

Test Report

Applicant: CT Cellutions, Inc

Address of Applicant: 5705 Commerce Blvd, Alpharetta, Georgia 30004, United States

Manufacturer/Factory: Z-TECH COMMUNICATION(SZ) Co., Ltd

Address of Manufacturer/Factory: 7/F BLK D ,BAO'AN ZHI'GU YIN'TIAN ROAD NO.4 XI'XIANG STR' BAO'AN SHENZHEN CITY ,CHINA

Equipment Under Test (EUT)

Product Name: MOBILE PHONES

Model No.: COSMAS V

Trade mark: CELLUTION

FCC ID: 2AT3DCOSMASV

Applicable standards: FCC CFR Title 47 Part 2
FCC CFR Title 47 Part 22 Subpart H
FCC CFR Title 47 Part 24 Subpart E

Date of sample receipt: March 18, 2020

Date of Test: March 18-April 08, 2020

Date of report issued: April 09, 2020

Test Result : PASS *

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

Authorized Signature:

A circular blue stamp with the text "GLOBAL UNITED TECHNOLOGY SERVICES" around the perimeter and "GTS" in the center. Overlaid on the stamp is a handwritten signature in black ink that appears to read "Robinson Lo".

Robinson Lo

Laboratory Manager

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

1 Version

Version No.	Date	Description
00	April 09, 2020	Original

Prepared By:

Tiger Chen

Project Engineer

Date:

April 09, 2020

Check By:

Robinson

Reviewer

Date:

April 09, 2020

2 Contents

Page

1	VERSION	2
2	CONTENTS	3
3	TEST SUMMARY	4
4	GENERAL INFORMATION	5
4.1	GENERAL DESCRIPTION OF EUT	5
4.2	RELATED SUBMITTAL(S) / GRANT (S)	7
4.3	TEST METHODOLOGY.....	7
4.4	DEVIATION FROM STANDARDS	7
4.5	ABNORMALITIES FROM STANDARD CONDITIONS.....	7
4.6	TEST FACILITY	7
4.7	TEST LOCATION.....	7
5	TEST INSTRUMENTS LIST	8
6	SYSTEM TEST CONFIGURATION	9
6.1	TEST MODE	9
6.2	CONFIGURATION OF TESTED SYSTEM	9
6.3	CONDUCTED AVERAGE OUTPUT POWER AND ERP/EIRP	10
6.4	PEAK-TO-AVERAGE RATIO	13
6.5	OCCUPY BANDWIDTH.....	15
6.6	MODULATION CHARACTERISTIC.....	25
6.7	OUT OF BAND EMISSION AT ANTENNA TERMINALS.....	25
6.8	FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT.....	37
6.9	FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT.....	43
6.10	FREQUENCY STABILITY V.S. VOLTAGE MEASUREMENT	47
7	TEST SETUP PHOTO	50
8	EUT CONSTRUCTIONAL DETAILS	50

3 Test Summary

Test Item	Section in CFR 47	Result
RF Exposure (SAR)	Part 1.1307 Part 2.1093	Pass* (Please refer to SAR Report)
RF Output Power	Part 2.1046 Part 22.913(a) Part 24.232(c)	Pass
Peak-to-Average Ratio	Part 2.1046 Part 22.913(d) Part 24.232(d)	Pass
Modulation Characteristics	Part 2.1047	Pass
99% Occupied Bandwidth & 26dB Bandwidth	Part 2.1049 Part 22.917(b) Part 24.238(b)	Pass
Spurious Emissions at Antenna Terminal	Part 2.1051 Part 22.917 Part 24.238	Pass
Field Strength of Spurious Radiation	Part 2.1053 Part 22.917 Part 24.238	Pass
Out of band emission, Band Edge	Part 2.1051 Part 22.917 Part 24.238	Pass
ERP and EIRP	Part 22.913(a) Part 24.232(b)	Pass
Frequency stability vs. temperature	Part 2.1055(a)(1)(b) Part 22.355 Part 24.235	Pass
Frequency stability vs. voltage	Part 2.1055(d)(1)(2) Part 22.355 Part 24.235	Pass

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

4 General Information

4.1 General Description of EUT

Product Name:	MOBILE PHONES
Model No.:	COSMAS V
Test sample(s) ID:	GTS202003000167-1
Sample(s) Status:	Engineer sample
Serial No.:	CLT20200300002
Hardware Version:	N/A
Software Version:	N/A
Support Networks:	GSM, GPRS, EGPRS, WCDMA
Support Bands:	GSM850, PCS1900, WCDMA Band V, WCDMA Band II
TX Frequency:	GSM850: 824.20MHz-848.80MHz PCS1900: 1850.20MHz-1909.80MHz WCDMA Band V: 826.40MHz-846.60MHz WCDMA Band II: 1852.40MHz-1907.60MHz
Modulation type:	GSM/GPRS: GMSK EGPRS: GMSK/8PSK WCDMA Band II/V: QPSK
Antenna type:	PIFA antenna
Antenna gain:	GSM850:-4.03dBi PCS1900:1.35dBi WCDMA Band V: -4.03dBi WCDMA Band II: 1.35dBi
Power supply:	Adaptor Model: Cosmasv Input: AC 100-240V, 50/60Hz, 0.2A Output: DC 5.0V, 700mA Or Battery: DC 3.7V, 1800mAh

Operation Frequency List:

GSM 850		PCS1900		WCDMA Band V		WCDMA Band II	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
128	824.20	512	1850.20	4132	826.40	9262	1852.40
129	824.40	513	1850.40	4133	826.60	9263	1852.60
· ∴	· ∴	· ∴	· ∴	· ∴	· ∴	· ∴	· ∴
189	836.40	660	1879.80	4181	836.20	9399	1879.80
190	836.60	661	1880.00	4182	836.40	9400	1880.00
191	836.80	662	1880.20	4183	836.60	9401	1880.20
· ∴	· ∴	· ∴	· ∴	· ∴	· ∴	· ∴	· ∴
250	848.60	809	1909.60	4232	846.40	9537	1907.40
251	848.80	810	1909.80	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:

Final test channel:

GSM 850		PCS1900		WCDMA Band V		WCDMA Band II	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
128	824.20	512	1850.20	4132	826.40	9262	1852.40
190	836.60	661	1880.00	4183	836.60	9400	1880.00
251	848.80	810	1909.80	4233	846.60	9538	1907.60

4.2 Related Submittal(s) / Grant (s)

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

4.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures document on ANSI C63.26:2015 and FCC CFR 47.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055 and 2.1057

4.4 Deviation from Standards

None.

4.5 Abnormalities from Standard Conditions

None.

4.6 Test Facility

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

- **FCC —Registration No.: 381383**

Global United Technology Services Co., Ltd., Shenzhen 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 files. Registration 381383.

- **IC —Registration No.: 9079A**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A.

- **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). LAB CODE:600179-0

4.7 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

Address: No. 123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102

Tel: 0755-27798480

Fax: 0755-27798960

5 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	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July. 03 2015	July. 02 2020
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June. 26 2019	June. 25 2020
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 26 2019	June. 25 2020
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June. 26 2019	June. 25 2020
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 26 2019	June. 25 2020
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 26 2019	June. 25 2020
9	Coaxial Cable	GTS	N/A	GTS211	June. 26 2019	June. 25 2020
10	Coaxial cable	GTS	N/A	GTS210	June. 26 2019	June. 25 2020
11	Coaxial Cable	GTS	N/A	GTS212	June. 26 2019	June. 25 2020
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 26 2019	June. 25 2020
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	June. 26 2019	June. 25 2020
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 26 2019	June. 25 2020
15	Band filter	Amindeon	82346	GTS219	June. 26 2019	June. 25 2020
16	Power Meter	Anritsu	ML2495A	GTS540	June. 26 2019	June. 25 2020
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 26 2019	June. 25 2020
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	June. 26 2019	June. 25 2020
19	Splitter	Agilent	11636B	GTS237	June. 26 2019	June. 25 2020
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 26 2019	June. 25 2020
21	Breitband hornantenne	SCHWARZBECK	BBHA 9170	GTS579	Oct. 19 2019	Oct. 18 2020
22	Amplifier	TDK	PA-02-02	GTS574	Oct. 19 2019	Oct. 18 2020
23	Amplifier	TDK	PA-02-03	GTS576	Oct. 19 2019	Oct. 18 2020
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	GTS578	June. 26 2019	June. 25 2020

General used equipment:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Humidity/ Temperature Indicator	KTJ	TA328	GTS243	June. 26 2019	June. 25 2020
2	Barometer	ChangChun	DYM3	GTS255	June. 26 2019	June. 25 2020

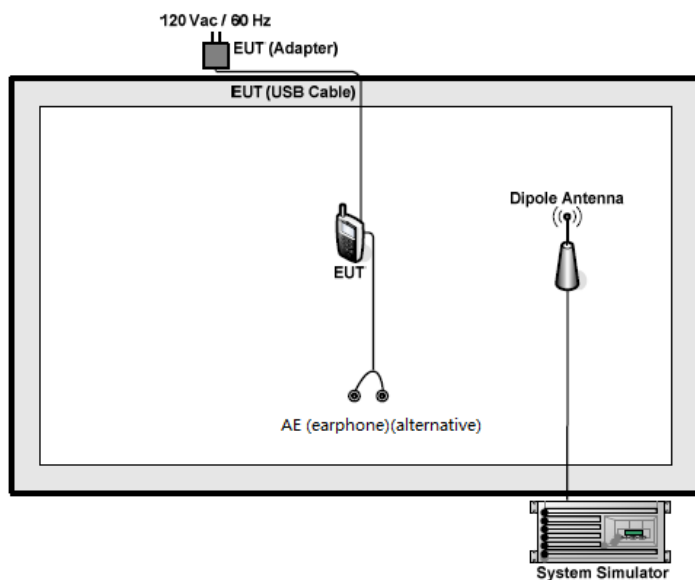
6 System test configuration

6.1 Test mode

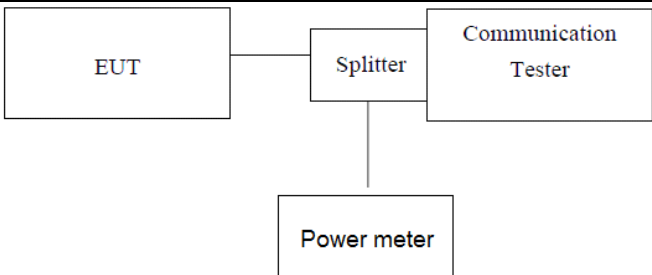
During all testing, EUT is in link mode with base station emulator at maximum power level. The spurious emission measurements were carried out in semi-anechoic chamber with 3-meter test range, and EUT is rotated on three test planes to find out the worst emission.

Test modes		
Band	Radiated	Conducted
GSM 850	■ GSM link	■ GSM link
	■ GPRS 1 link	■ GPRS 1 link
	■ EPRS 1 link	■ EGPRS 1 link
PCS 1900	■ GSM link	■ GSM link
	■ GPRS 1 link	■ GPRS 1 link
	■ EGPRS 1 link	■ EGPRS 1 link
WCDMA II	■ RMC 12.2Kbps link	■ RMC 12.2Kbps link
WCDMA Band V	■ RMC 12.2Kbps link	■ RMC 12.2Kbps link

6.2 Configuration of Tested System



6.3 Conducted Average Output Power and ERP/EIRP

Test Requirement:	FCC part 22.913(a) and FCC part 24.232(c)
Test Method:	FCC part2.1046
Limit:	GSM850, WCDMA Band V: 7W(38.45dBm) PCS1900, WCDMA Band II: 2W(33dBm)
Test setup:	 <i>Note: Measurement setup for testing on Antenna connector</i>
Test Procedure:	1. The transmitter output port was connected to base station. 2. The RF output of EUT was connected to the power meter by RF cable and attenuator, the path loss was compensated to the results for each measurement. 3. Set EUT at maximum power through base station. 4. Select lowest, middle, and highest channels for each band and different modulation. 5. Measure the maximum burst peak power.
Test Instruments:	Refer to section 5.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

Measurement Data

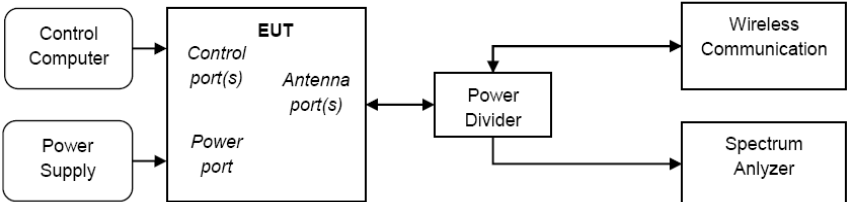
Conducted Power (dBm)						
Band	GSM850			PCS1900		
Channel	128	190	251	512	661	810
Frequency	824.20	836.60	848.80	1850.20	1880.00	1909.80
GSM (GMSK, 1 TX slot)	33.42	33.36	33.48	30.41	30.39	30.21
GPRS (GMSK, 1 TX slot)	32.84	32.51	32.09	29.45	29.58	29.78
GPRS (GMSK, 2 TX slot)	31.39	31.28	31.44	28.48	28.46	28.36
GPRS (GMSK, 3 TX slot)	30.14	30.41	30.82	27.62	27.19	27.08
GPRS (GMSK, 4 TX slot)	29.84	29.63	29.48	26.09	26.37	26.12
EGPRS (8PSK, 1 TX slot)	31.44	31.46	31.37	29.84	29.46	29.33
EGPRS (8PSK, 2 TX slot)	30.53	30.58	30.82	28.49	28.32	28.46
EGPRS (8PSK, 3 TX slot)	29.49	29.69	29.46	27.31	27.28	27.31
EGPRS (8PSK, 4 TX slot)	28.62	28.46	28.34	26.08	26.42	26.24

Conducted Power (dBm)						
Band	WCDMA Band II			WCDMA Band V		
Channel	9262	9400	9538	4132	4183	4233
Frequency	1852.4	1880.0	1907.6	826.4	836.6	846.6
RMC 12.2Kbps	21.86	22.36	21.91	21.34	22.24	21.59
HSDPA Subtest-1	21.85	21.30	21.47	21.14	22.50	22.82
HSDPA Subtest-2	22.98	22.17	22.79	21.43	22.44	21.82
HSDPA Subtest-3	21.80	22.04	21.24	21.75	21.52	21.40
HSDPA Subtest-4	21.19	21.73	21.55	21.85	21.13	22.77
HSUPA Subtest-1	21.74	22.31	21.55	21.33	21.79	22.48
HSUPA Subtest-2	21.77	21.85	21.13	22.39	21.83	22.60
HSUPA Subtest-3	22.70	22.58	22.13	22.81	22.92	22.34
HSUPA Subtest-4	21.47	21.84	22.09	21.77	21.77	21.42
HSUPA Subtest-5	21.29	22.45	22.09	21.90	22.49	21.35

