



# **FCC Licensed Transmitter Test Report for**

**VHF Data Modem  
ZRT 170 TR-5**

Reference Standard 47CFR Part 2, Subpart J: Oct 2007

Manufacturer RF Technologies Ltd

For type of equipment and serial number, refer to section 3

Report Number 03-404/4240/2/10

Report Produced by: -

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## 2 Summary of Test Results

The VHF Data Modem ZRT 170 TR-5 was tested for compliance to the following standard for licensed transmitters: -

47CFR Part 2, Subpart J : Oct 2009  
47CFR Part 90, Subpart I & J : Oct 2009  
**Class TNB Intentional Radiator**

Title	References	Results
1. RF Power Output.	47CFR Part 2, Subpart J	conducted: PASSED <sup>1</sup>
		radiated: Not Applicable <sup>2</sup>
2. Modulation Characteristics.	47CFR Part 2, Subpart J	PASSED <sup>3</sup>
3. Occupied Bandwidth & Emission Mask	47CFR Part 2, Subpart J	PASSED
4. Spurious Emissions at Antenna Terminals.	47CFR Part 2, Subpart J	PASSED
5. Field Strength of Spurious Radiation.	47CFR Part 2, Subpart J	PASSED
6. Frequency Stability.	47CFR Part 2, Subpart J	PASSED
7. Transient Frequency.	47CFR Part 90, Subpart I	PASSED

1. Output power is limited by the station license. The maximum rated power of 5W may not be suitable for some applications.
2. Output power for this type of licensed device is measured at the antenna port.
3. Maximum permissible deviation is limited by the station license. The EUT may not be suitable for applications where the permitted deviation is less than 2kHz.

This report relates to the equipment tested as identified by a unique serial number and at the time it was tested. It does not relate to any other similar equipment and performance of the product before or after the test cannot be guaranteed.

The measurement uncertainty, where stated, is the expanded uncertainty based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

Date of Test: 11th to 18th March 2010

Test Engineer:

Approved By:  
Technical Director

Authorised Representative:

**3. Information about Equipment Under Test**

Applicant	RF Technologies Ltd 27-29 New Road Hextable Kent BR8 7LS
Brand name of EUT	RF DataTech
Model Number(s) of EUTs	ZRT 170 TR-5
Serial Numbers of EUTs	25989, 25990 & 25991
FCC ID (if applicable):	Not stated
Date when equipment was received by RN Electronics Limited	11th March 2010
Date of test:	11th to 18th March 2010
Customer order number:	Not stated
Visual description of EUT:	A small rectangular aluminium case with a BNC connector at one end, a D-type and a 2 pin power connector at the other. The front cover has two circular programme and channel setting dials and five status LEDs.
Main function of the EUT:	A radio modem for data transmission

**EUT Information specification.**

Height	152mm
Width	75mm
Depth	30mm
Weight	0.35kg
Voltage	13.8VDC
Current required from above voltage source	2.2A
Highest Frequencies used / generated	138MHz, 156MHz & 174MHz

**EUT Configurations for testing.**

Choice of model(s) for type testing	3 Prototype Models Top, Middle and Bottom of Band
Method of achieving an unmodulated carrier frequency	Software Control
Audio capsule / test fixture used	Not Applicable
Declared power level (dBm)	5W
Declared channel bandwidth (kHz)	12.5kHz

Description of ancillary equipment connected to the equipment under test, for the purpose of tests, can be found in Section 10. Auxiliary Equipment.

Any modifications made to the EUT, whilst under test, can be found in Section 11.

Modifications

This report was printed on: 20 July 2010

#### 4. Specifications

The tests were performed by RN Electronics Engineer Peter Finley who set up the tests, the test equipment, and operated it in accordance with the **R.N. Electronics Ltd** procedures manual and the relevant standards listed below.

##### 4.1 Relevant Standards

	Standard Number	Version	Description
4.1.1	47CFR Part 90, Subpart I & J	Oct 2009	Part 90 – Private Land Mobile Radio Services.
4.1.2	47CFR Part 2, Subpart J	Oct 2009	Part 2 - Frequency Allocations And Radio Treaty Matters; General Rules And Regulations.
4.1.3	ITU Rec. SM.329	10 (02/03)	Unwanted emissions in the spurious domain
4.1.4	ANSI/TIA-603-C	2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

##### 4.2 Deviations Applied

None.

##### 4.3 Measurement Uncertainty

Parameter	Uncertainty
RF frequency	<±7 x 10 <sup>-8</sup>
Conducted RF power into 50ohms	<±0.82 dB
Maximum frequency deviation:	<±1 %
Occupied Bandwidth	<±2 %
Radiated emissions (valid up to 26.5 GHz).	<±3.4 dB

##### 4.4 Tests at Extremes of Temperature and Voltage

The following test conditions were used to simulate testing at nominal or extremes.

Voltage Test Conditions	
V nom	13.8
V min	10.0
V max	15.5

- A permanent internal RF port was used for testing.
- A test fixture was used for testing.
- A temporary RF port was created for testing.
- The equipment external RF port was used for testing.

## 5. Tests, Methods and Results

### 5.1 RF Power Output

#### 5.1.1 Conducted

##### 5.1.1.1 Test Methods

Test Requirements 47CFR Part 2, Subpart I & J  
Test Method: TIA-603-C, Clause 2.2.1.  
Limits: 47CFR Clause §90.205(s)

##### 5.1.1.1.1 Configuration of EUT

The EUT was tested on a bench. Measurements were made at the 50 ohm coaxial transmit port.

##### 5.1.1.1.2 Test Procedure

Tests were made in accordance with the Test Method noted above using the measuring equipment noted in the 'Test Equipment' Section. The power stated is the maximum power observed from an average power detector.

##### 5.1.1.2 Test results

Ambient conditions.

Temperature: 21°C

Relative humidity: 28%

Low Power Setting

	Low Channel	Middle Channel	High Channel
Power measured (dBm)	19.59	19.96	20.01
Converted to mW	91.0	99.1	100.2

High Power Setting

	Low Channel	Middle Channel	High Channel
Power measured (dBm)	37.0	36.84	36.95
Converted to W	5.01	4.83	4.95

Max power observed	Variation in power observed
37.0dBm	0.16dB (high setting) 0.42dB (low setting)

LIMITS:

Subpart I: Output power shall not exceed by more than 20% the manufacturer's rated output power.

Subpart J: Maximum output power varies by application between 1 and 30 W.

The EUT may therefore not be suitable for certain applications of less than 5W authorisation.

##### 5.1.1.3 Test Equipment used

E266, E290, E308, E309, E397

See Section 9 for more details

**5.1.2 Radiated**

Test not applicable. The EUT has no internal antenna.

**5.2 Modulation Characteristics**

**5.2.1 Frequency response**

Test not applicable. The EUT is not an audio transmitter.

## 5.2.2 Modulation Limiting

### 5.2.2.1 Test Methods

Test Requirements	47CFR Part 2, Subpart J
Test Method:	47CFR Part 2, Subpart J, §2.1047
Limits:	47CFR Clauses §90.20 & §90.35

### 5.2.2.1 Configuration of EUT

The EUT was tested on the bench and ambient conditions were monitored. Measurements were made at the 50 ohm coaxial transmit port. The manufacturer declares that the EUT was set for maximum deviation, which cannot normally be increased by the user.

### 5.2.2.2 Test Procedure

Tests were made in accordance with the Test Method noted above using the measuring equipment noted in the 'Test Equipment' Section. The EUT was set to each modulation setting and the peak deviation was measured using the EUT's internal random data source.

## 5.2.3 Test Results

Ambient conditions.

Temperature: 20°C

Relative humidity: 36%

Modulation	Peak Frequency Deviation (kHz)		
	Low Channel	Mid Channel	High Channel
FSK (1200 bps)	1.520	1.493	1.596
FFSK (2400 bps)	1.523	1.510	1.597
GMSK (4800 bps)	1.610	1.814	1.676
4FSK (9600 bps)	1.597	1.608	1.569

LIMITS:

90.20(d)(33) ... the maximum frequency deviation may not exceed 2.5kHz  
90.35(c)(39) ... the maximum frequency deviation may not exceed 2.5kHz  
90.20(d)(54) ... the maximum frequency deviation may not exceed 1.2kHz  
90.35(c)(54) ... the maximum frequency deviation may not exceed 1.2kHz

The EUT may therefore not be suitable for certain applications of less than 2kHz authorisation.

### 5.2.4 Test Equipment used

TMS49, E309

See Section 9 for more details

### 5.3 Occupied Bandwidth & Emission Mask

#### 5.3.1 Test Methods

Test Requirements: 47CFR Part 2, Subpart J  
Test Method: 47CFR Part 2, Subpart J, §2.1049  
Limits: 47CFR Clause §90.209(b)

##### 5.3.1.1 Configuration of EUT

The EUT was tested on the bench and ambient conditions were monitored. Measurements were made at the 50 ohm coaxial transmit port. The manufacturer declares that the EUT was set for maximum deviation, which cannot normally be increased by the user.

##### 5.3.1.2 Test Procedure

Tests were made in accordance with the Test Method noted above, using the measuring equipment noted in the 'Test Equipment' section.

##### 5.3.1.3 Test Results

Ambient conditions.  
Temperature: 20°C      Relative humidity: 33%

Modulation	99% Bandwidth (kHz)		
	Low Channel	Mid Channel	High Channel
FSK (1200 bps)	4.97	4.88	5.06
FFSK (2400 bps)	4.97	4.88	5.06
GMSK (4800 bps)	4.97	4.97	5.06
4FSK (9600 bps)	5.16	5.06	5.16

The plots for this test may be found in section 6. Graphical Results. Limits are as drawn on the respective plots.

LIMITS:  
11.25kHz authorised bandwidth.  
Emission mask D.

##### 5.3.1.4 Test Equipment used

E003, TMS73

See Section 9 for more details

## 5.4 Spurious Emissions at Antenna Terminals

### 5.4.1 Conducted

#### 5.4.1.1 Test Methods

Test Requirements 47CFR Part 2, Subpart J  
Test Methods:

TIA-603-C, 2.2.13

ITU-R Rec. SM.329

Limits: 47CFR Clause §90.20(d)(3)

#### 5.4.1.1.1 Configuration of EUT

The EUT was tested on the bench and ambient conditions were monitored. Measurements were made at the 50 ohm coaxial transmit port. The manufacturer declares that the EUT was set for maximum deviation, which cannot normally be increased by the user.

#### 5.4.1.1.2 Test Procedure

Tests were made in accordance with the Test Method noted above using the measuring equipment noted in the 'Test Equipment' Section. The power stated is the maximum power observed using a peak detector. Bandwidth settings are per FCC / ITU-R rules, not the TIA reference.

#### 5.4.1.2 Test results

Ambient conditions.

Temperature: 18°C

Relative humidity: 43%

All modulations were checked for emissions. Worst case data (4FSK modulation) is presented in this report:

TABLE OF SPURIOUS EMISSIONS

Channel Name	Low	Low
Channel Spacing	12.5kHz	12.5kHz
Modulation Type	4FSK	4FSK
Power Level	0.1W	5W

Spurious Frequency (MHz)	Measured Spurious Level (dBm)	Measured Spurious Level (dBm)
276	-56.62	-64.24
414	-63.04	-62.28
Frequency Range	Plot Number	
9kHz-1GHz	SPURIOUS PLOT 1	SPURIOUS PLOT 3
1GHz-2GHz	SPURIOUS PLOT 2	SPURIOUS PLOT 4

TABLE OF SPURIOUS EMISSIONS

Channel Name	Middle	Middle
Channel Spacing	12.5kHz	12.5kHz
Modulation Type	4FSK	4FSK
Power Level	0.1W	5W

Spurious Frequency (MHz)	Measured Spurious Level (dBm)	Measured Spurious Level (dBm)
312	-63.16	-64.02
468	-58.03	-63.15
Frequency Range	Plot Number	Plot Number
9kHz-1GHz	SPURIOUS PLOT 5	SPURIOUS PLOT 7
1GHz-2GHz	SPURIOUS PLOT 6	SPURIOUS PLOT 8

TABLE OF SPURIOUS EMISSIONS

Channel Name	Top	Top
Channel Spacing	12.5kHz	12.5kHz
Modulation Type	4FSK	4FSK
Power Level	0.1W	5W

Spurious Frequency (MHz)	Measured Spurious Level (dBm)	Measured Spurious Level (dBm)
348	-63.31	-63.74
522	-59.41	
Frequency Range	Plot Number	Plot Number
9kHz-1GHz	SPURIOUS PLOT 9	SPURIOUS PLOT 11
1GHz-2GHz	SPURIOUS PLOT 10	SPURIOUS PLOT 12

The plots referred to in the above tables may be found in section 6. Graphical Results

LIMITS:  $50+10\log(P)$  or 70dB, whichever is the lesser attenuation.

Power Level	0.1W	5W
Attenuation (dB)	40	57
Limit (dBm)	-20	-20

#### 5.4.1.3 Test Equipment used

E003, E306, E308, TMS73

See Section 9 for more details

## 5.5 Field Strength of Spurious Radiation.

### 5.5.1 Test Methods

Test Requirements: 47CFR Part 2, Subpart J  
Test Methods: TIA-603-C, 2.2.12  
ITU-R Rec. SM.329

Limits: 47CFR Clause §90.20(d)(3)

#### 5.5.1.1 Configuration of EUT

The EUT was placed in a vertical position in a shielded anechoic chamber.  
Measurements were made at 3m distance 30MHz to 2GHz, then substitution was performed using a known signal generator.

#### 5.5.1.2 Test Procedure

Tests were made in accordance with the Test Methods noted above using the measuring equipment noted in the 'Test Equipment' Section. Bandwidth settings are per FCC / ITU-R rules, not the TIA reference.

### 5.5.2 Test Results

Ambient conditions.

Temperature: 16°C      Relative humidity: 30%

All modulations and both power levels were checked for emissions. Worst case data (4FSK modulation, 5W) is presented in this report:

Channel Name	LOW
Channel Spacing	12.5kHz
Modulation Type	4FSK
Power Level	5W

Spurious Frequency (MHz)	Measured Spurious Level (dBm)	Antenna Polarisation	EUT Polarisation
276	-66	Vertical	Vertical
276	-57	Horizontal	Vertical
414	-67	Vertical	Vertical
414	-62	Horizontal	Vertical
552	-	Vertical	Vertical
552	-65	Horizontal	Vertical
966	-61	Vertical	Vertical
966	-60	Horizontal	Vertical

Channel Name	MIDDLE
Channel Frequency	156MHz
Channel Spacing	12.5kHz
Modulation Type	4FSK
Power Level	5W

Spurious Frequency (MHz)	Measured Spurious Level (dBm)	Antenna Polarisation	EUT Polarisation
312	-72	Vertical	Vertical
312	-70	Horizontal	Vertical
468	-60	Vertical	Vertical
468	-52	Horizontal	Vertical
780	-63	Horizontal	Vertical

Channel Name	HIGH
Channel Frequency	174MHz
Channel Spacing	12.5kHz
Modulation Type	4FSK
Power Level	5W

Spurious Frequency (MHz)	Measured Spurious Level (dBm)	Antenna Polarisation	EUT Polarisation
348	-68	Vertical	Vertical
348	-59	Horizontal	Vertical
522	-55	Vertical	Vertical
522	-48	Horizontal	Vertical
1045	-60	Horizontal	Vertical

LIMITS:  $50 + 10\log(P)$  or 70dB, whichever is the lesser attenuation.

Power Level	0.1W	5W
Attenuation (dB)	40	57
Limit (dBm)	-20	-20

### 5.5.3 Test Equipment Used

E131, E226, E268, E342, TMS814, TMS82, TMS903, C033

See Section 9 for more details

## 5.6 Frequency Error

### 5.6.1 Test Methods

Test Requirements: 47CFR Part 2, Subpart J  
Test Method: 47CFR Part 2, Subpart J, Clause §2.1055  
Limits: 47CFR Clause §90.213

#### 5.6.1.1 Configuration of EUT

The mid band EUT was placed in a temperature controlled chamber and thermal balance was achieved at each temperature set before testing commenced. Measurements were made at the 50 ohm coaxial transmit port. The EUT was set into a CW mode for the purposes of this test.

#### 5.6.1.2 Test Procedure

Tests were made in accordance with the Test Method noted above using the measuring equipment noted in the 'Test Equipment' Section. At each temperature extreme, the EUT was switched on in the transmit condition for one minute, after which the tests were conducted.

### 5.6.2 Test results

Ambient conditions.

Temperature: 18°C      Relative humidity: 36%

Radio parameters.

