



## MEASUREMENT AND TEST REPORT


VERSION 1.01

**Report Prepared for:** Daniels Electronics Ltd.  
43 Erie Street  
Victoria, BC  
V8V 1P8

**Equipment Under Test (EUT):** UT-4E900-00-300  
Audio and paging base station transmitter

**FCC ID:** H4JUT-4E900  
**FCC Rule Part(s):** Part 22, 90  
**Industry Canada Rule Part(s)** RSS 119

**Tested by:** Island Compliance Services Inc.  
6454 Fitzgerald Road  
Courtenay, BC  
V9J 1N7

<b>Authorized By</b>
Andrew Eadie (Manager)


**Date:** 8<sup>th</sup> July 2011

Note: This test report has been prepared for the Applicant and device described herein. It may not be duplicated or used in part without prior written consent from Island Compliance Services Inc.

**FCC OATS registration number:** 386117  
**Industry Canada OATS registration number:** 9578B-1

## Revision History

Version	Date	Author	Comment
1.00	27th June 2011	A. Eadie	Original Release
1.01	8 <sup>th</sup> July 2011	A. Eadie	Added reference to ANSI/TIA-603-C-2004 in section 2.2

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## 2 SUMMARY OF TEST RESULTS

The equipment under test was found to comply with the test standards and criteria outlined herein.

Test Description	Reference Specification	Result	Comment
RF Power Output	2.1046 RSS119 (5.4)	Complies	
Audio Frequency Response	2.1047 (a)	Complies	
Audio Low-Pass Filter Response	2.1047 (a)	Complies	
Modulation Limiting	2.1047 (b)	Complies	
Occupied Bandwidth	90.210, 22.357 RSS119 (5.8)	Complies	
Spurious Emissions at Antenna Port	2.1051	Complies	
Field Strength of Spurious Emissions	2.1053(a)	Complies	
Frequency Stability	90.213 RSS119 (5.3)	Complies	

### 2.1 ENVIRONMENTAL CONDITIONS

Description	Reading
Indoor Temperature	22 °C
Indoor Humidity	50%
Outdoor Temperature	16 °C
Indoor Humidity	50%

### 2.2 STANDARD TEST CONDITIONS AND ENGINEERING PRACTICES

Except as noted herein, the following conditions and procedures were observed during the testing:

In accordance with ANSI/TIA-603-C-2004, and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10° to 40°C (50° to 104 °F) unless the particular equipment requirements specify testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 90% relative humidity.

Measurement results, unless otherwise noted, are worst-case measurements.

### 3 GENERAL EQUIPMENT SPECIFICATIONS

Item	Description
<b>Manufacturer</b>	Daniels Electronics
<b>Model Number</b>	UT-4E900-00-300
<b>Function</b>	Land Mobile Radio Service – Audio and Paging
<b>Power Supply Input</b>	13.8 VDC
<b>Emission Designators</b>	11K0F3E, 16K0F1D, 16K0F3E, 8K10F1D, 8K10F1E, 9K20F1D
<b>Power Output</b>	3.65W
<b>Channel Spacing</b>	12.5kHz, 25kHz
<b>Frequency Range</b>	896MHz – 960MHz

#### 3.1 AUXILIARY EQUIPMENT

Equipment	Description
None	N/A

#### 3.2 ENGINEERING CHANGES TO PRODUCTION UNIT

N/A

## 4 RF POWER OUTPUT

Test Name	Reference Specification	Result	Notes
RF Power Output	2.1046 RSS119 (5.4)	Complies	

### 4.1 METHOD

See section 12.1 for test set-up.

### 4.2 DATA

Tuned Frequency (MHz)	Measurement (dBm)
896	35.60
928	35.49
960	35.28

### 4.3 ADDITIONAL INFORMATION

Description	Comment
Test Engineer	B. Balston
Test Date	18 <sup>th</sup> May 2011

## 5 AUDIO FREQUENCY RESPONSE

Test Description	Reference Specification	Result	Notes
Audio Frequency Response	2.1047	Complies	

### 5.1 DATA

See attached plot(s).