ERP/EIRP Power (dBm)						
Band	GSM850			PCS1900		
Channel	128	190	251	512	661	810
Frequency	824.20	836.60	848.80	1850.20	1880.00	1909.80
GSM (GMSK, 1 TX slot)	29.39	29.33	29.45	31.76	31.74	31.56
GPRS (GMSK, 1 TX slot)	28.81	28.48	28.06	30.80	30.93	31.13
GPRS (GMSK, 2 TX slot)	27.36	27.25	27.41	29.83	29.81	29.71
GPRS (GMSK, 3 TX slot)	26.11	26.38	26.79	28.97	28.54	28.43
GPRS (GMSK, 4 TX slot)	25.81	25.60	25.45	27.44	27.72	27.47
EGPRS (8PSK, 1 TX slot)	27.41	27.43	27.34	31.19	30.81	30.68
EGPRS (8PSK, 2 TX slot)	26.50	26.55	26.79	29.84	29.67	29.81
EGPRS (8PSK, 3 TX slot)	25.46	25.66	25.43	28.66	28.63	28.66
EGPRS (8PSK, 4 TX slot)	24.59	24.43	24.31	27.43	27.77	27.59

ERP/EIRP Power (dBm)						
Band	WCDMA Band II			WCDMA Band V		
Channel	9262	9400	9538	4132	4183	4233
Frequency	1852.4	1880.0	1907.6	826.4	836.6	846.6
RMC 12.2Kbps	23.21	23.71	23.26	17.31	18.21	17.56
HSDPA Subtest-1	23.20	22.65	22.82	17.11	18.47	18.79
HSDPA Subtest-2	24.33	23.52	24.14	17.40	18.41	17.79
HSDPA Subtest-3	23.15	23.39	22.59	17.72	17.49	17.37
HSDPA Subtest-4	22.54	23.08	22.90	17.82	17.10	18.74
HSUPA Subtest-1	23.09	23.66	22.90	17.30	17.76	18.45
HSUPA Subtest-2	23.12	23.20	22.48	18.36	17.80	18.57
HSUPA Subtest-3	24.05	23.93	23.48	18.78	18.89	18.31
HSUPA Subtest-4	22.82	23.19	23.44	17.74	17.74	17.39
HSUPA Subtest-5	22.64	23.80	23.44	17.87	18.46	17.32

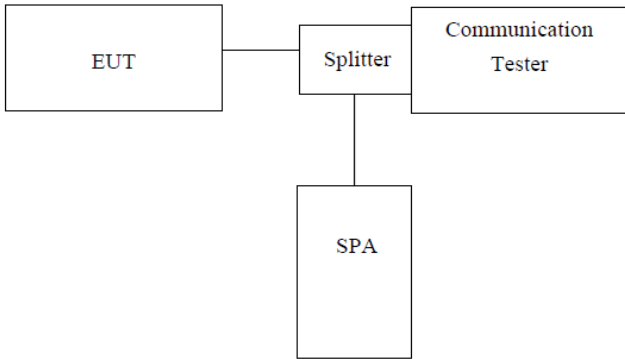
6.4 Peak-to-Average Ratio

Test Requirement:	FCC Part 22.913(d) and FCC Part 24.232(d)
Test Method:	FCC part2.1046
Limit:	13db
Test setup:	 <pre> graph LR CC[Control Computer] --> EUT[EUT] PS[Power Supply] --> EUT subgraph EUT direction TB CP[Control port(s)] AP[Antenna port(s)] PP[Power port] end AP <--> PD[Power Divider] PD --> WC[Wireless Communication] PD --> SA[Spectrum Analyzer] </pre>
Test Procedure:	A peak to average ratio measurement is performed at the conducted port of the EUT. For WCDMA signals, the spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level. For GSM signals, an average and a peak trace are used on a spectrum analyzer to determine the largest deviation between the average and the peak power of the EUT in a bandwidth greater than the emission bandwidth. The traces are generated with the spectrum analyzer set to zero span mode. Test Settings 1. The signal analyzer's CCDF measurement profile enabled 2. Frequency= carrier center frequency 3. Measurement BW > EBW of signal 4. for continuous transmissions, set to 1ms 5. Record the maximum PAPR level associated with a probability of 0.1%.
Test Instruments:	Refer to section 5.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

Measurement data

Test Band	Peak to Average Ratio (dB)			Limit (dB)	Result
	Low Ch.	Middle Ch.	High Ch.		
GSM850	6.27	6.54	6.15	13	PASS
GSM1900	7.73	7.08	6.97	13	PASS
WCDMA Band V	3.34	3.58	2.92	13	PASS
WCDMA Band II	2.84	3.18	2.56	13	PASS

6.5 Occupy Bandwidth

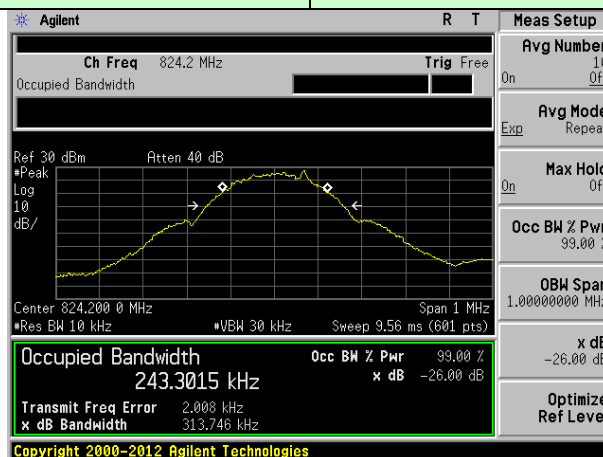
Test Requirement:	FCC part 22.917(b) and FCC part 24.238(b)
Test Method:	FCC part2.1049
Test setup:	 <i>Note: Measurement setup for testing on Antenna connector</i>
Test Procedure:	1. The EUT's output RF connector was connected with a short cable to the spectrum analyzer 2. RBW was set to about 1% of 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 5.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

Measurement Data

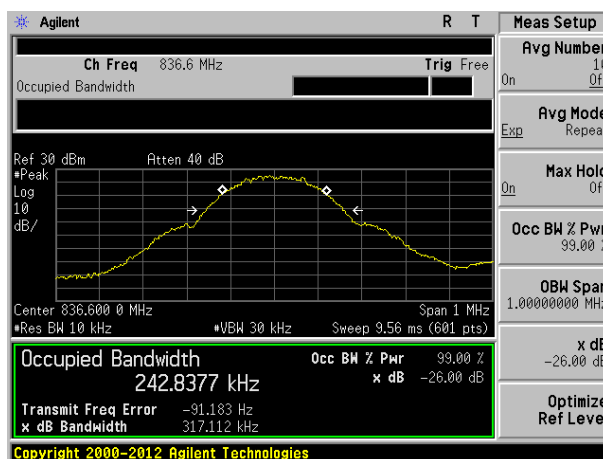
EUT Mode	Channel	Frequency (MHz)	99% Occupy bandwidth (KHz)	-26dB bandwidth (KHz)
GSM 850 (GSM link)	128	824.20	243.3015	313.746
	190	836.60	242.8377	317.112
	251	848.80	254.0060	325.421
GSM 850 (GPRS 1 link)	128	824.20	244.1870	319.498
	190	836.60	238.3917	312.134
	251	848.80	251.7912	323.523
GSM 850 (EGPRS 1 link)	128	824.20	246.9369	319.205
	190	836.60	250.1280	318.103
	251	848.80	241.1299	322.984
PCS 1900 (GSM link)	512	1850.20	247.9134	324.423
	661	1880.00	244.2856	315.205
	810	1909.80	247.5308	321.931
PCS 1900 (GPRS 1 link)	512	1850.20	246.9755	317.799
	661	1880.00	244.2791	318.526
	810	1909.80	246.8292	317.989
PCS 1900 (EGPRS 1 link)	512	1850.20	243.1211	313.152
	661	1880.00	252.8006	318.368
	810	1909.80	247.5986	317.121
WCDMA Band II (RMC 12.2Kbps link)	9262	1852.4	4158.8	4701
	9400	1880.0	4160.8	4704
	9538	1907.6	4170.9	4728
4684WCDMA Band V (RMC 12.2Kbps link)	4132	826.40	4163.7	4695
	4183	836.60	4138.2	4684
	4233	846.60	4165.6	4712

Test plot as follows:

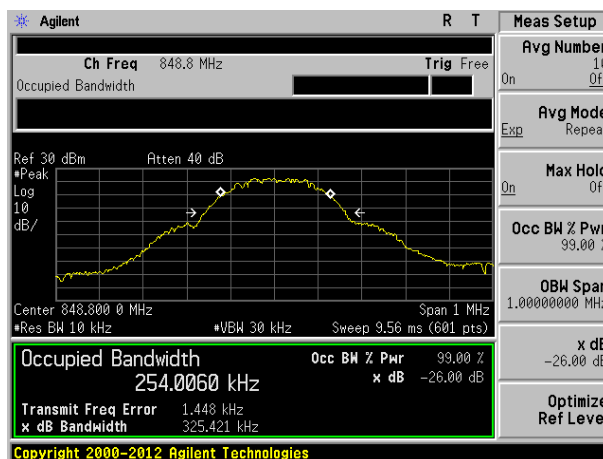
Test band:	GSM 850 (GSM link)
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Lowest channel

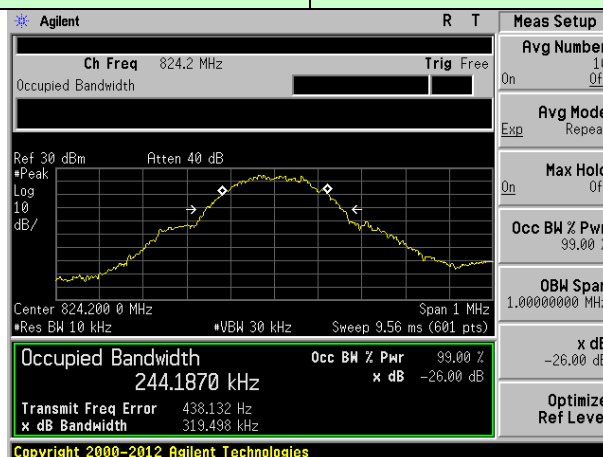


Middle channel

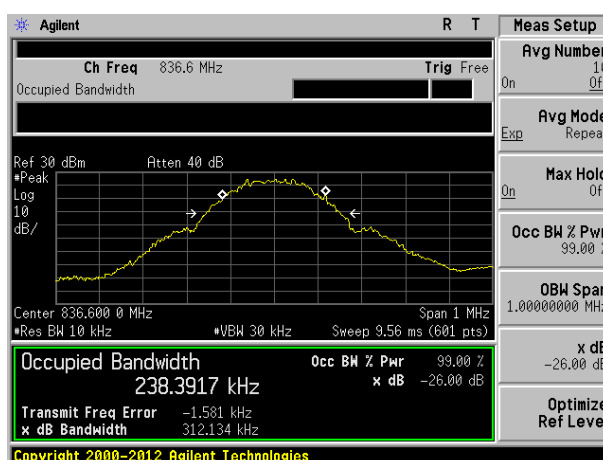


Highest channel

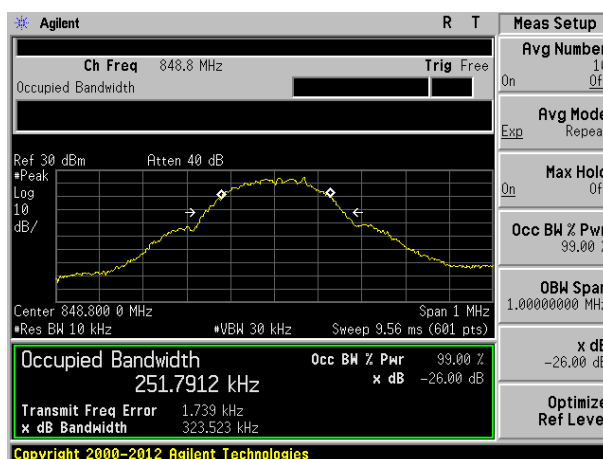
Test band:	GSM 850 (GPRS 1 link)
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Lowest channel

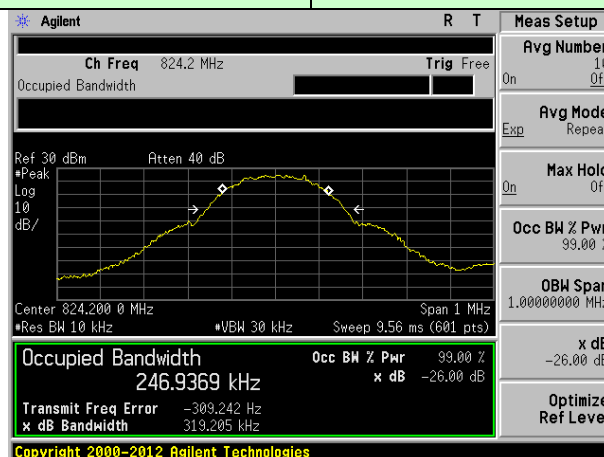


Middle channel

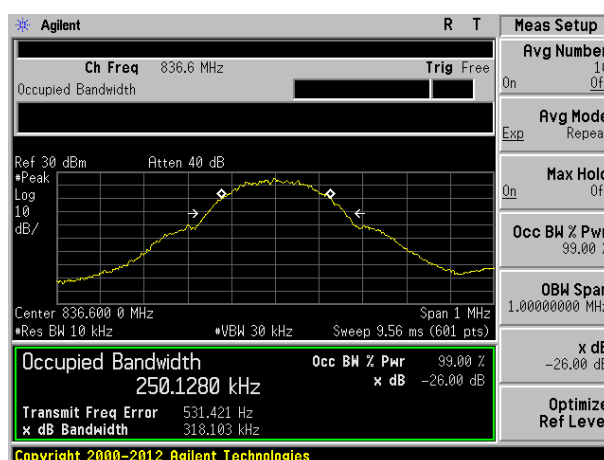


Highest channel

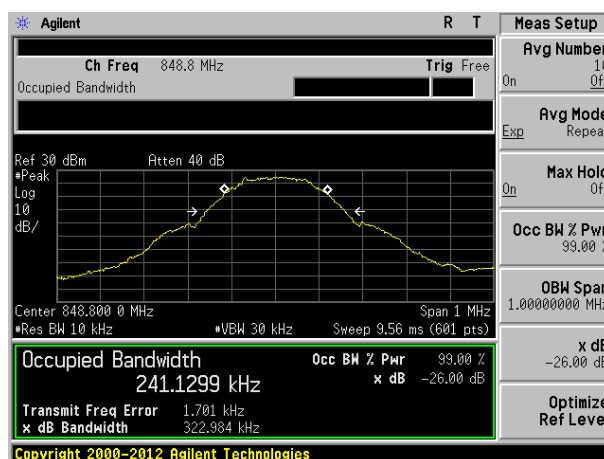
Test band:	GSM 850 (EGPRS 1 link)
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Lowest channel

