

Test Site:
FCC Test Site No.: 96997
IC OATS No.: IC2237E

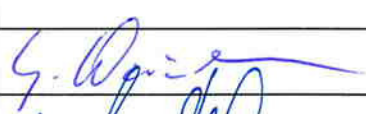



ECL-EMC Test Report No.: 10-221

Equipment under test: ION-M85HP/17HP/19HP (850MHz Path)
FCC ID: XS5-ION-M851719HP
IC ID: 2237E-IONM851719HP
Type of test: FCC 47 CFR Part 22 Subpart H:2009
Cellular Radiotelephone Service
RSS-Gen:2007, RSS-131:2003
Zone Enhancers for the Land Mobile Service

Measurement Procedures: 47 CFR Parts 2 (*Frequency Allocations and Radio Treaty Matters; General Rules and Regulations*),
90 (*Private Land Mobile*),
ANSI/TIA-603-C (2004), *Land Mobile FM or PM Communications Equipment Measurement and Performance Standards*
IC-RSS-GEN General Requirements and Information for the Certification of Radiocommunication Equipment

Test result: **Passed**

Date of issue:	20.09.10			Signature:
Issue-No.:	01	Author:	G.Weinfurter Test Engineer	
Date of delivery:	19.07.2010	Checked:	M. Lehmann Representative Head EMC	
Test dates:	19.07. – 03.08.2010			

Test Report No.: 10-121

FCC ID: XS5-ION-M851719HP

IC ID: 2237E-IONM851719HP



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General:

The purpose of this report is to show compliance to the FCC regulations for licensed devices operating under section 22 of the Code of Federal Regulations title 47.

This report informs about the results of the RF tests, it only refers to the equipment under test. No part of this report may be reproduced in any form, without written permission.



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1 Test Results Summary

Name of Test	FCC Para. No.	IC Para. No.	FCC Method	FCC Spec.	Result
RF Power Output	22.913	RSS-Gen/ ANSI C63.4:2009	2.1046	500 Watts	Complies
Occupied Bandwidth		RSS-Gen/ ANSI C63.4	2.1049	Input/Output	Complies
Spurious Emissions at Antenna Terminals	22.917	RSS 132	2.1051	-13dBm	Complies
Field Strength of Spurious Emissions	22.917	RSS 132 section 4.5	2.1053	-13dBm E.I.R.P	Complies
Frequency Stability	n.a.	RSS 132	2.1055	Must stay in band	NA

Frequency stability is not applicable because the device uses a common oscillator to up convert and down convert the RF signal. The EUT does not contain modulation circuitry, or frequency generation, therefore the test was not performed.



2 Equipment under test (E.U.T.)

2.1 Description

Kind of equipment	ION-M85HP/17HP/19HP Repeater	
Andrew Ident. Number	7617880-0001	
Serial no.(SN)	11	
Revision	01	
Software version and ID	V 1.1.0.10	Id.No.7614712-00
Type of modulation and Designator	GSM (GXW)	<input checked="" type="checkbox"/>
	GSM EDGE (G7W)	<input checked="" type="checkbox"/>
	CDMA (F9W)	<input checked="" type="checkbox"/>
	W-CDMA (F9W)	<input checked="" type="checkbox"/>
Frequency Translation	F1-F1	<input checked="" type="checkbox"/>
	F1-F2	<input type="checkbox"/>
	N/A	<input type="checkbox"/>
Band Selection	Software	<input type="checkbox"/>
	Duplexer	<input checked="" type="checkbox"/>
	Full band	<input type="checkbox"/>

2.1.1 Downlink

Pass band	Path 869 MHz – 894 MHz
Max. composite output power based on one carrier per path (rated)	46 dBm = 39,8 W
Gain	13 dB @ Pout BTS of 33 dBm

2.1.2 Uplink

Pass band	Path 824 MHz – 849 MHz
Maximum rated output power	n. a.
Gain	n.a.

Note: The EUT does not transmit over the air in the uplink direction.

2.1.3 Description of EUT

Andrew ION-M85HP/17HP/19HP is a multi-band, multi-operator remote unit with various extension units. It is used in conjunction with a master unit in the ION optical distribution system.

This Test Report describes only the approval of the 850 MHz Path (ION-M85HP). The ION-M85HP/17HP/19HP Repeater consists of one 850 MHz path, one 1700 MHz path and one 1900 MHz path with the intended use of simultaneous transmission

2.1.4 System diagrams

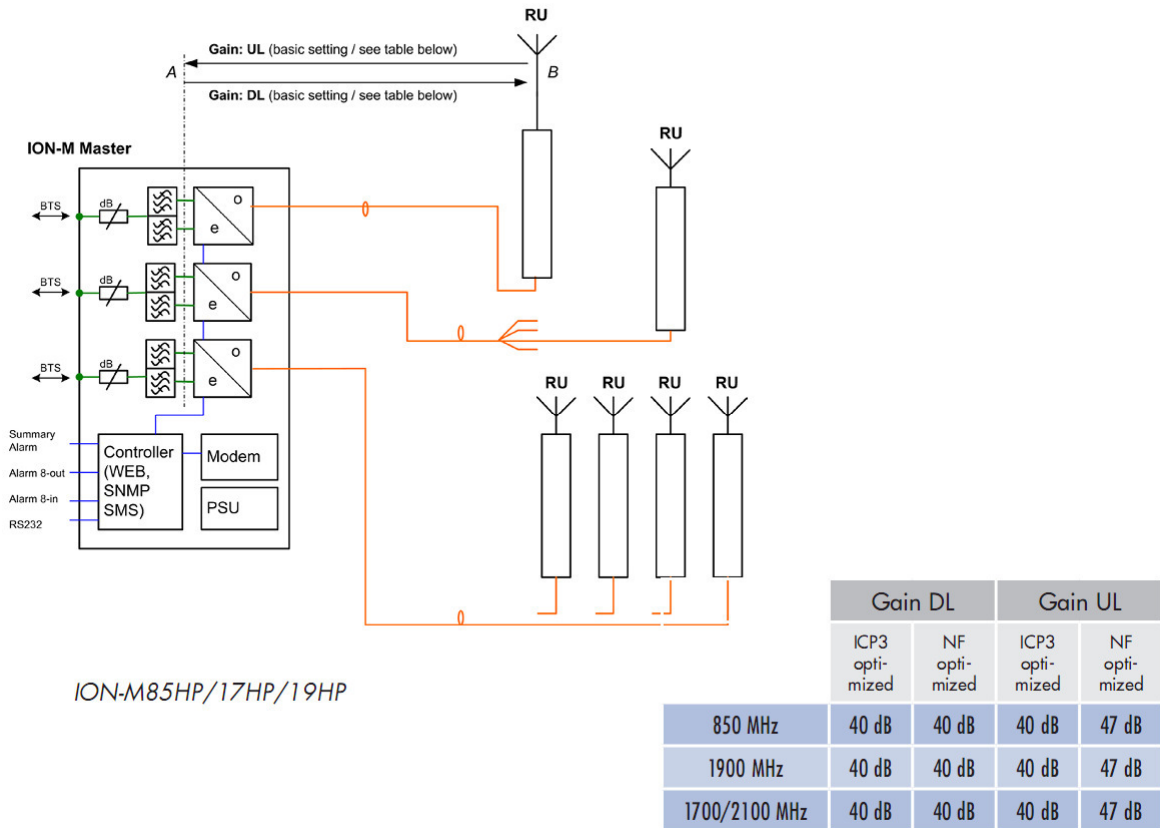


figure 2.1.4-#1 System diagrams: EUT is Remote Unit

2.1.5 Block diagram of measurement reference points

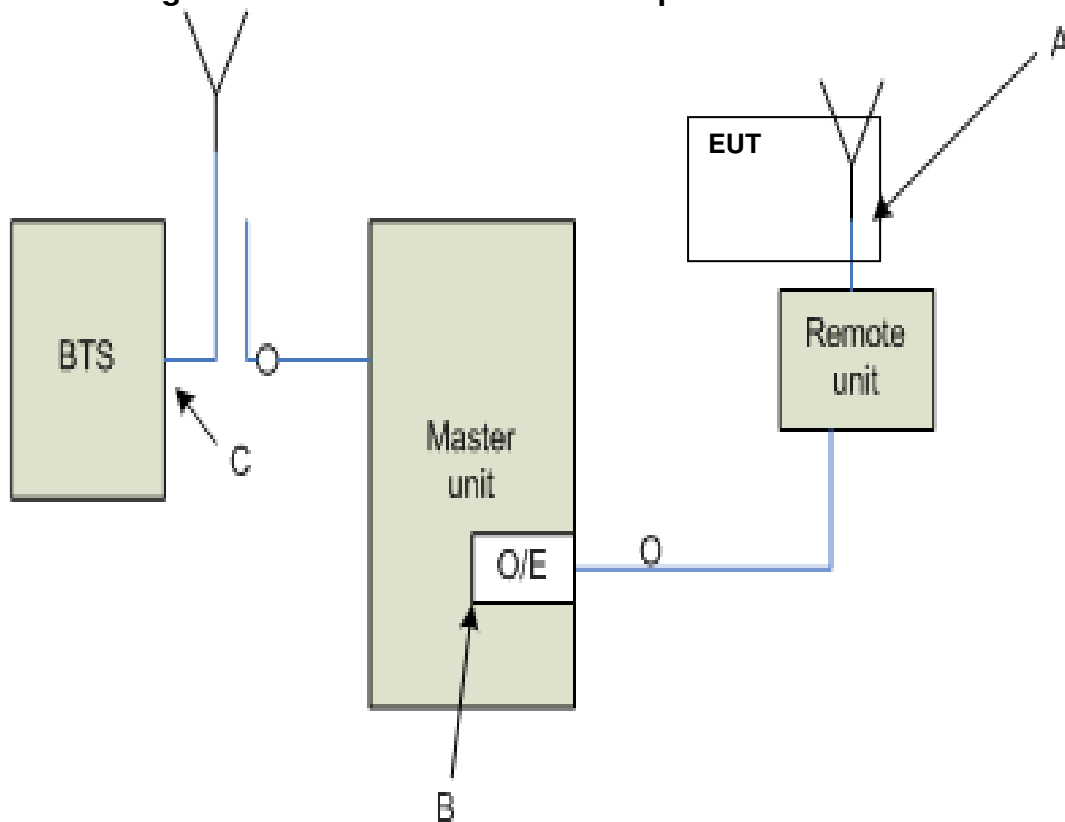


figure 2.1.5-#1 Block diagram of measurement reference points

Remote Unit is the EUT

O/E Optcal/Electrical converter

SRMU SubRackMaster Unit

Reference point A, Remote Unit DL output, UL input

Reference point B, SRMU UL output, DL input

Reference point C, BTS DL output, UL input

3 Test site (Andrew Buchdorf)

3.1 Test environment

All tests were performed under the following environmental conditions:

Condition	Minimum value	Maximum value
Barometric pressure	86 kPa	106 kPa
Temperature	15 °C	30 °C
Relative Humidity	20 %	75 %
Power supply range	±5% of rated voltages	

3.2 Test equipment

Andrew Inv. No.	Test equipment	Type	Manufacturer	Serial No.	Calibration
8741	Network Analyzer	ZVRE	R&S	100034	02/2011
8890	Spectrum Analyzer	FSP	R&S	100674	07/2011
8848	Generator	E4438C	Agilent	My45092504	07/2011
8667	Power Meter	E4418A	Agilent	GB38273230	04/2011
8668	Power Sensor	E8481H	Agilent	US3318A192 08	04/2011
7355	Power Amplifier	3-Band Amp	Andrew	----	CIU
7157	RF-Cable	Succoflex	Suhner	36180/4P	CIU
7158	RF-Cable	Succoflex	Suhner	36182/4P	CIU
7289	RF-Cable	Succoflex	Suhner	28443/4PE	CIU
7290	RF-Cable	Succoflex	Suhner	28444/4PE	CIU
7385	RF-Cable	Succoflex	Suhner	36267/4P	CIU
7387	RF-Cable	Succoflex	Suhner	36267/4P	CIU
7390	RF-Cable	Succoflex	Suhner	40193/4P	CIU
7381	RF-Cable	Succoflex	Suhner	40200/4P	CIU
7384	RF-Cable	Succoflex	Suhner	40448/4P	CIU
7294	RF-Cable	Succoflex	Suhner	40448/4P	CIU
7382	RF-Cable	Succoflex	Suhner	40221/4P	CIU
7406	Matrix	extended	Andrew	----	CIU

CIU = Calibrate in use

3.3 Input and output losses

All recorded power levels should be referenced to the input and output connectors of the repeater, unless explicitly stated otherwise.

