



TEST REPORT

No. 2013TAR686

for

Sony Mobile Communications AB

GSM/WCDMA/LTE mobile phone

Type: PM-0610-BV

FCC ID: PY7PM-0610

with

Hardware Version: A

Software Version: 14.1.H.0.436

Issued Date: Oct. 09th, 2013

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.6629B-1

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

No. 52, Huayuan Bei Road, Haidian District, Beijing, P. R. China 100191.

Tel:+86(0) 10-62304633-2561, Fax:+86(0)10-62304633-2504 Email:welcome@emcite.com. www.emcite.com

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1. Test Laboratory

1.1. Testing Location

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

Location D

Company Name: TMC Beijing, Telecommunication Metrology Center of MIIT
Address: No.18A, Kangding Street, Beijing Economic-Technological Development Area, Beijing, China
Postal Code: 100176

1.2. Testing Environment

Normal Temperature: 15-35°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.

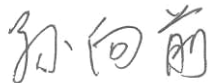
1.3. Project data

Receipt of Sample Sep. 21st, 2013
Testing Start Date: Sep. 27th, 2013
Testing End Date: Sep. 30th, 2013


1.4. Signature



Qu Pengfei
(Prepared this test report)



Sun Xiangqian
(Reviewed this test report)



Song Chongwen
(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name: Sony Mobile Communications AB
Address /Post: Sony Mobile R&D Center, No. 16, Guangshun South Street,
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: Sony Mobile R&D Center, No. 16, Guangshun South Street,
Chaoyang District
City: Beijing
Postal Code: 100102
Country: China
Contact Person: Ma, Gang
Telephone: +86-10-58656312
Fax: +86-10-58659049

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 1/5/6/19, HSDPA, HSUPA, LTE FDD bands 1/3/19/21, Bluetooth (EDR and 4.0), ANT+, WLAN (802.11 a/ac/b/g/n), NFC, FM, GPS mobile phone
Type	PM-0610-BV
FCC ID	PY7PM-0610
GSM Frequency Band	GSM 850/900/1800/1900
UMTS Frequency Band	FDD Band 1 / FDD Band 5 / FDD Band 6 / FDD Band 19
LTE Frequency Band	FDD Band 1/ FDD Band 3 / TDD Band 19 / TDD Band 21
Antenna	Internal
Power supply	Battery (charged by travel adapter or vehicle charger)
Extreme vol. Limits	3.6VDC to 4.2VDC (nominal: 4.2VDC)
Extreme temp. Tolerance	-30°C to +50°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
EUT3	CB5A1UQQE8	004402541004895	A	14.1.H.0.436
EUT5	CB5A1UQQCG	004402541005223	A	14.1.H.0.436

*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
#22974	Travel Charger	8512W19 200056	1C
#24009	USB Cable	123307DD003654E	1
#22974			
	Commercial name	EP880	
	Type	AC-0400-EU	
	Manufacturer	SALCOMP	
	Length of cable	98.5 cm (length of USB cable)	

#24009

Commercial name	EC801
Type	AI-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/LTE mobile phone with integrated antenna and inbuilt battery.

The EUT supports GSM 850/900/1800/1900MHz bands, WCDMA FDD band 1/5/6/19 and LTE FDD bands 1/3/19/21. It supports GPRS service with multi-slots class 33 and EGPRS service with multi-slots class 33. The HSDPA and HSUPA 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/ac/b/g/n) and Wi-Fi hotspot functions. For WLAN 802.11n, it supports 20MHz bandwidth on 2.4GHz band and 20MHz/40MHz bandwidths on 5GHz/5.8GHz band. For WLAN 802.11 ac, it supports 20MHz/40MHz/80MHz bandwidths.

It consists of normal options: battery 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	EUT3 + #22974 + #24009	Tests with travel charger
Set.4	EUT3	ERP/EIRP/RSE tests
Set.8	EUT5	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	10-1-12 Edition
ANSI/TIA-603-C	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards	2004
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	2009
KDB 971168 D01	Measurement Guidance for Certification of Licensed Digital Transmitters	v02r01

5. LABORATORY ENVIRONMENT

Semi-anechoic chamber SAC-2 (10 meters×6.7meters×6.1meters) 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 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:		
Verdict Column	P	Pass
	F	Fail
	NA	Not applicable
	NM	Not measured
Location Column	A/B/C/D	The test is performed in test location A, B, C or D which are described in section 1.1 of this report

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	P	B
2	Emission Limit	22.917, 2.1051	A.2	P	B
3	Conducted Emission	15.107/207	A.3	P	D
4	Frequency Stability	22.355, 2.1055	A.4	P	B
5	Occupied Bandwidth	2.1049(h)(i)	A.5	P	B
6	Emission Bandwidth	22.917(b)	A.6	P	B
7	Band Edge Compliance	22.917(b)	A.7	P	B
8	Conducted Spurious Emission	22.917, 2.1057	A.8	P	B

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	100766	R&S	2014-04-08
2.	Spectrum Analyzer	E4440A	MY48250642	Agilent	2014-03-04
3.	LISN	ESH3-Z5	825562/028	R&S	2014-06-12
4.	Universal Radio Communication Tester	E5515C	MY48363198	Agilent	2014-07-08
5.	Universal Radio Communication Tester	E5515C	MY48361083	Agilent	2014-03-16
6.	EMI Antenna	VULB 9163	9163-482	Schwarzbeck	2014-02-17
7.	EMI Antenna	3117	00119024	ETS-Lindgren	2014-02-02
8.	EMI Antenna	3117	00058889	ETS-Lindgren	2014-02-02
9.	Signal Generator	N5183A	MY49060052	Agilent	2014-03-19
10.	Climatic chamber	SH-241	92003546	ESPEC	2014-05-11
11.	Universal Radio Communication Tester	CMU200	108646	R&S	2013-11-02

ANNEX A: MEASUREMENT RESULTS

A.1 OUTPUT POWER

Reference

FCC: CFR Part 22.913(a)

A.1.1 Summary

During the process of testing, the EUT was controlled via 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

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

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

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

A.1.2.2 Measurement result

WCDMA Band V

	Channel number	Frequency(MHz)	output power(dBm)
WCDMA (Band V)	4132	826.4	24.47
	4183	836.6	24.25
	4233	846.6	24.33

A.1.3 Radiated

A.1.3.1 Description

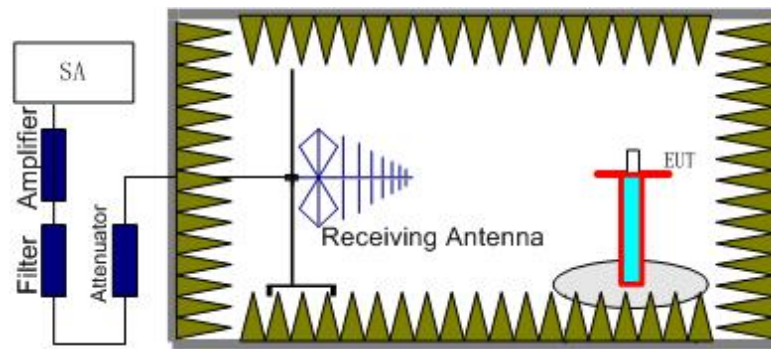
This is the test for the maximum radiated power from the EUT.

