FCC TEST REPORT

FCC ID: SY4-A02025

On Behalf of

Shanghai Huace Navigation Technology LTD.

Geodetic GNSS Receiver (P3DT)

Model No.: 1103906523

Prepared for	:	Shanghai Huace Navigation Technology LTD.
Address	:	Building C, 599 Gaojing Road, Qingpu District, Shanghai, China

Prepared By	:	Shenzhen Alpha Product Testing Co., Ltd.
Address	:	Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103, Shenzhen, Guangdong, China

Report Number	:	T1881484 03
Date of Receipt	:	August 15, 2018
Date of Test	:	September 15, 2018-November 02, 2018
Date of Report	:	November 02, 2018
Version Number	:	REV0

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TEST REPORT DECLARATION

Applicant	:	Shanghai Huace Navigation Technology LTD.
Address	:	Building C, 599 Gaojing Road, Qingpu District, Shanghai, China
Manufacturer	:	Shanghai Huace Navigation Technology LTD.
Address	:	Building C, 599 Gaojing Road, Qingpu District, Shanghai, China
EUT Description	:	Geodetic GNSS Receiver (P3DT)
		(A) Model No. : 1103906523
		(B) Trademark : CHCNAV

Measurement Standard Used:

FCC CFR Title 47 Part 2
FCC CFR Title 47 Part22 Subpart H
FCC CFR Title 47 Part24 Subpart E

The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits both conducted and radiated emissions. The test results are contained in this test report and Shenzhen Alpha Product Testing Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After the test, our opinion is that EUT compliance with the requirement of the above standards.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen Alpha Product Testing Co., Ltd.

Tested by (name + signature).....:	Reak Yang Project Engineer	Reak Yang
Approved by (name + signature).....:	Simple Guan Project Manager	
Date of issue…… ……..:	November 02, 2018	

Revision History

Revision	Issue Date	Revisions	Revised By
00	November 02, 2018	Initial released Issue	Simple Guan

1 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)(2) Part 24.232 (c)	Pass
Peak-to-Average Ratio	Part 2.1046 Part 24.232 (d)	Pass
Modulation Characteristics	Part 2.1047	Pass
99% & -26 dB Occupied Bandwidth	Part 2.1049 Part 22.917 Part 24.238	Pass
Spurious Emissions at Antenna Terminal	Part 2.1051 Part 22.917 (a) Part 24.238 (a)	Pass
Field Strength of Spurious Radiation	Part 2.1053 Part 22.917 (a) Part 24.238 (a)	Pass
Out of band emission, Band Edge	Part 22.917 (a) Part 24.238 (a)	Pass
Frequency stability vs. temperature	Part 2.1055(a)(1)(b)	Pass
Frequency stability vs. voltage	Part 2.1055(d)(1)(2)	Pass

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

2 General Information

2.1 General Description of EUT

Description	:	Geodetic GNSS Receiver (P3DT)
Model Number	:	1103906523
Note	:	1. The model name “1103906523” corresponding client’s internal model is “Geodetic GNSS Receiver (P3DT).
Trademark	:	CHCNAV
Test Voltage	:	Input: 9-36V⎓2A
Support Networks		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		12
EGPRS Class		10
Modulation type		GPRS: GMSK EGPRS: GMSK/8PSK WCDMA Band II/V: QPSK
Antenna type		Internal antenna
Antenna gain		1dBi(max.) For GSM 850 & Band V 2.5dBi(max.) For DCS 1900 & Band II
Software version	:	V8.42
Hardware version	:	V1.2

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

2.2 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.

2.3 Test Methodology

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

2.4 Test Facility

Shenzhen Alpha Product Testing Co., Ltd
Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103, Shenzhen, Guangdong, China

June 21, 2018 File on Federal Communication Commission
Registration Number: 293961

July 25, 2017 Certificated by IC
Registration Number: 12135A

3 Test Instruments list

Equipment	Manufacturer	Model No.	Serial No.	Last cal.	Cal Interval
Bilog Antenna	Schwarzbeck	VULB 9168	VULB9168-438	2018.04.13	2Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D(1201)	2018.04.13	2Year
Loop Antenna	SCHWARZBECK	FMZB 1519B	00059	2016.09.29	2Year
Filter	KANGMAI	ZLPF-LDC-1000-1959	1209002075	2018.09.21	1Year
Filter	WAINWRIGHT	WHKX2.80 /18G-12SS	SN1	2018.09.21	1Year
Filter	WAINWRIGHT	WHKX1.0G/15 G-10SS	SN40	2018.09.21	1Year
RF Cable	Resenberger	Cable 4	N/A	2018.09.21	1Year
CMU200	ROHDE&SCHWARZ	CMU200	116785	2018.09.11	1Year
CMW500	ROHDE&SCHWARZ	CMW500	1201.0002K50-117239-sM	2018.09.21	1Year
Signal Analyzer	Agilent	N9020A	MY499100060	2018.09.11	1Year
vector Signal Generator	Agilent	N5182A	MY49060042	2018.09.11	1Year
vector Signal Generator	Agilent	E4438C	US44271917	2018.09.11	1Year
Amplifier	Agilent	8449B	3008A02664	2018.09.21	1Year
Test Receiver	ROHDE&SCHWARZ	ESR	1316.3003K03-102082-Wa	2018.09.21	1Year
9*6*6 anechoic	CHENYU	9*6*6	N/A	/	/
RF Cable	Resenberger	Cable 1	N/A	2018.09.21	1Year
RF Cable	Resenberger	Cable 2	N/A	2018.09.21	1Year
RF Cable	Resenberger	Cable 3	N/A	2018.09.21	1Year
Power Sensor	Power Radio	RPR3006W	15100041SNO91	2018.09.21	1Year
20dB Attenuator	ICPROBING	IATS1	82347	2018.09.21	1Year
L.I.S.N.#1	SCHWARZBECK	NSLK8126	8126-466	2018.09.21	1Year
L.I.S.N.#2	ROHDE&SCHWARZ	ENV216	101043	2018.09.21	1Year
POWER DIVIDER	Mini-circuits	PD-2SF-0010	N/A	2018.09.21	1Year
POWER DIVIDER	Mini-circuits	PD-2SF-0010	N/A	2018.09.21	1Year
Temperature& Humidity test chamber	GZGONGWEN	GDS-250	080821	2018.10.21	1Year

4 System test configuration

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

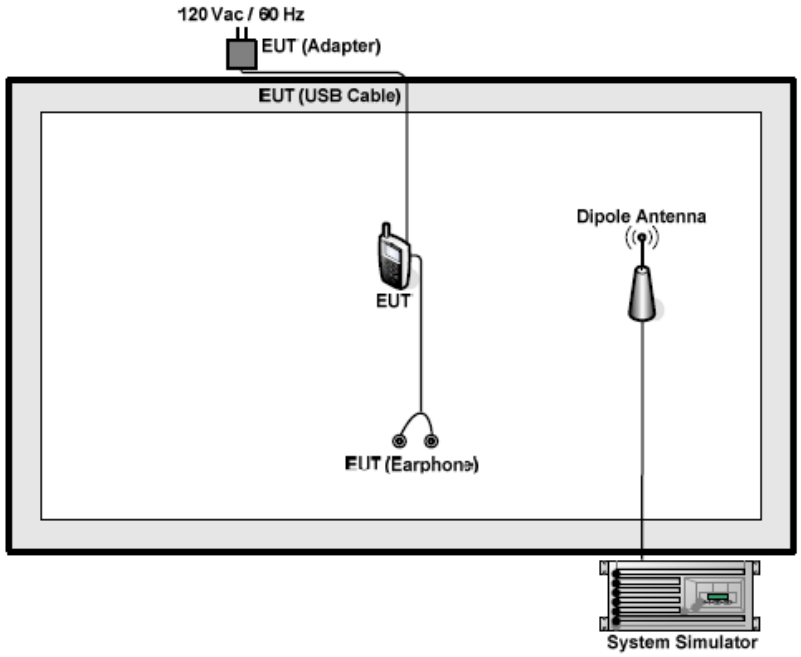
Note: The maximum power levels are GSM mode for GMSK link, GPRS multi-slot class 8 mode for GMSK link, EGPRS multi-slot class 8 mode for 8PSK link, RMC12.2Kbps mode for WCDMA Band V/II. only these modes were used for all tests.

The conducted power tables are as follows:

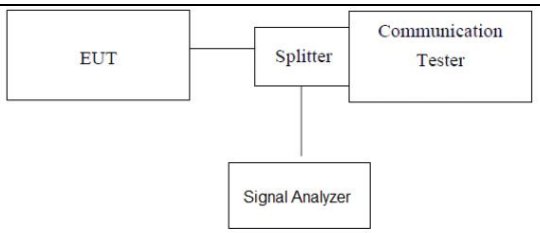
Conducted Power (dBm)						
Band	GSM850			PCS1900		
Channel	128	190	251	512	661	810
Frequency	824.20	836.60	848.80	1850.20	1880.00	1909.80
GPRS (GMSK, 1 TX slot)	**33.31**	32.77	32.70	29.26	29.19	28.02
GPRS (GMSK, 2 TX slot)	32.43	32.42	31.52	29.09	27.32	27.56
GPRS (GMSK, 3 TX slot)	30.24	29.37	30.56	27.50	26.98	25.69
GPRS (GMSK, 4 TX slot)	28.39	28.83	29.07	25.58	25.05	25.46
EGPRS (8PSK, 1 TX slot)	30.36	29.62	29.74	27.13	26.17	25.92
EGPRS (8PSK, 2 TX slot)	29.13	29.88	29.57	26.15	26.27	26.30
EGPRS (8PSK, 3 TX slot)	27.39	27.14	27.29	24.39	23.32	22.78
EGPRS (8PSK, 4 TX slot)	27.52	26.56	26.86	22.57	23.37	22.67

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	19.76	20.12	19.75	22.41	21.90	**22.95**
HSDPA Subtest-1	20.06	20.27	20.82	21.11	21.17	21.70
HSDPA Subtest-2	20.53	20.75	19.73	21.88	21.03	21.49
HSDPA Subtest-3	20.33	19.57	19.83	21.67	21.43	21.32
HSDPA Subtest-4	20.34	20.48	20.34	22.10	22.36	21.27
HSUPA Subtest-1	19.99	20.41	19.61	22.11	21.43	21.65
HSUPA Subtest-2	20.48	20.31	19.14	22.44	21.44	22.03
HSUPA Subtest-3	20.75	19.77	19.34	21.83	21.86	21.59
HSUPA Subtest-4	20.05	19.61	19.69	21.95	20.92	21.94
HSUPA Subtest-5	19.94	21.04	19.88	21.48	21.34	21.84
AMR	20.32	20.49	19.60	22.07	21.28	21.93

4.2 Configuration of Tested System



4.3 Conducted AV Output Power

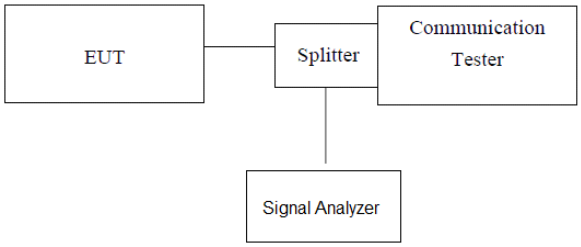
Test Requirement:	FCC part22.913(a) and FCC part24.232(b)
Test Method:	FCC part2.1046
Limit:	GSM850, WCDMA Band V: 7W PCS1900, WCDMA Band II: 2W
Test setup:	 *Note: Measurement setup for testing on Antenna connector*
Test Procedure:	1. The transmitter output port was connected to base station. 2. The RF output of EUT was connected to the Signal Analyzer 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 average power.
Test Instruments:	Refer to section 5.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

Measurement Data

Burst Average Power (dBm)						
Band	GSM 850			PCS 1900		
Channel	128	190	251	512	661	810
Frequency (MHz)	824.2	836.6	848.8	1850.2	1880.0	1909.8
GPRS (GMSK, 1-Slot)	32.97	32.86	32.66	29.23	28.95	28.02
GPRS (GMSK, 2-Slot)	32.01	31.88	31.79	28.37	27.63	27.32
GPRS (GMSK, 3-Slot)	29.98	30.24	30.55	27.20	26.44	26.22
GPRS (GMSK, 4-Slot)	27.87	28.78	29.45	25.43	25.69	25.5
EGPRS (8PSK, 1-Slot)	30.62	29.92	29.90	27.23	26.92	25.96
EGPRS (8PSK, 2-Slot)	29.92	29.96	27.90	26.41	25.73	25.63
EGPRS (8PSK, 3-Slot)	28.12	27.46	27.58	24.55	23.28	22.68
EGPRS (8PSK, 4-Slot)	27.68	26.81	26.58	22.2	23.1	22.42

Fram Average Power (dBm)						
Band	GSM 850			PCS 1900		
Channel	128	190	251	512	661	810
Frequency (MHz)	824.2	836.6	848.8	1850.2	1880.0	1909.8
GPRS (GMSK, 1-Slot)	24.04	23.64	23.51	20.21	20.24	19.57
GPRS (GMSK, 2-Slot)	25.90	26.07	25.30	22.64	22.11	21.99
GPRS (GMSK, 3-Slot)	25.45	24.51	26.00	23.05	22.49	21.47
GPRS (GMSK, 4-Slot)	25.23	26.24	26.26	22.53	21.86	22.90
EGPRS (8PSK, 1-Slot)	21.40	21.36	21.33	18.87	17.80	16.53
EGPRS (8PSK, 2-Slot)	24.11	24.18	23.52	19.56	20.06	20.11
EGPRS (8PSK, 3-Slot)	23.91	22.99	13.01	20.11	19.03	18.75
EGPRS (8PSK, 4-Slot)	24.83	23.83	13.26	19.93	19.98	18.92

