Report On

FCC Testing of the
Shanghai SAND Information Technology System Co.,Ltd
GSM/GPRS EFT-POS PS400
In accordance with FCC CFR 47 Part 15, 22 and 24

COMMERCIAL-IN-CONFIDENCE

FCC ID: XLHPS400

Document 57008081 Report 01 Issue 1 August 2009

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REPORT ON	FCC Testing of the Shanghai SAND Information Technology System Co.,Ltd GSM/GPRS EFT-POS PS400 In accordance with FCC CFR 47 Part 15, 22 and 24 Document 57008081 Report 01 Issue 1 August 09
PREPARED FOR	Shanghai SAND Information Technology System Co.,Ltd No. 22 Building, Baoshi Garden, No. 487 Tianlin Road, Shanghai 200233 P.R. China
PREPARED BY	**Xiaoying ZHANG** Project Engineer
APPROVED BY	**Qun LI** Project Engineer
DATED	18 August 2009

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC CFR 47: Part 15, 22 and 24. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

Q Li X Zhang

Product Service

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SECTION 1

REPORT SUMMARY

FCC Testing of the Shanghai SAND Information Technology System Co.,Ltd
GSM/GPRS EFT-POS PS400
In accordance with FCC CFR 47 Part 15, 22 and 24

Product Service

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Shanghai SAND Information Technology System Co.,Ltd GSM/GPRS EFT-POS PS400 to the requirements of FCC CFR 47 Part 15, 22 and 24: 2008.

Testing was carried out in support of an application for Grant of Equipment Authorisation of GSM/GPRS EFT-POS PS400.

Objective	To perform FCC testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Shanghai SAND Information Technology System Co.,Ltd
Model Number(s)	GSM/GPRS EFT-POS PS400
Serial Number(s)	Engineering Sample
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 15, 22 and 24: 2008
Incoming Release Date	Declaration of Build Status 08 January 2009
Start of Test	08 January 2009
Finish of Test	07 July 2009
Name of Engineer(s)	Q Li X Zhang
Related Document(s)	FCC CFR 47 Part 2:2008 ANSI C63.4:2003

Product Service

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of results in accordance with FCC CFR 47 Part 15, 22 and 24: 2008, is shown below.

Configuration - GSM/GPRS EFT-POS							
Section	FCC Clause	IC Clause	Test Description	Mode	Mod State	Result	Comments
FCC CFR 47: Part 15, Subparts B							
2.1	15.109		Enclosure Radiated Emissions	Receiving	0	Pass	
2.2	15.107		Conducted Emissions on Power Line	Idle	0	Pass	
FCC CFR 47: Part 22							
2.3	22.913 (a)		Maximum Peak Output Power - Conducted	824.2 MHz	0	Pass	
				836.6 MHz	0	Pass	
				848.8 MHz	0	Pass	
2.4	22.913 (a)		Maximum Peak Output Power – Radiated (EIRP Method)	824.2 MHz	0	Pass	
				836.6 MHz	0	Pass	
				848.8 MHz	0	Pass	
2.5	2.1047 (d)		Modulation Characteristics	824.2 MHz	0	N/A	
				836.6 MHz	0	Pass	
				848.8 MHz	0	N/A	
2.6	2.1049 (h), 22.917 (b)		Occupied Bandwidth	824.2 MHz	0	Pass	
				836.6 MHz	0	Pass	
				848.8 MHz	0	Pass	
2.7	2.1051, 2.905, 22.917(b)		Spurious Emissions at Terminals (±1MHz)	824.2 MHz	0	Pass	
				836.6 MHz	0	Pass	
				848.8 MHz	0	Pass	
2.8	22.917 (a)		Radiated Spurious Emissions	824.2 MHz	0	Pass	
				836.6 MHz	0	Pass	
				848.8 MHz	0	Pass	
2.9	2.1051, 22.917 (a)		Conducted Spurious Emissions	824.2 MHz	0	Pass	
				836.6 MHz	0	Pass	
				848.8 MHz	0	Pass	
2.10	2.1055, 22.355		Frequency Stability Under Temperature Variations	824.2 MHz	0	N/A	
				836.6 MHz	0	Pass	
				848.8 MHz	0	N/A	
2.11	2.1055, 22.355		Frequency Stability Under Voltage Variations	824.2 MHz	0	N/A	
				836.6 MHz	0	Pass	
				848.8 MHz	0	N/A	

Product Service

Configuration - GSM/GPRS EFT-POS							
Section	FCC Clause	IC Clause	Test Description	Mode	Mod State	Result	Comments
FCC CFR 47: Part 24							
2.12	24.232 (c)		Maximum Peak Output Power - Conducted	1850.2 MHz	0	Pass	
				1880.0 MHz	0	Pass	
				1909.8 MHz	0	Pass	
2.13	24.232 (c)		Maximum Peak Output Power – Radiated (EIRP Method)	1850.2 MHz	0	Pass	
				1880.0 MHz	0	Pass	
				1909.8 MHz	0	Pass	
2.14	2.1047 (d)		Modulation Characteristics	1850.2 MHz	0	N/A	
				1880.0 MHz	0	Pass	
				1909.8 MHz	0	N/A	
2.15	24.232 (d)		Peak- Average Ratio	1850.2 MHz	0	N/A	
				1880.0 MHz	0	Pass	
				1909.8 MHz	0	N/A	
2.16	2.1049 (h), 24.238 (b)		Occupied Bandwidth	1850.2 MHz	0	Pass	
				1880.0 MHz	0	Pass	
				1909.8 MHz	0	Pass	
2.17	2.1051, 24.229, 24.238 (b)		Spurious Emissions at Terminals (±1MHz)	1850.2 MHz	0	Pass	
				1880.0 MHz	0	Pass	
				1909.8 MHz	0	Pass	
2.18	24.238 (a)		Radiated Spurious Emissions	1850.2 MHz	0	Pass	
				1880.0 MHz	0	Pass	
				1909.8 MHz	0	Pass	
2.19	2.1051, 24.238 (a)		Conducted Spurious Emissions	1850.2 MHz	0	Pass	
				1880.0 MHz	0	Pass	
				1909.8 MHz	0	Pass	
2.20	2.1055, 24.235		Frequency Stability Under Temperature Variations	1850.2 MHz	0	N/A	
				1880.0 MHz	0	Pass	
				1909.8 MHz	0	N/A	
2.21	2.1055, 24.235		Frequency Stability Under Voltage Variations	1850.2 MHz	0	N/A	
				1880.0 MHz	0	Pass	
				1909.8 MHz	0	N/A	

N/A – Not Applicable

Product Service

1.3 DECLARATION OF BUILD STATUS

MAIN EUT	
MANUFACTURING DESCRIPTION	GSM/GPRS EFT-POS
MANUFACTURER	Shanghai SAND Information Technology System Co.,Ltd
TYPE	PS400
PART NUMBER	--
SERIAL NUMBER	Engineering Samples
HARDWARE VERSION	--
SOFTWARE VERSION	--
TRANSMITTER OPERATING RANGE	GSM850: 824.2 to 848.8 MHz GSM1900: 1850.2 to 1909.8 MHz
RECEIVER OPERATING RANGE	GSM850: 824.2 to 848.8 MHz GSM1900: 1930.2 to 1989.8 MHz
COUNTRY OF ORIGIN	P.R. CHINA
INTERMEDIATE FREQUENCIES	None
ITU DESIGNATION OF EMISSION	850 Band – 242K8GXW 1900 Band – 242K4GXW
HIGHEST INTERNALLY GENERATED FREQUENCY	GSM 850 Band: 824 – 849 MHz PCS 1900 Band: 1850 – 1910 MHz
OUTPUT POWER (W or dBm)	850 Band: Class 4 (PCL 5) 2W or 33dBm 1900 Band : Class 0 (PCL 0) 1W or 30dBm
FCC ID	XLHPS400
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	Dual Band GSM/GPRS EFT-POS with RFID Reader
MANUFACTURING DESCRIPTION	The EFT-POS PS400 was powered by a Lithium Battery: 7.4Vdc normal; 6.8V – 8.4Vdc extreme The battery could be charged by the adaptor: Model Type: HKA01210008-2A Manufacturer: Huntkey Input: 100 – 240Vac, 0.5 Amax, 50/60Hz Output: 10.0Vdc, 0.8A

Signature	Zeng Jing
Date	10 January 2009
D of B S Serial No	57008081

No responsibility will be accepted by TÜV Product Service as to the accuracy of the information declared in this document by the manufacturer.

Product Service

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) PS400 was a Shanghai SAND Information Technology System Co.,Ltd GSM/GPRS EFT-POS designed for data transmitting in the GSM850 and PCS 1900 networks as shown below. A full technical description can be found in the Manufacturers documentation.

Equipment Under Test

Product Service

1.4.2 Test Configuration

The EUT was configured in accordance with FCC CFR 47 Part 15, 22 and 24: 2008.

The EUT was powered by a 7.4V full charged Battery.

Test Configuration 1 – GSM 850 Mode

Test Configuration 2 – PCS 1900 Mode

1.4.3 Modes of Operation

Operation Modes

Mode 0 – Idle

Test Configuration 1 – GSM 850 Mode :

Mode 1 – GSM 824.2 MHz (Bottom Channel)
Mode 2 – GSM 836.4 MHz (Middle Channel)
Mode 3 – GSM 848.8 MHz (Top Channel)

Mode 4 – GPRS 824.2 MHz (Bottom Channel)
Mode 5 – GPRS 836.4 MHz (Middle Channel)
Mode 6 – GPRS 848.8 MHz (Top Channel)

Mode 7 – 850MHz Receiving on 836.4 MHz (Middle Channel)

Mode 8 – Carrier 836.4 MHz (Middle Channel)

Test Configuration 2 – PCS 1900 Mode :

Mode 1 – GSM 1850.2 MHz (Bottom Channel)
Mode 2 – GSM 1880.0 MHz (Middle Channel)
Mode 3 – GSM 1909.8 MHz (Top Channel)

Mode 4 – GPRS 1850.2 MHz (Bottom Channel)
Mode 5 – GPRS 1880.0 MHz (Middle Channel)
Mode 6 – GPRS 1909.8 MHz (Top Channel)

Mode 7 – 850MHz Receiving on 1880.0 MHz (Middle Channel)

Mode 8 – Carrier 1880.0 MHz (Middle Channel)

Information on the specific test modes utilised are detailed in the test procedure for each individual test.

Product Service

1.5 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure, test laboratories or an open test area as appropriate.

1.6 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

1.7 MODIFICATION RECORD

Modification State	Description of Modification fitted to EUT	Sample S/N
0	Initial sample supplied by customer	Engineering sample

No modifications were made to the EUT during testing.

1.8 ALTERNATIVE TEST SITE

The testing was conducted at the following site registrations:

FCC Accreditation
910917 The State Radio Monitoring Center, No.80 Beilishi Road Xicheng District Beijing, China.

Product Service

SECTION 2

TEST DETAILS

FCC Testing of the Shanghai SAND Information Technology System Co.,Ltd
GSM/GPRS EFT-POS PS400
In accordance with FCC CFR 47 Part 15, 22 and 24

2.1 ENCLOSURE RADIATED EMISSIONS

2.1.1 Specification Reference

FCC CFR 47 Part 15: 2008, Subpart B, Clause 15.109

2.1.2 Equipment Under Test

GSM/GPRS EFT-POS PS400

2.1.3 Date of Test and Modification State

06 and 07 July 2009 – Modification State 0

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.5 Test Method and Operating Modes

The test was applied in accordance with ANSI C63.4.

A preliminary profile of the Spurious Radiated Emissions was obtained by operating the EUT on a remotely controlled turntable within a semi-anechoic chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

Emissions identified within the range 30MHz – 1GHz were formally measured using a CISPR Quasi-Peak detector.

The measurements were performed at a 3m distance unless otherwise stated.

The test was performed with the EUT in the following modes of operation:

Configuration 1 - Mode 7
Configuration 2 - Mode 7

2.1.6 Environmental Conditions

	06 July 2009	07 July 2009
Ambient Temperature	23.2°C	24.2°C
Relative Humidity	24.1%	23.3%

Product Service

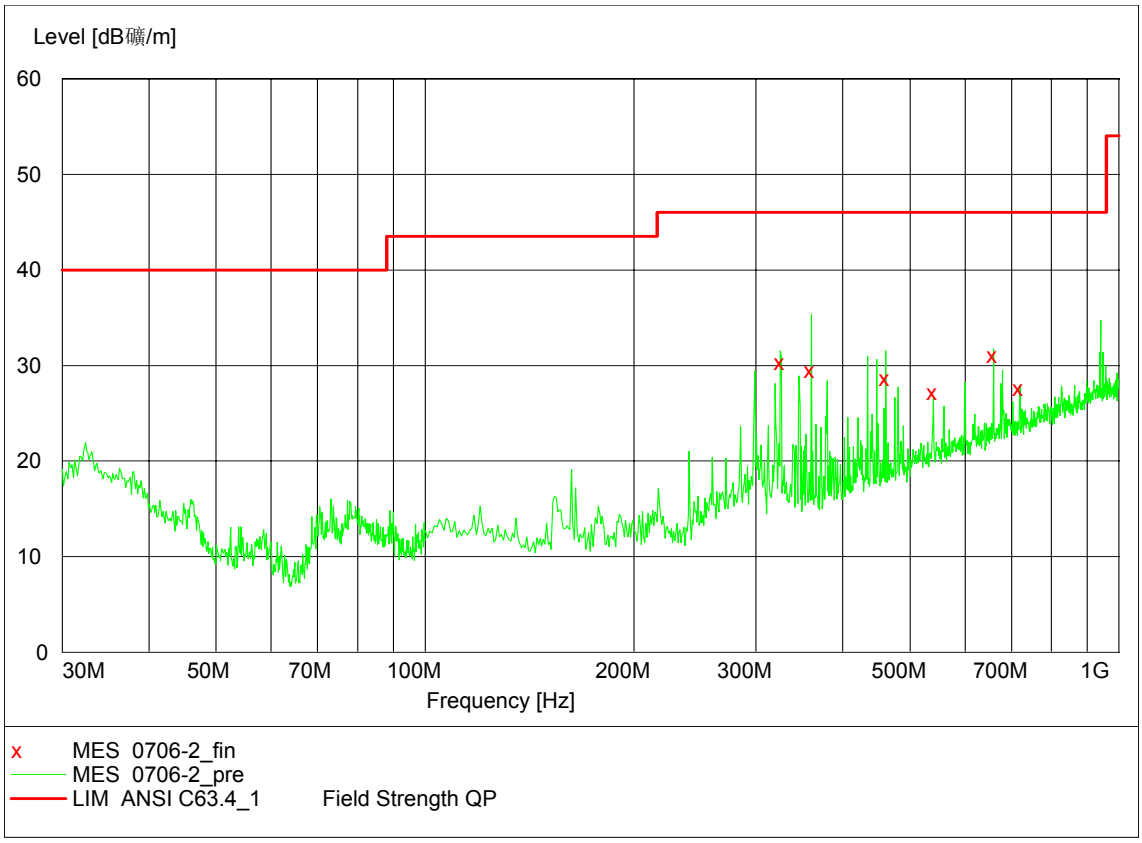
2.1.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part FCC CFR 47 Part 15: 2008 Subpart B for Spurious Radiated Emissions (30MHz – 1GHz).

Measurements were made with the EUT in idle Mode (See section 1.4.3 for details).

The test results are shown below.

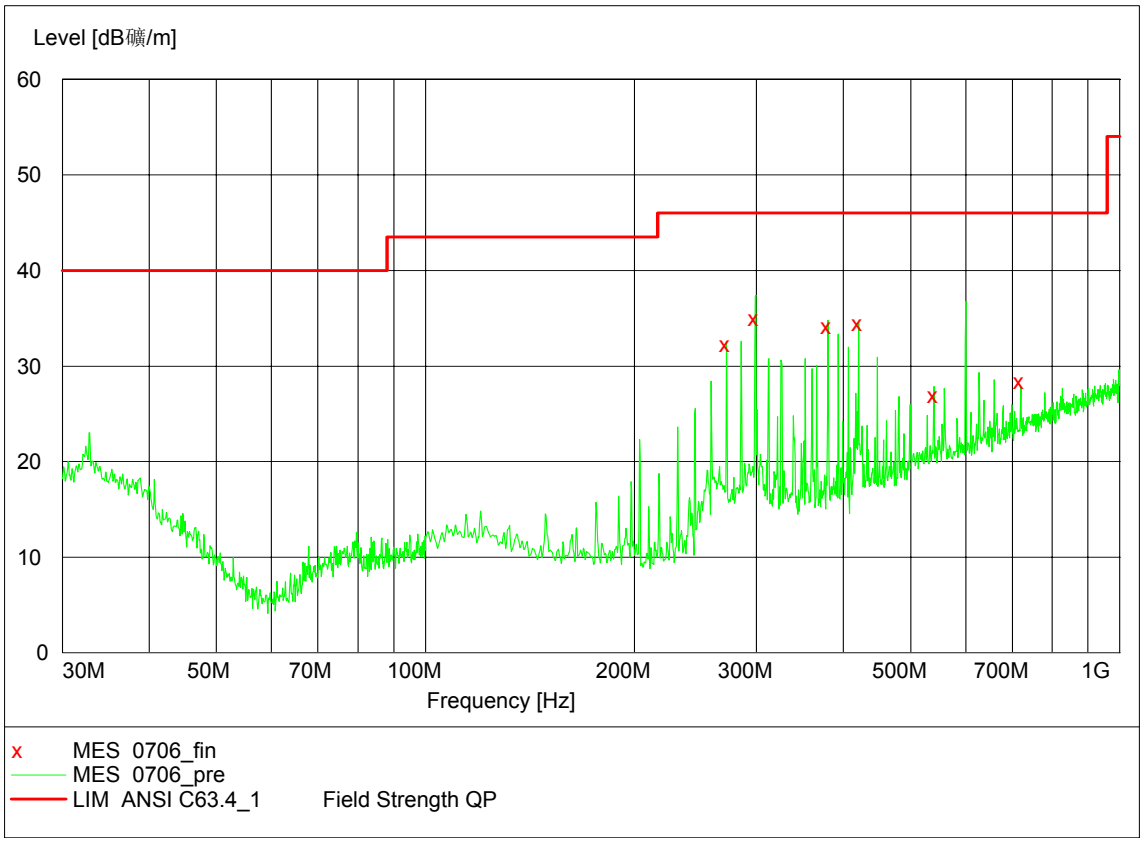
Configuration 1- GSM 850 Receiving Mode 7



Emission Frequency (MHz)	Polarisation	Height (cm)	Azimuth (degree)	Field Strength		Limit	
				dBµV/m	µV/m	dBµV/m	µV/m
325.420000	Horizontal	100.00	270.00	30.30	32.73	46.00	200.00
360.100000	Horizontal	100.00	270.00	29.50	29.85	46.00	200.00
461.080000	Horizontal	200.00	270.00	28.60	26.91	46.00	200.00
540.020000	Vertical	100.00	270.00	27.20	22.91	46.00	200.00
660.020000	Vertical	100.00	270.00	31.10	35.89	46.00	200.00
720.020000	Vertical	100.00	0.00	27.60	23.99	46.00	200.00

Product Service

Configuration 2- PCS 1900 Receiving Mode 7



Emission Frequency (MHz)	Polarisation	Height (cm)	Azimuth (degree)	Field Strength		Limit	
				dBµV/m	µV/m	dBµV/m	µV/m
271.180000	Horizontal	100.00	270.00	32.30	41.21	46.00	200.00
298.360000	Horizontal	100.00	270.00	35.00	56.23	46.00	200.00
379.660000	Horizontal	100.00	270.00	34.10	50.70	46.00	200.00
420.340000	Horizontal	100.00	270.00	34.50	53.09	46.00	200.00
540.020000	Horizontal	200.00	270.00	26.90	22.13	46.00	200.00
720.020000	Horizontal	100.00	0.00	28.40	26.30	46.00	200.00

2.2 CONDUCTED EMISSIONS ON POWER LINE

2.2.1 Specification Reference

FCC CFR 47 Part 15: 2008, Subpart B, Clause 15.107

2.2.2 Equipment Under Test

GSM/GPRS EFT-POS PS400

2.2.3 Date of Test and Modification State

06 July 2009 – Modification State 0

2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of ANSI C63.4.

Emissions were formally measured using a Quasi-Peak and Average Detectors, which meet the CISPR requirements. The details of the worst-case emissions for the Live and Neutral Lines are presented in the tables below.

Conducted Emission were measured on Live and Neutral Lines in turn.

Measurements were made over the frequency range 0.15MHz to 30MHz.

The EUT was supplied from a 10.0Vdc 0.8A AD/DC Adatptor.

The test was performed with the EUT in the following configurations and modes of operation:

- Mode 0

2.2.6 Environmental Conditions

	06 July 2009
Ambient Temperature	23.2°C
Relative Humidity	24.1%

Product Service

2.2.7 Test Results

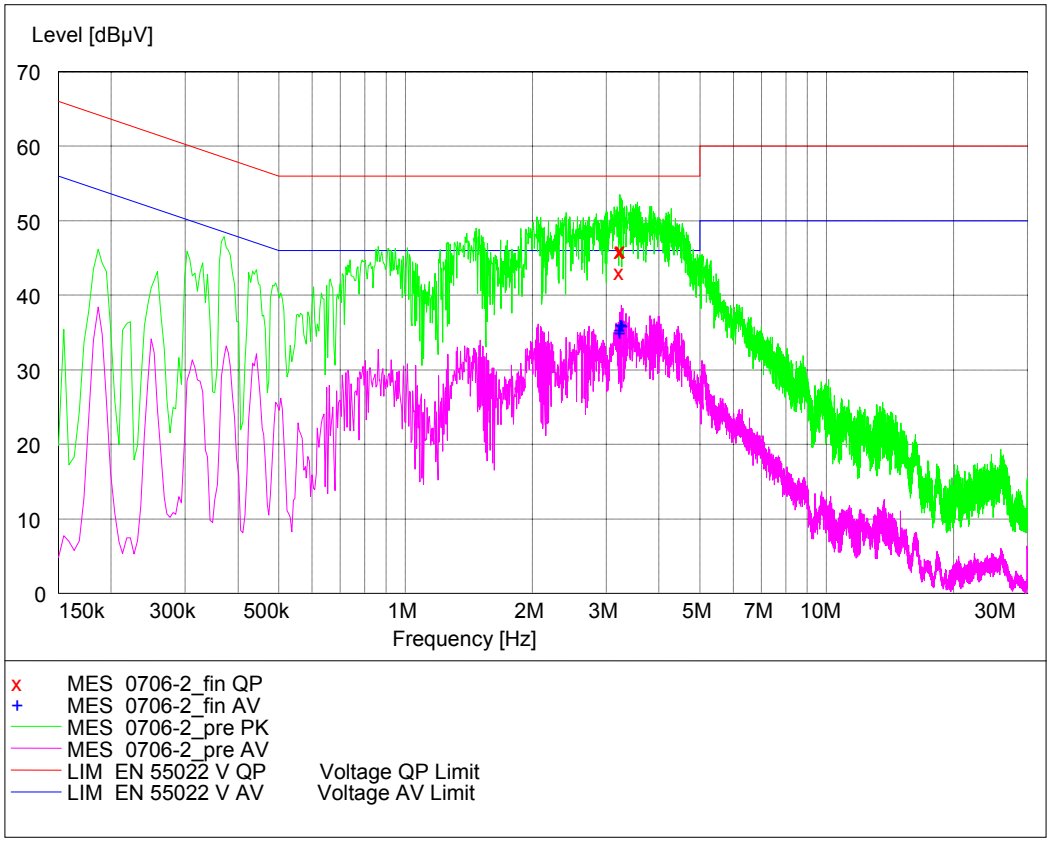
For the period of test the EUT met the Class B requirements of FCC CFR 47 Part 15: 2008 for Conducted Emissions on AC Power Ports.

Measurements were made with the EUT in idle Mode (See section 1.4.3 for details).

The test results are shown below.

- Mode 0

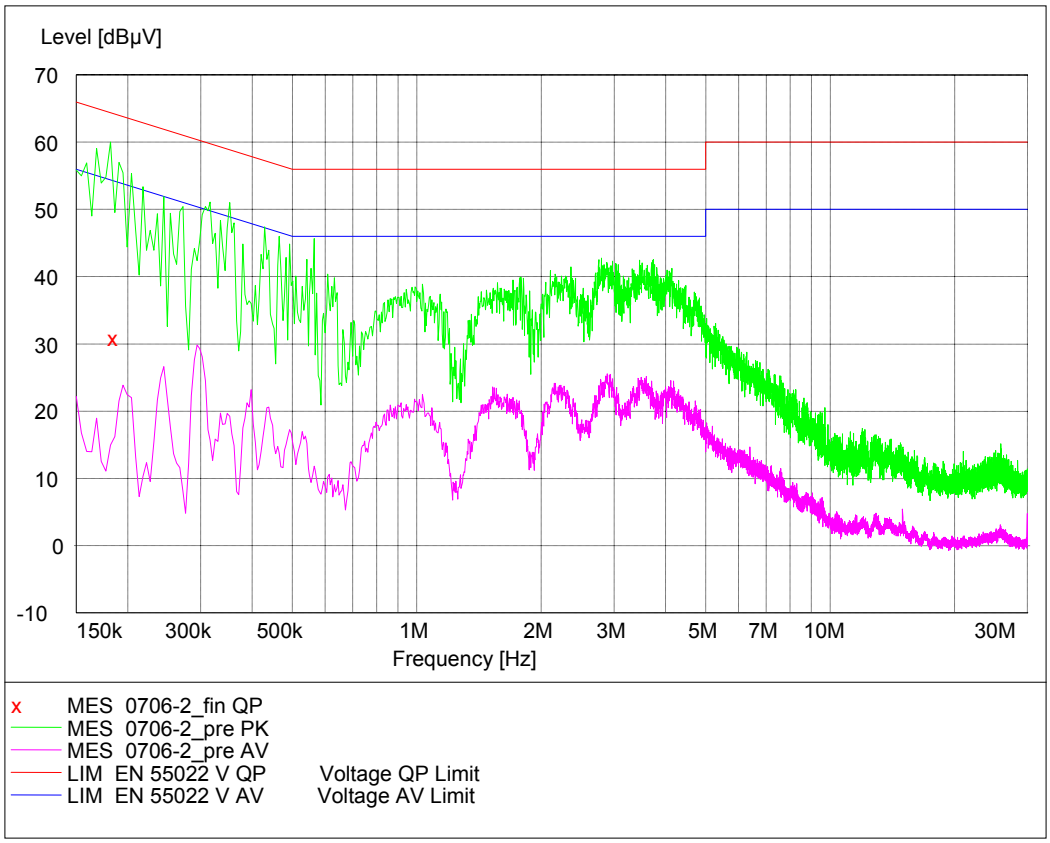
Live Line



Emission Frequency (MHz)	Average Level	Margin	Average Limit	
	dBµV	dB	dBµV	µV
3.232000	35.40	10.6	46.00	200.00
3.236000	35.00	11.0	46.00	200.00
3.256500	36.10	9.9	46.00	200.00
3.262000	36.10	9.9	46.00	200.00
3.281500	36.00	10.0	46.00	200.00

Product Service

Neutral Line



The margin between the specification requirements and all other emissions was 20dB or more below the specified Quasi-Peak and 20dB or more below the specified Average limit.

Product Service

2.3 MAXIMUM PEAK OUTPUT POWER - CONDUCTED

2.3.1 Specification Reference

FCC CFR 47 Part 22: 2008, Clause 22.913 (a)

2.3.2 Equipment Under Test

GSM/GPRS EFT-POS PS400

2.3.3 Date of Test and Modification State

06 July 2009 – Modification State 0

2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 22: 2008.

Using a Spectrum Analyzer with attenuator(s), the output was connected to a spectrum analyzer, the output power of the EUT was measured at the antenna terminals.

The path loss measured and entered as a reference level offset.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1
- Mode 1
- Mode 2
- Mode 3
- Mode 4
- Mode 5
- Mode 6

2.3.6 Environmental Conditions

	06 July 2009
Ambient Temperature	23.2°C
Relative Humidity	24.1%

Product Service

2.3.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 22: 2008 for Maximum Peak Output Power - Conducted.

The test results are shown below.

Configuration 1 – GSM 850 Mode 1 & 2 & 3

Channel	Frequency (MHz)	Path Loss (dB)	Result (dBm)	Result (W)
128	824.2	17.0	31.89	1.55
189	836.4	17.0	31.90	1.55
251	848.8	17.0	31.95	1.57

Configuration 1 – GPRS 850 Mode 4 & 5 & 6

Channel	Frequency (MHz)	Path Loss (dB)	Result (dBm)	Result (W)
128	824.2	17.0	31.89	1.55
189	836.4	17.0	31.90	1.55
251	848.8	17.0	31.95	1.57

Limit	≤7W or ≤38.45dBm for FCC

Remarks

The EUT does not exceed 7W or 38.45dBm for FCC at the measured frequencies.

2.4 MAXIMUM PEAK OUTPUT POWER – RADIATED (EIRP METHOD)

2.4.1 Specification Reference

FCC CFR 47 Part 22: 2008, Clause 22.913 (a)

2.4.2 Equipment Under Test

GSM/GPRS EFT-POS PS400

2.4.3 Date of Test and Modification State

07 July 2009 – Modification State 0

2.4.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 22: 2008.

The EUT contains an integral antenna and therefore the Maximum Peak Output Power was made using the EIRP method.

The Spectrum Analyser was turned to the test frequency. The device Output Power setting was controlled as specified in the Product Information. The device was then rotated through 360 degrees until the hishest power level was observed in both horizontal and vertical polarisation.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1
- Mode 1
- Mode 2
- Mode 3
- Mode 4
- Mode 5
- Mode 6

2.4.6 Environmental Conditions

	07 July 2009
Ambient Temperature	24.2°C
Relative Humidity	23.3%

Product Service

2.4.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 22: 2008 for Maximum Peak Output Power - Radiated.

The test results are shown below.

Configuration 1 – GSM 850 Mode 1 & 2 & 3

Channel	Frequency (MHz)	Result (dBm)	Result (W)
128	824.2	29.83	0.96
189	836.4	31.11	1.29
251	848.8	31.73	1.49

Configuration 1 – GPRS 850 Mode 4 & 5 & 6

Channel	Frequency (MHz)	Result (dBm)	Result (W)
128	824.2	29.84	0.96
189	836.4	31.09	1.29
251	848.8	31.77	1.50

Limit	≤7W or ≤38.45dBm for FCC

Remarks

The EUT does not exceed 7W or 38.45dBm for FCC at the measured frequencies.

