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Report On

FCC Testing of the
Ericsson AB RRUS 11 B26A / KRC 161 287/2

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FCC ID: TA8AKRC161287-2

Document 75918306 Report 01 Issue 1

June 2012



Product Service

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COMMERCIAL-IN-CONFIDENCE

REPORT ON

FCC Testing of the
Ericsson AB RRUS 11 B26A / KRC 161 287/2

Document 75918306 Report 01 Issue 1

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PREPARED FOR

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PREPARED BY

Y He
Test Engineer

APPROVED BY

S Bennett
Authorised Signatory

DATED

29 June 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 90. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

Y He

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 7
1.4	Product Information 8
1.5	Test Conditions 13
1.6	Deviations From the Standard 13
1.7	Modification Record 13
1.8	Alternative Test Site 13
2	TEST DETAILS 14
2.1	Maximum Peak Output Power - Conducted 15
2.2	Modulation Characteristics 18
2.3	Occupied Bandwidth 22
2.4	Emission Mask 27
2.5	Radiated Spurious Emissions 31
2.6	Conducted Spurious Emissions 36
2.7	Frequency Stability Under Temperature Variations 47
2.8	Frequency Stability Under Voltage Variations 49
3	TEST EQUIPMENT USED 51
3.1	Test Equipment Used 52
3.2	Measurement Uncertainty 54
4	ACCREDITATION, DISCLAIMERS AND COPYRIGHT 55
4.1	Accreditation, Disclaimers and Copyright 56



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SECTION 1

REPORT SUMMARY

FCC Testing of the
Ericsson AB RRUS 11 B26A / KRC 161 287/2



1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Ericsson AB RRUS 11 B26A / KRC 161 287/2 to the requirements of FCC CFR 47 Part 90.

Testing was carried out in support of an application for Grant of Equipment Authorisation in the name of RRUS 11 B26A / KRC 161 287/2.

Objective	To perform FCC Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Ericsson AB
Product Name	RRUS 11 B26A
Product Number	KRC 161 287/2
Serial Number(s)	C826062816, C826062817
Software Version	CXP102051/14_R20AJ
PIS Software Version	CXP 901 7316/1, R44GS
Hardware Version	R1C
Number of Samples Tested	2
Test Specification/Issue/Date	FCC CFR 47 Part 90: 2011
Incoming Release Date	Declaration of Build Status 01 June 2012
Order Number Date	PTP 02 June 2012
Start of Test	04 June 2012
Finish of Test	29 June 2012
Name of Engineer(s)	X Zhang C Zhang
Related Document(s)	ANSI C63.4: 2009 ANSI/TIA-603-C-2004 FCC CFR 47 Part 2: 2011



1.2 BRIEF SUMMARY OF RESULTS

A brief summary of results in accordance with FCC CFR 47 Part 2 and 90, is shown below.

Configuration 1 – Radio Equipment						
Section	Spec Clause	Test Description	Mode	Mod State	Result	Comments
	FCC Part 2 and 90					
	90.635	Effective Radiated Power	862.90MHz		N/A	No integral antenna.
			865.50MHz		N/A	
			868.10MHz		N/A	
			862.90MHz + 864.15MHz		N/A	
			864.25MHz + 865.50MHz		N/A	
			866.85MHz + 868.10MHz		N/A	
2.1	2.1046, 90.635	Maximum Peak Output Power - Conducted	862.90MHz	0	Pass	-
			865.50MHz	0	Pass	
			868.10MHz	0	Pass	
			862.90MHz + 864.15MHz	0	Pass	
			864.25MHz + 865.50MHz	0	Pass	
			866.85MHz + 868.10MHz	0	Pass	
2.2	2.1047 (d)	Modulation Characteristics	862.90MHz		N/A	-
			865.50MHz	0	Pass	
			868.10MHz		N/A	
			862.90MHz + 864.15MHz		N/A	
			864.25MHz + 865.50MHz		N/A	
			866.85MHz + 868.10MHz		N/A	
2.3	2.1049 (h)	Occupied Bandwidth ¹	862.90MHz	0	Pass	-
			865.50MHz	0	Pass	
			868.10MHz	0	Pass	
			862.90MHz + 864.15MHz		N/A	
			864.25MHz + 865.50MHz		N/A	
			866.85MHz + 868.10MHz		N/A	
2.4	2.1051, 90.210 (g), 90.691	Emission Masks	862.90MHz	0	Pass	-
			865.50MHz		N/A	
			868.10MHz	0	Pass	
			862.90MHz + 864.15MHz	0	Pass	
			864.25MHz + 865.50MHz		N/A	
			866.85MHz + 868.10MHz	0	Pass	



Configuration 1 – Radio Equipment						
Section	Spec Clause	Test Description	Mode	Mod State	Result	Comments
	FCC Part 2 and 90					
2.5	2.1053, 90.691	Radiated Spurious Emissions	862.90MHz	0	Pass	-
			865.50MHz	0	Pass	
			868.10MHz	0	Pass	
			862.90MHz + 864.15MHz	0	Pass	
			864.25MHz + 865.50MHz	0	Pass	
			866.85MHz + 868.10MHz	0	Pass	
2.6	2.1051, 90.691	Conducted Spurious Emissions	862.90MHz	0	Pass	-
			865.50MHz	0	Pass	
			868.10MHz	0	Pass	
			862.90MHz + 864.15MHz	0	Pass	
			864.25MHz + 865.50MHz	0	Pass	
			866.85MHz + 868.10MHz	0	Pass	
2.7	2.1055, 90.213	Frequency Stability Under Temperature Variations	862.90MHz		N/A	-
			865.50MHz	0	Pass	
			868.10MHz		N/A	
			862.90MHz + 864.15MHz		N/A	
			864.25MHz + 865.50MHz		N/A	
			866.85MHz + 868.10MHz		N/A	
2.8	2.1055, 90.213	Frequency Stability Under Voltage Variations	862.90MHz		N/A	-
			865.50MHz	0	Pass	
			868.10MHz		N/A	
			862.90MHz + 864.15MHz		N/A	
			864.25MHz + 865.50MHz		N/A	
			866.85MHz + 868.10MHz		N/A	

N/A – Not Applicable

Note1: See Sprint Nextel's Request for Waiver to permit the operation of Broadband CDMA Technology in the 817-824/862-869 MHz band.



1.3 DECLARATION OF BUILD STATUS

MAIN EUT	
MANUFACTURING DESCRIPTION	Radio Equipment
MANUFACTURER	Ericsson AB
PRODUCT NUMBER	RRUS 11 B26A
PART NUMBER	KRC 161 287/2
SERIAL NUMBER	C826062816, CB26062817
HARDWARE VERSION	R1C
SOFTWARE VERSION	CXP102051/14_R20AJ
PIS SOFTWARE VERSION	CXP 901 7316/1, R44GS
TRANSMITTER OPERATING RANGE	TX: 862MHz - 869MHz RX: 817MHz - 824MHz
MODULATIONS	BPSK, QPSK, 8PSK, 16QAM
INTERMEDIATE FREQUENCIES	--
ITU DESIGNATION OF EMISSION	1M25F9W
CHANNEL BANDWIDTH	1.25MHz
OUTPUT POWER (RMS) (W or dBm)	Single Carrier: 1 x 46dBm per port Multi Carrier (x 2): 2 x 43dBm 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	TA8AKRC161287-2
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	The equipment is the Radio Part of CDMA Base Station.

Signature

Date

10 June 2012

D of B S Serial No

75918306 /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.



Product Service

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) RRUS 11 B26A / KRC 161 287/2 is an Ericsson AB Radio Equipment working in the public mobile service 800MHz band which provides communication connections to CDMA800 network. The RRUS 11 B26A / KRC 161 287/2 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 90.

The RRUS 11 B26A / KRC 161 287/2 supports CDMA with BPSK, QPSK, 8PSK and 16QAM modulations at 800MHz. The settings below were found to be representative for all traffic scenarios when 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 Occupied Bandwidth¹, Emission Masks and Conducted Spurious Emissions tests.

- 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, Radiated Spurious Emissions and Frequency Stability tests.

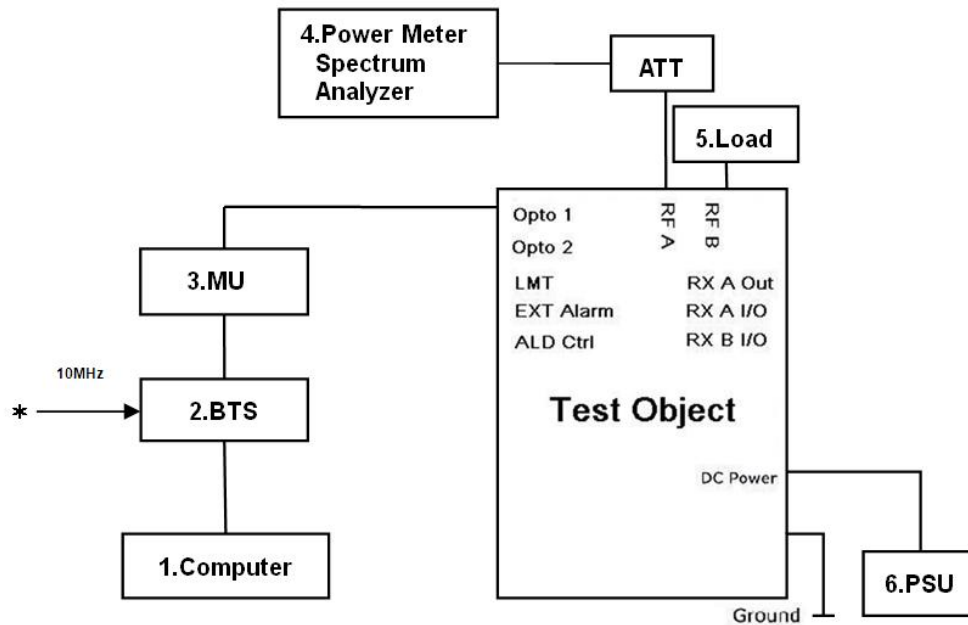
For other modulations, the settings are as follows:

- 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

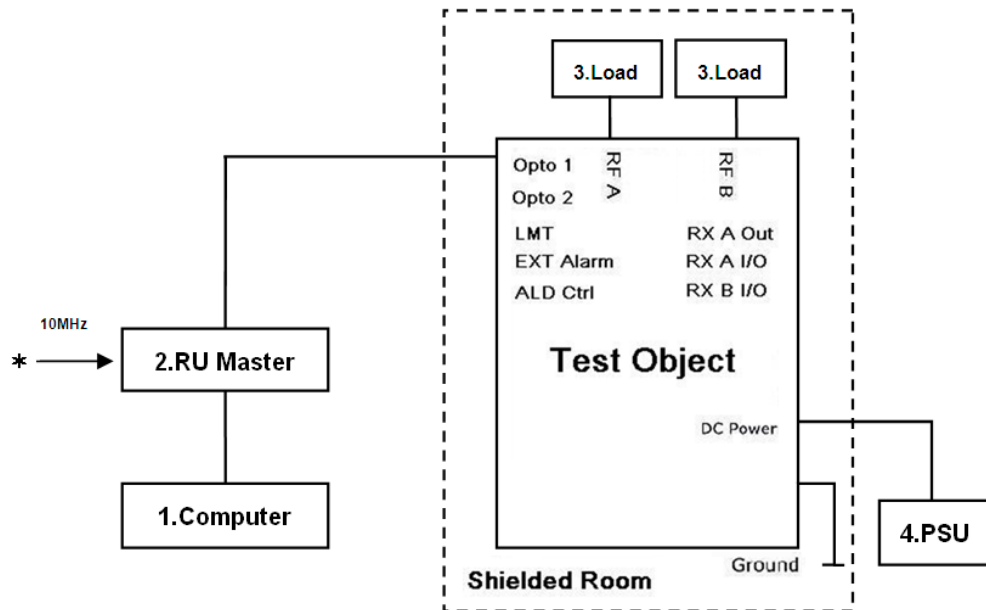
The EUT has two TX/RX ports and it can be configured to transmit with 800MHz single or multi carrier at both RF output connectors. All TX measurements were performed on the combined TX/RX output connector RF A. Limited complementary TX measurements were done at connector RF B to verify identical performance 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 B26A / KRC 161 287/2	R1C	C826062816

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.	DUL20 01	KDU 137 533/4	R1D	CB4K440243
	XMU0201	KDU137 754/1	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	--	MY48250517
	Spectrum Analyzer	Rohde & Schwarz FSQ26	--	200900
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 B26A / KRC 161 287/2	R1C	C826062817

No.	Auxiliary Equipment	Part Number / Model Type	Version	Serial Number
1	Computer	ADVANTECH 610H	--	ATB5103888
2.	RU Master	LPC 102 400/5	R1B	Y01E368189
3	Load	TF100	--	09121631
	Load	TF100	--	09121602
4	Power Supply	DH1716-5D	--	200360033



1.4.3 Modes of Operation

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

Mode 1 - Channel No. 476: 862.90MHz (Bottom Channel)

Mode 2 - Channel No. 580: 865.50MHz (Middle Channel)

Mode 3 - Channel No. 684: 868.10MHz (Top Channel)

Mode 4 - Channel No. 476 + 526: 862.90MHz + 864.15MHz (B and B+1.25MHz)

Mode 5 - Channel No. 530 + 580: 864.25MHz + 865.50MHz (M-1.25MHz and M)

Mode 6 - Channel No. 634 + 684: 866.85MHz + 868.10MHz (T-1.25MHz and T)

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



Product Service

1.5 TEST CONDITIONS

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

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

Only Radiated Spurious Emissions has been performed under the following site registration:

FCC Accreditation 910917:

The State Radio Monitoring Centre, No.80 Beilishi Road Xicheng District Beijing, China.