4.4 Peak-to-Average Ratio

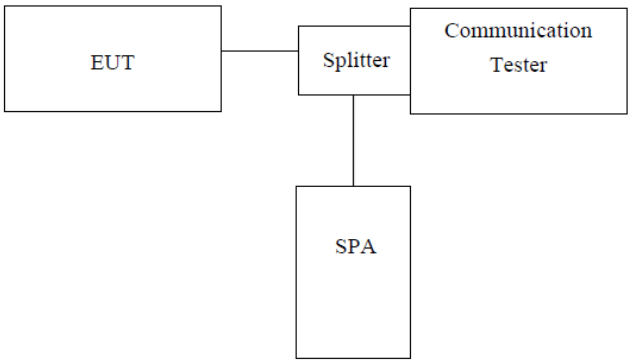
Test Requirement:	FCC part24.232(d)
Test Method:	FCC part2.1046
Limit:	13db
Test setup:	 *Note: Measurement setup for testing on Antenna connector*
Test Procedure:	1. The transmitter output port was connected to base station. 2. The RF output of EUT was connected to the Signal Analyzer by RF cable and 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 average power. 6. Record the maximum peak-to-average ratio value.
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	Peak to Average Ratio (dB)			Limit (dB)	Result
	Low Ch.	Middle Ch.	High Ch.		
GSM/TM1/GSM850	9.06	9.43	9.58	13	PASS
GSM/TM1/GSM1900	9.06	9.31	9.41	13	PASS

Test mode	Peak to Average Ratio (dB)			Limit (dB)	Result
	Low Ch.	Middle Ch.	High Ch.		
WCDMA Band II	3.34	3.27	3.29	13	PASS
WCDMA Band V	3.08	3.18	3.39		

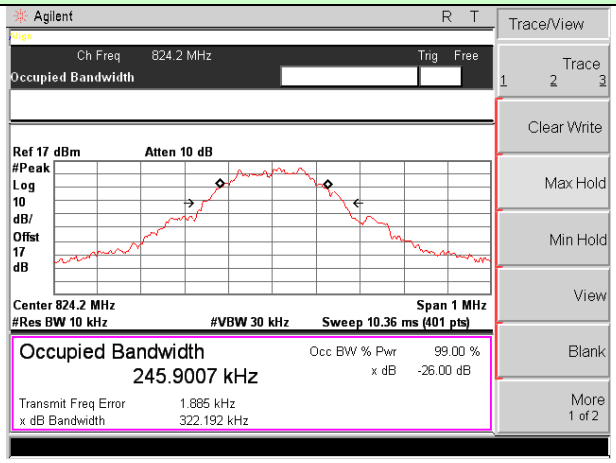
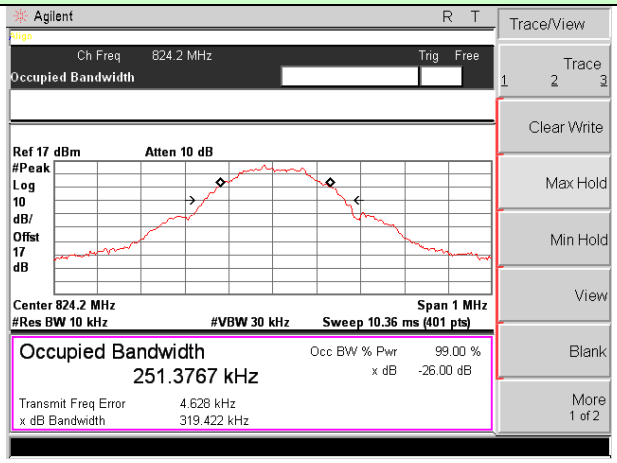
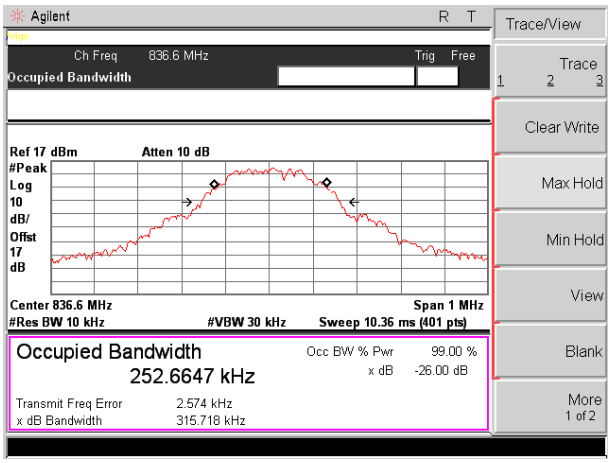
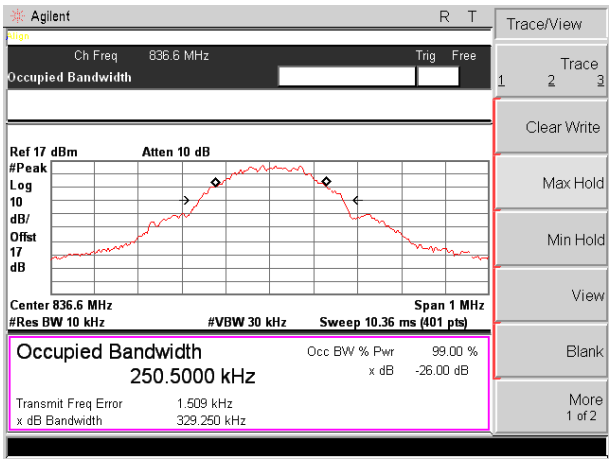
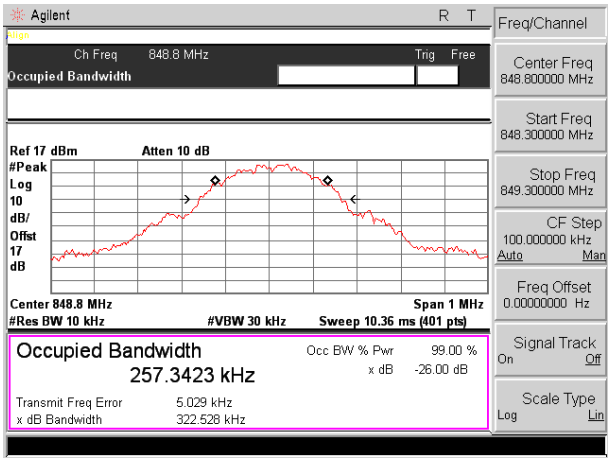
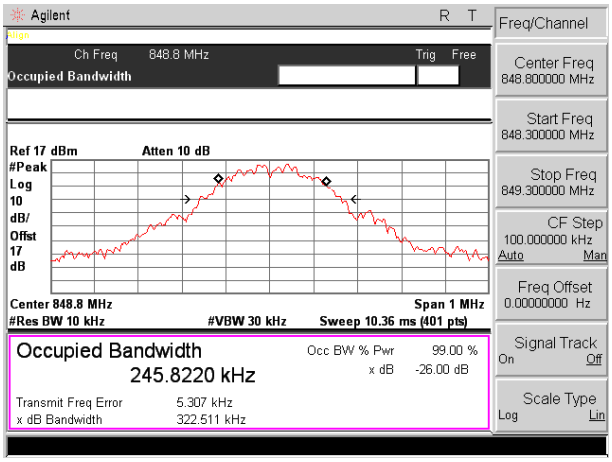
4.5 Occupy Bandwidth

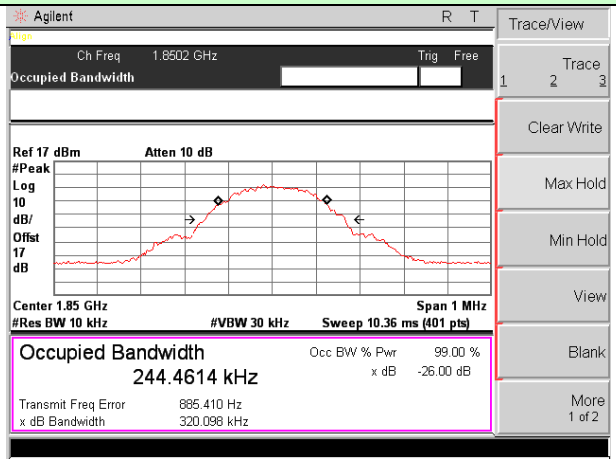
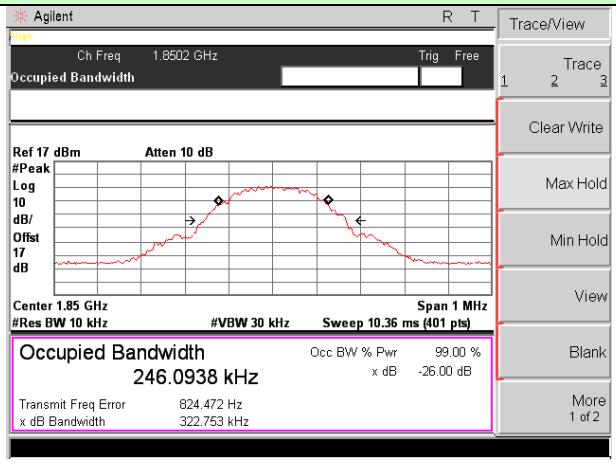
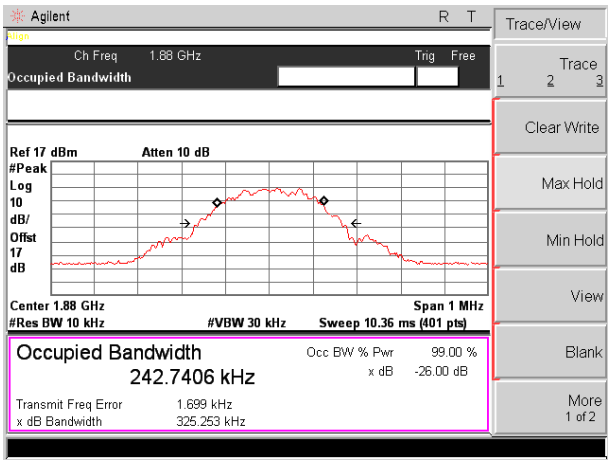
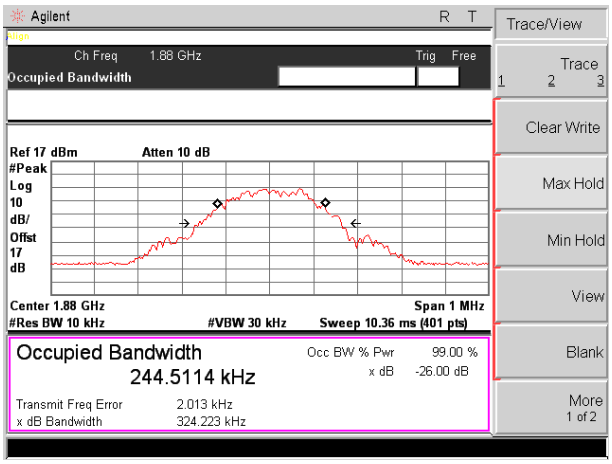
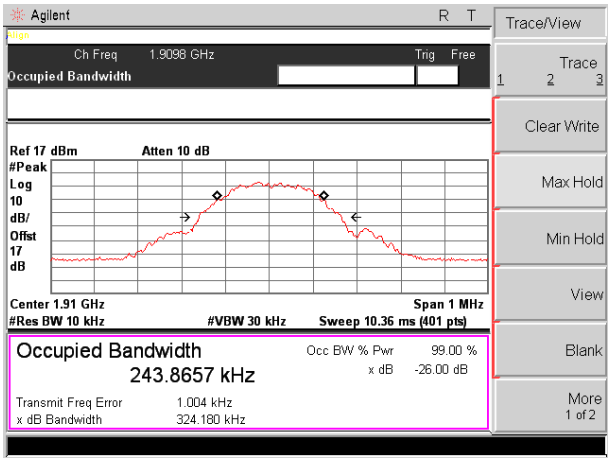
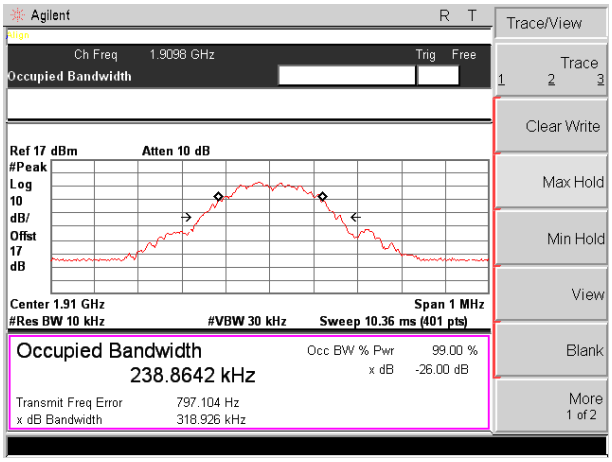
Test Requirement:	FCC part22.913(a) and FCC part24.232(b)
Test Method:	FCC part2.1049
Test setup:	 *Note: Measurement setup for testing on Antenna connector*
Test Procedure:	1. The EUT's output RF connector was connected with a short cable to the spectrum analyzer 2. RBW was set to about 1% of emission 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

