

TEST REPORT

No. 2013TAR862

for

Sony Mobile Communications AB

GSM/WCDMA Mobile Phone

Type: PM-0760-BV

FCC ID: PY7PM-0760

with

Hardware Version: A

Software Version: 19.0.D.0.109

Issued Date: Jan. 03rd, 2014

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 TMC Beijing.

Test Laboratory:

DAkks accreditation (DIN EN ISO/IEC 17025): No. D-PL-12123-01-01

FCC 2.948 Listed: No.733176 IC O.A.T.S listed: No.6629A-1

TMC Beijing, Telecommunication Metrology Center of Ministry of Industry and Information Technology

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1. Test Laboratory

1.1. Testing Location

Location A

Company Name: TMC Beijing, Telecommunication Metrology Center of MIIT

Address: No 52, Huayuan Bei Road, Haidian District, Beijing, P.R. China

Postal Code: 100191

Location B

Company Name: TMC Beijing, Telecommunication Metrology Center of MIIT

Address: Building Shouxiang, No.51, Xueyuan Road, Haidian District, Beijing,

China

Postal Code: 100191

1.2. Testing Environment

Normal Temperature: $15-35^{\circ}$ C Relative Humidity: 20-75%

Air pressure 980 - 1040 hPa

The climatic requirements above are general exclude the special requirements for dedicated test environments listed in section 5 and some specific test cases in other parts of this report.

1.3. Project data

Receipt of Sample Dec. 12th, 2013
Testing Start Date: Dec. 13th, 2013
Testing End Date: Dec. 30th, 2013

1.4. Signature

Qu Pengfei

(Prepared this test report)

Sun Xiangqian

(Reviewed this test report)

Song Chongwen

(Approved this test report)



Address /Post:

2. Client Information

2.1. Applicant Information

Company Name: Sony Mobile Communications (China) Co. Ltd

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Chaoyang District

City: Beijing
Postal Code: 100102
Country: China
Contact Person: Ma, Gang

Telephone: +86-10-58656312 Fax: +86-10-58659049

2.2. Manufacturer Information

Company Name: Sony Mobile Communications AB Address /Post: Mobilvägen, 22188 Lund, Sweden

City: Lund
Postal Code: 22188
Country: Sweden

Contact Person: Nilsson, Mikael
Telephone: +46 703 227503
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3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description GSM 850/900/1800/1900 quad bands, GPRS, EDGE,

WCDMA FDD bands 1/2/5/8, HSDPA, HSUPA,

Bluetooth (EDR and 4.0), ANT+, WLAN (802.11 a/b/g/n),

NFC, FM, GPS mobile phone

Type PM-0760-BV FCC ID PY7PM-0760

GSM Frequency Band GSM 850/900/1800/1900

UMTS Frequency Band FDD Band 1 / FDD Band 2 / FDD Band 5 / FDD Band 8

Antenna Internal

Power supply Battery (charged by travel adapter or vehicle charger)

Extreme vol. Limits 3.5VDC to 4.1VDC (nominal: 3.7VDC)

Extreme temp. Tolerance -20°C to +55°C

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of Telecommunication Metrology Center of MIIT of People's Republic of China.

3.2. Internal Identification of EUT used during the test

EUT ID*	SN	IMEI	HW Version	SW Version
EUT2	CB5126835K	004402147212546	AP1	19.0.D.0.109
EUT8	CB5126836V	004402147212884	AP1	19.0.D.0.109

^{*}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	Revision
#22972	Travel Charger	8512W19 100198	1C
#24005	USB Cable	123307DE00365F2	1
#22972			

Commercial name EP880

Type AC-0400-EU

Manufacturer SALCOMP

Length of cable 98.5 cm (length of USB cable)

#24005

Commercial name EC801
Type Al-0401
Manufacturer Sony Mobile
Length of cable 98.5 cm

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



3.4. General Description

The Equipment Under Test (EUT) is a model of GSM/WCDMA Mobile Phone with integrated antenna and inbuilt battery.

The EUT supports GSM 850/900/1800/1900MHz bands and WCDMA FDD bands 1/2/5/8. It supports GPRS service with multi-slots class 33 and EGPRS service with multi-slots class 33. The HSDPA and HSUPA (Cat 6) features are also supported.

It has MP3, camera, USB memory, Mobile High-Definition Link (MHL), FM radio, GPS receiver, NFC, Bluetooth (EDR and Bluetooth 4.0), ANT+, WLAN (802.11 a/b/g/n) and Wi-Fi hotspot functions. For WLAN 802.11n, it supports 20MHz and 40MHz bandwidths on both 2.4GHz band and 5GHz/5.8GHz band.

It consists of normal options: USB cable and travel charger.

Manual and specifications of the EUT were provided to fulfil the test.

Samples undergoing test were selected by the client.

3.5. EUT set-ups

EUT Set-up No. Combination of EUT and AE		Remarks
Set.3	EUT2 + #22972 + #24005	Tests with travel charger
Set.4	EUT2	ERP/EIRP/RSE tests
Set.5	EUT8	Conducted RF tests



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 22	PUBLIC MOBILE SERVICES	10-1-13
		Edition
FCC Part 24	PERSONAL COMMUNICATIONS SERVICES	10-1-13
		Edition
ANSI/TIA-603-C	Land Mobile FM or PM Communications Equipment	2004
	Measurement and Performance Standards	
ANSI C63.4	Methods of Measurement of Radio-Noise Emissions from	2009
	Low-Voltage Electrical and Electronic Equipment in the	
	Range of 9 kHz to 40 GHz	
KDB 971168 D01	Measurement Guidance for Certification of Licensed Digital	v02r01
	Transmitters	



5. LABORATORY ENVIRONMENT

Semi-anechoic chamber SAC-1 (23 meters × 17meters × 10meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 15 %, Max. = 75 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB;
	1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4Ω
Normalised site attenuation (NSA)	< ± 4 dB, 3m/10m distance,
	from 30 to 1000 MHz
Site voltage standing-wave ratio (S _{VSWR})	Between 0 and 6 dB, from 1GHz to 18GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 3000 MHz

Fully-anechoic chamber FAC-3 (9 meters × 6.5 meters × 4 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 15 %, Max. = 75 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB;
	1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4 Ω
Site voltage standing-wave ratio (S _{VSWR})	Between 0 and 6 dB, from 1GHz to 18GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 4000 MHz

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

Temperature	Min. = 15 °C, Max. = 35 °C	
Relative humidity	Min. = 20 %, Max. = 75 %	
Shielding effectiveness	0.014MHz - 1MHz, >60dB;	
	1MHz - 1000MHz, >90dB.	
Electrical insulation	> 2 MΩ	
Ground system resistance	< 4 Ω	



6. SUMMARY OF TEST RESULTS

6.1. Summary of test results

Abbreviations used in this clause:		
	Р	Pass
Verdict Column	F	Fail
verdict Column	NA	Not applicable
	NM	Not measured
Location Column	A /P /C /D	The test is performed in test location A, B, C or D
Location Column	A/B/C/D	which are described in section 1.1 of this report

WCDMA Band II

Items	Test Name	Clause in FCC rules	Section in this report	Verdict	Test Location
1	Output Power	24.232(c)	A.1	Р	В
2	Emission Limit	24.238, 2.1051	A.2	Р	В
3	Conducted Emission	15.107/207	A.3	Р	Α
4	Frequency Stability	24.235, 2.1055	A.4	Р	В
5	Occupied Bandwidth	2.1049(h)(i)	A.5	Р	В
6	Emission Bandwidth	24.238(b)	A.6	Р	В
7	Band Edge Compliance	24.238(b)	A.7	Р	В
8	Conducted Spurious Emission	24.238, 2.1057	A.8	Р	В

