REV	Δ	DESCRIPTION	SHEET EFFECTED	DATE	DRAWN	CHECKED
A				29/12/2011	M. Reuben	S. Cohen
B		Lap-top radiated emission tests added	Appendix	28/01/2013	M. Reuben	S. Cohen

EMC Laboratory

Micom Pathfinder
HF-SSB Manpack Transceiver

FCC ID_YO5MICOM-PF25W

Manufactured by

Elbit Systems Land and C4I - Tadiran Ltd.

Test Report

According to FCC Part 90 Requirements

September 2011

	Fonction/Title	Name	Signature	Date
Prepared by:	Technical Writer	M. Reuben		08.09.2011
Checked by:	Test Engineer	I. Arbitman		13.09.2011
Approved By:	EMC Lab. Manager	S.Cohen		29/12/2011

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1. Introduction

1.1. Scope

This document describes the measurement procedures and tests for FCC part 90 of the Micom Pathfinder, manufactured by Elbit Systems Land and C^{4}I - Ltd.

1.2. Description of equipment Under Test

Equipment Under Test:	Micom Pathfinder
FCCID	YO5MICOM-PF25W
Manufacturer:	Elbit Systems Land and C^{4}I - Ltd.
Serial Numbers:	MP420
Transmit Frequency Range	1.6 to 30 MHz in 10-Hz steps
Receiver Frequency Range	0.1 to 30 MHz in 10-Hz steps (0.1 to 1.6 MHz reduced performance)
Transmit Power	5, 10, 15, 25 W P.E.P and average
RF Impedance (antenna)	-50Ω for dipole and broadband -Internal automatic tuner for whip
Number of RF Channels	200 simplex or half duplex
Scanning	5 groups of 100 channels, guard channel
ALE	MIL-STD-188-141B, JITC certified
Mode of Operation:	USB, LSB, PILOT, AME
Services	-Analog voice -Digital voice (vocoder option) -50-4800 bps (internal modem option) COMSEC (option)
Date, Remote Control	RS-232C
GPS Receiver (optional)	Location, movement and time
Power Source	FRN8577 Rechargeable Lithium-Ion Battery (14.4 V, 230 Wh)
Receiver operating frequency:	MHZ
Year of Manufacture:	2009

1.3. Applicant Information:

Applicant:	Elbit Systems Land and C^{4}I - Ltd.
Applicant Address	26 Hashoftim St. P.O.B. 267, 58102 Holon, Israel
Telephone:	+972-3-5574476
FAX:	+972-3-5575320
The testing was observed by:	Samuel Cohen
Following applicant's personnel:	Samuel Cohen

1.4. Test Performance:

Date of reception for testing:	15/10/2009
Dates of testing	10.08.2011
Test Laboratory Location	Elbit Systems Land and C^{4}I – Ltd., EMC LAB, Hashoftim 26 Holon 58102 ISRAEL Tel: 972-3-5574476 Fax: 972-3-5575320
Applicable EMC Specification:	
Code of Federal Regulations	47, FCC Docket 89-103,Part 15: Radio Frequency Devices, Sections

2. Test Summary and Signatures.

Elbit Systems Land and C^{4}I – Ltd., EMC Laboratory has completed testing of E.U.T in accordance with the requirements of the FCC Part 90 Regulations for Class B equipment.

The E.U.T was found to comply with the requirements of the FCC Part 90 Regulations given below

Test	Test Description	Section	PASS/FAIL
1	RF Power Output	2.1046	PASS
2	Audio Frequency Response	2.1047	PASS
3	Audio Low-Pass Filter Response	2.1047	N/A (1)
4	Modulation Limiting	2.1047	PASS
5	Occupied Bandwidth	2.1049	PASS
6	Spurious Emissions at Antenna Terminals	2.1051	PASS
7	Field Strength of Spurious Emissions	2.1053	PASS
8	Frequency Stability	2.1055	PASS
9	Transient Frequency Behavior	90.214	N/A (2)

2.1. Footnotes for N/A's

(1) The apparatus is not required to have a low-pass filter.

(2) The apparatus does not operate in the required frequency range.

2.2. Test Conditions:

Indoor	Temperature	24^{0}C
	Humidity	12%

Outdoor	Temperature	12^{0}C
	Humidity	63%

	Function/Title	Name	Signature	Date
Test performed by	Test Engineer	I. Arbitman		11.08.2011
Test Report prepared by	Technical Writer	M. Reuben		11.08.2011
Test Report Approved by	EMC Lab. Manager	S Cohen		

3. E.U.T Information

3.1. E.U.T description

Micom Pathfinder, a manpack version of the robust MICOM-3 mobile radio, is an advanced HF-SSB transceiver that provides a complete solution to the communication requirements in the crowded HF band.

For manpack operation, Micom Pathfinder is powered by a rechargeable Lithium-Ion battery, has selectable transmit RF power of 5, 10, 15 and 25 W, and high sensitivity. Its built-in automatic antenna tuner supports a wide range of antennas, including a 2.7 meter (9 ft) whip which can be easily folded for storage. For static operation, Micom Pathfinder can also be used with dipole, longwire and other types of broadband antennas.

3.2. Changes made to EUT

No changes were made.

4. RF Power Output – Part 2.1046

E.U.T:	Micom Pathfinder
S/N:	MP420
Date:	08.09.2011
Standard	90.205 (a)
Relative Humidity:	38%
Ambient Temperature:	24^0 C
Air Pressure:	1010hPa

Testing Engineer: I. Arbitman Date 08.09.2011

4.1. Test Results Summary & Conclusions

The E.U.T was found to comply with RF Power Output – Part 2.1046.

4.2. Measured Data

Measured at Dipole Antenna terminal. PEP using two tones.
Rated RF Output Power: 25 watts PEP, 44dBm
Measured using 400 Hz and 1800 Hz tones adjusted for rated RF output power.

4.3. Test Instrumentation and Equipment

Table 1: Test Instrumentation and Equipment

Item	Model	Manufacturer	Next Date Calibration
Audio Analyzer	8903A	HP	24.05.2012
Power Reflection Meter	NAP	R&S	08.06.2012
Attenuator 30 dB	769-30	Narda	21.06.2012

4.4. Test Results

Frequencies examined: 1.65 MHz, 15.6 MHz, 29.9 MHz

Transmitting Power: 5W, 10W, 15W & 25W

Rate	TX 1.65 MHz		TX 15.6 MHz		TX 29.9 MHz	
	dBm	W	dBm	W	dBm	W
MAX (25W)	41.8	15.2	41.2	12.9	41	12.9
HIGH (15W)	40.8	12.3	40.2	10.6	39.9	9.5
MED (10W)	37.7	6.0	37.1	5.2	36.5	4.5
LOW (5W)	34.7	3.0	33.7	2.3	33.7	2.4

5. Audio Frequency Response – Part 2.1047

E.U.T	Micom Pathfinder
S/N:	MP420
Date:	02.08.2010
Standard	90.210 (a)
Relative Humidity:	38%
Ambient Temperature:	24^0 C
Air Pressure:	1010hPa

Testing Engineer: I. Arbitman Date 02.08.2010

5.1. Test Results Summary & Conclusions

The E.U.T was found in compliance with Audio Frequency Response – Part 2.1047.

5.2. Test Instrumentation and Equipment

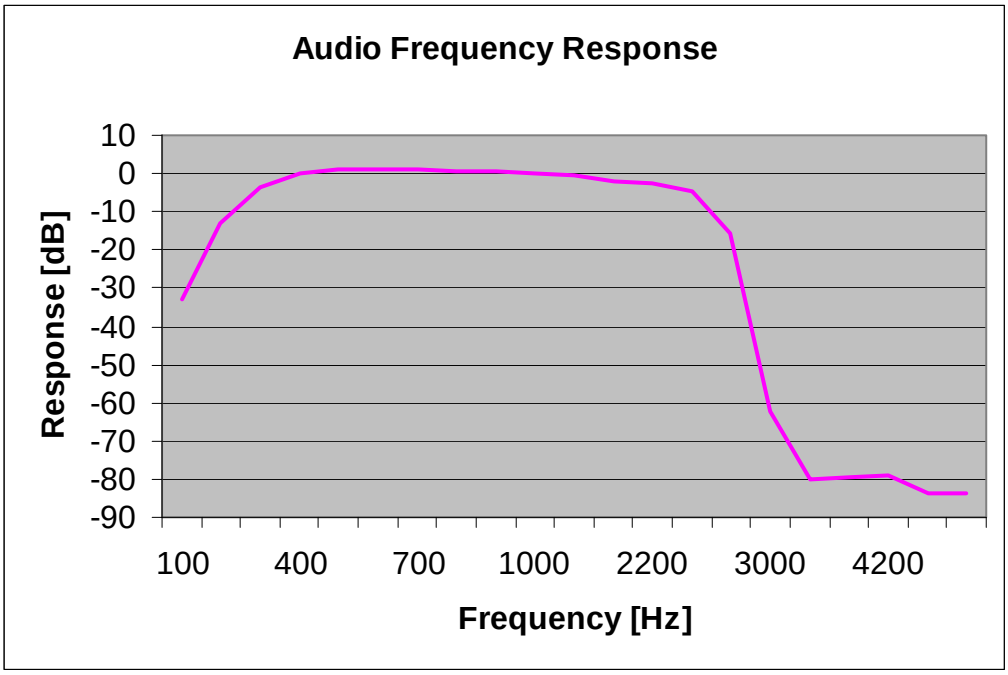
Table 2: Test Instrumentation and Equipment

Item	Model	Manufacturer	Next Date Calibration
Audio Analyzer	8903A	HP	24.05.2012
Spectrum Analyzer	8593E	HP	14.03.2012
Power Reflection Meter	NAP	R&S	14.05.2012

5.3. Test Results

Frequencies examined: 1.65 MHz, 15.6 MHz, 29.9 MHz

Transmitting Power: 5W, 10W, 15W & 25W



6. Modulation Limiting – Part 2.1047

E.U.T	Micom Pathfinder
S/N:	MP420
Date:	01/11/2009
Standard	N/A
Relative Humidity:	38%
Ambient Temperature:	24^0 C
Air Pressure:	1010hPa

Testing Engineer: S. Kozliner Date 08.09.2011

6.1. Test Results Summary & Conclusions

The E.U.T was found to be in compliance with Modulation Limiting – Part 2.1047

6.2. Test Instrumentation and Equipment

Table 3: Test Instrumentation and Equipment

Item	Model	Manufacturer	Next Date Calibration
Audio Analyzer	8903A	HP	24.05.2012
Power Reflection Meter	NAP	R&S	14.05.2012
Attenuator 30 dB	769-30	Narda	21.06.2012

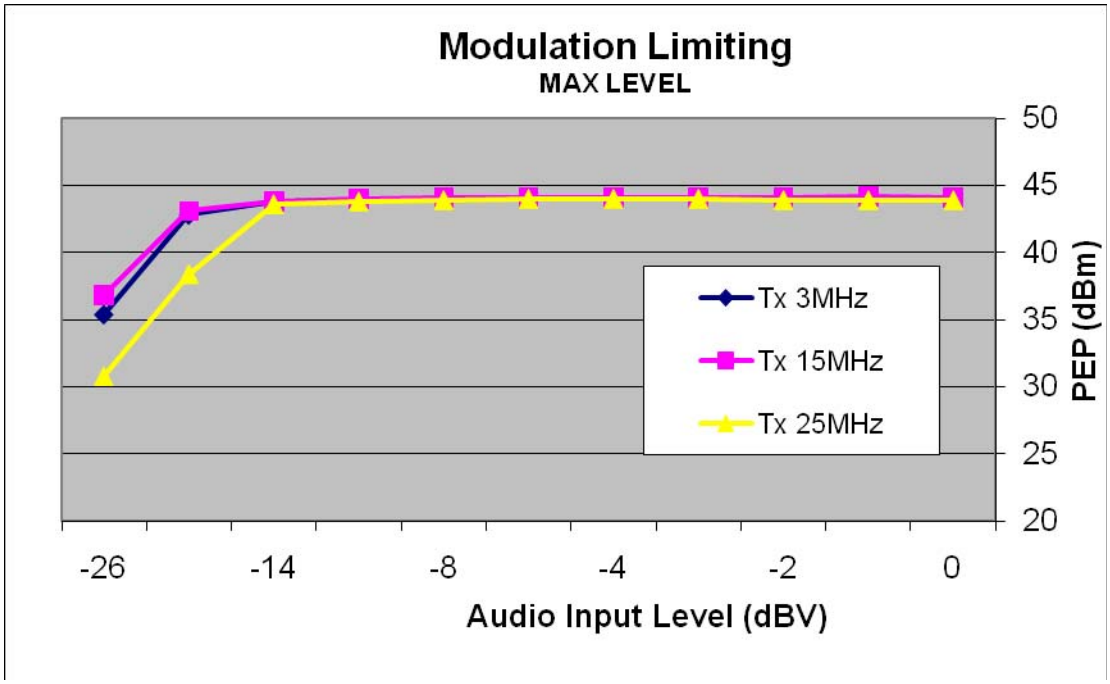
6.3. Test Results

Frequencies examined: 1.65 MHz, 15.6 MHz, 29.9 MHz

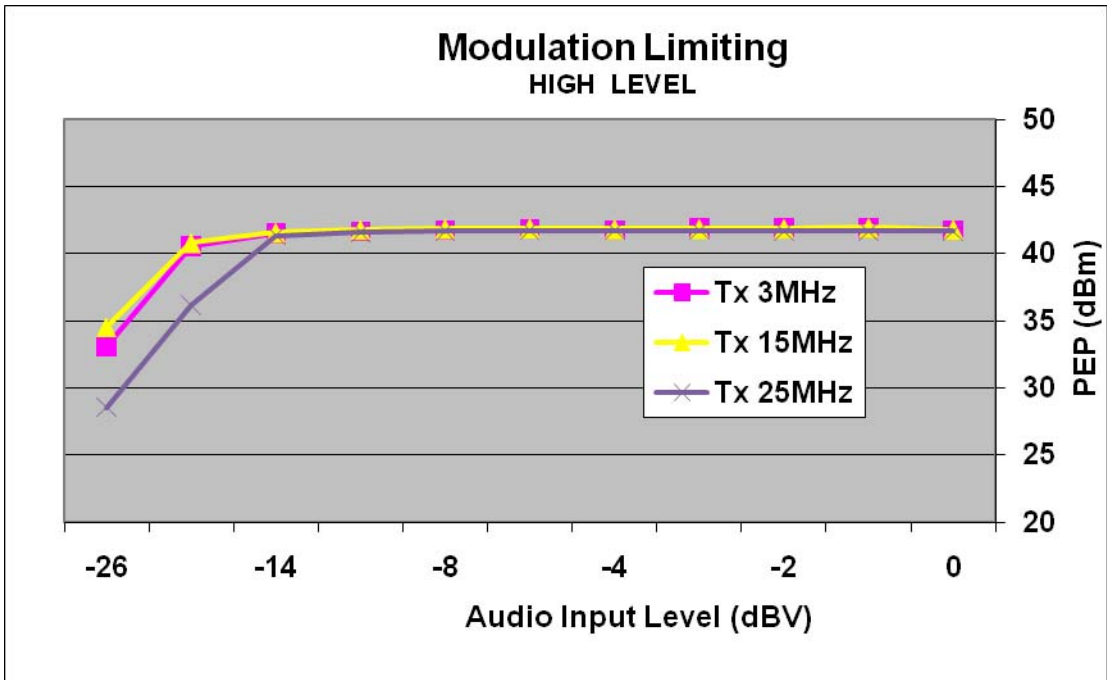
Transmitting Power: 5W, 10W, 15W & 25W

The test results plots are shown below.

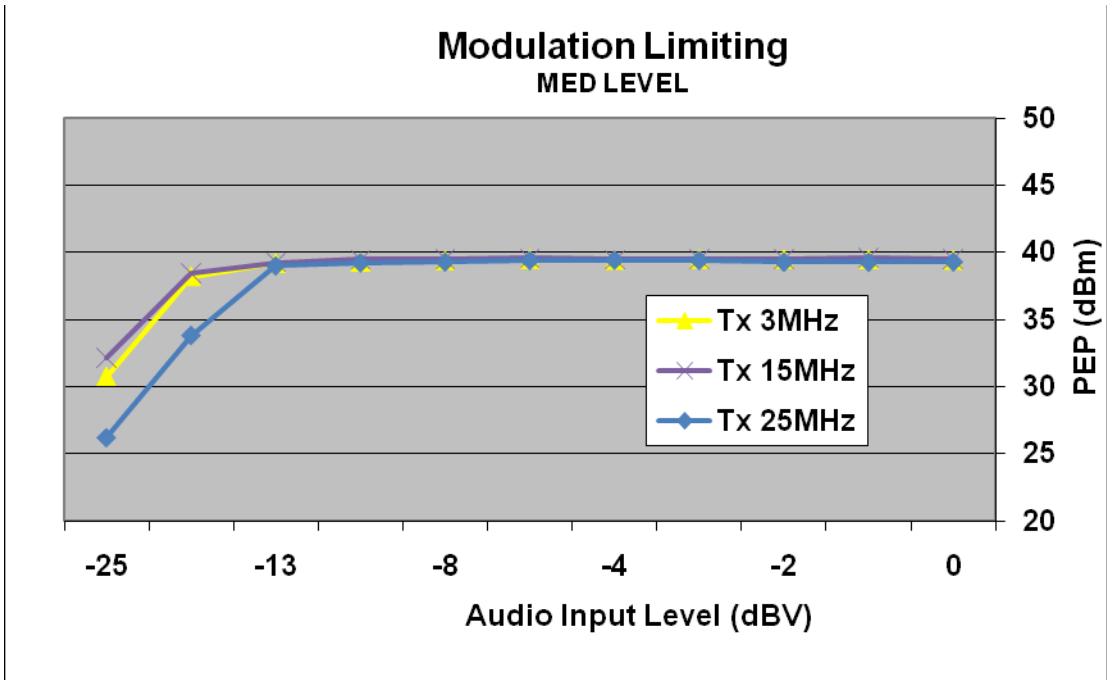
1. Power Maximum



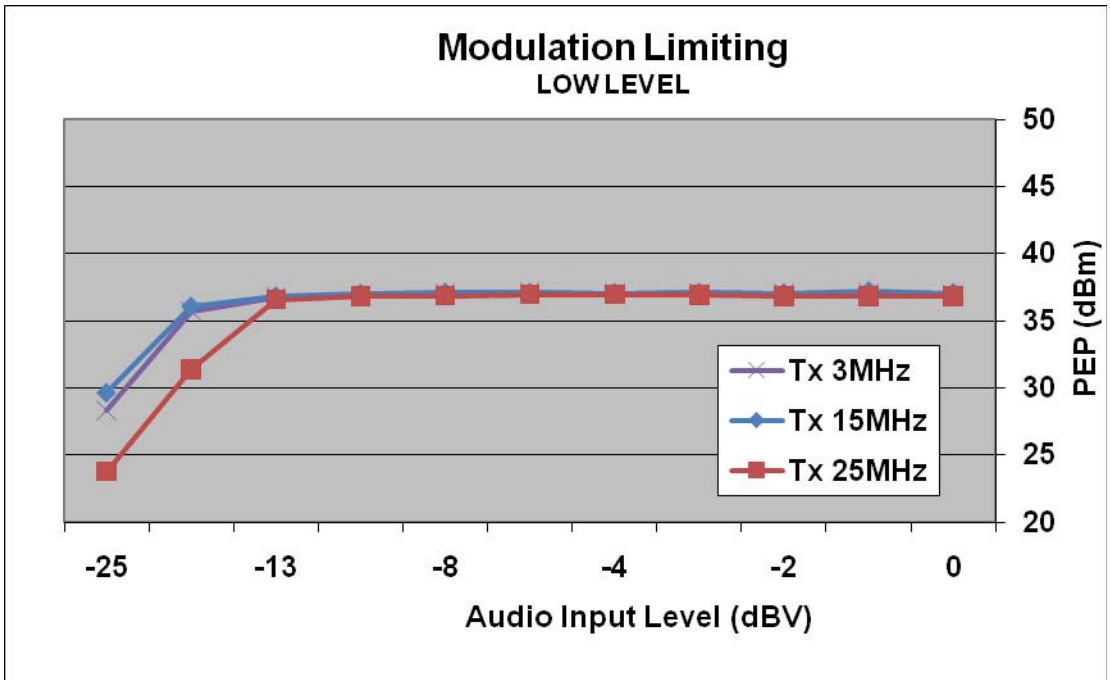
2. Power High



3. Power Medium



4. Power Low


Modulation Limiting
LOW LEVEL
50
45
40
35
30
25
20
PEP (dBm)
Tx 3MHz
Tx 15MHz
Tx 25MHz
-25
-13
-8
-4
-2
0
Audio Input Level (dBV)

7. Occupied Bandwidth – Part 2.1049

E.U.T	Micom Pathfinder
S/N:	MP420
Date:	25.09.2009
Standard	90.210 (a)
Relative Humidity:	38%
Ambient Temperature:	24^0 C
Air Pressure:	1010hPa

Testing Engineer: I. Arbitman Date 31.08.2011

7.1. Test Results Summary & Conclusions

The E.U.T was found in compliance with Occupied Bandwidth – Part 2.1049

7.2. Test Instrumentation and Equipment

Table 4: Test Instrumentation and Equipment

Item	Model	Manufacturer	Next Date of Calibration
Spectrum Analyzer	E7405A	Agilent	27.05.2010
Attenuator 30 dB	769-30	Narda	21.06.2011
Audio Analyzer	8903A	HP	24.06.2010

