

Test report 20103937306

based on:
FCC Part 80 (10-1-10 Edition)

150W MF/HF SSB radiotelephone with integrated
class-A DSC controller, NBDP controller and 6-ch
scanning watch-keeping receiver
SAILOR
TT-6311A

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This report comprises of three modules. The total number of pages is: 22

Main module

1 Introduction

This report contains the result of tests performed by:

Telefication B.V.
Edisonstraat 12a
6902 PK Zevenaar
The Netherlands

Telefication complies with the accreditation criteria for test laboratories as laid down in ISO/IEC 17025:2005. The accreditation covers the quality system of the laboratory as well as the specific activities as described in the authorized annex bearing the accreditation number L021 and is granted on 30 November 1990 by the Dutch Council For Accreditation (RvA: Raad voor Accreditatie). The copyright of this test report is owned by Telefication bv and may not be reproduced except in full without the written approval of Telefication bv.

Ordering party:

Company name : Thrane & Thrane A/S
Address : Lundtoftegårdsvej 93 D
Zipcode : 2800
City/town : Kgs. Lyngby
Country : Denmark
Date of order : 2 September 2010

2 Product

A sample of the following product was submitted for testing:

Product name	:	150W MF/HF SSB radiotelephone with integrated class-A DSC controller, NBDP controller and 6-ch scanning watch-keeping receiver	
Manufacturer	:	Thrane & Thrane A/S	
Trade mark	:	SAILOR	
Type designation	:	TT-6311A	
Units	:	Transceiver unit	TT-6361A (FET technology))
		Control unit	TT-6301A
		Antenna tuner unit	TT-6381A
FCC ID	:	ROJ6300	
Software version	:	Test SW: 1.02 - 1.03	
Hardware version	:	BOM Revision A	
Serial number TU	:	0704040006	

3 Test schedule

Tests are carried out in accordance with the specification detailed in chapter 6 "Summary" of this report.

Tests are carried out at the following location:

- Telefication, Zevenaar

Tests are carried out between:

- 28 October 2010 and 16 February 2011
-

4 Product documentation

For production of this report the following product documentation is used:

Description	Identification	Date
User manual	98-131070-A_USER_MANUAL.pdf	February 16, 2011
Installation manual	98-130890-A Preliminary-01_.pdf	2010
Correction sheet User Manual	correction-sheet-for-9813170-A.pdf	25-2-2011
Installation Guide Control Unit	TT98-132396-A Installation Guide SAILOR 630x MF_HF Control Unit.pdf	9-2-2011
Installation Guide Transceiver Unit and Antenna Tuning Unit	TT98-133081-A Installation Guide SAILOR MF_HF ATU and TU.pdf	9-2-2011
Assembly drawing	TT38-122883-C55.pdf	21-12-2006
Assembly drawing	TT38-122883-C56.pdf	21-12-2006
Electrical diagram	TT93-122883-D.pdf	26-9-2007
Assembly drawing	38-127961-C_CD1.PDF	14-1-2011
Assembly drawing	38-127961-C_CD8.PDF	14-1-2011
Electrical diagram	93-127961-c.pdf	14-1-2011
Assembly diagram	38-127962-B_ASb.pdf	14-1-2011
Assembly drawing	38-127962-B_AST.pdf	14-1-2011
Electrical diagram	93-127962-b.pdf	14-1-2011
Printed circuit board	TT38-122881-C54.pdf	31-1-2007
Assembly drawing	TT38-122881-C56.pdf	19-12-2006
Electrical diagram	TT93-122881-H.pdf	27-4-2009
Assembly drawing	TT38-122880-D56.pdf	1-6-2007
Electrical diagram	TT93-122880-F.pdf	1-6-2007
Printed Circuit Board	38-122882-A54.pdf	31-1-2007
Assembly drawing	TT38-122882-A55.pdf	12-12-2006
Assembly drawing	TT38-122882-A56.pdf	12-12-2006
Electrical diagram	TT93-122882-A.pdf	12-12-2006
Printed circuit board	TT38-122879-E54.pdf	12-6-2007
Assembly drawing	TT38-122879-E55.pdf	11-6-2007
Assembly drawing	TT38-122879-E56.pdf	11-6-2007
Electrical diagram	TT93-122879-G.pdf	20-8-2007

The above mentioned documentation will be filed at Telefication B.V. Zevenaar for a period of 10 years following the issue of this report.

5 Observations and comments

None.

6 Summary

The product is intended for use in the following application area:

SHIP STATION IN THE MARITIME SERVICE (GMDSS)

The sample is tested according to the following specification:

FCC Part 80 (10-1-10 Edition)

7 Conclusions

The sample of the product showed **NO NON-COMPLIANCES** to the specification stated in chapter 6 of this report.

