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Report On

FCC and Industry Canada Testing of the
Ericsson AB RRUS 11 B5 / KRC 161 285/2

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FCC ID: TA8AKRC161285-2
IC ID: 287AB-AS1612852

Document 75918895 Report 01 Issue 1

September 2012



Product Service

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Ericsson AB RRUS 11 B5 / KRC 161 285/2

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PREPARED FOR

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DATED

7 September 2012

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 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);

He Yuanjin
Y He

Zhang Chengxin
C Zhang





CONTENTS

Section		Page No
1	REPORT SUMMARY	3
1.1	Introduction	4
1.2	Brief Summary of Results	5
1.3	Declaration of Build Status	8
1.4	Product Information	9
1.5	Test Conditions	14
1.6	Deviations From the Standard	14
1.7	Modification Record	14
1.8	Alternative Test Site	14
2	TEST DETAILS	15
2.1	Maximum Peak Output Power - Conducted	16
2.2	Peak – Average Ratio	19
2.3	Modulation Characteristics	33
2.4	Occupied Bandwidth	37
2.5	Spurious Emissions at Antenna Terminals ($\pm 1\text{MHz}$)	42
2.6	Radiated Spurious Emissions	48
2.7	Conducted Spurious Emissions	53
2.8	Frequency Stability Under Temperature Variations	61
2.9	Frequency Stability Under Voltage Variations	63
2.10	Receiver Spurious Emissions	65
3	TEST EQUIPMENT USED	71
3.1	Test Equipment Used	72
3.2	Measurement Uncertainty	74
4	ACCREDITATION, DISCLAIMERS AND COPYRIGHT	75
4.1	Accreditation, Disclaimers and Copyright	76



Product Service

SECTION 1

REPORT SUMMARY

FCC and Industry Canada Testing of the
Ericsson AB RRUS 11 B5 / KRC 161 285/2



1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Ericsson AB RRUS 11 B5 / KRC 161 285/2 to the requirements of FCC CFR 47 Part 22 and Industry Canada RSS-132.

Testing was carried out in support of a C2PC application for RRUS 11 B5 / KRC 161 285/2 to include CDMA wireless network.

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 AB
Product Name	RRUS 11 B5
Part Number	KRC 161 285/2
IC Model Number	AS1612852
Serial Number(s)	CB4M585068, CB4M714686
RBS Software Version	CXP 102 051/16 R19CF
PIS Software Version	CXP 901 7316/1 R39UL
Hardware Version	R1F
Number of Samples Tested	2
Test Specification/Issue/Date	FCC CFR 47 Part 22: 2011 Industry Canada RSS-132 Issue 2: 2005
Incoming Release Date	Declaration of Build Status 25 July 2012
Order Number	PTP
Date	26 July 2012
Start of Test	27 July 2012
Finish of Test	8 August 2012
Name of Engineer(s)	Y He C Zhang
Related Document(s)	ANSI C63.4: 2009 FCC CFR 47 Part 2: 2011 Industry Canada RSS-GEN Issue 3: 2010



1.2 BRIEF SUMMARY OF RESULTS

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

Configuration 1 – Radio Equipment							
Section	Spec Clause		Test Description	Mode	Mod State	Result	Comments
	FCC Part 2 and 22	RSS-132 and RSS-GEN					
	22.913 (a)	4.4	Effective Radiated Power	869.88MHz		N/A	No integral antenna.
				881.52MHz		N/A	
				893.10MHz		N/A	
				869.88MHz+871.11MHz		N/A	
				881.52MHz+882.75MHz		N/A	
				891.87MHz+893.10MHz		N/A	
				869.88MHz	0	Pass	
2.1	2.1046, 22.913 (a)	4.4	Maximum Peak Output Power - Conducted	881.52MHz	0	Pass	-
				893.10MHz	0	Pass	
				869.88MHz+871.11MHz	0	Pass	
				881.52MHz+882.75MHz	0	Pass	
				891.87MHz+893.10MHz	0	Pass	
				869.88MHz	0	Pass	
				881.52MHz	0	Pass	
2.2	22.913 (a)	-	Peak – Average Ratio	893.10MHz	0	Pass	-
				869.88MHz+871.11MHz	0	Pass	
				881.52MHz+882.75MHz	0	Pass	
				891.87MHz+893.10MHz	0	Pass	
				869.88MHz		N/A	
				881.52MHz	0	Pass	
				893.10MHz		N/A	
2.3	2.1047 (d)	4.2	Modulation Characteristics	869.88MHz+871.11MHz		N/A	-
				881.52MHz+882.75MHz		N/A	
				891.87MHz+893.10MHz		N/A	
				869.88MHz	0	Pass	
				881.52MHz	0	Pass	
				893.10MHz	0	Pass	
				869.88MHz+871.11MHz		N/A	
2.4	2.1049, 22.917 (b)	RSS-Gen 4.6.1	Occupied Bandwidth	881.52MHz+882.75MHz		N/A	-
				891.87MHz+893.10MHz		N/A	
				869.88MHz	0	Pass	
				881.52MHz	0	Pass	
				893.10MHz	0	Pass	
				869.88MHz+871.11MHz		N/A	
				881.52MHz+882.75MHz		N/A	



Configuration 1 – Radio Equipment							
Section	Spec Clause		Test Description	Mode	Mod State	Result	Comments
	FCC Part 2 and 22	RSS-132 and RSS-GEN					
2.5	2.1051, 22.917 (b)	4.5	Spurious Emissions at Antenna Terminals ($\pm 1\text{MHz}$)	869.88MHz	0	Pass	-
				881.52MHz		N/A	
				893.10MHz	0	Pass	
				869.88MHz+871.11MHz	0	Pass	
				881.52MHz+882.75MHz			
				891.87MHz+893.10MHz	0	Pass	
2.6	2.1053, 22.917 (a)	4.5	Radiated Spurious Emissions	869.88MHz	0	Pass	-
				881.52MHz	0	Pass	
				893.10MHz	0	Pass	
				869.88MHz+871.11MHz		N/A	
				881.52MHz+882.75MHz		N/A	
				891.87MHz+893.10MHz	0	Pass	
2.7	2.1051, 22.917 (a)	4.5	Conducted Spurious Emissions	869.88MHz	0	Pass	-
				881.52MHz	0	Pass	
				893.10MHz	0	Pass	
				869.88MHz+871.11MHz	0	N/A	
				881.52MHz+882.75MHz	0	Pass	
				891.87MHz+893.10MHz	0	N/A	
2.8	2.1055, 22.355	4.3	Frequency Stability Under Temperature Variations	869.88MHz		N/A	-
				881.52MHz	0	Pass	
				893.10MHz		N/A	
				869.88MHz+871.11MHz		N/A	
				881.52MHz+882.75MHz		N/A	
				891.87MHz+893.10MHz		N/A	



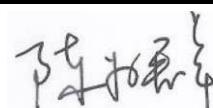
Configuration 1 – Radio Equipment							
Section	Spec Clause		Test Description	Mode	Mod State	Result	Comments
	FCC Part 2 and 24	RSS-132 and RSS-GEN					
2.9	2.1055, 22.355	4.3	Frequency Stability Under Voltage Variations	869.88MHz		N/A	-
				881.52MHz	0	Pass	
				893.10MHz		N/A	
				869.88MHz+871.11MHz		N/A	
				881.52MHz+882.75MHz		N/A	
				891.87MHz+893.10MHz		N/A	
2.10	15.111	4.6	Receiver Spurious Emissions	869.88MHz	0	Pass	-
				881.52MHz	0	Pass	
				893.10MHz	0	Pass	
				869.88MHz+871.11MHz		N/A	
				881.52MHz+882.75MHz		N/A	
				891.87MHz+893.10MHz		N/A	

N/A – Not Applicable

1.3 DECLARATION OF BUILD STATUS

MAIN EUT	
MANUFACTURING DESCRIPTION	Radio Equipment
MANUFACTURER	Ericsson AB
PRODUCT NAME	RRUS 11 B5
PART NUMBER	KRC 161 285/2
IC Model Number	AS1612852
SERIAL NUMBER(s)	CB4M585068, CB4M714686
HARDWARE VERSION	R1F
RBS SOFTWARE VERSION	CXP 102 051/16 R19CF
PIS SOFTWARE VERSION	CXP 901 7316/1 R39UL
TRANSMITTER OPERATING RANGE	TX: 869MHz - 894MHz RX: 824MHz - 849MHz
MODULATIONS	BPSK, QPSK, 8PSK, 16QAM
INTERMEDIATE FREQUENCIES	--
ITU DESIGNATION OF EMISSION	1M25F9W
CHANNEL BANDWIDTH	1.25 MHz
OUTPUT POWER (RMS) (W or dBm)	Single Carrier: 1 x 46.0dBm (1 x 40W) per port Multi Carrier (x 2): 2 x 43.0.dBm (2 x 20W) per port
OUTPUT POWER TOLERANCE	± 1.0dB
NUMBER OF ANTENNA PORTS	2 TX/ RX ports
SUPPORTED CONFIGURATION	Dual Single Carrier or Multi Carrier. Both RF chains are identical.
FCC ID	TA8AKRC161285-2
IC ID	287AB-AS1612852
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	The equipment is the Radio Part of CDMA Base Station.

Signature



Date

10 August 2012

D of B S Serial No

75918895/01

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

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) RRUS 11 B5 / KRC 161 285/2 is an Ericsson AB Radio Equipment working in the public mobile service 850MHz band which provides communication connections to CDMA850 network. The RRUS 11 B5 / KRC 161 285/2 operates from a -48V DC 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

1.4.2 Test Configuration

Configuration 1: Radio Equipment

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

The RRUS 11 B5 / KRC 161 285/2 supports CDMA with BPSK, QPSK, 8PSK and 16QAM modulations at 850MHz. The setting below were found to be representative for all traffic scenarios when several settings with the different modulations and the number of carriers were tested to find the worst case setting. These settings were used for all measurements if not otherwise noted:

- Single carrier:
 BPSK Modulation
 Forward Traffic Channel using Spreading Rate 1 (1X), Voice
 User Channels: 6
 Channel rate: 9.6kbps
 Channel bandwidth: 1.25MHz
 This setting was found to be representative in Spurious Emissions at Antenna Terminals (± 1 MHz).
- Single carrier:
 QPSK Modulation
 Forward Traffic Channel using Spreading Rate 1 (1X), Voice
 User Channels: 6
 Channel rate: 9.6kbps
 Channel bandwidth: 1.25MHz
 This setting was found to be representative in Maximum Peak Output Power, Conducted Spurious Emission, Radiated Spurious Emissions and Frequency Stability tests.

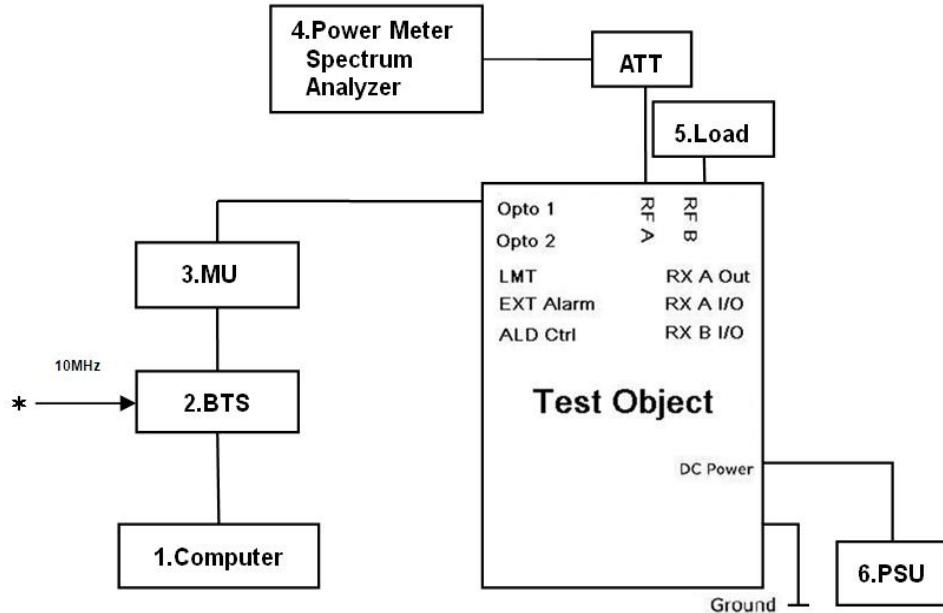
For other modulations, the settings are as follows:

- QPSK Modulation: High Rate Packet Data
 User Channels: 14
 Channel rate: 614.4kbps
- 8PSK Modulation: High Rate Packet Data
 User Channels: 14
 Channel rate: 921.6kbps
- 16QAM Modulation: High Rate Packet Data
 User Channels: 14
 Channel rate: 2457.6kbps

Channel bandwidth: 1.25MHz

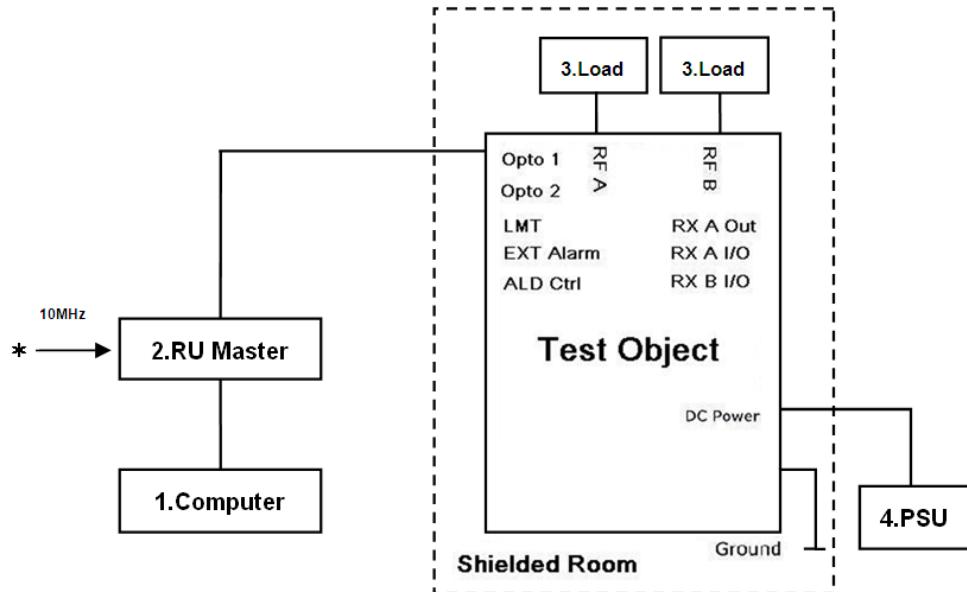
The EUT has two TX/RX ports and it can be configured to transmit with 850MHz single or multi carrier at both RF output connectors. All TX measurements were performed on the combined TX/RX output connector RF A. Limited complementary TX measurements were done at connector RF B to verify identical performance for both transmitter chains. The complete testing was performed with the EUT transmitting at maximum RF power unless otherwise stated.

The EUT was powered by a -48V DC Power supply.

Test Setup, Conducted Measurement:

Test Object	Part Number	Version	Serial Number
Radio Part	RRUS 11 B5 / KRC 161 285/2	R1F	CB4M585068

No.	Auxiliary Equipment	Part Number / Model Type	Version	Serial Number
1	Computer	HP DC5100SFF	--	CNG6510B8B
2	BTS 602	--	--	--
	DBU	NTLK70AA	06	NNTMPX00M151
	XCEM-A	NTLK86AAE5	02	NNTMPX00MPRG
	XCEM-A	NTLK86AAE5	02	NNTMPX00LLDN
	AEM1302	NTLK85GAE5	07	NNTMPX00V5VV
	AEM1302	NTLK85GAE5	07	--
3	DUL 20 01	KDU 137 533/4	R1D	CB4K440243
	XMU 02 01	KDU137 745/1	R1A	C824793854
	SUP 6601	BFL 901 009/1	R3B	BR81650806
4	Power Meter	Agilent N1914A	--	MY50001665
	Thermal Power Sensor	Agilent 8482A	--	MY45093513
	Spectrum Analyzer	Agilent E4440A	--	MY46188035
	Spectrum Analyzer	Agilent N9020A	--	MY46471155
5	Load	MCLI TNN-15..150	--	120
6	Power Supply	XFR 60-46	--	E00103273

Test Setup, Radiated Measurement:


Test Object	Part Number	Version	Serial Number
Radio Part	RRUS 11 B5 / KRC 161 285/2	R1F	CB4M714686

No.	Auxiliary Equipment	Part Number / Model Type	Version	Serial Number
1	Computer	ADVANTECH 610H	--	ATB5103888
2.	RU Master	CPC 102 400/5	R1B	701E368189
3	Load	TF100	--	09121631
	Load	TF100	--	09121602
4	Power Supply	DH1716-5D	--	20080401

1.4.3 Modes of Operation

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

Mode 1 - Channel No. 1019: 869.88MHz (Bottom Channel)

Mode 2 - Channel No. 384: 881.52MHz (Middle Channel)

Mode 3 - Channel No. 770: 893.10MHz (Top Channel)

Mode 4 - Channel No. 1019 + 37: 869.88MHz + 871.11MHz (B and B+1.23MHz)

Mode 5 - Channel No. 384 + 425: 881.52MHz + 882.75MHz (M and M+1.23MHz)

Mode 6 - Channel No. 729 + 770: 891.87MHz + 893.10MHz (T-1.23MHz and T)

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 -48V 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 910917:
The State Radio Monitoring Centre, No.80 Beilishi Road Xicheng District Beijing, China.

Industry Canada Accreditation 7308A-1:
The State Radio Monitoring Centre, No.80 Beilishi Road Xicheng District Beijing, China.



SECTION 2

TEST DETAILS

FCC and Industry Canada Testing of the
Ericsson AB RRUS 11 B5 / KRC 161 285/2

2.1 MAXIMUM PEAK OUTPUT POWER - CONDUCTED

2.1.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1046
 FCC CFR 47 Part 22, Clause 22.913 (a)
 Industry Canada RSS-132, Clause 4.4

2.1.2 Equipment Under Test

RRUS 11 B5 / KRC 161 285/2, S/N: CB4M585068

2.1.3 Date of Test and Modification State

27 and 30 July 2012 – 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 2 and Part 22 and Industry Canada RSS-132.

Using a power meter and attenuator(s), the output power of the EUT was measured at the antenna terminal. The carrier power was measured with BPSK, QPSK, 8PSK and 16QAM modulations.

The path loss was 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

2.1.6 Environmental Conditions

	27 July 2012	30 July 2012
Ambient Temperature	22.8°C	25.6°C
Relative Humidity	52.5%	48.7%

2.1.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 22 and Industry Canada RSS-132 for Maximum Peak Output Power.

