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# Report On

FCC and Industry Canada Testing of the  
Ericsson RRUS 11 B2 / KRC 161 276/2

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FCC ID: TA8AKRC161276-2  
IC ID: 287AB-AS1612762

Document 75915702 Report 01 Issue 1

December 2011



Product Service

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**REPORT ON**

FCC and Industry Canada Testing of the  
Ericsson RRUS 11 B2 / KRC 161 276/2

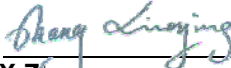
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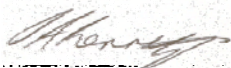
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**S Bennett**  
Authorised Signatory

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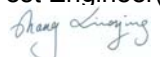
02 December 2011

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**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 24 and Industry Canada RSS-133. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

  
X Zhang

  
C Zhang





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## **SECTION 1**

### **REPORT SUMMARY**

FCC and Industry Canada Testing of the  
Ericsson RRUS 11 B2 / KRC 161 276/2



## 1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Ericsson RRUS 11 B2 / KRC 161 276/2 to the requirements of FCC CFR 47 Part 24 and Industry Canada RSS-133.

Testing was carried out in support of an application for Grant of Equipment Authorisation in the name of RRUS 11 B2 / KRC 161 276/2.

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 B2
Part Number	KRC 161 276/2
IC Model Number	AS1612762
Serial Number(s)	C825336870
Software Version	CXP9018319%1_R1A54
Hardware Version	R1A
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 24: 2010 Industry Canada RSS-133 issue 5: 2009
Incoming Release Date	Declaration of Build Status 17 October 2011
Order Number Date	PTP 14 October 2011
Start of Test	17 October 2011
Finish of Test	25 October 2011
Name of Engineer(s)	X Zhang C Zhang
Related Document(s)	ANSI C63.4: 2009 FCC CFR 47 Part 2: 2010 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 24 and Industry Canada RSS-133, is shown below.

Configuration 1 – Radio Equipment							
Section	Spec Clause		Test Description	Mode	Mod State	Result	Comments
	FCC Part 2 and 24	RSS-133 and RSS-GEN					
	24.232 (a)	6.4	Effective Radiated Power	1930.7MHz (1.4MHz OBW / 1940.0MHz (20.0MHz OBW)		N/A	No integral antenna.
				1960.0MHz (1.4MHz, 3.0MHz, 5.0MHz, 10.0MHz, 15.0MHz, 20.0MHz OBW)		N/A	
				1989.3MHz (1.4MHz OBW) / 1980.0MHz (20.0MHz OBW)		N/A	
2.1	2.1046, 24.232 (a)	6.4	Maximum Peak Output Power - Conducted	1930.7MHz (1.4MHz OBW / 1940.0MHz (20.0MHz OBW)	0	Pass	-
				1960.0MHz (1.4MHz, 3.0MHz, 5.0MHz, 10.0MHz, 15.0MHz, 20.0MHz OBW)	0	Pass	
				1989.3MHz (1.4MHz OBW) / 1980.0MHz (20.0MHz OBW)	0	Pass	
2.2	24.232 (d)	6.4	Peak – Average Ratio	1930.7MHz (1.4MHz OBW / 1940.0MHz (20.0MHz OBW)	0	Pass	-
				1960.0MHz (1.4MHz, 3.0MHz, 5.0MHz, 10.0MHz, 15.0MHz, 20.0MHz OBW)	0	Pass	
				1989.3MHz (1.4MHz OBW) / 1980.0MHz (20.0MHz OBW)	0	Pass	
2.3	2.1047 (d)	6.2	Modulation Characteristics	1932.5MHz (5.0MHz OBW)		N/A	-
				1960.0MHz (5.0MHz OBW)	0	Pass	
				1987.5MHz (5.0MHz OBW)		N/A	
2.4	2.1049, 24.238 (b)	RSS-Gen 4.6.1	Occupied Bandwidth	1930.7MHz (1.4MHz OBW) / 1940.0MHz (20.0MHz OBW)	0	Pass	-
				1960.0MHz (1.4MHz, 3.0MHz, 5.0MHz, 10.0MHz, 15.0MHz, 20.0MHz OBW)	0	Pass	
				1989.3MHz (1.4MHz OBW) / 1980.0MHz (20.0MHz OBW)	0	Pass	



Configuration 1 – Radio Equipment							
Section	Spec Clause		Test Description	Mode	Mod State	Result	Comments
	FCC Part 2 and 24	RSS-133 and RSS-GEN					
2.5	2.1051, 24.238 (b)	6.5	Spurious Emissions at Antenna Terminals ( $\pm 1$ MHz)	1930.7MHz (1.4MHz OBW) / 1931.5MHz (3.0MHz OBW) 1932.5MHz (5.0MHz OBW) / 1935.0MHz (10.0MHz OBW) 1937.5MHz (15.0MHz OBW) / 1940.0MHz (20.0MHz OBW)	0	Pass	-
				1960.0MHz		N/A	
				1989.3MHz (1.4MHz OBW) / 1988.5MHz (3.0MHz OBW) 1987.5MHz (5.0MHz OBW) / 1985.0MHz (10.0MHz OBW) 1982.5MHz (15.0MHz OBW) / 1980.0MHz (20.0MHz OBW)	0	Pass	
2.6	2.1053, 24.238 (a)	6.5	Radiated Spurious Emissions	1930.7MHz (1.4MHz OBW)	0	Pass	-
				1960.0MHz (1.4MHz, 3.0MHz, 5.0MHz, 10.0MHz, 15MHz, 20.0MHz OBW)	0	Pass	
				1989.3MHz (1.4MHz OBW)	0	Pass	
2.7	2.1051, 24.238 (a)	6.5	Conducted Spurious Emissions	1930.7MHz (1.4MHz OBW) / 1940.0MHz (20.0MHz OBW)	0	Pass	-
				1960.0MHz (1.4MHz, 20.0MHz OBW)	0	Pass	
				1989.3MHz (1.4MHz OBW) / 1980.0MHz (20.0MHz OBW)	0	Pass	
2.8	2.1055, 24.235	6.3	Frequency Stability Under Temperature Variations	1932.5MHz (5.0MHz OBW)		N/A	-
				1960.0MHz (5.0MHz OBW)	0	Pass	
				1987.5MHz (5.0MHz OBW)		N/A	
2.9	2.1055, 24.235	6.3	Frequency Stability Under Voltage Variations	1932.5MHz (5.0MHz OBW)		N/A	-
				1960.0MHz (5.0MHz OBW)	0	Pass	
				1987.5MHz (5.0MHz OBW)		N/A	
2.10	-	6.6	Receiver Spurious Emissions	1932.5MHz (5.0MHz OBW)	0	Pass	-
				1960.0MHz (5.0MHz OBW)	0	Pass	
				1987.5MHz (5.0MHz OBW)	0	Pass	

N/A – Not Applicable



## 1.3 DECLARATION OF BUILD STATUS

MAIN EUT	
MANUFACTURING DESCRIPTION	Radio Equipment
MANUFACTURER	Ericsson AB
PRODUCT NAME	RRUS 11 B2
PART NUMBER	KRC 161 276/2
IC Model Number	AS1612762
SERIAL NUMBER	C825336870
HARDWARE VERSION	R1A
SOFTWARE VERSION	CXP9017316%1_R39SS
TRANSMITTER OPERATING RANGE	TX: 1930MHz - 1990MHz RX: 1850MHz - 1910MHz
DUPLEXER MODE	FDD
MODULATIONS	QPSK, 16QAM, 64QAM
INTERMEDIATE FREQUENCIES	--
ITU DESIGNATION OF EMISSION	1M40F9W 3M00F9W 5M00F9W 10M0F9W 15M0F9W 20M0F9W
SUPPORTED CHANNEL BANDWIDTH CONFIGURATION	1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz and 20MHz according to 3GPP TS 36.141
OUTPUT POWER (RMS) (W or dBm)	2 x 46dBm (2 x 40W)
NUMBER OF ANTENNA PORTS	2 TX/RX ports
SUPPORTED CONFIGURATION	Dual Single Carrier. Both RF chains are identical
FCC ID	TA8AKRC161276-2
IC ID	287AB-AS1612762
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	The equipment is the Radio Part of LTE Base Station.

Signature

Date

28 October 2011

D of B S Serial No

75915702/01

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



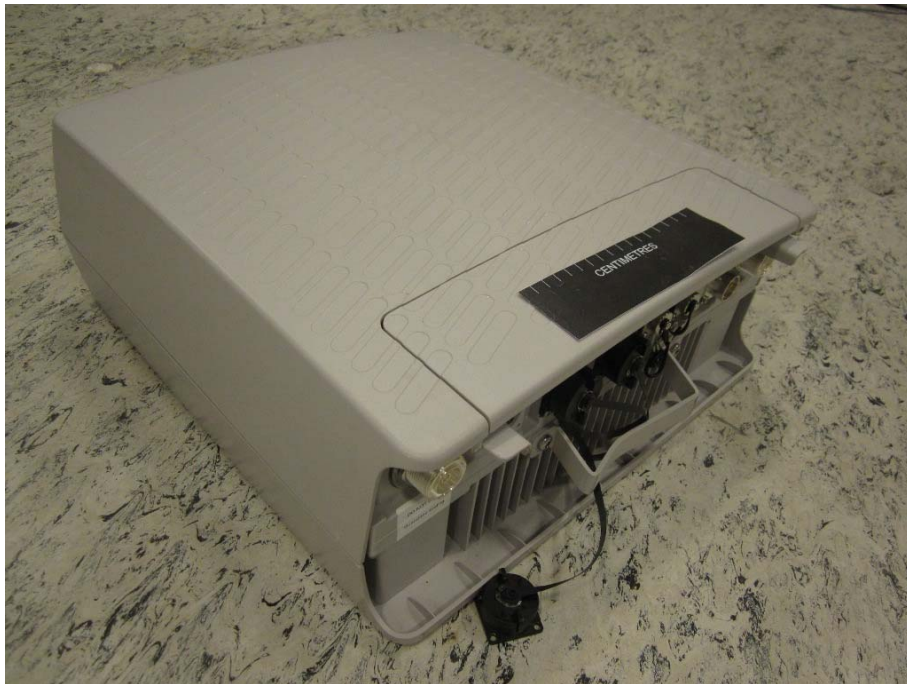


## 1.4 PRODUCT INFORMATION

### 1.4.1 Technical Description

The Equipment Under Test (EUT) RRUS 11 B2 / KRC 161 276/2 is an Ericsson Radio Equipment working in the public mobile service 1900MHz band which operates in LTE mode. The RRUS 11 B2 / KRC 161 276/2 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 24 and Industry Canada RSS-133.

The RRUS 11 B2 / KRC 161 276/2 supports Test Models E-TM1.1, E-TM3.2 and E-TM3.1 at 1900MHz defined in 3GPP TS 36.141. Test Model E-TM1.1 was used to represent QPSK modulation only, Test Model E-TM3.2 was used to represent 16QAM modulation, and Test Model E-TM3.1 was used to represent 64QAM modulation.

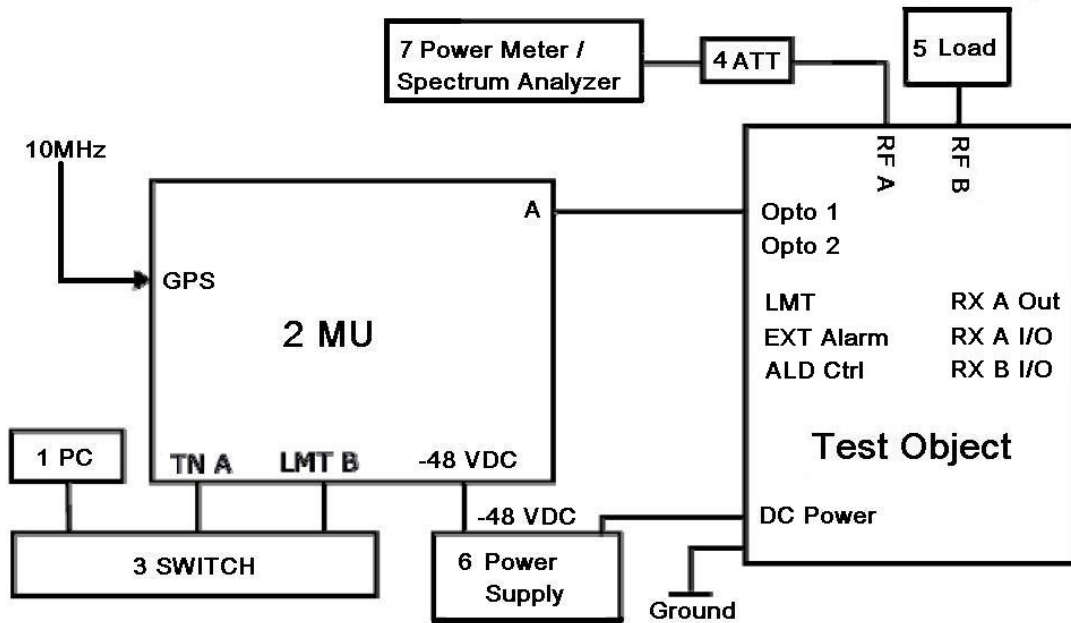
The settings below were found to be representative for all traffic scenarios when several settings with the different modulations, channel bandwidths were tested to find the worst case setting. These settings were used for all measurements if not otherwise noted:

- Test Model E-TM1.1 in channel bandwidth 1.4MHz and 20MHz.

The EUT has two TX/RX ports and it can be configured to transmit in 1900MHz with both TX are active. 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. RX testing was performed on the RX connector RF B of the EUT when the EUT was set as single Transmitter.

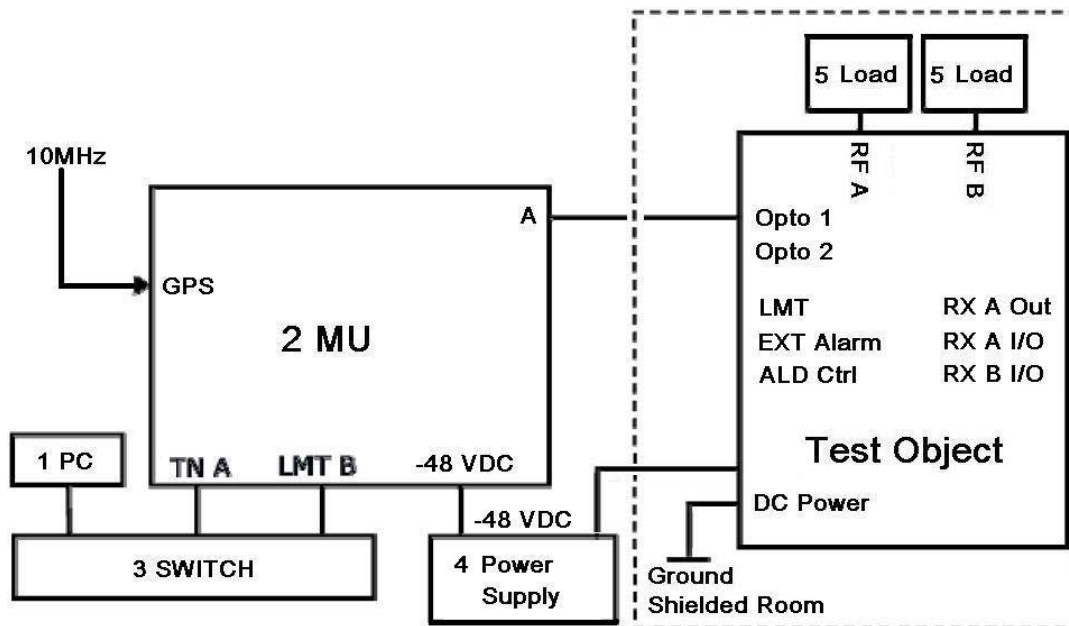
The complete testing was performed with the EUT transmitting at maximum RF power unless otherwise stated.

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 B2 / KRC 161 276/2	R1A	C825336870

No.	Auxiliary Equipment	Part Number / Model Type	Version	Serial Number
1	Computer	HP EliteBook 6930p	--	2CE0090RQQ
2	RBS 6601	BFL 901 009/1	--	--
	DUL 20 01	KDU 137 533/4	R1C	C824321509
	SUP 6601	1/BFL 901 009/1	R3B	BR81262547
3	Switch	TESF1008+	V4.2	11328413308
4	Attenuator	48-40-43-LIM	--	BR5020
5	Load	TF100	--	09121602
6	Power Supply	DH1716-5D	--	200360033
	Power Supply	DH1716A-14	--	20080401
7	Power Meter	Rohde & Schwarz NRP	--	102438
	Thermal Power Sensor	Rohde & Schwarz NRP-Z51	--	102431
	Spectrum Analyzer	FSQ26	--	201124

**Test Setup, Radiated Measurement:**

Test Object	Part Number	Version	Serial Number
Radio Part	RRUS 11 B2 / KRC 161 276/2	R1A	C825336870

No.	Auxiliary Equipment	Part Number / Model Type	Version	Serial Number
1	Computer	HP EliteBook 6930p	--	2CE0090RQQ
2	RBS 6601	BFL 901 009/1	--	--
	DUL 20 01	KDU 137 533/4	R1C	C824321509
	SUP 6601	1/BFL 901 009/1	R3B	BR81262547
3	Switch	TESF1008+	V4.2	11328413308
4	Power Supply	DH1716-5D	--	200360033
5	Load	TF100	--	09121602
	Load	TF100	--	09121631



### 1.4.3 Modes of Operation

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

Bottom Channel :

Mode 1 - 1.4 : EARFCN 607: 1930.7MHz (1.4MHz Bandwidth)

Mode 1 - 3 : EARFCN 615: 1931.5MHz (3.0MHz Bandwidth)

Mode 1 - 5 : EARFCN 625: 1932.5MHz (5.0MHz Bandwidth)

Mode 1 - 10 : EARFCN 650: 1935.0MHz (10.0MHz Bandwidth)

Mode 1 - 15 : EARFCN 675: 1937.5MHz (15.0MHz Bandwidth)

Mode 1 - 20 : EARFCN 700: 1940.0MHz (20.0MHz Bandwidth)

Middle Channel :

Mode 2 : EARFCN 900: 1960.0MHz

Top Channel :

Mode 3 - 1.4 : EARFCN 1193: 1989.3MHz (1.4MHz Bandwidth)

Mode 3 - 3 : EARFCN 1185: 1988.5MHz (3.0MHz Bandwidth)

Mode 3 - 5 : EARFCN 1175: 1987.5MHz (5.0MHz Bandwidth)

Mode 3 - 10 : EARFCN 1150: 1985.0MHz (10.0MHz Bandwidth)

Mode 3 - 15 : EARFCN 1125: 1982.5MHz (15.0MHz Bandwidth)

Mode 3 - 20 : EARFCN 1100: 1980.0MHz (20.0MHz Bandwidth)

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**

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:

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



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## **SECTION 2**

### **TEST DETAILS**

FCC and Industry Canada Testing of the  
Ericsson RRUS 11 B2 / KRC 161 276/2



Product Service

## **2.1 MAXIMUM PEAK OUTPUT POWER - CONDUCTED**

### **2.1.1 Specification Reference**

FCC CFR 47 Part 2, Clause 2.1046  
FCC CFR 47 Part 24, Clause 24.232 (a)  
Industry Canada RSS-133, Clause 6.4

### **2.1.2 Equipment Under Test**

RRUS 11 B2 / KRC 161 276/2, S/N: C825336870

### **2.1.3 Date of Test and Modification State**

17 October 2011 – 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 24 and Industry Canada RSS-133.

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 E-TM1.1, E-TM3.2 and E-TM3.1 test models.

