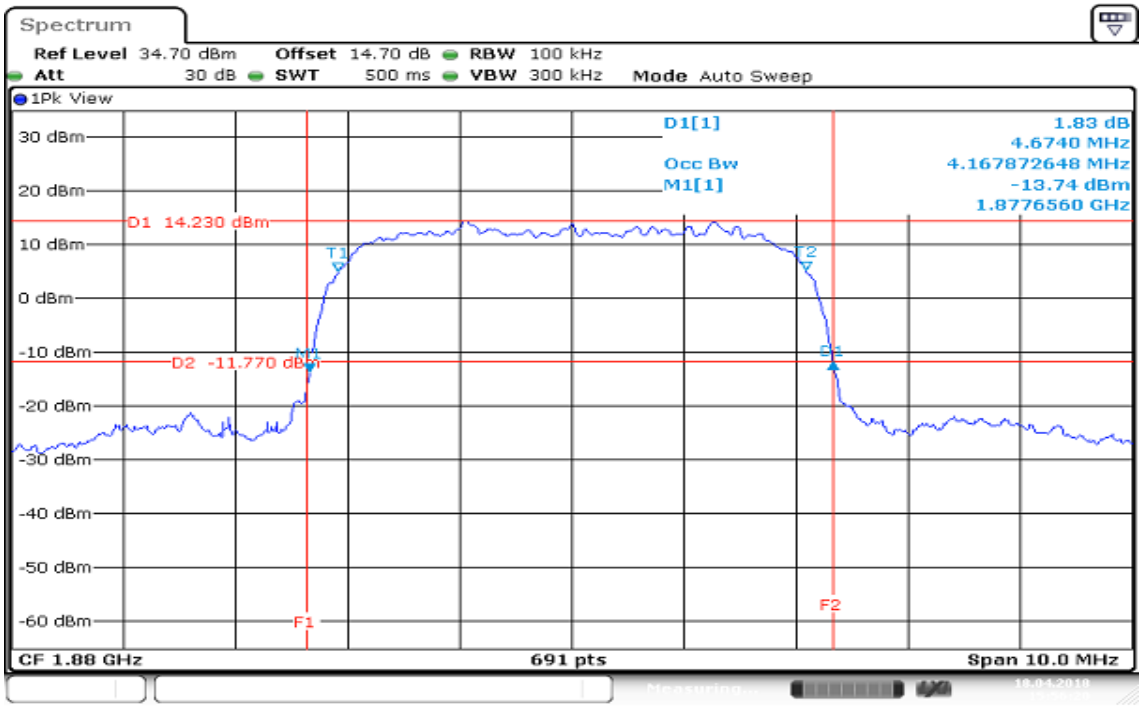
Mid CH



Date: 18.APR.2018 15:56:21

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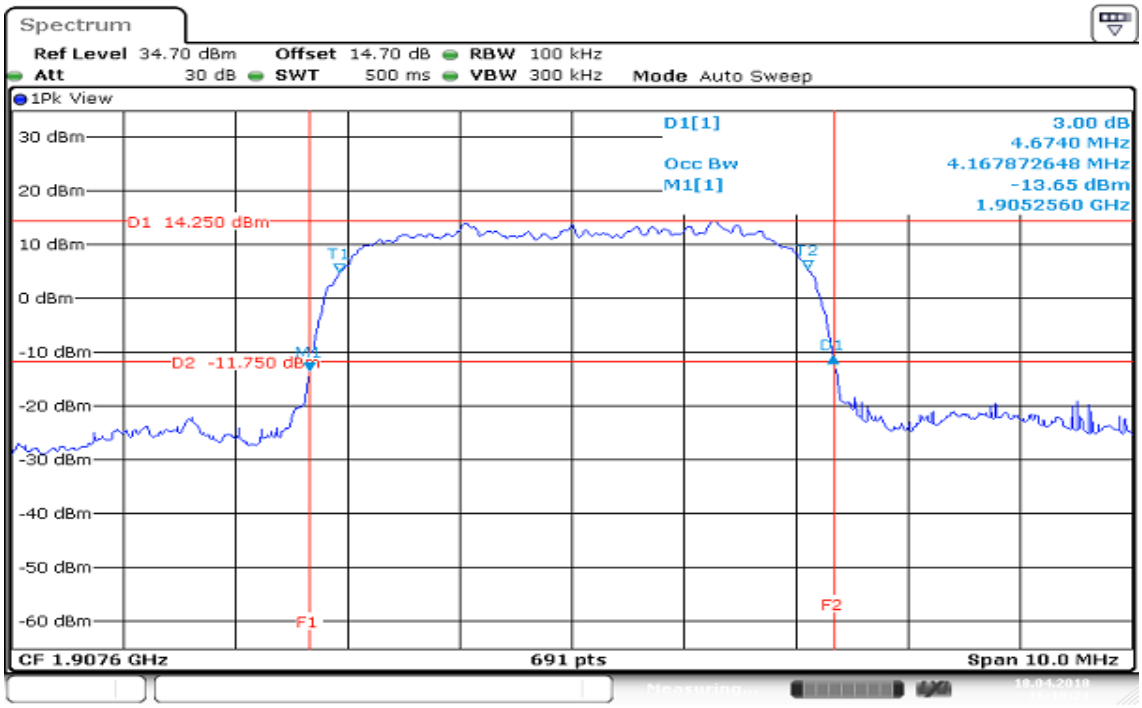
High CH



Date: 18.APR.2018 16:10:21

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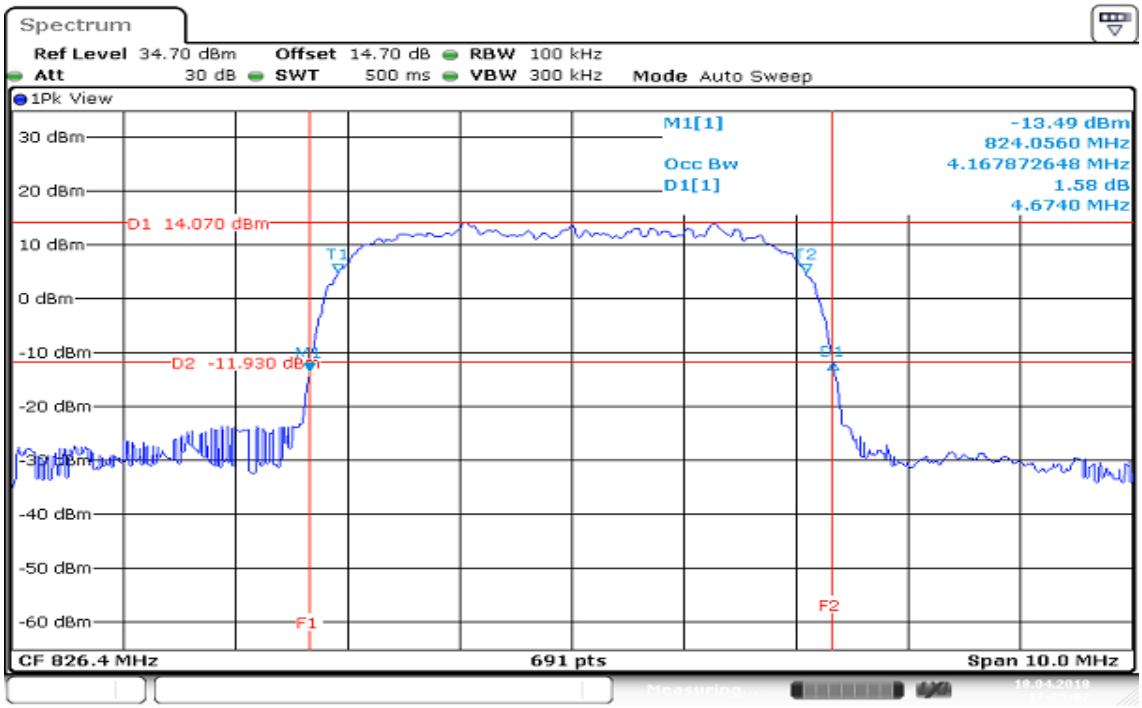
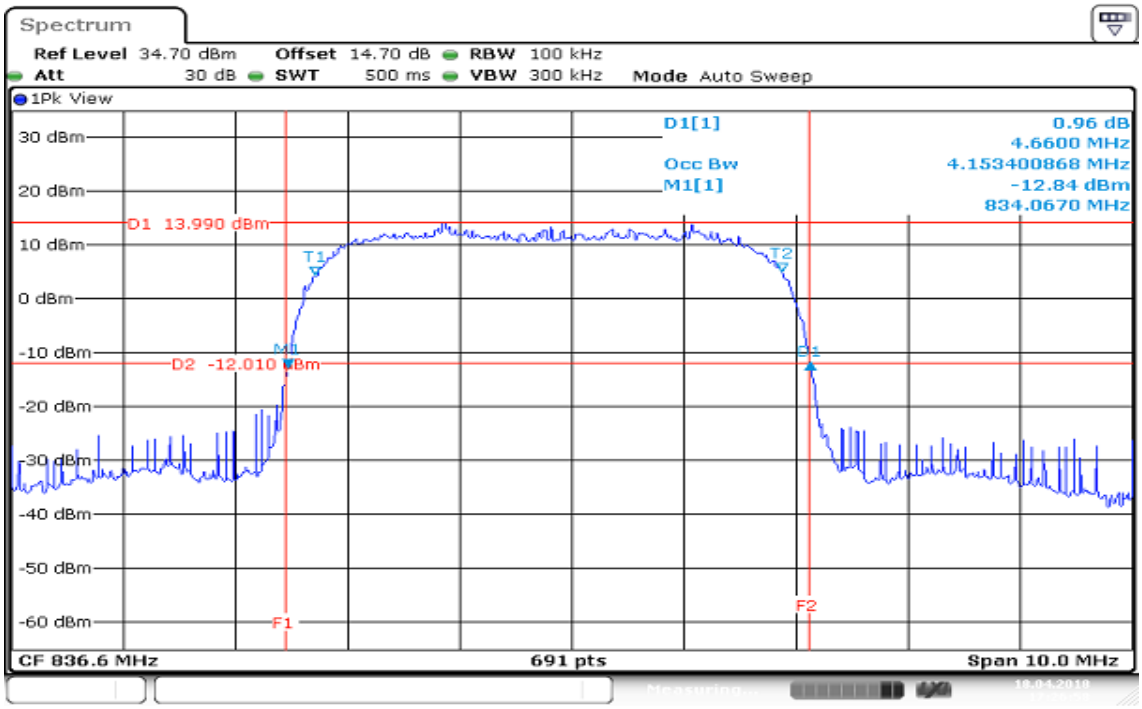
WCDMA 12.2k RMC (Band V)

Low CH



Date: 18 APR 2018 17:25:03

Mid CH



Date: 18 APR 2018 17:26:59

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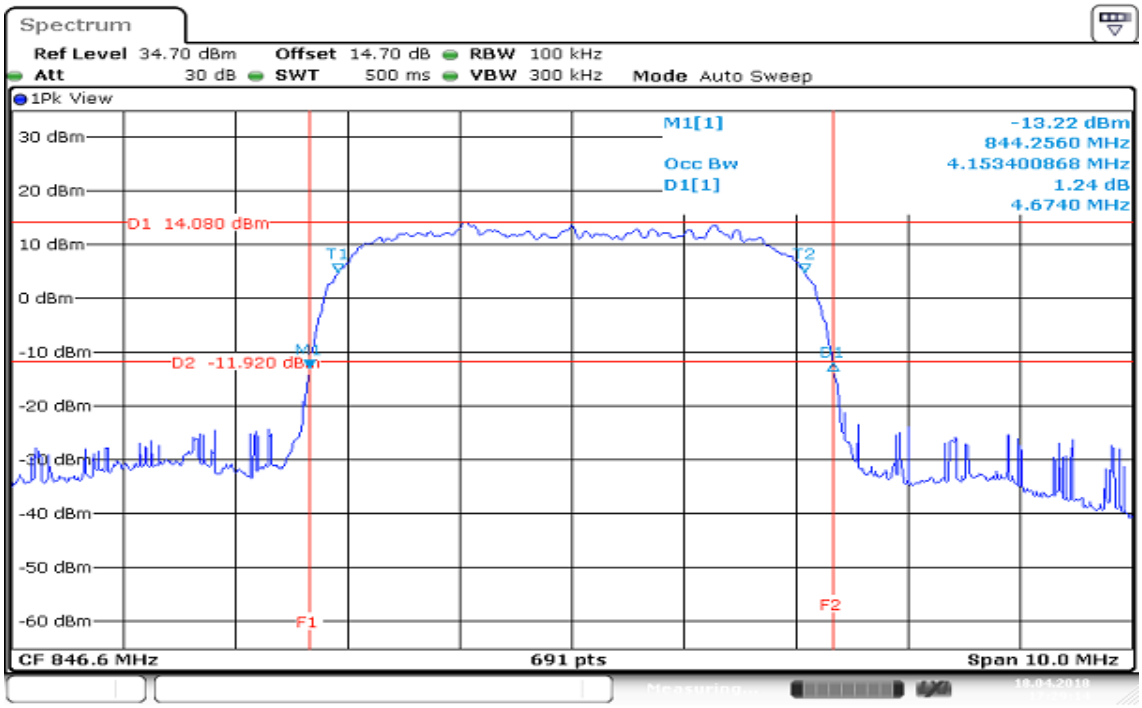
High CH



Date: 18.APR.2018 17:29:14

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8.4 CONDUCTED BANDEDG MEASUREMENT

Limit

FCC §22.917(a), Band V

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 II

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 Power Meas License Digital Systems, section 6.0 and TIA-603-E section 2.2.13,

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.