O/P Power: 5W      Modulation: None      Frequency: 156.000 MHz

TABLE OF FREQUENCY ERROR

Temperature	Voltage	Bottom Channel	Middle Channel	Top Channel
-30°C	Nominal	-	156.000231	-
-20°C	Nominal	-	156.000162	-
-10°C	Nominal	-	156.000061	-
0°C	Nominal	-	156.000034	-
+10°C	Nominal	-	156.000015	-
+20°C	Nominal	-	155.999976	-
+20°C	Minimum	-	155.999947	-
+20°C	Maximum	-	155.999951	-
+30°C	Nominal	-	155.999921	-
+40°C	Nominal	-	155.999881	-
+50°C	Nominal	-	155.999850	-

	Bottom Channel	Middle Channel	Top Channel
Variation in Frequency (+/-Hz)	-	+231/-150	-
Worst case observed (ppm)		+1.48 / -0.96	

LIMITS:

Fixed stations +/-2.5ppm

Mobile stations +/-5ppm

### 5.6.3 Test Equipment used

E003, E306, TMS36, TMS57, TMS73, TMS80, P209

See Section 9 for more details

## 5.7 Transient Frequency Behaviour

### 5.7.1 Test Methods

Test Requirements: 47CFR Part 90, Subpart I  
Test Methods: TIA-603-C, 2.2.19  
Limits: 47CFR Clause §90.214

#### 5.7.1.1 Configuration of EUT

The EUT was tested on the bench and ambient conditions were monitored. The EUT was placed into a CW mode for purposes of this test.

#### 5.7.1.2 Test Procedure

Tests were made in accordance with the Test Method noted above using the measuring equipment noted in the 'Test Equipment' Section at Site A. The EUT was repeatedly keyed up and down and the frequency vs. time curve observed. For the modulation domain analyser an FM discriminator connected to an oscilloscope was used.

### 5.7.2 Test results

Ambient conditions.

Temperature: 20°C      Relative humidity: 37%

TABLE OF TRANSIENT BEHAVIOUR

Channel	Switch	TX Transient Plot Filename
Low	On	4240-3 138MHz Transient at 12.5kHz FM
Low	Off	4240-3 138MHz Transient at 12.5kHz FM OFF
Mid	On	4240-3 156MHz Transient at 12.5kHz FM
Mid	Off	4240-3 156MHz Transient at 12.5kHz FM OFF
High	On	4240-3 174MHz Transient at 12.5kHz FM
High	Off	4240-3 174MHz Transient at 12.5kHz FM OFF

The plots for this test may be found in section 6. Graphical Results. Limits are as drawn on the respective plots.

LIMITS: (for 12.5kHz channel spacing)

Period	t1	t2	t3
Max. deviation (kHz)	12.5	6.25	12.5
Time span (ms)	5.0	20.0	5.0

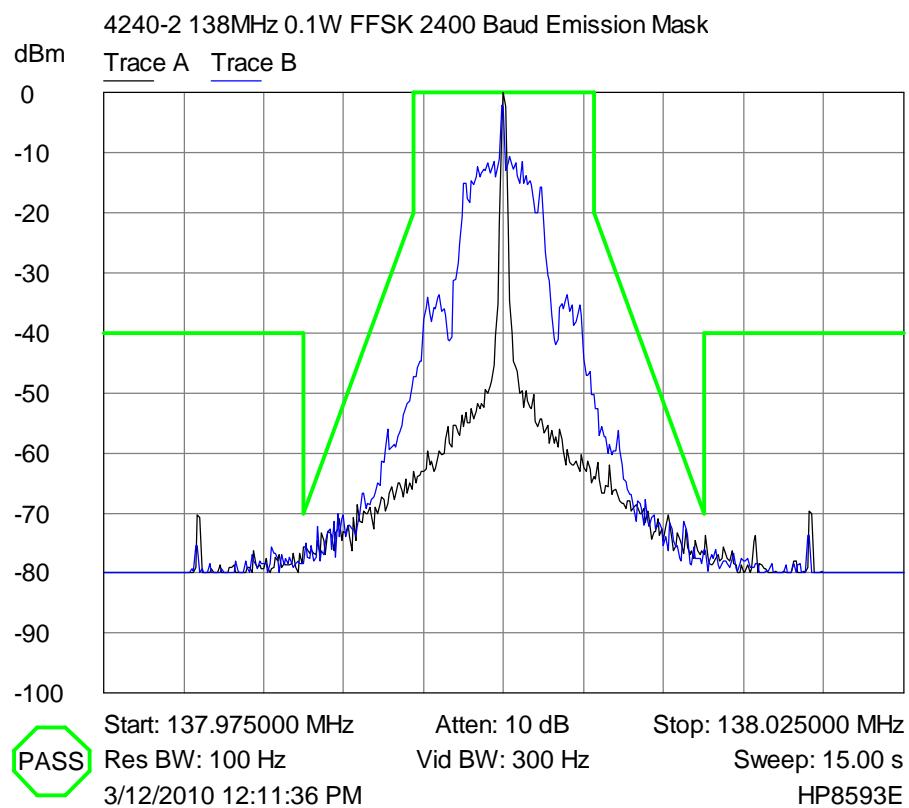
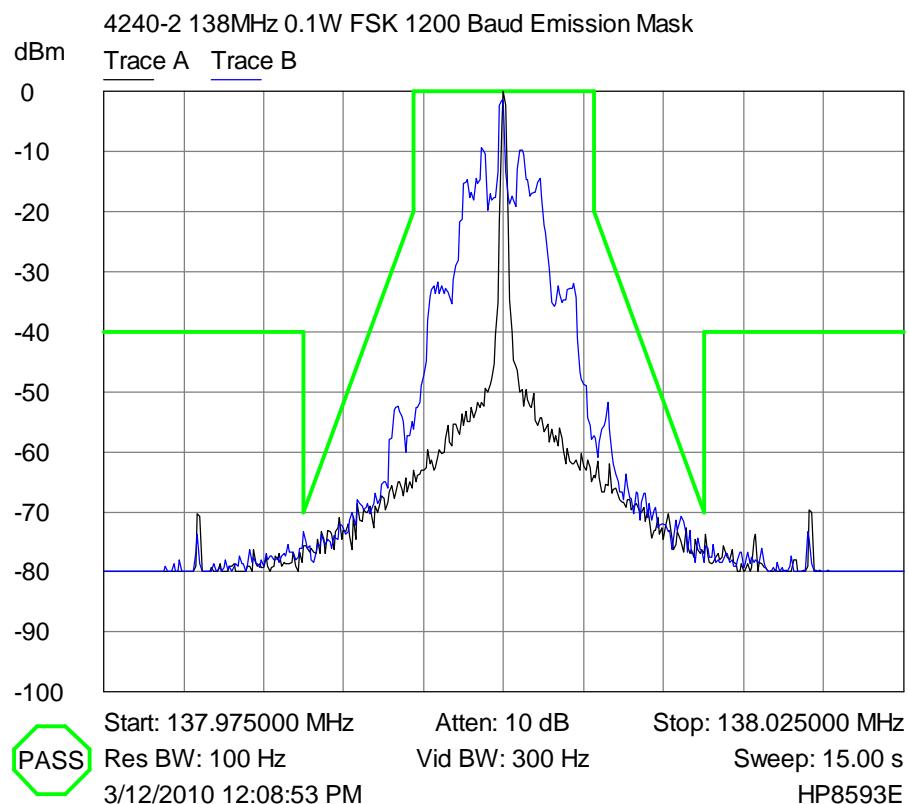
### 5.7.3 Test Equipment used

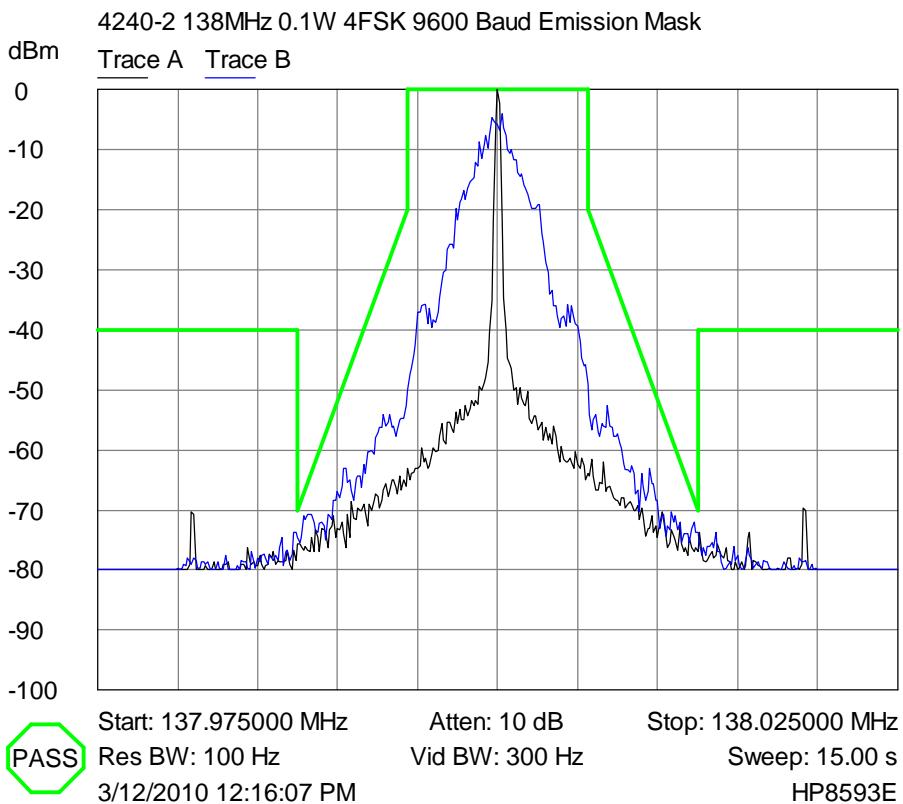
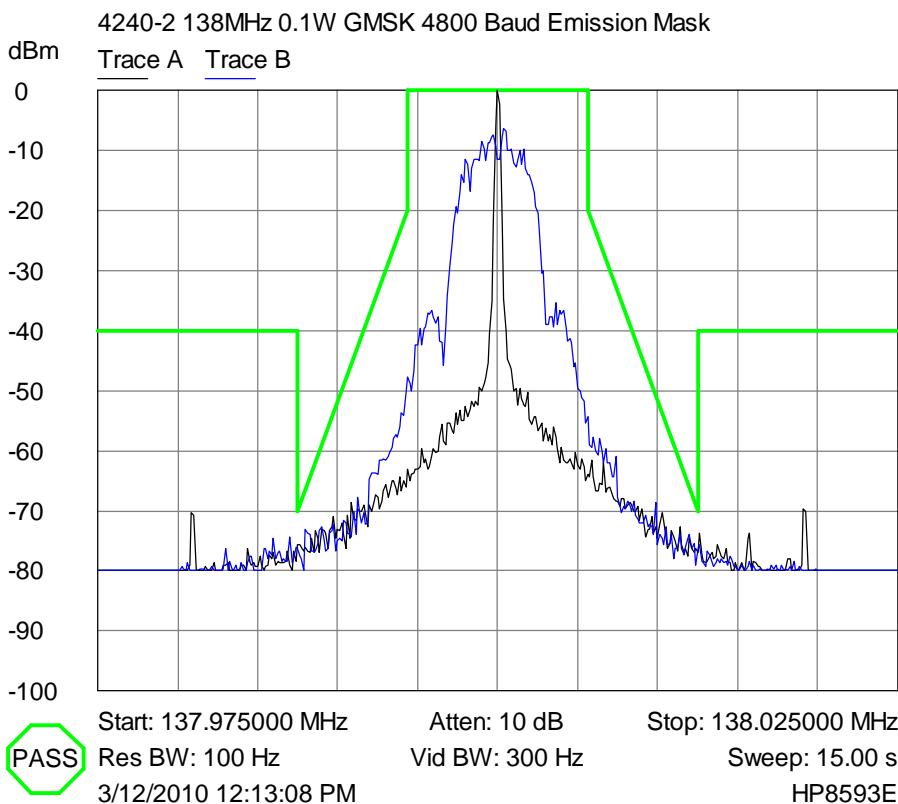
E249, E255, E266, E308, E321, E351, E364, E372, TMS73, P209