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 - 1.4, Mode 1 - 20  
- Mode 2 (1.4MHz, 3.0MHz, 5.0MHz, 10.0MHz, 15.0MHz, 20MHz OBW)  
- Mode 3 - 1.4, Mode 3 - 20

### **2.1.6 Environmental Conditions**

17 October 2011

Ambient Temperature 23.2°C

Relative Humidity 20.5%





### 2.1.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 24 and Industry Canada RSS-133 for Maximum Peak Output Power.

The test results are shown below

#### **E-TM1.1: 1.4MHz Bandwidth**

##### **Configuration 1 - Mode 1 - 1.4, Mode 2 and Mode 3 - 1.4**

EARFCN	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
607 (Bottom)	1930.7	41.5	45.73	37.41
900 (Middle)	1960.0	41.5	45.90	38.90
1193 (Top)	1989.3	41.5	45.76	37.67

#### **E-TM1.1: 20.0MHz Bandwidth**

##### **Configuration 1 - Mode 1 - 20, Mode 2 and Mode 3 - 20**

EARFCN	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
700 (Bottom)	1940.0	41.5	45.74	37.50
900 (Middle)	1960.0	41.5	45.71	37.24
1100 (Top)	1980.0	41.5	45.70	37.15

#### **E-TM1.1: 3.0MHz, 5.0MHz, 10.0MHz and 15.0MHz Bandwidth**

##### **Configuration 1 - Mode 2**

EARFCN	Frequency (MHz)	BW Configuration (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
900 (Middle)	1960.0	3.0	41.5	45.93	39.17
		5.0	41.5	45.88	38.73
		10.0	41.5	45.82	38.19
		15.0	41.5	45.76	37.67

**E-TM3.2 and E-TM3.1: 1.4MHz Bandwidth****Configuration 1 - Mode 2**

EARFCN	Frequency (MHz)	Test Model	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
900 (Middle)	1960.0	E-TM3.2	41.5	45.88	38.73
		E-TM3.1	41.5	45.86	38.55

**E-TM3.2 and E-TM3.1: 20.0MHz Bandwidth****Configuration 1 - Mode 2**

EARFCN	Frequency (MHz)	Test Model	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
900 (Middle)	1960.0	E-TM3.2	41.5	45.73	37.41
		E-TM3.1	41.5	45.76	37.67

Limit	$\leq 100W$ or $\leq +50dBm$
-------	------------------------------

**Remarks**

The EUT does not exceed 100W or 50dBm at the measured frequencies.



Product Service

## 2.2 PEAK – AVERAGE RATIO

### 2.2.1 Specification Reference

FCC CFR 47 Part 24, Clause 24.232 (d)  
Industry Canada RSS-133, Clause 6.4

### 2.2.2 Equipment Under Test

RRUS 11 B2 / KRC 161 276/2, S/N: C825336870

### 2.2.3 Date of Test and Modification State

17 and 18 October 2011 – 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 24 and Industry Canada RSS-133.

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 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 - 1.4, Mode 1 - 20  
- Mode 2 (1.4MHz, 3.0MHz, 5.0MHz, 10.0MHz, 15.0MHz, 20MHz OBW)  
- Mode 3 - 1.4, Mode 3 - 20

### 2.2.6 Environmental Conditions

	17 October 2011	18 October 2011
Ambient Temperature	23.2°C	22.5°C
Relative Humidity	20.5%	43.0%



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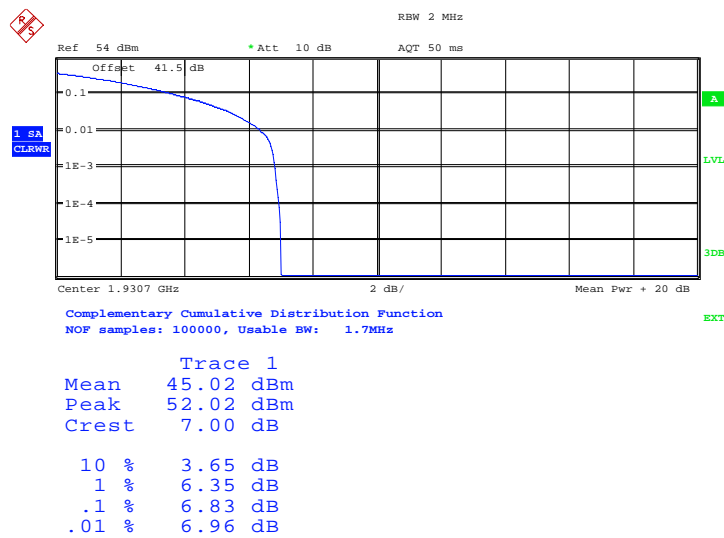
## 2.2.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 24 and Industry Canada RSS-133 for Peak – Average Ratio.

The test results are shown below.

### Configuration 1 - Mode 1 - 1.4

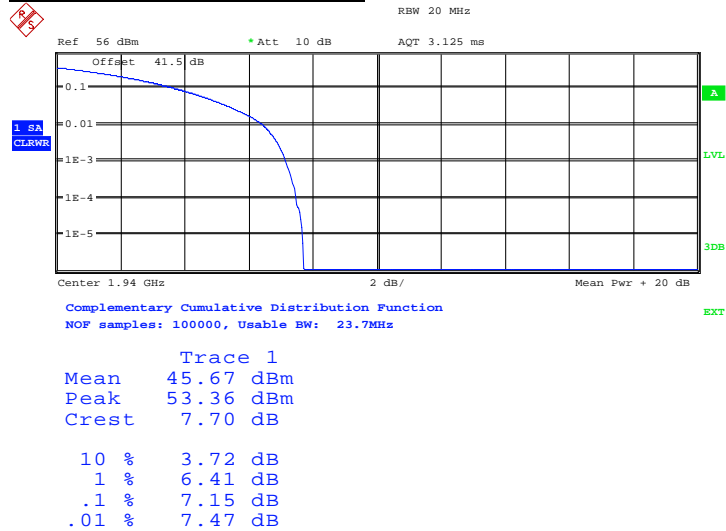
#### E-TM1.1: 1.4MHz Bandwidth



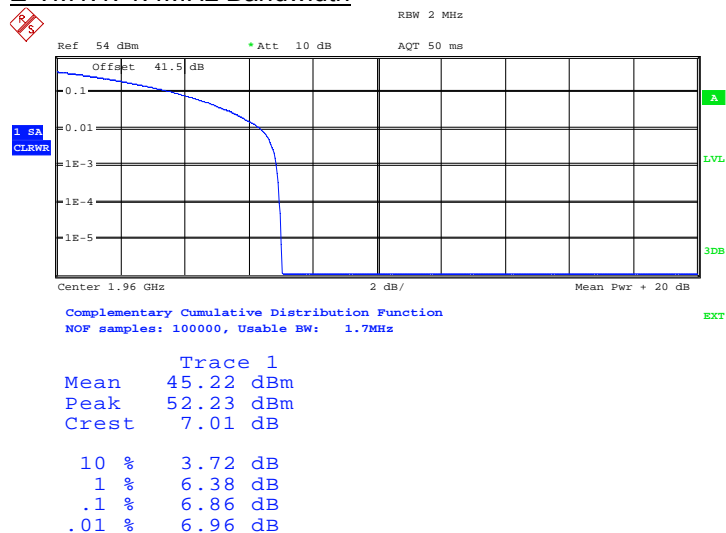
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**Configuration 1 - Mode 1 – 20****E-TM1.1: 20.0MHz Bandwidth**

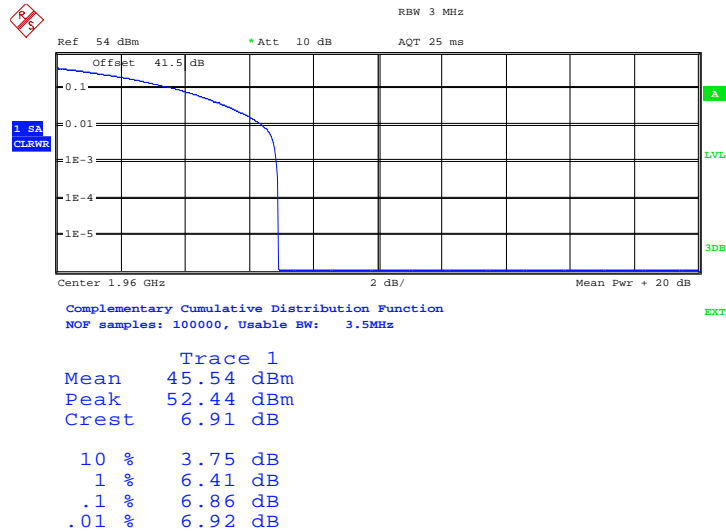
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**Configuration 1 - Mode 2****E-TM1.1: 1.4MHz Bandwidth**

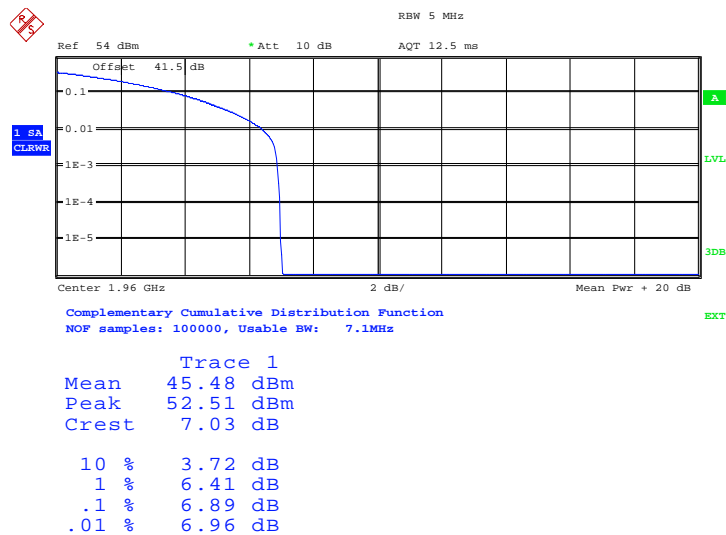
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Product Service

E-TM1.1; 3.0MHz Bandwidth

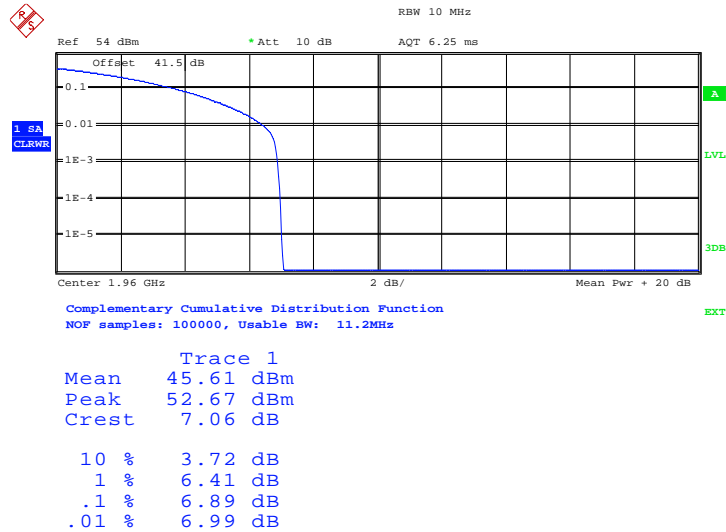
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E-TM1.1; 5.0MHz Bandwidth

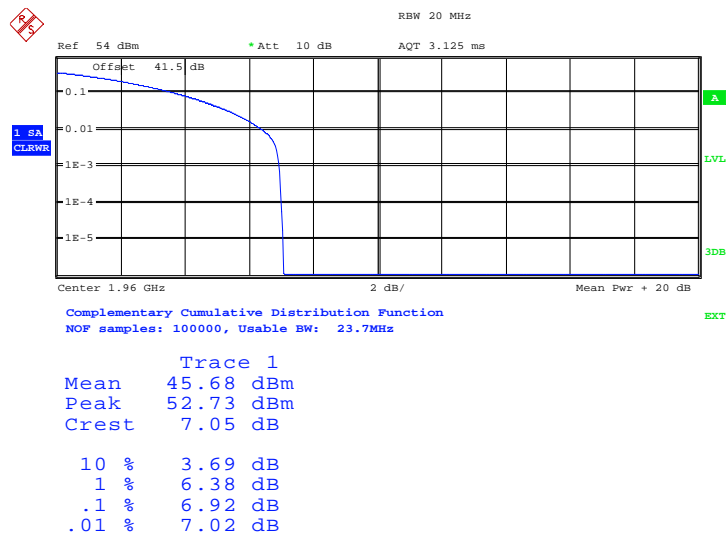
Date: 17.OCT.2011 11:01:26



Product Service

E-TM1.1; 10.0MHz Bandwidth

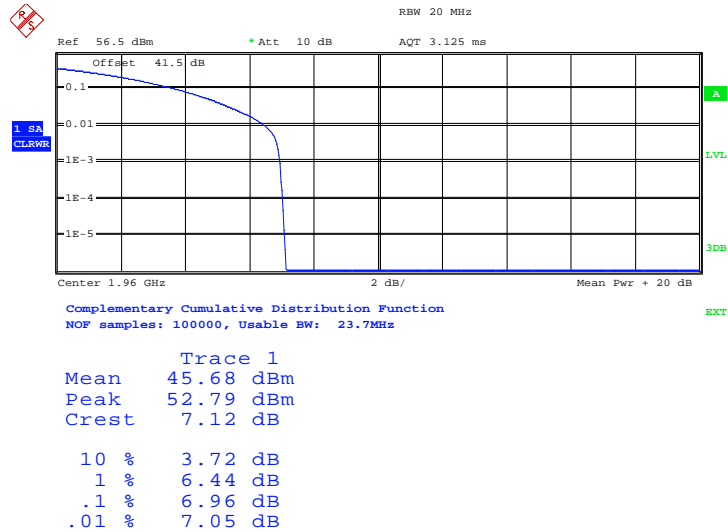
Date: 17.OCT.2011 11:05:05

E-TM1.1; 15.0MHz Bandwidth

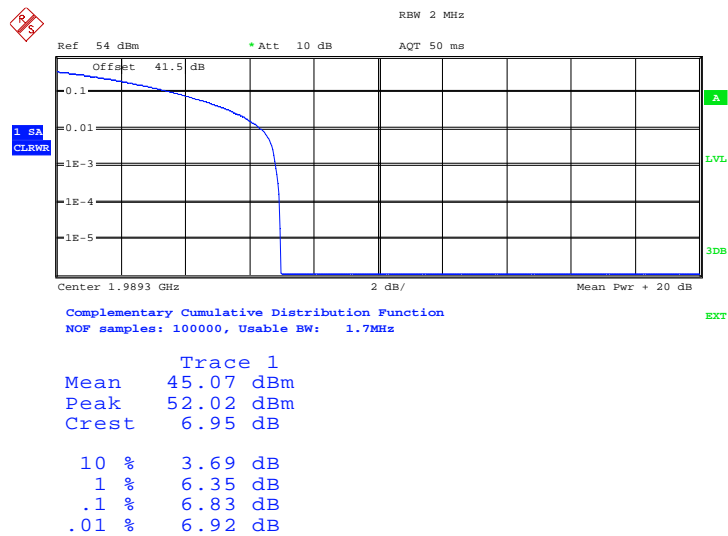
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Product Service

**E-TM1.1: 20.0MHz Bandwidth**

Date: 17.OCT.2011 08:17:10

**Configuration 1 - Mode 3 - 1.4****E-TM1.1: 1.4MHz Bandwidth**

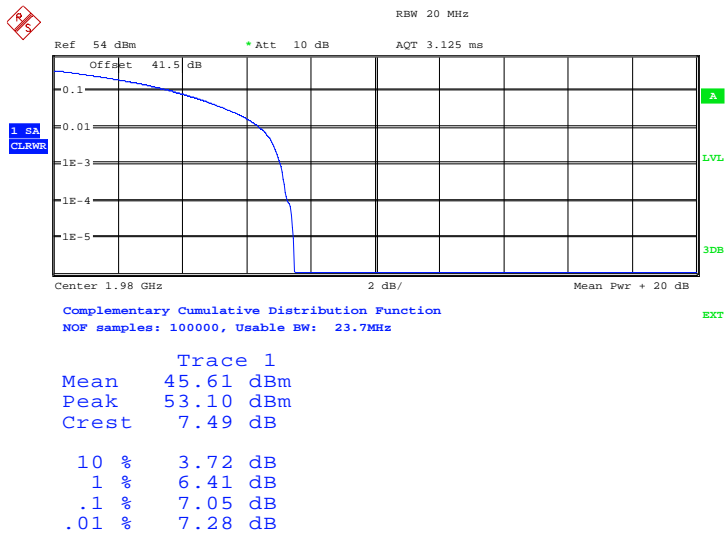
Date: 17.OCT.2011 10:30:18

**Configuration 1 - Mode 3 - 20****E-TM1.1: 20.0MHz Bandwidth**





Product Service



Date: 17.OCT.2011 09:02:55

Limit	13dB
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Remarks

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



Product Service

## **2.3 MODULATION CHARACTERISTICS**

### **2.3.1 Specification Reference**

FCC CFR 47 Part 2, Clause 2.1047 (d)  
Industry Canada RSS-133 Clause 6.2

### **2.3.2 Equipment Under Test**

RRUS 11 B2 / KRC 161 276/2, S/N: C825336870

### **2.3.3 Date of Test and Modification State**

18 October 2011 – 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-133.

Connect the RF output connector RF A to a spectrum analyzer with an attenuator. The other connector 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 QPSK, 16QAM and 64QAM modulations and was tested in 5MHz Bandwidth.

