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Report On

FCC Testing of the
Thrane & Thrane A/S TT-6366B
In accordance with FCC 47 CFR Part 80 and FCC 47 CFR Part 2

COMMERCIAL-IN-CONFIDENCE

FCC ID: ROJ6300B

Document 75929910 Report 01 Issue 1

December 2015



Product Service

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APPROVED BY

Nic Forsyth
Authorised Signatory

DATED

23 December 2015

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 80 and FCC 47 CFR Part 2. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

M Russell





Product Service

CONTENTS

Section	Page No
1	REPORT SUMMARY 3
1.1	Introduction 4
1.2	Brief Summary of Results 5
1.3	Application Form 6
1.4	Product Information 8
1.5	Test Conditions 8
1.6	Deviations from the Standard 8
1.7	Modification Record 8
2	TEST DETAILS 9
2.1	Bandwidths 10
2.2	Transmitter Frequency Tolerances 15
2.3	Spurious Emissions at Antenna Terminal 17
2.4	Radiated Spurious Emissions 33
2.5	Modulation Requirements 39
2.6	Transmitter Power 43
2.7	Suppression of Interference Aboard Ships 46
3	TEST EQUIPMENT USED 51
3.1	Test Equipment Used 52
3.2	Measurement Uncertainty 54
4	ACCREDITATION, DISCLAIMERS AND COPYRIGHT 55
4.1	Accreditation, Disclaimers and Copyright 56
ANNEX A	Customer Declarations A.2
ANNEX A	Software Declaration B.2



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SECTION 1

REPORT SUMMARY

FCC Testing of the
Thrane & Thrane A/S TT-6366B
In accordance with FCC 47 CFR Part 80 and FCC 47 CFR Part 2



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1.1 INTRODUCTION

The information contained in this report is intended to show the verification of FCC Testing of the Thrane & Thrane A/S TT-6366B to the requirements of FCC 47 CFR Part 80 and FCC 47 CFR Part 2.

Objective	To perform FCC Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Thrane & Thrane A/S
Model Number(s)	System: SAILOR 6311 MF/HF 150W DSC Class A - FCC Control Unit: TT-6301A (P/N 406301A) Antenna Tuning Unit: TT-6384B (P/N 406384B) Transceiver Unit: TT-6366B (P/N 406366B)
Serial Number(s)	System: Control Unit: 0901770177 Antenna Tuning Unit: 0000000001 Transceiver Unit: 0000000004
Number of Samples Tested	One System
Test Specification/Issue/Date	FCC 47 CFR Part 80 (2014) FCC 47 CFR Part 2 (2014)
Incoming Release Date	Application Form 24 November 2015
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	P2640_04-JHO 20 March 2015
Start of Test	24 November 2015
Finish of Test	27 November 2015
Name of Engineer(s)	M Russell



1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 80 and FCC 47 CFR Part 2 is shown below.

Section	Specification Clause		Test Description	Result	Comments/Base Standard
	Part 80	Part 2			
Transmit - Voice					
2.1	80.205	2.1049	Bandwidths	Pass	
2.2	80.209	2.1055	Transmitter Frequency Tolerances	Pass	
2.3	80.211	2.1051	Spurious Emissions at Antenna Terminal	Pass	
2.4	80.211	2.1051	Radiated Spurious Emissions	Pass	
2.5	80.213	2.1047	Modulation Requirements	Pass	
2.6	80.215	2.1046	Transmitter Power	Pass	
2.7	80.217 (b)	-	Suppression of Interference Aboard Ships	Pass	
Annex A	80.203	-	Authorisation of Transmitters for Licensing	-	Customer Declaration
Annex A	80.225	-	Requirements for Selective Calling Equipment	-	Customer Declaration



1.3 APPLICATION FORM

EQUIPMENT DESCRIPTION	
Model Name/Number	Thrane & Thrane A/S TT-6366B
Part Number	Transceiver Unit: SAILOR 6366 (P/N 406366B) Control Unit: SAILOR 6301 (P/N 406301A) Antenna Tuning Unit: SAILOR 6384 (P/N 406384B)
Hardware Version	
Software Version	2.07
FCC ID (if applicable)	ROJ6300B
Industry Canada ID (if applicable)	
Technical Description (Please provide a brief description of the intended use of the equipment)	150W MF/HF Transceiver DSC Class A Communication equipment designed for maritime applications.

POWER SOURCE	
☐ AC mains	State voltage
AC supply frequency (Hz)	
VAC	
Max Current	
Hz	
☐ Single phase	☐ Three phase
And / Or	
☒ External DC supply	
Nominal voltage	24 V Max Current 15 A
Extreme upper voltage	31.2 V
Extreme lower voltage	20.4 V
Battery	
☐ Nickel Cadmium	☐ Lead acid (Vehicle regulated)
☐ Alkaline	☐ Leclanche
☐ Lithium	☐ Other Details :
Volts nominal.	
End point voltage as quoted by equipment manufacturer	V

FREQUENCY INFORMATION	
Frequency Range	1.6 to 25.2 MHz
Channel Spacing (where applicable)	
Receiver Frequency Range (if different)	0.15 to 30 MHz
Channel Spacing (if different)	
Test Frequencies*	Bottom 2.182 MHz Channel Number (if applicable)
	Middle 8.291 MHz Channel Number (if applicable)
	Top 25.188 MHz Channel Number (if applicable)
Intermediate Frequencies	N/A (direct conversion) MHz
Highest Internally Generated Frequency :	98.304 MHz



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POWER CHARACTERISTICS			
Maximum TX power	150	W	
Minimum TX power	106	W (if variable)	
Is transmitter intended for :			
Continuous duty		☒ Yes	☐ No
Intermittent duty		☐ Yes	☐ No
If intermittent state DUTY CYCLE			
Transmitter ON		seconds	
Transmitter OFF		seconds	

ANTENNA CHARACTERISTICS			
☐	Antenna connector	State impedance	Ohm
☐	Temporary antenna connector	State impedance	Ohm
☐	Integral antenna Type	State impedance	dBi
☒	External antenna Type	monopole	State impedance 3 dBi dBi

MODULATION CHARACTERISTICS			
☒	Amplitude	☐	Frequency
☐	Phase	☐	Other (please provide details):
Can the transmitter operate un-modulated?			☒ Yes ☐ No

CLASS OF EMISSION USED	
ITU designation or Class of Emission:	
1	J3E
(if applicable) 2	J2B
(if applicable) 3	
If more than three classes of emission, list separately:	

BATTERY POWER SUPPLY	
Model name/number	Identification/Part number
Manufacturer	Country of Origin

ANCILLARIES (If applicable)	
Model name/number	Identification/Part number
Manufacturer	Country of Origin

EXTREME CONDITIONS			
Extreme test voltages (Max)	V	Extreme test voltages (Mix)	V
Nominal DC Voltage	V	DC Maximum Current	A
Maximum temperature	°C	Minimum temperature	°C

I hereby declare that I am entitled to sign on behalf of the applicant and that the information supplied is correct and complete.

Name: *Lasse Anker Knudsen*

Position held: *Project Manager* Date: *17/12-2015*

Lasse Anker Knudsen



Product Service

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Thrane & Thrane A/S TT-6366B. A full technical description can be found in the manufacturer's documentation.

1.5 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure.

The EUT was powered from a 24.0 V DC supply.

FCC Measurement Facility Registration Number
90987 Octagon House, Fareham Test Laboratory

1.6 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standard were made during testing.

1.7 MODIFICATION RECORD

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
Serial Number: 00000004			
0	As supplied by manufacturer.	N/A	N/A
1	Power increased by 0.4 dB on 25,188 kHz.	Erik Anderson	25/11/2015

The table above details modifications made to the EUT during the test programme. The modifications incorporated during each test are recorded on the appropriate test pages.



Product Service

SECTION 2

TEST DETAILS

FCC Testing of the
Thrane & Thrane A/S TT-6366B
In accordance with FCC 47 CFR Part 80 and FCC 47 CFR Part 2



2.1 BANDWIDTHS

2.1.1 Specification Reference

FCC 47 CFR Part 80, Clause 80.205
FCC 47 CFR Part 2, Clause 2.1049

2.1.2 Equipment Under Test and Modification State

TT-6366B - Modification State 1

S/N: System:

Control Unit: 0901770177

Antenna Tuning Unit: 0000000001

Transceiver Unit: 0000000004

2.1.3 Date of Test

25 November 2015

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.5 Test Procedure

This test was performed in accordance with FCC 47 CFR Part 2, clause 2.1049.

Remarks

The EUT was connected to a spectrum analyser via a cable and attenuator. Audio tones at 400 Hz and 1800 Hz as specified in clause 2.1049 (c)(2) with an amplitude of 650 mV which was 10dB greater than that necessary to produce rated PEP. The spectrum analyser detector was set to max hold using a peak detector and using the 99% occupied bandwidth function the occupied bandwidth was recorded.

2.1.6 Environmental Conditions

Ambient Temperature 23.9°C
Relative Humidity 33.8%

2.1.7 Test Results

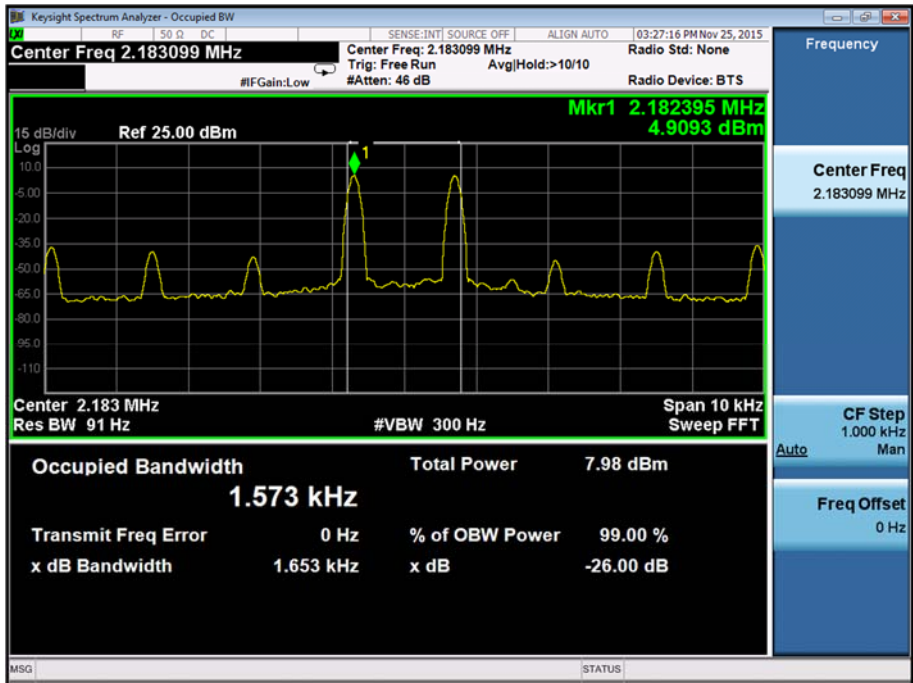
Transmit - Voice, Bandwidths Results

	2182 kHz	4125 kHz	6215 kHz	8291 kHz	12290 kHz	16420 kHz	25188 kHz
Authorised Bandwidth	3 kHz	3 kHz	3 kHz	3 kHz	3 kHz	3 kHz	3 kHz
Result (kHz)	1.573	1.573	1.579	1.575	1.577	1.575	1.576

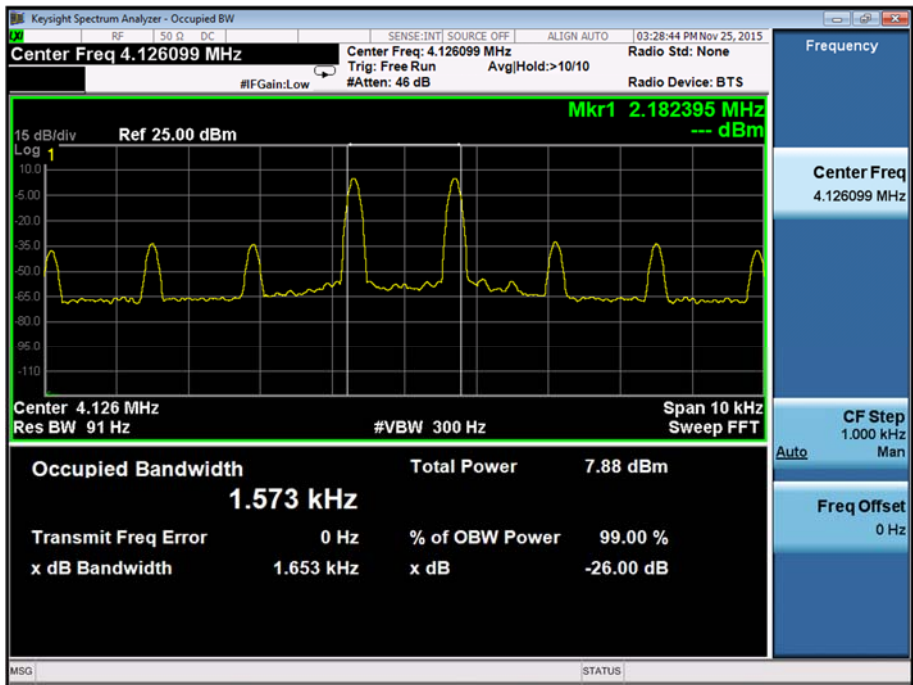


Product Service

Transmit - Voice, 2182 kHz, Bandwidths Plot



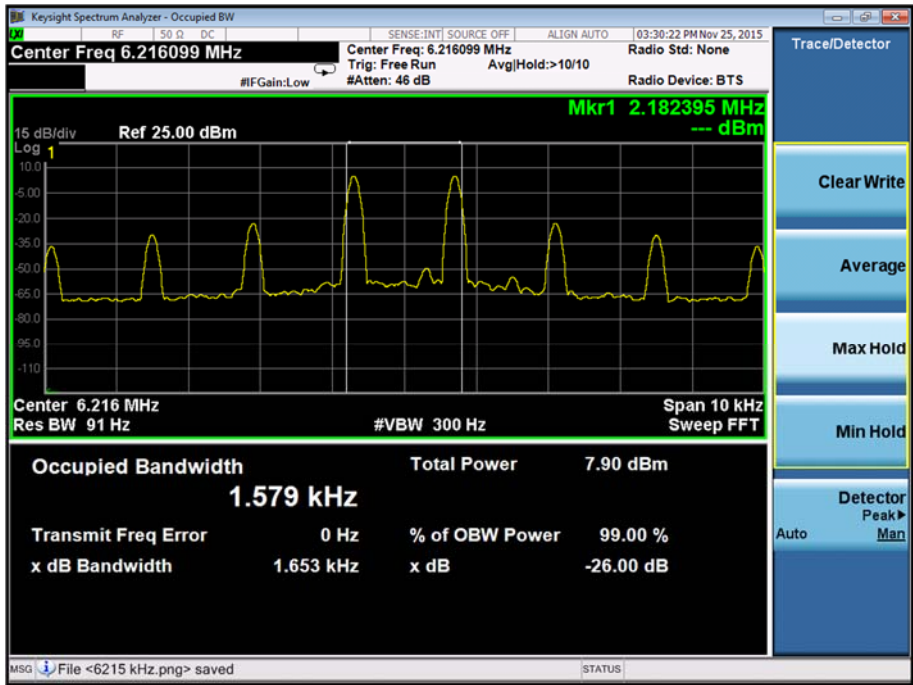
Transmit - Voice, 4125 kHz, Bandwidths Plot