See Section 9 for more details

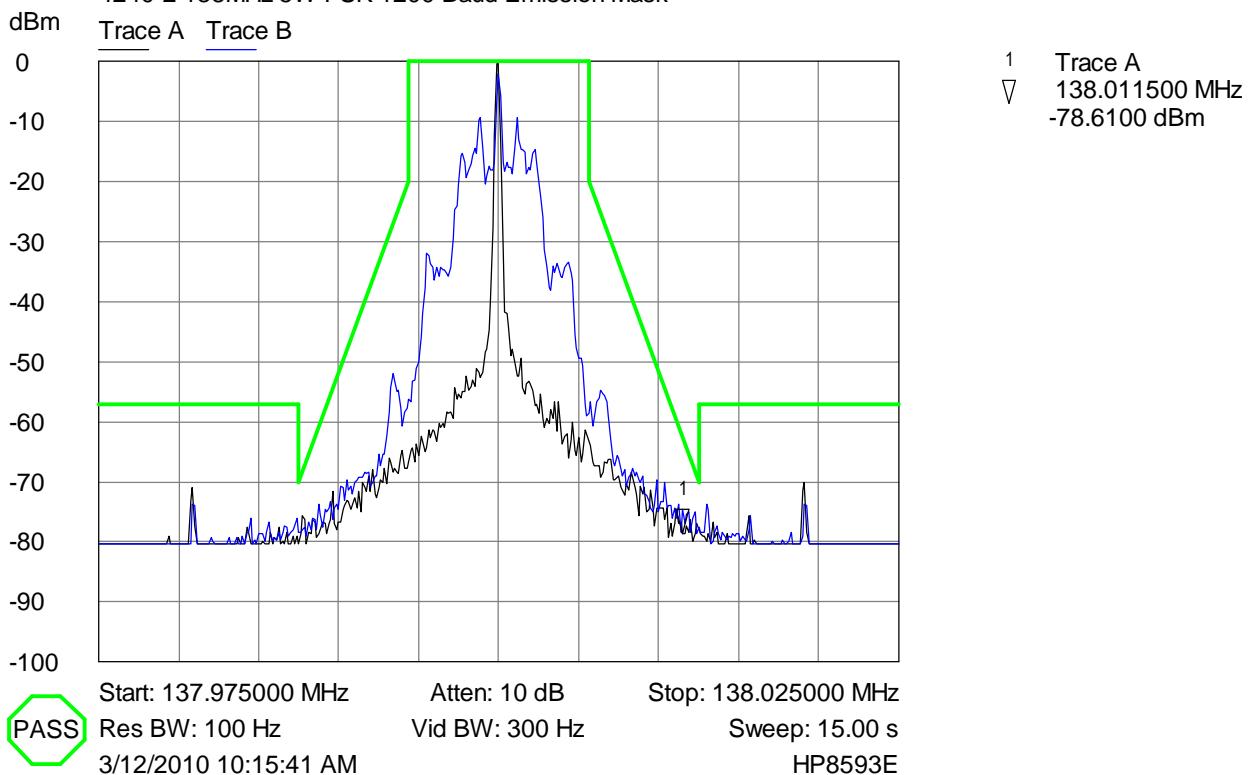
## 6. Graphical Results

### 6.1 Emission Masks

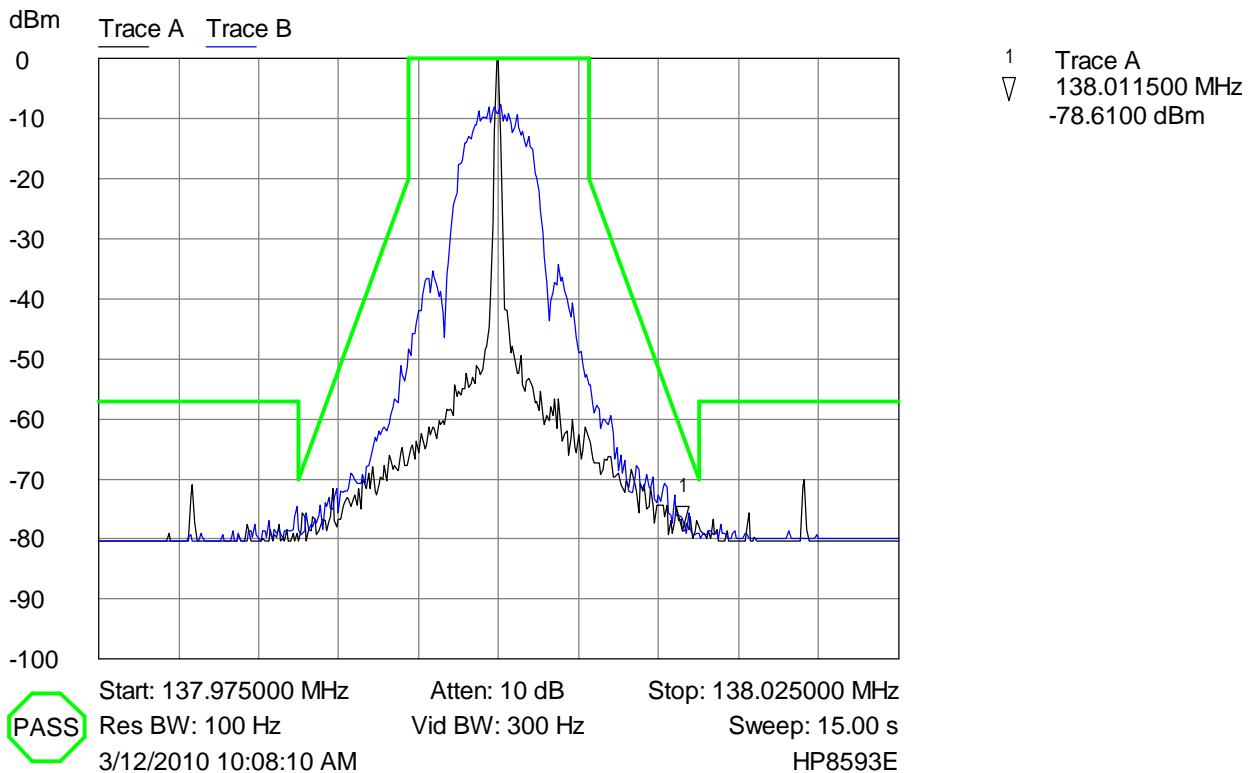


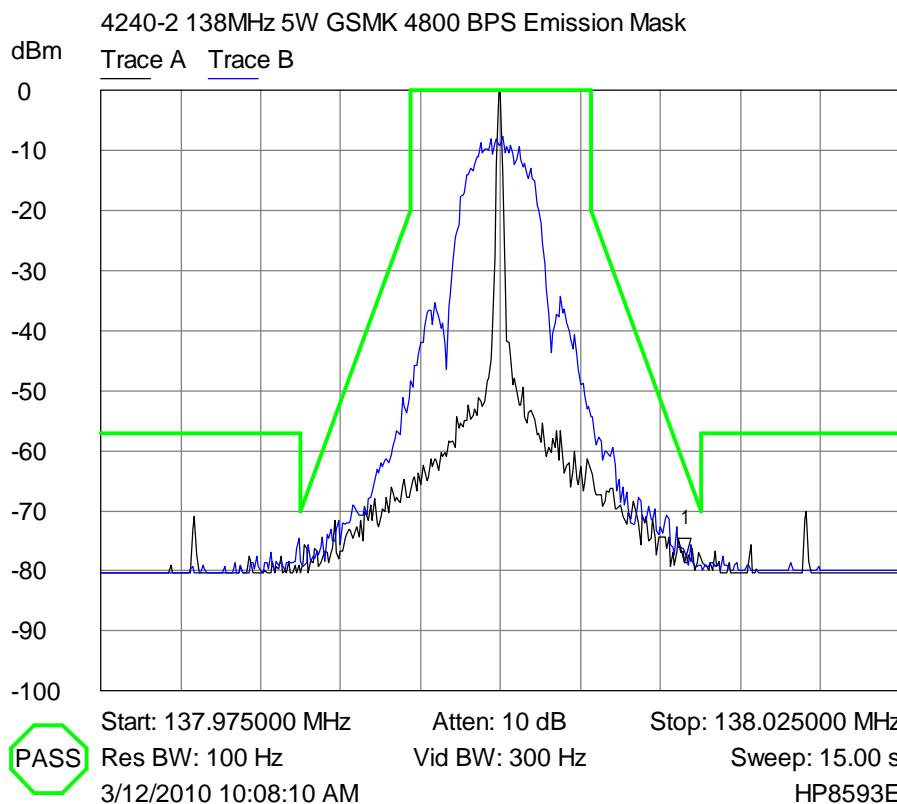


4240-2 138MHz 5W FSK 1200 Baud Emission Mask

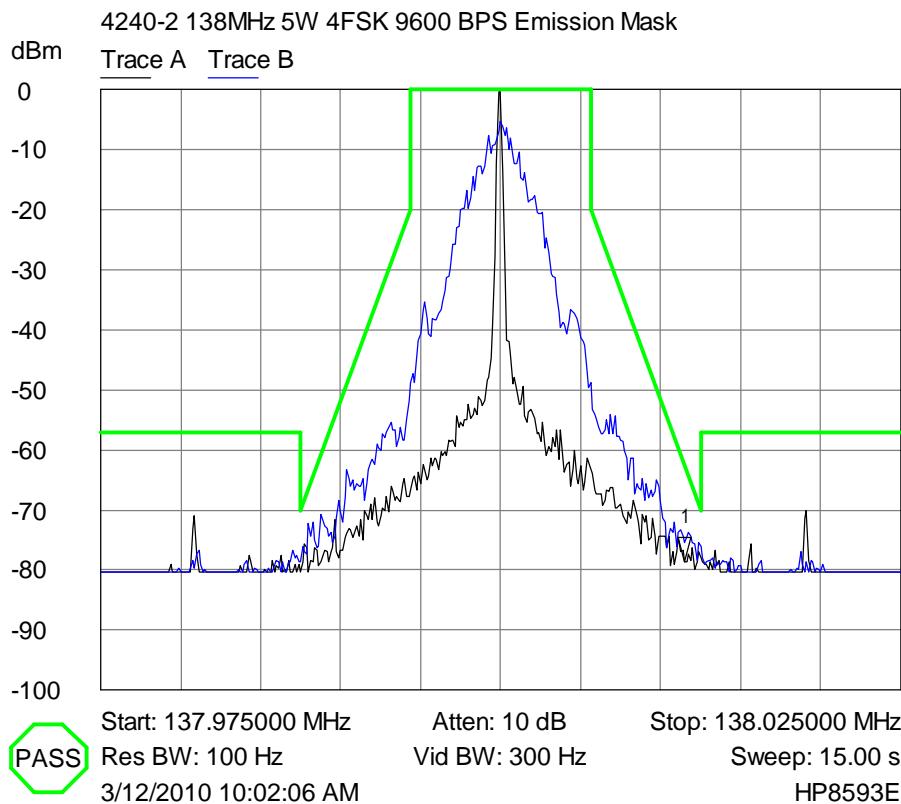


4240-2 138MHz 5W GSMK 4800 BPS Emission Mask

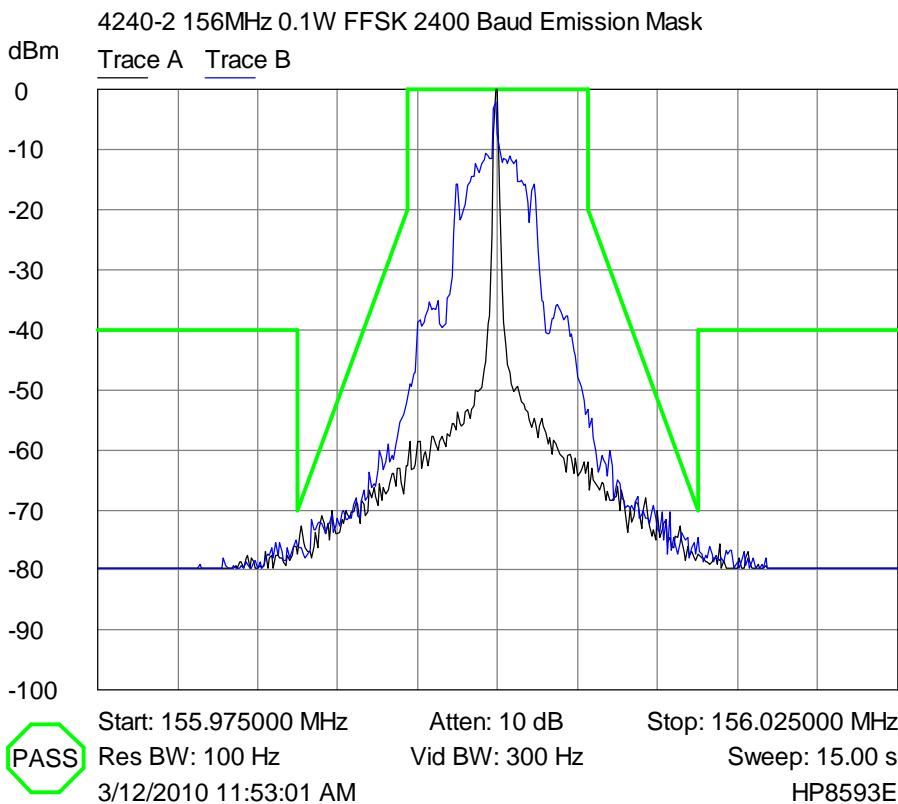
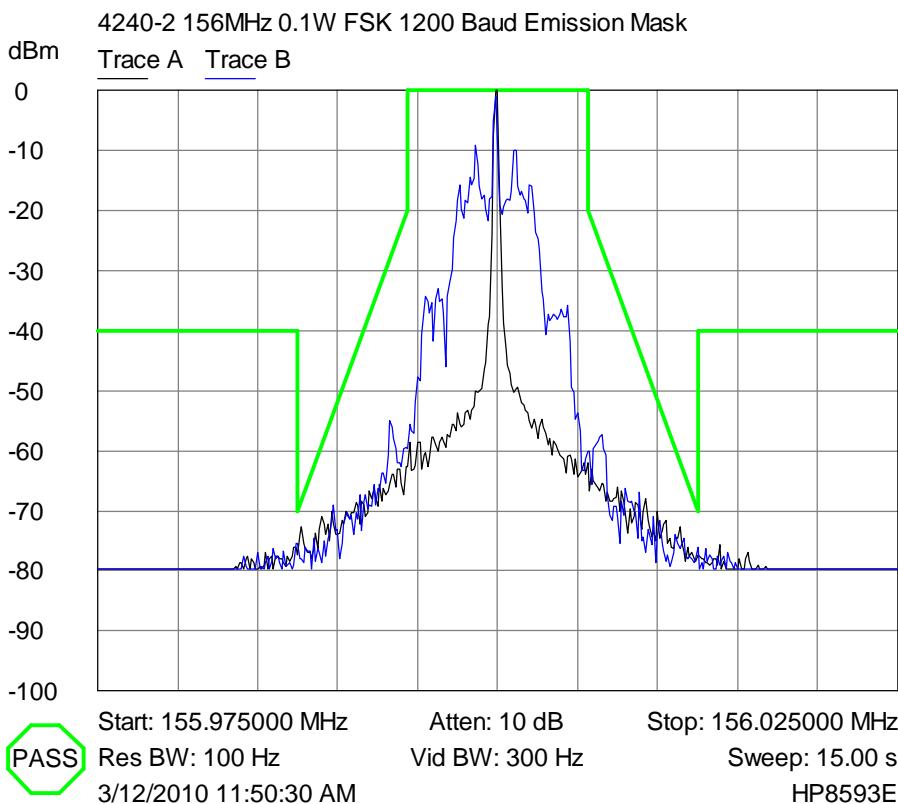


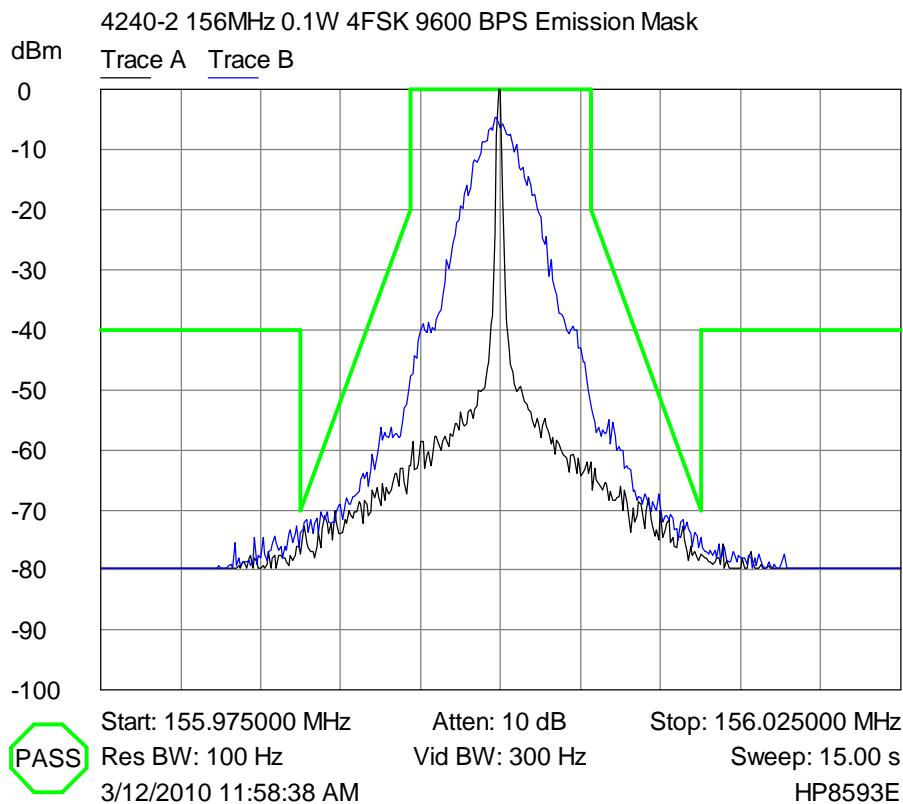
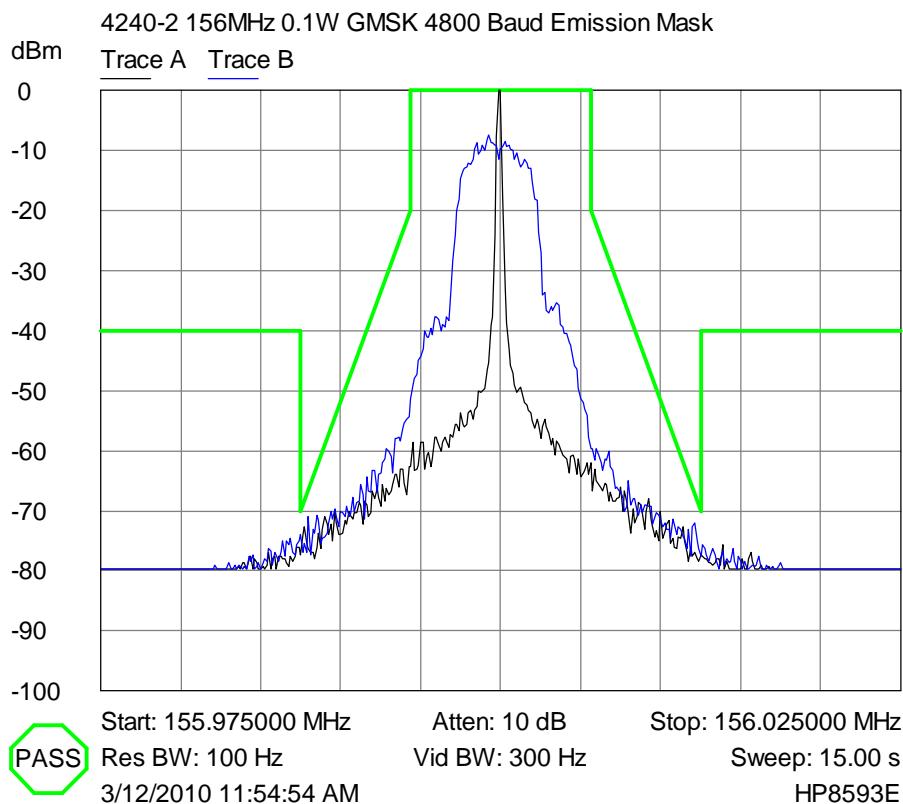


1 Trace A  
▽ 138.011500 MHz  
-78.6100 dBm



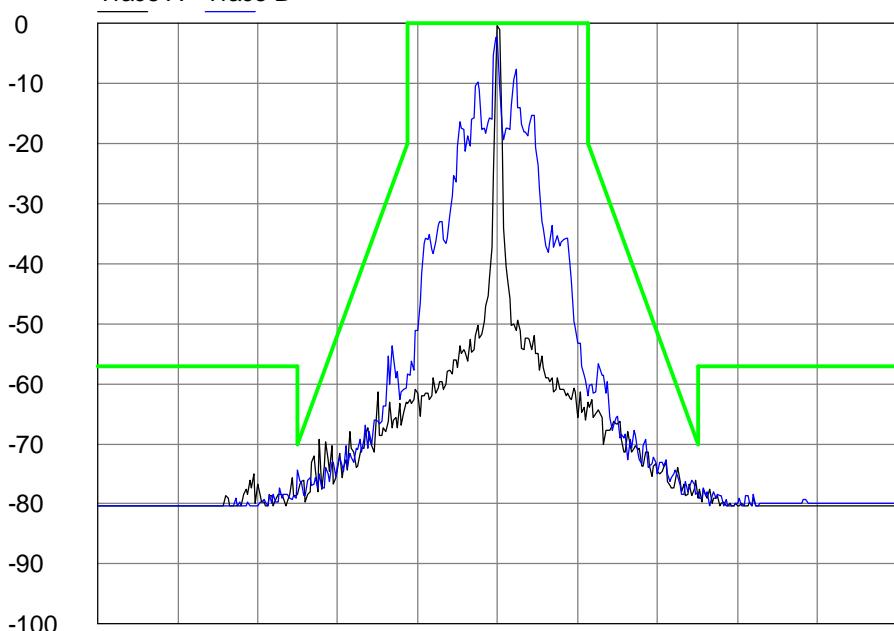
1 Trace A  
▽ 138.011500 MHz  
-78.6100 dBm





