Registration
No.910917

TEST REPORT FOR WCDMA TESTING

Report No.: SRTC2017-9004(F)-0009

Product Name: WCDMA/GSM (GPRS) Dual-Mode Digital Mobile Phone

Product Model: ZTE BLADE L7

Applicant: ZTE Corporation

Manufacturer: ZTE Corporation

Specification: FCC Part 24E, Part 22H, Part 2 (October, 2016 edition)

FCC ID: SRQ-ZTEBLADEL7

The State Radio_monitoring_center Testing Center (SRTC)

No.80 Beilishi Road Xicheng District Beijing, China

Tel: 86-10-57996181 Fax: 86-10-57996288

CONTENTS

1. GENERAL INFORMATION 2

1.1 NOTES OF THE TEST REPORT 2
1.2 INFORMATION ABOUT THE TESTING LABORATORY 2
1.3 APPLICANT'S DETAILS 2
1.4 MANUFACTURER'S DETAILS 2
1.5 TEST ENVIRONMENT 3

2 DESCRIPTION OF THE DEVICE UNDER TEST 4

2.1FINAL EQUIPMENT BUILD STATUS 4
2.2 SUPPORT EQUIPMENT 5

3 REFERENCE SPECIFICATION 6

4 KEY TO NOTES AND RESULT CODES 7

5 RESULT SUMMARY 8

6 TEST RESULT 9

6.1 RF POWER OUTPUT-FCC PART24.232(B) 9
6.2 EFFECTIVE ISOTROPIC RADIATED POWER-FCC PART24.232(B) 10
6.3 OCCUPIED BANDWIDTH-FCC PART2.1049 13
6.4 EMISSION BANDWIDTH-FCC PART24.238(B) 14
6.5 SPURIOUS EMISSIONS AT ANTENNA TERMINAL-FCC PART2.1051/24.238 15
6.6 BAND EDGES COMPLIANCE-FCC PART24.238(B) 16
6.7 FREQUENCY STABILITY-FCC PART2.1055/24.235 17
6.8 RADIATED SPURIOUS EMISSIONS-FCC PART2.1053/24.238 18
6.9 PEAK-AVERAGE RATIO -FCC PART 24.232(D) 22

7 MEASUREMENT UNCERTAINTIES 23

8 TEST EQUIPMENTS 24

APPENDIX A – TEST DATA OF CONDUCTED EMISSION 26

APPENDIX B – TEST DATA OF RADIATED EMISSION 48

APPENDIX C – TEST SETUP 52

Copyright © SRTC

1. GENERAL INFORMATION

1.1 Notes of the test report

The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written permission of The State Radio_monitoring_center Testing Center (SRTC).
The test results relate only to individual items of the samples which have been tested.

1.2 Information about the testing laboratory

Company:	The State Radio_monitoring_center Testing Center (SRTC)
Address:	No.80 Beilishi Road, Xicheng District
City:	Beijing
Country or Region:	P.R.China
Contacted person:	Liu Jia
Tel:	+86 10 5799 6181
Fax:	+86 10 5799 6288
Email:	liujiaf@srtc.org.cn

1.3 Applicant's details

Company:	ZTE Corporation
Address:	ZTE Plaza, #55 Keji Road South, Hi-Tech, Industrial Park, Nanshan District,Guangdong
City:	Shenzhen
Country or Region:	P.R.China
Grantee Code:	SRQ
Contacted person:	Min Zhang
Tel:	021-68897867
Fax:	021-50801070
Email:	zhang.min13@zte.com.cn

1.4 Manufacturer's details

Company:	ZTE Corporation
Address:	ZTE Plaza, #55 Keji Road South, Hi-Tech, Industrial Park, Nanshan District,Guangdong
City:	Shenzhen
Country or Region:	P.R.China
Contacted person:	Min Zhang
Tel:	021-68897867
Fax:	021-50801070
Email:	zhang.min13@zte.com.cn

Copyright © SRTC

1.5 Test Environment

Date of Receipt of test sample at SRTC:	2017.01.21
Testing Start Date:	2017.01.24
Testing End Date:	2017.03.20

Environmental Data:	Temperature (°C)	Humidity (%)
Ambient	25	38
Maximum Extreme	55	40
Minimum Extreme	-10	---

Normal Supply Voltage (V d.c.):	3.7
Maximum Extreme Supply Voltage (V d.c.):	4.2
Minimum Extreme Supply Voltage (V d.c.):	3.5

Copyright © SRTC

2 DESCRIPTION OF THE DEVICE UNDER TEST

2.1Final Equipment Build Status

Frequency Range	WCDMA Band II: Tx:1850~1910MHz Rx:1930~1990MHz WCDMA Band V: Tx:824~849MHz Rx:869~894MHz
Rated Output Power	WCDMA Band II:24.0dBm WCDMA Band V:24.0dBm
Modulation Type	QPSK
Emission Designator	4M50F9W
Duplex Mode	FDD
Duplex Spacing	WCDMA Band II:80MHz WCDMA Band V:45MHz
Antenna Type	Fixed Internal
Power Supply	Battery or Charger
HW Version	MB1.0
SW Version	GEN_GLB_B1258D_BL7V1.0B01
IMEI	863720030003379

Copyright © SRTC

2.2 Support Equipment

The following support equipment was used to exercise the DUT during testing:

Battery 1

Equipment	Battery
Manufacturer	TM
Model Number	Li3822T43P3h716043
Serial Number	-----

Battery 2

Equipment	Battery
Manufacturer	BAK
Model Number	Li3822T43P3h716043
Serial Number	-----

As the information described above, there are one models of battery manufactured by two companies. The relevant tests have been performed in order to verify in which combination case (EUT exercised by one models of battery manufactured by two companies) the EUT would have the worst features. So all the tests shown in this test report are performed when the EUT exercised by the battery 1 manufactured by TM.

Copyright © SRTC

3 REFERENCE SPECIFICATION

Specification	Version	Title
2.1046	July 7, 1998	Measurements required: RF power output.
2.1049	July 7, 1998	Measurements required: Occupied bandwidth.
2.1051	July 7, 1998	Measurements required: Spurious emissions at antenna terminals.
2.1053	July 7, 1998	Measurements required: Field strength of spurious radiation.
2.1055	Dec. 9, 2003	Measurements required: Frequency stability.
22.355	Oct. 17, 1996	Frequency tolerance.
22.913	Dec. 15, 2004	Effective radiated power limits.
22.917	Dec. 17, 2002	Emission limitations for cellular equipment.
24.232	May 2, 2008	Power and antenna height limits.
24.235	N/A	Frequency stability.
24.238	Dec. 17, 2002	Emission limitations for Broadband PCS equipment.

Copyright © SRTC

4 KEY TO NOTES AND RESULT CODES

The following are the definition of the test result.

Code	Meaning
PASS	Test result shows that the requirements of the relevant specification have been met.
FAIL	Test result shows that the requirements of the relevant specification have not been met.
N/T	Test case is not tested.
NTC	Nominal voltage, Normal Temperature
HV	High voltage, Normal Temperature
LV	Low voltage, Normal Temperature
HTHV	high voltage, High Temperature
LTHV	High voltage, Low Temperature
HTLV	Low voltage, High Temperature
LTLV	Low voltage, Low Temperature

Copyright © SRTC

5 RESULT SUMMARY

No.	Test case	FCC reference	Verdict
1	RF Power Output	22.913(a)/24.232(b)	Pass
2	Effective Radiated Power and Effective Isotropic Radiated Power	22.913(a)/24.232(b)	Pass
3	Occupied Bandwidth	2.1049	Pass
4	Emission Bandwidth	22.917(b)/24.238(b)	Pass
5	Spurious Emissions at antenna terminal	2.1051/22.917/24.238	Pass
6	Band Edges Compliance	22.917(b)/24.238(b)	Pass
7	Frequency Stability	2.1055/22.355/24.235	Pass
8	Radiated Spurious Emissions	2.1053/22.917(a)/24.238	Pass
9	Peak-Average Ratio	24.232(d)	Pass

This Test Report Is Issued by: Mr. Peng Zhen	Checked by: Ms. Liu Jia
Tested by: Mr. He Dengshun	Issued date: 20170320

Copyright © SRTC

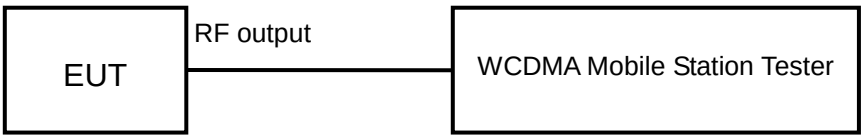
6 TEST RESULT

6.1 RF Power Output-FCC Part24.232(b)

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test Setup:



WCDMA band II

Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. Then the test data can be read at the tester screen. The loss between RF output port of the EUT and the input port of the tester will be taken into consideration.
The measurement will be conducted at three channels No9262, No9400 and No9538 (Bottom, middle and top channels of WCDMA band II)
The measurement will be conducted at three channels No4132, No4183 and No4233 (Bottom, middle and top channels of WCDMA band V)

Limits	≤24dBm

WCDMA band V

Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. Then the test data can be read at the tester screen. The loss between RF output port of the EUT and the input port of the tester will be taken into consideration.
The measurement will be conducted at three channels No4132, No4183 and No4233 (Bottom, middle and top channels of WCDMA band V)

Limits	≤24dBm

Test result:
The test results are shown in Appendix A.

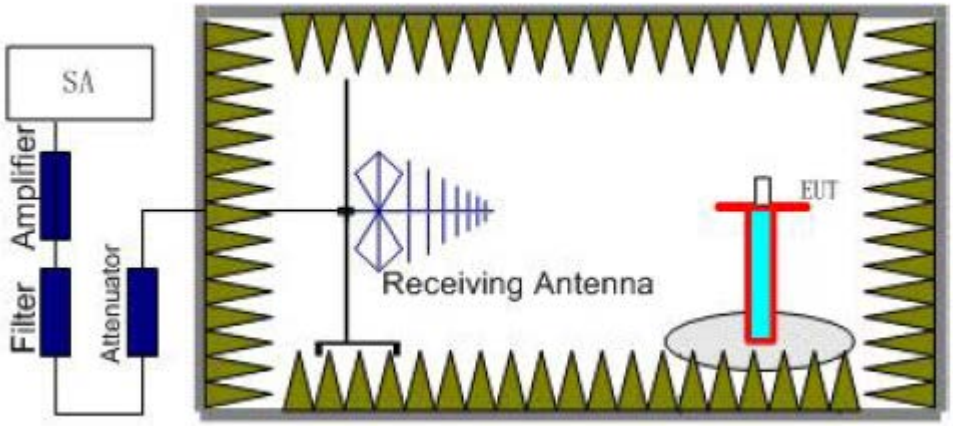
Copyright © SRTC

6.2 Effective Isotropic Radiated Power-FCC Part24.232(b)

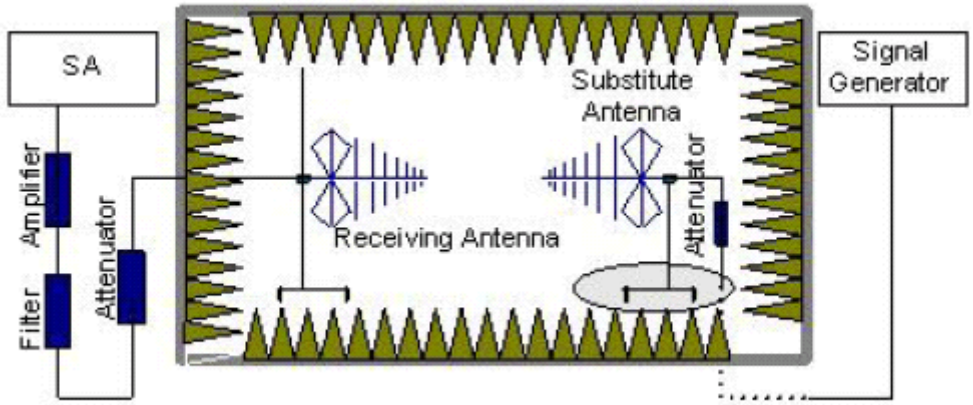
Ambient condition:

Temperature	Relative humidity	Pressure
20.8°C	36.5%	100.9kPa

Test setup:



Step 1



Step 2

Copyright © SRTC

WCDMA band II

Test procedure:
The measurements procedures in TIA-603C-2004 are used.
Step 1:
The measurement is carried out in the fully anechoic chamber. EUT was placed on a 2.4 meters high non-conductive table at a 3 meters test distance from the test receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT. The height of receiving antenna is 2.4m and varies in certain range to find the maximum power value. A radio link shall be established between EUT and Tester. The output power of the cell signal of the tester will be decreased until the output power of the EUT reach a maximum value. A peak detector is used and RBW is set to 3MHz. Then the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turn table shall be rotated from 0 to 360 degrees for detecting the maximum power value on spectrum analyzer or receiver. And the maximum value of the receiver should be recorded as (Pr).

Step 2:
A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator. To repeat the same procedure as step1 and the level of signal generator will be adjusted till the same power value on the spectrum analyzer or receiver. The ERP/EIRP of the EUT can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
A power (Pmea) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (Pmea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
A “reference path loss” should be calculated after test. The attenuation of “reference path loss” is the cable loss between the Signal Source with the Substitution Antenna (Pca) and the Substitution Antenna Gain (Ga).
The measurement results are obtained as described below:
Power (EIRP) = Pmea+ Pca+ Ga

The measurement will be done at three channels No9262, No9400 and No9538 (Bottom, middle and top channels of WCDMA band II).

