FCC RF Test Report

APPLICANT	:	Fibocom Wireless Inc
EQUIPMENT	:	LTE module
BRAND NAME	:	Fibocom
MODEL NAME	:	NL668-AM-00
FCC ID	:	ZMONL668AM00
STANDARD	:	FCC 47 CFR Part 2, 22(H), 24(E), 27(L)
CLASSIFICATION	:	PCS Licensed Transmitter (PCB)

The product was received on Oct. 19, 2018 and completely tested on Nov. 15, 2018. We, Sporton International (Shenzhen) Inc., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.26-2015 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (Shenzhen) Inc., the test report shall not be reproduced except in full.

Eric Shih

Approved by: Eric Shih / Manager

TESTING
NVLAP LAB CODE 600156-0

Sporton International (Shenzhen) Inc.
1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen City, Guangdong Province 518055, China

TABLE OF CONTENTS

REVISION HISTORY **3**
SUMMARY OF TEST RESULT **4**
1 GENERAL DESCRIPTION **5**
1.1 Applicant 5
1.2 Manufacturer 5
1.3 Product Feature of Equipment Under Test 5
1.4 Product Specification of Equipment Under Test 6
1.5 Modification of EUT 6
1.6 Maximum ERP/EIRP Power, Frequency Tolerance, and Emission Designator 6
1.7 Testing Location 7
1.8 Applicable Standards 7
2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST **8**
2.1 Test Mode 8
2.2 Connection Diagram of Test System 9
2.3 Support Unit used in test configuration 9
2.4 Measurement Results Explanation Example 10
2.5 Frequency List of Low/Middle/High Channels 10
3 CONDUCTED TEST RESULT **11**
3.1 Measuring Instruments 11
3.2 Test Setup 11
3.3 Test Result of Conducted Test 11
3.4 Conducted Output Power and ERP/EIRP 12
3.5 Peak-to-Average Ratio 12
3.6 99% Occupied Bandwidth and 26dB Bandwidth Measurement 13
3.7 Conducted Band Edge 14
3.8 Conducted Spurious Emission 14
3.9 Frequency Stability 15
4 RADIATED TEST ITEMS **16**
4.1 Measuring Instruments 16
4.2 Test Setup 16
4.3 Test Result of Radiated Test 16
4.4 Field Strength of Spurious Radiation Measurement 17
5 LIST OF MEASURING EQUIPMENT **18**
6 UNCERTAINTY OF EVALUATION **19**
APPENDIX A. TEST RESULTS OF CONDUCTED TEST
APPENDIX B. TEST RESULTS OF RADIATED TEST
APPENDIX C. TEST SETUP PHOTOGRAPHS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG8O1914A	Rev. 01	Initial issue of report	Nov. 28, 2018

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.4	§2.1046	Conducted Output Power	Reporting Only	PASS	-
	§22.913(a)(5)	Effective Radiated Power	< 7 Watts	PASS	-
	§24.232(c)	Equivalent Isotropic Radiated Power	< 2 Watts	PASS	-
	§27.50(d)(4)	Equivalent Isotropic Radiated Power	< 1 Watts	PASS	-
3.5	§24.232(d)	Peak-to-Average Ratio	< 13 dB	PASS	-
3.6	§2.1049	Occupied Bandwidth	Reporting Only	PASS	-
3.7	§2.1051 §22.917(a) §24.238(a) §27.53(h)	Band Edge Measurement	< 43+10log10(P[Watts])	PASS	-
3.8	§2.1051 §22.917(a) §24.238(a) §27.53(h)	Conducted Emission	< 43+10log10(P[Watts])	PASS	-
3.9	§2.1055 §22.355	Frequency Stability for Temperature & Voltage	< 2.5 ppm for Part 22H	PASS	-
	§2.1055 §24.235 §27.54		Within Authorized Band		
4.4	§2.1053 §22.917(a) §24.238(a) §27.53(h)	Field Strength of Spurious Radiation	< 43+10log10(P[Watts])	PASS	Under limit 35.40 dB at 3465.200 MHz

1 General Description

1.1 Applicant

Fibocom Wireless Inc
5/F,Tower A,Technology Building II,1057 Nanhai Avenue,Shenzhen,China

1.2 Manufacturer

Fibocom Wireless Inc
5/F,Tower A,Technology Building II,1057 Nanhai Avenue,Shenzhen,China

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	LTE module
Brand Name	Fibocom
Model Name	NL668-AM-00
FCC ID	ZMONL668AM00
EUT supports Radios application	WCDMA/HSPA/DC-HSDPA/HSPA+(16QAM uplink is not supported)/LTE
IMEI Code	Conducted:866857032754141 Radiation: 866857032753648
HW Version	V1.0.1
SW Version	19006.1000.00.02.77.07
EUT Stage	Production Unit

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx Frequency	**WCDMA:** Band V: 826.4 MHz ~ 846.6 MHz Band II: 1852.4 MHz ~ 1907.6 MHz Band IV: 1712.4 MHz ~ 1752.6 MHz
Rx Frequency	**WCDMA:** Band V: 871.4 MHz ~ 891.6 MHz Band II: 1932.4 MHz ~ 1987.6 MHz Band IV: 2112.4 MHz ~ 2152.6 MHz
Maximum Output Power to Antenna	**WCDMA:** Band V: 23.53 dBm Band II: 24.17 dBm Band IV: 23.74 dBm
Antenna Type	Dipole Antenna
Antenna Gain	Cellular Band: 4.00 dBi PCS Band: 4.00 dBi AWS Band: 4.50 dBi
Type of Modulation	WCDMA : BPSK (Uplink) HSDPA/DC-HSDPA : QPSK (Uplink) HSUPA : QPSK (Uplink) HSPA+ : 16QAM (uplink is not supported) DC-HSDPA : 64QAM

1.5 Modification of EUT

No modifications are made to the EUT during all test items.

1.6 Maximum ERP/EIRP Power, Frequency Tolerance, and Emission Designator

FCC Rule	System	Type of Modulation	Maximum ERP/EIRP (W)	Frequency Tolerance (ppm)	Emission Designator
Part 22H	WCDMA Band V RMC 12.2Kbps	BPSK	0.3451	0.0411 ppm	4M31F9W
Part 24E	WCDMA Band II RMC 12.2Kbps	BPSK	0.6561	0.0105 ppm	4M12F9W
Part 27L	WCDMA Band IV RMC 12.2Kbps	BPSK	0.6668	0.0551 ppm	4M13F9W

1.7 Testing Location

Sporton International (Shenzhen) Inc. is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600156-0).

Test Site	Sporton International (Shenzhen) Inc.		
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen City, Guangdong Province 518055, China TEL: +86-755-8637-9589 FAX: +86-755-8637-9595		
Test Site No.	**Sporton Site No.**	**FCC designation No.**	**FCC Test Firm Registration No.**
	TH01-SZ	CN5018	337463

Test Site	Sporton International (Shenzhen) Inc.		
Test Site Location	No. 3 Bldg the third floor of south, Shahe River west, Fengzeyuan Warehouse, Nanshan District, Shenzhen City, Guangdong Province 518055, China TEL: +86-755- 3320-2398		
Test Site No.	**Sporton Site No.**	**FCC designation No.**	**FCC Test Firm Registration No.**
	03CH02-SZ	CN5019	577730

1.8 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR Part 2, 22(H), 24(E), 27(L)
- ANSI C63.26-2015
- FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- FCC KDB 412172 D01 Determining ERP and EIRP v01r01

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

2.1 Test Mode

Antenna port conducted and radiated test items were performed according to KDB 971168 D01 Power Meas. License Digital Systems v03r01 with maximum output power.

Radiated measurements were performed with rotating EUT in different three orthogonal test planes to find the maximum emission.

Radiated emissions were investigated as following frequency range:

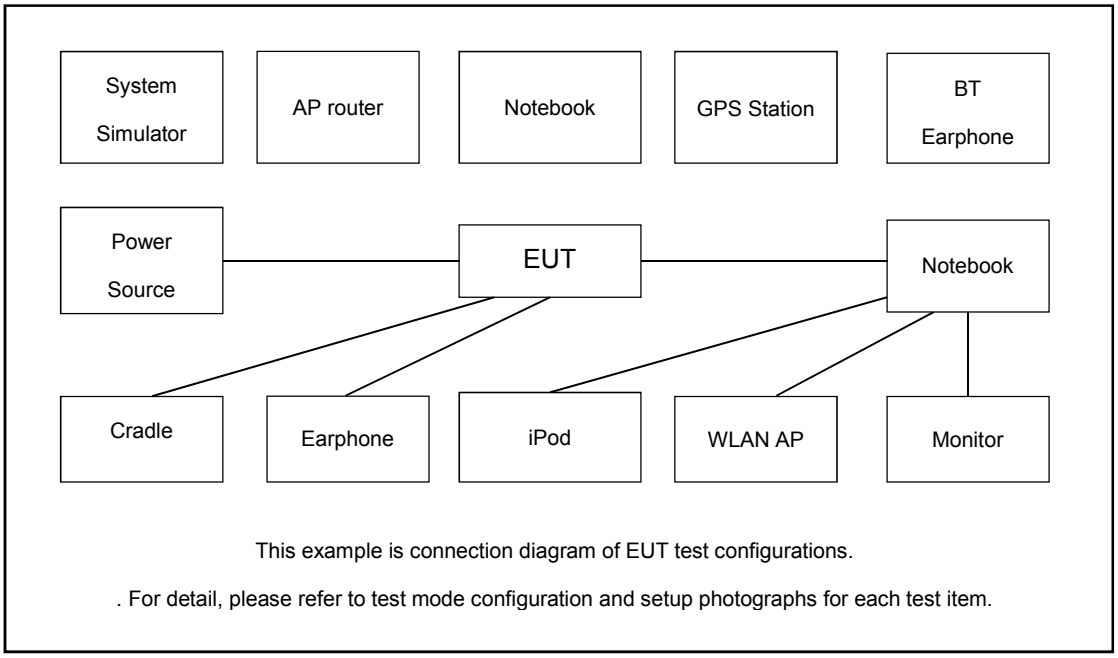
1. 30 MHz to 10th harmonic for WCDMA Band V.
2. 30 MHz to 10th harmonic for WCDMA Band IV.
3. 30 MHz to 10th harmonic for WCDMA Band II.

