Report On

FCC CFR 47 Part 22 and Industry Canada RSS 132 Testing of the
Ericsson (China) Communications Company Ltd
RRUN8-22

COMMERCIAL-IN-CONFIDENCE

FCC ID: WODFKRC161170-4
IC ID: 287AH-FG1611704

Document 75904652 Report 01 Issue 1 October 2008

TUV Product Service Ltd, Octagon House, Concorde Way, Segensworth North,
Fareham, Hampshire, United Kingdom, PO15 5RL
Tel: +44 (0) 1489 558100. Website: www.tuvps.co.uk

REPORT ON

FCC CFR 47 Part 22 and Industry Canda RSS 132 Testing of the Ericsson (China) Communications Company Ltd
RRUN8-22

Document 75904652 Report 01 Issue 1

October 2008

PREPARED FOR

Ericsson (China) Communications Company Ltd
Ericsson Tower
No.5 Lize East Street
Chaoyang District
Beijing 100102
China

PREPARED BY

N Bennett
Senior Administrator

APPROVED BY

M Jenkins
Authorised Signatory

DATED 16 October 2008

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 22 and Industry Canada RSS 132. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

R A Blagg

UKAS TESTING 0141

Product Service

CONTENTS

Product Service

SECTION 1

REPORT SUMMARY

FCC CFR 47 Part 22 and Industry Canada RSS 132 Testing of the
Ericsson (China) Communications Company Ltd
RRUN8-22

Product Service

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Ericsson (China) Communications Company Ltd RRUN8-22 to the requirements of FCC CFR 47 Part 22: 2006 and Industry Canada RSS 132:2005.

Testing was carried out in support of an application for Grant of Equipment Authorisation in the name of Ericsson (China) Communications Company Ltd RRUN8-22.

Objective	To perform FCC and Industry Canada Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Ericsson (China) Communications Company Ltd
Model Number(s)	RRUN8-22
Serial Number(s)	CB 47233132
Software Version	08A
Hardware Version	R1A
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 22: 2006 Industry Canada RSS 132: 2005
Incoming Release Date	Declaration of Build Status 07 October 2008
Order Number Date	4502549536 09 September 2008
Start of Test	07 October 2008
Finish of Test	10 October 2008
Name of Engineer(s)	C Zhang R A Blagg
Related Document(s)	ANSI C63.4 : 2003

Testing was performed in accordance with FCC Part 22:2006 as at the time of testing FCC Part 22:2007 was not on our UKAS Scope of Accreditation, however a Technical Comparison between the two Issues of the specification has been made and the equipment under test is still found to be compliant with FCC Part 22:2007.

Product Service

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of results in accordance with FCC CFR 47 Part 22: 2006 and Industry Canada RSS 132:2005, is shown below.

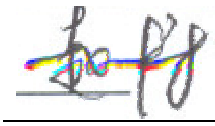
Configuration 1 - Base Station							
Section	Spec Clause		Test Description	Mode	Mod State	Result	Comments
	FCC Part 22	Industry Canada RSS 132					
-	22.913(a)		Effective Radiated Power	869.2 MHz	0	N/A	No integral antenna.
				881.6 MHz	0	N/A	
				893.8 MHz	0	N/A	
2.1	2.913 (a)	4.4	Maximum Peak Output Power - Conducted	869.2 MHz	0	Pass	-
				881.6 MHz	0	Pass	
				893.8 MHz	0	Pass	
2.2	2.1047 (d)		Modulation Characteristics	881.6 MHz	0	N/A	Technical description provided
2.3	2.1049, 22.917(b)	4.2	Occupied Bandwidth	869.2 MHz	0	Pass	-
				881.6 MHz	0	Pass	
				893.8 MHz	0	Pass	
2.4	2.1051, 22.917(b)	4.5	Spurious Emissions at Antenna Terminals (±1MHz)	869.2 MHz	0	Pass	-
				881.6 MHz		N/A	
				893.8 MHz	0	Pass	
2.5	2.1053, 22.917(a)	4.5	Radiated Spurious Emissions	869.2 MHz	0	Pass	-
				881.6 MHz	0	Pass	
				893.8 MHz	0	Pass	
2.6	2.1051, 22.917(a)	4.3	Conducted Spurious Emissions	869.2 MHz	0	Pass	-
				881.6 MHz	0	Pass	
				893.8 MHz	0	Pass	
2.7	2.1055, 22.355	4.3	Frequency Stability Under Temperature Variations	869.2 MHz		N/A	-
				881.6 MHz	0	Pass	
				893.8 MHz		N/A	
2.8	2.1055, 22.355	4.3	Frequency Stability Under Voltage Variations	869.2 MHz		N/A	-
				881.6 MHz	0	Pass	
				893.8 MHz		N/A	

N/A – Not Applicable

Product Service

1.3 DECLARATION OF BUILD STATUS

MAIN EUT	
MANUFACTURING DESCRIPTION	Radio Equipment
MANUFACTURER	Ericsson
TYPE	Normal BTS
PART NUMBER	KRC 161 170/4
SERIAL NUMBER	CB 47233132
HARDWARE VERSION	R1A
SOFTWARE VERSION	08A
TRANSMITTER OPERATING RANGE	869.2MHz - 893.8MHz
RECEIVER OPERATING RANGE	824.2MHz – 848.8MHz
COUNTRY OF ORIGIN	China
INTERMEDIATE FREQUENCIES	71MHz
ITU DESIGNATION OF EMISSION	250KGXW
HIGHEST INTERNALLY GENERATED FREQUENCY	894MHz
OUTPUT POWER (W or dBm)	43dBm
FCC ID	WODFKRC161170-4
IC ID	287AH-FG1611704
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	The equipment is a Remote Radio Unit of GSM Base Stations

Signature 

Date 07 October 2008

D of B S Serial No 75904652/01

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) was an Ericsson (China) Communications Company Ltd RRUN8-22 working in the public mobile service 800MHz band which provides communication connections to GSM850 network. The RRUN8-22 operates from a -48V volt supply.

The Equipment Under Test (EUT) is shown in the photograph below. A full technical description can be found in the Manufacturers documentation.

Equipment Under Test

Product Service

1.4.2 Test Configuration

Configuration 1: Radio Equipment

The EUT was configured in accordance with FCC CFR 47 Part 22: 2006 and Industry Canada RSS 132:2005.

The RRUN8-22 supports both GMSK and 8PSK modulation at 800MHz, the cabinet can house a maximum of two TRX's. Testing was performed on one TRX RF output connector. The complete testing was performed with both modulation schemes at maximum RF power unless otherwise stated. The EUT was powered by a -48V DC Power supply.

1.4.3 Modes of Operation

Modes of operation of each EUT during testing were as follows:

Mode 1 - 869.2 MHz (Bottom Channel)

Mode 2 - 881.6 MHz (Middle Channel)

Mode 3 - 893.8 MHz (Top Channel)

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

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.

The EUT was powered from a -48 V DC supply.

1.6 DEVIATIONS FROM THE STANDARD

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

1.7 MODIFICATION RECORD

No modifications were made to the EUT during testing.

1.8 ALTERNATIVE TEST SITE

Testing has been performed under the following site registrations:

FCC Accreditation
612767 The State Radio Monitoring Center, No.80 Beilishi Road Xicheng District Beijing, China.

Industry Canada Accreditation
7308A The State Radio Monitoring Center, No.80 Beilishi Road Xicheng District Beijing, China.

Product Service

SECTION 2

TEST DETAILS

FCC CFR 47 Part 22 and Industry Canada RSS 132 Testing of the
Ericsson (China) Communications Company Ltd
RRUN8-22

2.1 MAXIMUM PEAK OUTPUT POWER - CONDUCTED

2.1.1 Specification Reference

FCC CFR 47 Part 22: 2006, Clause 22.913(a) and Industry Canada RSS 132:2005 Clause 4.4

2.1.2 Equipment Under Test

RRUN8-22, S/N: CB 47233132

2.1.3 Date of Test and Modification State

07 October 2008 – 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 the test method requirements of FCC CFR 47 Part 22: 2006 and Industry Canada RSS 132:2005.

Using a spectrum analyzer and attenuator(s), the output power of the EUT was measured at the antenna terminals. The EUT supports GMSK and 8PSK modulation schemes. The carrier power was measured with both modulations and all of the timeslots working.

The spectrum analyzer 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 1 - Mode 1
- Mode 2
- Mode 3

2.1.6 Environmental Conditions

	07 October 2008
Ambient Temperature	27.1°C
Relative Humidity	36.3%

Product Service

2.1.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 22: 2006 and Industry Canada RSS 132:2005 for Effective Radiated Power.

The test results are shown below.

Configuration 1 - Mode 1

	Frequency (MHz)	Path Loss (dB)	Result (dBm)	Result (W)
GMSK	869.2	40.4	42.92	19.588
8PSK	869.2	40.4	41.48	13.122

Configuration 1 - Mode 2

	Frequency (MHz)	Path Loss (dB)	Result (dBm)	Result (W)
GMSK	881.6	40.4	43.12	20.512
8PSK	881.6	40.4	41.44	13.932

Configuration 1 - Mode 3

	Frequency (MHz)	Path Loss (dB)	Result (dBm)	Result (W)
GMSK	893.8	40.4	43.12	20.512
8PSK	893.8	40.4	41.13	12.972

Limit	≤500W or <+57dBm

Remarks

The EUT does not exceed 500W or +57dBm at the measured frequencies.

2.2 MODULATION CHARACTERISTICS

2.2.1 Specification Reference

FCC CFR 47 Part 22: 2006, Clause 2.1047(d)

2.2.2 Equipment Under Test

No testing performed.

2.2.3 Modulation Description

The modulation scheme used in GSM is called Gaussian Minimum Shift Keying (GMSK). GMSK facilitates the use of narrow bandwidth and allows for both coherent and non coherent detection capabilities. It is a scheme in which the transitions from One to Zero or Zero to One do not occur quickly, but over a period of time. If pulses are transmitted quickly harmonics are transmitted. The power spectrum for a square wave is rich in harmonics, and the power within the side lobes is wasted, and can be a cause of potential interference.

A method to reduce the harmonics is to round off the edges of the pulses thus lowering the spectral components of the signal. In GSM this is done by using a Gaussian pre-filter which typically has a bandwidth of 81.25kHz. The output from the Gaussian filter then phase modulates the carrier. As there are no dramatic phase transitions of the carrier this gives a constant envelope and low spectral component output from the transmitter.

The spectral efficiency is calculated by

bit rate / Channel bandwidth = 270.83333 kbit/s / 200 kHz = 1.354 bit/s/Hz.

The bandwidth product BT = Bandwidth x bit duration = 81.25 kHz x 3.6923 micros = 0.3

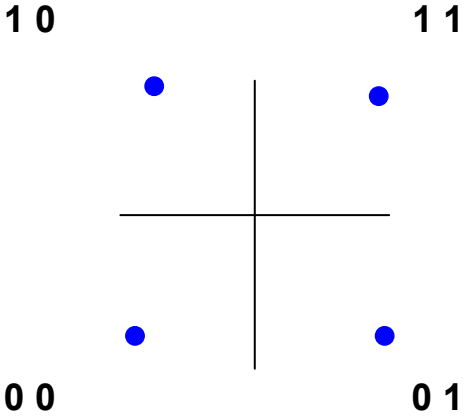
GMSK and 8PSK overview.

The modulation schemes used for the EUT are GMSK and 8PSK. The 8PSK modulation scheme is EDGE (Enhanced Date Rates for GSM Evolution).

A brief overview of how GMSK and 8PSK works is shown below.

GMSK (Gaussian Minimum Shift Keying)

The fundamental principal behind GMSK is Phase shift keying. This splits a data stream into a series of 2-digit phase shifts, using the following phase shifts to represent data pairs.



Therefore for the BIT sequence 0 0 1 1 1 0 0 1 The corresponding phase shift will be used

BIT SEQUENCE	0 0	1 1	1 0	01
PHASE	225º	45º	135º	315º

This is called QPSK (Quadratic Phase Shift Keying)

<u>However</u>

There is a problem with QPSK: transition from e.g. 00 to 11 gives phase shift of 180° (π radians). This has the effect of inverting the carrier waveform and this can lead to detection errors at the receiver.