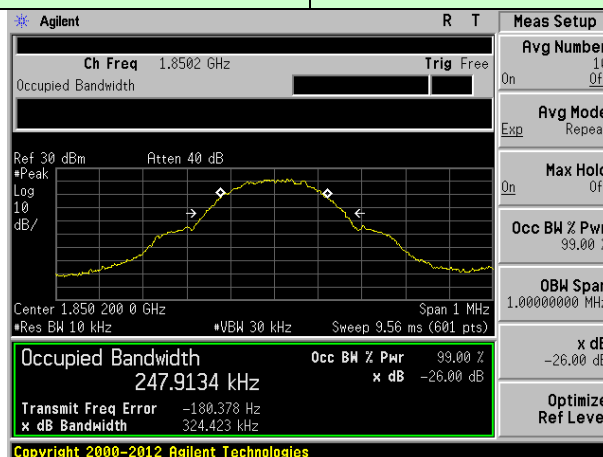


Middle channel

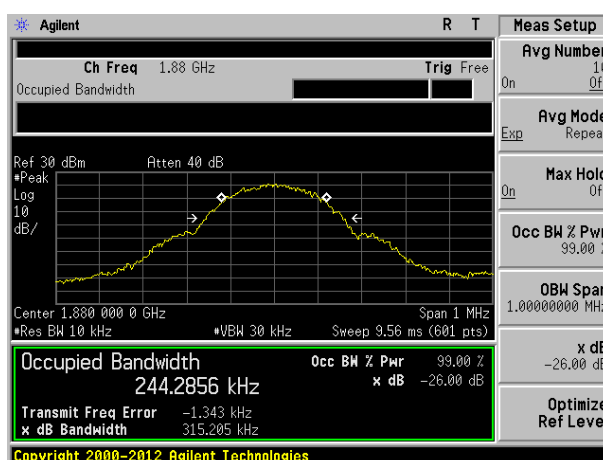


Highest channel

Test band:	PCS 1900 (GSM link)
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Lowest channel

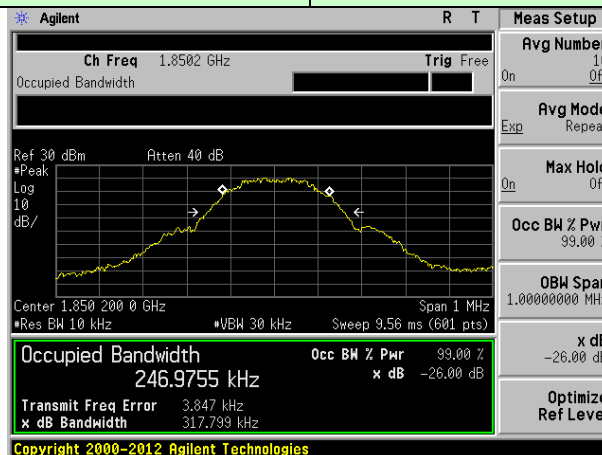


Middle channel

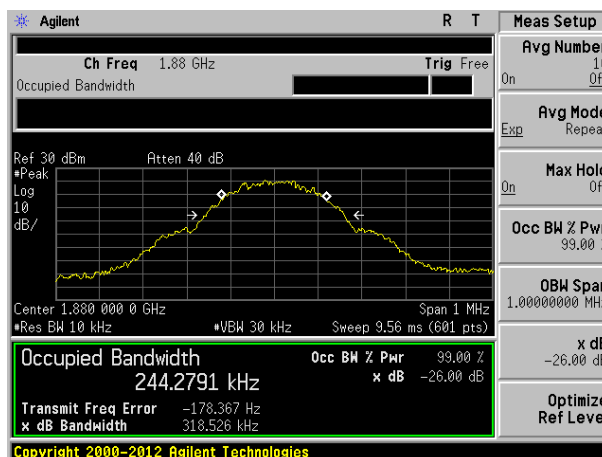


Highest channel

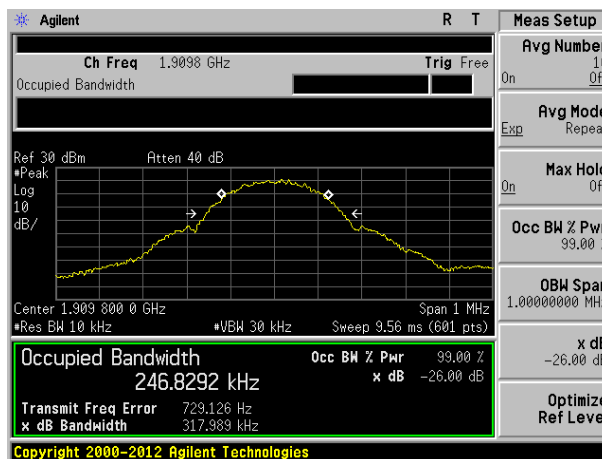
Test band:	PCS 1900 (GPRS 1 link)
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Lowest channel

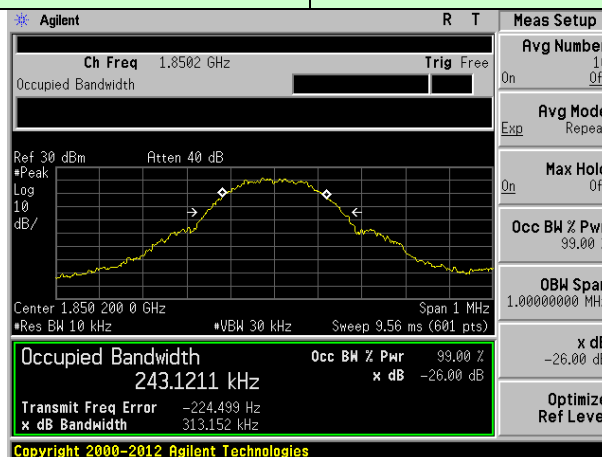


Middle channel

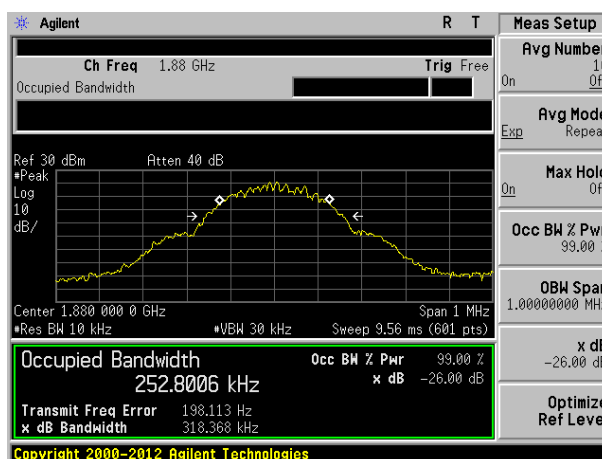


Highest channel

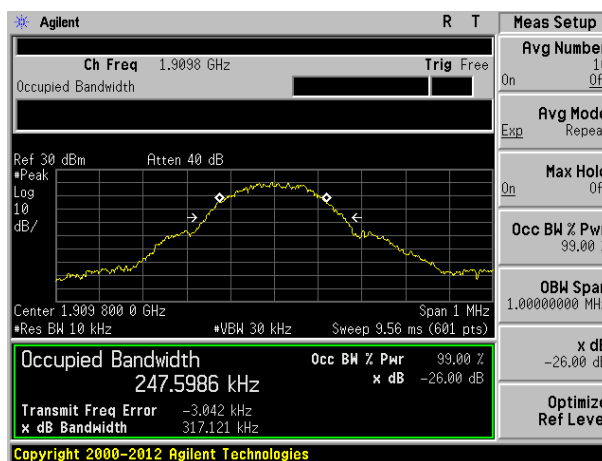
Test band:	PCS 1900 (EGPRS 1 link)
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Lowest channel

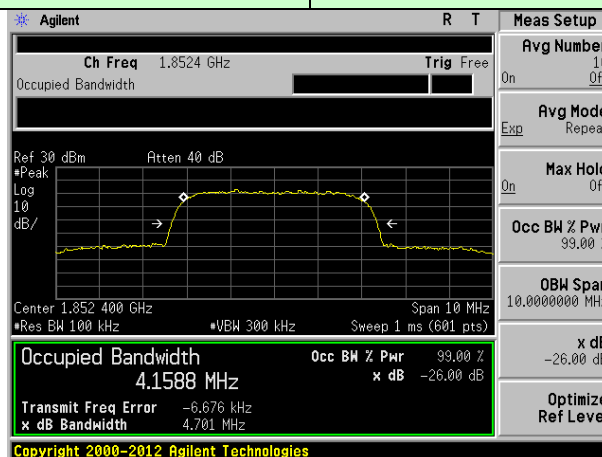


Middle channel

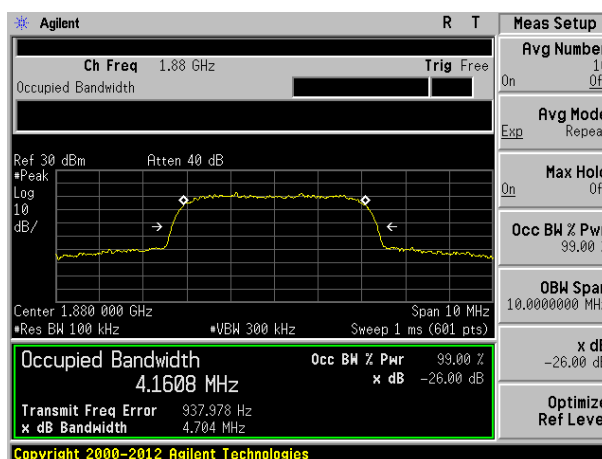


Highest channel

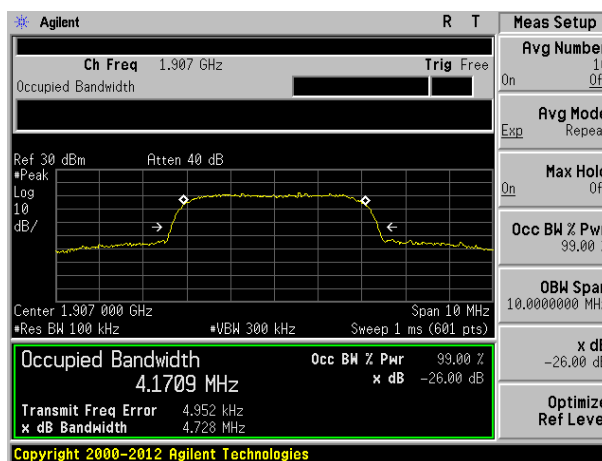
Test band:	WCDMA Band II (RMC 12.2Kbps link)
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Lowest channel

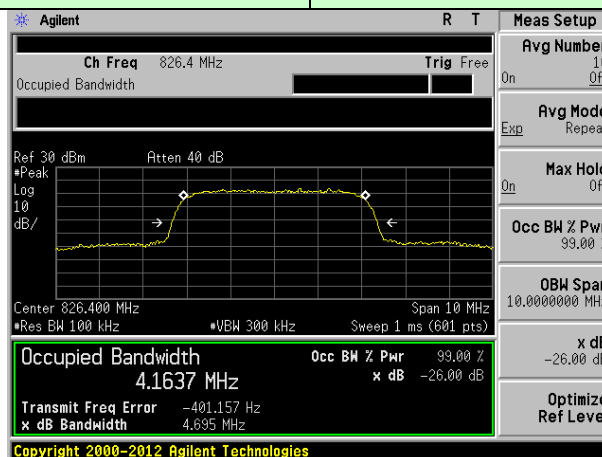


Middle channel

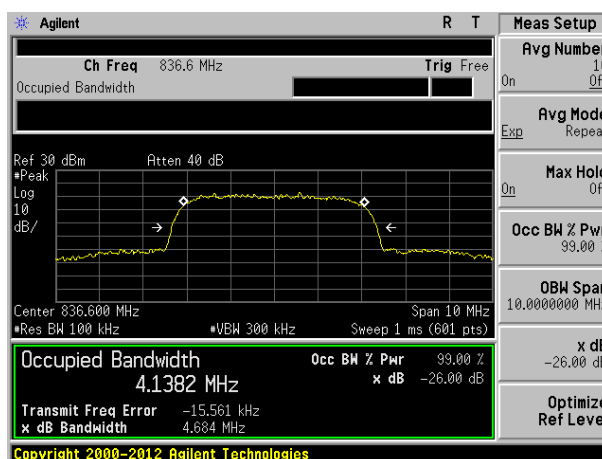


Highest channel

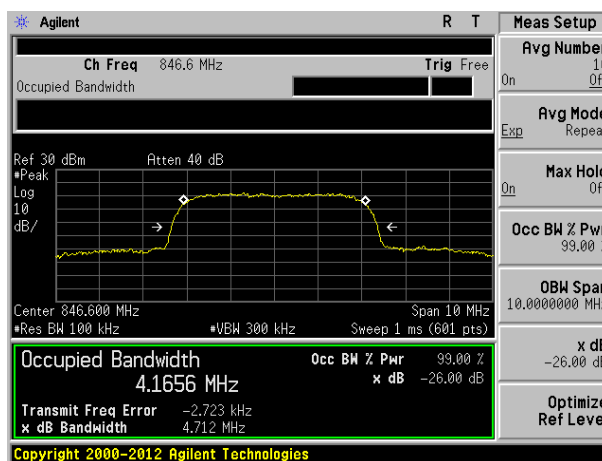
Test band:	WCDMA Band V (RMC 12.2Kbps link)
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Lowest channel



Middle channel

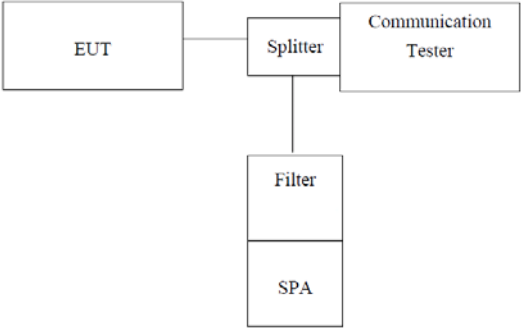


Highest channel

6.6 MODULATION CHARACTERISTIC

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

6.7 Out of band emission at antenna terminals

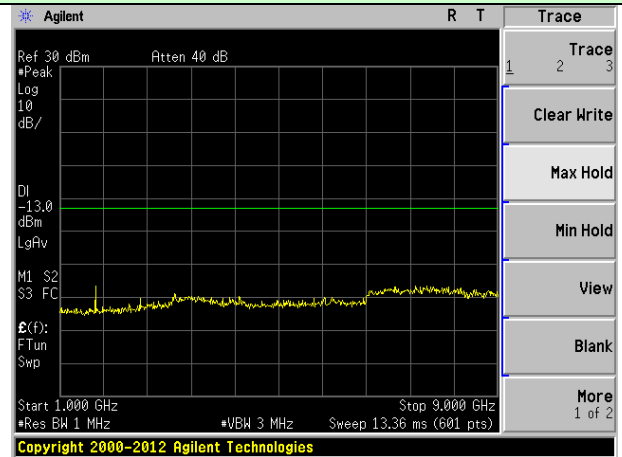
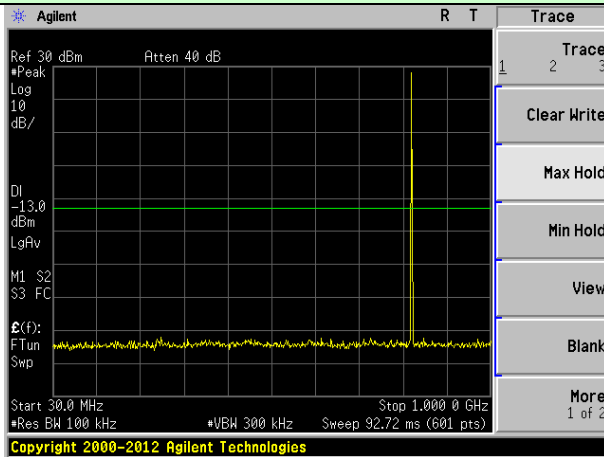
Test Requirement:	FCC part 22.917 and FCC part 24.238
Test Method:	FCC part 2.1051
Limit:	-13dBm
Test setup:	 <i>Note: Measurement setup for testing on Antenna connector</i>
Test Procedure:	1 The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. 2 The resolution bandwidth of the spectrum analyzer was set at 1MHz, sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic. 3 For the out of band: Set the RBW, VBW = 1MHz, Start=30MHz, Stop= 10th harmonic. 4 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 5.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