The test results are shown below

Single Carrier

Configuration 1 - Mode 1, 2 and 3

BPSK

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
1019 (Bottom)	869.88	40.4	46.02	39.99
384 (Middle)	881.52	40.4	46.18	41.50
770 (Top)	893.10	40.4	45.90	38.90

QPSK

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
1019 (Bottom)	869.88	40.4	46.00	39.81
384 (Middle)	881.52	40.4	46.18	41.50
770 (Top)	893.10	40.4	45.86	38.55

8PSK

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
1019 (Bottom)	869.88	40.4	45.97	39.54
384 (Middle)	881.52	40.4	46.17	41.40
770 (Top)	893.10	40.4	45.89	38.82

16QAM

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
1019 (Bottom)	869.88	40.4	46.02	39.99
384 (Middle)	881.52	40.4	46.16	41.30
770 (Top)	893.10	40.4	45.87	38.64

Multi Carrier (1x2)**Configuration 1 - Mode 4, 5 and 6****BPSK**

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
1019 & 37	869.88 & 871.11	40.4	46.02	39.99
384 & 425	881.52 & 882.75	40.4	46.21	41.78
729 & 770	891.87 & 893.10	40.4	45.99	39.72

QPSK

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
1019 & 37	869.88 & 871.11	40.4	46.06	40.36
384 & 425	881.52 & 882.75	40.4	46.21	41.78
729 & 770	891.87 & 893.10	40.4	45.99	39.72

8PSK

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
1019 & 37	869.88 & 871.11	40.4	46.00	39.81
384 & 425	881.52 & 882.75	40.4	46.20	41.69
729 & 770	891.87 & 893.10	40.4	45.96	39.45

16QAM

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
1019 & 37	869.88 & 871.11	40.4	46.02	39.99
384 & 425	881.52 & 882.75	40.4	46.18	41.50
729 & 770	891.87 & 893.10	40.4	45.96	39.45

Limit	≤500W or ≤+57dBm
-------	------------------

Remarks

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

2.2 PEAK – AVERAGE RATIO

2.2.1 Specification Reference

FCC CFR 47 Part 22, Clause 22.913 (a)

2.2.2 Equipment Under Test

RRUS 11 B5 / KRC 161 285/2, S/N: CB4M585068

2.2.3 Date of Test and Modification State

27, 30 and 31 July 2012, 01 and 02 August 2012 – 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 FCC CFR 47 Part 22.

A peak to average ratio measurement is performed at the conducted port of the EUT. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in 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 spectrum analyzer Measurement bandwidth was set to 2MHz for single carrier , 3MHz for 2 carriers, 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

2.2.6 Environmental Conditions

	27 July 2012	30 July 2012	31 July 2012	01 August 2012	02 August 2012
Ambient Temperature	22.8°C	25.6°C	26.1°C	27.0°C	25.5°C
Relative Humidity	52.5%	48.7%	47.5%	47.7%	49.8%

2.2.7 Test Results

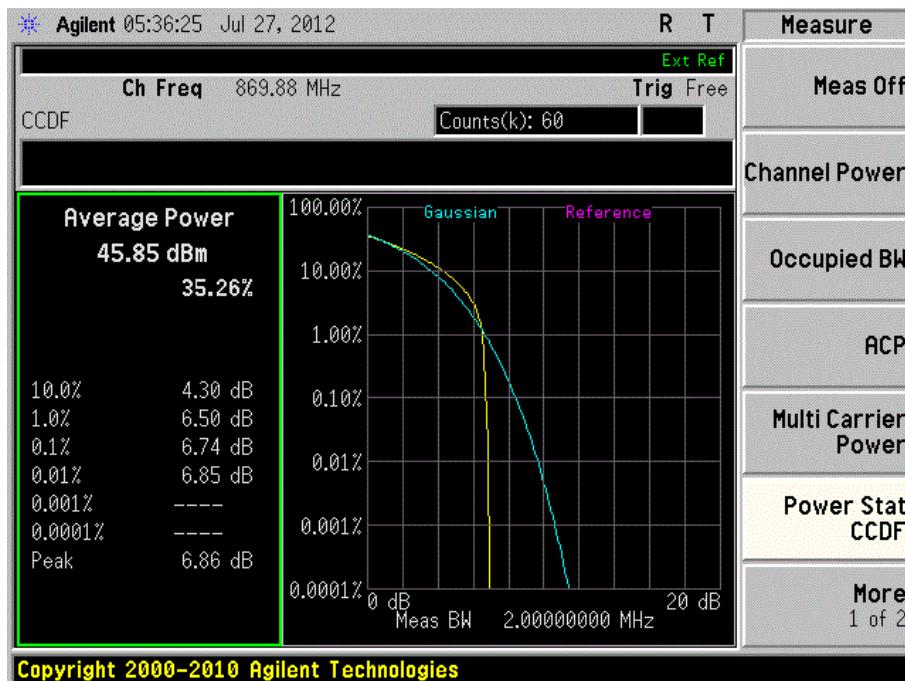
For the period of test the EUT met the requirements of FCC CFR 47 Part 22 for Peak – Average Ratio.

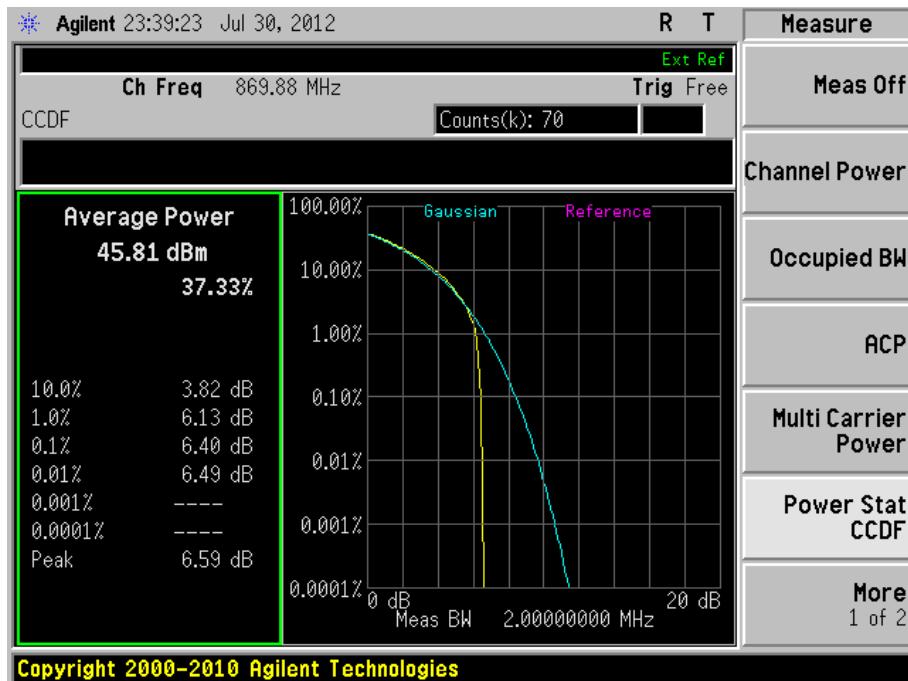
The test results are shown below.

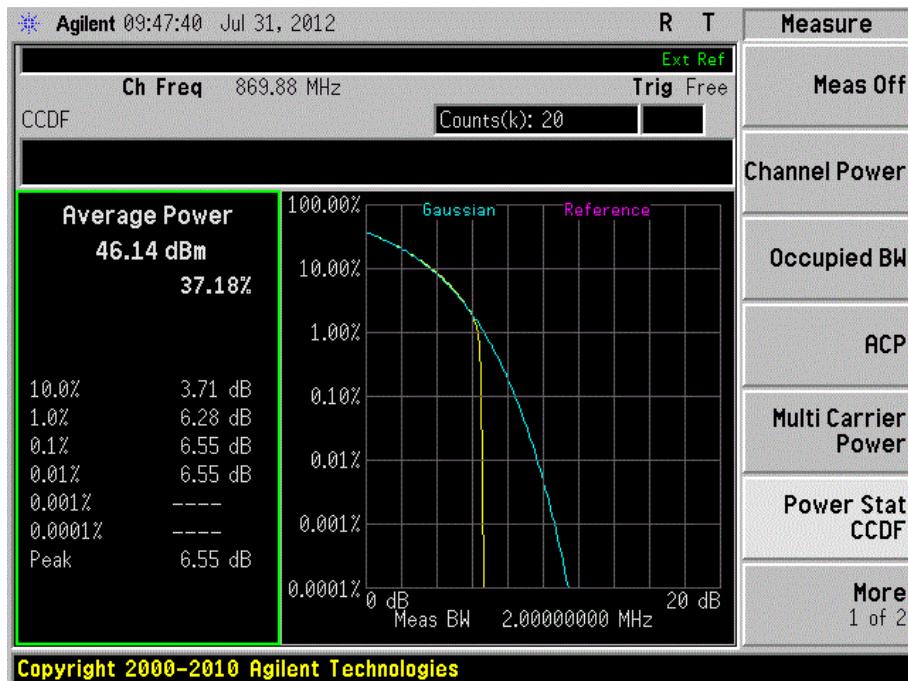
Single Carrier

Configuration 1 - Mode 1

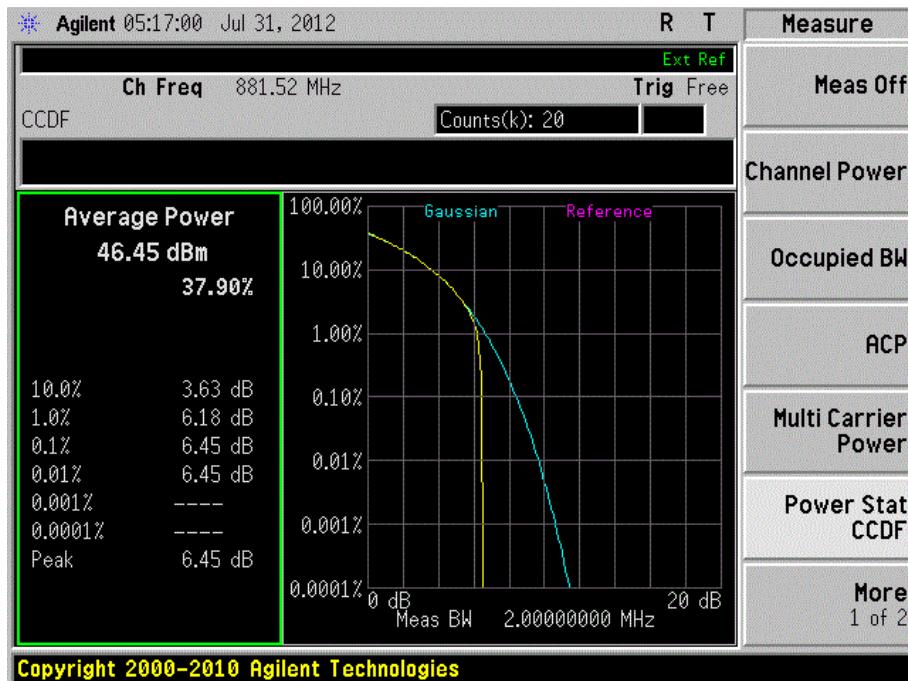
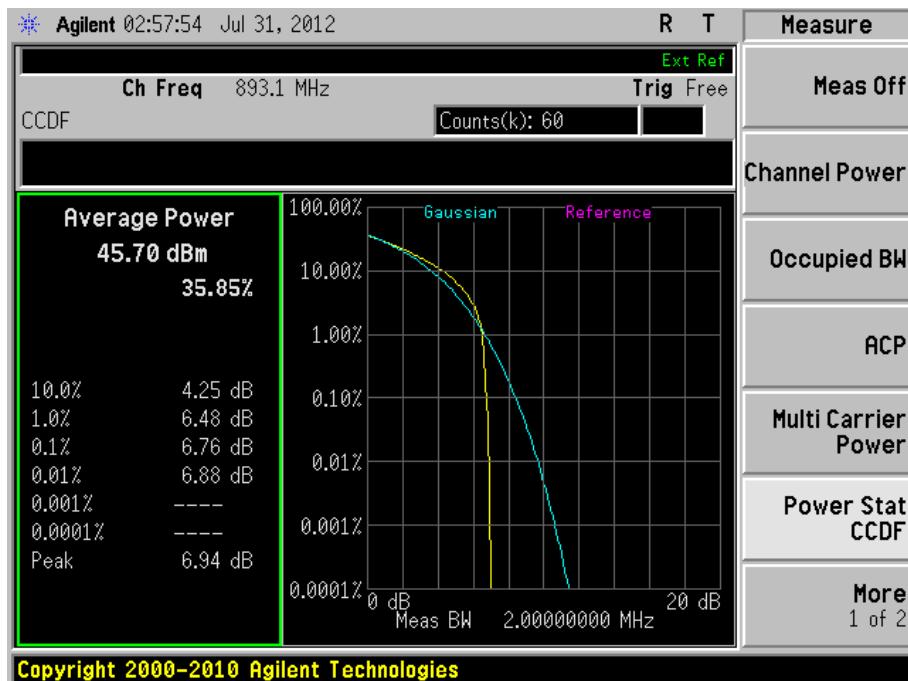
BPSK

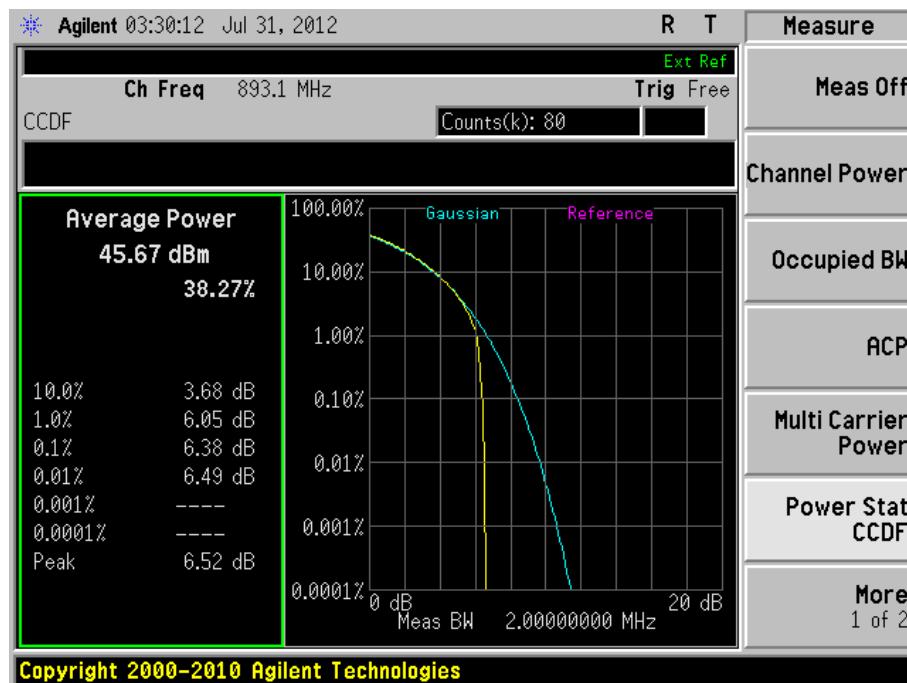
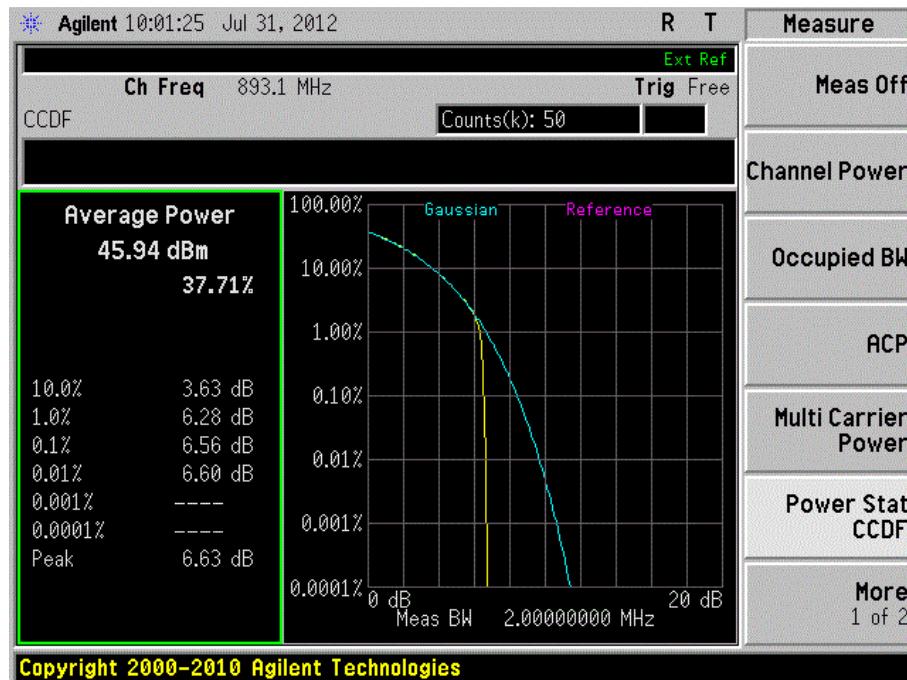