4240-2 156MHz 5W FSK 1200 Baud Emission Mask

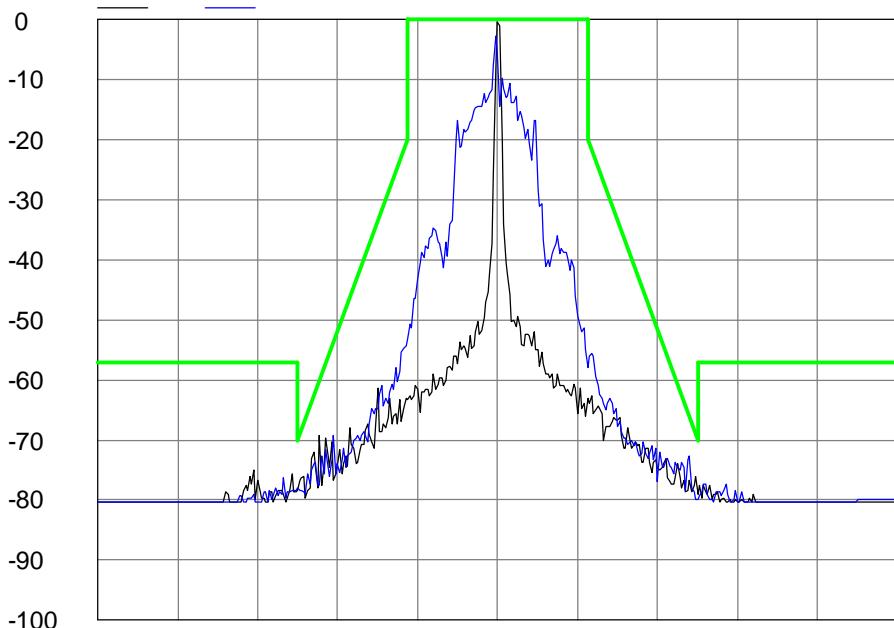
dBm Trace A Trace B



 PASS Start: 155.975000 MHz Stop: 156.025000 MHz  
Res BW: 100 Hz Vid BW: 300 Hz Sweep: 15.00 s  
3/12/2010 10:30:30 AM HP8593E

4240-2 156MHz 5W FFSK 2400 BPS Emission Mask

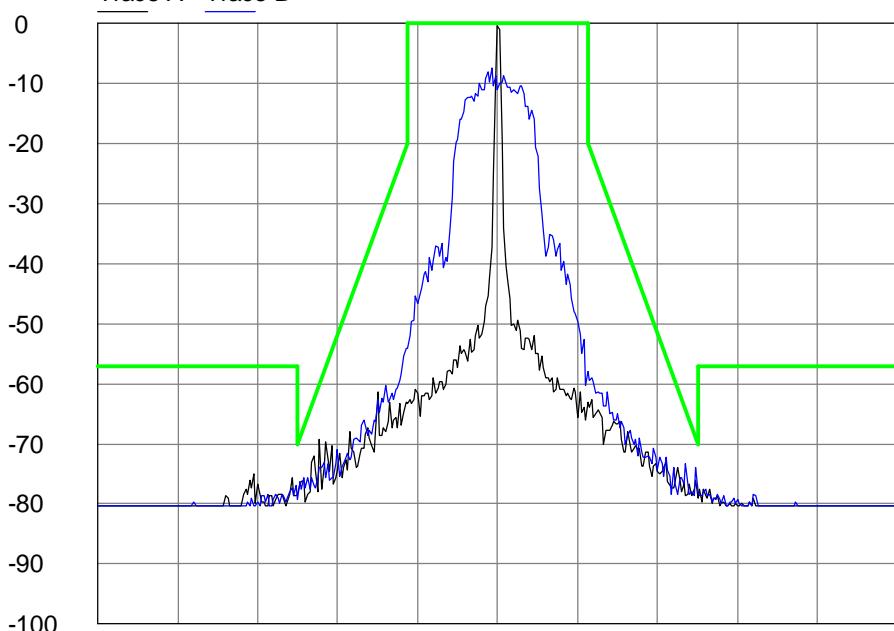
dBm Trace A Trace B



 PASS Start: 155.975000 MHz Stop: 156.025000 MHz  
Res BW: 100 Hz Vid BW: 300 Hz Sweep: 15.00 s  
3/12/2010 10:28:39 AM HP8593E

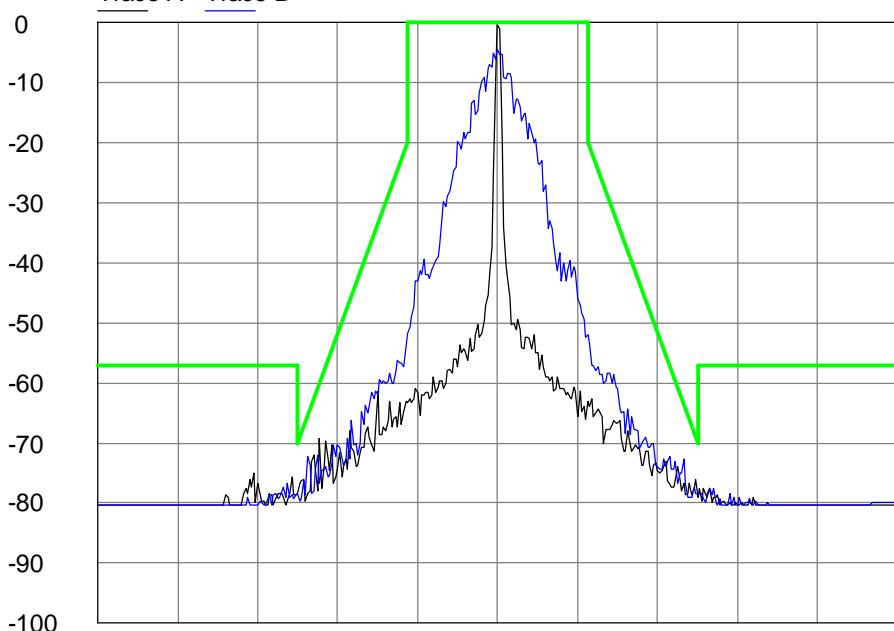
4240-2 156MHz 5W GMSK 4800 BPS Emission Mask

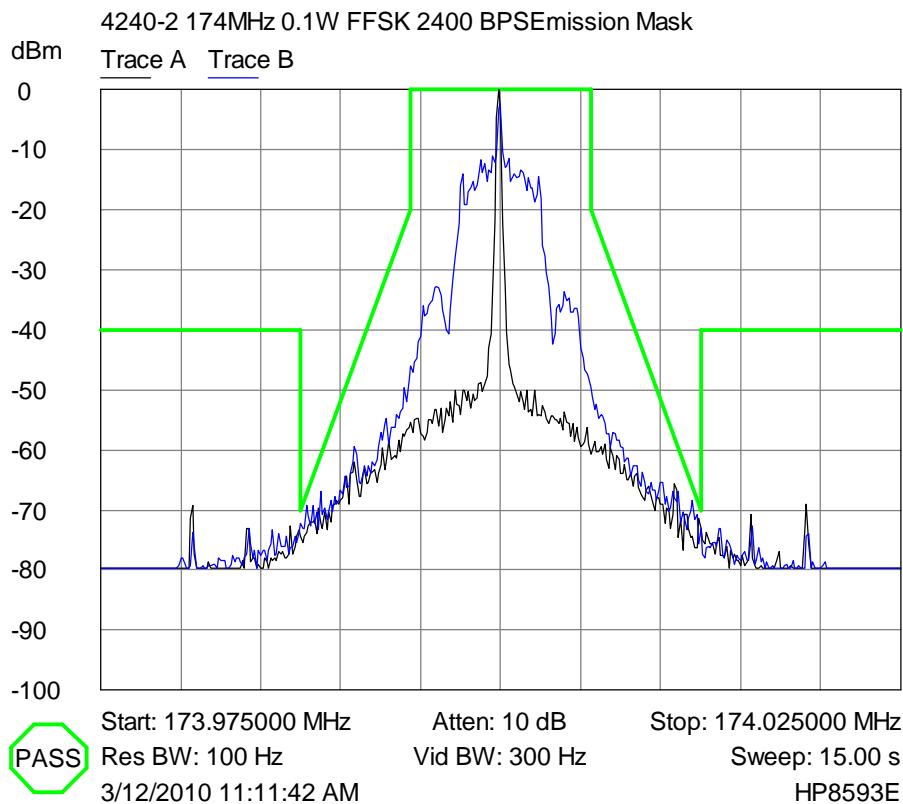
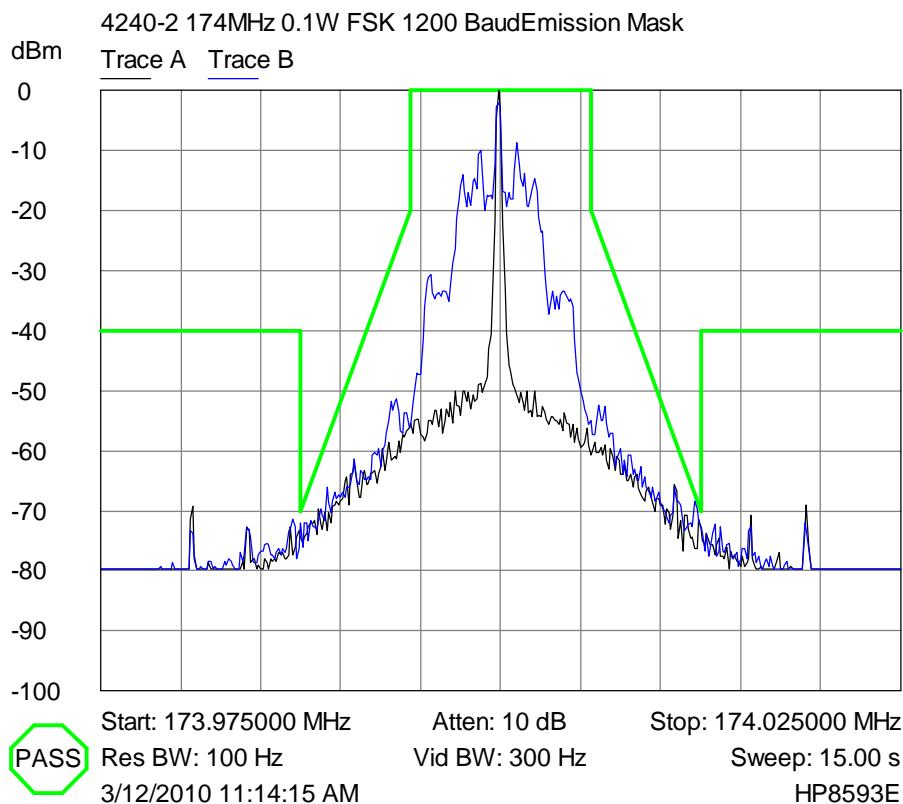
dBm Trace A Trace B

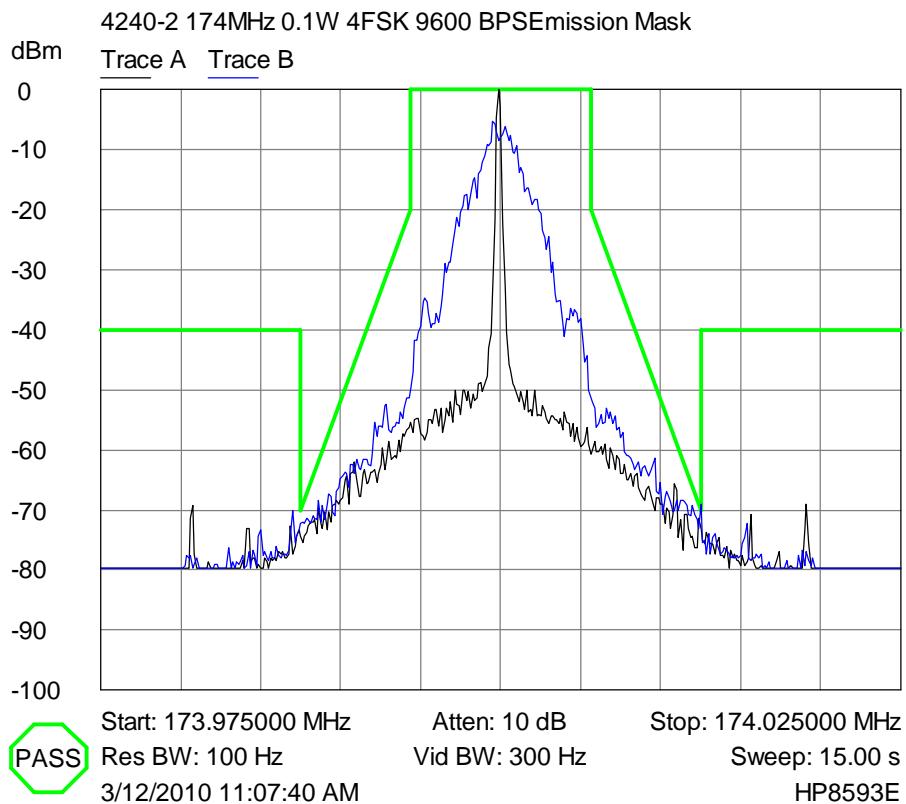
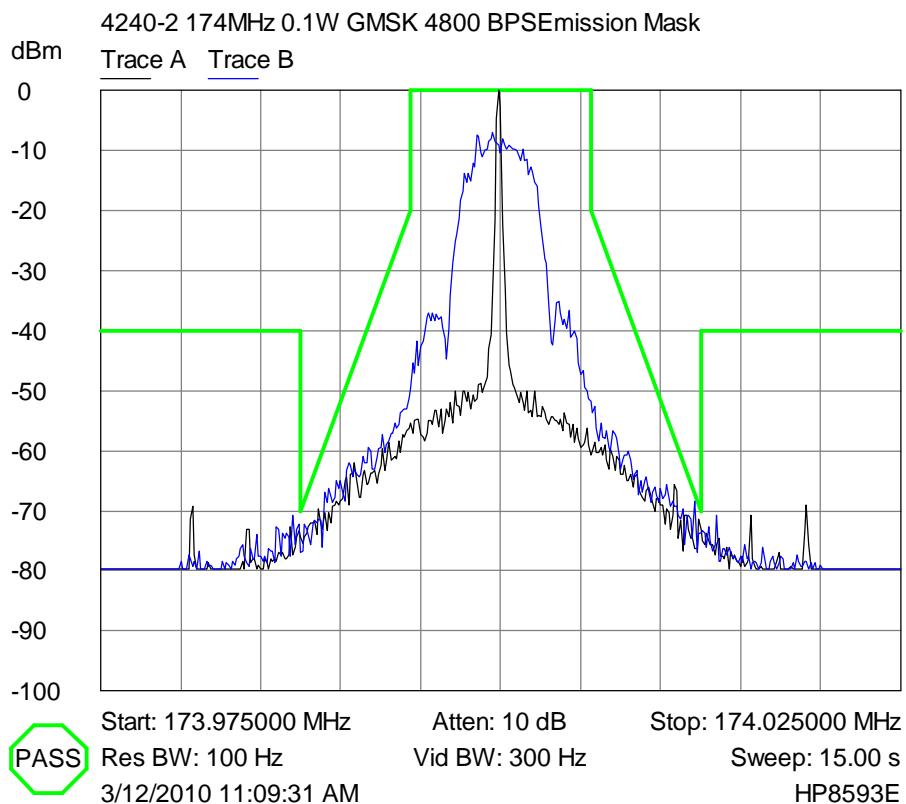


