

# EMI – TEST REPORT

- FCC Part 15.209, RSS-210 -

Model Name	: Me1550 (internal development name), RONDO 3		
	(market name), product codes: Me1550, Me1551,		
	Me1552, Me1553		
Product Description	: Single Unit Audio Processor for cochlear implant		
	system including a 2.4 GHz transceiver with integral		
	antenna		
Applicant	: MED-EL Elektromedizinische Geraete GmbH		
Address	: Fuerstenweg 77a		
	6020 INNSBRUCK, AUSTRIA		
Manufacturer	: MED-EL Elektromedizinische Geraete GmbH		
Address	: Fuerstenweg 77a		
	6020 INNSBRUCK, AUSTRIA		

<b>Test Result</b> according to the stall listed in clause 1 test standards:	Indards	POSITIVE				
Test Report No. :	T456	644-01-00SK	27. August 2020 Date of issue			



CSA Group Bayern GmbH Ohmstrasse 1-4 · 94342 STRASSKIRCHEN · GERMANY Tel.:+49(0)9424-94810 · Fax:+49(0)9424-9481440 File No. T45644-01-00SK, page 1 of 24



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ATTACHMENT A and B as separate supplements

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## 1 TEST STANDARDS

#### FCC Rules and Regulations Part 15, Subpart A - General (September, 2019)

Part 15, Subpart A, Section 15.31	Measurement standards
Part 15, Subpart A, Section 15.33	Frequency range of radiated measurements
Part 15, Subpart A, Section 15.35	Measurement detector functions and bandwidths

#### FCC Rules and Regulations Part 15, Subpart C - Intentional Radiators (September, 2019)

Part 15, Subpart C, Section 15.203	Antenna requirement
Part 15, Subpart C, Section 15.204	External radio frequency power amplifiers and antenna modifications
Part 15, Subpart C, Section 15.205	Restricted bands of operation
Part 15, Subpart C, Section 15.207	Conducted limits
Part 15, Subpart C, Section 15.209	Radiated emission limits, general requirements
ANSI C63.10: 2013	Testing Unlicensed Wireless Devices
ETSI TR 100 028 V1.3.1: 2001-03	Electromagnetic Compatibility and Radio Spectrum Matters (ERM); Uncertainties in the Measurement of Mobile Radio Equipment Characteristics—Part 1 and Part 2



### 2 <u>SUMMARY</u>

#### 2.1 Summary for all EMI tests

FCC Rule Part	RSS Rule Part	Description	Result
15.207(a)	RSS-Gen, 8.8	Conducted emissions	passed
15.209(a)	RSS-210, 7.2 RSS-Gen, 6.12	Field strength of the fundamental wave	passed
15.209(c)	RSS-210, 7.3 RSS-Gen, 8.9, 8.10	Spurious emissions	passed
-	RSS-Gen, 6.7	99 % Bandwidth	no limit
15.203	-	Antenna requirement	passed

The mentioned RSS Rule parts in the above table are related to: RSS-Gen, Issue 5, March 2019, Amendment 1 RSS-210, Issue 10, December 2019

#### 2.2 Final assessment

The equipment under test fulfills the EMC requirements cited in clause 1 test standards.

Date of receipt of test sample

: acc. to storage records

Testing commenced on : 10. January 2020

Testing concluded on

: 27. August 2020

Checked by:

Tested by:

Klaus Gegenfurtner Team Leader Radio Sabine Kugler Radio Team



## 3 EQUIPMENT UNDER TEST

#### 3.1 General remarks

This test report covers the 11.6 MHz inductive link. The 2.4 GHz transceiver is recorded in the test reports T45644-00-06 und T45644-00-07 issued by CSA Group Bayern GmbH.

#### 3.2 Information provided by the Client

Please note, we do not take any responsibility for information provided by the client or his representative which may have an influence on the validity of the test results.

### 3.3 Sampling

The customer is responsible for the choice of sample. Sample configuration, start-up and operation is carried out by the customer or according his/her instructions.

#### 3.4 Photo documentation of the EUT

Detailed photos see attachment A

### 3.5 Short description of the Equipment under Test (EUT)

The EUT is a single unit audio processor with a 2.4 GHz transceiver with an 11.6 MHz inductive link. The Me1550 (internal development name) is a medical device similar to a hearing aid but is worn off the ear at a position slightly above and behind the ear. It converts acoustic signals and drives an implanted MED-EL cochlear implant which - based on the information from the audio processor - directly stimulates the acoustic nerve in the inner ear to evoke auditory sensations. The 2.4 GHz transceiver can receive commands from an external device and can transmit acknowledge messages to the latter.

A short distance inductive wireless power transfer technology is utilized for charging the internal battery of the device when it is not worn by the user.

Number of tested samples:	1
Serial number:	143
Firmware version:	2.0.1
Туре:	Me1550

According to the manufacturer the sub variants Me1551, Me1552, and Me1553 do not differ in hardware and/or firmware, they just differ in product code which are only introduced for marketing and sales purposes.

#### 3.6 Power supply system utilised

Power supply voltage	:	3.8 VDC, (Li-lon battery)
Power supply voltage (alternative)	:	120 VAC, 60 Hz, 5.0 VDC (charging via cable)
Power supply voltage (alternative)	:	120 VAC, 60 Hz, 4.75 VDC (wireless charging base)

All tests were carried out with a supply voltage of 120 V, 60 Hz unless otherwise stated.



#### 3.7 Highest internal frequency

Highest internal frequency : 2.48 GHz

#### 3.8 EUT operation mode

The equipment under test was operated during the measurement under the following conditions:

- 11.6 MHz TX continuous, 2.4 GHz off, without charging

- 11.6 MHz TX continuous, 2.4 GHz off, charging via cable
- EUT off, wireless charging

#### 3.9 Antenna

The following antenna shall be used with the EUT:

Characteristic	Plug	Frequency range (MHz)	Gain (dBi)
Integrated inductive loop	-	11.6	-

#### 3.10 EUT configuration

(The CDF filled by the applicant can be viewed at the test laboratory.)

The following peripheral devices and interface cables were connected during the measurements:

-	Reset Plug	Model :	MED-EL
-	Test Implant	Model :	Concerto, MED-EL
-	Charging cable	Model :	SN021915, MED-EL GmbH
-	Wireless charging base	Model :	SN 1347172CY003, mophie inc.
-	Switching power adaptor	Model :	UES06WNCPU-050100SPA, Ansmann AG

#### 3.11 Determination of worst case conditions for final measurement

Measurements are made in all three orthogonal axes and the settings of the EUT are changed to locate at which position and at what setting of the EUT produce the maximum of the emissions. For the further measurement the EUT is set in X position.



#### TEST ENVIRONMENT 4

#### Address of the test laboratory 4.1

CSA Group Bayern GmbH Ohmstrasse 1-4 94342 STRASSKIRCHEN GERMANY

#### 4.2 Accreditation and Recognition of the test laboratory

Within the framework of the Mutual Recognition Agreement (MRA) between the European Community and the USA the EMC test laboratory listed above has been approved as a Conformity Assessment Body (CAB) designated by the EU member states through the conclusion of the MRA on the basis of Article 133 of the treaty

The site is accredited/registered by

- the German accreditation body DAkkS-Registration No.: D-PL-12030-01-02
- the Federal Communications Commission (FCC) Registration Number: 0013864798
- the Bundesnetzagentur (German Federal Network Agency) as Conformity assessment body (CAB) Registration No: BnetzA-CAB-13/21-07

#### Statement regarding the usage of logos in test reports 4.3

The accreditation and notification body logos displayed in this test report are only valid for standards listed in the accreditation or notification scope of CSA Group Bayern GmbH.

