



TEST REPORT

No. 2013TAR758

for

ZTE Corporation

Mobile Hotspot

Model Name: MF61

with

FCC ID : Q78-ZTEMF61

Hardware Version: di3C

Software Version: TF_US_MF61V1.0.0B01

Issued Date: 2013-12-25

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:

DAR 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

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

3/F Shou Xiang Technology Building, No.51 Xueyuan Road, Hai Dian District, Beijing, P. R. China,100191.

Tel:+86(0)10-62304633-2604, Fax:+86(0)10-62304633, Email:welcome@emcite.com, web: www.emcite.com

CONTENTS

1. TEST LABORATORY	3
1.1. TESTING LOCATION	3
1.2. TESTING ENVIRONMENT	3
1.3. PROJECT DATA	3
1.4. SIGNATURE.....	3
2. CLIENT INFORMATION.....	4
2.1. APPLICANT INFORMATION.....	4
2.2. MANUFACTURER INFORMATION.....	4
3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT (AE)	5
3.1. ABOUT EUT	5
3.2. INTERNAL IDENTIFICATION OF EUT USED DURING THE TEST	5
3.3. INTERNAL IDENTIFICATION OF AE USED DURING THE TEST	5
3.4. NORMAL ACCESSORY SETTING.....	6
3.5. GENERAL DESCRIPTION	6
4. REFERENCE DOCUMENTS	7
4.1. REFERENCE DOCUMENTS FOR TESTING.....	7
5. LABORATORY ENVIRONMENT.....	8
6. SUMMARY OF TEST RESULTS	9
7. TEST EQUIPMENTS UTILIZED	10
ANNEX A: MEASUREMENT RESULTS.....	11
A.1 OUTPUT POWER.....	11
A.2 EMISSION LIMIT.....	15
A.3 CONDUCTED EMISSION	20
A.4 FREQUENCY STABILITY	22
A.5 OCCUPIED BANDWIDTH	24
A.6 EMISSION BANDWIDTH.....	28
A.7 BAND EDGE COMPLIANCE	32
A.8 CONDUCTED SPURIOUS EMISSION	34

1. Test Laboratory

1.1. Testing Location

Company Name: TMC Beijing, Telecommunication Metrology Center of MIIT
Address: 3/F Shou Xiang Technology Building, No.51 Xueyuan Road, Hai
Dian District, Beijing, P. R. China
Postal Code: 100191
Telephone: 00861062304633
Fax: 00861062304633

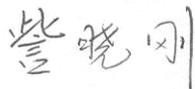
1.2. Testing Environment

Normal Temperature: 15-35°C
Relative Humidity: 20-75%

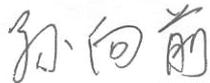
1.3. Project data

Testing Start Date: 2013-09-18
Testing End Date: 2013-12-25

1.4. Signature



Zi Xiaogang
(Prepared this test report)



Sun Xiangqian
(Reviewed this test report)



Lu Bingsong
Deputy Director of the laboratory
(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name: ZTE CORPORATION
Address /Post: ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan
District, Shenzhen, Guangdong, 518057, P.R. China
City: Shenzhen
Postal Code: 518057
Country: China
Telephone: +86-21-68897541
Fax: +86-21-50801070

2.2. Manufacturer Information

Company Name: ZTE CORPORATION
Address /Post: ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan
District, Shenzhen, Guangdong, 518057, P.R. China
City: Shenzhen
Postal Code: 518057
Country: China
Telephone: +86-21-68897541
Fax: +86-21-50801070

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

3.1. About EUT

Description	Mobile Hotspot
Model Name	MF61
FCC ID	Q78-ZTEMF61
Frequency	PCS 1900MHz; WCDMA Band IV
GPRS operation mode	Class B
GPRS Class	Class 10
EGPRS Class	Class 12
Antenna	Integrated
Power supply	Battery or Charger (AC Adaptor)
Output power	28.81dBm maximum EIRP measured for PCS1900
Extreme vol. Limits	3.5VDC to 4.2VDC (nominal: 3.7VDC)
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 or IMEI	HW Version	SW Version
N12	/	di3C	TF_US_MF61V1.0.0B01
N08	868680010962124	di3C	TF_US_MF61V1.0.0B01

*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	Note
AE3	USB Cable	/	/
AE4	Battery	60101104254000767	/

AE3

Model	/
Manufacturer	ZTE
Length of headset line	100 cm

AE4

Model	Li3715T42P3h654251
Manufacturer	ZTE CORPORATION
Capacitance	1500 mAh
Nominal Voltage	3.7V

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

3.4. Normal Accessory setting

Fully charged battery was used during the test;

3.5. General Description

The Equipment Under Test (EUT) is a model of Mobile Hotspot with integrated antenna. Manual and specifications of the EUT were provided to fulfil the test. Samples undergoing test were selected by the Client.

4. Reference Documents

4.1. Reference Documents for testing

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

Reference	Title	Version
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	2003
FCC Part 2	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS	10-1-12 Edition
FCC Part 24	PERSONAL COMMUNICATIONS SERVICES	10-1-12 Edition
KDB971168 D01	Procedures for Compliance Measurement of the Fundamental Emission Power of Licensed Wideband (> 1 MHz) Digital Transmission Systems	2011

5. LABORATORY ENVIRONMENT

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

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. =20 %, Max. = 80 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 2 MΩ
Ground system resistance	< 0.5 Ω

Fully-anechoic chamber 2 (8.6 meters×6.1 meters×3.85 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 2 MΩ
Ground system resistance	< 1 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

Semi-anechoic chamber 2 / Fully-anechoic chamber 3 (10 meters×6.7 meters×6.15 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 2 MΩ
Ground system resistance	< 0.5 Ω
Normalised site attenuation (NSA)	< ±3.5 dB, 3 m distance
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

6. SUMMARY OF TEST RESULTS

PCS 1900

Items	Test Name	Section in this report	Verdict
1	Output Power	A.1	P
2	Emission Limit	A.2	P
3	CONDUCTED EMISSION	A.3	P
4	Frequency Stability	A.4	P
5	Occupied Bandwidth	A.5	P
6	Emission Bandwidth	A.6	P
7	Band Edge Compliance	A.7	P
8	Conducted Spurious Emission	A.8	P

7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE
1	Test Receiver	ESCI	100344	R&S	2014-03-28
2	Test Receiver	ESU26	100235	R&S	2014-01-05
3	EMI Antenna	VULB 9163	514	Schwarzbeck	2014-11-10
4	EMI Antenna	3117	00139065	ETS-Lindgren	2014-07-31
5	LISN	ESH2-Z5	829991/012	R&S	2014-04-15
6	Universal Radio Communication Tester	CMU200	102228	R&S	2014-06-23
7	Universal Radio Communication Tester	E5515C	MY48361083	Agilent	2014-03-16
8	Spectrum Analyzer	E4440A	MY48250642	Agilent	2014-03-04
9	EMI Antenna	9117	177	Schwarzbeck	2014-06-29
10	EMI Antenna	VULB 9163	482	Schwarzbeck	2014-02-17
11	EMI Antenna	3117	00119024	ETS-Lindgren	2014-02-02
12	EMI Antenna	3117	00058889	ETS-Lindgren	2014-02-02
13	Signal Generator	N5183A	MY49060052	Agilent	2014-03-18
14	Climatic chamber	PL-2G	343074	ESPEC	2014-05-11

ANNEX A: MEASUREMENT RESULTS

A.1 OUTPUT POWER

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 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 Rhode & Schwarz Spectrum Analyzer FSU (peak) These measurements were done at 3 frequencies, 1850.2 MHz, 1880.0MHz and 1909.8MHz for PCS1900 band. (bottom, middle and top of operational frequency range).

A.1.2.2 Test Condition

RBW	VBW	Sweep Time	Span
1MHz	1MHz	300ms	10MHz

PCS1900

Limit

	Power step	Nominal Peak output power (dBm)	Power & Multislot class	Operation class
GPRS	3	30dBm(1W)	10	B
EGPRS	5	26dBm(0.4W)	12	B

Measurement result

GPRS(GMSK, 1Slot)

Frequency(MHz)	Power Step	Output power(dBm)
1850.2	3	29.05
1880.0	3	28.96
1909.8	3	29.12

EGPRS(GMSK, 1Slot)

Frequency(MHz)	Power Step	Output power(dBm)
1850.2	5	26.26
1880.0	5	26.13
1909.8	5	26.32

A.1.3 Radiated

A.1.3.1 Description

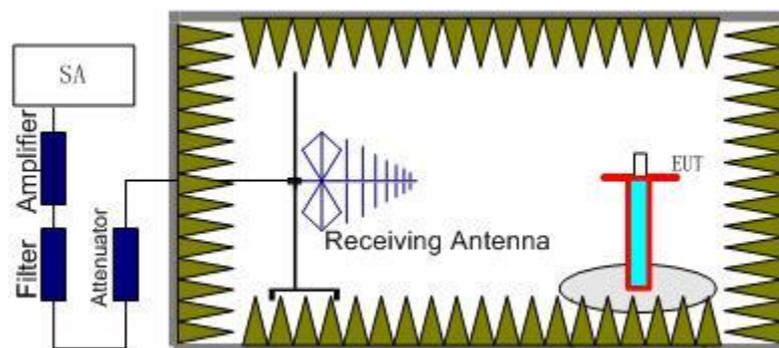
This is the test for the maximum radiated power from the EUT.

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."

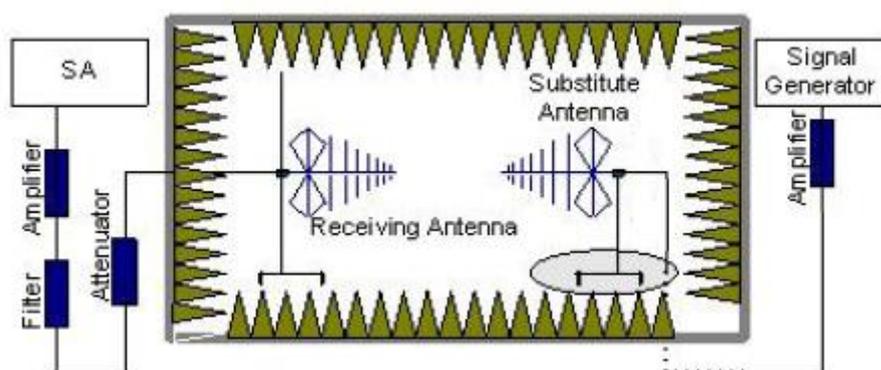
A.1.3.2 Method of Measurement

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 (P_r).
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, $ERP = EIRP - 2.15\text{dBi}$.

