

TEST REPORT

For

HF/VHF/UHF All Mode Transceiver

In conformity with

FCC CFR 47 Part15 Subpart B (CSR)

Model : FTX-1

FCC ID : K6620845X30

Test Item : HF/VHF/UHF All Mode Transceiver

Report No. : WE241223BG1-11

Issue Date : 18 March 2025

Prepared for

YAESU MUSEN CO., LTD.

Omori Bellport D building 3F, 6-26-3 Minamioi, Shinagawa-ku,
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Prepared by

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History

Report No.	Date	Revisions	Issued By
WE241223BG1-11	18 Mar. 2025	Initial Issue	A.Tamura

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1 General information

1.1 Product description from supplier

Test item	: HF/VHF/UHF All Mode Transceiver
Manufacturer	: YAESU MUSEN CO., LTD.
Address	: 43 Utsuroda, Morijuku, Sukagawa-shi, Fukushima-ken 962-0001 JAPAN
Model	: FTX-1
FCC ID	: K6620845X30
Serial number	: SPP1
Hardware version	: SPP1
Software version	: N/A
Operating frequency range	: 0.03 – 174 MHz / 400 – 470 MHz
Highest internal operating Freq.	: 470 MHz
Receipt date of EUT	: 31 January 2025
Nominal power source voltages	: DC 13.8 V AC 120V/60Hz (for DC Power Supply)

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1.2 Test(s) performed/ Summary of test result

Test specification(s)	: FCC CFR 47 Part 15 Subpart B
Test method(s)	: ANSI C63.4: 2014
Test(s) started	: 03 February 2025
Test(s) completed	: 20 February 2025
Purpose of test(s)	: Certification as the scanning receiver
Summary of test result	: <u>Complied</u>

Note: The above judgment is only based on the measurement data, and it does not include the measurement uncertainty. Accordingly, the statement below is applied to the test result.

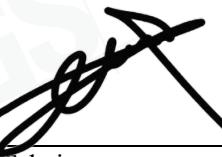
The EUT complies with the limit required in the standard in case that the margin is not less than the measurement uncertainty in the Laboratory.

Compliance of the EUT is more probable than non-compliance in case that the margin is less than the measurement uncertainty in the Laboratory.

Test engineer

: 
A. Tamura
C&P EMC/Wireless

Reviewer

: 
T. Takei
Manager, C&P EMC/Wireless

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1.3 Test facility

[Kitayamata laboratory]

Address: 3-5-23, Kitayamata, Tsuzuki-ku, Yokohama, 224-0021, Japan

TEL: +81-50-1780-7880

FAX: +81-45-592-7506

The description of the test facilities has been filed under registration number JP5227 at the Office of the Federal Communications Commission. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

Accredited by American Association for Laboratory Accreditation (A2LA) for the emission tests stated in the scope of the certificate under Certificate Number 7080.01

Registered by Innovation, Science and Economic Development Canada (ISED):
The registered CAB identifier is JP0009.

Accredited by The Japan Accreditation Board for Conformity Assessment (JAB) for EMC/RF tests stated in the scope of the certificate under Certificate Number RTL02770

Registered by Voluntary Control Council for Interference by Information Technology Equipment (VCCI)
Each registered facility number is as follows;
Test site A-0212.

This report must not be used by the client to claim product certification, approval, or endorsement by A2LA, NIST, or any agency of the U.S. Government.



1.4 Measurement uncertainty

The treatment of uncertainty is based on the general matters on the definition of uncertainty in "Guide to the expression of uncertainty in measurement (GUM)" published by ISO. The Lab's uncertainty is determined by referring ETSI TR 100 028-1 V1.4.1.

The uncertainty of the measurement result in the level of confidence of approximately 95% (k=2) is as follows;

AC conducted emission (150 kHz - 30 MHz)	: ± 3.3 dB
RF conducted emission (30 MHz - 6 GHz)	: ± 1.3 dB
Radiated emission (30 MHz - 1000 MHz)	: ± 5.0 dB
Radiated emission (1 GHz - 6 GHz)	: ± 4.2 dB

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1.5 Summary of test results

Requirement	Section in specification	Result	Section in this report
Radiated emissions (30 to 2000 MHz) (*1)	15.109	Complied	2.1
Conducted emission for receiver	15.111	Complied	2.2
AC power line conducted emissions	15.107	Complied	2.3
38 dB Rejection (cellular band)	15.121 (b)	N/A (*2)	-

(*1) The highest internal operating frequency is 470 MHz.

(*2) This item was not tested in this report.

1.6 Setup of equipment under test (EUT)

1.6.1 Test configuration of EUT

Equipment(s) under test

No.	Item	Model No.	Manufacture	Serial No.
1	HF/VHF/UHF ALL MODE TRANSCEIVER	FTX-1	YAESU MUSEN CO., LTD.	SPP1
-	-	-	-	-

Support Equipment(s)

No.	Item	Model No.	Manufacture	Serial No.
2	DC Power Supply	FP-1030A	YAESU MUSEN CO., LTD.	-
3	External Speaker	MLS-100	YAESU MUSEN CO., LTD.	-
4	Head Microphone	SSM-30E	YAESU MUSEN CO., LTD.	-
5	Handphone	YH-77STA	YAESU MUSEN CO., LTD.	-

Connected cable(s)

No.	Item	From	To	Length [m]	Cable Shielded	Ferrite Core
A	DC cable	1	2	1.5	No	No
B	Speaker cable	1	3	1.8	No	No
C	Mic cable	1	4	1.6	No	No
D	Headphone cable	1	5	1.8	No	No
E	KEY cable	1	OPEN	1.6	No	No
F	USB cable	1	OPEN	1.2	Yes	No
G	GND cable	1	GND	2.5	No	No

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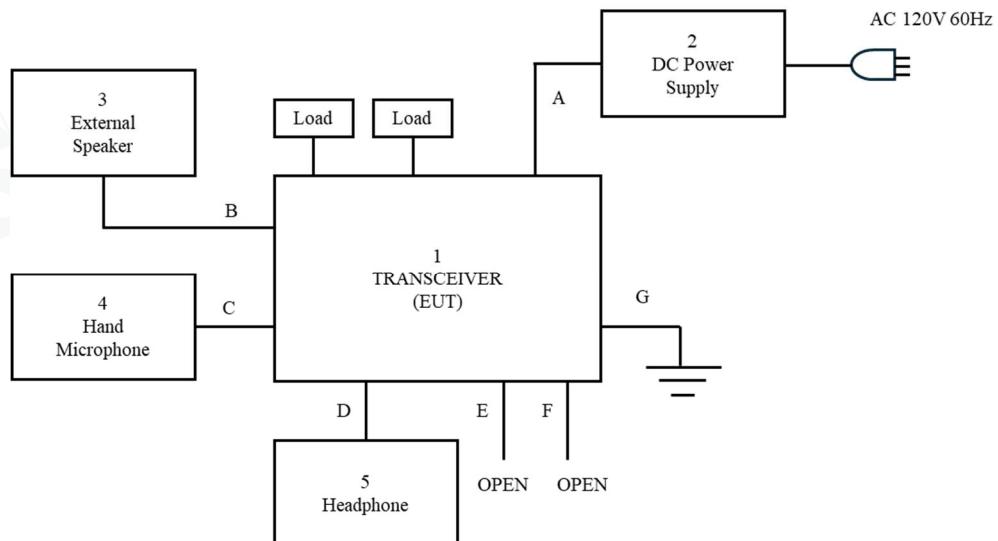
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1.6.2 Operating condition:

- Rx 0.03 MHz (EUT is set to 0.03 MHz as low channel for HF band)
- Rx 30 MHz (Middle channel for HF band)
- Rx 56 MHz (High channel for HF band)
- Rx 118 MHz (Low channel for VHF band)
- Rx 144 MHz (Middle channel for VHF band)
- Rx 174 MHz (High channel for VHF band)
- Rx 400 MHz (Low channel for UHF band)
- Rx 435 MHz (Middle channel for UHF band)
- Rx 470 MHz (High channel for UHF band)

Note: Operating frequency was selected by the manufacturer.