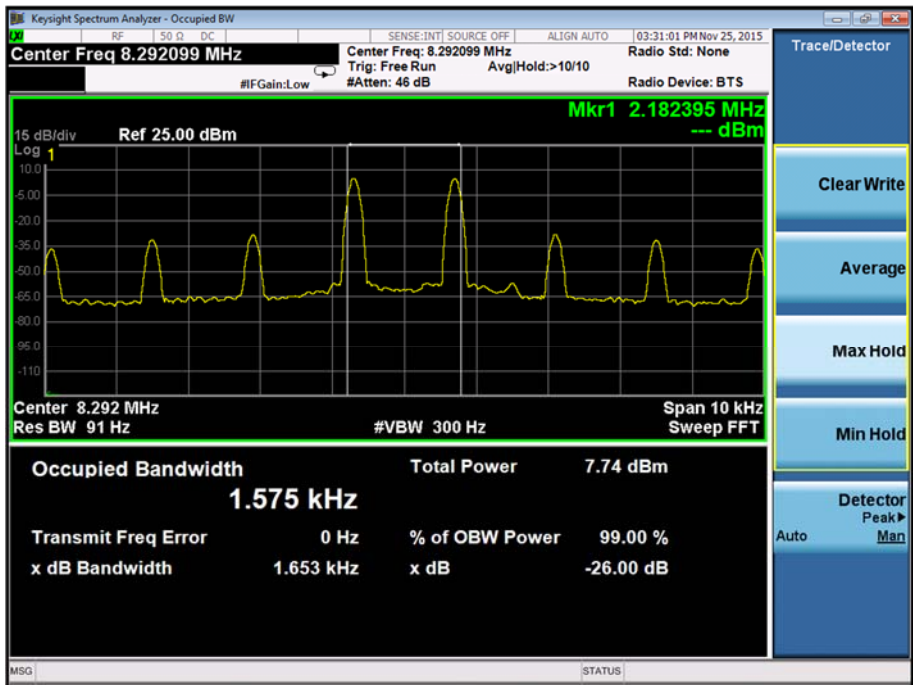


Product Service

Transmit - Voice, 6215 kHz, Bandwidths Plotw



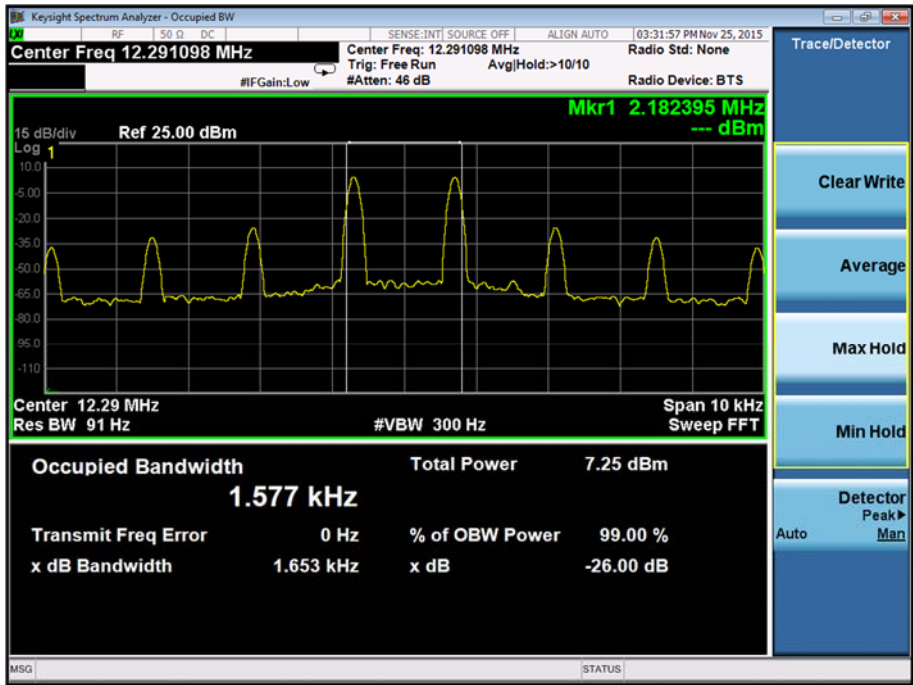
Transmit - Voice, 8291 kHz, Bandwidths Plot



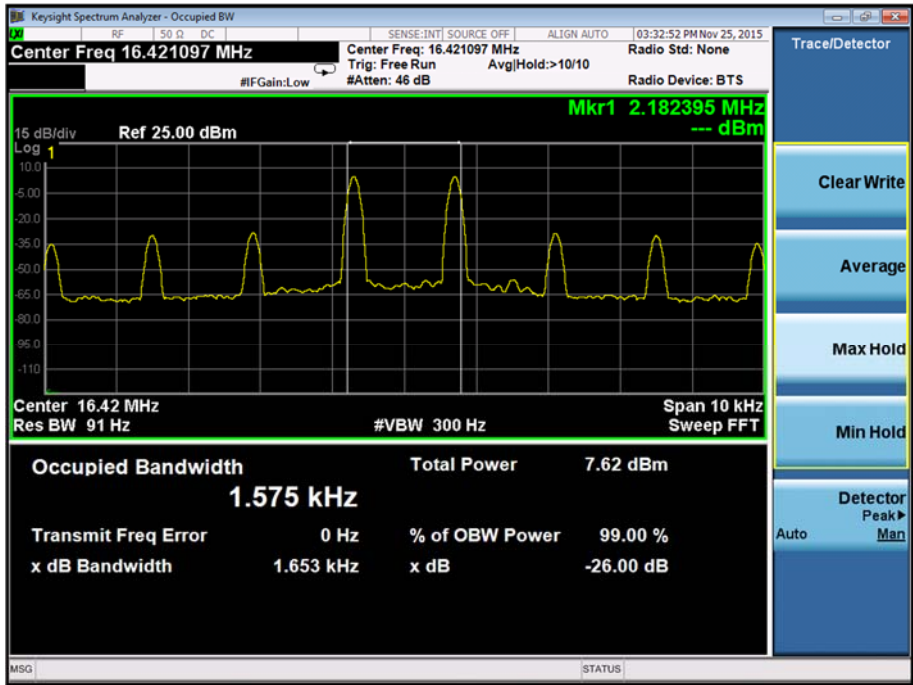


Product Service

Transmit - Voice, 12290 kHz, Bandwidths Plot



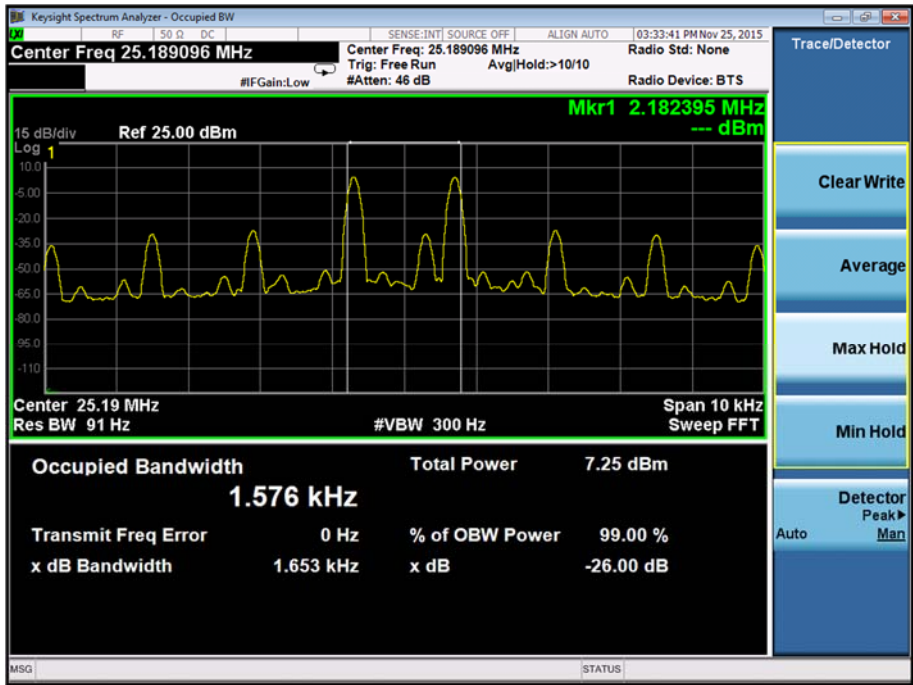
Transmit - Voice, 16420 kHz, Bandwidths Plot





Product Service

Transmit - Voice, 25188 kHz, Bandwidths Plot



FCC 47 CFR Part 80, Limit Clause 80.205

The nominal authorised channel bandwidth for voice is 3 kHz



2.2 TRANSMITTER FREQUENCY TOLERANCES

2.2.1 Specification Reference

FCC 47 CFR Part 80, Clause 80.209
FCC 47 CFR Part 2, Clause 2.1055

2.2.2 Equipment Under Test and Modification State

TT-6366B - Modification State 1

S/N: System:

Control Unit: 0901770177

Antenna Tuning Unit: 0000000001

Transceiver Unit: 0000000004

2.2.3 Date of Test

25 November 2015, 26 November 2015 & 27 November 2015

2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.5 Test Procedure

This test was performed in accordance with measurement requirements of FCC 47 CFR Part 2, clause 2.1055.

Remarks

For measurements of frequency stability under voltage variations, the EUT was placed inside a temperature chamber and the temperature was lowered to -20 degrees. After a suitable period of time for thermal stabilisation the measurement the EUT was powered from a cold start and the frequency measured within 1 minute. The frequency stability was monitored for a further 10 minutes and the result recorded below. The EUT was then powered off and the temperature increased in 10 degree steps up to a maximum temperature of 50 degrees.

A 1 kHz audio tone at an input level of 650 mV was applied to generate a single tone at an offset of 1 kHz from the nominal frequency. The limit was then compared to 25,189 kHz to ensure compliance. The manufacturer states that the frequency control is identical for all channels therefore only a single channel was measured. The highest operating frequency provides the highest frequency error results. Therefore measurements were performed on the highest operating band only.

2.2.6 Environmental Conditions

Ambient Temperature	23.1°C
Relative Humidity	40.8%



Product Service

2.2.7 Test Results

Temperature °C	Fundamental Measured Frequency (kHz)
-20	25189.003457
-10	25189.004709
0	25189.003849
+10	25189.002720
+20	25189.000671
+30	25188.997048
+40	25188.996264
+50	25188.997732

Transmit - Voice, 25188 kHz, Transmitter Frequency Tolerance Under Voltage Variations Results

Voltage	Fundamental Measured Frequency (kHz)
20.4 V DC	25188.996732
27.6 V DC	25188.996726

FCC 47 CFR Part 80, Limit Clause 80.209

± 20 Hz



2.3 SPURIOUS EMISSIONS AT ANTENNA TERMINAL

2.3.1 Specification Reference

FCC 47 CFR Part 80, Clause 80.211
FCC 47 CFR Part 2, Clause 2.1051

2.3.2 Equipment Under Test and Modification State

TT-6366B - Modification State 1

S/N: System:

Control Unit: 0901770177

Antenna Tuning Unit: 0000000001

Transceiver Unit: 0000000004

2.3.3 Date of Test

24 November 2015 & 25 November 2015

2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.5 Test Procedure

This test was performed in accordance with FCC 47 CFR Part 2, clause 2.1051.

Remarks

The EUT was connected to a spectrum analyser via a cable and attenuator. The path loss was measured using a vector network analyser for frequencies greater than 10 MHz and a signal generator/spectrum analyser for frequencies less than 10 MHz. The appropriate offset was entered as an offset in the analyser.

For measurements within 250% of the authorized bandwidth the reference level was set as the observed peak envelope power on the spectrum analyser (3 dB higher than the mean value of the emission).

