FCC Report (GSM&WCDMA)

Applicant:	Darmuoba, S.A. de C.V
Address of Applicant:	Mar Negro 1, Col. Tacuba, CDMX. C.P 11410 Miguel Hidalgo, Distrito Federal, Mexico
Manufacturer/Factory:	Z-TECH COMMUNICATION(SZ)CO;LTD
Address of Manufacturer/Factory:	7L BLK D BAO'AN ZHIGU YIN'TIAN ROAD NO.4 XI'XIANG, BAO'AN DISTRICT SZ CHINA
Equipment Under Test (EUT)	
Product Name:	MOBIE PHONE
Model No.:	SD50
Trade mark:	UNEONE
FCC ID:	2AIFYSD50
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:	April 28, 2019
Date of Test:	April 29, 2019-May 30, 2019
Date of report issued:	May 31, 2019
Test Result :	PASS *

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

Authorized Signature:

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	*May 31, 2019*	*Original*

Prepared By:	Bill. Yuan	***Date:***	*May 31, 2019*
	Project Engineer		
Check By:	Robinson Lo	***Date:***	*May 31, 2019*
	Reviewer		

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 TEST FACILITY 7
4.5 TEST LOCATION 7

5 TEST INSTRUMENTS LIST 8

6 SYSTEM TEST CONFIGURATION 10

6.1 TEST MODE 10
6.2 CONFIGURATION OF TESTED SYSTEM 11
6.3 CONDUCTED PEAK OUTPUT POWER 12
6.4 PEAK-TO-AVERAGE RATIO 14
6.5 OCCUPY BANDWIDTH 16
6.6 MODULATION CHARACTERISTIC 26
6.7 OUT OF BAND EMISSION AT ANTENNA TERMINALS 26
6.8 ERP, EIRP MEASUREMENT 38
6.9 FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT 48
6.10 FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT 54
6.11 FREQUENCY STABILITY V.S. VOLTAGE MEASUREMENT 58

7 TEST SETUP PHOTO 62

8 EUT CONSTRUCTIONAL DETAILS 62

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 24.232	Pass
Modulation Characteristics	Part 2.1047	Pass
99% & -26 dB Occupied 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
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:	MOBIE PHONE
Model No.:	SD50
Test sample(s) ID:	GTS201904000204-1
Sample(s) Status	Engineer sample
Serial No.:	356888100000437
Hardware version:	SD50_V1.1
Software version:	SD50_002R
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
GPRS Class:	10
EGPRS Class	12
Release	R99
Modulation type:	GSM/GPRS: GMSK EGPRS: GMSK/8PSK WCDMA Band II/V: QPSK
Antenna type:	PIFA antenna
Antenna gain:	GSM850:-3.79dBi PCS1900:1.26dBi WCDMA Band V: -3.79dBi WCDMA Band II: 1.26dBi
Power supply:	Adaptor Model:SD50-A Input: AC 100-240V, 50-60Hz, 150mA Output: DC 5V, 800mA Or Battery: DC 3.8V, 2000mAh, 7.6W

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 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. ● **Industry Canada (IC) —Registration No.: 9079A-2** 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-2. ● **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

4.5 Test Location

All tests were performed at:
Global United Technology Services Co., Ltd. Address: No. 301-309, 3/F., 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. 27 2018	June. 26 2019
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 27 2018	June. 26 2019
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June. 27 2018	June. 26 2019
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 27 2018	June. 26 2019
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 27 2018	June. 26 2019
9	Coaxial Cable	GTS	N/A	GTS211	June. 27 2018	June. 26 2019
10	Coaxial cable	GTS	N/A	GTS210	June. 27 2018	June. 26 2019
11	Coaxial Cable	GTS	N/A	GTS212	June. 27 2018	June. 26 2019
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 27 2018	June. 26 2019
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	June. 27 2018	June. 26 2019
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 27 2018	June. 26 2019
15	Band filter	Amindeon	82346	GTS219	June. 27 2018	June. 26 2019
16	Power Meter	Anritsu	ML2495A	GTS540	June. 27 2018	June. 26 2019
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 27 2018	June. 26 2019
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	June. 27 2018	June. 26 2019
19	Splitter	Agilent	11636B	GTS237	June. 27 2018	June. 26 2019
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 27 2018	June. 26 2019
21	Breitband hornantenne	SCHWARZBECK	BBHA 9170	GTS579	Oct. 20 2018	Oct. 19 2019
22	Amplifier	TDK	PA-02-02	GTS574	Oct. 20 2018	Oct. 19 2019
23	Amplifier	TDK	PA-02-03	GTS576	Oct. 20 2018	Oct. 19 2019
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	GTS578	June. 27 2018	June. 26 2019

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. 27 2018	June. 26 2019
2	Barometer	ChangChun	DYM3	GTS255	June. 27 2018	June. 26 2019

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 ■ GPRS 1 link ■ EPRS 1 link	■ GSM link ■ GPRS 1 link ■ EGPRS 1 link
PCS 1900	■ GSM link ■ GPRS 1 link ■ EGPRS 1 link	■ GSM link ■ GPRS 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

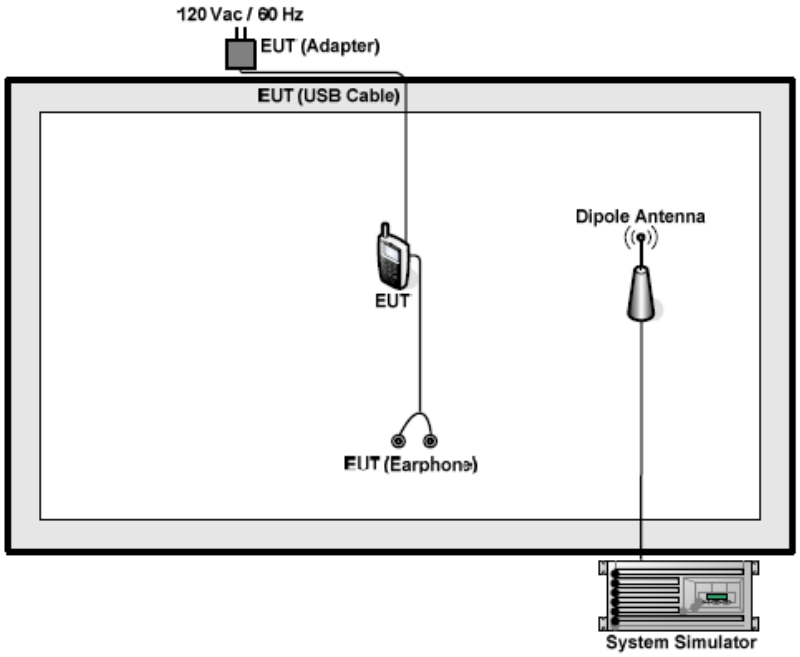
Note: The maximum power levels are GSM mode for GMSK link, GPRS multi-slot class 10 mode for GMSK link, EGPRS multi-slot class 12 mode for 8PSK link, RMC12.2Kbps mode for WCDMA Band V/II. only these modes were used for all tests.

The conducted power tables are as follows:

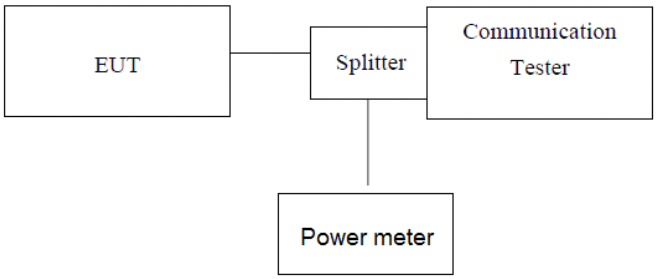
Conducted Power (dBm)						
Band	GSM850			PCS1900		
Channel	128	190	251	512	661	810
Frequency	824.20	836.60	848.80	1850.20	1880.00	1909.80
GSM (GMSK, 1 TX slot)	33.58	33.51	33.47	30.65	30.52	30.57
GPRS (GMSK, 1 TX slot)	32.36	32.33	32.42	29.36	29.35	29.41
GPRS (GMSK, 2 TX slot)	31.25	31.36	31.40	28.21	28.25	28.31
GPRS (GMSK, 3 TX slot)	30.83	30.76	30.81	27.72	27.75	27.63
GPRS (GMSK, 4 TX slot)	29.62	29.64	29.69	26.54	26.58	26.55
EGPRS (8PSK, 1 TX slot)	31.52	31.59	31.53	29.75	29.74	29.70
EGPRS (8PSK, 2 TX slot)	30.36	30.37	30.34	28.53	28.59	28.56
EGPRS (8PSK, 3 TX slot)	29.53	29.57	29.52	27.42	27.39	27.40
EGPRS (8PSK, 4 TX slot)	28.42	28.50	28.48	26.83	26.65	26.72

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	22.61	22.64	22.60	22.54	22.53	22.55
HSDPA Subtest-1	22.42	22.45	22.48	22.36	22.32	22.30
HSDPA Subtest-2	21.37	21.33	21.30	21.45	21.49	21.48
HSDPA Subtest-3	21.18	21.20	21.23	21.36	21.34	21.30
HSDPA Subtest-4	21.09	21.07	21.11	21.30	21.29	21.26
HSUPA Subtest-1	22.25	22.20	22.21	22.48	22.45	22.43
HSUPA Subtest-2	21.47	21.45	21.43	21.42	21.36	21.38
HSUPA Subtest-3	21.21	21.20	21.23	21.25	21.28	21.34
HSUPA Subtest-4	21.18	21.15	21.13	21.20	21.18	21.16
HSUPA Subtest-5	21.10	21.11	21.08	21.12	21.15	21.10
AMR	22.61	22.64	22.60	22.54	22.53	22.55

6.2 Configuration of Tested System



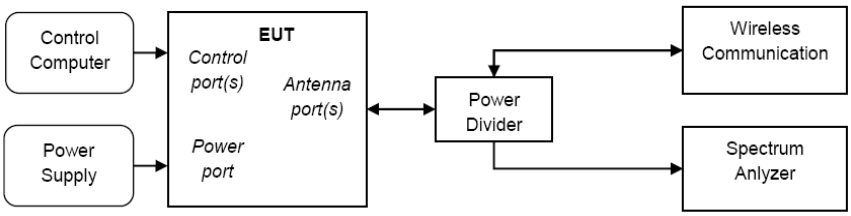
6.3 Conducted Peak Output Power

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:	 *Note: Measurement setup for testing on Antenna connector*
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

EUT Mode	Channel	Frequency (MHz)	PK power (dBm)	Limit (dBm)	Result
GSM 850 (GSM link)	128	824.20	33.58	38.45	Pass
	190	836.60	33.51		
	251	848.80	33.47		
GSM 850 (GPRS 1 link)	128	824.20	32.36	38.45	Pass
	190	836.60	32.33		
	251	848.80	32.42		
GSM 850 (EGPRS 1 link)	128	824.20	31.52	38.45	Pass
	190	836.60	31.59		
	251	848.80	31.53		
PCS 1900 (GSM link)	512	1850.20	30.65	33.01	Pass
	661	1880.00	30.52		
	810	1909.80	30.57		
PCS 1900 (GPRS 1 link)	512	1850.20	29.36	33.01	Pass
	661	1880.00	29.35		
	810	1909.80	29.41		
PCS 1900 (EGPRS 1 link)	512	1850.20	29.75	33.01	Pass
	661	1880.00	29.74		
	810	1909.80	29.70		
WCDMA Band V (RMC 12.2Kbps link)	4132	826.40	22.54	38.45	Pass
	4183	836.60	22.53		
	4233	846.60	22.55		
WCDMA Band II (RMC 12.2Kbps link)	9262	1852.4	22.61	33.01	Pass
	9400	1880.0	22.64		
	9538	1907.6	22.60		

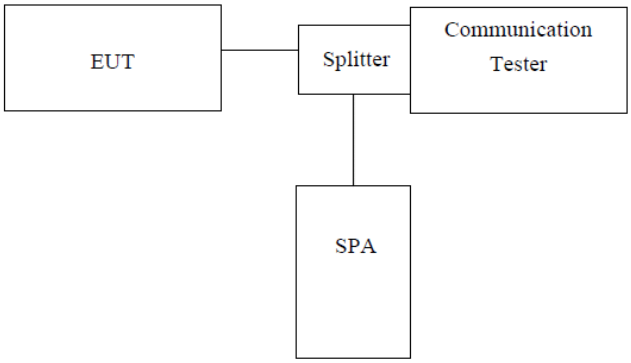
6.4 Peak-to-Average Ratio

Test Requirement:	FCC part24.232
Test Method:	FCC part2.1046
Limit:	13db
Test setup:	
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	Test mode	Peak to Average Ratio (dB)			Limit (dB)	Result
		Low Ch.	Middle Ch.	High Ch.		
GSM850	GSM/TMI	0.25	0.26	0.34	13	PASS
GSM1900	GSM/TMI	0.27	0.31	0.32	13	PASS
WCDMA850	UMTS/TMI	2.85	2.95	3.10	13	PASS
WCDMA1900	UMTS/TMI	3.09	3.11	3.13	13	PASS

6.5 Occupy Bandwidth

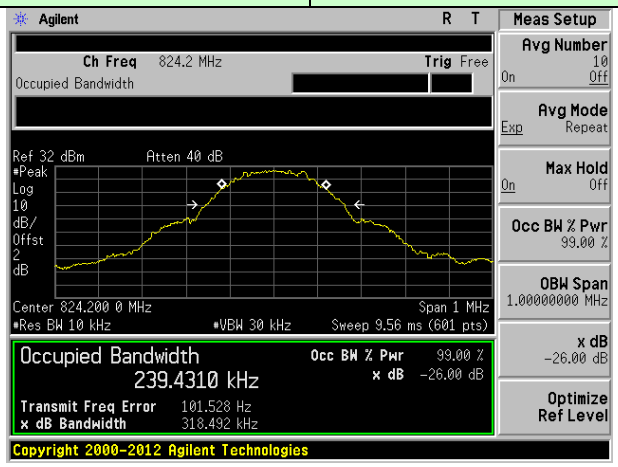
Test Requirement:	FCC part 22.917(b) and FCC part 24.238(b)
Test Method:	FCC part2.1049
Test setup:	 *Note: Measurement setup for testing on Antenna connector*
Test Procedure:	1. The EUT's output RF connector was connected with a short cable to the spectrum analyzer 2. RBW was set to about 1% of emission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

Measurement Data

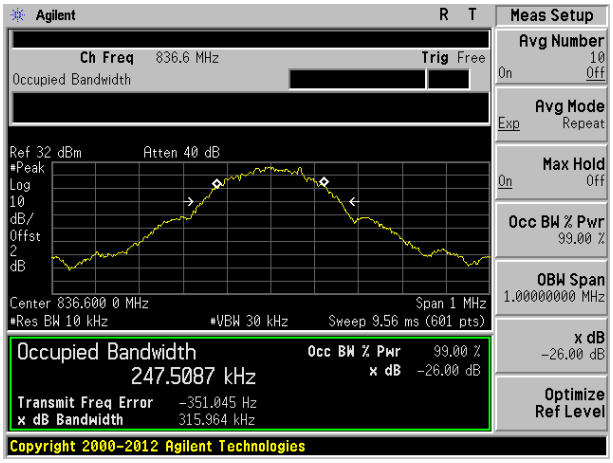
EUT Mode	Channel	Frequency (MHz)	99% Occupy bandwidth (KHz)	-26dB bandwidth (KHz)
GSM 850 (GSM link)	128	824.20	239.431	318.492
	190	836.60	247.509	315.964
	251	848.80	242.433	315.973
GSM 850 (GPRS 1 link)	128	824.20	238.501	318.219
	190	836.60	238.251	310.559
	251	848.80	236.894	316.034
GSM 850 (EGPRS 1 link)	128	824.20	229.671	295.499
	190	836.60	245.565	299.946
	251	848.80	241.896	303.481
PCS 1900 (GSM link)	512	1850.20	242.943	314.189
	661	1880.00	248.120	313.910
	810	1909.80	248.839	319.459
PCS 1900 (GPRS 1 link)	512	1850.20	246.226	319.325
	661	1880.00	243.811	320.866
	810	1909.80	247.783	317.177
PCS 1900 (EGPRS 1 link)	512	1850.20	252.516	317.357
	661	1880.00	249.489	318.819
	810	1909.80	239.532	314.786
WCDMA Band V (RMC 12.2Kbps link)	4132	826.40	4141.4	4753.0
	4183	836.60	4120.6	4720.0
	4233	846.60	4139.5	4724.0
WCDMA Band II (RMC 12.2Kbps link)	9262	1852.4	4178.7	4825.0
	9400	1880.0	4117.2	4713.0
	9538	1907.6	4132.6	4767.0