PCS1900-EIRP

Limits

	Power Step	Burst Peak EIRP (dBm)
GPRS	3	≤33dBm (2W)
EGPRS	5	≤33dBm (2W)

Measurement result

GPRS (GMSK, 1 slot)

Frequency (MHz)	P _{mea} (dBm)	Cable Loss (dB)	P _{Ag} (dB)	Antenna Gain (dBi)	RMS EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1850.20	-25.46	3.19	-50.00	-4.56	25.91	33.00	7.09	V
1880.00	-23.22	3.11	-50.00	-4.43	28.10	33.00	4.90	V
1909.80	-22.31	3.18	-50.00	-4.30	28.81	33.00	4.19	H

EGPRS (8PSK, 1 slot)

Frequency (MHz)	P _{mea} (dBm)	Cable Loss (dB)	P _{Ag} (dB)	Antenna Gain (dBi)	RMS EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1850.20	-25.79	3.19	-50.00	-4.56	25.58	33.00	7.42	V
1880.00	-26.26	3.11	-50.00	-4.43	25.06	33.00	7.94	V
1909.80	-24.47	3.18	-50.00	-4.30	26.65	33.00	6.35	H

Frequency: 1909.80MHz

Peak EIRP(dBm)= P_{Mea}(-22.31dBm) - P_{cl}(3.18dB) - P_{Ag}(-50.00dB) - G_a (-4.30dB) =28.81dBm

ANALYZER SETTINGS: RBW = VBW = 3MHz

A.2 EMISSION LIMIT

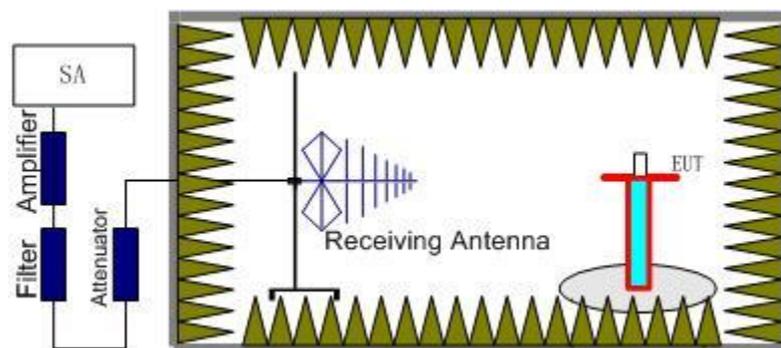
A.2.1 Measurement Method

The measurement procedures in TIA-603C-2004 are used.

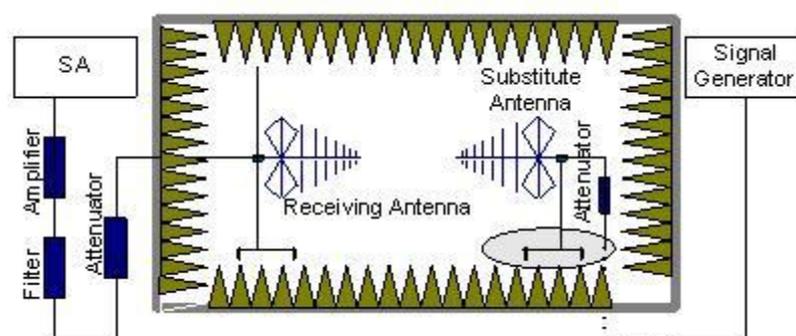
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 1910 MHz. The resolution bandwidth is set as outlined in Part 24.238. The spectrum is scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of PCS1900

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 (P_r).
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. 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.

A 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 (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.2.2 Measurement Limit

Part 24.238 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 PCS1900 (1850.2 MHz, 1880 MHz and 1909.8 MHz). 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 PCS1900 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.2.4 Measurement Results Table

Frequency	Channel	Frequency Range	Result
GPRS 1900MHz	Low	30MHz-20GHz	Pass
	Middle	30MHz-20GHz	Pass
	High	30MHz-20GHz	Pass

A.2.5 Sweep Table

Working Frequency	Subrange (GHz)	RBW	VBW	Sweep time (s)
1900MHz	0.03~1	1 MHz	3 MHz	10
	1-2	1 MHz	3 MHz	2
	2~5	1 MHz	3 MHz	3
	5~8	1 MHz	3 MHz	3
	8~11	1 MHz	3 MHz	3
	11~14	1 MHz	3 MHz	3
	14~18	1 MHz	3 MHz	3
	18~20	1 MHz	3 MHz	2

GPRS Mode Channel 512/1850.2MHz

Frequency(MHz)	Pmea(dBm)	Cable Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
3700.48	-34.53	4.44	-8.14	-30.83	-13.00	17.83	H
5550.67	-22.72	5.46	-10.02	-18.16	-13.00	5.16	H
7401.08	-40.00	6.42	-11.34	-35.08	-13.00	22.08	V
9251.19	-38.26	7.65	-12.60	-33.31	-13.00	20.31	V
11101.45	-40.31	8.40	-12.40	-36.31	-13.00	23.31	V
12951.54	-34.63	8.86	-13.24	-30.25	-13.00	17.25	V

GPRS Mode Channel 661/1880.0MHz

Frequency(MHz)	Pmea(dBm)	Cable Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
3759.84	-36.85	4.52	-8.21	-33.16	-13.00	20.16	H
5639.93	-27.68	5.45	-10.06	-23.07	-13.00	10.07	H
7520.16	-37.55	6.82	-11.42	-32.95	-13.00	19.95	V
9400.01	-40.00	7.45	-12.60	-34.85	-13.00	21.85	V
11280.20	-40.42	8.55	-12.40	-36.57	-13.00	23.57	V
13160.21	-30.27	9.14	-13.46	-25.95	-13.00	12.95	V

GPRS Mode Channel 810/1909.8MHz

Frequency(MHz)	Pmea(dBm)	Cable Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
3819.71	-38.13	4.50	-8.28	-34.35	-13.00	21.35	H
5729.35	-32.66	5.55	-10.09	-28.12	-13.00	15.12	V
7639.40	-35.42	6.72	-11.54	-30.60	-13.00	17.60	H
9549.01	-42.40	7.79	-12.58	-37.61	-13.00	24.61	V
11459.05	-37.32	8.64	-12.40	-33.56	-13.00	20.56	V
13369.12	-25.43	9.07	-13.67	-20.83	-13.00	7.83	V

A.3 CONDUCTED EMISSION

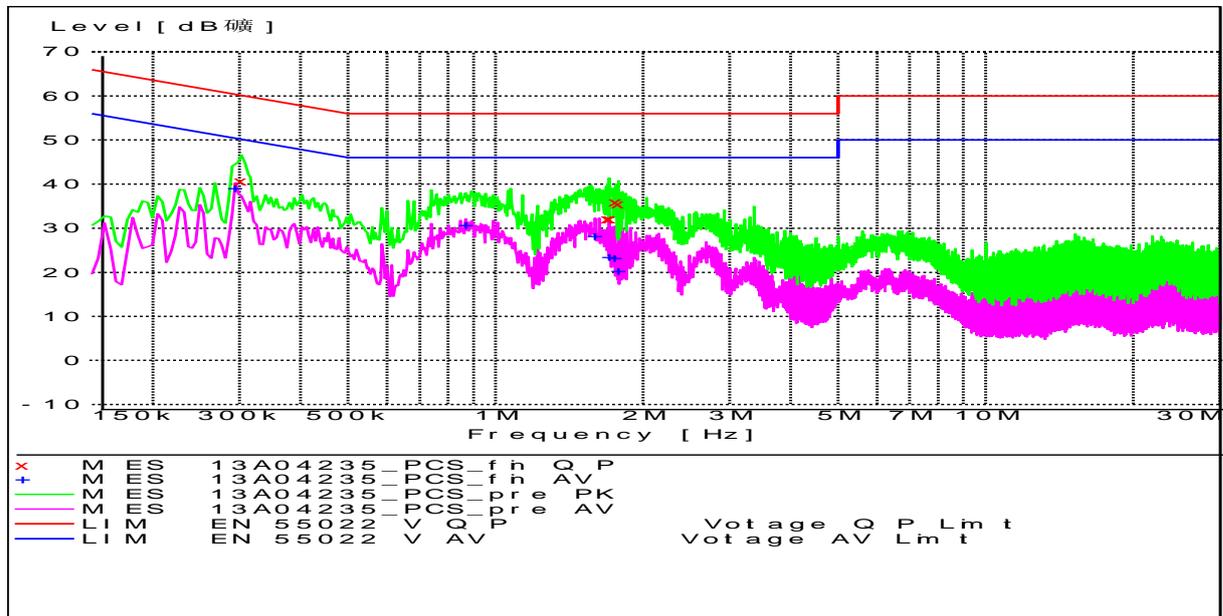
The measurement procedure in ANSI C63.4-1003 is used. Conducted Emission is measured with travel charger.

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
PCS1900MHz



MEASUREMENT RESULT: "13A04235_PCS_fin QP"

18/09/2013 19:57

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Line	PE
0.303000	40.70	9.8	60	19.5	L1	GND
1.693500	32.00	9.7	56	24.0	N	GND
1.702500	32.00	9.7	56	24.0	N	GND
1.711500	32.10	9.7	56	23.9	N	GND
1.761000	35.90	9.7	56	20.1	L1	GND
1.779000	35.40	9.7	56	20.6	L1	GND

MEASUREMENT RESULT: "13A04235_PCS_fin AV"

18/09/2013 19:57

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Line	PE
0.294000	39.10	9.8	50	11.3	N	GND
0.870000	30.80	9.8	46	15.2	N	GND
1.594500	28.30	9.7	46	17.7	N	GND
1.702500	23.60	9.7	46	22.4	L1	GND
1.747500	23.20	9.7	46	22.8	L1	GND
1.779000	20.30	9.7	46	25.7	N	GND

A.4 FREQUENCY STABILITY

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 channel 661 for PCS 1900 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. Remeasure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments remeasuring 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

A.4.2.1 For Hand carried battery powered equipment

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 4.2VDC, 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 of -10 % and +12.5 %. For the purposes of measuring frequency stability these voltage limits are to be used.