For measurement of harmonic frequencies, a resolution bandwidth of 300 Hz RBW was chosen so that the mean value of the individual tones and intermodulation products could be measured. The RBW was increased to improve the sweep time where required as a worst case result. These products are discrete in bandwidth and therefore this choice of bandwidth was seen as appropriate. A peak detector and max hold settings were used to obtain a worst case result.

2.3.6 Environmental Conditions

Ambient Temperature 24.0°C

Relative Humidity 34.4%



Product Service

2.3.7 Test Results

FCC 47 CFR Part 80, Limit Clause 80.211

Emission Mask

On any frequency removed from the assigned frequency by more than 50 % up to and including 150 % of the authorized bandwidth: At least 28 dB

On any frequency removed from the assigned frequency by more than 150 % up to and including 250 % of the authorized bandwidth: At least 35 dB

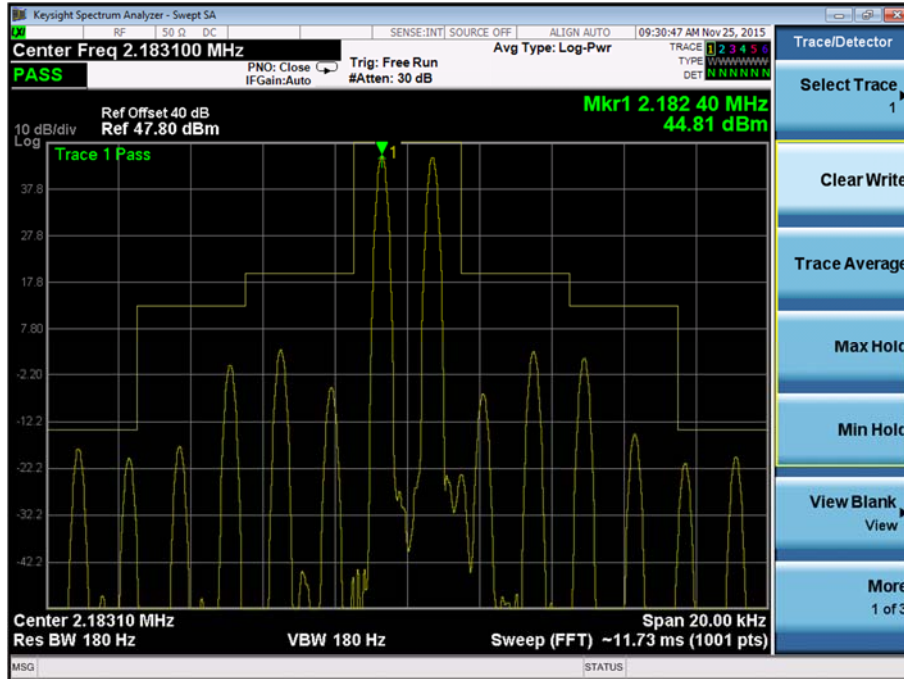
Outside the Emission Mask

>250 % of authorised bandwidth $43+10 \log P$ OR -13 dBm
24.0 V DC Supply

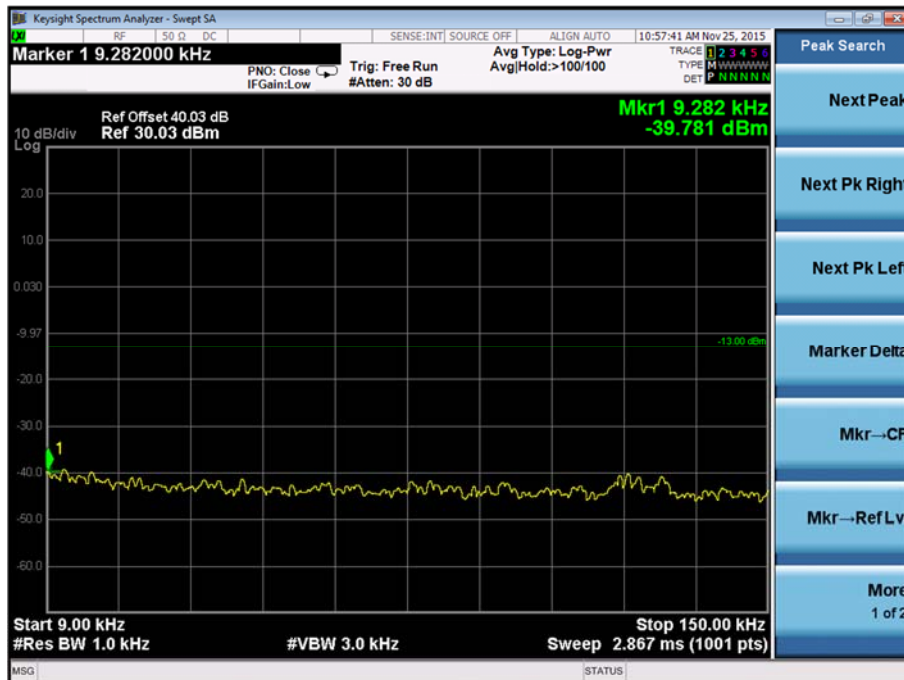


Product Service

Transmit - Voice, 2182 kHz, Emission Mask, Spurious Emissions at Antenna Terminal Plot



Transmit - Voice, 2182 kHz, 9 kHz to 150 kHz, Spurious Emissions at Antenna Terminal Plot



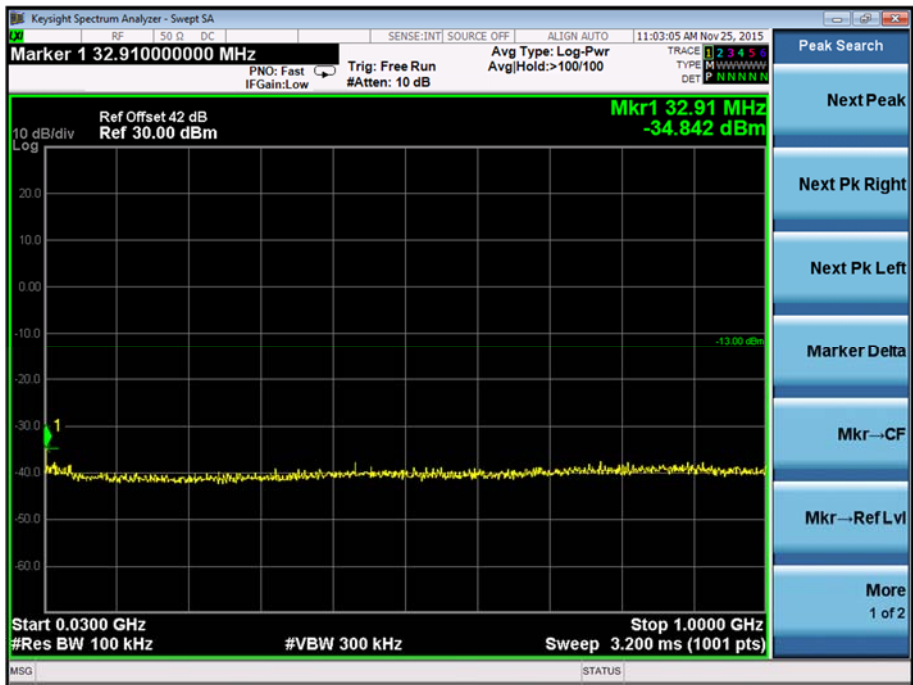


Product Service

Transmit - Voice, 2182 kHz, 150 kHz to 30 MHz, Spurious Emissions at Antenna Terminal Plot



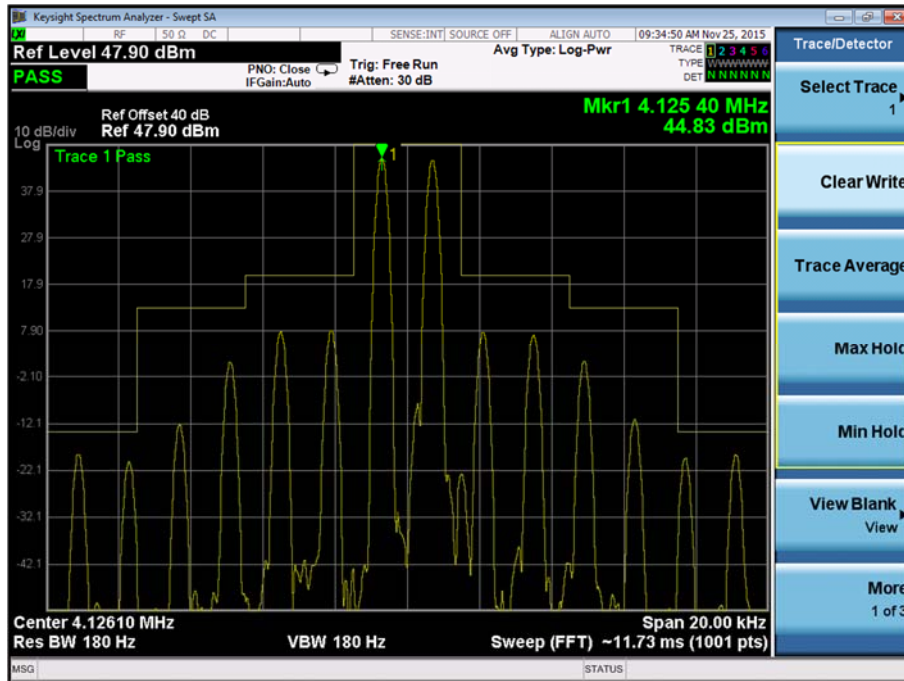
Transmit - Voice, 2182 kHz, 30 MHz to 1 GHz, Spurious Emissions at Antenna Terminal Plot





Product Service

Transmit - Voice, 4125 kHz, Emission Mask, Spurious Emissions at Antenna Terminal Plot



Transmit - Voice, 4125 kHz, 9 kHz to 150 kHz, Spurious Emissions at Antenna Terminal Plot



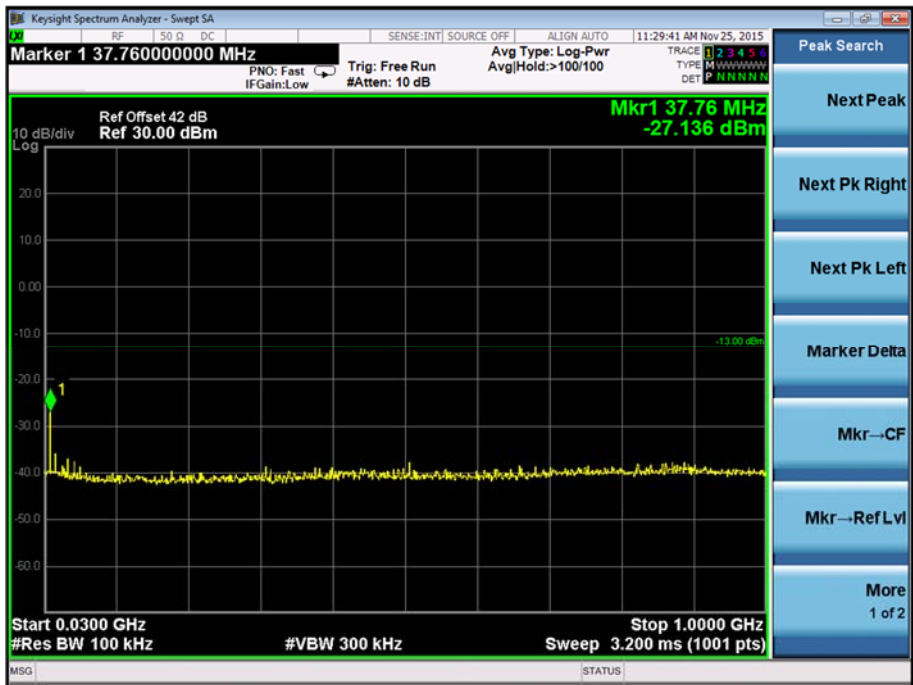


Product Service

Transmit - Voice, 4125 kHz, 150 kHz to 30 MHz, Spurious Emissions at Antenna Terminal Plot



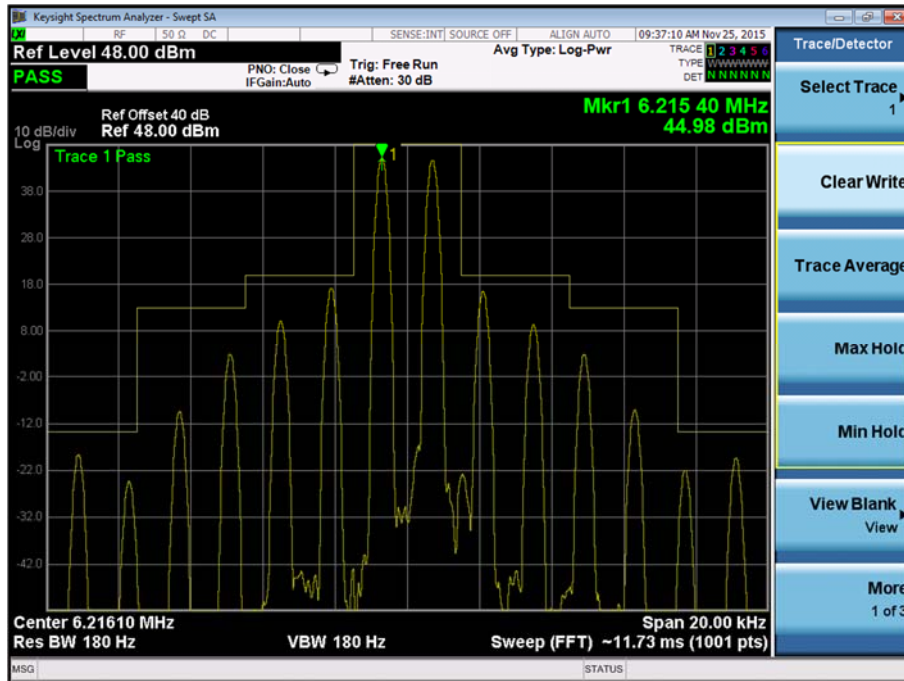
Transmit - Voice, 4125 kHz, 30 MHz to 1 GHz, Spurious Emissions at Antenna Terminal Plot