2.5 MODULATION CHARACTERISTICS

2.5.1 Specification Reference

FCC CFR 47 Part 2: 2008, Clause 2.1047 (d)

2.5.2 Equipment Under Test

GSM/GPRS EFT-POS PS400

2.5.3 Date of Test and Modification State

15 January 2009 – Modification State 0

2.5.4 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 2: 2008.

Two views are shown for the GMSK mode of operation. One view shows the active slot. The other view shows the active slots over a complete frame.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 2

2.5.5 Environmental Conditions

	15 January 2009
Ambient Temperature	22.9°C
Relative Humidity	24.2%

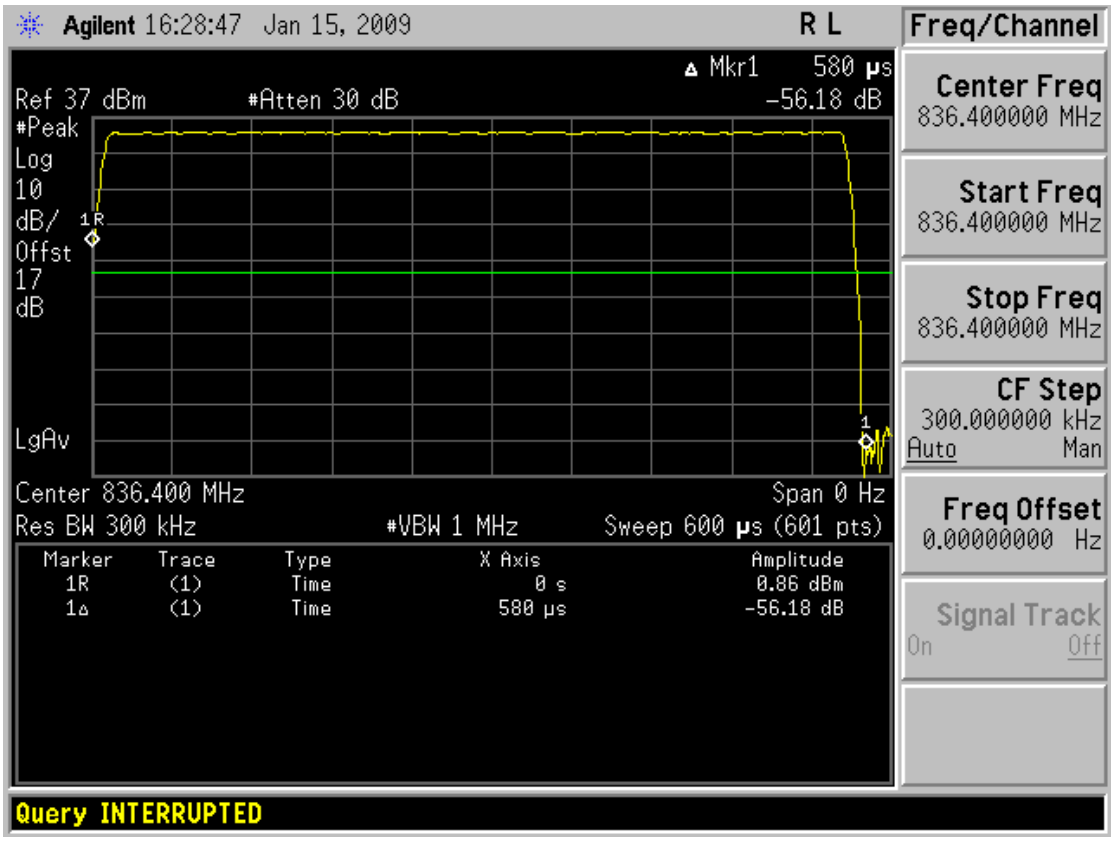
Product Service

2.5.6 Test Result

Plots are shown on the following page showing the EUT transmitting with the modulations:

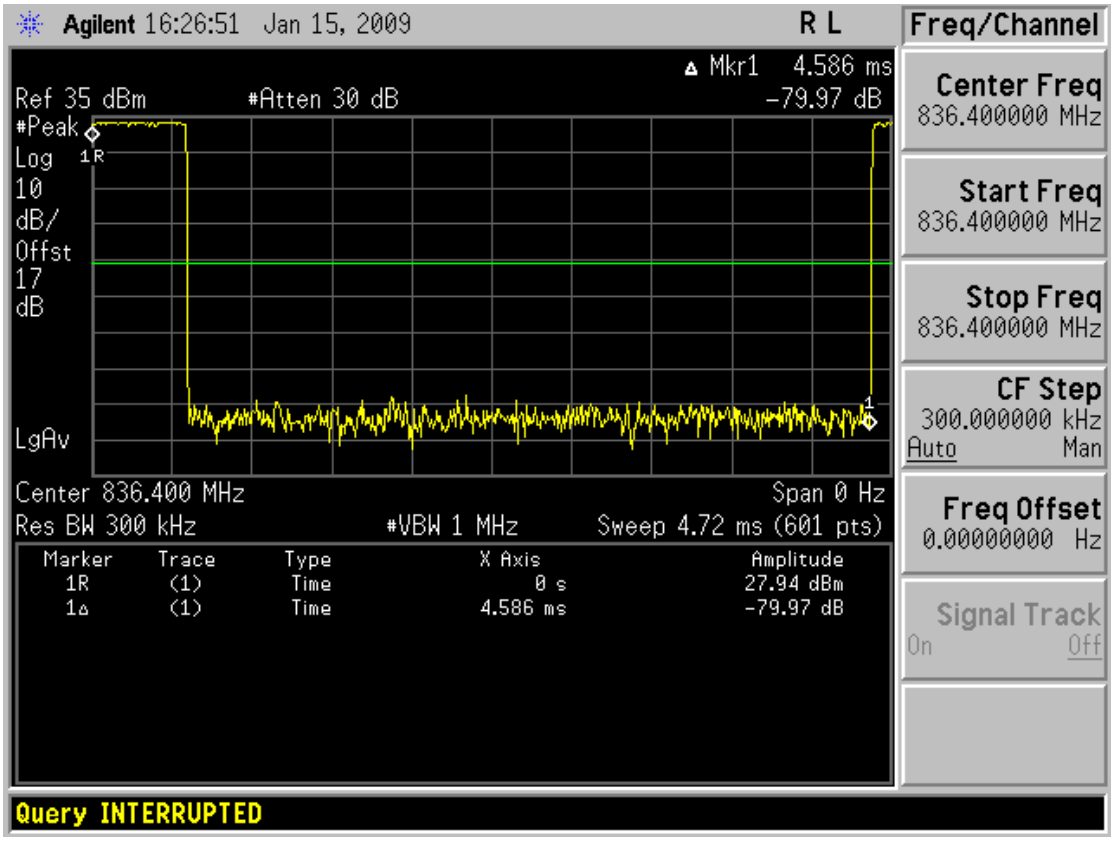
Measurements were made with the EUT in Middle Channel.

EUT transmitting with GMSK modulation:



GSM Mode. View of TS3

Product Service



GSM Mode. View of one Complete Frame Showing TS3

Product Service

2.6 OCCUPIED BANDWIDTH

2.6.1 Specification Reference

FCC CFR 47 Part 22: 2008, Clause 22.917 (b), 2.1049 (h),

2.6.2 Equipment Under Test

GSM/GPRS EFT-POS PS400

2.6.3 Date of Test and Modification State

15 January 2009 – Modification State 0

2.6.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.6.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 22: 2008.

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1
- Mode 2
- Mode 3
- Mode 4
- Mode 5
- Mode 6

2.6.6 Environmental Conditions

	15 January 2009
Ambient Temperature	22.9°C
Relative Humidity	24.2%

Product Service

2.6.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 22: 2008 for Occupied Bandwidth.

Configuration 1 – GSM 850 Mode 1 & 2 & 3

Channel	Frequency (MHz)	99% Power bandwidth (kHz)
128	824.2	242.8240
189	836.4	241.3509
251	848.8	239.5736

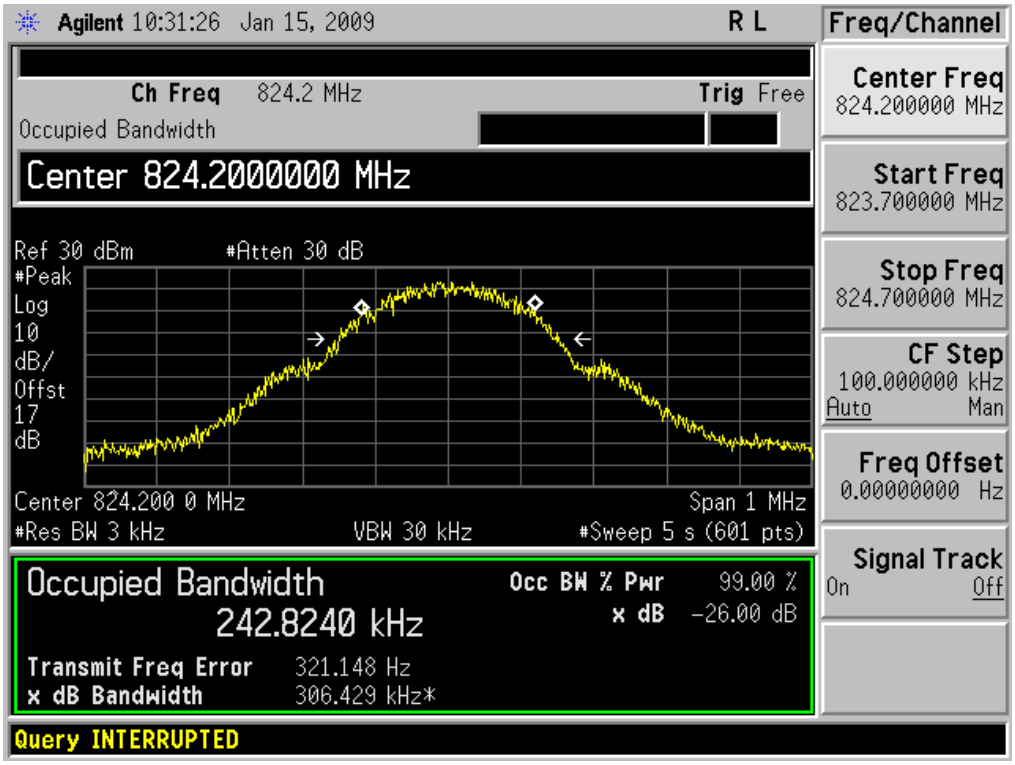
Configuration 1 – GPRS 850 Mode 4 & 5 & 6

Channel	Frequency (MHz)	99% Power bandwidth (kHz)
128	824.2	239.9147
189	836.4	240.0504
251	848.8	242.1943

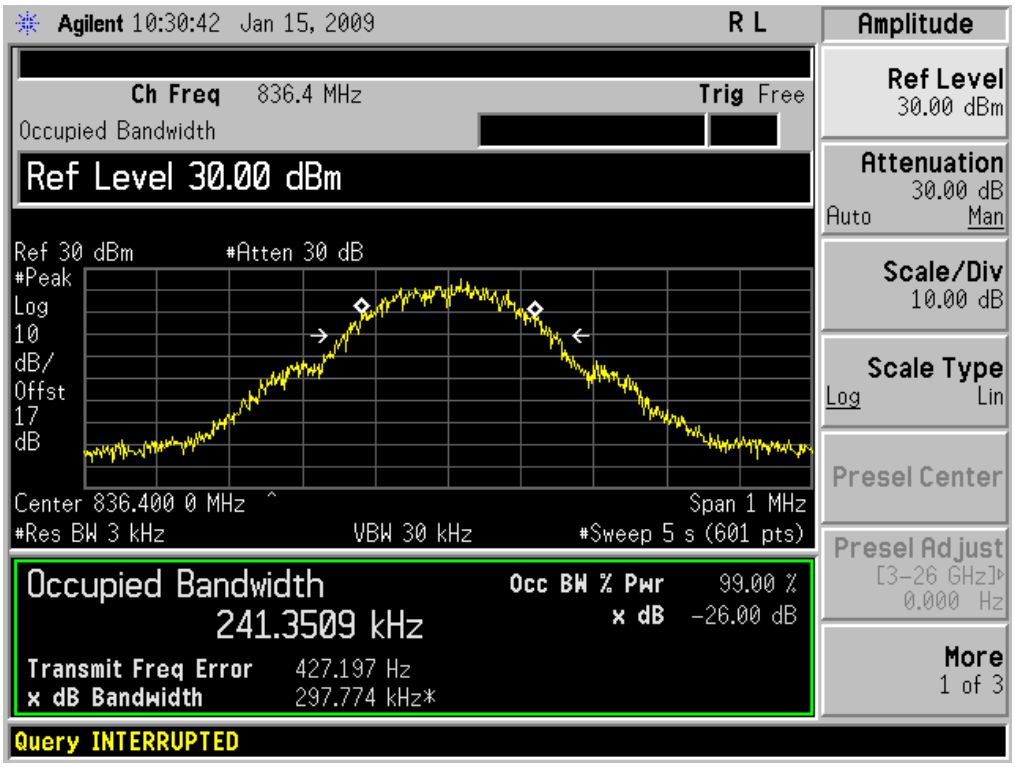
Product Service

The plots of test results are shown below.

Configuration 1 – GSM 850 Mode 1

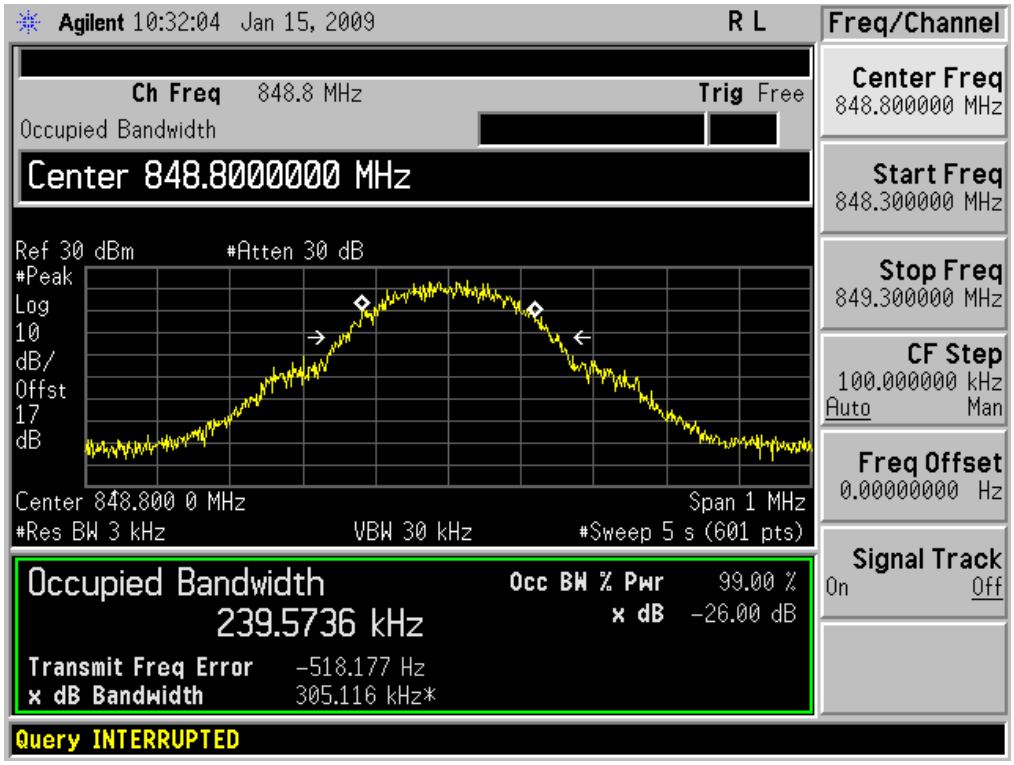


Configuration 1 – GSM 850 Mode 2

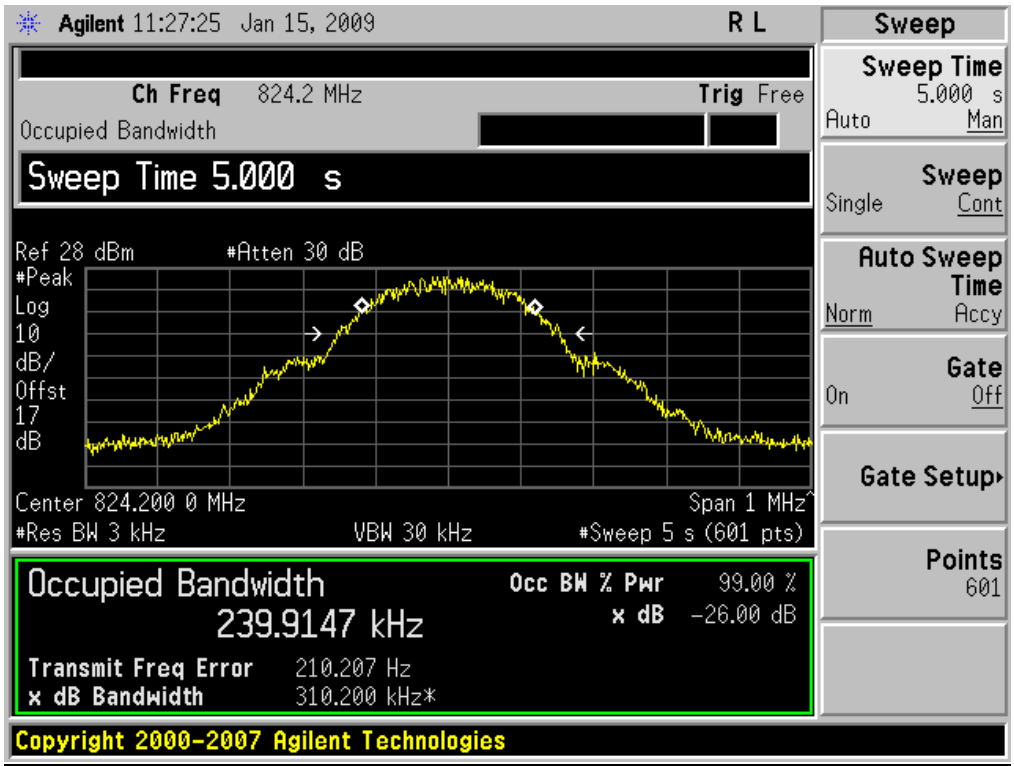


Product Service

Configuration 1 – GSM 850 Mode 3

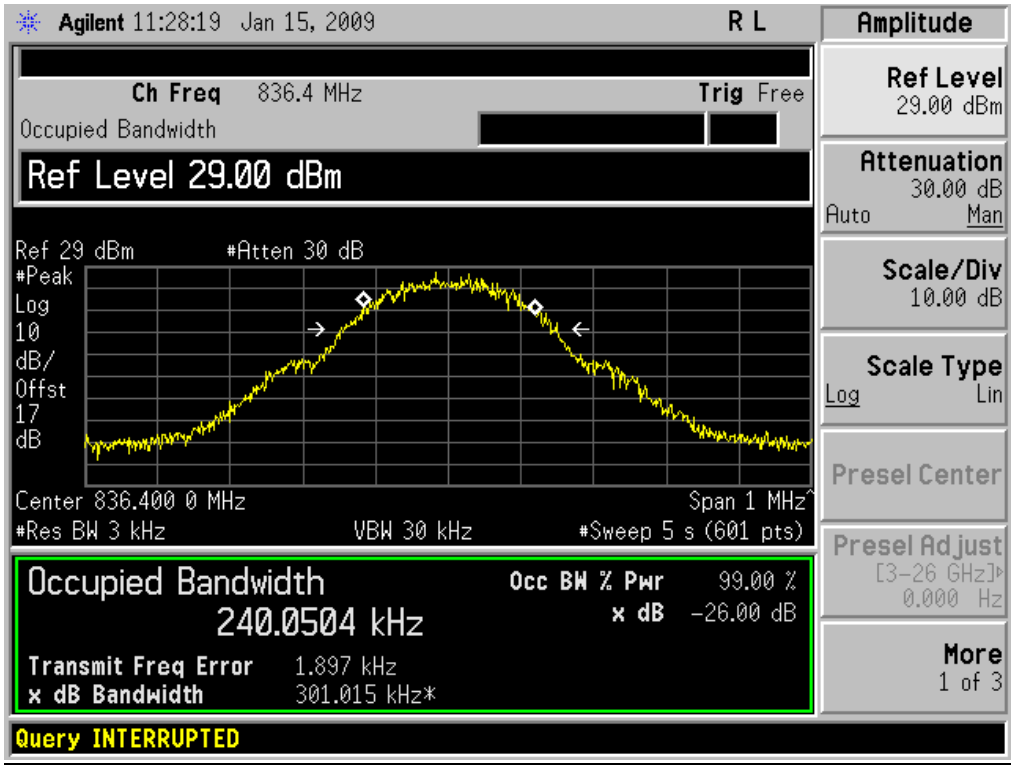


Configuration 1 – GPRS 850 Mode 1

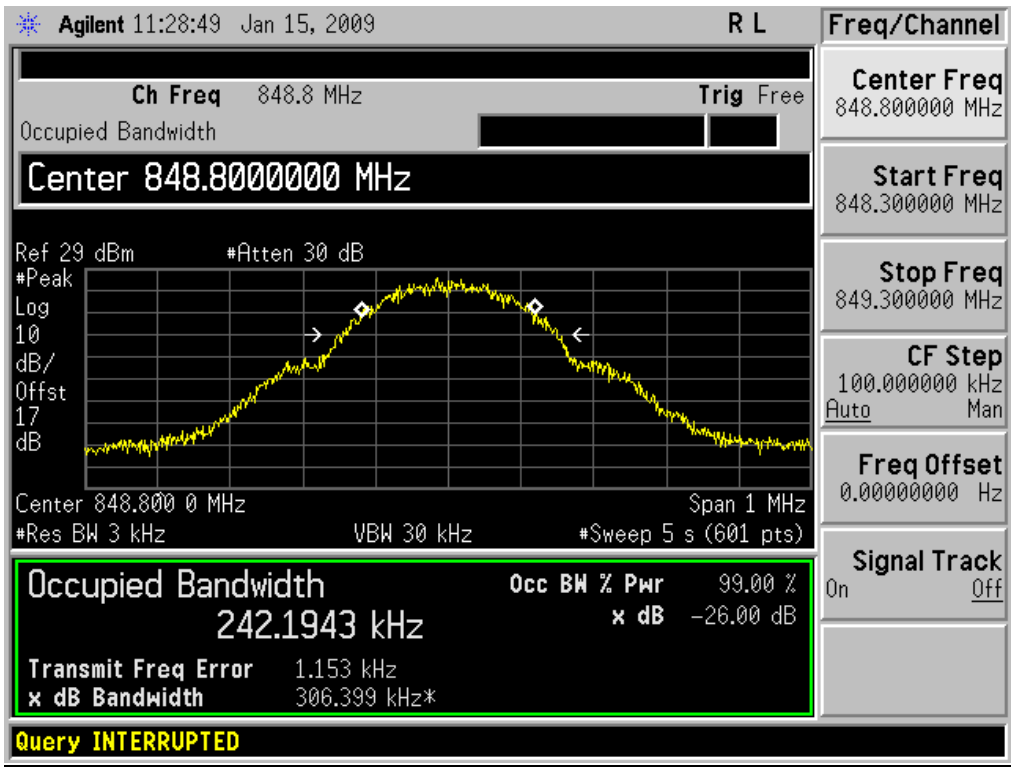


Product Service

Configuration 1 – GPRS 850 Mode 2



Configuration 1 – GPRS 850 Mode 3



2.7 SPURIOUS EMISSIONS AT TERMINALS (±1MHz)

2.7.1 Specification Reference

FCC CFR 47 Part 22: 2008, Clause 22.917 (a), 2.1051

2.7.2 Equipment Under Test

GSM/GPRS EFT-POS PS400

2.7.3 Date of Test and Modification State

15 January 2009 – Modification State 0

2.7.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.7.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 22 and 24: 2008.

The measruments were made per definition in 22.917. The output was connected to a spectrum analyzer with attenuator. Measurement were performed using a peak detector with the trace display set to Max Hold. The limit was displayed, showing the –13dBm.

The measurement path loss was entered as a reference level offset into the Spectrum Analyser.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1
- Mode 1
- Mode 3
- Mode 4
- Mode 6

2.7.6 Environmental Conditions

	15 January 2009
Ambient Temperature	22.9°C
Relative Humidity	24.2%

Product Service

2.7.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 22: 2008 Spurious Emissions Antenna Terminals (±1MHz)

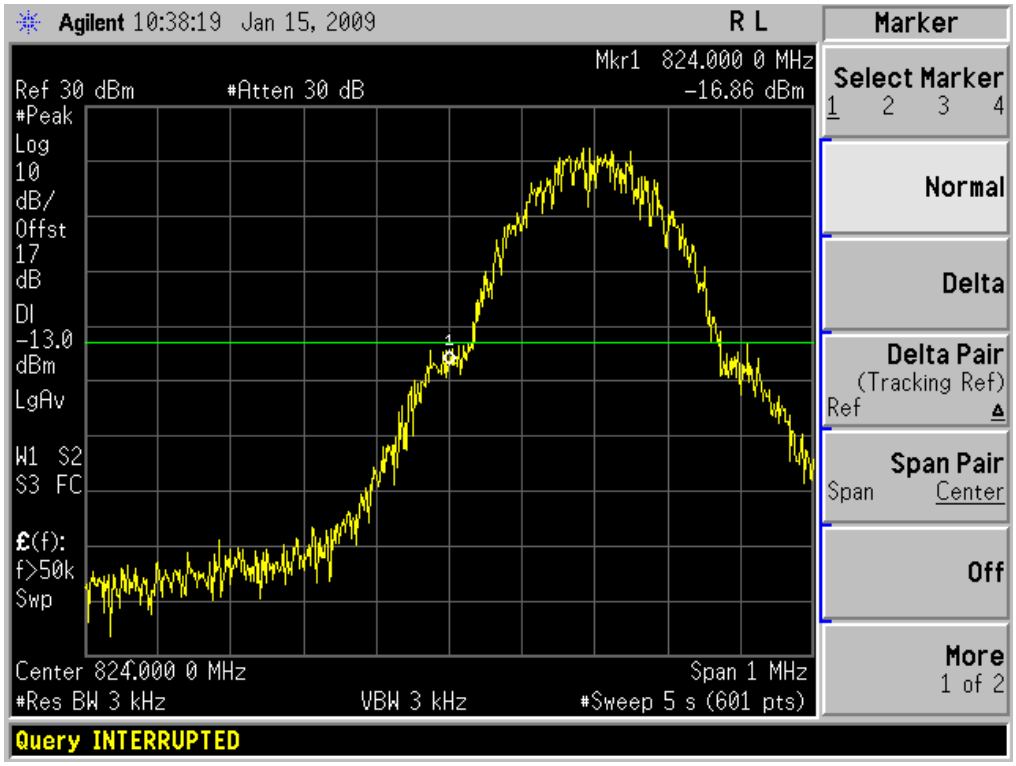
The test results are shown below.

Below are the Frequencies the EUT was tested against along with the tested channels.

Channel (MHz)	Edge Test Channel No./Frequencies	Limit (dBm)
Bottom 824.2	Channel: 128 Frequency: 824MHz	-13
Top 848.8	Channel: 251 Frequency : 849MHz	-13

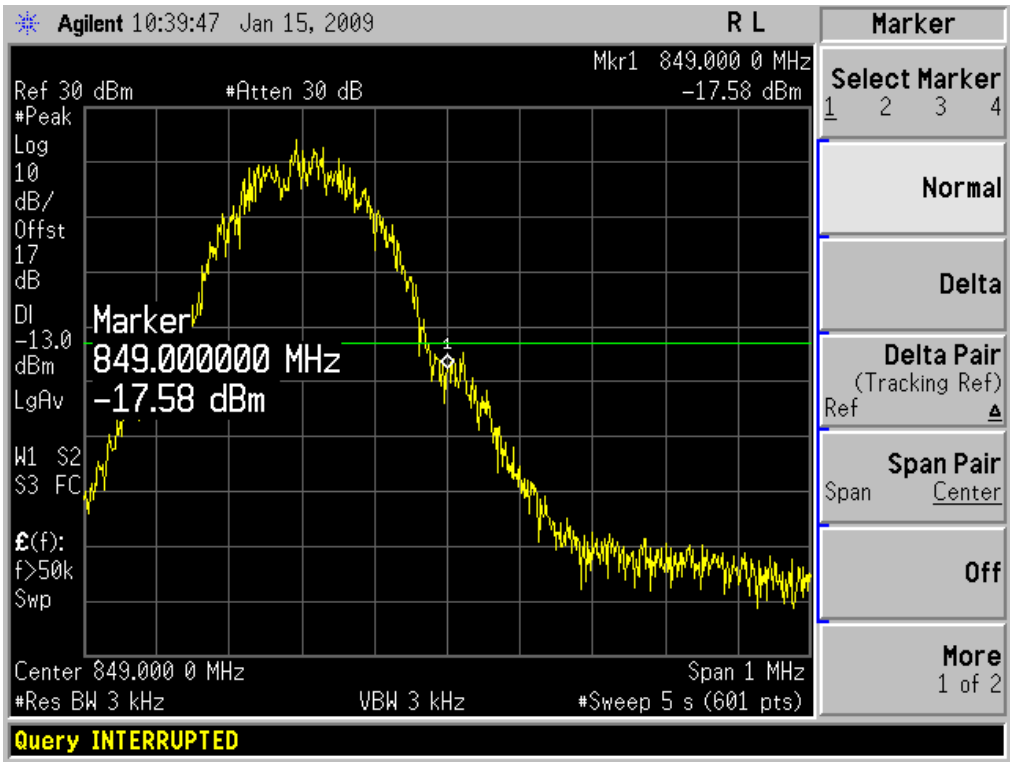
The channels shown in the table above are the minimum and maximum channels that can be used in the authorised frequency ranges to maintain compliance.