The test equipment used in this test has to be calibrated, so that the functionality is also checked.

All cables, attenuators, splitter, isolator, circulator and combiner etc. must be measured before testing and used for compensation during testing.

3.4 Measurement uncertainty

The extended measurement uncertainty corresponds to the measurement results from the standard measurement uncertainty multiplied by the coverage factor $k=2$. The true value is located in the corresponding interval with a probability of 95 %.

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IC ID: 2237E-IONM851719HP



4 Test site (TEMPTON Service Plus GmbH)

FCC Test site: 96997
IC OATS: 2237E

See relevant dates under section 8.

5 RF Power Out: §22.913, §2.1046; IC RSS-131

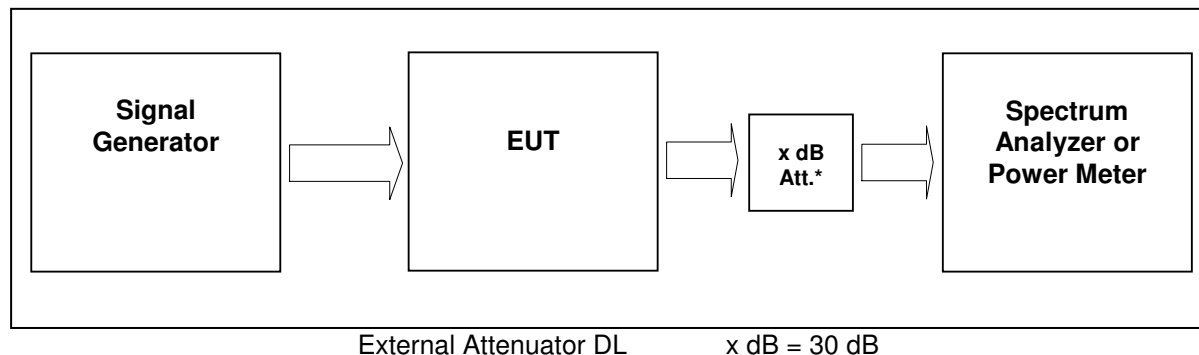


figure 5-#1 Test setup: RF Power Out: §22.913, §2.1046; IC RSS-131

Measurement uncertainty	± 0,38 dB
Test equipment used	8890; 8667; 8668; 8848; 7355;

5.1 Limit

Minimum standard:

Para. No.22.913

The effective radiated power (ERP) of transmitters in the Cellular Radiotelephone Service must not exceed the limits in this section.

(a) *Maximum ERP.* In general, the effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts. However, for those systems operating in areas more than 72 km (45 miles) from international borders that:

- (1) Are located in counties with population densities of 100 persons or fewer per square mile, based upon the most recently available population statistics from the Bureau of the Census; or,
- (2) Extend coverage on a secondary basis into cellular unserved areas, as those areas are defined in § 22.949, the ERP of base transmitters and cellular repeaters of such systems must not exceed 1000 Watts. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

5.2 Test method

§ 2.1046 Measurements required: RF power output.

(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in § 2.1033(c)(8). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

(c) For measurements conducted pursuant to paragraphs (a) and (b) of this section, all calculations and methods used by the applicant for determining carrier power or peak envelope power, as appropriate, on the basis of measured power in the radio frequency load attached to the transmitter output terminals shall be shown. Under the test conditions specified, no components of the emission spectrum shall exceed the limits specified in the applicable rule parts as necessary for meeting occupied bandwidth or emission limitations

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5.3 Test Results

Detector RMS.

Test signal GSM:

Signal waveform with GMSK modulation in all time slots according to 3GPP TS45.004

Test signal GSM EDGE:

Signal waveform with 8-PSK modulation in all time slots according to 3GPP TS45.004

Test signal CDMA:

Signal waveform according to table 6.2-1 of standard specification 3GPP2 C.p0051-0 v1.0 16.February 2006 pilot, sync, paging, 37 traffics, which is equal to the table 6.5.2.1 of 3GPP2 C.S0010-C v2.0 24.February 2006.

Test signal WCDMA:

Signal waveform according to Test Model 1 of standard specification 3GPP TS25.141. Signal modulated with a combination of PCCPCH, SCCPCH and Dedicated Physical Channels specified as test model 1 64 DPCH.



5.3.1 Downlink

Modulation	Measured at		RBW VBW Span	RF Power [dBm]	RF Power [W]	Plot -
GSM	Middle	881,5 MHz	1MHz 3MHz 10MHz	46,0	39,8	5.3.1.1 #1
EDGE	Middle	881,5 MHz	1MHz 3MHz 10MHz	46,0	39,8	5.3.1.2 #1
CDMA	Middle	881,5 MHz	3MHz 10MHz 15MHz	46,0	39,8	5.3.1.3 #1
WCDMA	Middle	881,5 MHz	10MHz 10MHz 50MHz	46,0	39,8	5.3.1.4 #1
Maximum output power = 46,0 dBm = 39,8 W						
Limit Maximum output power = 57 dBm = 500 W						

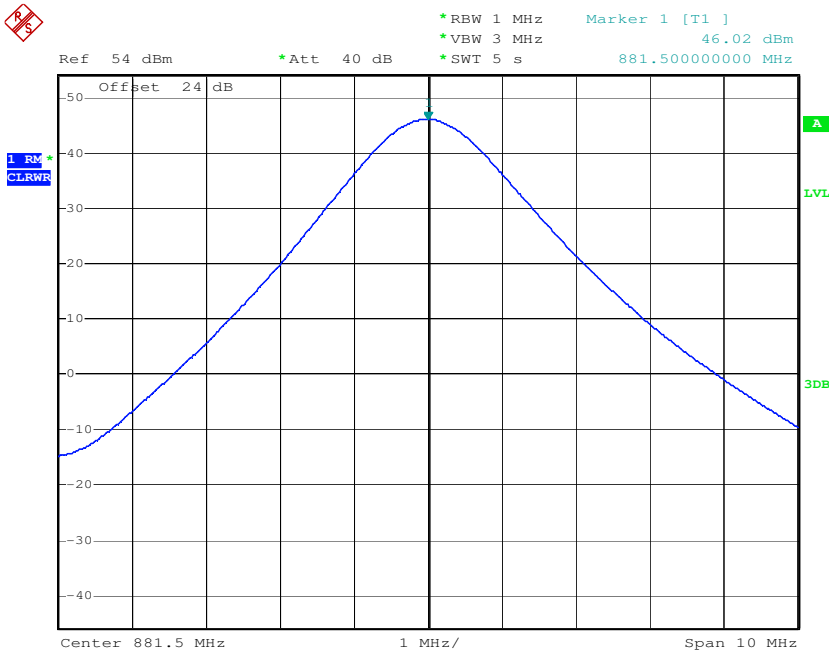
table 5.3.1-#1 RF Power Out: §22.913, §2.1046; IC RSS-131 Test Results Downlink

Modulation	Pin / dBm (Ref. point B)
GSM	4,9
EDGE	4,9
CDMA	4,9
WCDMA	4,9

table 5.3.1-#2 RF Power Out: §22.913, §2.1046; IC RSS-131 Test Results Downlink Input power



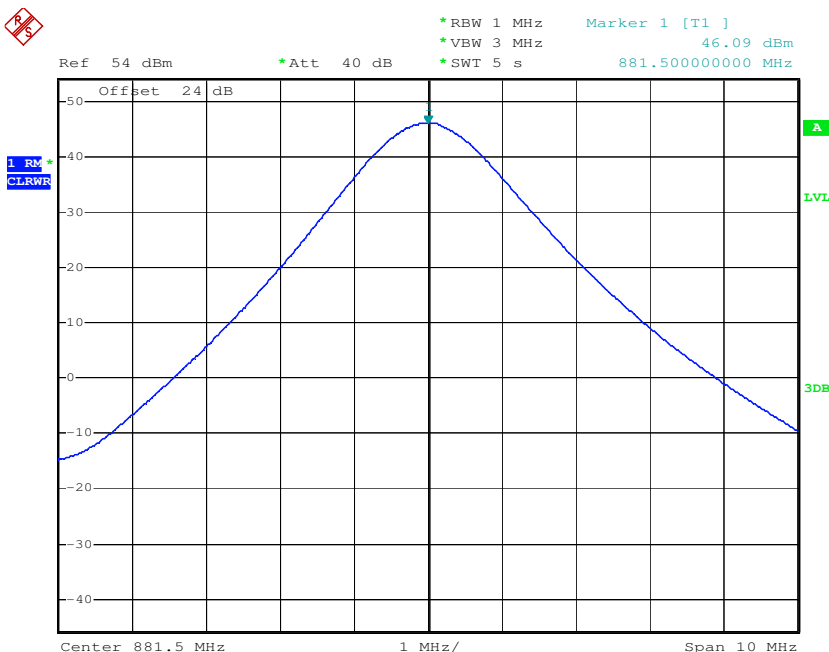
5.3.1.1 GSM



Date: 16.JUN.2010 11:24:41

plot 5.3.1.1-#1 RF Power Out: §22.913, §2.1046; IC RSS-131; Test Results; Downlink; GSM Middle

5.3.1.2 EDGE



Date: 16.JUN.2010 11:27:11

plot 5.3.1.2-#1 RF Power Out: §22.913, §2.1046; IC RSS-131; Test Results; Downlink; EDGE Middle

