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REVISION

Date	Revision	Comments
08-December-2011	1	Initial test report
24-January-2012	2	Added Tx radiated spurious emissions Open Area Test Site test results as required for FCC (page 32). Added Conducted Emissions Plots as per RSS-Gen 4.3(e): Annexes 3 and 4. Added note to state that receiver spurious emissions were measured at the antenna port using the conducted method as per RSS-Gen 4.10 (page 40).

INTRODUCTION

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

REASON FOR REPORT
The TB9400 K4 100W is a new addition to the Tait Communications Ltd product line capable of APCO Phase 1 C4FM and LSM modulation.

Type Approval Testing of the	TBCK4B
Transmitter Frequency Range	762 → 776 MHz, 850 → 870 MHz
Receiver Frequency Range	794 → 824 MHz

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

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

DESCRIPTION OF SAMPLE
Manufacturer Tait Electronics Limited
Equipment: Base Station Transceiver
Type: TBCK4B

On the TBCK4B Base Station Transceiver consisting of:

FUNCTIONAL DESCRIPTION	PRODUCT DESIGNATION CODE	SERIAL NUMBER (S)
Reciter	T01-01103-NAAA	18133695
Power Amplifier	T01-01121-NBAA	18133725
Power Management Unit	TBA30A0-0100	18130813
Rack Frame	T01-01131-0002	18133665

Quantity: 1 of each

HARDWARE & SOFTWARE Details:

FUNCTIONAL DESCRIPTION	FIRMWARE VERSION	HARDWARE VERSION
Reciter	tbc p25 trunk.20111118115451-jenkins	0001
Power Amplifier	0.01.00.trunk.20111118001500-jenkins	00.01
Power Management Unit	0312	00.03
Front Panel	0.01.00.trunk.20111018001343-jenkins-r2.5	00.01

TEST CONDITIONS

All testing was performed between 24th November 2011 → 1st December 2011, and under the following conditions:

Test Frequency Pair 769.06875 MHz (TX) / 799.08675 MHz (RX) – External 10 MHz Frequency Reference was used (excluding Radiated Emissions).

Ambient temperature: 20°C → 30°C
Relative Humidity: 20% → 75%
Standard Test Voltage 120 V_{AC}

STATEMENT OF COMPLIANCE

The TBCK4B base station transceiver as tested in this report was found to conform to the following standards:

FCC CFR 47 Parts 22 & 90

RSS-119 Issue 11 & RSS-Gen Issue 3

MODULATION TYPES, NECESSARY BANDWIDTH, and EMISSION DESIGNATORS

MODULATION TYPES:

F1E	C4FM	4800 symbols/sec	9600 bps
F1D	C4FM	4800 symbols/sec	9600 bps
F7W	C4FM	4800 symbols/sec	9600 bps
D1W	LSM	4800 symbols/sec	9600 bps
D7W	LSM	4800 symbols/sec	9600 bps

CHANNEL SPACINGS: 12.5 kHz

EMISSION DESIGNATORS:

C4FM	8k10F1E	8k10F1D
	8k10F7E	8k10F7D
LSM	8k70D1W	8K70D7W

MODULATION TYPES, NECESSARY BANDWIDTHS, AND EMISSION DESIGNATORS

Digital Voice / Data (C4FM 4 – Level FSK)

Digital Voice/data transmissions use a 4 level frequency shift keying modulation scheme. The necessary bandwidth as been measured using the 99% energy rule, and in accordance with TIA/EIA 102 CAAB 2.2.5.2

Digital Voice 12.5 kHz Bandwidth

99% bandwidth
= 8.1 kHz

Emission Designator

8k10F1E

F1E represents a digital FM voice transmission

8K10F7E

F7E represents two or more channels containing quantized or digital voice information

Digital Data 12.5 kHz Bandwidth

99% bandwidth
= 8.1 kHz

Emission Designator

8k10F1D

F1D represents an digital FM data transmission

8K10F7D

F7D represents two or more channels containing quantized or digital information

Linear Simulcast Modulation (LSM)

Digital Voice/data transmissions use a 4 level frequency shift keying modulation scheme suitable for 12.5 kHz channel spacing. The necessary bandwidth has been measured using the 99% energy rule, and in accordance with TIA/EIA 102 CAAB 2.2.5.2

Digital Data 12.5 kHz Bandwidth

99% bandwidth
= 9.0 kHz

Emission Designator

8k70D1W

D1W represents single channels containing quantized or digital information combining of two modulation modes simultaneously (amplitude + angle) for a data/telephony combination.

8K70D7W

D7W represents two or more channels containing quantized or digital information combining of two modulation modes simultaneously (amplitude + angle) for a data/telephony combination.

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: ± 0.6 dB

MEASUREMENT RESULTS:

Manufacturer's Rated Output Power: Switchable: 100 W and 10 W

Nominal 100 Unmodulated	769.06875 MHz	852.5125 MHz	868.9875 MHz
Measured (Watts)	96.2	95.5	98.7
Variation (%)	-3.8	-4.5	-2.3
Variation (dB)	-0.2	-0.2	-0.1
Nominal 10 Unmodulated	769.06875 MHz	852.5125 MHz	868.9875 MHz
Measured (Watts)	10.9	11.2	11.4
Variation (%)	+9.0	+12.0	+14.0
Variation (dB)	0.4	0.5	0.6

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Nominal 100 LSM	769.06875 MHz	852.5125 MHz	868.9875 MHz
Measured (Watts)	96.2	94.7	97.5
Variation (%)	-3.8	-5.3	-2.5
Variation (dB)	-0.2	-0.2	-0.1
Nominal 10 LSM	769.06875 MHz	852.5125 MHz	868.9875 MHz
Measured (Watts)	10.7	11.0	11.4
Variation (%)	+7.0	+10.0	+14.0
Variation (dB)	0.3	0.4	0.6

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

SPECIFICATION: FCC 47 CFR 90.543

MEASUREMENT PROCEDURE:

1. Refer Annex 2 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:

C4FM

Tx FREQUENCY: 769.06875 MHz 100 W

Frequency Offset	Measurement Bandwidth	ACP Measured Lower (dBc)	ACP Measured Upper (dBc)	Maximum ACP (dBc)
9.375 kHz	6.25 kHz	-41.29	-40.17	-40
15.625 kHz	6.25 kHz	-73.08	-73.23	-60
21.875 kHz	6.25 kHz	-75.42	-75.06	-60
37.5 kHz	25 kHz	-70.74	-70.8	-60
62.5 kHz	25 kHz	-73.6	-73.55	-65
87.5 kHz	25 kHz	-76.94	-77.21	-65
150 kHz	100 kHz	-75.06	-74.89	-65
250 kHz	100 kHz	-79.85	-79.46	-65
350 kHz	100 kHz	-84.09	-84.03	-65
>400 kHz to 12 MHz	30 kHz (swept)	-81.25		-80
12 MHz to paired receive band	30 kHz (swept)	-83.0		-80
In the paired receive band	30 kHz (swept)	<-100		-100

ADJACENT CHANNEL POWER

SPECIFICATION: FCC 47 CFR 90.543

LSM

Tx FREQUENCY: 769.06875 MHz 100 W

Frequency Offset	Measurement Bandwidth	ACP Measured Lower (dBc)	ACP Measured Upper (dBc)	Maximum ACP (dBc)
9.375 kHz	6.25 kHz	-44.83	-44.86	-40
15.625 kHz	6.25 kHz	-73.64	-74.05	-60
21.875 kHz	6.25 kHz	-75.33	-75.45	-60
37.5 kHz	25 kHz	-70.99	-71.16	-60
62.5 kHz	25 kHz	-74.32	-74.13	-65
87.5 kHz	25 kHz	-77.53	-77.35	-65
150 kHz	100 kHz	-75.42	-74.59	-65
250 kHz	100 kHz	-79.67	-79.28	-65
350 kHz	100 kHz	-83.84	-83.61	-65
>400 kHz to 12 MHz	30 kHz (swept)	-81.5		-80
12 MHz to paired receive band	30 kHz (swept)	-83.4		-80
In the paired receive band	30 kHz (swept)	<-100		-100

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. For analog measurements: The EUT was modulated by a 2500Hz tone at an input level 16dB 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 = 100Hz, Video Bandwidth = 1 kHz

Emission Mask B, H and G – Resolution bandwidth = 300Hz, Video Bandwidth = 3 kHz

MEASUREMENT RESULTS:

See the plots on the following pages for 12.5 kHz channel spacing.

LIMIT CLAUSE: FCC 47 CFR 90.210 RSS-119 5.5

EMISSION MASKS

Emission Mask B	12.5 kHz Channel Spacing	LSM; C4FM
Emission Mask D	12.5 kHz Channel Spacing	LSM; C4FM
Emission Mask H	12.5 kHz Channel Spacing	LSM; C4FM
Emission Mask G	12.5 kHz Channel Spacing	LSM; C4FM

DATA SPEED

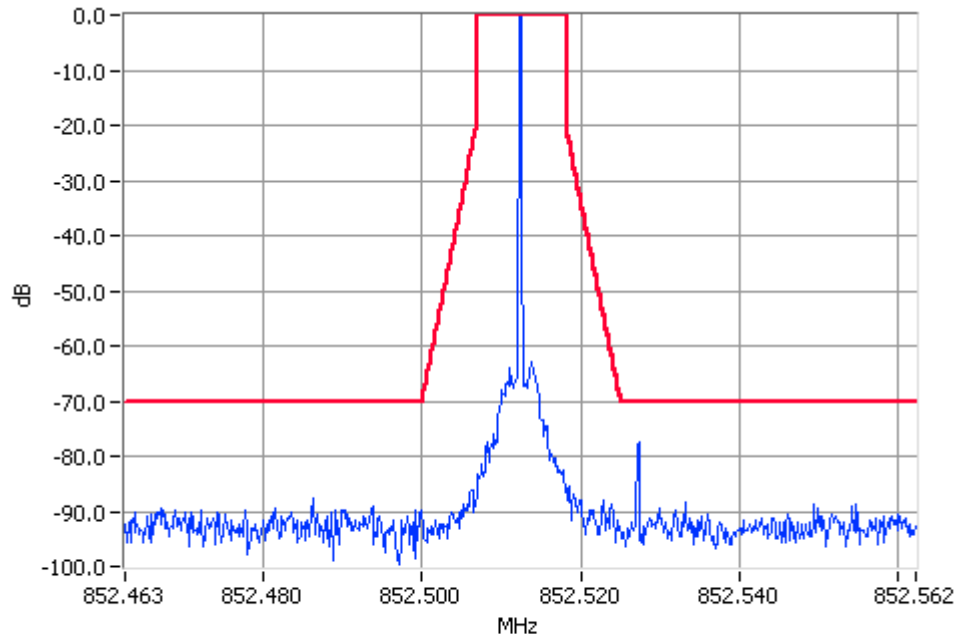
C4FM	12.5 kHz Channel Spacing	9600 bps
LSM	12.5 kHz Channel Spacing	9600 bps

Occupied Bandwidth and Spectrum Masks

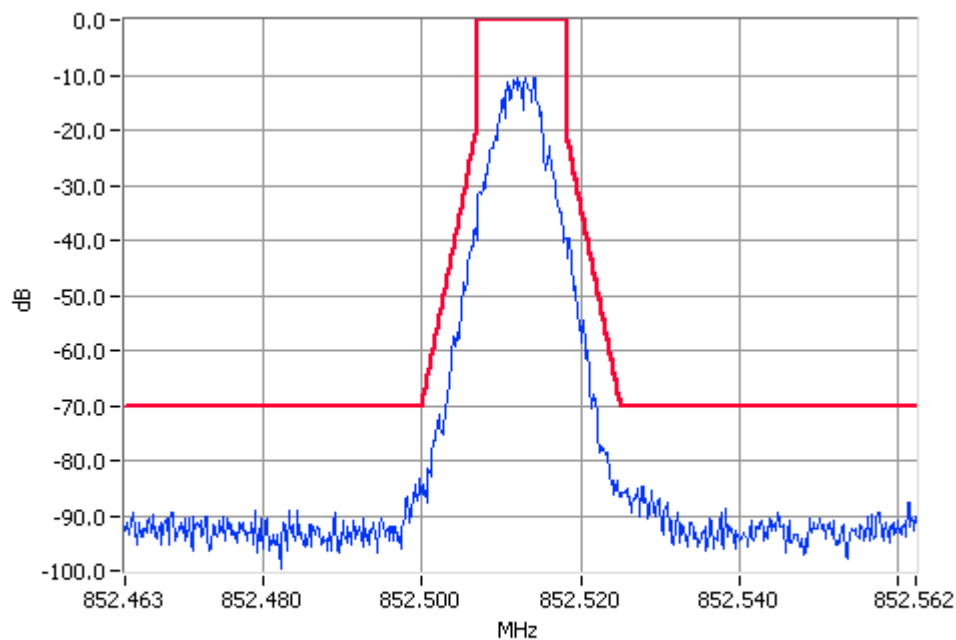
C4FM

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



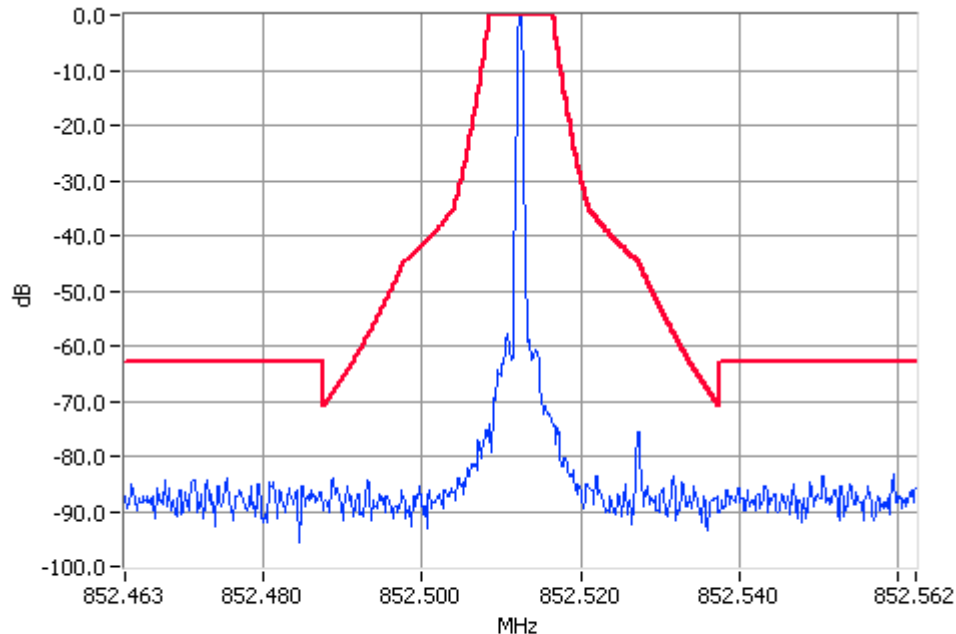
C4FM 852.5125MHz Mask D 100W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

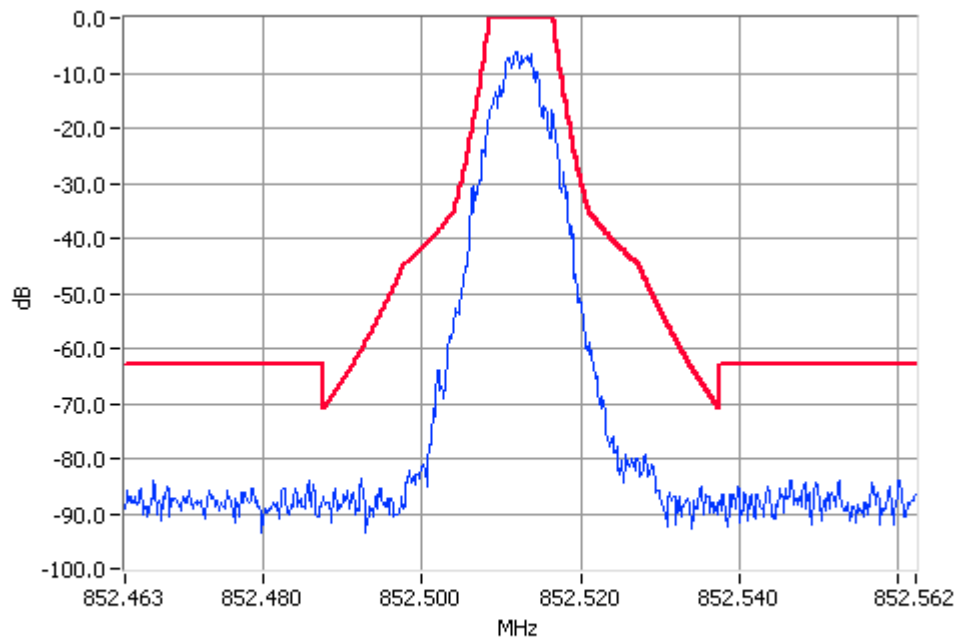
C4FM

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



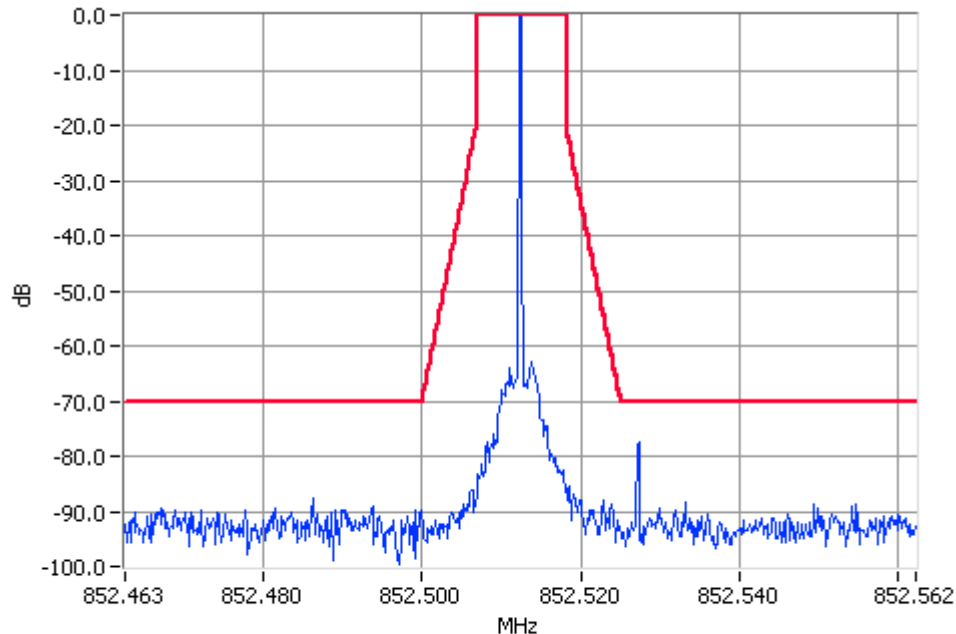
C4FM 852.5125MHz Mask H 100W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