A.4.2.2 For equipment powered by primary supply voltage

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. 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.4.3 Measurement results

PCS 1900

Frequency Error vs Voltage

Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.5	-54	0.028
3.7	-50	0.027
4.2	-52	0.028

Frequency Error vs Temperature

temperature(°C)	Frequency error(Hz)	Frequency error(ppm)
-30	-54	0.029
-20	-53	0.028
-10	-59	0.031
0	-62	0.033
10	-55	0.029
20	-55	0.029
30	-55	0.029
40	-51	0.027
50	-55	0.029

A.5 OCCUPIED BANDWIDTH

A.5.1 Occupied Bandwidth Results

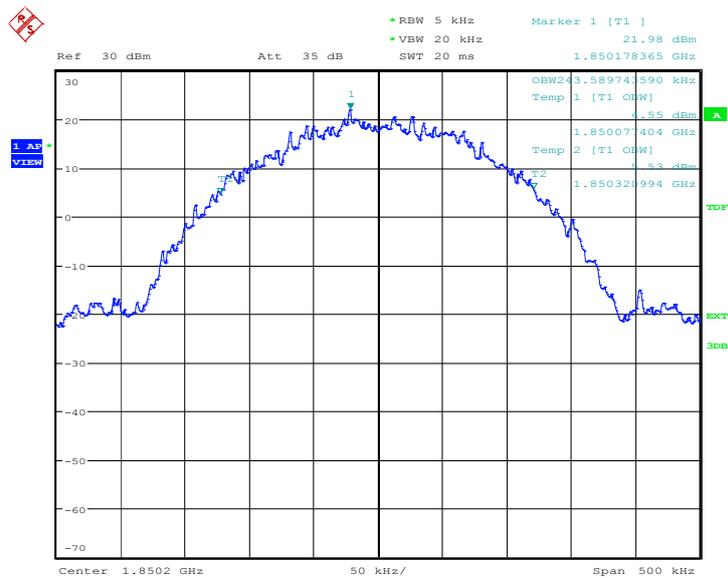
Similar to conducted emissions; occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of PCS1900 band. The table below lists the measured 99% BW. Spectrum analyzer plots are included on the following pages.

GPRS 1900(99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)
1850.2	243.590
1880.0	243.590
1909.8	244.391

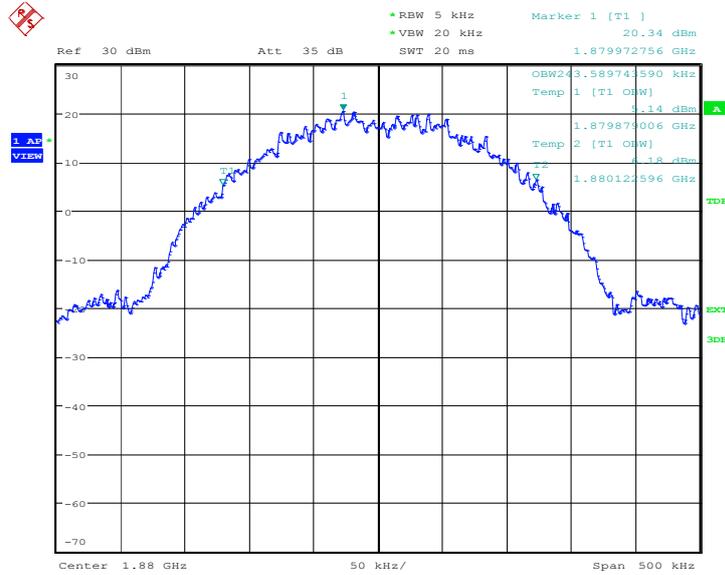
GPRS 1900

Channel 512-Occupied Bandwidth(99% BW)



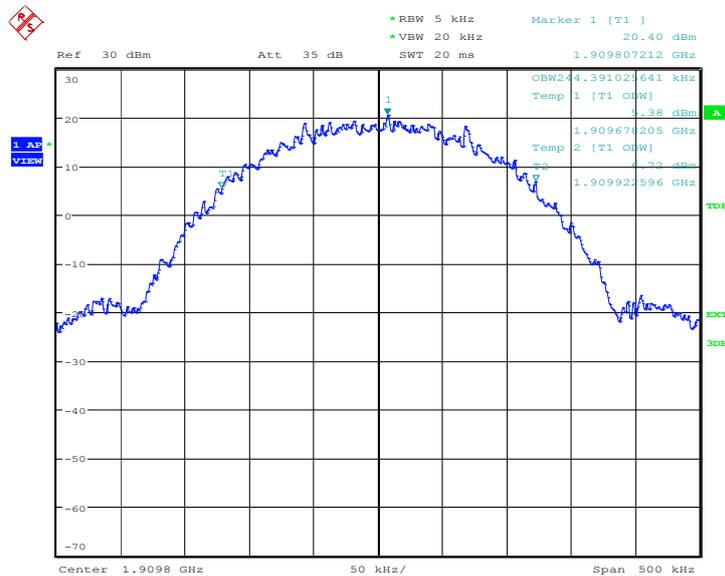
Date: 29.OCT.2013 09:17:33

Channel 661-Occupied Bandwidth (99% BW)



Date: 29.OCT.2013 09:18:05

Channel 810-Occupied Bandwidth (99% BW)

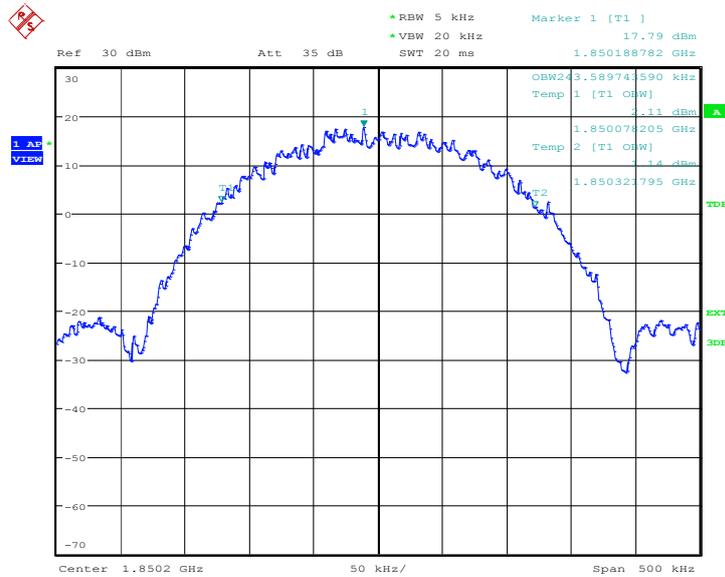


Date: 29.OCT.2013 09:18:37

EGPRS 1900-8PSK (99% BW)

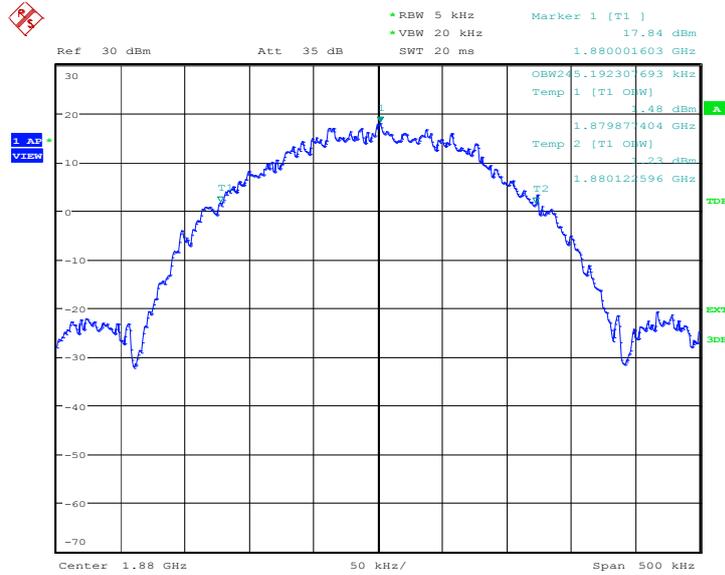
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)
1850.2	243.590
1880.0	245.192
1909.8	246.795

**EGPRS 1900-8PSK
Channel 512-Occupied Bandwidth (99% BW)**



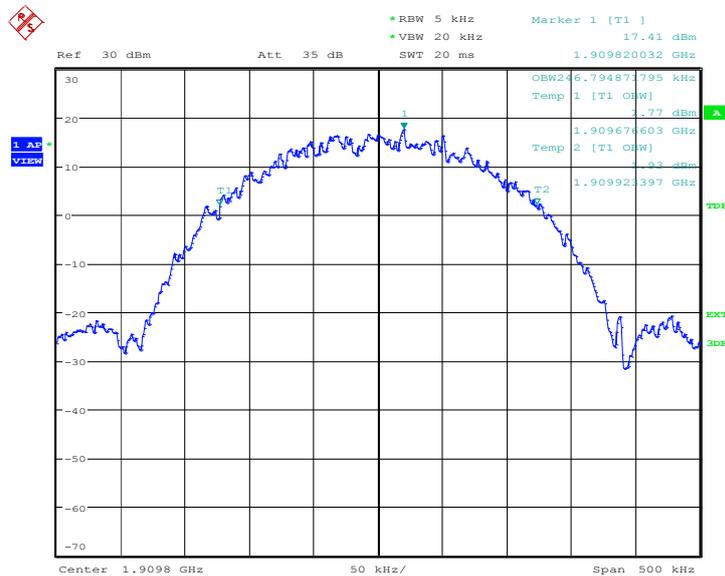
Date: 29.OCT.2013 09:25:15

Channel 661-Occupied Bandwidth (99% BW)



Date: 29.OCT.2013 09:25:47

Channel 810-Occupied Bandwidth (99% BW)



Date: 29.OCT.2013 09:26:19

A.6 EMISSION BANDWIDTH

A.6.1 Emission Bandwidth Results

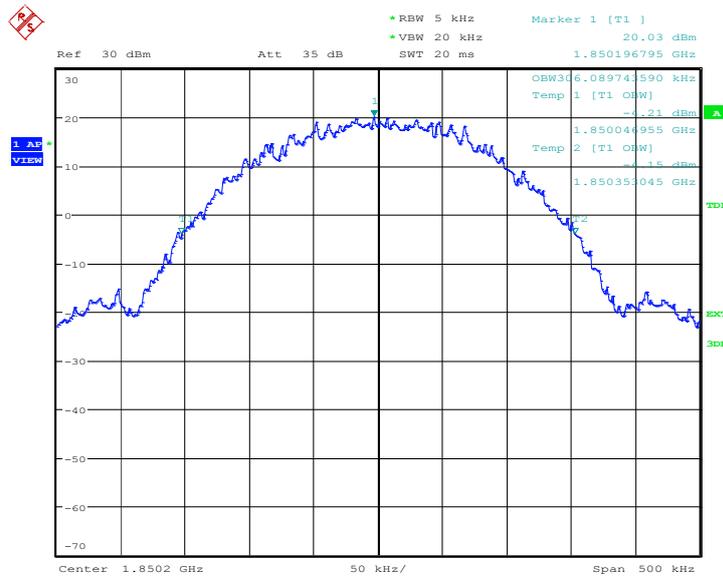
Similar to conducted emissions; Emission bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of PCS1900 band . Table below lists the measured 100% BW. Spectrum analyzer plots are included on the following pages.