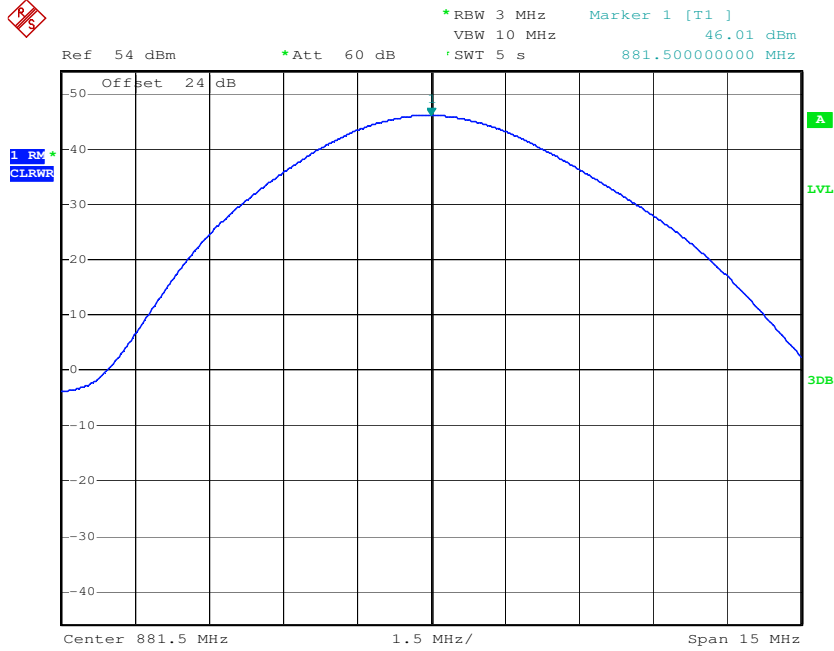
Test Report No.: 10-121

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IC ID: 2237E-IONM851719HP



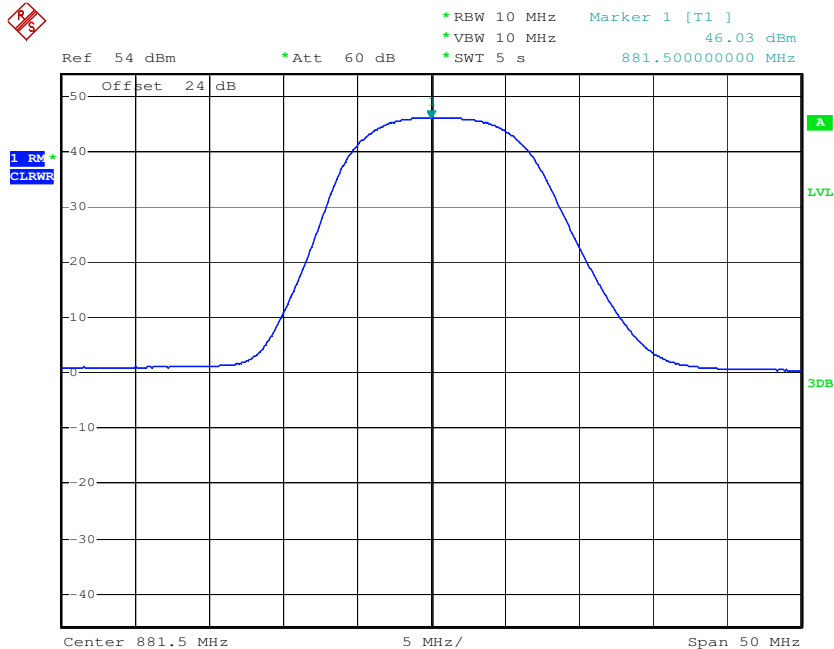
5.3.1.3 CDMA



Date: 15.JUN.2010 12:03:58

plot 5.3.1.3-#1 RF Power Out: §22.913, §2.1046; IC RSS-131; Test Results; Downlink; CDMA Middle

5.3.1.4 WCDMA



Date: 15.JUN.2010 13:50:49

plot 5.3.1.4-#1 RF Power Out: §22.913, §2.1046; IC RSS-131; Test Results; Downlink; WCDMA Middle

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IC ID: 2237E-IONM851719HP



5.3.2 Uplink

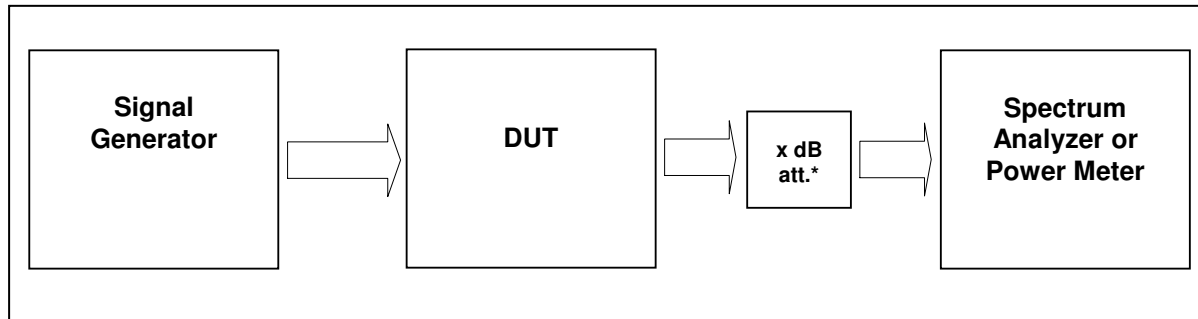
n.a.

Note: The EUT does not transmit over the air in the uplink direction.

5.4 Summary test result

Test result	complies, according the plots above
Tested by:	W. Meir
Date:	14.07.2010

6 Occupied Bandwidth: §2.1049; RSS-GEN



External Attenuator DL x dB = 30 dB
figure 6-#1 Test setup: Occupied Bandwidth: §2.1049; RSS-GEN

Measurement uncertainty	± 0,38 dB
Test equipment used	8890; 8667; 8668; 8848; 7355; 7160

6.1 Limit

The spectral shape of the output should look similar to input for all modulations.

6.2 Test method

Para. No.2.1049

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions as applicable:

6.3 Test results

For composite power measurements: Detector RMS.

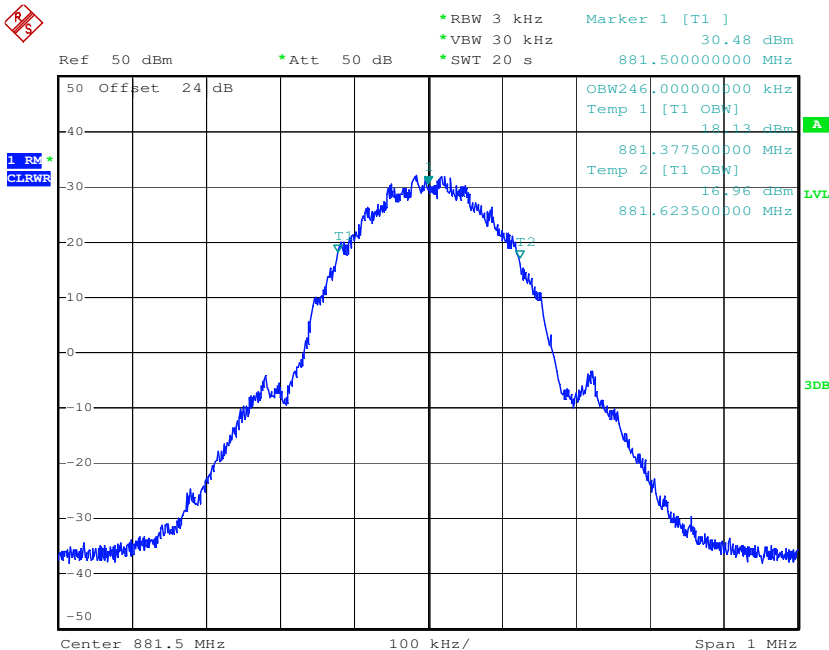
6.3.1 Downlink

Modulation	Measured at		RBW VBW Span	Occupied Bandwidth	Plot #
GSM	Middle	881,5 MHz	3 kHz 30 kHz 1 MHz	246,0 kHz	6.3.1.1 #1, #2
EDGE	Middle	881,5 MHz	3 kHz 30 kHz 1 MHz	246,0 kHz	6.3.1.2 #1, #2
CDMA	Middle	881,5 MHz	30 kHz 300 kHz 5 MHz	1,26 MHz	6.3.1.3 #1, #2
WCDMA	Middle	881,5 MHz	100 kHz 1 MHz 10 MHz	4,18 MHz	6.3.1.4 #1, #2

table 6.3-#1 Occupied Bandwidth: §2.1049; RSS-GEN Test results

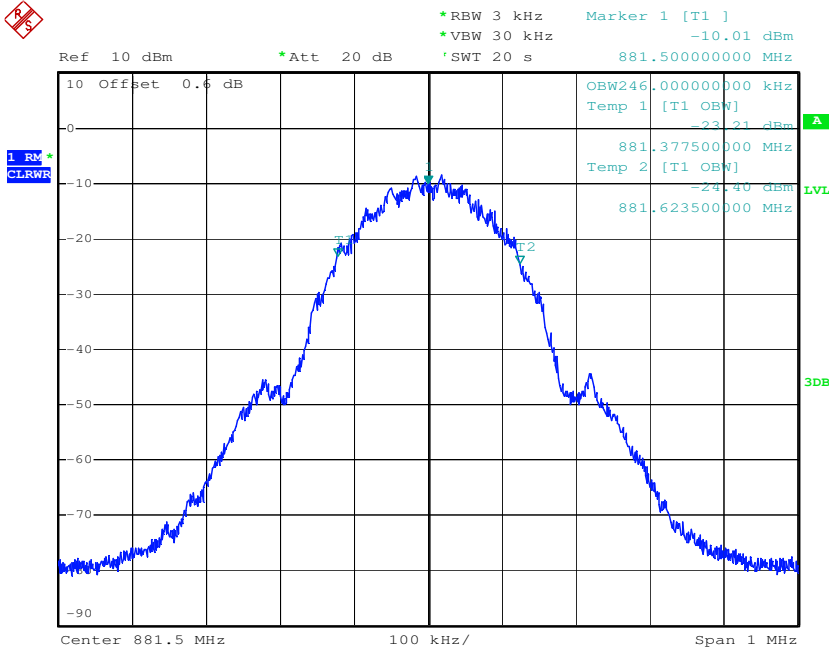


6.3.1.1 GSM



Date: 15.JUN.2010 15:12:02

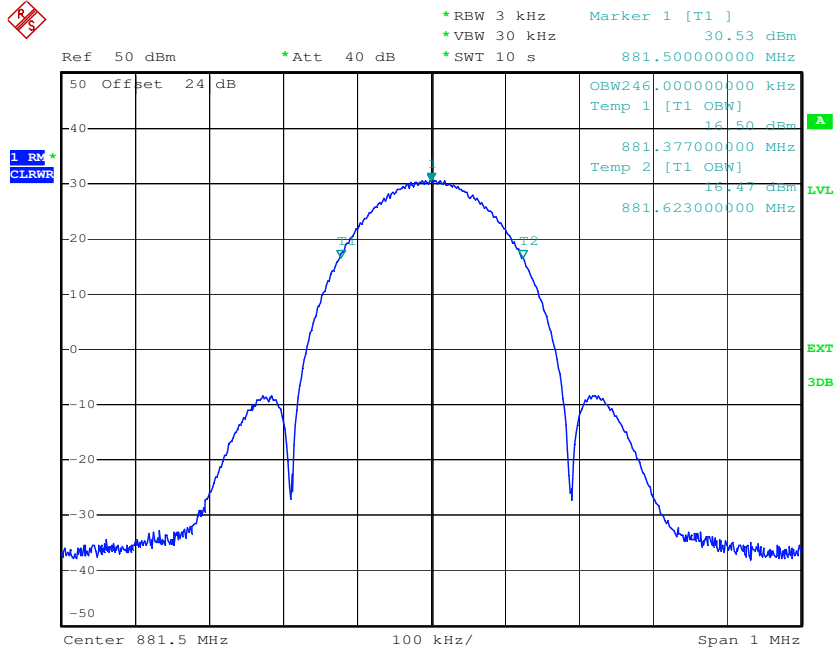
plot 6.3.1.1-#1 Occupied Bandwidth: §2.1049; RSS-GEN; Test results; Downlink; GSM Output



