

LABORATORY TEST REPORT

RADIO PERFORMANCE MEASUREMENTS

for the

TBCK4E Base Station Transceiver

Tested in accordance with:

FCC 47 CFR Parts 90

RSS-119 Issue 11
RSS-Gen Issue 3

Report Revision:

1

Issue Date:

23-01-13

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REVISION

Date	Revision	Comments
23-01-13	1	Initial test report

INTRODUCTION

This report covers the requirements of FCC 47 Parts 90 and RSS-119 Issue 11 & RSS-Gen Issue 3.

REASON FOR REPORT
The TB9300 K4 100W Base Station is a new addition to the Tait Ltd product line capable of Digital Mobile Radio (DMR) modulation. DMR supports two voice channels in each 12.5 kHz channel.

Type Approval Testing of the TBCK4E,

Frequency ranges: TX: 762 → 776 MHz, 850 → 870 MHz and RX: 794 → 824 MHz.

in accordance with:

FCC 47 CFR Parts 90
RSS-119 Issue 11 & RSS-Gen Issue 3

REPORT PREPARED FOR

Tait Communications
PO Box 1645
558 Wairakei Road
Christchurch
New Zealand

DESCRIPTION OF SAMPLE

Manufacturer: Tait Limited
Equipment: Base Station Transceiver
Type: TBCK4E

TBCK4E Base Station Transceiver consisting of:

FUNCTIONAL DESCRIPTION	PRODUCT DESIGNATION CODE	SERIAL NUMBER (S)
Reciter	T01-01105-NAAA	18167383
Power Amplifier	T01-01136-NBAA	18167214
Power Management Unit	TBA30A0-0100	18167103
Front Panel	T01-01110-CCAA	18167400
Sub Rack	T01-01101-EAAA	18167399

Quantity: 1 of each

HARDWARE & SOFTWARE Details:

FUNCTIONAL DESCRIPTION	FIRMWARE VERSION	HARDWARE VERSION
Reciter	Dmr-1.05.00.0011	00.00
Power Amplifier	0312	00.02
Power Management Unit	0314	00.03
Front Panel	1.02.00.0004	00.04

TEST CONDITIONS

All testing was performed between 28 December 2012 → 16 January 2013, and under the following conditions:

Ambient temperature: 15°C → 30°C

Relative Humidity: 20% → 75%

Standard Test Voltage 120 Vac

Test Frequency pair 769.06875 MHz (TX) / 799.08675 MHz (RX): An external 10 MHz Frequency Reference was used (excluding Radiated Emissions).

STATEMENT OF COMPLIANCE

We, TELTEST LABORATORIES of 558 Wairakei Road, Christchurch New Zealand, declare under our sole responsibility that the product:

Equipment: BASE STATION Transceiver
Type: TBCK4E
Product Code: T01-01131-0007
Serial Number(s): 18167383
Quantity: 1

to which this declaration relates, is in conformity with the following standards:

FCC 47 CFR Parts 90

RSS-119 Issue 11 & RSS-Gen Issue 3

Signature: _____

S.A. Crompton
Compliance Laboratory Manager

Date: _____

MODULATION TYPES, NECESSARY BANDWIDTH & 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:

DMR Digital Voice / Data	7K60FXW
DMR Digital Data	7K60FXD

FXW represents FM combination of data and telephony.
FXD represents FM data only

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 A 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 RESULTS:

Manufacturer's Rated Output Power:

Switchable: 100 W and 10 W

Nominal 100 W	769.06875 MHz	852.5125 MHz	868.9875 MHz
Measured	101.1	102.8	102.2
Variation (%)	1.1	2.8	2.2
Variation (dB)	0.0	0.1	0.1
Nominal 10 W	769.06875 MHz	852.5125 MHz	868.9875 MHz
Measured	10.1	10.7	10.8
Variation (%)	1.3	6.9	8.0
Variation (dB)	0.1	0.3	0.3
Measurement Uncertainty		± 0.6 dB	

LIMIT CLAUSES:

FCC 47 CFR 90.205 (s)

The output power shall not exceed by more than 20%... 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 ±1.0 dB of the manufacturer's rated power.

ADJACENT CHANNEL POWER RATIO

SPECIFICATION: FCC 47 CFR 90.543

MEASUREMENT PROCEDURE:

1. Refer Annex A for equipment set up.
2. The transmitter is modulated with the standard modulating signal.
3. The test is performed in accordance with 47 CFR 90.543

LIMIT CLAUSE: FCC 47 CFR 90.543

MEASUREMENT RESULTS:

4FSK

Tx FREQUENCY: 769.06875 MHz 100 W

Frequency Offset	Measurement Bandwidth	ACP Measured		Maximum ACP (dBc)
		Lower (dBc)	Upper (dBc)	
9.375 kHz	6.25 kHz	-43.25	-43.77	-40
15.625 kHz	6.25 kHz	-75.57	-75.61	-60
21.875 kHz	6.25 kHz	-86.62	-86.68	-60
37.5 kHz	25.0 kHz	-82.26	-83.37	-60
62.5 kHz	25.0 kHz	-84.97	-85.54	-65
87.5 kHz	25.0 kHz	-85.73	86.05	-65
150 kHz	100 kHz	-78.26	-78.32	-65
250 kHz	100 kHz	-81.73	-81.76	-65
350 kHz	100 kHz	-85.14	-85.26	-65
>400 kHz to 12 MHz	30 kHz (swept)	-86.09		-80
12 MHz to paired receive band	30 kHz (swept)	-91.8		-80
In the paired receive band	30 kHz (swept)	<-100		-100

4FSK

Tx FREQUENCY: 769.06875 MHz 10 W

Frequency Offset	Measurement Bandwidth	ACP Measured		Maximum ACP (dBc)
		Lower (dBc)	Upper (dBc)	
9.375 kHz	6.25 kHz	-43.82	-44.04	-40
15.625 kHz	6.25 kHz	-77.01	-76.20	-60
21.875 kHz	6.25 kHz	-84.71	-85.58	-60
37.5 kHz	25.0 kHz	-81.03	-81.73	-60
62.5 kHz	25.0 kHz	-84.23	-84.68	-65
87.5 kHz	25.0 kHz	-85.6	-86.00	-65
150 kHz	100 kHz	-78.41	-78.45	-65
250 kHz	100 kHz	-81.63	-81.53	-65
350 kHz	100 kHz	-84.76	-84.96	-65
>400 kHz to 12 MHz	30 kHz (swept)	-86.78		-80
12 MHz to paired receive band	30 kHz (swept)	-93.22		-80
In the paired receive band	30 kHz (swept)	<-100		-100

TRANSMITTER 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 A for Equipment Set up.
2. For analog measurements: The EUT was modulated by a 2500 Hz tone at an input level 16 dB above a level that produced 50% deviation. The input level was established at the frequency of maximum response of the audio modulating circuit.
For Data measurements: 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 = 100 Hz, Video Bandwidth = 1 kHz
Emission Mask B, and C – Resolution bandwidth = 300 Hz, Video Bandwidth = 3 kHz

MEASUREMENT RESULTS:

See the plots on the following pages for 12.5 kHz & 25.0 kHz channel spacings.

LIMIT CLAUSE: FCC 47 CFR 90.210 RSS-119 5.5

EMISSION MASKS

Emission Mask D	12.5 kHz Channel Spacing	4FSK
Emission Mask G	12.5 kHz Channel Spacing	4FSK
Emission Mask H	12.5 kHz Channel Spacing	4FSK

DATA SPEED

4 level FSK	12.5 kHz Channel Spacing	9600 bps
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Occupied Bandwidth and Spectrum Masks

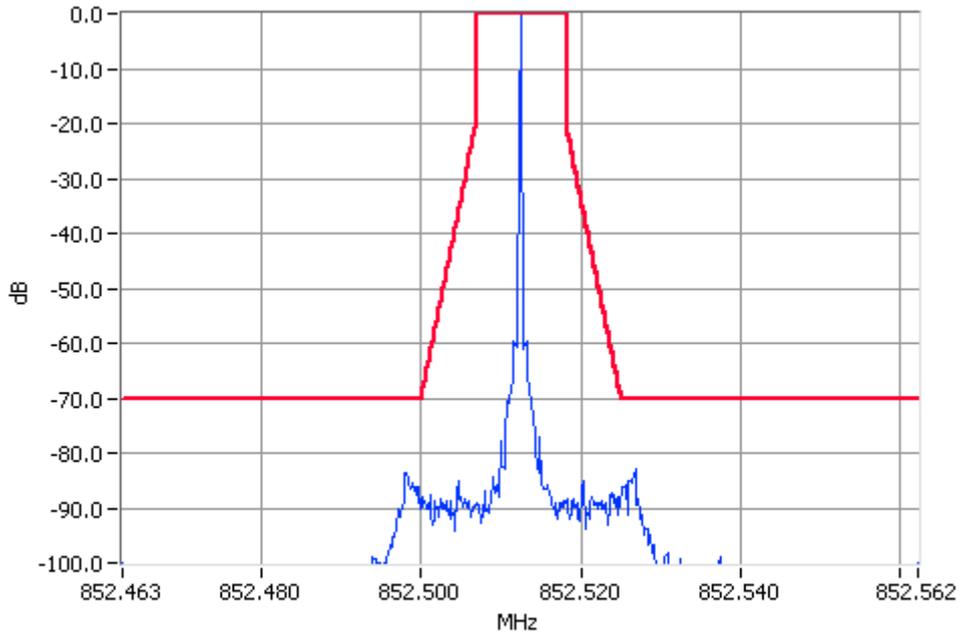
4FSK

SPECIFICATION: FCC CFR 2.1049 (c)

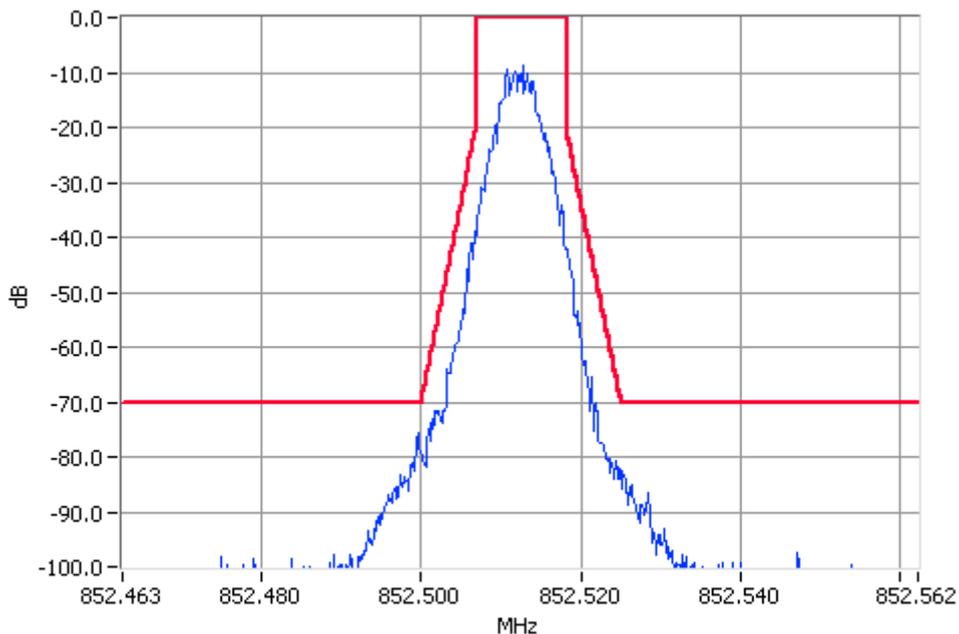
RSS-119 5.5

Tx FREQUENCY: 852.5125 MHz 100 W

12.5 kHz Channel Spacing



Unmodulated 852.5125MHz Mask D 100W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass



4FSK 852.5125MHz Mask D 100W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

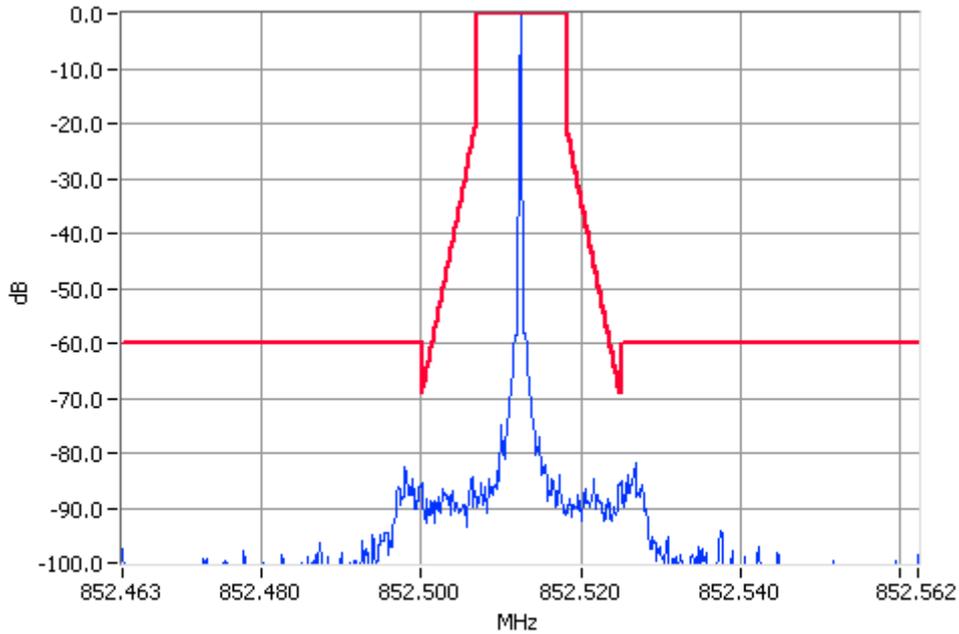
4FSK

SPECIFICATION: FCC CFR 2.1049 (c)

