| REV | Δ | DESCRIPTION | SHEET EFFECTED | DATE | DRAWN | CHECKED |
|---|---|---|---|---|---|---|
| A | | | | 28.01.2014 | M. Reuben | S. Cohen |
| B | | Updated Power requirements | | 25.03.2014 | M. Reuben | S. Cohen |

## EMC Laboratory

# MICOM Z DASH

## FCC ID_Y05MICOM DS125W

## Manufactured by

## Elbit Systems Land and C4I Ltd.

# Test Report

## According to FCC Part 80 Requirements

## January 2014

| | Fonction/Title | Name | Signature | Date |
|---|---|---|---|---|
| Prepared by: | Technical Writer | M. Reuben | | 19.01.2014 |
| Checked by: | Test Engineer | O.Dror | | 19.01.2014 |
| Approved By: | EMC Lab. Manager | S.Cohen | | 4-Feb-14 |

# Table of Contents

**Para** **Page No**



# List of Figures

**Figure No** **Page No**

## List of Tables

**Table No** **Page No**

# 1. Introduction

## 1.1. Scope

This document describes the measurement procedures and tests for FCC part 80 of the Micom Z Dash, manufactured by Elbit Systems Land and $C^4I$ Ltd.

## 1.2. Description of equipment Under Test

| | |
|---|---|
| Equipment Under Test: | Micom Z Dash |
| FCCID | YO5MICOM DS125W |
| Manufacturer: | Elbit Systems Land and $C^4I$ - Ltd. |
| Serial Numbers: | MZ6789 |
| Transmit Frequency Range | 1.6 to 30 MHz in 10-Hz steps |
| Receiver Frequency Range | 0.1 to 30 MHz in 10-Hz steps<br>(0.1 to 1.6 MHz reduced performance) |
| Transmit Power | 125 W P.E.P and average |
| RF Impedance (antenna) | -50Ω for dipole and broadband<br>-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<br>-Digital voice (vocoder option)<br>-50-4800 bps (internal modem option)<br>COMSEC (option) |
| Date, Remote Control | RS-232C |
| GPS Receiver (optional) | Location, movement and time |
| Power Source | FRN8577 Rechargeable Lithium-Ion Battery<br>(14.4 V, 230 WH) |
| Receiver operating frequency: | MHZ |
| Year of Manufacture: | 2013 |

## 1.3. Applicant Information:

| | |
|---|---|
| Applicant: | Elbit Systems Land and $C^4I$ - 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 | 15.01.2014 |
| Test Laboratory Location | Elbit Systems Land and C4I 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 15.109, 15.209, 15.231, & 15.207 |

## 2. Test Summary and Signatures.

Elbit Systems Land and C4I Ltd., EMC Laboratory has completed testing of E.U.T in accordance with the requirements of the FCC Part 80 Regulations for Class B equipment.

The E.U.T was found to comply with the requirements of the FCC Part 80 Regulations given below

| Test | Test Description | Section | PASS/FAIL |
|---|---|---|---|
| 1 | RF Power Output | 2.1046 + 80.215 (d) | PASS |
| 2 | Audio Frequency Response | 2.1047 | PASS |
| 4 | Modulation Limiting | 2.1047 + 80.213 (a)(3) | PASS |
| 5 | Occupied Bandwidth | 2.1049 + 80.205 (a) + 80.211 (a) (f) | PASS |
| 7 | Spurious Emissions at Antenna Terminals | 2.1051 + 80.211 (a) (f) | PASS |
| 9 | Frequency Stability | 2.1055 + 80.209 (a) | PASS |

### 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 | 28% |

| | | |
|---|---|---|
| Outdoor | Temperature | $29^0$ C |
| | Humidity | 47% |

| | Function/Title | Name | Signature | Date |
|---|---|---|---|---|
| Test performed by | Test Engineer | D. Oshri |  | 19.01.2014 |
| Test Report prepared by | Technical Writer | M. Reuben |  | 04.02.2014 |
| Test Report Approved by | EMC Lab. Manager | S. Cohen |  | 05.02.2014 |

# 3. E.U.T Information

## 3.1. E.U.T description

The Micom-Z transceiver is a complete HF/SSB receiver-transmitter capable of receiving and transmitting voice, data, and continuous-wave (CW) telegraphy using upper-sideband (USB), lower-sideband (LSB), AME and pilot carrier modulation. High selectivity and a wide dynamic range ensure clear, undisturbed signal reception.

## 3.2. Changes made to EUT

No changes were made.

# 4. RF Power Output – Part 2.1046

E.U.T: Micom Z Dash
S/N: MZ6789
Date: 19.01.2014
Standard 2.1046 + 80.215 (d)
Relative Humidity: 28%
Ambient Temperature: $24^0$ C
Air Pressure: 1010hPa
Testing Engineer: D. Oshri Date 19.01.2014

## 4.1. Test Results Summary & Conclusions

The E.U.T was found to comply with RF Power Output – Part 2.1046 + 80.215 (d).

## 4.2. Measured Data

Measured at Dipole Antenna terminal. PEP using two tones.
Rated RF Output Power: 125 watts PEP, 51dBm
Measured using 400 Hz and 1800 Hz tones adjusted for rated RF output power.
Frequencies examined: 2.1 MHz, 2.182 MHz, 4.219 MHz, 6.2 MHz, 8.815 MHz, 12.715 MHz, 16.885 MHz, 18.81 MHz 19.72 MHz, 22.8 MHz & 26.1 MHz
Transmitting power: 125W

## 4.3. Test Instrumentation and Equipment

*Table 1: Test Instrumentation and Equipment*

| Item | Model | Manufacturer | Next Date Calibration |
|---|---|---|---|
| Audio Analyzer | 8903A | HP | 23.12.2014 |
| Power Reflection Meter | NAP | R&S | 04.06.2014 |
| Power Head | NAP Z-7 | R&S | 04.06.2014 |
| Attenuator 30 dB | 769-30 | Narda | 21.05.2015 |

## 4.4. Test Results

| RF Power Output For Tx 125W | | | | | | |
|---|---|---|---|---|---|---|
| Frequency [MHz] | Emission | Modulation | Tx Output | | Final Voltage [V] | Final Current [A] |
| | | | dBm | W [pep] | | |
| 2.1 | J3E | Two Tones SSB | ----- | 0 | 13.8 | 0.9 |
| | | | 51 | 125.5 | 13.8 | 16.8 |
| | R3E | One Tone AME | 51.2 | 130.5 | 13.8 | 18.3 |
| | A1A | CW | 50.4 | 110.5 | 13.8 | 21.8 |
| 2.182 | J3E | SSB | ----- | 0 | 13.8 | 0.9 |
| | | | 51.1 | 129.1 | 13.8 | 17 |
| | R3E | AME | 51.1 | 129.7 | 13.8 | 19.4 |
| | A1A | CW | 50.5 | 111 | 13.8 | 21.8 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 4.219 | J3E | Two Tones SSB | ----- | 0 | 13.8 | 1 |
| | | | 51.1 | 128.8 | 13.8 | 16.9 |
| | R3E | One Tone AME | 51.2 | 132.4 | 13.8 | 19.1 |
| | A1A | CW | 50.6 | 114.6 | 13.8 | 22.2 |
| 6.2 | J3E | Two Tones SSB | ----- | 0 | 13.8 | 1 |
| | | | 50.9 | 123.5 | 13.8 | 16.5 |
| | R3E | One Tone AME | 51 | 126.8 | 13.8 | 19.5 |
| | A1A | CW | 50.5 | 112.6 | 13.8 | 21.9 |
| 8.815 | J3E | Two Tones SSB | ----- | 0 | 13.8 | 1 |
| | | | 51 | 124.6 | 13.8 | 17.2 |
| | R3E | One Tone AME | 51 | 126 | 13.8 | 20.1 |
| | A1A | CW | 50.6 | 113.6 | 13.8 | 22.8 |
| 12.715 | J3E | Two Tones SSB | ----- | 0 | 13.8 | 1 |
| | | | 50.9 | 123.8 | 13.8 | 16.1 |
| | R3E | One Tone AME | 50.9 | 122.2 | 13.8 | 19.2 |
| | A1A | CW | 50.5 | 112.2 | 13.8 | 20.9 |
| 16.885 | J3E | Two Tones SSB | ----- | 0 | 13.8 | 1 |
| | | | 50.8 | 120.6 | 13.8 | 15.8 |
| | R3E | One Tone AME | 50.8 | 119.1 | 13.8 | 18.6 |
| | A1A | CW | 50.5 | 112 | 13.8 | 20.4 |
| 18.81 | J3E | Two Tones SSB | ----- | 0 | 13.8 | 1 |
| | | | 50.8 | 120.6 | 13.8 | 15.3 |
| | R3E | One Tone AME | 50.7 | 118.6 | 13.8 | 17.7 |
| | A1A | CW | 50.5 | 112.4 | 13.8 | 18.7 |
| 19.72 | J3E | Two Tones SSB | ----- | 0 | 13.8 | 1 |
| | | | 50.8 | 120.1 | 13.8 | 14.8 |
| | R3E | One Tone AME | 50.9 | 121.7 | 13.8 | 16.4 |
| | A1A | CW | 50.5 | 112.2 | 13.8 | 18.1 |
| 22.8 | J3E | Two Tones SSB | ----- | 0 | 13.8 | 1 |
| | | | 51 | 124.6 | 13.8 | 15.1 |
| | R3E | One Tone AME | 50.9 | 124.3 | 13.8 | 16.6 |
| | A1A | CW | 50.5 | 111.9 | 13.8 | 18.8 |
| 26.1 | J3E | Two Tones SSB | ----- | 0 | 13.8 | 1 |
| | | | 50.8 | 118.7 | 13.8 | 15.1 |
| | R3E | One Tone AME | 50.5 | 113.5 | 13.8 | 18.4 |
| | A1A | CW | 50.4 | 110 | 13.8 | 18.9 |

# 5. Audio Frequency Response – Part 2.1047

| | |
|---|---|
| E.U.T | Micom Z Dash |
| S/N: | MZ6789 |
| Date: | 10.06.2013 |
| Standard | 90.210 (a) |
| Relative Humidity: | 28% |
| Ambient Temperature: | $24^0$ C |
| Air Pressure: | 1010hPa |

Testing Engineer: D. Oshri Date 10.06.2013

## 5.1. Test Results Summary & Conclusions

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

## 5.2. Test Instrumentation and Equipment

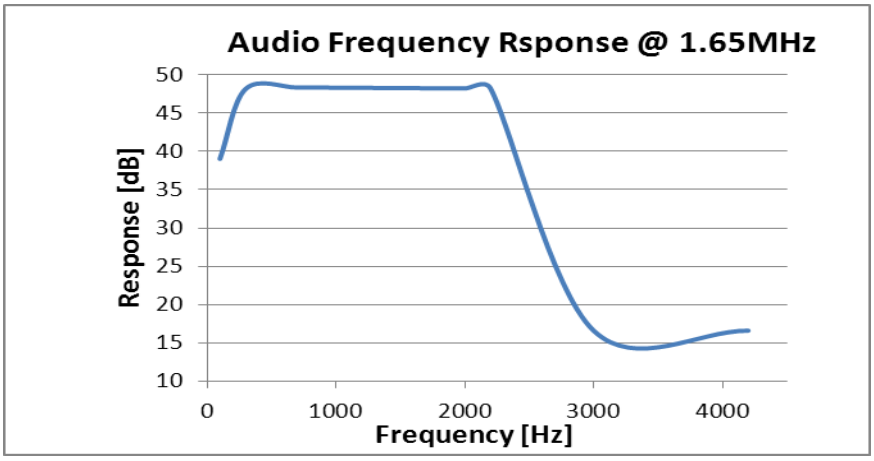
***Table 2: Test Instrumentation and Equipment***

| Item | Model | Manufacturer | Next Date Calibration |
|---|---|---|---|
| Audio Analyzer | 8903A | HP | 23.12.2014 |
| Spectrum Analyzer | 8593E | HP | 18.05.2014 |
| Power Reflection Meter | NAP | R&S | 04.06.2014 |
| Power Head | NAP Z-7 | R&S | 04.06.2014 |

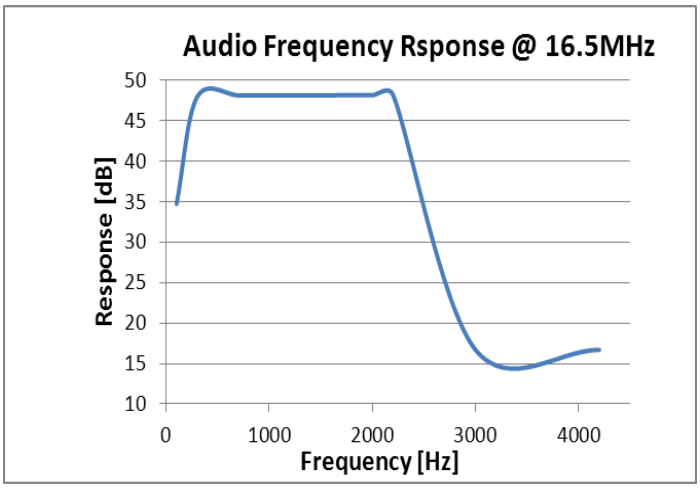
## 5.3. Test Results

Frequencies examined: 1.65 MHz, 16.5 MHz, and 29.9 MHz

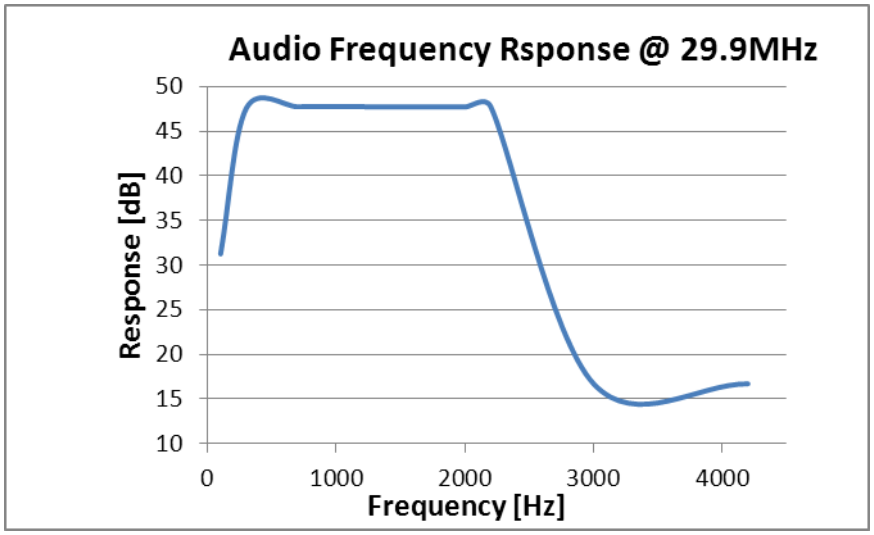
Transmitting Power: 125W




| | Frequency Response @ 1.65MHz [dB] |
|---|---|
| Tx Power | 125W |
| Audio Freq [Hz] | |
| 100 | 38.7 |
| 300 | 51.1 |
| 700 | 51.2 |
| 1000 | 51.2 |
| 2000 | 51.1 |
| 2200 | 51.1 |
| 3000 | 16.7 |
| 4200 | 16.7 |




| | Frequency Response @ 16.5MHz [dB] |
|---|---|
| Tx Power | 125W |
| Audio Freq [Hz] | |
| 100 | 34.5 |
| 300 | 50.8 |
| 700 | 50.9 |
| 1000 | 50.9 |
| 2000 | 50.9 |
| 2200 | 51 |
| 3000 | 16.7 |
| 4200 | 16.7 |




| | Frequency Response @ 29.9MHz [dB] |
|---|---|
| Tx Power | 125W |
| Audio Freq [Hz] | |
| 100 | 31.2 |
| 300 | 49.6 |
| 700 | 49.7 |
| 1000 | 49.7 |
| 2000 | 49.7 |
| 2200 | 49.7 |
| 3000 | 16.7 |
| 4200 | 16.7 |

# 6. Modulation Limiting – Part 2.1047

| | |
|---|---|
| E.U.T | Micom Z Dash |
| S/N: | MZ6789 |
| Date: | 16.06.2013 |
| Standard | N/A |
| Relative Humidity: | 28% |
| Ambient Temperature: | $24^0$ C |
| Air Pressure: | 1010hPa |

Testing Engineer: D. Oshri Date 16.06.2013

## 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 | 23.12.2013 |
| Power Reflection Meter | NAP | R&S | 04.06.2014 |
| Power Head | NAP Z-7 | R&S | 04.06.2014 |
| Attenuator 30 dB | 769-30 | Narda | 21.05.2015 |

## 6.3. Test Results

Frequencies examined: 3 MHz, 15 MHz, and 25 MHz

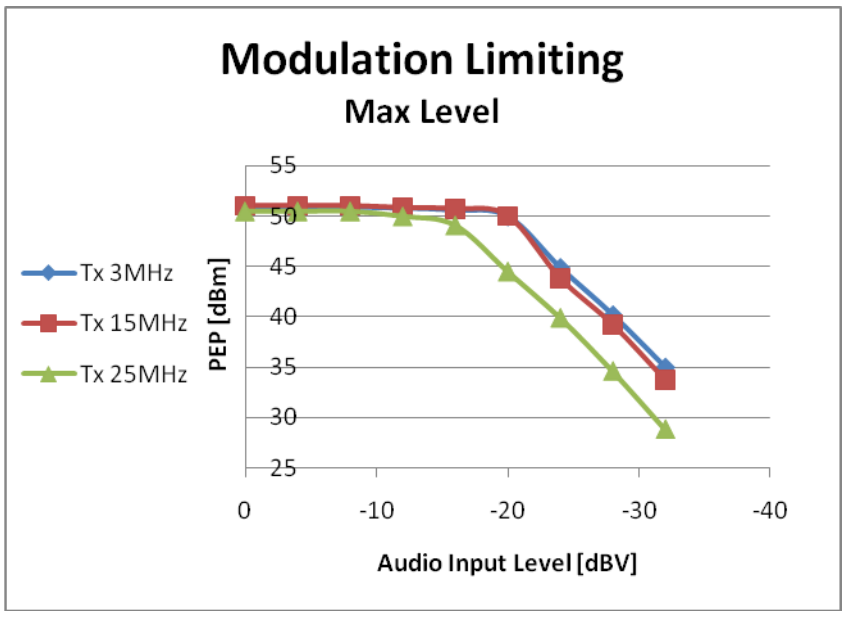
Transmitting Power: 125W

The test results are as shown below.

| | Modulation Limiting @ 3MHz [dBm] |
|---|---|
| Tx Power | 125W |
| Audio Level [dBv] | |
| 0 | 50.9 |
| -4 | 50.9 |
| -8 | 50.9 |
| -12 | 50.8 |
| -16 | 50.6 |
| -20 | 50 |
| -24 | 44.9 |
| -28 | 40.2 |
| -32 | 35 |

| | Modulation Limiting @ 15MHz [dBm |
|---|---|
| Tx Power | 125W |
| Audio Level [dBv] | |
| 0 | 51 |
| -4 | 51 |
| -8 | 51 |
| -12 | 50.8 |
| -16 | 50.7 |
| -20 | 50 |
| -24 | 43.8 |
| -28 | 39.2 |
| -32 | 33.7 |

| | Modulation Limiting @ 25MHz [dBm] |
|---|---|
| Tx Power | 125W |
| Audio Level [dBv] | |
| 0 | 50.5 |
| -4 | 50.5 |
| -8 | 50.5 |
| -12 | 50 |
| -16 | 49.1 |
| -20 | 44.5 |
| -24 | 39.9 |
| -28 | 34.6 |
| -32 | 28.8 |



# 7. Occupied Bandwidth – Part 2.1049

| | |
|---|---|
| E.U.T | Micom Z Dash |
| S/N: | MZ6789 |
| Date: | 19.01.2014 |
| Standard | .1049 + 80.205 (a) + 80.211 (a) (f) |
| Relative Humidity: | 28% |
| Ambient Temperature: | $24^0$ C |
| Air Pressure: | 1010hPa |

Testing Engineer: D. Oshri Date 19.01.2014

## 7.1. Test Results Summary & Conclusions

The E.U.T was found to be in compliance with Occupied Bandwidth – Part .1049 + 80.205 (a) + 80.211 (a) (f)

## 7.2. Test Instrumentation and Equipment

***Table 4: Test Instrumentation and Equipment***

| Item | Model | Manufacturer | Next Date of Calibration |
|---|---|---|---|
| Spectrum Analyzer | E7405A | Agilent | 09.11.2014 |
| Attenuator 30 dB | 769-30 | Narda | 21.05.2015 |
| Audio Analyzer | 8903A | HP | 23.12.2014 |