Test plot as follows:

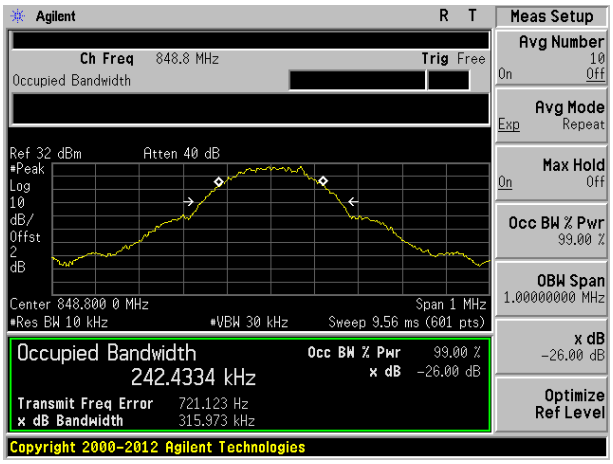
Test band:	GSM 850 (GSM link)



Lowest channel

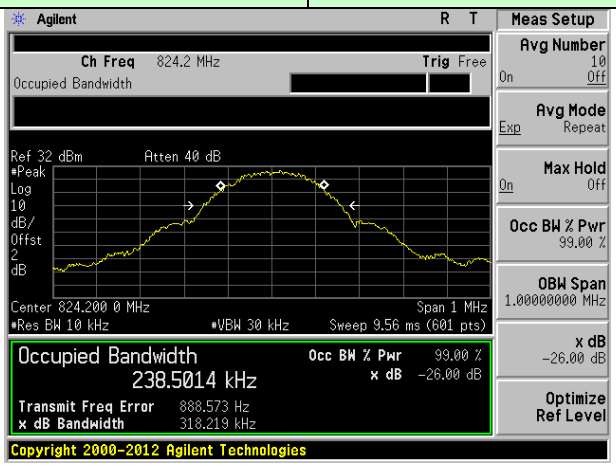


Middle channel

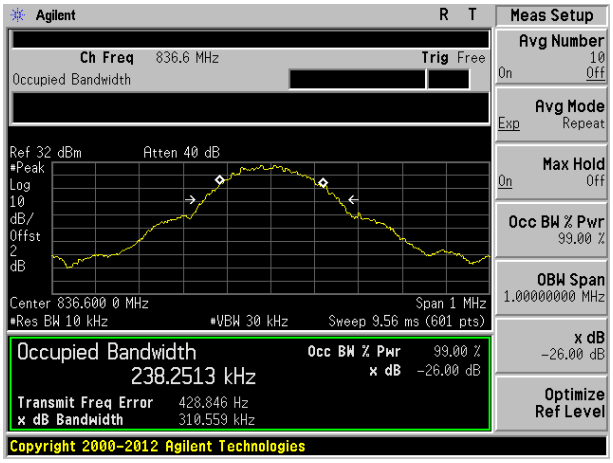


Highest channel

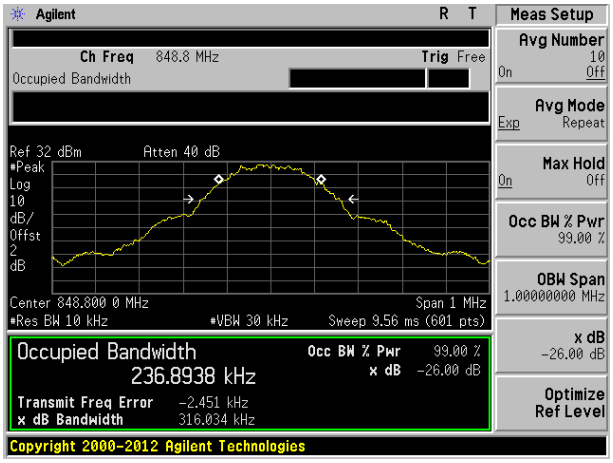
Test band:	GSM 850 (GPRS 1 link)



Lowest channel

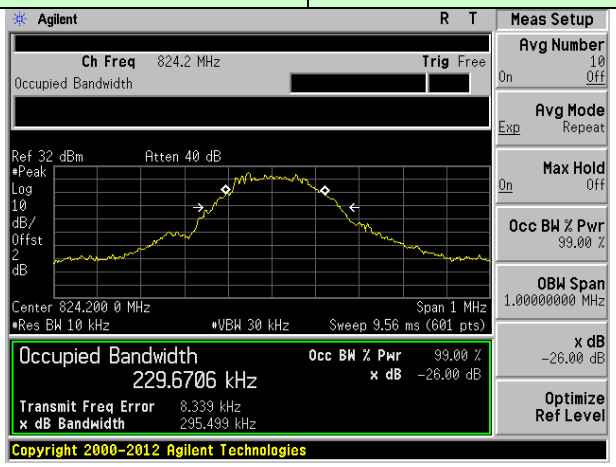


Middle channel

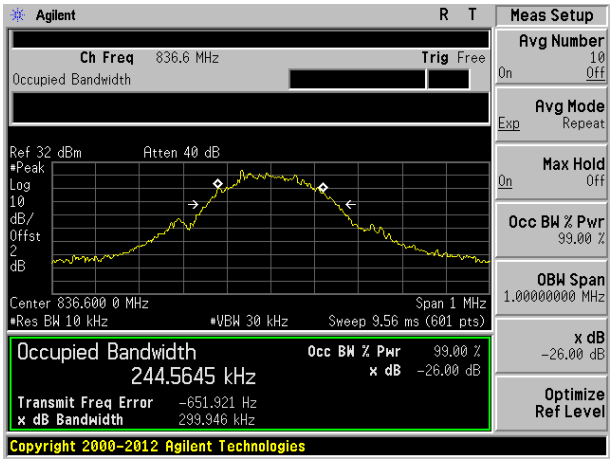


Highest channel

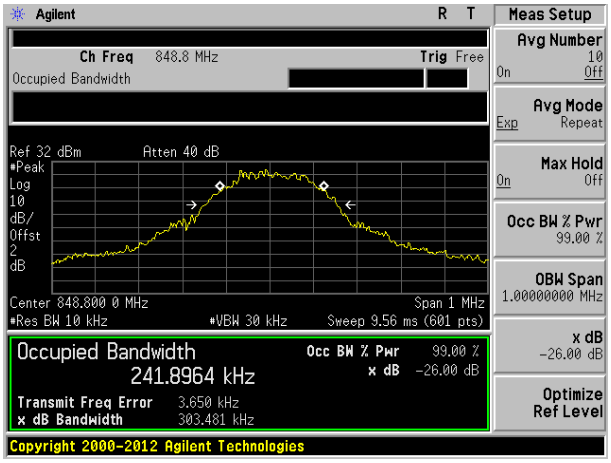
Test band:	GSM 850 (EGPRS 1 link)



Lowest channel

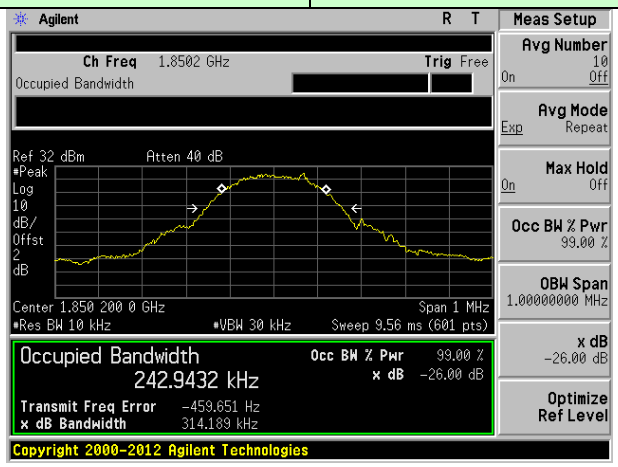


Middle channel

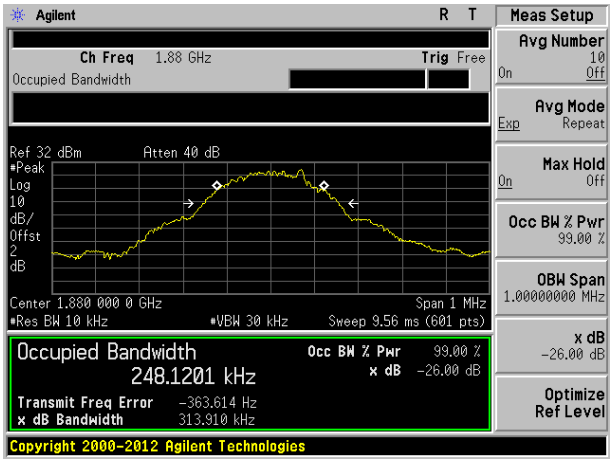


Highest channel

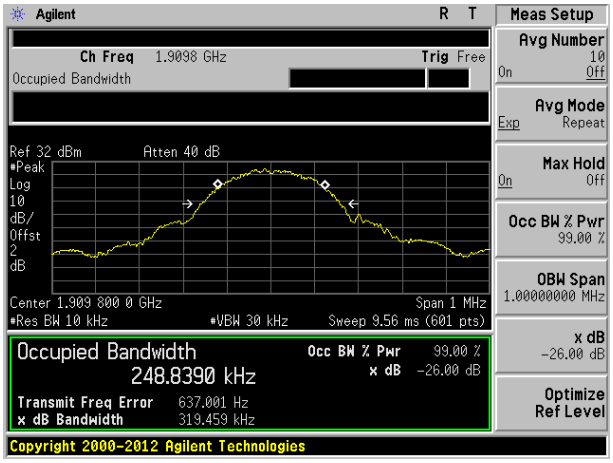
Test band:	PCS 1900 (GSM link)



Lowest channel

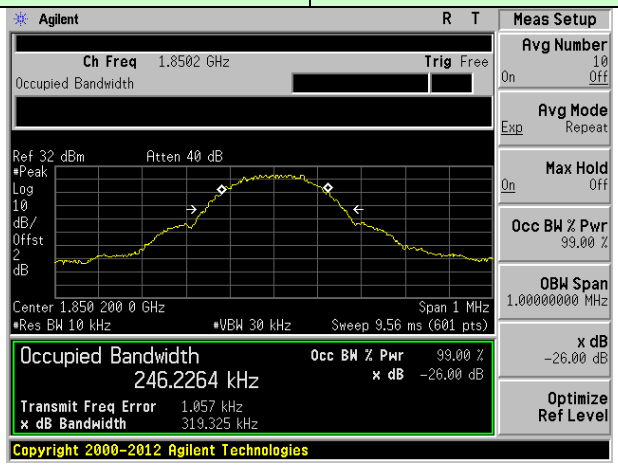


Middle channel

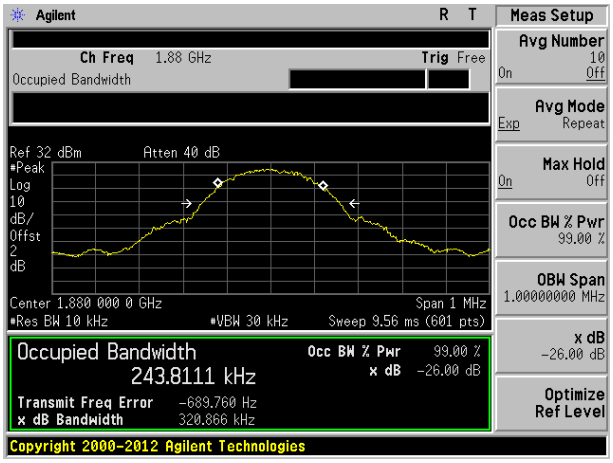


Highest channel

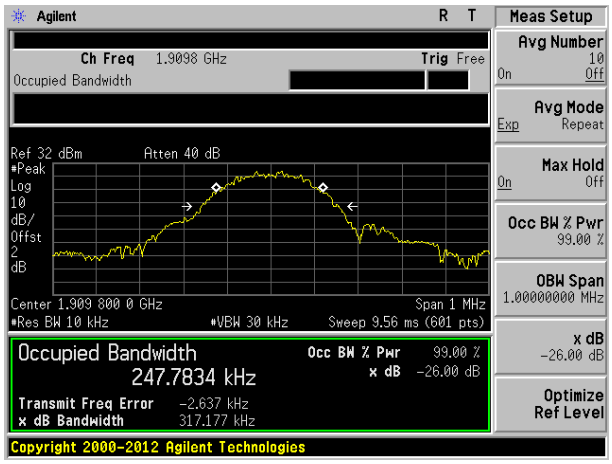
Test band:	PCS 1900 (GPRS 1 link)



Lowest channel

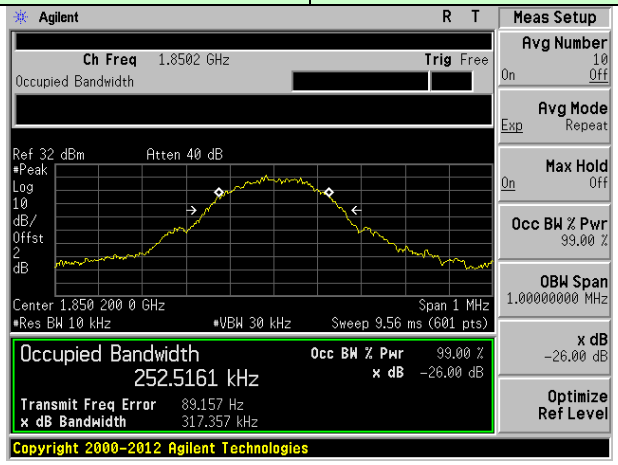


Middle channel

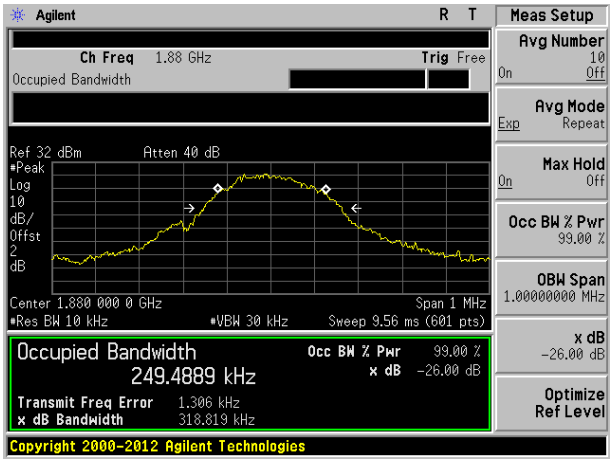


Highest channel

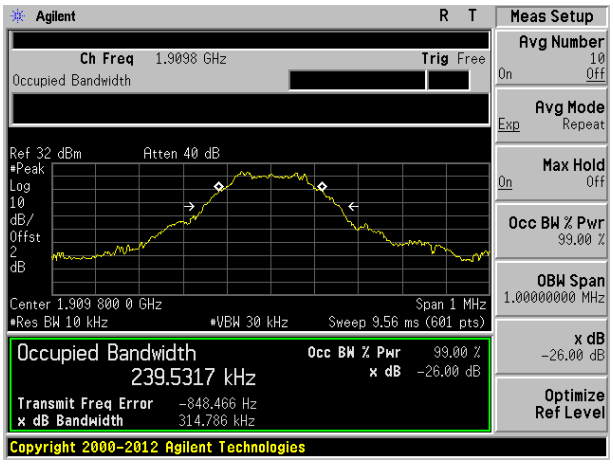
Test band:	PCS 1900 (EGPRS 1 link)