Date: 15.JUN.2010 15:15:00

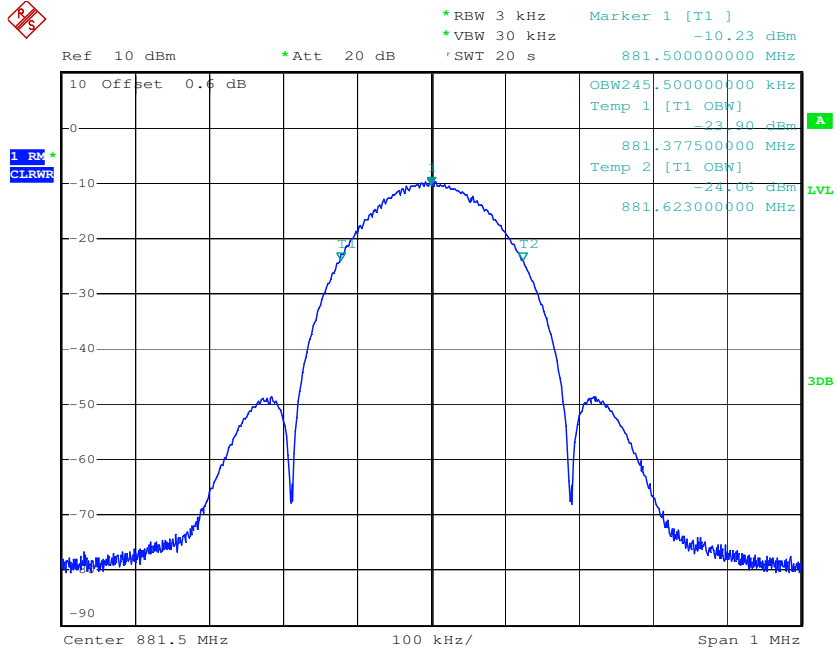
plot 6.3.1.1-#2 Occupied Bandwidth: §2.1049; RSS-GEN; Test results; Downlink; GSM Input

6.3.1.2 EDGE



Date: 27.JUL.2010 11:30:09

plot 6.3.1.2-#1 Occupied Bandwidth: §2.1049; RSS-GEN; Test results; Downlink; EDGE Output

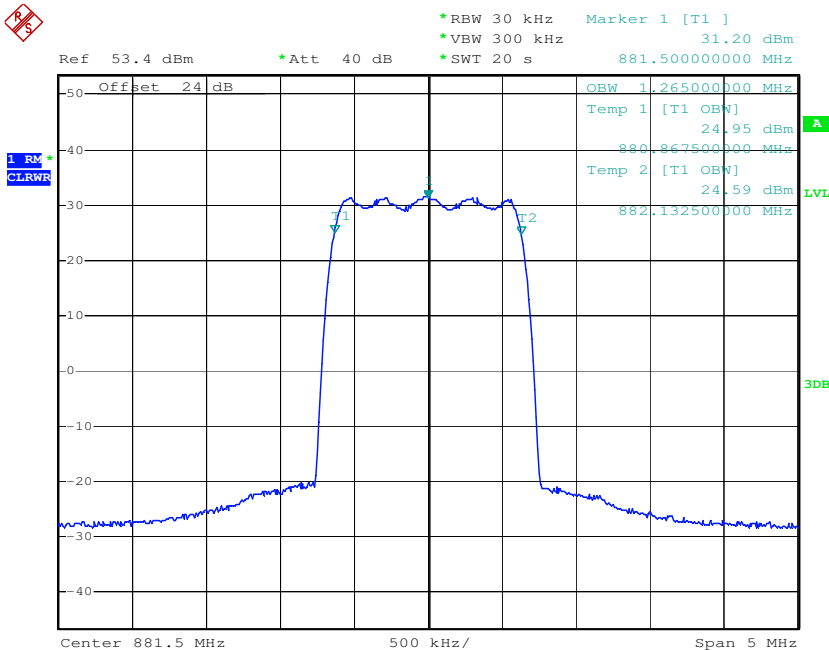


Date: 15.JUN.2010 15:17:50

plot 6.3.1.2-#2 Occupied Bandwidth: §2.1049; RSS-GEN; Test results; Downlink; EDGE Input

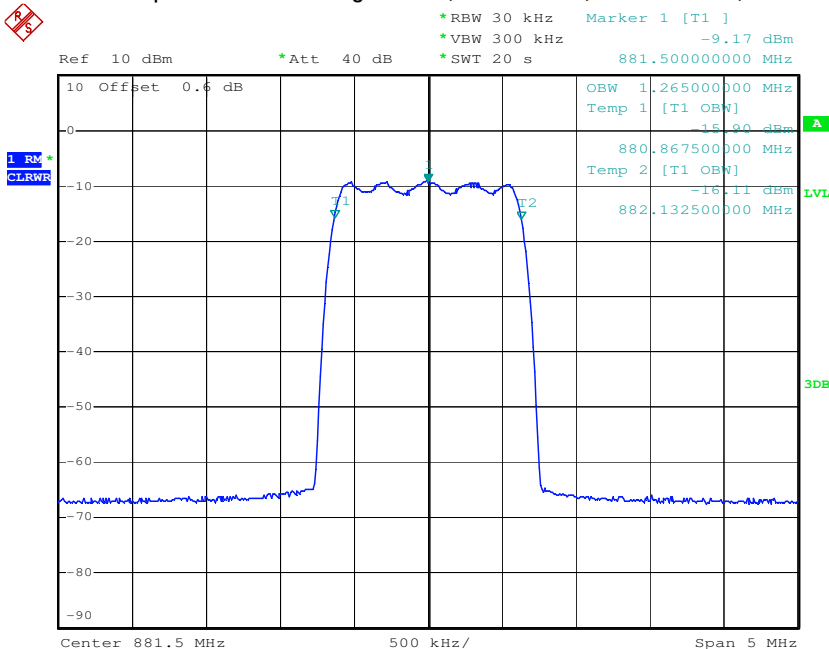


6.3.1.3 CDMA



Date: 15.JUN.2010 15:52:12

plot 6.3.1.3-#1 Occupied Bandwidth: §2.1049; RSS-GEN; Test results; Downlink; CDMA Output



Date: 15.JUN.2010 15:54:00

plot 6.3.1.3-#2 Occupied Bandwidth: §2.1049; RSS-GEN; Test results; Downlink; CDMA Input

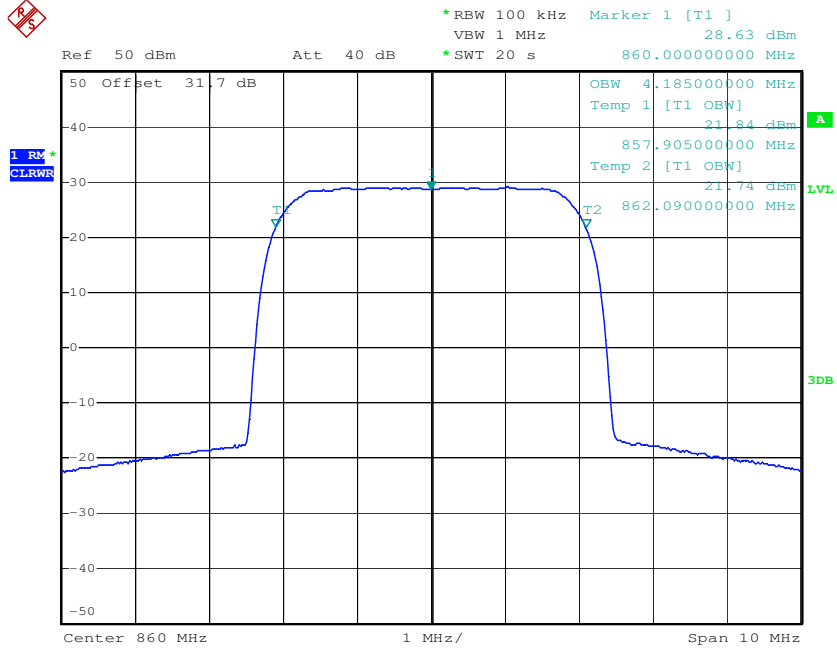
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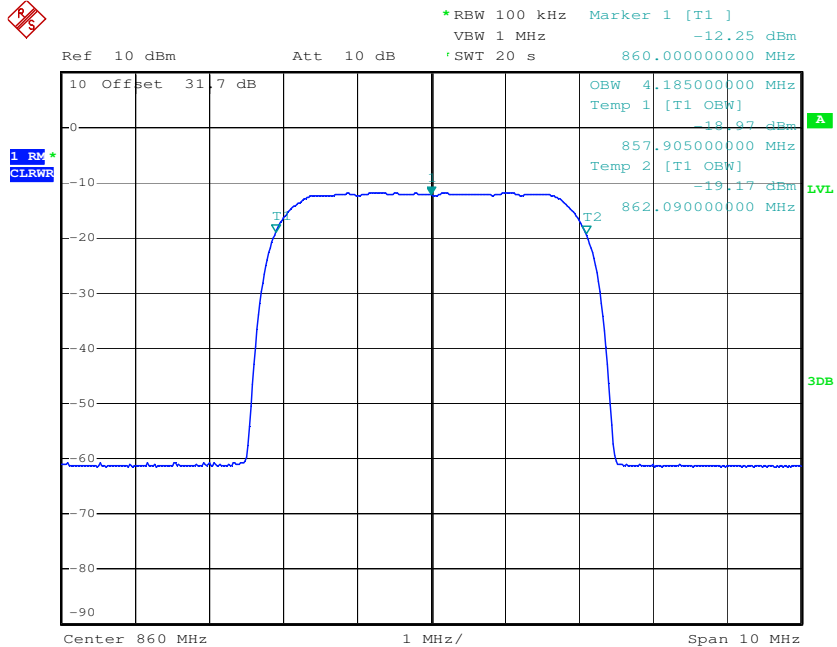


6.3.1.4 WCDMA



Date: 2.MAR.2010 16:15:36

plot 6.3.1.4-#1 Occupied Bandwidth: §2.1049; RSS-GEN; Test results; Downlink; WCDMA Output



Date: 2.MAR.2010 16:17:01

plot 6.3.1.4-#2 Occupied Bandwidth: §2.1049; RSS-GEN; Test results; Downlink; WCDMA Input

Test Report No.: 10-121

FCC ID: XS5-ION-M851719HP

IC ID: 2237E-IONM851719HP



6.3.2 Uplink

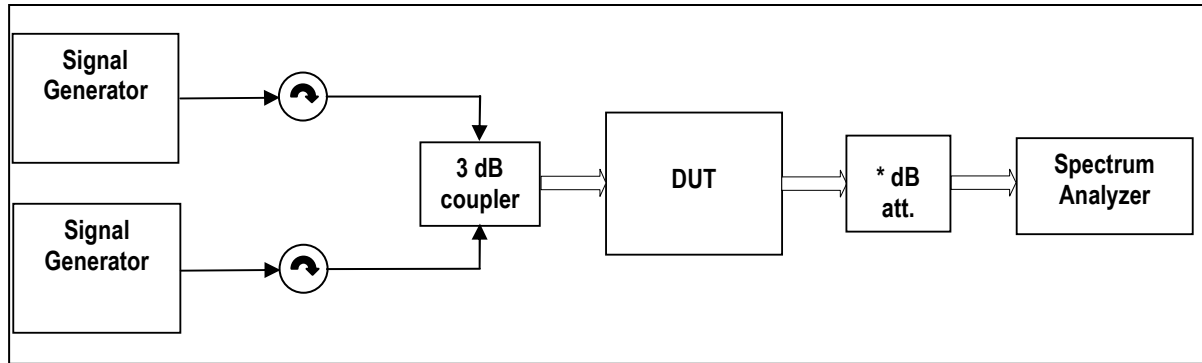
n.a.