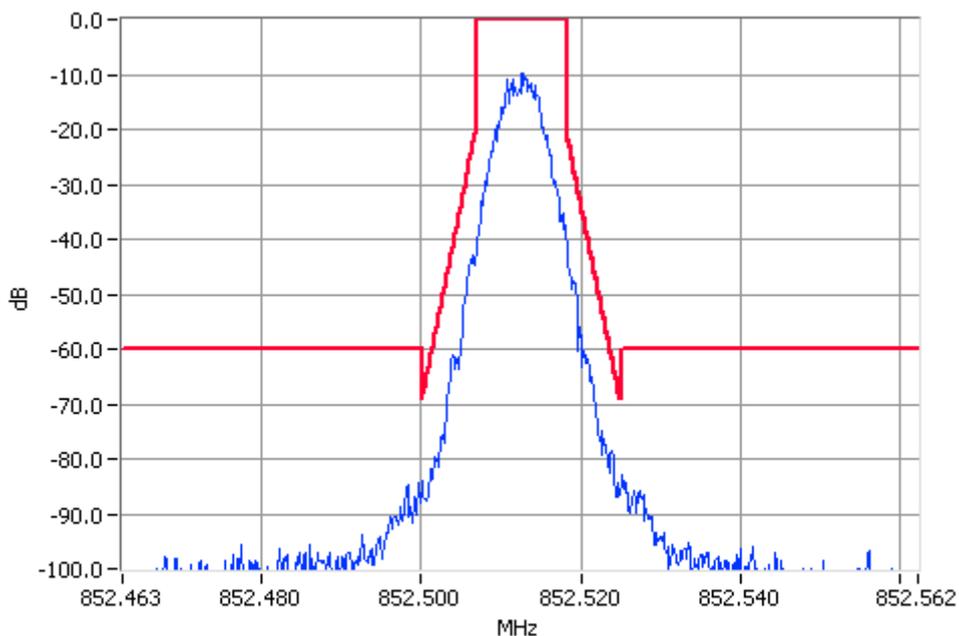
RSS-119 5.5

Tx FREQUENCY: 852.5125 MHz 10 W

12.5 kHz Channel Spacing



Unmodulated 852.5125MHz Mask D 10W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass



4FSK 852.5125MHz Mask D 10W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

4FSK

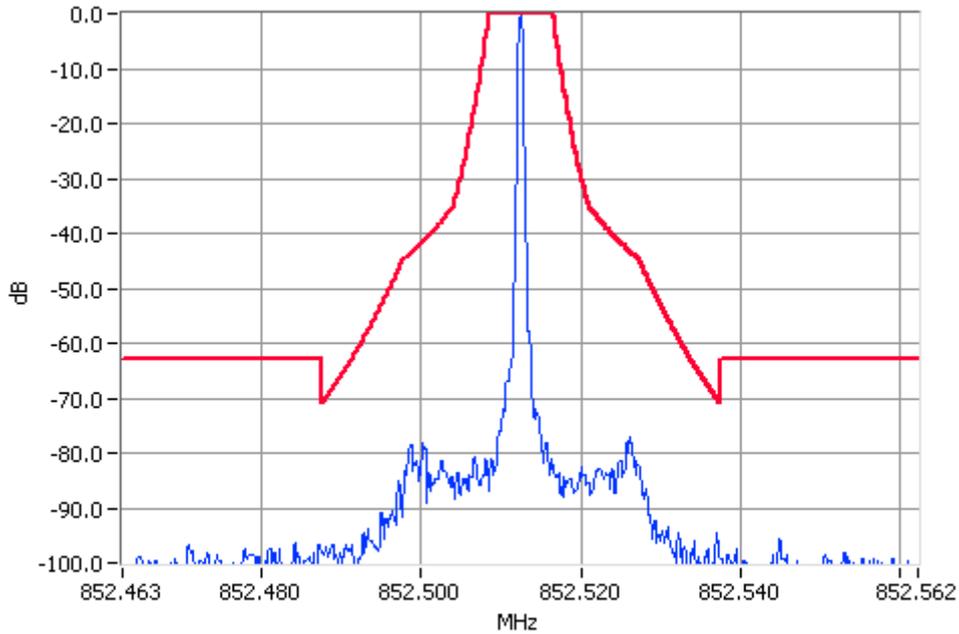
SPECIFICATION: FCC CFR 2.1049 (c)

RSS-119 5.5

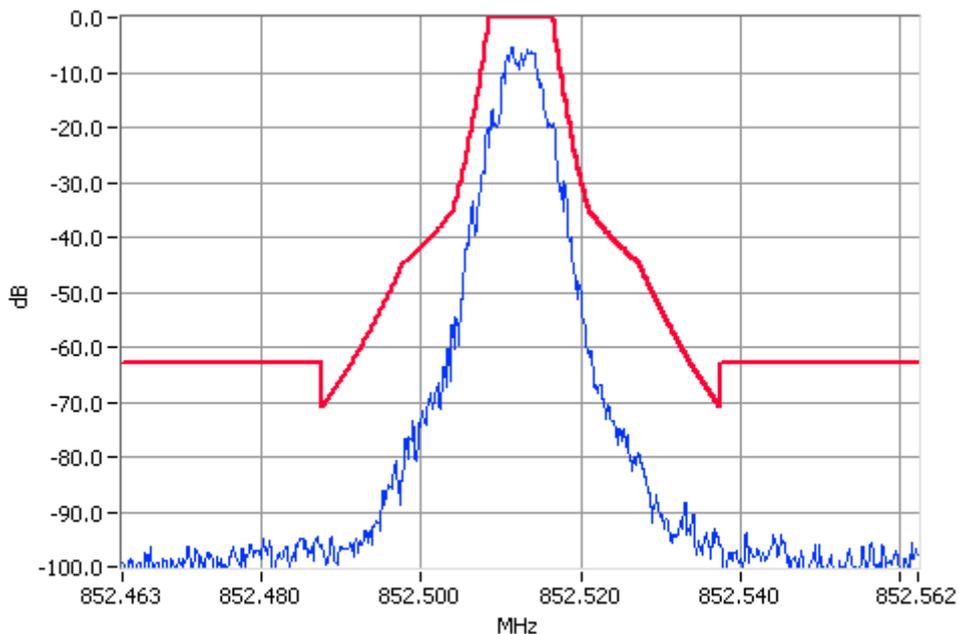
Tx FREQUENCY: 852.5125 MHz

100 W

12.5 kHz Channel Spacing



Unmodulated 852.5125MHz Mask H 100W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass



4FSK 852.5125MHz Mask H 100W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

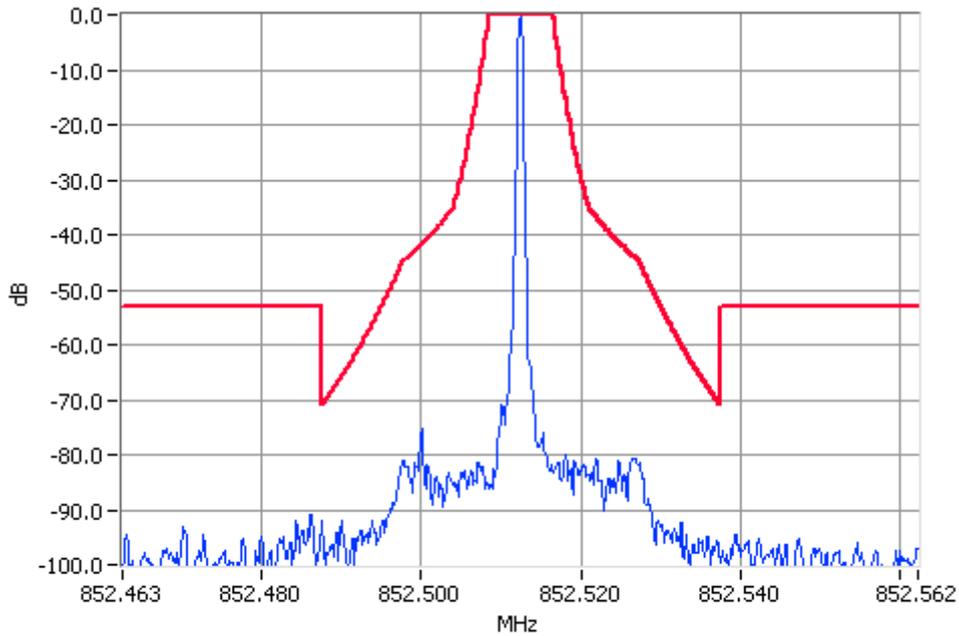
4FSK

SPECIFICATION: FCC CFR 2.1049 (c)

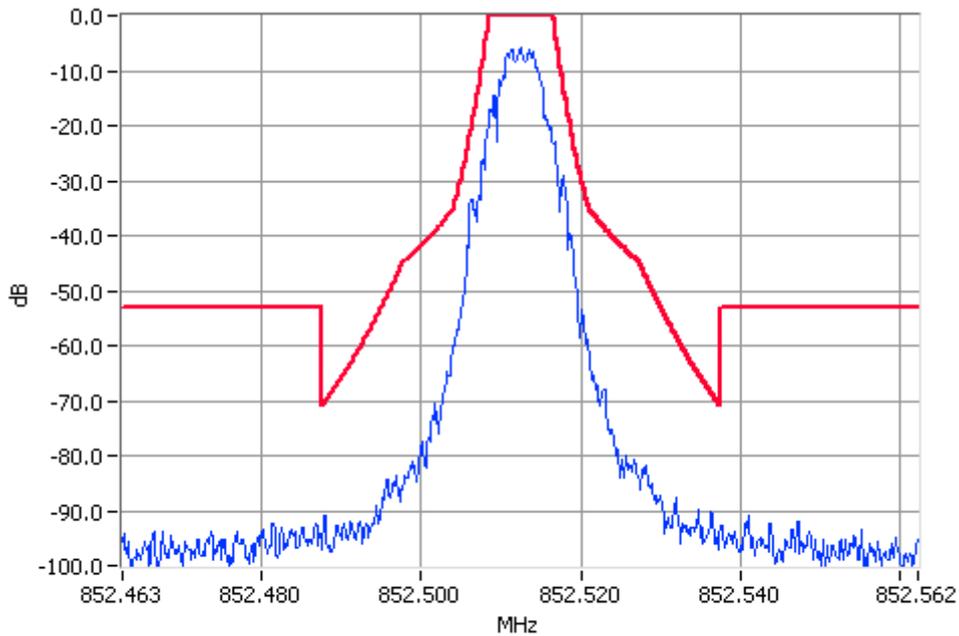
RSS-119 5.5

Tx FREQUENCY: 852.5125 MHz 10 W

12.5 kHz Channel Spacing



Unmodulated 852.5125MHz Mask H 10W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass



4FSK 852.5125MHz Mask H 10W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

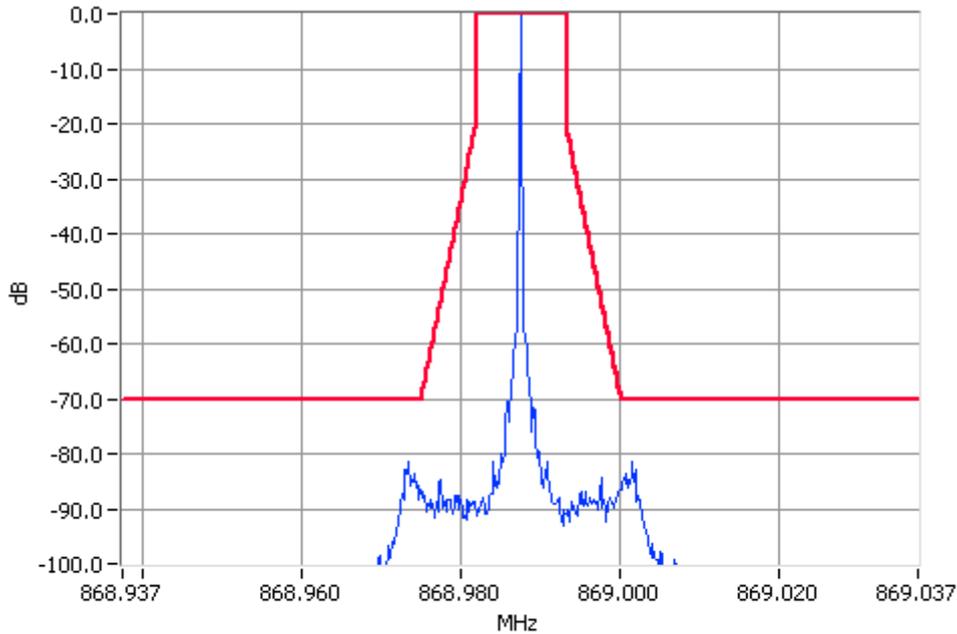
4FSK

SPECIFICATION: FCC CFR 2.1049 (c)

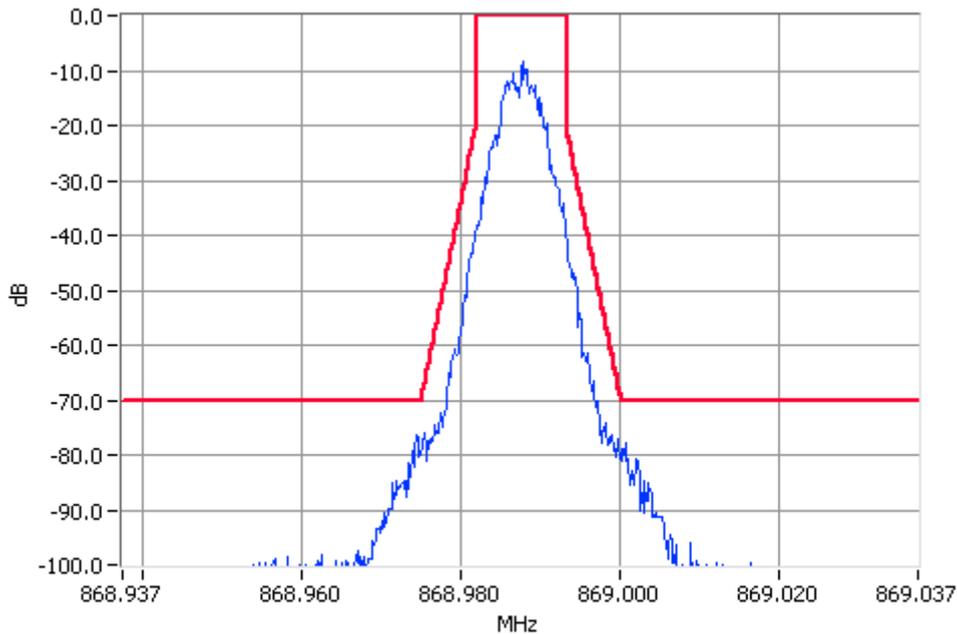
RSS-119 5.5

Tx FREQUENCY: 868.9875 MHz 100 W

12.5 kHz Channel Spacing



Unmodulated 868.9875MHz Mask D 100W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass



4FSK 868.9875MHz Mask D 100W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