Solution: restrict phase changes to ± 90°

1. Split bitstream into 2 streams e.g.

	0 0		1 1		0 1		1 0	
I Stream	0		1		0		1	
Q stream		0		1		1		0

2. Modulate each stream with PSK (1 = 90° or π/2, 0 = -90° or - π/2 phase shift)

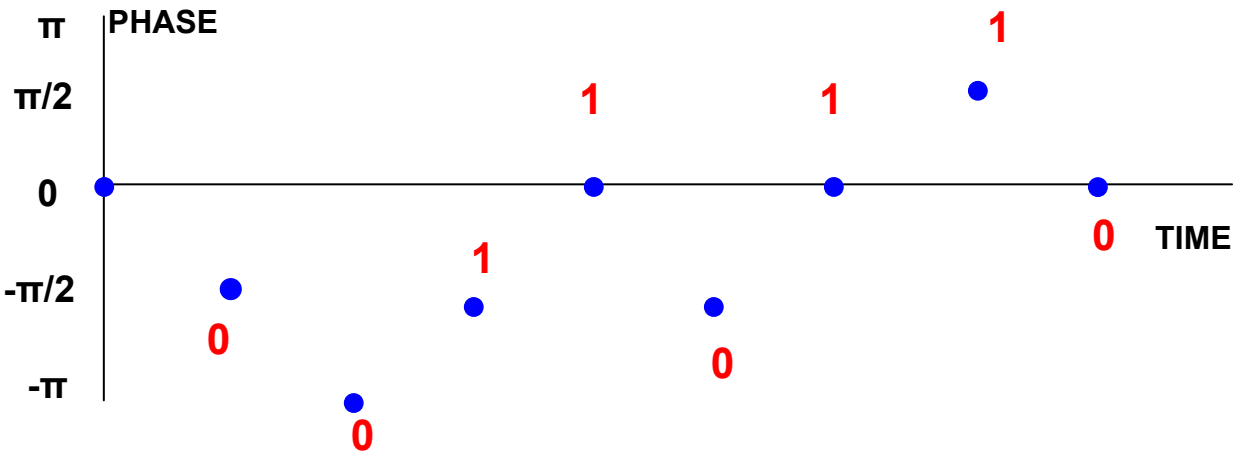
I Stream	0		1		0		1	
	-π/2		-π/2		-π/2		π/2	
Q stream		0		1		1		0
		-π/2		π/2		π/2		-π/2

Product Service

3. Combine (add) the two PSK signals:

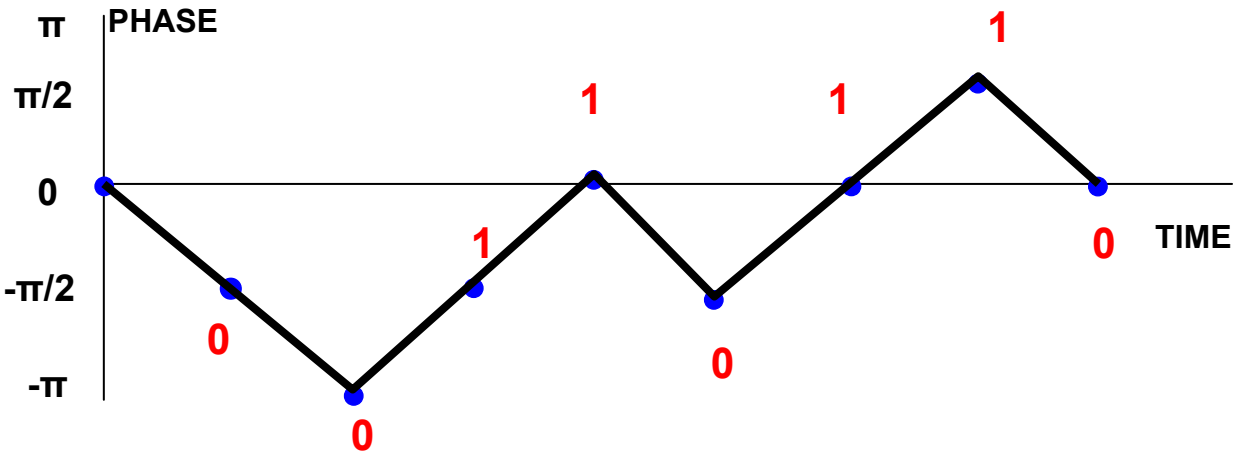
Combined Phase	-π/2	-π	-π/2	0	-π/2	0	π/2	0

Result: offset - QPSK, phase change is restricted to ± π/2 radians:



It would be preferable to have "gradual" changes in place between each pair of bits (Continuous-phase modulation). Replacing each “rectangular” shaped pulse (for 1 or 0) with a sinusoidal pulse can do this:

Result: Minimum Shift Keying (MSK):



Product Service

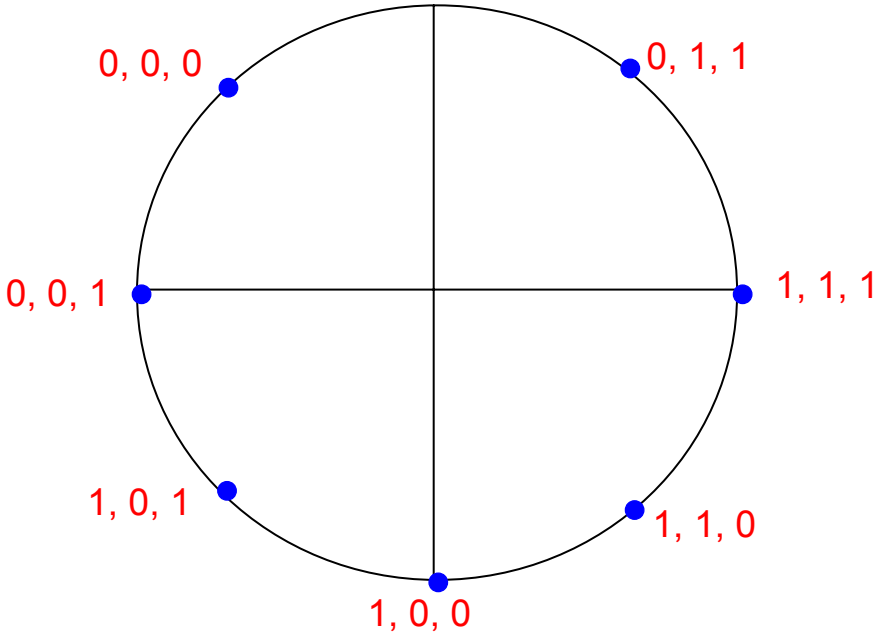
Gaussian Minimum Shift Keying

MSK has high sidebands relative to the main lobes in the frequency domain - this can lead to interference with adjacent signals.

If the rectangular pulses corresponding to the bitstream are filtering using a Gaussian-shaped impulse response filter, we get Gaussian MSK (GMSK) - this has low sidelobes compared to MSK.

8-SK (8-Phase Shift Keying)

8PSK uses the same basic principle of phase shift modulation. The only difference being the increased number of vectors.



Product Service

2.3 OCCUPIED BANDWIDTH

2.3.1 Specification Reference

FCC CFR 47 Part 22: 2006, Clause 2.1049(h), 22.917(b) and Industry Canada RSS 132:2005 Clause 4.2

2.3.2 Equipment Under Test

RRUN8-22, S/N: CB 47233132

2.3.3 Date of Test and Modification State

08 October 2008 – 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: 2006 and Industry Canada RSS 132:2005.

The EUT was transmitting at maximum power, modulated with all timeslots active. Using a resolution bandwidth of 10 kHz and a video bandwidth of 100 kHz.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 –26dBc points were also established and the emission bandwidth determined.

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

Configuration 1 - Mode 1
- Mode 2
- Mode 3

2.3.6 Environmental Conditions

	08 October 2008
Ambient Temperature	27.7°C
Relative Humidity	33.5%

Product Service

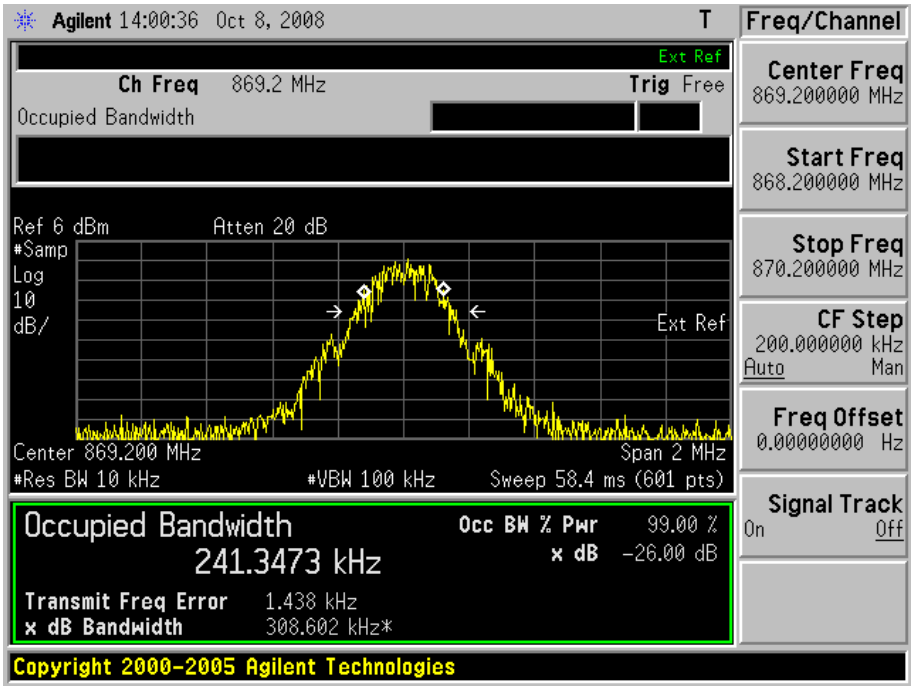
2.3.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 22: 2006 and Industry Canada RSS 132:2005 for Occupied Bandwidth.

The test results are shown below.

