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# RADIO TEST REPORT

Project ID

**PRJ0045373**

Report ID

**REP021031**

Applicant:

**Barrett Communications Pty Ltd**

Model (HVIN):

**PRC-4090 System Docking Station**

Product name (PMN):

**SDR Transceiver**

FCC identifier:

**FCC ID: OW4-PRC4090MB**

ISED Certification number:

**IC: 6468A-4090MB**

Specifications:

**FCC 47 CFR Part 87**

Aviation Services

Date of issue: **May 14, 2025**

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**Kevin Rose, EMC/RF Specialist**

Tested by

Signature

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**Fahar A Sukkoor, EMC/RF Specialist**

Reviewed by

Signature

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ANAB File Number: AT-3195 (Ottawa); AT-3193 (Pointe-Claire); AT-3194 (Cambridge)





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Website	<a href="http://www.nemko.com">www.nemko.com</a>		

#### Limits of responsibility

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Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contained in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

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## Section 1. Report summary

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### 1.1 Applicant and manufacturer

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Company name	Barrett Communications Pty Ltd
Address	47 Discovery Drive, Bibra Lake
City	Perth
Province/State	Western Australia
Postal/Zip code	6163
Country	Australia

### 1.2 Test specifications

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FCC 47 CFR Part 87

Aviation Services

### 1.3 Test methods

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ANSI C63.26:2015

American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

### 1.4 Statement of compliance

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In the configuration tested, the EUT was found compliant.

Testing was completed against all relevant requirements of the test standard. Results obtained indicate that the product under test complies in full with the requirements tested. The test results relate only to the items tested.

See "Summary of test results" for full details.

### 1.5 Exclusions

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None

### 1.6 Test report revision history

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Revision #	Details of changes made to test report
REP021031	Original report issued

## Section 2. Summary of test results

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### 2.1 FCC Part 87 test results

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Part	Test description	Verdict
§87.131	Power and emissions	Pass
2.1047	Modulation characteristics	Reported
87.141(d)	Modulation requirements	Pass
87.139(c)	Emission limits, conducted method	Pass
87.139(c)	Emission limits, radiated method	Pass
87.133(c)	Frequency stability	Pass

Notes: None

## Section 3. Equipment under test (EUT) details

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### 3.1 Sample information

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Receipt date	October 10, 2023
Nemko sample ID number	PRJ00453730001

### 3.2 EUT information

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Product name	SDR Transceiver
Model	PRC-4090 System Docking Station
Serial number	402412160

### 3.3 Technical information

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Operating band	1.705–30 MHz
Test frequencies	1.722, 16.1, and 27.86 MHz
Modulation type	J3E and H3E
Occupied bandwidth (99 %)	2.7 kHz (J3E), 3 kHz (H3E)
Power requirements	24 Vdc
Emission designator	2K70J3E, 3K00H3E
Antenna information	Various antenna type based on the manual

### 3.4 Product description and theory of operation

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The PRC-4090 System Docking Station is an SDR based HF SSB transceiver with a frequency range of 1.705 to 30 MHz in transmit and 250 kHz to 30 MHz in receive. The Barrett PRC-4090 is designed using the latest technology enabling a physically small package with a full feature complement.

Designed to operate in the most arduous environments, as encountered in portable, off-road vehicles, vessels and aircraft environments, the Barrett PRC-4090 will provide many years of efficient and trouble free service.

The Barrett PRC-4090 supports features such as digital voice, data transmission and remote diagnostics as well as established features such as Selective Call (Selcall), direct dial telephone connection to base stations fitted with telephone interconnect systems (Telcall), GPS location, 2G and 3G ALE (Automatic Link Establishment) and frequency hopping. These features make the Barrett PRC-4090 transceiver one of the most economical and versatile HF transceivers available today.

The Barrett PRC-4090 transceiver caters for increased use of HF data transmission for Internet email access and point-to-point data applications, by providing a comprehensive data modem interface port, high speed transmit-to-receive switching, a high stability frequency standard and an efficient cooling system option.

The Barrett PRC-4090 is operated by a smartphone-style touchscreen, full colour Control Handset. The handset integrates seamlessly into manpack, vehicle and base station installations when used with the cradle and cradle docking station. The streamlined design and unobtrusive size can easily mount to a vehicle dashboard or vessel helm.

The Barrett PRC-4090 transceiver can be controlled from all major mobile and desktop platforms. Full remote control is available via the Barrett PRC-4090 Remote Control app, providing unprecedented access to all transceiver functionality across all major platforms.

Teamed with other matching Barrett products which include antennas, power supplies, vehicle tracking packages and HF modems, the Barrett PRC-4090 transceiver becomes a powerful tool, providing solutions to many long distance communication requirements.

Operated 24 V DC supply, the transmitter is rated at 150 watt PEP (when connected to DC via the System Docking Station (SDS)) respectively in voice and data mode and is protected from over-voltage or reverse-voltage application.

Auxiliary features such as Selcall, Telcall, scanning, mute status, alarm system etc. can be individually enabled or disabled for every channel as required to suit your operation.

### 3.5 EUT exercise details

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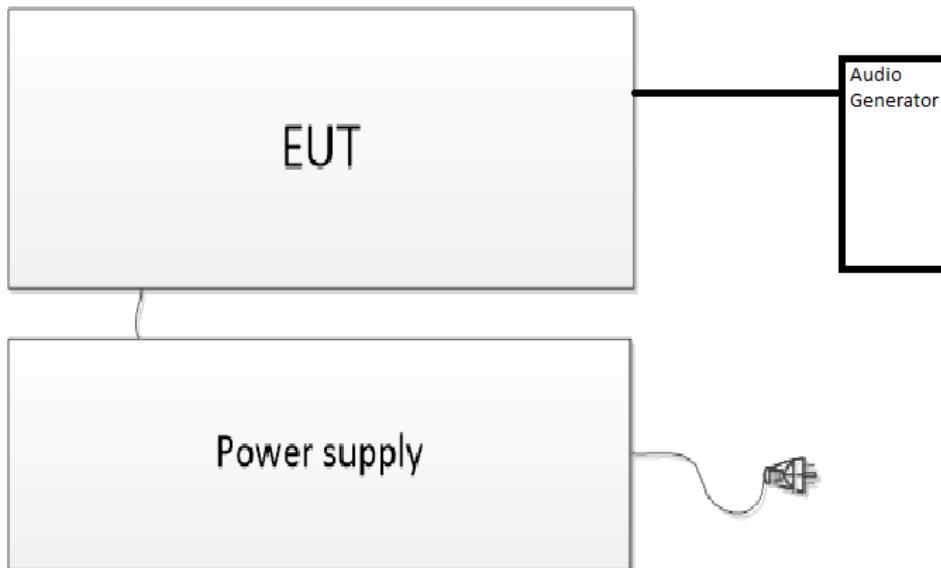
The EUT was programmed for the low, mid, and high channels

J3E modulation used 400 and 1800 Hz audio input tone

H3E modulation used 1500 Hz audio input tone

### 3.6 EUT setup diagram

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*Figure 3.6-1: Setup diagram*

### 3.7 EUT sub assemblies

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*Table 3.7-1: EUT sub assemblies*

Description	Brand name	Model/Part number	Serial number
Power supply 24 VDC	Barrett	PRC-4022	402412150
SDR Transceiver	Barrett	PRC-4090	402412160

### 3.8 EUT Support Equipment

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*Table 3.8-1: EUT support equipment*

Description	Brand name	Model/Part number	Serial number
Audio generator	Agilent	33500B	N/A

## Section 4. Engineering considerations

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### 4.1 Modifications incorporated in the EUT

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There were no modifications performed to the EUT during this assessment.

### 4.2 Technical judgment

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None

### 4.3 Deviations from laboratory tests procedures

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No deviations were made from laboratory procedures.

## Section 5. Test conditions

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### 5.1 Atmospheric conditions

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Temperature	15–30 °C
Relative humidity	20–75 %
Air pressure	860–1060 mbar

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

### 5.2 Power supply range

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The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages  $\pm 5\%$ , for which the equipment was designed.

## Section 6. Measurement uncertainty

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### 6.1 Uncertainty of measurement

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UKAS Lab 34 and TIA-603-B have been used as guidance for measurement uncertainty reasonable estimations with regards to previous experience and validation of data. Nemko Canada, Inc. follows these test methods in order to satisfy ISO/IEC 17025 requirements for estimation of uncertainty of measurement for wireless products.

Measurement uncertainty budgets for the tests are detailed below. Measurement uncertainty calculations assume a coverage factor of  $K = 2$  with 95% certainty.

