FCC REPORT

(GPRS & WCDMA)

Applicant:	YiHang Technologys Co.,Ltd.
Address of Applicant:	4/F, PuSheng Building, GaoXin 6th Road, Hi-Tech District, Xi'an, Shaanxi, P.R.C

Equipment Under Test (EUT)

Product Name:	GSM/WCDMA Multi-mode On-board equipment
Model No.:	TREQr-5
Trade mark:	OBC
FCC ID:	2AHEC-TREQR-5
Applicable standards:	FCC CFR Title 47 Part 2 FCC CFR Title 47 Part 22 Subpart H FCC CFR Title 47 Part 24 Subpart E FCC CFR Title 47 Part 27 Subpart L
Date of sample receipt:	17 Feb., 2016
Date of Test:	17 Feb., to 09 Mar., 2016
Date of report issued:	09 Mar., 2016
Test Result:	PASS *

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Bruce Zhang
Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the CCIS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

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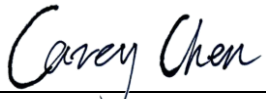
2. Version

Version No.	Date	Description
00	*09 Mar., 2016*	*Original*

Tested by:  ***Date:*** *09 Mar., 2016*

Test Engineer

Reviewed by:  ***Date:*** *09 Mar., 2016*

Project Engineer

3. Contents

4. Test Summary

Test Item	Section in CFR 47	Uncertainty	Result
RF Output Power	Part 2.1046 Part 22.913 (a)(2) Part 24.232 (c) Part 27.50 (d)(4)	±1.50dB	Pass
Peak-to-Average Power Ratio	Part 24.232 (d)	±1.50dB	Pass
Modulation Characteristics	Part 2.1047	/	Pass
99% & -26 dB Occupied Bandwidth	Part 2.1049 Part 22.917(b) Part 24.238(b) Part 27.53(h)	±1.50dB	Pass
Spurious Emissions at Antenna Terminal	Part 2.1051 Part 22.917 (a) Part 24.238 (a) Part 27.53 (h)	±1.50dB	Pass
Field Strength of Spurious Radiation	Part 2.1053 Part 22.917 (a) Part 24.238 (a) Part 27.53 (h)	±4.88dB	Pass
Out of band emission, Band Edge	Part 22.917 (a) Part 24.238 (a) Part 27.53 (h)	±1.50dB	Pass
Frequency stability vs. temperature	Part 2.1055(a)(1)(b)	±0.001ppm	Pass
Frequency stability vs. voltage	Part 2.1055(d)(1)(2)	±0.001ppm	Pass

Pass: The EUT complies with the essential requirements in the standard.

5. General Information

5.1 Client Information

Applicant:	YiHang Technologys Co.,Ltd.
Address of Applicant:	4/F, PuSheng Building, GaoXin 6th Road, Hi-Tech District, Xi'an, Shaanxi, P.R.C
Manufacturer:	YiHang Technologys Co.,Ltd.
Address of Manufacturer:	4/F, PuSheng Building, GaoXin 6th Road, Hi-Tech District, Xi'an, Shaanxi, P.R.C

5.2 General Description of E.U.T.

Product Name:	GSM/WCDMA Multi-mode On-board equipment
Model No.:	TREQr-5
Operation Frequency range:	GPRS1900: 1850.20MHz-1909.80MHz WCDMA Band V: 826.4MHz-846.6MHz WCDMA Band II: 1852.4 MHz -1907.6 MHz WCDMA Band IV: 1712.4 MHz -1752.6 MHz
Modulation type:	GPRS:GMSK, UMTS:QPSK, EGPRS: 8PSK
Antenna type:	Internal Antenna
Antenna gain:	GPRS 1900: 1.19 dBi WCDMA 850:-0.37 dBi WCDMA 1900:1.19 dBi WCDMA 1700: -0.37 dBi
Power supply:	DC 12V

Operation Frequency List:

GPRS1900		WCDMA Band IV	
Channel:	Frequency (MHz)	Channel:	Frequency (MHz)
512	1850.20	1312	1712.40
513	1850.40	1313	1712.60
….	….	….	….
660	1879.80	1412	1732.40
661	1880.00	1413	1732.60
662	1880.20	1414	1732.80
…	…	…	…
809	1909.60	1512	1752.40
810	1909.80	1513	1752.60
WCDMA Band V		WCDMA Band II	
Channel:	Frequency (MHz)	Channel:	Frequency (MHz)
4132	826.40	9262	1852.40
4133	826.60	9263	1852.60
….	….	….	….
4182	836.40	9399	1879.80
4183	836.60	9400	1880.00
4184	836.80	9401	1880.20
…	…	…	…
4232	846.40	9537	1907.40
4233	846.60	9538	1907.60

Regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

GPRS1900			WCDMA Band IV		
Channel		Frequency(MHz)	Channel		Frequency(MHz)
Lowest channel	512	1850.20	Lowest channel	1312	1712.40
Middle channel	661	1880.00	Middle channel	1413	1732.60
Highest channel	810	1909.80	Highest channel	1513	1752.60
WCDMA Band V			WCDMA Band II		
Channel		Frequency(MHz)	Channel		Frequency(MHz)
Lowest channel	4132	826.40	Lowest channel	9262	1852.40
Middle channel	4183	836.60	Middle channel	9400	1880.00
Highest channel	4233	846.60	Highest channel	9538	1907.60

5.3 Test modes

Data mode (GPRS)	Keep the EUT in GPRS mode on PCS 1900.
Data mode (EGPRS)	Keep the EUT in EGPRS mode on PCS 1900.
Data mode (RMC 12.2kbps)	Keep the EUT in RMC on WCDMA Band II, WCDMA Band IV and WCDMA Band V respectively.
Data mode (HSDPA Subtest 1~4)	Keep the EUT in HSDPA mode on WCDMA Band II, WCDMA Band IV and WCDMA Band V respectively.
Data mode (HSUPA Subtest 1~5)	Keep the EUT in HSUPA mode on WCDMA Band II, WCDMA Band IV and WCDMA Band V respectively.
Remark:	Just the worst case mode shown in report.

5.4 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is filing to comply with Section Part 22 subpart H, Part 24 subpart E and Part 27 subpart L of the FCC CFR 47 Rules.

5.5 Test Methodology

Both conducted and radiated testing were performed according to the procedures document on TIA/EIA 603 and FCC CFR 47.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055 and 2.1057

5.6 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **FCC - Registration No.: 817957**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in out files. Registration 817957, February 27, 2012.

- **IC - Registration No.: 10106A-1**

The 3m Semi-anechoic chamber of Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

- **CNAS - Registration No.: CNAS L6048**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6048.

5.7 Laboratory Location

Shenzhen Zhongjian Nanfang Testing Co., Ltd.
Address: No. B-C, 1/F., Building 2, Laodong No.2 Industrial Park, Xixiang Road,
Bao'an District, Shenzhen, Guangdong, China
Tel: +86-755-23118282
Fax: +86-755-23116366

5.8 Description of Support Units

Manufacturer	Description	Model	Serial Number	FCC ID/DoC
GS Japan	Lead-acid battery	55D26R-MFZ	8362810610	N/A

5.9 Test Instruments list

Radiated Emission:

Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	SAEMC	9(L)*6(W)* 6(H)	CCIS0001	08-23-2014	08-22-2017
2	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	CCIS0005	03-28-2015	03-28-2016
3	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA9120D	CCIS0006	03-28-2015	03-28-2016
4	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
5	Amplifier (10kHz-1.3GHz)	HP	8447D	CCIS0003	04-01-2015	03-31-2016
6	Amplifier (1GHz-18GHz)	Compliance Direction Systems Inc.	PAP-1G18	CCIS0011	04-01-2015	03-31-2016
7	Pre-amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	04-01-2015	03-31-2016
8	Horn Antenna	ETS-LINDGREN	3160	GTS217	04-01-2015	03-31-2016
9	Printer	HP	HP LaserJet P1007	N/A	N/A	N/A
10	Positioning Controller	UC	UC3000	CCIS0015	N/A	N/A
11	Spectrum analyzer 9k-30GHz	Rohde & Schwarz	FSP 30	CCIS0023	03-28-2015	03-28-2016
12	EMI Test Receiver	Rohde & Schwarz	ESPI	CCIS0022	03-28-2015	03-28-2016
13	Loop antenna	Laplace instrument	RF300	EMC0701	04-01-2015	03-31-2016
14	Universal radio communication tester	Rhode & Schwarz	CMU200	CCIS0069	03-28-2015	03-28-2016
15	Signal Analyzer	Rohde & Schwarz	FSIQ3	CCIS0088	04-08-2015	04-08-2016
16	DC Power Supply	Shenzhen XinNuoEr Technologies Co., Ltd.	WYK-10020K	CCIS0201	10-31-2015	10-30-2016
17	Temperature Humidity Chamber	Fo Shan Heng Pu Electronics Co., Ltd.	HPGDS-500	CCIS0240	11-18-2015	11-27-2016

6. System test configuration

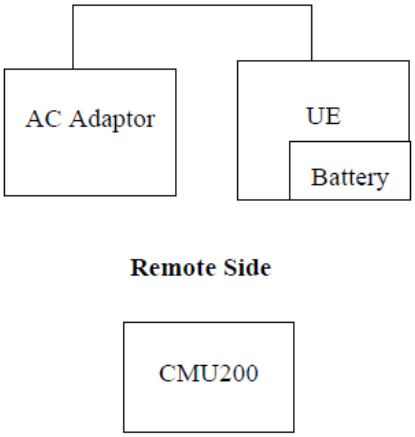
6.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the commission's requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

6.2 EUT Exercise

The EUT (Transmitter) was operated in the engineering mode to fix the Tx frequency which was for the purpose of the measurements.

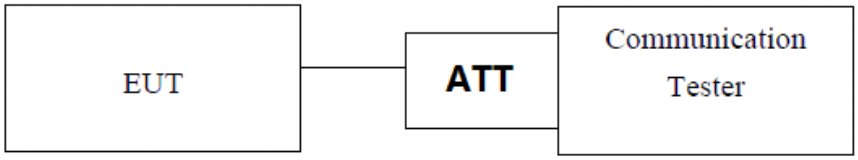
6.3 Configuration of Tested System



6.4 Description of Test Modes

The EUT has been tested under operating condition.
EUT staying in continuous transmitting mode. Channel Low, Mid and High for each type band with rated data rate were chosen for full testing.
The field strength of spurious radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for three modes (GPRS1900, WCDMA Band V, WCDMA Band IV and WCDMA Band II) with power adaptor, earphone and Data cable. The worst-case H mode for GPRS1900, UMTS 850, UMTS 1700 and UMTS 1900.

6.5 Conducted Output Power

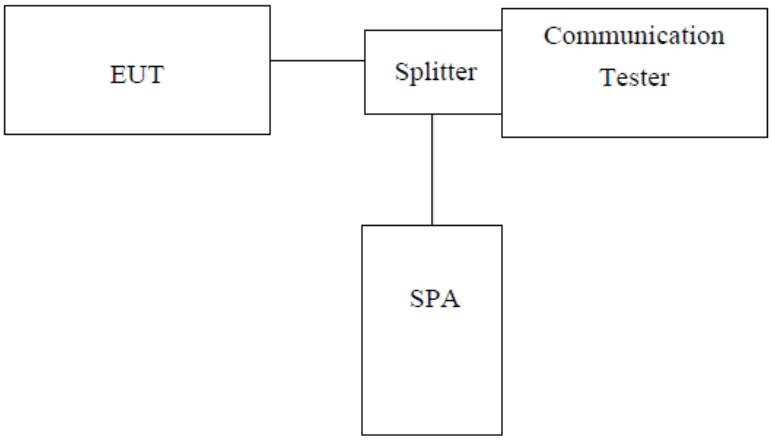
Test Requirement:	FCC part 22.913(a), FCC part 24.232(b) and FCC part 27.50(d)
Test Method:	FCC part 2.1046
Limit:	GPRS 1900: 2W WCDMA Band V: 7W WCDMA Band II: 2W WCDMA Band IV: 1W
Test setup:	 *Note: Measurement setup for testing on Antenna connector*
Test Procedure:	The transmitter output was connected to a calibrated attenuator, the other end of which was connected to the CMU200. Transmitter output power was read off in dBm.
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Data

EUT Mode	Burst Average power (dBm)			Limit(dBm)
	512	661	810	
	1850.20MHz	1880.00MHz	1909.80MHz	
GPRS 1900 (1 Uplink slot)	29.60	29.58	29.34	33
GPRS 1900 (2 Uplink slot)	27.37	27.20	27.14	
GPRS 1900 (3 Uplink slot)	25.01	25.21	25.06	
GPRS 1900 (4 Uplink slot)	22.00	21.99	22.03	
EGPRS 1900 (1 Uplink slot)	25.01	25.16	24.90	
EGPRS 1900 (2 Uplink slot)	22.89	22.78	22.65	
EGPRS 1900 (3 Uplink slot)	21.07	20.92	20.84	
EGPRS 1900 (4 Uplink slot)	19.70	19.56	19.44	