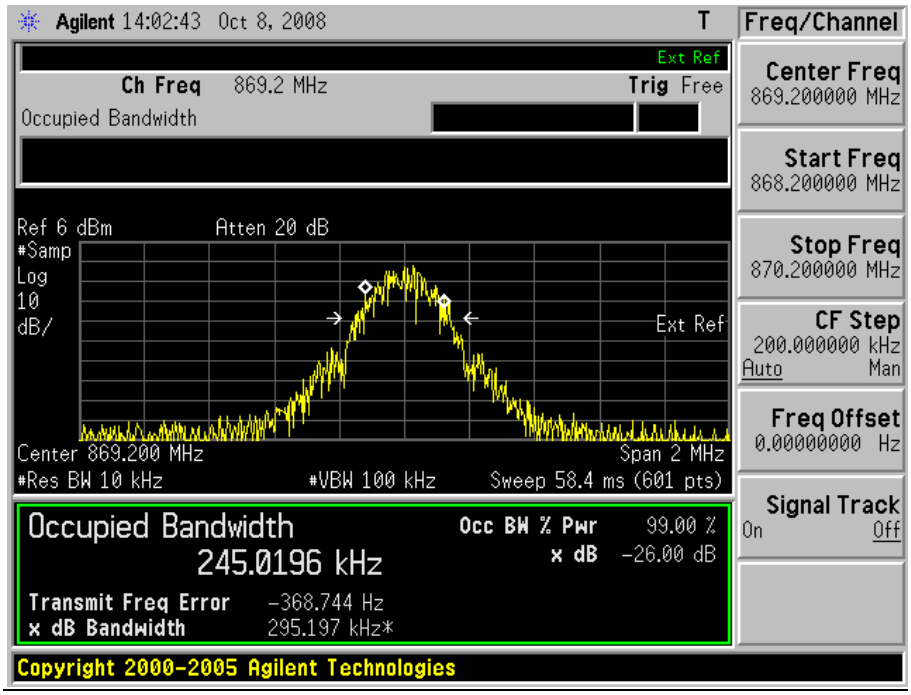
Configuration 1 - Mode 1

GMSK - Maximum Power



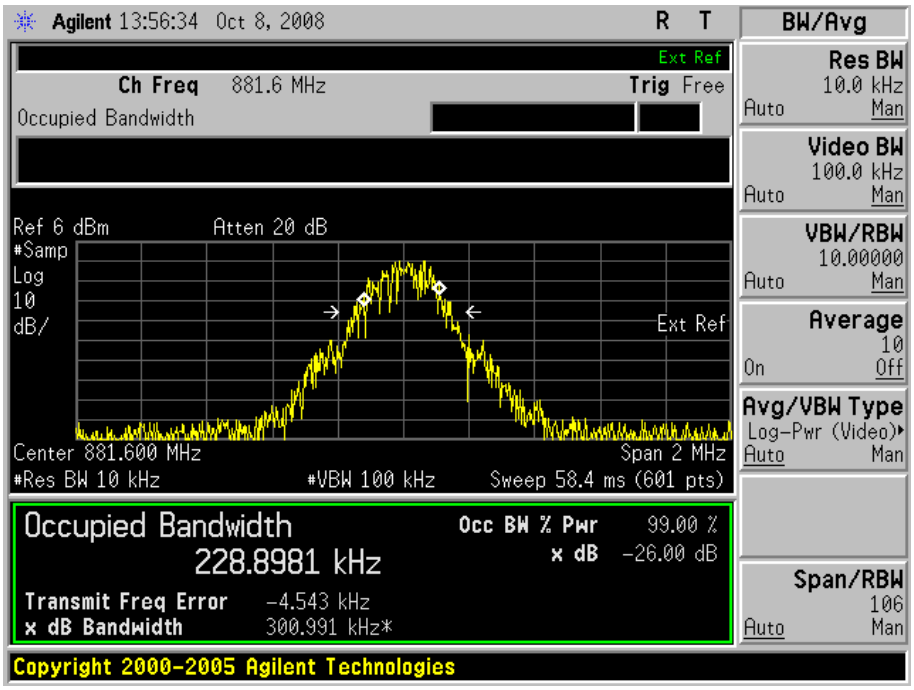
Product Service

8PSK - Maximum Power



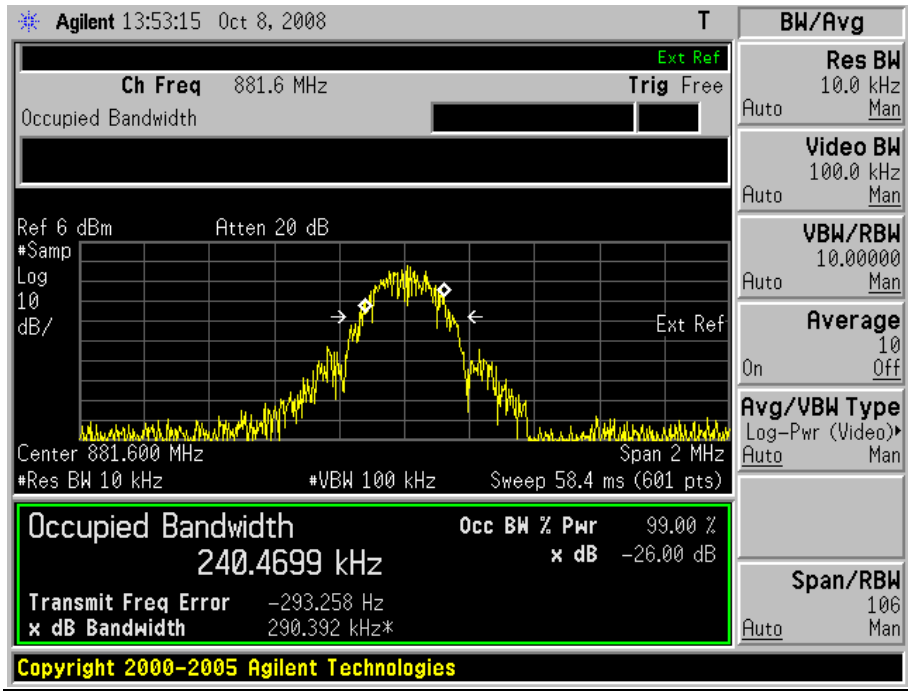
Configuration 1 - Mode 2

GMSK - Maximum Power



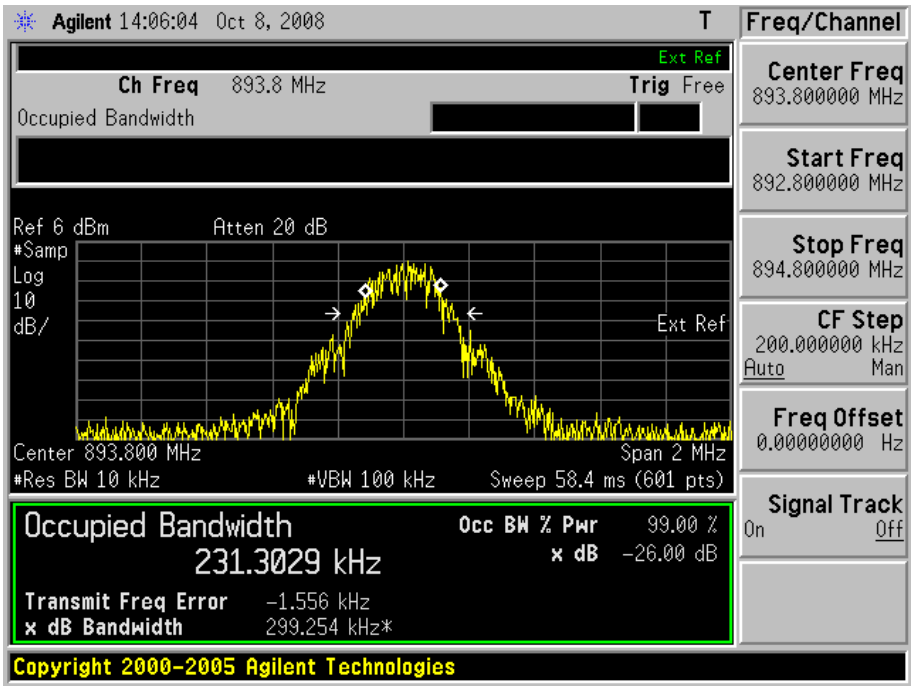
Product Service

8PSK - Maximum Power



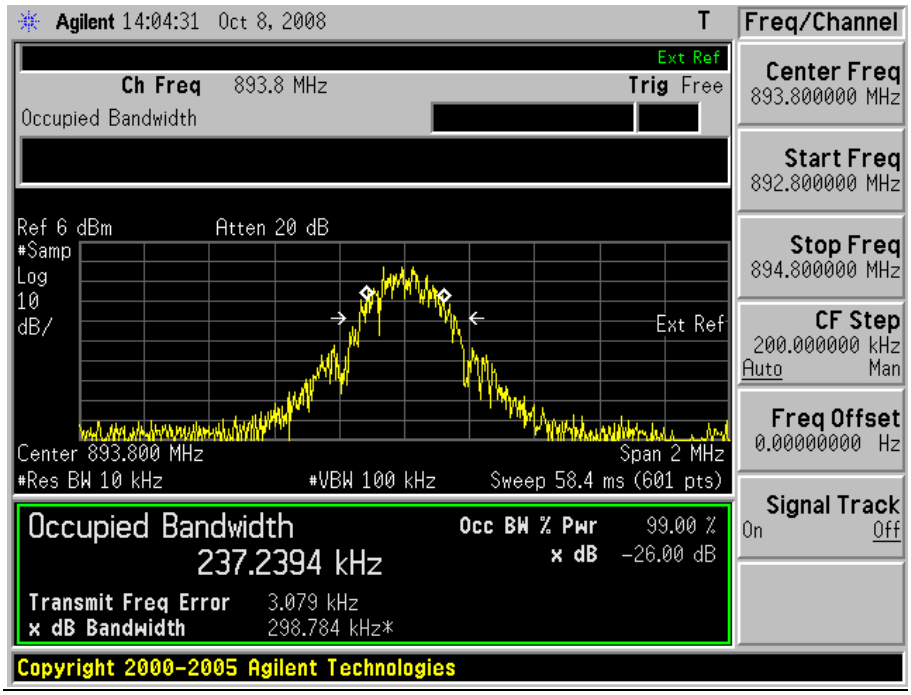
Configuration 1 - Mode 3

GMSK - Maximum Power



Product Service

8PSK - Maximum Power



2.4 SPURIOUS EMISSIONS AT TERMINALS (±1MHz)

2.4.1 Specification Reference

FCC CFR 47 Part 22: 2006, Clause 2.1051, 22.917(b) and Industry Canada RSS 132:2005 Clause 4.5

2.4.2 Equipment Under Test

RRUN8-22, S/N: CB 47233132

2.4.3 Date of Test and Modification State

09 October 2008 – 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: 2006 and Industry Canada RSS 132:2005.

In accordance with 22.917(b), at least 1% of the 26dB bandwith was used for the resolution and video bandwidths up to 1 MHz away from the block edge. At greater than 1MHz the resolution and video bandwidths were increased to 1 MHz.

The reference power and path losses of all channels used for testing in each frequency block were measured. It was found that there was <0.5dB variation in all channels, thus the worst case reference level offset was used throughout. Having entered the reference level offset, the limit line was displayed, showing the –13dBm, (43+10log (P)), limit.

The EUT was tested at it's maximum power level with all timeslots active.

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

Configuration 1 - Mode 1
- Mode 3

2.4.6 Environmental Conditions

	09 October 2008
Ambient Temperature	27.8°C
Relative Humidity	34.4%

Product Service

2.4.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 22: 2006 and Industry Canada RSS 132:2005 for 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.

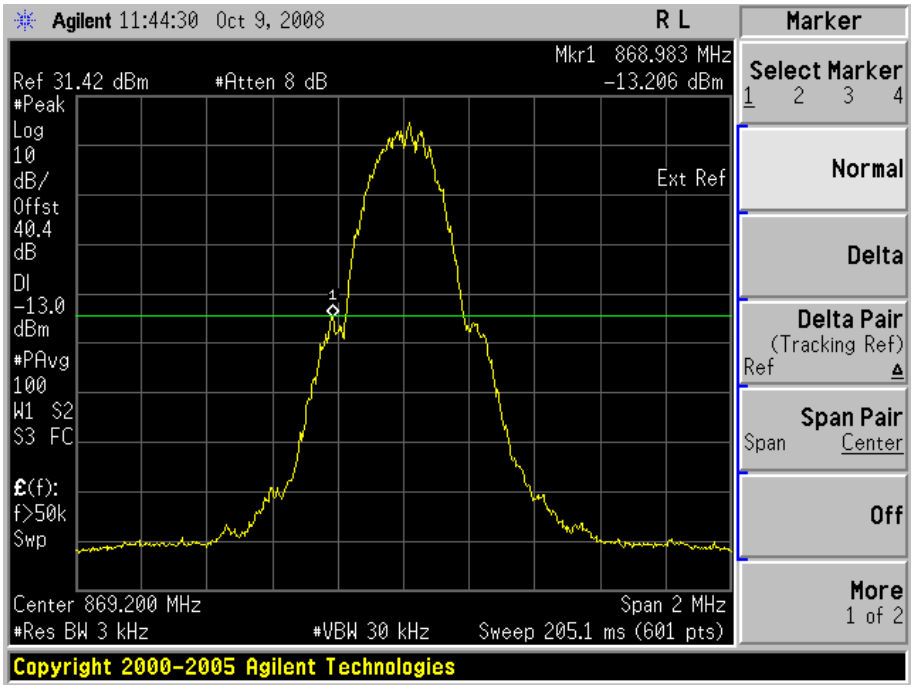
Channel (MHz)	Edge Test with GMSK modulation Channel No./Frequencies	Edge Test with 8PSK modulation Channel No./Frequencies
Bottom 869.2	Channel: 128 Frequency: 869MHz P2 Power level	Channel: 128 Frequency : 869MHz P1 Power level
Top 893.8	Channel: 251 Frequency : 894MHz P1 Power level	Channel : 251 Frequency: 894MHz P1 Power level

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. Channels used outside of those stated and power levels used beyond those stated in the table exceed the specification limits, thus they cannot be used.

The channels outside of those shown in the table above were not tested at lower power levels to determine a level at which compliance would be achieved. Therefore, to maintain compliance, only the channels shown in the table above shall be used.