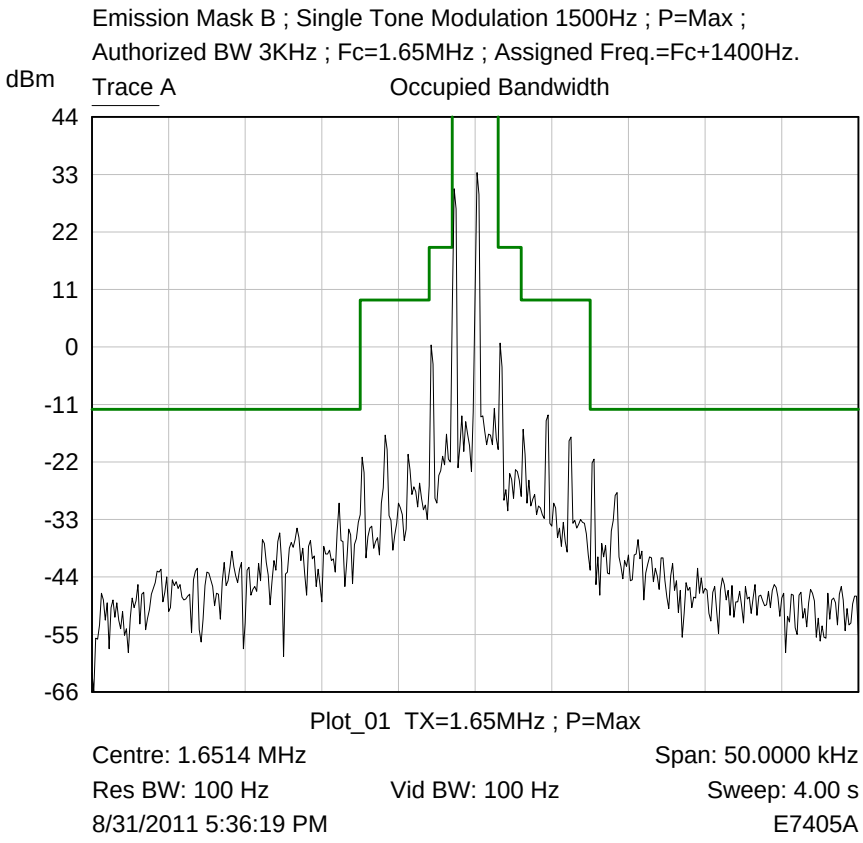
7.3. Test Results

Frequencies examined: 1.65 MHz, 15.6 MHz. 29.9 MHz

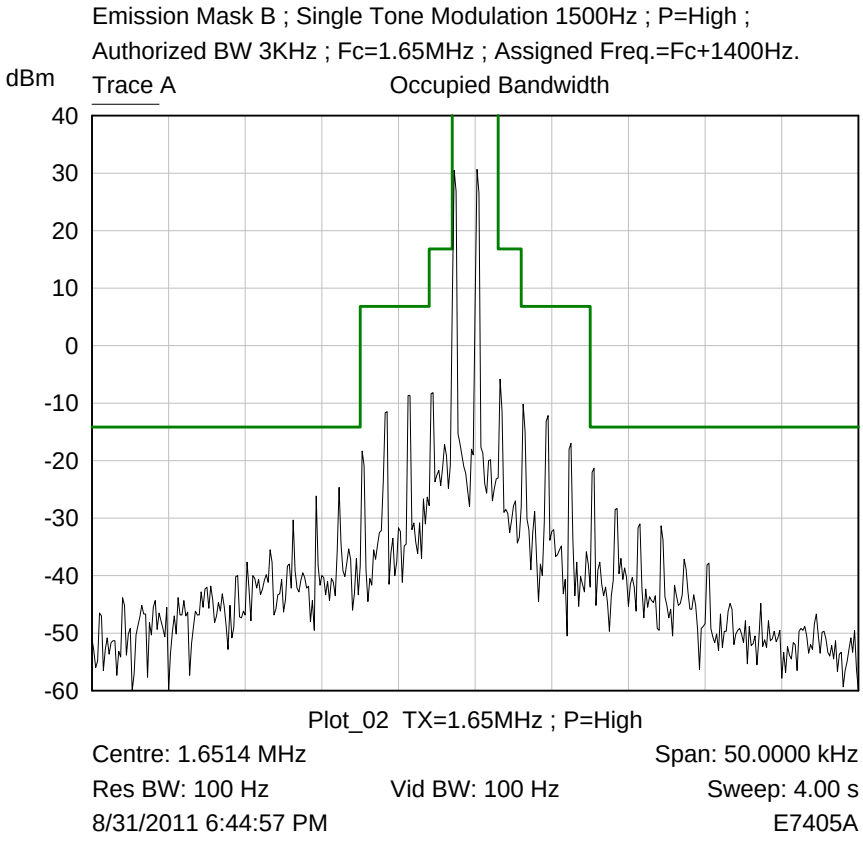
Transmitting Power: 5W, 10W, 15W & 25W

Table 5: Test Results

Mode of Operation	Frequency (MHz)	Power	Compliance Y/N
AME	1.65	Maximum	Y
	1.65	High	Y
	1.65	Medium	Y
	1.65	Low	Y
	15.6	Maximum	Y
	15.6	High	Y
	15.6	Medium	Y
	15.6	Low	Y
	29.9	Maximum	Y
	29.9	High	Y
	29.9	Medium	Y
	29.9	Low	Y
SSB	1.65	Maximum	Y
	1.65	High	Y
	1.65	Medium	Y
	1.65	Low	Y
	15.6	Maximum	Y
	15.6	High	Y
	15.6	Medium	Y
	15.6	Low	Y
	29.9	Maximum	Y
	29.9	High	Y
	29.9	Medium	Y
	29.9	Low	Y

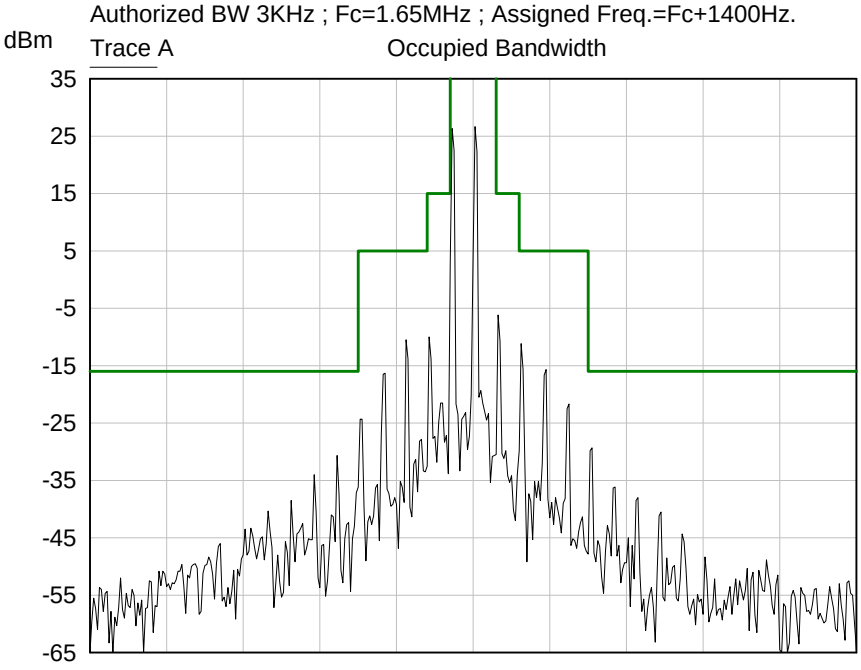


Plot Occupied Bandwidth - AME/ 1



Plot Occupied Bandwidth - AME/ 2

Emission Mask B ; Single Tone Modulation 1500Hz ; P=Med ;
Authorized BW 3KHz ; Fc=1.65MHz ; Assigned Freq.=Fc+1400Hz.



Plot_03 TX=1.65MHz ; P=Med

Centre: 1.6514 MHz Span: 50.0000 kHz
Res BW: 100 Hz Vid BW: 100 Hz Sweep: 4.00 s
8/31/2011 6:41:14 PM E7405A

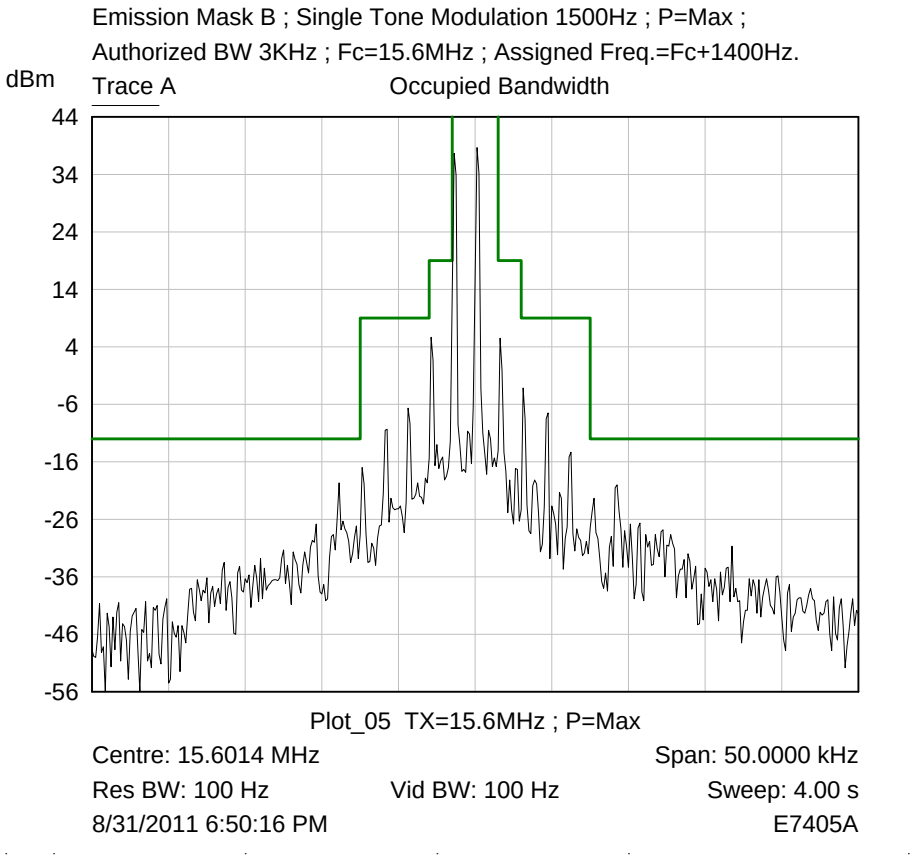
Plot Occupied Bandwidth - AME/ 3

Emission Mask B ; Single Tone Modulation 1500Hz ; P=Low ;
Authorized BW 3KHz ; Fc=1.65MHz ; Assigned Freq.=Fc+1400Hz.

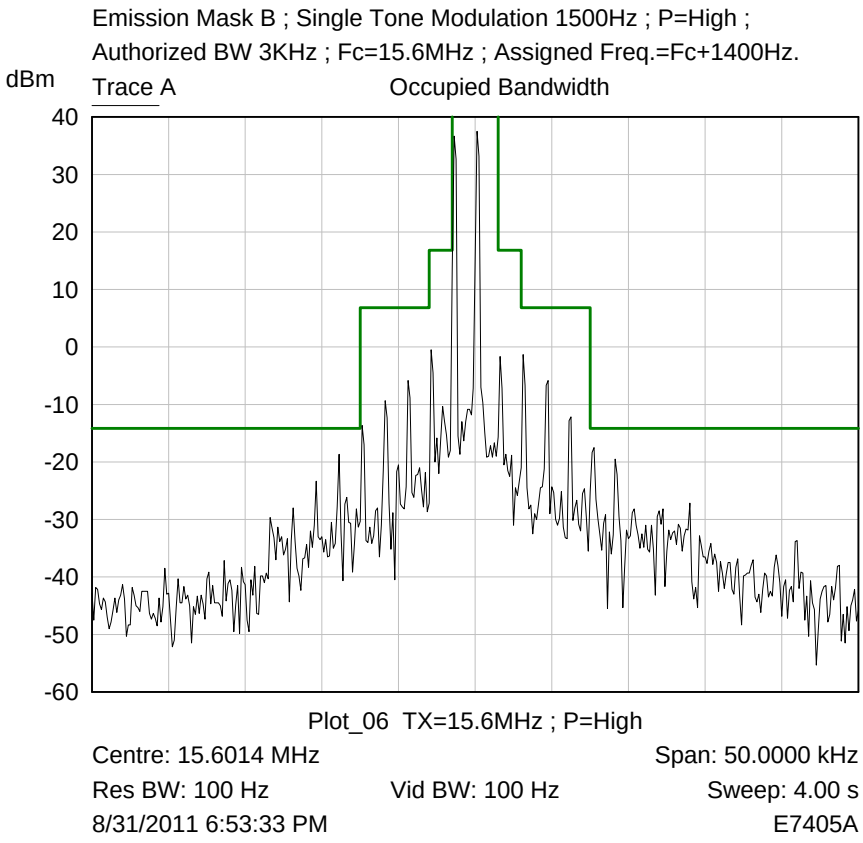
Plot_04 TX=1.65MHz ; P=Low

Centre: 1.6514 MHz Span: 50.0000 kHz
Res BW: 100 Hz Vid BW: 100 Hz Sweep: 4.00 s
8/31/2011 7:30:29 PM E7405A