Configuration 1 – GSM 850 Mode 1

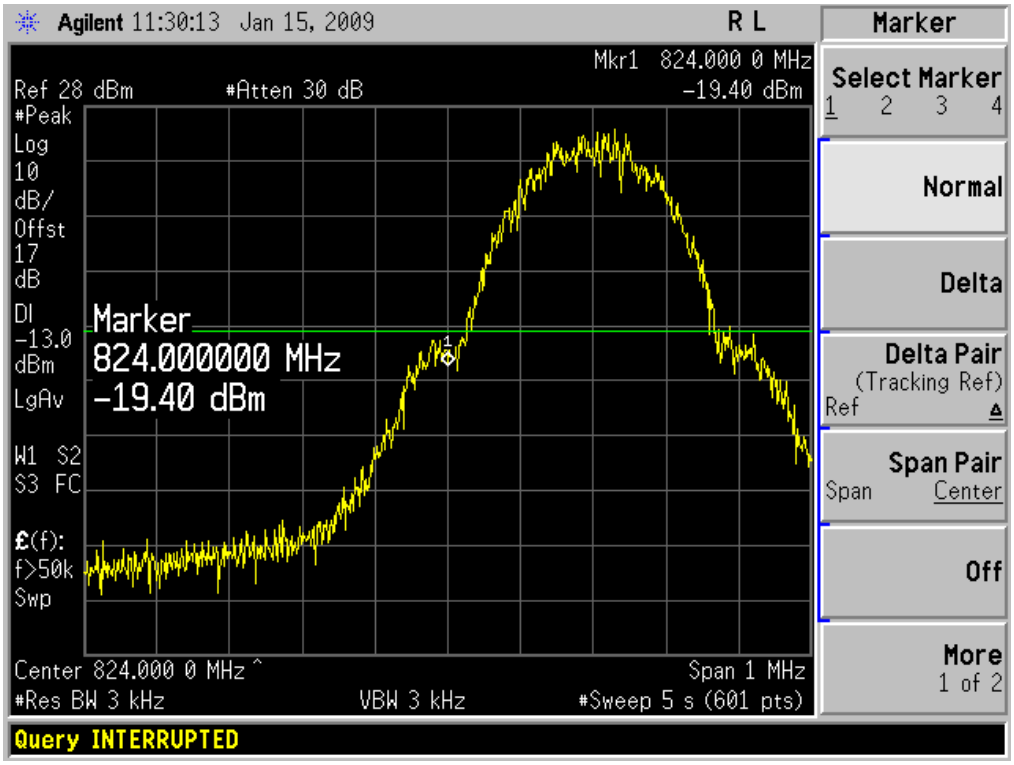


Product Service

Configuration 1 – GSM 850 Mode 3

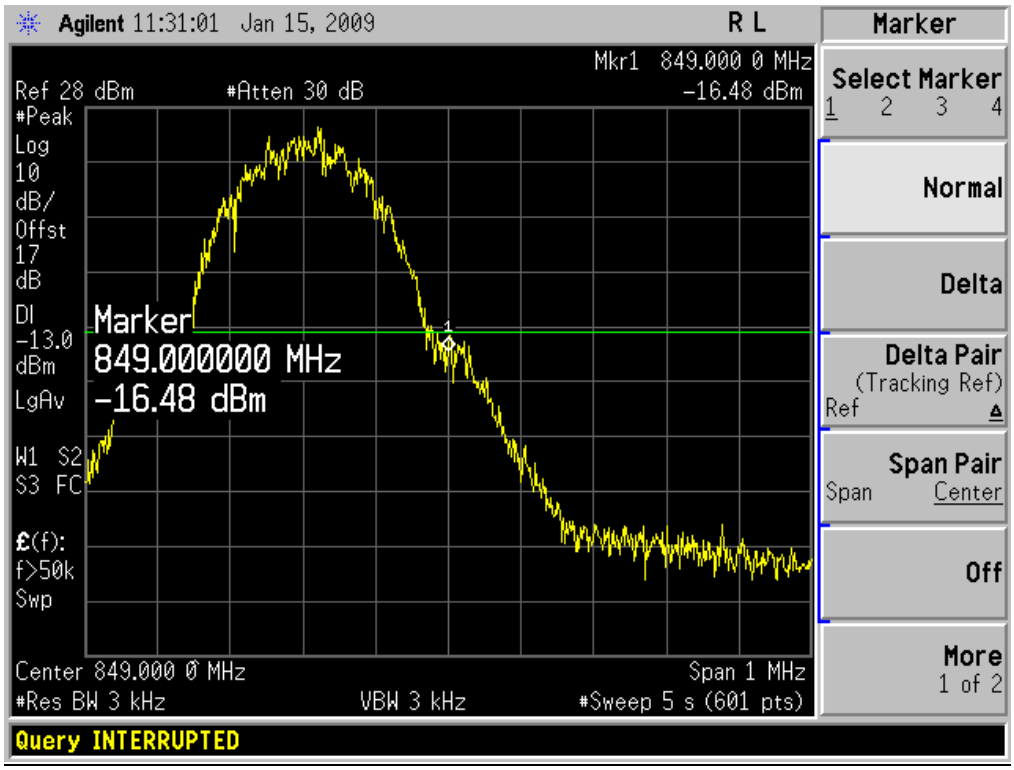


Configuration 1 – GPRS 850 Mode 4



Product Service

Configuration 1 – GPRS 850 Mode 6



2.8 RADIATED SPURIOUS EMISSIONS

2.8.1 Specification Reference

FCC CFR 47 Part 22: 2008, 22.917 (a)

2.8.2 Equipment Under Test

GSM/GPRS EFT-POS PS400

2.8.3 Date of Test and Modification State

06 and 07 July 2009 – Modification State 0

2.8.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.8.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 22: 2008.

A preliminary profile of the Spurious Radiated Emissions was obtained by operating the EUT on a remotely controlled turntable within the anechoic chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations.

Emissions identified within the range 30MHz – 1GHz were then formally meausred using a Peak detector. Emissions identified withing the range 1GHz – 10GHz were then formally measured using Peak and Average Dectectors, as propriate.

The measurements were performed at a 3m distance unless otherwise stated.

The limit was displayed, showing the –13dBm.

The test was performed with the EUT operating on all modes in section1.4.3 and record the result of the following configurations and modes of operation for worst case:

Configuration 1 - Mode 1
- Mode 2
- Mode 3
- Mode 4
- Mode 5
- Mode 6

2.8.6 Environmental Conditions

	06 July 2009	07 July 2009
Ambient Temperature	23.2°C	24.2°C
Relative Humidity	24.1%	23.3%

Product Service

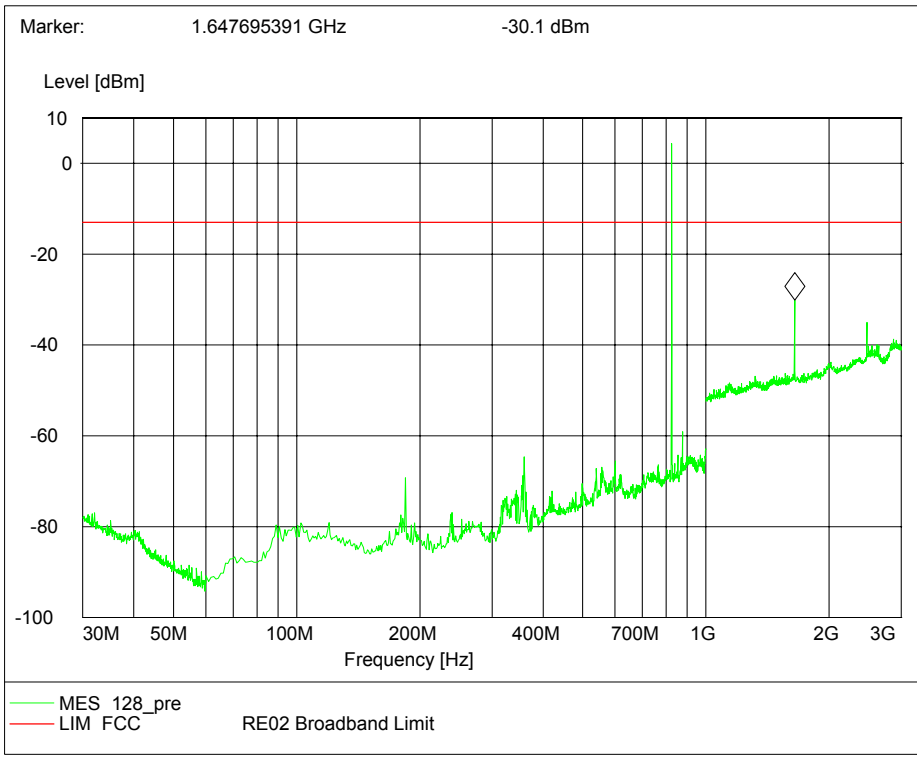
2.8.7 Test Result

For the period of test the EUT met the requirements of FCC CFR 47 Part 22: 2008 for Radiated Spurious Emissions.

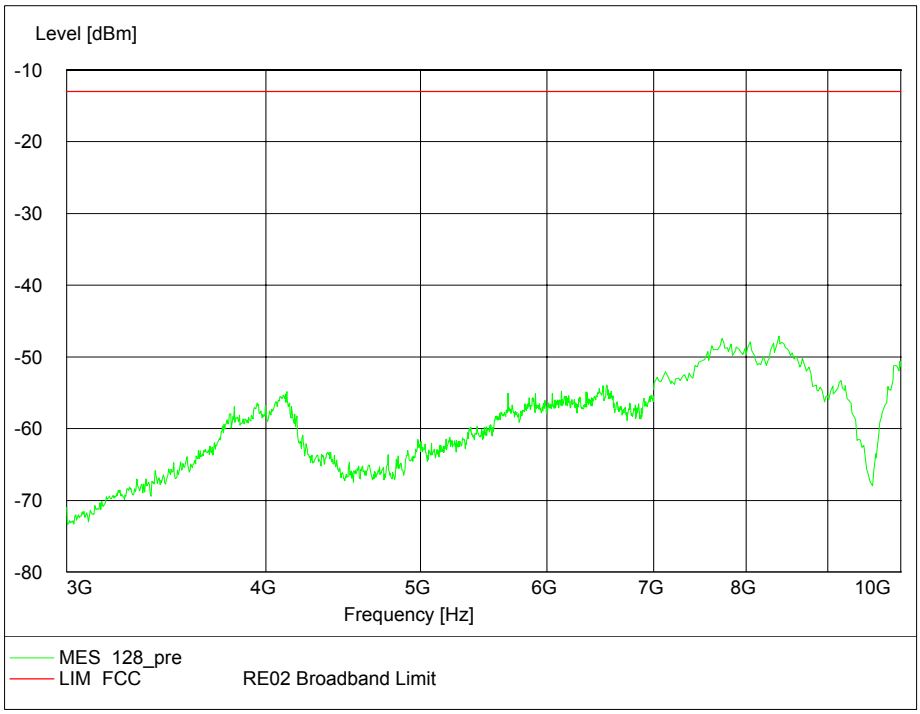
The test results are shown below.

Configuration 1 – GSM 850 Mode 1

30MHz to 3GHz

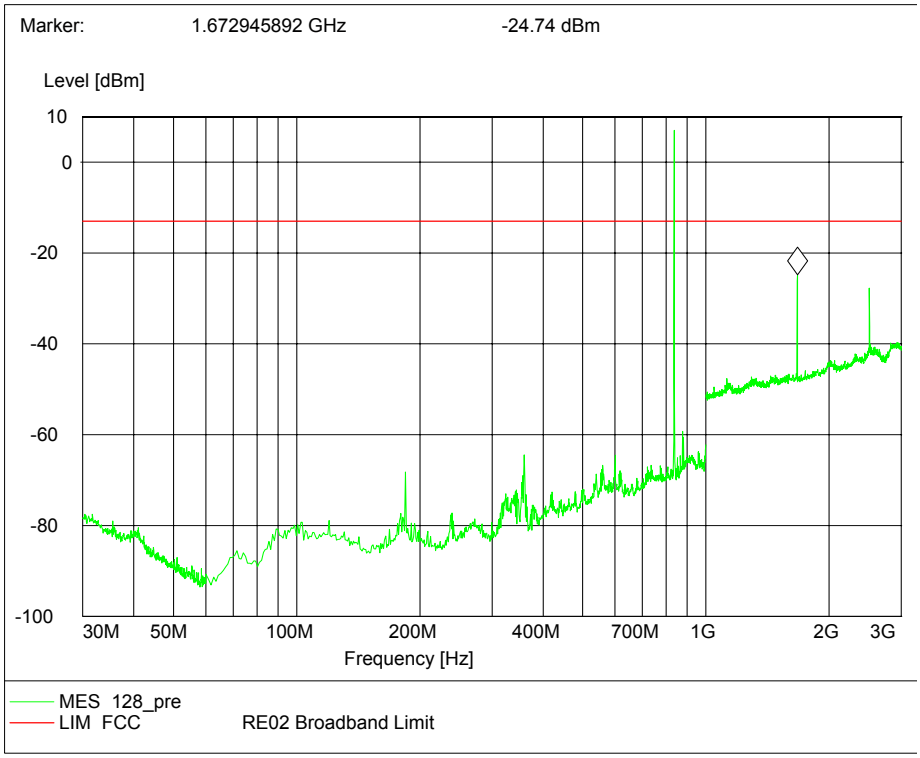


3GHz to 10GHz



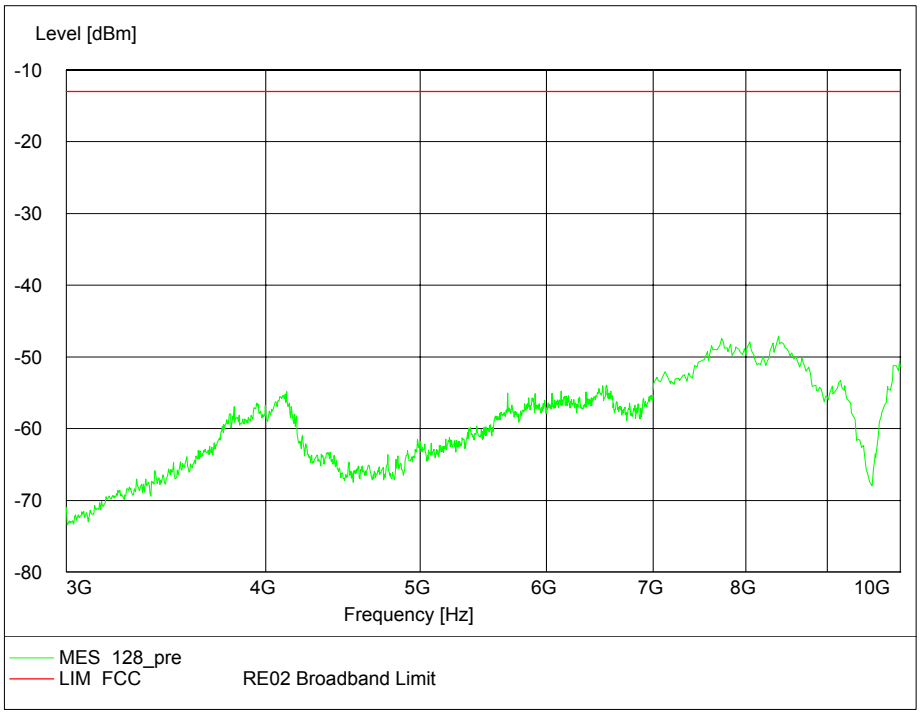
Configuration 1 – GSM 850 Mode 2

30MHz to 3GHz



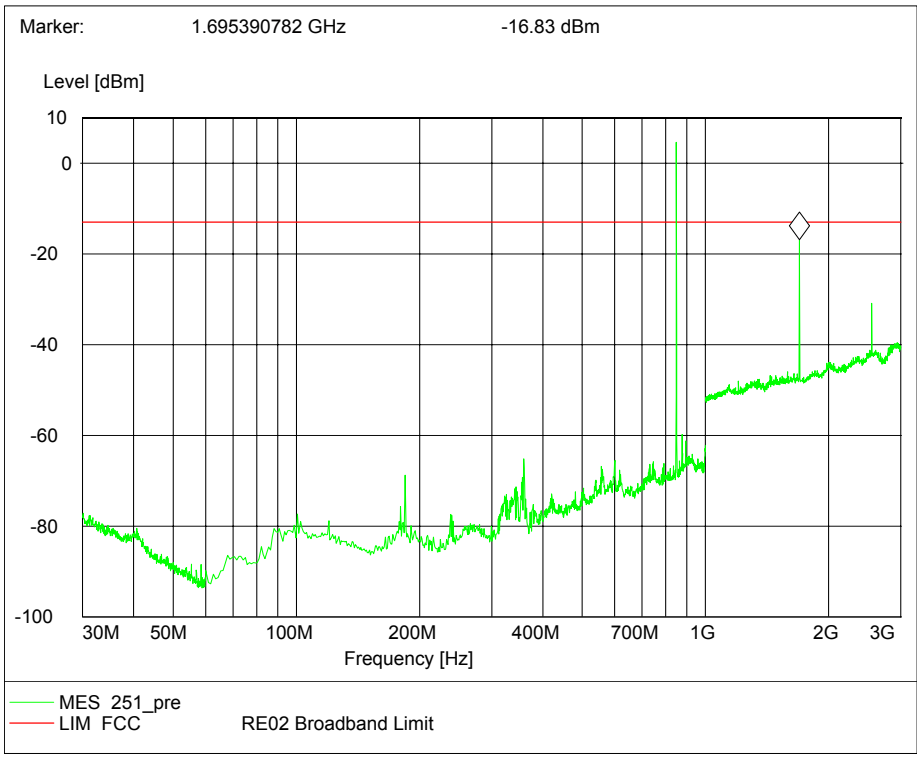
Product Service

3GHz to 10GHz



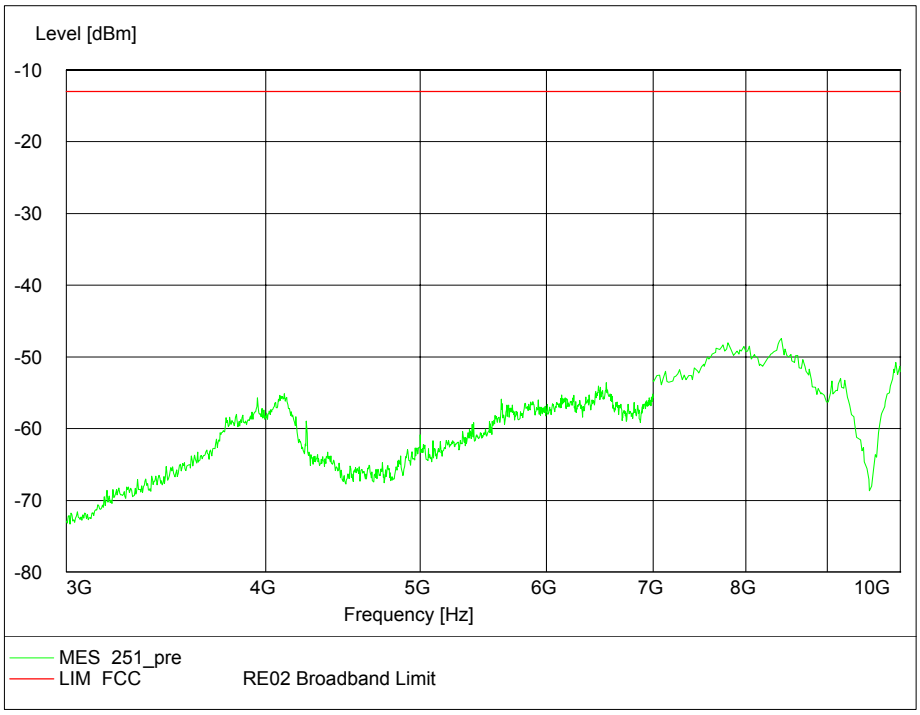
Configuration 1 – GSM 850 Mode 3

30MHz to 3GHz



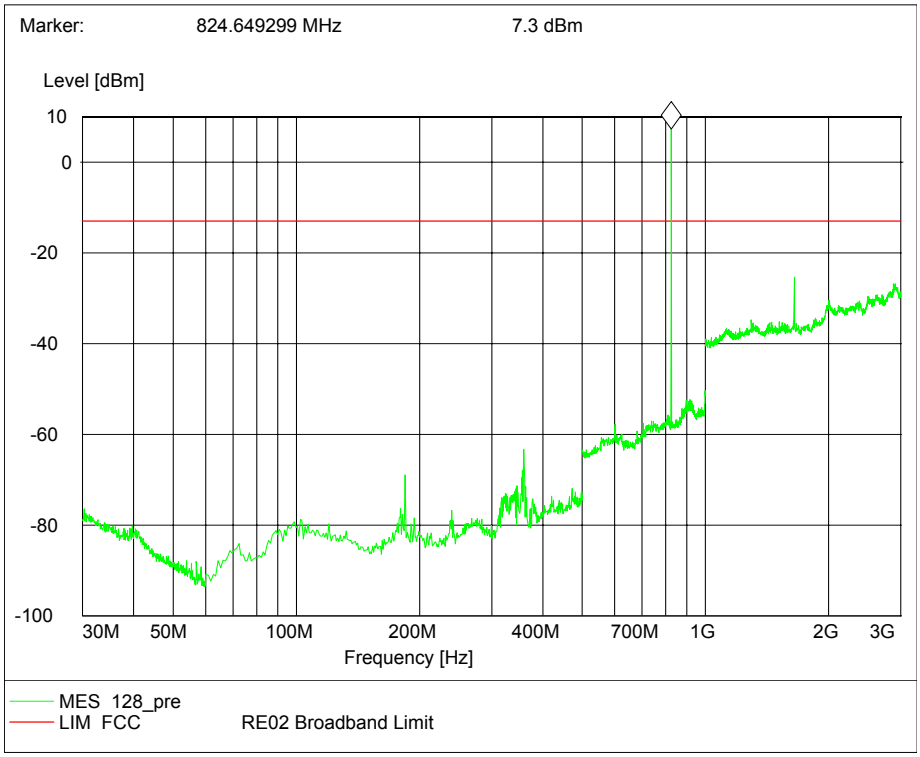
Product Service

3GHz to 10GHz



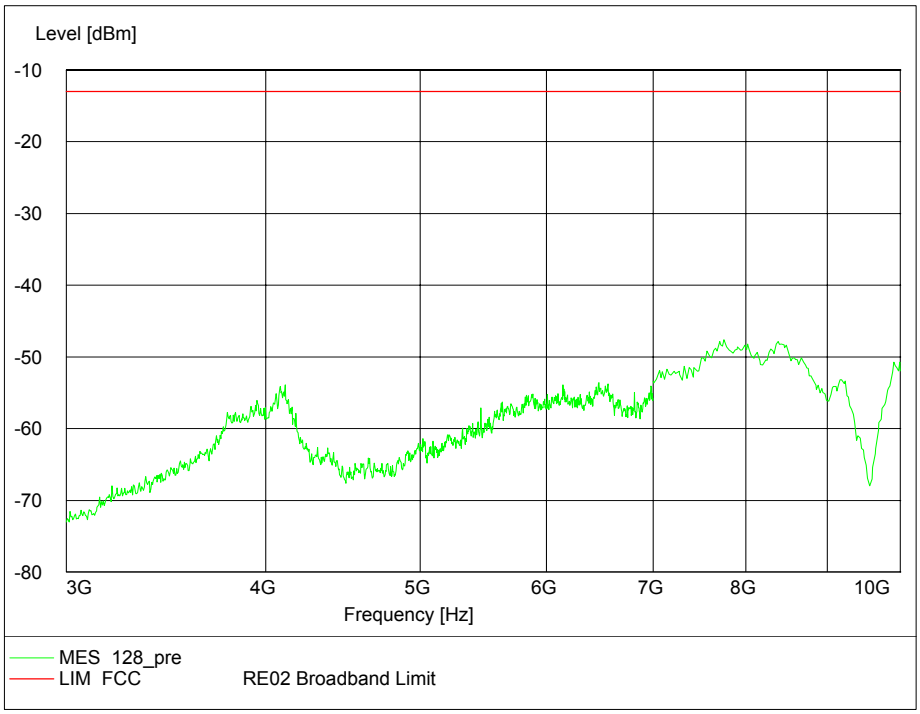
Configuration 1 – GPRS 850 Mode 4

30MHz to 3GHz



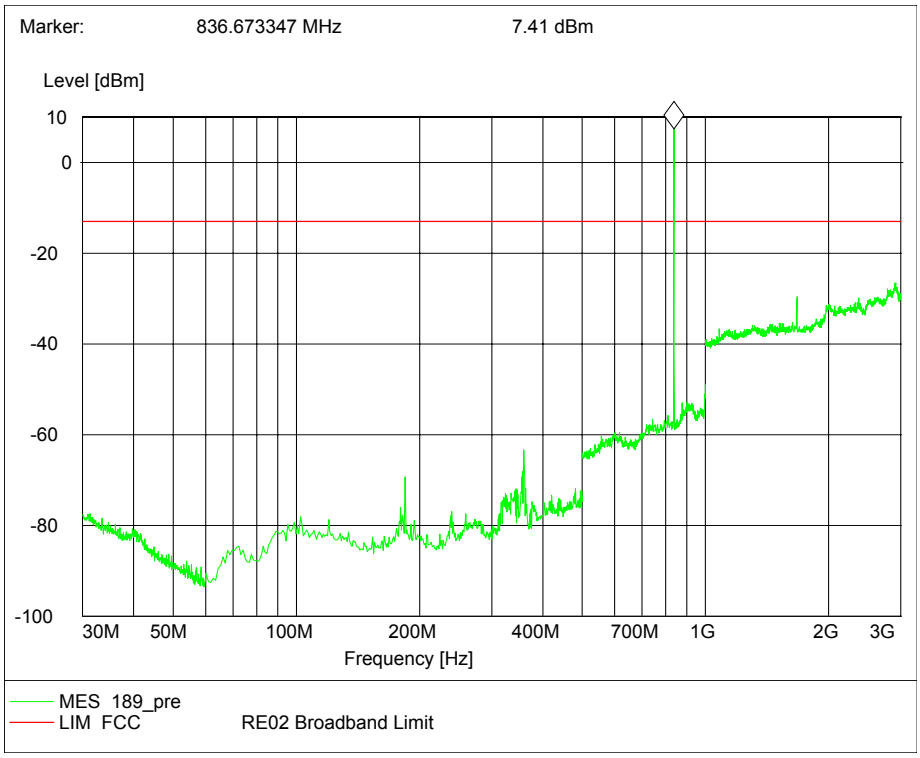
Product Service

3GHz to 10GHz



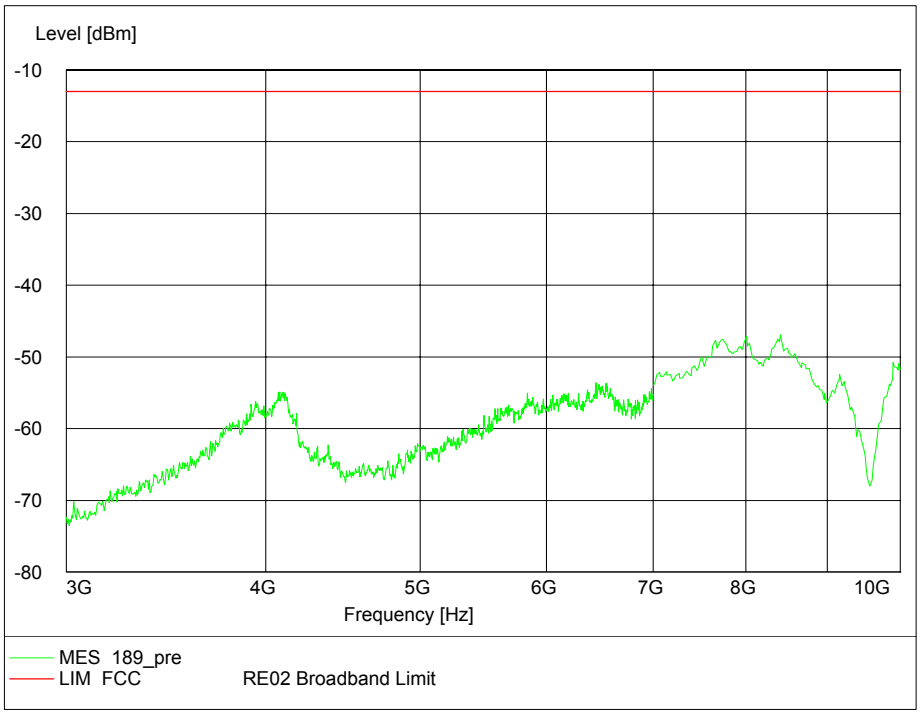
Configuration 1 – GPRS 850 Mode 5

30MHz to 3GHz



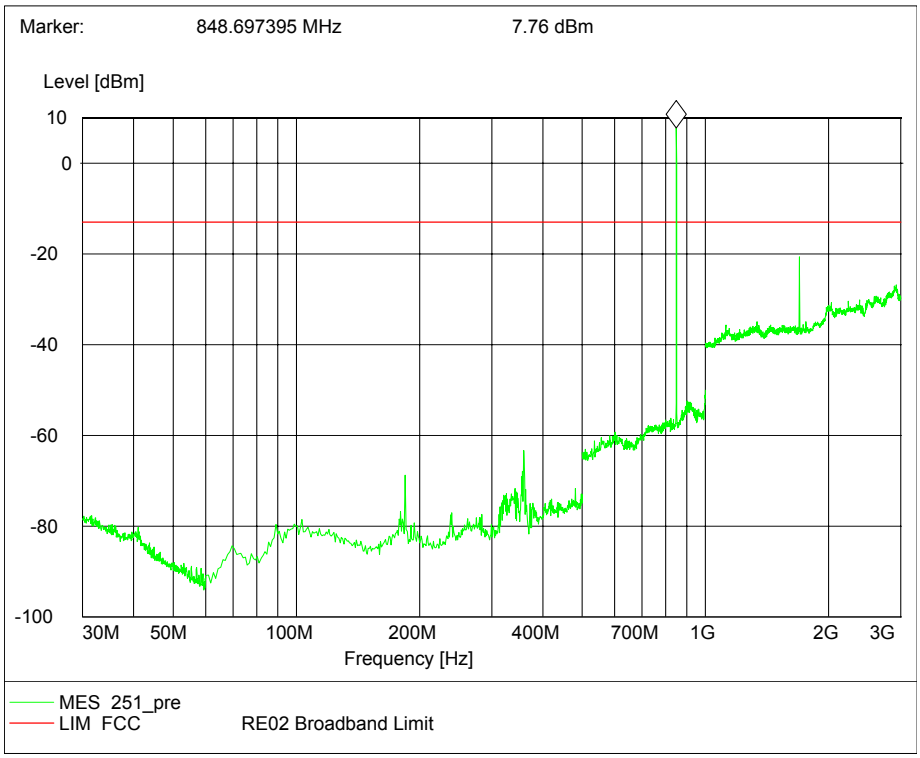
Product Service

3GHz to 10GHz

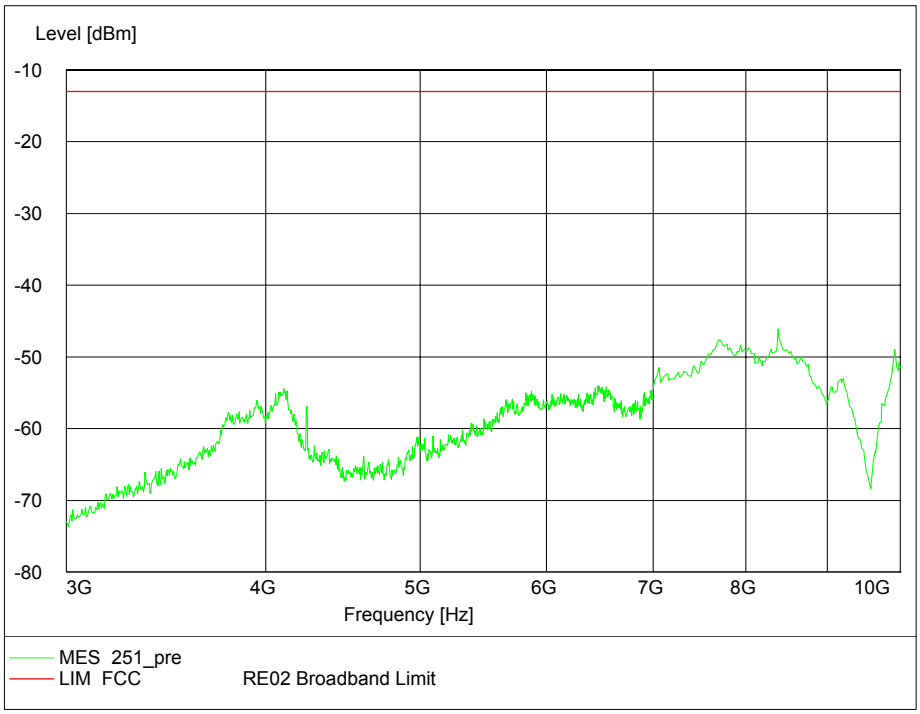


Configuration 1 – GPRS 850 Mode 6

30MHz to 3GHz



3GHz to 10GHz



Limit	-13dBm

2.9 CONDUCTED SPURIOUS EMISSIONS

2.9.1 Specification Reference

FCC CFR 47 Part 22: 2008, Clause 22.917 (a), 2.1051

2.9.2 Equipment Under Test

GSM/GPRS EFT-POS PS400

2.9.3 Date of Test and Modification State

15 January 2009 – Modification State 0

2.9.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.9.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 22: 2008.