Note: The EUT does not transmit over the air in the uplink direction.

6.4 Summary test result

Test result	complies, according the plots above
Tested by:	W. Meir
Date:	2.03.2010

7 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; RSS-131, RSS-GEN



External Attenuator DL x dB = 30 dB

figure 7-#1 Test setup: Spurious Emissions at Antenna Terminals: §22.917, §2.1051; RSS-131, RSS-GEN

Measurement uncertainty	± 0,54 dB ± 1,2 dB ± 1,5 dB	9 kHz to 3 GHz 3 GHz to 7 GHz 7 GHz to 26 GHz
Test equipment used	8890; 8667; 8668; 8848; 7355	

7.1 Limit

Minimum standard:
Para. No.22.917

(a) *Out of band emissions.* 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.

(b) *Measurement procedure.* Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (*i.e.* 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

7.2 Test method

Para. No 2.1051 Measurements required: Spurious emissions at antenna terminals.

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in § 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

[39 FR 5919, Feb. 15, 1974. Redesignated and amended at 63 FR 36599, July 7, 1998]



7.3 Test results

7.3.1 Downlink

<1MHz from Band Edge

Detector: RMS.

Modulation	Measured at Band Edge	Carriers	RBW VBW Span Sweep points	Max. level (dBm)	Plot -
GSM	Lower Edge Upper Edge	869,4 MHz 869,6 MHz 893,4 MHz 893,6 MHz	3kHz 30kHz 2MHz	< -34	7.3.1.1 #1 #2
EDGE	Lower Edge Upper Edge	869,4 MHz 869,6 MHz 893,4 MHz 893,6 MHz	3kHz 30kHz 2MHz	< -30	7.3.1.2 #1 #2
CDMA	Lower Edge Upper Edge	869,775 MHz 871,025 MHz 891,975 MHz 893,225 MHz	30kHz 300kHz 6MHz	< -18	7.3.1.3 #1 #2
WCDMA	Lower Edge Upper Edge	871,6 MHz 876,6 MHz 886,4 MHz 891,4 MHz	100kHz 1MHz 15MHz	< -16	7.3.1.4 #1 #2

table 7.3-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; RSS-131, RSS-GEN Test results <1MHz from Band Edge

Test Report No.: 10-121

FCC ID: XS5-ION-M851719HP

IC ID: 2237E-IONM851719HP



>1MHz from Band Edge

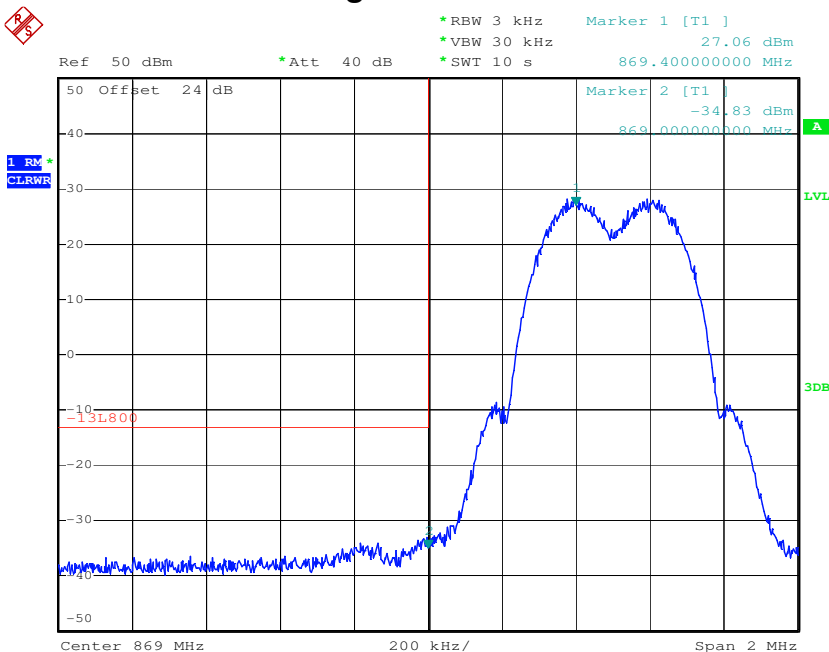
Detector: RMS.

Modulation	Carrier	RBW VBW Span	Max. level (dBm)	Plot -
GSM	881,5 MHz	1MHz 3MHz 30MHz – 10GHz	< -40	7.3.1.5 #1
EDGE	881,5 MHz	1MHz 3MHz 30MHz – 10GHz	< -40	7.3.1.6 #1
CDMA	881,5 MHz	1MHz 3MHz 30MHz – 10GHz	< -40	7.3.1.7 #1
WCDMA	881,5 MHz	1MHz 3MHz 30MHz – 10GHz	< -40	7.3.1.8 #1

table 7.3-#2 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; RSS-131, RSS-GEN Test results <1MHz from Band Edge

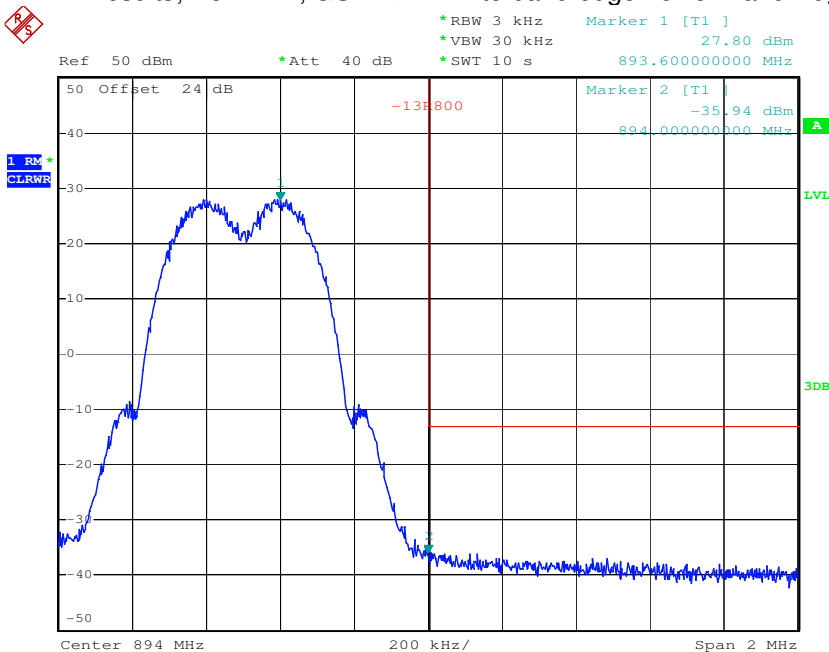


7.3.1.1 GSM < 1MHz to band edge



Date: 15.JUL.2010 17:02:54

plot 7.3.1.1-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; RSS-131, RSS-GEN; Test results; Downlink; GSM < 1MHz to band edge Lower Band Edge



Date: 15.JUL.2010 17:00:47

plot 7.3.1.1-#2 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; RSS-131, RSS-GEN; Test results; Downlink; GSM < 1MHz to band edge Upper Band Edge

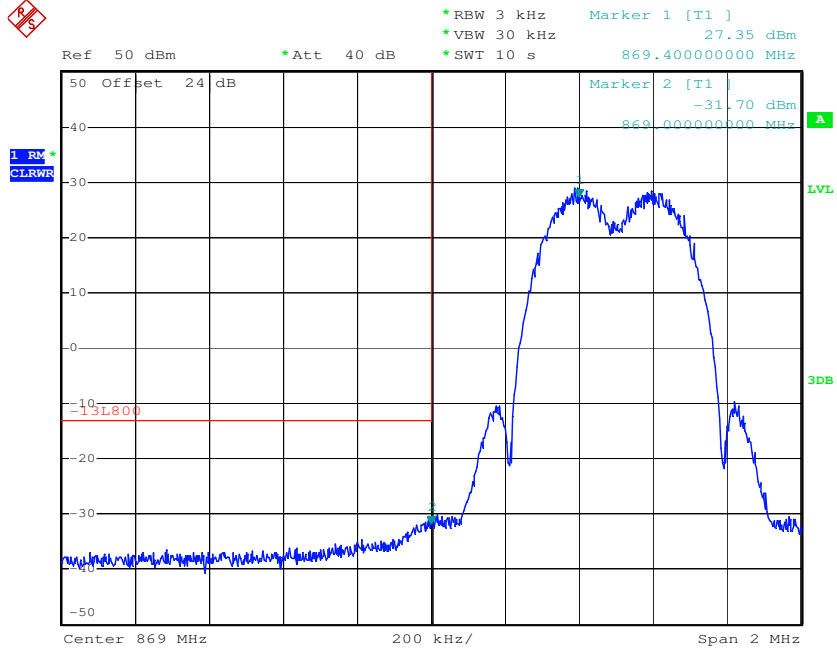
Test Report No.: 10-121

FCC ID: XS5-ION-M851719HP

IC ID: 2237E-IONM851719HP

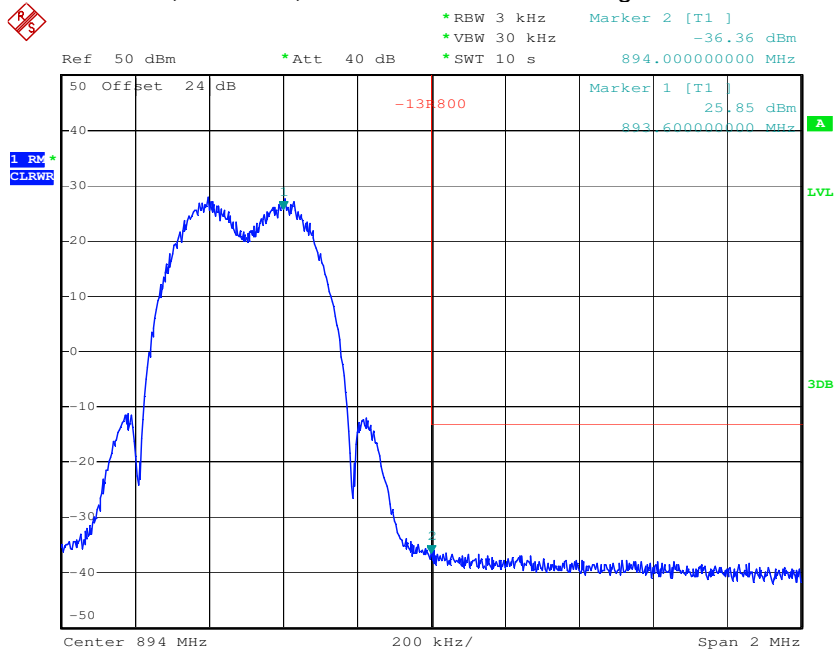


7.3.1.2 EDGE < 1MHz to band edge



Date: 15.JUL.2010 17:24:37

plot 7.3.1.2-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; RSS-131, RSS-GEN; Test results; Downlink; EDGE < 1MHz to band edge Lower Band Edge

