



Full

TEST REPORT

No. I17D00219-SRD05

For

Client : Shanghai Simcom Ltd.

Production : LTE-FDD/HSPA MODULE

Model Name : SIM7600A

FCC ID: UDV-201709

Hardware Version: V1.02

Software Version: B02V01

Issued date: 2017-07-09

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of ECIT Shanghai.

Test Laboratory:

ECIT Shanghai, East China Institute of Telecommunications

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Revision Version

Report Number	Revision	Date	Memo
I17D00219-SRD05	00	2017-07-09	Initial creation of test report

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1. Test Laboratory

1.1. Testing Location

Company Name:	ECIT Shanghai, East China Institute of Telecommunications
Address:	7-8F, G Area, No. 668, Beijing East Road, Huangpu District, Shanghai, P. R. China
Postal Code:	200001
Telephone:	(+86)-021-63843300
Fax:	(+86)-021-63843301
FCC Registration NO.:	489729

1.2. Testing Environment

Normal Temperature:	15-35°C
Extreme Temperature:	-10/+55°C
Relative Humidity:	20-75%

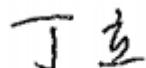
1.3. Project data

Project Leader:	Zhou Yan
Testing Start Date:	2016-06-03
Testing End Date:	2016-08-05
Testing Start Date:	2017-06-21 (N06 for new test)
Testing End Date:	2017-06-28 (N06 for new test)

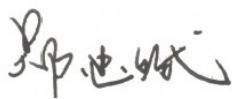
1.4. Signature



Yang Dejun
(Prepared this test report)



Ding Li
(Reviewed this test report)



Zheng Zhongbin
Director of the laboratory
(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name: Shanghai Simcom Ltd.
Address: SIM Technology Building.,No.633, Jinzhong Rd,Changning District, Shanghai, P.R.China
Contact: yongsheng.li
Telephone: 021-32523134

2.2. Manufacturer Information

Company Name: Shanghai Simcom Ltd.
Address: SIM Technology Building.,No.633, Jinzhong Rd,Changning District, Shanghai, P.R.China
Contact: yongsheng.li
Telephone: 021-32523134

3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

EUT Description	LTE-FDD/HSPA MODULE
Model name	SIM7600A
FCC ID	UDV-201709
Frequency	WCDMA Band II/V LTE FDD2/4/12
Extreme Temperature	-10/+55 °C
Nominal Voltage	3.8V
Extreme High Voltage	4.2V
Extreme Low Voltage	3.4V

Note: Photographs of EUT are shown in ANNEX A of this test report.

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version	Date of receipt
N06	861475030000931	V1.02	SIM7500A_V1.0	2016-06-02
N06	861475030055224	V1.02	B02V01	2017-06-11

*EUT ID: is used to identify the test sample in the lab internally.

3.3. Internal Identification of AE used during the test

AE ID*	Description	SN
AE1	RF cable	---
---	---	---

*AE ID: is used to identify the test sample in the lab internally.

3.4. Statements

The product name SIM7600A, supporting WCDMA/DC-HSDPA/LTE, manufactured by Shanghai Simcom Ltd. is a variant product for testing. According to the variant description, We used the sample N06 to test the worse cases of Band 2 and Band 5'RSE and the 16QAM modulation. The rest of the test results please refer to I16D00113-RFA_V2.

ECIT has verified that the compliance of the tested device specified in section 5 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 5 of this test report.

4. Reference Documents

4.1. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC Part 24	PERSONAL COMMUNICATIONS SERVICES	2014
FCC Part 22	PUBLIC MOBILE SERVICES	2014
ANSI-TIA-603-E	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards	2016
ANSI C63.4	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2014

5. SUMMARY OF TEST RESULTS

Item	Test items	FCC rules	result
1	Output Power	2.1046/22.913(a)/24.232(c)	N/A
2	Peak-to-Average Ratio	24.232(d)	N/A
3	99%Occupied Bandwidth	2.1049(h)(i)/ 22.917(b)	N/A
4	-26dB Emission Bandwidth	22.917(b)/§24.238(b)	N/A
5	Band Edge at antenna terminals	22.917(a)/24.238(a)	N/A
6	Frequency stability	2.1055/24.235	N/A
7	Conducted Spurious mission	2.1053/22.917(a)/24.238(a)	N/A
8	Emission Limit	2.1051/22.917/24.238/22.913/24 .232	Pass

6. Test Equipment Utilized

Climate chamber

No.	Equipment	Model	Serial Number	Manufacturer	Calibration date	Cal.interval
1	Climate chamber	SH-641	92012011	ESPEC	2016-01-06	2 Year

Radiated emission test system

The test equipment and ancillaries used are as follows.

No.	Equipment	Model	Serial Number	Manufacturer	Calibration date	Cal.interval
1	Universal Radio Communication Tester	CMU200	123123	R&S	2017-05-11	1 Year
2	EMI Test Receiver	ESU40	100307	R&S	2017-05-11	1 Year
3	TRILOG Broadband Antenna	VULB9163-163	VULB9163-515	Schwarzbeck	2017-02-25	3 Year
4	Double-ridged Waveguide Antenna	ETS-3117	00135890	ETS	2017-01-11	3 Year
5	2-Line V-Network	ENV216	101380	R&S	2017-05-11	1 Year
6	Substitution Antenna	ETS-3117	00135890	ETS	2017-01-11	3 Year
7	RF Signal Generator	SMF100A	102314	R&S	2017-05-11	1 Year
8	Substitution Antenna	VUBA9117	9117-266	Schwarzbeck	2017-08-18	3 Year
9	Amplifier	SCU03	10009	R&S	2017-01-05	1 Year

10	Amplifier	NTWPA -008610 F	12023024	Rflight	2017-01-05	1 Year
11	Attenuators	BW-N3 W5+	/	MCL	2017-01-05	1 Year

Conducted test system

No.	Name	Type	SN	Manufacture	Calibration date	Cal.interval
1	Spectrum Analyzer	FSQ26	101096	R&S	2017-05-11	1 Year
2	Universal Radio Communicat	CMU200	123102	R&S	2017-05-11	1 Year
3	DC Power Supply	ZUP60-14	LOC-220Z006-0007	TDL-Lambda	2017-05-11	1 Year

7. Test Environment

Shielding Room1 (6.0 meters×3.0 meters×2.7 meters) did not exceed following limits along the conducted RF performance testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	> 100 dB
Ground system resistance	< 0.5 Ω

Control room did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 25 %, Max. = 75 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω

Fully-anechoic chamber1 (6.9 meters×10.9 meters×5.4 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 25 %, Max. = 75 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω
VSWR	Between 0 and 6 dB, from 1GHz to 18GHz
Site Attenuation Deviation	Between -4 and 4 dB, 30MHz to 1GHz
Uniformity of field strength	Between 0 and 6 dB, from 80MHz to 3000 MHz

ANNEX A. MEASUREMENT RESULTS

ANNEX A.1. OUTPUT POWER

A.1.1. Summary

During the process of testing, the EUT was controlled Rhode & Schwarz Digital Radio. Communication tester (CMU-200) to ensure max power transmission and proper modulation. This result contains peak output power and EIRP measurements for the EUT. In all cases, output power is within the specified limits.

A.1.2. Conducted

A.1.2.1. Method of Measurements

Method of measurements please refer to KDB971168 D01 v02r02 clause 5.

The EUT was set up for the max output power with pseudo random data modulation.

The power was measured with Rhode & Schwarz Spectrum Analyzer FSQ(peak).

These measurements were done at 3 frequencies, 1850.2 MHz, 1880.0MHz and 1909.8MHz for PCS1900 band; 824.2MHz, 836.6MHz and 848.8MHz for GSM850 band. (bottom, middle and top of operational frequency range).