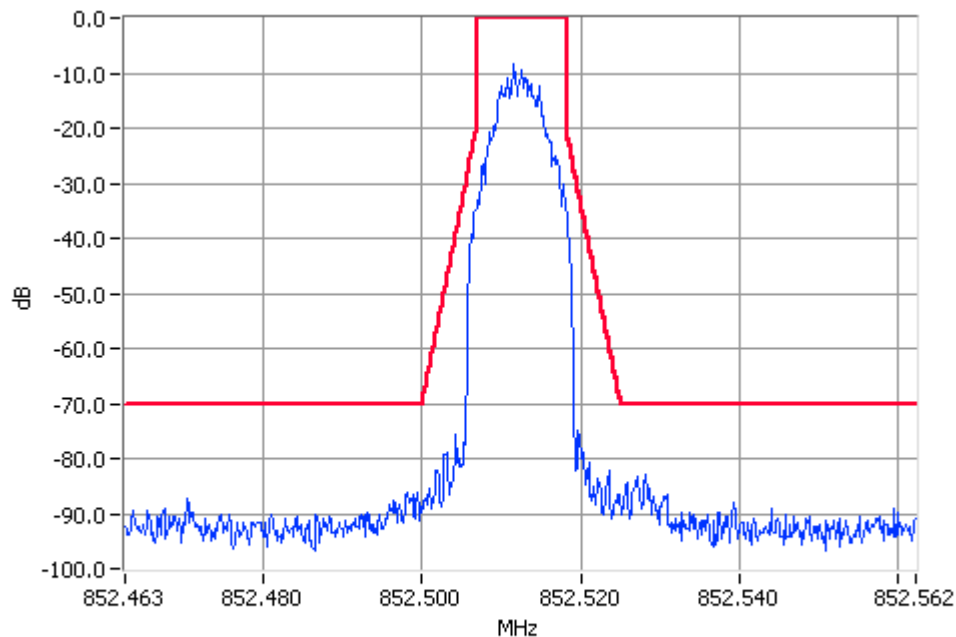
LSM

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



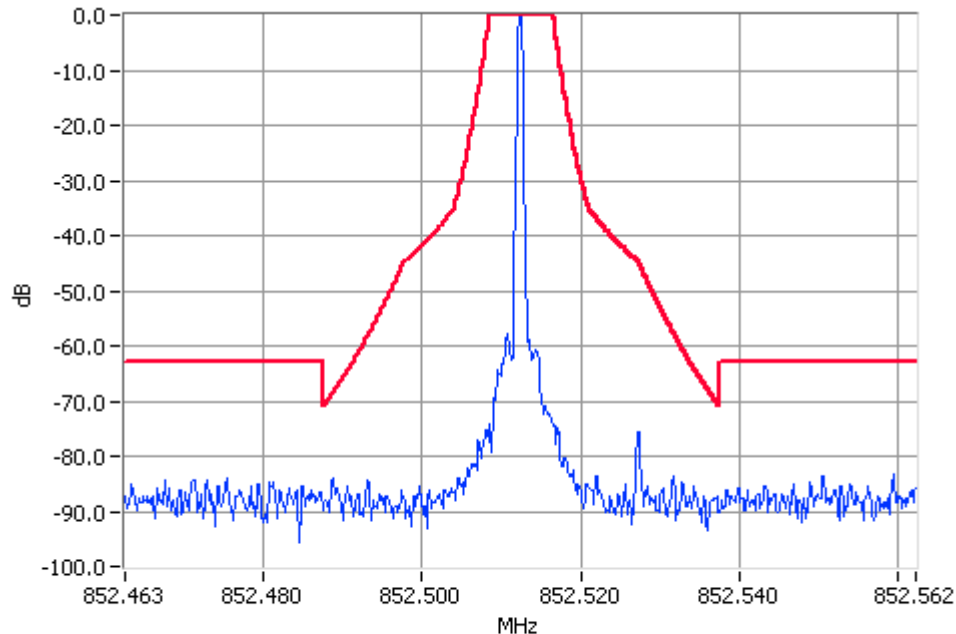
LSM 852.5125MHz Mask D 100W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

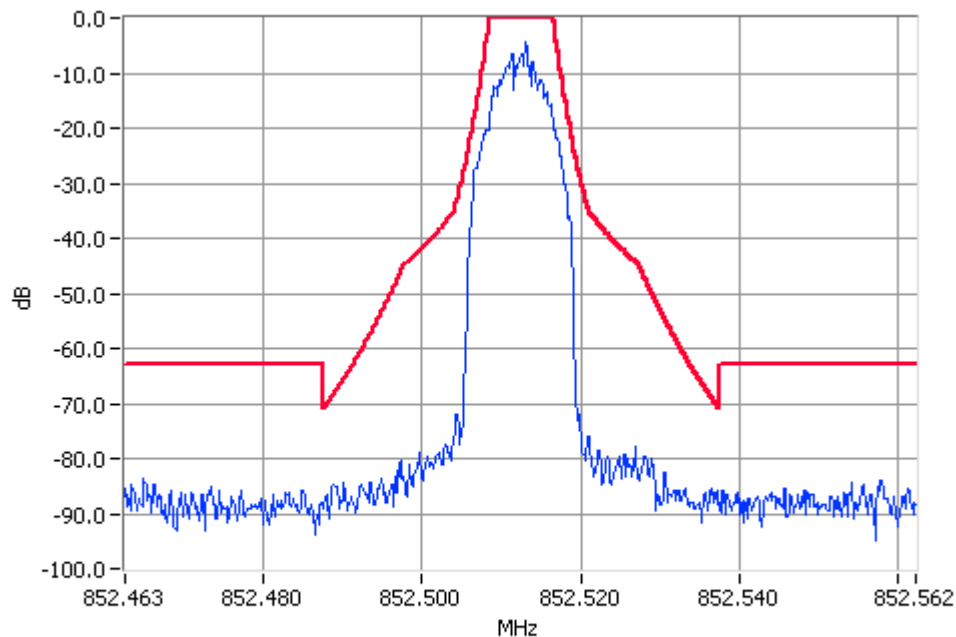
LSM

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



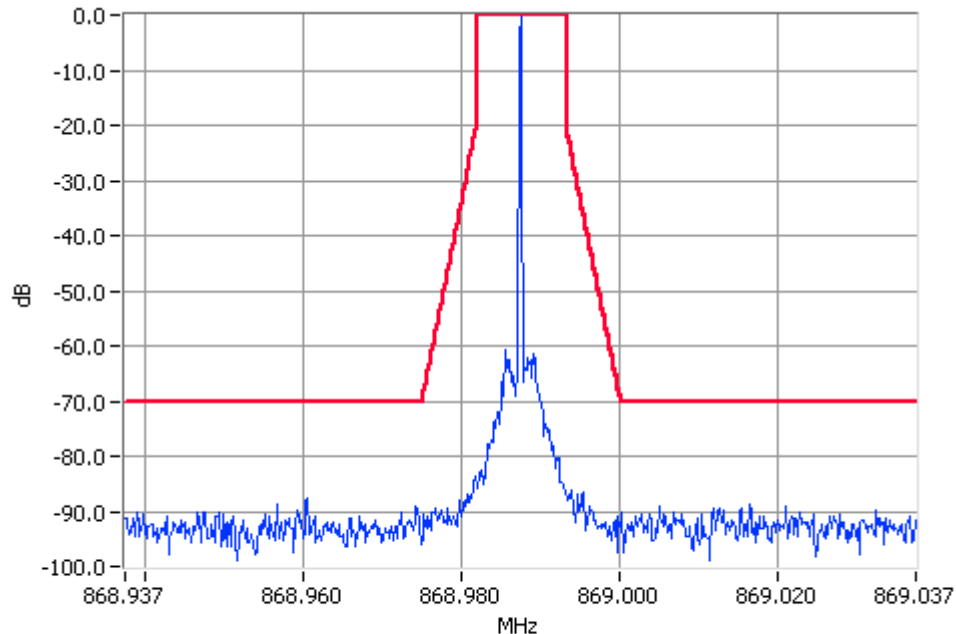
LSM 852.5125MHz Mask H 100W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

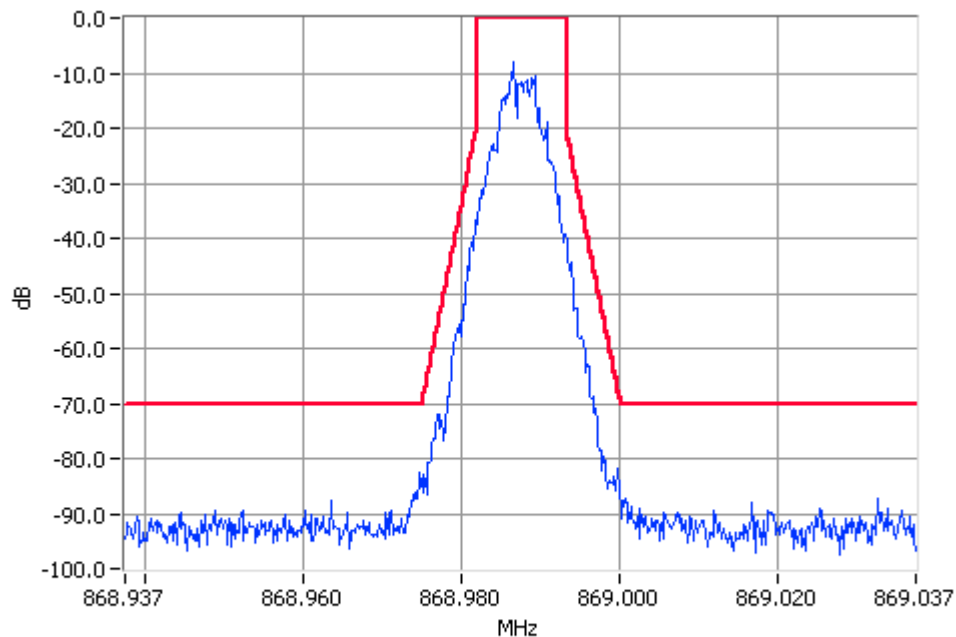
C4FM

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



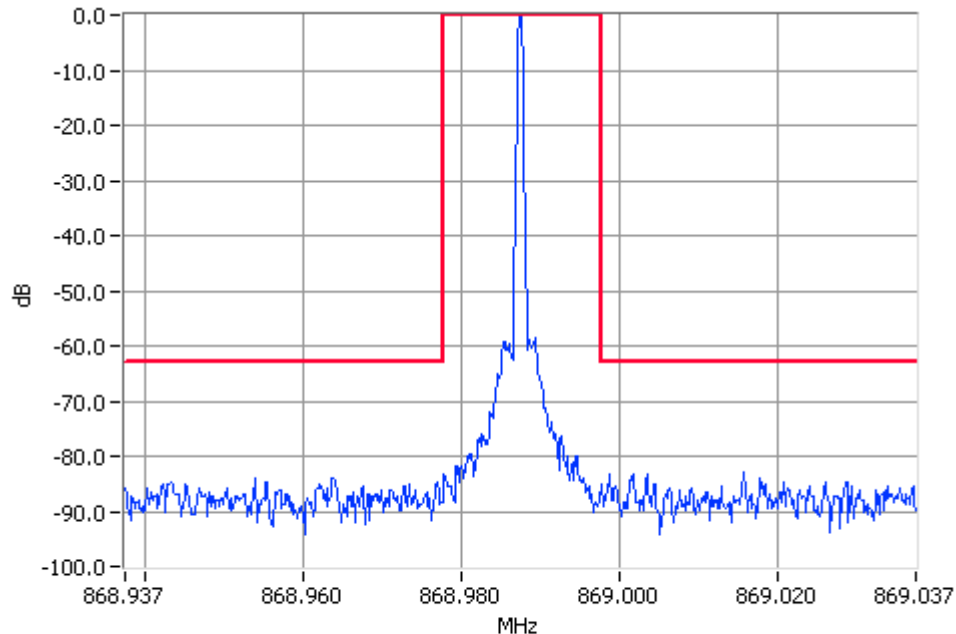
C4FM 868.9875MHz Mask D 100W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

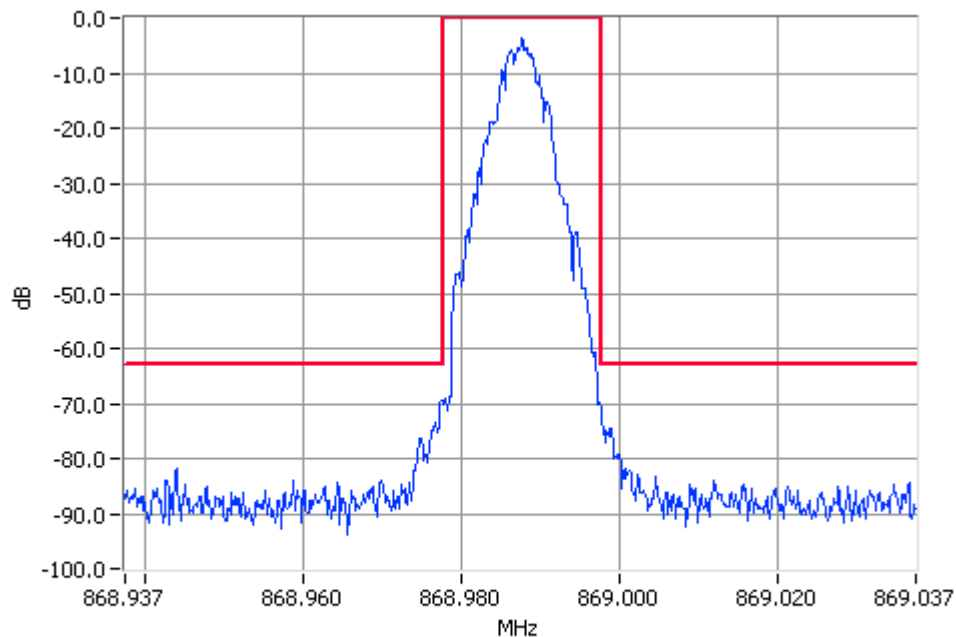
C4FM

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



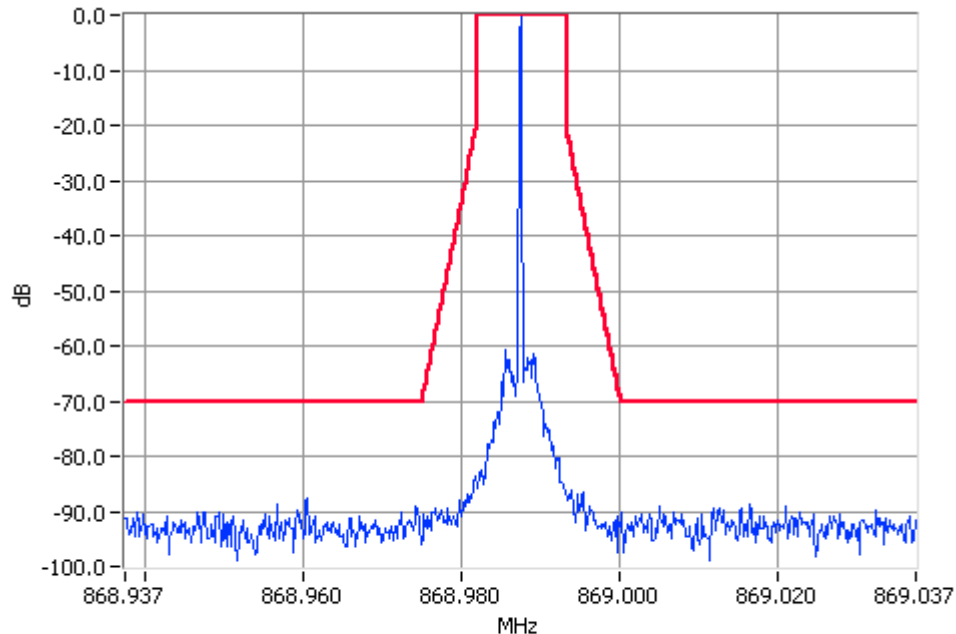
C4FM 868.9875MHz Mask G 100W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

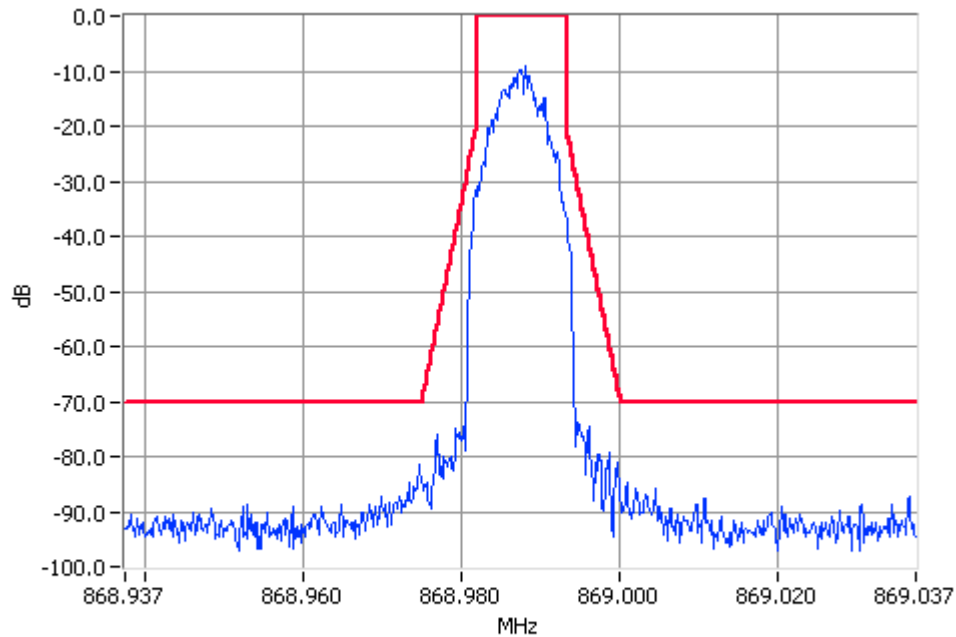
LSM

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



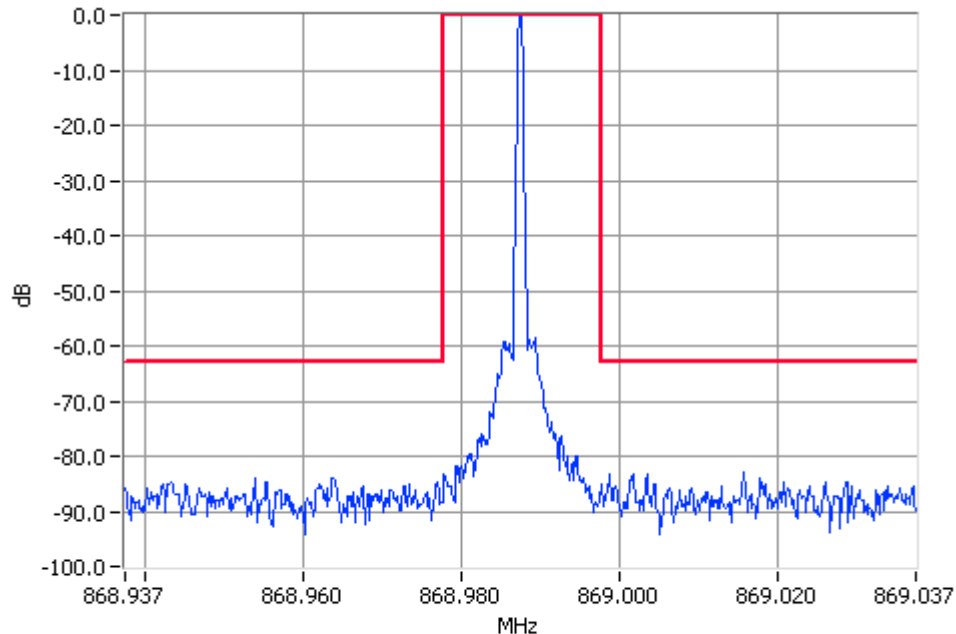
LSM 868.9875MHz Mask D 100W
RBW=100Hz, VBW=1000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

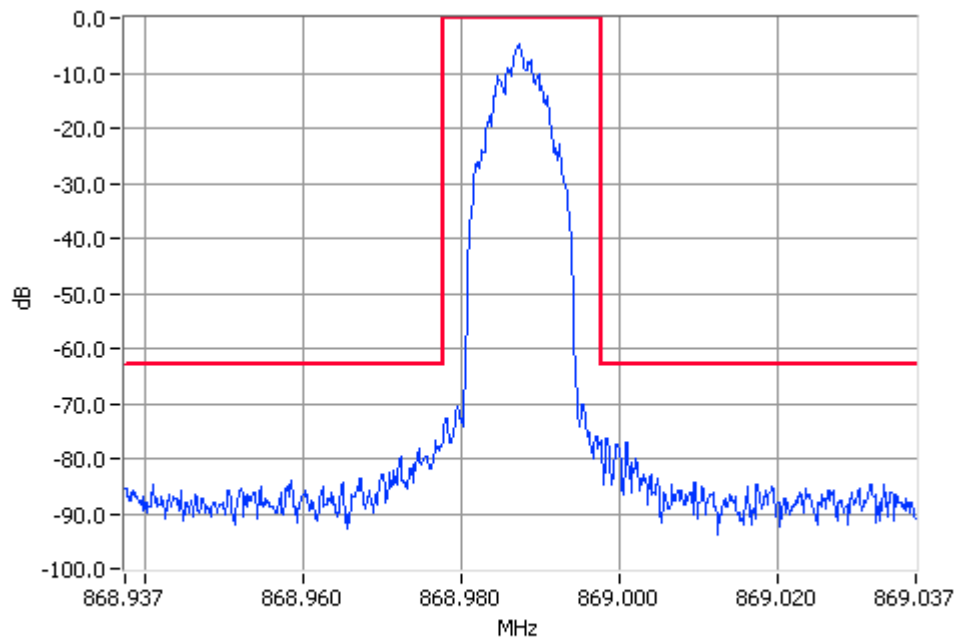
LSM

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



LSM 868.9875MHz Mask G 100W
RBW=300Hz, VBW=3000Hz, 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:

4. 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 10th Harmonic: 100kHz to Fc-BW
Fc+ BW to 10Fc GHz
5. 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 for 12.5 kHz channel spacings.