All modes and data rates and positions were investigated.

Test modes are chosen to be reported as the worst case configuration below:

Test Modes		
Band	**Radiated TCs**	**Conducted TCs**
WCDMA Band V	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link
WCDMA Band II	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link
WCDMA Band IV	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link

2.2 Connection Diagram of Test System



2.3 Support Unit used in test configuration

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8m
2.	DC Power Supply	GW INSTEK	GPS-3030D	N/A	N/A	Unshielded, 1.8m
3.	Adapter	N/A	N/A	N/A	Unshielded,1.2m	N/A
4.	Test Jig	N/A	N/A	N/A	N/A	N/A
5.	WWAN Antenna	N/A	HYT-690-2700H-3	N/A	N/A	N/A

2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between RF conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level will be exactly the RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

The following shows an offset computation example with RF cable loss 4.5 dB and a 10dB attenuator.

Example :

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 4.5 + 10 = 14.5 (dB)

2.5 Frequency List of Low/Middle/High Channels

Frequency List				
Band	**Channel/Frequency(MHz)**	**Lowest**	**Middle**	**Highest**
WCDMA Band V	Channel	4132	4182	4233
	Frequency	826.4	836.4	846.6
WCDMA Band II	Channel	9262	9400	9538
	Frequency	1852.4	1880.0	1907.6
WCDMA Band IV	Channel	1312	1413	1513
	Frequency	1712.4	1732.6	1752.6

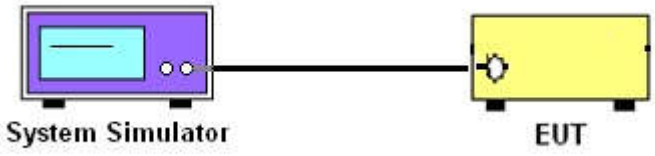
3 Conducted Test Result

3.1 Measuring Instruments

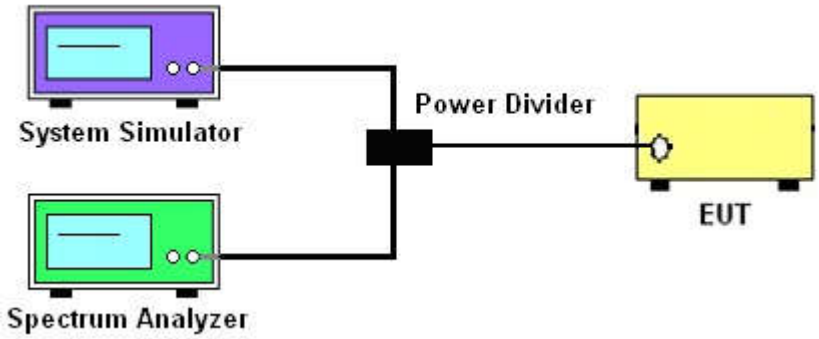
See list of measuring instruments of this test report.

3.2 Test Setup

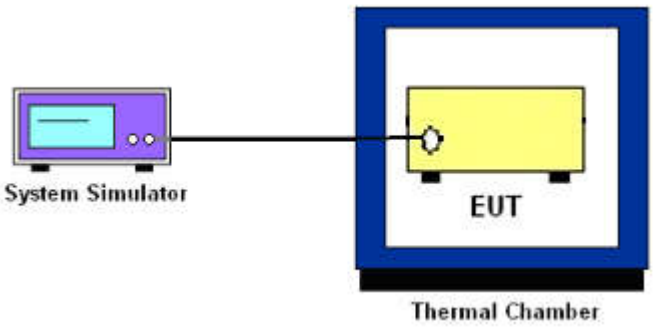
3.2.1 Conducted Output Power



3.2.2 Peak-to-Average Ratio, Occupied Bandwidth, Conducted Band-Edge and Conducted Spurious Emission



3.2.3 Frequency Stability



3.3 Test Result of Conducted Test

Please refer to Appendix A.

3.4 Conducted Output Power and ERP/EIRP

3.4.1 Description of the Conducted Output Power and ERP/EIRP

A system simulator was used to establish communication with the EUT. Its parameters were set to enforce EUT transmitting at the maximum power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

The ERP of mobile transmitters must not exceed 7 Watts for WCDMA Band V.

The EIRP of mobile transmitters must not exceed 2 Watts for WCDMA Band II.

The EIRP of mobile transmitters must not exceed 1 Watts for WCDMA Band IV.

According to KDB 412172 D01 Power Approach,

EIRP = $P_T + G_T – L_C$, ERP = EIRP -2.15, where

P_T = transmitter output power in dBm

G_T = gain of the transmitting antenna in dBi

L_C = signal attenuation in the connecting cable between the transmitter and antenna in dB

3.4.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.2
2. The transmitter output port was connected to the system simulator.
3. Set EUT at maximum power through the system simulator.
4. Select lowest, middle, and highest channels for each band and different modulation.
5. Measure and record the power level from the system simulator.

3.5 Peak-to-Average Ratio

3.5.1 Description of the PAR Measurement

The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

3.5.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.2.3.4 (CCDF).
2. The EUT was connected to spectrum and system simulator via a power divider.
3. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
4. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
5. Record the deviation as Peak to Average Ratio.

3.6 99% Occupied Bandwidth and 26dB Bandwidth Measurement

3.6.1 Description of 99% Occupied Bandwidth and 26dB Bandwidth Measurement

The occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

The 26 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 26 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth.

3.6.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.4
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be between two and five times the anticipated OBW.
4. The nominal resolution bandwidth (RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.
5. Set the detection mode to peak, and the trace mode to max hold.
6. Determine the reference value: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace. (this is the reference value)
7. Determine the “-26 dB down amplitude” as equal to (Reference Value – X).
8. Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the “–X dB down amplitude” determined in step 6. If a marker is below this “-X dB down amplitude” value it shall be placed as close as possible to this value. The OBW is the positive frequency difference between the two markers.
9. Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.

3.7 Conducted Band Edge

3.7.1 Description of Conducted Band Edge Measurement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.

3.7.2 Test Procedures

1. The testing follows ANSI C63.26 section 5.7
2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
3. The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator. The path loss was compensated to the results for each measurement.
4. The band edges of low and high channels for the highest RF powers were measured.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
6. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)

3.8 Conducted Spurious Emission

3.8.1 Description of Conducted Spurious Emission Measurement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.

It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its 10th harmonic.

3.8.2 Test Procedures

1. The testing follows ANSI C63.26 section 5.7
2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
3. The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator. The path loss was compensated to the results for each measurement.
4. The middle channel for the highest RF power within the transmitting frequency was measured.
5. The conducted spurious emission for the whole frequency range was taken.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
7. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)

3.9 Frequency Stability

3.9.1 Description of Frequency Stability Measurement

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency.

3.9.2 Test Procedures for Temperature Variation

1. The testing follows ANSI C63.26 section 5.6.4
2. The EUT was set up in the thermal chamber and connected with the system simulator.
3. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
4. With power OFF, the temperature was raised in 10°C step up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

3.9.3 Test Procedures for Voltage Variation

1. The testing follows ANSI C63.26 section 5.6.5
2. The EUT was placed in a temperature chamber at 20±5°C and connected with the system simulator.
3. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value for other than hand carried battery equipment.
4. For hand carried, battery powered equipment, reduce the primary ac or dc supply voltage to the battery operating end point, which shall be specified by the manufacturer.
5. The variation in frequency was measured for the worst case.

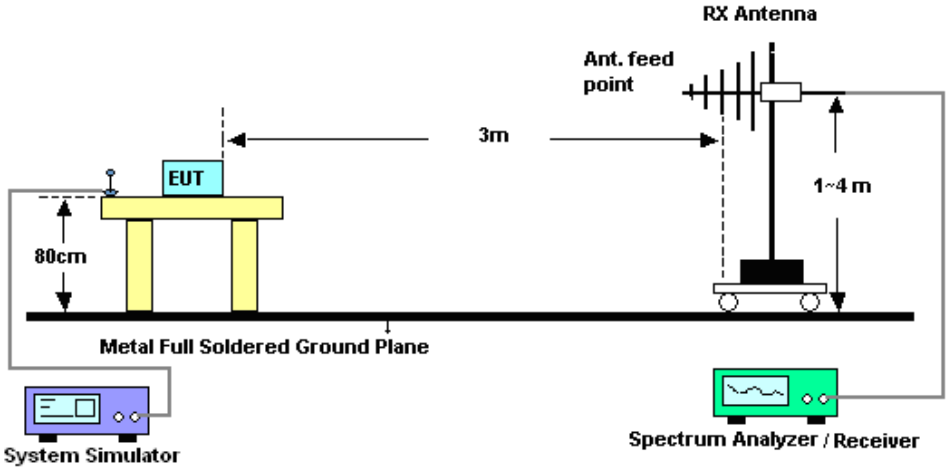
4 Radiated Test Items

4.1 Measuring Instruments

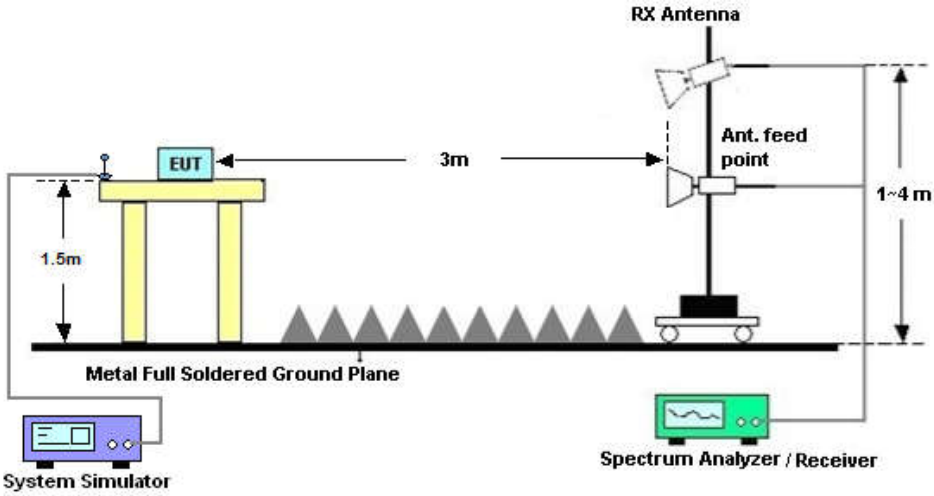
See list of measuring instruments of this test report.