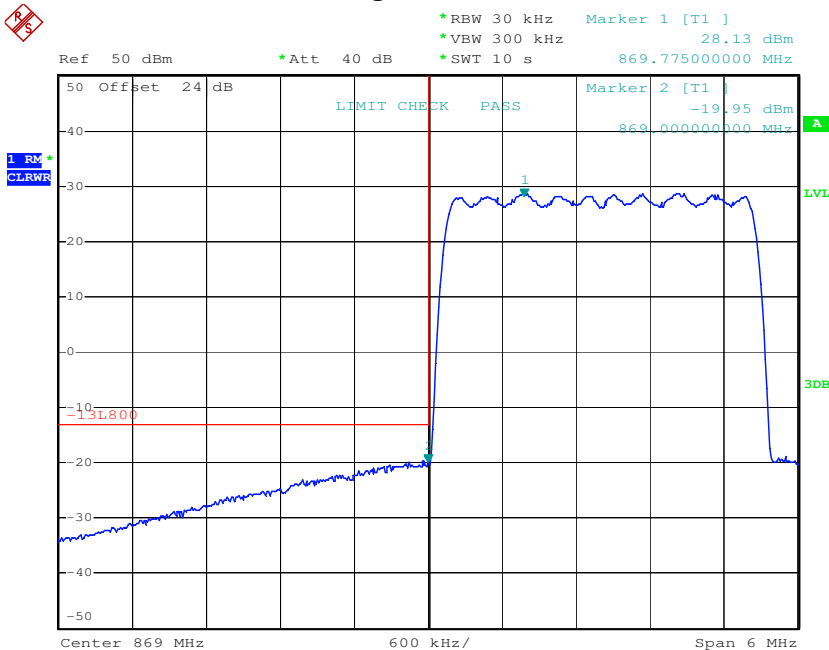


Date: 15.JUL.2010 17:27:12

plot 7.3.1.2-#2 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; RSS-131, RSS-GEN; Test results; Downlink; EDGE < 1MHz to band edge Upper Band Edge

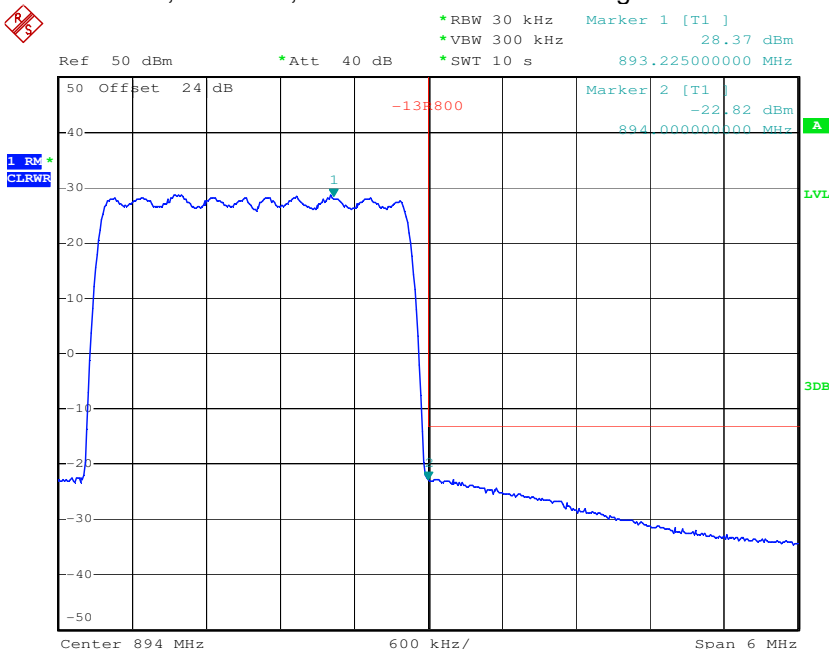


7.3.1.3 CDMA < 1MHz to band edge



Date: 15.JUL.2010 15:39:23

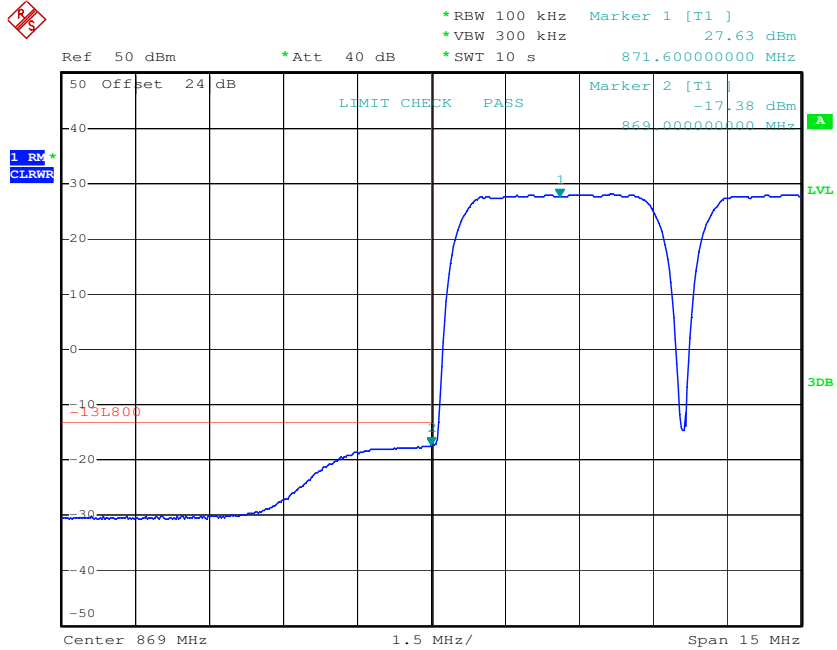
plot 7.3.1.3-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; RSS-131, RSS-GEN; Test results; Downlink; CDMA < 1MHz to band edge Lower Band Edge



Date: 15.JUL.2010 15:43:41

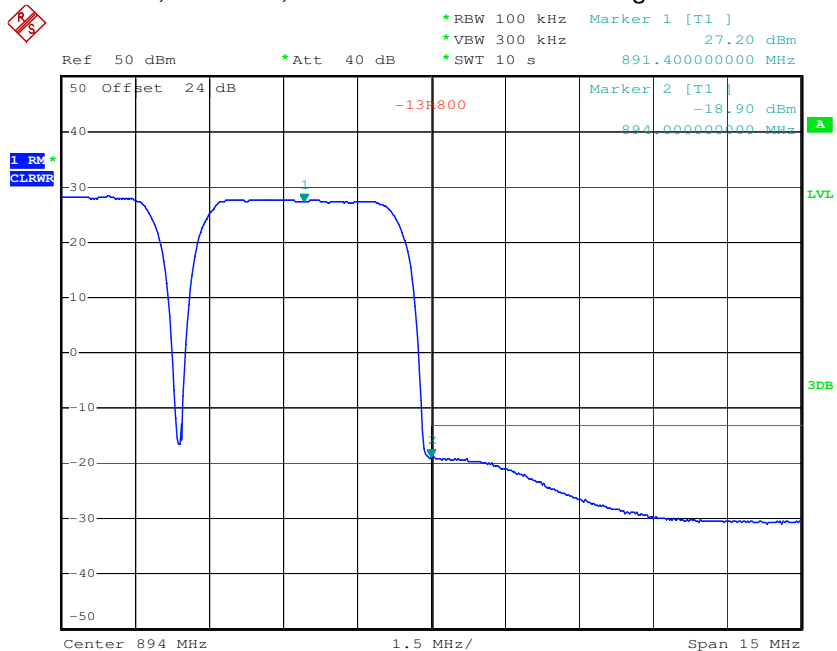
plot 7.3.1.3-#2 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; RSS-131, RSS-GEN; Test results; Downlink; CDMA < 1MHz to band edge Upper Band Edge

7.3.1.4 WCDMA < 1MHz to band edge



Date: 15.JUL.2010 15:35:31

plot 7.3.1.4-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; RSS-131, RSS-GEN; Test results; Downlink; WCDMA < 1MHz to band edge Lower Band Edge

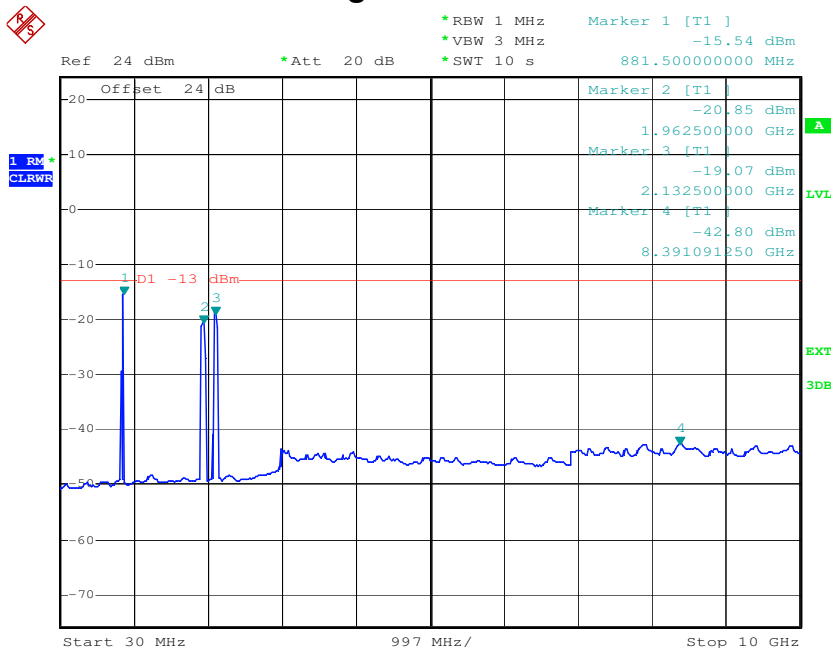


Date: 15.JUL.2010 15:31:17

plot 7.3.1.4-#2 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; RSS-131, RSS-GEN; Test results; Downlink; WCDMA < 1MHz to band edge Upper Band Edge