4240-2 156MHz 5W 4FSK 9600 BPS Emission Mask

dBm Trace A Trace B

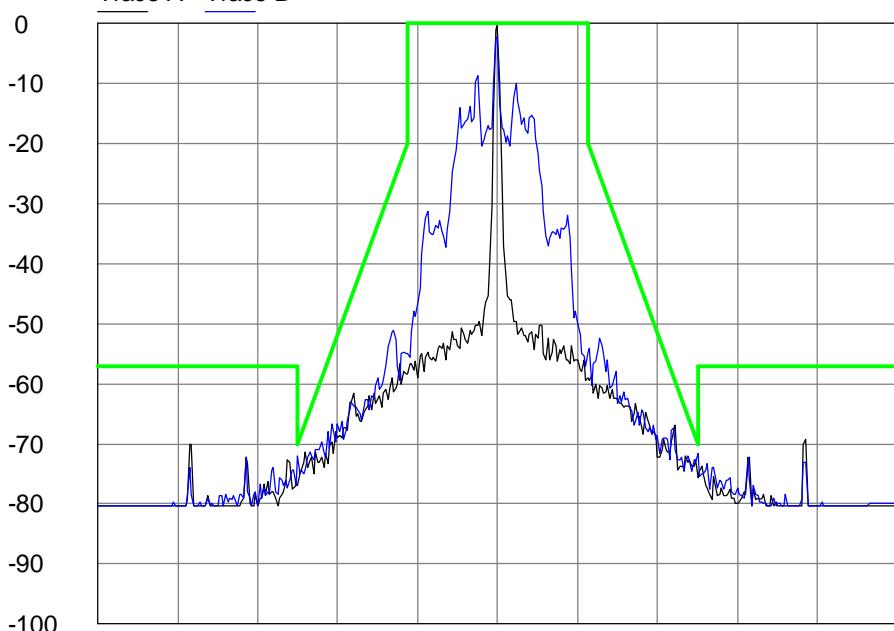






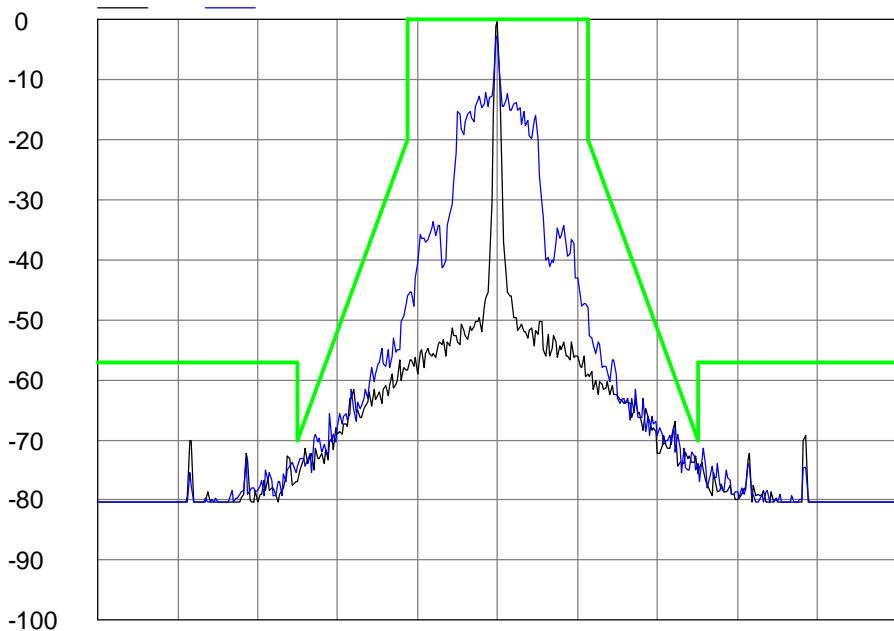
4240-2 174MHz 5W FSK 1200 Baud Emission Mask

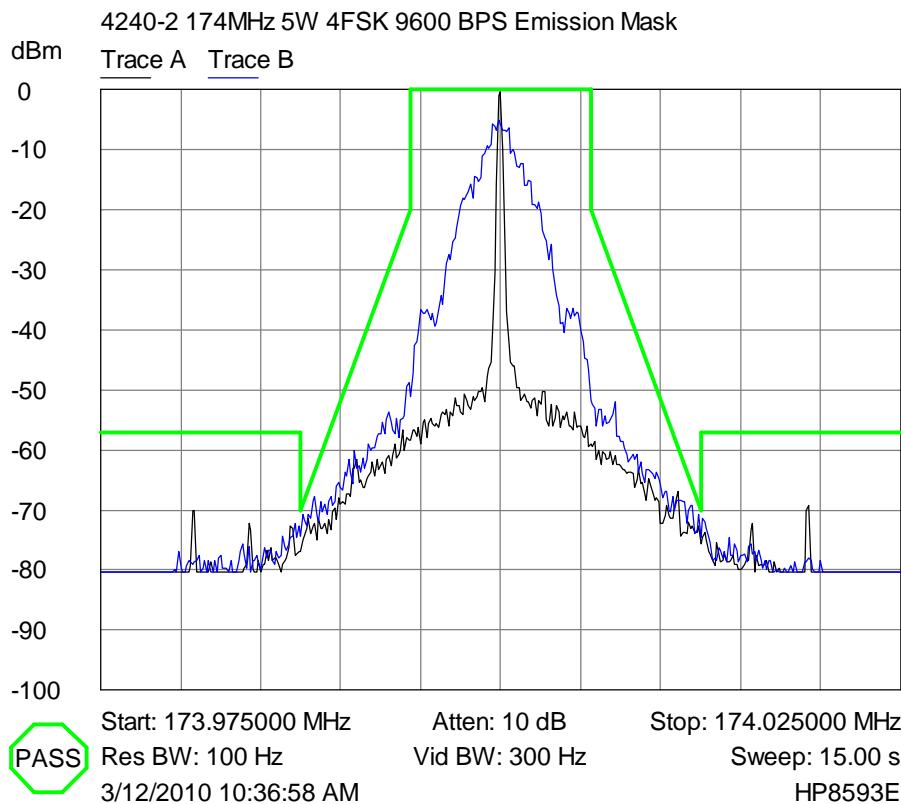
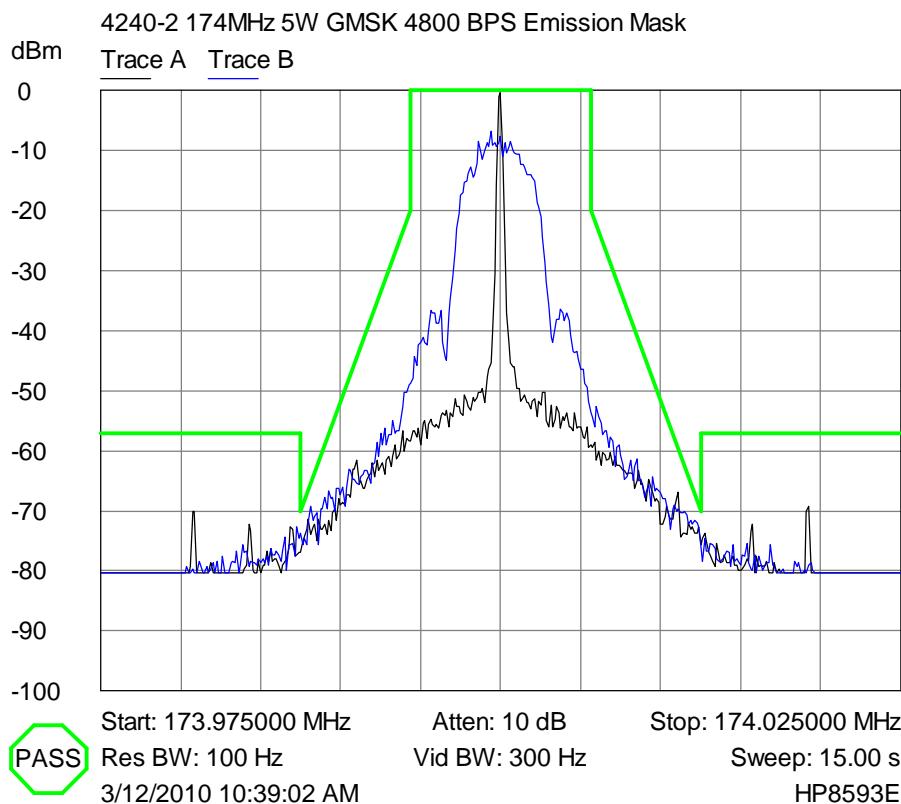
dBm Trace A Trace B



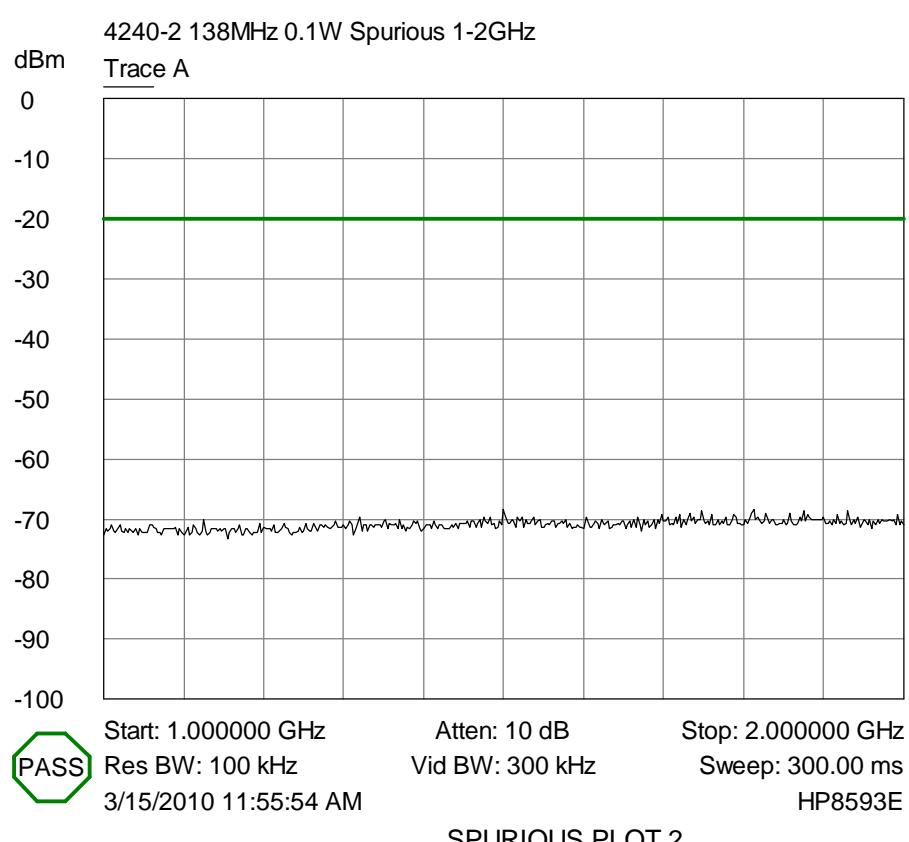
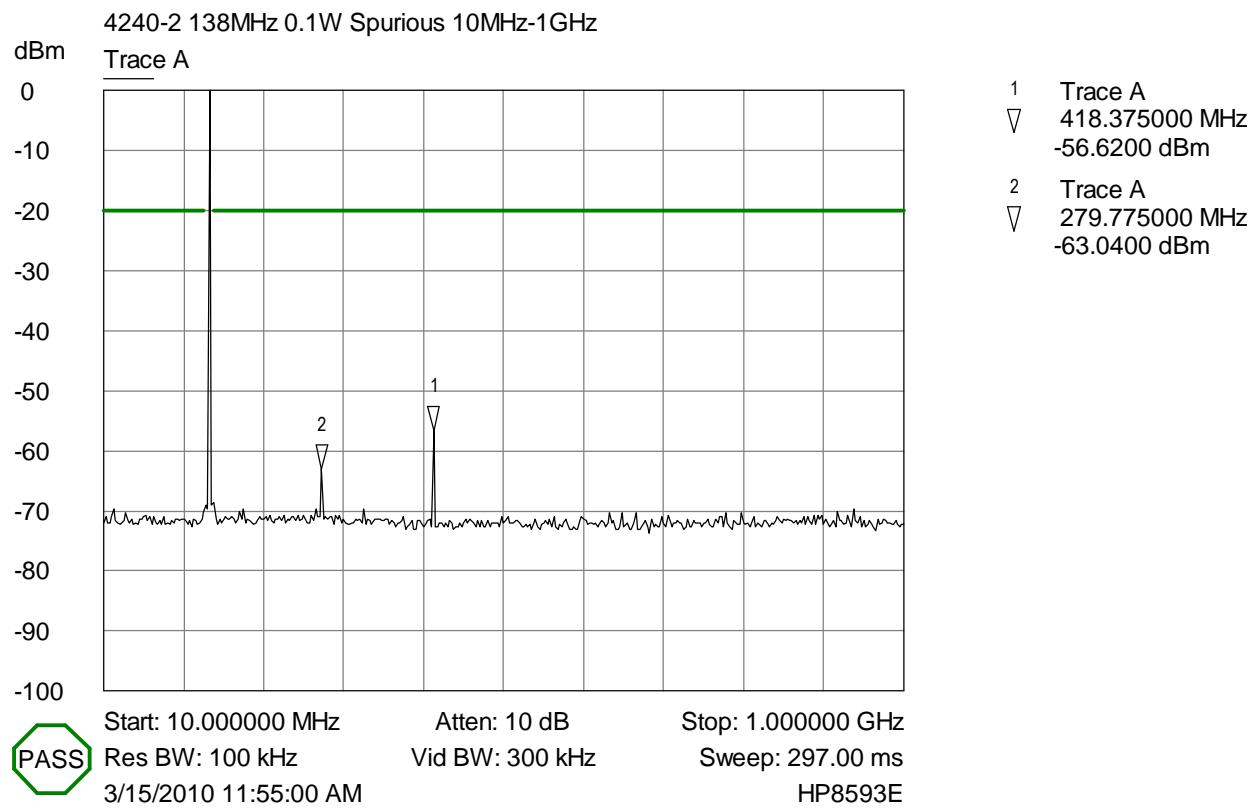
4240-2 174MHz 5W FFSK 2400 BPS Emission Mask

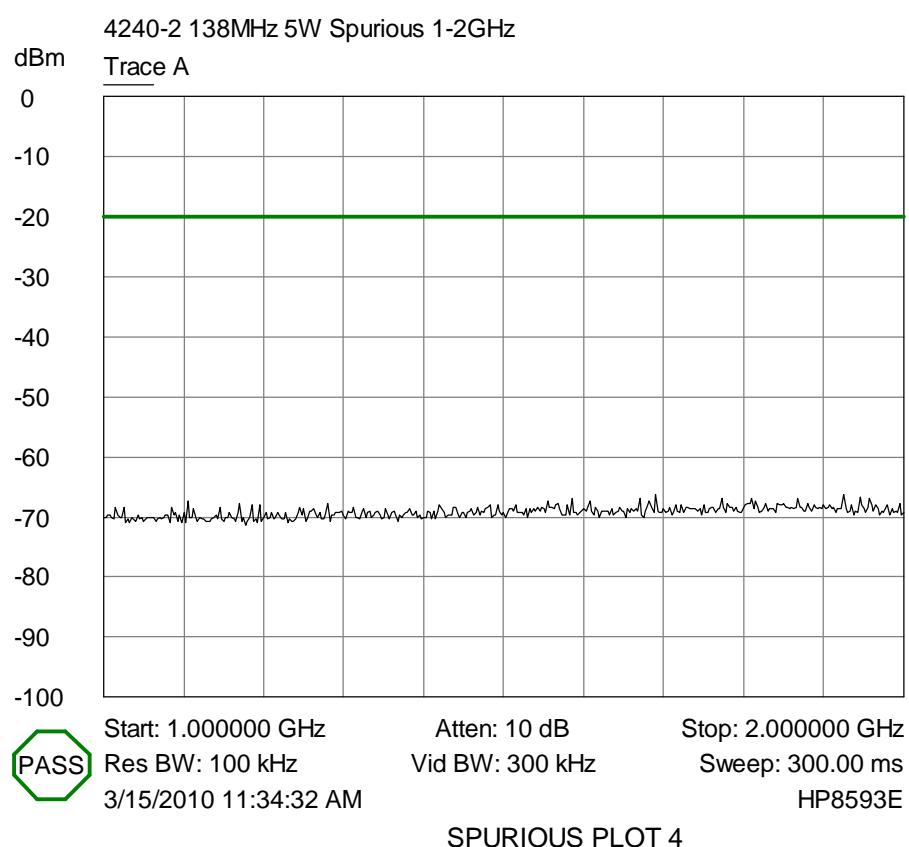
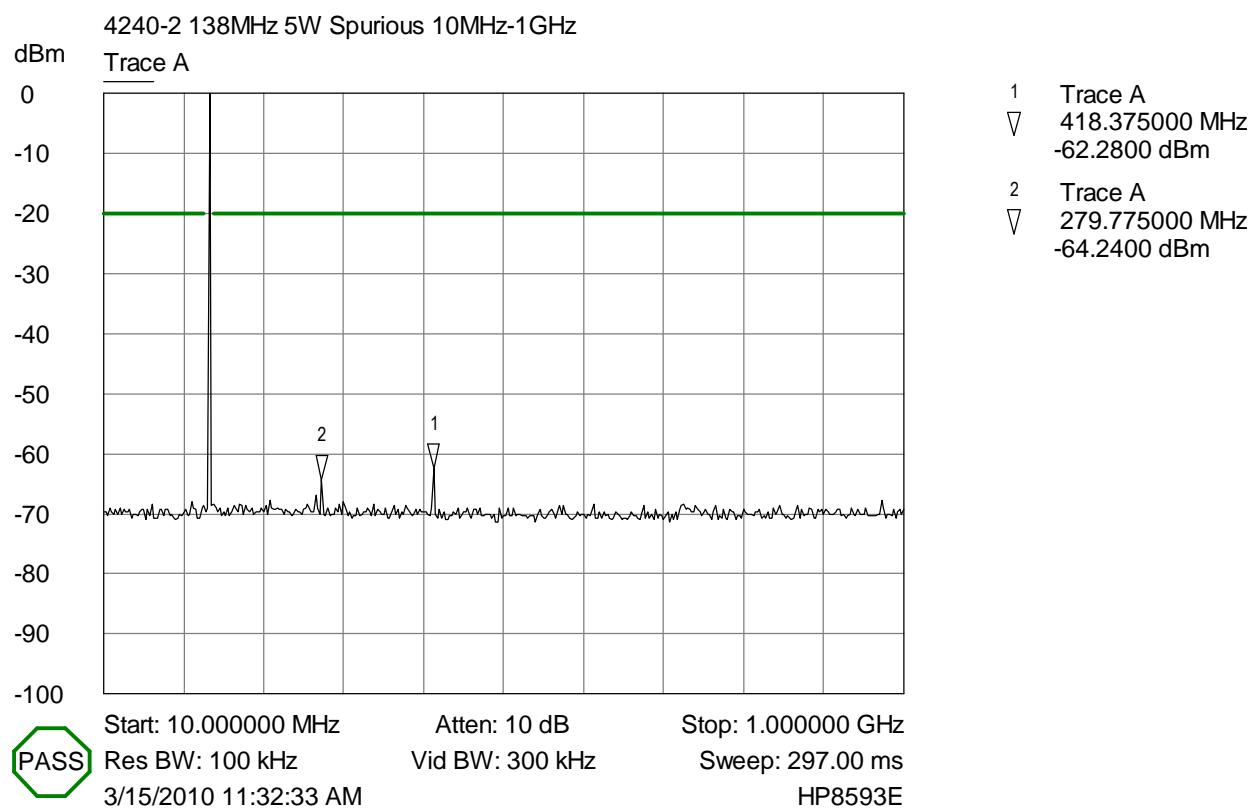
dBm Trace A Trace B