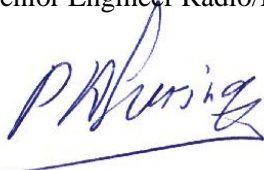
The results of the tests as stated in this report, are exclusively applicable to the product item as identified in this report. Telefication does not accept any responsibility for the results stated in this report, with respect to the properties of product items not involved in these tests.

All tests are performed by:

name : P.A. Suringa

function : Senior Engineer Radio/EMC

signature :



Review of test methods and report by:

name : ing. A. van der Valk

function : Senior Test Engineer

signature :



The above conclusions have been verified by the following signatory:

date : 5 May, 2011

name : ing. A. van der Valk

function : Manager Laboratory a.i.

signature :



Test results module

1 Summary

According to FCC Parts 2 & 80, the following requirements have been assessed:

Port	Reference	Phenomena	Result
Enclosure	§ 2.1053 (a)	Radiated emissions	P
RF connector	§ 80.211 (a) (3)	Conducted spurious at the antenna terminal	P
RF connector	§ 80.211 (a) (1), (2)	Occupied bandwidth	P
RF connector	§ 80.209 (a)	Frequency stability	P
RF connector	§ 80.213 (b)	Modulation limitation	P
RF connector	§ 80.215 (d)	Transmitter power	P
RF connector	§ 80.209 (a)	Frequency stability vs. voltage	P
RF connector	§ 2.1047 (a)	Audio frequency response of SSB telephony	P
RF connector	§ 2.1047 (b) (c)	Level control and/or limiter for SSB	P

Results:

P = pass
F = fail

NA = not applicable
NP = not performed

2 Test results

2.1 Radiated spurious (> 30 MHz), cabinet radiation

- Requirement reference : FCC part 2, section 2.1053 (a)
- Method : Measurements in the range 0.03 – 1 GHz are performed in a 3 m semi anechoic room (SAR).
At 3m distance the following relationship is applied:
 $ERP_{dBm} = E_{dB\mu V/m} - 80.5 \text{ dB}$
- Compliance limit : > 60 dB attenuation w.r.t. mean power
- Results : In the table, “c” refers to the fundamental carrier frequency of 25.070 MHz.

Frequency	dB μ V/m	Attenuation (dB)
1c	131.6 ^{*)}	0
2c	36.6	95
3c	56.3	75.3
4c	50.9	80.7
5c	48.7	82.9
6c	62.0	69.6
7c	57.9	73.7
8c	57.8	73.8
9c	55.7	75.9
10c	60.2	71.4
11c	48.5	83.1
12c	41.2	90.4
13c	47.6	84
14c	43.5	88.1
15c	50.8	80.8
16c	47.7	83.9
17c	48.6	83
18c	43.9	87.7
19c	52.1	79.5
20c	52.9	78.7
21c	49.5	82.1
22c	43.7	87.9
23c	Noise level	
24c	Noise level	
25c	45.9	85.7

^{*)} calculated value: 52 dBm PEP – 3 dB + 2.14 dBi = 51.14 dBm ERP

Used equipment:

Equipment used (refers to item numbers in section “used test equipment”)	5, 16, 21, 22
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2.2 Conducted spurious at the antenna terminal

Requirement reference : FCC part 80, section 80.211 (a) (3)

Compliance limit : attenuation > 43 dB + 10 log P = 43 + 22 = 65 dB

Method : Modulated in J3E mode with 400 and 1800 Hz tones with a level 10 dB greater than that necessary to produce rated peak envelope power.

Results :

Channel frequency (kHz)	Attenuation (dB) w.r.t. fundamental	
	2 nd harmonic	3 rd harmonic
1605	> 80.4	69.6
2060	> 82.6	71
3800	> 78.1	72.1
4065	75.2	72
6203	74.2	75
8195	66.4	75
12230	72.5	73
16360	> 79.8	72.8
18780	> 81	74
22000	> 81.3	70.3
25070	> 75.2	70.2

Used equipment:

Equipment used (refers to item numbers in section "used test equipment")	2, 3, 10, 16, 17
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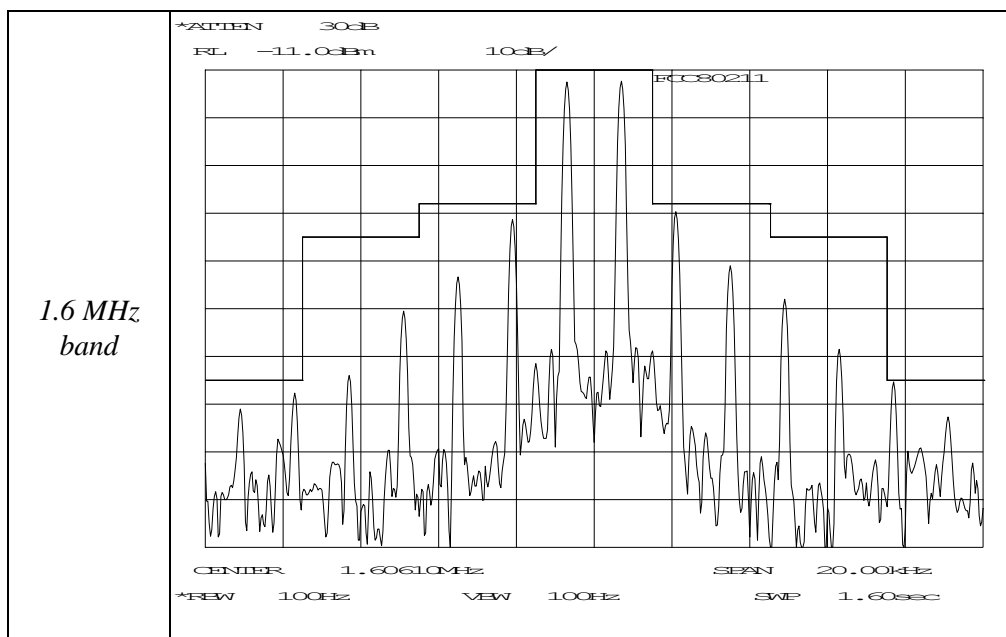
2.3 Occupied bandwidth

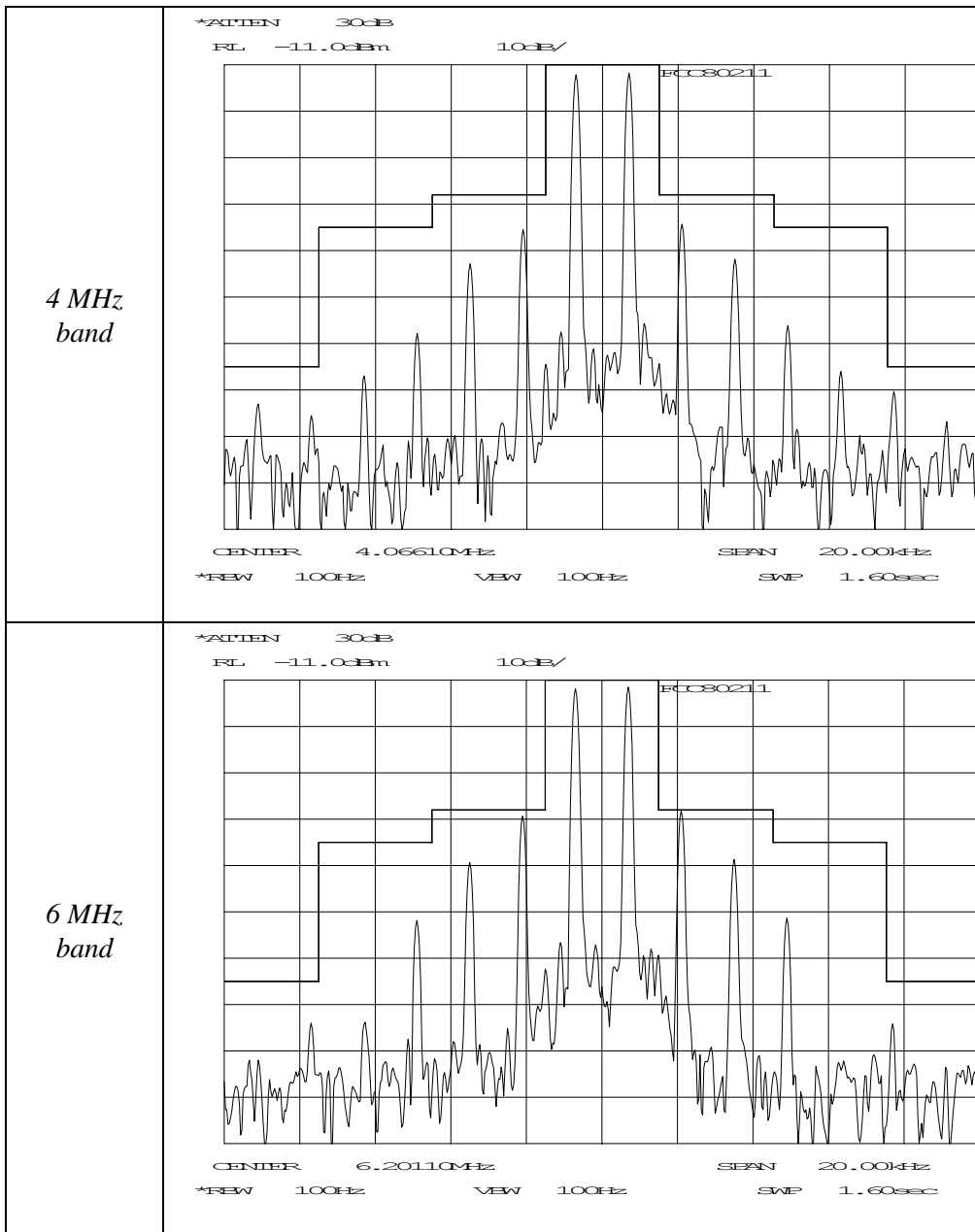
Requirement reference : FCC part 80, sections 80.211(a) (1); 80.211(a) (2)
 FCC part 2, section 2.1049 (c) (4)