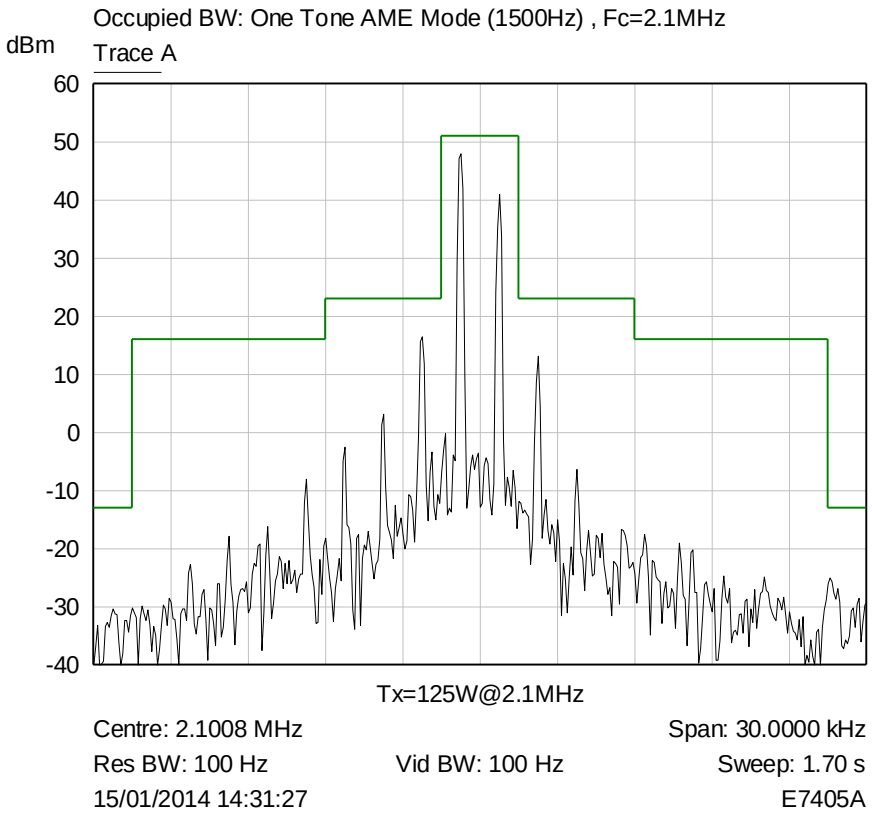
## 7.3. Test Results

Frequencies examined: 2.1 MHz, 2.182 MHz, 4.219 MHz, 6.2 MHz, 8.815 MHz, 12.715 MHz, 16.885 MHz, 18.81 MHz, 19.72 MHz, 22.8 MHz & 26.1 MHz

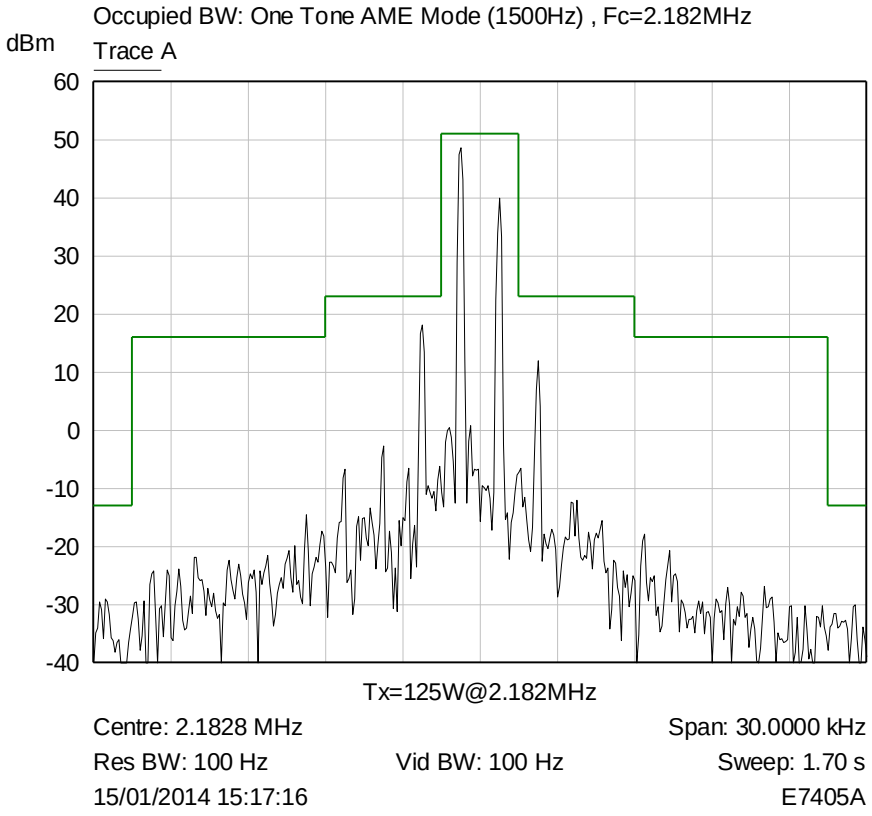
Transmitting Power: 125W

***Table 5: Test Results for 125W Power***

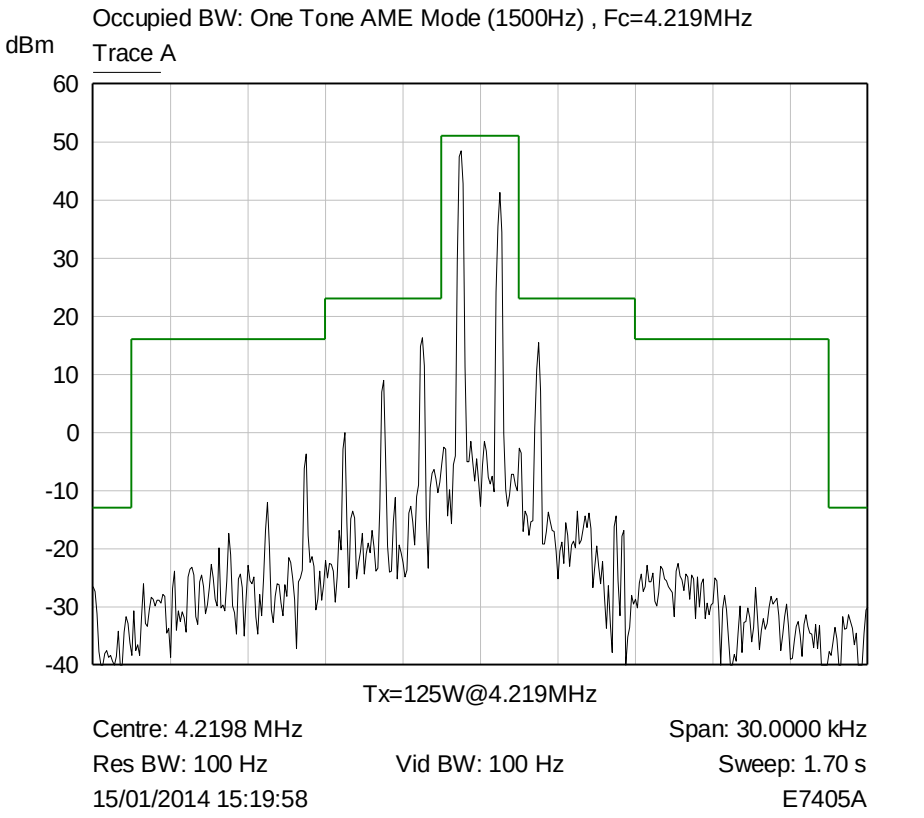
| Mode of Operation | Frequency (MHz) | Compliance Y/N |
|---|---|---|
| AME | 2.100 | Y |
| | 2.182 | Y |
| | 4.219 | Y |
| | 6.200 | Y |
| | 8.815 | Y |
| | 12.710 | Y |
| | 16.885 | Y |
| | 18.810 | Y |
| | 19.720 | Y |
| | 22.800 | Y |
| | 26.100 | Y |
| CW | 2.100 | Y |
| | 2.182 | Y |
| | 4.219 | Y |
| | 6.200 | Y |
| | 8.815 | Y |
| | 12.710 | Y |
| | 16.885 | Y |
| | 18.810 | Y |
| | 19.720 | Y |
| | 22.800 | Y |
| | 26.100 | Y |
| SSB | 2.100 | Y |
| | 2.182 | Y |
| | 4.219 | Y |
| | 6.200 | Y |
| | 8.815 | Y |
| | 12.710 | Y |
| | 16.885 | Y |
| | 18.810 | Y |
| | 19.720 | Y |
| | 22.800 | Y |
| | 26.100 | Y |



