

# TEST REPORT

For

## 144/430MHz DIGITAL/ANALOG TRANSCEIVER

In conformity with

### FCC CFR 47 Part15 Subpart B (CSR)

**Model : FT3DR**

**FCC ID : K6620725X20**

**Test Item : 144/430MHz DIGITAL/ANALOG TRANSCEIVER**

**Report No. : WE190325BC1-22**

**Issue Date : 17 May 2019**

**Prepared for**

YAESU MUSEN CO., LTD.  
Tennozu Parkside Building 2-5-8 Higashi-Shinagawa,  
Shinagawa-ku, Tokyo 140-0002 JAPAN

**Prepared by**

SGS Japan Inc.  
3-5-23, Kiyatamata, Tsuzuki-ku, Yokohama, 224-0021, Japan  
Telephone: +81+(0)45- 550-3520  
FAX: +81+(0)45- 592-7506

This Test Report is issued by the Company under its General Conditions of Service printed overleaf or available on request and accessible at <http://www.sgs.com>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Unless otherwise stated the results shown in this Test Report refer only to the sample(s) tested. This Test Report cannot be reproduced expert, in full, without prior approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this test report is unlawful and offenders may be prosecuted to the fullest extent of the law.

この試験報告書は裏面に記載された、もしくは <http://www.sgs.com> で入手が可能なサービスに関する一般的条件に則して発行されます。そちらに明記されている弊社の負うべき債務・補償の範囲及び司法管轄の項目をご注意ください。他に特に明記のない限り、この試験報告書に記載された結果は、試験サンプルのみに属します。この書面全体の複製以外には、弊社からの事前の許可を得ること無く複製することを禁じます。この検査報告書を無断で変更、偽造、改ざんすることは違法であり、違反者に対しては法的手段を講じることになります。

## Table of contents

<b>1</b>	<b>General information.....</b>	<b>3</b>
1.1	Product description .....	3
1.2	Test(s) performed/ Summary of test result .....	4
1.3	Test facility .....	5
1.4	Measurement uncertainty.....	5
1.5	Summary of test results.....	6
1.6	Setup of equipment under test (EUT) .....	6
1.6.1	Test configuration of EUT .....	6
1.6.2	Operating condition: .....	6
1.6.3	Setup diagram of tested system.....	7
1.7	Equipment modifications.....	7
1.8	Deviation from the standard .....	7
<b>2</b>	<b>Test procedure and test data .....</b>	<b>8</b>
2.1	Radiated emissions .....	8
2.2	Conducted emissions for receiver .....	15
2.3	AC power line conducted emissions.....	17
<b>3</b>	<b>Test setup photographs .....</b>	<b>19</b>
3.1	Radiated emissions .....	19
3.2	AC power line conducted emissions.....	19
<b>4</b>	<b>List of utilized test equipment / calibration .....</b>	<b>20</b>

## History

Report No.	Date	Revisions	Issued By
WE190325BC1-21	25 Apr. 2019	Initial Issue	T. Kato
WE190325BC1-22	17 May 2019	Replace the test result at high channel operation (999.975 MHz -> 985.000 MHz operation)	T. Kato

This Test Report is issued by the Company under its General Conditions of Service printed overleaf or available on request and accessible at <http://www.sgs.com>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Unless otherwise stated the results shown in this Test Report refer only to the sample(s) tested. This Test Report cannot be reproduced, in full, without prior approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this test report is unlawful and offenders may be prosecuted to the fullest extent of the law.

この試験報告書は裏面に記載された、もしくは <http://www.sgs.com> で入手が可能なサービスに関する一般的条件に則して発行されます。そちらに明記されている弊社の負うべき債務・補償の範囲及び司法管轄の項目をご注意ください。他に特に明記のない限り、この試験報告書に記載された結果は、試験サンプルのみに属します。この書面全体の複製以外には、弊社からの事前の許可を得ること無く複製することを禁じます。この検査報告書を無断で変更、偽造、改ざんすることは違法であり、違反者に対しては法的手段を講じることになります。

# 1 General information

## 1.1 Product description

Test item	: 144/430MHz DIGITAL/ANALOG TRANSCEIVER
Manufacturer	: YAESU MUSEN CO., LTD.
Address	: 43 Utsuroda, Morijuku, Sukagawa-shi, Fukushima-ken 962-0001 JAPAN
Model	: FT3DR
FCC ID	: K6620725X20
Serial number	: 9E010011
Hardware version	: 9E01
Software version	: Ver. 88.73 (MAIN)
	: Ver. 0.70 (SUB)
	: Ver. 92.07 (DSP)
Operating frequency range	: 0.5 - 985.000 MHz
Highest internal operating Freq.	: 941.94 MHz
Receipt date of EUT	: 04 Apr. 2019
Nominal power source voltages	: DC 7.4 V (Battery)

This Test Report is issued by the Company under its General Conditions of Service printed overleaf or available on request and accessible at <http://www.sgs.com>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Unless otherwise stated the results shown in this Test Report refer only to the sample(s) tested. This Test Report cannot be reproduced, in full, without prior approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this test report is unlawful and offenders may be prosecuted to the fullest extent of the law.

この試験報告書は裏面に記載された、もしくは <http://www.sgs.com> で入手が可能なサービスに関する一般的条件に則して発行されます。そちらに明記されている弊社の負うべき債務・補償の範囲及び司法管轄の項目をご確認ください。他に特に明記のない限り、この試験報告書に記載された結果は、試験サンプルのみに属します。この書面全体の複製以外には、弊社からの事前の許可を得ること無く複製することを禁じます。この検査報告書を無断で変更、偽造、改ざんすることは違法であり、違反者に対しては法的手段を講じることになります。

## 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 : 04 Apr. 2019  
Test(s) completed : 17 May 2019  
Purpose of test(s) : Certification as the scanning receiver


Summary of test result : Complied

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 is case that the margin is less than the measurement uncertainty in the Laboratory.