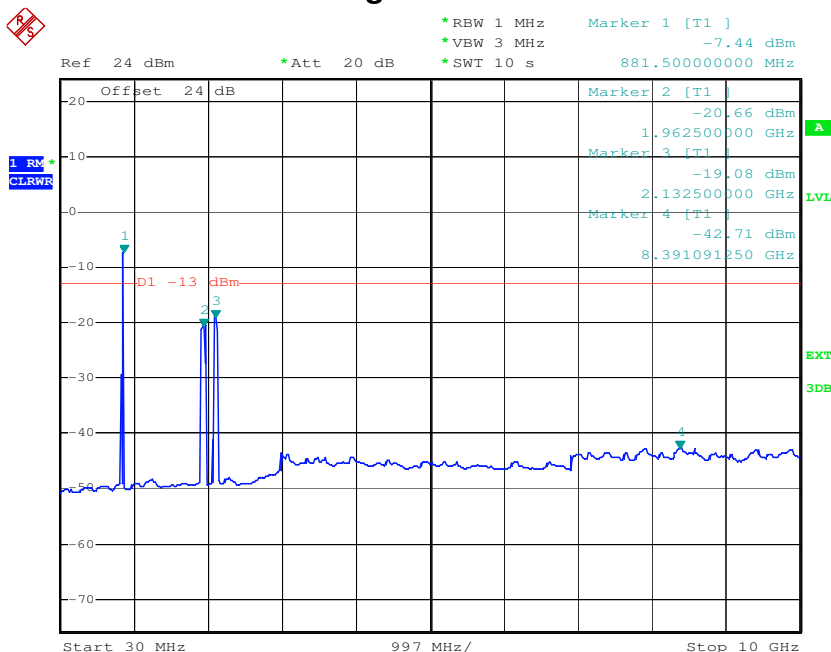
7.3.1.5 GSM > 1MHz to band edge



Date: 16.JUL.2010 10:45:19

plot 7.3.1.5-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; RSS-131, RSS-GEN; Test results; Downlink; GSM > 1MHz to band edge; carrier (881,5MHz) notched

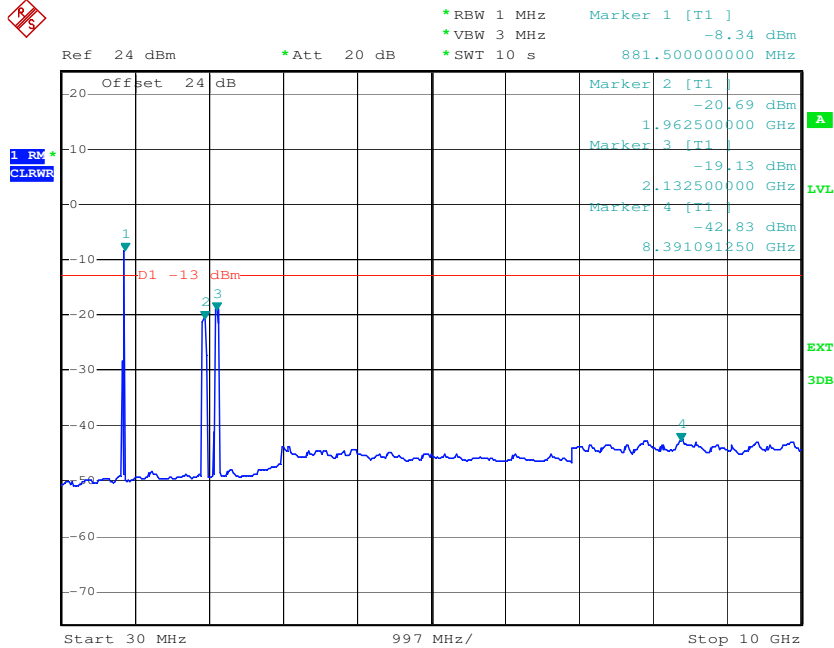
7.3.1.6 EDGE > 1MHz to band edge



Date: 16.JUL.2010 11:52:53

plot 7.3.1.6-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; RSS-131, RSS-GEN; Test results; Downlink; EDGE > 1MHz to band edge; carrier (881,5MHz) notched

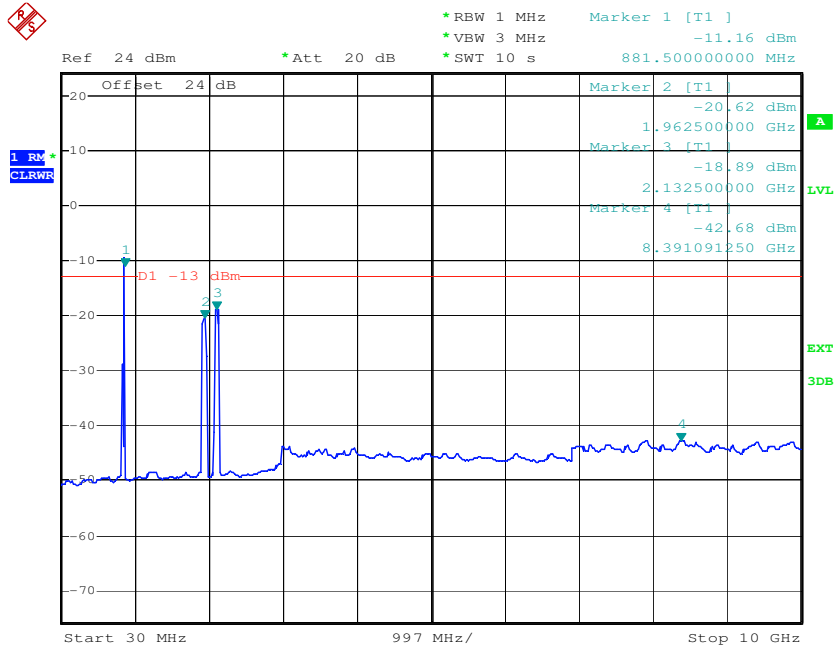
7.3.1.7 CDMA > 1MHz to band edge



Date: 16.JUL.2010 11:46:48

plot 7.3.1.7-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; RSS-131, RSS-GEN; Test results; Downlink; CDMA > 1MHz to band edge; carrier (881,5MHz) notched

7.3.1.8 WCDMA > 1MHz to band edge



Date: 16.JUL.2010 11:44:56

plot 7.3.1.8-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; RSS-131, RSS-GEN; Test results; Downlink; WCDMA > 1MHz to band edge; carrier (881,5MHz) notched

Test Report No.: 10-121

FCC ID: XS5-ION-M851719HP

IC ID: 2237E-IONM851719HP



7.3.2 Uplink

n.a.

Note: The EUT does not transmit over the air in the uplink direction.

7.4 Summary test result

Test result	complies, according the plots above
Tested by:	W. Meir
Date:	16.07.2010

Test Report No.: 10-121

FCC ID: XS5-ION-M851719HP

IC ID: 2237E-IONM851719HP



8 Field Strength of Spurious Emissions: §22.917, §2.1053

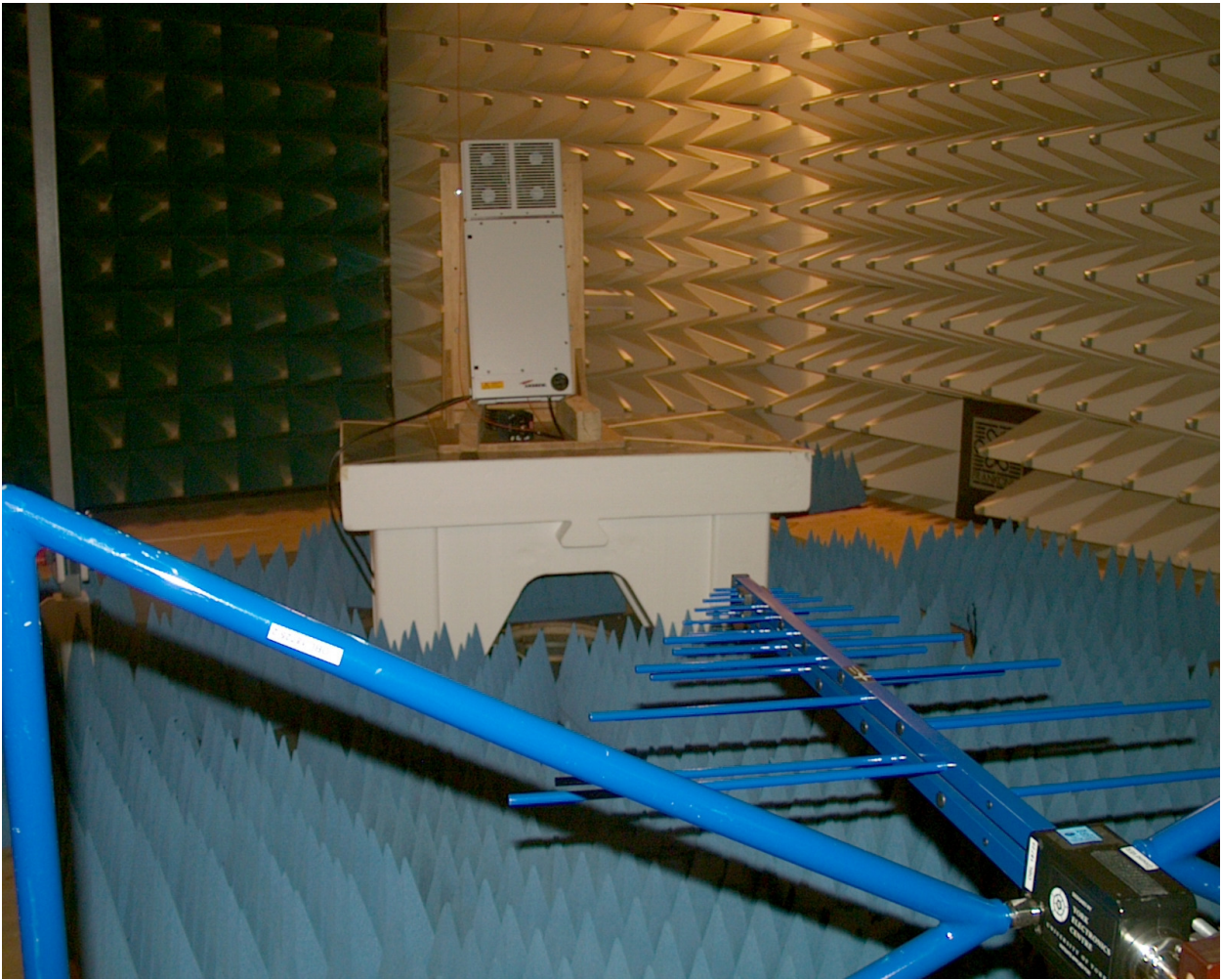


picture 8.1: Test setup: Field Strength Emission 1GHz to 20GHz @3m in the FAC

Test Report No.: 10-121

FCC ID: XS5-ION-M851719HP

IC ID: 2237E-IONM851719HP



picture 8.2: Test setup: Field Strength Emission <1 GHz @3m in the FAC

Test Report No.: 10-121

FCC ID: XS5-ION-M851719HP

IC ID: 2237E-IONM851719HP



This clause specifies requirements for the measurement of radiated emission.