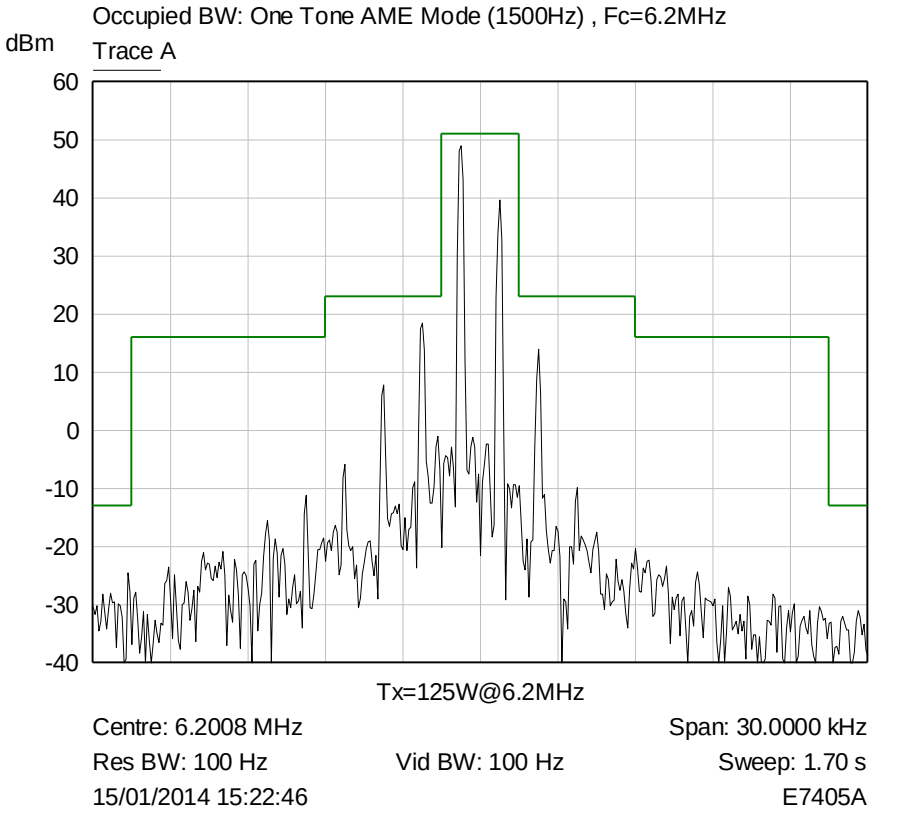

***Plot Occupied Bandwidth - AME/ 1***



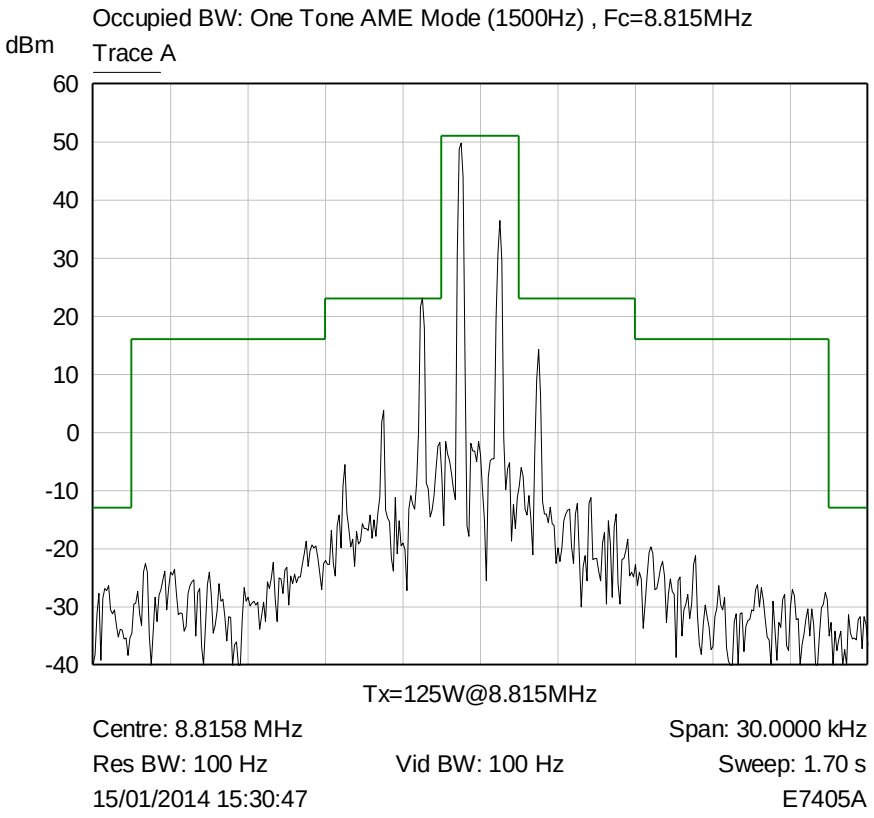

***Plot Occupied Bandwidth - AME/ 2***



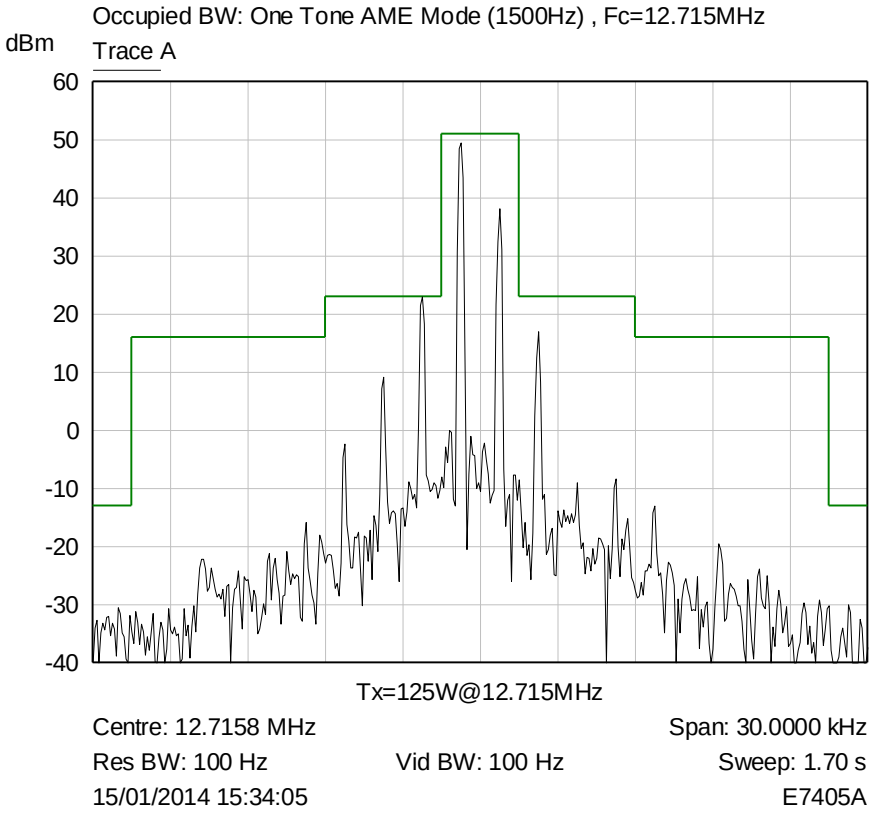

***Plot Occupied Bandwidth - AME/ 3***



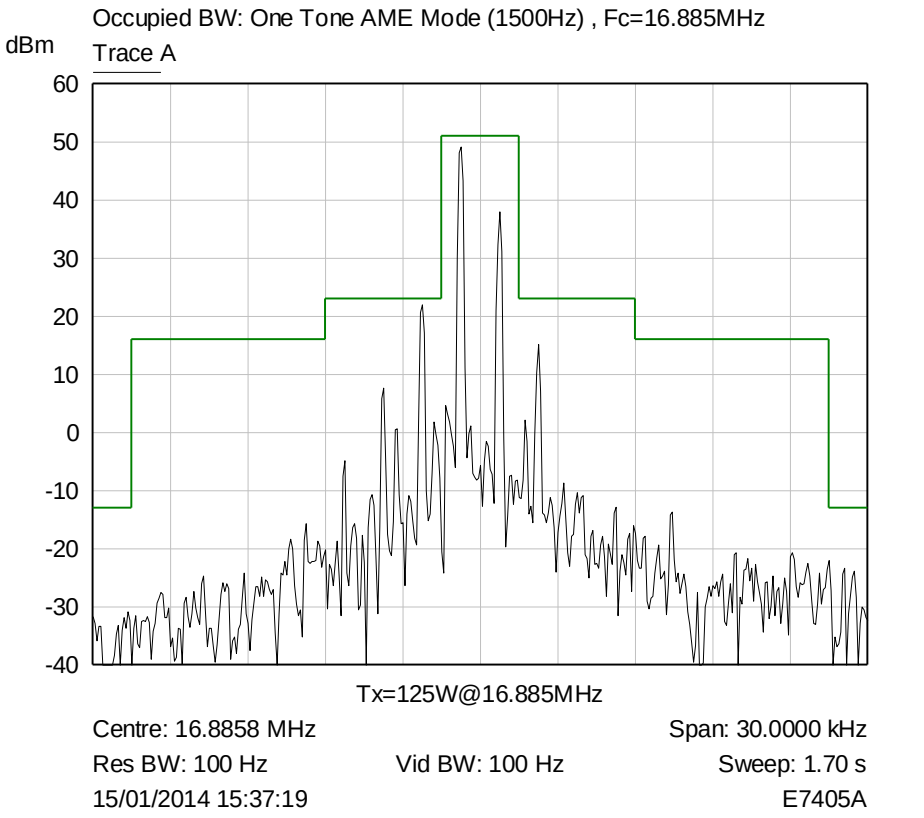

***Plot Occupied Bandwidth - AME/ 4***



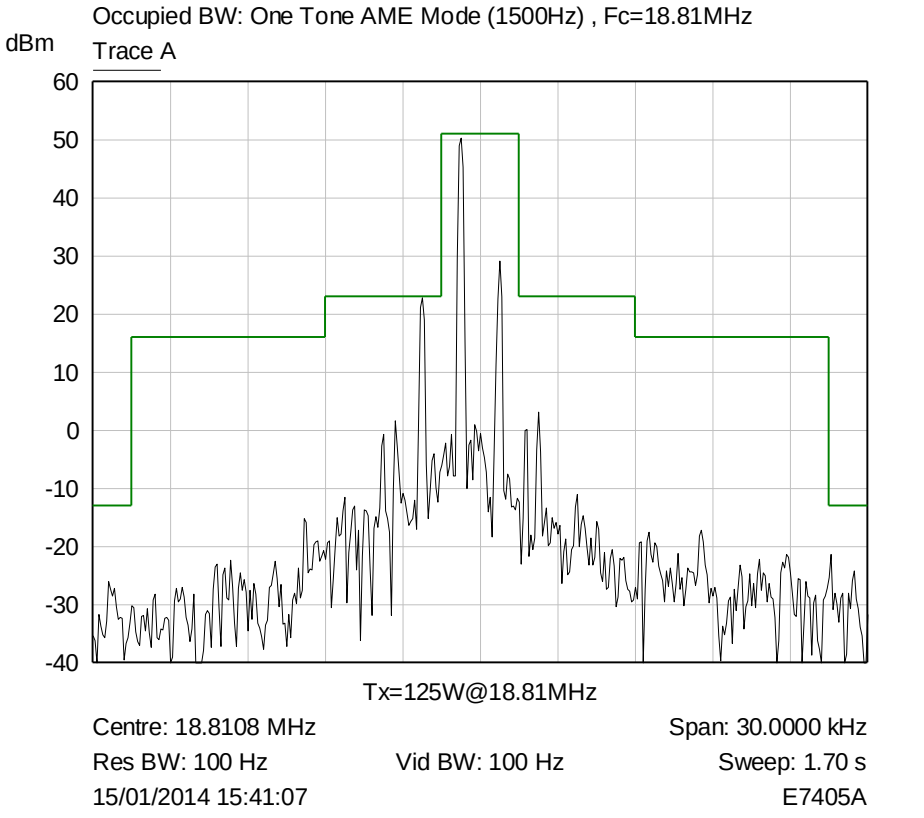

***Plot Occupied Bandwidth - AME/ 5***



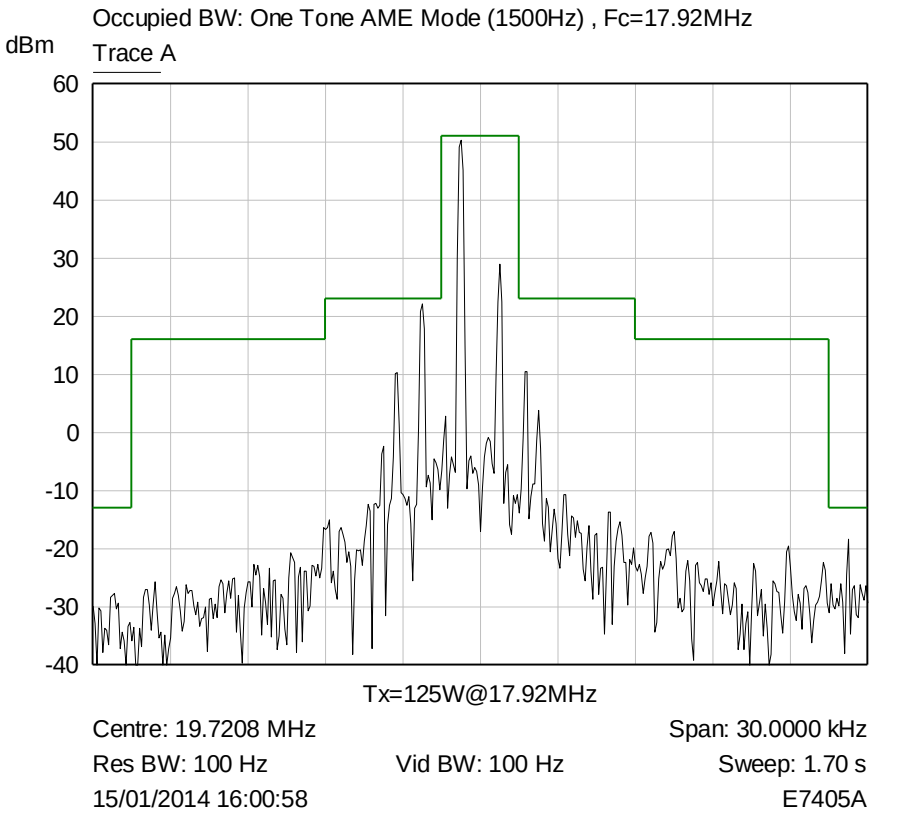

***Plot Occupied Bandwidth - AME/ 6***



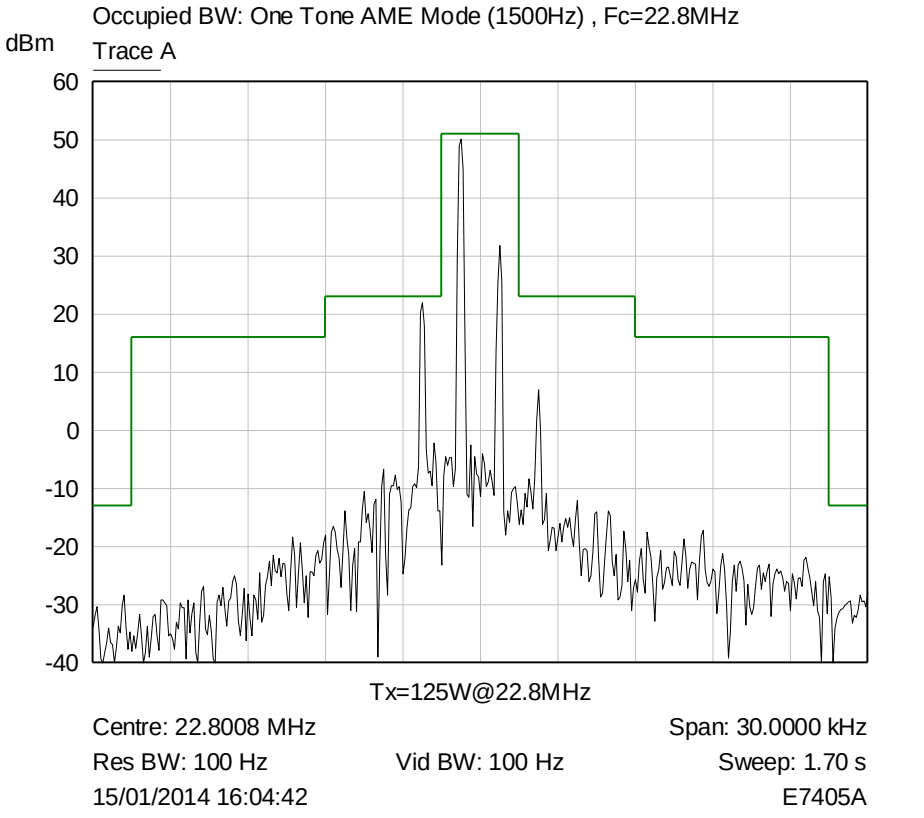

***Plot Occupied Bandwidth - AME/ 7***



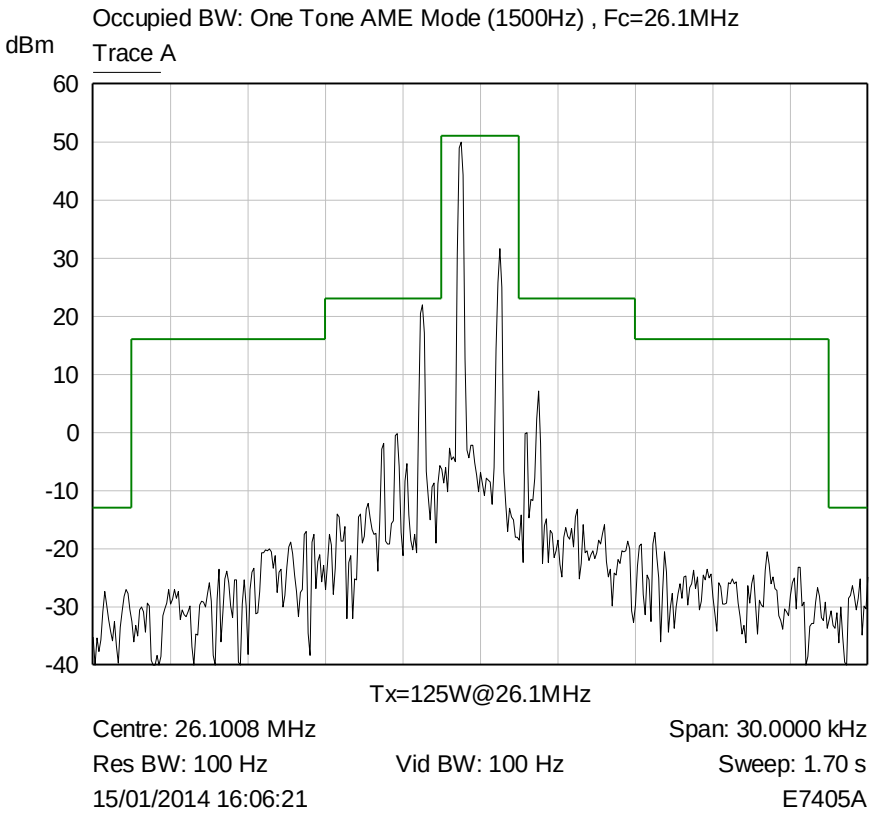

***Plot Occupied Bandwidth - AME/ 8***



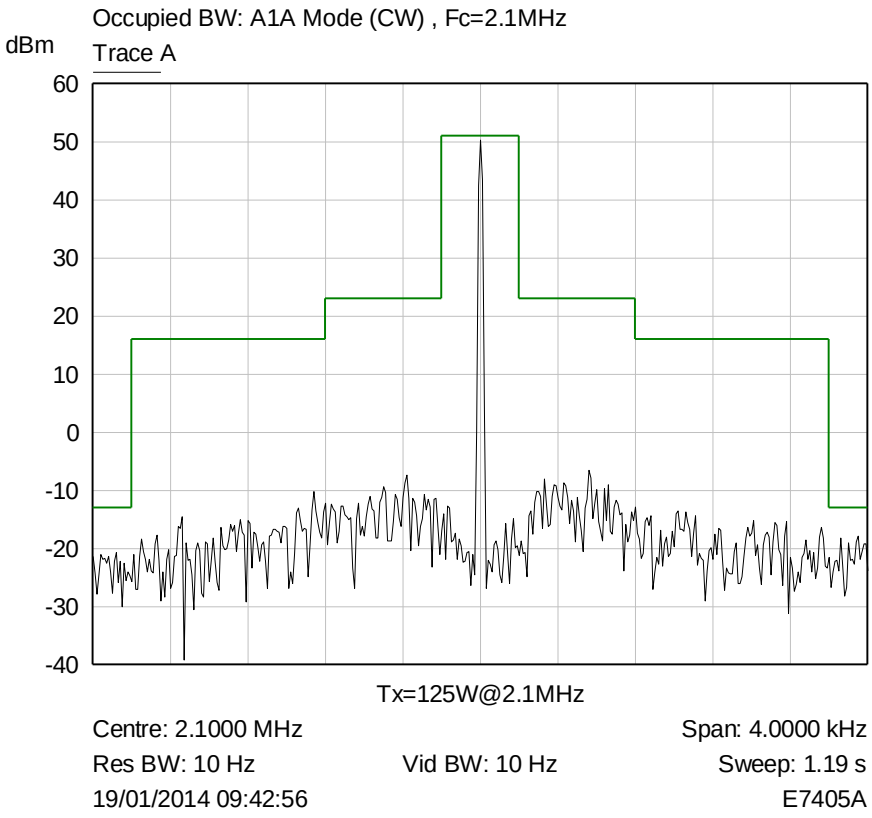

***Plot Occupied Bandwidth - AME/ 9***



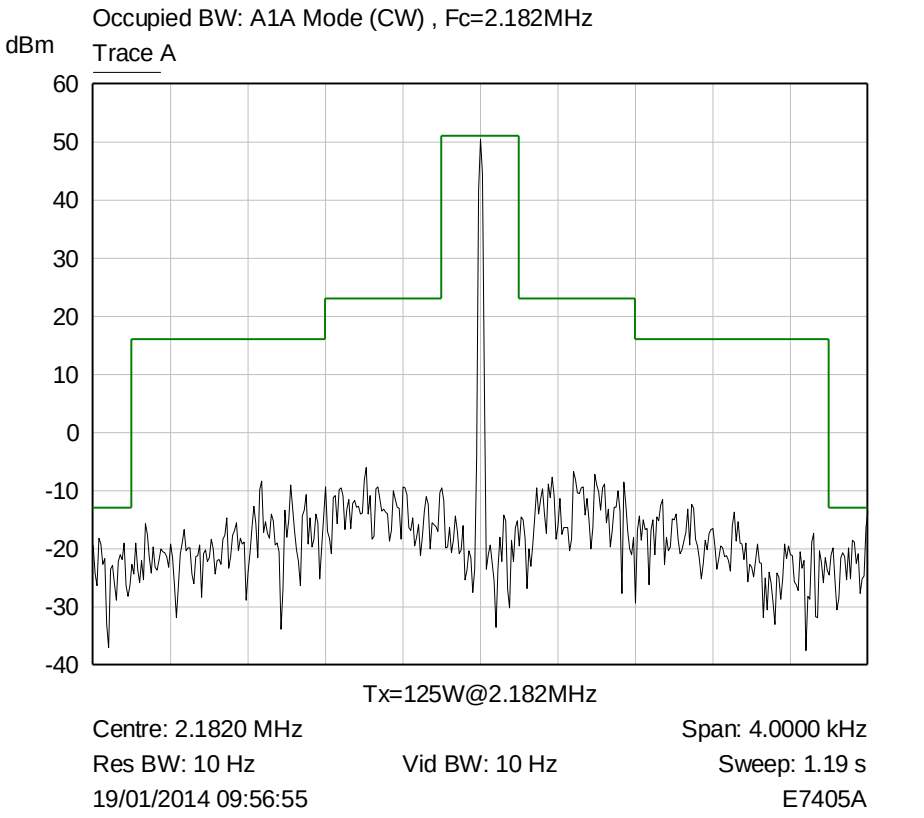

***Plot Occupied Bandwidth - AME/ 10***



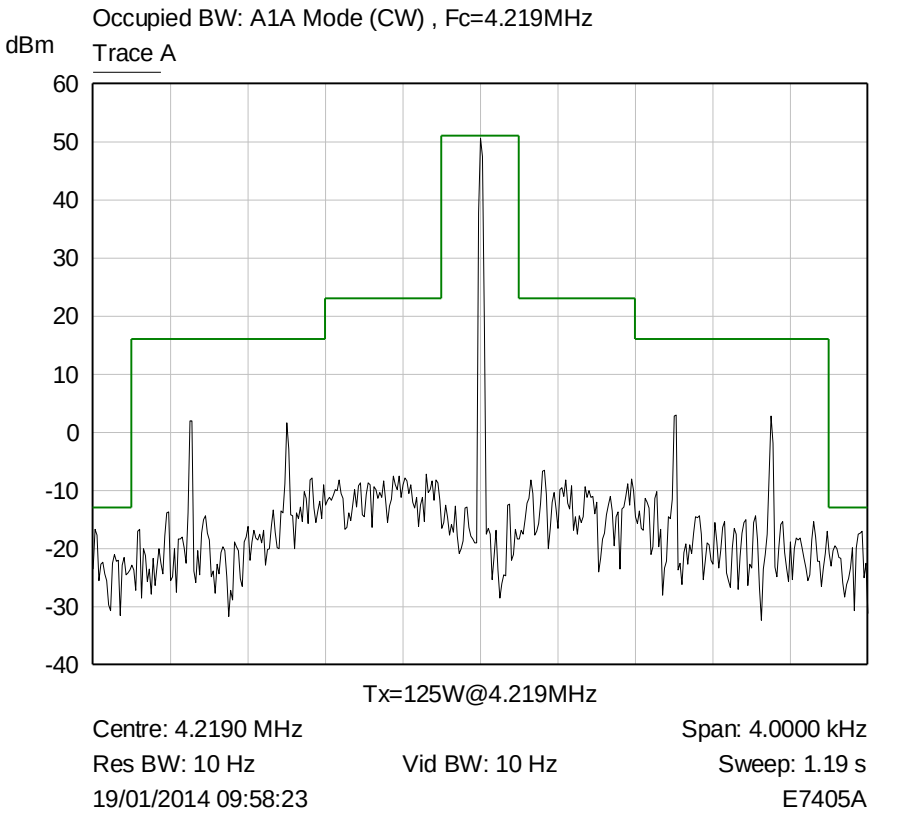

***Plot Occupied Bandwidth - AME/ 11***



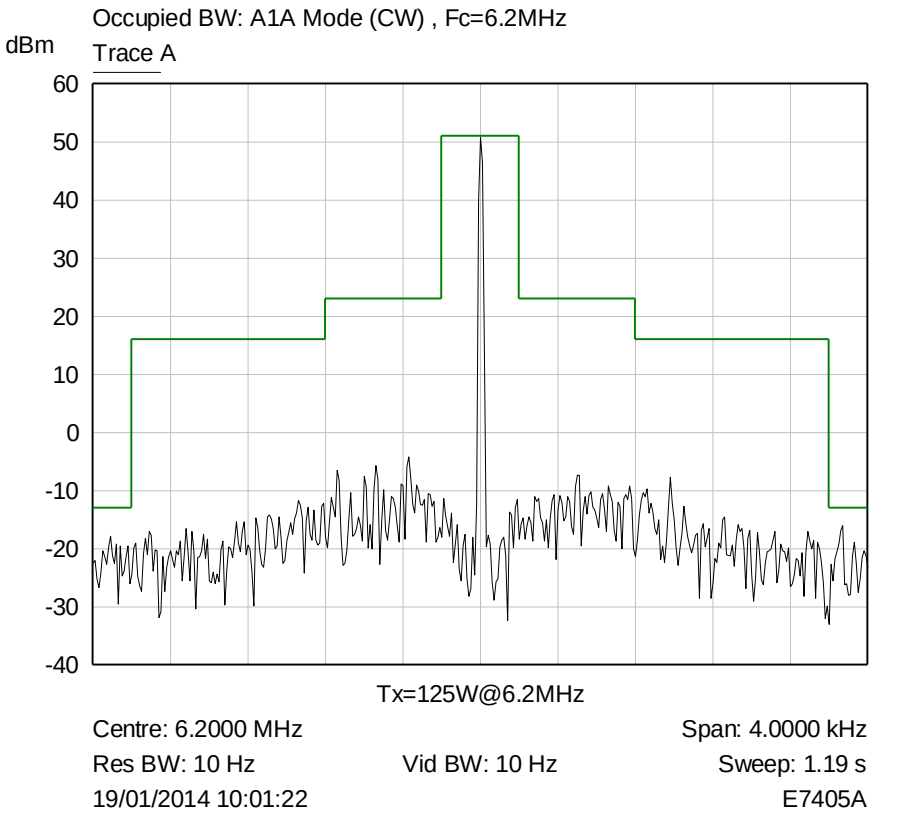

***Plot Occupied Bandwidth - CW/ 12***



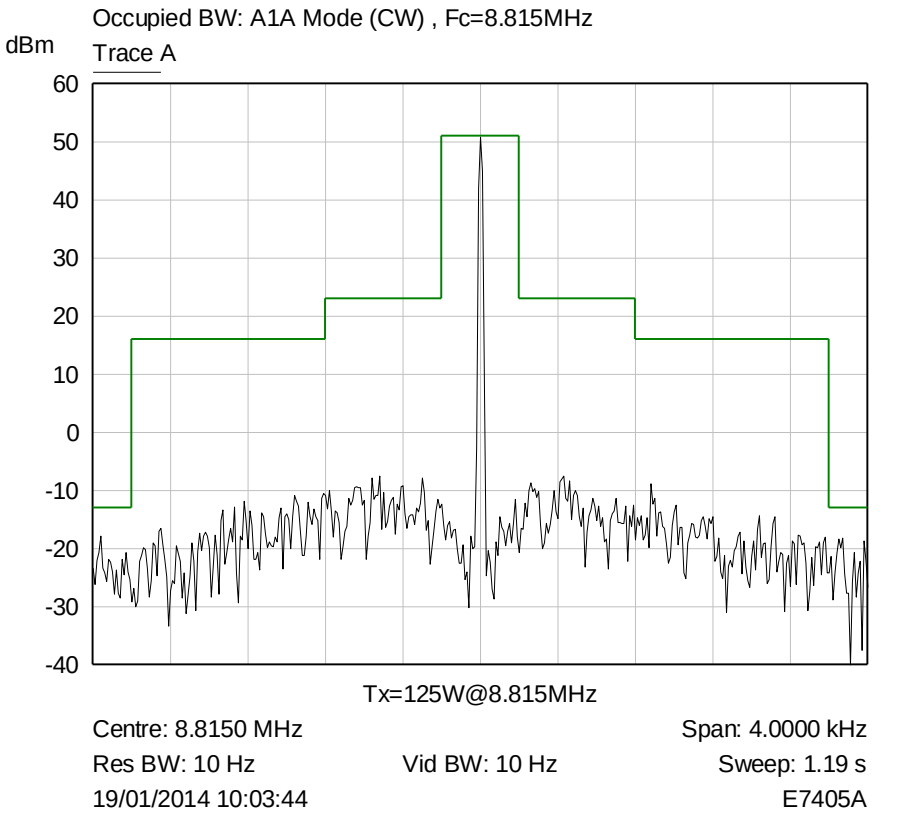

***Plot Occupied Bandwidth - CW/ 13***



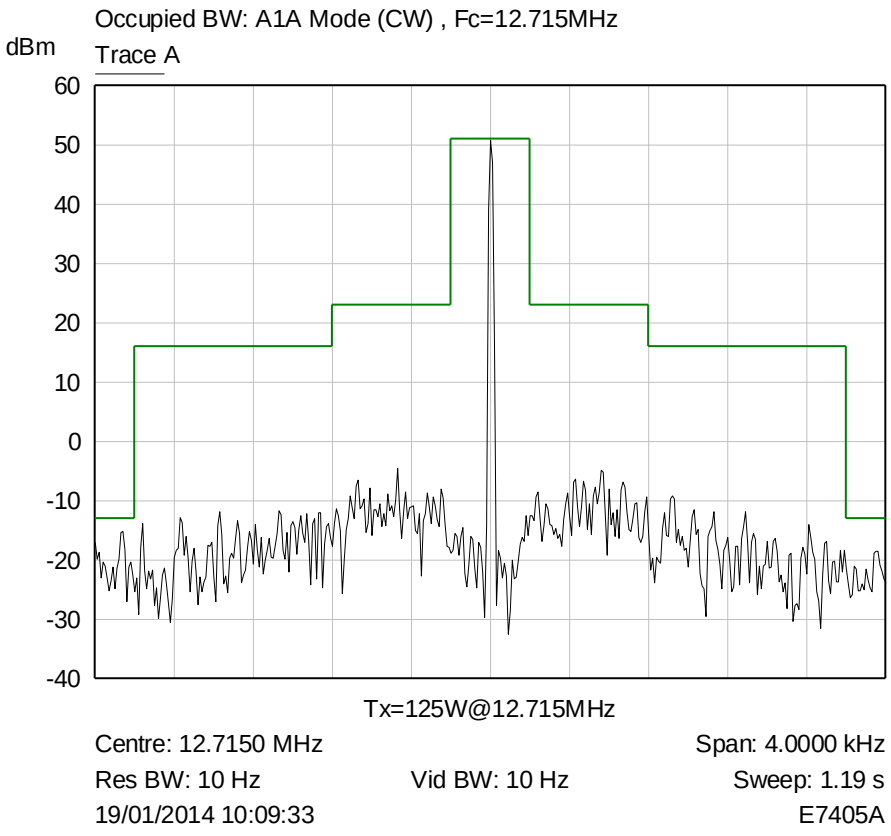

***Plot Occupied Bandwidth - CW/ 14***



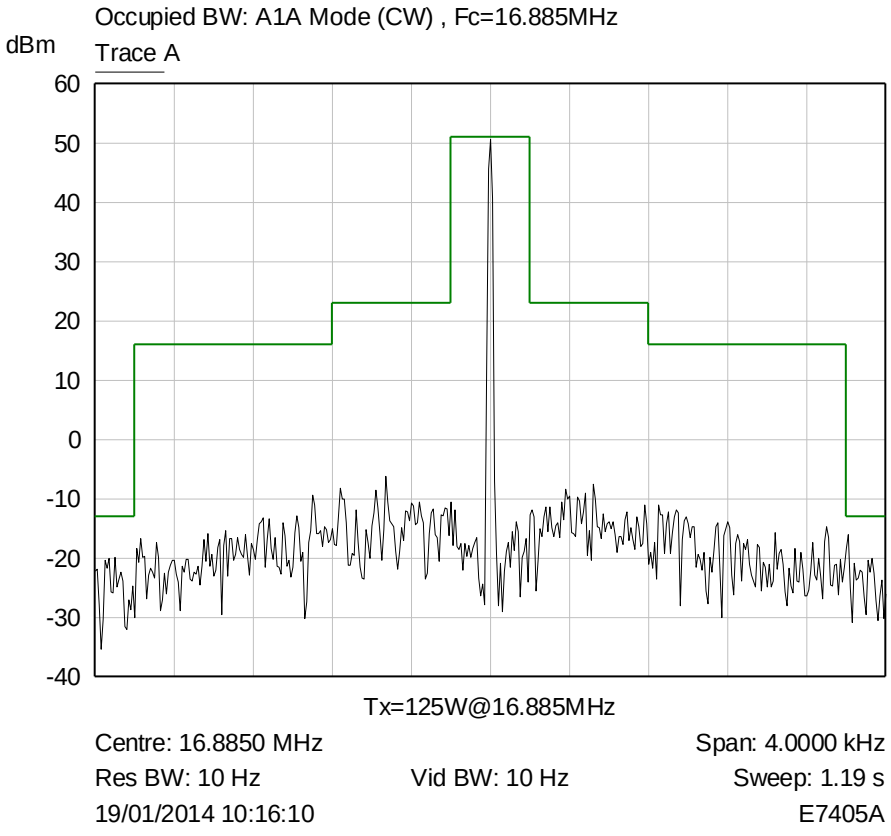

***Plot Occupied Bandwidth - CW/ 15***



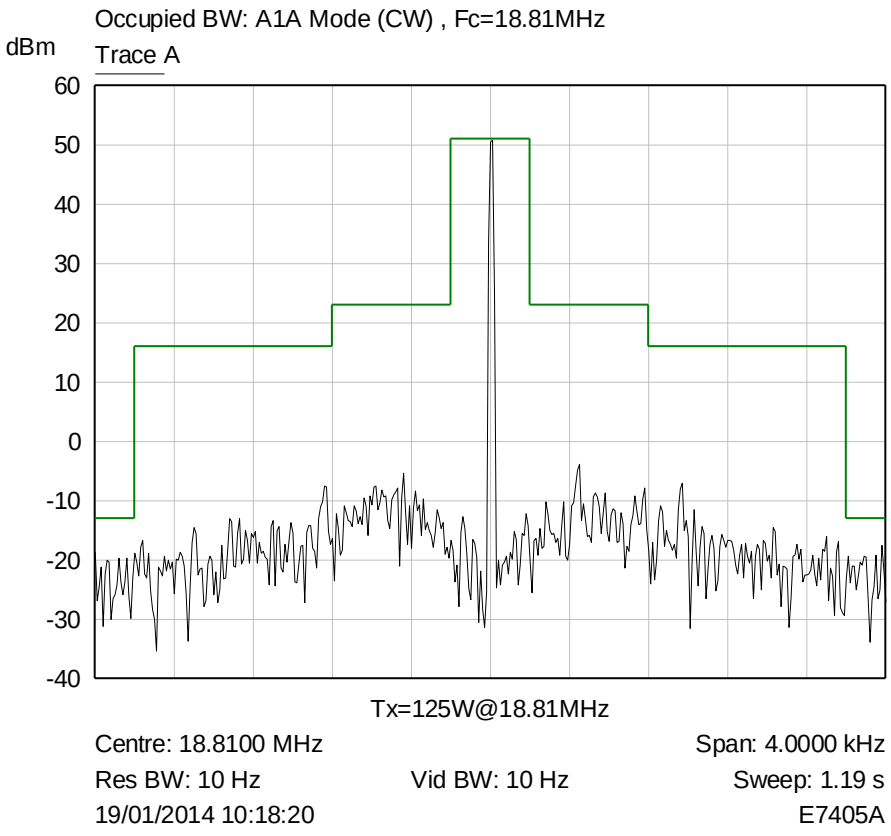

***Plot Occupied Bandwidth - CW/ 16***



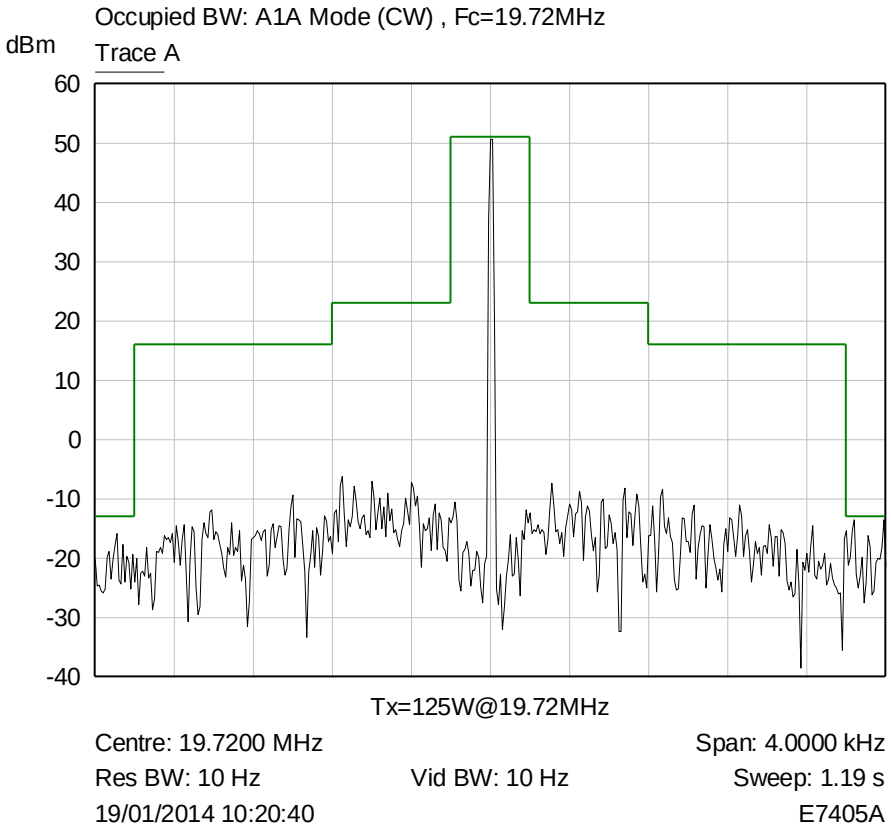

***Plot Occupied Bandwidth - CW/ 17***



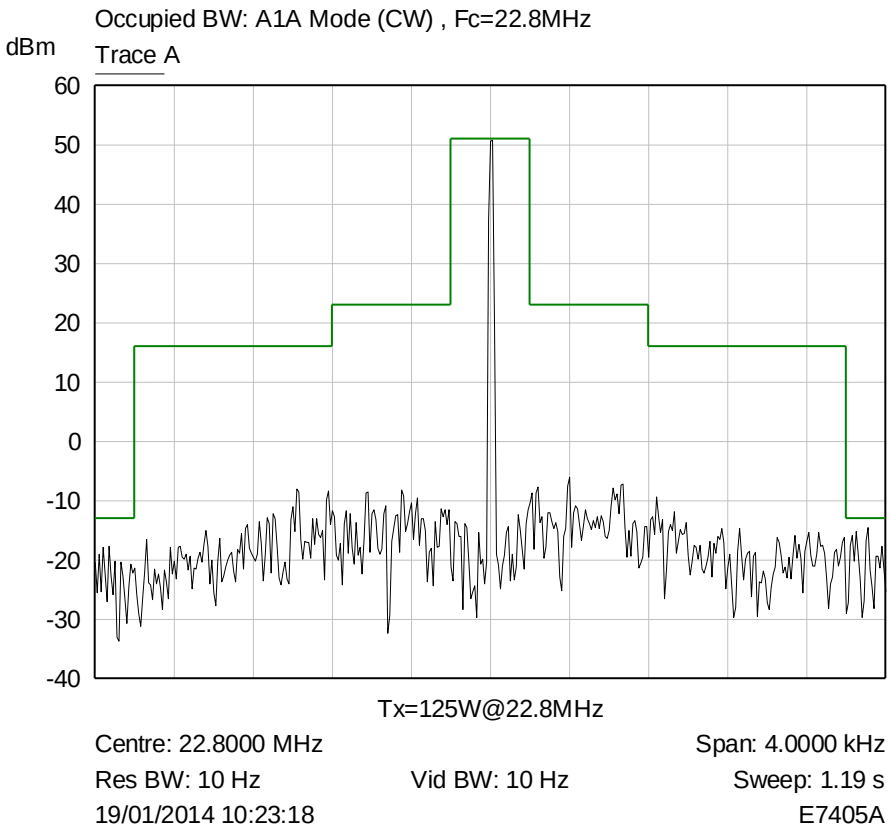