#### 4.4 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:

Humidity:

15-35 °C

30-60 %

Atmospheric pressure: 86-106 kPa

#### 4.5 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. It is noted that the expanded measurement uncertainty corresponds to the measurement results from the standard measurement uncertainty multiplied by the coverage factor k = 2. The true value is located in the corresponding interval with a probability of 95 % The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16-4-2 / 2011 + A1 / 2014 "Uncertainties, statistics and limit modelling - Uncertainty in EMC measurements" and is documented in the quality system acc. to DIN EN ISO/IEC 17025. For all measurements shown in this report, the measurement uncertainty of the test laboratory, CSA Group Bayern GmbH, is below the measurement uncertainty as defined by CISPR. Therefore, no special measures must be taken into consideration with regard to the limits according to CISPR. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

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#### 4.6 Conformity Decision Rule

The conformity decision rule is based on the ILAC G8 published at the time of reporting.

#### 4.6.1 General information

CSA Group Bayern GmbH is recognized as wireless testing laboratory under the CAB identifier:

#### FCC: DE 0011 ISED: DE0009

#### 4.6.2 General Standard information

The test methods used comply with ANSI C63.10 - "Testing Unlicensed Wireless Devices".

#### 4.6.2.1 Justification

The equipment under test (EUT) is configured in a typical user arrangement in accordance with the manufacturers instructions.

#### 4.6.3 Details of test procedures

#### 4.6.3.1 Conducted emission

Test setup according ANSI C63.10



The final level, expressed in  $dB\mu V$ , is arrived at by taking the reading directly from the Spectrum analyser. This level is compared to the limit.

To convert between dB $\mu$ V and  $\mu$ V, the following conversions apply:

 $dB\mu V = 20(\log \mu V)$  $\mu V = Inverse \log(dB\mu V/20)$ 

Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EUT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection and a Line Impedance Stabilization Network (LISN) with 50  $\Omega$  / 50  $\mu$ H (CISPR 16) characteristics. The receiver is protected by means of an impedance matched pulse limiter connected directly to the RF input. Table top equipment is placed on a non-conducting table 80 centimetres above the floor and is positioned 40 centimetres from the vertical ground plane (wall) of the screen room. If the minimum limit margin appears to be less than 20 dB with a peak mode measurement, the emission is re-measured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.



#### 4.6.3.2 Radiated emission

#### 4.6.3.2.1 OATS1 test site (9 kHz - 30 MHz):

Test setup according ANSI C63.10



Emissions from the EUT are measured in the frequency range of 9 MHz to 30 MHz using a tuned receiver and a calibrated loop antenna. Table top equipment is placed on a 1.0 X 1.5 m non-conducting table 80 centimetres above the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screened room located outside the test area. The antenna is positioned 3, 10 or 30 metres horizontally from the EUT and is repeated vertically. To locate maximum emissions from the test sample the antenna is varied along the site axis and the EUT is rotated 360 degrees.

#### 4.6.3.2.2 OATS1 test site (30 MHz - 1 GHz):



Spurious emissions from the EUT are measured in the frequency range of 30 MHz to 1000 MHz using a tuned receiver and appropriate broadband linearly polarised antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection. Table top equipment is placed on a 1.0 X 1.5 m non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screened room located outside the test area. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 metres and the EUT is rotated 360 degrees. The final level in dBµV/m is calculated by taking the reading from the EMI receiver (Level dBµV) and adding the correction factors and cable loss factor (dB). The FCC limit is subtracted from this result in order to provide the limit margin listed in the measurement protocol.

The resolution bandwidth setting: 30 MHz – 1000 MHz: RBW: 120 kHz

#### Example:

annpi	0.									
	Frequency (MHz)	Level (dBu\/)	+	Factor	=	Level (dBu\//m)	-	Limit (dBu)//m)	=	Delta (dB)
	719.0	(ubµv) 75.0	+	(UD) 32.6	=	107.6	-	110.0	=	(ub) -2.4
				02.0						

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#### 4.6.3.2.3 Anechoic chamber 1 (1000 MHz – 18000 MHz)

Test setup according ANSI C63.10.



Radiated emissions from the EUT are measured in the frequency range 1 GHz up to 18 GHz as specified in 47 CFR Part 15, Subpart A, Section 15.33, using a spectrum analyser and appropriate linearly polarized antennas. Table top equipment is placed on a non-conducting table, 1.5 metre above the ground plane. The turntable is fully covered with the appropriate absorber (Type VHP-12). Any controlling device is positioned such that it does not significantly influence the measurement results. Interconnecting cables that hang closer than 40 cm to the ground plane are folded back and forth in the center, forming a bundle 30 cm to 40 cm long. Measurements are made in in three orientations of the EUT and the horizontal and vertical polarization planes of measurement antenna in a fully anechoic room. The measurement antenna is adjusted and the EUT orientated to permit the measurement of the maximum emission from the EUT. The conditions determined as worst-case will then be used for the final measurements.

#### 4.6.3.2.4 Anechoic chamber 1 (18 GHz – 40 GHz)



Emissions from the EUT are measured in the frequency range 18 GHz up to 40 GHz as specified in 47 CFR Part 15, Subpart A, Section 15.33, using a spectrum analyser and appropriate linearly polarized antennas. Table top equipment is placed on a non-conducting table, 0.8 metre above the ground plane. The turntable is fully covered with the appropriate absorber (Type VHP-12). Any controlling device is positioned such that it does not significantly influence the measurement results. Interconnecting cables that hang closer than 40 cm to the ground plane are folded back and forth in the center, forming a bundle 30 cm to 40 cm long. Measurements are made in in three orientations of the EUT and the horizontal and vertical polarization planes of measurement antenna in a fully anechoic room. The measurement antenna is adjusted and the EUT orientated to permit the measurement of the maximum emission from the EUT. The conditions determined as worst-case will then be used for the final measurements. Where appropriate, the test distance may be reduced in order to detect emissions under better uncertainty. The limits are adopted.



## 5 TEST CONDITIONS AND RESULTS

#### 5.1 Conducted emissions

For test instruments and accessories used see section 6 Part A4.

#### Legend for tables:

- QP-L ... QuasiPeak reading including correction factor
- AV-L ... Average reading including correction factor
- D-Limit... Measured value to limit delta (margin)

#### 5.1.1 Description of the test location

Test location: Shielded Room S2

#### 5.1.2 Photo documentation of the test setup

For detailed photos of the test set-up see Attachment B.

#### 5.1.3 Applicable standard

According to FCC Part 15, Section 15.207(a):

Except as shown in paragraphs (b) and (c) of this Section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the given limits.

#### 5.1.4 Description of Measurement

The measurements are performed following the procedures set out in ANSI C63.4 described under item 4.4.3. If the minimum limit margin appears to be less than 20 dB with a peak mode measurement, the emissions are remeasured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

#### 5.1.5 Test result

Frequency range:	0.15 MHz - 30 MHz
Min. limit margin by	-1.7 dB at 11.46 MHz

Limit according to FCC Part 15, Section 15.207(a):

Frequency of emission	Conducted li	mit (dBµV)
(MHz)	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 requirements are FULFILLED.

#### **Remarks:** For detailed results, please see the following page(s).

For description of the measurement see 4.6.3.