These measurements were done at 3 frequencies, 1852.4 MHz, 1880.0MHz and 1907.6MHz for WCDMA Band II; 826.4MHz, 836.6MHz and 846.6MHz for WCDMA Band V. (bottom, middle and top of operational frequency range).

A.1.2.2 Test procedures:

1. The transmitter output port was connected to base station.
2. Set the EUT at maximum power through base station.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure the maximum burst average power for GSM and maximum average power for other modulation signal.

A.1.2.3 Limit:

22.913(a) Mobile stations are limited to 7watts.

24.232(c) Mobile and portable stations are limited to 2 watts.

A.1.2.4 Test Procedure:

The transmitter output power was connected to calibrated attenuator, the other end of which was connected to signal analyzer. Transmitter output power was read off the power in dBm. The power outputs at the transmitter antenna port was determined by adding the value of attenuator to the signal analyzer reading.

A.1.2.5 GSM Test Condition:

RBW	VBW	Sweep time	Span
-----	-----	------------	------

1MHz	1MHz	300ms	10MHz
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A.1.2.6 WCDMA Test Condition:

RBW	VBW	Sweep time	Span
10MHz	10MHz	800ms	50MHz

A.1.2.7 Measurement results:

Band II		
Channel/fc(MHz)	16QAM Peak power (dBm)	16QAM Average power (dBm)
Mid 9400 /1880	21.53	21.39
Low 9262/1852.4	21.74	21.57
High 9538/1907.6	21.23	21.11

Band V		
Channel/fc(MHz)	16QAM Peak power (dBm)	16QAM Average power (dBm)
Mid 4183/836.6	23.05	22.95
Low 4132/826.4	23.02	22.86
High 4233/846.6	23.07	22.84

Conclusion: PASS**ANNEX A.2. Peak-to-Average Power Ratio**

Method of test measurements please refer to KDB971168 D01 v02r02 clause 5.7.

A.2.1 PAPR Limit

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

A.2.2 Test procedures

1. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
2.
 - 1) Select the spectrum analyzer CCDF function.

- 2) Set RBW \geq signal's occupied bandwidth.
- 3) Set the number of counts to a value that stabilizes the measured CCDF curve;
- 4) Sweep time \geq 1s.

3. Record the maximum PAPR level associated with a probability of 0.1%.

A.2.3 Test results:

16QAM Band II			
Channel	9262	9400	9538
Frequency (MHz)	1852.4	1880	1907.6
PAPR(dB)	3.43	3.43	3.37
16QAM Band V			
Channel	4132	4183	4233
Frequency (MHz)	826.4	836.4	846.6
PAPR(dB)	3.30	3.21	3.27

Conclusion: PASS**ANNEX A.3. Occupied Bandwidth**

Method of test please refer to KDB971168 D01 v02r02 clause 4.0.

A.3.1. Occupied Bandwidth

Similar to conducted emissions; occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of GSM850, PCS1900, WCDMA BANDII and WCDMA BANDV.

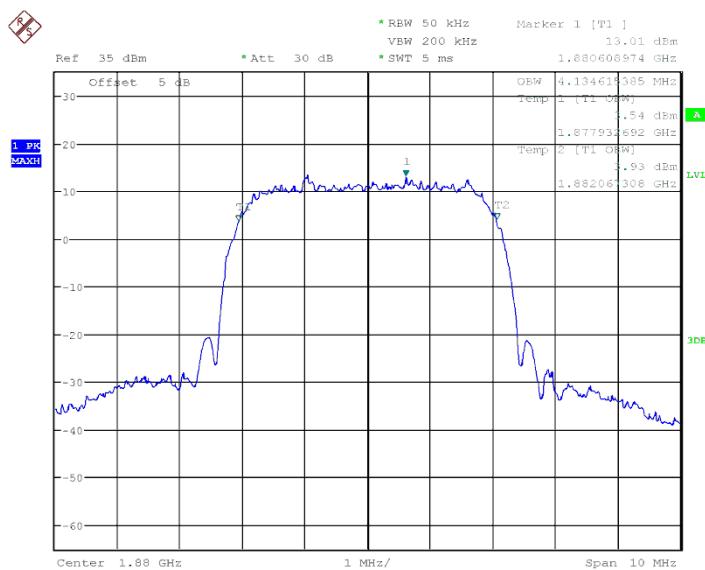
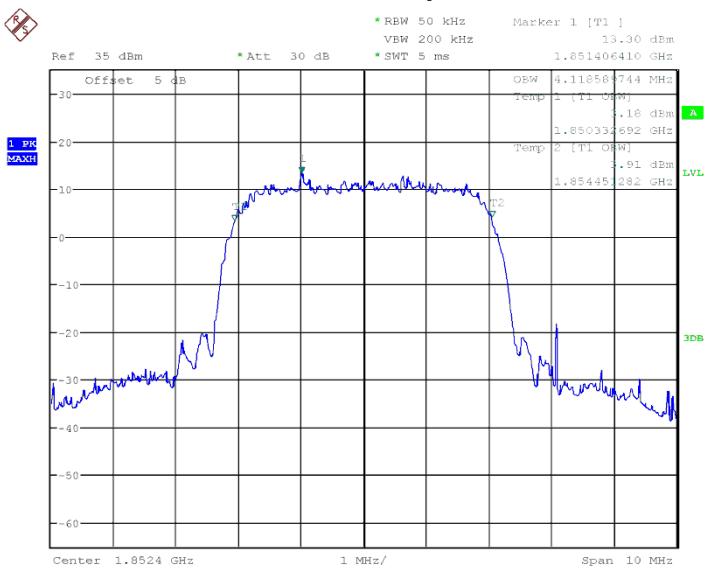
A.3.2 Test Procedure:

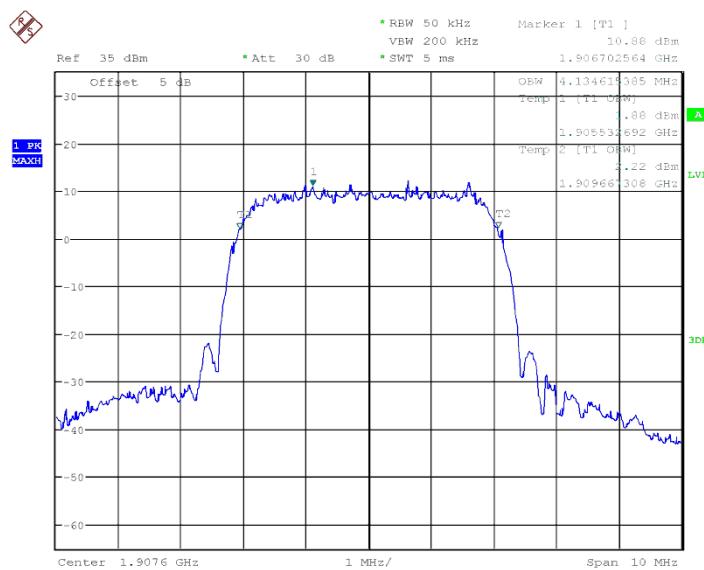
1. The EUT output RF connector was connected with a short cable to the signal analyzer.
2. RBW was set to about 1% of emission BW, VBW \geq 3 times RBW,.
3. 99% bandwidth were measured, the occupied bandwidth is delta frequency between the two points where the display line intersects the signal trace.