***Plot Occupied Bandwidth - CW/ 18***



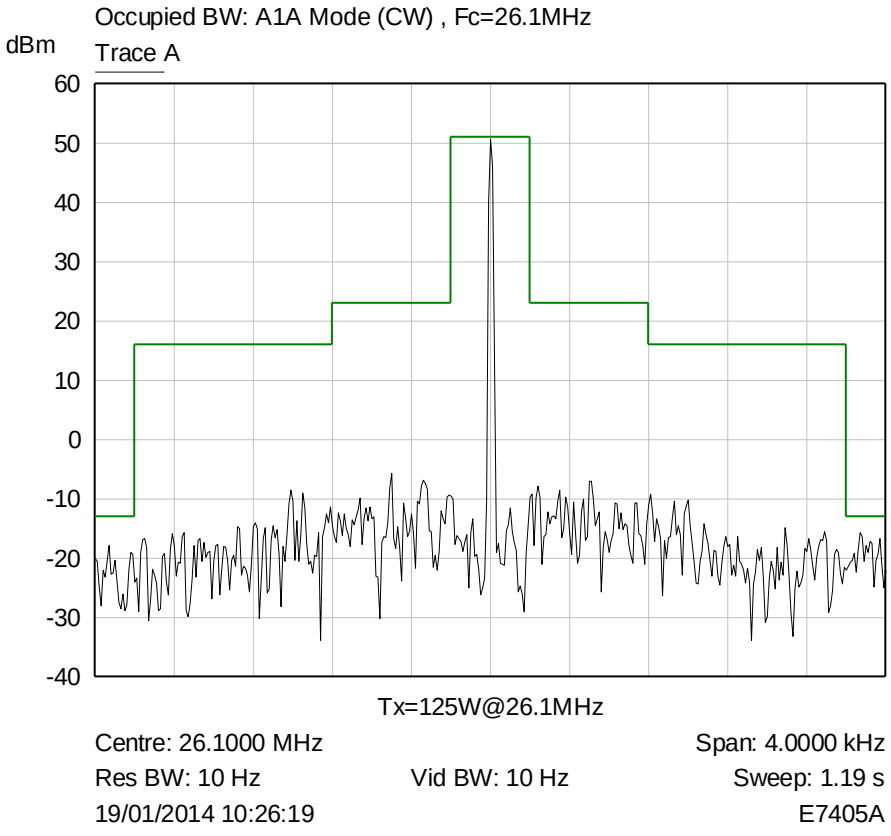

***Plot Occupied Bandwidth - CW/ 19***



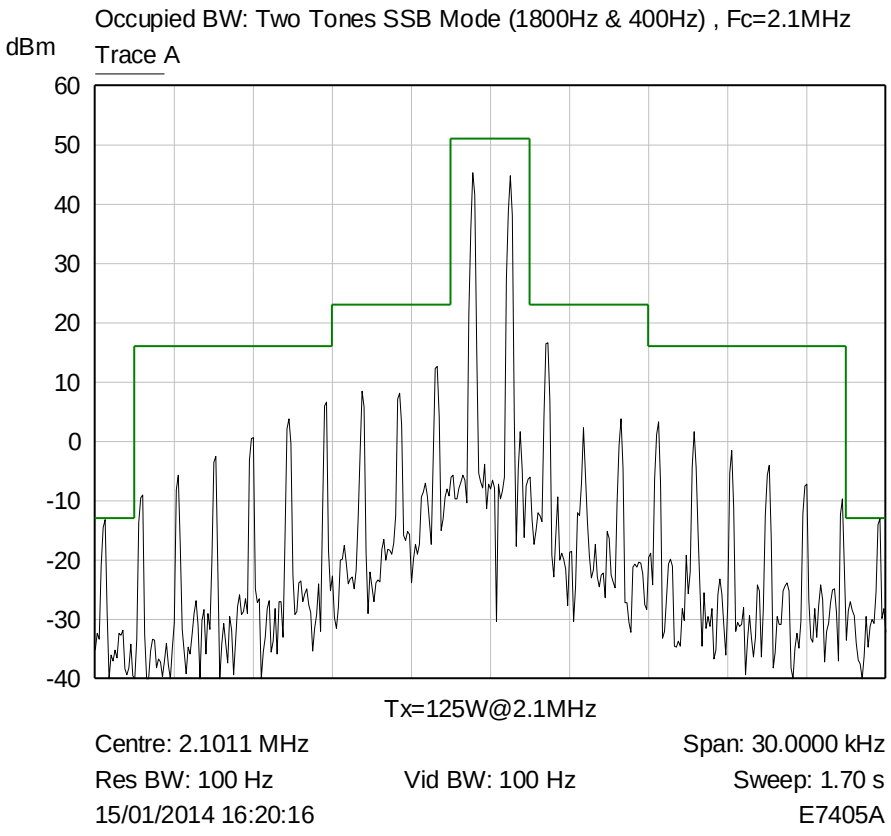

***Plot Occupied Bandwidth - CW/ 20***



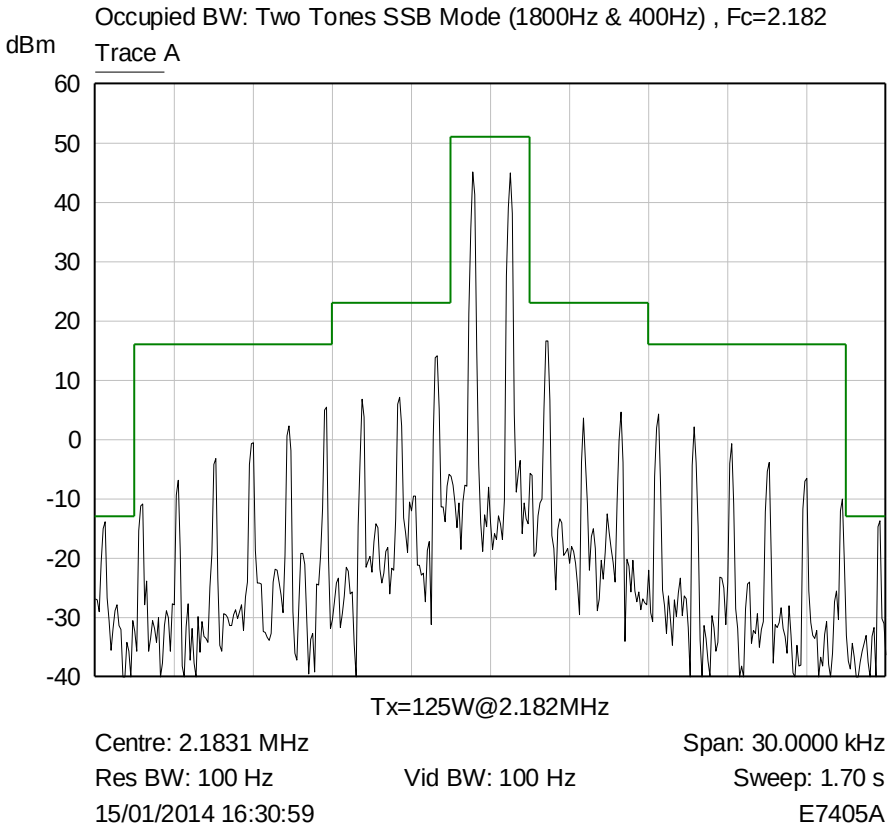

***Plot Occupied Bandwidth - CW/ 21***



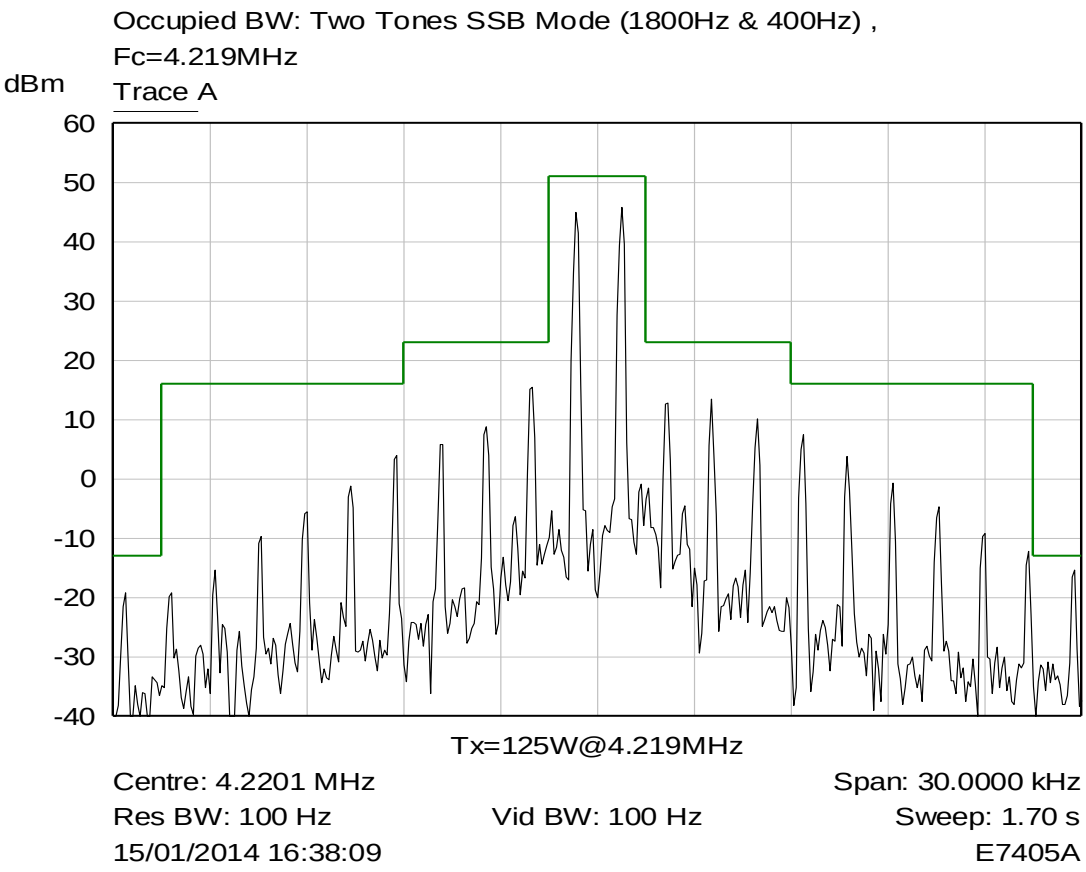

***Plot Occupied Bandwidth - CW/ 22***



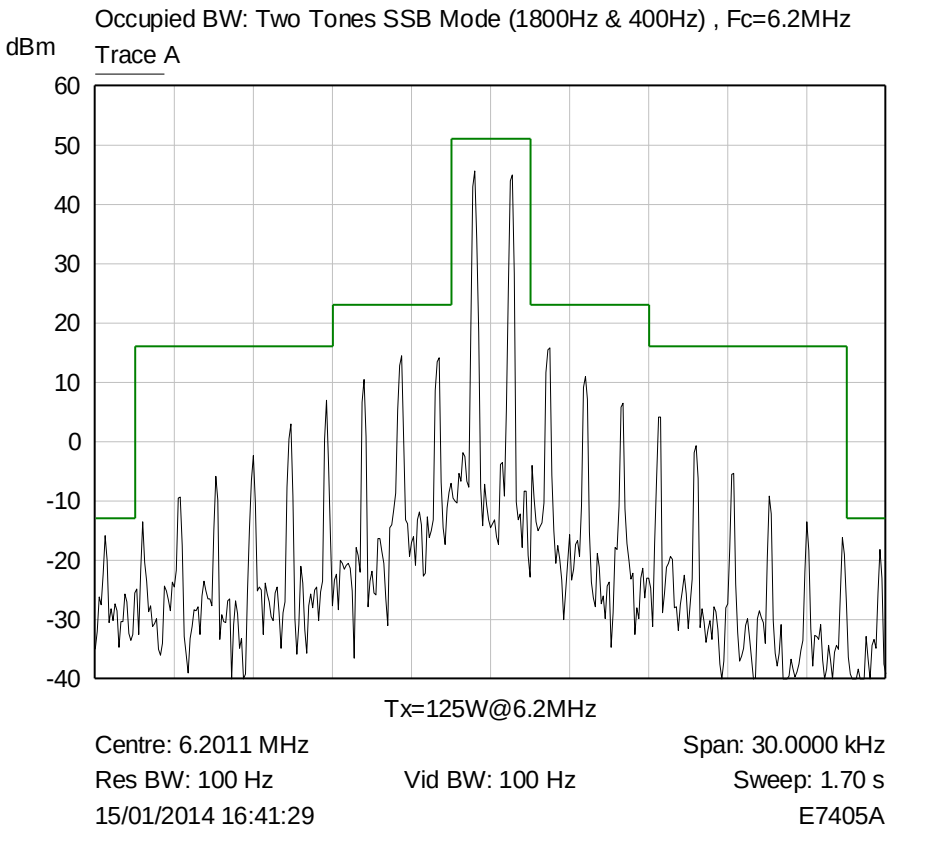

***Plot Occupied Bandwidth - SSB/ 23***



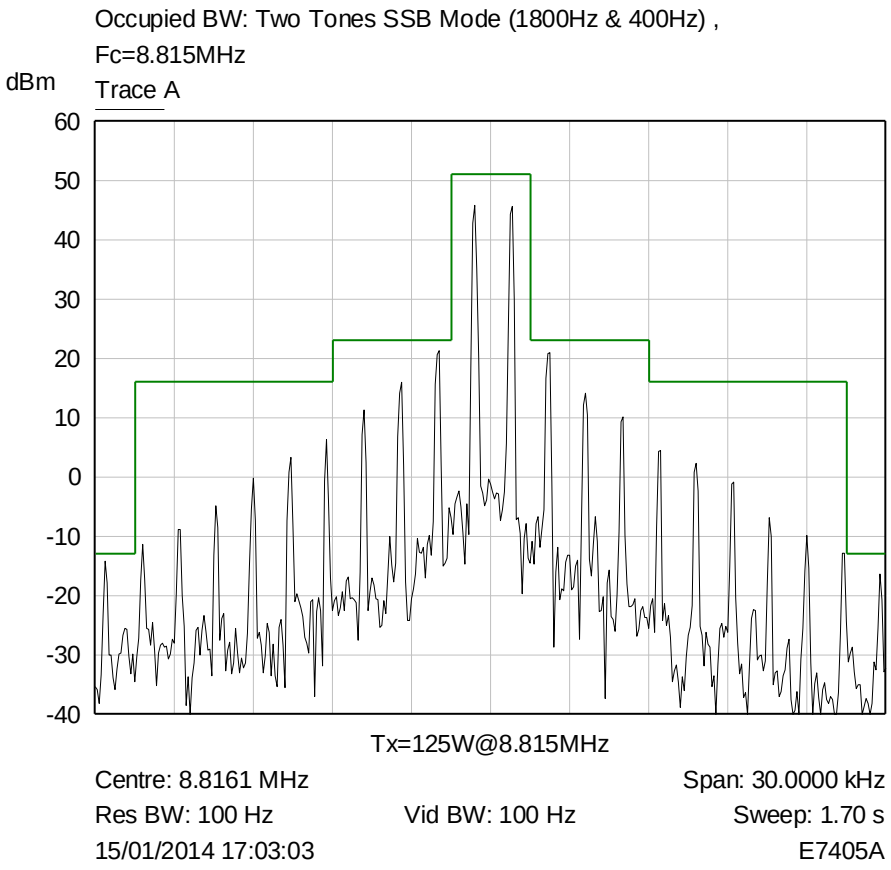

***Plot Occupied Bandwidth - SSB/ 24***



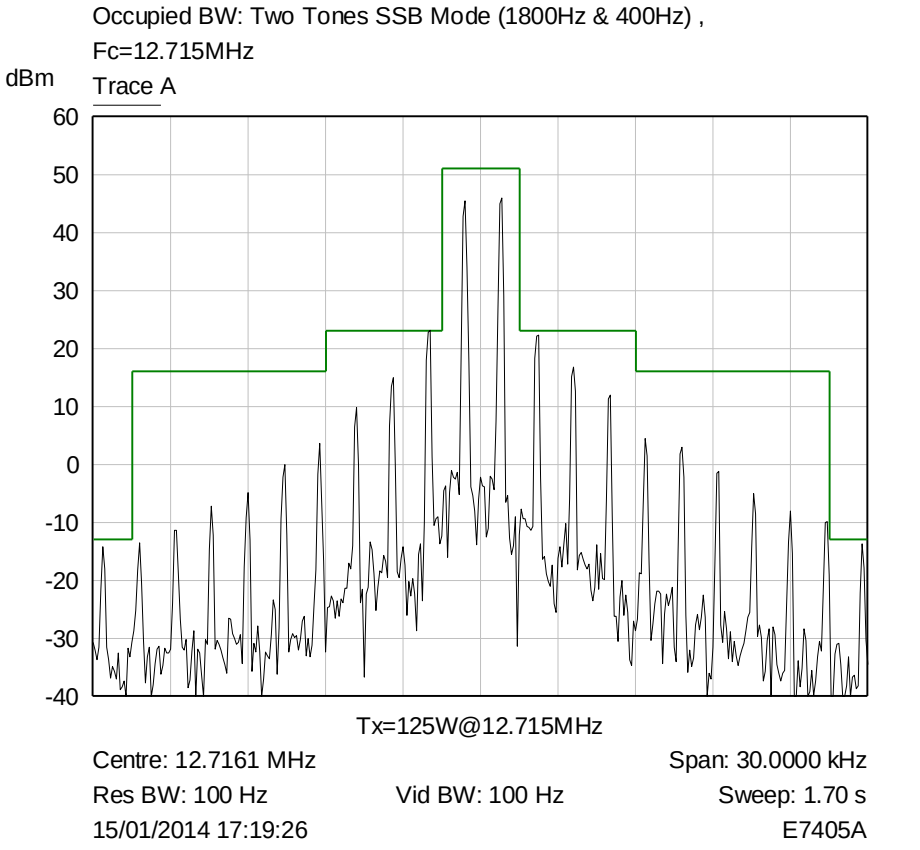

***Plot Occupied Bandwidth - SSB/ 25***



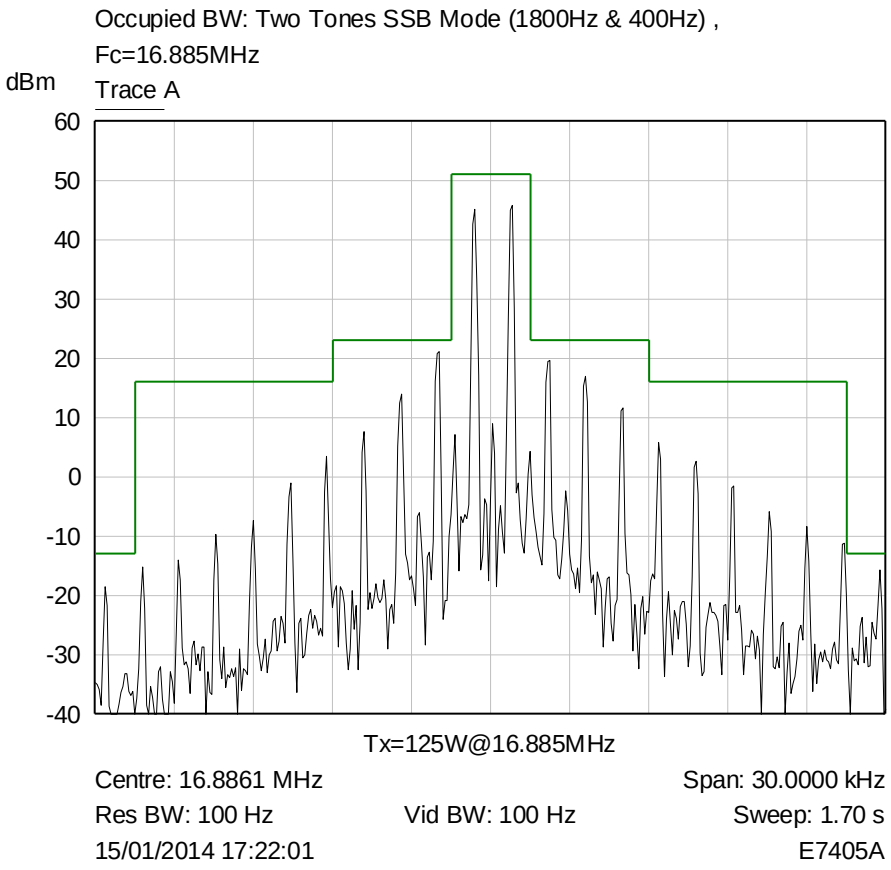

***Plot Occupied Bandwidth - SSB/ 26***



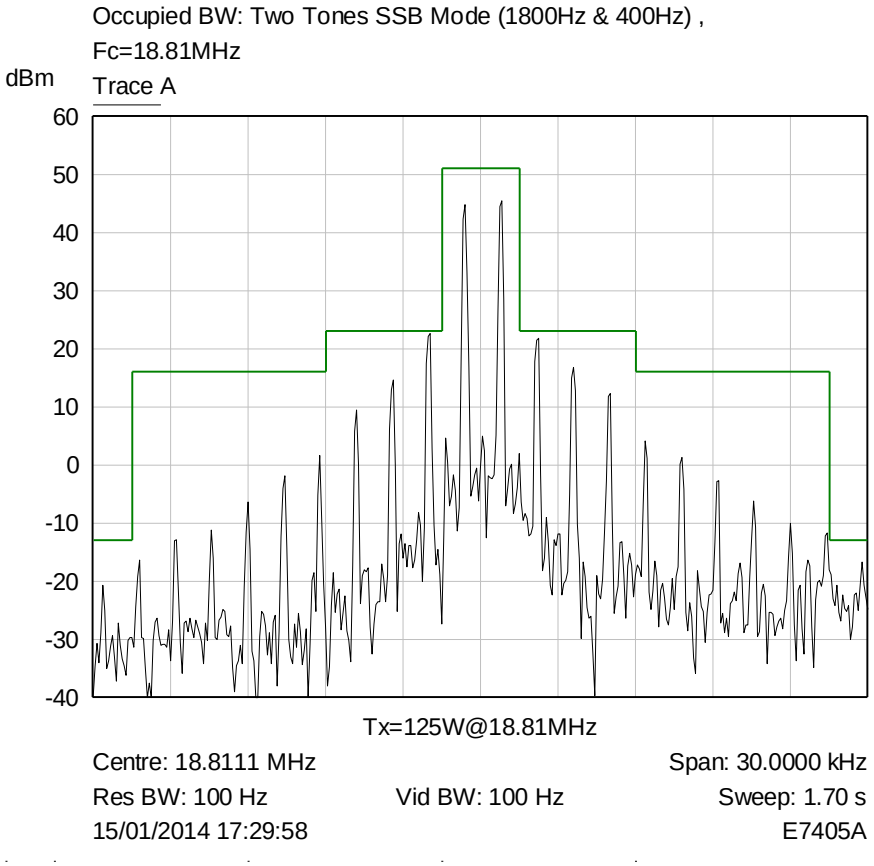

***Plot Occupied Bandwidth - SSB/ 27***



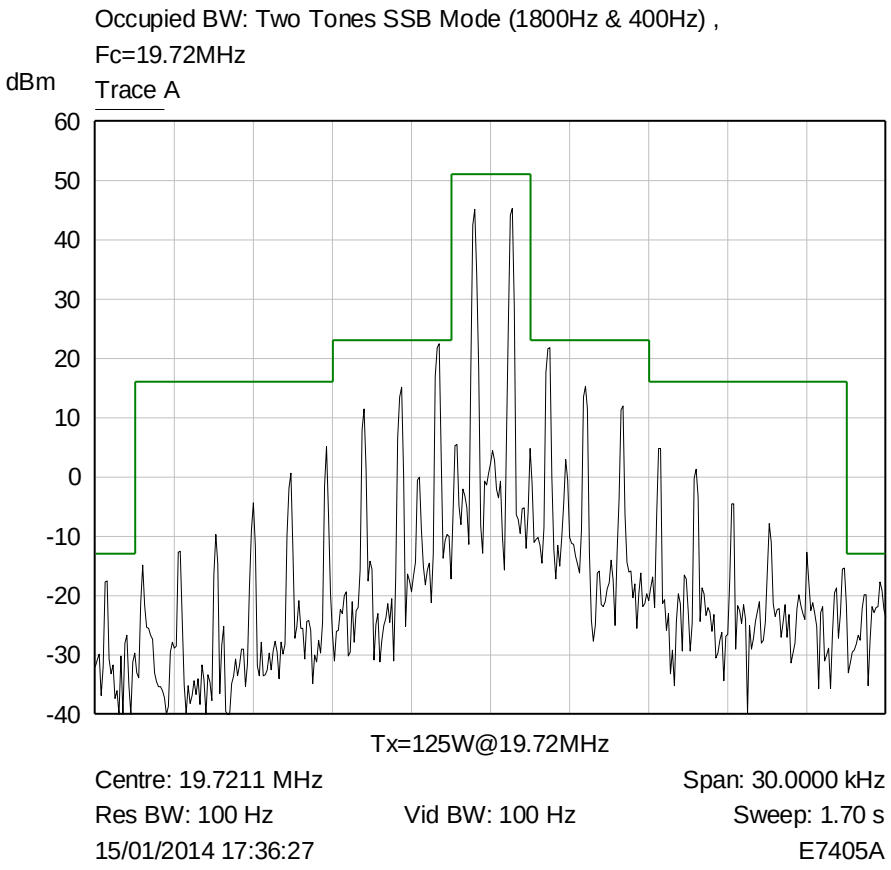

***Plot Occupied Bandwidth - SSB/ 28***



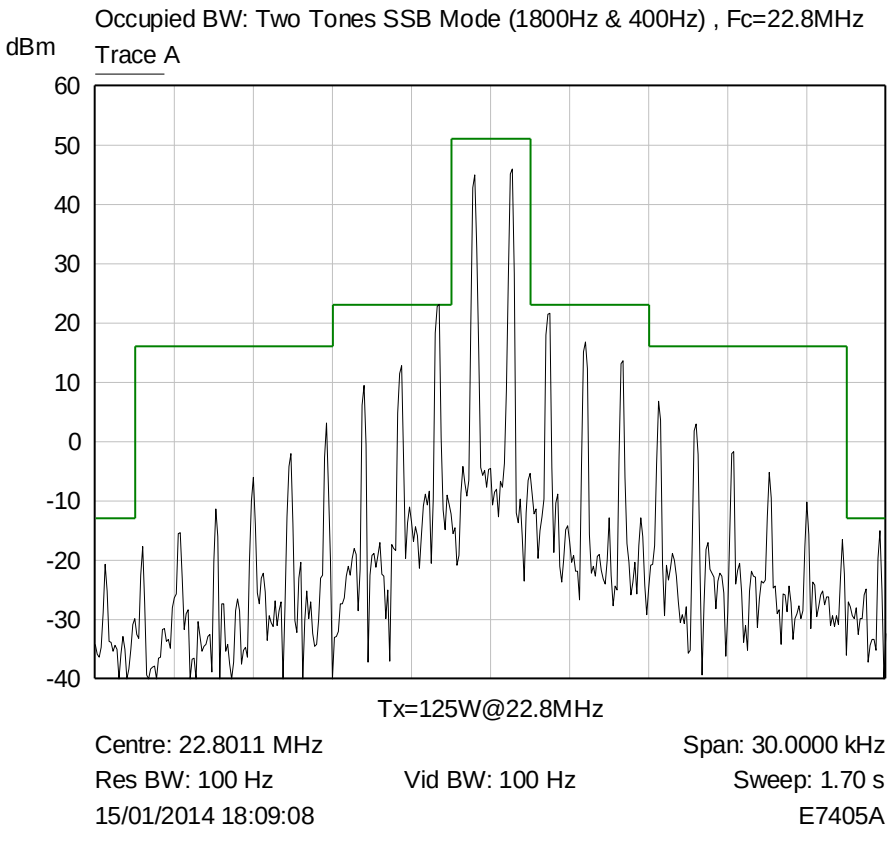

***Plot Occupied Bandwidth - SSB/ 29***



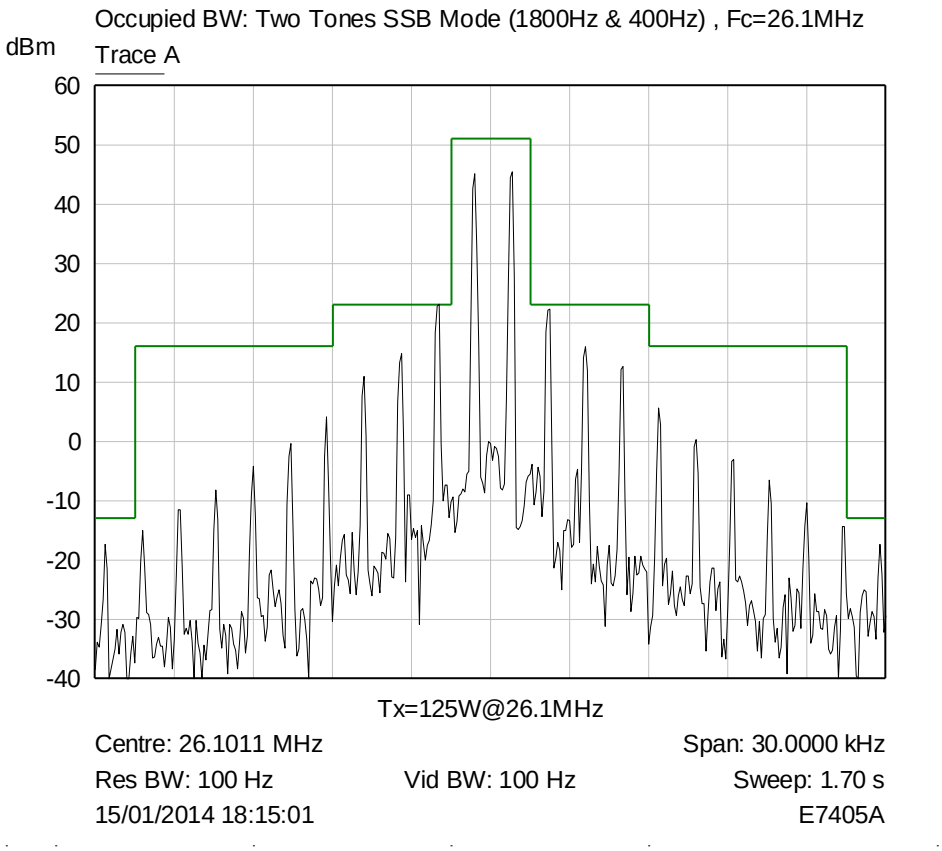

***Plot Occupied Bandwidth - SSB/ 30***




***Plot Occupied Bandwidth - SSB/ 31***




***Plot Occupied Bandwidth - SSB/ 32***




***Plot Occupied Bandwidth - SSB/ 33***

# 8. Spurious Emissions at Antenna Terminals – Part 2.1051

| | |
|---|---|
| E.U.T | Micom Z Dash |
| S/N: | MZ6789 |
| Date: | 15.01.2014 |
| Standard | 2.1051 + 80.211 (a) (f) |
| Relative Humidity: | 28% |
| Ambient Temperature: | $24^0$ C |
| Air Pressure: | 1010hPa |

Testing Engineer: D. Oshri Date 15.01.2014