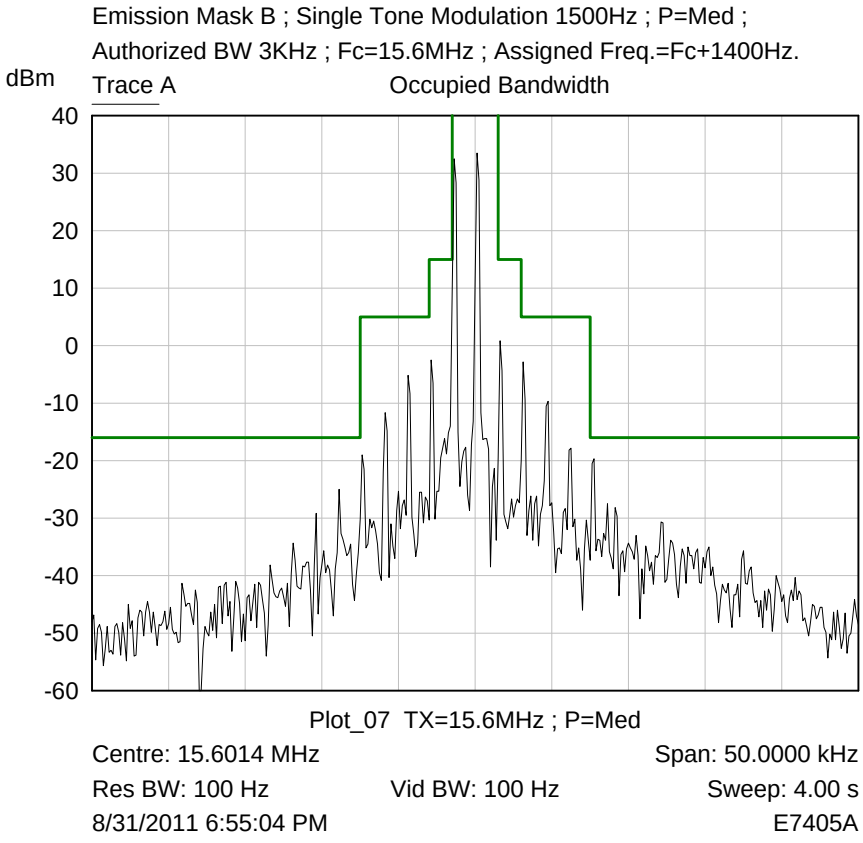
Plot Occupied Bandwidth - AME/ 4



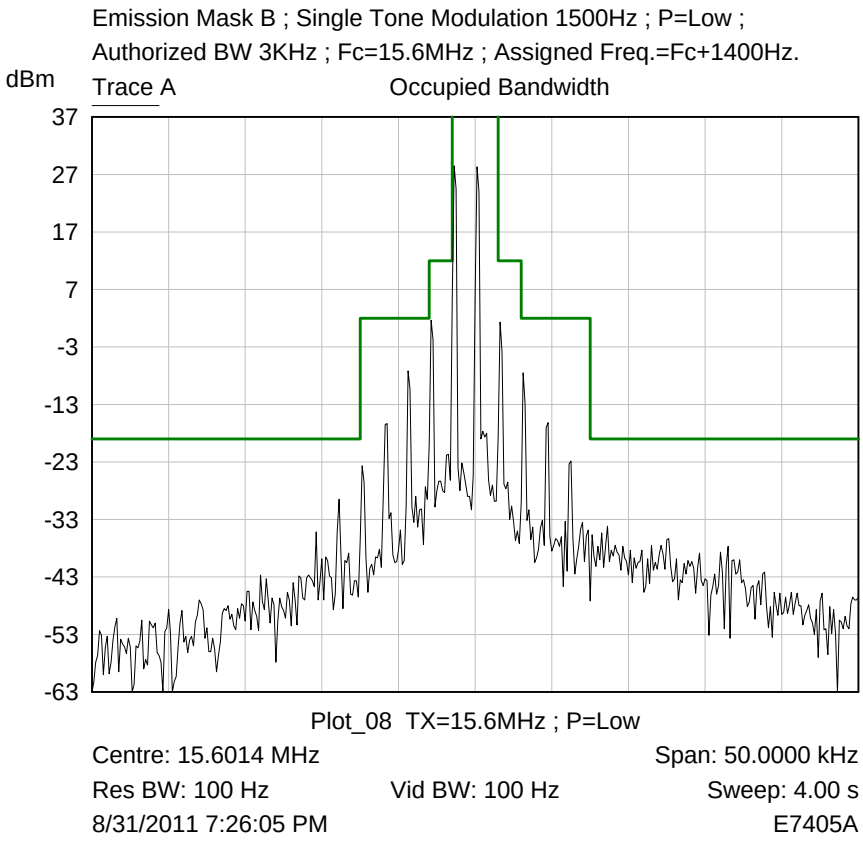
Plot Occupied Bandwidth - AME/ 5



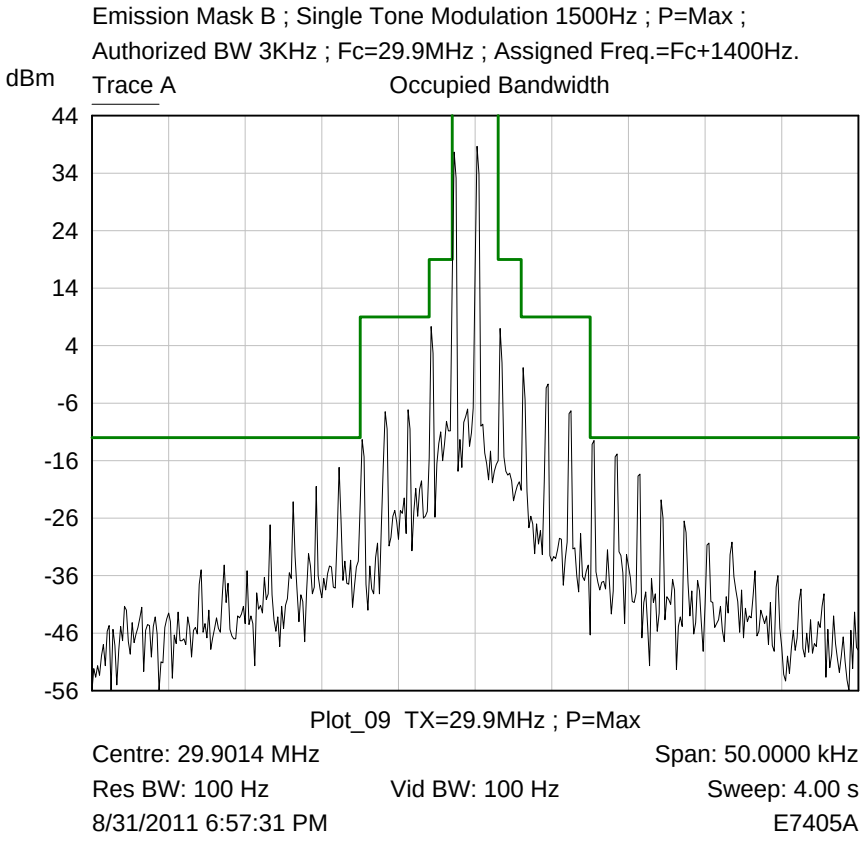
Plot Occupied Bandwidth - AME/ 6



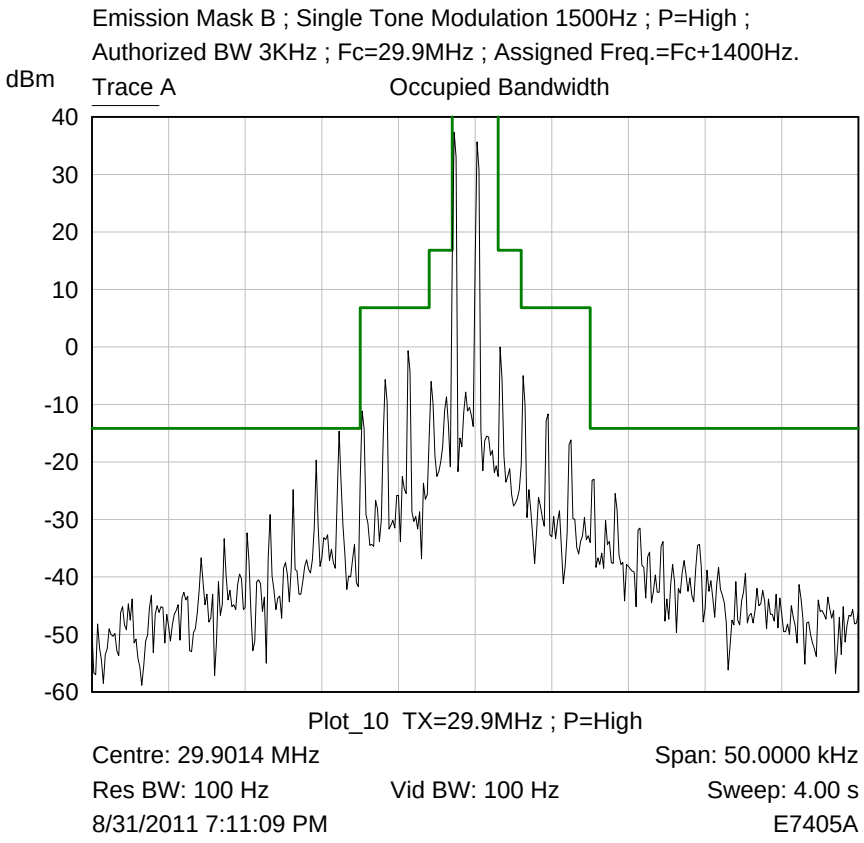
Plot Occupied Bandwidth - AME/ 7



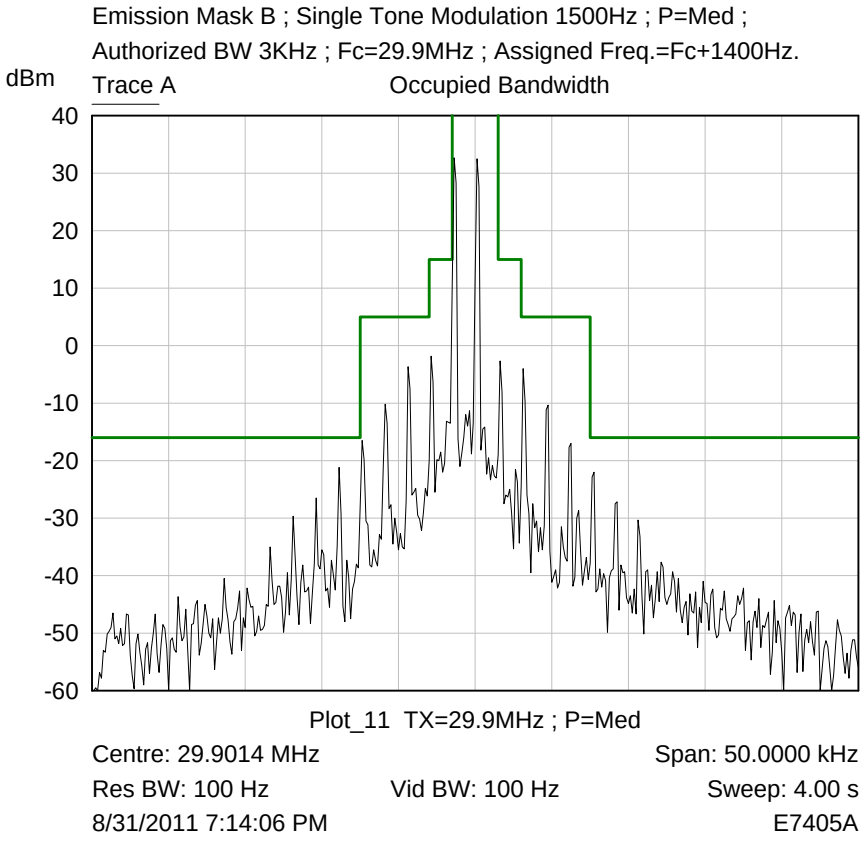
Plot Occupied Bandwidth - AME/ 8



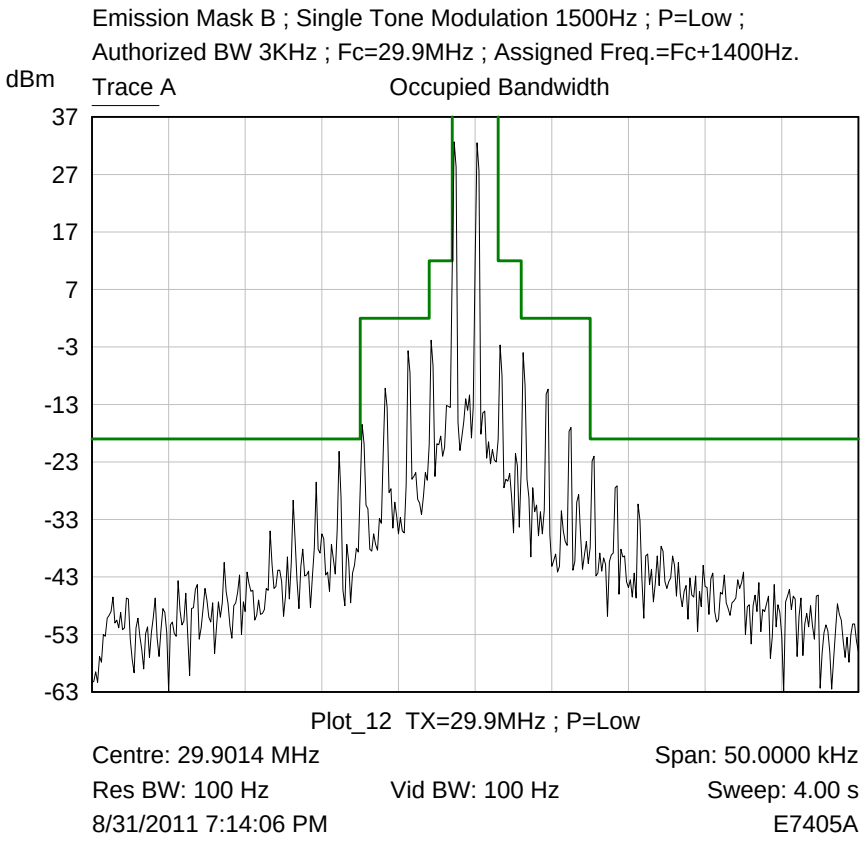
Plot Occupied Bandwidth - AME/ 9



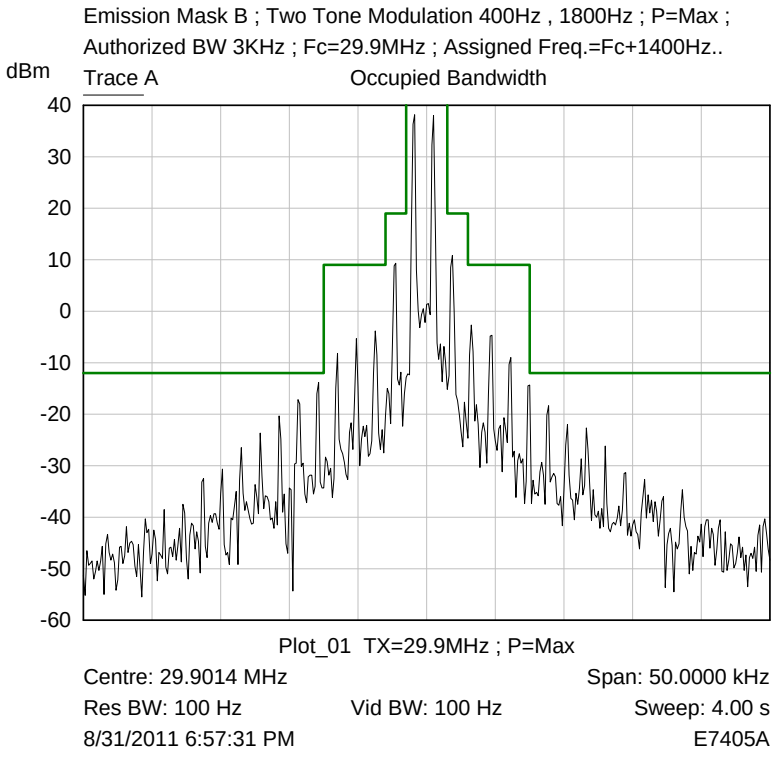
Plot Occupied Bandwidth - AME/ 10



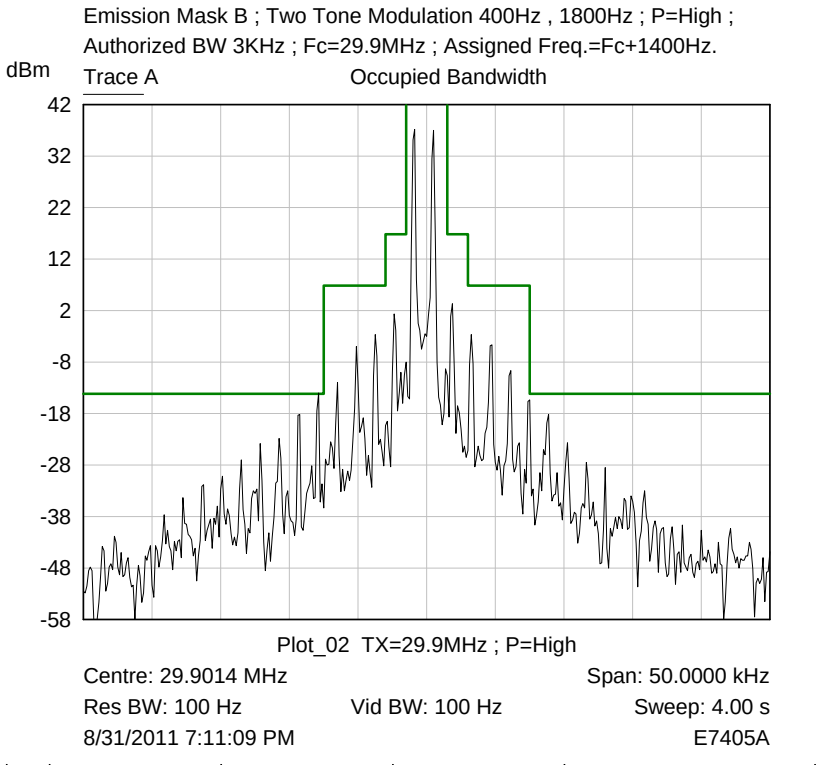
Plot Occupied Bandwidth - AME/ 11



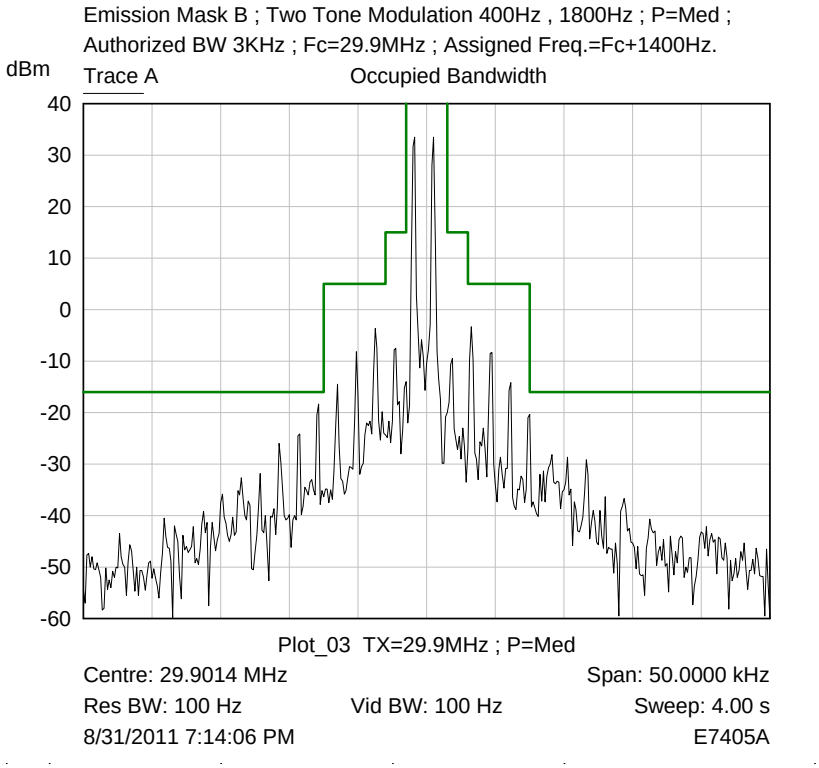
Plot Occupied Bandwidth - AME/ 12



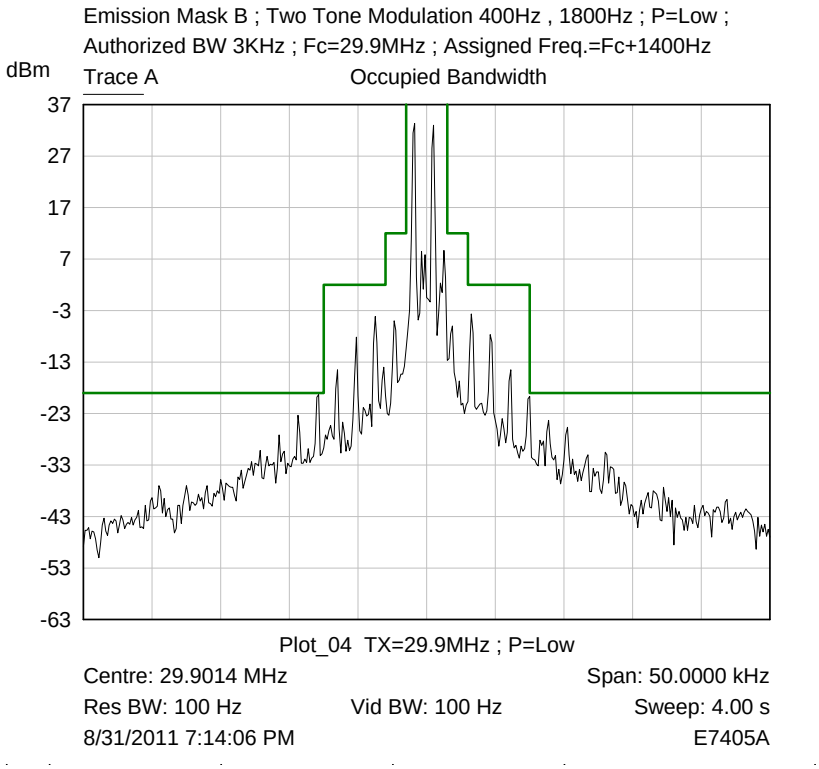
Plot Occupied Bandwidth - SSB/ 13



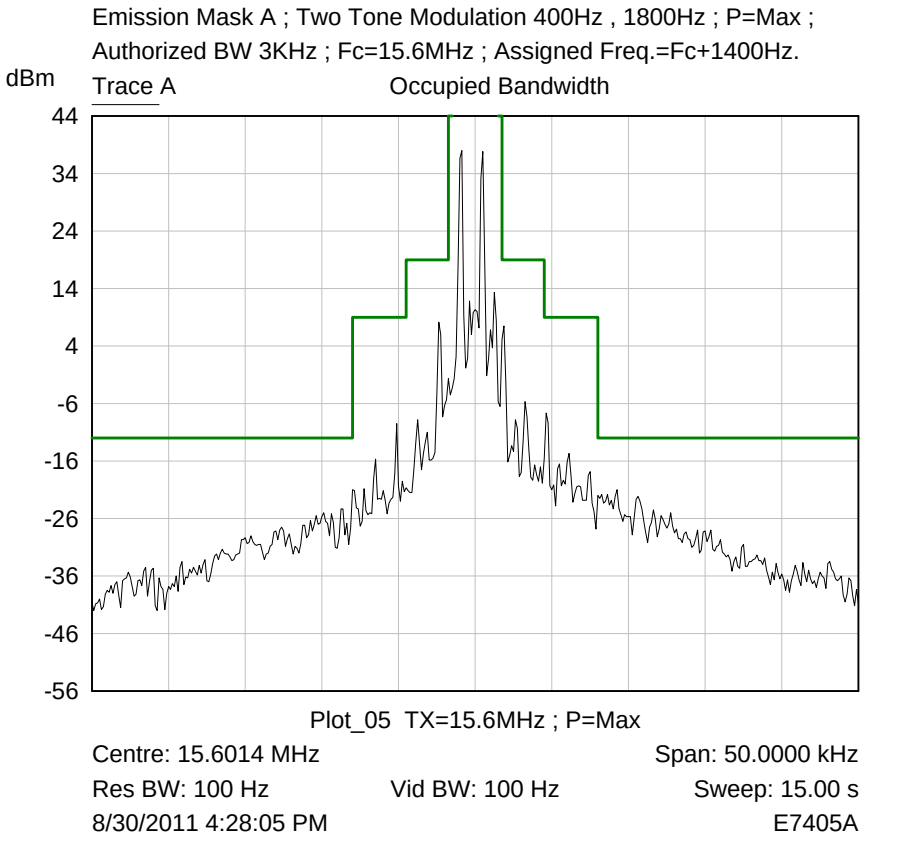
Plot Occupied Bandwidth - SSB/ 14



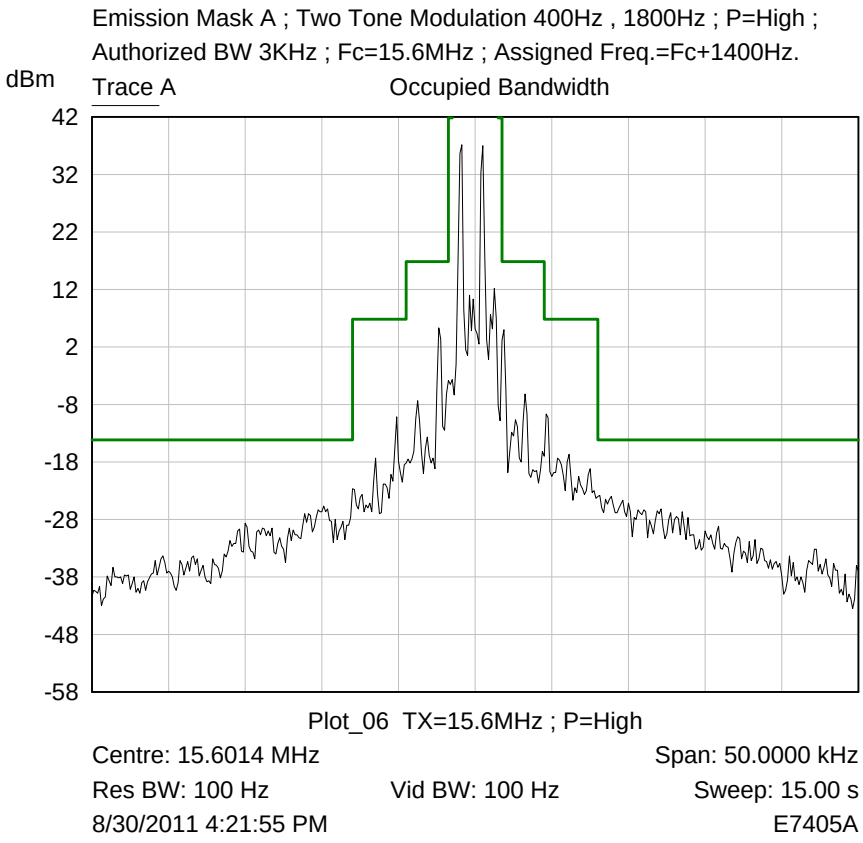
Plot Occupied Bandwidth - SSB/ 15



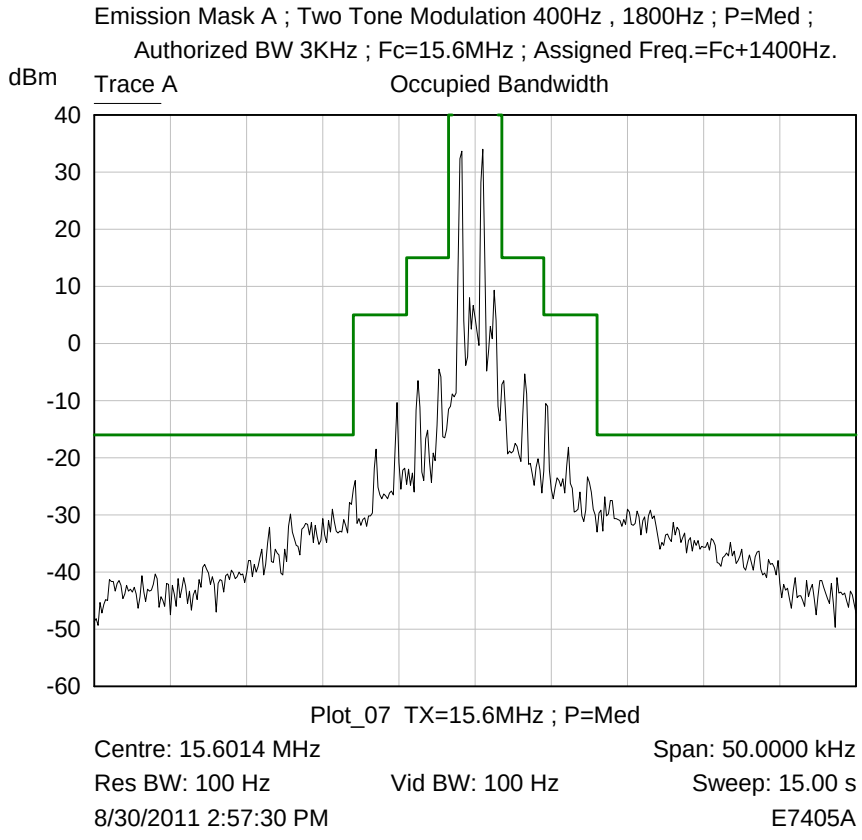
Plot Occupied Bandwidth - SSB/ 16



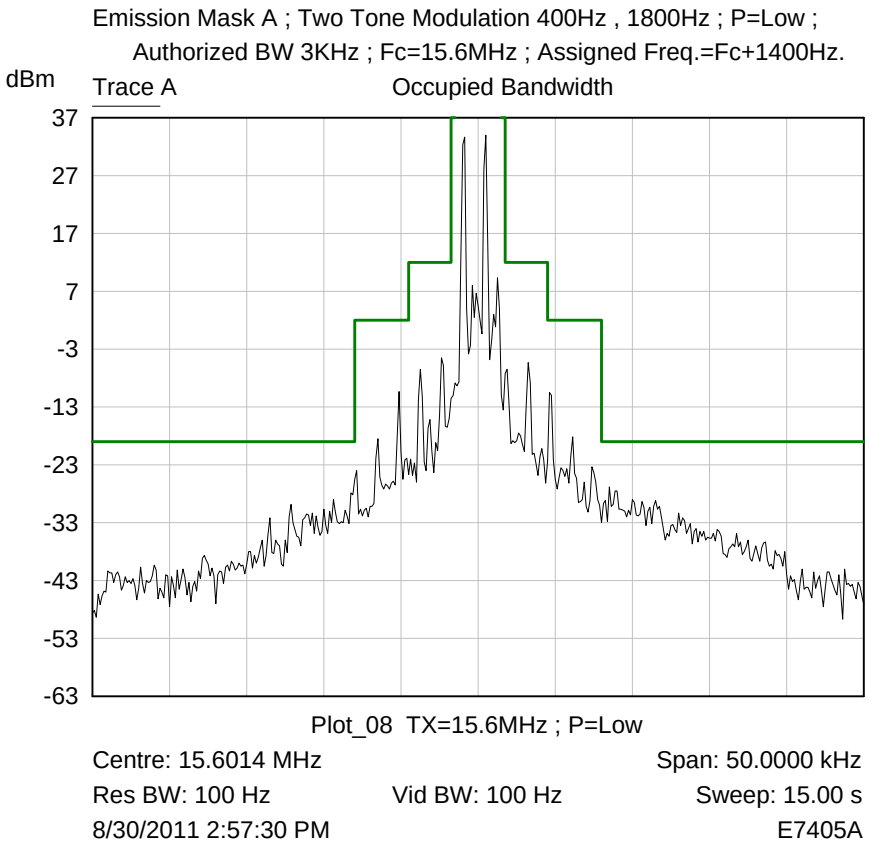
Plot Occupied Bandwidth - SSB/ 17



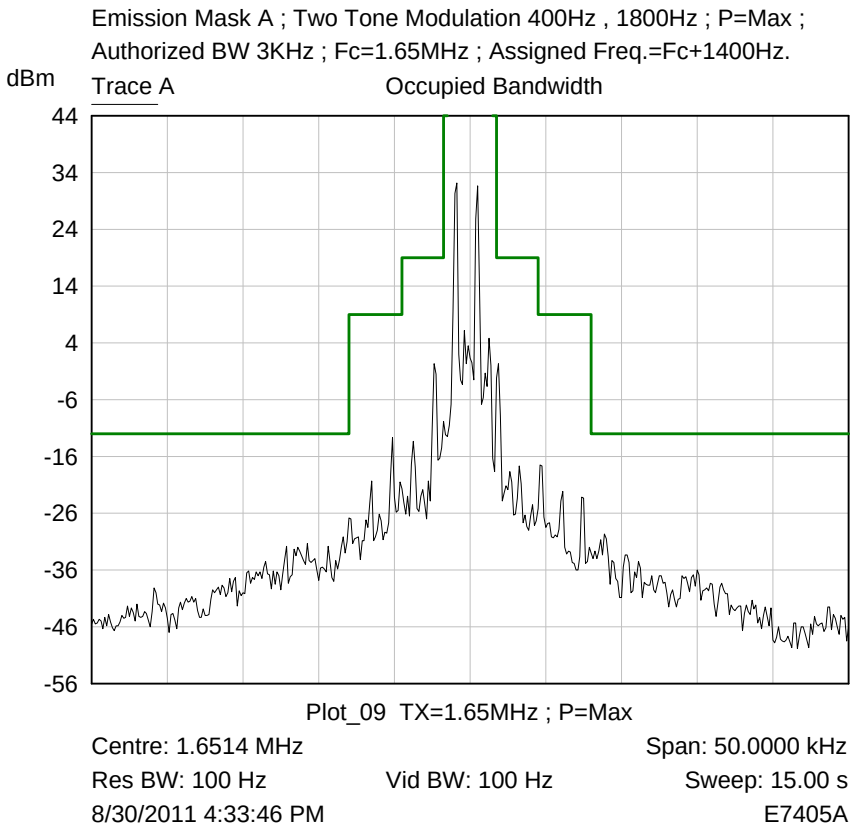
Plot Occupied Bandwidth - SSB/ 18



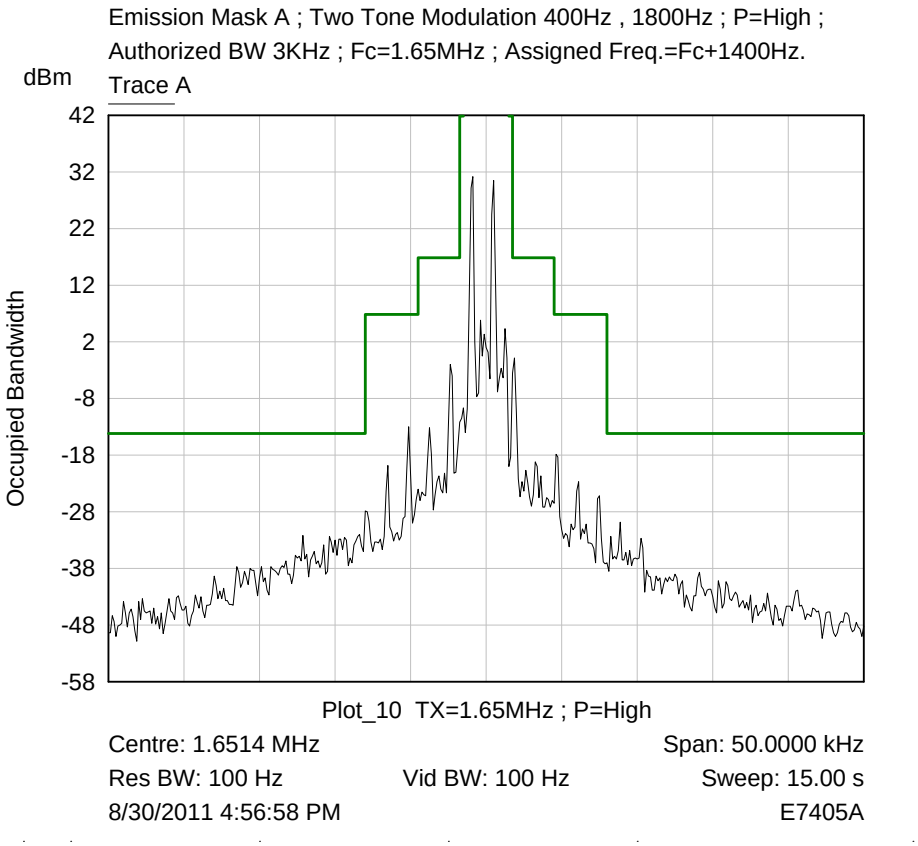
Plot Occupied Bandwidth - SSB/ 19



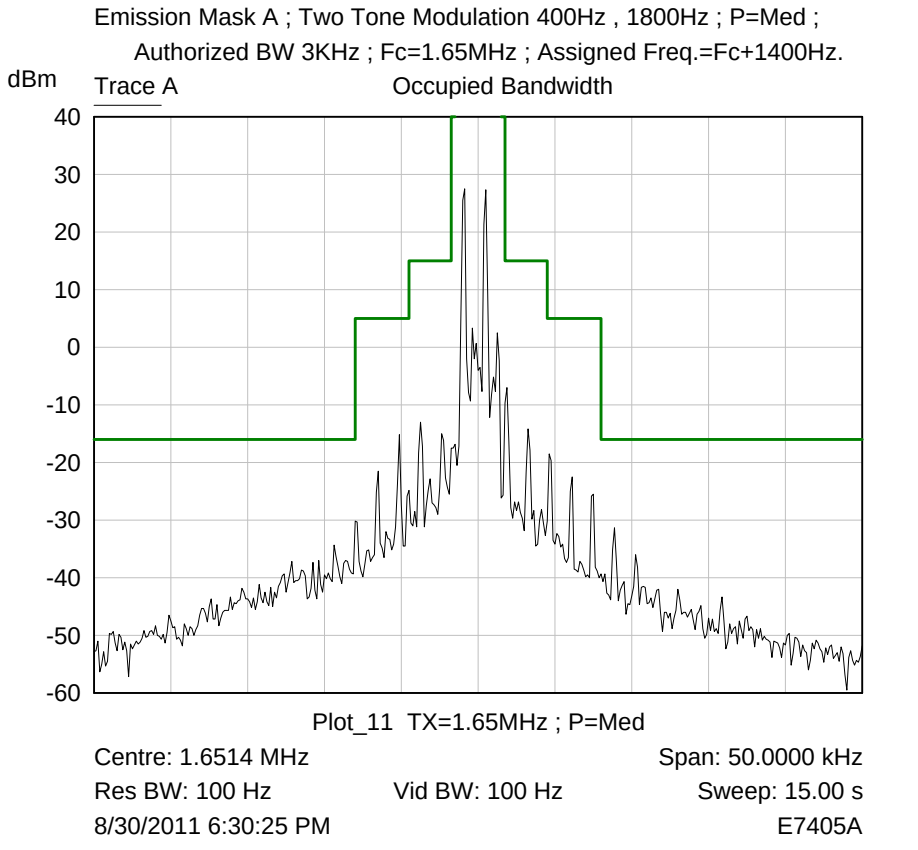
Plot Occupied Bandwidth - SSB/ 20



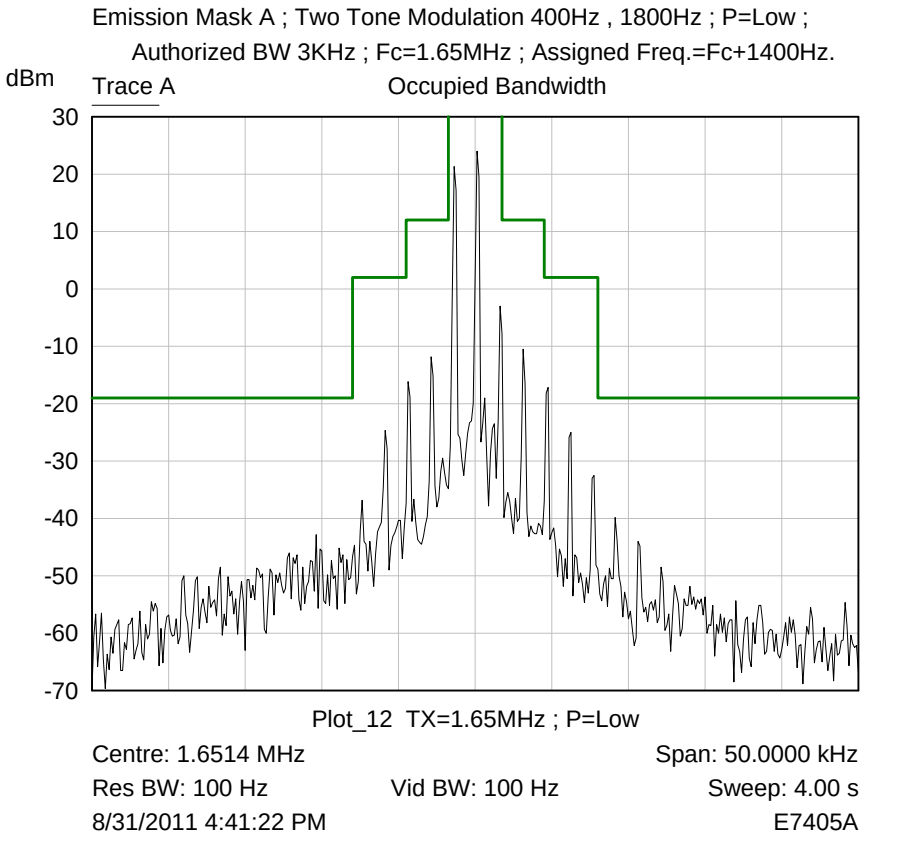
Plot Occupied Bandwidth - SSB/ 21



Plot Occupied Bandwidth - SSB/ 22



Plot Occupied Bandwidth - SSB/ 23



Plot Occupied Bandwidth - SSB/ 24

8. Spurious Emissions at Antenna Terminals – Part 2.1051

E.U.T	Micom Pathfinder
S/N:	MP420
Date:	10.08.2011
Standard	90.210 (a) (3)