Test name	Measurement uncertainty, dB
All antenna port measurements	0.55
Conducted spurious emissions	1.13
Radiated spurious emissions	3.78
AC power line conducted emissions	3.55

## Section 7. Test equipment

### 7.1 Test equipment list

*Table 7.1-1: Equipment list*

Equipment	Manufacturer	Model no.	Asset no.	Cal./Ver. cycle	Next cal./ver.
3 m EMI test chamber	TDK	SAC-3	FA002047	1 year	January 19, 2024
Flush mount turntable	SUNAR	FM2022	FA003006	—	NCR
Controller	SUNAR	SC110V	FA002976	—	NCR
Antenna mast	SUNAR	TLT2	FA003007	—	NCR
AC Power source	Chroma		FA003020	—	NCR
Receiver/spectrum analyzer	Rohde & Schwarz	ESU 40	FA002071	1 year	March 2, 2024
Bilog antenna (20–3000 MHz)	Sunol	JB3	FA002108	1 year	March 7, 2024
Active loop antenna (0.01–30 MHz)	Com-Power	AL-130	FA002722	1 year	April 3, 2024
Spectrum analyzer	Rohde & Schwarz	FSW50	FA002971	1 year	December 31, 2023
Temperature chamber	Thermotron	SM-16C	FA001030	1 year	January 24, 2024
Audio Generator	Agilent	33500 B series	None	N/A	NCR
Attenuator	Narda	776B-20	FA001153	—	VOU
Attenuator	Narda	769-20	FA001394	—	VOU

Note: NCR - no calibration required, VOU - verify on use

## Section 8. Test data

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### 8.1 FCC 87.131 Power and emissions

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#### 8.1.1 Definitions and limits

Class of station	Frequency band/frequency	Authorized emission(s) <sup>2</sup>	Maximum power <sup>1</sup>
Aeronautical enroute and aeronautical fixed	HF	R3E, H3E, J3E, J7B, H2B, J2D	6 kW

<sup>1</sup>The power is measured at the transmitter output terminals and the type of power is determined according to the emission designator as follows:

(i) Mean power (pY) for amplitude modulated emissions and transmitting both sidebands using unmodulated full carrier.

(ii) Peak envelope power (pX) for all emission designators other than those referred to in paragraph (i) of this note.

<sup>2</sup>Excludes automatic link establishment.

#### 8.1.2 Test summary

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Verdict	Pass	Test date	November 15, 2023
Tested by	Kevin Rose		

#### 8.1.3 Observations, settings and special notes

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##### Test conditions

Audio input	1500 Hz
Modulation	H3E
Audio input	400 Hz and 1800 Hz
Modulation	J3E

##### Test receiver settings:

Detector mode	Peak
Resolution bandwidth	>OBW
Video bandwidth	= >RBW
Trace mode	Max Hold
Measurement time	Auto

#### 8.1.4 Test data

**Table 8.1-1: results 150 W system operation J3E**

Modulation	Frequency, MHz	RF output power, dBm	Limit, dBm	Margin, dB
J3E	1.722	50.97	67.78	16.81
J3E	16.1	51.61	67.78	16.17
J3E	27.86	51.10	67.78	16.68

**Table 8.1-2: results 125 W system operation J3E**

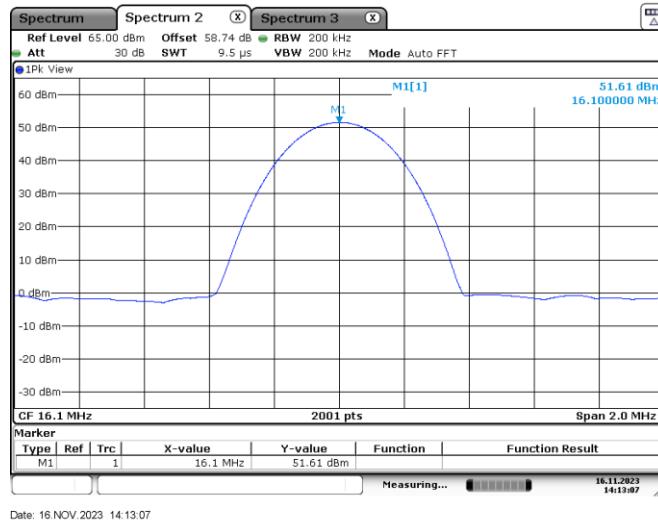
Modulation	Frequency, MHz	RF output power, dBm	Limit, dBm	Margin, dB
J3E	1.722	50.58	67.78	17.20
J3E	16.1	51.05	67.78	16.73
J3E	27.86	51.19	67.78	16.59

**Table 8.1-3: results 30 W system operation J3E**

Modulation	Frequency, MHz	RF output power, dBm	Limit, dBm	Margin, dB
J3E	1.722	44.72	67.78	23.06
J3E	16.1	45.20	67.78	22.58
J3E	27.86	44.87	67.78	22.91

**Table 8.1-4: results 10 W system operation J3E**

Modulation	Frequency, MHz	RF output power, dBm	Limit, dBm	Margin, dB
J3E	1.722	40.33	67.78	27.45
J3E	16.1	40.66	67.78	27.12
J3E	27.86	40.33	67.78	27.45



**Figure 8.1-1: J3E modulation, output power Example**

### 8.1.1 Test data

Table 8.1-5: results 150 W system operation H3E

Modulation	Frequency, MHz	RF output power, dBm	Limit, dBm	Margin, dB
H3E	1.722	51.57	67.78	16.21
H3E	16.10	51.66	67.78	16.12
H3E	27.86	51.34	67.78	16.44

Table 8.1-6: results 125 W system operation H3E

Modulation	Frequency, MHz	RF output power, dBm	Limit, dBm	Margin, dB
H3E	1.722	50.52	67.78	17.26
H3E	16.10	51.05	67.78	16.73
H3E	27.86	51.18	67.78	16.6

Table 8.1-7: results 30 W system operation H3E

Modulation	Frequency, MHz	RF output power, dBm	Limit, dBm	Margin, dB
H3E	1.722	44.72	67.78	23.06
H3E	16.10	45.20	67.78	22.58
H3E	27.86	45.10	67.78	22.68

Table 8.1-8: results 10 W system operation H3E

Modulation	Frequency, MHz	RF output power, dBm	Limit, dBm	Margin, dB
H3E	1.722	40.23	67.78	27.55
H3E	16.10	40.67	67.78	27.11
H3E	27.86	40.33	67.78	27.45

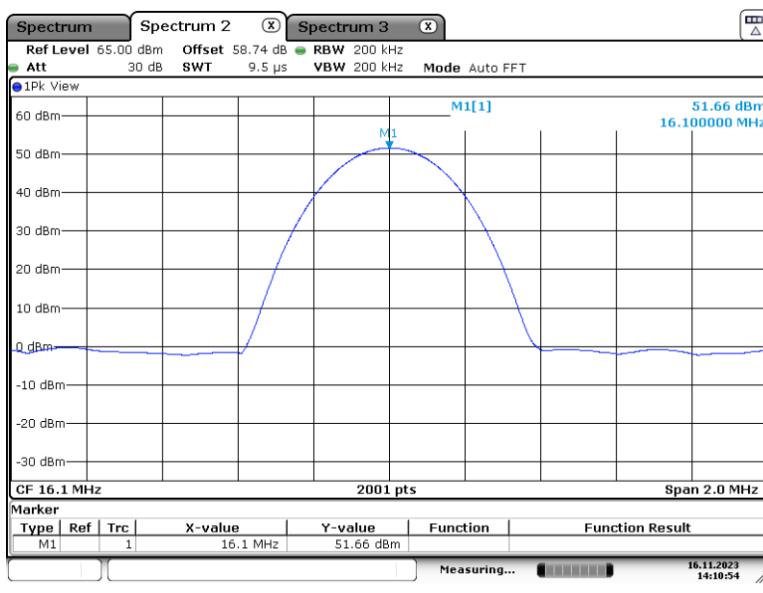


Figure 8.1-2: H3E modulation, output power Example

## 8.2 FCC 2.1047 Modulation characteristics

### 8.2.1 Definitions and limits

(a) 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.

(b) *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.

(c) Single sideband and independent sideband radiotelephone transmitters which employ a device or circuit to limit peak envelope power. A curve showing the peak envelope power output versus the modulation input voltage shall be supplied. The modulating signals shall be the same in frequency as specified in paragraph (c) of §2.1049 for the occupied bandwidth tests.