## 8.1. Test Results Summary & Conclusions

The E.U.T was found to be in compliance with the Spurious Emissions at Antenna Terminals – Part 2.1051 + 80.211 (a) (f)

## 8.2. Test Instrumentation and Equipment

***Table 6: Test Instrumentation and Equipment***

| Item | Model | Manufacturer | Next Date of Calibration |
|---|---|---|---|
| Spectrum Analyzer | E7405A | Agilent | 09.11.2014 |
| Attenuator 30 dB | 769-30 | Narda | 21.05.2015 |
| Audio Analyzer | 8903A | HP | 23.12.2014 |

## 8.3. Test Results

Frequencies examined: 2.1 MHz, 2.182 MHz, 4.219 MHz, 6.2 MHz, 8.815 MHz, 12.715 MHz, 16.885 MHz, 18.81 MHz 19.72 MHz, 22.8 MHz & 26.1 MHz

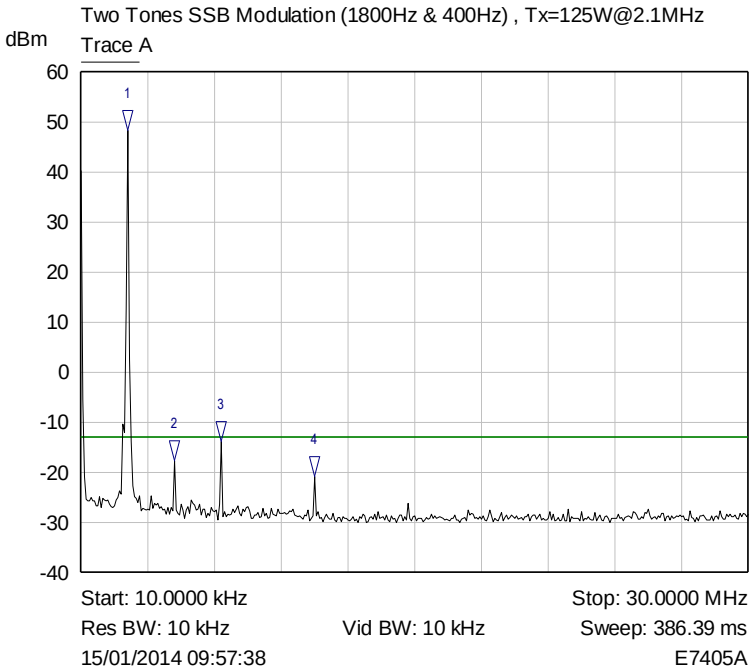
Frequency range: 0 – 30 MHz & 30 – 300 MHz

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 125 Watts

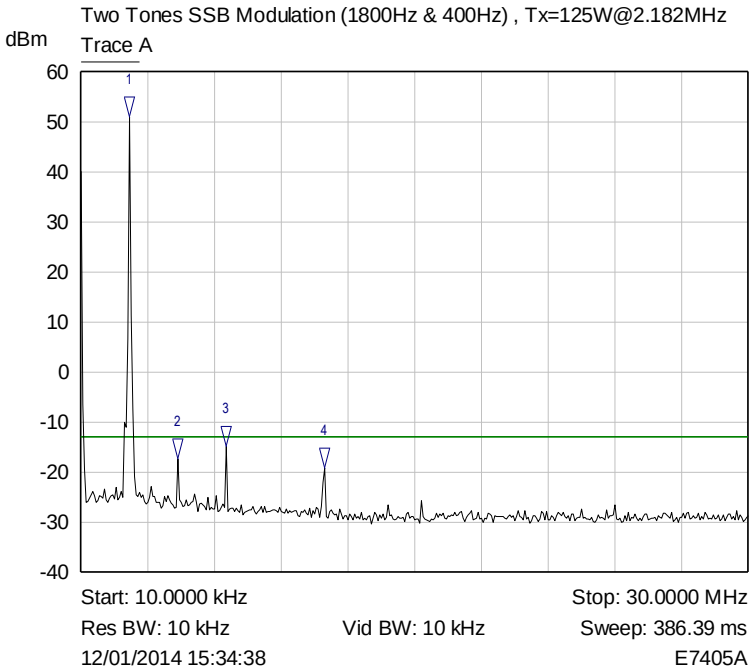
***Table 7: Test Results for Maximum Power***

| Frequency (MHz) | Frequency Range | Difference bet 1 & 2 (dB) | Compliance Y/N |
|---|---|---|---|
| 2.100 | 0 – 30 MHz | 64.84 | Y |
| 2.182 | | 65.81 | Y |
| 4.219 | | 64.50 | Y |
| 6.200 | | 64.83 | Y |
| 8.815 | | 69.14 | Y |
| 12.715 | | 68.35 | Y |
| 16.885 | | 69.51 | Y |
| 18.810 | | 66.55 | Y |
| 19.720 | | 67.19 | Y |
| 22.800 | | 65.47 | Y |
| 26.100 | | 65.47 | Y |
| 2.100 | 30 – 300 MHz | | Y |
| 2.182 | | | Y |
| 4.219 | | | Y |
| 6.200 | | | Y |
| 8.815 | | | Y |
| 12.715 | | | Y |
| 16.885 | | | Y |
| 18.810 | | | Y |
| 19.720 | | | Y |
| 22.800 | | | Y |
| 26.100 | | | Y |