Relative Humidity:	38%
Ambient Temperature:	24^0 C
Air Pressure:	1010hPa

Testing Engineer: I. Arbitman  Date 10.08.2011

8.1. Test Results Summary & Conclusions

The E.U.T was found in compliance with Spurious Emissions at Antenna Terminals – Part 2.1051

8.2. Test Instrumentation and Equipment

Table 6: Test Instrumentation and Equipment

Item	Model	Manufacturer	Next Date of Calibration
Spectrum Analyzer	E7405A	Agilent	11.05.2012
Attenuator 30 dB	769-30	Narda	21.06.2012
Audio Analyzer	8903A	HP	24.05.2012

8.3. Test Results

Frequencies examined: 1.65 MHz, 15.6 MHz, 29.9 MHz

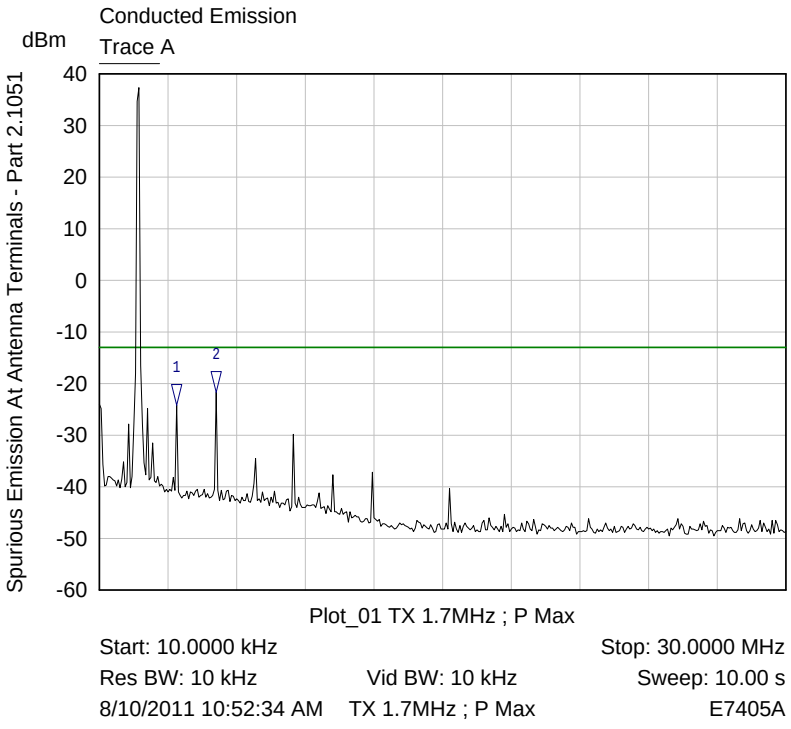
Transmitting Power: 5W, 10W, 15W & 25W

All emissions were measured using the following input criteria:

- Two Tone Modulation 400 Hz and 1800 Hz
- Input level set to 10dB above the level required for Max PEP 25 Watts

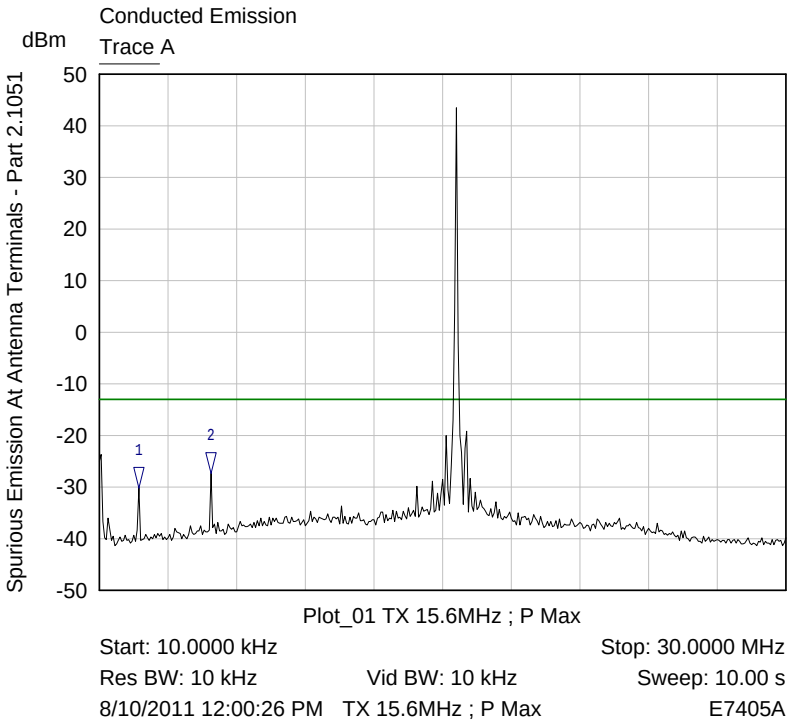
Table 7: Test Results

Frequency (MHz)	Power	Compliance Y/N
1.65	Maximum	Y
1.65	High	Y
1.65	Medium	Y
1.65	Low	Y
15.6	Maximum	Y
15.6	High	Y
15.6	Medium	Y
15.6	Low	Y
29.9	Maximum	Y
29.9	High	Y
29.9	Medium	Y
29.9	Low	Y



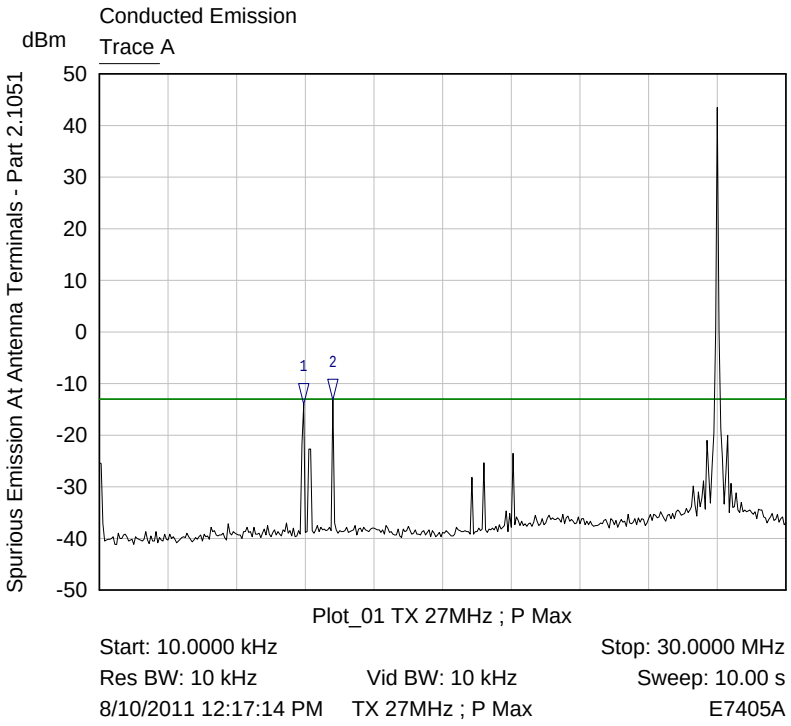
Mkr	Trace	X-Axis	Value	Notes
1 ▽	Trace A	3.3839 MHz	-24.17 dBm	
2 ▽	Trace A	5.1083 MHz	-21.61 dBm	

Plot Spurious Emissions – Antenna Terminal – TX 1.7 MHz P Max/ 1



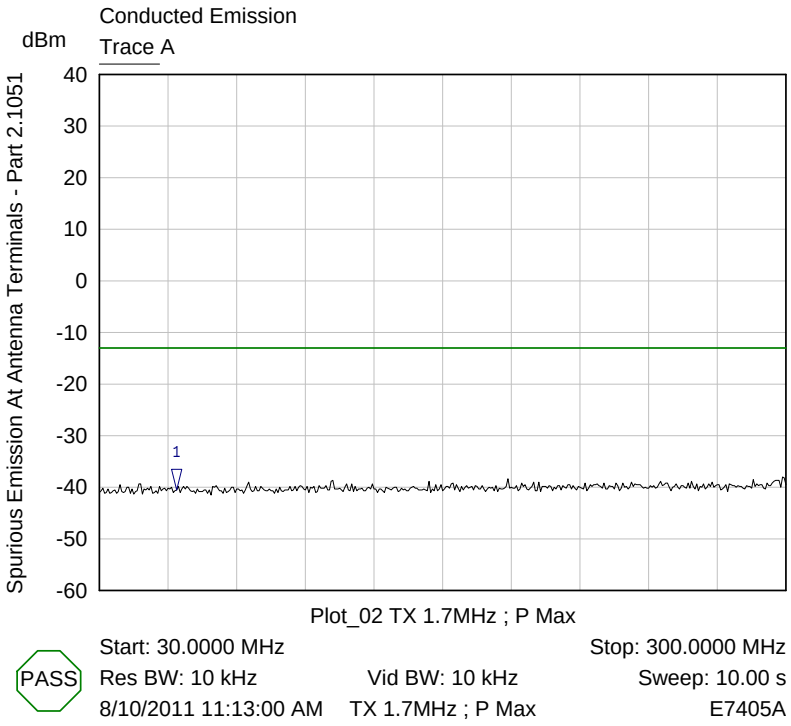
Mkr	Trace	X-Axis	Value	Notes
1 ▽	Trace A	1.7344 MHz	-30.21 dBm	
2 ▽	Trace A	4.8834 MHz	-27.33 dBm	

Plot Spurious Emissions – Antenna Terminal – TX 15.6 MHz P Max/ 2



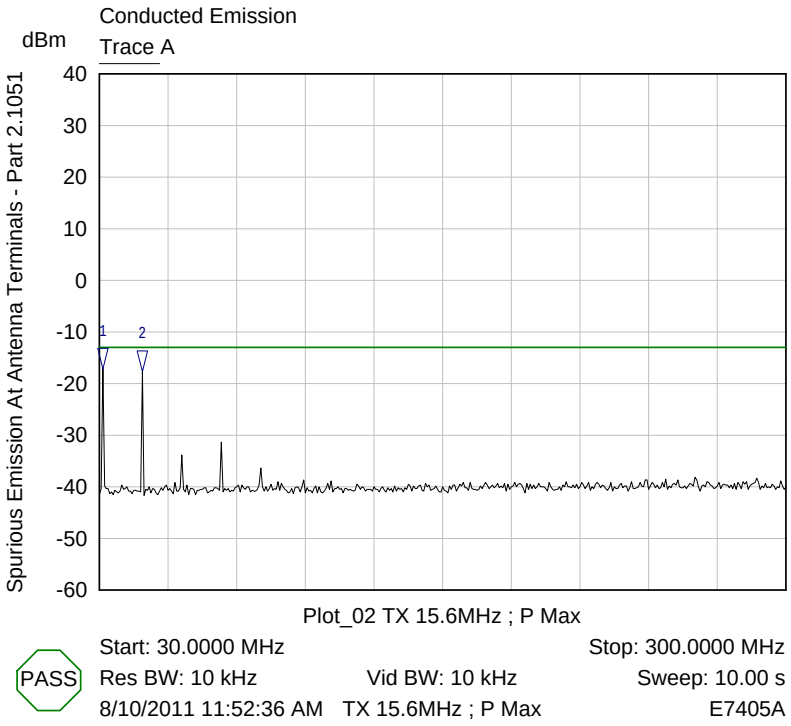
Mkr	Trace	X-Axis	Value	Notes
1	Trace A	8.9320 MHz	-13.98 dBm	
2	Trace A	10.2066 MHz	-13.10 dBm	