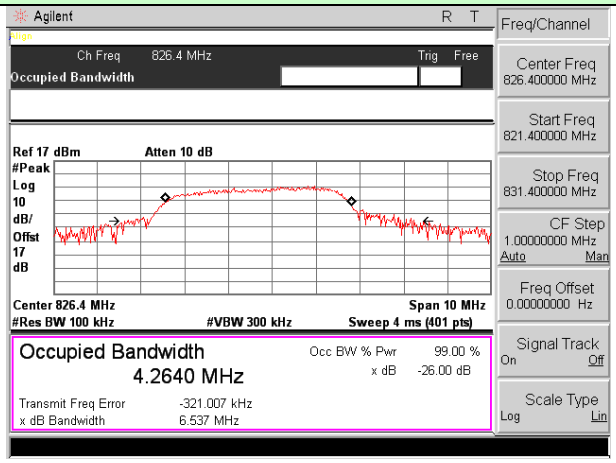
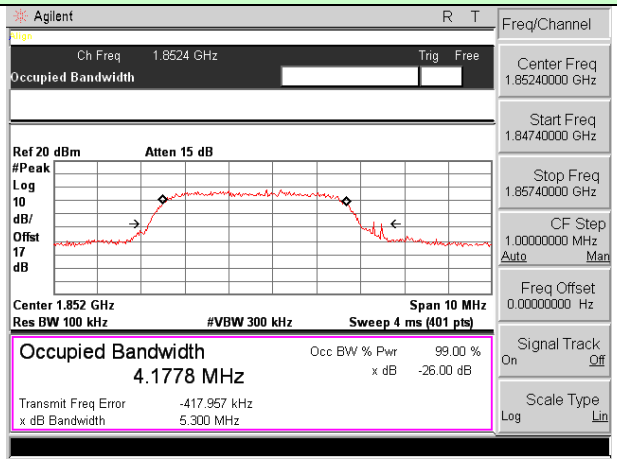
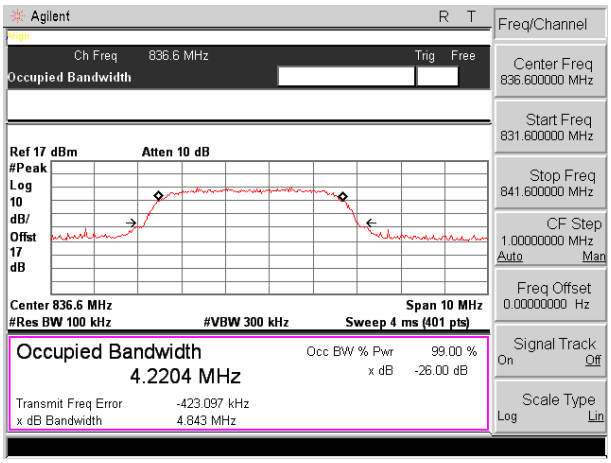
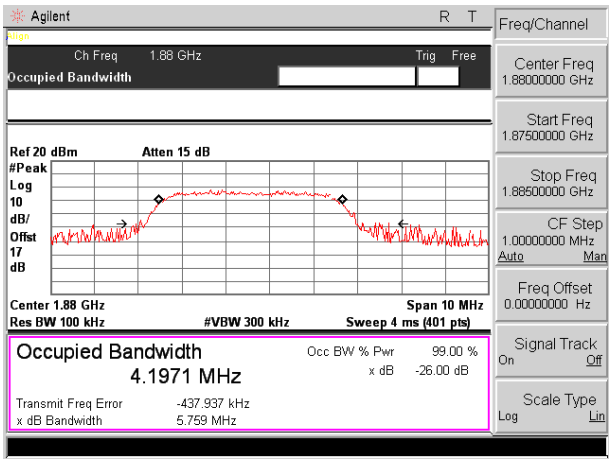
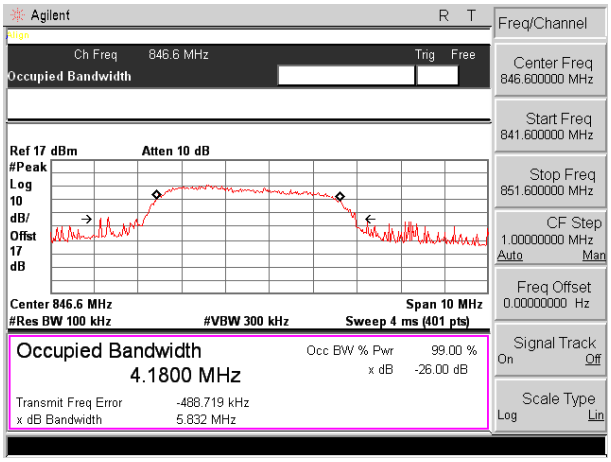
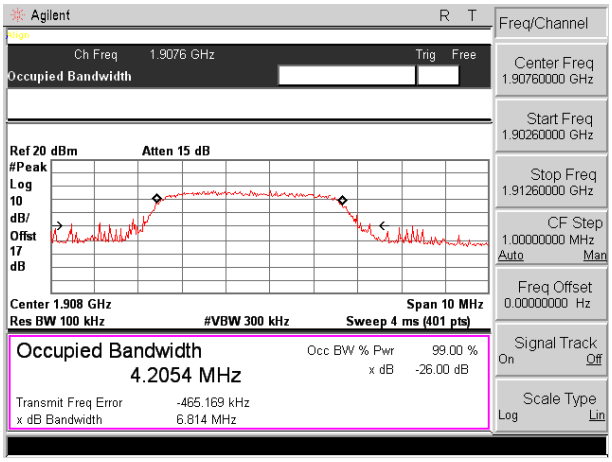
Measurement Data

EUT Mode	Channel	Frequency (MHz)	99% Occupy bandwidth (KHz)	-26dB bandwidth (KHz)
GSM 850 (GPRS 1 link)	128	824.20	245.901	322.192
	190	836.60	252.665	315.718
	251	848.80	257.342	322.528
GSM 850 (EGPRS 1 link)	128	824.20	251.377	319.422
	190	836.60	250.500	329.250
	251	848.80	245.822	322.511
PCS 1900 (GPRS 1 link)	512	1850.20	244.461	320.098
	661	1880.00	242.741	325.253
	810	1909.80	243.866	324.180
PCS 1900 (EGPRS 1 link)	512	1850.20	246.094	322.753
	661	1880.00	244.511	324.223
	810	1909.80	238.864	318.926
WCDMA Band V (RMC 12.2Kbps link)	4132	826.40	4264.0	6537.0
	4183	836.60	4220.4	4843.0
	4233	846.60	4180.0	5832.0
WCDMA Band II (RMC 12.2Kbps link)	9262	1852.4	4177.8	5300.0
	9400	1880.0	4197.1	5759.0
	9538	1907.6	4205.4	6814.0

Test plot as follows:

GSM 850 (GPRS 1 link)	GSM 850 (EGPRS 1 link)
	
Lowest channel	Lowest channel
	
Middle channel	Middle channel
	
Highest channel	Highest channel

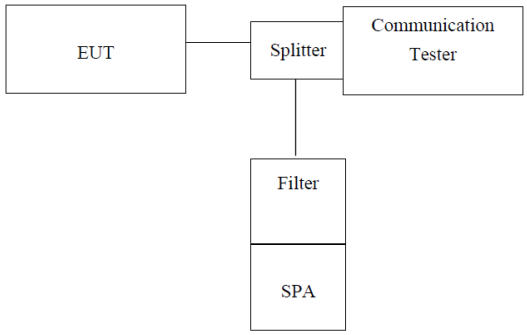
PCS 1900 (GPRS 1 link)	PCS 1900 (EGPRS 1 link)
	
Lowest channel	Lowest channel
	
Middle channel	Middle channel
	
Highest channel	Highest channel

WCDMA Band V (RMC 12.2Kbps link)	WCDMA Band II (RMC 12.2Kbps link)
	
Lowest channel	Lowest channel
	
Middle channel	Middle channel
	
Highest channel	Highest channel

4.6 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.

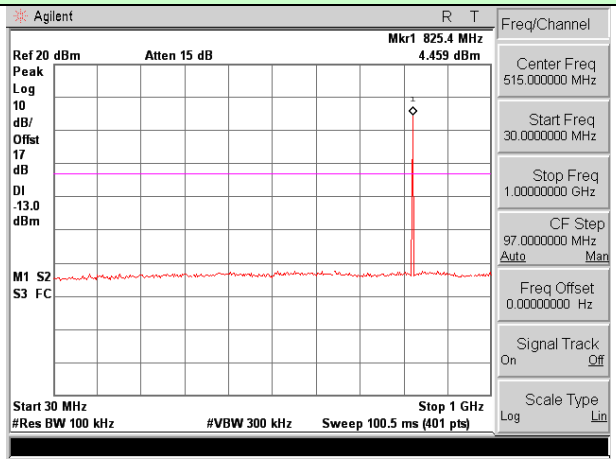
4.7 Out of band emission at antenna terminals

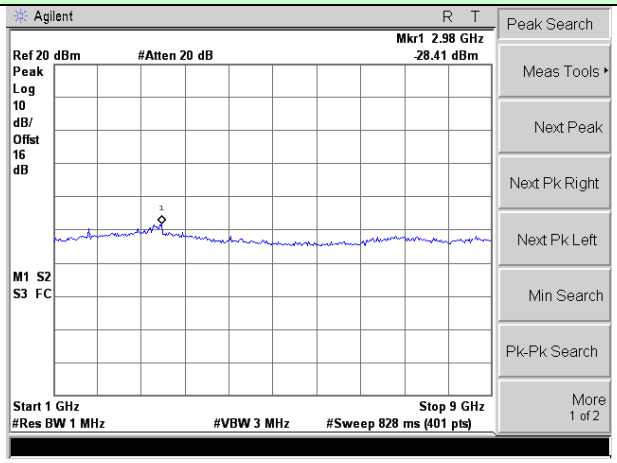
Test Requirement:	FCC part22.917(a) and FCC part24.238(a)
Test Method:	FCC part2.1051
Limit:	-13dBm
Test setup:	 ***Note:*** *Measurement setup for testing on Antenna connector*
Test Procedure:	1 The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. 2 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:

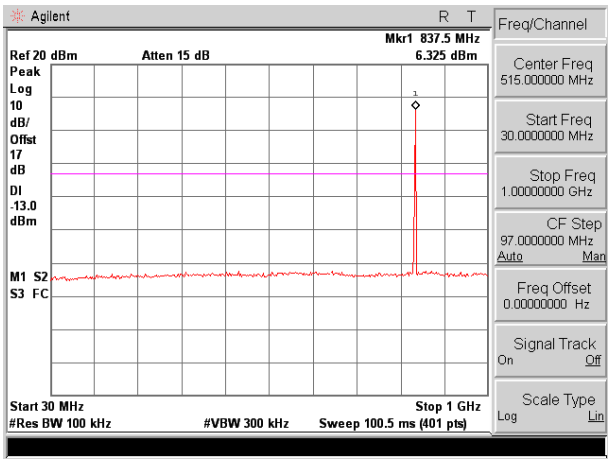
Note: During the conducted spurious emission test, a band filter was used. The information of the filter is reported at section 6.0 (refer to item 24, 25).

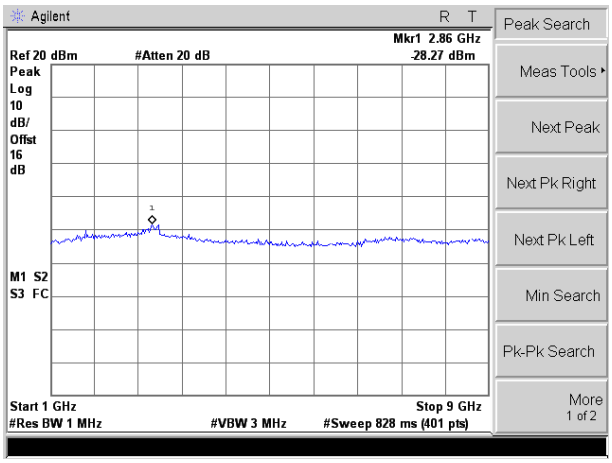
Test Mode: Traffic mode	GSM 850 (GPRS 1 link)



