

# LABORATORY TEST REPORT

## RADIO PERFORMANCE MEASUREMENTS

for the

TBCB1D Base Station Transceiver

Tested in accordance with:

FCC 47 CFR Part 22, 74 & 90

RSS-119 Issue 11  
RSS-Gen Issue 3

Report Revision: 1

Issue Date: 3-July-2012

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## REVISION

Date	Revision	Comments
3-July-2012	1	Initial test report

## INTRODUCTION

This report covers the requirements of FCC 47 Part 22, 74, 90 and RSS-119 Issue 11 & RSS-Gen Issue 3.

REASON FOR REPORT
The TB9300 B1 50W Base Station is a new addition to the Tait Ltd product line capable of Digital Mobile Radio (DMR) modulation.

Type Approval Testing of the  
TBCB1D DMR Base Station  
Transceiver

Frequency Range (MHz)	F.C.C. Part No.
150.800-152.855	22
157.450-162.0125	22
152.855-154.000	74
157.450-161.575	74
161.625-161.775	74
162.0125-173.200	74
150.8-156.2475	90, 90.210
157.0375-161.575	90, 90.210
161.775-173.400	90, 90.210

in accordance with: FCC 47 CFR Part 22, 74, 90  
RSS-119 Issue 11 & RSS-Gen Issue 3

REPORT PREPARED FOR  
Tait Ltd  
PO Box 1645  
558 Wairakei Road  
Christchurch  
New Zealand

### DESCRIPTION OF SAMPLE

Manufacturer: Tait Limited  
Equipment: Base Station Transceiver  
Type: TBCB1D  
TBCB1D Base Station Transceiver consisting of:

FUNCTIONAL DESCRIPTION	PRODUCT DESIGNATION CODE	SERIAL NUMBER (S)
Reciter	T01-01105-DAAA	18149061
Power Amplifier	TBA80B1-0001	18137267
Power Management Unit	TBA30A0-0100	18130221
Front Panel	T01-01110-CAAA	18149074
Sub Rack	T01-01131-0006	18149019

Quantity: 1 of each

Hardware & Software Details:

FUNCTIONAL DESCRIPTION	FIRMWARE VERSION	HARDWARE VERSION
Reciter	dmr-0.04.00.0003	00.00
Power Amplifier	0312	00.02
Power Management Unit	0314	00.03
Front Panel	0.01.00.trunk.20120417163306-r4.5	00.01

TEST CONDITIONS

All testing was performed between 7<sup>th</sup> June → 2<sup>nd</sup> July 2012, and under the following conditions:

Ambient temperature: 20°C → 30°C  
Relative Humidity: 20% → 75%  
Standard Test Voltage 120 V<sub>AC</sub>

## STATEMENT OF COMPLIANCE

The TBCB1D base station transceiver as tested in this report was found to conform to the following standards:

**FCC CFR 47 Parts 22, 74 & 90**

**RSS-119 Issue 11 & RSS-Gen Issue 3**

## MODULATION TYPES, NECESSARY BANDWIDTH, and EMISSION DESIGNATORS

### MODULATION TYPES:

4 Level FSK (as per ETSI TS 102 361-1)      4800 symbols/sec      9600 bps

CHANNEL SPACING:    12.5 kHz

**NECESSARY BANDWIDTH:** The necessary bandwidth has been measured using the 99% energy rule, and in accordance with TIA/EIA 102 CAAB 2.2.5.2 and RSS-Gen 4.6.1

99% bandwidth = 7.6 kHz

### EMISSION DESIGNATORS:

Data and Voice	7K60FXW
Data Only	7K60FXD

## TEST RESULTS

### TRANSMITTER OUTPUT POWER (CONDUCTED)

SPECIFICATION: FCC 47 CFR 2.1046  
RSS-119 5.4

GUIDE: TIA/EIA-603D 2.2.1

MEASUREMENT PROCEDURE:

1. Refer Annex 2 for Equipment set up.
2. The coaxial attenuator has an impedance of 50 Ohms.
3. The unmodulated output power was measured with an RF Power meter.

MEASUREMENT UNCERTAINTY:  $\pm 0.6$  dB

MEASUREMENT RESULTS:

Manufacturer's Rated Output Power: Switchable: 50 W and 5 W

<b>Nominal 50 W Unmodulated</b>	152.1 MHz	153.1 MHz	158.1 MHz	173.1 MHz
Measured (Watts)	46.0	46.1	46.1	48.0
Variation (%)	-8.0	-7.8	-7.8	-4.0
Variation (dB)	-0.36	-0.35	-0.35	-0.18

<b>Nominal 5 W Unmodulated</b>	152.1 MHz	153.1 MHz	158.1 MHz	173.1 MHz
Measured (Watts)	4.6	4.6	4.6	4.8
Variation (%)	-8.0	-8.0	-8.0	-4.0
Variation (dB)	-0.36	-0.36	-0.36	-0.18

LIMIT CLAUSES:

FCC 47 CFR 90.205 (s)

The output power shall not exceed by more than 20% of the manufacturer's rated output power for the particular transmitter specifically listed on the authorization.

RSS-119 5.4

The output power shall be within  $\pm 1.0$  dB of the manufacturer's rated power.

## OCCUPIED BANDWIDTH AND SPECTRUM MASKS

SPECIFICATION: FCC 47 CFR 2.1049 (c) RSS-119 5.5

GUIDE: TIA/EIA-603D 2.2.11

### MEASUREMENT PROCEDURE:

1. Refer Annex 2 for Equipment Set up.
2. The EUT was modulated with an internally generated pseudo random bit sequence at the appropriate Baud rates.
3. The Occupied Bandwidth was measured on the Spectrum Analyser, with bandwidth settings as follows.

Emission Mask D – Resolution Bandwidth = 100Hz, Video Bandwidth = 1 kHz

### MEASUREMENT RESULTS:

See the plots on the following pages.

LIMIT CLAUSE: FCC 47 CFR 90.210 RSS-119 5.5

### EMISSION MASKS

Emission Mask D 12.5 kHz Channel Spacing

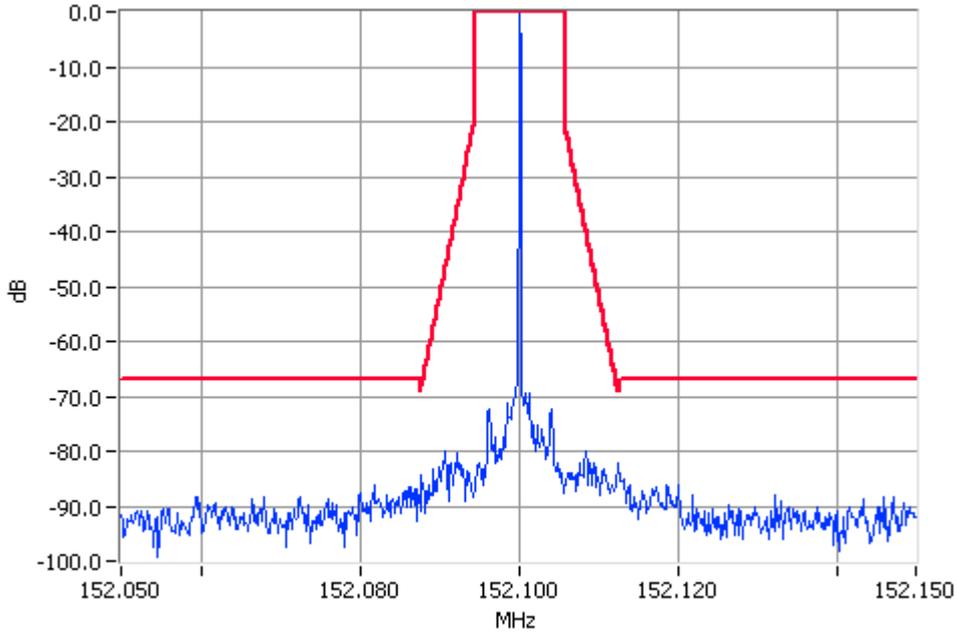
### DATA SPEED

12.5 kHz Channel Spacing 9600 bps

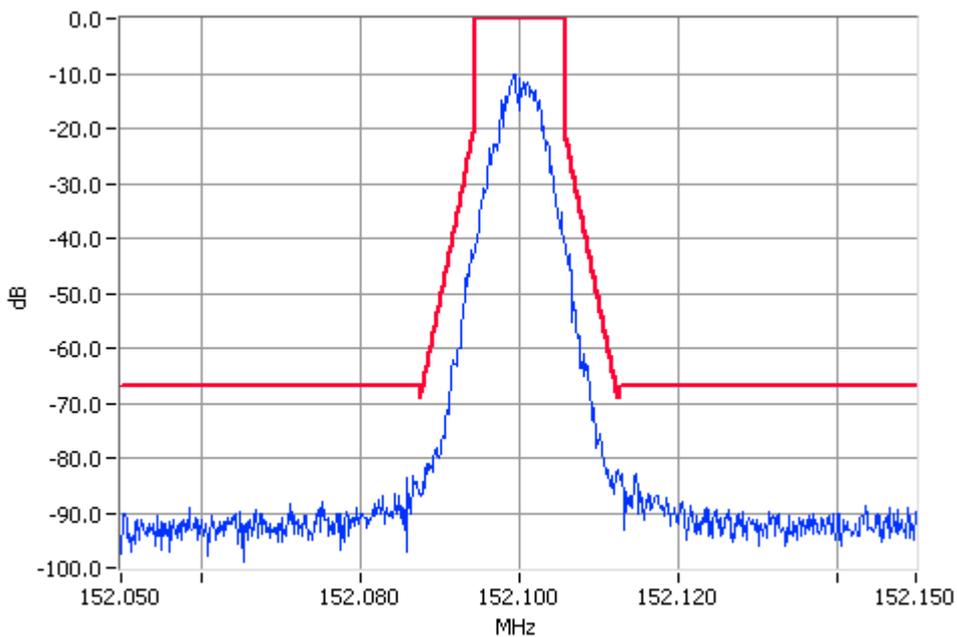
### Occupied Bandwidth and Spectrum Masks

SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 152.1 MHz 50 W 12.5 kHz Channel Spacing



**Unmodulated 152.1000MHz Mask D 50W**  
**RBW=100Hz, VBW=1000Hz, Detector Mode=Peak**  
**Result=Pass**

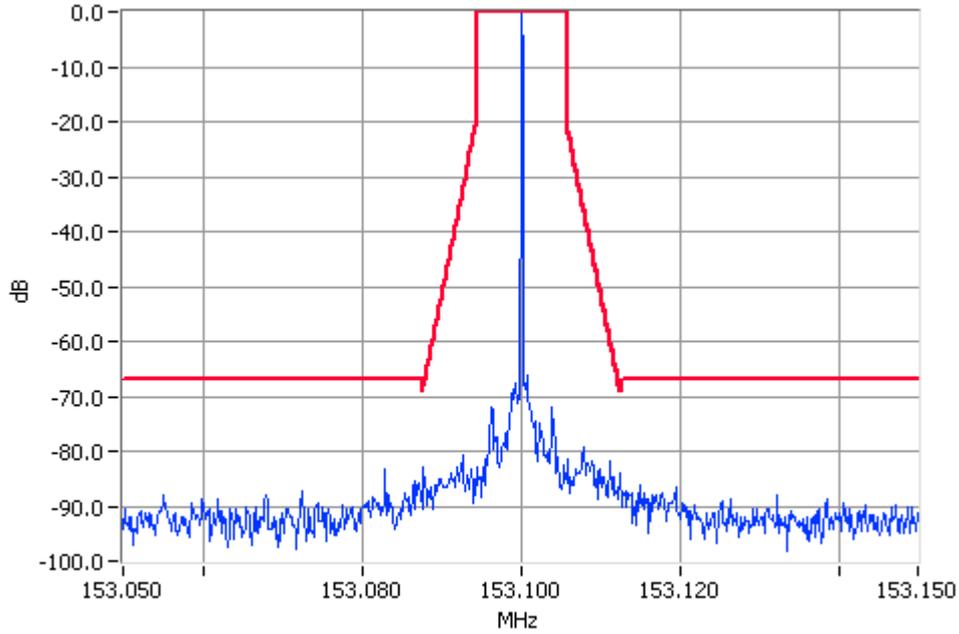


**DMR 152.1000MHz Mask D 50W**  
**RBW=100Hz, VBW=1000Hz, Detector Mode=Peak**  
**Result=Pass**

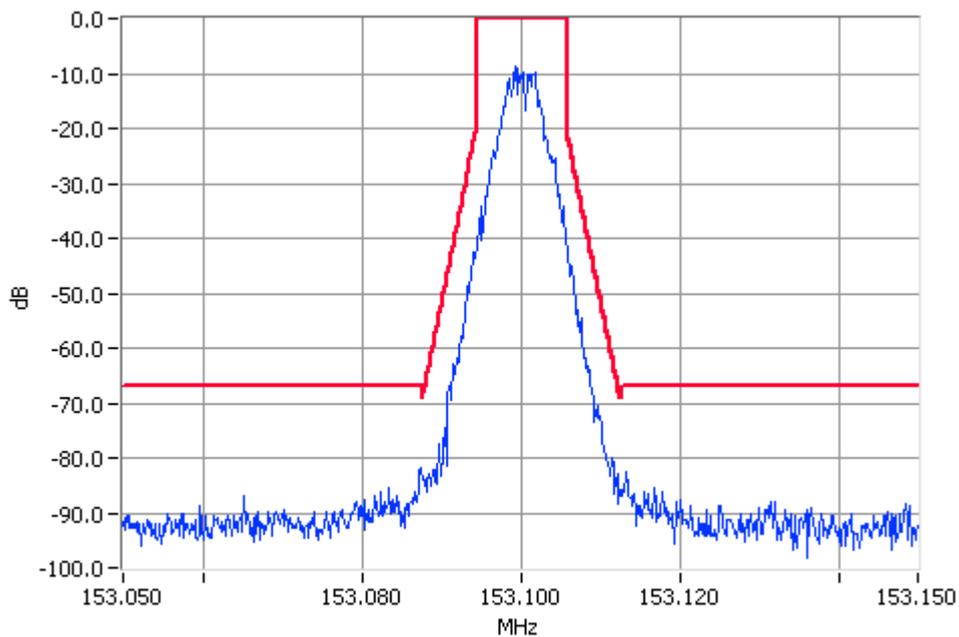
### Occupied Bandwidth and Spectrum Masks

SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 153.1 MHz 50 W 12.5 kHz Channel Spacing



**Unmodulated 153.1000MHz Mask D 50W**  
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak  
Result=Pass

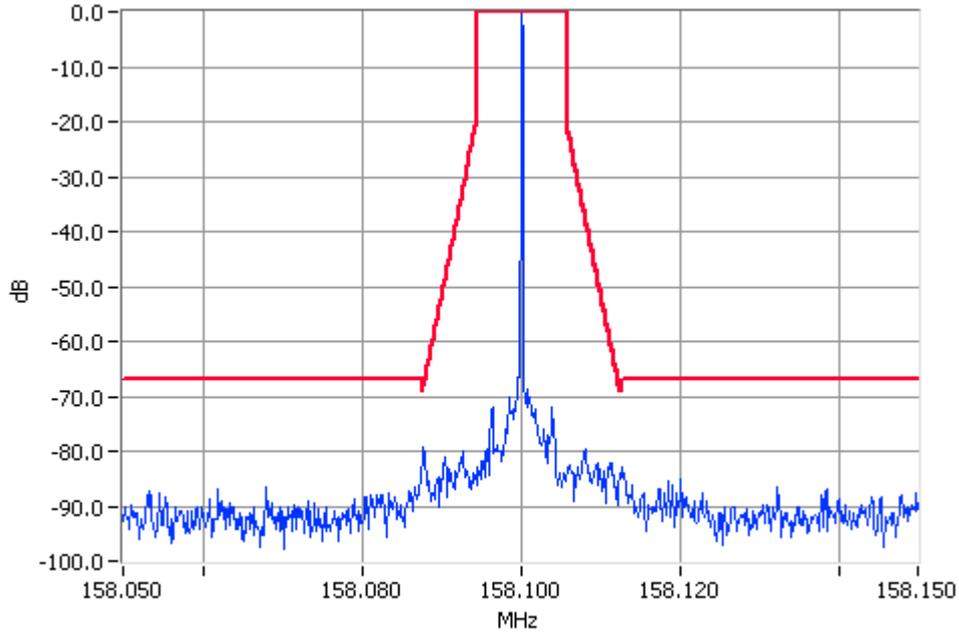


**DMR 153.1000MHz Mask D 50W**  
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak  
Result=Pass

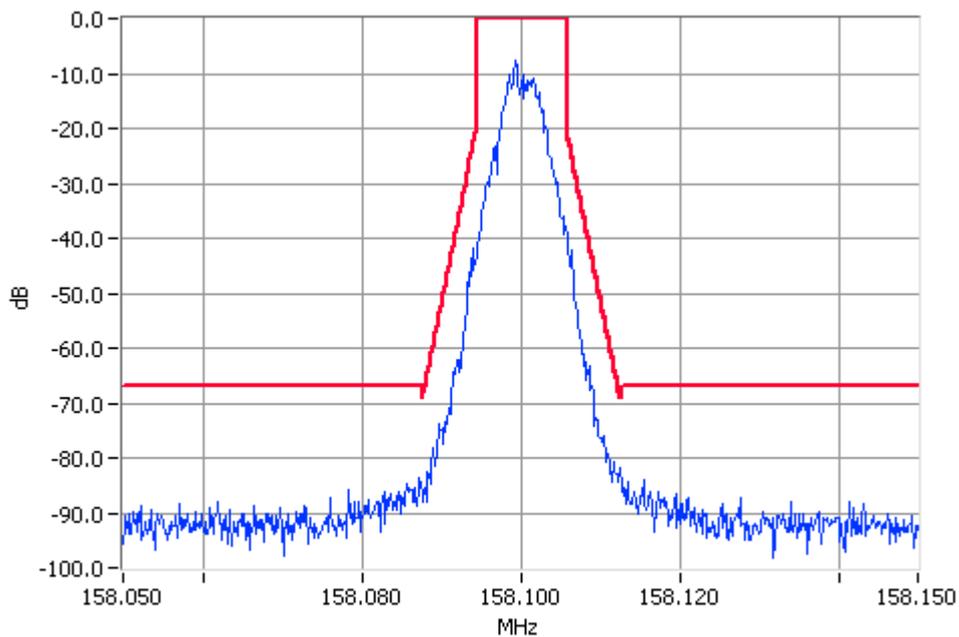
### Occupied Bandwidth and Spectrum Masks

SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 158.1 MHz 50 W 12.5 kHz Channel Spacing