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#### 5.1.6 Test protocol



$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	MHz		dB(µV)	dB	dB	dB(µV)	dB	dB		dB
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	0.150	1	54.1	-11.9	66.0	35.6	-20.4	56.0	Phase 1	10.1
0.2271 $45.4$ $-17.2$ $62.6$ $27.0$ $-25.6$ $52.6$ Phase 1 $10.1$ $0.249$ 1 $43.4$ $-18.4$ $61.8$ $26.0$ $-25.8$ $51.8$ Phase 1 $10.2$ $0.444$ 2 $41.2$ $-16.6$ $57.8$ $29.0$ $-18.8$ $47.8$ Phase 1 $10.2$ $0.449$ 2 $32.9$ $-24.0$ $56.9$ $21.3$ $-25.6$ $46.9$ Phase 1 $10.2$ $0.467$ 2 $33.7$ $-22.8$ $56.6$ $18.0$ $-28.6$ $46.6$ Phase 1 $10.2$ $0.605$ 3 $26.4$ $-29.6$ $56.0$ $15.7$ $-30.3$ $46.0$ Phase 1 $10.2$ $0.807$ 3 $27.4$ $-28.6$ $56.0$ $19.8$ $-26.2$ $46.0$ Phase 1 $10.2$ $0.807$ 3 $26.9$ $-29.1$ $56.0$ $20.8$ $-25.2$ $46.0$ Phase 1 $10.2$ $0.870$ 3 $26.9$ $-29.1$ $56.0$ $20.8$ $-25.2$ $46.0$ Phase 1 $10.2$ $0.870$ 3 $26.9$ $-29.1$ $56.0$ $20.8$ $-25.2$ $46.0$ Phase 1 $10.3$ $2.037$ $4$ $20.9$ $-35.1$ $56.0$ $14.3$ $-31.7$ $46.0$ Phase 1 $10.3$ $2.213$ $4$ $21.4$ $-34.6$ $56.0$ $14.5$ $-31.5$ $46.0$ Phase 1 $10.4$ $3.269$ $5$ $23.5$ $-32.5$ $56.0$ $17.9$ $-28.1$ $46.0$ Phase 1 </td <td>0.155</td> <td>1</td> <td>53.5</td> <td>-12.2</td> <td>65.8</td> <td>35.8</td> <td>-20.0</td> <td>55.8</td> <td>Phase 1</td> <td>10.1</td>	0.155	1	53.5	-12.2	65.8	35.8	-20.0	55.8	Phase 1	10.1
0.249         1         43.4         -18.4         61.8         26.0         -25.8         51.8         Phase 1         10.1           0.404         2         41.2         -16.6         57.8         29.0         -18.8         47.8         Phase 1         10.2           0.449         2         32.9         -24.0         56.9         21.3         -25.6         46.9         Phase 1         10.2           0.467         2         33.7         -22.8         56.6         18.0         -28.6         46.0         Phase 1         10.2           0.605         3         26.4         -29.6         56.0         15.7         -30.3         46.0         Phase 1         10.2           0.807         3         27.4         -28.6         56.0         19.8         -26.2         46.0         Phase 1         10.2           0.870         3         26.9         -29.1         56.0         20.8         -25.2         46.0         Phase 1         10.3           2.037         4         20.9         -35.1         56.0         15.7         -30.3         46.0         Phase 1         10.3           3.174         5         22.6         -33.4	0.227	1	45.4	-17.2	62.6	27.0	-25.6	52.6	Phase 1	10.1
0.404         2         41.2         -16.6         57.8         29.0         -18.8         47.8         Phase 1         10.2           0.449         2         32.9         -24.0         56.9         21.3         -25.6         46.9         Phase 1         10.2           0.467         2         33.7         -22.8         56.6         18.0         -28.6         46.6         Phase 1         10.2           0.605         3         26.4         -29.6         56.0         15.7         -30.3         46.0         Phase 1         10.2           0.807         3         27.4         -28.6         56.0         19.8         -26.2         46.0         Phase 1         10.2           0.852         3         26.0         -30.0         56.0         18.8         -27.2         46.0         Phase 1         10.2           0.870         3         26.9         -29.1         56.0         20.8         -25.2         46.0         Phase 1         10.3           2.037         4         20.9         -35.1         56.0         14.3         -31.7         46.0         Phase 1         10.3           3.174         5         22.6         -33.4	0.249	1	43.4	-18.4	61.8	26.0	-25.8	51.8	Phase 1	10.1
0.449         2         32.9         -24.0         56.9         21.3         -25.6         46.9         Phase 1         10.2           0.467         2         33.7         -22.8         56.6         18.0         -28.6         46.6         Phase 1         10.2           0.605         3         26.4         -29.6         56.0         15.7         -30.3         46.0         Phase 1         10.2           0.807         3         27.4         -28.6         56.0         19.8         -26.2         46.0         Phase 1         10.2           0.852         3         26.0         -30.0         56.0         18.8         -27.2         46.0         Phase 1         10.2           0.870         3         26.9         -29.1         56.0         20.8         -25.2         46.0         Phase 1         10.3           2.037         4         20.9         -35.1         56.0         15.7         -30.3         46.0         Phase 1         10.3           2.213         4         21.4         -34.6         56.0         14.3         -31.7         46.0         Phase 1         10.4           3.269         5         23.5         -32.5	0.404	2	41.2	-16.6	57.8	29.0	-18.8	47.8	Phase 1	10.2
0.467         2         33.7         -22.8         56.6         18.0         -28.6         46.6         Phase 1         10.2           0.605         3         26.4         -29.6         56.0         15.7         -30.3         46.0         Phase 1         10.2           0.807         3         27.4         -28.6         56.0         19.8         -26.2         46.0         Phase 1         10.2           0.852         3         26.0         -30.0         56.0         18.8         -27.2         46.0         Phase 1         10.2           0.870         3         26.9         -29.1         56.0         20.8         -25.2         46.0         Phase 1         10.3           2.037         4         20.9         -35.1         56.0         15.7         -30.3         46.0         Phase 1         10.3           2.213         4         21.4         -34.6         56.0         14.3         -31.7         46.0         Phase 1         10.3           3.174         5         22.6         -33.4         56.0         17.9         -28.1         46.0         Phase 1         10.4           3.269         5         23.5         56.0         1	0.449	2	32.9	-24.0	56.9	21.3	-25.6	46.9	Phase 1	10.2
0.605         3         26.4         -29.6         56.0         15.7         -30.3         46.0         Phase 1         10.2           0.807         3         27.4         -28.6         56.0         19.8         -26.2         46.0         Phase 1         10.2           0.852         3         26.0         -30.0         56.0         18.8         -27.2         46.0         Phase 1         10.2           0.870         3         26.9         -29.1         56.0         20.8         -25.2         46.0         Phase 1         10.2           1.317         4         25.7         -30.3         56.0         17.8         -28.2         46.0         Phase 1         10.3           2.037         4         20.9         -35.1         56.0         15.7         -30.3         46.0         Phase 1         10.3           2.213         4         21.4         -34.6         56.0         14.3         -31.7         46.0         Phase 1         10.4           3.269         5         23.5         -32.5         56.0         12.6         -33.4         46.0         Phase 1         10.4           4.799         5         25.0         -31.0	0.467	2	33.7	-22.8	56.6	18.0	-28.6	46.6	Phase 1	10.2
0.807         3         27.4         -28.6         56.0         19.8         -26.2         46.0         Phase 1         10.2           0.852         3         26.0         -30.0         56.0         18.8         -27.2         46.0         Phase 1         10.2           0.870         3         26.9         -29.1         56.0         20.8         -25.2         46.0         Phase 1         10.2           1.317         4         25.7         -30.3         56.0         17.8         -28.2         46.0         Phase 1         10.3           2.037         4         20.9         -35.1         56.0         15.7         -30.3         46.0         Phase 1         10.3           2.213         4         21.4         -34.6         56.0         14.3         -31.7         46.0         Phase 1         10.3           3.174         5         22.6         -33.4         56.0         14.5         -31.5         46.0         Phase 1         10.4           3.269         5         23.5         -32.5         56.0         17.9         -28.1         46.0         Phase 1         10.4           4.781         5         26.0         -30.0	0.605	3	26.4	-29.6	56.0	15.7	-30.3	46.0	Phase 1	10.2
0.852         3         26.0         -30.0         56.0         18.8         -27.2         46.0         Phase 1         10.2           0.870         3         26.9         -29.1         56.0         20.8         -25.2         46.0         Phase 1         10.2           1.317         4         25.7         -30.3         56.0         17.8         -28.2         46.0         Phase 1         10.3           2.037         4         20.9         -35.1         56.0         15.7         -30.3         46.0         Phase 1         10.3           2.213         4         21.4         -34.6         56.0         14.3         -31.7         46.0         Phase 1         10.3           3.174         5         22.6         -33.4         56.0         14.5         -31.5         46.0         Phase 1         10.4           3.269         5         23.5         -32.5         56.0         12.6         -33.4         46.0         Phase 1         10.4           4.781         5         26.0         -30.0         56.0         17.9         -28.1         46.0         Phase 1         10.4           4.799         5         25.0         -31.0	0.807	3	27.4	-28.6	56.0	19.8	-26.2	46.0	Phase 1	10.2
0.870         3         26.9         -29.1         56.0         20.8         -25.2         46.0         Phase 1         10.2           1.317         4         25.7         -30.3         56.0         17.8         -28.2         46.0         Phase 1         10.3           2.037         4         20.9         -35.1         56.0         15.7         -30.3         46.0         Phase 1         10.3           2.213         4         21.4         -34.6         56.0         14.3         -31.7         46.0         Phase 1         10.3           3.174         5         22.6         -33.4         56.0         14.5         -31.5         46.0         Phase 1         10.4           3.269         5         23.5         -32.5         56.0         12.6         -33.4         46.0         Phase 1         10.4           4.781         5         26.0         -30.0         56.0         17.9         -28.1         46.0         Phase 1         10.4           4.799         5         25.0         -31.0         56.0         17.9         -28.1         46.0         Phase 1         10.6           6.542         6         30.4         -29.7	0.852	3	26.0	-30.0	56.0	18.8	-27.2	46.0	Phase 1	10.2
1.317       4       25.7       -30.3       56.0       17.8       -28.2       46.0       Phase 1       10.3         2.037       4       20.9       -35.1       56.0       15.7       -30.3       46.0       Phase 1       10.3         2.213       4       21.4       -34.6       56.0       14.3       -31.7       46.0       Phase 1       10.3         3.174       5       22.6       -33.4       56.0       14.5       -31.5       46.0       Phase 1       10.4         3.269       5       23.5       -32.5       56.0       12.6       -33.4       46.0       Phase 1       10.4         4.781       5       26.0       -30.0       56.0       17.9       -28.1       46.0       Phase 1       10.4         4.799       5       25.0       -31.0       56.0       17.9       -28.1       46.0       Phase 1       10.4         6.479       6       29.5       -30.5       60.0       21.2       -28.8       50.0       Phase 1       10.6         6.542       6       30.4       -29.7       60.0       21.6       -28.4       50.0       Phase 1       10.6         7.415	0.870	3	26.9	-29.1	56.0	20.8	-25.2	46.0	Phase 1	10.2
2.037       4       20.9       -35.1       56.0       15.7       -30.3       46.0       Phase 1       10.3         2.213       4       21.4       -34.6       56.0       14.3       -31.7       46.0       Phase 1       10.3         3.174       5       22.6       -33.4       56.0       14.5       -31.5       46.0       Phase 1       10.4         3.269       5       23.5       -32.5       56.0       12.6       -33.4       46.0       Phase 1       10.4         4.781       5       26.0       -30.0       56.0       17.9       -28.1       46.0       Phase 1       10.4         4.799       5       25.0       -31.0       56.0       17.9       -28.1       46.0       Phase 1       10.4         6.479       6       29.5       -30.5       60.0       21.2       -28.8       50.0       Phase 1       10.6         6.542       6       30.4       -29.7       60.0       21.6       -28.4       50.0       Phase 1       10.6         6.938       6       28.8       -31.2       60.0       21.8       -28.3       50.0       Phase 1       10.6         11.454	1.317	4	25.7	-30.3	56.0	17.8	-28.2	46.0	Phase 1	10.3