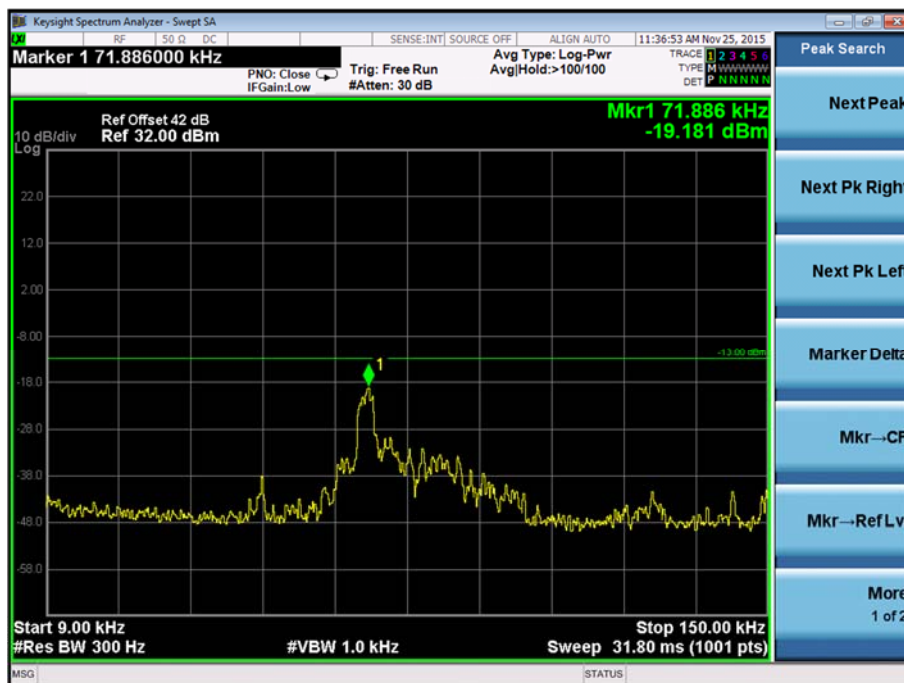


Product Service

Transmit - Voice, 6215 kHz, Emission Mask, Spurious Emissions at Antenna Terminal Plot



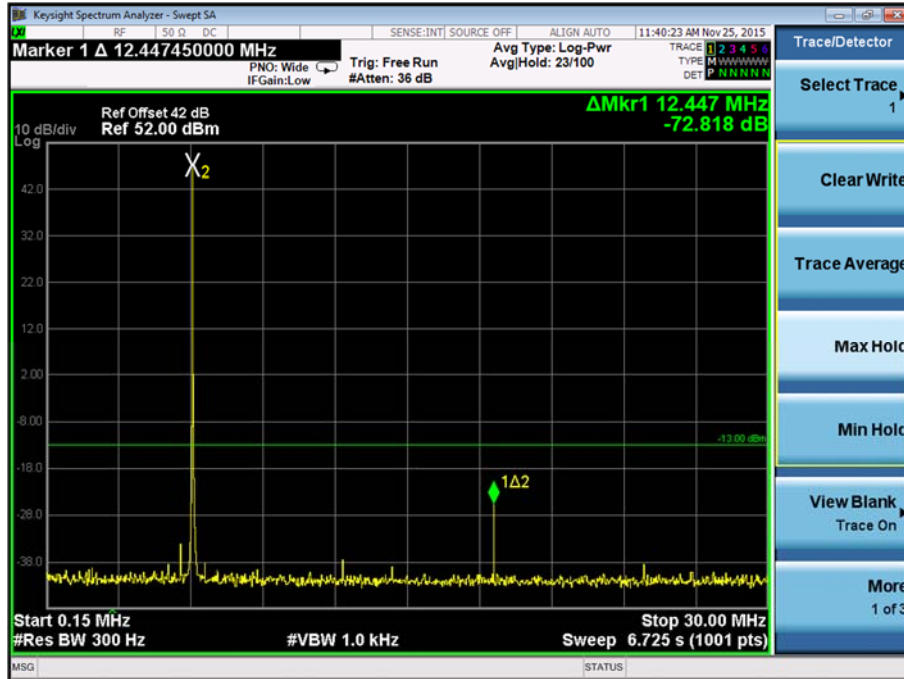
Transmit - Voice, 6215 kHz, 9 kHz to 150 kHz, Spurious Emissions at Antenna Terminal Plot



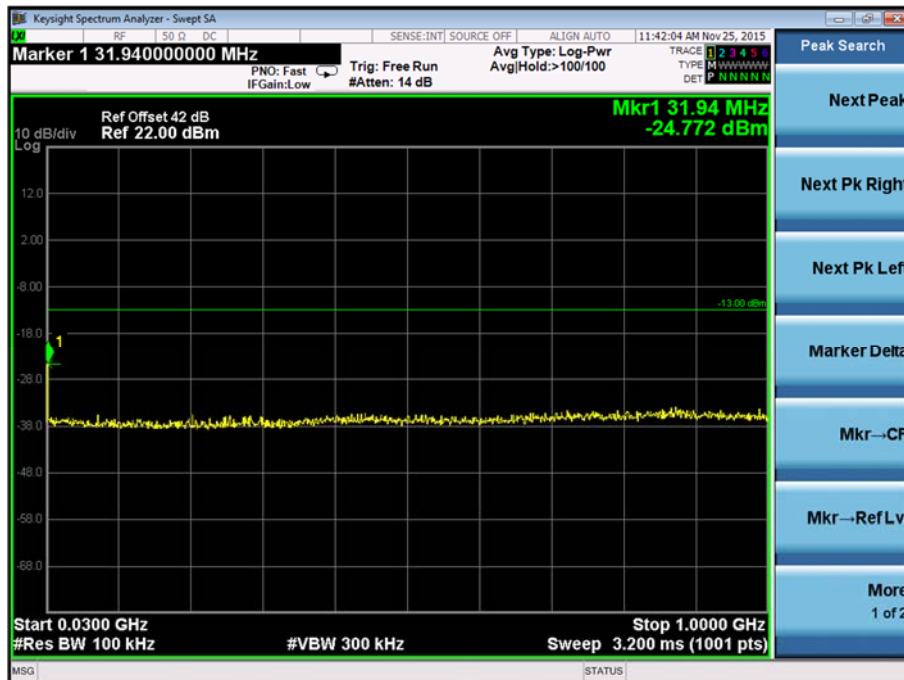


Product Service

Transmit - Voice, 6215 kHz, 150 kHz to 30 MHz, Spurious Emissions at Antenna Terminal Plot



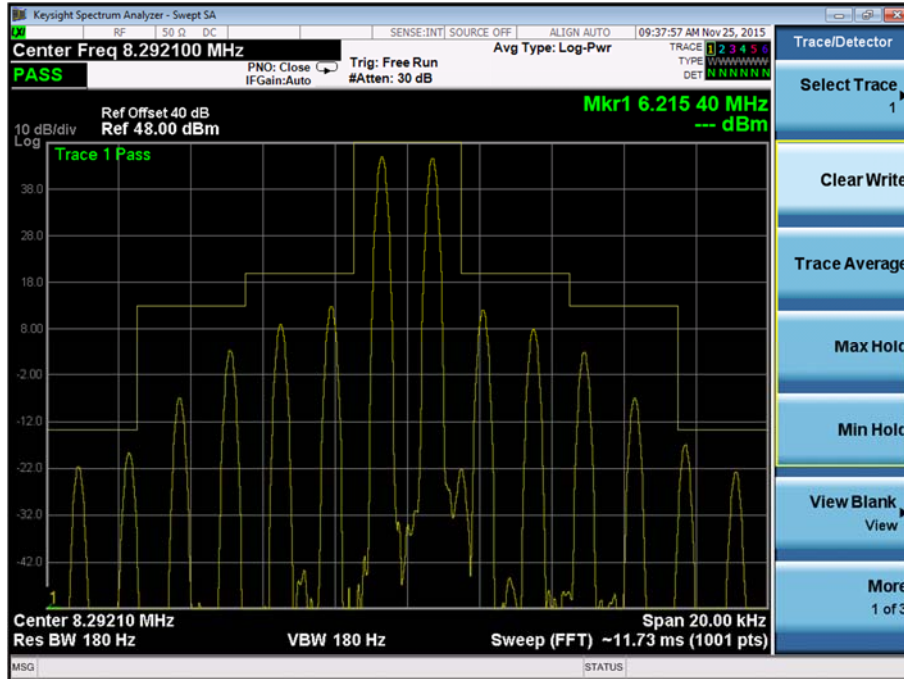
Transmit - Voice, 6215 kHz, 30 MHz to 1 GHz, Spurious Emissions at Antenna Terminal Plot





Product Service

Transmit - Voice, 8291 kHz, Emission Mask, Spurious Emissions at Antenna Terminal Plot



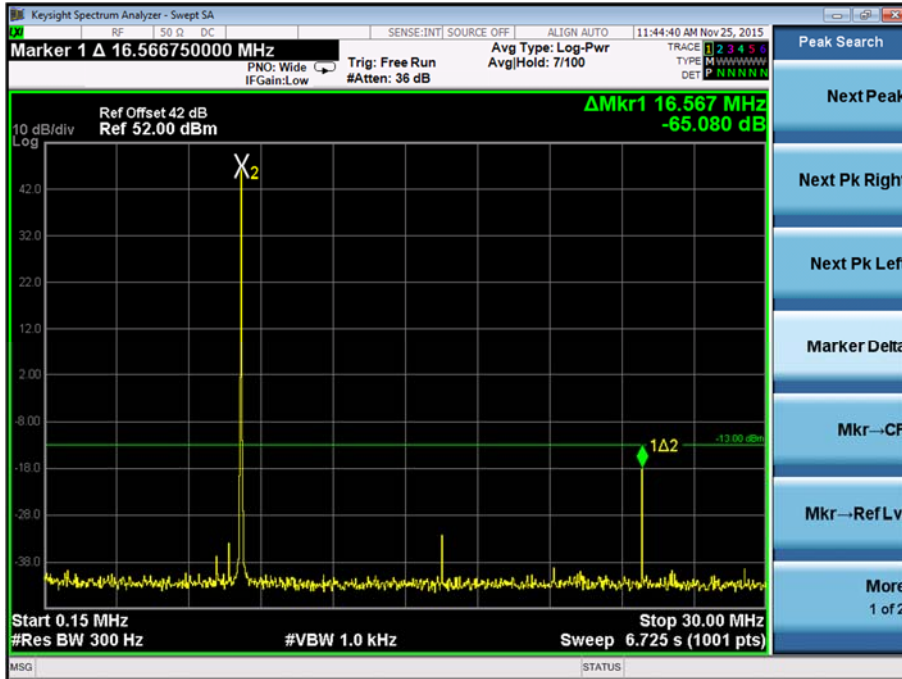
Transmit - Voice, 8291 kHz, 9 kHz to 150 kHz, Spurious Emissions at Antenna Terminal Plot



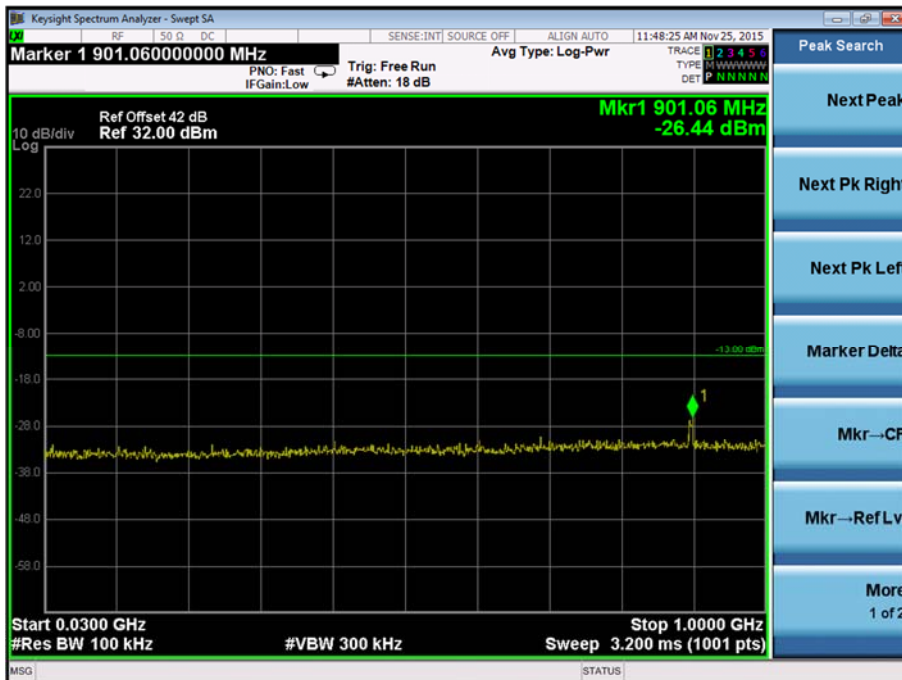


Product Service

Transmit - Voice, 8291 kHz, 150 kHz to 30 MHz, Spurious Emissions at Antenna Terminal Plot