GPRS 1900(100% BW)

Frequency(MHz)	Emission Bandwidth (100% BW)(kHz)
1850.2	306.090
1880.0	309.295
1909.8	304.487

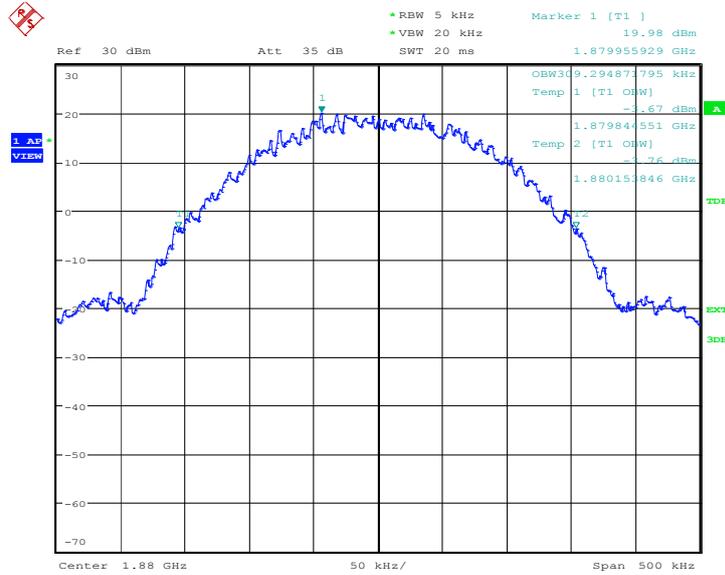
GPRS 1900

Channel 512-Emission Bandwidth (100% BW)



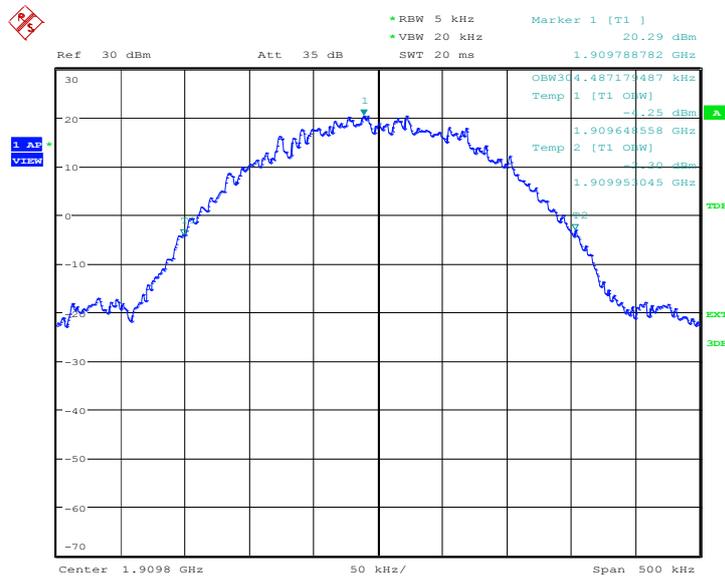
Date: 29.OCT.2013 09:19:11

Channel 661-Emission Bandwidth (100% BW)



Date: 29.OCT.2013 09:19:43

Channel 810-Emission Bandwidth (100% BW)



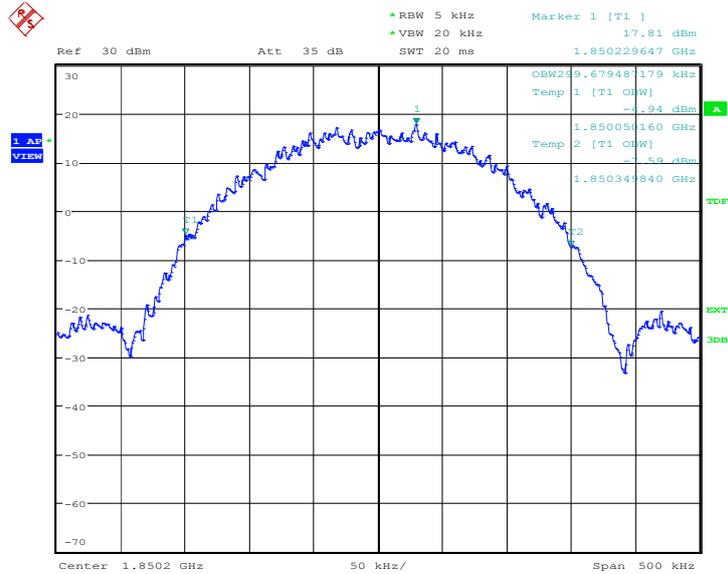
Date: 29.OCT.2013 09:20:15

EGPRS 1900-8PSK (100% BW)

Frequency(MHz)	Emission Bandwidth (100% BW)(kHz)
1850.2	299.679
1880.0	300.481
1909.8	302.083

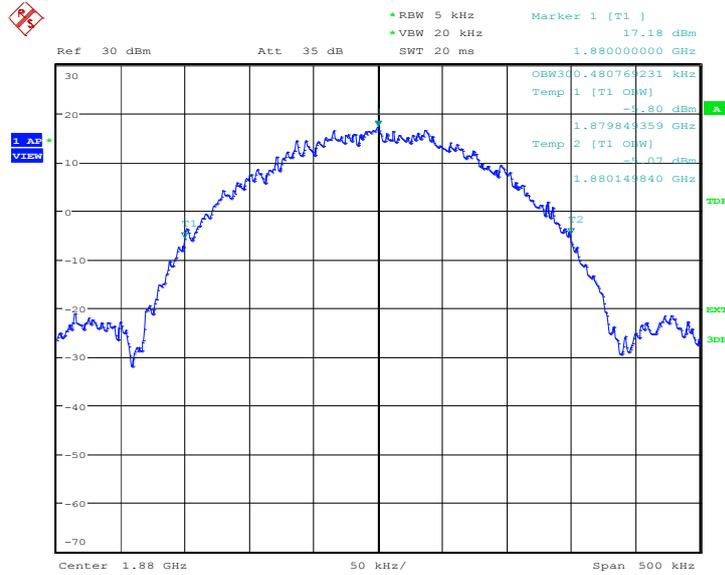
EGPRS 1900-8PSK

Channel 512-Emission Bandwidth (100% BW)



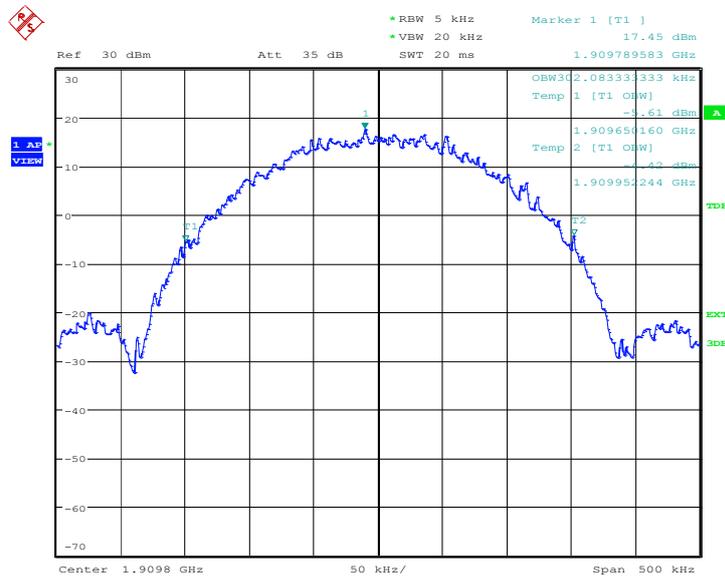
Date: 29.OCT.2013 09:26:53

Channel 661-Emission Bandwidth (100% BW)



Date: 29.OCT.2013 09:27:25

Channel 810-Emission Bandwidth (100% BW)

