

Test report

98471231

Part 1 of 1

Equipment:	Maritime Iridium Telephone
Manufacturer:	ECI Satellite Communication A/S
Trade marks:	ECI; Sailor; Skanti; Skanti Leisure; STN-ATLAS; Kelvin Hughes; Litton Marine; DEBEG; Nordcontrol
Type designations:	ST4120 SC4150 SA4110 H4196
Variant:	ITU 7701 ICUH 7701 IAU 7701

Contents

1.	Introduction.....	3
2.	Product	4
3.	Test schedule.....	5
4.	Product documentation	6
5.	Observations and comments.....	6
6.	Summary.....	7
7.	Conclusions.....	8
8.	Test Results Module Index	9
	Section 1. Summary of Test Results	11
	Section 2. General Equipment Specification	13
	Section 3. RF Power Output.....	15
	Section 4. Occupied Bandwidth.....	17
	Section 5. Spurious Emissions at Antenna Terminals.....	19
	Section 6. Field Strength of Spurious Emissions	26
	Section 7. Frequency Stability	35
	Section 8. Protection of Radionavigation/Satellite Service	35
	Section 9. Test Equipment List.....	37
	Annex A. Test Diagrams	38
	Para. No. 2.1046 - R.F. Power Output	38
	Para. No. 2.1049 - Occupied Bandwidth	38
	Para. No. 2.1051 - Spurious Emissions at Antenna Terminals	38
	Para. No. 2.1053 - Field Strength of Radiation.....	39
	Para. No. 2.1055 - Frequency Stability	40

1. Introduction

This report contains the result of tests performed and/or conducted by KTL-Arnhem

KTL-Arnhem
Utrechtseweg 310
6812 AR Arnhem
The Netherlands

KTL-Arnhem complies with the accreditation criteria for laboratories as described in the STERLAB Criteria which contains all of the criteria from EN 45001 and ISO/IEC guide 25 and the relevant criteria from ISO 9001. The accreditation covers the quality system of the laboratory as well as the specified activities described in the accreditation certificate bearing the accreditation number L021 and is granted on 30 November 1990 by the Dutch Council For Accreditation (RvA: Raad voor Accreditatie). An extended procedure for performing tests outside their permanent premises has been accepted by the board of STERLAB for accreditation. KTL-Arnhem is thereby allowed to conduct tests on any suitable site by regular KTL-Arnhem staff, using suitable equipment that is property of KTL-Arnhem or of a second party.

Ordering party:

Company name : ECI Satellite Communication A/S
Address : Porsvej 2
Postcode : 9200
City/town : Aalborg Sv
Country : Denmark
Date of order : 28 January 1999
References : None

2. Product

A sample of the following product was submitted for testing:
Maritime Iridium Telephone

Manufacturer	: ECI Satellite Communication A/S
Trade marks	: ECI; Sailor; Skanti; Skanti Leisure; STN-ATLAS; Kelvin Hughes; Litton Marine; DEBEG; Nordcontrol
Type designation	: ST4120; transceiver unit (ECI, Sailor) SC4150; handset (ECI, Sailor) SA4110; antenna (ECI, Sailor) H4196; T-connection (ECI, Sailor)
Variants	: ITU 7701; transceiver unit (Skanti) ICUH 7701; handset (Skanti) IAU 7701; antenna (Skanti)
Hardware version	: Not provided
Serial number	: Not provided
Software release	: Not provided

3. Test schedule

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

- The following tests have been performed at KTL-Arnhem:
 - *RF Power Output tests*
 - *Occupied Bandwidth*
 - *Spurious Emissions at Antenna Terminals*
 - *Field Strength of Spurious (> 1 GHz)*
 - *Frequency Stability*
 - *Protection of Radionavigation/Satellite Service*

- The following tests have been performed at Open Area Test Site KRQ (H44)
FCC-KRQ/EMC99-4248
Utrechtseweg 310
6812 AR Arnhem
The Netherlands:
 - *Field Strength of Spurious (< 1 GHz)*

- The following test has been conducted at Motorola Space and Systems Technology Group
8201 East McDowell Road
Scottsdale, AZ 85252-1417
United States of America:
 - *Spurious Emissions at Antenna Terminals*

Tests were carried out on the following dates:

- | | |
|--|--|
| - RF Power Output: | 01 April 1999 |
| - Occupied Bandwidth: | 30 March 1999 |
| - Spurious Emissions at Antenna Terminals: | 30 March 1999 (at KTL-Arnhem)
24 September 1998 (at Motorola) |
| - Field Strength of Spurious: | 09 September 1999 |
| - Frequency Stability: | 12 April 1999 |
| - Protection of Radionavigation/Satellite Service: | 01 April 1999 |

4. Product documentation

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

Description	Date	Identification
Handset prelim. Operator's manual	March 1999	SAILOR
System block diagram	Not dated	1 sheet
Schematics of transceiver unit	Not dated	4-0-35850B; 6 sheets
Component layout of transceiver unit	Not dated	5-6-35850B; 1 sheet
Schematics of handset	Not dated	Display module 30498; Processor module 30499

The above mentioned documentation will be filed at KTL-Arnhem for a period of 10 years following the issue of this report.

5. Observations and comments

This product contains a unit (OEM) being the L-Band transceiver (type MS2-10), manufactured by Motorola Inc.

This transceiver has been previously tested against the European standard TBR 41 per September 1998 at the Motorola facilities, Phoenix, Arizona.

Consequently, parts of the test results of the afore mentioned type test have been applied within this test report.

For all tests the sample was set to its highest power output (7 W).

The measured data shown in this report is only corrected for an external attenuation connected between the spectrum analyzer and the tested sample.

The units of the conducted test data are to be interpreted as dBm E.I.R.P.

6. Summary

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

GMPCS (MARITIME SATELLITE APPLICATION)

The sample was tested according to the following specification:

FCC PART 25 (10-1-98 Edition)

7. Conclusions

The sample of the product showed **NO NON-COMPLIANCES** regarding the specification as stated in chapter 6 "Summary" of this report.

The results of the type tests as stated in this report, are exclusively applicable to the product item as identified in this report. KTL-Arnhem 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.

This report comprises of a main module and 1 module with test results and other information. All pages have been numbered consecutively and bear the KTL logo, the report number and sub-numbers. The total number of pages in this report is 40.

All tests have been performed and/or conducted by:

name : ing. P.A. Suringa
function : Senior Engineer Radio/EMC
signature :

Review of test methods and report by:

name : J.P. van de Poll
function : Senior Engineer TE
signature :

The above conclusions have been verified by the following signatory.

date : 10 September 1999
name : ing. A.M. Stofferis
function : Technical Manager Accredited Testing
signature :

8. Test Results Module Index

Section 1. Summary of Test Results

General
Summary of Test Data

Section 2. General Equipment Specification

Specifications
System Diagram

Section 3. RF Power Output

Test Result
Measurement Data
Graph

Section 4. Occupied Bandwidth

Test Result
Test Data
Graph

Section 5. Spurious Emissions at Antenna Terminals

Test Result
Test Data
Graphs

Section 6. Field Strength of Spurious

Test Result
Test Data
Table and Graphs

Section 7. Frequency Stability

Test Result
Measurement Data
Table

Section 8. Protection of Radionavigation/Satellite Service

Test Result
Measurement Data
Graph

Section 9. Test Equipment List

Table

Test Results Module Index (continued)

Annex A - Test Diagrams

- R.F. Power Output
- Occupied Bandwidth
- Spurious Emissions at Antenna Terminals
- Field Strength of Spurious
- Frequency Stability
- Protection of Radionavigation/Satellite Service

Section 1. Summary of Test Results

Manufacturer: ECI Satellite Communication A/S

Model No.: ST4120; transceiver unit (ECI, Sailor)
SC4150; handset (ECI, Sailor)
SA4110; antenna (ECI, Sailor)
H4196: T-connection (ECI, Sailor)

Serial No.: --

General: All measurements are traceable to national standards.

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 25.



New Submission



Production Unit



Class II Permissive Change



Pre-Production Unit

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE
TEST SPECIFICATIONS HAVE BEEN MADE.

See “**Summary of Test Data**”.

Summary of Test Data

Name of test	Par. No.	Spec.	Meas.	Result
RF Power Output	25.204(a)	+40 dBW/4kHz	-8.55 dBW/4 kHz	Complies
Occupied Bandwidth	25.202(f)	mask	see graphs	Complies
Spurious Emissions at Antenna Terminals	25.202(f)	-13 dBm	-16.19 dBm	Complies
Field Strength of Spurious Emissions	25.202(f)	-13 dBm E.I.R.P.	-38.33 dBm E.I.R.P.	Complies
Frequency Stability	25.202(d)	0.001 %	0.000099 %	Complies
Protection of Radionavigation/Satellite Service	25.213(b)	-70 dBW/MHz	-87.33 dBW/MHz	Complies

Test Conditions:

Antenna Conducted Measurements

Temperature: 23 °C
Humidity: 47 %

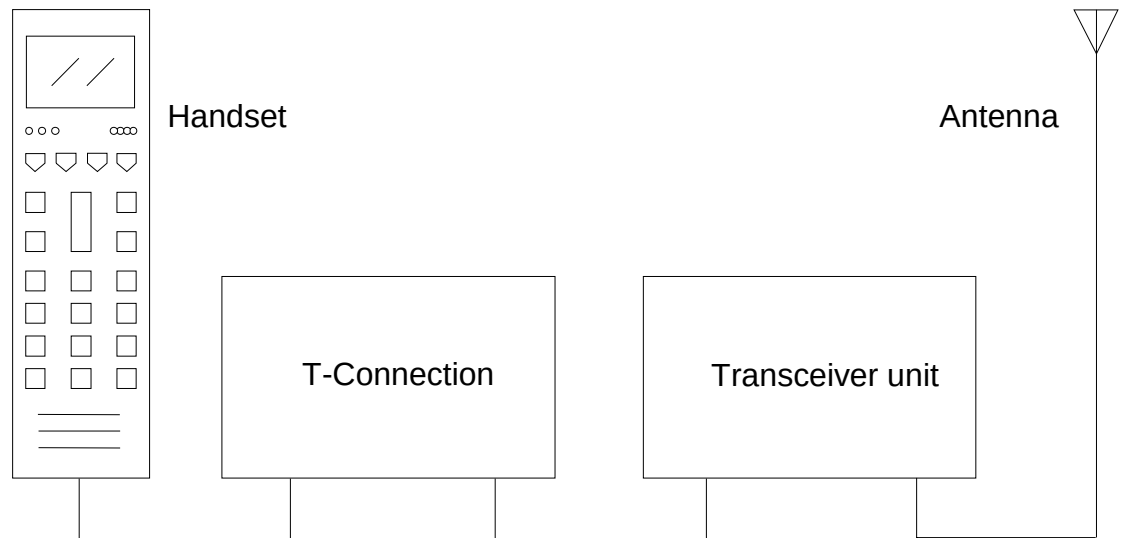
Radiated Measurements

Temperature: 25 °C
Humidity: 65 %

Section 2. General Equipment Specification

Supply Voltage Input:	Nominal	24 V _{DC}		
Frequency Range:	Subband 01	1616.000000 - 1616.333333 MHz		
	Subband 15	1620.666667 - 1621.000000 MHz		
	Subband 30	1625.666667 - 1626.000000 MHz		
Authorized Bandwidth:		41.66666667 kHz		
Type of Modulation and Emission Designator:		41K7Q7W--	TDMA ☒	FDMA ☒
Output Impedance:		50 Ω		
Antenna Gain:		0 dBi		
E.I.R.P. Density(Rated):		not specified		
RF Output (Rated):		7 W		

System Diagram

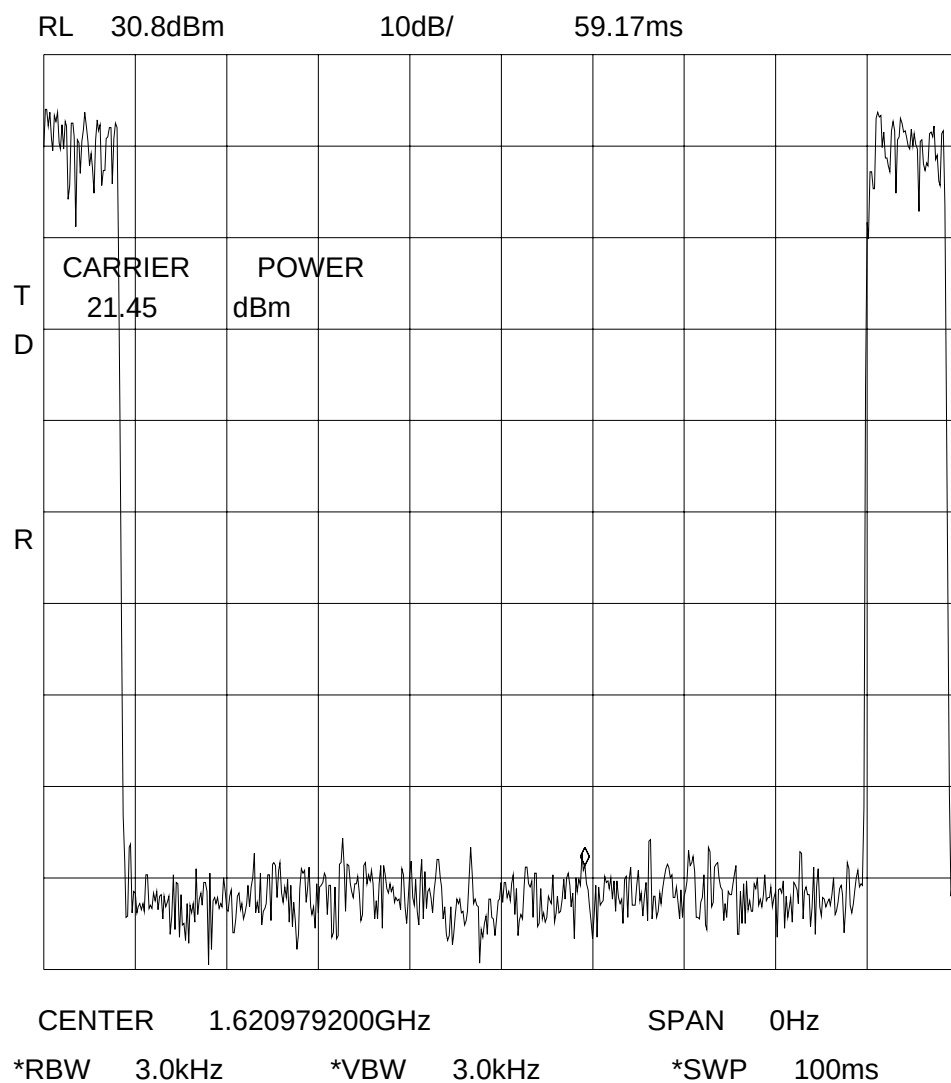


Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 2.1046
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Test Results: Complies.

Measurement Data: Maximum E.I.R.P. Density: 21.45 dBm
Maximum E.I.R.P. Density: -8.55 dBW/4kHz
Also see attached graph.

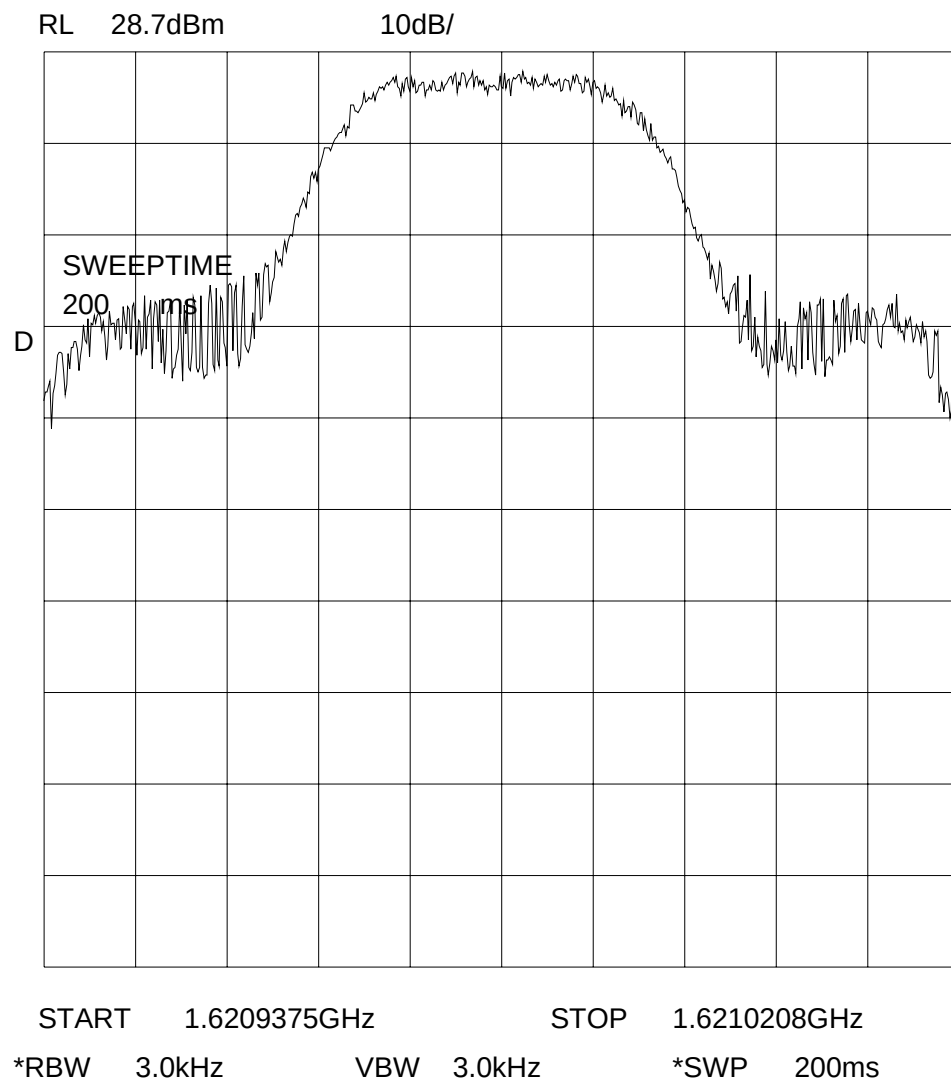


Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.1049
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Test Results: Complies.

Test Data: See attached graph.