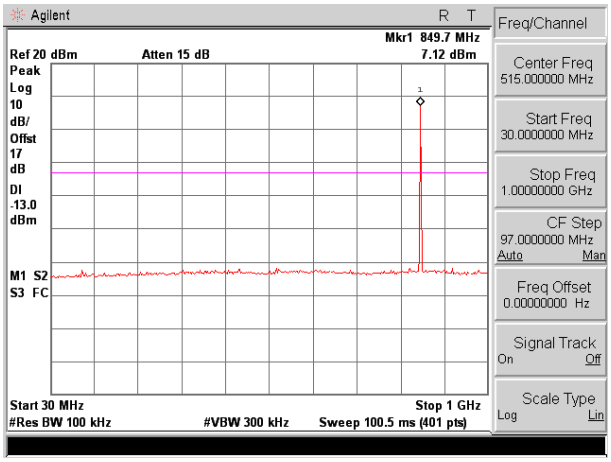


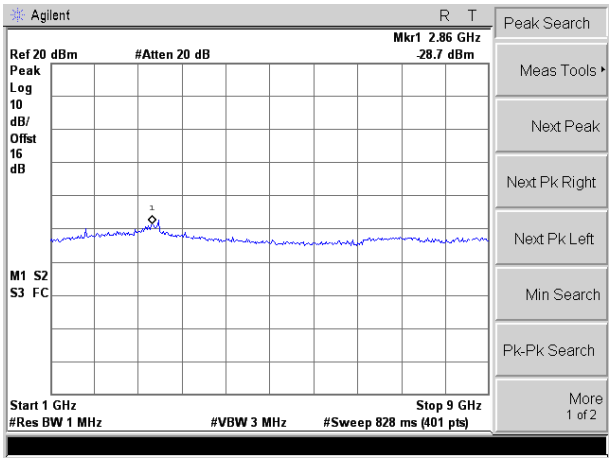
Lowest channel





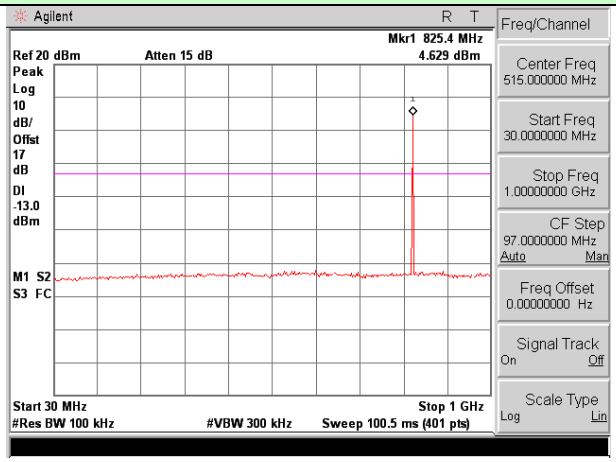
Middle channel

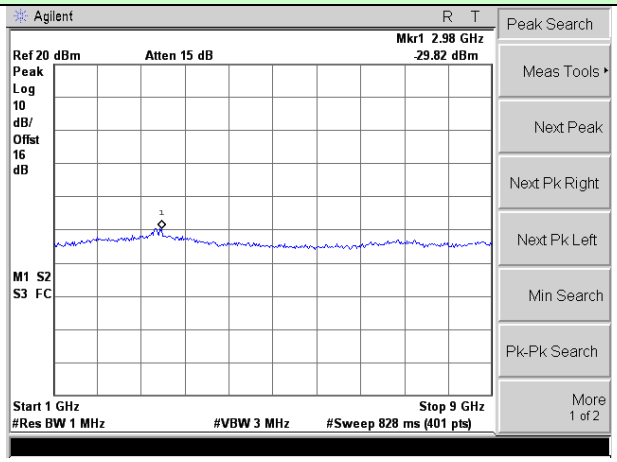




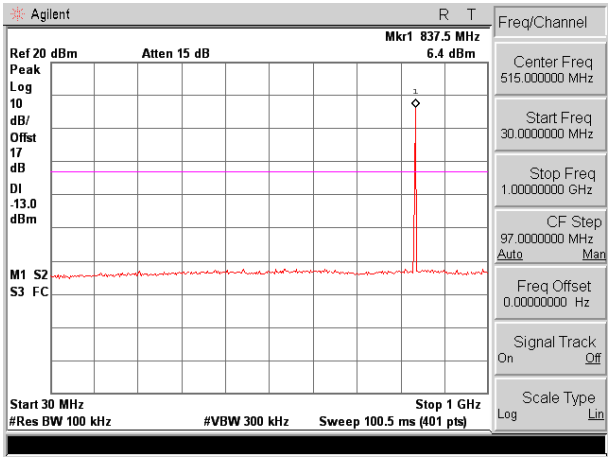
Highest channel

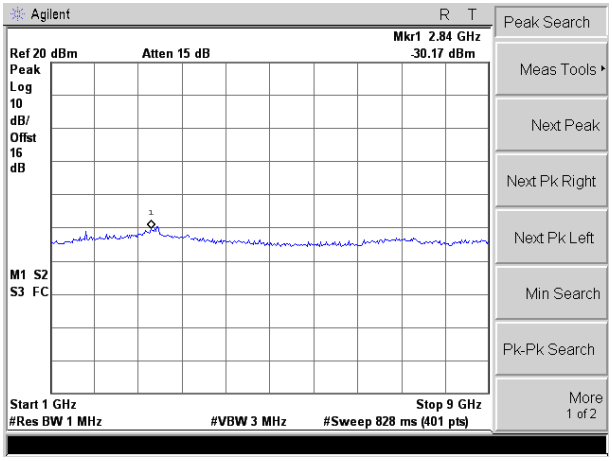
Test Mode: Traffic mode	GSM 850 (EGPRS 1 link)



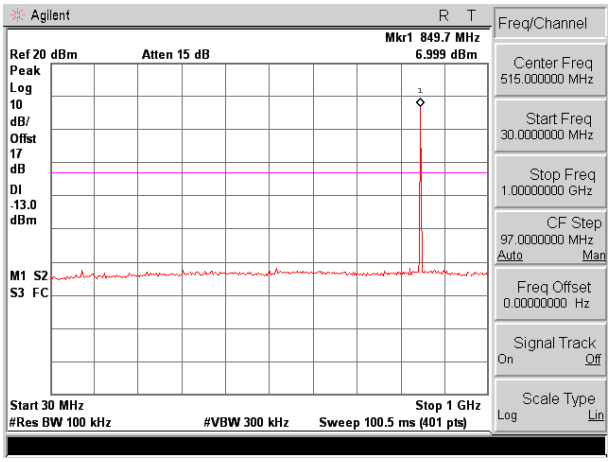


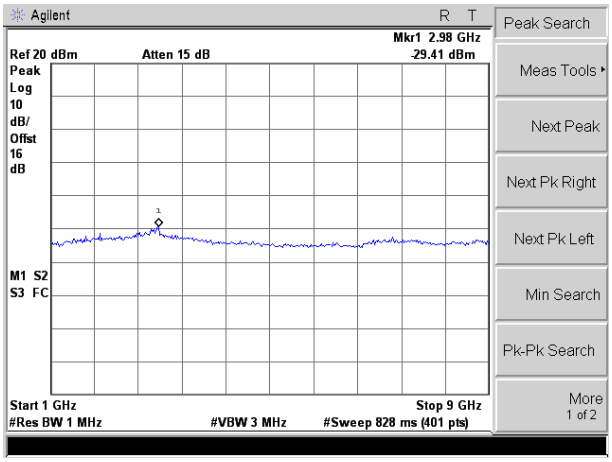
Lowest channel





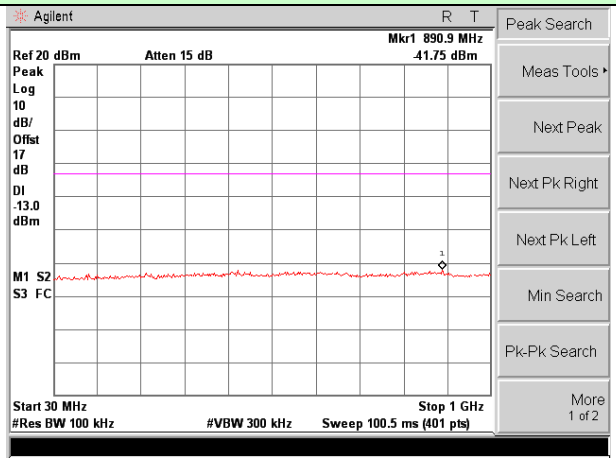
Middle channel

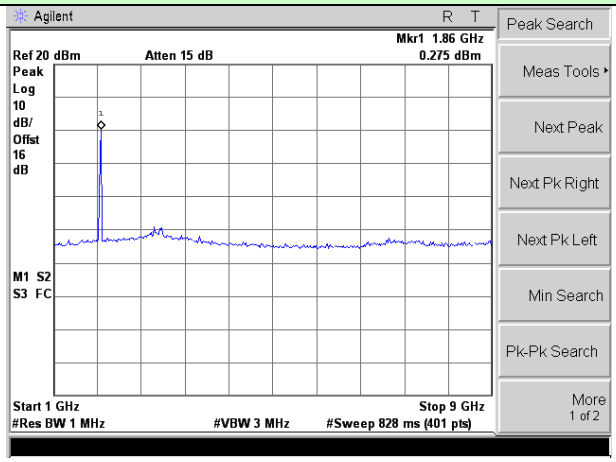




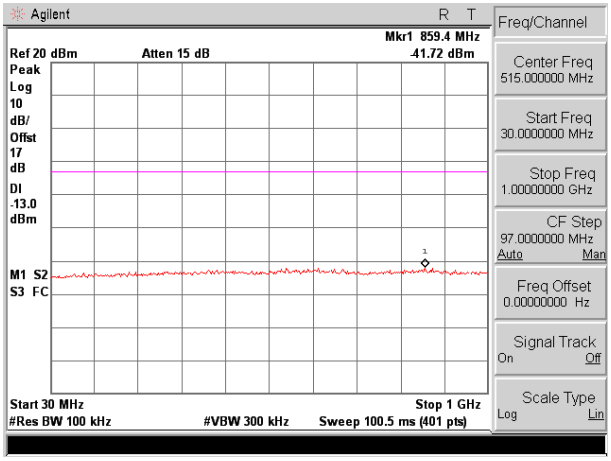
Highest channel

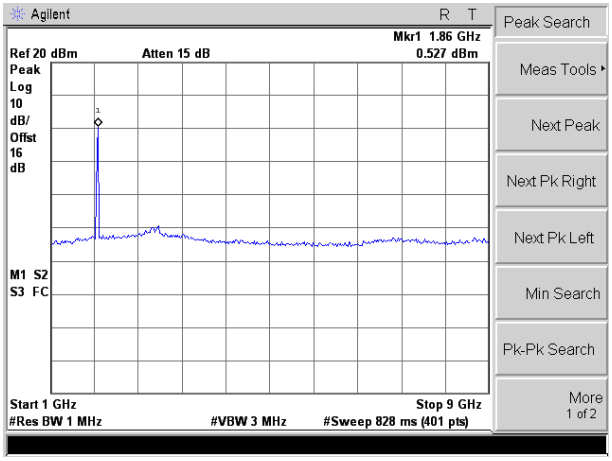
Test Mode: Traffic mode	PCS1900 (GPRS 1 link)