A.3.3 Test result:

16QAM BAND II

Test channel	Frequency (MHz)	99% Occupied Bandwidth(MHz)
Mid 9400	1880	4.13
Low 9262	1852.4	4.12
High 9538	1907.6	4.13

Conclusion: PASS
16QAM BAND II

Channel9400-Occupied Bandwidth

Channel 9262-Occupied Bandwidth

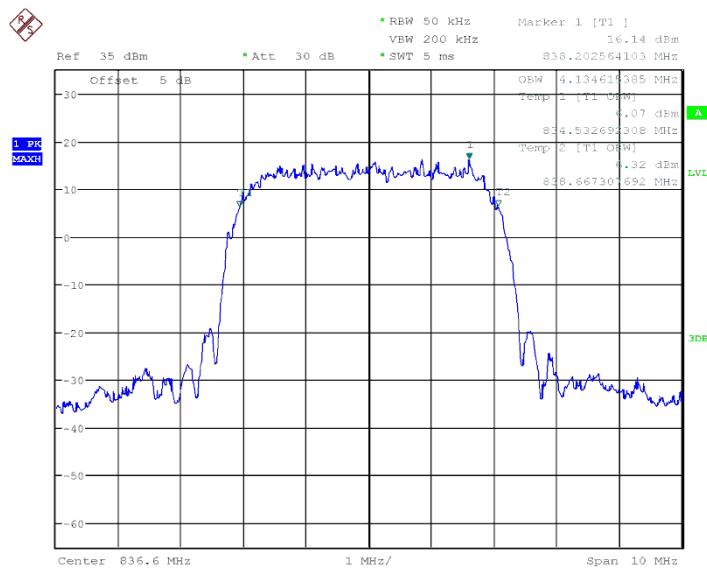


Channel 9538-Occupied Bandwidth

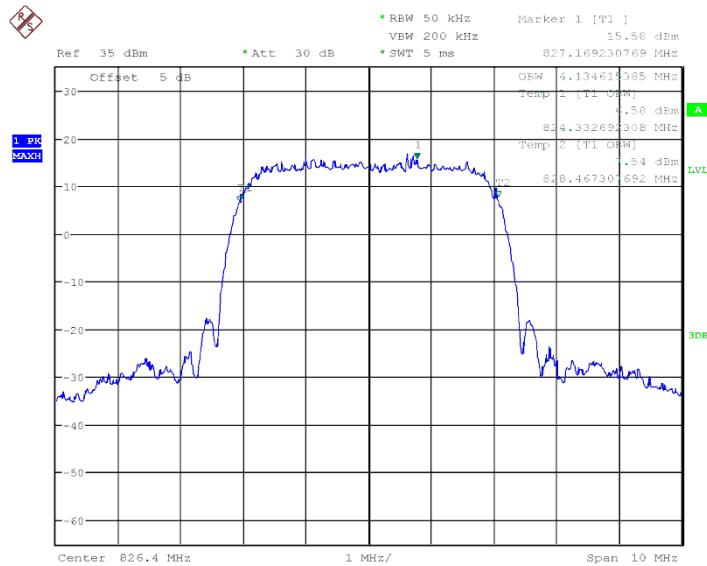
16QAM BAND V		
Test channel	Frequency (MHz)	99% Occupied Bandwidth(MHz)
Mid 4183	836.6	4.13
Low 4132	826.4	4.13
High 4233	846.6	4.13

Conclusion: PASS

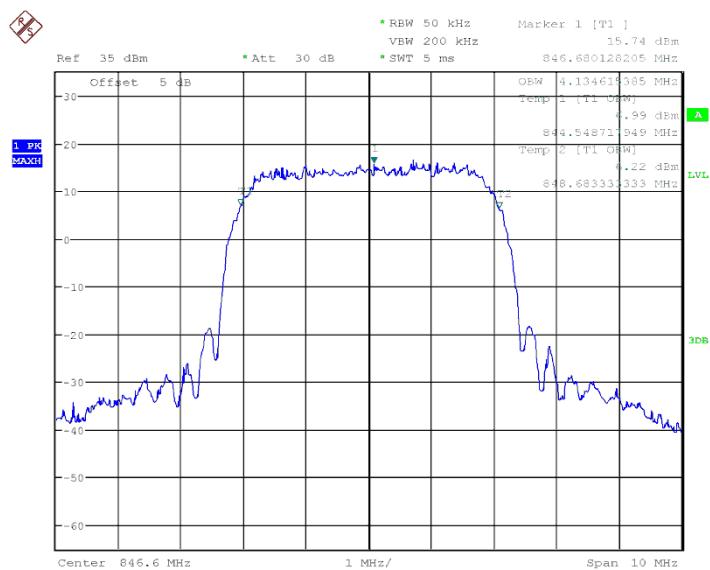
16QAM BAND V



Channel 4183-Occupied Bandwidth



Channel 4132-Occupied Bandwidth

**Channel 4233-Occupied Bandwidth**

ANNEX A.4. -26dB Emission Bandwidth

Method of test please refer to KDB971168 D01 v02r02 clause 4.0.

A.4.1. -26dB Emission Bandwidth

Similar to conducted emissions; occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of GSM850, PCS1900, WCDMA BANDII and WCDMA BANDV.

A.4.2 Test Procedure:

1. The EUT output RF connector was connected with a short cable to the signal analyzer.
2. RBW was set to about 1% of emission BW, VBW \geq 3 times RBW.,
3. 26dB bandwidth were measured, the occupied bandwidth is delta frequency between the two points where the display line intersects the signal trace.

A.4.3 Measurement methods:

For GSM: signal analyzer setting as: RBW=3KHz;VBW=10KHz;Span=1MHz.

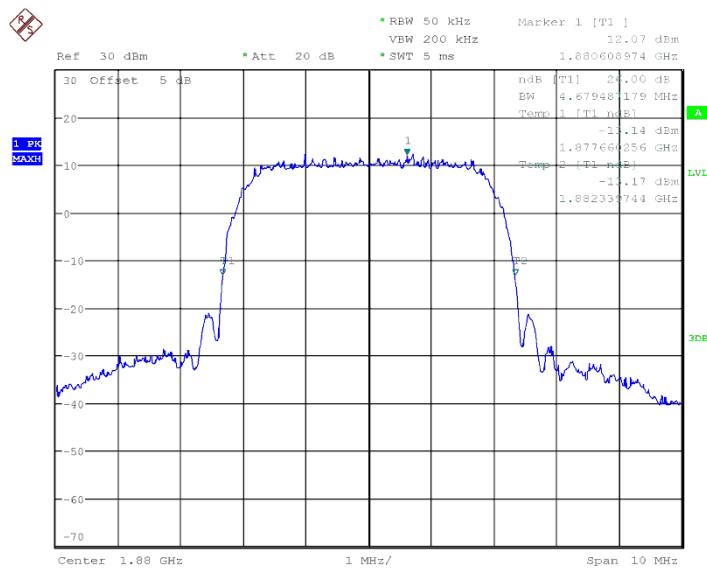
For WCDMA: signal analyzer setting as: RBW=50KHZ;VBW=20KHZ;Span=10MHz.