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

Configuration 1 - Mode 2 (5.0MHz OBW)

### **2.3.5 Environmental Conditions**

18 October 2011

Ambient Temperature 22.5°C

Relative Humidity 43.0%



Product Service

### 2.3.6 Test Result

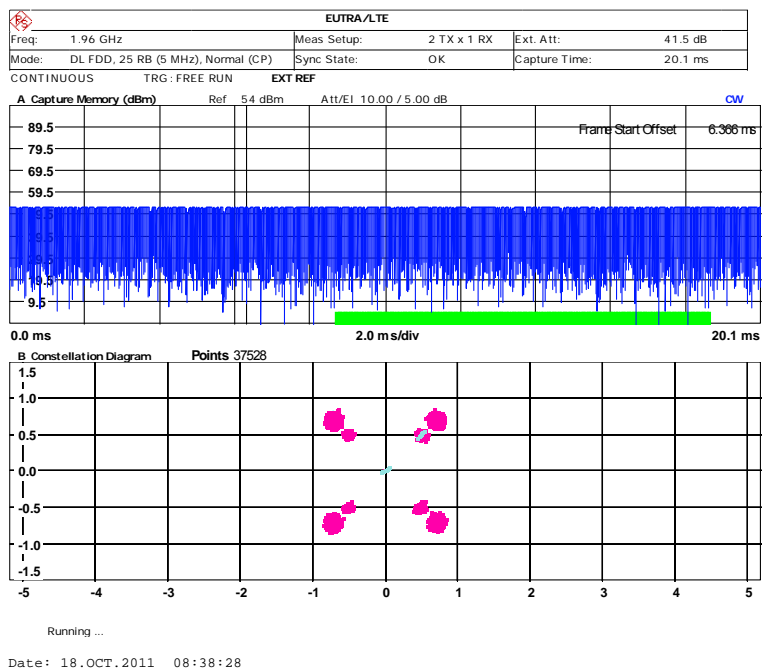
Plots are shown on the following page showing the EUT transmitting with all of the modulations:

The test results are shown below

#### Configuration 1 - Mode 2

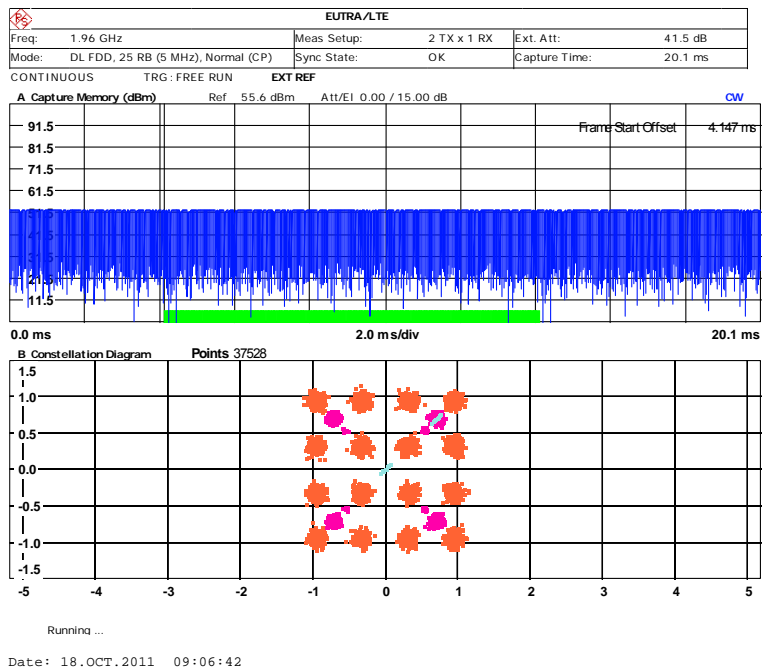
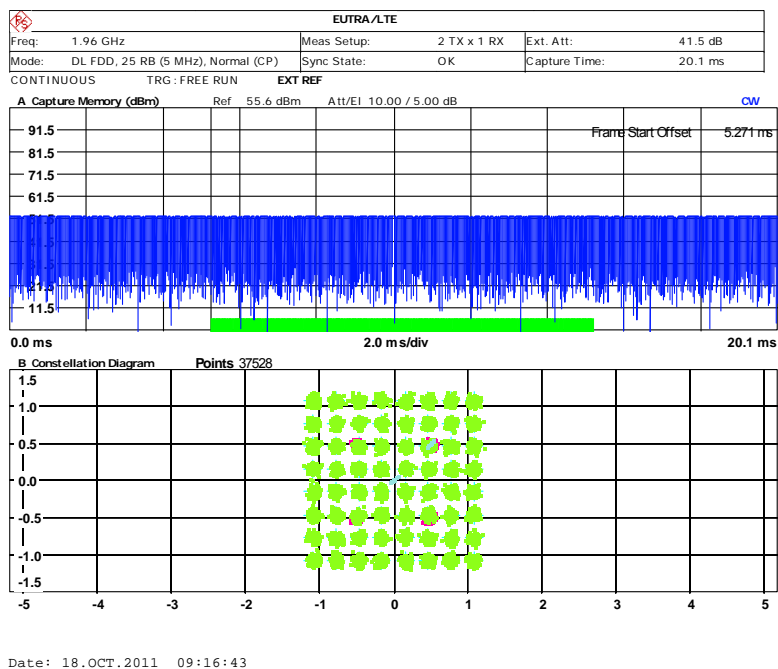
#### 5.0MHz Bandwidth

E-TM1.1: EUT transmitting with QPSK modulation in:





Product Service

E-TM3.2: EUT transmitting with 16QAM modulation:E-TM3.1: EUT transmitting with 64QAM modulation:



Product Service

## **2.4 OCCUPIED BANDWIDTH**

### **2.4.1 Specification Reference**

FCC CFR 47 Part 2, Clause 2.1049 (h)  
 FCC CFR 47 Part 24, Clause 24.238 (b)  
 Industry Canada RSS-GEN, Clause 4.6.1

### **2.4.2 Equipment Under Test**

RRUS 11 B2 / KRC 161 276/2, S/N: C825336870

### **2.4.3 Date of Test and Modification State**

17 and 18 October 2011 – 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 24 and Industry Canada RSS-GEN.

The EUT was transmitting at maximum power, modulated using the test models E-TM1.1, E-TM3.2 and E-TM3.1. The EUT was tested in the 6 supported bandwidths. At least 1% of the emission bandwidths were used for the resolution bandwidth.

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 - 1.4, Mode 1 - 20  
                           - Mode 2 (1.4MHz, 3.0MHz, 5.0MHz, 10.0MHz, 15.0MHz, 20MHz OBW)  
                           - Mode 3 - 1.4, Mode 3 - 20

### **2.4.6 Environmental Conditions**

	17 October 2011	18 October 2011
Ambient Temperature	23.2°C	22.5°C
Relative Humidity	20.5%	43.0%



### 2.4.7 Test Results

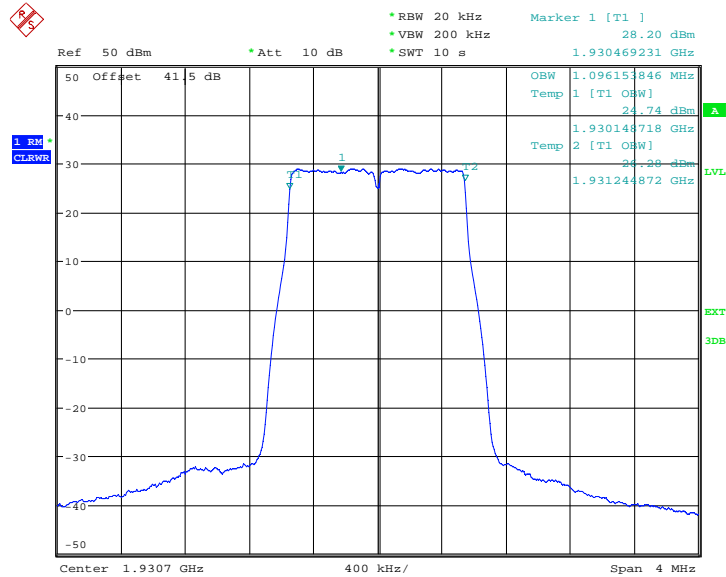
For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 24 and Industry Canada RSS-GEN for Occupied Bandwidth.

The test results are shown below

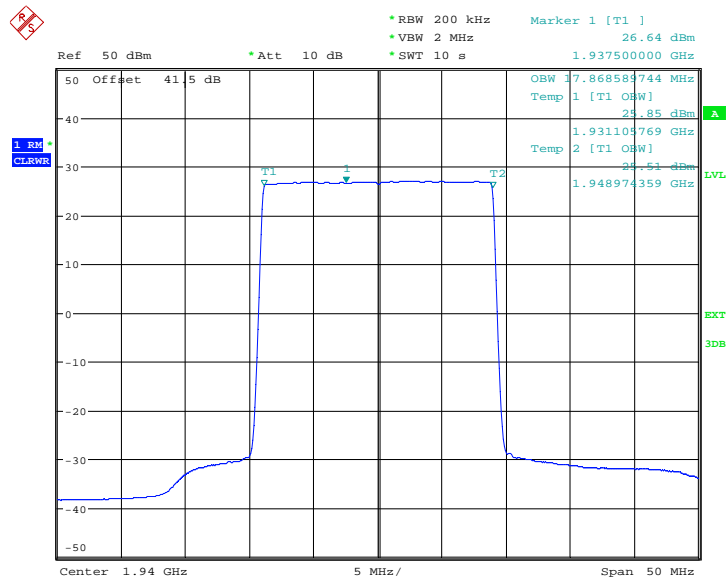
Test Model	BW configuration (MHz)	Frequency (MHz) / Channel	Occupied Bandwidth (MHz)
E-TM1.1	1.4	1930.7 (Bottom)	1.10
	20.0	1940.0 (Bottom)	17.87
	1.4	1960.0 (Middle)	1.10
	3.0	1960.0 (Middle)	2.70
	5.0	1960.0 (Middle)	4.47
	10.0	1960.0 (Middle)	8.97
	15.0	1960.0 (Middle)	13.41
	20.0	1960.0 (Middle)	17.87
	1.4	1989.3 (Top)	1.10
	20.0	1980.0 (Top)	17.87
E-TM3.2	1.4	1960.0 (Middle)	1.10
	20.0	1960.0 (Middle)	17.89
E-TM3.1	1.4	1960.0 (Middle)	1.09
	20.0	1960.0 (Middle)	17.87