Product Service

SECTION 2

TEST DETAILS

FCC Testing of the
Ericsson AB RRUS 11 B26A / KRC 161 287/2



Product Service

2.1 MAXIMUM PEAK OUTPUT POWER - CONDUCTED

2.1.1 Specification Reference

FCC CFR 47 Part 2.1046
FCC CFR 47 Part 90, Clause 90.635

2.1.2 Equipment Under Test

RRUS 11 B26A / KRC 161 287/2, S/N: C826062816

2.1.3 Date of Test and Modification State

04 June 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 90.

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 all 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

04 June 2012

Ambient Temperature 25.7°C

Relative Humidity 49.5%



2.1.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 90 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
476 (Bottom)	862.90	40.4	45.98	39.63
580 (Middle)	865.50	40.4	46.93	49.32
684 (Top)	868.10	40.4	46.88	48.75

QPSK

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
476 (Bottom)	862.90	40.4	46.02	39.99
580 (Middle)	865.50	40.4	46.97	49.77
684 (Top)	868.10	40.4	46.89	48.87

8PSK

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
476 (Bottom)	862.90	40.4	45.98	39.63
580 (Middle)	865.50	40.4	46.07	40.46
684 (Top)	868.10	40.4	45.98	39.63

16QAM

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
476 (Bottom)	862.90	40.4	46.01	39.90
580 (Middle)	865.50	40.4	46.08	40.55
684 (Top)	868.10	40.4	46.02	39.99

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

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
476 (Bottom)	862.90	40.4	46.00	39.81
580 (Middle)	865.50	40.4	46.02	39.99
684 (Top)	868.10	40.4	45.99	39.71

QPSK

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
476 (Bottom)	862.90	40.4	46.01	39.90
580 (Middle)	865.50	40.4	46.03	40.09
684 (Top)	868.10	40.4	46.04	40.18

8PSK

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
476 (Bottom)	862.90	40.4	46.03	40.09
580 (Middle)	865.50	40.4	46.03	40.09
684 (Top)	868.10	40.4	46.06	40.36

16QAM

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
476 (Bottom)	862.90	40.4	46.03	40.09
580 (Middle)	865.50	40.4	46.06	40.36
684 (Top)	868.10	40.4	46.08	40.55

Limit	$\leq 1000W$ or $\leq +60dBm$
-------	-------------------------------

Remarks

The EUT does not exceed 1000W or 60dBm at the measured frequencies.



2.2 MODULATION CHARACTERISTICS

2.2.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1047 (d)

2.2.2 Equipment Under Test

RRUS 11 B26A / KRC 161 287/2, S/N: C826062816

2.2.3 Date of Test and Modification State

05, 06 and 29 June 2012 – Modification State 0

2.2.4 Test Method and Operating Modes

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

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 mode of operation:

Configuration 1 - Mode 2

2.2.5 Environmental Conditions

	05 June 2012	06 June 2012	29 June 2012
Ambient Temperature	26.8°C	26.1°C	24.1°C
Relative Humidity	47.0%	45.1%	50.1%



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2.2.6 Test Results

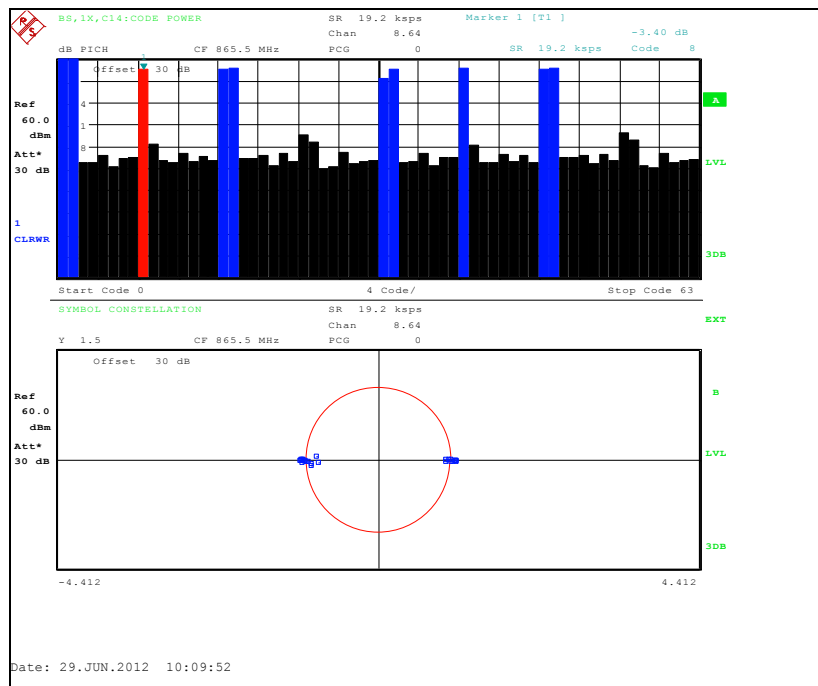
Plots are listed on the following showing the EUT transmitting with all of the modulations:

The test results are shown below

Single Carrier

Configuration 1 - Mode 2

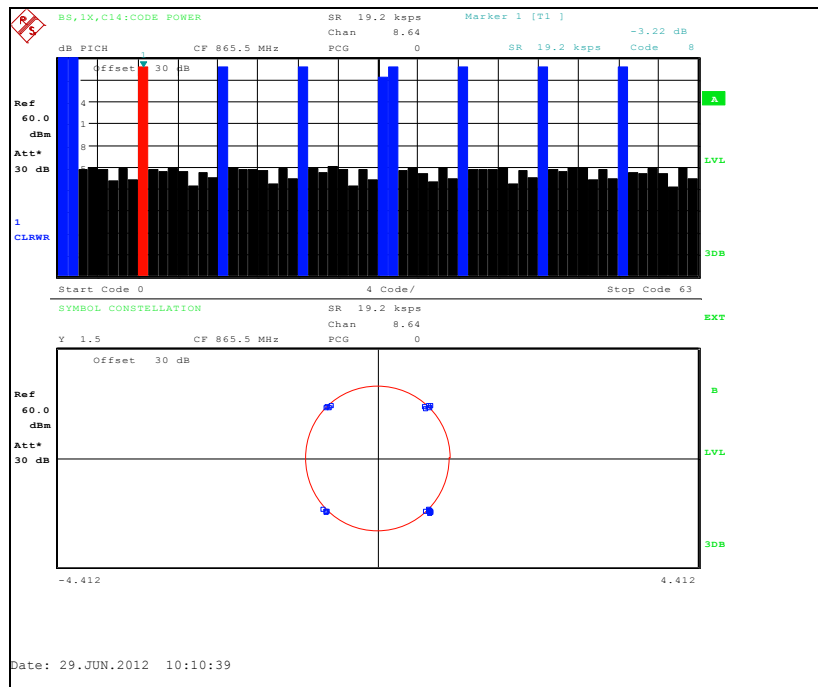
EUT transmitting with BPSK(Voice) modulation:



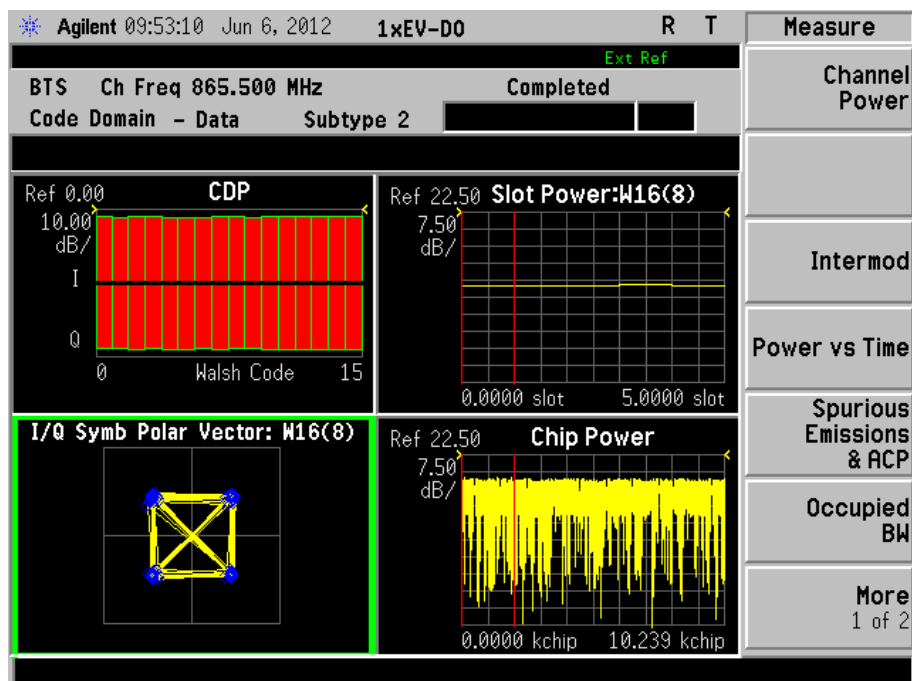


Product Service

EUT transmitting with QPSK(Voice) modulation:



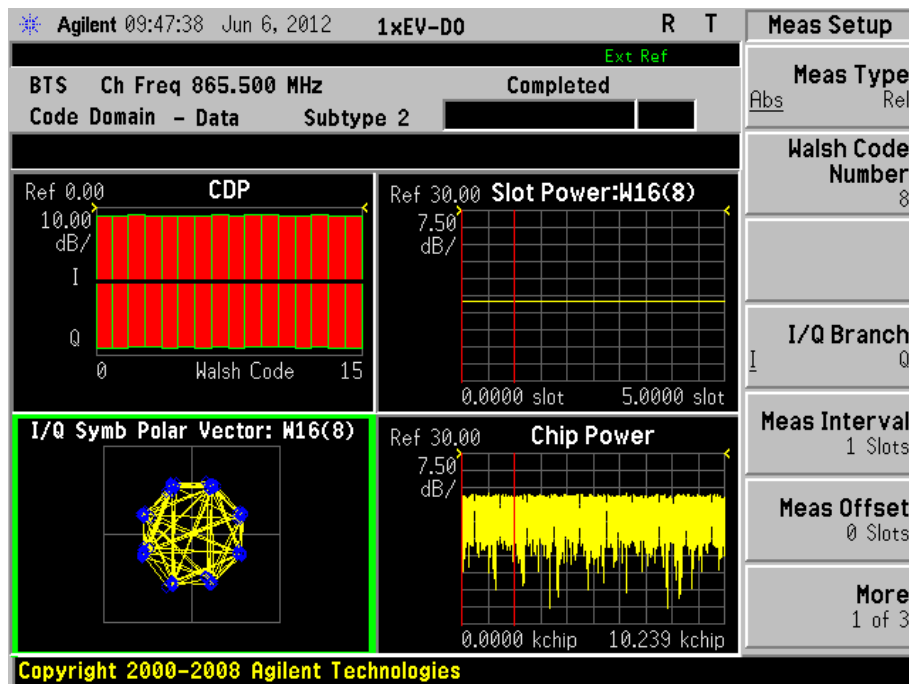
EUT transmitting with QPSK modulation:



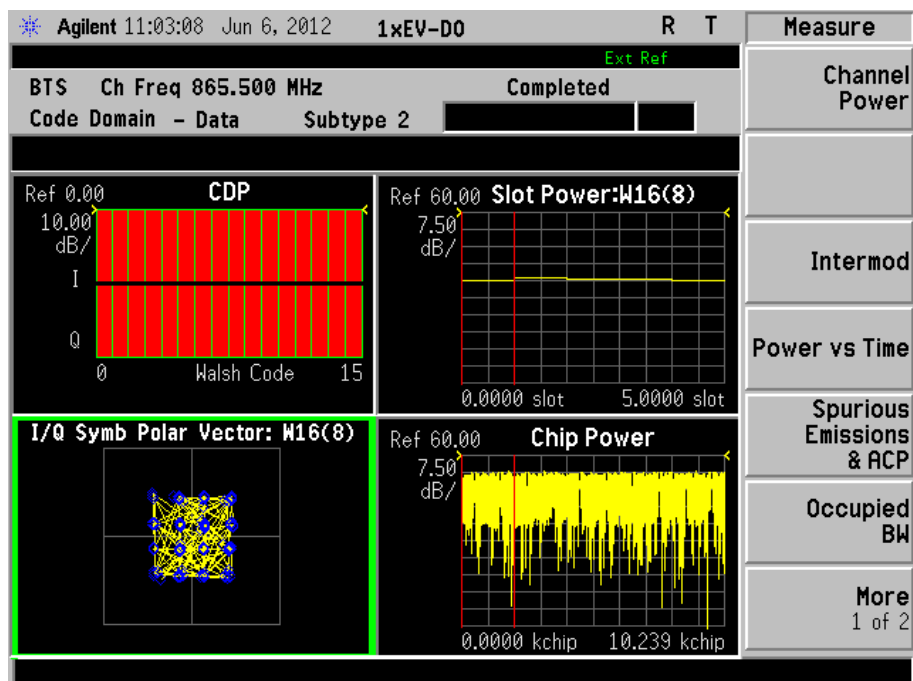


Product Service

EUT transmitting with 8PSK modulation:



EUT transmitting with 16QAM modulation:





Product Service

2.3 OCCUPIED BANDWIDTH

2.3.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1049 (h)

2.3.2 Equipment Under Test

RRUS 11 B26A / KRC 161 287/2, S/N: C826062816

2.3.3 Date of Test and Modification State

05 and 06 June 2012 – 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 2 .

The EUT was transmitting at maximum power. 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

2.3.6 Environmental Conditions

	05 June 2012	06 June 2012
Ambient Temperature	26.8°C	26.1°C
Relative Humidity	47.0%	45.1%



Product Service

2.3.7 Test Results

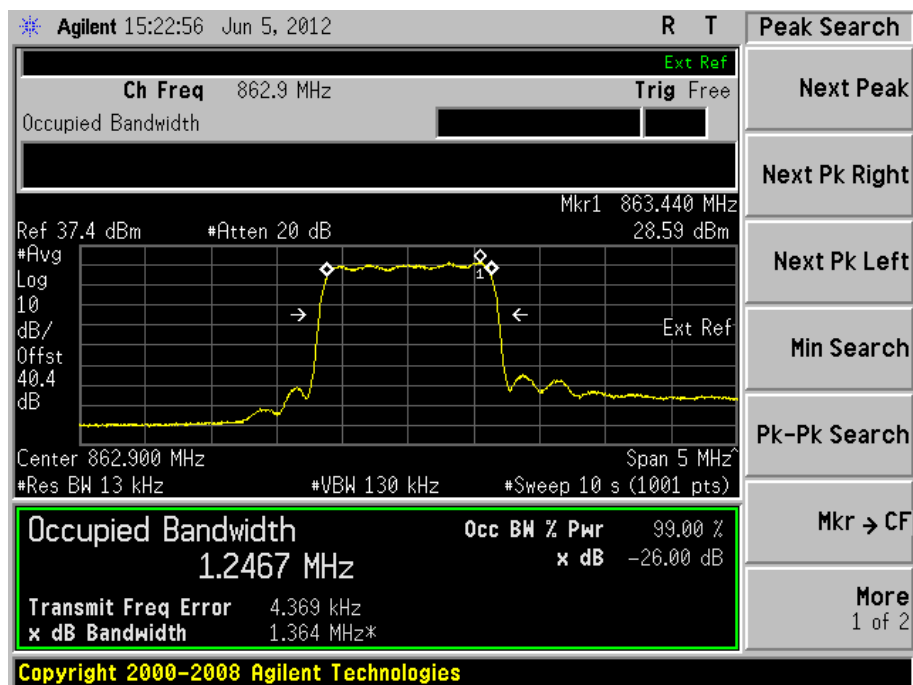
For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 90 for Occupied Bandwidth.

The test results are shown below

Single Carrier:

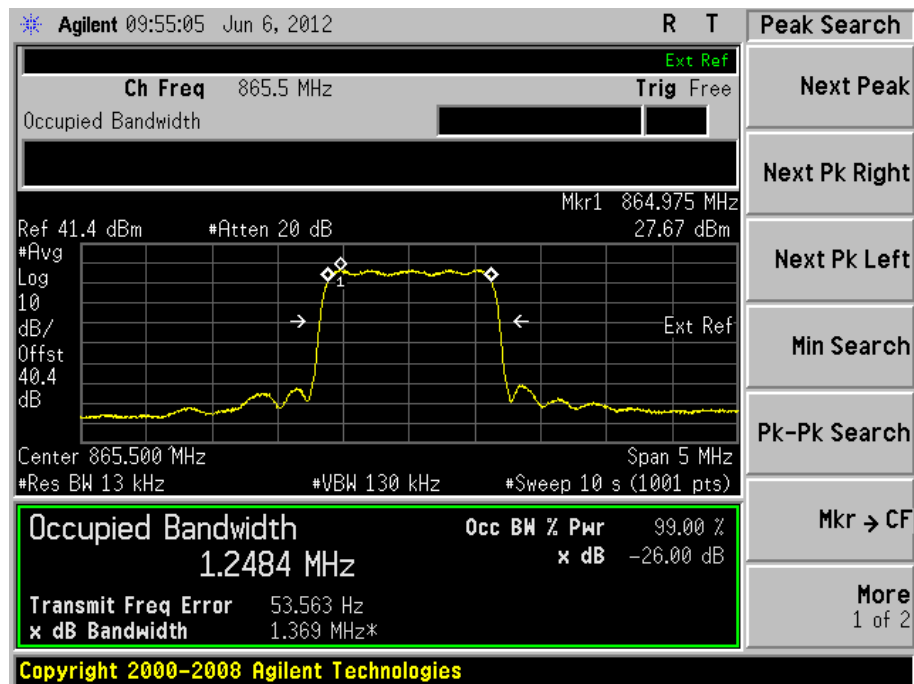
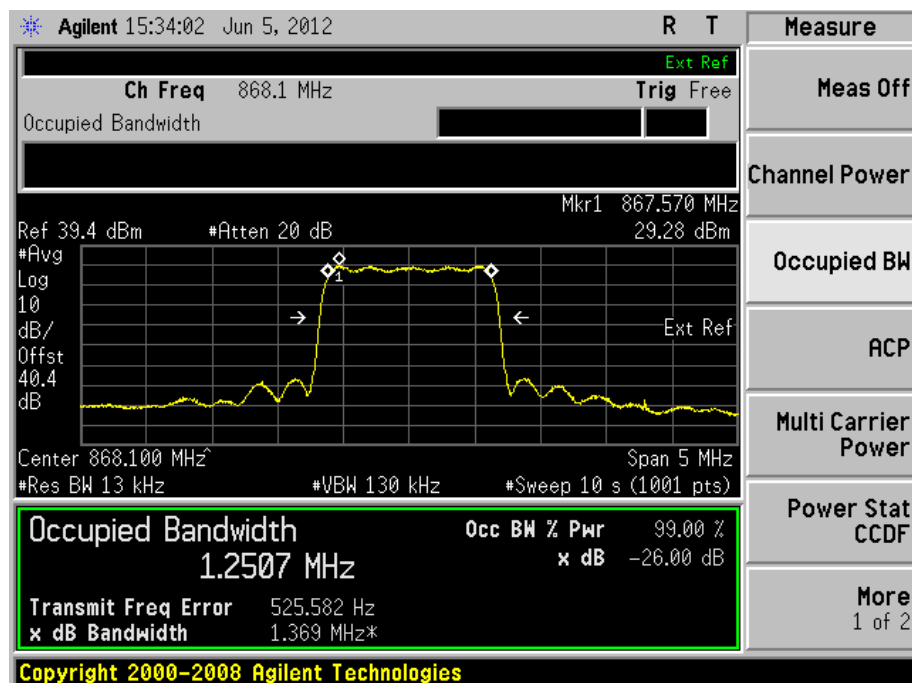
BPSK

Configuration 1 – Mode 1



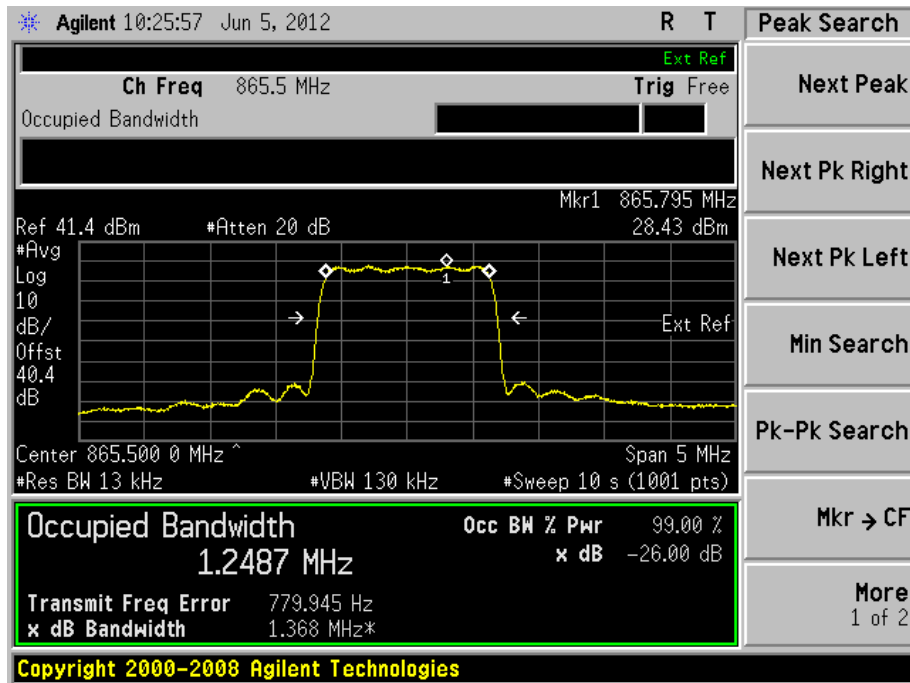
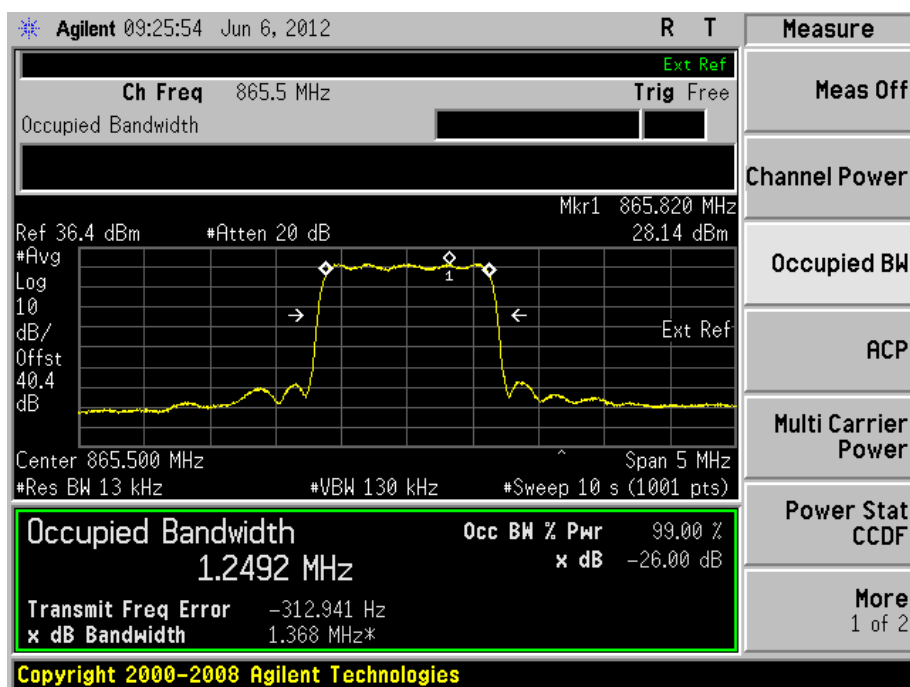


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Configuration 1 – Mode 2Configuration 1 – Mode 3