Test engineer

:   
T. Kato  
(Test Engineer, EMC/RF Testing Lab.)

Reviewer

:   
K. Onishi  
(Testing Leader, EMC/RF Testing Lab.)

This Test Report is issued by the Company under its General Conditions of Service printed overleaf or available on request and accessible at <http://www.sgs.com>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Unless otherwise stated the results shown in this Test Report refer only to the sample(s) tested. This Test Report cannot be reproduced except, in full, without prior approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this test report is unlawful and offenders may be prosecuted to the fullest extent of the law.

この試験報告書は裏面に記載された、もしくは <http://www.sgs.com> で入手が可能なサービスに関する一般的条件に則して発行されます。そちらに明記されている弊社の負うべき債務・補償の範囲及び司法管轄の項目をご注意ください。他に特に明記のない限り、この試験報告書に記載された結果は、試験サンプルのみに属します。この書面全体の複製以外には、弊社からの事前の許可を得ること無く複製することを禁じます。この検査報告書を無断で変更、偽造、改ざんすることは違法であり、違反者に対しては法的手段を講じることになります。

### 1.3 Test facility

The Federal Communications Commission has reviewed the technical characteristics of the test facilities at SGS Japan Inc., located in 472, Nippa-cho, Kohoku-ku, Yokohama, 223-0057, Japan, and has found these test facilities to be in compliance with the requirements of 47 CFR Part 15, section 2.948.

The description of the test facilities has been filed under registration number 319924 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.

The list of all public test facilities is available on the Internet at <http://www.fcc.gov>.

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

Accredited by **National Voluntary Laboratory Accreditation Program (NVLAP)** for the emission tests stated in the scope of the certificate under Certificate Number 200780-0

This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal 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 UKAS Publication LAB34: 2002 “The Expression of Uncertainty in EMC Testing” and CISPR16-4-2: 2011 “Uncertainty in EMC Measurements”.

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)	: ± 0.9 dB
Radiated emission (30 MHz - 200 MHz)	: ± 4.7 dB
Radiated emission (200 MHz - 1000 MHz)	: ± 6.1 dB
Radiated emission (1 GHz - 6 GHz)	: ± 4.4 dB

This Test Report is issued by the Company under its General Conditions of Service printed overleaf or available on request and accessible at <http://www.sgs.com>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Unless otherwise stated the results shown in this Test Report refer only to the sample(s) tested. This Test Report cannot be reproduced, in full, without prior approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this test report is unlawful and offenders may be prosecuted to the fullest extent of the law.

この試験報告書は裏面に記載された、もしくは <http://www.sgs.com> で入手が可能なサービスに関する一般的条件に則して発行されます。そちらに明記されている弊社の負うべき債務・補償の範囲及び司法管轄の項目をご注意ください。他に特に明記のない限り、この試験報告書に記載された結果は、試験サンプルのみに属します。この書面全体の複製以外には、弊社からの事前の許可を得ること無く複製することを禁じます。この検査報告書を無断で変更、偽造、改ざんすることは違法であり、違反者に対しては法的手段を講じることになります。

## 1.5 Summary of test results

Requirement	Section in specification	Result	Section in this report
Radiated emissions (30 to 5000 MHz) (*1)	15.109	Complied	2.1
Conducted emission for receiver	15.111	Complied	2.2
AC power line conducted emissions	15.107	- (*2)	2.3
38 dB Rejection (cellular band)	15.121 (b)	- (*3)	-

(\*1) The highest internal operating frequency is 941.94 MHz

(\*2) The EUT is a battery powered equipment.

(\*3) 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	Manufacture	Model No.	Serial No.
1	144/430MHz DIGITAL/ANALOG TRANSCEIVER (for Radiated test)	YAESU MUSEN	FT3DR	9E010011
-	-	-	-	-

#### Support Equipment(s)

No.	Item	Manufacture	Model No.	Serial No.
2	Li-ion Battery Pack	YAESU MUSEN	SBR-14LI	Q37
3	Microphone	YAESU MUSEN	MH-34B4B	YTS07

#### Connected cable(s)

No.	Item	From	To	Cable Shielded	Ferrite Core	Length [m]
A	Mic. Cable	1	3	No	No	0.4
-	-	-	-	-	-	-

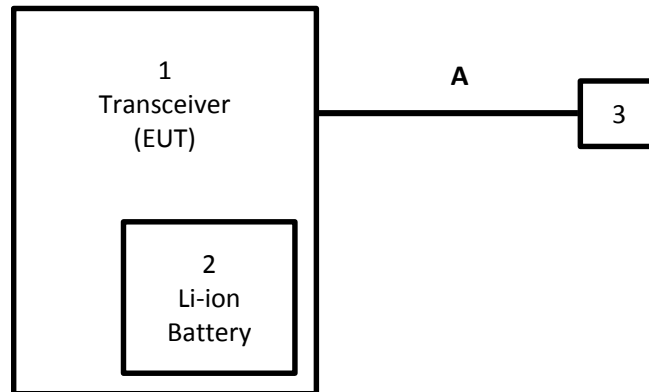
### 1.6.2 Operating condition:

- Rx 0.52 MHz
- Rx 499.975 MHz
- Rx 985.000 MHz

This Test Report is issued by the Company under its General Conditions of Service printed overleaf or available on request and accessible at <http://www.sgs.com>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Unless otherwise stated the results shown in this Test Report refer only to the sample(s) tested. This Test Report cannot be reproduced expert, in full, without prior approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this test report is unlawful and offenders may be prosecuted to the fullest extent of the law.