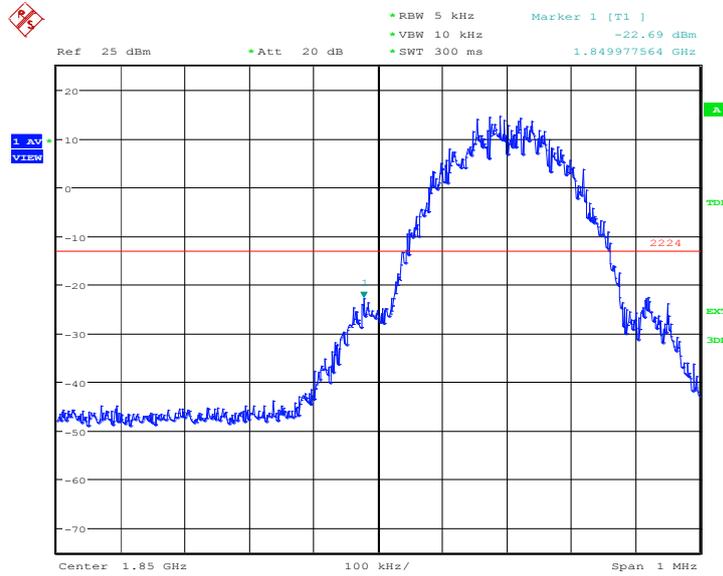


Date: 29.OCT.2013 09:27:58

A.7 BAND EDGE COMPLIANCE

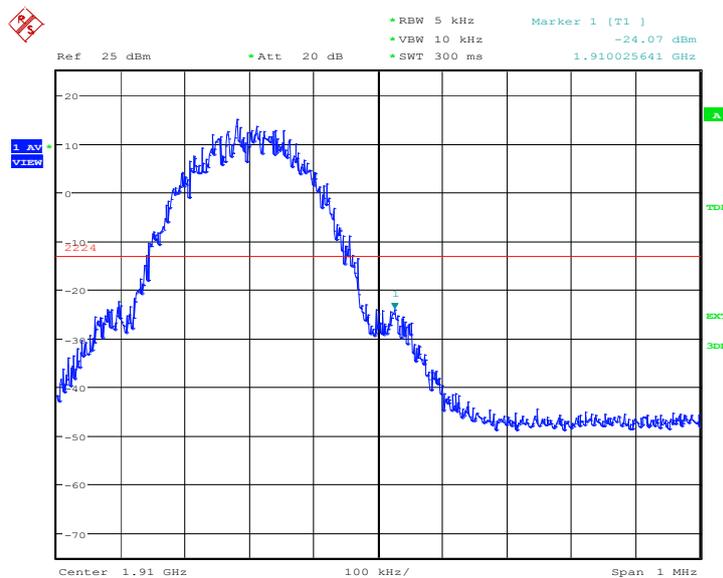
GPRS 1900

LOW BAND EDGE BLOCK-A (PCS-1900)-Channel 512



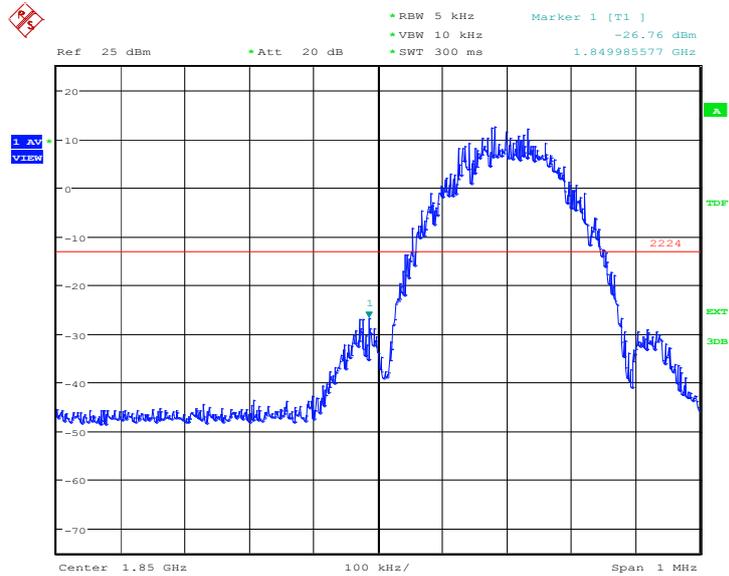
Date: 29.OCT.2013 09:20:30

HIGH BAND EDGE BLOCK-C (PCS-1900) -Channel 810



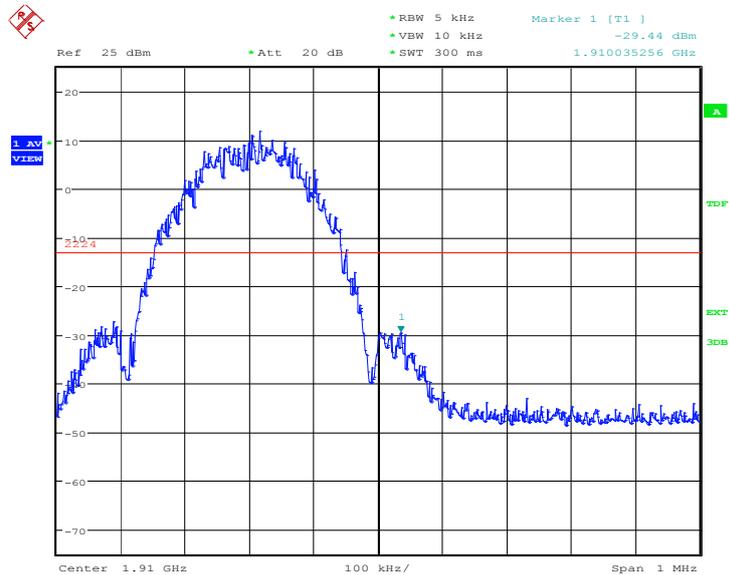
Date: 29.OCT.2013 09:20:44

**EGPRS 1900-8PSK
LOW BAND EDGE BLOCK-A (PCS-1900)-Channel 512**



Date: 29.OCT.2013 09:28:12

HIGH BAND EDGE BLOCK-C (PCS-1900) –Channel 810



Date: 29.OCT.2013 09:28:26

A.8 CONDUCTED SPURIOUS EMISSION

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 the equipment of PCS1900 band, this equates to a frequency range of 30 MHz to 19.1 GHz, data taken from 30 MHz to 20 GHz.
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.

Transmitter

Channel	Frequency (MHz)
512	1850.2
661	1880.0
810	1909.8

A. 8.2 Measurement Limit

Part 24.238 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.

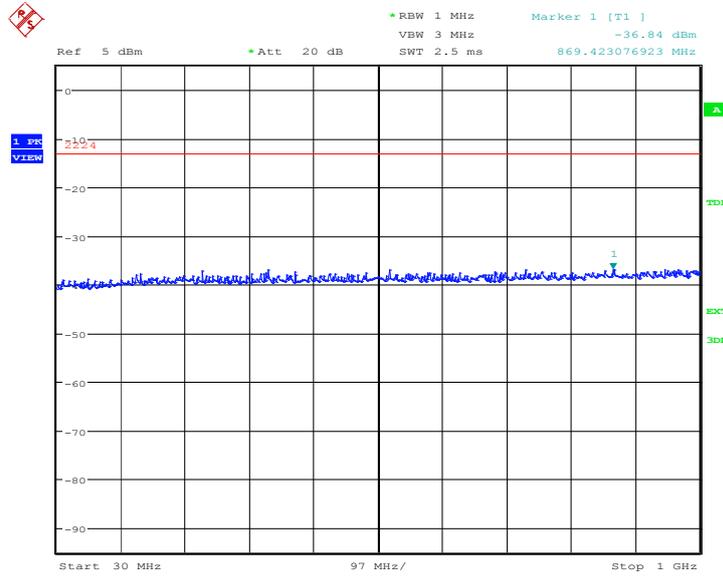
The specification that emissions shall be attenuated below the transmitter power (P) by at least $43 + 10 \log (P)$ dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 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

PCS1900

A.8.3.1 Channel 512: 30MHz – 1GHz

Spurious emission limit –13dBm.

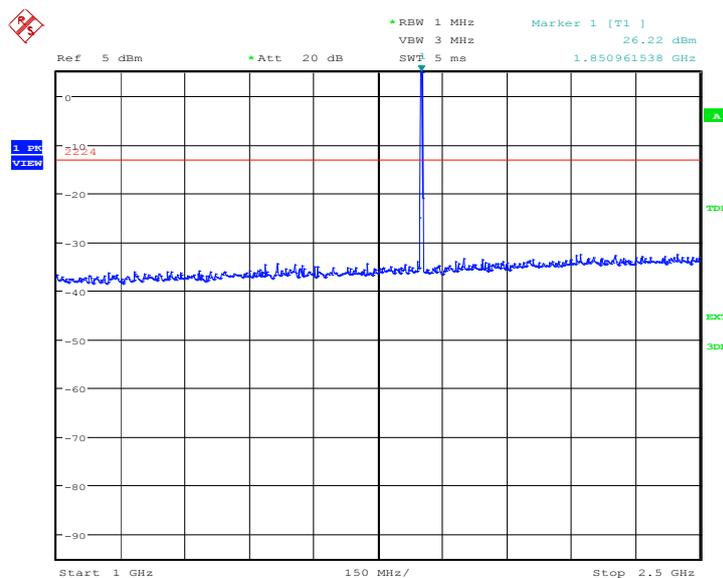


Date: 1.NOV.2013 10:26:08

A.8.3.2 Channel 512: 1GHz – 2.5GHz

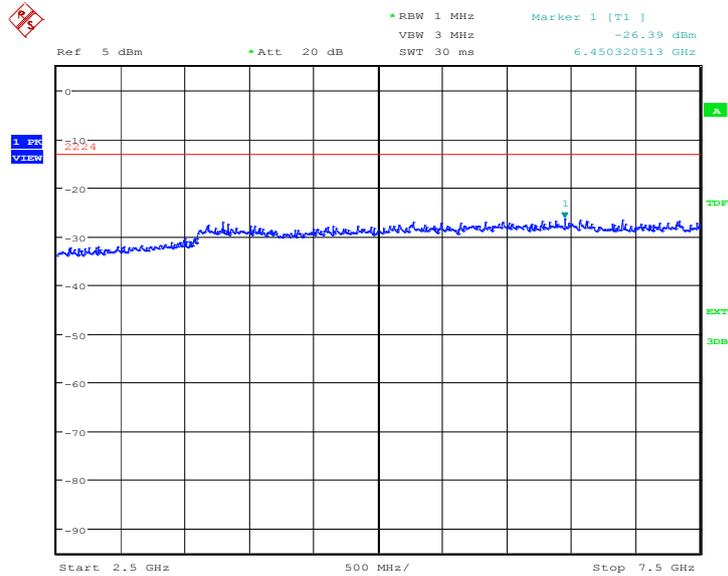
Spurious emission limit –13dBm.

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



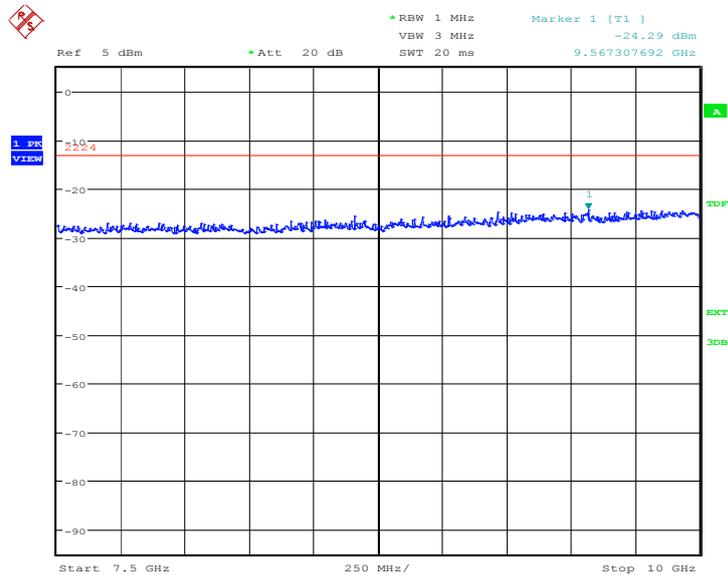
Date: 1.NOV.2013 10:26:36

A.8.3.3 Channel 512: 2.5GHz – 7.5GHz
Spurious emission limit –13dBm.