WCDMA Band V

Items	Test Name	Clause in FCC rules	Section in this report	Verdict	Test Location
1	Output Power	22.913(a)	A.1	Р	В
2	Emission Limit	22.917, 2.1051	A.2	Р	В
3	Conducted Emission	15.107/207	A.3	Р	Α
4	Frequency Stability	22.355, 2.1055	A.4	Р	В
5	Occupied Bandwidth	2.1049(h)(i)	A.5	Р	В
6	Emission Bandwidth	22.917(b)	A.6	Р	В
7	Band Edge Compliance	22.917(b)	A.7	Р	В
8	Conducted Spurious Emission	22.917, 2.1057	A.8	Р	В

6.2. Statements

The test cases listed in section 6.1 of this report for the EUT specified in section 3 were performed by TMC according to the standards or reference documents in section 4.1

The EUT met all applicable requirements of the standards or reference documents in section 4.1. This report only deals with the WCDMA functions among the features described in section 3.



7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE
1.	Test Receiver	ESCI	100344	R&S	2014-03-28
2.	Spectrum Analyzer	E4440A	MY48250642	Agilent	2014-03-04
3.	LISN	ESH2-Z5	829991/012	R&S	2014-04-14
4.	EMI Antenna	VULB 9163	9163-482	Schwarzbeck	2014-02-17
5.	EMI Antenna	3117	00119024	ETS-Lindgren	2014-02-02
6.	EMI Antenna	3117	00058889	ETS-Lindgren	2014-02-02
7.	EMI Antenna	VUBA 9117	167	Schwarzbeck	2014-04-01
8.	Signal Generator	N5183A	MY49060052	Agilent	2014-03-19
9.	Climatic chamber	SH-241	92003546	ESPEC	2014-05-11
10.	Universal Radio Communication Tester	CMU200	116455	R&S	2014-05-19
11.	Universal Radio Communication Tester	E5515C	MY48361083	Agilent	2014-03-16
12.	Universal Radio Communication Tester	E5515C	MY48363198	Agilent	2014-07-08



ANNEX A: MEASUREMENT RESULTS

A.1 OUTPUT POWER

Reference

FCC: CFR Part 22.913(a), 24.232(b).

A.1.1 Summary

During the process of testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication tester (CMU200) to ensure max power transmission and proper modulation.

This result contains peak output power and ERP/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

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

The power was measured with spectrum analyzer's RMS detector.

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

A.1.2.2 Measurement result

WCDMA Band II

	Channel number	Frequency(MHz)	output power(dBm)
WCDMA	9262	1852.4	24.15
(Band II)	9400	1880.0	24.27
	9538	1907.6	24.41

WCDMA Band V

	Channel number	Frequency(MHz)	output power(dBm)
WCDMA	4132	826.4	24.47
(Band V)	4183	836.6	24.44
	4233	846.6	24.39



A.1.3 Radiated

A.1.3.1 Description

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

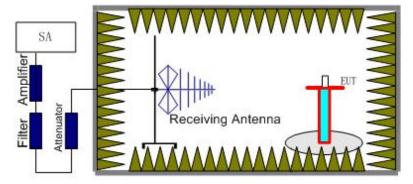
Rule Part 22.913(a) specifies "Maximum ERP. The effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts."

Rule Part 24.232(b) 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."

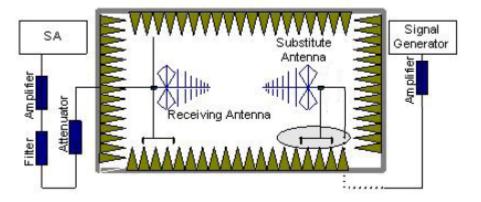
A.1.3.2 Method of Measurement

The measurements procedures in TIA-603C-2004 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, a 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. Adjust the level of the signal generator output until the value of the receiver reaches 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. An amplifier should be connected to the Signal Source output port. And the cable should be connected 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:

Power (EIRP) = P_{Mea} - P_{Aq} - P_{cl} - G_a

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

For test layout photo, please refer to Pic.1 in Annex B.

WCDMA Band II- EIRP

Limits

Band	Peak EIRP (dBm)
WCDMA Band II	≤33dBm (2W)

Measurement result

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	P _{Ag} (dB)	G _a (dBi)	Peak EIRP(dBm)	Polarization
1852.4	-29.86	3.18	-50.00	-4.55	21.51	Horizontal
1880.0	-30.64	3.11	-50.00	-4.43	20.68	Horizontal
1907.6	-29.39	3.18	-50.00	-4.31	21.74	Horizontal

Sample calculation: 1907.6 MHz

Peak EIRP (dBm) = P_{Mea} (-29.39 dBm) - G_a (-4.31 dBi) - P_{Aq} (-50.00 dB) - P_{cl} (3.18 dB)

= 21.74 dBm

ANALYZER SETTINGS: RBW = VBW = 5MHz

Note: Expanded measurement uncertainty for WCDMA Band II is U = 1.07dB, k = 2.



WCDMA Band V- ERP

Limits

Band	Peak ERP (dBm)
WCDMA Band V	≤38.45dBm

Measurement result

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	P _{Ag} (dB)	G _a (dBi)	Correction (dB)	Peak ERP(dBm)	Polarization
826.4	-29.81	2.07	-53.00	0.85	2.15	18.12	Vertical
836.6	-30.12	2.08	-53.00	0.90	2.15	17.75	Vertical
846.6	-30.54	2.09	-53.00	0.94	2.15	17.28	Vertical

Sample calculation: 826.40 MHz

 $Peak \; ERP(dBm) = P_{Mea}(-29.81 \; dBm) \; - \; G_a \; (0.85 \; dBi) \; - \; P_{Ag} \; (-53.00 \; dB) \; - \; P_{cl} \; (2.07 \; dB) \; - 2.15 \; dB$

= 18.12 dBm

ANALYZER SETTINGS: RBW = VBW = 5MHz

Note: Expanded measurement uncertainty for WCDMA Band V is U = 0.96 dB, k=2.



A.2 EMISSION LIMT

Reference

FCC: CFR 2.1051, Part 22.917(a), 24.238(a).

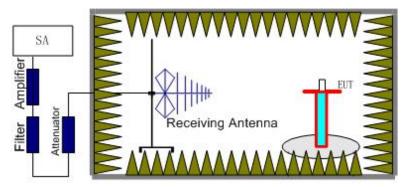
A.2.1 Measurement Method

The measurements procedures in TIA-603C-2004 are used. This measurement is carried out in fully-anechoic chamber 3.

The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 1910 MHz. The resolution bandwidth is set 1MHz as outlined in Part 22.917 and Part 24.238. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of WCDMA Band II and WCDMA Band V.

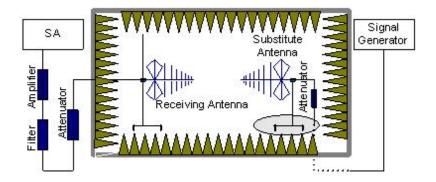
The procedure of radiated spurious emissions is as follows:

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 non-harmonic and harmonics of the transmit frequency through the 10th harmonic 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. Adjust the level of the signal generator output until the value of the receiver reaches 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. The Path loss (P_{pl}) between the Signal Source with the Substitution Antenna and the Substitution Antenna Gain (G_a) should be recorded after test.
 - An amplifier should be connected in for the test.
 - The Path loss (Ppl) is the summation of the cable loss and the gain of the amplifier.
 - The measurement results are obtained as described below:
 - Power (EIRP) = P_{Mea} + P_{pl} + G_a
- 5. This value is EIRP since the measurement is calibrated using an antenna of known gain (unit: dBi) and known input power.
- 6. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dB.