Plot Spurious Emissions – Antenna Terminal – TX 27 MHz P Max/ 3



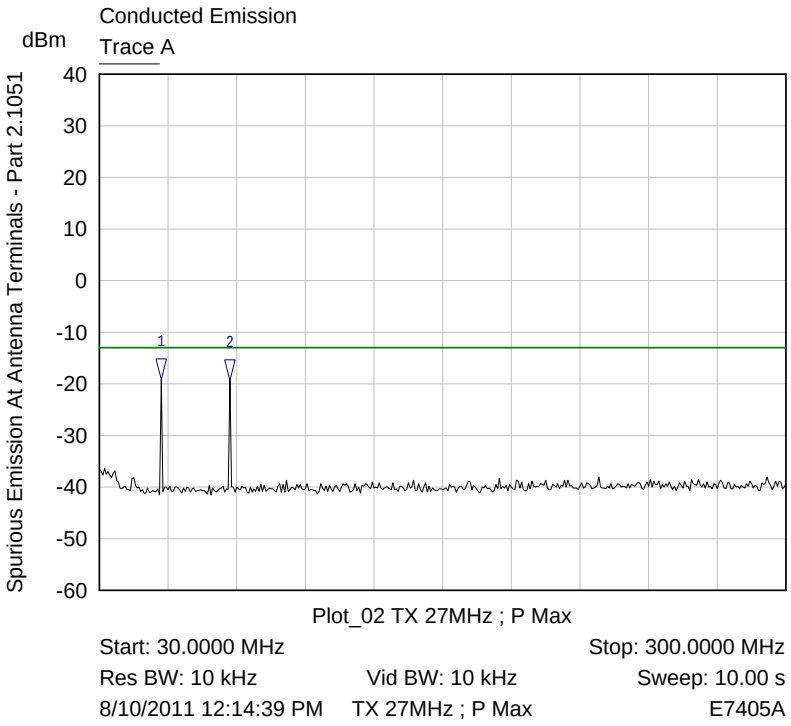
Mkr	Trace	X-Axis	Value	Notes
1	Trace A	60.3750 MHz	-40.50 dBm	

Plot Spurious Emissions – Antenna Terminal – TX 1.7 MHz P Max/ 4



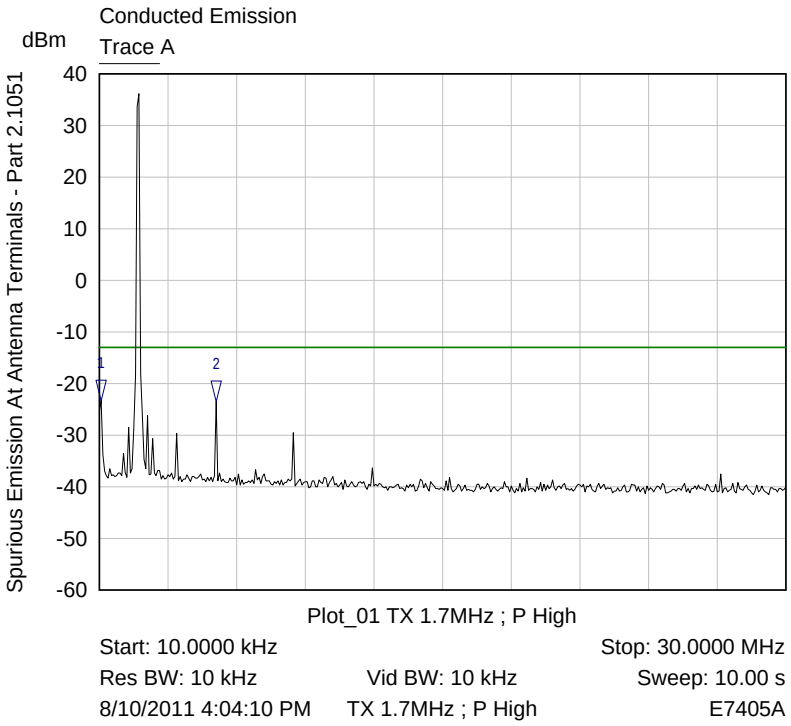
Mkr	Trace	X-Axis	Value	Notes
1	Trace A	31.3500 MHz	-17.09 dBm	
2	Trace A	46.8750 MHz	-17.61 dBm	

Plot Spurious Emissions – Antenna Terminal – TX 15.6 MHz P Max/ 5



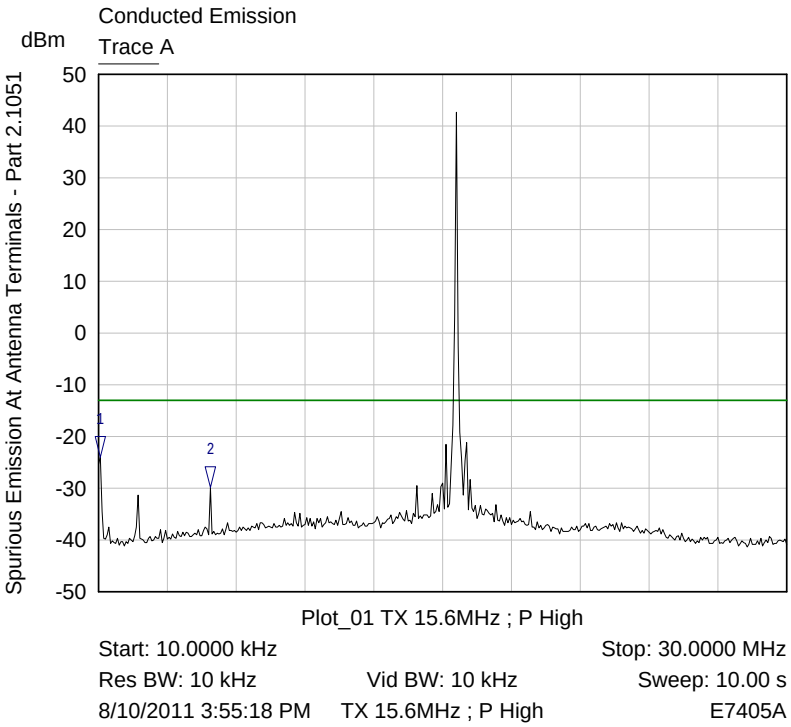
Mkr	Trace	X-Axis	Value	Notes
1	Trace A	54.3000 MHz	-19.23 dBm	
2	Trace A	81.3000 MHz	-19.28 dBm	

Plot Spurious Emissions – Antenna Terminal – TX 27 MHz P Max/ 6



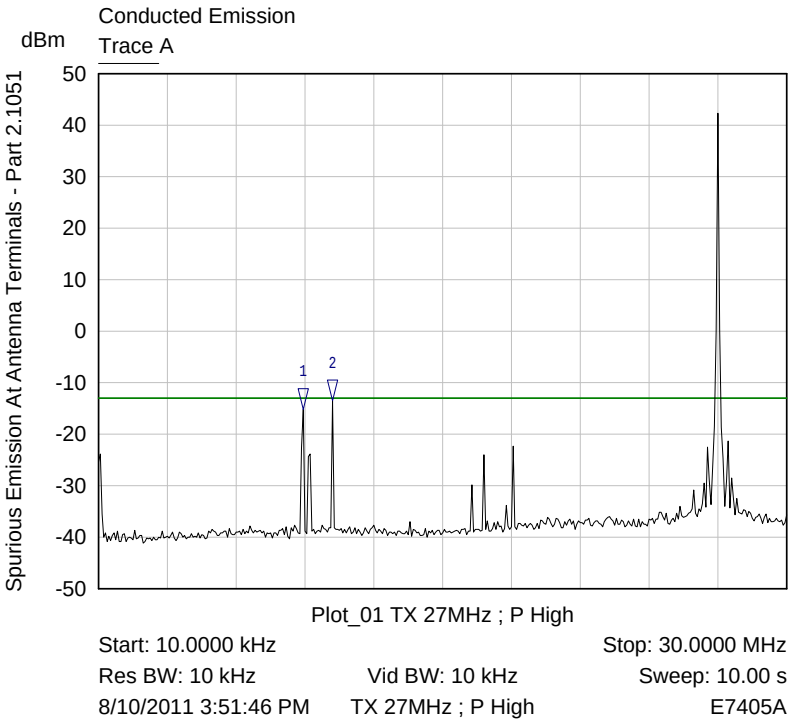
Mkr	Trace	X-Axis	Value	Notes
1 ▽	Trace A	84.9750 kHz	-23.38 dBm	
2 ▽	Trace A	5.1083 MHz	-23.49 dBm	

Plot Spurious Emissions – Antenna Terminal – TX 1.7 MHz P High/ 7



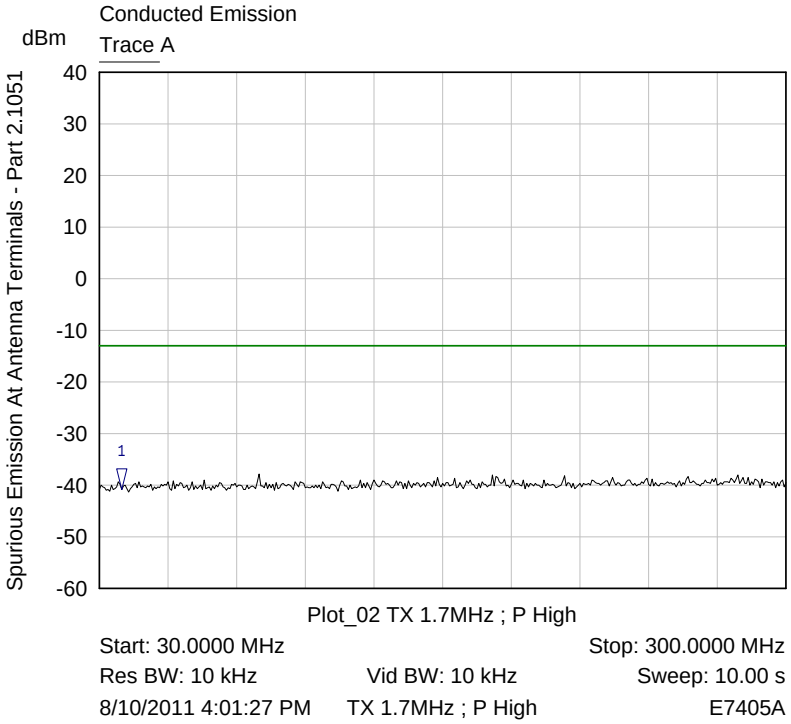
Mkr	Trace	X-Axis	Value	Notes
1 ▽	Trace A	84.9750 kHz	-24.00 dBm	
2 ▽	Trace A	4.8834 MHz	-29.85 dBm	

Plot Spurious Emissions – Antenna Terminal – TX 15.6 MHz P High/ 8



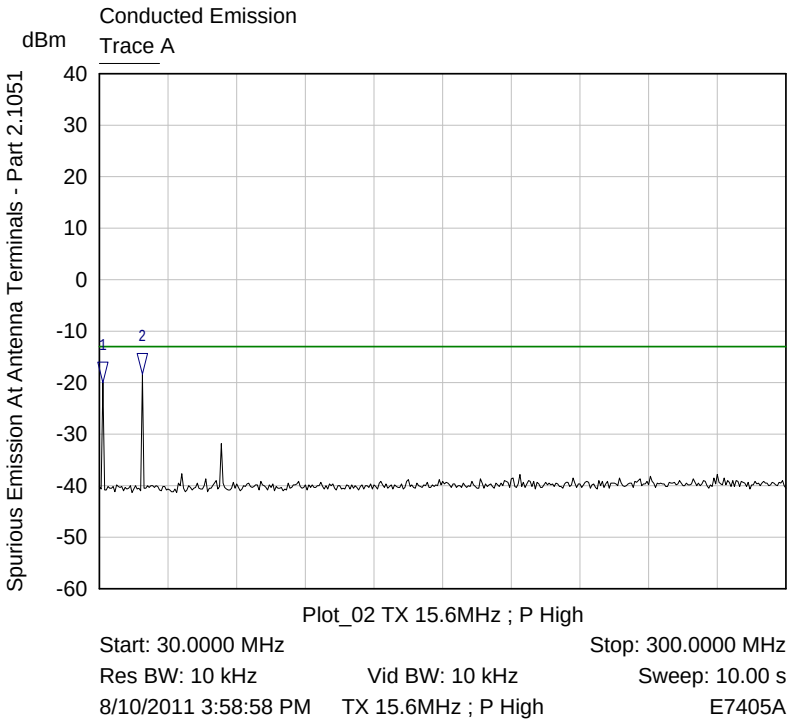
Mkr	Trace	X-Axis	Value	Notes
1	Trace A	8.9320 MHz	-15.09 dBm	
2	Trace A	10.2066 MHz	-13.51 dBm	

Plot Spurious Emissions – Antenna Terminal – TX 27 MHz P High/ 9



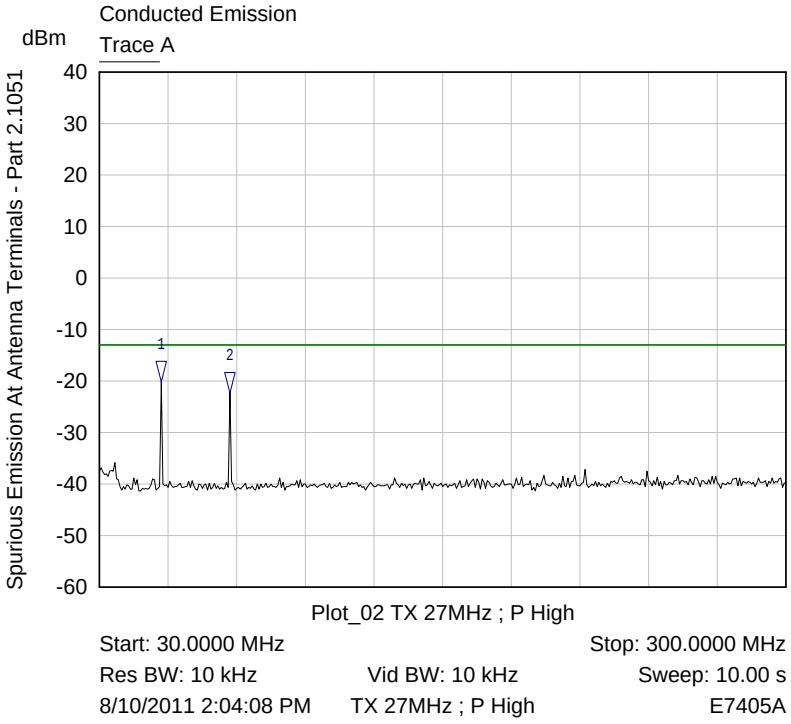
Mkr	Trace	X-Axis	Value	Notes
1	Trace A	38.7750 MHz	-40.76 dBm	

Plot Spurious Emissions – Antenna Terminal – TX 1.7 MHz P High/ 10



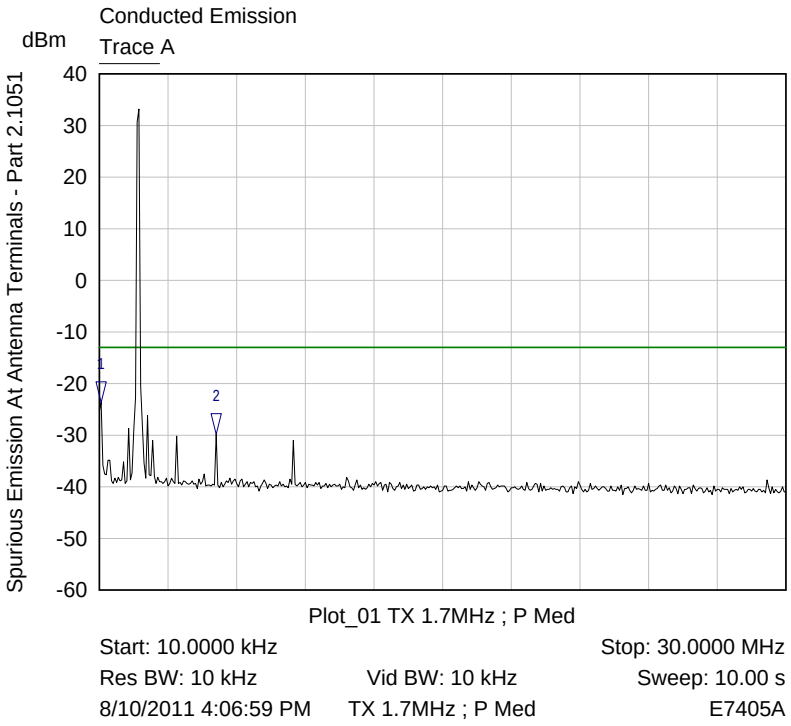
Mkr	Trace	X-Axis	Value	Notes
1	Trace A	31.3500 MHz	-19.95 dBm	
2	Trace A	46.8750 MHz	-18.35 dBm	

Plot Spurious Emissions – Antenna Terminal – TX 15.6 MHz P High/ 11



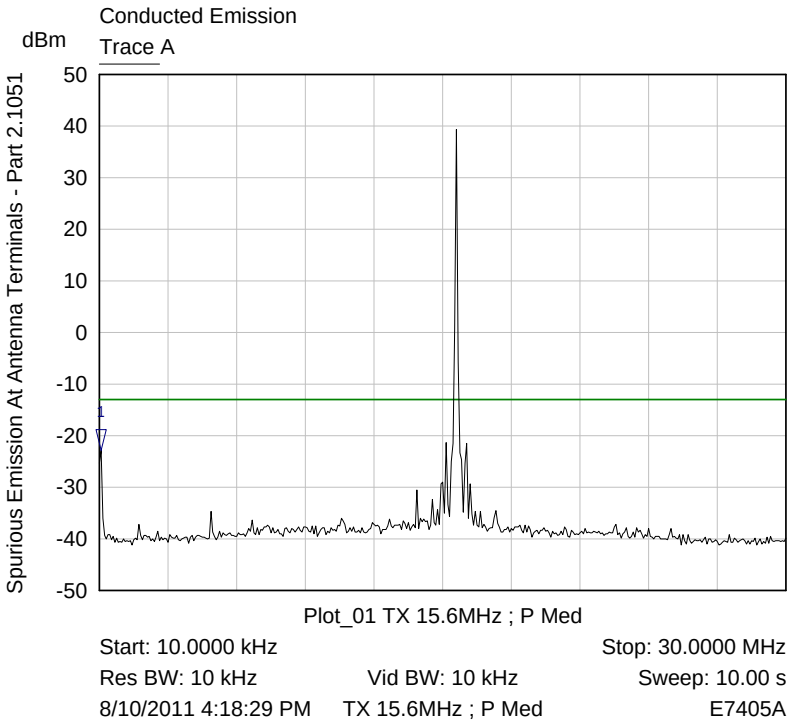
Mkr	Trace	X-Axis	Value	Notes
1	Trace A	54.3000 MHz	-20.18 dBm	
2	Trace A	81.3000 MHz	-22.36 dBm	

Plot Spurious Emissions – Antenna Terminal – TX 27 MHz P High/ 12



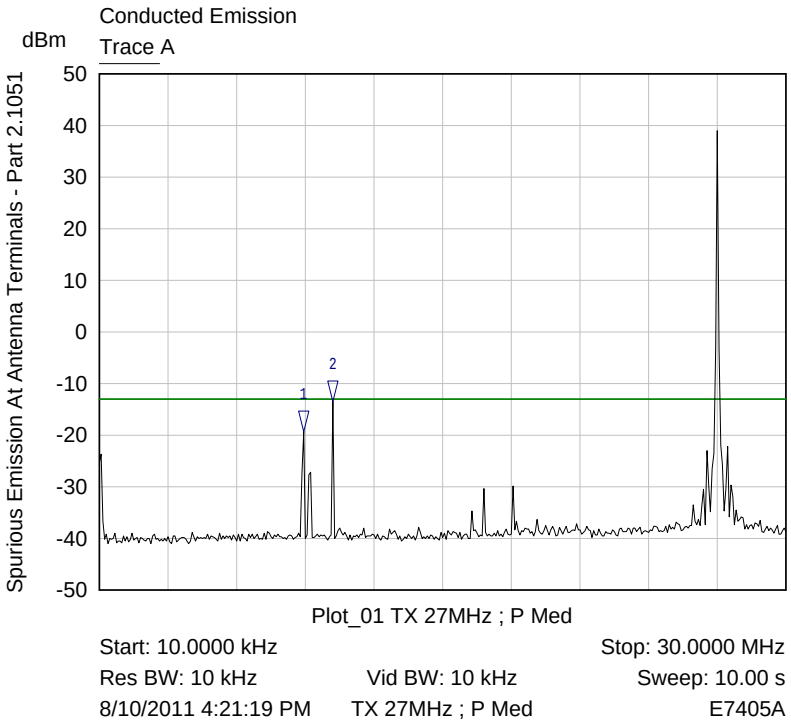
Mkr	Trace	X-Axis	Value	Notes
1 ▽	Trace A	84.9750 kHz	-23.69 dBm	
2 ▽	Trace A	5.1083 MHz	-29.79 dBm	