1.6.3 Setup diagram of tested system



Note: The signal cable E and F were connected to no AE by a request from the manufacturer.

50 ohm terminals were connected to the antenna terminals (HF / VHF / UHF)

1.7 Equipment modifications

No modifications have been made to the equipment in order to achieve compliance with the applicable standards described in clause 1.2.

1.8 Deviation from the standard

No deviations from the standards described in clause 1.2.

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2 Test procedure and test data

2.1 Radiated emissions

Test setup

Test setup was implemented according to the method of ANSI C63.4 clause 6 “General requirements for EUT equipment arrangements and operation”, clause 8.2 and Annex H.3 “Radiated emission measurements setup”.

Test procedure

Measurement procedures were implemented according to the method of ANSI C63.4 clauses 8.2.

The EUT is place on a non-conducted table which is 0.8 m height from a ground plane and the measurement antenna to EUT distance is 3 meters. The turn table is rotated for 360 degrees to determine the maximum emission level.

The antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

The spectrum analyzer and receiver are set to the followings;

RBW=100 kHz (up to 1000 MHz) or 1 MHz (above 1000 MHz),

VBW= 300 kHz (up to 1000 MHz) or 3 MHz (above 1000 MHz)

Final measurement is carried out with a receiver RBW of 120 kHz (up to 1000 MHz), or 1 MHz (above 1000 MHz).

Applicable rule and limitation

FCC 15.109 Radiated emissions limits

Frequency [MHz]	Field Strength [μ V/m]	Measurement Distance [m]	Field Strength [dB μ V/m]
30 – 88	100	3	40.0
88 – 216	150	3	43.5
216 – 960	200	3	46.0
Above 960	500	3	53.9

In the emission table above, the tighter limit applies at the band edges.

The emission limits shown in the above table are based on measurements employing a QP detector (up to 1000 MHz) or AVE/PEAK detector (above 1000 MHz).

Test results - Complied with requirement

Test equipment used (refer to List of utilized test equipment)

AC01 (EM)	AC01 (EG)	BA10	CL11	CL35	CL36	DH06
PR15	PR16	TR10	CL80	-	-	-

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Test software used

EMI1 Ver. 6.1

Calculation method

The Correction Factor and Result are calculated as followings.

$$\text{Correction Factor [dB/m]} = \text{Ant. Factor [dB/m]} + \text{Loss [dB]} - \text{Gain [dB]}$$

$$\text{Result [dB}\mu\text{V/m]} = \text{Reading [dB}\mu\text{V]} + \text{Correction Factor [dB/m]}$$

Test Data

Operating mode: Rx 0.03 MHz

Range: 30 - 1000 MHz

No.	Frequency [MHz]	Reading [dB μ V]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Ant.
1	144.546	34.5	12.0	8.2	30.2	24.5	43.5	19.0	Hori.
2	701.949	43.8	18.7	11.8	30.3	44.0	46.0	2.0	Hori.
3	809.996	38.7	19.7	12.2	30.0	40.6	46.0	5.4	Hori.
4	94.402	41.5	9.3	7.7	30.2	28.3	43.5	15.2	Vert.
5	648.022	35.5	18.8	11.7	30.3	35.7	46.0	10.3	Vert.
6	755.972	33.5	19.8	12.0	30.2	35.1	46.0	10.9	Vert.

Range: 1000 - 2000 MHz

No.	Frequency [MHz]	Reading PK [dB μ V]	Reading AVE [dB μ V]	C.Factor [dB/m]	Result PK [dB μ V/m]	Result AVE [dB μ V/m]	Limit PK [dB μ V/m]	Limit AVE [dB μ V/m]	Margin PK [dB]	Margin AVE [dB]	Ant.
1	1658.834	52.0	46.9	-6.6	45.4	40.3	73.9	53.9	28.5	13.6	Hori.
2	1769.523	55.6	49.4	-6.2	49.4	43.2	73.9	53.9	24.5	10.7	Hori.
3	1990.601	48.8	42.2	-4.3	44.5	37.9	73.9	53.9	29.4	16.0	Hori.
4	1658.834	52.1	48.7	-6.6	45.5	42.1	73.9	53.9	28.4	11.8	Vert.
5	1769.423	53.7	49.8	-6.2	47.5	43.6	73.9	53.9	26.4	10.3	Vert.
6	1990.501	48.3	41.9	-4.3	44.0	37.6	73.9	53.9	29.9	16.3	Vert.

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Operating mode: Rx 30 MHz

Range: 30 - 1000 MHz

No.	Frequency [MHz]	Reading [dB μ V]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Ant.
1	141.830	32.8	12.1	8.2	30.2	22.9	43.5	20.6	Hori.
2	648.022	38.1	18.8	11.7	30.3	38.3	46.0	7.7	Hori.
3	701.949	43.1	18.7	11.8	30.3	43.3	46.0	2.7	Hori.
4	94.499	43.5	9.3	7.7	30.2	30.3	43.5	13.2	Vert.
5	144.643	33.8	12.0	8.2	30.2	23.8	43.5	19.7	Vert.
6	647.925	34.5	18.8	11.7	30.3	34.7	46.0	11.3	Vert.

Range: 1000 - 2000 MHz

No.	Frequency [MHz]	Reading PK [dB μ V]	Reading AVE [dB μ V]	C.Factor [dB/m]	Result PK [dB μ V/m]	Result AVE [dB μ V/m]	Limit PK [dB μ V/m]	Limit AVE [dB μ V/m]	Margin PK [dB]	Margin AVE [dB]	Ant.
1	1658.934	50.5	45.2	-6.6	43.9	38.6	73.9	53.9	30.0	15.3	Hori.
2	1769.423	55.7	50.1	-6.2	49.5	43.9	73.9	53.9	24.4	10.0	Hori.
3	1990.601	49.9	44.0	-4.3	45.6	39.7	73.9	53.9	28.3	14.2	Hori.
4	1658.834	53.2	50.5	-6.6	46.6	43.9	73.9	53.9	27.3	10.0	Vert.
5	1769.423	53.5	48.6	-6.2	47.3	42.4	73.9	53.9	26.6	11.5	Vert.
6	1990.501	49.1	44.0	-4.3	44.8	39.7	73.9	53.9	29.1	14.2	Vert.

Operating mode: Rx 56 MHz

Range: 30 - 1000 MHz

No.	Frequency [MHz]	Reading [dB μ V]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Ant.
1	144.546	35.9	12.0	8.2	30.2	25.9	43.5	17.6	Hori.
2	647.925	37.8	18.8	11.7	30.3	38.0	46.0	8.0	Hori.
3	701.949	42.8	18.7	11.8	30.3	43.0	46.0	3.0	Hori.
4	94.402	45.5	9.3	7.7	30.2	32.3	43.5	11.2	Vert.
5	121.462	35.7	12.6	8.0	30.2	26.1	43.5	17.4	Vert.
6	647.925	35.9	18.8	11.7	30.3	36.1	46.0	9.9	Vert.