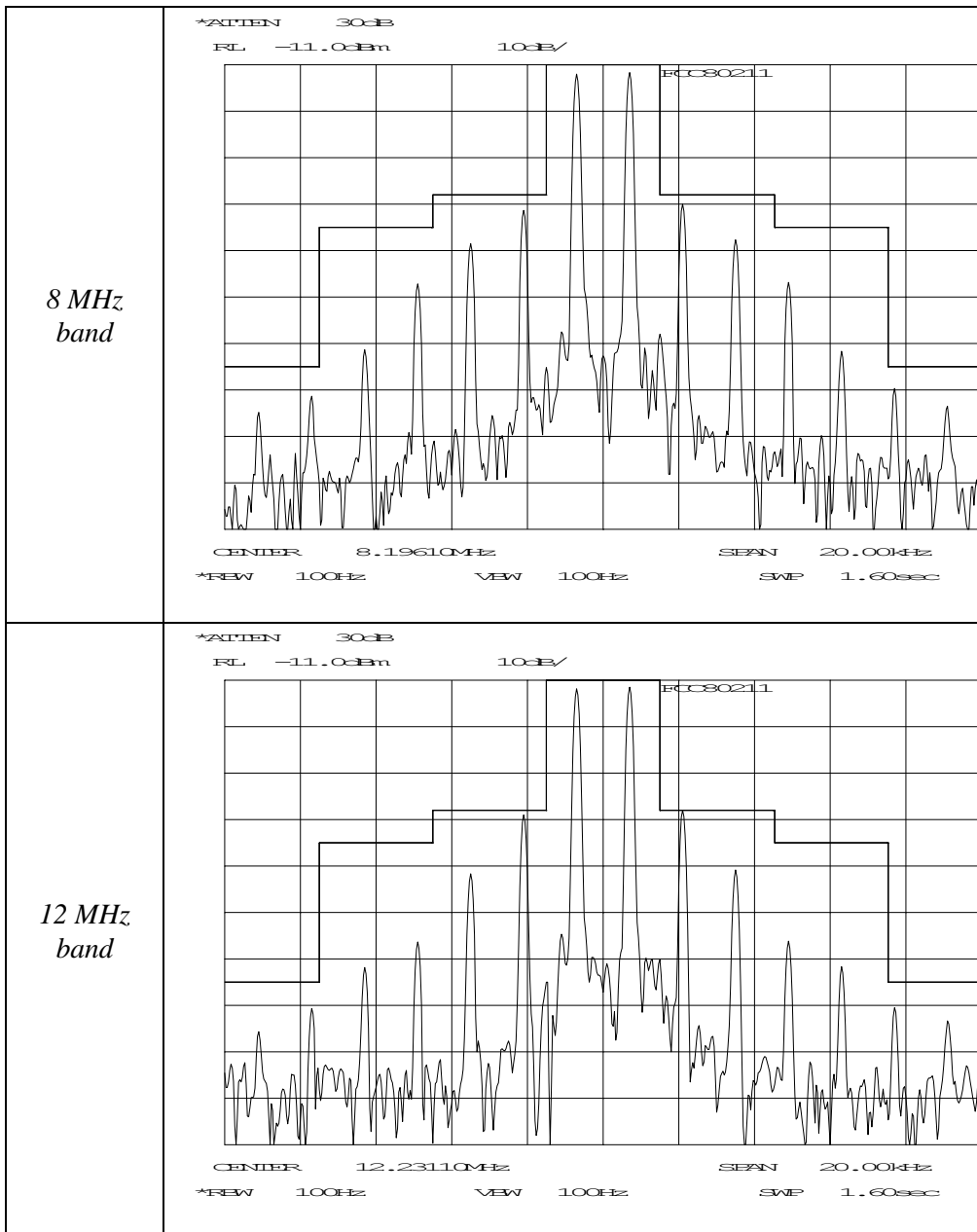
Compliance limit : see plots below

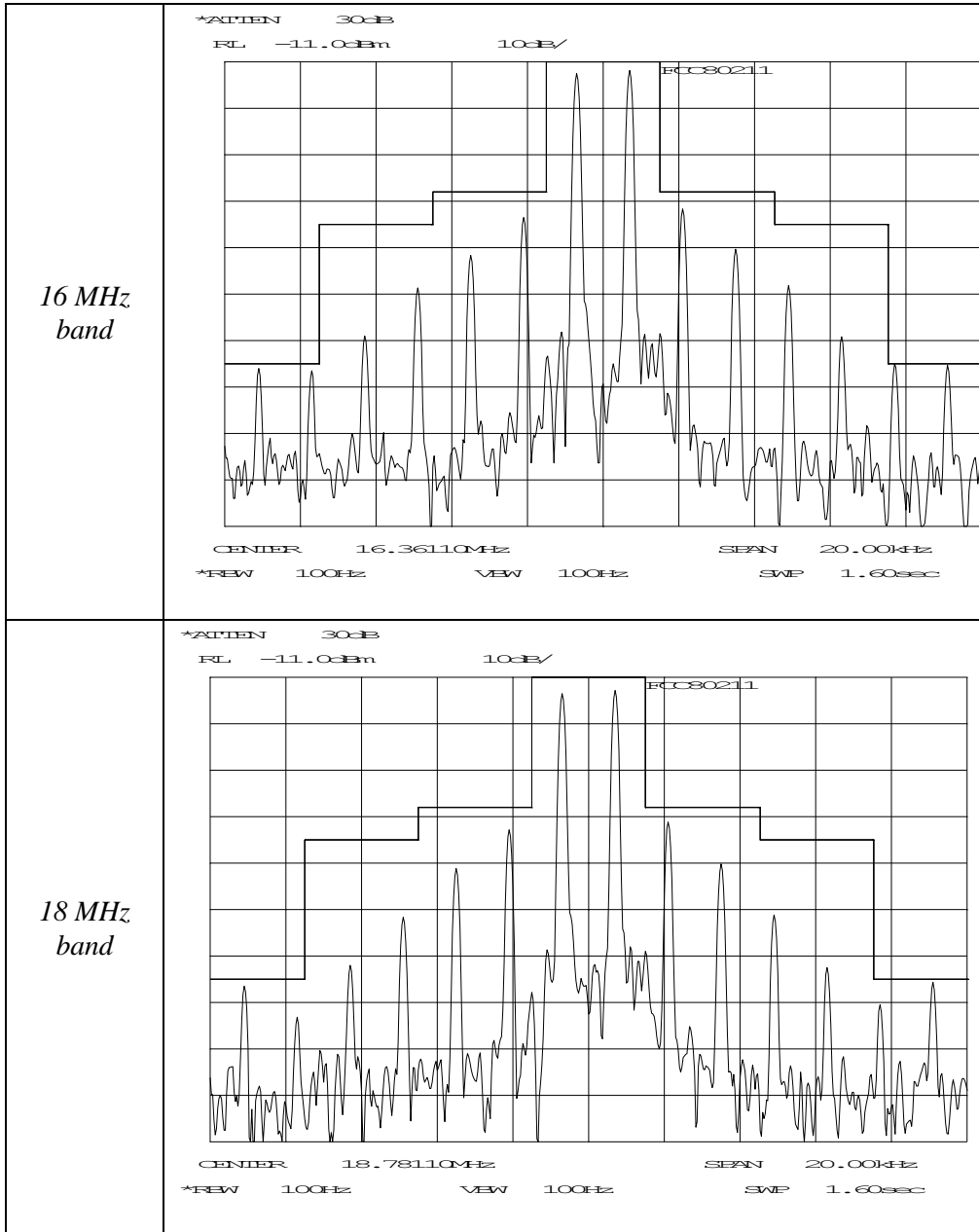
Method : Modulated in J3E mode with 400 and 1800 Hz tones with a level 10 dB greater than that necessary to produce rated peak envelope power.