A.2.2 Measurement Limit

Part 22.917(a) and 24.238(a) all 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.2.3 Measurement Results

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the WCDMA Band II (1852.4 MHz, 1880.0MHz and 1907.6MHz) and 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 II or 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.

WCDMA BAND II, Channel 9262/1852.4MHz

Frequency	P _{Mea}	P _{pl}	Ga	Peak EIRP	Limit	Dolority
(MHz)	(dBm)	(dB)	(dBi)	(dBm)	(dBm)	Polarity
3703.20	-48.64	4.43	-8.14	-44.93	-13.00	Vertical
5160.09	-62.63	5.22	-9.80	-58.05	-13.00	Vertical
8093.98	-63.02	6.95	-11.96	-58.01	-13.00	Horizontal
9263.33	-54.37	7.68	-12.60	-49.45	-13.00	Vertical
12463.48	-57.07	8.72	-12.69	-53.10	-13.00	Vertical
15533.29	-56.87	10.00	-13.37	-53.50	-13.00	Vertical

WCDMA BAND II, Channel 9400/1880MHz

Frequency	P _{Mea}	P _{pl}	Ga	Peak EIRP	Limit	Dolority
(MHz)	(dBm)	(dB)	(dBi)	(dBm)	(dBm)	Polarity
3762.17	-50.72	4.52	-8.21	-47.03	-13.00	Vertical
5887.65	-62.99	5.59	-10.16	-58.42	-13.00	Vertical
6897.02	-61.94	6.09	-11.00	-57.03	-13.00	Horizontal
10252.45	-60.56	7.51	-12.45	-55.62	-13.00	Horizontal
11776.50	-58.06	8.93	-12.46	-54.53	-13.00	Vertical
13558.90	-58.13	9.25	-13.82	-53.56	-13.00	Horizontal

WCDMA BAND II, Channel 9538/1907.6MHz

Frequency	P _{Mea}	P_{pl}	G_{a}	Peak EIRP	Limit	Polority
(MHz)	(dBm)	(dB)	(dBi)	(dBm)	(dBm)	Polarity
3817.44	-46.58	4.49	-8.28	-42.79	-13.00	Vertical
5516.06	-62.41	5.48	-10.01	-57.88	-13.00	Vertical
7022.07	-63.12	6.38	-11.11	-58.39	-13.00	Horizontal
10612.35	-58.76	8.39	-12.48	-54.67	-13.00	Vertical
13241.85	-58.01	9.12	-13.54	-53.59	-13.00	Horizontal
16408.32	-54.39	10.61	-12.51	-52.49	-13.00	Horizontal



WCDMA BAND V, Channel 4132/826.4MHz

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Polarization
1655.03	-56.15	2.93	-5.42	2.15	-55.81	-13.00	Vertical
4024.03	-63.29	4.67	-8.51	2.15	-61.60	-13.00	Vertical
5083.12	-63.85	5.20	-9.75	2.15	-61.45	-13.00	Horizontal
6508.80	-61.09	6.00	-10.61	2.15	-58.63	-13.00	Horizontal
8087.96	-62.34	6.97	-11.95	2.15	-59.51	-13.00	Vertical
9242.17	-61.18	7.67	-12.60	2.15	-58.40	-13.00	Vertical

WCDMA BAND V, Channel 4183/836.6MHz

Frequency	P _{Mea}	Path	Antenna	Correction	Peak	Limit	Polarization
(MHz)	(dBm)	Loss(dB)	Gain(dBi)	(dB)	ERP(dBm)	(dBm)	Polanzation
1670.89	-52.59	2.98	-5.35	2.15	-52.37	-13.00	Vertical
4801.27	-61.52	5.09	-9.34	2.15	-59.42	-13.00	Vertical
6167.49	-63.19	5.81	-10.33	2.15	-60.82	-13.00	Horizontal
6692.72	-57.31	6.12	-10.79	2.15	-54.79	-13.00	Vertical
8061.68	-62.65	6.90	-11.94	2.15	-59.76	-13.00	Vertical
9111.76	-61.97	7.59	-12.60	2.15	-59.11	-13.00	Horizontal

WCDMA BAND V, Channel 4233/846.6MHz

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Polarization
1695.33	-55.23	2.95	-5.24	2.15	-55.09	-13.00	Vertical
3910.71	-60.54	4.52	-8.39	2.15	-58.82	-13.00	Vertical
5137.05	-61.48	5.24	-9.78	2.15	-59.09	-13.00	Horizontal
6198.22	-59.87	5.77	-10.36	2.15	-57.43	-13.00	Horizontal
7803.49	-61.36	6.82	-11.70	2.15	-58.63	-13.00	Vertical
9067.93	-62.39	7.53	-12.60	2.15	-59.47	-13.00	Vertical

Note: Expanded measurement uncertainty for this test item is U = 4.2 dB, k = 2.



A.3 CONDUCTED EMISSION

Reference

FCC: CFR Part 15.107/207

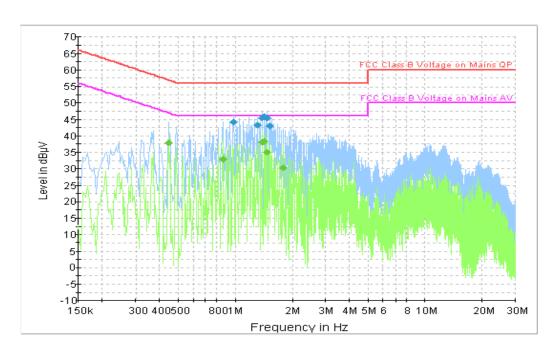
The measurement procedure in ANSI C63.4-2009 is used. Conducted Emission is measured with travel charger. The EUT is working under WCDMA 850/1700/1900MHz traffic mode which is the worst case of conducted emission measurement.

For test layout photo, please refer to Pic.2 in Annex B.

A.3.1 Limit

Frequency of Emission	Conducted Limit (dBµV)		
(MHz)	Quasi -Peak	Average	
0.15 – 0.5	66 to 56*	56 to 46*	
0.5 – 5	56	46	
5 – 30	60	50	
* Decreases with logarithm of the frequency			

A.3.2 Measurement result WCDMA Band II



IF bandwidth 9 kHz

Note: The graphic result above is the maximum of the measurements for both phase line and neutral line.