A.4.4 Test results:

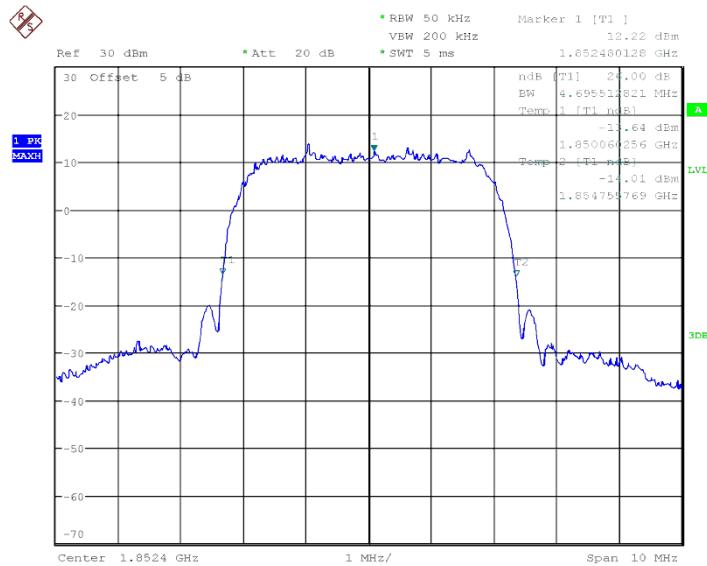
16QAM BAND II		
Test channel	Frequency (MHz)	-26dBc Emission Bandwidth(MHz)
Mid 9400	1880	4.68
Low 9262	1852.4	4.69
High 9538	1907.6	4.68

Conclusion: PASS

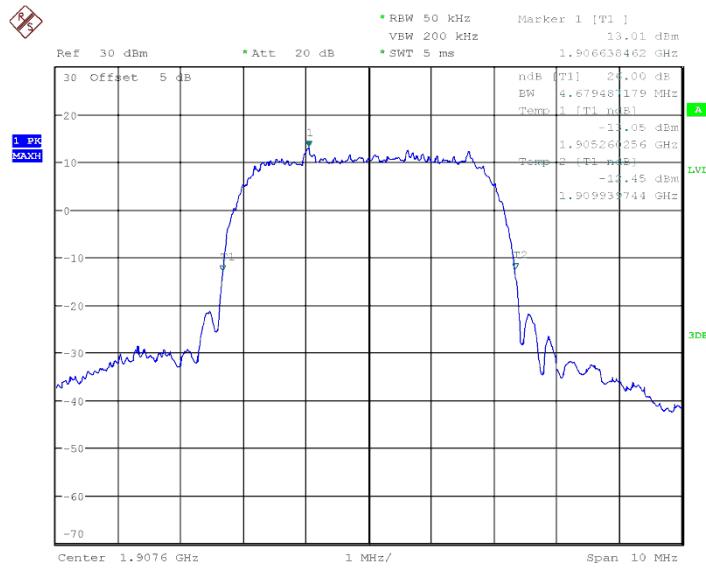
16QAM BAND II



Channel 9400- Emission Bandwidth (-26dBc BW)



Channel 9262- Emission Bandwidth (-26dBc BW)

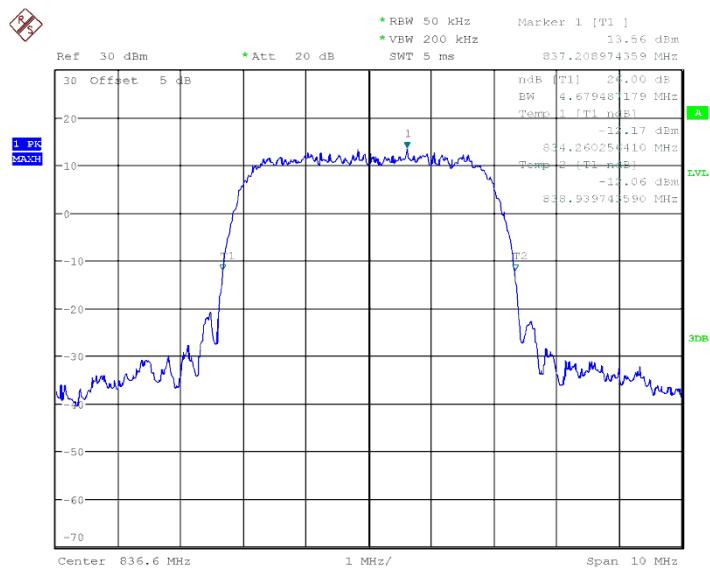


Channel 9538- Emission Bandwidth (-26dBc BW)

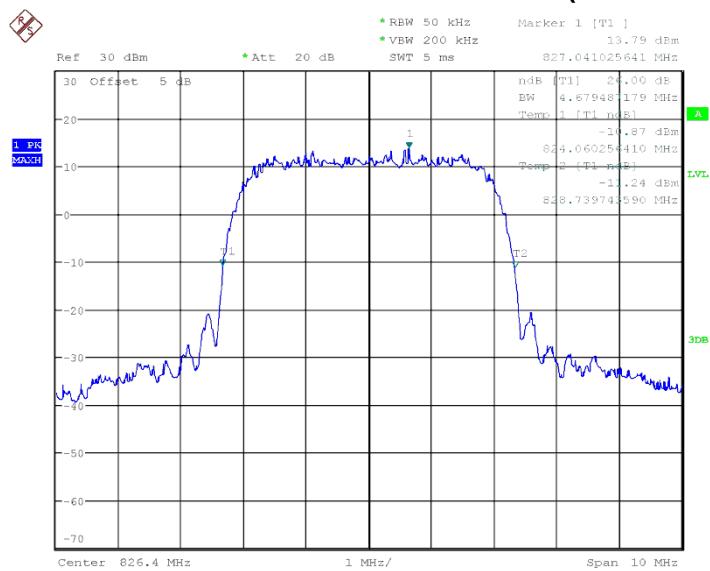
16QAM BAND V		
Test channel	Frequency (MHz)	-26dBc Emission Bandwidth(MHz)
Mid 4183	836.6	4.68
Low 4132	826.4	4.68
High 4233	846.6	4.69

Conclusion: PASS

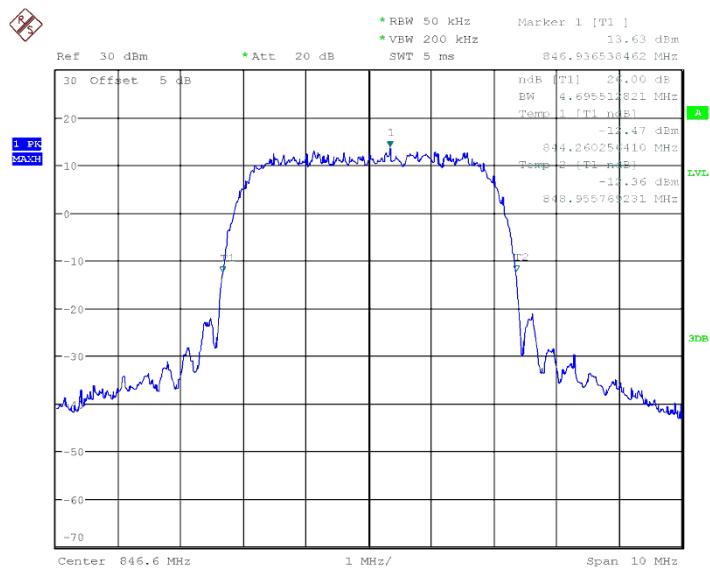
16QAM BAND V



Channel 4183- Emission Bandwidth (-26dBc BW)



Channel 4132- Emission Bandwidth (-26dBc BW)