4.2 Test Setup

4.2.1 For radiated test from 30MHz to 1GHz



4.2.2 For radiated test above 1GHz



4.3 Test Result of Radiated Test

Please refer to Appendix B.

4.4 Field Strength of Spurious Radiation Measurement

4.4.1 Description of Field Strength of Spurious Radiated Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

4.4.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.5
2. The EUT was placed on a rotatable wooden table 0.8 meters for frequency below 1GHz and 1.5 meter for frequency above 1GHz above the ground.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between one meter and four meters to search for the maximum spurious emission for both horizontal and vertical polarizations.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking record of maximum spurious emission.
7. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
9. Taking the record of output power at antenna port.
10. Repeat step 7 to step 8 for another polarization.
11. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
12. ERP (dBm) = EIRP - 2.15
13. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
14. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)

5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	10Hz~40GHz	Apr. 19, 2018	Nov. 09, 2018~ Nov. 15, 2018	Apr. 18, 2019	Conducted (TH01-SZ)
Thermal Chamber	Ten Billion Hongzhangroup	LP-150U	H2014081803	-40~+150°C	Dec. 26, 2017	Nov. 09, 2018~ Nov.15, 2018	Dec. 25, 2018	Conducted (TH01-SZ)
Spectrum Analyzer	R&S	FSV40	101041	10Hz~40GHz	Oct. 20, 2018	Oct. 30, 2018	Oct. 19, 2019	Radiation (03CH02-SZ)
Bilog Antenna	TeseQ	CBL6112D	35407	30MHz-2GHz	May 10, 2018	Oct. 30, 2018	May 09, 2019	Radiation (03CH02-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1285	1GHz~18GHz	Dec. 13, 2017	Oct. 30, 2018	Dec. 12, 2018	Radiation (03CH02-SZ)
HF Amplifier	MITEQ	TTA1840-35 -HG	1871923	18GHz~40GHz	Jul. 30, 2018	Oct. 30, 2018	Jul. 29, 2019	Radiation (03CH02-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18Ghz-40GHz	Mar. 30, 2018	Oct. 30, 2018	Mar. 29, 2019	Radiation (03CH02-SZ)
LF Amplifier	Burgeon	BPA-530	102211	0.01~3000Mhz	Oct. 20, 2018	Oct. 30, 2018	Oct. 19, 2019	Radiation (03CH02-SZ)
HF Amplifier	Agilent	8449B	3008A01023	1GHz~26.5GHz	Oct. 20, 2018	Oct. 30, 2018	Oct. 19, 2019	Radiation (03CH02-SZ)
AC Power Source	Chroma	61601	61601000247 0	N/A	NCR	Oct. 30, 2018	NCR	Radiation (03CH02-SZ)
Turn Table	Chaintek	T-200	N/A	0~360 degree	NCR	Oct. 30, 2018	NCR	Radiation (03CH02-SZ)
Antenna Mast	Chaintek	MBS-400	N/A	1 m~4 m	NCR	Oct. 30, 2018	NCR	Radiation (03CH02-SZ)

NCR: No Calibration Required

6 Uncertainty of Evaluation

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.5dB

Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.3dB

Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.7dB

Appendix A. Test Results of Conducted Test

Conducted Output Power(Average power)

Conducted Power (*Unit: dBm)									
Band	WCDMA Band V			WCDMA Band II			WCDMA Band IV		
Channel	4132	4182	4233	9262	9400	9538	1312	1413	1513
Frequency	826.4	836.4	846.6	1852.4	1880	1907.6	1712.4	1732.6	1752.6
RMC 12.2K	23.42	**23.53**	23.45	**24.17**	24.02	23.78	**23.74**	23.63	23.65
HSDPA Subtest-1	22.58	22.52	22.49	22.87	22.76	22.89	22.38	22.44	22.41
HSDPA Subtest-2	22.62	22.60	22.54	22.88	22.82	22.85	22.39	22.40	22.35
HSDPA Subtest-3	22.12	22.12	22.04	22.40	22.35	22.47	21.92	21.93	21.88
HSDPA Subtest-4	22.13	22.12	22.05	22.38	22.34	22.45	21.91	21.92	21.88
DC-HSDPA Subtest-1	22.31	22.24	22.23	22.63	22.52	22.65	22.12	22.18	22.16
DC-HSDPA Subtest-2	22.36	22.33	22.29	22.64	22.57	22.60	22.12	22.12	22.09
DC-HSDPA Subtest-3	21.86	21.85	21.79	22.16	22.10	22.22	21.65	21.65	21.62
DC-HSDPA Subtest-4	21.88	21.86	21.80	22.14	22.08	22.19	21.65	21.65	21.62
HSUPA Subtest-1	22.12	22.15	21.90	22.16	22.24	22.18	21.64	21.84	21.66
HSUPA Subtest-2	21.53	21.37	21.38	21.69	21.70	21.66	21.02	21.23	21.22
HSUPA Subtest-3	21.23	20.92	20.96	21.40	21.31	21.59	20.93	20.81	20.93
HSUPA Subtest-4	21.57	21.47	21.52	21.75	21.66	21.85	21.46	21.37	21.21
HSUPA Subtest-5	22.50	22.20	22.40	22.80	22.80	22.90	22.30	22.30	22.30

ERP/EIRP

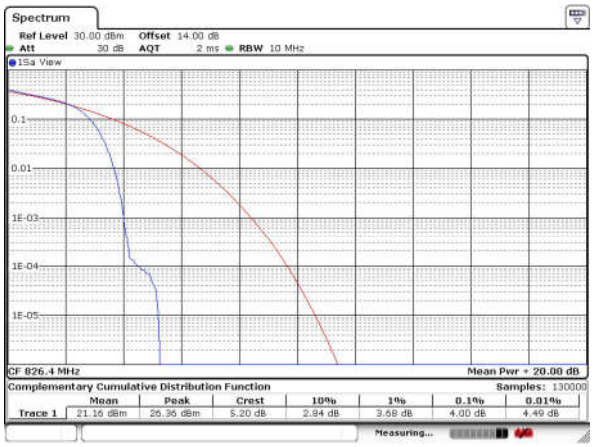
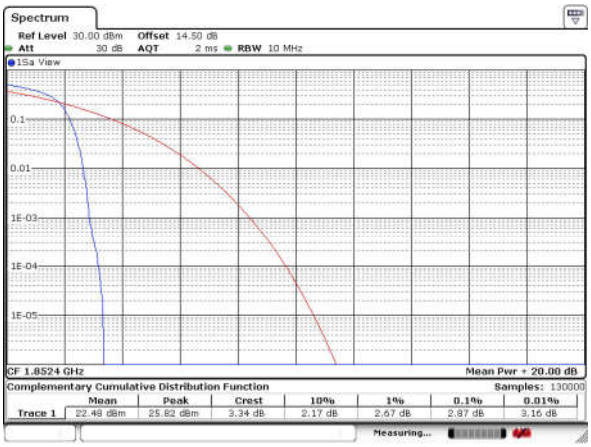
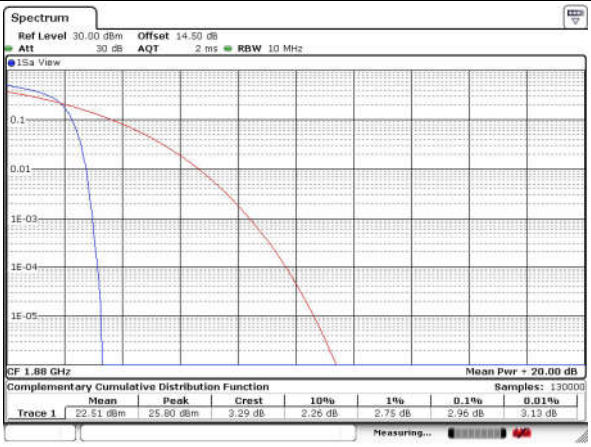
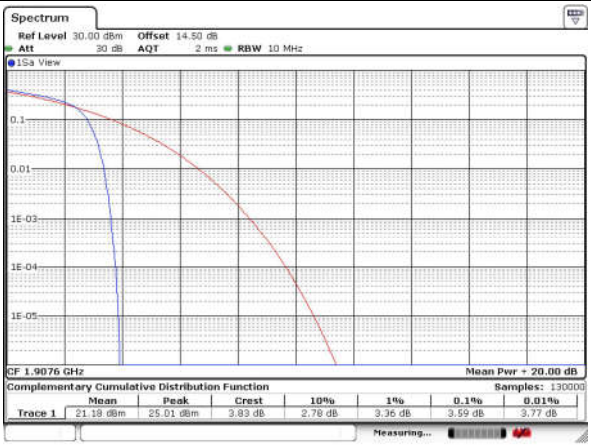
WCDMA Band V (G_T - L_C = 4.00 dBi)			
Channel	4132	4182	4233
	(Low)	(Mid)	(High)
Frequency (MHz)	826.4	836.4	846.6
Conducted Power (dBm)	23.42	23.53	23.45
Conducted Power (Watts)	0.2198	0.2254	0.2213
ERP(dBm)	25.27	25.38	25.30
ERP(Watts)	0.3365	0.3451	0.3388