### 5.2 ADDITIONAL INFORMATION

Description	Comment
Test Engineer	A. Eadie
Test Date	27 <sup>th</sup> May 2011

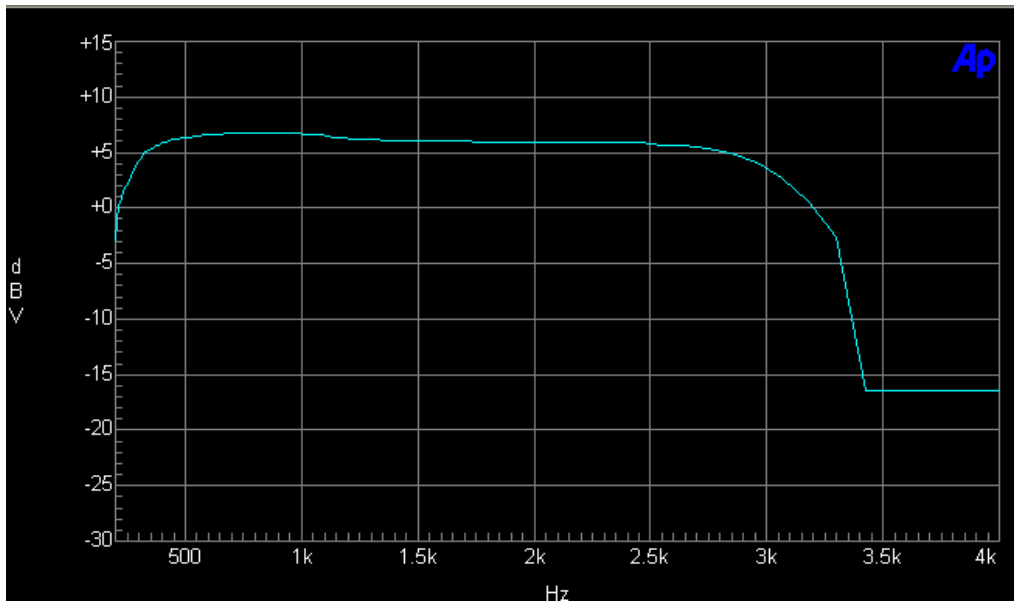


FIGURE 1 - AUDIO FREQUENCY RESPONSE

## AUDIO LOW-PASS FILTER RESPONSE

Test Description	Reference Specification	Result	Notes
Audio Low-Pass Filter Response	2.1047(a)	Complies	

### 5.3 DATA

See attached "Figure 1 - Audio Frequency Response" plot above.

### 5.4 ADDITIONAL INFORMATION

Transmitter under test includes an audio low pass filter with cut off frequency around 3kHz.

Description	Comment
Test Engineer	A. Eadie
Test Date	27 <sup>th</sup> May 2011



## 6 MODULATION LIMITING

Test Description	Reference Specification	Result	Notes
Modulation Limiting	2.1047(b)	Complies	Limits: +/- 5kHz in wideband mode +/- 2.5 kHz in narrowband mode

### 6.1 DATA

See attached plot(s).