EUT Mode		Burst Average power (dBm)			Limit(dBm)
		4132	4183	4233	
		826.40MHz	836.60MHz	846.60MHz	
UMTS 850 HSDPA	Subtest 1	21.42	21.39	21.31	38.45
	Subtest 2	21.26	21.15	21.19	
	Subtest 3	19.70	19.65	19.61	
	Subtest 4	19.61	19.42	19.44	
UMTS 850 HSUPA	Subtest 1	20.81	20.71	20.62	
	Subtest 2	21.46	21.33	21.32	
	Subtest 3	20.33	20.27	20.13	
	Subtest 4	21.51	21.41	21.37	
	Subtest 5	20.58	20.45	20.52	
UMTS 850 RMC	12.2kbps	22.44	22.30	22.31	
EUT Mode		Burst Average power (dBm)			Limit(dBm)
		9262	9400	9538	
		1852.40MHz	1880.00MHz	1907.60MHz	
UMTS 1900 HSDPA	Subtest 1	22.05	21.95	21.83	33.00
	Subtest 2	21.86	21.80	21.69	
	Subtest 3	20.38	20.18	20.21	
	Subtest 4	20.27	19.89	20.02	
UMTS 1900 HSUPA	Subtest 1	21.28	21.15	21.19	
	Subtest 2	22.00	21.86	21.81	
	Subtest 3	20.86	20.75	20.80	
	Subtest 4	22.03	21.89	21.84	
	Subtest 5	21.14	21.04	21.03	
UMTS 1900 RMC	12.2kbps	22.78	22.92	22.71	
EUT Mode		Burst Average power (dBm)			Limit(dBm)
		1312	1412	1513	
		1712.40MHz	1732.40MHz	1752.60MHz	
UMTS 1700 HSDPA	Subtest 1	21.93	21.83	21.79	30.00
	Subtest 2	21.78	21.59	21.42	
	Subtest 3	20.32	20.16	20.02	
	Subtest 4	20.14	20.32	20.47	
UMTS 1700 HSUPA	Subtest 1	21.11	21.07	20.93	
	Subtest 2	21.93	21.70	21.68	
	Subtest 3	20.79	20.53	20.55	
	Subtest 4	21.97	21.79	21.77	
	Subtest 5	21.05	20.94	20.82	
UMTS 1700 RMC	12.2kbps	22.72	22.69	22.64	

6.6 Occupy Bandwidth

Test Requirement:	FCC part 22.913(a), FCC part 24.232(b) and FCC Part 27.53(h)
Test Method:	FCC part 2.1049
Test setup:	 *Note: Measurement setup for testing on Antenna connector*
Test Procedure:	1. The EUT's output RF connector was connected with a short cable to the spectrum analyzer 2. RBW was set to about 1% of emission BW, VBW= 3 times RBW. 3. -26dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

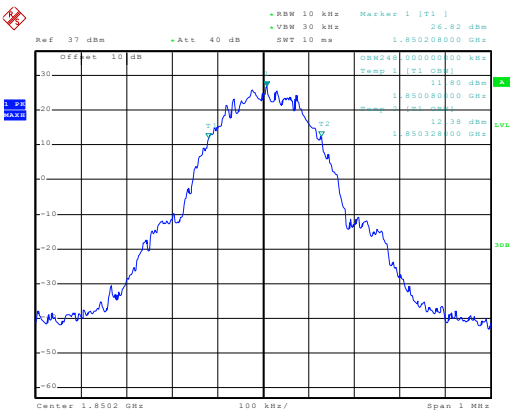
Measurement Data

EUT Mode	Channel	Frequency (MHz)	99% Occupy bandwidth (kHz)	-26dB bandwidth (kHz)
GPRS 1900	512	1850.2	248	320
	661	1880.0	242	316
	810	1909.8	244	314
EGPRS1900	512	1850.2	246	314
	661	1880.0	244	306
	810	1909.8	246	314
UMTS850 12.2k RMC	4132	824.4	4160	4680
	4183	836.0	4180	4680
	4233	846.6	4160	4680
UMTS1900 12.2k RMC	9262	1852.4	4200	4680
	9400	1880.0	4200	4680
	9538	1907.6	4180	4680
UMTS1700 12.2k RMC	1312	1712.40	4180	4700
	1413	1732.60	4200	4680
	1513	1752.60	4200	4680

Test plot as follows:

99% Occupy bandwidth

GPRS 1900



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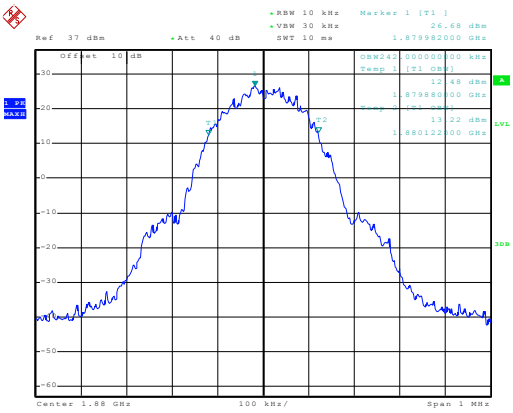
Lowest channel



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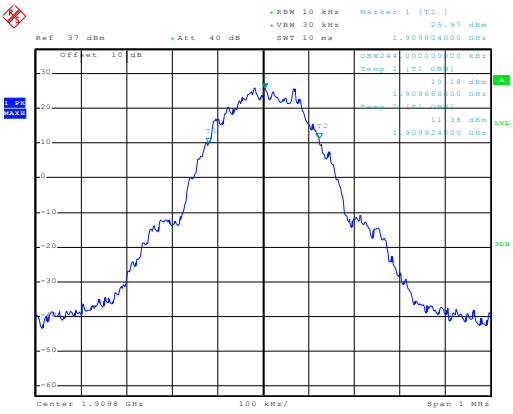

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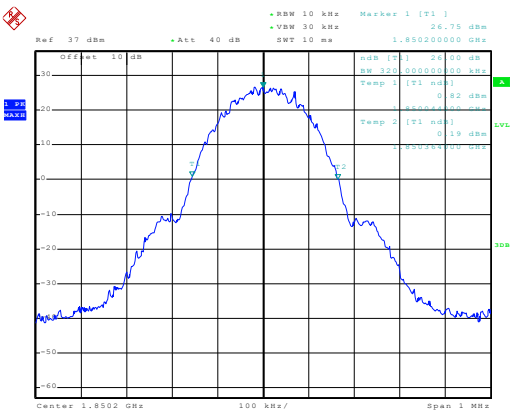
Highest channel

26dB Emission Bandwidth

GPRS 1900



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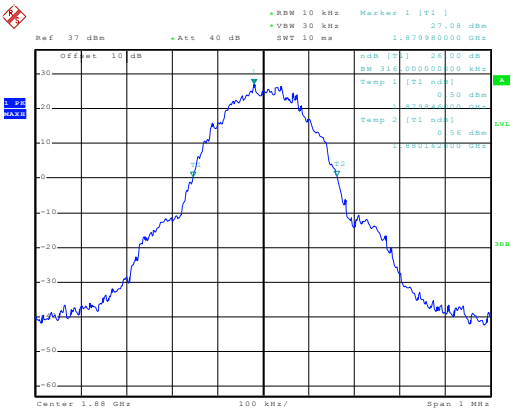

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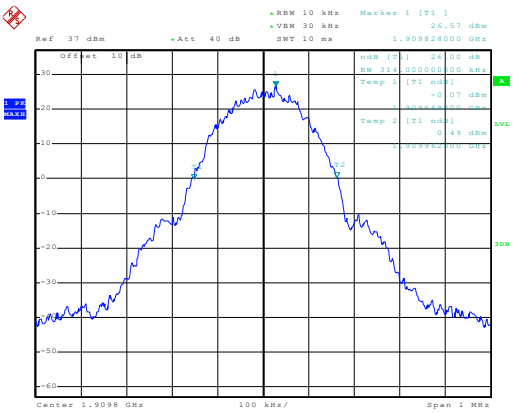
Middle channel



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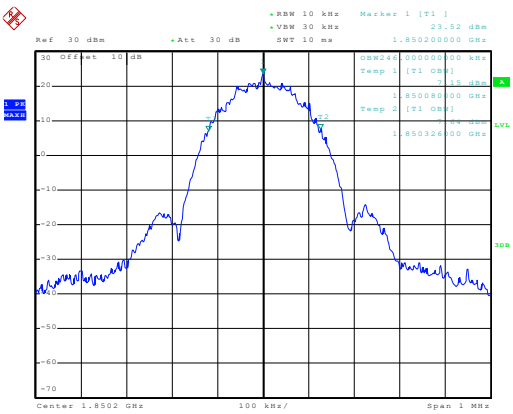
Highest channel

99% Occupy bandwidth

EGPRS 1900



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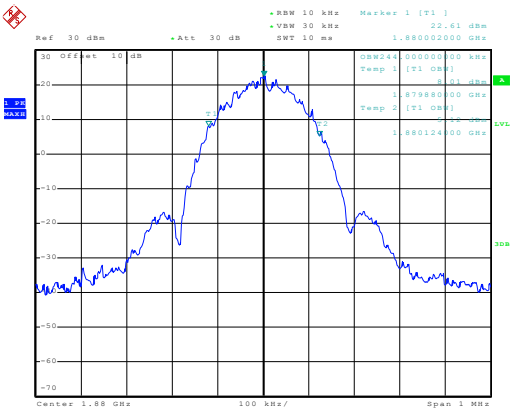

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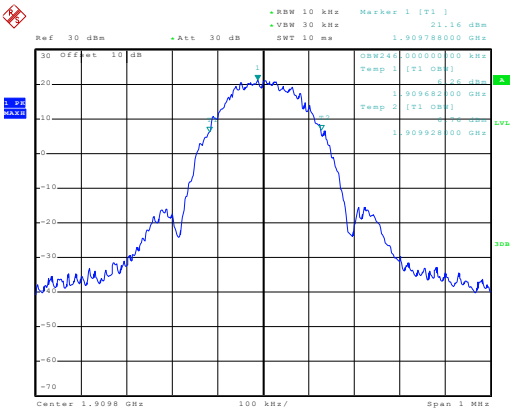
Middle channel



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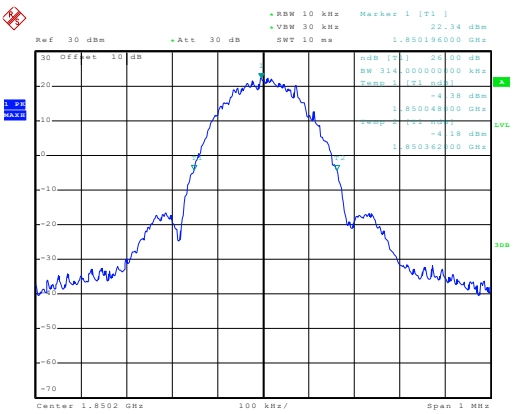
Highest channel

26dB Emission Bandwidth

EGPRS 1900



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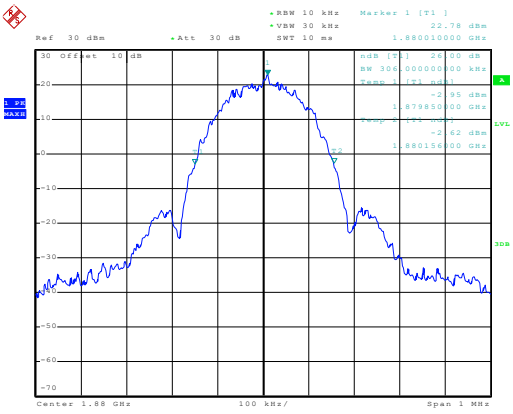
Lowest channel



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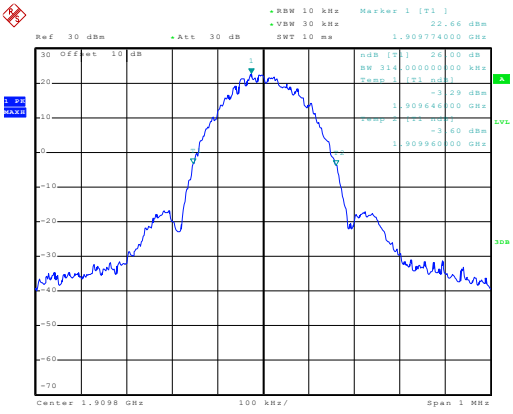
Middle channel



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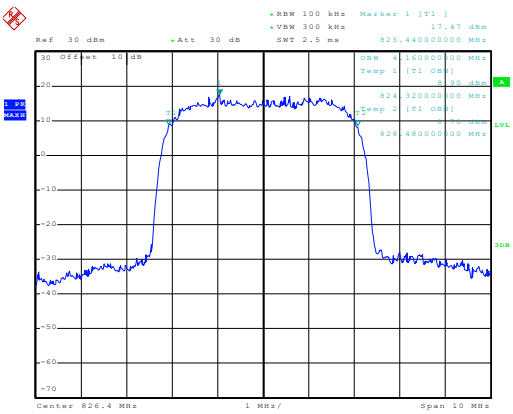
Highest channel

99% Occupy bandwidth

UMTS 850 12.2k RMC



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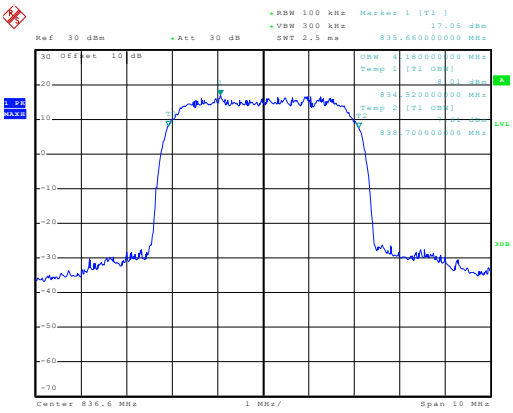
Lowest channel



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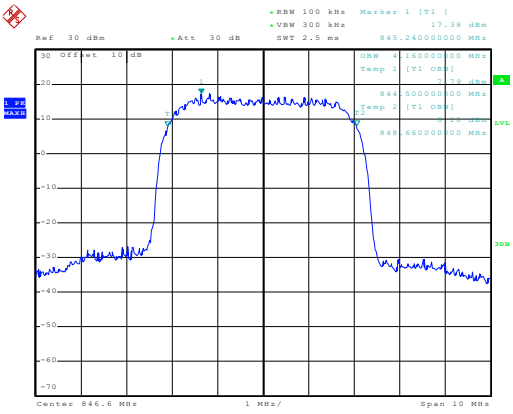
Middle channel