2.213       4       21.4       -34.6       56.0       14.3       -31.7       46.0       Phase 1       10.3         3.174       5       22.6       -33.4       56.0       14.5       -31.5       46.0       Phase 1       10.4         3.269       5       23.5       -32.5       56.0       12.6       -33.4       46.0       Phase 1       10.4         4.781       5       26.0       -30.0       56.0       17.9       -28.1       46.0       Phase 1       10.4         4.799       5       25.0       -31.0       56.0       17.9       -28.1       46.0       Phase 1       10.4         6.479       6       29.5       -30.5       60.0       21.2       -28.8       50.0       Phase 1       10.6         6.542       6       30.4       -29.7       60.0       21.6       -28.4       50.0       Phase 1       10.6         6.938       6       28.6       -31.4       60.0       20.5       -29.5       50.0       Phase 1       10.6         7.415       6       28.8       -31.2       60.0       21.8       -28.3       50.0       Phase 1       10.9         11.463	2.037	4	20.9	-35.1	56.0	15.7	-30.3	46.0	Phase 1	10.3
3.174       5       22.6       -33.4       56.0       14.5       -31.5       46.0       Phase 1       10.4         3.269       5       23.5       -32.5       56.0       12.6       -33.4       46.0       Phase 1       10.4         4.781       5       26.0       -30.0       56.0       17.9       -28.1       46.0       Phase 1       10.4         4.799       5       25.0       -31.0       56.0       17.9       -28.1       46.0       Phase 1       10.4         6.479       6       29.5       -30.5       60.0       21.2       -28.8       50.0       Phase 1       10.6         6.542       6       30.4       -29.7       60.0       21.6       -28.4       50.0       Phase 1       10.6         6.938       6       28.6       -31.4       60.0       20.5       -29.5       50.0       Phase 1       10.6         7.415       6       28.8       -31.2       60.0       21.8       -28.3       50.0       Phase 1       10.6         11.454       7       55.9       -4.1       60.0       48.3       -1.7       50.0       Phase 1       10.9         11.463	2.213	4	21.4	-34.6	56.0	14.3	-31.7	46.0	Phase 1	10.3
3.269       5       23.5       -32.5       56.0       12.6       -33.4       46.0       Phase 1       10.4         4.781       5       26.0       -30.0       56.0       17.9       -28.1       46.0       Phase 1       10.4         4.799       5       25.0       -31.0       56.0       17.9       -28.1       46.0       Phase 1       10.4         6.479       6       29.5       -30.5       60.0       21.2       -28.8       50.0       Phase 1       10.6         6.542       6       30.4       -29.7       60.0       21.6       -28.4       50.0       Phase 1       10.6         6.938       6       28.6       -31.4       60.0       20.5       -29.5       50.0       Phase 1       10.6         7.415       6       28.8       -31.2       60.0       21.8       -28.3       50.0       Phase 1       10.6         11.454       7       55.9       -4.1       60.0       48.2       -1.8       50.0       Phase 1       10.9         11.463       7       55.9       -4.1       60.0       26.3       -23.7       50.0       Phase 1       10.9         18.888	3.174	5	22.6	-33.4	56.0	14.5	-31.5	46.0	Phase 1	10.4
4.781       5       26.0       -30.0       56.0       17.9       -28.1       46.0       Phase 1       10.4         4.799       5       25.0       -31.0       56.0       17.9       -28.1       46.0       Phase 1       10.4         6.479       6       29.5       -30.5       60.0       21.2       -28.8       50.0       Phase 1       10.6         6.542       6       30.4       -29.7       60.0       21.6       -28.4       50.0       Phase 1       10.6         6.938       6       28.6       -31.4       60.0       20.5       -29.5       50.0       Phase 1       10.6         7.415       6       28.8       -31.2       60.0       21.8       -28.3       50.0       Phase 1       10.6         11.454       7       55.9       -4.1       60.0       48.2       -1.8       50.0       Phase 1       10.9         11.463       7       55.9       -4.1       60.0       48.3       -1.7       50.0       Phase 1       10.9         18.888       7       35.7       -24.3       60.0       26.3       -23.7       50.0       Phase 1       11.4         22.913	3.269	5	23.5	-32.5	56.0	12.6	-33.4	46.0	Phase 1	10.4
4.799       5       25.0       -31.0       56.0       17.9       -28.1       46.0       Phase 1       10.4         6.479       6       29.5       -30.5       60.0       21.2       -28.8       50.0       Phase 1       10.6         6.542       6       30.4       -29.7       60.0       21.6       -28.4       50.0       Phase 1       10.6         6.938       6       28.6       -31.4       60.0       20.5       -29.5       50.0       Phase 1       10.6         7.415       6       28.8       -31.2       60.0       21.8       -28.3       50.0       Phase 1       10.6         11.454       7       55.9       -4.1       60.0       48.2       -1.8       50.0       Phase 1       10.9         11.463       7       55.9       -4.1       60.0       48.3       -1.7       50.0       Phase 1       10.9         18.888       7       35.7       -24.3       60.0       26.3       -23.7       50.0       Phase 1       11.4         22.913       8       46.3       -13.7       60.0       35.7       -14.3       50.0       Phase 1       11.6         22.917	4.781	5	26.0	-30.0	56.0	17.9	-28.1	46.0	Phase 1	10.4
6.479       6       29.5       -30.5       60.0       21.2       -28.8       50.0       Phase 1       10.6         6.542       6       30.4       -29.7       60.0       21.6       -28.4       50.0       Phase 1       10.6         6.938       6       28.6       -31.4       60.0       20.5       -29.5       50.0       Phase 1       10.6         7.415       6       28.8       -31.2       60.0       21.8       -28.3       50.0       Phase 1       10.6         11.454       7       55.9       -4.1       60.0       48.2       -1.8       50.0       Phase 1       10.9         11.463       7       55.9       -4.1       60.0       48.3       -1.7       50.0       Phase 1       10.9         18.888       7       35.7       -24.3       60.0       26.3       -23.7       50.0       Phase 1       11.4         22.913       8       46.3       -13.7       60.0       35.7       -14.3       50.0       Phase 1       11.6         22.917       8       46.3       -13.7       60.0       35.8       -14.2       50.0       Phase 1       11.6         27.574	4.799	5	25.0	-31.0	56.0	17.9	-28.1	46.0	Phase 1	10.4
6.542       6       30.4       -29.7       60.0       21.6       -28.4       50.0       Phase 1       10.6         6.938       6       28.6       -31.4       60.0       20.5       -29.5       50.0       Phase 1       10.6         7.415       6       28.8       -31.2       60.0       21.8       -28.3       50.0       Phase 1       10.6         11.454       7       55.9       -4.1       60.0       48.2       -1.8       50.0       Phase 1       10.9         11.463       7       55.9       -4.1       60.0       48.3       -1.7       50.0       Phase 1       10.9         18.888       7       35.7       -24.3       60.0       26.3       -23.7       50.0       Phase 1       11.4         22.913       8       46.3       -13.7       60.0       35.7       -14.3       50.0       Phase 1       11.6         22.917       8       46.3       -13.7       60.0       35.8       -14.2       50.0       Phase 1       11.6         27.574       9       40.4       60.0       35.8       -14.2       50.0       Phase 1       11.6	6.479	6	29.5	-30.5	60.0	21.2	-28.8	50.0	Phase 1	10.6
6.938       6       28.6       -31.4       60.0       20.5       -29.5       50.0       Phase 1       10.6         7.415       6       28.8       -31.2       60.0       21.8       -28.3       50.0       Phase 1       10.6         11.454       7       55.9       -4.1       60.0       48.2       -1.8       50.0       Phase 1       10.9         11.463       7       55.9       -4.1       60.0       48.3       -1.7       50.0       Phase 1       10.9         18.888       7       35.7       -24.3       60.0       26.3       -23.7       50.0       Phase 1       11.4         22.913       8       46.3       -13.7       60.0       35.7       -14.3       50.0       Phase 1       11.6         22.917       8       46.3       -13.7       60.0       35.8       -14.2       50.0       Phase 1       11.6         27.574       9       40.4       60.0       20.6       40.4       50.0       Phase 1       11.6	6.542	6	30.4	-29.7	60.0	21.6	-28.4	50.0	Phase 1	10.6
7.415       6       28.8       -31.2       60.0       21.8       -28.3       50.0       Phase 1       10.6         11.454       7       55.9       -4.1       60.0       48.2       -1.8       50.0       Phase 1       10.9         11.463       7       55.9       -4.1       60.0       48.3       -1.7       50.0       Phase 1       10.9         18.888       7       35.7       -24.3       60.0       26.3       -23.7       50.0       Phase 1       11.4         22.913       8       46.3       -13.7       60.0       35.7       -14.3       50.0       Phase 1       11.6         22.917       8       46.3       -13.7       60.0       35.8       -14.2       50.0       Phase 1       11.6         27.574       9       40.4       60.0       20.6       40.4       50.0       Phase 1       11.6	6.938	6	28.6	-31.4	60.0	20.5	-29.5	50.0	Phase 1	10.6
11.454       7       55.9       -4.1       60.0       48.2       -1.8       50.0       Phase 1       10.9         11.463       7       55.9       -4.1       60.0       48.3       -1.7       50.0       Phase 1       10.9         18.888       7       35.7       -24.3       60.0       26.3       -23.7       50.0       Phase 1       11.4         22.913       8       46.3       -13.7       60.0       35.7       -14.3       50.0       Phase 1       11.6         22.917       8       46.3       -13.7       60.0       35.8       -14.2       50.0       Phase 1       11.6         27.524       9       40.4       60.0       23.6       40.4       50.0       Phase 1       11.6	7.415	6	28.8	-31.2	60.0	21.8	-28.3	50.0	Phase 1	10.6
11.463       7       55.9       -4.1       60.0       48.3       -1.7       50.0       Phase 1       10.9         18.888       7       35.7       -24.3       60.0       26.3       -23.7       50.0       Phase 1       11.4         22.913       8       46.3       -13.7       60.0       35.7       -14.3       50.0       Phase 1       11.6         22.917       8       46.3       -13.7       60.0       35.8       -14.2       50.0       Phase 1       11.6         27.524       9       40.4       60.0       23.6       40.4       50.0       Phase 1       11.6	11.454	7	55.9	-4.1	60.0	48.2	-1.8	50.0	Phase 1	10.9
18.888         7         35.7         -24.3         60.0         26.3         -23.7         50.0         Phase 1         11.4           22.913         8         46.3         -13.7         60.0         35.7         -14.3         50.0         Phase 1         11.6           22.917         8         46.3         -13.7         60.0         35.8         -14.2         50.0         Phase 1         11.6           27.524         9         46.4         60.0         35.8         -14.2         50.0         Phase 1         11.6	11.463	7	55.9	-4.1	60.0	48.3	-1.7	50.0	Phase 1	10.9
22.913         8         46.3         -13.7         60.0         35.7         -14.3         50.0         Phase 1         11.6           22.917         8         46.3         -13.7         60.0         35.8         -14.2         50.0         Phase 1         11.6           27.524         9         40.4         60.0         35.8         -14.2         50.0         Phase 1         11.6	18.888	7	35.7	-24.3	60.0	26.3	-23.7	50.0	Phase 1	11.4
22.917 8 46.3 -13.7 60.0 35.8 -14.2 50.0 Phase 1 11.6	22.913	8	46.3	-13.7	60.0	35.7	-14.3	50.0	Phase 1	11.6
	22.917	8	46.3	-13.7	60.0	35.8	-14.2	50.0	Phase 1	11.6
27.534 8 43.9 -16.1 60.0 33.6 -16.4 50.0 Phase 1 11.7	27.534	8	43.9	-16.1	60.0	33.6	-16.4	50.0	Phase 1	11.7