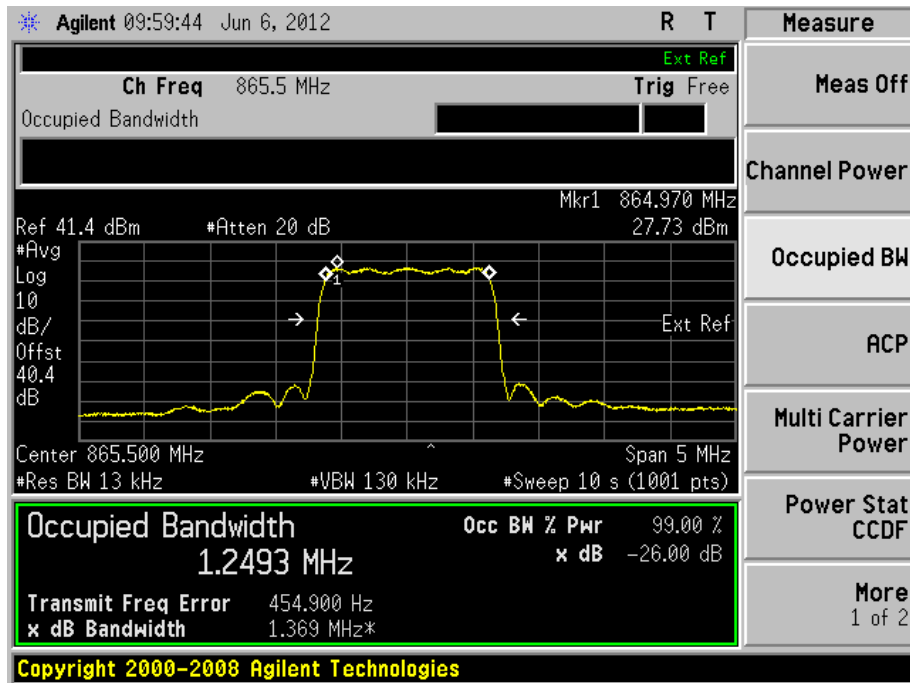


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QPSKConfiguration 1 – Mode 28PSKConfiguration 1 – Mode 2



Product Service

16QAMConfiguration 1 – Mode 2



Product Service

2.4 EMISSION MASK

2.4.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1051
 FCC CFR 47 Part 90, Clause 90.210(g)
 FCC CFR 47 Part 90, Clause 90.691

2.4.2 Equipment Under Test

RRUS 11 B26A / KRC 161 287/2, S/N: C826062816

2.4.3 Date of Test and Modification State

05 June 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 90.

In accordance with 90.691(a), Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

- (1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $116 \log_{10}(f/6.1)$ decibels or $50 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.
- (2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

In accordance with 90.210(g), Emission Mask G, for transmitters that are not equipped with an audio low-pass filter, the power of any emissions must be attenuated below the unmodulated carrier power (P) as follows:

- (1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 10kHz, but no more than 250 percent of the authorized bandwidth: At least $116 \log_{10}(f_d/6.1)$ dB, or $50 + 10 \log_{10}(P)$ dB or 70 dB, whichever is the lesser attenuation.
- (2) On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least $43 + 10 \log_{10}(P)$ dB.

The EUT was tested at its maximum power level. At least 1% of the emission bandwidth was used for the resolution bandwidth. Spectrum analyser detector was set as RMS.



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

The EUT was tested at it's maximum power level. Both Antennas were tested and the tests performed on Antenna A were selected as representative.

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

2.4.6 Environmental Conditions

05 June 2012

Ambient Temperature 26.8°C

Relative Humidity 47.0%

2.4.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 90.

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

BPSK

Single Carrier

Configuration 1 - Mode 1 and 3

Band Edge Frequency	Emission Mask Test with QPSK modulation Channel No./Frequencies
Bottom 862 MHz	Channel: 476 Frequency: 862.90 MHz
Top 869 MHz	Channel: 684 Frequency: 868.10 MHz

Multi Carrier (1x2)

Configuration 1 - Mode 4 and 6

Band Edge Frequency	Emission Mask Test with QPSK modulation Channel No./Frequencies
Bottom 862 MHz	Channel: 476 & 526 Frequency: 862.90 & 864.15 MHz
Top 869 MHz	Channel: 634 & 684 Frequency: 866.85 & 868.10 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.

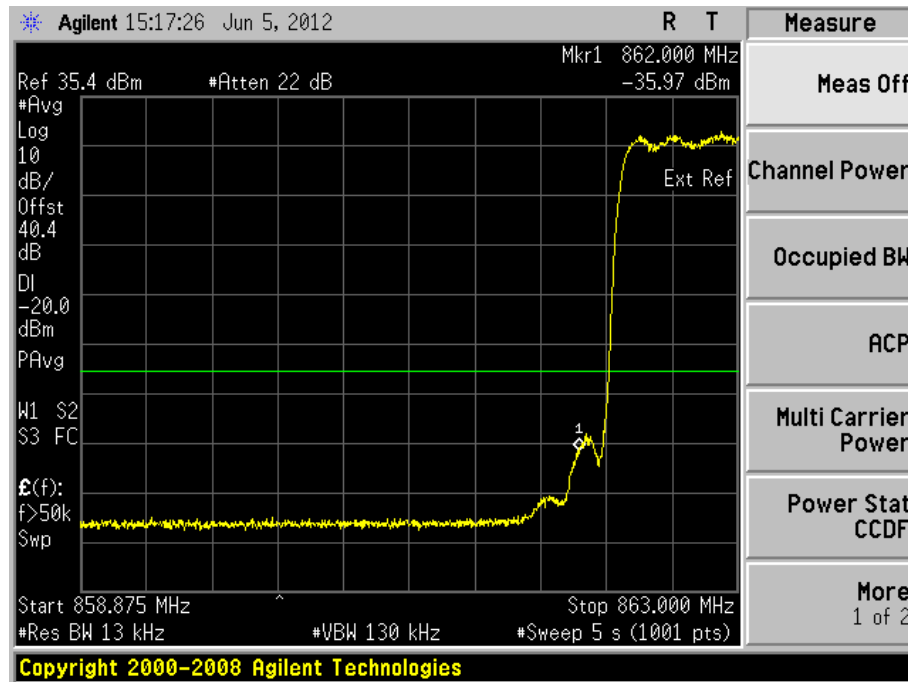


The test results are shown below

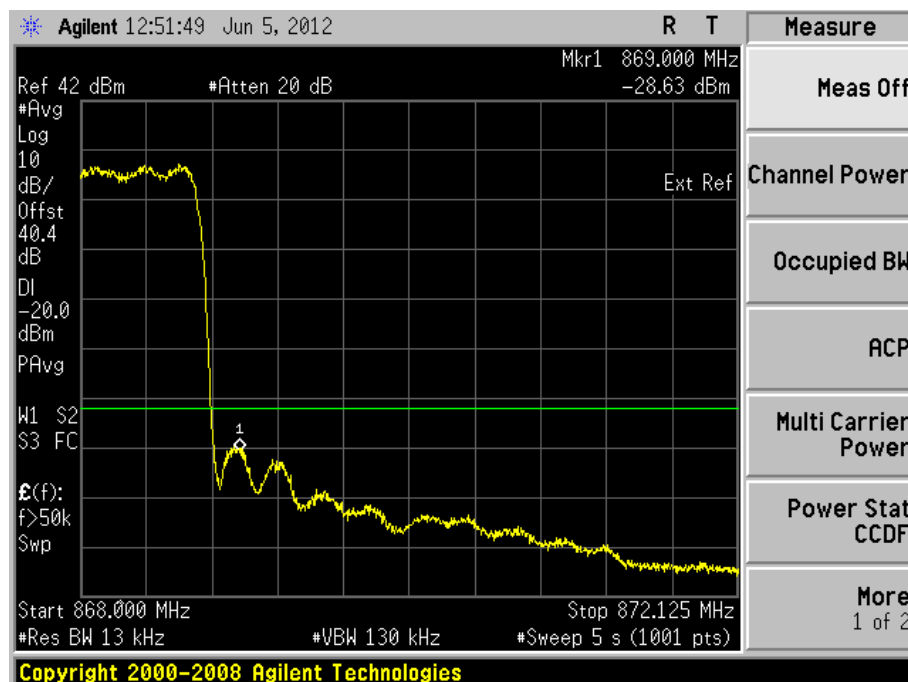
BPSK

Single Carrier

Configuration 1 - Mode 1

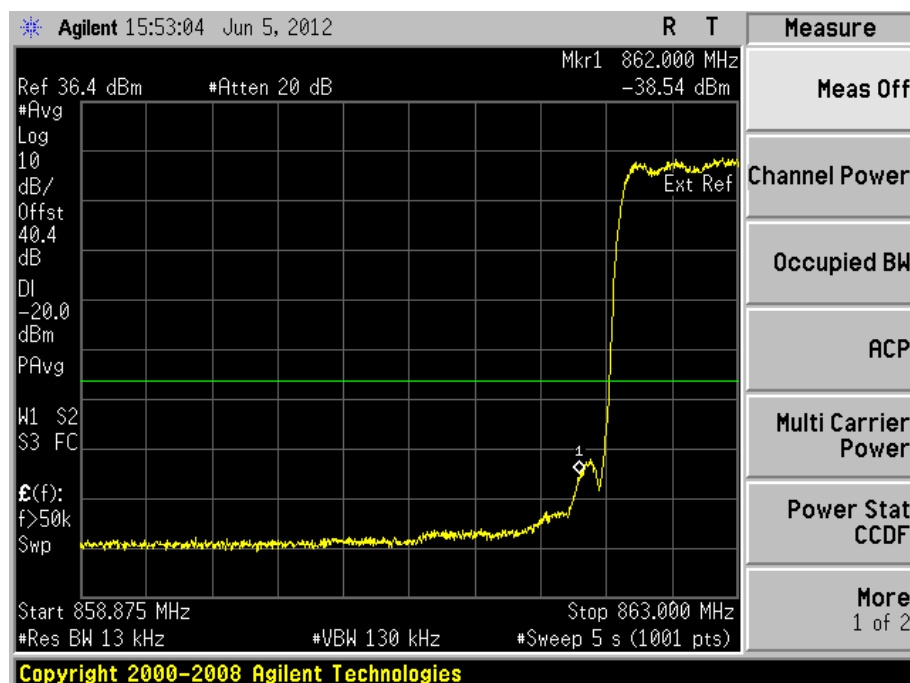
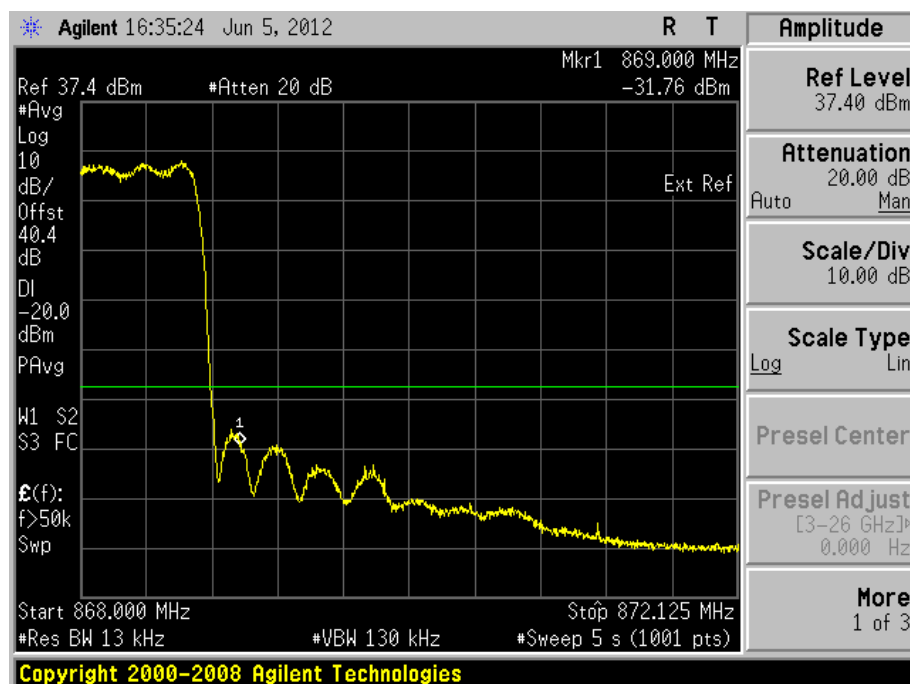


Configuration 1 – Mode 3





Product Service

Multi Carrier (1x2)**Configuration 1 - Mode 4****Configuration 1 - Mode 6****Limit**

The power of any emission outside the frequency band shall be attenuated below the transmitter power (P) by at least $50 + 10\log P$ dB.