### 6.2 ADDITIONAL INFORMATION

Description	Comment
Test Engineer	A. Eadie
Test Date	31 <sup>st</sup> May 2011

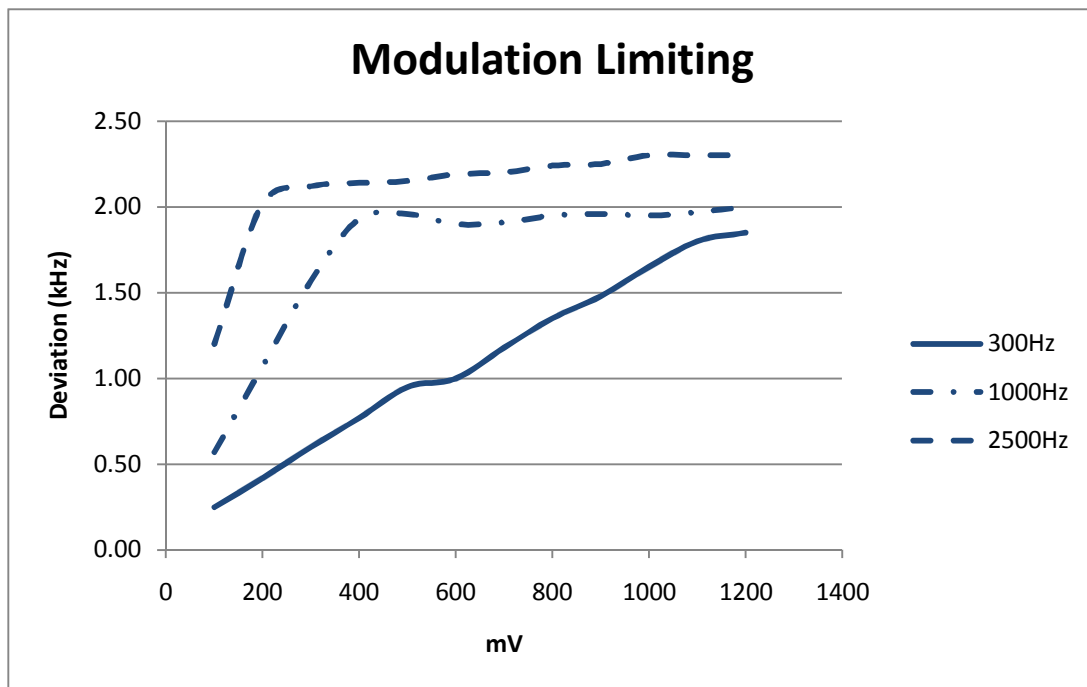


FIGURE 2 - NARROWBAND

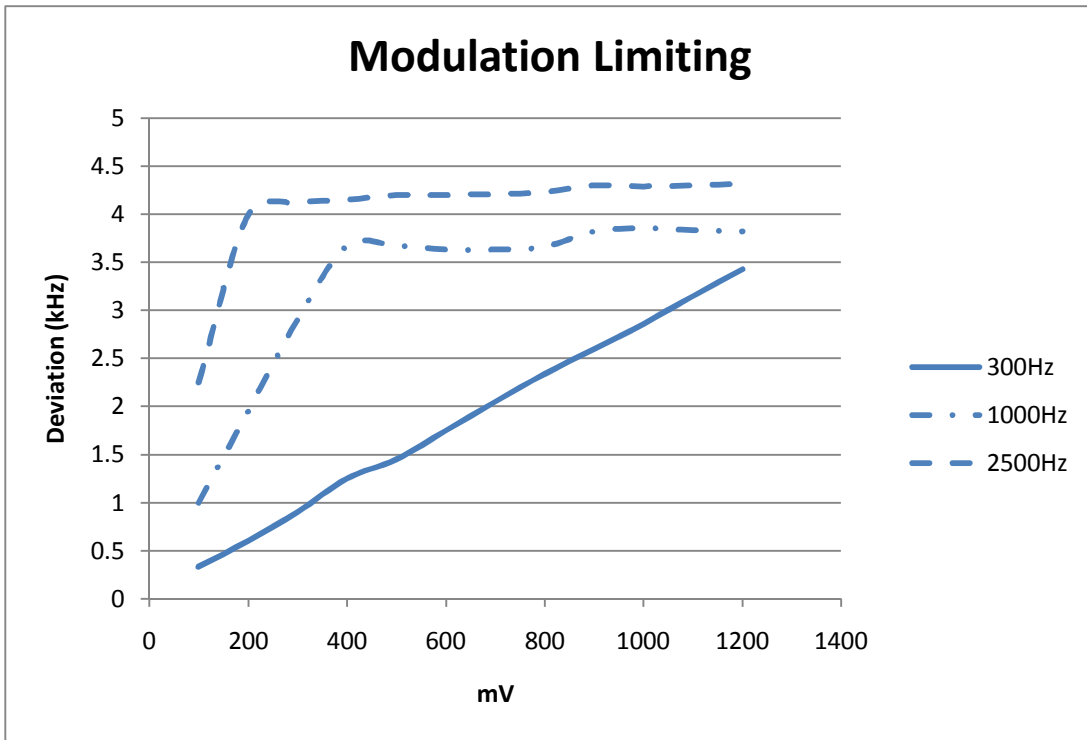


FIGURE 3 - WIDEBAND

## 7 OCCUPIED BANDWIDTH

Test Description	Reference Specification	Result	Notes
Occupied Bandwidth	90.210, 22.357 RSS119 (5.8)	Complies	Mask I, B, 22.357 2.5kHz 1V pk input signal Peak power established prior to testing

### 7.1 DATA

See attached plot(s).

### 7.2 ADDITIONAL INFORMATION

Measurements were made at several places in the band and the worst cases are reported below.