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freq	SR	QP	margin	limit	AV	margin	limit	line	corr
MHz		dB(µV)	dB	dB	dB(µV)	dB	dB		dB
0.150	9	50.6	-15.4	66.0	33.5	-22.5	56.0	Neutral	10.1
0.155	9	51.2	-14.6	65.8	33.6	-22.2	55.8	Neutral	10.1
0.222	9	44.0	-18.7	62.7	25.3	-27.5	52.7	Neutral	10.1
0.399	10	40.3	-17.5	57.9	35.8	-12.0	47.9	Neutral	10.2
0.404	10	38.6	-19.2	57.8	35.0	-12.8	47.8	Neutral	10.2
0.467	10	32.7	-23.9	56.6	19.0	-27.6	46.6	Neutral	10.2
0.489	10	32.2	-24.0	56.2	21.3	-24.9	46.2	Neutral	10.2
0.645	11	28.7	-27.3	56.0	18.8	-27.2	46.0	Neutral	10.2
0.672	11	27.9	-28.2	56.0	20.6	-25.4	46.0	Neutral	10.2
0.911	11	26.1	-29.9	56.0	18.9	-27.1	46.0	Neutral	10.2
1.538	12	23.0	-33.0	56.0	19.4	-26.6	46.0	Neutral	10.3
1.583	12	23.6	-32.4	56.0	19.8	-26.2	46.0	Neutral	10.3
1.776	12	22.7	-33.3	56.0	18.8	-27.2	46.0	Neutral	10.3
1.835	12	22.7	-33.3	56.0	18.1	-27.9	46.0	Neutral	10.3
2.936	13	24.0	-32.0	56.0	18.6	-27.4	46.0	Neutral	10.3
4.047	13	26.0	-30.0	56.0	19.9	-26.1	46.0	Neutral	10.4
4.092	13	25.7	-30.3	56.0	19.7	-26.3	46.0	Neutral	10.4
6.452	14	27.5	-32.5	60.0	22.6	-27.4	50.0	Neutral	10.5
6.627	14	27.7	-32.3	60.0	21.5	-28.5	50.0	Neutral	10.6
7.005	14	27.0	-33.1	60.0	22.1	-27.9	50.0	Neutral	10.6
8.072	14	29.3	-30.7	60.0	21.0	-29.0	50.0	Neutral	10.6
11.450	15	51.5	-8.5	60.0	46.3	-3.7	50.0	Neutral	10.8
14.469	15	30.6	-29.4	60.0	24.5	-25.5	50.0	Neutral	11.0
14.478	15	30.5	-29.5	60.0	24.3	-25.7	50.0	Neutral	11.0
22.899	16	40.7	-19.3	60.0	33.2	-16.8	50.0	Neutral	11.3
23.502	16	38.7	-21.4	60.0	31.4	-18.6	50.0	Neutral	11.3
24.119	16	34.8	-25.2	60.0	28.4	-21.6	50.0	Neutral	11.3
27.525	16	37.0	-23.0	60.0	31.3	-18.7	50.0	Neutral	11.2