この試験報告書は裏面に記載された、もしくは <http://www.sgs.com> で入手が可能なサービスに関する一般的条件に則して発行されます。そちらに明記されている弊社の負うべき債務・補償の範囲及び司法管轄の項目をご注意ください。他に特に明記のない限り、この試験報告書に記載された結果は、試験サンプルのみに属します。この書面全体の複製以外には、弊社からの事前の許可を得ること無く複製することを禁じます。この検査報告書を無断で変更、偽造、改ざんすることは違法であり、違反者に対しては法的手段を講じることになります。

### 1.6.3 Setup diagram of tested system



## 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.

This Test Report is issued by the Company under its General Conditions of Service printed overleaf or available on request and accessible at <http://www.sgs.com>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Unless otherwise stated the results shown in this Test Report refer only to the sample(s) tested. This Test Report cannot be reproduced expert, in full, without prior approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this test report is unlawful and offenders may be prosecuted to the fullest extent of the law.

この試験報告書は裏面に記載された、もしくは <http://www.sgs.com> で入手が可能なサービスに関する一般的条件に則して発行されます。そちらに明記されている弊社の負うべき債務・補償の範囲及び司法管轄の項目をご注意ください。他に特に明記のない限り、この試験報告書に記載された結果は、試験サンプルのみに属します。この書面全体の複製以外には、弊社からの事前の許可を得ること無く複製することを禁じます。この検査報告書を無断で変更、偽造、改ざんすることは違法であり、違反者に対しては法的手段を講じることになります。

## 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 placed 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 [ $\mu\text{V/m}$ ]	Measurement Distance [m]	Field Strength [ $\text{dB}\mu\text{V/m}$ ]
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	TR06	CL11	PR21	BA07	CL30	CL38
PR12	DH06					

This Test Report is issued by the Company under its General Conditions of Service printed overleaf or available on request and accessible at <http://www.sgs.com>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Unless otherwise stated the results shown in this Test Report refer only to the sample(s) tested. This Test Report cannot be reproduced, in full, without prior approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this test report is unlawful and offenders may be prosecuted to the fullest extent of the law.

この試験報告書は裏面に記載された、もしくは <http://www.sgs.com> で入手が可能なサービスに関する一般的条件に則して発行されます。そちらに明記されている弊社の負うべき債務・補償の範囲及び司法管轄の項目をご注意ください。他に特に明記のない限り、この試験報告書に記載された結果は、試験サンプルのみに属します。この書面全体の複製以外には、弊社からの事前の許可を得ること無く複製することを禁じます。この検査報告書を無断で変更、偽造、改ざんすることは違法であり、違反者に対しては法的手段を講じることになります。

**Test software used**  
EMI1 Ver. 5.9

### Calculation method

The Correction Factor and Result are calculated as followings.

$$\begin{aligned}\text{Correction Factor [dB/m]} &= \text{Ant. Factor [dB/m]} + \text{Loss [dB]} - \text{Gain [dB]} \\ \text{Result [dB}\mu\text{V/m]} &= \text{Reading [dB}\mu\text{V]} + \text{Correction Factor [dB/m]}\end{aligned}$$

### Test Data

Operating mode: Rx 0.52 MHz (X-plane)

Range: 30 - 1000 MHz

No.	Frequency [MHz]	Reading [dB $\mu$ V]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]	Ant.
1	375.850	34.3	15.7	10.0	30.2	29.8	46.0	16.2	Hori.

Range: 1000 - 5000 MHz

No.	Frequency [MHz]	Reading PK [dB $\mu$ V]	Reading AVE [dB $\mu$ V]	C.Factor [dB/m]	Result PK [dB $\mu$ V/m]	Result AVE [dB $\mu$ V/m]	Limit PK [dB $\mu$ V/m]	Limit AVE [dB $\mu$ V/m]	Margin PK [dB]	Margin AVE [dB]	Ant.
1	3006.801	47.1	41.1	-2.6	44.5	38.5	73.9	53.9	29.4	15.4	Hori.
2	3660.893	50.4	47.2	-1.1	49.3	46.1	73.9	53.9	24.6	7.8	Hori.
3	3006.801	50.8	47.8	-2.6	48.2	45.2	73.9	53.9	25.7	8.7	Vert.
4	3660.884	51.5	48.8	-1.1	50.4	47.7	73.9	53.9	23.5	6.2	Vert.

Operating mode: Rx 0.52 MHz (Y-plane)

Range: 30 - 1000 MHz

No.	Frequency [MHz]	Reading [dB $\mu$ V]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]	Ant.
1	375.850	30.9	15.7	10.0	30.2	26.4	46.0	19.6	Hori.
2	375.850	27.2	15.7	10.0	30.2	22.7	46.0	23.3	Vert.

Range: 1000 - 5000 MHz

No.	Frequency [MHz]	Reading PK [dB $\mu$ V]	Reading AVE [dB $\mu$ V]	C.Factor [dB/m]	Result PK [dB $\mu$ V/m]	Result AVE [dB $\mu$ V/m]	Limit PK [dB $\mu$ V/m]	Limit AVE [dB $\mu$ V/m]	Margin PK [dB]	Margin AVE [dB]	Ant.
1	3006.801	47.2	41.9	-2.6	44.6	39.3	73.9	53.9	29.3	14.6	Hori.
2	3660.799	53.0	51.0	-1.1	51.9	49.9	73.9	53.9	22.0	4.0	Hori.
3	3006.801	49.2	45.2	-2.6	46.6	42.6	73.9	53.9	27.3	11.3	Vert.
4	3660.851	49.3	45.3	-1.1	48.2	44.2	73.9	53.9	25.7	9.7	Vert.