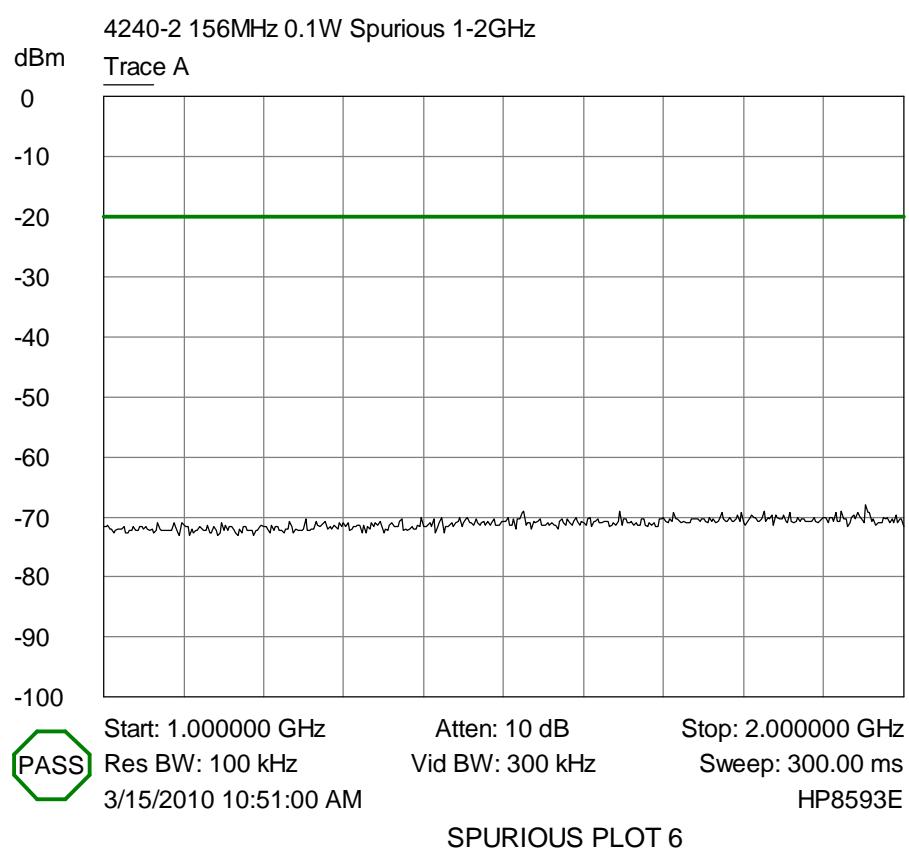
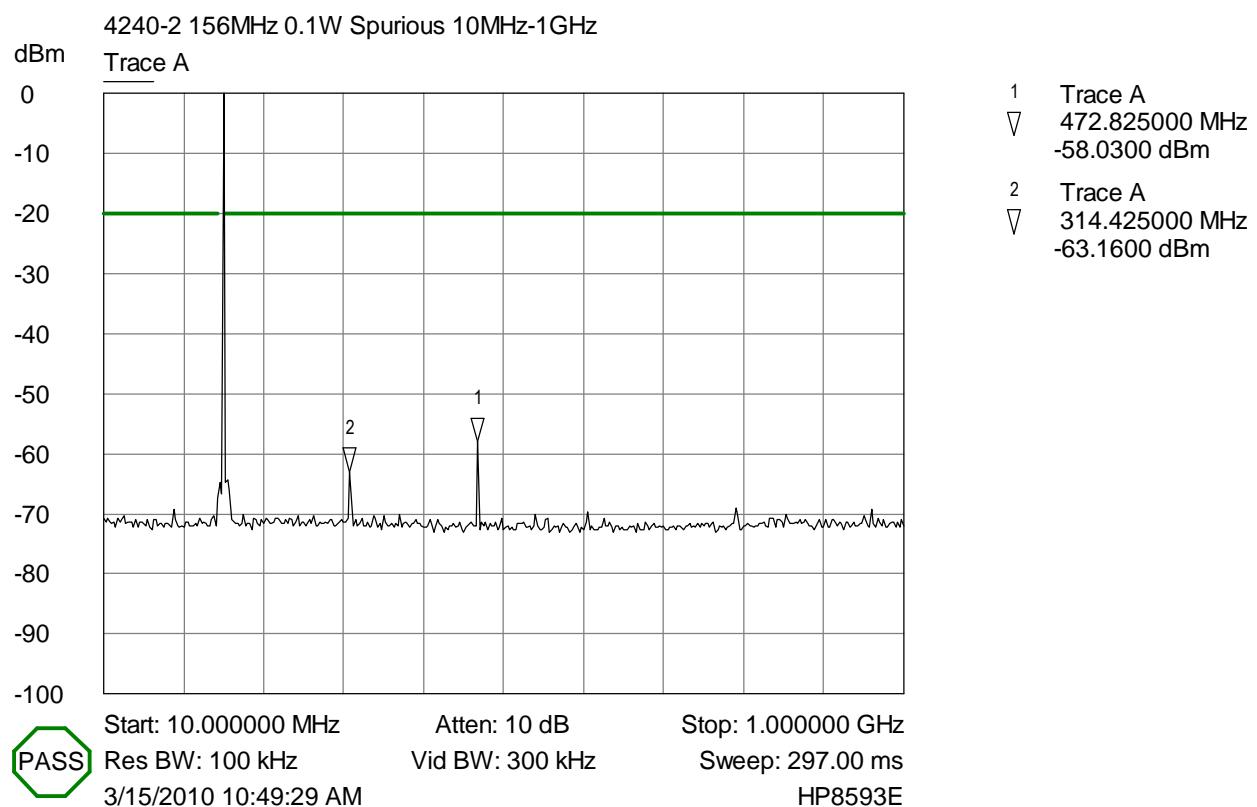


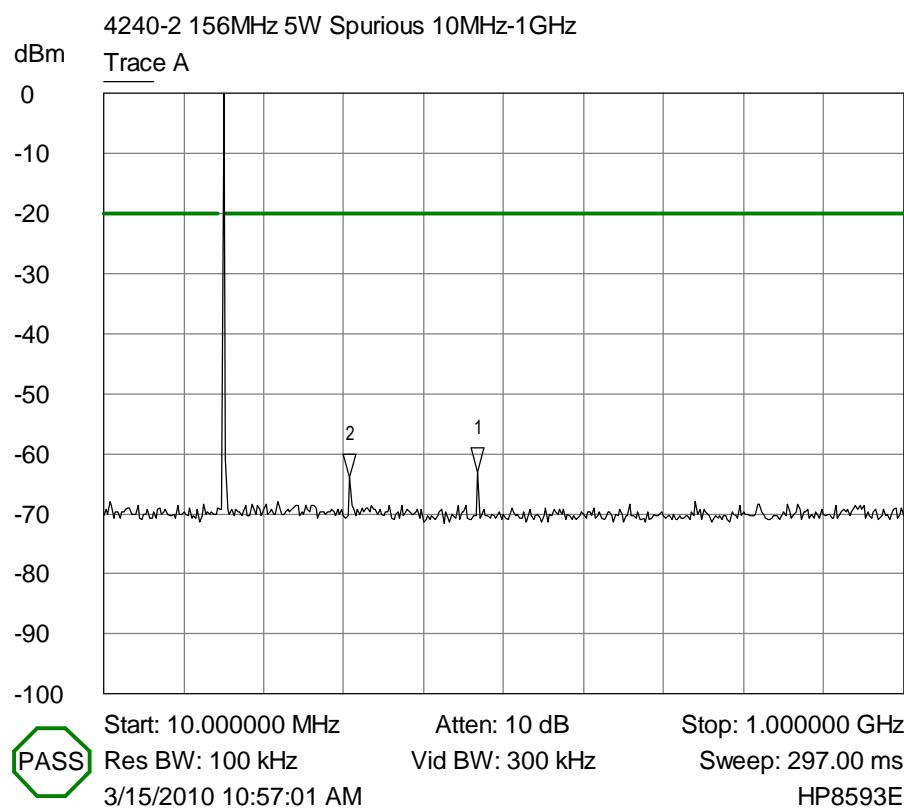


## 6.2 Spurious Emission at the Antenna Port

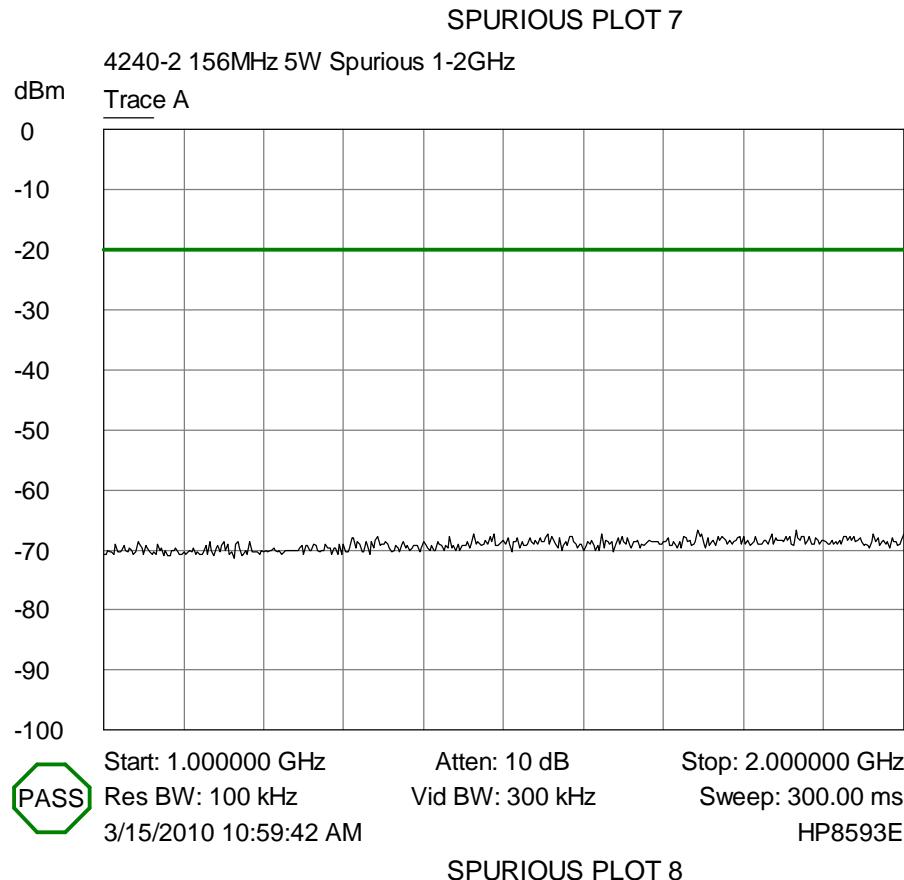




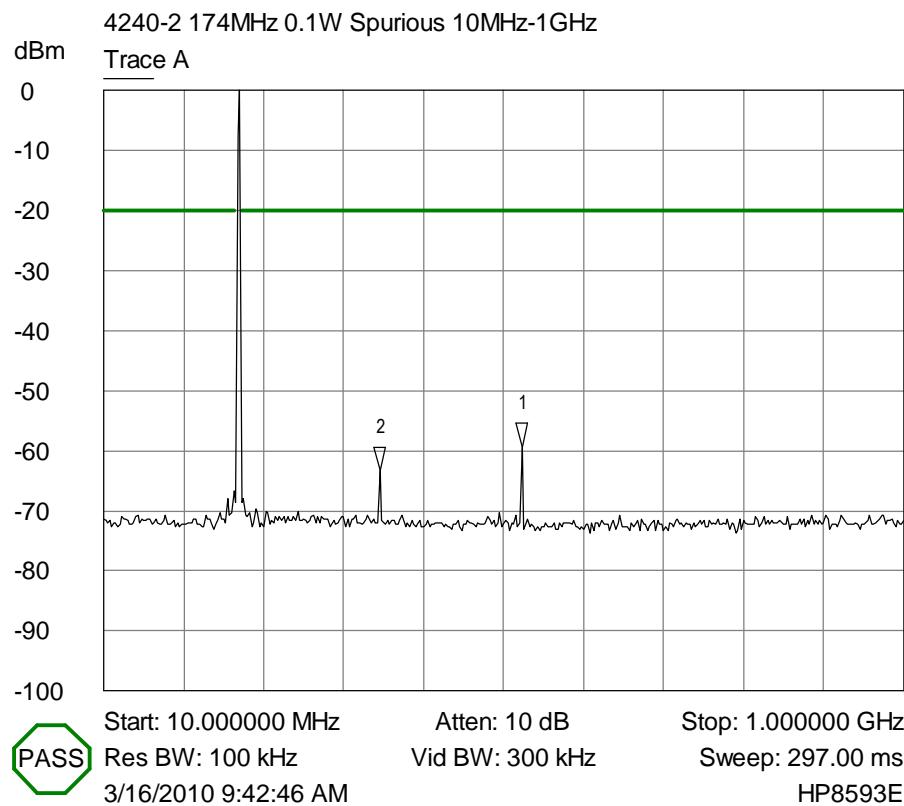




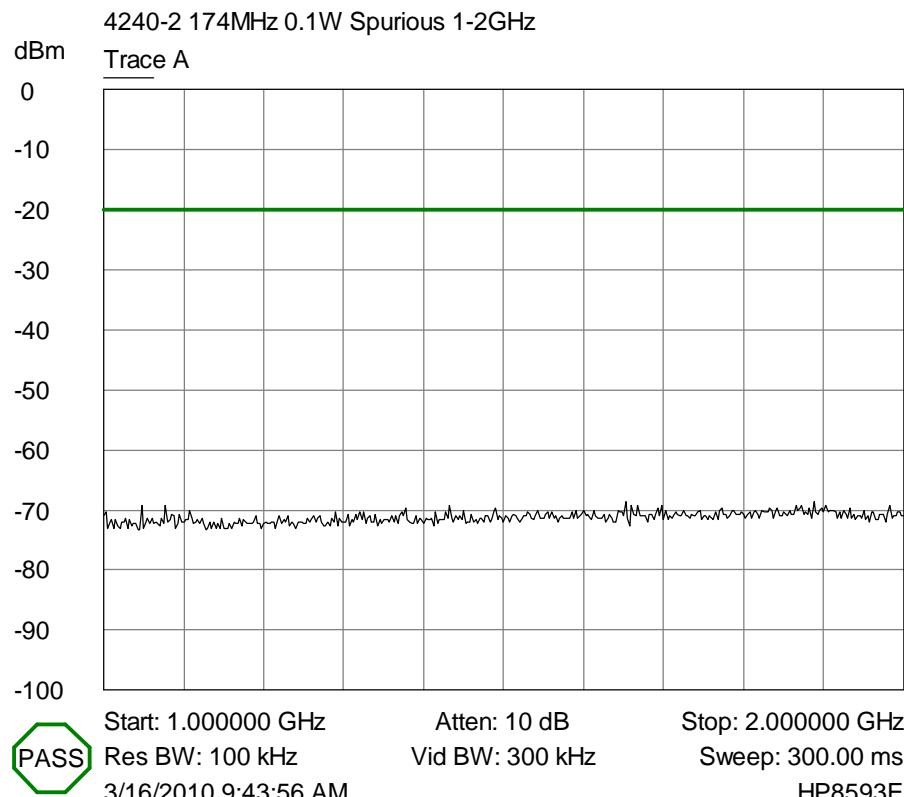
1 Trace A  
472.825000 MHz  
-63.1500 dBm  
2 Trace A  
314.425000 MHz  
-64.0200 dBm