Plot Spurious Emissions – Antenna Terminal – TX Mode P Med/ 13



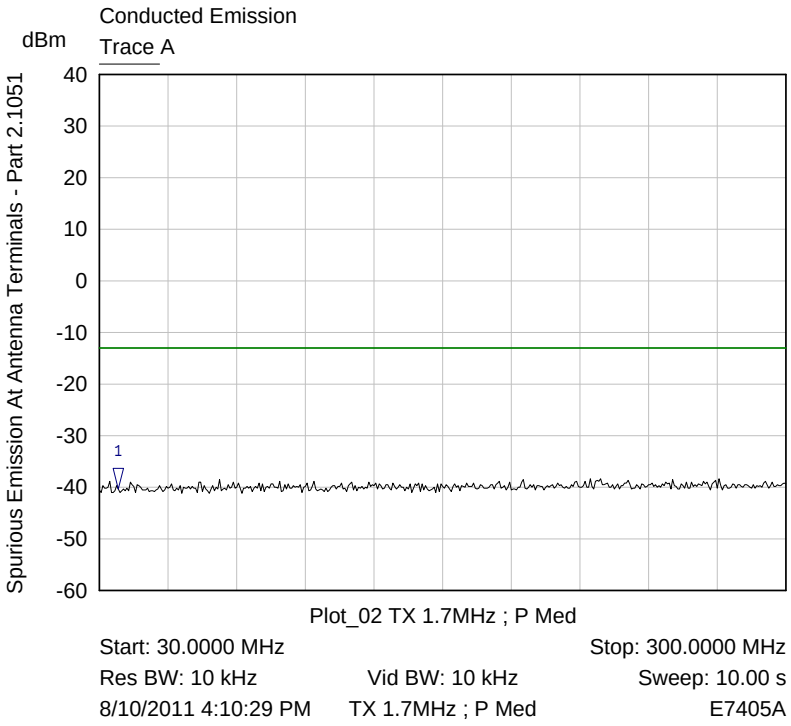
Mkr	Trace	X-Axis	Value	Notes
1 ▽	Trace A	84.9750 kHz	-22.83 dBm	

Plot Spurious Emissions – Antenna Terminal – TX Mode P Med/ 14



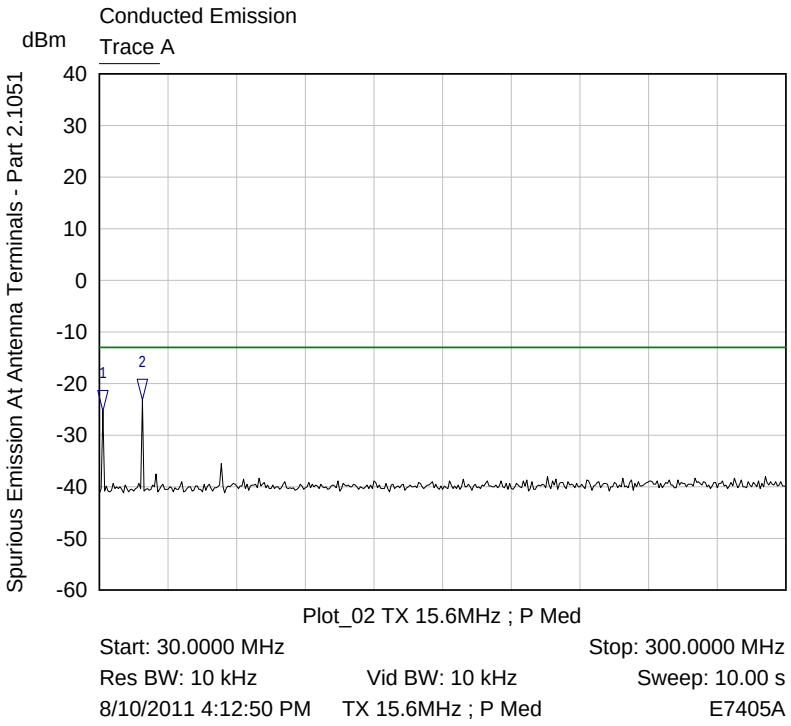
Mkr	Trace	X-Axis	Value	Notes
1	Trace A	8.9320 MHz	-19.39 dBm	
2	Trace A	10.2066 MHz	-13.55 dBm	

Plot Spurious Emissions – Antenna Terminal – TX Mode P Med/ 15



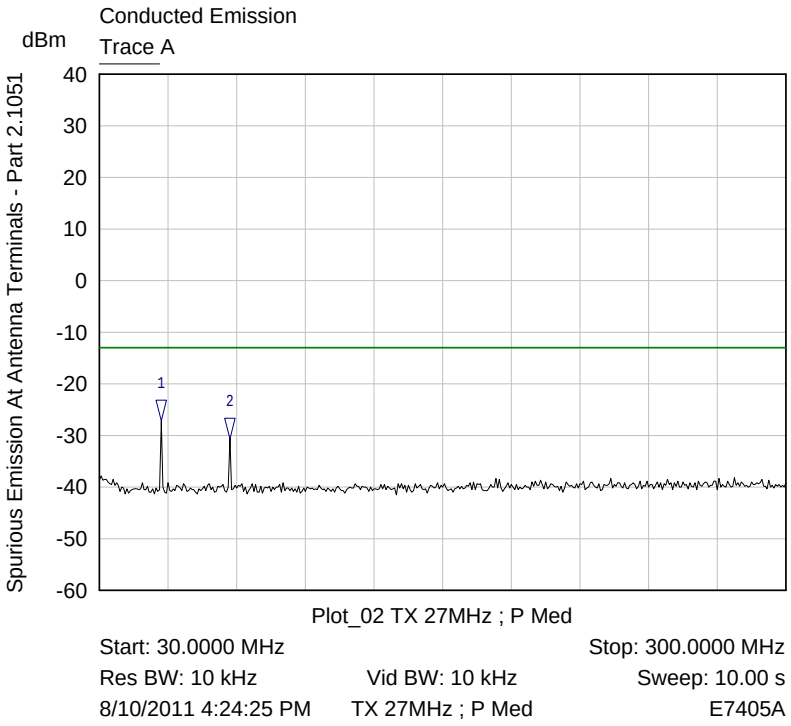
Mkr	Trace	X-Axis	Value	Notes
1	Trace A	37.4250 MHz	-40.32 dBm	

Plot Spurious Emissions – Antenna Terminal – TX Mode P Med/ 16



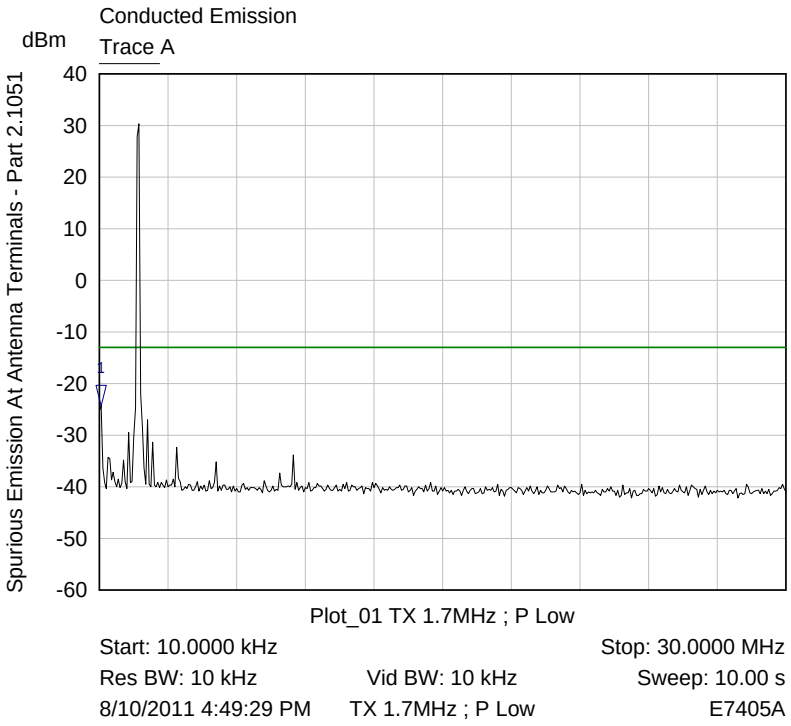
Mkr	Trace	X-Axis	Value	Notes
1	Trace A	31.3500 MHz	-25.34 dBm	
2	Trace A	46.8750 MHz	-23.14 dBm	

Plot Spurious Emissions – Antenna Terminal – TX Mode P Med/ 17



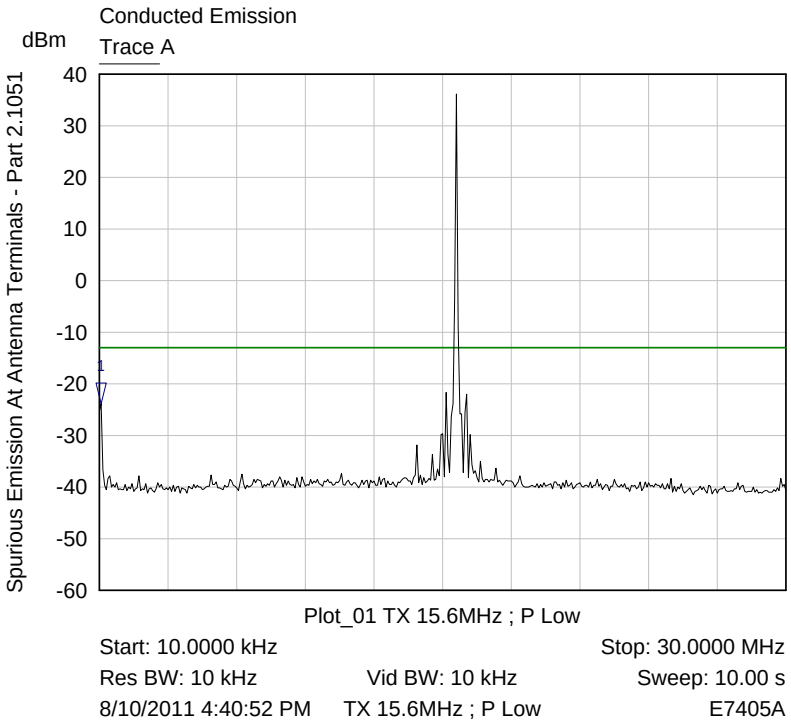
Mkr	Trace	X-Axis	Value	Notes
1	Trace A	54.3000 MHz	-27.24 dBm	
2	Trace A	81.3000 MHz	-30.69 dBm	

Plot Spurious Emissions – Antenna Terminal – TX Mode P Med/ 18



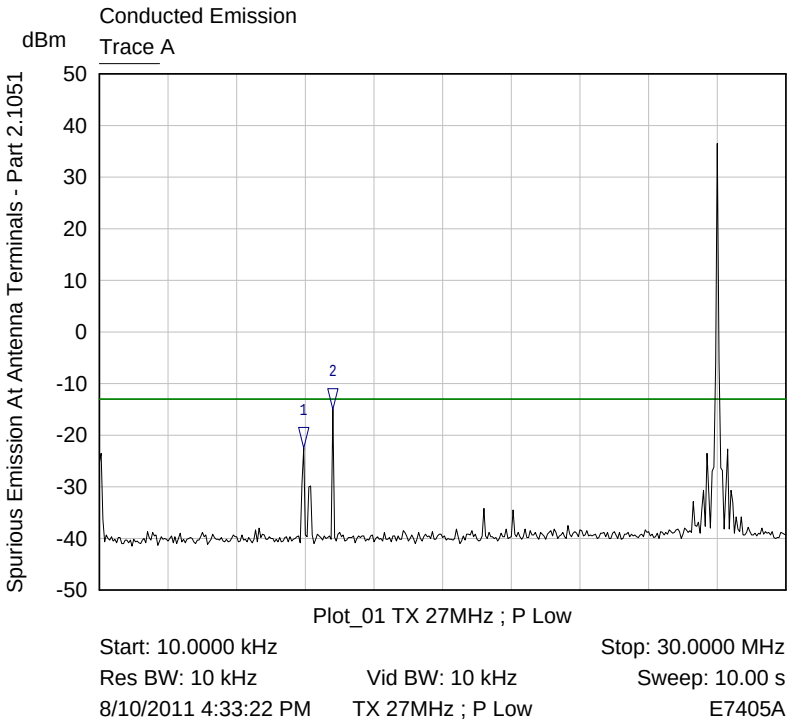
Mkr	Trace	X-Axis	Value	Notes
1 ▽	Trace A	84.9750 kHz	-24.30 dBm	

Plot Spurious Emissions – Antenna Terminal – TX 1.7 MHz P Low/ 19



Mkr	Trace	X-Axis	Value	Notes
1 ▽	Trace A	84.9750 kHz	-23.85 dBm	

Plot Spurious Emissions – Antenna Terminal – TX 15.6 MHz P Low/ 20

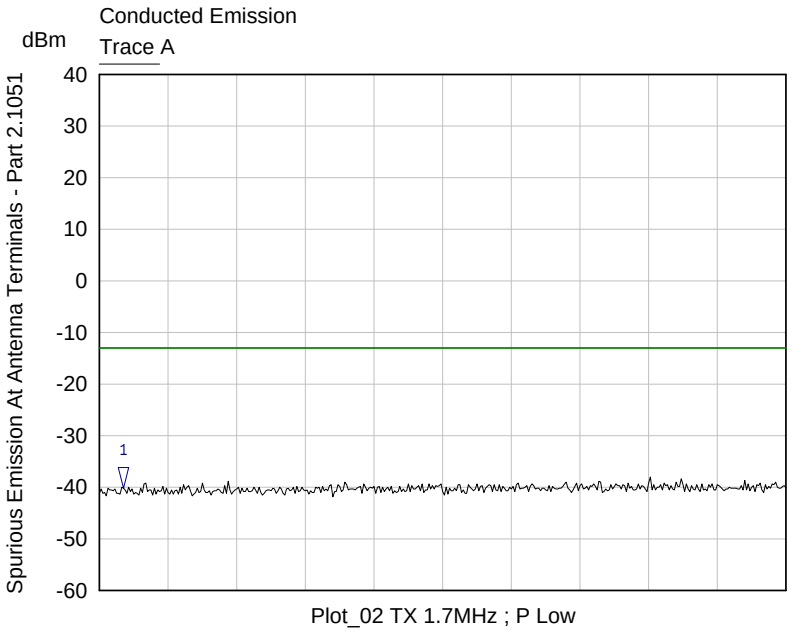


Plot_01 TX 27MHz ; P Low

Start: 10.0000 kHz Stop: 30.0000 MHz
Res BW: 10 kHz Vid BW: 10 kHz Sweep: 10.00 s
8/10/2011 4:33:22 PM TX 27MHz ; P Low E7405A

Mkr	Trace	X-Axis	Value	Notes
1	Trace A	8.9320 MHz	-22.50 dBm	
2	Trace A	10.2066 MHz	-15.06 dBm	

Plot Spurious Emissions – Antenna Terminal – TX 27 MHz P Low/ 21

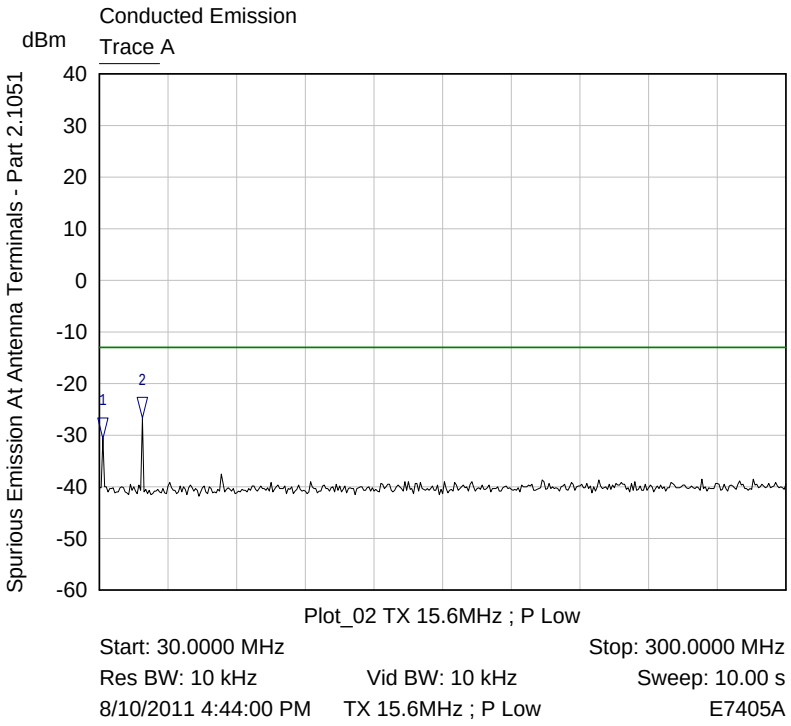


Plot_02 TX 1.7MHz ; P Low

Start: 30.0000 MHz Stop: 300.0000 MHz
Res BW: 10 kHz Vid BW: 10 kHz Sweep: 10.00 s
8/10/2011 4:47:15 PM TX 1.7MHz ; P Low E7405A

Mkr	Trace	X-Axis	Value	Notes
1	Trace A	39.4500 MHz	-40.15 dBm	

Plot Spurious Emissions – Antenna Terminal – TX 1.7 MHz P Low/ 22

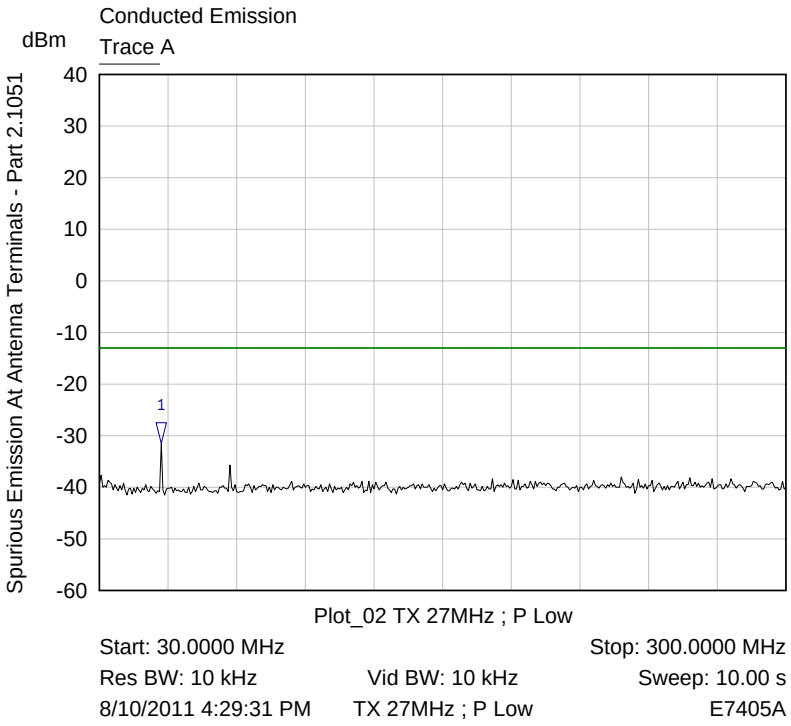


Plot_02 TX 15.6MHz ; P Low

Start: 30.0000 MHz Stop: 300.0000 MHz
Res BW: 10 kHz Vid BW: 10 kHz Sweep: 10.00 s
8/10/2011 4:44:00 PM TX 15.6MHz ; P Low E7405A

Mkr	Trace	X-Axis	Value	Notes
1	Trace A	31.3500 MHz	-30.72 dBm	
2	Trace A	46.8750 MHz	-26.71 dBm	

Plot Spurious Emissions – Antenna Terminal – TX 15.6 MHz P Low/ 23



Plot_02 TX 27MHz ; P Low

Start: 30.0000 MHz Stop: 300.0000 MHz
Res BW: 10 kHz Vid BW: 10 kHz Sweep: 10.00 s
8/10/2011 4:29:31 PM TX 27MHz ; P Low E7405A

Mkr	Trace	X-Axis	Value	Notes
1	Trace A	54.3000 MHz	-31.52 dBm	

Plot Spurious Emissions – Antenna Terminal – TX 27 MHz P Low/ 24

9. Carrier Suppression at Antenna Terminals – Part 2.1051

E.U.T	Micom Pathfinder
S/N:	MP420
Date:	11.08.2011
Standard	90.210 (a)
Relative Humidity:	38%
Ambient Temperature:	24^0 C
Air Pressure:	1010hPa

Testing Engineer: I. Arbitman  Date 11.08.2011

9.1. Test Results Summary & Conclusions

The E.U.T was found in compliance with Carrier Suppression at Antenna Terminals – Part 2.1051

9.2. Test Instrumentation and Equipment

Table 8: Test Instrumentation and Equipment

Item	Model	Manufacturer	Next Date of Calibration
Spectrum Analyzer	E7405A	Agilent	11.05.2012
Attenuator 30 dB	769-30	Narda	21.06.2012
Audio Analyzer	8903A	HP	24.05.2012

9.3. Test Results

Frequencies examined: 1.65 MHz, 15.6 MHz. 29.9 MHz

Transmitting Power: 5W, 10W, 15W & 25W

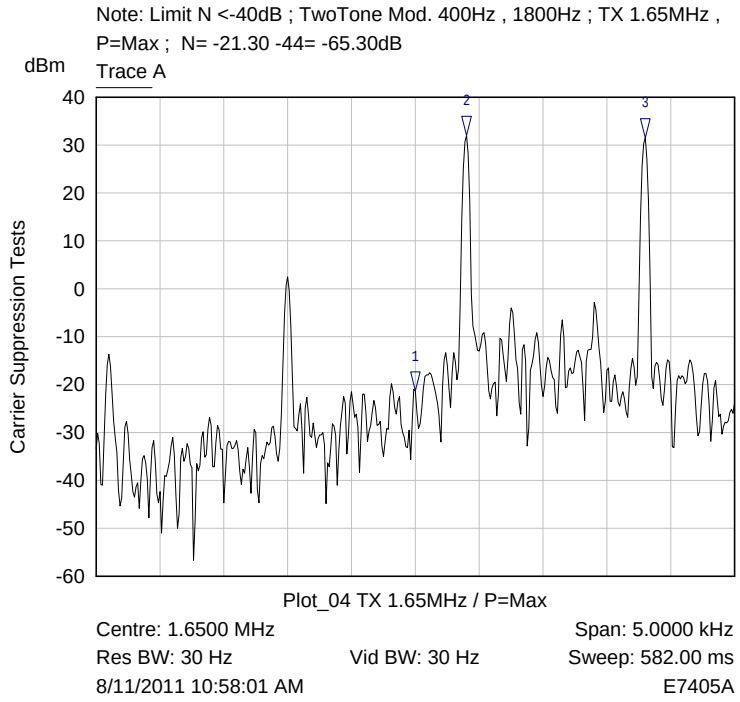
All emissions were measured using the following input criteria:

- Two Tone Modulation 400 Hz and 1800 Hz
- Input level set to 10dB above the level required for Max PEP 25 Watts