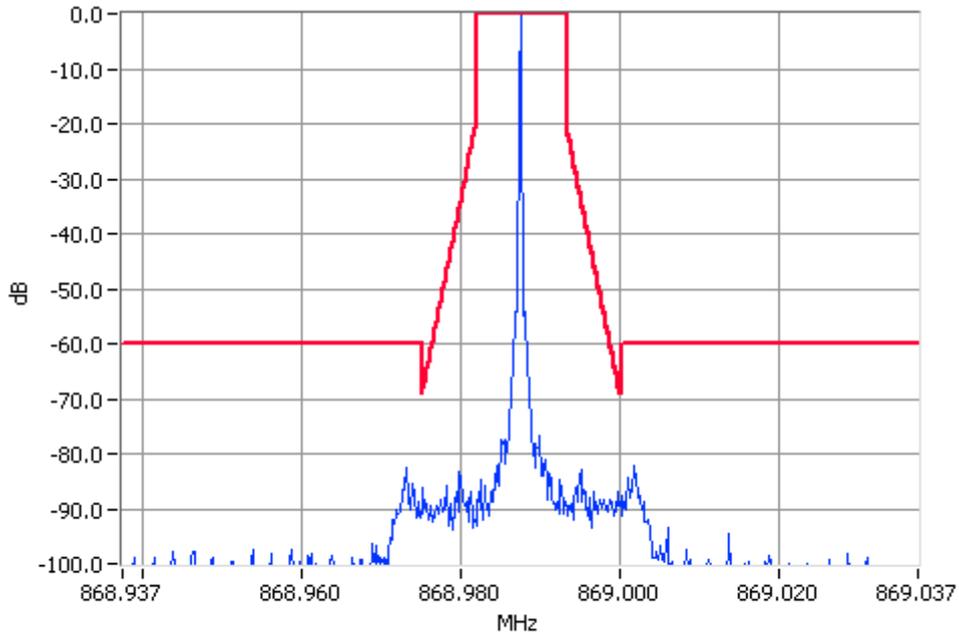
4FSK

SPECIFICATION: FCC CFR 2.1049 (c)

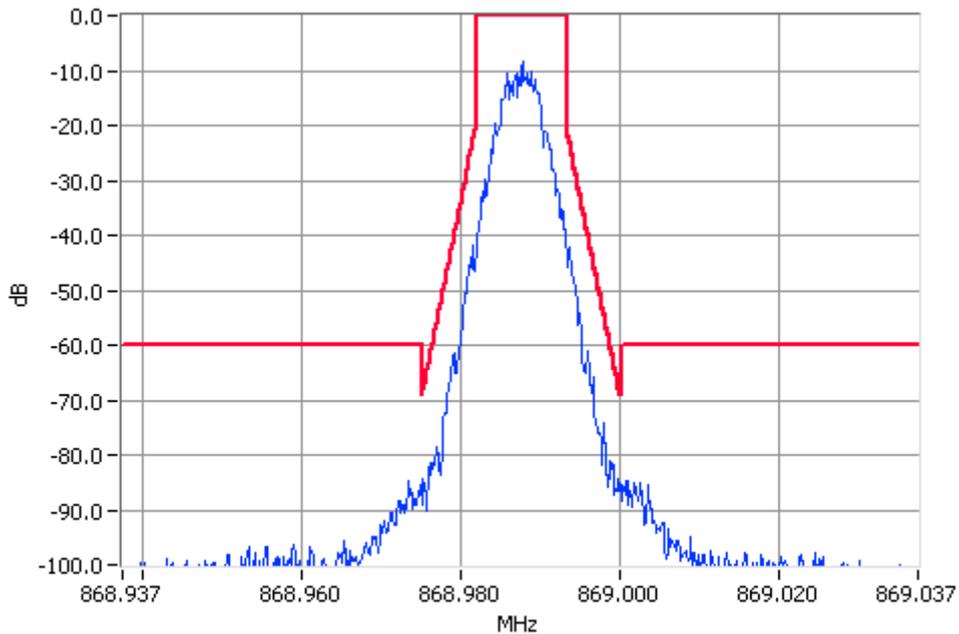
RSS-119 5.5

Tx FREQUENCY: 868.9875 MHz 10 W

12.5 kHz Channel Spacing



Unmodulated 868.9875MHz Mask D 10W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass



4FSK 868.9875MHz Mask D 10W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

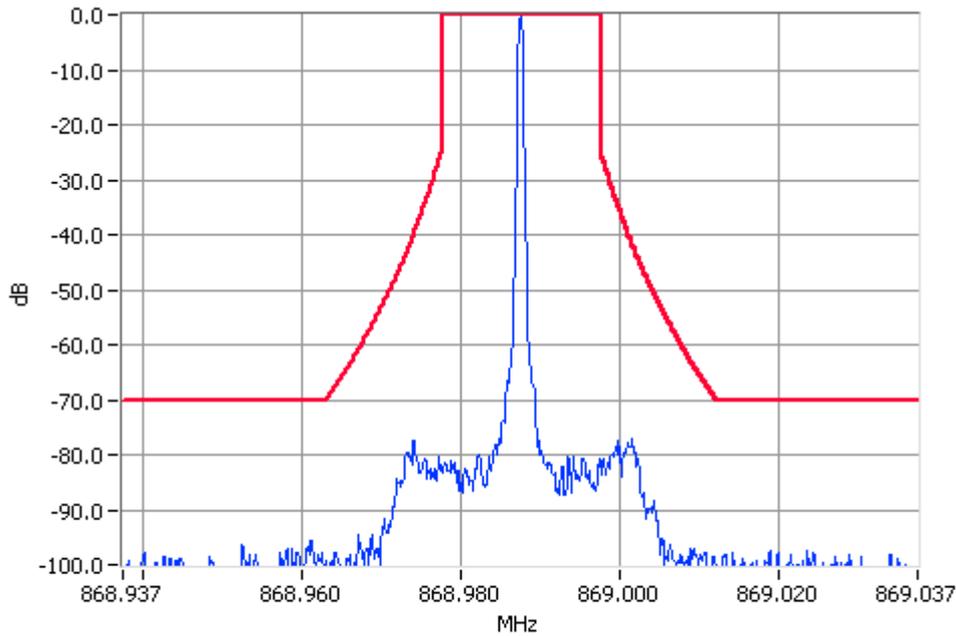
4FSK

SPECIFICATION: FCC CFR 2.1049 (c)

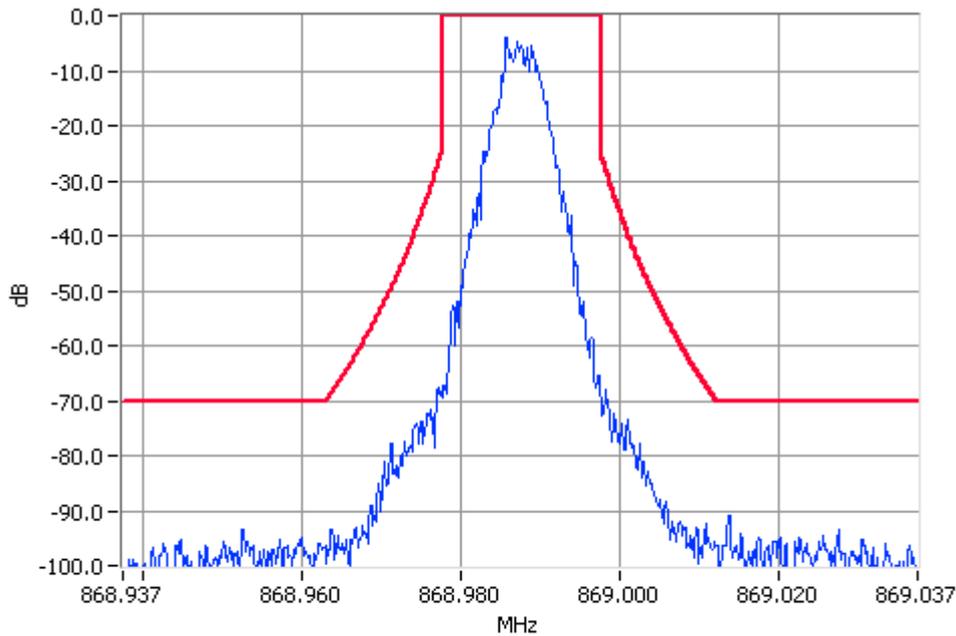
RSS-119 5.5

Tx FREQUENCY: 868.9875 MHz 100 W

12.5 kHz Channel Spacing



Unmodulated 868.9875MHz Mask G 100W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass



4FSK 868.9875MHz Mask G 100W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

Occupied Bandwidth and Spectrum Masks

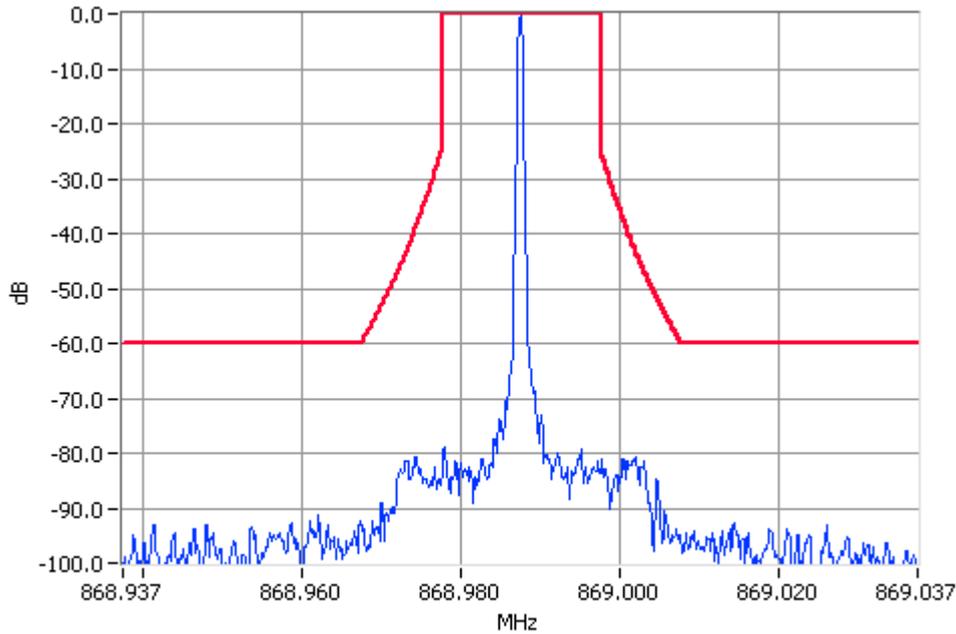
4FSK

SPECIFICATION: FCC CFR 2.1049 (c)

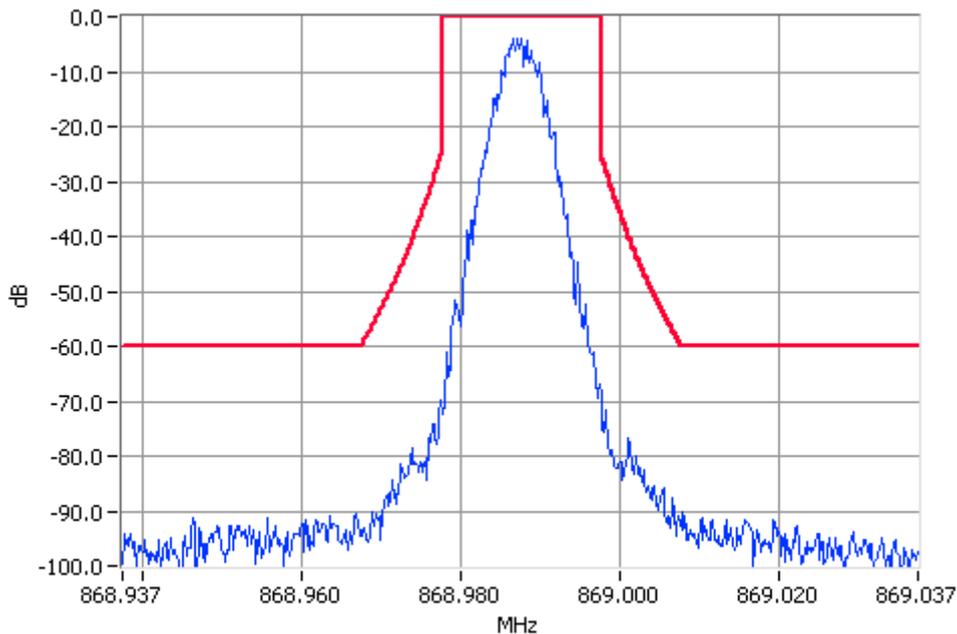
RSS-119 5.5

Tx FREQUENCY: 868.9875 MHz 10 W

12.5 kHz Channel Spacing



Unmodulated 868.9875MHz Mask G 10W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass



4FSK 868.9875MHz Mask G 10W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

TRANSMITTER SPURIOUS EMISSIONS (CONDUCTED)

SPECIFICATIONS: FCC 47 CFR 2.1051

RSS-119 5.8

GUIDE: TIA/EIA-603D 2.2.13

MEASUREMENT PROCEDURE:

1. Refer Annex A for equipment set up.
2. The frequency range examined was from the lowest frequency generated within the EUT, to a frequency higher than the 10th Harmonic: 100 kHz to Fc-BW
Fc+ BW to 10Fc GHz
3. 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 20 dB 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 for 12.5 kHz channel spacing. Refer to Annex B for plots.

LIMIT CLAUSES: FCC 47 CFR 90.210

RSS-119 5.8

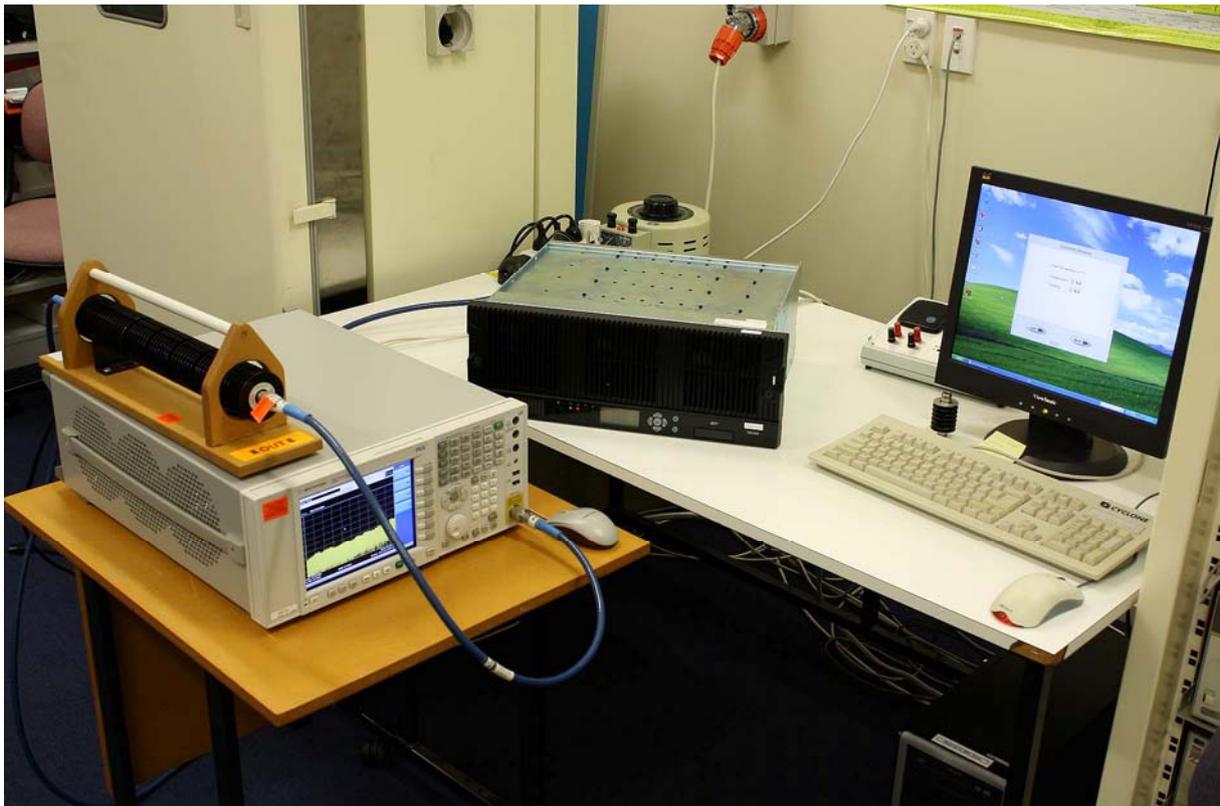


Photo: Conducted Emissions Setup

Spurious Emissions (Tx Conducted)

SPECIFICATION: FCC CFR 2.1051

RSS-119 5.8

Tx FREQUENCY: 769.06875 MHz

12.5 kHz Channel Spacing 769.06875 MHz @ 100 W Emission Mask D, G and H

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
1538.1375	-37.2	-87.2
No other emissions were detected at a level greater than 20 dB below the limit.		