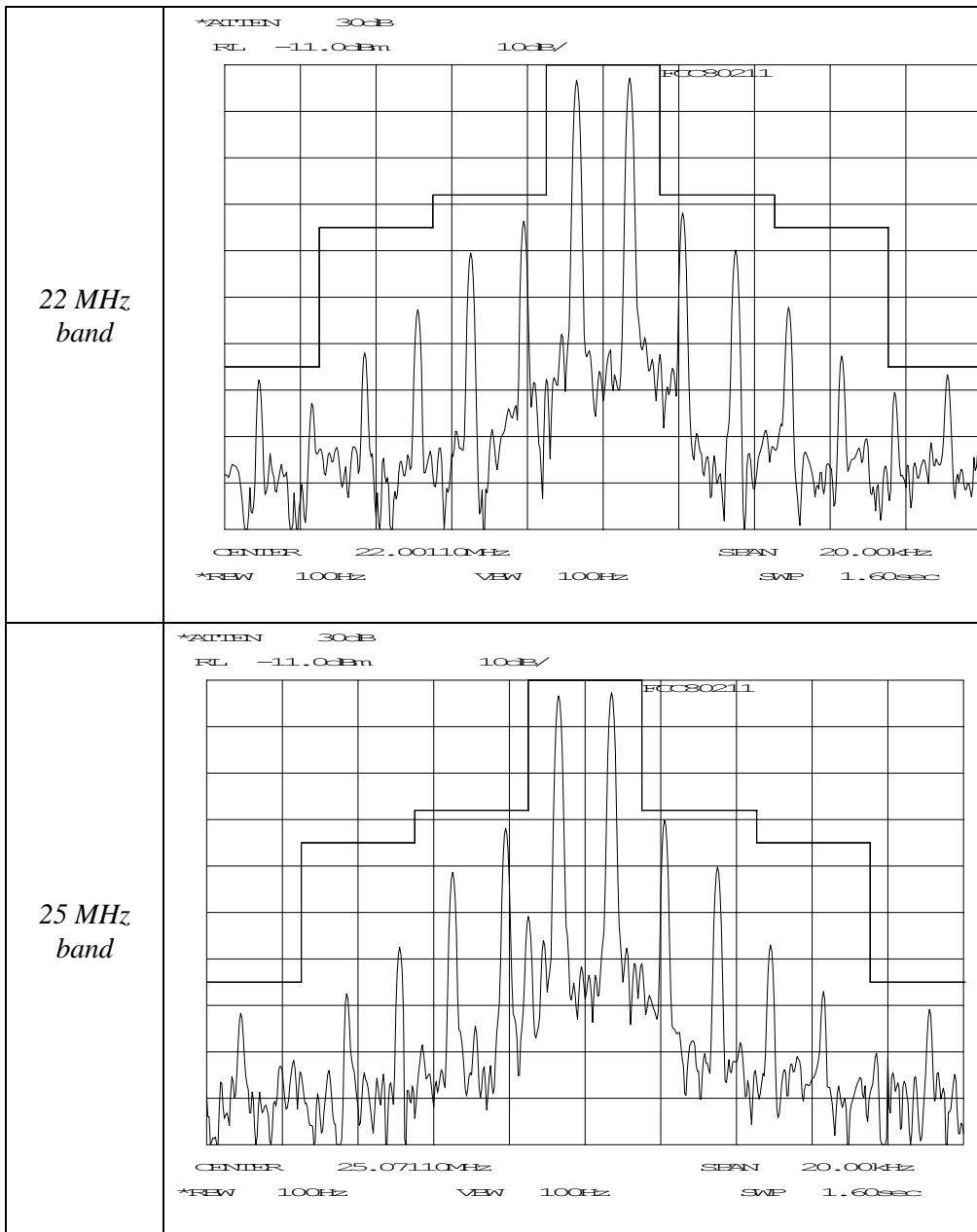
Microphone input











Used equipment:

<p>Equipment used (refers to item numbers in section "used test equipment")</p>	<p>1, 2, 3, 10, 17</p>
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2.4 Transmitter power

Requirement reference : FCC part 80, section 80.215 (d); part 2, section 2.1046 (b)

Compliance limit : ≤ 150 W PEP

Method : Modulated in J3E mode with 400 and 1800 Hz tones with a level 10 dB greater than that necessary to produce rated peak envelope power.

Frequency	Final voltage (V)	Final current (A)	Peak envelope power (W)
1605 kHz	24.0	12.0	115
2187.5 kHz	24.0	13.0	118
3800 kHz	24.0	12.6	122
ITU ch 401	24.0	12.5	149
ITU ch 601	24.0	12.6	146
ITU ch 801	24.0	13.4	149
ITU ch 1201	24.0	12.9	150
ITU ch 1601	24.0	12.7	136
ITU ch 1801	24.0	12.9	150
ITU ch 2201	24.0	13.1	133
ITU ch 2501	24.0	13.0	138
Measurement uncertainty	0.5 dB		

Used equipment:

Equipment used (refers to item numbers in section "used test equipment")	2, 10, 12, 17, 20
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2.5 Frequency stability with temperature

Requirement reference : FCC part 80, section 80.209 (a)

Compliance limit : +/-10 Hz (radiotelephony mode)

Results :

Temperature °C	Frequency error (Hz) at ch. freq.	
	2060 kHz	25118 kHz
-20	0	-3
-10	0	0
0	0	+3
10	0	+1
20	0	+1
30	0	+1
40	0	+5
50	0	+2