**Channel 4233- Emission Bandwidth (-26dBc BW)**

ANNEX A.5. Band Edge at antenna terminals

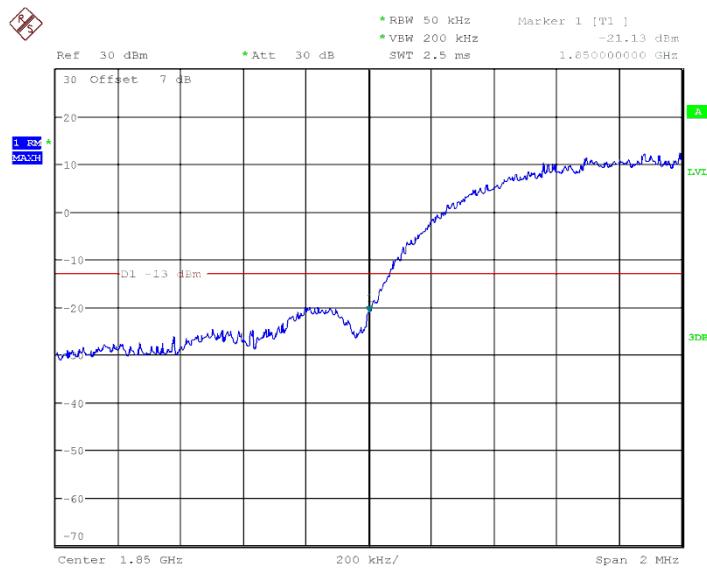
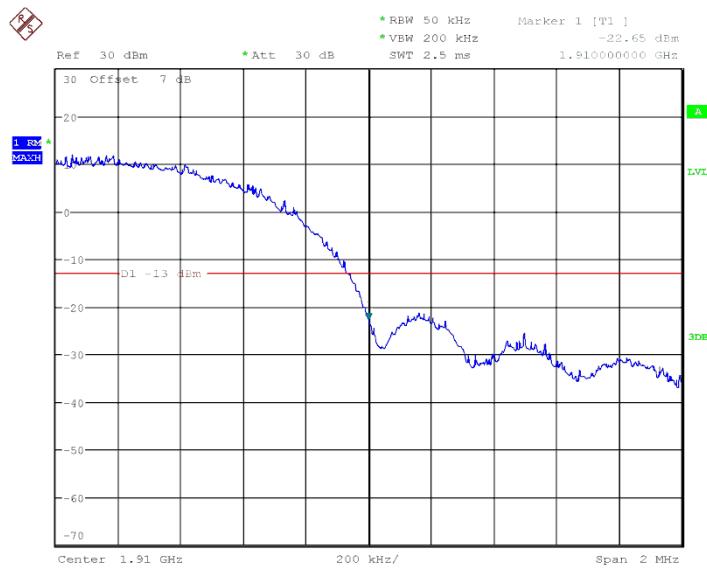
Method of test measurements please refer to KDB971168 D01 v02r02 clause 3.5

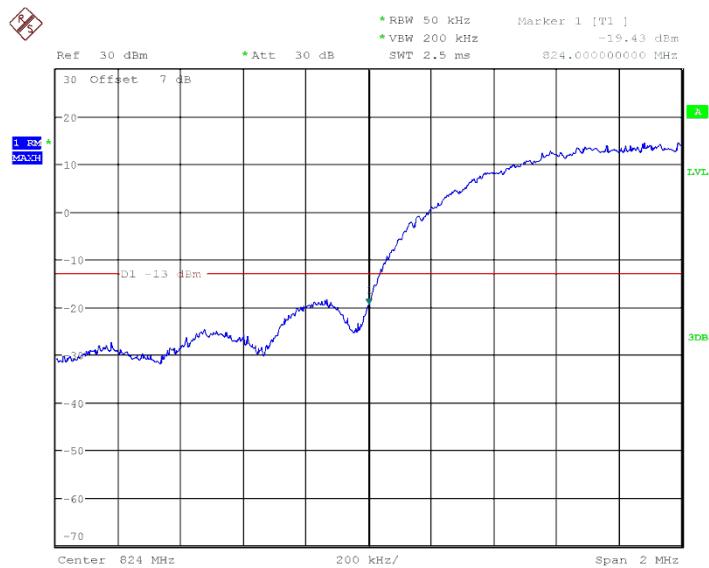
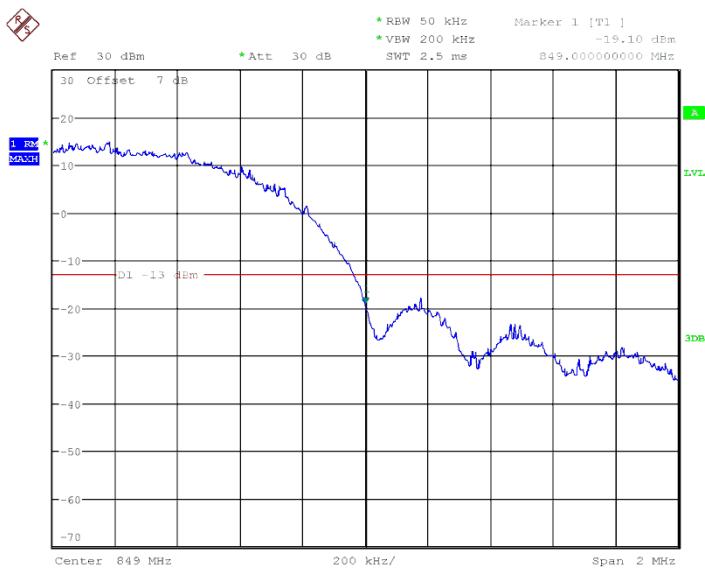
A.5.1 Limit:

The magnitude of each spurious and harmonic emission that can be detected when the equipment is operated under the conditions specification in the instruction manual and/or alignment procedure, shall not be less than $43+10\log(P)$ (Mean power in watts) dBc below the mean power output outside a license's frequency block(-13dBm).

A.5.2 Test procedure:

1. The RF output of the transceiver was connected to a signal analyzer through appropriate attenuation.
2. In the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.
3. The RF fundamental frequency should be excluded against the limit line in the operating frequency band
4. The limit line is derived from $43+10\log(P)$ Db below the transmitter power P(Watts)
 $=P(W)-[43+10\log(P)](Db)$
 $=[30+10\log(P)](dBm)-[43+10\log(P)](Db)$
 $=-13dBm$

16QAM BANDII

16QAM-Channel 9262- LOW BAND EDGE

16QAM-Channel 9538- HIGH BAND EDGE
Conclusion: PASS

16QAM BAND V**16QAM-Channel 4132- LOW BAND EDGE****16QAM-Channel 4233- HIGH BAND EDGE****Conclusion: PASS**

ANNEX A.6. FREQUENCY STABILITY

Method of test measurements please refer to KDB971168 D01 v02r02 clause 3.8

A.5.1. Method of Measurement and test procedures

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a "call mode". This is accomplished with the use of R&S CMU200 DIGITAL RADIO COMMUNICATION TESTER.

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -30°C.
3. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on mid channel of GSM850, PCS1900, WCDMA BANDII and WCDMA BANDV, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10°C increments from -30°C to +50°C. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1 1/2 hours unpowered, to allow any self-heating to stabilize, before continuing.
6. Subject the EUT to overnight soak at +50°C.
7. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
8. Repeat the above measurements at 10 C increments from +50°C to -30°C. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
9. At all temperature levels hold the temperature to +/- 0.5°C during the measurement procedure.

A.5.2. Measurement Limit

A.5.2.1. For Hand carried battery powered equipment

According to the JTC standard the GSM frequency stability of the carrier shall be accurate to within 0.1ppm of the received frequency from the base station. And the WCDMA is 2.5ppm. This accuracy is sufficient to meet Sec.24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d)(2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 3.4VDC and 4.2VDC, with a nominal voltage of 3.8VDC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages was varied from 85% to 115%.