2.5 RADIATED SPURIOUS EMISSIONS

2.5.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1053
FCC CFR 47 Part 90, Clause 90.691

2.5.2 Equipment Under Test

RRUS 11 B26A / KRC 161 287/2, S/N: C826062817

2.5.3 Date of Test and Modification State

14 and 15 June 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 90.

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 - $(43 + 10\log(P))$ 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:

$$E_{(v/m)} = (30 \times 1.64 \times 39.71)^{0.5} / 3 = 14.73 \text{ V/m} = 143.37 \text{ dB}\mu\text{V/m}$$

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

$$43 + 10\log(39.71) = 58.99 \text{ dB}$$

Therefore the limit at 3m measurement distance is:

$$143.37 - 58.99 = 84.4 \text{ dB}\mu\text{V/m}$$

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 in the following configurations and modes of operation as the worst cases:

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

2.5.6 Environmental Conditions

	14 June 2012	15 June 2012
Ambient Temperature	24.5°C	25.0°C
Relative Humidity	29.5%	32.2%



2.5.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 90 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.

Single Carrier

BPSK

Configuration 1 - Mode 2

No emissions were detected within 20dB of the limit.

QPSK

Configuration 1 - Mode 1

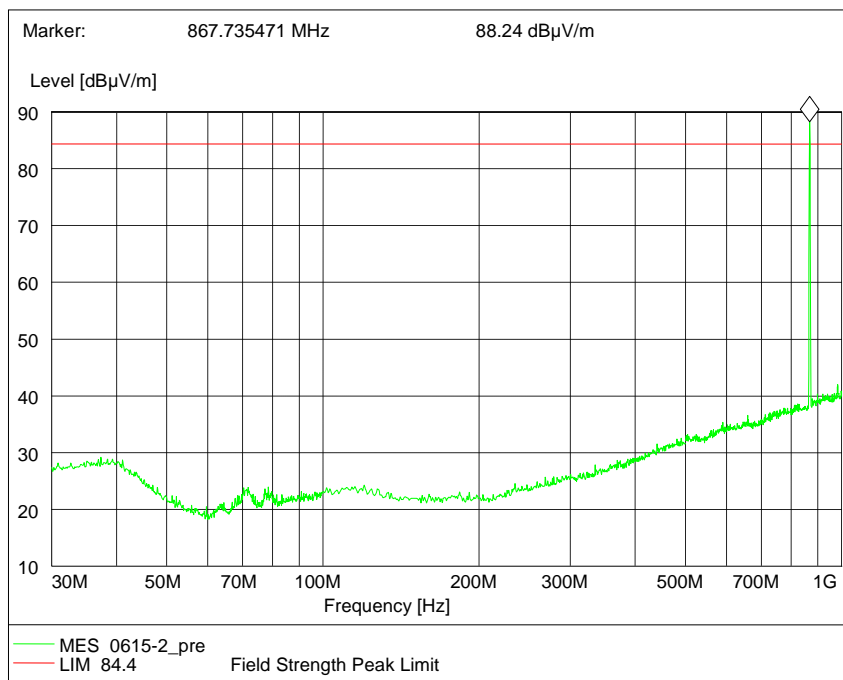
No emissions were detected within 20dB of the limit.

Configuration 1 - Mode 2

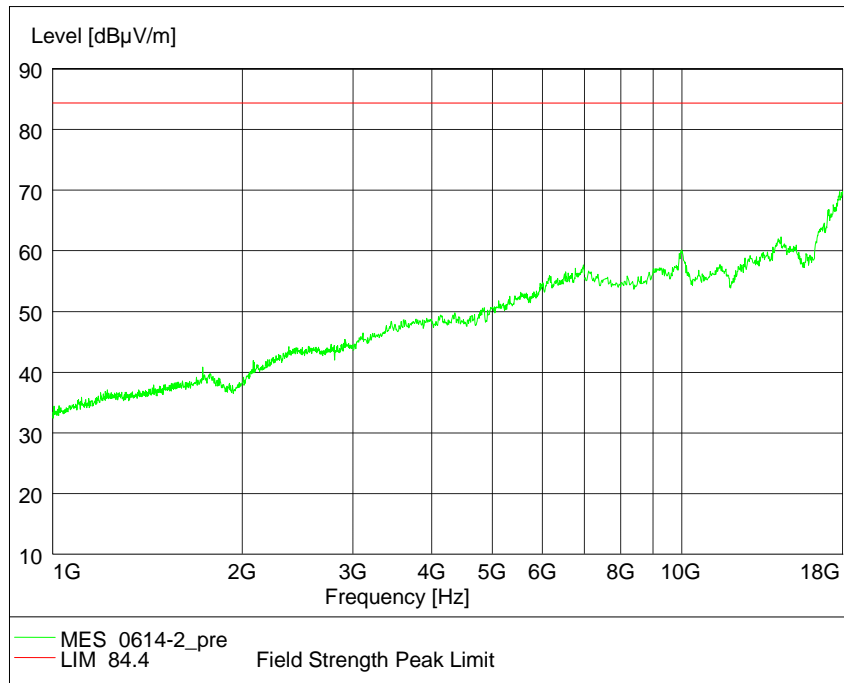
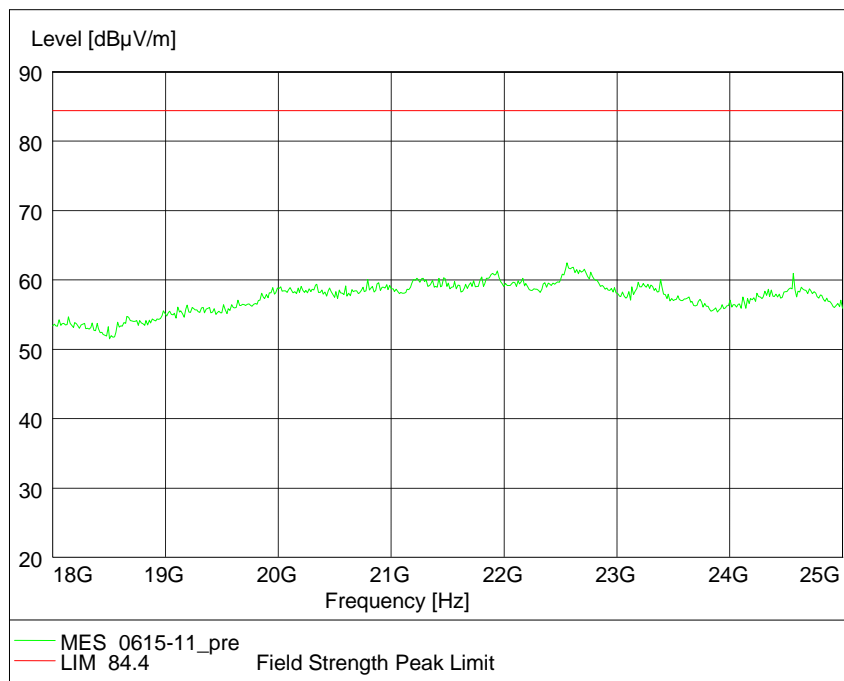
No emissions were detected within 20dB of the limit.

Configuration 1 - Mode 3

30MHz – 1GHz



Note: The marked emission is the operating frequency.

1GHz – 18GHz18GHz – 25GHz



Product Service

8PSKConfiguration 1 - Mode 2

No emissions were detected within 20dB of the limit.

16QAMConfiguration 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 / 84.4 dB μ V/m
-------	----------------------------

Remarks

The EUT does not exceed -13dBm at the measured frequencies.



Product Service

2.6 CONDUCTED SPURIOUS EMISSIONS

2.6.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1051
FCC CFR 47 Part 90, Clause 90.691

2.6.2 Equipment Under Test

RRUS 11 B26A / KRC 161 287/2, S/N: C826062816

2.6.3 Date of Test and Modification State

04 and 07 June 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 90.

In accordance with Part 2.1051 and Part 90.691, 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 resolution was set to 1MHz for 9kHz to 25GHz. The spectrum analyzer 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 4
- Mode 5
- Mode 6

2.6.6 Environmental Conditions

	04 June 2012	07 June 2012
Ambient Temperature	25.7°C	26.5°C
Relative Humidity	49.5%	46.3%



Product Service

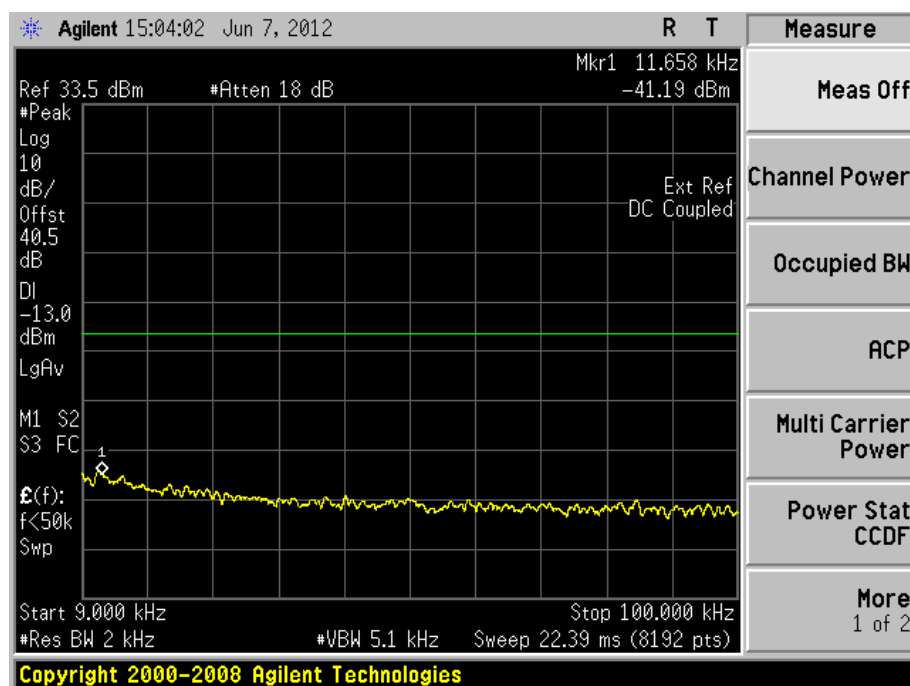
2.6.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 90 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 measruement with a smaller Span showed that it was related to the LO feedthrough.