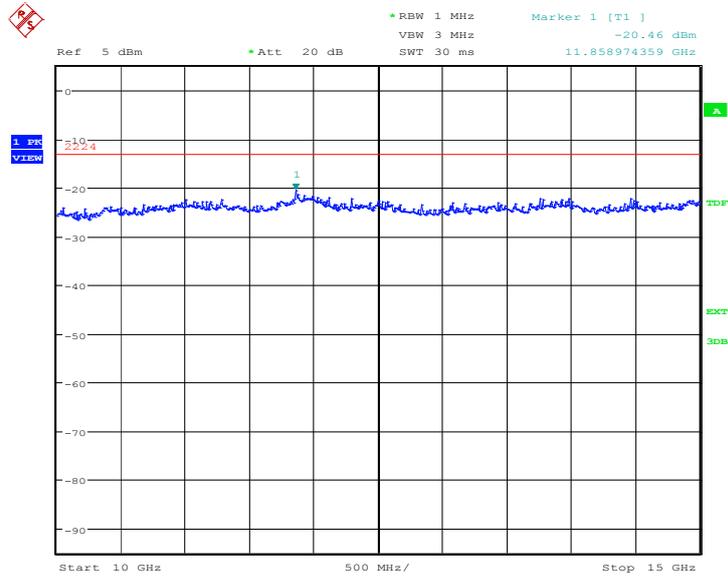
Date: 1.NOV.2013 10:27:04

A.8.3.4 Channel 512: 7.5GHz –10GHz
Spurious emission limit –13dBm.



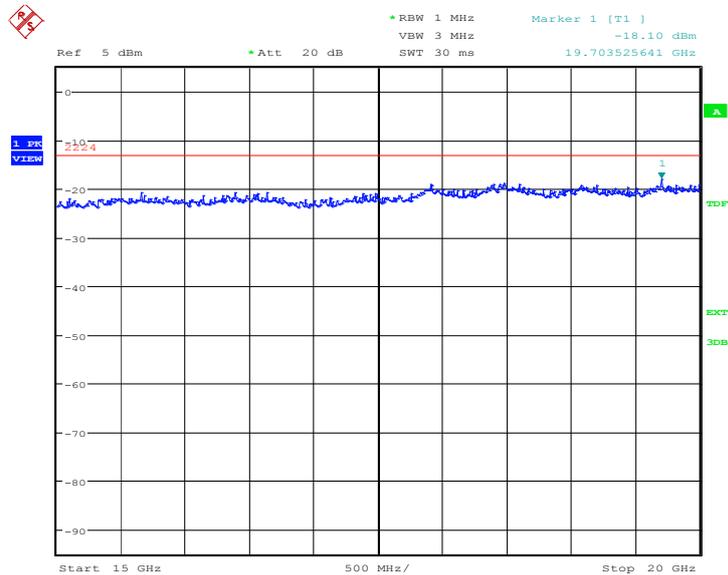
Date: 1.NOV.2013 10:27:32

A.8.3.5 Channel 512: 10GHz –15GHz
Spurious emission limit –13dBm.



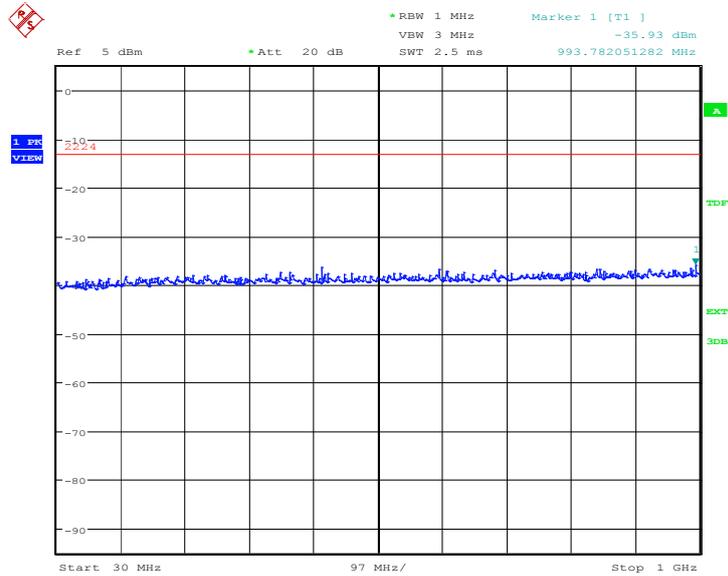
Date: 1.NOV.2013 10:28:01

A.8.3.6 Channel 512: 15GHz –20GHz
Spurious emission limit –13dBm.



Date: 1.NOV.2013 10:28:29

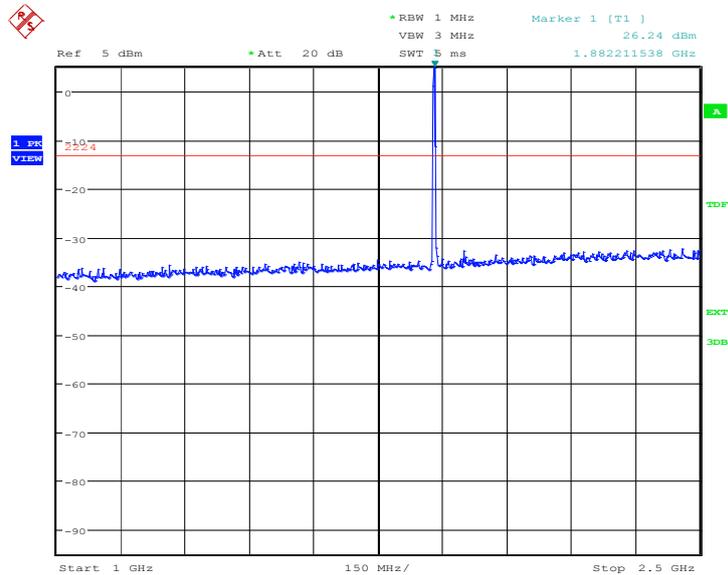
A.8.3.7 Channel 661: 30MHz – 1GHz
Spurious emission limit –13dBm



Date: 1.NOV.2013 10:28:58

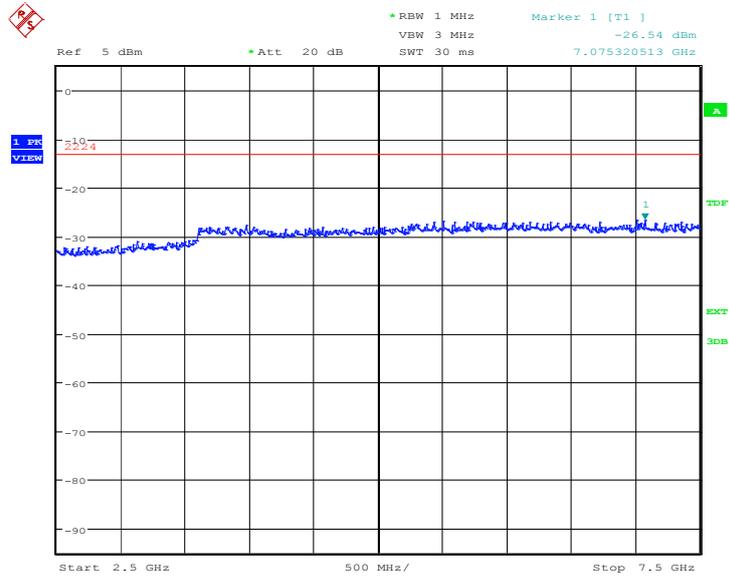
A.8.3.8 Channel 661: 1GHz –2.5GHz
Spurious emission limit –13dBm