This Test Report is issued by the Company under its General Conditions of Service printed overleaf or available on request and accessible at <http://www.sgs.com>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Unless otherwise stated the results shown in this Test Report refer only to the sample(s) tested. This Test Report cannot be reproduced expert, in full, without prior approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this test report is unlawful and offenders may be prosecuted to the fullest extent of the law.

この試験報告書は裏面に記載された、もしくは <http://www.sgs.com> で入手が可能なサービスに関する一般的条件に則して発行されます。そちらに明記されている弊社の負うべき債務・補償の範囲及び司法管轄の項目をご注意ください。他に特に明記のない限り、この試験報告書に記載された結果は、試験サンプルのみに属します。この書面全体の複製以外には、弊社からの事前の許可を得ること無く複製することを禁じます。この検査報告書を無断で変更、偽造、改ざんすることは違法であり、違反者に対しては法的手段を講じることになります。

Operating mode: Rx 0.52 MHz (Z-plane)

Range: 30 - 1000 MHz

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	375.770	22.7	15.7	10.0	30.2	18.2	46.0	27.8	Hori.
2	227.569	22.6	12.1	8.9	30.2	13.4	46.0	32.6	Vert.
3	234.941	22.2	12.2	8.9	30.2	13.1	46.0	32.9	Vert.
4	375.770	23.8	15.7	10.0	30.2	19.3	46.0	26.7	Vert.

Range: 1000 - 5000 MHz

No.	Frequency [MHz]	Reading PK [dBμV]	Reading AVE [dBμV]	C.Factor [dB/m]	Result PK [dBμV/m]	Result AVE [dBμV/m]	Limit PK [dBμV/m]	Limit AVE [dBμV/m]	Margin PK [dB]	Margin AVE [dB]	Ant.
1	3006.801	51.4	48.5	-2.6	48.8	45.9	73.9	53.9	25.1	8.0	Hori.
2	3660.804	53.0	50.8	-1.1	51.9	49.7	73.9	53.9	22.0	4.2	Hori.
3	3006.801	47.1	41.5	-2.6	44.5	38.9	73.9	53.9	29.4	15.0	Vert.
4	3660.769	49.1	45.4	-1.1	48.0	44.3	73.9	53.9	25.9	9.6	Vert.

Operating mode: Rx 499.975 MHz (X-plane)

Range: 30 - 1000 MHz

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	375.850	34.3	15.7	10.0	30.2	29.8	46.0	16.2	Hori.
2	441.925	38.2	16.8	10.5	30.2	35.3	46.0	10.7	Hori.
3	441.925	35.9	16.8	10.5	30.2	33.0	46.0	13.0	Vert.

Range: 1000 - 5000 MHz

No.	Frequency [MHz]	Reading PK [dBμV]	Reading AVE [dBμV]	C.Factor [dB/m]	Result PK [dBμV/m]	Result AVE [dBμV/m]	Limit PK [dBμV/m]	Limit AVE [dBμV/m]	Margin PK [dB]	Margin AVE [dB]	Ant.
1	2209.625	45.5	36.2	4.2	49.7	40.4	73.9	53.9	24.2	13.5	Hori.
2	3006.801	46.8	41.0	-2.6	44.2	38.4	73.9	53.9	29.7	15.5	Hori.
3	3006.801	51.0	47.8	-2.6	48.4	45.2	73.9	53.9	25.5	8.7	Vert.
4	3977.326	43.8	34.2	0.5	44.3	34.7	73.9	53.9	29.6	19.2	Vert.
5	4134.351	42.3	32.4	0.8	43.1	33.2	73.9	53.9	30.8	20.7	Vert.

This Test Report is issued by the Company under its General Conditions of Service printed overleaf or available on request and accessible at <http://www.sgs.com>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Unless otherwise stated the results shown in this Test Report refer only to the sample(s) tested. This Test Report cannot be reproduced expert, in full, without prior approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this test report is unlawful and offenders may be prosecuted to the fullest extent of the law.

この試験報告書は裏面に記載された、もしくは <http://www.sgs.com> で入手が可能なサービスに関する一般的条件に則して発行されます。そちらに明記されている弊社の負うべき債務・補償の範囲及び司法管轄の項目をご注意ください。他に特に明記のない限り、この試験報告書に記載された結果は、試験サンプルのみに属します。この書面全体の複製以外には、弊社からの事前の許可を得ること無く複製することを禁じます。この検査報告書を無断で変更、偽造、改ざんすることは違法であり、違反者に対しては法的手段を講じることになります。

Operating mode: Rx 499.975 MHz (Y-plane)

Range: 30 - 1000 MHz

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	375.850	31.0	15.7	10.0	30.2	26.5	46.0	19.5	Hori.
2	441.925	35.7	16.8	10.5	30.2	32.8	46.0	13.2	Hori.
3	441.925	33.7	16.8	10.5	30.2	30.8	46.0	15.2	Vert.

Range: 1000 - 5000 MHz

No.	Frequency [MHz]	Reading PK [dBμV]	Reading AVE [dBμV]	C.Factor [dB/m]	Result PK [dBμV/m]	Result AVE [dBμV/m]	Limit PK [dBμV/m]	Limit AVE [dBμV/m]	Margin PK [dB]	Margin AVE [dB]	Ant.
1	2209.626	45.8	36.5	4.2	50.0	40.7	73.9	53.9	23.9	13.2	Hori.
2	3006.801	48.2	41.9	-2.6	45.6	39.3	73.9	53.9	28.3	14.6	Hori.
3	2209.626	44.6	33.4	4.2	48.8	37.6	73.9	53.9	25.1	16.3	Vert.
4	3006.801	49.4	45.3	-2.6	46.8	42.7	73.9	53.9	27.1	11.2	Vert.