Used equipment:

Equipment used (refers to item numbers in section "used test equipment")	2, 7, 10, 14
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2.6 Frequency stability with supply voltage

Requirement reference : FCC part 80, section 80.209 (a)

Compliance limit : +/-10 Hz (radiotelephony mode)

Voltage variation (%)	Voltage (V)	Frequency error (Hz) at ch. freq.	
		2060 kHz	25070 kHz
-15	20.4	0	+3
-10	21.6	0	+3
-5	22.8	0	+3
0	24.0	0	+3
5	25.2	0	+4
10	26.4	0	+4
15	27.6	0	+4

Used equipment:

Equipment used (refers to item numbers in section "used test equipment")	2, 7, 10
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2.7 Audio frequency response of SSB telephony

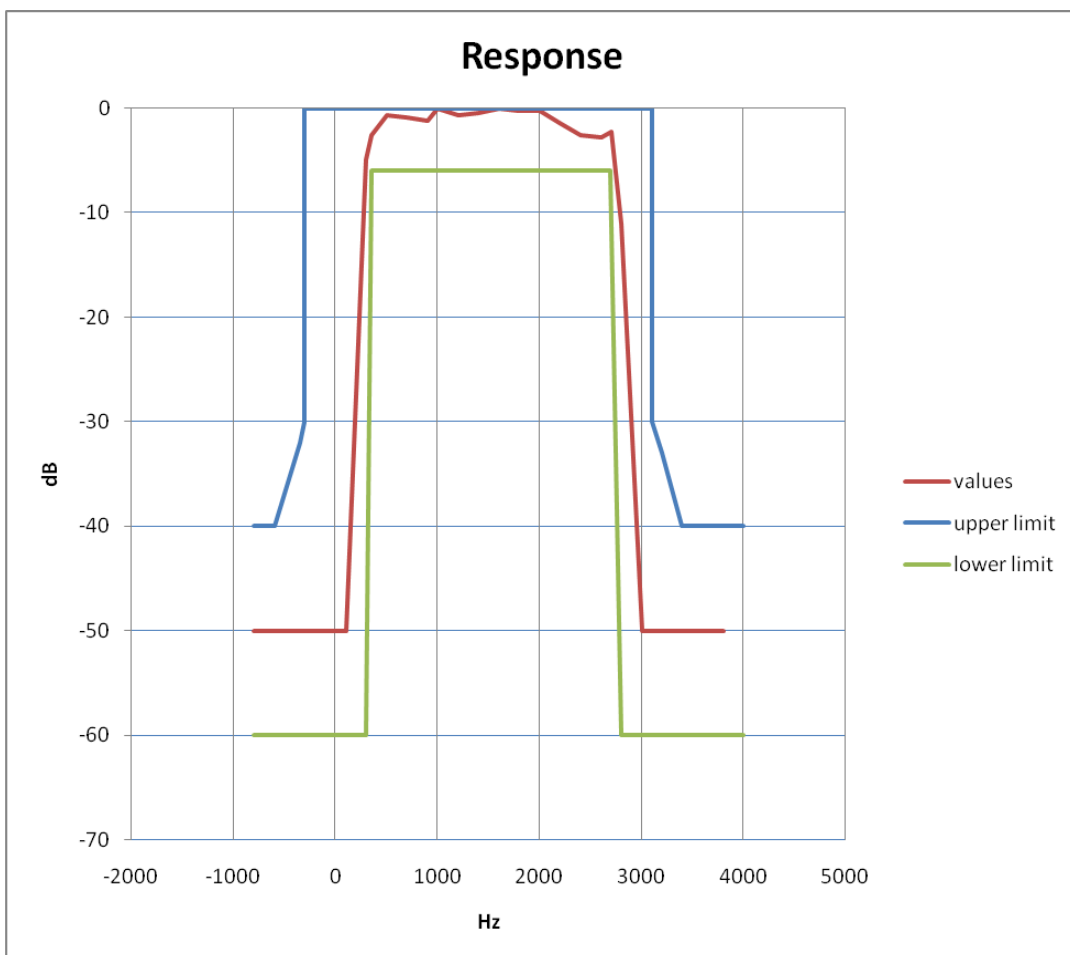
Requirement reference : FCC part 2, section 2.1047 (a)

Compliance limit : Not applicable (notwithstanding the plot mask)

Method : The frequency of the AF test signal is varied between 100 Hz and 10 kHz. The level of the AF test signal is adjusted so that the output power is 10 dB below the rated output power.