Lowest channel

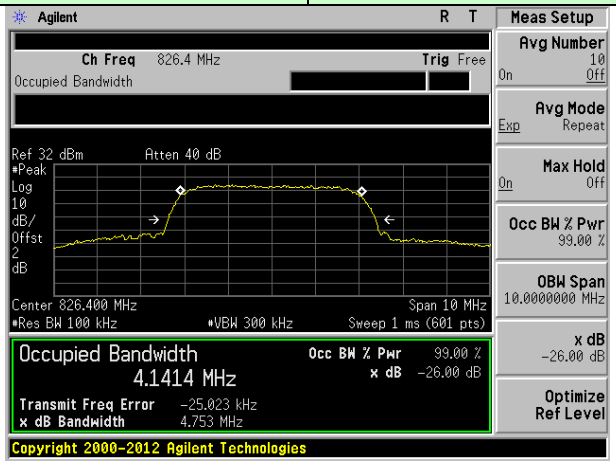


Middle channel

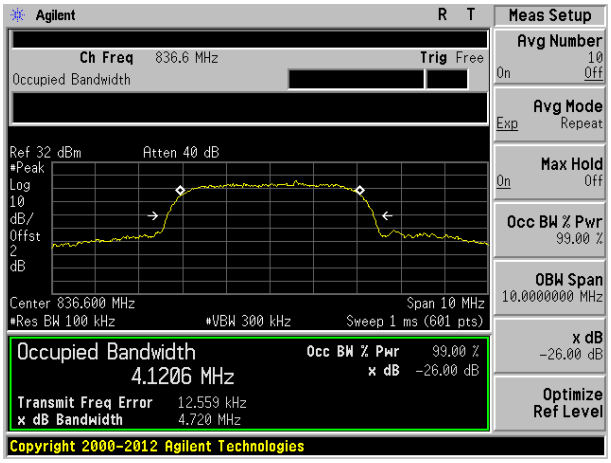


Highest channel

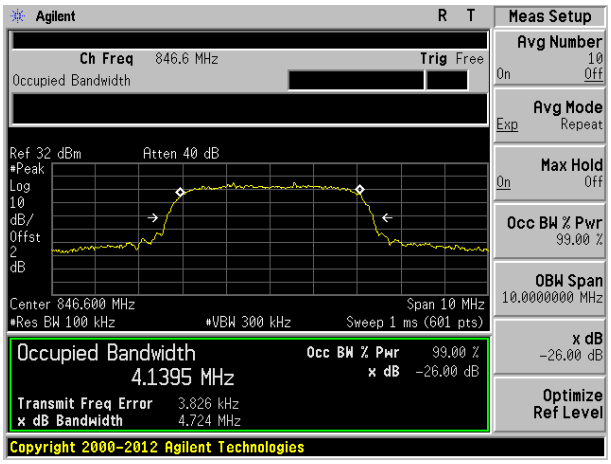
Test band:	WCDMA Band V (RMC 12.2Kbps link)



Lowest channel

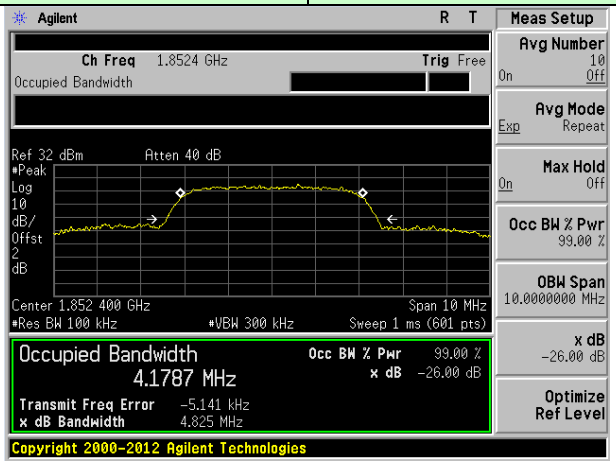


Middle channel

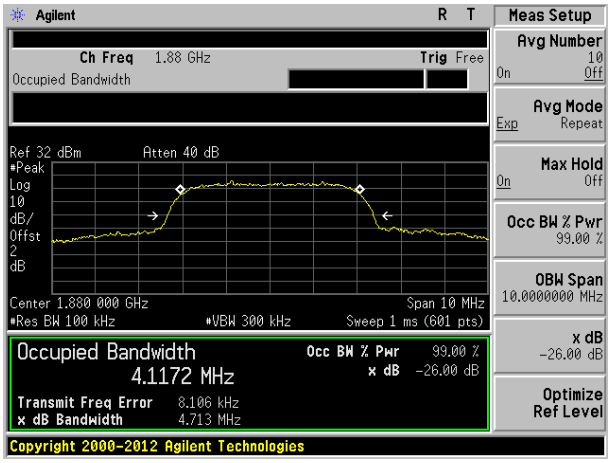


Highest channel

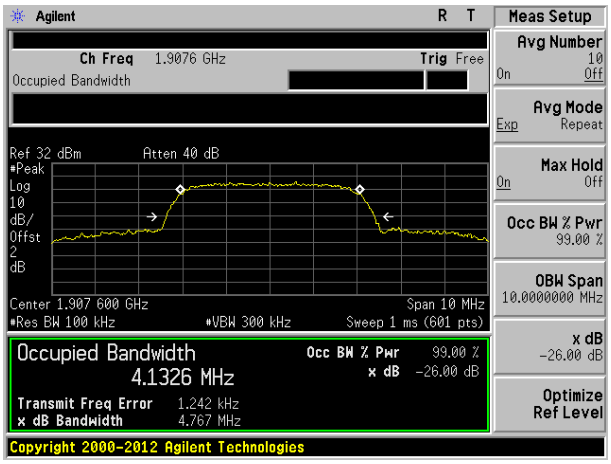
Test band:	WCDMA Band II (RMC 12.2Kbps link)



Lowest channel



Middle channel

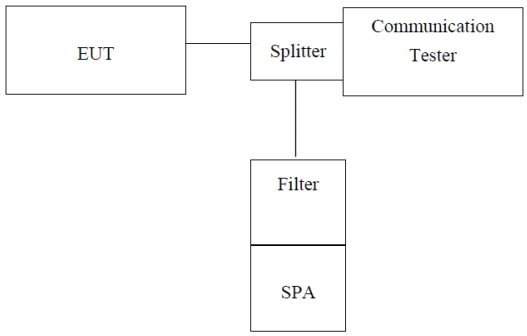


Highest channel

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.

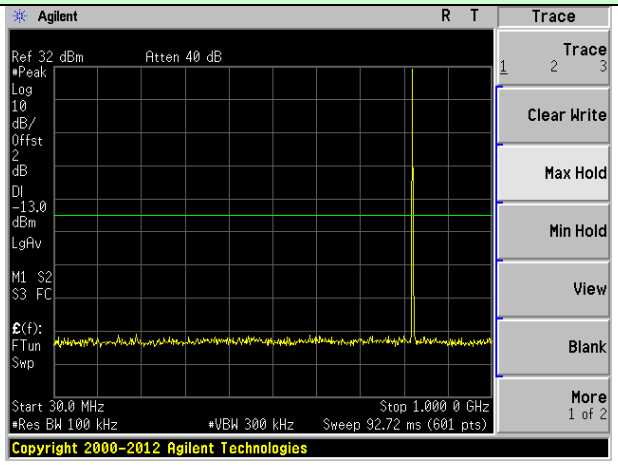
6.7 Out of band emission at antenna terminals

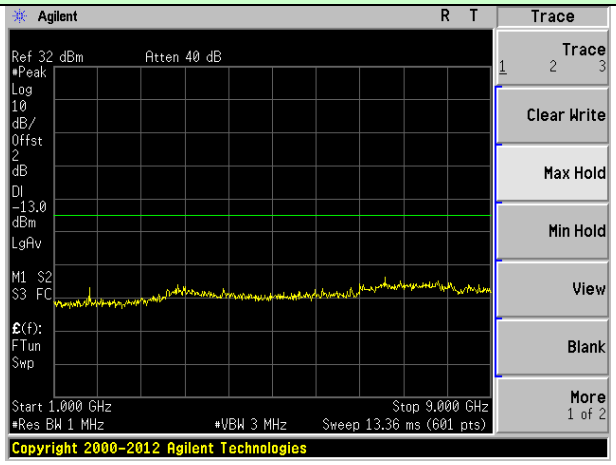
Test Requirement:	FCC part 22.917 and FCC part 24.238
Test Method:	FCC part2.1051
Limit:	-13dBm
Test setup:	 *Note: Measurement setup for testing on Antenna connector*
Test Procedure:	1 The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. 2 The resolution 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:

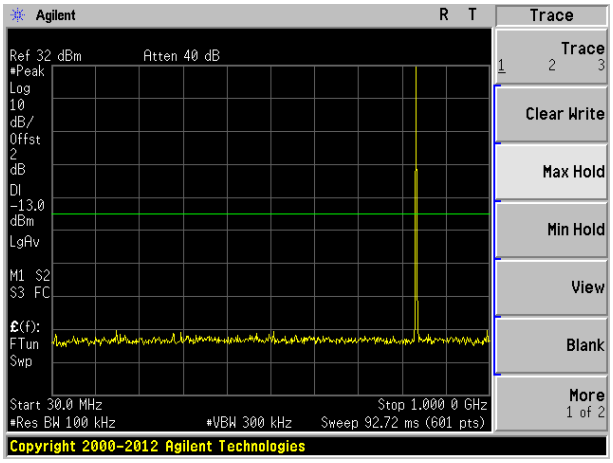
Note: During the conducted spurious emission test, a band filter was used. The information of the filter is reported at section 6.0 (refer to item 24, 25).

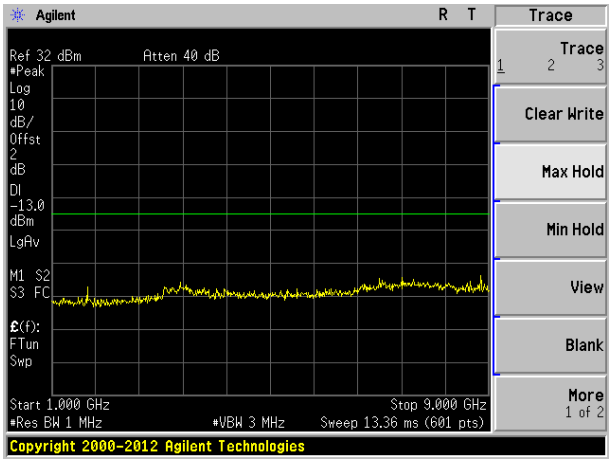
Test Mode: Traffic mode	GSM 850 (GSM link)



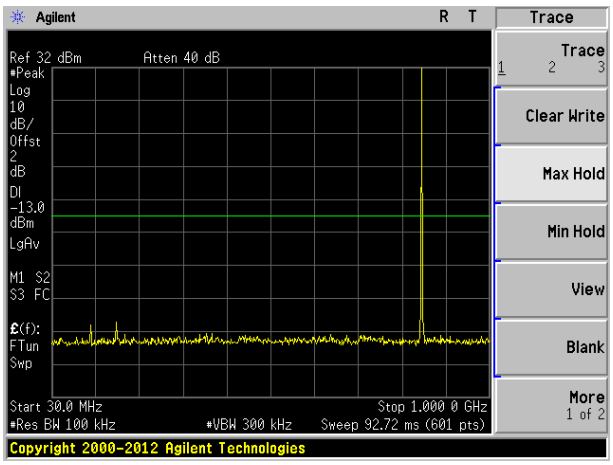


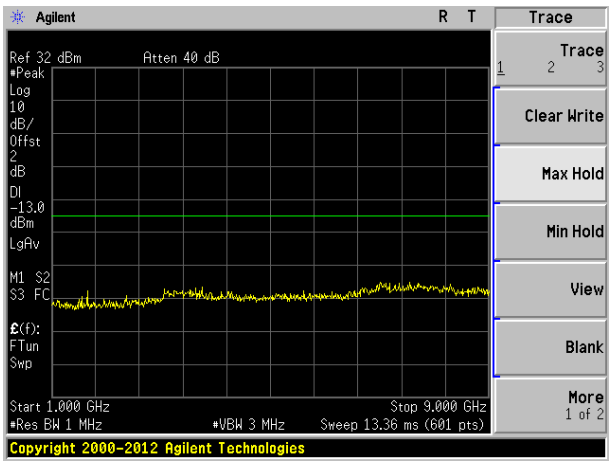
Lowest channel





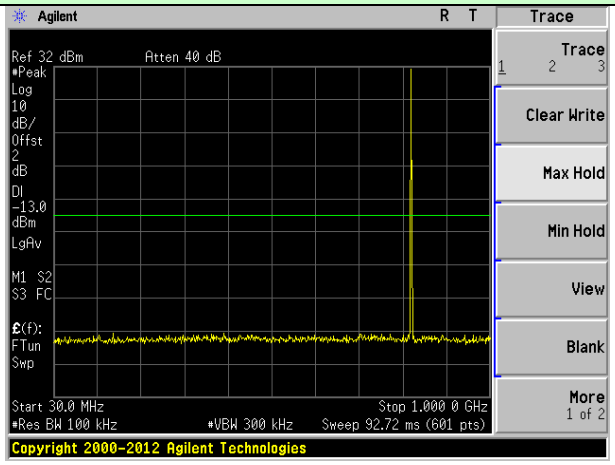
Middle channel

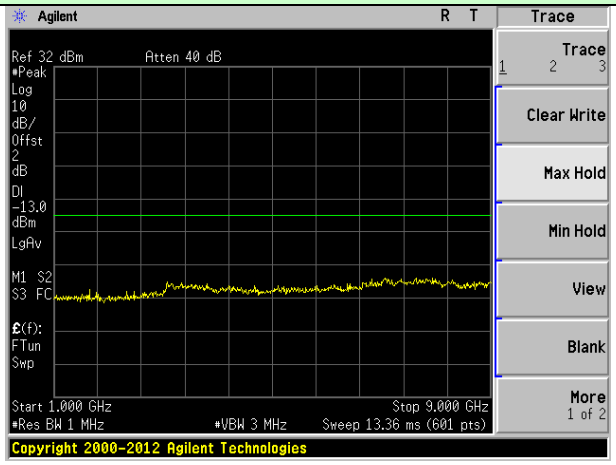




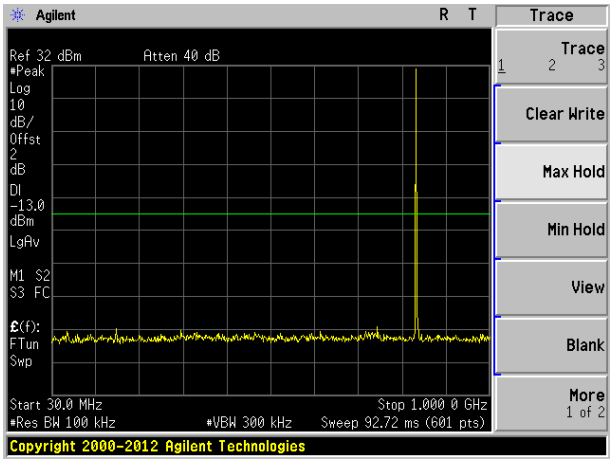
Highest channel

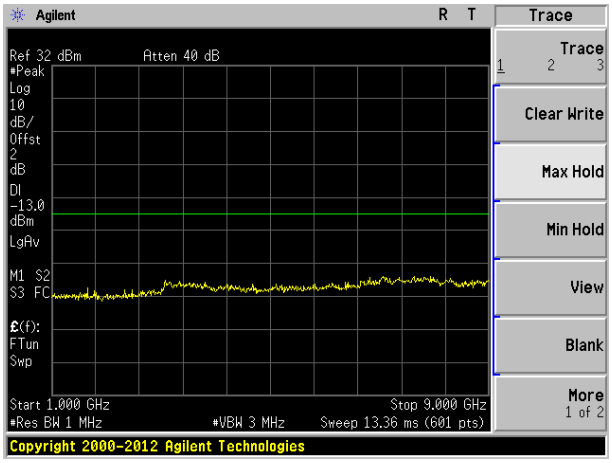
Test Mode: Traffic mode	GSM 850 (GPRS 1 link)