Limits	≤33dBm

Copyright © SRTC

WCDMA band V

Test procedure:
The measurements procedures in TIA-603C-2004 are used.
Step 1:
The measurement is carried out in the fully anechoic chamber. EUT was placed on a 2.4 meters high non-conductive table at a 3 meters test distance from the test receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT. The height of receiving antenna is 2.4m and varies in certain range to find the maximum power value. A radio link shall be established between EUT and Tester. The output power of the cell signal of the tester will be decreased until the output power of the EUT reach a maximum value. A peak detector is used and RBW is set to 3MHz. Then the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turn table shall be rotated from 0 to 360 degrees for detecting the maximum power value on spectrum analyzer or receiver. And the maximum value of the receiver should be recorded as (Pr).

Step 2:
A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator. To repeat the same procedure as step1 and the level of signal generator will be adjusted till the same power value on the spectrum analyzer or receiver. The ERP/EIRP of the EUT can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
A power (Pmea) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (Pmea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
A “reference path loss” should be calculated after test. The attenuation of “reference path loss” is the cable loss between the Signal Source with the Substitution Antenna (Pca) and the Substitution Antenna Gain (Ga).

The measurement results are obtained as described below:
Power (EIRP) = Pmea+ Pca+ Ga

This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15dB) and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP – 2.15 (dB).

The measurement will be done at three channels No4132, No4183 and No4233 (Bottom, middle and top channels of WCDMA band V)

Limits	≤38.5dBm

Test result:
The test results are shown in Appendix B.

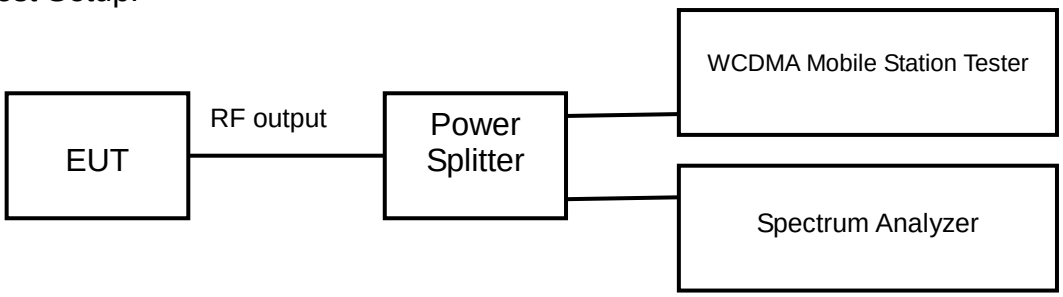
Copyright © SRTC

6.3 Occupied Bandwidth-FCC Part2.1049

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test Setup:



WCDMA band II

Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The occupied bandwidth is measured using spectrum analyzer. RBW is set to 51kHz on spectrum analyzer. The bandwidth of 99% power can be read on spectrum analyzer.
The measurement will be conducted at three channels No9262, No9400 and No9538 (Bottom, middle and top channels of WCDMA band II)

Limits: No specific occupied bandwidth requirements in part 2.1049

WCDMA band V

Test procedure:
After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The occupied bandwidth is measured using spectrum analyzer. RBW is set to 30kHz on spectrum analyzer. The bandwidth of 99% power can be read on spectrum analyzer.
The measurement will be conducted at three channels No4132, No4183 and No4233 (Bottom, middle and top channels of WCDMA band V)

Limits: No specific occupied bandwidth requirements in part 2.1049

Test result:
The test results are shown in Appendix A.

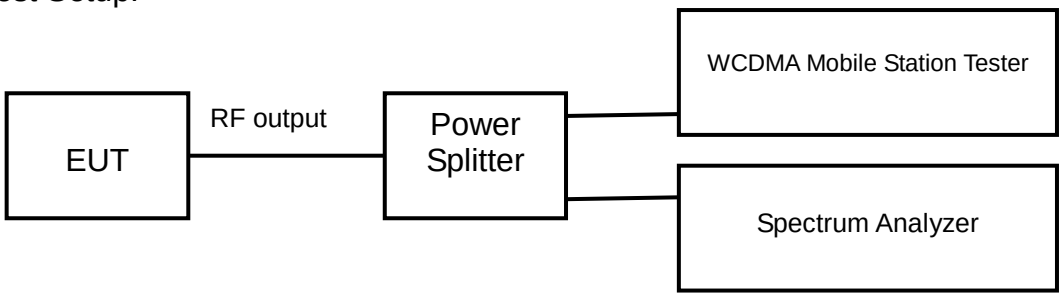
Copyright © SRTC

6.4 Emission Bandwidth-FCC Part24.238(b)

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test Setup:



WCDMA band II

Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The emission bandwidth is measured using spectrum analyzer. RBW is set to 30kHz on spectrum analyzer. The bandwidth of -26dBc power can be read on spectrum analyzer.

The measurement will be conducted at three channels No9262, No9400 and No9538 (Bottom, middle and top channels of WCDMA band II)

Limits: No specific emission bandwidth requirements in part 24.238(b)

WCDMA band V

Test procedure:
After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The emission bandwidth is measured using spectrum analyzer. RBW is set to 30kHz on spectrum analyzer. The bandwidth of -26dBc power can be read on spectrum analyzer.
The measurement will be conducted at three channels No9262, No9400 and No9538 (Bottom, middle and top channels of WCDMA band V)

Limits: No specific emission bandwidth requirements in part 22.917(b)

Test result:
The test results are shown in Appendix A.

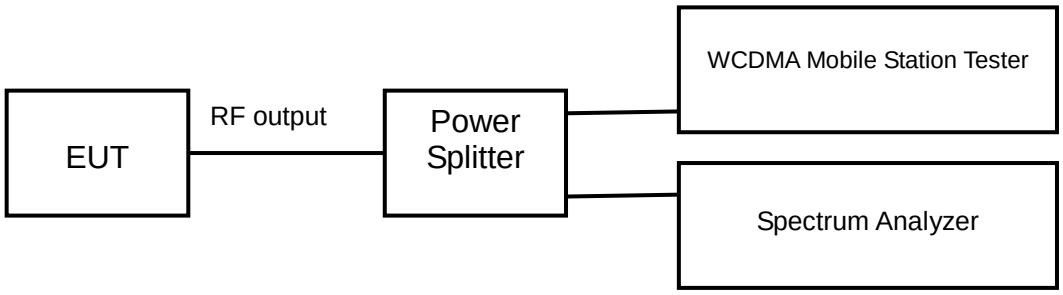
Copyright © SRTC

6.5 Spurious Emissions at antenna terminal-FCC Part2.1051/24.238

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test Setup:



WCDMA band II

Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The measurement is carried out using a spectrum analyzer. The spectrum analyzer scans from 30MHz to 20GHz (higher than the 10th harmonic of the carrier). The peak detector is used and RBW is set to 1MHz on spectrum analyzer.

The measurement will be conducted at one channel No9400 (middle channel of WCDMA band II)

Limits	≤-13dBm

WCDMA band V

Test procedure:
After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The measurement is carried out using a spectrum analyzer. The spectrum analyzer scans from 30MHz to 9GHz (higher than the 10th harmonic of the carrier). The peak detector is used and RBW is set to 1MHz on spectrum analyzer.
The measurement will be conducted at one channel No4183 (middle channel of WCDMA band V)

Limits	≤-13dBm

Test result:
The test results are shown in Appendix A.

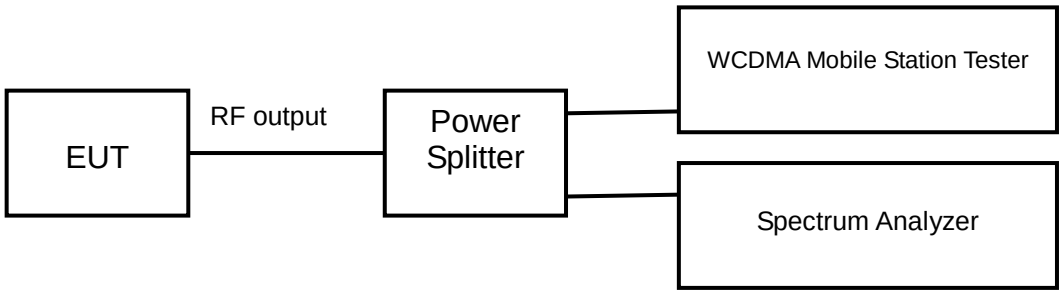
Copyright © SRTC

6.6 Band Edges Compliance-FCC Part24.238(b)

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test Setup:



WCDMA band II

Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The measurement is carried out using a spectrum analyzer. The peak detector is used and RBW is set to at least 1% of the emission bandwidth on spectrum analyzer.

The measurement will be conducted at two channels No9262 and No9538 (Bottom and top channels of WCDMA band II)

Limits	≤-13dBm

WCDMA band V

Test procedure:
After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The measurement is carried out using a spectrum analyzer. The peak detector is used and RBW is set to at least 1% of the emission bandwidth on spectrum analyzer.
The measurement will be conducted at two channels No4132 and No4233 (Bottom and top channels of WCDMA band V)

Limits	≤-13dBm

Test result:
The test results are shown in Appendix A.

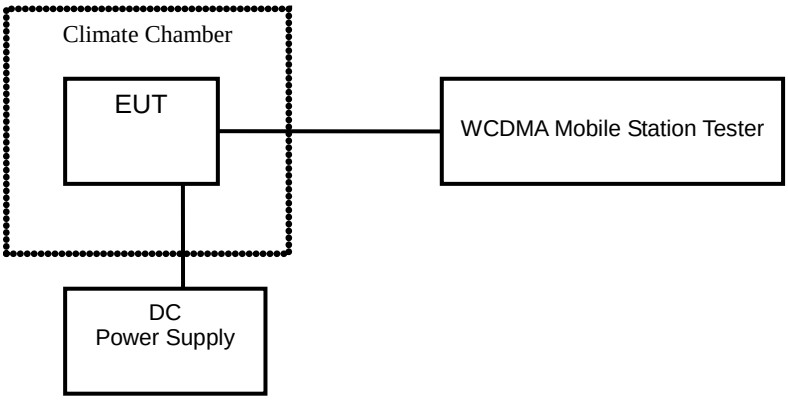
Copyright © SRTC

6.7 Frequency Stability-FCC Part2.1055/24.235

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test setup:



WCDMA band II

Test Procedure:

A radio link shall be established between EUT and Tester. The tester will sample the transmitter RF output signal and measure its frequency. The temperature inside the climate chamber is varied from -30 to +50°C in 10°C step size, and also the DC power supply voltage to the EUT is varied from LV to HV. The measurement will be conducted at three channels No9262, No9400 and No9538 (Bottom, middle and top channels of WCDMA band II).
Limits: No specific frequency stability requirements in part 2.1055 and part 24.235.

WCDMA band V

Test Procedure:
A radio link shall be established between EUT and Tester. The tester will sample the transmitter RF output signal and measure its frequency. The temperature inside the climate chamber is varied from -30 to +50°C in 10°C step size, and also the DC power supply voltage to the EUT is varied from LV to HV. The measurement will be conducted at three channels No4132, No4183 and No4233 (Bottom, middle and top channels of WCDMA band V).
Limits: No specific frequency stability requirements in part 2.1055 and part 22.355.

Test result:
The test results are shown in Appendix A.

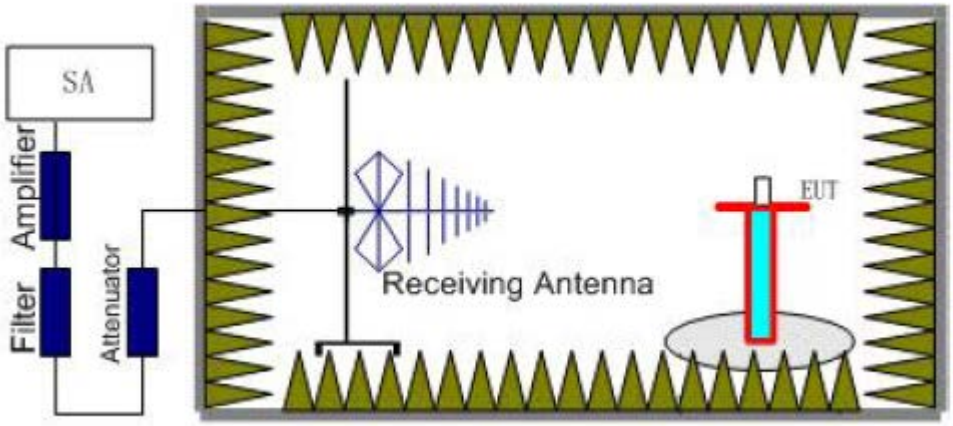
Copyright © SRTC

6.8 Radiated Spurious Emissions-FCC Part2.1053/24.238

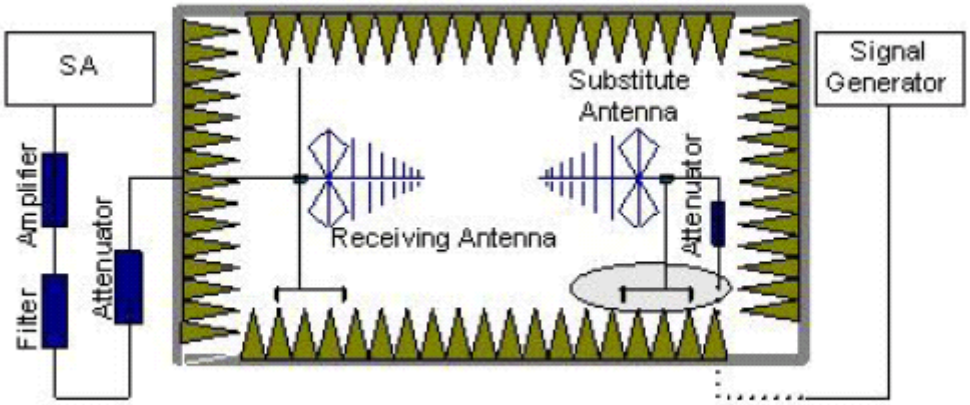
Ambient condition:

Temperature	Relative humidity	Pressure
20.8°C	36.5%	100.9kPa

Test Setup:



Step 1



Step 2

Copyright © SRTC

WCDMA band II

Test procedure:
The measurements procedures in TIA-603C-2004 are used.
The spectrum was scanned from 30MHz to the 10th harmonic of the highest frequency generated within the equipment.