## 8.2.2 Test summary

Verdict	Pass	Test date	November 16, 2023
Tested by	Kevin Rose		

### 8.2.3 Observations, settings and special notes

None

#### 8.2.4 Test data

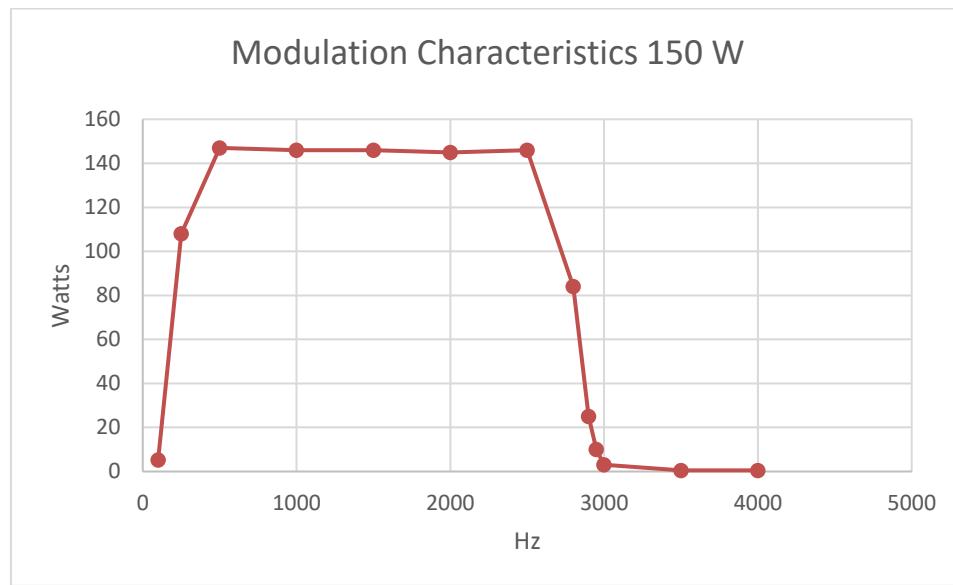


Figure 8.2-1: Modulation Characteristic Audio Frequency Response

Table 8.2-1: Modulation characteristics, frequency response results 150 Watts

Input Frequency, Hz	Output power, Watts
100	5.25
250	108
500	147
1000	146
1500	146
2000	145
2500	146
2800	84
2900	25
2950	10
3000	3
3500	0.5
4000	0.5
5000	0.5

Note: the input level we reduced to see the true audio response. The EUT shuts down when it exceeds the limit.

**Table 8.2-2: Modulation characteristics, modulation limiting results 150 Watts**

1.722 MHz		16.1 MHz		27.86 MHz	
Input Audio, V p-p	Output power, Watts	Input Audio, V p-p	Output power, Watts	Input Audio, V p-p	Output power, Watts
0.1	1.72	0.1	0.3	0.1	0.7
0.2	5.6	0.2	1.5	0.2	2.9
0.3	13	0.3	3.7	0.3	6.5
0.4	26	0.4	7.4	0.4	11.3
0.5	43	0.5	12.3	0.5	17
0.6	68	0.6	19	0.6	24
0.7	100	0.7	30	0.7	33
0.8	135	0.8	44	0.8	44
0.9	150	0.9	57	0.9	54
1	150	1	70	1	64
1.1	151	1.1	84	1.1	75
1.5	150	1.2	100	1.2	87
		1.3	118	1.3	100
		1.4	134	1.4	115
		1.5	147	1.5	129
		1.6	148	1.6	132
		1.7	148	1.7	139
		1.8	148	1.8	139
		1.9	148	1.9	139
		2	149	2	139

**Table 8.2-3: Modulation characteristics, modulation limiting results 125 Watts**

1.722 MHz		16.1 MHz		27.86 MHz	
Input Audio, V p-p	Output power, Watts	Input Audio, V p-p	Output power, Watts	Input Audio, V p-p	Output power, Watts
0.1	0.4	0.1	1.6	0.1	2.3
0.2	2	0.2	7	0.2	9
0.3	6.8	0.3	18	0.3	19
0.4	16	0.4	37	0.4	33
0.5	30	0.5	61	0.5	50
0.6	53	0.6	92	0.6	72
0.7	83	0.7	122	0.7	97
0.8	116	0.8	127	0.8	114
0.9	126	0.9	127	0.9	115
1	126	1	127	1	115
1.1	126	1.1	127	1.1	115
1.5	126	1.2	127	1.2	115
		1.3	127	1.3	115
		1.4	127	1.4	115
		1.5	127	1.5	115
		1.6	127	1.6	115
		1.7	127	1.7	115
		1.8	127	1.8	115
		1.9	127	1.9	115
		2	127	2	115

Table 8.2-4: Modulation characteristics, modulation limiting results 30 Watts

1.722 MHz		16.1 MHz		27.86 MHz	
Input Audio, V p-p	Output power, Watts	Input Audio, V p-p	Output power, Watts	Input Audio, V p-p	Output power, Watts
0.1	0.2	0.1	0.5	0.1	0.5
0.2	0.9	0.2	2	0.2	2
0.3	2	0.3	4.5	0.3	4.5
0.4	4	0.4	8	0.4	7.5
0.5	0.6	0.5	12.4	0.5	11
0.6	10	0.6	18.5	0.6	15.4
0.7	15	0.7	26	0.7	21
0.8	22	0.8	33	0.8	27.5
0.9	29.9	0.9	33	0.9	31.3
1	30	1	33	1	31.3
1.1	30	1.1	33	1.1	31.3
1.5	30	1.2	33	1.2	31.3
		1.3	33	1.3	31.3
		1.4	33	1.4	31.3
		1.5	33	1.5	31.3
		1.6	33	1.6	31.3
		1.7	33	1.7	31.3
		1.8	33	1.8	31.3
		1.9	33	1.9	31.3
		2	33	2	31.3

Table 8.2-5: Modulation characteristics, modulation limiting results 10 Watts

1.722 MHz		16.1 MHz		27.86 MHz	
Input Audio, V p-p	Output power, Watts	Input Audio, V p-p	Output power, Watts	Input Audio, V p-p	Output power, Watts
0.1	0.2	0.1	0.5	0.1	0.5
0.2	1	0.2	2.1	0.2	1.8
0.3	2.5	0.3	4.8	0.3	4.1
0.4	4.5	0.4	8.4	0.4	6.9
0.5	7.3	0.5	11.8	0.5	10.24
0.6	10.5	0.6	11.5	0.6	10.7
0.7	10	0.7	11.5	0.7	10.8
0.8	10	0.8	11.5	0.8	10.8
0.9	10.3	0.9	11.5	0.9	10.8
1	10.3	1	11.5	1	10.8
1.1	10.4	1.1	11.5	1.1	10.8
1.5	10.4	1.2	11.5	1.2	10.8
		1.3	11.5	1.3	10.8
		1.4	11.5	1.4	10.8
		1.5	11.5	1.5	10.8
		1.6	11.5	1.6	10.8
		1.7	11.5	1.7	10.8
		1.8	11.5	1.8	10.8
		1.9	11.5	1.9	10.8
		2	11.5	2	10.8

## 8.3 FCC 87.139(c) Emission limits, emission mask

### 8.3.1 Definitions and limits

(c) For aircraft station transmitters first installed after February 1, 1983, and for aeronautical station transmitters in use after February 1, 1983, and using H2B, H3E, J3E, J7B or J9W, the peak envelope power of any emissions must be attenuated below the peak envelope power of the transmitter ( $p_X$ ) as follows:

- 1) When the frequency is removed from the assigned frequency by more than 50 percent up to and including 150 percent of the authorized bandwidth of 3.0 kHz, the attenuation must be at least 30 dB.
- 2) When the frequency is removed from the assigned frequency by more than 150 percent up to and including 250 percent of the authorized bandwidth of 3.0 kHz, the attenuation must be at least 38 dB.
- 3) When the frequency is removed from the assigned frequency by more than 250 percent of the authorized bandwidth of 3.0 kHz for aircraft transmitters the attenuation must be at least 43 dB. For aeronautical station transmitters with transmitter power up to and including 50 watts the attenuation must be at least  $43 + 10 \log_{10} p_X$  dB and with transmitter power more than 50 watts the attenuation must be at least 60 dB.

### 8.3.2 Test summary

Verdict	Pass	Tested by	Kevin Rose	Test date	November 16, 2023
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### 8.3.3 Observations, settings and special notes

Test conditions

Audio input	1500 Hz
Modulation	H3E

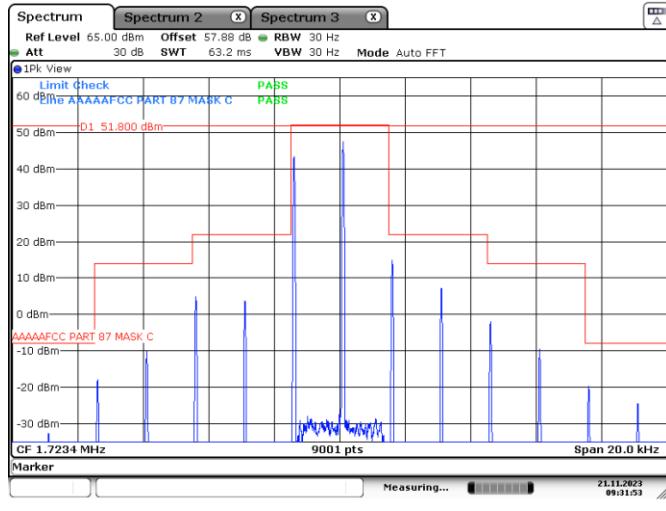
Audio input	400 Hz and 1800 Hz
Modulation	J3E

Note: the EUT has an Audio low-pass filter.