Operating mode: Rx 499.975 MHz (Z-plane)

Range: 30 - 1000 MHz

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	441.925	36.3	16.8	10.5	30.2	33.4	46.0	12.6	Hori.
2	375.850	30.6	15.7	10.0	30.2	26.1	46.0	19.9	Vert.
3	441.925	34.4	16.8	10.5	30.2	31.5	46.0	14.5	Vert.

Range: 1000 - 5000 MHz

No.	Frequency [MHz]	Reading PK [dBμV]	Reading AVE [dBμV]	C.Factor [dB/m]	Result PK [dBμV/m]	Result AVE [dBμV/m]	Limit PK [dBμV/m]	Limit AVE [dBμV/m]	Margin PK [dB]	Margin AVE [dB]	Ant.
1	2209.625	44.8	33.2	4.2	49.0	37.4	73.9	53.9	24.9	16.5	Hori.
2	3006.801	51.5	48.4	-2.6	48.9	45.8	73.9	53.9	25.0	8.1	Hori.
3	3977.326	44.0	34.9	0.5	44.5	35.4	73.9	53.9	29.4	18.5	Hori.
4	2209.626	44.2	32.7	4.2	48.4	36.9	73.9	53.9	25.5	17.0	Vert.
5	3006.801	47.7	41.2	-2.6	45.1	38.6	73.9	53.9	28.8	15.3	Vert.

This Test Report is issued by the Company under its General Conditions of Service printed overleaf or available on request and accessible at <http://www.sgs.com>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Unless otherwise stated the results shown in this Test Report refer only to the sample(s) tested. This Test Report cannot be reproduced expert, in full, without prior approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this test report is unlawful and offenders may be prosecuted to the fullest extent of the law.

この試験報告書は裏面に記載された、もしくは <http://www.sgs.com> で入手が可能なサービスに関する一般的条件に則して発行されます。そちらに明記されている弊社の負うべき債務・補償の範囲及び司法管轄の項目をご注意ください。他に特に明記のない限り、この試験報告書に記載された結果は、試験サンプルのみに属します。この書面全体の複製以外には、弊社からの事前の許可を得ること無く複製することを禁じます。この検査報告書を無断で変更、偽造、改ざんすることは違法であり、違反者に対しては法的手段を講じることになります。

Operating mode: Rx 985.000 MHz (X-plane)

Range: 30 - 1000 MHz

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	930.950	41.0	20.7	12.7	28.9	45.5	46.0	0.5	Hori.
2	930.950	31.4	20.7	12.7	28.9	35.9	46.0	10.1	Vert.

Range: 1000 - 5000 MHz

No.	Frequency [MHz]	Reading PK [dBμV]	Reading AVE [dBμV]	C.Factor [dB/m]	Result PK [dBμV/m]	Result AVE [dBμV/m]	Limit PK [dBμV/m]	Limit AVE [dBμV/m]	Margin PK [dB]	Margin AVE [dB]	Ant.
1	2792.851	44.2	33.5	6.8	51.0	40.3	73.9	53.9	22.9	13.6	Hori.
2	4654.751	43.8	36.6	1.7	45.5	38.3	73.9	53.9	28.4	15.6	Hori.
3	4654.751	44.4	37.6	1.7	46.1	39.3	73.9	53.9	27.8	14.6	Vert.

Operating mode: Rx 985.000 MHz (Y-plane)

Range: 30 - 1000 MHz

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	930.950	40.2	20.7	12.7	28.9	44.7	46.0	1.3	Hori.
2	930.950	31.3	20.7	12.7	28.9	35.8	46.0	10.2	Vert.

Range: 1000 - 5000 MHz

No.	Frequency [MHz]	Reading PK [dBμV]	Reading AVE [dBμV]	C.Factor [dB/m]	Result PK [dBμV/m]	Result AVE [dBμV/m]	Limit PK [dBμV/m]	Limit AVE [dBμV/m]	Margin PK [dB]	Margin AVE [dB]	Ant.
1	4654.751	45.2	38.4	1.7	46.9	40.1	73.9	53.9	27.0	13.8	Hori.
2	4654.751	44.2	37.2	1.7	45.9	38.9	73.9	53.9	28.0	15.0	Vert.

This Test Report is issued by the Company under its General Conditions of Service printed overleaf or available on request and accessible at <http://www.sgs.com>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Unless otherwise stated the results shown in this Test Report refer only to the sample(s) tested. This Test Report cannot be reproduced, in full, without prior approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this test report is unlawful and offenders may be prosecuted to the fullest extent of the law.

この試験報告書は裏面に記載された、もしくは <http://www.sgs.com> で入手が可能なサービスに関する一般的条件に則して発行されます。そちらに明記されている弊社の負うべき債務・補償の範囲及び司法管轄の項目をご確認ください。他に特に明記のない限り、この試験報告書に記載された結果は、試験サンプルのみに属します。この書面全体の複製以外には、弊社からの事前の許可を得ること無く複製することを禁じます。この検査報告書を無断で変更、偽造、改ざんすることは違法であり、違反者に対しては法的手段を講じることになります。

Operating mode: Rx 985.000 MHz (Z-plane)

Range: 30 - 1000 MHz

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	930.950	33.6	20.7	12.7	28.9	38.1	46.0	7.9	Hori.
2	930.950	37.3	20.7	12.7	28.9	41.8	46.0	4.2	Vert.

Range: 1000 - 5000 MHz

No.	Frequency [MHz]	Reading PK [dBμV]	Reading AVE [dBμV]	C.Factor [dB/m]	Result PK [dBμV/m]	Result AVE [dBμV/m]	Limit PK [dBμV/m]	Limit AVE [dBμV/m]	Margin PK [dB]	Margin AVE [dB]	Ant.
1	3723.802	42.8	31.9	-0.7	42.1	31.2	73.9	53.9	31.8	22.7	Hori.
2	4654.751	44.0	37.1	1.7	45.7	38.8	73.9	53.9	28.2	15.1	Hori.
3	4654.751	44.9	38.6	1.7	46.6	40.3	73.9	53.9	27.3	13.6	Vert.