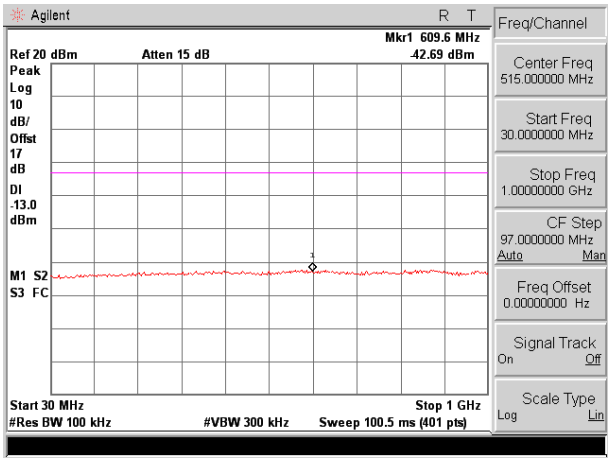


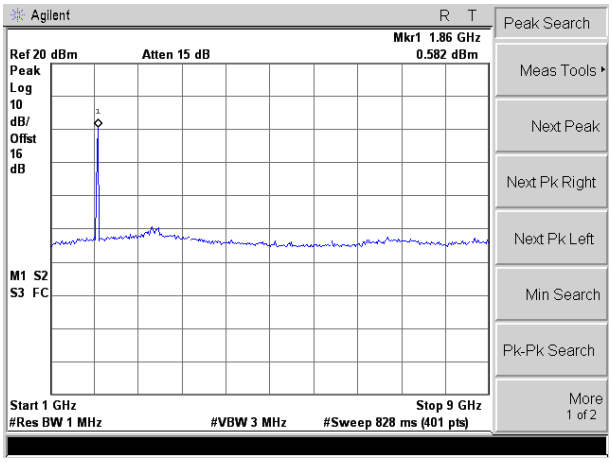
Lowest channel





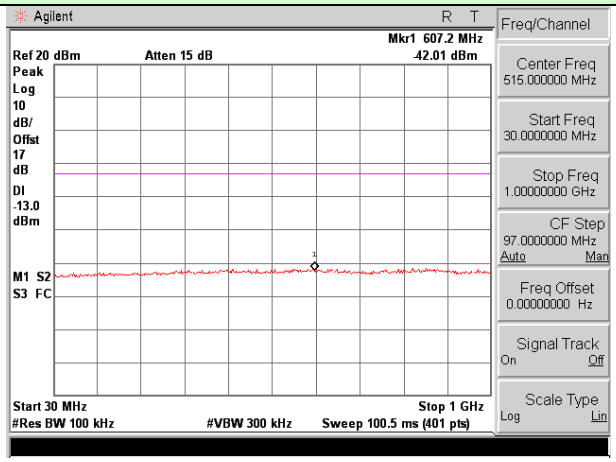
Middle channel

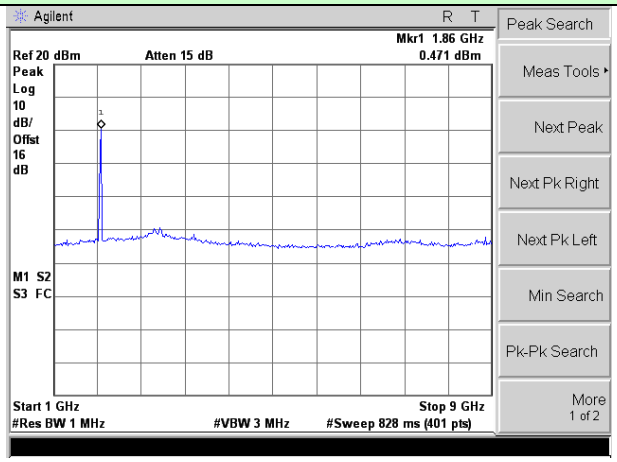




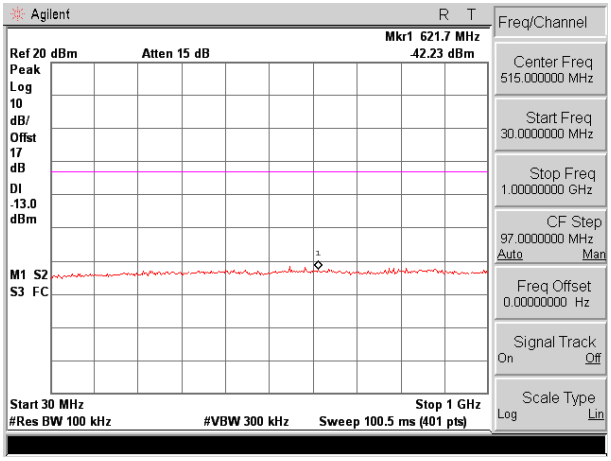
Highest channel

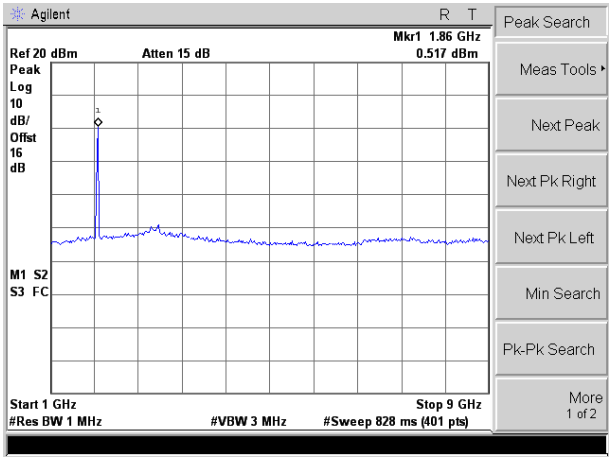
Test Mode: Traffic mode	PCS1900 (EGPRS 1 link)



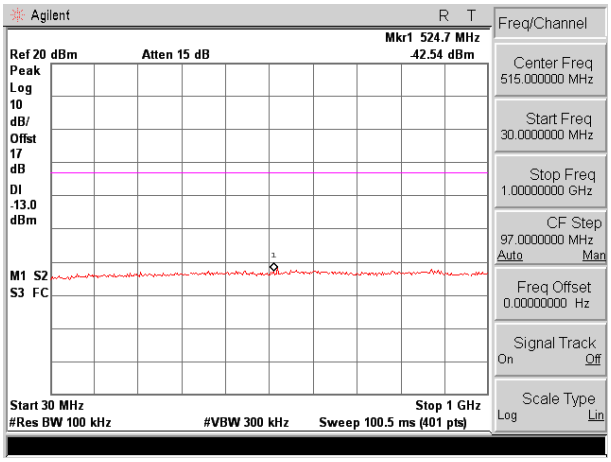


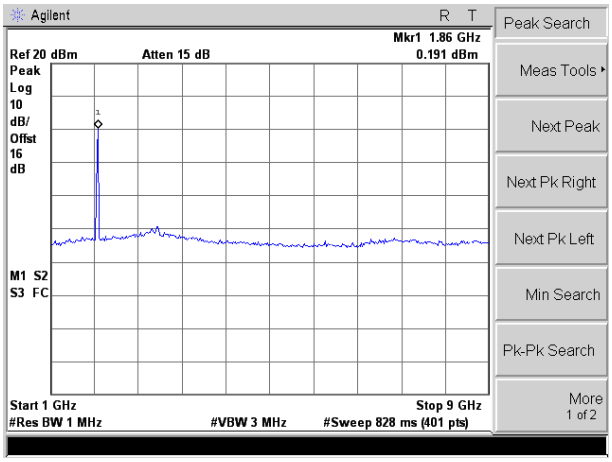
Lowest channel





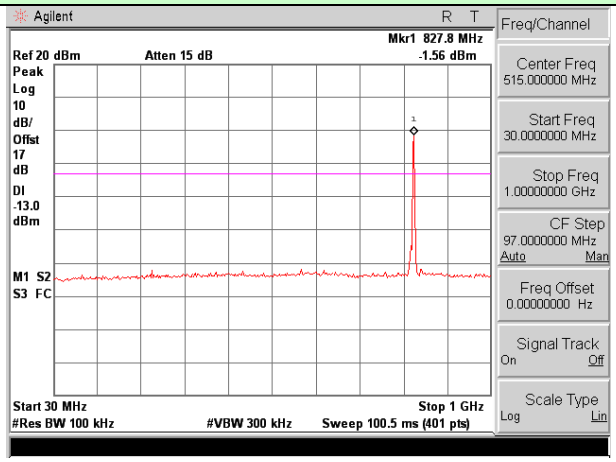
Middle channel

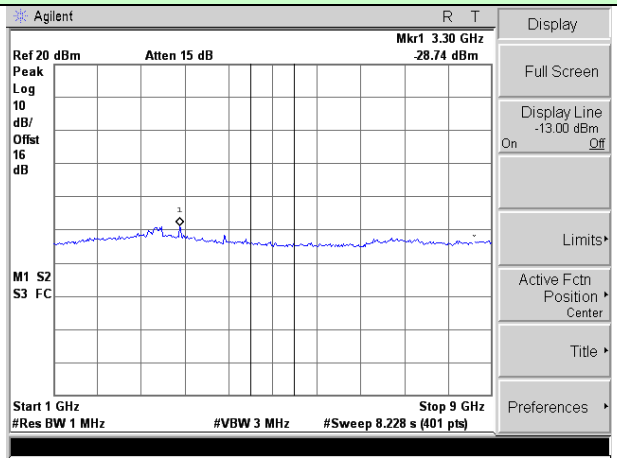




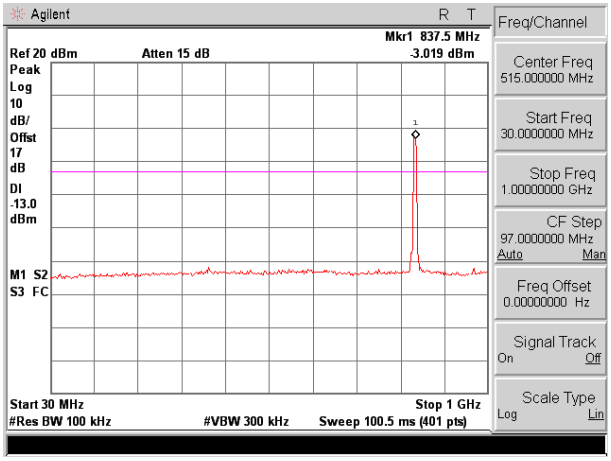
Highest channel

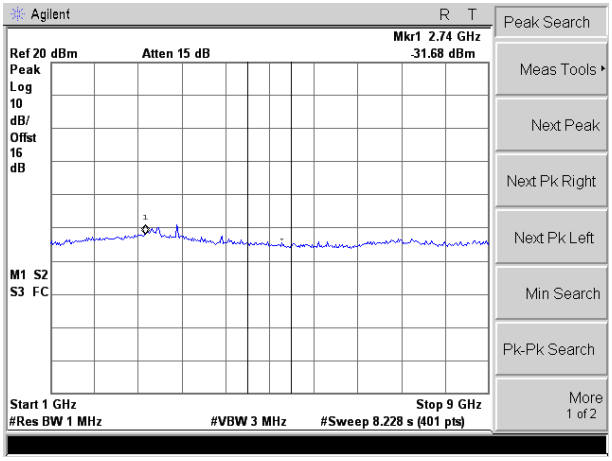
Test Mode: Traffic mode	WCDMA Band V (RMC 12.2Kbps link)



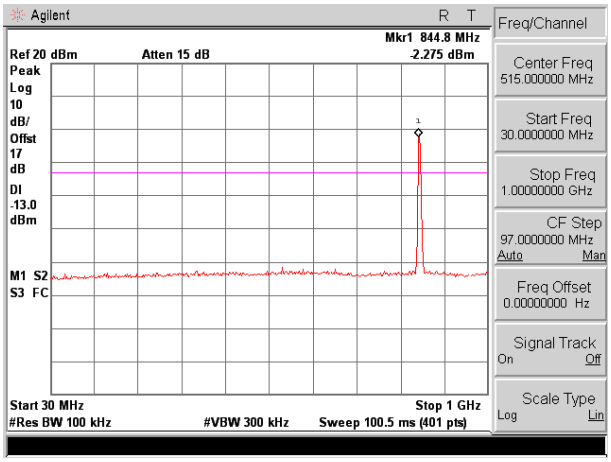


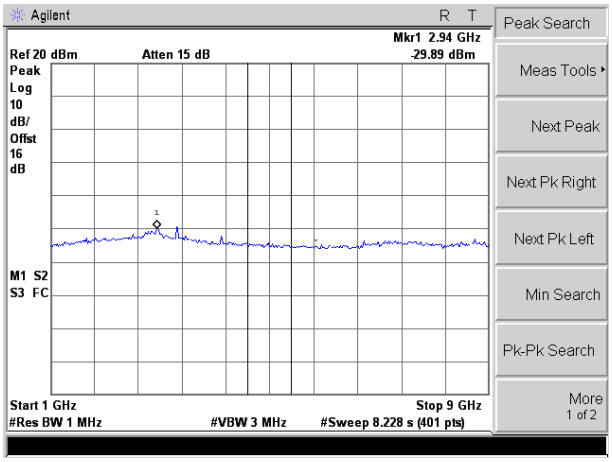
Lowest channel





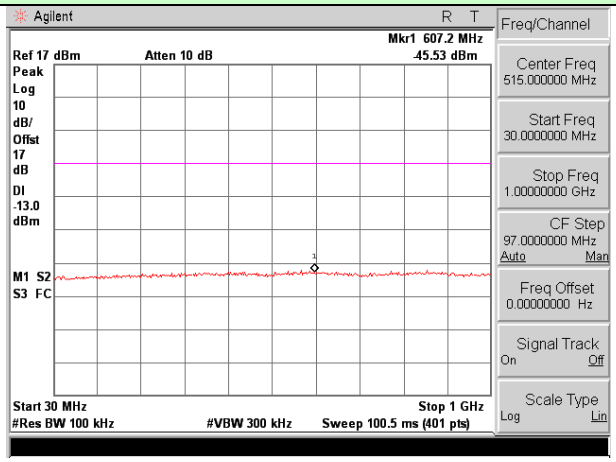
Middle channel

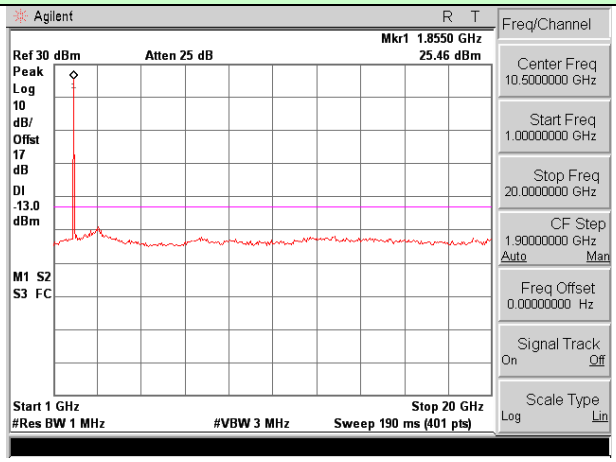




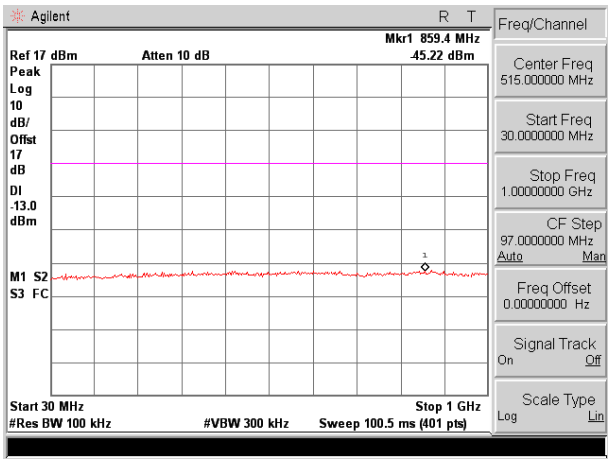
Highest channel

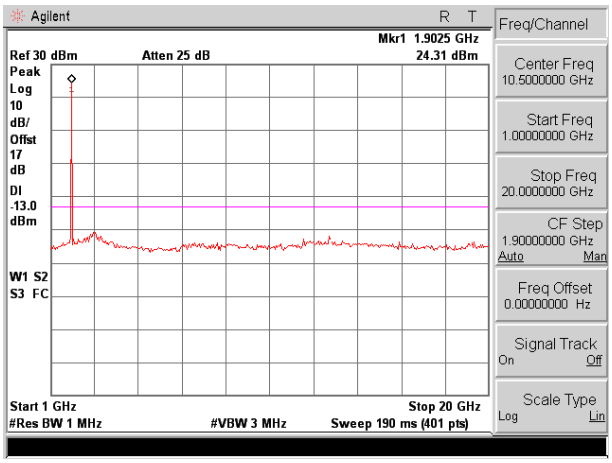
Test Mode: Traffic mode	WCDMA Band II (RMC 12.2Kbps link)