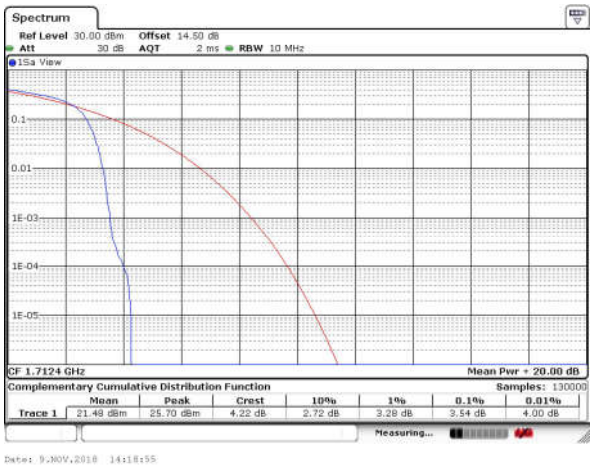
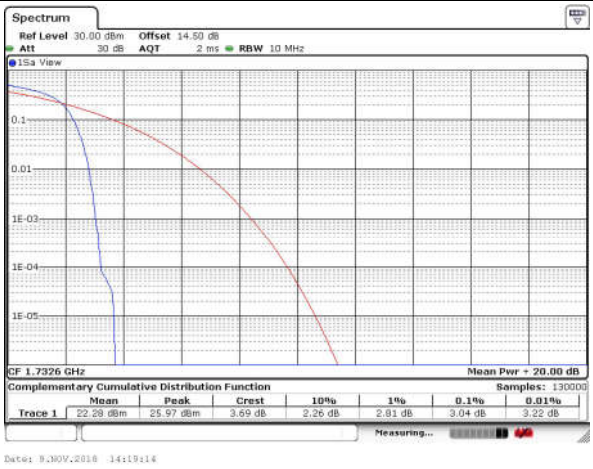
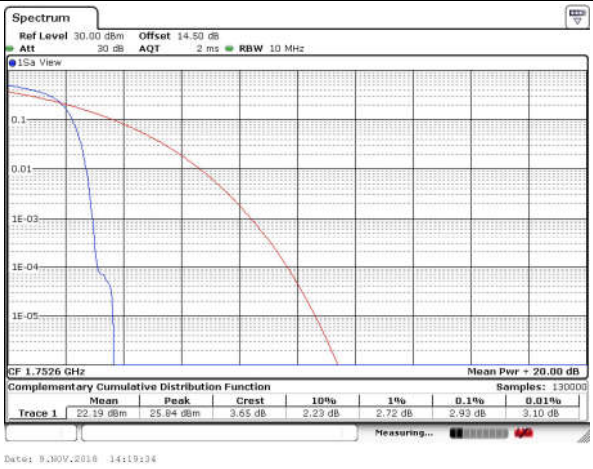
WCDMA Band II (G_T - L_C = 4.00 dBi)			
Channel	9262	9400	9538
	(Low)	(Mid)	(High)
Frequency (MHz)	1852.4	1880	1907.6
Conducted Power (dBm)	24.17	24.02	23.78
Conducted Power (Watts)	0.2612	0.2523	0.2388
EIRP(dBm)	28.17	28.02	27.78
EIRP(Watts)	0.6561	0.6339	0.5998

WCDMA Band IV (G_T - L_C = 4.50 dBi)			
Channel	1312	1413	1513
	(Low)	(Mid)	(High)
Frequency (MHz)	1712.4	1732.6	1752.6
Conducted Power (dBm)	23.74	23.63	23.65
Conducted Power (Watts)	0.2366	0.2307	0.2317
EIRP(dBm)	28.24	28.13	28.15
EIRP(Watts)	0.6668	0.6501	0.6531

Peak-to-Average Ratio

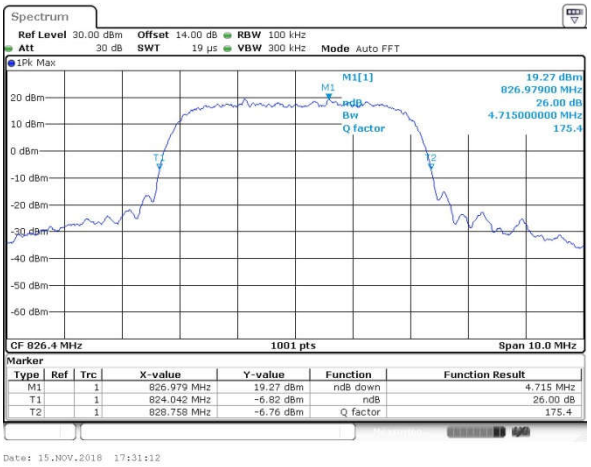
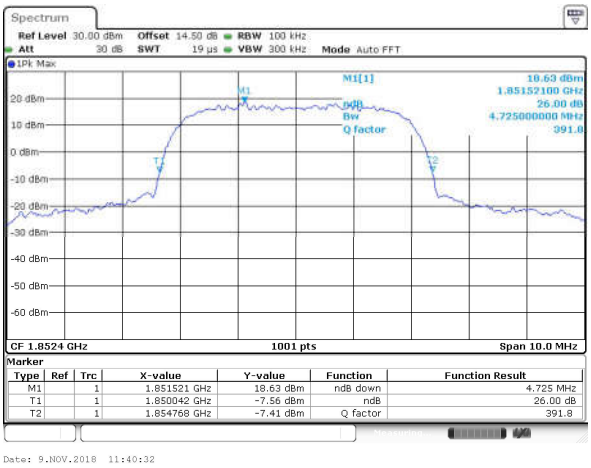
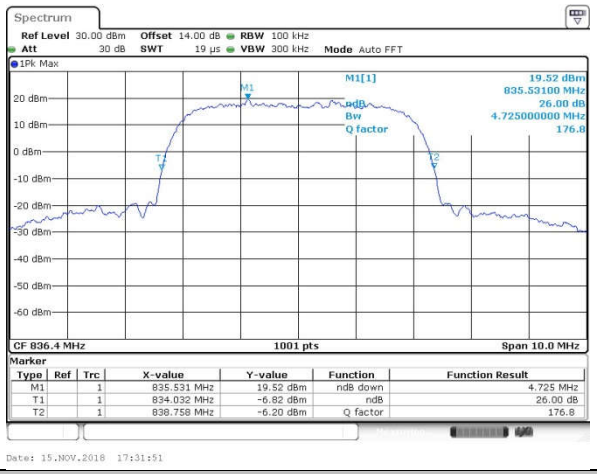
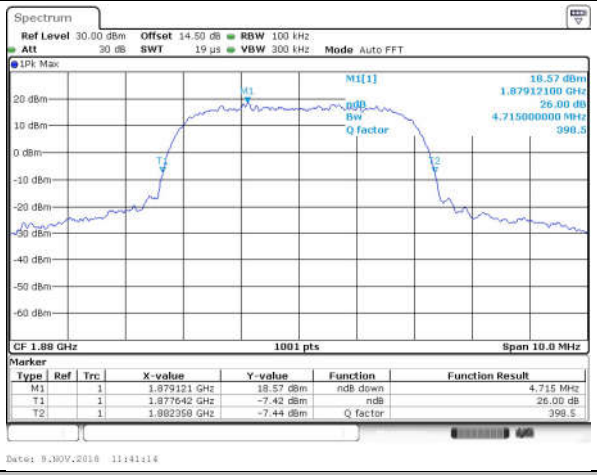
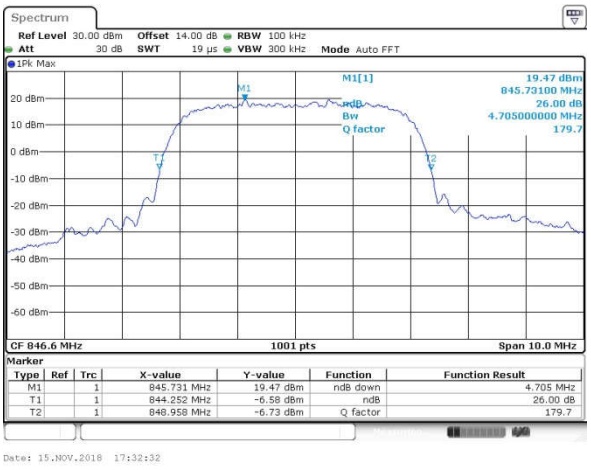
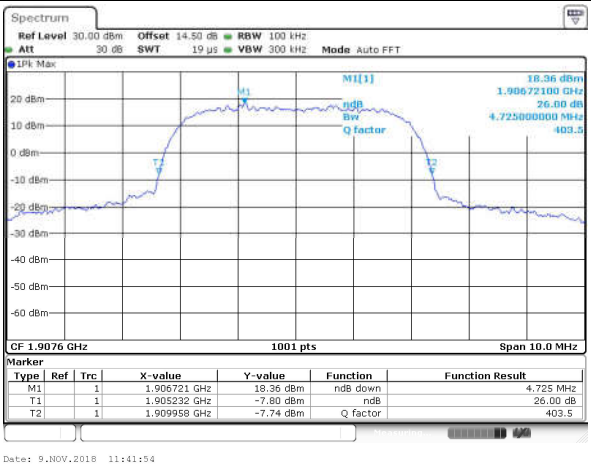
Mode	WCDMA Band V(dB)	WCDMA Band II(dB)	WCDMA Band IV(dB)	Limit: 13dB
Mod.	RMC 12.2Kbps	RMC 12.2Kbps	RMC 12.2Kbps	Result
Lowest CH	4.00	2.87	3.54	PASS
Middle CH	3.16	2.96	3.04	
Highest CH	3.30	3.59	2.93	

WCDMA Band V (RMC 12.2Kbps)	WCDMA Band II (RMC 12.2Kbps)
Lowest Channel	**Lowest Channel**
	