Step 1:
The measurement is carried out in the fully anechoic chamber. EUT was placed on a 2.4 meter high non-conductive table at a 3 meter test distance from the test receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT. The height of receiving antenna is 2.4m and varies in certain range to find the maximum power value. A radio link shall be established between EUT and Tester. The output power of the cell signal of the tester will be decreased until the output power of the EUT reach a maximum value. The measurement is carried out using a spectrum analyzer or receiver. The spectrum analyzer scans from 30MHz to 20GHz (higher than the 10th harmonic of the carrier). The peak detector is used and RBW is set to 1MHz on spectrum analyzer. Then the antenna height and turn table rotation is adjusted till the maximum power value is founded on spectrum analyzer or receiver. A notch filter is necessary in the band near to the carrier frequency. A high pass filter is needed to avoid the distortion of the testing equipment in the band above the carrier frequency.

Step 2:
A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
A power (Pmea) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (Pmea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
A “reference path loss” should be calculated after test. The attenuation of “reference path loss” is the cable loss between the Signal Source with the Substitution Antenna (Pca) and the Substitution Antenna Gain (Ga).
Calculation procedure:
The data of cable loss and antenna gain has been calibrated in full testing frequency range before the testing.

The power of the Radiated Spurious Emissions is calculated by adding the cable loss and antenna gain. The basic equation with a sample calculation is as followed:
Power(EIRP) = P_{mea}+ P_{ca} + G_a
This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15dB) and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP – 2.15 (dB).

Copyright © SRTC

Assumed the power of signal source record is -20dBm. A cable loss of -30dB, and an antenna gain of 11dB are added.
$P=P_{mea}+P_{ca}+G_a$=(-20dBm)+(-30dB)+(11dB)= -39dBm

The measurement will be done at carrier frequencies that pertain to bottom (Channel 9262), middle (Channel 9400) and top (Channel 9538) channels of WCDMA band II.

WCDMA band V

Test procedure:
The measurements procedures in TIA-603C-2004 are used.
The spectrum was scanned from 30MHz to the 10th harmonic of the highest frequency generated within the equipment.

Step 1:
The measurement is carried out in the fully anechoic chamber. EUT was placed on a 2.4 meter high non-conductive table at a 3 meter test distance from the test receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT. The height of receiving antenna is 2.4m and varies in certain range to find the maximum power value. A radio link shall be established between EUT and Tester. The output power of the cell signal of the tester will be decreased until the output power of the EUT reach a maximum value. The measurement is carried out using a spectrum analyzer or receiver. The spectrum analyzer scans from 30MHz to 20GHz (higher than the 10th harmonic of the carrier). The peak detector is used and RBW is set to 1MHz on spectrum analyzer. Then the antenna height and turn table rotation is adjusted till the maximum power value is founded on spectrum analyzer or receiver. A notch filter is necessary in the band near to the carrier frequency. A high pass filter is needed to avoid the distortion of the testing equipment in the band above the carrier frequency.

Step 2:
A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
A power (P_{mea}) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (P_r). The power of signal source (P_{mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
A “reference path loss” should be calculated after test. The attenuation of “reference path loss” is the cable loss between the Signal Source with the Substitution Antenna (P_{ca}) and the Substitution Antenna Gain (G_a).

Calculation procedure:
The data of cable loss and antenna gain has been calibrated in full testing frequency range before the testing.

Copyright © SRTC

The power of the Radiated Spurious Emissions is calculated by adding the cable loss and antenna gain. The basic equation with a sample calculation is as followed:
Power(EIRP) = P_{mea}+ P_{ca} + G_a
This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15dB) and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP – 2.15 (dB).

Assumed the power of signal source record is -20dBm. A cable loss of -30dB, and an antenna gain of 11dB are added.
$P=P_{mea}+P_{ca}+G_a$=(-20dBm)+(-30dB)+(11dB)= -39dBm

The measurement will be done at carrier frequencies that pertain to bottom (Channel 4132), middle (Channel 4183) and top (Channel 4233) channels of WCDMA band V.

Test result:
The test results are shown in Appendix B.

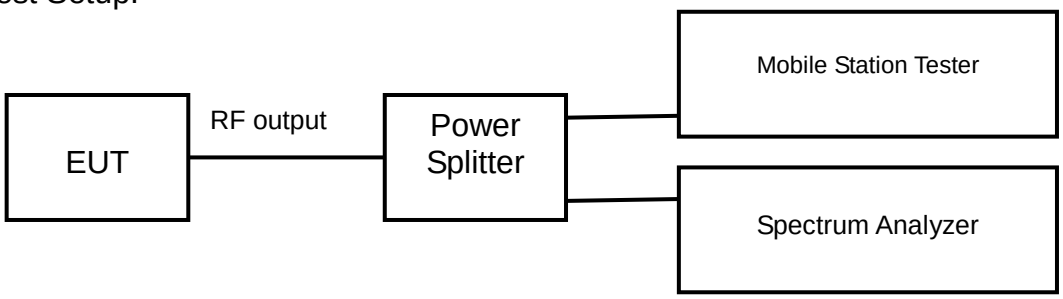
Copyright © SRTC

6.9 Peak-Average Ratio -FCC Part 24.232(d)

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test Setup:



Test procedure:
After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The Peak-Average Ratio is measured using spectrum analyzer. RBW is set to 30kHz on spectrum analyzer. The Peak-Average Ratio can be read on spectrum analyzer.

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

Test result:
The test results are shown in Appendix A

Copyright © SRTC

7 MEASUREMENT UNCERTAINTIES

Items	Uncertainty	
Occupied Bandwidth	3kHz	
Peak power output	0.67dB	
Band edge compliance	1.20dB	
Spurious emissions	30MHz～1GHz	2.83dB
	1GHz～12.75GHz	2.50dB
	12.75GHz～25GHz	2.75dB

Copyright © SRTC

8 TEST EQUIPMENTS

No.	Name/Model	Manufacturer	S/N	Calibration Due Date
1	E5515C(8960) Mobile Station Tester	Agilent	MY48367401	2017.8.20
2	N9020A Spectrum Analyzer	Agilent	MY48010771	2017.8.20
3	DC Power Supply E3645A	Agilent	MY40000740	2017.8.20
4	Power Splitter 11850C	Agilent	026057	2017.8.20
5	Temperature chamber SH241	ESPEC	92000390	2017.8.20
6	12.65m×8.03m×7.50m Fully-Anechoic Chamber	FRANKONIA	---	---
7	Turn table Diameter:1m	HD	---	---
8	Antenna master FAC(MA4.0)	MATURO	---	---
9	HF 906 Double-Ridged Waveguide Horn Antenna	R&S	100030	2017.8.20
10	HL562 Ultra log antenna	R&S	100016	2017.8.20
11	3160-09 Receive antenna	SCHWARZ-BECK	002058-002	2017.8.20
12	ESI 40 EMI test receiver	R&S	100015	2017.8.20
13	Radio tester	CMU 200	114667	2017.8.20

Copyright © SRTC

APPENDIX A – TEST DATA OF CONDUCTED EMISSION

Please refer to the attachment.

APPENDIX B – TEST DATA OF RADIATED EMISSION

Please refer to the attachment.

APPENDIX C – TEST SETUP

Please refer to the attachment.

Copyright © SRTC

APPENDIX A – TEST DATA OF CONDUCTED EMISSION

RF Power Output-FCC Part24.232(b)

WCDMA band II

WCDMA Mode:

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
1852.4	9262	22.33
1880.0	9400	22.44
1907.6	9538	22.54

HSDPA/HSUPA Mode:

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
1852.4	9262	21.32
1880.0	9400	21.10
1907.6	9538	20.77

WCDMA band V

WCDMA Mode:

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
826.4	4132	22.25
836.6	4183	22.43
846.6	4233	22.34

HSDPA/HSUPA Mode:

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
826.4	4132	21.18
836.6	4183	21.13
846.6	4233	21.20

Copyright © SRTC

Occupied Bandwidth-FCC Part2.1049

WCDMA band II

WCDMA Mode:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (MHz)
1852.4	9262	4.090
1880.0	9400	4.083
1907.6	9538	4.084

HSDPA/HSUPA Mode:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (MHz)
1852.4	9262	4.089
1880.0	9400	4.082
1907.6	9538	4.087

WCDMA band V

WCDMA Mode:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (MHz)
826.4	4132	4.010
836.6	4183	4.107
846.6	4233	4.091

4.097

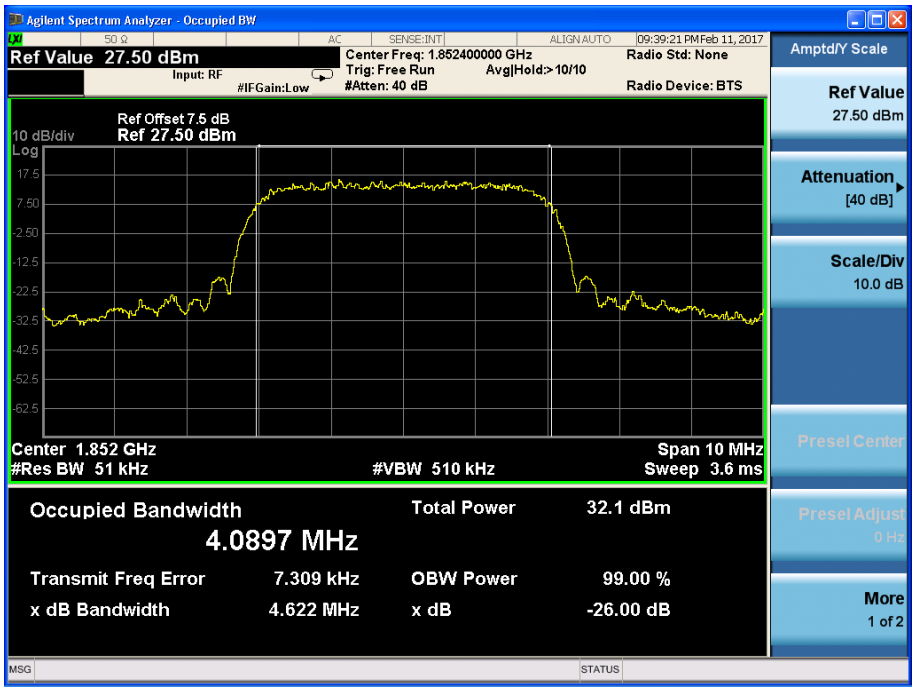
HSDPA/HSUPA Mode:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (MHz)
826.4	4132	4.097
836.6	4183	4.071
846.6	4233	4.097

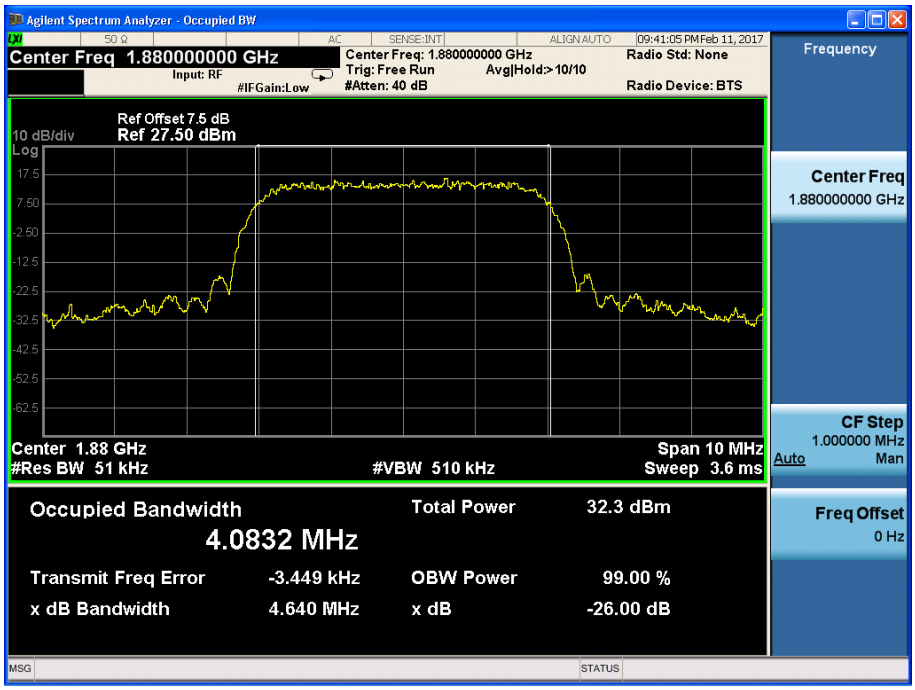
Copyright © SRTC

WCDMA band II

WCDMA Mode:

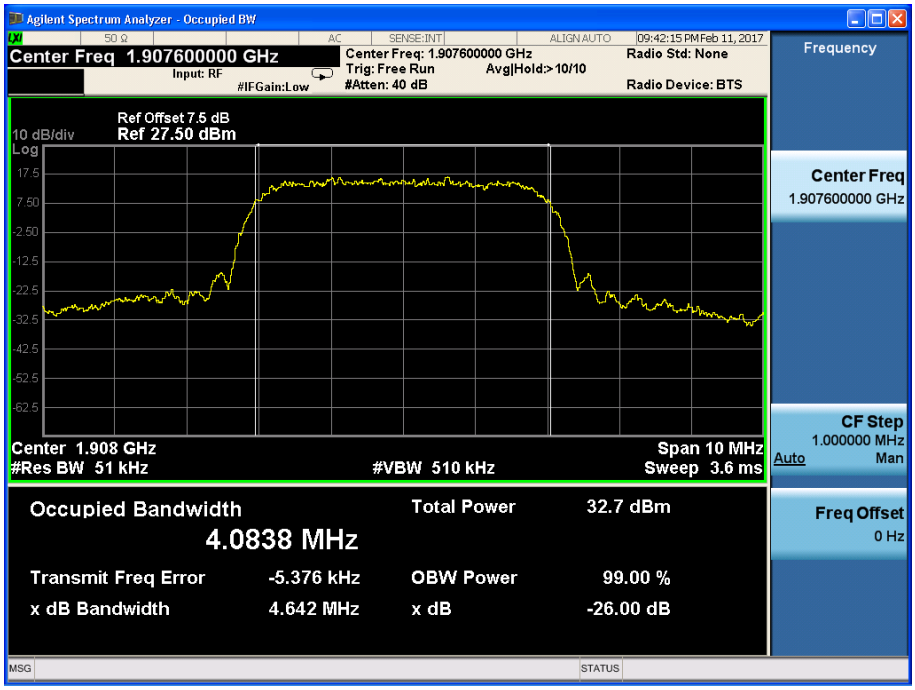


Channel 9262



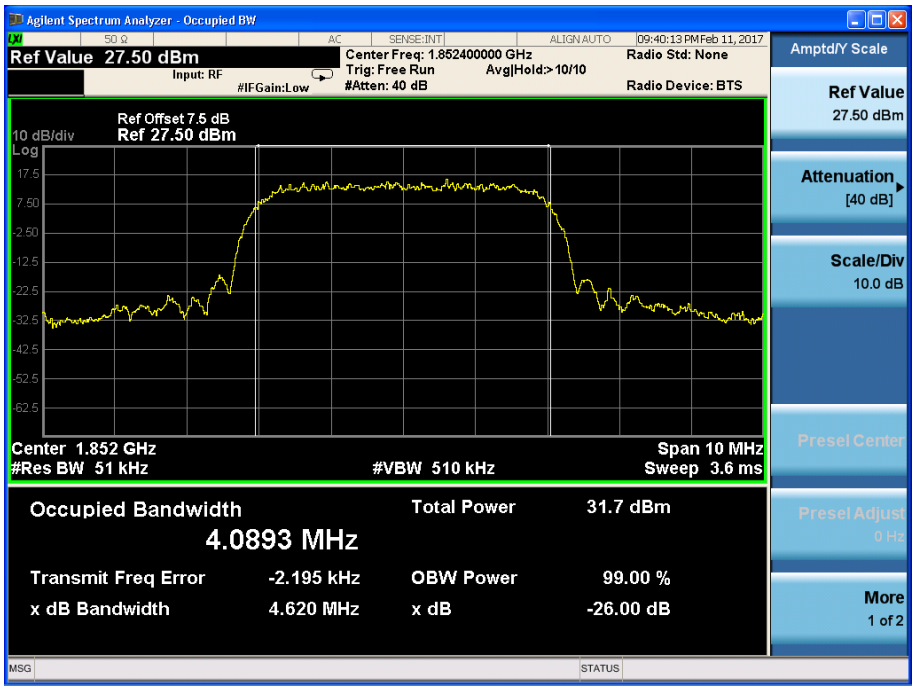
Channel 9400

Copyright © SRTC



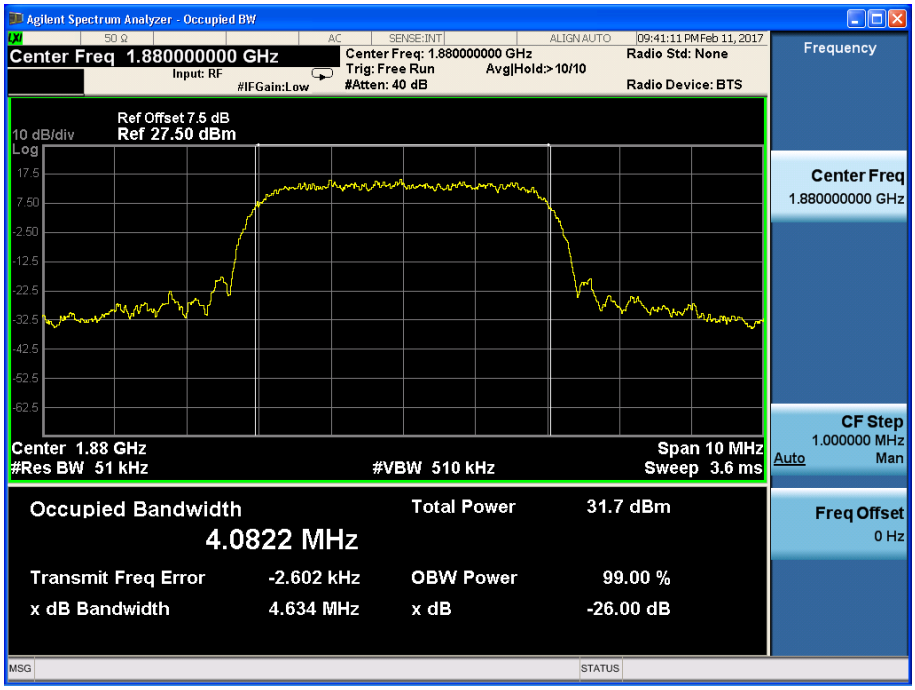
Channel 9538

HSDPA/HSUPA Mode:

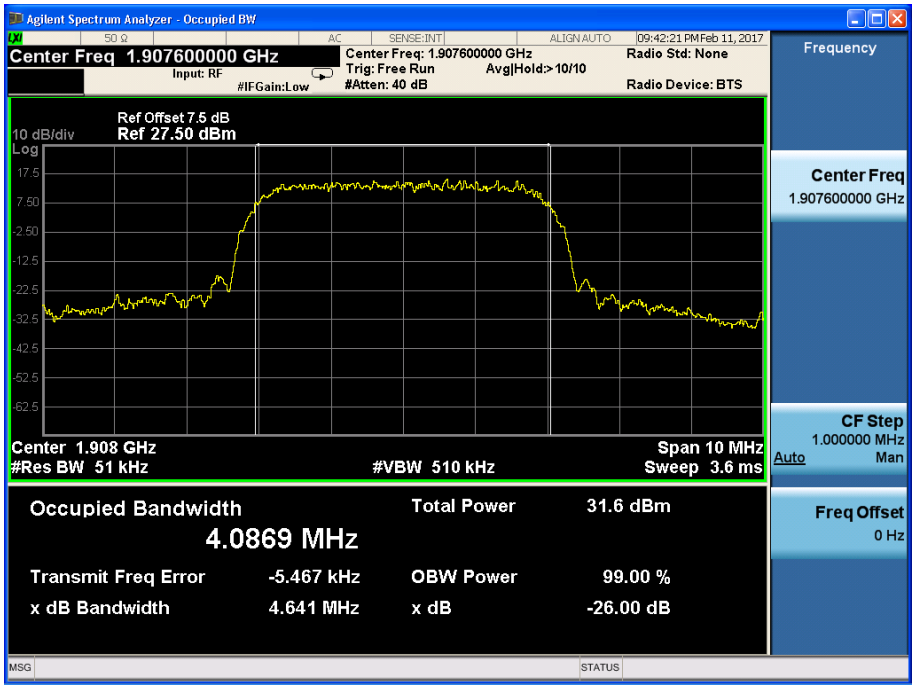


Channel 9262

Copyright © SRTC



Channel 9400

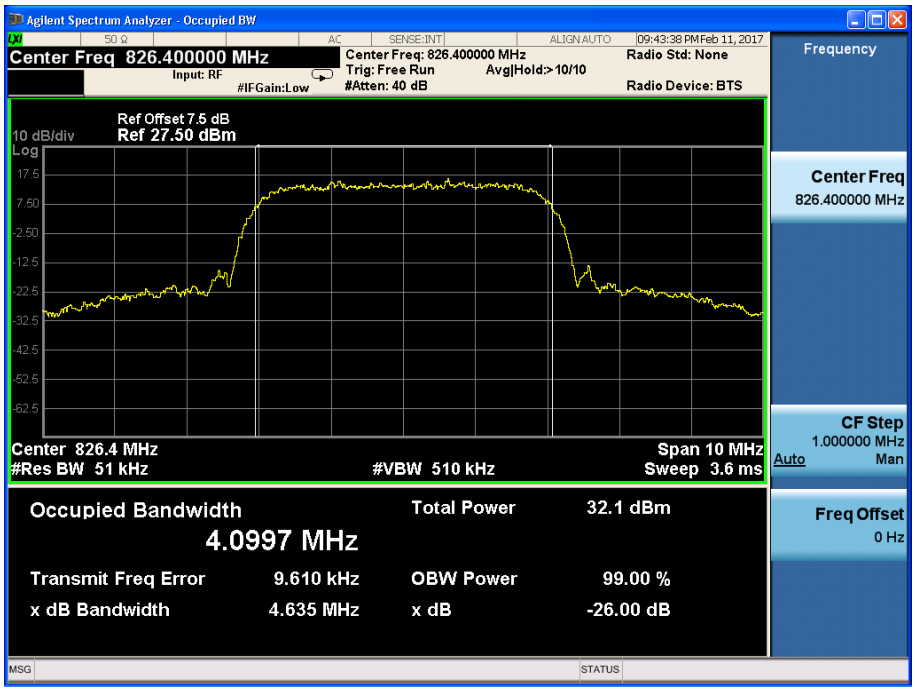


Channel 9538

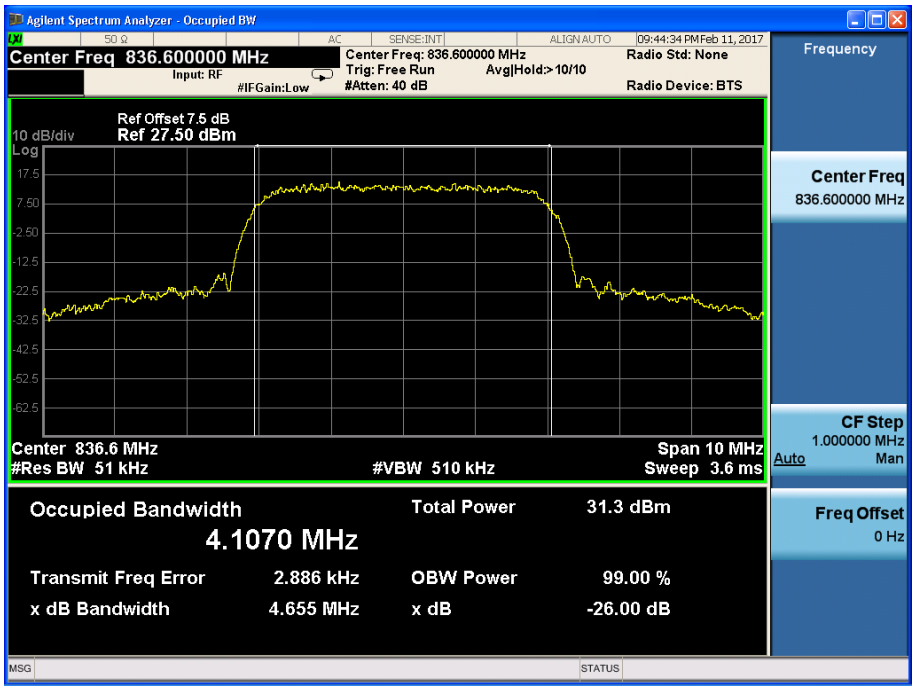
Copyright © SRTC

WCDMA band V

WCDMA Mode:

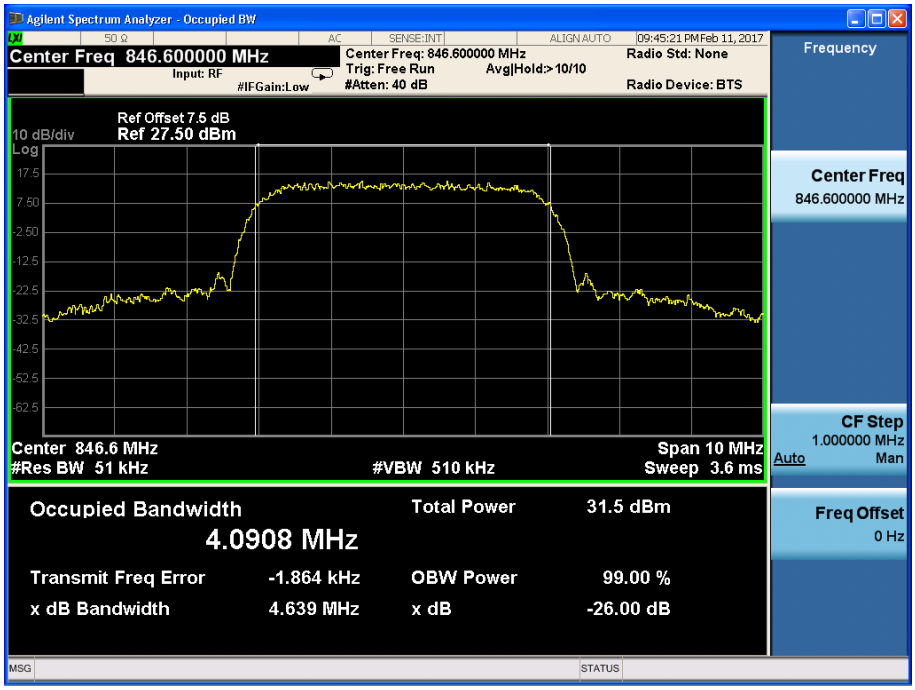


Channel 4132



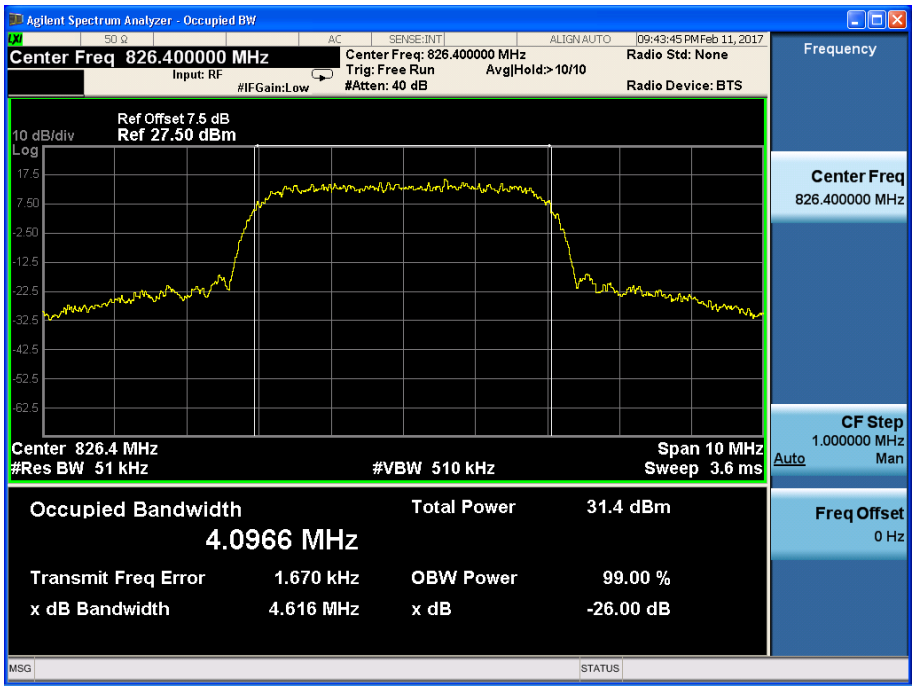
Channel 4183

Copyright © SRTC



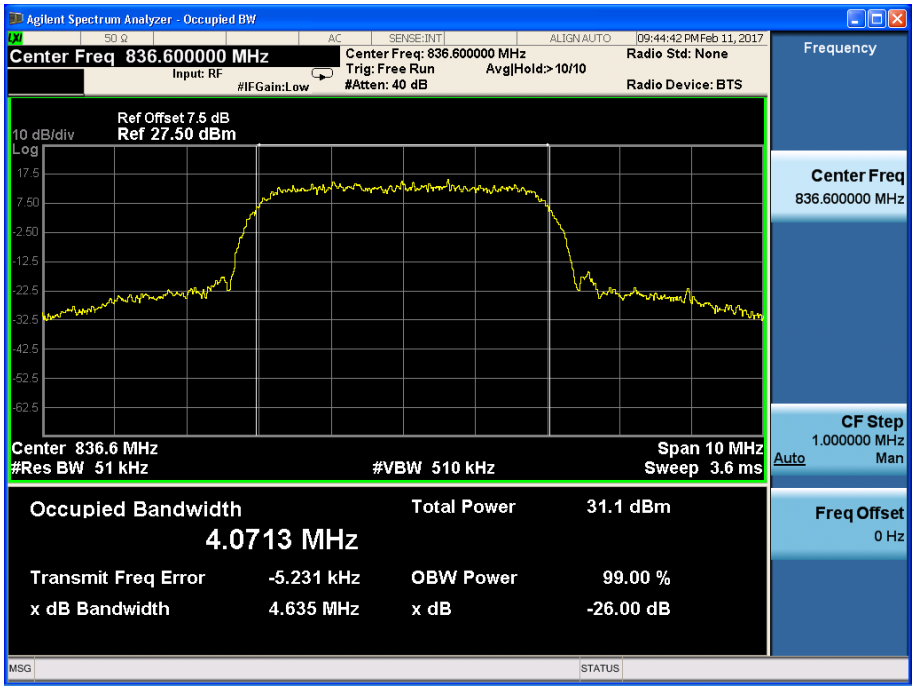
Channel 4233

HSDPA/HSUPA Mode:

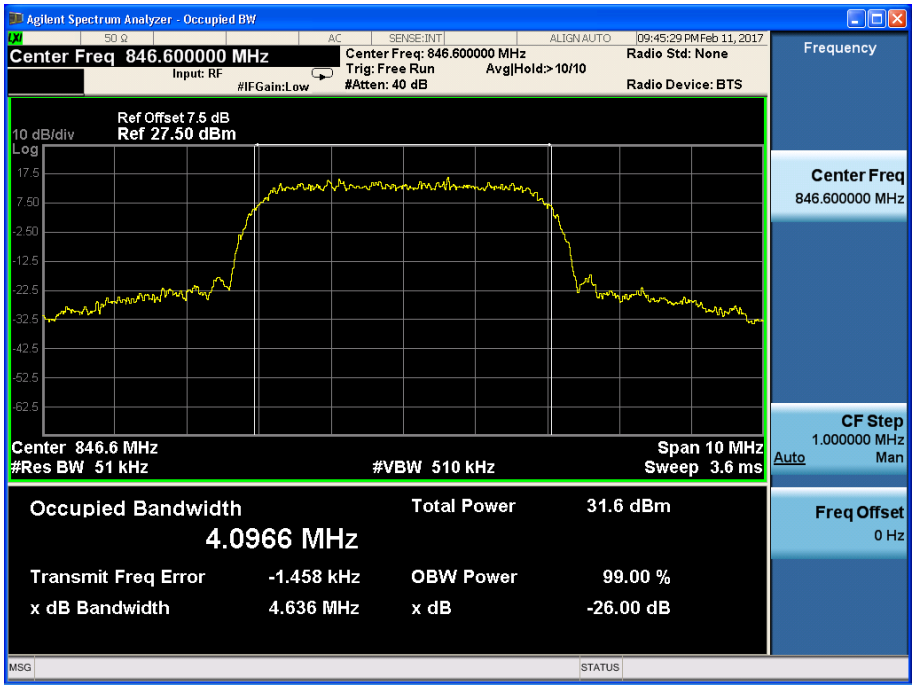


Channel 4132

Copyright © SRTC



Channel 4183



Channel 4233

Copyright © SRTC

Emission Bandwidth-FCC Part24.238(b)

WCDMA band II

WCDMA Mode:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dBc Power (MHz)
1852.4	9262	4.622
1880.0	9400	4.640
1907.6	9538	4.642

HSDPA/HSUPA Mode:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dBc Power (MHz)
1852.4	9262	4.620
1880.0	9400	4.643
1907.6	9538	4.641

WCDMA band V

WCDMA Mode:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dBc Power (MHz)
826.4	4132	4.635
836.6	4183	4.655
846.6	4233	4.639

HSDPA/HSUPA Mode:

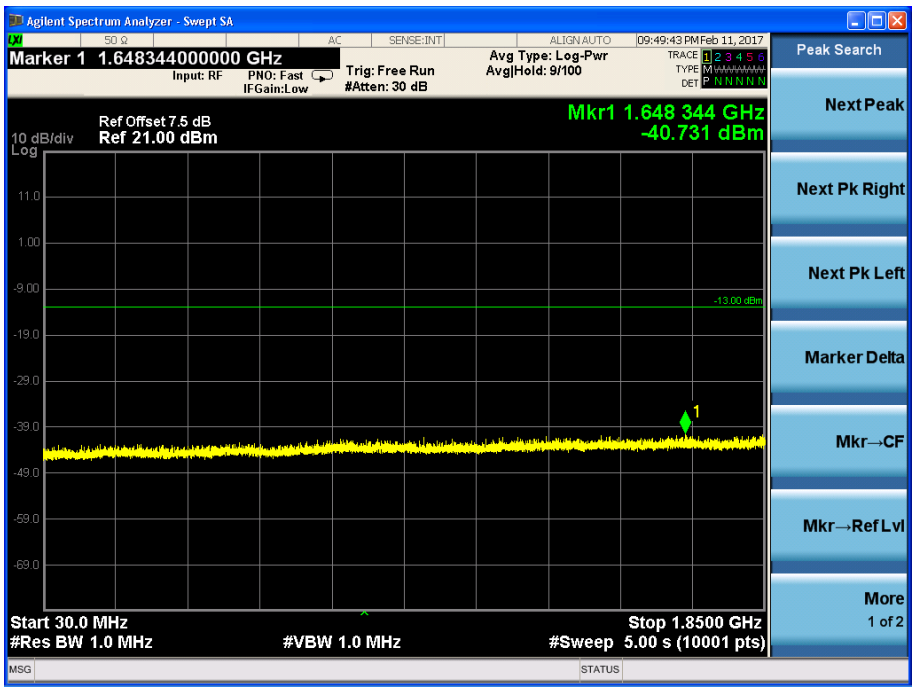
Carrier frequency (MHz)	Channel No.	Bandwidth of -26dBc Power (MHz)
826.4	4132	4.616
836.6	4183	4.635
846.6	4233	4.636

Copyright © SRTC

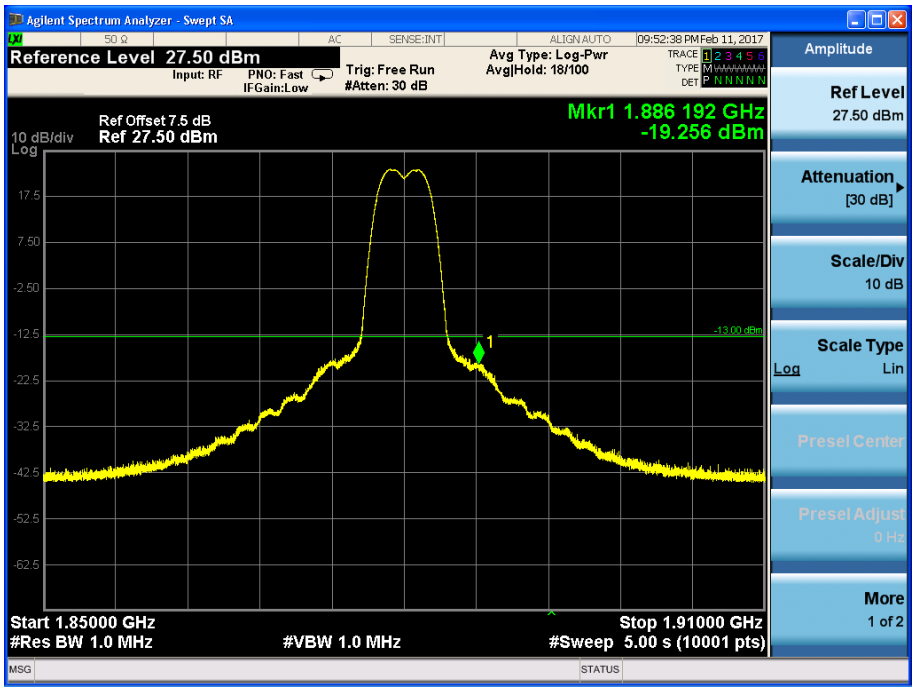
Spurious Emissions at antenna terminal-FCC Part2.1051/24.238

WCDMA band II

WCDMA Mode:



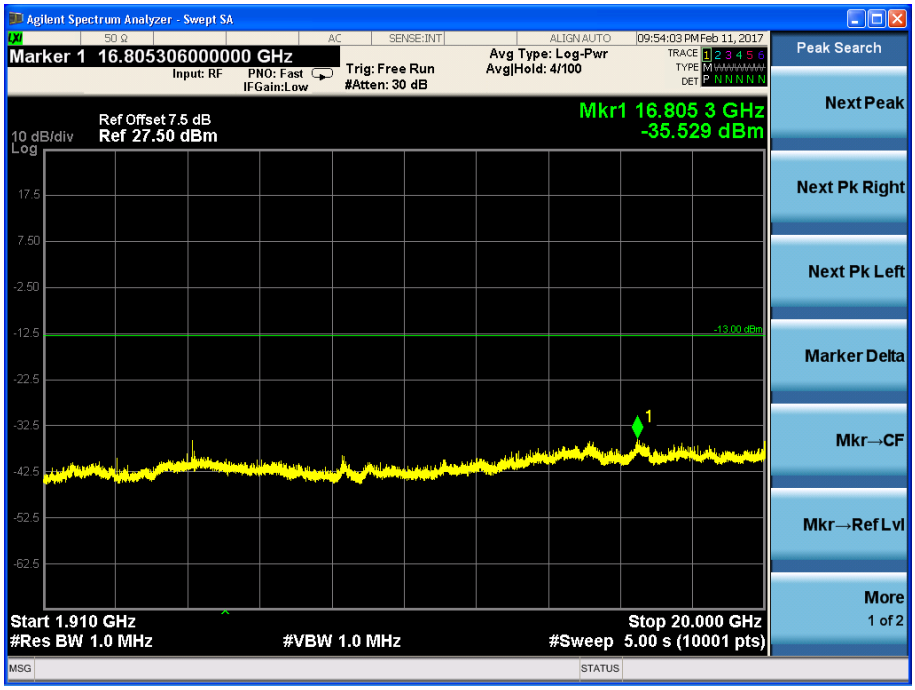
Channel 9400, 30MHz~1850MHz



Channel 9400, 1850MHz~1910MHz

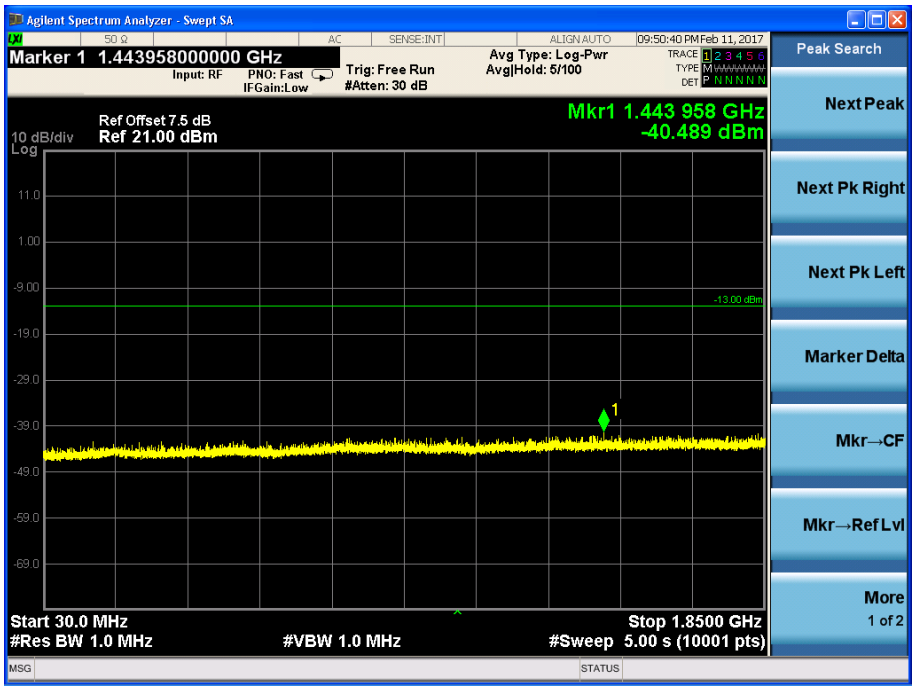
Note: The signal beyond the limit is the signal transmitted by EUT.