In accordance with Part 2.1051, the spurious emissions from the antenna terminal were measured. The transmitter output power was attenuated using a attenuator and the frequency spectrum investigated from 9kHz to 10GHz. The EUT was set to transmit on maximum power. The EUT was tested on Bottom, Middle and Top channels. The resolution bandwidht was set to 1MHz and video bandwidths were set to 1MHz thus meeting the requirements of Part 22.917 (a). The spectrum analyser detector was set to peak and trace was kept on Max Hold. The limit line was displayed, showing the –13dBm.

The maximum path loss across the measurement band was used as the reference level offset to ensure worst case.

In addition, measurements were made up to the 10^{th} harmonic of the fundamental.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1
- Mode 2
- Mode 3
- Mode 4
- Mode 5
- Mode 6

2.9.6 Environmental Conditions

	15 January 2009
Ambient Temperature	22.9°C
Relative Humidity	24.2%

Product Service

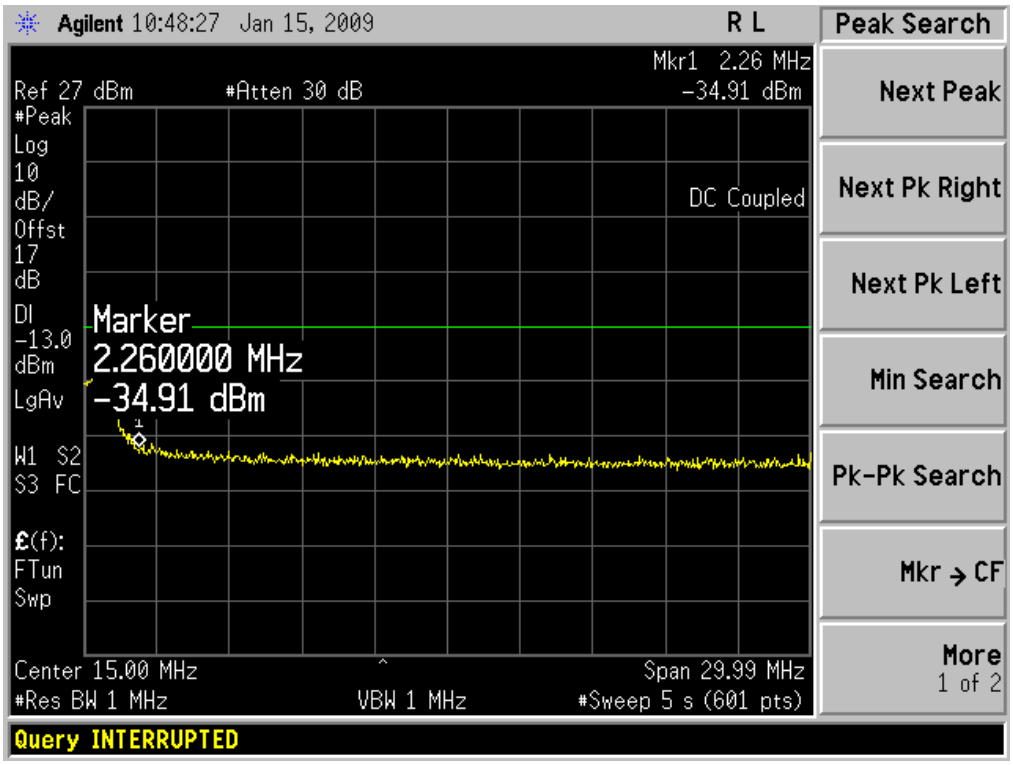
2.9.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 22: 2008 for Spurious Emissions.

The test results are shown below.

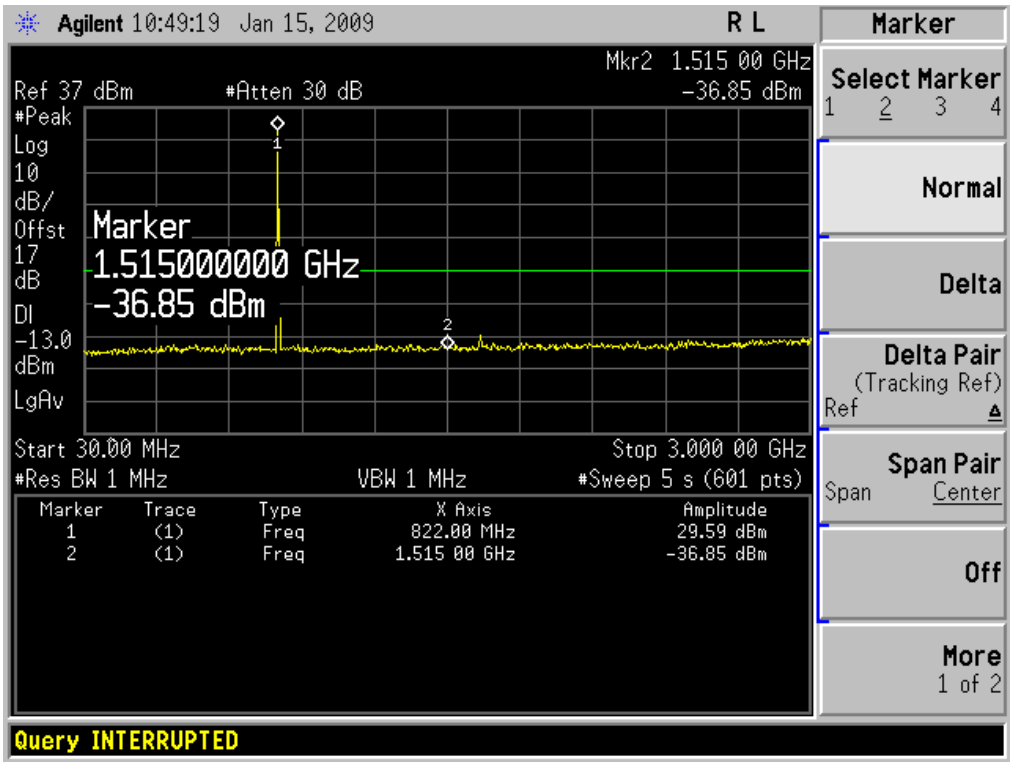
Configuration 1 – GSM 850 Mode 1

9kHz to 30MHz



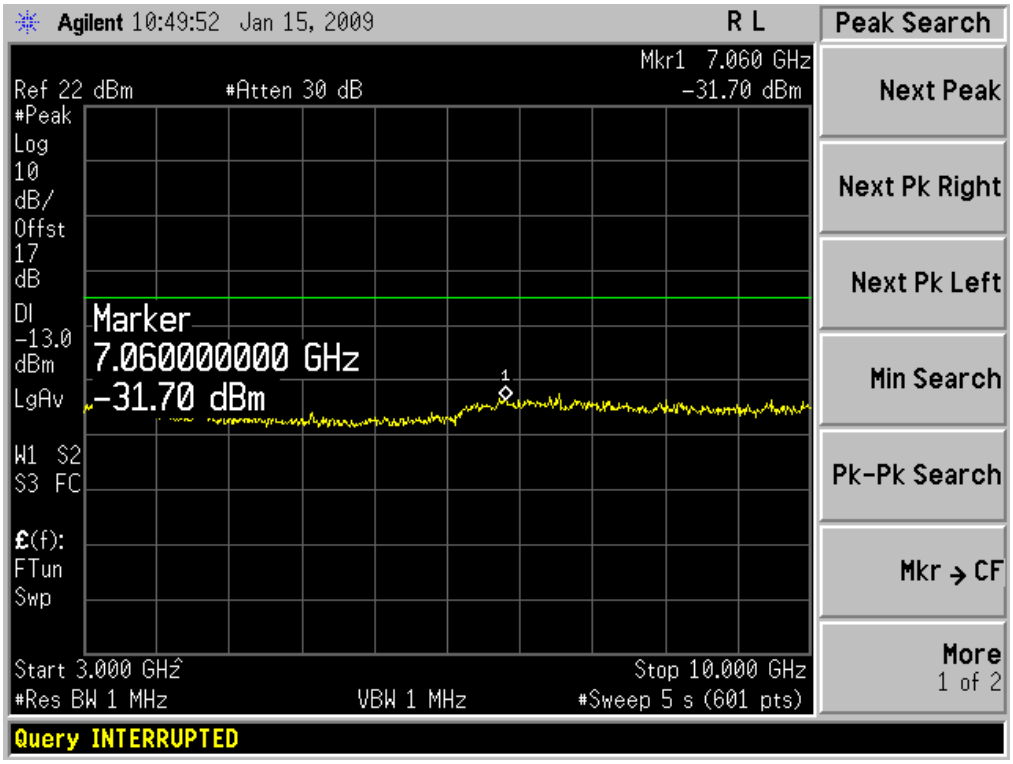
Product Service

30MHz to 3GHz



Note: The emission beyond the limit is the operating frequency.

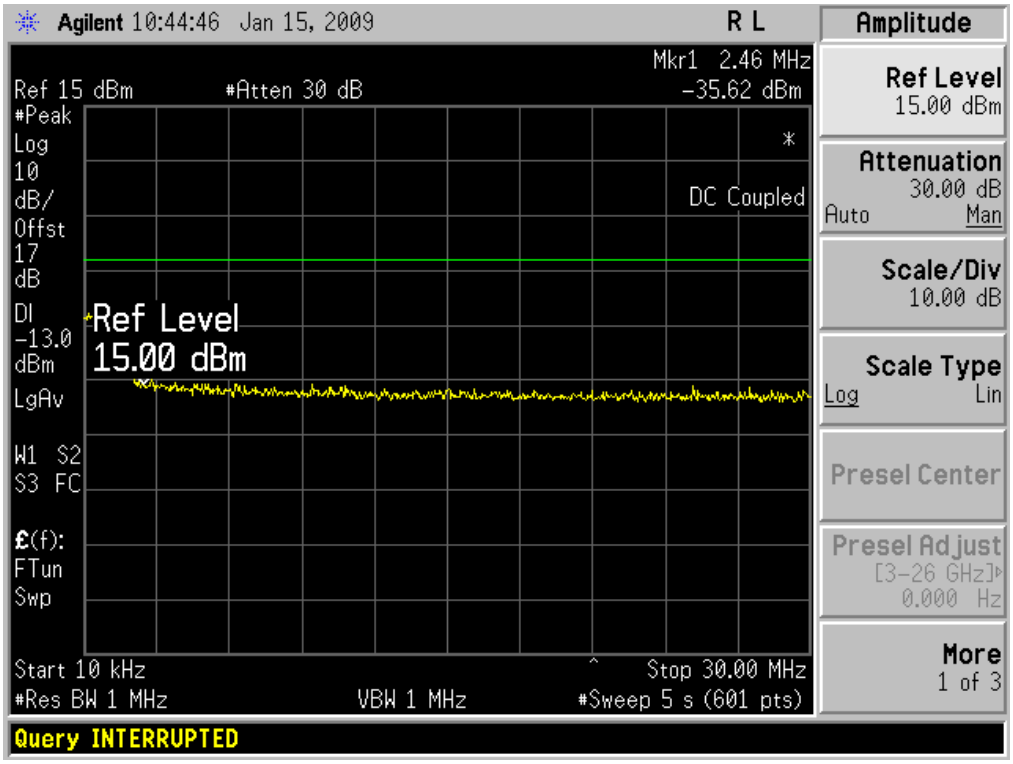
3GHz to 10GHz



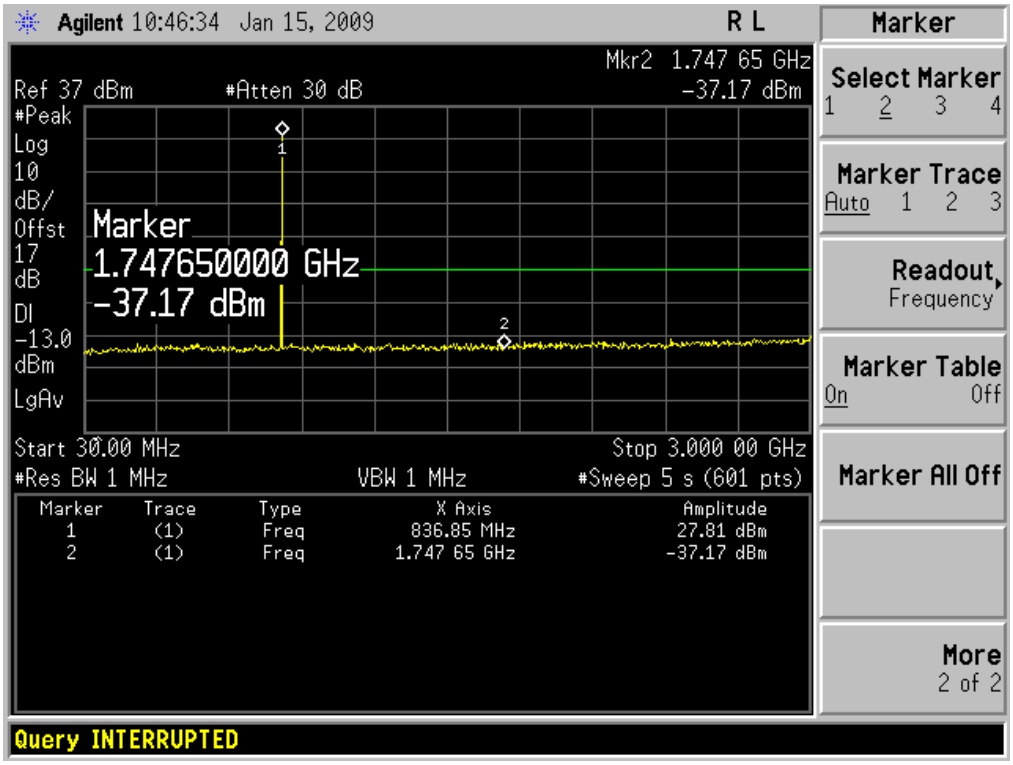
Product Service

Configuration 1 – GSM 850 Mode 2

9kHz to 30MHz



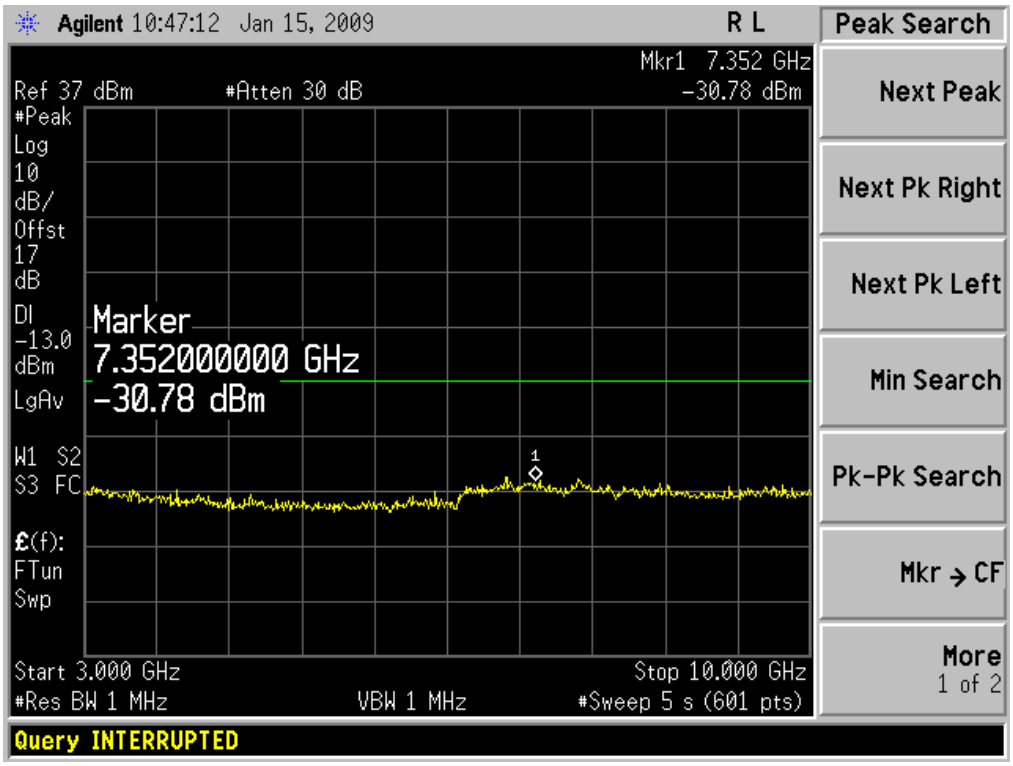
30MHz to 3GHz



Note: The emission beyond the limit is the operating frequency.

Product Service

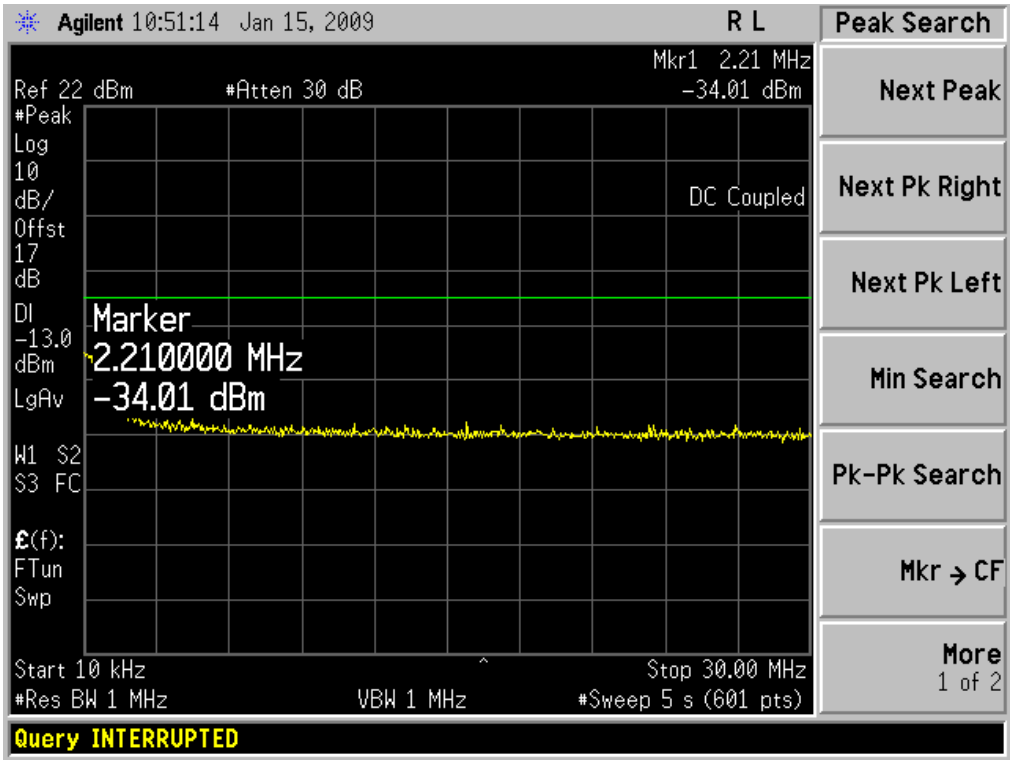
3GHz to 10MHz



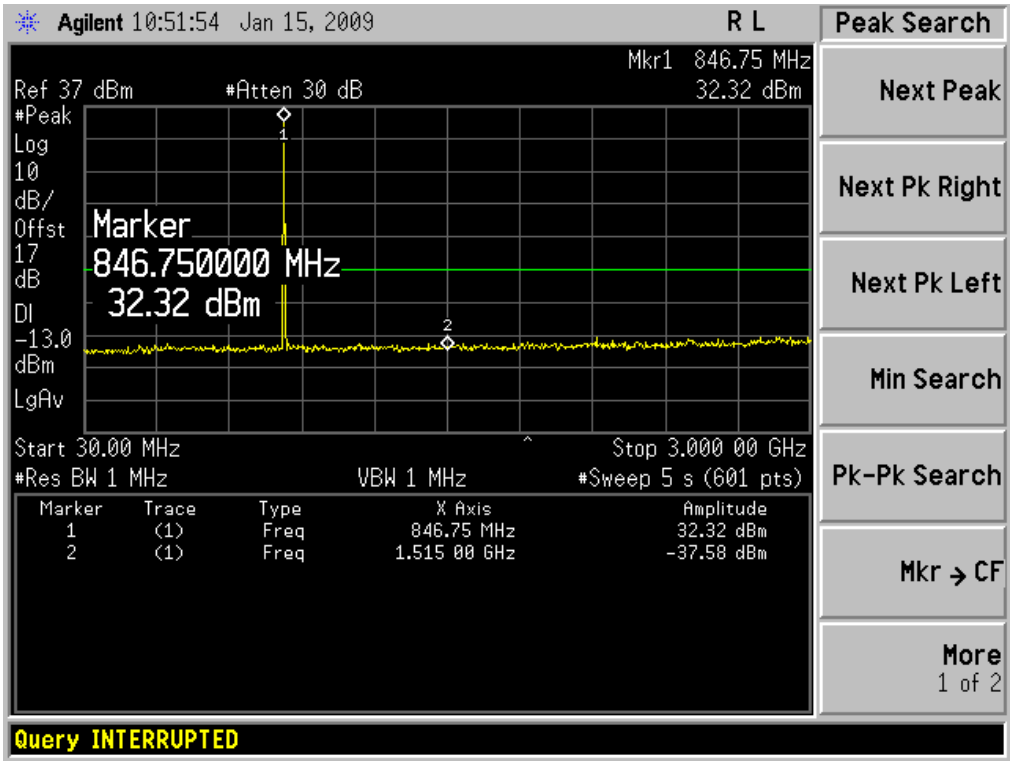
Product Service

Configuration 1 – GSM 850 Mode 3

9kHz to 30MHz



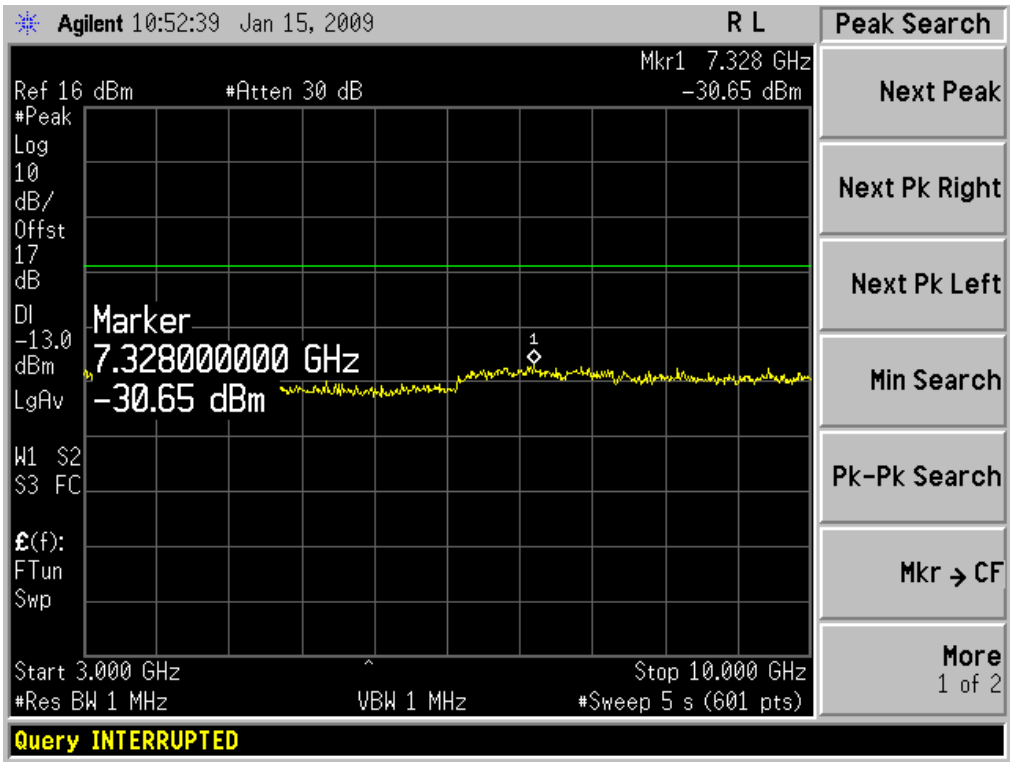
30MHz to 3GHz



Note: The emission beyond the limit is the operating frequency.

Product Service

3GHz to 10GHz



Limit	-13dBm

2.10 FREQUENCY STABILITY UNDER TEMPERATURE VARIATIONS

2.10.1 Specification Reference

FCC CFR 47 Part 22: 2008, Clause 22.355, 2.1055

2.10.2 Equipment Under Test

GSM/GPRS EFT-POS PS400

2.10.3 Date of Test and Modification State

15 January 2009 – Modification State 0

2.10.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.10.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 22: 2008.

The EUT was set to transmit on maximum power. A Spectrum Analyser was used to measure the frequency error.The temperature was adjusted between –30ºC and +50ºC in 10º steps as per 2.1055.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 8

2.10.6 Environmental Conditions

	15 January 2009
Ambient Temperature	22.9°C
Relative Humidity	24.4%

Product Service

2.10.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 22: 2008 for Frequency Stability Under Temperature Variations.

The test results are shown below.

Configuration 1 – GSM 850 Carrier Mode 14

7.4 V Supply

Temperature Interval (ºC)	Deviation (Hz)
-30	--
-20	--
-10	-21.67
0	-23.41
+10	-34.60
+20	19.58
+30	-10.10
+40	-20.94
+50	-24.86

* The EUT does not operate at -20ºC and below. Its lowest operating temperature is -10ºC with -21.67Hz deviation from the nominal.

Limit	±1.0 ppm or ± 836.4 Hz

Remarks

The frequency stability of the EUT is sufficient to keep it within the authorised frequency ranges at any temperature interval across the measured range.

2.11 FREQUENCY STABILITY UNDER VOLTAGE VARIATIONS

2.11.1 Specification Reference

FCC CFR 47 Part 22: 2008, Clause 22.355, 2.1055

2.11.2 Equipment Under Test

GSM/GPRS EFT-POS PS400

2.11.3 Date of Test and Modification State

15 January 2009 – Modification State 0

2.11.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.11.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 22: 2008.

The EUT was set to transmit on maximum power. A Spectrum Analyser was used to measure the frequency error. The supplied voltage was varied from 6.8V to 8.4V according to the specification declaration from the manufacturer at ambient temperature.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 8

2.11.6 Environmental Conditions

	15 January 2009
Ambient Temperature	22.9°C
Relative Humidity	24.2%

Product Service

2.11.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 22: 2008 for Frequency Stability Under Voltage Variations.

The test results are shown below.

Configuration 1 – GSM 850 Carrier Mode 14

DC Voltage (V)	Deviation (Hz)
7.4	19.58
8.4	-18.84
6.8	-20.98

Limit	±1.0 ppm or ± 836.4 Hz

2.12 MAXIMUM PEAK OUTPUT POWER - CONDUCTED

2.12.1 Specification Reference

FCC CFR 47 Part 24: 2008, Clause 24.232 (c)

2.12.2 Equipment Under Test

GSM/GPRS EFT-POS PS400

2.12.3 Date of Test and Modification State

06 July 2009 – Modification State 0

2.12.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.12.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 24: 2008.

Using a Spectrum Analyzer with attenuator(s), the output was connected to a spectrum analyzer, the output power of the EUT was measured at the antenna terminals.

The spectrum analyser RBW and VBW were set to 1MHz and the path loss measured and entered as a reference level offset.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 2
- Mode 1
- Mode 2
- Mode 3
- Mode 4
- Mode 5
- Mode 6

2.12.6 Environmental Conditions

	06 July 2009
Ambient Temperature	23.2°C
Relative Humidity	24.1%

Product Service

2.12.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 24: 2008 for Maximum Peak Output Power - Conducted.

The test results are shown below.

Configuration 2 – GSM 1900 Mode 1 & 2 & 3

Channel	Frequency (MHz)	Path Loss (dB)	Result (dBm)	Result (W)
512	1850.2	17.0	28.94	0.78
661	1880.0	17.0	28.54	0.71
810	1909.8	17.0	28.32	0.68

Configuration 2 – GPRS 1900 Mode 4 & 5 & 6

Channel	Frequency (MHz)	Path Loss (dB)	Result (dBm)	Result (W)
512	1850.2	17.0	28.93	0.78
661	1880.0	17.0	28.52	0.71
810	1909.8	17.0	28.29	0.67

Limit	≤2W or ≤33dBm for FCC

Remarks

The EUT does not exceed 2W or 33dBm for FCC at the measured frequencies.