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."

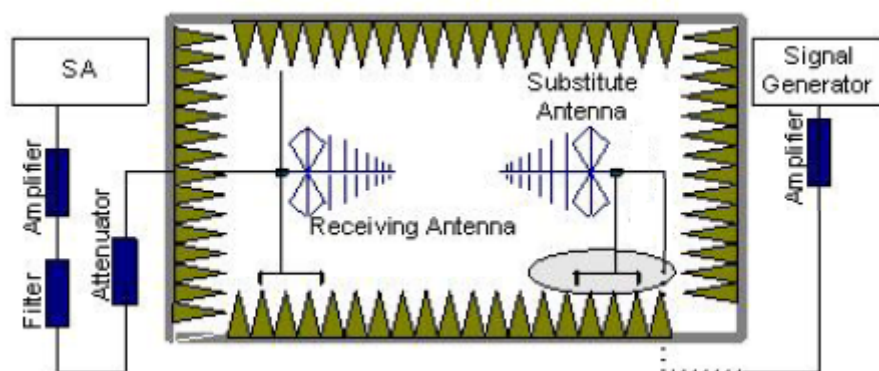
A.1.3.2 Method of Measurement

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 (P_r).
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:

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

5. This value is EIRP since the measurement is calibrated using an antenna of known gain (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 V- ERP

Limits

	RMS 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	-26.68	2.07	-53	0.85	2.15	21.25	Vertical
836.6	-26.24	2.08	-53	0.90	2.15	21.63	Vertical
846.6	-27.02	2.09	-53	0.94	2.15	20.80	Vertical

Sample calculation: 836.6 MHz

$$\begin{aligned} \text{Peak ERP(dBm)} &= P_{\text{Mea}}(-26.24 \text{ dBm}) - G_a(0.90 \text{ dBi}) - P_{\text{Ag}}(-53.00 \text{ dB}) - P_{\text{cl}}(2.08 \text{ dB}) - 2.15 \text{ dB} \\ &= 21.63 \text{ dBm} \end{aligned}$$

ANALYZER SETTINGS: RBW = VBW = 5MHz

Note: Expanded measurement uncertainty for WCDMA Band V is $U = 0.96\text{dB}$, $k=2$.

A.2 EMISSION LIMIT

Reference

FCC: CFR 2.1051, Part 22.917(a).

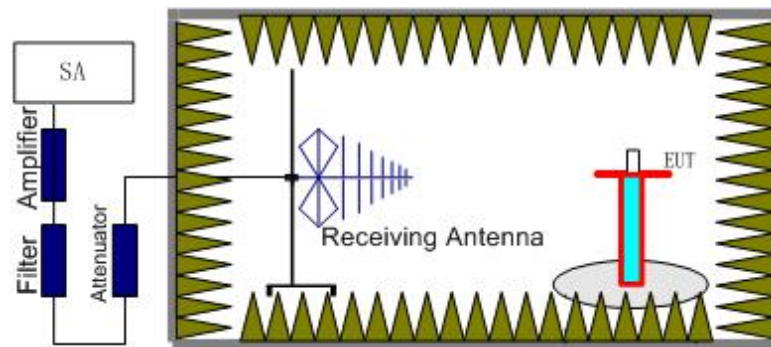
A.2.1 Measurement Method

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

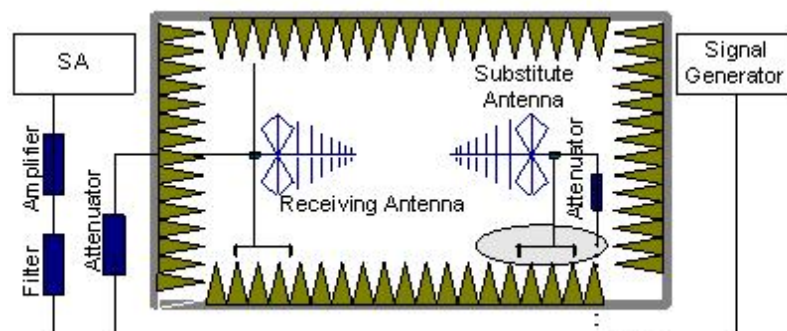
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 846.6 MHz. The resolution bandwidth is set to 1MHz as outlined in Part 22.917. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of 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, 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. 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 (P_{pl}) is the summation of the cable loss and the gain of the amplifier.

The measurement results are obtained as described below:

$$\text{Power (EIRP)} = P_{Mea} + P_{pl} + G_a$$

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) specifies 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 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.

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
2537.68	-47.35	3.62	-5.50	2.15	-47.62	-13.00	Horizontal
3353.31	-64.70	4.24	-7.55	2.15	-63.54	-13.00	Horizontal
5339.33	-63.62	5.41	-9.90	2.15	-61.28	-13.00	Vertical
6171.84	-61.14	5.80	-10.34	2.15	-58.75	-13.00	Horizontal
7100.91	-61.62	6.40	-11.16	2.15	-59.01	-13.00	Vertical
9549.96	-59.90	7.79	-12.58	2.15	-57.26	-13.00	Horizontal

WCDMA BAND V, Channel 4183/836.6MHz

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Polarization
1768.83	-59.88	3.05	-4.92	2.15	-60.16	-13.00	Vertical
2513.04	-46.95	3.59	-5.43	2.15	-47.26	-13.00	Horizontal
3408.77	-63.98	4.19	-7.68	2.15	-62.64	-13.00	Vertical
4489.1	-62.30	4.92	-8.79	2.15	-60.58	-13.00	Horizontal
6414.5	-63.05	5.83	-10.53	2.15	-60.50	-13.00	Horizontal
8324.16	-60.99	7.29	-12.09	2.15	-58.34	-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
3252.61	-62.75	4.16	-7.31	2.15	-61.75	-13.00	Vertical
4032.7	-62.23	4.69	-8.52	2.15	-60.55	-13.00	Horizontal
5071.45	-63.82	5.21	-9.74	2.15	-61.44	-13.00	Horizontal
6075.29	-61.58	5.81	-10.26	2.15	-59.28	-13.00	Vertical
6845.22	-62.65	6.16	-10.95	2.15	-60.01	-13.00	Horizontal
8057.38	-59.33	6.90	-11.93	2.15	-56.45	-13.00	Horizontal

Note: The maximum value of expanded measurement uncertainty for this test item is $U = 4.2\text{dB}$, $k=2$.