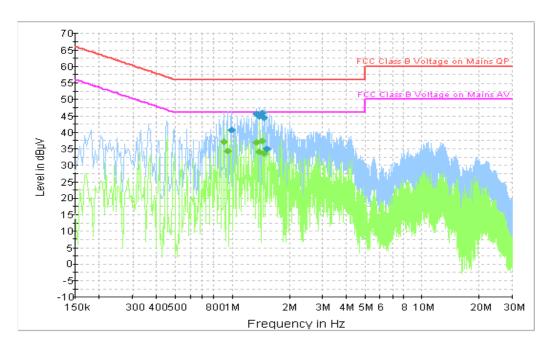
Final Result 1

Frequency	QuasiPeak	PE	Lina	Corr.	Margin	Limit
(MHz)	(dBµV)	PE	Line	(dB)	(dB)	$(dB\mu V)$
0.982500	44.1	GND	L1	9.7	11.9	56.0
1.311000	43.2	GND	L1	9.7	12.8	56.0
1.387500	45.4	GND	L1	9.7	10.6	56.0
1.428000	45.8	GND	L1	9.7	10.2	56.0
1.473000	45.5	GND	L1	9.7	10.5	56.0
1.518000	43.0	GND	L1	9.7	13.0	56.0

Final Result 2

Frequency	Average	DE	T :	Corr.	Margin	Limit
(MHz)	(dBµV)	PE	Line	(dB)	(dB)	(dBµV)
0.447000	37.9	GND	L1	9.8	9.1	46.9
0.861000	32.8	GND	L1	9.8	13.2	46.0
1.387500	38.0	GND	L1	9.7	8.0	46.0
1.428000	38.3	GND	L1	9.7	7.7	46.0
1.473000	35.1	GND	L1	9.7	10.9	46.0
1.797000	30.3	GND	L1	9.7	15.7	46.0

WCDMA Band V



IF bandwidth 9 kHz

Note: The graphic result above is the maximum of the measurements for both phase line and neutral line.



Final Result 1

Frequency	QuasiPeak	PE	Lina	Corr.	Margin	Limit
(MHz)	(dBµV)	PE	Line	(dB)	(dB)	$(dB\mu V)$
0.991500	40.7	GND	L1	9.7	15.3	56.0
1.351500	45.7	GND	L1	9.7	10.3	56.0
1.396500	44.8	GND	L1	9.7	11.2	56.0
1.437000	45.9	GND	L1	9.7	10.1	56.0
1.482000	44.3	GND	L1	9.7	11.7	56.0
1.531500	35.0	GND	L1	9.7	21.0	56.0

Final Result 2

Frequency	Average	DE	T :	Corr.	Margin	Limit
(MHz)	(dBµV)	PE	Line	(dB)	(dB)	(dBµV)
0.901500	37.1	GND	L1	9.7	8.9	46.0
0.946500	34.4	GND	L1	9.7	11.6	46.0
1.351500	37.0	GND	L1	9.7	9.0	46.0
1.396500	34.1	GND	L1	9.7	11.9	46.0
1.437000	37.4	GND	L1	9.7	8.6	46.0
1.482000	33.6	GND	L1	9.7	12.4	46.0



A.4 FREQUENCY STABILITY

Reference

FCC: CFR Part 2.1055, 22.355, 24.235.

A.4.1 Method of Measurement

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℃.
- 3. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on mid channel of WCDMA Band II and WCDMA Band V, 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 1.5 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 1.5 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.4.2 Measurement Limit

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. 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 3.5VDC and 4.1VDC, with a nominal voltage of 3.7VDC. 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 represent a tolerance from -5.4% to 10.8%. For the purposes of measuring frequency stability these voltage limits are to be used.



A.4.3 Measurement results

WCDMA Band II

Room Temperature: 24 °C Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)	Frequency error (ppm)
4.1	-12	0.007
3.7	-10	0.005
3.5	-10	0.005

Frequency Error vs Temperature

Temperature (°C)	Frequency error (Hz)	Frequency error (ppm)
50°	-10	0.005
40°	-12	0.006
30°	-13	0.007
20°	-13	0.007
10°	-11	0.006
0°	-12	0.006
- 10°	-11	0.006
- 20°	-11	0.006
- 30°	-15	0.008

WCDMA Band V

Room Temperature: 24°C Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)	Frequency error (ppm)
4.1	4	0.004
3.7	6	0.007
3.5	4	0.005

Frequency Error vs Temperature

Temperature (°C)	Frequency error (Hz)	Frequency error (ppm)
50°	3	0.004
40°	6	0.007
30°	-4	0.005
20°	8	0.009
10°	5	0.006
0°	6	0.008
- 10°	6	0.007
- 20°	5	0.006
- 30°	7	0.009

Expanded measurement uncertainty for this test item is 10 Hz, k = 2.



A.5 OCCUPIED BANDWIDTH

Reference

FCC: CFR Part 2.1049(h)(i)

A.5.1 Occupied Bandwidth Results

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 WCDMA Band II and WCDMA Band V. The table below lists the measured 99% BW. Spectrum analyzer plots are included on the following pages.

Measurement Parameters:

RBW = 50 kHz, VBW = 100 kHz

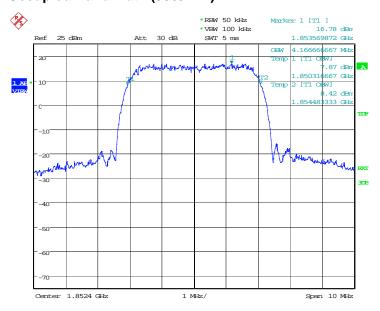
WCDMA Band II (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(MHz)
1852.4	4.167
1880.0	4.183
1907.6	4.183

Expanded measurement uncertainty for this test item is 1.1 kHz, k=2

WCDMA Band II

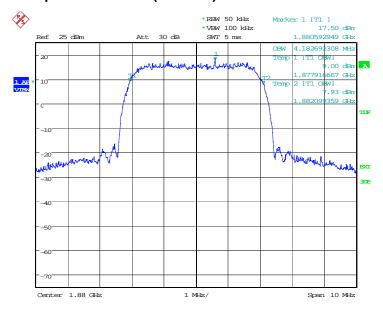
Channel 9262-Occupied Bandwidth (99% BW)



Date: 23.DEC.2013 10:34:57

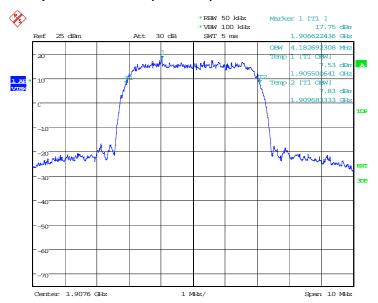


Channel 9400-Occupied Bandwidth (99% BW)



Date: 23.DEC.2013 10:35:32

Channel 9538-Occupied Bandwidth (99% BW)



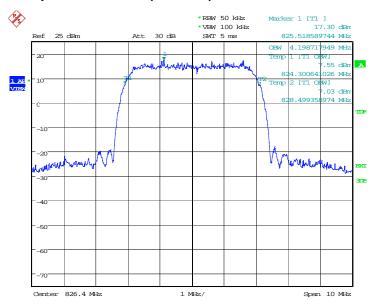
Date: 23.DEC.2013 10:36:06



WCDMA Band V (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(MHz)
826.4	4.199
836.6	4.151
846.6	4.183

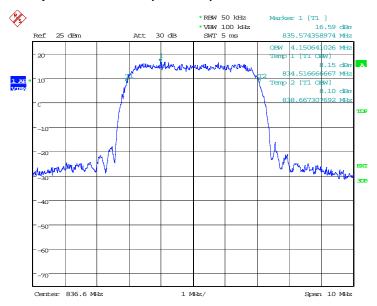
WCDMA Band V Channel 4132-Occupied Bandwidth (99% BW)



Date: 23.DEC.2013 10:54:42

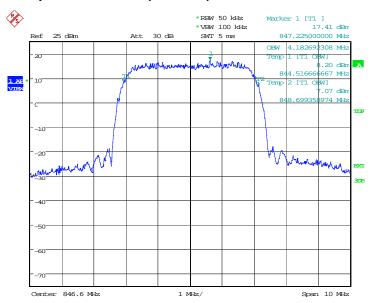


Channel 4183-Occupied Bandwidth (99% BW)



Date: 23.DEC.2013 10:55:16

Channel 4233-Occupied Bandwidth (99% BW)



Date: 23.DEC.2013 10:55:51



A.6 EMISSION BANDWIDTH

Reference

FCC: CFR Part 22.917(b), 24.238(a)

A.6.1Emission Bandwidth Results

Emission 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 WCDMA Band II and WCDMA Band V. Table below lists the measured 100% BW. Spectrum analyzer plots are included on the following pages.