Spectrum analizer settings:

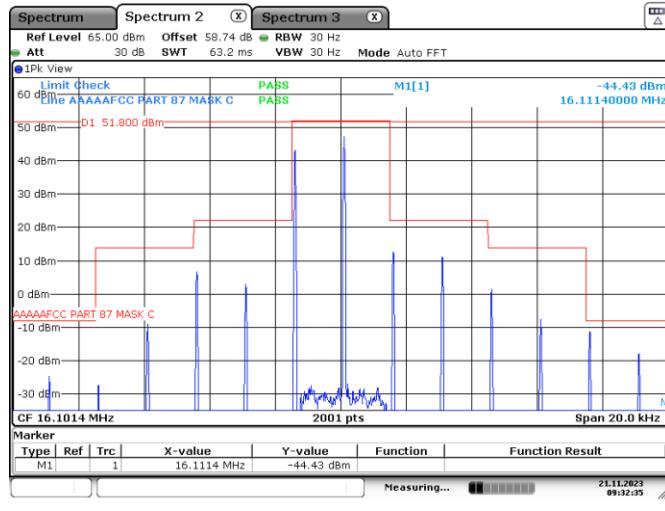
Detector mode	Peak
Resolution bandwidth	30 Hz and 300 Hz
Video bandwidth	$\geq$ RBW
Trace mode	Max Hold

### 8.3.4 Test data



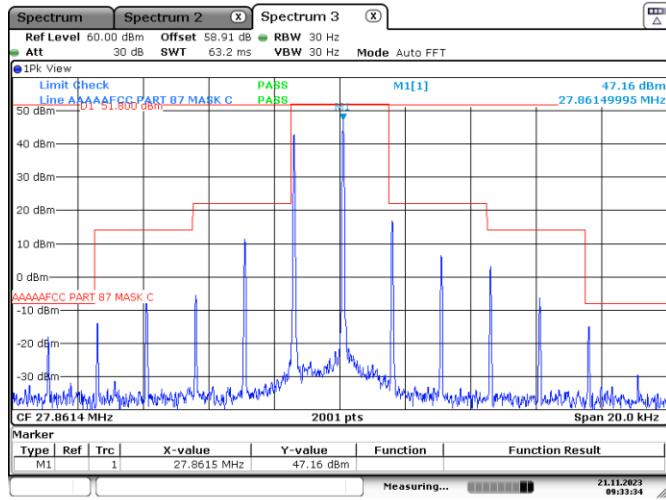
Date: 21.NOV.2023 09:31:54

Figure 8.3-1: Low channel Mask 150W H3E



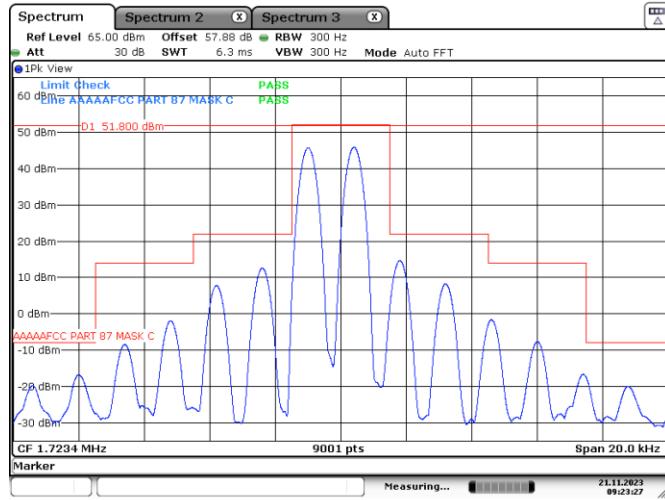
Date: 21.NOV.2023 09:32:35

Figure 8.3-2: Mid channel Mask 150W H3E



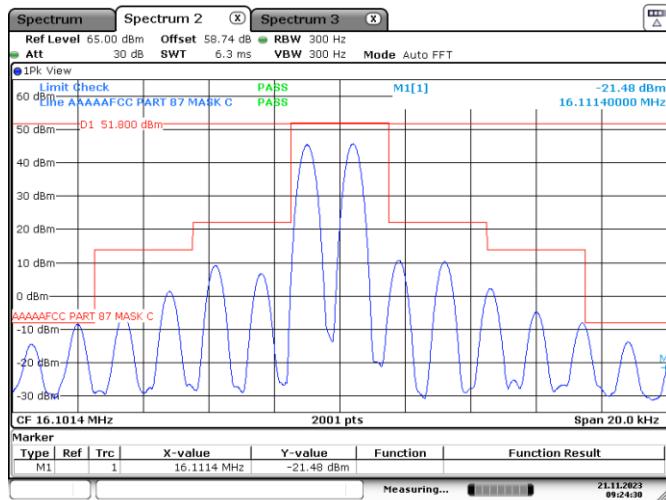
Date: 21.NOV.2023 09:33:34

Figure 8.3-3: High channel Mask 150W H3E



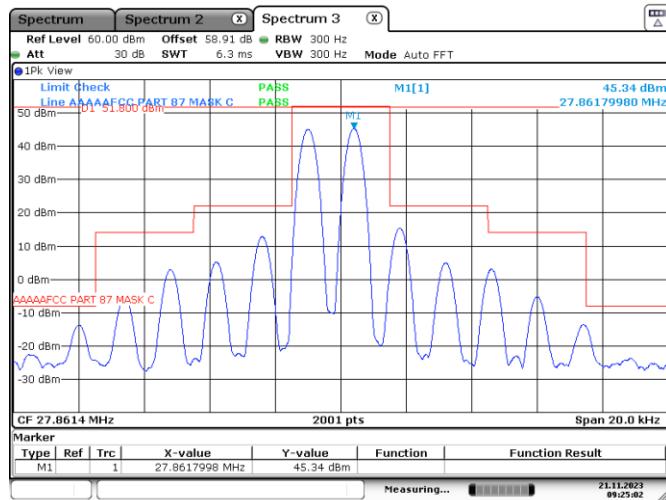
Date: 21.NOV.2023 09:23:27

Figure 8.3-4: Low channel Mask 150W J3E



Date: 21.NOV.2023 09:24:31

Figure 8.3-5: Mid channel Mask 150W J3E



Date: 21.NOV.2023 09:25:02

Figure 8.3-6: High channel Mask 150W J3E

## 8.4 FCC 87.141(d) Modulation requirements

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### 8.4.1 Definitions and limits

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(d) Single sideband transmitters must be able to operate in the following modes:

<b>Carrier mode</b>	<b>Level N(dB) of the carrier with respect to peak envelope power</b>
Full carrier (H3E)	0>N>-6
Suppressed carrier (J3E)	Aeronautical stations N<-40.

### 8.4.2 Test summary

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Verdict	Pass		
Tested by	Kevin Rose	Test date	November 17, 2023

### 8.4.3 Observations, settings and special notes

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Test conditions

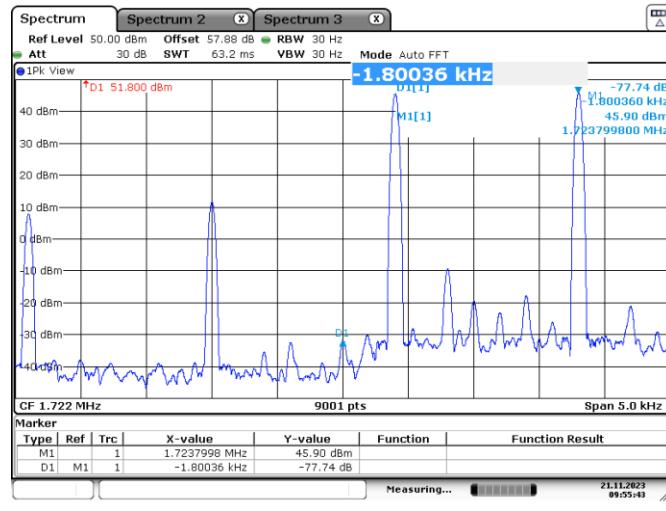
Audio input	1500 Hz
Modulation	H3E

Audio input	400 Hz and 1800 Hz
Modulation	J3E

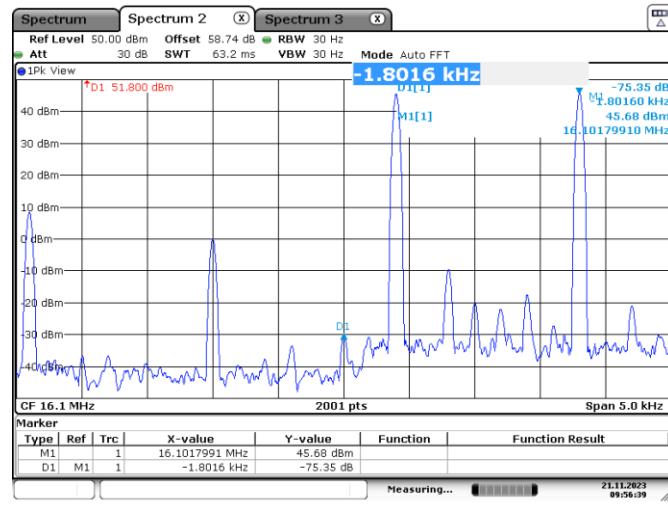
Spectrum analyzer settings:

Detector mode	Peak
Resolution bandwidth	30 Hz
Video bandwidth	= > 30 Hz
Trace mode	Max Hold

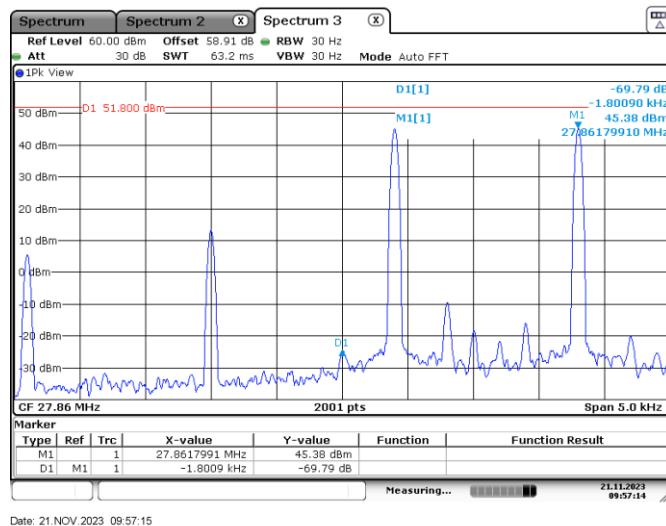
#### 8.4.4 Test data



Date: 21.NOV.2023 09:55:43



Date: 21.NOV.2023 09:56:39

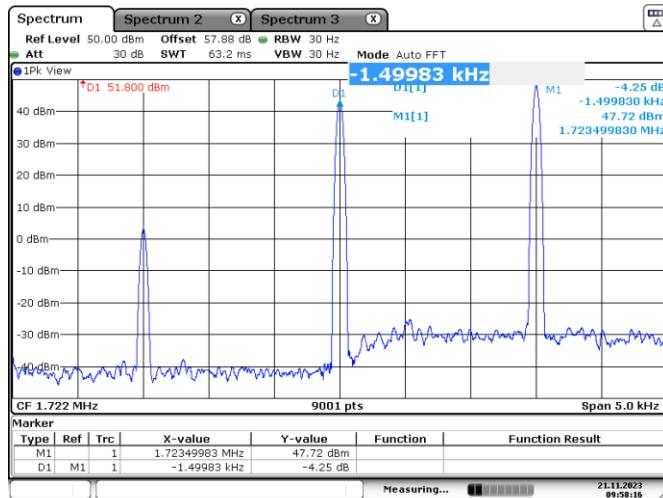


Date: 21.NOV.2023 09:57:15

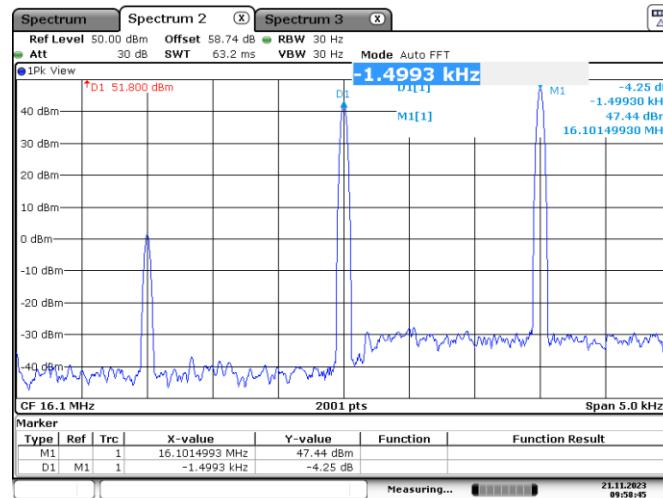
**Table 8.4-1: 40 dB Carrier suppression results**

Channel	Carrier suppression, dBc	Limit, dBc	Margin, dB
Low	77.74	40	37.74
Mid	75.35	40	35.35
High	67.79	40	27.79

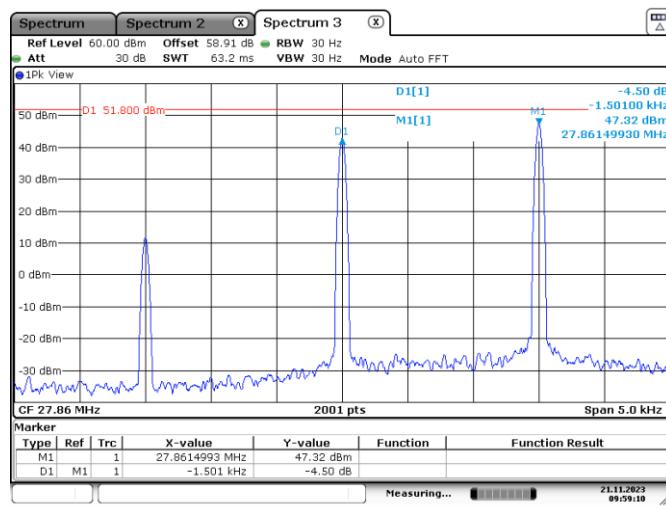
#### 8.4.1 Test data



Date: 21.NOV.2023 09:58:17



Date: 21.NOV.2023 09:58:45



Date: 21.NOV.2023 09:59:10

**Table 8.4-2: Full Carrier results**

Channel	Attenuation, dB	Limit, dB	Margin, dB
Low	4.25	6	1.75
Mid	4.25	6	1.75
High	4.50	6	1.50

## 8.5 FCC 87.139(c) Emission limits, conducted method

### 8.5.1 Definitions and limits

(c) For aircraft station transmitters first installed after February 1, 1983, and for aeronautical station transmitters in use after February 1, 1983, and using H2B, H3E, J3E, J7B or J9W, the peak envelope power of any emissions must be attenuated below the peak envelope power of the transmitter ( $p_X$ ) as follows:

- 1) When the frequency is removed from the assigned frequency by more than 50 percent up to and including 150 percent of the authorized bandwidth of 3.0 kHz, the attenuation must be at least 30 dB.
- 2) When the frequency is removed from the assigned frequency by more than 150 percent up to and including 250 percent of the authorized bandwidth of 3.0 kHz, the attenuation must be at least 38 dB.
- 3) When the frequency is removed from the assigned frequency by more than 250 percent of the authorized bandwidth of 3.0 kHz for aircraft transmitters the attenuation must be at least 43 dB. For aeronautical station transmitters with transmitter power up to and including 50 watts the attenuation must be at least  $43 + 10 \log_{10} p_X$  dB and with transmitter power more than 50 watts the attenuation must be at least 60 dB.

### 8.5.2 Test summary

Verdict	Pass	Test date	November 16, 2023
Tested by	Kevin Rose		

### 8.5.3 Observations, settings and special notes

#### Test conditions

Audio input	1500 Hz
Modulation	H3E
Audio input	400 Hz and 1800 Hz
Modulation	J3E

#### Spectrum analyzer settings below 30 MHz:

Detector mode	Peak
Resolution bandwidth	10 kHz
Video bandwidth	10 kHz
Trace mode	Max Hold

#### Spectrum analyzer settings above 30 MHz:

Detector mode	Peak
Resolution bandwidth	100 kHz
Video bandwidth	100 kHz
Trace mode	Max Hold