Copyright © SRTC



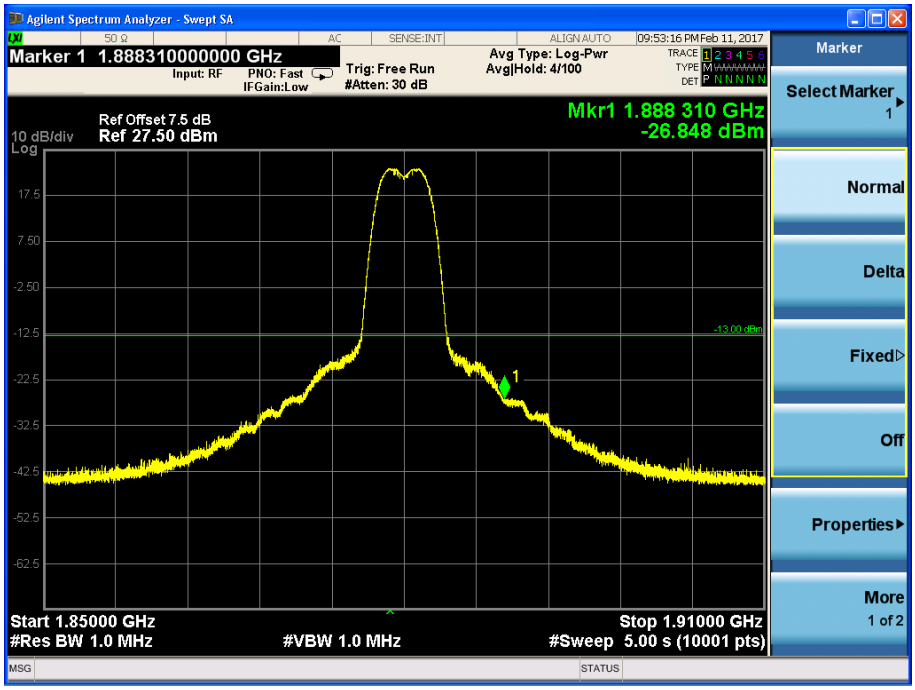
Channel 9400, 1910MHz~20GHz

HSDPA/HSUPA Mode:



Channel 9400, 30MHz~1850MHz

Copyright © SRTC



Channel 9400, 1850MHz~1910MHz

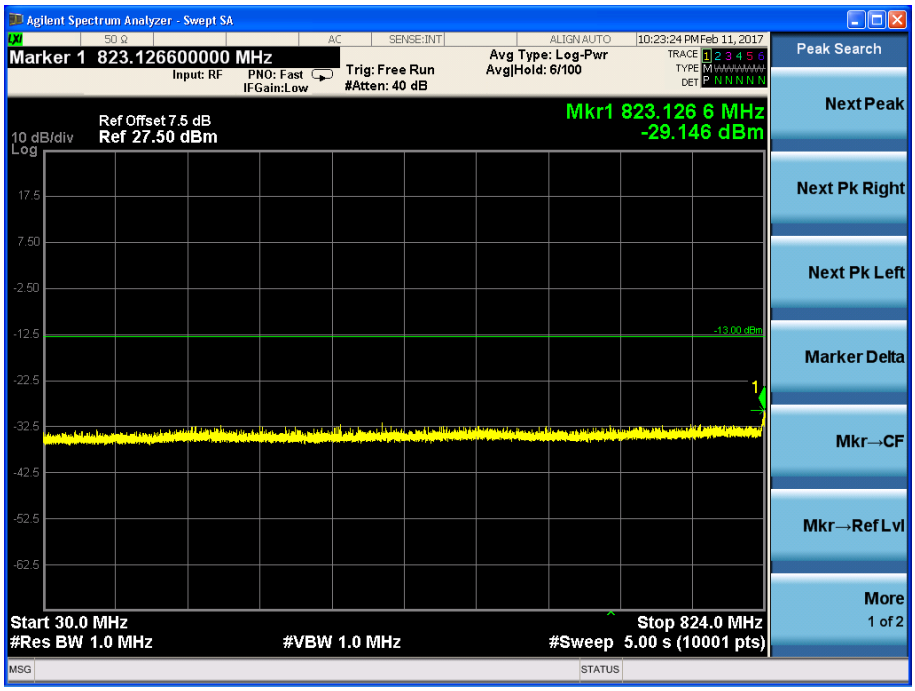
Note: The signal beyond the limit is the signal transmitted by EUT.

Channel 9400, 1910MHz~20GHz

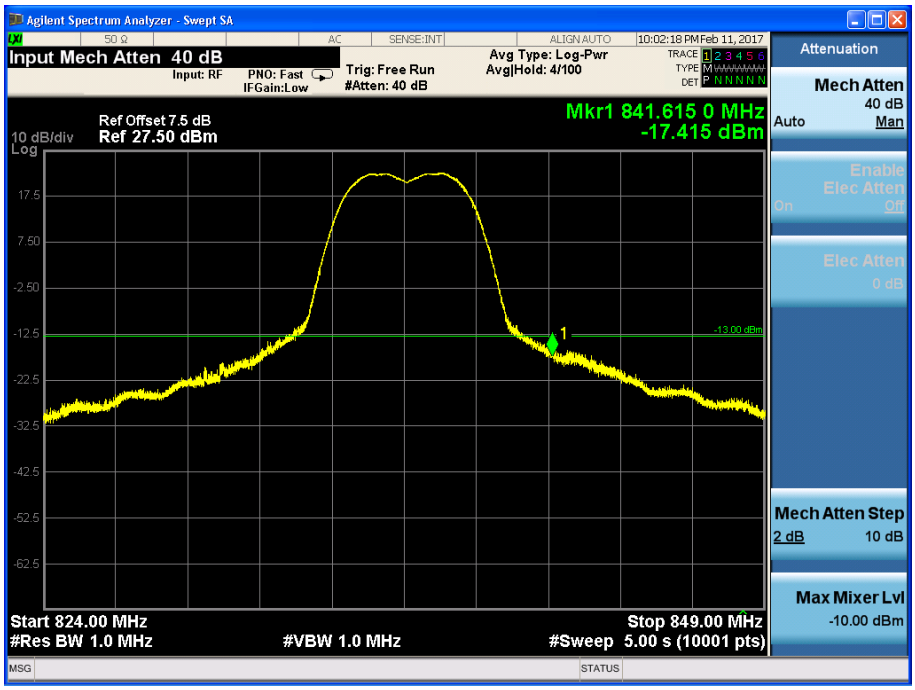
Copyright © SRTC

WCDMA band V

WCDMA Mode:



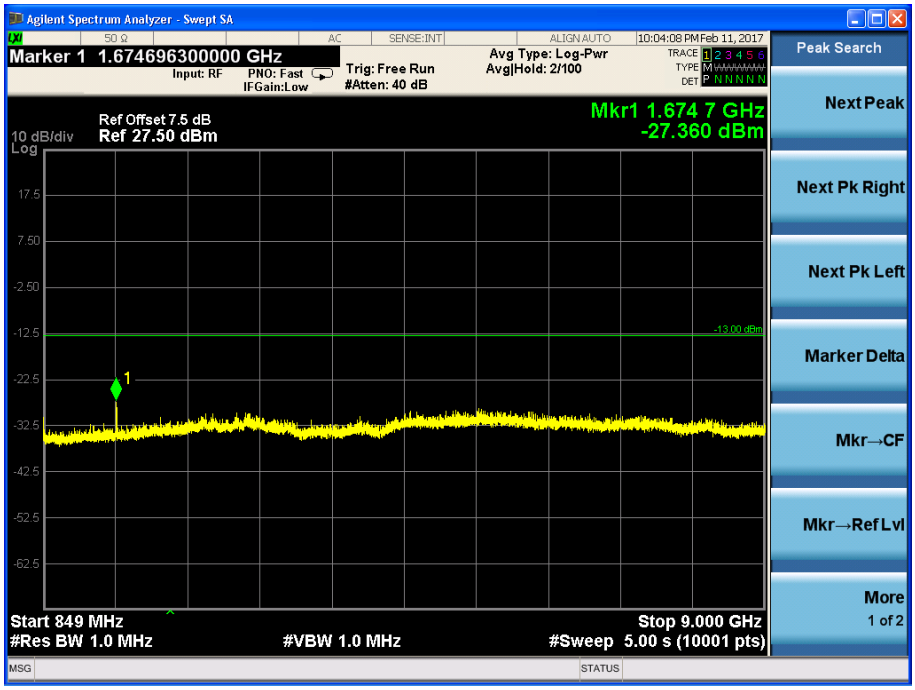
Channel 4183, 30MHz~824MHz



Channel 4183, 824MHz~849MHz

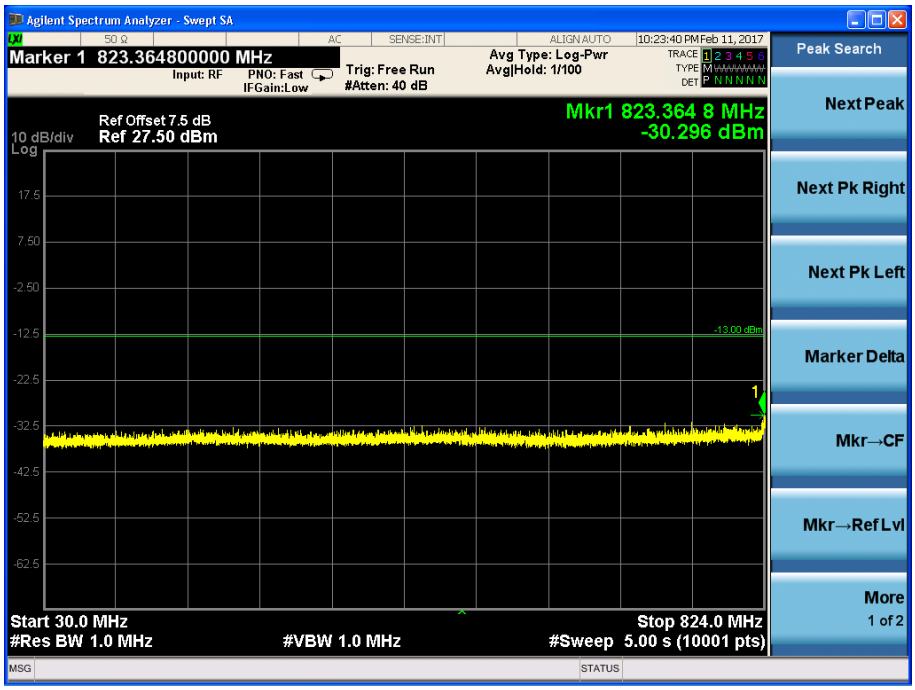
Note: The signal beyond the limit is the signal transmitted by EUT.

Copyright © SRTC



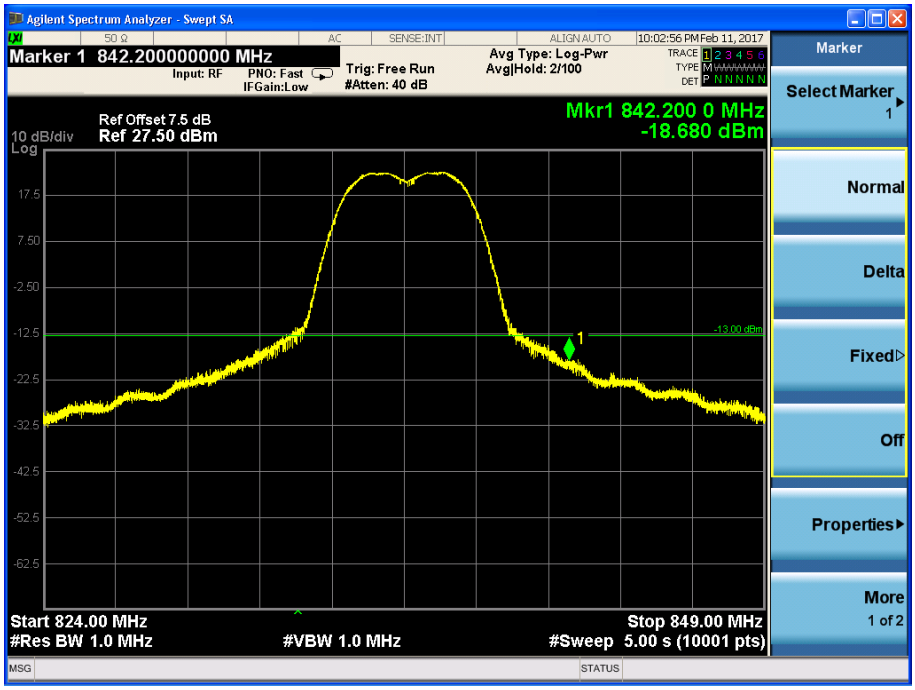
Channel 4183, 849MHz~9GHz

HSDPA/HSUPA Mode:



Channel 4183, 30MHz~824MHz

Copyright © SRTC



Channel 4183, 824MHz~849MHz

Note: The signal beyond the limit is the signal transmitted by EUT.