Measurement Parameters:

RBW = 50 kHz, VBW = 100 kHz

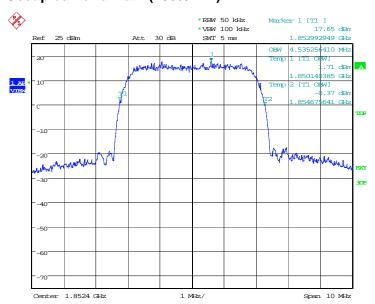
WCDMA Band II (100% BW)

Frequency(MHz)	Occupied Bandwidth (100% BW)(MHz)
1852.4	4.535
1880.0	4.535
1907.6	4.535

Expanded measurement uncertainty for this test item is 1.1 kHz, k=2.

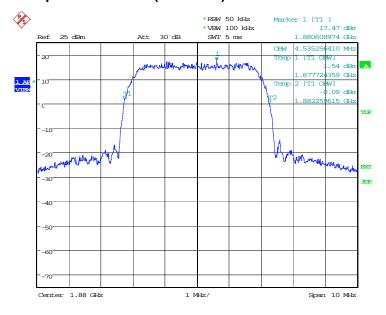
WCDMA Band II

Channel 9262-Occupied Bandwidth (100% BW)



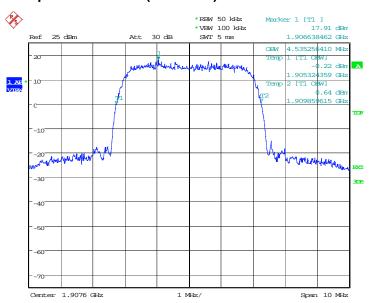


Channel 9400-Occupied Bandwidth (100% BW)



Date: 23.DEC.2013 10:37:17

Channel 9538-Occupied Bandwidth (100% BW)



Date: 23.DEC.2013 10:37:52

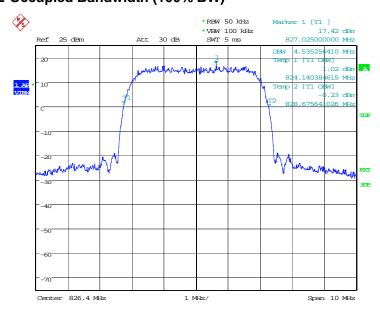


WCDMA Band V (100% BW)

Frequency(MHz)	Occupied Bandwidth (100% BW)(MHz)
826.40	4.535
836.60	4.535
846.60	4.519

Expanded measurement uncertainty for this test item is 1.1 kHz, k=2.

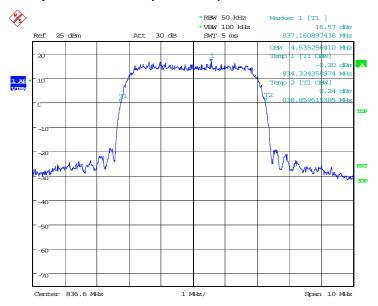
WCDMA Band V Channel 4132-Occupied Bandwidth (100% BW)



Date: 23.DEC.2013 10:56:27

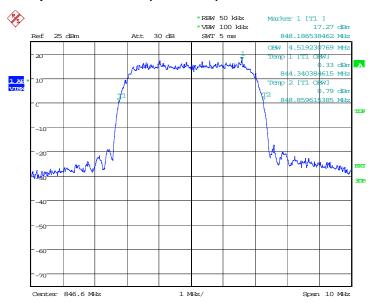


Channel 4183-Occupied Bandwidth (100% BW)



Date: 23.DEC.2013 10:57:02

Channel 4233-Occupied Bandwidth (100% BW)



Date: 23.DEC.2013 10:57:36



A.7 BAND EDGE COMPLIANCE

Reference

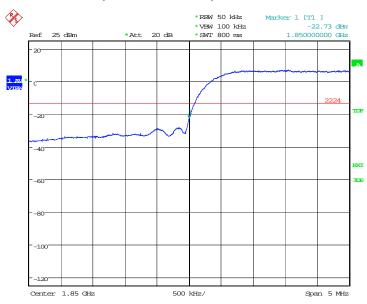
FCC: CFR Part 22.917(b), 24.238(a).

A.7.1 Measurement limit

On any frequency outside frequency band of the US Cellular/PCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log (P) dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

A.7.2 Measurement result

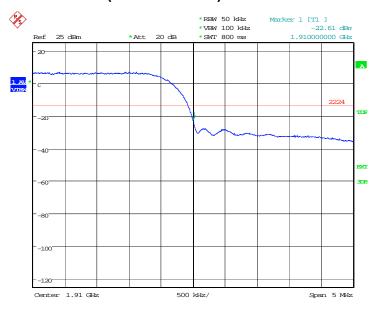
WCDMA Band II LOW BAND EDGE BLOCK-A (WCDMA Band II)-Channel 9262



Date: 23.DEC.2013 10:38:08

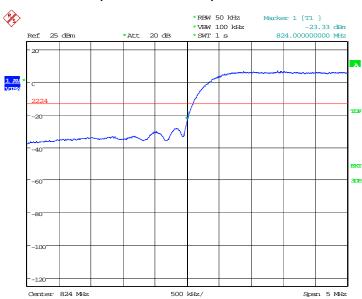


HIGH BAND EDGE BLOCK-C (WCDMA Band II) -Channel 9538



Date: 23.DEC.2013 10:38:25

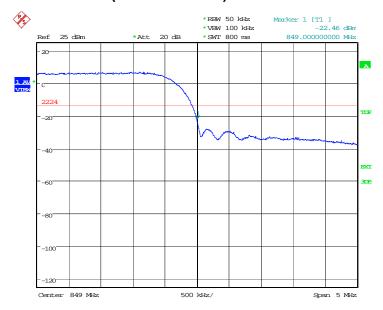
WCDMA Band V LOW BAND EDGE BLOCK-A (WCDMA Band V)-Channel 4132



Date: 23.DEC.2013 10:57:53



HIGH BAND EDGE BLOCK-C (WCDMA Band V) - Channel 4233



Date: 23.DEC.2013 10:58:09



A.8 CONDUCTED SPURIOUS EMISSION

Reference

FCC: CFR Part 2.1057, 22.917, 24.238.

A.8.1 Measurement Method

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

- 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 are taken from 30 MHz to 20 GHz. For WCDMA Band V, data are taken from 30 MHz to 10 GHz.
- 2. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

WCDMA Band II Transmitter

Channel	Frequency (MHz)
9262	1852.40
9400	1880.00
9538	1907.60

WCDMA Band V Transmitter

Channel	Frequency (MHz)
4132	826.40
4183	836.60
4233	846.60

A. 8.2 Measurement Limit

Part 22.917 and Part 24.238 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. 8.3 Measurement result

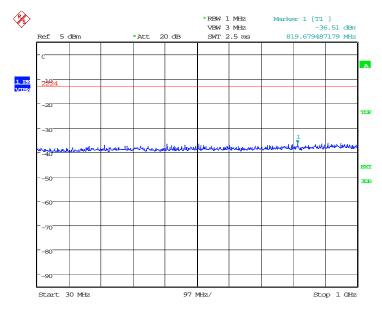
Measurement Uncertainty: 0.3dB



WCDMA Band II

A. 8.3.1 Channel 9262: 30MHz -1GHz

Spurious emission limit -13dBm.