A.5.2.2. For equipment powered by primary supply voltage

According to the JTC standard the GSM frequency stability of the carrier shall be accurate to within 0.1ppm of the received frequency from the base station. And the WCDMA is 2.5ppm. This accuracy is sufficient to meet Sec.24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. For this EUT section 2.1055(d)(1) applies. This requires varying primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

A.5.3 Test results**16QAM BAND II Mid Channel/fc(MHz) 9400 /1880****Frequency Error VS Temperature**

Power Supply (VDc)	Environment Temperature(°C)	Frequency error(Hz)	Limit (Hz)
3.8	-30	-3.45	4700
3.8	-20	-2.56	4700
3.8	-10	-9.45	4700
3.8	0	-6.75	4700
3.8	10	-4.26	4700
3.8	20	-6.17	4700
3.8	30	-3.99	4700
3.8	40	-6.34	4700
3.8	50	-10.45	4700

Frequency Error VS Voltage

Power Supply (VDc)	Environment Temperature(°C)	Frequency error(Hz)	Limit (Hz)
3.4	25	2.33	4700
3.8	25	6.12	4700
4.2	25	5.42	4700

16QAM BAND V Mid Channel/fc(MHz) 4183/836.6**Frequency Error VS Temperature**

Power Supply (VDc)	Environment Temperature(°C)	Frequency error(Hz)	Limit (Hz)

3.8	-30	-0.03	2091.5
3.8	-20	1.05	2091.5
3.8	-10	-0.22	2091.5
3.8	0	1.12	2091.5
3.8	10	0.56	2091.5
3.8	20	-1.12	2091.5
3.8	30	0.21	2091.5
3.8	40	-1.09	2091.5
3.8	50	-1.45	2091.5

Frequency Error VS Voltage

Power Supply (VDc)	Environment Temperature(°C)	Frequency error(Hz)	Limit (Hz)
3.4	25	1.42	2091.5
3.8	25	-1.57	2091.5
4.2	25	4.32	2091.5

Conclusion: PASS**ANNEX A.7. CONDUCTED SPURIOUS EMISSION****A7.1. WCDMA Measurement Method and test procedures**

The following steps outline the procedure used to measure the conducted emissions from the EUT.

1. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the equipment of WCDMA Band II, this equates to a frequency range of 30 MHz to 19.1 GHz, data taken from 30 MHz to 20 GHz. For WCDMA Band V, data taken from 30 MHz to 10GHz.
2. The sweep time is set automatically by instrument itself. That should be the optimal sweep time for the span and the RBW. If the sweep time is too short, that is sweep is too fast, the sweep result is not accurate; If the sweep time is too long, that is sweep is too low, some frequency components may be lost. The instrument will give a optimal sweep time according the selected span and RBW.
3. The procedure to get the conducted spurious emission is as follows:
The trace mode is set to MaxHold to get the highest signal at each frequency;
Wait 25 seconds;

Get the result.

4. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

16QAM Band II Transmitter

Channel	Frequency (MHz)
9262	1852.40
9400	1880.00
9538	1907.60

16QAM Band V Transmitter

Channel	Frequency (MHz)
4132	826.40
4183	836.60
4233	846.60

A 7.2.1. Measurement Limit

Part 24.238 and Part 22.917 specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

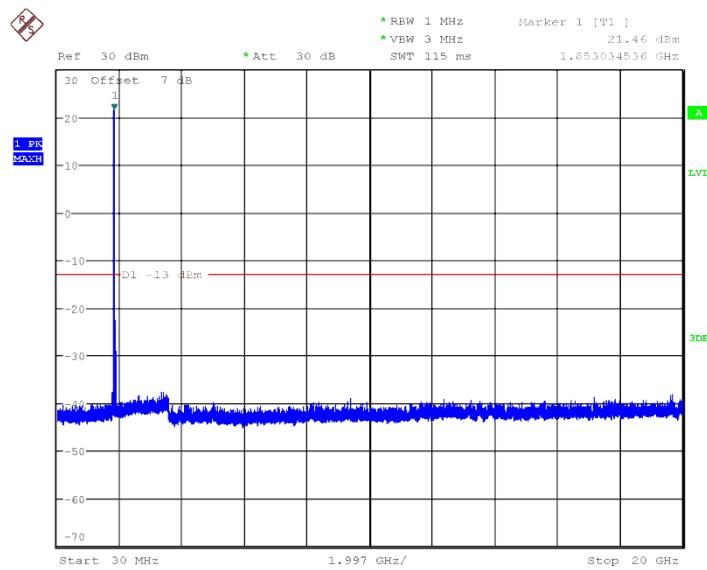
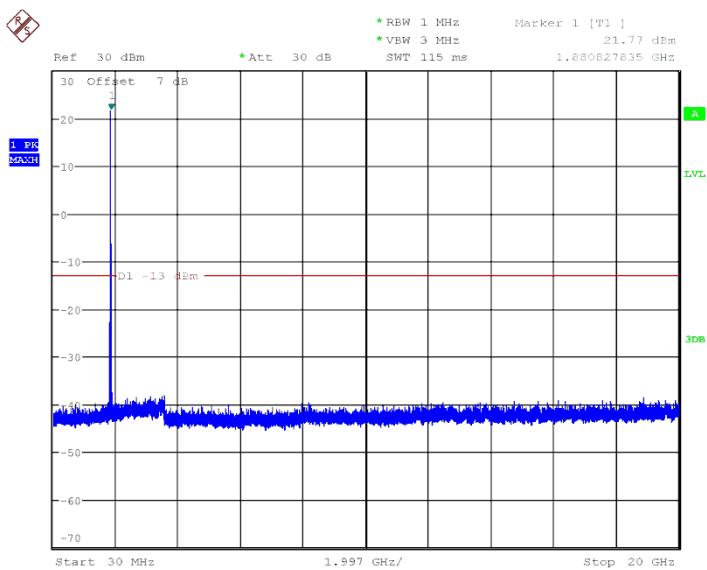
The specification that emissions shall be attenuated below the transmitter power (P) by at least $43 + 10 \log(P)$ dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

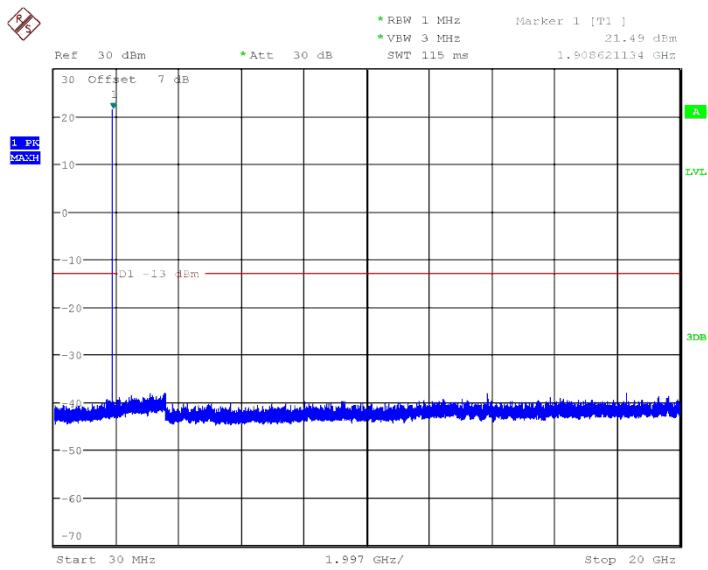
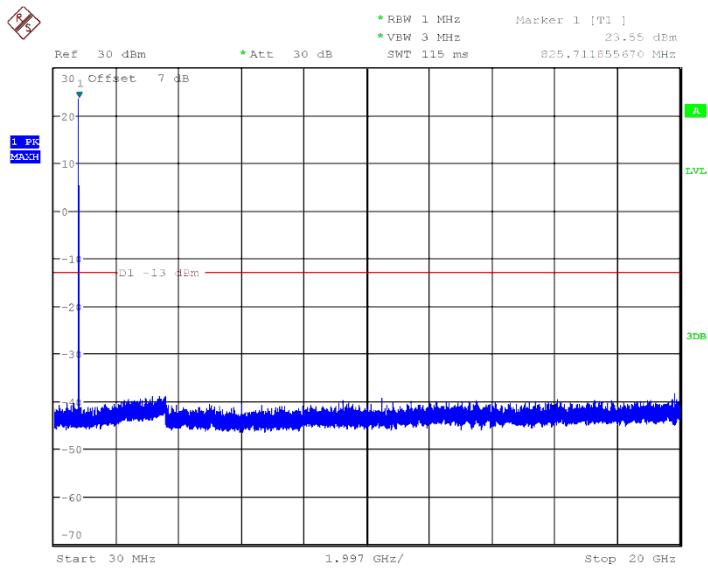
A 7.2.2. Measurement result