LIMIT CLAUSES: FCC 47 CFR 90.210 RSS-119 5.8

MEASUREMENT UNCERTAINTY: ± 3.0 dB

Spurious Emissions (Tx Conducted)

SPECIFICATION: FCC CFR 2.1051 RSS-119 5.8

Tx FREQUENCY: 769.06875 MHz

C4FM	769.06875 MHz @ 100 W	Emission Mask B, 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.		

C4FM	769.06875 MHz @ 10 W	Emission Mask B, 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.		

LSM		769.06875 MHz @ 100 W	Emission Mask B, 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.			

LSM		769.06875 MHz @ 10 W	Emission Mask B, 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.			

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Tx FREQUENCY: 852.5125 MHz

C4FM		852.5125 MHz @ 100 W	Emission Mask B, D, G and H
Emission Frequency (MHz)	Level (dBm)	Level (dBc)	
5115.0748	-35.2	-85.2	
No other emissions were detected at a level greater than 20 dB below the limit.			

C4FM		852.5125 MHz @ 10 W	Emission Mask B, 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.			

LSM		852.5125 MHz @ 100 W	Emission Mask B, D, G and H
Emission Frequency (MHz)	Level (dBm)	Level (dBc)	
5115.0748	-35.8	-85.8	
No other emissions were detected at a level greater than 20 dB below the limit.			

LSM		852.5125 MHz @ 10 W	Emission Mask B, 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.			

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Tx FREQUENCY: 868.9875 MHz

C4FM		868.9875 @ 100 W	Emission Mask B, D, G and H
Emission Frequency (MHz)	Level (dBm)	Level (dBc)	
868.8919	-23.0	-73.0	
5213.9247	-33.0	-83.0	
No other emissions were detected at a level greater than 20 dB below the limit.			

C4FM		868.9875 @ 10 W	Emission Mask B, D, G and H
Emission Frequency (MHz)	Level (dBm)	Level (dBc)	
868.8919	-31.7	-71.7	
No other emissions were detected at a level greater than 20 dB below the limit.			

LSM		868.9875 @ 100 W	Emission Mask B, D, G and H
Emission Frequency (MHz)	Level (dBm)	Level (dBc)	
868.8919	-24.0	-74.0	
5213.9247	-34.6	-84.6	
No other emissions were detected at a level greater than 20 dB below the limit.			

LSM		868.9875 MHz @ 10 W	Emission Mask B, D, G and H
Emission Frequency (MHz)	Level (dBm)	Level (dBc)	
868.8919	-32.3	-72.3	
No other 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 $50 + 10 \log_{10}(P_{\text{Watts}})$	
100 W	-20 dBm	-70 dBc
10 W	-20 dBm	-60 dBc

Carrier Output Power Watts	Emission Mask B, G and H 12.5 kHz Channel Spacing $43 + 10 \log_{10}(P_{\text{Watts}})$	
100 W	-13 dBm	-63 dBc
10 W	-13 dBm	-53 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 10dB of the limit is then re-tested on the OATS along with measurements from 1000MHz to the 10th 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 10 dB 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: 769.06875 MHz

C4FM		769.06875 MHz @ 100 W	Emission Mask B, D, G and H
Emission Frequency (MHz)	Level (dBm)	Level (dBc)	
~	~	~	
No emissions were detected at a level greater than 10 dB below the limit.			

C4FM		769.06875 MHz @ 10 W	Emission Mask B, D, G and H
Emission Frequency (MHz)	Level (dBm)	Level (dBc)	
~	~	~	
No emissions were detected at a level greater than 10 dB below the limit.			

LSM		769.06875 MHz @ 100 W	Emission Mask B, D, G and H
Emission Frequency (MHz)	Level (dBm)		Level (dBc)
~	~		~
No emissions were detected at a level greater than 10 dB below the limit.			

LSM		769.06875 MHz @ 10 W	Emission Mask B, D, G and H
Emission Frequency (MHz)	Level (dBm)		Level (dBc)
~	~		~
No emissions were detected at a level greater than 10 dB below the limit.			

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Report Number 3311

Tx FREQUENCY: 852.5125 MHz

C4FM		852.5125 MHz @ 100 W	Emission Mask B, D, G and H
Emission Frequency (MHz)	Level (dBm)	Level (dBc)	
~	~	~	
No emissions were detected at a level greater than 10 dB below the limit.			

C4FM		852.5125 MHz @ 10 W	Emission Mask B, D, G and H
Emission Frequency (MHz)	Level (dBm)	Level (dBc)	
~	~	~	
No emissions were detected at a level greater than 10 dB below the limit.			

LSM		852.5125 MHz @ 100 W	Emission Mask B, D, G and H
Emission Frequency (MHz)		Level (dBm)	Level (dBc)
~		~	~
No emissions were detected at a level greater than 10 dB below the limit.			

LSM		852.5125 MHz @ 10 W	Emission Mask B, D, G and H
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			
LSM		852.5125 MHz @ 100 W	Emission Mask B, D, G and H
Harmonics Emission Frequency (MHz)		Level (dBm)	Level (dBc)
1705.025		-35.9	-85.9
2557.5375		-33.2	-83.2
3410.05		<-39.3	<-89.3
4262.5625		<-40.4	<-90.4
5115.075		<-32.5	<-82.5
5967.5875		<-36.3	<-86.3

TELTEST Laboratories
Tait Electronics Limited
Report Number 3311

Tx FREQUENCY: 868.9875 MHz

C4FM		868.9875 @ 100 W	Emission Mask B, D, G and H
Emission Frequency (MHz)	Level (dBm)	Level (dBc)	
~	~	~	
No emissions were detected at a level greater than 10 dB below the limit.			

C4FM		868.9875 @ 10 W	Emission Mask B, D, G and H
Emission Frequency (MHz)	Level (dBm)	Level (dBc)	
~	~	~	
No emissions were detected at a level greater than 10 dB below the limit.			

LSM		868.9875 @ 100 W	Emission Mask B, D, G and H
Emission Frequency (MHz)	Level (dBm)	Level (dBc)	
~	~	~	
No emissions were detected at a level greater than 10 dB below the limit.			

LSM		868.9875 MHz @ 10 W	Emission Mask B, D, G and H
Emission Frequency (MHz)	Level (dBm)	Level (dBc)	
~	~	~	
No emissions were detected at a level greater than 10 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 $50 + 10 \log_{10}(P_{\text{Watts}})$			
100 W	-20 dBm	-70 dBc		
10 W	-20 dBm	-60 dBc		

Carrier Output Power Watts	Emission Mask B, G and H 12.5 kHz Channel Spacing $43 + 10 \log_{10}(P_{\text{Watts}})$	
100 W	-13 dBm	-63 dBc
10 W	-13 dBm	-53 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 $+50^{\circ}\text{C}$ 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.

MEASUREMENT UNCERTAINTY: $\pm 50\text{ Hz}$

Nominal Tx FREQUENCY: 769.06875 MHz 100 W 12.5 kHz channel Spacing

Note: For 769.06875 MHz the laboratories 10 MHz external frequency reference was used!

Temperature ($^{\circ}\text{C}$)	Frequency (MHz)	Error (ppm)
50	769.068745	-0.01
40	769.068740	-0.01
30	769.068753	0.00
20	769.068738	-0.02
10	769.068743	-0.01
0	769.068738	-0.02
-10	769.068743	-0.01
-20	769.068753	0.00
-30	769.068742	-0.01

Nominal Tx FREQUENCY: 852.5125 MHz 100 W 12.5 kHz channel Spacing

Temperature ($^{\circ}\text{C}$)	Frequency (MHz)	Error (ppm)
50	852.512609	0.1
40	852.512529	0.0
30	852.512452	-0.1
20	852.512545	0.1
10	852.512710	0.2
0	852.512462	0.0
-10	852.512632	0.2
-20	852.512889	0.5
-30	852.512880	0.4

TELTEST Laboratories
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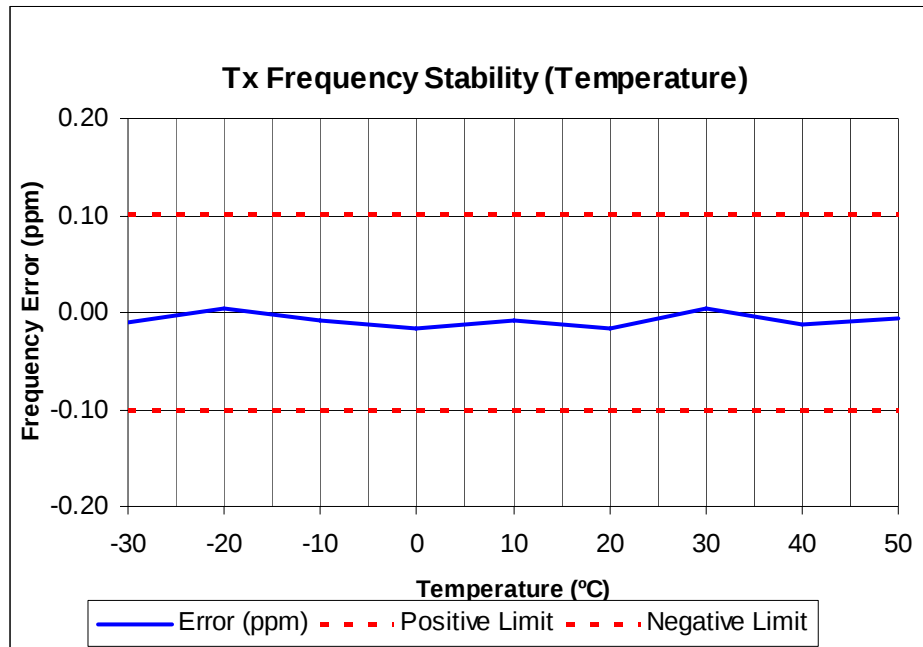
Nominal Tx FREQUENCY: 868.9875 MHz 100 W 12.5 kHz channel Spacing

Temperature (°C)	Frequency (MHz)	Error (ppm)
50	868.987595	0.1
40	868.987536	0.0
30	868.987441	-0.1
20	868.987531	0.0
10	868.987711	0.2
0	868.987449	-0.1
-10	868.987619	0.1
-20	868.987887	0.4
-30	868.987893	0.5

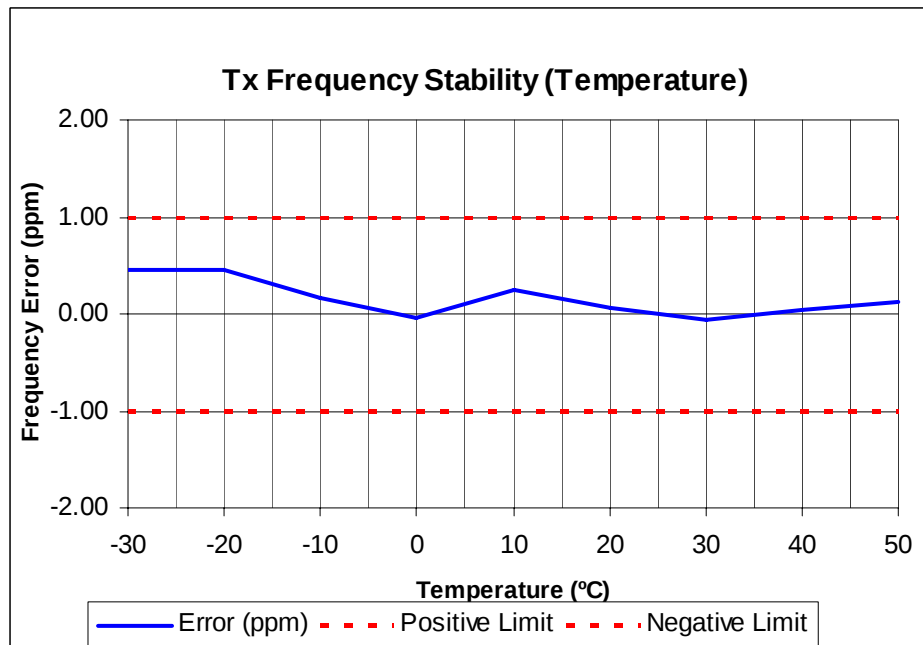
Transmitter Frequency Stability - Temperature

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

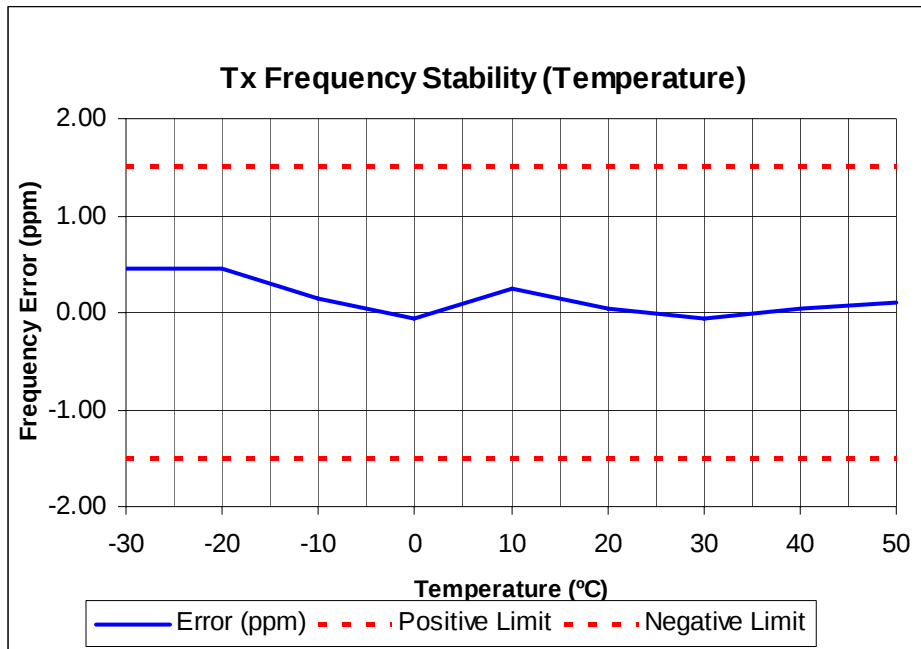
Tx FREQUENCY: 769.06875 MHz 100 W 12.5 kHz channel Spacing



Tx FREQUENCY: 852.5125 MHz 100 W 12.5 kHz channel Spacing



Tx FREQUENCY: 868.9875 MHz 100 W 12.5 kHz channel Spacing



LIMIT: RSS-119 5.3

Channel Spacing (kHz)	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 Spacing (kHz)	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 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:

Voltage	FREQUENCY ERROR (ppm) for 12.5 kHz		
	769.06875 MHz	852.5125 MHz	868.9875 MHz
120 V _{AC}	0.00	-0.02	0.01
102 V _{AC}	-0.01	-0.01	0.01
138 V _{AC}	0.00	0.00	0.02

LIMIT CLAUSES: RSS-119 5.3

Channel Spacing (kHz)	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 Spacing (kHz)	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

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

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.		

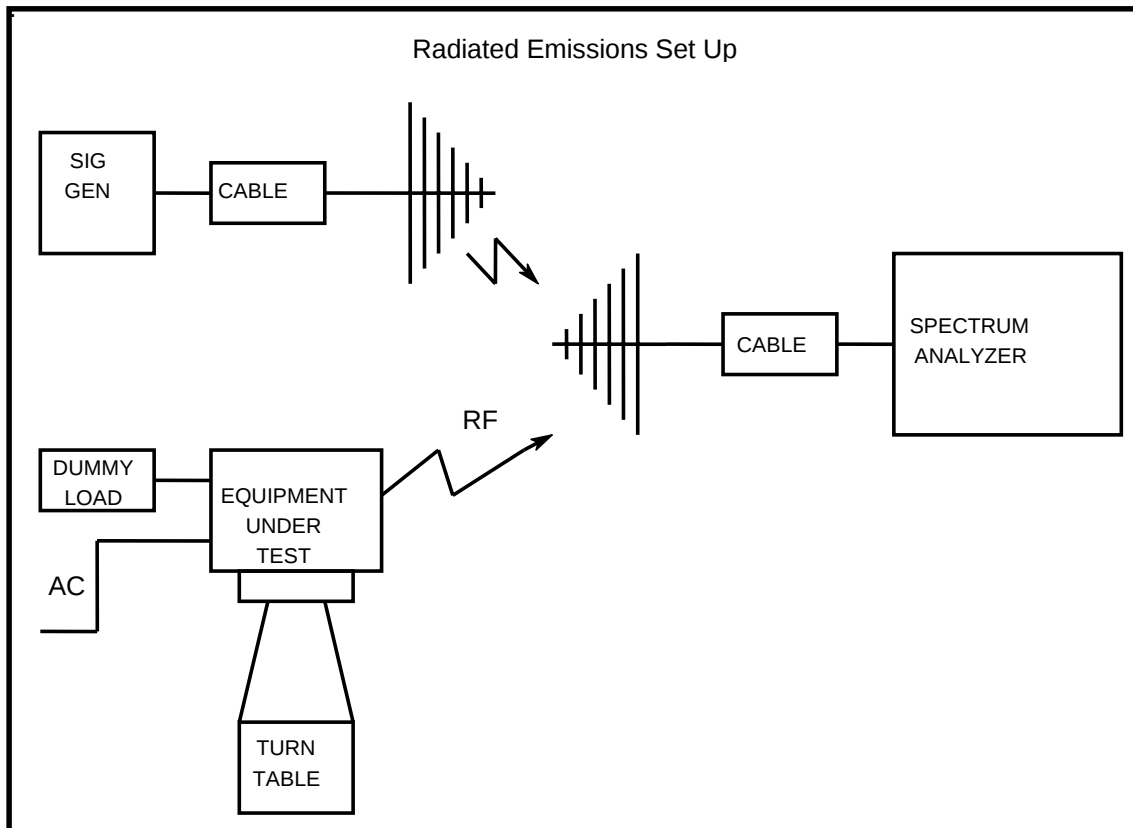
823.9875 MHz RX Port (Receive)		
Emission Frequency (MHz)	Level (nW)	Level (dBm)
~	~	~
No emissions were detected within 20 dB of Limit.		