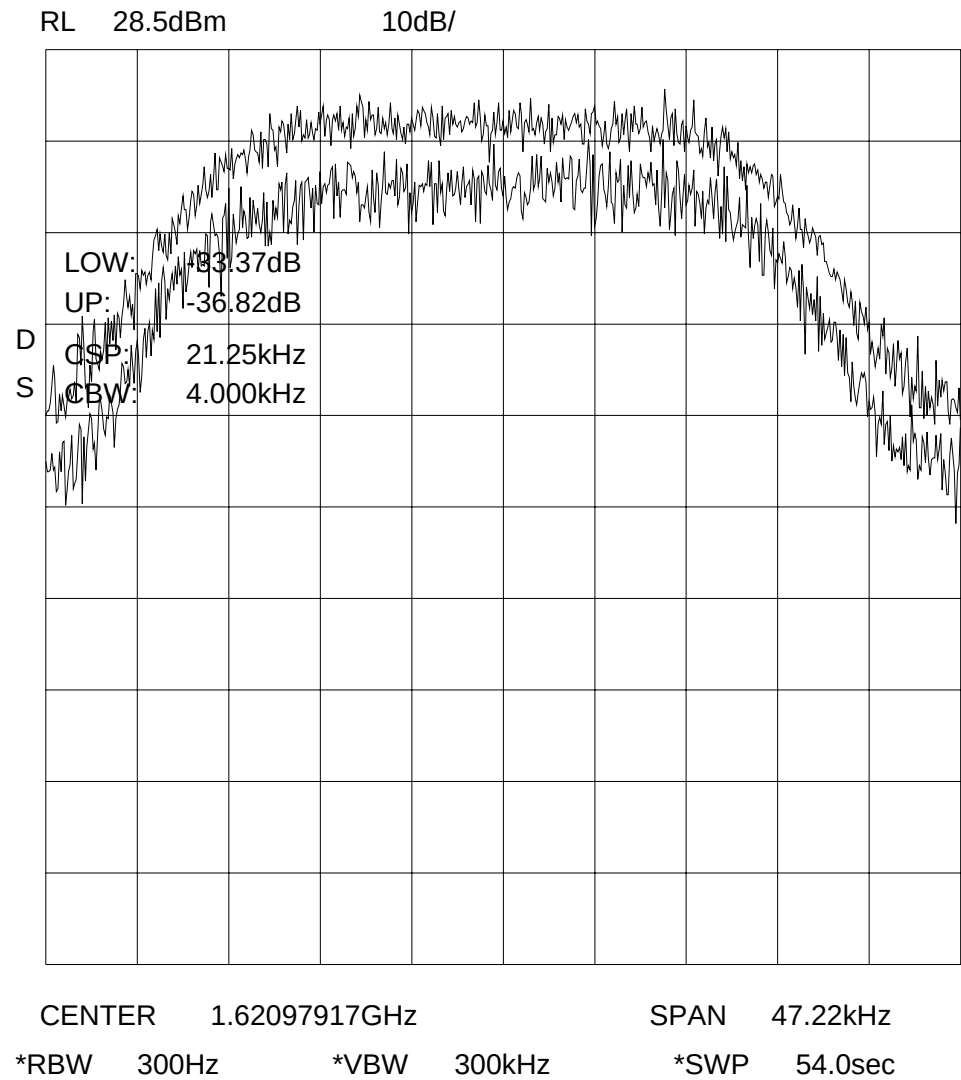
Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.1051
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Test Results: Complies.

Test Data: See attached graphs.

Remark: The graphs have been recorded using the spectrum analyzer in adjacent channel power (ACP) mode. The 2 BW method has been selected, followed by selection of the bandwidth in which the power has to be determined (4 kHz).
With this configuration the analyzer will determine the power by performing two measurements at bandwidths of 3 kHz and 10 kHz.
The power in 4 kHz bandwidth will be calculated from the two afore mentioned measurements.

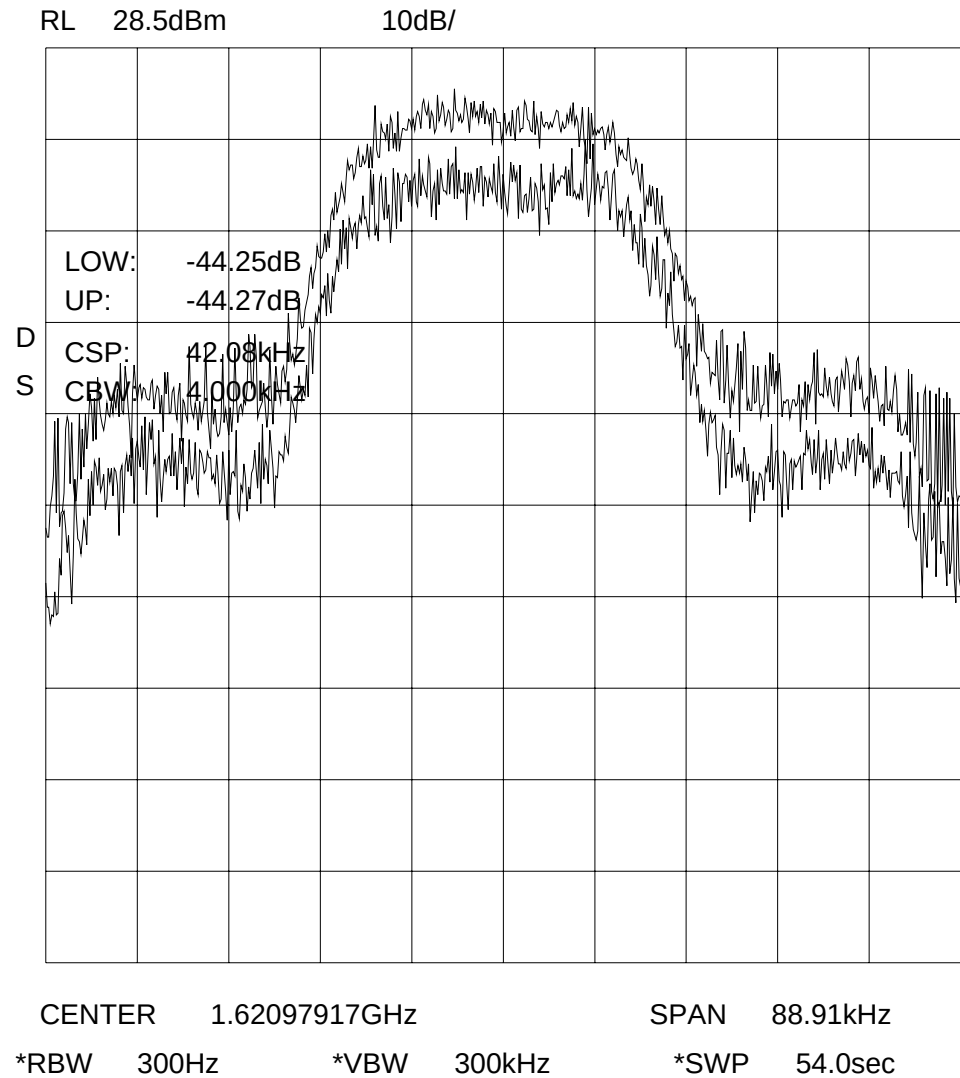


Operating channel no.: 120 (1620.97916667 MHz)

2 BW method

Attenuation at $f_{\text{nom}} - 51\%$: 33.37 dB

Attenuation at $f_{\text{nom}} + 51\%$: 36.82 dB

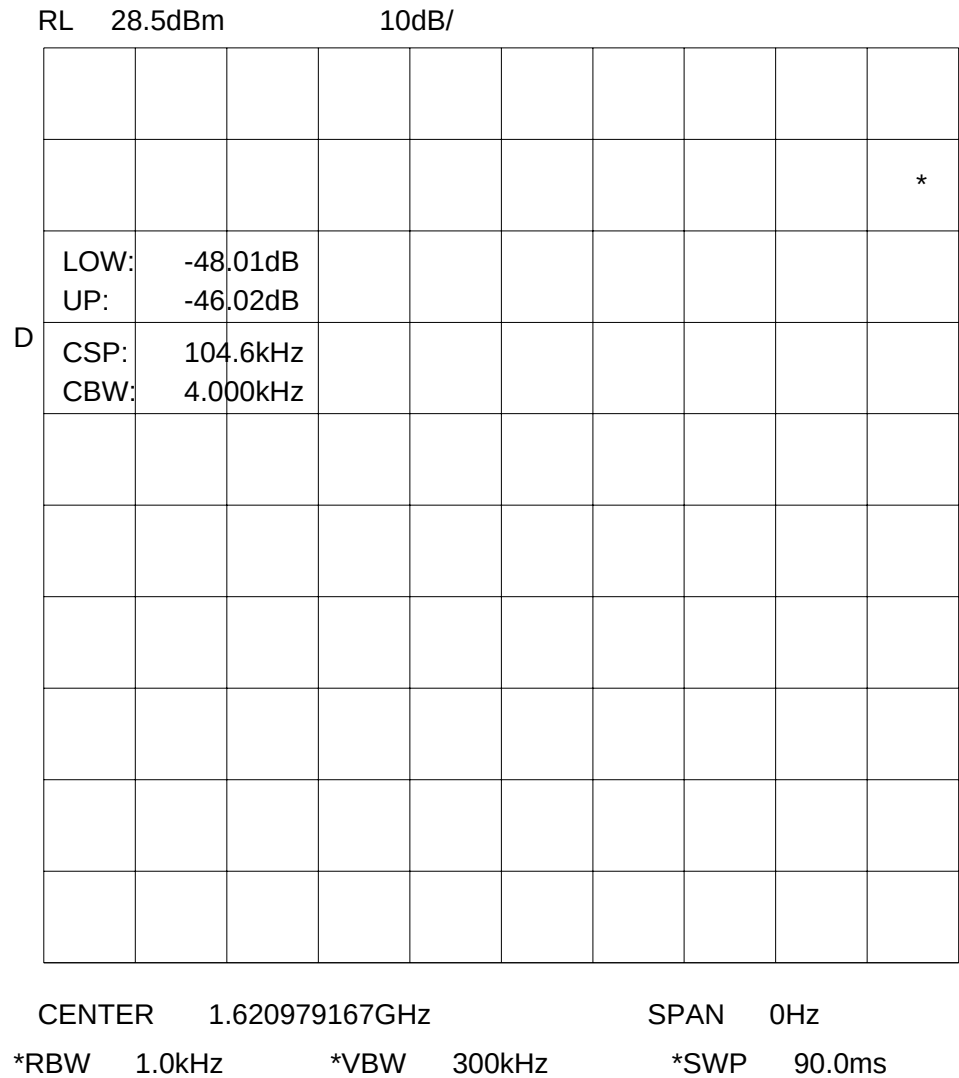


Operating channel no.: 120 (1620.97916667 MHz)