**Unmodulated 158.1000MHz Mask D 50W**  
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak  
Result=Pass

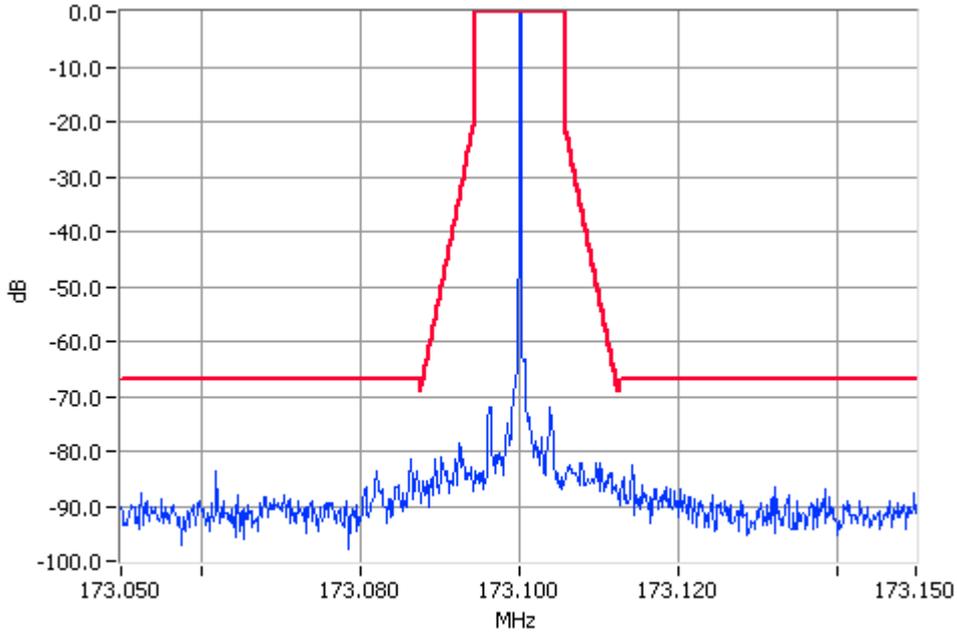


**DMR 158.1000MHz Mask D 50W**  
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak  
Result=Pass

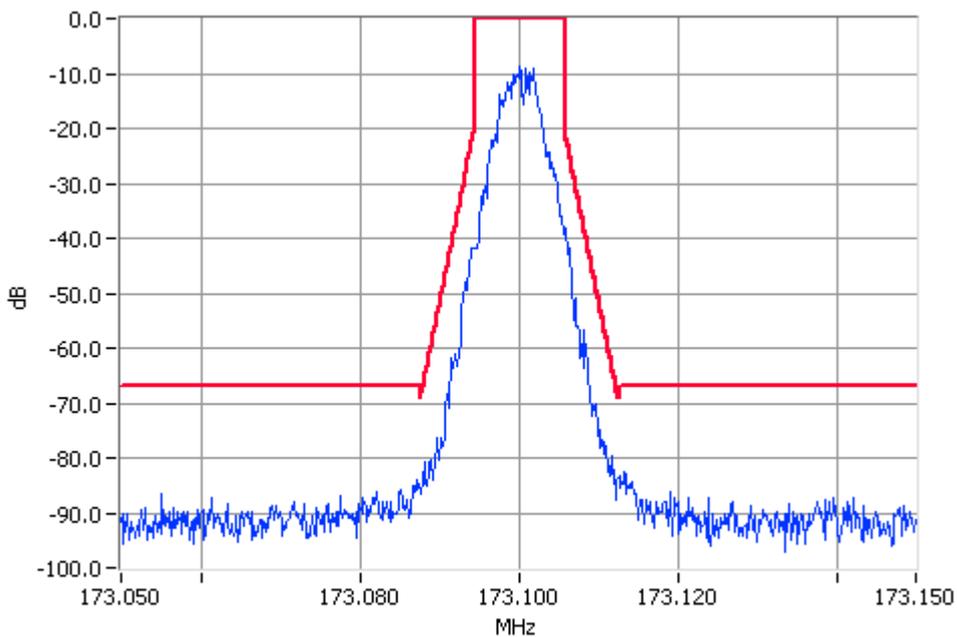
### Occupied Bandwidth and Spectrum Masks

SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 173.1 MHz 50 W 12.5 kHz Channel Spacing



**Unmodulated 173.1000MHz Mask D 50W**  
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak  
Result=Pass



**DMR 173.1000MHz Mask D 50W**  
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak  
Result=Pass

## SPURIOUS EMISSIONS (Tx CONDUCTED)

SPECIFICATIONS: FCC 47 CFR 2.1051 RSS-119 5.8

GUIDE: TIA/EIA-603D 2.2.13

### MEASUREMENT PROCEDURE:

1. Refer Annex 2 for equipment set up.  
The frequency range examined was from the lowest frequency generated within the EUT, to a frequency higher than the 10<sup>th</sup> Harmonic: 100kHz to Fc-BW  
Fc+ BW to 10Fc GHz
2. A Pre-scan is performed with a resolution bandwidth of 1 kHz, and a video bandwidth of 3 kHz. If any emissions are found to be within 20dB of the limit a second measurement is made with the carrier modulated, and a resolution bandwidth of 10 kHz, and a video bandwidth of 30 kHz.

Spurious emissions which were attenuated by more than 20 dB below the limit were not recorded.

### MEASUREMENT RESULTS:

See the tables on the following pages. Spectrum Analyser plots appear in Annex 3.

LIMIT CLAUSES: FCC 47 CFR 90.210 RSS-119 5.8

MEASUREMENT UNCERTAINTY:  $\pm 3.0$  dB

SPURIOUS EMISSIONS (Tx CONDUCTED)

SPECIFICATION: FCC CFR 2.1051 RSS-119 5.8

Tx FREQUENCY: 152.1 MHz

50 W		Emission Mask D
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 20 dB below the limit.		

5 W		Emission Mask D
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 20 dB below the limit.		

Tx FREQUENCY: 153.1 MHz

50 W		Emission Mask D
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 20 dB below the limit.		

5 W		Emission Mask D
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 20 dB below the limit.		

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Tx FREQUENCY: 158.1 MHz

50 W		Emission Mask D
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 20 dB below the limit.		

5 W		Emission Mask D
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 20 dB below the limit.		

Tx FREQUENCY: 173.1 MHz

50 W		Emission Mask D
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 20 dB below the limit.		

5 W		Emission Mask D
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 20 dB below the limit.		

LIMITS: FCC 47 CFR 90.210                      RSS-119                      5.8

Carrier Output Power Watts	Emission Mask D 12.5 kHz Channel Spacing $50 + 10 \text{ Log}_{10} (P_{\text{Watts}})$	
50 W	-20 dBm	-67 dBc
5 W	-20 dBm	-57 dBc

## SPURIOUS EMISSIONS (Tx RADIATED)

SPECIFICATION: FCC 47 CFR 2.1053

GUIDE: TIA/EIA-603D 2.2.12

### MEASUREMENT PROCEDURE:

#### Initial Scan:

1. The EUT is placed in the S-Line TEM cell and emissions are measured from 30MHz to 1000MHz. Any emission within 20dB of the limit is then re-tested on the OATS along with measurements from 1000MHz to the 10<sup>th</sup> harmonic of the fundamental frequency.
2. The EUT is then placed on a wooden turntable at a distance of 0.5 metres from the test antenna and emissions are measured from 1000MHz to the upper frequency required. Any emission within 20dB of the limit or at least six measurements are then re-tested on the OATS.

#### OATS Measurement:

1. Refer Annex 1 for equipment set up  
The EUT is placed on a wooden turntable at a distance of three metres from the test antenna. The output terminal is connected to an RF dummy load.
2. The test antenna is raised from 1m to 4m to obtain a maximum reading; the turntable is then rotated through 360° to obtain the maximum response of each spurious emission. Valid emissions are determined by switching the EUT on and off.
3. The EUT is then replaced by a signal generator and substitution antenna to make measurements by the substitution method.

### MEASUREMENT RESULTS:

See the tables on the following pages

LIMIT CLAUSE: FCC 47 CFR 90.210

MEASUREMENT UNCERTAINTY: ± 4.6 dB

Spurious Emissions (Tx Radiated)

SPECIFICATION: FCC CFR 2.1053

Tx FREQUENCY: 152.1 MHz

50 W		Emission Mask D
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 20 dB below the limit.		

5 W		Emission Mask D
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 20 dB below the limit.		

Tx FREQUENCY: 153.1 MHz

50 W		Emission Mask D
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 20 dB below the limit.		

5 W		Emission Mask D
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 20 dB below the limit.		

Tx FREQUENCY: 158.1 MHz

50 W		Emission Mask D
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 20 dB below the limit.		

5 W		Emission Mask D
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 20 dB below the limit.		

Open Area Test Site Results			
50 W		158.1 MHz	Emission Mask D
Harmonics Emission Frequency (MHz)	Level (dBm)	Level (dBc)	
316.2	-79.56	-126.56	
474.3	-75.65	-122.65	
632.4	-83.56	-130.56	
790.5	-81.58	-128.58	
948.6	-50.00	-97.00	
1106.7	-78.38	-125.38	

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Tx FREQUENCY: 173.1 MHz

50 W		Emission Mask D
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 20 dB below the limit.		

5 W		Emission Mask D
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 20 dB below the limit.		

LIMITS: FCC 47 CFR 90.210

Carrier Output Power Watts	Emission Mask D 12.5 kHz Channel Spacing $50 + 10 \text{ Log}_{10} (P_{\text{Watts}})$	
50 W	-20 dBm	-70 dBc
5 W	-20 dBm	-60 dBc

TRANSMITTER FREQUENCY STABILITY - TEMPERATURE

SPECIFICATION: FCC 47 CFR 2.1055 (a) (1) RSS-119 5.3

GUIDE: TIA/EIA-603D 2.2.2

MEASUREMENT PROCEDURE:

1. Refer Annex 2 for equipment set up.
2. The EUT was tested for frequency error from -30 °C to +50°C in 10 °C increments
3. The frequency error was recorded in parts per million (ppm).

MEASUREMENT RESULTS:

See the plots on the following pages.

MEASUREMENT UNCERTAINTY: ± 50 Hz

Nominal Tx FREQUENCY: 152.1 MHz 50 W 12.5 kHz channel Spacing

Temperature (°C)	Frequency (MHz)	Error (ppm)
-30	152.099994	-0.04
-20	152.100009	0.06
-10	152.100002	0.01
0	152.099980	-0.13
10	152.099987	-0.09
20	152.100000	0.00
30	152.099998	-0.01
40	152.099999	-0.01
50	152.100016	0.11

Nominal Tx FREQUENCY: 153.1 MHz 50 W 12.5 kHz channel Spacing

Temperature (°C)	Frequency (MHz)	Error (ppm)
-30	153.099994	-0.04
-20	153.100010	0.07
-10	153.100003	0.02
0	153.099981	-0.12
10	153.099987	-0.08
20	153.100000	0.00
30	153.099998	-0.01
40	153.100000	0.00
50	153.100016	0.10

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Nominal Tx FREQUENCY: 158.1 MHz 50 W 12.5 kHz channel Spacing

Temperature (°C)	Frequency (MHz)	Error (ppm)
-30	158.099994	-0.04
-20	158.100011	0.07
-10	158.100002	0.01
0	158.099980	-0.13
10	158.099987	-0.08
20	158.100000	0.00
30	158.099999	-0.01
40	158.100000	0.00
50	158.100018	0.11

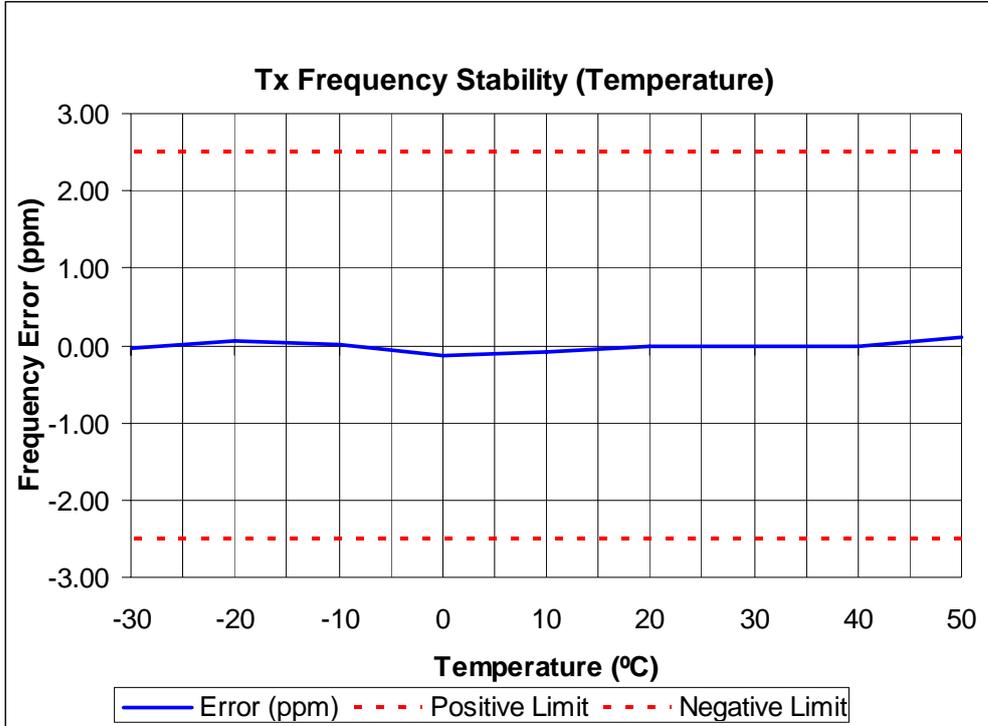
Nominal Tx FREQUENCY: 173.1 MHz 50 W 12.5 kHz channel Spacing

Temperature (°C)	Frequency (MHz)	Error (ppm)
-30	173.099994	-0.03
-20	173.100011	0.06
-10	173.100002	0.01
0	173.099977	-0.13
10	173.099986	-0.08
20	173.100000	0.00
30	173.099998	-0.01
40	173.100000	0.00
50	173.100020	0.12

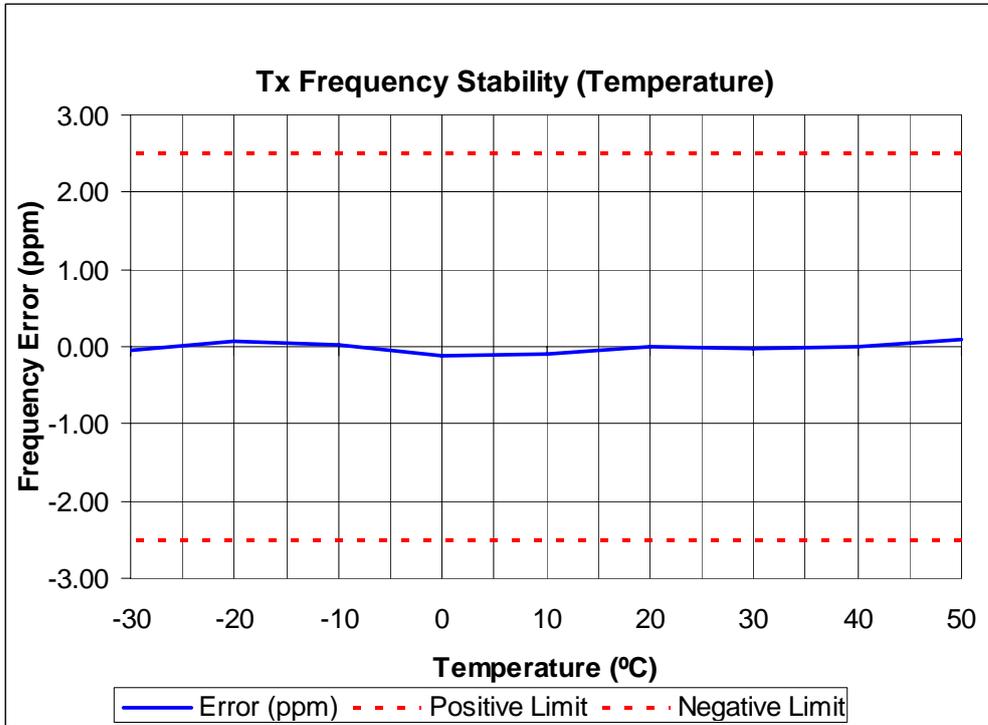
### Transmitter Frequency Stability - Temperature

SPECIFICATION: FCC 47 CFR 2.1055 (a) (1)

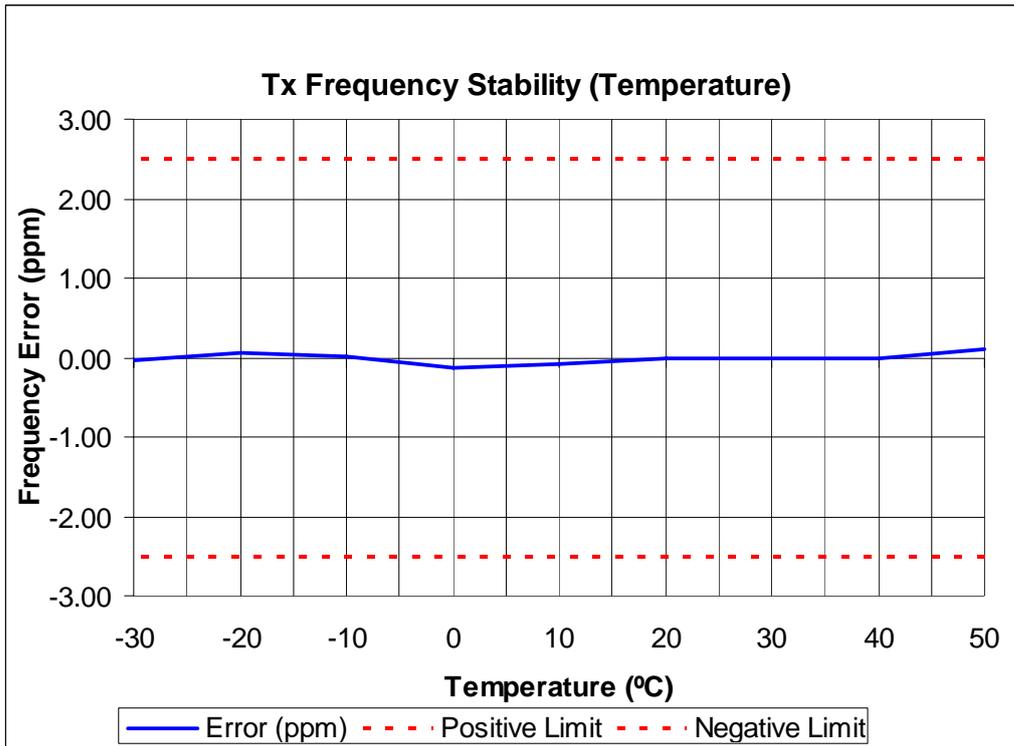
Tx FREQUENCY: 152.1 MHz      50 W      12.5 kHz channel Spacing



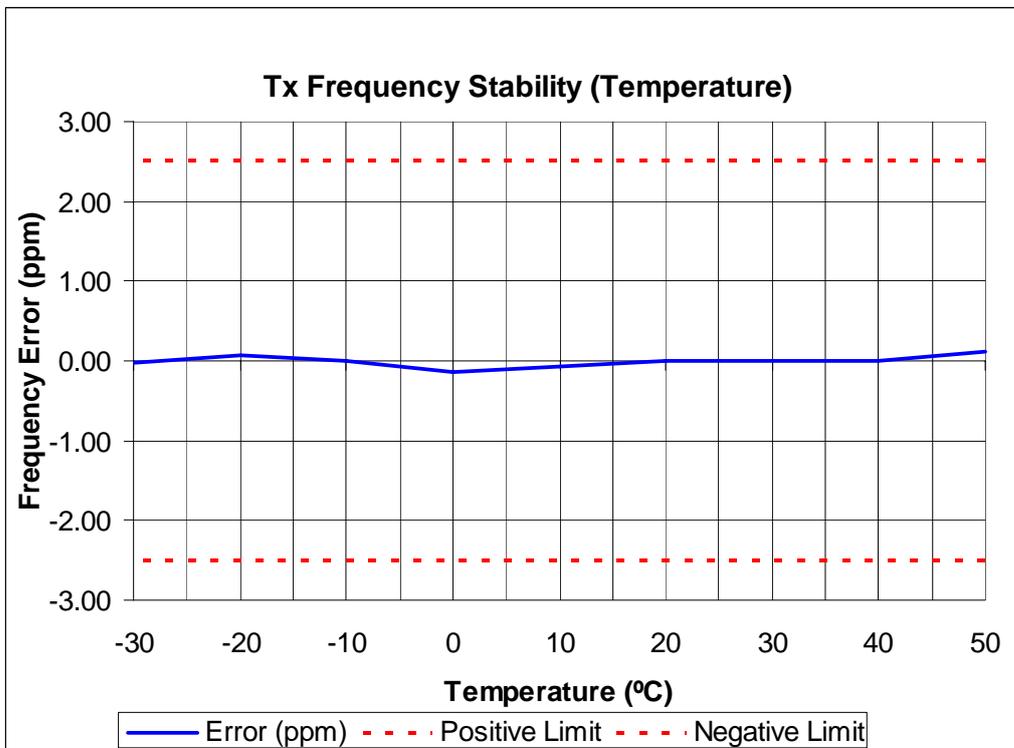
Tx FREQUENCY: 153.1 MHz      50 W      12.5 kHz channel Spacing



Tx FREQUENCY: 158.1 MHz      50 W      12.5 kHz channel Spacing



Tx FREQUENCY: 173.1 MHz      50 W      12.5 kHz channel Spacing



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LIMIT CLAUSES: RSS-119 5.3

Frequency Band (MHz)	Frequency Error (ppm)
138-174	2.5

LIMIT CLAUSES: FCC 47 CFR 90.539(b) / FCC 47 CFR 90.213

Assigned Frequency (MHz)	Frequency Error (ppm)
138-174	2.5

TRANSMITTER FREQUENCY STABILITY - VOLTAGE

SPECIFICATION: FCC 47 CFR 2.1055 (d) (1) RSS-119 5.3

GUIDE: TIA/EIA-603D 2.2.2

MEASUREMENT PROCEDURE:

1. Refer Annex 2 for equipment set up.
2. The EUT was tested for frequency error at an input voltage to the radio of 85% to 115%.
3. The frequency error was recorded in parts per million (ppm).