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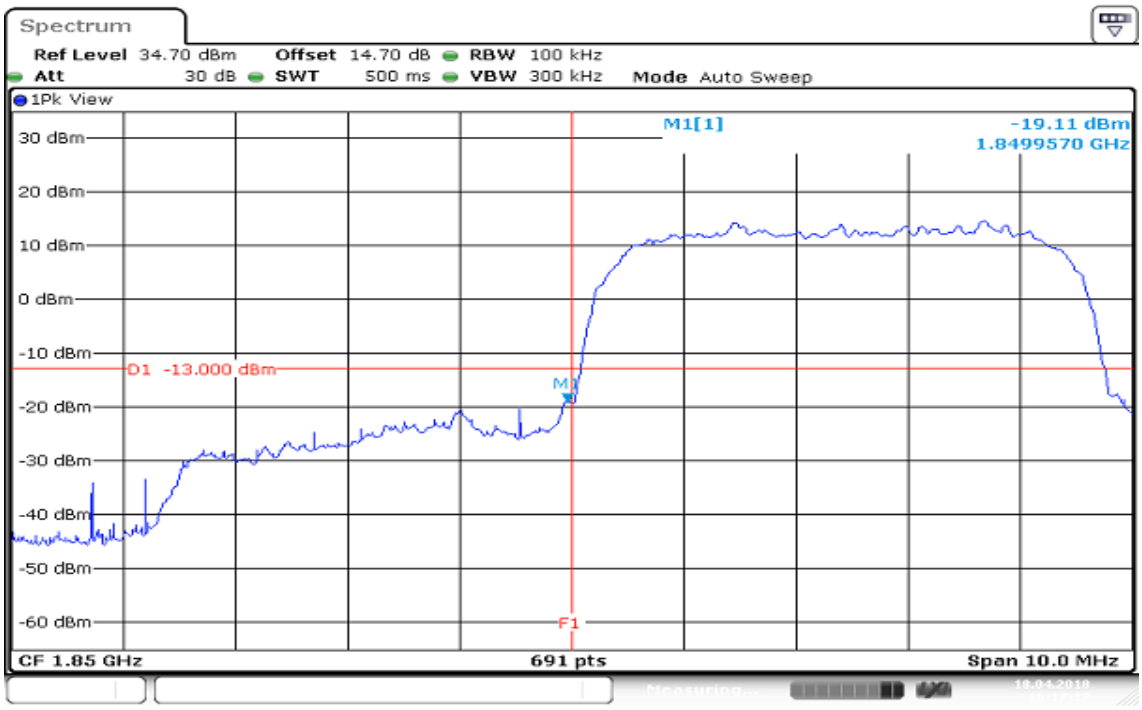
Test Data

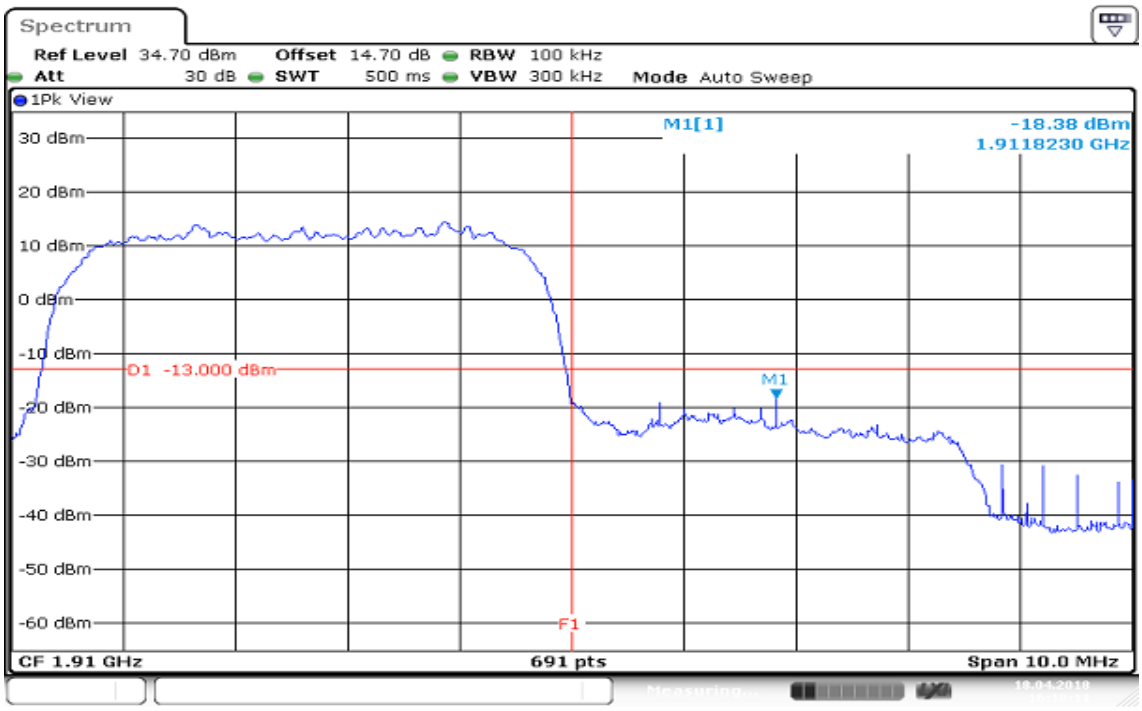
WCDMA 12.2k RMC (Band II)

Low CH



Date: 18.APR.2018 16:17:17

High CH



Date: 18.APR.2018 16:18:11

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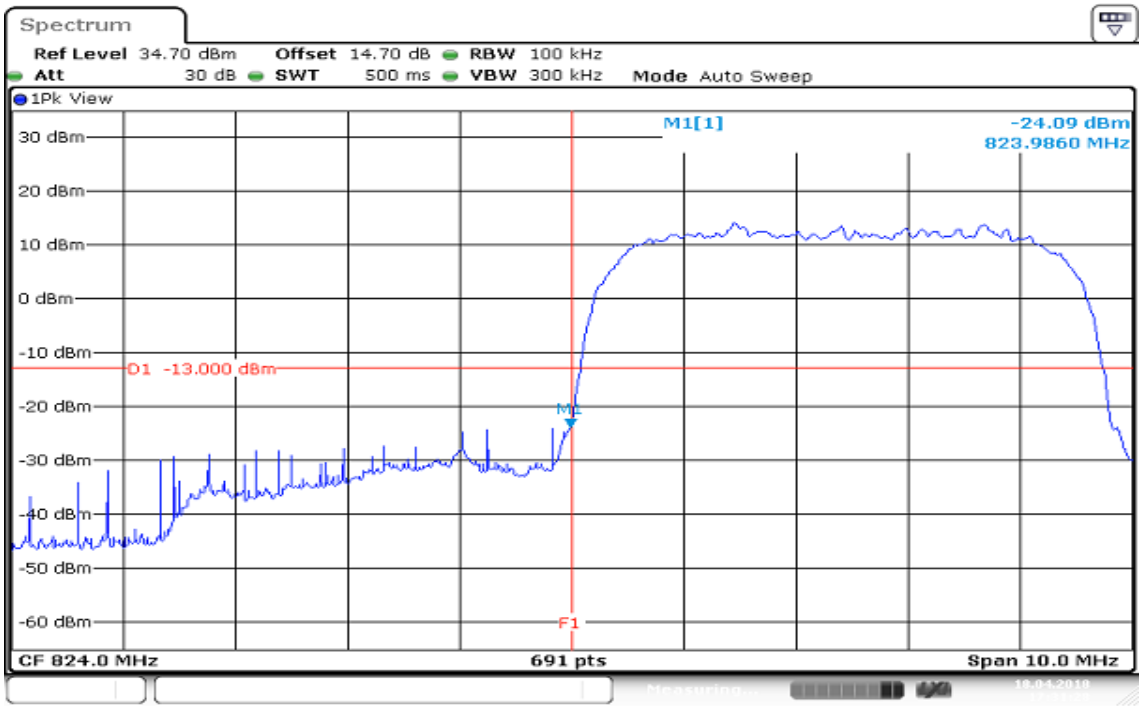
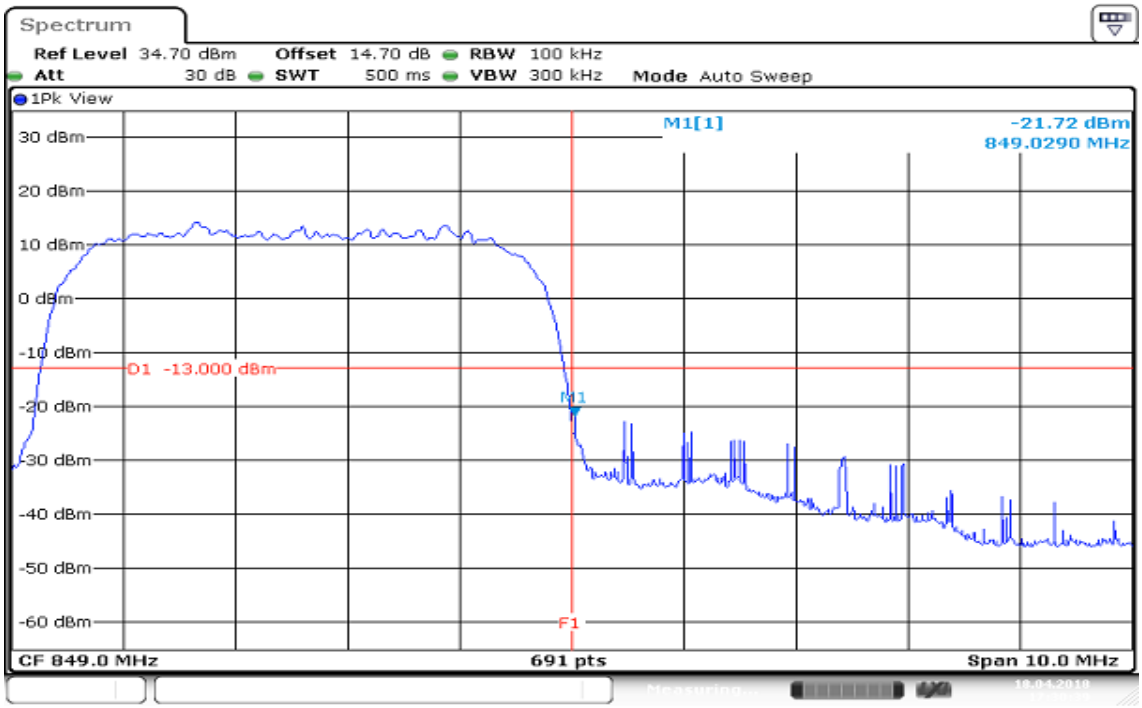
WCDMA 12.2k RMC (Band V)

Low CH



Date: 18.APR.2018 17:31:29

High CH



Date: 18.APR.2018 17:30:40

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8.5 PEAK TO AVERAGE RATIO

Limit

FCC §22.913(d), Band V

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 II

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

According to KDB 971168 D01 Power Meas License Digital Systems section 5.7,

1. Set resolution/measurement bandwidth ≥ 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%.

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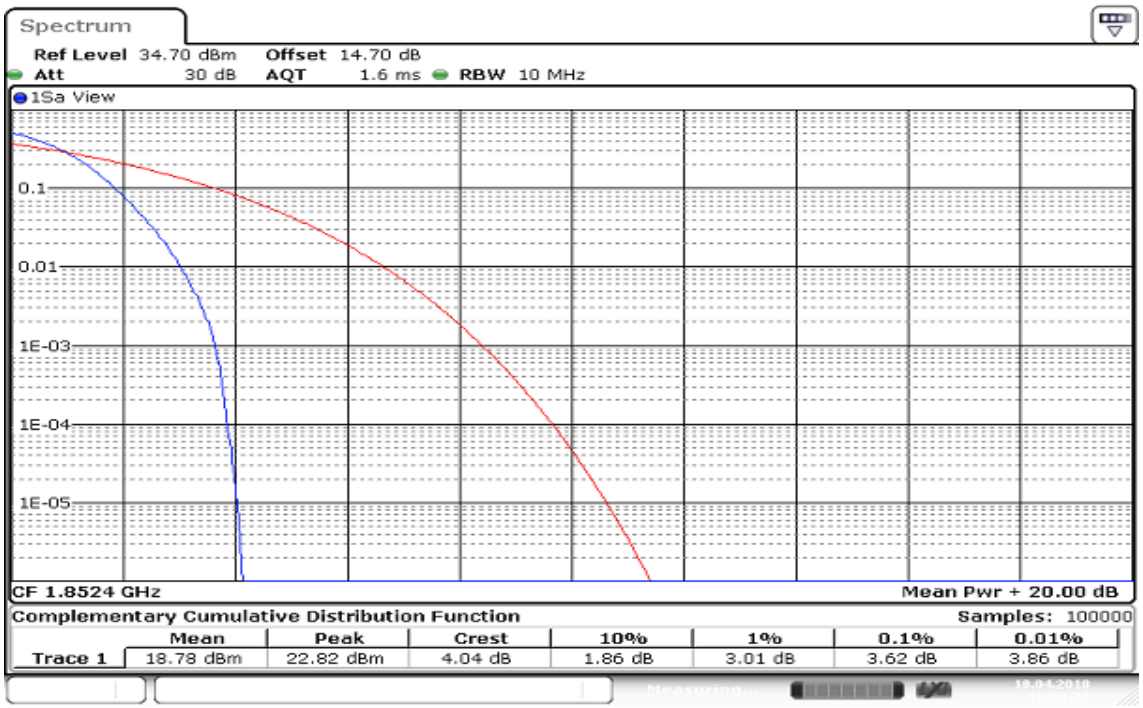
Test Data

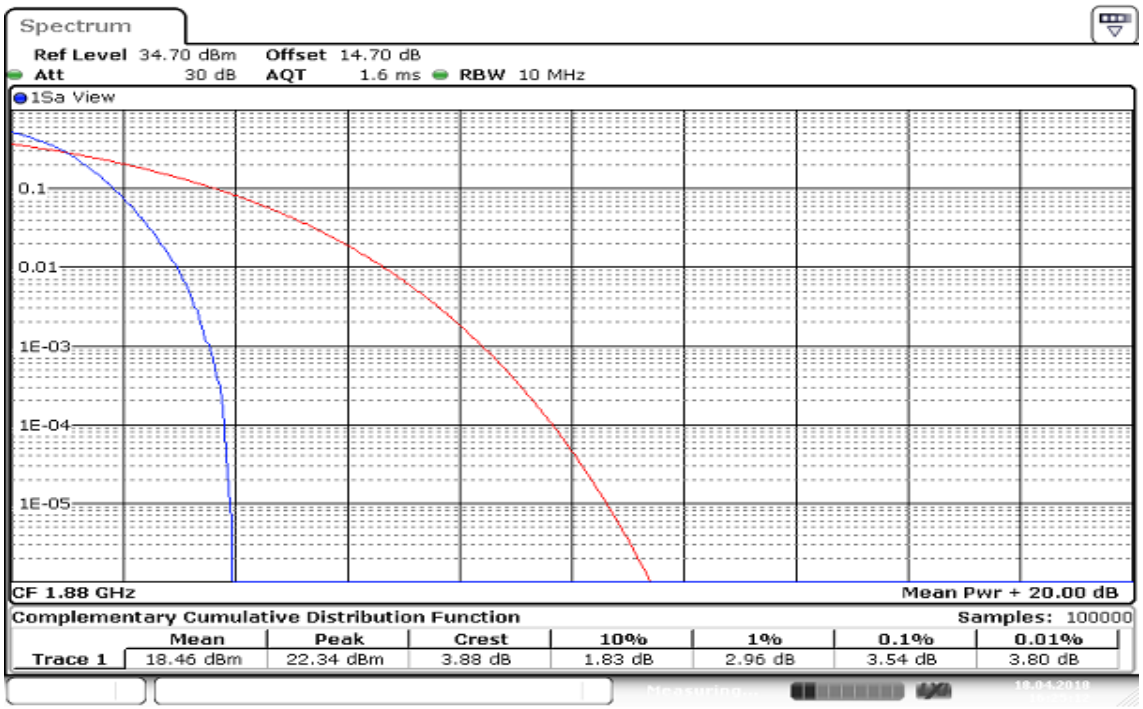
WCDMA 12.2k RMC (Band II)