2.13 MAXIMUM PEAK OUTPUT POWER – RADIATED (EIRP METHOD)

2.13.1 Specification Reference

FCC CFR 47 Part 24: 2008, Clause 24.232 (c)

2.13.2 Equipment Under Test

GSM/GPRS EFT-POS PS400

2.13.3 Date of Test and Modification State

07 July 2009 – Modification State 0

2.13.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.13.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 24: 2008.

The EUT contains an integral antenna and therefore the Maximum Peak Output Power was made using the EIRP method.

The Spectrum Analyser was turned to the test frequency. The device Output Power setting was controlled as specified in the Product Information. The device was then rotated through 360 degrees until the hishest power level was observed in both horizontal and vertical polarisation.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 2
- Mode 1
- Mode 2
- Mode 3
- Mode 4
- Mode 5
- Mode 6

2.13.6 Environmental Conditions

	07 July 2009
Ambient Temperature	24.2°C
Relative Humidity	23.3%

Product Service

2.13.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 24: 2008 for Maximum Peak Output Power - Radiated.

The test results are shown below.

Configuration 2– GSM 1900 Mode 1 & 2 & 3

Channel	Frequency (MHz)	Result (dBm)	Result (W)
512	1850.2	29.65	0.92
661	1880.0	29.59	0.91
810	1909.8	28.96	0.79

Configuration 2 – GPRS 1900 Mode 4 & 5 & 6

Channel	Frequency (MHz)	Result (dBm)	Result (W)
512	1850.2	29.65	0.92
661	1880.0	29.57	0.91
810	1909.8	28.95	0.78

Limit	≤2W or ≤33dBm for FCC

Remarks

The EUT does not exceed 2W or 33dBm for FCC at the measured frequencies.

2.14 MODULATION CHARACTERISTICS

2.14.1 Specification Reference

FCC CFR 47 Part 2: 2008, Clause 2.1047 (d)

2.14.2 Equipment Under Test

GSM/GPRS EFT-POS PS400

2.14.3 Date of Test and Modification State

15 January 2009 – Modification State 0

2.14.4 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 2: 2008.

Two views are shown for the GMSK mode of operation. One view shows the active slot. The other view shows the active slots over a complete frame.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 2 - Mode 2

2.14.5 Environmental Conditions

	15 January 2009
Ambient Temperature	22.9°C
Relative Humidity	24.2%

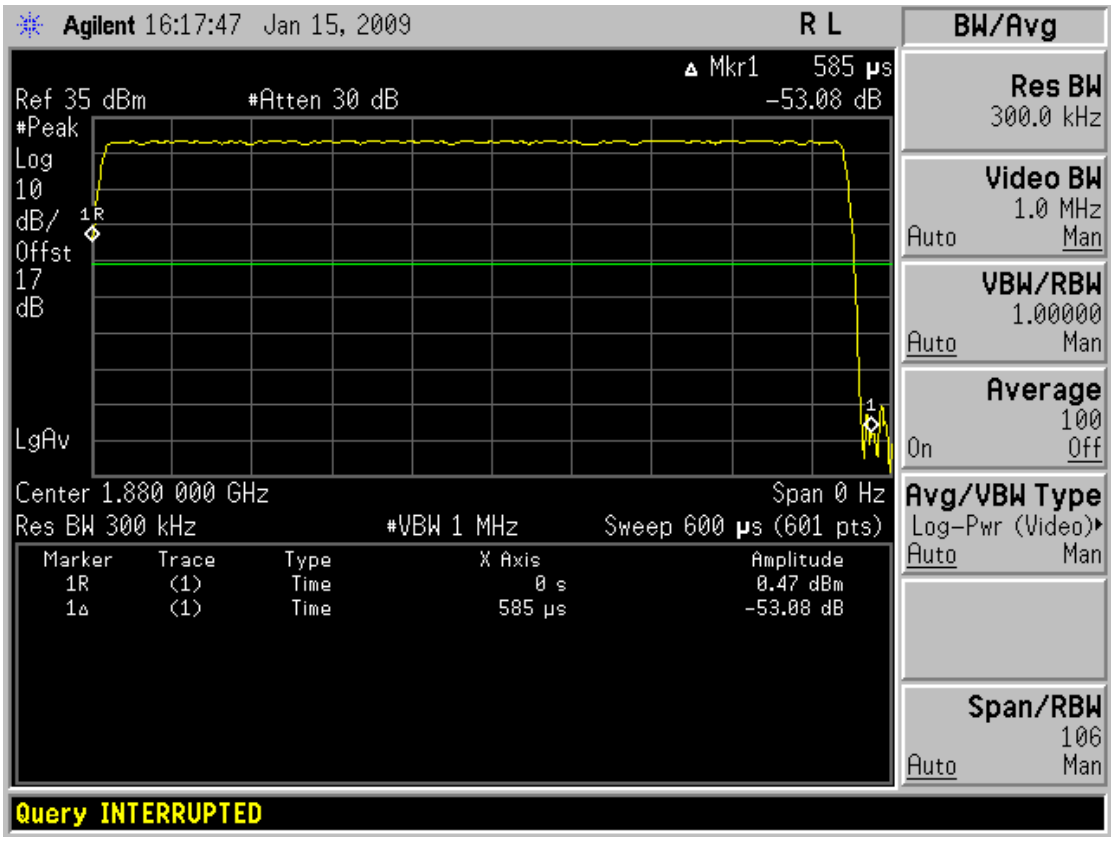
Product Service

2.14.6 Test Result

Plots are shown on the following page showing the EUT transmitting with the modulations:

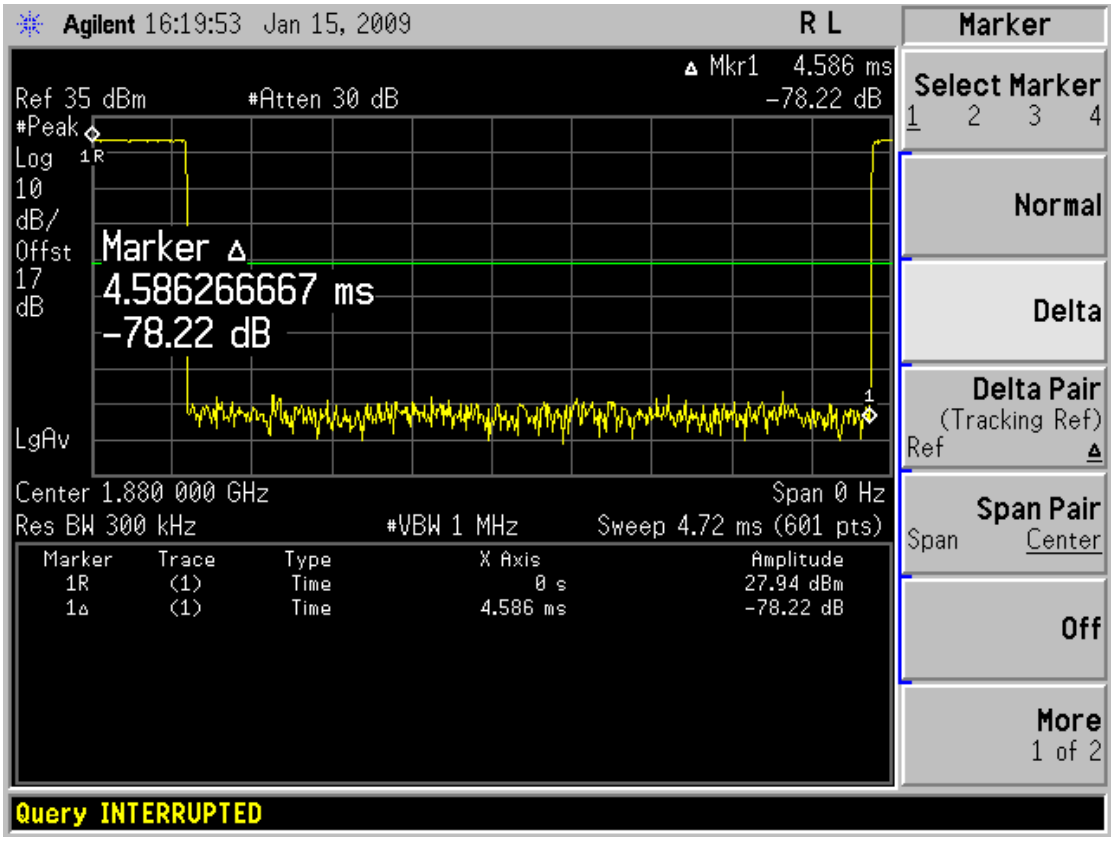
Measurements were made with the EUT in Middle Channel.

EUT transmitting with GMSK modulation:



GSM Mode. View of TS3

Product Service



GSM Mode. View of one Complete Frame Showing TS3

2.15 PEARK – AVERAGE RATIO

2.15.1 Specification Reference

FCC CFR 47 Part 24: 2008, Clause 24.232 (d)

2.15.2 Equipment Under Test

GSM/GPRS EFT-POS PS400

2.15.3 Date of Test and Modification State

15 January 2009 – Modification State 0

2.15.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.15.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 24: 2008.

A peak to average ratio measurment is performed at the conducted port of the EUT. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determined the largest deviation between the average and the peak power of the EUT in 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.

The path loss measured and entered as a reference level offset.

The test was performed with the EUT operating on all modes in section 1.4.3 and record the result of following configurations and modes of operation for worst case:

Configuration 2 - Mode 2

2.15.6 Environmental Conditions

	15 January 2009
Ambient Temperature	22.9°C
Relative Humidity	24.2%

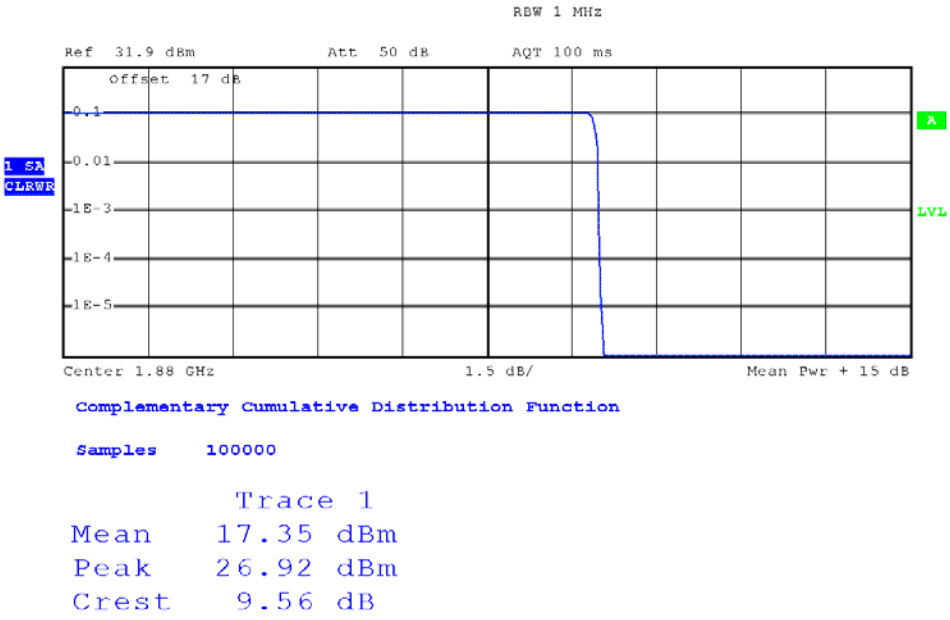
Product Service

2.15.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 24: 2008 Peak – Average Ratio.

The test results are shown below.

Configuration 2 – GSM 1900 Mode 2



Limit	13dB

Remarks

The Peak – Average ratio does not exceed 13dB at the measured frequencies.

Product Service

2.16 OCCUPIED BANDWIDTH

2.16.1 Specification Reference

FCC CFR 47 Part 24: 2008, Clause 24.238 (b), 2.1049 (h),

2.16.2 Equipment Under Test

GSM/GPRS EFT-POS PS400

2.16.3 Date of Test and Modification State

15 January 2009 – Modification State 0

2.16.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.16.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 24: 2008.

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 2 - Mode 1
- Mode 2
- Mode 3
- Mode 4
- Mode 5
- Mode 6

2.16.6 Environmental Conditions

	15 January 2009
Ambient Temperature	22.9°C
Relative Humidity	24.2%

Product Service

2.16.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 24: 2008 for Occupied Bandwidth.

Configuration 2 – GSM 1900 Mode 1 & 2 & 3

Channel	Frequency (MHz)	99% Power bandwidth (kHz)
512	1850.2	240.46
661	1880.0	238.22
810	1909.8	242.40

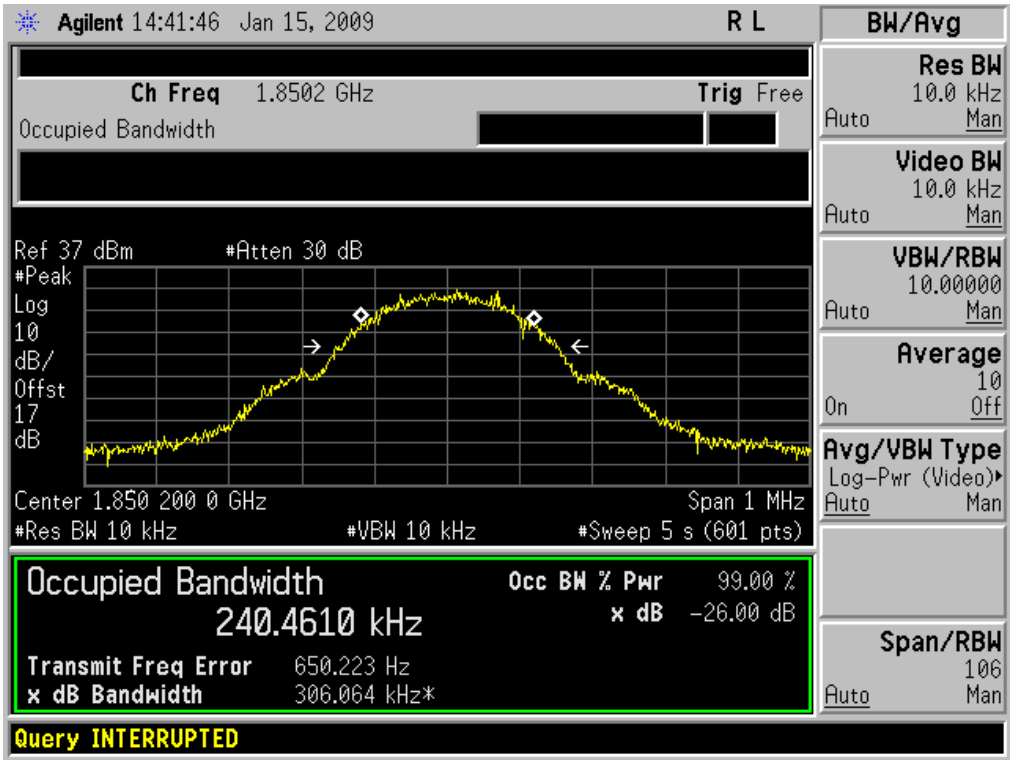
Configuration 2 – GPRS 1900 Mode 4 & 5 & 6

Channel	Frequency (MHz)	99% Power bandwidth (kHz)
512	1850.2	239.13
661	1880.0	235.25
810	1909.8	238.95

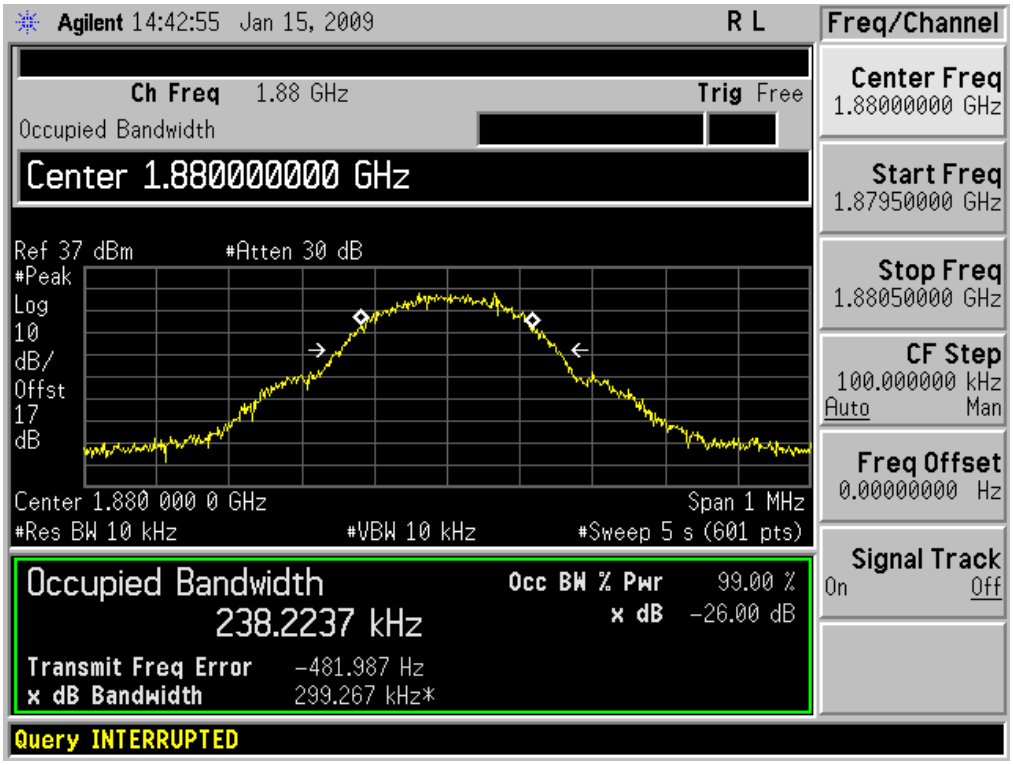
Product Service

The plots of test results are shown below.

Configuration 2 – GSM 1900 Mode 1

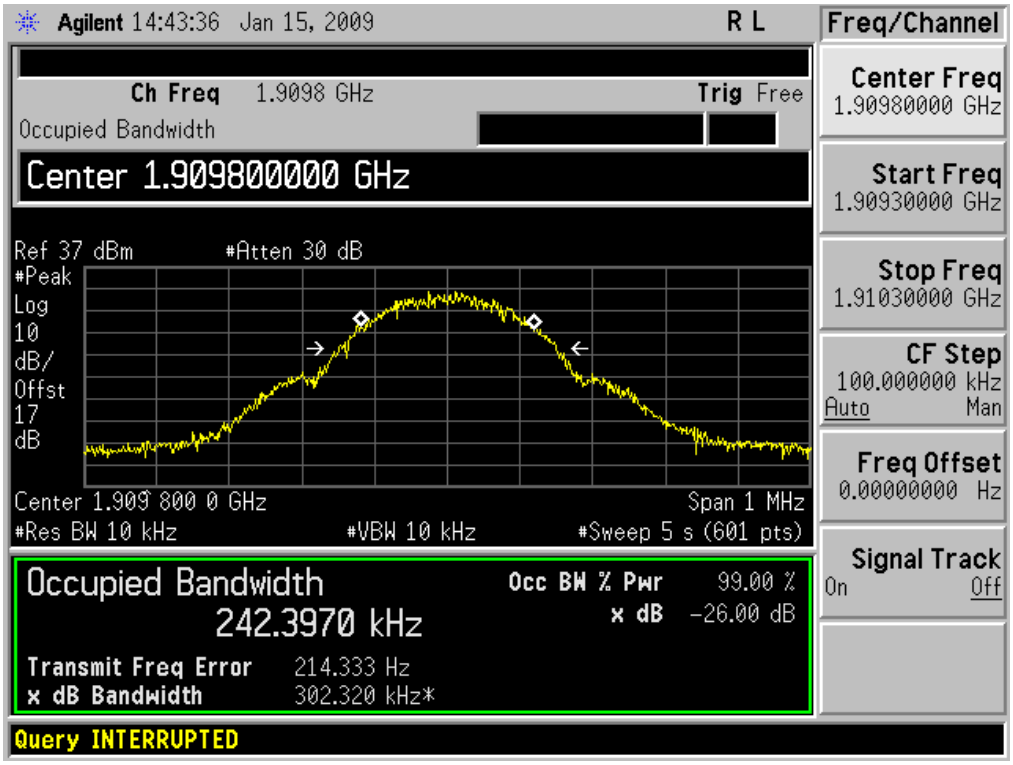


Configuration 2 – GSM 1900 Mode 2

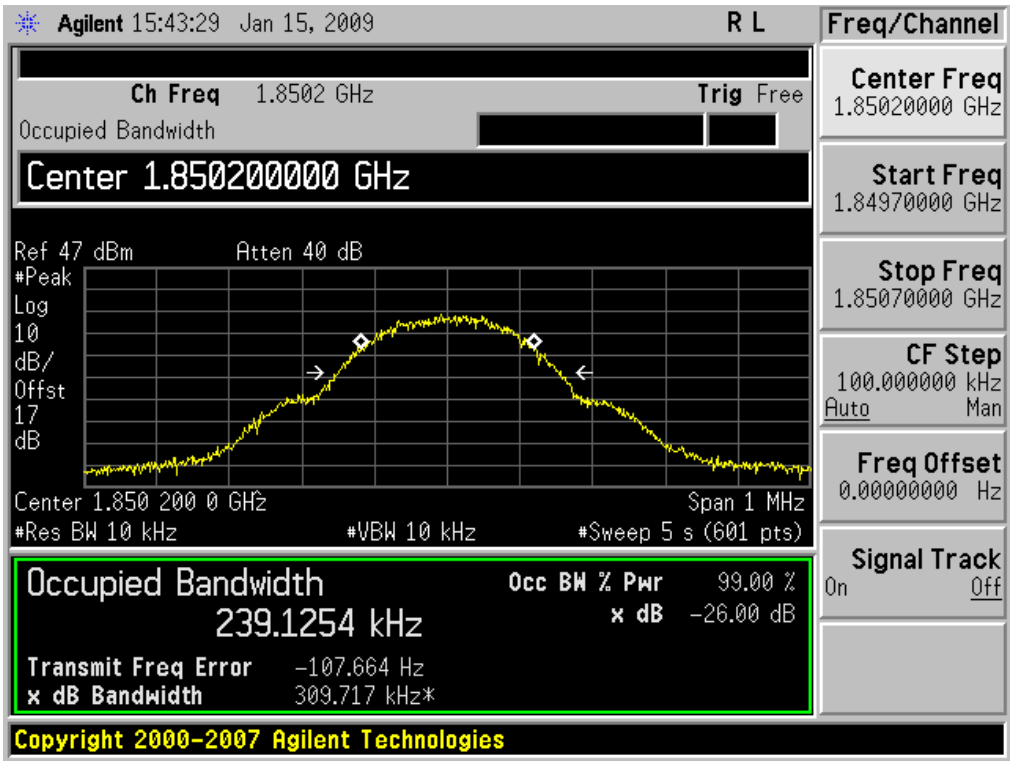


Product Service

Configuration 2 – GSM 1900 Mode 3

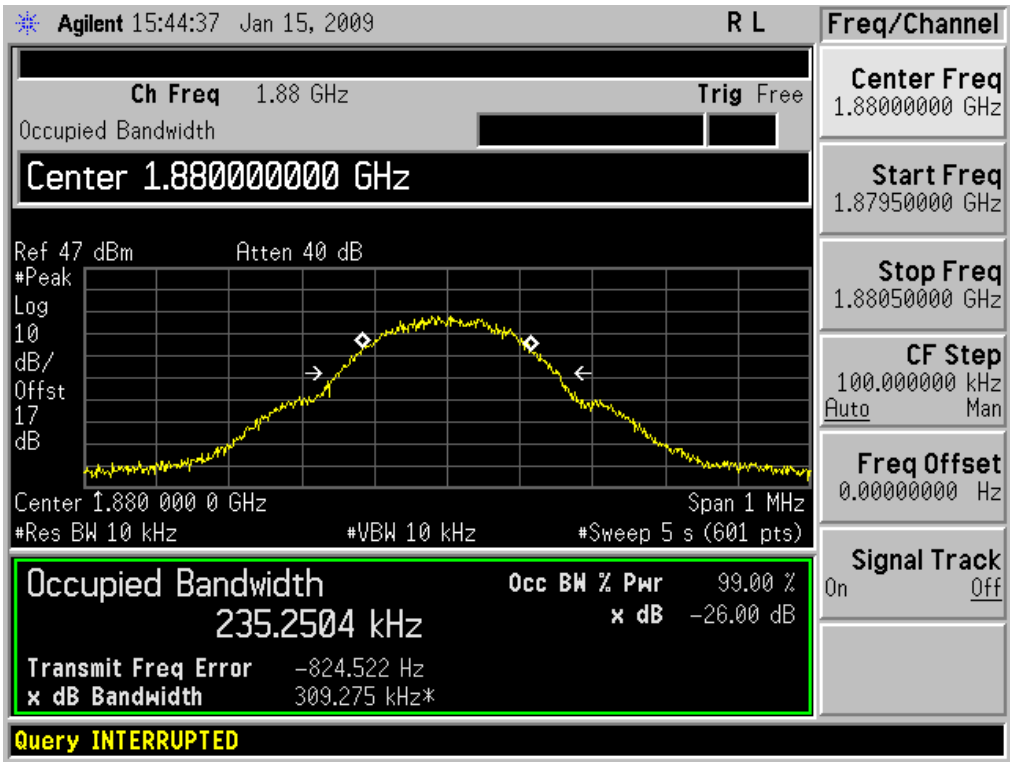


Configuration 2 – GPRS 1900 Mode 4

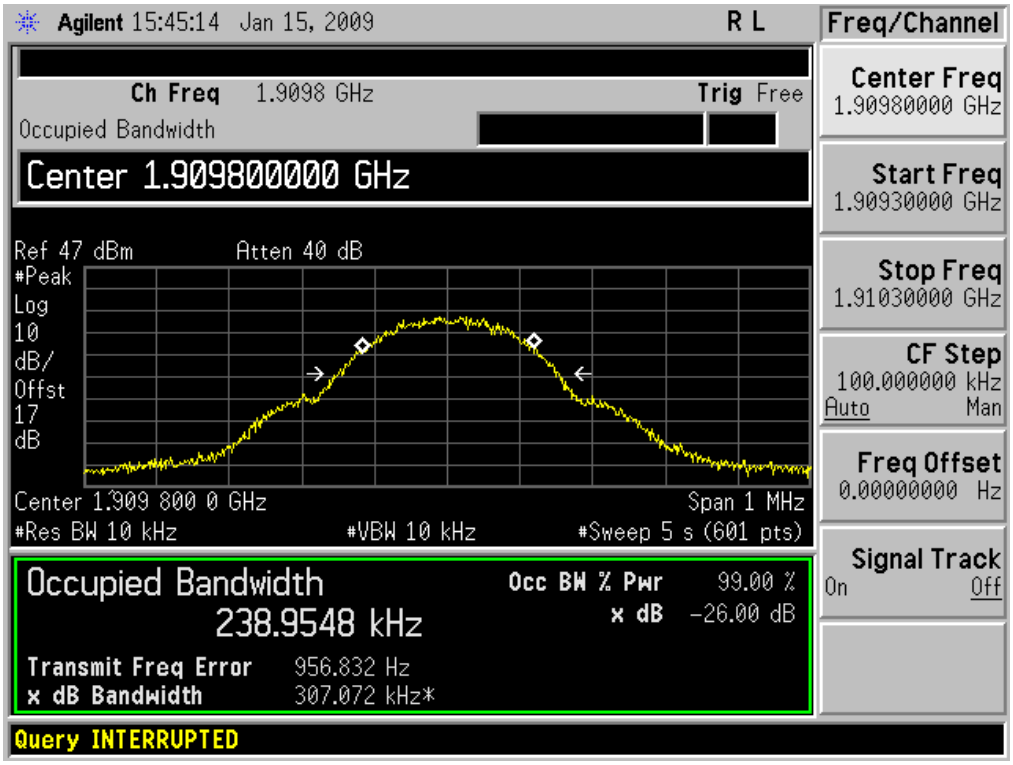


Product Service

Configuration 2 – GPRS 1900 Mode 5



Configuration 2 – GPRS 1900 Mode 6



2.17 SPURIOUS EMISSIONS AT TERMINALS (±1MHz)

2.17.1 Specification Reference

FCC CFR 47 Part 24: 2008, Clause 24.229, 24.238 (b), 2.1051 (h),

2.17.2 Equipment Under Test

GSM/GPRS EFT-POS PS400

2.17.3 Date of Test and Modification State

15 January 2009 – Modification State 0

2.17.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.17.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 24: 2008.

The measruments were made per definition in 24.238. The output was connected to a spectrum analyzer with attenuator. Measurement were performed using a peak detector with the trace display set to Max Hold. The limit was displayed, showing the –13dBm.

The measurement path loss was entered as a reference level offset into the Spectrum Analyser.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 2 - Mode 1
- Mode 3
- Mode 4
- Mode 6

2.17.6 Environmental Conditions

	15 January 2009
Ambient Temperature	22.9°C
Relative Humidity	24.2%

Product Service

2.17.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 24: 2008 Spurious Emissions Antenna Terminals (±1MHz)

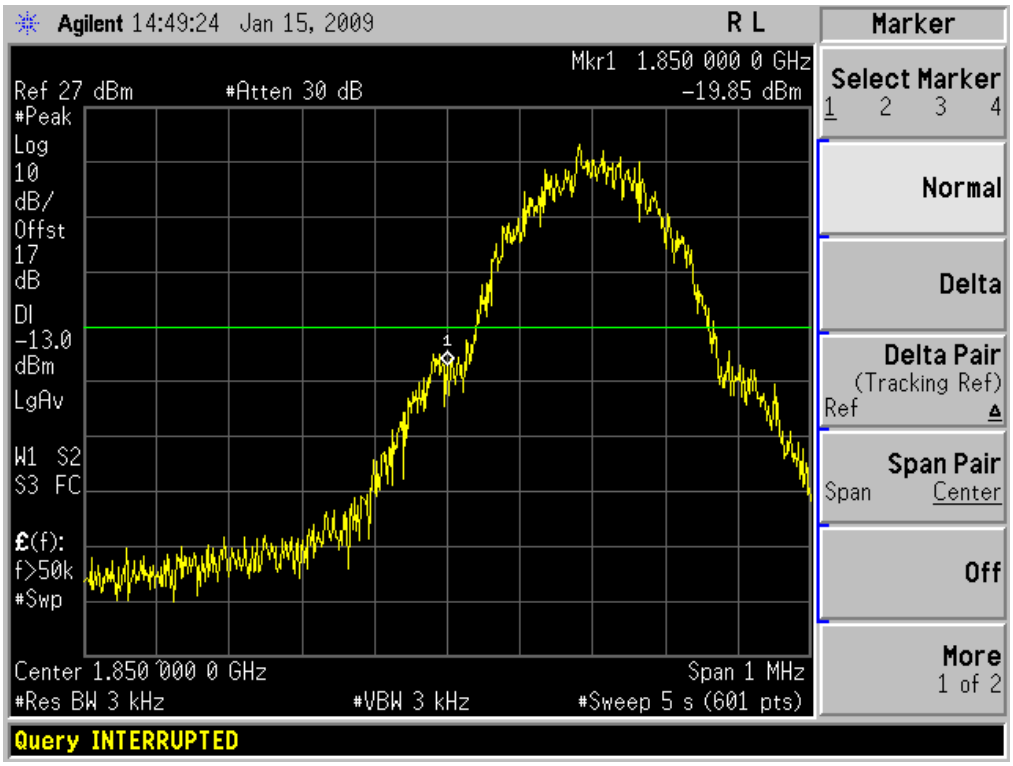
The test results are shown below.