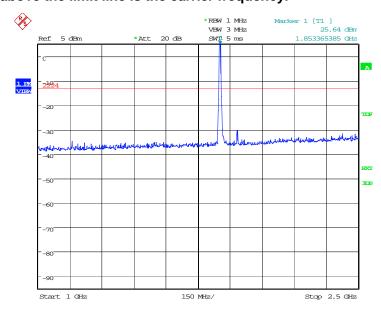


Date: 23.DEC.2013 10:38:56

A.8.3.2 Channel 9262: 1GHz -2.5GHz

Spurious emission limit -13dBm.

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

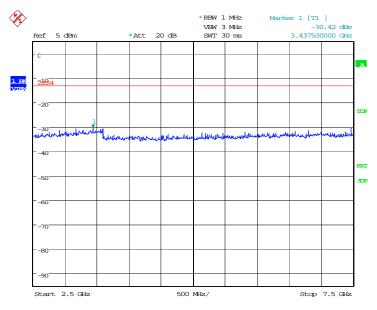


Date: 23.DEC.2013 10:39:23



A.8.3.3 Channel 9262: 2.5GHz -7.5GHz

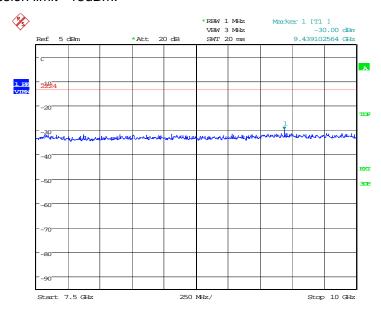
Spurious emission limit -13dBm.



Date: 23.DEC.2013 10:39:51

A.8.3.4 Channel 9262: 7.5GHz -10GHz

Spurious emission limit -13dBm.

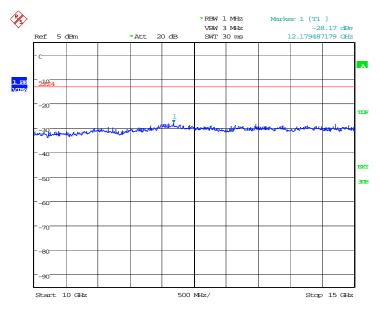


Date: 23.DEC.2013 10:40:20



A.8.3.5 Channel 9262: 10GHz -15GHz

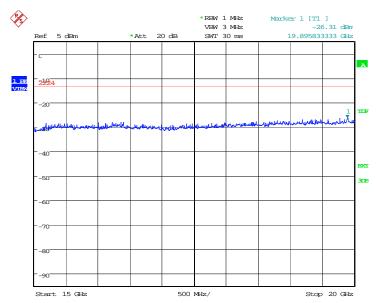
Spurious emission limit -13dBm.



Date: 23.DEC.2013 10:40:48

A.8.3.6 Channel 9262: 15GHz -20GHz

Spurious emission limit -13dBm.

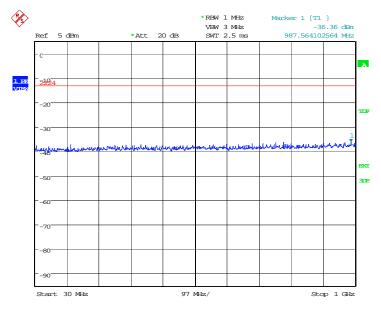


Date: 23.DEC.2013 10:41:16



A. 8.3.7 Channel 9400: 30MHz -1GHz

Spurious emission limit -13dBm.

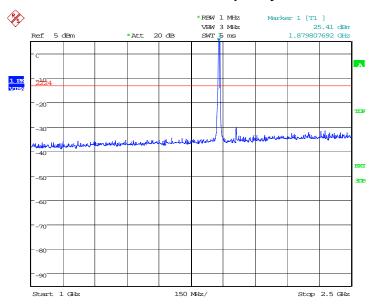


Date: 23.DEC.2013 10:41:47

A.8.3.8 Channel 9400: 1GHz -2.5GHz

Spurious emission limit -13dBm.

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

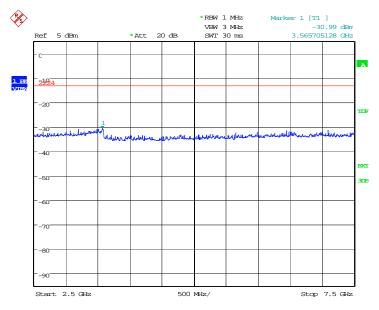


Date: 23.DEC.2013 10:42:15



A.8.3.9 Channel 9400: 2.5GHz -7.5GHz

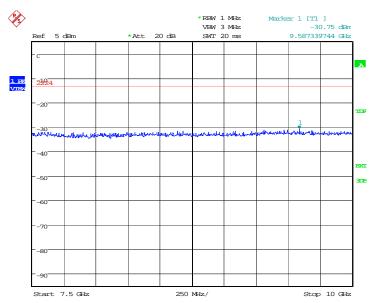
Spurious emission limit -13dBm.



Date: 23.DEC.2013 10:42:43

A.8.3.10 Channel 9400: 7.5GHz -10GHz

Spurious emission limit -13dBm.

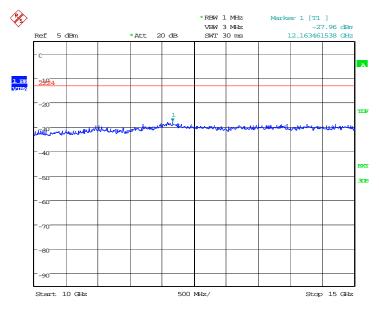


Date: 23.DEC.2013 10:43:12



A.8.3.11 Channel 9400: 10GHz -15GHz

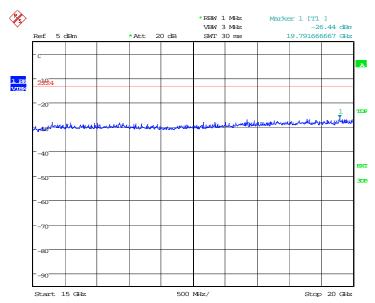
Spurious emission limit -13dBm.



Date: 23.DEC.2013 10:43:40

A.8.3.12 Channel 9400: 15GHz -20GHz

Spurious emission limit -13dBm.

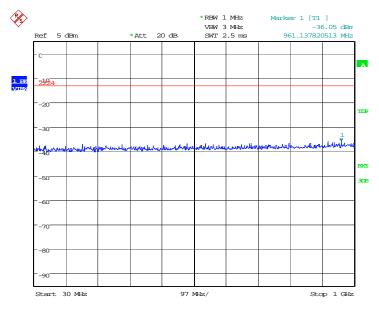


Date: 23.DEC.2013 10:44:08



A. 8.3.13 Channel 9538: 30MHz -1GHz

Spurious emission limit -13dBm.

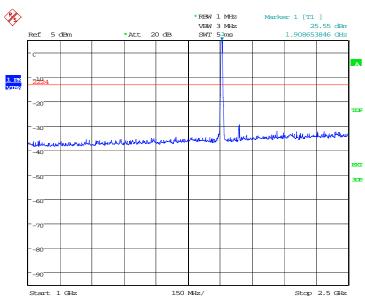


Date: 23.DEC.2013 10:44:39

A.8.3.14 Channel 9538: 1GHz -2.5GHz

Spurious emission limit -13dBm.