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

TEST EQUIPMENT LIST

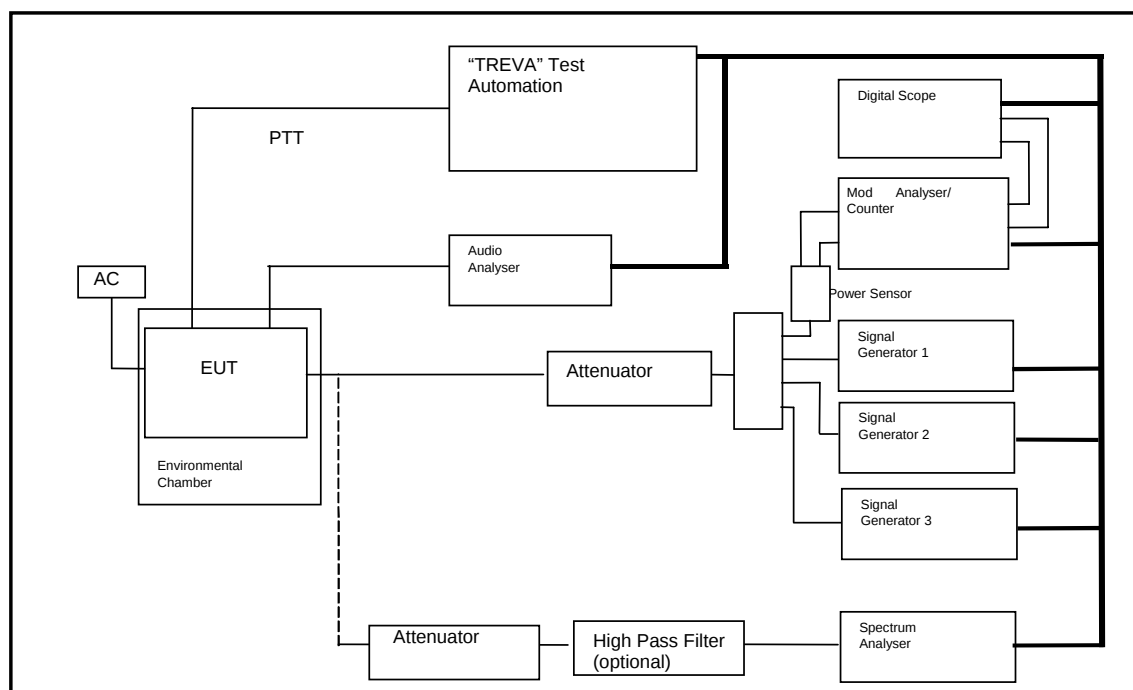
Equipment	Manufacturer	Model No	Serial No#	Tait ID	Cal Due
Signal Generator	Hewlett Packard	HP8642B (Opt 001)	2512A00176	E3064	14-Oct-12
Modulation Analyser	Hewlett Packard	HP8901B (Opt 002)	2441A00393	E3073	14-Oct-12
Variac	Yamabishi	S-260-5	TX-533	E1737	1-Sep-12
Horn Antenna	Emco	DRG3115	2084	E3076	6-Jan-13
Reference Horn Antenna	Emco	DRG3115	9512-4638	E3560	6-Jan-13
S-LINE TEM CELL	Rohde & Schwarz	1089.9296.02	338232/003	E3636	15-Jun-12
Amplifier +21.7 dB	Tait	ZFL-1000LN	E3660	E3360	2-Dec-12
RF Attenuator 150W	Weinschel	40-20-33	QT968	E4842	10-Oct-12
RF Attenuator 150W Treva	Weinschel	40-20-33	CJ405	E3733	13-Oct-12
1m Coax Cable BLUE)	Suhner	Sucoflex 104A	44610/4A	E4619	8-Oct-12
2m Coax (Black2)	Suhner	RG214HF/Nm/Nm/2000	Black2	E4623	8-Oct-12
3m Coax Cable (BLUE)	Suhner	Sucoflex 104A	44611/4A	E4620	8-Oct-12
Modulation Analyser	Hewlett Packard	HP8901B (Opt 002)	3704A05837	E3786	13-Oct-12
Power Head	Hewlett Packard	HP11722A	3111A05573	E7054	18-Oct-12
RF Attenuator	Weinschel	Model 1	BL9950	E4080	13-Oct-12
RF Attenuator	Weinschel	Model 1	BL9958	E4081	13-Oct-12
RF Attenuator 150W Treva	Weinschel	40-20-23	MF817	E4082	13-Oct-12
RF Splitter Combiner	Minicircuits	ZFSC-4-1	-	E4083	13-Oct-12
RF Splitter Combiner	Minicircuits	ZFSC-4-1	-	E4084	13-Oct-12
RF Attenuator 25W	Weinschel	33-20-33	BD5871	E3673	8-Oct-12
RF Attenuator 150W Treva	Weinschel	40-20-33	CJ405	E3733	13-Oct-12
Spectrum Analyser	Agilent	E4445A	MY42510072	E4139	26-Aug-12
Filter High Pass	Tait	HPF (E3785)	N/A	E3785	Cal on Use
Attenuator	Weinschel	67-30-33	BR0531	E4280	10-Oct-12
Multimeter	Fluke	77	35069359	E3237	10-Oct-12
Temp & Humidity datalogger	Hobo	H8	-	E4441	7-Aug-12
Temp & Humidity datalogger	Hobo	H8	-	E4442	7-Aug-12
AC Voltmeter	Tait	Tait	-	1	1-Sep-12
AC Voltmeter	Tait	Tait	-	2	1-Sep-12
OATS NSA	Tait	-	-	-	13-Apr-12
OATS Tower Cable	Intelcom	RG214	OATS1	E4621	12-Oct-12
OATS Turntable Cable	Intelcom	RG215	OATS2	E4622	12-Oct-12
Antenna Tower	Electrometrics	EM-4720-2	112	E4447	Cal on Use
Controller	Electrometrics	EM-4700	119	E4445	Cal on Use
Turntable	Electrometrics	EM-4704A	105	E4446	Cal on Use
Power Sensor	Hewlett Packard	11722A	2716A02037		18-Oct-12

ANNEX 1– RADIATED EMISSIONS TEST SETUP DETAILS



ANNEX 2– AUTOMATED EMISSIONS TEST SETUP DETAILS

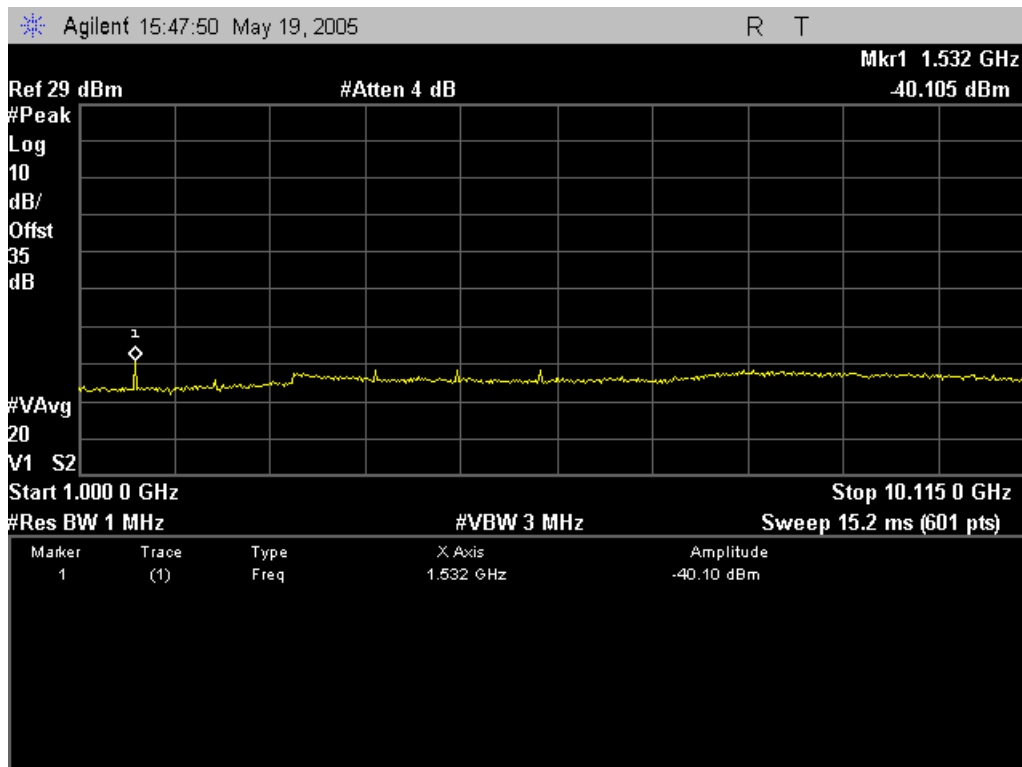
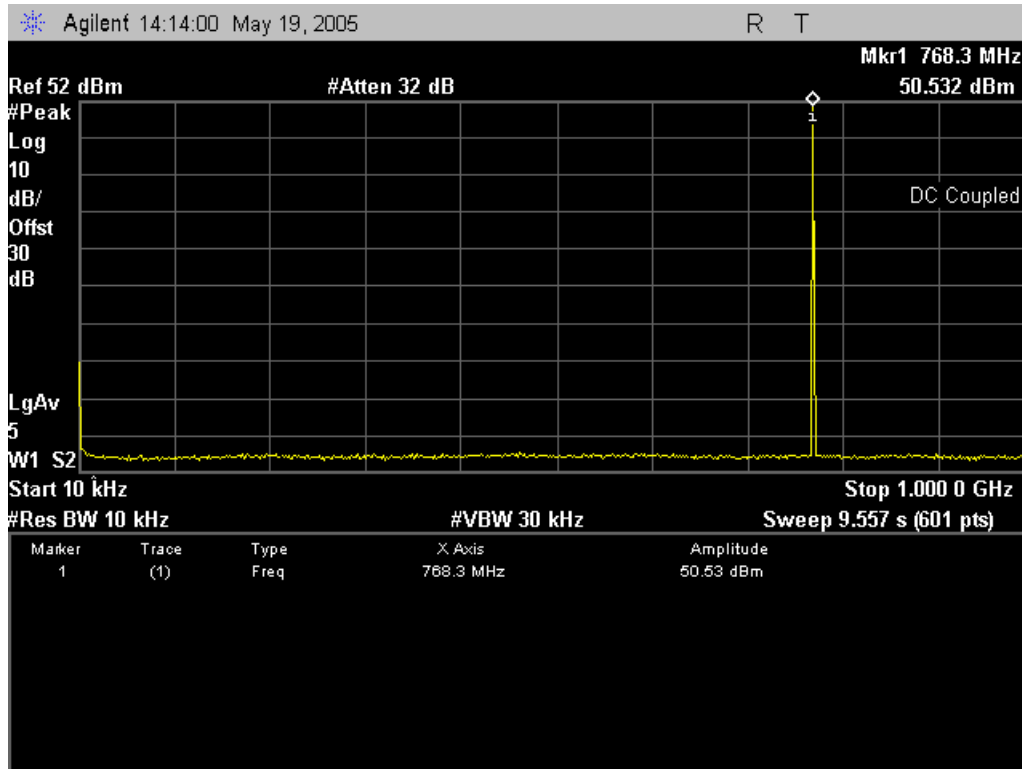
All other testing is performed using the Teltest Radio **E**valuation system (TREVA), which is configured as shown below. The Spectrum Analyser is connected to the EUT via the attenuator network for Conducted Emissions testing, and Occupied Bandwidth.



ANNEX 3 – TX CONDUCTED EMISSION PLOTS

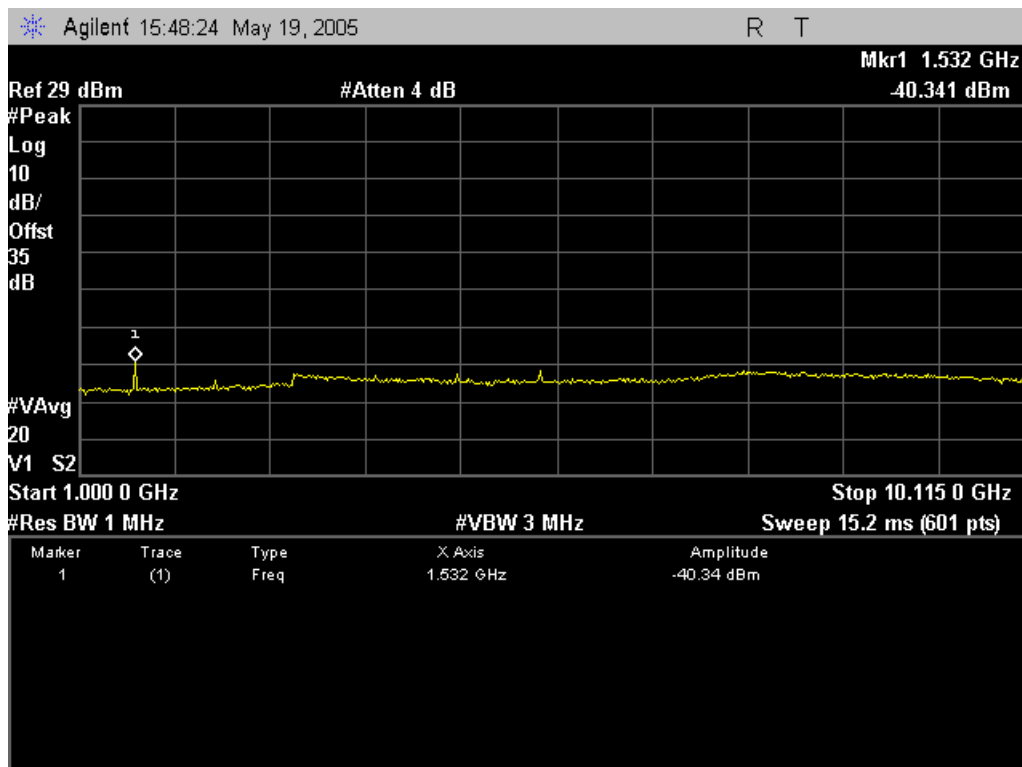
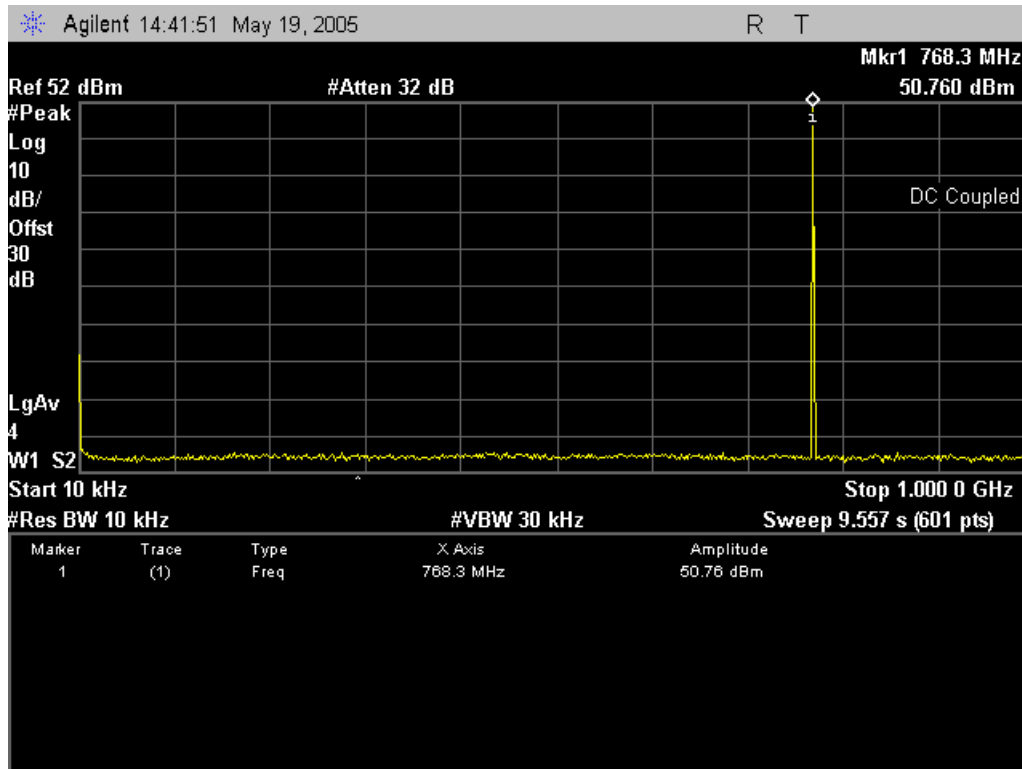
SPECIFICATION: RSS-119 5.8