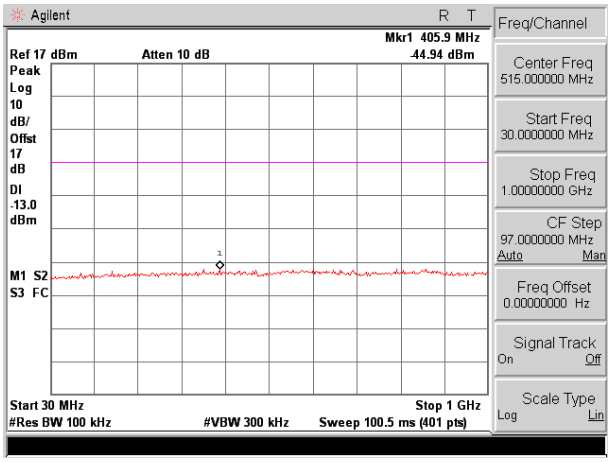


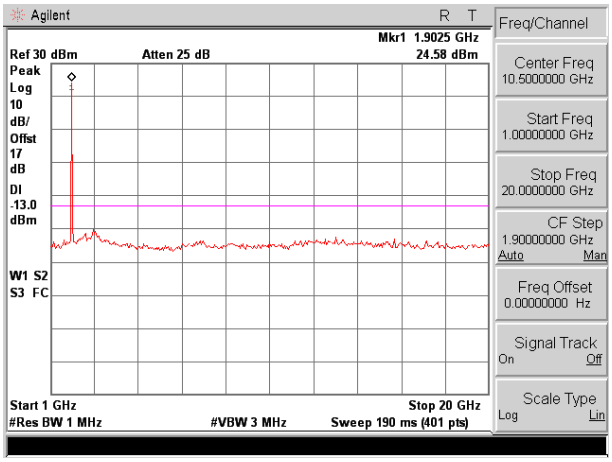
Lowest channel





Middle channel

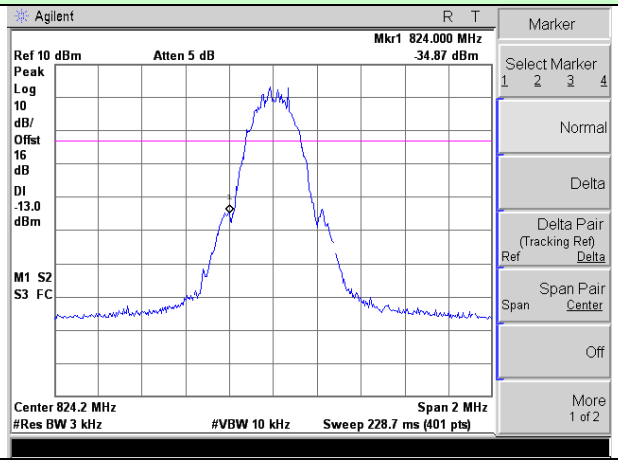




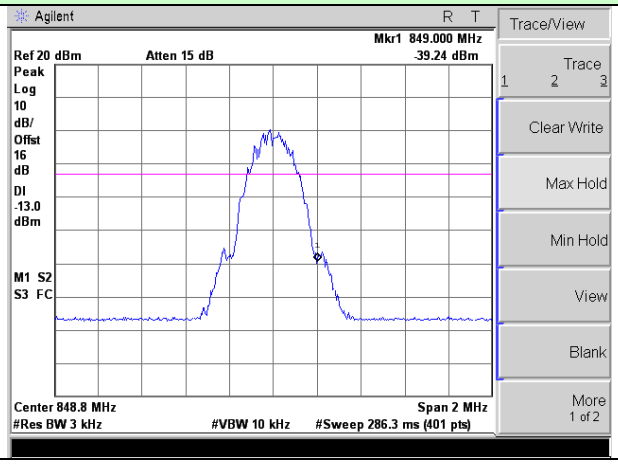
Highest channel

Band Edge:

Test Mode: Traffic mode	GSM850 (GPRS 1 link)

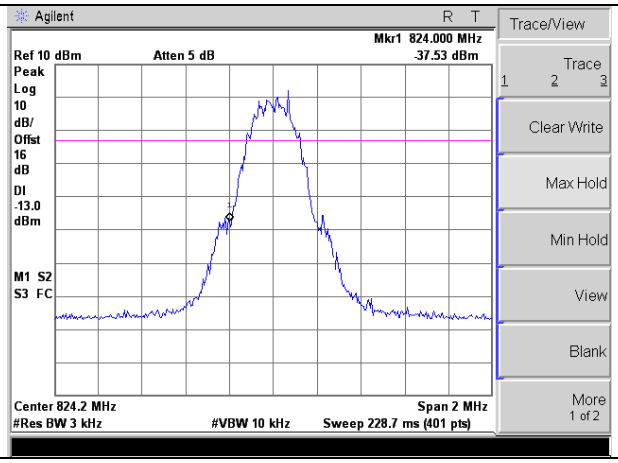


Lowest channel

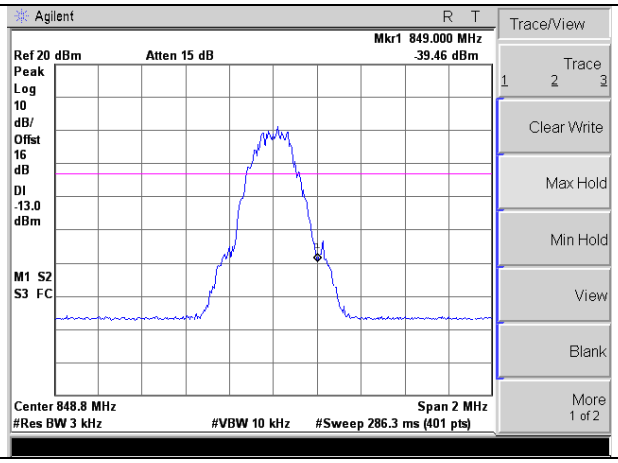


Highest channel

Test Mode: Traffic mode	GSM850 (EGPRS 1 link)

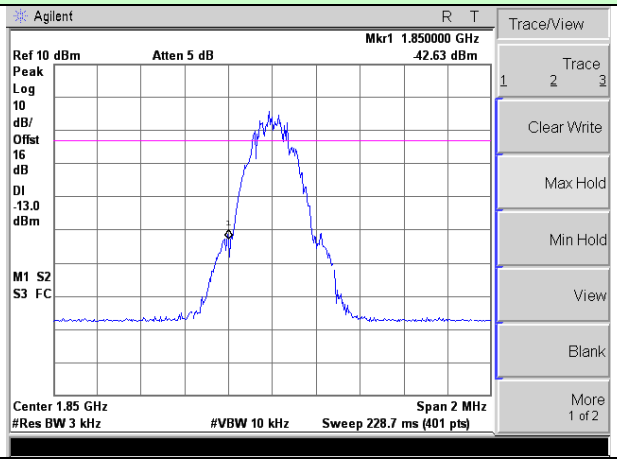


Lowest channel

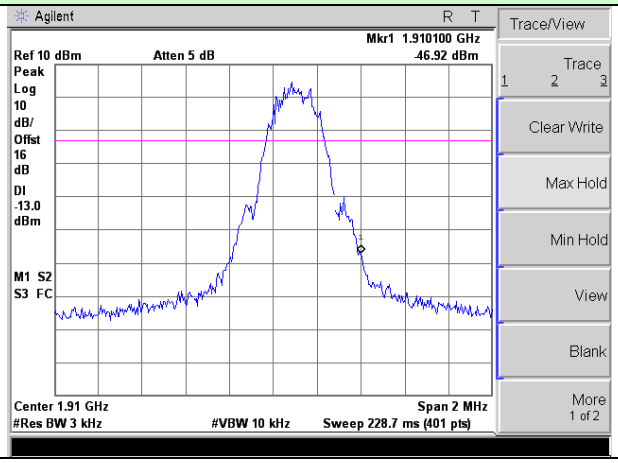


Highest channel

Test Mode: Traffic mode	PCS1900 (GPRS 1 link)

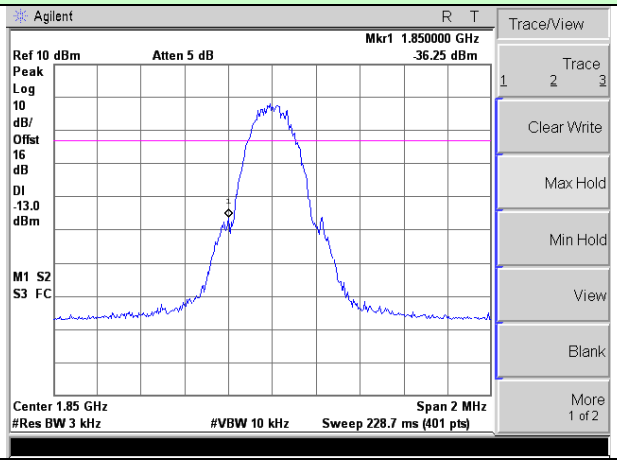


Lowest channel

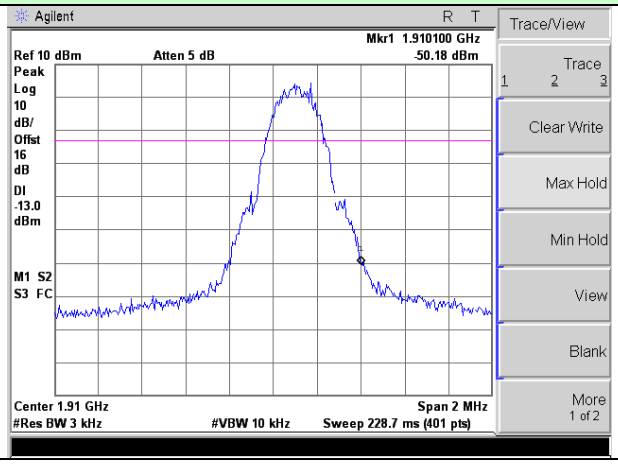


Highest channel

Test Mode: Traffic mode	PCS1900 (EGPRS 1 link)