12.5 kHz Channel Spacing 769.06875 MHz @ 10 W Emission Mask D, G and H

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

Tx FREQUENCY: 852.5125 MHz

12.5 kHz Channel Spacing 852.5125 MHz @ 100 W Emission Mask D, G and H

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
4262.5626	-28.1	-78.1
5115.0751	-36.2	-86.2
No other emissions were detected at a level greater than 20 dB below the limit.		

12.5 kHz Channel Spacing 852.5125 MHz @ 10 W Emission Mask D, G and H

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

Spurious Emissions (Tx Conducted)

SPECIFICATION: FCC CFR 2.1051

RSS-119 5.8

Tx FREQUENCY: 868.9875 MHz

12.5 kHz Channel Spacing

868.9875 MHz @ 100 W

Emission Mask D, G and H

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
885.1141	-35.9*	-85.9
4344.9375	-23.3	-73.3
5213.9250	-33.9	-83.9
No other emissions were detected at a level greater than 20 dB below the limit.		

* Modulated with 4FSK

12.5 kHz Channel Spacing

868.9875 MHz @ 10 W

Emission Mask D, G and H

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

Carrier Output Power Watts	Emission Mask G and H 12.5 kHz Channel Spacing $43 + 10 \text{ Log}_{10} (P_{\text{Watts}})$	
	Level (dBm)	Level (dBc)
100 W	-13 dBm	-63 dBc
10 W	-13 dBm	-53 dBc

TRANSMITTER SPURIOUS EMISSIONS (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 30 MHz to 1000 MHz. Any emission within 10 dB of the limit is then re-tested on the OATS along with measurements from 1000 MHz to the 10th harmonic of the fundamental frequency.
2. The EUT is then placed in the Reverberation Chamber and emissions are measured from 1000 MHz to 8000 MHz. Any emissions within 10 dB of the limit are then re-tested on the OATS.
3. If emissions above 8000 MHz are to be measured 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 8000 MHz to the upper frequency required.
Any emission within 10 dB of the limit is then re-tested on the OATS.
4. The harmonics emissions upto the 6th harmonic of the fundamental frequency are measured on the OATS

OATS Measurement:

1. 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 1 m to 4 m 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

Spurious Emissions (Tx Radiated)

SPECIFICATION: FCC CFR 2.1053

Tx FREQUENCY: 769.06875 MHz

12.5 kHz Channel Spacing 769.06875 MHz @ 100 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 10 dB below the limit.		

12.5 kHz Channel Spacing 769.06875 MHz @ 10 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 10 dB below the limit.		

12.5 kHz Channel Spacing 852.5125 MHz @ 100 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
4262.5625	-29.3	79.3
No other emissions were detected at a level greater than 10 dB below the limit.		

12.5 kHz Channel Spacing 852.5125 MHz @ 10 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 10 dB below the limit.		

12.5 kHz Channel Spacing 868.9875 MHz @ 100 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 10 dB below the limit.		

12.5 kHz Channel Spacing 868.9875 MHz @ 10 W Emission Mask D

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 10 dB below the limit.		

Open Area Test Site Results:

12.5 kHz Channel Spacing 852.5125 MHz @ 100 W Emission Mask D

Harmonics Emission Frequency (MHz)	Level (dBm)	Level (dBc)
1705.0250	-34.1	-84.1
2557.5375	-50.1	-100.1
3410.0500	-33.3	-83.3
4262.5625	-29.3	-79.3
5115.0750	<-50.0	<-100.0
5967.5875	<-50.0	<-100.0

LIMITS: FCC CFR 2.1053

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

Tx Radiated Emissions - Continued

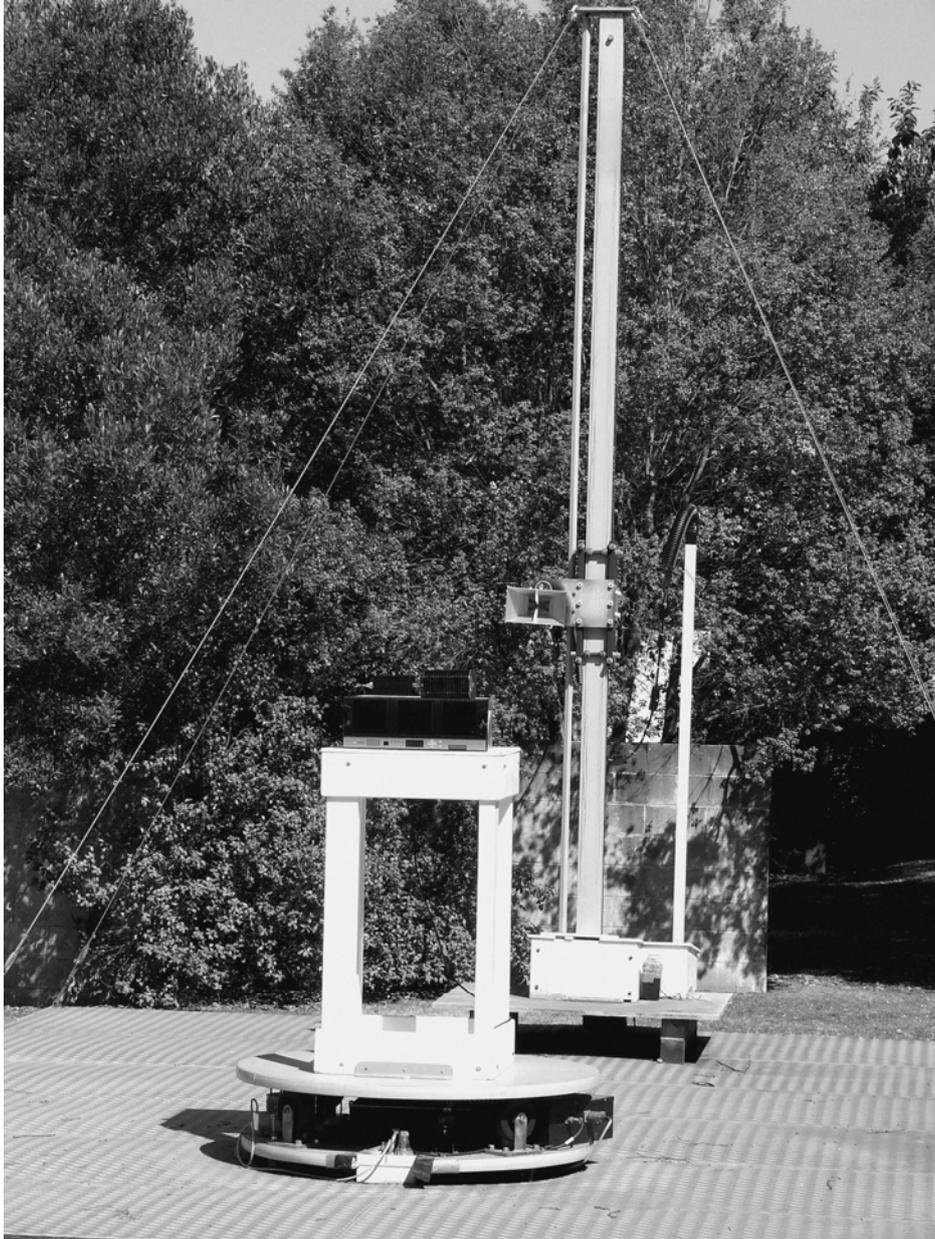


Photo: OATS Setup

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 A 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 for 12.5 kHz channel spacings.

An external frequency reference (T801-42) was used for these measurements.

769.06875 MHz

Temperature (°C)	Frequency (MHz)	Error (ppm)
50	769.068744	-0.01
40	769.068752	0.00
30	769.068741	-0.01
20	769.068746	-0.01
10	769.068754	0.01
0	769.068745	-0.01
-10	769.068739	-0.01
-20	769.068757	0.01
-30	769.068744	-0.01

852.5125 MHz

Temperature (°C)	Frequency (MHz)	Error (ppm)
50	852.512488	-0.01
40	852.512497	0.00
30	852.512493	-0.01
20	852.512495	-0.01
10	852.512501	0.00
0	852.512496	0.00
-10	852.512494	-0.01
-20	852.512490	-0.01
-30	852.512497	0.00

Transmitter Frequency Stability - Temperature

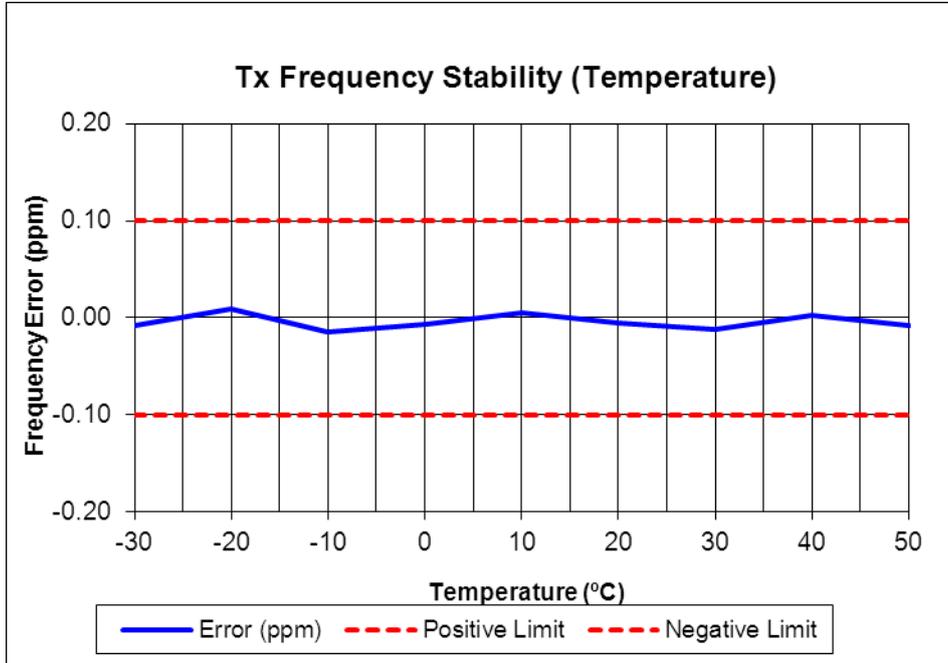
868.9875 MHz

Temperature (°C)	Frequency (MHz)	Error (ppm)
50	868.987497	0.00
40	868.987503	0.00
30	868.987493	-0.01
20	868.987505	0.01
10	868.987495	-0.01
0	868.987494	-0.01
-10	868.987487	-0.01
-20	868.987482	-0.02
-30	868.987493	-0.01

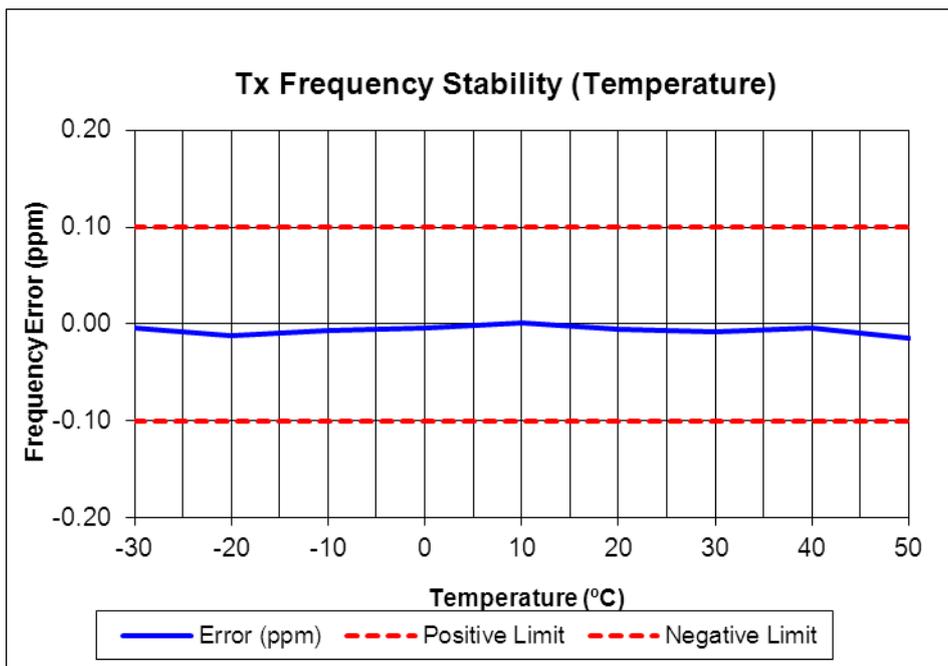
Transmitter Frequency Stability - Temperature