[Test condition]

Day 1

Tested Date: 04 Apr. 2019  
Humidity: 29 %

Temperature: 17 degC  
Atmos. Press: 1017 hPa

Day 2

Tested Date: 08 Apr. 2019  
Humidity: 43 %

Temperature: 20 degC  
Atmos. Press: 1009 hPa

Day 3

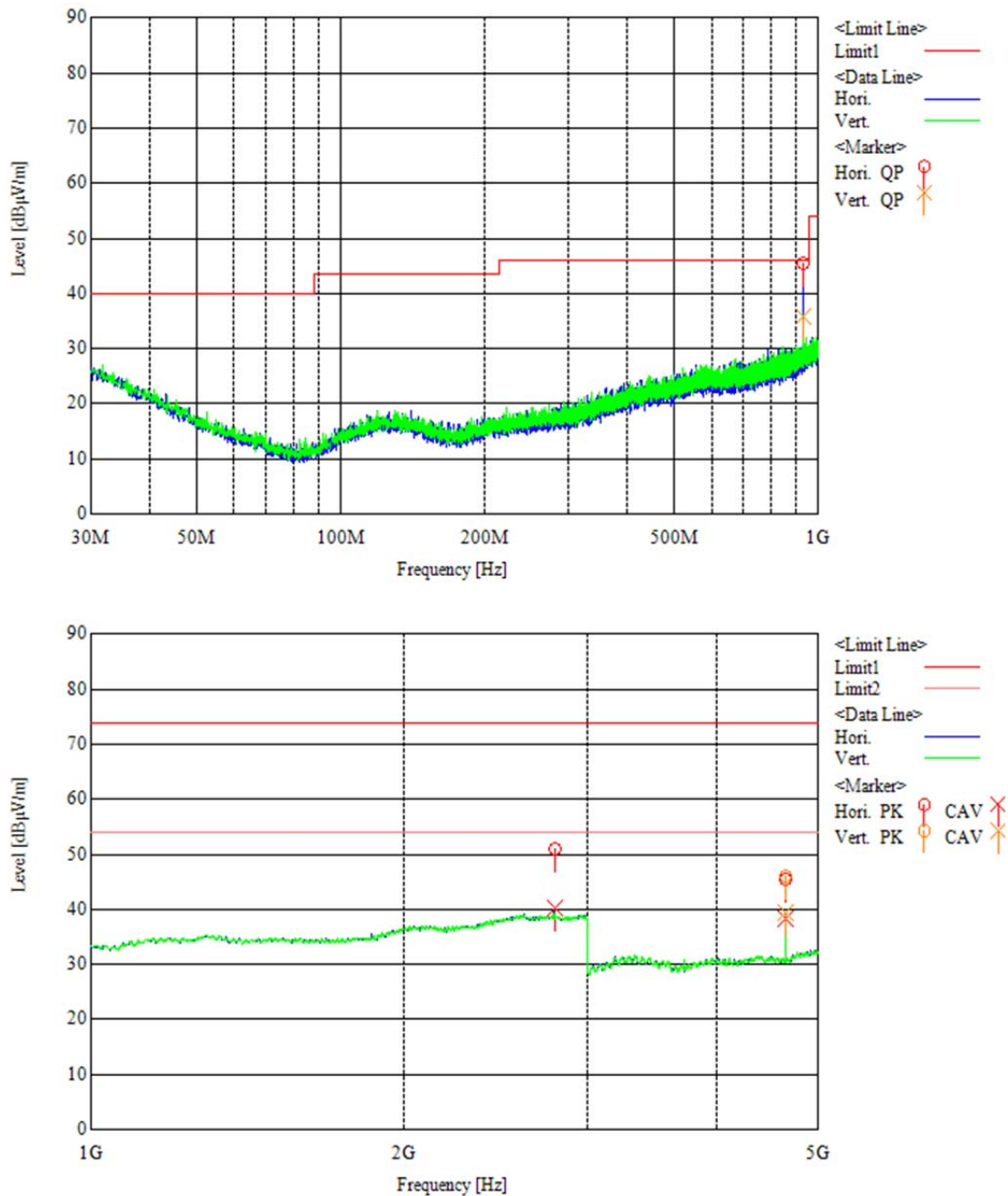
Tested Date: 17 May 2019  
Humidity: 52 %

Temperature: 22 degC  
Atmos. Press: 1020 hPa

This Test Report is issued by the Company under its General Conditions of Service printed overleaf or available on request and accessible at <http://www.sgs.com>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Unless otherwise stated the results shown in this Test Report refer only to the sample(s) tested. This Test Report cannot be reproduced, in full, without prior approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this test report is unlawful and offenders may be prosecuted to the fullest extent of the law.

この試験報告書は裏面に記載された、もしくは <http://www.sgs.com> で入手が可能なサービスに関する一般的条件に則して発行されます。そちらに明記されている弊社の負うべき債務・補償の範囲及び司法管轄の項目をご注意ください。他に特に明記のない限り、この試験報告書に記載された結果は、試験サンプルのみに属します。この書面全体の複製以外には、弊社からの事前の許可を得ること無く複製することを禁じます。この検査報告書を無断で変更、偽造、改ざんすることは違法であり、違反者に対しては法的手段を講じることになります。

[Chart] Rx 985.000 MHz, X-plane



This Test Report is issued by the Company under its General Conditions of Service printed overleaf or available on request and accessible at <http://www.sgs.com>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Unless otherwise stated the results shown in this Test Report refer only to the sample(s) tested. This Test Report cannot be reproduced expert, in full, without prior approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this test report is unlawful and offenders may be prosecuted to the fullest extent of the law.