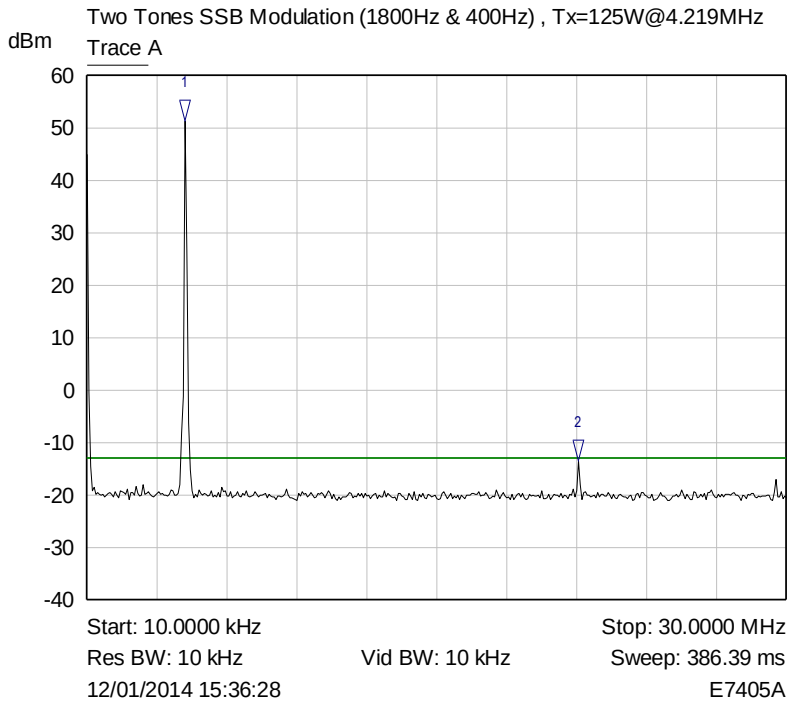

| Mkr | Trace | X-Axis | Value | Notes |
|---|---|---|---|---|
| 1 | Trace A | 2.1093 MHz | 48.39 dBm | |
| 2 | Trace A | 4.2086 MHz | -17.61 dBm | |
| 3 | Trace A | 6.3079 MHz | -13.84 dBm | |
| 4 | Trace A | 10.5065 MHz | -20.80 dBm | |

***Plot Spurious Emissions at Antenna Terminal – Tx = Max (125W)/ 1***



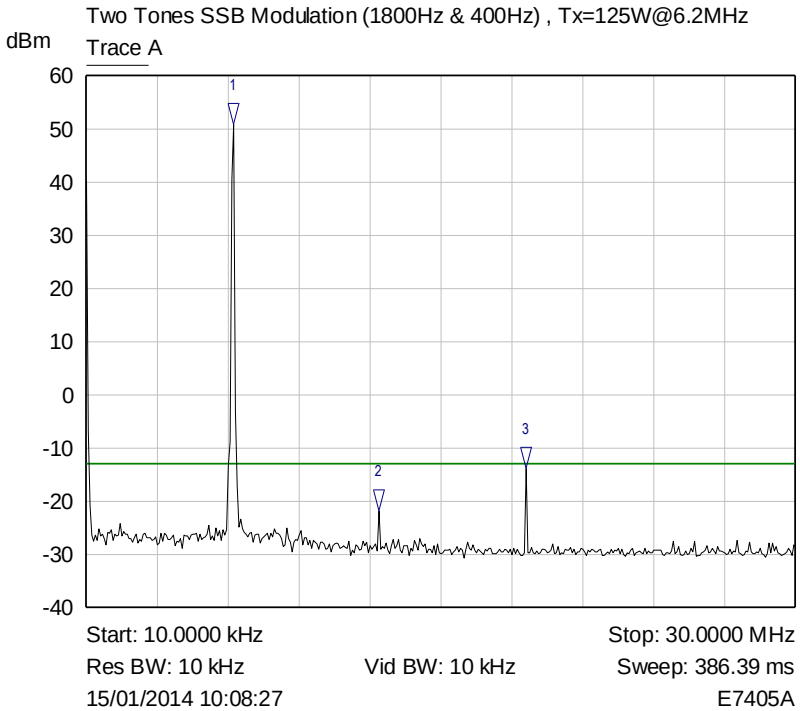

| Mkr | Trace | X-Axis | Value | Notes |
|---|---|---|---|---|
| 1 | Trace A | 2.1843 MHz | 50.95 dBm | |
| 2 | Trace A | 4.3586 MHz | -17.40 dBm | |
| 3 | Trace A | 6.5328 MHz | -14.81 dBm | |
| 4 | Trace A | 10.9564 MHz | -19.11 dBm | |

***Plot Spurious Emissions at Antenna Terminal – Tx = Max (125W)/ 2***



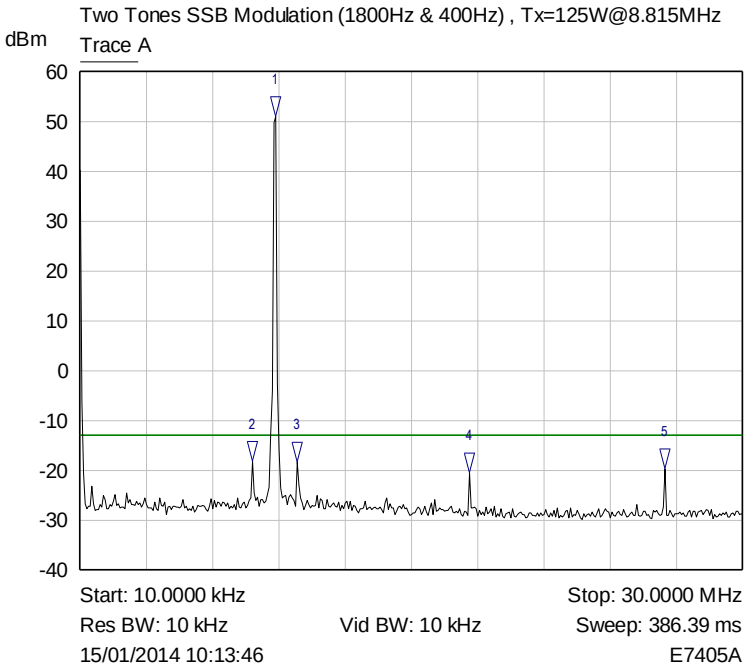

| Mkr | Trace | X-Axis | Value | Notes |
|---|---|---|---|---|
| 1 ▽ | Trace A | 4.2086 MHz | 51.27 dBm | |
| 2 ▽ | Trace A | 21.0780 MHz | -13.50 dBm | |

***Plot Spurious Emissions at Antenna Terminal – Tx = Max (125W)/ 3***



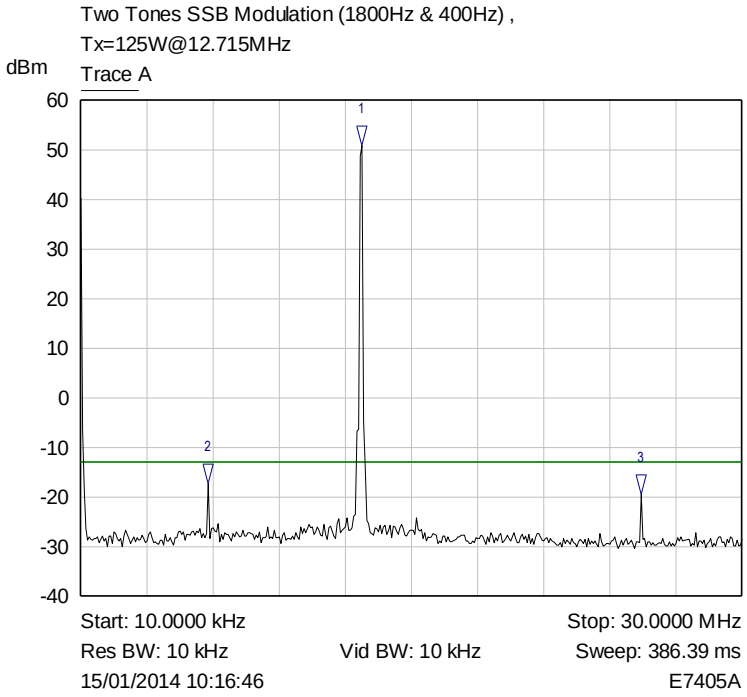

| Mkr | Trace | X-Axis | Value | Notes |
|---|---|---|---|---|
| 1 ▽ | Trace A | 6.2329 MHz | 50.76 dBm | |
| 2 ▽ | Trace A | 12.3809 MHz | -21.81 dBm | |
| 3 ▽ | Trace A | 18.6038 MHz | -13.83 dBm | |

***Plot Spurious Emissions at Antenna Terminal – Tx = Max (125W)/ 4***



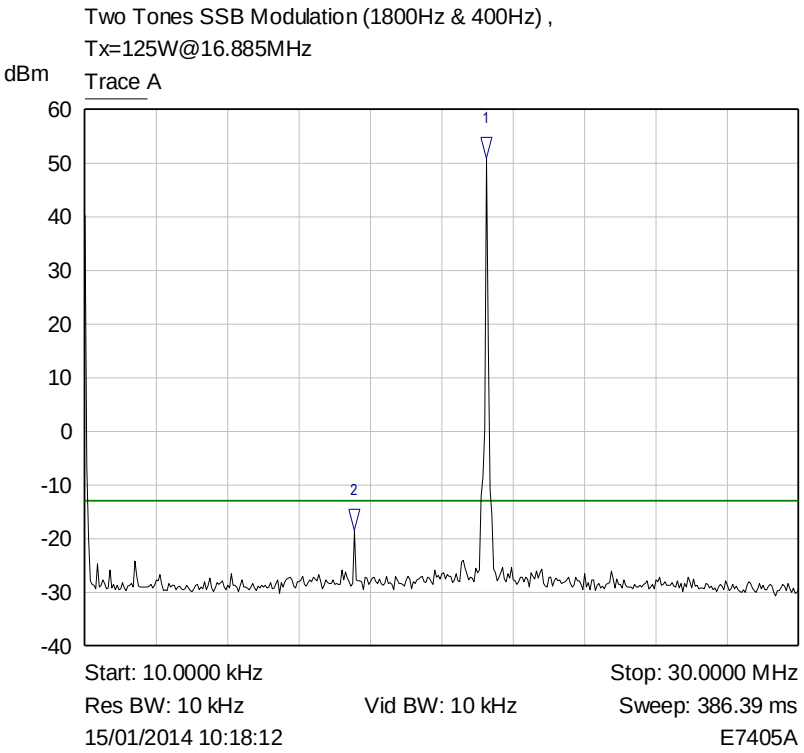

| Mkr | Trace | X-Axis | Value | Notes |
|---|---|---|---|---|
| 1 | Trace A | 8.8571 MHz | 50.95 dBm | |
| 2 | Trace A | 7.8074 MHz | -18.14 dBm | |
| 3 | Trace A | 9.8317 MHz | -18.30 dBm | |
| 4 | Trace A | 17.6291 MHz | -20.43 dBm | |
| 5 | Trace A | 26.4762 MHz | -19.62 dBm | |

***Plot Spurious Emissions at Antenna Terminal – Tx = Max (125W)/ 5***



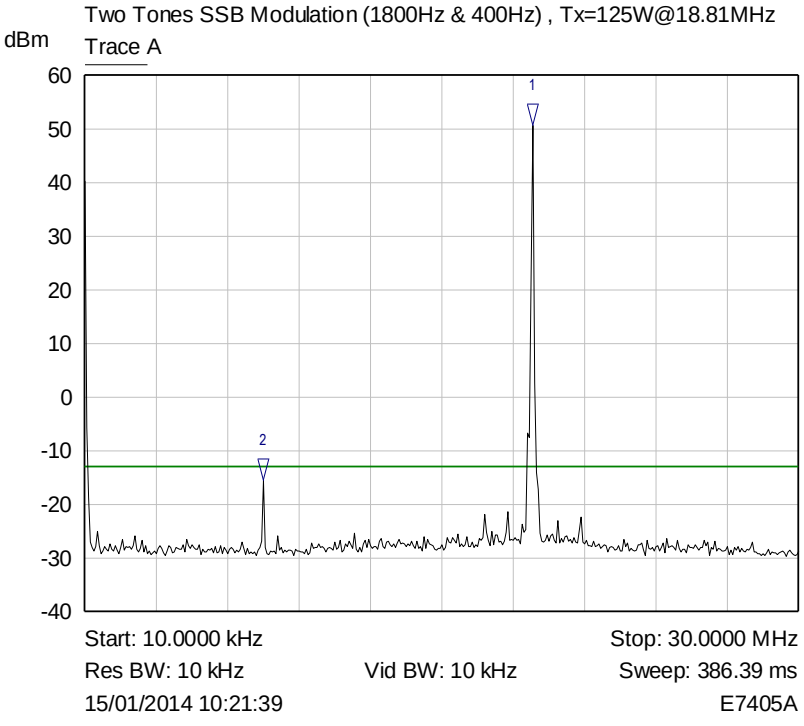

| Mkr | Trace | X-Axis | Value | Notes |
|---|---|---|---|---|
| 1 | Trace A | 12.7558 MHz | 50.79 dBm | |
| 2 | Trace A | 5.7831 MHz | -17.35 dBm | |
| 3 | Trace A | 25.4265 MHz | -19.58 dBm | |

***Plot Spurious Emissions at Antenna Terminal – Tx = Max (125W)/ 6***



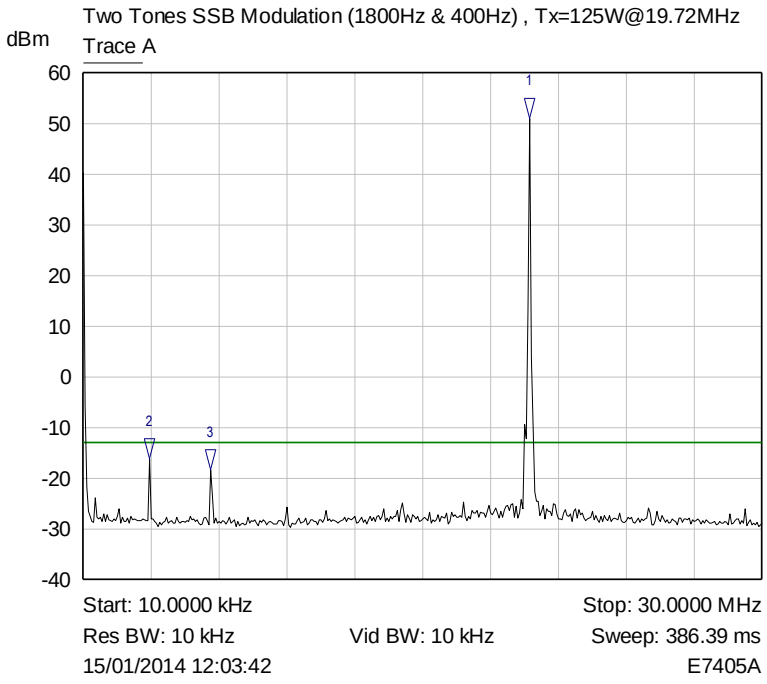

| Mkr | Trace | X-Axis | Value | Notes |
|---|---|---|---|---|
| 1 ▽ | Trace A | 16.8794 MHz | 50.82 dBm | |
| 2 ▽ | Trace A | 11.3312 MHz | -18.51 dBm | |

***Plot Spurious Emissions at Antenna Terminal – Tx = Max (125W)/ 7***



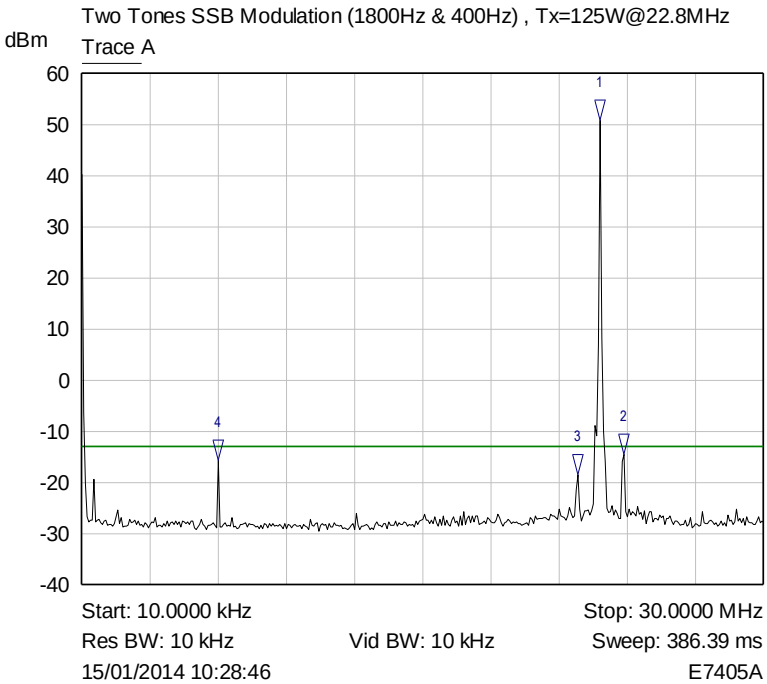

| Mkr | Trace | X-Axis | Value | Notes |
|---|---|---|---|---|
| 1 ▽ | Trace A | 18.8287 MHz | 50.74 dBm | |
| 2 ▽ | Trace A | 7.5075 MHz | -15.55 dBm | |

***Plot Spurious Emissions at Antenna Terminal – Tx = Max (125W)/ 8***



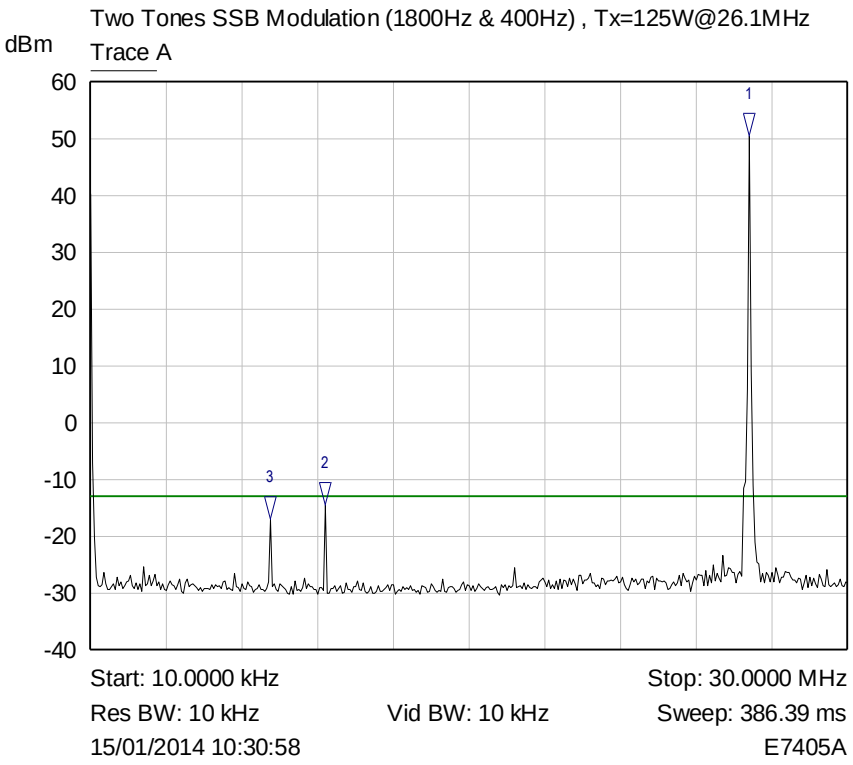

| Mkr | Trace | X-Axis | Value | Notes |
|---|---|---|---|---|
| 1 ▽ | Trace A | 19.7284 MHz | 51.08 dBm | |
| 2 ▽ | Trace A | 2.9340 MHz | -16.19 dBm | |
| 3 ▽ | Trace A | 5.6331 MHz | -18.34 dBm | |

***Plot Spurious Emissions at Antenna Terminal – Tx = Max (125W)/ 9***



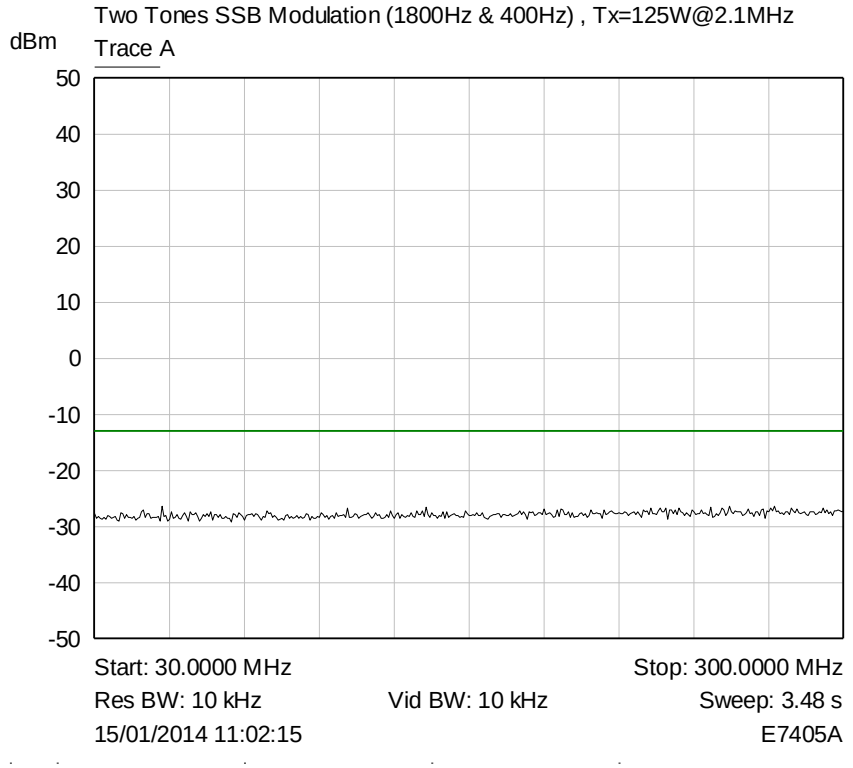

| Mkr | Trace | X-Axis | Value | Notes |
|---|---|---|---|---|
| 1 ▽ | Trace A | 22.8024 MHz | 50.85 dBm | |
| 2 ▽ | Trace A | 23.8521 MHz | -14.47 dBm | |
| 3 ▽ | Trace A | 21.8277 MHz | -18.43 dBm | |
| 4 ▽ | Trace A | 6.0080 MHz | -15.71 dBm | |