Below are the Frequencies the EUT was tested against along with the tested channels.

Frequency Block	Lower Block Edge Test Channels / Frequencies	Upper Block Edge Test Channels / Frequencies
A	Channel: 512 Frequency: 1850MHz	-
C	-	Channel: 810 Frequency : 19010MHz

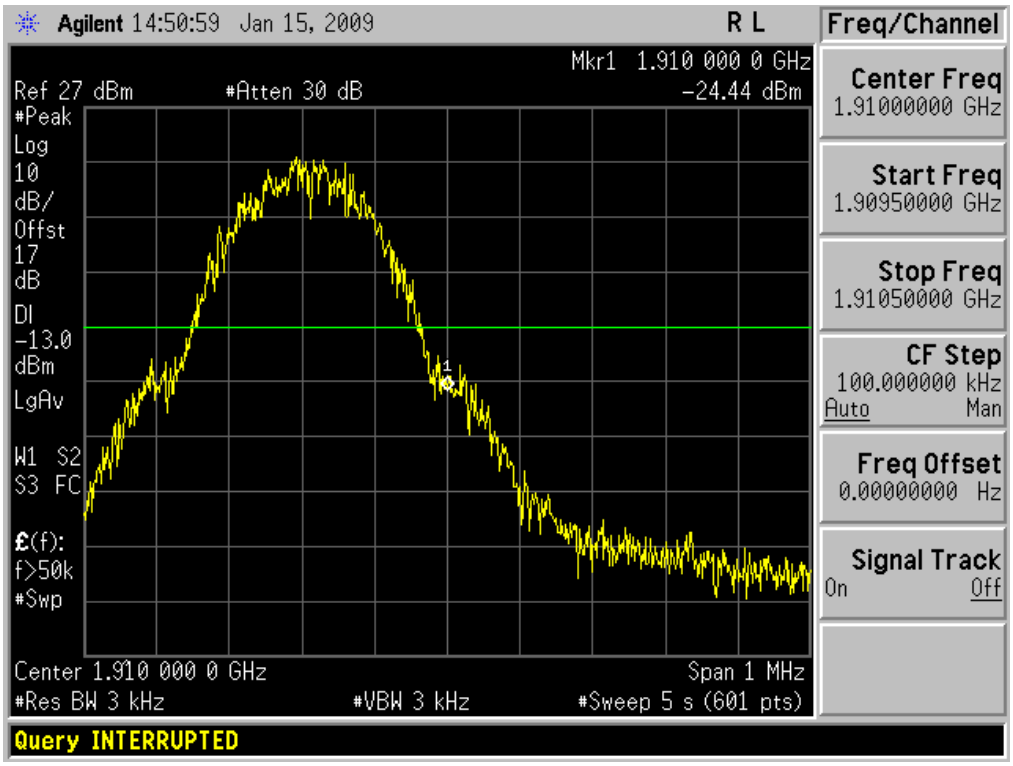
The channels shown in the table above are the minimum and maximum channels that can be used in the authorised frequency ranges to maintain compliance.

Configuration 2 – GSM 1900 Mode 1

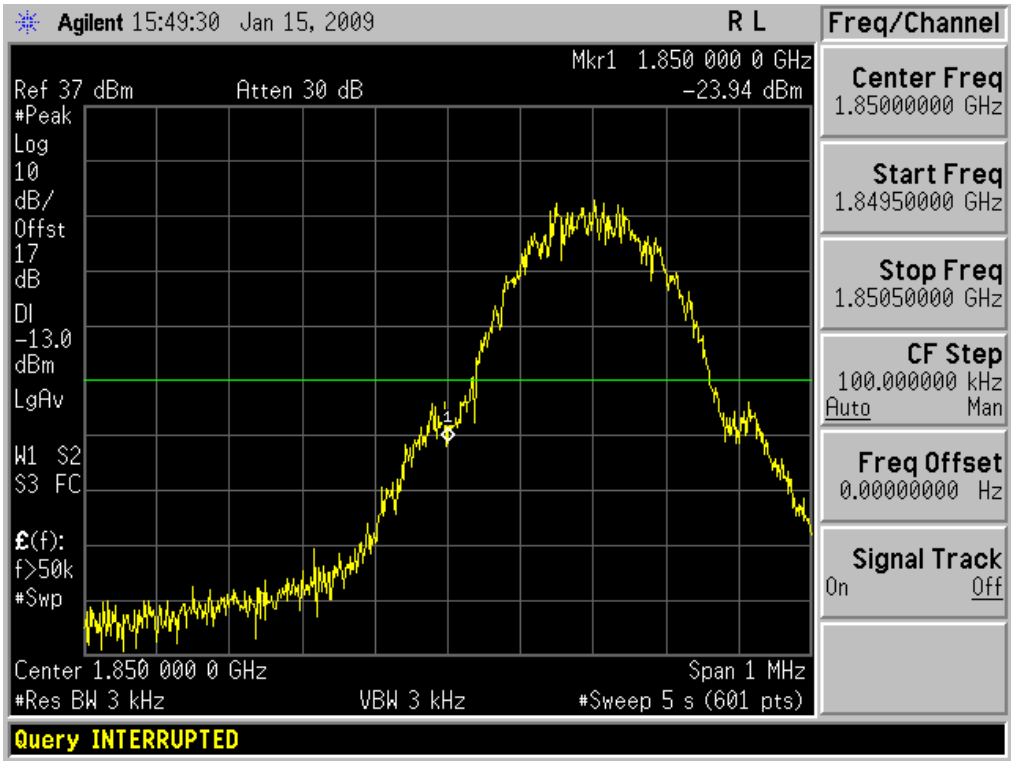


Product Service

Configuration 2 – GSM 1900 Mode 3

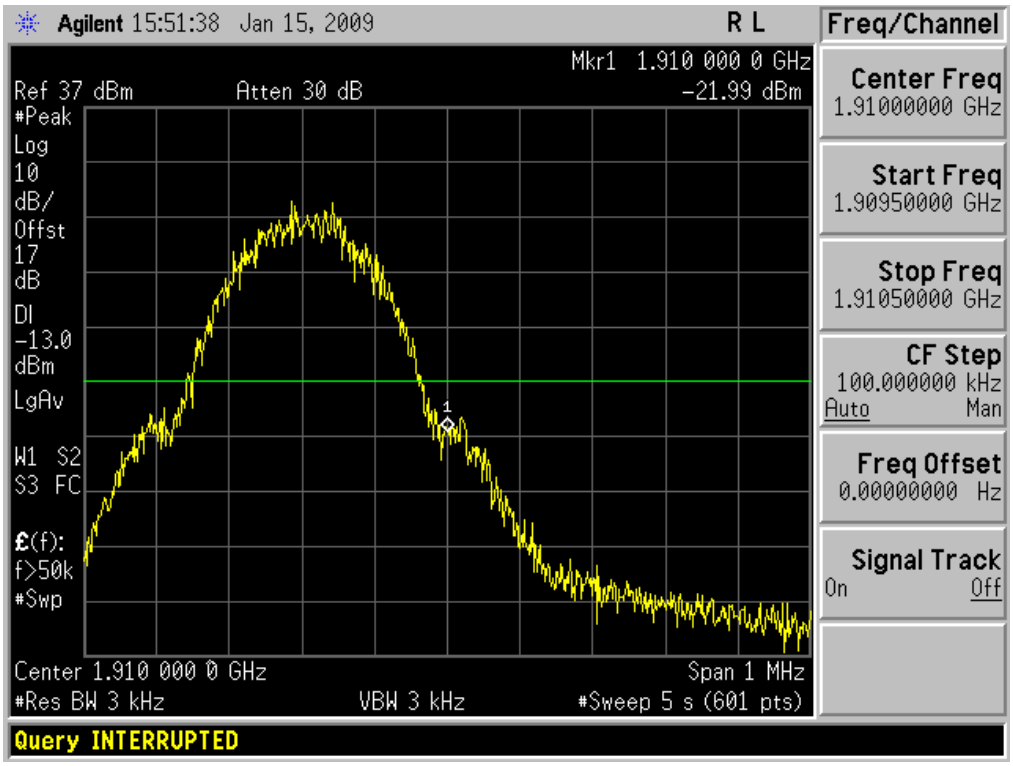


Configuration 2 – GPRS 1900 Mode 4



Product Service

Configuration 2 – GPRS 1900 Mode 6



Limit	-13dBm

2.18 RADIATED SPURIOUS EMISSIONS

2.18.1 Specification Reference

FCC CFR 47 Part 24: 2008, 24.238 (a),

2.18.2 Equipment Under Test

GSM/GPRS EFT-POS PS400

2.18.3 Date of Test and Modification State

06 and 07 July 2009 – Modification State 0

2.18.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.18.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 24: 2008.

A preliminary profile of the Spurious Radiated Emissions was obtained by operating the EUT on a remotely controlled turntable within the anechoic chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations.

Emissions identified within the range 30MHz – 1GHz were then formally meausred using a Peak detector. Emissions identified withing the range 1GHz – 20GHz were then formally measured using Peak and Average Dectectors, as propriate.

The measurements were performed at a 3m distance unless otherwise stated.

The limit was displayed, showing the –13dBm.

The test was performed with the EUT operating on all modes in section1.4.3 and record the result of the following configurations and modes of operation for worst case:

Configuration 2 - Mode 1
- Mode 2
- Mode 3
- Mode 4
- Mode 5
- Mode 6

2.18.6 Environmental Conditions

	06 July 2009	07 July 2009
Ambient Temperature	23.2°C	24.2°C
Relative Humidity	24.1%	23.3%

Product Service

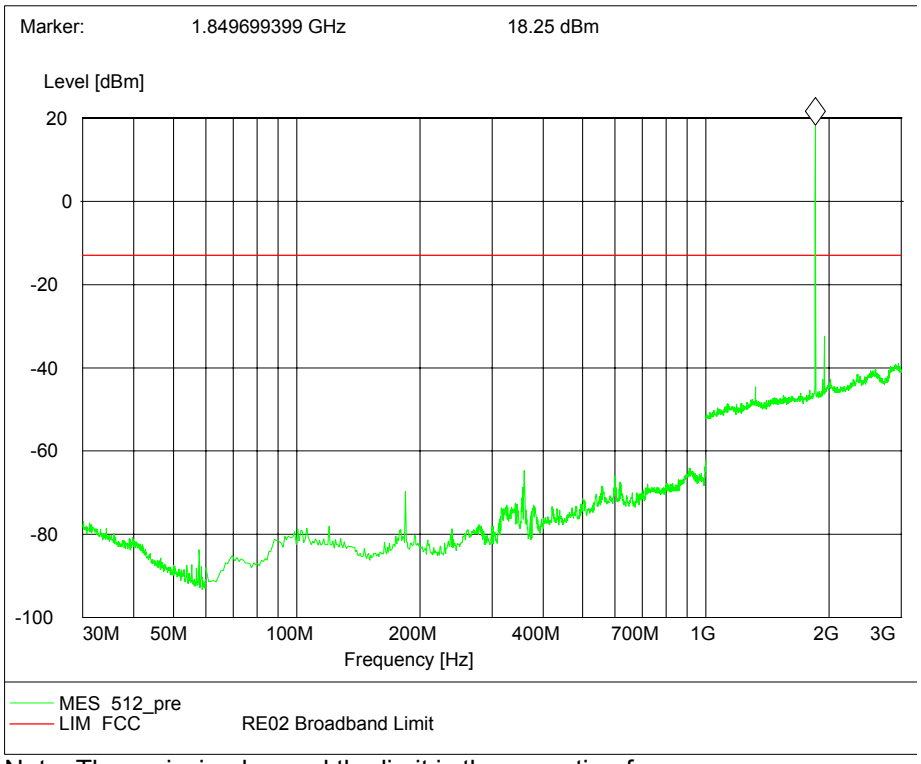
2.18.7 Test Result

For the period of test the EUT met the requirements of FCC CFR 47 Part 24: 2008 for Radiated Spurious Emissions.

The test results are shown below.

Configuration 2 – GSM 1900 Mode 1

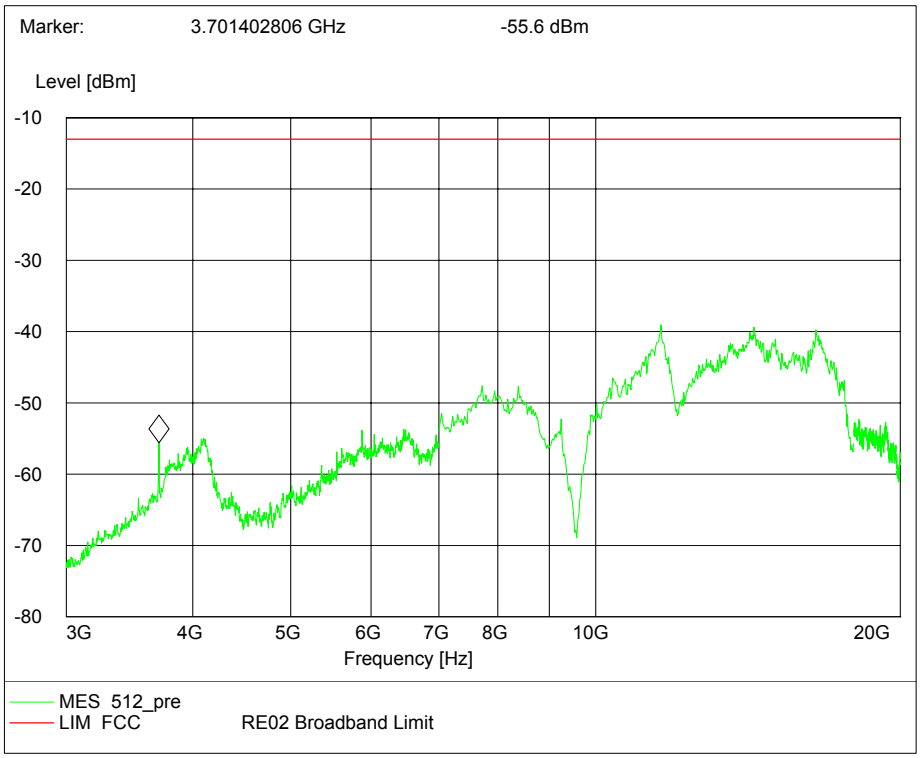
30MHz to 3GHz



Note: The emission beyond the limit is the operating frequency.

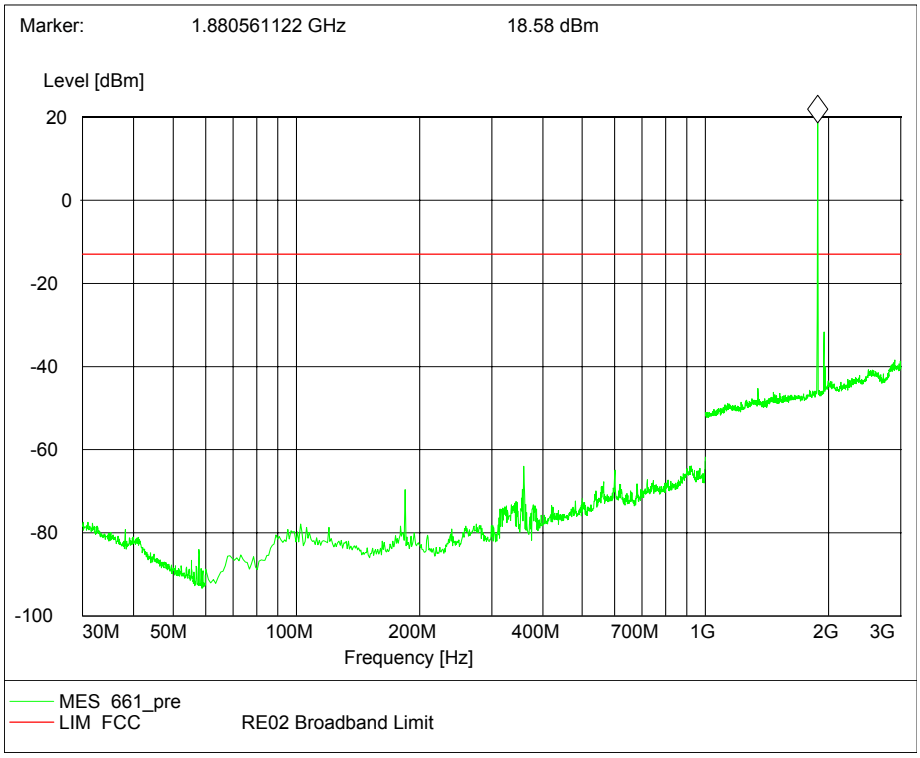
Product Service

3GHz to 20GHz



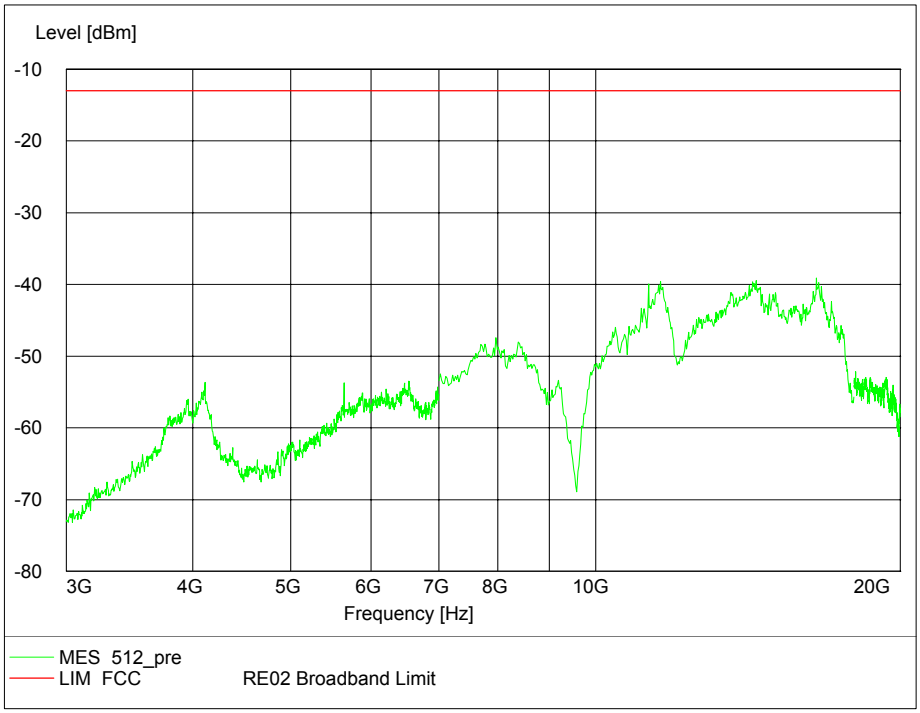
Configuration 2 – GSM 1900 Mode 2

30MHz to 3GHz



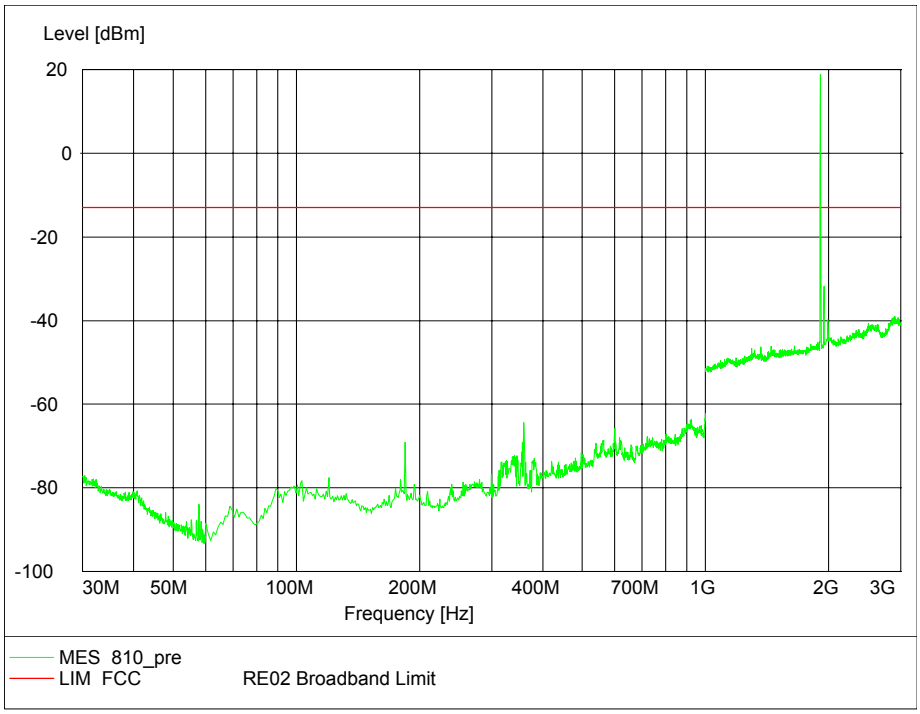
Note: The emission beyond the limit is the operating frequency.

3GHz to 20GHz



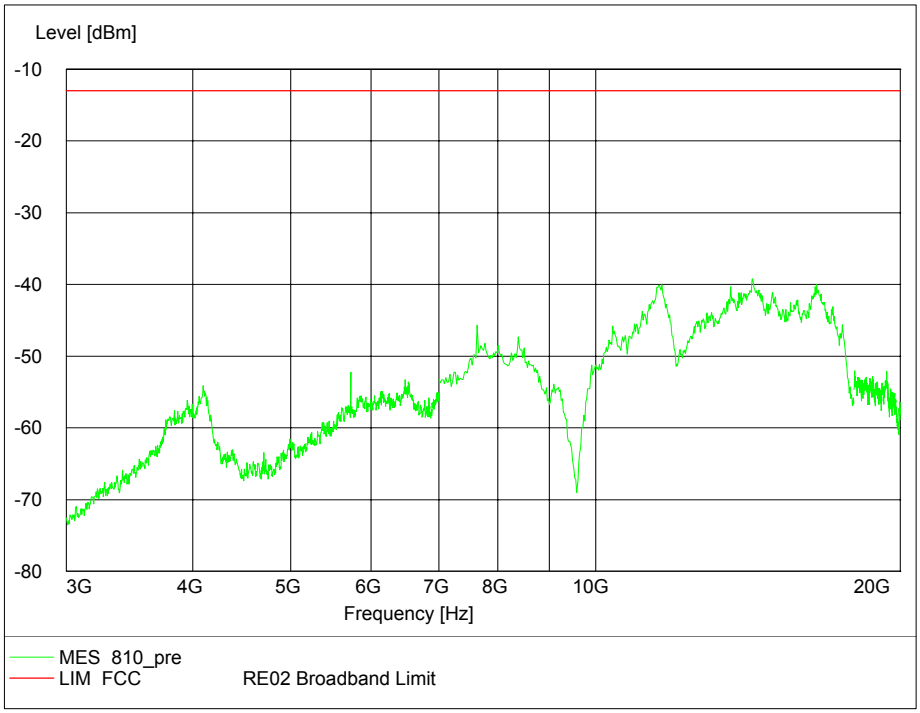
Configuration 2 – GSM 1900 Mode 3

30MHz to 3GHz



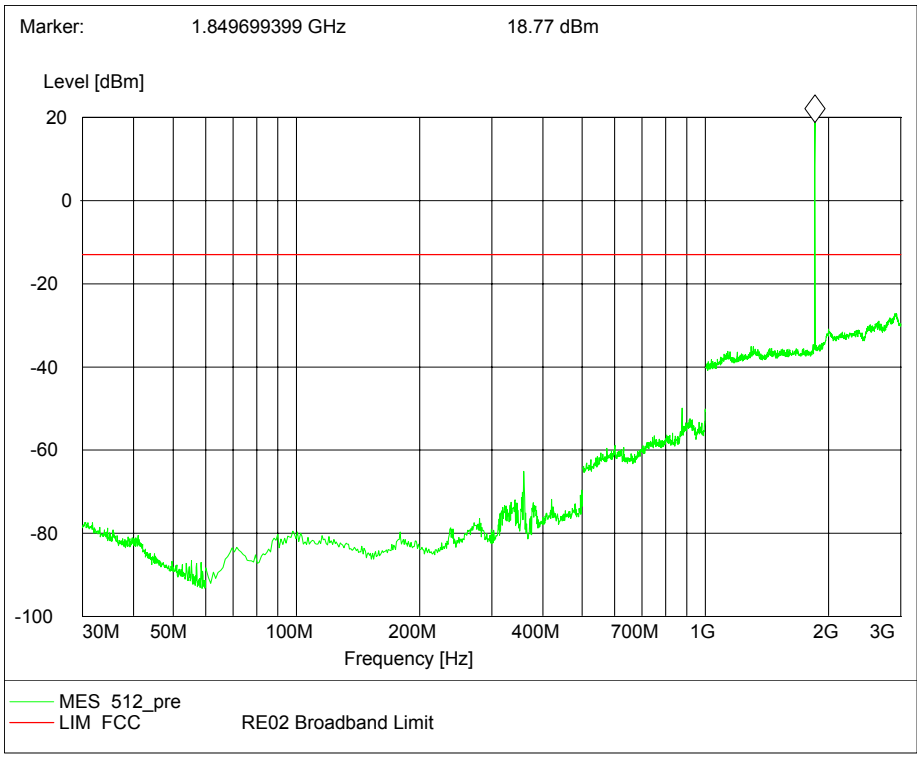
Note: The emission beyond the limit is the operating frequency.

3GHz to 20GHz



Configuration 2 – GPRS 1900 Mode 4

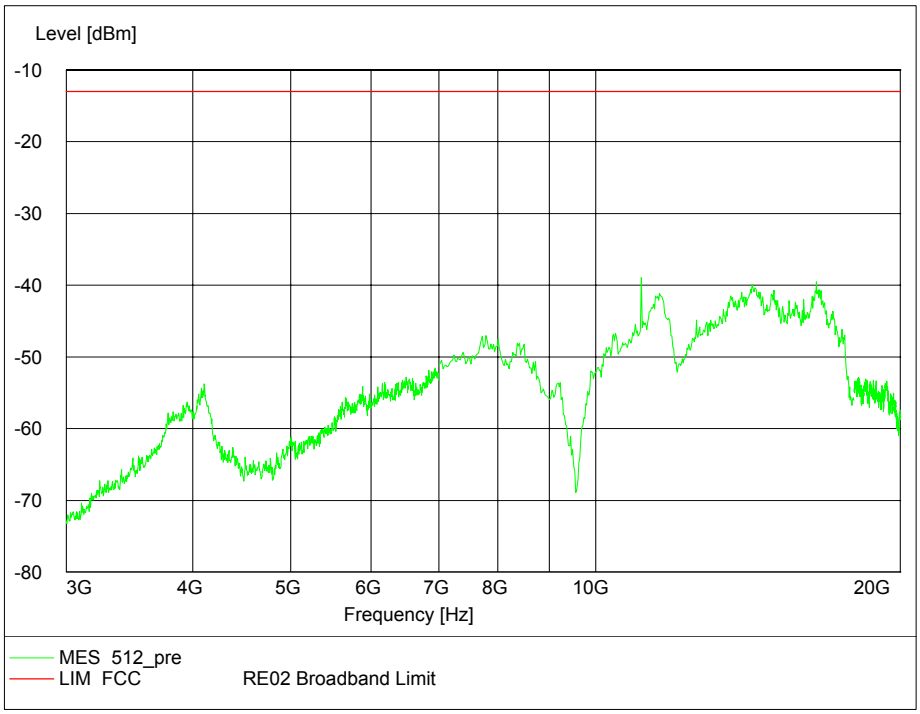
30MHz to 3GHz



Note: The emission beyond the limit is the operating frequency.