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



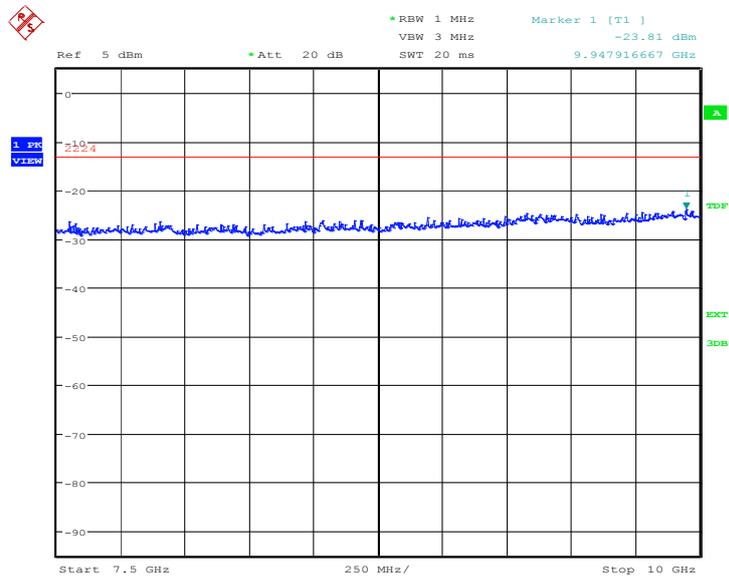
Date: 1.NOV.2013 10:29:26

A.8.3.9 Channel 661: 2.5GHz –7.5GHz
Spurious emission limit –13dBm



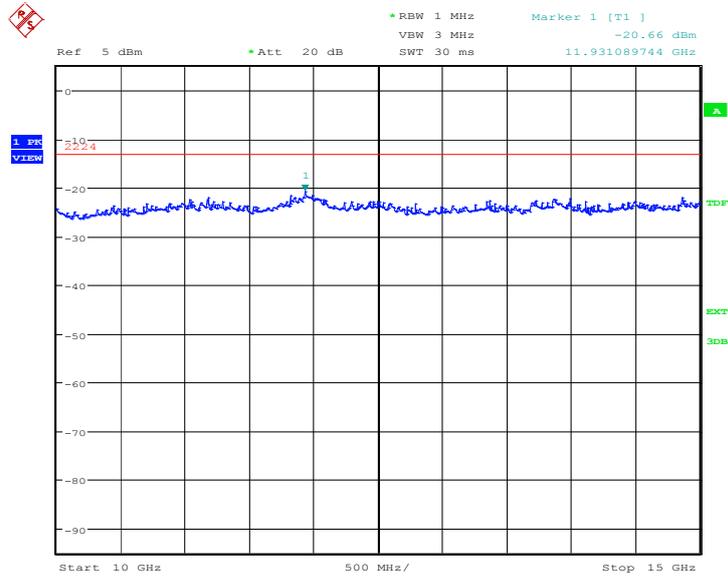
Date: 1.NOV.2013 10:29:54

A.8.3.10 Channel 661: 7.5GHz –10GHz
Spurious emission limit –13dBm



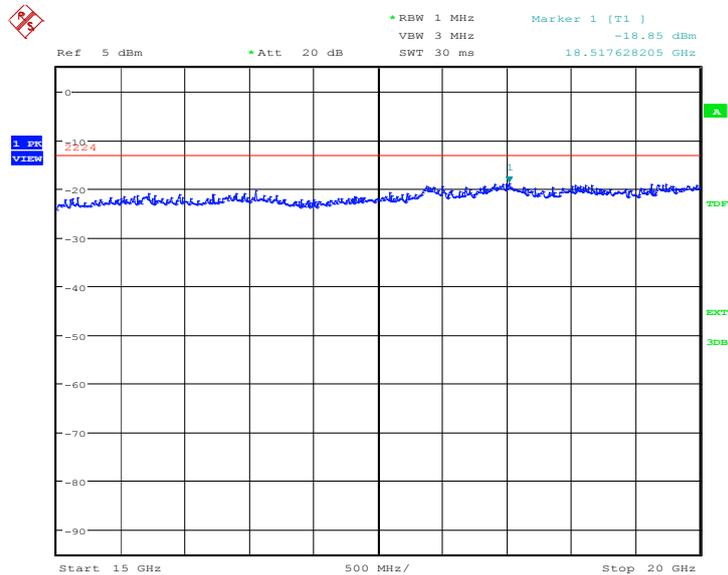
Date: 1.NOV.2013 10:30:22

A.8.3.11 Channel 661: 10GHz –15GHz
Spurious emission limit –13dBm.



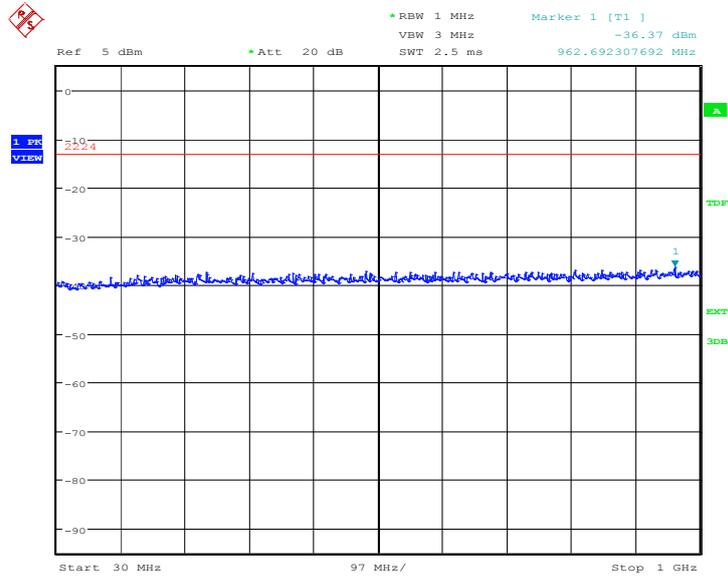
Date: 1.NOV.2013 10:30:50

A.8.3.12 Channel 661: 15GHz –20GHz
Spurious emission limit –13dBm.



Date: 1.NOV.2013 10:31:19

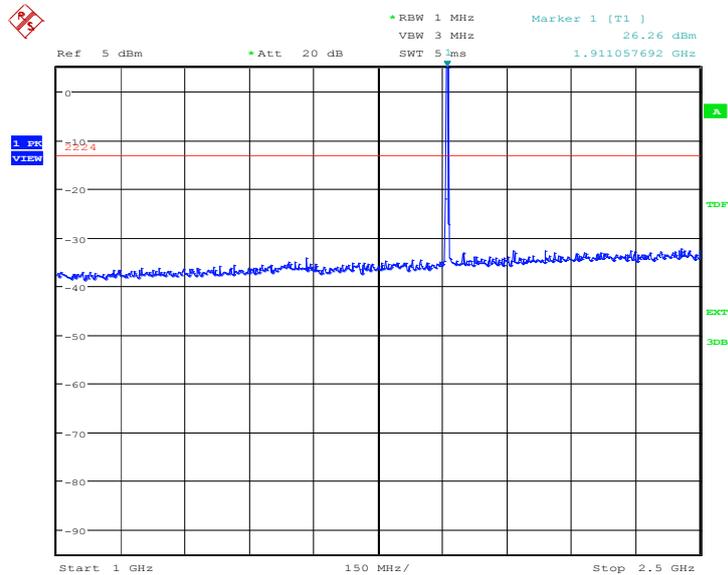
A.8.3.13 Channel 810: 30MHz – 1GHz
Spurious emission limit –13dBm.



Date: 1.NOV.2013 10:31:48

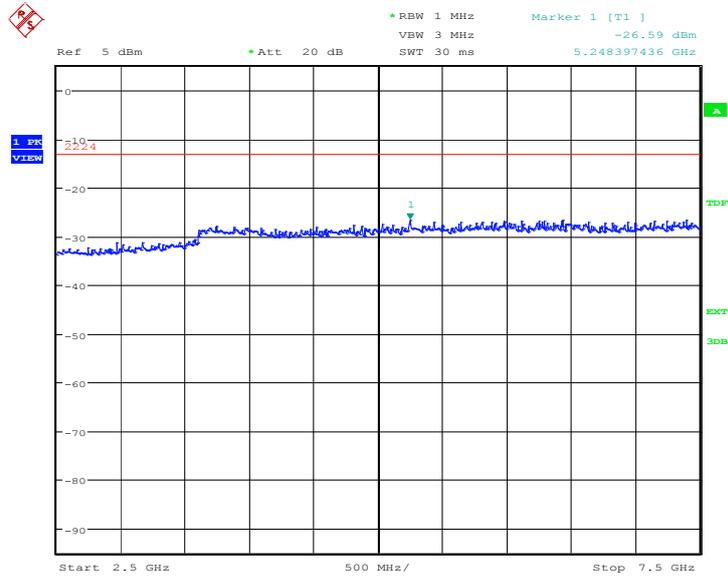
A.8.3.14 Channel 810: 1GHz – 2.5GHz
Spurious emission limit –13dBm.

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



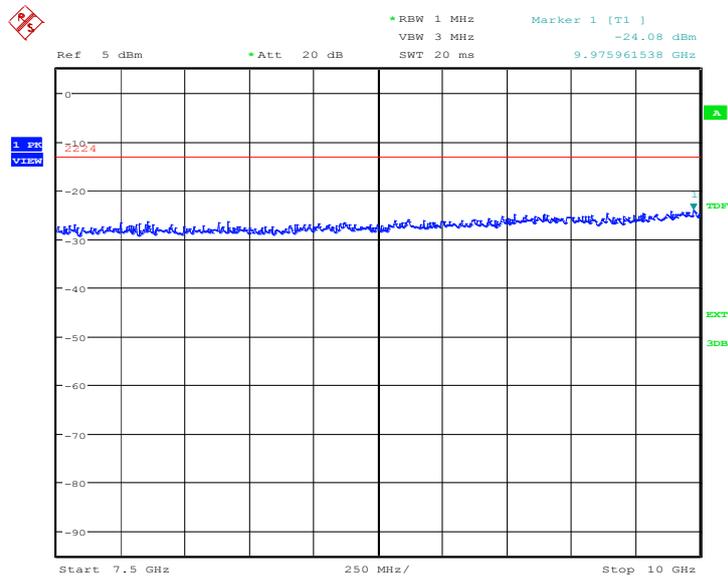
Date: 1.NOV.2013 10:32:16

A.8.3.15 Channel 810:2.5GHz – 7.5GHz
Spurious emission limit –13dBm.



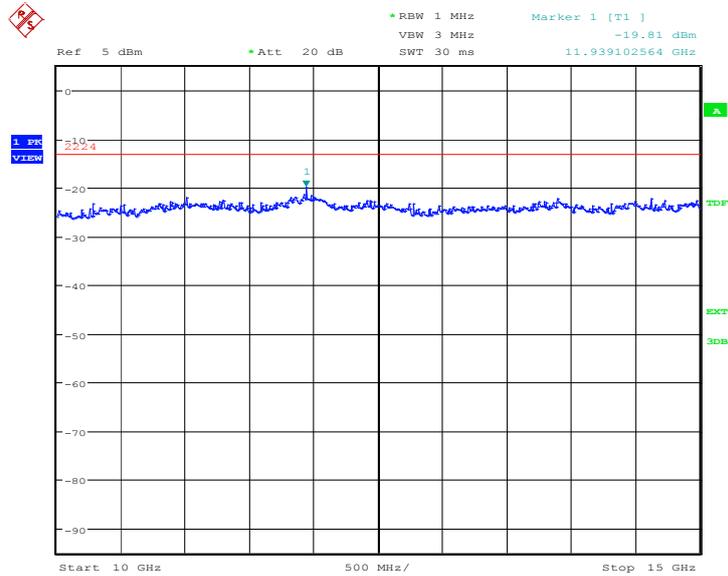
Date: 1.NOV.2013 10:32:44

A.8.3.16 Channel 810: 7.5GHz – 10GHz
Spurious emission limit –13dBm.