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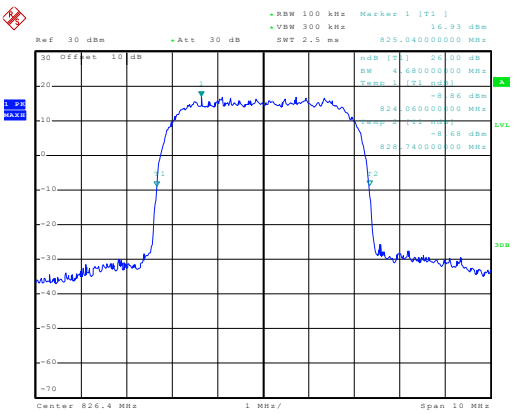
Highest channel

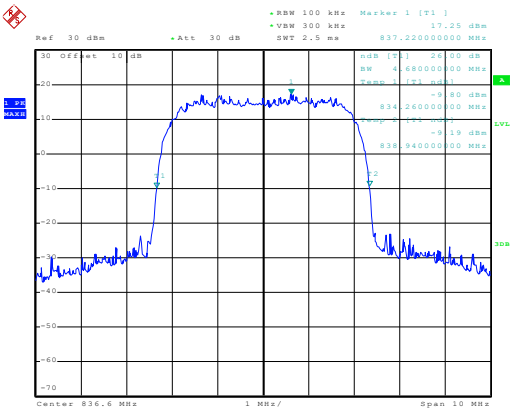
26dB Emission Bandwidth

UMTS 850 12.2k RMC



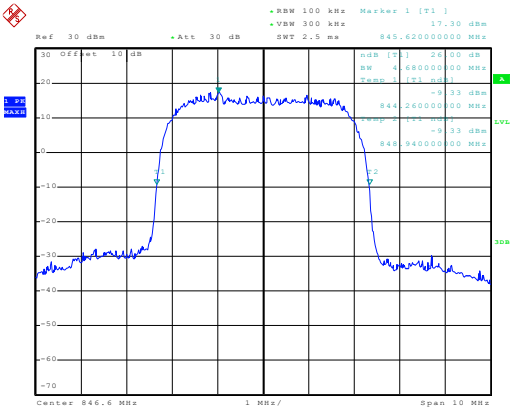
Date: 18.FEB.2016 18:13:22

Lowest channel



Date: 18.FEB.2016 18:13:48

Middle channel

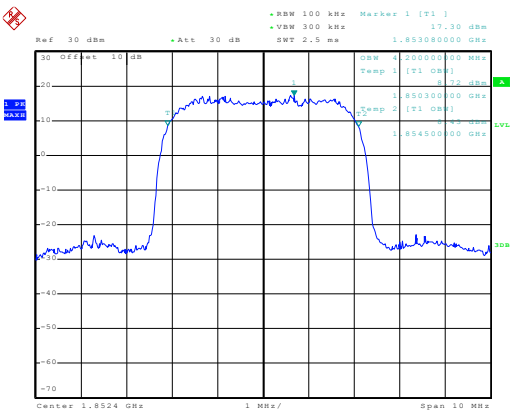


Date: 18.FEB.2016 18:14:52

Highest channel

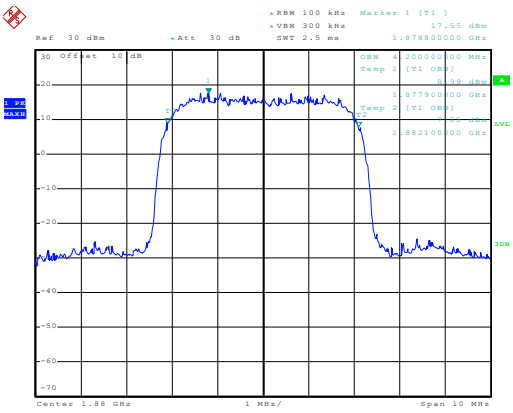
99% Occupy bandwidth

UMTS 1900 12.2k RMC



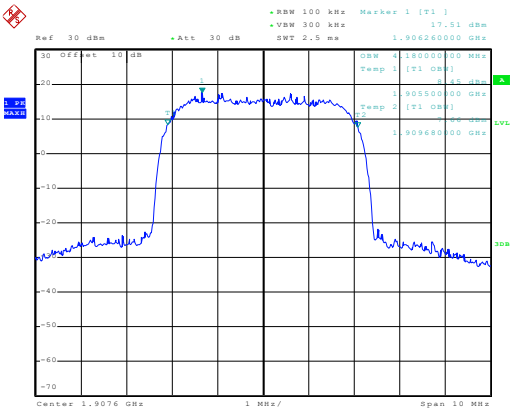
Date: 18.FEB.2016 18:06:02

Lowest channel



Date: 18.FEB.2016 18:07:04

Middle channel

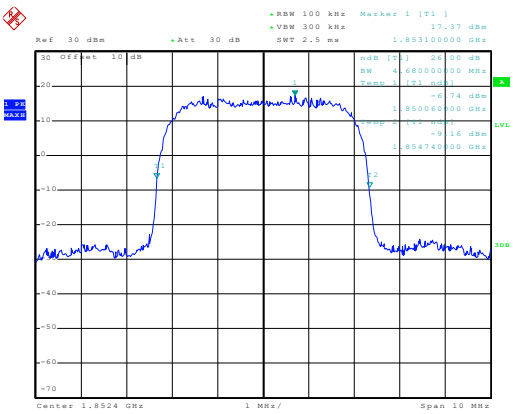


Date: 18.FEB.2016 18:07:36

Highest channel

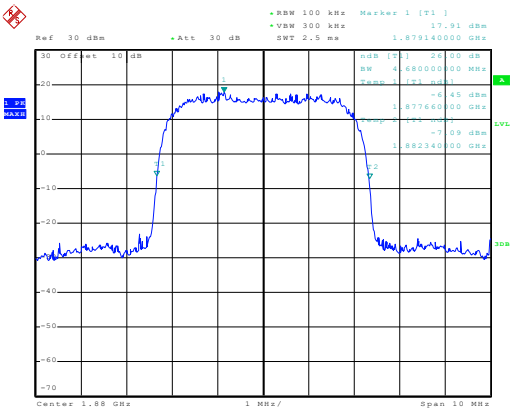
26dB Emission Bandwidth

UMTS 1900 12.2k RMC



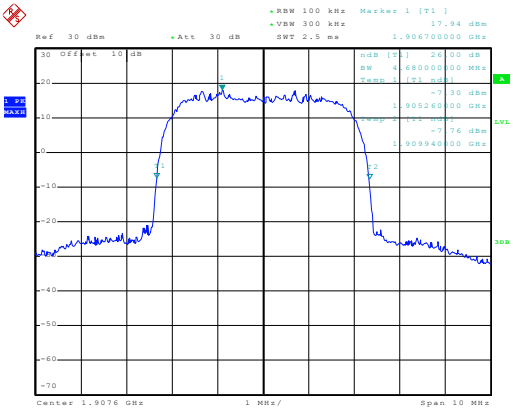
Date: 18.FEB.2016 18:06:21

Lowest channel



Date: 18.FEB.2016 18:06:50

Middle channel

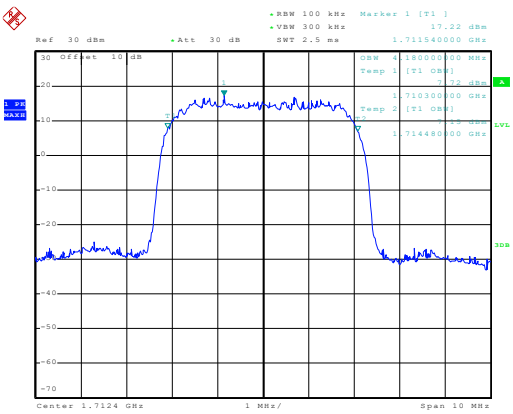


Date: 18.FEB.2016 18:08:03

Highest channel

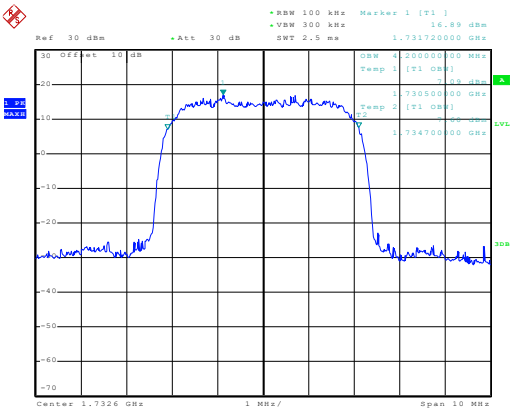
99% Occupy bandwidth

UMTS 1700 12.2k RMC



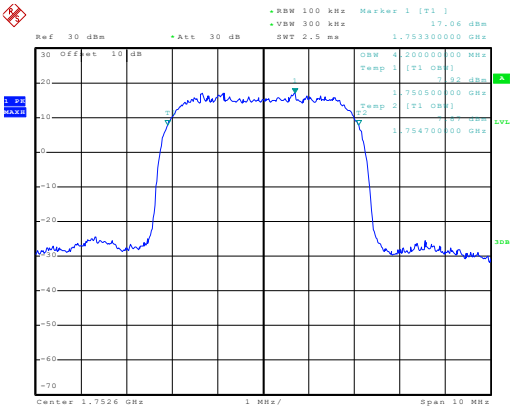
Date: 18.FEB.2016 18:09:18

Lowest channel



Date: 18.FEB.2016 18:09:52

Middle channel

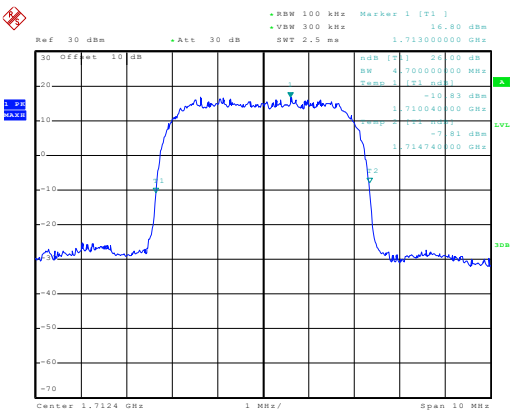


Date: 18.FEB.2016 18:11:37

Highest channel

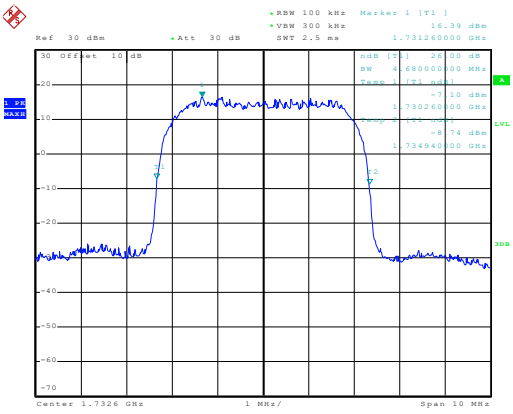
26dB Emission Bandwidth

UMTS 1700 12.2k RMC



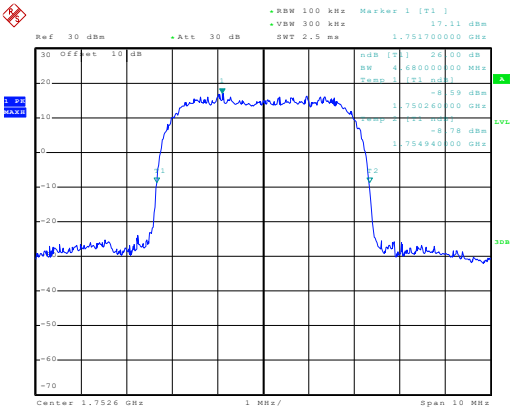
Date: 18.FEB.2016 18:09:04

Lowest channel



Date: 18.FEB.2016 18:10:05

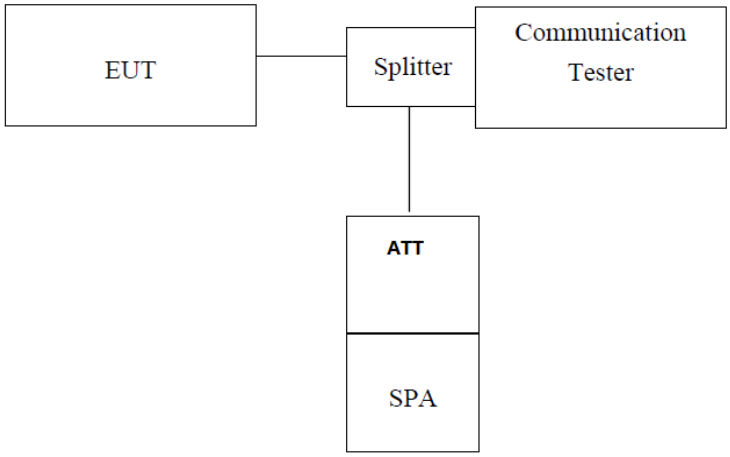
Middle channel



Date: 18.FEB.2016 18:10:35

Highest channel

6.7 Peak-to-Average Power Ratio

Test Requirement:	FCC part 24.232(d)
Limit:	The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.
Test setup:	 *Note: Measurement setup for testing on Antenna connector*
Test Procedure:	1 The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. 2 Set the CCDF option in spectrum analyzer, RBW ≥ OBW, 3 Set the EUT working in highest power level, measured and recorded the 0.1% as PAPR level. 4 Repeat step 1~3 at other frequency and modulations.
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