2 BW method

Attenuation at $f_{\text{nom}} - 101\%$: 44.25 dB

Attenuation at $f_{\text{nom}} + 101\%$: 44.27 dB

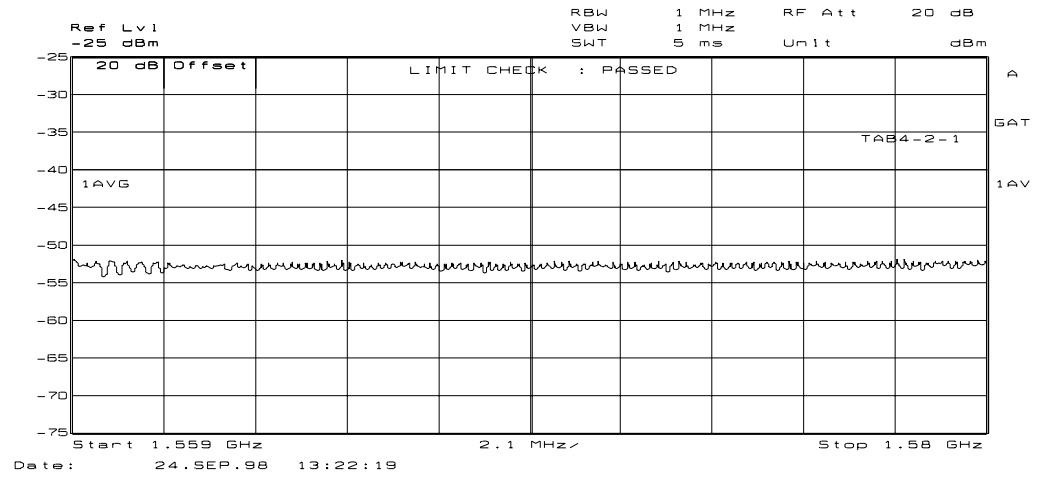
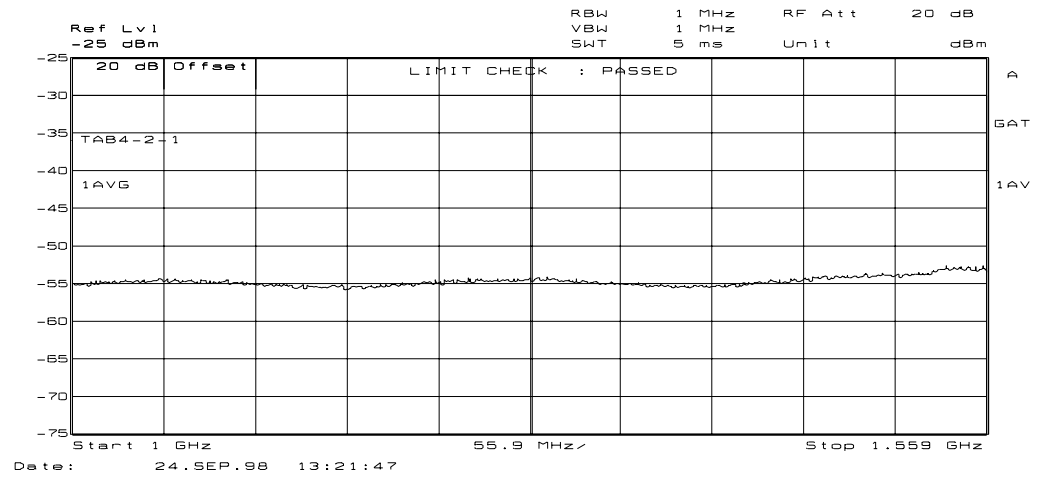


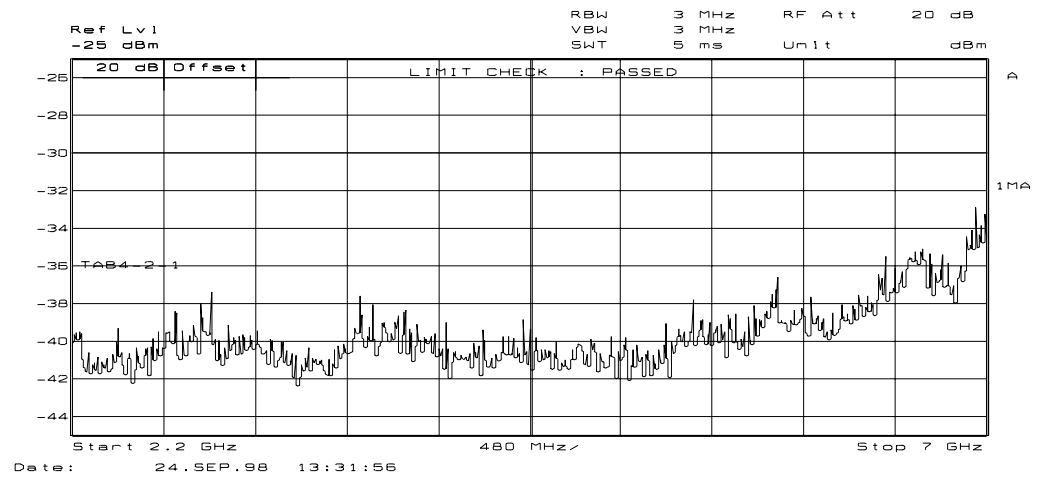
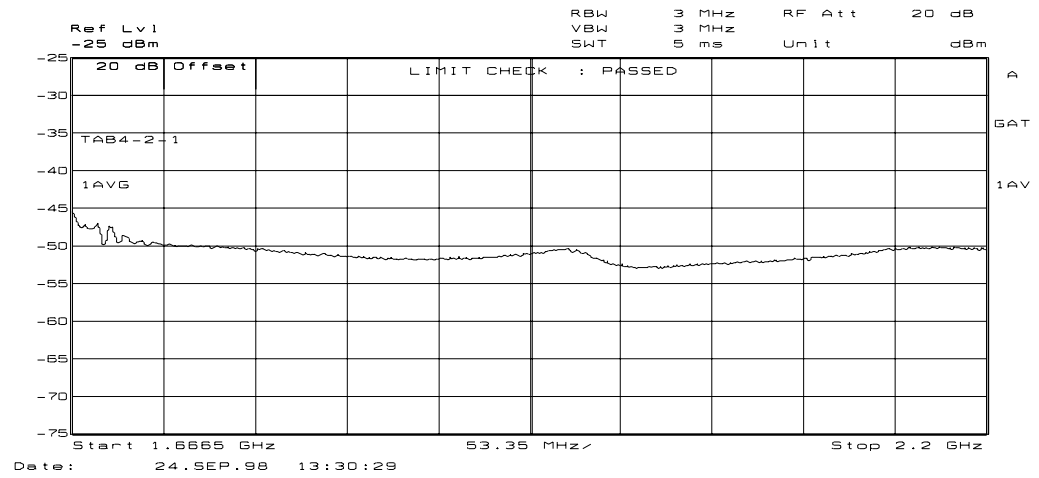
Operating channel no.: 120 (1620.97916667 MHz)