MEASUREMENT UNCERTAINTY: ± 50 Hz

MEASUREMENT RESULTS: 50 W

Voltage	FREQUENCY ERROR (ppm) for 12.5 kHz			
	152.1 MHz	153.1MHz	158.1 MHz	173.1 MHz
120 V <sub>AC</sub>	-0.03	-0.03	-0.03	-0.02
102 V <sub>AC</sub>	-0.03	-0.03	-0.03	-0.04
138 V <sub>AC</sub>	-0.03	-0.03	-0.02	-0.03

LIMIT CLAUSES: RSS-119 5.3

Frequency Band (MHz)	Frequency Error (ppm)
138-174	2.5

LIMIT CLAUSES: FCC 47 CFR 90.539(b) / FCC 47 CFR 90.213

Frequency Range (MHz)	Frequency Error (ppm)
150-174 MHz	2.5

**SPURIOUS EMISSIONS (Tx STANDBY / Rx CONDUCTED)**

SPECIFICATION: RSS-119 5.11

GUIDE: TIA/EIA-603D 2.1.2

NOTE: This product has a detachable antenna. Receiver spurious emissions were measured using the conducted method at the antenna port as per RSS-Gen 4.10.

**MEASUREMENT PROCEDURE:**

1. Refer Annex 2 for Equipment set up diagram.
2. The frequency range examined was from 30 MHz to 3 times highest tunable frequency.
3. Spurious emissions which were attenuated more than 20dB below the limit were not recorded.

MEASUREMENT UNCERTAINTY: ± 2.5 dB

MEASUREMENT RESULTS: See the tables on the following pages. Spectrum Analyser plots appear in Annex 4.

Transmit Port:

152.1 MHz TX Port (TX Standby)		
Emission Frequency (MHz)	Level (nW)	Level (dBm)
~	~	~
No emissions were detected within 20 dB of Limit.		

153.1 MHz TX Port (TX Standby)		
Emission Frequency (MHz)	Level (nW)	Level (dBm)
~	~	~
No emissions were detected within 20 dB of Limit.		

158.1 MHz TX Port (TX Standby)		
Emission Frequency (MHz)	Level (nW)	Level (dBm)
~	~	~
No emissions were detected within 20 dB of Limit.		

173.1 MHz TX Port (TX Standby)		
Emission Frequency (MHz)	Level (nW)	Level (dBm)
~	~	~
No emissions were detected within 20 dB of Limit.		

Receive Port:

152.1 MHz RX Port (Receive)		
Emission Frequency (MHz)	Level (nW)	Level (dBm)
~	~	~
No emissions were detected within 20 dB of Limit.		

153.1 MHz RX Port (Receive)		
Emission Frequency (MHz)	Level (nW)	Level (dBm)
~	~	~
No emissions were detected within 20 dB of Limit.		

156.1 MHz RX Port (Receive)		
Emission Frequency (MHz)	Level (nW)	Level (dBm)
~	~	~
No emissions were detected within 20 dB of Limit.		

158.1 MHz RX Port (Receive)		
Emission Frequency (MHz)	Level (nW)	Level (dBm)
~	~	~
No emissions were detected within 20 dB of Limit.		

173.1 MHz RX Port (Receive)		
Emission Frequency (MHz)	Level (nW)	Level (dBm)
~	~	~
No emissions were detected within 20 dB of Limit.		

LIMIT CLAUSE:	RSS-Gen	6.2	
LIMIT	30 → 1000 MHz	2 nW	- 57 dBm
	> 1000 MHz	5 nW	- 53 dBm

## TRANSIENT FREQUENCY BEHAVIOUR

SPECIFICATION: FCC 47 CFR 90.214 RSS-119 5.9

GUIDE: TIA/EIA-603D 2.2.19

### MEASUREMENT PROCEDURE:

1. Refer Annex 2 for Equipment set up diagram.
2. Measurements and plots were made following the TIA/EIA procedure.

MEASUREMENT UNCERTAINTY:  $\pm 130$  Hz

### MEASUREMENT RESULTS:

See the tables and plots on the following pages.

LIMIT CLAUSE: FCC 47 CFR 90.214

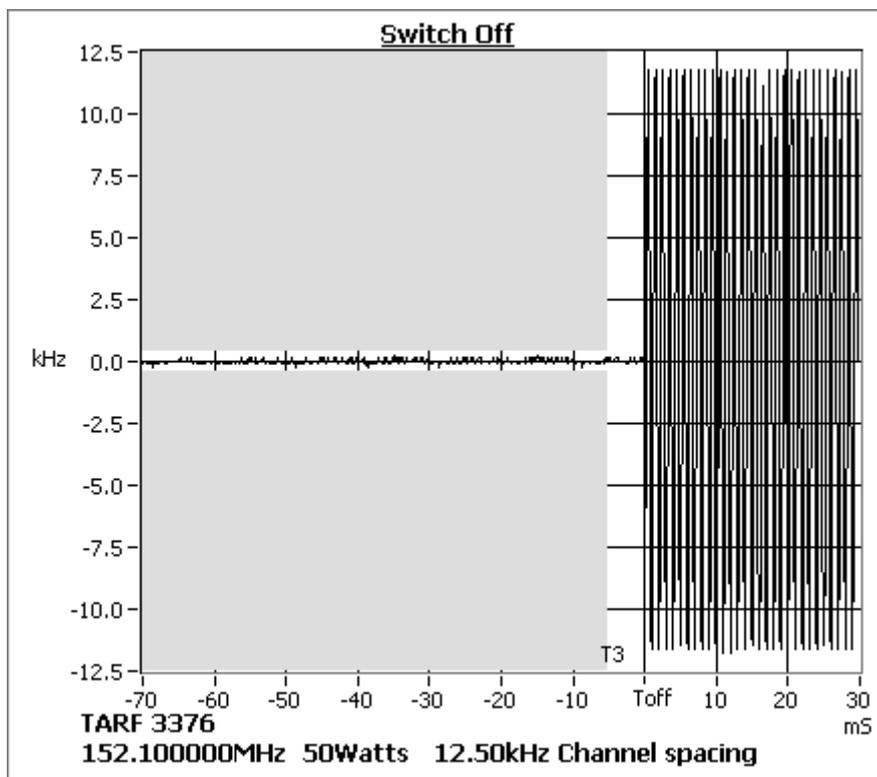
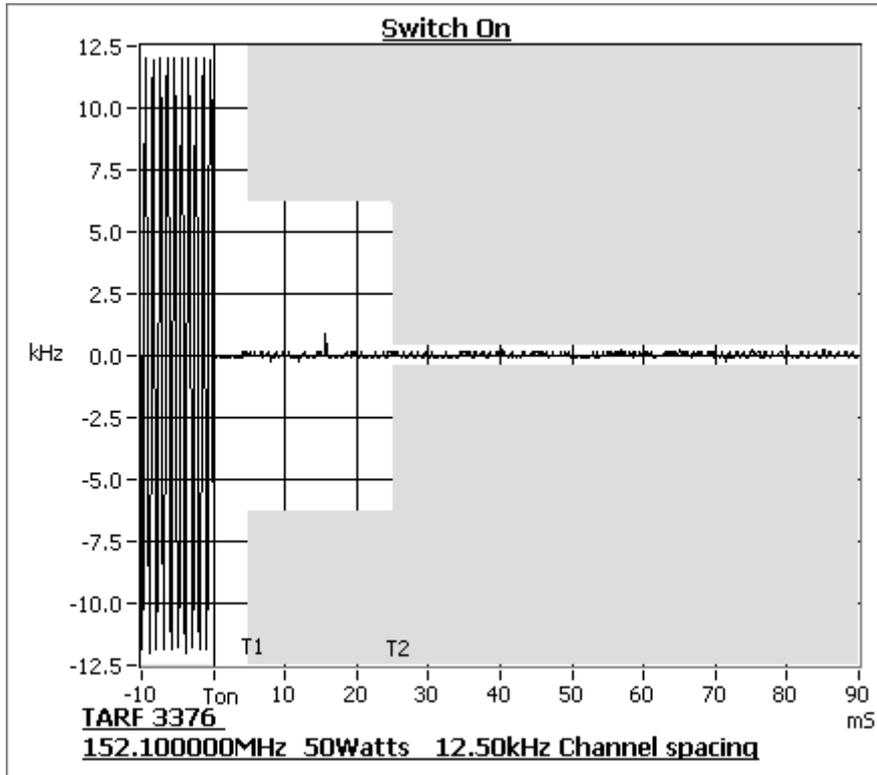
TELTEST Laboratories  
Tait Limited  
Report Number 3376

Tx Frequency: 152.1 MHz 50 W 12.5 kHz Channel Spacing

FREQUENCY	152.1 MHz @ 50 W Tx	
TRANSIENT RESPONSE PERIOD	CARRIER PEAK VARIATION FROM NORMAL	
	Key ON (kHz)	Key OFF (kHz)
t1	-5.2	N/A
t2	0.9	N/A
t3	N/A	0.1
t2 → t3 ppm	1.8	
ERROR LIMIT (t2 → t3) ppm	2.5	

Confirm that during periods t1 and t3 the frequency difference does not exceed the value of one channel separation.	YES
Confirm that during the period t2 the frequency difference does not exceed half a channel separation.	YES
Confirm that during the period t2 to t3 the frequency difference does not exceed the frequency error limit.	YES

Tx Frequency: 152.1 MHz    50W    12.5 kHz Channel Spacing



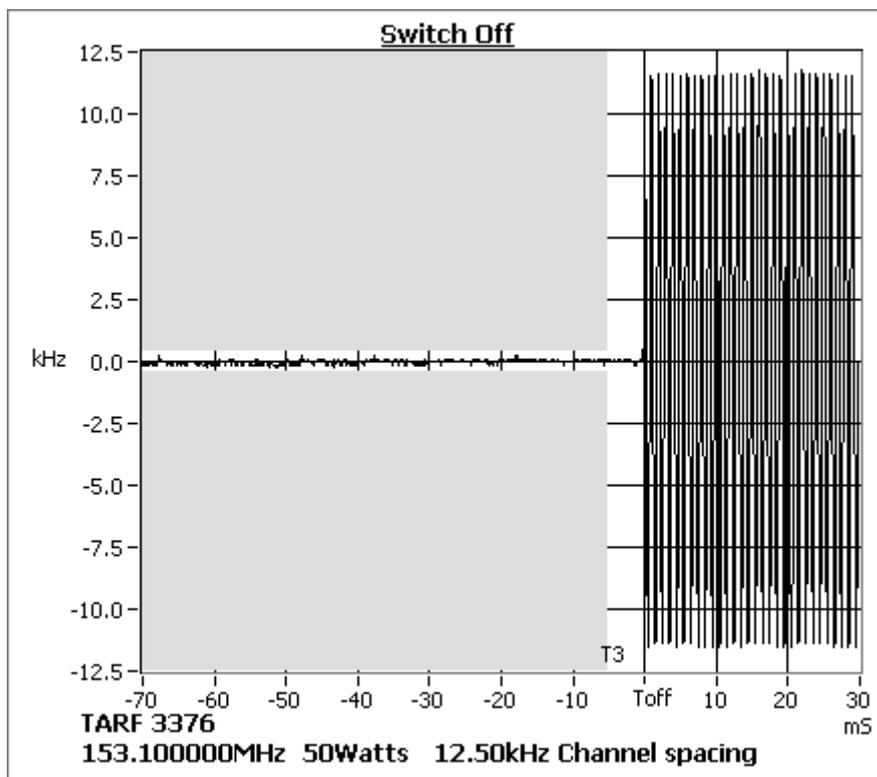
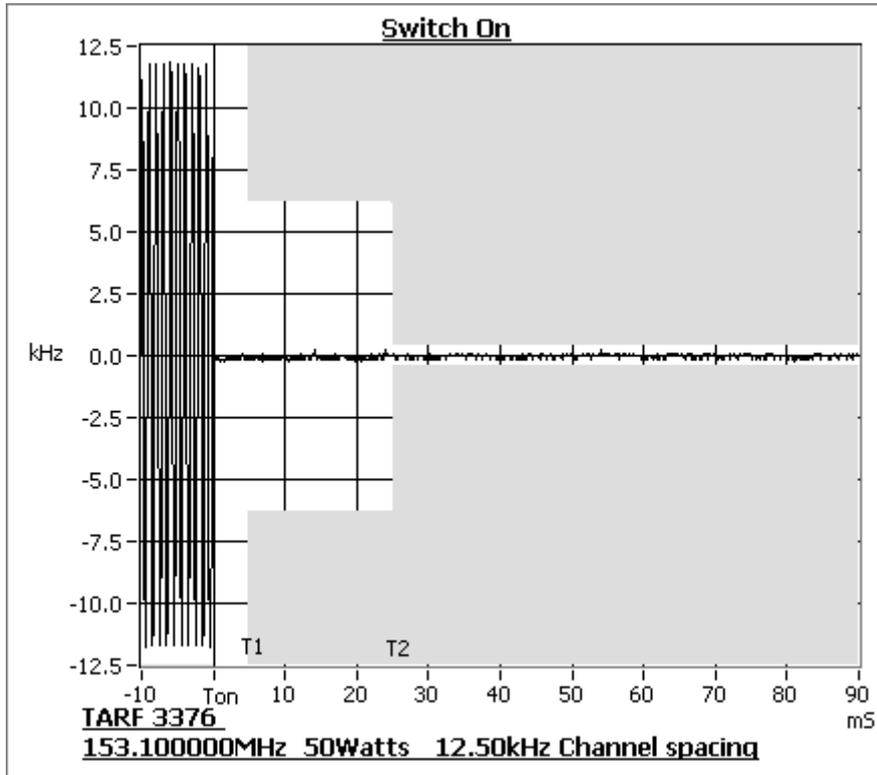
TELTEST Laboratories  
Tait Limited  
Report Number 3376

Tx Frequency: 153.1 MHz 50 W 12.5 kHz Channel Spacing

FREQUENCY	153.1 MHz @ 50 W Tx	
TRANSIENT RESPONSE PERIOD	CARRIER PEAK VARIATION FROM NORMAL	
	Key ON (kHz)	Key OFF (kHz)
t1	1.1	N/A
t2	-0.3	N/A
t3	N/A	0.7
t2 → t3 ppm	-1.7	
ERROR LIMIT (t2 → t3) ppm	2.5	

Confirm that during periods t1 and t3 the frequency difference does not exceed the value of one channel separation.	YES
Confirm that during the period t2 the frequency difference does not exceed half a channel separation.	YES
Confirm that during the period t2 to t3 the frequency difference does not exceed the frequency error limit.	YES

Tx Frequency: 153.1 MHz    50 W    12.5 kHz Channel Spacing



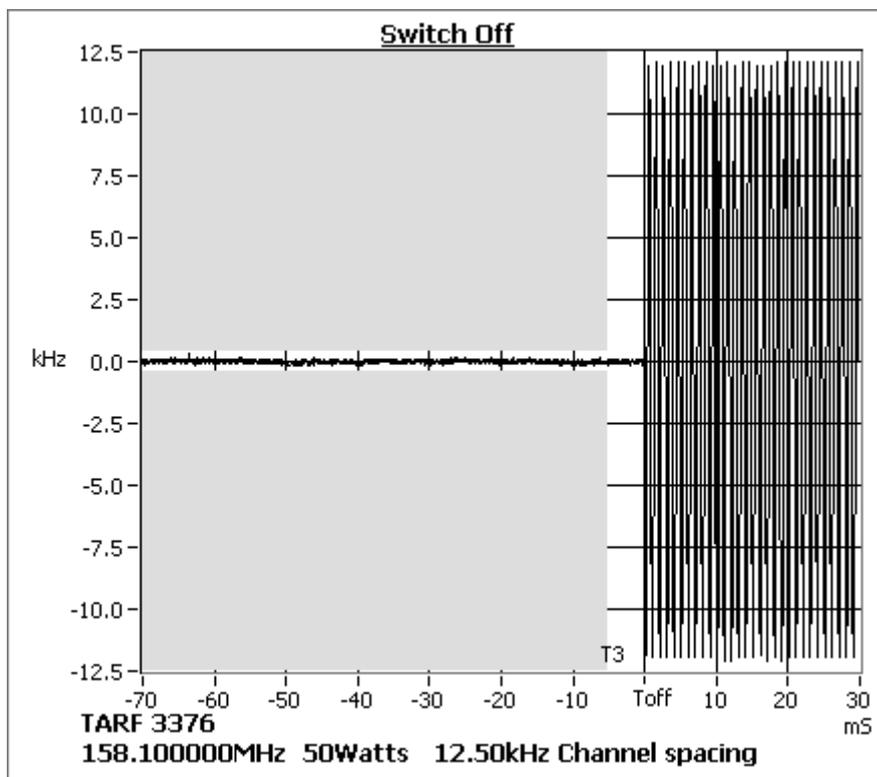
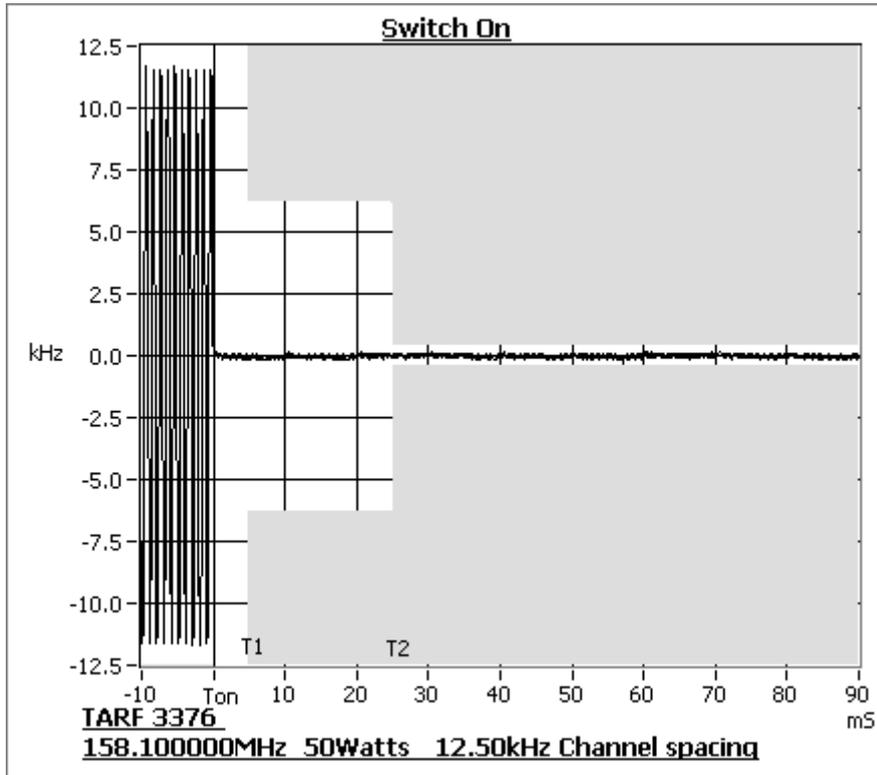
TELTEST Laboratories  
Tait Limited  
Report Number 3376