A.3 CONDUCTED EMISSION

Reference

FCC: CFR Part 15.107/207

The measurement procedure in ANSI C63.4-2003 is used. Conducted Emission is measured with travel charger. The EUT is working under WCDMA 850 MHz traffic mode which is the worst case of conducted emission measurement.

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

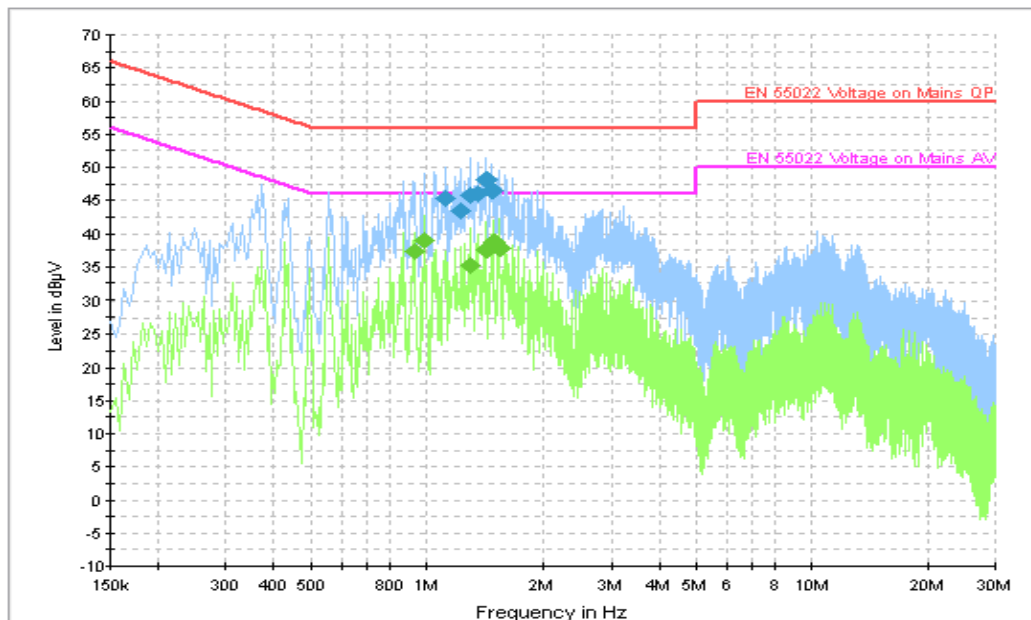
A.3.1 Limit

Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	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 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 (MHz)	QuasiPeak (dB μ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
1.117501	45.2	GND	N	9.9	10.8	56.0
1.234501	43.3	GND	N	9.9	12.7	56.0
1.302001	45.7	GND	N	9.9	10.3	56.0
1.369501	46.1	GND	N	9.9	9.9	56.0
1.428001	48.2	GND	N	9.9	7.8	56.0
1.477501	46.5	GND	N	9.9	9.5	56.0

Final Result 2

Frequency (MHz)	CAverage (dB μ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.928501	37.3	GND	N	9.9	8.7	46.0
0.987001	39.0	GND	N	9.9	7.0	46.0
1.302001	35.2	GND	N	9.9	10.8	46.0
1.428001	37.5	GND	N	9.9	8.5	46.0
1.486501	38.7	GND	N	9.9	7.3	46.0
1.545001	37.7	GND	N	9.9	8.3	46.0

Note: The maximum value of expanded measurement uncertainty for this test item is $U=2.9\text{dB}$, $k=2$.

A.4 FREQUENCY STABILITY

Reference

FCC: CFR Part 2.1055, 22.355,

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°C.
3. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on mid channel of 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 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 1/2 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. 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 3.6VDC and 4.2VDC, with a nominal voltage of 4.2VDC. 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 of -14.3 %. For the purposes of measuring frequency stability these voltage limits are to be used.

A.4.3 Measurement results

WCDMA Band V

Room Temperature: 24°C

Frequency Error vs Voltage

Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.6	-4	0.005
4.2	-10	0.012
4.2	3	0.004

Frequency Error vs Temperature

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

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

Measurement Parameters:

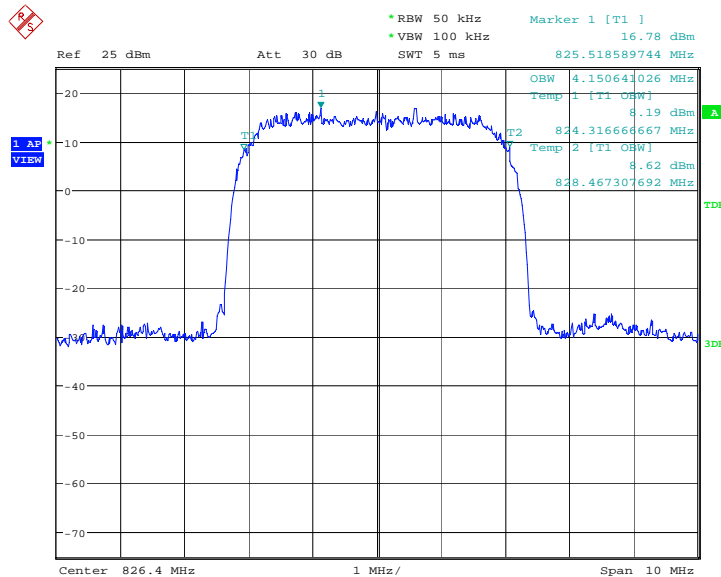
RBW = 50 kHz, VBW = 100 kHz

WCDMA Band V (99% BW)

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

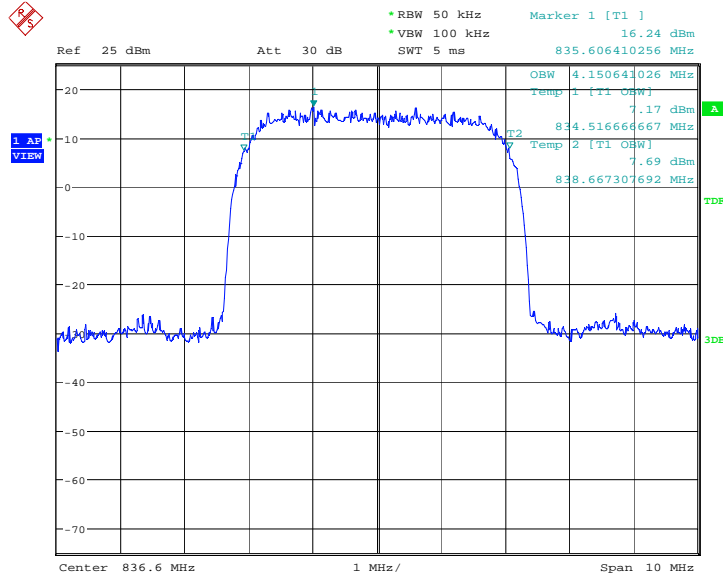
WCDMA Band V

Channel 4132-Occupied Bandwidth (99% BW)