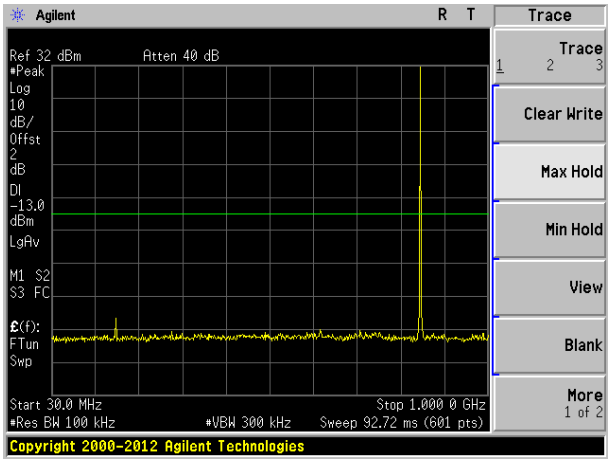


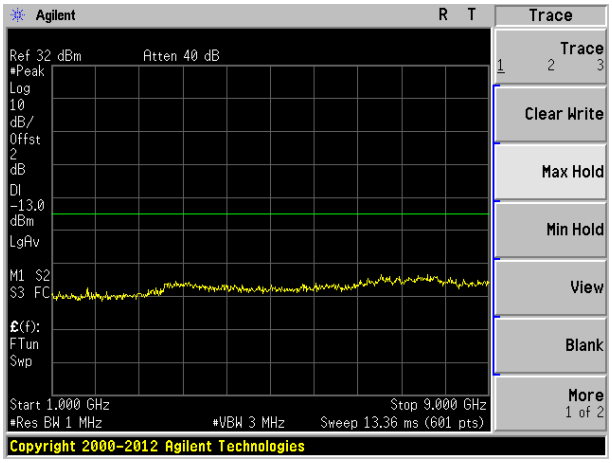
Lowest channel





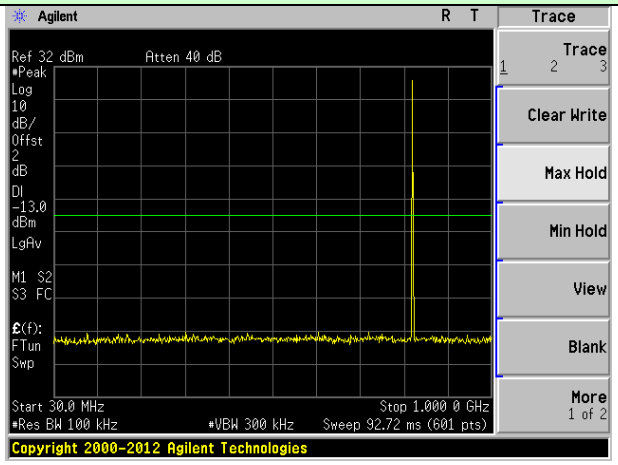
Middle channel

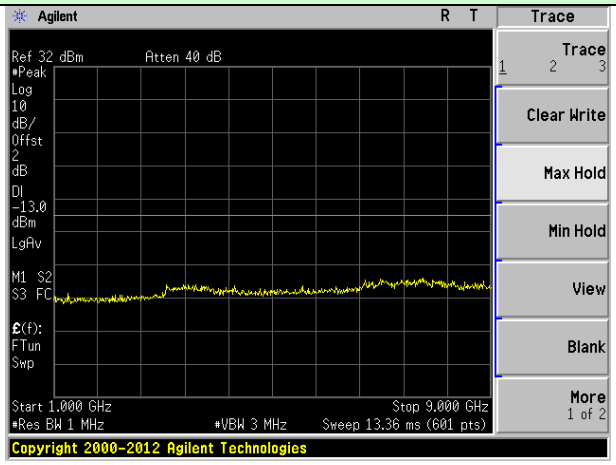




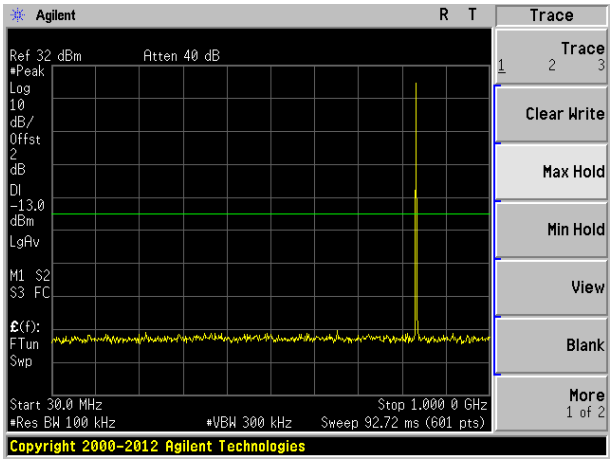
Highest channel

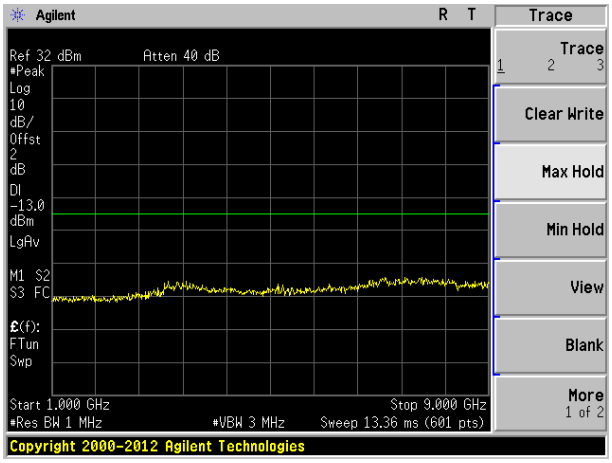
Test Mode: Traffic mode	GSM 850 (EGPRS 1 link)



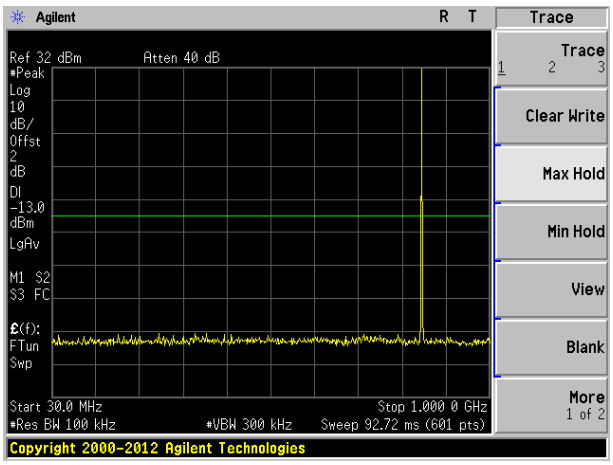


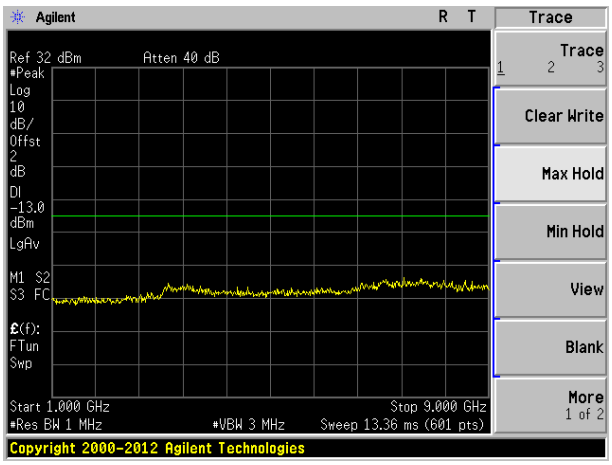
Lowest channel





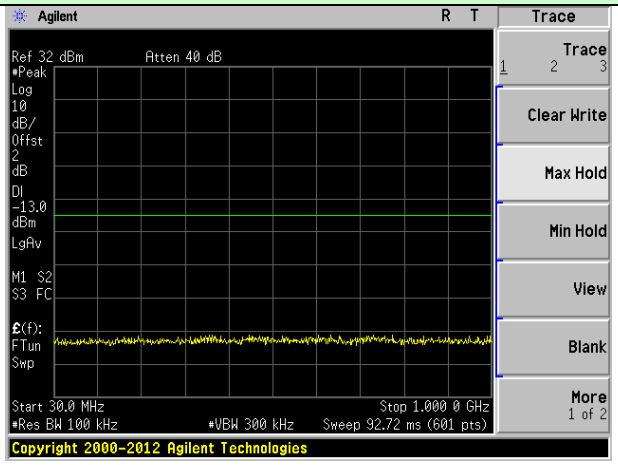
Middle channel

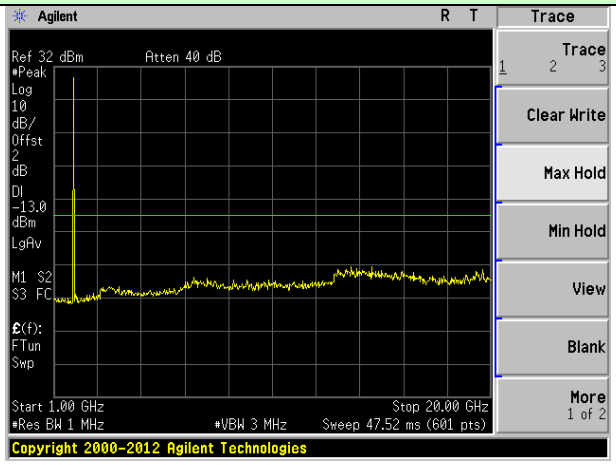




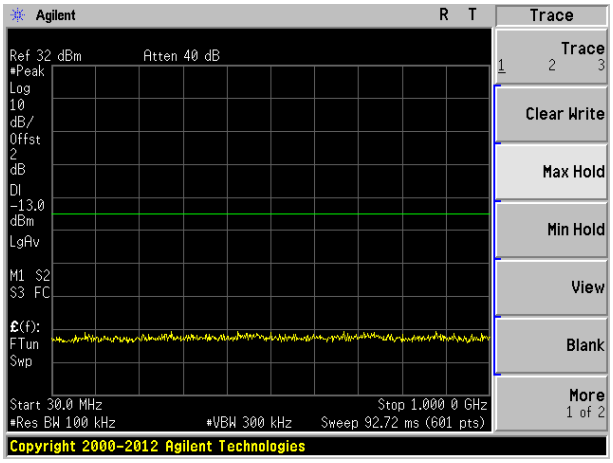
Highest channel

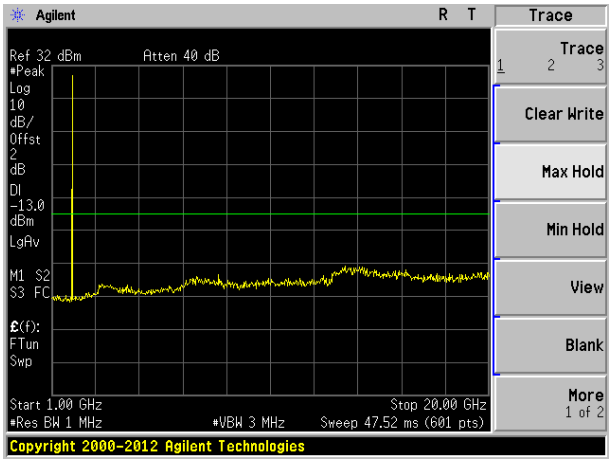
Test Mode: Traffic mode	PCS1900 (GSM link)