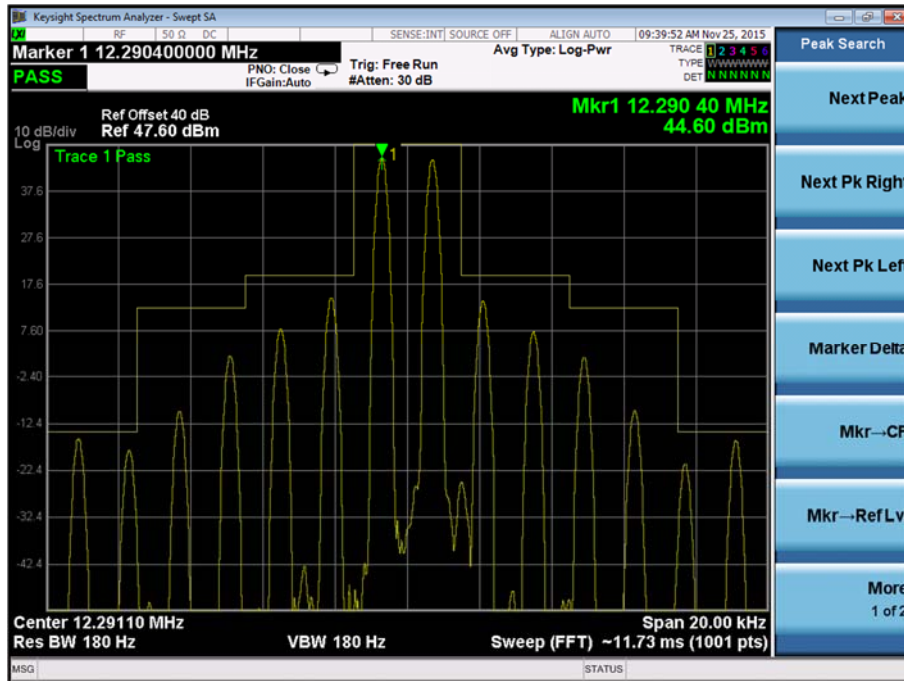


Transmit - Voice, 8291 kHz, 30 MHz to 1 GHz, Spurious Emissions at Antenna Terminal Plot





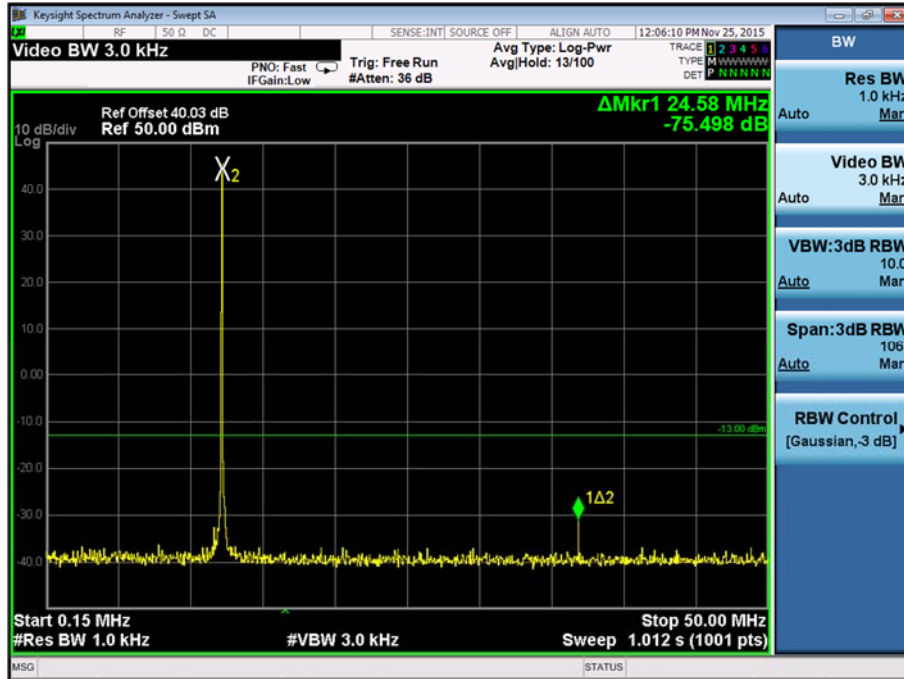
Product Service

Transmit - Voice, 12290 kHz, Emission Mask, Spurious Emissions at Antenna Terminal PlotTransmit - Voice, 12290 kHz, 9 kHz to 150 kHz, Spurious Emissions at Antenna Terminal Plot



Product Service

Transmit - Voice, 12290 kHz, 150 kHz to 50 MHz, Spurious Emissions at Antenna Terminal Plot

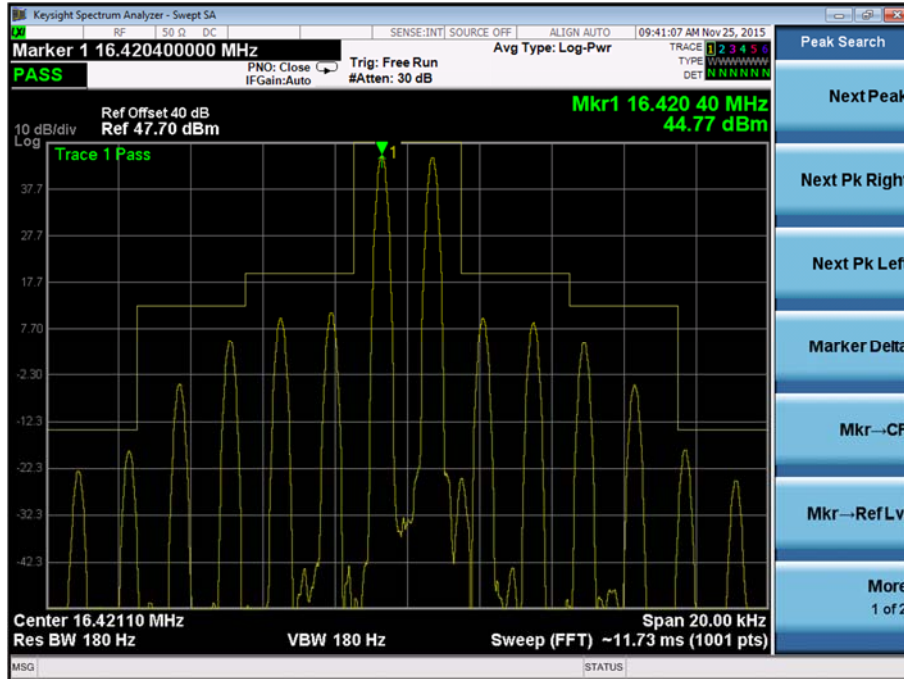


Transmit - Voice, 12290 kHz, 50 MHz to 1 GHz, Spurious Emissions at Antenna Terminal Plot





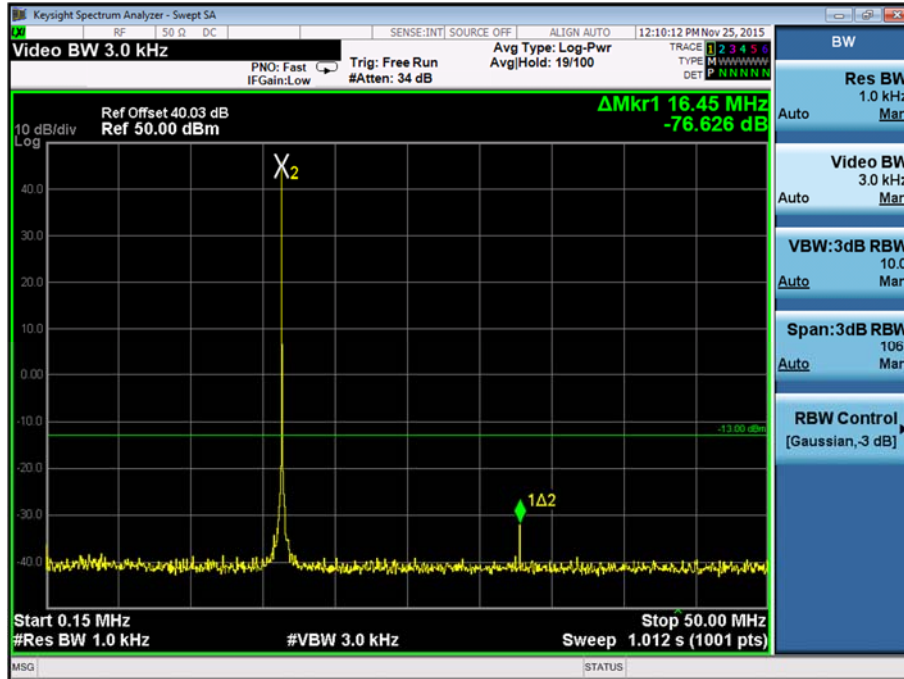
Product Service

Transmit - Voice, 16420 kHz, Emission Mask, Spurious Emissions at Antenna Terminal PlotTransmit - Voice, 16420 kHz, 9 kHz to 150 kHz, Spurious Emissions at Antenna Terminal Plot



Product Service

Transmit - Voice, 16420 kHz, 150 kHz to 50 MHz, Spurious Emissions at Antenna Terminal Plot



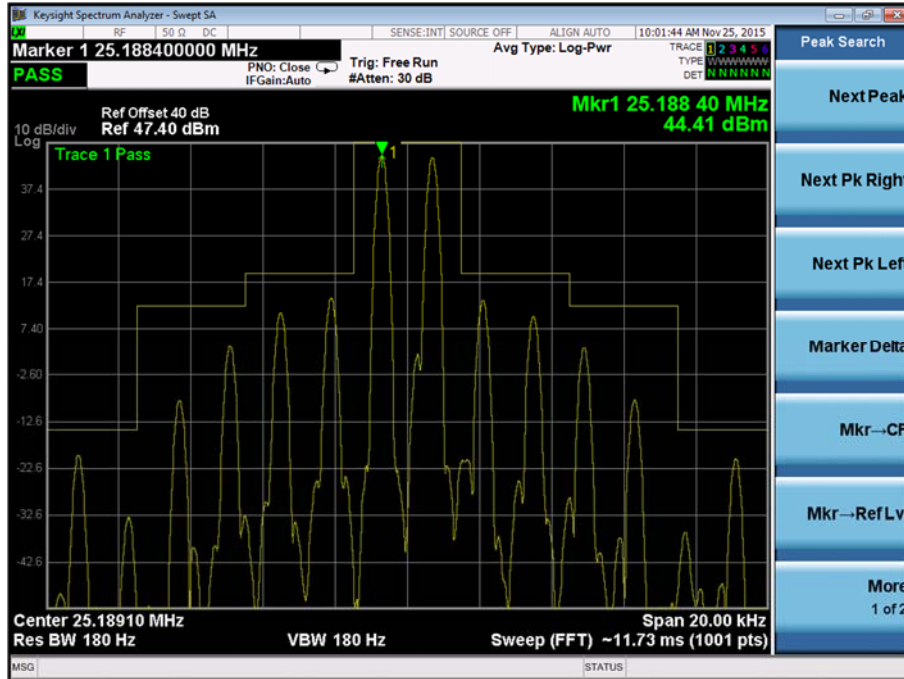
Transmit - Voice, 16420 kHz, 50 MHz to 1 GHz, Spurious Emissions at Antenna Terminal Plot





Product Service

Transmit - Voice, 25188 kHz, Emission Mask, Spurious Emissions at Antenna Terminal Plot



Transmit - Voice, 25188 kHz, 9 kHz to 150 kHz, Spurious Emissions at Antenna Terminal Plot





Product Service

2.4 RADIATED SPURIOUS EMISSIONS**2.4.1 Specification Reference**

FCC 47 CFR Part 80, Clause 80.211
FCC 47 CFR Part 2, Clause 2.1051

2.4.2 Equipment Under Test and Modification State

TT-6366B - Modification State 0

S/N: System:

Control Unit: 0901770177

Antenna Tuning Unit: 0000000001

Transceiver Unit: 0000000004

2.4.3 Date of Test

24 November 2015

2.4.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.5 Test Procedure

The test was performed in accordance with the measurement procedures of ANSI C63.4, clause 8.