Product Service

**E-TM1.1****Configuration 1 - Mode 1 - 1.4****1.4MHz Bandwidth**

Date: 17.OCT.2011 10:08:32

**Configuration 1 - Mode 1 - 20****20.0MHz Bandwidth**

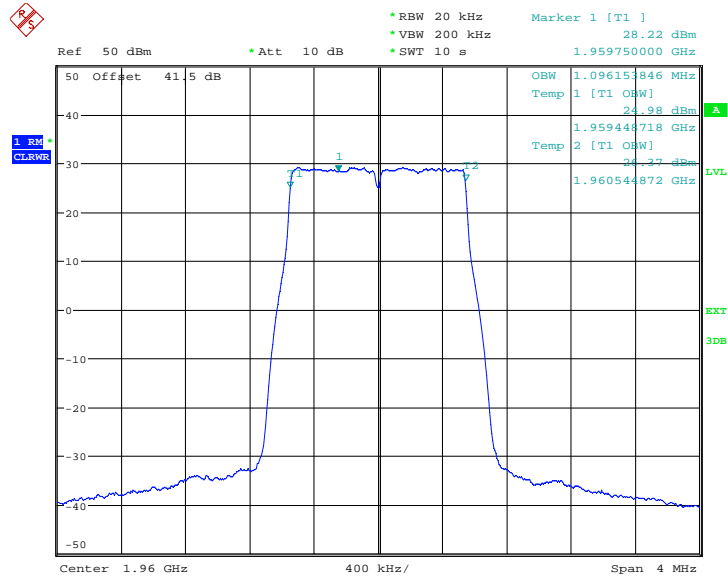
Date: 17.OCT.2011 08:57:18



Product Service

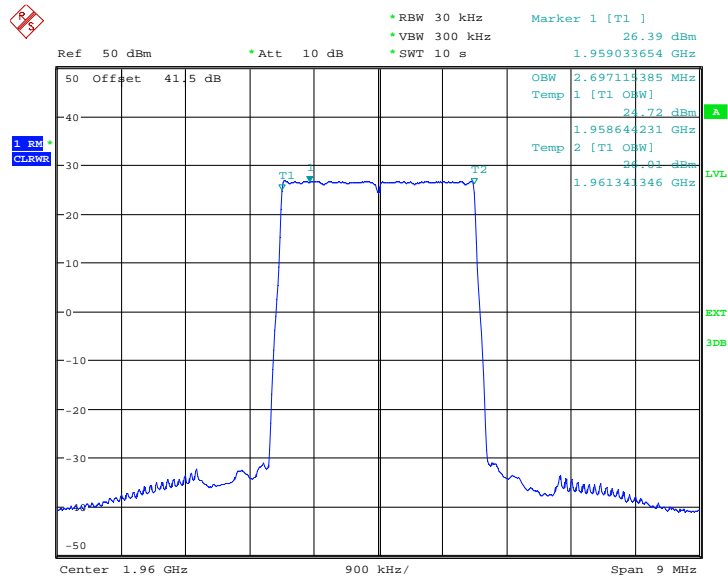
## Configuration 1 - Mode 2

### 1.4MHz Bandwidth



Date: 17.OCT.2011 10:16:04

### 3.0MHz Bandwidth

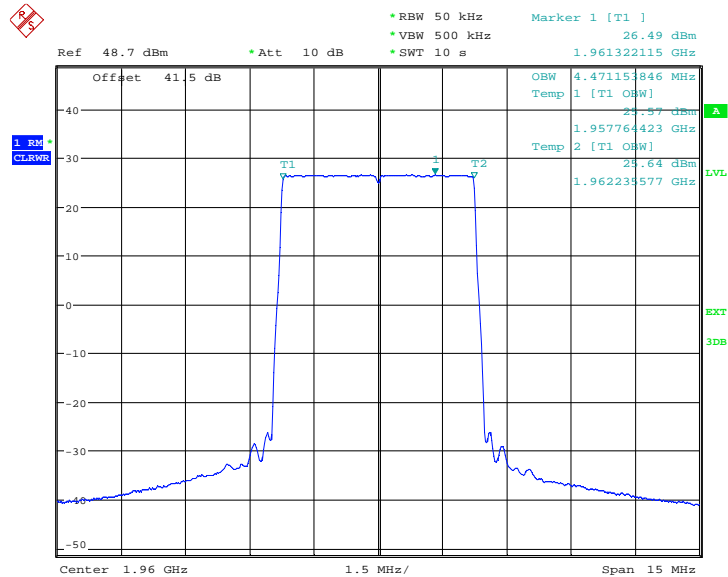


Date: 17.OCT.2011 10:40:51



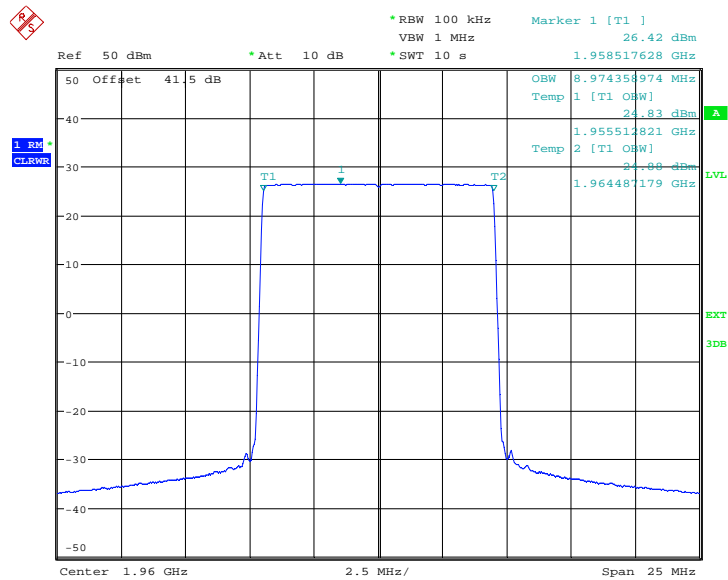


### 5.0MHz Bandwidth



Date: 17.OCT.2011 10:55:53

### 10.0MHz Bandwidth

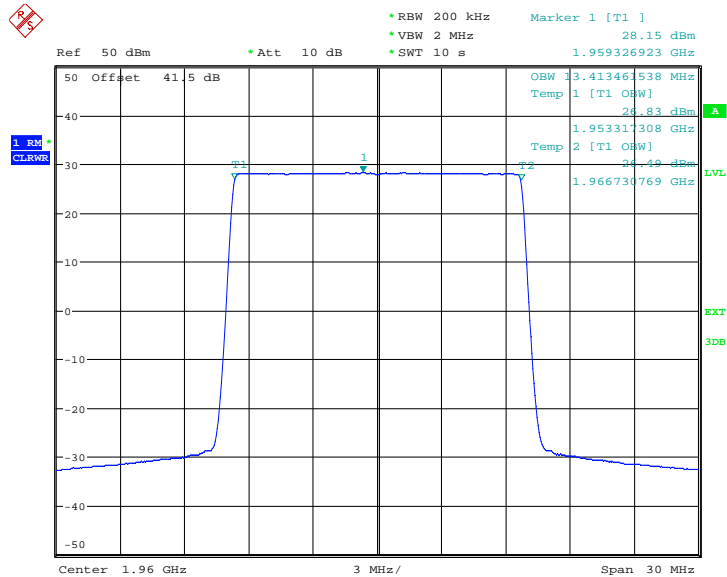


Date: 17.OCT.2011 11:08:37



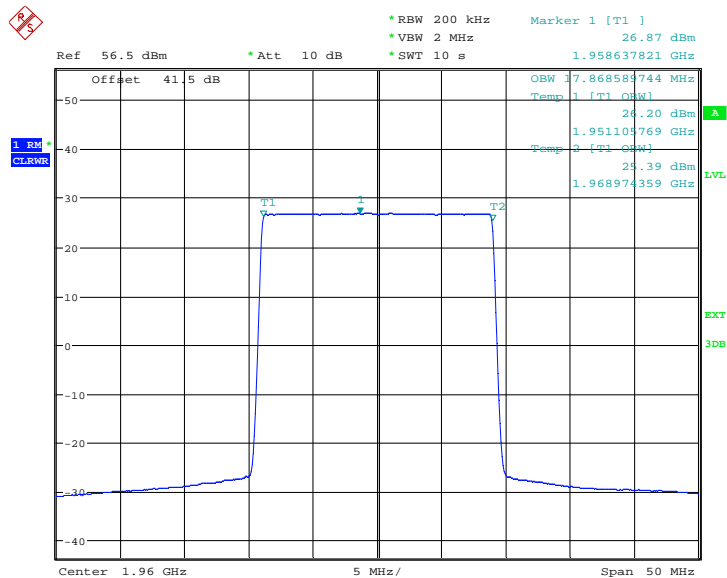
Product Service

### 15.0MHz Bandwidth



Date: 18.OCT.2011 04:54:25

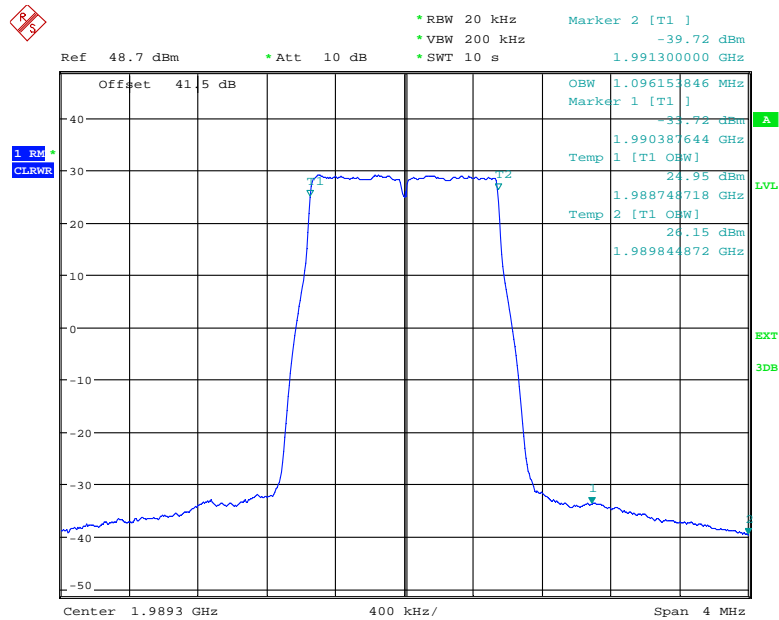
### 20.0MHz Bandwidth



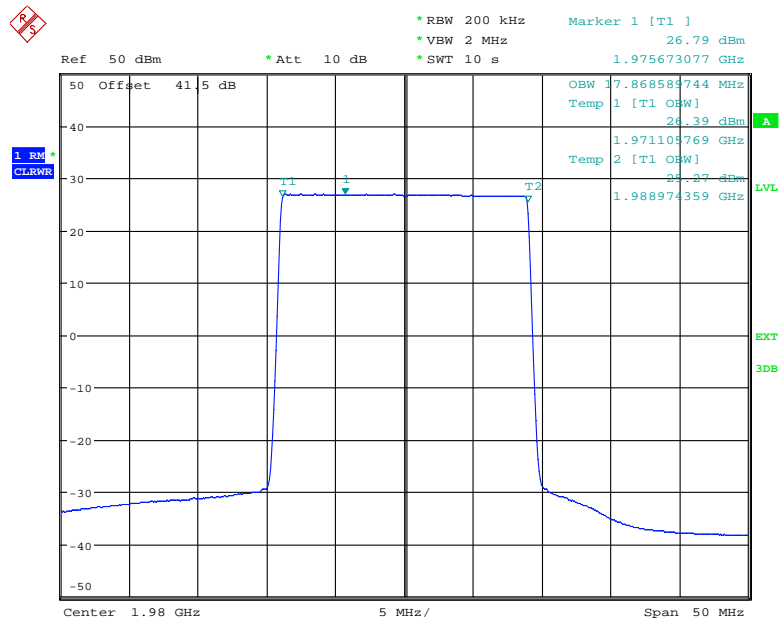
Date: 17.OCT.2011 08:21:38



Product Service

**Configuration 1 - Mode 3 - 1.4****1.4MHz Bandwidth**

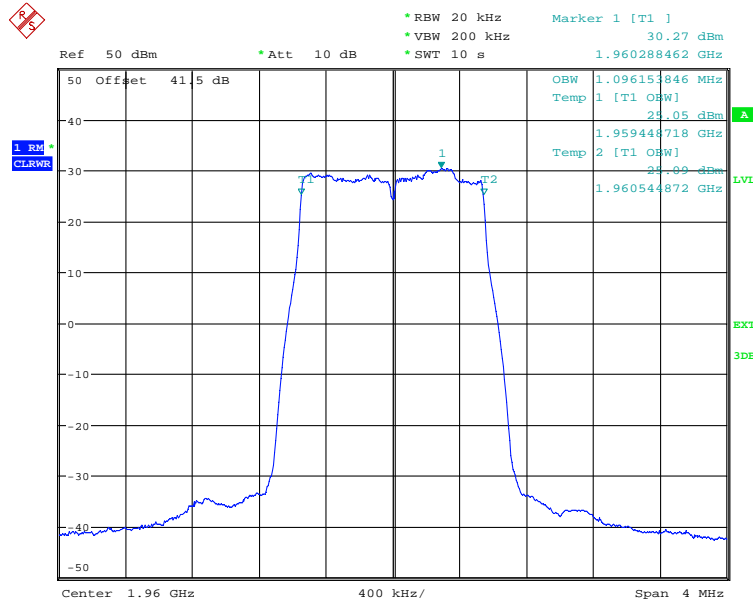
Date: 17.OCT.2011 10:29:36

**Configuration 1 - Mode 3 - 20****20.0MHz Band**

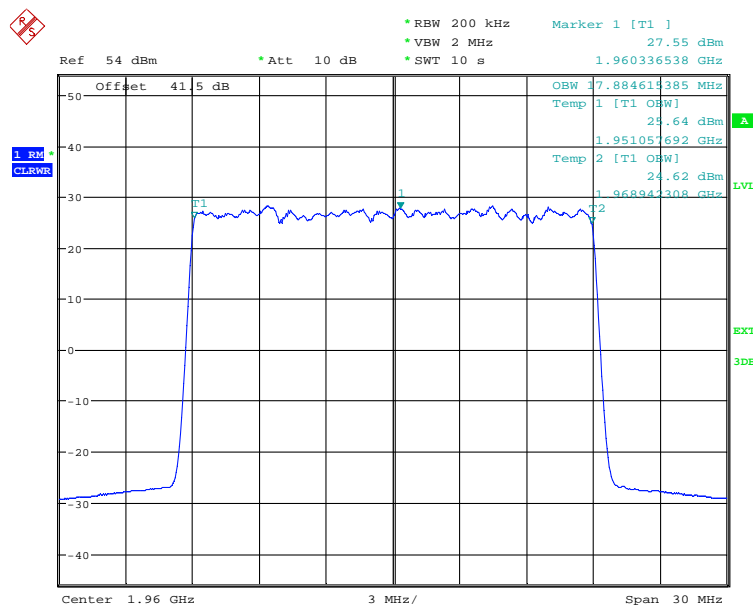
Date: 17.OCT.2011 09:04:59



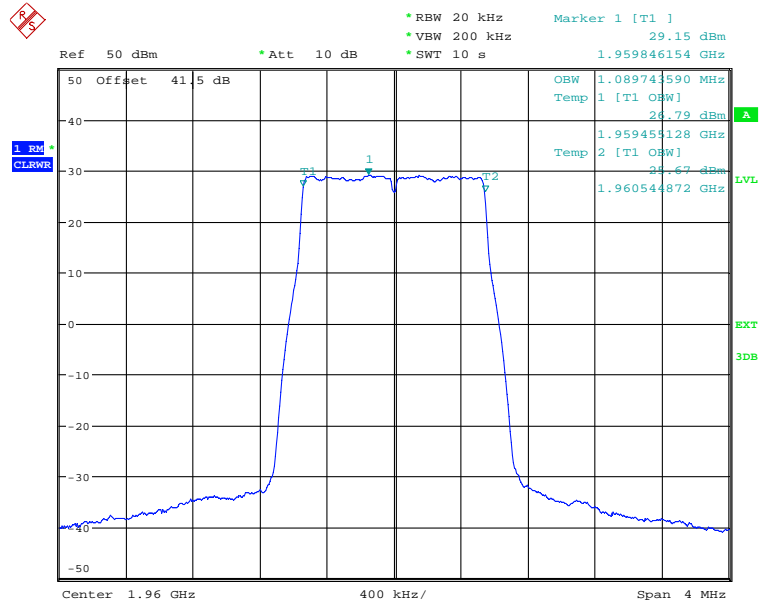
Product Service

**E-TM3.2****Configuration 1 - Mode 2****1.4MHz Bandwidth**

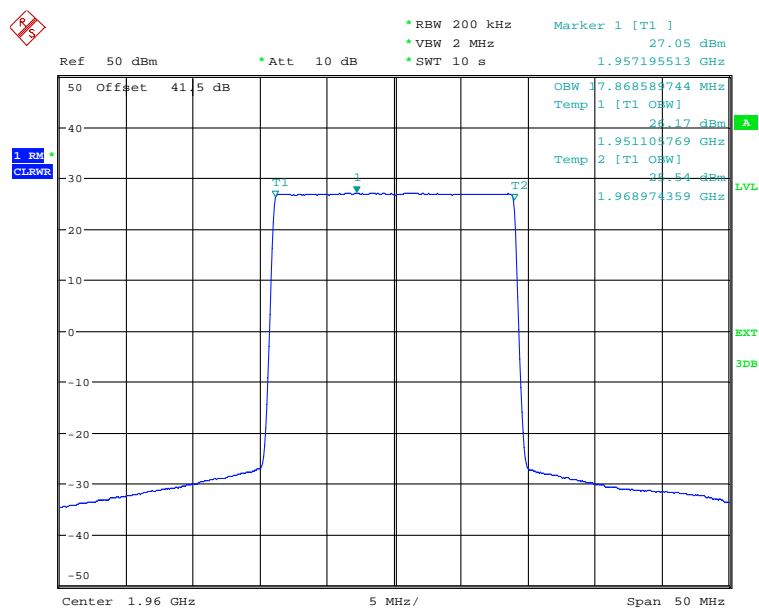
Date: 18.OCT.2011 05:30:52

**Configuration 1 - Mode 2****20MHz Bandwidth**

Date: 18.OCT.2011 07:43:00

**E-TM3.1****Configuration 1 - Mode 2****1.4MHz Bandwidth**

Date: 18.OCT.2011 05:40:27

**Configuration 1 - Mode 2****20MHz Bandwidth**

Date: 18.OCT.2011 08:20:06





## 2.5.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 24 and Industry Canada RSS-133 for Spurious Emissions Antenna Terminals ( $\pm 1$  MHz)

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

### ETM1.1

Bandwidth: 1.4MHz

Configuration 1 - Mode 1 - 1.4 and Mode 3 - 1.4

Band Edge Frequency	Bottom 1930 MHz	Top 1990 MHz	RBW / VBW (Hz)
Edge Test with 1.4MHz Bandwidth Channel No./Frequencies	Channel: 607 Frequency: 1930.7 MHz	Channel: 1193 Frequency: 1989.3 MHz	20k / 200k

Bandwidth: 3.0MHz

Configuration 1 - Mode 1 - 3 and Mode 3 - 3

Band Edge Frequency	Bottom 1930 MHz	Top 1990 MHz	RBW / VBW (Hz)
Edge Test with 3.0MHz Bandwidth Channel No./Frequencies	Channel: 615 Frequency: 1931.5 MHz	Channel: 1185 Frequency: 1988.5MHz	30k / 300k

Bandwidth: 5.0MHz

Configuration 1 - Mode 1 - 5 and Mode 3 - 5

Band Edge Frequency	Bottom 1930 MHz	Top 1990 MHz	RBW / VBW (Hz)
Edge Test with 5.0MHz Bandwidth Channel No./Frequencies	Channel: 625 Frequency: 1932.5 MHz	Channel: 1175 Frequency: 1987.5 MHz	50k / 500k

Bandwidth: 10.0MHzConfiguration 1 - Mode 1 - 10 and Mode 3 - 10

Band Edge Frequency	Bottom 1930 MHz	Top 1990 MHz	RBW / VBW (Hz)
Edge Test with 10.0MHz Bandwidth Channel No./Frequencies	Channel: 650 Frequency: 1935.0 MHz	Channel: 1150 Frequency: 1985.0 MHz	100k / 1M

Bandwidth: 15.0MHzConfiguration 1 - Mode 1 - 15 and Mode 3 - 15

Band Edge Frequency	Bottom 1930 MHz	Top 1990 MHz	RBW / VBW (Hz)
Edge Test with 15.0MHz Bandwidth Channel No./Frequencies	Channel: 675 Frequency: 1937.5 MHz	Channel: 1125 Frequency: 1982.5 MHz	200k / 2M

Bandwidth: 20.0MHzConfiguration 1 - Mode 1 - 20 and Mode 3 - 20

Band Edge Frequency	Bottom 1930 MHz	Top 1990 MHz	RBW / VBW (Hz)
Edge Test with 20.0MHz Bandwidth Channel No./Frequencies	Channel: 700 Frequency: 1940.0 MHz	Channel: 1100 Frequency: 1980.0 MHz	200k / 2M

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.