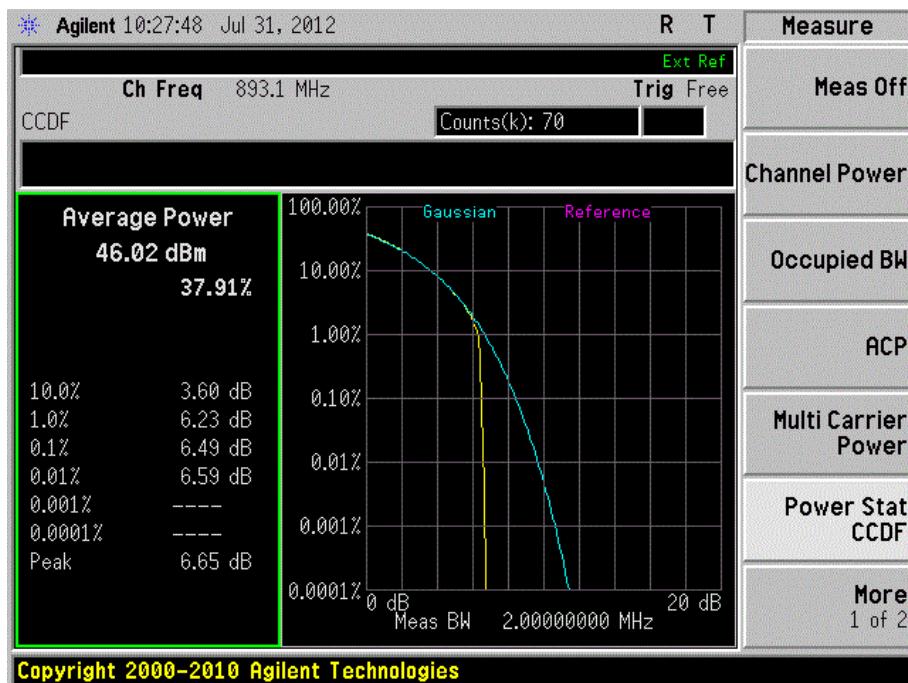
QPSK8PSK

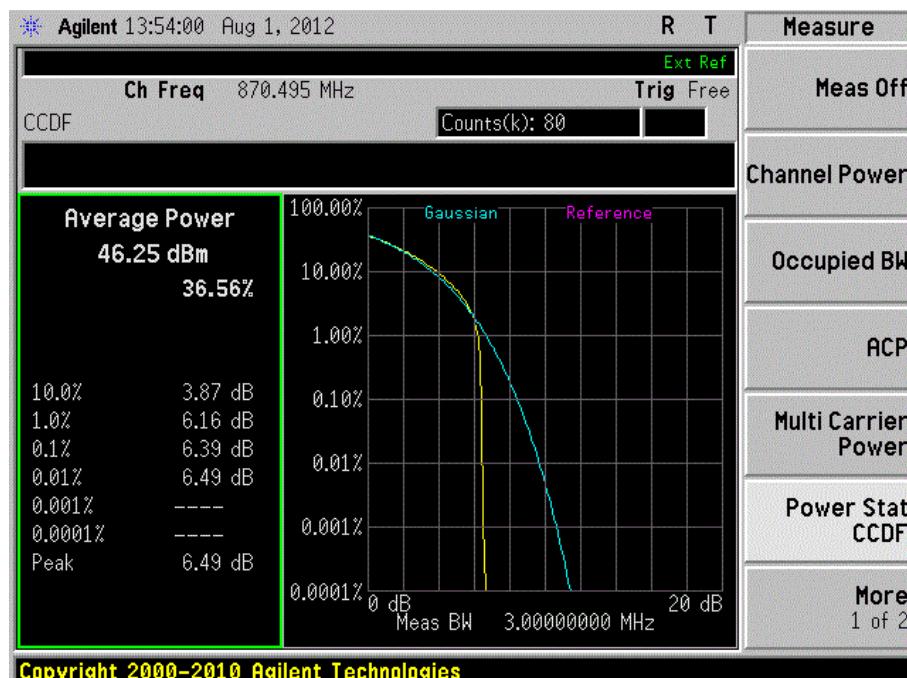
16QAMConfiguration 1 - Mode 2BPSK

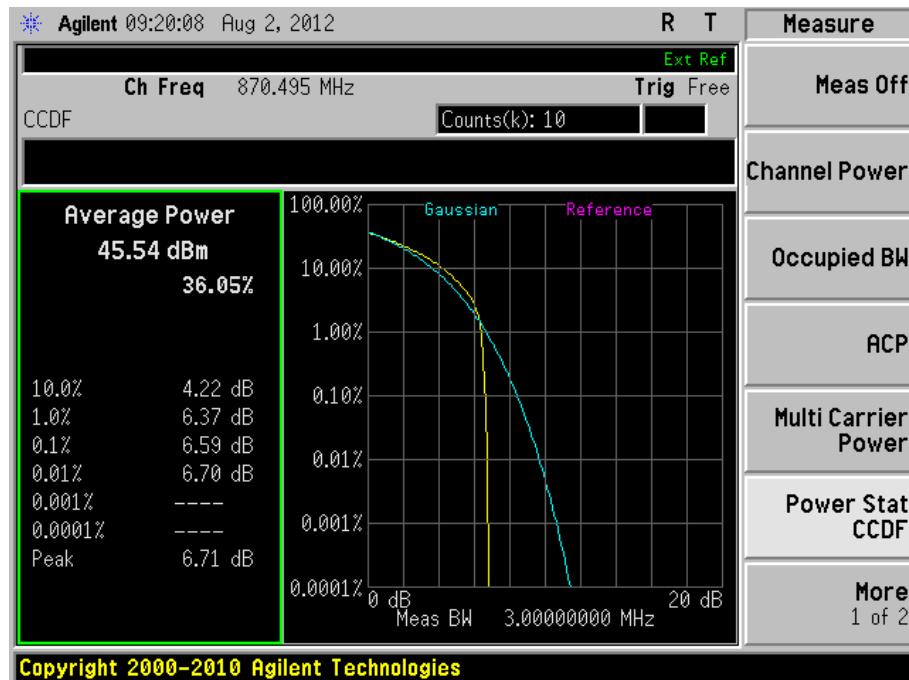
QPSK8PSK

16QAMConfiguration 1 - Mode 3BPSK

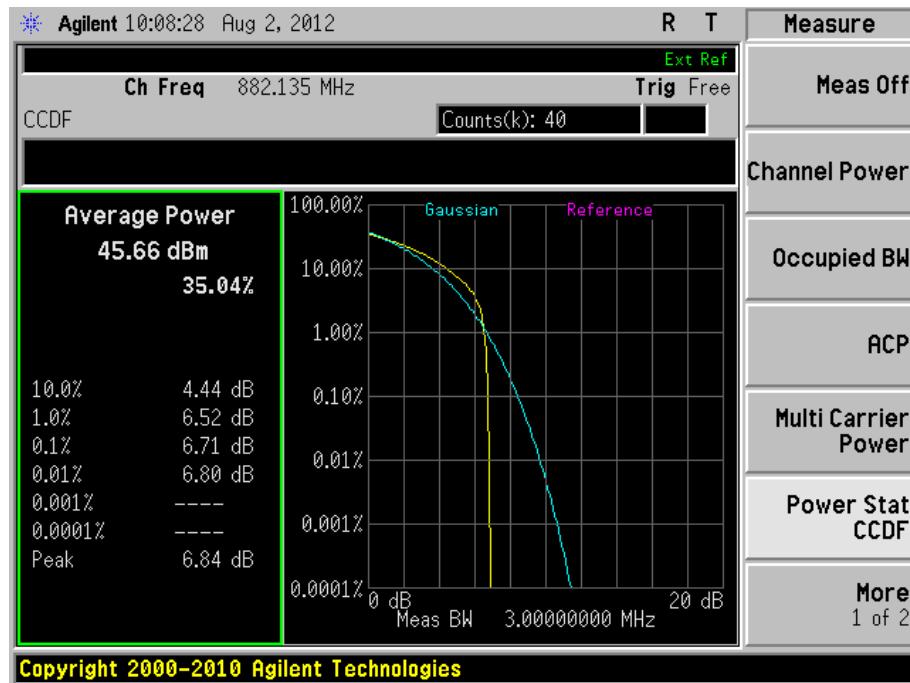
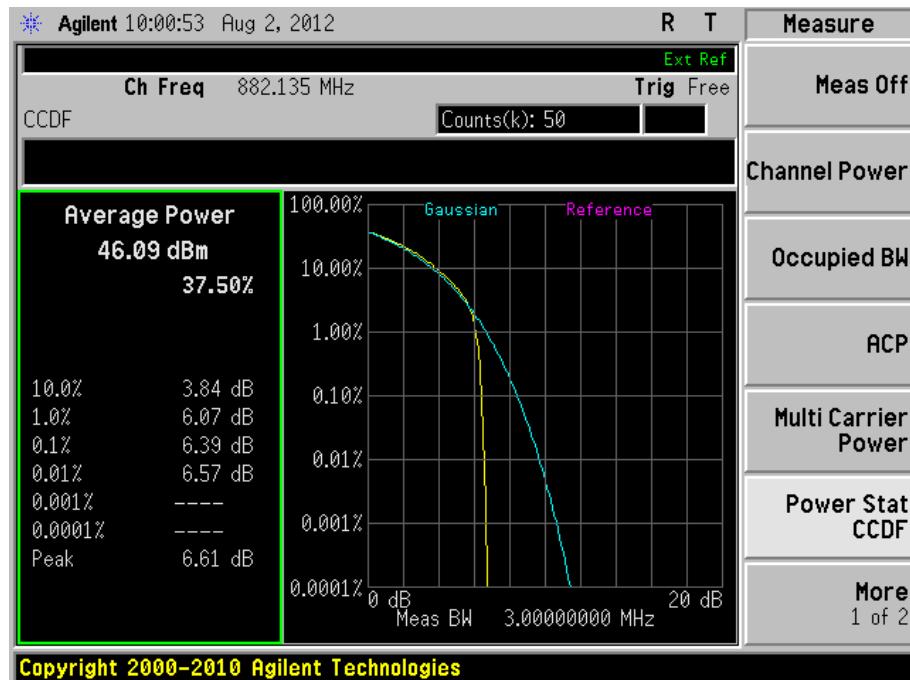
QPSK8PSK

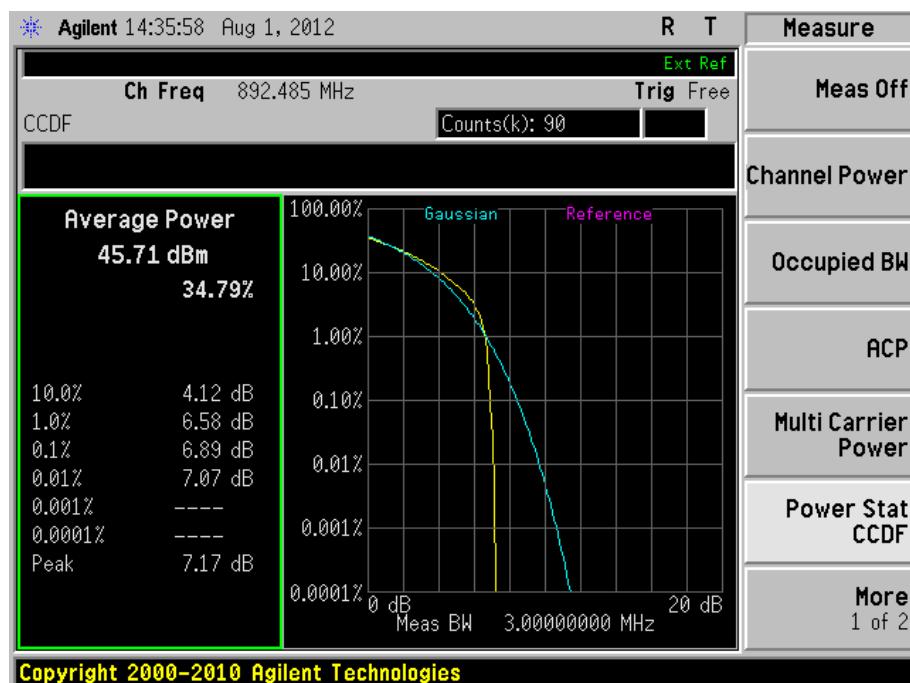
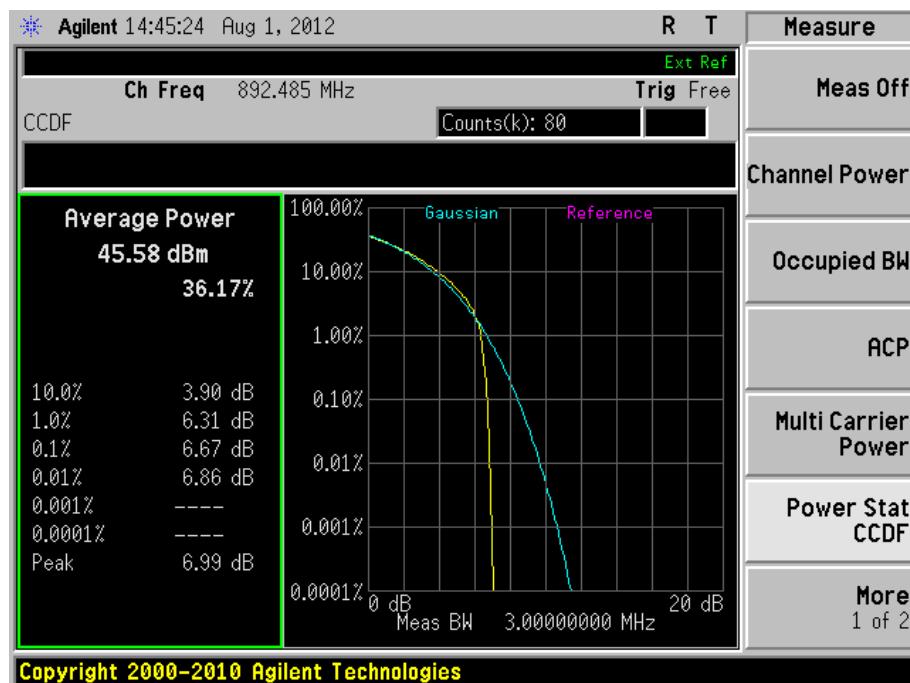
16QAM

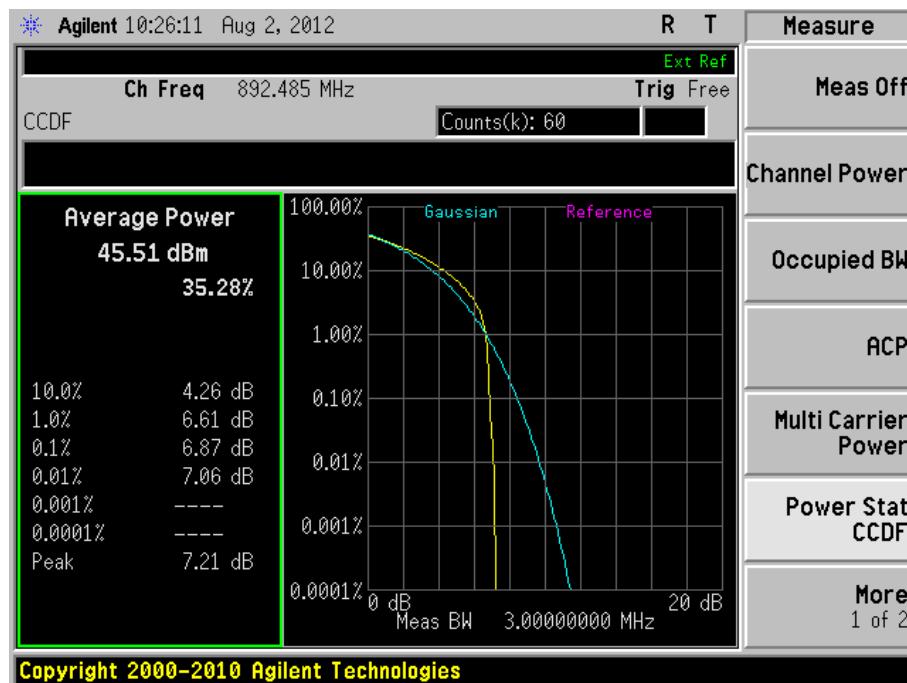
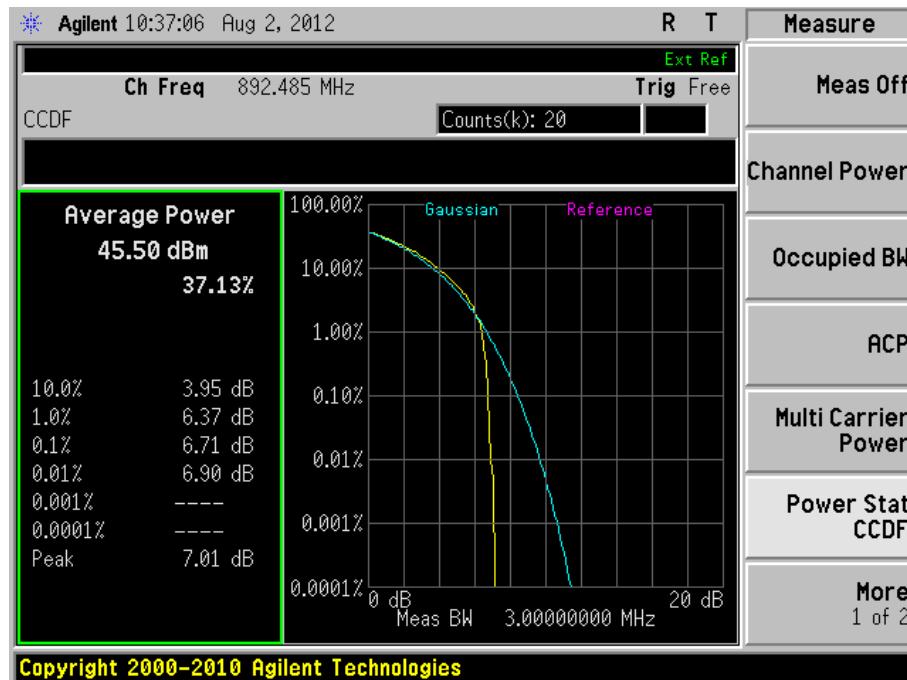
Multi Carrier (1x2):Configuration 1 - Mode 4BPSKQPSK

8PSK16QAM

Configuration 1 - Mode 5BPSKQPSK

8PSK16QAM

Configuration 1 - Mode 6BPSKQPSK

8PSK16QAM

Limit	13dB
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Remarks

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



2.3 MODULATION CHARACTERISTICS

2.3.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1047 (d)
Industry Canada RSS-132 Clause 6.2

2.3.2 Equipment Under Test

RRUS 11 B5 / KRC 161 285/2, S/N: CB4M585068

2.3.3 Date of Test and Modification State

30 and 31 July 2012 – Modification State 0

2.3.4 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 2 and Industry Canada RSS-132.

Connect the TX output connector RF A to a spectrum analyzer with an attenuator. The other connector RF B was connected to match load. The EUT was controlled to transmit maximum power. Measure and record the constellation of the EUT by the spectrum analyzer.

The EUT supports BPSK, QPSK, 8PSK and 16QAM modulations.