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

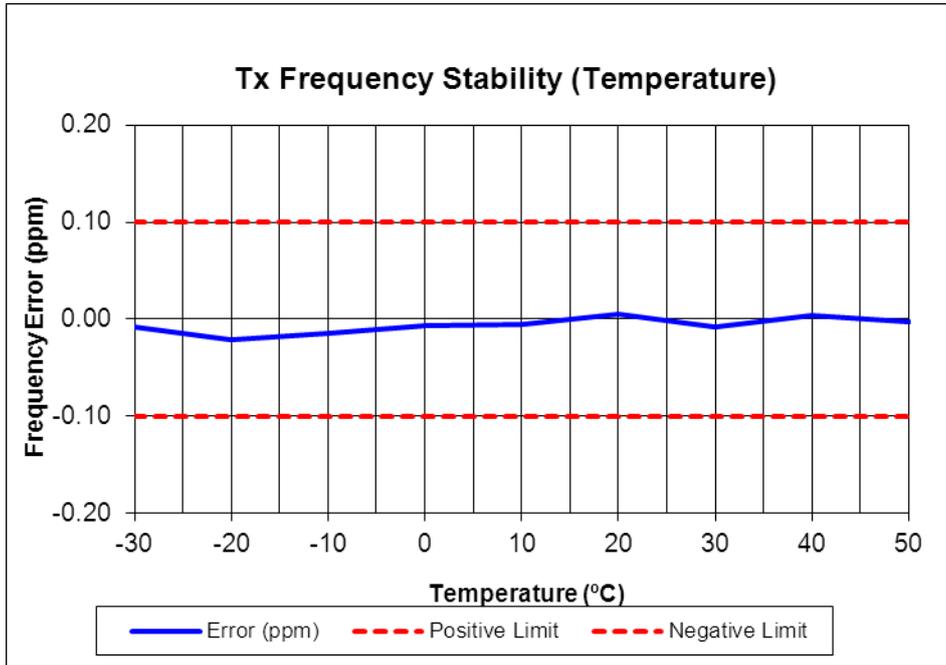
Tx FREQUENCY: 769.06875 MHz 100 W 12.5 kHz channel Spacing



Tx FREQUENCY: 852.5125 MHz 100 W 12.5 kHz channel Spacing



Tx FREQUENCY: 868.9875 MHz 100 W 12.5 kHz channel Spacing



Transmitter Frequency Stability - Temperature

LIMIT: RSS-119 5.3

Channel Frequency (MHz)	Frequency Error (ppm)
769.06875	0.1
852.5125	1.0
868.9875	1.0

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

Channel Frequency (MHz)	Frequency Error (ppm)
769.06875	0.1
852.5125	1.0
868.9875	1.5

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 A 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 RESULTS:

Voltage	FREQUENCY ERROR (ppm) for 12.5 kHz		
	769.06875 MHz	852.5125 MHz	868.9875 MHz
120 V _{DC}	-0.02	-0.02	-0.02
102 V _{DC}	-0.02	-0.01	-0.02
138 V _{DC}	-0.02	-0.02	-0.02

LIMIT: RSS-119 5.3

Channel Frequency (MHz)	Frequency Error (ppm)
769.06875	0.1
852.5125	1.0
868.9875	1.0

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

Channel Frequency (MHz)	Frequency Error (ppm)
769.06875	0.1
852.5125	1.0
868.9875	1.5

SPURIOUS EMISSIONS (TX STANDBY / RX CONDUCTED)

SPECIFICATION: RSS-119 5.11

GUIDE: TIA/EIA-603D 2.1.2

MEASUREMENT PROCEDURE:

1. Refer Annex A 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 20 dB below the limit were not recorded.
4. Refer to Annex C for plots.

769.06875 MHz TX Port (TX Standby)		
Emission Frequency (MHz)	Level (nW)	Level (dBm)
~	~	~
No emissions were detected within 20 dB of Limit.		

852.5125 MHz TX Port (TX Standby)		
Emission Frequency (MHz)	Level (nW)	Level (dBm)
~	~	~
No emissions were detected within 20 dB of Limit.		

868.9875 MHz TX Port (TX Standby)		
Emission Frequency (MHz)	Level (nW)	Level (dBm)
~	~	~
No emissions were detected within 20 dB of Limit.		

799.06875 MHz RX Port (Receive)		
Emission Frequency (MHz)	Level (nW)	Level (dBm)
~	~	~
No emissions were detected within 20 dB of Limit.		

807.5125 MHz RX Port (Receive)		
Emission Frequency (MHz)	Level (nW)	Level (dBm)
~	~	~
No emissions were detected within 20 dB of Limit.		

823.9875 MHz RX Port (Receive)		
Emission Frequency (MHz)	Level (nW)	Level (dBm)
~	~	~

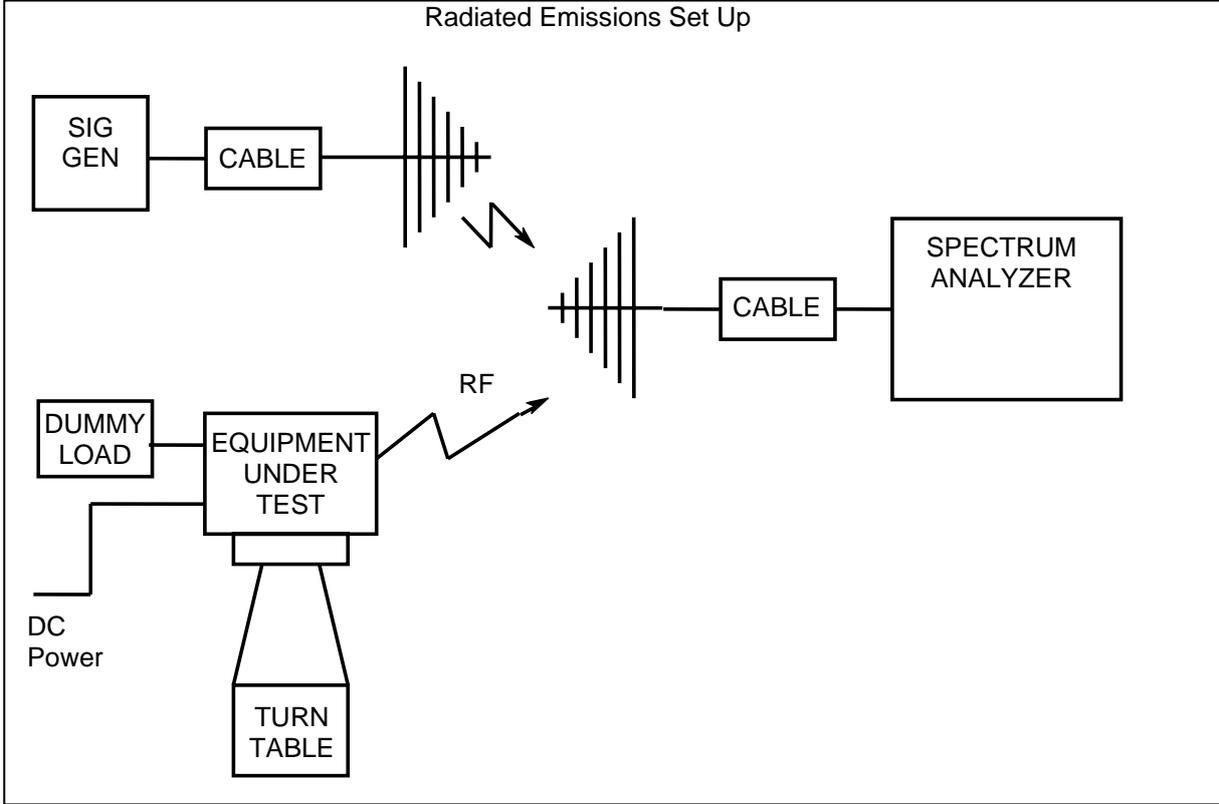
LIMIT CLAUSE: RSS-Gen 6(b)

LIMIT	30 → 1000 MHz	2 nW	- 57 dBm
	> 1000 MHz	5 nW	- 53 dBm

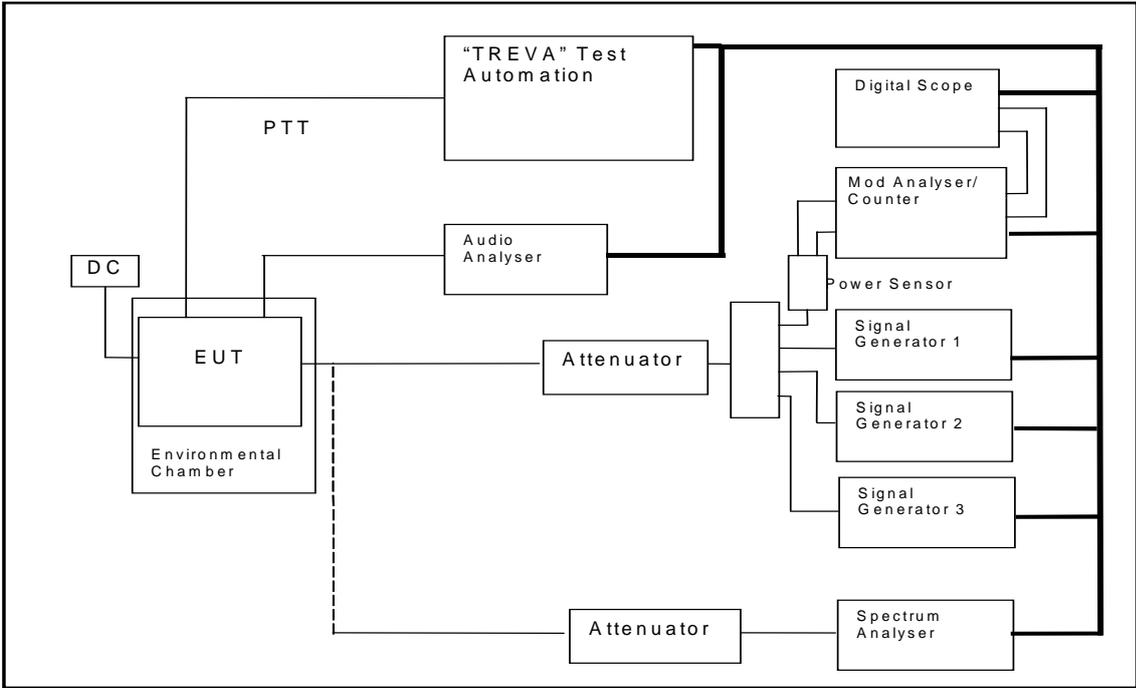
TEST EQUIPMENT LIST

Equipment Type	Information	Manufacturer	Model No	Serial No#	Tait ID	Cal Due
AC Voltmeter		Tait		2		3-Sep-13
Antenna	18GHz DRG	Emco	DRG3115	9512-4638	E3560	5-April-13
Antenna	18GHz DRG	Emco	DRG3115	2084	E3076	5-April-13
Audio Analyser	TREVA1	Hewlett Packard	HP8903A	2308A02597	E3074	10-Oct-13
Coax Cable	1m Blue	Suhner	Sucoflex 104A	44610/4A	E4619	12-Oct-13
Coax Cable	2m Black	Suhner	RG214HF/Nm/2000	Black2	E4623	12-Oct-13
Coax Cable	2m Black	Suhner	RG214HF/Nm/2000	Black3	E4624	13-Oct-13
Coax Cable	3m Blue	Suhner	Sucoflex 104A	44611/4A	E4620	13-Oct-13
Coax Cable	OATS Tower Cable	Intelcom	RG214	OATS1	E4621	15-Oct-13
Coax Cable	OATS Turntable Cable	Intelcom	RG215	OATS2	E4622	15-Oct-13
Environ. Chamber	Upright	Contherm	5400 RHSLT.M	1416	E4051	2-Aug-15
Modulation Analyser	TREVA1	Hewlett Packard	HP8901B (Opt 002)	2441A00393	E3073	18-Oct-13
OATS	Antenna Tower	Electrometrics	EM-4720-2	112	E4447	on use
OATS	Controller	Electrometrics	EM-4700	119	E4445	on use
OATS	Turntable	Electrometrics	EM-4704A	105	E4446	on use
Power Meter	TREVA1 Power Head for HP8901	Hewlett Packard	HP11722A	3111A05573	E7054	18-Oct-13
Power Supply	TREVA1	Hewlett Packard	HP6032A	2441A00412	E3075	17-Oct-13
RF Attenuator	20dB 25W	Weinschel	33-20-33	BD5871	E3673	13-Oct-13
RF Attenuator	TREVA1 20dB 150W	Weinschel	40-20-33	QT968	E4842	13-Oct-13
RF Attenuator	30dB 350W	Weinschel	67-30-33	BR0531	E4280	13-Oct-13
RF Chamber	S-LINE TEM CELL	Rohde & Schwarz	1089.9296.02	338232/003	E3636	31-Aug-15
RF Load	50W	Weinschel	F1426	BF0487	E3675	13-Oct-13
Signal Generator	Analog 1GHz	Hewlett Packard	HP8648A	3430U00344	E3579	18-Oct-13
Signal Generator	Analog 4GHz	Agilent	E4422B	GB40050320	E3788	15-Oct-13
Signal Generator	Digital 4GHz	Agilent	E4433B	US38440446	E4147	18-Oct-13
Spectrum Analyser	26.5GHz	Agilent	PXA N9030A	MY49432161	E4907	30-Mar-14
Spectrum Analyser	13.2GHz	Hewlett Packard	HP8562E	3821A00779	E3715	17-Oct-13
Spectrum Analyser	13.2GHz	Agilent	E4445A	MY42510072	E4139	21-Nov-14
Frequency Ref	TREVA 1, 2	Tait	T801-42	13162902	-	MSL GPS
Power Meter	02. - 4GHz directional power meter	29765	NRT Z44	105151	E4853	15-Oct-13
Power Meter	USB interface for NRT Z44	29765.1	NRT Z5	105152	E4852	15-Oct-13
RF Chamber	Stirrer controller for reverb chamber	Teseq	Stirrer Controller	29765.1	E4854	on use
RF Chamber	.5 - 18GHz Reverberation Chamber	Teseq	RVC XS	29765	E4855	on use
Field Strength Meter	10kHz 9.25GHz RF Field Probe	NARDA	EP601	401WX01247	E4856	28-Feb-13
Antenna	1-18GHz DRG	Schwarzbeck	BBHA 9120 D	9120D-885	E4857	on use
Antenna	1-18GHz DRG	Schwarzbeck	BBHA 9120 D	9120D-884	E4858	on use