Description	Comment
Test Engineer	A. Eadie
Test Date	27 <sup>th</sup> May 2011

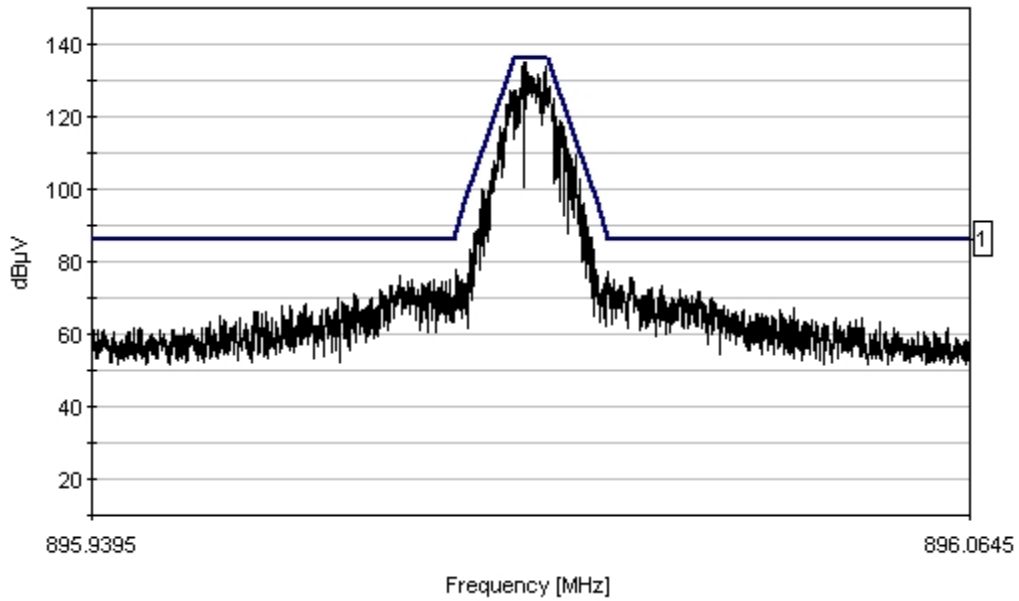


FIGURE 4 - 896MHZ – F1E MODULATION

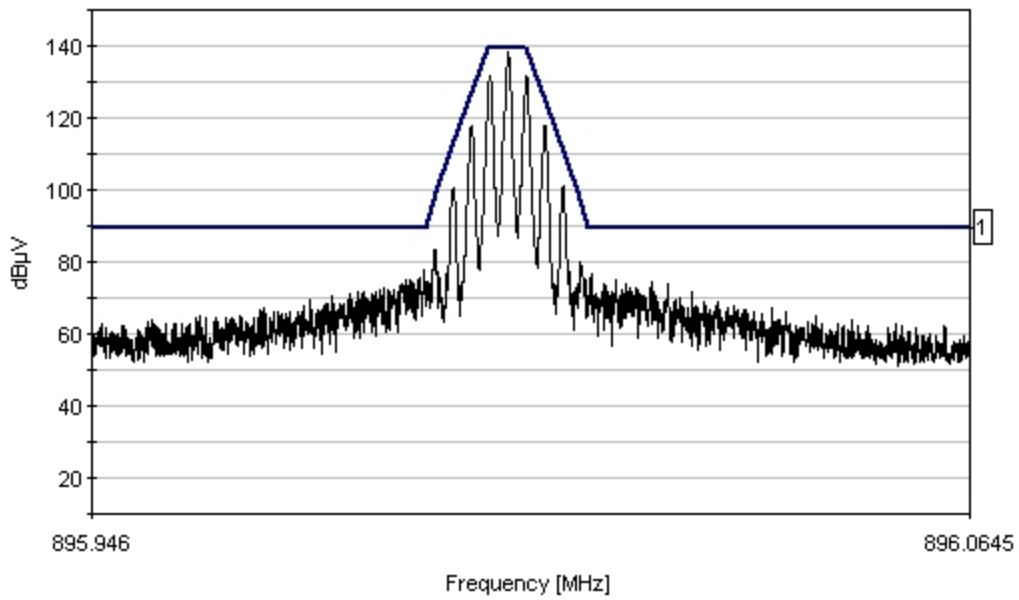


FIGURE 5 - 896 MHZ - F3E MODULATION

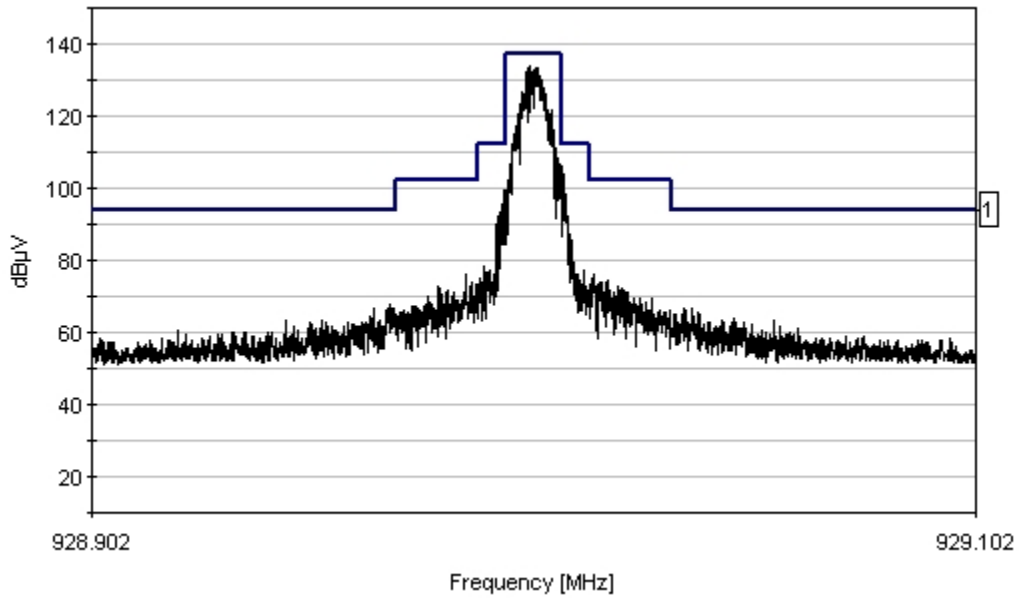


FIGURE 6 - 929 MHZ - F1E MODULATION

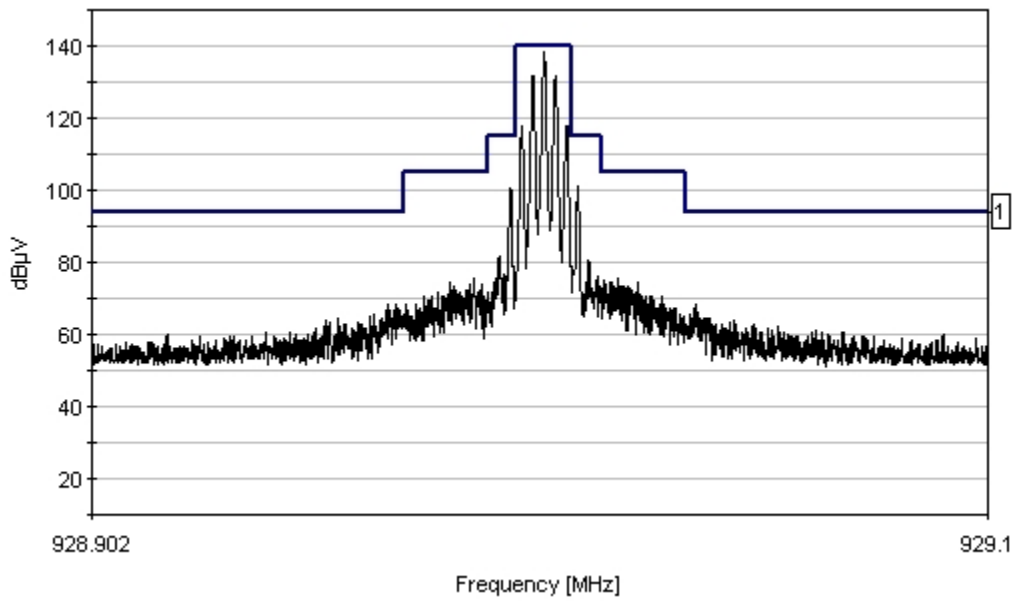


FIGURE 7 - 929 MHZ - F3E MODULATION