Test plot as follows:

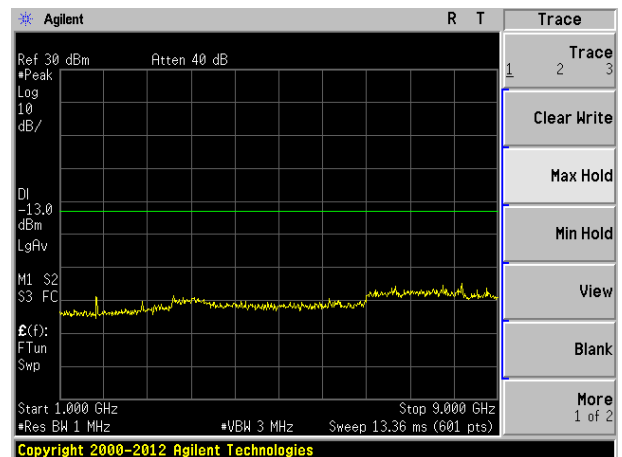
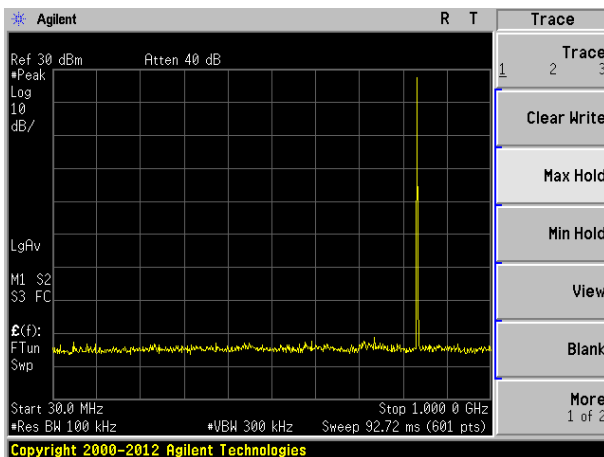
Note: During the conducted spurious emission test, a band filter was used. The information of the filter is reported at section 6.0 (refer to item 24, 25).

Test Mode: Traffic mode

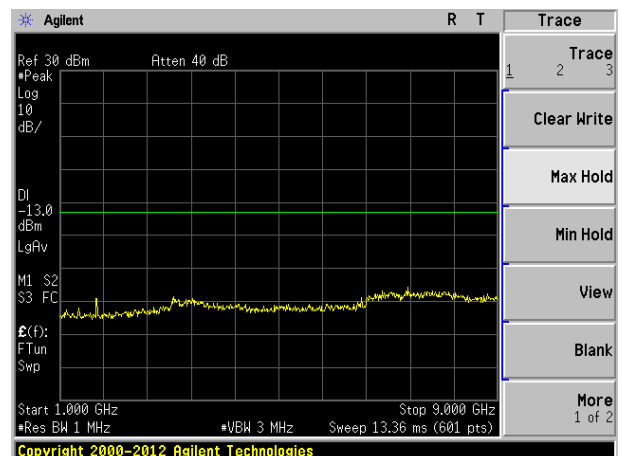
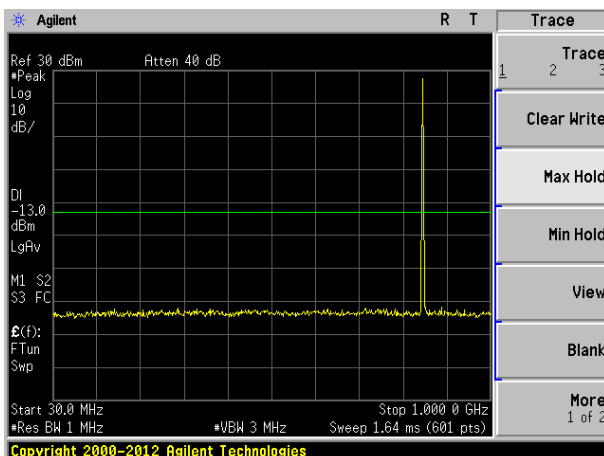
GSM 850 (GSM link)



Lowest channel

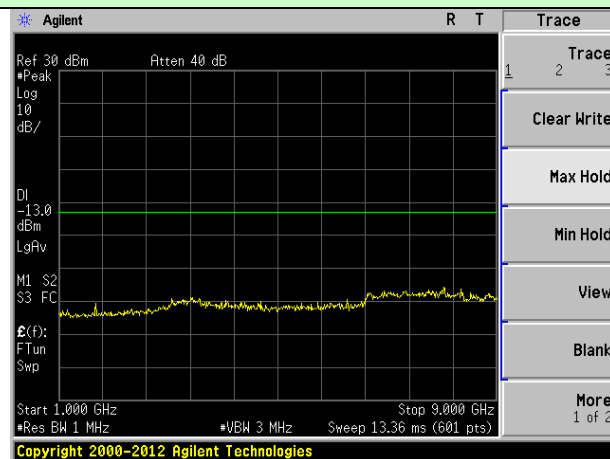
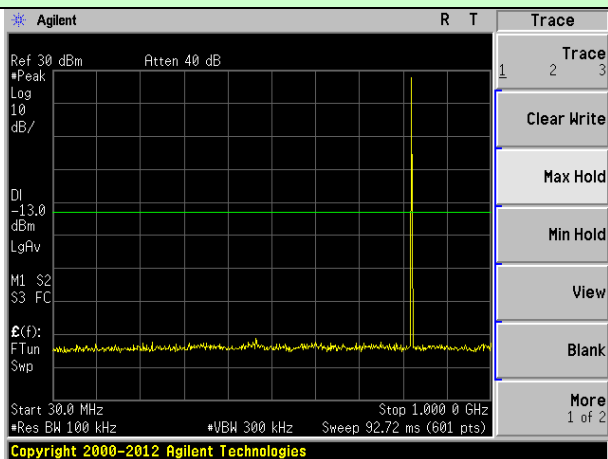


Middle channel

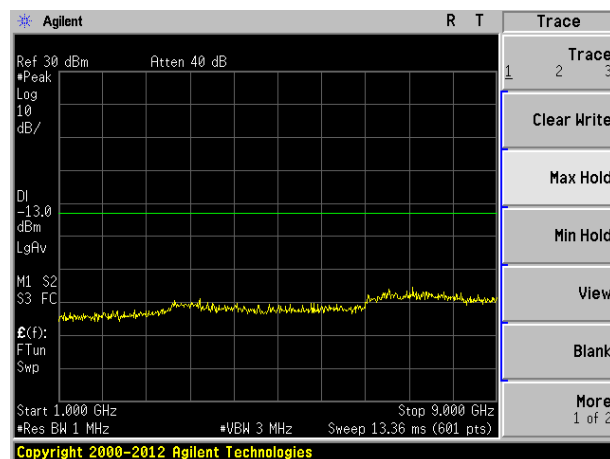
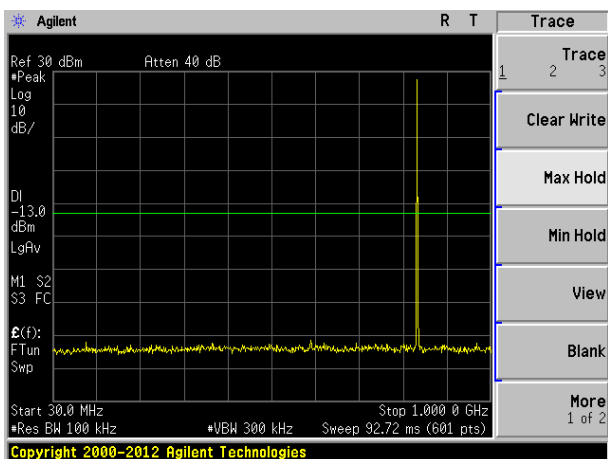


Highest channel

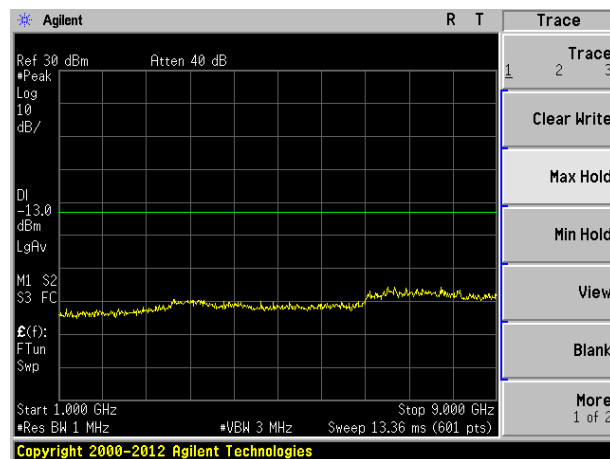
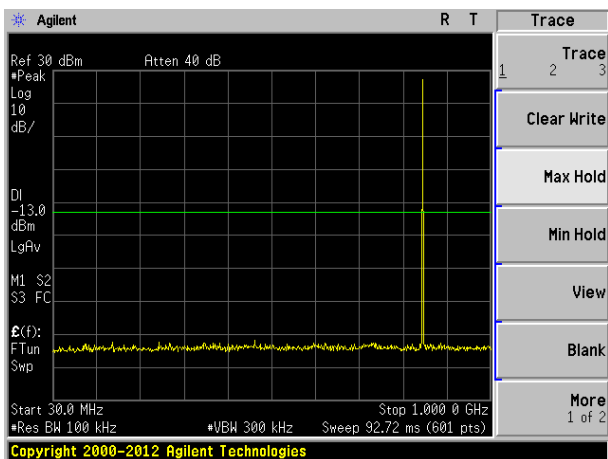
Test Mode: Traffic mode	GSM 850 (GPRS 1 link)
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Lowest channel



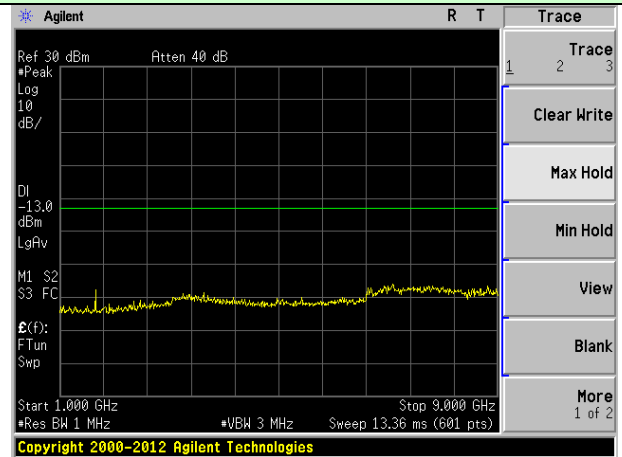
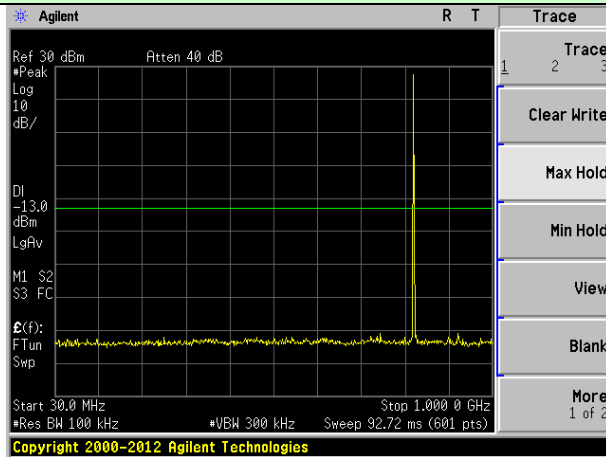
Middle channel



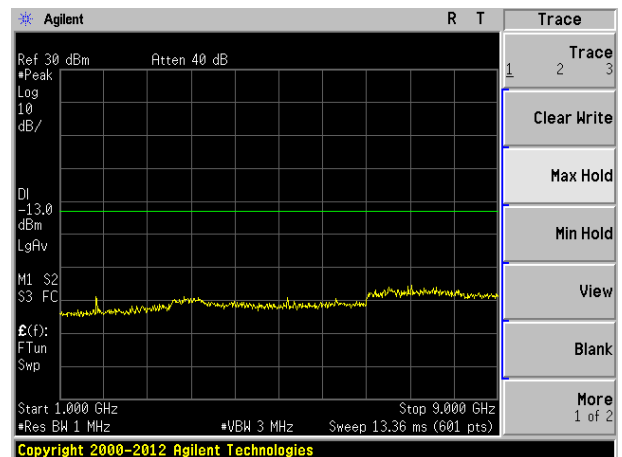
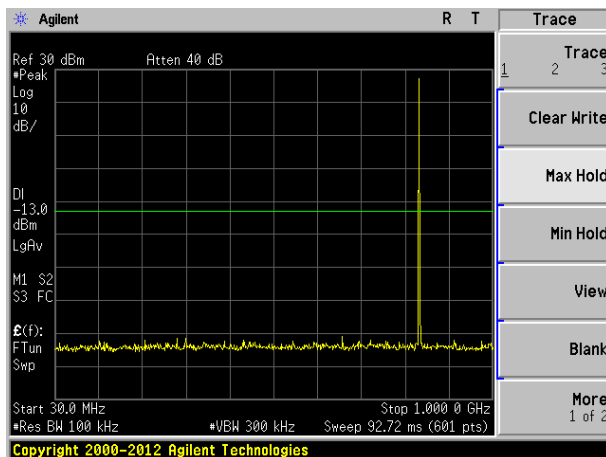
Highest channel