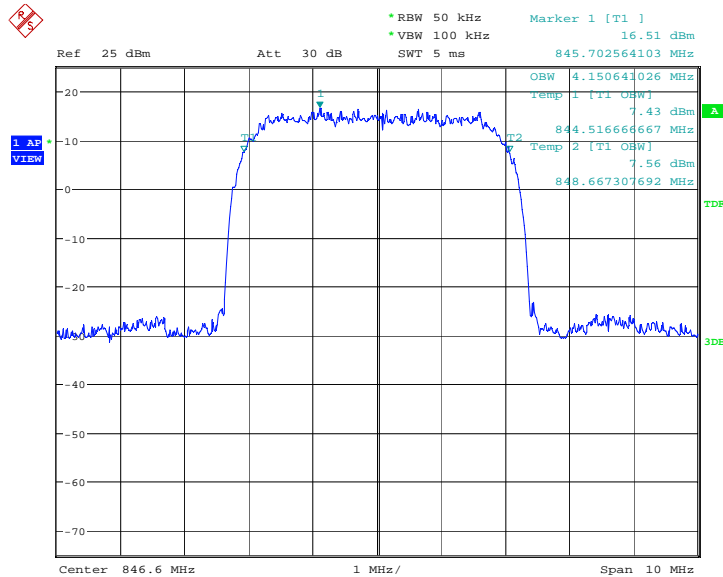
Date: 26.SEP.2013 15:13:32

Channel 4183-Occupied Bandwidth (99% BW)



Date: 26.SEP.2013 15:14:23

Channel 4233-Occupied Bandwidth (99% BW)



Date: 26.SEP.2013 15:15:02

A.6 EMISSION BANDWIDTH

Reference

FCC: CFR Part 22.917(b)

A.6.1 Emission 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 V. Table below lists the measured 100% BW. Spectrum analyzer plots are included on the following pages.

Measurement Parameters:

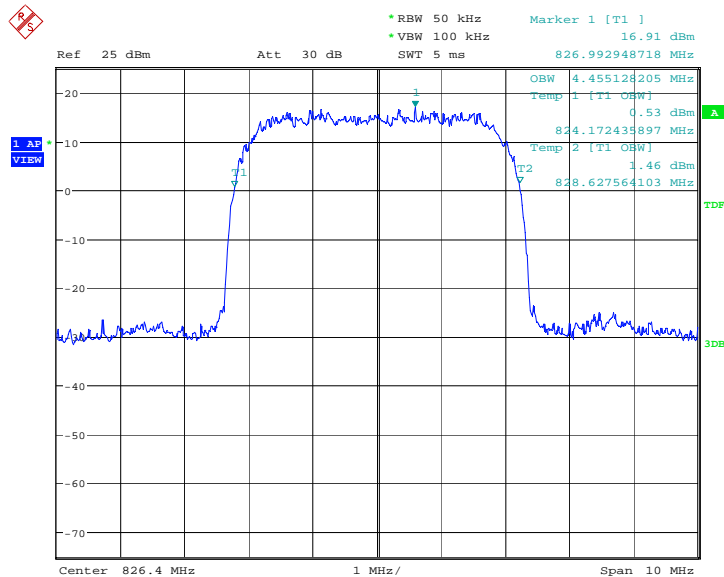
RBW = 50 kHz, VBW = 100 kHz

WCDMA Band V (100% BW)

Frequency(MHz)	Emission Bandwidth (100% BW)(MHz)
826.40	4.455
836.60	4.455
846.60	4.471

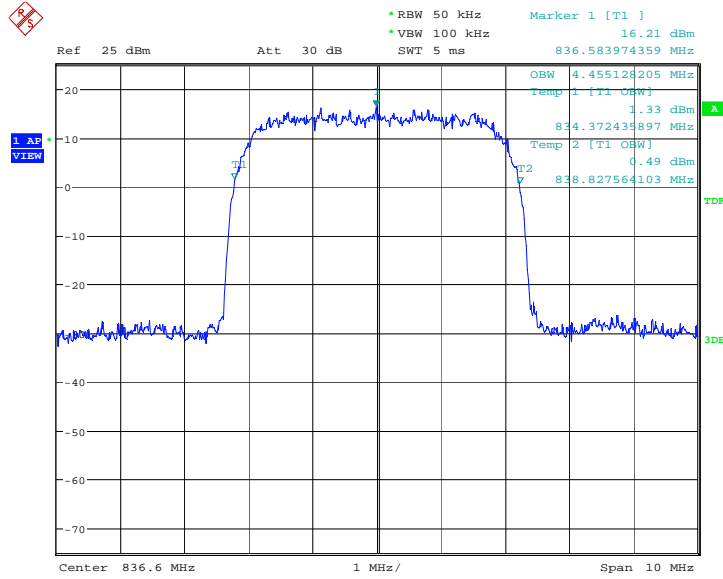
WCDMA Band V

Channel 4132-Emission Bandwidth (100% BW)



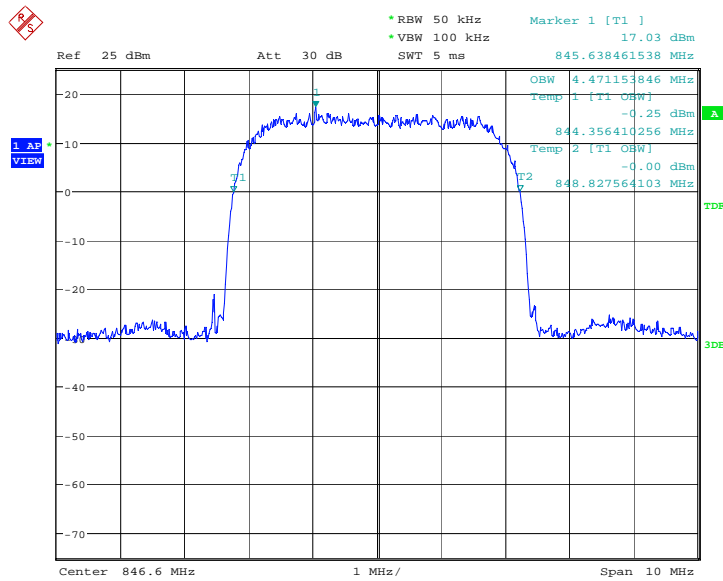
Date: 26.SEP.2013 15:15:45

Channel 4183-Emission Bandwidth (100% BW)



Date: 26.SEP.2013 15:16:32

Channel 4233-Emission Bandwidth (100% BW)



Date: 26.SEP.2013 15:17:16

A.7 BAND EDGE COMPLIANCE

Reference

FCC: CFR Part 22.917(b).