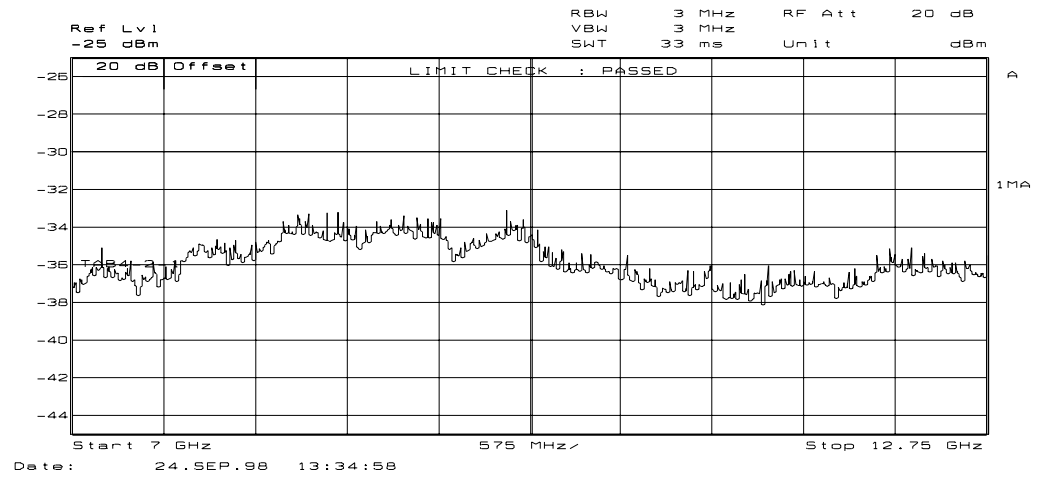
2 BW method

Attenuation at $f_{\text{nom}} - 251\%$: 48.01 dB

Attenuation at $f_{\text{nom}} + 251\%$: 46.02 dB





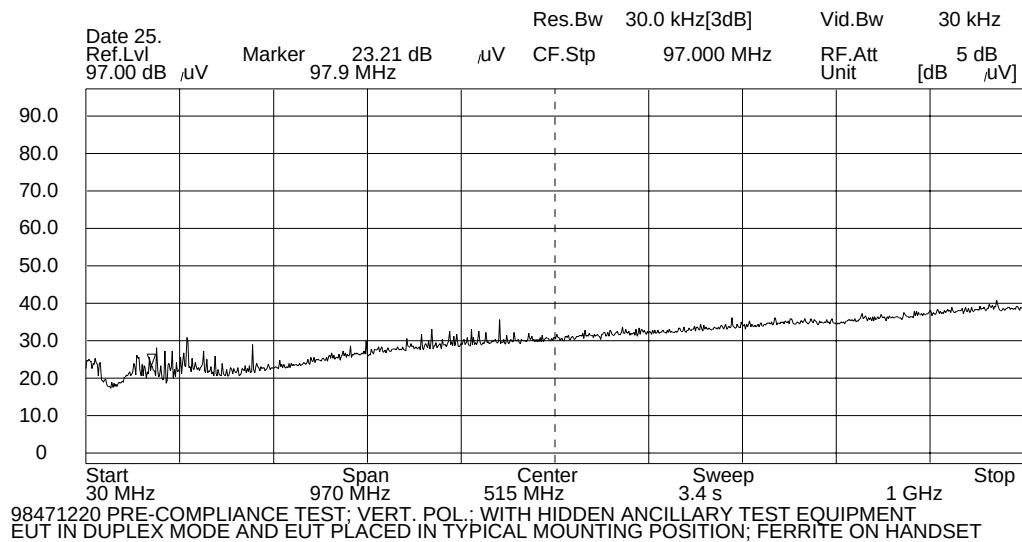
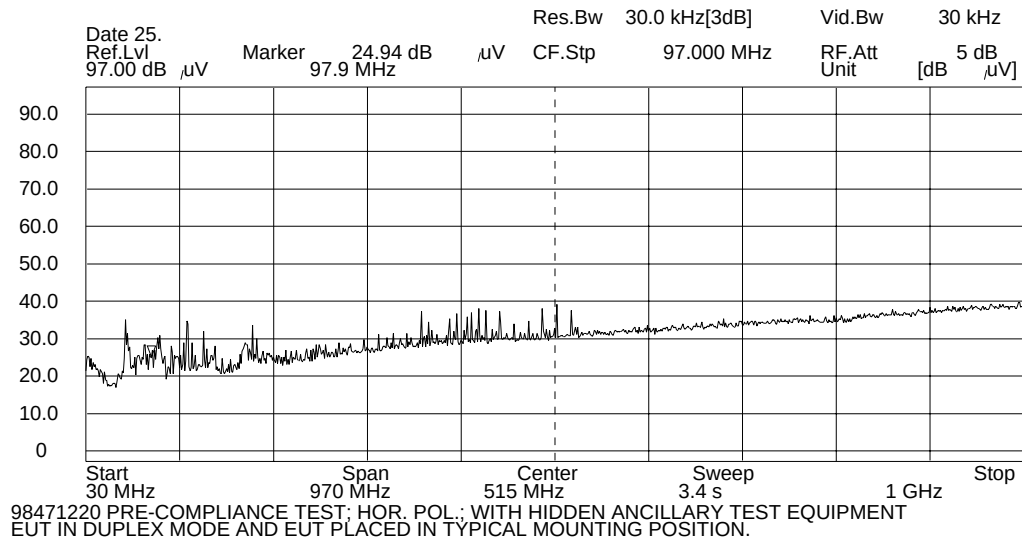


Section 6. Field Strength of Spurious Emissions

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 2.1053
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Test Results: Complies.

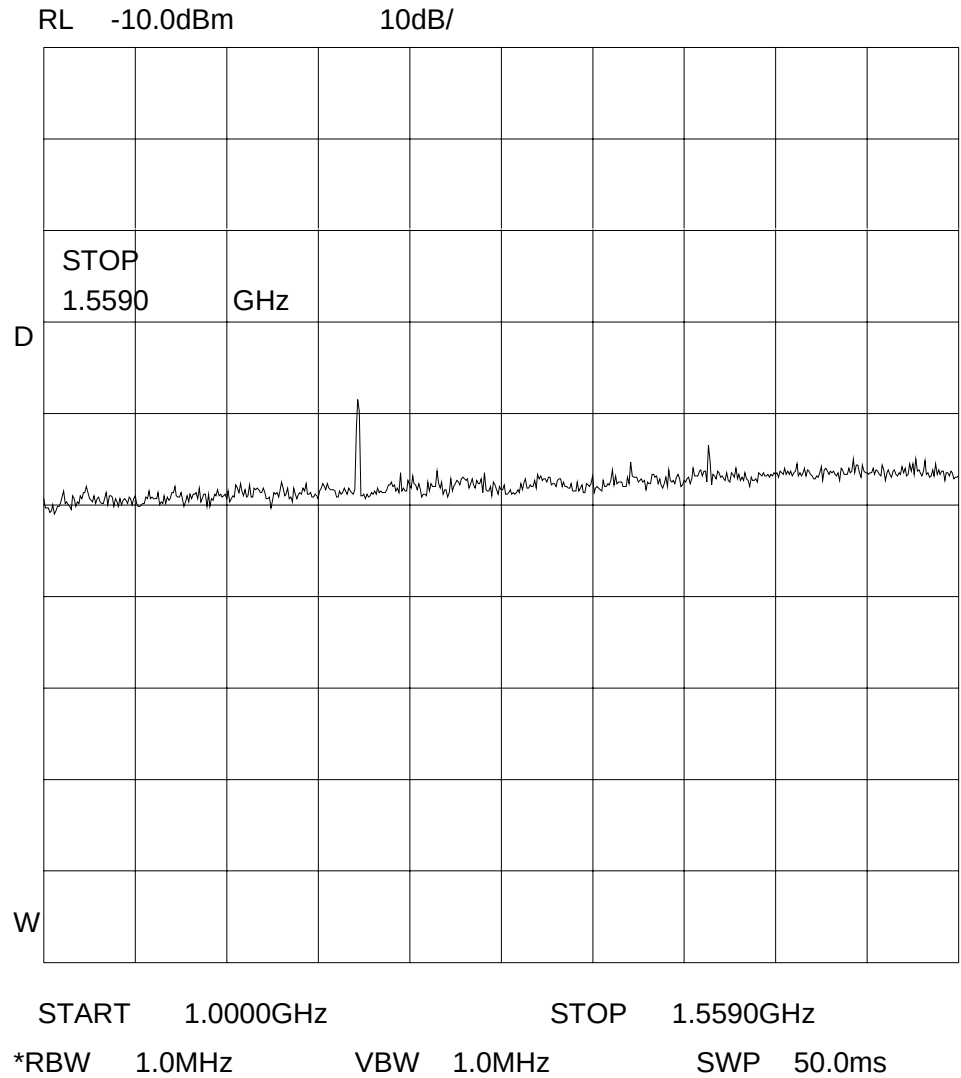
Test Data: The maximum E.I.R.P. is -68.33 dBW or -38.33 dBm.
See attached graphs for pre-scan tests.
See attached table and graphs for compliance tests.

Test Data - Radiated Emissions (Pre-scan)

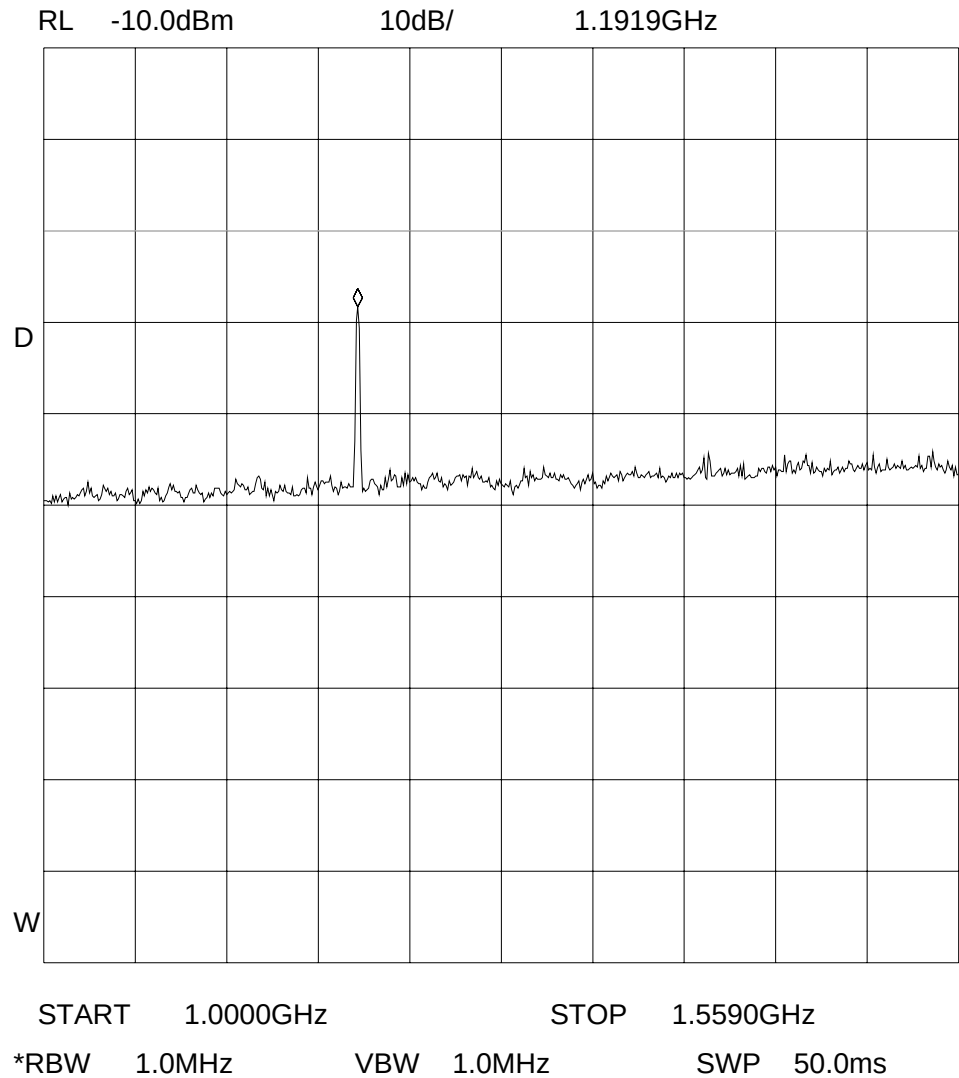
Test Data - Radiated Emissions (Compliance)