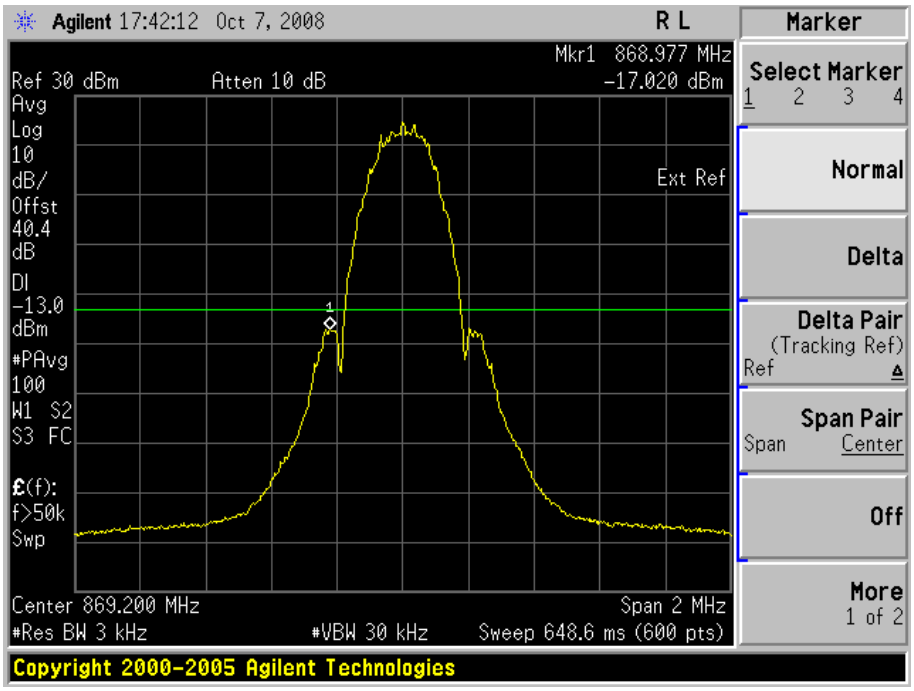
Configuration 1 - Mode 1

GMSK - Edge Measurement with EUT Transmitting on P2 Power Level



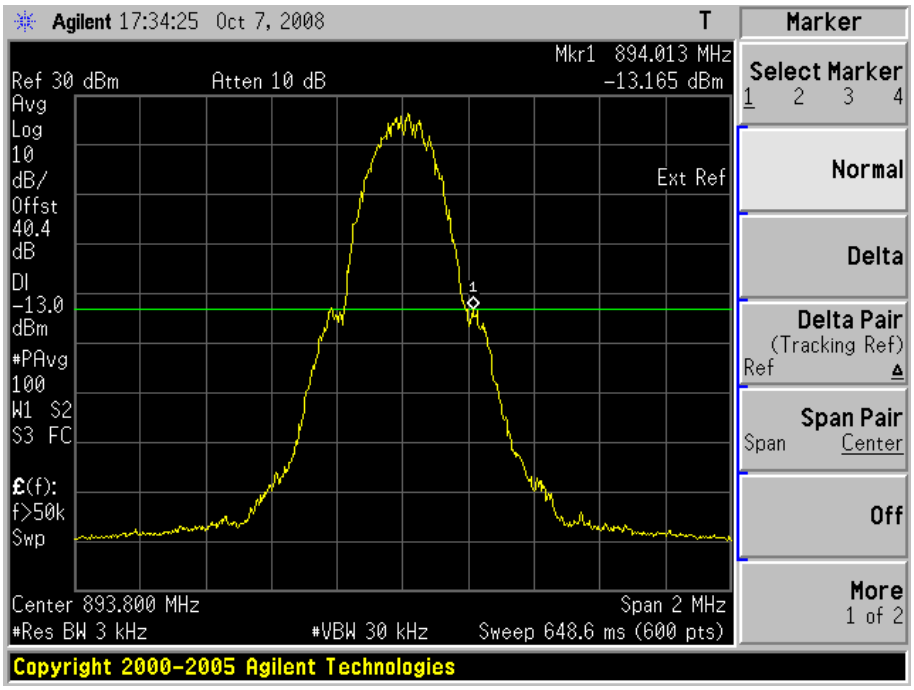
Product Service

8PSK - Edge Measurement with EUT Transmitting on P1 Power Level



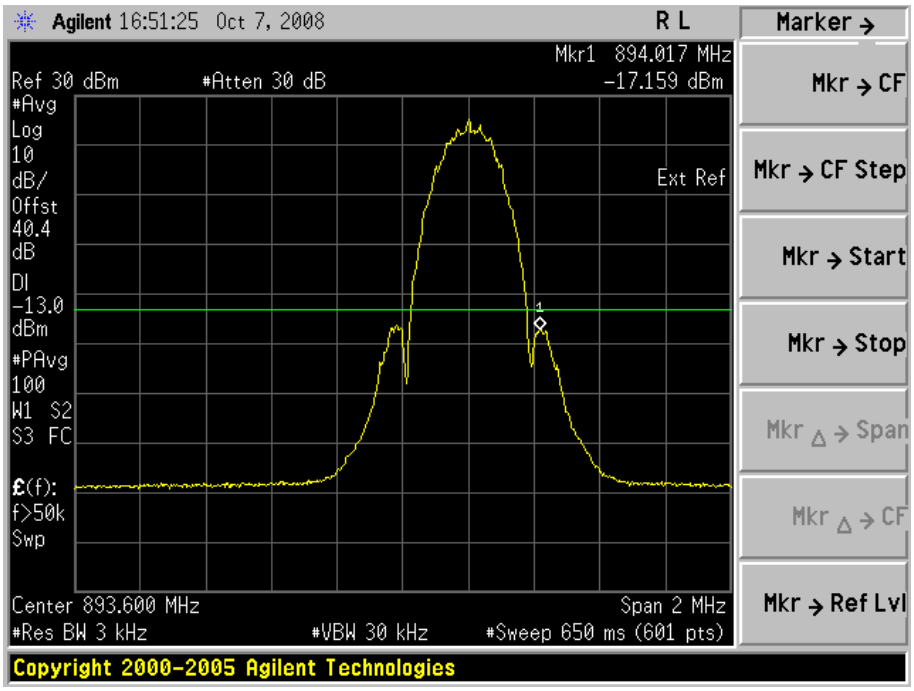
Configuration 1 - Mode 3

GMSK - Edge Measurement with EUT Transmitting on P1 Power Level



Product Service

8PSK - Edge Measurement with EUT Transmitting on P1 Power Level



Product Service

2.5 RADIATED SPURIOUS EMISSIONS

2.5.1 Specification Reference

FCC CFR 47 Part 22: 2006, Clause 2.1053, 22.917(a) and Industry Canada RSS 132:2005 Clause 4.5

2.5.2 Equipment Under Test

RRUN8-22, S/N: CB 47233132

2.5.3 Date of Test and Modification State

10 October 2008 – Modification State 0

2.5.4 Test Equipment Used

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

2.5.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 22: 2006 and Industry Canada RSS 132:2005.

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.

Using the information from the preliminary profiling of the EUT, the list of emissions was then confirmed or updated under Anechoic Chamber (3 metres) conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

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

Emissions identified within the range 1GHz – 9GHz were then formally measured using Peak and Average Detectors, as appropriate.

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

The limits for Spurious Emissions have been calculated, as shown below using the following formula:

Field Strength of Carrier - (43 + 10Log (P)) dB

Product Service

Where:
Field Strength is measured in dBµV/m
P is measured Transmitter Power in Watts

Determination of Spurious Emission Limit

As the EUT does not have an integral antenna, the field strength of the carrier has been calculated assuming that the power is to be fed to a half-wave tuned dipoles as per 2.1053(a).

$E_{(v/m)}=(30 \times G_i \times P_o)^{0.5} / d$

Where G_i is the antenna gain of ideal half-wave dipoles,
P_o is the power out of the transceiver in W,
d is the measurement distance in meter.

Therefore at 3m measurement distance the field strength using the lowest transceiver output power would be:

$E_{(v/m)}=(30 \times 1.64 \times 12.972)^{0.5} / 3 = 8.421 V/m = 138.5 dB\mu V/m$

As per 22.917(a) the spurious emission must be attenuated by 43 + 10log (P_o) dB this gives:

43 + 10log(12.972) = 54.1dB

Therefore the limit at 3m measurement distance is:

138.5 – 54.1 = 84.4 dBµV/m

This limit has been used to determine Pass or Fail for the harmonics measured and detailed in the following results.

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

Configuration 1 - Mode 1
- Mode 2
- Mode 3

2.5.6 Environmental Conditions

	10 October 2008
Ambient Temperature	23.2°C
Relative Humidity	43.3%

Product Service

2.5.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 22: 2006 and Industry Canada RSS 132:2005 Clause 4.5 for Receiver Spurious Emissions.

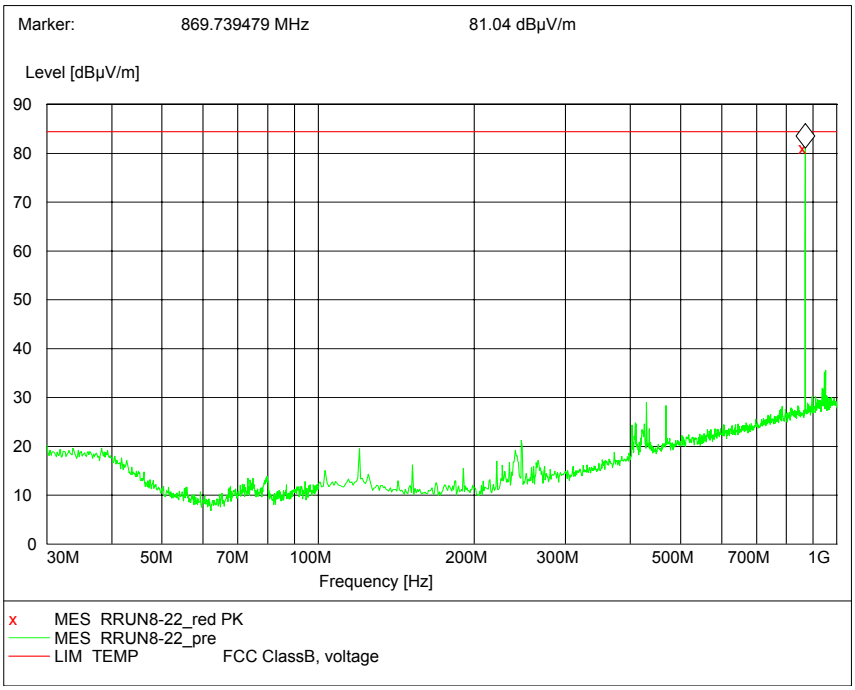
The test results are shown below.

Configuration 1 - Mode 1

No emissions were detected within 20dB of the limit.