Tx Frequency: 158.1 MHz 50 W 12.5 kHz Channel Spacing

FREQUENCY	158.1 MHz @ 50 W Tx	
TRANSIENT RESPONSE PERIOD	CARRIER PEAK VARIATION FROM NORMAL	
	Key ON (kHz)	Key OFF (kHz)
t1	-0.2	N/A
t2	-0.2	N/A
t3	N/A	-0.3
t2 → t3 ppm	-2.0	
ERROR LIMIT (t2 → t3) ppm	2.5	

Confirm that during periods t1 and t3 the frequency difference does not exceed the value of one channel separation.	YES
Confirm that during the period t2 the frequency difference does not exceed half a channel separation.	YES
Confirm that during the period t2 to t3 the frequency difference does not exceed the frequency error limit.	YES

Tx Frequency: 158.1 MHz 50 W 12.5 kHz Channel Spacing



Tx Frequency: 173.1 MHz 50 W 12.5 kHz Channel Spacing

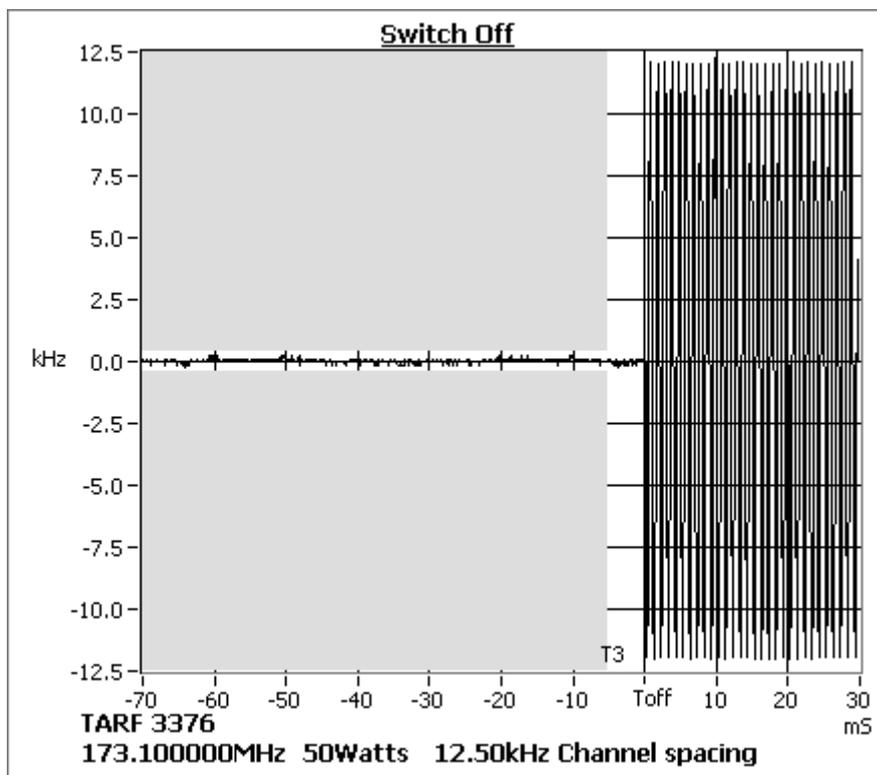
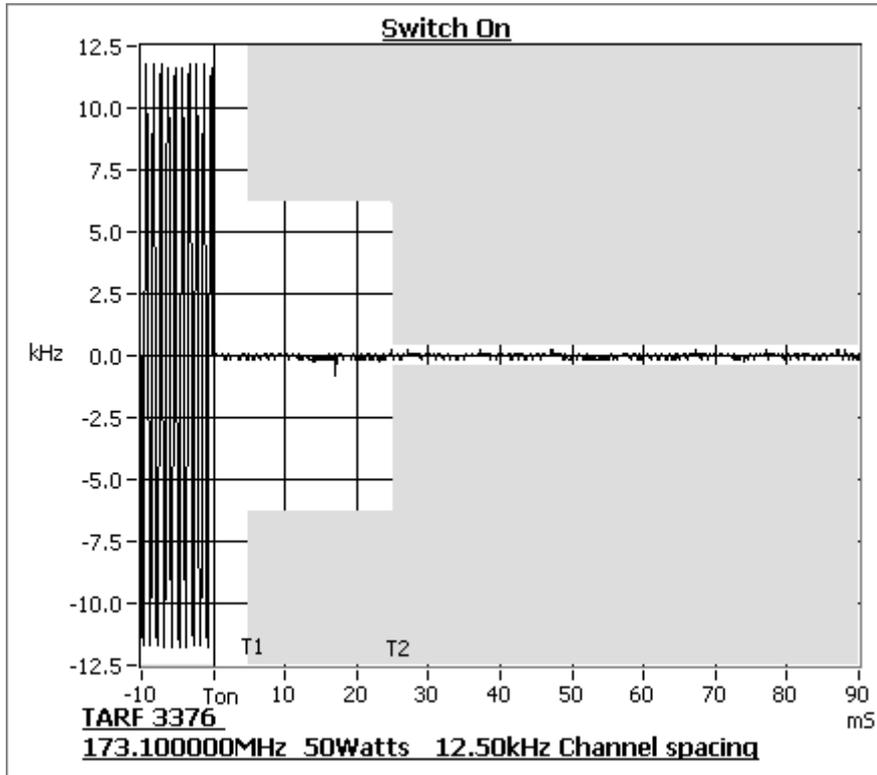
FREQUENCY	173.1 MHz @ 50 W Tx	
TRANSIENT RESPONSE PERIOD	CARRIER PEAK VARIATION FROM NORMAL	
	Key ON (kHz)	Key OFF (kHz)
t1	-0.3	N/A
t2	-0.8	N/A
t3	N/A	-0.3
t2 → t3 ppm	-1.6	
ERROR LIMIT (t2 → t3) ppm	2.5	

Confirm that during periods t1 and t3 the frequency difference does not exceed the value of one channel separation.	YES
Confirm that during the period t2 the frequency difference does not exceed half a channel separation.	YES
Confirm that during the period t2 to t3 the frequency difference does not exceed the frequency error limit.	YES

LIMIT CLAUSE: RSS-119 5.9 Channel Spacing 12.5 kHz

TRANSIENT PERIODS	MAXIMUM FREQUENCY DIFFERENCE (kHz)	FREQUENCY RANGE 138 – 174 MHz
t1 (ms)	±12.5	5 ms
t2 (ms)	±6.25	20 ms
t3 (ms)	±12.5	5 ms

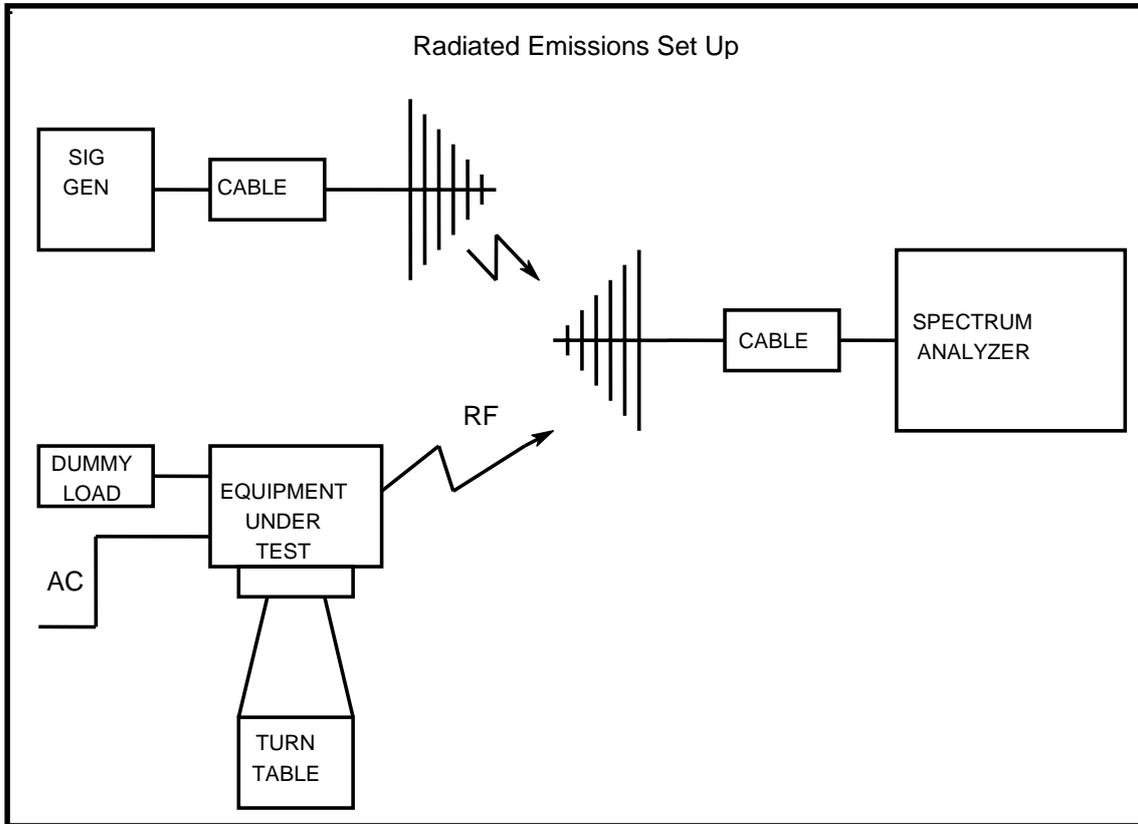
Tx Frequency: 173.1 MHz 50 W 12.5 kHz Channel Spacing



TEST EQUIPMENT LIST

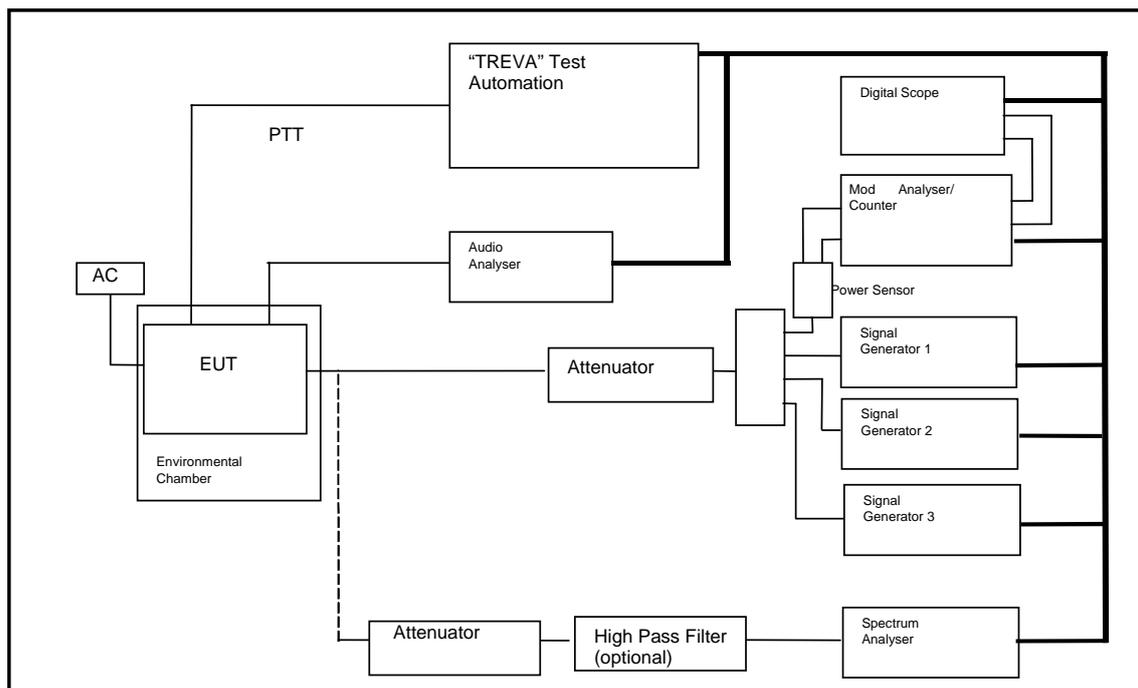
Equipment	Manufacturer	Model No	Serial No#	Tait ID	Cal Due
1m Coax (Blue)	Suhner	Sucoflex 104A	44610/4A	E4619	8-Oct-12
2m Coax (Black3)	Suhner	RG214HF/Nm/Nm/2000	Black3	E4624	8-Oct-12
2m Coax (Black5)	Suhner	RG214HF/Nm/Nm/2000	Black5	E4850	8-Oct-12
2m Coax (Black6)	Suhner	RG214HF/Nm/Nm/2000	Black6	E4849	8-Oct-12
3m Coax (Blue)	Suhner	Sucoflex 104A	44611/4A	E4620	8-Oct-12
AC Voltmeter 1	Tait				1-Sep-12
AC Voltmeter 2	Tait				1-Sep-12
Amplifier +21.7 dB	Tait	ZFL-1000LN	E3660	E3360	2-Dec-12
Antenna Tower	Electrometrics	EM-4720-2	112	E4447	Cal on Use
Audio Analyser	Hewlett Packard	HP8903A	2308A02597	E3074	14-Oct-12
Audio Analyser	Hewlett Packard	HP8903B	2818A04275	E3710	13-Oct-12
Controller	Electrometrics	EM-4700	119	E4445	Cal on Use
Environ. Chamber	Contherm	5400 RHSLT.M	1416	E4051	12-Jul-12
Filter High Pass	Tait	HPF	N/A	E3382	Cal on Use
Horn Antenna	Emco	DRG3115	2084	E3076	6-Jan-13
Modulation Analyser	Hewlett Packard	HP8901B (Opt 002)	2441A00393	E3073	14-Oct-12
Modulation Analyser	Hewlett Packard	HP8901B (Opt 002)	3704A05837	E3786	13-Oct-12
Multimeter	Fluke	77	35069359	E3237	10-Oct-12
OATS Tower Cable	Intelcom	RG214	OATS1	E4621	12-Oct-12
OATS Turntable Cable	Intelcom	RG215	OATS2	E4622	12-Oct-12
Oscilloscope	Tektronics	TDS340	B013611	E3585	10-Oct-12
Oscilloscope	Tektronics	TDS380	B017095	E3782	12-Oct-12
Power Supply	Agilent	N5767A	US09F4901H	E4656	13-Oct-12
Power Supply	Hewlett Packard	HP6032A	2441A00412	E3075	13-Oct-12
RF Attenuator 10dB	Weinschel	57-10-34	LB590	E3674	4-Oct-12
RF Attenuator 10dB	Weinschel	24-10-34	AZ0401	E3388	17-Oct-12
RF Attenuator 20dB	Weinschel	24-20-44	AW1266	E3562	11-Oct-12
RF Attenuator 20dB	Weinschel	40-20-33	BL9950	E4080	Cal on Use
RF Attenuator 20dB	Weinschel	40-20-33	MF817	E4082	Cal on Use
RF Attenuator 30dB	Weinschel	67-30-33	BR0531	E4280	10-Oct-12
RF Attenuator 6dB	Weinschel	40-06-34	KV457	E3561	8-Oct-12
RF Load 150W	Bird	8166	524	E3625	8-Oct-12
RF Splitter Combiner	Minicircuits	ZFSC-4-1	-	E4083	Cal on Use
RF Splitter Combiner	Minicircuits	ZFSC-4-1	-	E4084	Cal on Use
Signal Generator	Rohde & Schwarz	SMY01 1062.5502.11	841736/019	E3553	20-Oct-12
Signal Generator	Rohde & Schwarz	SML03 1090.3000.13	100597	E4050	17-Nov-12
Signal Generator	Agilent	E4433B	US38440446	E4147	4-Oct-12
Signal Generator	Agilent	E8663D	MY50420224	E4908	14-Oct-12
S-Line TEM Cell	Rohde & Schwarz	1089.9296.02	338232/003	E3636	15-Aug-12
Spectrum Analyser	Agilent	PXA N9030A	MY49432161	E4907	30-Mar-14
Spectrum Analyser	Agilent	PSA E4445A	MY42510072	E4139	26-Aug-12
Temp & Humidity datalogger	Hobo	H8		E4441	7-Aug-12
Temp & Humidity datalogger	Hobo	H8		E4442	7-Aug-12
Turntable	Electrometrics	EM-4704A	105	E4446	Cal on Use
Variac	Dimmerstat	10 D-1P	801/D90736/110		Cal on Use
Variac	Dimmerstat	10 D-1P	801/D90736/111		Cal on Use
Variac	Yamabishi	S-260-5	TX-533	E1737	1-Sep-12

ANNEX 1– RADIATED EMISSIONS TEST SETUP DETAILS



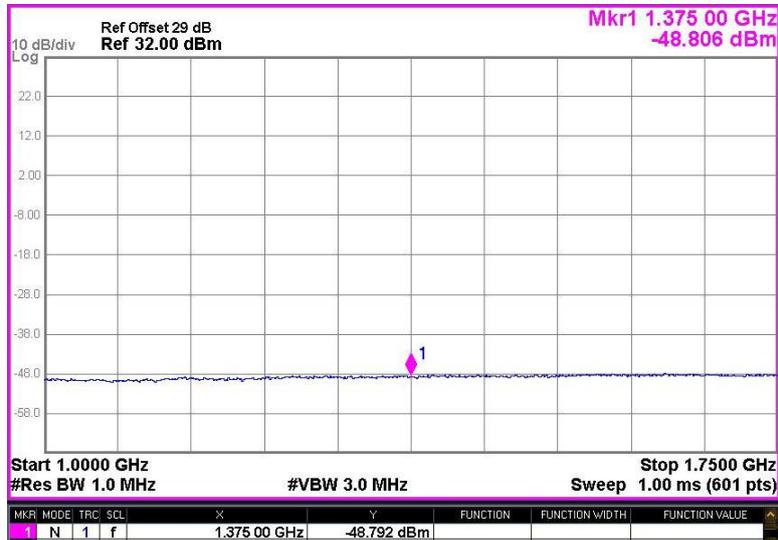
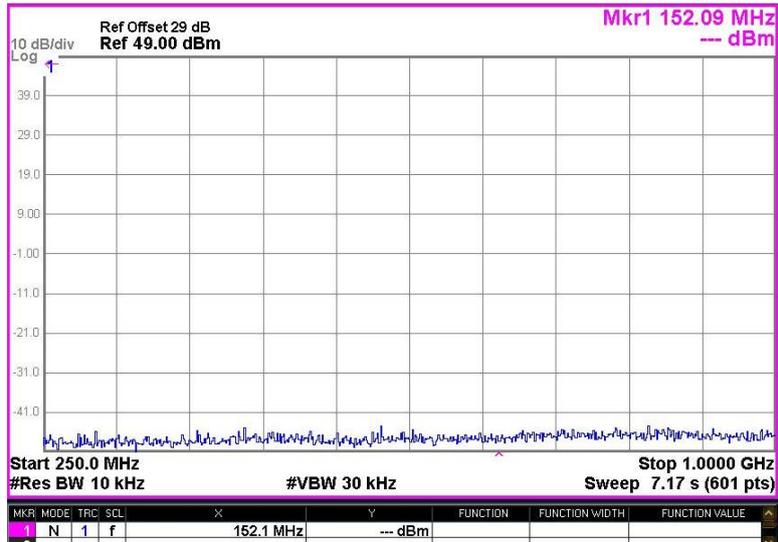
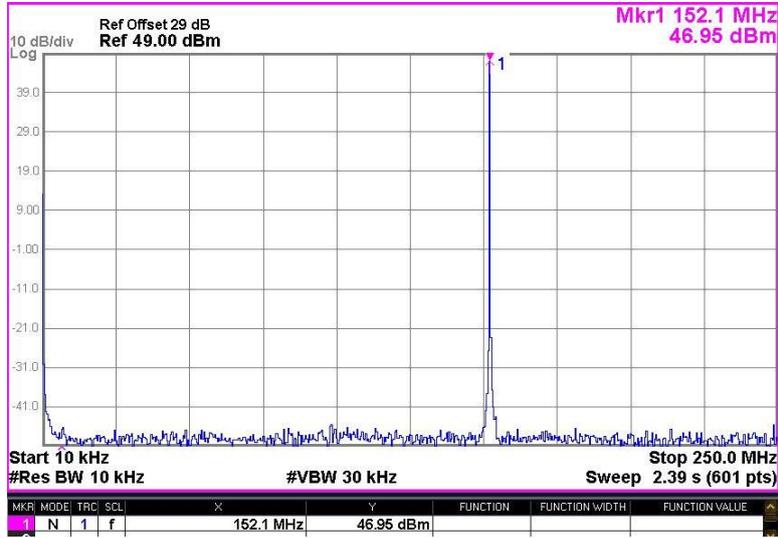
ANNEX 2– AUTOMATED EMISSIONS TEST SETUP DETAILS

All other testing is performed using the Teltest Radio **EVAL**uation system (TREVA), which is configured as shown below. The Spectrum Analyser is connected to the EUT via the attenuator network for Conducted Emissions testing, and Occupied Bandwidth.