Range: 1000 - 2000 MHz

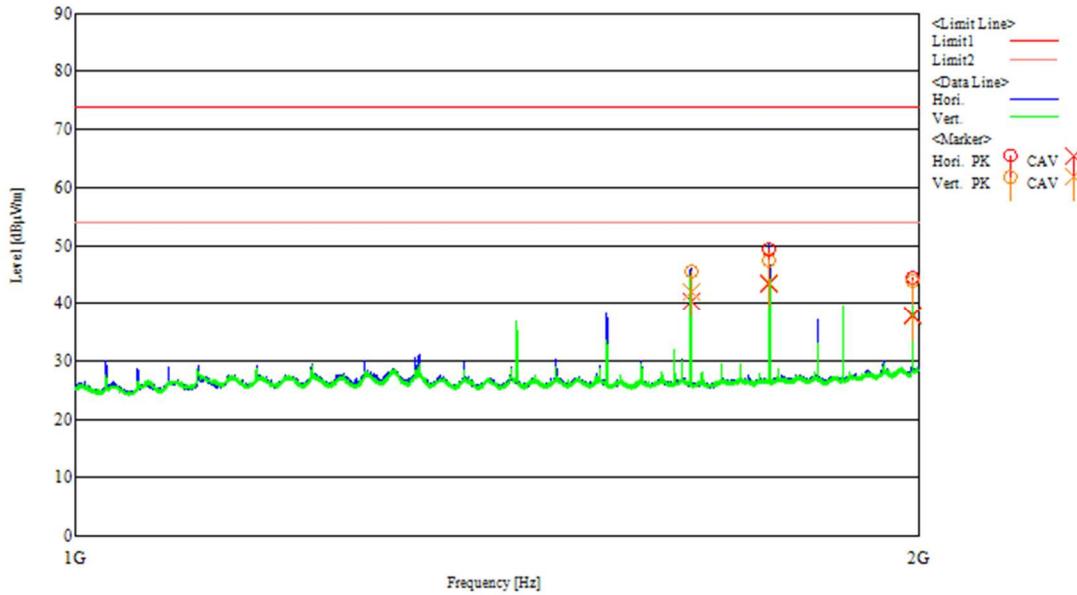
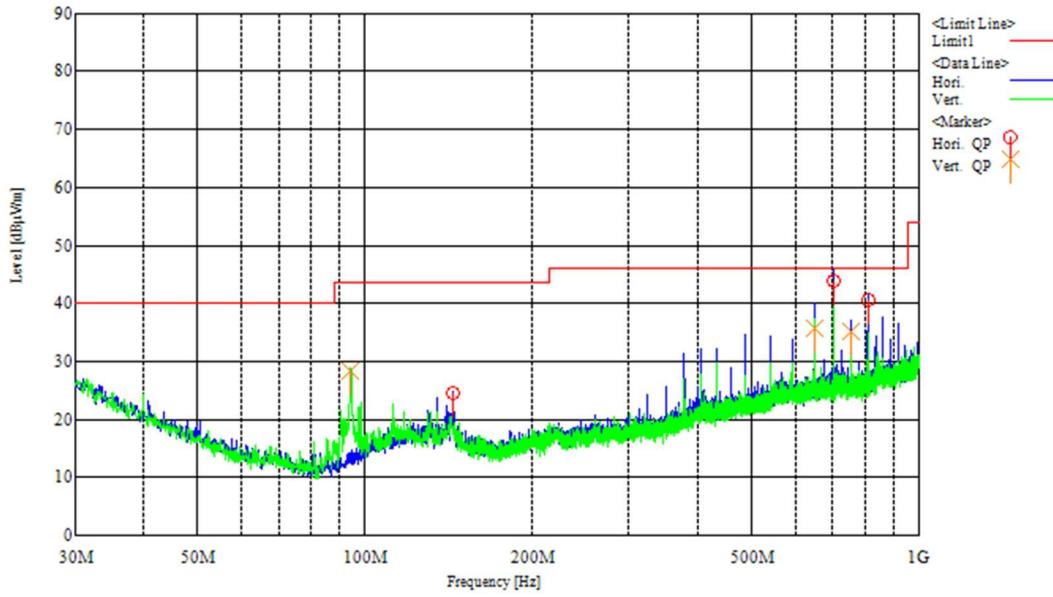
No.	Frequency [MHz]	Reading PK [dB μ V]	Reading AVE [dB μ V]	C.Factor [dB/m]	Result PK [dB μ V/m]	Result AVE [dB μ V/m]	Limit PK [dB μ V/m]	Limit AVE [dB μ V/m]	Margin PK [dB]	Margin AVE [dB]	Ant.
1	1658.834	50.3	46.1	-6.6	43.7	39.5	73.9	53.9	30.2	14.4	Hori.
2	1769.523	55.4	49.8	-6.2	49.2	43.6	73.9	53.9	24.7	10.3	Hori.
3	1990.601	48.5	42.8	-4.3	44.2	38.5	73.9	53.9	29.7	15.4	Hori.
4	1658.734	51.8	48.3	-6.6	45.2	41.7	73.9	53.9	28.7	12.2	Vert.
5	1769.423	52.6	48.5	-6.2	46.4	42.3	73.9	53.9	27.5	11.6	Vert.
6	1990.701	47.7	40.8	-4.3	43.4	36.5	73.9	53.9	30.5	17.4	Vert.

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[Worst Chart in HF band operation]

Operating condition: Rx 0.03 MHz



[Test condition]

Tested Date: 03 February 2025
 Humidity: 45 %

Temperature: 22 deg. C
 Atmos. Press: 1005 hPa

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Operating mode: Rx 118 MHz

Range: 30 - 1000 MHz

No.	Frequency [MHz]	Reading [dB μ V]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Ant.
1	144.643	34.8	12.0	8.2	30.2	24.8	43.5	18.7	Hori.
2	647.925	39.7	18.8	11.7	30.3	39.9	46.0	6.1	Hori.
3	701.949	44.9	18.7	11.8	30.3	45.1	46.0	0.9	Hori.
4	94.499	40.1	9.3	7.7	30.2	26.9	43.5	16.6	Vert.
5	144.546	39.3	12.0	8.2	30.2	29.3	43.5	14.2	Vert.
6	647.925	37.1	18.8	11.7	30.3	37.3	46.0	8.7	Vert.

Range: 1000 - 2000 MHz

No.	Frequency [MHz]	Reading PK [dB μ V]	Reading AVE [dB μ V]	C.Factor [dB/m]	Result PK [dB μ V/m]	Result AVE [dB μ V/m]	Limit PK [dB μ V/m]	Limit AVE [dB μ V/m]	Margin PK [dB]	Margin AVE [dB]	Ant.
1	1658.734	50.0	45.4	-6.6	43.4	38.8	73.9	53.9	30.5	15.1	Hori.
2	1769.423	53.9	49.1	-6.2	47.7	42.9	73.9	53.9	26.2	11.0	Hori.
3	1990.701	51.0	46.3	-4.3	46.7	42.0	73.9	53.9	27.2	11.9	Hori.
4	1658.934	51.7	48.4	-6.6	45.1	41.8	73.9	53.9	28.8	12.1	Vert.
5	1769.523	52.0	47.3	-6.2	45.8	41.1	73.9	53.9	28.1	12.8	Vert.
6	1990.601	47.0	39.2	-4.3	42.7	34.9	73.9	53.9	31.2	19.0	Vert.