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

Configuration 1 - Mode 2

2.3.5 Environmental Conditions

	30 July 2012	31 July 2012
Ambient Temperature	25.6°C	26.1°C
Relative Humidity	48.7%	47.5%

2.3.6 Test Result

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

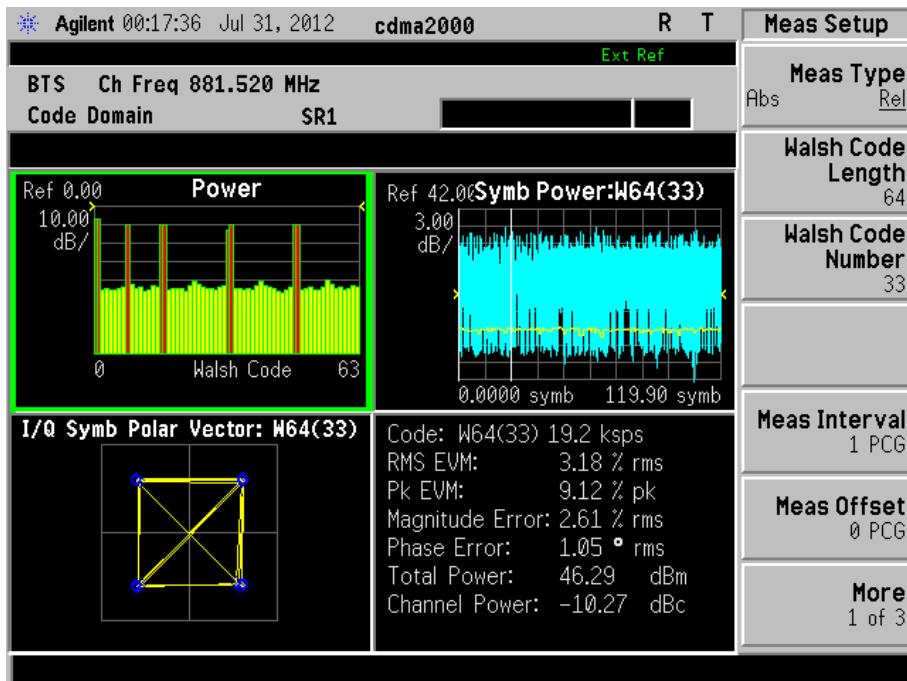
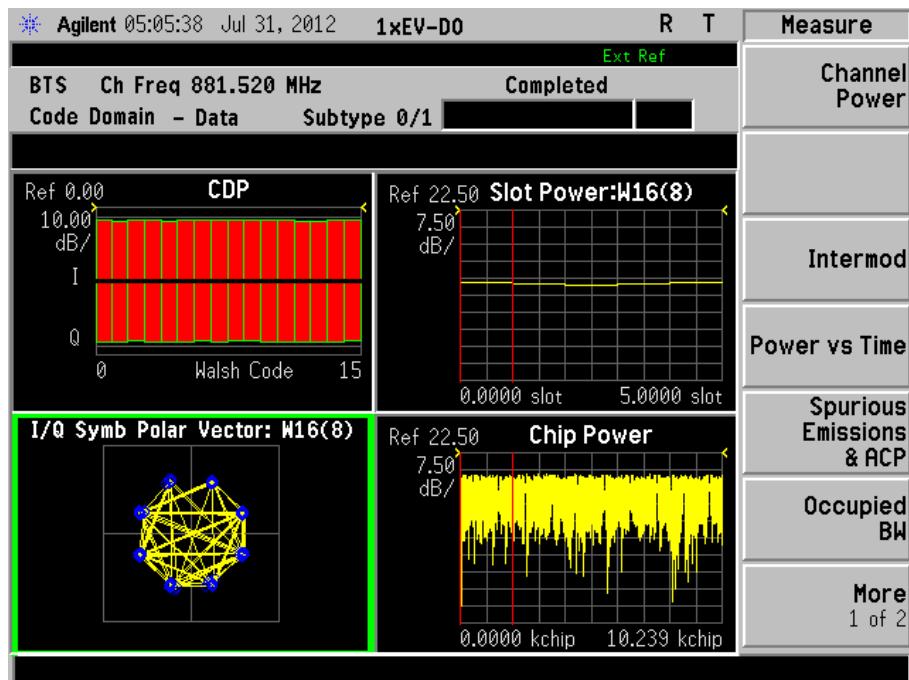
The test results are shown below

Single Carrier

Configuration 1 - Mode 2

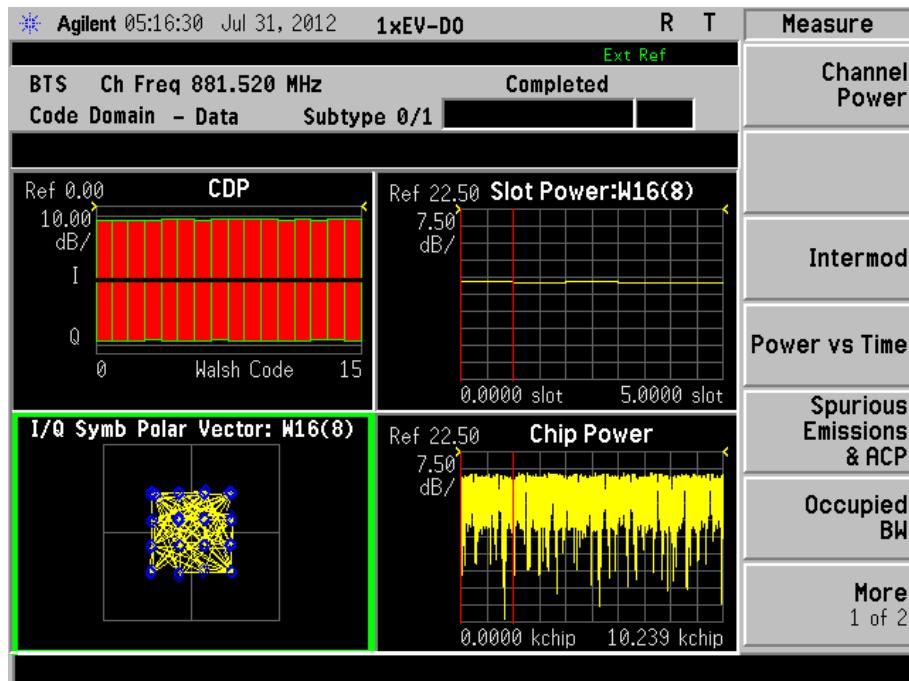
EUT transmitting with BPSK (Voice) modulation:



EUT transmitting with QPSK(Voice) modulation:

EUT transmitting with 8PSK modulation:




EUT transmitting with 16QAM modulation:





2.4 OCCUPIED BANDWIDTH

2.4.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1049 (h)
 FCC CFR 47 Part 22, Clause 22.917 (b)
 Industry Canada RSS-GEN, Clause 4.6.1

2.4.2 Equipment Under Test

RRUS 11 B5 / KRC 161 285/2, S/N: CB4M585068

2.4.3 Date of Test and Modification State

30 and 31 July 2012 – 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 2 and Part 22 and Industry Canada RSS-GEN.

The EUT was transmitting at maximum power, modulated using QPSK as the representative test modulation. Using a resolution bandwidth of 13kHz and a video bandwidth of 130kHz. 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

2.4.6 Environmental Conditions

	30 July 2012	31 July 2012
Ambient Temperature	25.6°C	26.1°C
Relative Humidity	48.7%	47.5%

2.4.7 Test Results

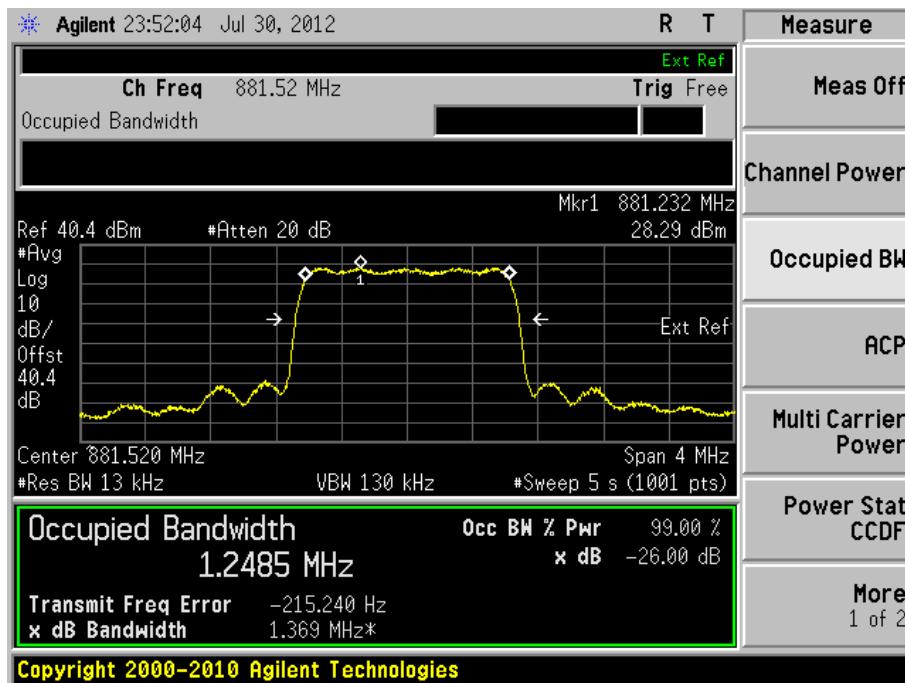
For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 22 and Industry Canada RSS-GEN for Occupied Bandwidth.

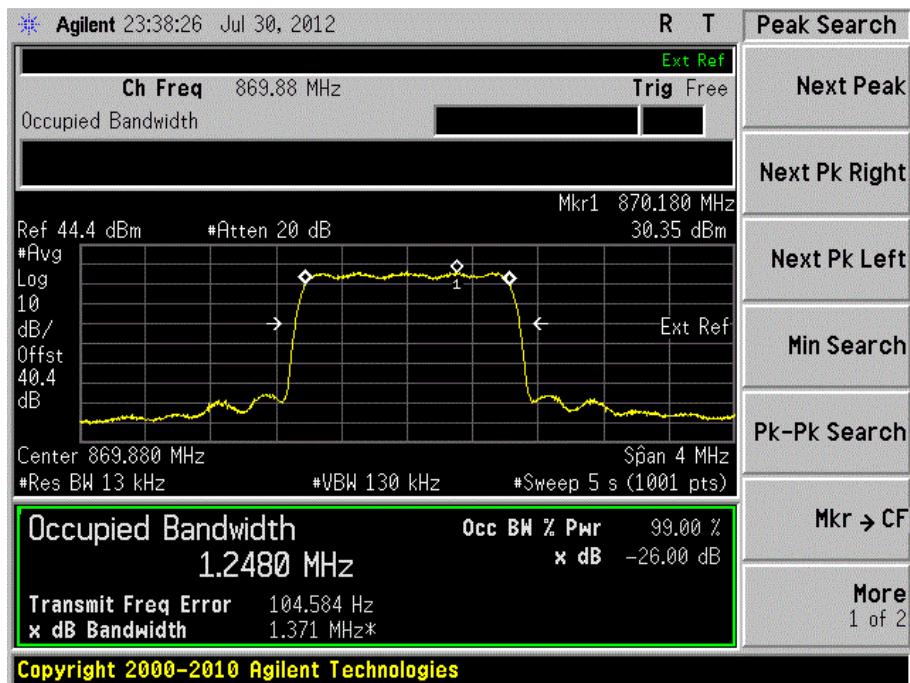
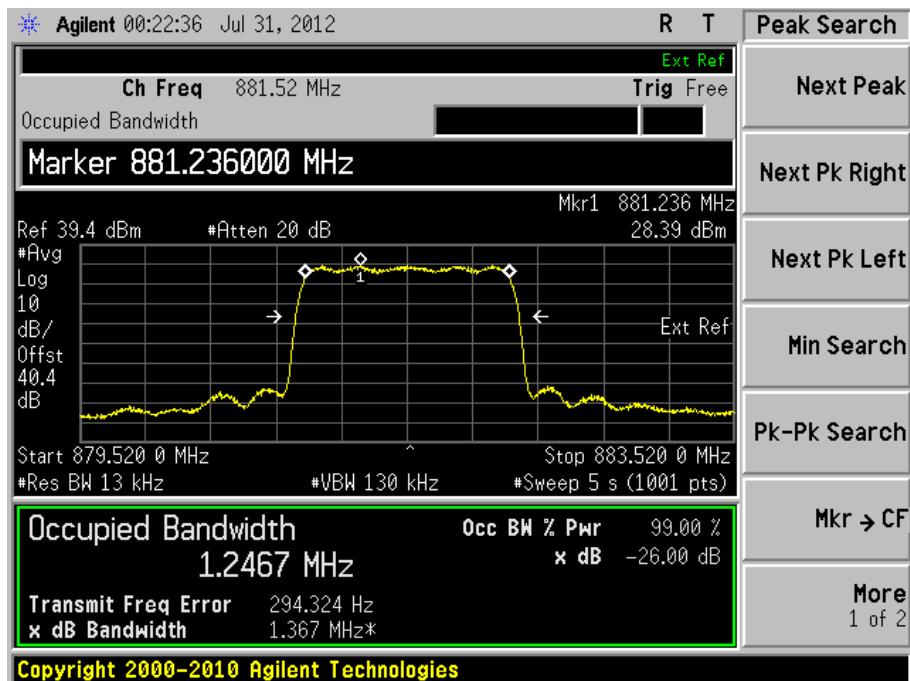
The test results are shown below

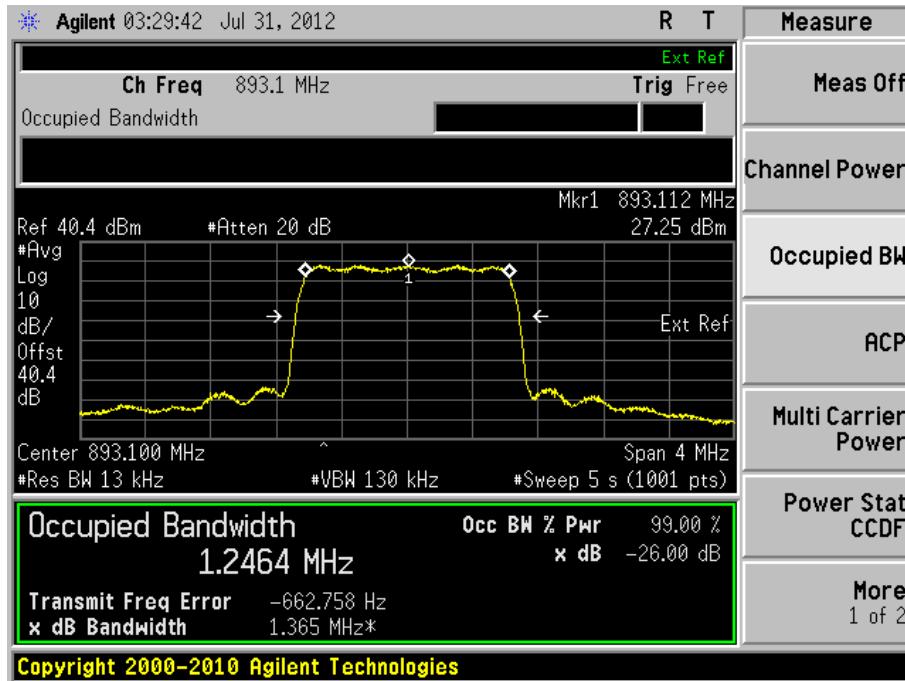
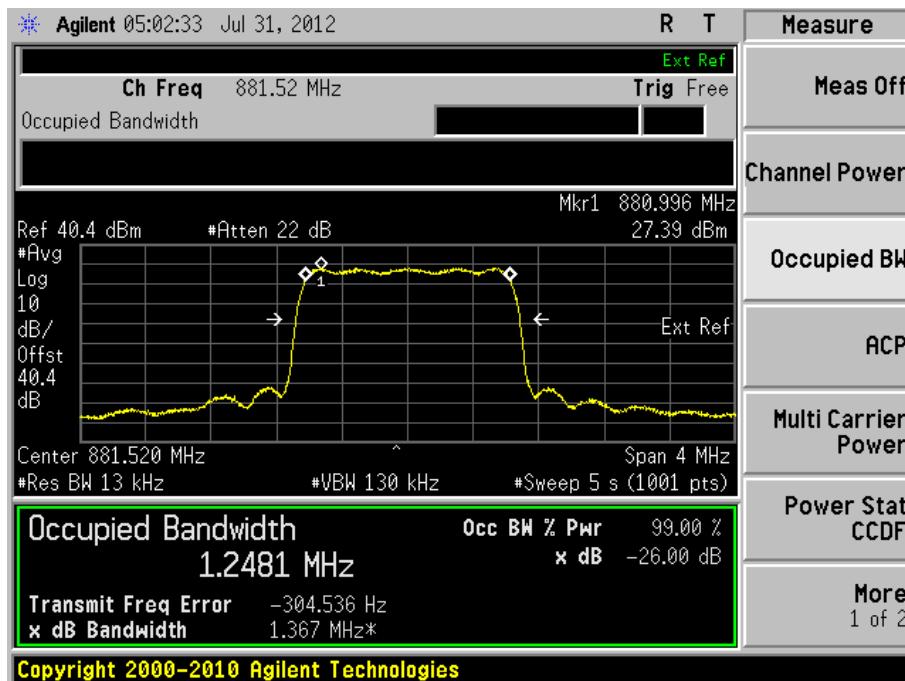
Single Carrier

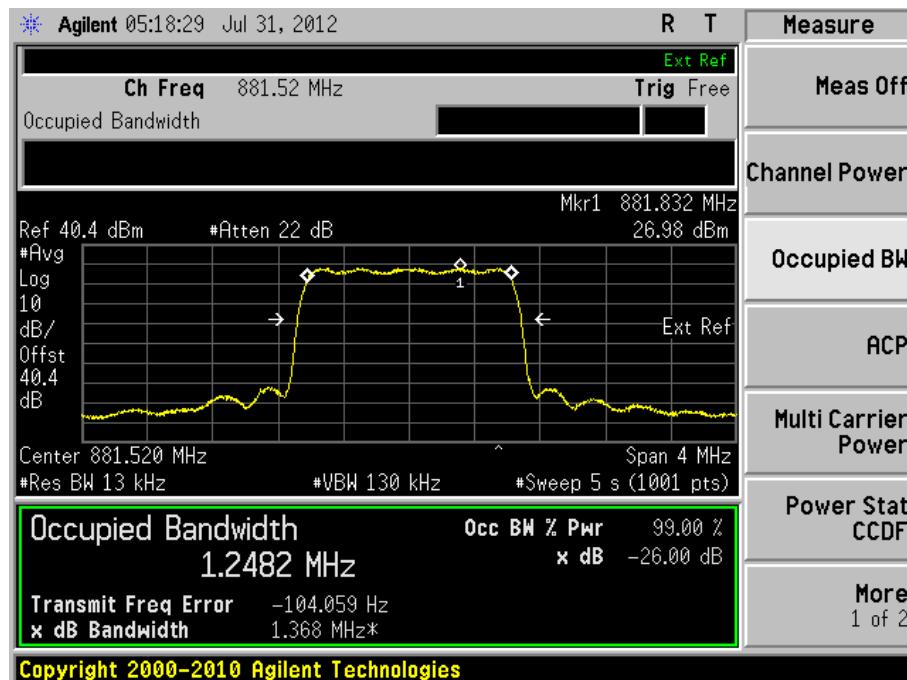
BPSK

Configuration 1 - Mode 2



QPSK**Configuration 1 - Mode 1****Configuration 1 - Mode 2**

Configuration 1 - Mode 38PSKConfiguration 1 - Mode 2

**16QAM****Configuration 1 - Mode 2**



2.5 SPURIOUS EMISSIONS AT ANTENNA TERMINALS ($\pm 1\text{MHz}$)

2.5.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1051
 FCC CFR 47 Part 22, Clause 22.917 (b)
 Industry Canada RSS-132 Clause 4.5

2.5.2 Equipment Under Test

RRUS 11 B5 / KRC 161 285/2, S/N: CB4M585068

2.5.3 Date of Test and Modification State

27 and 31 July 2012, 01 August 2012 – 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 2 and Part 22 and Industry Canada RSS-132.

In accordance with 22.917(b), at least 1% of the emission bandwidth shall be used for the resolution bandwidth up to 1MHz away from the block edge. For Single Carrier and Multi Carrier, a resolution bandwidth of 20kHz was used up to 1MHz away from the band edges. A resolution bandwidth of 51kHz was used between 1MHz to 5MHz away from the band edge. As the FCC and IC rules specify a minimum RBW of 100kHz for measurements of emissions > 1MHz away from the band edges, we use the RBW of 1MHz, which is more stringent, the limit line was adjusted with -13dB to -26dBm to compensate for the reduced measurement bandwidth. Spectrum analyzer detector was set as RMS.