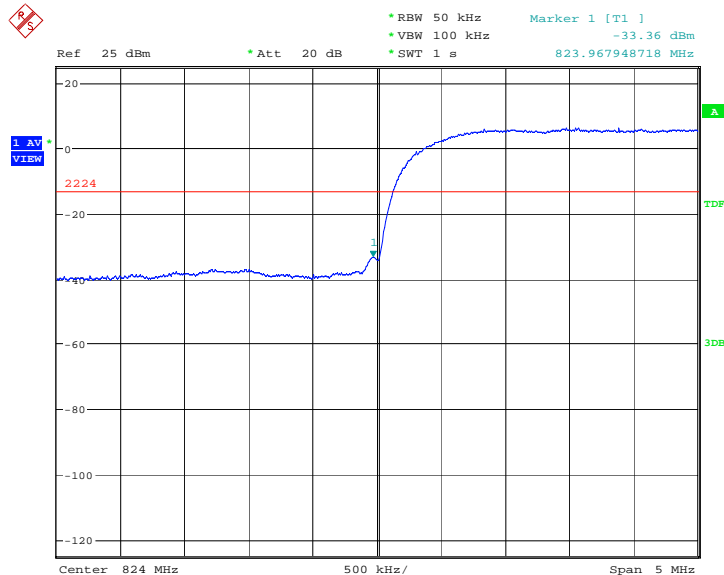
A.7.1 Measurement limit

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

A.7.2 Measurement result

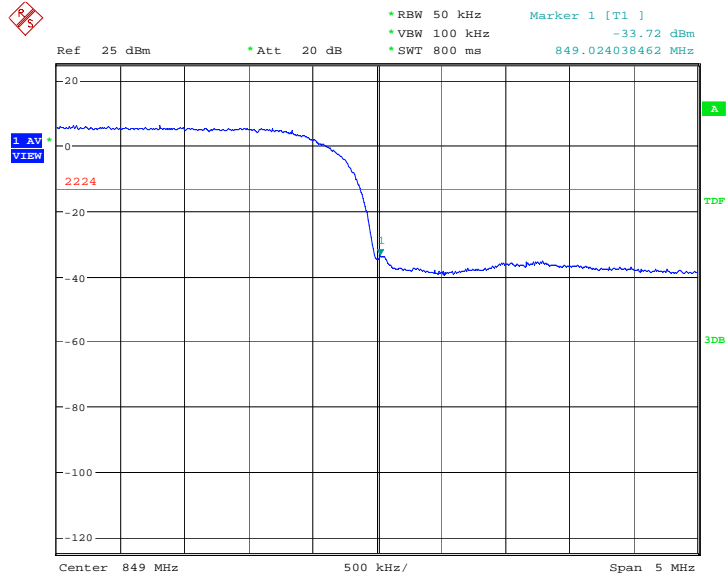
WCDMA Band V

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



Date: 26.SEP.2013 15:17:51

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



Date: 26.SEP.2013 15:18:15

A.8 CONDUCTED SPURIOUS EMISSION

Reference

FCC: CFR Part 2.1057, 22.917

A.8.1 Measurement Method

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 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 V Transmitter

Channel	Frequency (MHz)
4132	826.40
4183	836.60
4233	846.60

A. 8.2 Measurement Limit

Part 22.917 specifies 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.

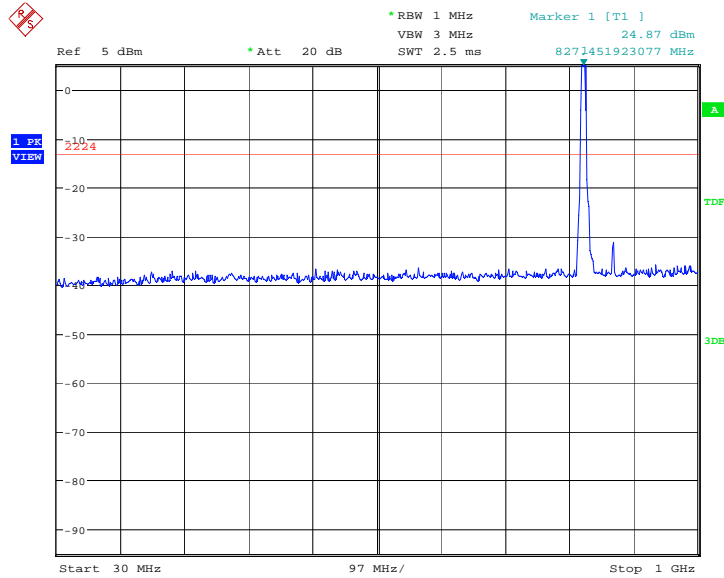
A. 8.3 Measurement result

Measurement Uncertainty: 0.3dB

A. 8.3.1 Channel 4132: 30MHz –1GHz

Spurious emission limit –13dBm.

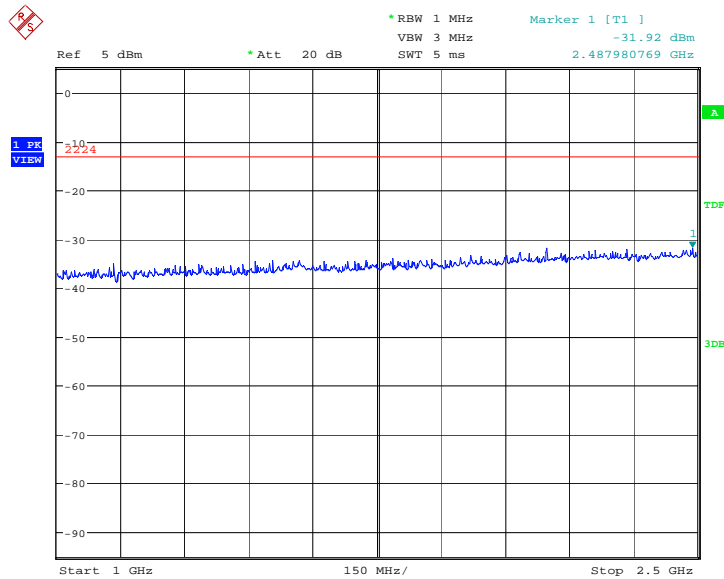
NOTE: peak above the limit line is the carrier frequency.



Date: 26.SEP.2013 15:19:04

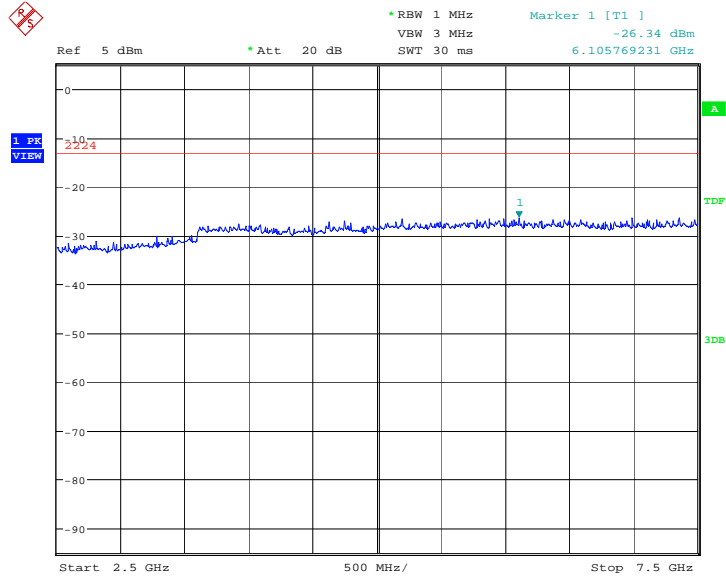
A. 8.3.2 Channel 4132: 1GHz – 2.5GHz

Spurious emission limit –13dBm.