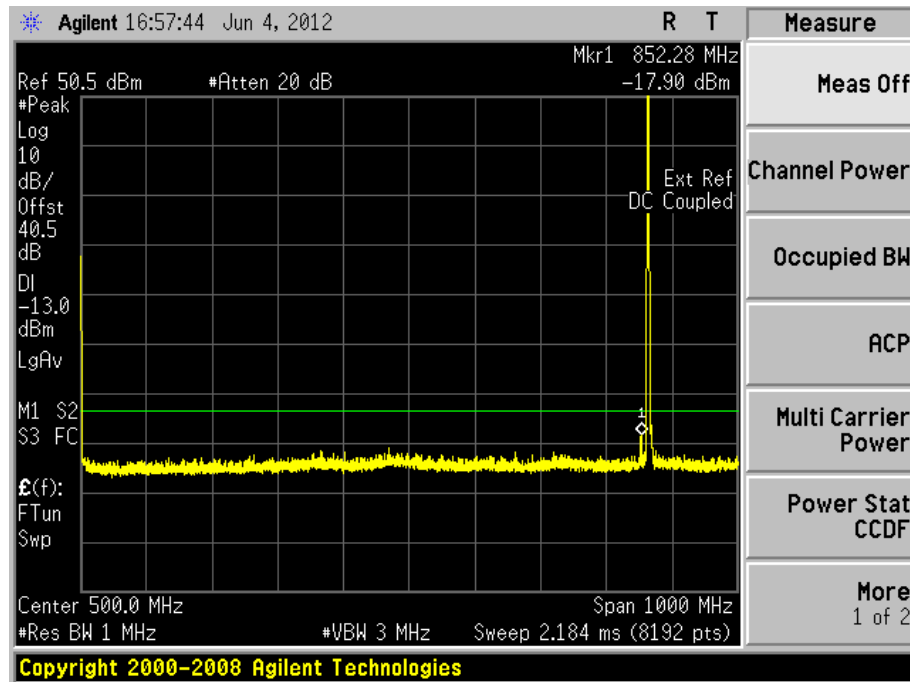


Product Service

BPSK**Single Carrier**

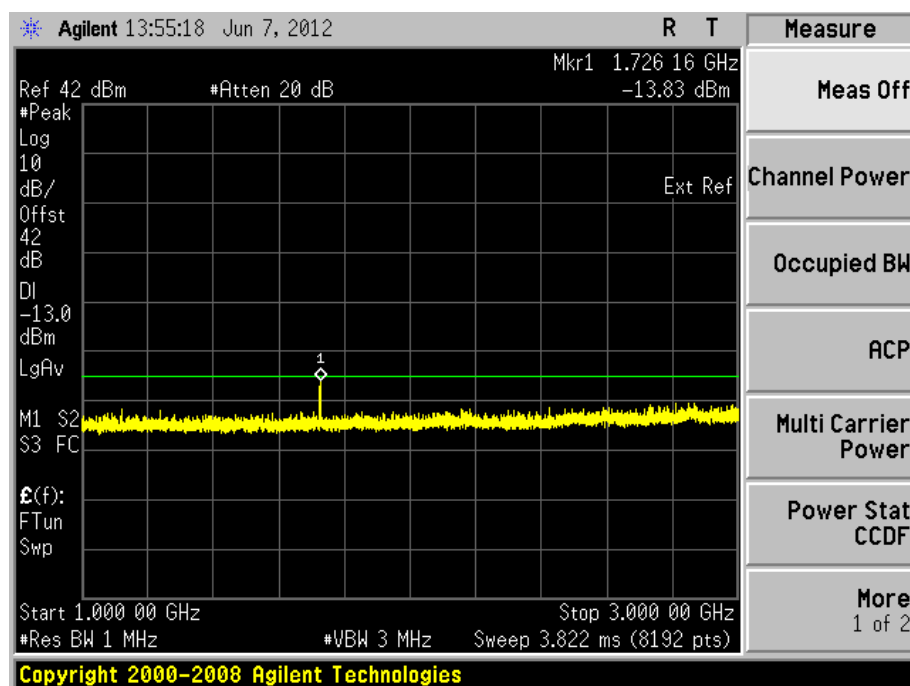
Configuration 1 - Mode 1

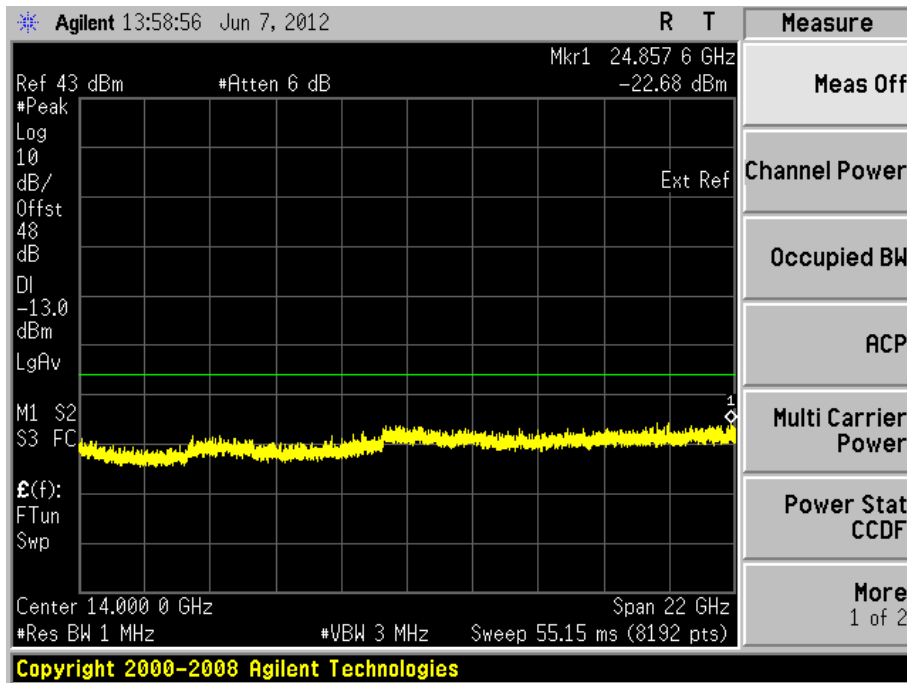
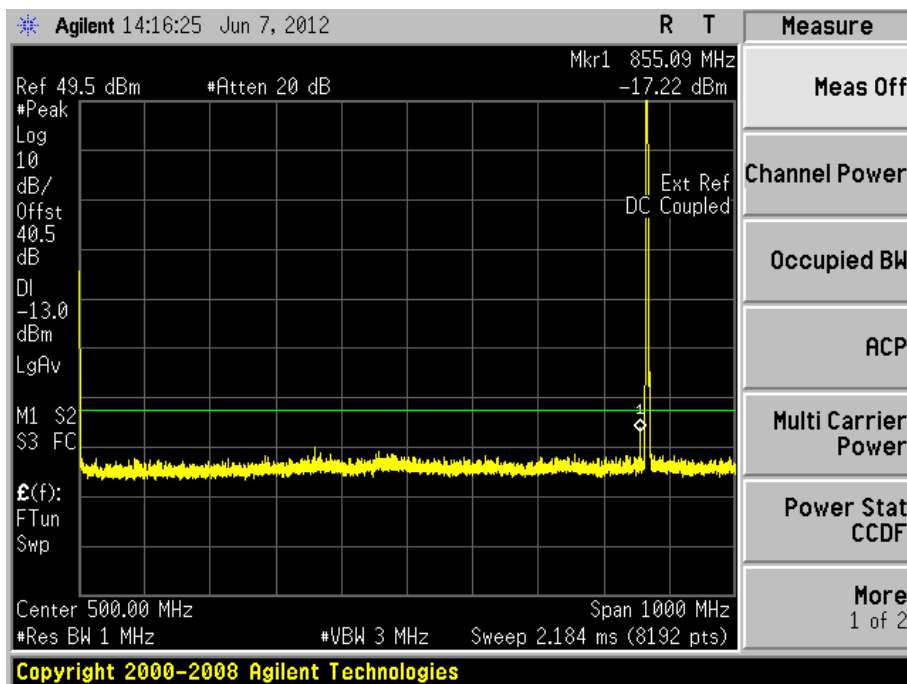
9kHz to 1GHz



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

1GHz to 3GHz

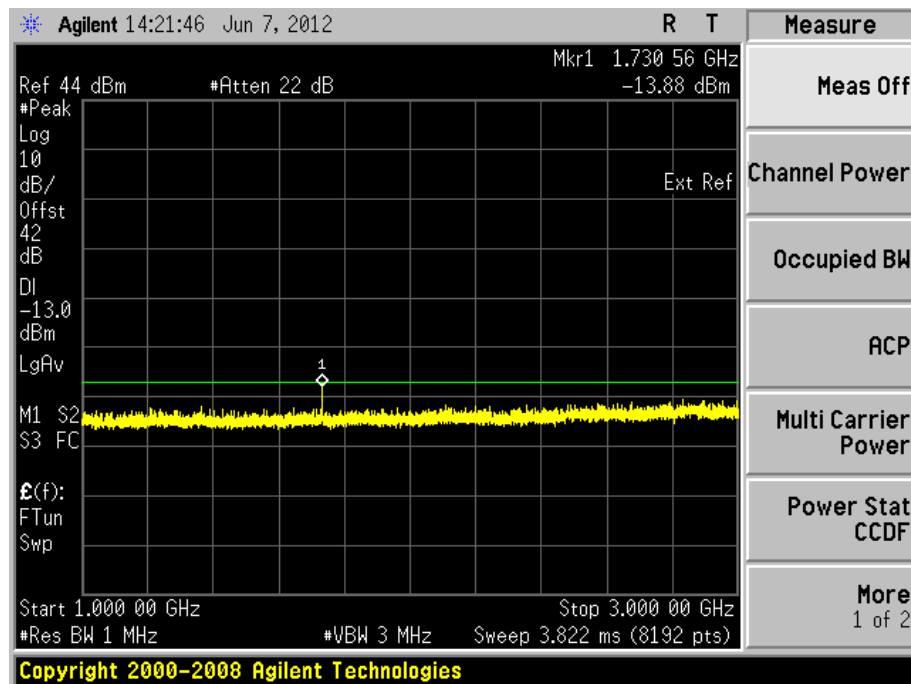
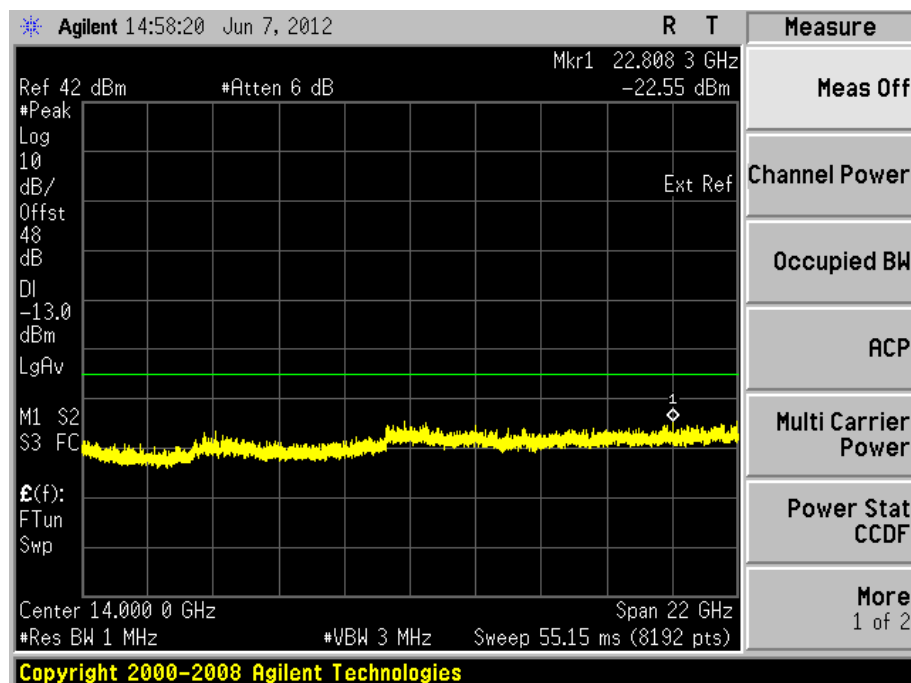