この試験報告書は裏面に記載された、もしくは <http://www.sgs.com> で入手が可能なサービスに関する一般的条件に則して発行されます。そちらに明記されている弊社の負うべき債務・補償の範囲及び司法管轄の項目をご注意ください。他に特に明記のない限り、この試験報告書に記載された結果は、試験サンプルのみに属します。この書面全体の複製以外には、弊社からの事前の許可を得ること無く複製することを禁じます。この検査報告書を無断で変更、偽造、改ざんすることは違法であり、違反者に対しては法的手段を講じることになります。

## 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)

CL31	TR06	-
------	------	---

### Test results - Complied with requirement

### Test Data

[The maximum spurious level]

Operating freq. [MHz]	Frequency range 30 - 1000 MHz		Frequency range 1000 - 5000 MHz	
	Freq. [MHz]	Level [dBm]	Freq. [MHz]	Level [dBm]
0.52	375.850	-71.7	3660.933	-62.3
499.975	375.850	-70.9	2209.467	-68.2
985.000	- (Note)	- (Note)	- (Note)	- (Note)

Note: No emission above noise floor was found.

[Test condition]

#### Day 1

Tested Date: 09 Apr. 2019  
Humidity: 51 %

Temperature: 24 degC  
Atmos. Press: 1018 hPa

#### Day 2

Tested Date: 17 May 2019  
Humidity: 52 %

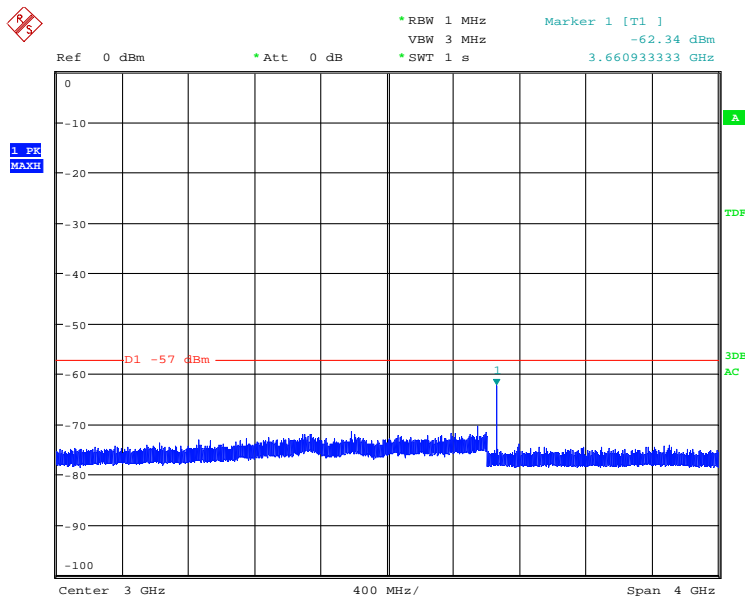
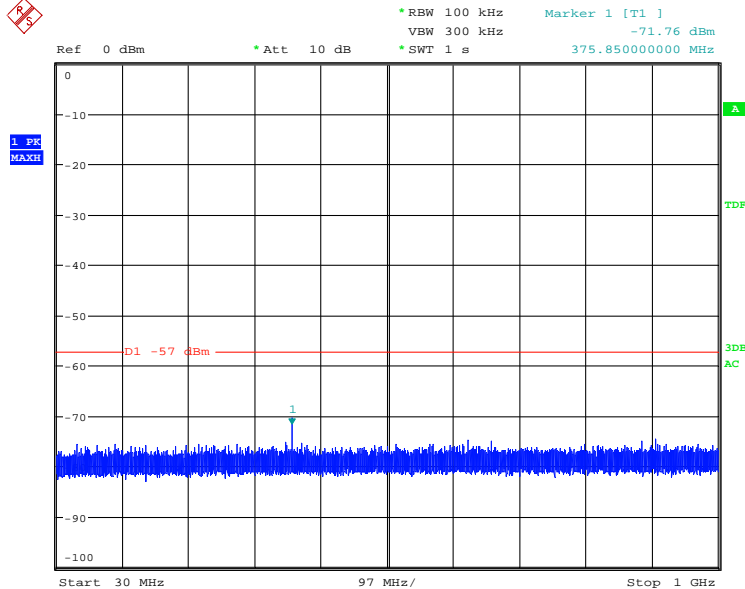
Temperature: 22 degC  
Atmos. Press: 1020 hPa

This Test Report is issued by the Company under its General Conditions of Service printed overleaf or available on request and accessible at <http://www.sgs.com>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Unless otherwise stated the results shown in this Test Report refer only to the sample(s) tested. This Test Report cannot be reproduced expert, in full, without prior approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this test report is unlawful and offenders may be prosecuted to the fullest extent of the law.

この試験報告書は裏面に記載された、もしくは <http://www.sgs.com> で入手が可能なサービスに関する一般的条件に則して発行されます。そちらに明記されている弊社の負うべき債務・補償の範囲及び司法管轄の項目をご注意ください。他に特に明記のない限り、この試験報告書に記載された結果は、試験サンプルのみに属します。この書面全体の複製以外には、弊社からの事前の許可を得ること無く複製することを禁じます。この検査報告書を無断で変更、偽造、改ざんすることは違法であり、違反者に対しては法的手段を講じることになります。

[Chart]

Operating mode: Rx 0.52 MHz



This Test Report is issued by the Company under its General Conditions of Service printed overleaf or available on request and accessible at <http://www.sgs.com>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Unless otherwise stated the results shown in this Test Report refer only to the sample(s) tested. This Test Report cannot be reproduced expert, in full, without prior approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this test report is unlawful and offenders may be prosecuted to the fullest extent of the law.