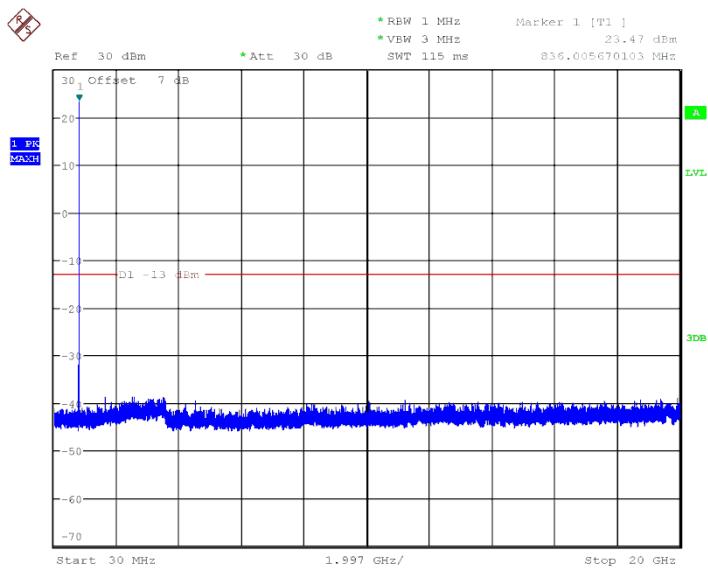
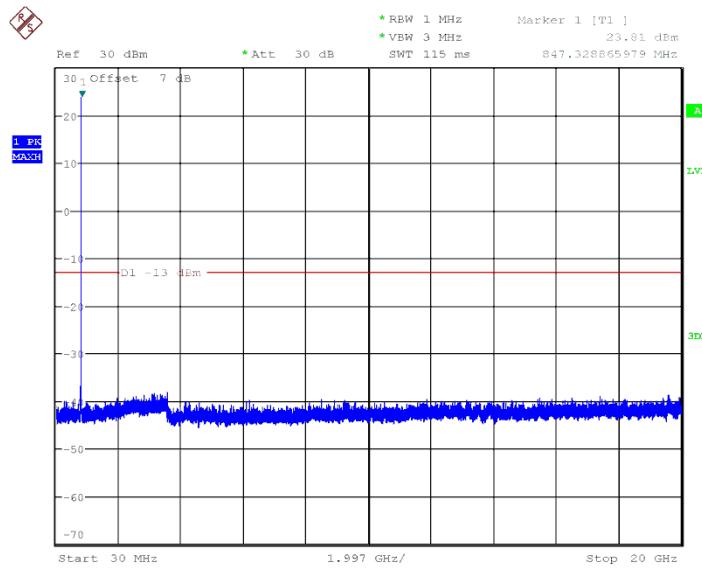
Spurious emission limit -13dBm.

Note: peak above the limit line is the carrier frequency.

A 7.2.2.1. 16QAM Band II

**Channel 9262: 30MHz~20GHz****Channel 9400: 30MHz~20GHz**

**Channel 9538: 30MHz~20GHz****Conclusion: PASS****A 7.2.2.2. 16QAM Band V****Channel 4132: 30MHz~20GHz**


Channel 4183: 30MHz~20GHz

Channel 4233: 30MHz~20GHz
Conclusion: PASS

ANNEX A.8. RADIATED

A.8.1. ERP

A.8.1.2. WCDMA ERP

A.8.1.2.1. Description

This is the test for the maximum radiated power from the EUT.

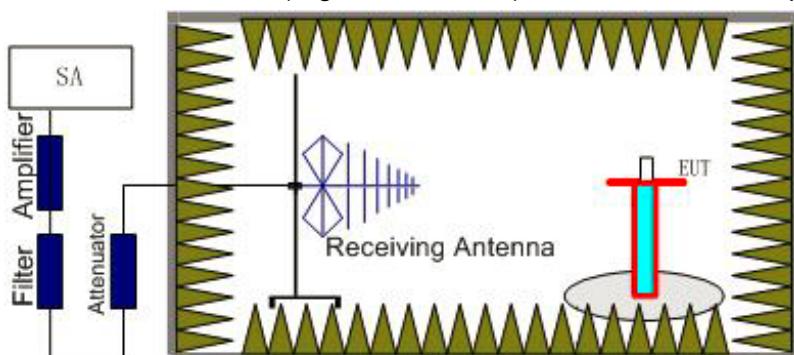
Rule Part 24.232(c) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power" and 24.232(c) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage."

Rule Part 22.913(a) specifies " The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts."

A.8.1.2.2. Method of Measurement

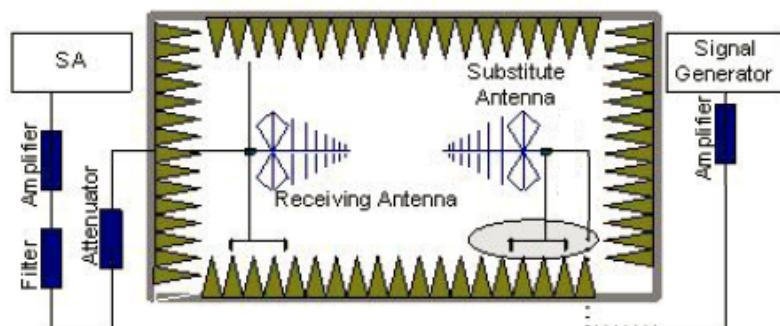
The measurements procedures in TIA-603E-2016 are used.

1. EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.5m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.



2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (Pr) .

3. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.



In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna, and adjust 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.

4. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna.

The cable loss (P_{cl}) ,the Substitution Antenna Gain (G_a) and the Amplifier Gain (P_{Ag}) should be recorded after test.

The measurement results are obtained as described below:

$$\text{Power(EIRP)} = P_{Mea} + P_{Ag} - P_{cl} + G_a$$

5. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.

6. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.15\text{dBi}$.

A.8.1.2.3 WCDMA Band II-EIRP

		Burst Peak EIRP (dBm)
WCDMA Band II		$\leq 33\text{dBm}$ (2W)

A.8.1.2.3.1 Measurement result

16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a Antenna Gain(dBi)	PeakEIRP(dBm)	Polarization
1852.4	-18.71	3.54	43.8	2.9	24.45	V
1880.0	-19.23	3.54	43.8	2.9	23.93	H
1907.6	-20.11	3.54	43.8	2.9	23.05	V

Frequency: 1907.6MHz

Peak EIRP(dBm)= $P_{Mea}(-20.11\text{dBm}) - P_{cl}(3.54\text{dB}) + P_{Ag}(43.8\text{dB}) + G_a(2.9\text{dBi}) = 23.05\text{dBm}$

ANALYZER SETTINGS: RBW = VBW = 5MHz

A.8.1.2.4 WCDMA Band V-EIRP

		Burst Peak ERP (dBm)
WCDMA Band V		$\leq 38.45\text{dBm}$ (7W)

A.8.1.2.4.1 Measurement result

16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a Antenna Gain(dBd)	PeakERP(dBm)	Polarization
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826.4	-13.58	3.2	37	2.9	23.12	H
836.6	-13.49	3.2	37	2.9	23.21	H
846.6	-12.32	3.2	37	2.9	24.38	H

Frequency: 846.6 MHz

Peak ERP(dBm)= P_{Mea}(-12.32dBm)- P_{cl}(3.2dB)+P_{Ag}(37dB)+G_a(2.9dBd)=24.38dBm

ANALYZER SETTINGS: RBW = VBW = 5MHz

Note: the EUT was displayed in several different direction, the worst cases were shown.

