FCC 47 CFR PART 22 SUBPART H AND PART 24 SUBPART E
&
INDUSTRY CANADA RSS-132 & RSS-133

Computer

FCC Model No.: AIM8IEM; AIM8IEMxxxxxxxxxxxxxxxxx (where "x" may be any alphanumeric character, "-" or blank for marketing purpose and no impact safety related critical components and constructions)

IC Model No.: AIM8IEM

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.)
Issued Date: January 3, 2019

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		January 3, 2019		Initial Issue	ALL	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

FCC Model No.: AIM8IEM; AIM8IEMxxxxxxxxxxxxxxxx (where "x" may be any alphanumeric character, "-" or blank for marketing purpose and no impact safety related critical components and constructions)

IC Model No.: AIM8IEM

Date of Test: December 4 ~ 7, 2018

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
FCC 47 CFR Part 22 Subpart H & Part 24 Subpart E & IC RSS-132 Issue 3: January, 2013 and IC RSS-133 Issue 6: January, 2018	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 ANSI C63.26-2015 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:

Jerry Chuang
Engineer
Compliance Certification Services Inc.

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2. EUT DESCRIPTION

Product	Computer
FCC Model No.	AIM8IEM; AIM8IEMxxxxxxxxxxxxxxxx (where "x" may be any alphanumeric character, "-" or blank for marketing purpose and no impact safety related critical components and constructions)
IC Model No.	AIM8IEM
Model Discrepancy	All the above models are identical except for the designation of model numbers. The suffix of (where "x" may be any alphanumeric character, "-" or blank for marketing purpose and no impact safety related critical components and constructions) on model number is just for marketing purpose only.
Trade Name	ADVANTECH
Received Date	November 23, 2018
Power Supply	1. VDC from Power Adapter Chicony / A16-018N1A I/P: 100-240Vac, 1A, 50-60Hz O/P: 5.15Vdc, 3A, 9.1Vdc, 2A, 18W 2. Battery ADVANTECH / AIM-BAT-8 Rating: 3.8V, 4900, 18.62Wh
Frequency Range	WCDMA / HSDPA / HSUPA Band II: 1852.4 ~ 1907.6 MHz WCDMA / HSDPA / HSUPA Band V: 826.4 ~ 846.6MHz
Transmit Power (ERP & EIRP Power)	WCDMA Band II: 27.62dBm WCDMA Band V: 16.68dBm
Antenna Gain	PIFA Antenna WCDMA band II: -1.98 dBi WCDMA band V: -1.91 dBi

Remark:

1. *The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.*
2. *For test mode WCDMA, HSUPA and HSDPA were pretest. The worst case was WCDMA in this test report*

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**	**0.5781**
	V	**826.4MHz ~ 846.6MHz**	**4M15F9W**	**0.0466**	**N/A**

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3. TEST SUMMARY

FCC Standard Section	IC Standard Section	Report Section	Test Item	Result
-	-	2	Antenna Requirement	Pass
2.1046	RSS-GEN 6.12	8.1	Average Power	Pass
22.913(a), 24.232(c)	RSS-132, section 5.4 RSS-133, section 6.4	8.2	ERP and EIRP Measurement	Pass
2.1049	RSS-GEN 6.7	8.3	Occupied Bandwidth Measurement	Pass
22.917(a), 24.238(a)	RSS-132 section 5.5 RSS-133 section 6.5	8.4	Conducted Band Edge	Pass
22.913(d), 24.232(d)	RSS-132, section 5.4 RSS-133, section 6.4	8.5	Peak to Average Ratio	Pass
22.917(a), 24.238(a)	RSS-132 section 5.5 RSS-133 section 6.5	8.6	Conducted Spurious Emission	Pass
22.917(a), 24.238(a)	RSS-132 section 5.5 RSS-133 section 6.5	8.7	Spurious Radiation Measurement	Pass
2.1055, 22.355, 24.235	RSS-132 section 5.3 RSS-133 section 6.3	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.

After verification, all tests carried out are with the worst-case test modes as shown below except radiated spurious emission below 1GHz and power line conducted emissions below 30MHz, which worst case was in normal link mode and receiving radiated spurious emission above 1GHz, which worst case was in CH Mid mode only.

WCDMA Band II:
Channel Low (CH9262), Channel Mid (CH9400) and Channel High (CH9538) were chosen for full testing.

WCDMA Band V:
Channel Low (CH4132), Channel Mid (CH4182) and Channel High (CH4233) were chosen for full testing.

4.2.1 The worst mode of measurement

Radiated Emission Measurement	
Test Condition	**Emission for Unwanted and Fundamental**
Power supply Mode	**Mode 1: EUT Power by Power Adapter** **Mode 2: EUT Power by battery.**
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 (X-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**
Bilog Antenna	Sunol Sciences	JB1	A052609	03/14/2018	03/13/2019
Cable	HUBER SUHNER	SUCOFLEX 104PEA	23452	06/29/2018	06/28/2019
Cable	HUBER SUHNER	SUCOFLEX 104PEA	33960	06/29/2018	06/28/2019
Digital Radio Communication Tester	R&S	CMU200	116604	07/19/2018	07/18/2019
Digital Thermo-Hygro Meter	WISEWIND	1110	D06	02/08/2018	02/07/2019
Horn Antenna	SCHWARZBECK	BBHA 9120D	779	03/14/2018	03/13/2019
Pre-Amplifier	Anritsu	MH648A	M89145	06/29/2018	06/28/2019
Pre-Amplifier	EMEC	EM01G26G	060570	06/29/2018	06/28/2019
Signal Analyzer	Agilent	N9010A	MY52220817	03/22/2018	03/21/2019
Wideband Radio Communication Tester	R&S	CMW 500	116875	04/20/2018	04/19/2019
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

Conducted Emissions Test Site					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Cal Date**	**Cal Due**
Coaxial Cable	Woken	WC12	CC001	06/29/2018	06/28/2019
Coaxial Cable	Woken	WC12	CC002	06/29/2018	06/28/2019
Power Divider	Solvang Technology	STI08-0015	008	07/27/2018	07/26/2019
Signal Analyzer	R&S	FSV 40	101073	09/27/2018	09/26/2019
Wireless Communication Test Set	Agilent	8960/E5515C	MY48363204	07/23/2018	07/22/2019

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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 A for the actual connections between EUT and support equipment.

7.2 SUPPORT EQUIPMENT

No	Equipment	Brand	Model	Series No.	FCC ID	Data Cable
	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.*

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8. FCC PART 22 & 24 REQUIREMENTS & INDUSTRY CANADA RSS-132 & RSS-133

8.1 AVERAGE POWER

Test Procedures

According to FCC Part 2.1046.
According to RSS-GEN 6.12.

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	22.9	0.19498
		9400/9800	1880.0	23.0	0.19724
		9538/9938	1907.6	22.6	0.18323
WCDMA Band V	RMC 12.2Kbps	4132/4357	826.4	22.7	0.18793
		4183/4408	836.4	22.8	0.19099
		4233/4458	846.6	22.7	0.18750

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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	20.7	0.11803
		9400/9800	1880.0	20.8	0.11912
		9538/9938	1907.0	20.5	0.11169
	2	9262/9662	1852.4	18.8	0.07516
		9400/9800	1880.0	18.8	0.07551
		9538/9938	1907.0	18.6	0.07178
	3	9262/9662	1852.4	20.6	0.11508
		9400/9800	1880.0	20.6	0.11535
		9538/9938	1907.0	20.4	0.11015
	4	9262/9662	1852.4	18.9	0.07780
		9400/9800	1880.0	19.0	0.07925
		9538/9938	1907.0	18.7	0.07345
	5	9262/9662	1852.4	21.5	0.14125
		9400/9800	1880.0	21.6	0.14289
		9538/9938	1907.0	19.1	0.08035
HSUPA V	1	4132/4357	826.4	20.4	0.11066
		4182/4407	836.4	20.5	0.11169
		4233/4458	846.6	20.4	0.11041
	2	4132/4357	826.4	18.5	0.06998
		4182/4407	836.4	18.5	0.07047
		4233/4458	846.6	18.6	0.07311
	3	4132/4357	826.4	20.0	0.09931
		4182/4407	836.4	20.1	0.10116
		4233/4458	846.6	20.6	0.11482
	4	4132/4357	826.4	18.9	0.07674
		4182/4407	836.4	18.9	0.07691
		4233/4458	846.6	18.9	0.07780
	5	4132/4357	826.4	21.0	0.12503
		4182/4407	836.4	21.4	0.13804
		4233/4458	846.6	21.6	0.14454

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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.

RSS-132, section 5.4

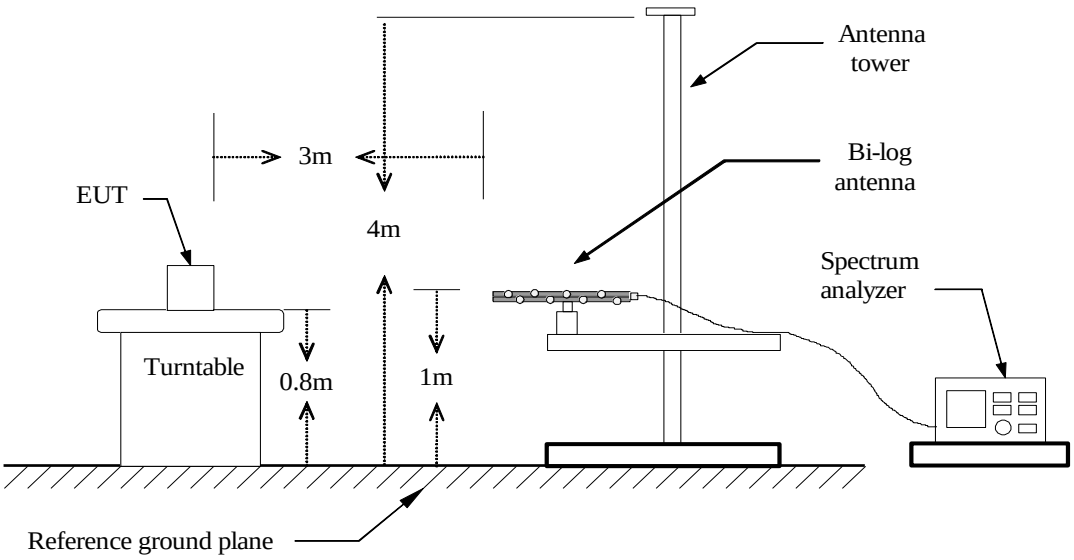
The transmitter output power shall be measured in terms of average power. The equivalent isotropically radiated power (e.i.r.p.) for mobile equipment shall not exceed 11.5 watts. Refer to SRSP-503 for base station e.i.r.p. limits.

RSS-133, section 6.4

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.

Test Configuration

Below 1 GHz



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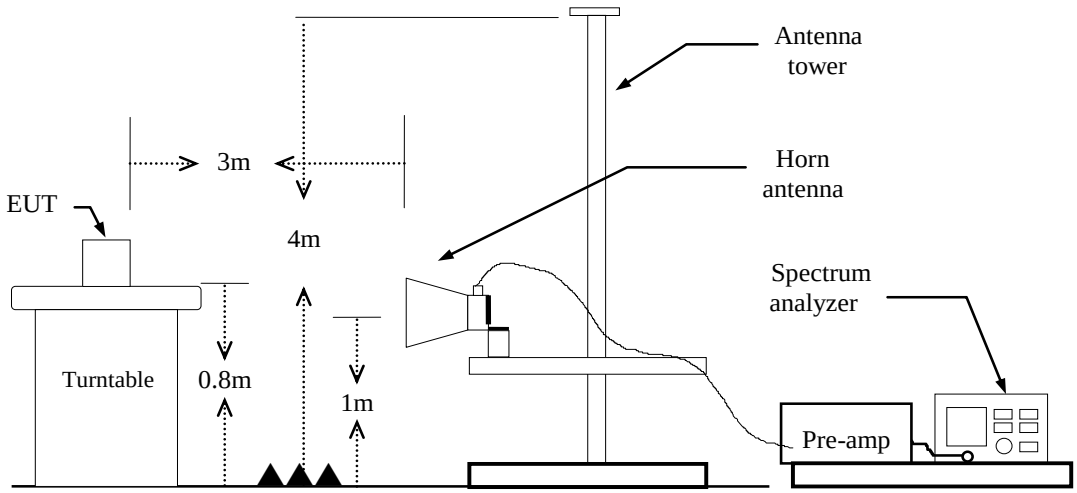
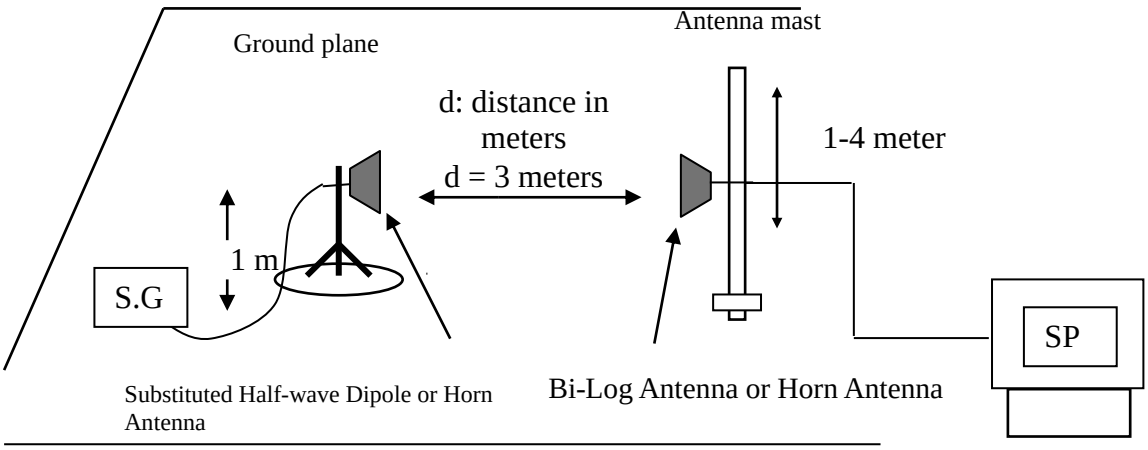
Above 1 GHz



For Substituted Method Test Set-UP



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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.

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	13.90	0.0245	26.95	0.4955
	Middle	14.58	0.0287	27.62	0.5781
	Highest	13.43	0.0220	26.43	0.4395

Test Mode	Channel	Vertical		Horizontal	
		ERP(dBm)	ERP(W)	ERP(dBm)	ERP(W)
WCDMA 12.2K RMC (Band V)	Lowest	5.62	0.0036	14.03	0.0253
	Middle	7.55	0.0057	16.68	0.0466
	Highest	6.05	0.0040	14.48	0.0281

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8.3 OCCUPIED BANDWIDTH MEASUREMENT

Limits

For Reporting purpose only.

TEST PROCEDURES

KDB 971168 D01.