ANNEX A – TEST SETUP DETAILS

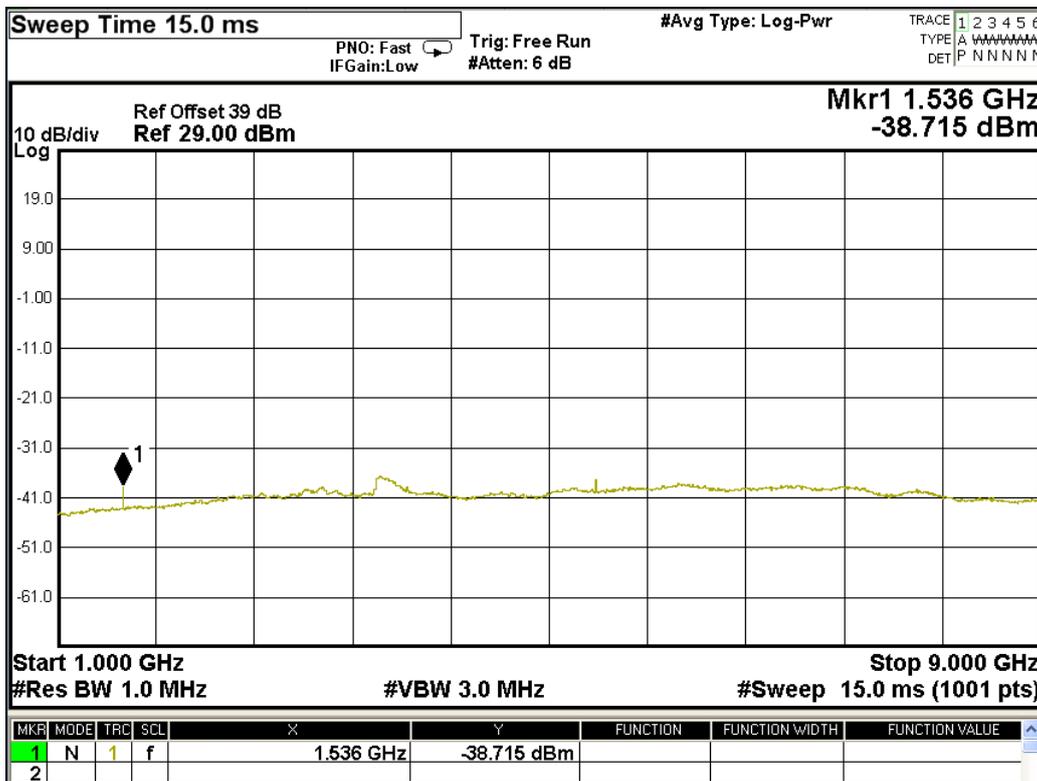
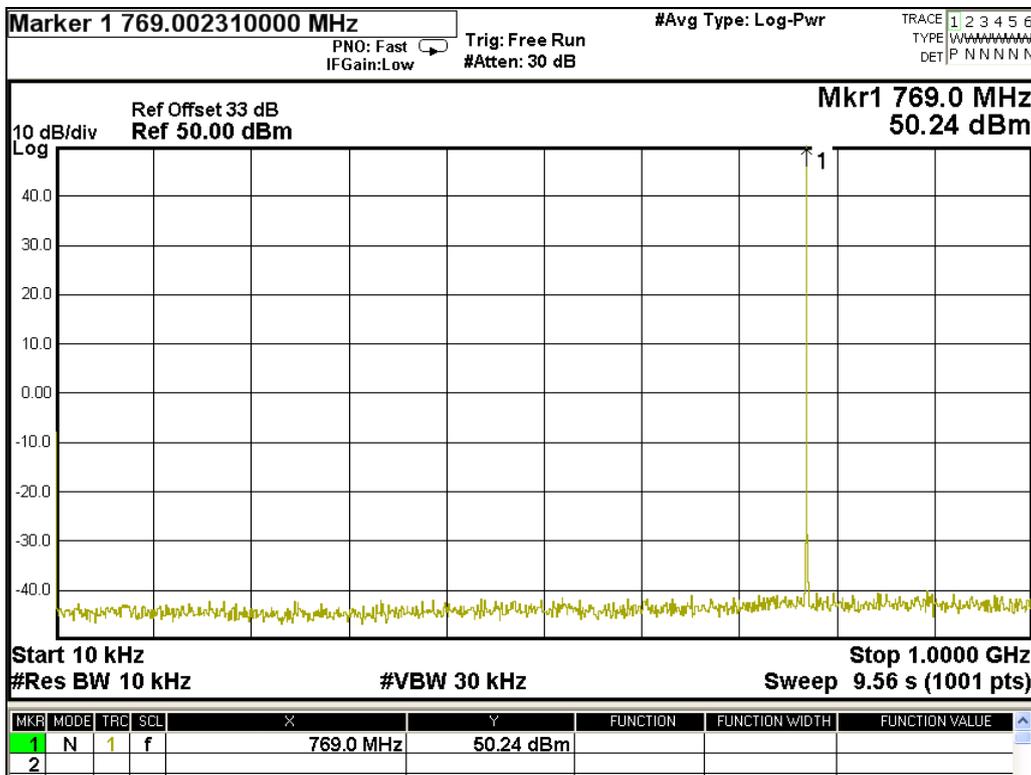


All other testing is performed using the Teltest Radio **EVAL**uation system (TREVA), which is configured as shown below. The Spectrum Analyser is connected to the EUT via the attenuator network for Conducted Emissions testing, and Occupied Bandwidth.

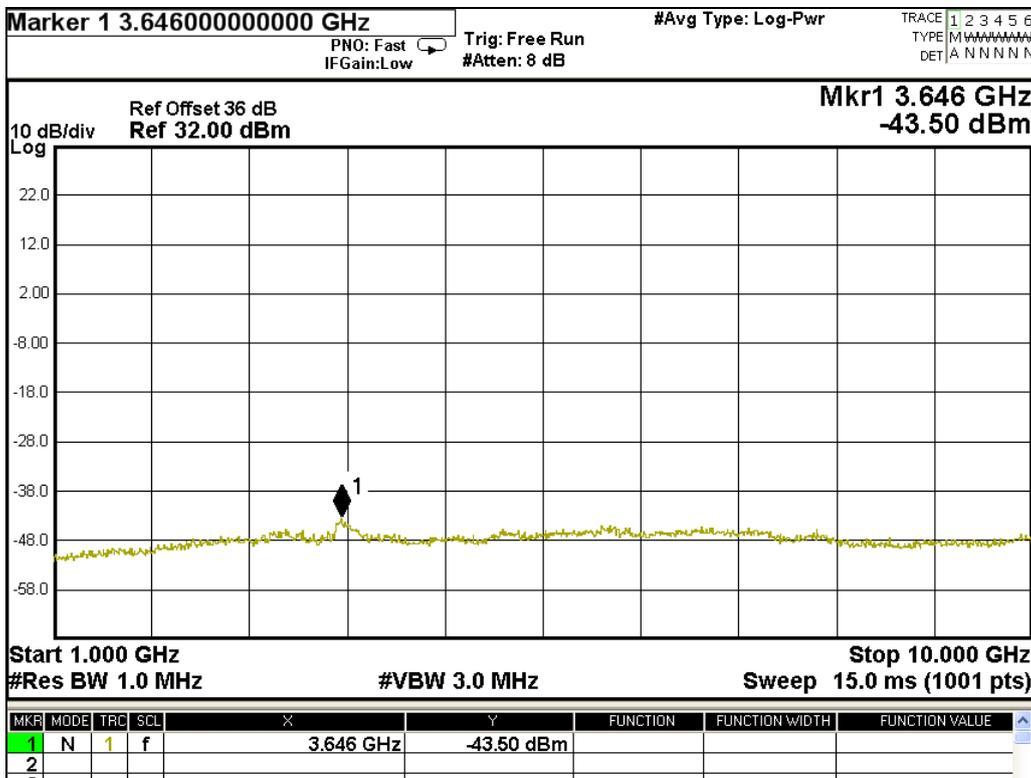
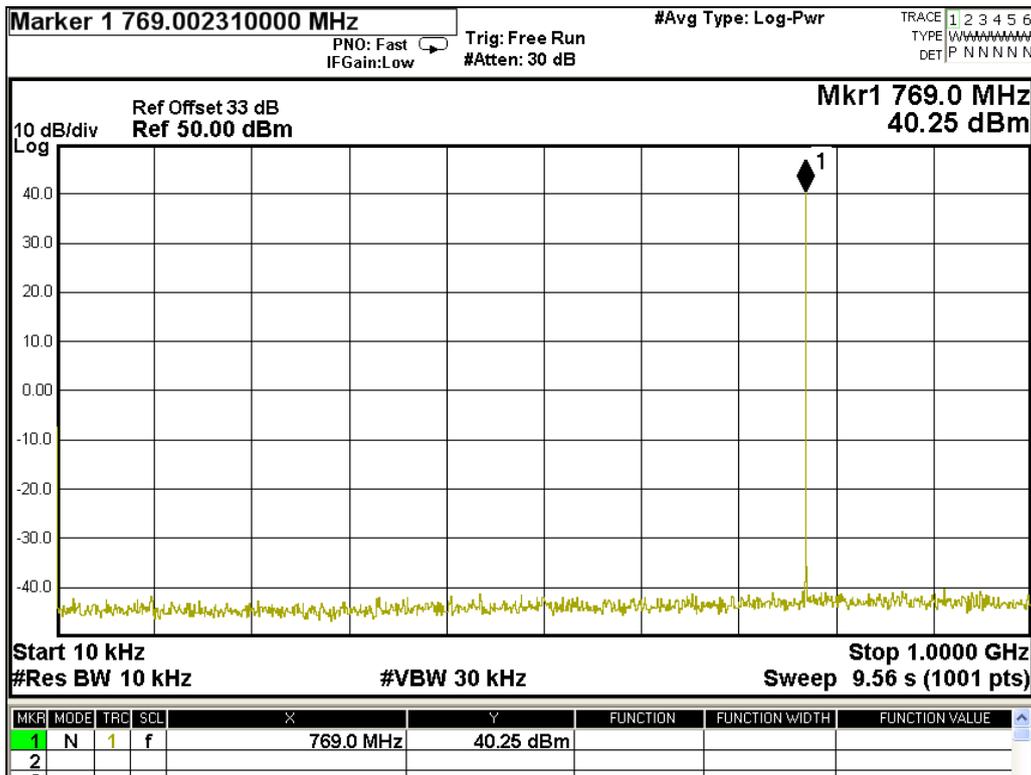


ANNEX B – TX CONDUCTED EMISSION PLOTS

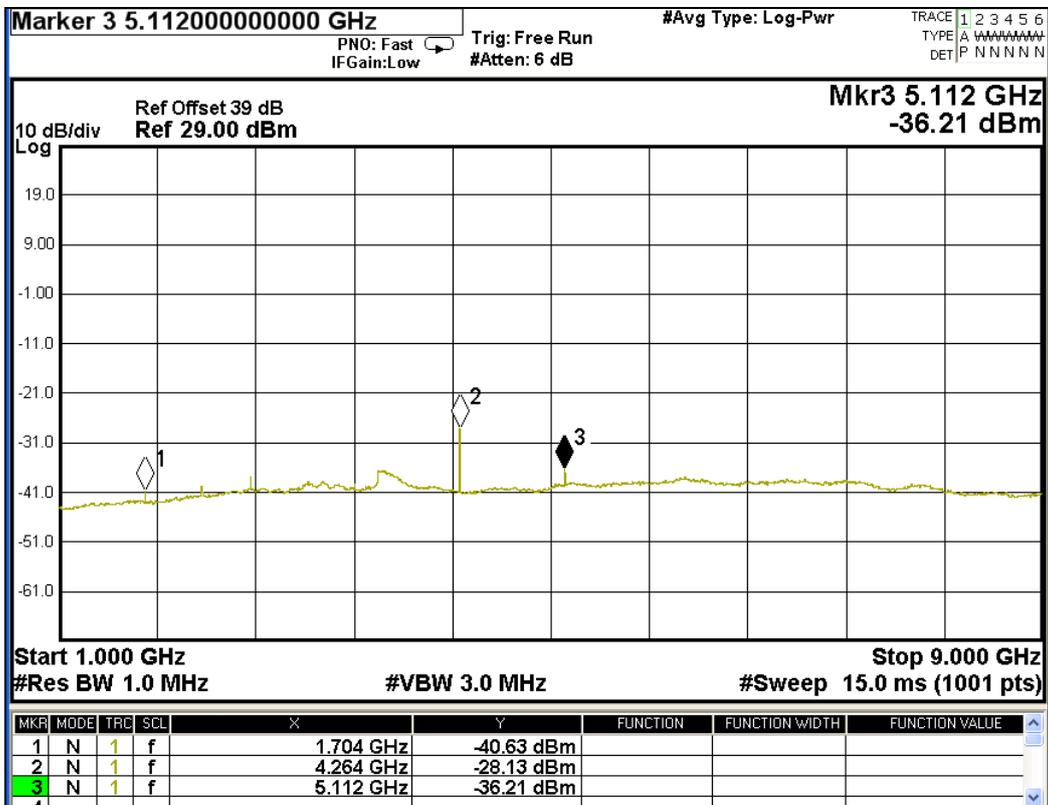
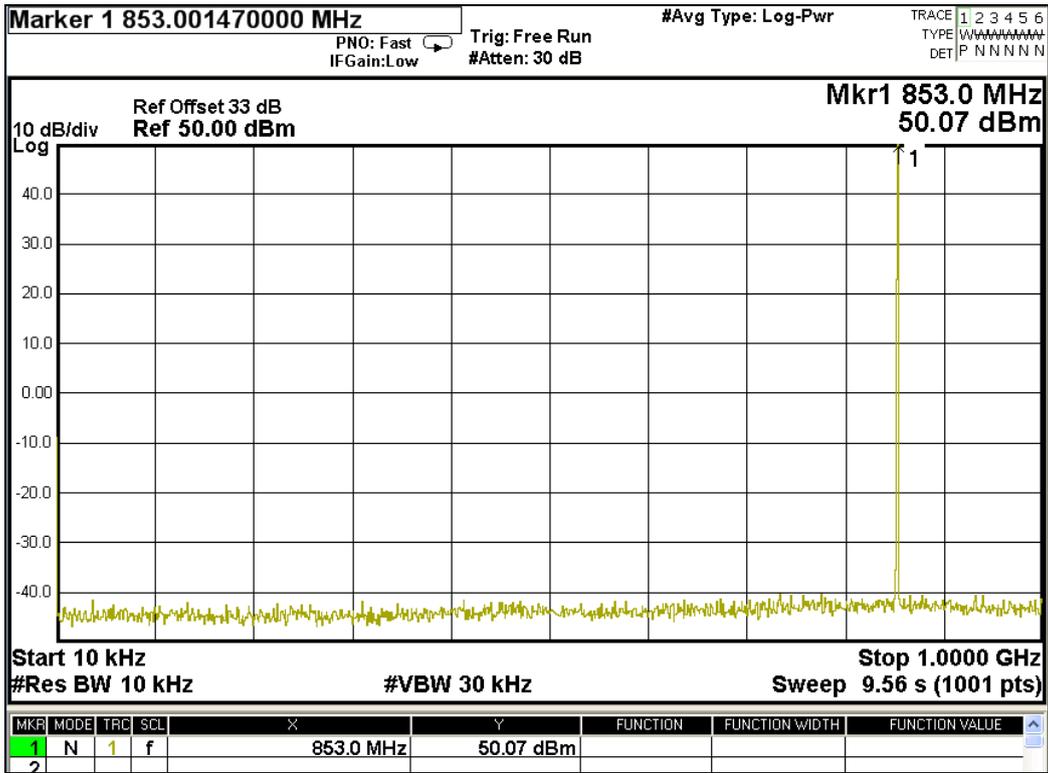
Tx FREQUENCY: 769.06875 MHz 100 Watts