Table 9: Test Results

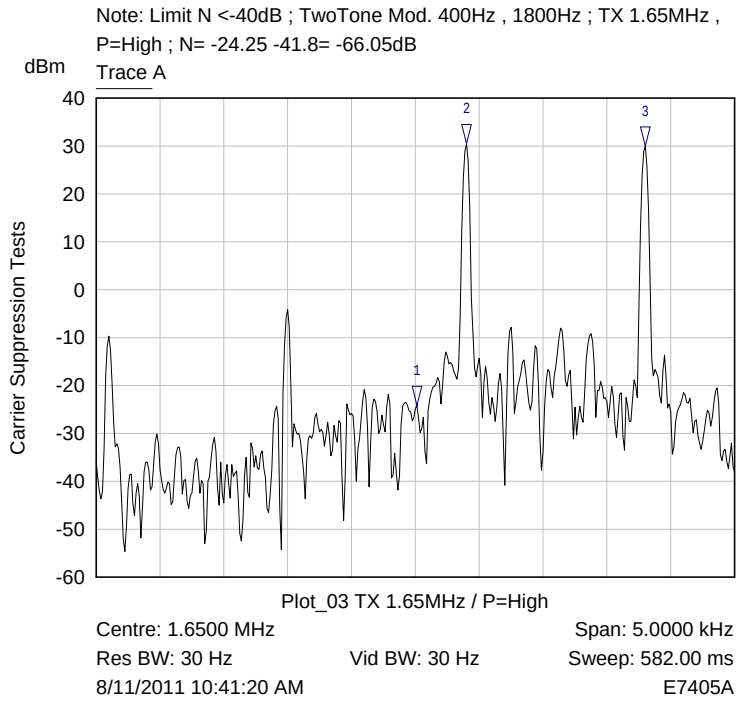
Frequency (MHz)	Power	Compliance Y/N
1.65	Maximum	Y
1.65	High	Y
1.65	Medium	Y
1.65	Low	Y
15.6	Maximum	Y
15.6	High	Y
15.6	Medium	Y
15.6	Low	Y
29.9	Maximum	Y
29.9	High	Y
29.9	Medium	Y
29.9	Low	Y

See attached plots



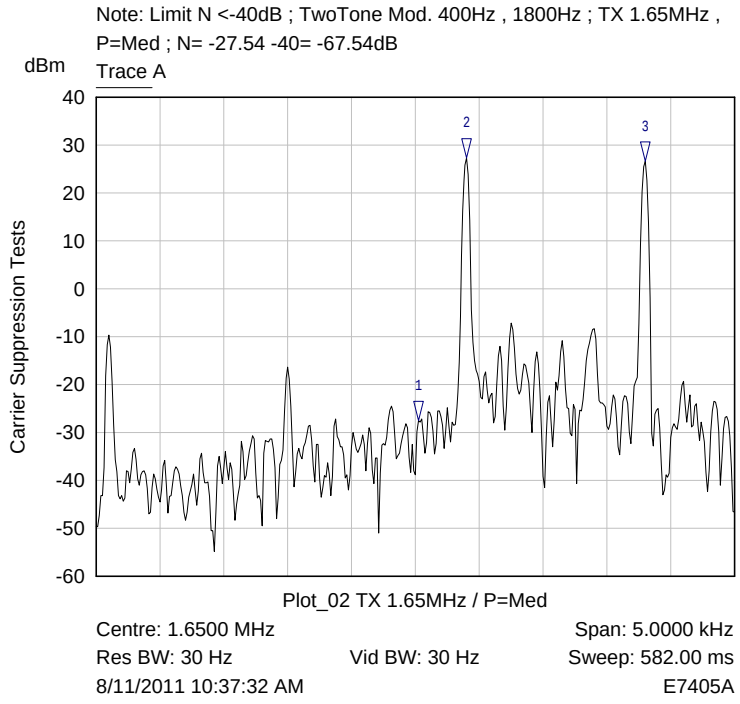
Mkr	Trace	X-Axis	Value	Notes
1	Trace A	1.6500 MHz	-21.30 dBm	Carrier
2	Trace A	1.6504 MHz	31.97 dBm	Tone 1
3	Trace A	1.6518 MHz	31.42 dBm	Tone 2

Plot Carrier Suppression – Antenna Terminal – TX 1.65 MHz P Maximum/ 1



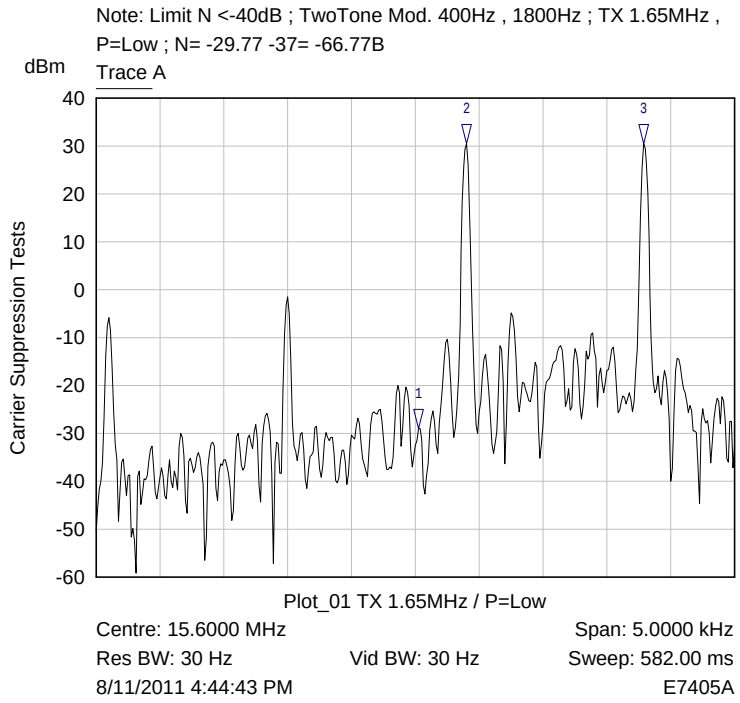
Mkr	Trace	X-Axis	Value	Notes
1	Trace A	1.6500 MHz	-24.25 dBm	Carrier
2	Trace A	1.6504 MHz	30.42 dBm	Tone 1
3	Trace A	1.6518 MHz	29.93 dBm	Tone 2

Plot Carrier Suppression – Antenna Terminal – TX 1.65 MHz P High/ 2



Mkr	Trace	X-Axis	Value	Notes
1	Trace A	1.6500 MHz	-27.54 dBm	Carrier
2	Trace A	1.6504 MHz	27.31 dBm	Tone 1
3	Trace A	1.6518 MHz	26.73 dBm	Tone 2

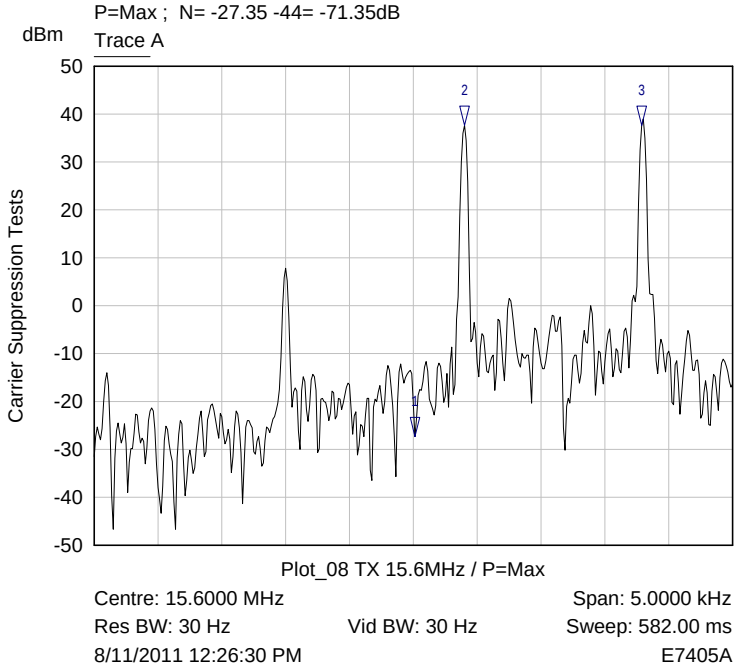
Plot Carrier Suppression – Antenna Terminal – TX 1.65 MHz P Medium/ 3



Mkr	Trace	X-Axis	Value	Notes
1	Trace A	15.6000 MHz	-29.03 dBm	Carrier
2	Trace A	15.6004 MHz	30.46 dBm	Tone 1
3	Trace A	15.6018 MHz	30.43 dBm	Tone 2

Plot Carrier Suppression – Antenna Terminal – TX 1.65 MHz P Low/ 4

Note: Limit N <-40dB ; TwoTone Mod. 400Hz , 1800Hz ; TX 15.6MHz , P=Max ; N= -27.35 -44= -71.35dB



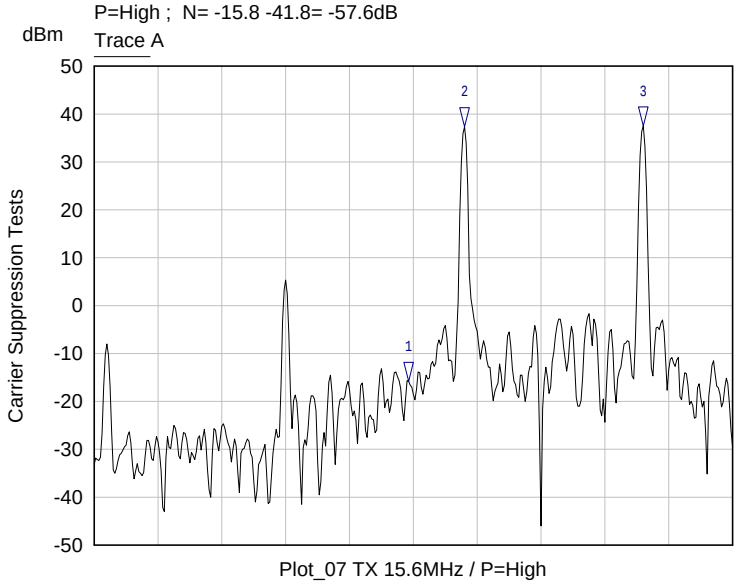
Plot_08 TX 15.6MHz / P=Max

Centre: 15.6000 MHz Span: 5.0000 kHz
Res BW: 30 Hz Vid BW: 30 Hz Sweep: 582.00 ms
8/11/2011 12:26:30 PM E7405A

Mkr	Trace	X-Axis	Value	Notes
1	Trace A	15.6000 MHz	-27.35 dBm	Carrier
2	Trace A	15.6004 MHz	37.74 dBm	Tone 1
3	Trace A	15.6018 MHz	37.69 dBm	Tone 2

Plot Carrier Suppression – Antenna Terminal – TX 15.6 MHz P Maximum/ 5

Note: Limit N <-40dB ; TwoTone Mod. 400Hz , 1800Hz ; TX 15.6MHz , P=High ; N= -15.8 -41.8= -57.6dB

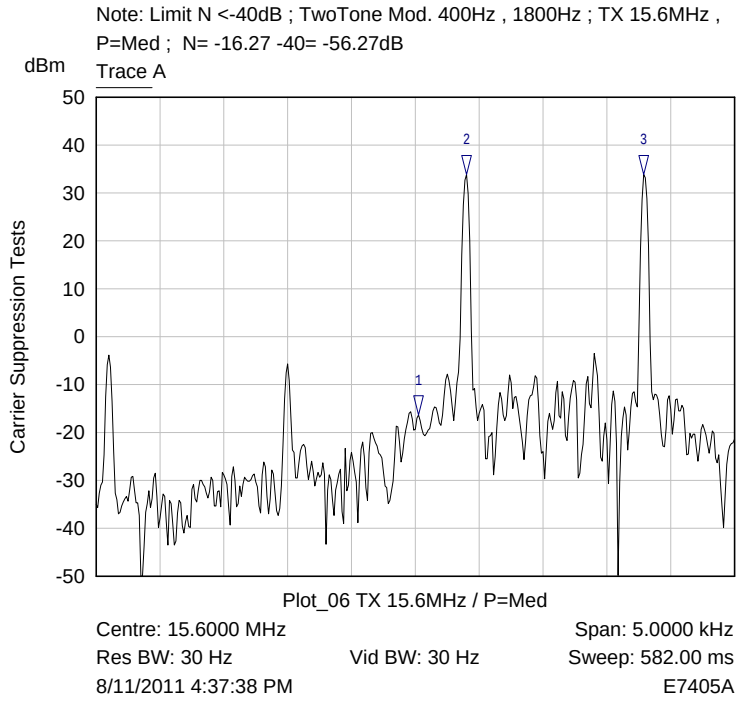


Plot_07 TX 15.6MHz / P=High

Centre: 15.6000 MHz Span: 5.0000 kHz
Res BW: 30 Hz Vid BW: 30 Hz Sweep: 582.00 ms
8/11/2011 4:32:17 PM E7405A

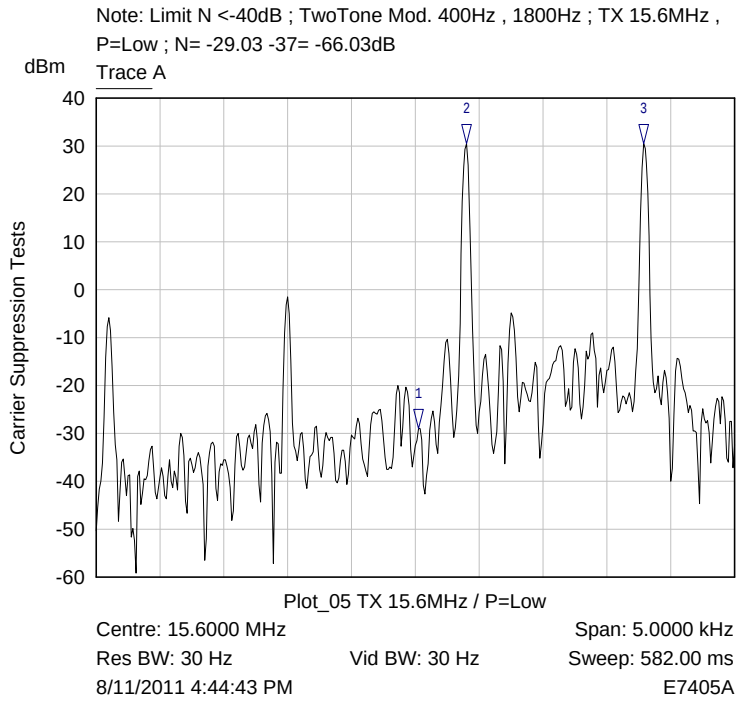
Mkr	Trace	X-Axis	Value	Notes
1	Trace A	15.6000 MHz	-15.80 dBm	Carrier
2	Trace A	15.6004 MHz	37.40 dBm	Tone 1
3	Trace A	15.6018 MHz	37.48 dBm	Tone 2

Plot Carrier Suppression – Antenna Terminal – TX 15.6 MHz P High/ 6



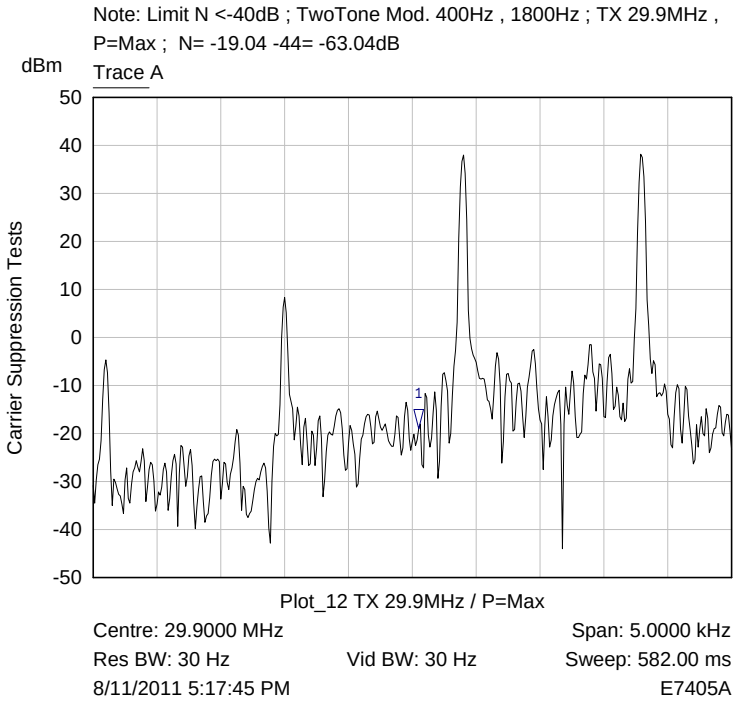
Mkr	Trace	X-Axis	Value	Notes
1	Trace A	15.6000 MHz	-16.27 dBm	Carrier
2	Trace A	15.6004 MHz	33.87 dBm	Tone 1
3	Trace A	15.6018 MHz	33.84 dBm	Tone 2

Plot Carrier Suppression – Antenna Terminal – TX 15.6 MHz P Medium/ 7



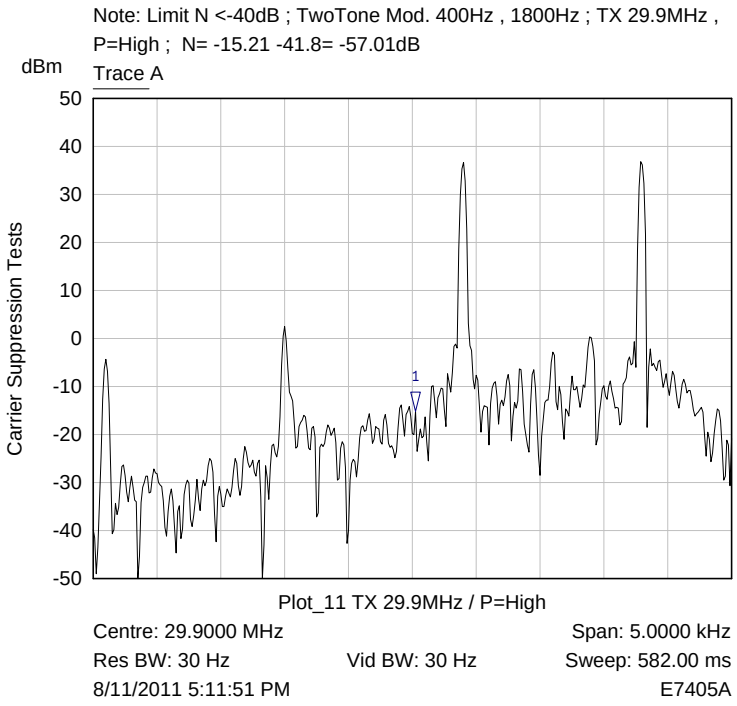
Mkr	Trace	X-Axis	Value	Notes
1	Trace A	15.6000 MHz	-29.03 dBm	Carrier
2	Trace A	15.6004 MHz	30.46 dBm	Tone 1
3	Trace A	15.6018 MHz	30.43 dBm	Tone 2

Plot Carrier Suppression – Antenna Terminal – TX 15.6 MHz P Low/ 8



Mkr	Trace	X-Axis	Value	Notes
1 ▽	Trace A	29.9001 MHz	-19.04 dBm	Carrier

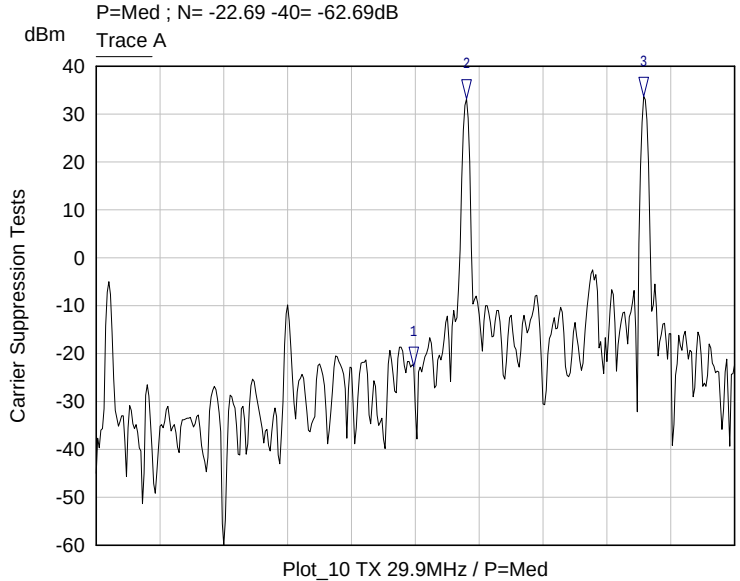
Plot Carrier Suppression – Antenna Terminal – TX 29.9 MHz P Maximum/ 9



Mkr	Trace	X-Axis	Value	Notes
1 ▽	Trace A	29.9000 MHz	-15.21 dBm	Carrier

Plot Carrier Suppression – Antenna Terminal – TX 29.9 MHz P High/ 10

Note: Limit N <-40dB ; TwoTone Mod. 400Hz , 1800Hz ; TX 29.9MHz , P=Med ; N= -22.69 -40= -62.69dB



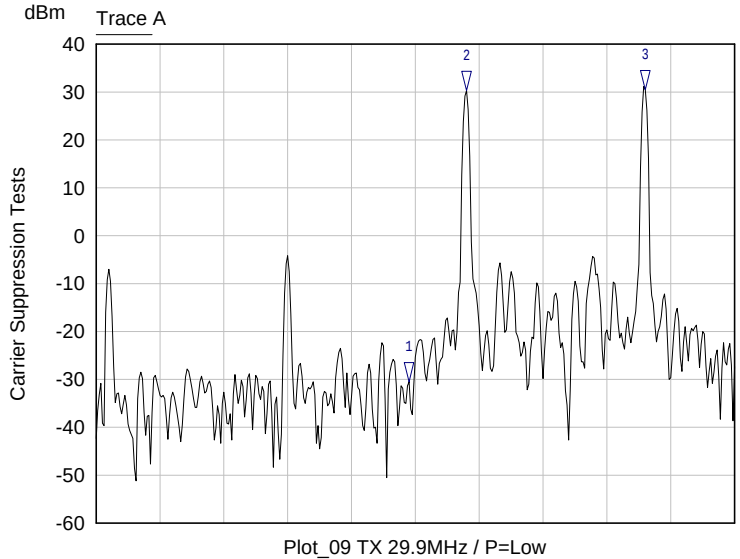
Plot_10 TX 29.9MHz / P=Med

Centre: 29.9000 MHz Span: 5.0000 kHz
Res BW: 30 Hz Vid BW: 30 Hz Sweep: 582.00 ms
8/11/2011 5:07:18 PM E7405A