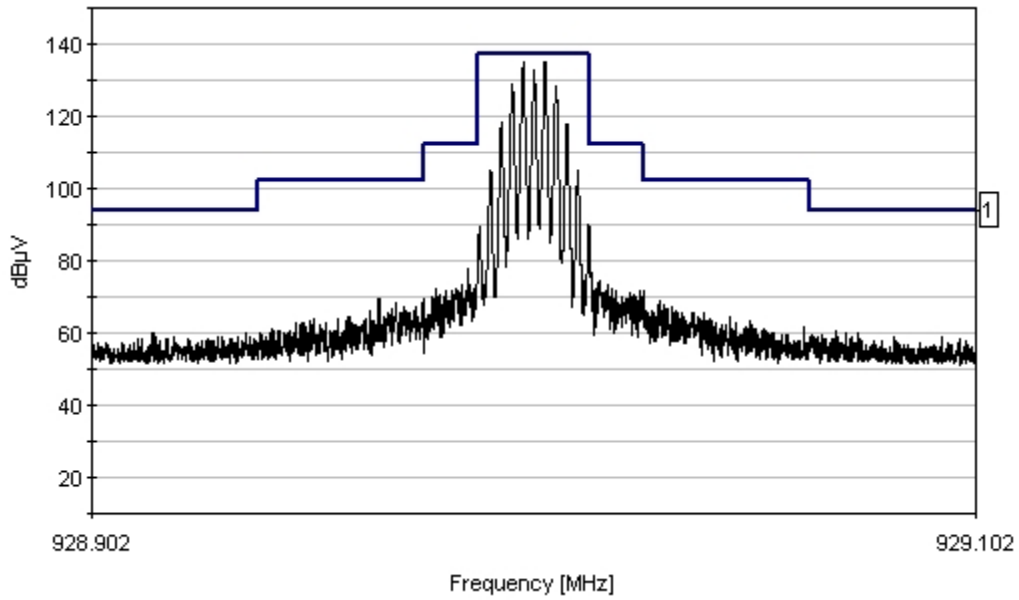


FIGURE 8 - 829 MHZ – 16K0F3E MODULATION

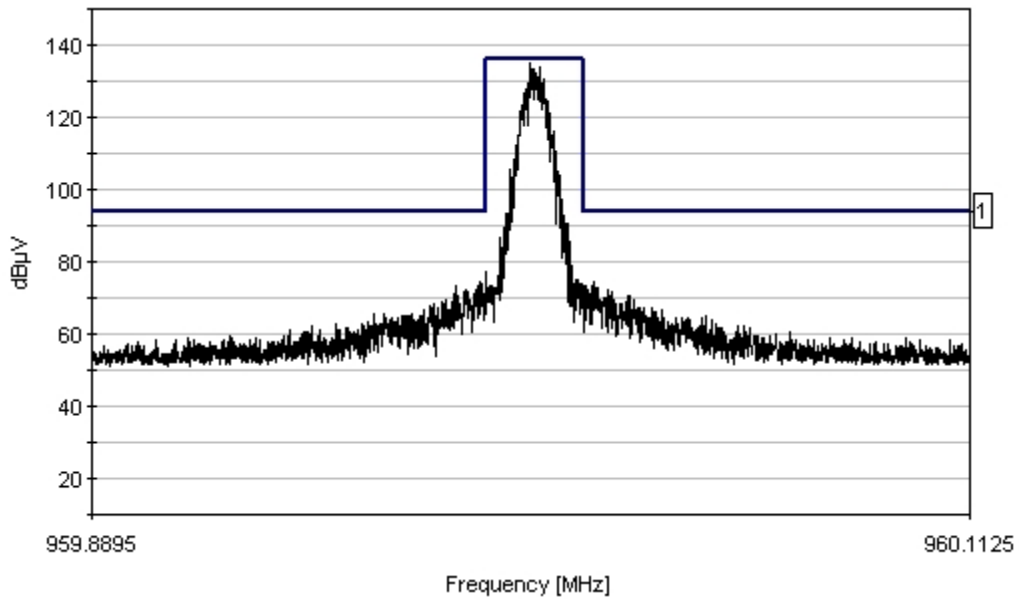


FIGURE 9 - 960 MHZ - F1E MODULATION

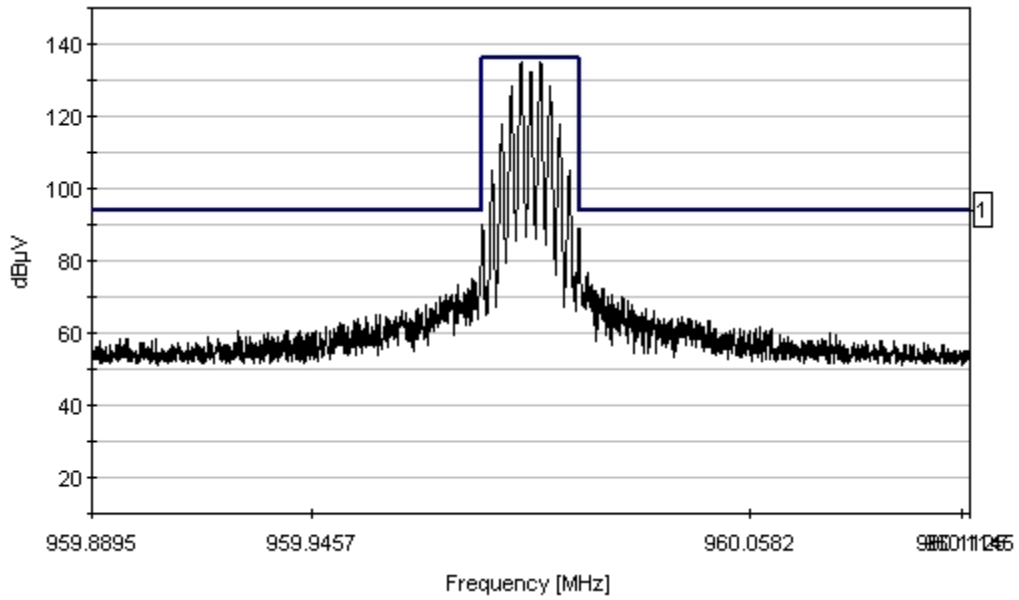


FIGURE 10 - 960 MHZ - 16K0F3E MODULATION

## 8 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Description	Reference Specification	Result	Notes
Spurious Emissions at Antenna Port	2.1051	Complies	Minimum standard -13dBm