2.4.6 Environmental Conditions

Ambient Temperature	20.6°C
Relative Humidity	34.0%



Product Service

2.4.7 Test Results

FCC 47 CFR Part 80, Limit Clause 80.211

Emission Mask

On any frequency removed from the assigned frequency by more than 50 % up to and including 150 % of the authorized bandwidth: At least 28 dB

On any frequency removed from the assigned frequency by more than 150 % up to and including 250 % of the authorized bandwidth: At least 35 dB

Outside the Emission Mask

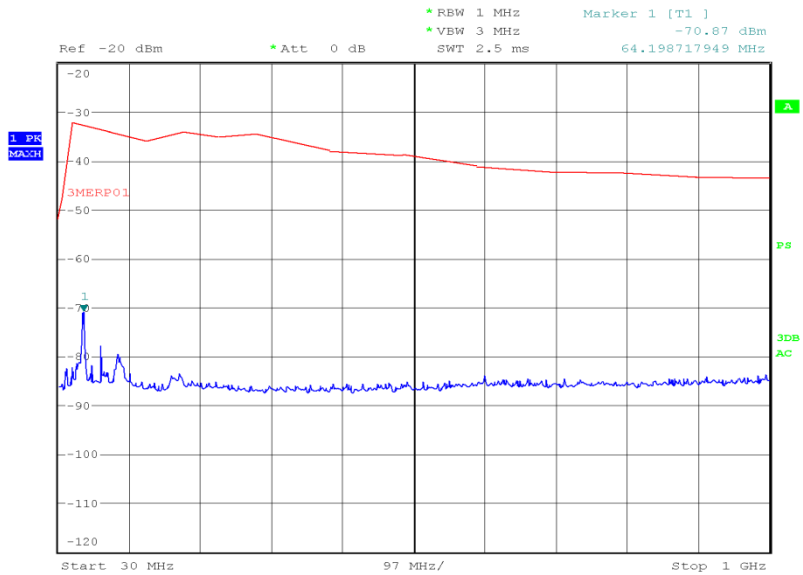
>250 % of authorised bandwidth $43+10 \log P$ OR -13 dBm

24.0 V DC Supply



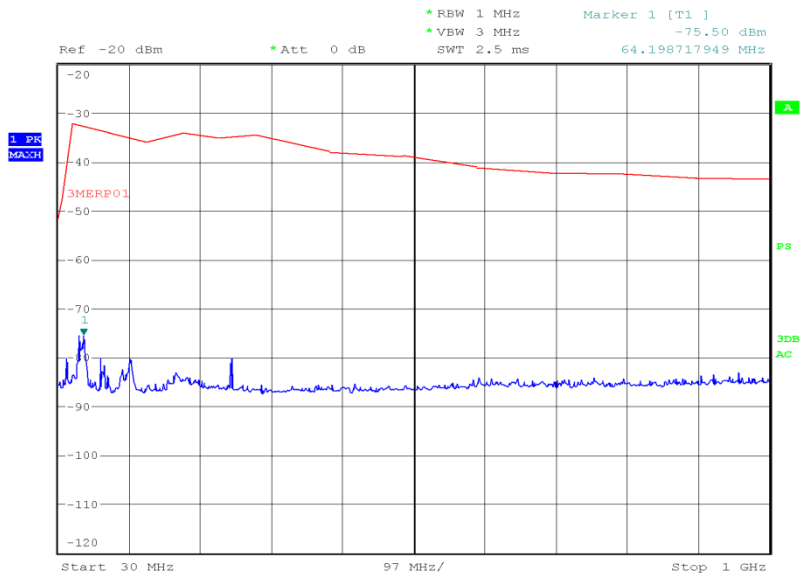
Product Service

Transmit - Voice, 2182 kHz, 30 MHz to 1 GHz, Radiated Spurious Emissions Plot



Date: 24.NOV.2015 20:14:52

Transmit - Voice, 4125 kHz, 30 MHz to 1 GHz, Radiated Spurious Emissions Plot

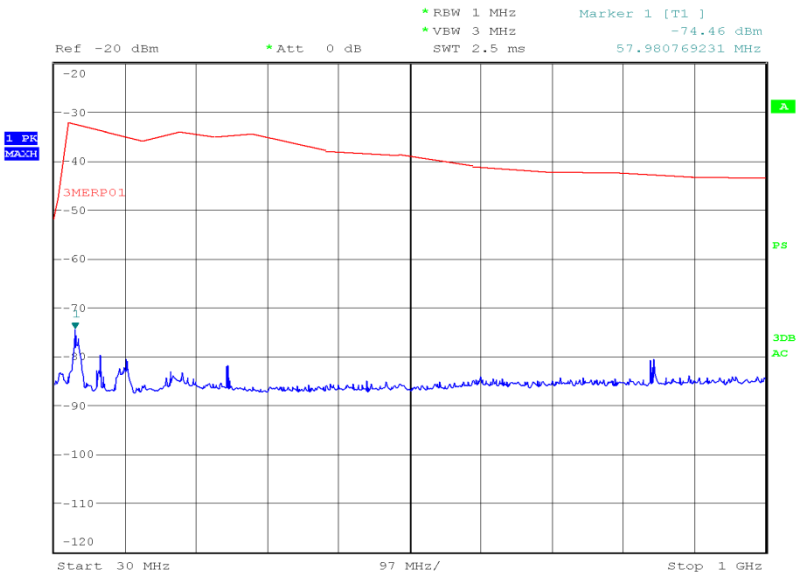


Date: 24.NOV.2015 17:43:04



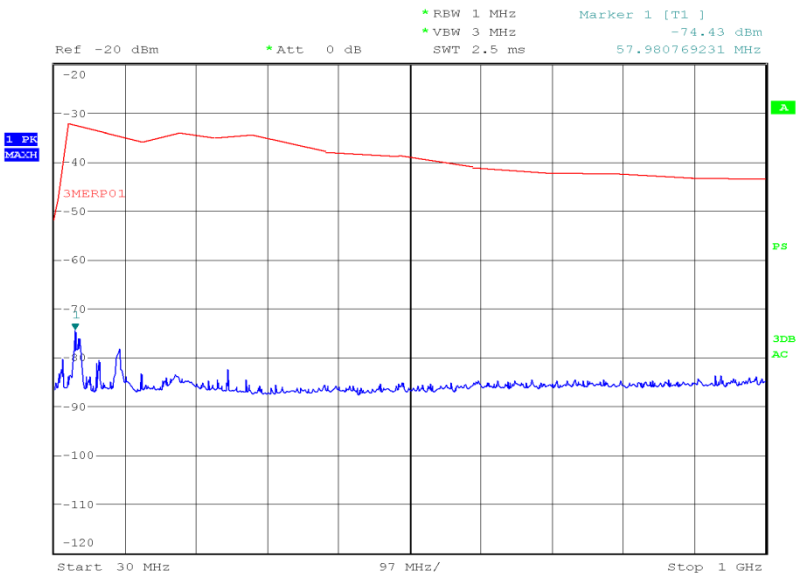
Product Service

Transmit - Voice, 6215 kHz, 30 MHz to 1 GHz, Radiated Spurious Emissions Plot



Date: 24.NOV.2015 17:53:45

Transmit - Voice, 8291 kHz, 30 MHz to 1 GHz, Radiated Spurious Emissions Plot

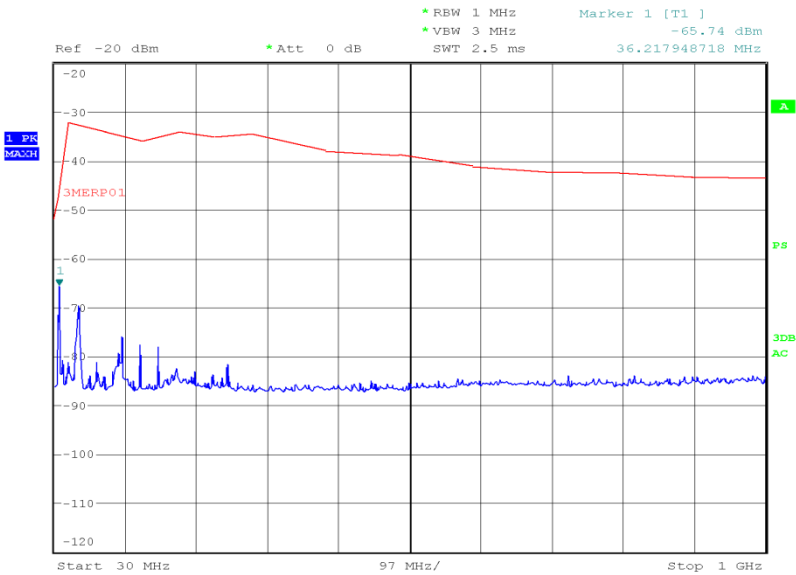


Date: 24.NOV.2015 18:06:20



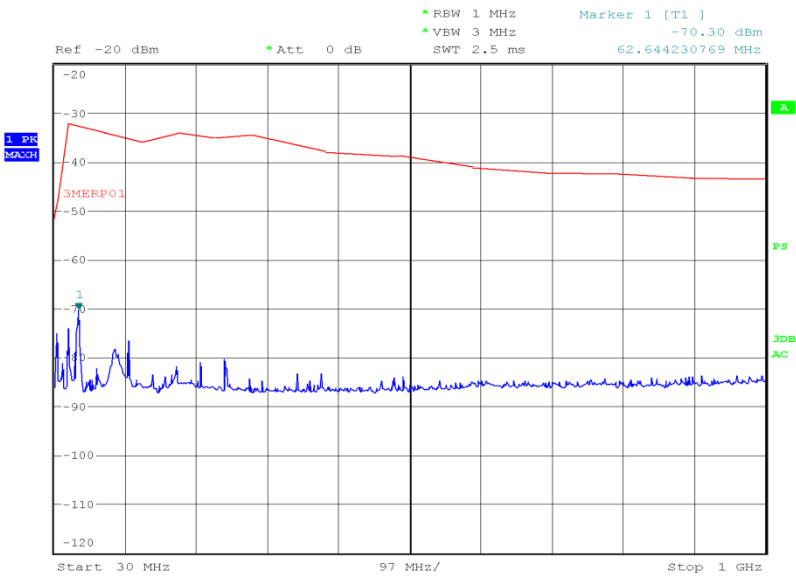
Product Service

Transmit - Voice, 12290 kHz, 30 MHz to 1 GHz, Radiated Spurious Emissions Plot



Date: 24.NOV.2015 18:35:09

Transmit - Voice, 16420 kHz, 30 MHz to 1 GHz, Radiated Spurious Emissions Plot

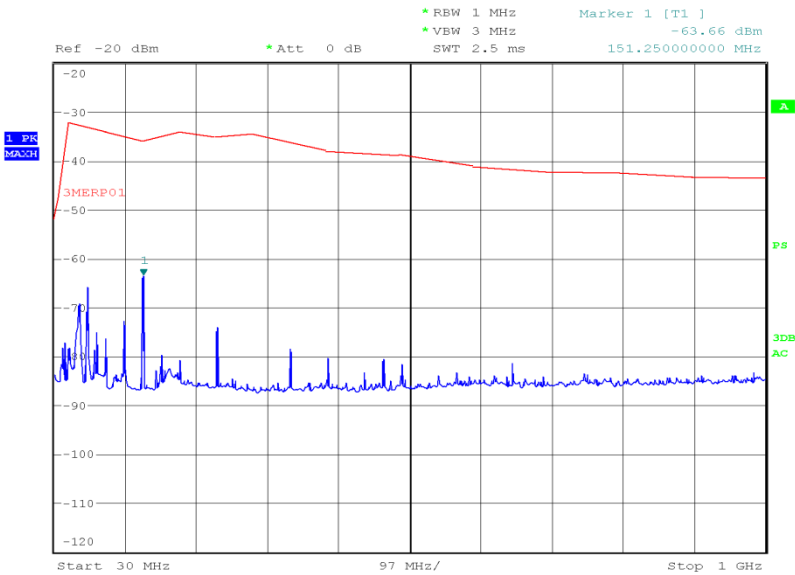


Date: 24.NOV.2015 18:48:27



Product Service

Transmit - Voice, 25188 kHz, 30 MHz to 1 GHz, Radiated Spurious Emissions Plot



Date: 24.NOV.2015 19:40:31



Product Service

2.5 MODULATION REQUIREMENTS

2.5.1 Specification Reference

FCC 47 CFR Part 80, Clause 80.213
FCC 47 CFR Part 2, Clause 2.1047

2.5.2 Equipment Under Test and Modification State

TT-6366B - Modification State 1

S/N: System:

Control Unit: 0901770177

Antenna Tuning Unit: 0000000001

Transceiver Unit: 0000000004

2.5.3 Date of Test

25 November 2015

2.5.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.5.5 Test Procedure

The EUT was connected to a spectrum analyser via a cable and attenuator. For all measurements the EUT was set to a frequency of 8291 kHz at the low power setting.

Audio Frequency Response

Measurement were made relative to the carrier power with an audio tone of 1 kHz with an amplitude of 25 mV. The audio frequency was varied in 100 Hz steps from 100 Hz to 5 kHz.

From 3.3 kHz upwards there was no significant change in audio power therefore this is not shown on the plot.

Modulation Limiting Capability

Measurements were made relative to a single 1 kHz audio tone at an amplitude of 25 mV. The amplitude was then increased in 6 dB steps to prove that the EUT utilises a modulation limiting filter.

Further results can be obtained from the reports required for MED approval.