Low CH



Date: 18.APR.2018 16:24:35

Mid CH



Date: 18.APR.2018 16:25:12

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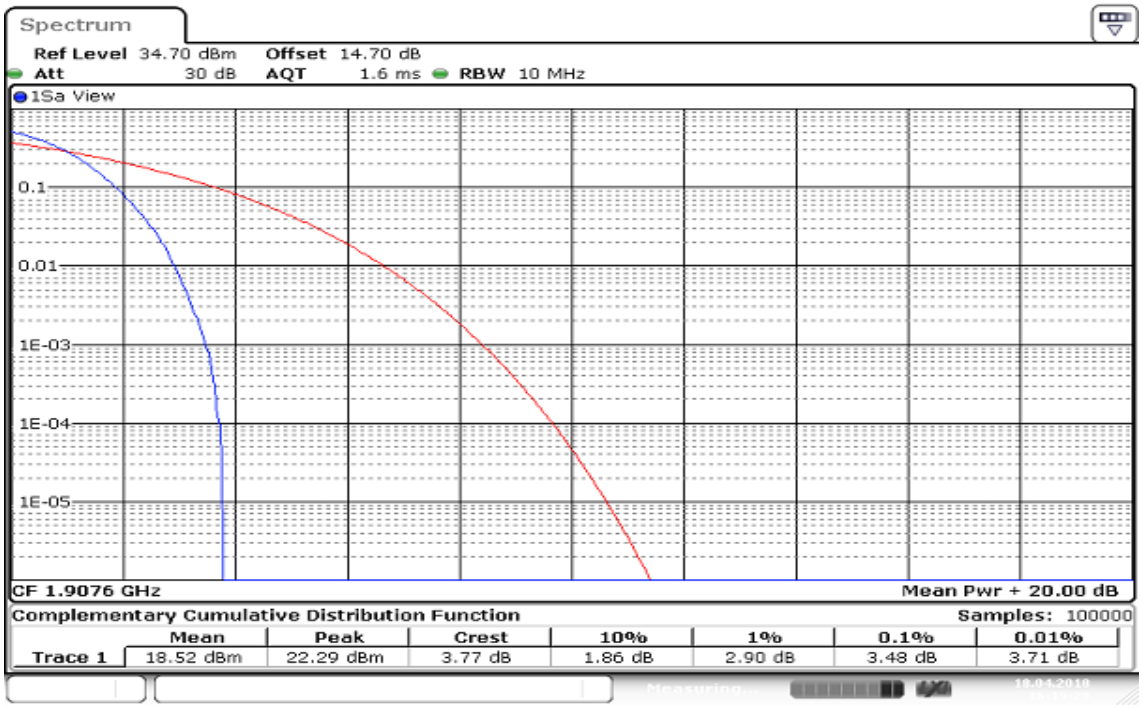
High CH



Date: 18.APR.2018 16:19:28

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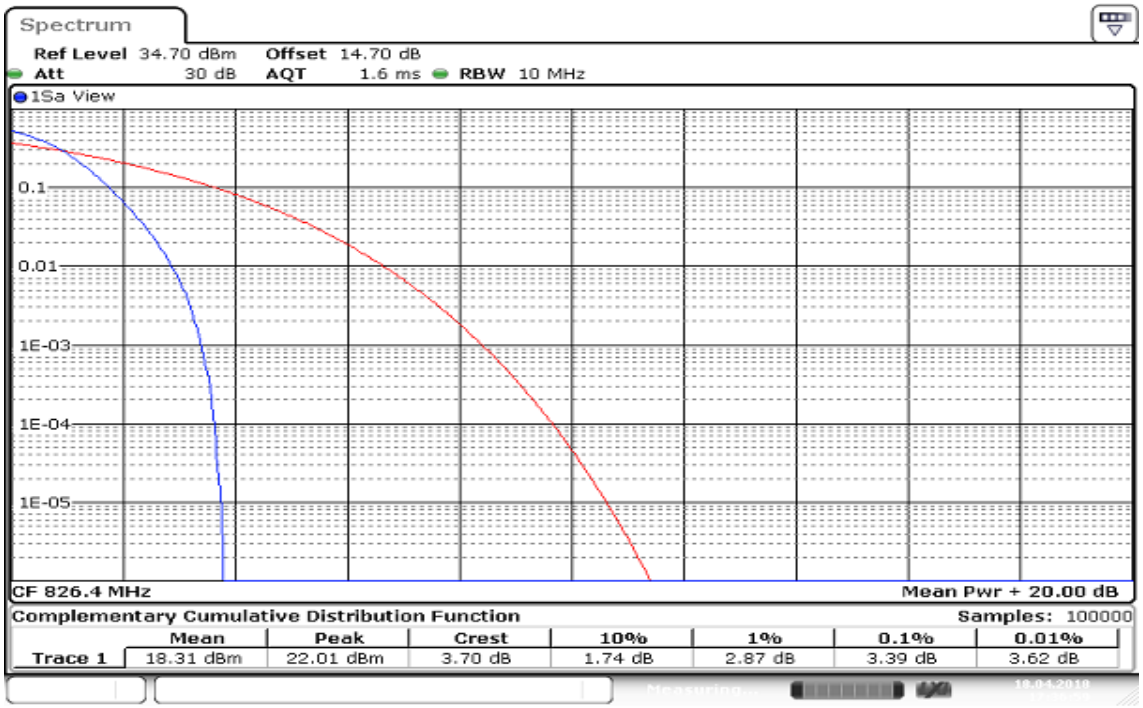
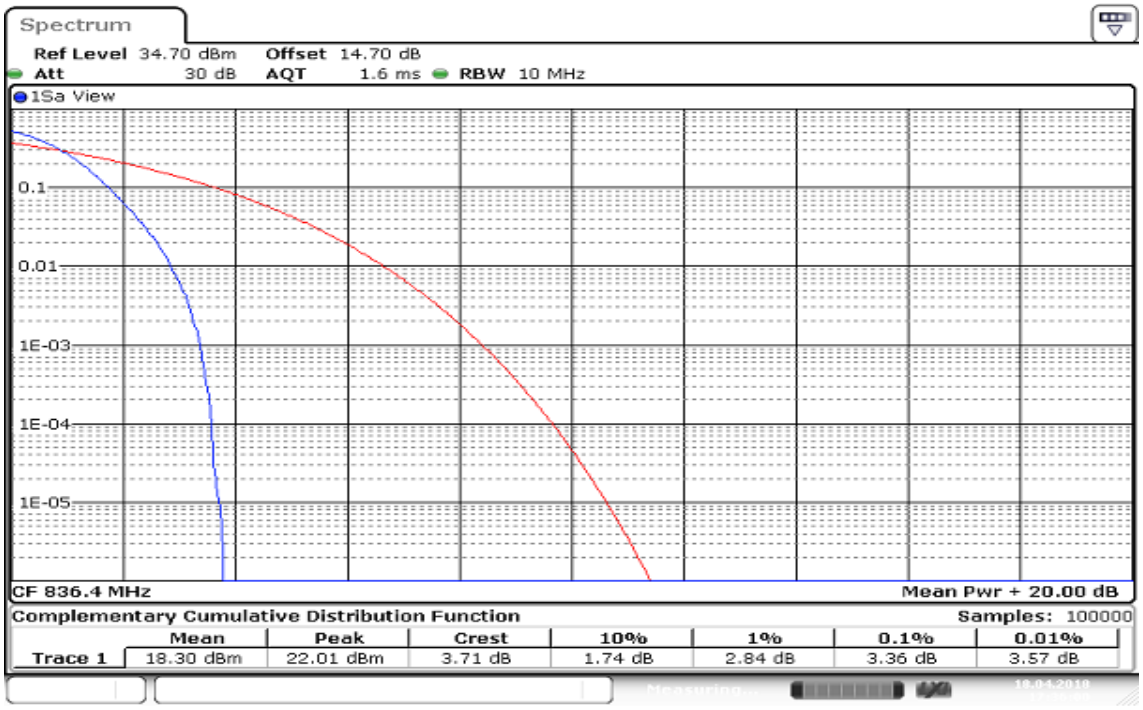
WCDMA 12.2k RMC (Band V)

Low CH



Date: 18.APR.2018 17:36:59

Mid CH



Date: 18.APR.2018 17:36:01

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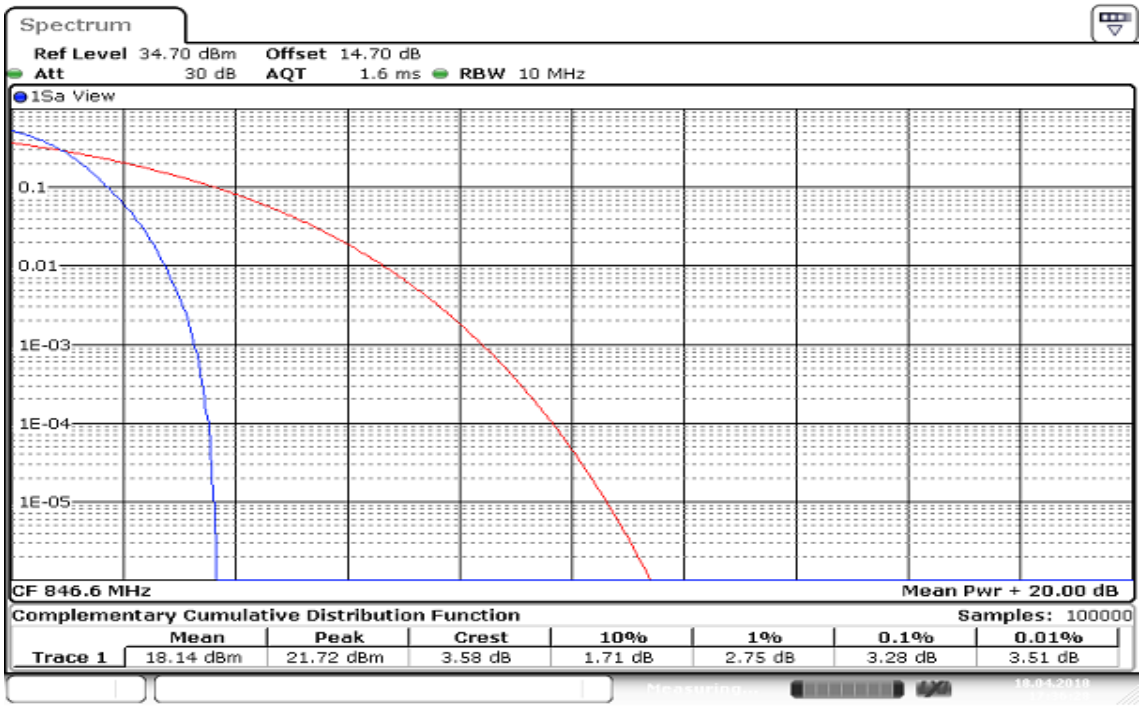
High CH



Date: 18.APR.2018 17:36:29

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8.6 CONDUCTED SPURIOUS EMISSIONS

Limit

FCC §22.917(a), Band V

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 II

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 Power Meas License Digital Systems section 6.0 and TIA-603-E secion 2.2.13,

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.

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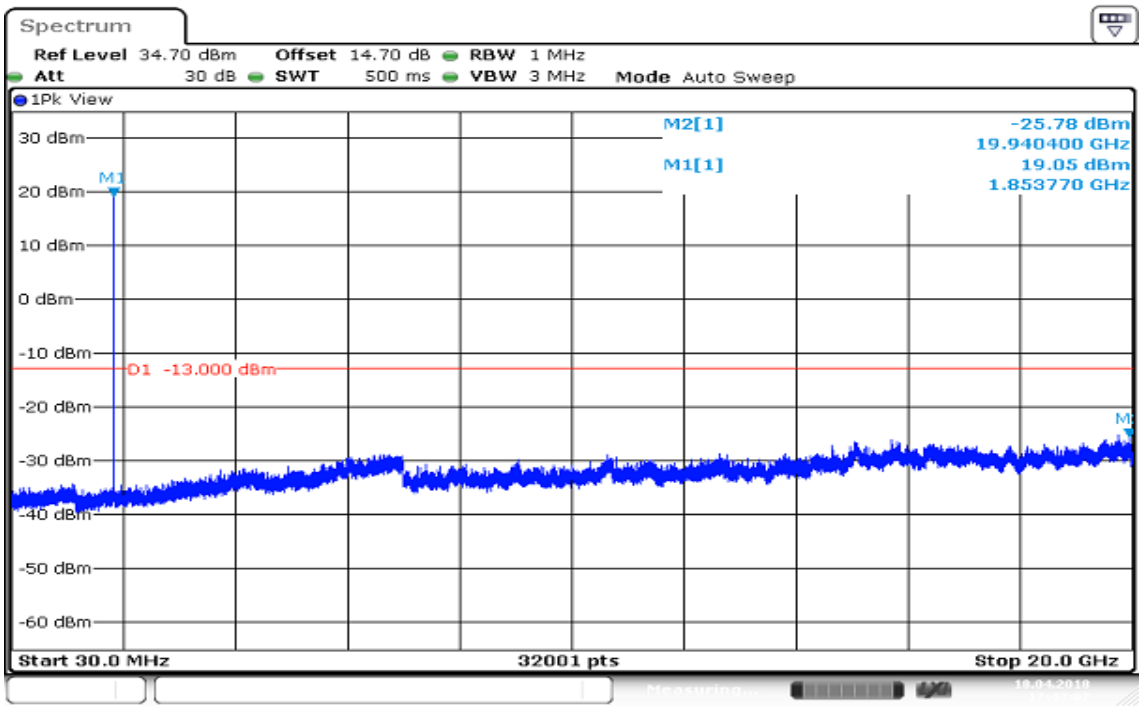
Test Data

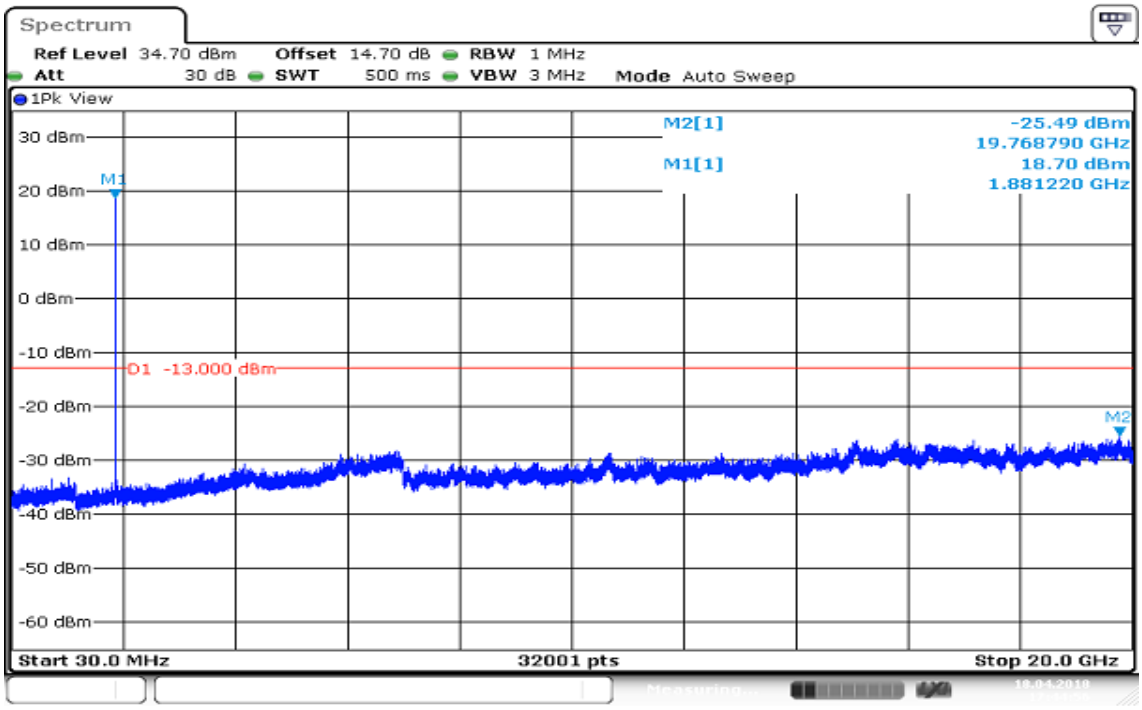
WCDMA 12.2k RMC (Band II)