Mkr	Trace	X-Axis	Value	Notes
1	Trace A	29.9000 MHz	-22.69 dBm	Carrier
2	Trace A	29.9004 MHz	33.19 dBm	Tone 1
3	Trace A	29.9018 MHz	33.61 dBm	Tone 2

Plot Carrier Suppression – Antenna Terminal – TX 29.9 MHz P Medium/ 11

Note: Limit N <-40dB ; TwoTone Mod. 400Hz , 1800Hz ; TX 29.9MHz , P=Low ; N= -30.47 -37= -67.47dB



Plot_09 TX 29.9MHz / P=Low

Centre: 29.9000 MHz Span: 5.0000 kHz
Res BW: 30 Hz Vid BW: 30 Hz Sweep: 582.00 ms
8/11/2011 4:58:44 PM E7405A

Mkr	Trace	X-Axis	Value	Notes
1	Trace A	29.9000 MHz	-30.47 dBm	Carrier
2	Trace A	29.9004 MHz	30.37 dBm	Tone 1
3	Trace A	29.9018 MHz	30.51 dBm	Tone 2

Plot Carrier Suppression – Antenna Terminal – TX 29.9 MHz P Low/ 12

10. Field Strength of Spurious Emissions – Part 2.1053

E.U.T	Micom Pathfinder
S/N:	MP420
Date:	13.09.2011
Standard	90.210 (a) (3)
Relative Humidity:	38%
Ambient Temperature:	24^0 C
Air Pressure:	1010hPa

Testing Engineer: I. Arbitman  Date 13/09/2011

10.1. Test Results Summary & Conclusions

The E.U.T was found in compliance with Spurious Emissions at Antenna Terminals – Part 2.1051

10.2. Test Instrumentation and Equipment

Table 10: Test Instrumentation and Equipment

Item	Model	Manufacturer	Next Date of Calibration
Spectrum Analyzer	E7405A	Agilent	11.05.2012
Attenuator 30 dB	769-30	Narda	21.06.2012
Audio Analyzer	8903A	HP	24.05.2012
Antenna	BTA-L	FRANKONIA	28.07.2012
Loop Antenna	HFH2-Z2	R&S	26.04.2012

10.3. Test Results

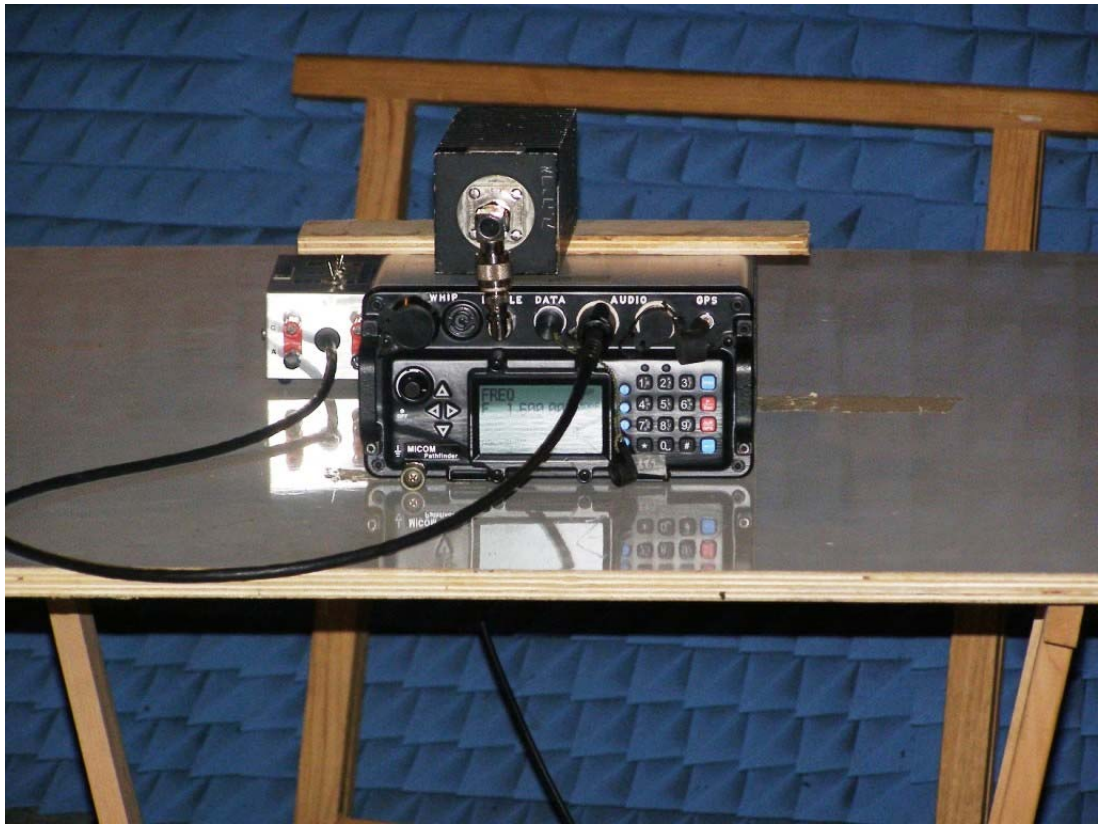
Frequencies examined: 1.65 MHz, 15.6 MHz. 29.9 MHz

Transmitting Power: 5W, 10W, 15W & 25W

All emissions were at least 30 dB below the specified limit.

10.4. Setup Photographs for Field Strength of Spurious Radiation

Setup Photograph/ 1



Setup Photograph/ 2

11. Frequency Stability – Part 2.1055

E.U.T	Micom Pathfinder
S/N:	MP420
Date:	13.09.2011
Standard	90.213 (a)
Relative Humidity:	38%
Ambient Temperature:	24^0 C
Air Pressure:	1010hPa

Testing Engineer: I. Arbitman Date 13/09/2011

11.1. Test Results Summary & Conclusions

The E.U.T was found in compliance with Spurious Emissions at Antenna Terminals – Part 2.1051

11.2. Test Instrumentation and Equipment

Table 11: Test Instrumentation and Equipment

Item	Model	Manufacturer	Next Date of Calibration
Spectrum Analyzer	E7405A	Agilent	11.05.2012
Attenuator 30 dB	769-30	Narda	21.06.2012
Audio Analyzer	8903A	HP	24.05.2012
Antenna	BTA-L	FRANKONIA	28.07.2012
Loop Antenna	HFH2-Z2	R&S	26.04.2012

11.3. Test Results

Frequencies examined: 1.65 MHz, 15.6 MHz. 29.9 MHz

Transmitting Power: 5W, 10W, 15W & 25W

Table 12: For Maximum Power

Test Condition	Frequency (MHz)	Frequency Drift (Hz)
+50°C, 13.8 VDC	15.601861	61
+40°C, 13.8 VDC	15.601861	61
+30°C, 13.8 VDC	15.601862	62
+20°C, 15.87 VDC	15.601862	62
+20°C, 11.73 VDC	15.601862	62
+20°C, 13.8 VDC	15.601862	62
+10°C, 13.8 VDC	15.601862	62
0°C, 13.8 VDC	15.601860	60
-10°C, 13.8 VDC	15.601860	60
-20°C, 13.8 VDC	15.601860	60
-30°C, 13.8 VDC	15.601859	59

Table 13: For High Power

Test Condition	Frequency (MHz)	Frequency Drift (Hz)
+50°C, 13.8 VDC	15.601861	61
+40°C, 13.8 VDC	15.601862	62
+30°C, 13.8 VDC	15.601862	62
+20°C, 15.87 VDC	15.601860	60
+20°C, 11.73 VDC	15.601860	60
+20°C, 13.8 VDC	15.601862	62
+10°C, 13.8 VDC	15.601860	60
0°C, 13.8 VDC	15.601862	62
-10°C, 13.8 VDC	15.601860	60
-20°C, 13.8 VDC	15.601860	60
-30°C, 13.8 VDC	15.601859	59

Table 14: For Medium Power

Test Condition	Frequency (MHz)	Frequency Drift (Hz)
+50°C, 13.8 VDC	15.601861	61
+40°C, 13.8 VDC	15.601861	61
+30°C, 13.8 VDC	15.601861	61
+20°C, 15.87 VDC	15.601862	62
+20°C, 11.73 VDC	15.601862	62
+20°C, 13.8 VDC	15.601862	62
+10°C, 13.8 VDC	15.601859	60
0°C, 13.8 VDC	15.601860	60
-10°C, 13.8 VDC	15.601860	60
-20°C, 13.8 VDC	15.601860	60
-30°C, 13.8 VDC	15.601861	61

Table 15: For Low Power

Test Condition	Frequency (MHz)	Frequency Drift (Hz)
+50°C, 13.8 VDC	15.601861	61
+40°C, 13.8 VDC	15.601861	61
+30°C, 13.8 VDC	15.601861	61
+20°C, 15.87 VDC	15.601862	62
+20°C, 11.73 VDC	15.601862	62
+20°C, 13.8 VDC	15.601862	62
+10°C, 13.8 VDC	15.601859	59
0°C, 13.8 VDC	15.601860	60
-10°C, 13.8 VDC	15.601860	60
-20°C, 13.8 VDC	15.601861	61
-30°C, 13.8 VDC	15.601861	61

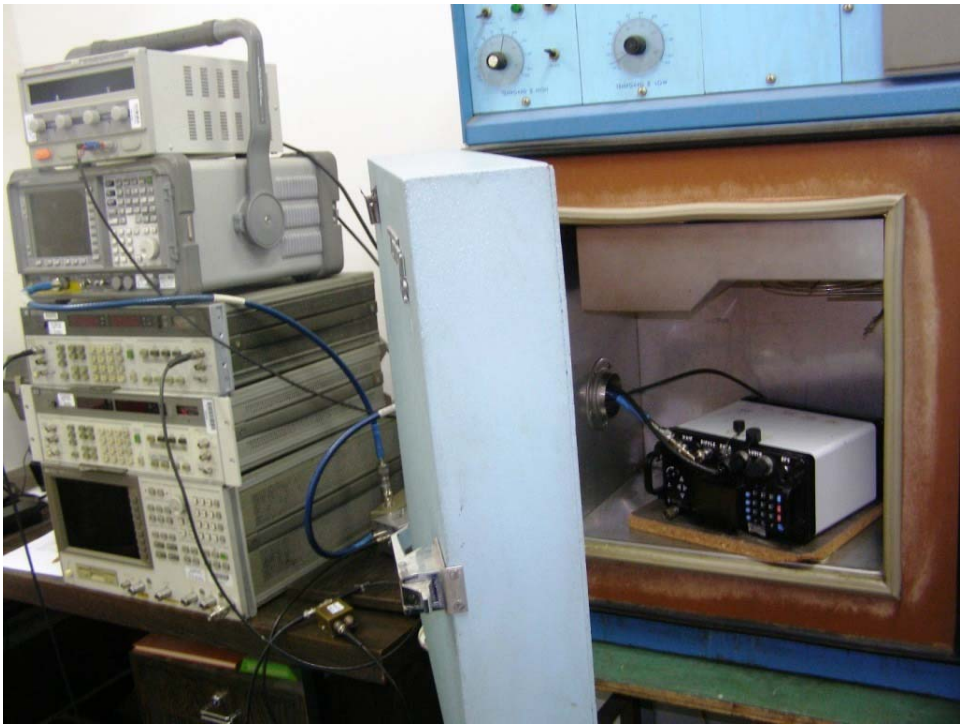
11.4. Setup Photographs for Frequency Stability

Setup Photograph/ 1

Setup Photograph/ 2

Setup Photograph/ 3

Setup Photograph/ 4



Setup Photograph/ 5

12. Setup Photographs

Setup Photograph/ 1

Setup Photograph/ 2

Setup Photograph/ 3

13. Abbreviations and Acronyms

The following abbreviations and acronyms are applicable in this document

BW	Bandwidth
R.BW	Resolution Bandwidth
V.BW	Video Bandwidth
db	Decibel
EMI	Electromagnetic interference
E.U.T	Equipment under test
LISN	Line impedance stabilization network
S/N	Serial number
QP	Quasi peak
PK	Peak

14. Appendix: Radiated Emission for Lap-top as per Part 15.109

E.U.T: Micom Pathfinder + Lap-top
S/N:
Date: 23/01/2013
Relative Humidity: 38%
Ambient Temperature: 24^0 C
Air Pressure: 1010hPa
Testing Engineer: I. Arbitman Date 23/01/2013

14.1. Test Results Summary & Conclusions

The E.U.T was found to comply with 15.109.

14.2. Limits of Radiated Interference Field Strength according 15.109

The test unit shall meet the limits of Table 7.c for Class B equipment.

Table 16: Limits for 15.109 Class B equipment

Frequency Range (MHz)	Quasi-peak Limits (dBμV/m)
30 - 88	40
88 - 216	43
216 - 960	46
960 - 2000	54

14.3. Test Instrumentation and Equipment

Table 17: Test Instrumentation and Equipment

Item	Model	Manufacturer	Next Date Calibration
Spectrum Analyzer	8593E	HP	23.05.2013
Double Ridge Guide Antenna(1-18GHz)	DRG-118/A	ARA	09.12.2013
Broadband Antenna(30-1000MHz)	BTA-L	FRANKONIA	28.07.2013
Low Noise Amplifier (0-1GHz)	AM-1300-N	MITEQ	02.04.2013
Low Noise Amplifier (1-4GHz)	AMM 003N	Avantek	02.04.2013
Low Noise Amplifier (2-18GHz)	PE 2-38	Planar	06.08.2013

14.4. Test Results

Table 18: RX Mode 15.109

Polarization	Frequency (MHz)	Mode Of Operation	Limit dBμV/m	Margin (dB)	Polarity Ver/Hor	Height (m)	Pass/ Fail
Vertical	30 - 1000	RX					Pass
Horizontal							Pass

14.5. Test Procedure

See paragraph 14.4

Photograph of Radiated Emission/ 1

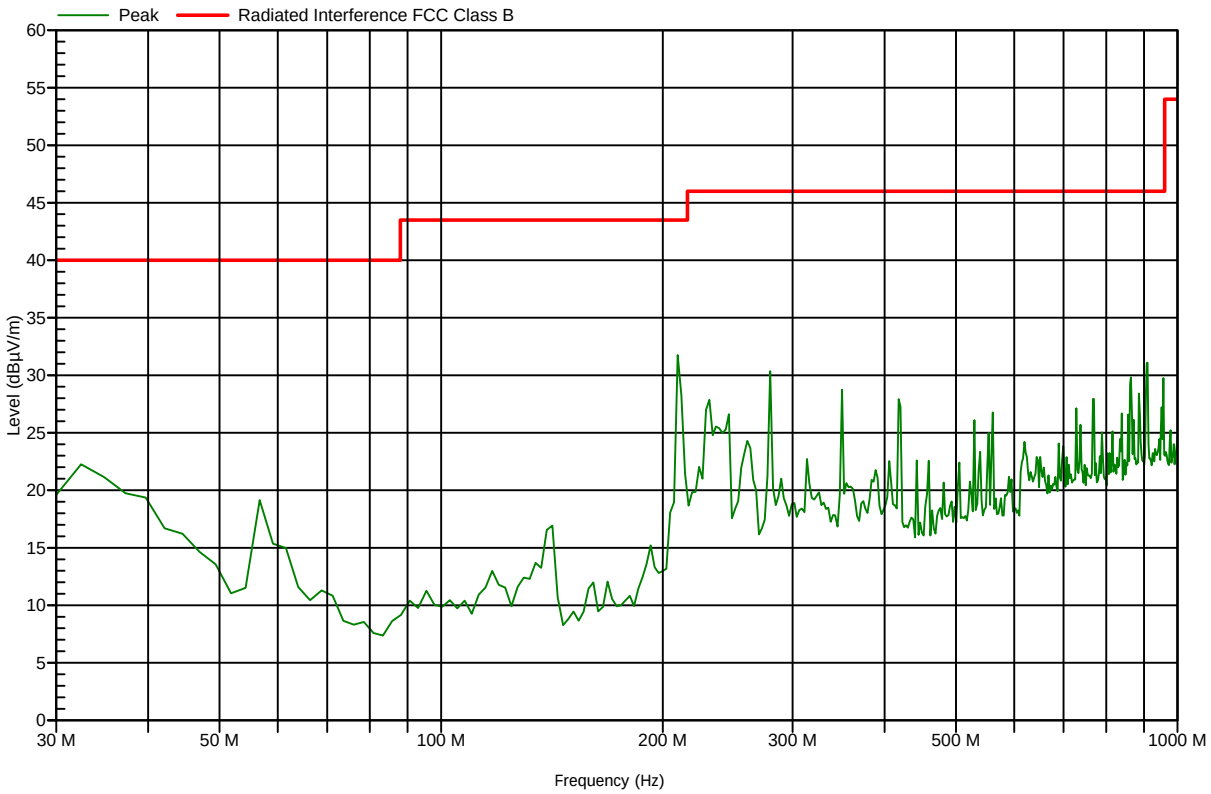
Test Results Plot No 1

FCC: 30-1000 MHz RX VER

Test & EUT General Information		Receiver Setting	
EUT Name:	Pathfinder	Spect Analyzer	Hewlett Packard 7405 AC coupling
S/N:		Ref. Level:	90 dBµV
Date of Test:	23.01.2013	RBW:	120 kHz
Test Engineer:	Ilya Arbitman	VBW:	1000 kHz
Antenna:	Frankonia gray BTA-L_B 3m	Sweep Time:	Auto [151.88 ms]
Polarization:	Vertical	Pre Amplifier	LNA 10k-1GHz 30dB

TEST REMARKS: Wednesday, January 23, 2013 2:01:40 PM

RX MODE; CONNECTED TO LAPTOP



MAXIMUM RESULT DEVIATION:

Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.

None

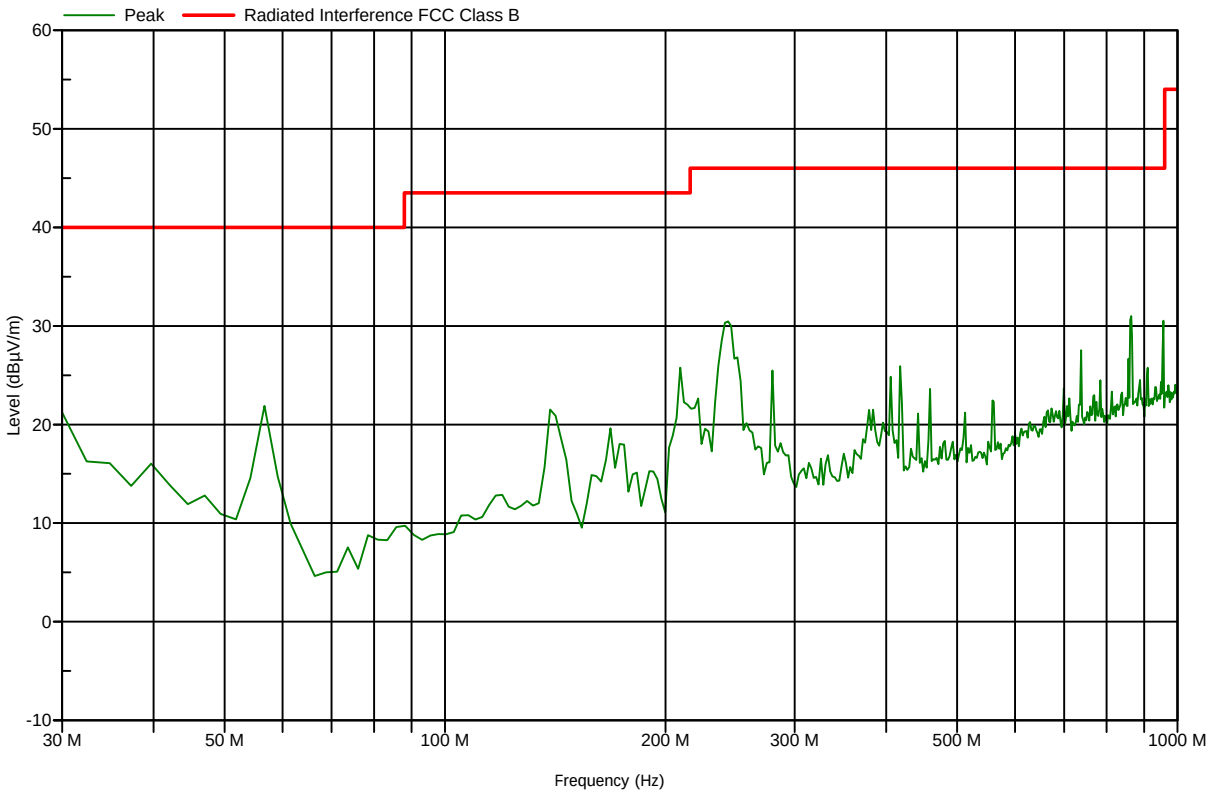
Test Results Plot No 2

FCC: 30-1000 MHz RX HOR

Test & EUT General Information		Receiver Setting	
EUT Name:	Pathfinder	Spect Analyzer	Hewlett Packard 7405 AC coupling
S/N:		Ref. Level:	90 dBµV
Date of Test:	23.01.2013	RBW:	120 kHz
Test Engineer:	Ilya Arbitman	VBW:	1000 kHz
Antenna:	Frankonia gray BTA-L_B 3m	Sweep Time:	Auto [151.88 ms]
Polarization:	Horizontal	Pre Amplifier	LNA 10k-1GHz 30dB

TEST REMARKS: Wednesday, January 23, 2013 2:09:27 PM

RX MODE; CONNECTED TO LAPTOP



MAXIMUM RESULT DEVIATION:

Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.

None