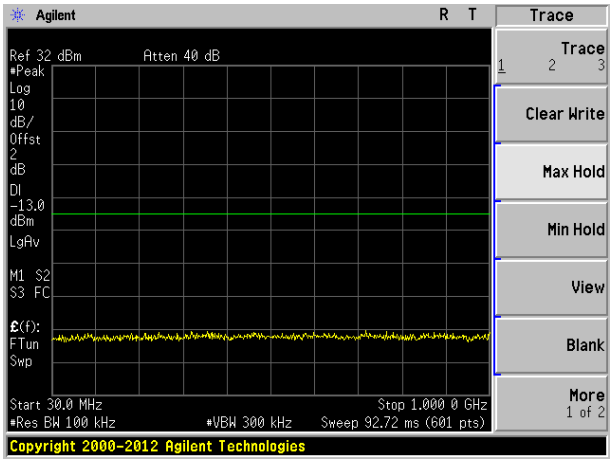


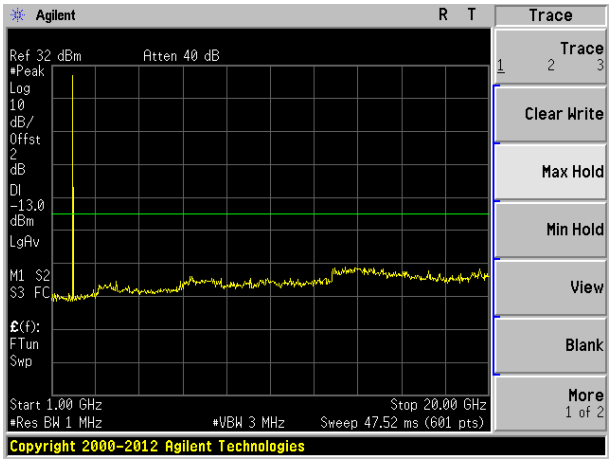
Lowest channel





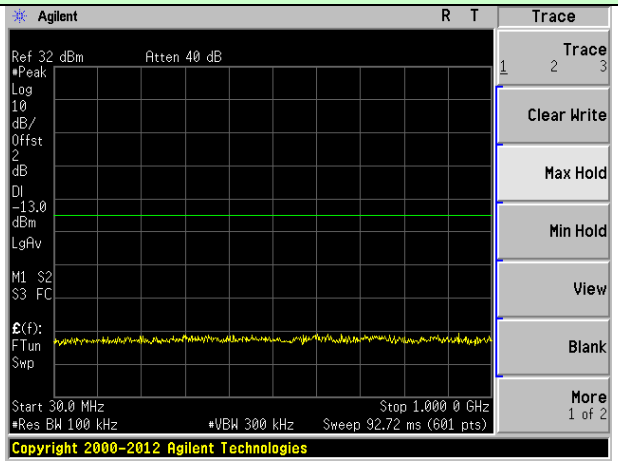
Middle channel

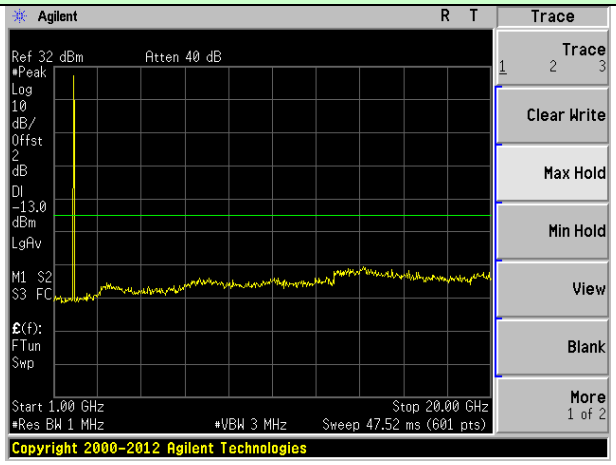




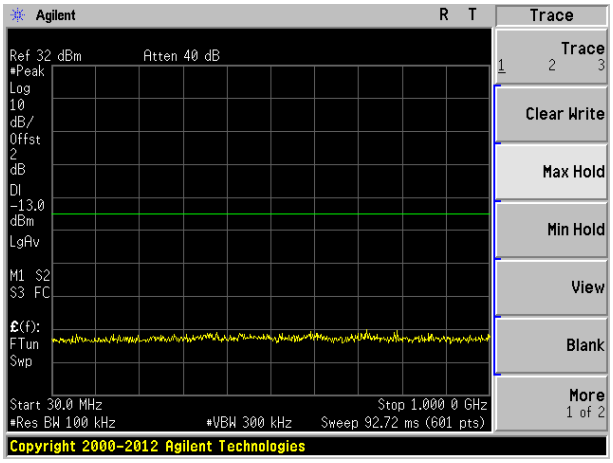
Highest channel

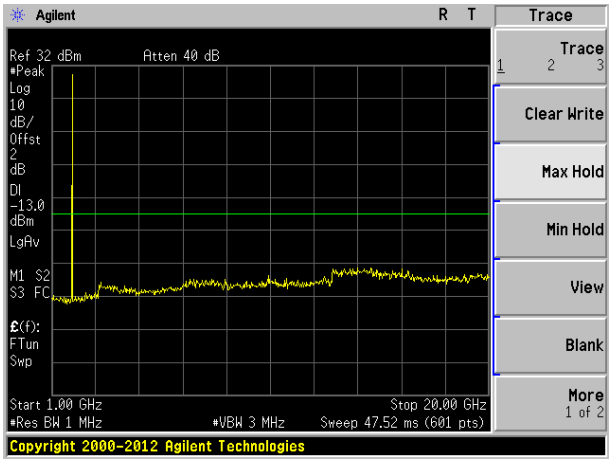
Test Mode: Traffic mode	PCS1900 (GPRS 1 link)



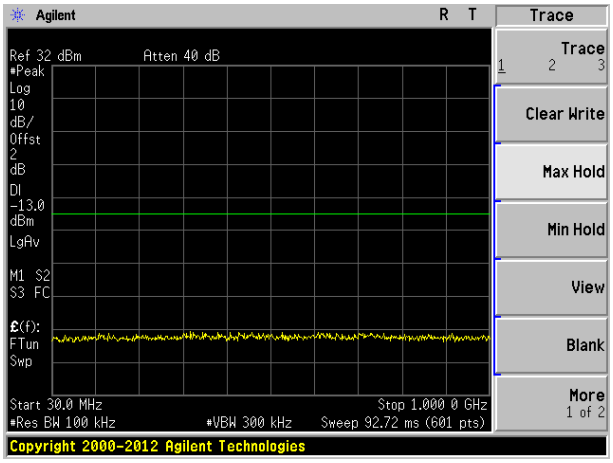


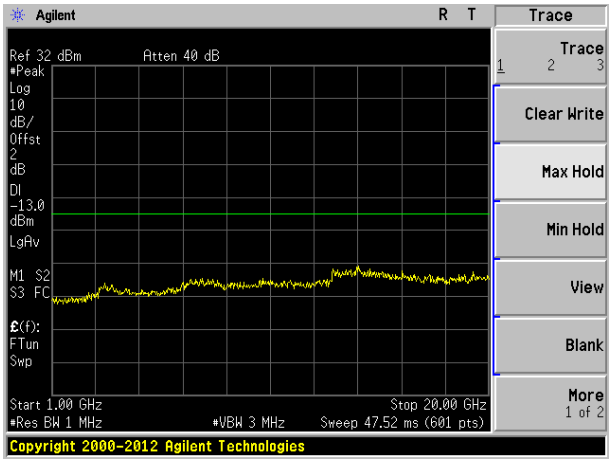
Lowest channel





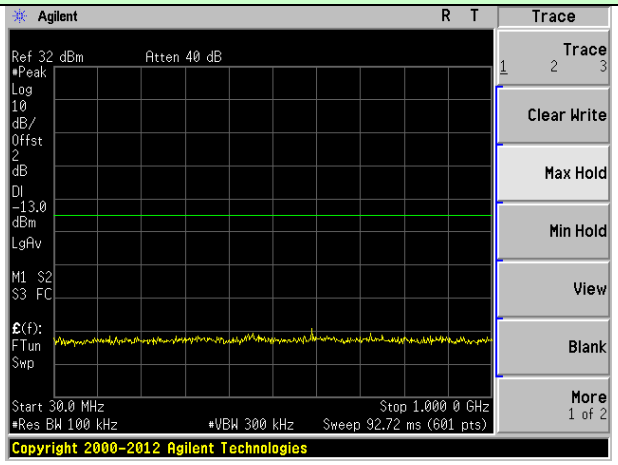
Middle channel

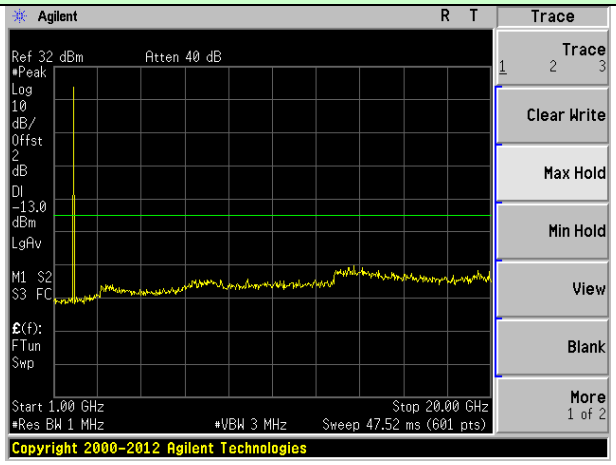




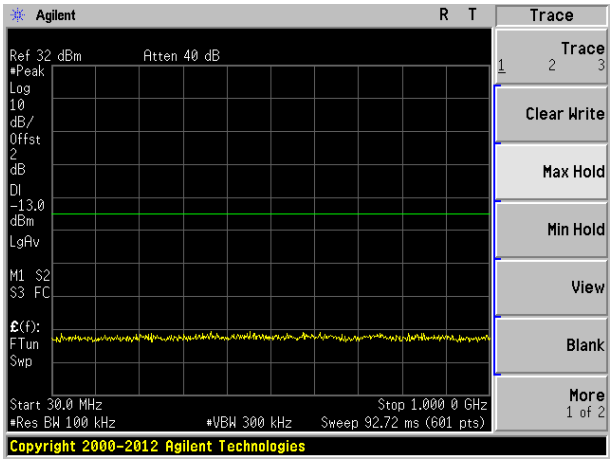
Highest channel

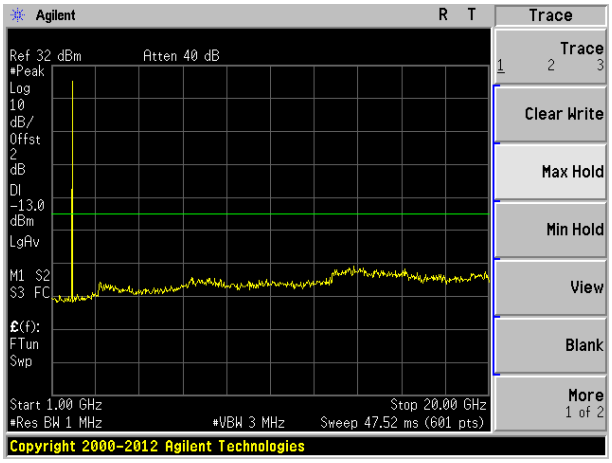
Test Mode: Traffic mode	PCS1900 (EGPRS 1 link)



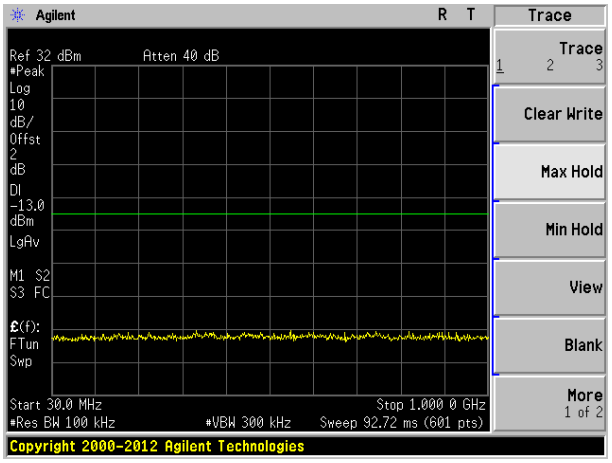


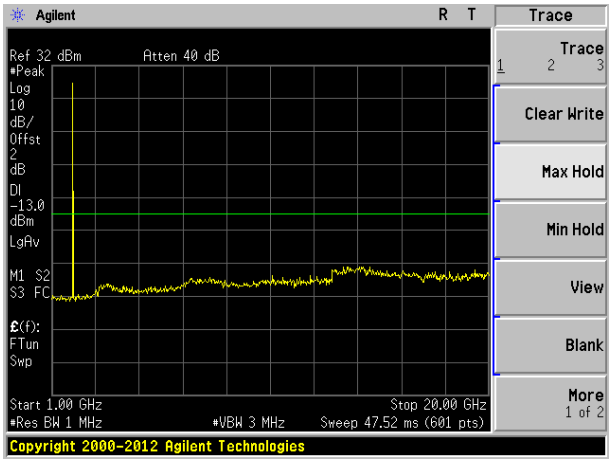
Lowest channel





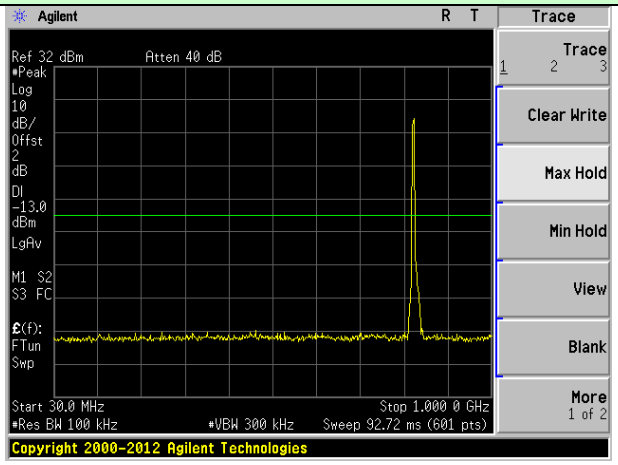
Middle channel

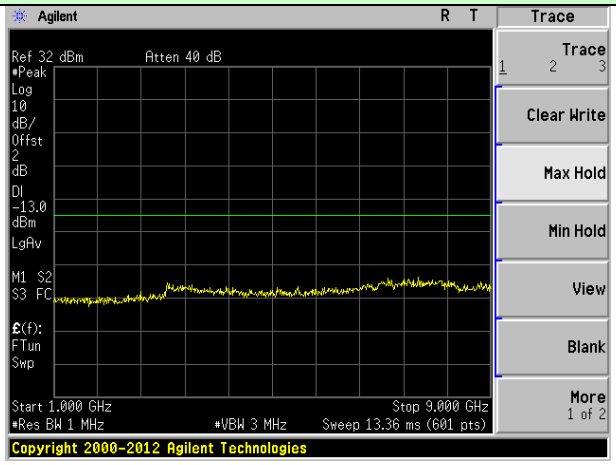




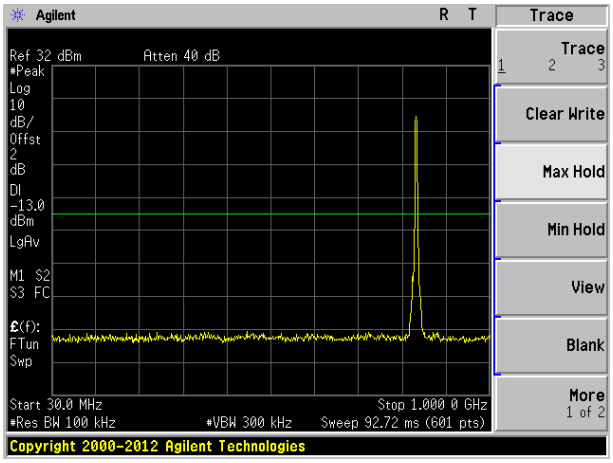
Highest channel

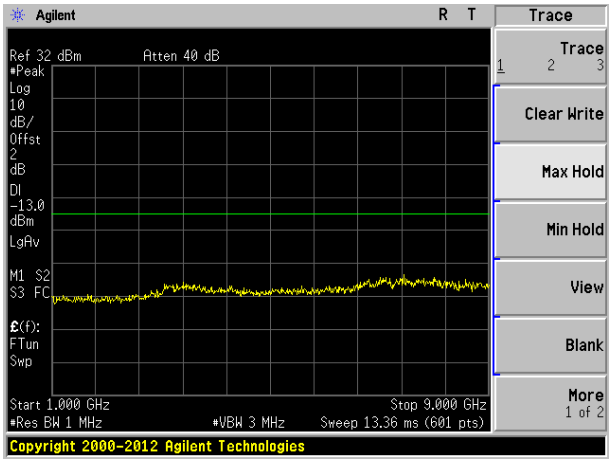
Test Mode: Traffic mode	WCDMA Band V (RMC 12.2Kbps link)