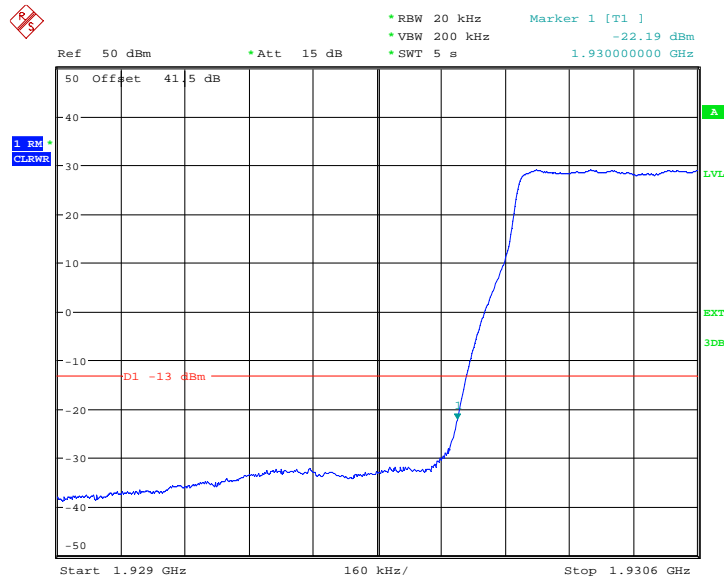


The test results are shown below

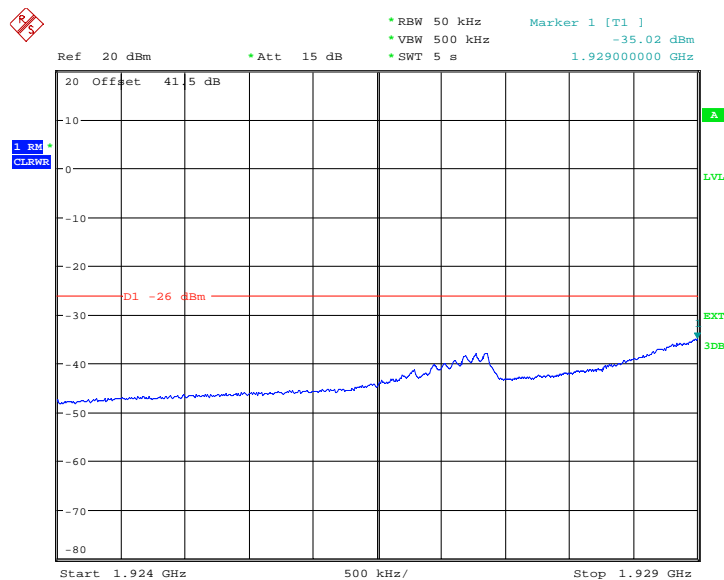
### E-TM1.1

### 1.4MHz Bandwidth

### Configuration 1 - Mode 1 - 1.4



Date: 19.OCT.2011 05:13:49

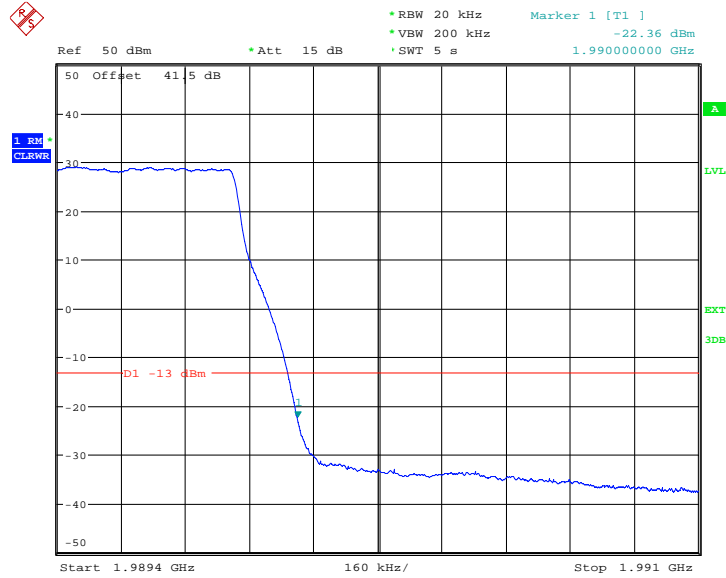


Date: 19.OCT.2011 05:15:05

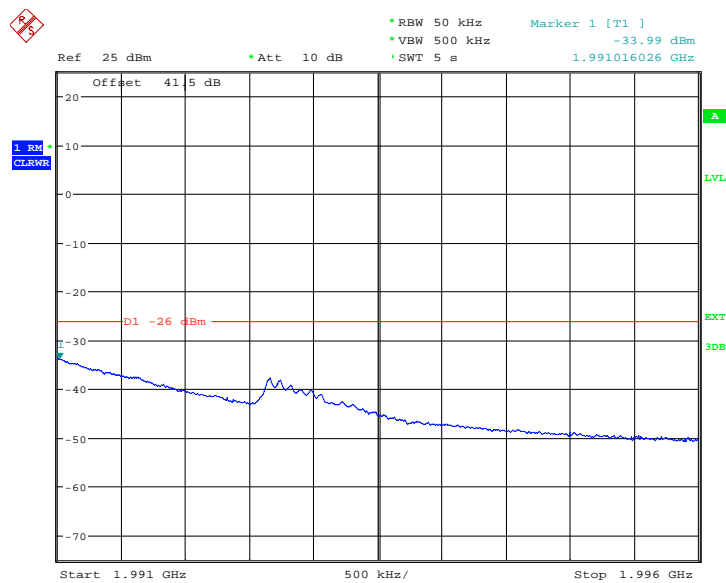


Product Service

### Configuration 1 - Mode 3 - 1.4



Date: 19.OCT.2011 05:20:24



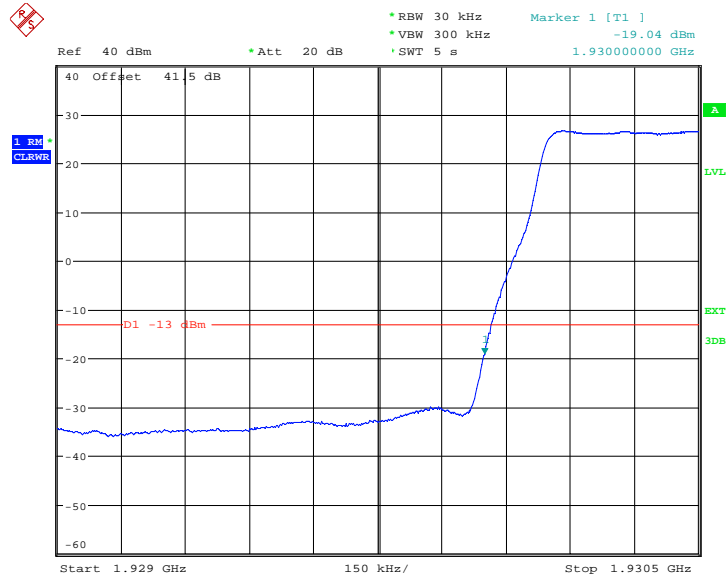
Date: 19.OCT.2011 05:18:48



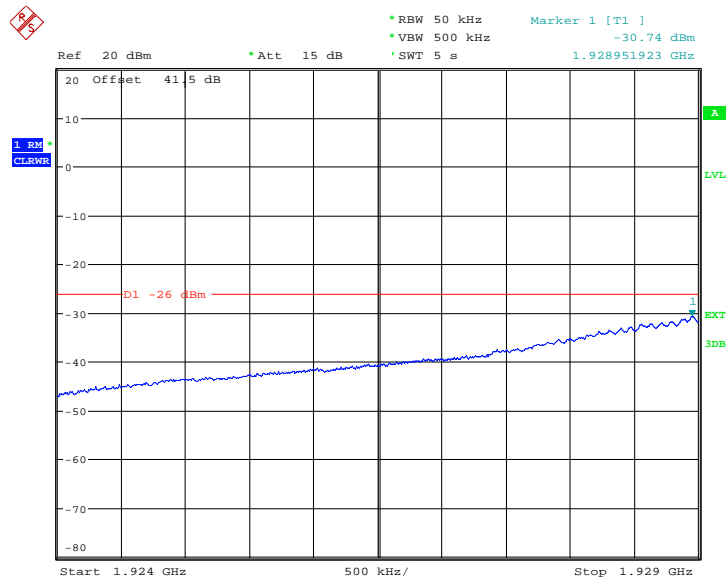
Product Service

### 3.0MHz Bandwidth

#### Configuration 1 - Mode 1 - 3



Date: 19.OCT.2011 05:02:31

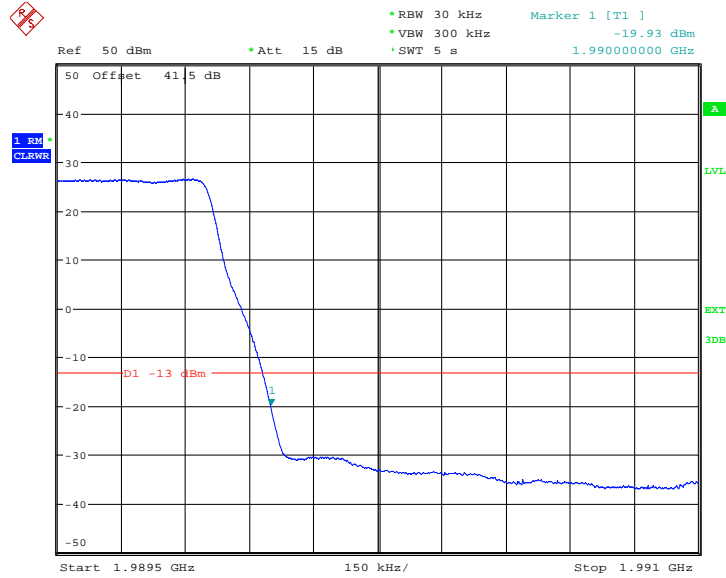


Date: 19.OCT.2011 04:47:45

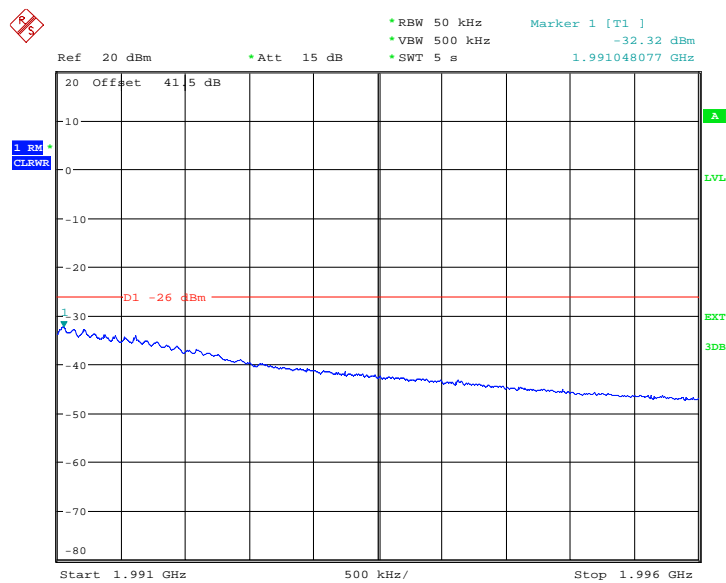


Product Service

### Configuration 1 - Mode 3 - 3



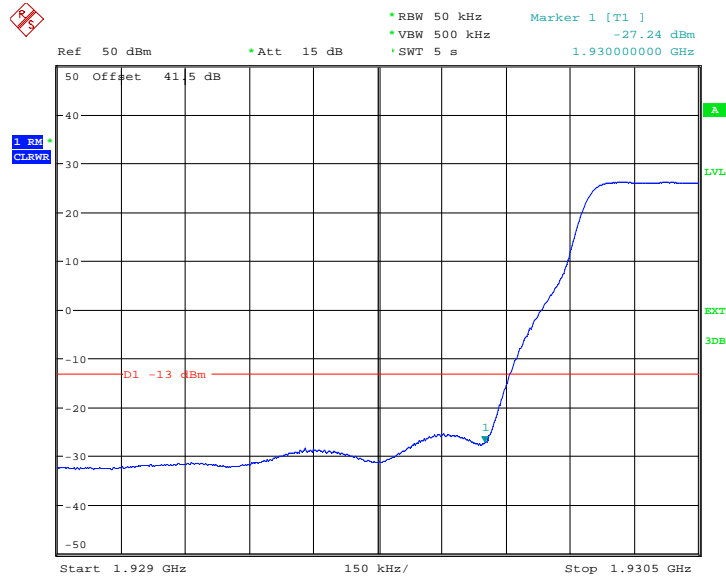
Date: 19.OCT.2011 04:42:35



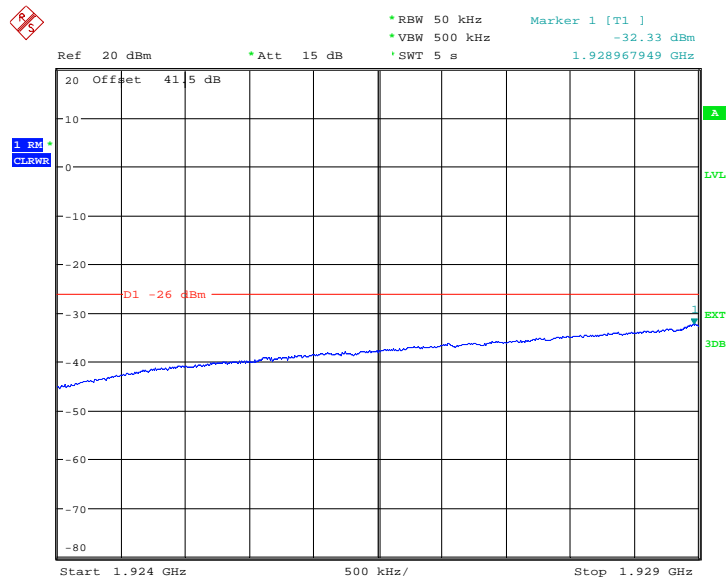
Date: 19.OCT.2011 04:43:46



Product Service

**5.0MHz Bandwidth****Configuration 1 - Mode 1 - 5**

Date: 19.OCT.2011 04:16:34

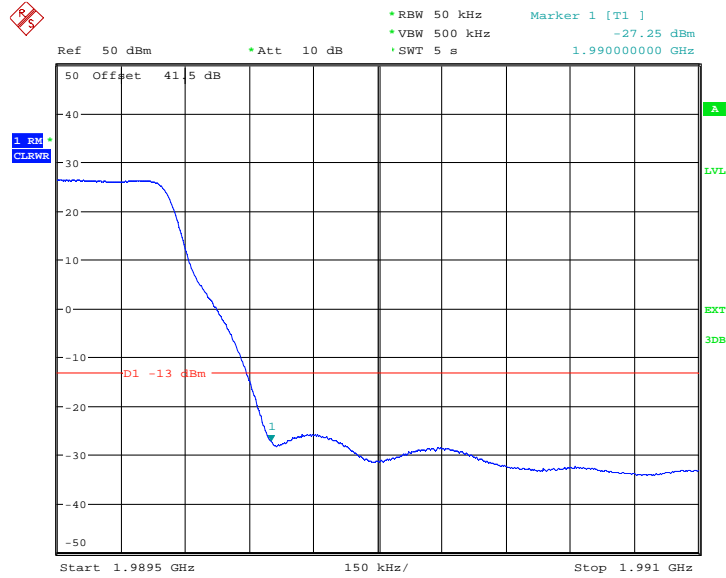


Date: 19.OCT.2011 04:14:52

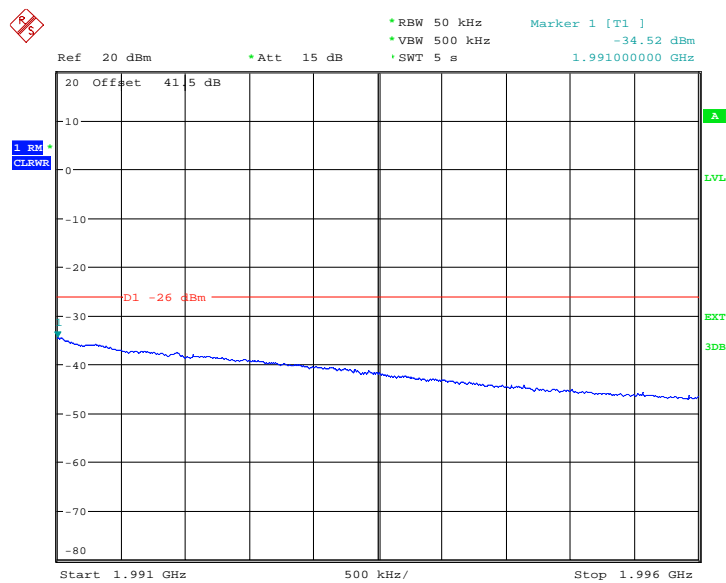


Product Service

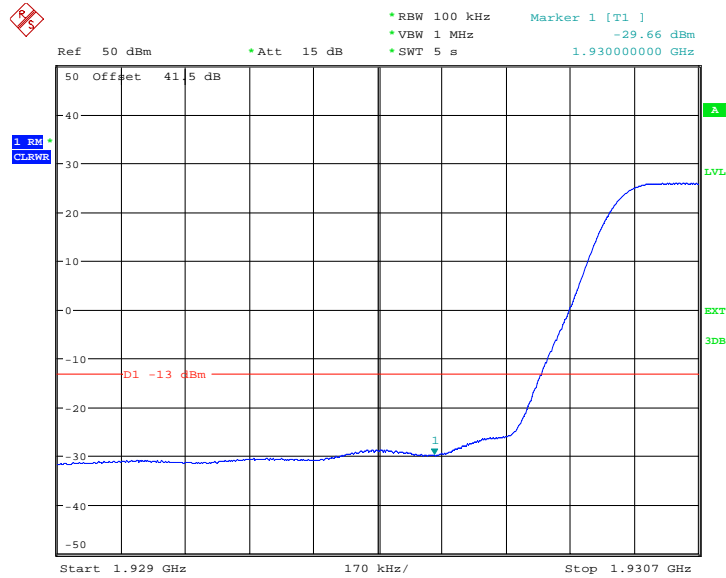
### Configuration 1 - Mode 3 - 5



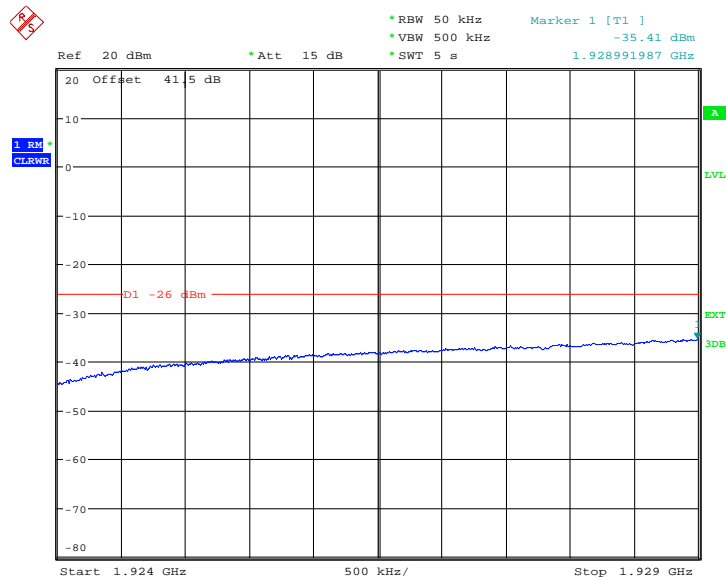
Date: 19.OCT.2011 04:07:49



Date: 19.OCT.2011 04:10:08

**10.0MHz Bandwidth****Configuration 1 - Mode 1 - 10**

Date: 19.OCT.2011 04:32:08

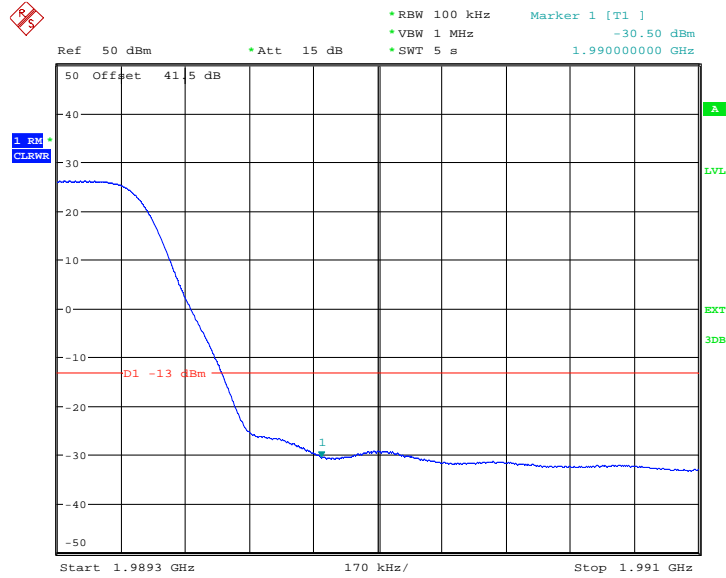


Date: 19.OCT.2011 04:34:20

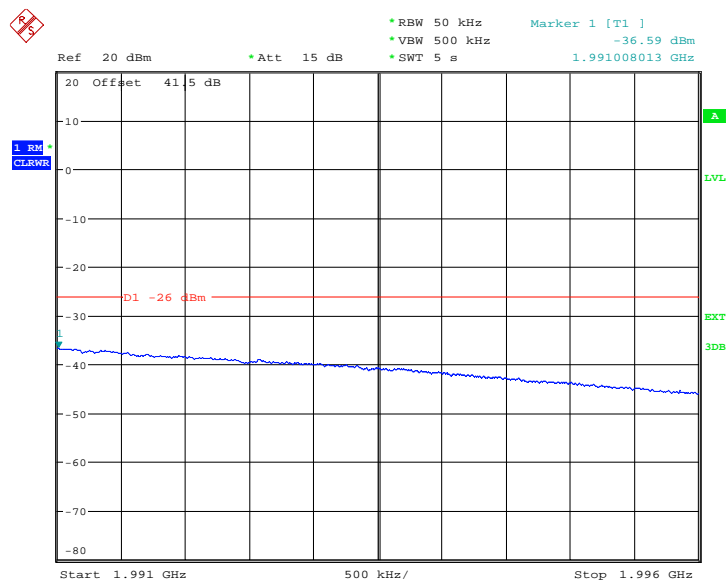


Product Service

### Configuration 1 - Mode 3 - 10



Date: 19.OCT.2011 04:37:40

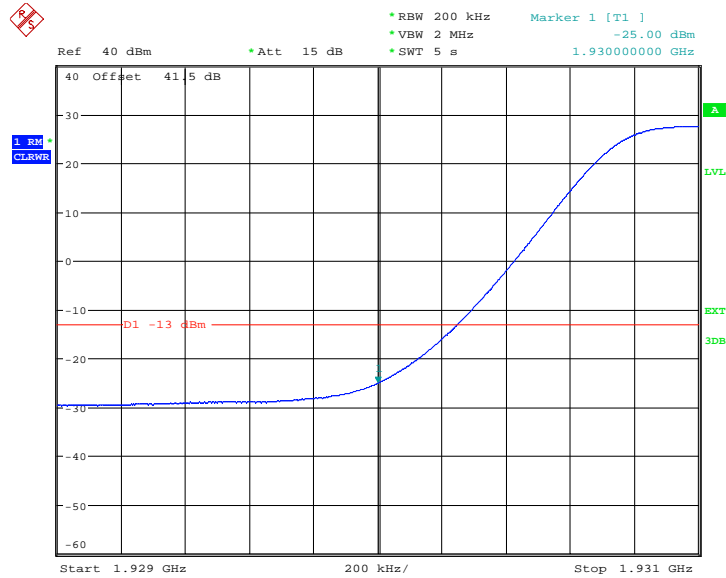


Date: 19.OCT.2011 04:36:10

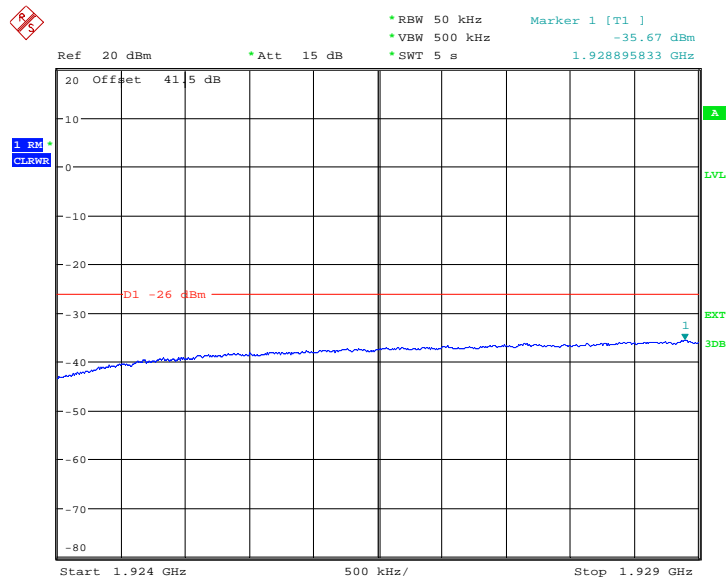




Product Service

**15.0MHz Bandwidth****Configuration 1 - Mode 1 - 15**

Date: 19.OCT.2011 05:28:57

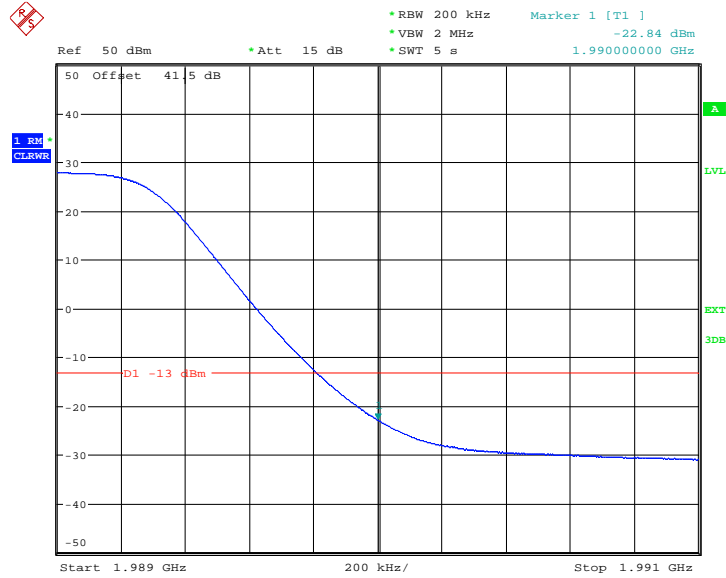


Date: 19.OCT.2011 05:28:01

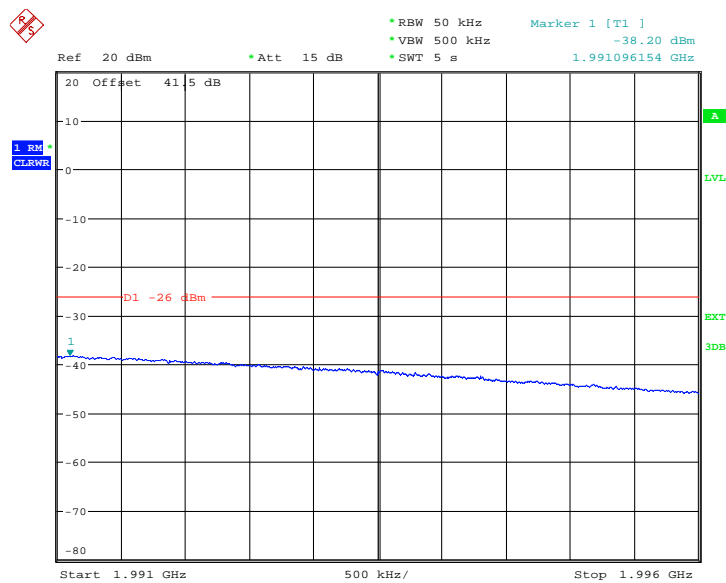


Product Service

### Configuration 1 - Mode 3 - 15



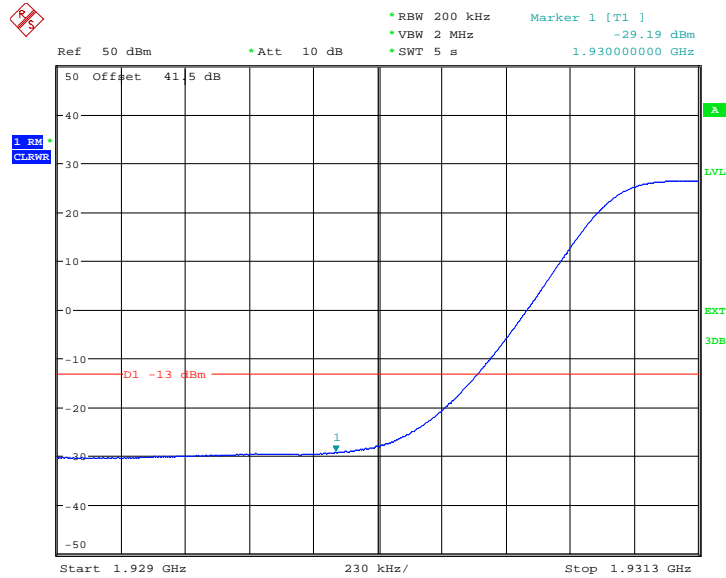
Date: 19.OCT.2011 05:24:48



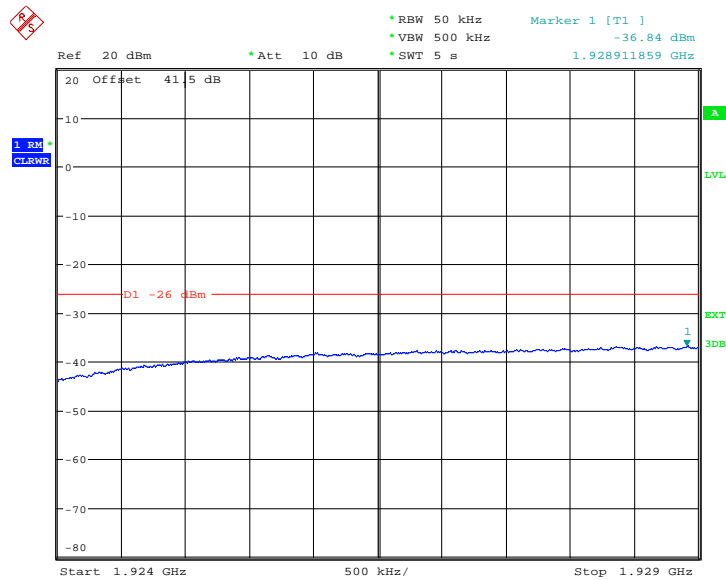
Date: 19.OCT.2011 05:25:47



Product Service

**20.0MHz Bandwidth****Configuration 1 - Mode 1 - 20**

Date: 17.OCT.2011 08:52:23

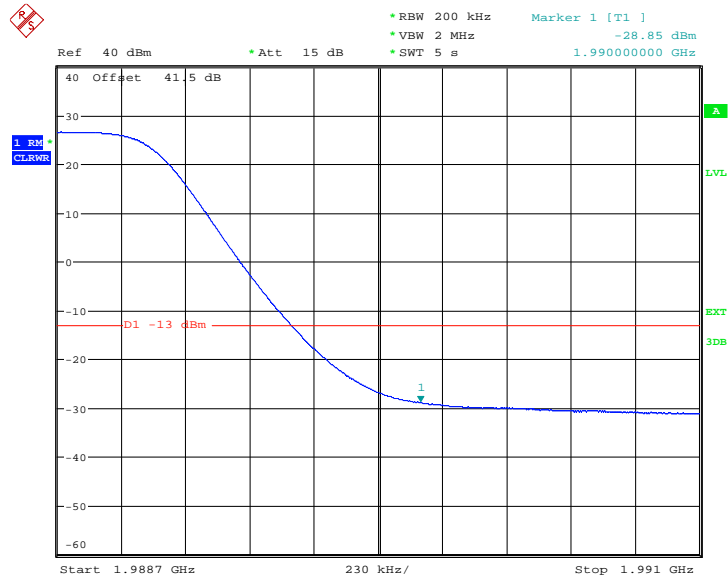


Date: 17.OCT.2011 08:53:28

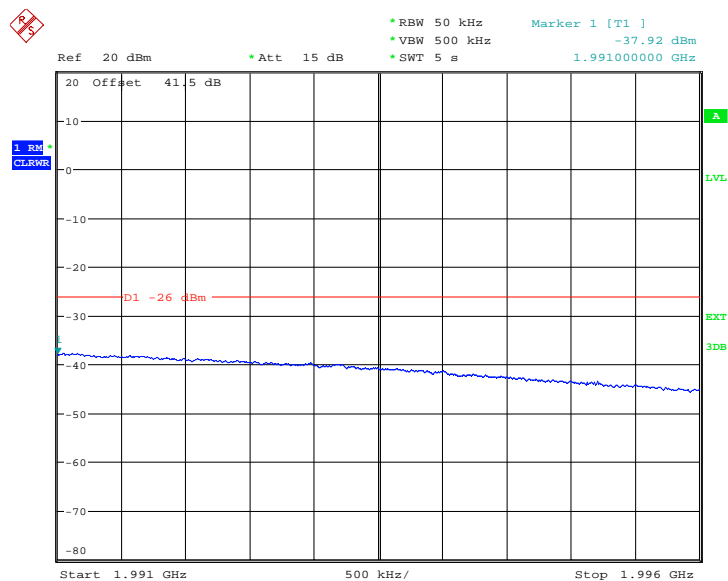


Product Service

### Configuration 1 - Mode 3 - 20



Date: 19.OCT.2011 05:32:42



Date: 19.OCT.2011 05:34:42

### Limit

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.



Product Service

## **2.6 RADIATED SPURIOUS EMISSIONS**

### **2.6.1 Specification Reference**

FCC CFR 47 Part 2, Clause 2.1053  
FCC CFR 47 Part 24, 24.238 (a)  
Industry Canada RSS-133, Clause 6.5

### **2.6.2 Equipment Under Test**

RRUS 11 B2 / KRC 161 276/2, S/N: C825336870

### **2.6.3 Date of Test and Modification State**

24 and 25 October 2011 – 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 24 and Industry Canada RSS-133.

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 $\mu$ 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:

$$E_{(v/m)} = (30 \times 1.64 \times 37.15)^{0.5} / 3 = 14.251 \text{ V/m} = 143.1 \text{ dB}\mu\text{V/m}$$

As per 24.238 (a) the spurious emission must be attenuated by  $43 + 10\log(P_o)$  dB this gives:

$$43 + 10\log(37.15) = 58.7 \text{ dB}$$

Therefore the limit at 3m measurement distance is:

$$143.1 - 58.7 = 84.4 \text{ dB}\mu\text{V/m}$$

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 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 - 1.4, Mode 1 - 3,  