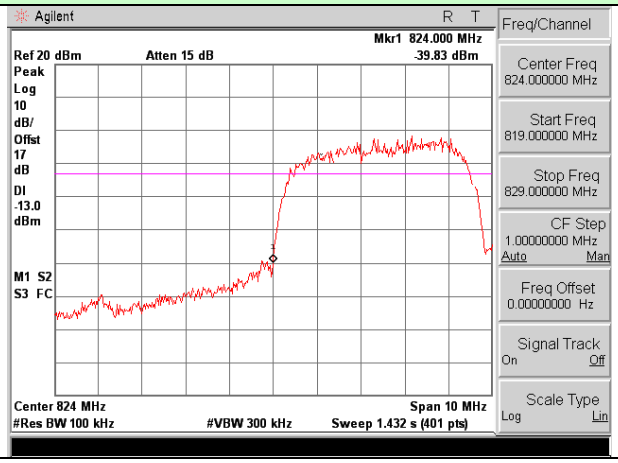


Lowest channel

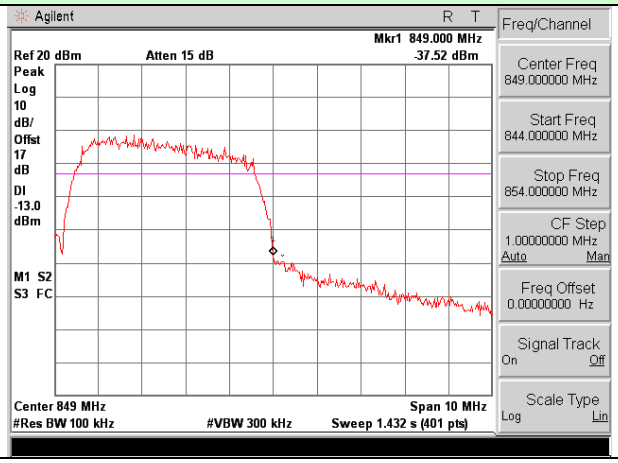


Highest channel

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

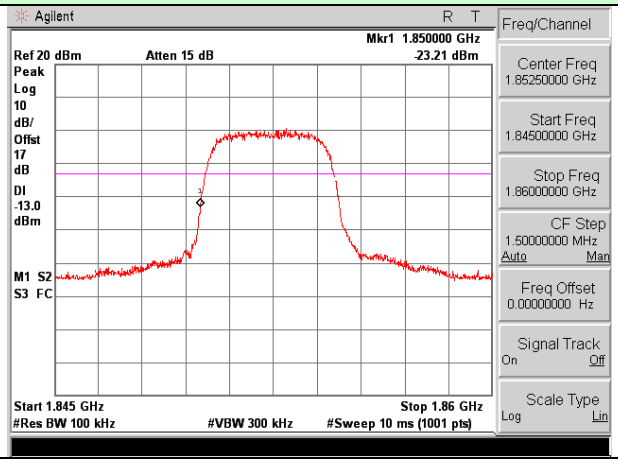


Lowest channel

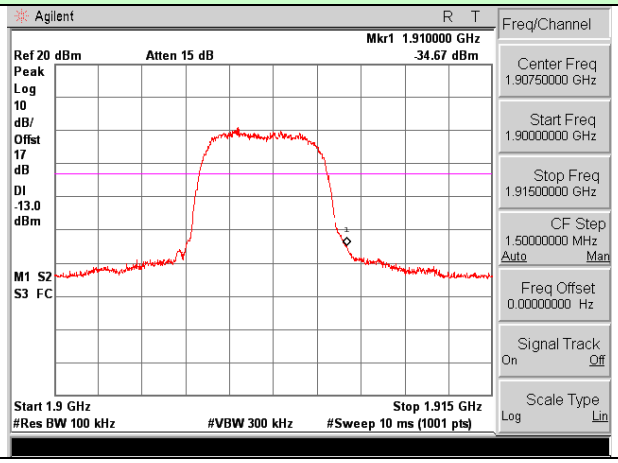


Highest channel

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

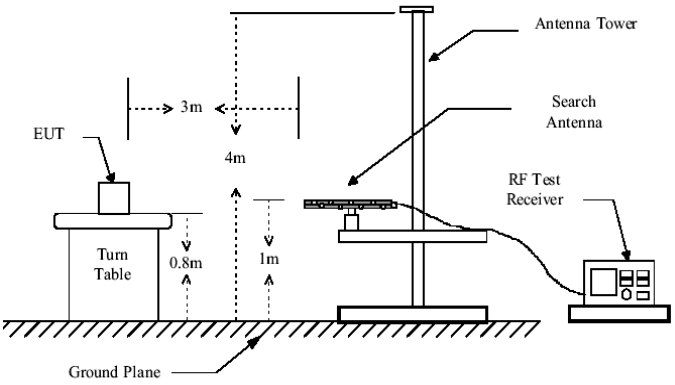
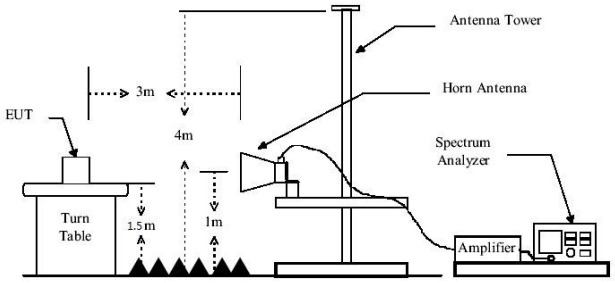
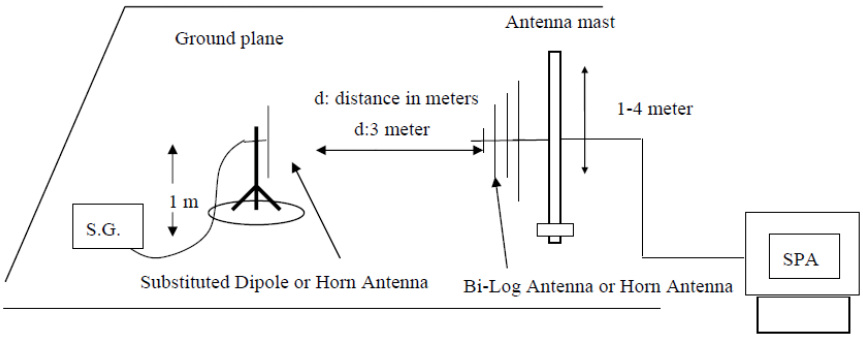


Lowest channel



Highest channel

4.8 ERP, EIRP Measurement

Test Requirement:	FCC part22.913(a) and FCC part24.232(b)
Test Method:	FCC part2.1046
Limit:	GSM850, WCDMA Band V: 7W PCS1900, WCDMA Band II: 2W
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

EUT mode	Channel	EUT Pol.	Antenna Pol.	ERP(dBm)	Limit (dBm)	Result
GSM850 (GPRS 1 link)	Lowest	H	V	27.12	38.45	Pass
			H	**31.33**		
		E1	V	26.50		
			H	29.87		
		E2	V	26.01		
			H	31.03		
	Middle	H	V	27.03	38.45	Pass
			H	31.00		
		E1	V	26.69		
			H	29.82		
		E2	V	25.32		
			H	29.68		
	Highest	H	V	26.44	38.45	Pass
			H	31.05		
		E1	V	26.39		
			H	30.37		
		E2	V	26.67		
			H	30.28		

EUT mode	Channel	EUT Pol.	Antenna Pol.	ERP(dBm)	Limit (dBm)	Result
GSM850 (EGPRS 1 link)	Lowest	H	V	27.40	38.45	Pass
			H	30.09		
		E1	V	27.57		
			H	30.63		
		E2	V	26.92		
			H	29.14		
	Middle	H	V	26.43	38.45	Pass
			H	30.26		
		E1	V	25.67		
			H	29.49		
		E2	V	25.52		
			H	28.19		
	Highest	H	V	27.73	38.45	Pass
			H	30.49		
		E1	V	26.90		
			H	29.77		
		E2	V	25.48		
			H	28.55		

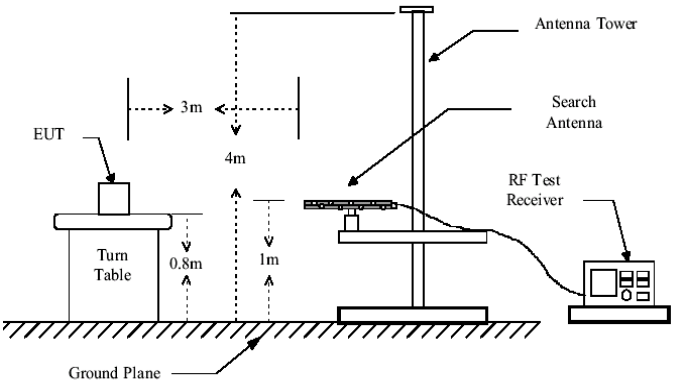
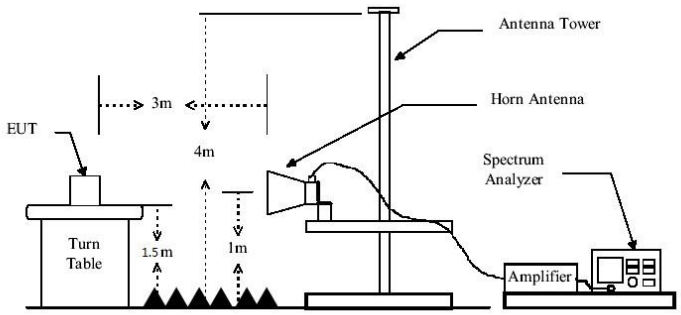
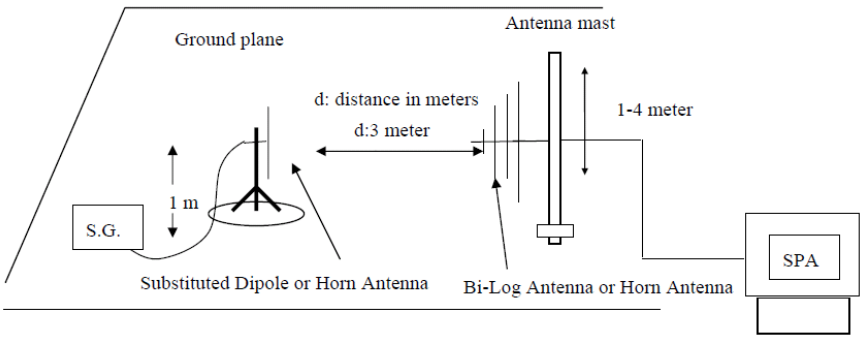
EUT mode	Channel	EUT Pol.	Antenna Pol.	EIRP (dBm)	Limit (dBm)	Result
PCS1900 (GPRS 1 link)	Lowest	H	V	23.93	33.01	Pass
			H	23.70		
		E1	V	23.13		
			H	23.63		
		E2	V	23.73		
			H	26.59		
	Middle	H	V	23.67	33.01	Pass
			H	25.99		
		E1	V	23.45		
			H	24.94		
		E2	V	23.51		
			H	23.66		
	Highest	H	V	23.03	33.01	Pass
			H	26.89		
		E1	V	24.33		
			H	27.27		
		E2	V	23.57		
			H	25.89		

EUT mode	Channel	EUT Pol.	Antenna Pol.	EIRP (dBm)	Limit (dBm)	Result
PCS1900 (EGPRS 1 link)	Lowest	H	V	23.41	33.01	Pass
			H	26.41		
		E1	V	22.92		
			H	25.86		
		E2	V	23.87		
			H	26.20		
	Middle	H	V	23.08	33.01	Pass
			H	26.22		
		E1	V	23.82		
			H	25.62		
		E2	V	23.05		
			H	24.50		
	Highest	H	V	23.70	33.01	Pass
			H	26.38		
		E1	V	23.99		
			H	26.42		
		E2	V	23.38		
			H	27.03		

EUT mode	Channel	EUT Pol.	Antenna Pol.	ERP(dBm)	Limit (dBm)	Result
WCDMA Band V	Lowest	H	V	23.58	38.45	Pass
			H	26.20		
		E1	V	22.91		
			H	25.94		
		E2	V	23.47		
			H	25.84		
	Middle	H	V	23.05	38.45	Pass
			H	26.21		
		E1	V	23.89		
			H	25.84		
		E2	V	23.75		
			H	25.06		
	Highest	H	V	23.89	38.45	Pass
			H	26.24		
		E1	V	23.38		
			H	27.00		
		E2	V	23.46		
			H	27.03		

EUT mode	Channel	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
WCDMA Band II	Lowest	H	V	23.17	33.01	Pass
			H	26.06		
		E1	V	23.03		
			H	26.24		
		E2	V	23.18		
			H	25.85		
	Middle	H	V	23.19	33.01	Pass
			H	25.99		
		E1	V	23.17		
			H	25.50		
		E2	V	23.37		
			H	24.66		
	Highest	H	V	23.96	33.01	Pass
			H	26.79		
		E1	V	23.64		
			H	26.90		
		E2	V	23.89		
			H	27.00		

4.9 Field strength of spurious radiation measurement

Test Requirement:	FCC part22.917(a) and FCC part24.238(a)
Test Method:	FCC part2.1053
Limit:	-13dBm
Test setup:	Below 1GHz  Above 1GHz  Substituted method: 

Test Procedure:	1. The EUT was placed on an non-conductive turntable using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer. 2. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations. 3. The frequency range up to tenth harmonic was investigated for each of three fundamental frequency (low, middle and high channels). Once spurious emission was identified, the power of the emission was determined using the substitution method. 4. The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency. ERP / EIRP = S.G. output (dBm) + Antenna Gain(dB/dBi) – Cable Loss (dB)
Test Instruments:	Refer to section 5.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

Measurement Data

Test mode:	GSM850 (GPRS)		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1648.40	Vertical	-36.98	-13.00	Pass
2472.60	V	-40.10		
3296.80	V	-41.88		
4121.00	V	-44.04		
4945.20	V	---		
1648.40	Horizontal	-42.34	-13.00	Pass
2472.60	H	-45.70		
3296.80	H	-48.26		
4121.00	H	-50.28		
4945.20	H	---		
Test mode:	**GSM850 (GPRS)**		**Test channel:**	**Middle**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1673.20	Vertical	-38.14	-13.00	Pass
2509.80	V	-41.01		
3346.40	V	-42.99		
4183.00	V	-43.81		
5019.60	V	---		
1673.20	Horizontal	-42.36	-13.00	Pass
2509.80	H	-45.84		
3346.40	H	-47.03		
4183.00	H	-49.82		
5019.60	H	---		
Test mode:	**GSM850 (GPRS)**		**Test channel:**	**Highest**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1697.60	Vertical	-38.75	-13.00	Pass
2546.40	V	-40.03		
3395.20	V	-42.65		
4244.00	V	-43.27		
5092.80	V	---		
1697.60	Horizontal	-42.33	-13.00	Pass
2546.40	H	-45.22		
3395.20	H	-46.27		
4244.00	H	-48.56		
5092.80	H	---		

Remark：

1. The emission behaviour belongs to narrowband spurious emission.
2. Remark"---" means that the emission level is too low to be measured
3. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

Test mode:	GSM850 (EGPRS)		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1648.40	Vertical	-37.02	-13.00	Pass
2472.60	V	-40.04		
3296.80	V	-41.91		
4121.00	V	-43.98		
4945.20	V	---		
1648.40	Horizontal	-42.33	-13.00	Pass
2472.60	H	-45.63		
3296.80	H	-48.29		
4121.00	H	-50.34		
4945.20	H	---		
Test mode:	**GSM850 (EGPRS)**		**Test channel:**	**Middle**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1673.20	Vertical	-38.08	-13.00	Pass
2509.80	V	-41.05		
3346.40	V	-42.90		
4183.00	V	-43.80		
5019.60	V	---		
1673.20	Horizontal	-42.42	-13.00	Pass
2509.80	H	-45.76		
3346.40	H	-46.99		
4183.00	H	-49.83		
5019.60	H	---		
Test mode:	**GSM850 (EGPRS)**		**Test channel:**	**Highest**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1697.60	Vertical	-38.71	-13.00	Pass
2546.40	V	-39.97		
3395.20	V	-42.55		
4244.00	V	-43.20		
5092.80	V	---		
1697.60	Horizontal	-42.39	-13.00	Pass
2546.40	H	-45.25		
3395.20	H	-46.30		
4244.00	H	-48.55		
5092.80	H	---		