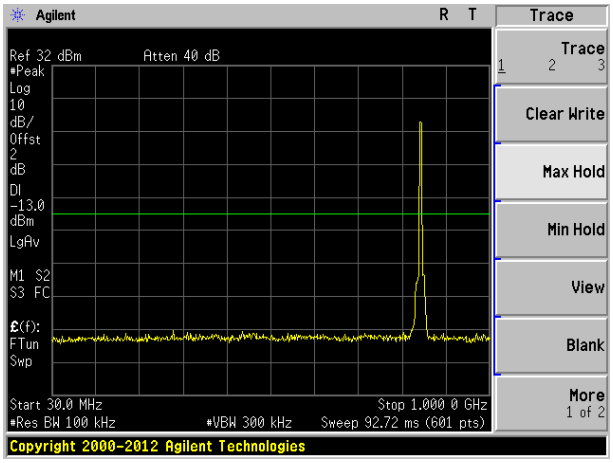


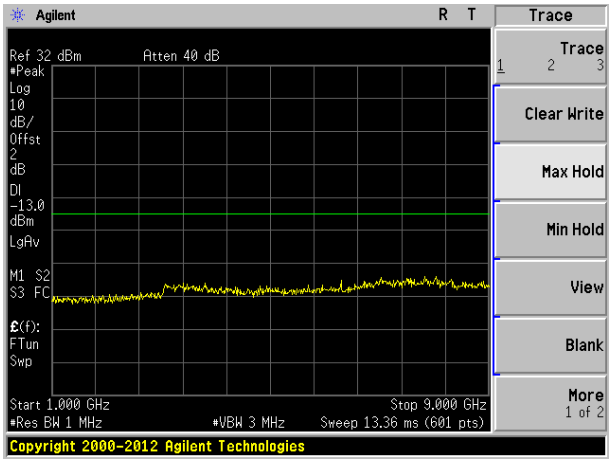
Lowest channel





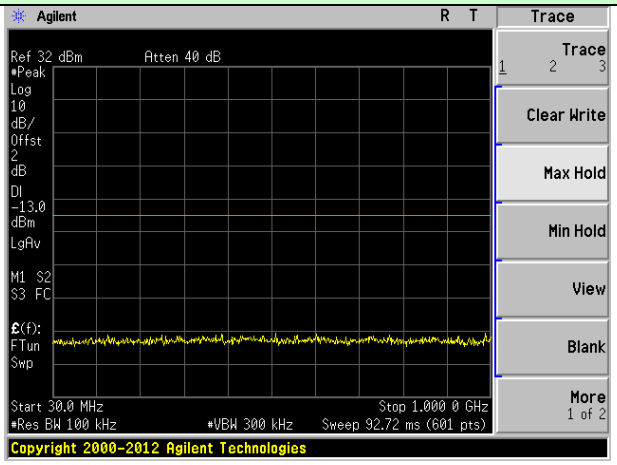
Middle channel

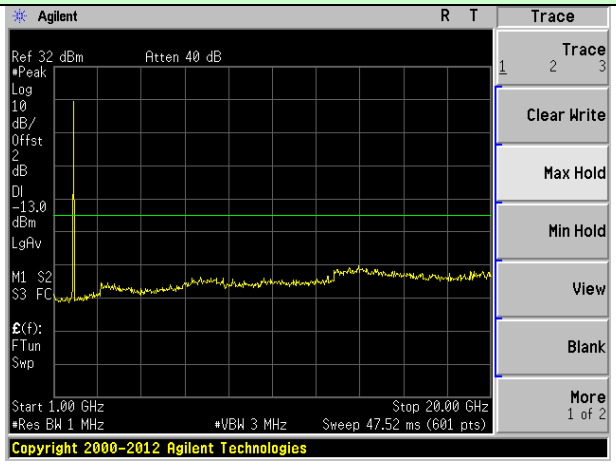




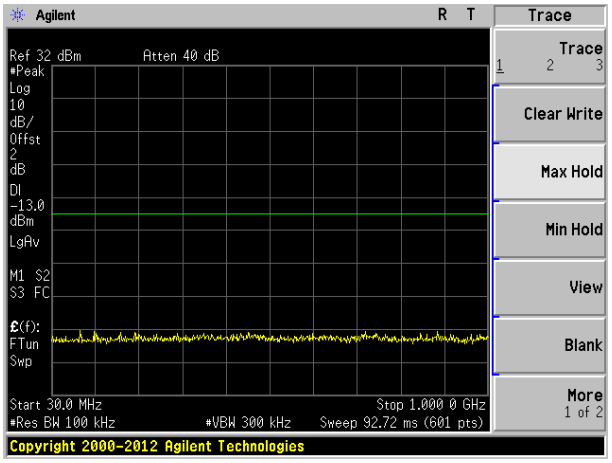
Highest channel

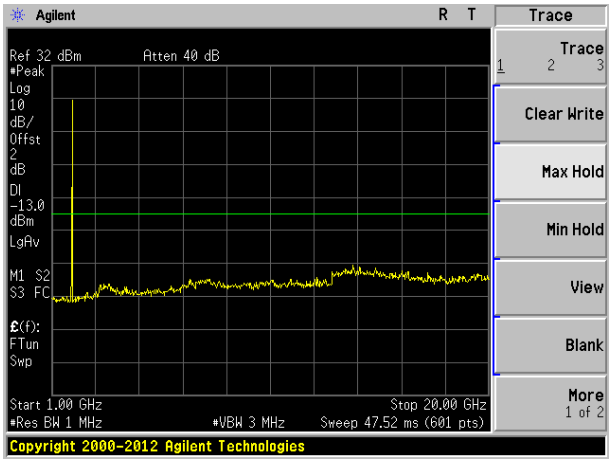
Test Mode: Traffic mode	WCDMA Band II (RMC 12.2Kbps link)



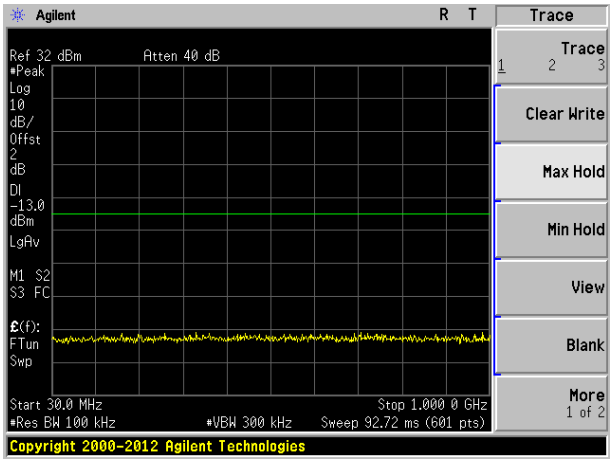


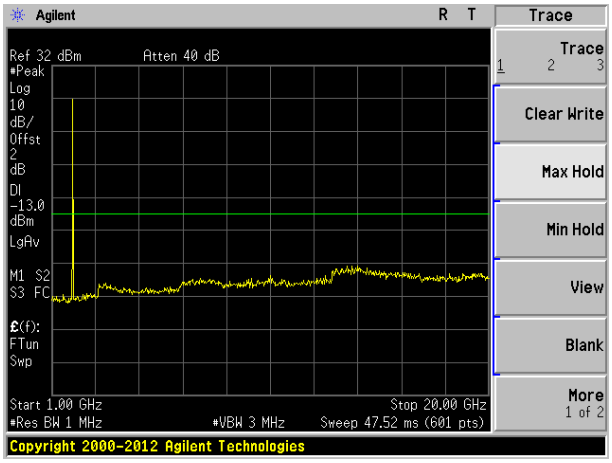
Lowest channel





Middle channel

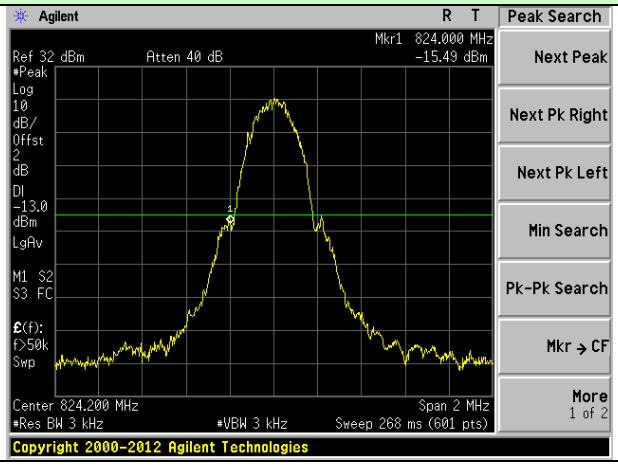




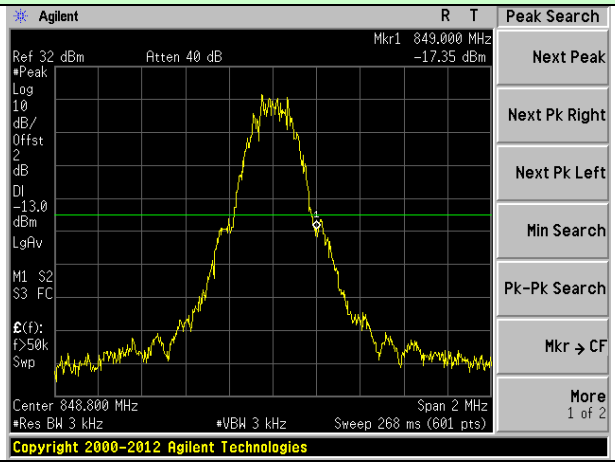
Highest channel

Band Edge:

Test Mode: Traffic mode	GSM850 (GSM link)

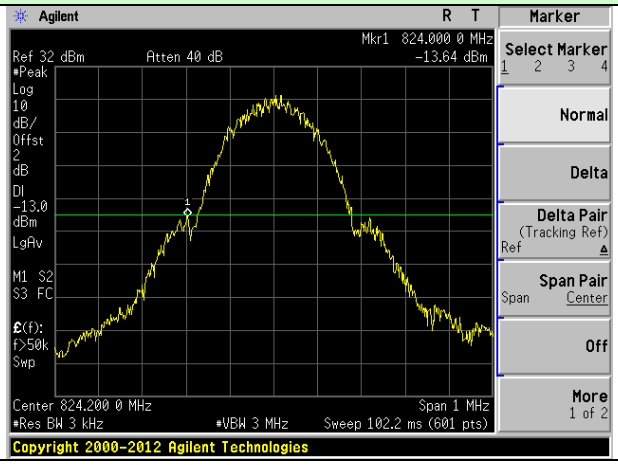


Lowest channel

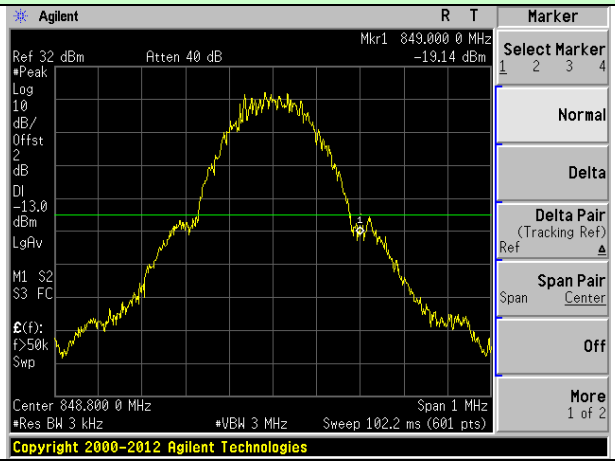


Highest channel

Test Mode: Traffic mode	GSM850 (GPRS 1 link)

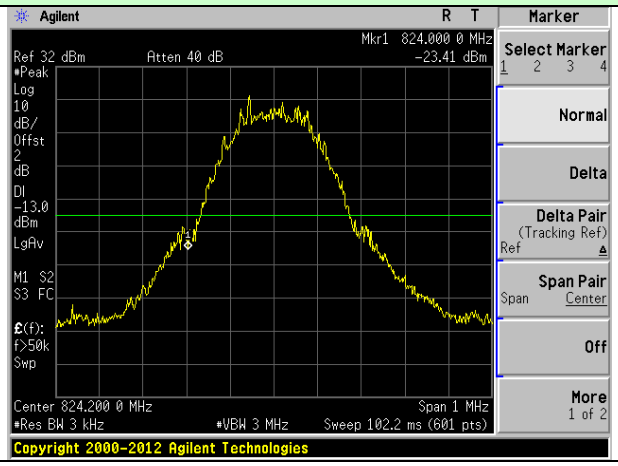


Lowest channel

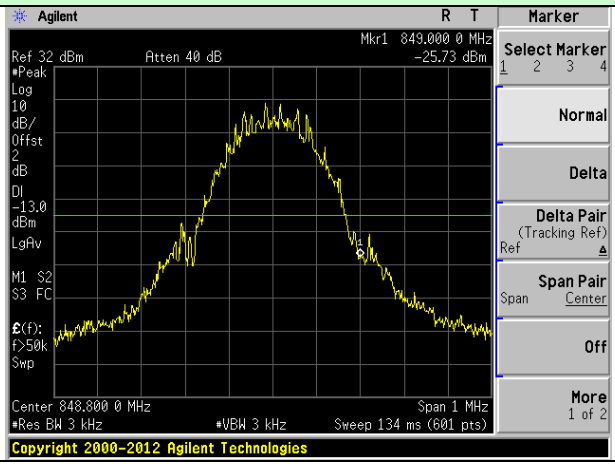


Highest channel

Test Mode: Traffic mode	GSM850 (EGPRS 1 link)

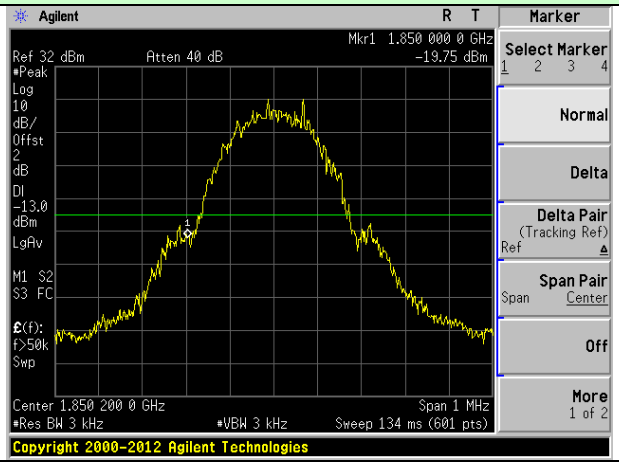


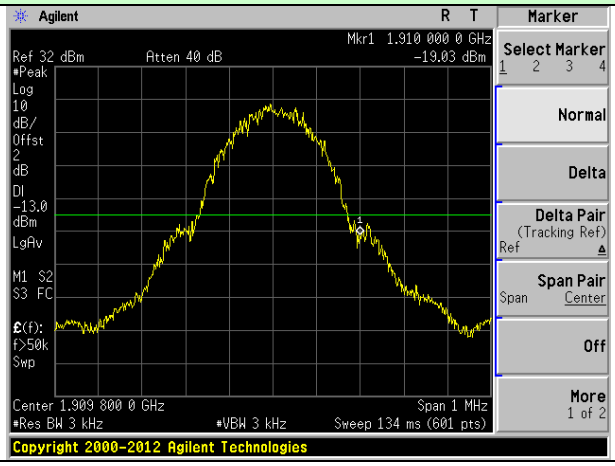
Lowest channel



Highest channel

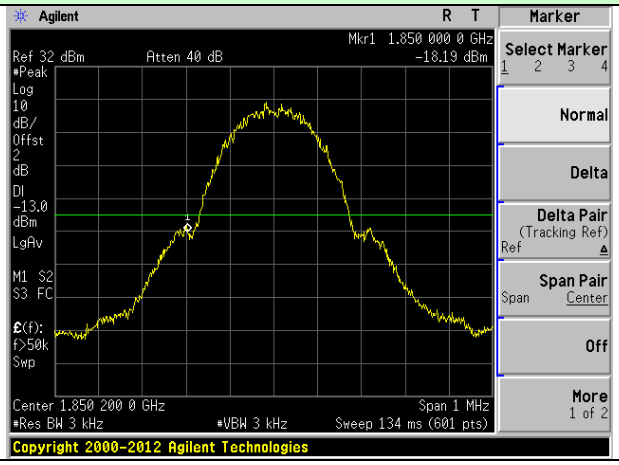
Test Mode: Traffic mode	PCS1900 (GSM link)