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	4.1389	4.718
	Middle	1880.0	4.1534	4.703
	Highest	1907.6	4.1534	4.703
WCDMA 12.2k RMC (Band V)	Lowest	826.4	4.1534	4.703
	Middle	836.4	4.1389	4.718
	Highest	846.6	4.1389	4.703

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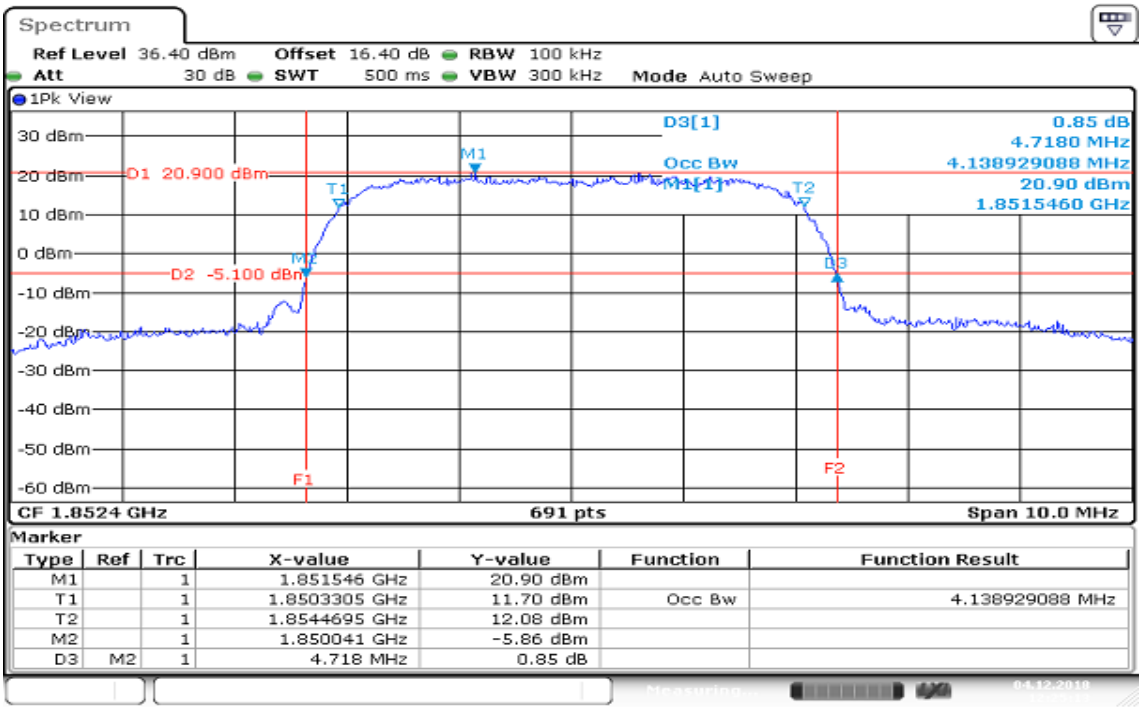
Test Plot

WCDMA 12.2k RMC (Band II)

Low CH

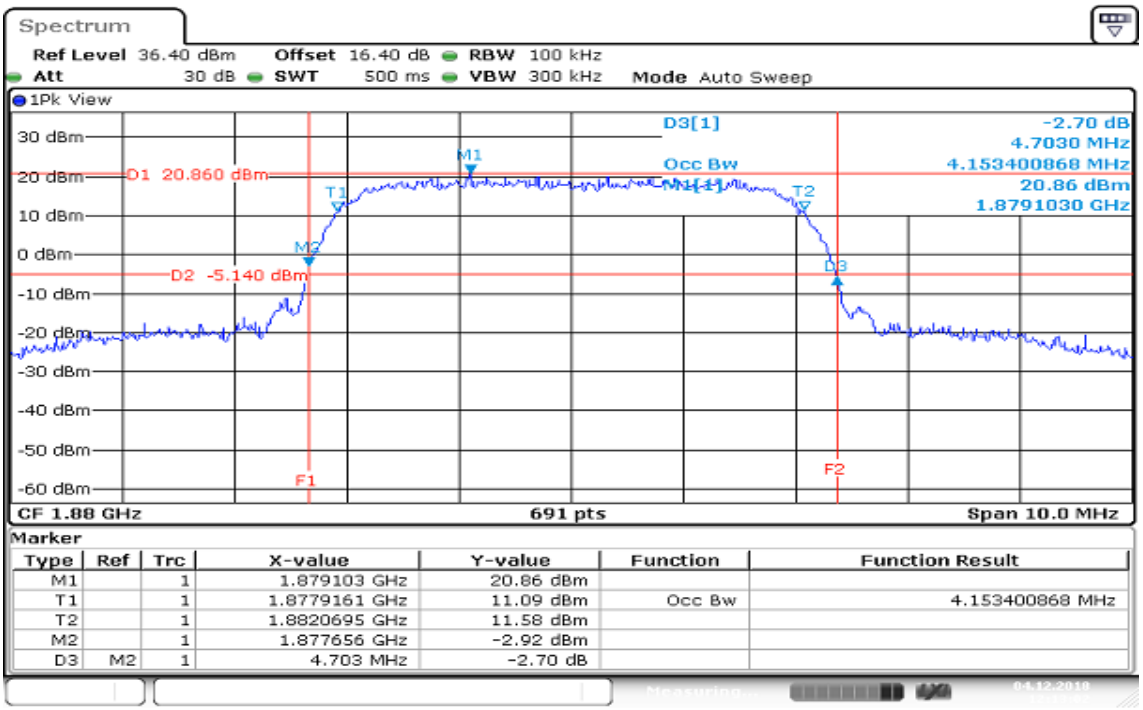


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.851546 GHz	20.90 dBm		
T1		1	1.8503305 GHz	11.70 dBm	Occ Bw	4.138929088 MHz
T2		1	1.8544695 GHz	12.08 dBm		
M2		1	1.850041 GHz	-5.86 dBm		
D3	M2	1	4.718 MHz	0.85 dB		

Date: 4.DEC.2018 12:25:14

Mid CH



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.879103 GHz	20.86 dBm		
T1		1	1.8779161 GHz	11.09 dBm	Occ Bw	4.153400868 MHz
T2		1	1.8820695 GHz	11.58 dBm		
M2		1	1.877656 GHz	-2.92 dBm		
D3	M2	1	4.703 MHz	-2.70 dB		

Date: 4.DEC.2018 12:13:02

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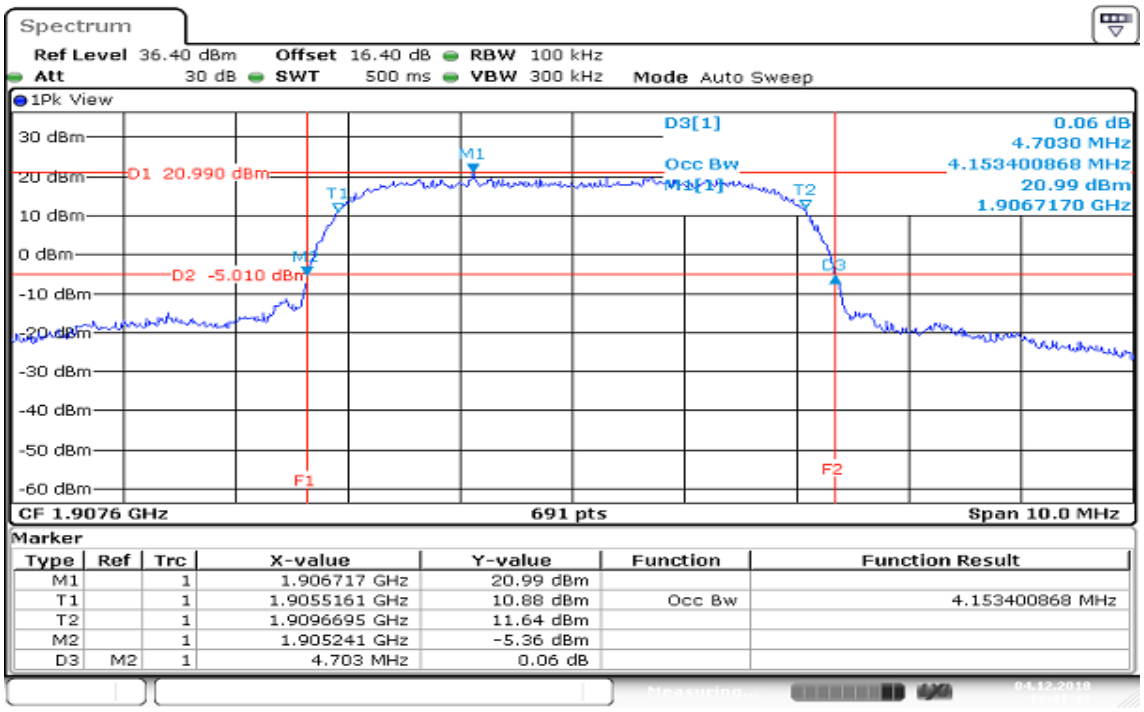
High CH



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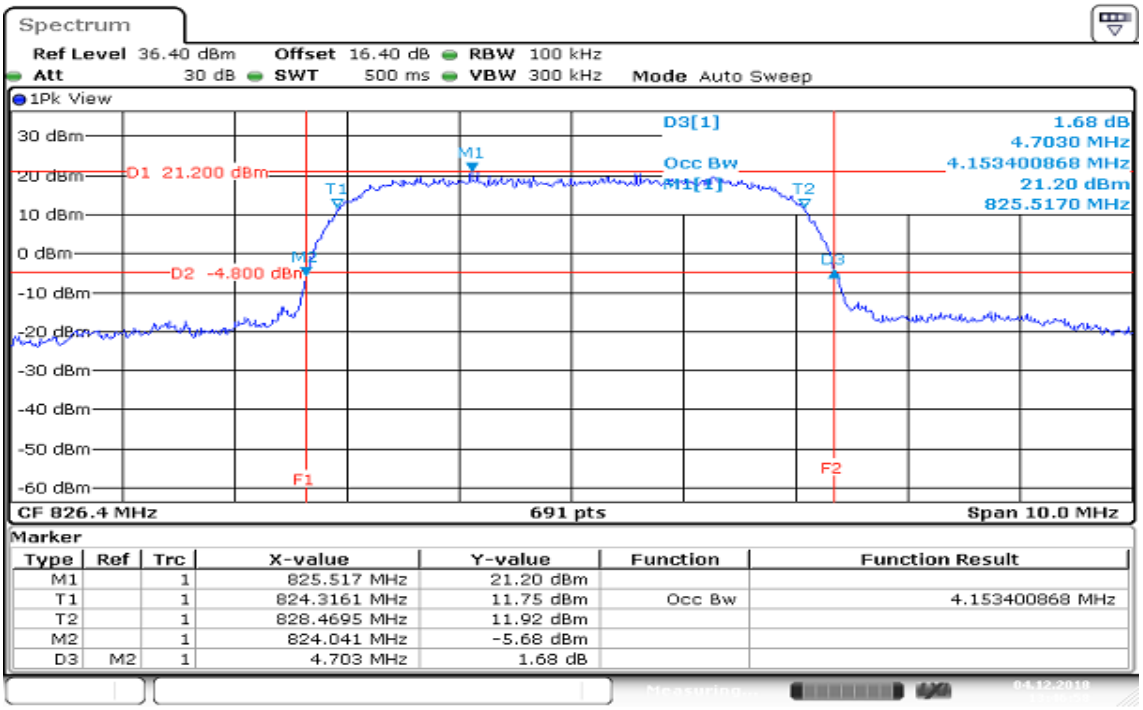
WCDMA 12.2k RMC (Band V)

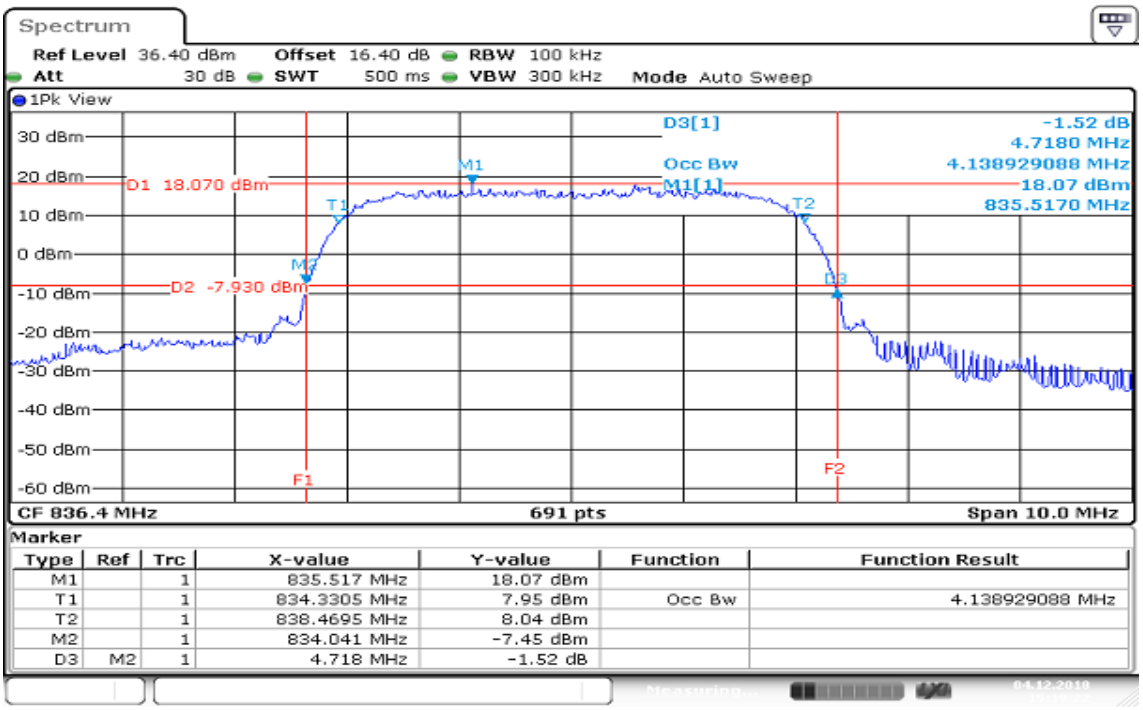
Low CH



Marker						
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	825.517 MHz	21.20 dBm		
T1		1	824.3161 MHz	11.75 dBm	Occ Bw	4.153400868 MHz
T2		1	828.4695 MHz	11.92 dBm		
M2		1	824.041 MHz	-5.68 dBm		
D3	M2	1	4.703 MHz	1.68 dB		

Date: 4.DEC.2018 13:46:57

Mid CH



Marker						
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	835.517 MHz	18.07 dBm		
T1		1	834.3305 MHz	7.95 dBm	Occ Bw	4.138929088 MHz
T2		1	838.4695 MHz	8.04 dBm		
M2		1	834.041 MHz	-7.45 dBm		
D3	M2	1	4.718 MHz	-1.52 dB		

Date: 4.DEC.2018 15:19:22

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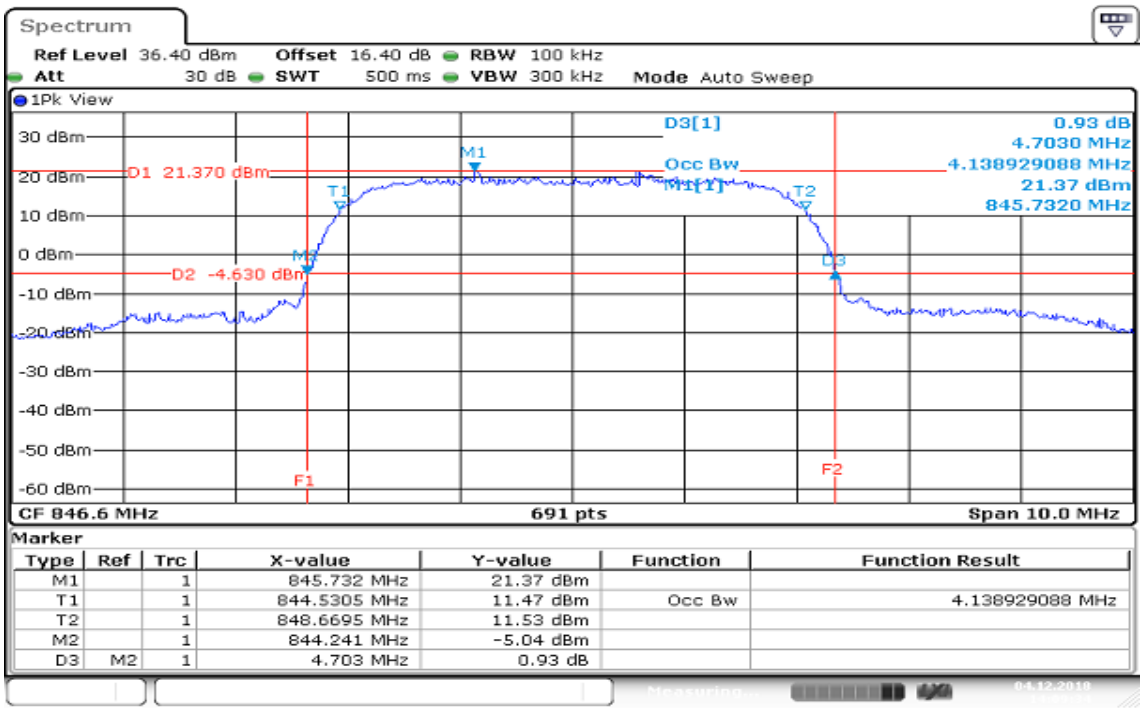
High CH



Date: 4.DEC.2018 14:09:34

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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.

RSS-132 section 5.5 and RSS-133 section 6.5

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 log10 p (watts).

TEST PROCEDURE

According to KDB 971168 D01.