 - Mode 2 (1.4MHz, 5MHz, 10.0MHz, 20.0MHz OBW)  
 - Mode 3 - 1.4, Mode 3 - 15

### **2.6.6 Environmental Conditions**

	24 October 2011	25 October 2011
Ambient Temperature	20.5°C	21.2°C
Relative Humidity	39.6%	35.8%



## 2.6.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 & Part 24 and Industry Canada RSS-133 for Radiated Spurious Emissions.

The test results are shown below

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

### **E-TM1.1**

#### **1.4MHz Bandwidth**

Configuration 1 - Mode 2

No emissions were detected within 20dB of the limit.

#### **3.0MHz Bandwidth**

Configuration 1 - Mode 2

No emissions were detected within 20dB of the limit.

#### **5.0MHz Bandwidth**

Configuration 1 - Mode 2

No emissions were detected within 20dB of the limit.

#### **10.0MHz Bandwidth**

Configuration 1 - Mode 2

No emissions were detected within 20dB of the limit.

#### **15.0MHz Bandwidth**

Configuration 1 - Mode 2

No emissions were detected within 20dB of the limit.

#### **20.0MHz Bandwidth**

Configuration 1 - Mode 2

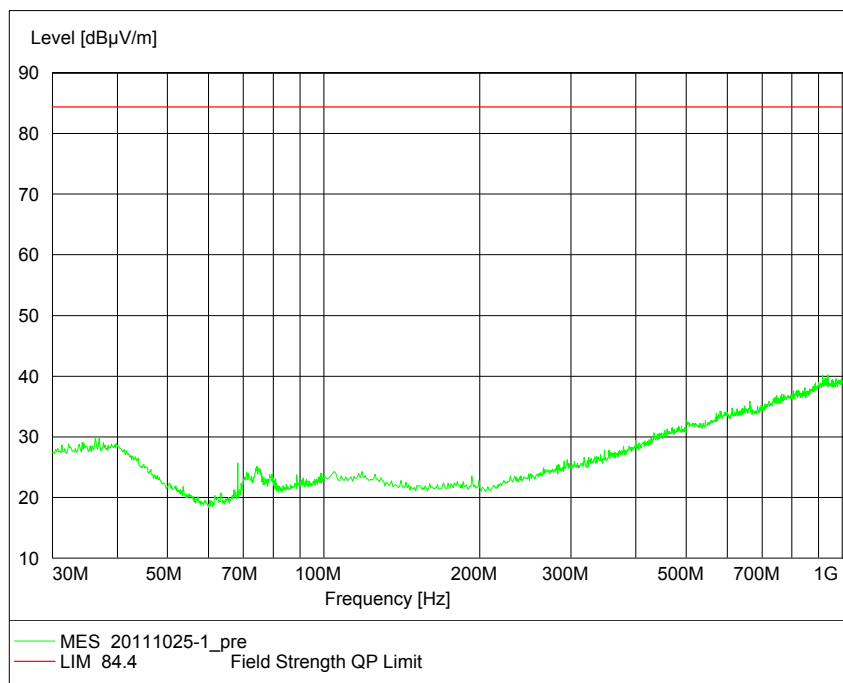
No emissions were detected within 20dB of the limit.

**E-TM3.2****1.4MHz Bandwidth****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.

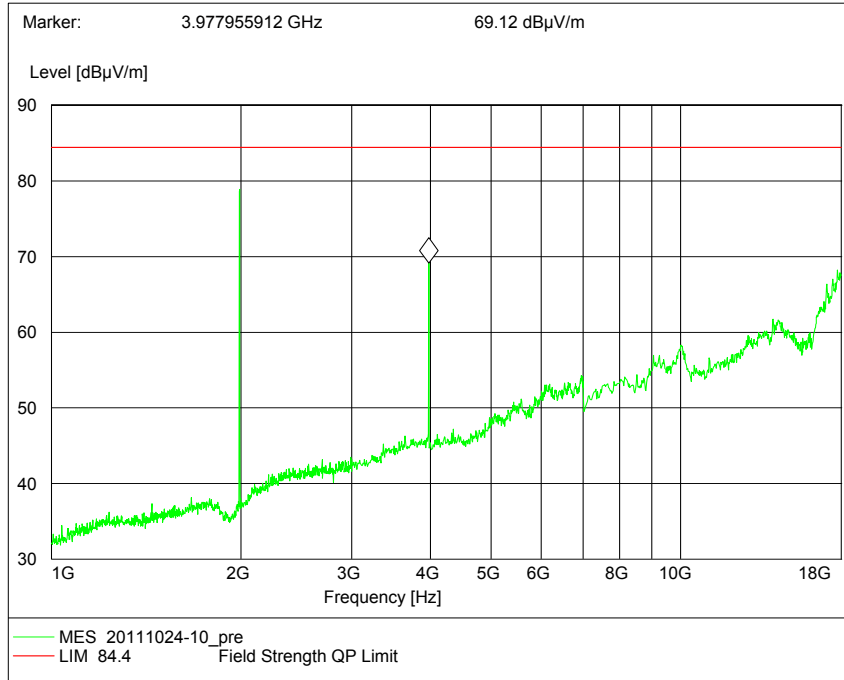
**Configuration 1 - Mode 3****30MHz to 1GHz**



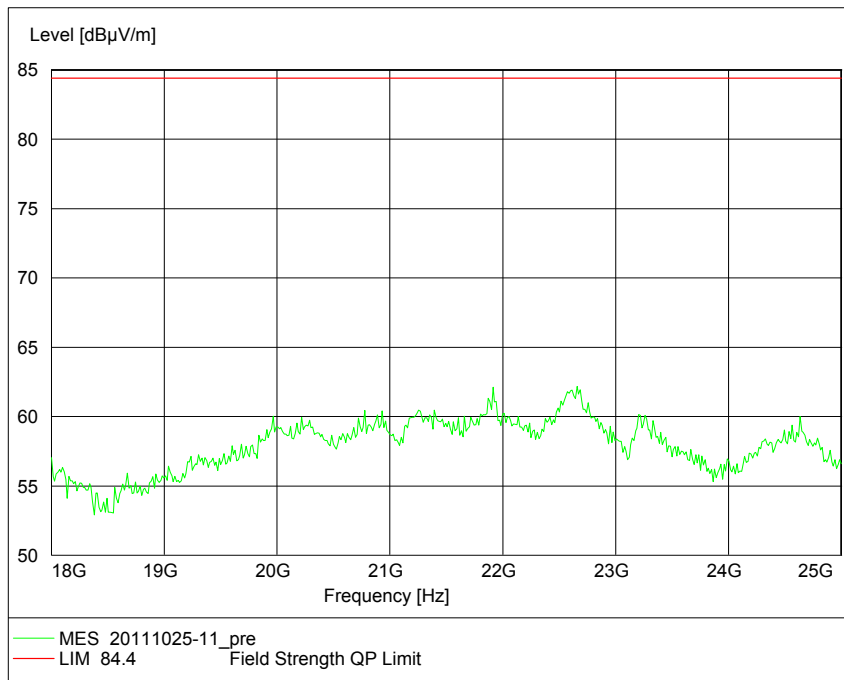


Product Service

### 1GHz to 18GHz



### 18GHz to 25GHz





Product Service

**E-TM3.1****1.4MHz Bandwidth**Configuration 1 - Mode 2

No emissions were detected within 20dB of the limit.

Limit	-13dBm / 84.4dBμV/m
-------	---------------------

Remarks

The EUT does not exceed -13dBm / 84.4dBμV/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 24, 24.238 (a)  
 Industry Canada RSS-133, Clause 6.5

### **2.7.2 Equipment Under Test**

RRUS 11 B2 / KRC 161 276/2, S/N: C825336870

### **2.7.3 Date of Test and Modification State**

17 and 19 October 2011 – 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 24 and Industry Canada RSS-133.

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 for E-TM1.1 test model in 1.4MHz and 20MHz bandwidth configurations as the representative modes. The resolution was set to 1MHz for 9kHz to 25GHz thus meeting the requirements of Part 24.238 (b). The spectrum analyser detector was set to peak and trace was kept on Max Hold.

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

In addition, measurements were made up to the 10<sup>th</sup> 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 - 1.4, Mode 1 - 20  
                               - Mode 2 (1.4MHz, 20.0MHz OBW)  
                               - Mode 3 - 1.4, Mode 3 - 20

### **2.7.6 Environmental Conditions**

	17 October 2011	19 October 2011
Ambient Temperature	23.2°C	26.0°C
Relative Humidity	20.5%	20.8%



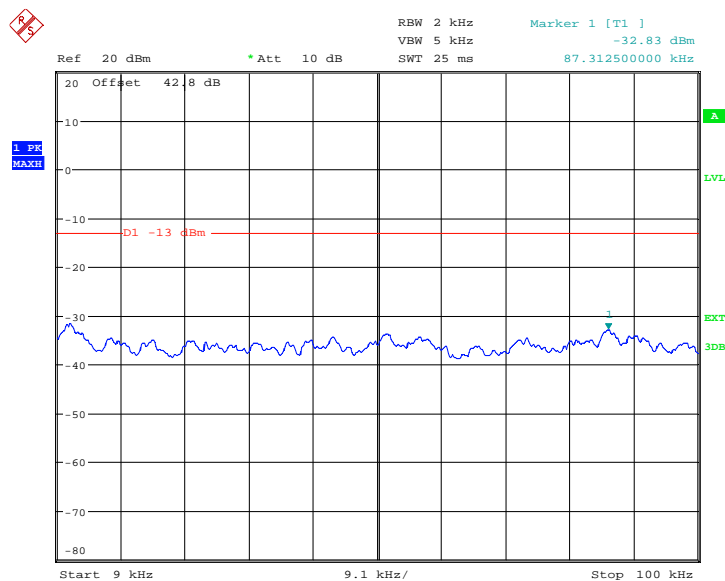
### 2.7.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 24 and Industry Canada RSS-133 for Conducted Spurious Emissions.

The test results are shown below

Remark:

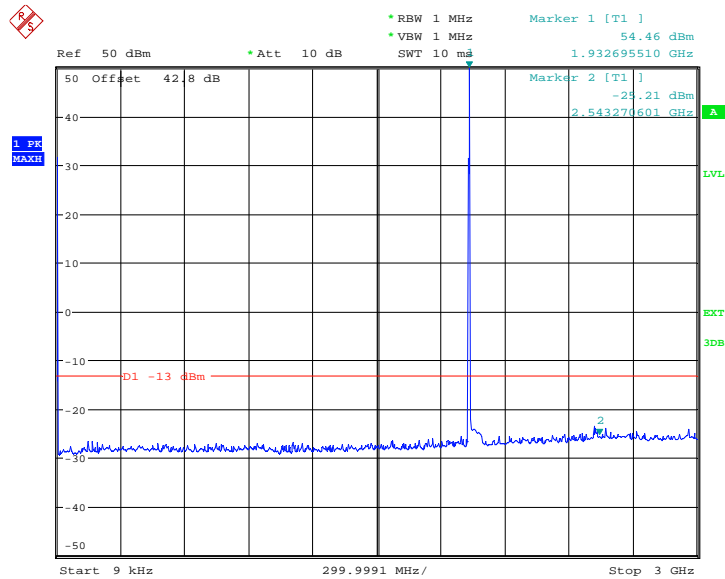
The emissions at 9kHz on the plots was not generated by the test object. A complementary measruement with a smaller Span showed that it was related to the LO feedthrough.



Date: 17.OCT.2011 10:02:45

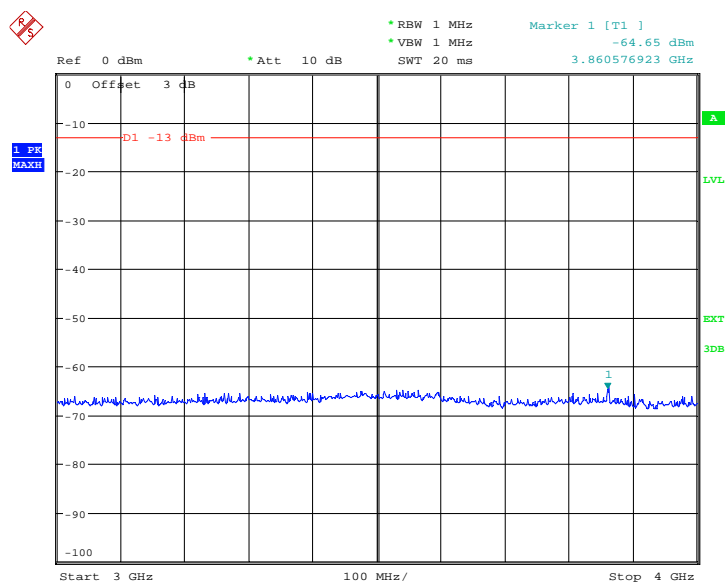


Product Service

**E-TM1.1****1.4MHz Bandwidth****Configuration 1 - Mode 1 - 1.4****9kHz to 3GHz**

Date: 17.OCT.2011 10:01:13

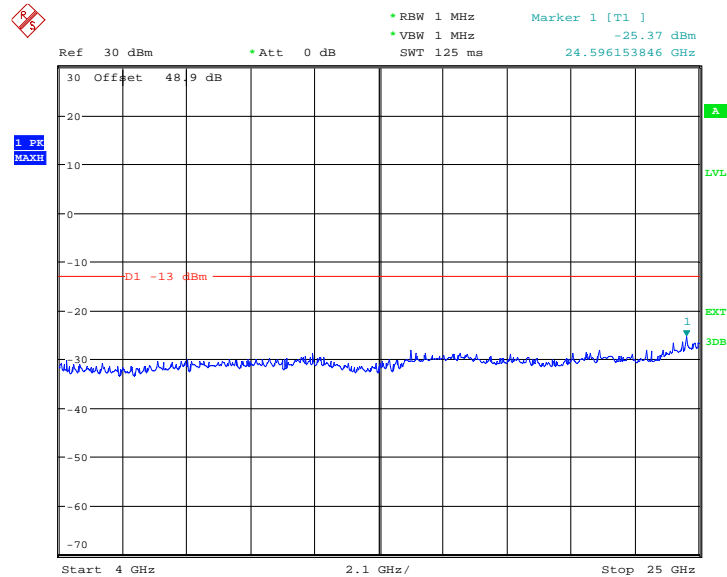
Note: The emission beyond the limit is the operating frequency.