#### 8.5.4 Test data

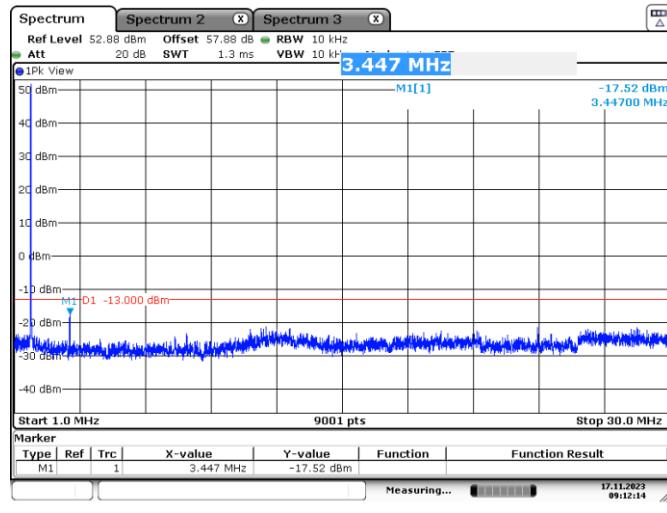


Figure 8.5-1: Low channel 1.722 MHz, H3E modulation, Conducted Spurious

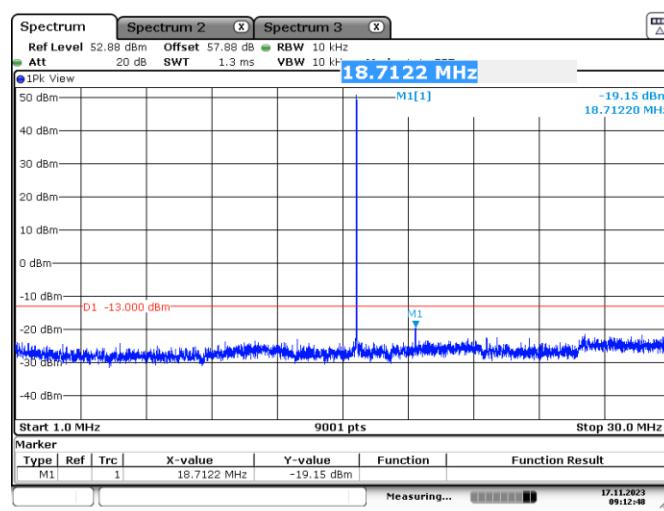


Figure 8.5-2: Mid channel 16.1 MHz, H3E modulation, Conducted Spurious

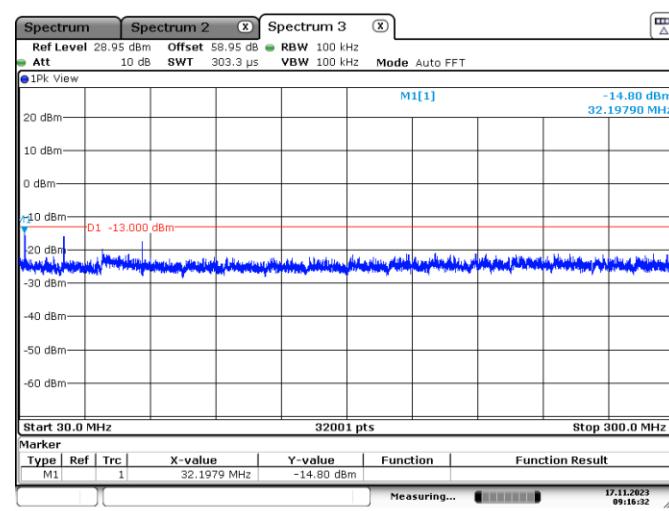
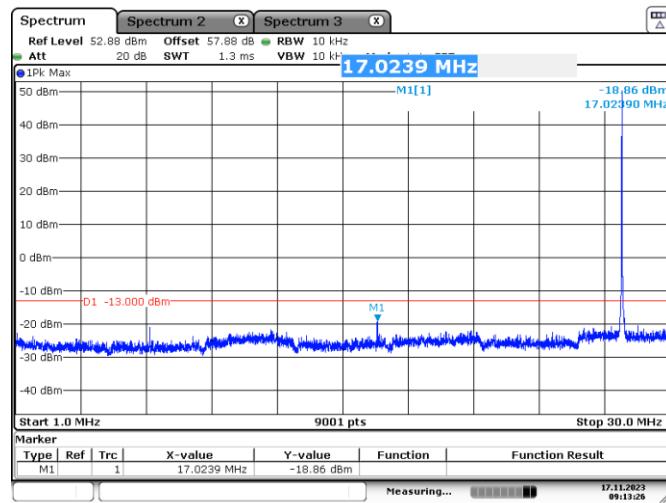
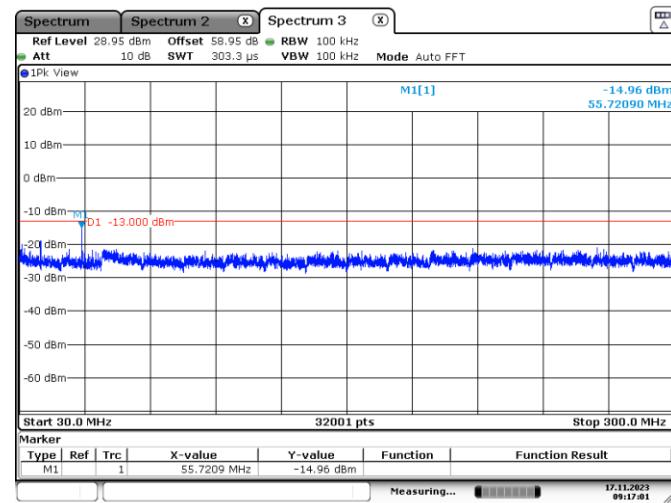