Tx FREQUENCY: 769.06875 MHz 100 Watts C4FM



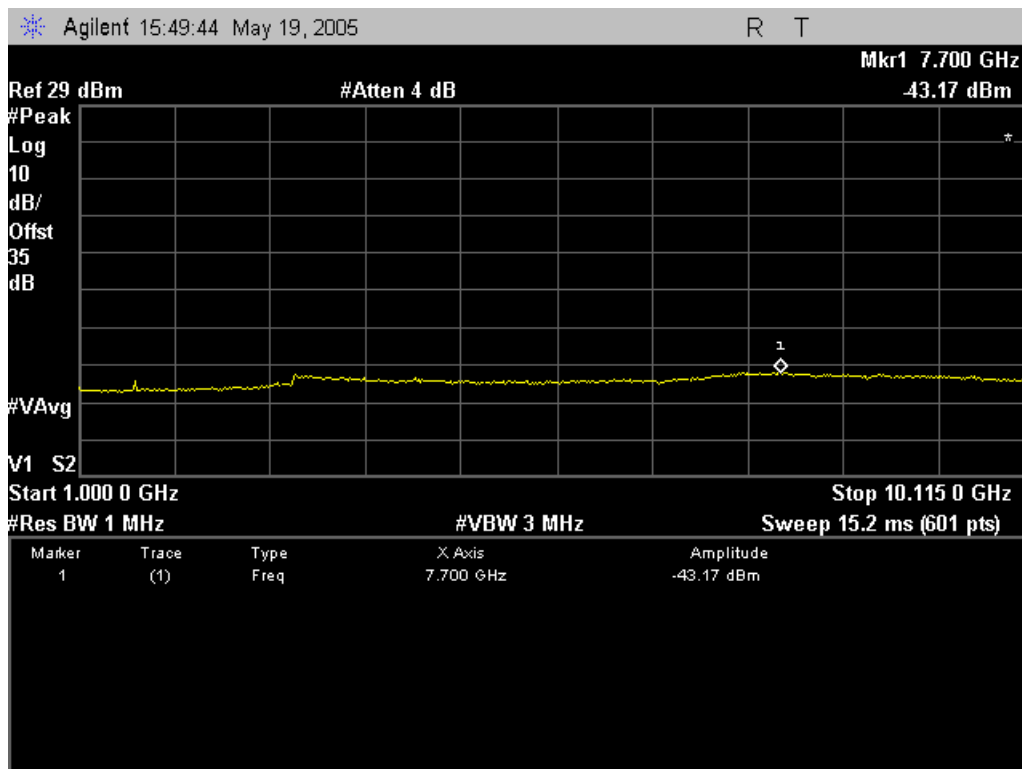
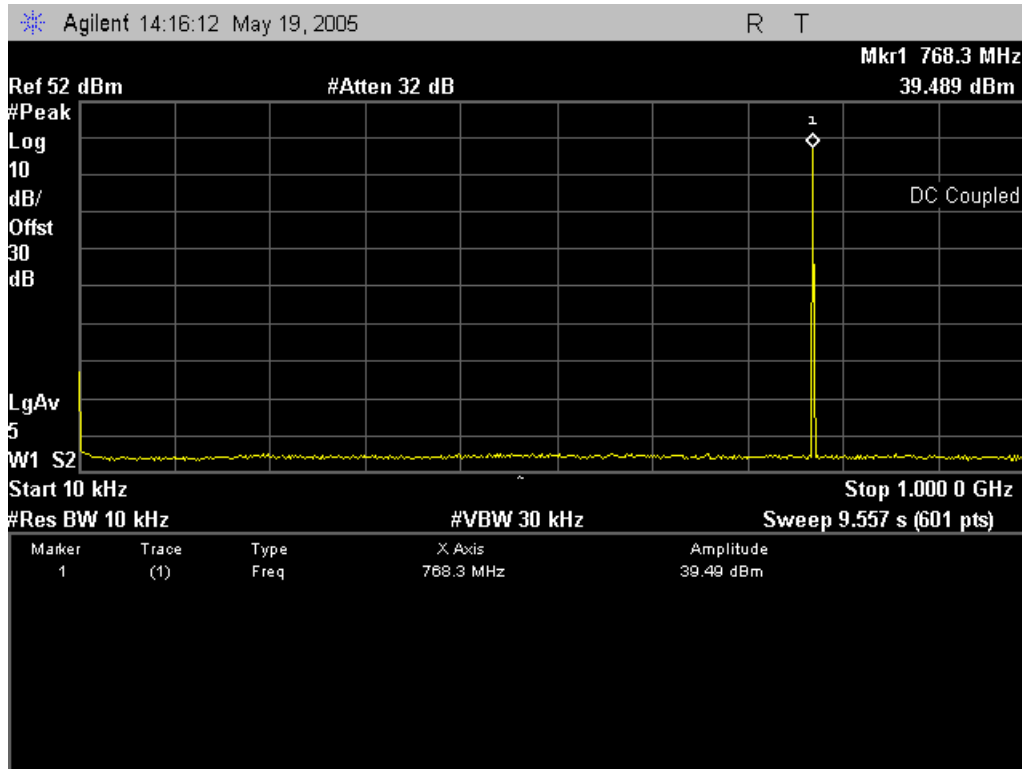
TELTEST Laboratories
Tait Electronics Limited
Report Number 3311

SPECIFICATION: RSS-119 5.8
Tx FREQUENCY: 769.06875 MHz 100 Watts LSM



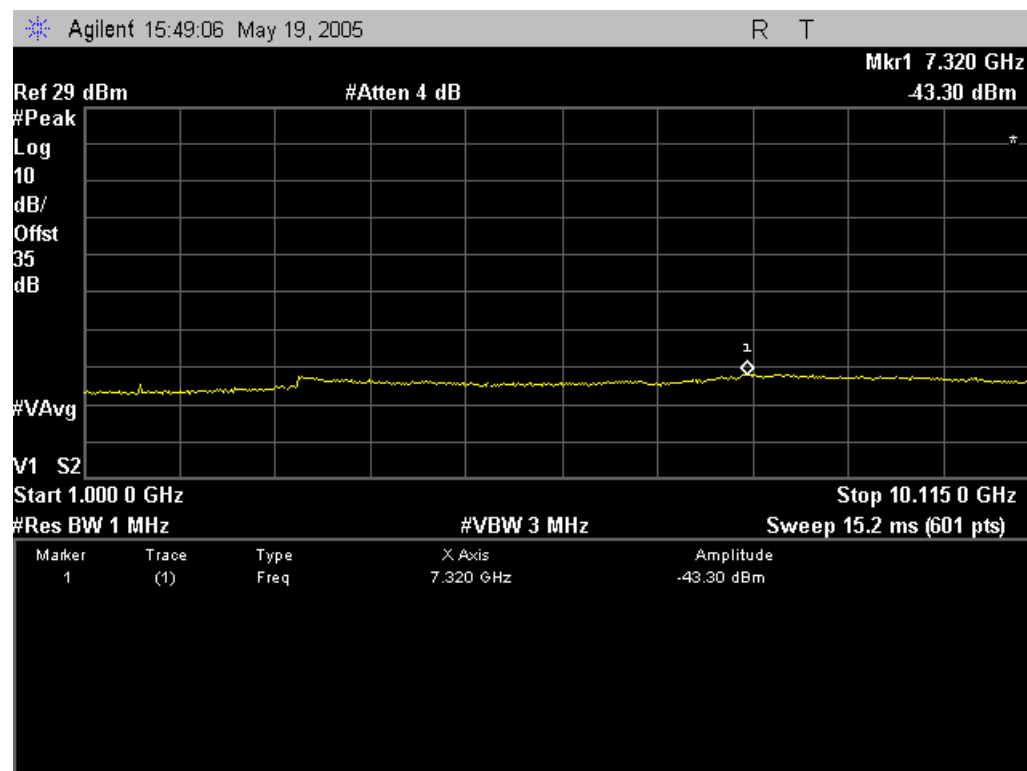
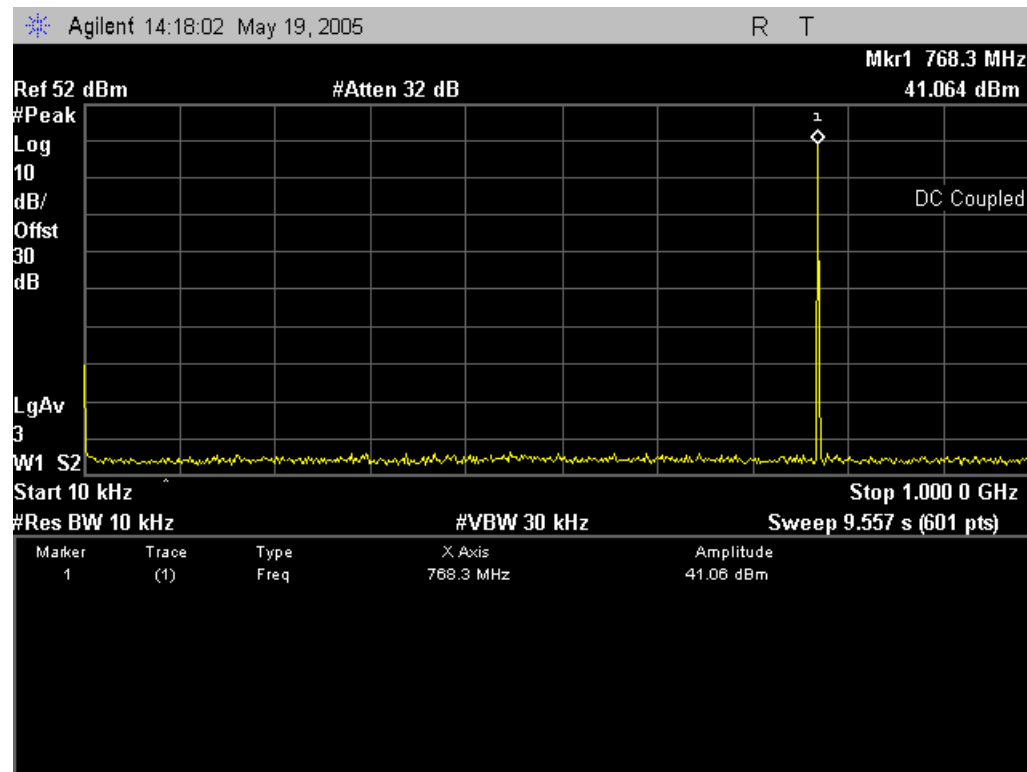
SPECIFICATION: RSS-119 5.8

Tx FREQUENCY: 769.06875 MHz 10 Watts C4 FM



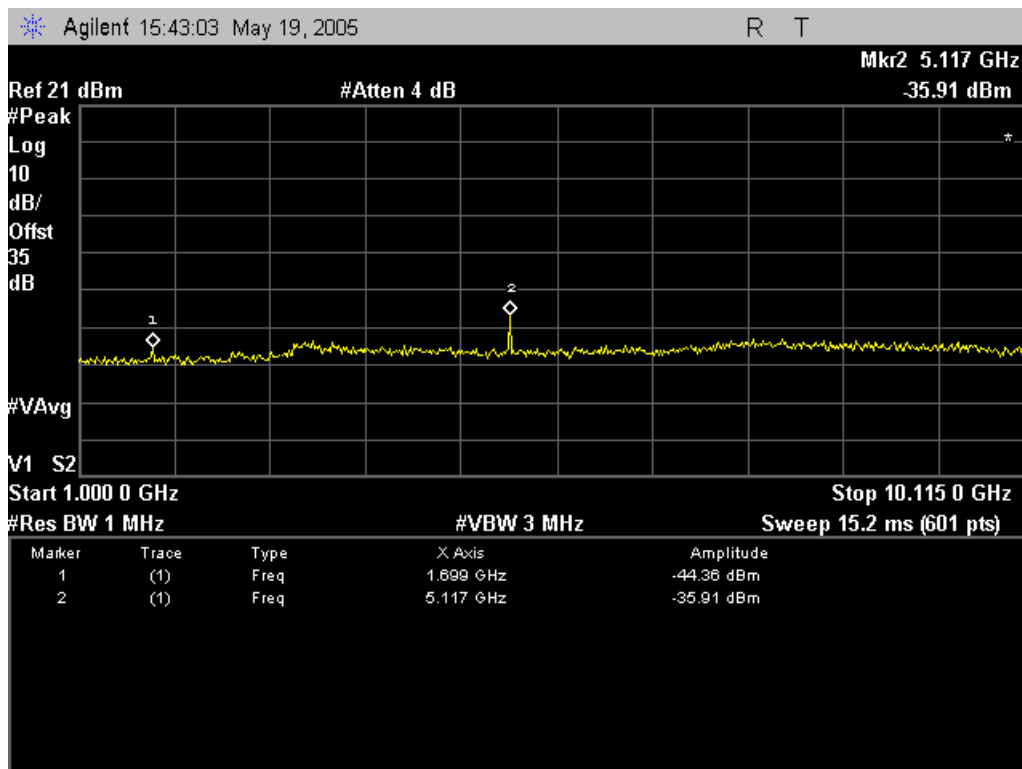
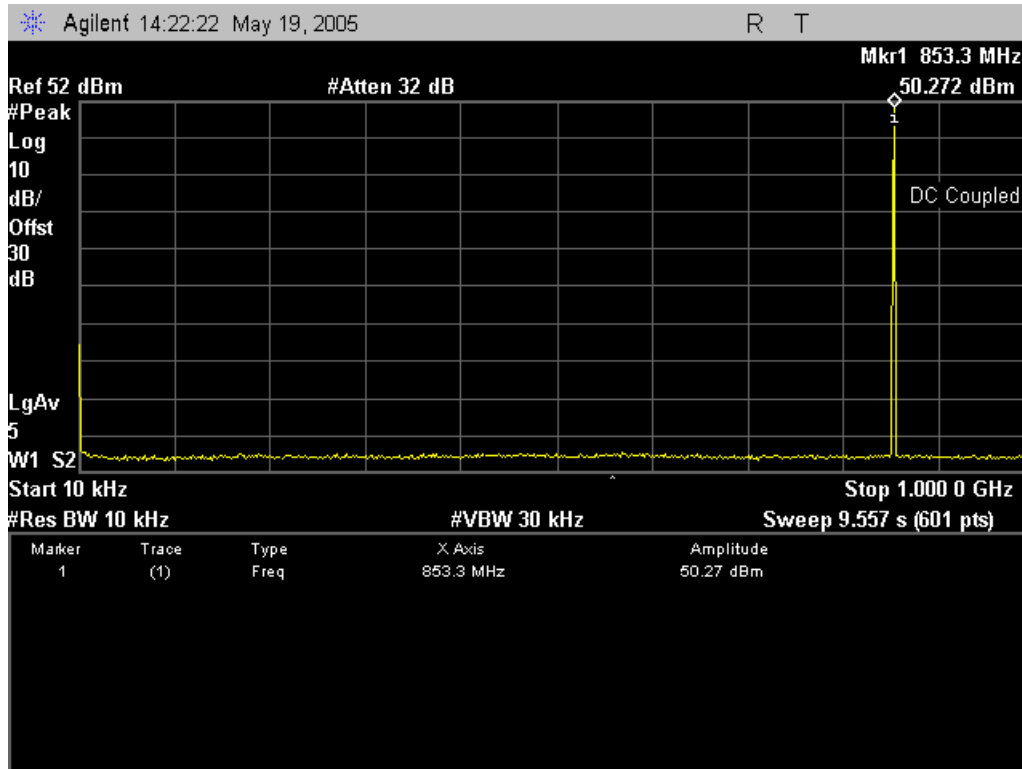
SPECIFICATION: RSS-119 5.8

Tx FREQUENCY: 769.06875 MHz 10 Watts LSM



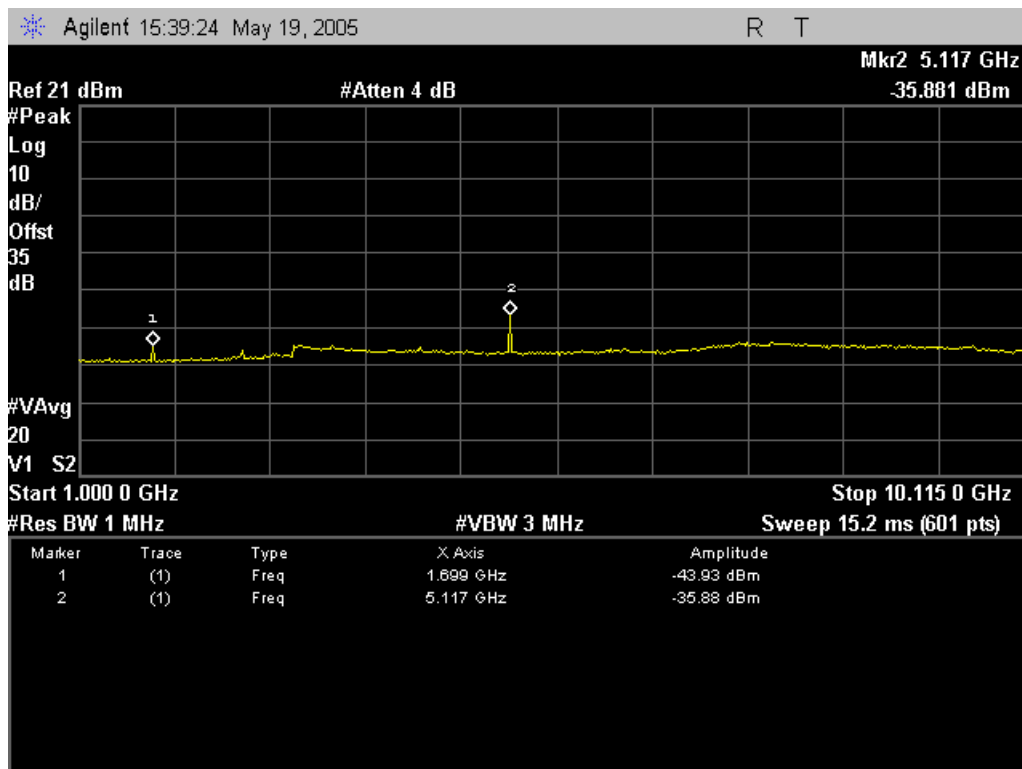
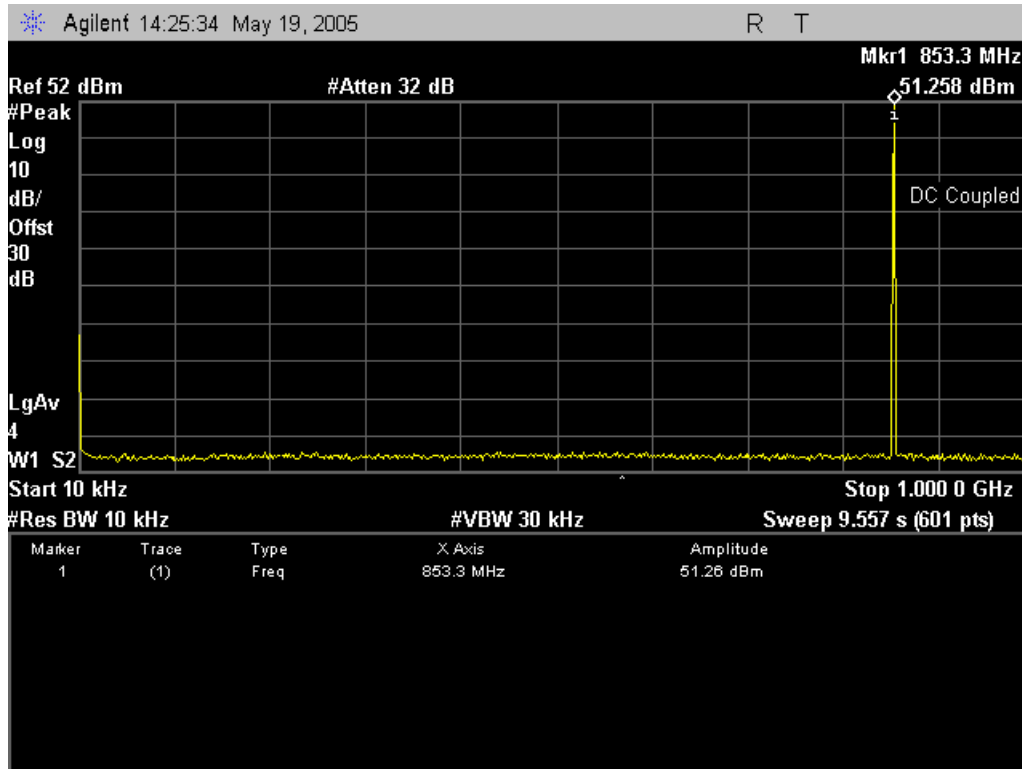
SPECIFICATION: RSS-119 5.8