Frequency (MHz)	Pol. (V/H)	E.R.P. (dBW)
129.960	V	-101.1
138.839	V	-89.0
163.133	H	-99.7
164.234	V	-100.8
390.780	H	-104.7
457.130	V	-90.7
471.233	V	-91.6
479.256	V	-101.4
486.620	H	-97.7
493.997	V	-101.3
501.369	V	-95.9
575.251	H	-91.0
719.260	V	-87.4

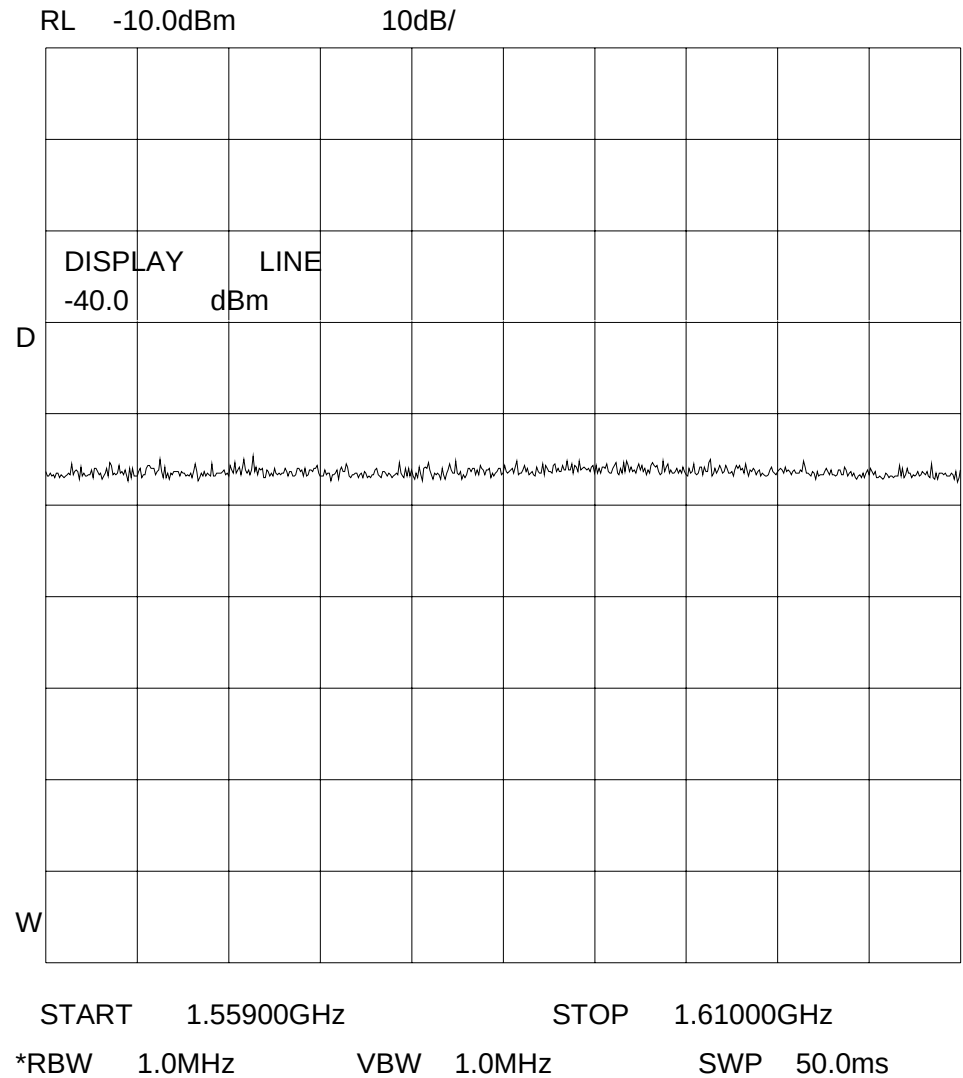
- Cabinet radiation
- Compliance test at 10 m Open Area Test Site (OATS KRQ (H44))



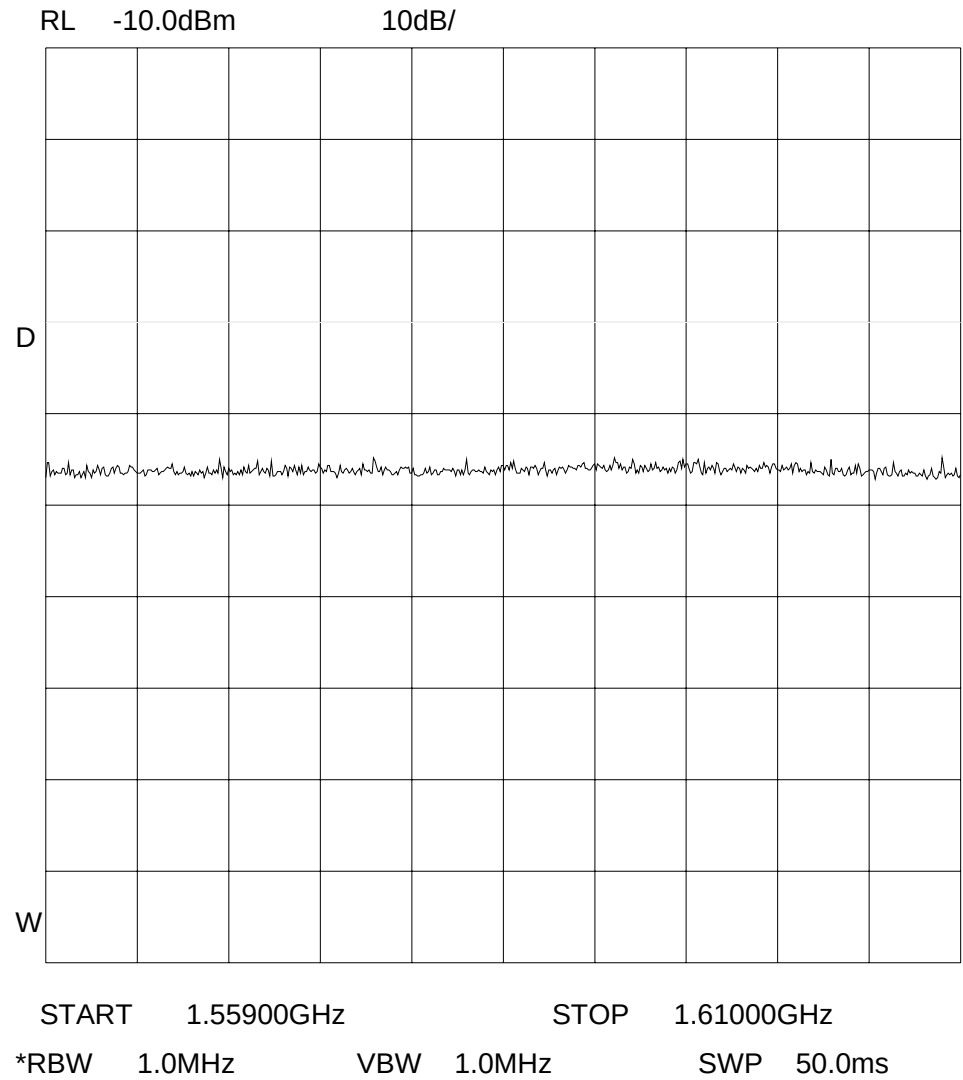
- Cabinet radiation
- Compliance test in 3 m Anechoic Chamber
- Horizontal polarization
- Amplitude units in dBm E.I.R.P.