3GHz to 25GHzConfiguration 1 - Mode 29kHz to 1GHz

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

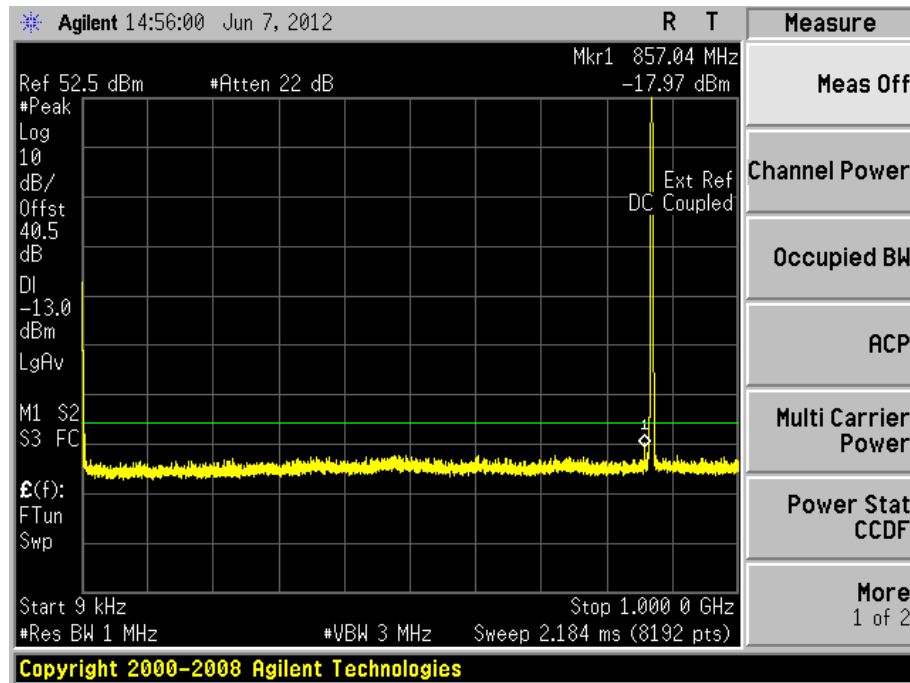


Product Service

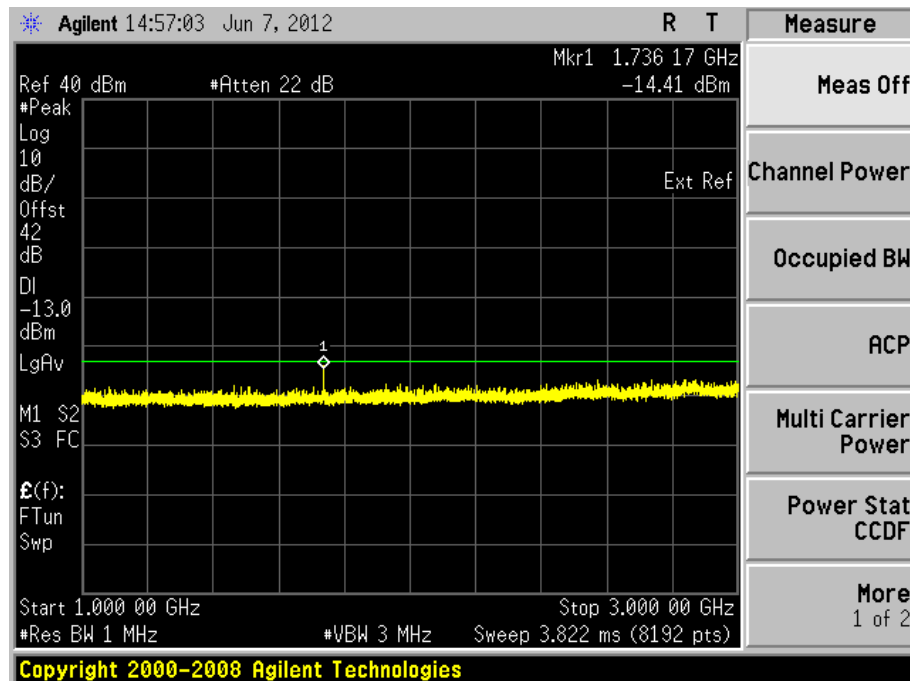
1GHz to 3GHz3GHz to 25GHz

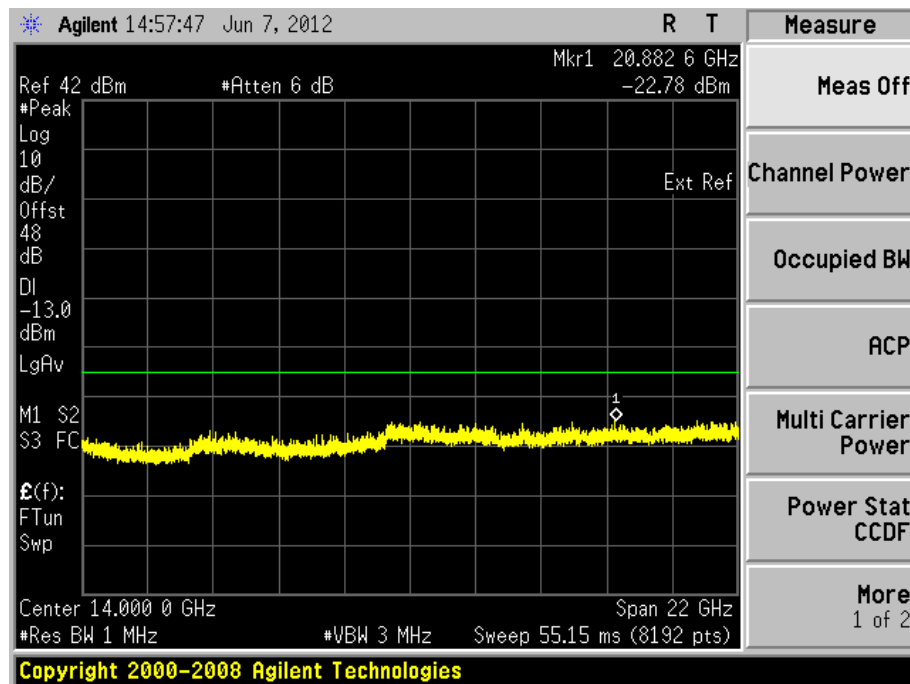
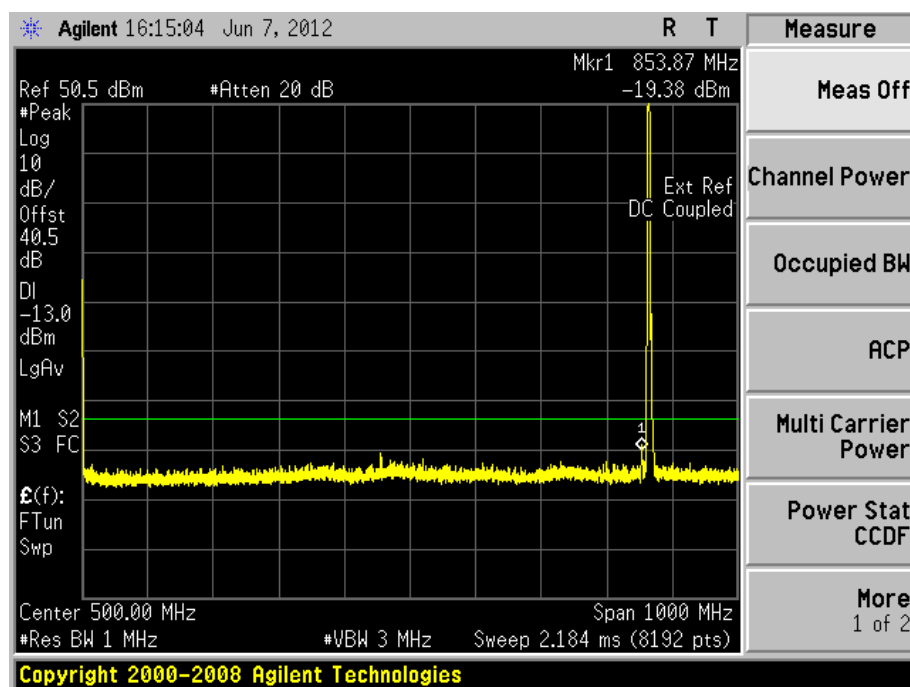


Product Service

Configuration 1 – Mode 39kHz – 1GHz

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

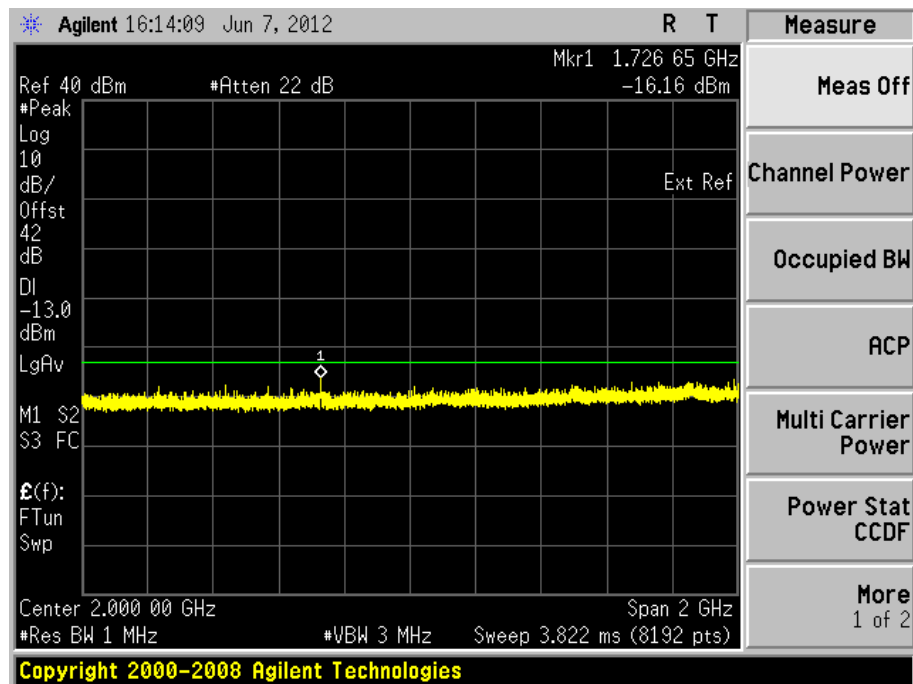
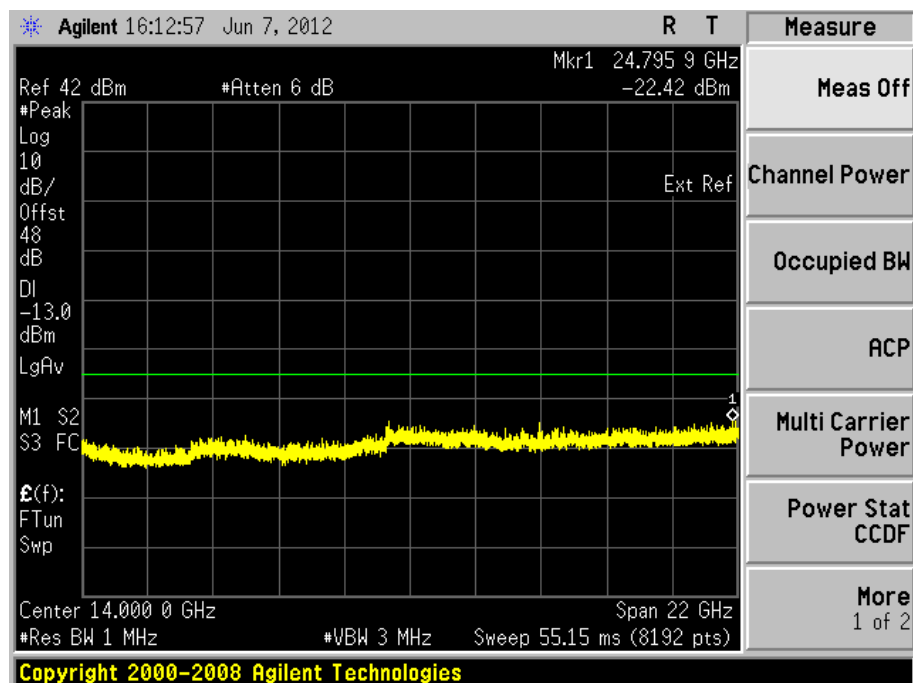
1GHz – 3GHz