A.8.2 EMISSION LIMIT (\$2.1051/\$22.917\$24.238)

A.8.2.1. WCDMA Measurement Method

The measurements procedures in TIA-603E-2016 are used.

The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment. The resolution bandwidth is set as outlined in Part 24.238 and Part 24.917. The spectrum is scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of WCDMA Band V.

A.8.2.2. Measurement Limit

Part 24.238 and Part 22.917 specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

The specification that emissions shall be attenuated below the transmitter power (P) by at least $43 + 10 \log(P)$ dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

A.8.2.3. Measurement Results

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the WCDMA Band V (826.4MHz, 836.6MHz and 846.6MHz) . It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the WCDMA Band V into any of the other blocks. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this.

A.8.2.3.1. Measurement Results Table

Frequency	Channel	Frequency Range	Result
WCDMA Band II	Low	30MHz~20GHz	P
	Middle	30MHz~20GHz	P
	High	30MHz~20GHz	P
WCDMA Band V	Low	30MHz~20GHz	P
	Middle	30MHz~20GHz	P
	High	30MHz~20GHz	P

Frequency	Channel	Frequency Range	Result
16QAM Band II	Low	30MHz~20GHz	P
	Middle	30MHz~20GHz	P
	High	30MHz~20GHz	P
16QAM Band V	Low	30MHz~20GHz	P
	Middle	30MHz~20GHz	P
	High	30MHz~20GHz	P

WCDMA BAND II Mode Channel 9262
Final result:

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
3703.2	-49.3	6.6	6.2	-49.7	-13	V
5560	-56.95	8.2	9.7	-55.45	-13	V
7691.6	-61.2	9.8	15.2	-55.8	-13	H
9730.4	-60	10.9	18.2	-52.7	-13	H
12292.55	-53.43	12.7	17.7	-48.43	-13	H

14412.15	-56.21	13.9	23.2	-46.91	-13	H
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WCDMA BAND II Mode Channel 9400**Final result:**

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
3758.4	-51.01	6.6	6.2	-51.41	-13	H
5642.8	-57.8	8.3	10.1	-56	-13	V
7468.4	-60.51	9.7	14.5	-55.71	-13	H
9390	-61.75	10.7	18.6	-53.85	-13	V
11770	-54	12.5	17.6	-48.9	-13	H
13398.9	-56.76	13.7	22.8	-47.66	-13	V

WCDMA BAND II Mode Channel 9538**Final result:**

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
3813.6	-49.57	6.7	6.4	-49.87	-13	V
5720	-55.27	8.5	10.4	-53.37	-13	V
7708.8	-61.47	9.8	15.2	-56.07	-13	V
9590	-60.4	10.8	18.4	-52.8	-13	H
11794.5	-54.26	12.5	17.5	-49.26	-13	H
14863.65	-55.62	14.3	23.8	-46.12	-13	V

WCDMA BAND V Mode Channel 4132**Final result:**

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
1654.642857	-53.52	4.3	3.1	-54.72	-13	V
2481.538462	-50.24	5.3	3.7	-51.84	-13	V
3308.8	-48.64	6.2	5.1	-49.74	-13	V
4284	-59.78	7.1	7.6	-59.28	-13	V
6472	-59.49	8.9	11.4	-56.99	-13	H
8292.4	-63.23	10.1	17.5	-55.83	-13	H

WCDMA BAND V Mode Channel 4183
Final result:

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
1671.428571	-56.39	4.3	3.1	-57.59	-13	V
2513.076923	-53.29	5.4	3.7	-54.99	-13	V
3345.6	-52.57	6.2	5.3	-53.47	-13	V
4259.2	-60.74	7.1	7.7	-60.14	-13	V
6616	-59.82	9.1	11.9	-57.02	-13	V
7583.2	-61.49	9.7	14.8	-56.39	-13	H

WCDMA BAND V Mode Channel 4233
Final result:

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
1695	-52.4	4.4	3	-53.8	-13	V

2542.6923 08	-49.26	5.4	3.8	-50.86	-13	V
3381.6	-52.22	6.3	5.5	-53.02	-13	V
4822.8	-58.69	7.6	8.2	-58.09	-13	V
5769.2	-60.42	8.5	10.5	-58.42	-13	H
8415.4	-63.08	10.2	17.8	-55.48	-13	H

16QAM BAND II Mode Channel 9262
Final result:

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarizatio n
3706.4	-51.74	6.6	6.2	-52.14	-13	V
5555.2	-56.72	8.2	9.7	-55.22	-13	V
7389.6	-60.26	9.7	14.2	-55.76	-13	H
9293.6	-62.04	10.7	18.5	-54.24	-13	H
10911.2	-56.2	11.8	17.8	-50.2	-13	H
12611.75	-53.65	12.8	18.9	-47.55	-13	V

16QAM BAND II Mode Channel 9400
Final result:

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarizatio n
3769.2	-52.65	6.6	6.3	-52.95	-13	V
5650	-54.51	8.3	10.1	-52.71	-13	V
7544	-61.02	9.7	14.7	-56.02	-13	H
9670	-60.41	10.8	18.3	-52.91	-13	H

12350.3	-53.94	12.6	18	-48.54	-13	V
15768.75	-51.05	14.8	22	-43.85	-13	H

16QAM BAND II Mode Channel 9538**Final result:**

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
3816.8	-50.73	6.7	6.4	-51.03	-13	V
5720	-54.88	8.5	10.4	-52.98	-13	V
7601.6	-60.72	9.7	14.9	-55.52	-13	V
9760	-59.97	11	18.1	-52.87	-13	H
11808.85	-53.55	12.5	17.5	-48.55	-13	V
13351.65	-56.76	13.7	22.4	-48.06	-13	H

16QAM BAND V Mode Channel 4132**Final result:**

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
1654.2857 14	-54.89	4.3	3.1	-56.09	-13	V
2481.9230 77	-52.33	5.3	3.7	-53.93	-13	V
3308.4	-46.81	6.2	5.1	-47.91	-13	V
4540.4	-58.89	7.4	7.4	-58.89	-13	H
5685.2	-60.52	8.4	10.2	-58.72	-13	H
7869.4	-61.73	9.9	15.9	-55.73	-13	H

16QAM BAND V Mode Channel 4183**Final result:**

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
1671.4285 71	-57.85	4.3	3.1	-59.05	-13	V
2507.3076 92	-56.21	5.4	3.7	-57.91	-13	H
3346	-53.74	6.2	5.3	-54.64	-13	V
4120	-60.18	7	7.4	-59.78	-13	V
5557.2	-59.06	8.2	9.7	-57.56	-13	V
6584.8	-59.67	9.1	11.8	-56.97	-13	H

16QAM BAND V Mode Channel 4233**Final result:**

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
1695	-53.17	4.4	3	-54.57	-13	V
2542.6923 08	-50.76	5.4	3.8	-52.36	-13	V
3382.4	-52.13	6.3	5.5	-52.93	-13	V
4664.4	-58.34	7.5	7.7	-58.14	-13	H
6356.8	-60.28	8.8	11.1	-57.98	-13	H
7711.6	-60.99	9.8	15.2	-55.59	-13	H

Conclusion: PASS

Note: the EUT was displayed in several different direction, the worst cases were shown.

ANNEX B. Deviations from Prescribed Test Methods

No deviation from Prescribed Test Methods.

*****End The Report*****