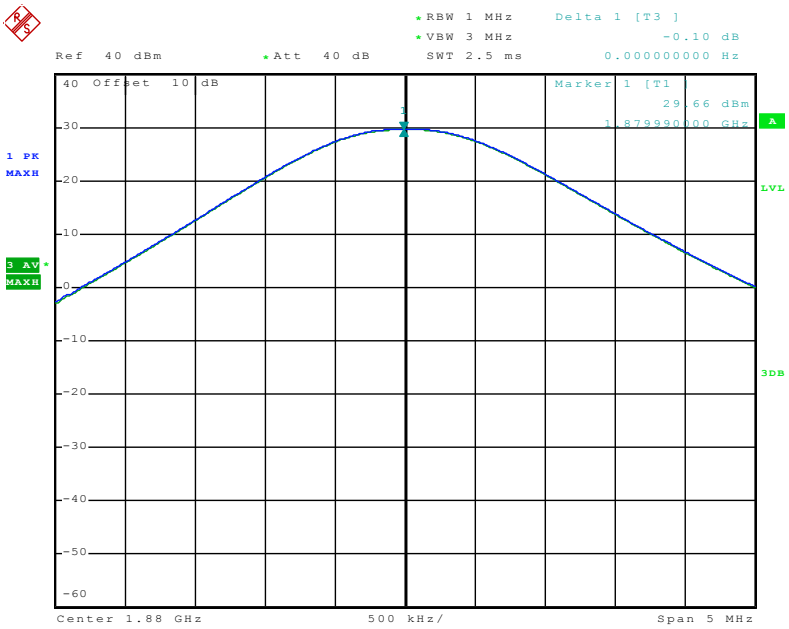
Measurement Data (worst case)

Modulation	Test channel	PAPR
GPRS 1900	661	0.10
EGPRS 1900	661	0.16
UMTS 850 RMC	4183	3.04
UMTS1700 RMC	1413	3.20
UMTS1900 RMC	9400	3.04

Test plots as below:

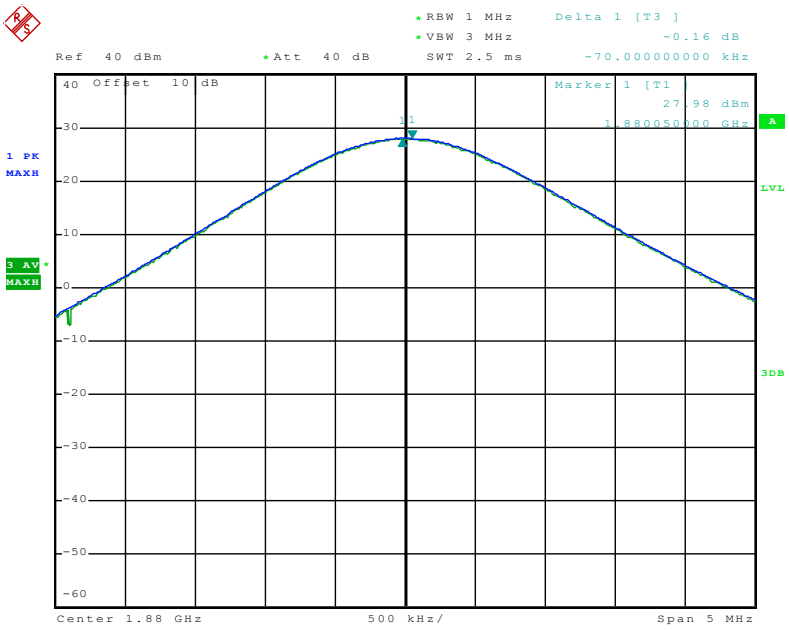
Middle channel

Modulation: GPRS 1900



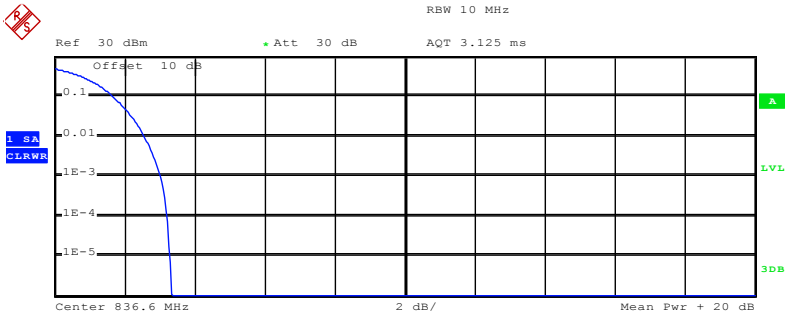
Middle channel

Modulation: EGPRS 1900



Middle channel

Modulation: UMTS 850 RMC



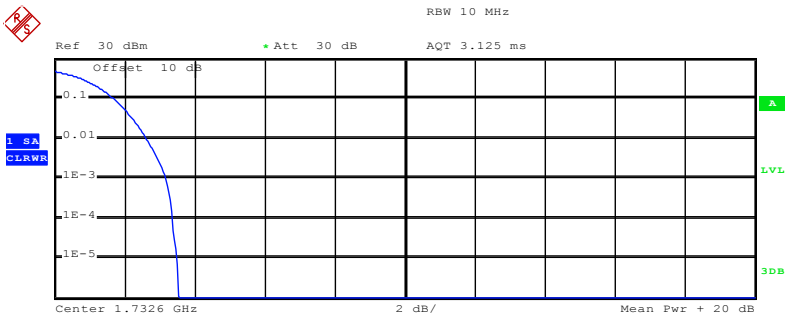
Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	22.01 dBm
Peak	25.34 dBm
Crest	3.34 dB
10 %	1.68 dB
1 %	2.56 dB
.1 %	3.04 dB
.01 %	3.24 dB

Date: 18.FEB.2016 18:24:01

Middle channel

Modulation: UMTS1700 RMC



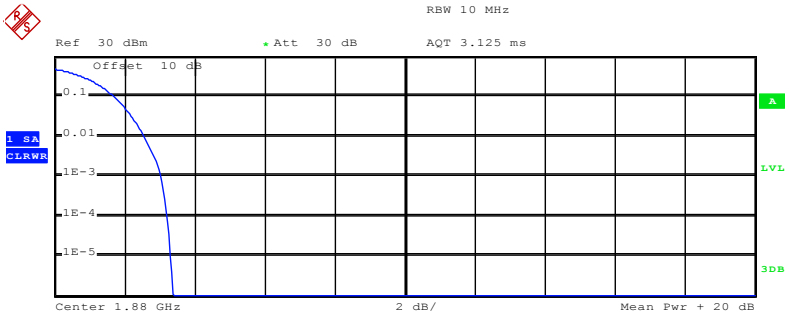
Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	21.52 dBm
Peak	25.06 dBm
Crest	3.54 dB
10 %	1.72 dB
1 %	2.64 dB
.1 %	3.20 dB
.01 %	3.40 dB

Date: 18.FEB.2016 18:22:56

Middle channel

Modulation: UMTS1900 RMC



Complementary Cumulative Distribution Function (100000 samples)

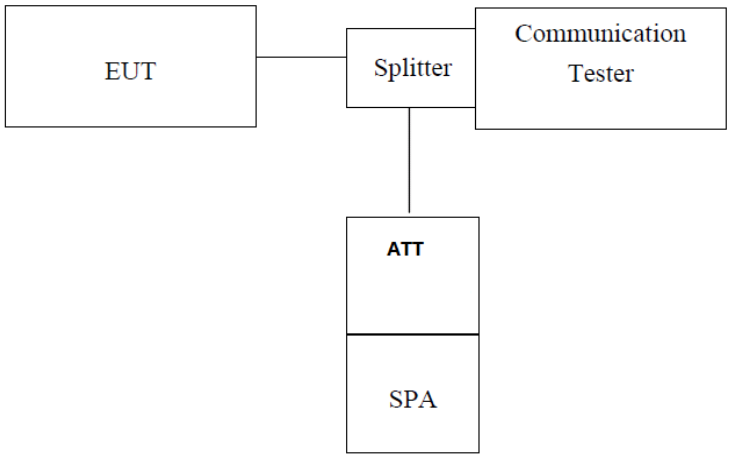
	Trace 1
Mean	22.60 dBm
Peak	25.98 dBm
Crest	3.38 dB
10 %	1.72 dB
1 %	2.56 dB
.1 %	3.04 dB
.01 %	3.24 dB

Date: 18.FEB.2016 18:22:03

6.8 Modulation Characteristic

According to FCC § 2.1047(d), Part 22H & 24E & 27L there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

6.9 Out of band emission at antenna terminals

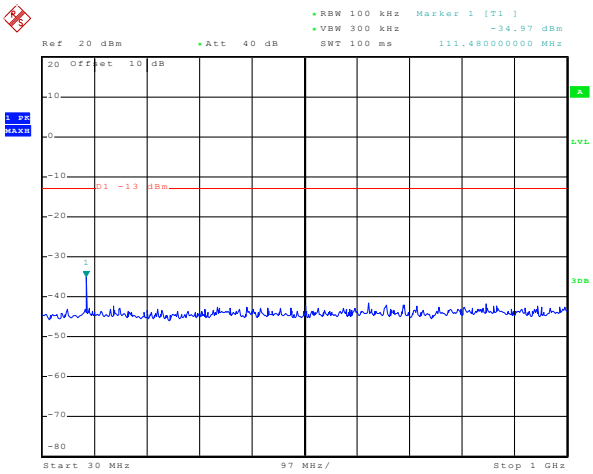
Test Requirement:	FCC part 22.917(a), FCC part 24.238(a) and FCC Part 27.53 (h)
Test Method:	FCC part 2.1051
Limit:	-13dBm
Test setup:	 ***Note:*** *Measurement setup for testing on Antenna connector*
Test Procedure:	5 The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. 6 The resolution bandwidth of the spectrum analyzer was set at 100 kHz when below 1GHz, 1MHz when above 1 GHz; sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic. 7 For the out of band: Set the RBW=100 kHz, VBW=300 kHz when below 1 GHz, RBW =1 MHz, VBW=3 MHz when above 1 GHz, Start=30MHz, Stop= 10th harmonic. 8 Band Edge Requirements: In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the out of band Emissions.
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Test plots as follows:

Spurious emission

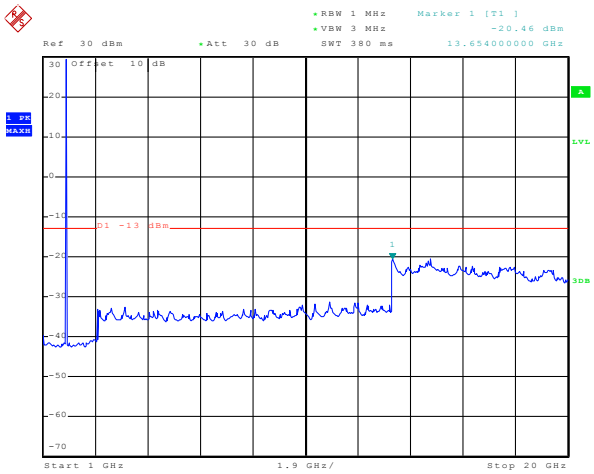
GPRS 1900

Lowest Channel



Date: 2.MAR.2016 19:20:46

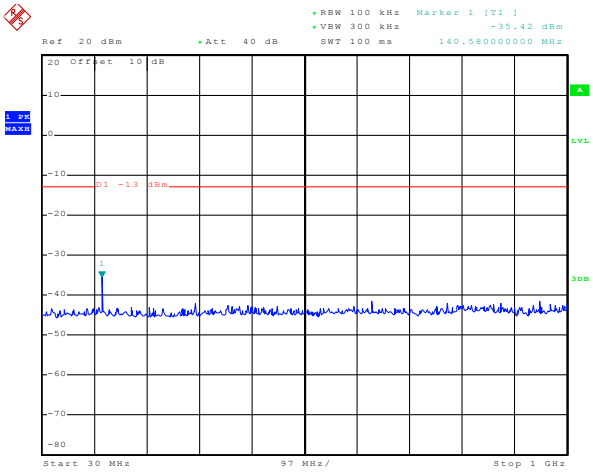
30MHz~1GHz



Date: 2.MAR.2016 19:24:46

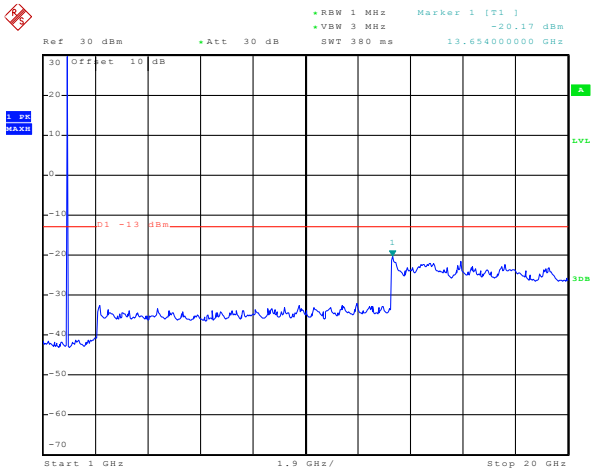
1GHz~20GHz

Middle Channel



Date: 2.MAR.2016 19:21:12

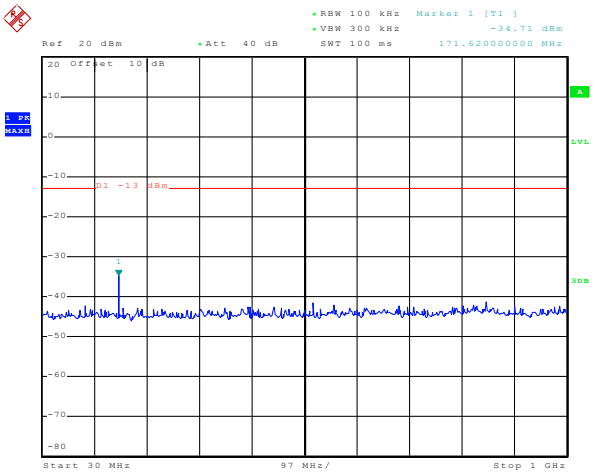
30MHz~1GHz



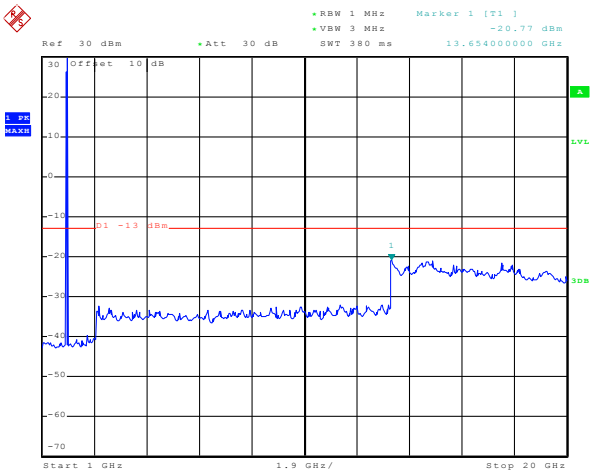
Date: 2.MAR.2016 19:23:53

1GHz~20GHz

Highest Channel



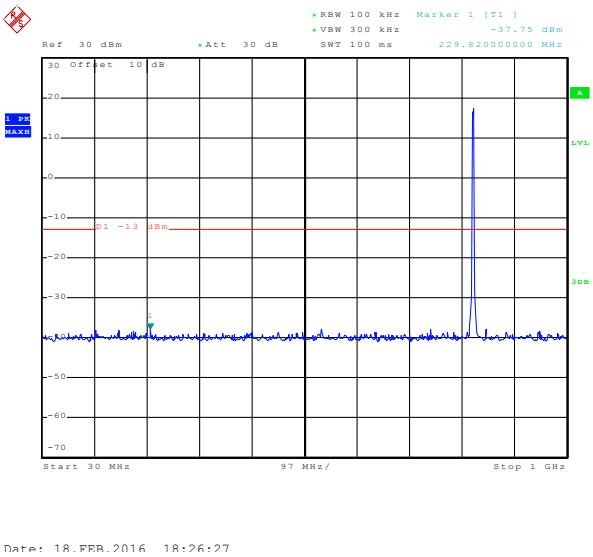
30MHz~1GHz



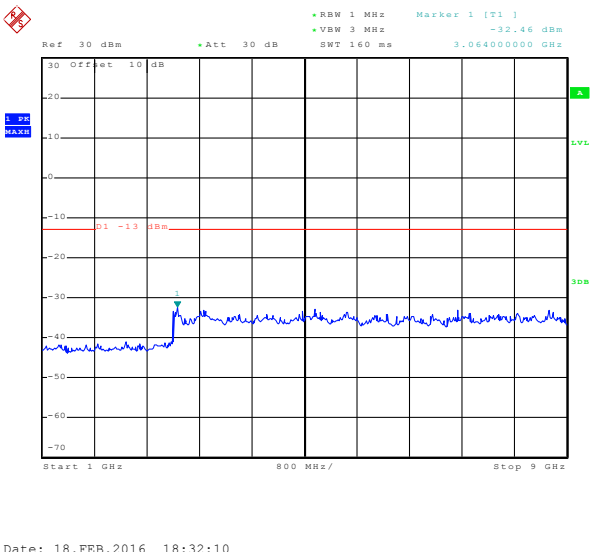
1GHz~20GHz

UMTS 850 12.2k RMC

Lowest Channel

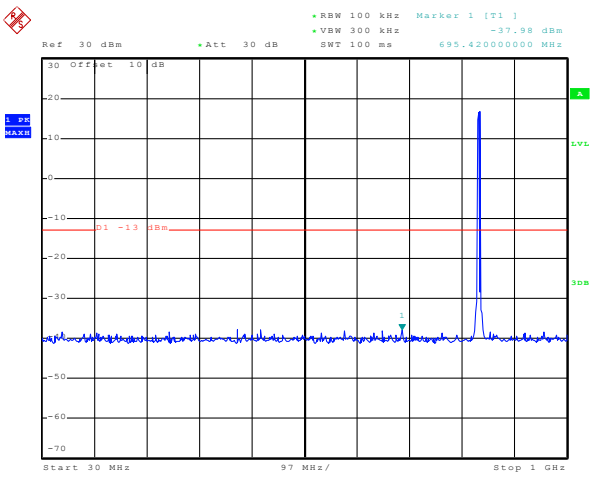


30MHz~1GHz



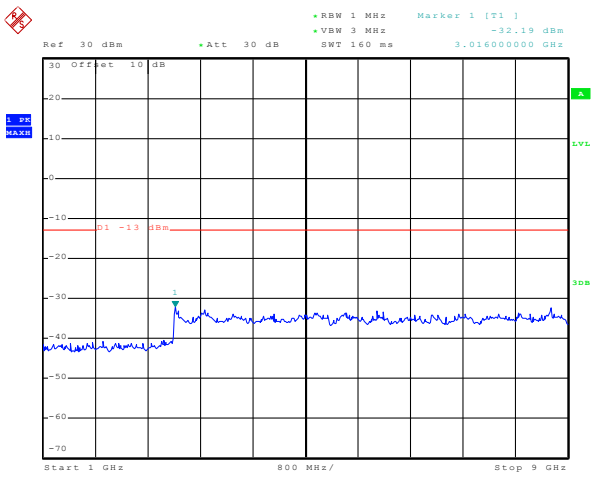
1GHz~9GHz

Middle Channel



Date: 18.FEB.2016 18:27:11

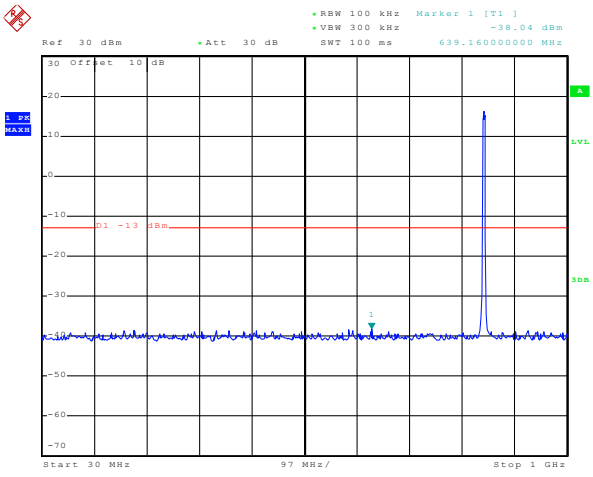
30MHz~1GHz



Date: 18.FEB.2016 18:31:59

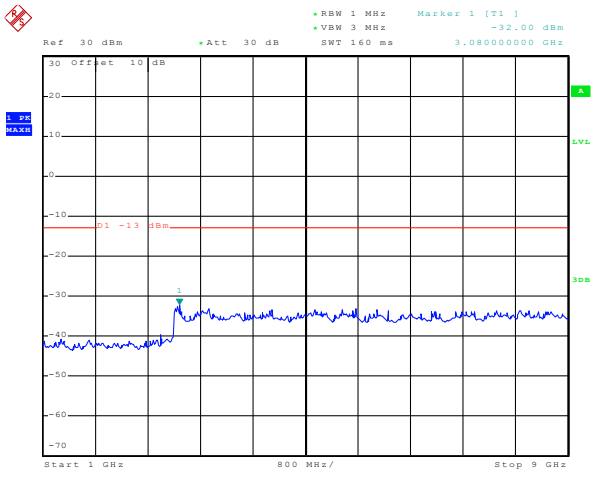
1GHz~9GHz

Highest Channel



Date: 18.FEB.2016 18:28:49

30MHz~1GHz

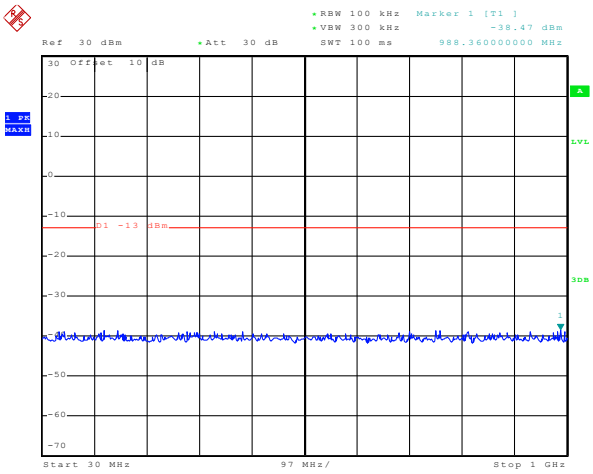


Date: 18.FEB.2016 18:31:32

1GHz~9GHz

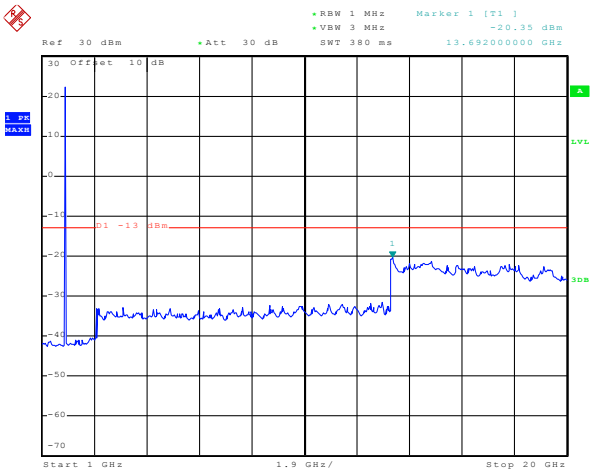
UMTS 1900 12.2k RMC

Lowest Channel



Date: 18.FEB.2016 18:36:14

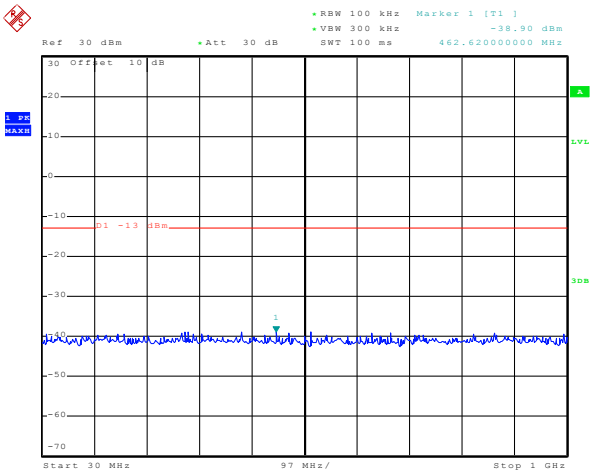
30MHz~1GHz