Middle Channel	**Middle Channel**
	
Highest Channel	**Highest Channel**
	

WCDMA Band IV (RMC 12.2Kbps)	
Lowest Channel	
	
Middle Channel	
	
Highest Channel	
	

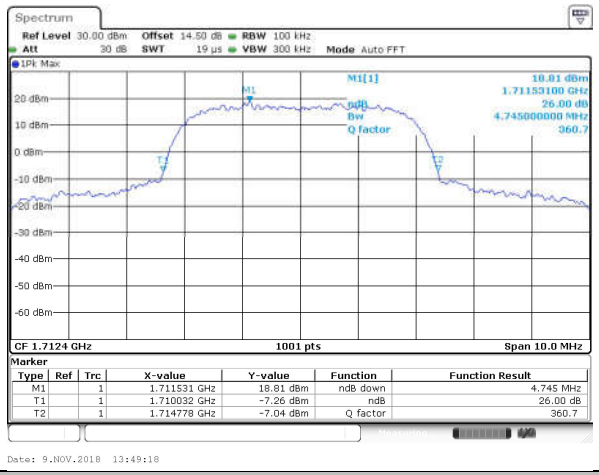
26dB Bandwidth

Mode	WCDMA Band V(MHz)	WCDMA Band II(MHz)	WCDMA Band IV(MHz)
Mod.	RMC 12.2Kbps	RMC 12.2Kbps	RMC 12.2Kbps
Lowest CH	4.72	4.73	4.75
Middle CH	4.73	4.72	4.73
Highest CH	4.71	4.73	4.73

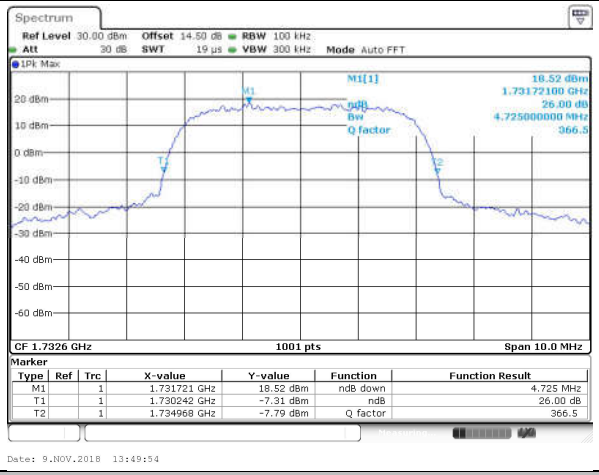
WCDMA Band V (RMC 12.2Kbps)	WCDMA Band II (RMC 12.2Kbps)
Lowest Channel	**Lowest Channel**
	
Middle Channel	**Middle Channel**
	
Highest Channel	**Highest Channel**
	

WCDMA Band IV (RMC 12.2Kbps)

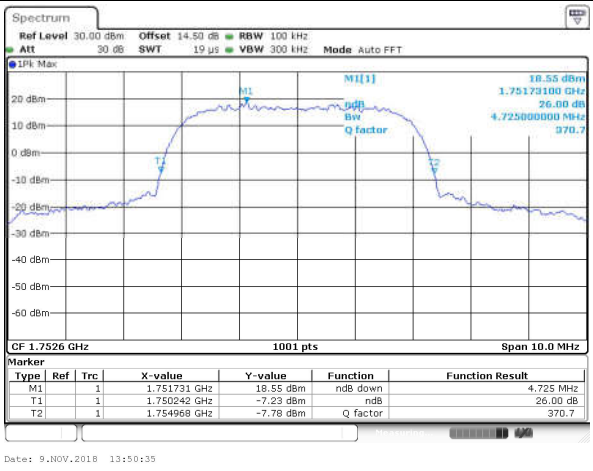
Lowest Channel



Middle Channel



Highest Channel

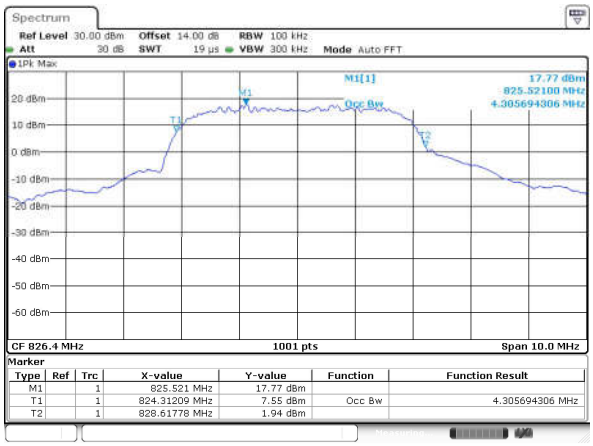


Occupied Bandwidth

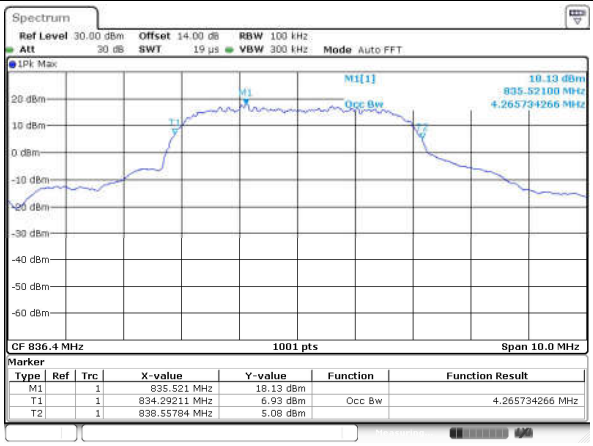
Mode	WCDMA Band V(MHz)	WCDMA Band II(MHz)	WCDMA Band IV(MHz)
Mod.	RMC 12.2Kbps	RMC 12.2Kbps	RMC 12.2Kbps
Lowest CH	4.31	4.12	4.13
Middle CH	4.27	4.12	4.12
Highest CH	4.24	4.12	4.12

WCDMA Band V (RMC 12.2Kbps)

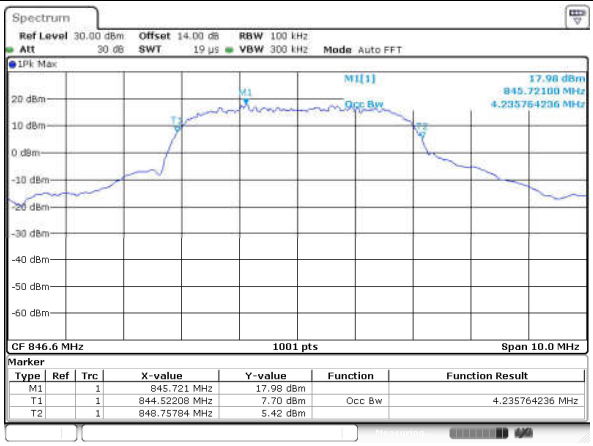
Lowest Channel



Middle Channel

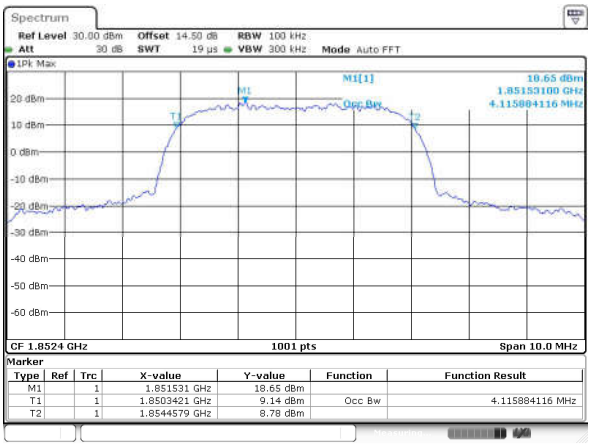


Highest Channel

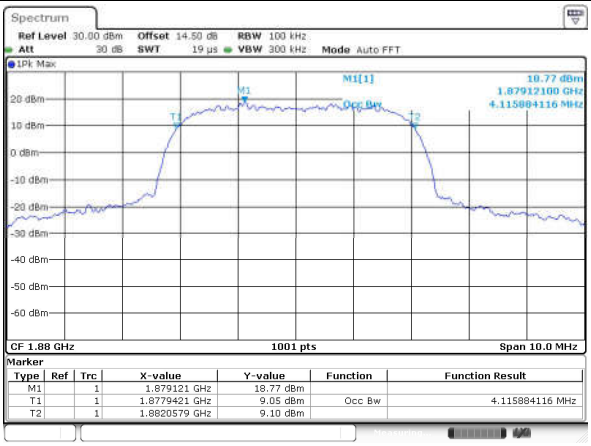


WCDMA Band II (RMC 12.2Kbps)

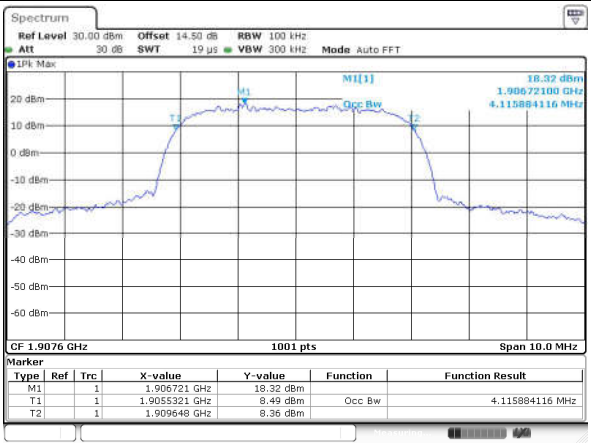
Lowest Channel



Middle Channel

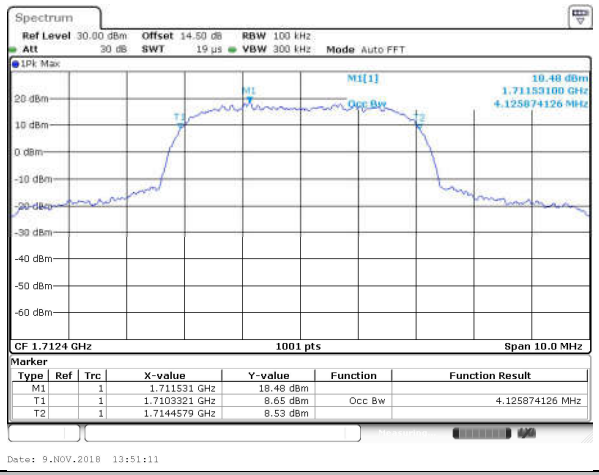


Highest Channel

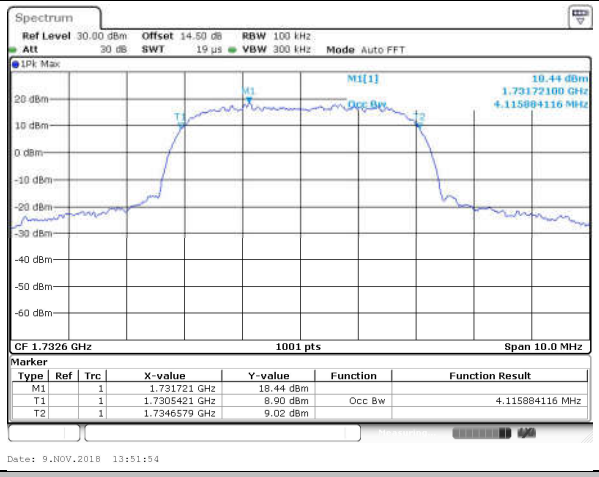


WCDMA Band IV (RMC 12.2Kbps)