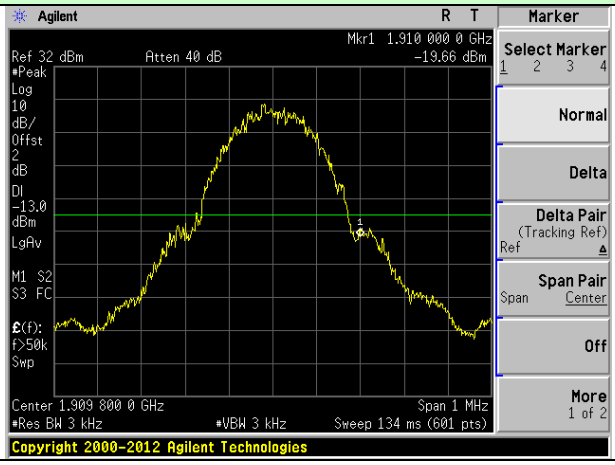




Lowest channel | Highest channel

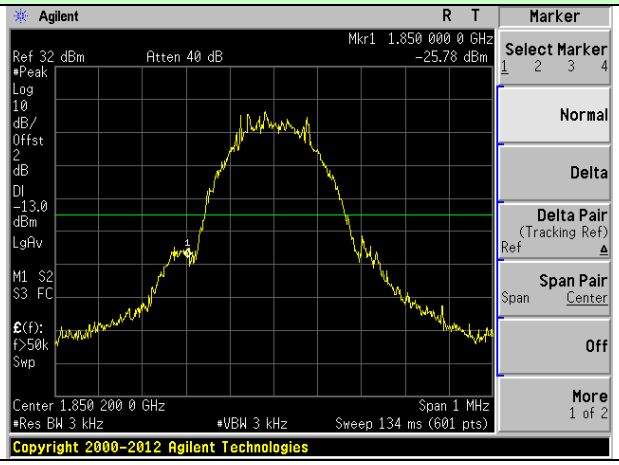
Test Mode: Traffic mode	PCS1900 (GPRS 1 link)

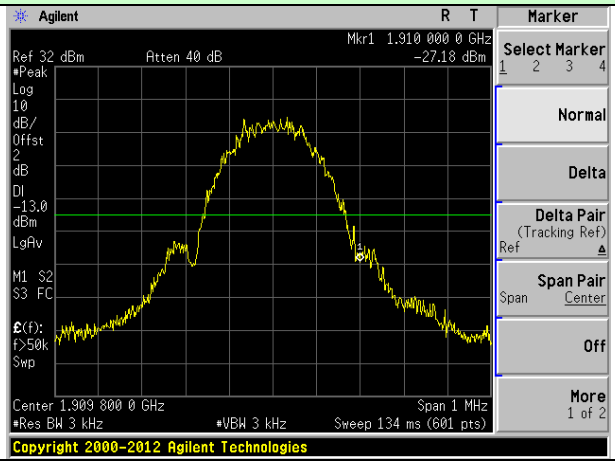




Lowest channel | Highest channel

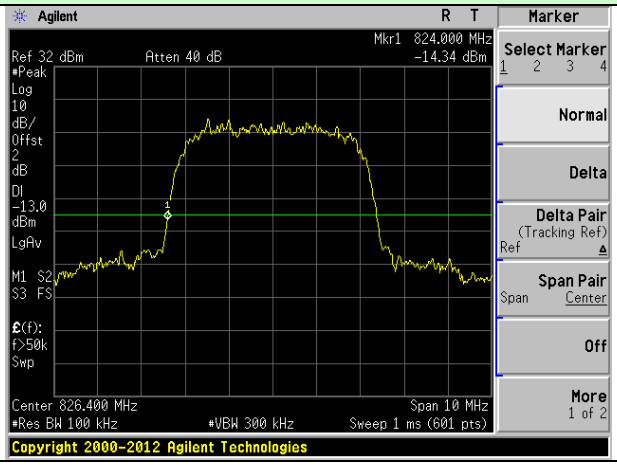
Test Mode: Traffic mode	PCS1900 (EGPRS 1 link)

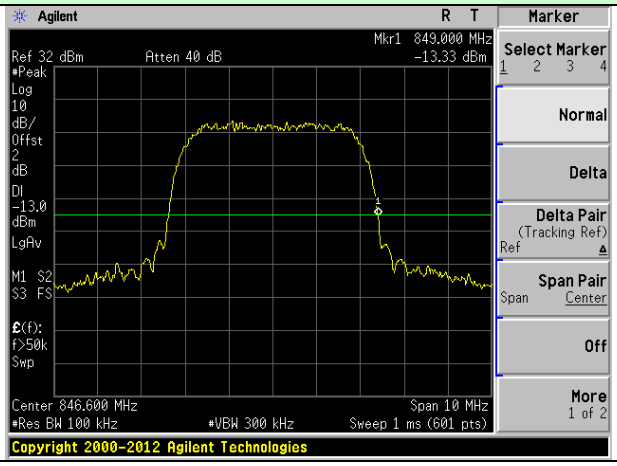




Lowest channel | Highest channel

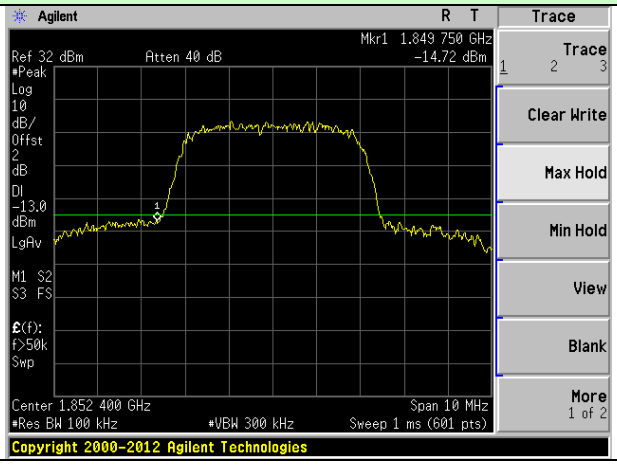
Test Mode: Traffic mode	WCDMA Band V (RMC 12.2Kbps link)

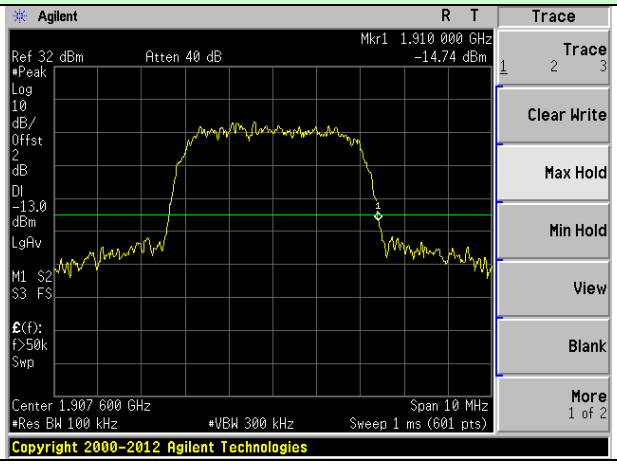




Lowest channel | Highest channel

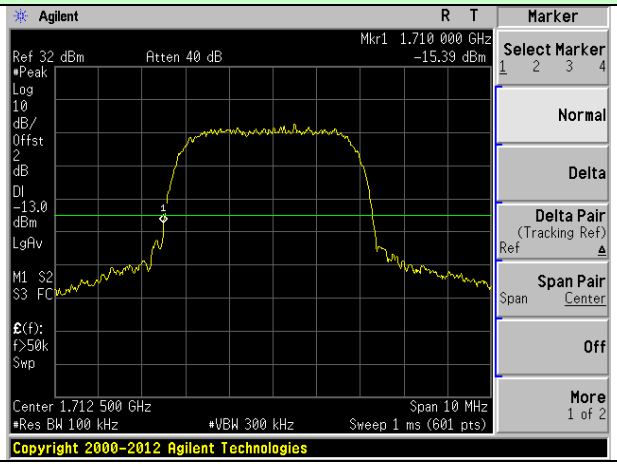
Test Mode: Traffic mode	WCDMA Band II (RMC 12.2Kbps link)

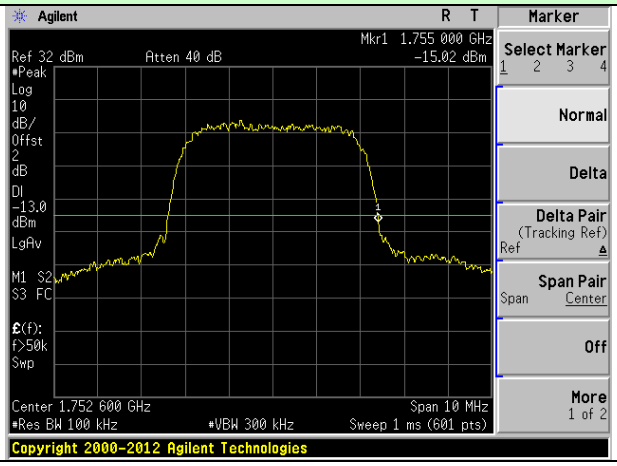




Lowest channel | Highest channel

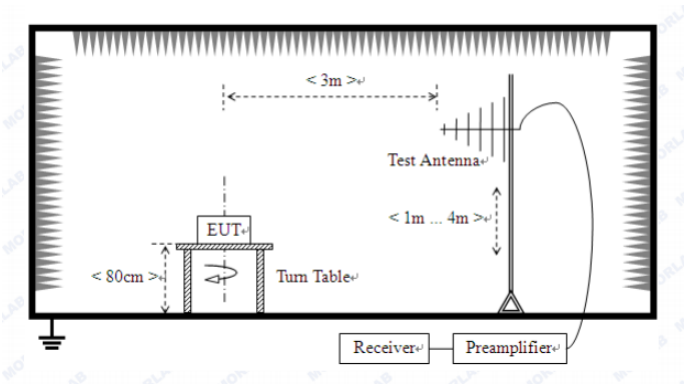
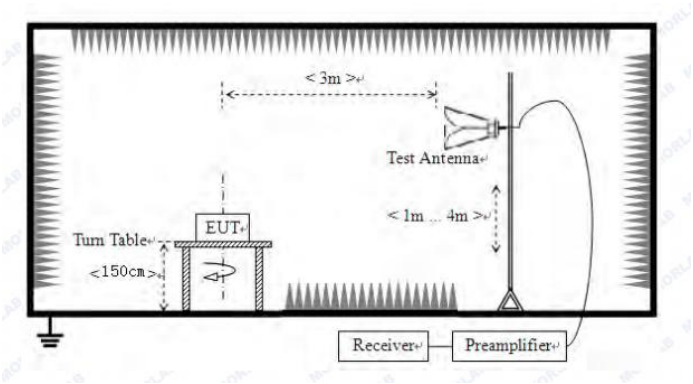
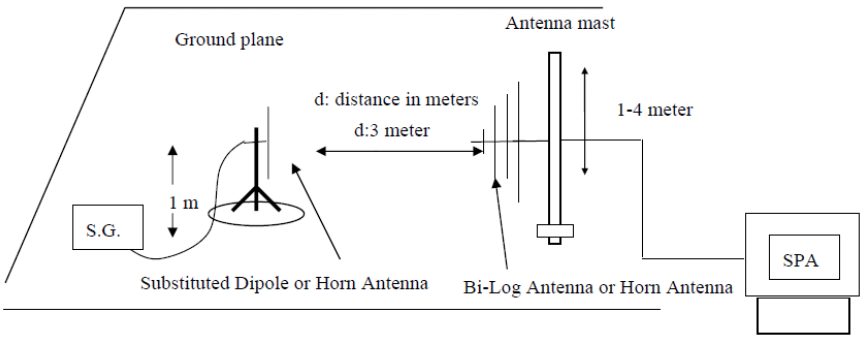
Test Mode: Traffic mode	WCDMA Band IV (RMC 12.2Kbps link)





Lowest channel | Highest channel

6.8 ERP, EIRP Measurement

Test Requirement:	FCC part22.913(a) and FCC part24.232(b)
Test Method:	FCC part 2.1046 and ANSI C63.26:2015
Limit:	GSM850, WCDMA Band V: 7W(38.45dBm) ERP PCS1900, WCDMA Band II: 2W(33dBm) 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 824.2 –848.80.8MHz were measured using a substitution method. The EUT was replaced by dipole antenna connected, the S.G. output was recorded and ERP was calculated asfollows: ERP = S.G. output (dBm) + Antenna Gain (dBd) – Cable Loss (dB) 4. EIRP in frequency band 1850.2 –1909.8MHz 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)
Test Instruments:	Refer to section 5.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

Measurement Data

Remark: All conditions have been considered and test, only the worst case report.

EUT mode	Channel	EUT Pol.	Antenna Pol.	ERP(dBm)	Limit (dBm)	Result
GSM850 (GSM link)	Lowest	H	V	32.21	38.45	Pass
			H	32.20		
		E1	V	29.10		
			H	29.01		
		E2	V	27.91		
			H	27.82		
	Middle	H	V	31.92	38.45	Pass
			H	31.70		
		E1	V	28.57		
			H	28.48		
		E2	V	27.75		
			H	27.66		
	Highest	H	V	31.95	38.45	Pass
			H	31.85		
		E1	V	28.76		
			H	28.66		
		E2	V	28.15		
			H	28.05		

EUT mode	Channel	EUT Pol.	Antenna Pol.	ERP(dBm)	Limit (dBm)	Result
GSM850 (GPRS 1 link)	Lowest	H	V	32.05	38.45	Pass
			H	31.97		
		E1	V	30.86		
			H	30.75		
		E2	V	28.63		
			H	28.52		
	Middle	H	V	31.62	38.45	Pass
			H	31.34		
		E1	V	30.19		
			H	30.08		
		E2	V	28.43		
			H	28.32		
	Highest	H	V	31.65	38.45	Pass
			H	31.54		
		E1	V	30.43		
			H	30.31		
		E2	V	28.93		
			H	28.82		

EUT mode	Channel	EUT Pol.	Antenna Pol.	ERP(dBm)	Limit (dBm)	Result
GSM850 (EGPRS 1 link)	Lowest	H	V	31.30	38.45	Pass
			H	31.32		
		E1	V	30.40		
			H	30.41		
		E2	V	29.51		
			H	29.56		
	Middle	H	V	31.45	38.45	Pass
			H	31.54		
		E1	V	30.60		
			H	30.65		
		E2	V	29.56		
			H	29.61		
	Highest	H	V	31.44	38.45	Pass
			H	31.49		
		E1	V	30.54		
			H	30.58		
		E2	V	29.42		
			H	29.47		

EUT mode	Channel	EUT Pol.	Antenna Pol.	EIRP (dBm)	Limit (dBm)	Result
PCS1900 (GSM link)	Lowest	H	V	29.32	33.01	Pass
			H	29.20		
		E1	V	28.15		
			H	28.05		
		E2	V	26.95		
			H	26.85		
	Middle	H	V	29.03	33.01	Pass
			H	28.82		
		E1	V	27.70		
			H	27.61		
		E2	V	26.82		
			H	26.72		
	Highest	H	V	29.05	33.01	Pass
			H	28.96		
		E1	V	27.86		
			H	27.76		
		E2	V	27.15		
			H	27.05		