Frequency range	Distance: EUT <-> antenna / location	Limit	Test method
30 MHz - 9 GHz	3 metres / FAC	FCC 47 CFR Part 22.917	TIA/EIA-603-C:2004
		IC RSS-131	
		FCC 47 CFR Part 22.917	
		IC RSS-131	

Test equipment used:

Designation	Type	Manufacturer	Invent.-no.	Cal.-date	due Cal.- date	used
EMI test receiver	ESI40	Rohde & Schwarz	E1687	20.10.2009	20.10.2010	X
EMI test receiver	ESI40	Rohde & Schwarz	E1607	04.03.2009	04.03.2010	
Antenna	CBL 6111	Chase	K1149	21.05.2010	21.05.2011	X
Antenna	CBL 6111	Chase	K1026	14.09.2009	14.09.2010	
RF Cable	Rosenberger	Frankonia	K1121 SET	28.12.2009	28.12.2010	X
Pre amplifier	AM1431	Miteq	K1721	02.07.2010	02.07.2011	X
Antenna	HL 025	R&S	K809	04.02.2010	04.02.2011	X
Antenna	MWH-1826 / B	ARA Inc.	K1042	06.04.2009	06.04.2011	X
Antenna	MWH-2640 / B	ARA Inc.	K1043	06.04.2009	06.04.2011	
Preamplifier	AFS4-00102000	Miteq	K817	11.11.2009	11.11.2010	X
Preamplifier	AFS4-00102000	Miteq	K838	06.10.2009	06.10.2010	
Preamplifier	JS43-1800-4000	Miteq	K1104	26.08.2009	26.08.2010	
RF Cable	Sucoflex 100	Suhner	K1742	09.04.2010	09.04.2011	X

The REMI version 2.135 has been used for max search.

Test set-up:

Test location: SAC/FAC
Both, the Fully Anechoic Chamber (FAC) and the Semi Anechoic Chamber (SAC) fulfil the requirements of ANSI C63.4 and CISPR 16-1-4 with regards to NSA and SVSWR.

Test Voltage: 115V / 60 Hz
Type of EUT: Wall mounted

Measurement uncertainty:

Measurement uncertainty expanded (95% or K=2)	± 4,7 dB for ANSI C63.4 measurement ± 0,5 dB for TIA-603 measurement
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Test Report No.: 10-121

FCC ID: XS5-ION-M851719HP

IC ID: 2237E-IONM851719HP



8.1 Limit §22.917

The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.

(a) *Out of band emissions.* 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.

(b) *Measurement procedure.* Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (*i.e.* 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

The emission measurements have been made with transmission at **Bottom/Middle/Top** frequency **(869MHz/881.5MHz/894MHz)**

The limit is -13dBm (e.i.r.p).

8.2 Test method ANSI/TIA/EA-603-C

Measurement procedure. TIA-603-C

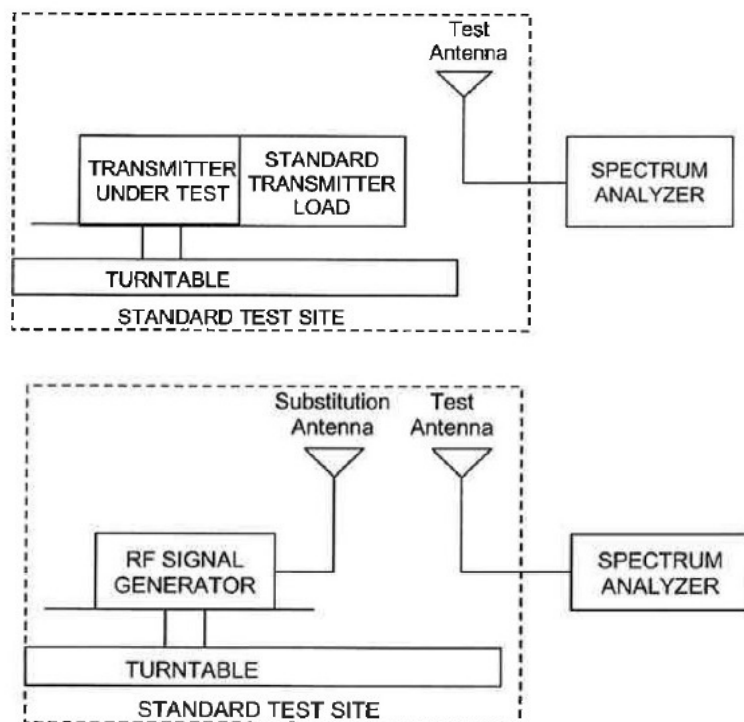
The antenna substitution method is used to determine the equivalent radiated power at spurious frequencies. The spurious emissions are measured at a distance of 3 meters. The EUT is then replaced with a reference substitution antenna with a known gain referenced to a dipole. This antenna is fed with a signal at the spurious frequency. The level of the signal is adjusted to repeat the previously measured level. The resulting eirp is the signal level fed to the reference antenna corrected for gain referenced to an isotropic dipole (see Figure 7.2).

From KDB (AMPLIFIER, BOOSTER, AND REPEATER REMINDER SHEET):

Radiated spurs (enclosure) – Use of CW signal (low, mid. and high freq.) is acceptable rather than all modulations.

The maximum RFI field strength was determined during the measurement by rotating the turntable (± 180 degrees) and varying the height of the receive antenna ($h = 1 \dots 4$ m) as like defined in ANSI C63.4. A measurement receiver has been used with a RBW 120 kHz up to 1 GHz and 1 MHz above 1 GHz. Steps with during pre measurement was half the RBW.

Both, the Fully Anechoic Chamber (FAC) and the Semi Anechoic Chamber (SAC) fulfil the requirements of ANSI C63.4 and CISPR 16-1-4 with regards to NSA and SVSWR.



picture 8.3: Substitution method

8.3 Climatic values in the lab

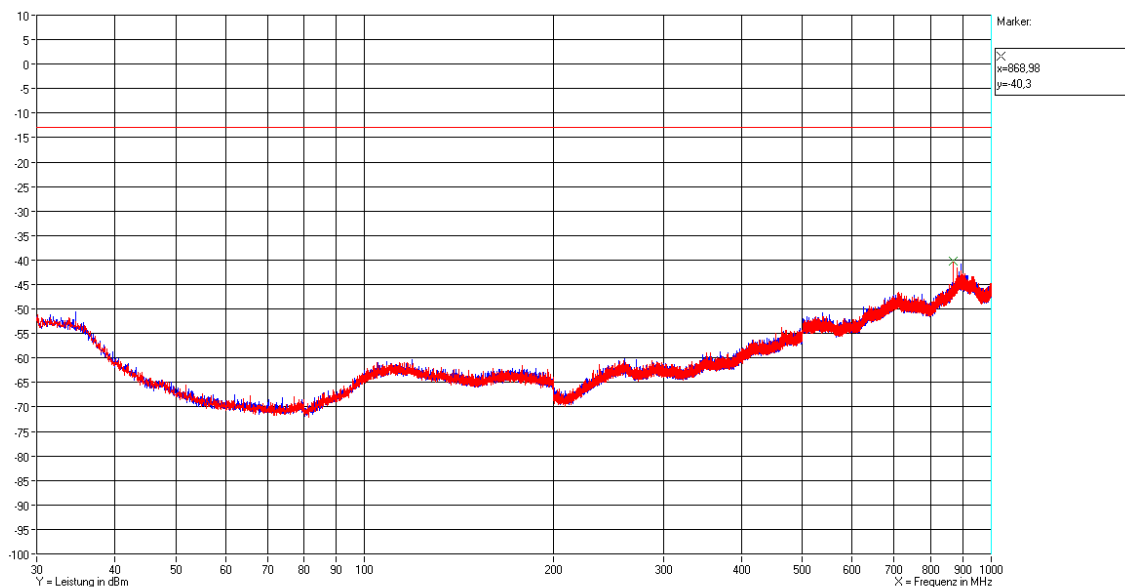
Temperature: 20°
 Relative Humidity: 45%
 Air-pressure: 1009hPa

8.4 Test results

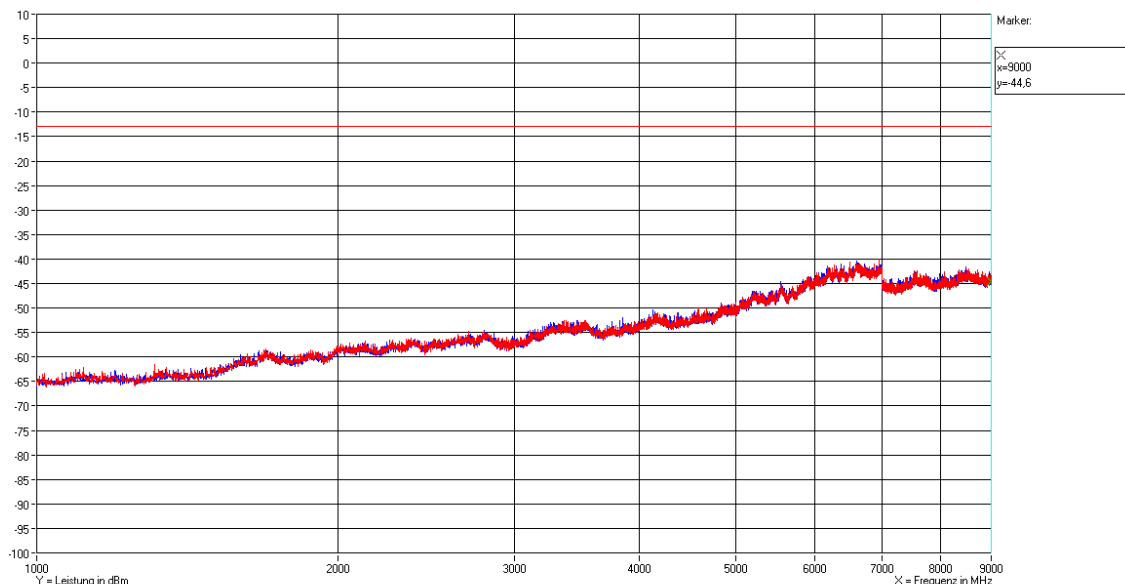
8.4.1 30 MHz to 9 GHz Downlink (Bottom – Middle – Top)

B/M/T: 869MHz/881.5MHz/894MHz

Polarisation: horizontal, vertical



Plot 8.1: Measurement: Field Strength Emission <1 GHz @3m in the FAC max.hold



Plot 8.2: Measurement: Field Strength Emission >1 GHz to 9GHz @3m in the FAC max.hold

No emission could be measured other than the fundamental frequencies.

Test Report No.: 10-121

FCC ID: XS5-ION-M851719HP

IC ID: 2237E-IONM851719HP



8.5 Summary test result

Test result	complies, according to the plots above
Tested by:	Mario Lehmann
Date:	03.08.2010

9 History

Revision	Modification	Date	Name
V01.00	Initial	20.09.2010	M. Lehmann

******* End of test report *******