**3GHz to 4GHz**

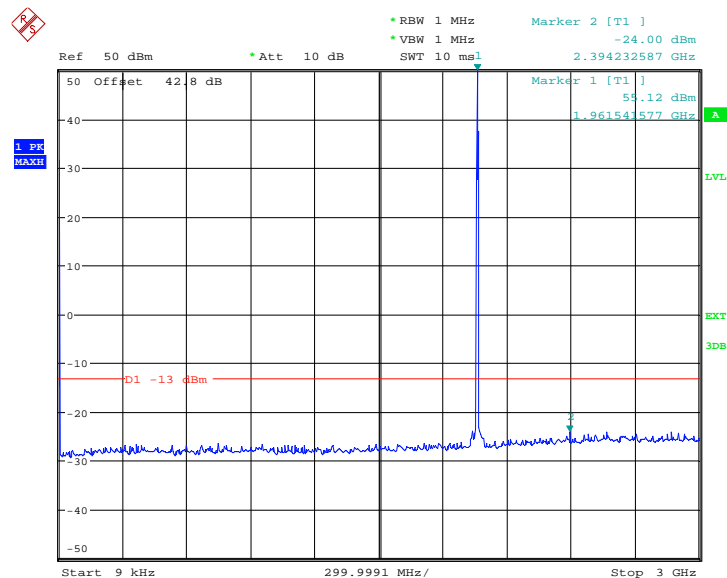
Date: 19.OCT.2011 10:45:34



Product Service

4GHz to 25GHz

Date: 19.OCT.2011 10:32:13

Configuration 1 - Mode 29kHz to 3GHz

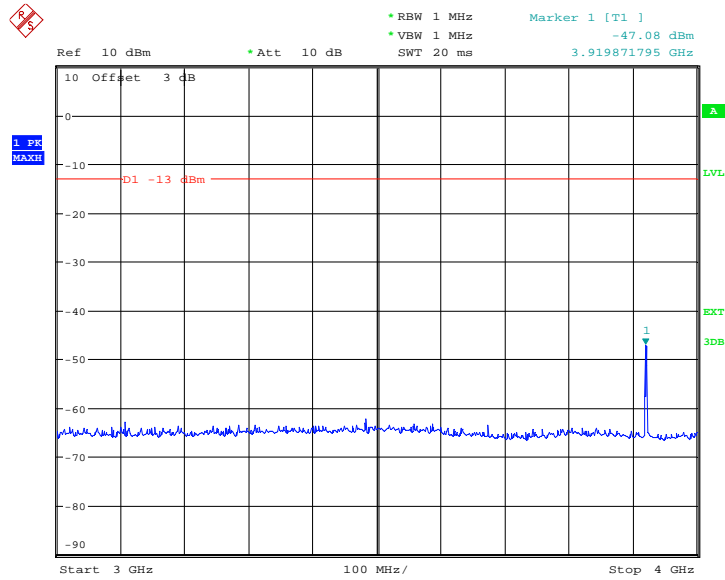
Date: 17.OCT.2011 10:19:51

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



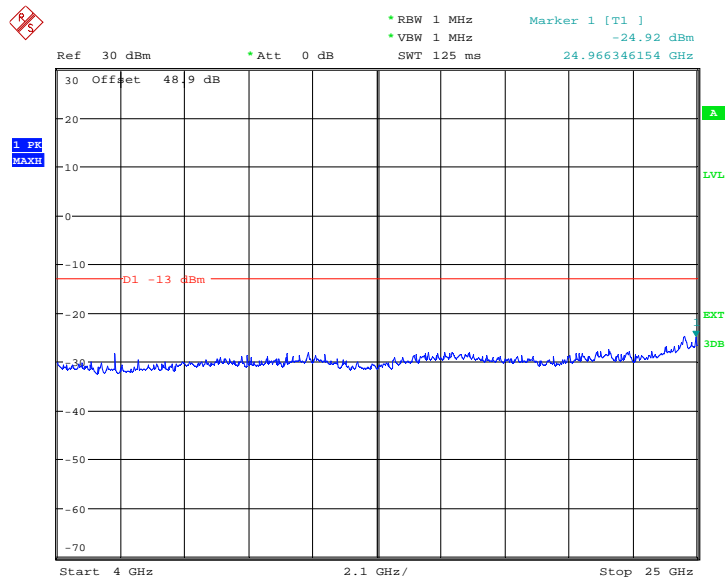
Product Service

### 3GHz to 4GHz



Date: 19.OCT.2011 09:58:18

### 4GHz to 25GHz



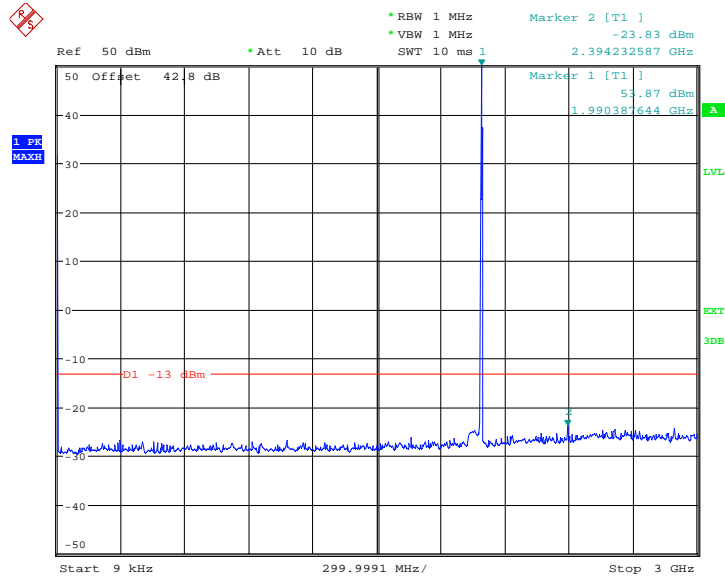
Date: 19.OCT.2011 10:02:18



Product Service

### Configuration 1 - Mode 3 - 1.4

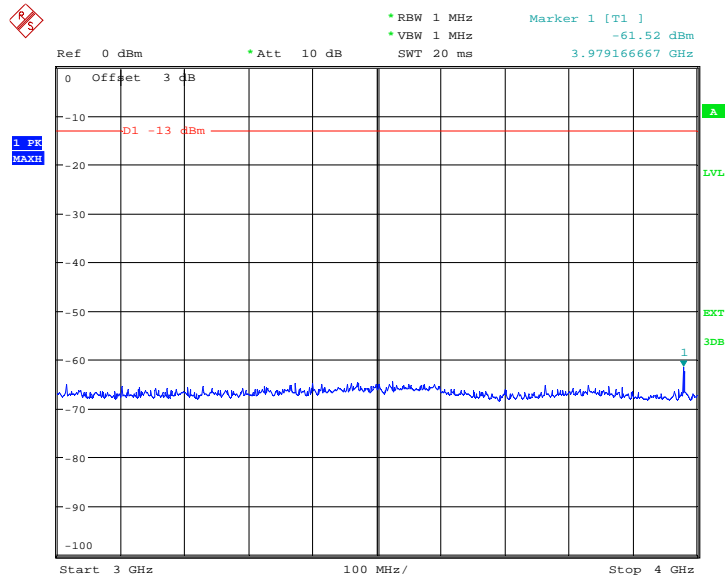
#### 9kHz to 3GHz



Date: 17.OCT.2011 10:26:53

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

#### 3GHz to 4GHz

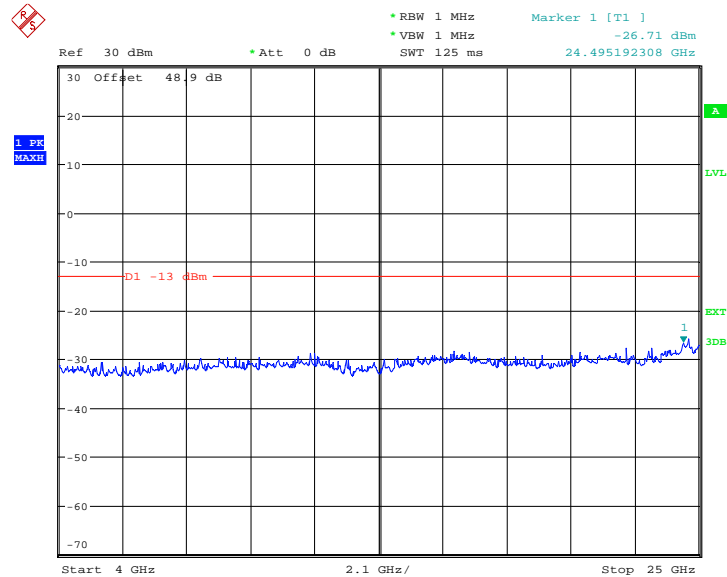


Date: 19.OCT.2011 10:43:37

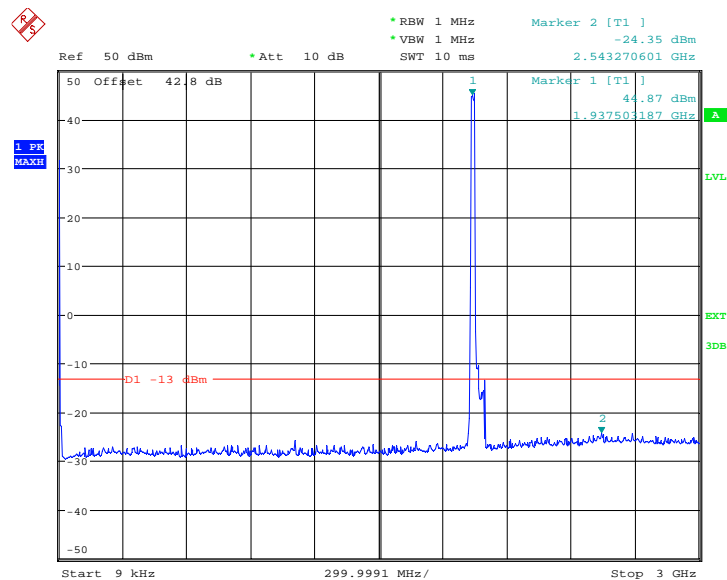




Product Service

**4GHz to 25GHz**

Date: 19.OCT.2011 10:33:40

**20MHz Bandwidth****Configuration 1 - Mode 1 - 20****9kHz to 3GHz**

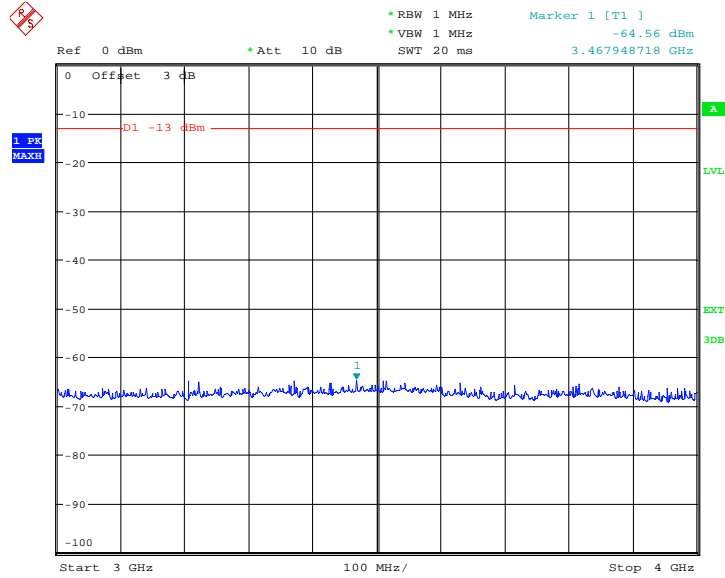
Date: 17.OCT.2011 09:17:30

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



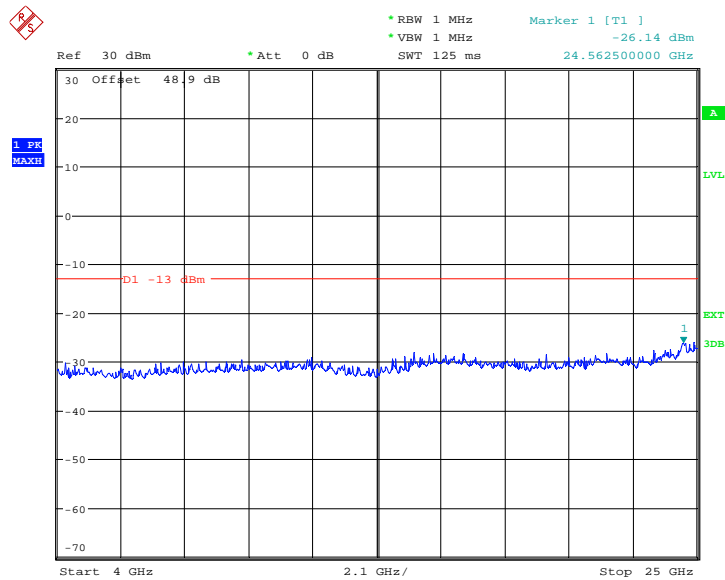
Product Service

### 3GHz to 4GHz



Date: 19.OCT.2011 10:56:37

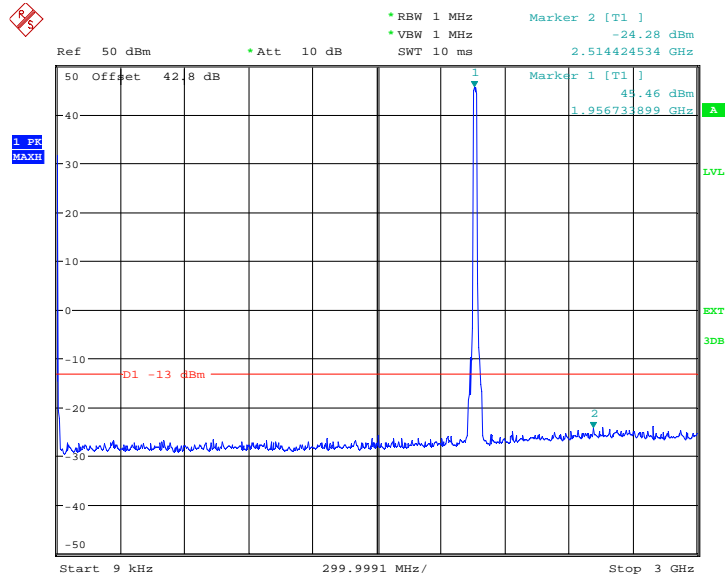
### 4GHz to 25GHz



Date: 19.OCT.2011 10:20:15

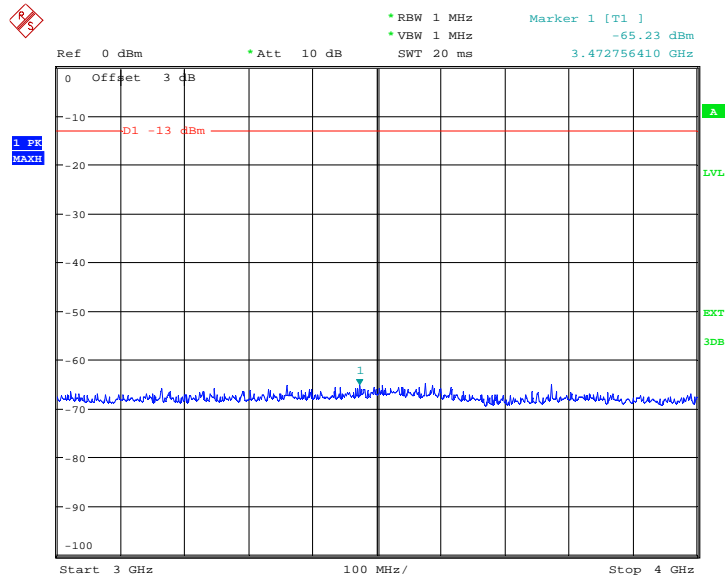


Product Service

Configuration 1 - Mode 29kHz to 3GHz

Date: 17.OCT.2011 09:15:13

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

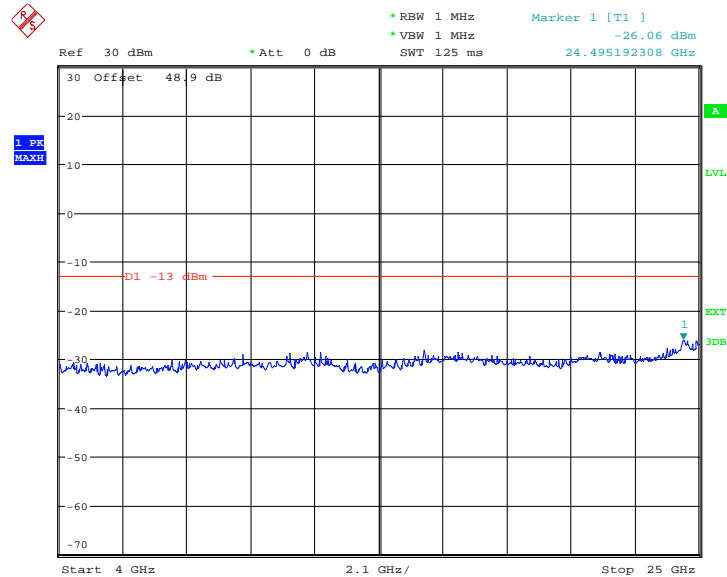
3GHz to 4GHz

Date: 19.OCT.2011 11:00:34



Product Service

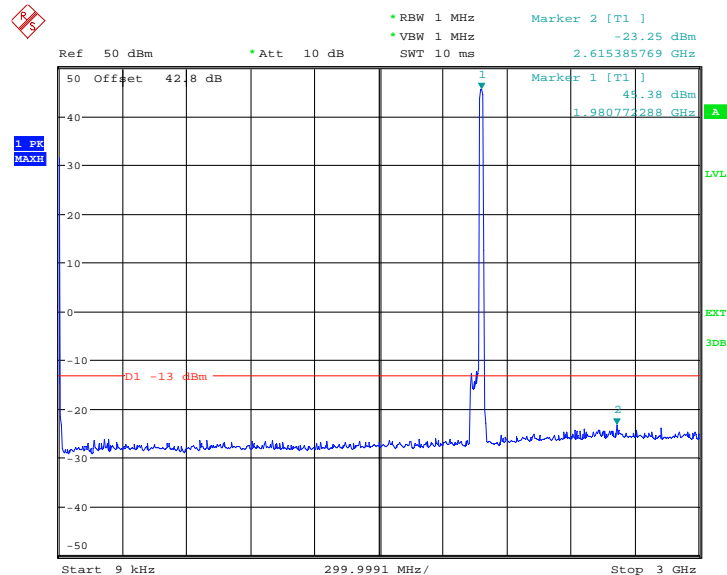
# 4GHz to 25GHz



Date: 19.OCT.2011 10:07:43

# Configuration 1 - Mode 3 - 20

# 9kHz to 3GHz

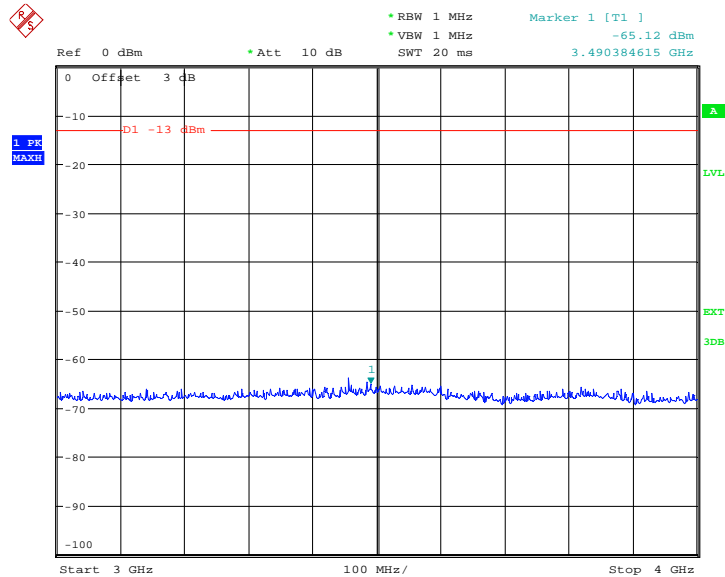


Date: 17.OCT.2011 09:09:05

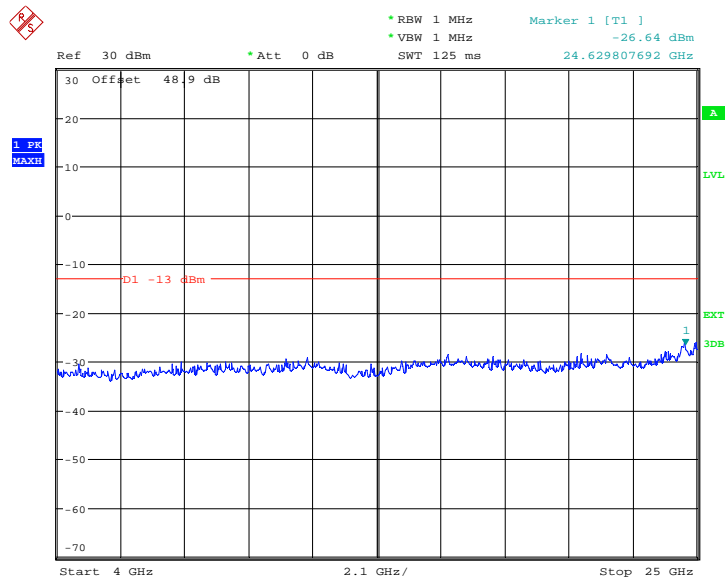
Note: The emission beyond the limit is the operating frequency.