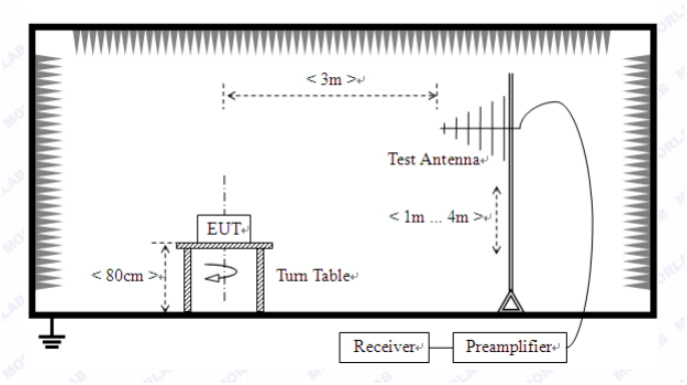
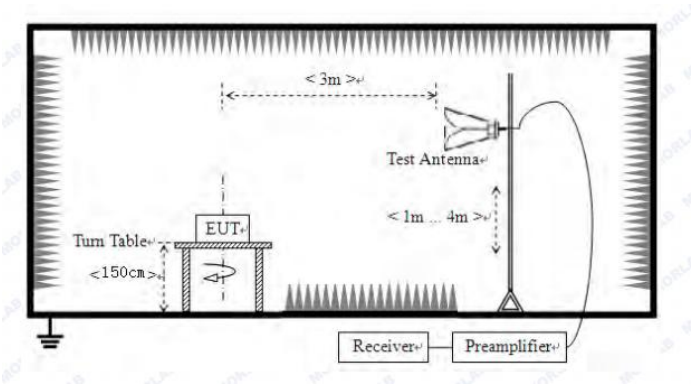
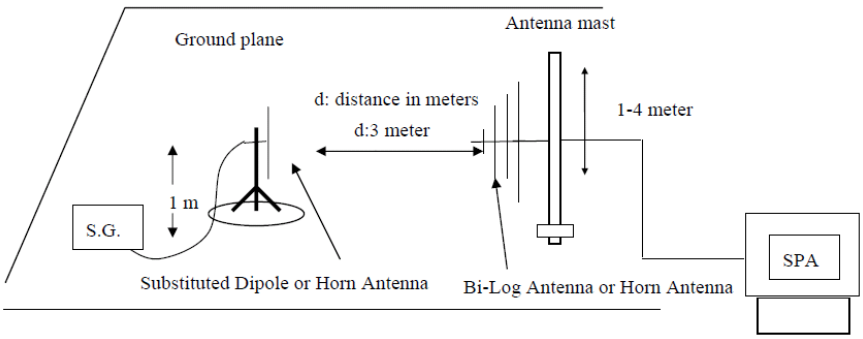
EUT mode	Channel	EUT Pol.	Antenna Pol.	EIRP (dBm)	Limit (dBm)	Result
PCS1900 (GPRS 1 link)	Lowest	H	V	29.01	33.01	Pass
			H	28.85		
		E1	V	28.73		
			H	28.59		
		E2	V	28.45		
			H	28.30		
	Middle	H	V	28.47	33.01	Pass
			H	28.17		
		E1	V	27.99		
			H	27.85		
		E2	V	28.14		
			H	27.99		
	Highest	H	V	28.38	33.01	Pass
			H	28.24		
		E1	V	28.09		
			H	27.95		
		E2	V	28.49		
			H	28.34		

EUT mode	Channel	EUT Pol.	Antenna Pol.	EIRP (dBm)	Limit (dBm)	Result
PCS1900 (EGPRS 1 link)	Lowest	H	V	28.96	33.01	Pass
			H	28.83		
		E1	V	27.68		
			H	27.52		
		E2	V	26.37		
			H	26.22		
	Middle	H	V	28.52	33.01	Pass
			H	28.20		
		E1	V	27.02		
			H	26.86		
		E2	V	26.17		
			H	26.02		
	Highest	H	V	28.57	33.01	Pass
			H	28.40		
		E1	V	27.25		
			H	27.10		
		E2	V	26.67		
			H	26.50		

EUT mode	Channel	EUT Pol.	Antenna Pol.	ERP(dBm)	Limit (dBm)	Result
WCDMA Band V	Lowest	H	V	22.31	38.45	Pass
			H	19.60		
		E1	V	15.83		
			H	19.02		
		E2	V	14.56		
			H	16.81		
	Middle	H	V	20.83	38.45	Pass
			H	18.05		
		E1	V	14.25		
			H	17.47		
		E2	V	15.23		
			H	16.82		
	Highest	H	V	19.79	38.45	Pass
			H	17.05		
		E1	V	13.47		
			H	16.03		
		E2	V	14.02		
			H	17.12		

EUT mode	Channel	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
WCDMA Band II	Lowest	H	V	22.02	33.01	Pass
			H	20.85		
		E1	V	17.21		
			H	20.52		
		E2	V	16.22		
			H	18.69		
	Middle	H	V	22.44	33.01	Pass
			H	19.99		
		E1	V	16.37		
			H	19.74		
		E2	V	17.14		
			H	18.87		
	Highest	H	V	21.37	33.01	Pass
			H	18.77		
		E1	V	15.34		
			H	18.04		
		E2	V	15.39		
			H	18.63		

6.9 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. ERP / EIRP = S.G. output (dBm) + Antenna Gain(dB/dBi) – Cable Loss (dB)
Test Instruments:	Refer to section 5.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

Measurement Data

Test mode:	GSM850		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1648.40	Vertical	-33.17	-13.00	Pass
2472.60	V	-35.62		
3296.80	V	-38.45		
4121.00	V	-40.18		
4945.20	V	---		
1648.40	Horizontal	-38.44	-13.00	Pass
2472.60	H	-42.62		
3296.80	H	-44.22		
4121.00	H	-47.43		
4945.20	H	---		
Test mode:	**GSM850**		**Test channel:**	**Middle**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1673.20	Vertical	-34.86	-13.00	Pass
2509.80	V	-37.35		
3346.40	V	-39.34		
4183.00	V	-41.27		
5019.60	V	---		
1673.20	Horizontal	-39.50	-13.00	Pass
2509.80	H	-42.82		
3346.40	H	-44.37		
4183.00	H	-46.71		
5019.60	H	---		
Test mode:	**GSM850**		**Test channel:**	**Highest**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1697.60	Vertical	-35.68	-13.00	Pass
2546.40	V	-37.45		
3395.20	V	-39.83		
4244.00	V	-41.16		
5092.80	V	---		
1697.60	Horizontal	-39.42	-13.00	Pass
2546.40	H	-42.60		
3395.20	H	-43.97		
4244.00	H	-46.12		
5092.80	H	---		

Remarks：

1. The emission behaviour belongs to narrowband spurious emission.
2. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

Test mode:	PCS1900		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3700.40	Vertical	-35.48	-13.00	Pass
5550.60	V	-37.12		
7400.80	V	-39.90		
9251.00	V	-41.23		
11101.20	V	---		
3700.40	Horizontal	-40.75	-13.00	Pass
5550.60	H	-43.57		
7400.80	H	-45.01		
9251.00	H	-47.47		
11101.20	H	---		
Test mode:	**PCS1900**		**Test channel:**	**Middle**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3760.00	Vertical	-32.25	-13.00	Pass
5640.00	V	-34.81		
7520.00	V	-36.95		
9400.00	V	-38.93		
11280.00	V	---		
3760.00	Horizontal	-37.15	-13.00	Pass
5640.00	H	-40.78		
7520.00	H	-42.31		
9400.00	H	-44.92		
11280.00	H	---		
Test mode:	**PCS1900**		**Test channel:**	**Highest**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3819.60	Vertical	-33.85	-13.00	Pass
5729.40	V	-36.34		
7639.20	V	-38.47		
9549.00	V	-40.34		
11458.80	V	---		
3819.60	Horizontal	-38.60	-13.00	Pass
5729.40	H	-42.96		
7639.20	H	-43.50		
9549.00	H	-46.21		
11458.80	H	---		

Remarks：

1. The emission behaviour belongs to narrowband spurious emission.
2. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

Test mode:	WCDMA Band V		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1652.80	Vertical	-34.33	-13.00	Pass
2479.20	V	-38.29		
3305.60	V	-41.09		
4132.00	V	-38.42		
4958.40	V	---		
1652.80	Horizontal	-37.31	-13.00	Pass
2479.20	H	-40.15		
3305.60	H	-45.74		
4132.00	H	-49.58		
4958.40	H	---		
Test mode:	**WCDMA Band V**		**Test channel:**	**Middle**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1672.80	Vertical	-36.80	-13.00	Pass
2509.20	V	-38.32		
3345.60	V	-42.11		
4182.00	V	-44.42		
5018.40	V	---		
1672.80	Horizontal	-39.56	-13.00	Pass
2509.20	H	-41.51		
3345.60	H	-46.45		
4182.00	H	-48.74		
5018.40	H	---		
Test mode:	**WCDMA Band V**		**Test channel:**	**Highest**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1693.20	Vertical	-35.86	-13.00	Pass
2539.80	V	-38.31		
3386.40	V	-41.17		
4233.00	V	-44.06		
5079.60	V	---		
1693.20	Horizontal	-39.38	-13.00	Pass
2539.80	H	-41.85		
3386.40	H	-43.31		
4233.00	H	-49.60		
5079.60	H	---		

Remarks：

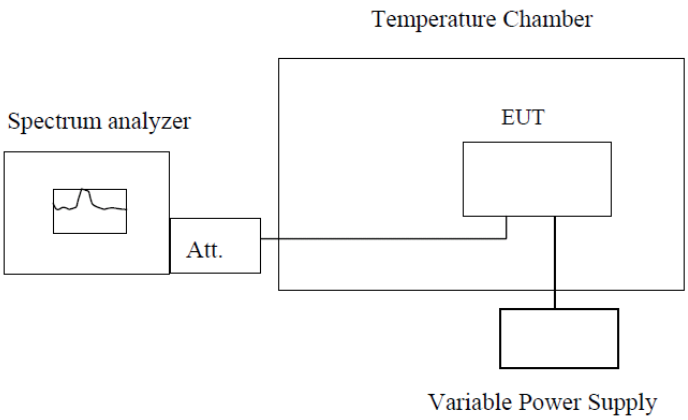
1. The emission behaviour belongs to narrowband spurious emission.
2. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

Test mode:	WCDMA Band II		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3704.46	Vertical	-35.44	-13.00	Pass
5556.86	V	-38.65		
7409.26	V	-41.32		
9261.66	V	-43.81		
11114.40	V	---		
3704.46	Horizontal	-41.62	-13.00	Pass
5556.86	H	-46.13		
7409.26	H	-48.09		
9261.66	H	-51.22		
11114.40	H	---		
Test mode:	**WCDMA Band II**		**Test channel:**	**Middle**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3759.83	Vertical	-36.43	-13.00	Pass
5639.83	V	-39.80		
7519.83	V	-42.45		
9399.83	V	-44.79		
11280.00	V	---		
3759.83	Horizontal	-42.61	-13.00	Pass
5639.83	H	-46.97		
7519.83	H	-48.76		
9399.83	H	-51.81		
11280.00	H	---		
Test mode:	**WCDMA Band II**		**Test channel:**	**Highest**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3815.03	Vertical	-36.51	-13.00	Pass
5722.63	V	-39.45		
7630.23	V	-41.71		
9537.83	V	-43.99		
11445.60	V	---		
3815.03	Horizontal	-41.92	-13.00	Pass
5722.63	H	-45.93		
7630.23	H	-47.65		
9537.83	H	-50.41		
11445.60	H	---		

Remarks：

1. The emission behaviour belongs to narrowband spurious emission.
2. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

6.10 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:	2.5ppm
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		
3.80	-30	29	0.0347	2.5	Pass
	-20	33	0.0394		
	-10	28	0.0331		
	0	22	0.0268		
	10	26	0.0316		
	20	22	0.0268		
	30	38	0.0458		
	40	34	0.0410		
	50	33	0.0394		

Reference Frequency: GSM850 (GPRS 1 link) Middle channel=190 channel=836.6MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.80	-30	51	0.0612	2.5	Pass
	-20	59	0.0708		
	-10	50	0.0592		
	0	43	0.0513		
	10	48	0.0576		
	20	42	0.0501		
	30	71	0.0851		
	40	62	0.0740		
	50	59	0.0700		

Reference Frequency: GSM850 (EGPRS 1 link) Middle channel=190 channel=836.6MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.80	-30	23	0.0269	2.5	Pass
	-20	25	0.0299		
	-10	21	0.0254		
	0	19	0.0224		
	10	20	0.0239		
	20	18	0.0209		
	30	31	0.0374		
	40	26	0.0314		
	50	25	0.0299		

Reference Frequency: PCS1900 (GSM link) Middle channel=661 channel=1880MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error			Result
		Hz	ppm		
3.80	-30	47	0.0249	2.5	Pass
	-20	55	0.0295		
	-10	47	0.0249		
	0	39	0.0210		
	10	47	0.0249		
	20	41	0.0217		
	30	66	0.0349		
	40	57	0.0303		
	50	54	0.0287		

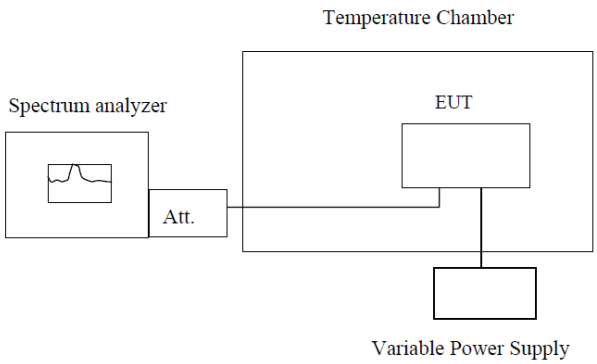
Reference Frequency: PCS1900 (GPRS 1 link) Middle channel=661 channel=1880MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error			Result
		Hz	ppm		
3.80	-30	125	0.0664	2.5	Pass
	-20	146	0.0779		
	-10	120	0.0639		
	0	99	0.0529		
	10	122	0.0646		
	20	102	0.0545		
	30	164	0.0872		
	40	138	0.0732		
	50	145	0.0769		

Reference Frequency: PCS1900 (EGPRS 1 link) Middle channel=661 channel=1880MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error			Result
		Hz	ppm		
3.80	-30	42	0.0223	2.5	Pass
	-20	49	0.0259		
	-10	39	0.0208		
	0	32	0.0172		
	10	41	0.0215		
	20	32	0.0172		
	30	55	0.0294		
	40	46	0.0244		
	50	49	0.0259		

Reference Frequency: WCDMA Band V Middle channel=4183 channel=836.6MHz					
Power supplied (Vdc)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.80	-30	35	0.0413	2.5	Pass
	-20	48	0.0577		
	-10	55	0.0652		
	0	26	0.0308		
	10	38	0.0458		
	20	42	0.0503		
	30	62	0.0742		
	40	58	0.0697		
	50	70	0.0832		

Reference Frequency: WCDMA Band II Middle channel=9400 channel=1880.0MHz					
Power supplied (Vdc)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.80	-30	107	0.0569	2.5	Pass
	-20	95	0.0505		
	-10	82	0.0434		
	0	76	0.0406		
	10	70	0.0370		
	20	60	0.0321		
	30	76	0.0406		
	40	86	0.0455		
	50	82	0.0434		

6.11 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:	2.5ppm
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	4.37	18	0.0217	2.5	Pass
	3.80	23	0.0273		
	3.23	22	0.0264		
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	4.37	36	0.0430	2.5	Pass
	3.80	42	0.0499		
	3.23	48	0.0572		
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	4.37	29	0.0344	2.5	Pass
	3.80	20	0.0242		
	3.23	23	0.0270		

Reference Frequency: PCS1900 (GSM link) Middle channel=661 channel=1880MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.37	30	0.0160	2.5	Pass
	3.80	38	0.0200		
	3.23	38	0.0204		
Reference Frequency: PCS1900 (GPRS 1 link) Middle channel=661 channel=1880MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.37	78	0.0412	2.5	Pass
	3.80	58	0.0310		
	3.23	78	0.0413		
Reference Frequency: PCS1900 (EGPRS 1 link) Middle channel=661 channel=1880MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.37	51	0.0269	2.5	Pass
	3.80	44	0.0232		
	3.23	35	0.0187		

Reference Frequency: WCDMA Band V Middle channel=4183 channel=836.6MHz					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.37	26	0.0316	2.5	Pass
	3.80	35	0.0423		
	3.23	17	0.0209		
Reference Frequency: WCDMA Band II Middle channel=940 channel=1880.0MHz					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.37	66	0.0349	2.5	Pass
	3.80	54	0.0288		
	3.23	61	0.0323		

7 Test Setup Photo

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

8 EUT Constructional Details

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

-----End------