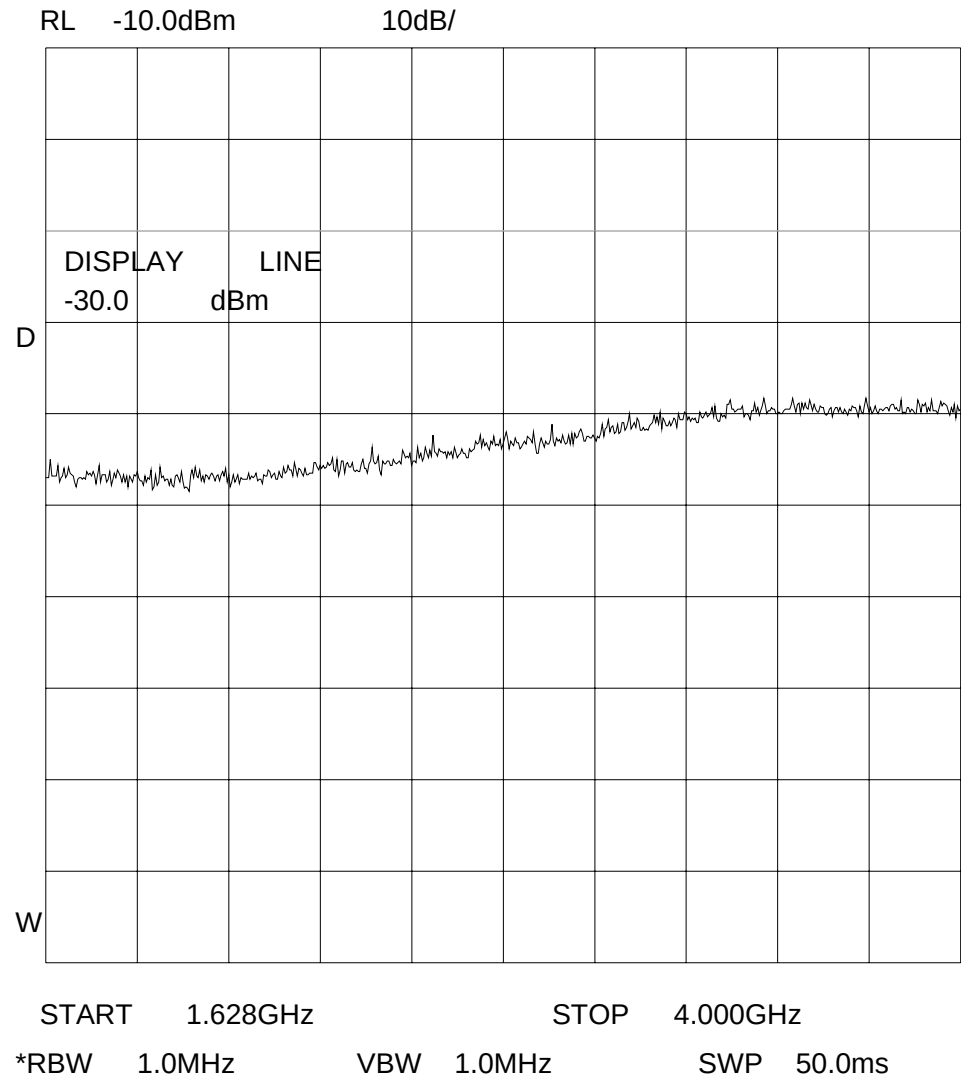
- Cabinet radiation
- Compliance test in 3 m Anechoic Chamber
- Vertical polarization
- Marker: -38.33 dBm
- Amplitude units in dBm E.I.R.P.



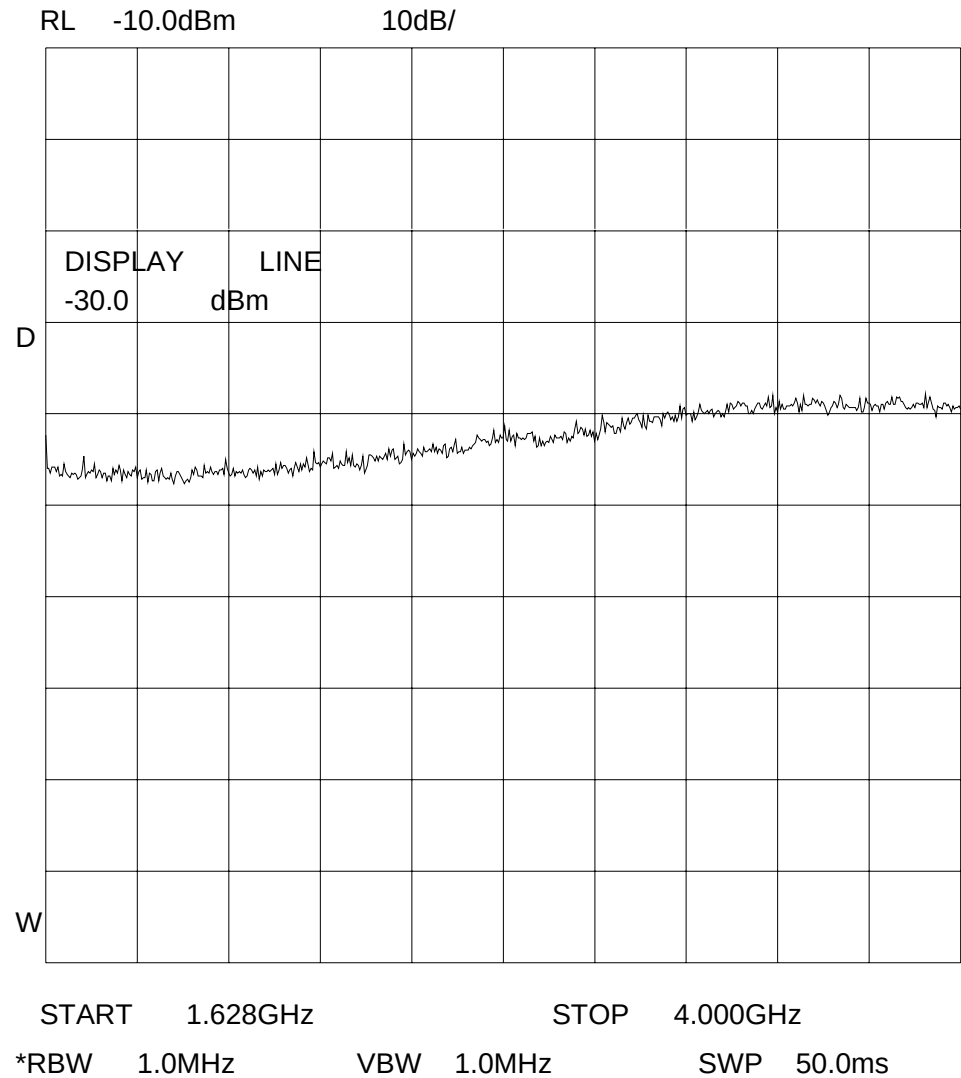
- Cabinet radiation
- Compliance test in 3 m Anechoic Chamber
- Horizontal polarization
- Amplitude units in dBm E.I.R.P.



- Cabinet radiation
- Compliance test in 3 m Anechoic Chamber
- Vertical polarization
- Amplitude units in dBm E.I.R.P.



- Cabinet radiation
- Compliance test in 3 m Anechoic Chamber
- Horizontal polarization
- Amplitude units in dBm E.I.R.P.



- Cabinet radiation
- Compliance test in 3 m Anechoic Chamber
- Vertical polarization
- Amplitude units in dBm E.I.R.P.

Section 7. Frequency Stability

NAME OF TEST: Frequency Stability	PARA. NO.: 25.202(d)
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Test Results: Complies.

Test Conditions: Standard Test Frequency: 1620.97916667 MHz
Standard Test Voltage: 24.0 Vdc

Measurement Data: See table.

FCC Title 47 Chapter I Subpart B Section no. 25.202(d)

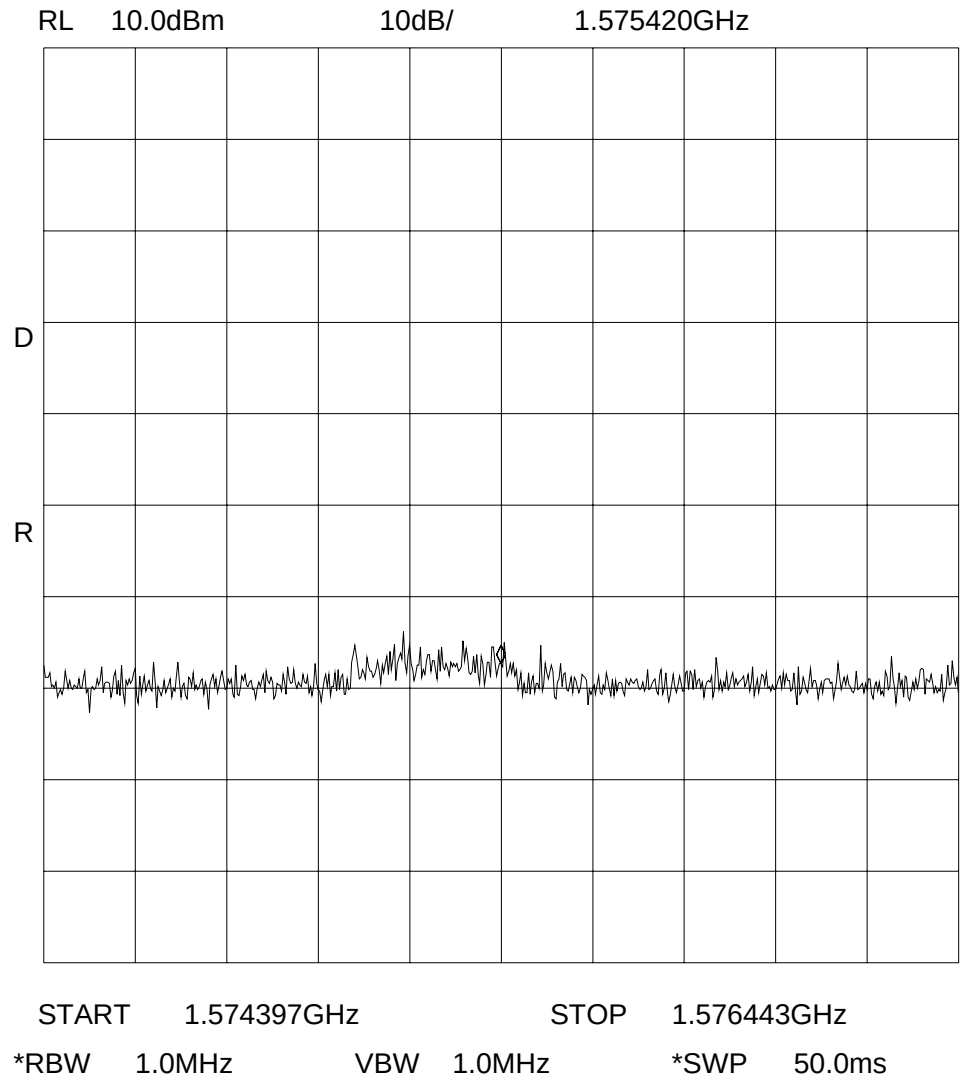
Supply Voltage	Temperature (°C)								
	-30	-20	-10	0	+10	+20	+30	+40	+50
	Frequency accuracy (ppm)								
20.4 V	-0,16	-0,26	-0,24	+0,05	+0,02	-0,1	-0,50	-0,52	-0,85
24.0 V	-0,36	-0,08	-0,03	-0,03	-0,01	-0,24	-0,29	-0,57	-0,88
27.6 V	-0,18	-0,01	+0,12	-0,03	+0,12	-0,11	-0,52	-0,54	-0,99

Section 8. Protection of Radionavigation/Satellite Service

NAME OF TEST: Protection of Radionavigation/Satellite Service	PARA. NO.: 25.213(b)
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Test Results: Complies.