Low CH



Date: 18.APR.2018 17:43:07

Mid CH



Date: 18.APR.2018 17:44:57

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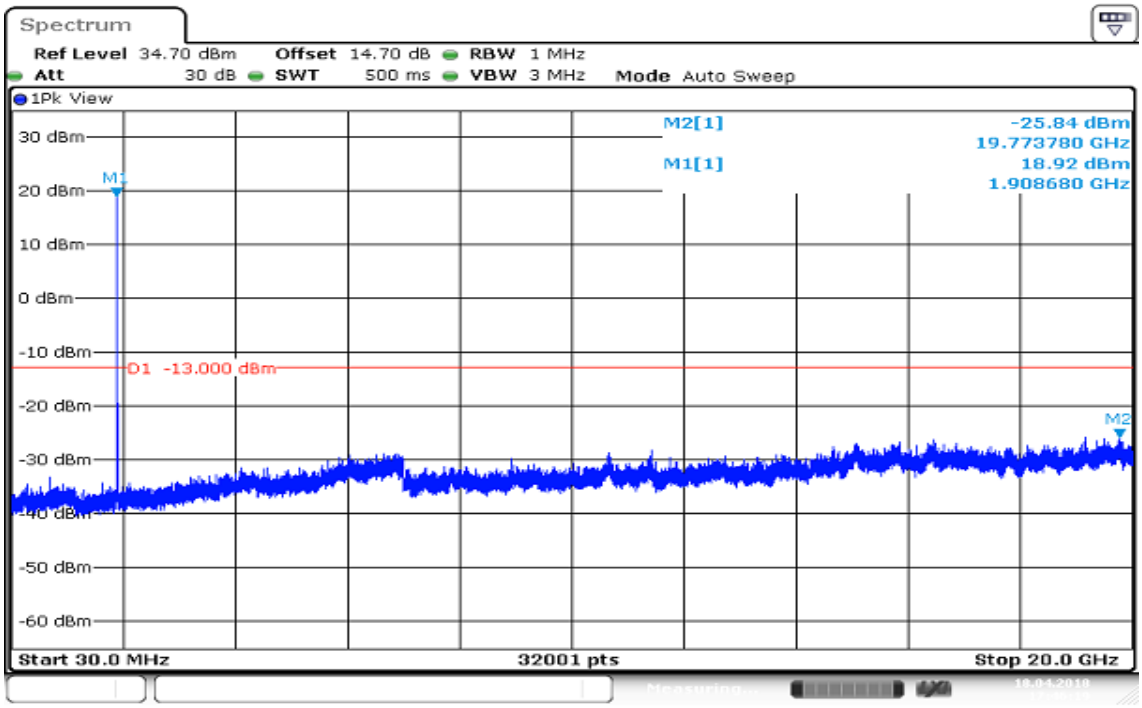
High CH



Date: 18.APR.2018 17:46:20

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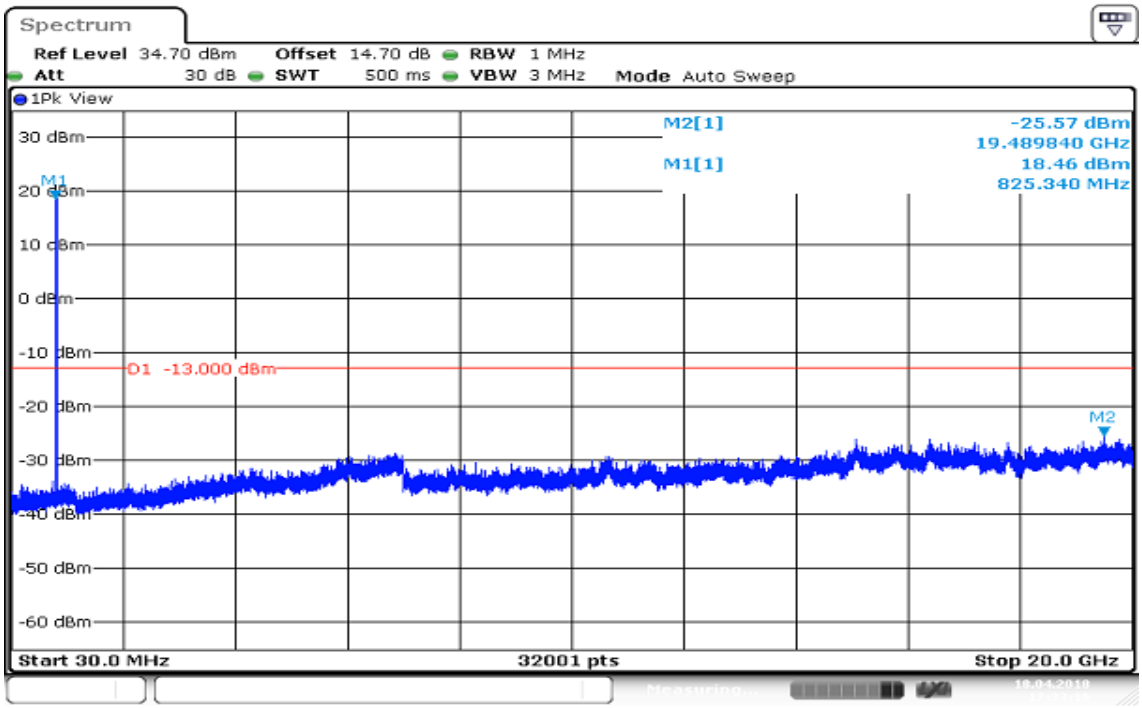
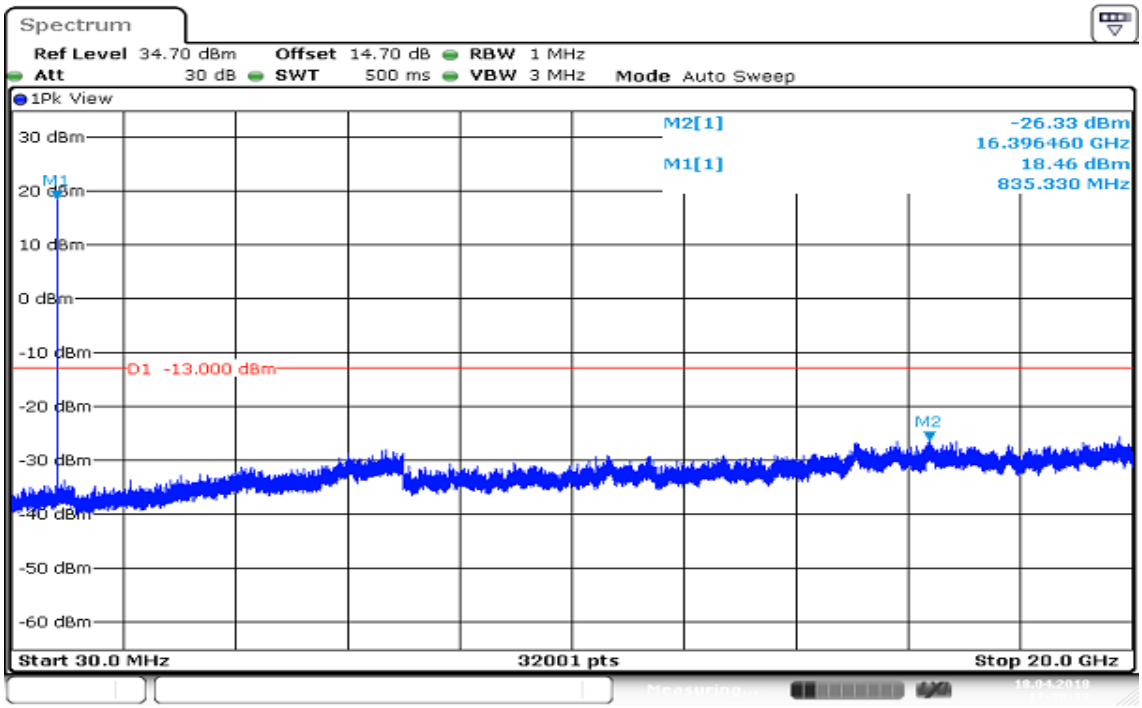
WCDMA 12.2k RMC (Band V)

Low CH



Date: 18.APR.2018 17:33:16

Mid CH



Date: 18.APR.2018 17:38:12

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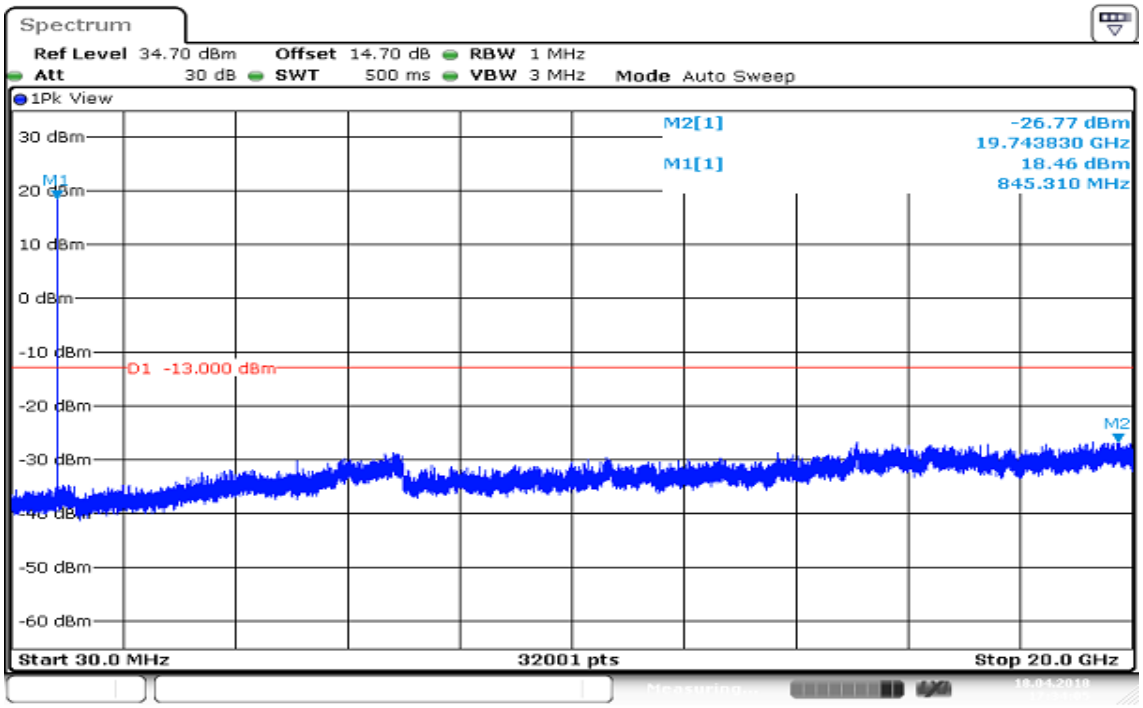
High CH



Date: 18.APR.2018 17:34:06

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8.7 SPURIOUS RADIATION MEASUREMENT

Limit

FCC §22.917(a), Band V

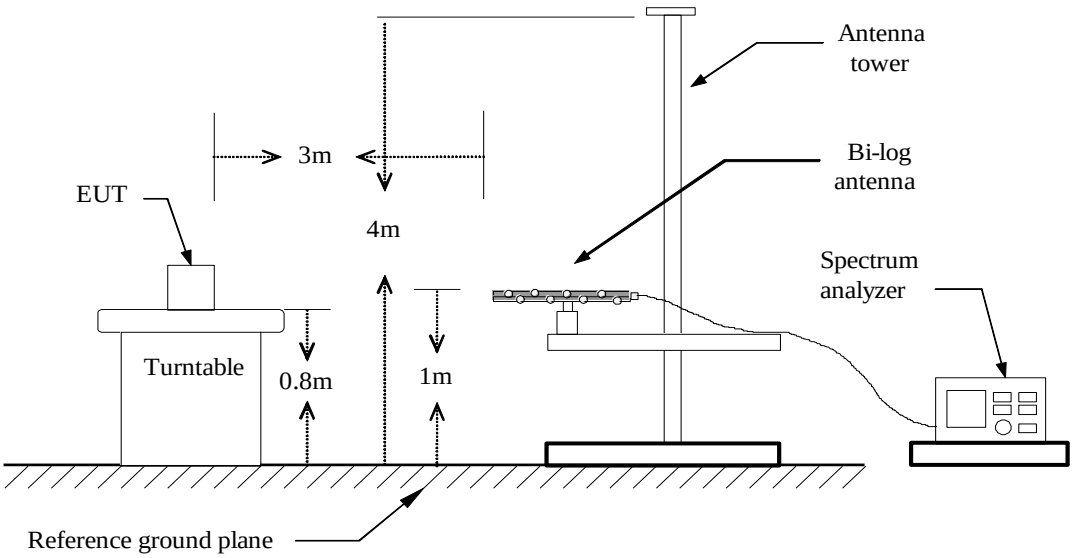
For operations in the 824-849 MHz band, out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