The EUT was tested at its maximum power level. 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 3
 - Mode 4
 - Mode 6

2.5.6 Environmental Conditions

	27 July 2012	31 July 2012	01 August 2012
Ambient Temperature	22.8°C	26.1°C	27.0°C
Relative Humidity	52.5%	47.5%	47.7%

2.5.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 22 and Industry Canada RSS-132 for Spurious Emissions Antenna Terminals ($\pm 1\text{MHz}$)

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

QPSK

Single Carrier

Configuration 1 - Mode 1 and 3

Band Edge Frequency	Edge Test with QPSK modulation Channel No./Frequencies
Bottom 869 MHz	Channel: 1019 Frequency: 869.88 MHz
Top 894 MHz	Channel: 770 Frequency: 893.10 MHz

Multi Carrier (1x2)

Configuration 1 - Mode 7 and 8

Band Edge Frequency	Edge Test with QPSK modulation Channel No./Frequencies
Bottom 869 MHz	Channel: 1019 & 37 Frequency: 869.88 & 871.11 MHz
Top 894 MHz	Channel: 729 & 770 Frequency: 891.87 & 893.10 MHz

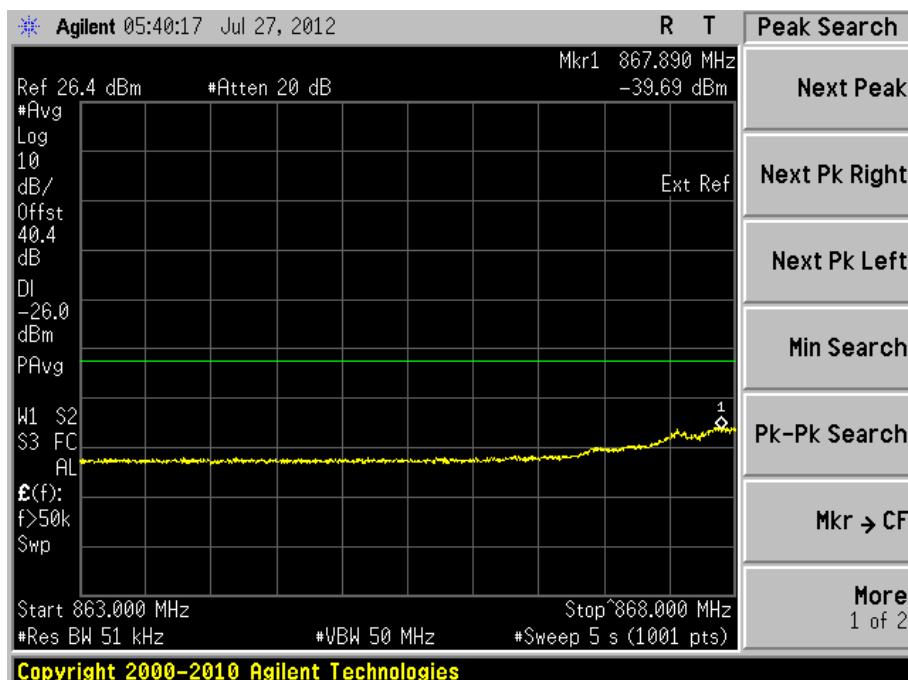
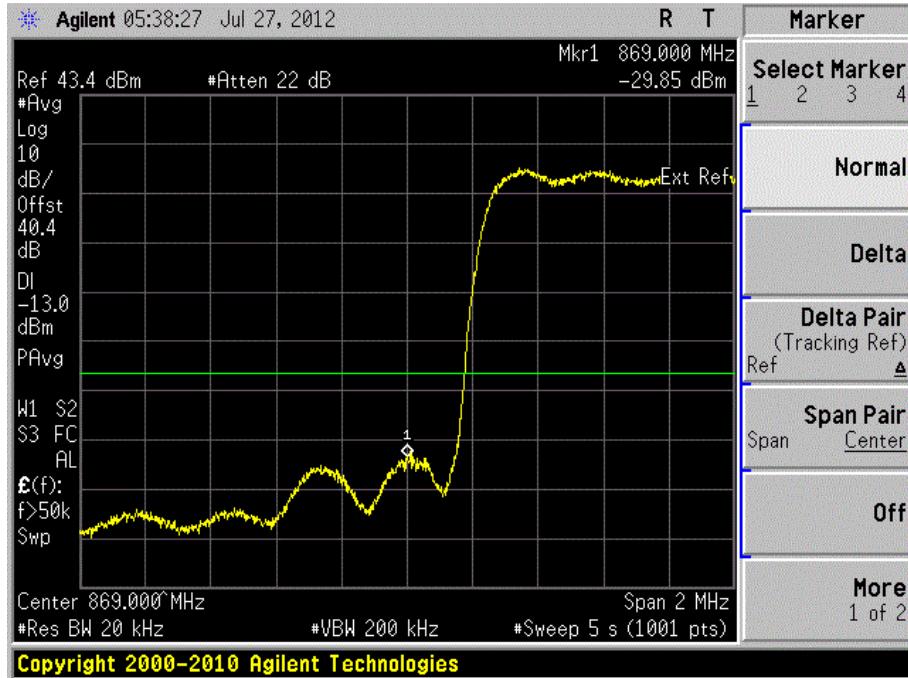
The channels shown in the table above are the minimum and maximum channels that can be used in the authorised frequency ranges to maintain compliance. Channels outside of ranges shown in the above tables shall not be made available to the end user.

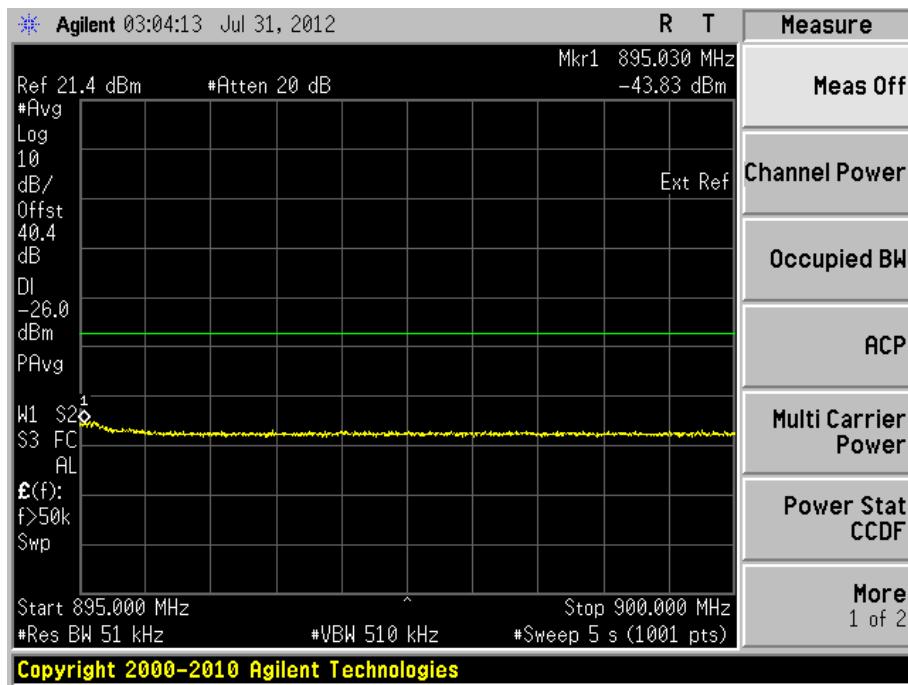
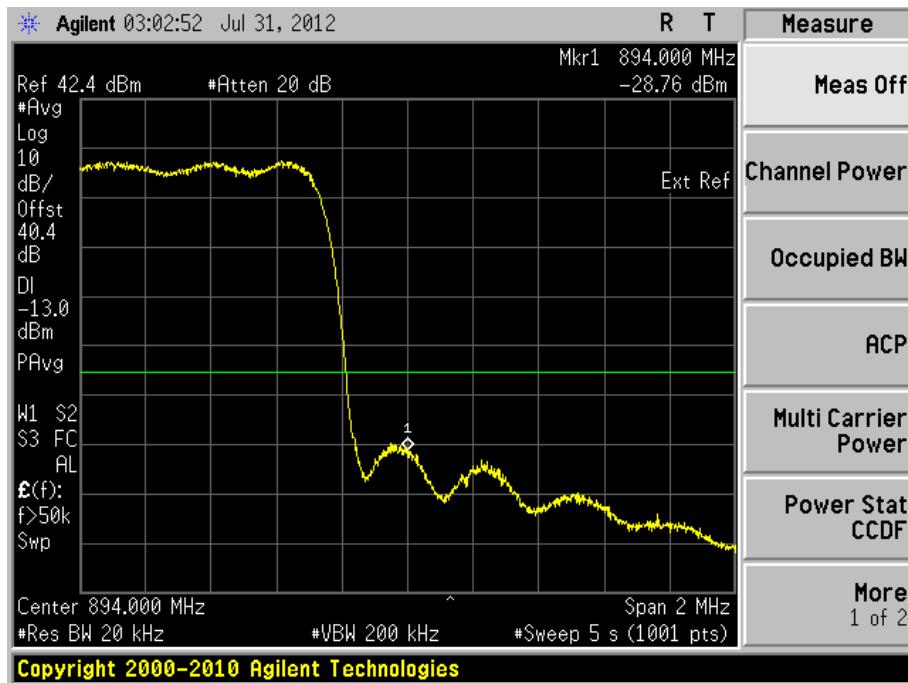
The test results are shown below

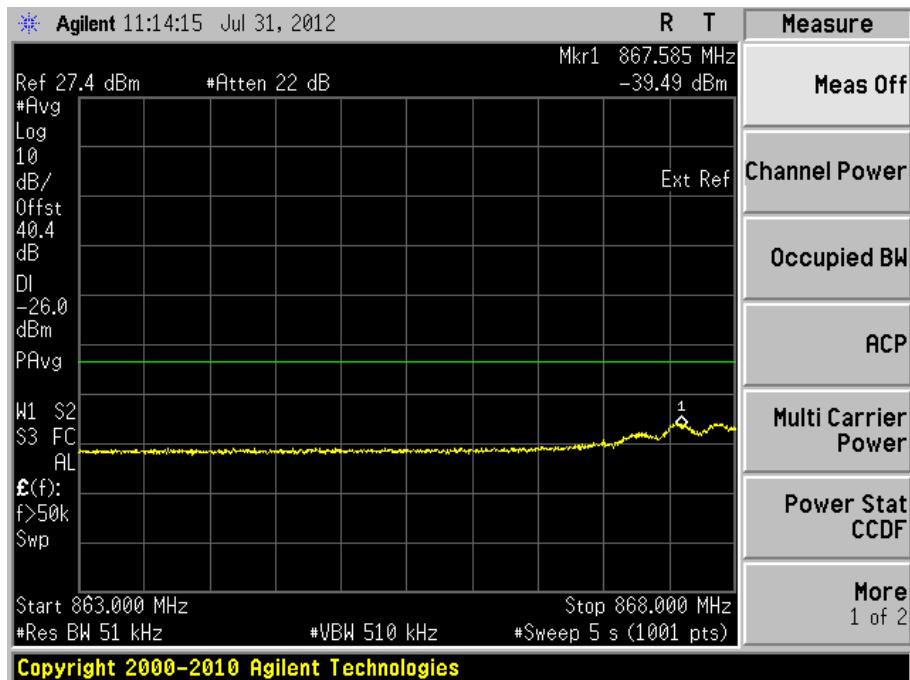
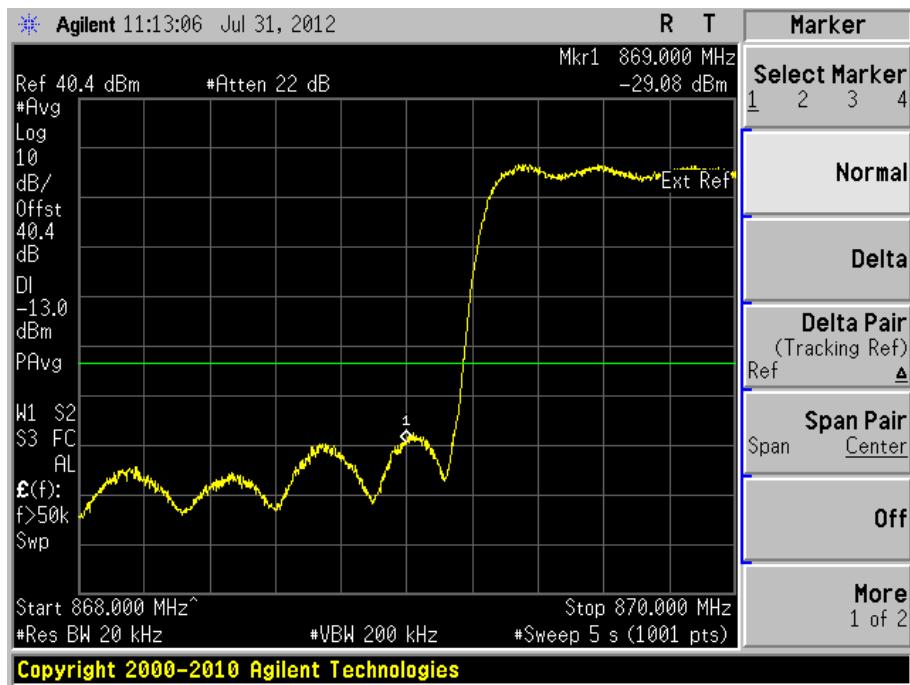
BPSK

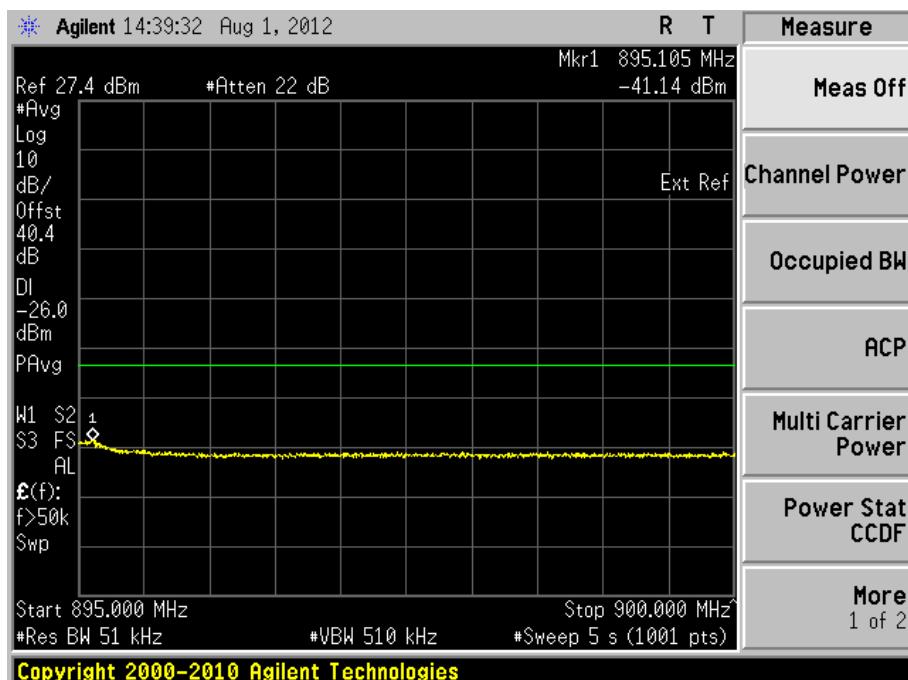
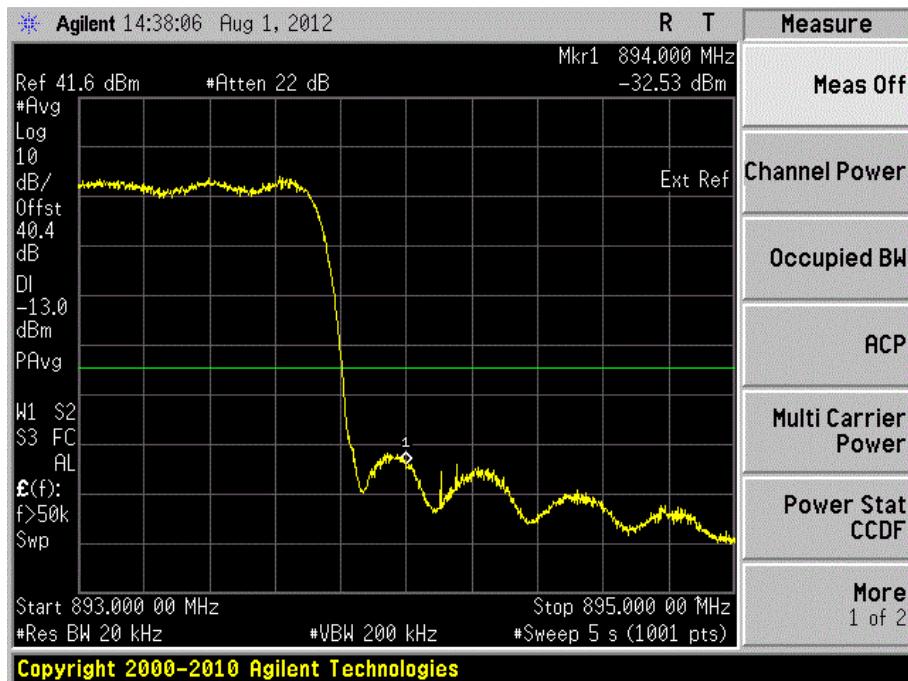
Single Carrier

Configuration 1 - Mode 1



Configuration 1 - Mode 3

Multi Carrier (1x2)**Configuration 1 - Mode 4**

Configuration 1 – Mode 6Limit

The power of any emission outside the frequency band shall be attenuated below the transmitter power (P) by at least $43 + 10\log P$ dB.



2.6 RADIATED SPURIOUS EMISSIONS

2.6.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1053
 FCC CFR 47 Part 22, Clause 22.917 (a)
 Industry Canada RSS-132, Clause 4.5

2.6.2 Equipment Under Test

RRUS 11 B5 / KRC 161 285/2, S/N: CB4M714686

2.6.3 Date of Test and Modification State

06 and 07 August 2012 – 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 2 and Part 22 and Industry Canada RSS-132.

A preliminary profile of the Spurious Radiated Emissions was obtained by operating the EUT on a remotely controlled turntable within the 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 – 25GHz were then formally measured using a Peak detector as the worst case.

In the frequency Range 30MHz – 25GHz, the measurement was performed with a resolution bandwidth of 1MHz.

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

Where:

Field Strength is measured in dB μ V/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:

$$E_{(V/m)} = (30 \times 1.64 \times 38.55)^{0.5} / 3 = 14.517V/m = 143.24dB\mu V/m$$

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

$$43 + 10\log(38.55) = 58.86dB$$

Therefore the limit at 3m measurement distance is:

$$143.24 - 58.86 = 84.4 dB\mu V/m$$

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 operating on all modes in section 1.4.3 and record the result of the following configurations and modes of operation for worst case:

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

2.6.6 Environmental Conditions

	06 August 2012	07 August 2012
Ambient Temperature	25.8°C	25.2°C
Relative Humidity	50.5%	45.5%



2.6.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 & Part 22 and Industry Canada RSS-132 for Radiated Spurious Emissions.

The test results are shown below

Note: Only the worst case results plots have been included as all of the emissions are greater than 20dB below the limit. A set of plots have been included to show the measurement system noise floor

BPSK(Voice)

Single Carrier

Configuration 1 - Mode 2

No emissions were detected within 20dB of the limit.

QPSK(Voice)

Single Carrier

Configuration 1 - Mode 2

No emissions were detected within 20dB of the limit.