The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

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freq	SR	QP	margin	limit	AV	margin	limit	line	corr
MHz		dB(µV)	dB	dB	dB(µV)	dB	dB		dB
0.159	1	40.9	-24.6	65.5	32.5	-23.1	55.5	Phase 1	10.1
0.164	1	40.1	-25.2	65.3	30.4	-24.9	55.3	Phase 1	10.1
0.218	1	34.0	-29.0	62.9	25.5	-27.4	52.9	Phase 1	10.1
0.222	1	33.7	-29.0	62.7	23.8	-28.9	52.7	Phase 1	10.1
0.300	2	27.1	-33.2	60.2	18.6	-31.7	50.2	Phase 1	10.1
0.305	2	26.5	-33.6	60.1	17.5	-32.6	50.1	Phase 1	10.1
0.516	2	28.6	-27.4	56.0	24.4	-21.6	46.0	Phase 1	10.2
0.654	3	23.7	-32.3	56.0	10.5	-35.5	46.0	Phase 1	10.2
0.776	3	23.1	-32.9	56.0	10.6	-35.4	46.0	Phase 1	10.2
1.127	3	20.2	-35.8	56.0	7.1	-38.9	46.0	Phase 1	10.2
1.131	3	20.7	-35.3	56.0	7.5	-38.5	46.0	Phase 1	10.2
1.227	4	19.3	-36.7	56.0	6.3	-39.8	46.0	Phase 1	10.2
1.236	4	19.9	-36.2	56.0	7.2	-38.8	46.0	Phase 1	10.2
1.731	4	18.4	-37.7	56.0	6.5	-39.5	46.0	Phase 1	10.3
2.208	4	17.5	-38.5	56.0	6.2	-39.8	46.0	Phase 1	10.3
2.612	5	17.7	-38.3	56.0	6.7	-39.3	46.0	Phase 1	10.3
3.075	5	17.9	-38.1	56.0	7.8	-38.2	46.0	Phase 1	10.4
4.007	5	19.5	-36.5	56.0	9.0	-37.0	46.0	Phase 1	10.4
4.043	5	19.4	-36.6	56.0	9.2	-36.8	46.0	Phase 1	10.4
6.461	6	13.0	-47.0	60.0	7.0	-43.0	50.0	Phase 1	10.6
6.785	6	11.6	-48.5	60.0	4.9	-45.1	50.0	Phase 1	10.6
7.347	6	13.0	-47.0	60.0	6.3	-43.7	50.0	Phase 1	10.6
8.778	6	14.3	-45.7	60.0	7.0	-43.0	50.0	Phase 1	10.7
9.767	7	14.2	-45.8	60.0	7.1	-42.9	50.0	Phase 1	10.7
13.155	7	13.7	-46.3	60.0	10.4	-39.6	50.0	Phase 1	11.0
13.610	7	13.9	-46.1	60.0	10.1	-40.0	50.0	Phase 1	11.1
16.386	7	12.9	-47.2	60.0	10.3	-39.7	50.0	Phase 1	11.3
19.578	8	12.5	-47.6	60.0	8.4	-41.6	50.0	Phase 1	11.4
20.838	8	12.2	-47.8	60.0	7.7	-42.3	50.0	Phase 1	11.5
24.398	8	7.9	-52.1	60.0	3.9	-46.1	50.0	Phase 1	11.7
24.627	8	6.4	-53.6	60.0	2.1	-48.0	50.0	Phase 1	11.7

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Test point:

Operation mode: Remarks:





freq	SR	QP	margin	limit	AV	margin	limit	line	corr
MHz		dB(µV)	dB	dB	dB(µV)	dB	dB		dB
0.164	9	40.1	-25.2	65.3	30.7	-24.6	55.3	Neutral	10.1
0.200	9	39.6	-24.0	63.6	32.1	-21.6	53.6	Neutral	10.1
0.222	9	35.7	-27.1	62.7	27.8	-25.0	52.7	Neutral	10.1
0.231	9	34.5	-27.9	62.4	26.5	-25.9	52.4	Neutral	10.1
0.300	10	29.5	-30.8	60.2	22.7	-27.5	50.2	Neutral	10.1
0.422	10	28.0	-29.4	57.4	23.6	-23.8	47.4	Neutral	10.2
0.516	10	36.9	-19.1	56.0	35.5	-10.5	46.0	Neutral	10.2
0.753	11	26.7	-29.3	56.0	23.2	-22.8	46.0	Neutral	10.2
1.149	11	26.6	-29.5	56.0	22.5	-23.6	46.0	Neutral	10.2
1.172	11	25.5	-30.5	56.0	22.3	-23.7	46.0	Neutral	10.2
1.214	12	24.9	-31.1	56.0	21.6	-24.5	46.0	Neutral	10.2
1.236	12	24.8	-31.3	56.0	21.2	-24.8	46.0	Neutral	10.2
2.172	12	26.6	-29.4	56.0	21.4	-24.6	46.0	Neutral	10.3
3.165	13	26.8	-29.2	56.0	22.6	-23.4	46.0	Neutral	10.4
3.179	13	26.3	-29.7	56.0	21.5	-24.5	46.0	Neutral	10.4
3.948	13	29.1	-27.0	56.0	24.6	-21.4	46.0	Neutral	10.4
4.088	13	30.2	-25.9	56.0	25.4	-20.6	46.0	Neutral	10.4
6.461	14	21.4	-38.6	60.0	17.3	-32.7	50.0	Neutral	10.5
6.519	14	21.7	-38.3	60.0	17.5	-32.5	50.0	Neutral	10.5
8.463	14	21.9	-38.1	60.0	17.3	-32.8	50.0	Neutral	10.6
9.287	14	21.7	-38.3	60.0	16.5	-33.5	50.0	Neutral	10.7
11.814	15	23.2	-36.8	60.0	18.4	-31.6	50.0	Neutral	10.8
16.395	15	22.5	-37.5	60.0	20.1	-29.9	50.0	Neutral	11.1
19.118	15	23.3	-36.8	60.0	19.0	-31.0	50.0	Neutral	11.2
19.988	16	23.8	-36.3	60.0	19.6	-30.4	50.0	Neutral	11.3
21.432	16	23.3	-36.7	60.0	19.3	-30.7	50.0	Neutral	11.3
24.263	16	21.6	-38.4	60.0	17.6	-32.4	50.0	Neutral	11.3
24.357	16	20.9	-39.2	60.0	16.8	-33.2	50.0	Neutral	11.3

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Result: passed



#### 5.2 Field strength of the fundamental wave

For test instruments and accessories used see section 6 Part CPR1.

#### 5.2.1 Description of the test location

Test location: OATS 1

Test distance: 3 meters

#### 5.2.2 Photo documentation of the test set-up

For detailed photos of the test set-up see Attachment B.

#### 5.2.1 Applicable standard

According to FCC Part 15C, Section 15.209: The emissions from intentional radiators shall not exceed the effective field strength limits.

#### 5.2.2 Description of Measurement

The magnetic field strength from the EUT will be measured on an open area test site in the frequency range of 9 kHz to 30 MHz using a tuned receiver and a shielded loop antenna. The set up of the EUT will be in accordance to ANSI C63.4. Measurements have been made in all three orthogonal axes and the shielded loop antenna was rotated to locate the maximum of the emissions. In the case where larger measuring distances are required the results will extrapolated based on the values measured on the closer distances according to Section 15.31(f)(2)(2). The fin al measurement will be performed with an EMI receiver set to quasi peak detector except for the frequency bands 9 kHz to 90 kHz and 110 to 490 kHz where an average detector will be used according to Section 15.209(d)(2). The resolution bandwidth during the measurement is as follows:

The resolution bandwidth	during the medo
9 kHz – 150 kHz:	RBW: 200 Hz
150 kHz – 30 MHz:	RBW: 9 kHz

Example:

Frequency (MHz)	Level (dBu\/)	+	Factor	=	Level dB(u)//m)	-	Limit dB(u)//m)	=	Delta (dB)
1.705	(α <b>υ</b> μν) 5	+	20	=	25	-	30	=	-5

#### 5.2.3 Test result

The measurement value is calculated from a distance of 3 m to 30 m by subtracting the factor 40 dB/decade.

Frequency	Reading PK	Reading PK	D factor	Level PK	Limit AV	Delta
(MHz)	dB(µA/m)	dB(µV/m)	dB(µV/m)	dB(µV/m)	dB(µV/m)	(dB)
11.62	2.9	53.9	-40.0	13.9	29.5	-15.6

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Limit according to FCC Part 15C, Section 15.209(a):

Frequency	Field strength of fu	indamental wave	Measurement distance
(MHz)	(µV/m)	dB(µV/m)	(metres)
0.009-0.490	2400/F(kHz)		300
0.490-1.705	24000/F (kHz)		30
1.705-30.0	30	29.5	30

The requirements are FULFILLED.

None

Remarks:

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#### 5.3 Spurious emissions < 1 GHz

For test instruments and accessories used see section 6 Part SER1, SER2.

#### Legend for tables:

Level vert. QuasiPeak reading including correction factor for vertically polarised antenna

- Level hor. QuasiPeak reading including correction factor for horizontally polarised antenna
- Limit Limit referred to the appropriate standard
- DLimit... Delta between limit and result (margin)
- Noise Characteristic of disturbance (narrowband or broadband)

#### 5.3.1 Description of the test location

Test location: OATS 1

Test distance: 3 metres

#### 5.3.2 Photo documentation of the test setup

For detailed photos of the test set-up see Attachment B.

#### 5.3.3 Applicable standard

According to FCC Part 15C, Section 15.209: The emissions from intentional radiators shall not exceed the effective field strength limits.

#### 5.3.4 Description of Measurement

The radiated power of the spurious emission from the EUT is measured in a test setup following the procedures set out in ANSI C63.4. If the emission level of the EUT in peak mode complies with the average limit is 20 dB lower, then testing will be stopped and peak values of the EUT will be reported, otherwise the emission will be measured in average mode again and reported.

The resolution bandwidth during the measurement is as follows:

9 kHz – 150 kHz:	RBW:	200 Hz
150 kHz – 30 MHz:	RBW:	9 kHz
30 MHz – 1000 MHz:	RBW:	120 kHz

#### 5.3.5 Test result

Frequency range:	9 kHz - 1000 MHz
Min. limit margin by	-13.3 dB at 119.76 MHz



#### Limit according to FCC Part 15 Subpart 15.209(a):

Frequency	Field strength of sp	ourious emissions	Measurement distance
(MHz)	(µV/m)	dB(µV/m)	(metres)
0.009-0.490	2400/F(kHz)		300
0.490-1.705	24000/F (kHz)		30
1.705-30.0	30	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

The requirements are FULFILLED.

**Remarks:** For detailed results, please see the following page(s).

For description of the measurement see 4.6.4.

#### 5.3.6 Test protocol

Operation mode: 11.6 MHz TX continuous, 2.4 GHz off, without charging Result: passed by: Sabine Kugler

Frequency	Reading PK	Reading PK	D factor	Level PK	Limit AV	Delta
(MHz)	dB(µA/m)	dB(µV/m)	dB(µV/m)	dB(µV/m)	dB(µV/m)	(dB)
0.47	-18.9	32.1	-80.0	-47.9	14.2	-62.1
11.62	2.9	53.9	-40.0	13.9	29.5	-15.6
23.24	-3.2	47.8	-40.0	7.8	29.5	-21.7

Note: the measurement value is calculated from a distance of 3 m to 300 m by subtracting the factor 40 dB/decade.

Frequency (MHz)	Reading Vert. (dBµV)	Reading Hor. (dBµV)	Correct. Vert. (dB)	Correct. Hor. (dB)	Level Vert. (dBµV/m)	Level Hor. (dBµV/m)	Limit (dBµV/m)	Dlimit (dB)
48.43	4.8	-3.2	15.1	13.9	19.9	10.7	40.0	-20.1
83.86	3.7	0.3	9.9	9.7	13.6	10.0	40.0	-26.4
119.76	18.7	12.9	11.5	12.3	30.2	25.2	43.5	-13.3
320.76	1.0	1.4	16.8	16.4	17.8	17.8	46.0	-28.2
457.17	1.9	-0.6	20.5	20.3	22.4	19.7	46.0	-23.6
765.90	-1.2	-1.2	27.2	26.8	26.0	25.6	46.0	-20.0



#### 5.4 Spurious emissions > 1 GHz

For test instruments and accessories used see section 6 Part SER 3.