Remark：

4. The emission behaviour belongs to narrowband spurious emission.
5. Remark"---" means that the emission level is too low to be measured
6. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

Test mode:	PCS1900 (GPRS)		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3700.40	Vertical	-37.57	-13.00	Pass
5550.60	V	-39.59		
7400.80	V	-42.11		
9251.00	V	-43.27		
11101.20	V	---		
3700.40	Horizontal	-41.92	-13.00	Pass
5550.60	H	-45.57		
7400.80	H	-47.21		
9251.00	H	-49.45		
11101.20	H	---		
Test mode:	**PCS1900 (GPRS)**		**Test channel:**	**Middle**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3760.00	Vertical	-34.45	-13.00	Pass
5640.00	V	-37.21		
7520.00	V	-39.54		
9400.00	V	-41.82		
11280.00	V	---		
3760.00	Horizontal	-40.21	-13.00	Pass
5640.00	H	-43.93		
7520.00	H	-45.05		
9400.00	H	-46.62		
11280.00	H	---		
Test mode:	**PCS1900 (GPRS)**		**Test channel:**	**Highest**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3819.60	Vertical	-35.97	-13.00	Pass
5729.40	V	-38.76		
7639.20	V	-41.00		
9549.00	V	-42.84		
11458.80	V	---		
3819.60	Horizontal	-40.60	-13.00	Pass
5729.40	H	-44.78		
7639.20	H	-46.07		
9549.00	H	-47.88		
11458.80	H	---		

Remark：

1. The emission behaviour belongs to narrowband spurious emission.
2. Remark"---" means that the emission level is too low to be measured
3. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

Test mode:	PCS1900 (EGPRS)		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3700.40	Vertical	-37.58	-13.00	Pass
5550.60	V	-40.36		
7400.80	V	-42.32		
9251.00	V	-44.08		
11101.20	V	---		
3700.40	Horizontal	-42.86	-13.00	Pass
5550.60	H	-45.62		
7400.80	H	-47.41		
9251.00	H	-49.73		
11101.20	H	---		
Test mode:	**PCS1900 (EGPRS)**		**Test channel:**	**Middle**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3760.00	Vertical	-35.36	-13.00	Pass
5640.00	V	-37.38		
7520.00	V	-40.52		
9400.00	V	-42.70		
11280.00	V	---		
3760.00	Horizontal	-40.35	-13.00	Pass
5640.00	H	-44.10		
7520.00	H	-45.58		
9400.00	H	-47.62		
11280.00	H	---		
Test mode:	**PCS1900 (EGPRS)**		**Test channel:**	**Highest**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3819.60	Vertical	-36.40	-13.00	Pass
5729.40	V	-39.74		
7639.20	V	-41.19		
9549.00	V	-43.78		
11458.80	V	---		
3819.60	Horizontal	-41.40	-13.00	Pass
5729.40	H	-44.91		
7639.20	H	-46.36		
9549.00	H	-48.56		
11458.80	H	---		

Remark：

4. The emission behaviour belongs to narrowband spurious emission.
5. Remark"---" means that the emission level is too low to be measured
6. 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	-36.46	-13.00	Pass
2479.20	V	-40.05		
3305.60	V	-43.40		
4132.00	V	-40.46		
4958.40	V	---		
1652.80	Horizontal	-39.49	-13.00	Pass
2479.20	H	-42.53		
3305.60	H	-47.77		
4132.00	H	-51.34		
4958.40	H	---		
Test mode:	**WCDMA Band V**		**Test channel:**	**Middle**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1672.80	Vertical	-38.77	-13.00	Pass
2509.20	V	-39.98		
3345.60	V	-43.87		
4182.00	V	-46.62		
5018.40	V	---		
1672.80	Horizontal	-40.91	-13.00	Pass
2509.20	H	-43.26		
3345.60	H	-48.23		
4182.00	H	-50.43		
5018.40	H	---		
Test mode:	**WCDMA Band V**		**Test channel:**	**Highest**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1693.20	Vertical	-37.73	-13.00	Pass
2539.80	V	-39.68		
3386.40	V	-42.80		
4233.00	V	-46.51		
5079.60	V	---		
1693.20	Horizontal	-40.87	-13.00	Pass
2539.80	H	-43.36		
3386.40	H	-45.28		
4233.00	H	-50.96		
5079.60	H	---		

Remark：

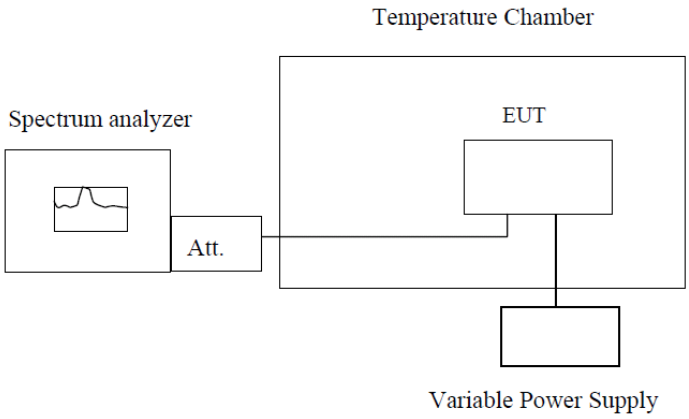
1. The emission behaviour belongs to narrowband spurious emission.
2. Remark"---" means that the emission level is too low to be measured
3. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

Test mode:	WCDMA Band II		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3704.80	Vertical	-38.83	-13.00	Pass
5557.20	V	-41.89		
7409.60	V	-44.71		
9262.00	V	-47.21		
11114.40	V	---		
3704.80	Horizontal	-45.59	-13.00	Pass
5557.20	H	-49.38		
7409.60	H	-50.72		
9262.00	H	-54.45		
11114.40	H	---		
Test mode:	**WCDMA Band II**		**Test channel:**	**Middle**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3760.00	Vertical	-39.94	-13.00	Pass
5640.00	V	-42.17		
7520.00	V	-45.42		
9400.00	V	-47.70		
11280.00	V	---		
3760.00	Horizontal	-45.43	-13.00	Pass
5640.00	H	-49.49		
7520.00	H	-51.30		
9400.00	H	-54.31		
11280.00	H	---		
Test mode:	**WCDMA Band II**		**Test channel:**	**Highest**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3815.20	Vertical	-40.10	-13.00	Pass
5722.80	V	-42.23		
7630.40	V	-44.33		
9538.00	V	-46.01		
11445.60	V	---		
3815.20	Horizontal	-44.25	-13.00	Pass
5722.80	H	-48.33		
7630.40	H	-49.25		
9538.00	H	-52.03		
11445.60	H	---		

Remark：

1. The emission behaviour belongs to narrowband spurious emission.
2. Remark"---" means that the emission level is too low to be measured
3. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

4.10 Frequency stability V.S. Temperature measurement

Test Requirement:	FCC Part2.1055(a)(1)(b)
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

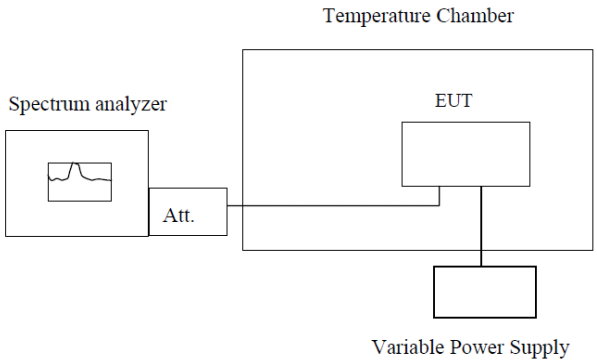
Measurement Data

Reference Frequency: GSM850 (GPRS 1 link) Middle channel=190 channel=836.6MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
12.0	-30	12	0.0145	2.5	Pass
	-20	32	0.0387		
	-10	22	0.0260		
	0	18	0.0211		
	10	14	0.0166		
	20	12	0.0149		
	30	27	0.0318		
	40	29	0.0351		
	50	23	0.0278		
Reference Frequency: GSM850 (EGPRS 1 link) Middle channel=190 channel=836.6MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
12.0	-30	49	0.0589	2.5	Pass
	-20	57	0.0678		
	-10	46	0.0554		
	0	40	0.0477		
	10	49	0.0580		
	20	38	0.0455		
	30	74	0.0881		
	40	64	0.0770		
	50	55	0.0657		

Reference Frequency: PCS1900 (GPRS 1 link) Middle channel=661 channel=1880MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error			Result
		Hz	ppm		
12.0	-30	36	0.0192	2.5	Pass
	-20	52	0.0278		
	-10	38	0.0202		
	0	37	0.0195		
	10	33	0.0174		
	20	26	0.0136		
	30	49	0.0261		
	40	39	0.0209		
	50	38	0.0203		
Reference Frequency: PCS1900 (EGPRS 1 link) Middle channel=661 channel=1880MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error			Result
		Hz	ppm		
12.0	-30	96	0.0512	2.5	Pass
	-20	96	0.0512		
	-10	92	0.0491		
	0	82	0.0434		
	10	107	0.0571		
	20	83	0.0439		
	30	140	0.0743		
	40	109	0.0580		
	50	122	0.0648		

Reference Frequency: WCDMA Band V Middle channel=4183 channel=836.6MHz					
Power supplied (Vdc)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
12.0	-30	102	0.1216	2.5	Pass
	-20	137	0.1643		
	-10	159	0.1896		
	0	68	0.0813		
	10	112	0.1338		
	20	117	0.1400		
	30	186	0.2226		
	40	170	0.2027		
	50	206	0.2468		
Reference Frequency: WCDMA Band II Middle channel=9400 channel=1880.0MHz					
Power supplied (Vdc)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
12.0	-30	85	0.0454	2.5	Pass
	-20	81	0.0433		
	-10	72	0.0381		
	0	71	0.0377		
	10	71	0.0375		
	20	63	0.0337		
	30	72	0.0382		
	40	78	0.0415		
	50	75	0.0396		

4.11 Frequency stability V.S. Voltage measurement

Test Requirement:	FCC Part2.1055(d)(1)(2)
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

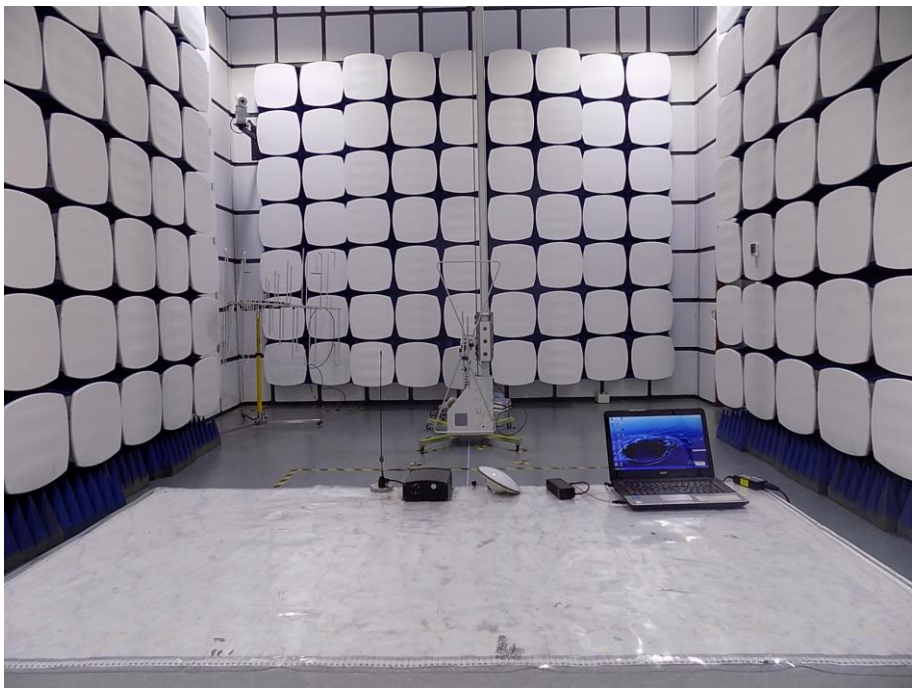
Reference Frequency: GSM850 (GPRS 1 link) Middle channel=190 channel=836.6MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	13.80	34	0.0403	2.5	Pass
	12.00	29	0.0341		
	10.20	30	0.0359		
Reference Frequency: GSM850 (EGPRS 1 link) Middle channel=190 channel=836.6MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	13.80	44	0.0524	2.5	Pass
	12.00	33	0.0394		
	10.20	29	0.0344		

Reference Frequency: PCS1900 (GPRS 1 link) Middle channel=661 channel=1880MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	13.80	45	0.0238	2.5	Pass
	12.00	33	0.0174		
	10.20	30	0.0157		
Reference Frequency: PCS1900 (EGPRS 1 link) Middle channel=661 channel=1880MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	13.80	60	0.0319	2.5	Pass
	12.00	69	0.0366		
	10.20	72	0.0382		

Reference Frequency: WCDMA Band V Middle channel=4183 channel=836.6MHz					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	13.80	51	0.0612	2.5	Pass
	12.00	46	0.0553		
	10.20	55	0.0654		
Reference Frequency: WCDMA Band II Middle channel=940 channel=1880.0MHz					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	13.80	11	0.0059	2.5	Pass
	12.00	16	0.0085		
	10.20	14	0.0077		

5 Test Setup Photo

Radiated Emission



6 EUT Constructional Details

Please refer to report T1881484 01.

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