Measurement Data: See graph.



- Marker: -57.33 dBm

Section 9. Test Equipment List

Equipment utilized for FCC part 25 § 25.202 (f), § 25.204 (a) and § 25.213 (b)			
<i>Description</i>	<i>Type</i>	<i>Serial number</i>	<i>Cal. due date</i>
EMI test receiver	R&S ESS	827742/002	29 Jan 2000
Biconical antenna	EMCO 3110	8908-1076	--
Logperiodical antenna	EMCO 3146	3294	--
Analyzer	HP 8563E	345A02969	10 May 2000
10 dB fixed attenuator	HP 8491A	s/n 58694	23 March 2000

Equipment utilized for FCC part 25 § 25.202 (d) (KTL-Arnhem property)			
<i>Description</i>	<i>Type</i>	<i>Serial number</i>	<i>Cal. due date</i>
Spectrum analyzer	HP 8563E	345A02969	10 May 2000
Splitter	R&S RVZ	825221/006	18 Sept. 2000
10 dB fixed attenuator	HP 8491A	58694	23 March 2000
6 dB fixed attenuator	HP 8491A	36209	23 March 2000
Crystal detector	HP 8470A	17825B	5 May 2000
Pulse generator	HP 8012B	2110A13129	29 June 2000

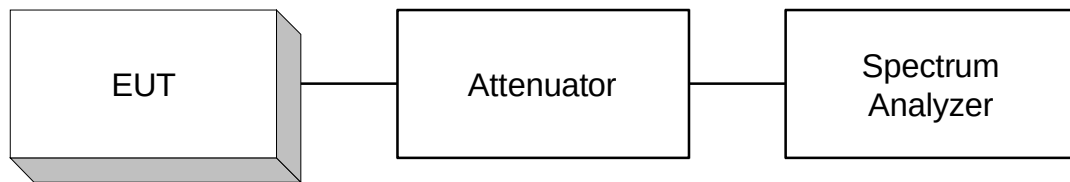
Equipment utilized for FCC part 25 § 25.202 (f) (Motorola Phoenix property)			
<i>Description</i>	<i>Type</i>	<i>Serial number</i>	<i>Cal. due date</i>
Spectrum analyzer	R&S ESMI	G53133	--
Attenuator 20 dB	Weinschel	AN1651	--
Pre-amplifier	HP 8447D	G12496	--
Spectrum analyzer	R&S FSEM	DE23123	--
Hygrom. & temp. ind.	Sufft	T56098	--

Annex A. Test Diagrams

Para. No. 2.1046 - R.F. Power Output

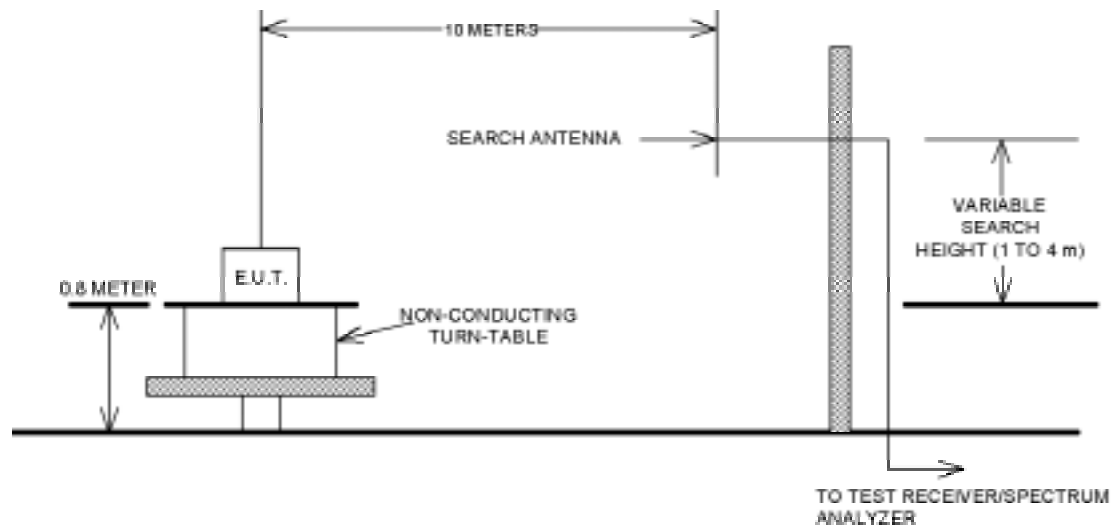
Para. No. 2.1049 - Occupied Bandwidth

Para. No. 2.1051 - Spurious Emissions at Antenna Terminals

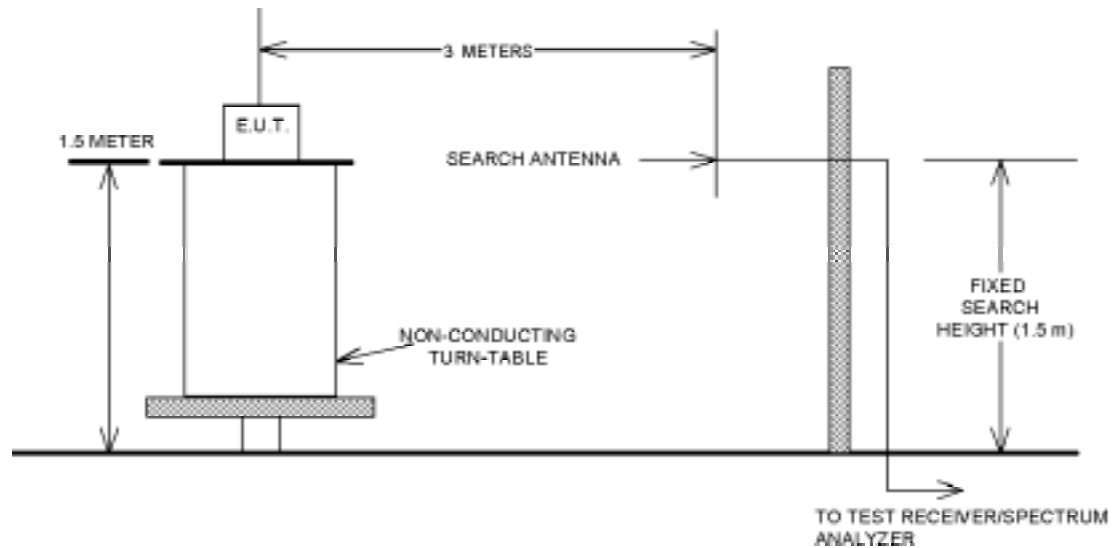


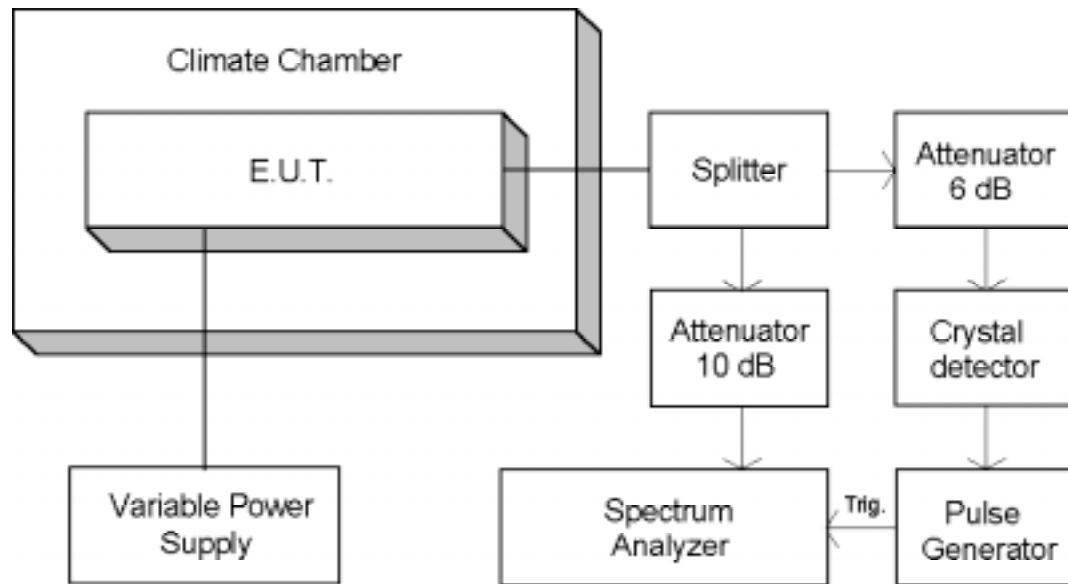
Para. No. 2.1053 - Field Strength of Radiation

<1 GHz:



>1 GHz:



Para. No. 2.1055 - Frequency Stability

10 MHz Reference