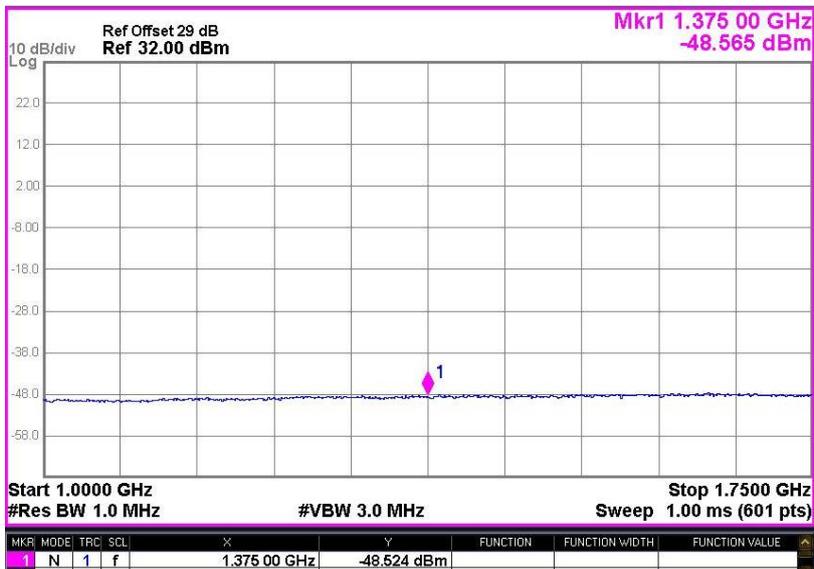
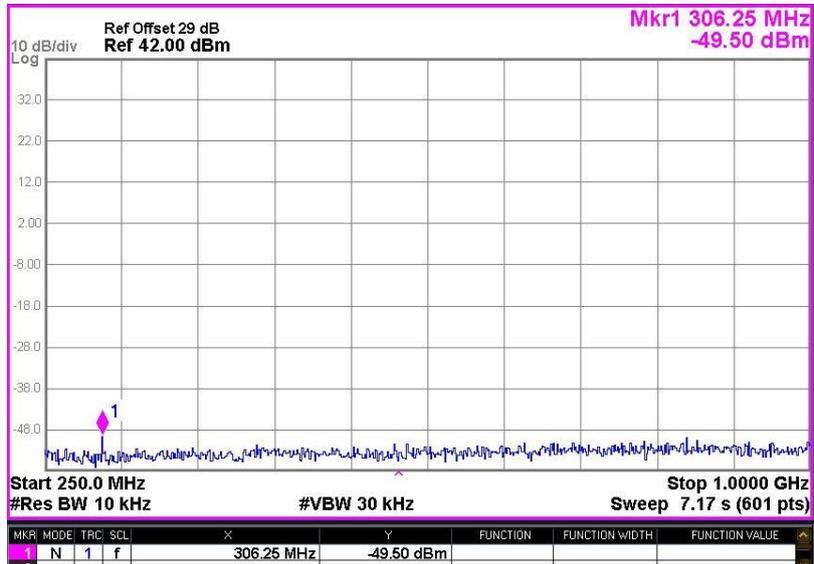
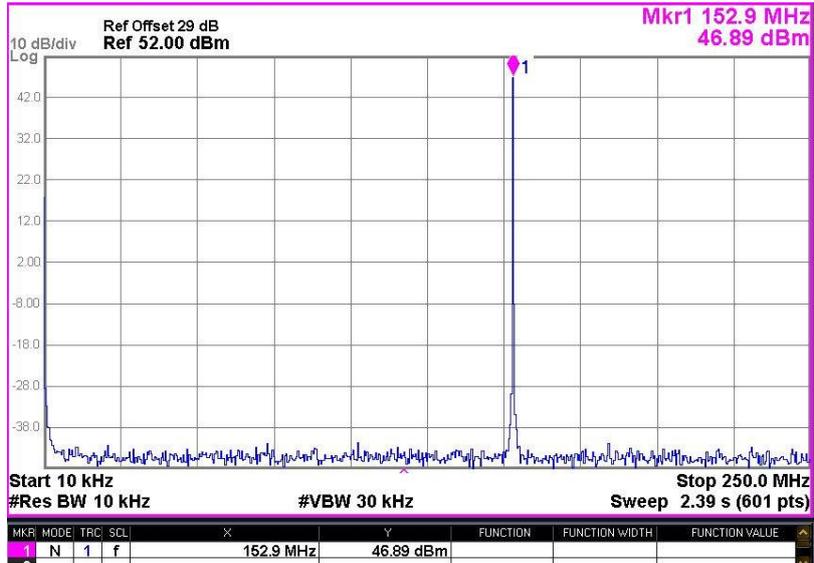
ANNEX 3 – TX CONDUCTED EMISSION PLOTS

SPECIFICATION: FCC 47 CFR 2.1051      RSS-119      5.8  
 Tx FREQUENCY: 152.1 MHz      50 Watts



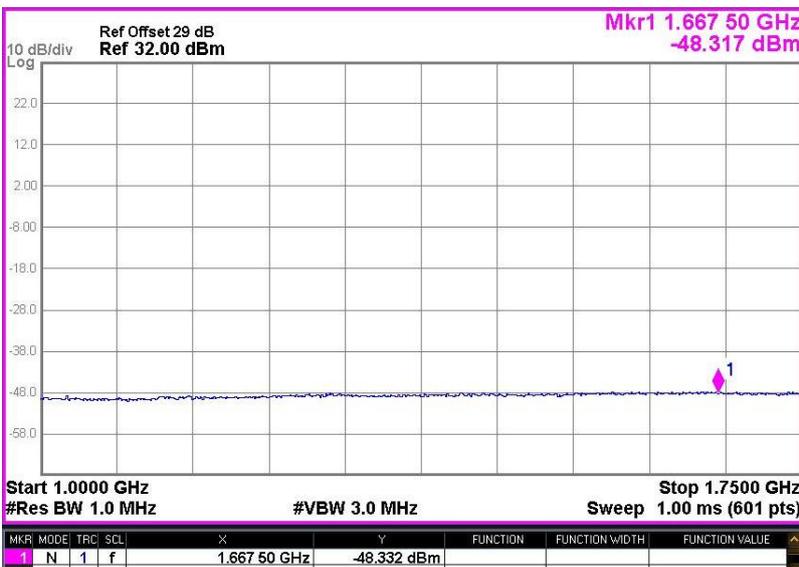
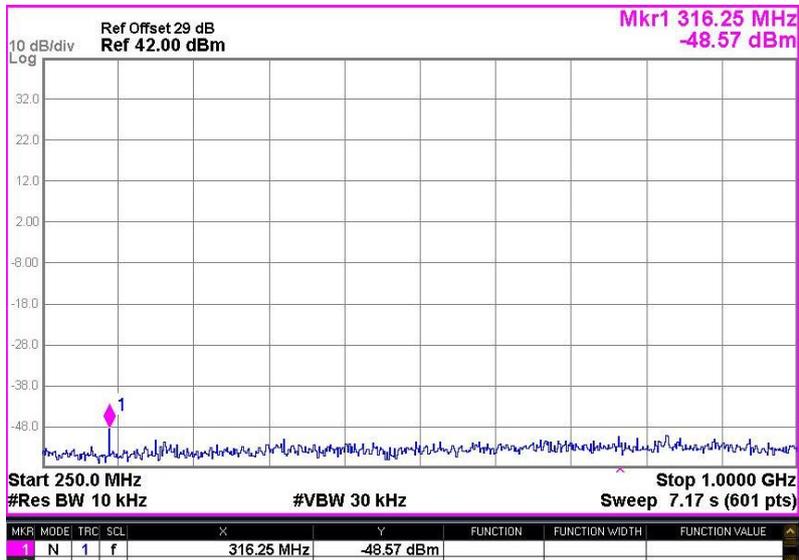
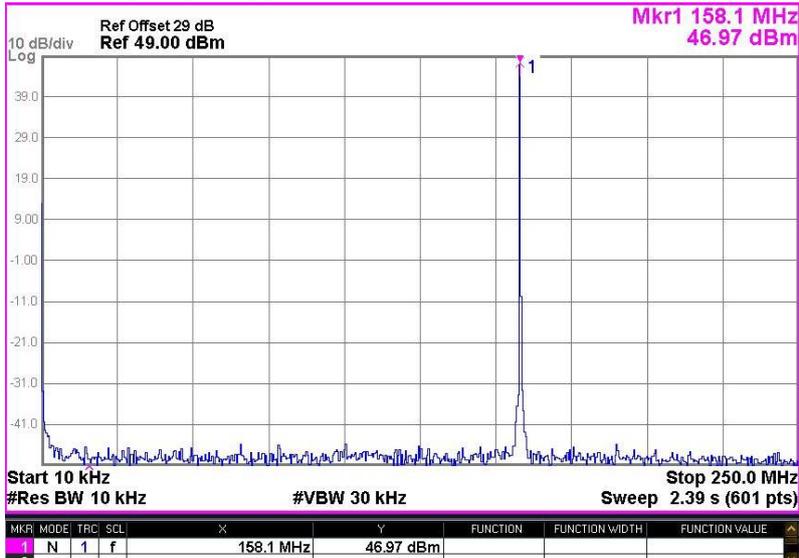
Tx FREQUENCY: 153.1 MHz

50 Watts



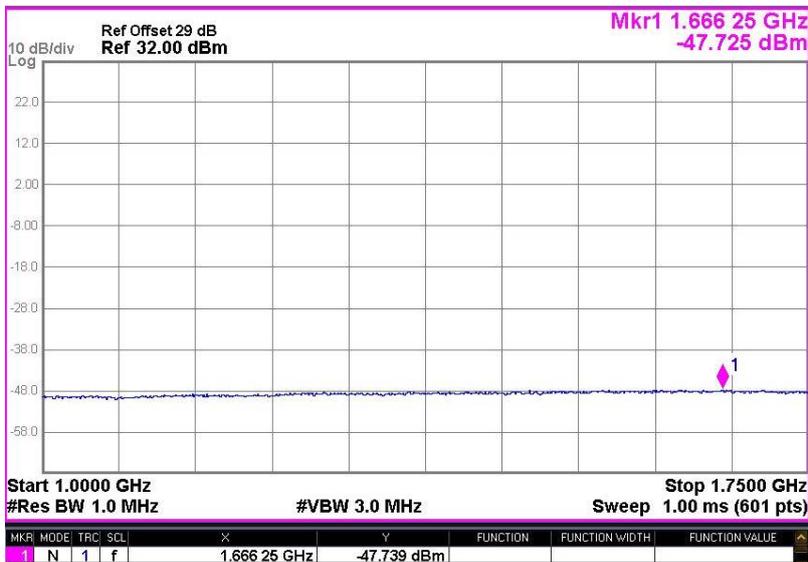
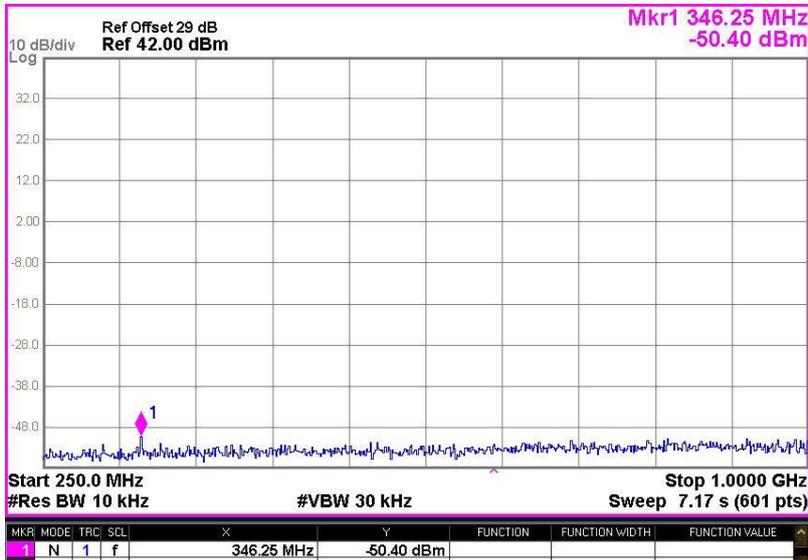
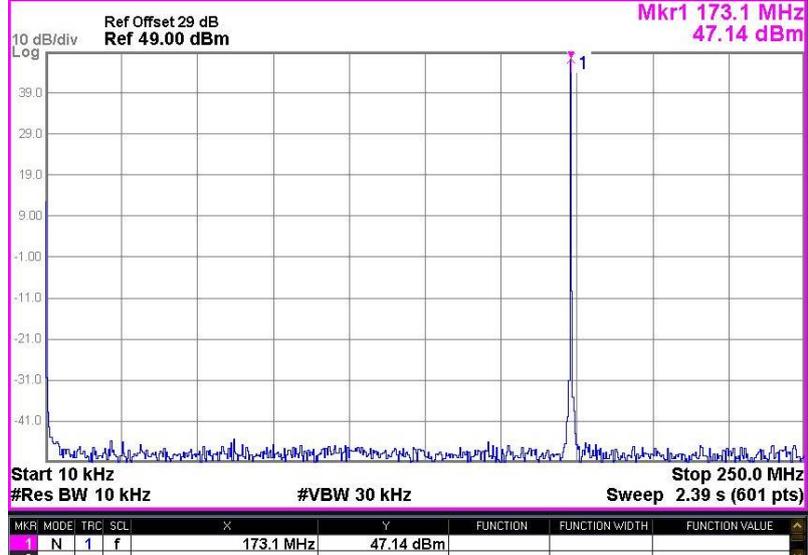
Tx FREQUENCY: 158.1 MHz

50 Watts



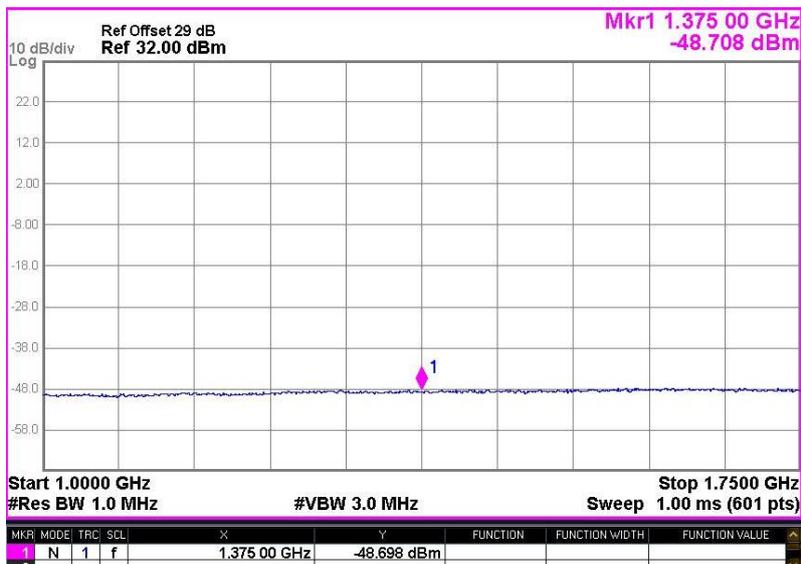
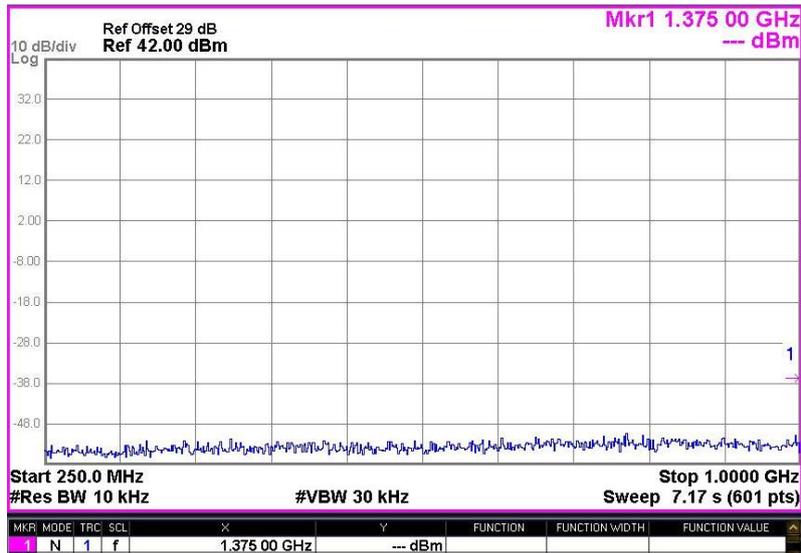
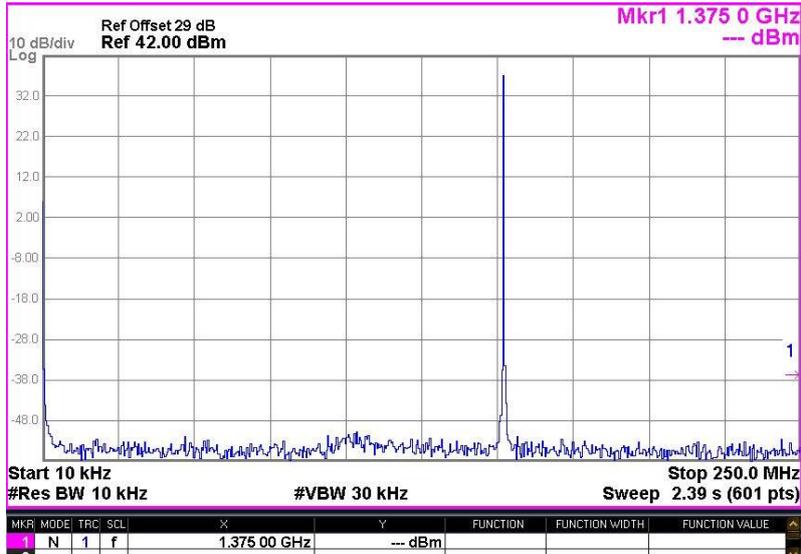
Tx FREQUENCY: 173.1 MHz