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

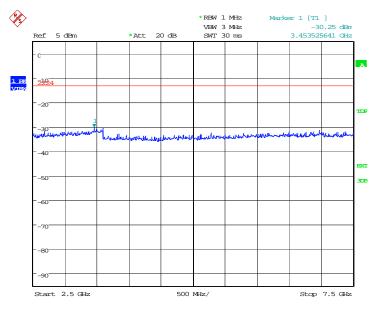


Date: 23.DEC.2013 10:45:07



A.8.3.15 Channel 9538: 2.5GHz -7.5GHz

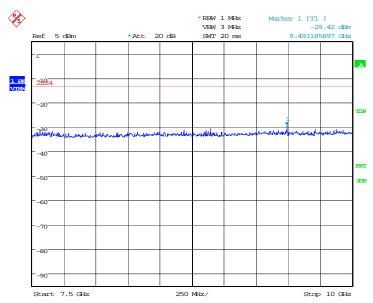
Spurious emission limit -13dBm.



Date: 23.DEC.2013 10:45:35

A.8.3.16 Channel 9538: 7.5GHz -10GHz

Spurious emission limit -13dBm.

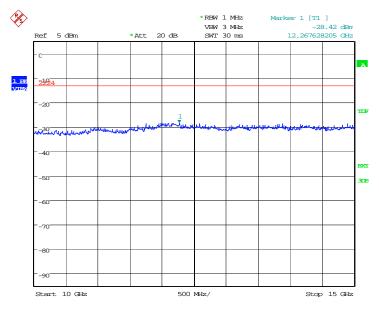


Date: 23.DEC.2013 10:46:04



A.8.3.17 Channel 9538: 10GHz -15GHz

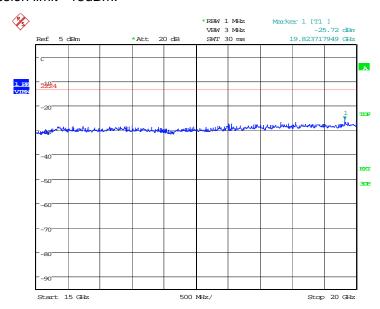
Spurious emission limit -13dBm.



Date: 23.DEC.2013 10:46:32

A.8.3.18 Channel 9538: 15GHz -20GHz

Spurious emission limit -13dBm.

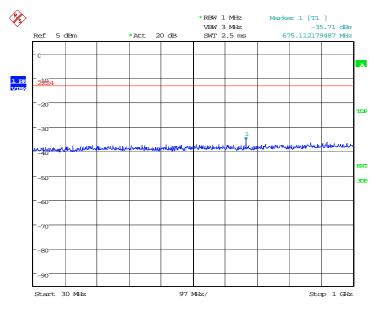


Date: 23.DEC.2013 10:47:00



A. 8.3.19 Idle mode: 30MHz -1GHz

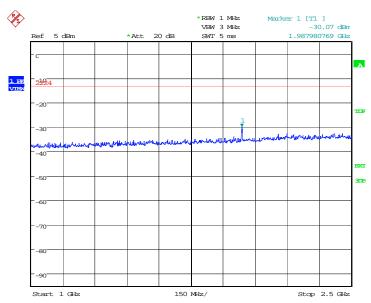
Spurious emission limit -13dBm.



Date: 23.DEC.2013 10:47:29

A.8.3.20 Idle mode: 1GHz -2.5GHz

Spurious emission limit -13dBm.

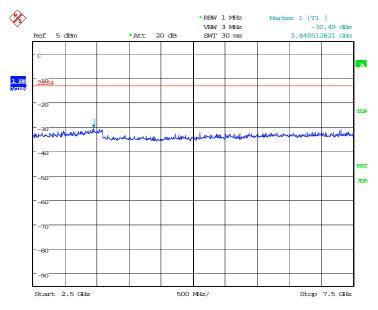


Date: 23.DEC.2013 10:47:57



A.8.3.21 Idle mode: 2.5GHz -7.5GHz

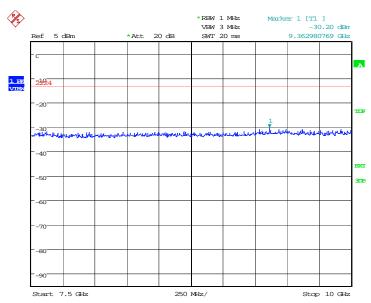
Spurious emission limit -13dBm.



Date: 23.DEC.2013 10:48:25

A.8.3.22 Idle mode: 7.5GHz -10GHz

Spurious emission limit -13dBm.

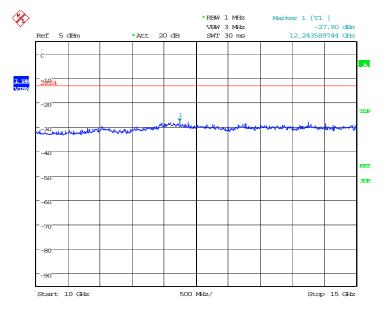


Date: 23.DEC.2013 10:48:54



A.8.3.23 Idle mode: 10GHz -15GHz

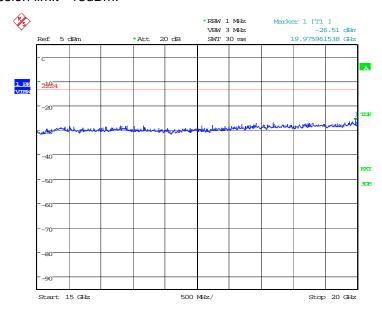
Spurious emission limit -13dBm.



Date: 23.DEC.2013 10:49:22

A.8.3.24 Idle mode: 15GHz -20GHz

Spurious emission limit -13dBm.



Date: 23.DEC.2013 10:49:50

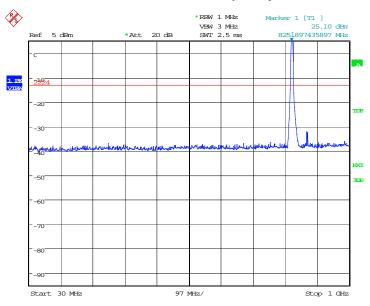


WCDMA Band V

A. 8.3.25 Channel 4132: 30MHz -1GHz

Spurious emission limit -13dBm.

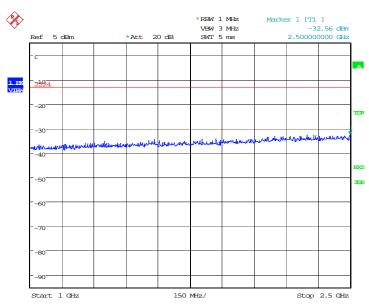
NOTE: peak above the limit line is the carrier frequency.



Date: 23.DEC.2013 10:58:40

A. 8.3.26 Channel 4132: 1GHz - 2.5GHz

Spurious emission limit -13dBm.

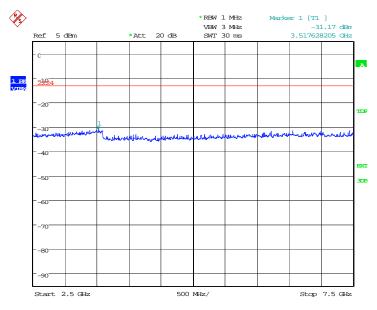


Date: 23.DEC.2013 10:59:08



A. 8.3.27 Channel 4132: 2.5GHz -7.5GHz

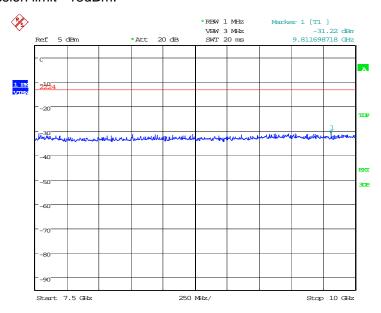
Spurious emission limit -13dBm.