### 8.1 DATA

See attached plot(s).

### 8.2 ADDITIONAL INFORMATION

Description	Comment
Test Engineer	B. Balston
Test Date	18 <sup>th</sup> May 2011

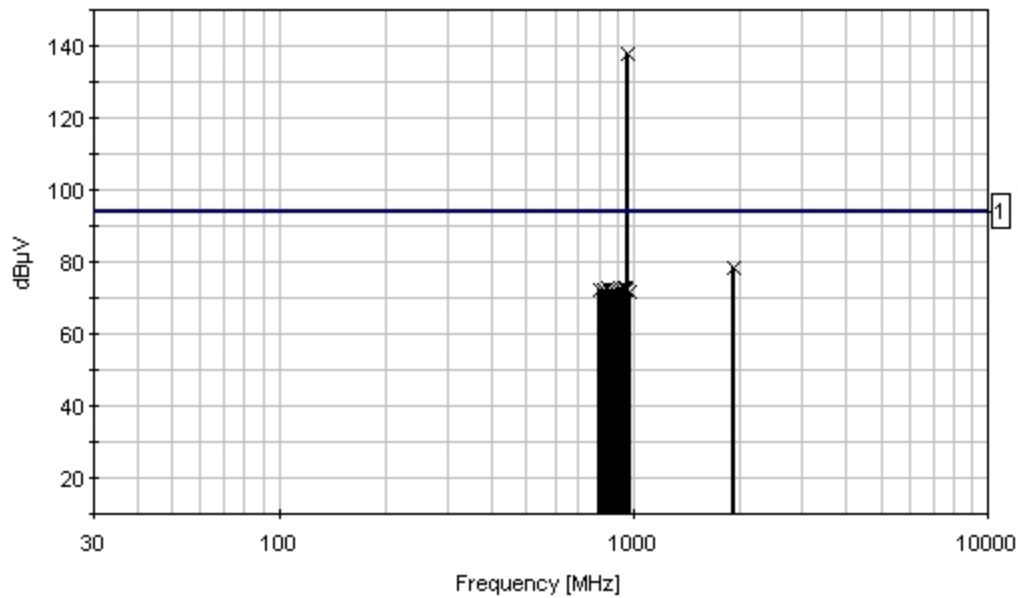


FIGURE 11 - SPURIOUS EMISSIONS



## 9 FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Description	Reference Specification	Result	Notes
Field Strength of Spurious Emissions	2.1053(a)	Complies	Substitution method used