Test Mode: Traffic mode

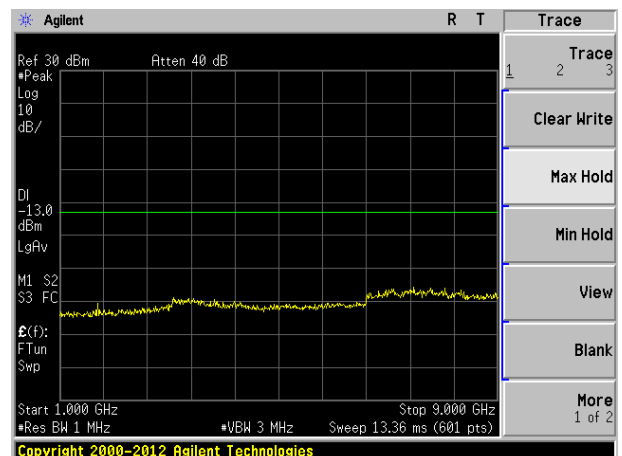
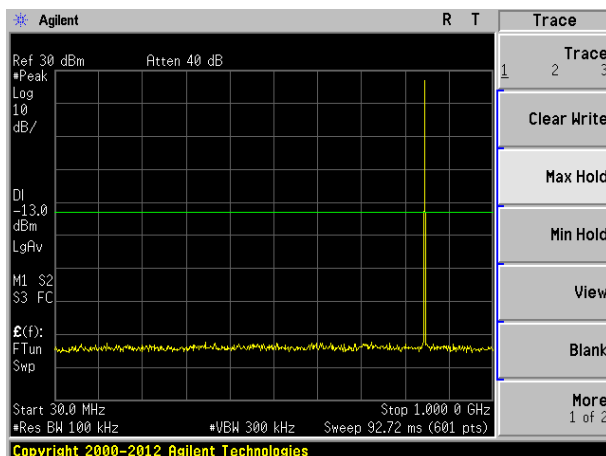
GSM 850 (EGPRS 1 link)



Lowest channel



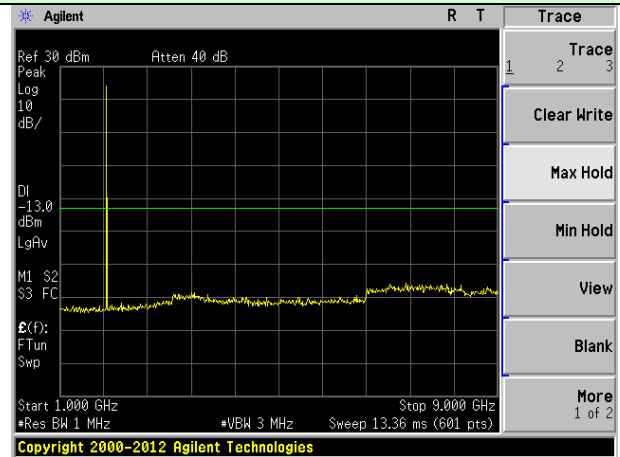
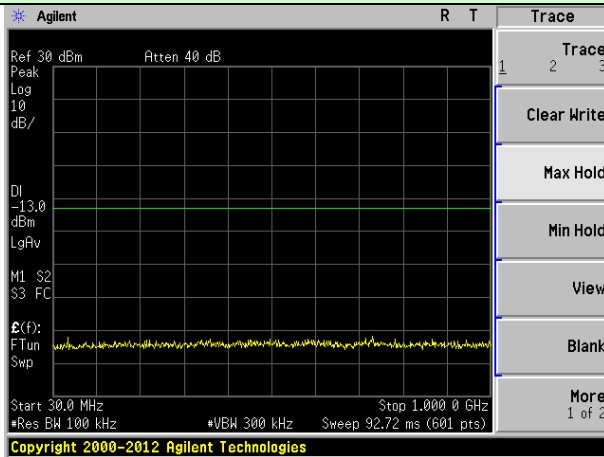
Middle channel



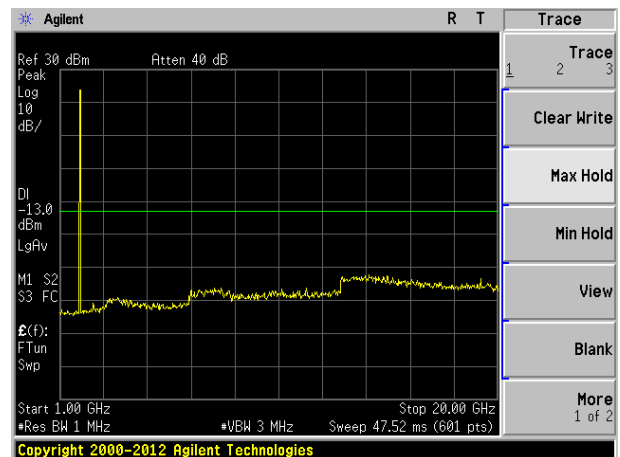
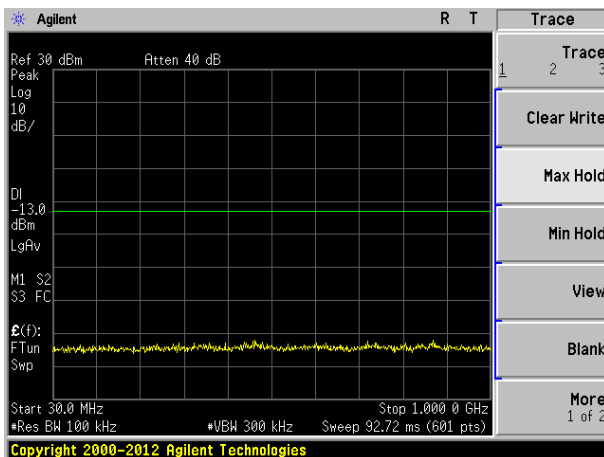
Highest channel

Test Mode: Traffic mode

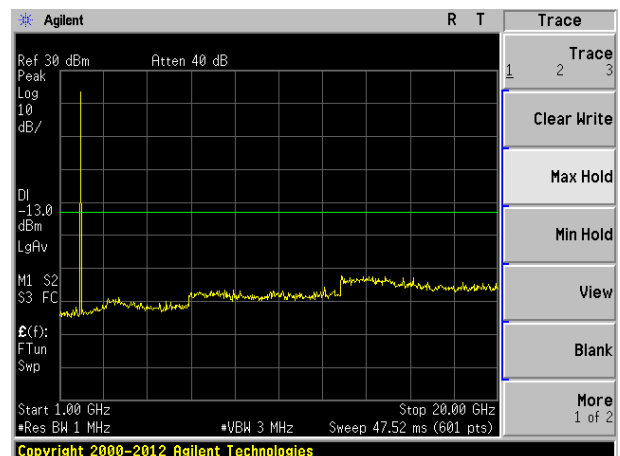
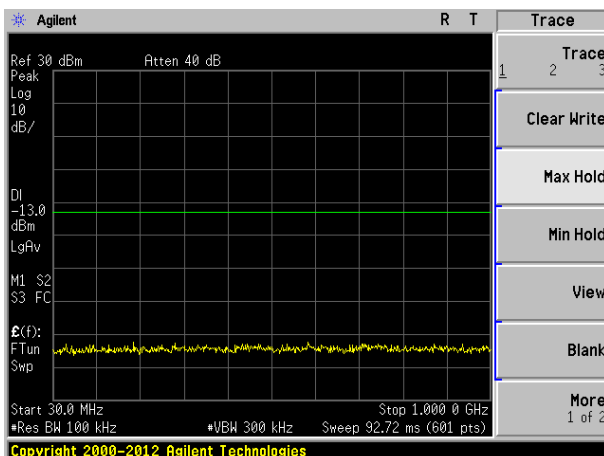
PCS1900 (GSM link)



Lowest channel

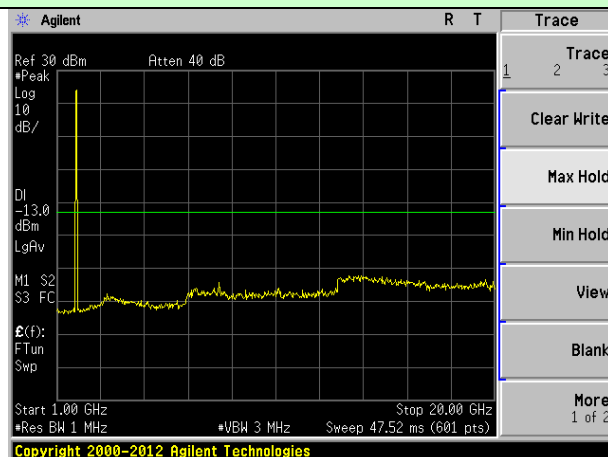
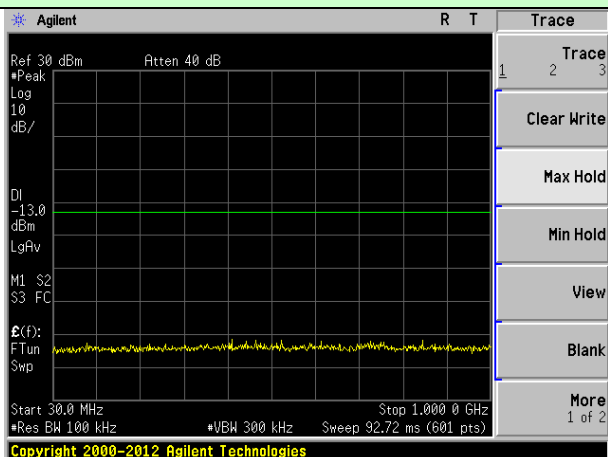


Middle channel

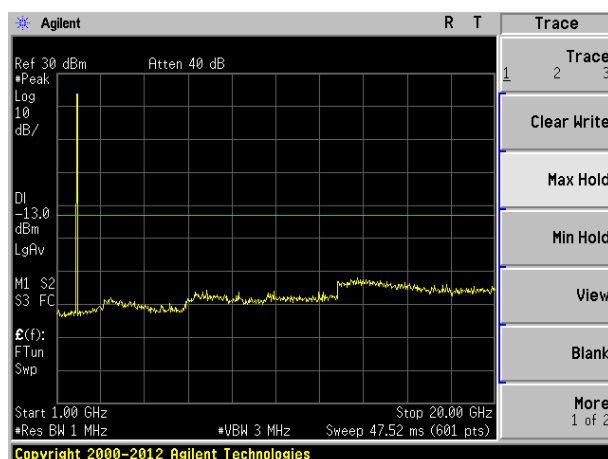
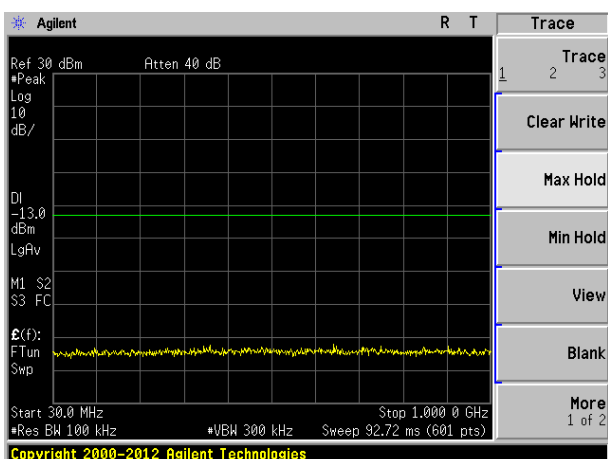


Highest channel

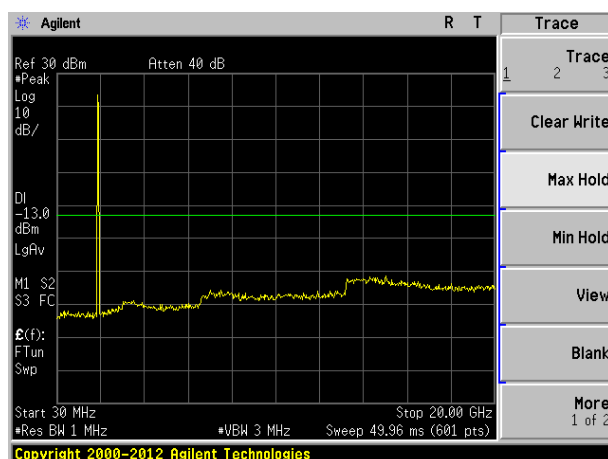
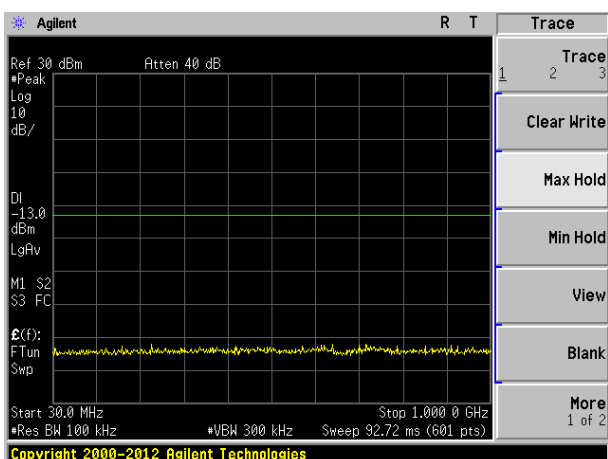
Test Mode: Traffic mode	PCS1900 (GPRS 1 link)
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Lowest channel



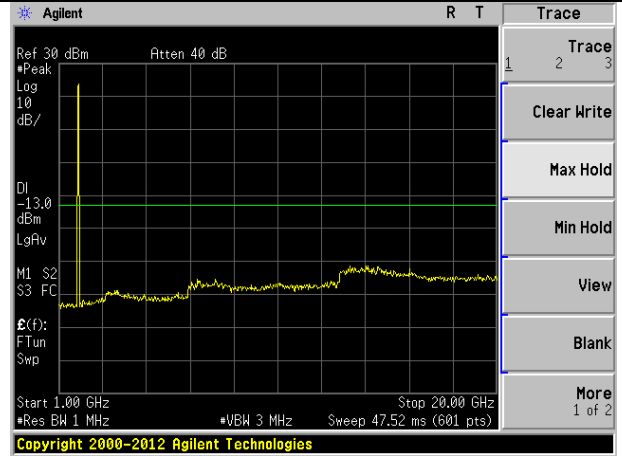
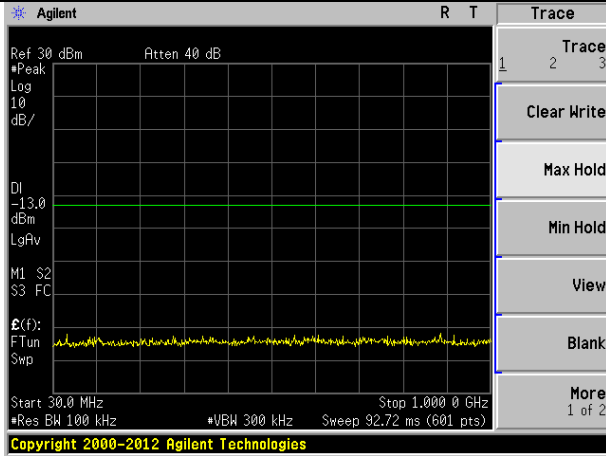
Middle channel