Figure 8.5-3: Mid channel 16.1 MHz, H3E modulation, Conducted Spurious



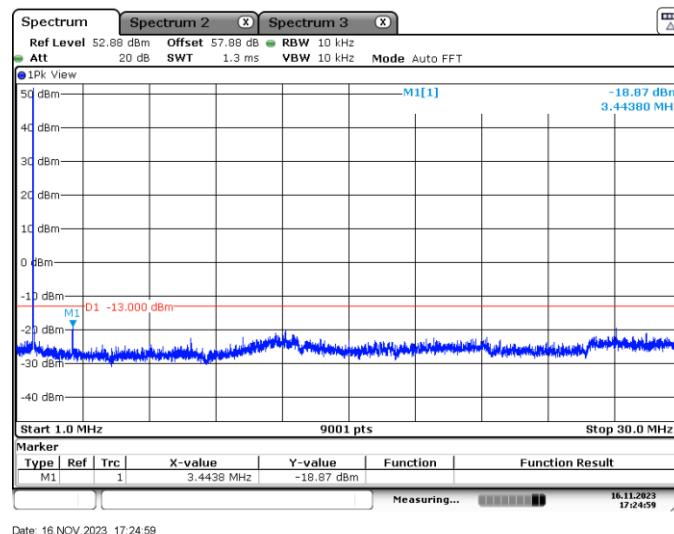
Date: 17.NOV.2023 09:13:26

Figure 8.5-4: High channel 27.86 MHz, H3E modulation, Conducted Spurious



Date: 17.NOV.2023 09:17:01

Figure 8.5-5: High channel 27.86 MHz, H3E modulation, Conducted Spurious



Date: 16.NOV.2023 17:24:59

Figure 8.5-6: Low channel 1.722 MHz, J3E modulation, Conducted Spurious

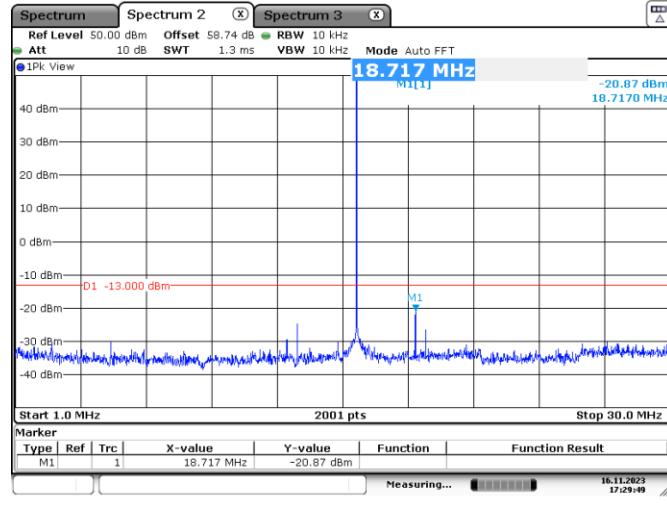


Figure 8.5-7: Mid channel 16.1 MHz, J3E modulation, Conducted Spurious

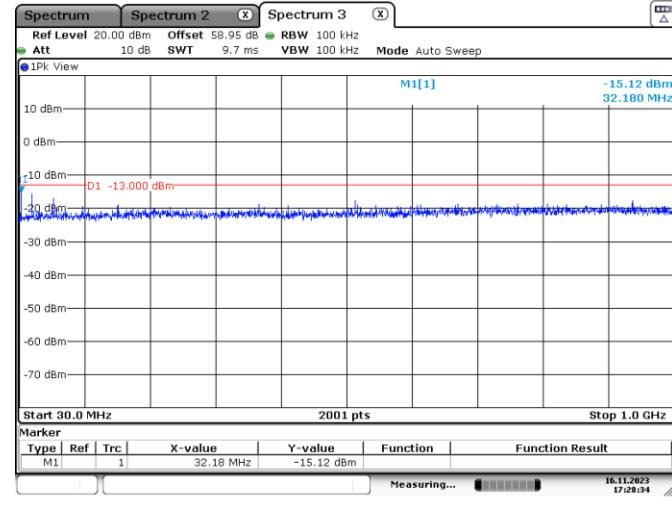


Figure 8.5-8: Mid channel 16.1 MHz, J3E modulation, Conducted Spurious

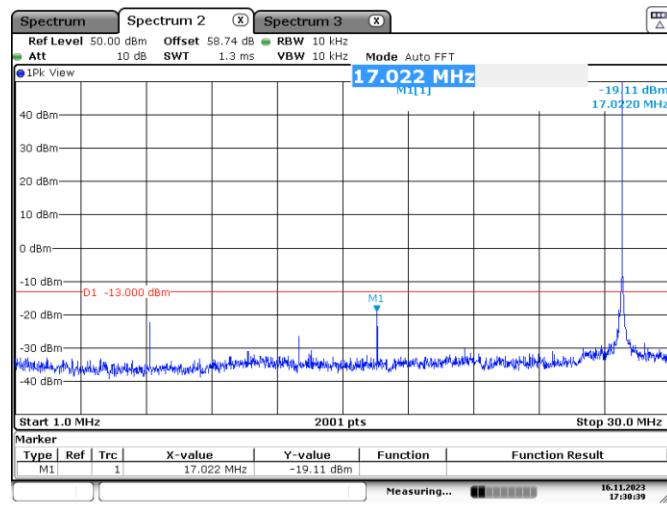


Figure 8.5-9: High channel 27.86 MHz, J3E modulation, Conducted Spurious

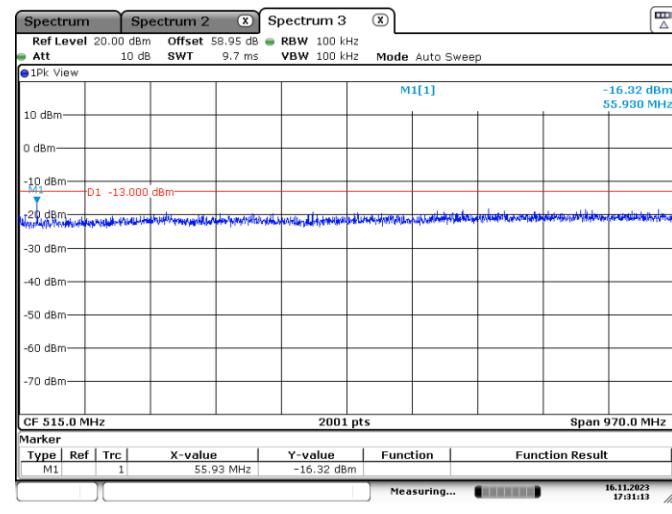


Figure 8.5-10: High channel 27.86 MHz, J3E modulation, Conducted Spurious

## 8.6 FCC 87.139(c) Emission limits, radiated method

### 8.6.1 Definitions and limits

(1) When the frequency is removed from the assigned frequency by more than 50 percent up to and including 150 percent of the authorized bandwidth of 3.0 kHz, the attenuation must be at least 30 dB.

(2) When the frequency is removed from the assigned frequency by more than 150 percent up to and including 250 percent of the authorized bandwidth of 3.0 kHz, the attenuation must be at least 38 dB.

(c) For aircraft station transmitters first installed after February 1, 1983, and for aeronautical station transmitters in use after February 1, 1983, and using H2B, H3E, J3E, J7B or J9W, the peak envelope power of any emissions must be attenuated below the peak envelope power of the transmitter ( $pX$ ) as follows:

(3) When the frequency is removed from the assigned frequency by more than 250 percent of the authorized bandwidth of 3.0 kHz for aircraft transmitters the attenuation must be at least 43 dB. For aeronautical station transmitters with transmitter power up to and including 50 watts the attenuation must be at least  $43 + 10 \log_{10} pX \text{ dB}$  and with transmitter power more than 50 watts the attenuation must be at least 60 dB.

### 8.6.2 Test summary

Verdict	Pass		
Tested by	Kevin Rose	Test date	November 16, 2023

### 8.6.3 Observations, settings and special notes

#### Test conditions

Audio input	1500 Hz
Modulation	H3E
Antenna termination	50 Ohm Load

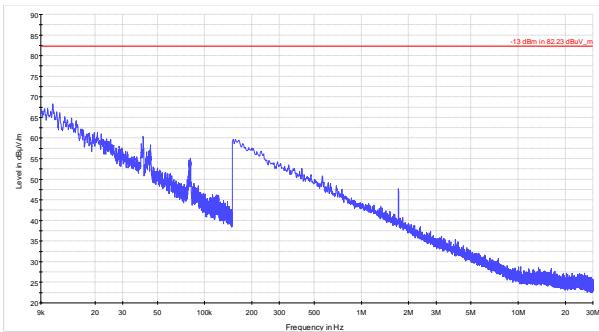
#### Spectrum analyzer settings below 30 MHz:

Detector mode	Peak
Resolution bandwidth	10 kHz
Video bandwidth	RBW × 3
Trace mode	Max Hold

#### Spectrum analyzer settings above 30 MHz:

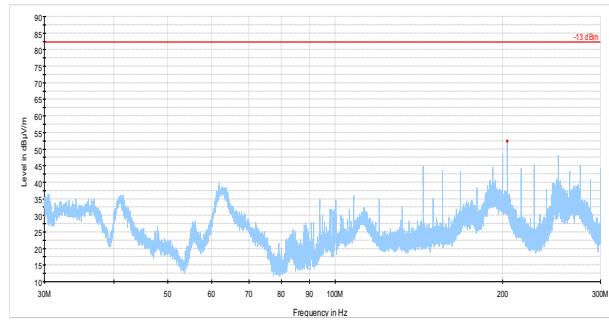
Detector mode	Peak
Resolution bandwidth	100 kHz
Video bandwidth	RBW × 3
Trace mode	Max Hold

#### 8.6.4 Test data



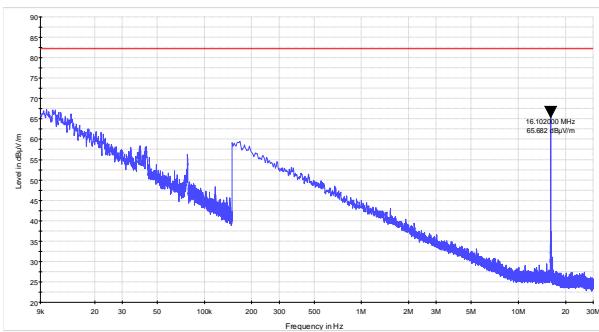
Barrett 4090 Base station RScan low channel TX 9 kHz to 30 MHz  
 AVG\_MAXH  
 PK4\_MAXH  
 <13 dBm in 82.23 dBuV/m

**Figure 8.6-1: Low channel Radiated Spurious**



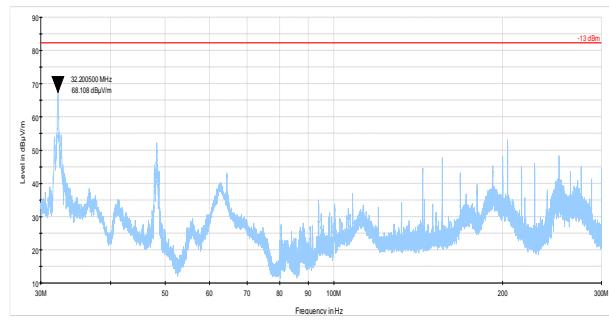
Barrett 4090 Base station RScan low channel TX 30-1000 MHz  
 Prev Result P-PK+  
 Critical\_Freq\_PPK+  
 Final Result QPK  
 <13 dBm

**Figure 8.6-2: Low channel Radiated Spurious**



Barrett 4090 Base station RScan mid channel TX 9 kHz to 30 MHz  
 AVG\_MAXH  
 PK4\_MAXH  
 <13 dBm in 82.23 dBuV/m

**Figure 8.6-3: Mid channel Radiated Spurious**



Barrett 4090 Base station RScan mid channel TX 30-300 MHz  
 Prev Result P-PK+  
 Critical\_Freq\_PPK+  
 Final Result QPK  
 <13 dBm