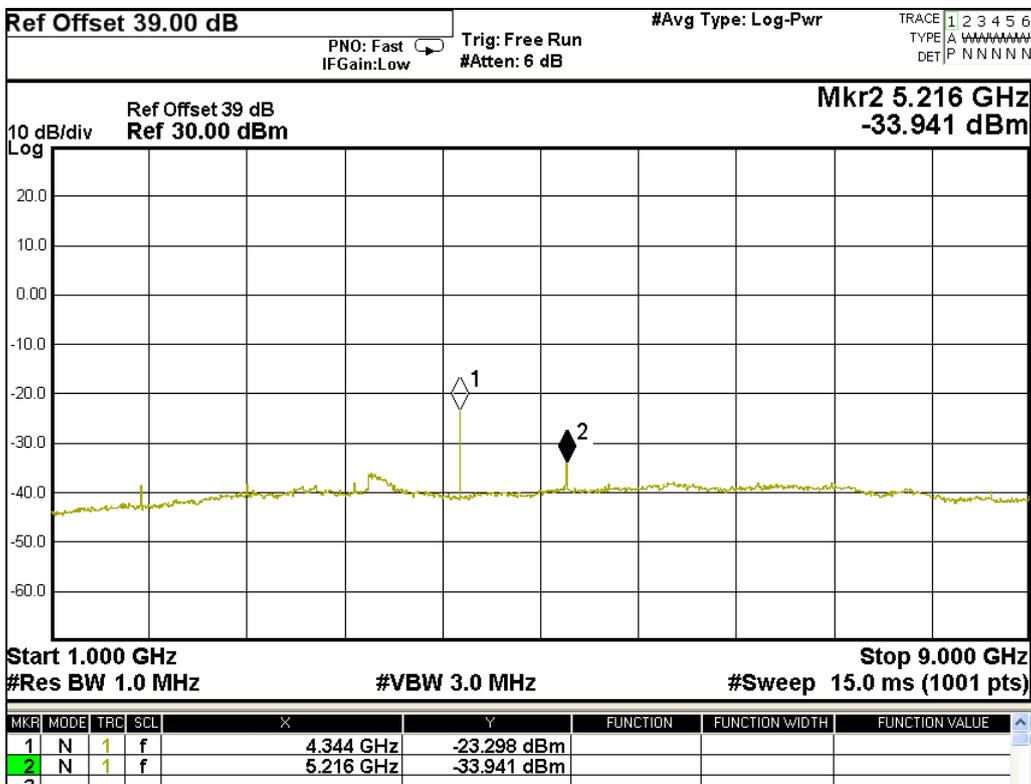
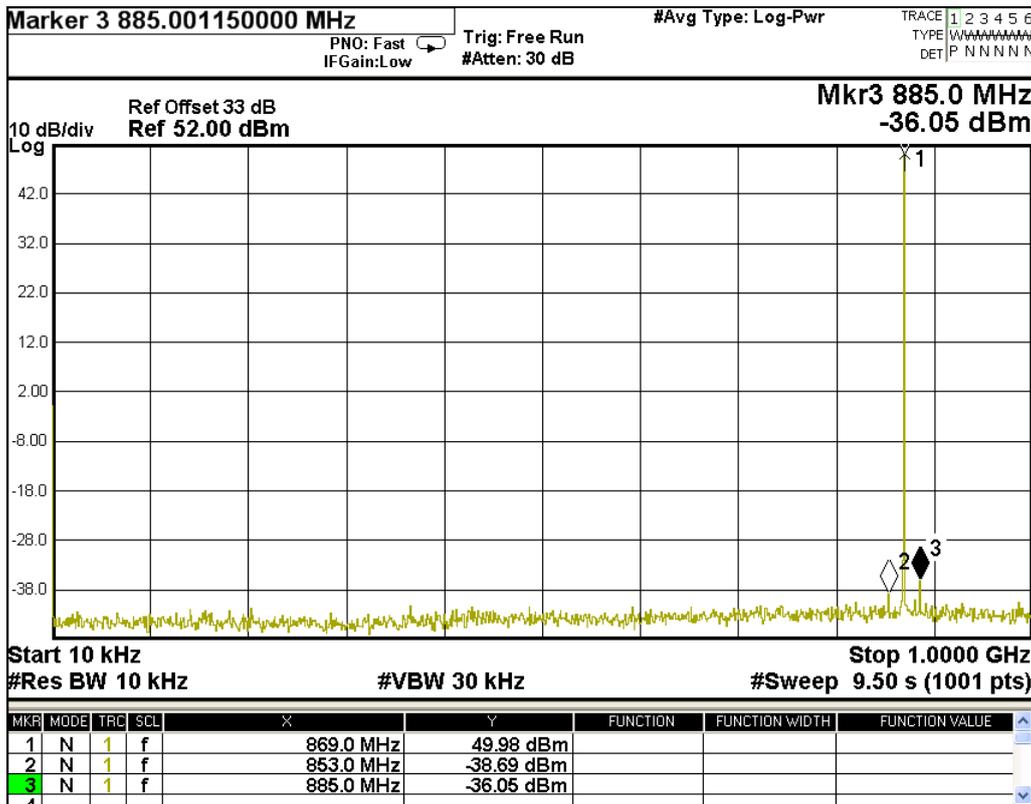
Tx FREQUENCY: 769.06875 MHz 10 Watts



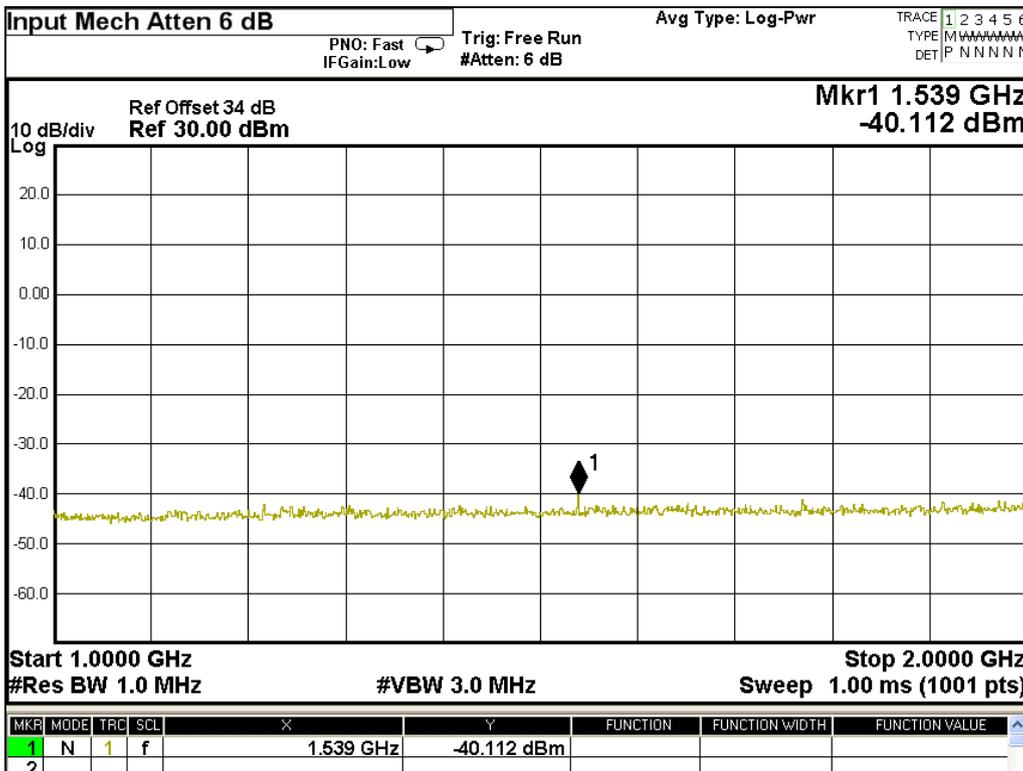
Tx FREQUENCY: 852.5125 MHz 100 Watts



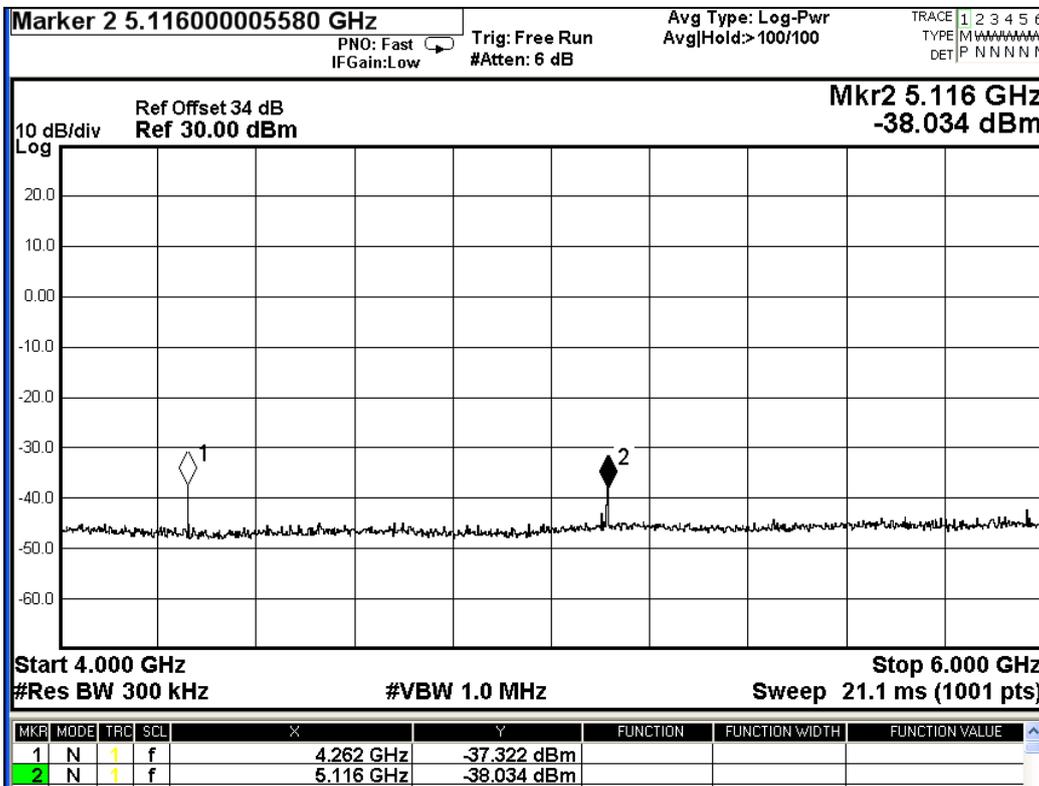
Tx FREQUENCY: 868.9875 MHz 100 Watts



Tx FREQUENCY: 769.06875 MHz 100 Watts 4FSK

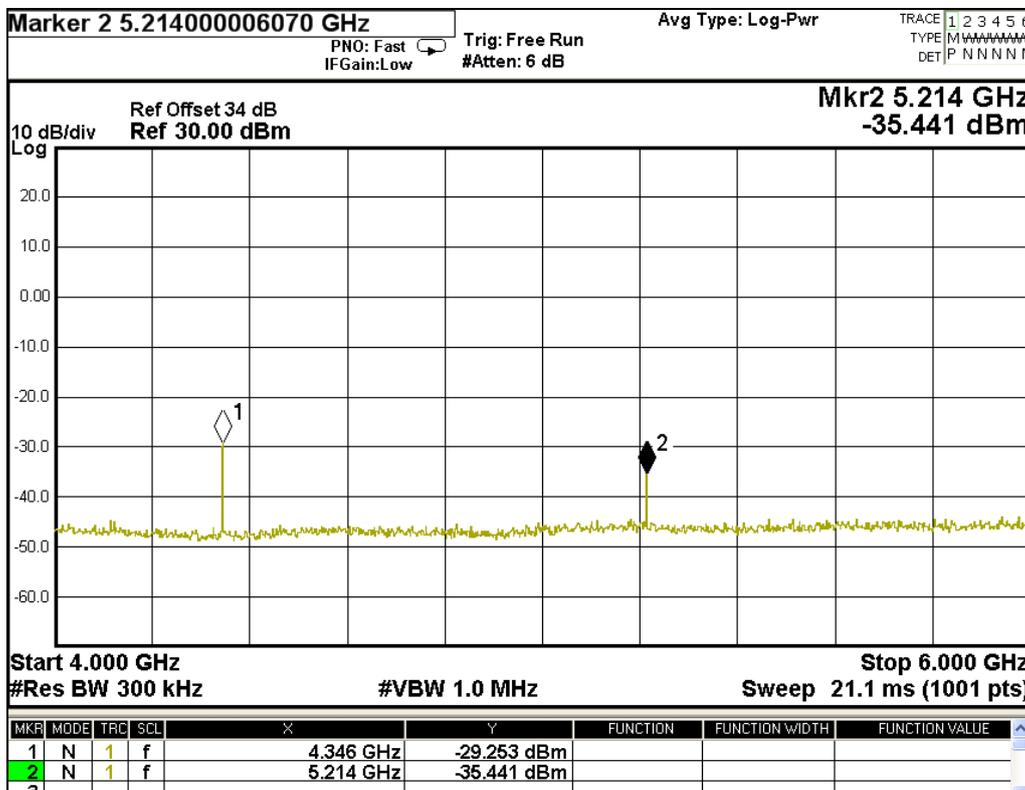
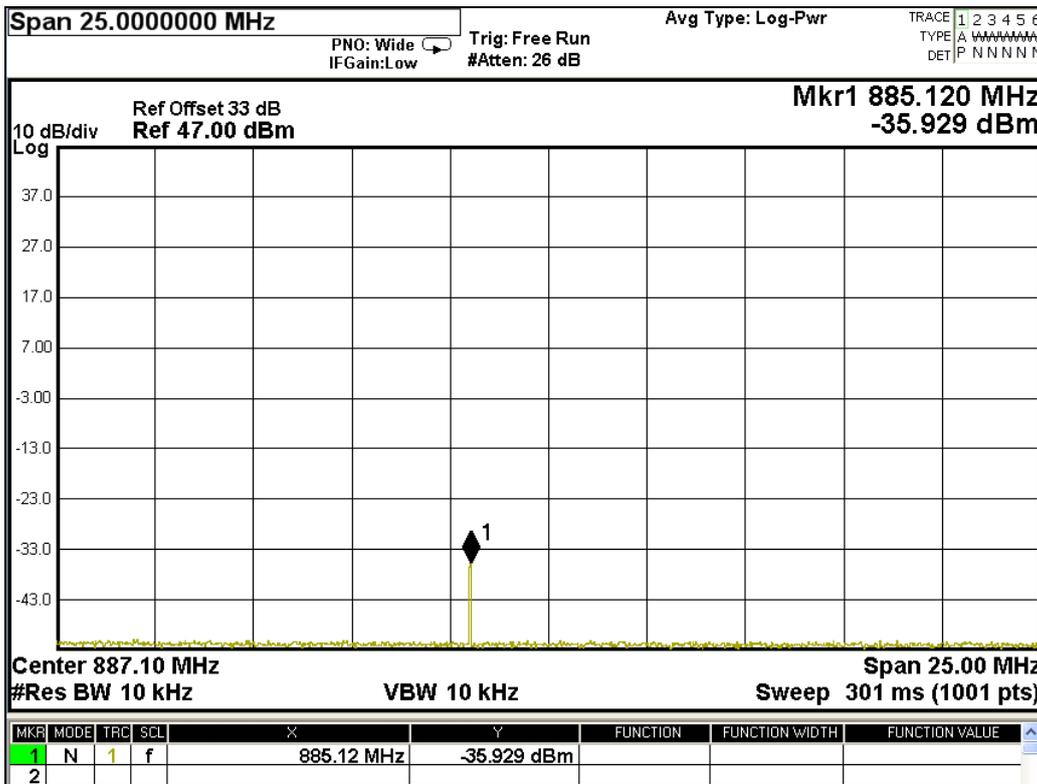