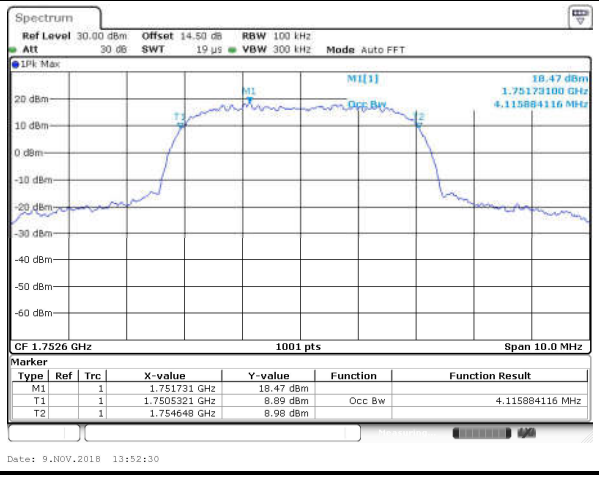
Lowest Channel



Middle Channel



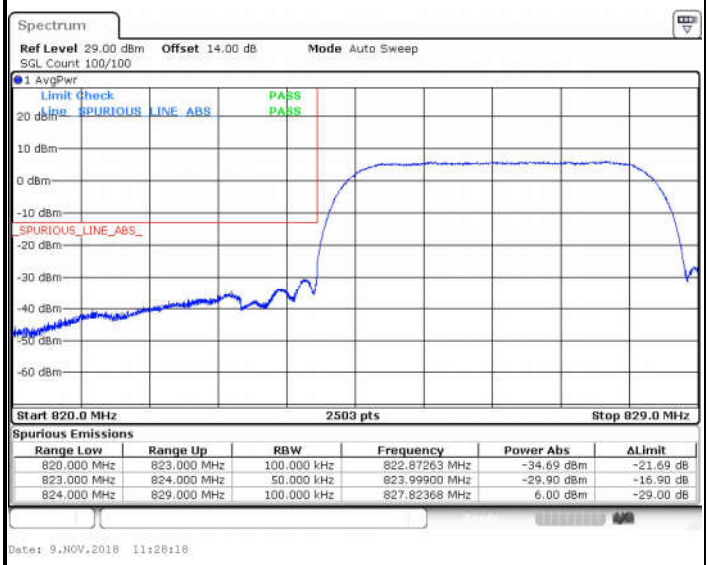
Highest Channel



Conducted Band Edge

WCDMA Band V (RMC 12.2Kbps)

Lowest Band Edge

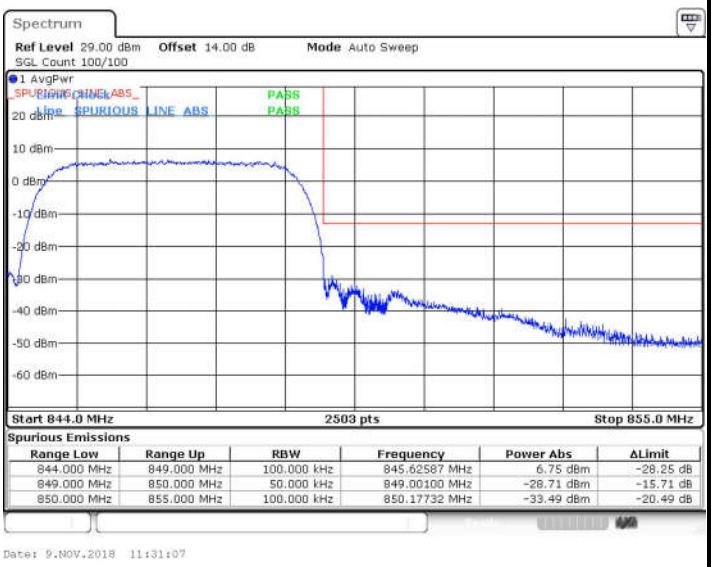


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
820.000 MHz	823.000 MHz	100.000 kHz	822.87263 MHz	-34.69 dBm	-21.69 dB
823.000 MHz	824.000 MHz	50.000 kHz	823.99900 MHz	-29.90 dBm	-16.90 dB
824.000 MHz	829.000 MHz	100.000 kHz	827.82368 MHz	6.00 dBm	-29.00 dB

Date: 9.NOV.2018 11:28:18

Highest Band Edge



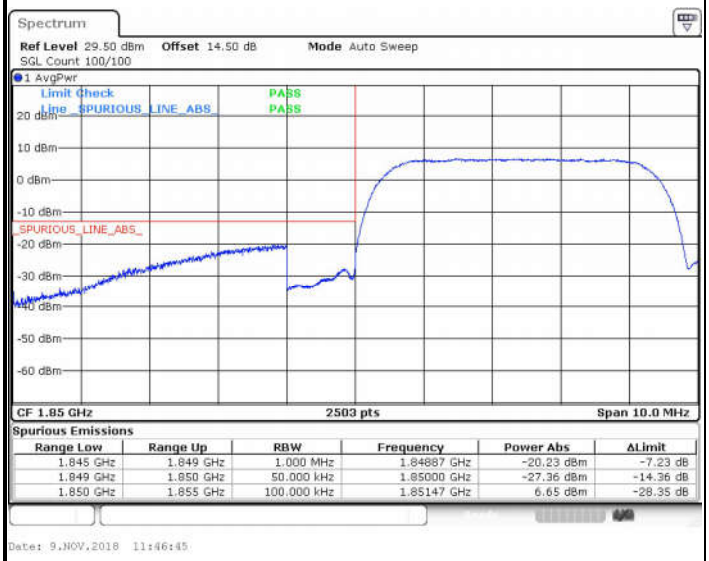
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
844.000 MHz	849.000 MHz	100.000 kHz	845.62587 MHz	6.75 dBm	-28.25 dB
849.000 MHz	850.000 MHz	50.000 kHz	849.00100 MHz	-28.71 dBm	-15.71 dB
850.000 MHz	855.000 MHz	100.000 kHz	850.17732 MHz	-33.49 dBm	-20.49 dB

Date: 9.NOV.2018 11:31:07

WCDMA Band II (RMC 12.2Kbps)

Lowest Band Edge

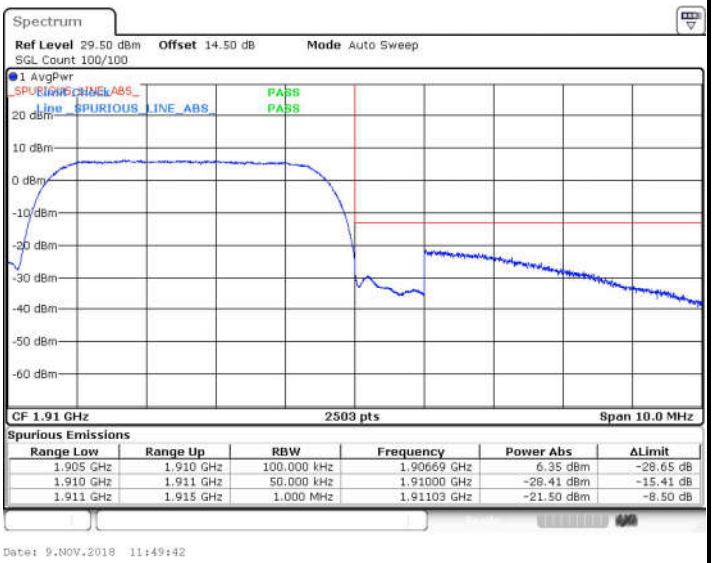


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.845 GHz	1.849 GHz	1.000 MHz	1.84887 GHz	-20.23 dBm	-7.23 dB
1.849 GHz	1.850 GHz	50.000 kHz	1.85000 GHz	-27.36 dBm	-14.36 dB
1.850 GHz	1.855 GHz	100.000 kHz	1.85147 GHz	6.65 dBm	-28.35 dB