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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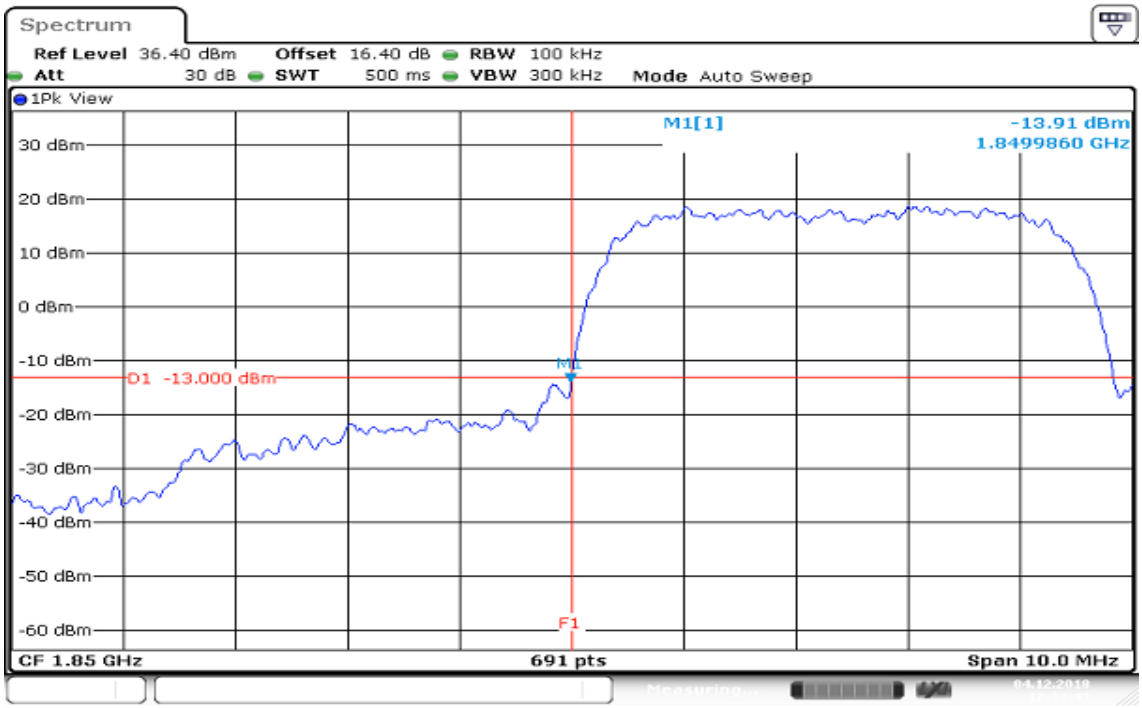
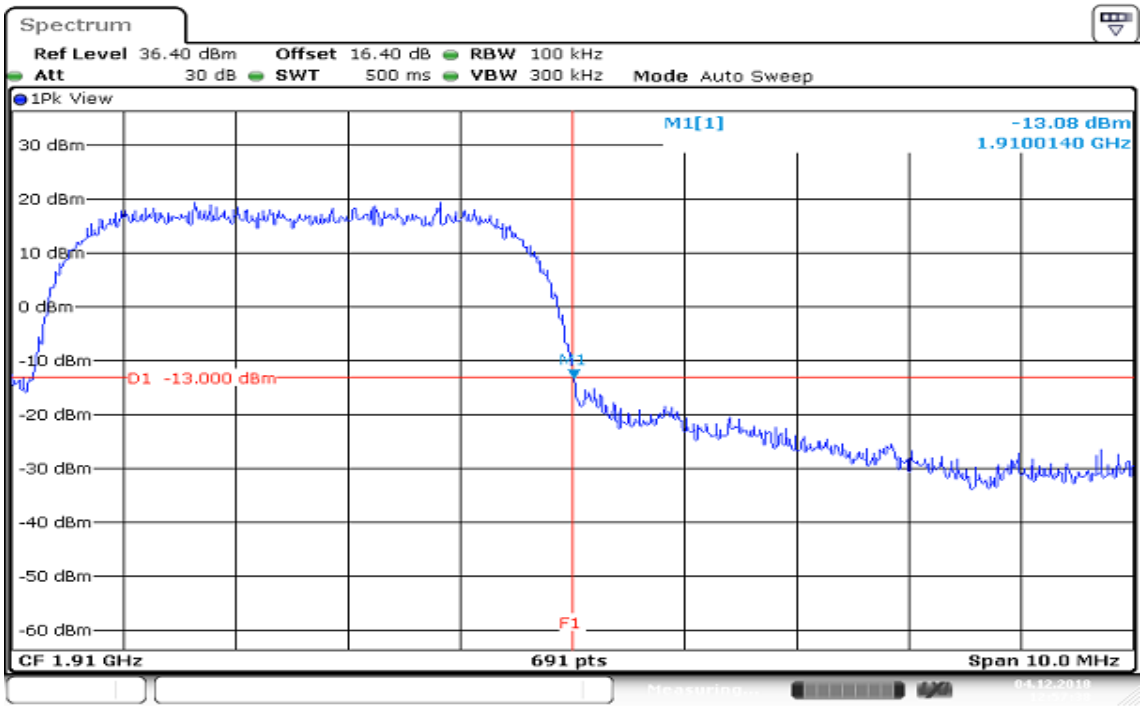
Test Data
WCDMA 12.2k RMC (Band II)
Low CH



Date: 4.DEC.2018 12:32:43

High CH



Date: 4.DEC.2018 12:57:38

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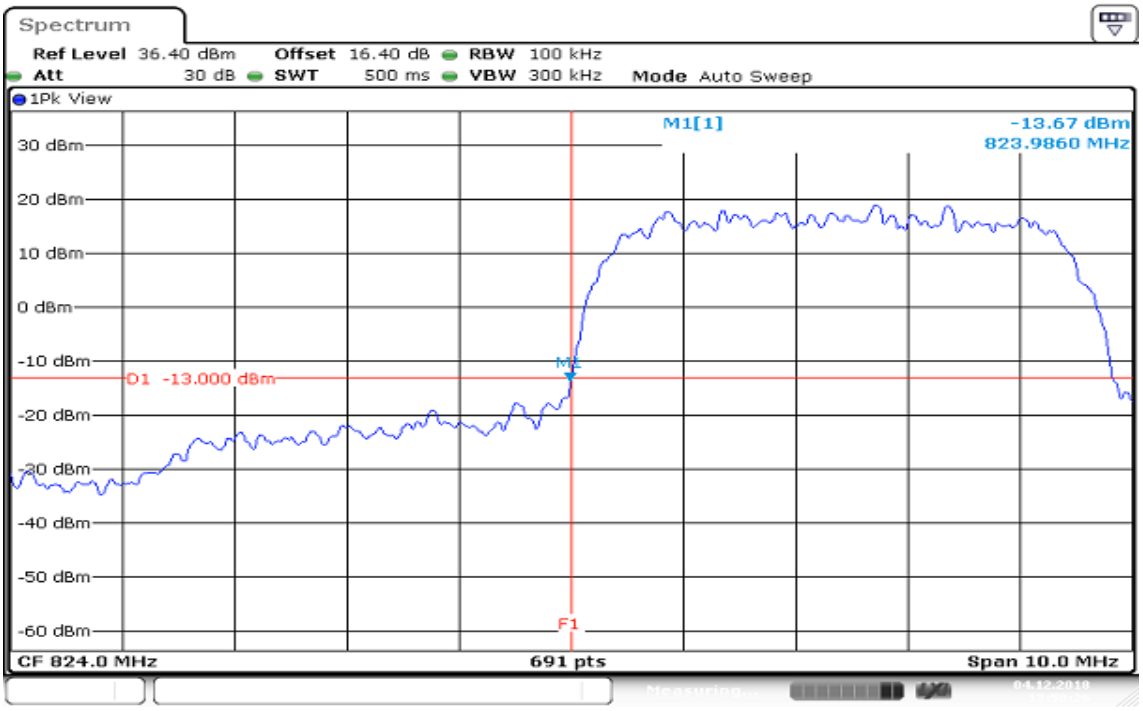
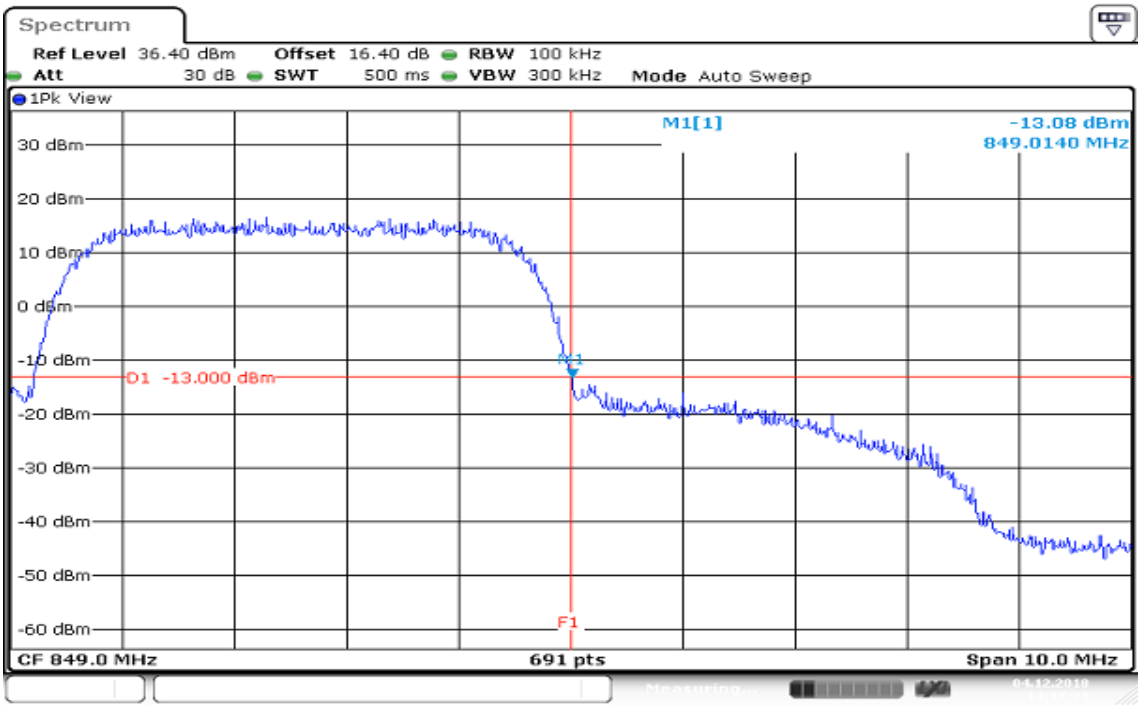
WCDMA 12.2k RMC (Band V)

Low CH



Date: 4.DEC.2018 13:50:27

High CH



Date: 4.DEC.2018 14:17:28

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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

RSS-132 section 5.4 and RSS-133 section 6.4

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.

Test Procedures

According to KDB 971168 D01.

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%.

WCDMA 12.2k RMC (Band II)

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
Low CH	1852.4	3.22
Mid CH	1880.0	3.22
High CH	1907.6	3.45

WCDMA 12.2k RMC (Band V)

Channel	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
Low CH	826.4	3.19
Mid CH	836.4	3.30
High CH	846.6	3.28

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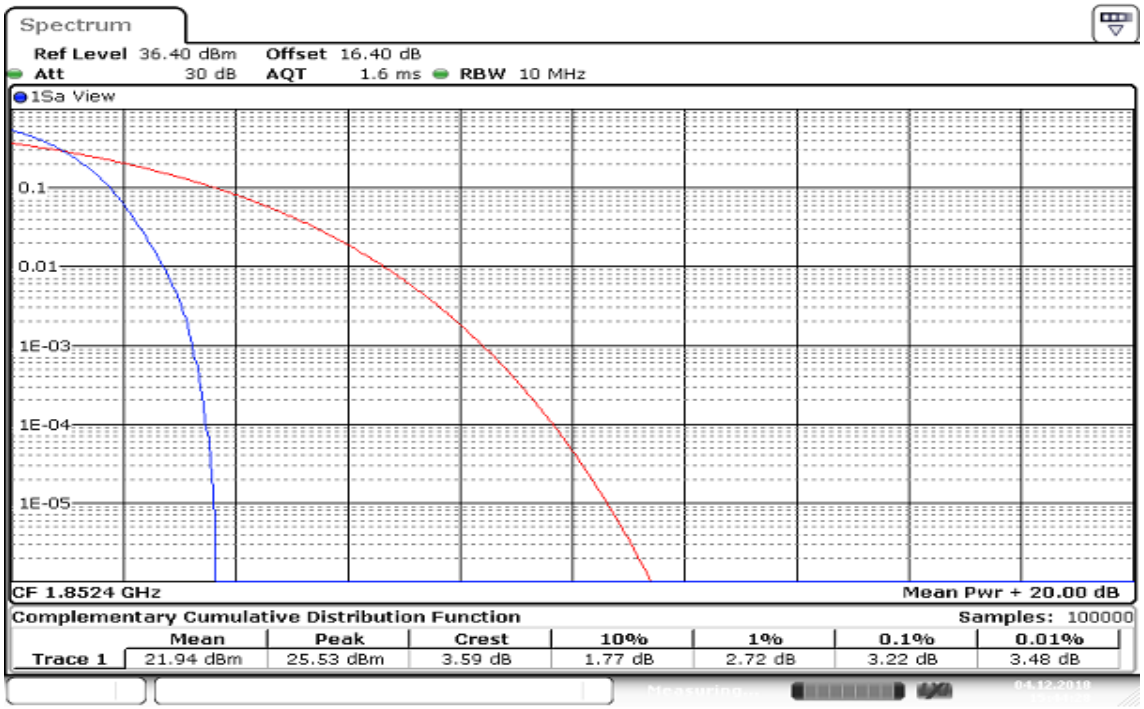
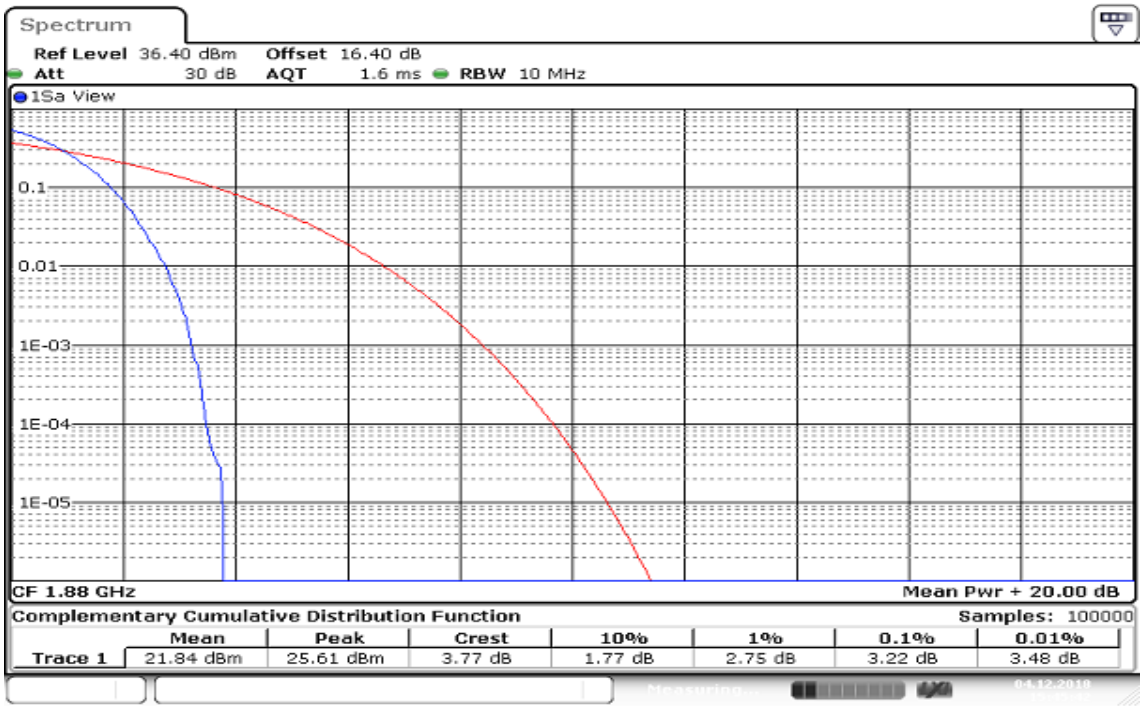
Test Data
WCDMA 12.2k RMC (Band II)
Low CH



Date: 4.DEC.2018 15:44:28

Mid CH



Date: 4.DEC.2018 15:45:42

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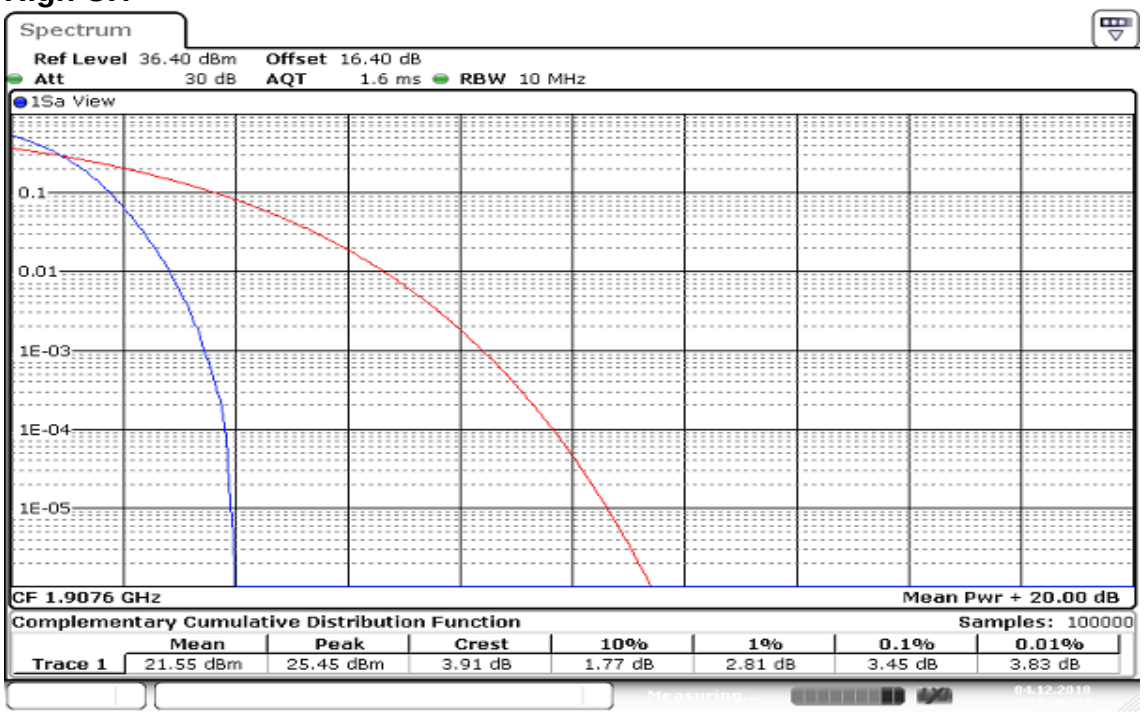
High CH