50 Watts



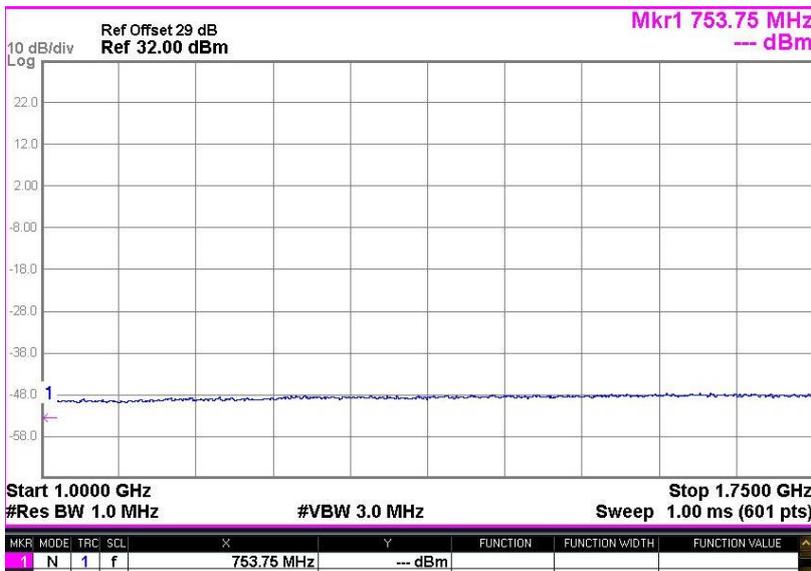
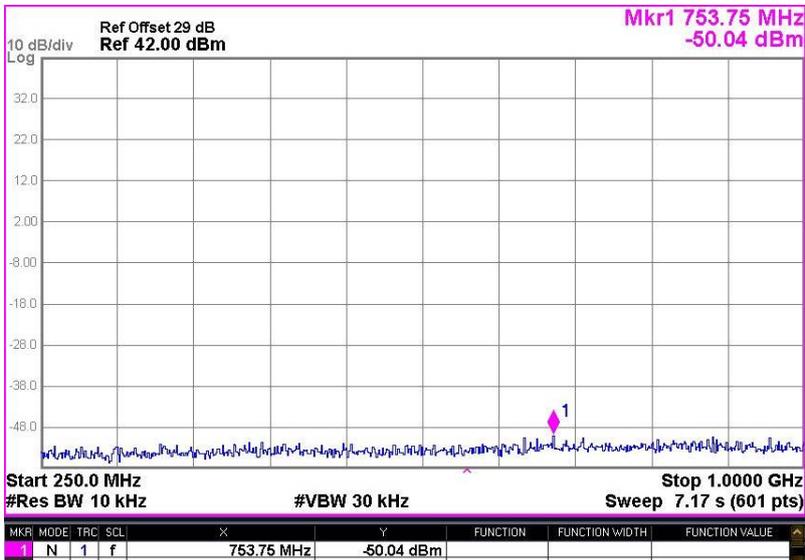
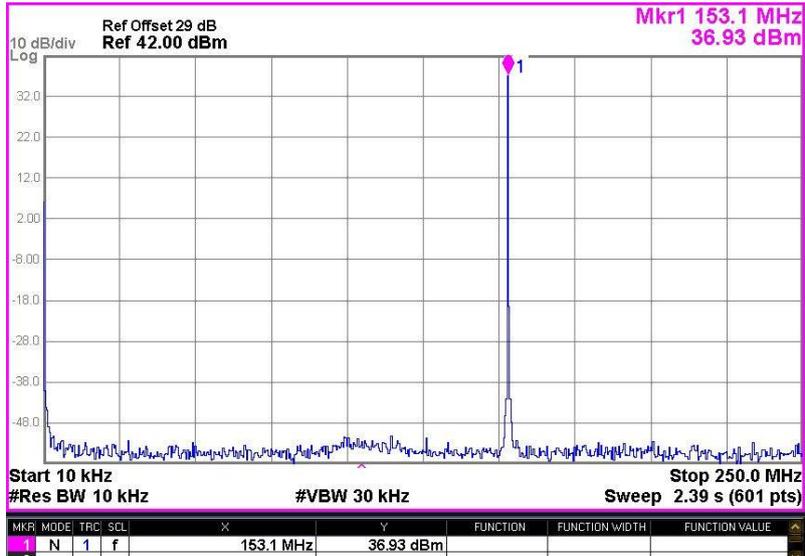
Tx FREQUENCY: 152.1 MHz

5 Watts

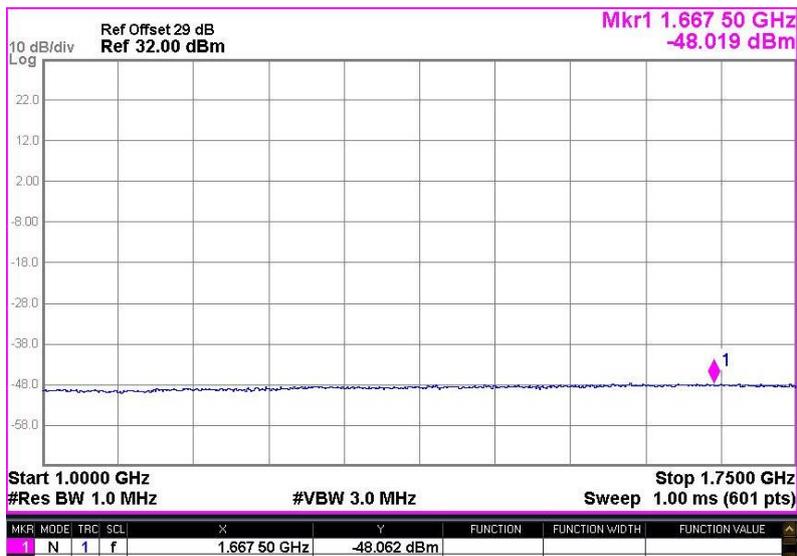
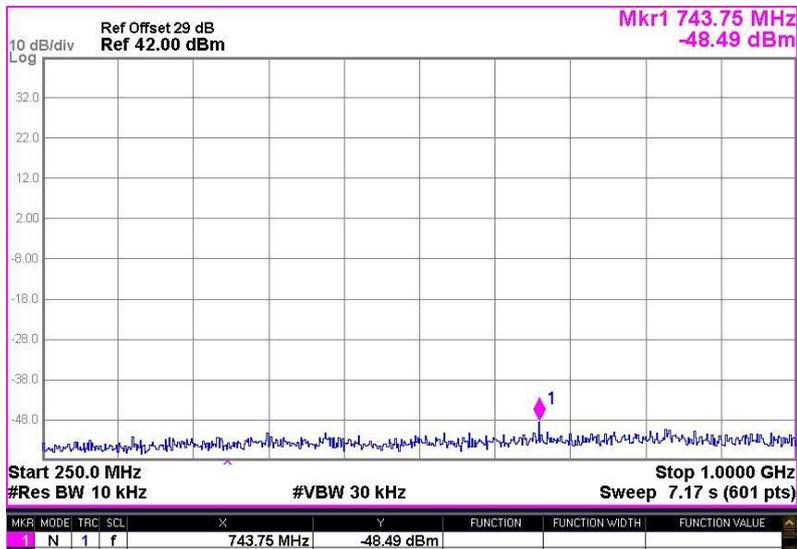
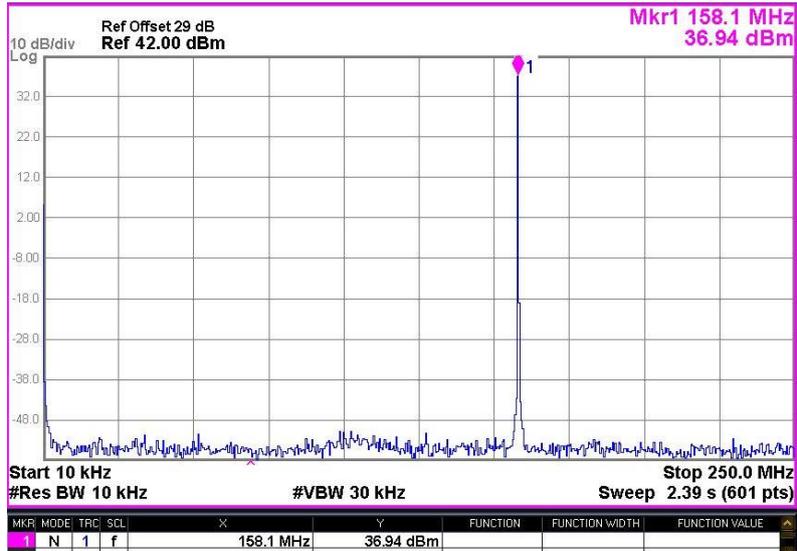


Tx FREQUENCY: 153.1 MHz

5 Watts

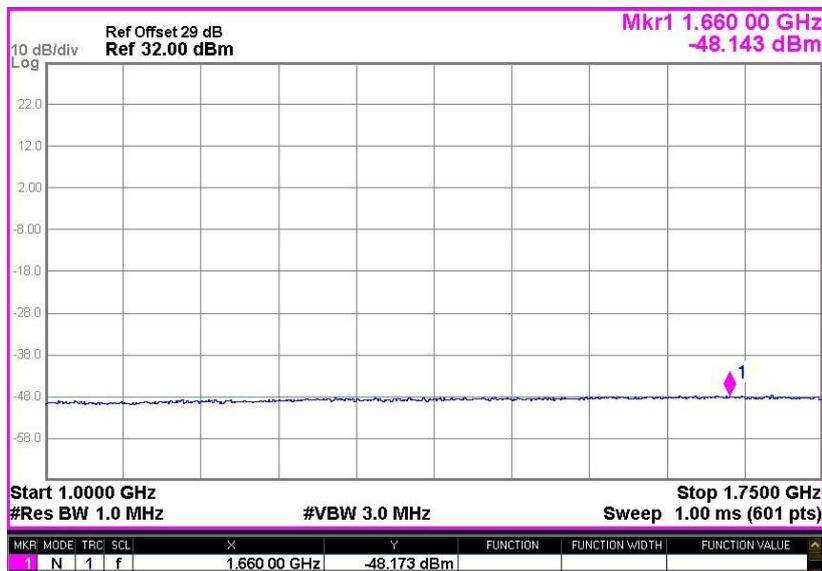
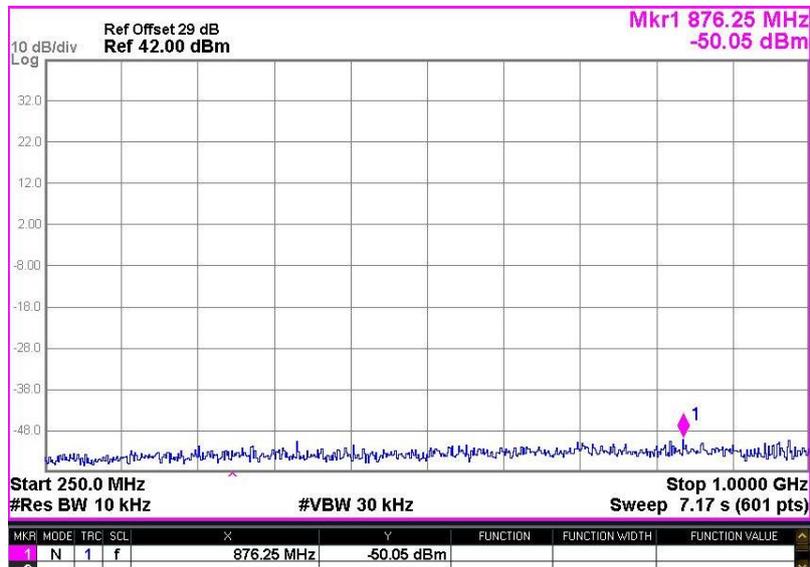
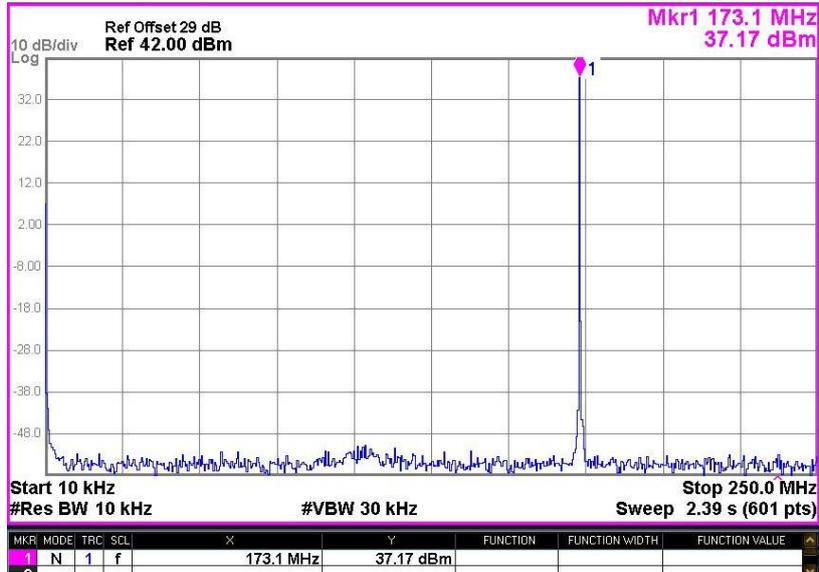


Tx FREQUENCY: 158.1 MHz 5 Watts



Tx FREQUENCY: 173.1 MHz

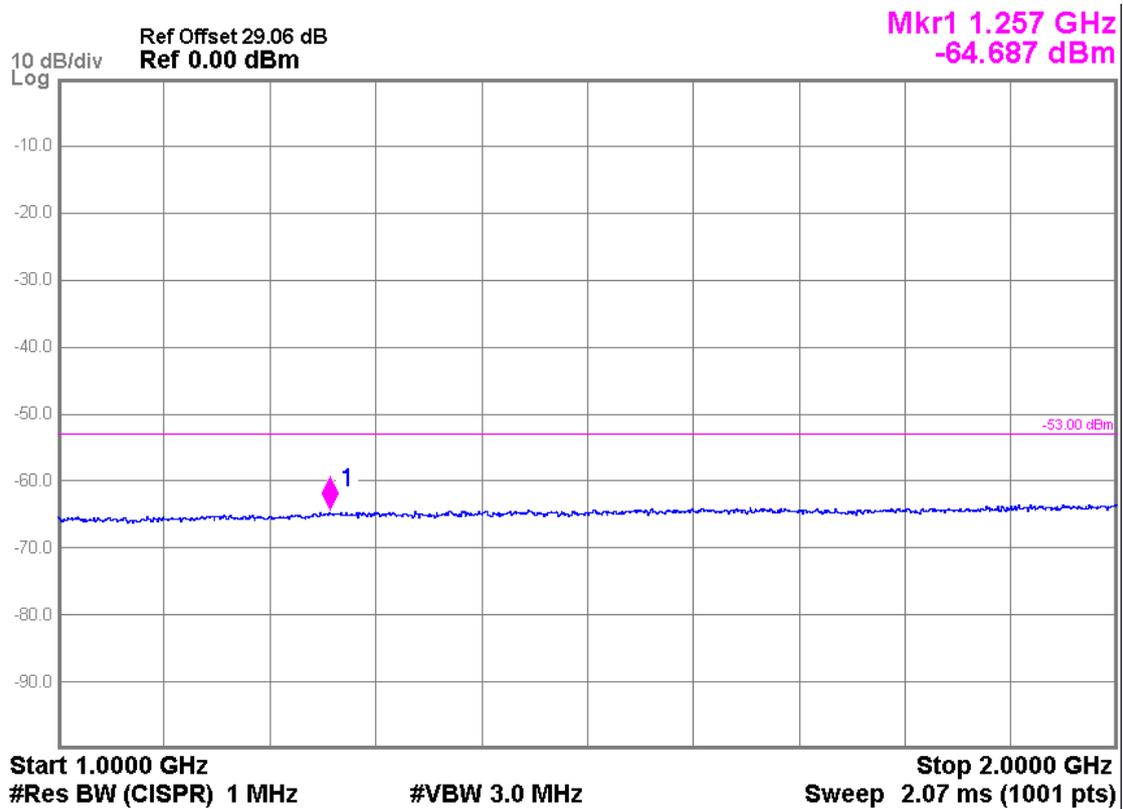
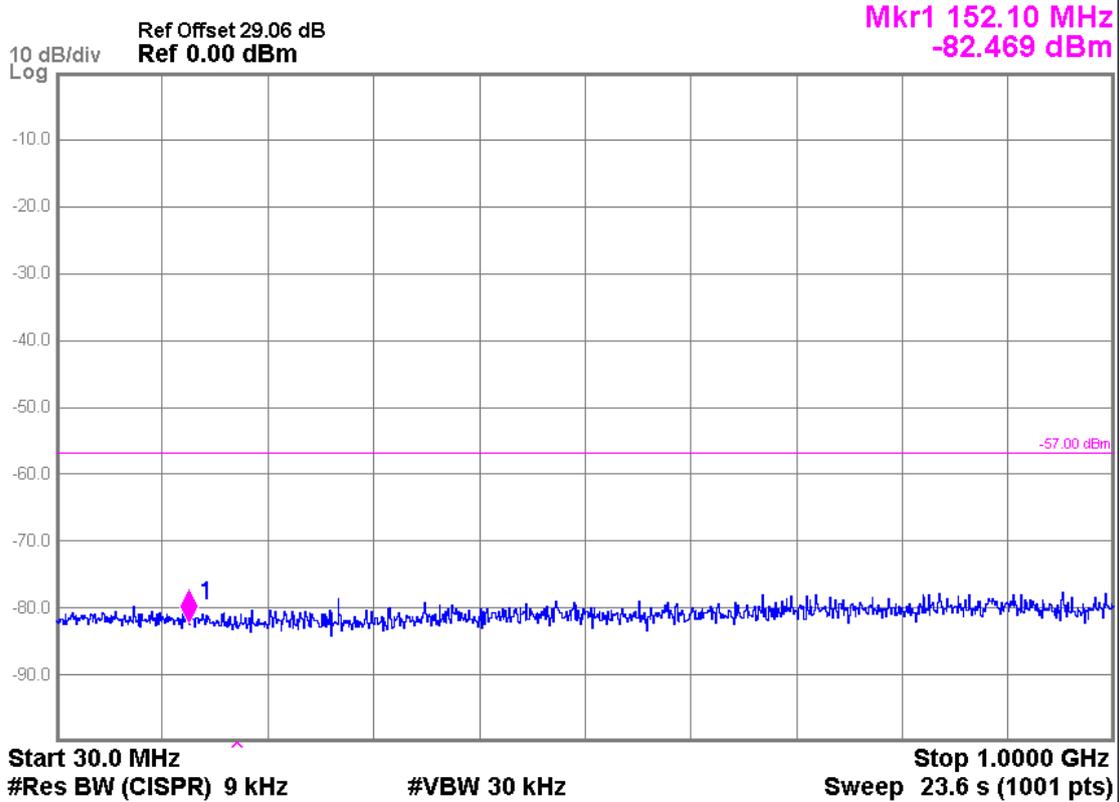
5 Watts