Date: 9.NOV.2018 11:46:45

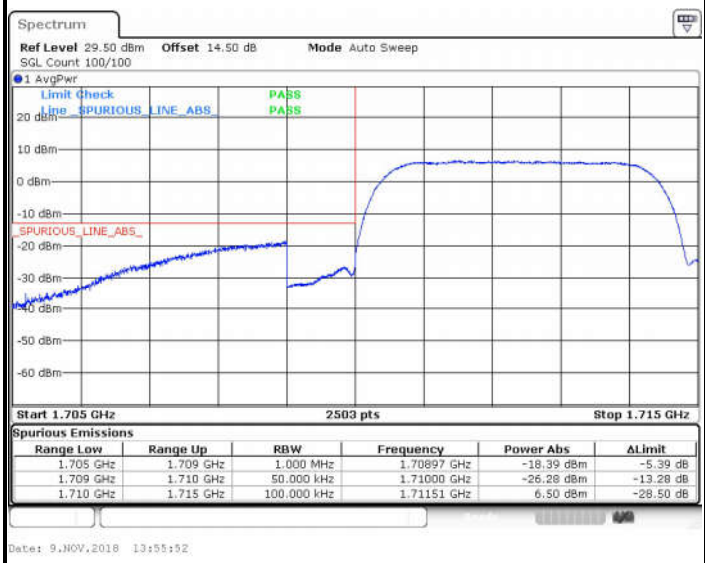
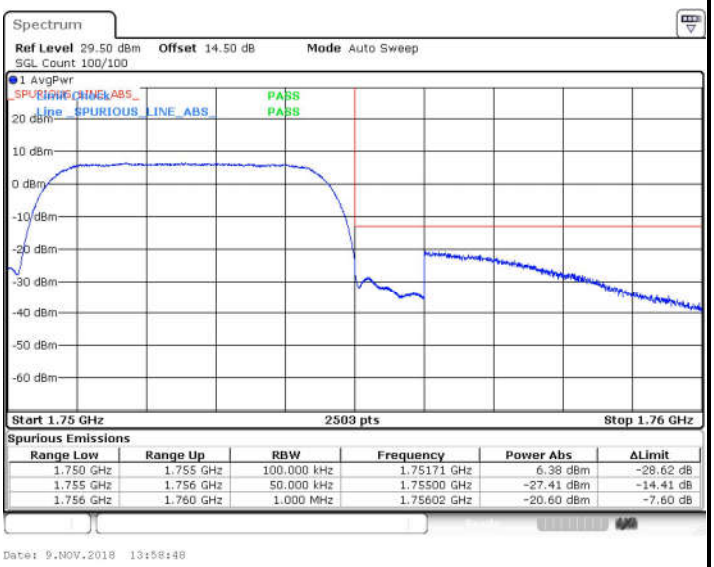
Highest Band Edge



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
1.905 GHz	1.910 GHz	100.000 kHz	1.90669 GHz	6.35 dBm	-28.65 dB
1.910 GHz	1.911 GHz	50.000 kHz	1.91000 GHz	-28.41 dBm	-15.41 dB
1.911 GHz	1.915 GHz	1.000 MHz	1.91103 GHz	-21.50 dBm	-8.50 dB

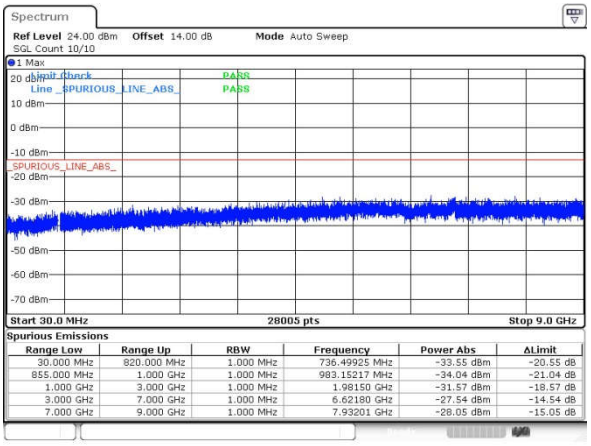
Date: 9.NOV.2018 11:49:42

WCDMA Band IV (RMC 12.2Kbps)	
Lowest Band Edge	**Highest Band Edge**
 Spurious Emissions Range Low / Range Up / RBW / Frequency / Power Abs / ΔLimit 1.705 GHz / 1.709 GHz / 1.000 MHz / 1.70897 GHz / -18.39 dBm / -5.39 dB 1.709 GHz / 1.710 GHz / 50.000 kHz / 1.71000 GHz / -26.28 dBm / -13.28 dB 1.710 GHz / 1.715 GHz / 100.000 kHz / 1.71151 GHz / 6.50 dBm / -28.50 dB Date: 9.NOV.2018 13:55:52	 Spurious Emissions Range Low / Range Up / RBW / Frequency / Power Abs / ΔLimit 1.750 GHz / 1.755 GHz / 100.000 kHz / 1.75171 GHz / 6.38 dBm / -28.62 dB 1.755 GHz / 1.756 GHz / 50.000 kHz / 1.75500 GHz / -27.41 dBm / -14.41 dB 1.756 GHz / 1.760 GHz / 1.000 MHz / 1.75602 GHz / -20.60 dBm / -7.60 dB Date: 9.NOV.2018 13:58:48

Conducted Spurious Emission

WCDMA Band V (RMC 12.2Kbps)

Lowest Channel

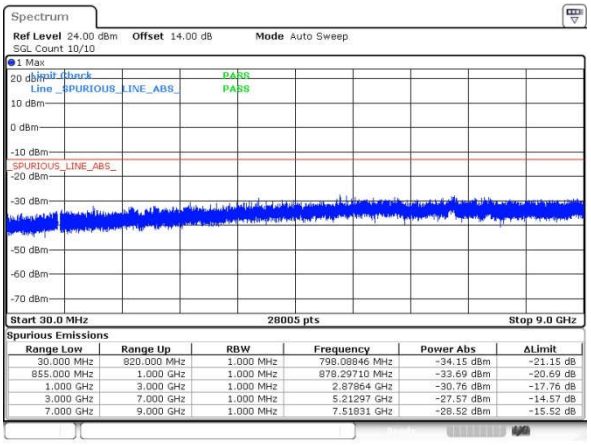


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	820.000 MHz	1.000 MHz	736.49925 MHz	-33.55 dBm	-20.55 dB
855.000 MHz	1.000 GHz	1.000 MHz	983.15217 MHz	-34.04 dBm	-21.04 dB
1.000 GHz	3.000 GHz	1.000 MHz	1.98150 GHz	-31.57 dBm	-18.57 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.62180 GHz	-27.54 dBm	-14.54 dB
7.000 GHz	9.000 GHz	1.000 MHz	7.93201 GHz	-28.05 dBm	-15.05 dB

Date: 15.NOV.2018 17:34:02

Middle Channel

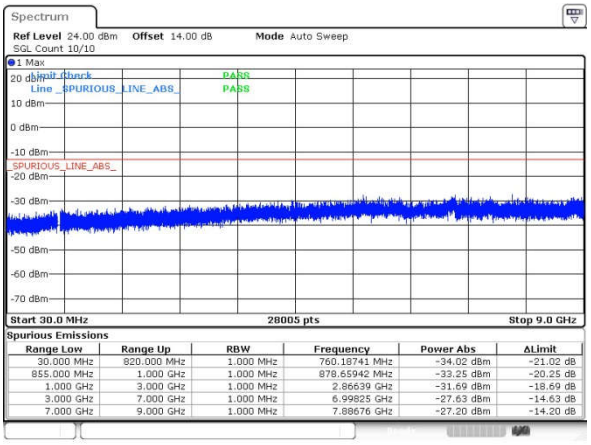


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	820.000 MHz	1.000 MHz	798.08846 MHz	-34.15 dBm	-21.15 dB
855.000 MHz	1.000 GHz	1.000 MHz	878.29710 MHz	-33.69 dBm	-20.69 dB
1.000 GHz	3.000 GHz	1.000 MHz	2.87864 GHz	-30.76 dBm	-17.76 dB
3.000 GHz	7.000 GHz	1.000 MHz	5.21297 GHz	-27.57 dBm	-14.57 dB
7.000 GHz	9.000 GHz	1.000 MHz	7.51831 GHz	-28.52 dBm	-15.52 dB

Date: 15.NOV.2018 17:35:42

Highest Channel



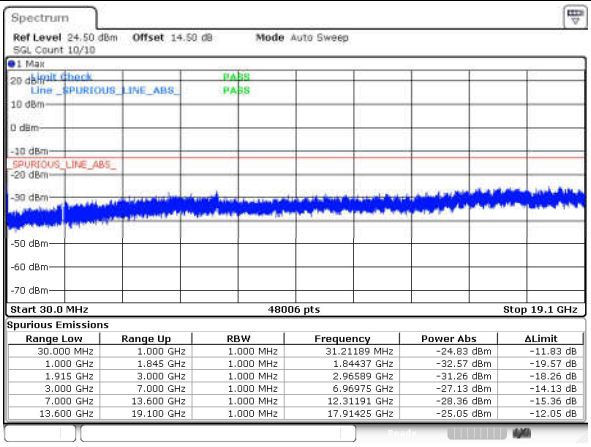
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	820.000 MHz	1.000 MHz	760.18741 MHz	-34.02 dBm	-21.02 dB
855.000 MHz	1.000 GHz	1.000 MHz	878.65942 MHz	-33.25 dBm	-20.25 dB
1.000 GHz	3.000 GHz	1.000 MHz	2.86639 GHz	-31.69 dBm	-18.69 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.99825 GHz	-27.63 dBm	-14.63 dB
7.000 GHz	9.000 GHz	1.000 MHz	7.88676 GHz	-27.20 dBm	-14.20 dB

Date: 15.NOV.2018 17:37:06

WCDMA Band II (RMC 12.2Kbps)

Lowest Channel

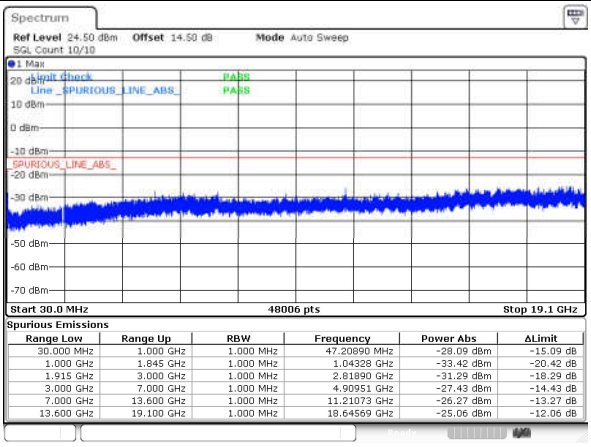


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	31.21189 MHz	-24.83 dBm	-11.83 dB
1.000 GHz	1.845 GHz	1.000 MHz	1.84437 GHz	-32.57 dBm	-19.57 dB
1.915 GHz	3.000 GHz	1.000 MHz	2.96589 GHz	-31.26 dBm	-18.26 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.96975 GHz	-27.13 dBm	-14.13 dB
7.000 GHz	13.600 GHz	1.000 MHz	12.31191 GHz	-28.36 dBm	-15.36 dB
13.600 GHz	19.100 GHz	1.000 MHz	17.91425 GHz	-25.05 dBm	-12.05 dB