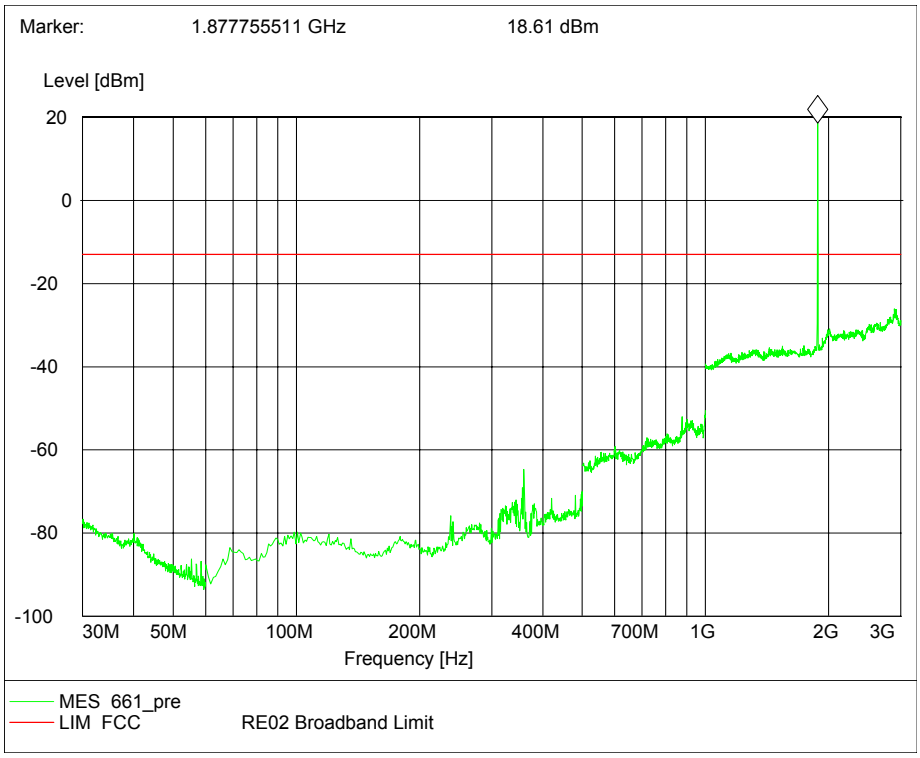
Product Service

3GHz to 20GHz



Configuration 2 – GPRS 1900 Mode 5

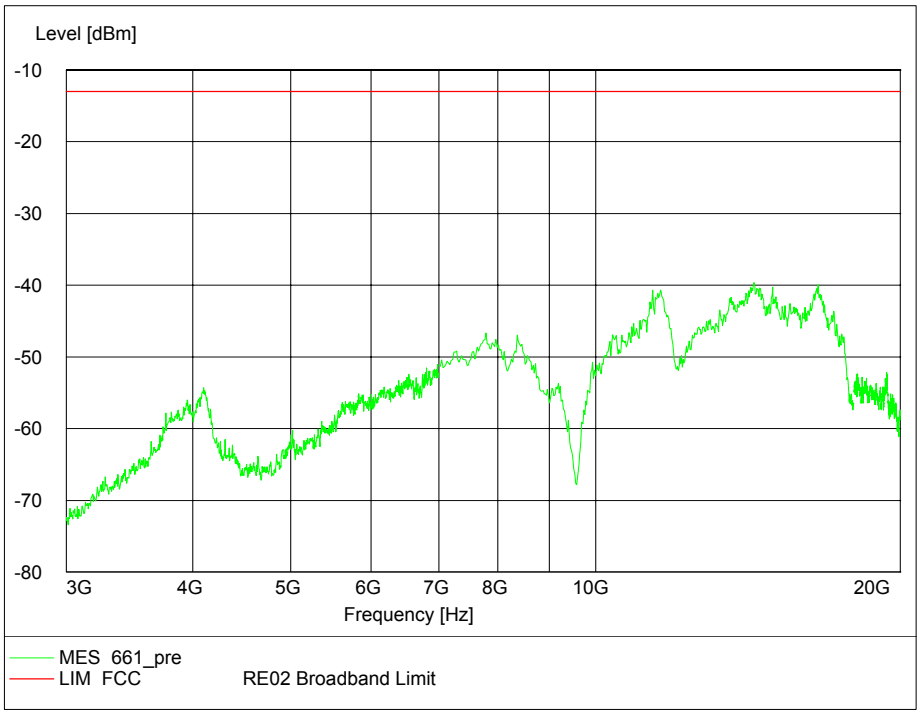
30MHz to 3GHz



Note: The emission beyond the limit is the operating frequency.

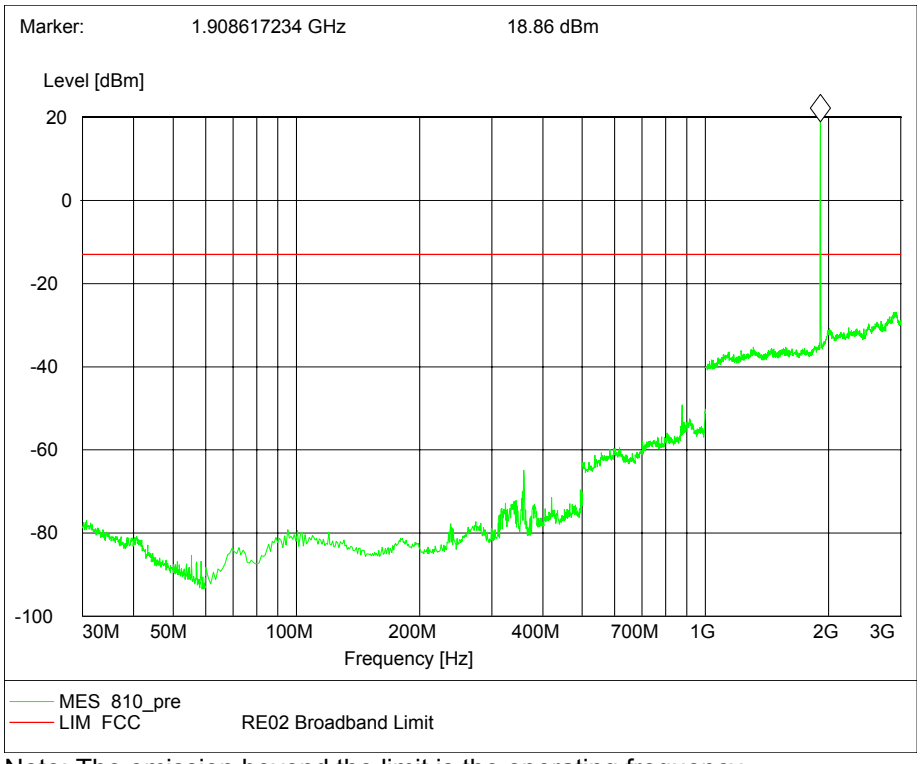
Product Service

3GHz to 20GHz



Configuration 2 – GPRS 1900 Mode 6

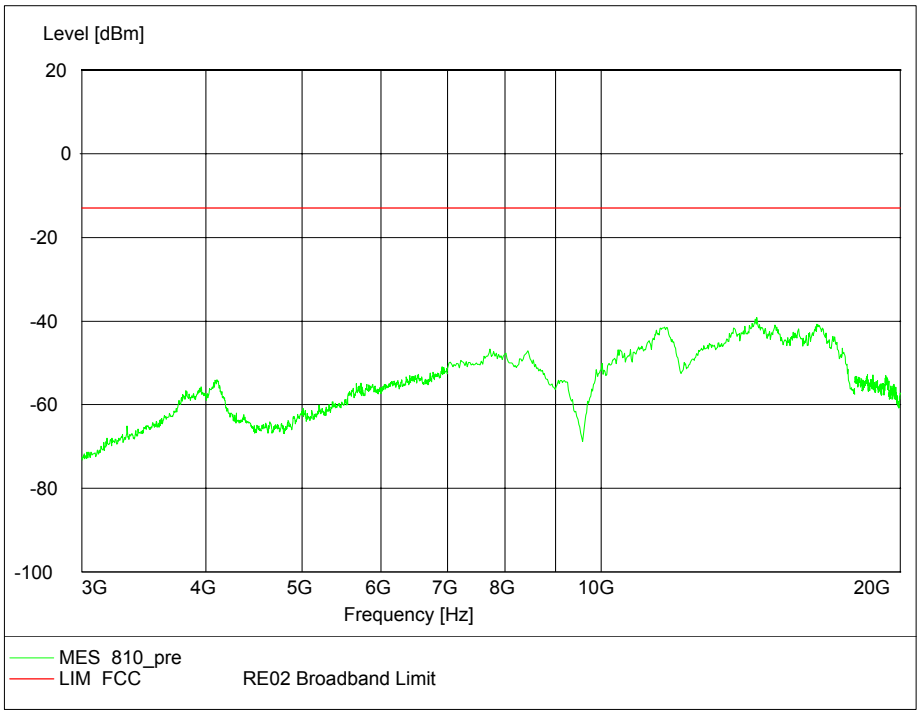
30MHz to 3GHz



Note: The emission beyond the limit is the operating frequency.

Product Service

3GHz to 20GHz



Limit	-13dBm

2.19 CONDUCTED SPURIOUS EMISSIONS

2.19.1 Specification Reference

FCC CFR 47 Part 24: 2008, Clause 24.238 (a), 2.1051,

2.19.2 Equipment Under Test

GSM/GPRS EFT-POS PS400

2.19.3 Date of Test and Modification State

15 January 2009 – Modification State 0

2.19.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.19.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 24: 2008.

In accordance with Part 2.1051, the spurious emissions from the antenna terminal were measured. The transmitter output power was attenuated using a attenuator and the frequency spectrum investigated from 9kHz to 10GHz. The EUT was set to transmit on maximum power. The EUT was tested on Bottom, Middle and Top channels. The resolution bandwidht was set to 1MHz and video bandwidths were set to 1MHz thus meeting the requirements of Part 24.238 (b). The spectrum analyser detector was set to peak and trace was kept on Max Hold. The limit line was displayed, showing the –13dBm.

The maximum path loss across the measurement band was used as the reference level offset to ensure worst case.

In addition, measurements were made up to the 10^{th} harmonic of the fundamental.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 2 - Mode 1
- Mode 2
- Mode 3
- Mode 4
- Mode 5
- Mode 6

2.19.6 Environmental Conditions

	15 January 2009
Ambient Temperature	22.9°C
Relative Humidity	24.2%

Product Service

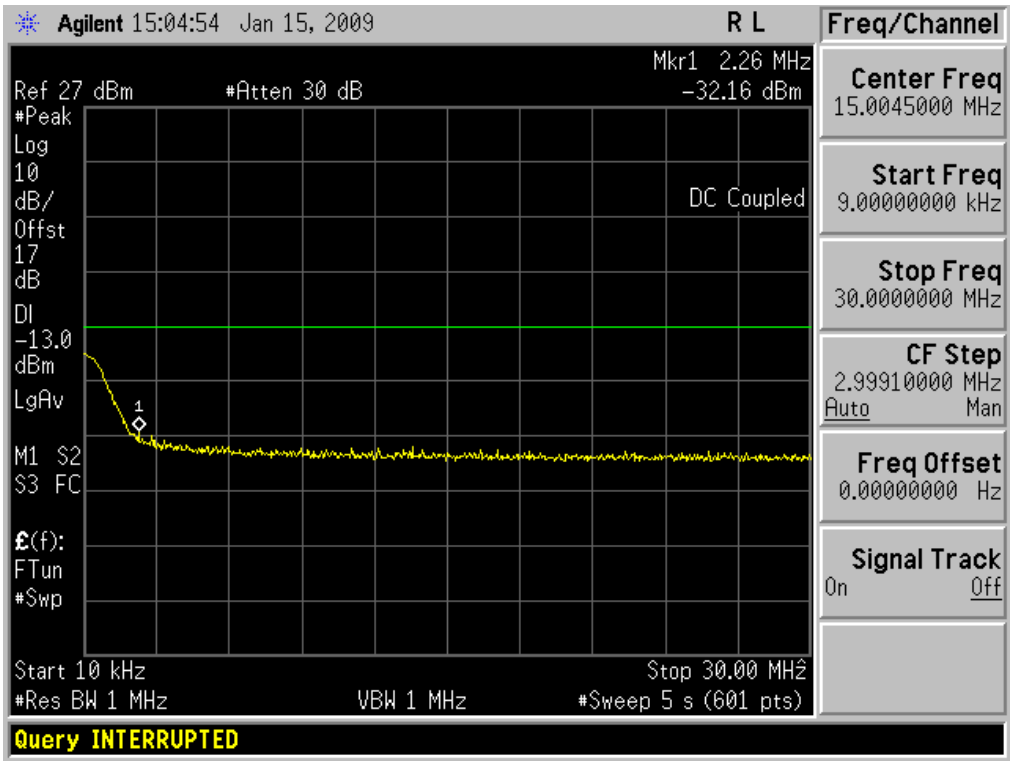
2.19.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 24: 2008 for Spurious Emissions.

The test results are shown below.

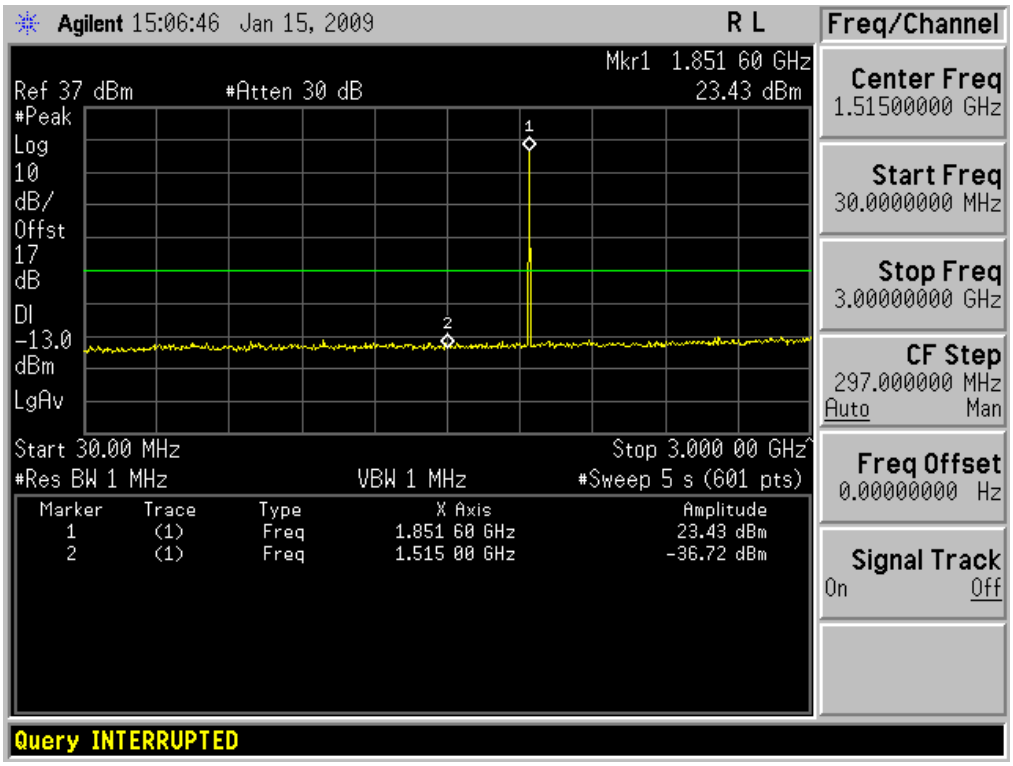
Configuration 2 – GSM 1900 Mode 1

9kHz to 30MHz



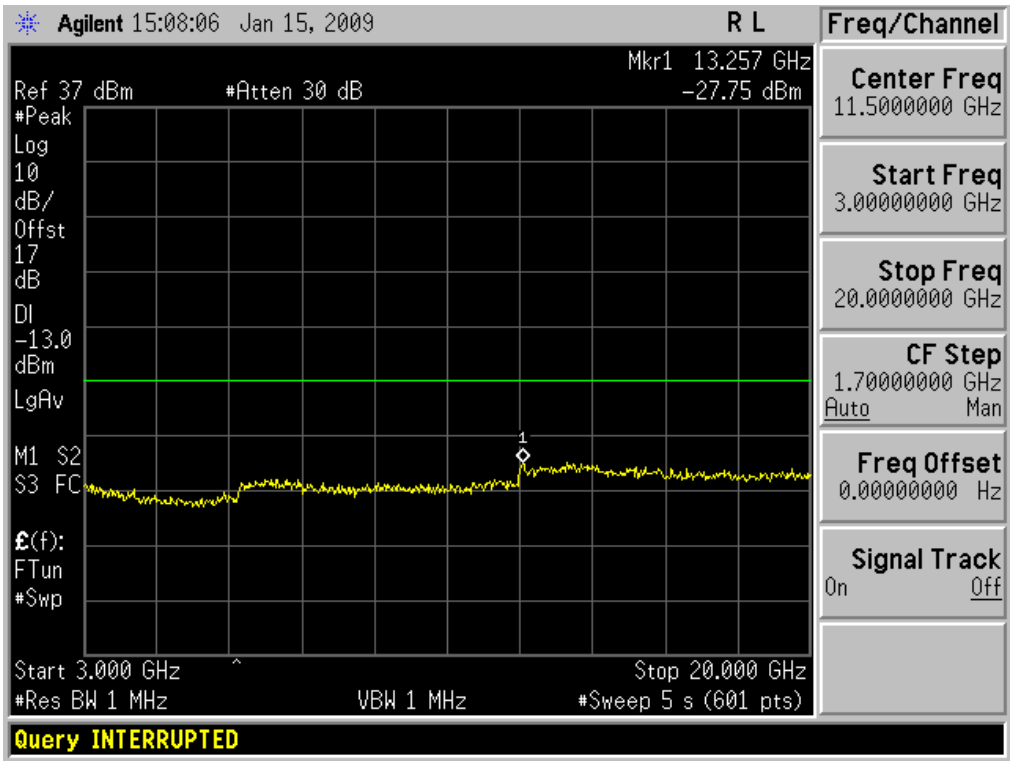
Product Service

30MHz to 3GHz



Note: The emission beyond the limit is the operating frequency.

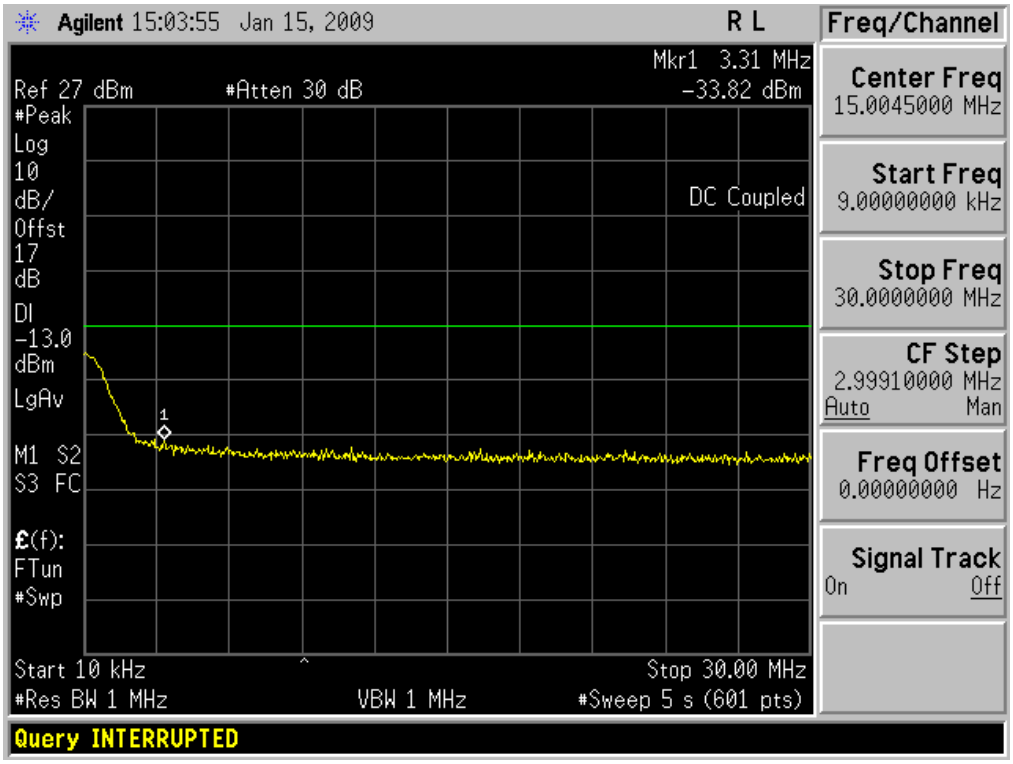
3GHz to 20GHz



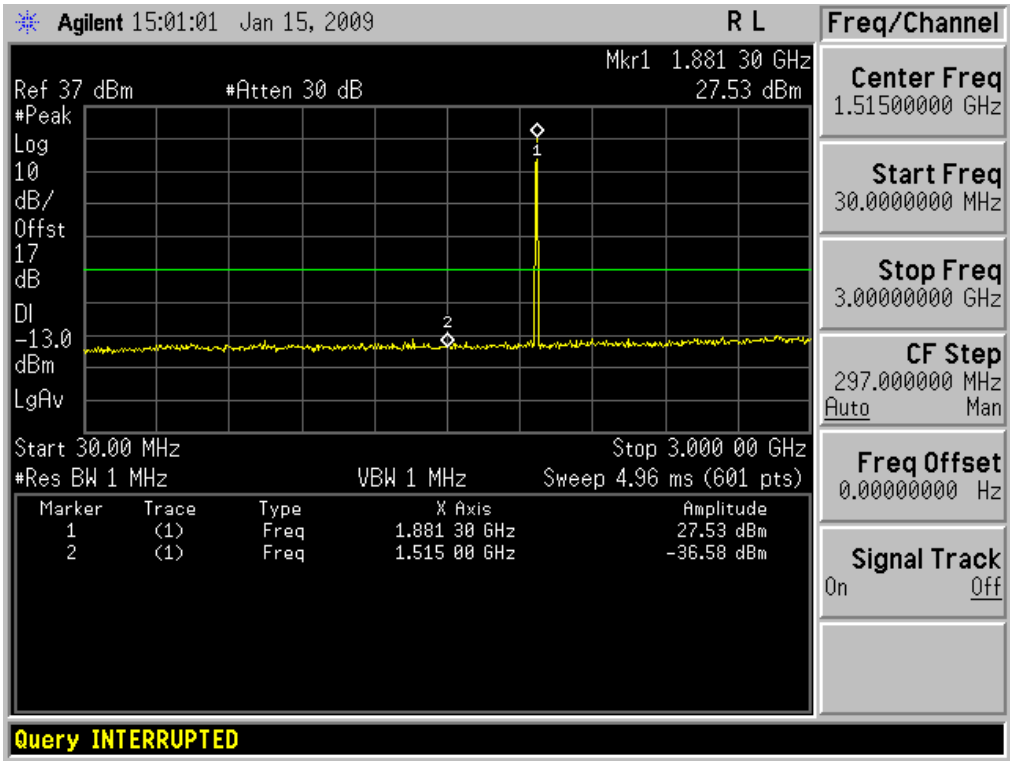
Product Service

Configuration 2– GSM 1900 Mode 2

9kHz to 30MHz



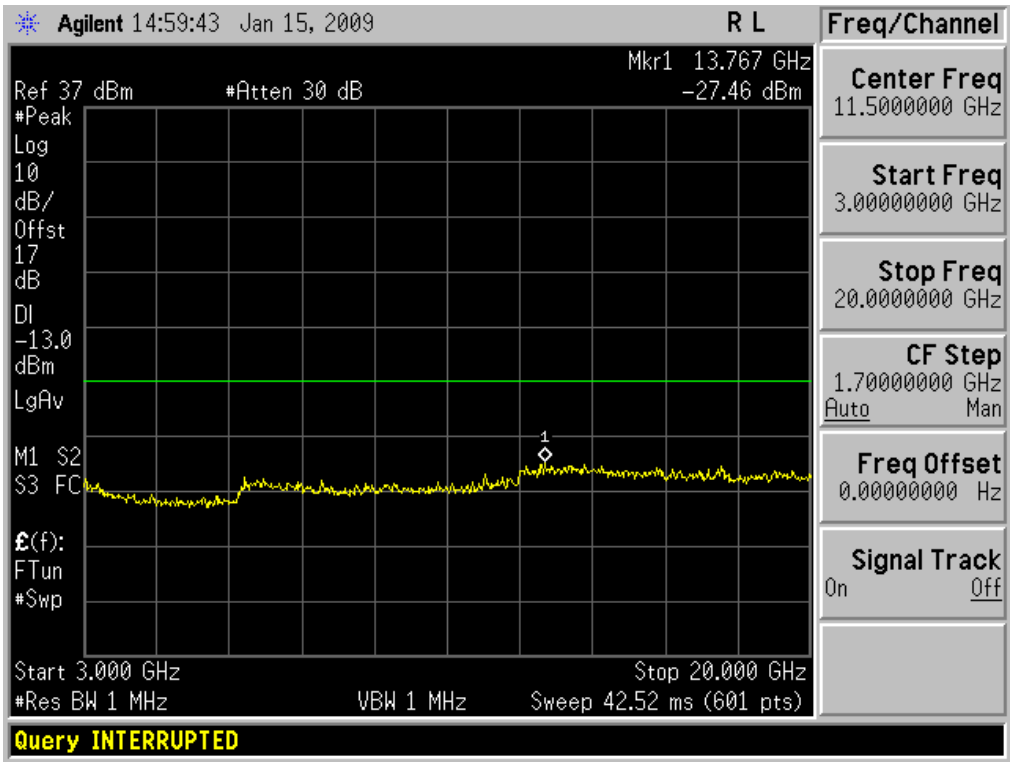
30MHz to 3GHz



Note: The emission beyond the limit is the operating frequency.

Product Service

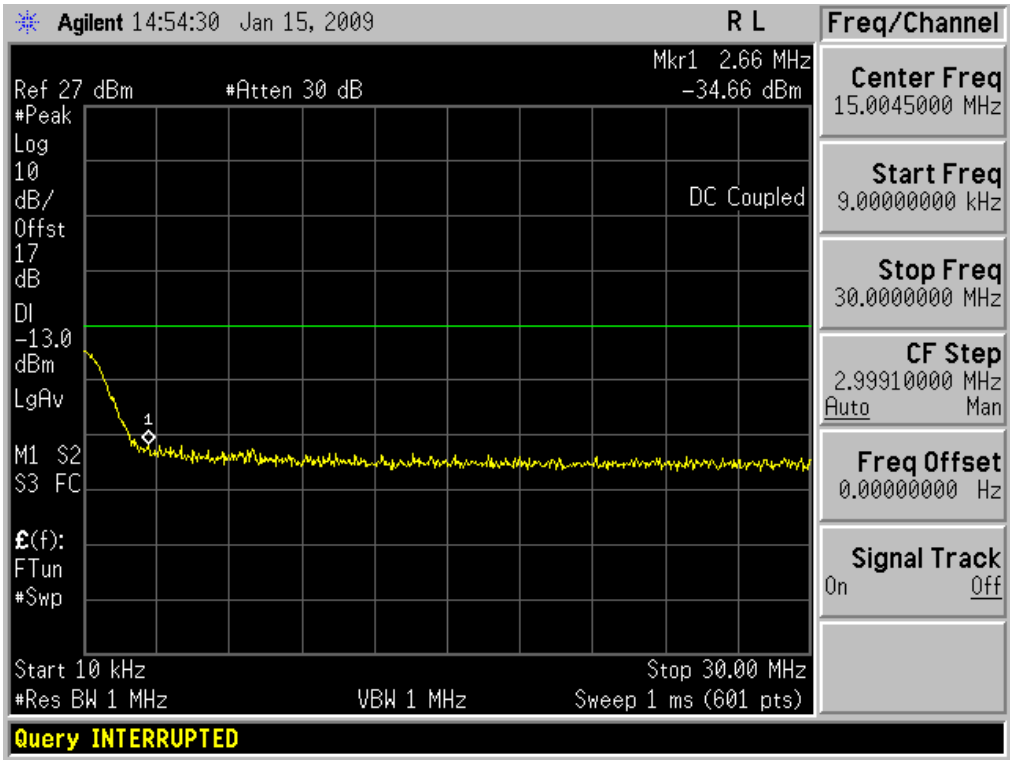
3GHz to 20GHz



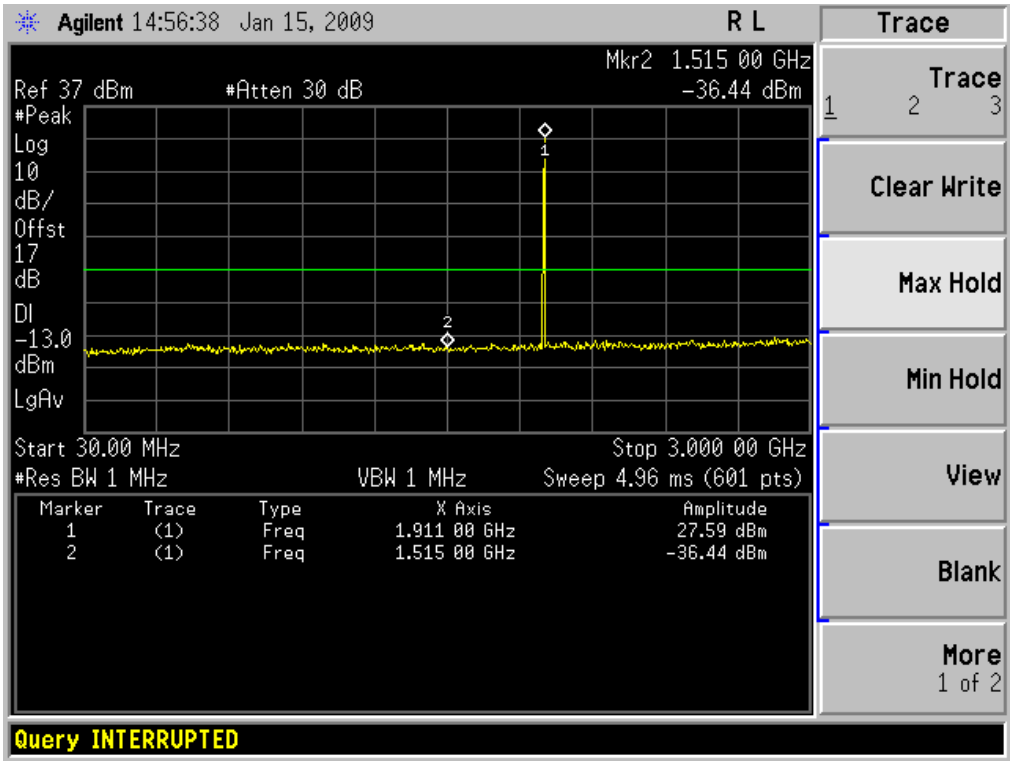
Product Service

Configuration 2 – GSM 1900 Mode 3

9kHz to 30MHz



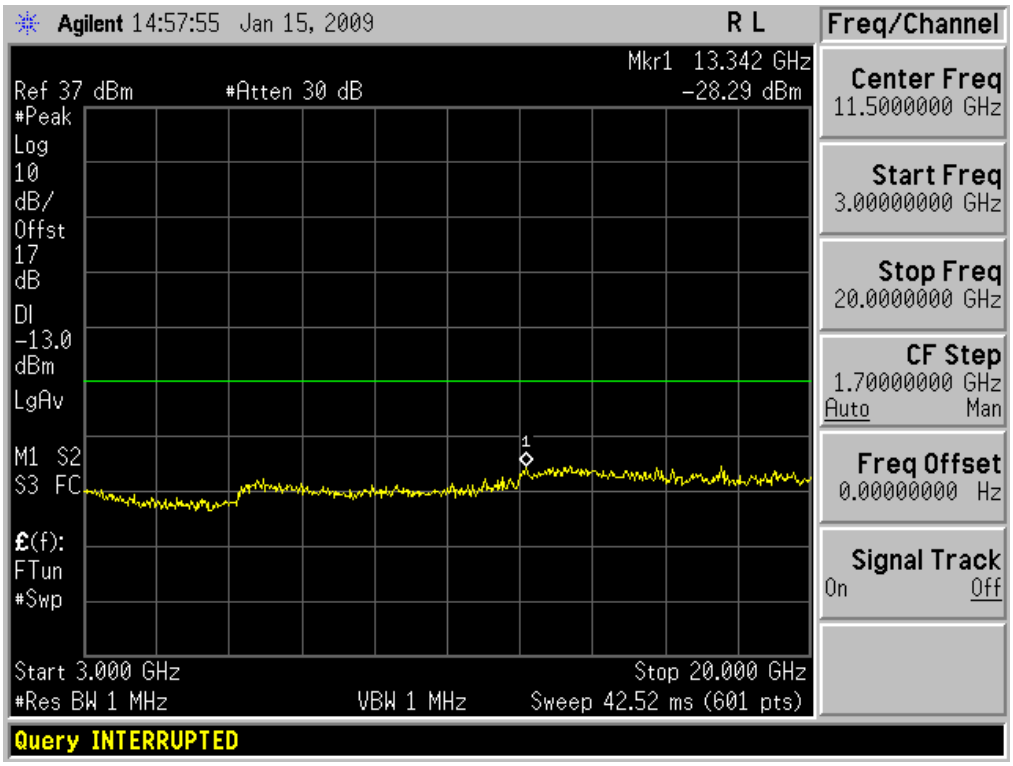
30MHz to 3GHz



Note: The emission beyond the limit is the operating frequency.