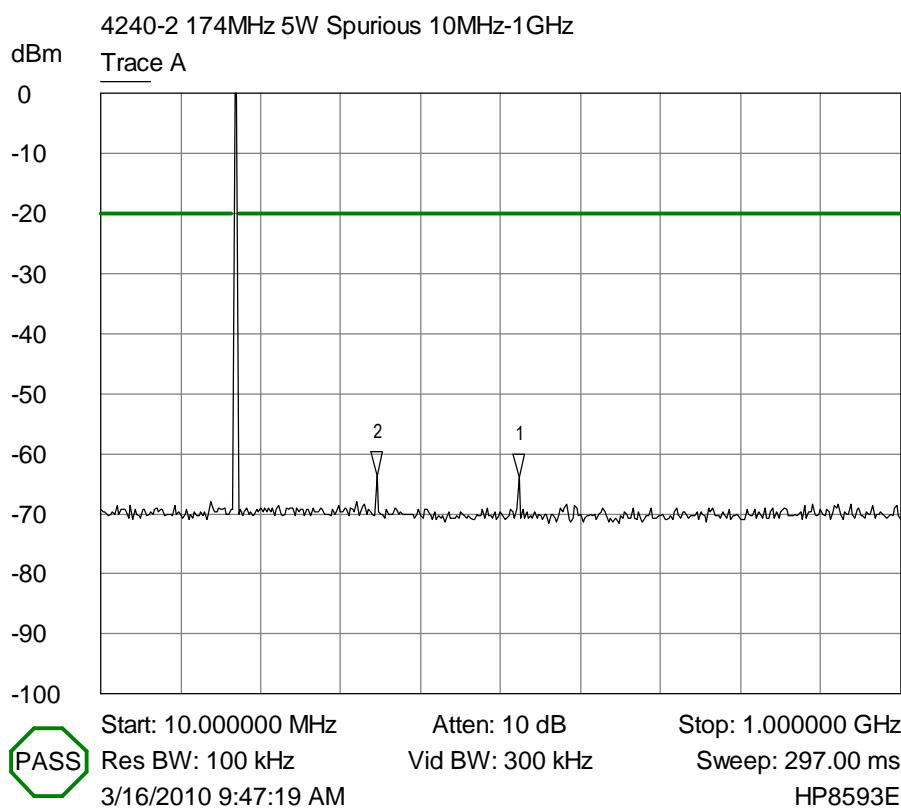
SPURIOUS PLOT 8



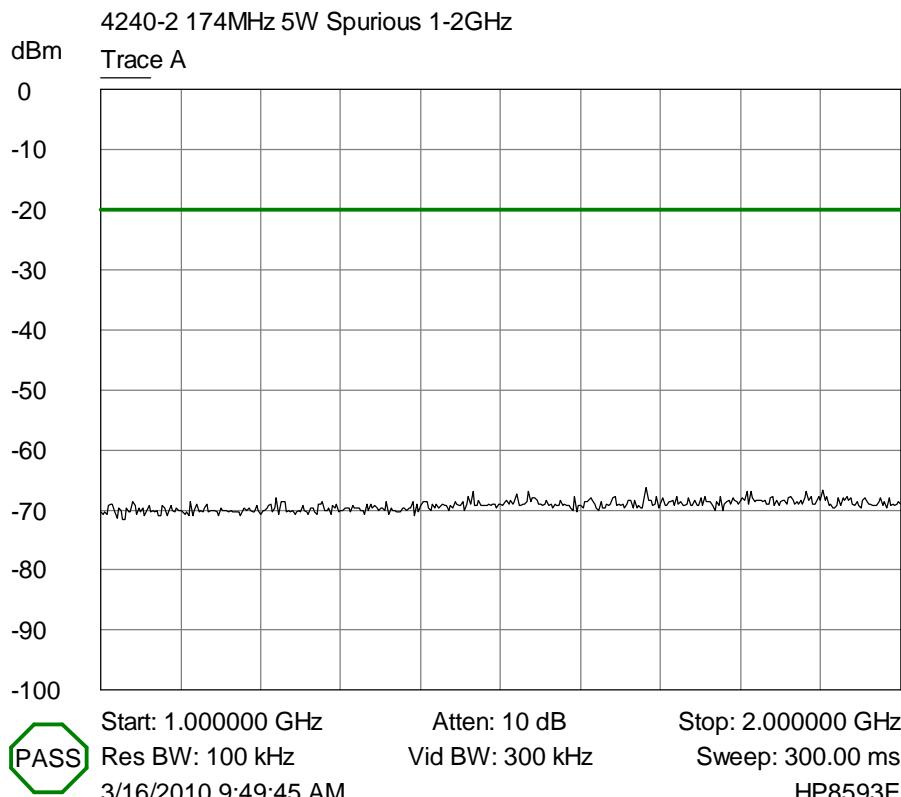
SPURIOUS PLOT 9



SPURIOUS PLOT 10

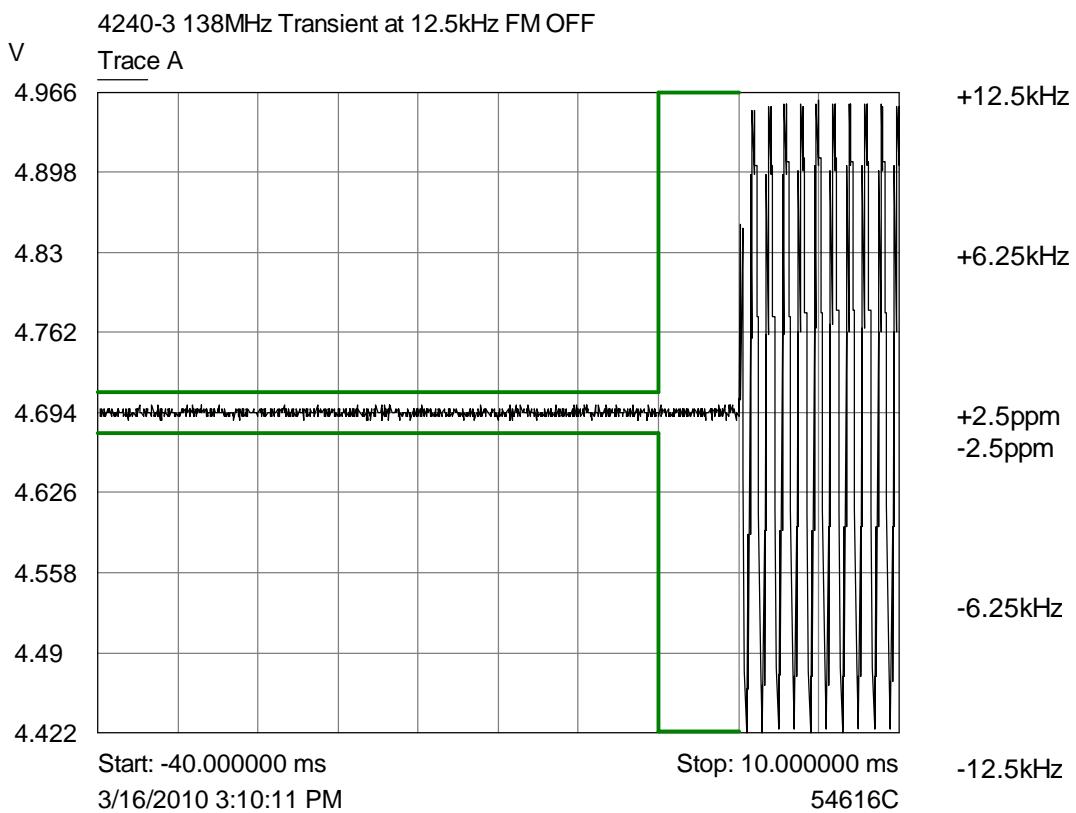
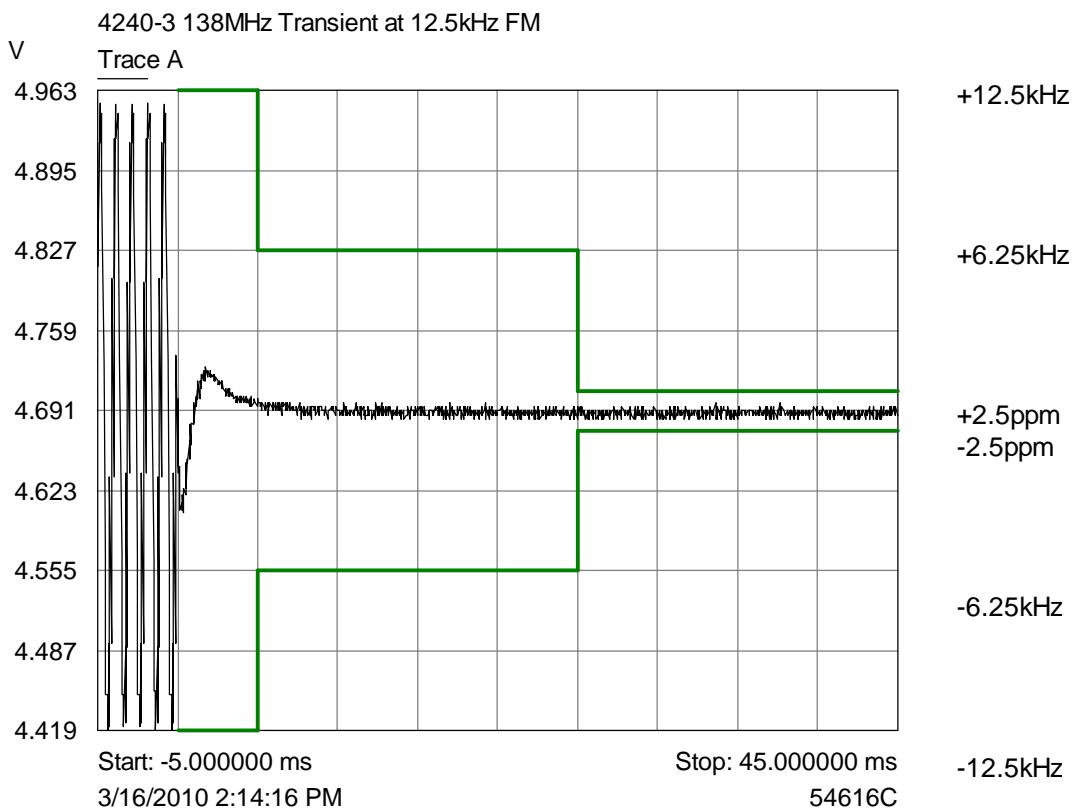