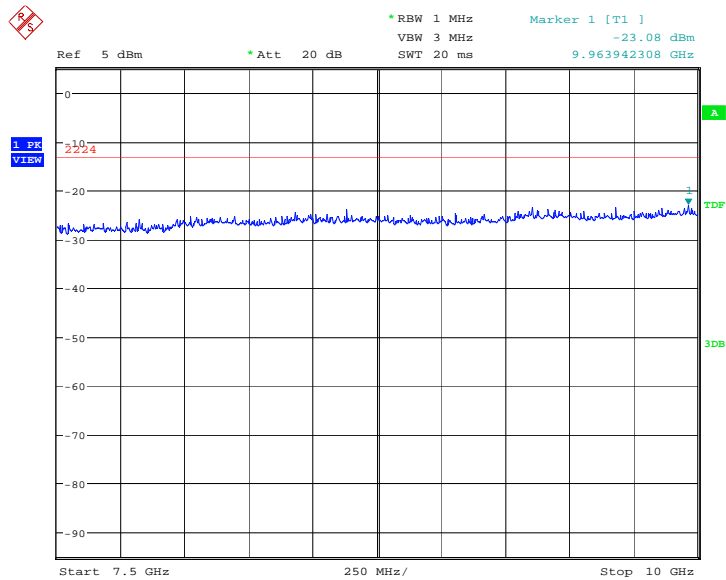
Date: 26.SEP.2013 15:19:32

A. 8.3.3 Channel 4132: 2.5GHz –7.5GHz
Spurious emission limit –13dBm.



Date: 26.SEP.2013 15:20:00

A. 8.3.4 Channel 4132: 7.5GHz – 10GHz
Spurious emission limit –13dBm.

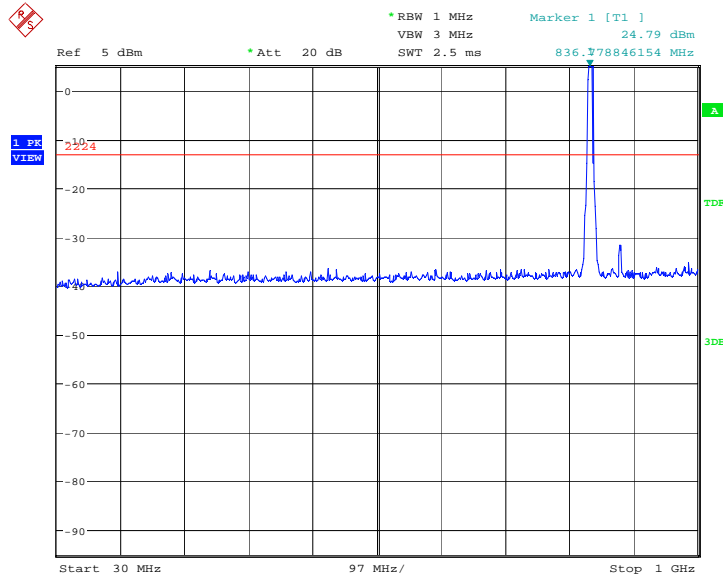


Date: 26.SEP.2013 15:20:29

A. 8.3.5 Channel 4183: 30MHz –1GHz

Spurious emission limit –13dBm.

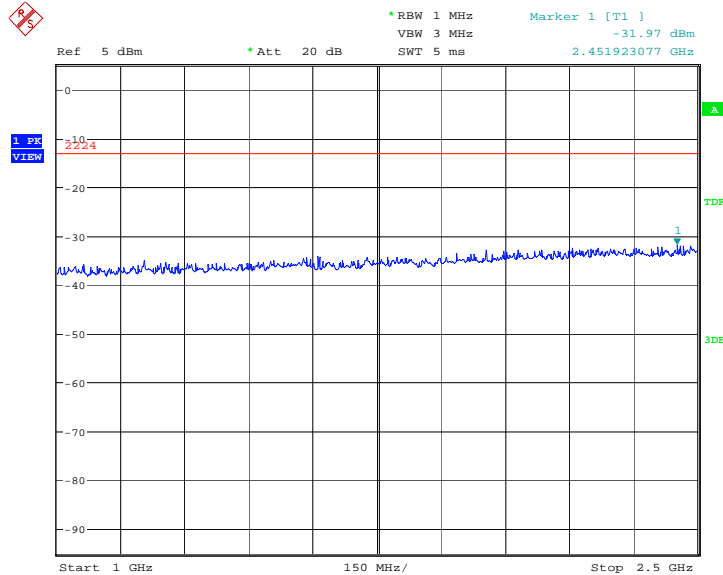
NOTE: peak above the limit line is the carrier frequency.



Date: 26.SEP.2013 15:21:30

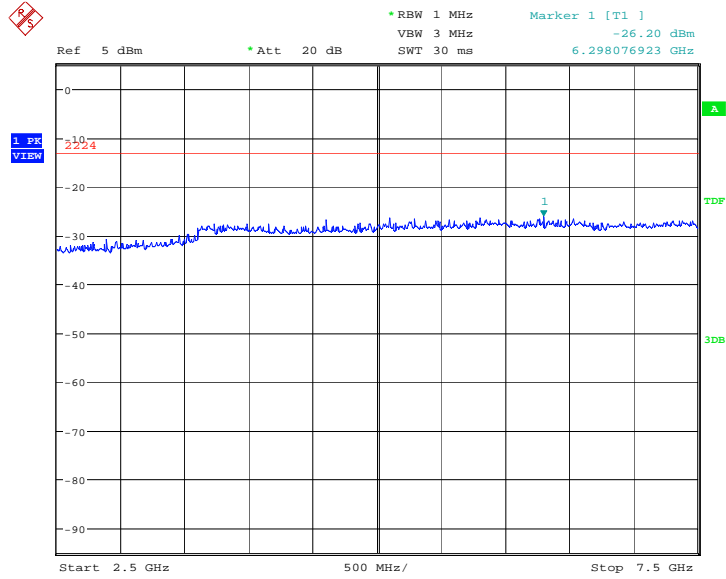
A.8.3.6 Channel 4183: 1GHz – 2.5GHz

Spurious emission limit –13dBm.