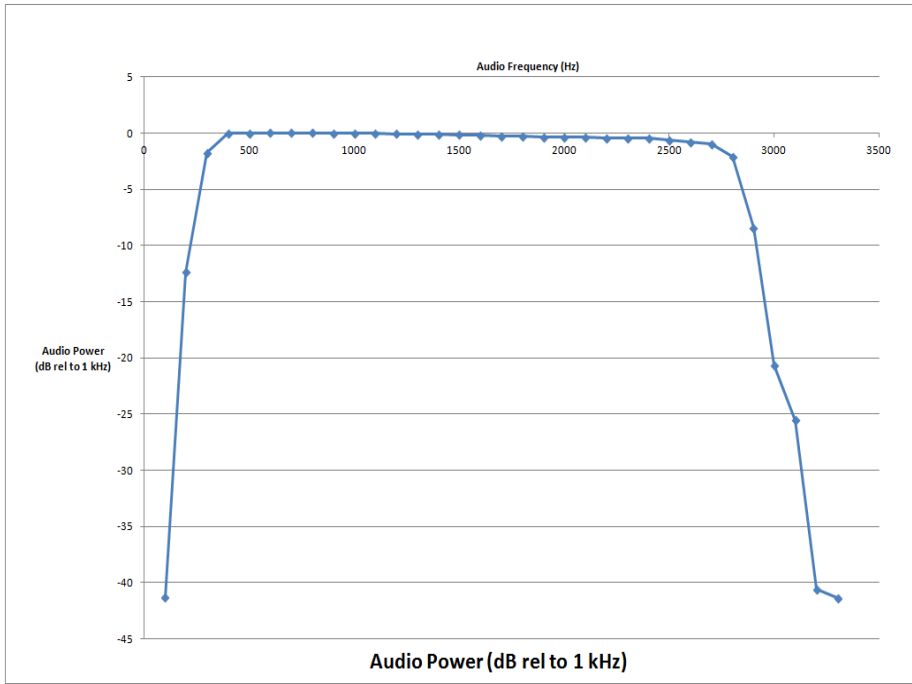
2.5.6 Environmental Conditions

Ambient Temperature	23.1°C
Relative Humidity	34.3%

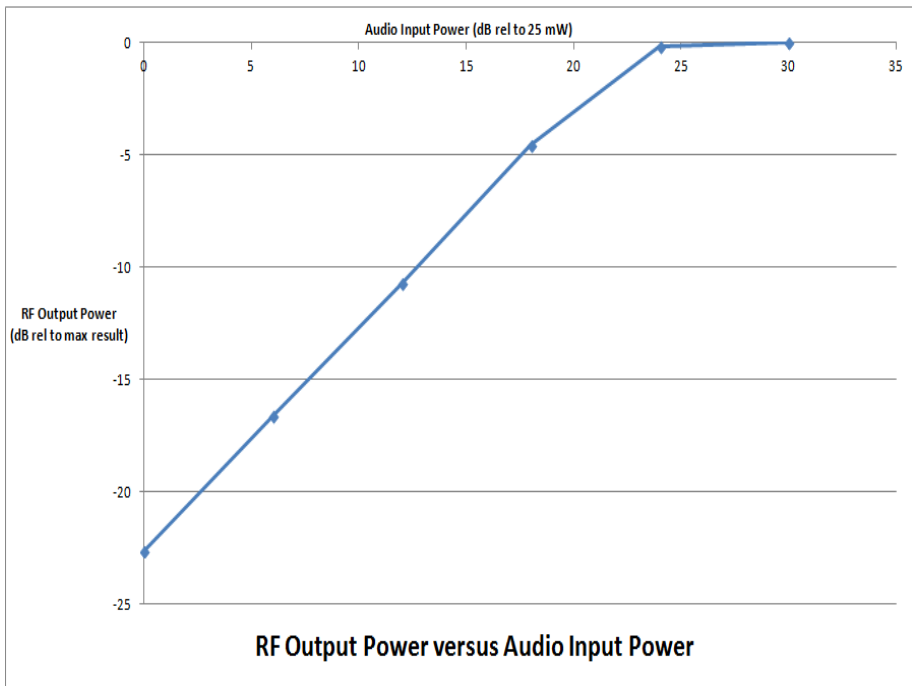


2.5.7 Test Results

Transmit - Voice, 8291 kHz, Frequency Response, Modulation Requirement Plot



Transmit - Voice, 8291 kHz, Modulation Limiting Capability, Modulation Requirement Plot





Product Service



Product Service

FCC 47 CFR Part 80, Limit Clause 80.213

Radiotelephone transmitters using A3E, F3E and G3E emission must have a modulation limiter to prevent any modulation over 100 percent.

FCC 47 CFR Part 2, Limit Clause 2.1047

Voice modulated communication equipment. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.

Equipment which employs modulation limiting. A curve or family of curves showing the percentage of modulation versus the modulation input voltage shall be supplied. The information submitted shall be sufficient to show modulation limiting capability throughout the range of modulating frequencies and input modulating signal levels employed.



Product Service

2.6 TRANSMITTER POWER**2.6.1 Specification Reference**

FCC 47 CFR Part 80, Clause 80.215
FCC 47 CFR Part 2, Clause 2.1046

2.6.2 Equipment Under Test and Modification State

TT-6366B - Modification State 1

S/N: System:

Control Unit: 0901770177

Antenna Tuning Unit: 0000000001

Transceiver Unit: 0000000004

2.6.3 Date of Test

25 November 2015

2.6.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.6.5 Test Procedure

This test was performed in accordance with FCC 47 CFR Part 2, clause 2.1046.

Remarks

The EUT was connected to a power meter sensor via the antenna switching unit. Audio tones at 400 Hz and 1800 Hz were input to the EUT at a level of 650 mV which was 10 dB greater than that necessary to produce rated PEP. The peak envelope power (PEP) was measured and recorded as per the tables below.

2.6.6 Environmental Conditions

Ambient Temperature	22.3°C
Relative Humidity	34.1%



2.6.7 Test Results

Transmit - Voice, 2182 kHz, Transmitter Power Results

Result (dBm)	Result (W)
50.98	125.3

Transmit - Voice, 4125 kHz, Transmitter Power Results

Result (dBm)	Result (W)
50.99	125.6

Transmit - Voice, 6215 kHz, Transmitter Power Results

Result (dBm)	Result (W)
50.84	121.2

Transmit - Voice, 8291 kHz, Transmitter Power Results

Result (dBm)	Result (W)
50.88	122.4

Transmit - Voice, 12290 kHz, Transmitter Power Results

Result (dBm)	Result (W)
50.56	113.8

Transmit - Voice, 16420 kHz, Transmitter Power Results

Result (dBm)	Result (W)
50.86	121.8

Transmit - Voice, 25188 kHz, Transmitter Power Results

Result (dBm)	Result (W)
50.43	110.3



Product Service

FCC 47 CFR Part 80, Limit Clause 80.215 (d)

Ship station frequencies below 27500 kHz. The maximum power must not exceed the values listed below:

- 2182 kHz – 400 W
- 4000 kHz to 275000 kHz - 1.5 kW

FCC 47 CFR Part 80, Limit Clause 80.909

The single sideband radiotelephone must be capable of operating on maritime frequencies in the band 1710 to 27500 kHz with a peak envelope output power of at least 120 watts for J3E emission on 2182 kHz and J3E emission on the distress and safety frequencies listed in § 80.369(b).



Product Service

2.7 SUPPRESSION OF INTERFERENCE ABOARD SHIPS**2.7.1 Specification Reference**

FCC 47 CFR Part 80, Clause 80.217 (b)

2.7.2 Equipment Under Test and Modification State

TT-6366B - Modification State 1

S/N: System:

Control Unit: 0901770177

Antenna Tuning Unit: 0000000001

Transceiver Unit: 0000000004

2.7.3 Date of Test

25 November 2015

2.7.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.7.5 Test Procedure

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 2, clause 2.1051.

Remarks

The receiver antenna port of the EUT was directly connected to a spectrum analyser. For measurements at frequencies less than 150 kHz a 1 kHz RBW was chosen and 100 kHz RBW was chosen for frequencies greater than 150 kHz.

2.7.6 Environmental Conditions

Ambient Temperature	23.4 - 23.8°C
Relative Humidity	34.9%



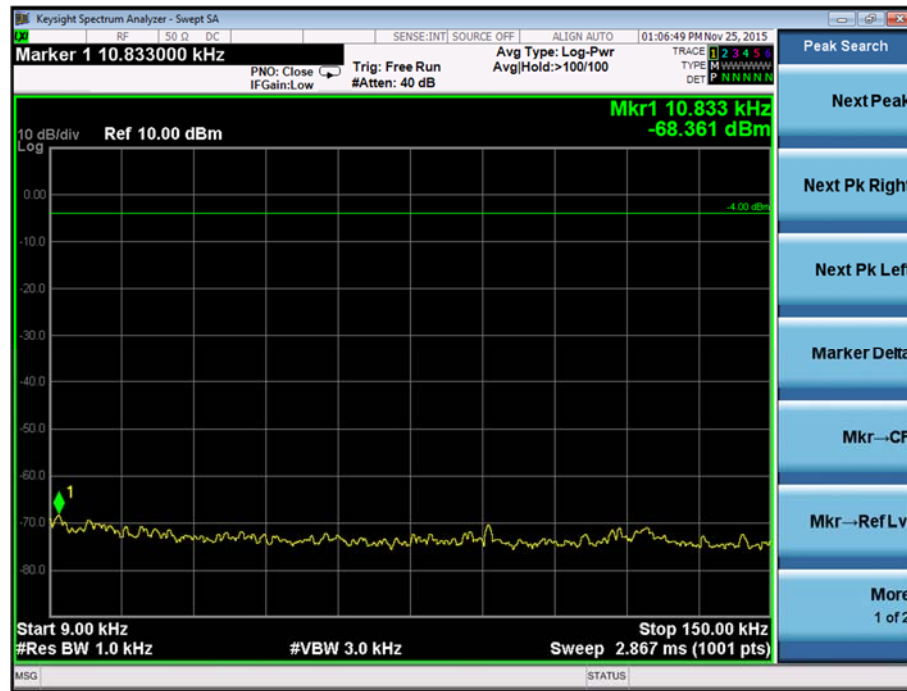
Product Service

2.7.7 Test Results

Transmit - Voice, 25188 kHz Suppression of Interference Aboard Ships Results

Frequency of Interfering Emissions	Power to Artificial Antenna (μW)	Power to Artificial Antenna (dBm)
9 kHz to 30 MHz	0.005374	-52.697
30 MHz to 100 MHz	0.005825	-52.347
100 MHz to 300 MHz	0.005665	-52.468
300 MHz to 1000 MHz	0.008970	-50.472

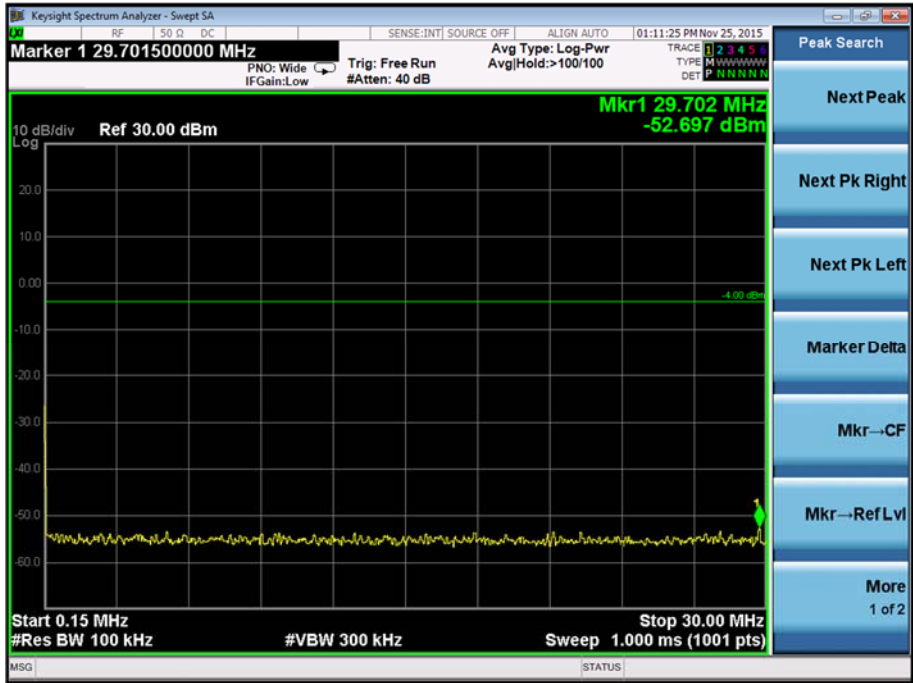
Transmit - Voice, 25188 kHz, 9 kHz to 150 kHz, Suppression of Interference Aboard Ships Plot



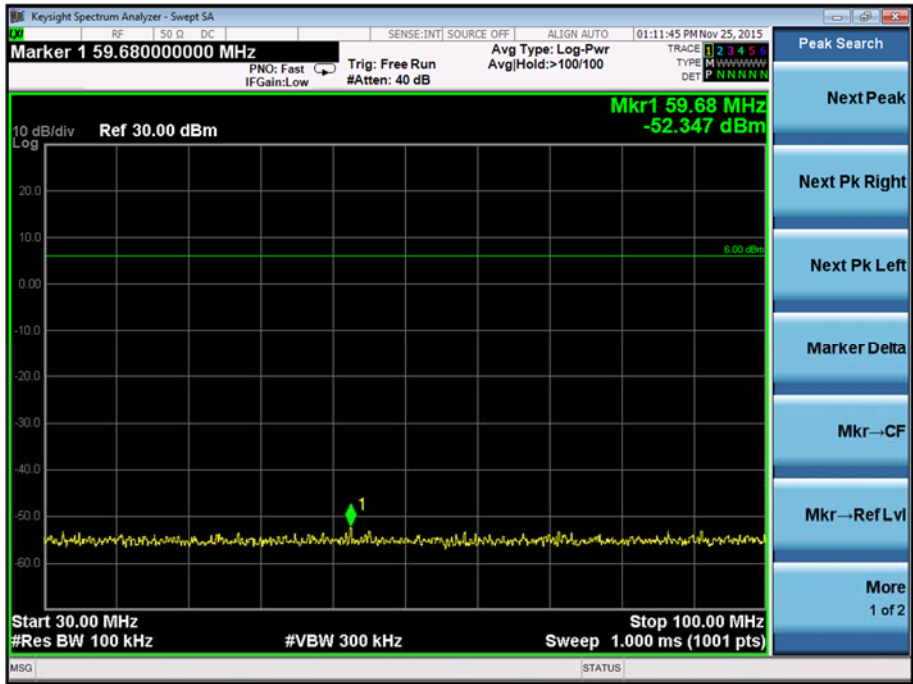


Product Service

Transmit - Voice, 25188 kHz, 150 kHz to 30 MHz, Suppression of Interference Aboard Ships Plot