Test frequency: 8291 kHz

Microphone input:



Used equipment:

Equipment used (refers to item numbers in section "used test equipment")	
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2.8 Level control and/or limiter for SSB

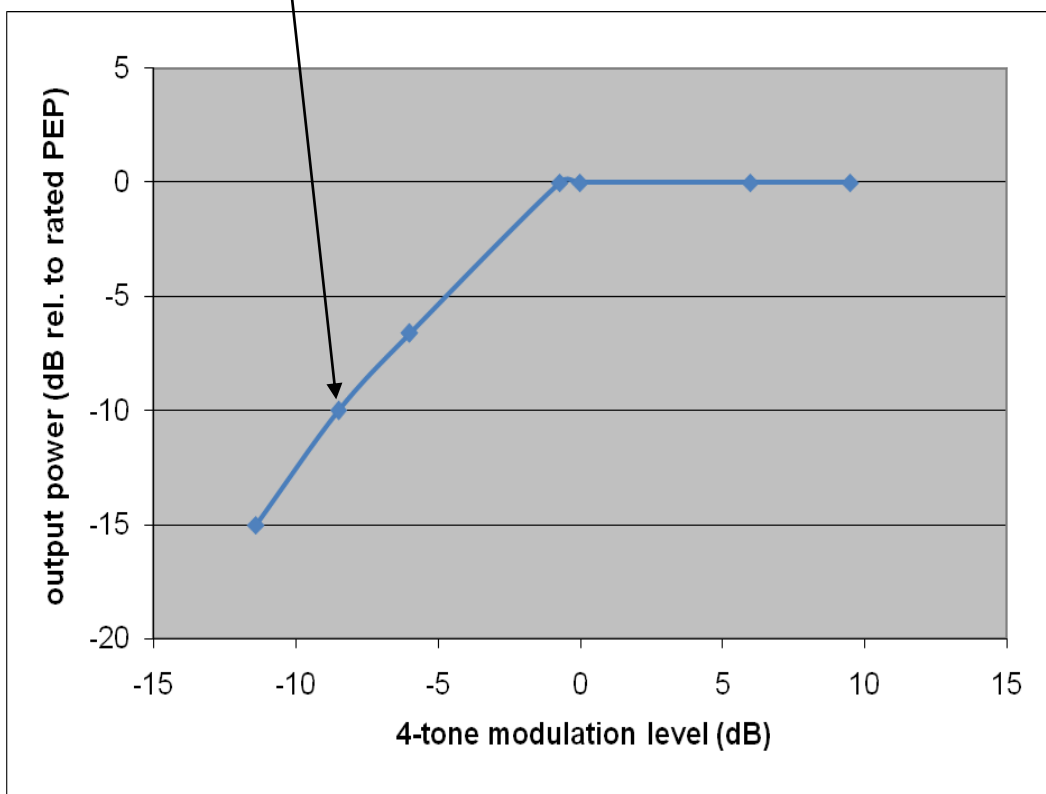
Requirement reference : FCC part 2, section 2.1047 (b) (c)

Compliance limit : Not applicable

Method : The modulation in J3E mode was four tones at frequencies 700 Hz, 1100 Hz, 1700 Hz and 2500 Hz. The output power relative to rated peak envelope power was measured with a spectrum analyser.

Microphone input

(9 mV input voltage for -10 dB relative to rated PEP)



Used equipment:

Equipment used (refers to item numbers in section "used test equipment")	1, 2, 3, 10, 17
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Used test equipment module

Ref	Description	Telefication ident.	Manufacturer	Model
1	Spectrum analyzer	TE 00099	HP	8562E
2	500 W 10 dB attenuator	TE 00380	Bird	8325
3	Multifunction synthesiser	TE 00176	HP	8904A
4	Decade attenuator	TE 00060	Danbridge	DA3HS/D
5	Coaxial termination	TE 00070	Termaline	8080
6	Spectrum analyzer	TE 11125	HP	FSP
7	Microwave counter	TE 00252	HP	5350B
8	Radio communication service mon.	TE 11129	R & S	CMS54
9	RF attenuator	TE 00343	Bird	8329
10	RF attenuator	TE 00172	Tenuline	8343-200
11	Power supply	TE 11130	Delta	SM35-45
12	Power meter	TE 00377	Bird	4381
13	Digital multimeter	TE 00210	Fluke	87
14	Climate chamber	TE 00741	CTS	C-40/350
15	Mouth simulator	TE 00530	Bruel & Kjaer	4227
16	Test receiver	TE 11128	R & S	ESCI
17	RF attenuator	TE 00128	Termaline	8343-100
19	Pre-amplifier 0.01 – 30 MHz	TE 00036	Telefication	--
20	Slug for feed through RF power meter	TE 00621	Bird	500W 2-30 MHz
21	Semi Anechoic Room	TE 00861	Comtest	--
22	BiconiLog antenna	TE 00967	Chase	CBL6112A