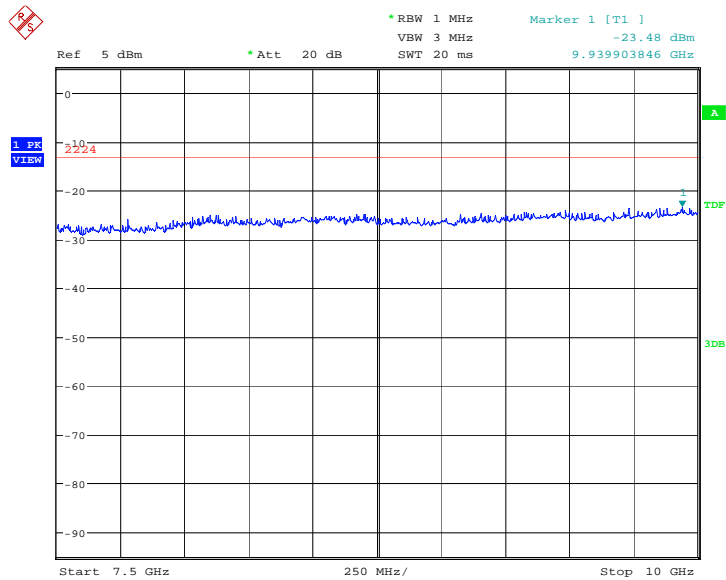
Date: 26.SEP.2013 15:21:58

A. 8.3.7 Channel 4183: 2.5GHz –7.5GHz
Spurious emission limit –13dBm.



Date: 26.SEP.2013 15:22:27

A. 8.3.8 Channel 4183: 7.5GHz – 10GHz
Spurious emission limit –13dBm.

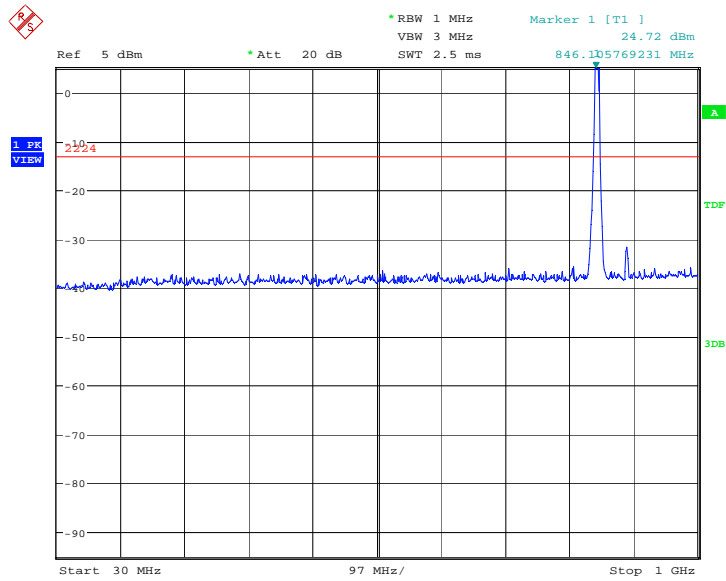


Date: 26.SEP.2013 15:22:55

A. 8.3.9 Channel 4233: 30MHz –1GHz

Spurious emission limit –13dBm.

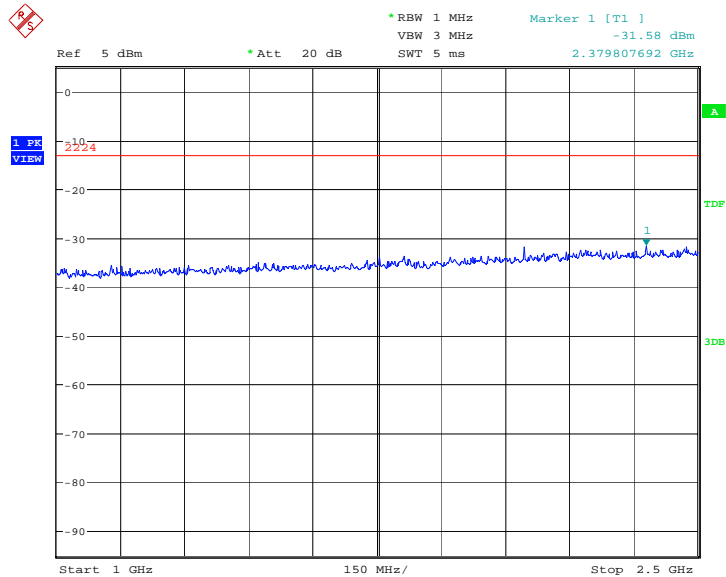
NOTE: peak above the limit line is the carrier frequency.



Date: 26.SEP.2013 15:23:39

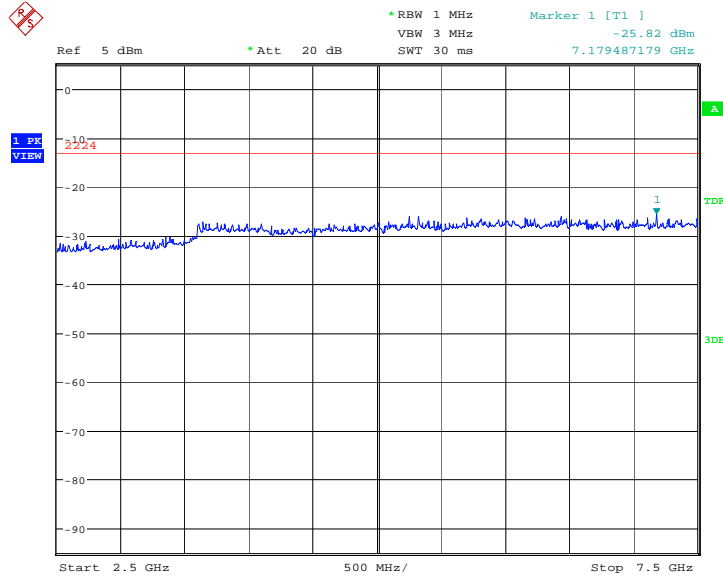
A. 8.3.10 Channel 4233: 1GHz – 2.5GHz

Spurious emission limit –13dBm.