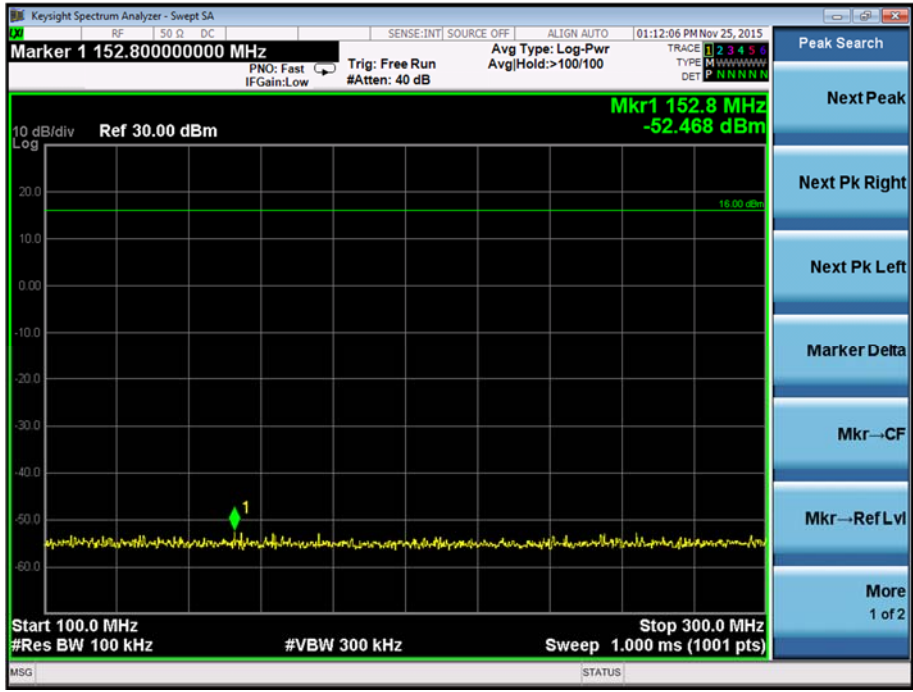
Transmit - Voice, 25188 kHz, 30 MHz to 100 MHz, Suppression of Interference Aboard Ships Plot



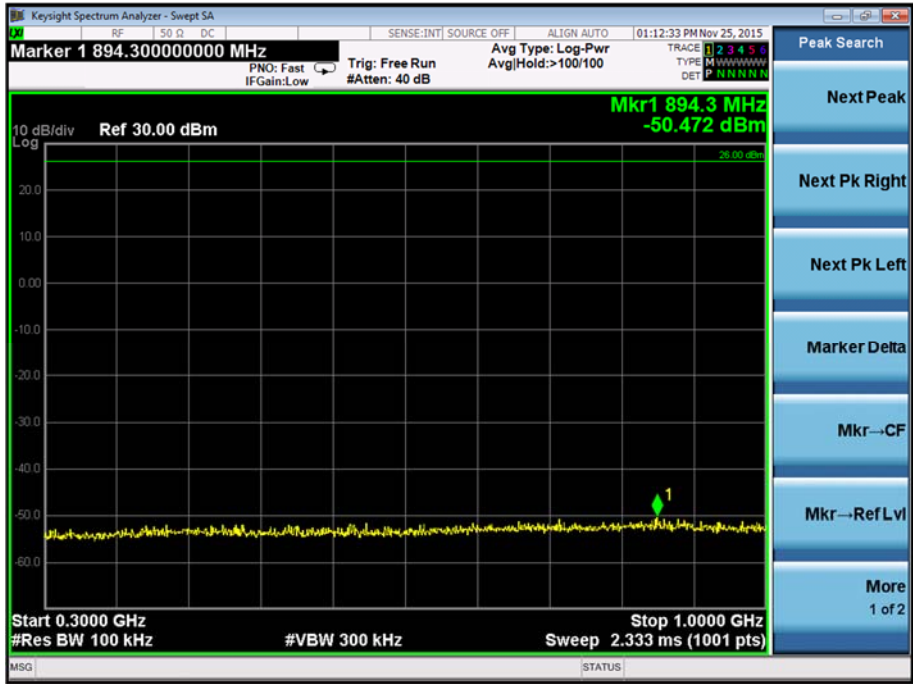


Product Service

Transmit - Voice, 25188 kHz, 100 MHz to 300 MHz, Suppression of Interference Aboard Ships Plot



Transmit - Voice, 25188 kHz, 300 MHz to 1000 MHz, Suppression of Interference Aboard Ships Plot





Product Service

FCC 47 CFR Part 80, Limit Clause 80.217 (b)

The EUT shall deliver not more than the following amounts of power, to an artificial antenna having electrical characteristics equivalent to those of the average receiving antenna(s) use on shipboard:

Frequency of interfering emissions	Power to artificial antenna in μ W
Below 30 MHz	400
30 to 100 MHz	4,000
100 to 300 MHz	40,000
Over 300 MHz	400,000



Product Service

SECTION 3

TEST EQUIPMENT USED



3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.2 - Bandwidths					
Audio Analyser	Hewlett Packard	8903B	44	12	7-Oct-2016
Attenuator (10dB, 10W)	Texscan	HFP-50N	468	12	22-Jun-2016
Audio Analyser	Hewlett Packard	8903B	576	12	8-Jun-2016
Power Supply Unit	Farnell	H60-25	1092	-	O/P Mon
Power Supply	Hewlett Packard	6104A	1948	-	TU
Multimeter	Iso-tech	IDM101	2422	12	22-Jan-2016
Hygrometer	Rotronic	I-1000	2891	12	19-Aug-2016
PXA Signal Analyser	Keysight Technologies	N9030A	4654	12	8-Oct-2016
Antenna Switching Unit	Thrane and Thrane	TT6384B	-	-	O/P Mon
Section 2.2 - Transmitter Frequency Tolerances					
Audio Analyser	Hewlett Packard	8903B	44	12	7-Oct-2016
Counter	Hewlett Packard	53181A	159	12	27-May-2016
Power Supply Unit	Farnell	H60-25	1092	-	O/P Mon
Chamber	Montford	8ft Cubed	2127	12	22-May-2016
Multimeter	Iso-tech	IDM101	2422	12	22-Jan-2016
Rubidium Frequency Standard	Symmetricon	8040C	3490	12	8-Apr-2016
Section 2.3 - Spurious Emissions at Antenna Terminals					
Audio Analyser	Hewlett Packard	8903B	44	12	7-Oct-2016
Attenuator (10dB, 10W)	Texscan	HFP-50N	468	12	22-Jun-2016
Audio Analyser	Hewlett Packard	8903B	576	12	8-Jun-2016
Signal Generator	Marconi	2031	762	12	5-Jun-2016
Power Supply Unit	Farnell	H60-25	1092	-	O/P Mon
Power Supply	Hewlett Packard	6104A	1948	-	TU
Multimeter	Iso-tech	IDM101	2422	12	22-Jan-2016
Hygrometer	Rotronic	I-1000	2891	12	19-Aug-2016
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-Sep-2016
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	7-Sep-2016
PXA Signal Analyser	Keysight Technologies	N9030A	4654	12	8-Oct-2016
30 dB Attenuator	Aeroflex Weinschel	813033	S/N: SQ409	24	23-Sep-2017
Antenna Switching Unit	Thrane and Thrane	TT6384B	-	-	O/P Mon



Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.5 - Emission Limitations					
Audio Analyser	Hewlett Packard	8903B	44	12	7-Oct-2016
Termination (50ohm, 50W)	Bird	8085	472	12	10-Sep-2016
Termination (50ohm)	Meca	405-1	547	12	28-Jul-2016
Audio Analyser	Hewlett Packard	8903B	576	12	8-Jun-2016
DC Power Supply	Hewlett Packard	6269B	742	-	TU
Screened Room (5)	Rainford	Rainford	1545	36	20-Dec-2017
Signal Generator	Rohde & Schwarz	SML01	1590	12	20-Apr-2016
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Antenna (Bilog)	Chase	CBL6143	2904	24	11-Jun-2017
Antenna (Biconnical)	Schaffner	VBA6106A	3107	12	11-Sep-2016
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	2-Nov-2016
7m Armoured RF Cable	SSI Cable Corp.	1501-13-13-7m WA(-)	3600	-	TU
9m RF Cable (N Type)	Rhophase	NPS-2303-9000- NPS	3791	-	TU
Multimeter	Fluke	177	3833	12	16-Jun-2016
Tilt Antenna Mast	maturo GmbH	TAM 4.0-P	3916	-	TU
Mast Controller	maturo GmbH	NCD	3917	-	TU
Hygropalm Temperature and Humidity Meter	Rotronic	HP21	4410	12	15-Apr-2016
30 dB Attenuator	Aeroflex Weinschel	813033	S/N: SQ409	24	23-Sep-2017
Antenna Switching Unit	Thrane and Thrane	TT6384B			
Section 2.6 - Modulation Requirements					
Audio Analyser	Hewlett Packard	8903B	44	12	7-Oct-2016
Attenuator (10dB, 10W)	Texscan	HFP-50N	468	12	22-Jun-2016
Power Supply Unit	Farnell	H60-25	1092	-	O/P Mon
Multimeter	Iso-tech	IDM101	2422	12	22-Jan-2016
Hygrometer	Rotronic	I-1000	2891	12	19-Aug-2016
Section 2.7 - Transmitter Power					
Audio Analyser	Hewlett Packard	8903B	44	12	7-Oct-2016
Audio Analyser	Hewlett Packard	8903B	576	12	8-Jun-2016
Power Supply Unit	Farnell	H60-25	1092	-	O/P Mon
Power Supply	Hewlett Packard	6104A	1948	-	TU
Multimeter	Iso-tech	IDM101	2422	12	22-Jan-2016
Hygrometer	Rotronic	I-1000	2891	12	19-Aug-2016
Power Reflection Meter	Rohde & Schwarz	NRT	S/N: 748100	24	12-Aug-2017
Antenna Switching Unit	Thrane and Thrane	TT6384B	-	-	O/P Mon
Section 2.8 - Suppression of Interference Aboard Ships					
Power Supply Unit	Farnell	H60-25	1092	-	O/P Mon
Multimeter	Iso-tech	IDM101	2422	12	22-Jan-2016
Hygrometer	Rotronic	I-1000	2891	12	19-Aug-2016
PXA Signal Analyser	Keysight Technologies	N9030A	4654	12	8-Oct-2016

The Antenna Switching Unit was used to switch the output impedance to 50 Ω from a 10 Ω input impedance for use on 2182 kHz.

TU – Traceability Unscheduled

O/P MON – Output Monitored with Calibrated Equipment



3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:-

Test Discipline	MU
Modulation Requirements	-
Bandwidths	± 58.05 Hz
Transmitter Power	± 0.70 dB
Transmitter Frequency Tolerances	± 11 Hz
Spurious Emissions at Antenna Terminal	± 3.454 dB
Suppression of Interference Aboard Ships	-
Radiated Spurious Emissions	± 3.08 dB
Authorisation of Transmitters for Licensing	-
Requirements for Selective Calling Equipment	-



Product Service

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



Product Service

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA
(Not UKAS Accredited).

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Product Service

ANNEX A

CUSTOMER DECLARATIONS



Product Service

COBHAM

Thrane & Thrane A/S

Declaration of Conformity with FCC §80.203

The undersigned of this letter declares that the following equipment complies with the requirements contained in the FCC §80.203 (Authorisation of transmitters for licensing) of the Commission's rules.

Equipment

Type No.
TT-6366B

Description

SAILOR 6366 TU MF/HF 150W DSC Class A FCC

Part No.

406366B

FCC Identifier

ROJ6300B

Manufacturer

Thrane & Thrane A/S Lundtoftegårdsvej 93D, DK-2800 Kgs. Lyngby, Denmark
Industrivej 30, DK-9490 Pandrup, Denmark

Place and Date

Kgs- Lyngby, 18 December 2015

Chief Financial Officer
Svend Åge Lundgaard Jensen

Document number: 99-149746-B

Thrane & Thrane A/S trading as Cobham SATCOM

Lundtoftegårdsvej 93D, DK-2800 Kgs. Lyngby, Denmark

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Page 1 of 1



Product Service

COBHAM

Thrane & Thrane A/S

Declaration of Conformity with FCC §80.225

The undersigned of this letter declares that the following Class-A ship station equipment complies with the requirements contained in the FCC §80.225 (Requirements for selective calling – DSC) of the Commission's rules.

Equipment**Type No.**

TT-6366B

Description

SAILOR 6366 TU MF/HF 150W DSC Class A FCC

Part No.

406366B

FCC Identifier

ROJ6300B

Manufacturer

Thrane & Thrane A/S Lundtoftegårdsvej 93D, DK-2800 Kgs. Lyngby, Denmark
Industrivej 30, DK-9490 Pandrup, Denmark

Place and Date

Kgs- Lyngby, 18 December 2015

Chief Financial Officer
Svend Åge Lundgaard Jensen

Document number: 99-149750-A

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Page 1 of 1



Product Service

ANNEX B

SOFTWARE DECLARATION



Product Service

COBHAM

Cobham SATCOM

Industrivej 30

9490 Pandrup

Denmark

To whom it may concern

Date: 15-12-2015

STATEMENT

Software version 2.07 was used during type approval of TT-6366B at TUV SUD.

Software version 2.08 is the version to be on the certificate.

The changes between the versions are described below:

- Alignment of pos/LAN input setup like in AIS, Navtex and radio – A products
- Firefox 41 support added
- two-tone signal replace single tone in connection with transmitter selftest

We state that the changes have no impact to the type approval measurements, which were carried out in accordance with FCC requirements.

Project Manager, R&D

Lasse A. Knudsen

A handwritten signature in red ink, appearing to read 'Lasse A. Knudsen'.