Operating mode: Rx 144 MHz

Range: 30 - 1000 MHz

No.	Frequency [MHz]	Reading [dB μ V]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Ant.
1	134.944	33.2	12.5	8.1	30.2	23.6	43.5	19.9	Hori.
2	647.925	38.8	18.8	11.7	30.3	39.0	46.0	7.0	Hori.
3	701.949	43.9	18.7	11.8	30.3	44.1	46.0	1.9	Hori.
4	94.499	45.4	9.3	7.7	30.2	32.2	43.5	11.3	Vert.
5	144.740	35.4	12.0	8.2	30.2	25.4	43.5	18.1	Vert.
6	701.949	39.3	18.7	11.8	30.3	39.5	46.0	6.5	Vert.

Range: 1000 - 2000 MHz

No.	Frequency [MHz]	Reading PK [dB μ V]	Reading AVE [dB μ V]	C.Factor [dB/m]	Result PK [dB μ V/m]	Result AVE [dB μ V/m]	Limit PK [dB μ V/m]	Limit AVE [dB μ V/m]	Margin PK [dB]	Margin AVE [dB]	Ant.
1	1658.834	49.1	41.0	-6.6	42.5	34.4	73.9	53.9	31.4	19.5	Hori.
2	1769.423	52.6	47.3	-6.2	46.4	41.1	73.9	53.9	27.5	12.8	Hori.
3	1990.501	48.3	41.9	-4.3	44.0	37.6	73.9	53.9	29.9	16.3	Hori.
4	1658.834	51.2	46.9	-6.6	44.6	40.3	73.9	53.9	29.3	13.6	Vert.
5	1769.523	50.1	45.2	-6.2	43.9	39.0	73.9	53.9	30.0	14.9	Vert.
6	1990.701	47.3	40.2	-4.3	43.0	35.9	73.9	53.9	30.9	18.0	Vert.

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Operating mode: Rx 174 MHz

Range: 30 - 1000 MHz

No.	Frequency [MHz]	Reading [dB μ V]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Ant.
1	144.837	36.5	12.0	8.2	30.2	26.5	43.5	17.0	Hori.
2	647.925	38.4	18.8	11.7	30.3	38.6	46.0	7.4	Hori.
3	701.949	43.9	18.7	11.8	30.3	44.1	46.0	1.9	Hori.
4	94.499	41.6	9.3	7.7	30.2	28.4	43.5	15.1	Vert.
5	148.522	34.3	11.7	8.2	30.2	24.0	43.5	19.5	Vert.
6	701.949	39.1	18.7	11.8	30.3	39.3	46.0	6.7	Vert.

Range: 1000 - 2000 MHz

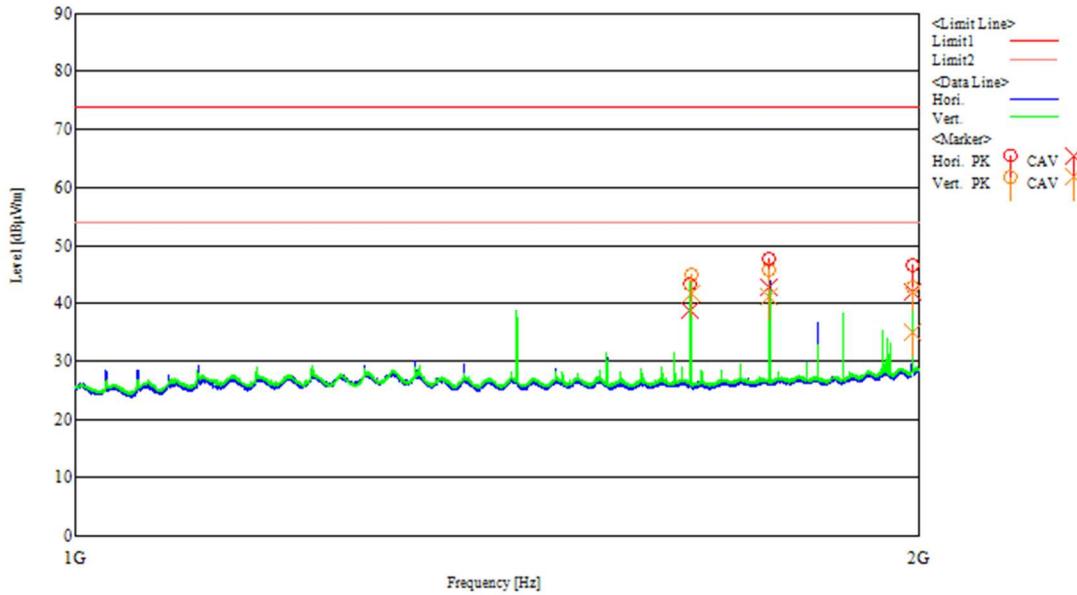
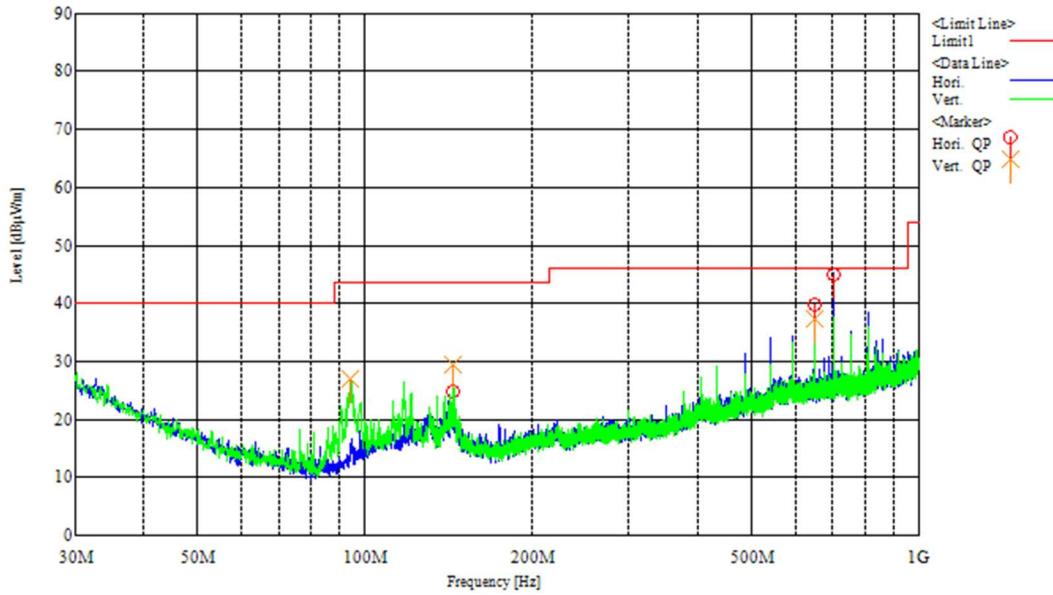
No.	Frequency [MHz]	Reading PK [dB μ V]	Reading AVE [dB μ V]	C.Factor [dB/m]	Result PK [dB μ V/m]	Result AVE [dB μ V/m]	Limit PK [dB μ V/m]	Limit AVE [dB μ V/m]	Margin PK [dB]	Margin AVE [dB]	Ant.
1	1658.834	48.8	42.6	-6.6	42.2	36.0	73.9	53.9	31.7	17.9	Hori.
2	1769.423	52.4	47.5	-6.2	46.2	41.3	73.9	53.9	27.7	12.6	Hori.
3	1990.501	49.3	43.1	-4.3	45.0	38.8	73.9	53.9	28.9	15.1	Hori.
4	1658.734	51.7	48.1	-6.6	45.1	41.5	73.9	53.9	28.8	12.4	Vert.
5	1769.323	51.3	47.1	-6.2	45.1	40.9	73.9	53.9	28.8	13.0	Vert.
6	1990.501	47.4	40.4	-4.3	43.1	36.1	73.9	53.9	30.8	17.8	Vert.