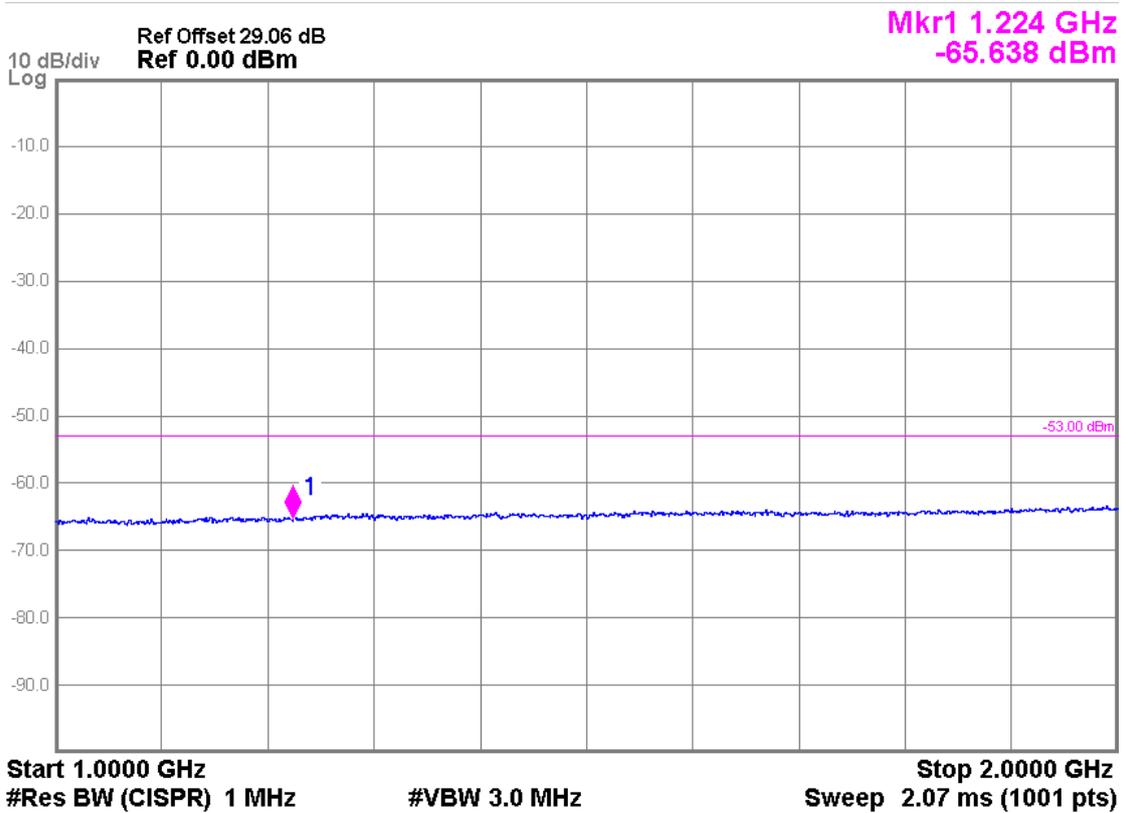
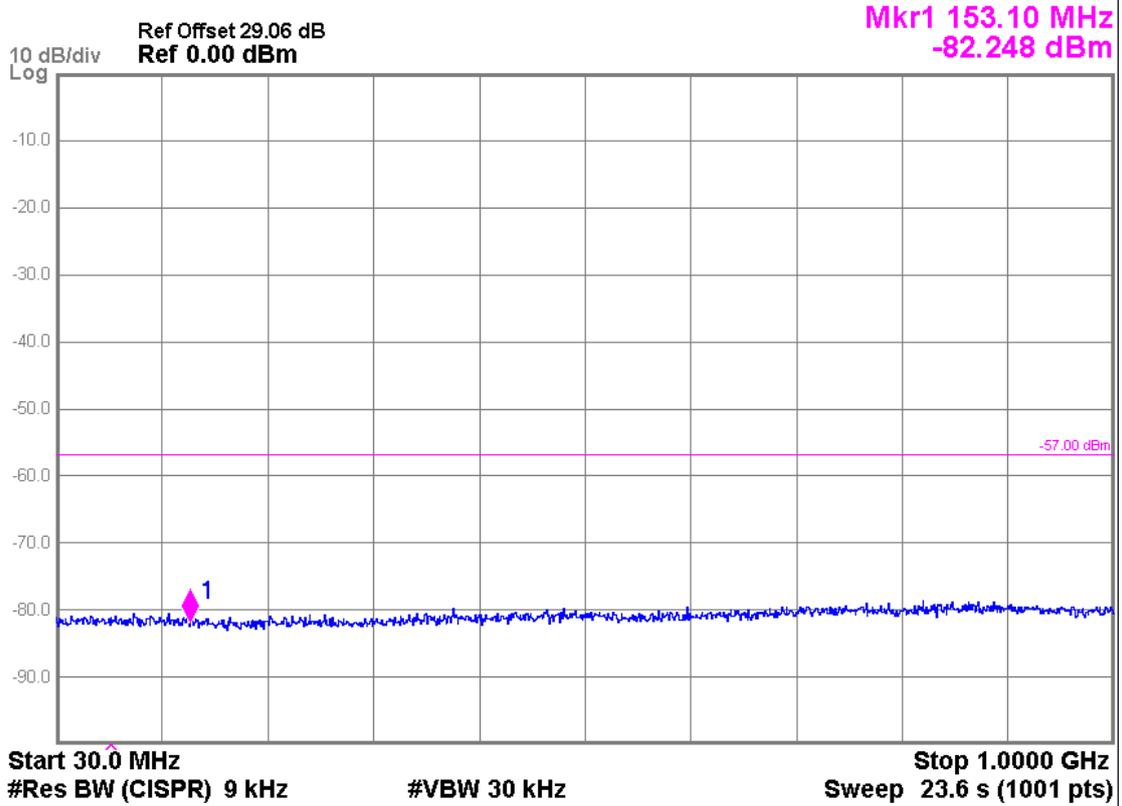
ANNEX 4 – TX STANDBY / RX CONDUCTED EMISSION PLOTS

SPECIFICATION: FCC 47 CFR 2.1051  
Tx FREQUENCY: 152.1 MHz

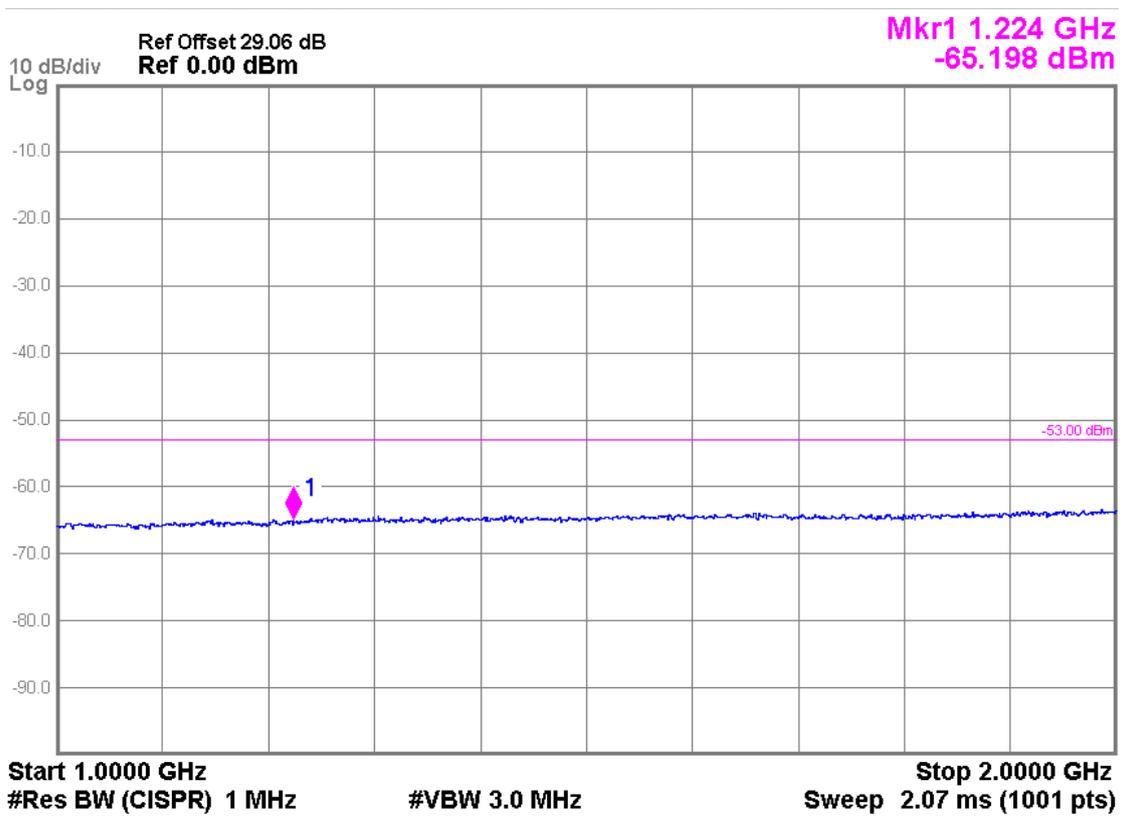
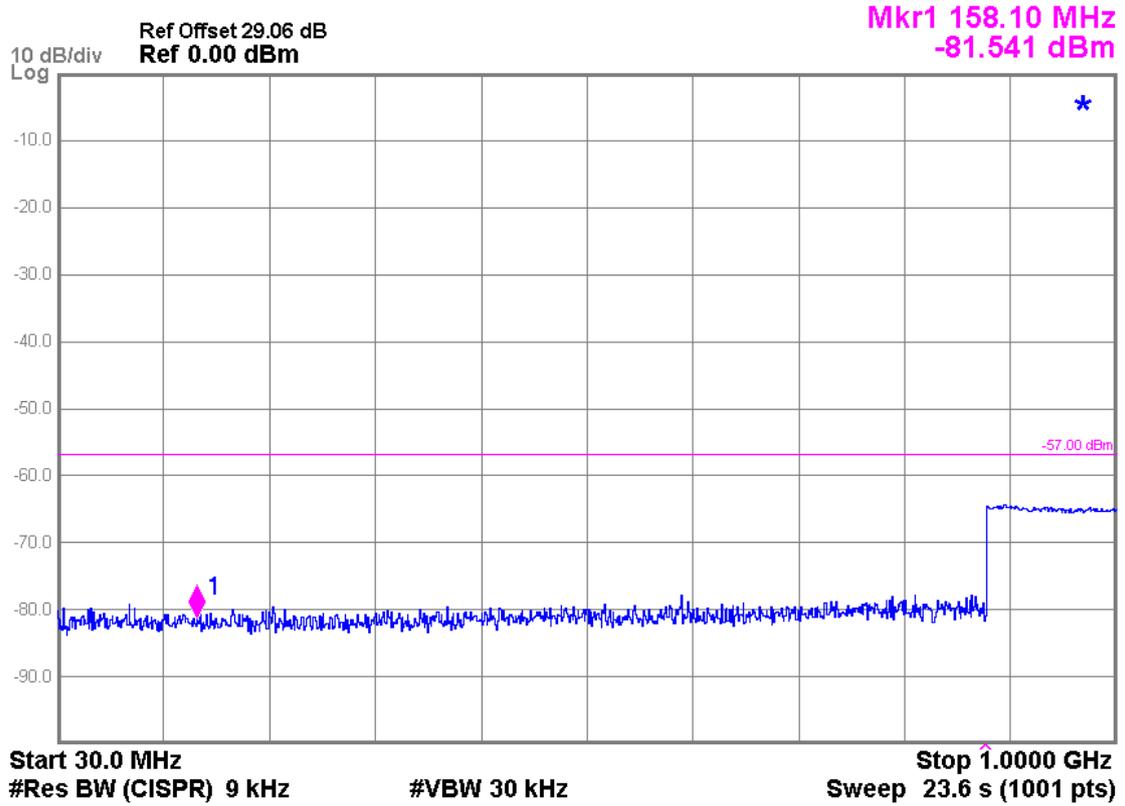
RSS-119 5.8  
0 W/Tx standby – Tx Port



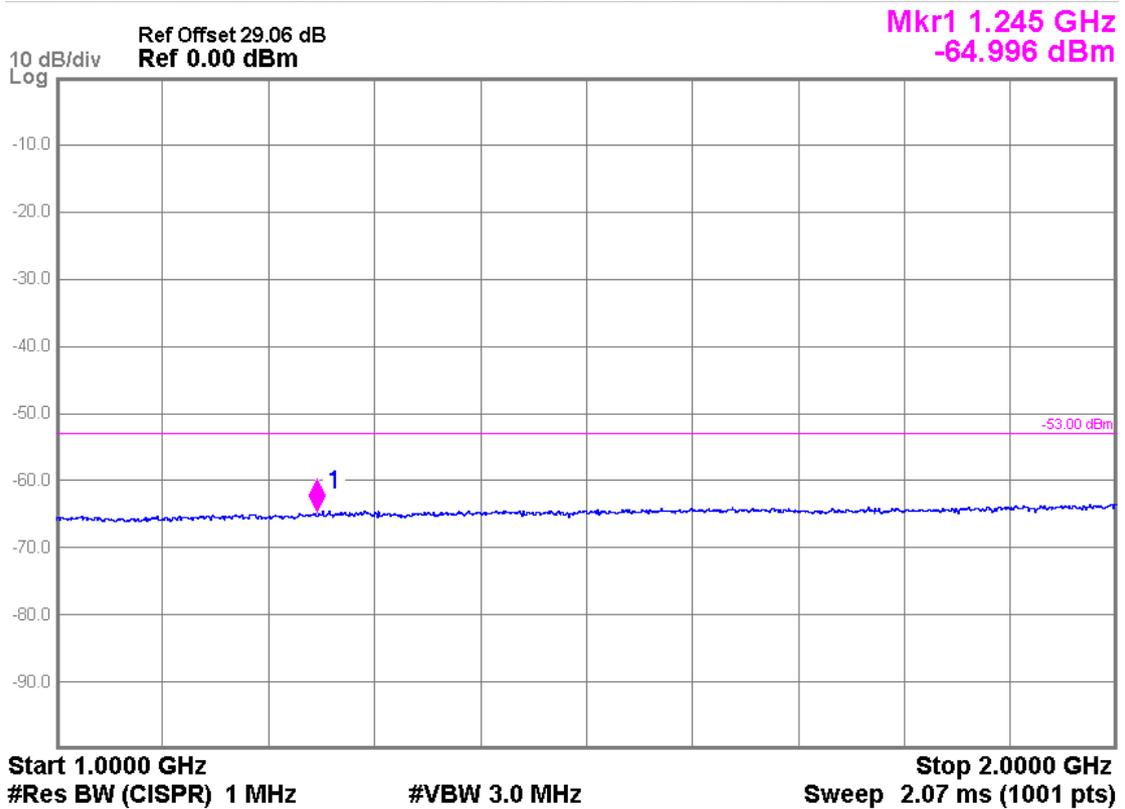
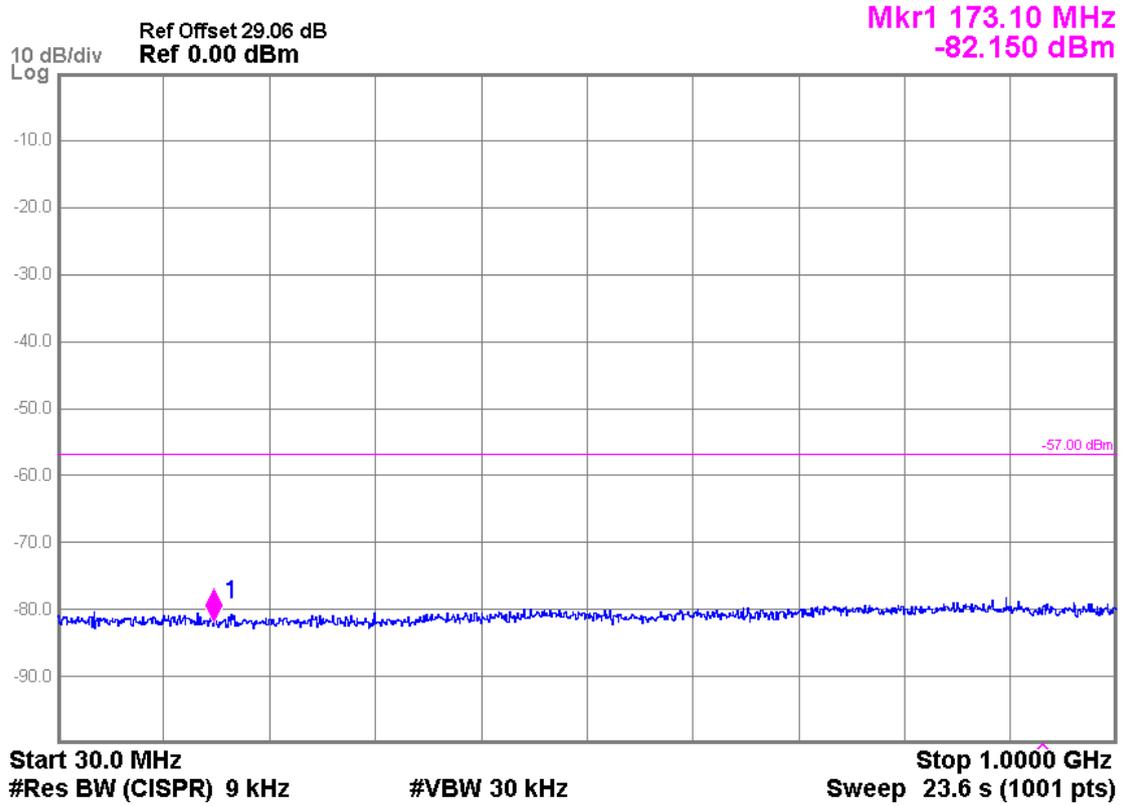
Tx FREQUENCY: 153.1 MHz 0 W/Tx standby – Tx Port



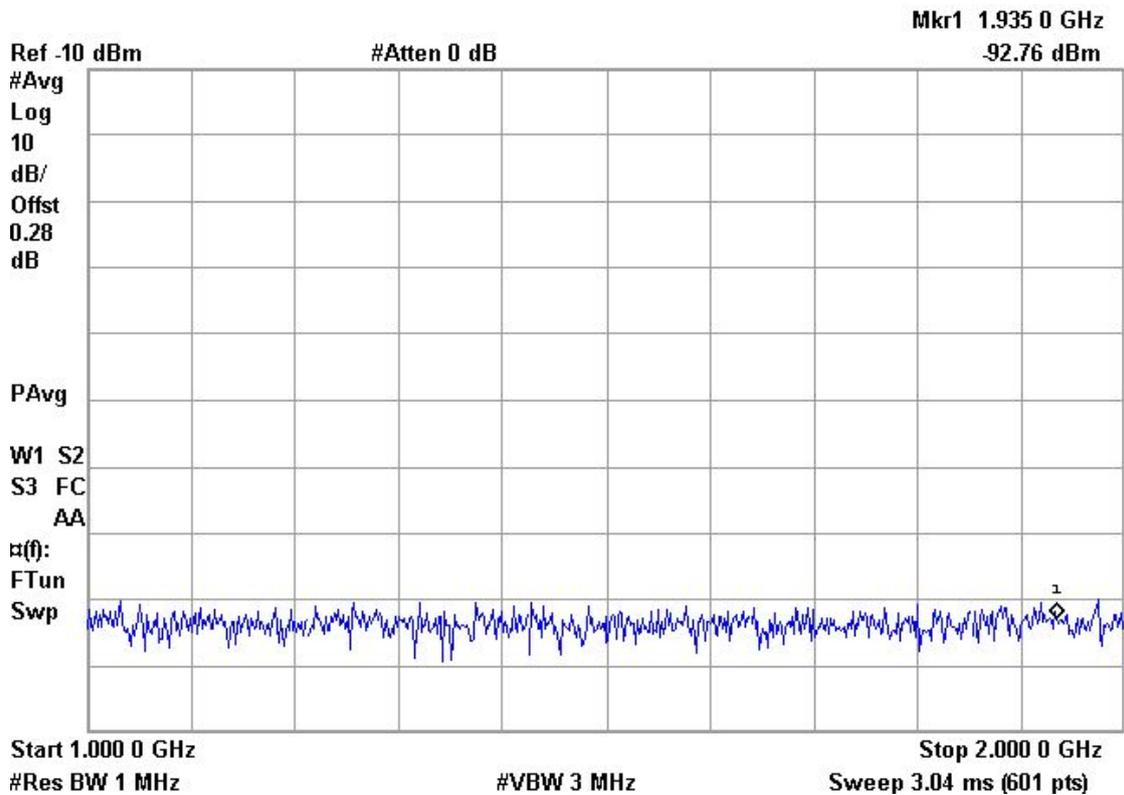
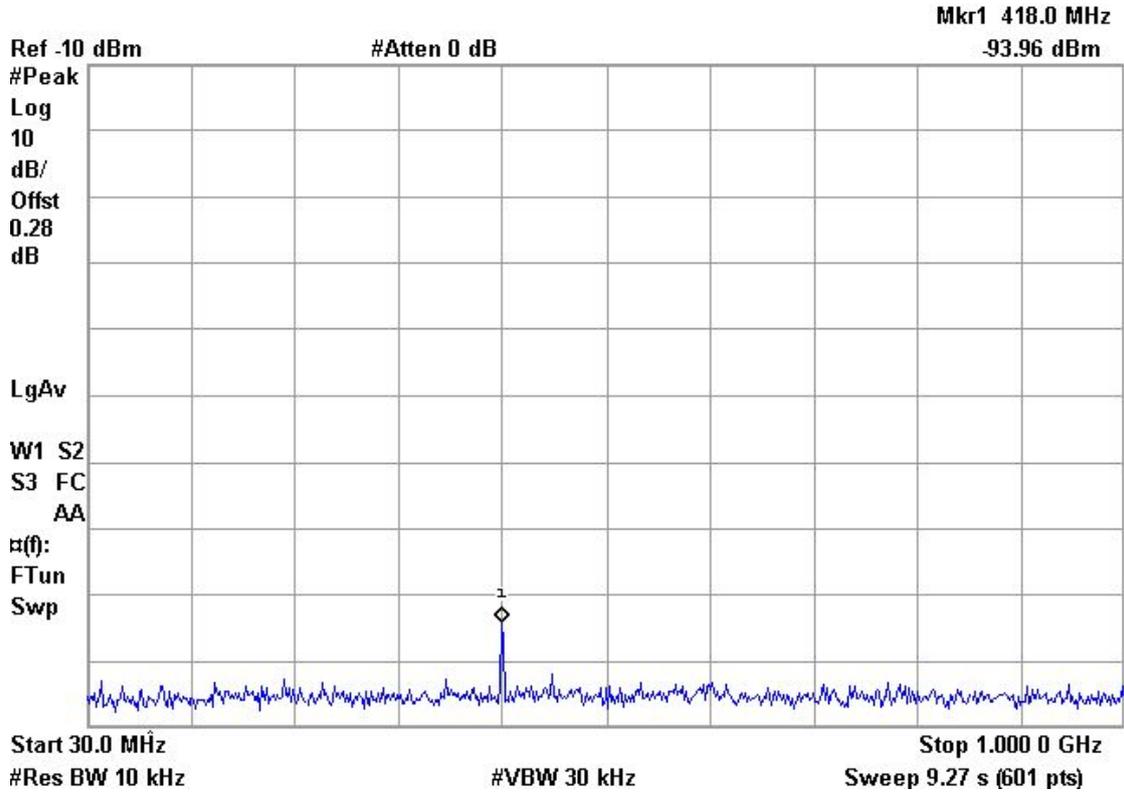
Tx FREQUENCY: 158.1 MHz 0 W/Tx standby – Tx Port