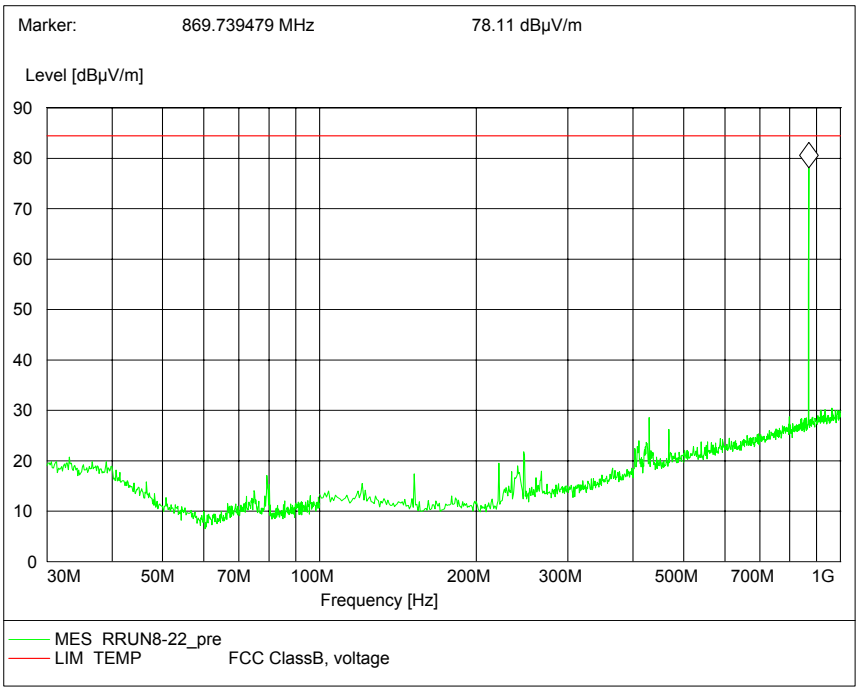
30MHz to 1GHz

GMSK



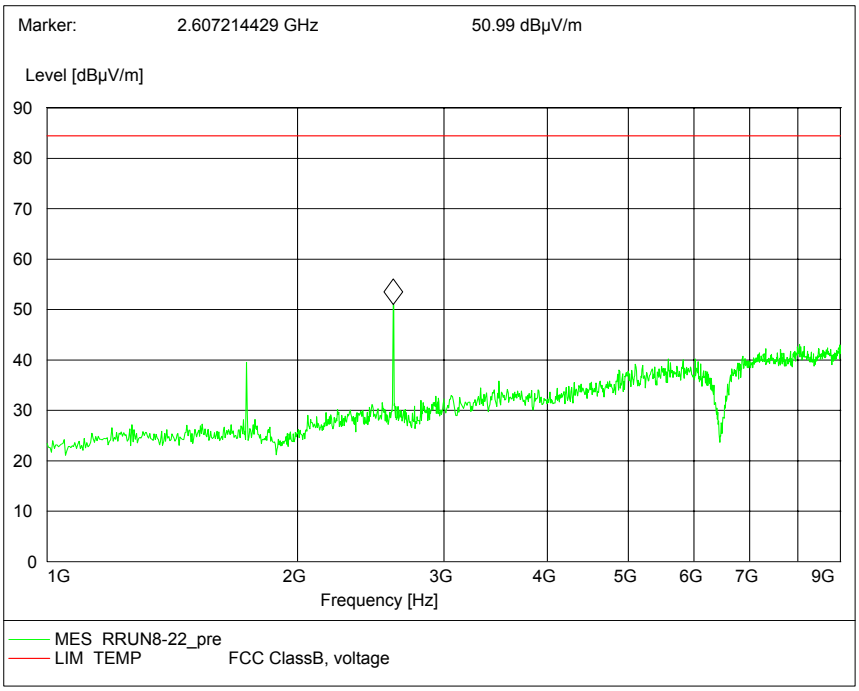
Product Service

8PSK



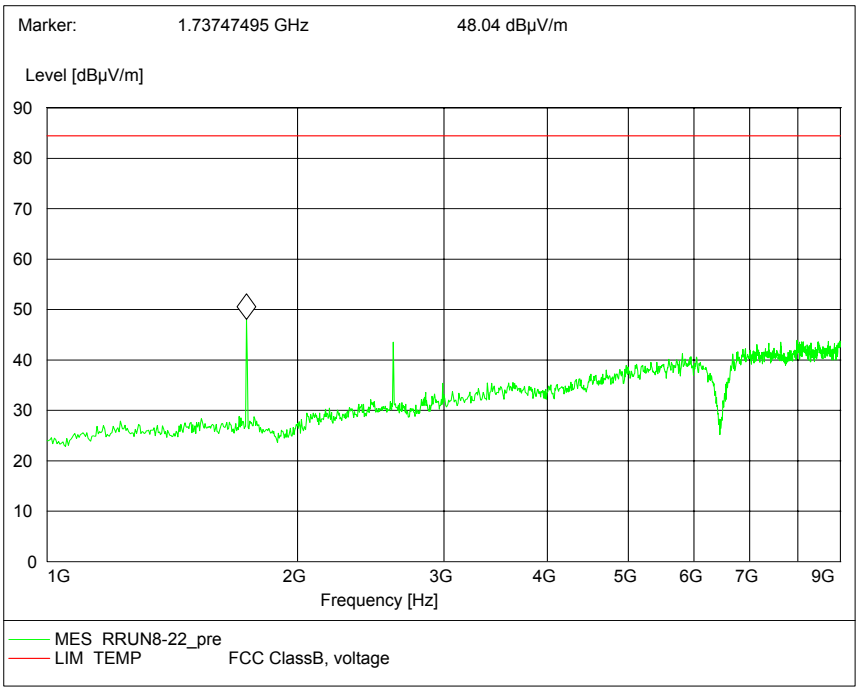
1GHz to 9GHz

GMSK



Product Service

8PSK

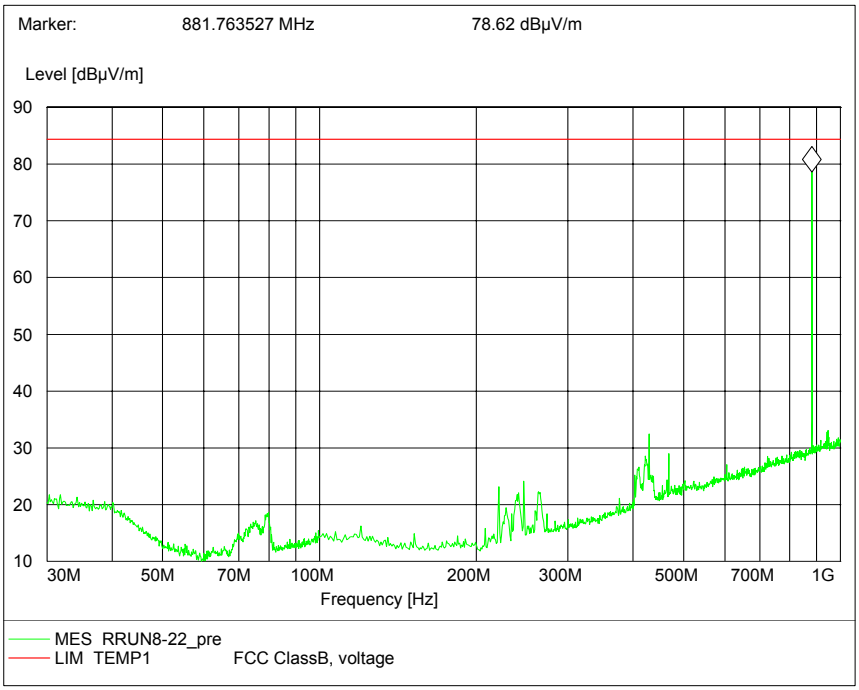


Configuration 1 - Mode 2

No emissions were detected within 20dB of the limit.

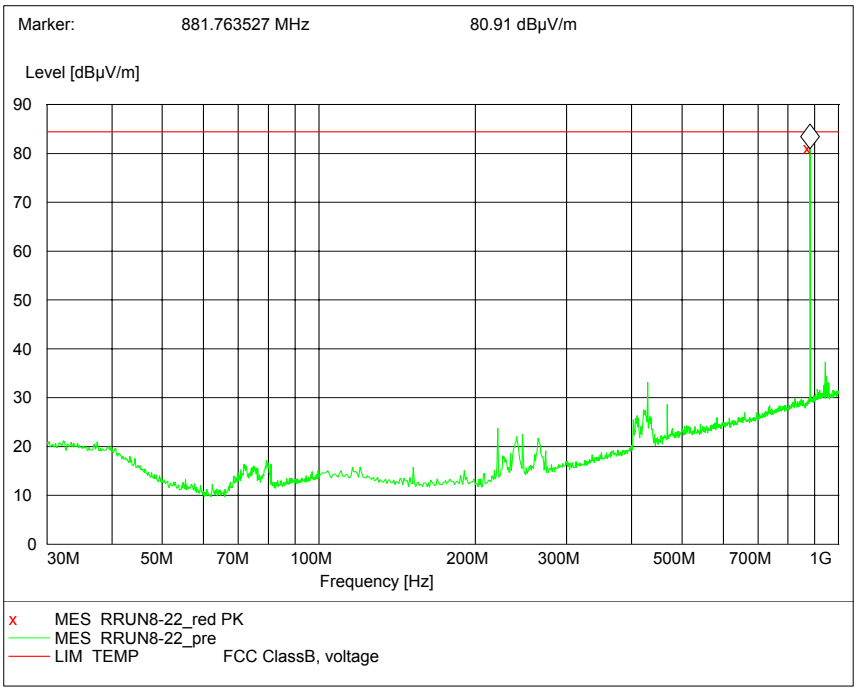
30MHz to 1GHz

GMSK



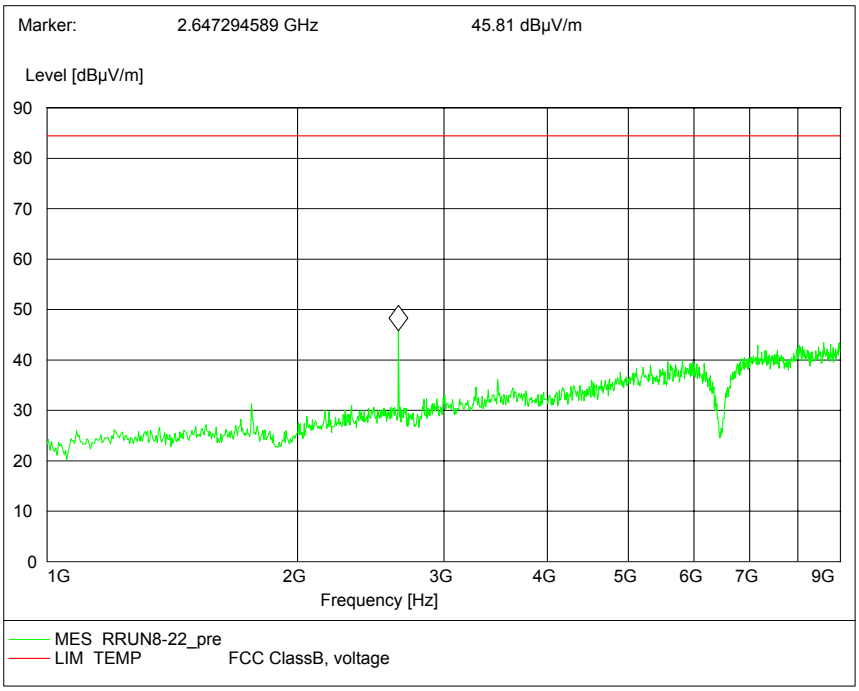
Product Service

8PSK

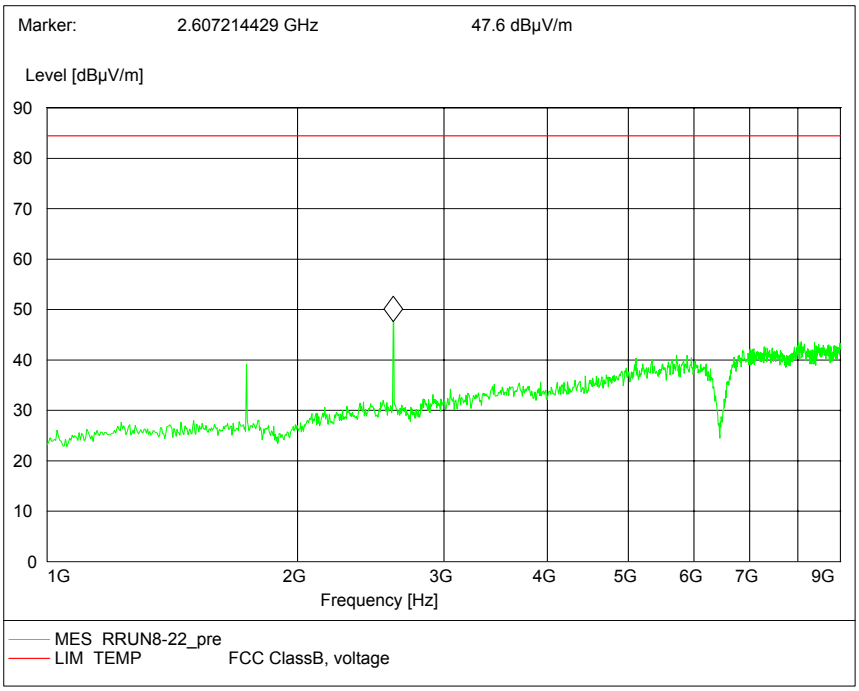


1GHz to 9GHz

GMSK



8PSK

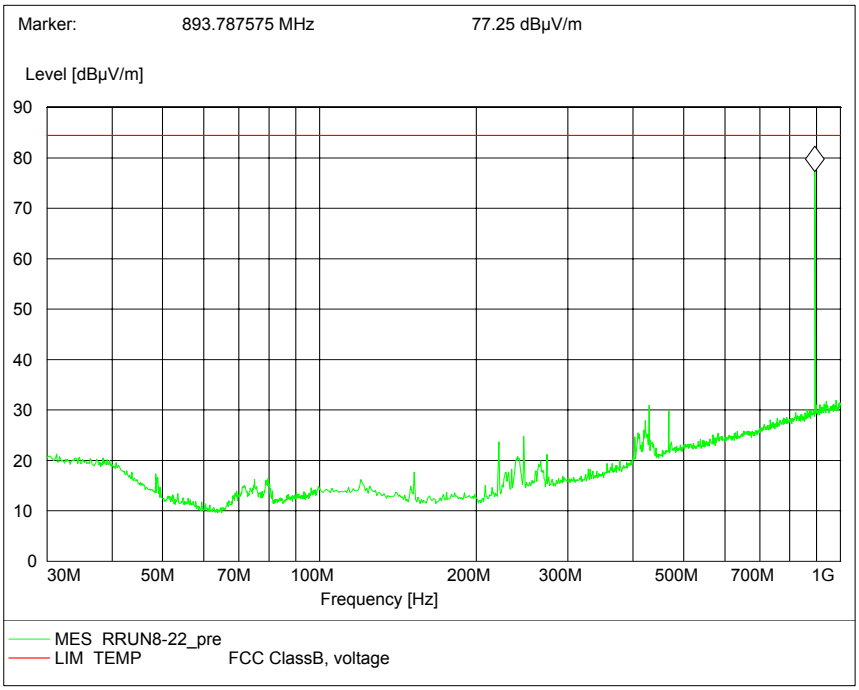


Configuration 1 - Mode 3

No emissions were detected within 20dB of the limit.