Date: 4.DEC.2018 15:46:43

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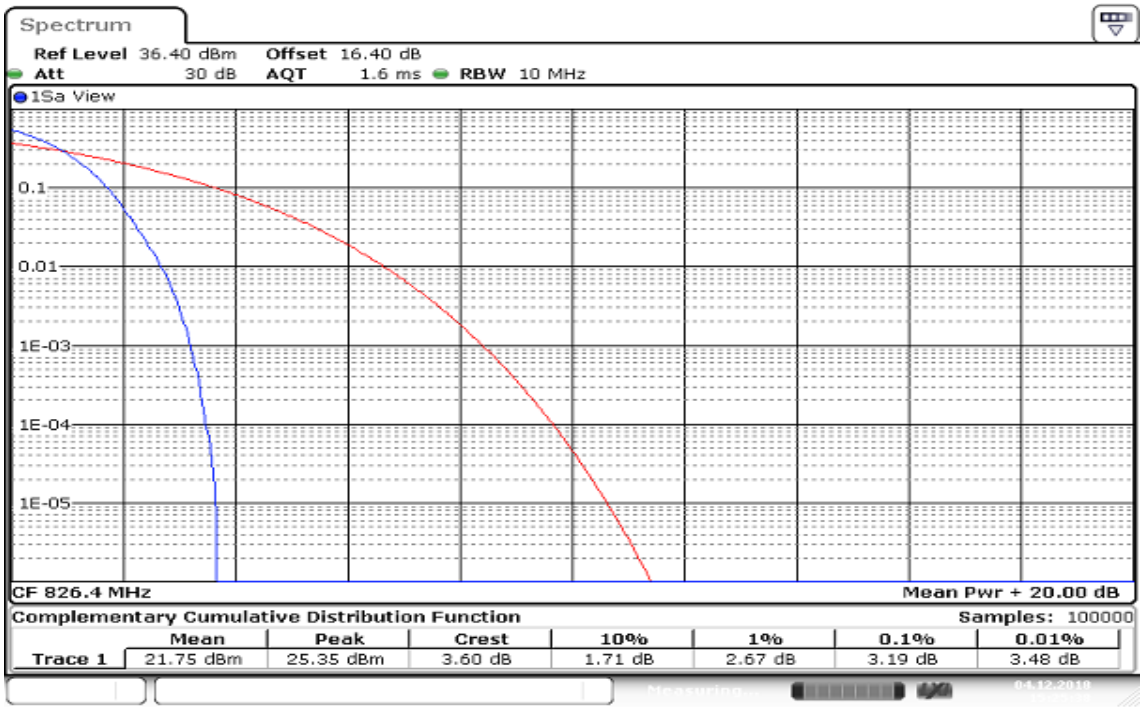
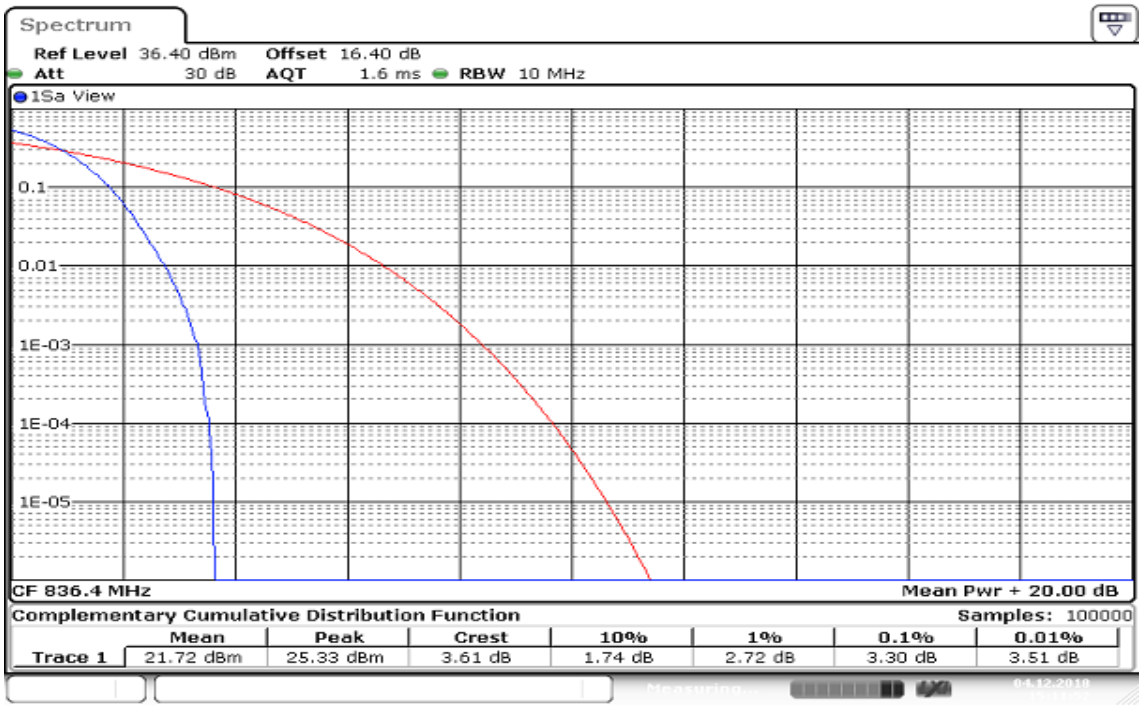
WCDMA 12.2k RMC (Band V)

Low CH



Date: 4.DEC.2018 15:25:39

Mid CH



Date: 4.DEC.2018 15:11:52

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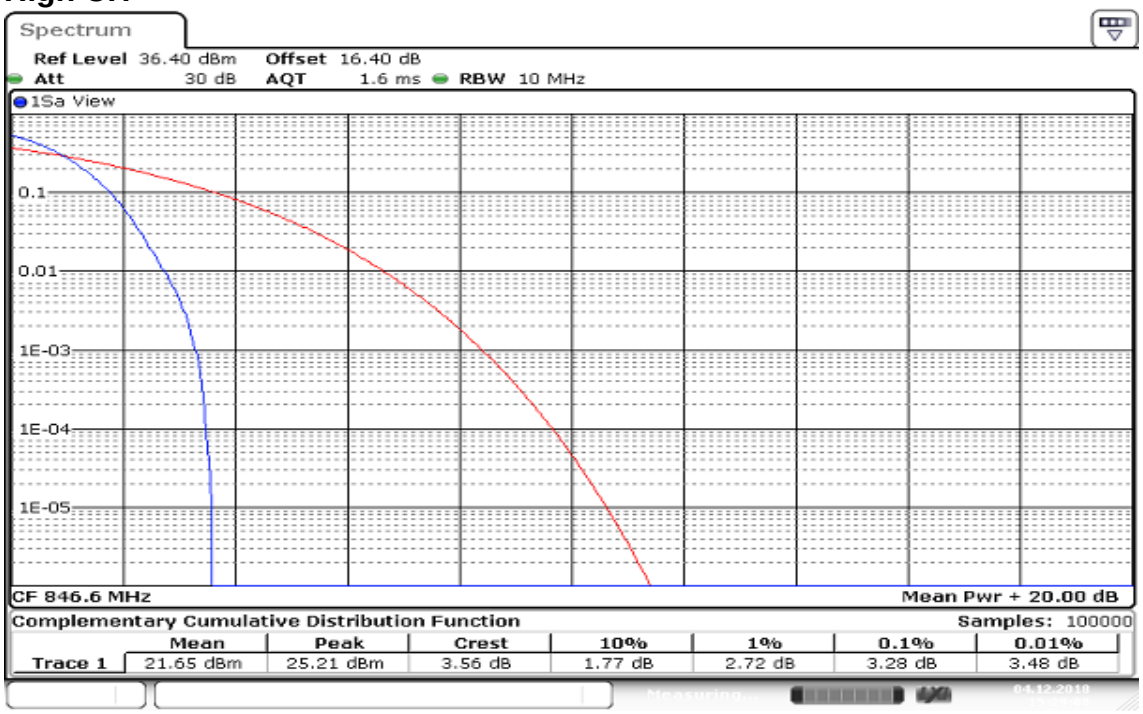
High CH



Date: 4.DEC.2018 15:29:09

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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.

RSS-132 section 5.5 and RSS-133 section 6.5

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 log10 p (watts).

Test Procedures

According to KDB 971168 D01.

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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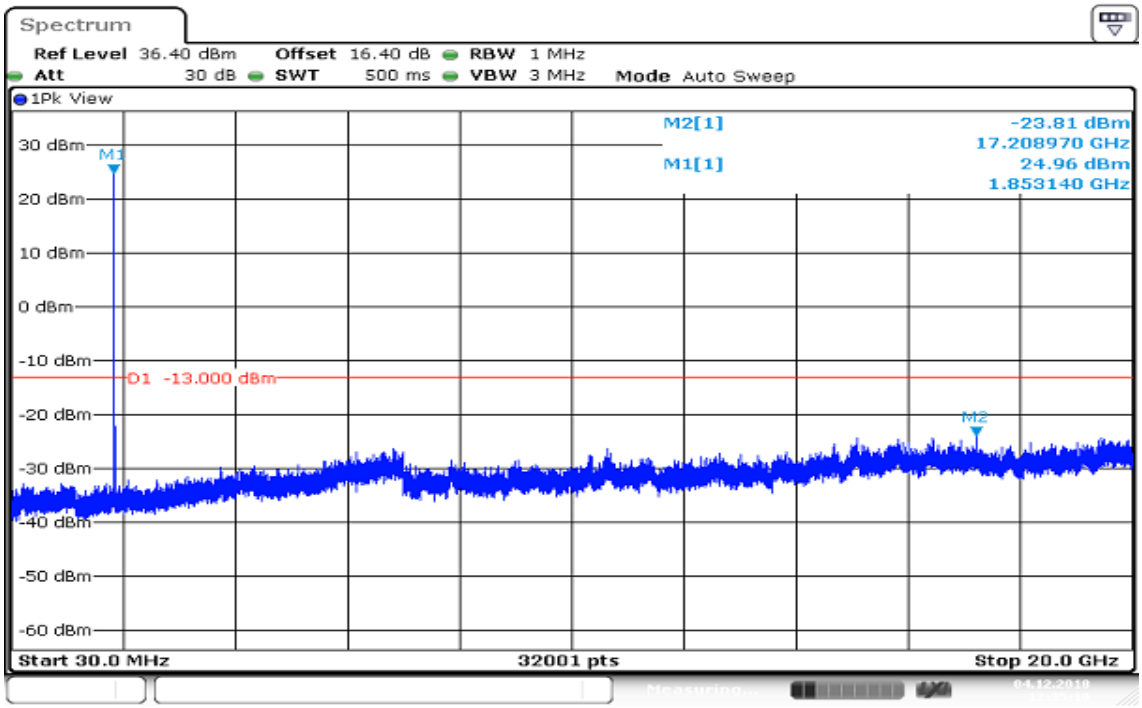
Test Data
WCDMA 12.2k RMC (Band II)
Low CH



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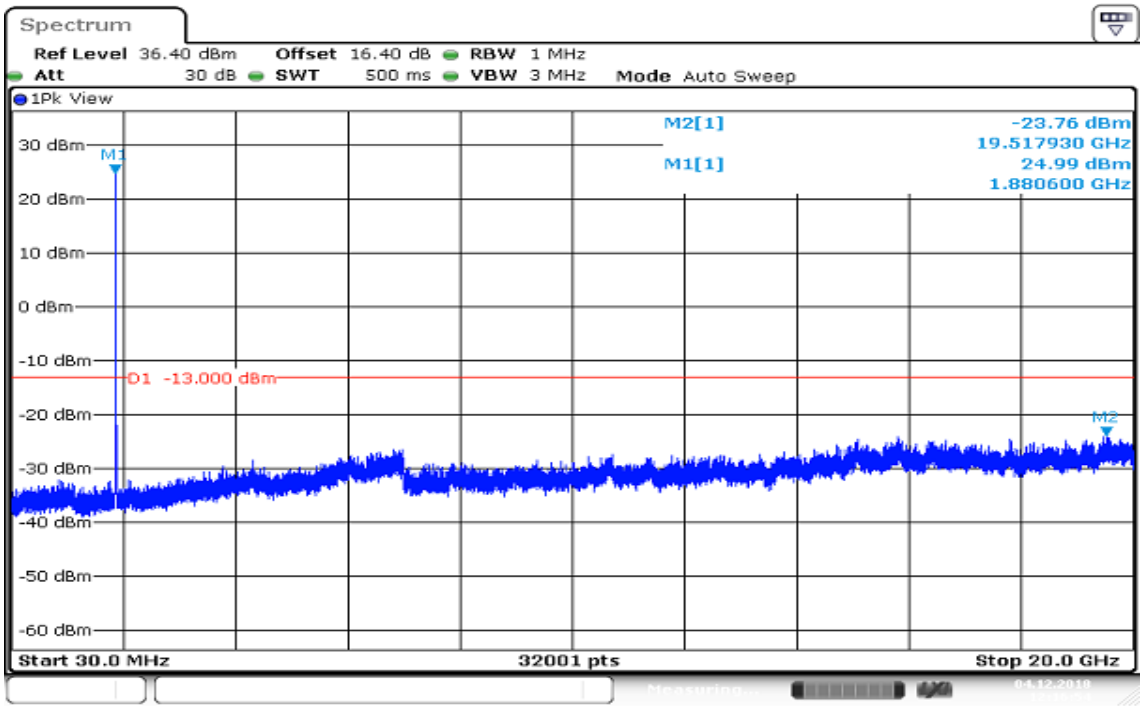
Mid CH



Date: 4.DEC.2018 12:16:54

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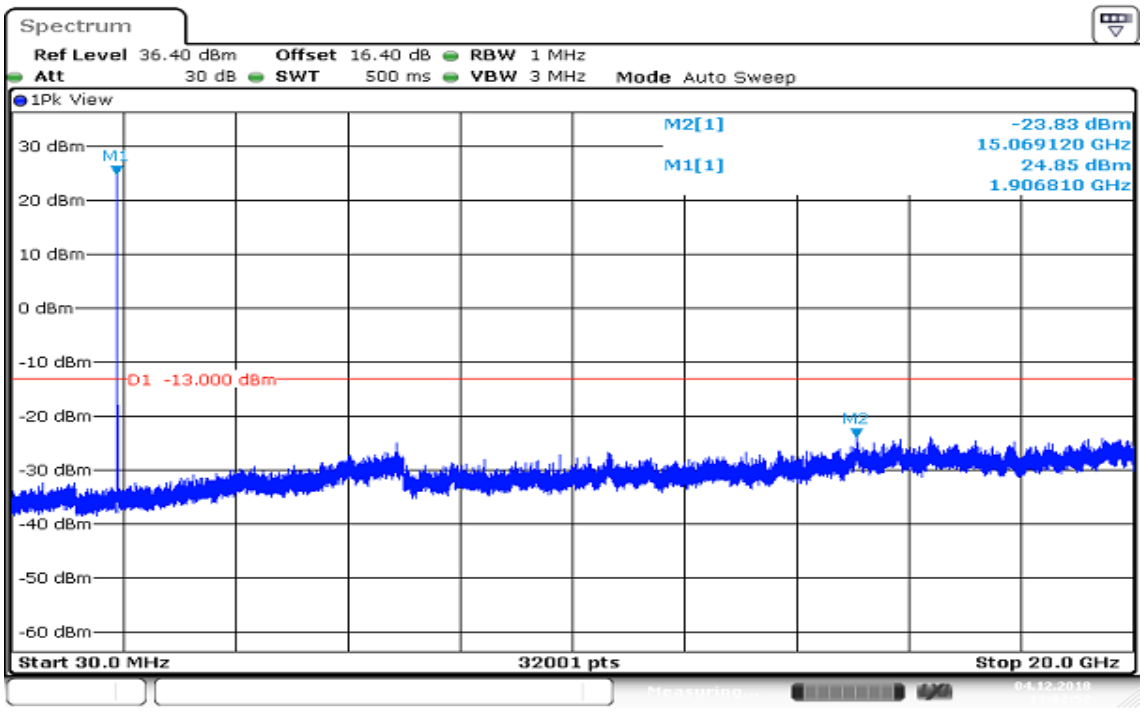
High CH