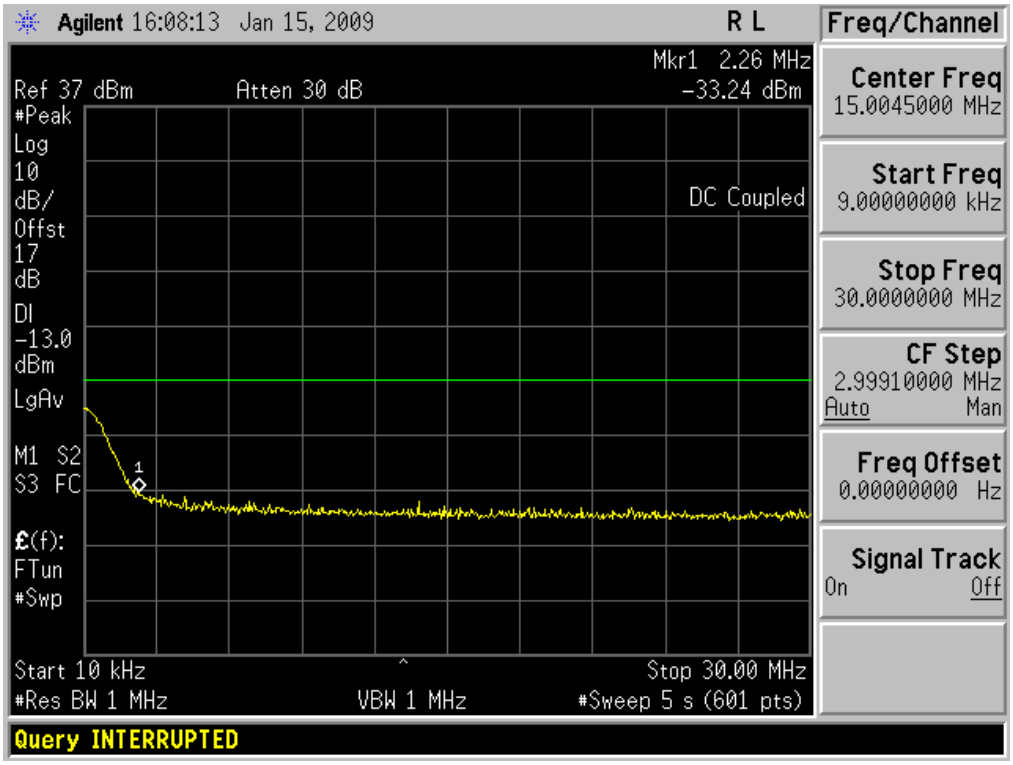
Product Service

3GHz to 20GHz



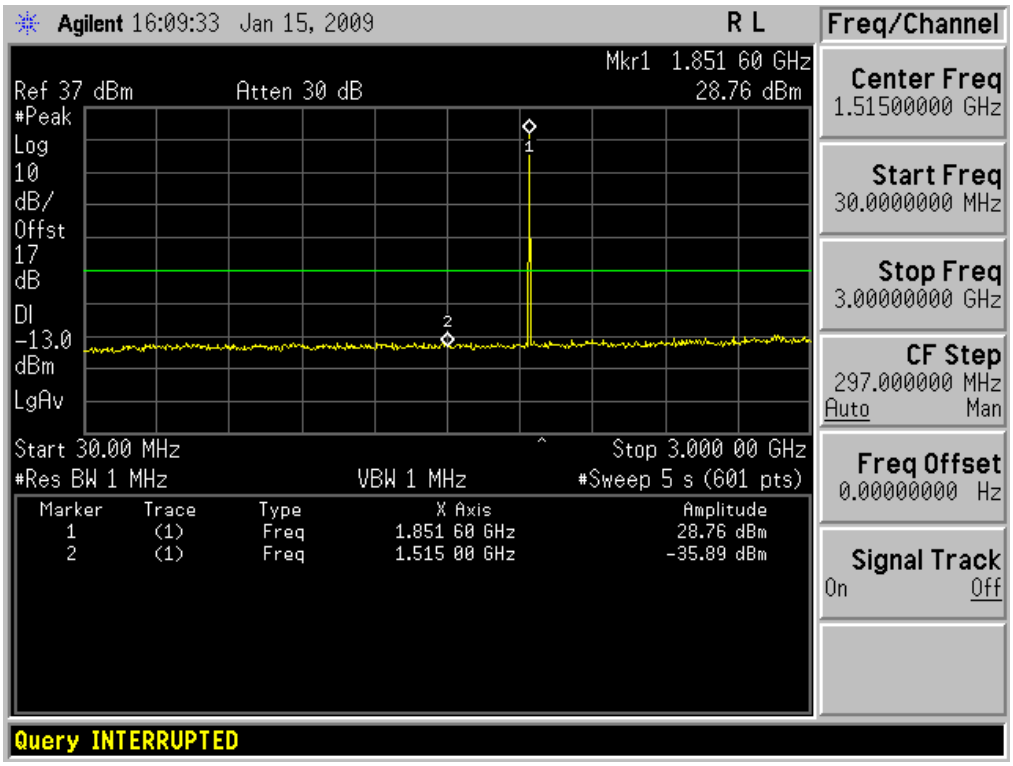
Configuration 2 – GPRS 1900 Mode 4

9kHz to 30MHz



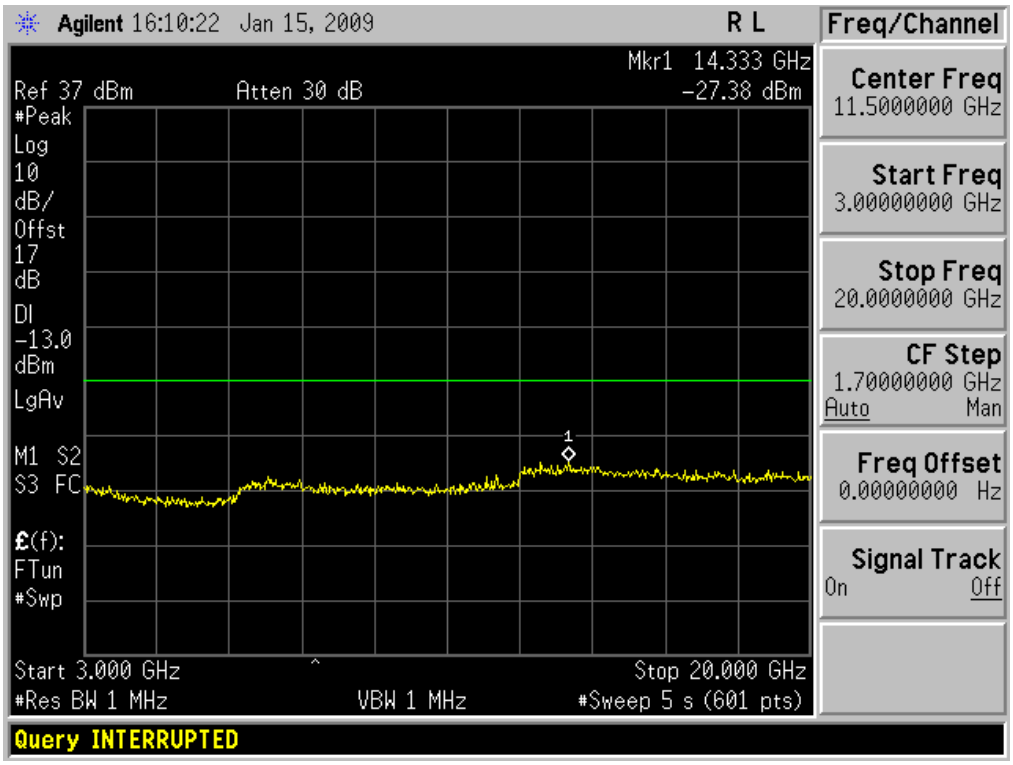
Product Service

30MHz to 3GHz



Note: The emission beyond the limit is the operating frequency.

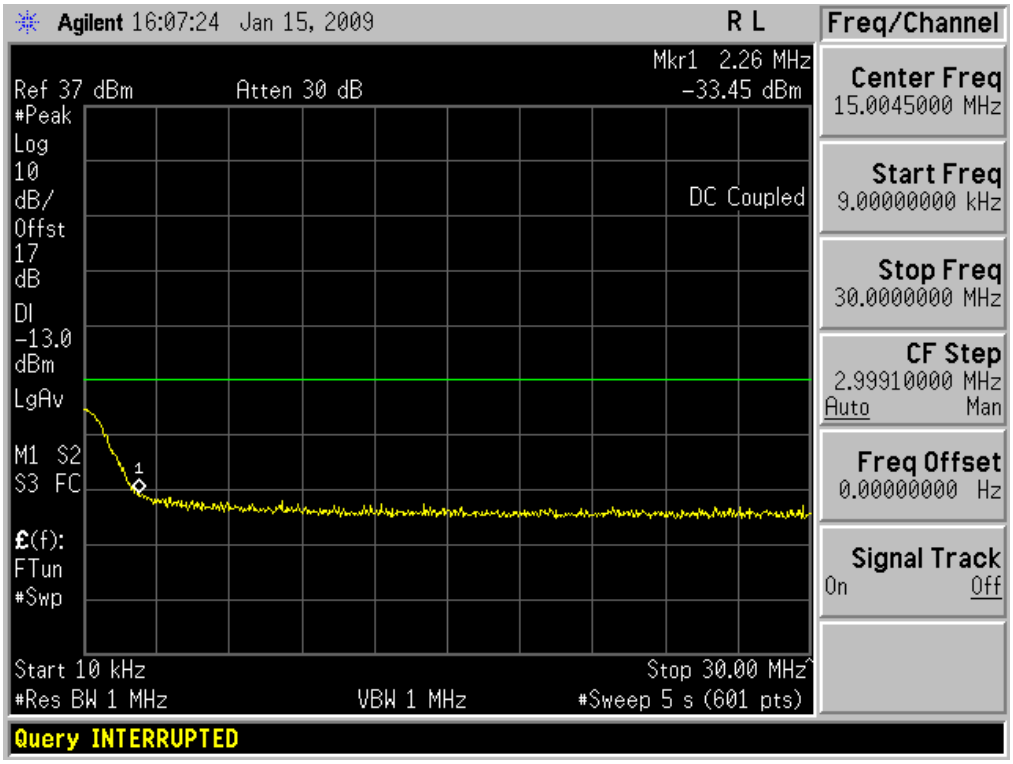
3GHz to 20GHz



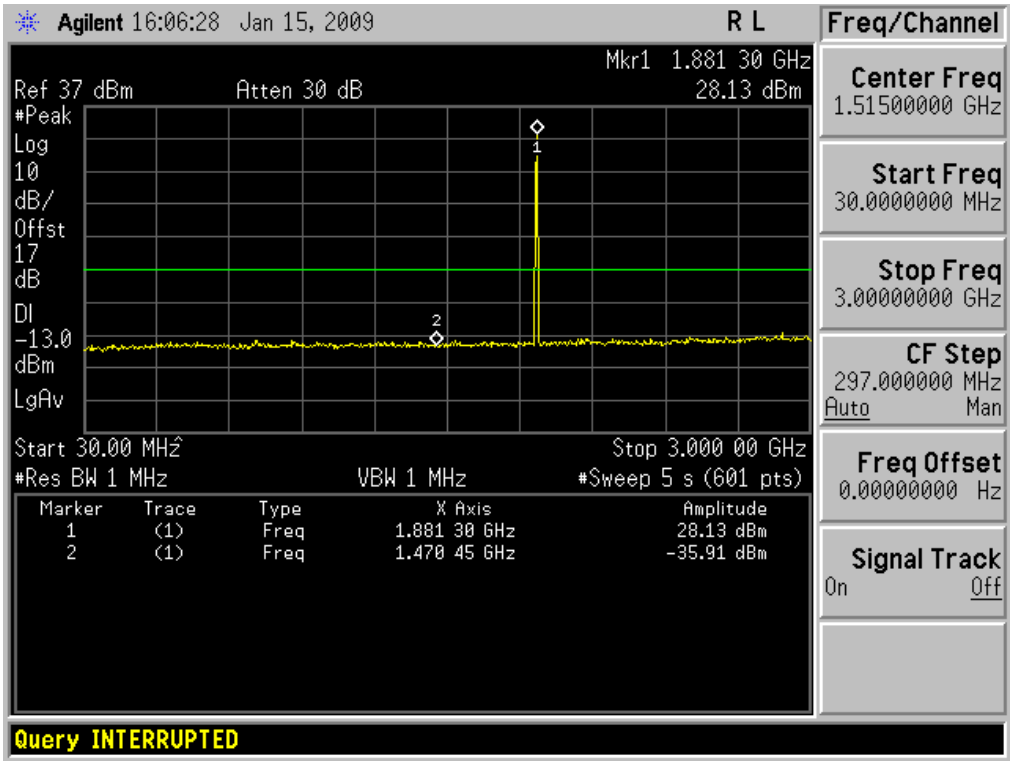
Product Service

Configuration 2– GPRS 1900 Mode 5

9kHz to 30MHz



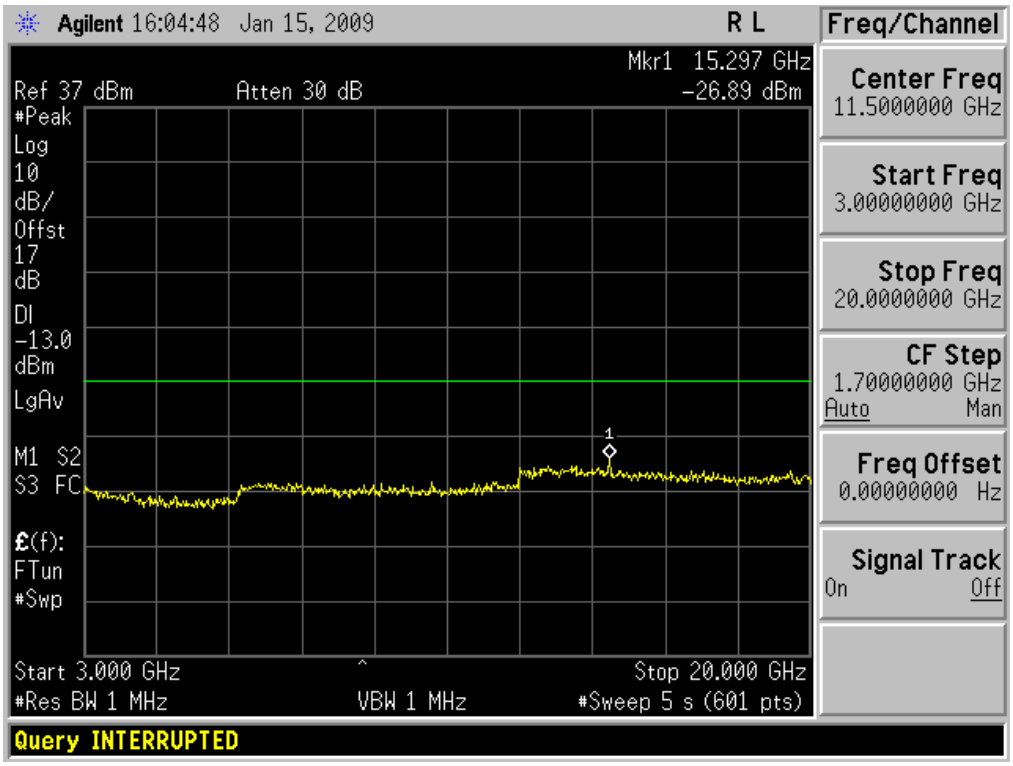
30MHz to 3GHz



Note: The emission beyond the limit is the operating frequency.

Product Service

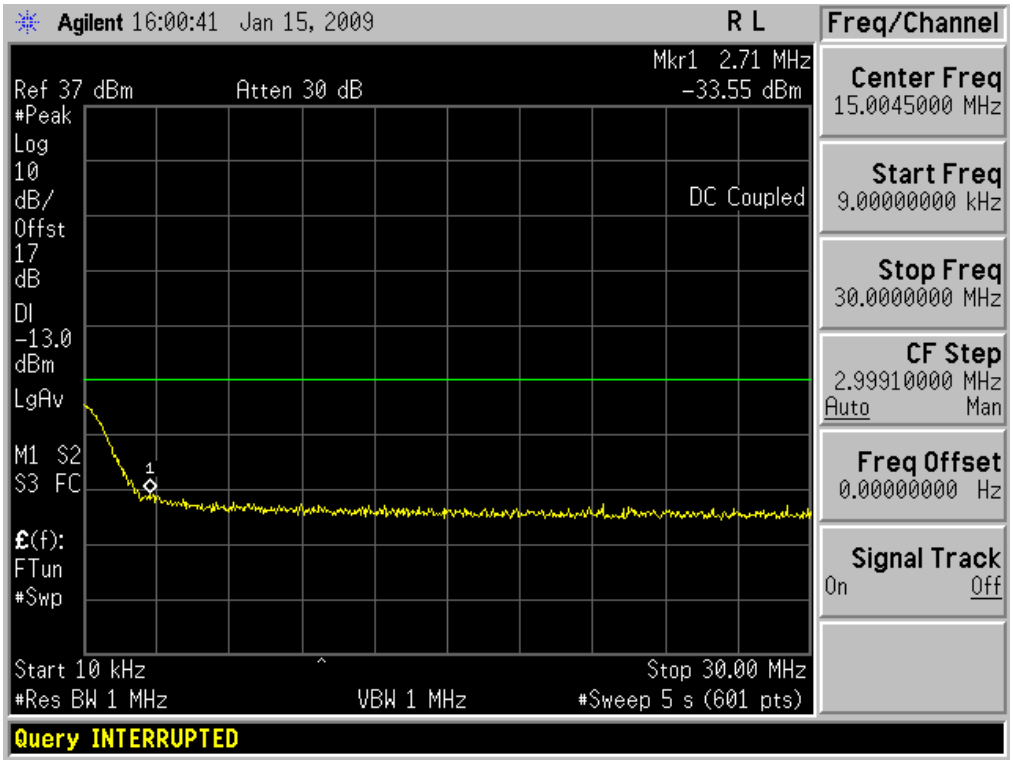
3GHz to 20GHz



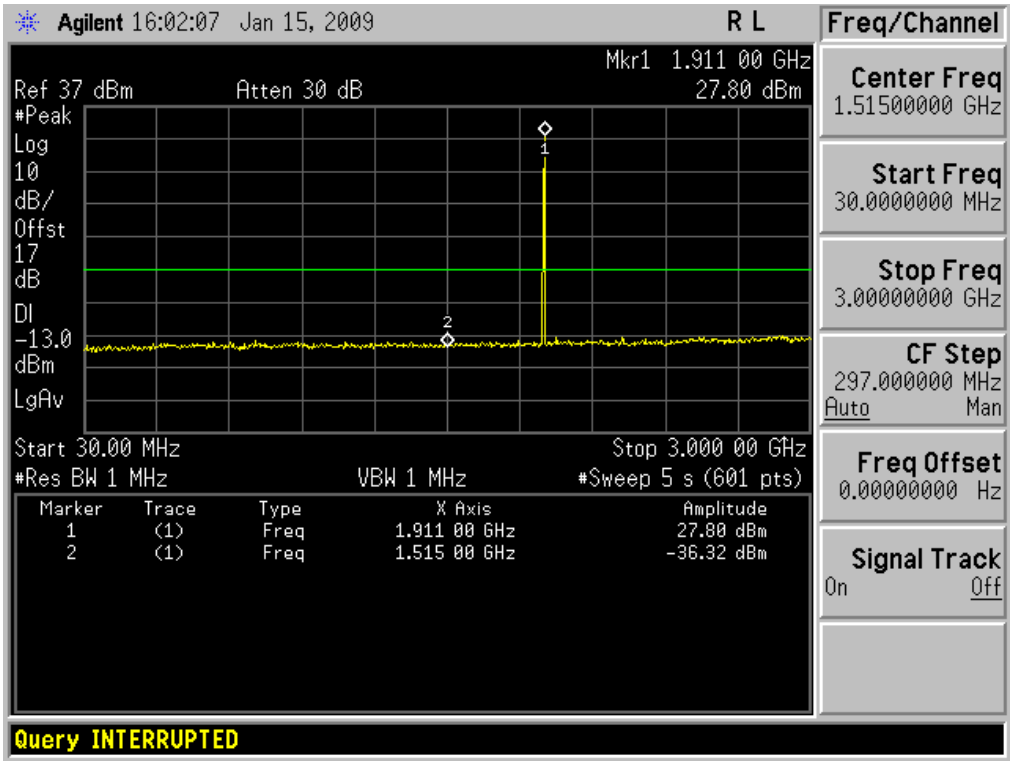
Product Service

Configuration 2 – GPRS 1900 Mode 6

9kHz to 30MHz



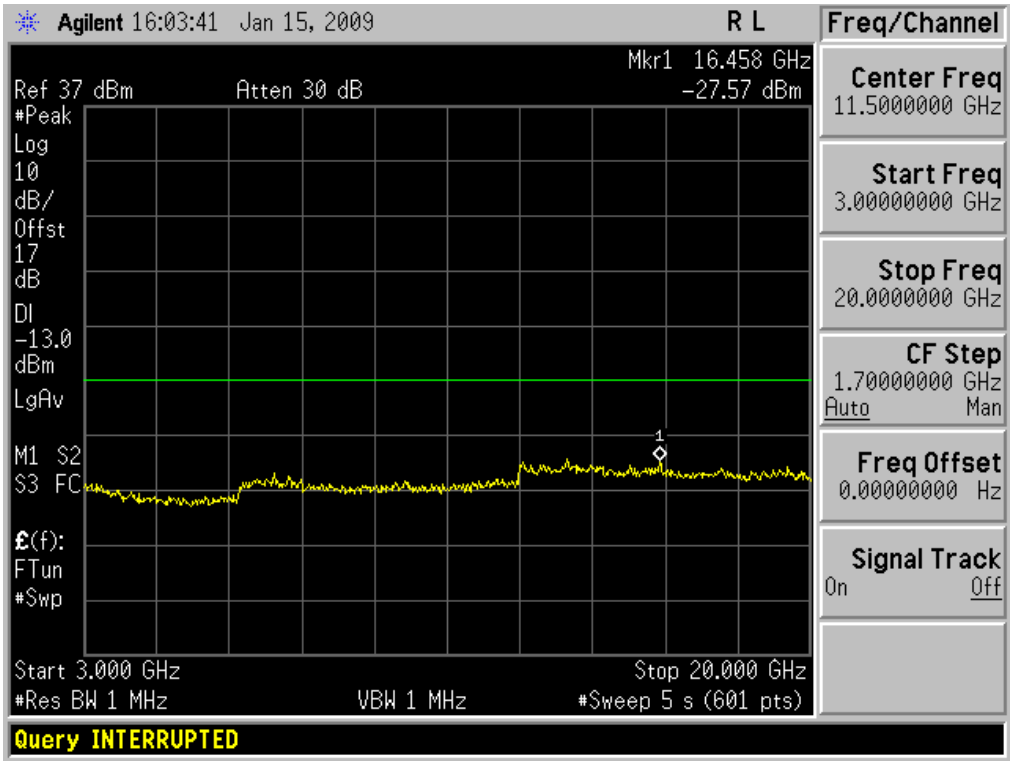
30MHz to 3GHz



Note: The emission beyond the limit is the operating frequency.

Product Service

3GHz to 20GHz



Limit	-13dBm

2.20 FREQUENCY STABILITY UNDER TEMPERATURE VARIATIONS

2.20.1 Specification Reference

FCC CFR 47 Part 24: 2008, Clause 24.235, 2.1055

2.20.2 Equipment Under Test

GSM/GPRS EFT-POS PS400

2.20.3 Date of Test and Modification State

15 January 2009 – Modification State 0

2.20.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.20.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 24: 2008.

The EUT was set to transmit on maximum power. A Spectrum Analyser was used to measure the frequency error.The temperature was adjusted between –30ºC and +50ºC in 10º steps as per 2.1055.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 2 - Mode 8

2.20.6 Environmental Conditions

	15 January 2009
Ambient Temperature	22.9°C
Relative Humidity	24.2%

Product Service

2.20.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 24: 2008 for Frequency Stability Under Temperature Variations.

The test results are shown below.

Configuration 2 – GSM 1900 Carrier Mode 8

7.4 V Supply

Temperature Interval (ºC)	Deviation (Hz)
-30	--
-20	--
-10	-19.98
0	13.17
+10	-38.91
+20	40.95
+30	34.98
+40	-30.87
+50	-32.48

* The EUT does not operate at -20ºC and below. Its lowest operating temperature is -10ºC with -19.98Hz deviation from the nominal.

Limit	±1.0 ppm or ± 1.88 kHz

Remarks

The frequency stability of the EUT is sufficient to keep it within the authorised frequency ranges at any temperature interval across the measured range.

2.21 FREQUENCY STABILITY UNDER VOLTAGE VARIATIONS

2.21.1 Specification Reference

FCC CFR 47 Part 24: 2008, Clause 24.235, 2.1055

2.21.2 Equipment Under Test

GSM/GPRS EFT-POS PS400

2.21.3 Date of Test and Modification State

15 January 2009 – Modification State 0

2.21.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.21.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 24: 2008.

The EUT was set to transmit on maximum power. A Spectrum Analyser was used to measure the frequency error. The supplied voltage was varied from 6.8V to 8.4V according to the specification declaration from the manufacturer at ambient temperature.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 2 - Mode 8

2.21.6 Environmental Conditions

	15 January 2009
Ambient Temperature	22.9°C
Relative Humidity	24.2%

Product Service

2.21.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 24: 2008 for Frequency Stability Under Voltage Variations.

The test results are shown below.

Configuration 2 – GSM 1900 Carrier Mode 15

DC Voltage (V)	Deviation (Hz)
7.4	40.95
8.4	-43.64
6.8	-49.31

Limit	±1.0 ppm or ± 1.88 kHz

Product Service

SECTION 3

TEST EQUIPMENT USED

Product Service

3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	Serial No.	Calibration Due
Section 2.3, 2.5, 2.6, 2.7, 2.9, 2.12, 2.14, 2.15, 2.16, 2.17, and 2.19 – Maximum Conducted Output Power , Modulation Characteristics, Peak-Average Ratio, Occupied Bandwidth , Spurious Emissions at Antenna Terminals (±1MHz) and Conducted Spurious Emissions.				
Wireless Communications Test Set	Agilent	8960 Series 10 E5515C	CYB46200950	2010/08/19
Spectrum Analyser	R&S	FSP30	1000356	2010/08/19
Spectrum Analyser	Agilent	E4440A	MY46187983	2010/08/19
Network Analyzer	Agilent	E8363B	MY43030474	2010/08/19
10dB Attenuator	Aeroflex Weinschel	2	BV7554	O/P MON
Power Splitter	Weischel	1506A	PC140	O/P MON
Section 2.1, 2.2, 2.4, 2.8, 2.13 and 2.18 – Enclosure Radiated Emissions, Conducted Emissions on Power Lines, Maximum Radiated Output Power and Radiated Spurious Emissions				
EMI Receiver	Rohde & Schwarz	ESI 40	100015	2010/08/19
Radio Tester	Rohde & Schwarz	CMU 200	100313	2010/08/19
Signal Generator	Rohde & Schwarz	SMR 20	100086	2010/08/19
Ultra log test antenna	Rohde & Schwarz	HL562	100167	2010/08/19
Double-Ridged Waveguide Horn Antenna	Rohde & Schwarz	HF 906	100029	2010/08/19
Double-Ridged Waveguide Horn Antenna	Rohde & Schwarz	HF 906	100030	2010/08/19
Antenna master	Frankonia	MA 260	-	TU
Relay Switch Unit	Rohde & Schwarz	331.1601.31	338965002	TU
Semi- Anechoic Chamber	Frankonia	23.18m×16.88m×9.60 m	-	2010/09/23
Full- Anechoic Chamber	Frankonia	12.65m*8.03m*7.50m	-	2010/08/19
Turn Table	Frankonia	PS2000	-	2010/08/19
EMI Test Software	Rohde & Schwarz	ES-K1	-	TU
EMI Test Receiver	Rohde & Schwarz	ESCS	100029	2010/08/19
LISN	Rohde & Schwarz	ESH2Z11	50FH-020-10	2010/08/19
Section 2.10, 2.11, 2.20 and 2.21 – Frequency Stability Under Temperature and Voltage Variations				
Wireless Communications Test Set	Agilent	8960 Series 10 E5515C	CYB46200950	2010/08/19
10dB Attenuator	Aeroflex Weinschel	2	BV7554	O/P MON
Power Supply	Agilent	E3645A	MY40000745	O/P MON
Digital Multimeter	FLUKE	179	91820401	2010/01/03
Climatic Chamber	ESPEC	SH-241	92000389	2010/08/19

O/P MON Output monitored with calibrated equipment
TU Traceability Unscheduled

3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:-

Test Discipline	Frequency / Parameter	MU
Radiated Emissions, Bilog Antenna, AOATS	30MHz to 1GHz Amplitude	5.1dB*
Radiated Emissions, Horn Antenna, AOATS	1GHz to 40GHz Amplitude	6.3dB*
Substitution Antenna, Radiated Field	30MHz to 22GHz Amplitude	2.6dB
Worst case error for both Time and Frequency measurement 12 parts in 10^6.		

* In accordance with CISPR 16-4

Product Service

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

This report relates only to the actual item/items tested.