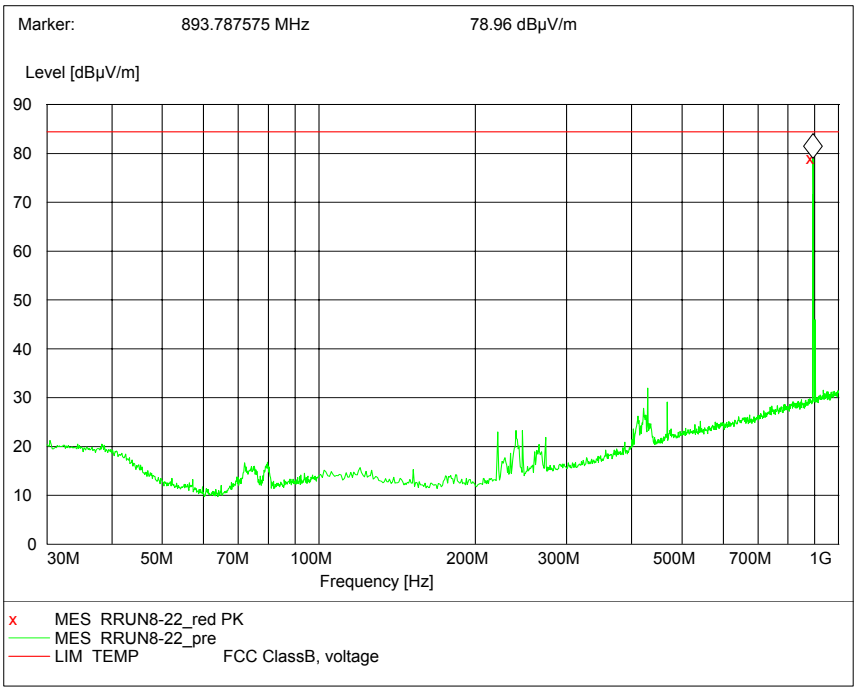
30MHz to 1GHz

GMSK



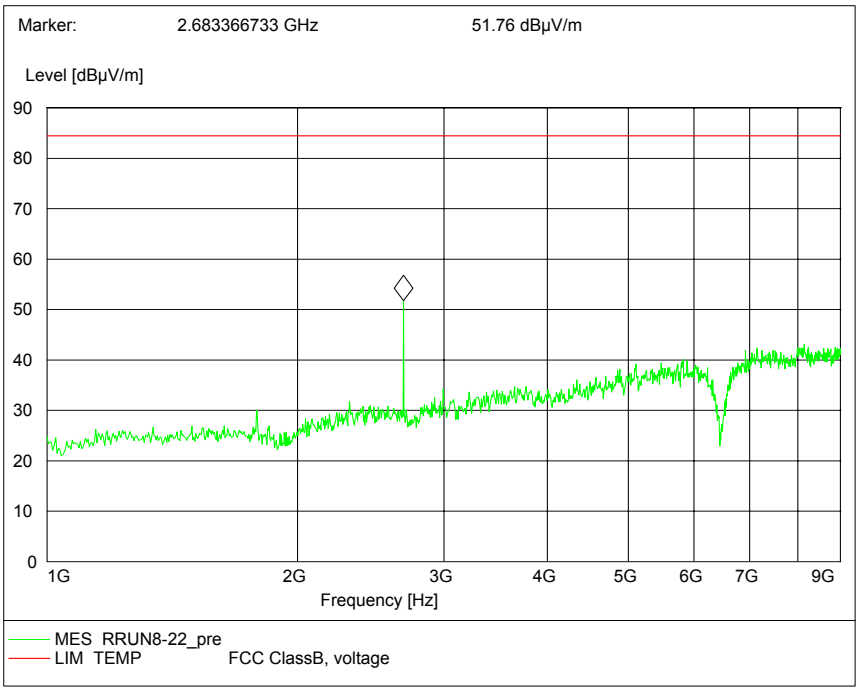
Product Service

8PSK



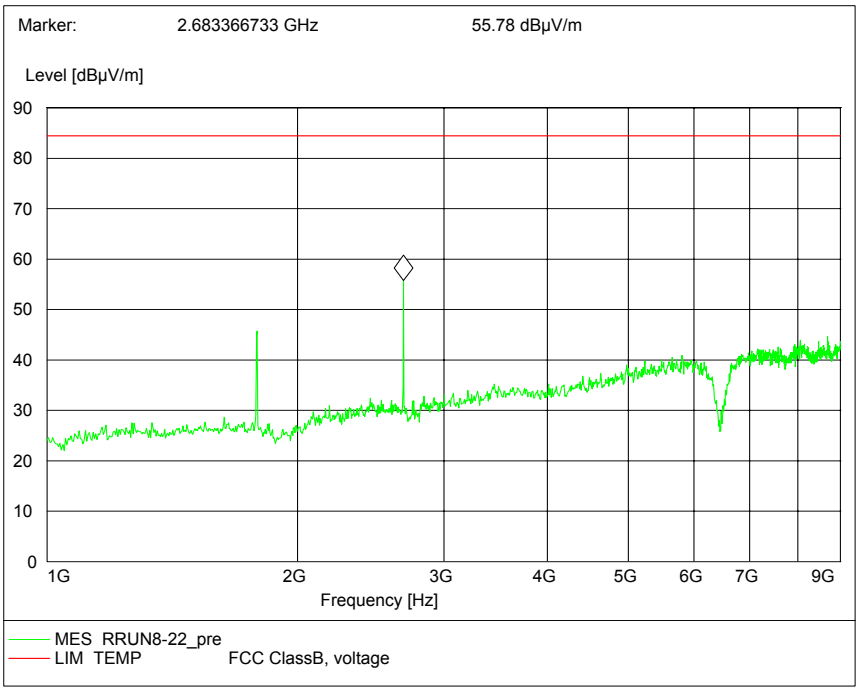
1GHz to 9GHz

GMSK



Product Service

8PSK



Limit	84.4dBµV/m.

Product Service

2.6 SPURIOUS EMISSIONS

2.6.1 Specification Reference

FCC CFR 47 Part 22: 2006, Clause 2.1051, 22.917(a) and Industry Canada RSS 132:2005 Clause 4.5

2.6.2 Equipment Under Test

RRUN8-22, S/N: CB 47233132

2.6.3 Date of Test and Modification State

09 October 2008 – 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: 2006 and Industry Canada RSS 132:2005.

In accordance with Part 2.1051, the spurious emissions from the antenna terminal were measured. The transmitter output power was attenuated using a combination of filters and attenuators and the frequency spectrum investigated from 9kHz to 9GHz. The EUT was set to transmit on full power on timeslot 3. The EUT was tested on Bottom, Middle and Top channels for both power levels. The resolution was set to 1MHz for 9kHz to 1.5GHz and 100kHz for 1.5GHz to 9GHz, video bandwidths were set to 1MHz thus meeting the requirements of Part 22.917(b). The spectrum analyser detector was set to Max Hold.

From 9kHz to 1.5GHz, an attenuator was used. This was to reduce saturation effects in the spectrum analyser.

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

2.6.6 Environmental Conditions

	09 October 2008
Ambient Temperature	28.0°C
Relative Humidity	32.8%

Product Service

2.6.7 Test Results

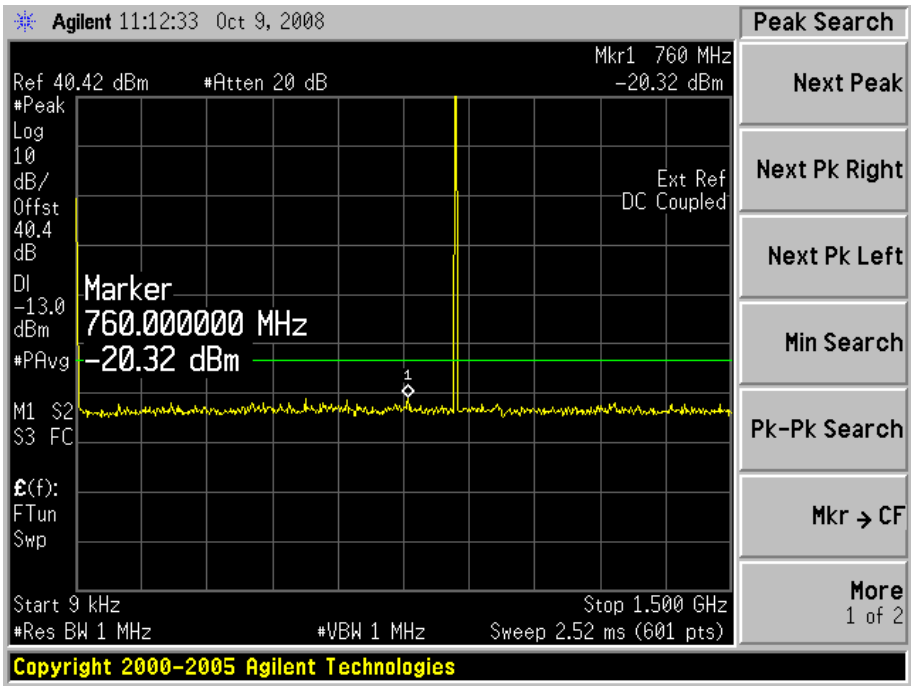
For the period of test the EUT met the requirements of FCC CFR 47 Part 22: 2006 and Industry Canada RSS 132:2005 for Spurious Emissions.

The test results are shown below.