***Plot Spurious Emissions at Antenna Terminal – Tx = Max (125W)/ 10***

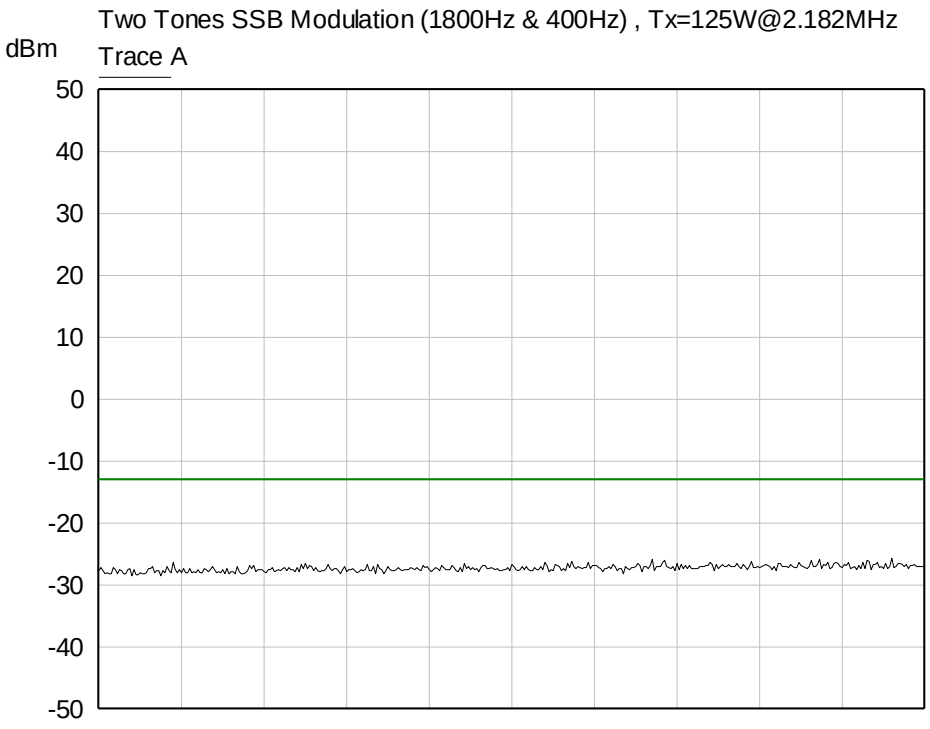



| Mkr | Trace | X-Axis | Value | Notes |
|---|---|---|---|---|
| 1 | Trace A | 26.1013 MHz | 50.50 dBm | |
| 2 | Trace A | 9.3069 MHz | -14.47 dBm | |
| 3 | Trace A | 7.1326 MHz | -16.96 dBm | |

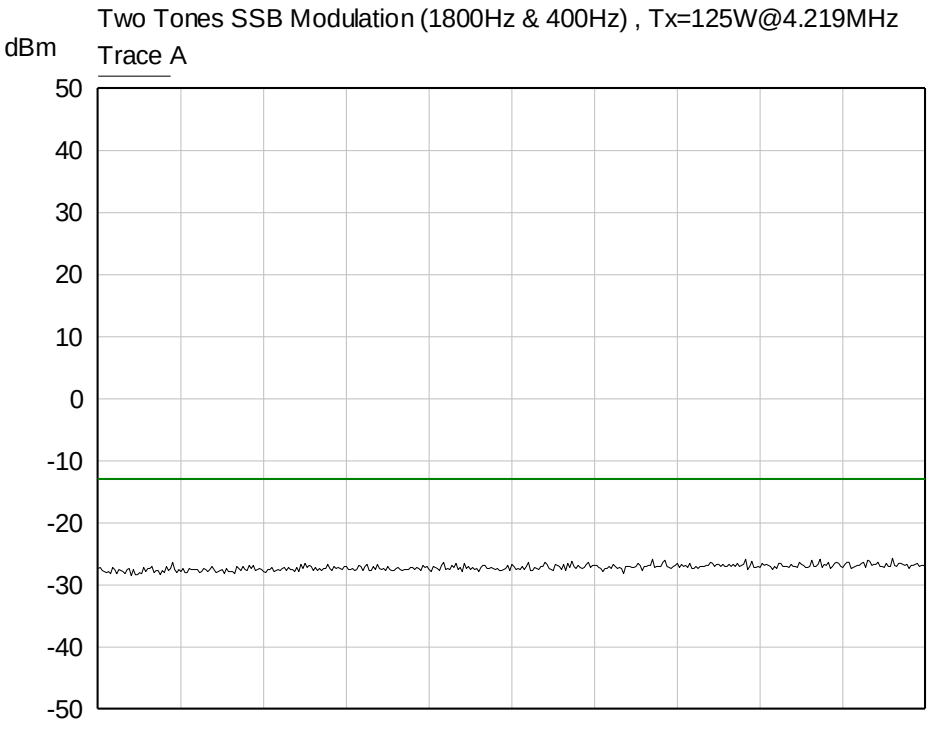
***Plot Spurious Emissions at Antenna Terminal – Tx = Max (125W)/ 11***



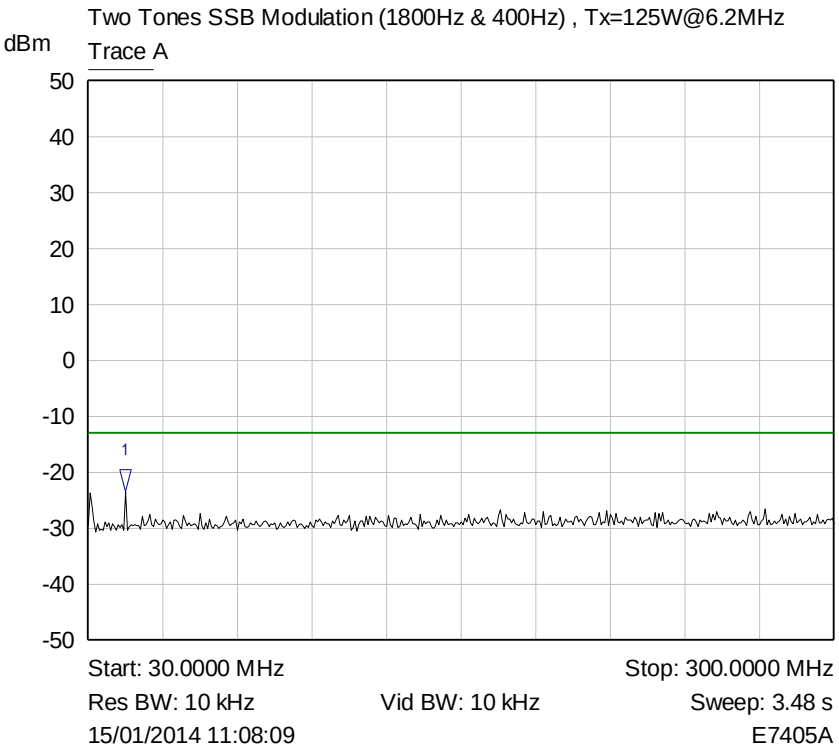

***Plot Spurious Emissions at Antenna Terminal – Tx = Max (125W)/ 12***




***Plot Spurious Emissions at Antenna Terminal – Tx = Max (125W)/ 13***

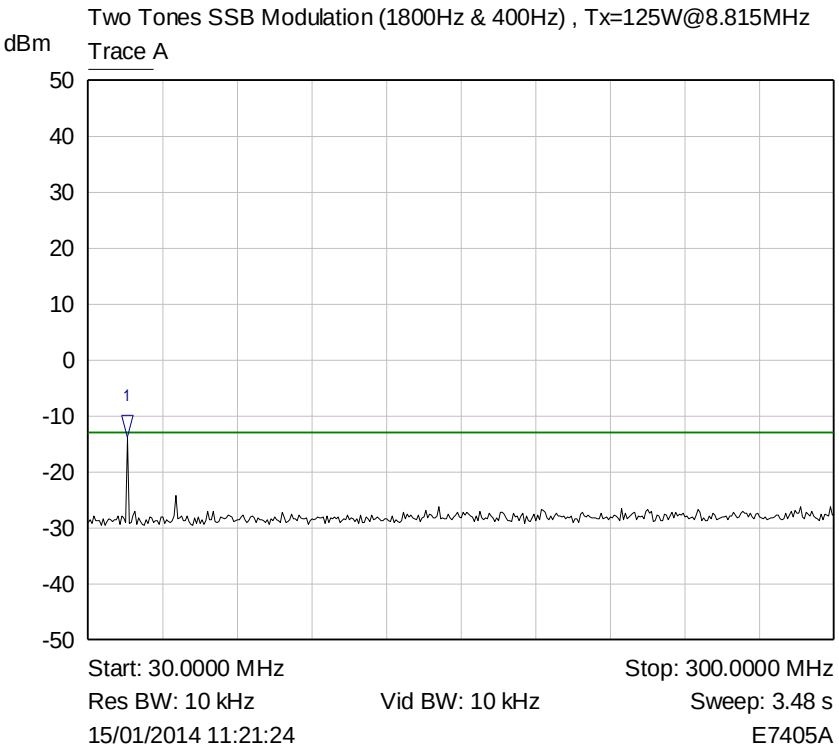



***Plot Spurious Emissions at Antenna Terminal – Tx = Max (125W)/ 14***



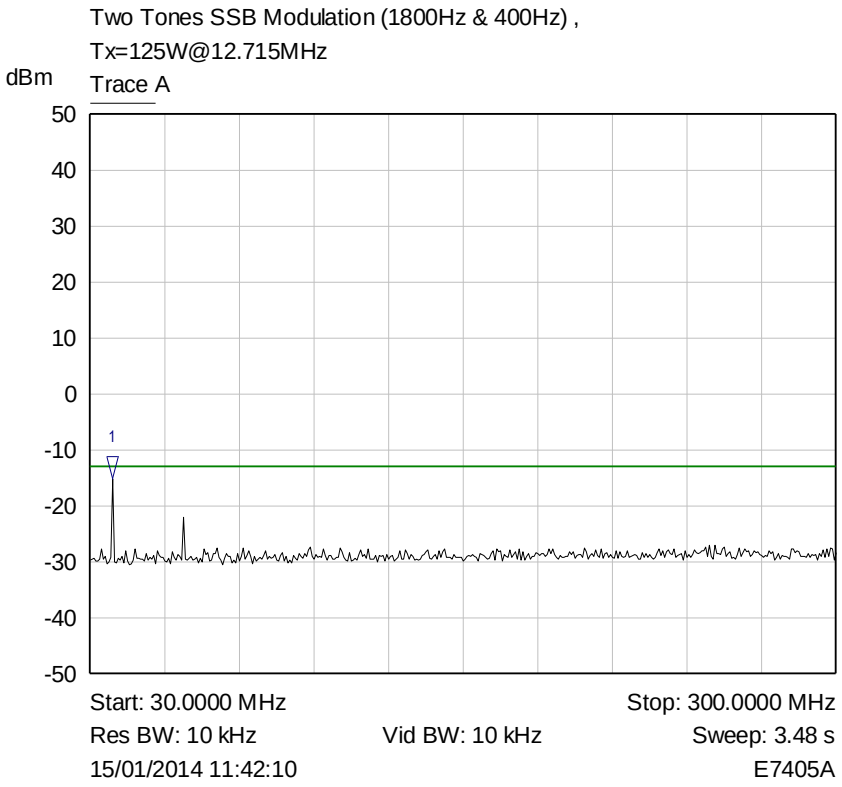

| Mkr | Trace | X-Axis | Value | Notes |
|---|---|---|---|---|
| 1 ▽ | Trace A | 43.5000 MHz | -23.51 dBm | |

***Plot Spurious Emissions at Antenna Terminal – Tx = Max (125W)/ 15***



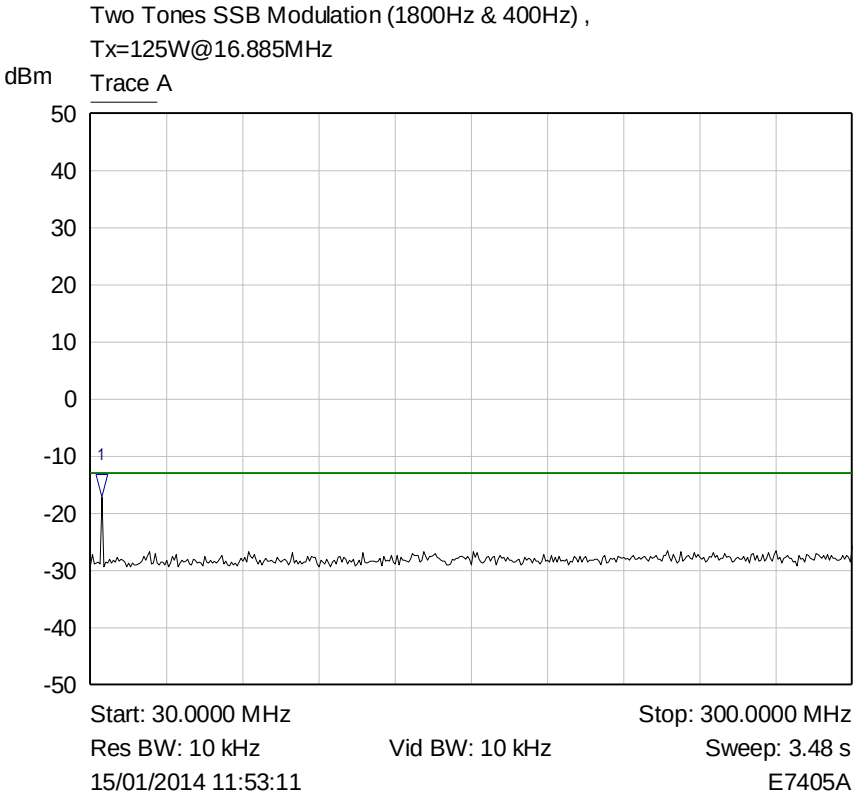

| Mkr | Trace | X-Axis | Value | Notes |
|---|---|---|---|---|
| 1 ▽ | Trace A | 44.1750 MHz | -13.77 dBm | |

***Plot Spurious Emissions at Antenna Terminal – Tx = Max (125W)/ 16***



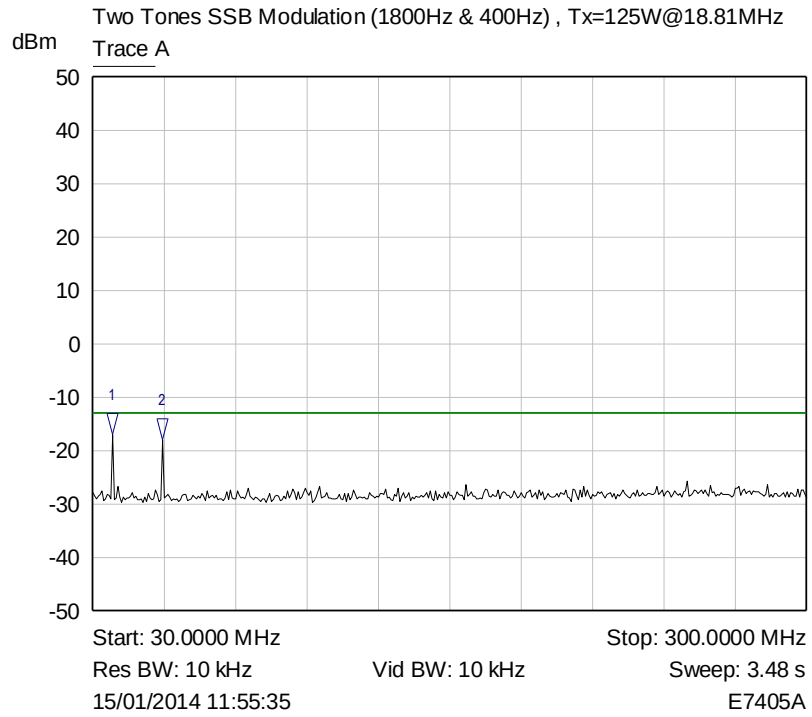

| Mkr | Trace | X-Axis | Value | Notes |
|---|---|---|---|---|
| 1 ▽ | Trace A | 38.1000 MHz | -15.19 dBm | |

***Plot Spurious Emissions at Antenna Terminal – Tx = Max (125W)/ 17***



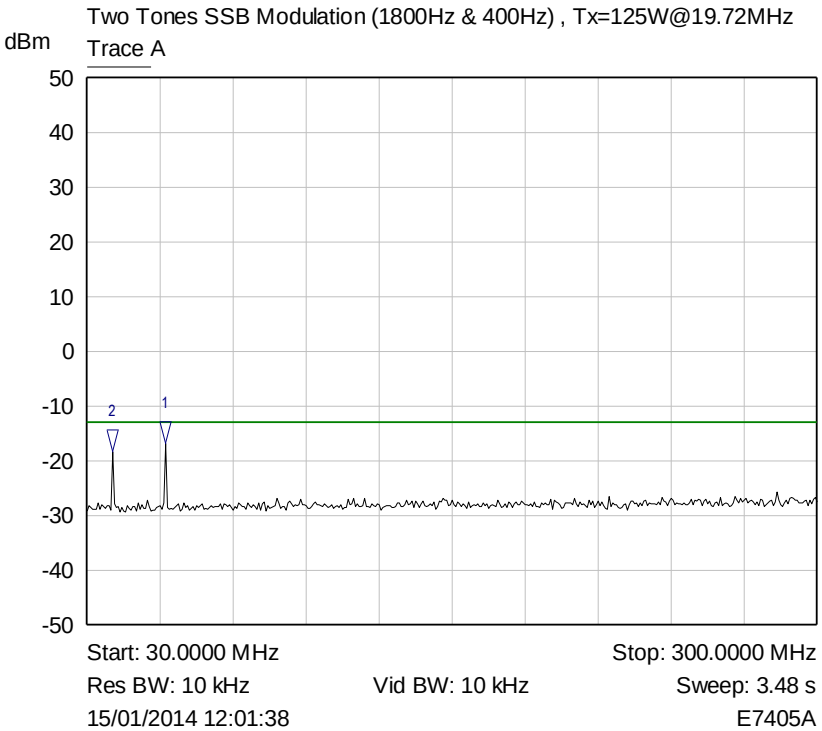

| Mkr | Trace | X-Axis | Value | Notes |
|---|---|---|---|---|
| 1 ▽ | Trace A | 34.0500 MHz | -17.10 dBm | |

***Plot Spurious Emissions – Antenna Terminal – Tx 16.5 MHz P High/ 18***



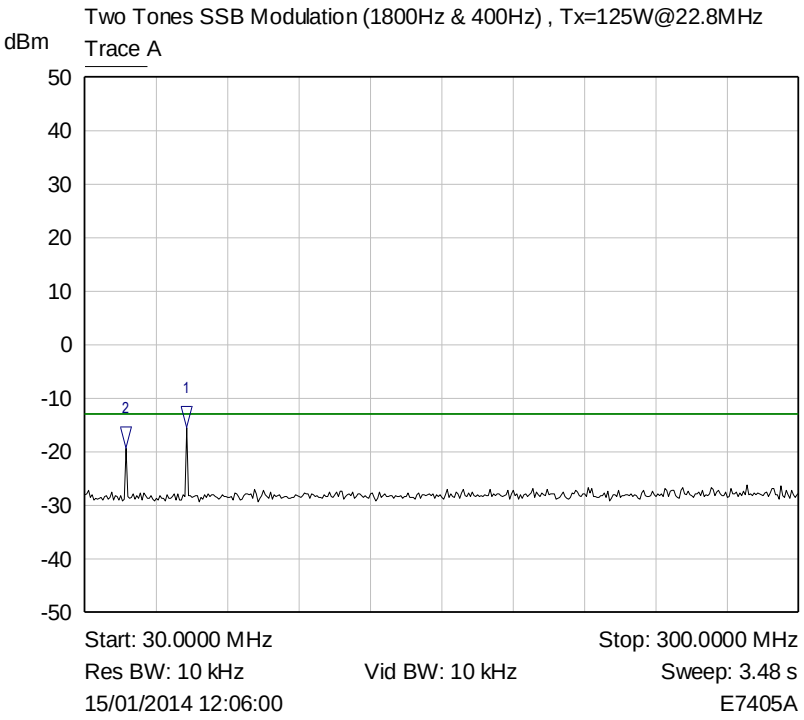

| Mkr | Trace | X-Axis | Value | Notes |
|---|---|---|---|---|
| 1 ▽ | Trace A | 37.4250 MHz | -17.04 dBm | |
| 2 ▽ | Trace A | 56.3250 MHz | -17.93 dBm | |

***Plot Spurious Emissions at Antenna Terminal – Tx = Max (125W)/ 19***



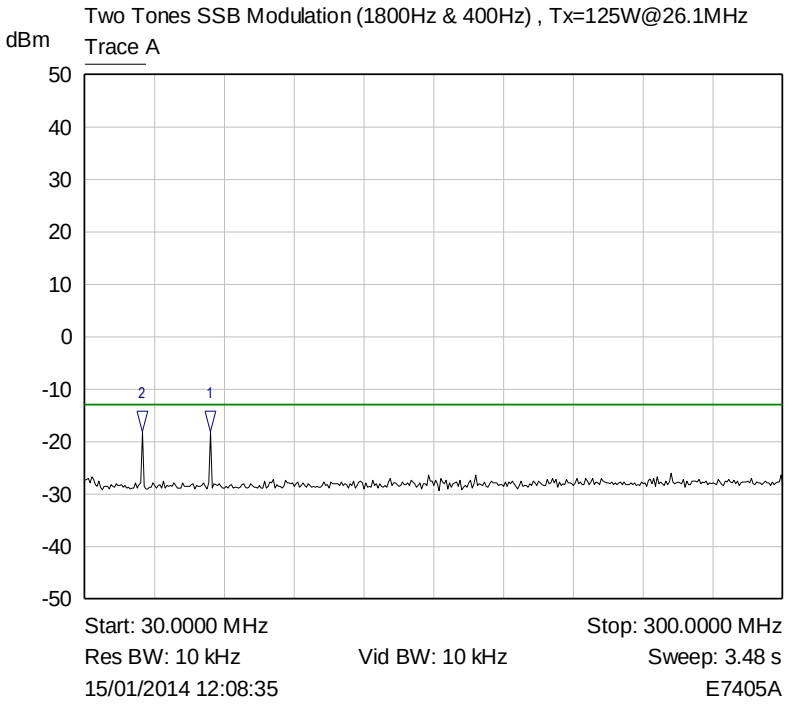

| Mkr | Trace | X-Axis | Value | Notes |
|---|---|---|---|---|
| 1 ▽ | Trace A | 59.0250 MHz | -16.90 dBm | |
| 2 ▽ | Trace A | 39.4500 MHz | -18.27 dBm | |