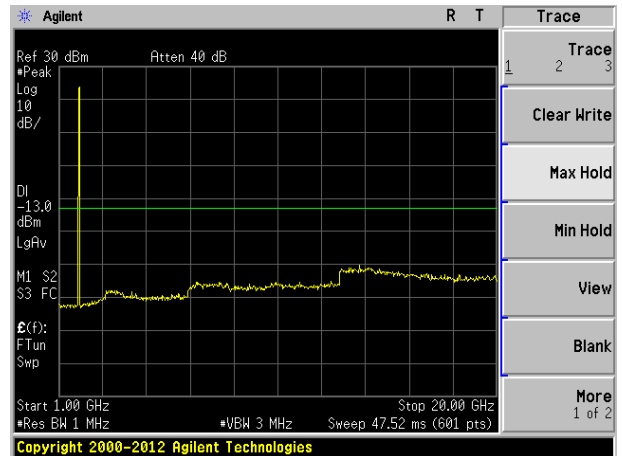
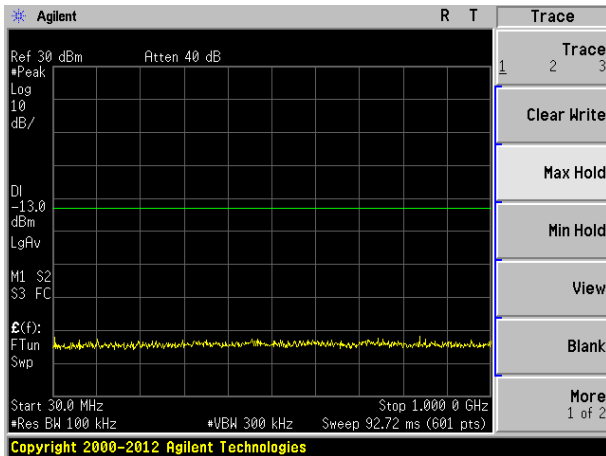
Highest channel

Test Mode: Traffic mode

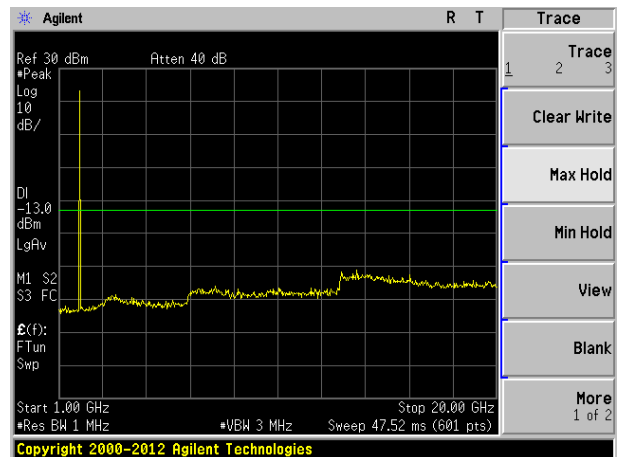
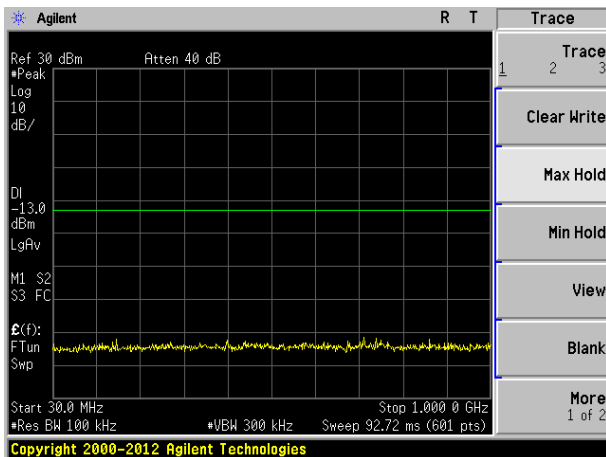
PCS1900 (EGPRS 1 link)



Lowest channel

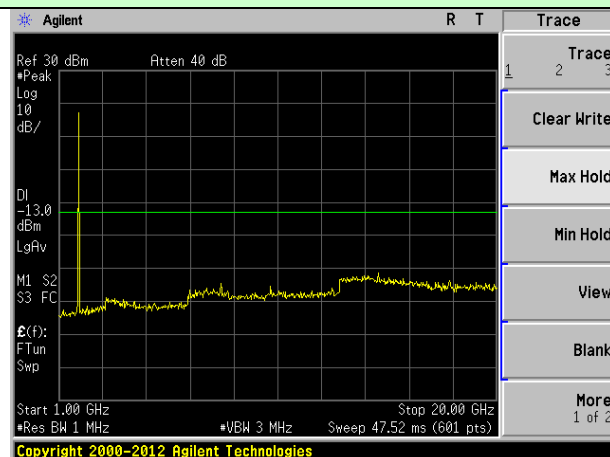
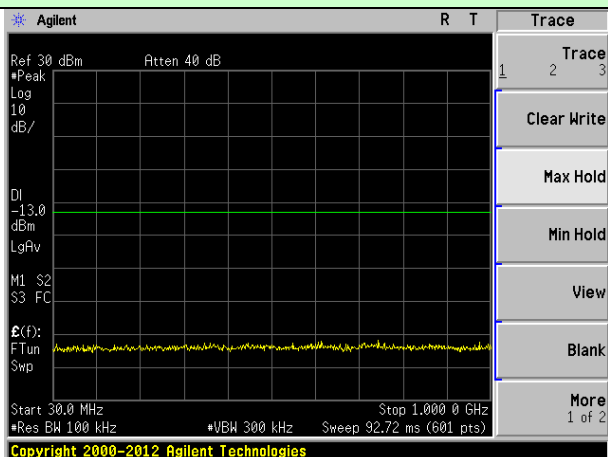


Middle channel

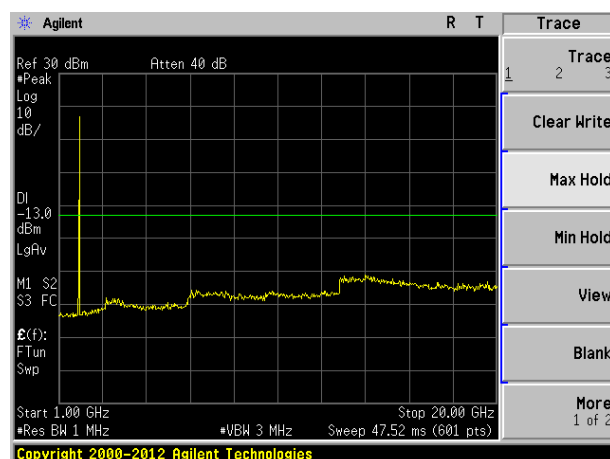
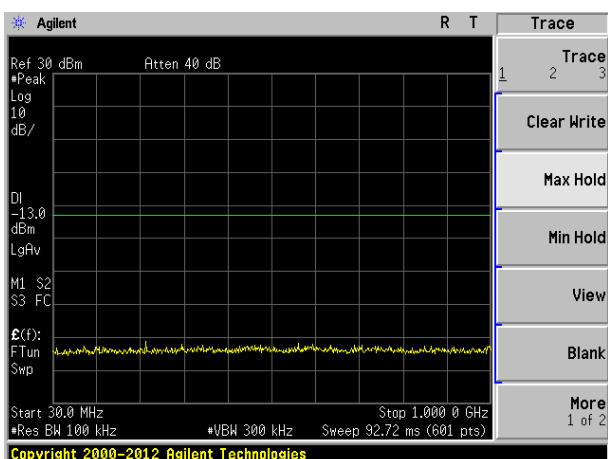


Highest channel

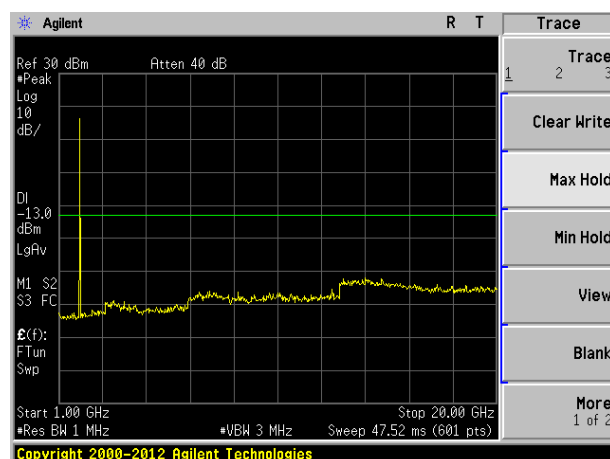
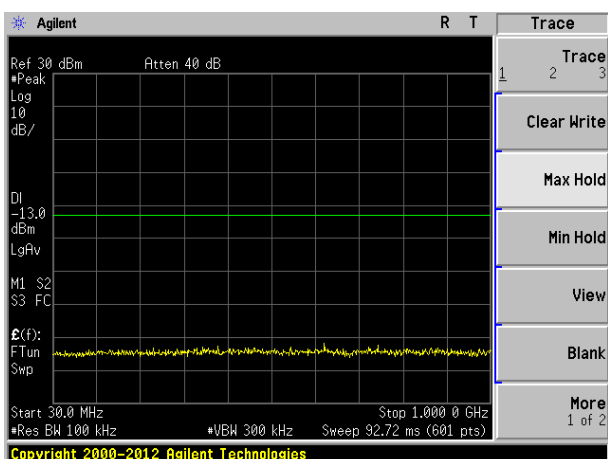
Test Mode: Traffic mode	WCDMA Band II (RMC 12.2Kbps link)
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Lowest channel

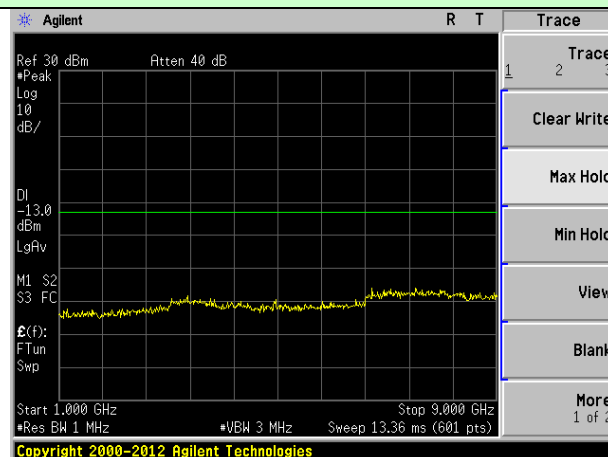
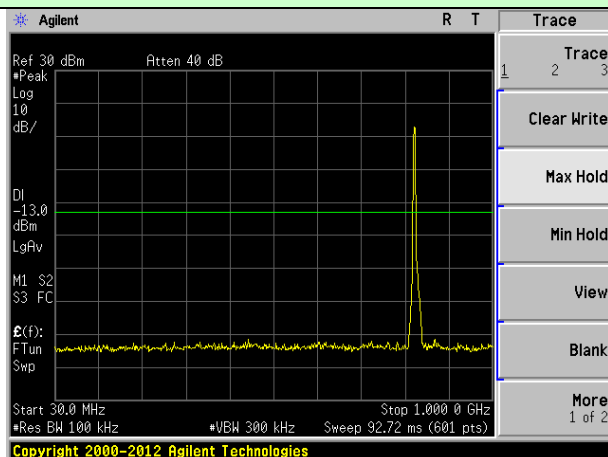


Middle channel

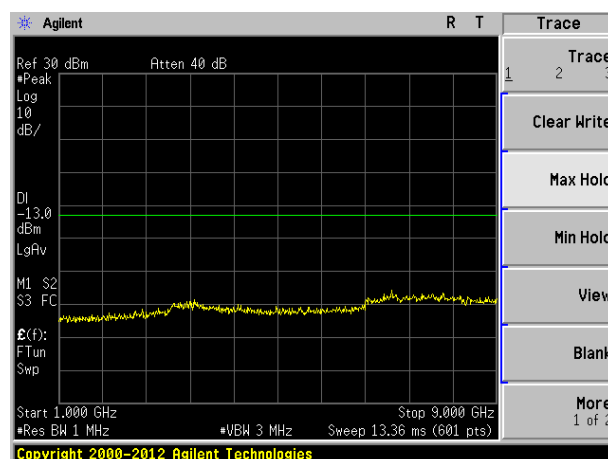
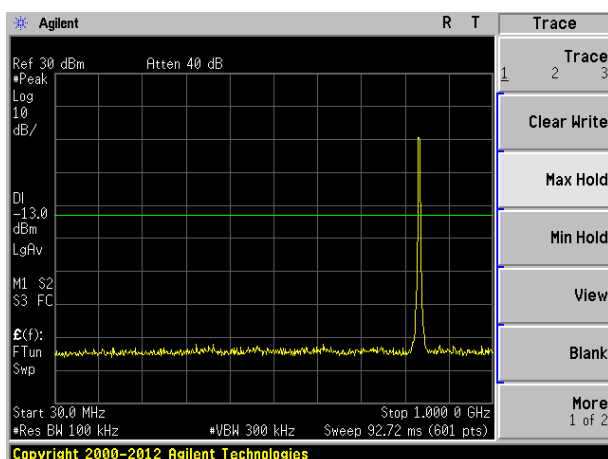


Highest channel

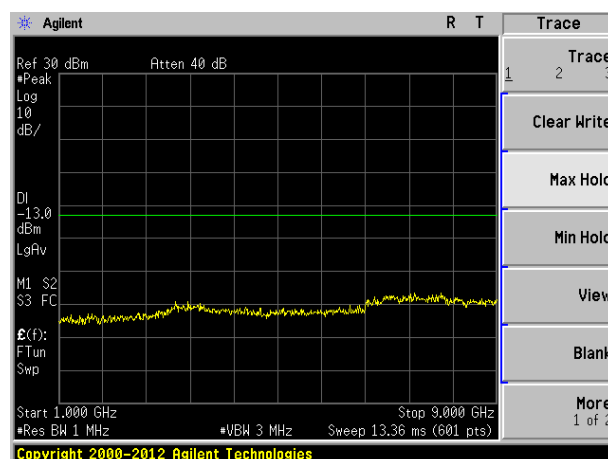
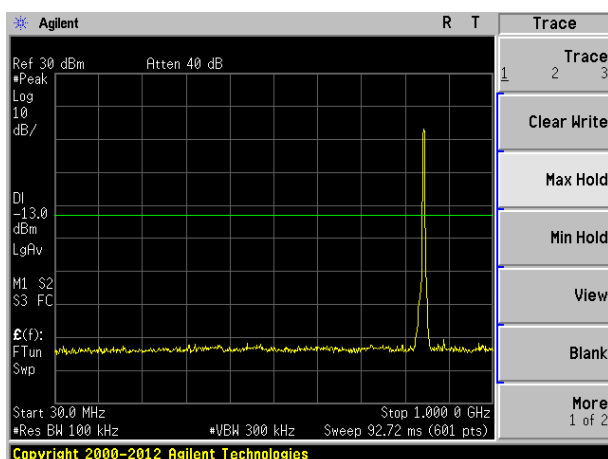
Test Mode: Traffic mode	WCDMA Band V (RMC 12.2Kbps link)
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Lowest channel