Date: 4.DEC.2018 13:02:52

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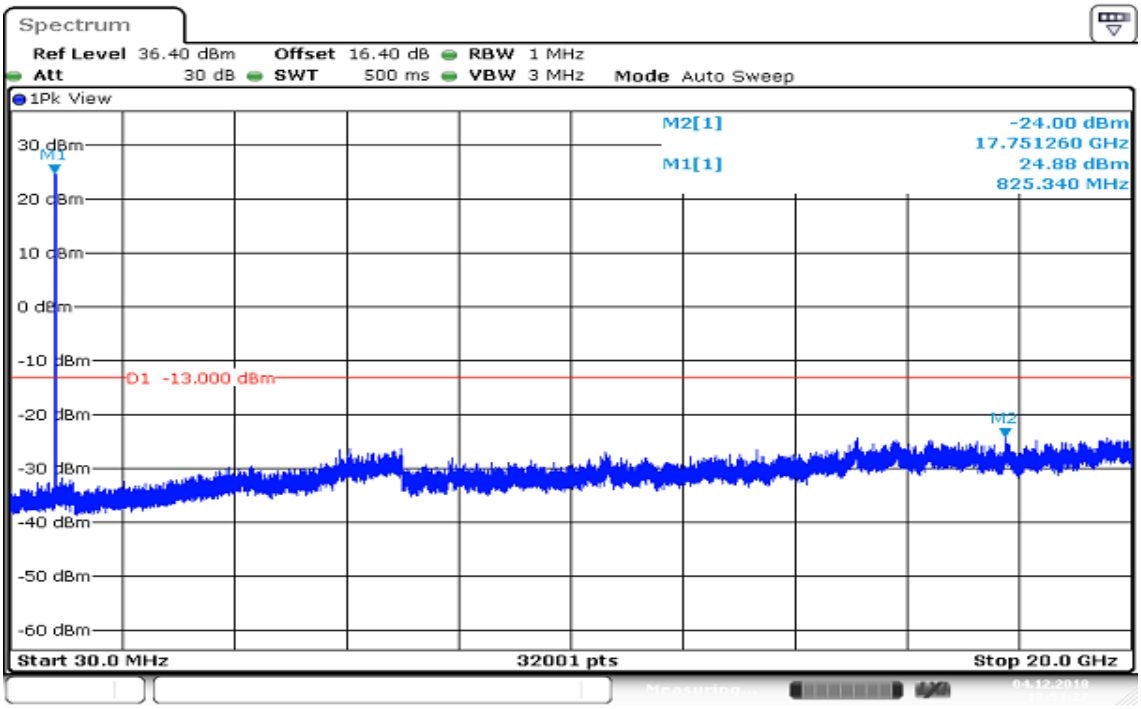
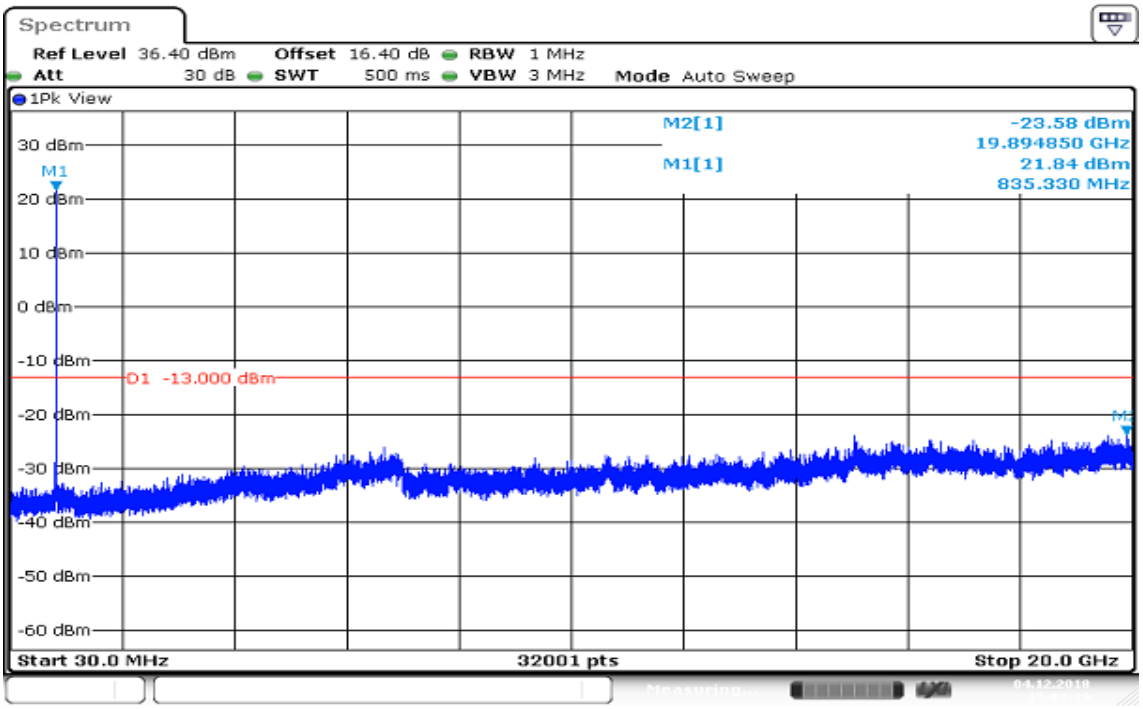
WCDMA 12.2k RMC (Band V)

Low CH



Date: 4.DEC.2018 13:53:27

Mid CH



Date: 4.DEC.2018 15:03:19

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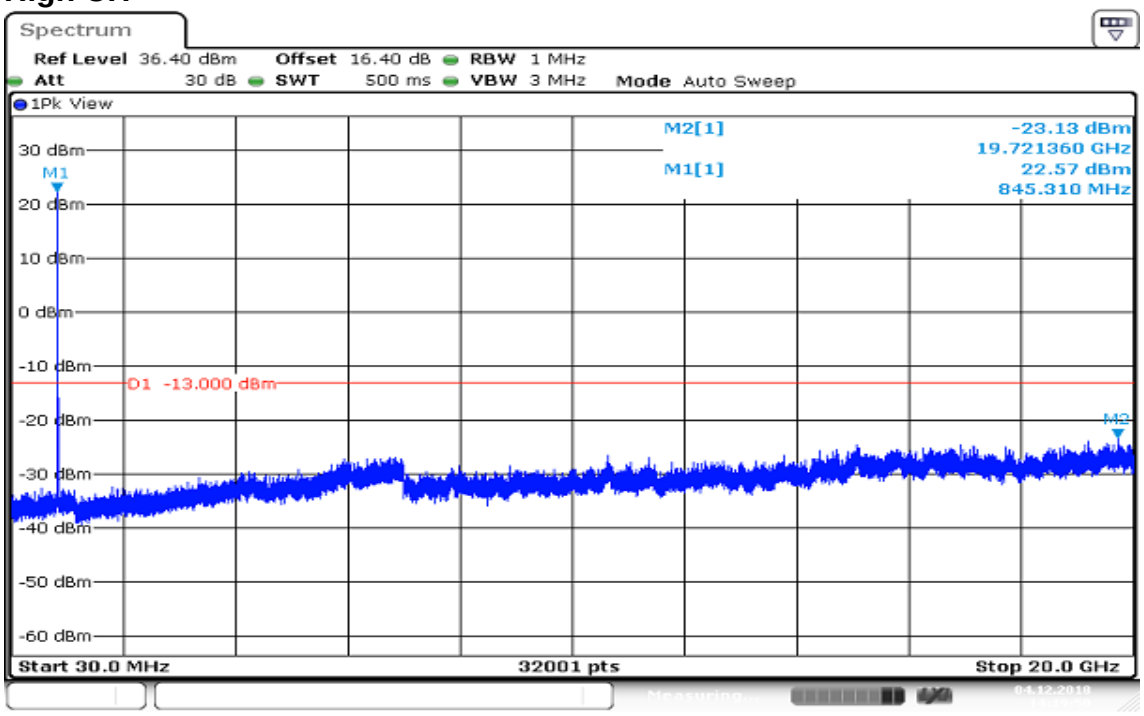
High CH



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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

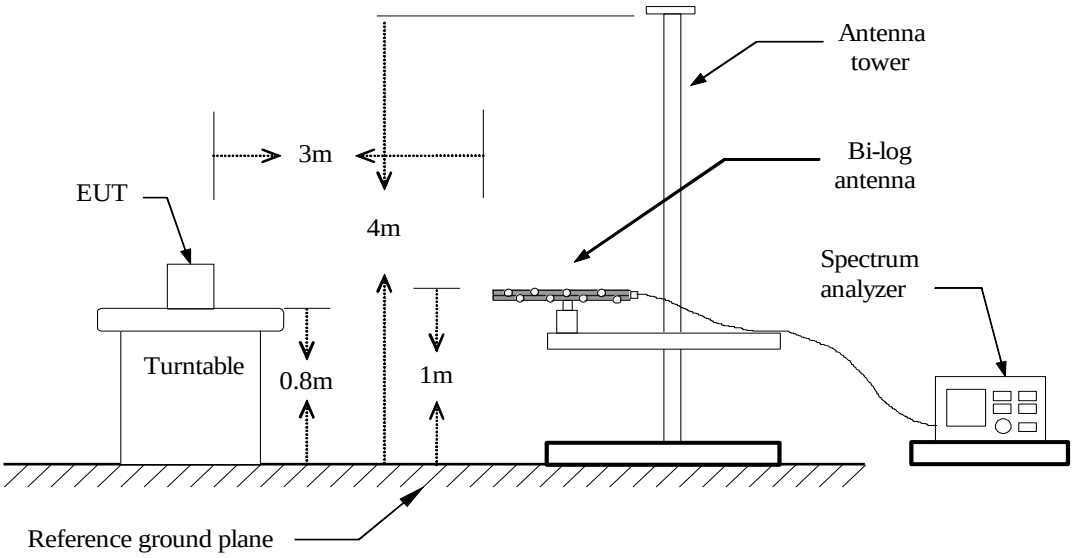
For operations in the 1850-1910 and 1930-1950 MHz band, out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

RSS-132 section 5.5 and RSS-133 section 6.5

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 log10 p (watts).

Test Configuration

Below 1 GHz



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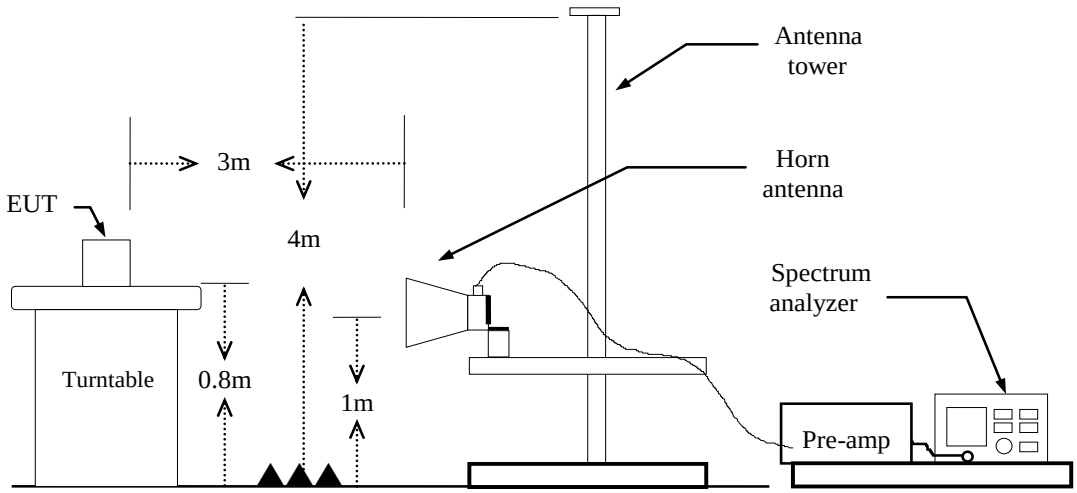
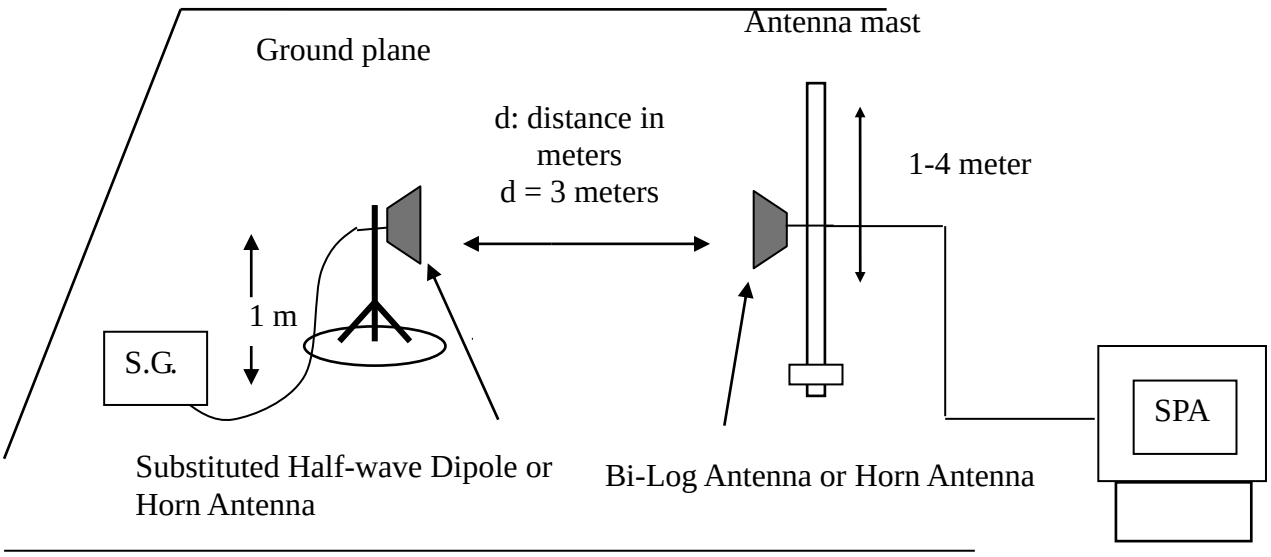
Above 1 GHz



Substituted Method Test Set-up



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TEST PROCEDURE

1. According to KDB 971168 D01.
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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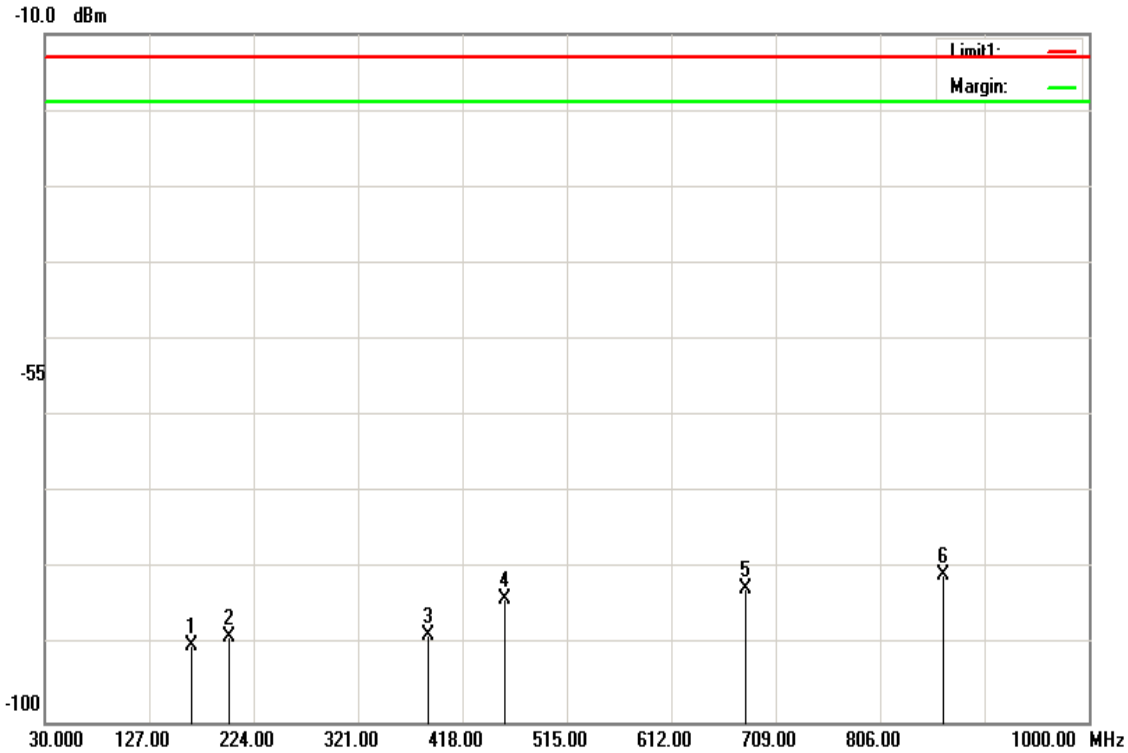
Radiated Spurious Emission Measurement Result / Below 1GHz

Operation Mode:	WCDMA 12.2k RMC Band II / TX /Mid CH	**Test Date:**	December 6, 2018
Temperature:	22℃	**Tested by:**	Jerry Chuang
Humidity:	48 % RH	**Polarity:**	Ver.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
166.7700	-86.55	1.28	-89.98	-13.00	-76.98	V
201.6900	-85.2	1.41	-88.76	-13.00	-75.76	V
385.9900	-84.62	1.97	-88.74	-13.00	-75.74	V
458.2550	-79.67	2.15	-83.97	-13.00	-70.97	V
680.8700	-77.7	2.64	-82.49	-13.00	-69.49	V
865.1700	-75.72	3	-80.87	-13.00	-67.87	V