Tx FREQUENCY: 852.5125 MHz 100 Watts C4FM



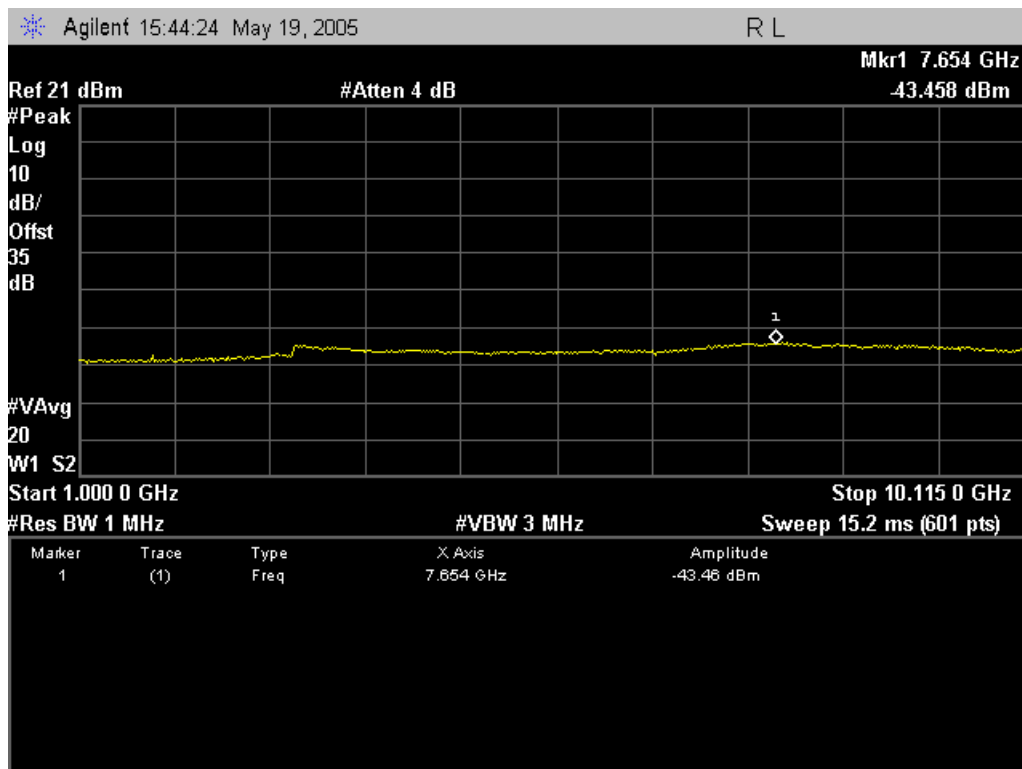
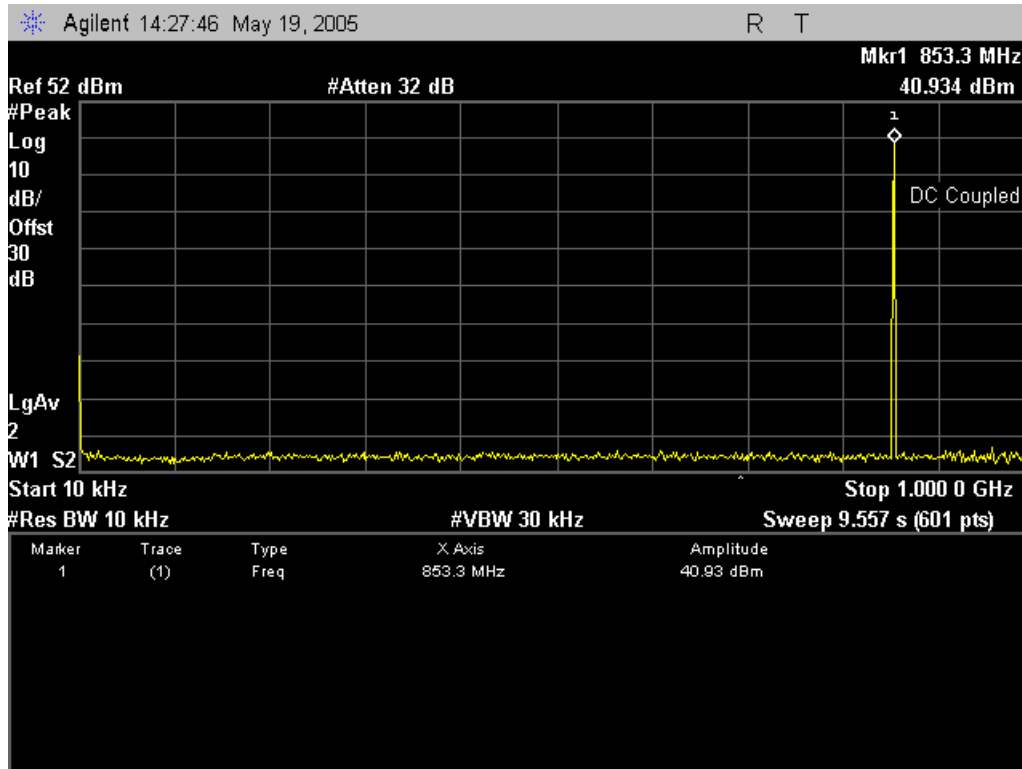
SPECIFICATION: RSS-119 5.8

Tx FREQUENCY: 852.5125 MHz 100 Watts LSM



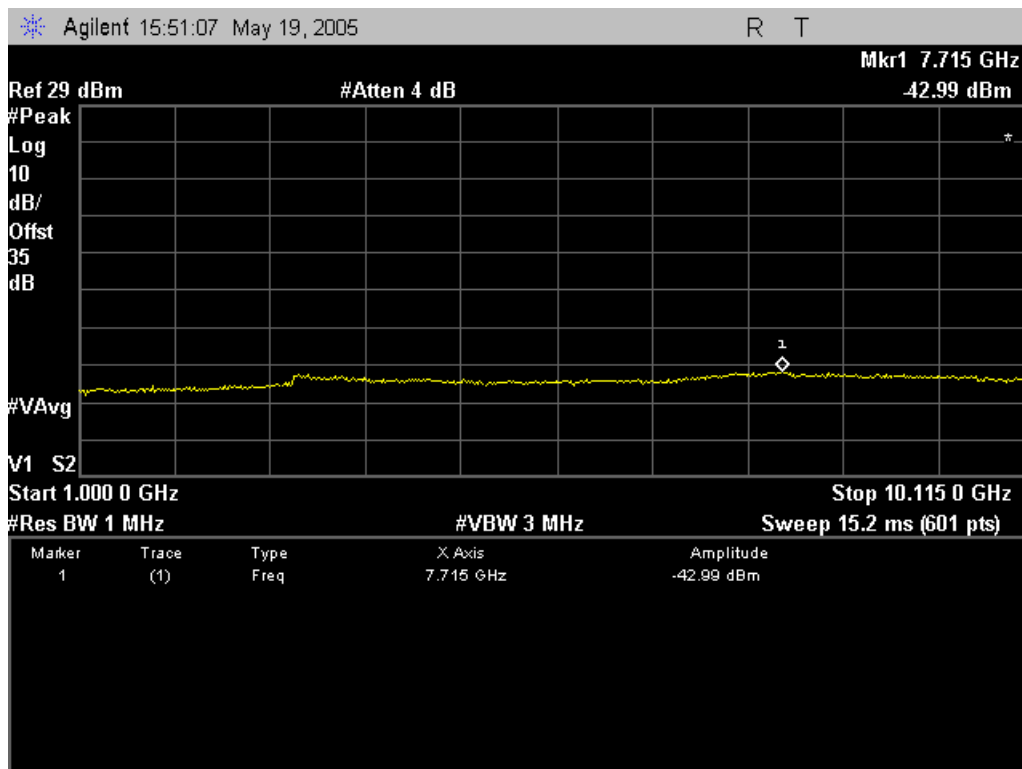
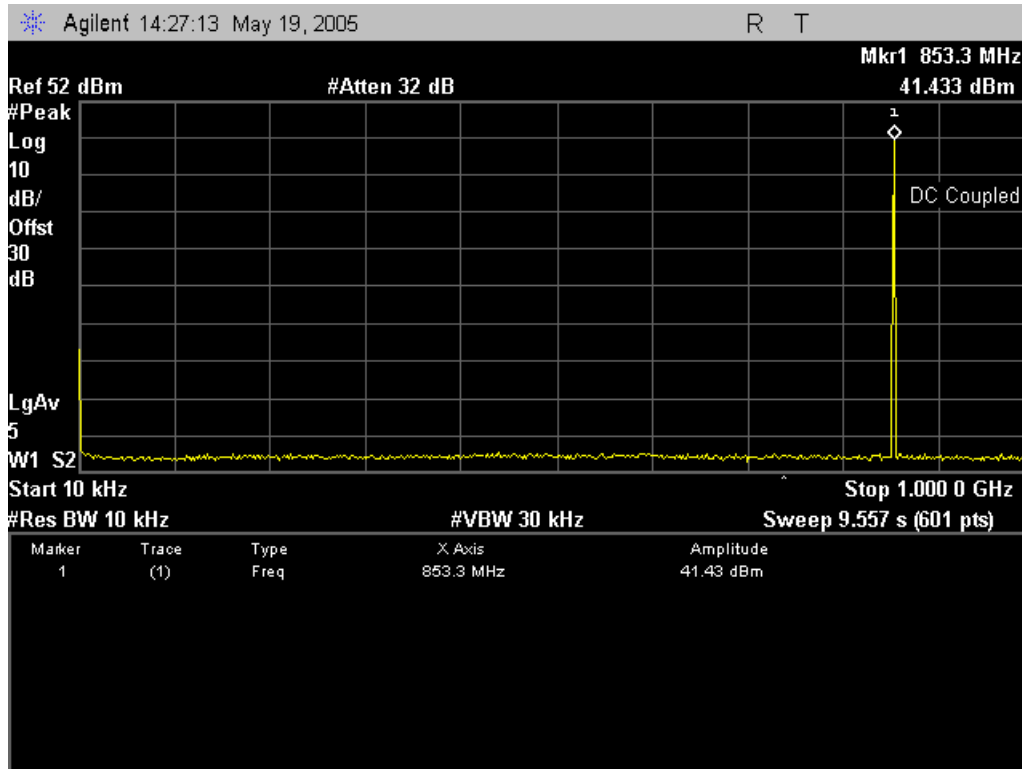
SPECIFICATION: RSS-119 5.8

Tx FREQUENCY: 852.5125 MHz 10 Watts C4FM



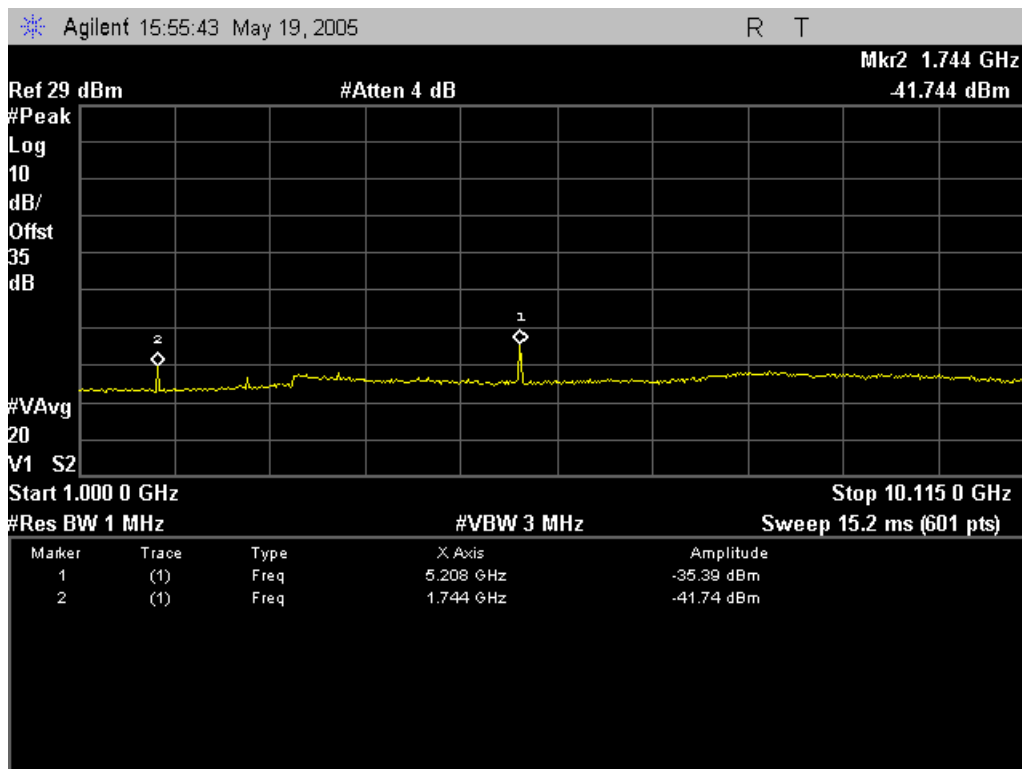
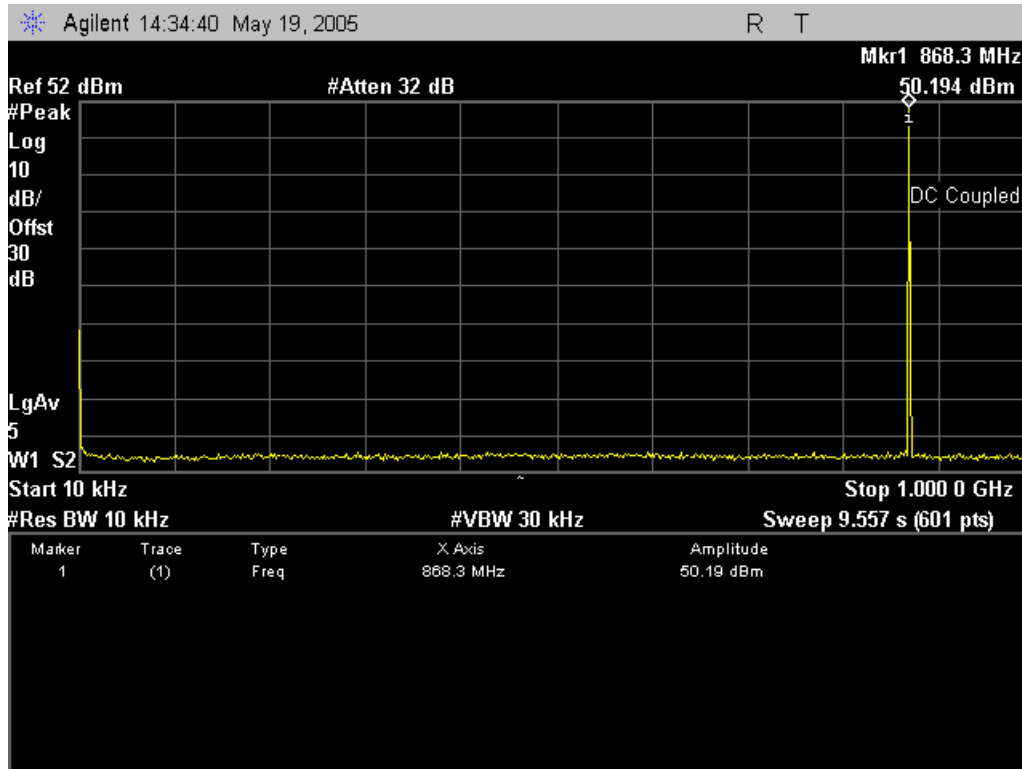
SPECIFICATION: RSS-119 5.8

Tx FREQUENCY: 852.5125 MHz 10 Watts LSM



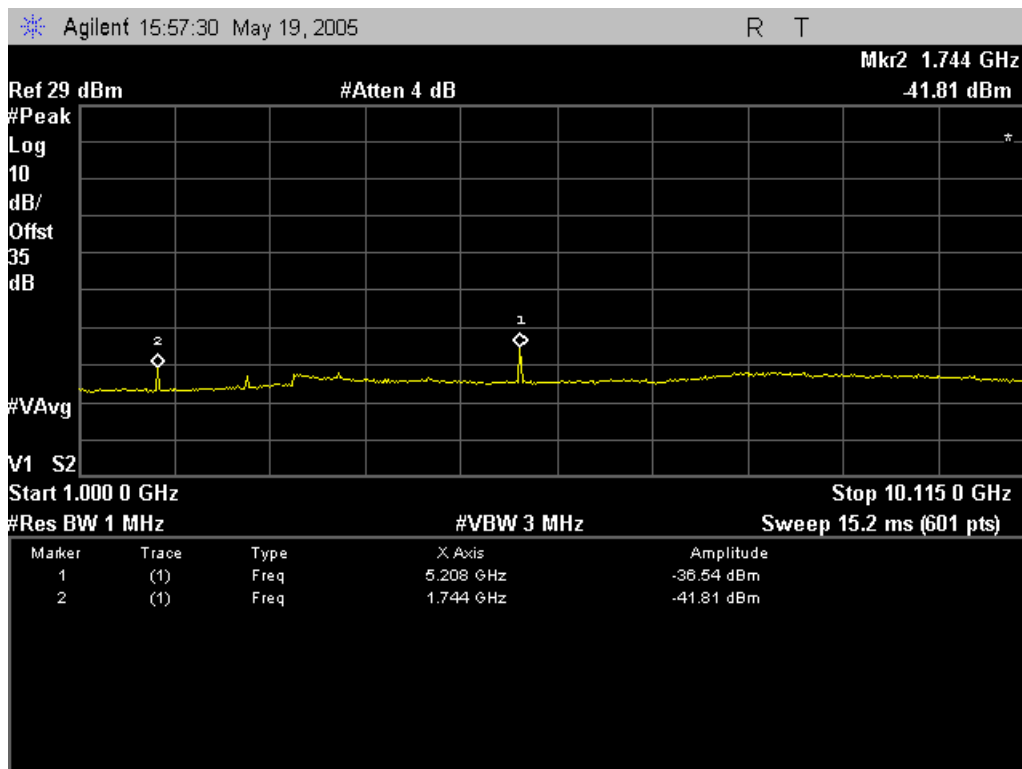
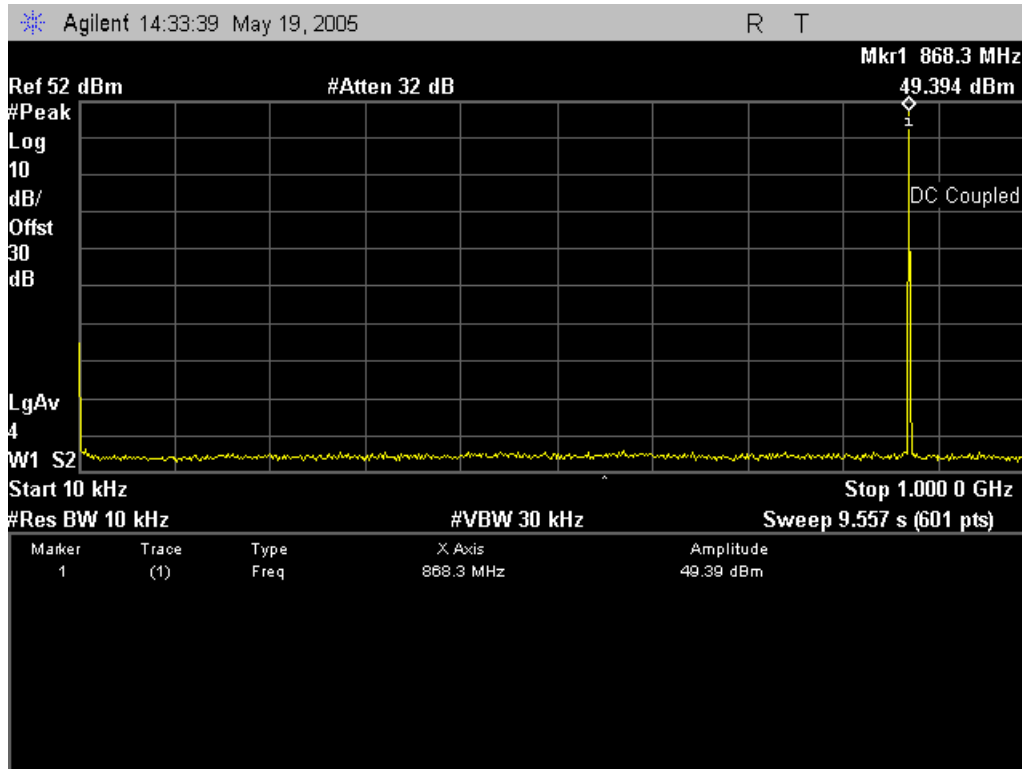
SPECIFICATION: RSS-119 5.8