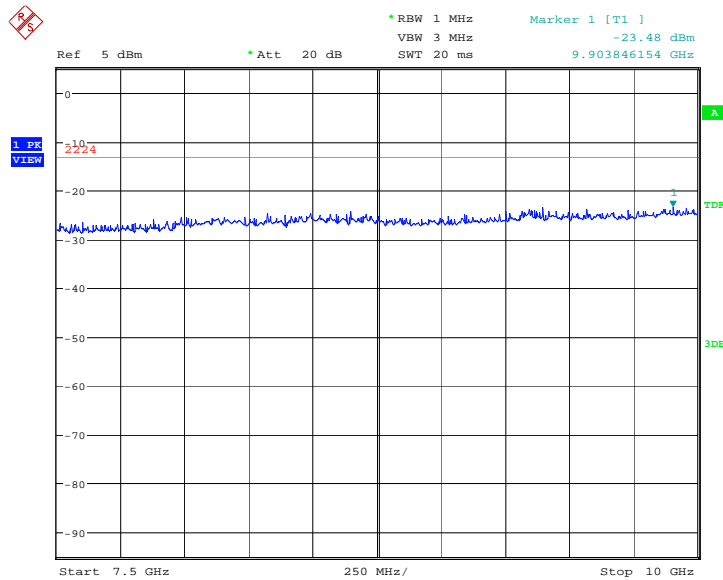
Date: 26.SEP.2013 15:24:08

A. 8.3.11 Channel 4233: 2.5GHz –7.5GHz
Spurious emission limit –13dBm.



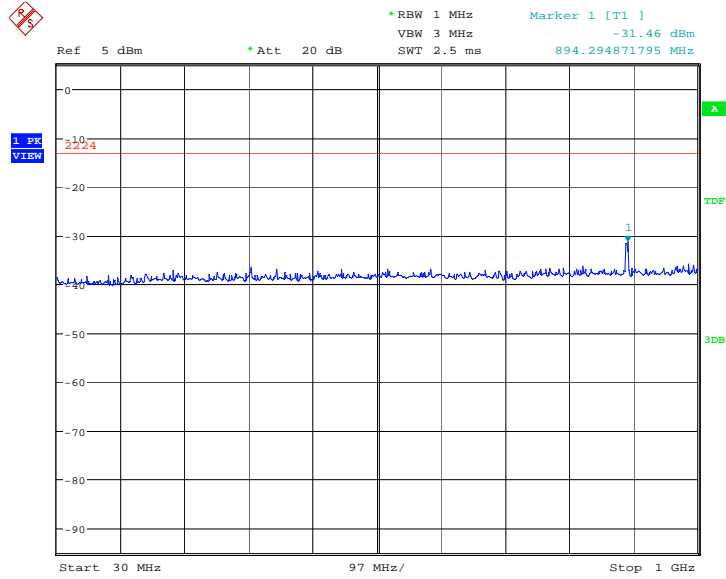
Date: 26.SEP.2013 15:24:36

A. 8.3.12 Channel 4233: 7.5GHz – 10GHz
Spurious emission limit –13dBm.



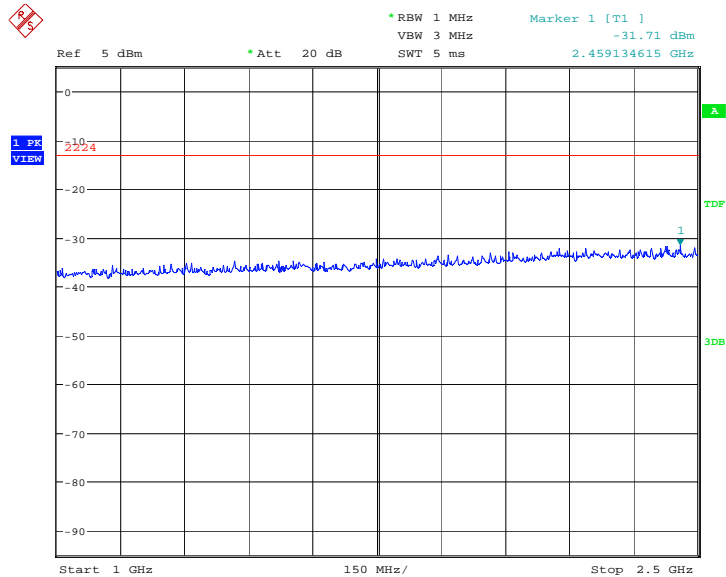
Date: 26.SEP.2013 15:25:04

A. 8.3.13 Idle mode: 30MHz – 1GHz
Spurious emission limit -13dBm.



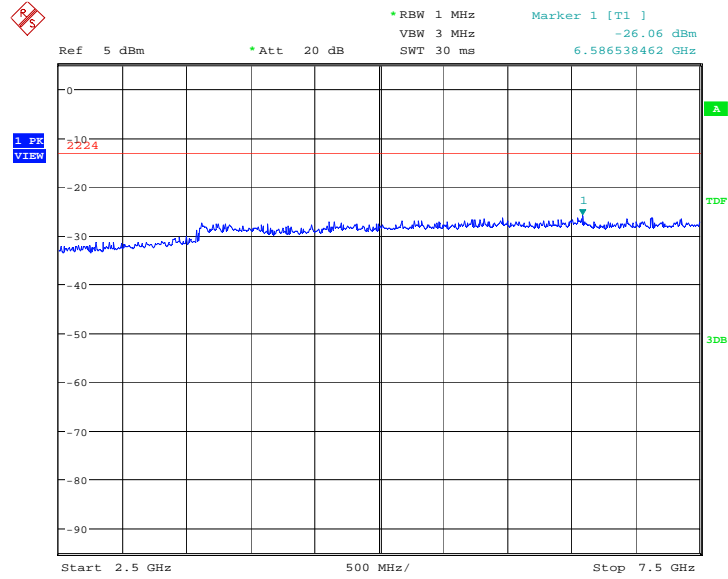
Date: 26.SEP.2013 15:28:31

A.8.3.14 Idle mode: 1GHz – 2.5GHz
Spurious emission limit -13dBm.



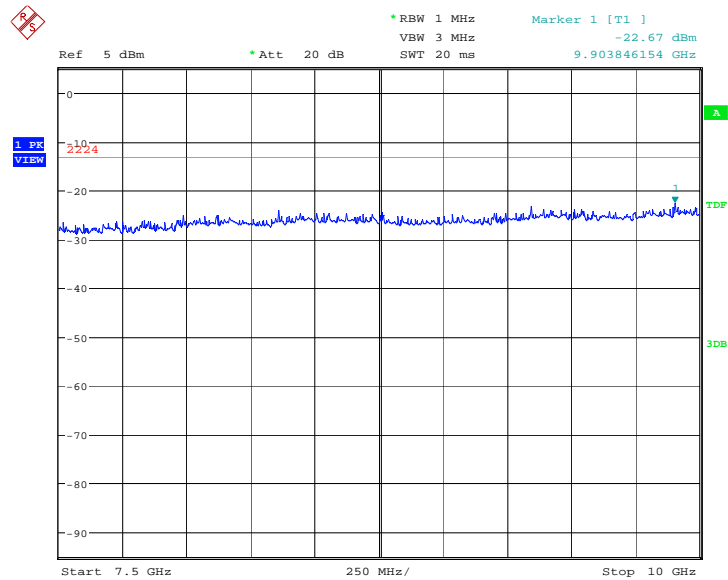
Date: 26.SEP.2013 15:28:59

A.8.3.15 Idle mode: 2.5GHz – 7.5GHz
Spurious emission limit -13dBm.



Date: 26.SEP.2013 15:29:28

A.8.3.16 Idle mode: 7.5GHz – 10GHz
Spurious emission limit -13dBm.



Date: 26.SEP.2013 15:29:56