Date: 18.FEB.2016 18:34:00

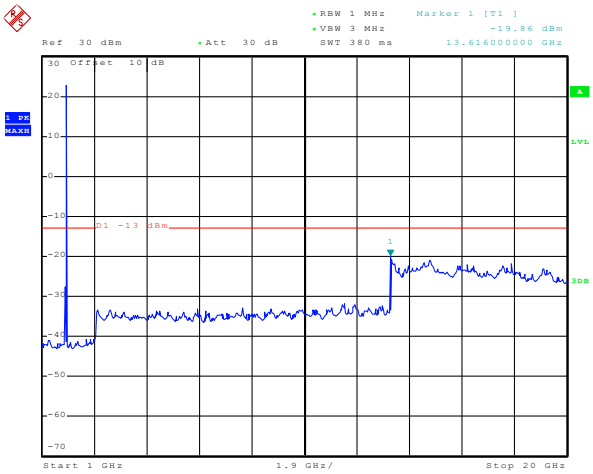
1GHz~20GHz

Middle Channel



Date: 18.FEB.2016 18:36:23

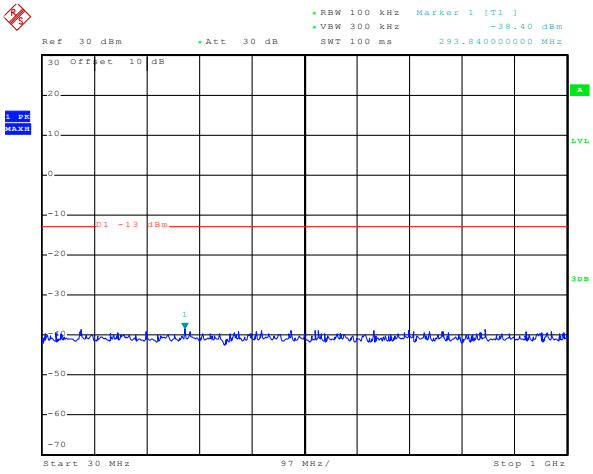
30MHz~1GHz



Date: 18.FEB.2016 18:34:25

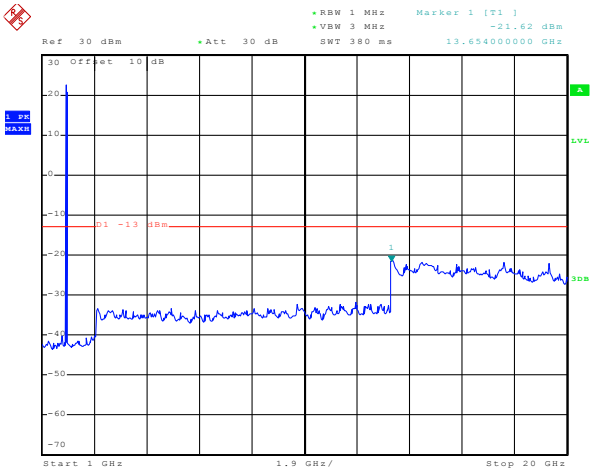
1GHz~20GHz

Highest Channel



Date: 18.FEB.2016 18:36:39

30MHz~1GHz

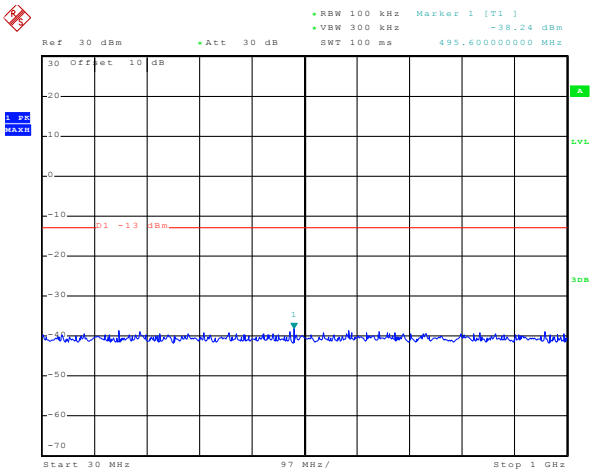


Date: 18.FEB.2016 18:35:26

1GHz~20GHz

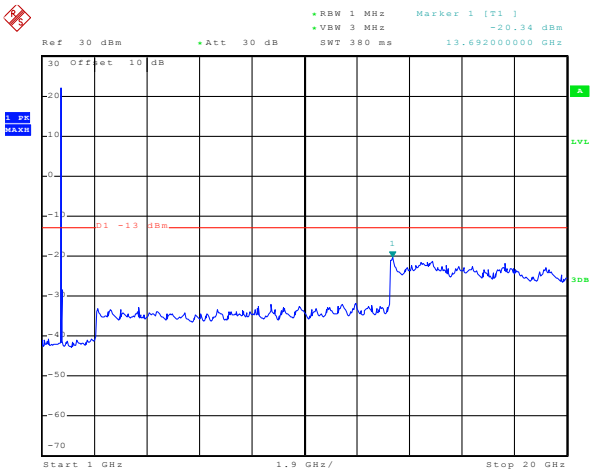
UMTS 1700 12.2k RMC

Lowest Channel



Date: 18.FEB.2016 18:37:25

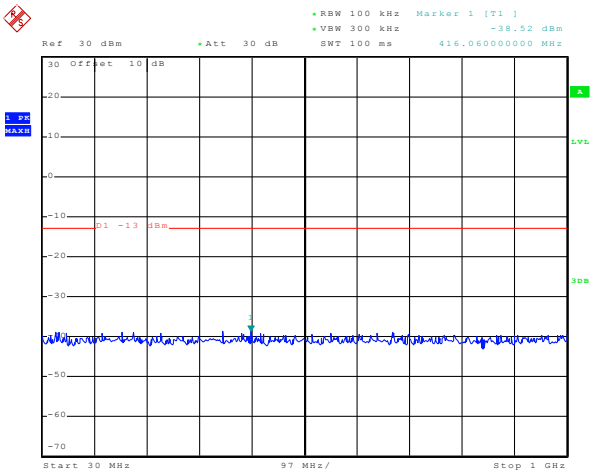
30MHz~1GHz



Date: 18.FEB.2016 18:38:55

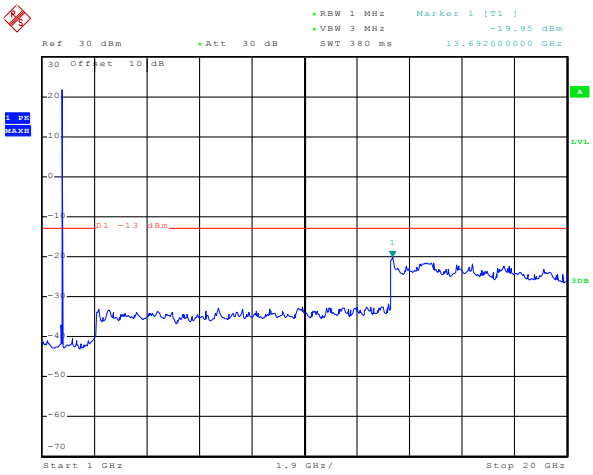
1GHz~20GHz

Middle Channel



Date: 18.FEB.2016 18:37:36

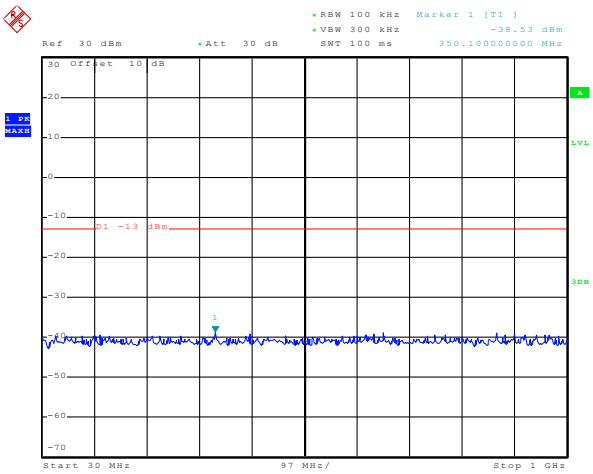
30MHz~1GHz



Date: 18.FEB.2016 18:39:34

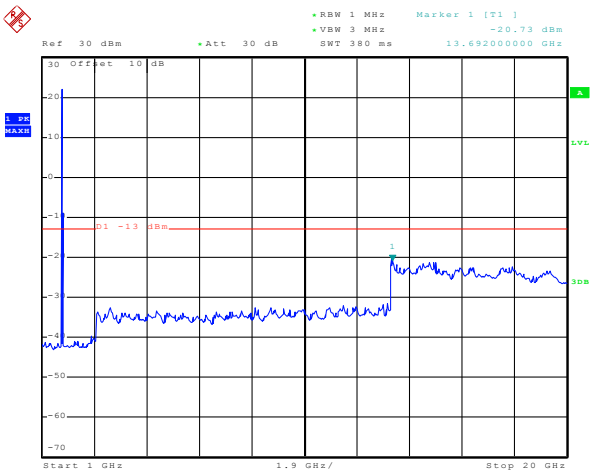
1GHz~20GHz

Highest Channel



Date: 18.FEB.2016 18:37:47

30MHz~1GHz

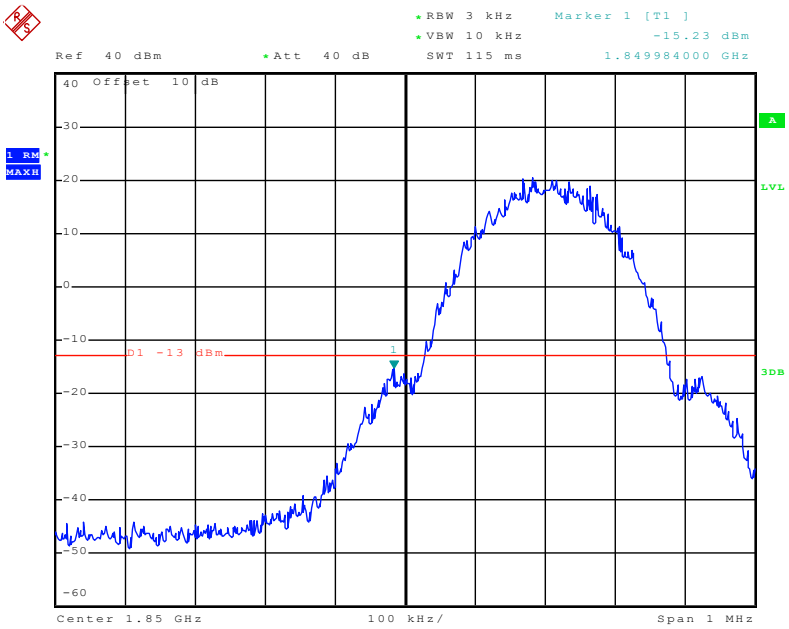


Date: 18.FEB.2016 18:40:05

1GHz~20GHz

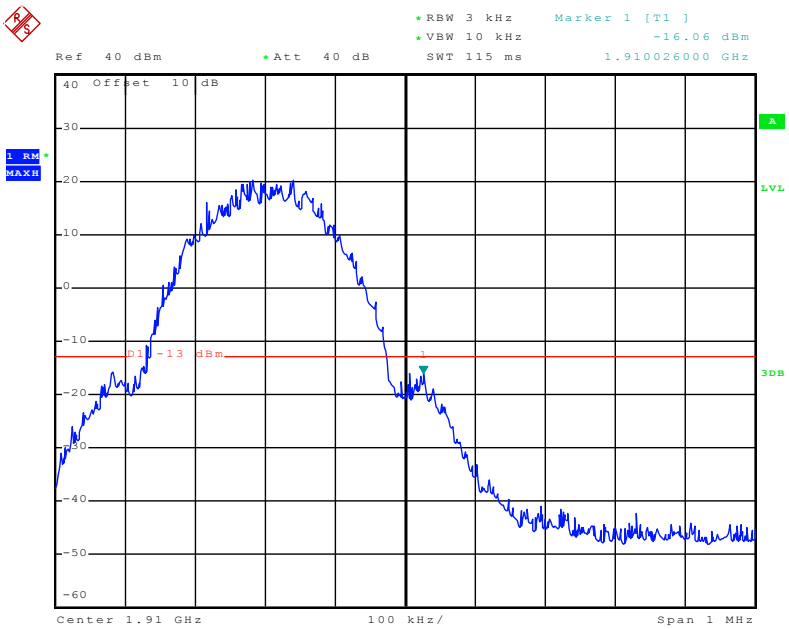
Band edge emission

GPRS1900



Date: 2.MAR.2016 19:17:23

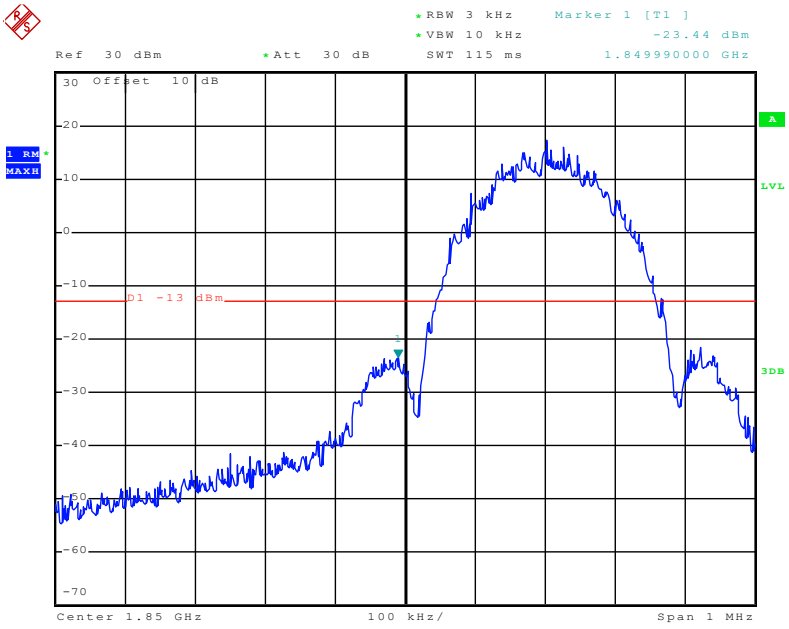
Lowest channel



Date: 2.MAR.2016 19:19:13

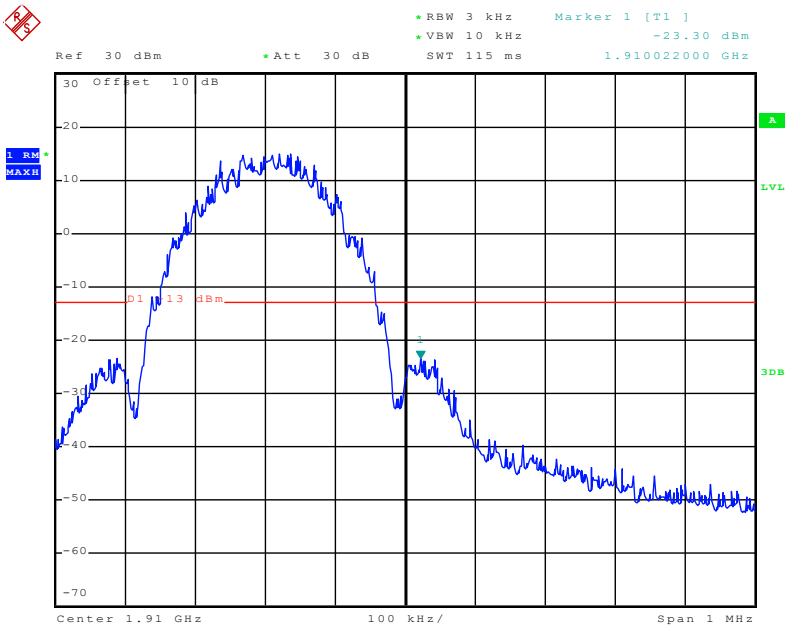