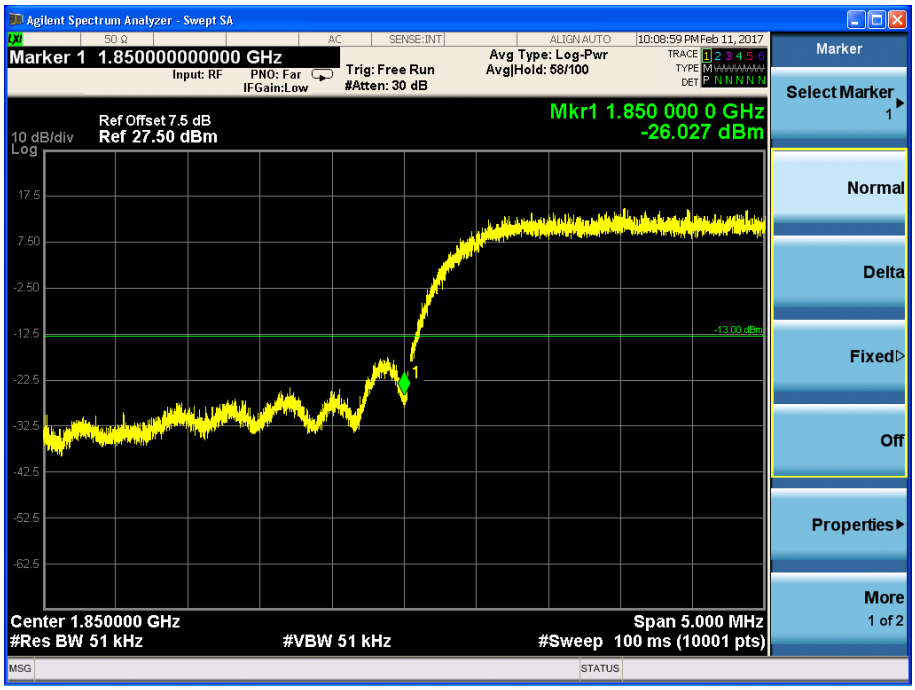
Channel 4183, 849MHz~9GHz

Copyright © SRTC

Band Edges Compliance-FCC Part24.238(b)

WCDMA band II

WCDMA Mode:

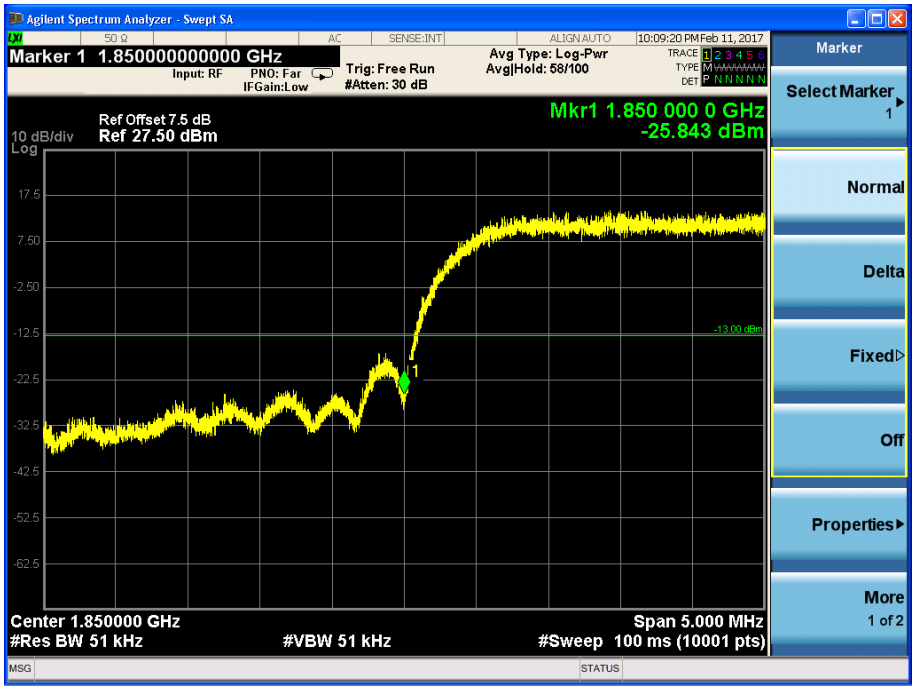


Channel 9262

Channel 9538

Copyright © SRTC

HSDPA/HSUPA Mode:



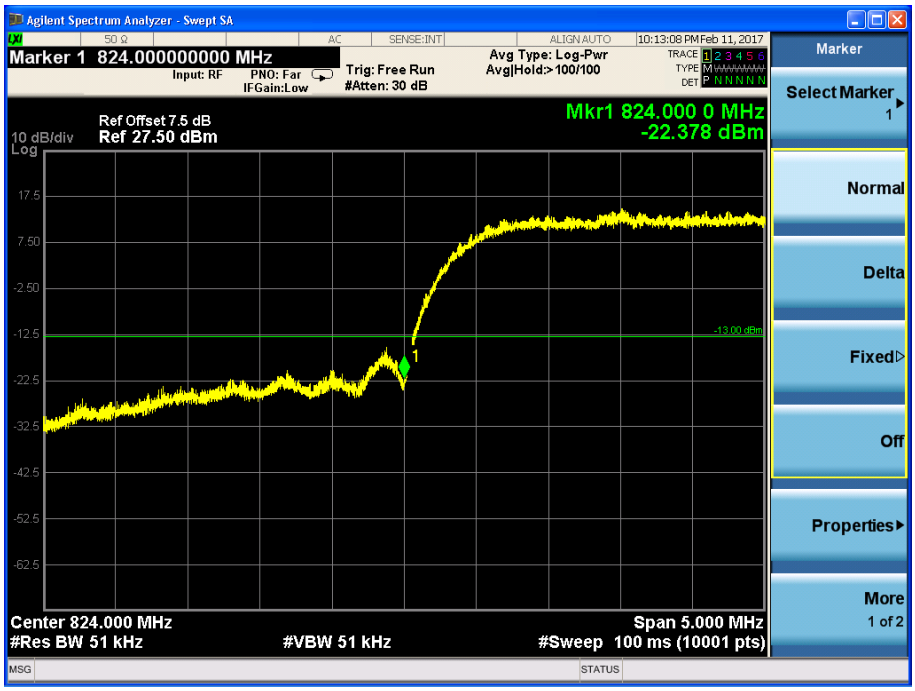
Channel 9262

Channel 9538

Copyright © SRTC

WCDMA band V

WCDMA Mode:

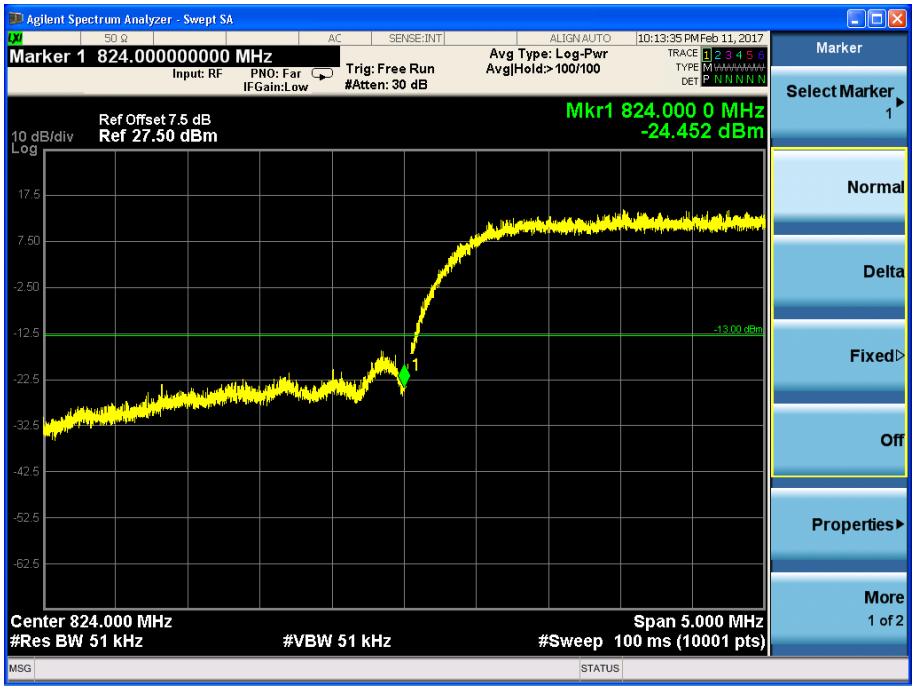


Channel 4132

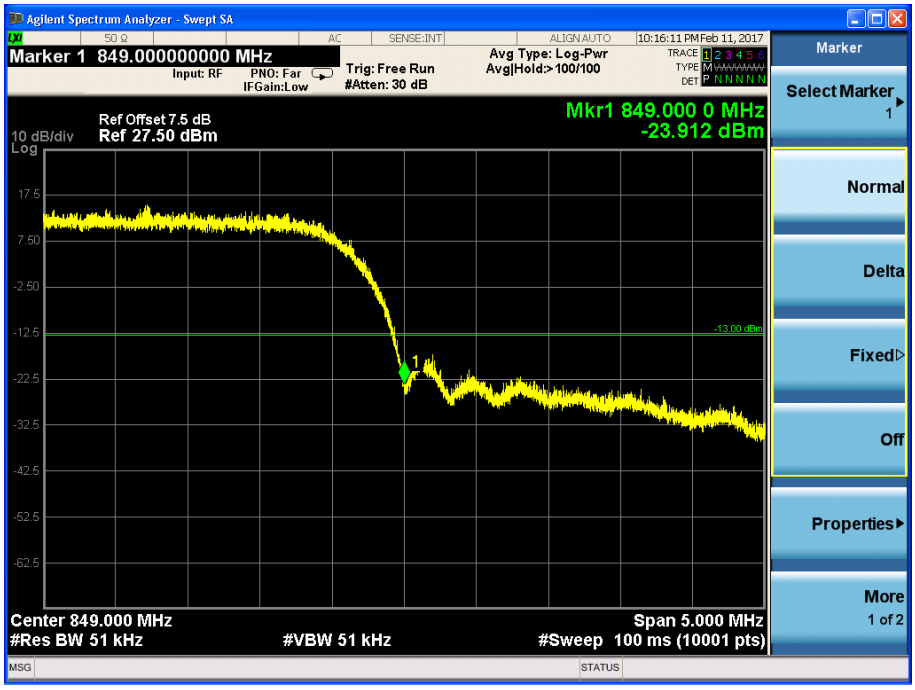
Channel 4233

Copyright © SRTC

HSDPA/HSUPA Mode:



Channel 4132



Channel 4233

Copyright © SRTC

Frequency Stability-FCC Part2.1055/24.235

WCDMA band II

WCDMA Mode:

Temperature(°C)	Test Result (ppm)@NV		
	Channel 9262	Channel 9400	Channel 9538
-30	0.001	0.002	0.001
-20	0.002	0.002	0.001
-10	0.003	0.003	0.002
0	0.001	0.002	0.003
+10	0.001	0.004	0.004
+20	0.002	0.002	0.002
+30	0.002	0.003	0.002
+40	0.002	0.004	0.001
+50	0.003	0.002	0.002

Voltage	Test Result (ppm)@NT		
	Channel 9262	Channel 9400	Channel 9538
LV	0.002	0.004	0.002
HV	0.004	0.004	0.002

HSDPA/HSUPA Mode:

Temperature(°C)	Test Result (ppm)@NV		
	Channel 9262	Channel 9400	Channel 9538
-30	0.002	0.001	0.002
-20	0.003	0.003	0.003
-10	0.002	0.001	0.002
0	0.002	0.003	0.001
+10	0.001	0.001	0.002
+20	0.001	0.004	0.001
+30	0.002	0.003	0.002
+40	0.003	0.002	0.003
+50	0.002	0.002	0.002

Voltage	Test Result (ppm)NT		
	Channel 9262	Channel 9400	Channel 9538
LV	0.003	0.002	0.003
HV	0.002	0.003	0.002

Copyright © SRTC

WCDMA band V

WCDMA Mode:

Temperature(°C)	Test Result (ppm)@NV		
	Channel 4132	Channel 4183	Channel 4233
-30	0.001	0.002	0.002
-20	0.002	0.001	0.002
-10	0.003	0.002	0.004
0	0.002	0.001	0.001
+10	0.002	0.003	0.002
+20	0.001	0.003	0.001
+30	0.003	0.002	0.003
+40	0.002	0.001	0.001
+50	0.002	0.002	0.002

Voltage	Test Result (ppm)@NT		
	Channel 4132	Channel 4183	Channel 4233
LV	0.002	0.003	0.002
HV	0.003	0.004	0.002

HSDPA/HSUPA Mode:

Temperature(°C)	Test Result (ppm)@NV		
	Channel 4132	Channel 4183	Channel 4233
-30	0.002	0.003	0.002
-20	0.001	0.003	0.001
-10	0.004	0.002	0.002
0	0.001	0.002	0.003
+10	0.003	0.003	0.003
+20	0.003	0.001	0.005
+30	0.002	0.002	0.002
+40	0.004	0.002	0.004
+50	0.003	0.001	0.002