### 9.1 DATA

Emission Frequency (MHz)	Ant.	Pol.	RCVD Signal (dB $\mu$ V/m)	Sig Sub. Factor	Rad Power (dBm)	Limit (dBm)	Margin (dB)	Detector
1792	Horn	H	37.2	64.11	-26.91	-13	13.91	Peak

FIGURE 12 – 896 MHZ FUNDAMENTAL FREQUENCY

Emission Frequency (MHz)	Ant.	Pol.	RCVD Signal (dB $\mu$ V/m)	Sig Sub. Factor	Rad Power (dBm)	Limit (dBm)	Margin (dB)	Detector
1856	Horn	H	33.5	62.71	-29.21	-13	16.21	Peak

FIGURE 12 – 929 MHZ FUNDAMENTAL FREQUENCY

Emission Frequency (MHz)	Ant.	Pol.	RCVD Signal (dB $\mu$ V/m)	Sig Sub. Factor	Rad Power (dBm)	Limit (dBm)	Margin (dB)	Detector
1920	Horn	H	28.3	62.11	-33.81	-13	20.81	Peak

FIGURE 13 – 960 MHZ FUNDAMENTAL FREQUENCY

No other emissions were detected. All emissions were less than -13dBm.

### 9.2 ADDITIONAL INFORMATION

Description	Comment
Test Engineer	B. Balston
Test Date	18 <sup>th</sup> May 2011

## 10 FREQUENCY STABILITY

Test Description	Reference Specification	Result	Notes
Frequency Stability	90.213 RSS119 (5.3)	Complies	Limit: Maximum drift = 1.5/2.5 ppm

### 10.1 DATA

Temperature (°C)	Reading (MHz)	Frequency Drift (Hz)	ppm
50	895.999940	-90	-0.10
40	895.999925	-105	-0.12
30	895.999965	-65	-0.07
20	895.999956	-74	-0.08
10	895.999965	-65	-0.07
0	895.999990	-40	-0.04
-10	896.000019	-11	-0.01
-20	896.000031	1	0.00
-30	896.000023	-7	-0.01

FIGURE 13 - FREQUENCY STABILITY VS TEMPERATURE

Voltage	Reading (MHz)	Drift (Hz)	ppm
+15%	895.999965	-35	-0.04
13.8 VDC	895.999962	-38	-0.04
-15%	895.999956	-44	-0.05

FIGURE 14 - FREQUENCY STABILITY VS VOLTAGE @ 25°C

### 10.2 ADDITIONAL INFORMATION

Description	Comment
Test Engineer	A. Eadie
Test Date	2 <sup>nd</sup> June 2011

## 11 TEST EQUIPMENT

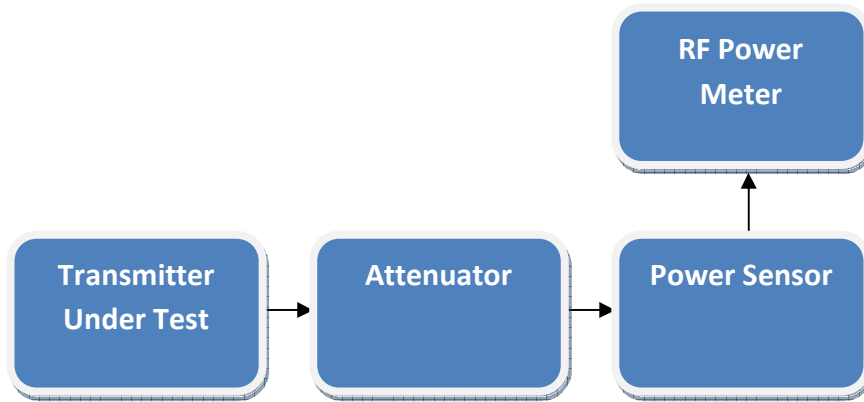
All applicable test equipment will be calibrated in accordance with ANSI Standard NCSL Z540-1 or other NIST traceable calibration standard.

Manufacturer	Description	Model	Serial Number	Cal/Char Due Date D/M/Y
HP	Spectrum Analyzer	8566B	1327A00106/ 2648A14332	7/12/2011
HP	Pre-selector	85685A	2648A00463	7/12/2011
HP	Quasi Peak Detector	85650A	2521A00704	14/10/2011
Electro Metrics	Hybrid Antenna	EM-3141	9902-1141	18/11/2011
AH Systems	Horn Antenna	SAS-571	1242	18/11/2011
HP	Signal Generator	8657A	2521A00704	15/11/2011
HP	Signal Generator	8673E	2704A00420	7/2/2012
Rohde & Schwarz	Power analyzer	NVRS	844352/043	15/5/2012
Rohde & Schwarz	Power probe	NRV-Z5	8429721029	15/5/2012
Audio Precision	Audio Analyzer	SYS222G	SYS1-45635	1/3/2012
HP	Audio Analyzer	3562A	2708A02430	COU*
IFR	Radio Test Set	1900 CSA	4105	15/11/2011
BMA/Watlow	Environmental Chamber	922	104	COU*
Lambda	Power Supply	LQD-422	43227	N/A