***Plot Spurious Emissions at Antenna Terminal – Tx = Max (125W)/ 20***




| Mkr | Trace | X-Axis | Value | Notes |
|---|---|---|---|---|
| 1 ▽ | Trace A | 68.4750 MHz | -15.42 dBm | |
| 2 ▽ | Trace A | 45.5250 MHz | -19.26 dBm | |

***Plot Spurious Emissions at Antenna Terminal – Tx = Max (125W)/ 21***




| Mkr | Trace | X-Axis | Value | Notes |
|---|---|---|---|---|
| 1 ▽ | Trace A | 78.6000 MHz | -18.11 dBm | |
| 2 ▽ | Trace A | 52.2750 MHz | -18.23 dBm | |

***Plot Spurious Emissions at Antenna Terminal – Tx = Max (125W)/ 22***

# 9. Frequency Stability – Part 2.1055

| | |
|---|---|
| E.U.T | Micom Z Dash |
| S/N: | MZ6789 |
| Date: | 27.01.2014 |
| Standard | 2.1055 + 80.209 (a) |
| Relative Humidity: | 28% |
| Ambient Temperature: | $24^0$ C |
| Air Pressure: | 1010hPa |

Testing Engineer: D. Oshri Date 27.01.2014

## 9.1. Test Results Summary & Conclusions

The E.U.T was found in compliance with Frequency Stability – Part 2.1055 + 80.209 (a)

## 9.2. Test Instrumentation and Equipment

***Table 8: Test Instrumentation and Equipment***

| Item | Model | Manufacturer | Next Date of Calibration |
|---|---|---|---|
| Frequency Counter | 5341A | HP | 14.05.2014 |
| DC Power Supply | HY3020E | Sinometer | 17.05.2015 |
| Attenuator 30dB/125W | 769-30 | Narda | 21.05.2015 |
| Attenuator 20dB/50W | WA23-20-34 | Weinschel Associates | 05.03.2015 |

## 9.3. Test Results

Frequencies examined: 2.1 MHz, & 26.1 MHz

Transmitting Power: 125W

***Table 9: Test Results for Cold Start, Temperature -30˚C***

| Tested Frequencies: 2.1MHz and 26.1MHz | | | | |
|---|---|---|---|---|
| Tx Mode: A1A (CW) | | | | |
| Temperature: -30˚C | | | | |
| **Lapse Of Time [minute]** | **Frequency [Hz]** | **Frequency Drift [Hz]** | **Frequency [Hz]** | **Frequency Drift [Hz]** |
| 0 | 2099999 | -1 | 26099981 | -19 |
| 1 | 2099999 | -1 | 26099981 | -19 |
| 2 | 2099999 | -1 | 26099981 | -19 |
| 3 | 2100000 | 0 | 26099984 | -16 |
| 4 | 2100000 | 0 | 26099984 | -16 |
| 5 | 2100000 | 0 | 26099984 | -16 |
| 6 | 2100000 | 0 | 26099985 | -15 |
| 7 | 2100000 | 0 | 26099987 | -13 |
| 8 | 2100000 | 0 | 26099989 | -11 |
| 9 | 2100000 | 0 | 26099989 | -11 |
| 10 | 2100000 | 0 | 26099990 | -10 |
| 15 | 2100000 | 0 | 26099990 | -10 |
| 20 | 2100000 | 0 | 26099990 | -10 |
| 30 | 2100000 | 0 | 26099991 | -9 |
| 40 | 2100000 | 0 | 26099991 | -9 |
| 50 | 2100000 | 0 | 26099993 | -7 |
| 60 | 2100000 | 0 | 26099993 | -7 |

*Table 10: Test Results for Cold Start, Temperature -20˚C*

| Tested Frequencies: 2.1MHz and 26.1MHz | | | | |
|---|---|---|---|---|
| Tx Mode: A1A (CW) | | | | |
| Temperature: -20˚C | | | | |
| **Lapse Of Time [minute]** | **Frequency [Hz]** | **Frequency Drift [Hz]** | **Frequency [Hz]** | **Frequency Drift [Hz]** |
| 0 | 2100001 | 1 | 26099997 | -3 |
| 1 | 2100000 | 0 | 26100001 | 1 |
| 2 | 2100000 | 0 | 26100001 | 1 |
| 3 | 2100000 | 0 | 26099999 | -1 |
| 4 | 2100000 | 0 | 26099998 | -2 |
| 5 | 2100000 | 0 | 26099998 | -2 |
| 6 | 2100000 | 0 | 26099996 | -4 |
| 7 | 2100000 | 0 | 26099996 | -4 |
| 8 | 2100000 | 0 | 26099996 | -4 |
| 9 | 2100000 | 0 | 26099994 | -6 |
| 10 | 2100000 | 0 | 26099994 | -6 |
| 15 | 2100000 | 0 | 26099991 | -9 |
| 20 | 2100000 | 0 | 26099986 | -14 |
| 30 | 2100000 | 0 | 26099986 | -14 |
| 40 | 2100000 | 0 | 26099989 | -11 |
| 50 | 2100000 | 0 | 26099987 | -13 |
| 60 | 2100000 | 0 | 26099990 | -10 |

*Table 11: Test Results for Cold Start, Temperature -10˚C*

| Tested Frequencies: 2.1MHz and 26.1MHz | | | | |
|---|---|---|---|---|
| Tx Mode: A1A (CW) | | | | |
| Temperature: -10˚C | | | | |
| **Lapse Of Time [minute]** | **Frequency [Hz]** | **Frequency Drift [Hz]** | **Frequency [Hz]** | **Frequency Drift [Hz]** |
| 0 | 2100000 | 0 | 26099992 | -8 |
| 1 | 2100000 | 0 | 26099999 | -1 |
| 2 | 2100000 | 0 | 26099999 | -1 |
| 3 | 2100000 | 0 | 26099998 | -2 |
| 4 | 2100000 | 0 | 26099998 | -2 |
| 5 | 2100000 | 0 | 26099998 | -2 |
| 6 | 2100000 | 0 | 26099998 | -2 |
| 7 | 2100000 | 0 | 26099998 | -2 |
| 8 | 2100000 | 0 | 26099998 | -2 |
| 9 | 2100000 | 0 | 26099998 | -2 |
| 10 | 2100000 | 0 | 26099998 | -2 |
| 15 | 2100000 | 0 | 26099987 | -13 |
| 20 | 2100000 | 0 | 26099987 | -13 |
| 30 | 2100000 | 0 | 26099987 | -13 |
| 40 | 2100000 | 0 | 26099988 | -12 |
| 50 | 2100000 | 0 | 26099998 | -2 |
| 60 | 2100000 | 0 | 26099989 | -11 |

*Table 12: Test Results for Cold Start, Temperature 0˚C*

| Tested Frequencies: 2.1MHz and 26.1MHz | | | | |
|---|---|---|---|---|
| Tx Mode: A1A (CW) | | | | |
| Temperature: 0˚C | | | | |
| **Lapse Of Time [minute]** | **Frequency [Hz]** | **Frequency Drift [Hz]** | **Frequency [Hz]** | **Frequency Drift [Hz]** |
| 0 | 2099998 | -2 | 26099986 | -14 |
| 1 | 2100001 | 1 | 26099984 | -16 |
| 2 | 2100001 | 1 | 26099982 | -18 |
| 3 | 2100001 | 1 | 26099980 | -20 |
| 4 | 2100000 | 0 | 26099983 | -17 |
| 5 | 2100000 | 0 | 26099992 | -8 |
| 6 | 2100000 | 0 | 26099990 | -10 |
| 7 | 2100000 | 0 | 26099990 | -10 |
| 8 | 2100000 | 0 | 26099988 | -12 |
| 9 | 2100000 | 0 | 26099988 | -12 |
| 10 | 2100000 | 0 | 26099987 | -13 |
| 15 | 2100000 | 0 | 26099987 | -13 |
| 20 | 2100000 | 0 | 26099983 | -17 |
| 30 | 2100000 | 0 | 26099983 | -17 |
| 40 | 2100000 | 0 | 26099982 | -18 |
| 50 | 2100000 | 0 | 26099983 | -17 |
| 60 | 2100000 | 0 | 26099983 | -17 |

*Table 13: Test Results for Cold Start, Temperature 10˚C*

| Tested Frequencies: 2.1MHz and 26.1MHz | | | | |
|---|---|---|---|---|
| Tx Mode: A1A (CW) | | | | |
| Temperature: 10˚C | | | | |
| **Lapse Of Time [minute]** | **Frequency [Hz]** | **Frequency Drift [Hz]** | **Frequency [Hz]** | **Frequency Drift [Hz]** |
| 0 | 2099999 | -1 | 26099985 | -15 |
| 1 | 2099999 | -1 | 26100006 | 6 |
| 2 | 2100001 | 1 | 26100005 | 5 |
| 3 | 2100001 | 1 | 26100003 | 3 |
| 4 | 2100001 | 1 | 26100002 | 2 |
| 5 | 2100000 | 0 | 26100000 | 0 |
| 6 | 2100000 | 0 | 26099999 | -1 |
| 7 | 2100000 | 0 | 26099996 | -4 |
| 8 | 2100000 | 0 | 26099996 | -4 |
| 9 | 2100000 | 0 | 26099995 | -5 |
| 10 | 2100000 | 0 | 26099995 | -5 |
| 15 | 2100000 | 0 | 26099991 | -9 |
| 20 | 2100000 | 0 | 26099984 | -16 |
| 30 | 2100000 | 0 | 26099983 | -17 |
| 40 | 2100000 | 0 | 26099983 | -17 |
| 50 | 2100000 | 0 | 26099982 | -18 |
| 60 | 2100000 | 0 | 26099982 | -18 |

*Table 14: Test Results for Cold Start, Temperature 20˚C*

| Tested Frequencies: 2.1MHz and 26.1MHz | | | | |
|---|---|---|---|---|
| Tx Mode: A1A (CW) | | | | |
| Temperature: 20˚C | | | | |
| **Lapse Of Time [minute]** | **Frequency [Hz]** | **Frequency Drift [Hz]** | **Frequency [Hz]** | **Frequency Drift [Hz]** |
| 0 | 2099999 | -1 | 26099987 | -13 |
| 1 | 2100001 | 1 | 26099988 | -12 |
| 2 | 2100000 | 0 | 26099999 | -1 |
| 3 | 2100001 | 1 | 26099999 | -1 |
| 4 | 2100001 | 1 | 26099998 | -2 |
| 5 | 2100001 | 1 | 26099997 | -3 |
| 6 | 2100001 | 1 | 26099997 | -3 |
| 7 | 2100001 | 1 | 26099997 | -3 |
| 8 | 2100001 | 1 | 26099996 | -4 |
| 9 | 2100001 | 1 | 26099996 | -4 |
| 10 | 2100000 | 0 | 26099996 | -4 |
| 15 | 2100000 | 0 | 26099993 | -7 |
| 20 | 2100000 | 0 | 26099994 | -6 |
| 30 | 2100000 | 0 | 26099993 | -7 |
| 40 | 2100000 | 0 | 26099995 | -5 |
| 50 | 2100000 | 0 | 26099996 | -4 |
| 60 | 2100000 | 0 | 26099999 | -1 |

*Table 15: Test Results for Cold Start, Temperature 30˚C*

| Tested Frequencies: 2.1MHz and 26.1MHz | | | | |
|---|---|---|---|---|
| Tx Mode: A1A (CW) | | | | |
| Temperature: 30˚C | | | | |
| **Lapse Of Time [minute]** | **Frequency [Hz]** | **Frequency Drift [Hz]** | **Frequency [Hz]** | **Frequency Drift [Hz]** |
| 0 | 2100000 | 0 | 26099996 | -4 |
| 1 | 2100000 | 0 | 26099998 | -2 |
| 2 | 2100000 | 0 | 26099998 | -2 |
| 3 | 2100001 | 1 | 26099998 | -2 |
| 4 | 2100001 | 1 | 26099999 | -1 |
| 5 | 2100000 | 0 | 26099999 | -1 |
| 6 | 2100000 | 0 | 26099999 | -1 |
| 7 | 2100000 | 0 | 26099998 | -2 |
| 8 | 2100000 | 0 | 26099998 | -2 |
| 9 | 2100000 | 0 | 26099998 | -2 |
| 10 | 2100000 | 0 | 26099997 | -3 |
| 15 | 2100000 | 0 | 26099997 | -3 |
| 20 | 2100000 | 0 | 26100000 | 0 |
| 30 | 2100000 | 0 | 26100000 | 0 |
| 40 | 2100000 | 0 | 26099999 | -1 |
| 50 | 2100000 | 0 | 26100000 | 0 |
| 60 | 2100000 | 0 | 26100000 | 0 |

*Table 16: Test Results for Cold Start, Temperature 40˚C*

| Tested Frequencies: 2.1MHz and 26.1MHz | | | | |
|---|---|---|---|---|
| Tx Mode: A1A (CW) | | | | |
| Temperature: 40˚C | | | | |
| **Lapse Of Time [minute]** | **Frequency [Hz]** | **Frequency Drift [Hz]** | **Frequency [Hz]** | **Frequency Drift [Hz]** |
| 0 | 2100001 | 1 | 26099996 | -4 |
| 1 | 2100001 | 1 | 26099998 | -2 |
| 2 | 2100001 | 1 | 26099999 | -1 |
| 3 | 2100001 | 1 | 26099998 | -2 |
| 4 | 2100001 | 1 | 26099998 | -2 |
| 5 | 2100001 | 1 | 26099998 | -2 |
| 6 | 2100001 | 1 | 26099998 | -2 |
| 7 | 2100001 | 1 | 26099999 | -1 |
| 8 | 2100001 | 1 | 26099999 | -1 |
| 9 | 2100001 | 1 | 26099999 | -1 |
| 10 | 2100001 | 1 | 26100000 | 0 |
| 15 | 2100001 | 1 | 26100000 | 0 |
| 20 | 2100001 | 1 | 26100000 | 0 |
| 30 | 2100000 | 0 | 26099999 | -1 |
| 40 | 2100000 | 0 | 26099997 | -3 |
| 50 | 2100000 | 0 | 26099997 | -3 |
| 60 | 2100000 | 0 | 26099994 | -6 |

*Table 17: Test Results for Cold Start, Temperature 50˚C*

| Tested Frequencies: 2.1MHz and 26.1MHz | | | | |
|---|---|---|---|---|
| Tx Mode: A1A (CW) | | | | |
| Temperature: 50˚C | | | | |
| **Lapse Of Time [minute]** | **Frequency [Hz]** | **Frequency Drift [Hz]** | **Frequency [Hz]** | **Frequency Drift [Hz]** |
| 0 | 2100000 | 0 | 26099994 | -6 |
| 1 | 2100000 | 0 | 26099995 | -5 |
| 2 | 2100001 | 1 | 26099995 | -5 |
| 3 | 2100001 | 1 | 26099995 | -5 |
| 4 | 2100001 | 1 | 26099999 | -1 |
| 5 | 2100001 | 1 | 26099999 | -1 |
| 6 | 2100001 | 1 | 26100001 | 1 |
| 7 | 2100001 | 1 | 26100003 | 3 |
| 8 | 2100001 | 1 | 26100003 | 3 |
| 9 | 2100000 | 0 | 26100002 | 2 |
| 10 | 2100000 | 0 | 26100002 | 2 |
| 15 | 2100001 | 1 | 26100005 | 5 |
| 20 | 2100001 | 1 | 26100008 | 8 |
| 30 | 2100001 | 1 | 26100008 | 8 |
| 40 | 2100001 | 1 | 26100008 | 8 |
| 50 | 2100001 | 1 | 26100008 | 8 |
| 60 | 2100001 | 1 | 26100008 | 8 |

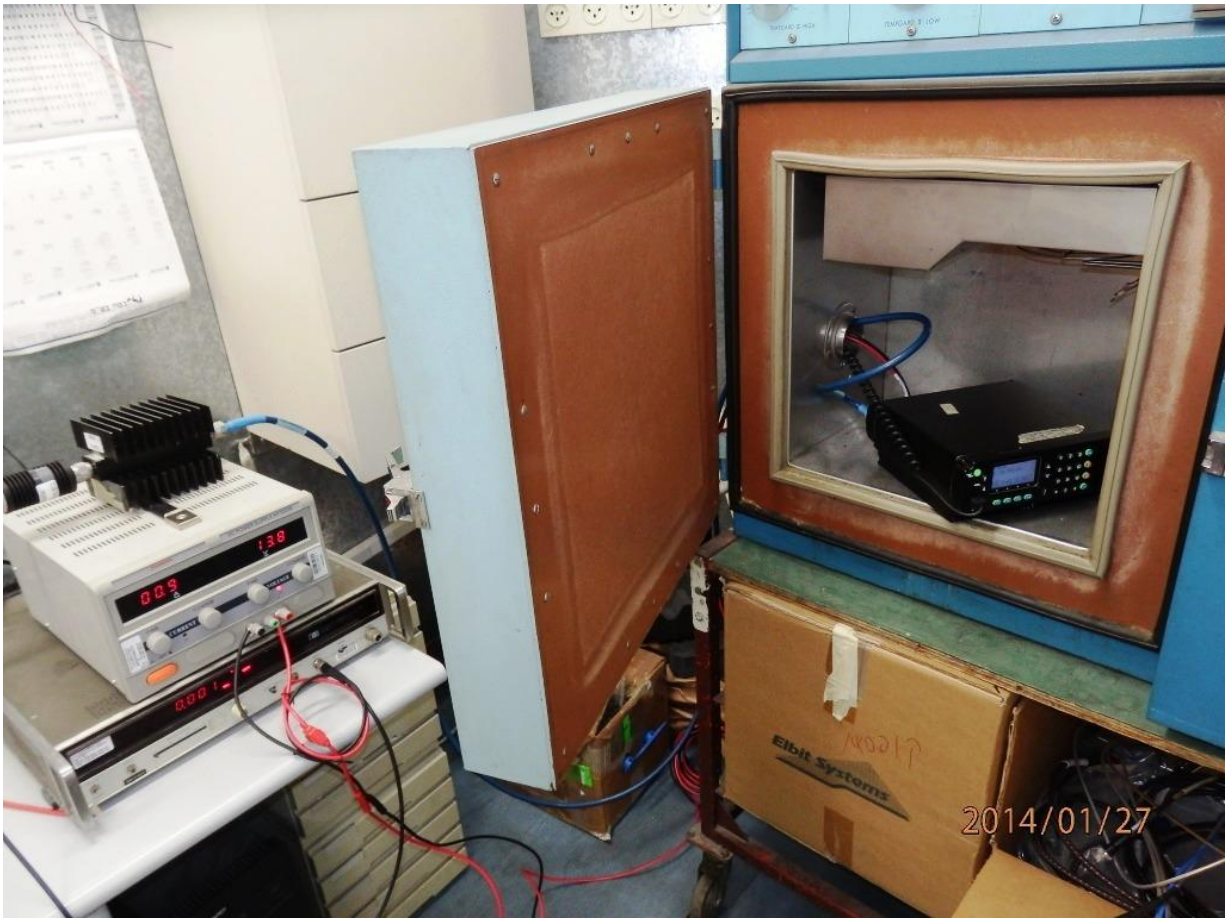
*Table 18: Test Results for Primary Supply Voltage*

| Tested Frequencies: 2.1MHz and 26.1MHz | | | | | |
|---|---|---|---|---|---|
| Tx Mode: A1A (CW) | | | | | |
| **Voltage Variation [%]** | **Supply Voltage [V]** | **Frequency [Hz]** | **Frequency Drift [Hz]** | **Frequency [Hz]** | **Frequency Drift [Hz]** |
| -15 | 10.2 | 2100000 | 0 | 26099997 | -3 |
| -10 | 10.8 | 2100000 | 0 | 26099992 | -8 |
| -5 | 11.4 | 2100000 | 0 | 26099991 | -9 |
| 0 | 12.0 | 2100000 | 0 | 26099991 | -9 |
| 5 | 12.6 | 2100000 | 0 | 26099991 | -9 |
| 10 | 13.2 | 2100000 | 0 | 26099991 | -9 |
| 15 | 13.8 | 2100000 | 0 | 26099991 | -9 |

*Table 19: Test Results For Temperature*

| Tested Frequencies: 2.1MHz and 26.1MHz | | | | |
|---|---|---|---|---|
| Tx Mode: A1A (CW) | | | | |
| Temterature (˚C) | Frequency [Hz] | Frequency Drift [Hz] | Frequency [Hz] | Frequency Drift [Hz] |
| -30 | 2100000 | 0 | 26099996 | -4 |
| -20 | 2099999 | -1 | 26099988 | -12 |
| -10 | 2099999 | -1 | 26099982 | -18 |
| 0 | 2099999 | -1 | 26099984 | -16 |
| 10 | 2099999 | -1 | 26099981 | -19 |
| 20 | 2100001 | 1 | 26099999 | -1 |
| 30 | 2100000 | 0 | 26100001 | 1 |
| 40 | 2100000 | 0 | 26100002 | 2 |
| 50 | 2100002 | 2 | 26100008 | 8 |

## 9.4. Setup Photographs for Frequency Stability




*Setup Photograph/ 1*

# 10. 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 |