3GHz – 25GHzMulti Carrier (1x2)Configuration 1 - Mode 49kHz to 1GHz

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

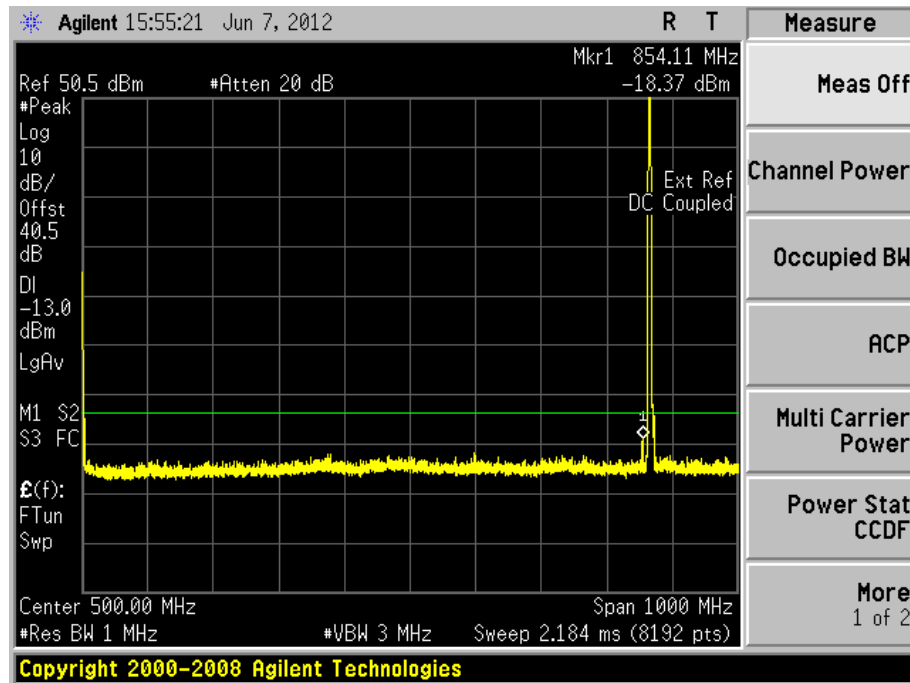


Product Service

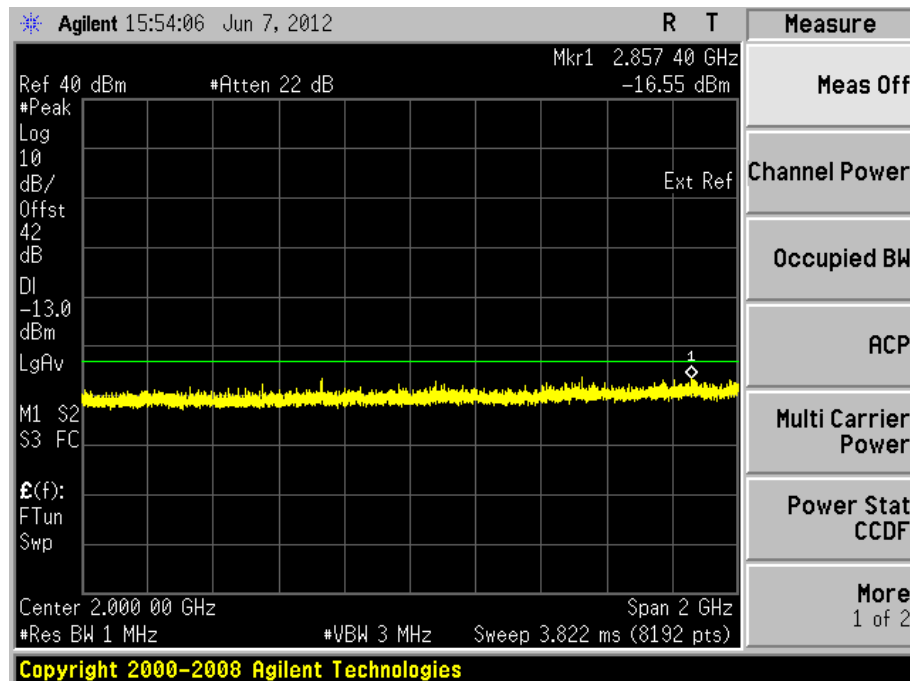
1GHz to 3GHz3GHz to 25GHz



Product Service

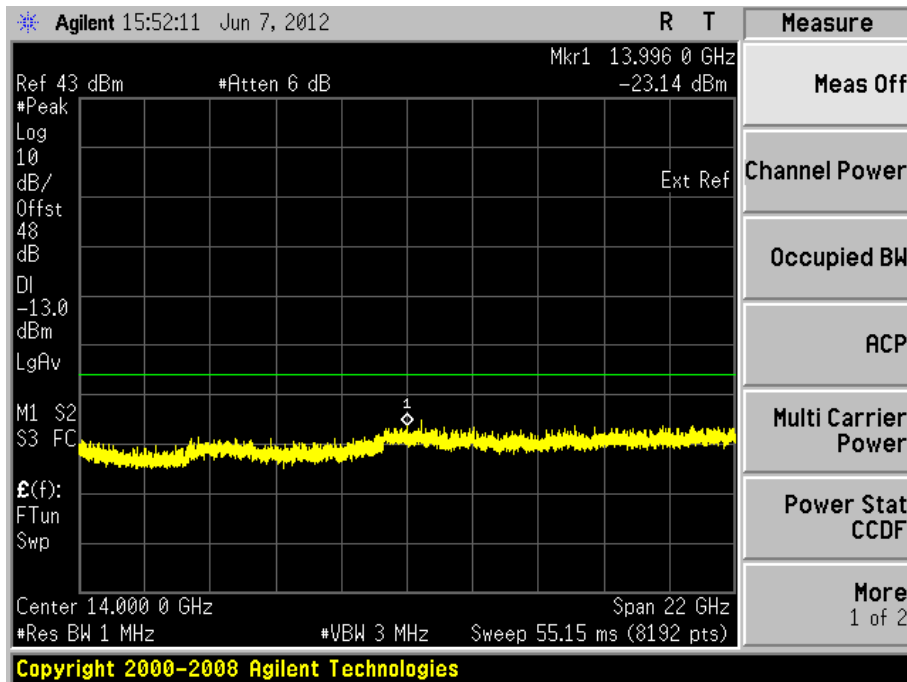
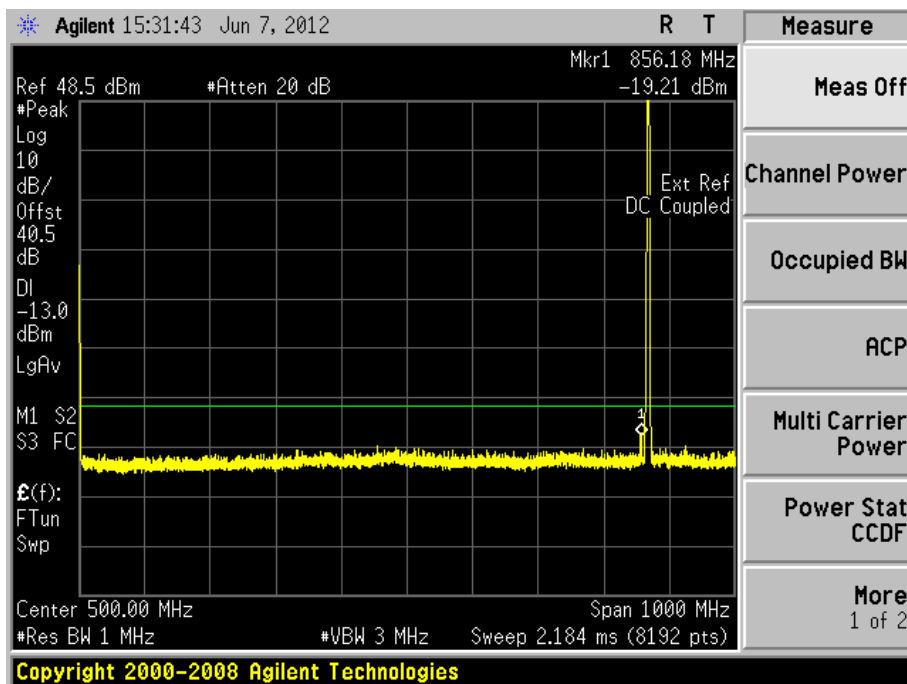
Configuration 1 - Mode 59kHz to 1GHz

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

1GHz to 3GHz



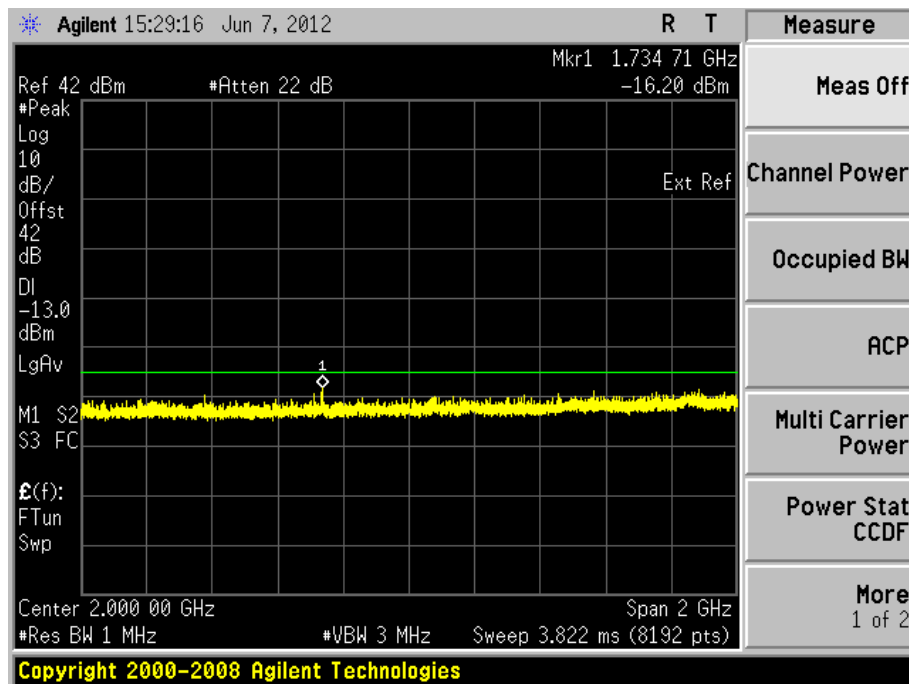
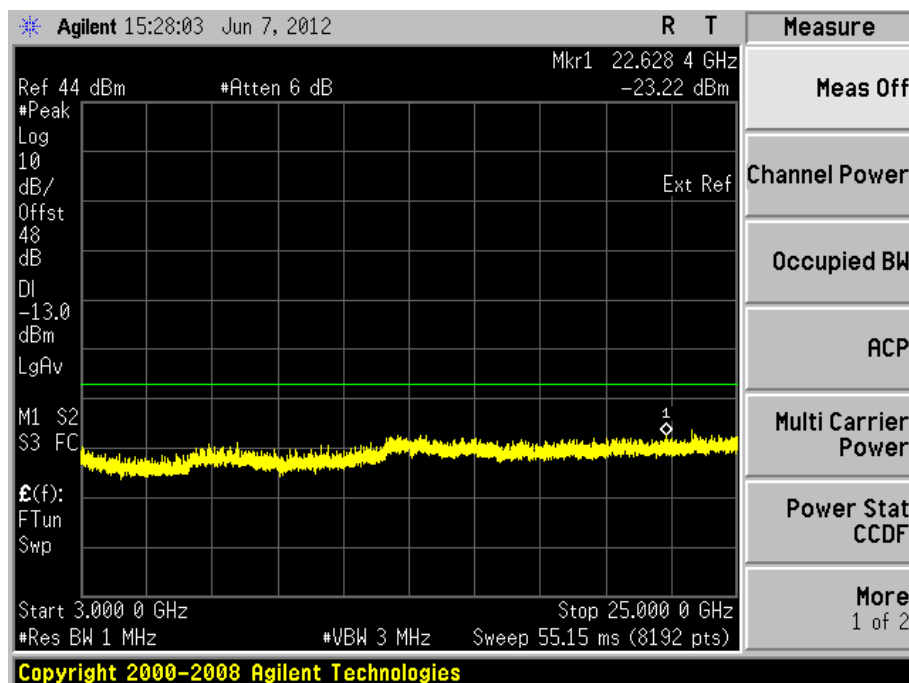
Product Service

3GHz to 25GHzConfiguration 1 - Mode 69kHz to 1GHz

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



Product Service

1GHz to 3GHz3GHz to 25GHz

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

Remarks

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



2.7 FREQUENCY STABILITY UNDER TEMPERATURE VARIATIONS

2.7.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1055
FCC CFR 47 Part 90, Clause 90.213

2.7.2 Equipment Under Test

RRUS 11 B26A / KRC 161 287/2, S/N: C826062816

2.7.3 Date of Test and Modification State

08 and 11 June 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 90.

The EUT was set to transmit on maximum power. A Spectrum Analyzer was used to measure the frequency error. The temperature was adjusted between -30°C and +50°C in 10°C 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 June 2012	11 June 2012
Ambient Temperature	26.3°C	28.5°C
Relative Humidity	45.0%	51.2%



2.7.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 90 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	+19.58
-20	+18.20
-10	+17.55
0	+18.22
+10	-21.92
+20	-19.10
+30	+23.32
+40	+19.82
+50	-20.02

Limit	±1.5 ppm or ±1.298kHz
-------	-----------------------

Remarks

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



Product Service

2.8 FREQUENCY STABILITY UNDER VOLTAGE VARIATIONS**2.8.1 Specification Reference**

FCC CFR 47 Part 2, Clause 2.1055
FCC CFR 47 Part 90, Clause 90.213

2.8.2 Equipment Under Test

RRUS 11 B26A / KRC 161 287/2, S/N: C826062816

2.8.3 Date of Test and Modification State

08 June 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 90.

The EUT was set to transmit on maximum power. A Spectrum Analyzer 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

2.8.6 Environmental Conditions

	08 June 2012
Ambient Temperature	26.3°C
Relative Humidity	45.0%



2.8.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 90 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	+20.74
-48.0	-19.10
-55.2	+19.54

Limit	± 1.5 ppm or ± 1.298 kHz
-------	----------------------------------

Remarks

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



Product Service

SECTION 3

TEST EQUIPMENT USED



3.1 TEST EQUIPMENT USED

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

Instrument	Manufacturer	Type No.	Serial No.	Calibration Period (months)	Calibration Due
Section 2.1, 2.2, 2.3, 2.4 and 2.6 – Maximum Conducted Output Power, Modulation Characteristics, Occupied Bandwidth, Emission Mask, and Conducted Spurious Emissions.					
Spectrum Analyser	Agilent	E4440A	MY48250517	12	12-April-2013
Spectrum Analyser	Rohde & Schwarz	FSQ26	200900	12	27-Mar-2013
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
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
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 2.5 – 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	23.18mx16.88 mx 9.60m	-	12	19-Aug-2012
Power Supply	Dahua	DH1716-5D	200360033	-	O/P MON
Digital Multimeter	FLUKE	179	91820401	12	13-Dec-2012
Thermo-hygrometer	AZ Instruments	8705	9151655	12	19-Dec-2012



Section 2.7 and 2.8 – 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
TU

Output monitored with calibration equipment
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



Product Service

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.

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