QPSK

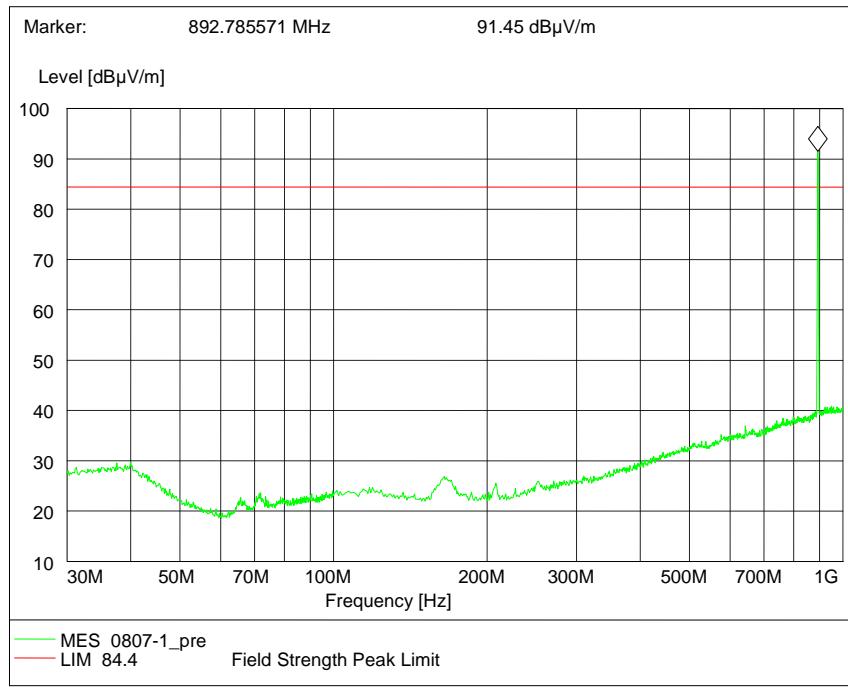
Single Carrier

Configuration 1 - Mode 1

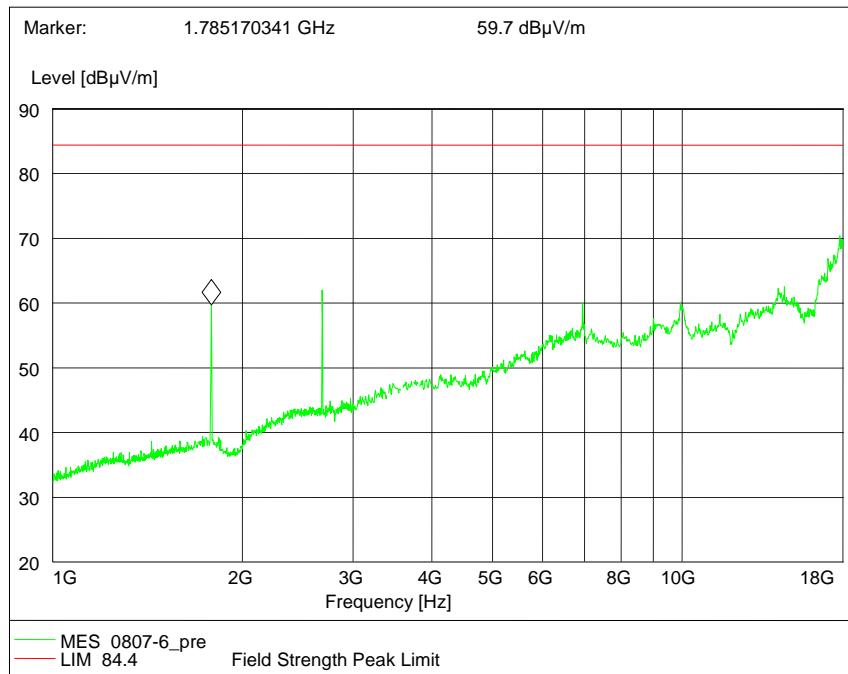
No emissions were detected within 20dB of the limit.

Configuration 1 - Mode 2

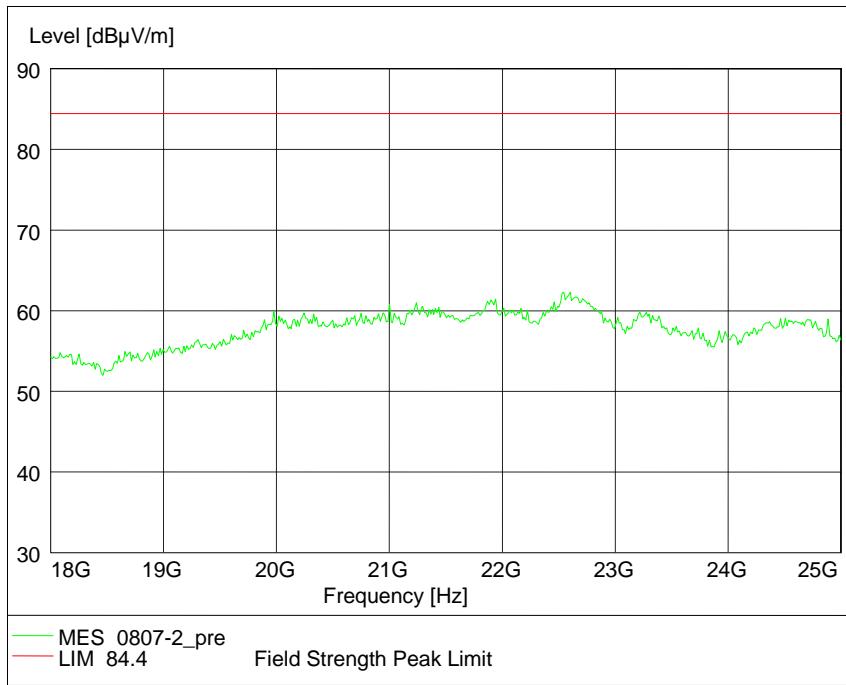
No emissions were detected within 20dB of the limit.

Configuration 1 - Mode 330MHz to 1GHz

Note: The emission marked is the operating frequency.

1GHz to 18GHz

18GHz to 25GHz



8PSK

Single Carrier

Configuration 1 - Mode 2

No emissions were detected within 20dB of the limit.

16QAM

Single Carrier

Configuration 1 - Mode 2

No emissions were detected within 20dB of the limit.

Multi Carrier (1x2)

QPSK

Configuration 1 - Mode 6

No emissions were detected within 20dB of the limit.

Limit	-13dBm / 84.4dB μ V/m
-------	---------------------------

Remarks

The EUT does not exceed -13dBm / 84.4dB μ V/m at the measured frequencies.



2.7 CONDUCTED SPURIOUS EMISSIONS

2.7.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1051
 FCC CFR 47 Part 22, Clause 22.917 (a)
 Industry Canada RSS-132, Clause 4.5

2.7.2 Equipment Under Test

RRUS 11 B5 / KRC 161 285/2, S/N: CB4M585068

2.7.3 Date of Test and Modification State

30 and 31 July 2012, 1 August 2012 – 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 2 and Part 22 and Industry Canada RSS-132.

In accordance with Part 2.1051, the spurious emissions from the antenna terminal were measured. The transmitter output power was attenuated using an attenuator and the frequency spectrum investigated from 9kHz to 25GHz. The EUT was set to transmit on maximum power. The EUT was tested on Bottom, Middle and Top channels. The resolution was set to 1MHz for 9kHz to 25GHz thus meeting the requirements of Industry Canada RSS-132 Clause 4.5.1.2. The spectrum analyser detector was set to peak and trace was kept on Max Hold.

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 10th harmonic of the highest internal frequency.

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

- Configuration 1
 - Mode 1
 - Mode 2
 - Mode 3
 - Mode 5

2.7.6 Environmental Conditions

	30 July 2012	31 July 2012	01 August 2012
Ambient Temperature	25.6°C	26.1°C	27.0°C
Relative Humidity	48.7%	47.5%	47.7%

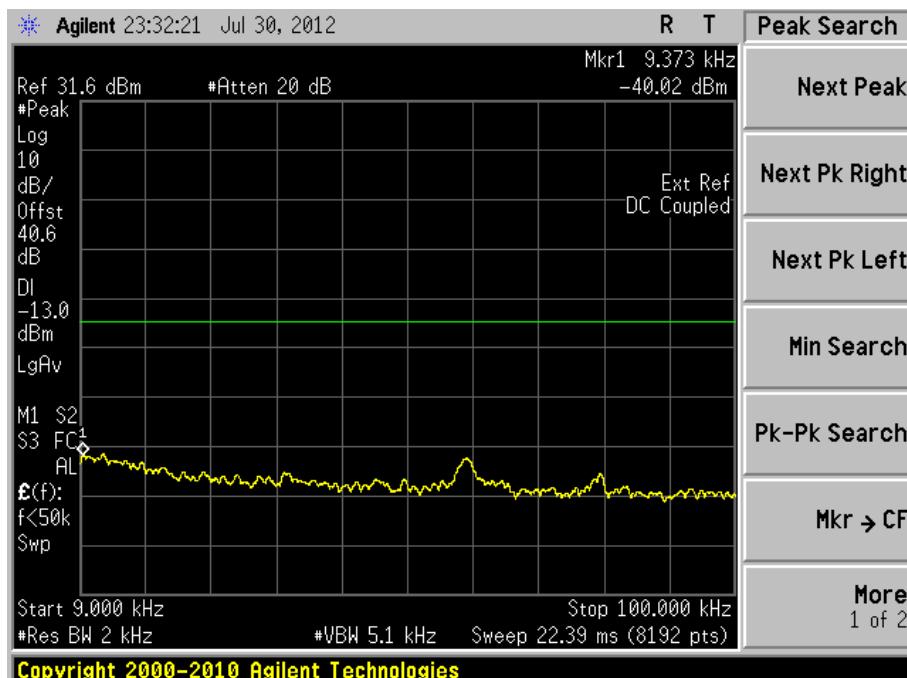
2.7.7 Test Results

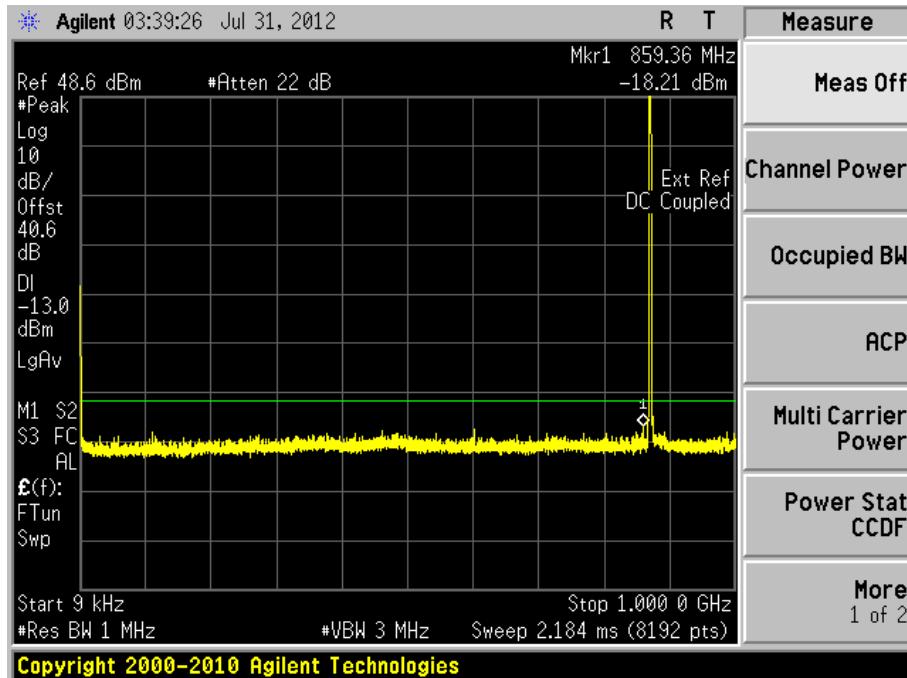
For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 22 and Industry Canada RSS-132 for Conducted Spurious Emissions.

The test results are shown below

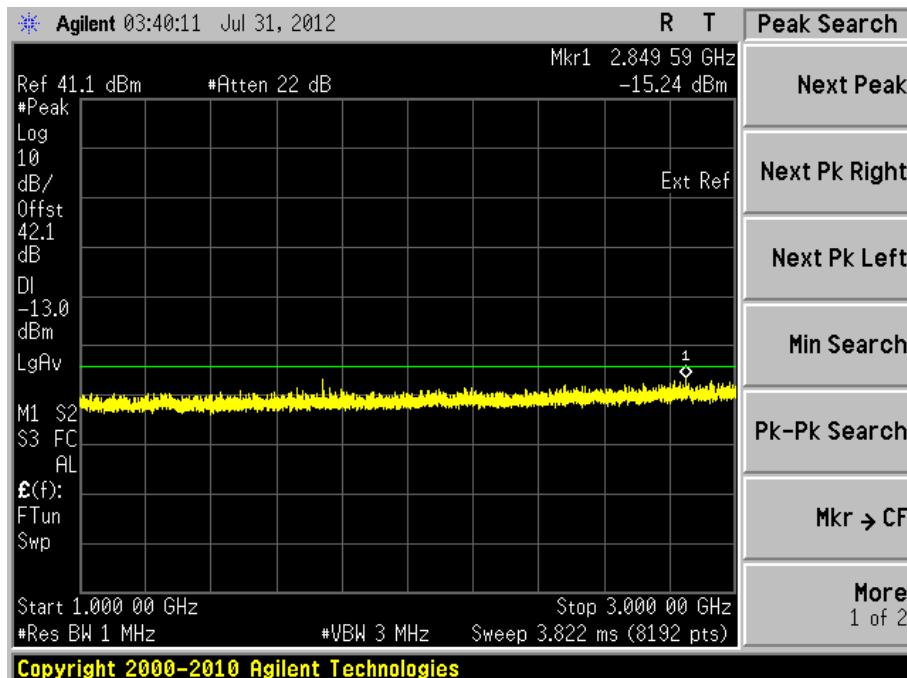
Remark:

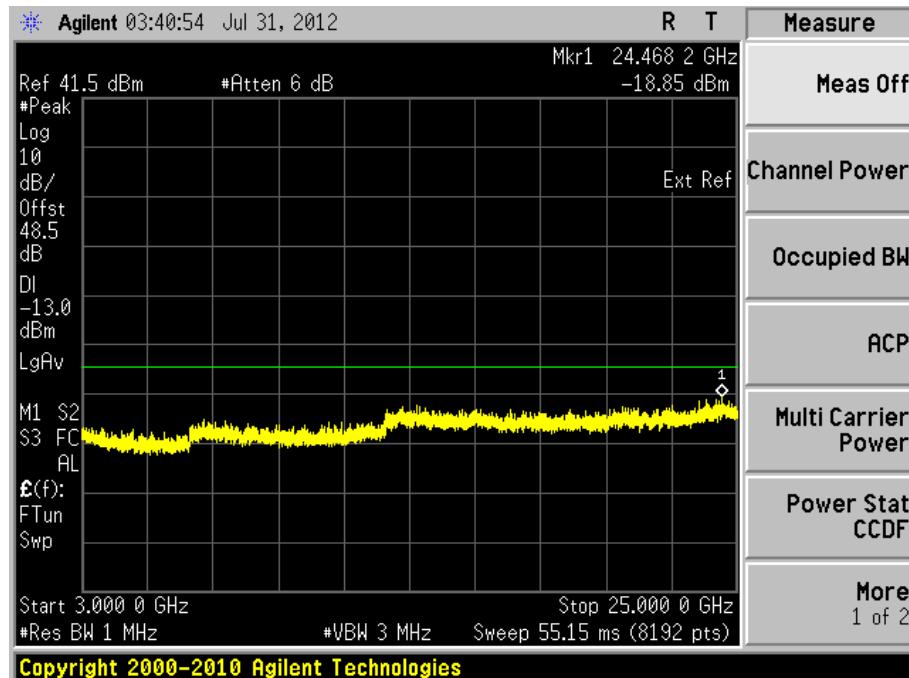
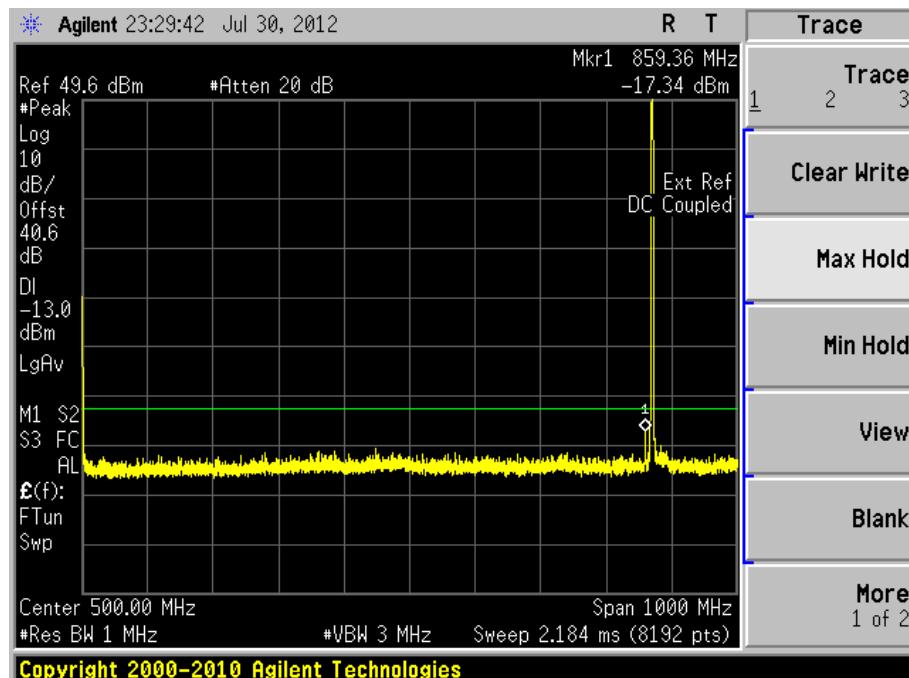
The emissions at 9kHz on the plots was not generated by the test object. A complementary measurement with a smaller Span showed that it was related to the LO feedthrough.