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[Worst Chart in VHF band operation]

Operating condition: Rx 118 MHz



[Test condition]

Tested Date: 03 February 2025
Humidity: 45 %

Temperature: 22 deg. C
Atmos. Press: 1005 hPa

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Operating mode: Rx 400 MHz

Range: 30 - 1000 MHz

No.	Frequency [MHz]	Reading [dB μ V]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Ant.
1	144.546	37.9	12.0	8.2	30.2	27.9	43.5	15.6	Hori.
2	647.925	38.7	18.8	11.7	30.3	38.9	46.0	7.1	Hori.
3	701.949	43.7	18.7	11.8	30.3	43.9	46.0	2.1	Hori.
4	94.499	44.6	9.3	7.7	30.2	31.4	43.5	12.1	Vert.
5	121.462	37.9	12.6	8.0	30.2	28.3	43.5	15.2	Vert.
6	701.949	37.4	18.7	11.8	30.3	37.6	46.0	8.4	Vert.

Range: 1000 - 2000 MHz

No.	Frequency [MHz]	Reading PK [dB μ V]	Reading AVE [dB μ V]	C.Factor [dB/m]	Result PK [dB μ V/m]	Result AVE [dB μ V/m]	Limit PK [dB μ V/m]	Limit AVE [dB μ V/m]	Margin PK [dB]	Margin AVE [dB]	Ant.
1	1658.934	49.5	44.6	-6.6	42.9	38.0	73.9	53.9	31.0	15.9	Hori.
2	1769.523	51.9	46.5	-6.2	45.7	40.3	73.9	53.9	28.2	13.6	Hori.
3	1990.601	49.4	43.3	-4.3	45.1	39.0	73.9	53.9	28.8	14.9	Hori.
4	1658.734	51.1	47.1	-6.6	44.5	40.5	73.9	53.9	29.4	13.4	Vert.
5	1769.523	51.2	47.3	-6.2	45.0	41.1	73.9	53.9	28.9	12.8	Vert.
6	1990.801	47.1	40.8	-4.3	42.8	36.5	73.9	53.9	31.1	17.4	Vert.

Operating mode: Rx 435 MHz

Range: 30 - 1000 MHz

No.	Frequency [MHz]	Reading [dB μ V]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Ant.
1	144.546	36.3	12.0	8.2	30.2	26.3	43.5	17.2	Hori.
2	647.925	38.8	18.8	11.7	30.3	39.0	46.0	7.0	Hori.
3	701.949	43.9	18.7	11.8	30.3	44.1	46.0	1.9	Hori.
4	94.499	46.3	9.3	7.7	30.2	33.1	43.5	10.4	Vert.
5	647.925	36.1	18.8	11.7	30.3	36.3	46.0	9.7	Vert.
6	701.949	37.9	18.7	11.8	30.3	38.1	46.0	7.9	Vert.

Range: 1000 - 2000 MHz

No.	Frequency [MHz]	Reading PK [dB μ V]	Reading AVE [dB μ V]	C.Factor [dB/m]	Result PK [dB μ V/m]	Result AVE [dB μ V/m]	Limit PK [dB μ V/m]	Limit AVE [dB μ V/m]	Margin PK [dB]	Margin AVE [dB]	Ant.
1	1658.934	50.8	46.6	-6.6	44.2	40.0	73.9	53.9	29.7	13.9	Hori.
2	1769.523	52.2	47.8	-6.2	46.0	41.6	73.9	53.9	27.9	12.3	Hori.
3	1990.601	48.8	43.7	-4.3	44.5	39.4	73.9	53.9	29.4	14.5	Hori.
4	1658.934	51.8	48.6	-6.6	45.2	42.0	73.9	53.9	28.7	11.9	Vert.
5	1769.323	51.4	48.3	-6.2	45.2	42.1	73.9	53.9	28.7	11.8	Vert.
6	1990.601	47.5	41.3	-4.3	43.2	37.0	73.9	53.9	30.7	16.9	Vert.

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Operating mode: Rx 470 MHz

Range: 30 - 1000 MHz

No.	Frequency [MHz]	Reading [dB μ V]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Ant.
1	144.643	35.7	12.0	8.2	30.2	25.7	43.5	17.8	Hori.
2	647.925	39.7	18.8	11.7	30.3	39.9	46.0	6.1	Hori.
3	701.949	44.0	18.7	11.8	30.3	44.2	46.0	1.8	Hori.
4	94.499	46.2	9.3	7.7	30.2	33.0	43.5	10.5	Vert.
5	647.925	35.4	18.8	11.7	30.3	35.6	46.0	10.4	Vert.
6	701.949	37.8	18.7	11.8	30.3	38.0	46.0	8.0	Vert.