SPURIOUS PLOT 11



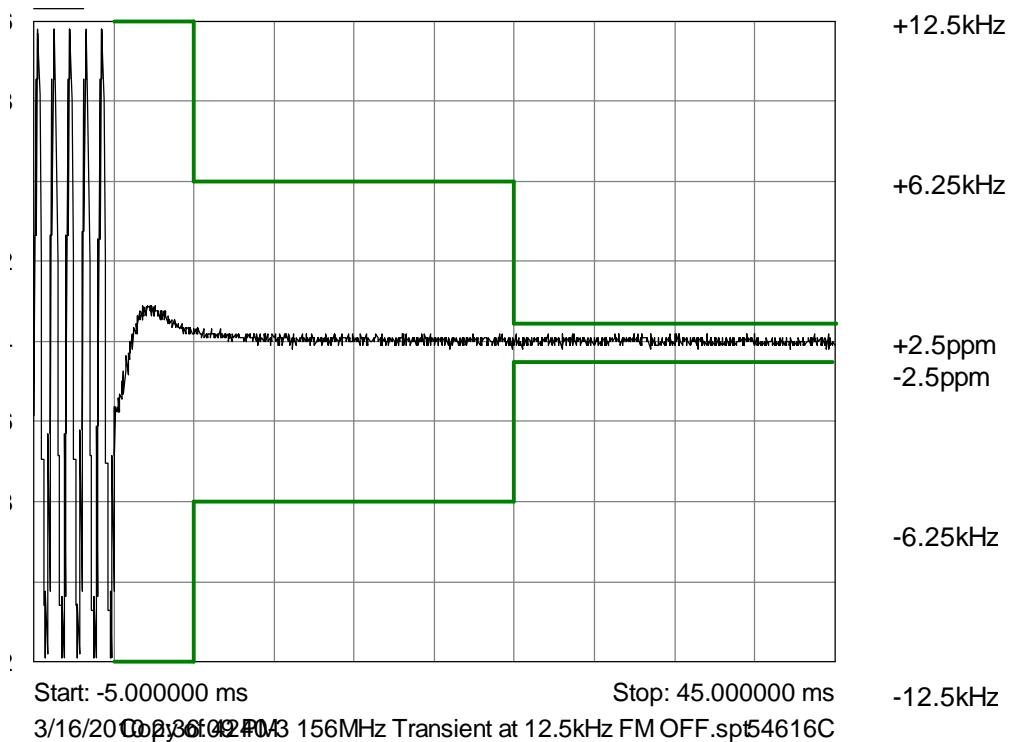
SPURIOUS PLOT 12

### 6.3 Transient frequency Behaviour



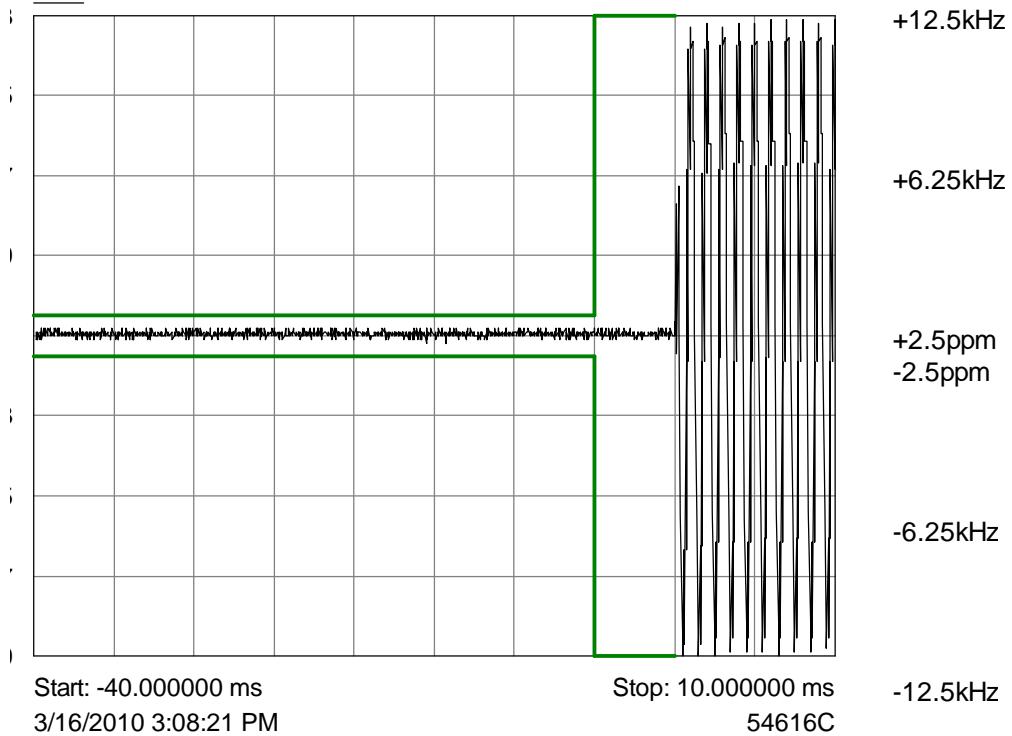
4240-3 156MHz Transient at 12.5kHz FM

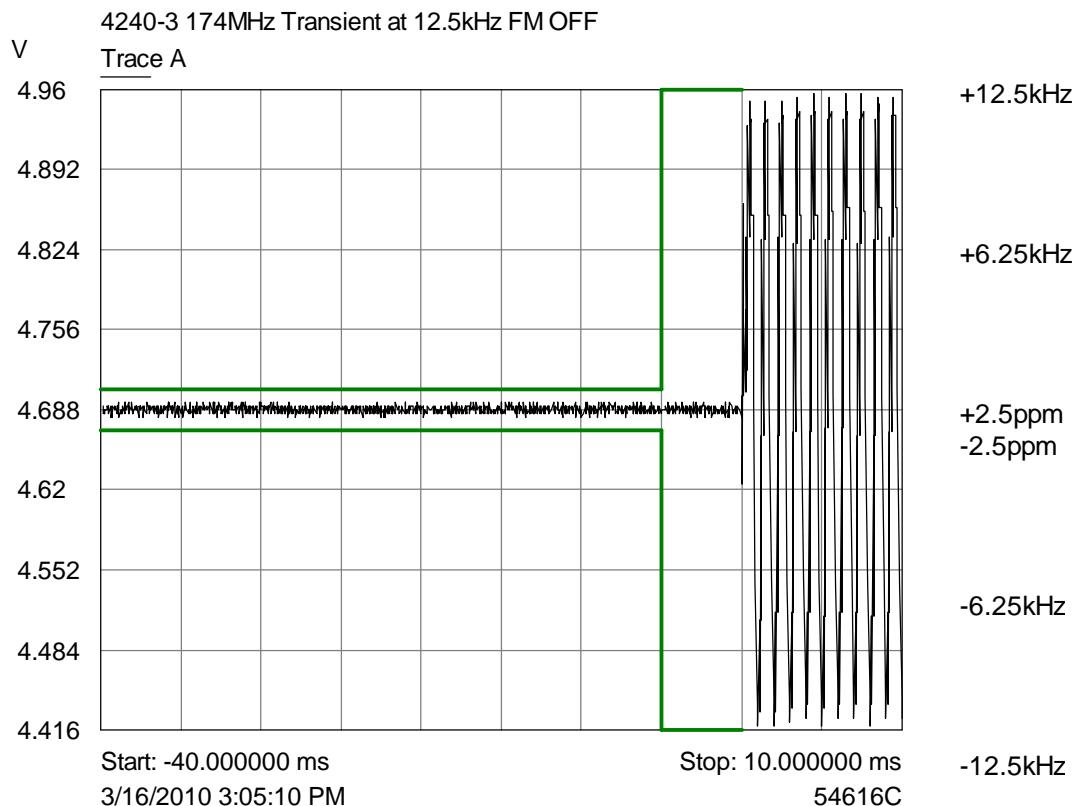
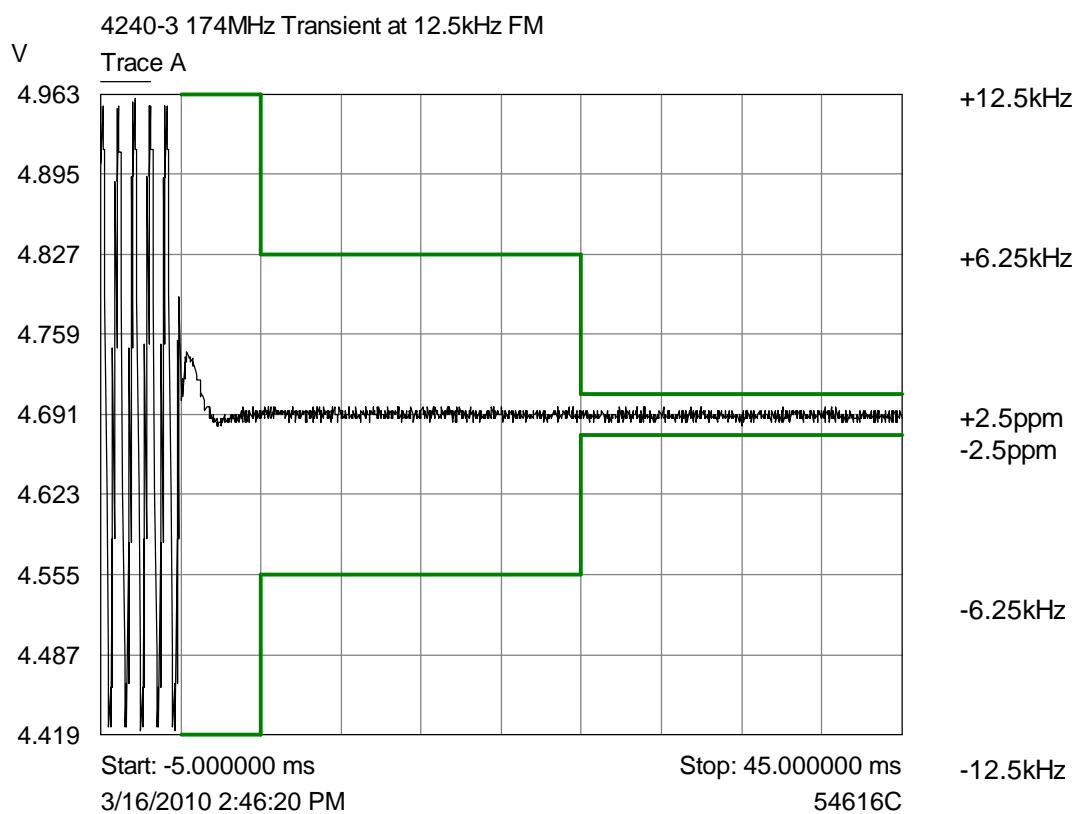
Trace A



4240-3 156MHz Transient at 12.5kHz FM OFF

Trace A





## 7. **Photographs**

### 7.1 **EUT Front View**



**7.2 EUT Reverse Angle**



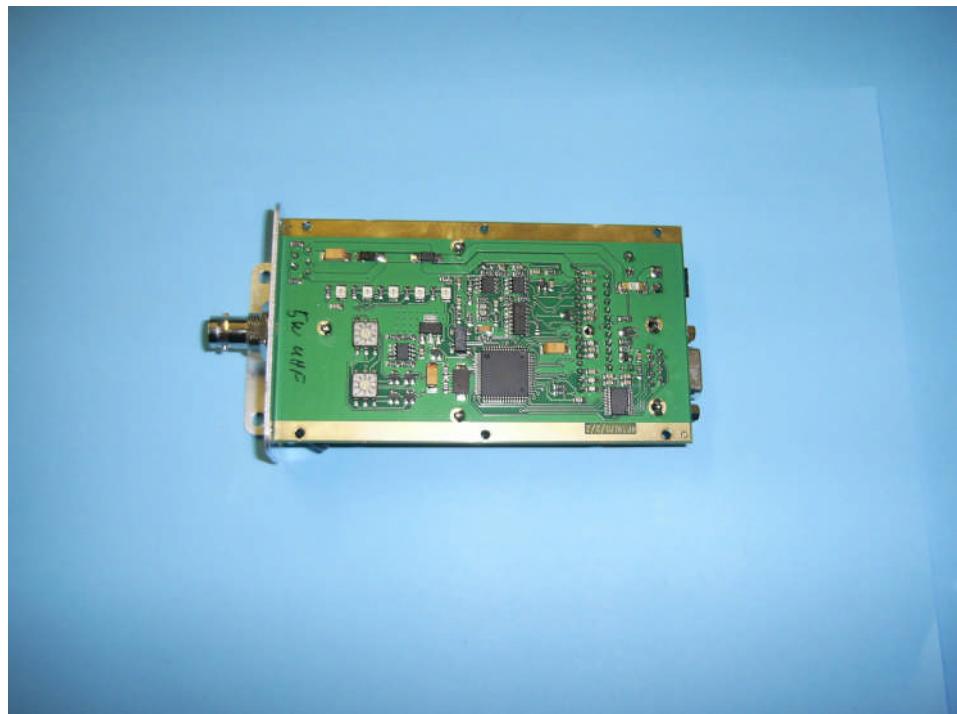
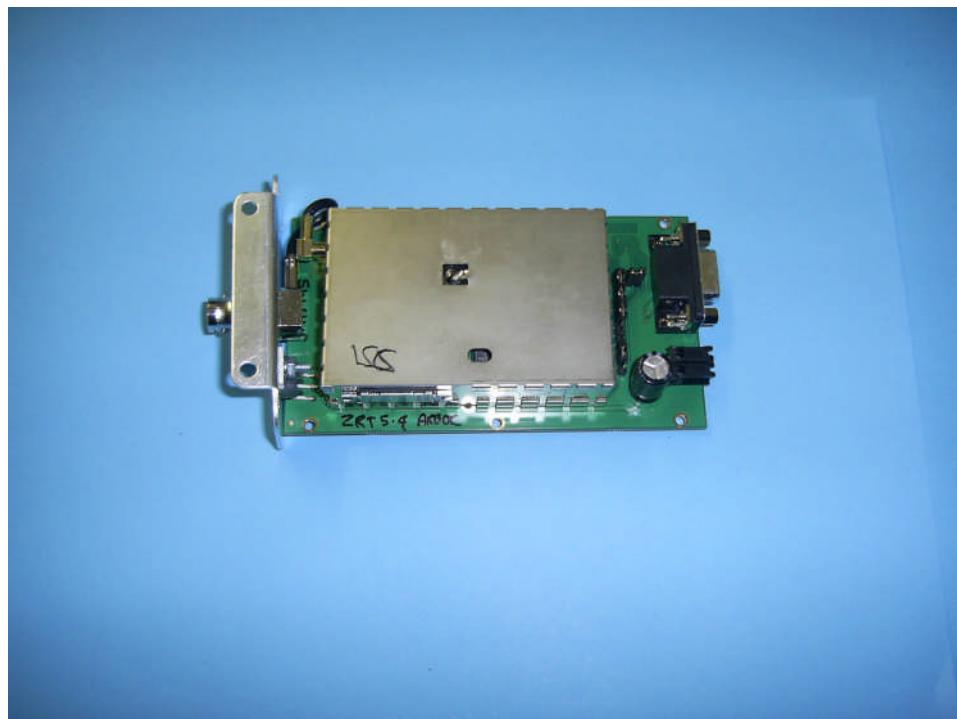
**7.3 EUT Antenna Connector Port**



#### 7.4 EUT Display / Controls



## 7.5 EUT Internal Construction



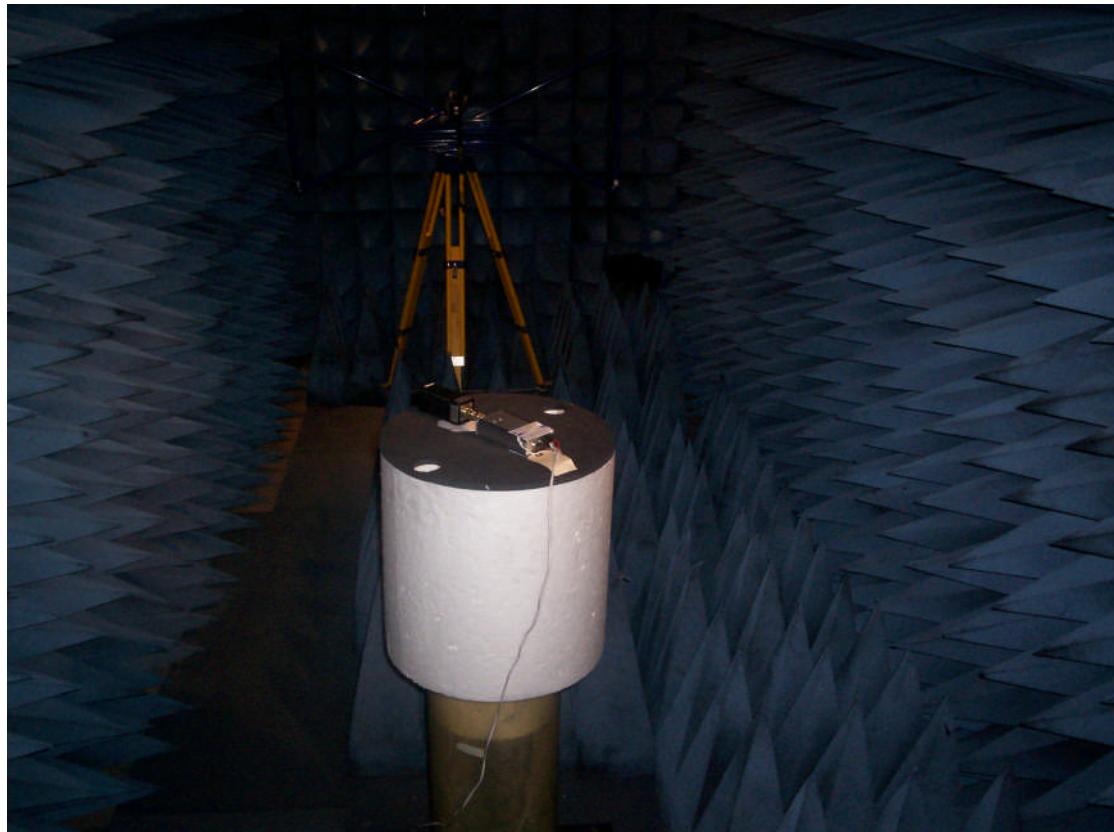
**7.6 EUT Identification Label**



**7.7 EUT Chassis**



**7.8 Test set-up, spurious emissions**



**8. Signal Leads**

Port Name	Cable Type
Antenna	BNC
Power	2 Wire
RS232	9 Way

## 9. Test Equipment Calibration list

The Following is a list of the test equipment currently in use at **R.N. Electronics Ltd.** EMC test facility. In line with our quality procedures, the equipment used will be within calibration for the period during which testing was carried out.

RNNo	Model	Description	Manufacturer
C033	8085	50R 50W Load	Bird
E003	HP8593E	Spectrum Analyser	Hewlett Packard
E131	ESG-3000A	Signal Generator	Hewlett Packard
E226	8546A	EMI Receiver	Hewlett Packard
E249	8471E	Detector	Hewlett Packard
E255	779	6 dB Attenuator	Narda
E266	2032	5.4GHz Signal Generator	Marconi Instruments
E268	BHA 9118	1-18 GHz Horn Antenna	Schaffner
E290	6914	Power Sensor	Marconi Instruments
E306	24-40-34	40dB Attenuator 8.5GHz 50W	Weinschel
E308	768F-20	20dB Attenuator	Narda
E309	392	30 dB Attenuator	Midwest Microwave
E321	3020A	BI-Directional Coaxial Coupler 50-1000 MHz	Narda
E324	BARO	Barometer	TFA
E342	8563E	Spectrum Analyser 26.5 GHz	HP
E342	8563E	Spectrum Analyser 26.5 GHz	HP
E351	54616C	500 MHz 2GSa/S Oscilloscope	HP (Agilent)
E364	HP8664A	0.1 - 3000 MHz Signal Generator	HP
E372	-	FM Discriminator	RN Electronics
E397	6960B	RF Power Meter	Marconi Instruments
P209	PL320	32v 2A DC PSU	Thurlby
TMS36	VMT04/30	Environmental Oven	Heraeus Votsch
TMS49	8901B	Modulation Analyser	Hewlett Packard
TMS57	2534	Digital Multimeter	Philips
TMS73	0.083333333	Off Air Standard	Quartzlock
TMS80	206-3722	Digital Thermometer & K Probe	RS Components Ltd
TMS814	MP627A	Doublet Antenna 200-1700 MHz	Anritsu Electric Co Ltd
TMS82	8449B	Pre Amplifier 1 - 26 GHz	Agilent
TMS903	CBL6111A	Bilog Antenna 30MHz - 1GHz	Chase

## **10. Auxiliary Equipment**

### **10.1 Supplied by RF Technologies Ltd**

Auxiliary equipment used for the purpose of test supplied by the above has been listed below

Manufacturer	Description	Model Number	Serial Number
FranMar	110-240V 50-60Hz 1.6A AC/DC Supply	SPN-260-12	3892A973

### **10.2 Supplied by RN Electronics Limited**

Auxiliary equipment used for the purpose of test supplied by the above has been listed below

RN Number	Manufacturer	Description	Model Number	Serial Number
P209	Thurlby	32v 2A DC PSU	PL320	117756

**11. Modifications**

In order for the EUT to produce the results shown within this report the following modifications, if any, were implemented.

NONE.



## **Certificate of Test 4240/2**

The unit noted below has been tested by **R.N. Electronics Limited** and conforms with the relevant subpart of chapter 47 of the Code of Federal Regulations tested per 47CFR2 subpart J.

*This certificate relates to the unit, as identified by unique serial number(s) and further detailed in the referenced report, in the condition(s) at the time it was tested. It does not relate to any other similar equipment and performance of the product before or after the test cannot be guaranteed. Furthermore, this is a certificate of test only and should not be confused with an equipment authorisation.*

Equipment:	VHF Data Modem ZRT 170 TR-5
FCC ID (if applicable):	Not stated
Manufacturer:	RF Technologies Ltd
Customer Purchase Order Number:	Not stated
R.N. Electronics Limited Report Number:	03-404/4240/2/10
Test Standards:	47CFR Part 2, Subpart J: Oct 2009 ↳ 47CFR Part 90, Subparts I & J: Oct 2009 Class TNB Intentional Radiator
Date:	11th to 18th March 2010

The measurement uncertainty gives a 95% confidence that the equipment meets the limits specified in the standards

For and on behalf of  
R.N. Electronics Limited

Signature:

Technical Director

**QMF21J – 3; FCC CFR 47 PART 2 J OCT 2007; RNE ISSUE 03 JAN 08**

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