Date: 9.NOV.2018 13:44:05

Middle Channel

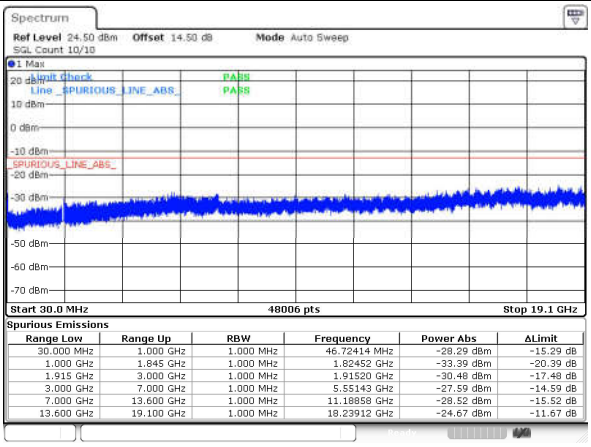


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	47.20890 MHz	-28.09 dBm	-15.09 dB
1.000 GHz	1.845 GHz	1.000 MHz	1.04328 GHz	-33.42 dBm	-20.42 dB
1.915 GHz	3.000 GHz	1.000 MHz	2.81890 GHz	-31.29 dBm	-18.29 dB
3.000 GHz	7.000 GHz	1.000 MHz	4.90951 GHz	-27.43 dBm	-14.43 dB
7.000 GHz	13.600 GHz	1.000 MHz	11.21073 GHz	-26.27 dBm	-13.27 dB
13.600 GHz	19.100 GHz	1.000 MHz	18.64569 GHz	-25.06 dBm	-12.06 dB

Date: 9.NOV.2018 13:45:49

Highest Channel



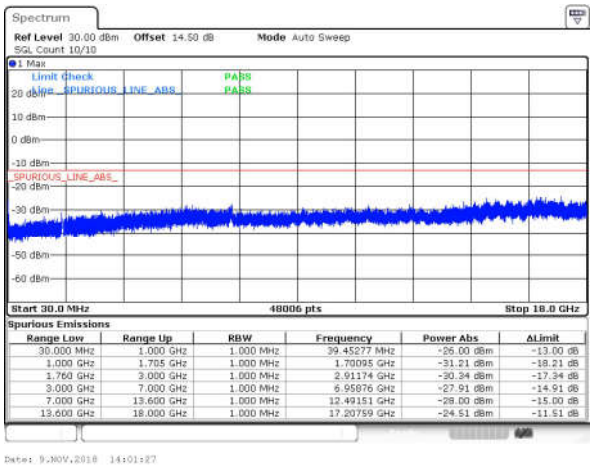
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	1.000 GHz	1.000 MHz	46.72414 MHz	-28.29 dBm	-15.29 dB
1.000 GHz	1.845 GHz	1.000 MHz	1.82452 GHz	-33.39 dBm	-20.39 dB
1.915 GHz	3.000 GHz	1.000 MHz	1.91520 GHz	-30.48 dBm	-17.48 dB
3.000 GHz	7.000 GHz	1.000 MHz	5.55143 GHz	-27.59 dBm	-14.59 dB
7.000 GHz	13.600 GHz	1.000 MHz	11.18858 GHz	-28.52 dBm	-15.52 dB
13.600 GHz	19.100 GHz	1.000 MHz	18.23912 GHz	-24.67 dBm	-11.67 dB

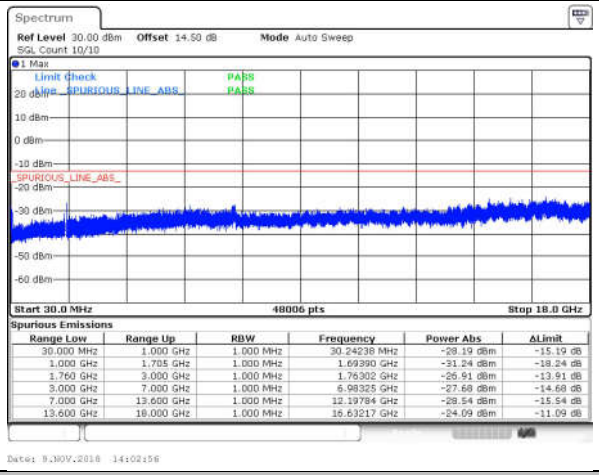
Date: 9.NOV.2018 13:47:25

WCDMA Band IV (RMC 12.2Kbps)

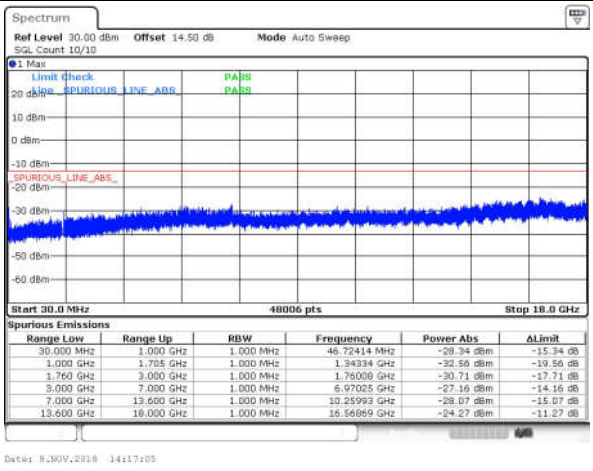
Lowest Channel



Middle Channel



Highest Channel



Frequency Stability

Test Conditions	Middle Channel	WCDMA Band V (RMC 12.2Kbps)	Limit 2.5ppm
Temperature (°C)	Voltage (Volt)	Deviation (ppm)	Result
50	Normal Voltage	0.0025	PASS
40	Normal Voltage	0.0012	
30	Normal Voltage	0.0411	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0215	
0	Normal Voltage	0.0118	
-10	Normal Voltage	0.0069	
-20	Normal Voltage	0.0079	
-30	Normal Voltage	0.0016	
20	Maximum Voltage	0.0111	
20	Normal Voltage	0.0000	
20	Battery End Point	0.0051	

Note: Normal Voltage = 3.8V. ；Battery End Point (BEP) = 3.3 V.；Maximum Voltage =4.4 V

Test Conditions	Middle Channel	WCDMA Band II (RMC 12.2Kbps)	Limit Note 2.
Temperature (°C)	Voltage (Volt)	Deviation (ppm)	Result
50	Normal Voltage	0.0050	PASS
40	Normal Voltage	0.0068	
30	Normal Voltage	0.0020	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0105	
0	Normal Voltage	0.0010	
-10	Normal Voltage	0.0057	
-20	Normal Voltage	0.0041	
-30	Normal Voltage	0.0015	
20	Maximum Voltage	0.0087	
20	Normal Voltage	0.0000	
20	Battery End Point	0.0002	

Note:

1. Normal Voltage = 3.8V. ；Battery End Point (BEP) = 3.3 V.；Maximum Voltage =4.4 V
2. The frequency fundamental emissions stay within the authorized frequency block based on the frequency deviation measured is small.

Test Conditions	Middle Channel	WCDMA Band IV (RMC 12.2Kbps)	Limit Note 2.
Temperature (°C)	Voltage (Volt)	Deviation (ppm)	Result
50	Normal Voltage	0.0062	PASS
40	Normal Voltage	0.0461	
30	Normal Voltage	0.0271	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0026	
0	Normal Voltage	0.0365	
-10	Normal Voltage	0.0240	
-20	Normal Voltage	0.0274	
-30	Normal Voltage	00487	
20	Maximum Voltage	0.0361	
20	Normal Voltage	0.0000	
20	Battery End Point	0.0551	

Note:

1. Normal Voltage = 3.8V. ；Battery End Point (BEP) = 3.3 V.；Maximum Voltage =4.4 V
2. The frequency fundamental emissions stay within the authorized frequency block based on the frequency deviation measured is small.

Appendix B. Test Results of Radiated Test

Radiated Spurious Emission

WCDMA Band V(RMC 12.2Kbps)									
Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	1672.8	-60.94	-13	-47.94	-71.31	-64.19	4.00	9.40	H
	2509.2	-64.14	-13	-51.14	-79.12	-67.71	4.88	10.60	H
	3345.6	-64.40	-13	-51.40	-81.37	-69.33	5.52	12.60	H
	1672.8	-60.99	-13	-47.99	-71.15	-64.24	4.00	9.40	V
	2509.2	-64.71	-13	-51.71	-79.54	-68.28	4.88	10.60	V
	3345.6	-64.18	-13	-51.18	-81.15	-69.11	5.52	12.60	V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

WCDMA Band II(RMC 12.2Kbps)									
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	3760	-57.10	-13	-44.10	-75.60	-63.85	5.85	12.60	H
	5640	-53.46	-13	-40.46	-75.63	-59.26	7.30	13.10	H
	7520	-54.86	-13	-41.86	-82.63	-58.01	8.35	11.50	H
	3760	-57.42	-13	-44.42	-75.96	-64.17	5.85	12.60	V
	5640	-53.25	-13	-40.25	-75.82	-59.05	7.30	13.10	V
	7520	-55.30	-13	-42.30	-82.88	-58.45	8.35	11.50	V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

WCDMA Band IV(RMC 12.2Kbps)									
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	3465.2	-49.11	-13	-36.11	-66.23	-55.96	5.65	12.50	H
	5197.8	-54.43	-13	-41.43	-76.10	-60.10	7.13	12.80	H
	6930.4	-56.86	-13	-43.86	-83.66	-60.26	8.40	11.80	H
	3465.2	-48.40	-13	-35.40	-65.55	-55.25	5.65	12.50	V
	5197.8	-53.45	-13	-40.45	-75.57	-59.12	7.13	12.80	V
	6930.4	-56.82	-13	-43.82	-83.73	-60.22	8.40	11.80	V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.