Highest channel

EGPRS1900



Date: 2.MAR.2016 18:56:46

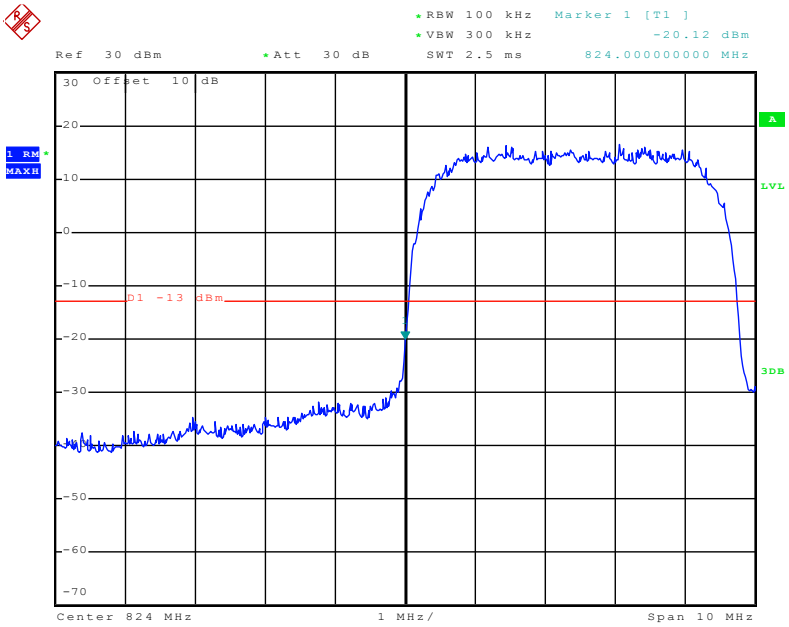
Lowest channel



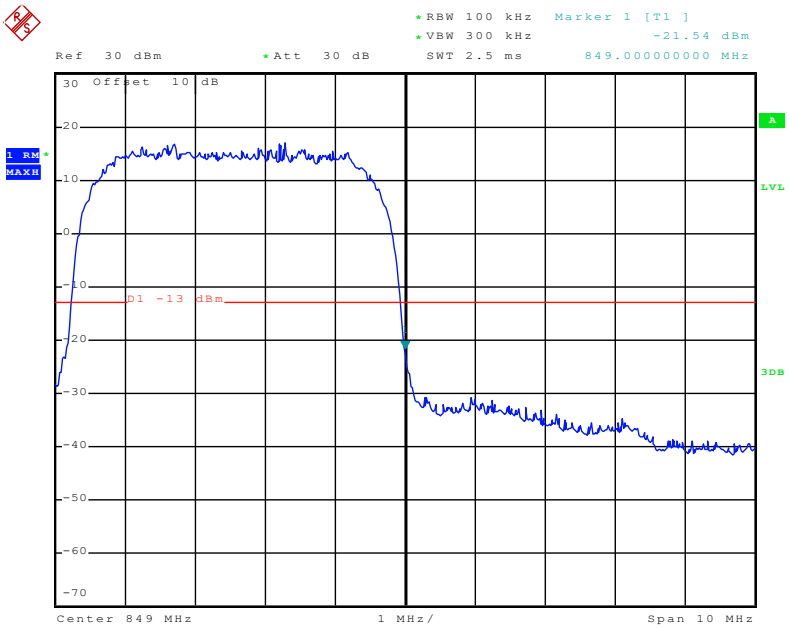
Date: 2.MAR.2016 18:56:02

Highest channel

UMTS850 12.2k RMC

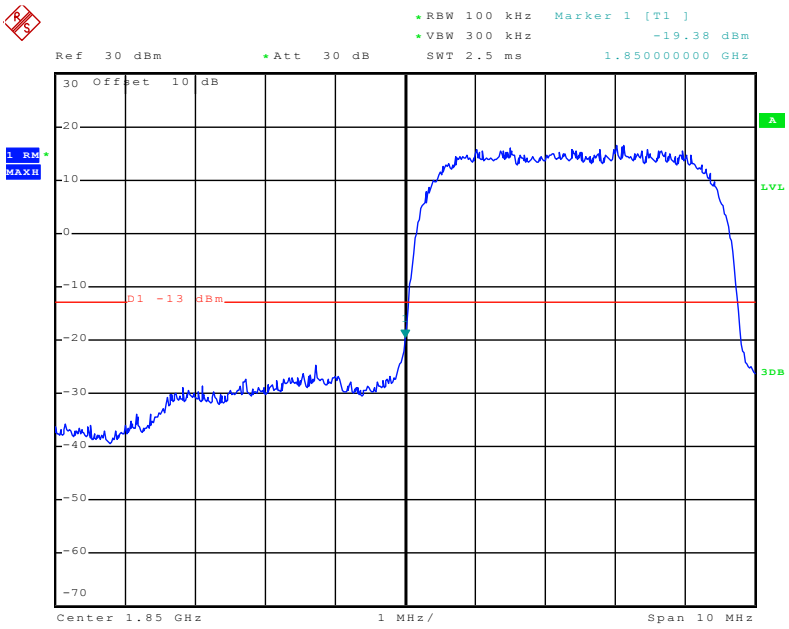


Lowest channel



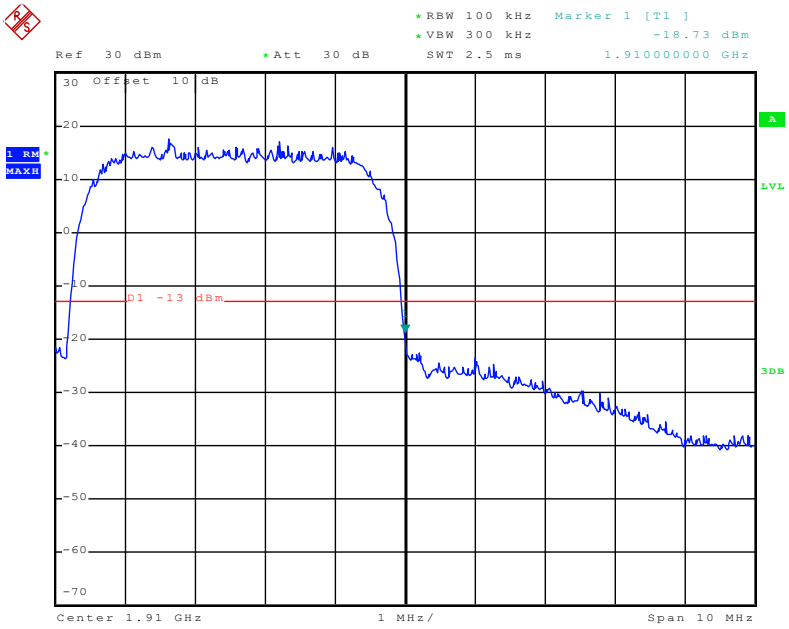
Highest channel

UMTS 1900 12.2k RMC



Date: 18.FEB.2016 18:19:58

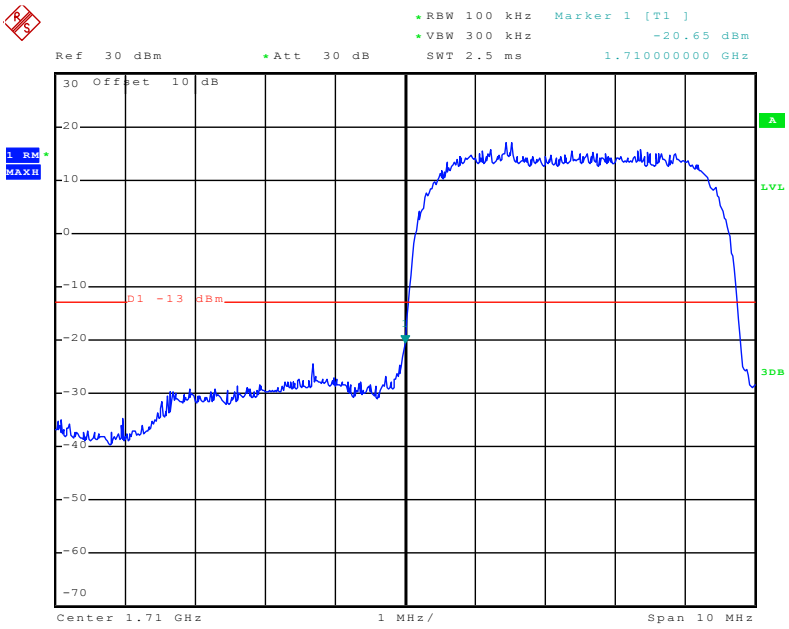
Lowest channel



Date: 18.FEB.2016 18:20:29

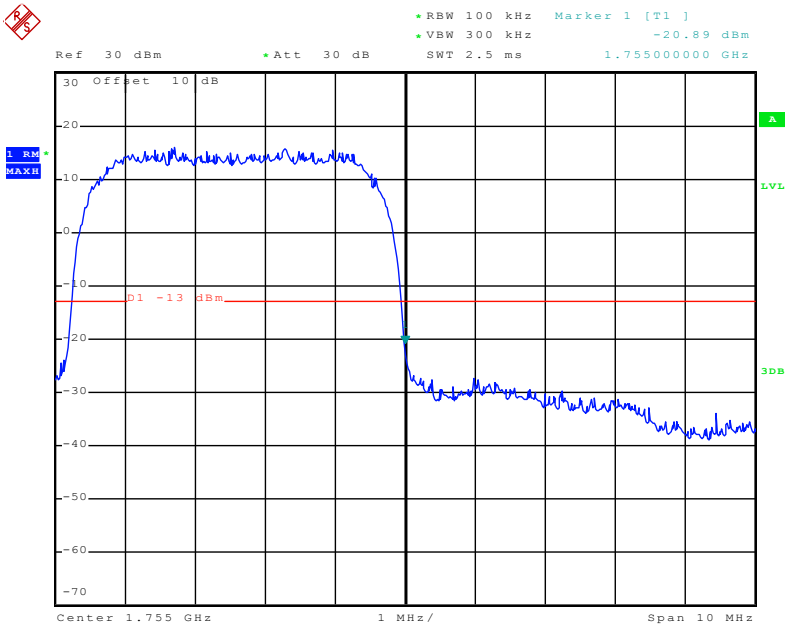
Highest channel

UMTS 1700 12.2k RMC



Date: 18.FEB.2016 18:18:09

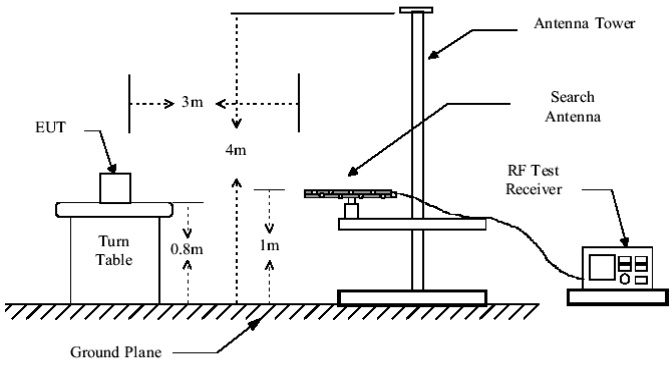
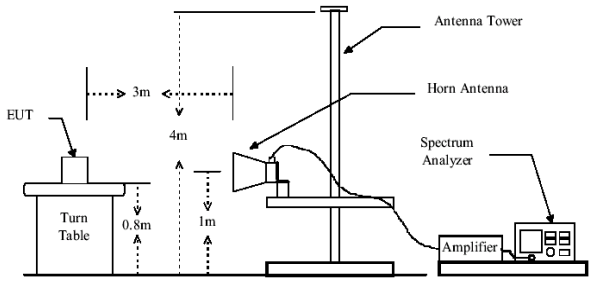
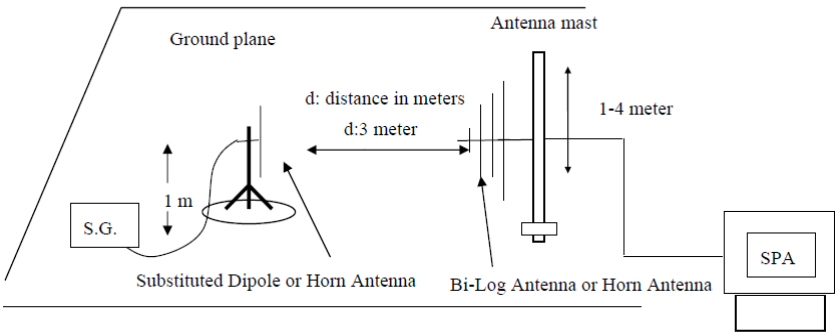
Lowest channel



Date: 18.FEB.2016 18:18:55

Highest channel

6.10 ERP, EIRP Measurement

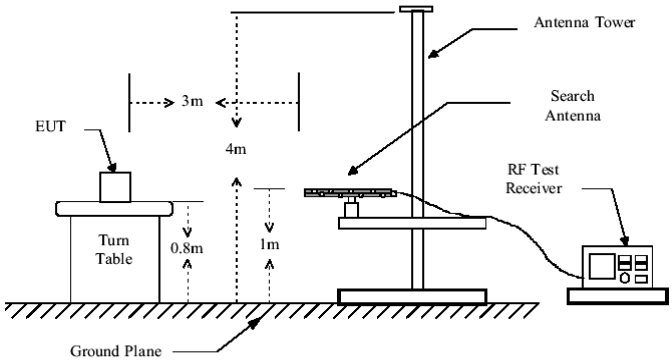
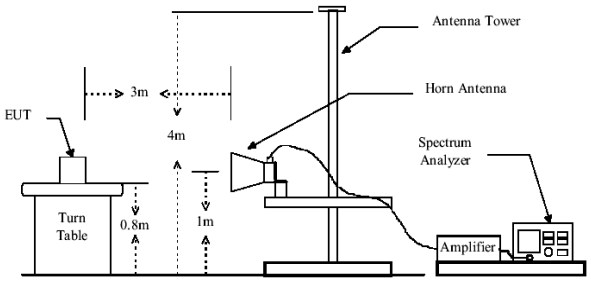
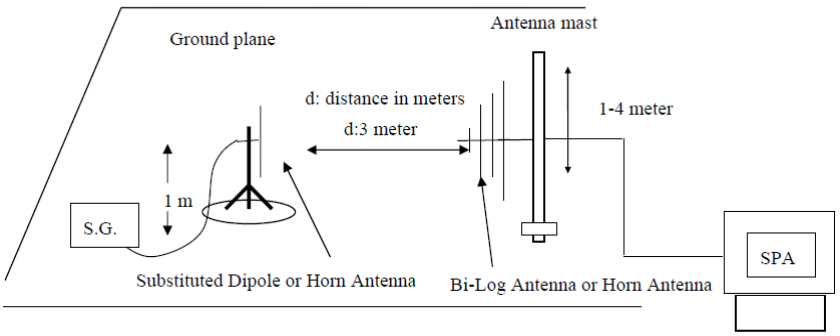
Test Requirement:	FCC part 22.913(a), FCC part 24.232(b) and FCC part 27.50(d)
Test Method:	FCC part 2.1046
Limit:	GPRS1900: 2W EIRP WCDMA Band V: 7W ERP WCDMA Band II: 2W EIRP WCDMA Band IV: 1W EIRP
Test setup:	Below 1GHz  Above 1GHz  Substituted method: 