FCC §24.238(a), Band II

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



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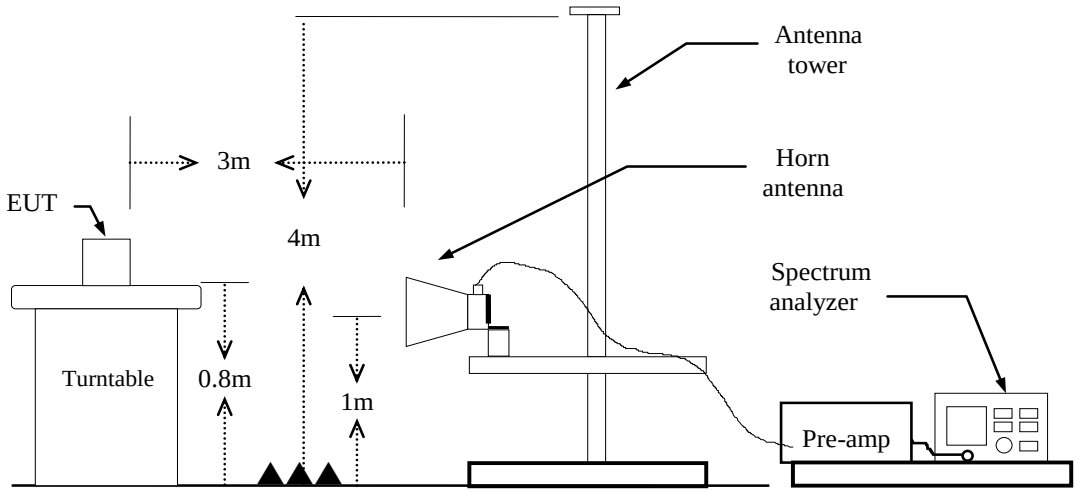
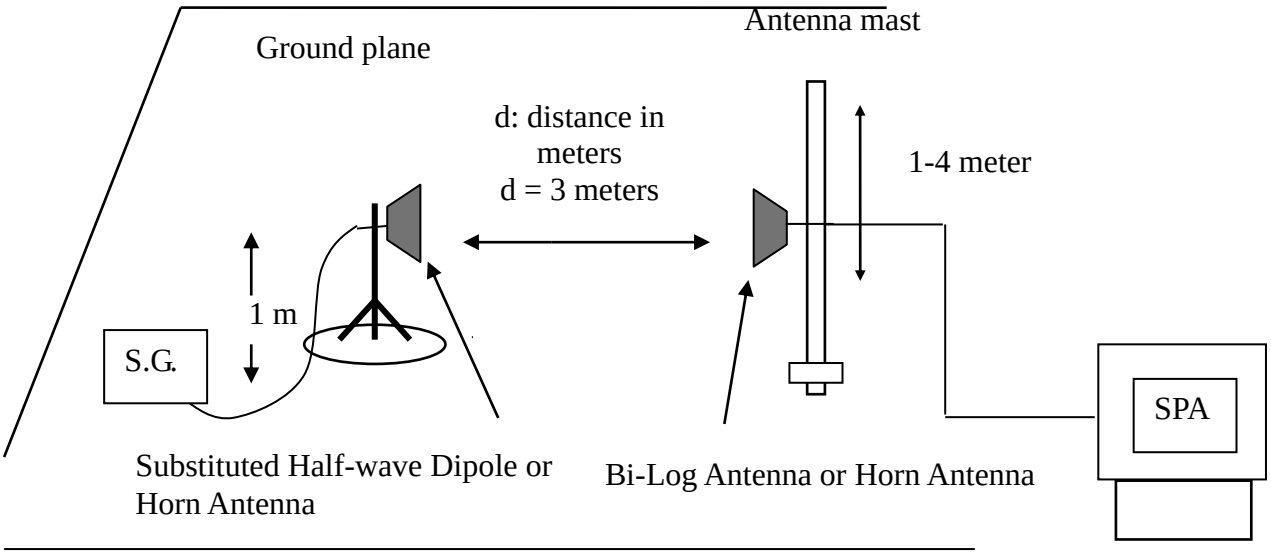
Above 1 GHz



Substituted Method Test Set-up



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TEST PROCEDURE

1. According to KDB 971168 D01 Power Meas License Digital Systems section 6 and TIA-603-E 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 (dBi) – Cable (dB) - 2.15

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

For test result, the S.G. value is including antenna gain and cable loss.

TEST RESULTS

Refer to the attached tabular data sheets.

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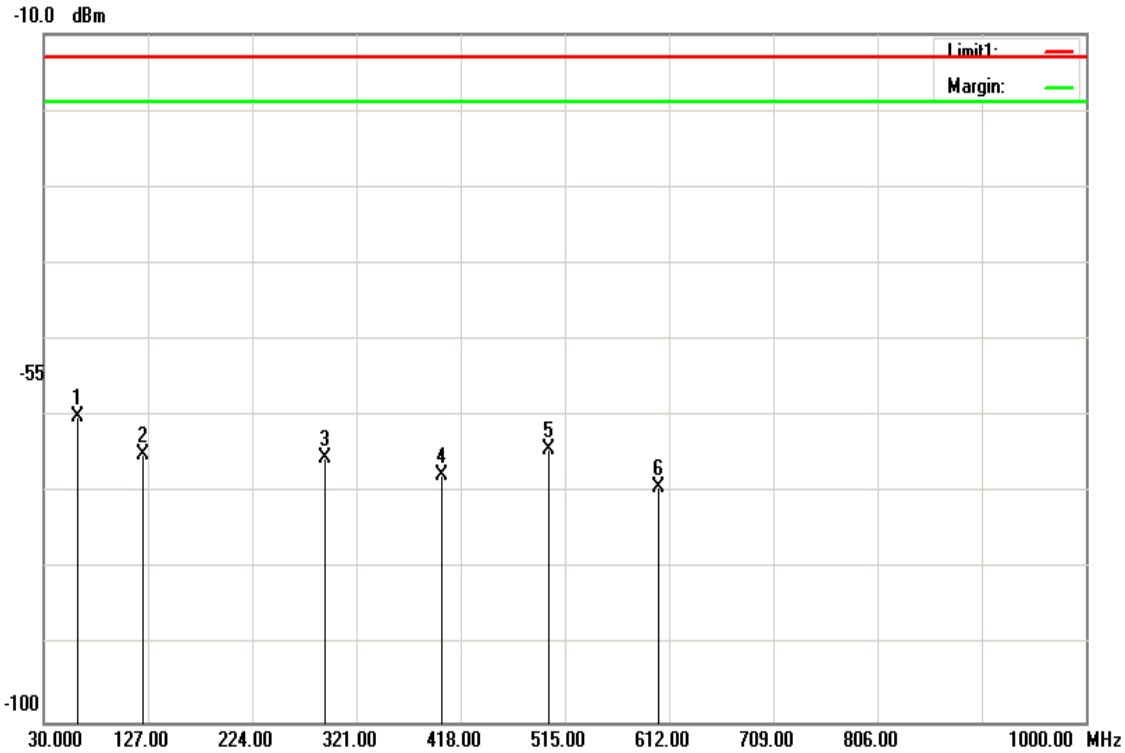
Radiated Spurious Emission Measurement Result / Below 1GHz

Operation Mode:	WCDMA 12.2k RMC Band II / TX /Mid CH	**Test Date:**	November 27, 2017
Temperature:	21℃	**Tested by:**	Kevin Kuo
Humidity:	54 % RH	**Polarity:**	Ver.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
61.5250	-59.06	-1	-60.06	-13.00	-47.06	V
122.1500	-65.96	0.93	-65.03	-13.00	-52.03	V
291.9000	-72.51	6.98	-65.53	-13.00	-52.53	V
401.0250	-75.08	7.29	-67.79	-13.00	-54.79	V
500.4500	-71.04	6.8	-64.24	-13.00	-51.24	V
602.3000	-67.93	-1.45	-69.38	-13.00	-56.38	V

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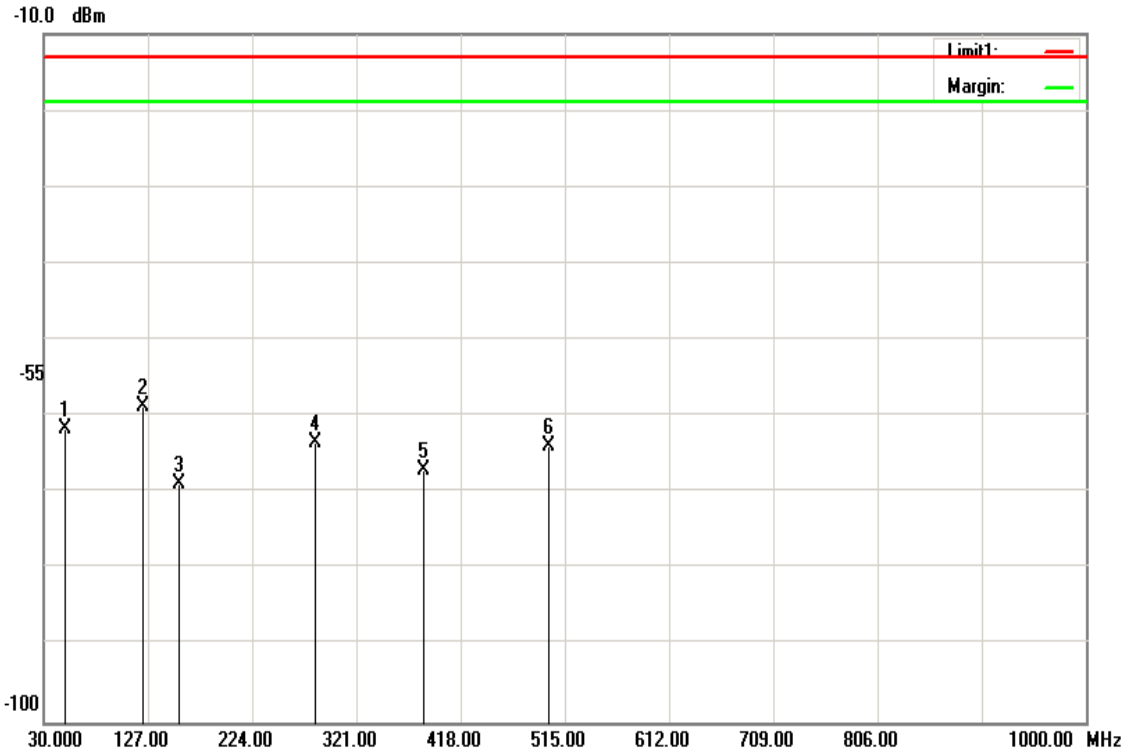
Operation Mode:	WCDMA 12.2k RMC Band II / TX /Mid CH	**Test Date:**	November 27, 2017
Temperature:	21℃	**Tested by:**	Kevin Kuo
Humidity:	54 % RH	**Polarity:**	Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
49.4000	-58.99	-2.56	-61.55	-13.00	-48.55	H
122.1500	-59.68	0.93	-58.75	-13.00	-45.75	H
156.1000	-68.57	-0.25	-68.82	-13.00	-55.82	H
282.2000	-70.63	7.08	-63.55	-13.00	-50.55	H
384.0500	-74.3	7.24	-67.06	-13.00	-54.06	H
500.4500	-70.79	6.8	-63.99	-13.00	-50.99	H

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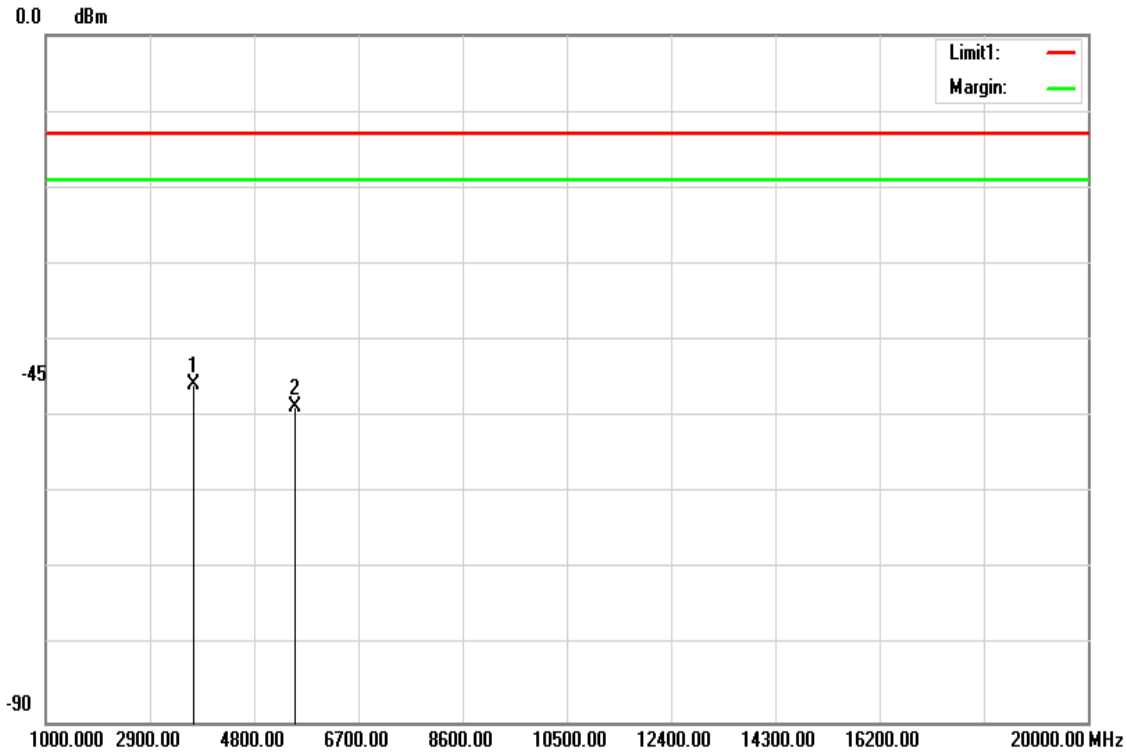
Above 1GHz

Operation Mode:	WCDMA 12.2k RMC Band II / TX / Low CH	**Test Date:**	November 27, 2017
Temperature:	21℃	**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	-58.25	12.54	-45.71	-13.00	-32.71	V
5557.000	-61.6	12.88	-48.72	-13.00	-35.72	V
N/A						

Remark:

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

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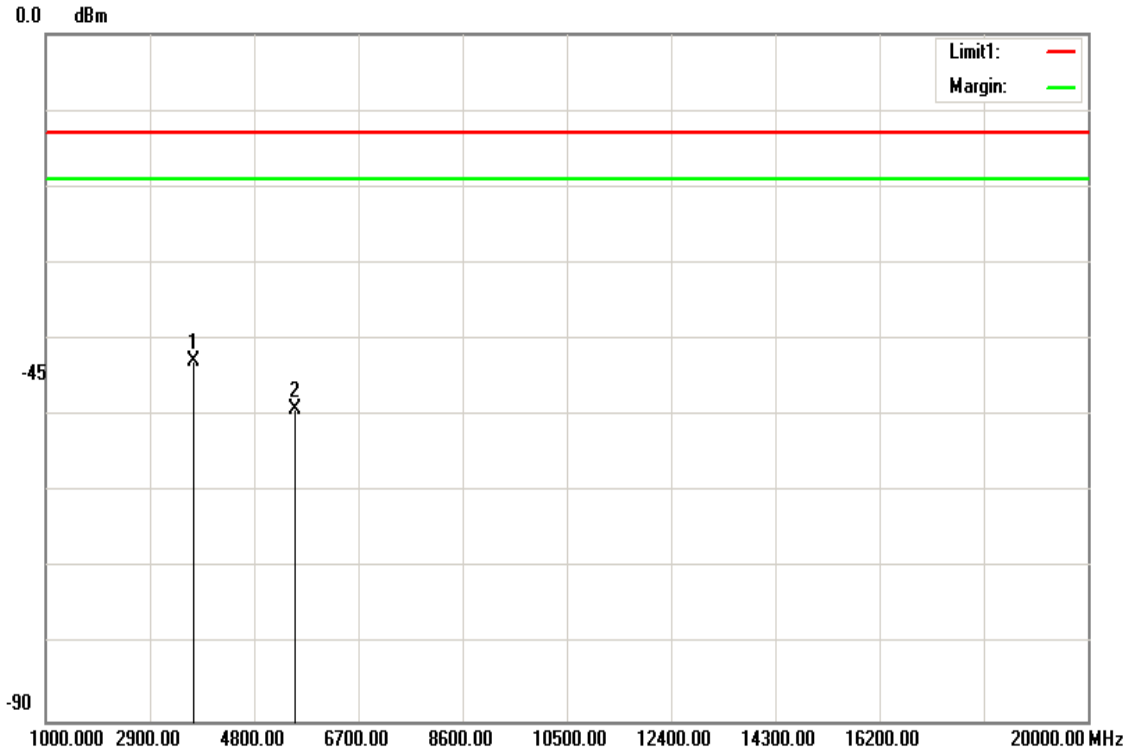
Operation Mode:	WCDMA 12.2k RMC Band II / TX / Low CH	**Test Date:**	November 27, 2017
Temperature:	21℃	**Tested by:**	Kevin Kuo
Humidity:	52 % RH	**Polarity:**	Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
3704.000	-55.44	12.54	-42.90	-13.00	-29.90	H
5557.000	-62.02	12.88	-49.14	-13.00	-36.14	H
N/A						