Tx FREQUENCY: 868.9875 MHz 100 Watts C4FM



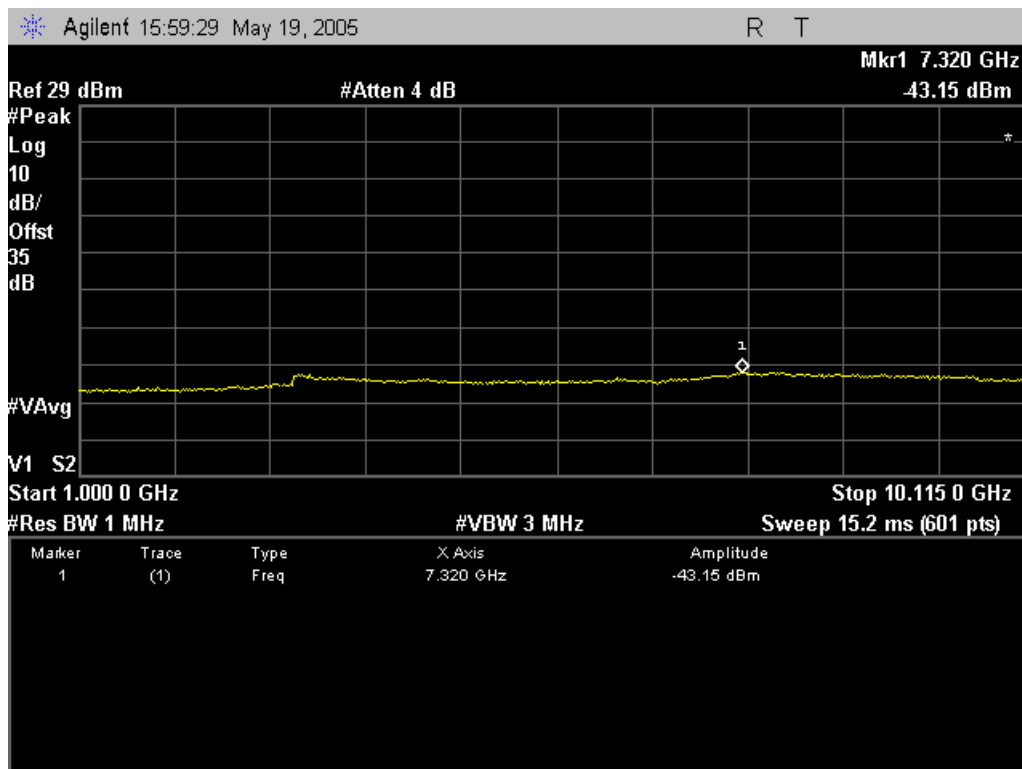
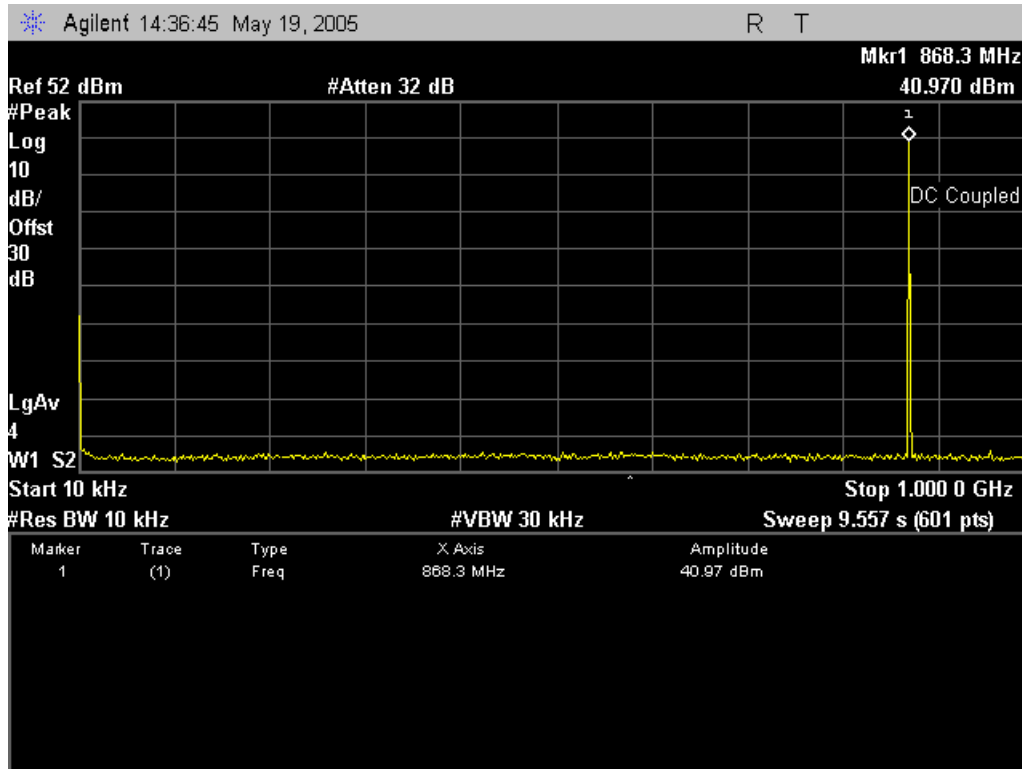
SPECIFICATION: RSS-119 5.8

Tx FREQUENCY: 868.9875 MHz 100 Watts LSM



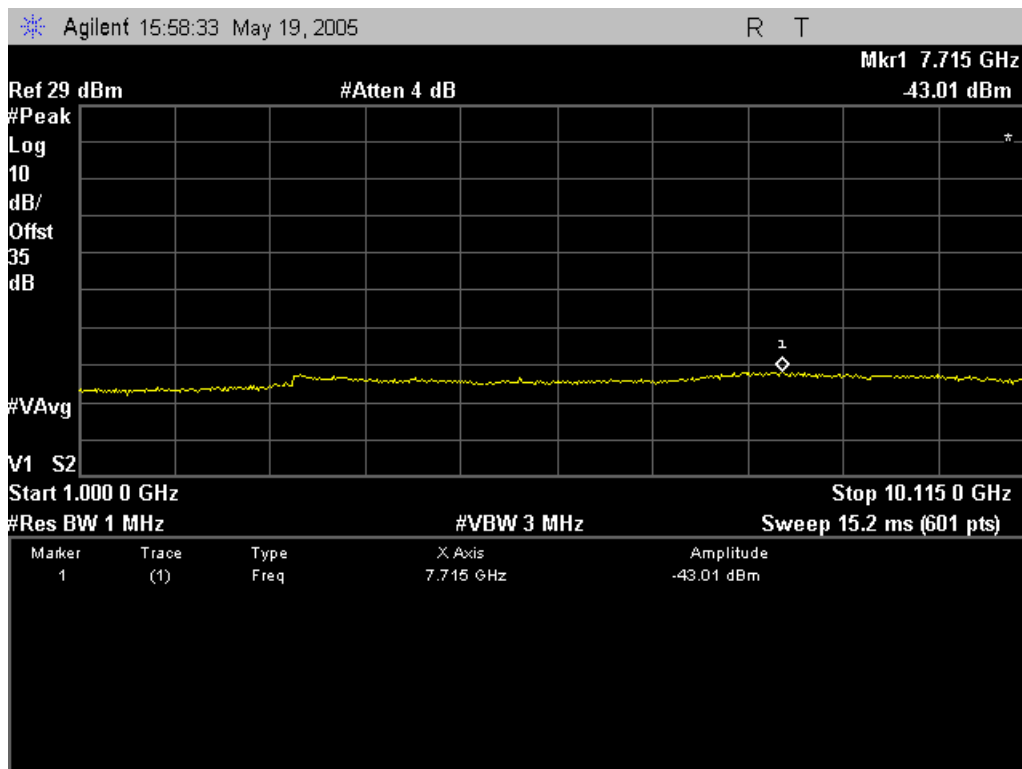
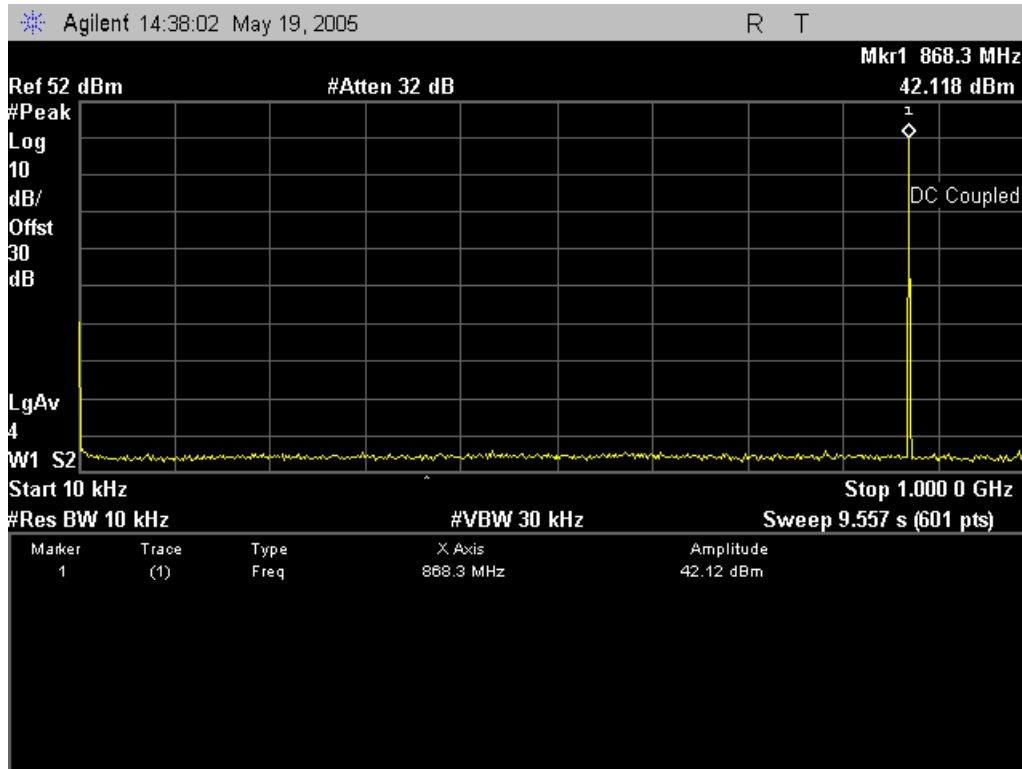
SPECIFICATION: RSS-119 5.8

Tx FREQUENCY: 868.9875 MHz 10 Watts C4FM



SPECIFICATION: RSS-119 5.8

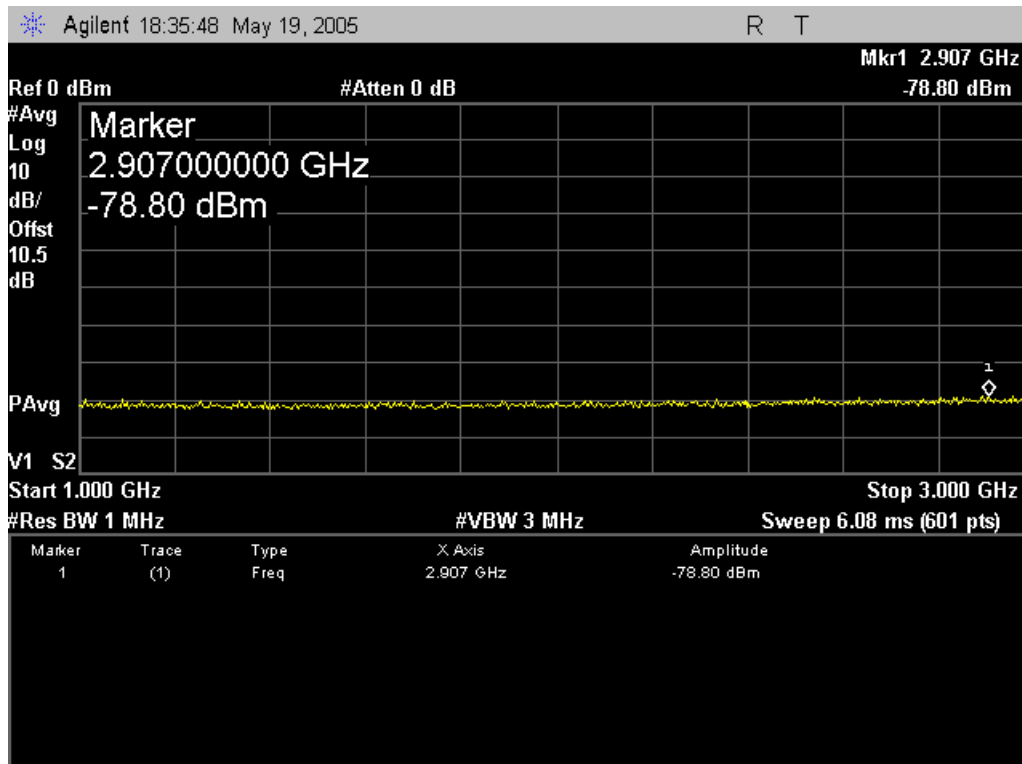
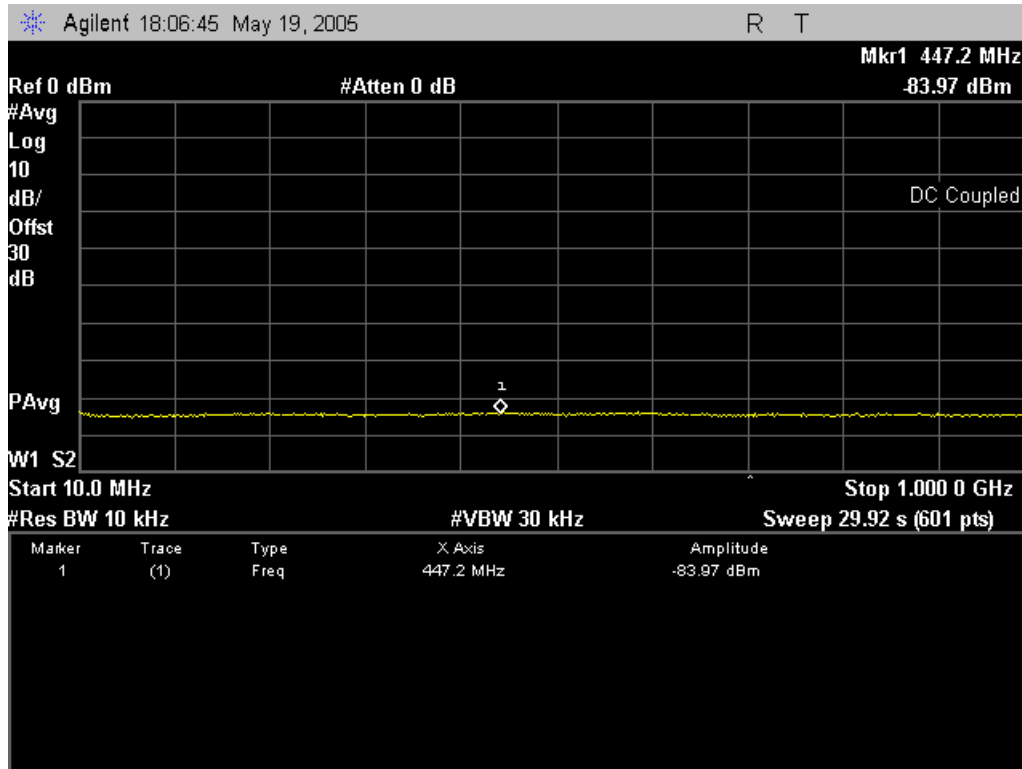
Tx FREQUENCY: 868.9875 MHz 10 Watts LSM