Test Procedure:	1. The EUT was placed on an non-conductive turntable using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer. 2. During the measurement, the EUT was communication with the station. The highest emission was recorded with the rotation of the turntable and the lowering of the test antenna from 4m to 1m. The reading was recorded and the field strength (E in dBuV/m) was calculated. 3. ERP in frequency band below 1GHz were measured using a substitution method. The EUT was replaced by dipole antenna connected, the S.G. output was recorded and ERP was calculated as follows: ERP = S.G. output (dBm) + Antenna Gain (dBd) – Cable Loss (dB) 4. EIRP in frequency band above 1GHz were measured using a substitution method. The EUT was replaced by or horn antenna connected, the S.G. output was recorded and EIRP was calculated as follows: EIRP = S.G. output (dBm) + Antenna Gain (dBi) – Cable Loss (dB) 5. The worse case was relating to the conducted output power.
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed (All three channels were tested, and just the worst case data were shown in the report.)

Measurement Data (worst case)

EUT mode	Channel	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
GPRS1900	512	H	V	23.08	33.00	Pass
			H	21.01		
EUT mode	**Channel**	**EUT Pol.**	**Antenna Pol.**	**EIRP(dBm)**	**Limit (dBm)**	**Result**
EGPRS1900	661	H	V	18.80	33.00	Pass
			H	16.27		
EUT mode	**Channel**	**EUT Pol.**	**Antenna Pol.**	**EIRP(dBm)**	**Limit (dBm)**	**Result**
UMTS 1900 12.2k RMC	9400	H	V	20.49	33.00	Pass
			H	18.53		
EUT mode	**Channel**	**EUT Pol.**	**Antenna Pol.**	**EIRP(dBm)**	**Limit (dBm)**	**Result**
UMTS 1700 12.2k RMC	1312	H	V	16.24	30.00	Pass
			H	15.02		
EUT mode	**Channel**	**EUT Pol.**	**Antenna Pol.**	**ERP(dBm)**	**Limit (dBm)**	**Result**
UMTS 850 12.2k RMC	4132	H	V	16.96	38.45	Pass
			H	17.02		

6.11 Field strength of spurious radiation measurement

Test Requirement:	FCC part 22.917(a), FCC part 24.238(a) and FCC part 27.53(h)
Test Method:	FCC part 2.1053
Limit:	-13dBm
Test setup:	Below 1GHz  Above 1GHz  Substituted method: 
Test Procedure:	1. The EUT was placed on an non-conductive turntable using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer. 2. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations. 3. The frequency range up to tenth harmonic was investigated for each of three fundamental frequency (low, middle and high channels). Once spurious emission was identified, the power of the emission was determined using the substitution method.

	4. The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency. ERP / EIRP = S.G. output (dBm) + Antenna Gain(dB/dBi) – Cable Loss (dB)
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details. Based on the ERP/EIRP results, we selected GPRS1900, UMTS RMC 850, UMTS RMC 1700 and UMTS RMC 1900 for Radiated spurious emission test, other modes were not test.
Test results:	Passed

Measurement Data (worst case)

Test mode:	GPRS1900		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3700.40	Vertical	-38.80	-13.00	Pass
5550.60	V	-34.63		
3700.40	Horizontal	-43.08	-13.00	Pass
5550.60	H	-39.00		
Test mode:	**GPRS1900**		**Test channel:**	**Middle**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3760.00	Vertical	-44.07	-13.00	Pass
5640.00	V	-37.36		
3760.00	Horizontal	-45.56	-13.00	Pass
5640.00	H	-40.44		
Test mode:	**GPRS1900**		**Test channel:**	**Highest**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3819.60	Vertical	-46.91	-13.00	Pass
5729.40	V	-39.99		
3819.60	Horizontal	-45.59	-13.00	Pass
5729.40	H	-37.62		

Remark:

1. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

Test mode:	UMTS850 12.2k RMC		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1652.80	Vertical	-48.74	-13.00	Pass
2479.20	V	-52.67		
3305.60	V	-51.47		
1652.80	Horizontal	-49.70	-13.00	Pass
2479.20	H	-53.30		
3305.60	H	-51.62		
Test mode:	**UMTS850 12.2k RMC**		**Test channel:**	**Middle**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1673.20	Vertical	-52.11	-13.00	Pass
2509.80	V	-47.26		
3346.40	V	-43.61		
1673.20	Horizontal	-50.36	-13.00	Pass
2509.80	H	-50.31		
3346.40	H	-51.33		
Test mode:	**UMTS850 12.2k RMC**		**Test channel:**	**Highest**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1693.20	Vertical	-48.97	-13.00	Pass
2539.80	V	-51.78		
3386.40	V	-50.08		
1693.20	Horizontal	-48.48	-13.00	Pass
2539.80	H	-52.91		
3386.40	H	-48.89		

Remark:

1. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

Test mode:	UMTS 1900 12.2k RMC		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3704.80	Vertical	-47.12	-13.00	Pass
5557.20	V	-41.43		
12966.80	V	-50.76		
3704.80	Horizontal	-40.89	-13.00	Pass
Test mode:	**UMTS 1900 12.2k RMC**		**Test channel:**	**Middle**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3760.00	Vertical	-45.85	-13.00	Pass
5640.00	V	-38.17		
3760.00	Horizontal	-48.24	-13.00	Pass
5640.00	H	-43.36		
Test mode:	**UMTS 1900 12.2k RMC**		Test channel:	Highest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3815.20	Vertical	-45.99	-13.00	Pass
5722.80	V	-37.65		
3815.20	Horizontal	-47.15	-13.00	Pass
5722.80	H	-42.71		

Remark:

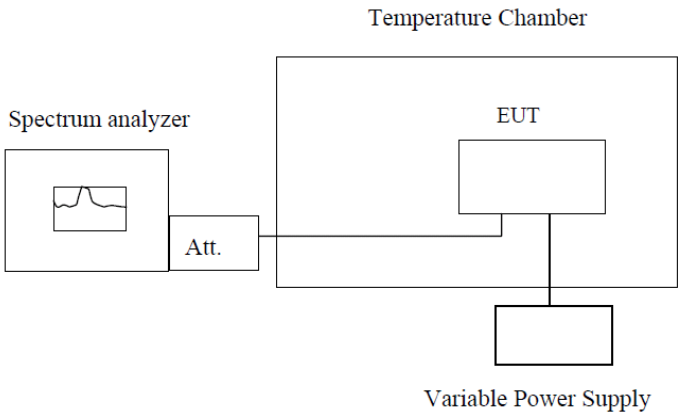
1. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

Test mode:	UMTS 1700 12.2k RMC		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3424.40	Vertical	-45.27	-13.00	Pass
5136.60	V	-47.19		
3424.40	Horizontal	-49.30		
5136.60	H	-47.52		
Test mode:	**UMTS 1700 12.2k RMC**		**Test channel:**	**Middle**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3464.80	Vertical	-49.30	-13.00	Pass
5197.20	V	-47.60		
3464.80	Horizontal	-49.23		
5197.20	H	-45.96		
Test mode:	**UMTS 1700 12.2k RMC**		Test channel:	Highest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3505.20	Vertical	-46.80	-13.00	Pass
5257.80	V	-46.78		
3505.20	Horizontal	-47.50		
5257.80	H	-47.00		

Remark:

1. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

6.12 Frequency stability V.S. Temperature measurement

Test Requirement:	FCC Part 2.1055(a)(1)(b)
Test Method:	FCC Part 2.1055(a)(1)(b)
Limit:	2.5 ppm
Test setup:	 **Note :** Measurement setup for testing on Antenna connector
Test procedure:	1. The equipment under test was connected to an external DC power supply and input rated voltage. 2. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. 3. The EUT was placed inside the temperature chamber. 4. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25℃ operating frequency as reference frequency. 5. Turn EUT off and set the chamber temperature to –30℃. After the temperature stabilized for approximately 30 minutes recorded the frequency. 6. Repeat step measure with 10℃ increased per stage until the highest temperature of +50℃ reached
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed
Remark:	All three channels of all modulations have been tested, but only the worst channel and the worst modulation show in this test item.

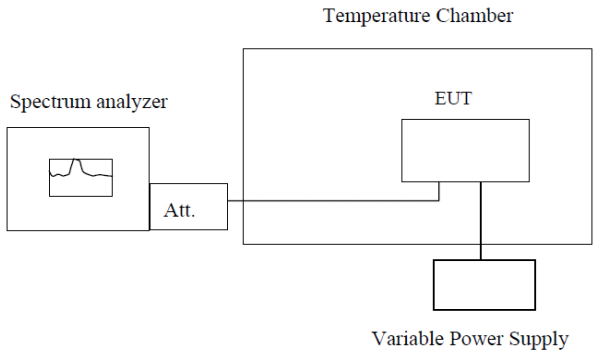
Measurement Data:

Reference Frequency: GPRS1900 Middle channel=661 channel=1880MHz					
Power supplied (Vdc)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
12.00	-30	163	0.086702	2.5	Pass
	-20	124	0.065957		
	-10	105	0.055851		
	0	124	0.065957		
	10	150	0.079787		
	20	126	0.067021		
	30	104	0.055319		
	40	113	0.060106		
	50	145	0.077128		

Reference Frequency: EGPRS 1900 Middle channel=661 channel=1880MHz					
Power supplied (Vdc)	Temperature (℃)	Frequency error			Result
		Hz	ppm		
12.00	-30	164	0.087234	2.5	Pass
	-20	125	0.066489		
	-10	108	0.057447		
	0	124	0.065957		
	10	122	0.064894		
	20	107	0.056915		
	30	126	0.067021		
	40	133	0.070745		
	50	149	0.079255		

Reference Frequency: UMTS850 12.2k RMC Middle channel=4183 channel=836.6MHz					
Power supplied (Vdc)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
12.00	-30	174	0.207985	2.5	Pass
	-20	122	0.145828		
	-10	136	0.162563		
	0	146	0.174516		
	10	152	0.181688		
	20	108	0.129094		
	30	126	0.150610		
	40	144	0.172125		
	50	105	0.125508		
Reference Frequency: UMTS1900 12.2k RMC Middle channel=9400 channel=1880MHz					
Power supplied (Vdc)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
12.00	-30	168	0.089362	2.5	Pass
	-20	142	0.075532		
	-10	124	0.065957		
	0	129	0.068617		
	10	136	0.072340		
	20	108	0.057447		
	30	122	0.064894		
	40	140	0.074468		
	50	155	0.082447		
Reference Frequency: UMTS1700 12.2k RMC Middle channel=1413 channel=1732.6MHz					
Power supplied (Vdc)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
12.00	-30	177	0.102159	2.5	Pass
	-20	152	0.087729		
	-10	142	0.081958		
	0	136	0.078495		
	10	125	0.072146		
	20	108	0.062334		
	30	129	0.074455		
	40	133	0.076763		
	50	138	0.079649		

6.13 Frequency stability V.S. Voltage measurement

Test Requirement:	FCC Part 2.1055(d)(1)(2)
Test Method:	FCC Part 2.1055(d)(1)(2)
Limit:	2.5ppm
Test setup:	 **Note :** Measurement setup for testing on Antenna connector
Test procedure:	1. Set chamber temperature to 25℃. Use a variable DC power source to power the EUT and set the voltage to rated voltage. 2. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency. 3. Reduce the input voltage to specify extreme voltage variation (+/- 15%) and endpoint, record the maximum frequency change.
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details, and all channels have been tested, only shows the worst channel data in this report.
Test results:	Passed

Measurement Data (the worst channel):

Reference Frequency: GPRS1900 Middle channel=661 channel=1880MHz					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	13.80	74	0.039362	2.5	Pass
	12.00	96	0.051064		
	10.20	44	0.023404		
Reference Frequency: EGPRS 1900 Middle channel= 661 channel=1880MHz					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	13.80	63	0.033511	2.5	Pass
	12.00	74	0.039362		
	10.20	77	0.040957		
Reference Frequency: UMTS 850 12.2k RMC Middle channel=4183 channel=836.6MHz					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	13.80	96	0.114750	2.5	Pass
	12.00	85	0.101602		
	10.20	56	0.066938		
Reference Frequency: UMTS 1900 12.2k RMC Middle channel=9400 channel=1880MHz					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	13.80	74	0.039362	2.5	Pass
	12.00	48	0.025532		
	10.20	89	0.047340		
Reference Frequency: UMTS1700 12.2k RMC Middle channel=1413 channel=1732.6MHz					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	13.80	63	0.036362	2.5	Pass
	12.00	96	0.055408		
	10.20	74	0.042710		