Remark:

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

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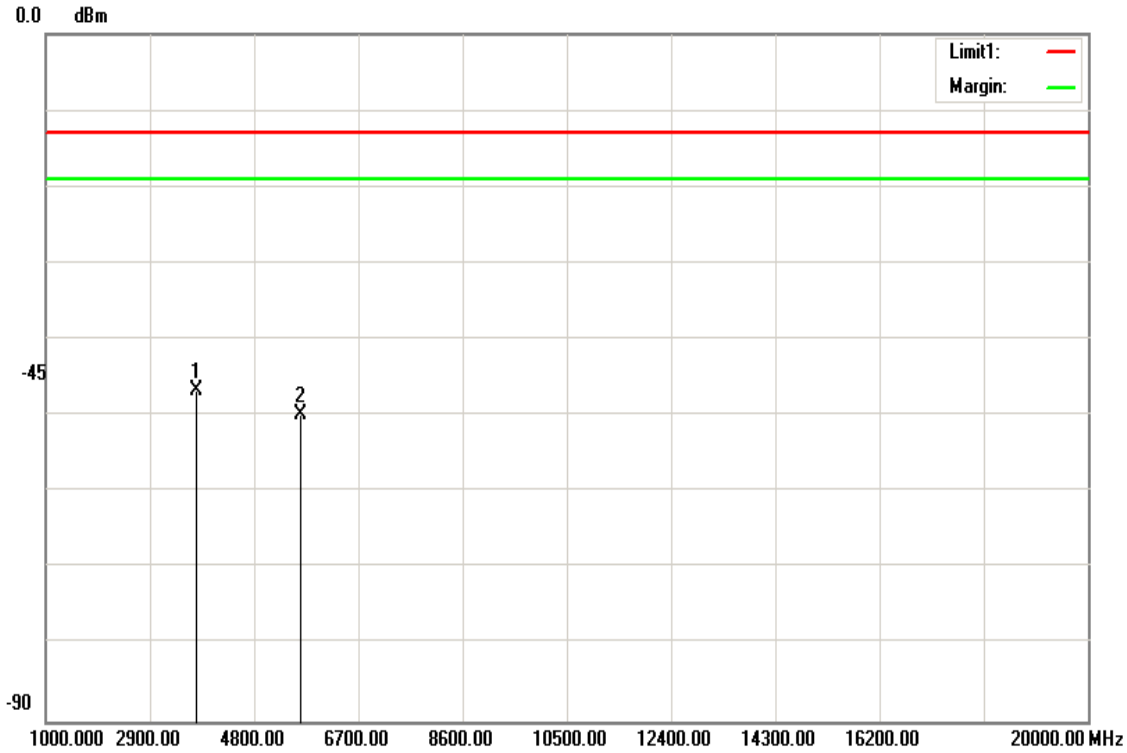
Operation Mode:	WCDMA 12.2k RMC Band II / TX / Mid CH	**Test Date:**	November 27, 2017
Temperature:	21℃	**Tested by:**	Kevin Kuo
Humidity:	54 % RH	**Polarity:**	Ver.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
3760.000	-59.28	12.55	-46.73	-13.00	-33.73	V
5640.000	-62.57	12.84	-49.73	-13.00	-36.73	V
N/A						

Remark:

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

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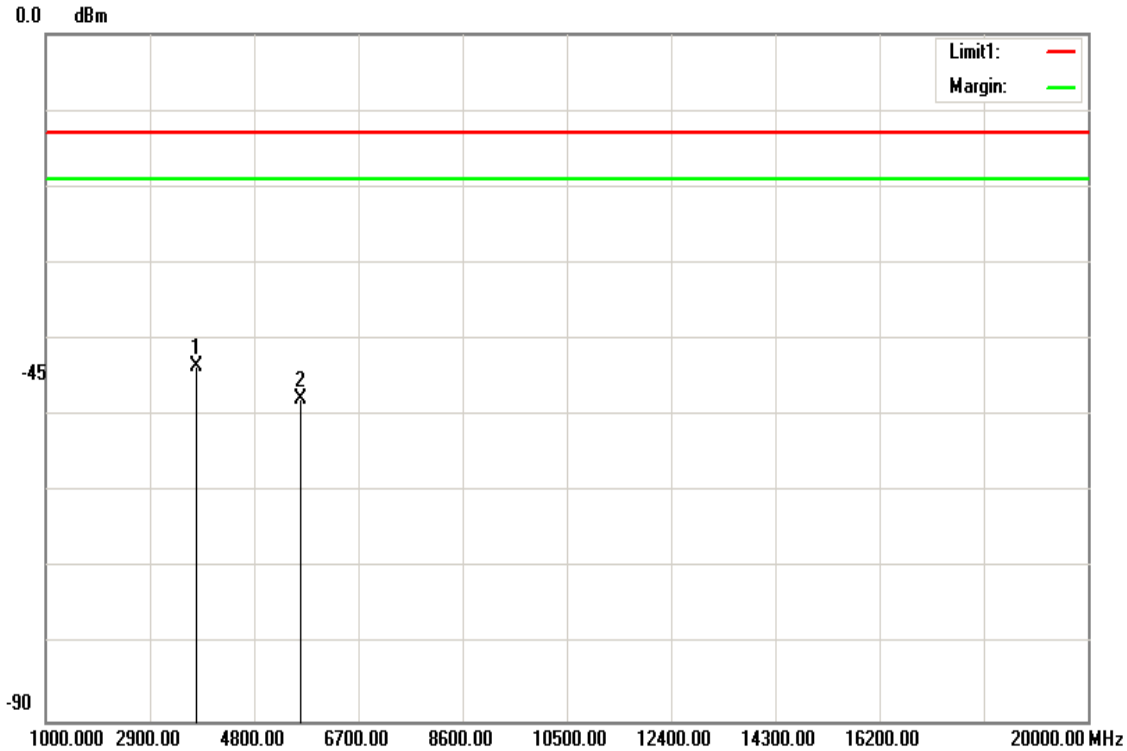
Operation Mode:	WCDMA 12.2k RMC Band II / TX / Mid CH	**Test Date:**	November 27, 2017
Temperature:	21℃	**Tested by:**	Kevin Kuo
Humidity:	54 % RH	**Polarity:**	Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
3760.000	-56.04	12.55	-43.49	-13.00	-30.49	H
5640.000	-60.72	12.84	-47.88	-13.00	-34.88	H
N/A						

Remark:

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

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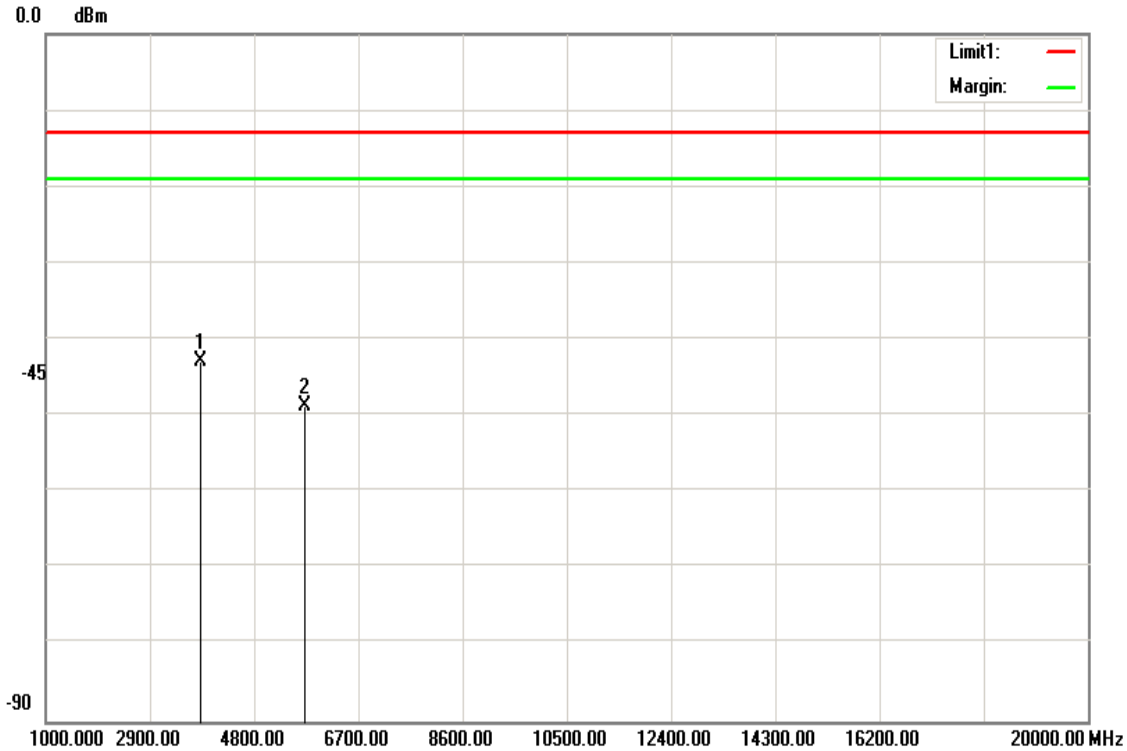
Operation Mode:	WCDMA 12.2k RMC Band II / TX / High CH	**Test Date:**	November 27, 2017
Temperature:	21℃	**Tested by:**	Kevin Kuo
Humidity:	54 % RH	**Polarity:**	Ver.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
3814.000	-55.36	12.56	-42.80	-13.00	-29.80	V
5725.000	-61.5	12.81	-48.69	-13.00	-35.69	V
N/A						

Remark:

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

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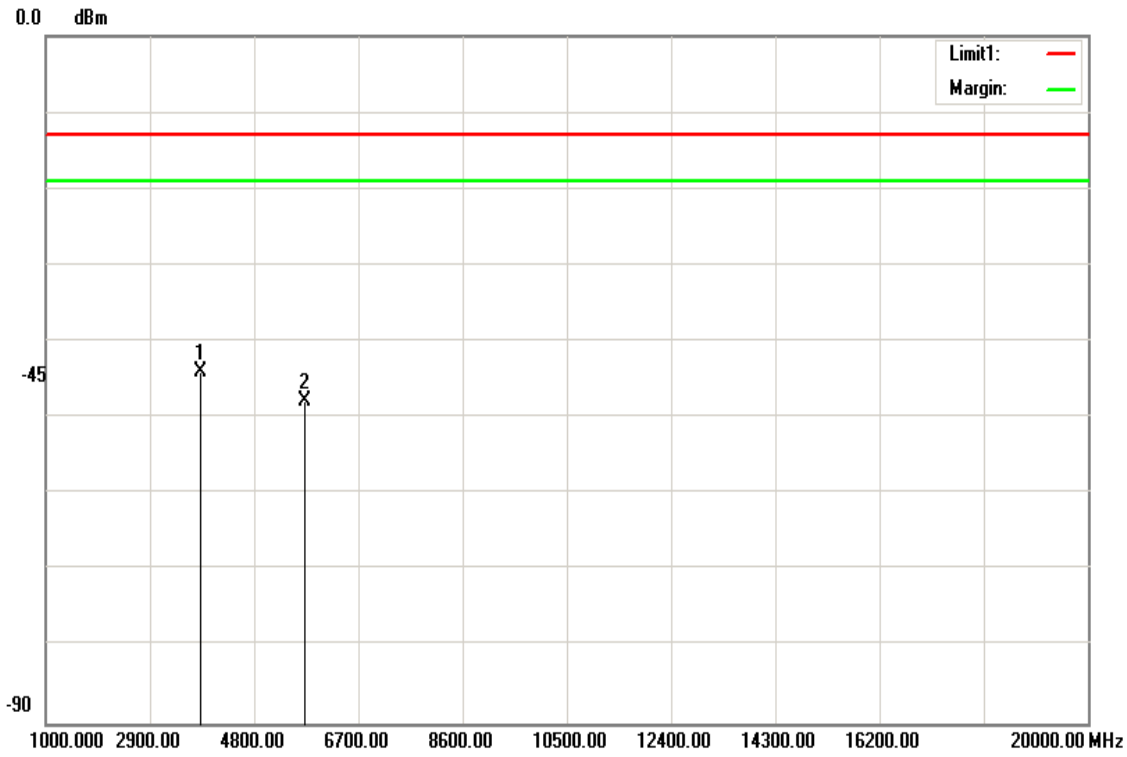
Operation Mode:	WCDMA 12.2k RMC Band II / TX / High CH	**Test Date:**	November 27, 2017
Temperature:	21℃	**Tested by:**	Kevin Kuo
Humidity:	54 % RH	**Polarity:**	Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
3814.000	-56.48	12.56	-43.92	-13.00	-30.92	H
5725.000	-60.55	12.81	-47.74	-13.00	-34.74	H
N/A						

Remark:

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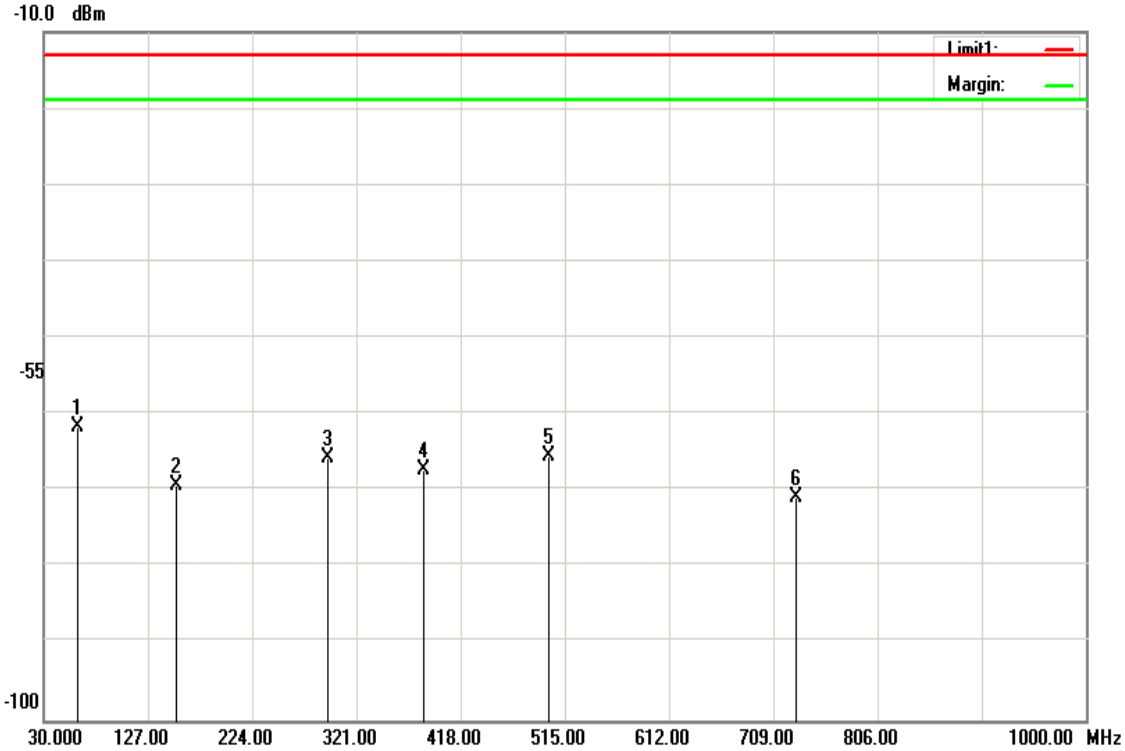
Radiated Spurious Emission Measurement Result / Below 1GHz