Tx FREQUENCY: 852.5125 MHz 100 Watts 4FSK



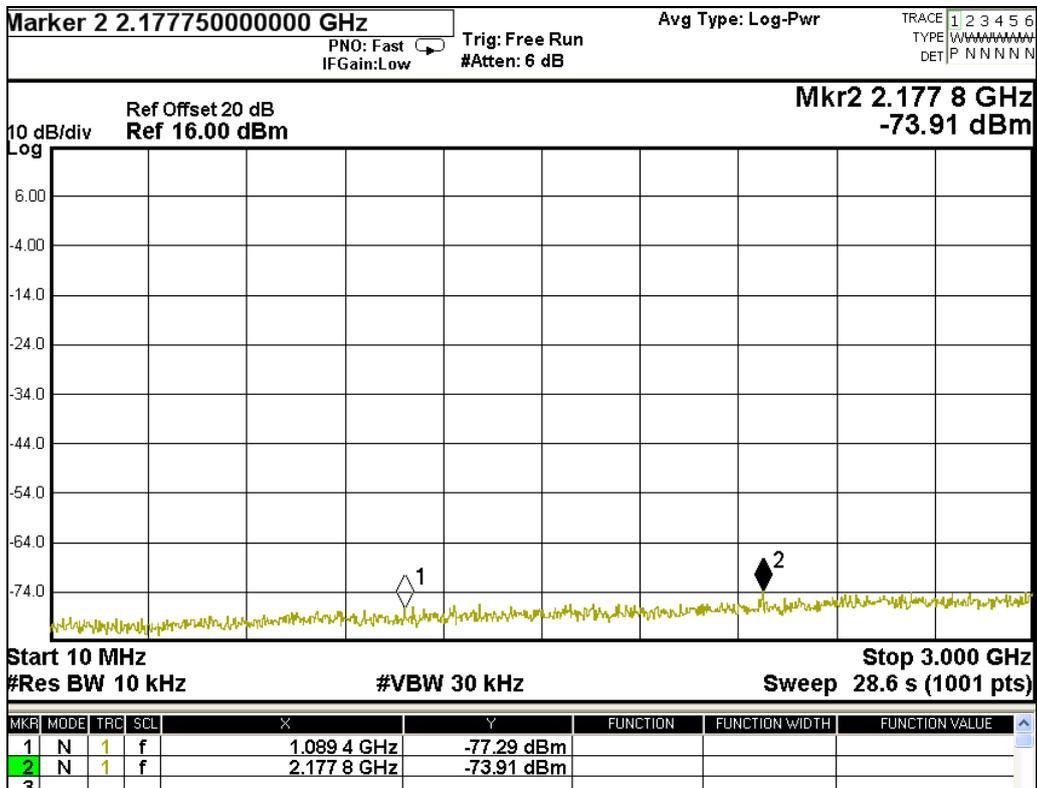
TELTEST Laboratories
Tait Communications
Report Number 3436

Tx FREQUENCY: 868.9875 MHz 100 Watts 4FSK

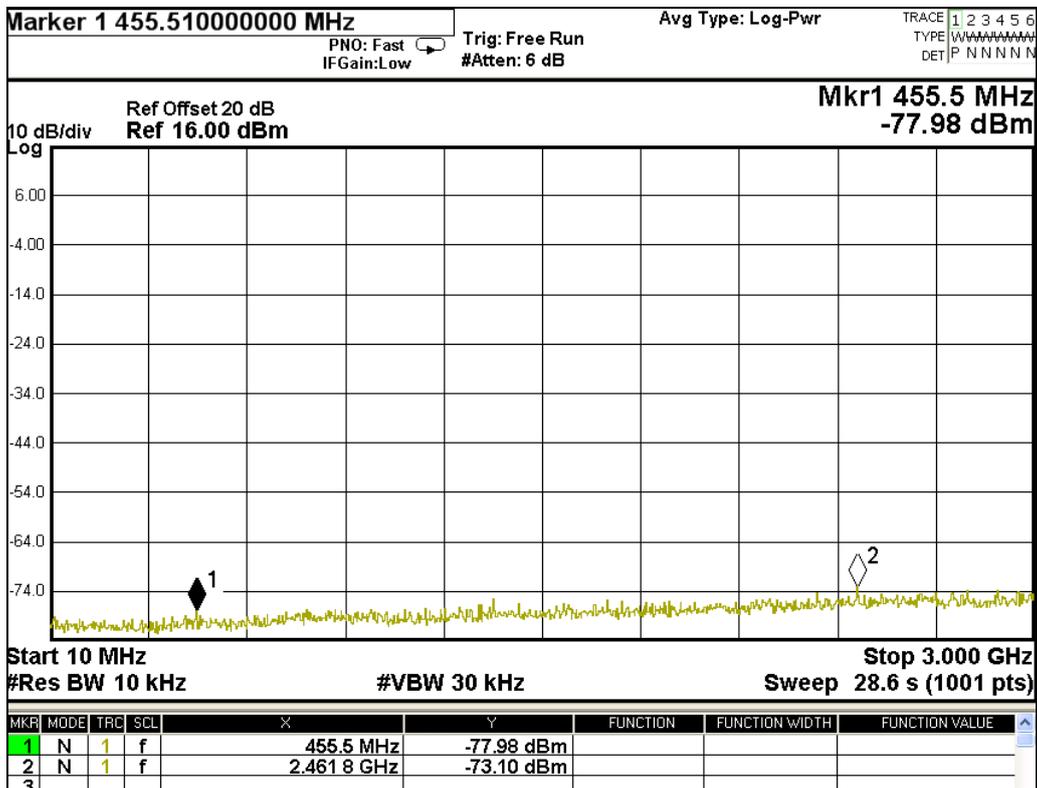


ANNEX C – TX STANDBY / RX CONDUCTED EMISSION PLOTS

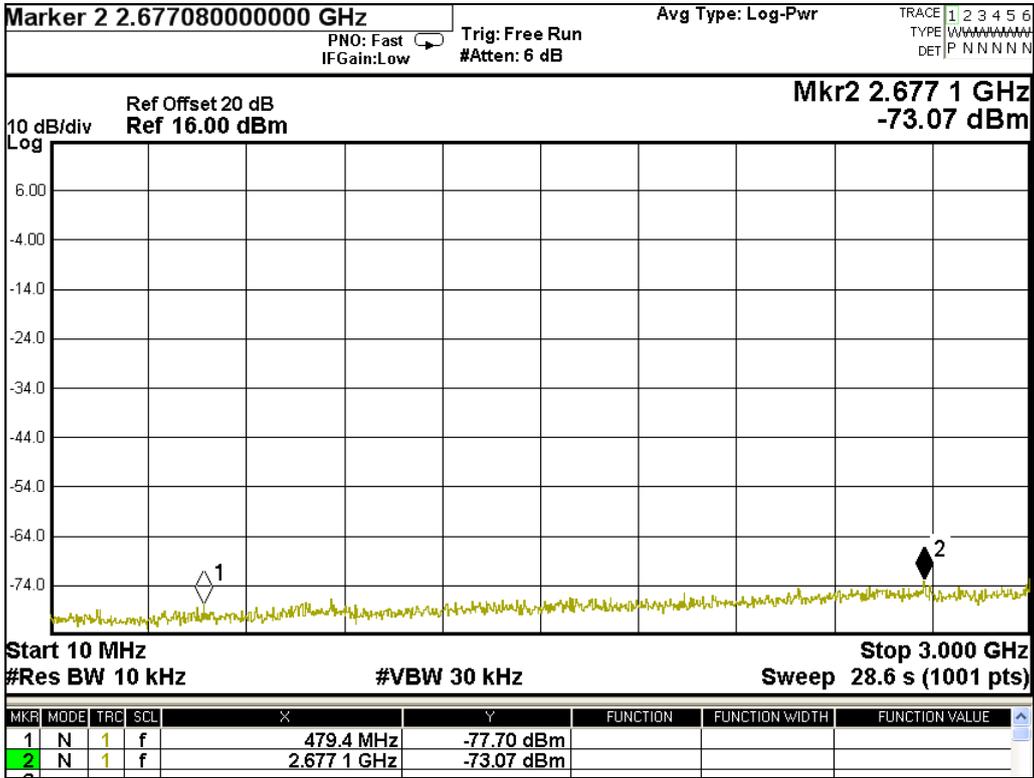
Tx FREQUENCY: 769.06875 MHz 0 Watts / TX Standby – TX Port



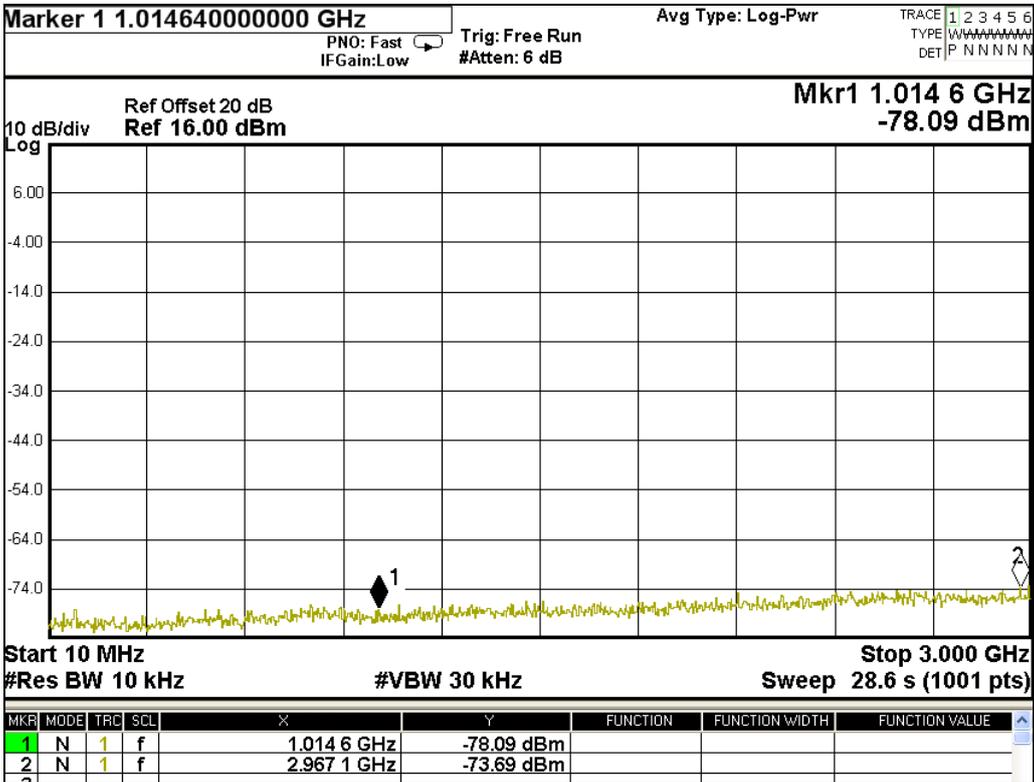
Tx FREQUENCY: 852.5125 MHz 0 Watts / TX Standby – TX Port



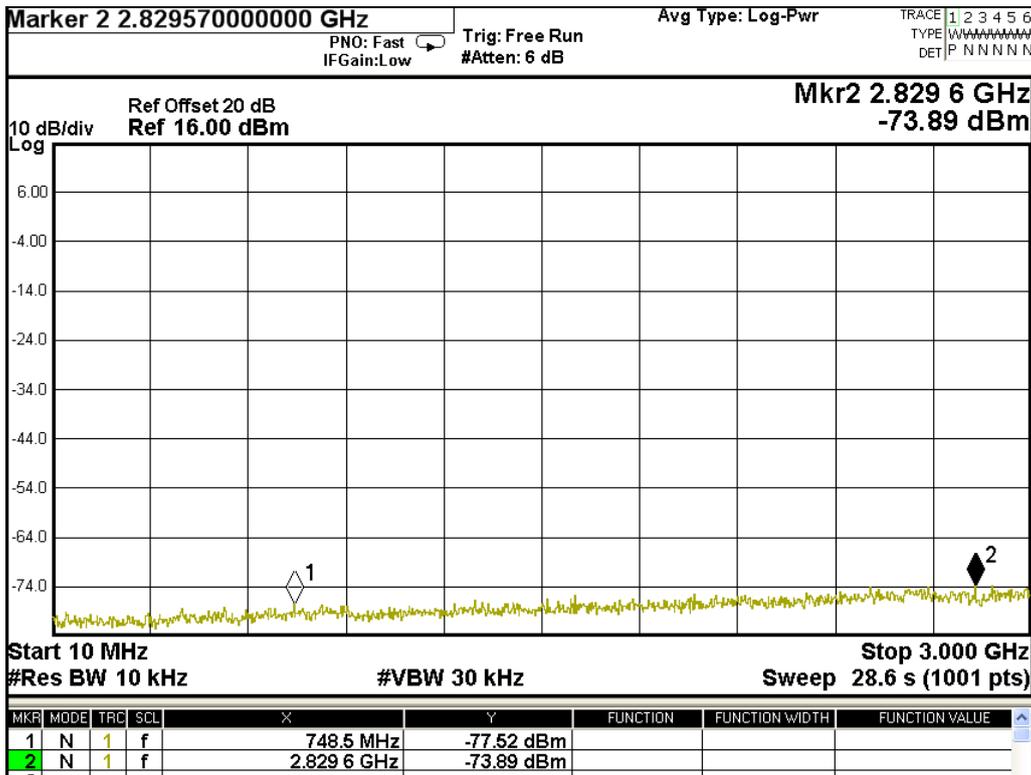
Tx FREQUENCY: 868.9875 MHz 0 Watts / TX Standby – TX Port



Rx FREQUENCY: 799.06875 MHz RX - RX Port



Rx FREQUENCY: 807.5125 MHz RX - RX Port



Rx FREQUENCY: 823.9875 MHz RX - RX Port