**Figure 8.6-4: Mid channel Radiated Spurious**

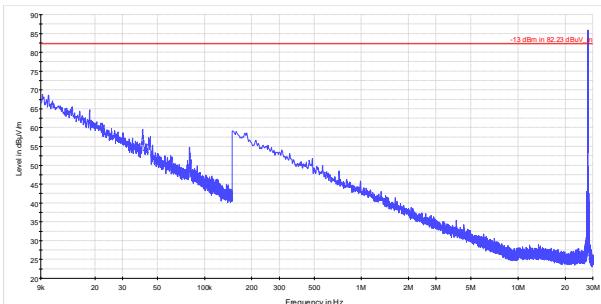


Figure 8.6-5: High channel Radiated Spurious

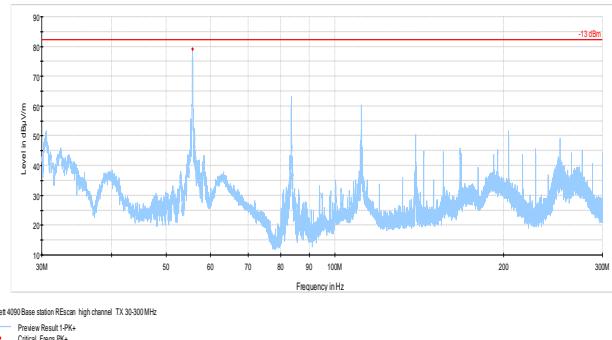


Figure 8.6-6: High channel Radiated Spurious

## 8.7 FCC 87.133 Frequency stability

### 8.7.1 Definitions and limits

(c) For single-sideband transmitters, the tolerance is:  
(1) All aeronautical stations on land: 10 Hz.

### 8.7.2 Test summary

Verdict	Pass
Tested by	Kevin Rose

Test date

November 16, 2023

### 8.7.3 Observations, settings and special notes

1500 Hz tone was used during testing

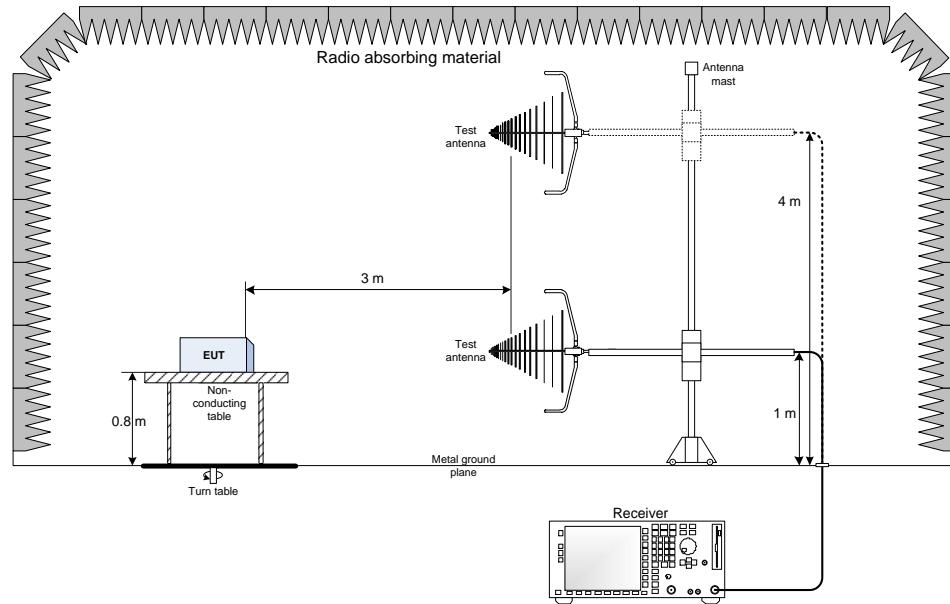
### 8.7.4 Test data

**Table 8.7-1: Frequency drift measurement results**

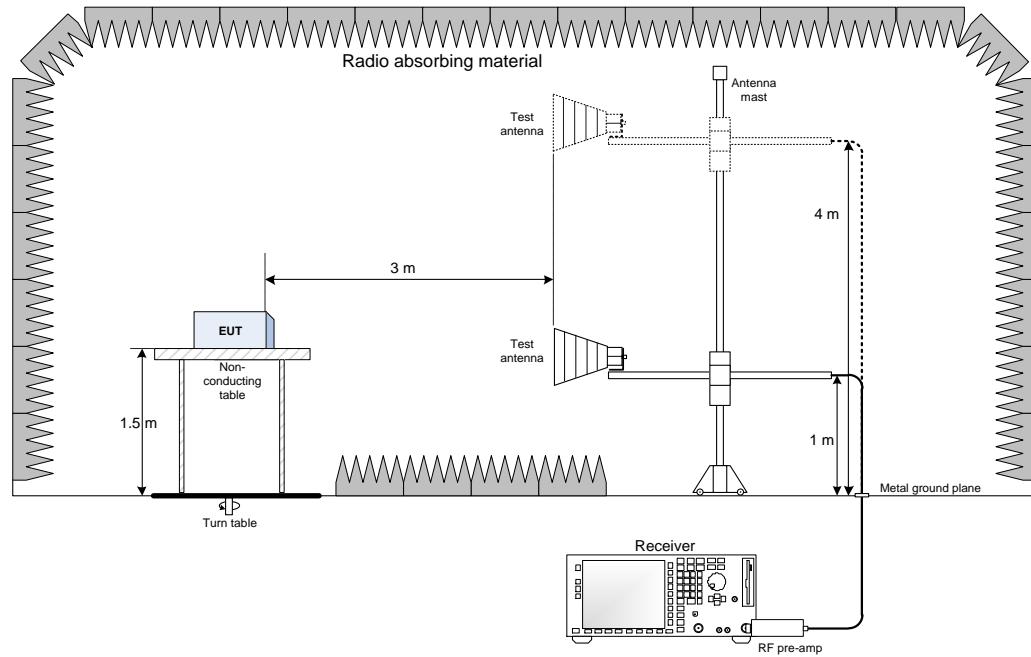
Test conditions	Frequency, MHz	Drift, Hz	Limit, Hz
+50 °C, Nominal	16.101796	6	±10 Hz
+40 °C, Nominal	16.101797	-4	±10 Hz
+30 °C, Nominal	16.101798	-3	±10 Hz
+20 °C, +15 %	16.101802	0	±10 Hz
+20 °C, Nominal	16.101802		Reference
+20 °C, -15 %	16.101802	0	±10 Hz
+10 °C, Nominal	16.101806	-4	±10 Hz
0 °C, Nominal	16.101806	-4	±10 Hz
-10 °C, Nominal	16.101806	-4	±10 Hz
-20 °C, Nominal	16.101807	-5	±10 Hz
-30 °C, Nominal	11.363001	0	±10 Hz

## Section 9. Block diagrams of test set-ups

### 9.1 Radiated emissions set-up for frequencies below 1 GHz

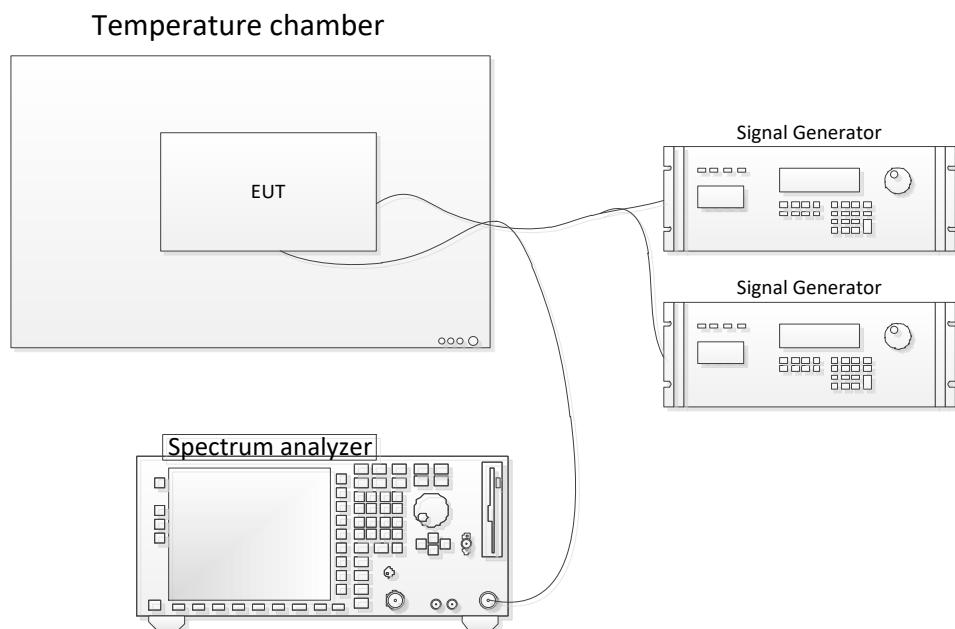


### 9.2 Radiated emissions set-up for frequencies above 1 GHz



### 9.3 Frequency stability

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### 9.4 Power limits, Modulation Characteristics, Emission limits, emission mask, bandwidth, Emission limits, conducted method

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