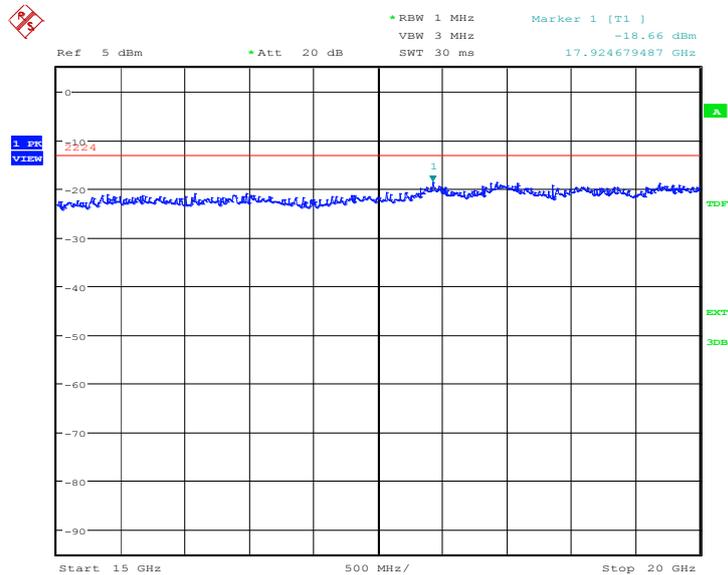
Date: 1.NOV.2013 10:33:12

A.8.3.17 Channel 810: 10GHz –15GHz
Spurious emission limit –13dBm.



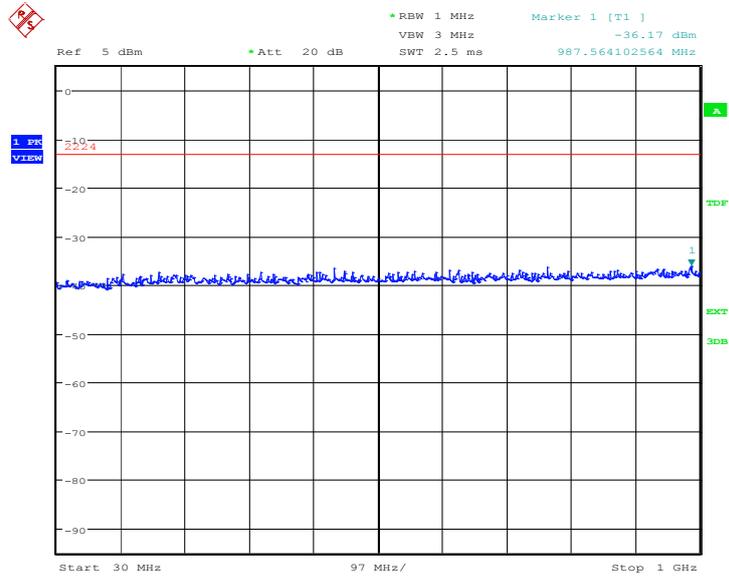
Date: 1.NOV.2013 10:33:40

A.8.3.18 Channel 810: 15GHz –20GHz
Spurious emission limit –13dBm.



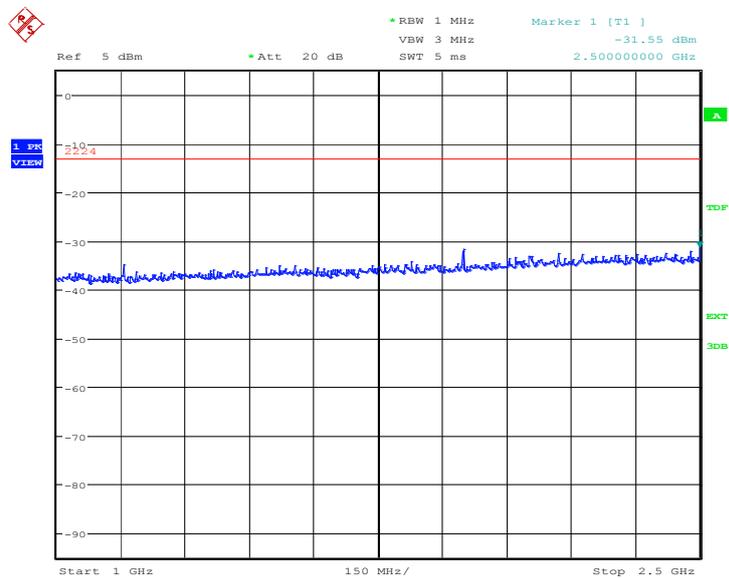
Date: 1.NOV.2013 10:34:08

A.8.3.19 Idle mode: 30MHz – 1GHz
Spurious emission limit –13dBm.



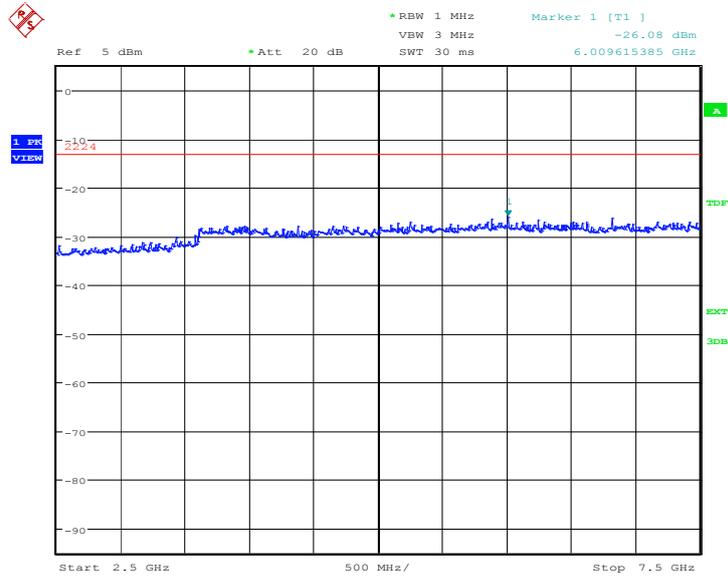
Date: 29.OCT.2013 10:12:39

A.8.3.20 Idle mode: 1GHz – 2.5GHz
Spurious emission limit –13dBm.



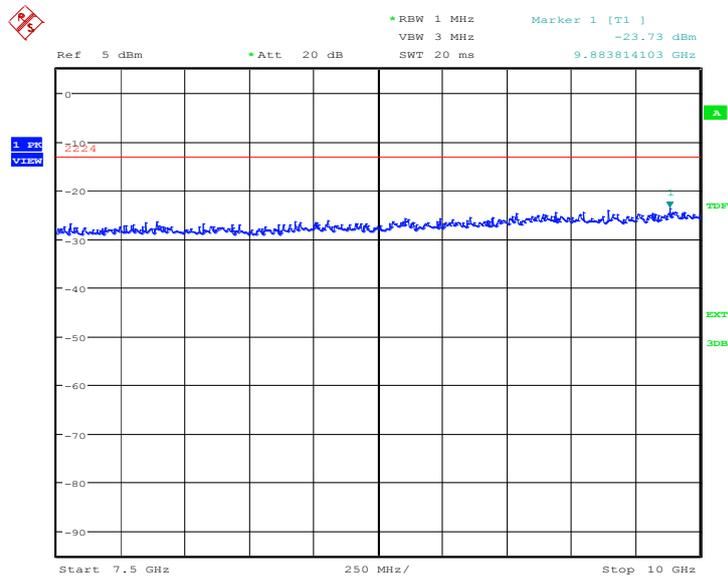
Date: 29.OCT.2013 10:13:07

A.8.3.21 Idle mode: 2.5GHz – 7.5GHz
Spurious emission limit –13dBm.



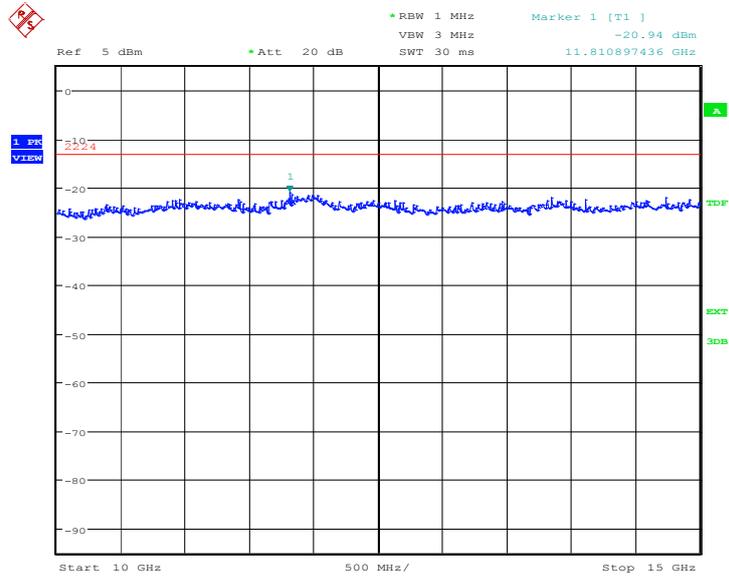
Date: 29.OCT.2013 10:13:35

A.8.3.22 Idle mode: 7.5GHz – 10GHz
Spurious emission limit –13dBm.



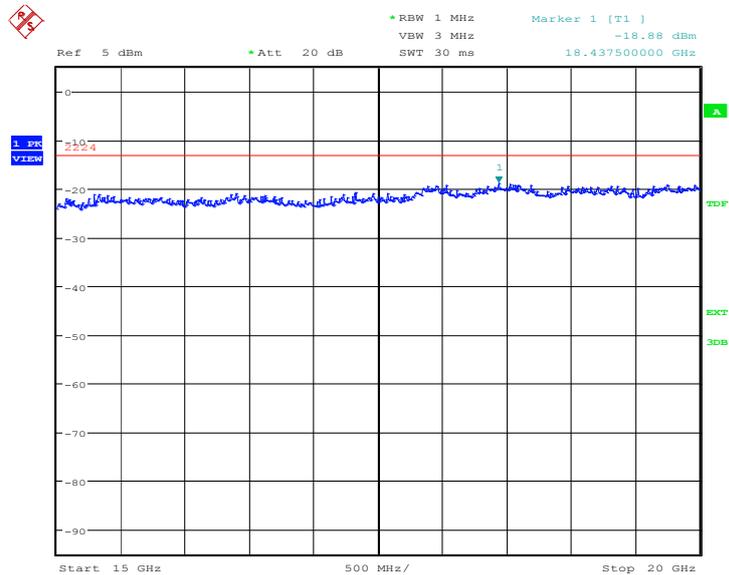
Date: 29.OCT.2013 10:14:03

A.8.3.23 Idle mode: 10GHz –15GHz
Spurious emission limit –13dBm.



Date: 29.OCT.2013 10:14:31

A.8.3.24 IDLE mode: 15GHz –20GHz
Spurious emission limit –13dBm.



Date: 29.OCT.2013 10:14:59

END OF REPORT