Range: 1000 - 2000 MHz

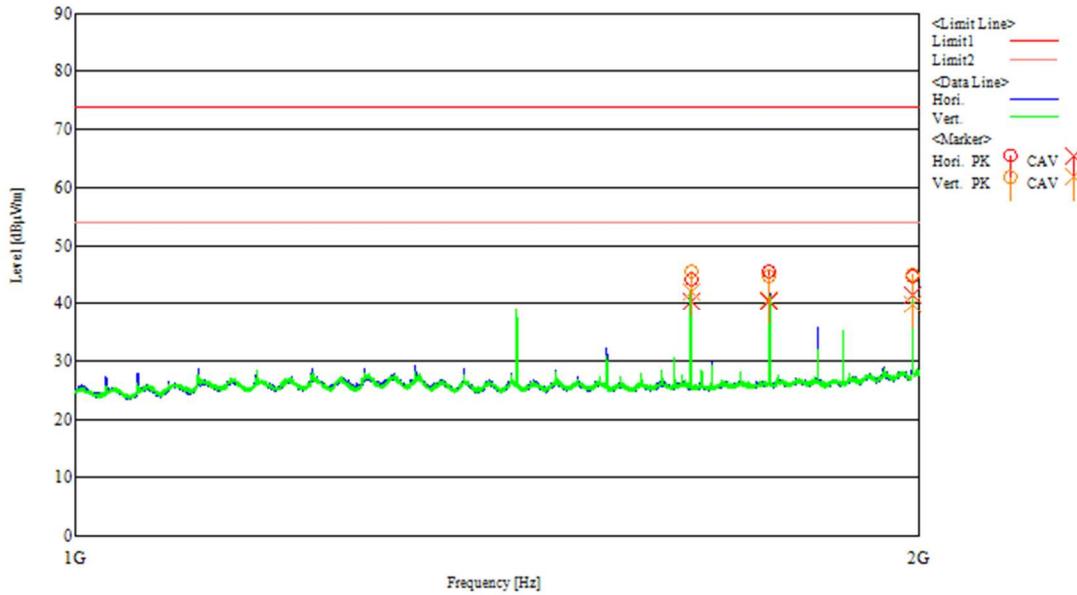
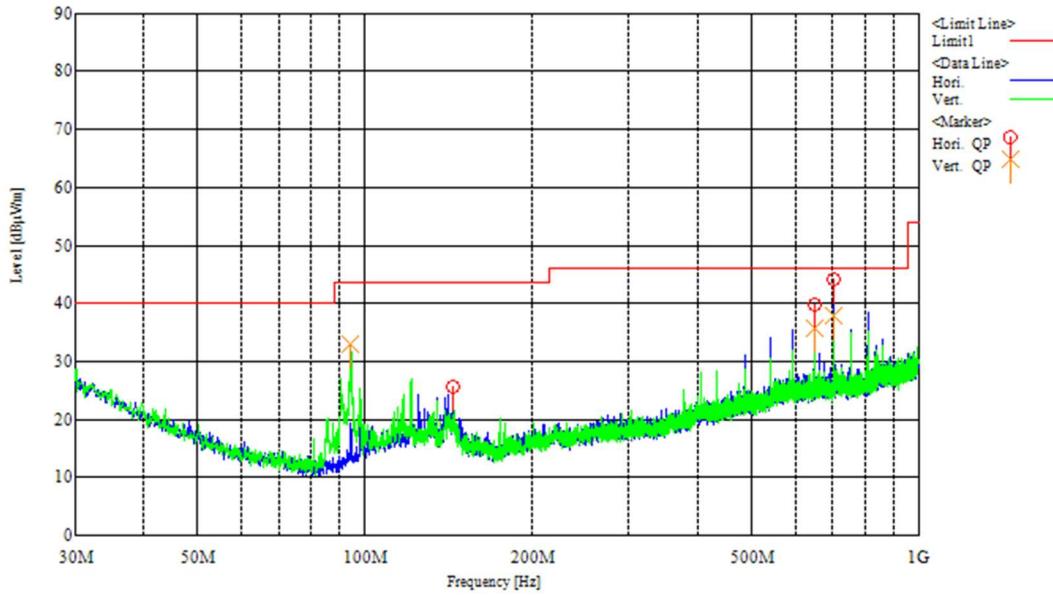
No.	Frequency [MHz]	Reading PK [dB μ V]	Reading AVE [dB μ V]	C.Factor [dB/m]	Result PK [dB μ V/m]	Result AVE [dB μ V/m]	Limit PK [dB μ V/m]	Limit AVE [dB μ V/m]	Margin PK [dB]	Margin AVE [dB]	Ant.
1	1658.834	50.7	46.9	-6.6	44.1	40.3	73.9	53.9	29.8	13.6	Hori.
2	1769.423	51.7	46.5	-6.2	45.5	40.3	73.9	53.9	28.4	13.6	Hori.
3	1990.501	49.1	45.8	-4.3	44.8	41.5	73.9	53.9	29.1	12.4	Hori.
4	1658.834	52.0	48.5	-6.6	45.4	41.9	73.9	53.9	28.5	12.0	Vert.
5	1769.323	50.9	46.8	-6.2	44.7	40.6	73.9	53.9	29.2	13.3	Vert.
6	1990.601	49.2	44.0	-4.3	44.9	39.7	73.9	53.9	29.0	14.2	Vert.

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[Worst Chart in UHF band operation]

Operating condition: Rx 470 MHz



[Test condition]

Tested Date: 03 February 2025
Humidity: 45 %

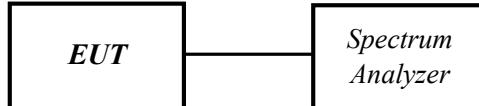
Temperature: 22 deg. C
Atmos. Press: 1005 hPa

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2.2 Conducted emissions for receiver

Test setup



Applicable rule and limitation

§15.111 (b) Antenna power conducted limit: 2 nW (= -57 dBm)

Test equipment used (refer to List of utilized test equipment)

CL36	TR10	-
------	------	---

Test results - Complied with requirement

Test Data

[The maximum spurious level at antenna port]

Operating freq. [MHz]	Frequency range 30 - 1000 MHz		Frequency range 1000 - 2000 MHz	
	Freq. [MHz]	Level [dBm]	Freq. [MHz]	Level [dBm]
30.00	-	-	1990.60	-65.59
174.00	-	-	1990.60	-65.75
435.00	-	-	1990.60	-65.08

Note:” - “ emission have more than 20dB margin or under noise floor

[Test condition]

Tested Date: 04 February 2025
Humidity: 45 %

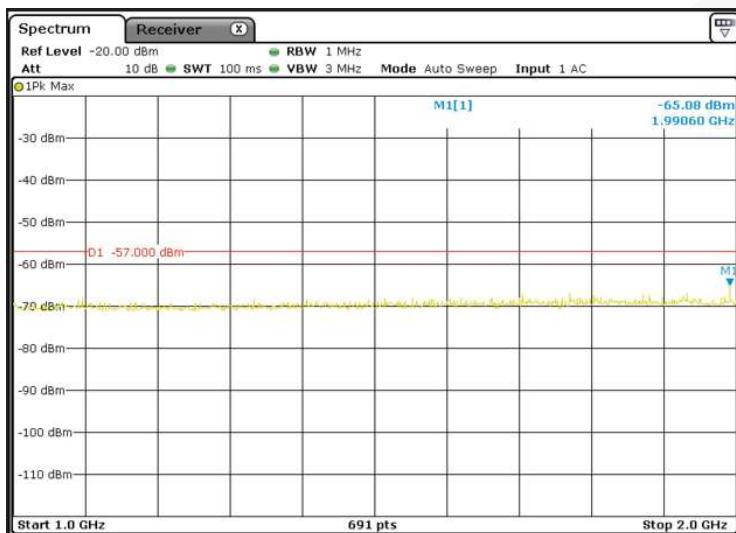
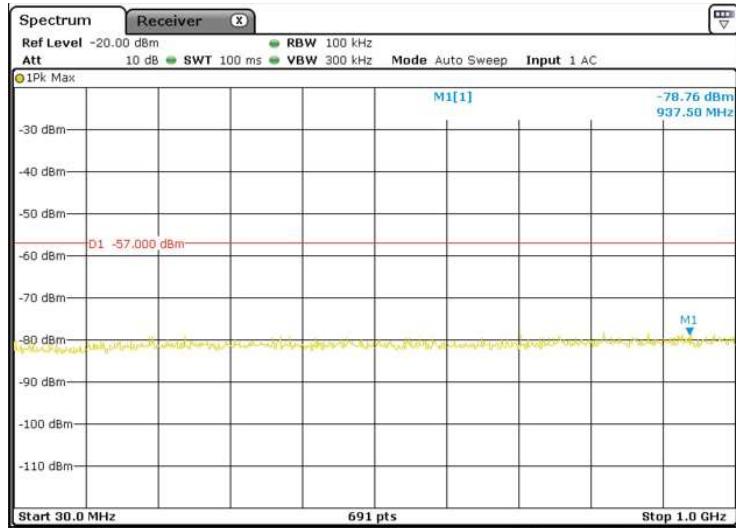
Temperature: 22 deg. C
Atmos. Press: 1003 hPa

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[Chart]

Operating mode: Rx 435.000 MHz (Worst)



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2.3 AC power line conducted emissions

Test setup

Test setup was implemented according to the method of ANSI C63.4 clause 6 “General requirements for EUT equipment arrangements and operation” and Annex H.1 “AC power line conducted emission measurements setup”.

Test procedure

Measurement procedures were implemented according to the method of ANSI C63.4 clauses 7, clause 13.1.3 and Annex H.2 “AC power line conducted emission measurements”.

Exploratory measurements were used the spectrum analyzer to identify the frequency of the emission that has the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable positions, and with a typical system equipment configuration and arrangement.