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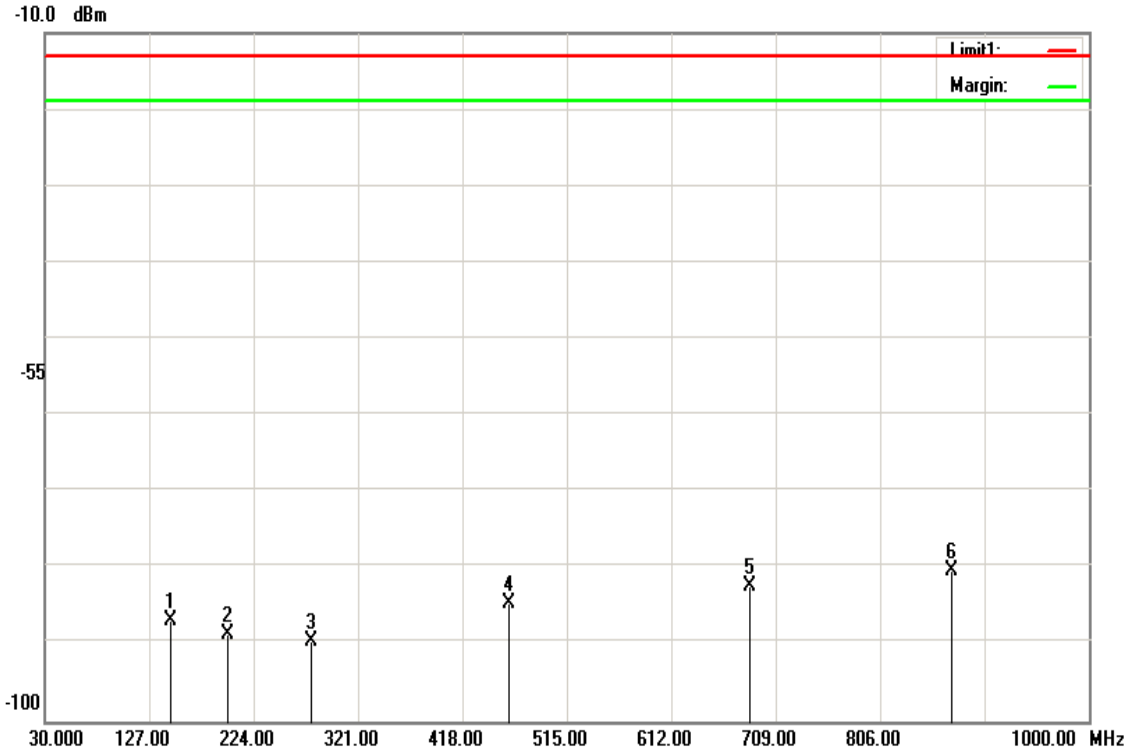
Operation Mode:	WCDMA 12.2k RMC Band II / TX /Mid CH	**Test Date:**	December 6, 2018
Temperature:	22℃	**Tested by:**	Jerry Chuang
Humidity:	48 % RH	**Polarity:**	Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
147.8550	-83.51	1.2	-86.86	-13.00	-73.86	H
199.7500	-85.01	1.4	-88.56	-13.00	-75.56	H
277.3500	-85.66	1.65	-89.46	-13.00	-76.46	H
462.1350	-80.21	2.16	-84.52	-13.00	-71.52	H
685.2350	-77.6	2.65	-82.40	-13.00	-69.40	H
872.9300	-75.23	3.01	-80.39	-13.00	-67.39	H

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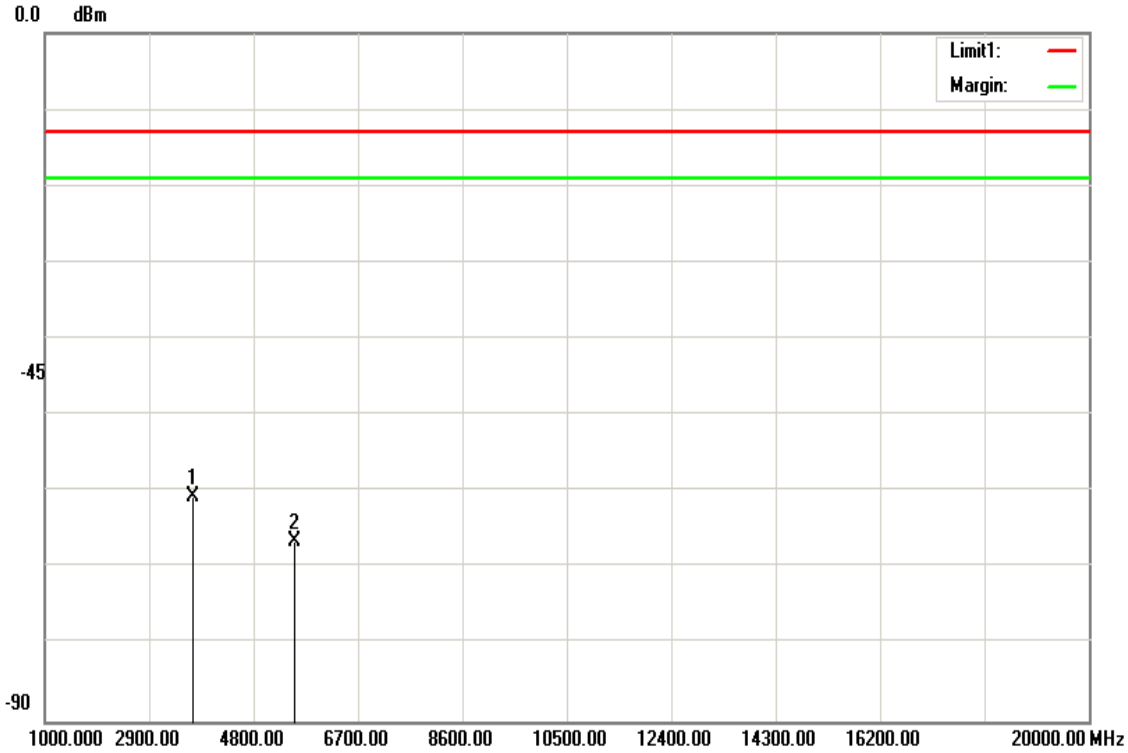
Above 1GHz

Operation Mode:	WCDMA 12.2k RMC Band II / TX / Low CH	**Test Date:**	December 7, 2018
Temperature:	22℃	**Tested by:**	Jerry Chuang
Humidity:	48 % RH	**Polarity:**	Ver.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
3705.500	-54.09	6.63	-60.72	-13.00	-47.72	V
5553.500	-58.15	8.29	-66.44	-13.00	-53.44	V
N/A						

Remark:

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

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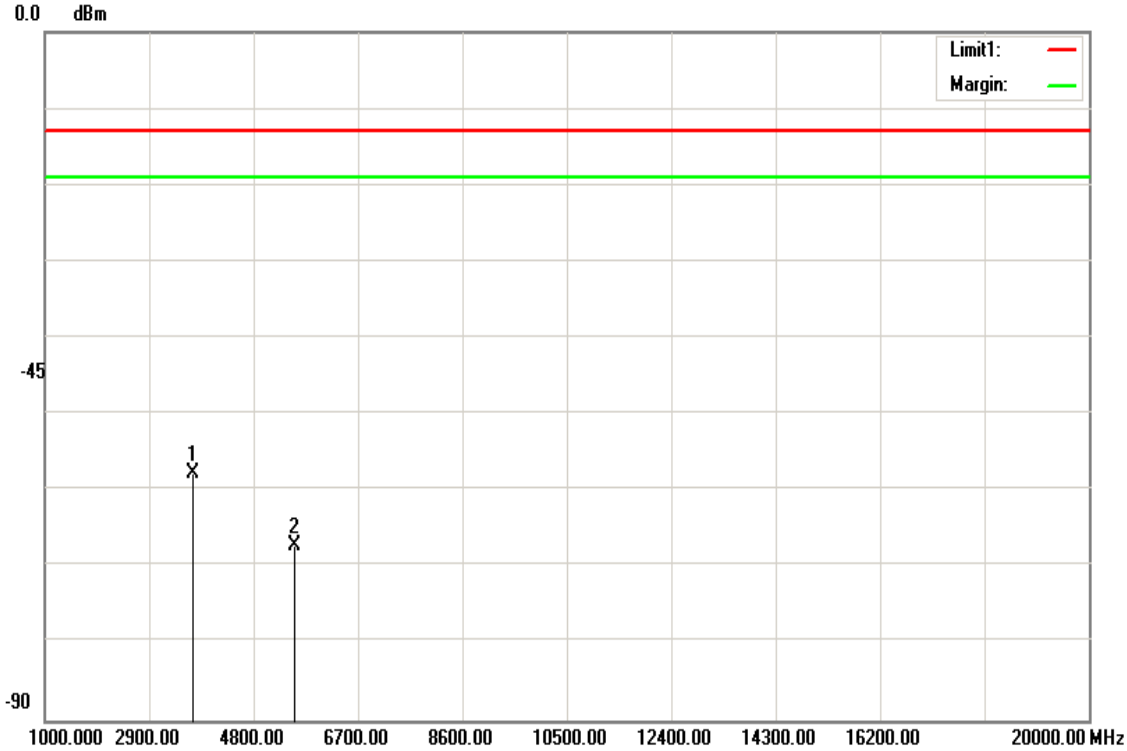
Operation Mode:	WCDMA 12.2k RMC Band II / TX / Low CH	**Test Date:**	December 7, 2018
Temperature:	22℃	**Tested by:**	Jerry Chuang
Humidity:	48 % RH	**Polarity:**	Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
3702.000	-51.05	6.63	-57.68	-13.00	-44.68	H
5553.500	-58.91	8.29	-67.20	-13.00	-54.20	H
N/A						

Remark:

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

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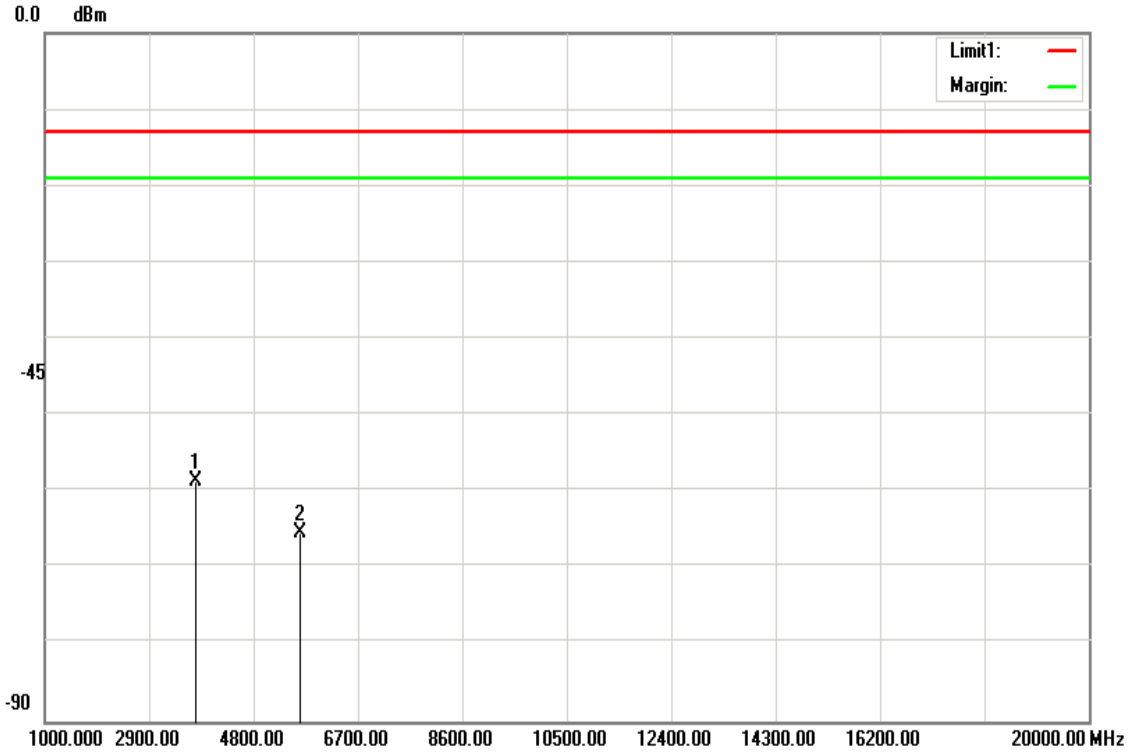
Operation Mode:	WCDMA 12.2k RMC Band II / TX / Mid CH	**Test Date:**	December 7, 2018
Temperature:	22℃	**Tested by:**	Jerry Chuang
Humidity:	48 % RH	**Polarity:**	Ver.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
3758.000	-51.97	6.68	-58.65	-13.00	-45.65	V
5637.500	-57.08	8.36	-65.44	-13.00	-52.44	V
N/A						

Remark:

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

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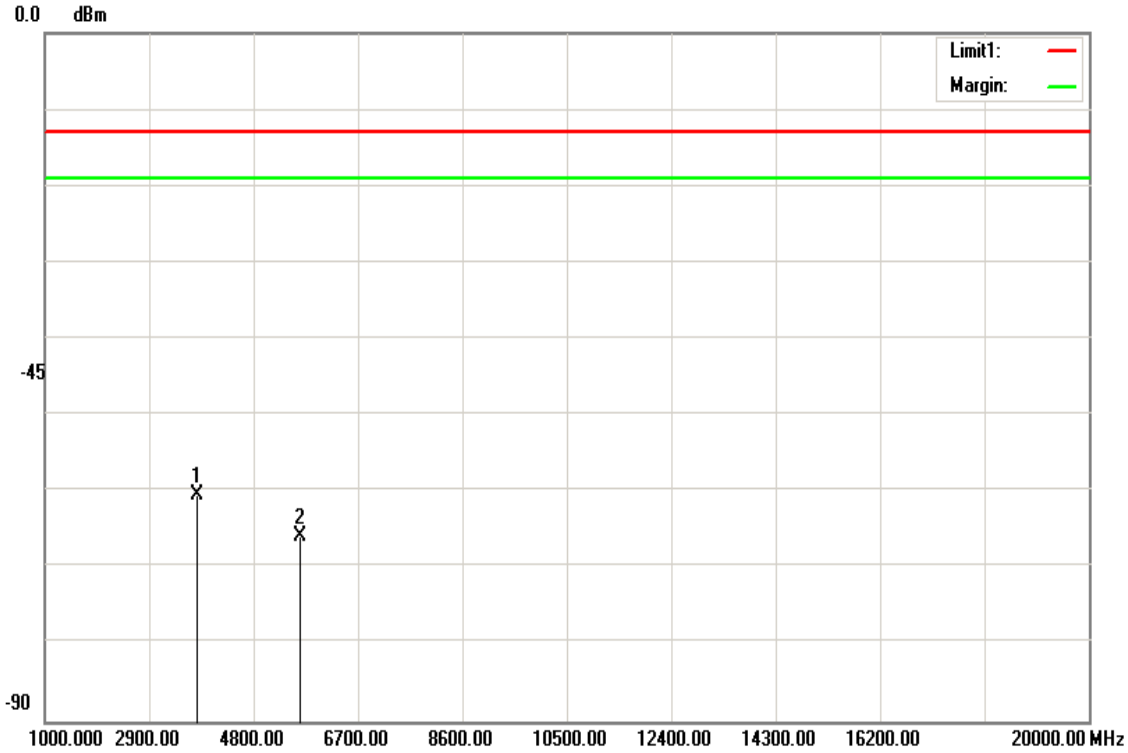
Operation Mode:	WCDMA 12.2k RMC Band II / TX / Mid CH	**Test Date:**	December 7, 2018
Temperature:	22℃	**Tested by:**	Jerry Chuang
Humidity:	48 % RH	**Polarity:**	Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
3761.500	-53.62	6.69	-60.31	-13.00	-47.31	H
5637.500	-57.4	8.36	-65.76	-13.00	-52.76	H
N/A						

Remark:

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

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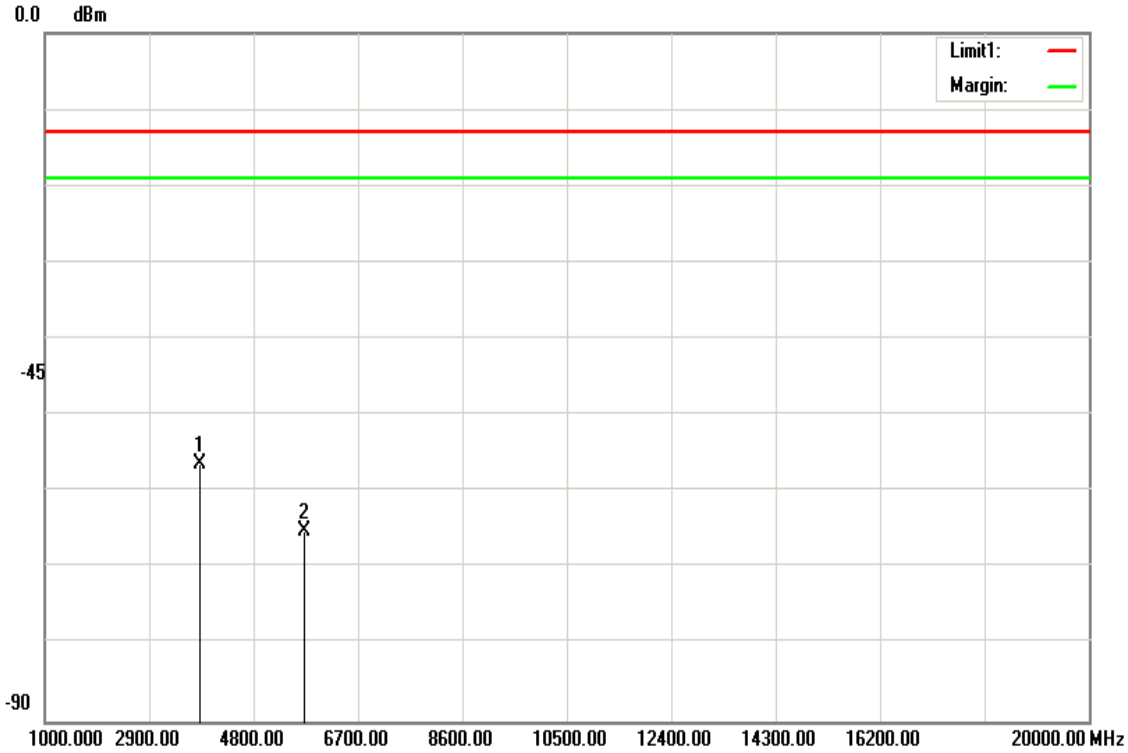
Operation Mode:	WCDMA 12.2k RMC Band II / TX / High CH	**Test Date:**	December 7, 2018
Temperature:	22℃	**Tested by:**	Jerry Chuang
Humidity:	48 % RH	**Polarity:**	Ver.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
3814.000	-49.69	6.74	-56.43	-13.00	-43.43	V
5721.500	-56.7	8.44	-65.14	-13.00	-52.14	V
N/A						

Remark:

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

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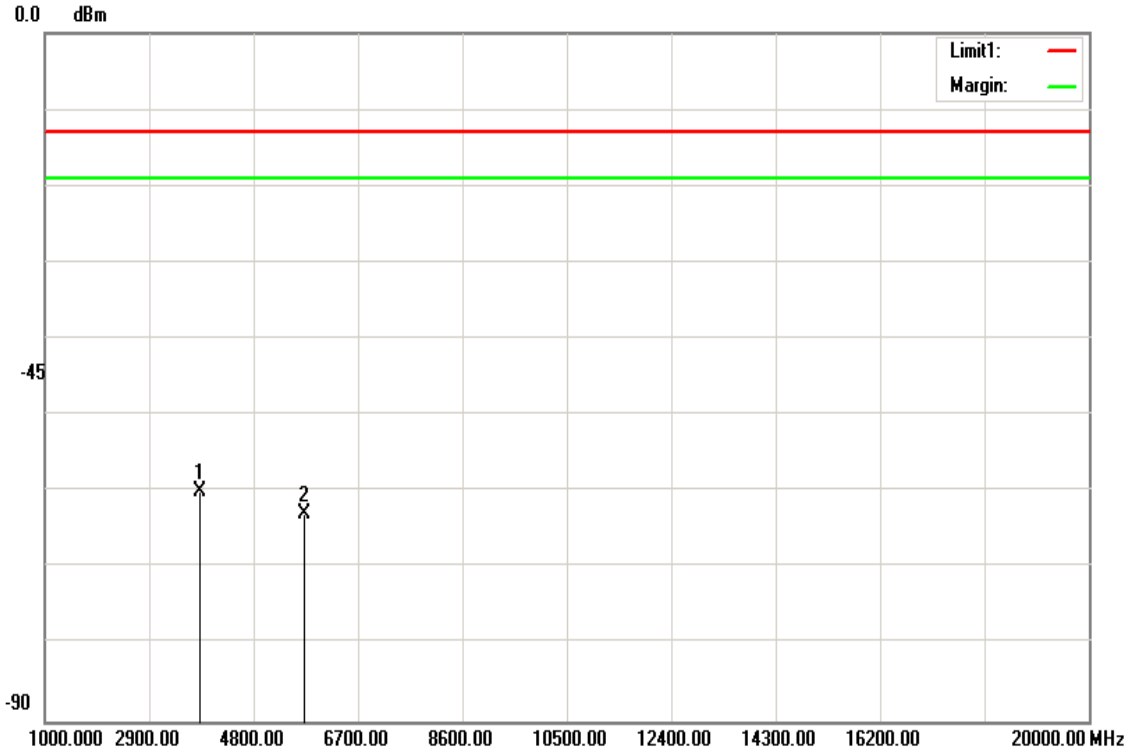
Operation Mode:	WCDMA 12.2k RMC Band II / TX / High CH	**Test Date:**	December 7, 2018
Temperature:	22℃	**Tested by:**	Jerry Chuang
Humidity:	48 % RH	**Polarity:**	Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
3817.500	-53.3	6.74	-60.04	-13.00	-47.04	H
5721.500	-54.37	8.44	-62.81	-13.00	-49.81	H
N/A						

Remark:

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

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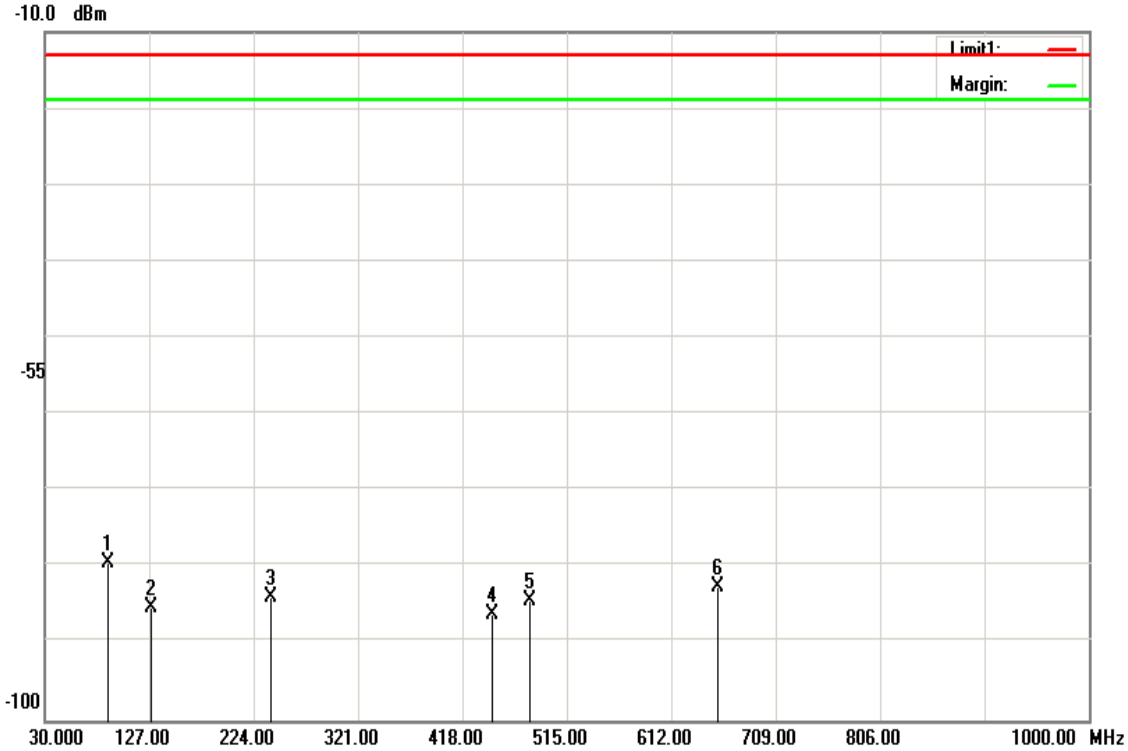
Radiated Spurious Emission Measurement Result / Below 1GHz

Operation Mode:	WCDMA 12.2k RMC Band V / TX /Mid CH	**Test Date:**	December 3, 2018
Temperature:	22℃	**Tested by:**	Jerry Chuang
Humidity:	48 % RH	**Polarity:**	Ver.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
89.6550	-76.39	0.93	-79.47	-13.00	-66.47	V
128.9400	-82.06	1.13	-85.34	-13.00	-72.34	V
240.4900	-80.31	1.53	-83.99	-13.00	-70.99	V
446.6150	-81.79	2.12	-86.06	-13.00	-73.06	V
481.0500	-80.02	2.2	-84.37	-13.00	-71.37	V
655.1650	-77.86	2.58	-82.59	-13.00	-69.59	V

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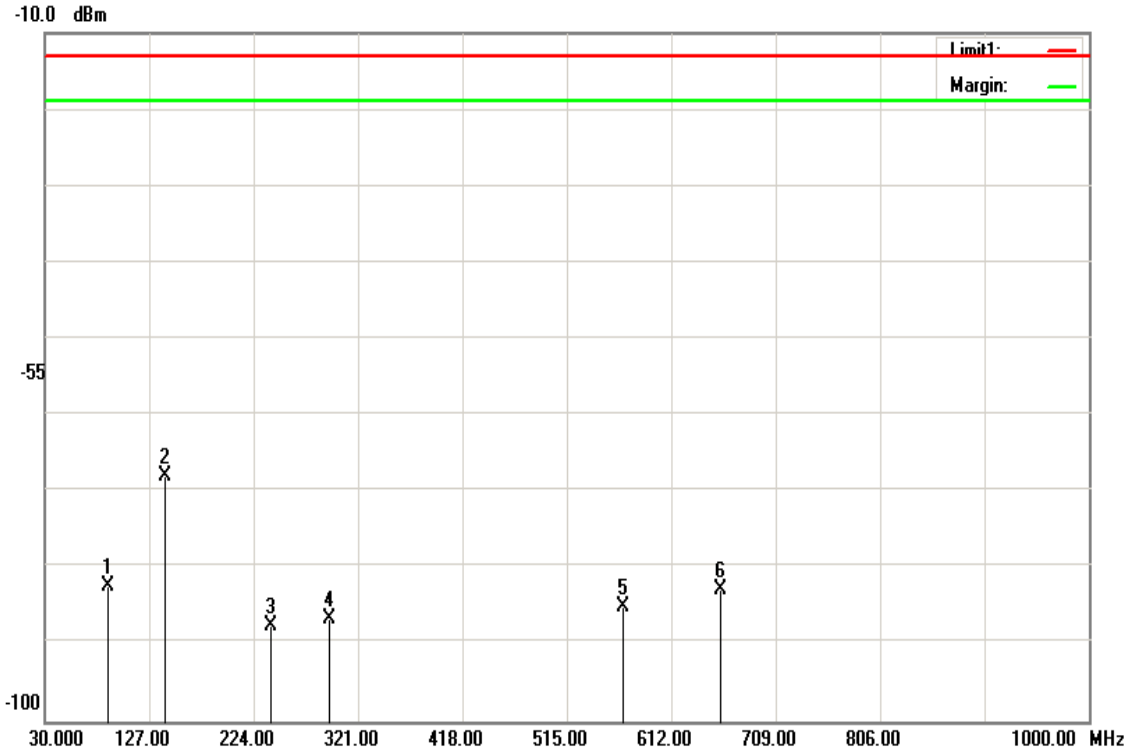
Operation Mode:	WCDMA 12.2k RMC Band V / TX /Mid CH	**Test Date:**	December 3, 2018
Temperature:	22℃	**Tested by:**	Jerry Chuang
Humidity:	48 % RH	**Polarity:**	Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
89.6550	-79.17	0.93	-82.25	-13.00	-69.25	H
141.5500	-64.58	1.18	-67.91	-13.00	-54.91	H
240.4900	-83.8	1.53	-87.48	-13.00	-74.48	H
295.2950	-82.71	1.71	-86.57	-13.00	-73.57	H
567.8650	-80.57	2.4	-85.12	-13.00	-72.12	H
657.5900	-78.07	2.59	-82.81	-13.00	-69.81	H

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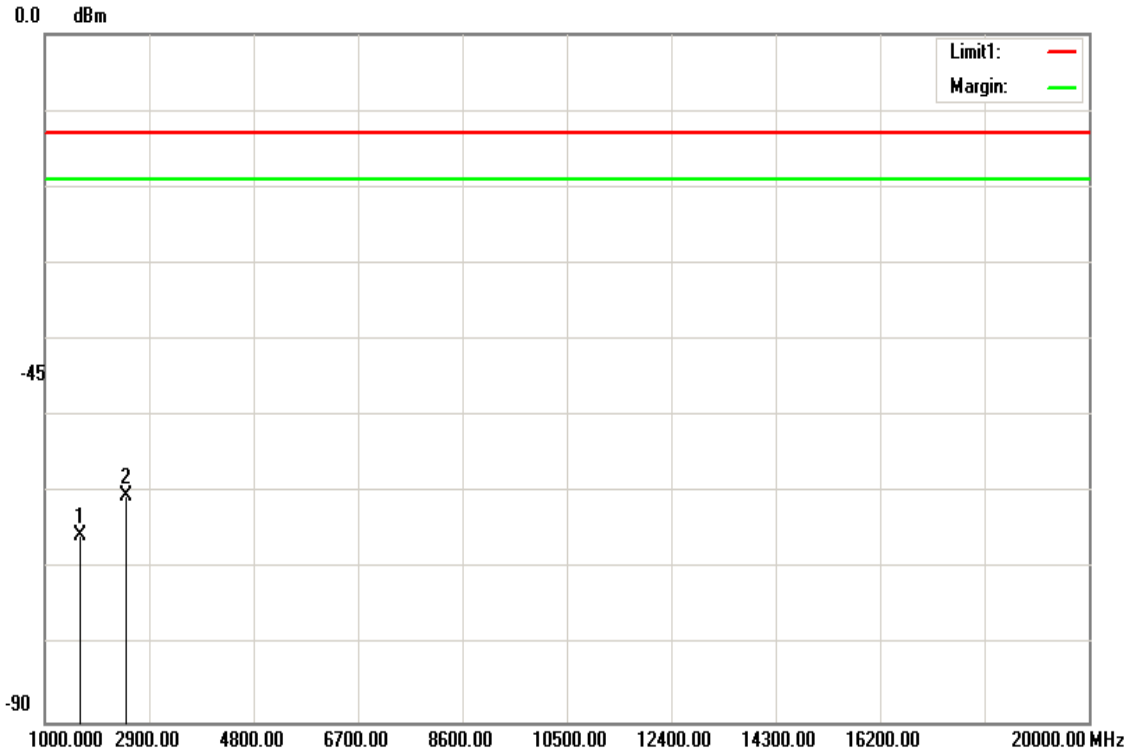
Above 1GHz

Operation Mode:	WCDMA 12.2k RMC Band V / TX / Low CH	**Test Date:**	December 7, 2018
Temperature:	22℃	**Tested by:**	Jerry Chuang
Humidity:	48 % RH	**Polarity:**	Ver.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1651.000	-61.28	4.2	-65.48	-13.00	-52.48	V
2477.000	-55.09	5.3	-60.39	-13.00	-47.39	V
N/A						

Remark:

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

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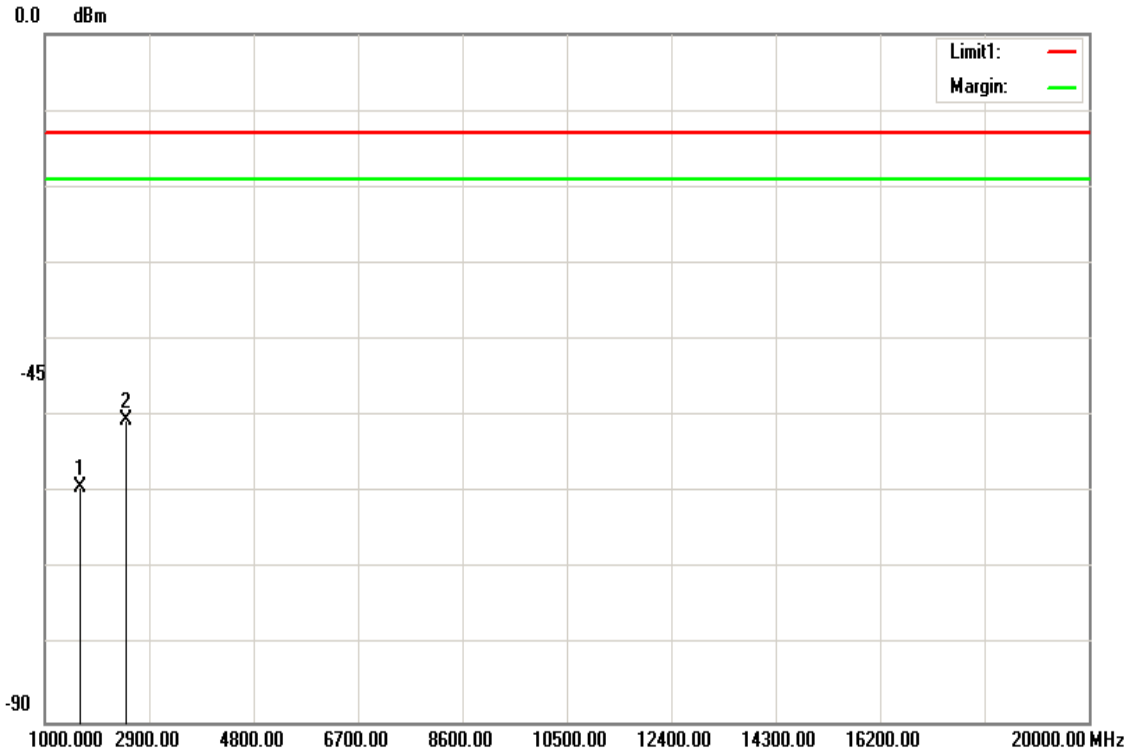
Operation Mode:	WCDMA 12.2k RMC Band V / TX / Low CH	**Test Date:**	December 7, 2018
Temperature:	22℃	**Tested by:**	Jerry Chuang
Humidity:	48 % RH	**Polarity:**	Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1651.000	-55.13	4.2	-59.33	-13.00	-46.33	H
2484.000	-45.3	5.31	-50.61	-13.00	-37.61	H
N/A						