Product Service

3GHz to 4GHz

Date: 19.OCT.2011 10:58:35

4GHz to 25GHz

Date: 19.OCT.2011 10:22:10

Remarks

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



Product Service

## **2.8 FREQUENCY STABILITY UNDER TEMPERATURE VARIATIONS**

### **2.8.1 Specification Reference**

FCC CFR 47 Part 2, Clause 2.1055  
 FCC CFR 47 Part 24, Clause 24.235  
 Industry Canada RSS-133, Clause 6.3

### **2.8.2 Equipment Under Test**

RRUS 11 B2 / KRC 161 276/2, S/N: C825336870

### **2.8.3 Date of Test and Modification State**

20 and 21 October 2011 – 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 24 and Industry Canada RSS-133.

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 EUT was tested with test model E-TM1.1 in 5MHz Bandwidth.

The test was performed with the EUT in the following configuration and mode of operation:

Configuration 1 - Mode 2 (5.0MHz)

### **2.8.6 Environmental Conditions**

	20 October 2011	21 October 2011
Ambient Temperature	26.1°C	26.0°C
Relative Humidity	21.9%	22.2%



### 2.8.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 24 and Industry Canada RSS-133 for Frequency Stability Under Temperature Variations.

The test results are shown below

Power Supply: -48V DC

#### **E-TM1.1: 5MHz Bandwidth**

#### **Configuration 1 - Mode 2**

Temperature Interval (°C)	Deviation (Hz)
-30	-8.51
-20	6.59
-10	-6.54
0	6.93
+10	5.76
<b>+20</b>	<b>-6.41</b>
+30	-6.91
+40	-5.25
+50	5.46

Limit	±1.0 ppm or ±1.96kHz
-------	----------------------

#### **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.



Product Service

## **2.9 FREQUENCY STABILITY UNDER VOLTAGE VARIATIONS**

### **2.9.1 Specification Reference**

FCC CFR 47 Part 2, Clause 2.1055  
FCC CFR 47 Part 24, Clause 24.235  
Industry Canada RSS-133, Clause 6.3

### **2.9.2 Equipment Under Test**

RRUS 11 B2 / KRC 161 276/2, S/N: C825336870

### **2.9.3 Date of Test and Modification State**

21 October 2011 – 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 24 and Industry Canada RSS-133.

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 EUT was tested with test model E-TM1.1 in 5MHz Bandwidth.

The test was performed with the EUT in the following configuration and mode of operation:

Configuration 1 - Mode 2 (5.0MHz)

### **2.9.6 Environmental Conditions**

21 October 2011

Ambient Temperature 26.0°C

Relative Humidity 22.2%





### 2.9.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 24 and Industry Canada RSS-133 for Frequency Stability Under Voltage Variations.

The test results are shown below

Temperature: 20°C

#### **E-TM1.1: 5MHz Bandwidth**

##### Configuration 1 - Mode 2

DC Voltage (V)	Deviation (Hz)
-40.8	-6.43
<b>-48.0</b>	<b>-6.41</b>
-55.2	-5.62

Limit	$\pm 1.0$ ppm or $\pm 1.96$ 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

**2.10 RECEIVER SPURIOUS EMISSIONS****2.10.1 Specification Reference**

Industry Canada RSS-133, Clause 6.6

**2.10.2 Equipment Under Test**

RRUS 11 B2 / KRC 161 276/2, S/N: C825336870

**2.10.3 Date of Test and Modification State**

18 October 2011 – 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 Industry Canada RSS-133.

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 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, -53dBm, 5 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 5<sup>th</sup> harmonic of the highest internal frequency.

The EUT was tested with test model E-TM1.1 in 5MHz Bandwidth.

The test was performed with the EUT in the following configuration and modes of operation as the worst cases:

- Configuration 1
- Mode 1 - 5
  - Mode 2 (5.0MHz)
  - Mode 3 - 5



Product Service

## 2.10.6 Environmental Conditions

18 October 2011

Ambient Temperature 22.5°C

Relative Humidity 43.0%

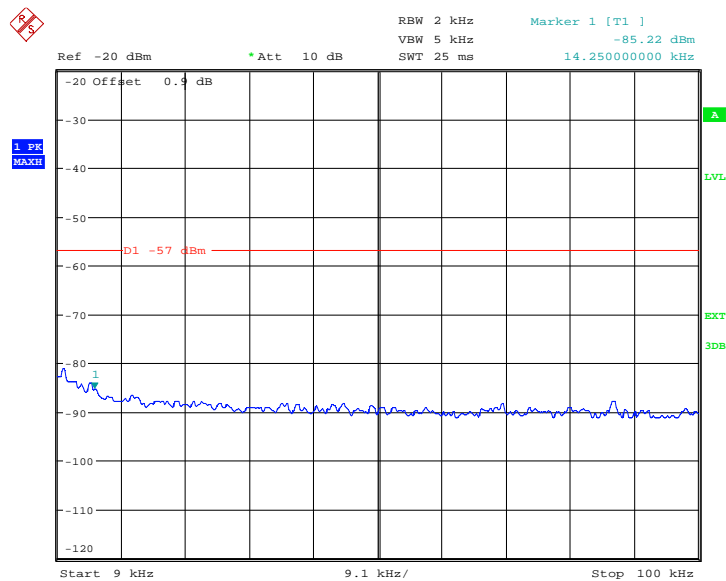
## 2.10.7 Test Results

For the period of test the EUT met the requirements of Industry Canada RSS-133 for Receiver Spurious Emissions.

The test results are shown below

Remark:

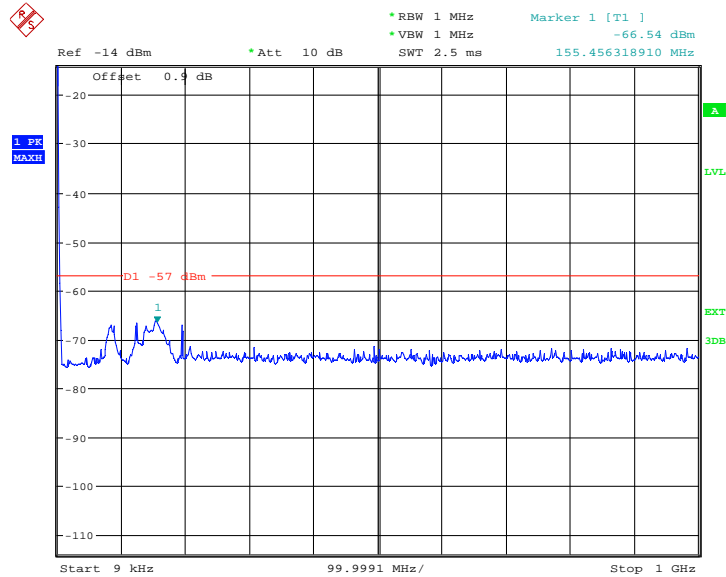
The emissions at 9kHz on the plots was not generated by the test object. A complementary measruement with a smaller Span showed that it was related to the LO feedthrough.



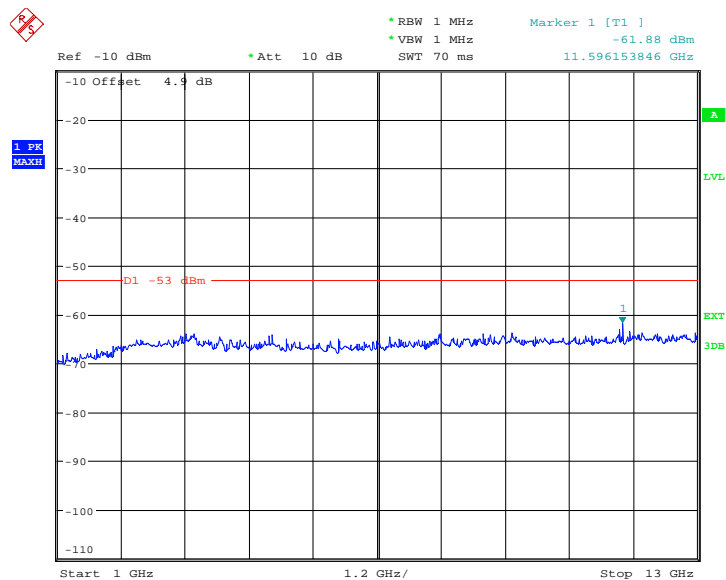
Date: 18.OCT.2011 11:01:18



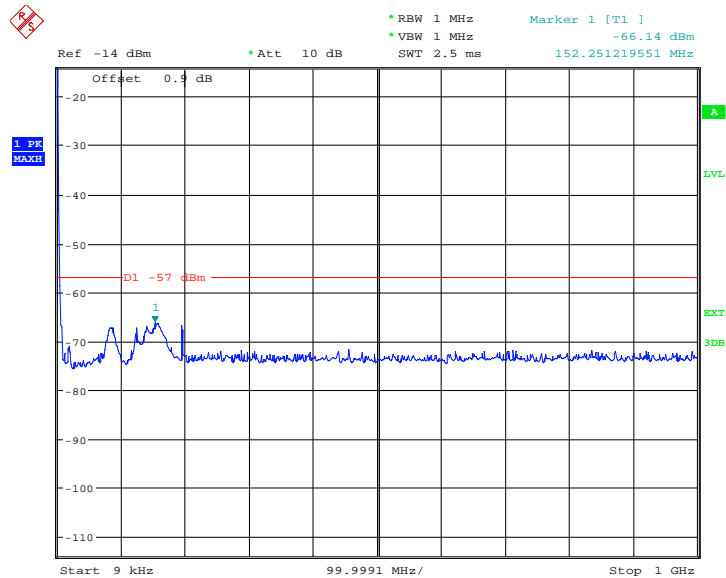
Product Service

**E-TM1.1: 5MHz Bandwidth****Configuration 1 - Mode 1 - 5****9kHz to 1GHz**

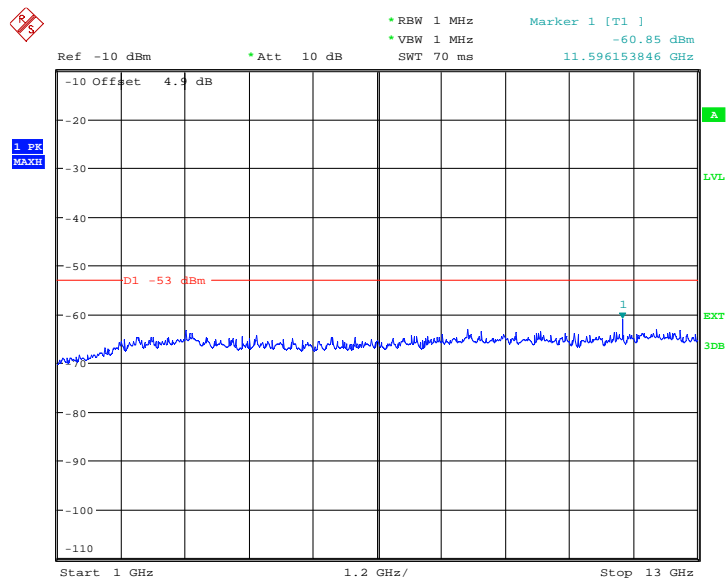
Date: 18.OCT.2011 11:28:56

**1GHz to 13GHz**

Date: 18.OCT.2011 11:27:56

Configuration 1 - Mode 29kHz to 1GHz

Date: 18.OCT.2011 11:21:42

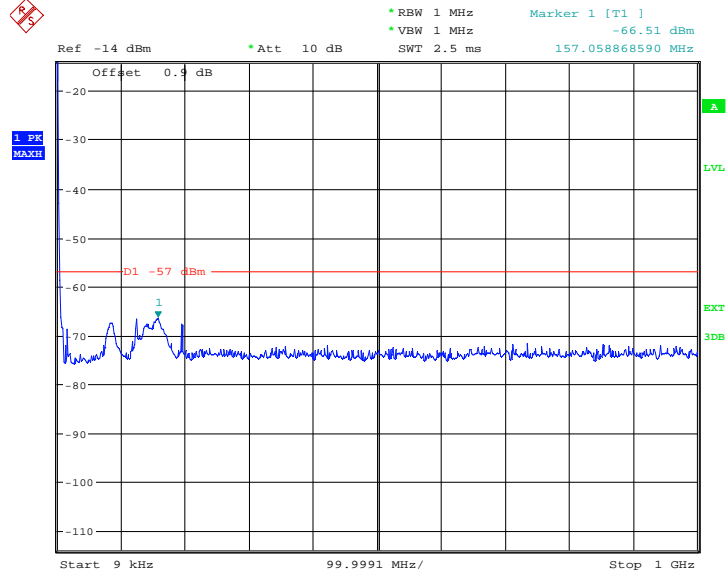
1GHz to 13GHz

Date: 18.OCT.2011 11:23:30



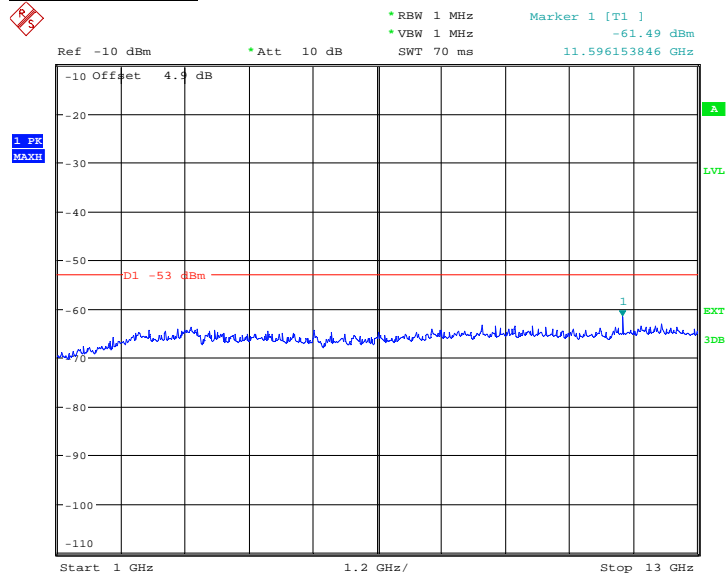
### Configuration 1 - Mode 3 - 5

#### 9kHz to 1GHz



Date: 18.OCT.2011 11:33:36

#### 1GHz to 13GHz



Date: 18.OCT.2011 11:35:31

Limit	-57dBm (30MHz-1GHz) and -53dBm (above 1GHz)
-------	---

#### Remarks

The EUT does not exceed -57dBm at the frequency range of 9kHz to 1GHz and does not exceed -53dBm at the frequency range of 1GHz 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
<b>Section 2.1, 2.2, 2.3, 2.4, 2.6, 2.7 and 2.10 – Maximum Conducted Output Power, Peak – Average Ratio, Modulation Characteristics, Occupied Bandwidth, Spurious Emissions at Antenna Terminals (<math>\pm 1</math> MHz) , Conducted Spurious Emissions and Receiver Spurious Emissions.</b>					
Spectrum Analyser	Rohde & Schwarz	FSQ26	201124	12	09-Jun-2012
Power Meter	Rohde & Schwarz	NRP	102438	12	10-Aug-2012
Thermal Power Sensor	Rohde & Schwarz	NRP-Z51	102431	12	10-Aug-2012
Network Analyzer	Agilent	8720D	US36140166	12	08-Sep-2012
40dB Attenuator	Aeroflex / Weinschel	48-40-43-LIM	BR5020	-	O/P MON
Load	Shanghai Huaxiang	TF100	09121602	-	O/P MON
Filter	Ericsson	ULK 904 193	-	-	O/P MON
Power Supply	Dahua	DH1716-5D	2008040003	-	O/P MON
Power Supply	Dahua	DH1716A-14	200380401	-	O/P MON
Digital Multi-meter	FLUKE	179	91820401	12	03-Jan-2012
Thermo-hygrometer	AZ Instruments	8705	9151655	12	16-Dec-2011
<b>Section 2.5 – Radiated Spurious Emissions</b>					
Load	Shanghai Huaxiang	TF100	09121602	-	O/P MON
Load	Shanghai Huaxiang	TF150	06081422	-	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	-	-	19-Aug-2012
Relay Switch Unit	Rohde & Schwarz	331.1601.31	338965002	-	TU
Semi Anechoic Chamber	Frankonia	23.18m×16.88m×9.60m	-	12	19-Aug-2012
Power Supply	Dahua	DH1716-5D	2008040003	-	O/P MON
Digital Multimeter	FLUKE	179	91820401	12	03-Jan-2012
Thermo-hygrometer	AZ Instruments	8705	9151655	12	16-Dec-2011





Section 2.8 and 2.9 – Frequency Stability Under Temperature and Voltage Variations					
Spectrum Analyser	Rohde & Schwarz	FSQ26	201124	12	09-Jun-2012
40dB Attenuator	Aeroflex / Weinschel	48-40-43-LIM	BR5020	-	O/P MON
Load	Shanghai Huaxiang	TF100	09121602	-	O/P MON
Temperature Chamber	Weiss-Voetsch	C1000-70	54686007020 020	12	08-Jun-2012
Power Supply	Dahua	DH1716-5D	2008040003	-	O/P MON
Power Supply	Dahua	DH1716A-14	200380401	-	O/P MON
Digital Multimeter	FLUKE	179	91820401	12	03-Jan-2012
Thermo-hygrometer	AZ Instruments	8705	9151655	12	16-Dec-2011

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**



Product Service

#### 4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



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