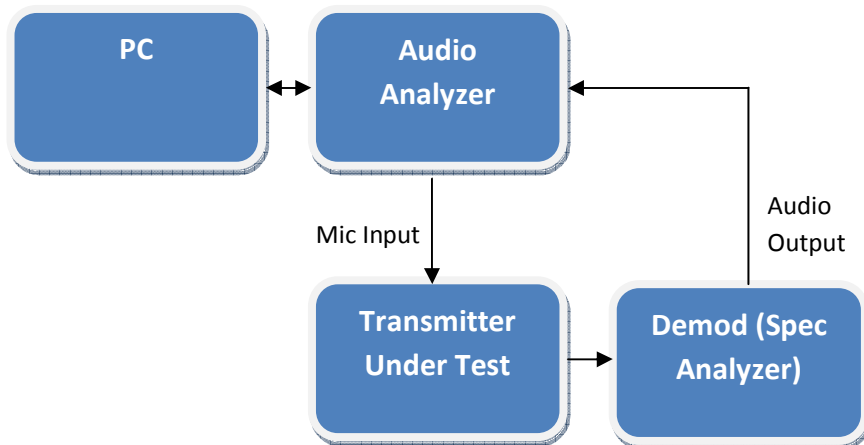
\*Calibrated on use.

## 12 TEST DIAGRAMS

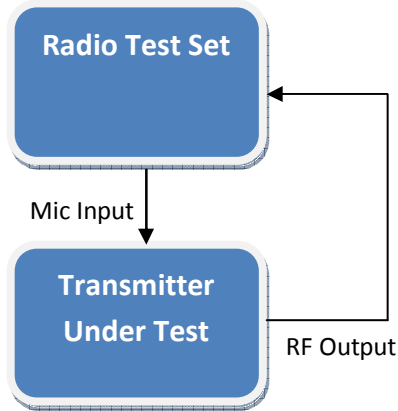
### 12.1 RF POWER



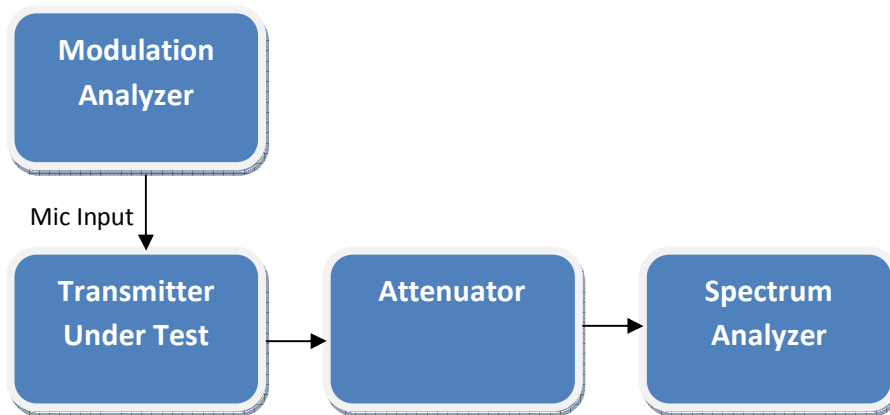
### 12.2 AUDIO FREQUENCY RESPONSE



### 12.3 MODULATION LIMITING



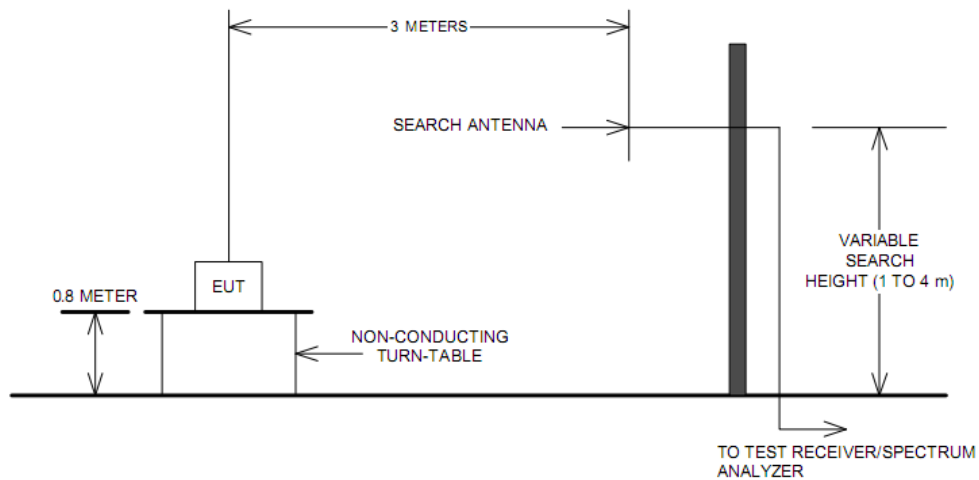
### 12.4 OCCUPIED BANDWIDTH



## 12.5 SPURIOUS EMISSIONS AT ANTENNA PORT



## 12.6 FIELD STRENGTH OF SPURIOUS EMISSIONS



## 12.7 FREQUENCY STABILITY