Middle channel

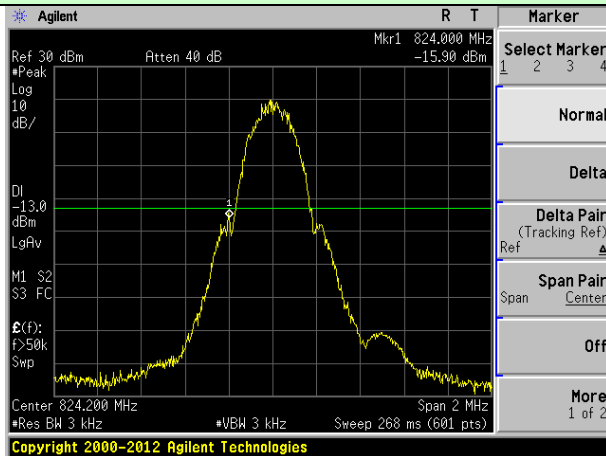


Highest channel

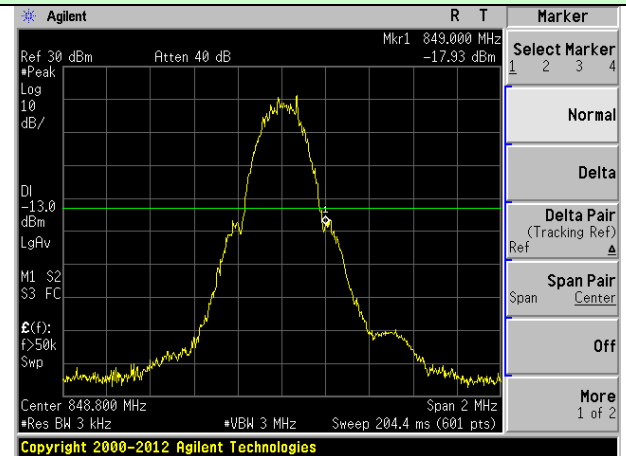
Band Edge:

Test Mode: Traffic mode

GSM850 (GSM link)



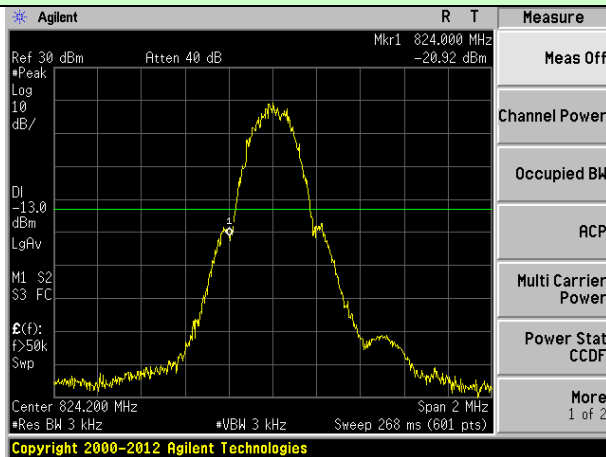
Lowest channel



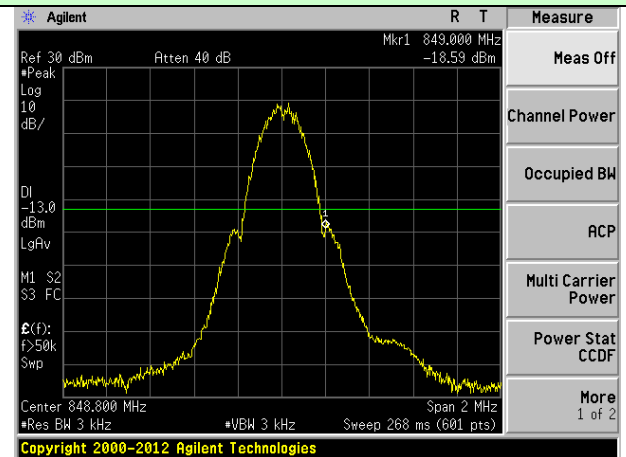
Highest channel

Test Mode: Traffic mode

GSM850 (GPRS 1 link)



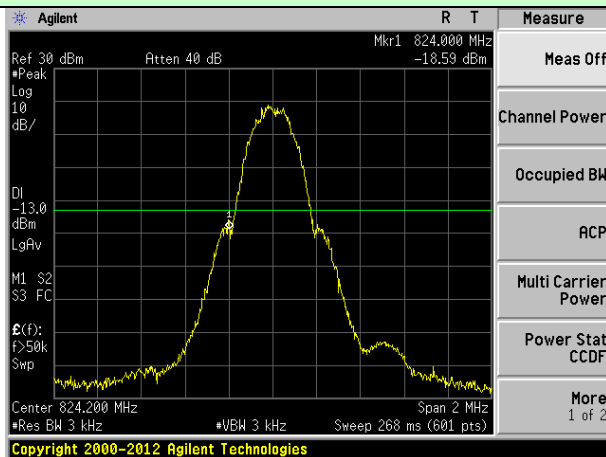
Lowest channel



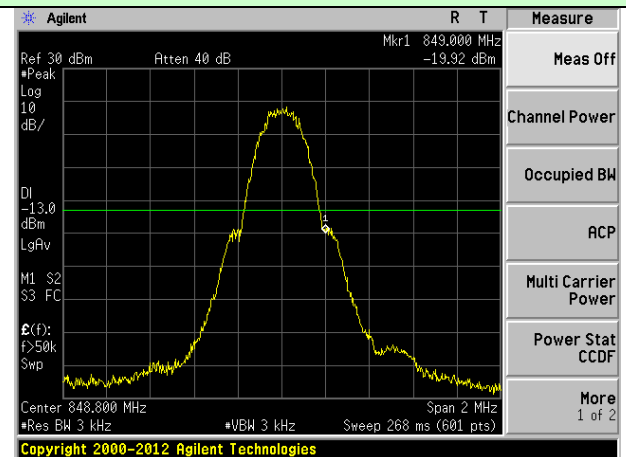
Highest channel

Test Mode: Traffic mode

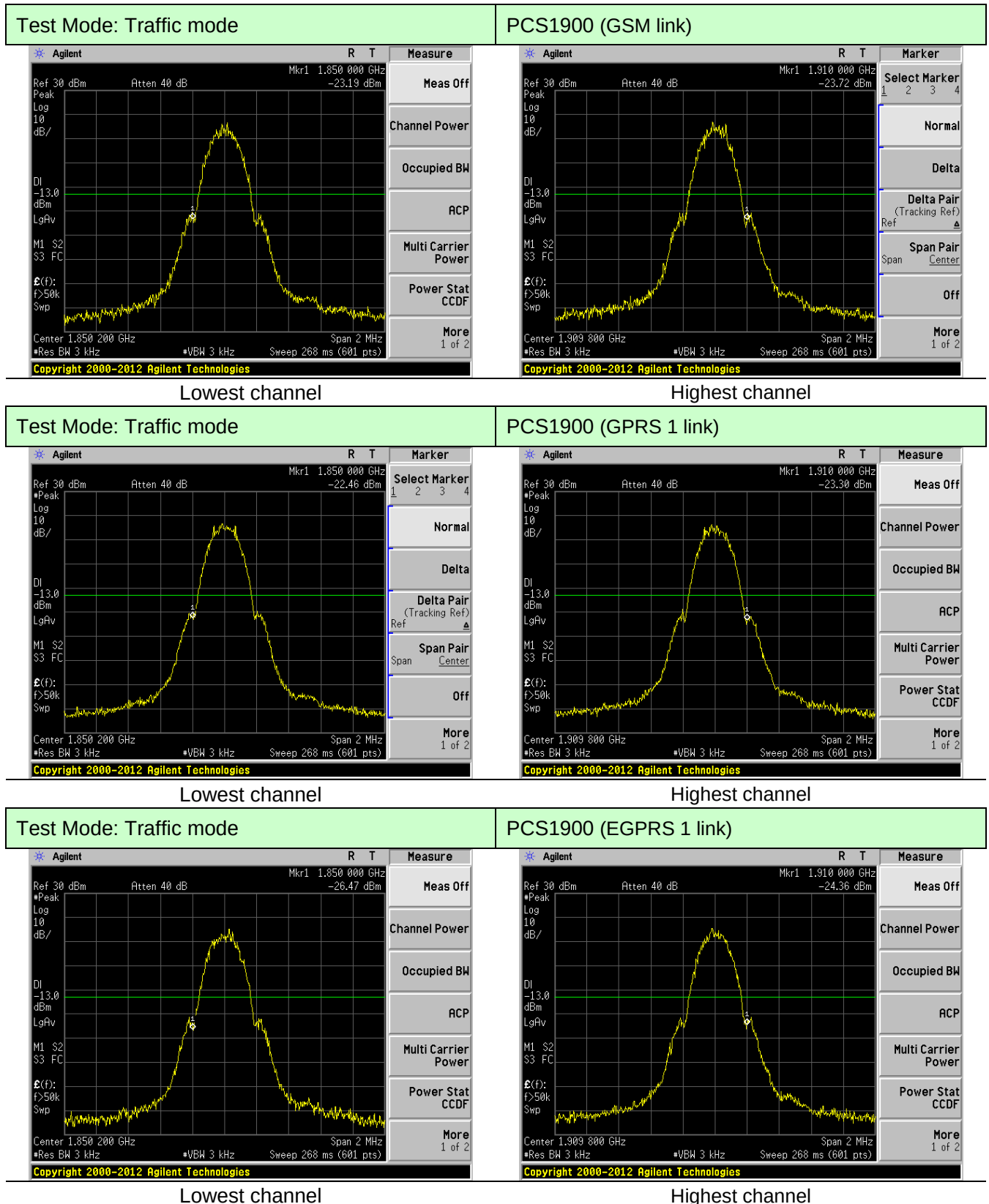
GSM850 (EGPRS 1 link)

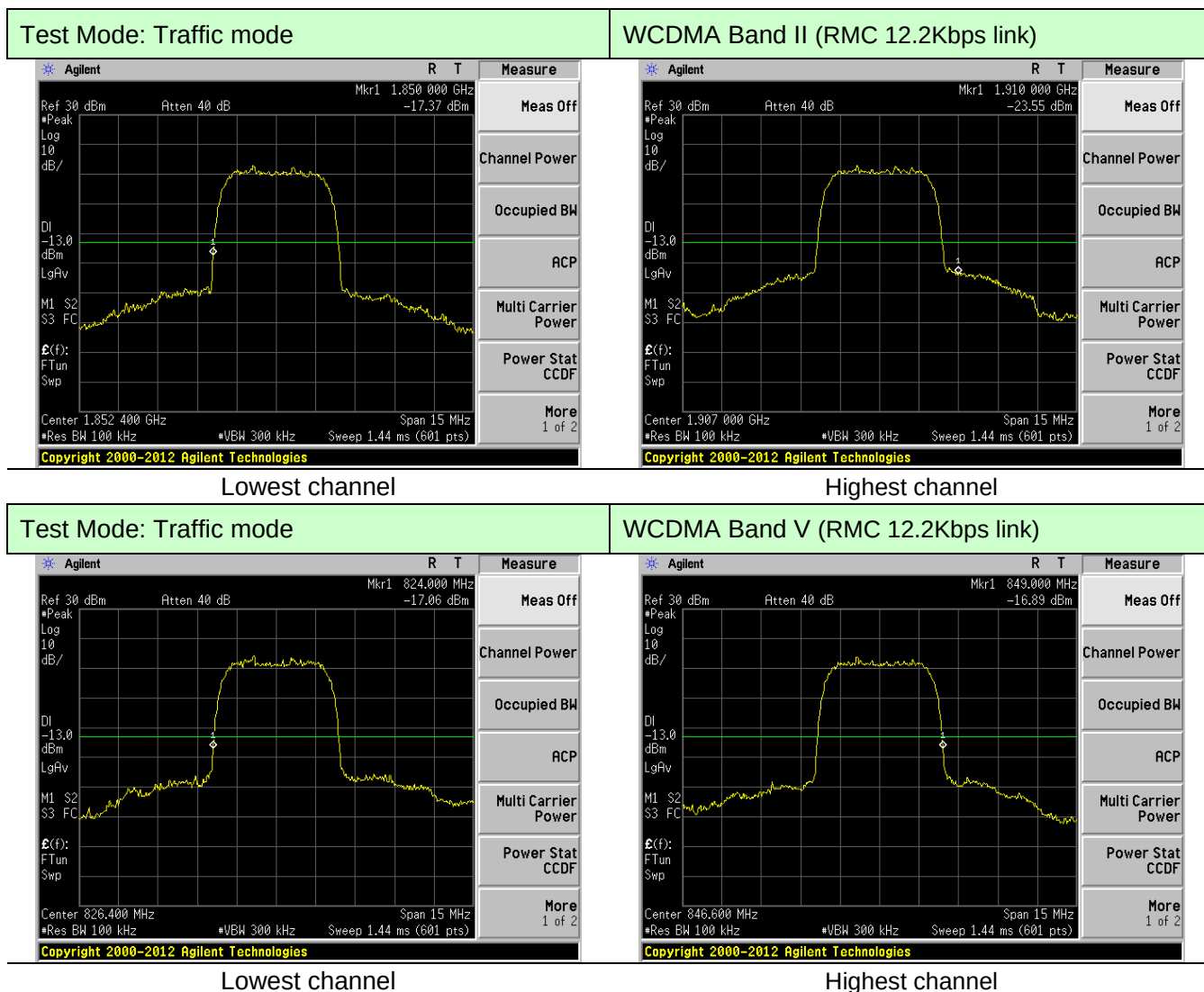


Lowest channel

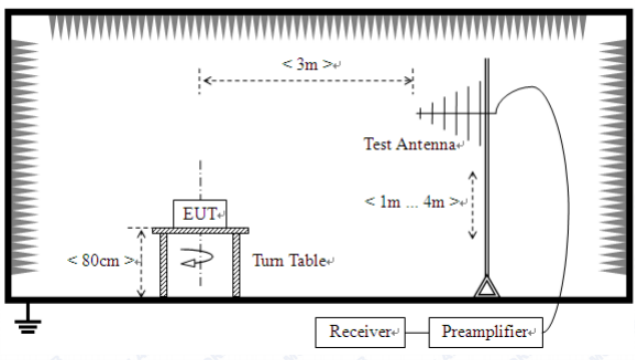
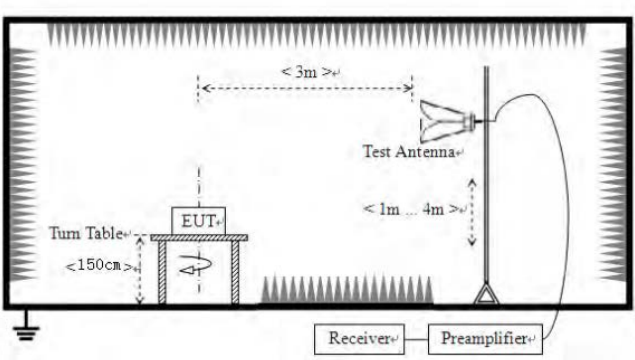
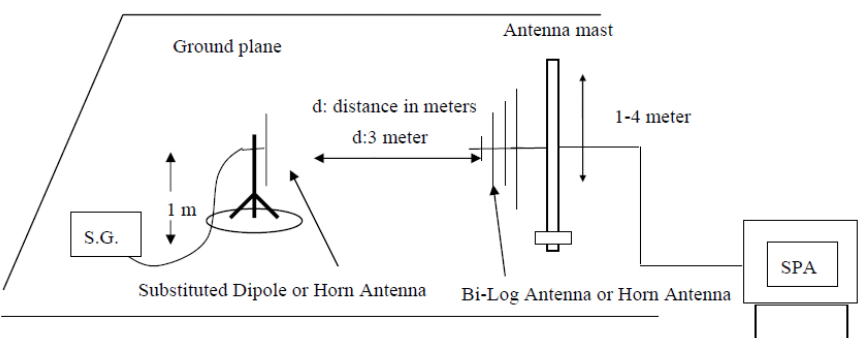