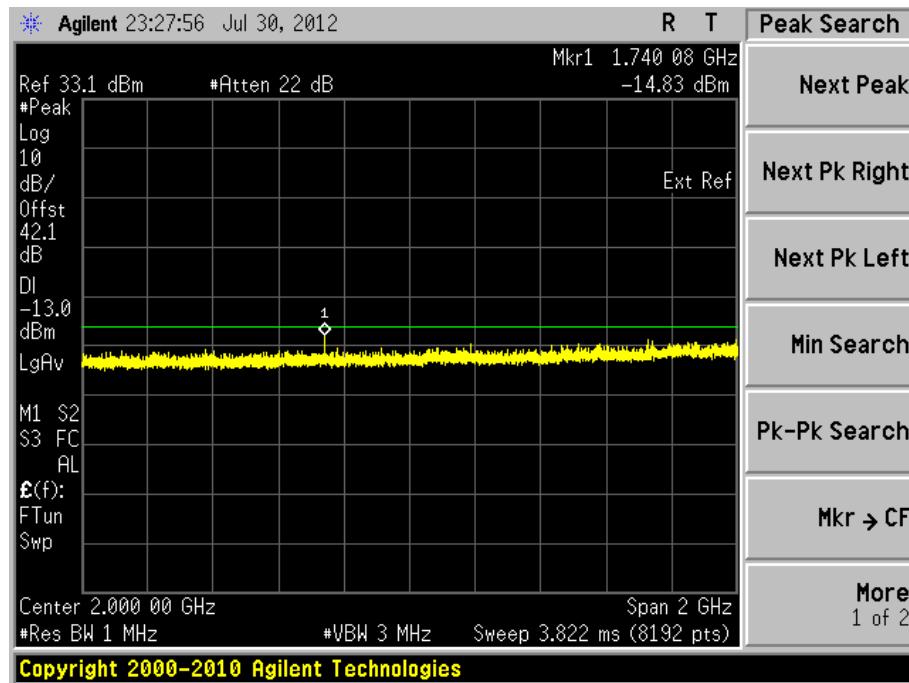
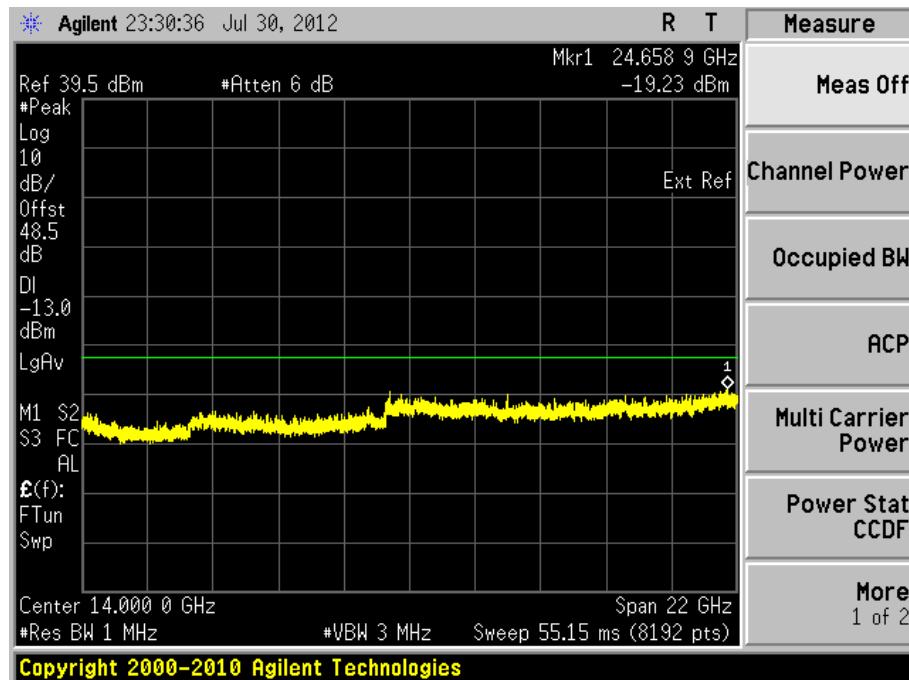
QPSK**Single Carrier****Configuration - Mode 1****9kHz to 1GHz**

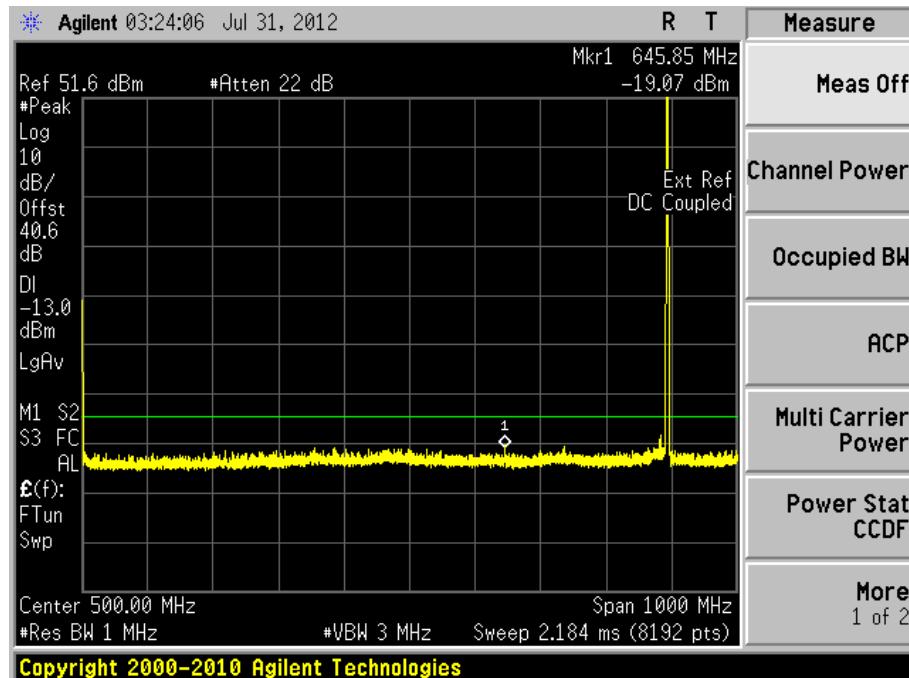
Note: The emission beyond the limit is the operating frequency.

1GHz to 3GHz

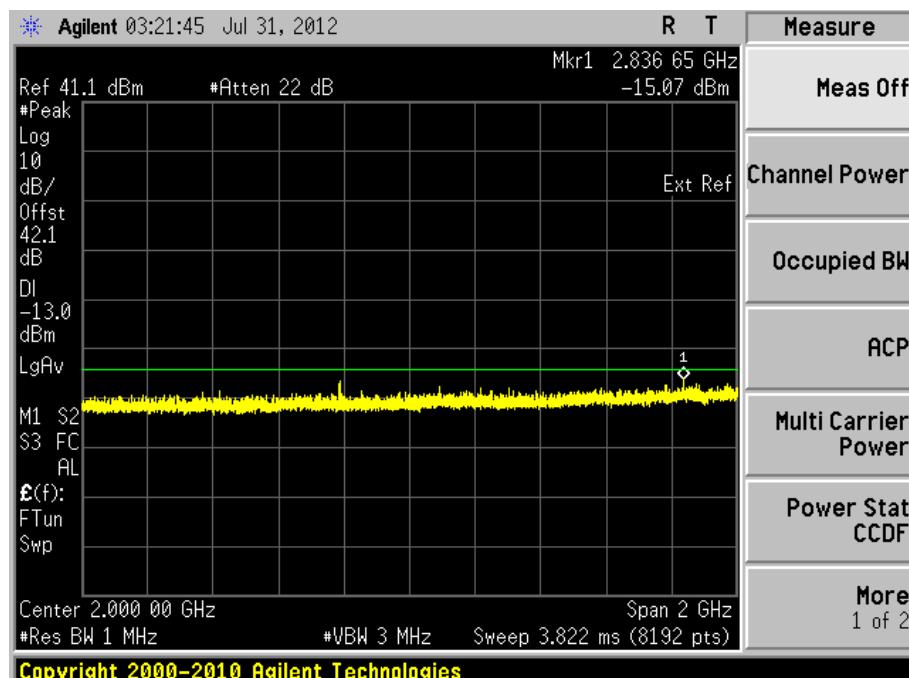
3GHz to 25GHzConfiguration 1 - Mode 29kHz to 1GHz

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

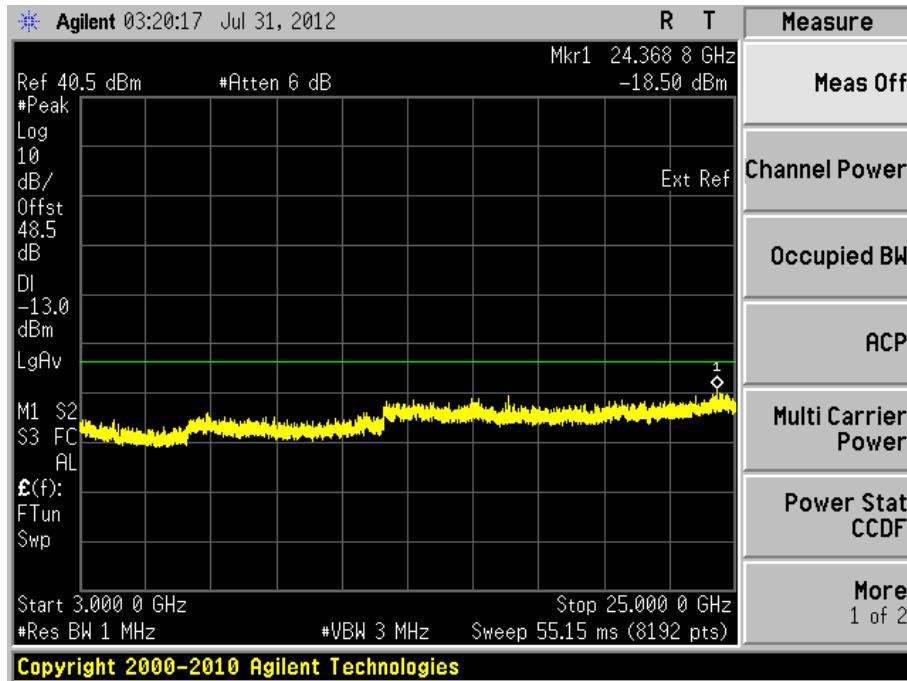
1GHz to 3GHz3GHz to 25GHz

Configuration 1 - Mode 39kHz to 1GHz

Note: The emissions beyond the limit are the operating frequencies.

1GHz to 3GHz

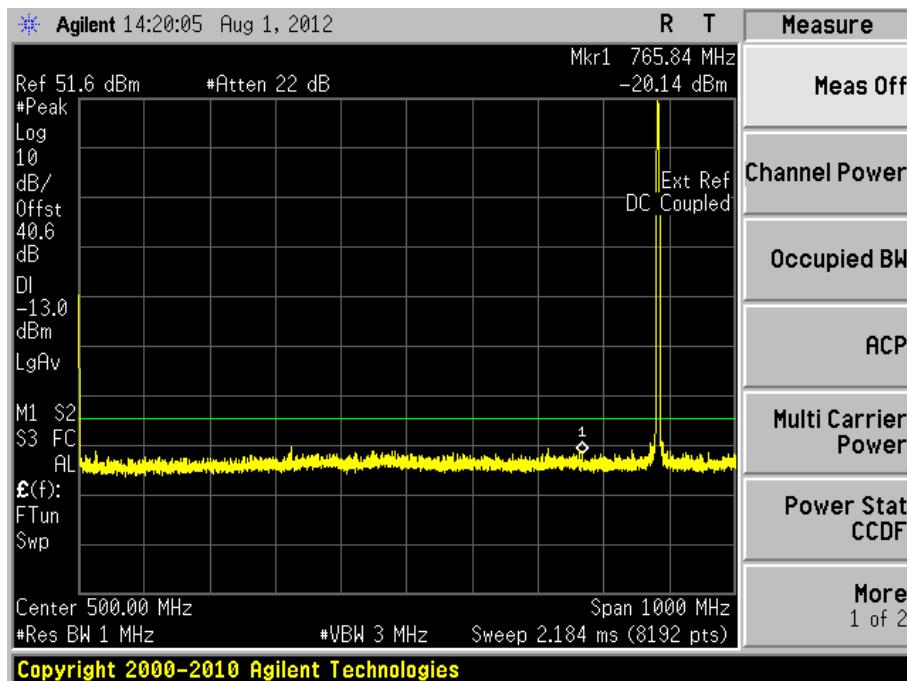
3GHz to 25GHz



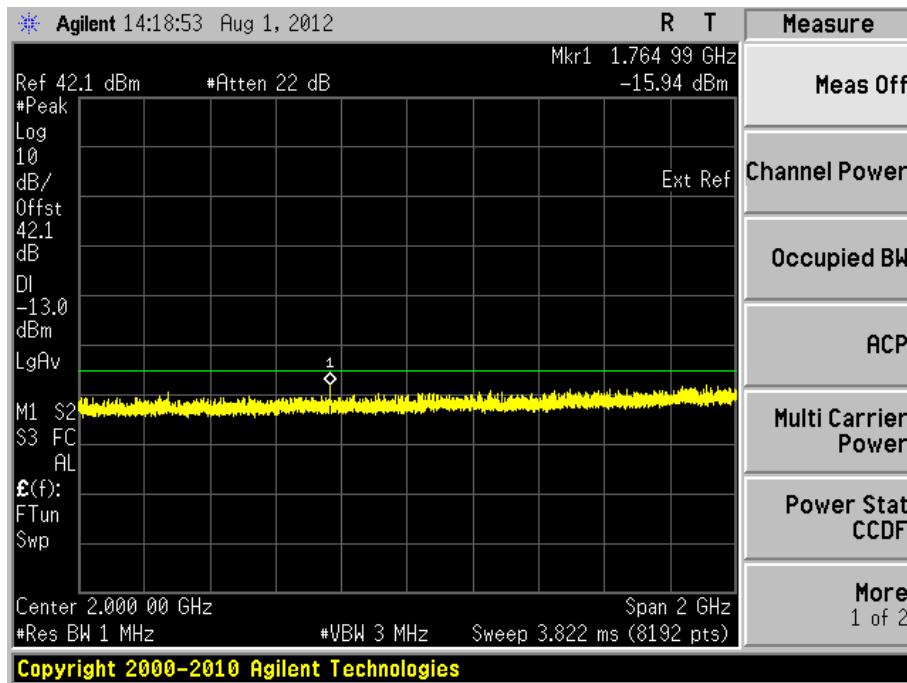
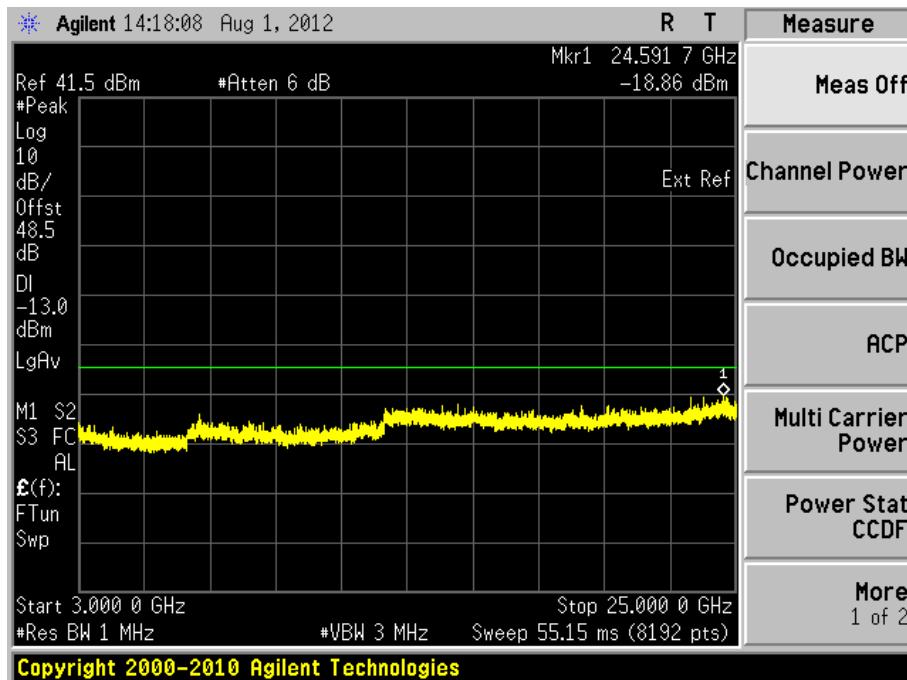
Multi Carrier (1x2)

Configuration 1 - Mode 5

9kHz to 1GHz



Note: The emissions beyond the limit are the operating frequencies.

1GHz to 3GHz3GHz to 25GHz

Limit	-13dBm
-------	--------

Remarks

The EUT does not exceed -13dBm at the frequency range of 9kHz to 25GHz.



2.8 FREQUENCY STABILITY UNDER TEMPERATURE VARIATIONS

2.8.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1055
 FCC CFR 47 Part 22, Clause 22.355
 Industry Canada RSS-132, Clause 4.3

2.8.2 Equipment Under Test

RRUS 11 B5 / KRC 161 285/2, S/N: CB4M585068

2.8.3 Date of Test and Modification State

03 and 06 August 2012 – 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 2 and Part 22 and Industry Canada RSS-132.

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

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

Configuration 1 - Mode 2

2.8.6 Environmental Conditions

	03 August 2012	06 August 2012
Ambient Temperature	26.5°C	25.8°C
Relative Humidity	45.5%	50.5%

2.8.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 22 and Industry Canada RSS-132 for Frequency Stability Under Temperature Variations.

The test results are shown below

Power Supply: -48V DC

Single Carrier

QPSK

Configuration 1 - Mode 2

Temperature Interval (°C)	Deviation (Hz)
-30	+19.84
-20	-20.24
-10	+21.43
0	-21.27
+10	+24.64
+20	-16.29
+30	-19.42
+40	+17.21
+50	+16.62

Limit	±1.5 ppm or ±1.322kHz
-------	-----------------------

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.



2.9 FREQUENCY STABILITY UNDER VOLTAGE VARIATIONS

2.9.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1055
FCC CFR 47 Part 22, Clause 22.355
Industry Canada RSS-132, Clause 4.3

2.9.2 Equipment Under Test

RRUS 11 B5 / KRC 161 285/2, S/N: CB4M585068

2.9.3 Date of Test and Modification State

03 August 2012 – 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 2 and Part 22 and Industry Canada RSS-132.

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 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

2.9.6 Environmental Conditions

03 August 2012

Ambient Temperature 26.5°C

Relative Humidity 45.5%

2.9.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 22 and Industry Canada RSS-132 for Frequency Stability Under Voltage Variations.

The test results are shown below

Temperature: 20°C

Single Carrier

QPSK

Configuration 1 - Mode 2

DC Voltage (V)	Deviation (Hz)
-40.8	+16.41
-48.0	-16.29
-55.2	-18.58

Limit	±1.5 ppm or ±1.322kHz
-------	-----------------------

Remarks

The frequency stability of the EUT is sufficient to keep it within the authorised frequency ranges under voltage variations across the measured range.

2.10 RECEIVER SPURIOUS EMISSIONS

2.10.1 Specification Reference

FCC CFR 47 Part 15, Clause 15.111
Industry Canada RSS-132, Clause 4.6

2.10.2 Equipment Under Test

RRUS 11 B5 / KRC 161 285/2, S/N: CB4M585068

2.10.3 Date of Test and Modification State

02 August 2012 – 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 15 and Industry Canada RSS-132.

In accordance with RSS-Gen Clause 6.2, the receiver spurious emissions from the antenna terminal were measured. Measurements were performed on the receiver antenna connector RF B. The EUT was set to transmitter mode on the TX connector RF A and during the measurement the RF A was terminated with match load, (50 Ohm).

The resolution was set to 1MHz in the frequency range 9kHz to 1GHz and 1MHz in the frequency range 1GHz to 13GHz thus meeting the requirements of RSS-Gen Clause 4.10, the spectrum analyser detector was set to peak and trace was kept on Max Hold to give the worst case. The limit line was displayed, showing the -57dBm, 2 nanowatts in band 9kHz to 1GHz and above 1GHz, -57dBm, 2 nanowatts.

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

In addition, measurements were made from 9kHz up to the 5th harmonic of the highest internal frequency.