Date: 23.DEC.2013 10:59:36

A. 8.3.28 Channel 4132: 7.5GHz - 10GHz

Spurious emission limit -13dBm.



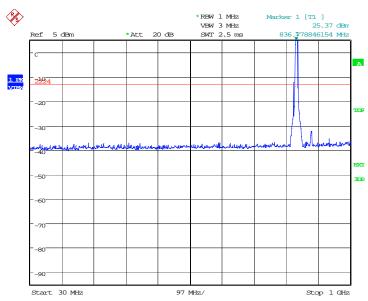
Date: 23.DEC.2013 11:00:04



A. 8.3.29 Channel 4183: 30MHz -1GHz

Spurious emission limit -13dBm.

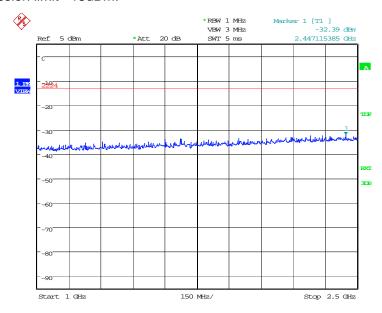
NOTE: peak above the limit line is the carrier frequency.



Date: 23.DEC.2013 11:00:36

A.8.3.30 Channel 4183: 1GHz - 2.5GHz

Spurious emission limit -13dBm.

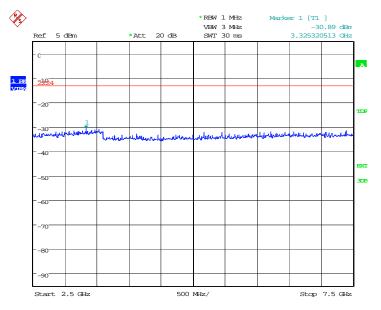


Date: 23.DEC.2013 11:01:04



A. 8.3.31 Channel 4183: 2.5GHz -7.5GHz

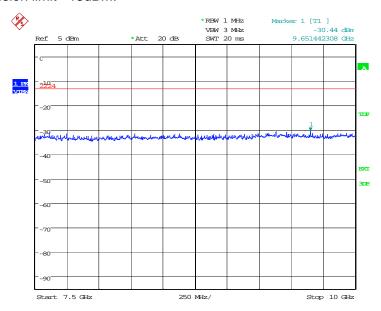
Spurious emission limit -13dBm.



Date: 23.DEC.2013 11:01:32

A. 8.3.32 Channel 4183: 7.5GHz - 10GHz

Spurious emission limit -13dBm.



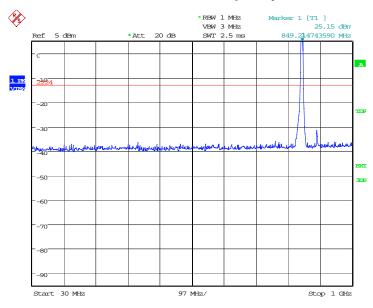
Date: 23.DEC.2013 11:02:00



A. 8.3.33 Channel 4233: 30MHz -1GHz

Spurious emission limit -13dBm.

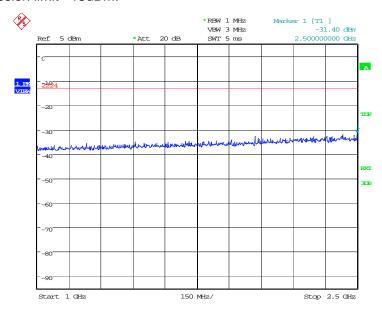
NOTE: peak above the limit line is the carrier frequency.



Date: 23.DEC.2013 11:02:31

A. 8.3.34 Channel 4233: 1GHz - 2.5GHz

Spurious emission limit -13dBm.

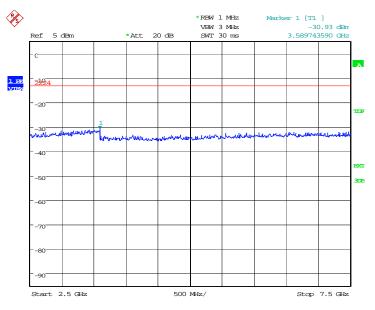


Date: 23.DEC.2013 11:02:59



A. 8.3.35 Channel 4233: 2.5GHz -7.5GHz

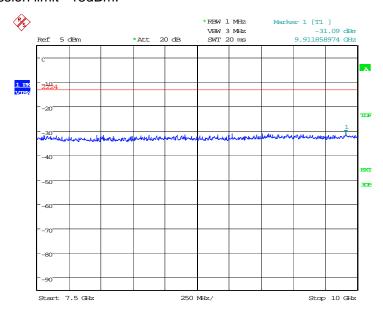
Spurious emission limit -13dBm.



Date: 23.DEC.2013 11:03:27

A. 8.3.36 Channel 4233: 7.5GHz - 10GHz

Spurious emission limit -13dBm.

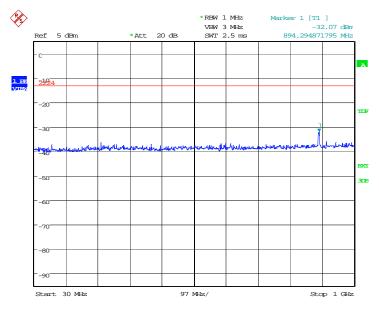


Date: 23.DEC.2013 11:03:55



A. 8.3.37 Idle mode: 30MHz - 1GHz

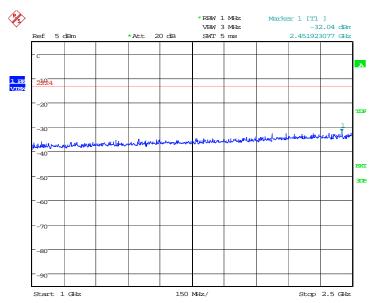
Spurious emission limit -13dBm.



Date: 23.DEC.2013 11:04:24

A.8.3.38 Idle mode: 1GHz - 2.5GHz

Spurious emission limit -13dBm.

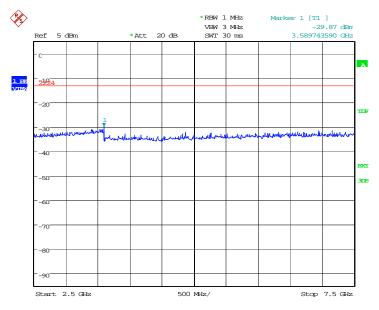


Date: 23.DEC.2013 11:04:53



A.8.3.39 Idle mode: 2.5GHz - 7.5GHz

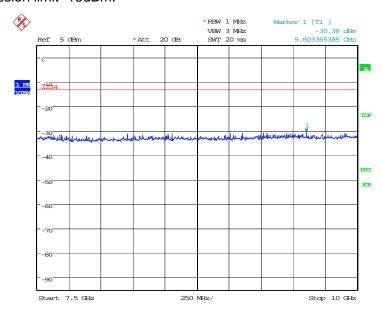
Spurious emission limit -13dBm.



Date: 23.DEC.2013 11:05:21

A.8.3.40 Idle mode: 7.5GHz - 10GHz

Spurious emission limit -13dBm.



Date: 23.DEC.2013 11:05:49



END OF REPORT