Highest channel





6.8 Field strength of spurious radiation measurement

Test Requirement:	FCC part22.917 and FCC part24.238
Test Method:	FCC part 2.1053 and ANSI C63.26:2015
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. $\text{EIRP} = \text{S.G. output (dBm)} + \text{Antenna Gain(dB/dBi)} - \text{Cable Loss (dB)}$ $\text{ERP} = \text{EIRP} - 2.15$
Test Instruments:	Refer to section 5.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

Measurement Data

GSM 850								
Channel	Frequency(MHz)	Polarization	SGP [dBm]	Substitution Gain[dBi]	Cable loss[dB]	ERP (dBm)	Limit (dBm)	Over Limit (dBm)
Lowest	1648.40	H	-63.77	6.74	2.37	-61.55	-13.00	-48.55
	2472.60	H	-64.28	8.94	3.18	-60.67	-13.00	-47.67
	3296.80	H	-62.90	10.62	3.62	-58.05	-13.00	-45.05
	1648.40	V	-61.28	6.74	2.37	-59.06	-13.00	-46.06
	2472.60	V	-59.52	8.94	3.18	-55.91	-13.00	-42.91
	3296.80	V	-59.35	10.62	3.62	-54.50	-13.00	-41.50
Middle	1673.20	H	-62.30	6.74	2.39	-60.10	-13.00	-47.10
	2509.80	H	-63.02	8.94	3.03	-59.26	-13.00	-46.26
	3346.40	H	-60.65	10.62	3.63	-55.81	-13.00	-42.81
	1673.20	V	-59.22	6.74	2.39	-57.02	-13.00	-44.02
	2509.80	V	-63.10	8.94	3.03	-59.34	-13.00	-46.34
	3346.40	V	-62.50	10.62	3.63	-57.66	-13.00	-44.66
Highest	1697.60	H	-59.54	6.74	2.40	-57.35	-13.00	-44.35
	2546.40	H	-63.61	8.94	3.06	-59.88	-13.00	-46.88
	3395.20	H	-59.92	10.62	3.64	-55.09	-13.00	-42.09
	1697.60	V	-63.82	6.74	2.40	-61.63	-13.00	-48.63
	2546.40	V	-64.29	8.94	3.06	-60.56	-13.00	-47.56
	3395.20	V	-61.01	10.62	3.64	-56.18	-13.00	-43.18

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

GSM 1900								
Channel	Frequency(MHz)	Polarization	SGP [dBm]	Substitution Gain[dBi]	Cable loss[dB]	EIRP (dBm)	Limit (dBm)	Over Limit (dBm)
Lowest	3700.40	H	-59.88	13.13	3.88	-50.63	-13.00	-37.63
	5550.60	H	-59.39	11.62	5.27	-53.04	-13.00	-40.04
	7400.80	H	-56.14	10.22	6.73	-52.65	-13.00	-39.65
	3700.40	V	-59.51	13.13	3.88	-50.26	-13.00	-37.26
	5550.60	V	-55.17	11.62	5.27	-48.82	-13.00	-35.82
	7400.80	V	-59.39	10.22	6.73	-55.90	-13.00	-42.90
Middle	3760.00	H	-55.93	13.13	3.90	-46.70	-13.00	-33.70
	5640.00	H	-56.06	11.62	5.33	-49.77	-13.00	-36.77
	7520.00	H	-57.16	10.22	6.82	-53.76	-13.00	-40.76
	3760.00	V	-57.76	13.13	3.90	-48.53	-13.00	-35.53
	5640.00	V	-56.14	11.62	5.33	-49.85	-13.00	-36.85
	7520.00	V	-56.30	10.22	6.82	-52.90	-13.00	-39.90
Highest	3819.60	H	-57.10	13.13	3.92	-47.89	-13.00	-34.89
	5729.40	H	-57.07	11.62	5.40	-50.85	-13.00	-37.85
	7639.20	H	-56.64	10.22	6.80	-53.22	-13.00	-40.22
	3819.60	V	-57.24	13.13	3.92	-48.03	-13.00	-35.03
	5729.40	V	-59.66	11.62	5.40	-53.44	-13.00	-40.44
	7639.20	V	-57.02	10.22	6.80	-53.60	-13.00	-40.60

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

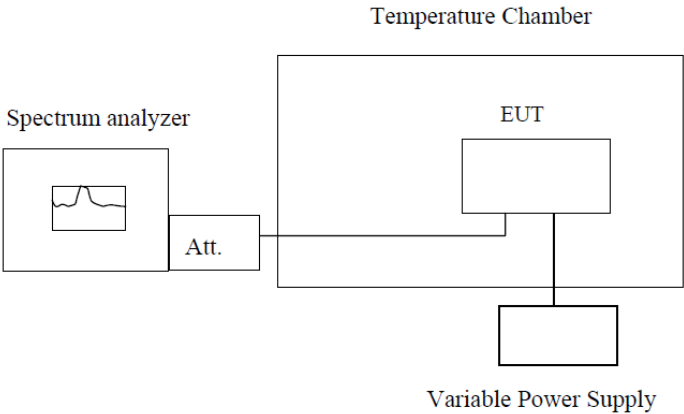
WCDMA Band V								
Channel	Frequency(MHz)	Polarization	SGP [dBm]	Substitution Gain[dBi]	Cable loss[dB]	ERP (dBm)	Limit (dBm)	Over Limit (dBm)
Lowest	1652.80	H	-60.25	6.74	2.37	-58.03	-13.00	-45.03
	2479.20	H	-62.28	8.94	3.18	-58.67	-13.00	-45.67
	3305.60	H	-59.29	10.62	3.62	-54.44	-13.00	-41.44
	1652.80	V	-59.90	6.74	2.37	-57.68	-13.00	-44.68
	2479.20	V	-62.89	8.94	3.18	-59.28	-13.00	-46.28
	3305.60	V	-63.44	10.62	3.62	-58.59	-13.00	-45.59
Middle	1672.80	H	-61.13	6.74	2.39	-58.93	-13.00	-45.93
	2509.20	H	-61.44	8.94	3.03	-57.68	-13.00	-44.68
	3345.60	H	-60.02	10.62	3.63	-55.18	-13.00	-42.18
	1672.80	V	-64.70	6.74	2.39	-62.50	-13.00	-49.50
	2509.20	V	-61.65	8.94	3.03	-57.89	-13.00	-44.89
	3345.60	V	-63.87	10.62	3.63	-59.03	-13.00	-46.03
Highest	1693.20	H	-63.76	6.74	2.40	-61.57	-13.00	-48.57
	2539.80	H	-60.16	8.94	3.06	-56.43	-13.00	-43.43
	3386.40	H	-59.30	10.62	3.64	-54.47	-13.00	-41.47
	1693.20	V	-64.24	6.74	2.40	-62.05	-13.00	-49.05
	2539.80	V	-62.68	8.94	3.06	-58.95	-13.00	-45.95
	3386.40	V	-63.47	10.62	3.64	-58.64	-13.00	-45.64

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

WCDMA Band II								
Channel	Frequency(MHz)	Polarization	SGP [dBm]	Substitution Gain[dBi]	Cable loss[dB]	EIRP (dBm)	Limit (dBm)	Over Limit (dBm)
Lowest	3704.80	H	-55.07	13.13	3.88	-45.82	-13.00	-32.82
	5557.20	H	-59.23	11.62	5.27	-52.88	-13.00	-39.88
	7409.60	H	-58.26	10.22	6.73	-54.77	-13.00	-41.77
	3704.80	V	-57.81	13.13	3.88	-48.56	-13.00	-35.56
	5557.20	V	-59.80	11.62	5.27	-53.45	-13.00	-40.45
	7409.60	V	-58.82	10.22	6.73	-55.33	-13.00	-42.33
Middle	3760.00	H	-59.55	13.13	3.90	-50.32	-13.00	-37.32
	5640.00	H	-56.98	11.62	5.33	-50.69	-13.00	-37.69
	7520.00	H	-59.64	10.22	6.82	-56.24	-13.00	-43.24
	3760.00	V	-55.48	13.13	3.90	-46.25	-13.00	-33.25
	5640.00	V	-57.33	11.62	5.33	-51.04	-13.00	-38.04
	7520.00	V	-55.27	10.22	6.82	-51.87	-13.00	-38.87
Highest	3815.20	H	-57.47	13.13	3.92	-48.26	-13.00	-35.26
	5722.80	H	-54.78	11.62	5.40	-48.56	-13.00	-35.56
	7630.40	H	-56.73	10.22	6.80	-53.31	-13.00	-40.31
	3815.20	V	-59.09	13.13	3.92	-49.88	-13.00	-36.88
	5722.80	V	-54.94	11.62	5.40	-48.72	-13.00	-35.72
	7630.40	V	-54.71	10.22	6.80	-51.29	-13.00	-38.29

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

6.9 Frequency stability V.S. Temperature measurement

Test Requirement:	FCC part 22.355 and FCC part 24.235
Test Method:	FCC Part2.1055(a)(1)(b)
Limit:	$\pm 2.5\text{ppm}$
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°C operating frequency as reference frequency. 5. Turn EUT off and set the chamber temperature to –20°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. 6. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.
Test Instruments:	Refer to section 5.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

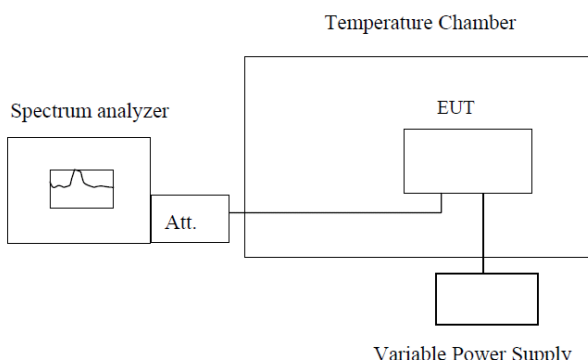
Measurement Data

Reference Frequency: GSM850 (GSM link) Middle channel=190 channel=836.6MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.70	-30	57	0.0686	±2.5	Pass
	-20	65	0.0775		
	-10	55	0.0657		
	0	45	0.0539		
	10	52	0.0627		
	20	45	0.0539		
	30	75	0.0893		
	40	67	0.0804		
	50	65	0.0775		
Reference Frequency: GSM850 (GPRS 1 link) Middle channel=190 channel=836.6MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.70	-30	42	0.0504	±2.5	Pass
	-20	46	0.0549		
	-10	40	0.0482		
	0	37	0.0437		
	10	38	0.0460		
	20	35	0.0415		
	30	55	0.0661		
	40	48	0.0571		
	50	46	0.0549		
Reference Frequency: GSM850 (EGPRS 1 link) Middle channel=190 channel=836.6MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.70	-30	305	0.3648	±2.5	Pass
	-20	352	0.4213		
	-10	295	0.3531		
	0	257	0.3074		
	10	288	0.3440		
	20	251	0.2999		
	30	422	0.5045		
	40	368	0.4396		
	50	348	0.4164		

Reference Frequency: PCS1900 (GSM link) Middle channel=661 channel=1880MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.70	-30	175	0.0933	±2.5	Pass
	-20	207	0.1103		
	-10	175	0.0933		
	0	149	0.0791		
	10	175	0.0933		
	20	154	0.0819		
	30	245	0.1301		
	40	213	0.1131		
	50	202	0.1074		
Reference Frequency: PCS1900 (GPRS 1 link) Middle channel=661 channel=1880MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.70	-30	79	0.0419	±2.5	Pass
	-20	91	0.0484		
	-10	74	0.0393		
	0	62	0.0329		
	10	76	0.0406		
	20	62	0.0329		
	30	103	0.0548		
	40	86	0.0458		
	50	91	0.0484		
Reference Frequency: PCS1900 (EGPRS 1 link) Middle channel=661 channel=1880MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.70	-30	218	0.1161	±2.5	Pass
	-20	255	0.1358		
	-10	210	0.1116		
	0	174	0.0928		
	10	212	0.1129		
	20	179	0.0954		
	30	285	0.1518		
	40	240	0.1278		
	50	252	0.1340		

Reference Frequency: WCDMA Band V Middle channel=4183 channel=836.6MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.70	-30	289	0.1539	±2.5	Pass
	-20	258	0.1373		
	-10	224	0.1189		
	0	210	0.1115		
	10	192	0.1023		
	20	168	0.0895		
	30	210	0.1115		
	40	234	0.1244		
	50	224	0.1189		
Reference Frequency: WCDMA Band II Middle channel=9400 channel=1880.0MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.70	-30	48	0.0572	±2.5	Pass
	-20	68	0.0807		
	-10	76	0.0914		
	0	35	0.0422		
	10	53	0.0636		
	20	59	0.0700		
	30	87	0.1043		
	40	82	0.0978		
	50	98	0.1171		

6.10 Frequency stability V.S. Voltage measurement

Test Requirement:	FCC part 22.355 and FCC part 24.235
Test Method:	FCC Part2.1055(d)(1)(2)
Limit:	$\pm 2.5\text{ppm}$
Test setup:	 Note : Measurement setup for testing on Antenna connector
Test procedure:	1. Set chamber temperature to 25°C. 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 specified extreme voltage variation (+/- 15%) and endpoint, record the maximum frequency change.
Test Instruments:	Refer to section 5.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

Measurement Data

Reference Frequency: GSM850 (GSM link) Middle channel=190 channel=836.6MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.07	45	0.0532	±2.5	Pass
	3.70	51	0.0615		
	3.30	58	0.0697		
Reference Frequency: GSM850 (GPRS 1 link) Middle channel=190 channel=836.6MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.07	40	0.0473	±2.5	Pass
	3.70	29	0.0346		
	3.30	33	0.0388		
Reference Frequency: GSM850 (EGPRS 1 link) Middle channel=190 channel=836.6MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.07	42	0.0505	±2.5	Pass
	3.70	48	0.0574		
	3.30	54	0.0640		

Reference Frequency: PCS1900 (GSM link) Middle channel=661 channel=1880MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.07	84	0.0449	±2.5	Pass
	3.70	103	0.0546		
	3.30	103	0.0546		
Reference Frequency: PCS1900 (GPRS 1 link) Middle channel=661 channel=1880MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.07	109	0.0582	±2.5	Pass
	3.70	82	0.0434		
	3.30	87	0.0463		
Reference Frequency: PCS1900 (EGPRS 1 link) Middle channel=661 channel=1880MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.07	172	0.0916	±2.5	Pass
	3.70	198	0.1053		
	3.30	199	0.1059		

Reference Frequency: WCDMA Band V Middle channel=4183 channel=836.6MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.07	54	0.0288	±2.5	Pass
	3.70	46	0.0243		
	3.30	51	0.0269		
Reference Frequency: WCDMA Band II Middle channel=940 channel=1880.0MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.07	50	0.0289	±2.5	Pass
	3.70	63	0.0366		
	3.30	60	0.0347		

7 Test Setup Photo

Reference to the **appendix I** for details.

8 EUT Constructional Details

Reference to the **appendix II** for details.

-----End-----