Tx FREQUENCY: 173.1 MHz 0 W/Tx standby – Tx Port

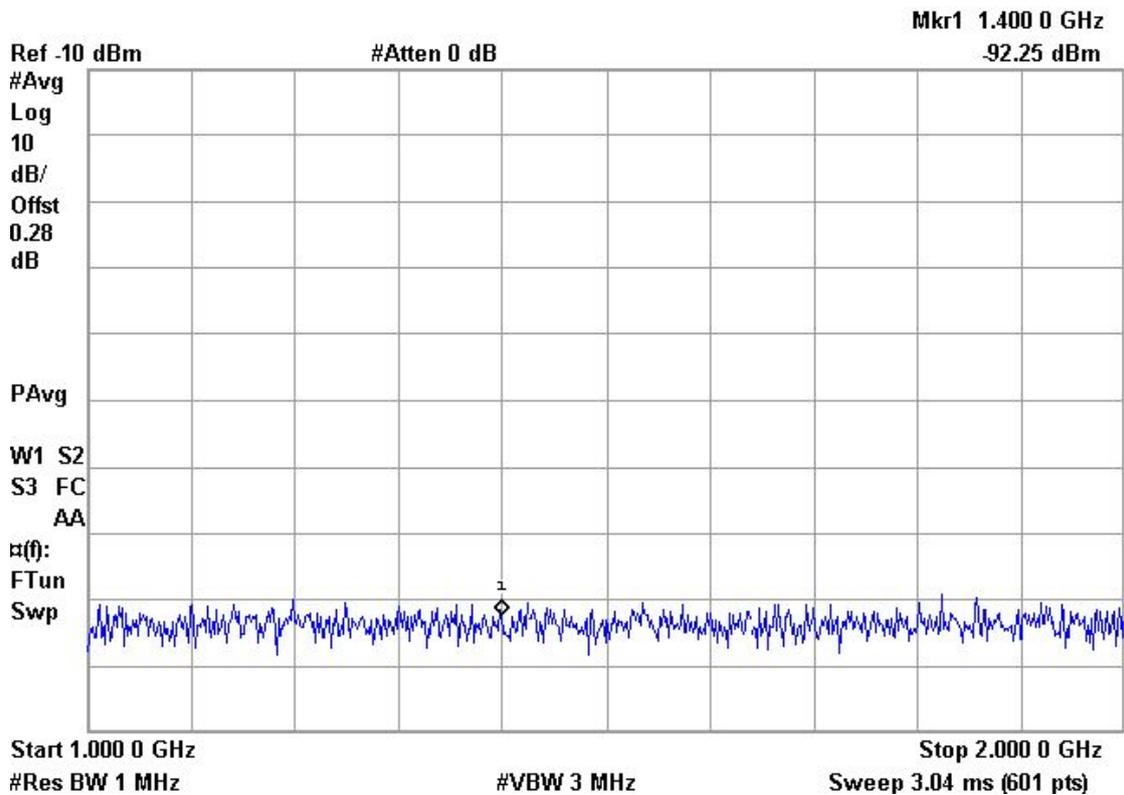
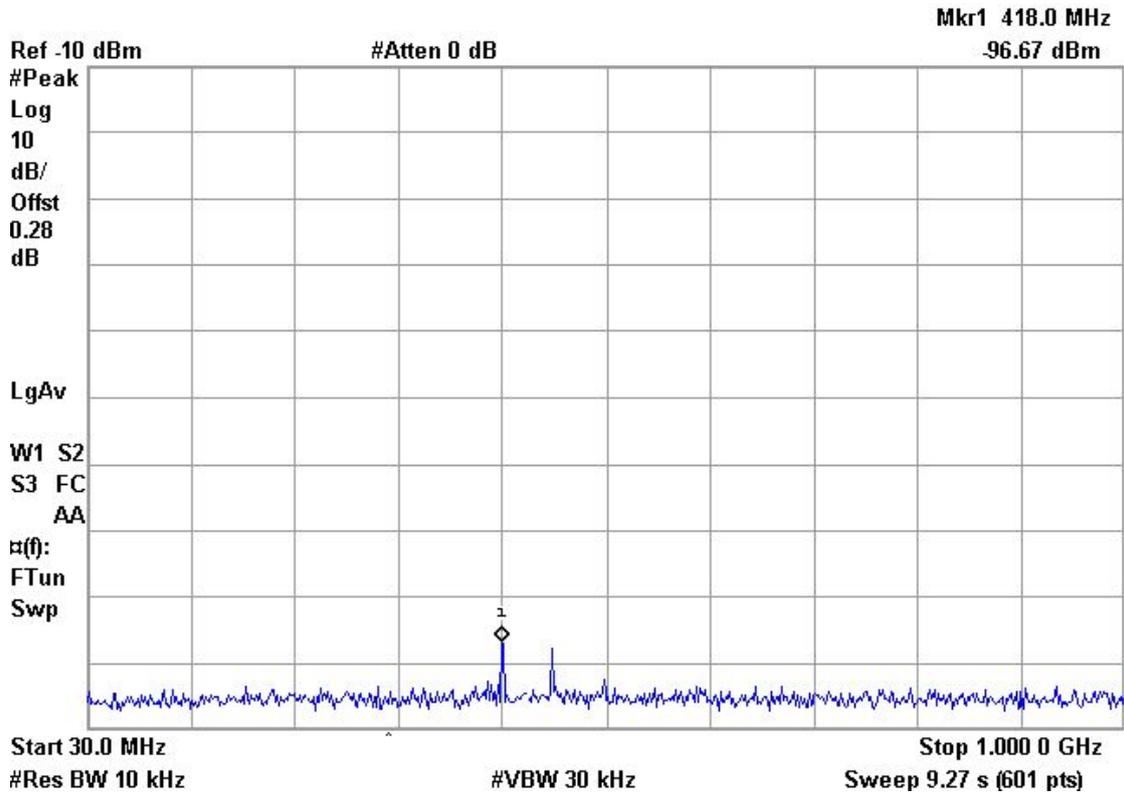


SPECIFICATION: RSS-119 5.11 RSS-Gen 4.10  
 Rx FREQUENCY: 152.1 MHz Receive Port



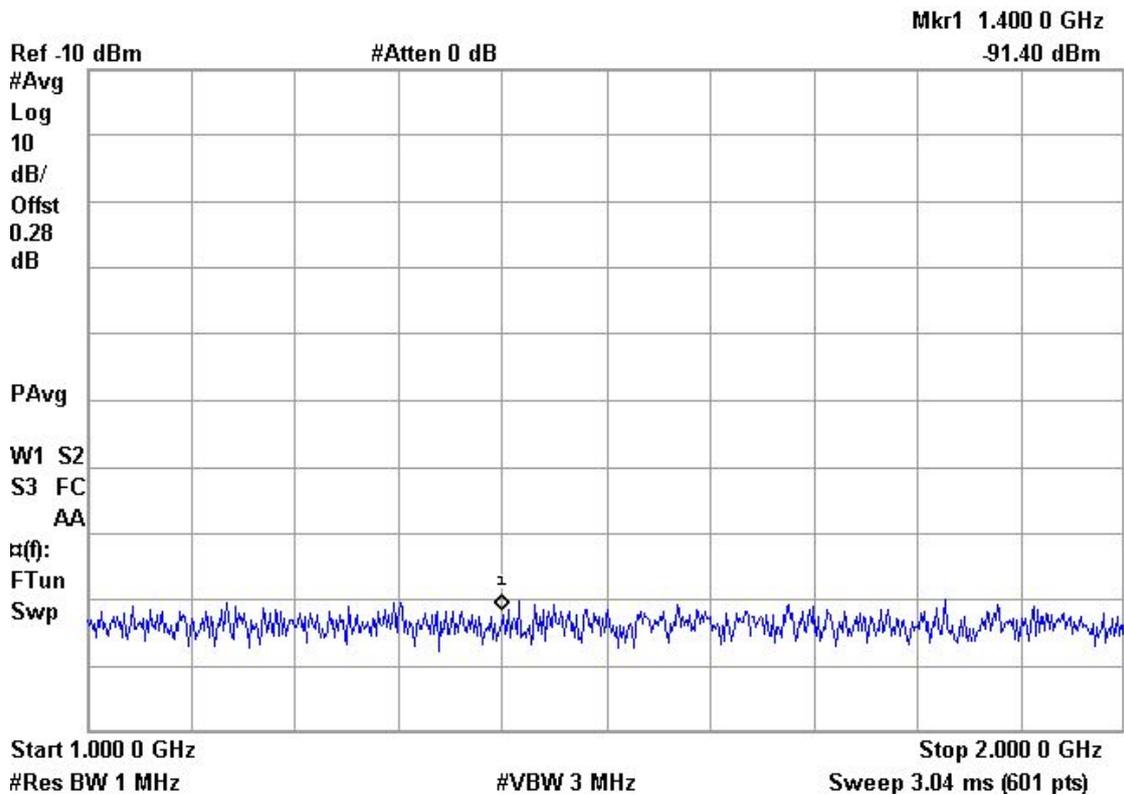
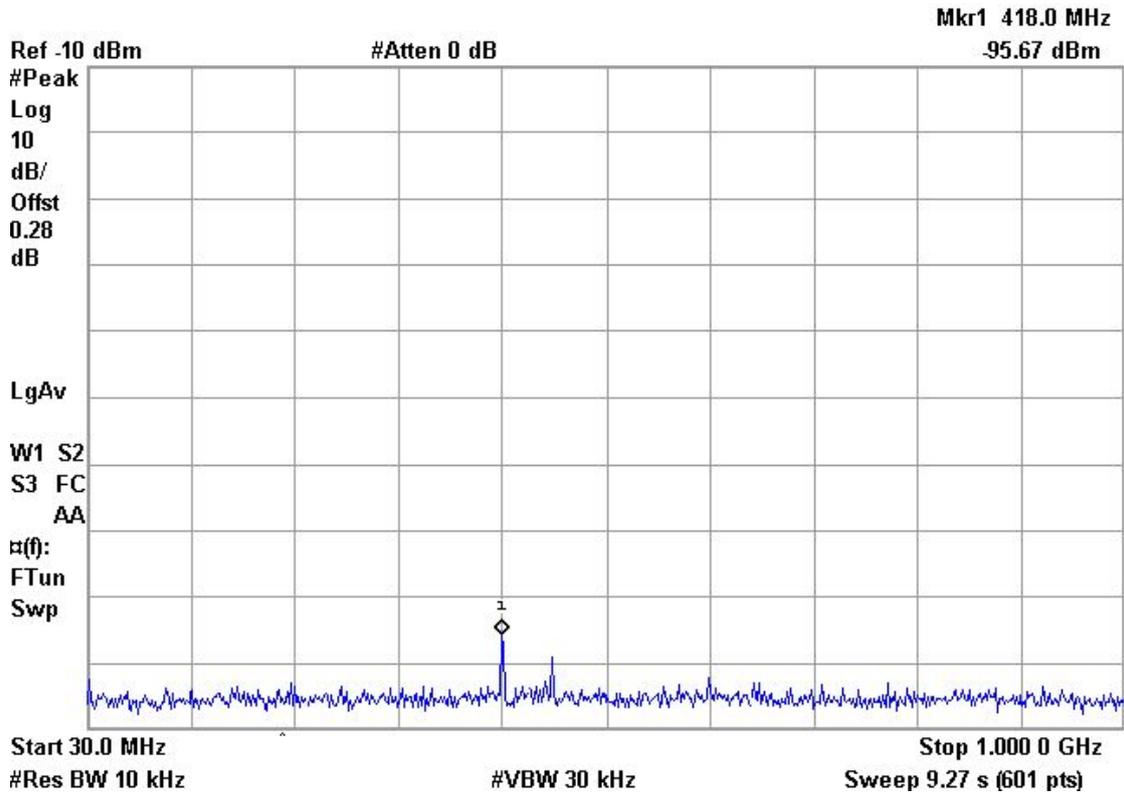
Rx FREQUENCY: 153.1 MHz

Receive Port



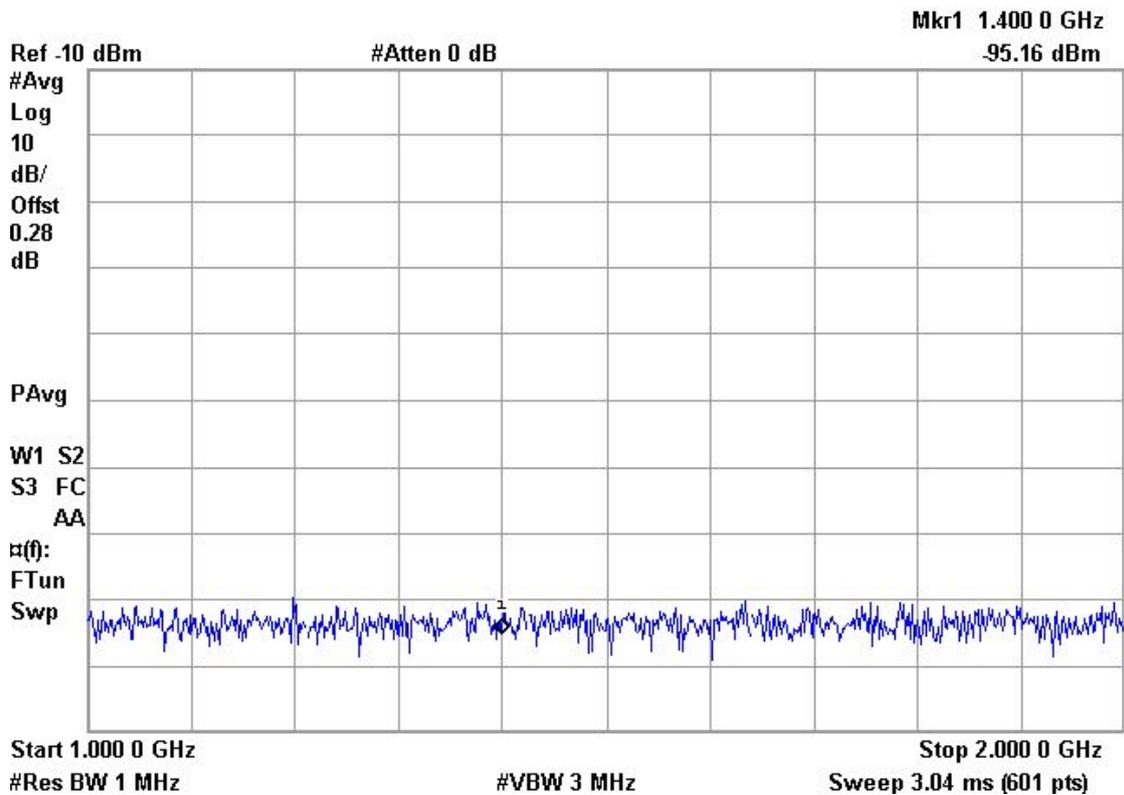
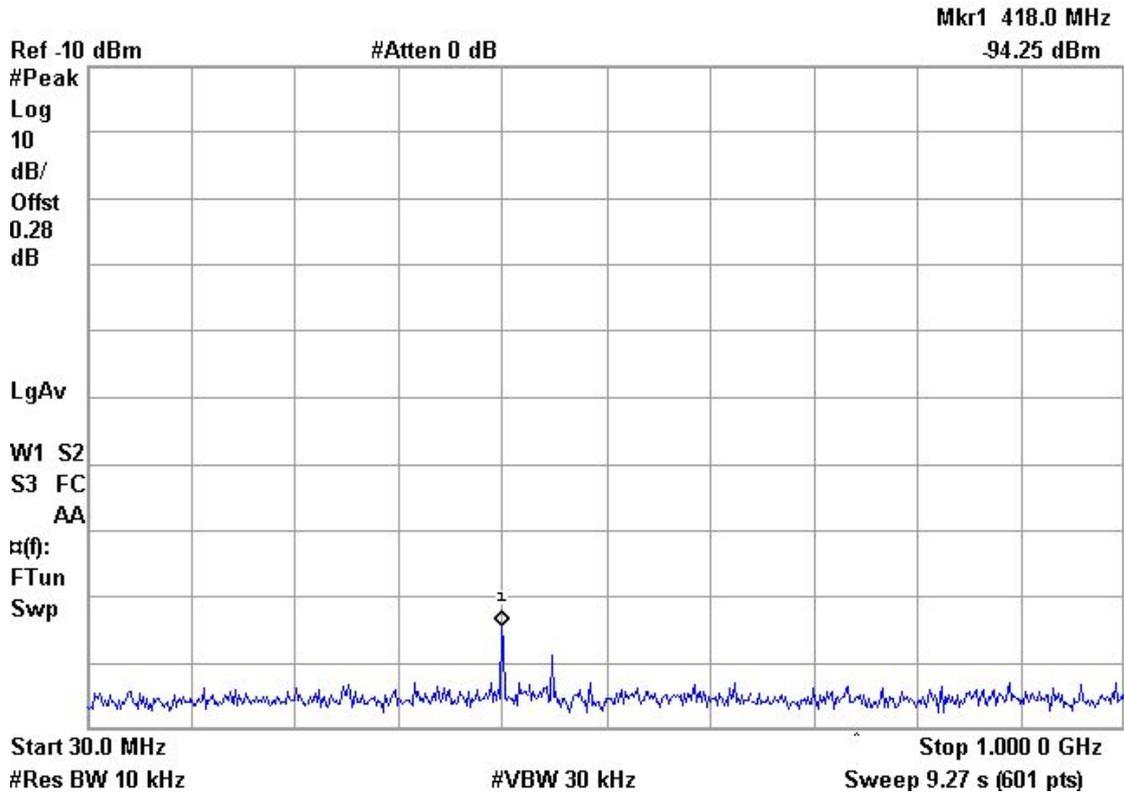
Rx FREQUENCY: 156.1 MHz

Receive Port



Rx FREQUENCY: 158.1 MHz

Receive Port



Rx FREQUENCY: 173.1 MHz

Receive Port