ANNEX 4 – TX STANDBY / RX CONDUCTED EMISSION PLOTS

SPECIFICATION: RSS-119 5.11

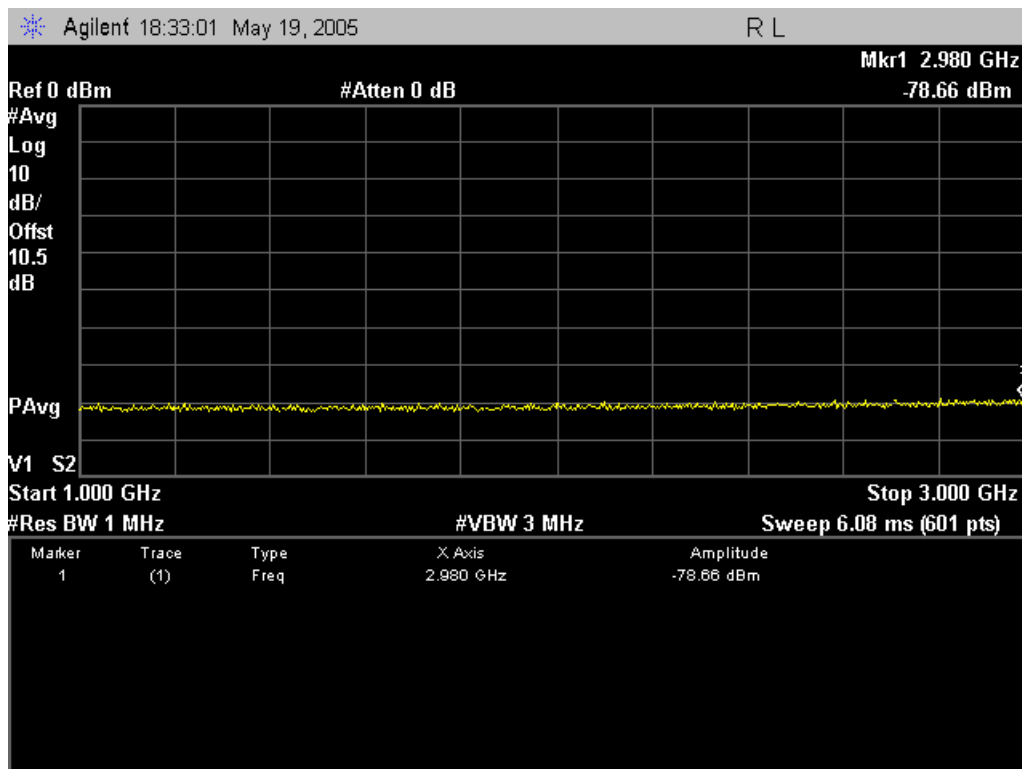
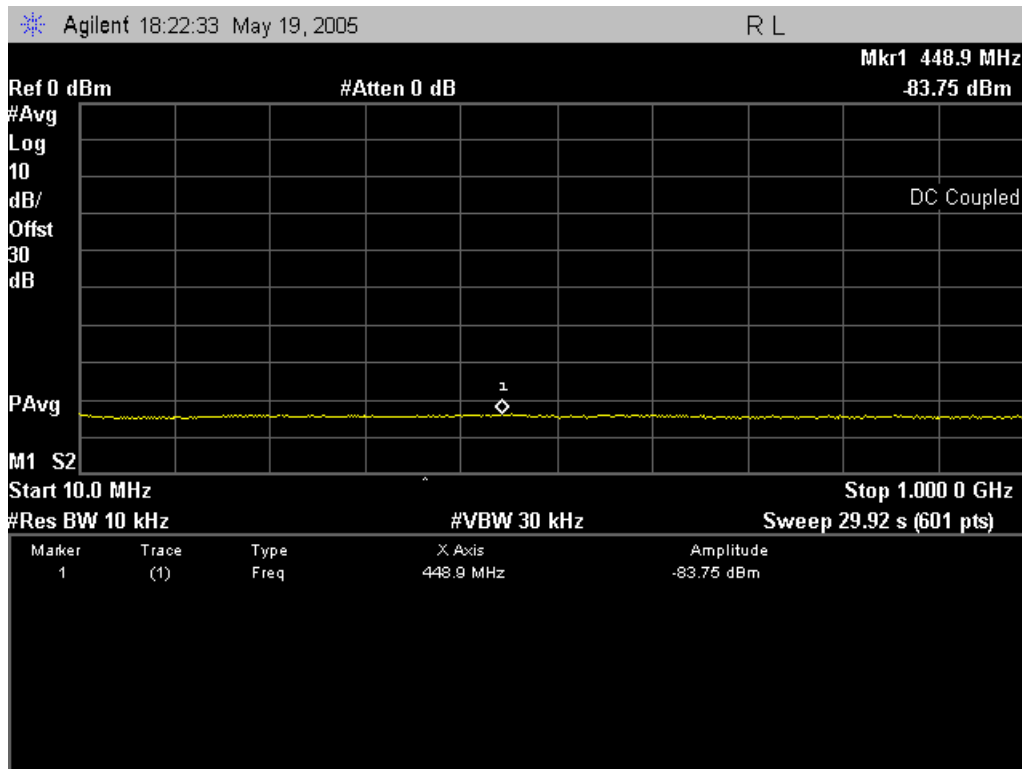
Tx FREQUENCY: 769.06875 MHz 0 Watts / TX Standby – TX Port



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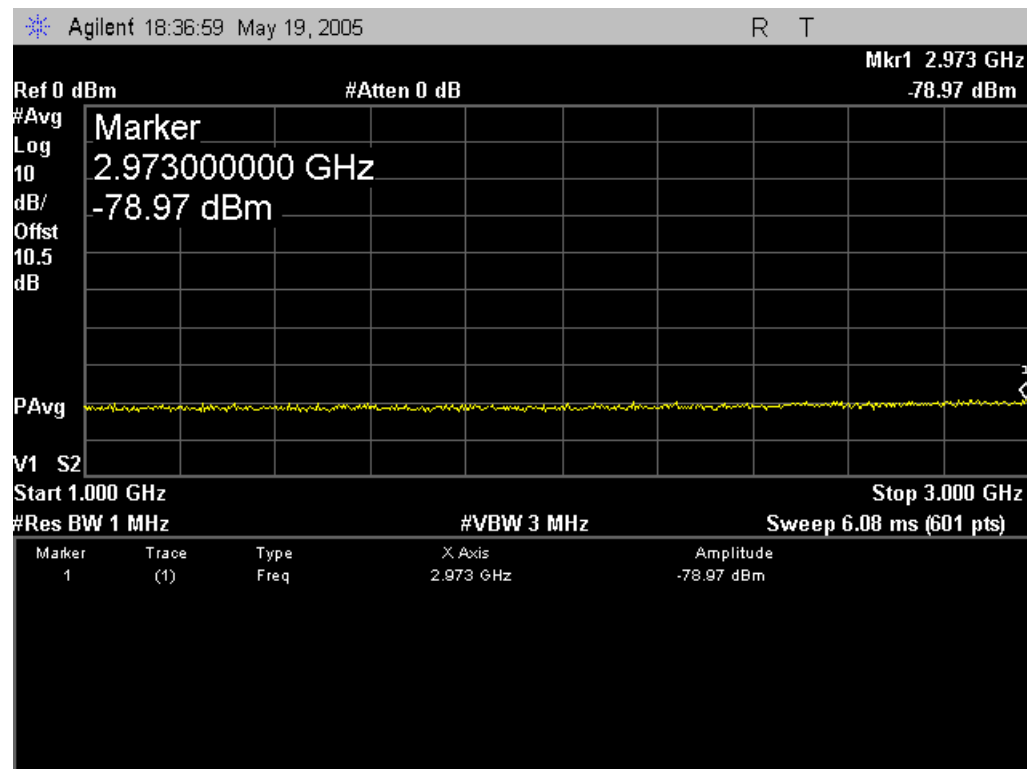
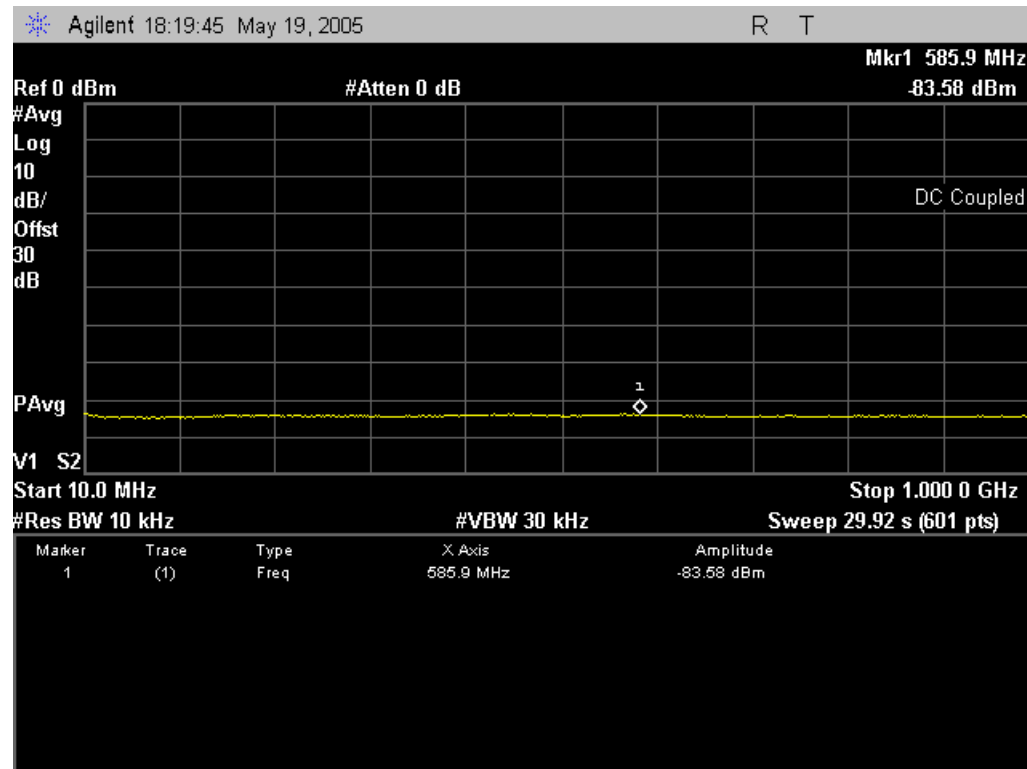
SPECIFICATION: RSS-119 5.11

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



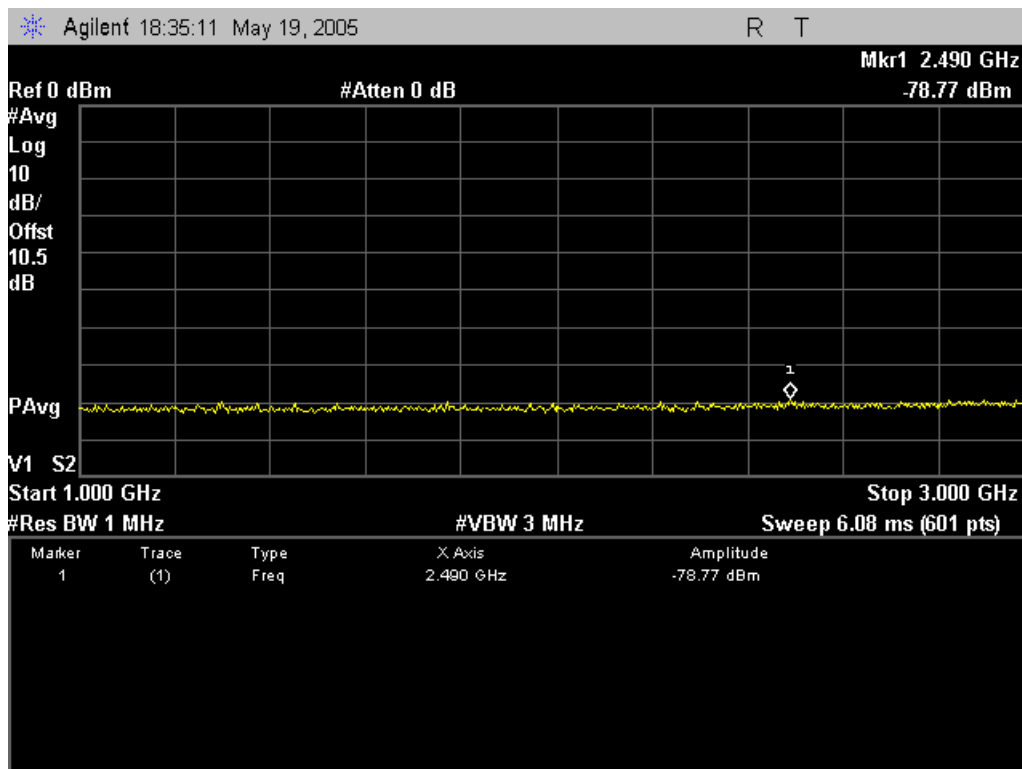
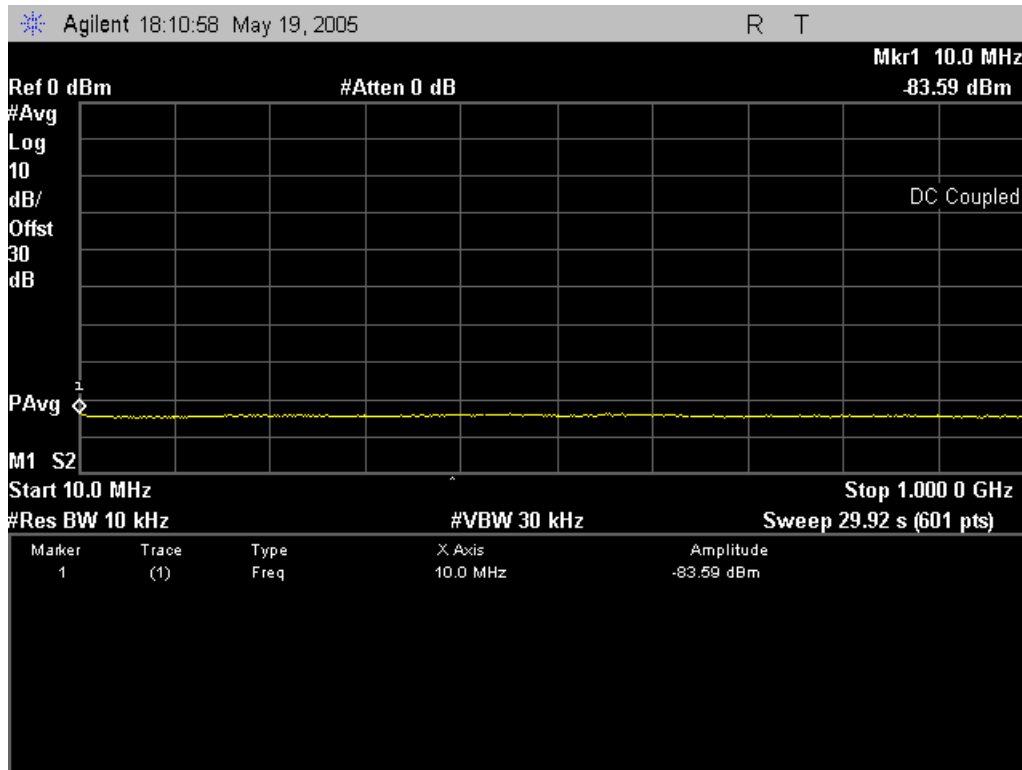
SPECIFICATION: RSS-119 5.11

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



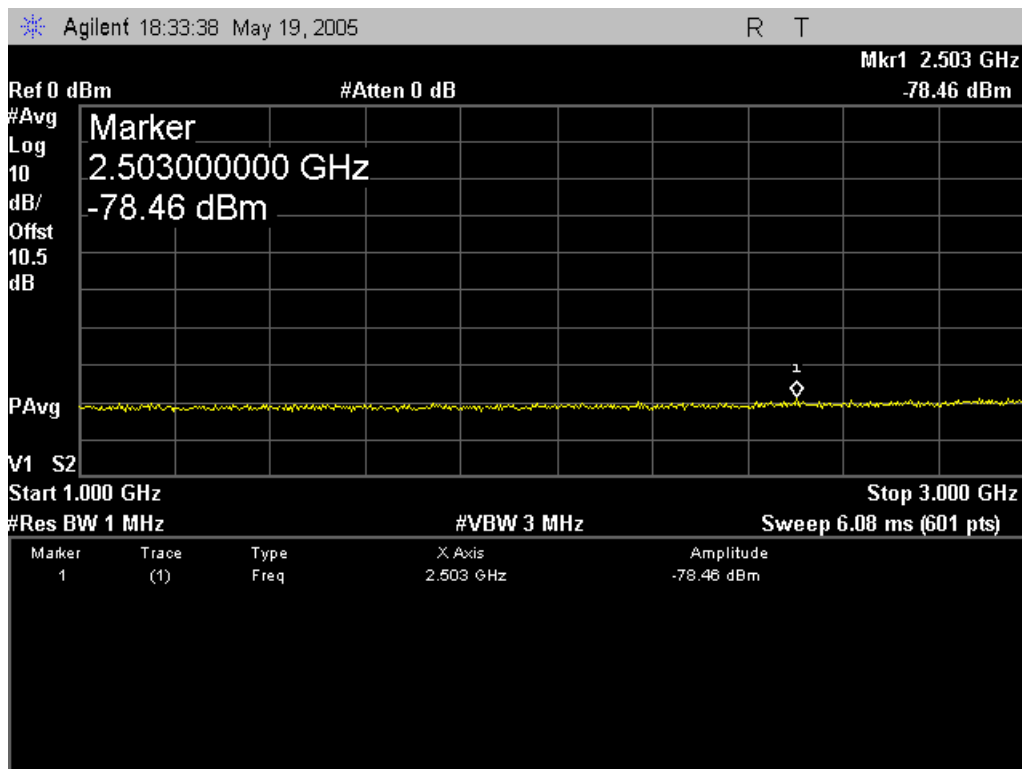
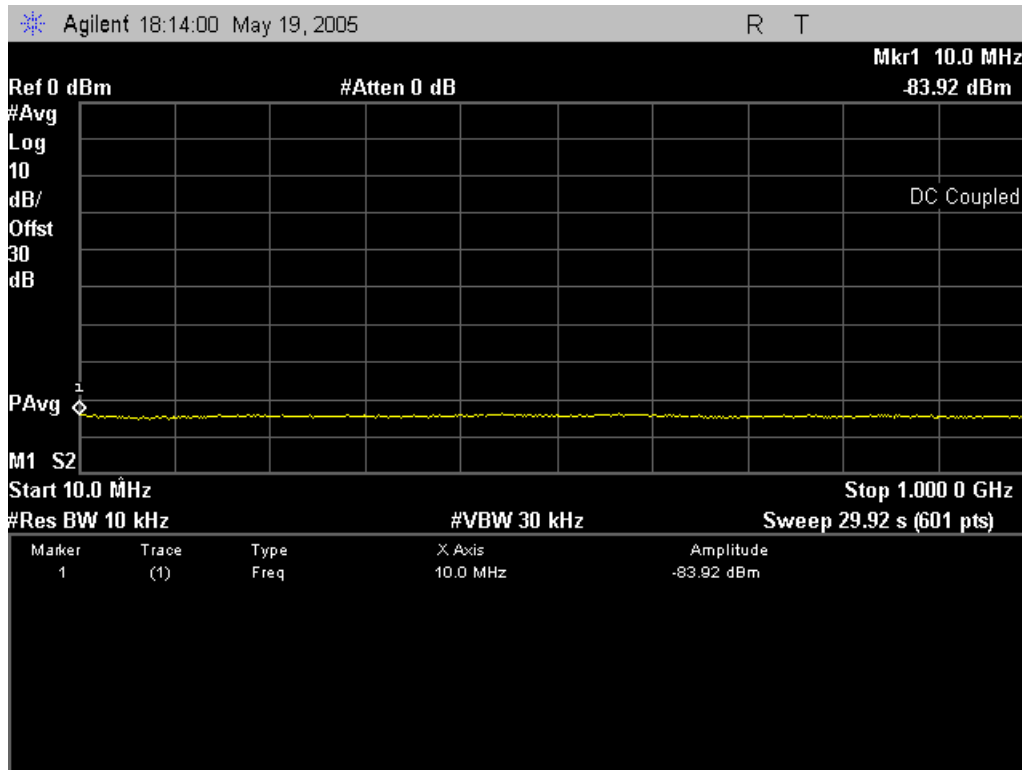
SPECIFICATION: RSS-119 5.11

Tx FREQUENCY: 799.06875 MHz RX – RX Port



SPECIFICATION: RSS-119 5.11

Tx FREQUENCY: 807.5125 MHz RX – RX Port



SPECIFICATION: RSS-119 5.11

Tx FREQUENCY: 823.9875 MHz RX – RX Port