Operation Mode:	WCDMA 12.2k RMC Band V / TX /Mid CH	**Test Date:**	November 27, 2017
Temperature:	21℃	**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)
61.5250	-60.61	-1	-61.61	-13.00	-48.61	V
153.6750	-69.16	-0.03	-69.19	-13.00	-56.19	V
294.3250	-72.62	6.96	-65.66	-13.00	-52.66	V
384.0500	-74.41	7.24	-67.17	-13.00	-54.17	V
500.4500	-72.23	6.8	-65.43	-13.00	-52.43	V
730.8250	-72.58	1.82	-70.76	-13.00	-57.76	V

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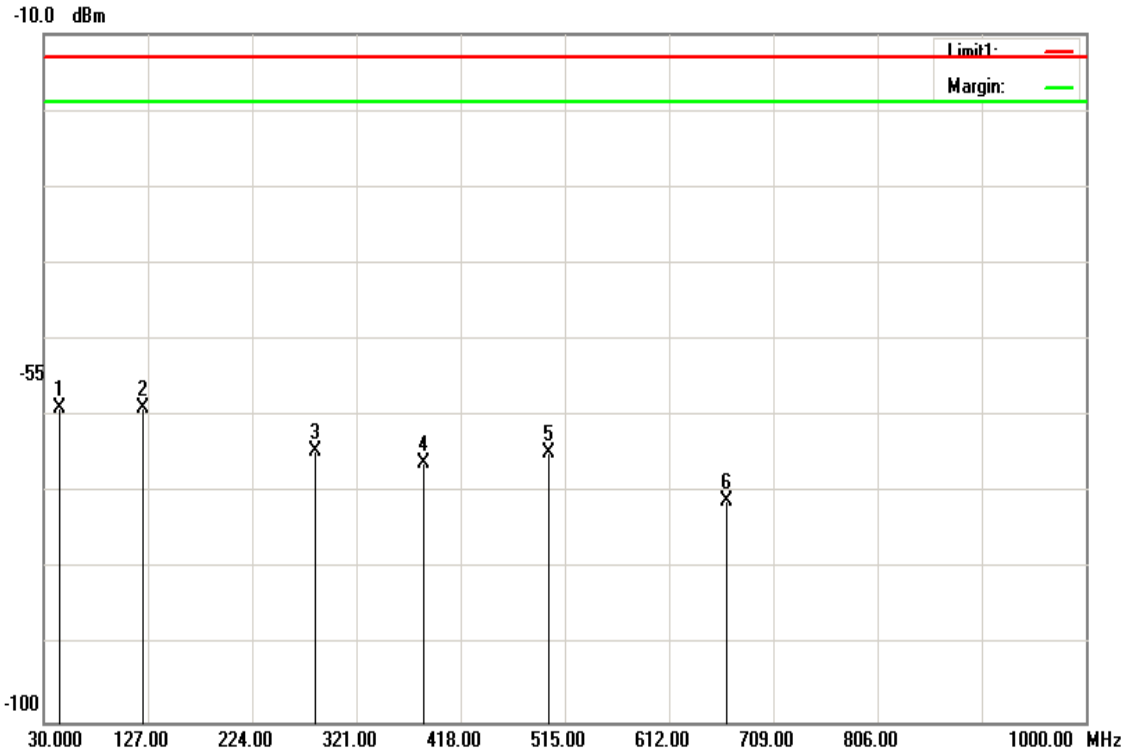
Operation Mode:	WCDMA 12.2k RMC Band V / TX /Mid CH	**Test Date:**	November 27, 2017
Temperature:	21℃	**Tested by:**	Kevin Kuo
Humidity:	54 % RH	**Polarity:**	Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
44.5500	-54.4	-4.59	-58.99	-13.00	-45.99	H
122.1500	-59.93	0.93	-59.00	-13.00	-46.00	H
282.2000	-71.59	7.08	-64.51	-13.00	-51.51	H
384.0500	-73.44	7.24	-66.20	-13.00	-53.20	H
500.4500	-71.57	6.8	-64.77	-13.00	-51.77	H
665.3500	-72.69	1.52	-71.17	-13.00	-58.17	H

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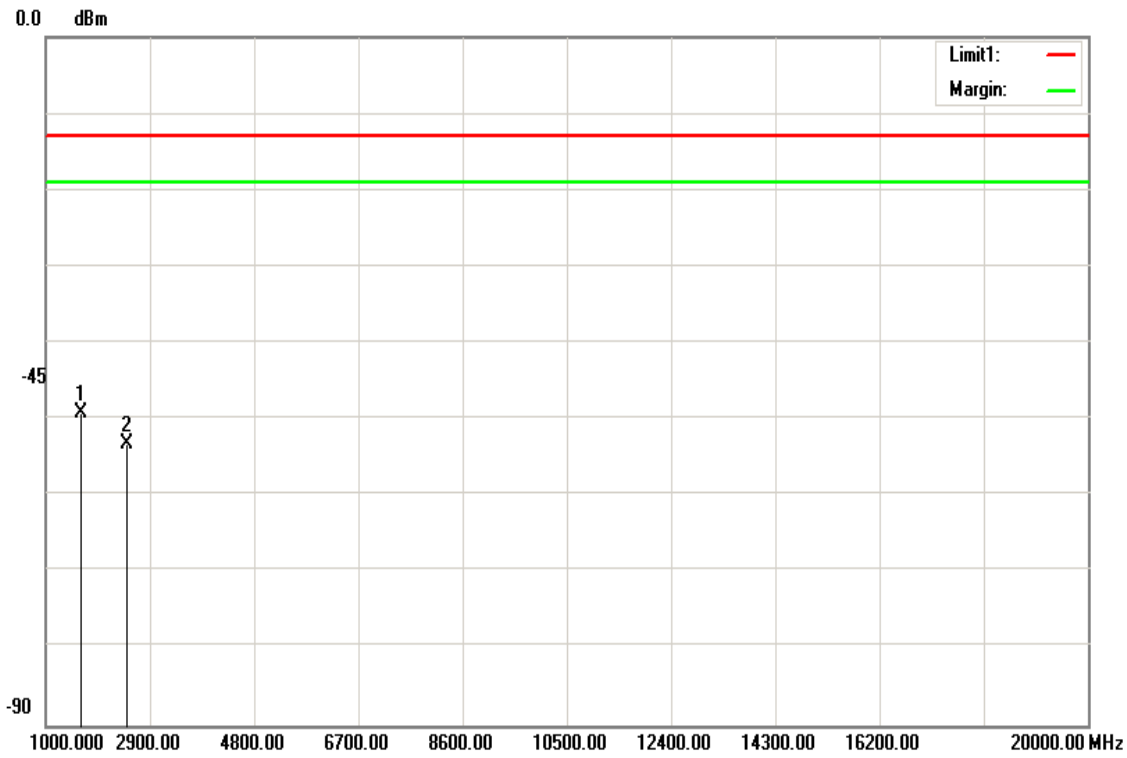
Above 1GHz

Operation Mode:	WCDMA 12.2k RMC Band V / TX / Low CH	**Test Date:**	November 27, 2017
Temperature:	21℃	**Tested by:**	Kevin Kuo
Humidity:	54 % RH	**Polarity:**	Ver.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1658.000	-50.58	1.52	-49.06	-13.00	-36.06	V
2477.000	-55.15	1.83	-53.32	-13.00	-40.32	V
N/A						

Remark:

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

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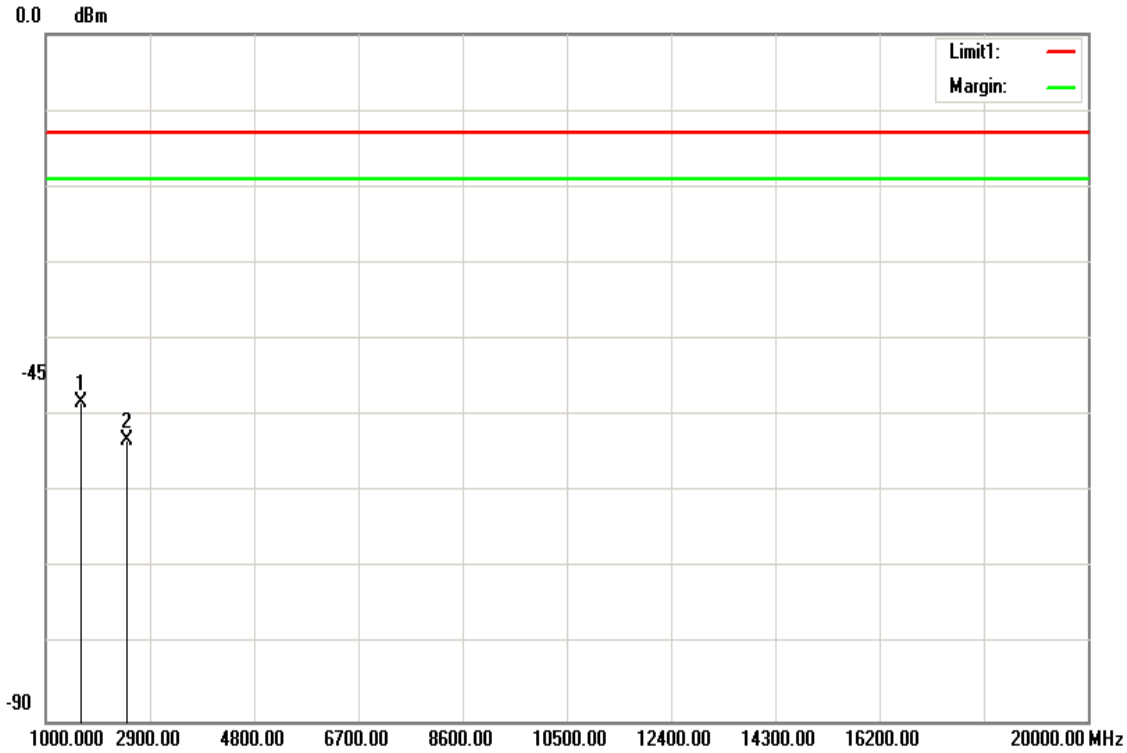
Operation Mode:	WCDMA 12.2k RMC Band V / TX / Low CH	**Test Date:**	November 27, 2017
Temperature:	21℃	**Tested by:**	Kevin Kuo
Humidity:	52 % RH	**Polarity:**	Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1658.000	-49.72	1.52	-48.20	-13.00	-35.20	H
2477.000	-55.13	1.83	-53.30	-13.00	-40.30	H
N/A						

Remark:

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

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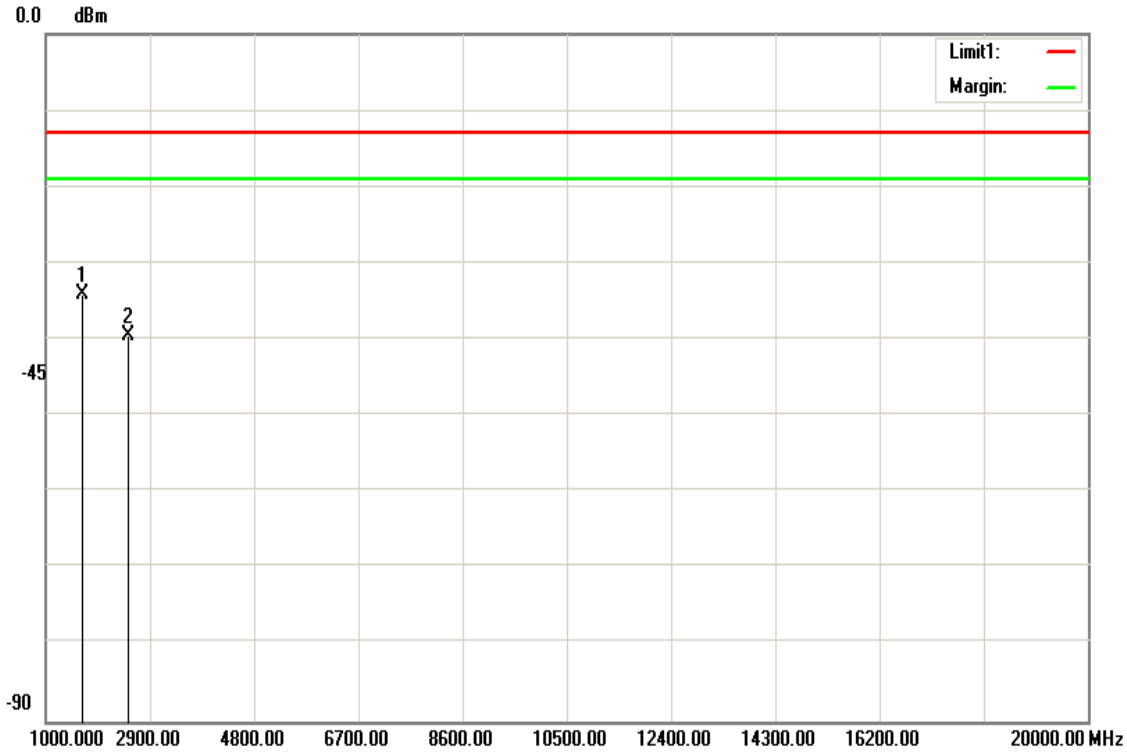
Operation Mode:	WCDMA 12.2k RMC Band V / TX / Mid CH	**Test Date:**	November 27, 2017
Temperature:	21℃	**Tested by:**	Kevin Kuo
Humidity:	52 % RH	**Polarity:**	Ver.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1672.000	-35.7	1.52	-34.18	-13.00	-21.18	V
2505.000	-41.35	1.94	-39.41	-13.00	-26.41	V
N/A						

Remark:

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

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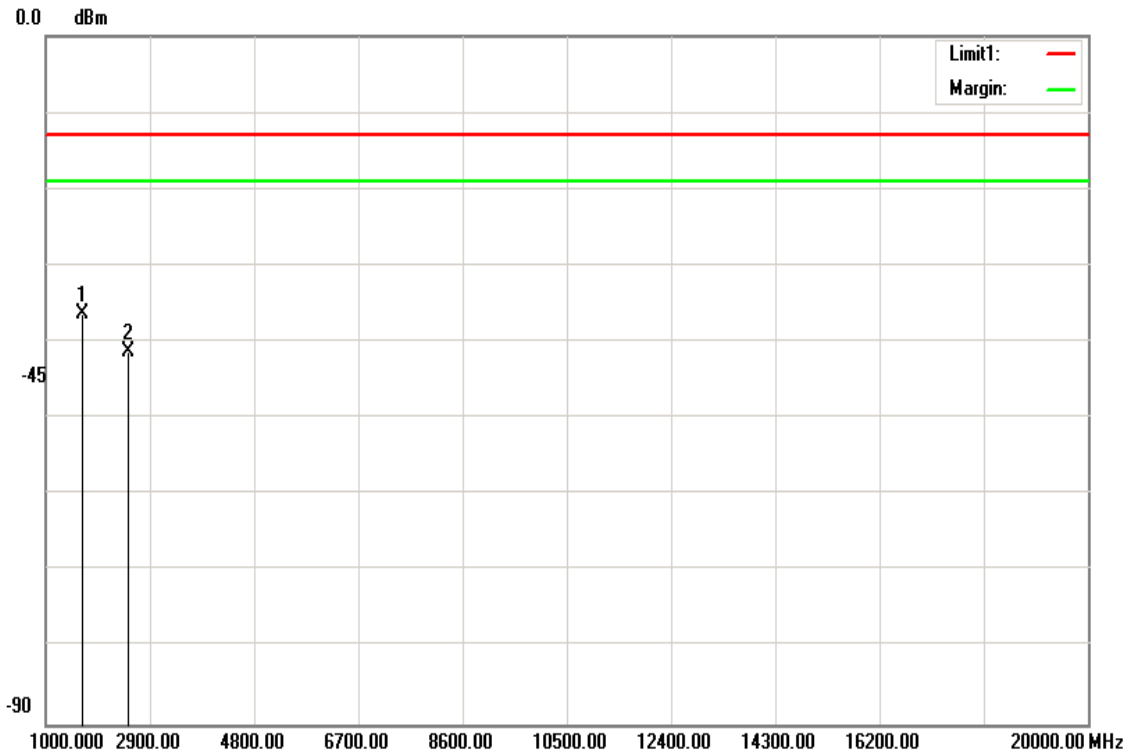
Operation Mode:	WCDMA 12.2k RMC Band V / TX / Mid CH 4182	**Test Date:**	November 27, 2017
Temperature:	21℃	**Tested by:**	Kevin Kuo
Humidity:	52 % RH	**Polarity:**	Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1672.000	-37.95	1.52	-36.43	-13.00	-23.43	H
2505.000	-43.21	1.94	-41.27	-13.00	-28.27	H
N/A						

Remark:

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

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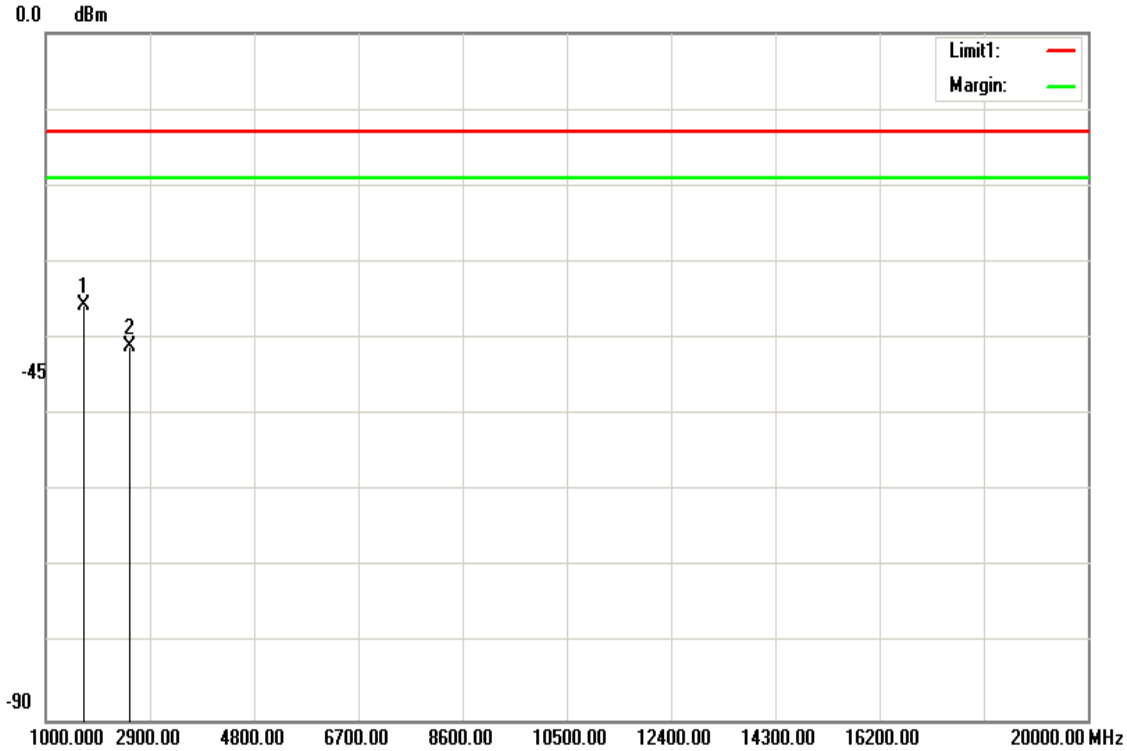
Operation Mode:	WCDMA 12.2k RMC Band V / TX /High CH	**Test Date:**	November 27, 2017
Temperature:	21℃	**Tested by:**	Kevin Kuo
Humidity:	52 % RH	**Polarity:**	Ver.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1693.000	-37.26	1.51	-35.75	-13.00	-22.75	V
2533.000	-43.46	2.47	-40.99	-13.00	-27.99	V
N/A						

Remark:

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

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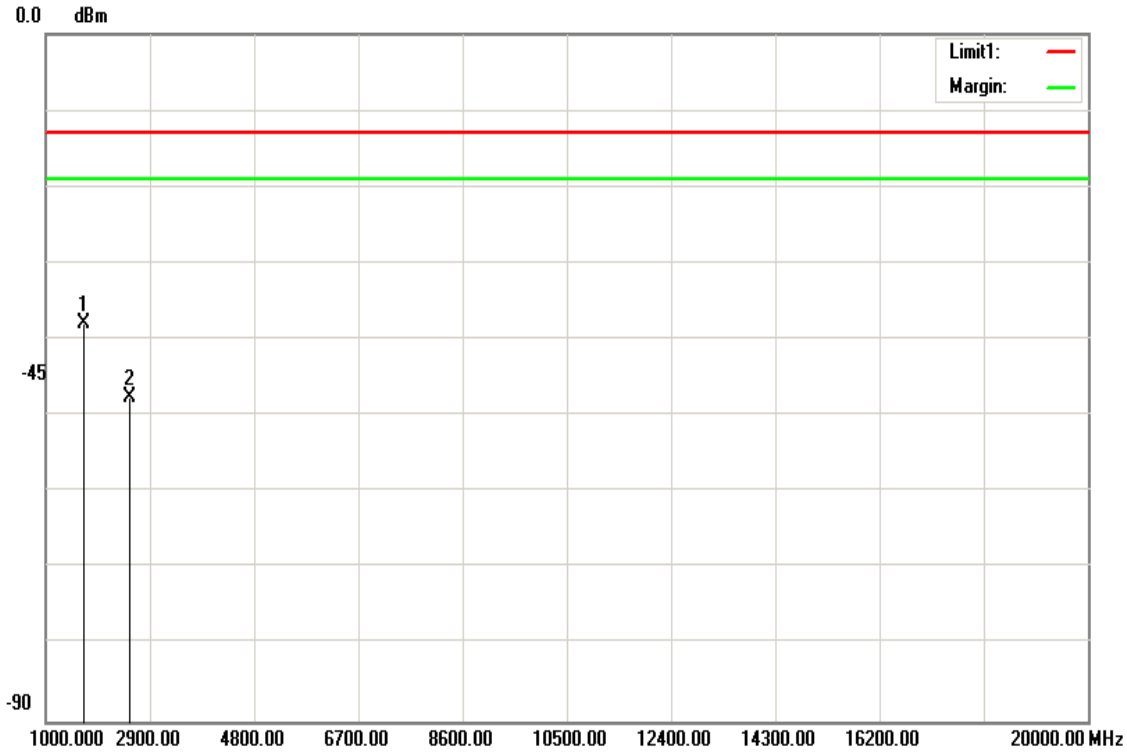
Operation Mode:	WCDMA 12.2k RMC Band V / TX /High CH	**Test Date:**	November 27, 2017
Temperature:	21℃	**Tested by:**	Kevin Kuo
Humidity:	52 % RH	**Polarity:**	Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1693.000	-39.43	1.51	-37.92	-13.00	-24.92	H
2533.000	-49.97	2.47	-47.50	-13.00	-34.50	H
N/A						

Remark:

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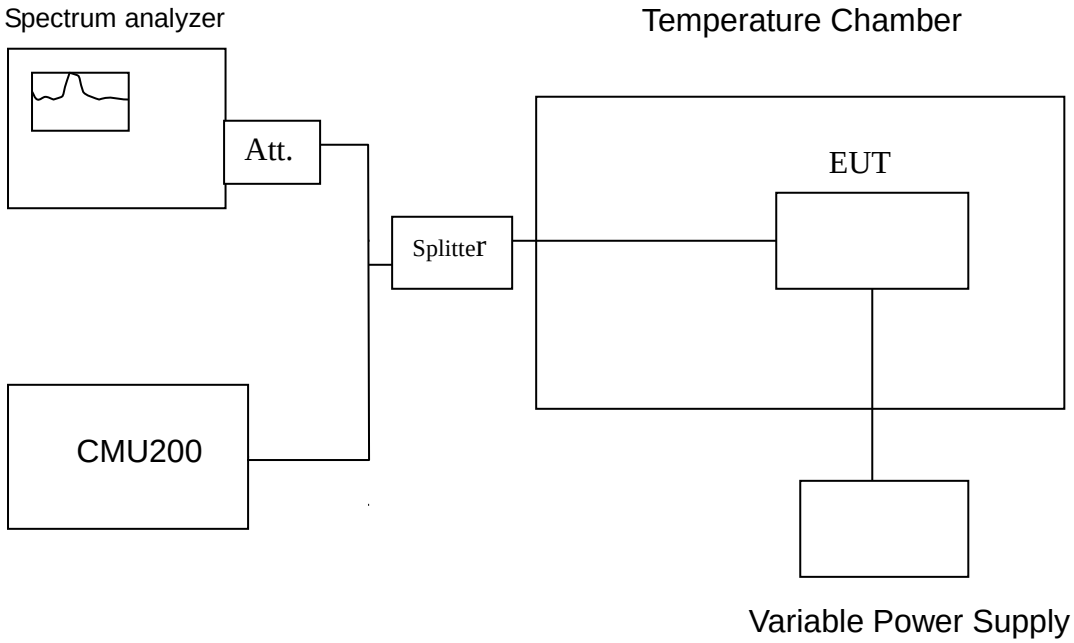
8.8 FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT

LIMIT

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

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block

Test Configuration



Remark: *Measurement setup for testing on Antenna connector*

TEST PROCEDURE

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20℃ operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30℃. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10ºC increased per stage until the highest temperature of +50℃ reached.

TEST RESULTS

No non-compliance noted.

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TEST RESULTS

FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT:

Reference Frequency: WCDMA 12.2k RMC Band II Low Channel 1852.4 MHz		
Limit: 1852.4 ~ 1907.6 MHz		
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Error(Hz)
12	50	-4.00
12	40	-2.00
12	30	-4.00
12	20	-5.00
12	10	-2.00
12	0	-3.00
12	-10	-6.00
12	-20	-4.00

Reference Frequency: WCDMA 12.2k RMC Band II Mid Channel 1880 MHz		
Limit: 1852.4 ~ 1907.6 MHz		
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Error(Hz)
12	50	-4.00
12	40	-3.00
12	30	-6.00
12	20	-7.00
12	10	-6.00
12	0	-5.00
12	-10	-7.00
12	-20	-5.00

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Reference Frequency: WCDMA 12.2k RMC Band II High Channel 1907.6 MHz		
Limit: 1852.4 ~ 1907.6 MHz		
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Error(Hz)
12	50	-13.00
12	40	-10.00
12	30	-11.00
12	20	-10.00
12	10	-12.00
12	0	-10.00
12	-10	-11.00
12	-20	-10.00

Reference Frequency: WCDMA 12.2k RMC Band V Low Channel 826.4 MHz		
Limit: 826.4 ~ 846.6MHz		
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Error(Hz)
12	50	1.00
12	40	2.00
12	30	-1.00
12	20	1.00
12	10	1.00
12	0	3.00
12	-10	2.00
12	-20	1.00

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Reference Frequency: WCDMA 12.2k RMC Band V Mid Channel 836.6 MHz		
Limit: 826.4 ~ 846.6MHz		
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Error(Hz)
12	50	2.00
12	40	2.00
12	30	1.00
12	20	1.00
12	10	1.00
12	0	-1.00
12	-10	2.00
12	-20	1.00

Reference Frequency: WCDMA 12.2k RMC Band V High Channel 846.6 MHz		
Limit: 826.4 ~ 846.6MHz		
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Error(Hz)
12	50	-1.00
12	40	1.00
12	30	-1.00
12	20	0.00
12	10	2.00
12	0	-1.00
12	-10	0.00
12	-20	1.00

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FREQUENCY STABILITY V.S. VOLTAGE MEASUREMENT:

Reference Frequency: WCDMA 12.2k RMC Band II Low Channel 1852.4 MHz		
Limit: 1852.4 ~ 1907.6 MHz		
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Error(Hz)
10.2	20	-4.00
12		-5.00
13.8		-5.00

Reference Frequency: WCDMA 12.2k RMC Band II Mid Channel 1880 MHz		
Limit: 1852.4 ~ 1907.6 MHz		
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Error(Hz)
10.2	20	-6.00
12		-7.00
13.8		-7.00

Reference Frequency: WCDMA 12.2k RMC Band II High Channel 1907.6 MHz		
Limit: 1852.4 ~ 1907.6 MHz		
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Error(Hz)
10.2	20	-12.00
12		-10.00
13.8		-10.00

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Reference Frequency: WCDMA 12.2k RMC Band V Mid Channel 826.4 MHz		
Limit: 826.4 ~ 846.6MHz		
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Error(Hz)
10.2	20	2.00
12		1.00
13.8		2.00

Reference Frequency: WCDMA 12.2k RMC Band V Mid Channel 836.6 MHz		
Limit: 826.4 ~ 846.6MHz		
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Error(Hz)
10.2	20	1.00
12		0.00
13.8		2.00

Reference Frequency: WCDMA 12.2k RMC Band V Mid Channel 846.6 MHz		
Limit: 826.4 ~ 846.6MHz		
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Error(Hz)
10.2	20	1.00
12		2.00
13.8		-1.00

-- End of Test Report --

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