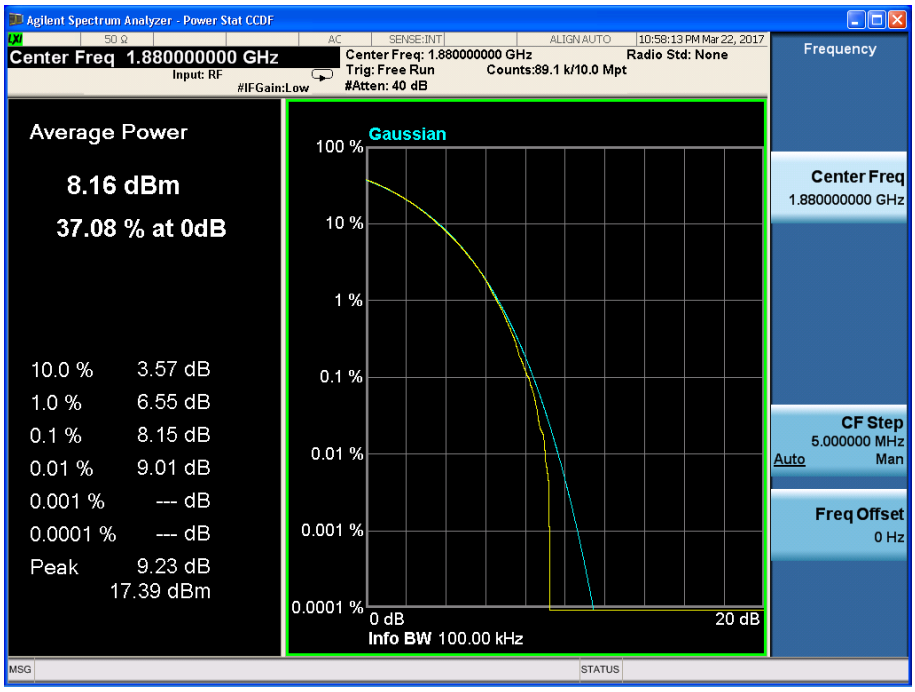
Voltage	Test Result (ppm)@NT		
	Channel 4132	Channel 4183	Channel 4233
LV	0.002	0.004	0.002
HV	0.003	0.006	0.003

Copyright © SRTC

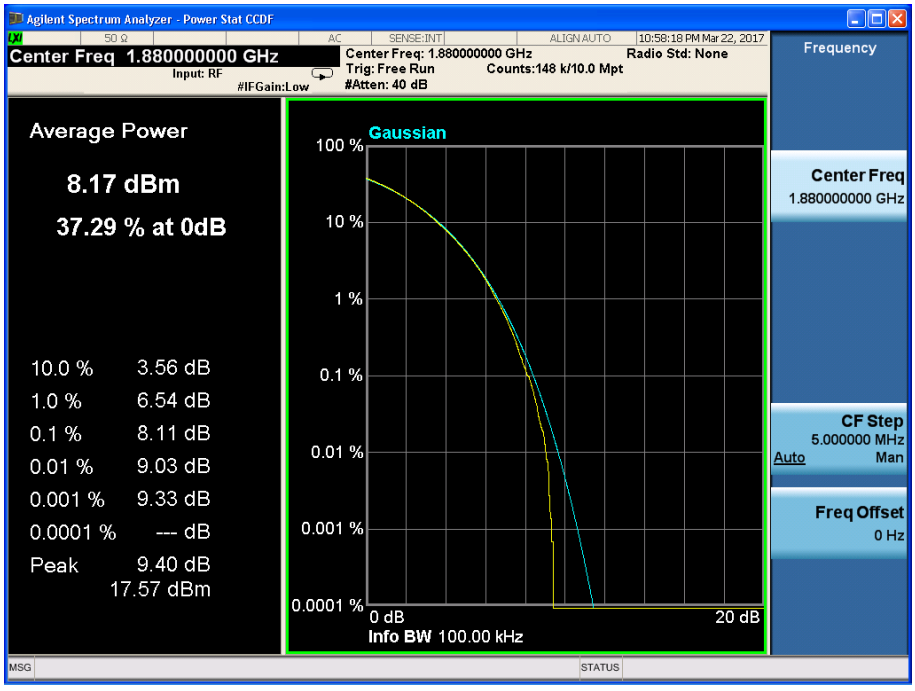
Peak-Average Ratio -FCC Part 24.232(d)

WCDMA band II

WCDMA Mode:



HSDPA/HSUPA Mode:



Copyright © SRTC

APPENDIX B – TEST DATA OF RADIATED EMISSION

Effective Isotropic Radiated Power-FCC Part24.232(b)

WCDMA band II

WCMDA Mode:

Frequency (MHz)	Peak EIRP(dBm)	Pca Cable loss	Ga Antenna Gain (dB)	Pmea (dBm)	Polarization
1852.4	20.77	-5	8.6	17.17	Vertical
1880.0	20.78	-5	8.6	17.18	Vertical
1907.6	22.03	-5	8.6	18.43	Vertical

HSDPA/HSUPA Mode:

Frequency (MHz)	Peak EIRP(dBm)	Pca Cable loss	Ga Antenna Gain (dB)	Pmea (dBm)	Polarization
1852.4	21.50	-5	8.6	17.90	Vertical
1880.0	20.54	-5	8.6	16.94	Vertical
1907.6	18.68	-5	8.6	15.08	Vertical

WCDMA band V

WCDMA Mode:

Frequency (MHz)	Peak ERP (dBm)	Pca Cable loss (dB)	Ga Antenna Gain (dB)	Pmea (dBm)	Polarization
826.4	22.00	-3.8	8.6	17.20	Vertical
836.6	22.36	-3.8	8.6	17.56	Vertical
846.6	21.96	-3.8	8.6	17.16	Vertical

HSDPA/HSUPA Mode:

Frequency (MHz)	Peak ERP (dBm)	Pca Cable loss (dB)	Ga Antenna Gain (dB)	Pmea (dBm)	Polarization
826.4	21.64	-3.8	8.6	16.84	Vertical
836.6	21.56	-3.8	8.6	16.76	Vertical
846.6	21.34	-3.8	8.6	16.54	Vertical

Copyright © SRTC

Radiated Spurious Emissions-FCC Part2.1053/24.238

WCDMA band II

WCDMA Mode:
Channel 9262

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2455.86	-52.12	-13	Vertical
2776.77	-50.40	-13	Horizontal
3731.99	-49.46	-13	Horizontal
6678.67	-45.07	-13	Horizontal
9963.15	-40.87	-13	Vertical
17821.70	-30.51	-13	Vertical

Channel 9400

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2448.02	-50.12	-13	Vertical
2775.28	-51.84	-13	Vertical
3734.28	-48.28	-13	Horizontal
6676.16	-45.95	-13	Vertical
9971.00	-38.57	-13	Horizontal
17806.91	-31.56	-13	Vertical

Channel 9538

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2456.04	-51.28	-13	Horizontal
2769.47	-50.79	-13	Vertical
3730.46	-48.64	-13	Horizontal
6696.23	-45.97	-13	Vertical
9968.77	-38.78	-13	Horizontal
17818.54	-32.07	-13	Vertical

HSDPA/HSUPA Mode:
Channel 9262

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2453.19	-51.74	-13	Horizontal
2768.41	-50.27	-13	Vertical
3744.15	-48.48	-13	Vertical
6688.27	-43.47	-13	Horizontal
9960.15	-38.08	-13	Horizontal

Copyright © SRTC

17813.46	-44.40	-13	Vertical

Channel 9400

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2452.27	-51.48	-13	Vertical
2780.25	-50.11	-13	Vertical
3744.33	-48.40	-13	Horizontal
6693.41	-45.31	-13	Horizontal
9959.23	-40.25	-13	Vertical
17812.67	-35.74	-13	Vertical

Channel 9538

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2449.03	-51.37	-13	Horizontal
2777.60	-51.25	-13	Vertical
3742.73	-49.12	-13	Horizontal
6693.72	-45.77	-13	Vertical
9957.46	-38.82	-13	Vertical
17806.57	-31.86	-13	Vertical

WCDMA band V

WCDMA Mode:
Channel 4132

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1629.50	-51.47	-13	Vertical
1668.82	-50.66	-13	Vertical
2534.38	-44.25	-13	Vertical
2569.30	-43.63	-13	Horizontal
8965.09	-40.11	-13	Vertical
9981.53	-36.25	-13	Horizontal

Channel 4183

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1627.73	-50.85	-13	Vertical
1671.38	-50.42	-13	Horizontal
2535.38	-43.94	-13	Vertical
2558.37	-43.33	-13	Vertical
8966.36	-40.14	-13	Horizontal
9986.48	-36.31	-13	Vertical

Copyright © SRTC

Channel 4233

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1618.82	-51.31	-13	Vertical
1672.89	-50.94	-13	Vertical
2529.93	-44.41	-13	Vertical
2570.03	-43.53	-13	Horizontal
8967.22	-40.71	-13	Vertical
9985.32	-36.47	-13	Vertical

HSDPA/HSUPA Mode:
Channel 4132

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1626.13	-51.49	-13	Vertical
1669.00	-51.09	-13	Vertical
2545.03	-43.65	-13	Horizontal
2561.35	-43.30	-13	Horizontal
8971.25	-40.78	-13	Vertical
9983.94	-36.19	-13	Vertical

Channel 4183

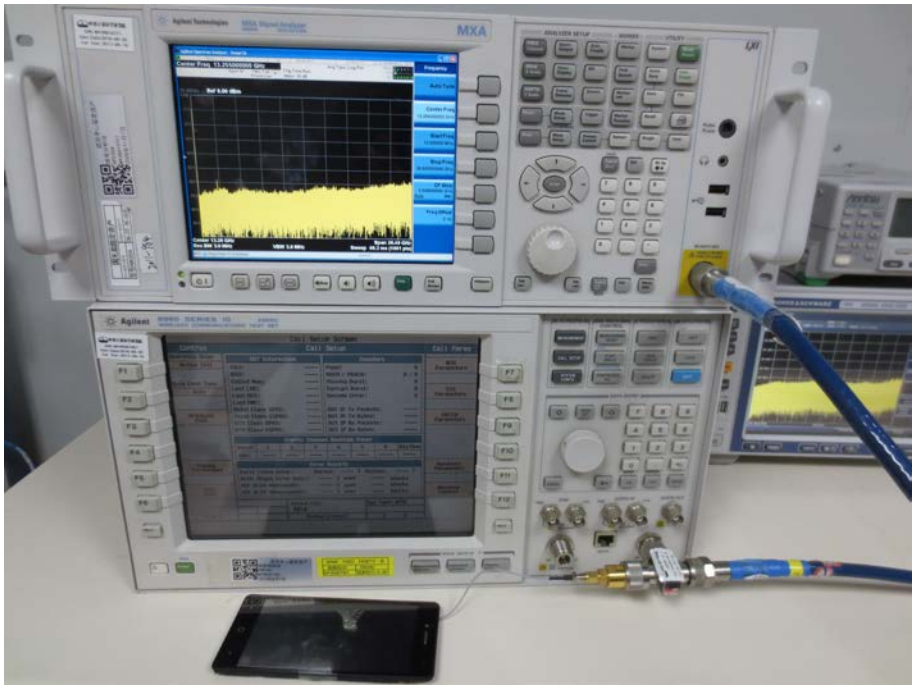
Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1622.98	-51.06	-13	Vertical
1680.53	-50.49	-13	Vertical
2541.47	-44.15	-13	Vertical
2572.55	-43.40	-13	Vertical
8973.30	-40.37	-13	Horizontal
9988.73	-36.10	-13	Horizontal

Channel 4233

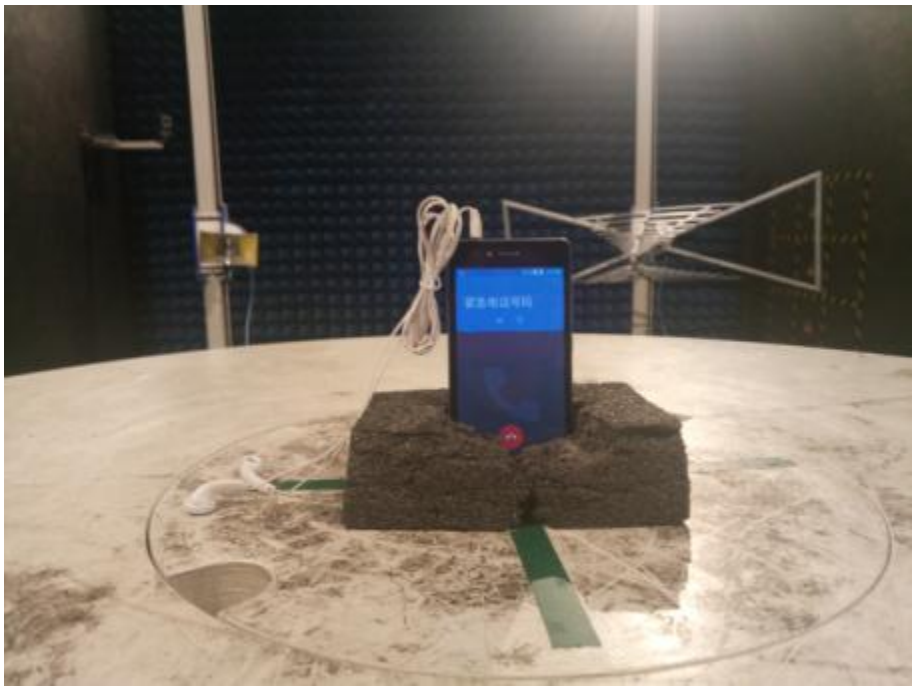
Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1635.44	-51.24	-13	Horizontal
1663.68	-50.68	-13	Vertical
2534.94	-44.82	-13	Vertical
2558.94	-43.33	-13	Vertical
8965.62	-40.13	-13	Horizontal
9972.72	-36.16	-13	Vertical

Copyright © SRTC

APPENDIX C – TEST SETUP



Spurious RF Conducted Emissions Test setup



Radiated Spurious Emissions Test setup

---End of Test Report---

Copyright © SRTC