Remark:

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

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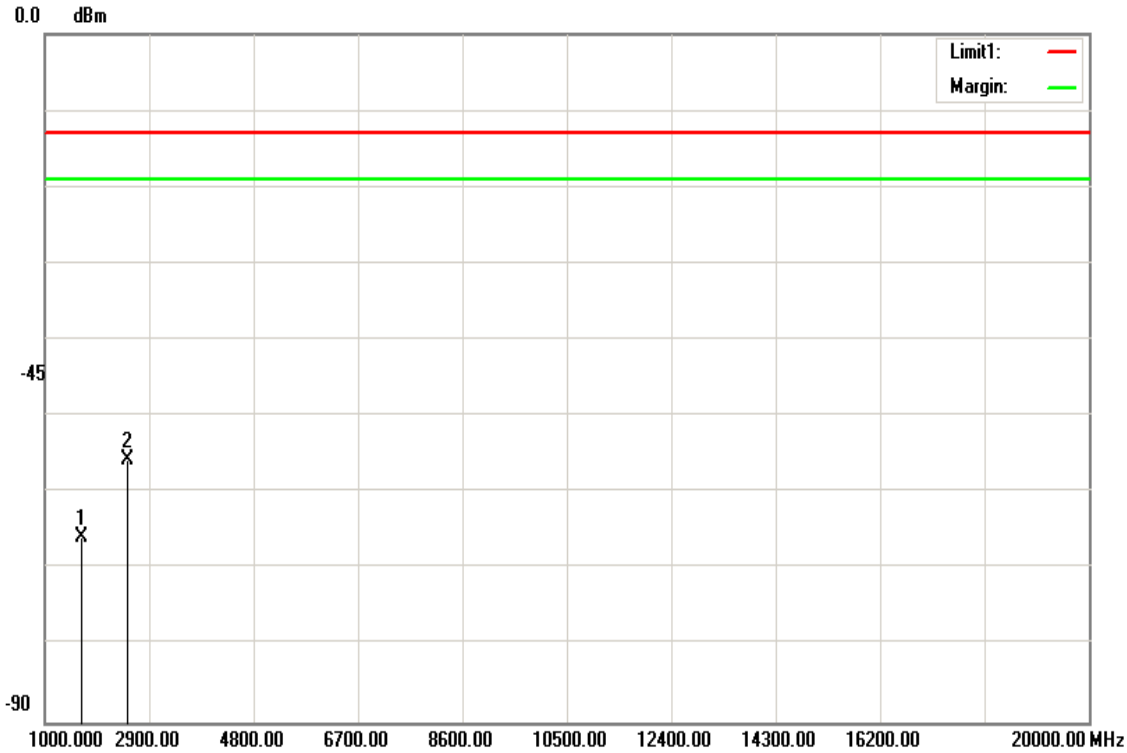
Operation Mode:	WCDMA 12.2k RMC Band V / TX / Mid CH	**Test Date:**	December 7, 2018
Temperature:	22℃	**Tested by:**	Jerry Chuang
Humidity:	48 % RH	**Polarity:**	Ver.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1672.000	-61.52	4.23	-65.75	-13.00	-52.75	V
2505.000	-50.38	5.34	-55.72	-13.00	-42.72	V
N/A						

Remark:

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

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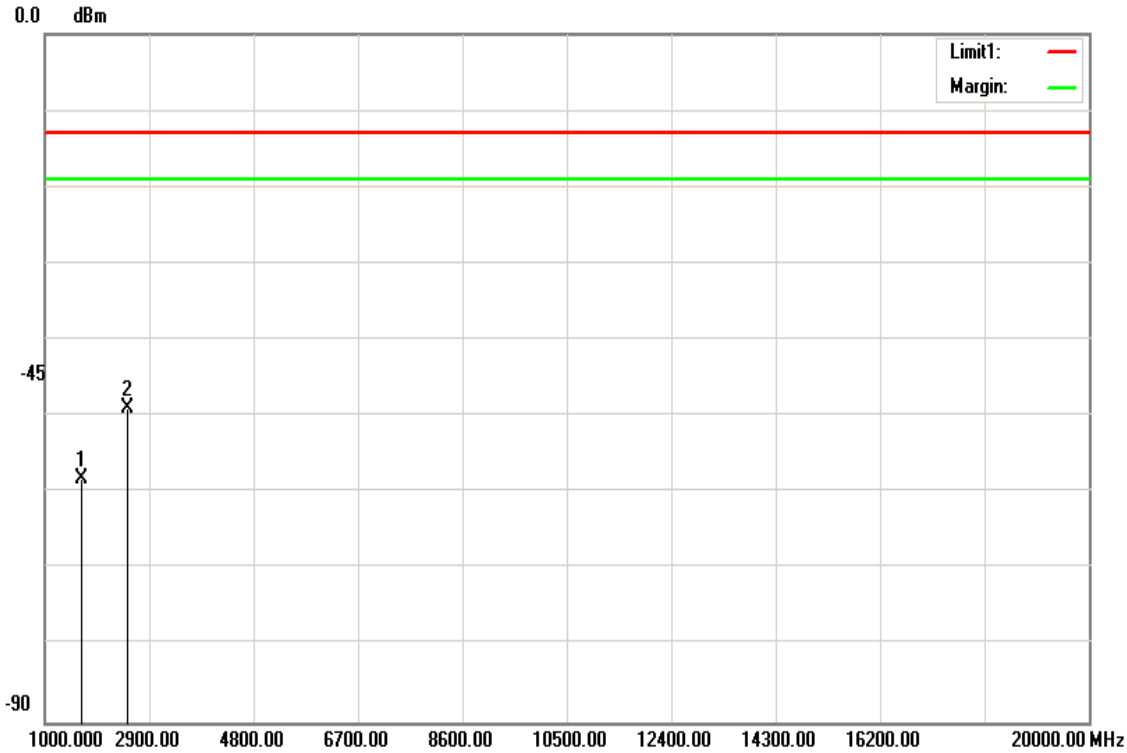
Operation Mode:	WCDMA 12.2k RMC Band V / TX / Mid CH 4182	**Test Date:**	December 7, 2018
Temperature:	22℃	**Tested by:**	Jerry Chuang
Humidity:	48 % RH	**Polarity:**	Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1672.000	-53.85	4.23	-58.08	-13.00	-45.08	H
2505.000	-43.57	5.34	-48.91	-13.00	-35.91	H
N/A						

Remark:

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

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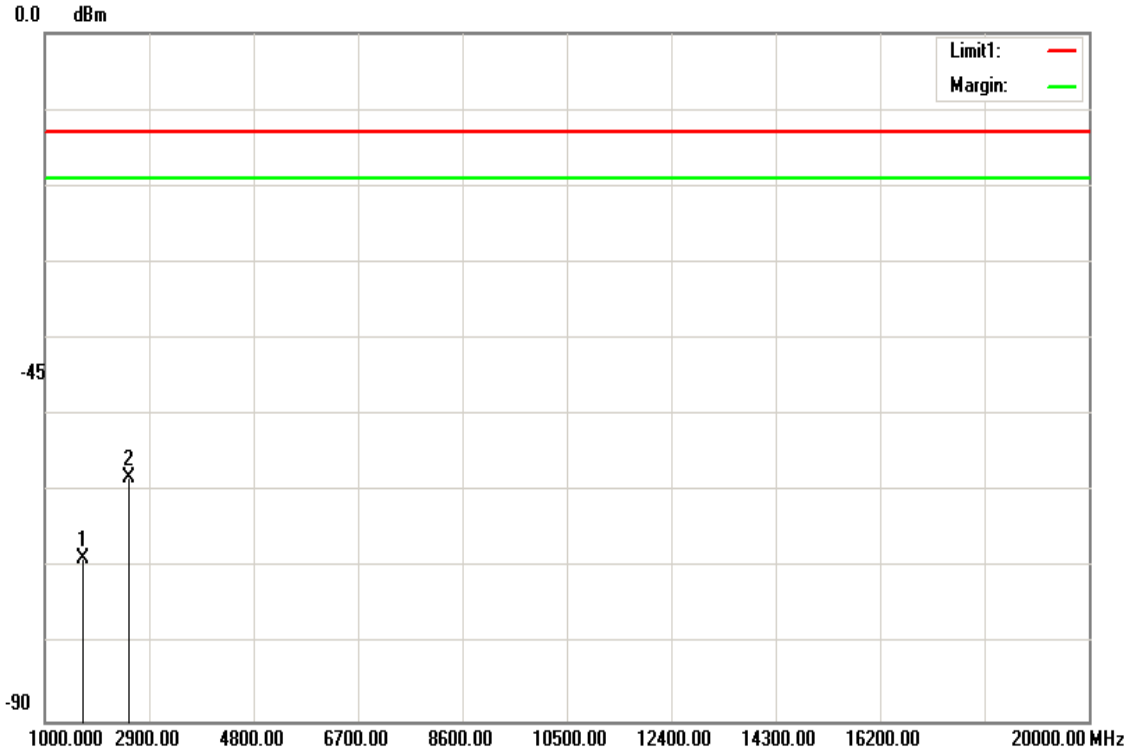
Operation Mode:	WCDMA 12.2k RMC Band V / TX /High CH	**Test Date:**	December 7, 2018
Temperature:	22℃	**Tested by:**	Jerry Chuang
Humidity:	48 % RH	**Polarity:**	Ver.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1693.000	-64.56	4.26	-68.82	-13.00	-55.82	V
2536.500	-52.86	5.37	-58.23	-13.00	-45.23	V
N/A						

Remark:

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

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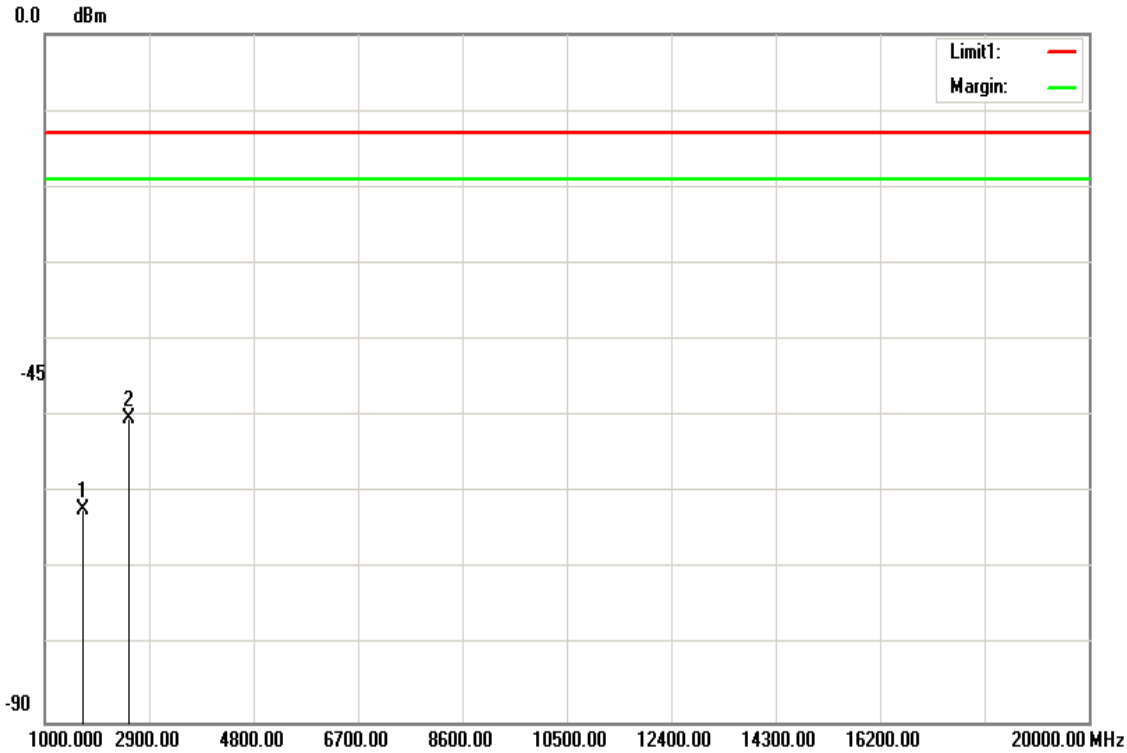
Operation Mode:	WCDMA 12.2k RMC Band V / TX /High CH	**Test Date:**	December 7, 2018
Temperature:	22℃	**Tested by:**	Jerry Chuang
Humidity:	48 % RH	**Polarity:**	Hor.



Frequency (MHz)	S.G. (dBm)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1693.000	-58.03	4.26	-62.29	-13.00	-49.29	H
2536.500	-44.99	5.37	-50.36	-13.00	-37.36	H
N/A						

Remark:

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

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8.8 FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT

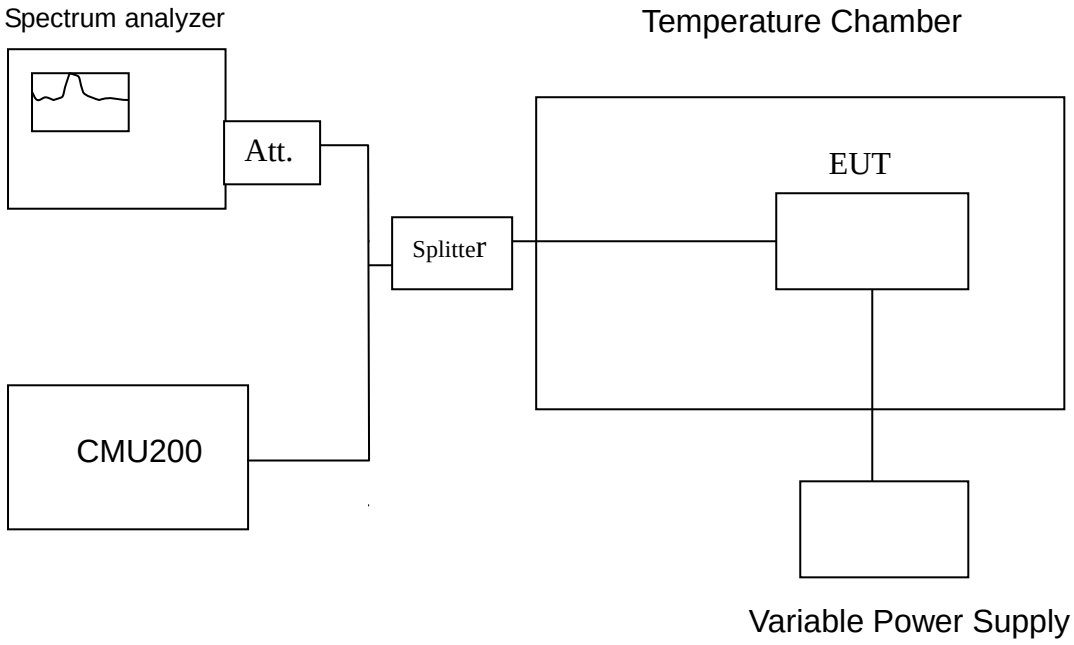
LIMIT

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

According to IC RSS-132 §5.3, IC RSS-133 §6.3.

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 con*

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 -20℃. 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)
120	50	1.00
120	40	-1.00
120	30	1.00
120	20	0.00
120	10	-1.00
120	0	1.00
120	-10	-1.00
120	-20	2.00

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)
120	50	-2.00
120	40	-1.00
120	30	0.00
120	20	1.00
120	10	-2.00
120	0	1.00
120	-10	1.00
120	-20	1.00

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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)
120	50	2.00
120	40	-1.00
120	30	2.00
120	20	0.00
120	10	-3.00
120	0	-1.00
120	-10	-2.00
120	-20	-4.00

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)
120	50	-3.00
120	40	-2.00
120	30	1.00
120	20	-1.00
120	10	0.00
120	0	-1.00
120	-10	1.00
120	-20	-2.00

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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)
120	50	-3.00
120	40	2.00
120	30	-1.00
120	20	0.00
120	10	-2.00
120	0	-1.00
120	-10	1.00
120	-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)
120	50	2.00
120	40	-2.00
120	30	3.00
120	20	0.00
120	10	1.00
120	0	1.00
120	-10	-2.00
120	-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)
102	20	1.00
120		0.00
138		-1.00

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)
102	20	-6.00
120		-7.00
138		-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)
102	20	-12.00
120		-10.00
138		-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)
102	20	2.00
120		1.00
138		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)
102	20	1.00
120		0.00
138		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)
102	20	1.00
120		2.00
138		-1.00

-- End of Test Report --

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