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

Configuration 1 - Mode 1
- Mode 2
- Mode 3

2.10.6 Environmental Conditions

Ambient Temperature	25.5°C
Relative Humidity	49.8%

02 August 2012

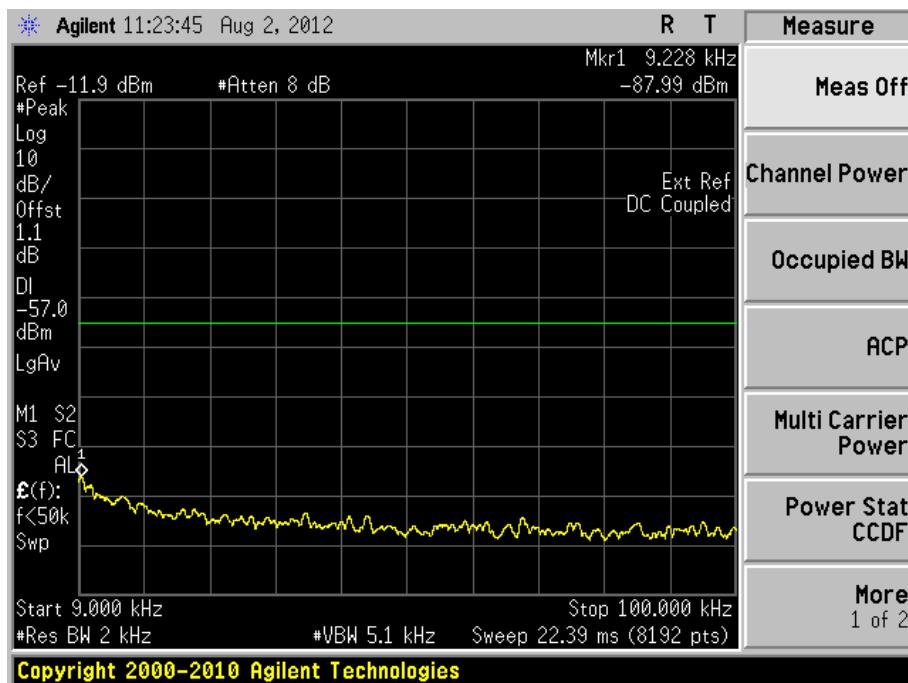
2.10.7 Test Results

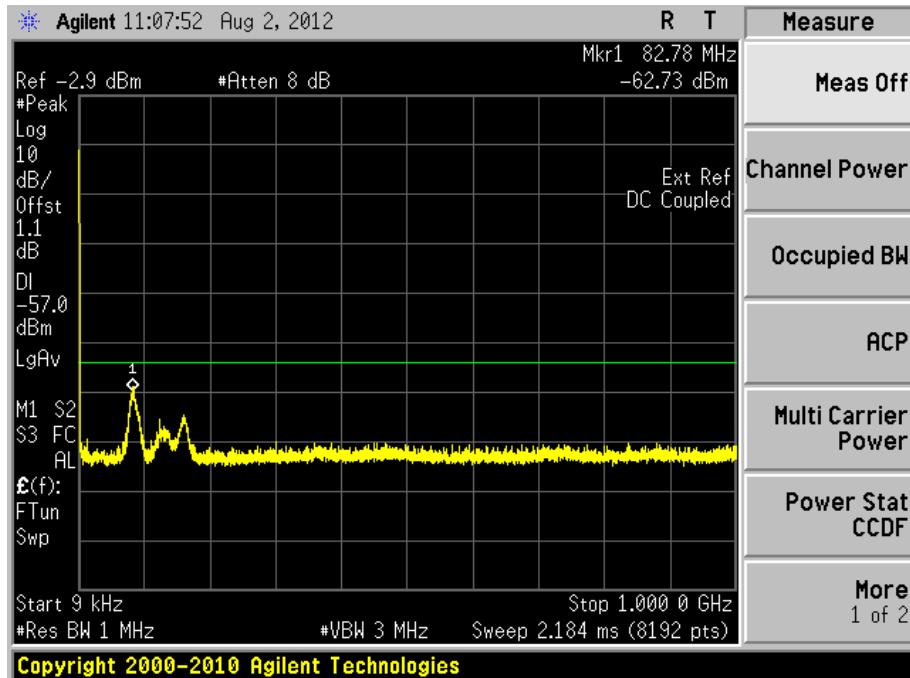
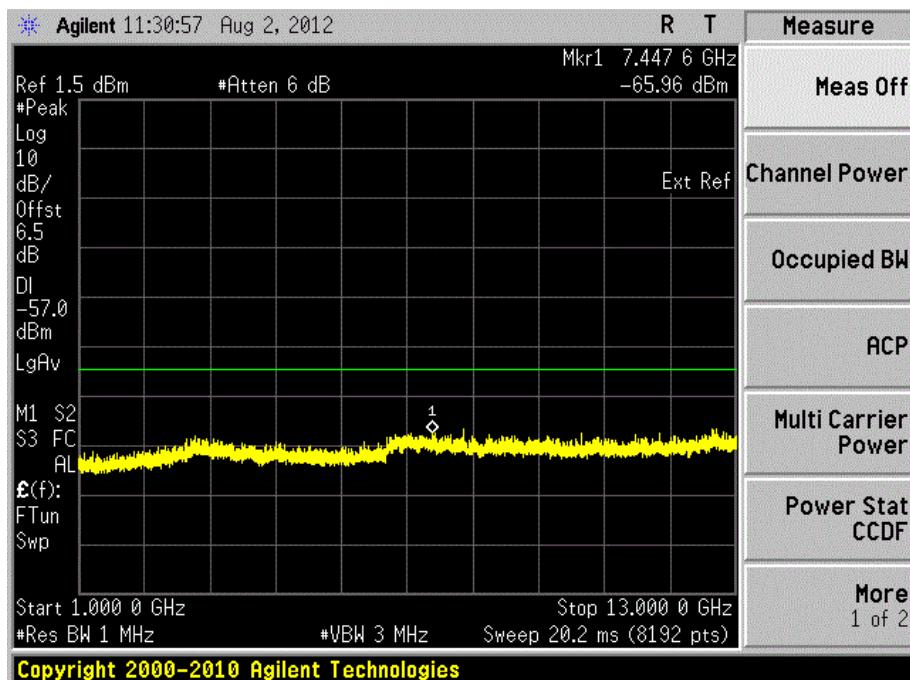
For the period of test the EUT met the requirements of FCC CFR 47 Part 15 and Industry Canada RSS-132 for Receiver Spurious Emissions.

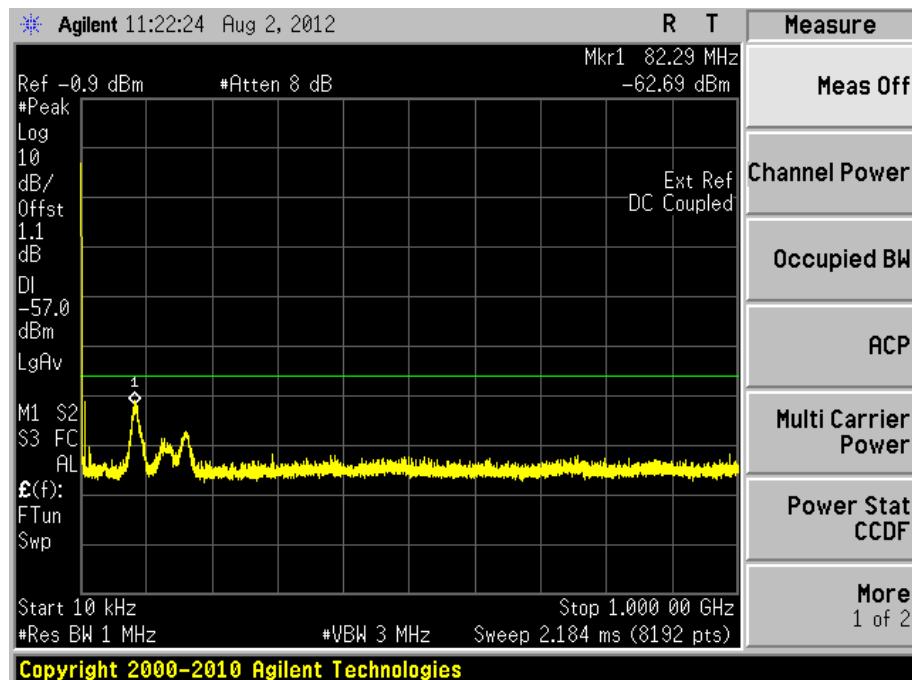
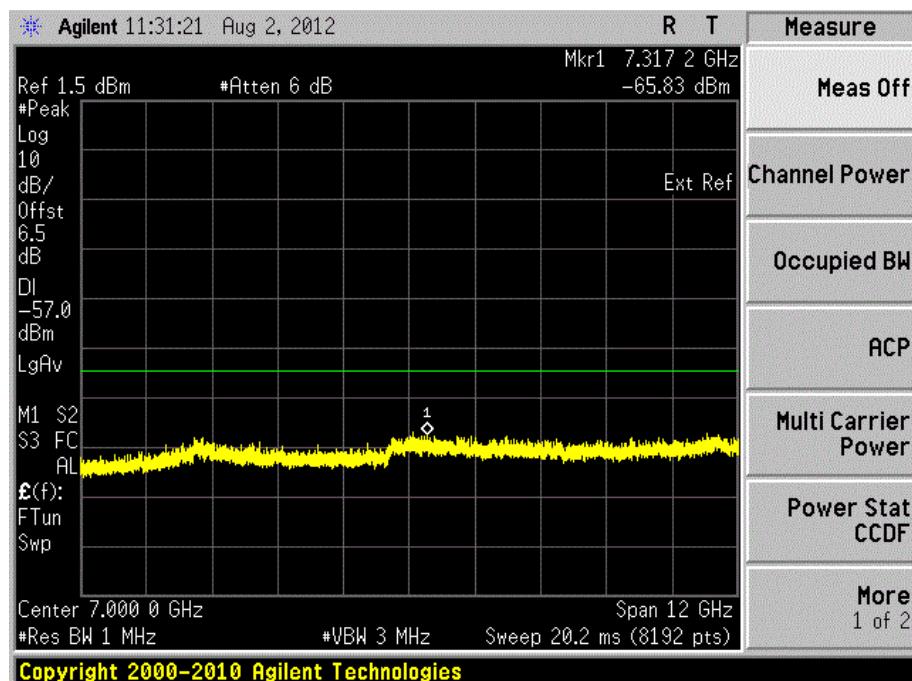
The test results are shown below

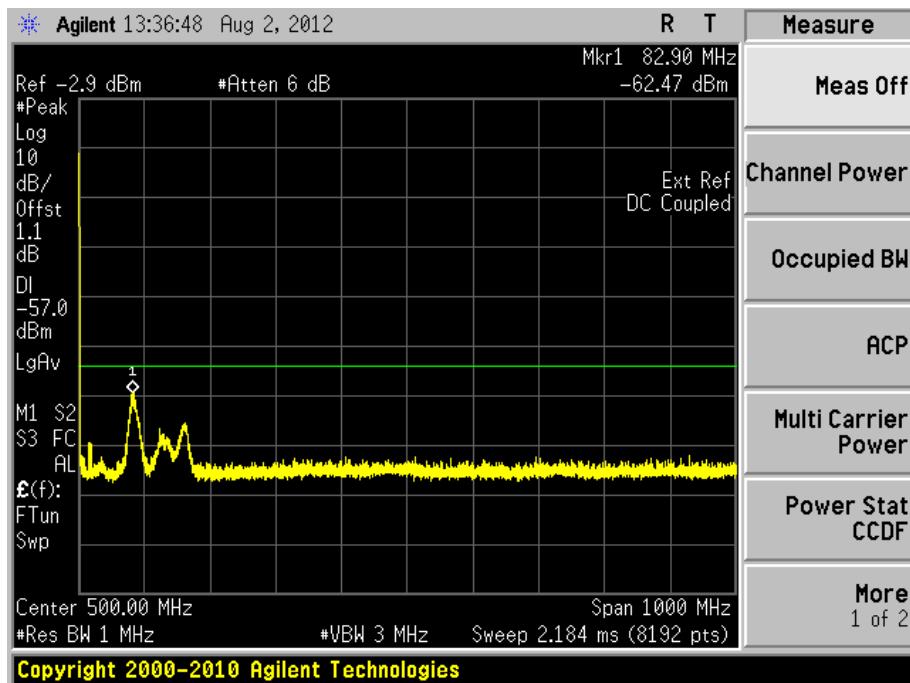
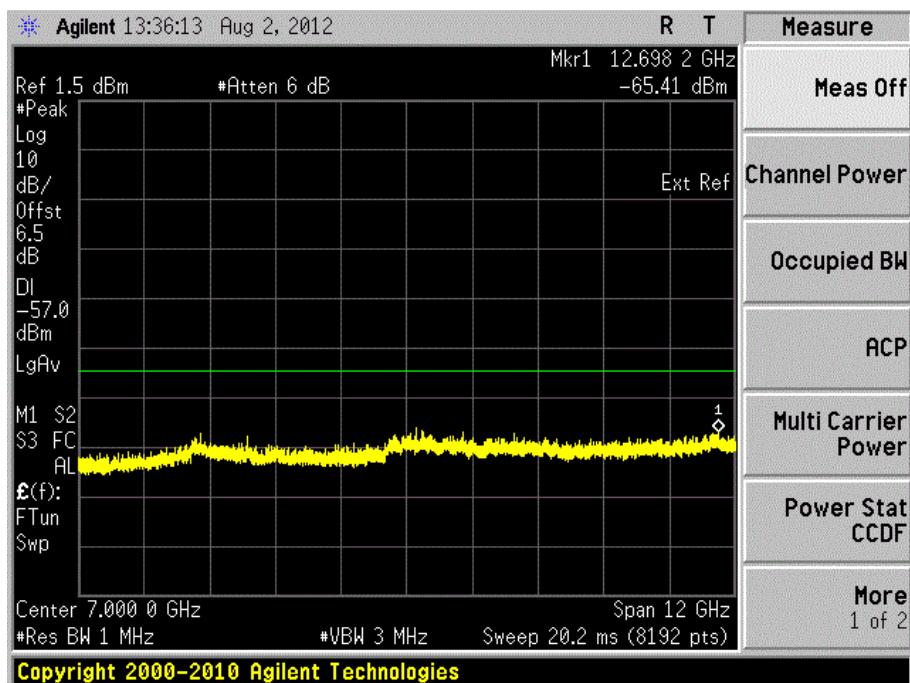
Remark:

The emissions at 9kHz on the plots was not generated by the test object. A complementary measurement with a smaller Span showed that it was related to the LO feedthrough.



QPSK**Single Carrier****Configuration 1 - Mode 1****9kHz to 1GHz****1GHz to 13GHz**

Configuration 1 – Mode 29kHz to 1GHz1GHz to 13GHz

Configuration 1 - Mode 39kHz to 1GHz1GHz to 13GHz



Product Service

Limit	-57dBm (9kHz-13GHz)
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Remarks

The EUT does not exceed -57dBm at the frequency range of 9kHz to 13GHz.



Product Service

SECTION 3

TEST EQUIPMENT USED

3.1 TEST EQUIPMENT USED

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

Instrument	Manufacturer	Type No.	Serial No.	Calibration Period (months)	Calibration Due
Section 2.1, 2.2, 2.3, 2.4, 2.5, 2.7 and 2.10 – Maximum Conducted Output Power, Peak – Average Ratio, Modulation Characteristics, Occupied Bandwidth, Spurious Emissions at Antenna Terminals ($\pm 1\text{MHz}$), Conducted Spurious Emissions and Receiver Spurious Emissions.					
Spectrum Analyser	Agilent	E4440A	MY46188035	12	12-April-2013
Signal Analyzer	Agilent	N9020A	MY46471155	12	08-Nov-2012
Power Meter	Agilent	N1914A	MY50001665	12	23-Nov-2012
Thermal Power Sensor	Agilent	8482A	MY45093513	12	02-April-2013
Network Analyzer	Agilent	E5071B	MY42404301	12	12-April-2013
40 dB Attenuator	Nanjing Jiexi	TSG 200C-18-40N	12010601	-	O/P MON
Load	Huber+ Suhner	65N-50-0-17	302260	-	O/P MON
Load	Nanjing Jiexi	MCLI TNN-15..150	120	-	O/P MON
Power Supply	XANTREX	XFR 60-46	E00103273	-	O/P MON
Digital Multi-meter	FLUKE	179	91820401	12	13-Dec-2012
Thermo-hygrometer	AZ Instruments	8705	9151655	12	19-Dec-2012
Section 2.6 – Radiated Spurious Emissions					
Load	Shanghai Huaxiang	TF100	09121631	-	O/P MON
Load	Shanghai Huaxiang	TF100	09121602	-	O/P MON
EMI Receiver	Rohde & Schwarz	ESI 40	100015	12	19-Aug-2012
Ultra log test antenna	Rohde & Schwarz	HL562	100167	12	19-Aug-2012
Double-Ridged Wave-guide Horn Antenna	Rohde & Schwarz	HF 906	100029	12	19-Aug-2012
Pyramidal Horn Antenna	EMCO	3160-09	-	-	-
Antenna master	Frankonia	MA 260	-	12	19-Aug-2012
Relay Switch Unit	Rohde & Schwarz	331.1601.31	338965002	-	TU
Semi Anechoic Chamber	Frankonia	23.18mx16.88mx 9.60m	-	12	19-Aug-2012
Power Supply	Dahua	DH1716A-14	20080401	-	O/P MON
Digital Multimeter	FLUKE	179	91820401	12	13-Dec-2012
Thermo-hygrometer	AZ Instruments	8705	9151655	12	19-Dec-2012



Instrument	Manufacturer	Type No.	Serial No.	Calibration Period (months)	Calibration Due
Section 2.8 and 2.9 – Frequency Stability Under Temperature and Voltage Variations					
Spectrum Analyser	Agilent	E4440A	MY48250517	12	12-April-2013
40 dB Attenuator	Nanjing Jiexi	TSG 200C-18-40N	12010601	-	O/P MON
50 dB Attenuator	Nanjing Jiexi	TSG 400-3-50NFnFRE-A	11091430	-	O/P MON
Load	Huber+ Suhner	65N-50-0-17	302260	-	O/P MON
Temperature Chamber	THERMOTRON	SE-600-6-6	34648	-	O/P MON
Power Supply	XANTREX	XFR 60-46	E00103273	-	O/P MON
Digital Multimeter	FLUKE	179	91820401	12	13-Dec-2012
Thermo-hygrometer	AZ Instruments	8705	9151655	12	16-Dec-2012

O/P MON Output monitored with calibration 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
Conducted Maximum Peak Output Power	30MHz to 10GHz Amplitude	0.5dB*
Conducted Emissions	30MHz to 40GHz Amplitude	3.0dB*
Frequency Stability	30MHz to 2GHz Amplitude	$<1 \times 10^{-7}$
Radiated Emissions, Bilog Antenna, AOATS	30MHz to 1GHz Amplitude	5.1dB*
Radiated Emissions, Horn Antenna, AOATS	1GHz to 40GHz Amplitude	6.3dB*
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.

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
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