Configuration 1 - Mode 1

9kHz to 1.5GHz

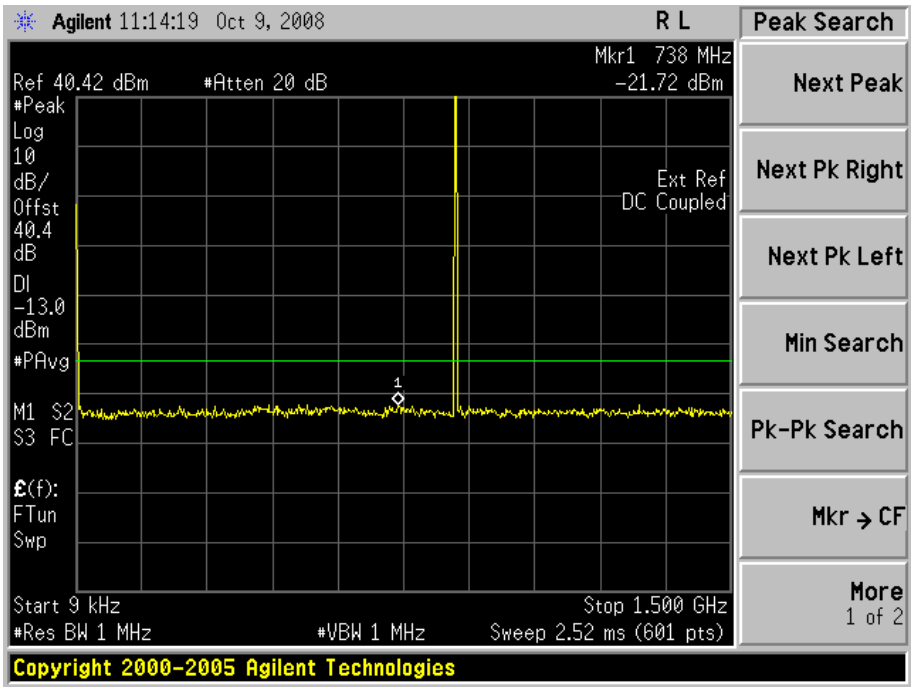
GMSK - Maximum Power



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

Product Service

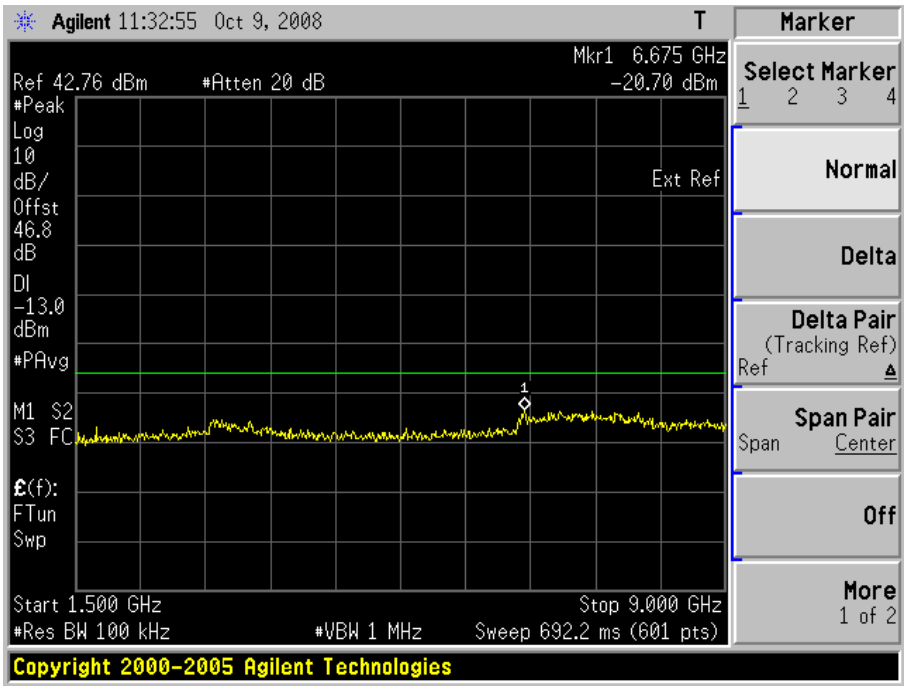
8PSK - Maximum Power



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

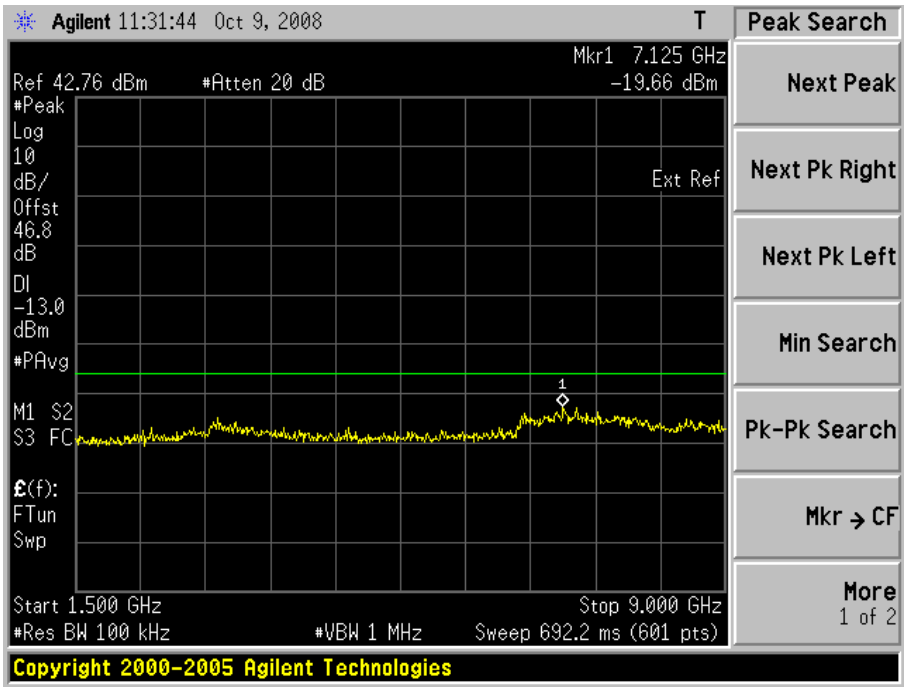
1.5GHz to 9GHz

GMSK - Maximum Power



Product Service

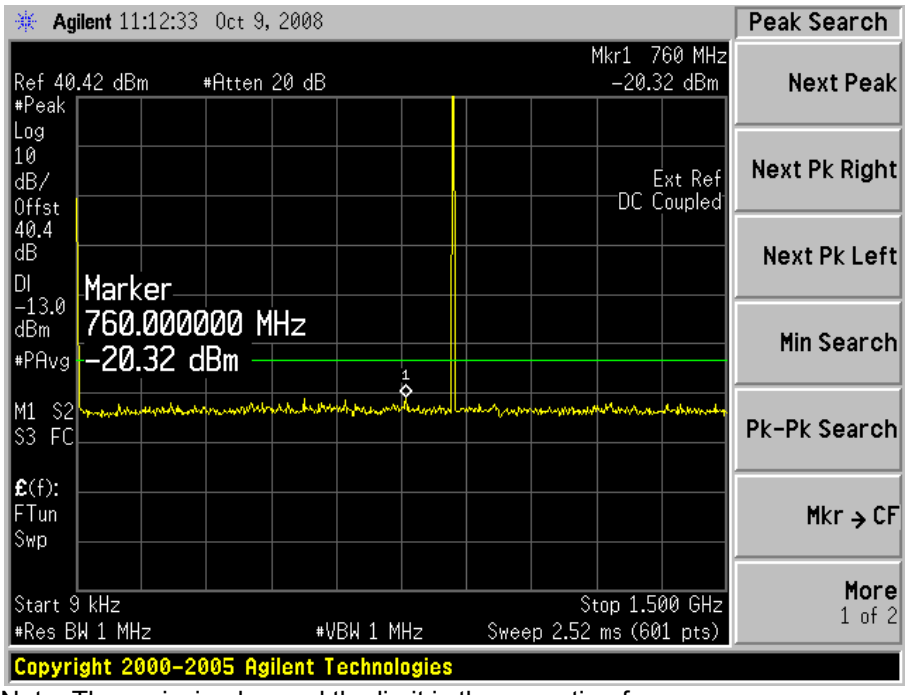
8PSK - Maximum Power



Configuration 1 - Mode 2

9kHz to 1.5GHz

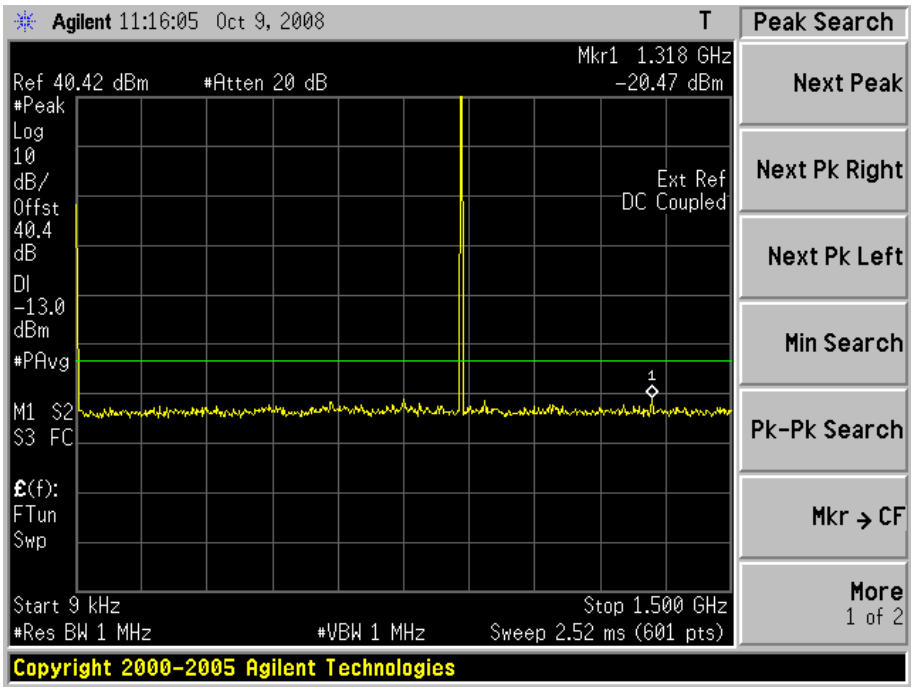
GMSK - Maximum Power



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

Product Service

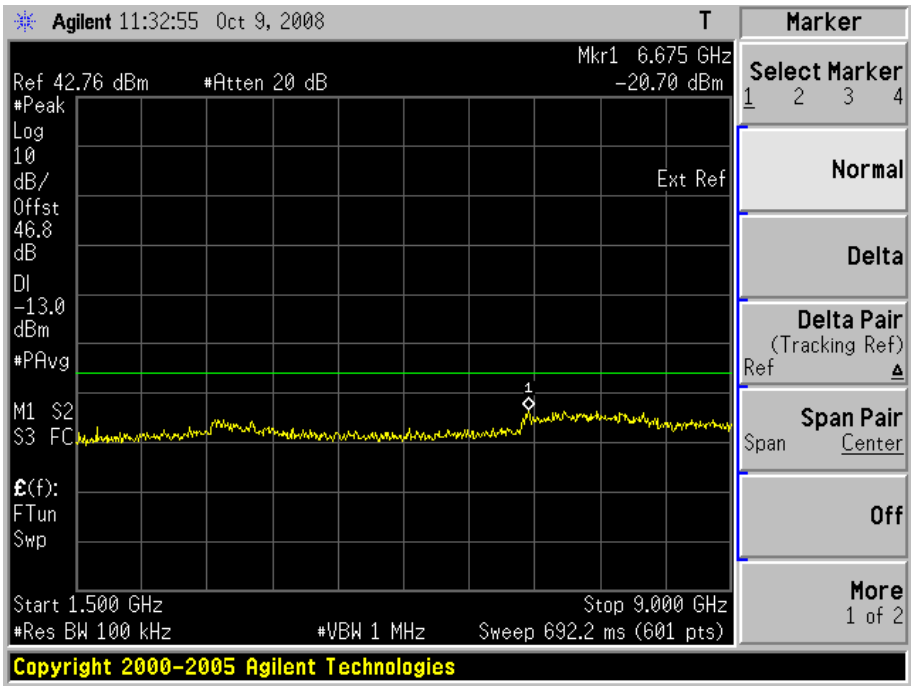
8PSK - Maximum Power



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

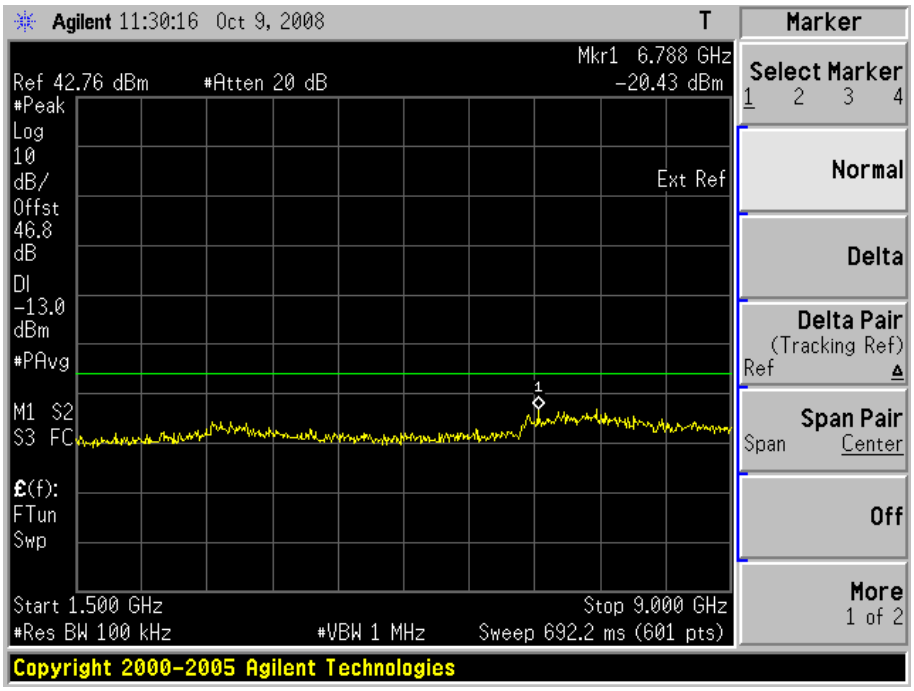
1.5GHz to 9GHz

GMSK - Maximum Power



Product Service

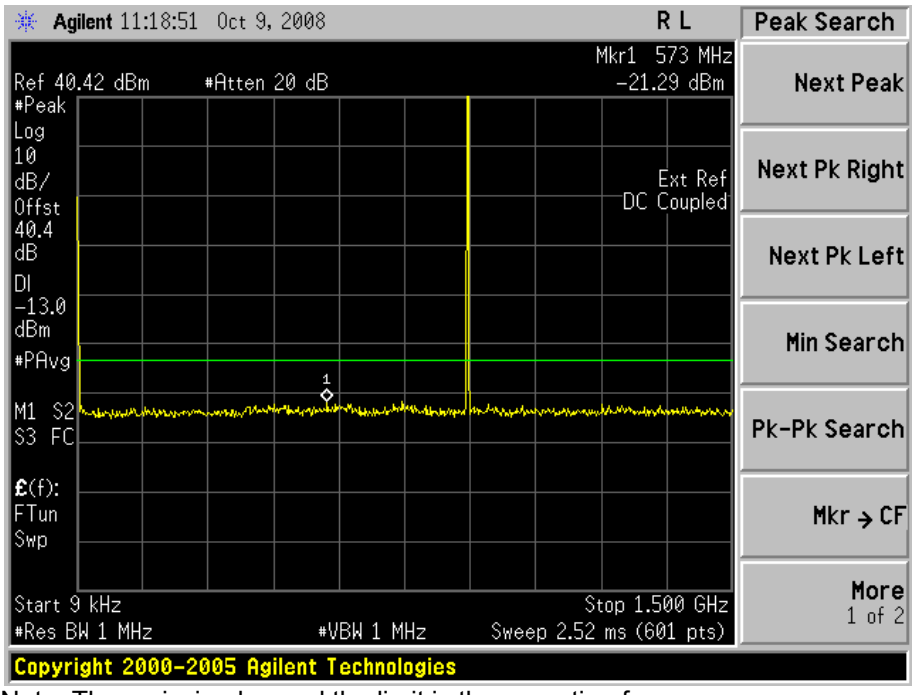
8PSK - Maximum Power



Configuration 1 - Mode 3

9kHz to 1.5GHz

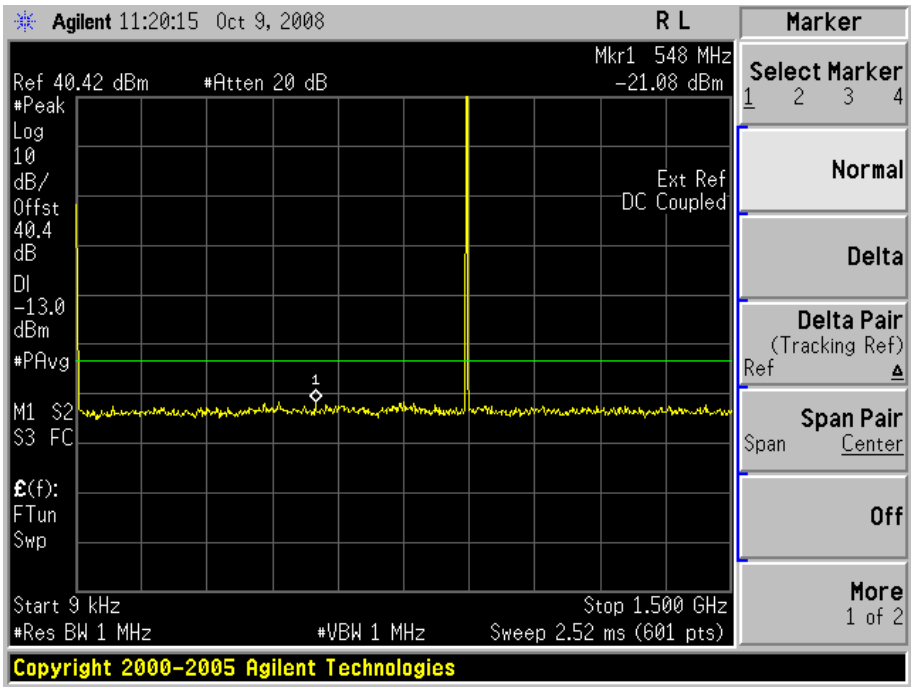
GMSK - Maximum Power



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

Product Service

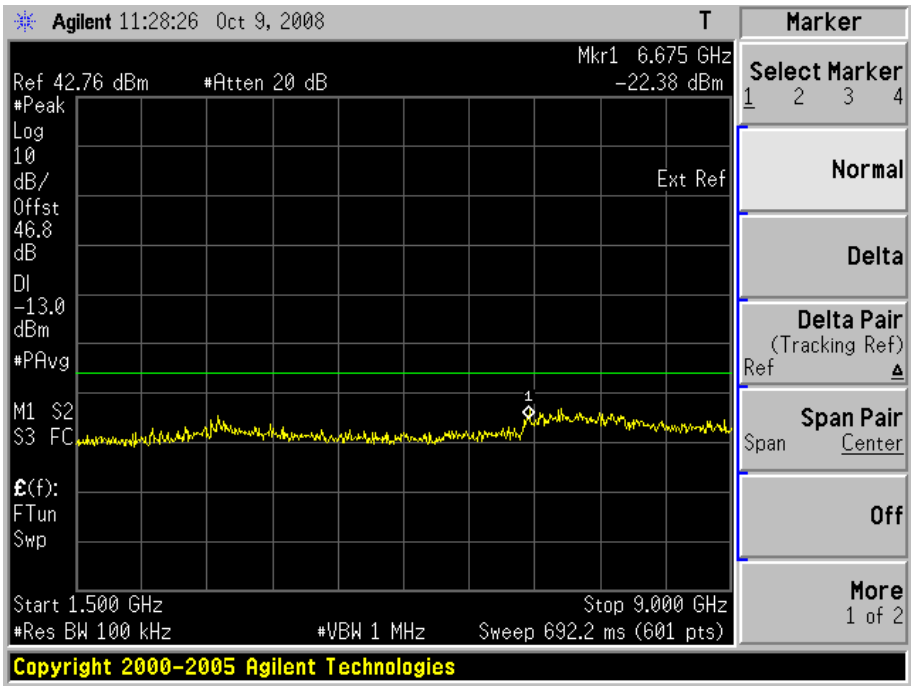
8PSK - Maximum Power



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

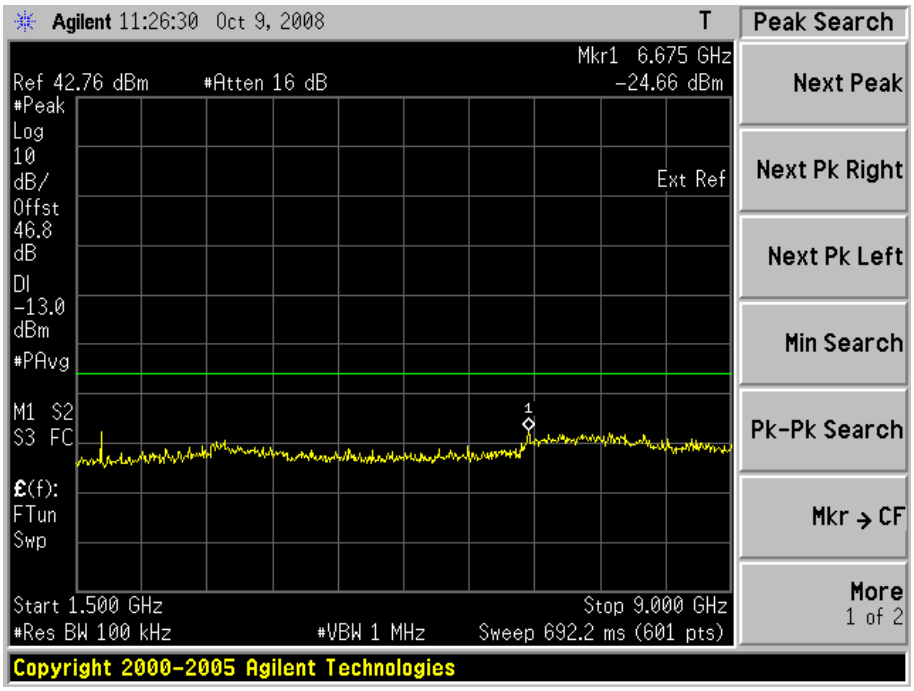
1.5GHz to 9GHz

GMSK - Maximum Power



Product Service

8PSK - Maximum Power



2.7 FREQUENCY STABILITY UNDER TEMPERATURE VARIATIONS

2.7.1 Specification Reference

FCC CFR 47 Part 22: 2006, Clause 2.1055, 22.355 and Industry Canada RSS 132:2005 Clause 4.3

2.7.2 Equipment Under Test

RRUN8-22, S/N: CB 47233132

2.7.3 Date of Test and Modification State

08 October 2008 – 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: 2006 and Industry Canada RSS 132:2005.

The EUT was set to transmit on maximum power with all timeslots active. A Spectrum Analyser was used to measure the frequency error. The average result was taken over 200 bursts. 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 2

2.7.6 Environmental Conditions

	08 October 2008
Ambient Temperature	28.0°C
Relative Humidity	35.0%

Product Service

2.7.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 22: 2006 and Industry Canada RSS 132:2005 for Frequency Stability Under Temperature Variations.

The test results are shown below.

Configuration 1 - Mode 2

GMSK

Temperature Interval (ºC)	Deviation (Hz)
-30	12.63
-20	13.82
-10	7.06
0	3.69
+10	4.89
+20	-8.51
+30	-8.34
+40	-4.20
+50	-0.49

8PSK

Temperature Interval (ºC)	Deviation (Hz)
-30	9.88
-20	10.45
-10	14.59
0	8.65
+10	5.33
+20	-7.41
+30	-12.11
+40	-6.72
+50	-1.03

Limit	±1.5 ppm or ±1.322 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.

2.8 FREQUENCY STABILITY UNDER VOLTAGE VARIATIONS

2.8.1 Specification Reference

FCC CFR 47 Part 22: 2006, Clause 2.1055, 22.355 and Industry Canada RSS 132:2005 Clause 4.3

2.8.2 Equipment Under Test

RRUN8-22, S/N: CB 47233132