この試験報告書は裏面に記載された、もしくは <http://www.sgs.com> で入手が可能なサービスに関する一般的条件に則して発行されます。そちらに明記されている弊社の負うべき債務・補償の範囲及び司法管轄の項目をご確認ください。他に特に明記のない限り、この試験報告書に記載された結果は、試験サンプルのみに属します。この書面全体の複製以外には、弊社からの事前の許可を得ること無く複製することを禁じます。この検査報告書を無断で変更、偽造、改ざんすることは違法であり、違反者に対しては法的手段を講じることになります。

## 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 [dBμV]	
	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)

-	-	-
---	---	---

### Test software used

EMI1 Ver. 5.9

### Calculation method

The Correction Factor and Result are calculated as followings.

Correction Factor [dB] = ISN Factor [dB] + Loss [dB]

Result [dBμV] = Reading [dBμV] + Correction Factor [dB]

### Test results - *This item was not tested*

This Test Report is issued by the Company under its General Conditions of Service printed overleaf or available on request and accessible at <http://www.sgs.com>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Unless otherwise stated the results shown in this Test Report refer only to the sample(s) tested. This Test Report cannot be reproduced, in full, without prior approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this test report is unlawful and offenders may be prosecuted to the fullest extent of the law.

この試験報告書は裏面に記載された、もしくは <http://www.sgs.com> で入手が可能なサービスに関する一般的条件に則して発行されます。そちらに明記されている弊社の負うべき債務・補償の範囲及び司法管轄の項目をご注意ください。他に特に明記のない限り、この試験報告書に記載された結果は、試験サンプルのみに属します。この書面全体の複製以外には、弊社からの事前の許可を得ること無く複製することを禁じます。この検査報告書を無断で変更、偽造、改ざんすることは違法であり、違反者に対しては法的手段を講じることになります。

## Test Data

[Emission level]

Operating mode: -

	Freq. [MHz]	Reading QP [dBμV]	Reading Ave [dBμV]	Factor [dB]	Result QP [dBμV]	Result Ave [dBμV]	Limit QP [dBμV]	Limit Ave [dBμV]	Margin QP [dB]	Margin Ave [dB]	Line
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-

[Chart]

[Test condition]

Tested Date: -  
Humidity: - %Temperature: - degC  
Atmos. Press: - hPa

This Test Report is issued by the Company under its General Conditions of Service printed overleaf or available on request and accessible at <http://www.sgs.com>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Unless otherwise stated the results shown in this Test Report refer only to the sample(s) tested. This Test Report cannot be reproduced, in full, without prior approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this test report is unlawful and offenders may be prosecuted to the fullest extent of the law.

この試験報告書は裏面に記載された、もしくは <http://www.sgs.com> で入手が可能なサービスに関する一般的条件に則して発行されます。そちらに明記されている弊社の負うべき債務・補償の範囲及び司法管轄の項目をご注意ください。他に特に明記のない限り、この試験報告書に記載された結果は、試験サンプルのみに属します。この書面全体の複製以外には、弊社からの事前の許可を得ること無く複製することを禁じます。この検査報告書を無断で変更、偽造、改ざんすることは違法であり、違反者に対しては法的手段を講じることになります。

## 4 List of utilized test equipment / calibration

ID No.	Kind of Equipment	Manufacturer	Model No.	Serial Number	Cal. Date	Cal. until
AC01(EM)	Anechoic Chamber (1st test room)	JSE	203397C	-	2018/4/14	2019/4/30
AC01(EG)	Anechoic Chamber (1st test room)	JSE	203397C	-	2019/3/30	2020/3/31
BA07	Biological Antenna	TESEQ	CBL6143A	26670	2018/12/7	2019/12/31
CL11	RF Cable for RE	RFT	-	-	2019/3/19	2020/3/31
CL30	RF Cable 5 m	SUHNER	SUCOFLEX104PE	MY3599	2019/1/23	2020/1/31
CL31	RF Cable 1 m	Junkosha	MWX221	1303S118	2019/1/23	2020/1/31
CL38	RF Cable 2 m	Junkosha	MWX221	1603S626	2019/1/23	2020/1/31
DH06	DRG Horn Antenna	A.H. Systems	SAS-571	1339	2018/6/19	2020/6/30
PR12	Pre. Amplifier (1-26G)	Agilent Technologies	8449B	3008A02513	2019/1/23	2020/1/31
PR21	Pre. Amplifier	Anritsu	MH648A	6200467119	2018/12/4	2019/12/31
TR06	Test Receiver (F/W : 4.73 SP4)	Rohde & Schwarz	ESU26	100002	2018/10/11	2019/10/31

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.

This Test Report is issued by the Company under its General Conditions of Service printed overleaf or available on request and accessible at <http://www.sgs.com>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Unless otherwise stated the results shown in this Test Report refer only to the sample(s) tested. This Test Report cannot be reproduced expert, in full, without prior approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this test report is unlawful and offenders may be prosecuted to the fullest extent of the law.

この試験報告書は裏面に記載された、もしくは <http://www.sgs.com> で入手が可能なサービスに関する一般的条件に則して発行されます。そちらに明記されている弊社の負うべき債務・補償の範囲及び司法管轄の項目をご注意ください。他に特に明記のない限り、この試験報告書に記載された結果は、試験サンプルのみに属します。この書面全体の複製以外には、弊社からの事前の許可を得ること無く複製することを禁じます。この検査報告書を無断で変更、偽造、改ざんすることは違法であり、違反者に対しては法的手段を講じることになります。