Final ac power line conducted emission measurements were performed based on the exploratory tests.

The EUT cable configuration and arrangement and mode of operation that produced the emission with the highest amplitude relative to the limit are selected for the final measurement.

When the measurement value is greater than average limitation the average detection measurements were performed.

Applicable rule and limitation

§15.107 (b) AC power line conducted limits

Frequency of Emission [MHz]	Conducted emissions Limit [dB μ V]	
	Quasi-peak	Average
0.15 - 0.5	66 to 56 *	56 to 46 *
0.5 - 5	56	46
5 - 30	60	50

* Decreases with the logarithm of the frequency. The lower limit applies at the band edges.

Test equipment used (refer to List of utilized test equipment)

TR09	CL72	LN06	-
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Test software used

EMI1 Ver. 6.1

Calculation method

The Correction Factor and Result are calculated as followings.

$$\text{Correction Factor [dB]} = \text{ISN Factor [dB]} + \text{Loss [dB]}$$

$$\text{Result [dB}\mu\text{V]} = \text{Reading [dB}\mu\text{V]} + \text{Correction Factor [dB]}$$

Test results - Complied with requirement

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Test Data

[Emission level]

Operating mode: Rx 0.03 MHz

	Freq. [MHz]	Reading QP [dB μ V]	Reading Ave [dB μ V]	Factor [dB]	Result QP [dB μ V]	Result Ave [dB μ V]	Limit QP [dB μ V]	Limit Ave [dB μ V]	Margin QP [dB]	Margin Ave [dB]	Line
1	0.18942	6.5	-0.2	10.3	16.8	10.1	64.1	54.1	47.3	44.0	Va
2	0.63782	1.0	-4.6	10.2	11.2	5.6	56.0	46.0	44.8	40.4	Va
3	10.51025	12.9	9.7	10.4	23.3	20.1	60.0	50.0	36.7	29.9	Va
4	0.15985	10.9	1.1	10.3	21.2	11.4	65.5	55.5	44.3	44.1	Vb
5	0.63289	1.1	-4.6	10.2	11.3	5.6	56.0	46.0	44.7	40.4	Vb
6	10.51025	9.4	6.1	10.4	19.8	16.5	60.0	50.0	40.2	33.5	Vb

Operating mode: Rx 30 MHz

	Freq. [MHz]	Reading QP [dB μ V]	Reading Ave [dB μ V]	Factor [dB]	Result QP [dB μ V]	Result Ave [dB μ V]	Limit QP [dB μ V]	Limit Ave [dB μ V]	Margin QP [dB]	Margin Ave [dB]	Line
1	0.16971	8.3	0.6	10.4	18.7	11.0	65.0	55.0	46.3	44.0	Va
2	0.62304	1.1	-4.6	10.2	11.3	5.6	56.0	46.0	44.7	40.4	Va
3	10.78039	12.4	9.6	10.4	22.8	20.0	60.0	50.0	37.2	30.0	Va
4	0.18449	6.8	0.1	10.3	17.1	10.4	64.3	54.3	47.2	43.9	Vb
5	0.68217	0.9	-4.7	10.2	11.1	5.5	56.0	46.0	44.9	40.5	Vb
6	10.60030	10.7	7.7	10.4	21.1	18.1	60.0	50.0	38.9	31.9	Vb

Operating mode: Rx 50 MHz

	Freq. [MHz]	Reading QP [dB μ V]	Reading Ave [dB μ V]	Factor [dB]	Result QP [dB μ V]	Result Ave [dB μ V]	Limit QP [dB μ V]	Limit Ave [dB μ V]	Margin QP [dB]	Margin Ave [dB]	Line
1	0.19435	5.8	-0.3	10.3	16.1	10.0	63.8	53.8	47.7	43.8	Va
2	0.66246	0.9	-4.7	10.2	11.1	5.5	56.0	46.0	44.9	40.5	Va
3	10.59029	4.7	-1.4	10.4	15.1	9.0	60.0	50.0	44.9	41.0	Va
4	0.16478	10.6	0.7	10.3	20.9	11.0	65.2	55.2	44.3	44.2	Vb
5	0.67724	1.0	-4.7	10.2	11.2	5.5	56.0	46.0	44.8	40.5	Vb
6	10.77038	3.0	-2.9	10.4	13.4	7.5	60.0	50.0	46.6	42.5	Vb

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Operating mode: Rx 118 MHz

	Freq. [MHz]	Reading QP [dB μ V]	Reading Ave [dB μ V]	Factor [dB]	Result QP [dB μ V]	Result Ave [dB μ V]	Limit QP [dB μ V]	Limit Ave [dB μ V]	Margin QP [dB]	Margin Ave [dB]	Line
1	0.19435	6.0	-0.3	10.3	16.3	10.0	63.8	53.8	47.5	43.8	Va
2	1.13549	0.3	-5.3	10.2	10.5	4.9	56.0	46.0	45.5	41.1	Va
3	10.87043	13.2	10.6	10.4	23.6	21.0	60.0	50.0	36.4	29.0	Va
4	0.19927	5.5	-0.4	10.3	15.8	9.9	63.6	53.6	47.8	43.7	Vb
5	1.63317	0.2	-5.3	10.2	10.4	4.9	56.0	46.0	45.6	41.1	Vb
6	10.78039	11.0	8.2	10.4	21.4	18.6	60.0	50.0	38.6	31.4	Vb

Operating mode: Rx 144 MHz

	Freq. [MHz]	Reading QP [dB μ V]	Reading Ave [dB μ V]	Factor [dB]	Result QP [dB μ V]	Result Ave [dB μ V]	Limit QP [dB μ V]	Limit Ave [dB μ V]	Margin QP [dB]	Margin Ave [dB]	Line
1	0.15493	12.8	1.2	10.4	23.2	11.6	65.7	55.7	42.5	44.1	Va
2	0.68217	0.7	-4.9	10.2	10.9	5.3	56.0	46.0	45.1	40.7	Va
3	10.78039	13.8	11.1	10.4	24.2	21.5	60.0	50.0	35.8	28.5	Va
4	0.16971	9.2	0.5	10.3	19.5	10.8	65.0	55.0	45.5	44.2	Vb
5	0.55405	1.2	-4.4	10.2	11.4	5.8	56.0	46.0	44.6	40.2	Vb
6	10.96048	10.5	7.8	10.4	20.9	18.2	60.0	50.0	39.1	31.8	Vb

Operating mode: Rx 174 MHz

	Freq. [MHz]	Reading QP [dB μ V]	Reading Ave [dB μ V]	Factor [dB]	Result QP [dB μ V]	Result Ave [dB μ V]	Limit QP [dB μ V]	Limit Ave [dB μ V]	Margin QP [dB]	Margin Ave [dB]	Line
1	0.16971	9.3	0.4	10.4	19.7	10.8	65.0	55.0	45.3	44.2	Va
2	0.67231	0.6	-4.8	10.2	10.8	5.4	56.0	46.0	45.2	40.6	Va
3	10.96048	10.5	7.8	10.4	20.9	18.2	60.0	50.0	39.1	31.8	Va
4	0.19435	5.7	-0.5	10.3	16.0	9.8	63.8	53.8	47.8	44.0	Vb
5	0.68217	0.8	-4.9	10.2	11.0	5.3	56.0	46.0	45.0	40.7	Vb
6	10.77038	5.4	-0.9	10.4	15.8	9.5	60.0	50.0	44.2	40.5	Vb