2.8.3 Date of Test and Modification State

08 October 2008 – 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: 2006 and Industry Canada RSS 132:2005.

The EUT was set to transmit on maximum power on timeslot 3. A Spectrum Analyser was used to measure the frequency error. The average result was taken over 200 bursts. The supplied voltage was varied from 85 to 115 percent of the nominal value.

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

Configuration 1 - Mode 2

2.8.6 Environmental Conditions

	08 October 2008
Ambient Temperature	27.5°C
Relative Humidity	35%

Product Service

2.8.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 22: 2006 and Industry Canada RSS 132:2005 for Frequency Stability Under Voltage Variations.

The test results are shown below.

Configuration 1 - Mode 2

20°C

GMSK

DC Voltage (V)	Deviation (Hz)
40.8	-9.11
48.0	-8.51
55.2	-9.50

8PSK

DC Voltage (V)	Deviation (Hz)
40.8	-4.62
48.0	-7.41
55.2	-6.93

Limit	±1.5 ppm or ±1.322 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.
Section 2.1, 2.3, 2.4 and 2.6 – Maximum Conducted Output Power , Emission Limitations for Cellular Equipment/Occupied Bandwidth , Spurious Emissions at Antenna Terminals (±1MHz) and Spurious Emissions			
Spectrum Analyser	Agilent	E4440A	MY46186610
40dB Attenuator	Shanghaitta Xiang	DTS100G	08011717
Power Supply	Da Hua	DH1716-5D	-
Digital Multimeter	IsoTech	IDM101	TE0466
Thermo-hygrometer	Rotronic	A1	TE0970
Section 2.5 – Radiated Spurious Emissions			
EMI Receiver	Rohde & Schwarz	ESI 40	100015
Ultra log test antenna	Rohde & Schwarz	HL562	100167
Double-Ridged Waveguide Horn Antenna	Rohde & Schwarz	HF 906	100029
Antenna master	Frankonia	MA 260	-
Relay Switch Unit	Rohde & Schwarz	331.1601.31	338965002
Signal generator	Rohde & Schwarz	SMR 20	100086
Semi- Anechoic Chamber	Frankonia	23.18m×16.88m×9.60m	-
Digital Multimeter	IsoTech	IDM101	TE0466
Thermo-hygrometer	Rotronic	A1	TE0970
Section 2.7 and 2.8 – Frequency Stability Under Temperature and Voltage Variations			
Spectrum Analyser	Agilent	E4440A	MY46186610
40dB Attenuator	Shanghaitta Xiang	DTS100G	08011717
Temperature Chamber	Zengda	GDW/SJ 6-16	200510203
Power Supply	Da Hua	DH1716-5D	-
Digital Thermometer	Fluke	51	TE2267
Digital Multimeter	IsoTech	IDM101	TE0466
Thermo-hygrometer	Rotronic	A1	TE0970

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*
Conducted Emissions, LISN	150kHz to 30MHz Amplitude	3.2dB*
Conducted Emissions, ISN	150kHz to 30MHz Amplitude	2.1dB
Substitution Antenna, Radiated Field	30MHz to 18GHz Amplitude	2.6dB
Worst case error for both Time and Frequency measurement 12 parts in 106.		

* In accordance with CISPR 16-4

Product Service

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

Product Service

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

UKAS TESTING 0141

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

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).