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Operating mode: Rx 400 MHz

	Freq. [MHz]	Reading QP [dB μ V]	Reading Ave [dB μ V]	Factor [dB]	Result QP [dB μ V]	Result Ave [dB μ V]	Limit QP [dB μ V]	Limit Ave [dB μ V]	Margin QP [dB]	Margin Ave [dB]	Line
1	0.16478	11.1	0.5	10.4	21.5	10.9	65.2	55.2	43.7	44.3	Va
2	0.68709	0.8	-4.9	10.2	11.0	5.3	56.0	46.0	45.0	40.7	Va
3	10.78039	13.7	11.1	10.4	24.1	21.5	60.0	50.0	35.9	28.5	Va
4	0.17464	8.0	0.1	10.3	18.3	10.4	64.7	54.7	46.4	44.3	Vb
5	0.59347	1.0	-4.6	10.2	11.2	5.6	56.0	46.0	44.8	40.4	Vb
6	10.96048	10.0	7.2	10.4	20.4	17.6	60.0	50.0	39.6	32.4	Vb

Operating mode: Rx 435 MHz

	Freq. [MHz]	Reading QP [dB μ V]	Reading Ave [dB μ V]	Factor [dB]	Result QP [dB μ V]	Result Ave [dB μ V]	Limit QP [dB μ V]	Limit Ave [dB μ V]	Margin QP [dB]	Margin Ave [dB]	Line
1	0.19927	5.4	-0.7	10.3	15.7	9.6	63.6	53.6	47.9	44.0	Va
2	0.68709	0.8	-4.8	10.2	11.0	5.4	56.0	46.0	45.0	40.6	Va
3	10.87043	13.4	10.9	10.4	23.8	21.3	60.0	50.0	36.2	28.7	Va
4	0.15985	12.0	0.8	10.3	22.3	11.1	65.5	55.5	43.2	44.4	Vb
5	0.57376	1.0	-4.6	10.2	11.2	5.6	56.0	46.0	44.8	40.4	Vb
6	11.05052	10.0	7.2	10.4	20.4	17.6	60.0	50.0	39.6	32.4	Vb

Operating mode: Rx 470 MHz

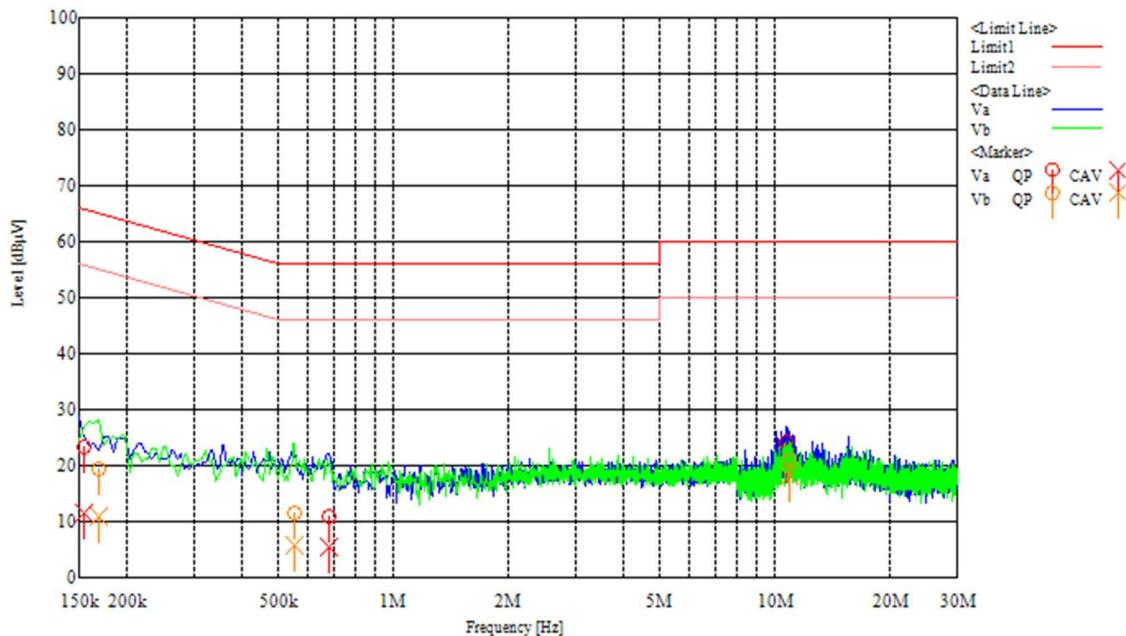
	Freq. [MHz]	Reading QP [dB μ V]	Reading Ave [dB μ V]	Factor [dB]	Result QP [dB μ V]	Result Ave [dB μ V]	Limit QP [dB μ V]	Limit Ave [dB μ V]	Margin QP [dB]	Margin Ave [dB]	Line
1	0.17956	7.4	0.1	10.4	17.8	10.5	64.5	54.5	46.7	44.0	Va
2	0.67724	0.8	-4.7	10.2	11.0	5.5	56.0	46.0	45.0	40.5	Va
3	10.68034	5.3	-0.9	10.4	15.7	9.5	60.0	50.0	44.3	40.5	Va
4	0.17464	8.7	0.3	10.3	19.0	10.6	64.7	54.7	45.7	44.1	Vb
5	0.58854	1.2	-4.6	10.2	11.4	5.6	56.0	46.0	44.6	40.4	Vb
6	10.64032	4.9	-0.9	10.4	15.3	9.5	60.0	50.0	44.7	40.5	Vb

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[Worst Chart]

Operating mode: 144MHz



[Test condition]

Tested Date: 20 February 2025
Humidity: 40 %

Temperature: 21 deg. C
Atmos. Press: 1018 hPa

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4 List of utilized test equipment / calibration

RFT ID No.	Kind of Equipment and Precision	Manufacturer	Model No.	Serial Number	Calibration Date	Calibrated until
AC01 (EM)	Anechoic Chamber (Y1 test room)	JSE	203397C	-	2024/03/29	2025/03/31
AC01 (EG)	Anechoic Chamber (Y1 test room)	JSE	203397C	-	2024/03/29	2025/03/31
BA10	Biological Antenna	TESEQ	CBL6111D	32342	2024/06/25	2025/06/30
CL35	RF Cable 2 m	Junkosha	MWX221	1502S020	2024/02/16	2025/02/28
CL36	RF Cable 2 m	Junkosha	MWX221	1502S021	2024/02/16	2025/02/28
CL80	RF Cable 8 m	HUBER&SUHNER	SUCOFLEX104PE	MY3792/4PE	2024/02/16	2025/02/28
CL11	RF Cable for RE	RFT	-	-	2024/03/05	2025/03/31
CL72	RF Cable for CE	RFT	-	-	2025/01/17	2026/01/31
LN06	LISN	Kyoritsu	KNW-407F	8-1773-3	2024/09/20	2025/09/30
DH06	DRG Horn Antenna	A.H. Systems	SAS-571	1339	2024/07/30	2026/07/31
PR15	Pre. Amplifier	Anritsu	MH648A	6201156141	2024/06/17	2025/06/30
PR16	Pre. Amplifier (1-26G)	Agilent Technologies	8449B	3008A01538	2024/02/16	2025/02/28
TR10	Test Receiver (F/W : 3.66)	Rohde & Schwarz	ESR26	101313	2024/05/28	2025/05/31
TR09	Test Receiver (F/W : 4.43 SP3)	Rohde & Schwarz	ESU8	100386	2024/09/12	2025/09/30

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

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