#### 5.4.1 Description of the test location

Test location: Anechoic chamber 1

Test distance: 3 metres

ETS Lindgren 3117: Dimension of the line tangent to the EUT according to CISPR 16-2-3:2010

<u>Note:</u> The  $\Theta$  3dB min values were given by the antenna manufacturer

Frequency GHz	⊖ 3 dB min	Measurement distance	<b>w</b> min
1	88	3 m	5.79 m
2	67	3 m	3.97 m
4	69	3 m	4.12 m
6	53	3 m	2.99 m
10	40	3 m	2.18 m
18	36	3 m	1.95 m

#### 5.4.2 Photo documentation of the test setup

For detailed photos of the test set-up see Attachment B.

#### 5.4.3 Applicable standard

According to FCC Part 15C, Section 15.209: The emissions from intentional radiators shall not exceed the effective field strength limits.

#### 5.4.4 Test result

Frequency range:	1 - 25 GHz
Min. limit margin	-6.0 dB at 17.94 GHz

The requirements are **FULFILLED**.

**Remarks:** For detailed results, please see the following page(s).

For description of the measurement see 4.6.5.



#### 5.4.5 Test protocol

For Level 57:00 dBu/m         Set 100 m         Set 100 m         Frequency 9.5000000           For Att 100 m         PPS 50 m         Nextch 30 m         Made Sweep         Frequency 9.5000000           For Att 100 m         PPS 50 m         Nextch 30 m         Made Sweep         Made Sweep           For Att 100 m         PPS 50 m         Nextch 30 m         Made Sweep         Made Sweep           For Att 100 m         PPS 50 m         Nextch 30 m         Made Sweep         Made Sweep           For Att 100 m         For Att 100 m         Made Sweep         Made Sweep         Made Sweep           For Att 100 m         Made Sweep         Made Sweep         Made Sweep         Made Sweep           For Att 100 m         He 74.000 m         He 74.000 m         Made Sweep         Made Sweep           For Att 100 m         He 74.000 m         He 74.000 m         He 74.000 m         He 74.000 m           State Sweep         He 74.000 m           State Sweep         He 74.000 m           State Sweep         He 74.000 m         He 7	y:	None Sabir	MHZ TX contin	uous, 2.4	GHz off, w	ithout charging	Result: passe
Incomposition         Incompos	Ref Level 87. Att Input TDE Input1 "ES1	00 dBμV/m 0 dB <b>SWT</b> 5 1 AC <b>PS</b>	● RBW 1 MHz 51 ms ● VBW 3 MHz 1 Off Notch Off	Mode Sweep			Frequency <b>9.500000</b>
Bit Bit State         Mit Bit Bit State         Mit Bit Bit State           73 dbp//m	1 Frequency S	weep					●1Pk Max ©2Rm
ac dby//m         M2[2]							M1[1] 51.55 dE
mill         mill <th< td=""><td>80 dBµV/m</td><td></td><td></td><td></td><td></td><td></td><td>M2[2] 48.02 dB</td></th<>	80 dBµV/m						M2[2] 48.02 dB
70         dbj.v/m         dbj.v/m <thdbj.v m<="" th=""> <thd>dbj.v/m         dbj</thd></thdbj.v>			——H2 74.000 dBµV/m ——				17.93625
60 dlp://m         50 dlp://m         50 dlp://m         50 dlp://m         50 dlp://m           50 dlp://m         50 dlp://m         50 dlp://m         50 dlp://m         50 dlp://m           1.0 GHz         34001 pts         1.7 GHz/         18           2 dlp://m         45 57 dlp://m         70 dlp://m         18           2 dlp://m         1.8 0520 GHz         47 232 dlp://m         70 dlp://m           2 1.90520 GHz         47 232 dlp://m         7 2 15720 GHz         45 57 dlp://m           2 1.90520 GHz         47 232 dlp://m         7 2 15720 GHz         45 57 dlp://m           2 1.90520 GHz         46 596 dlp://m         7 2 15720 GHz         45 57 dlp://m           3 2.00720 GHz         46 596 dlp://m         7 2 15720 GHz         45 57 dlp://m           3 2.00720 GHz         46 596 dlp://m         10 17 500200 GHz         51 5000001           Timper         1.80 dlp://m         9 16 565200 GHz         51 50000001           Timper         1.90 dlp://m         9 16 565200 GHz         51 5000001           Timper         1.80 dlp://m         9 16 565200 GHz         51 5000001           Timper         1.90 dlp://m         1.90 dlp://m         1.90 dlp://m           9 dlp://m         1.90 dlp://m         1.90 dlp://m </td <td>70 dBµV/m</td> <td></td> <td></td> <td>-</td> <td></td> <td></td> <td></td>	70 dBµV/m			-			
00 dbu//m         0							
St. dBy//m         St. dBy	60 dBµV/m───						
S0 dbj//m         Bit is db bit bit db bit is db bit is db bit is db bit bit bit bit bit bit bit bit bit bi		H1 54.000 dBµV/m					
Application	50 dBµV/m						and the second of the second o
An any matrix         And any matrix         And any matrix         And any matrix           20 dBµ//m         20 dBµ//m         1.7 GHz/         18           20 dBµ//m         1.0 GHz         34001 pts         1.7 GHz/         18           20 dBµ//m         1.3 GHz         34001 pts         1.7 GHz/         18           20 dBµ//m         1.3 GHz         45.817 GBµ//m         No         X-Value         Y-Value           2         1.906220 GHz         47.232 dBµ//m         7         2.152720 GHz         45.852 dBµ//m           3         2.0 1720 GHz         44.585 dBµ//m         7         2.152720 GHz         45.852 dBµ//m           3         2.0 1720 GHz         44.585 dBµ//m         7         2.152720 GHz         45.852 dBµ//m           3         2.0 1720 GHz         46.364 dBµ//m         9         2.528580 GHz         55.547 dBµ//m           5         2.111720 GHz         46.364 dBµ//m         10         17.936250 GHz         51.547 dBµ//m           11 dtrepostor/module         1.0 GHz         Mode Sweep         Frequency         21.50000001           11 dtrepostor/module         1.42 0.122         1.40 0.12         1.40 0.12         1.40 0.12           0 dbµ//m         1.42 0.122         1.56.64		8 Tutal		يعرد فأفدن العنور للبلي	الملاجع أحفاظه العامة المتعادي	دال <sup>2</sup> الارتفاريسي واليونوا والاي البيد في <sup>الا</sup> رد الريماني <sup>المال</sup> بالمها <sup>ل</sup> ة المالية المالية	and the second
Statut/m         Image: Statut /m         Image: Statut /m         Image: Statut /m           20 dbu//m         1.0 GHz         34001 pts         1.7 GHz/         18           2 dbu//m         1         1.331220 GHz         45.817 GBu//m         6         2.141220 GHz         45.745 GBu//m           1         1.331220 GHz         42.817 GBu//m         6         2.141220 GHz         45.745 GBu//m           2         1         1.331220 GHz         42.817 GBu//m         6         2.141220 GHz         45.835 GBu//m           3         1         1.331220 GHz         42.817 GBu//m         6         2.15020 GHz         45.835 GBu//m           3         2.069720 GHz         44.964 dBu//m         9         16.565290 GHz         51.547 dBu//m           4         2.069720 GHz         48.964 dBu//m         10         17.936250 GHz         51.547 dBu//m           6 Att         0.dB SVT 21 ms * VBW 31MHz         Mode Sweep         Frequency 21.5000000         Frequency 21.5000000           1 DDF input 1 FS18-407; COLBER 11-014*         Mode Sweep         M1[1] 19-972 d         149.94 Marc 24.9122           1 DD dbu//m         H2 9.500 dbu//m         H2 9.500 dbu//m         H2 9.500 dbu//m         149.94 Marc 24.9122           1 DD dbu//m         H2 9.500 dbu//m </td <td>40, двµ∨ура</td> <td>والقراري ويستعير</td> <td>A STATE OF A STATE OF A</td> <td>and hole of the local for the second</td> <td>ngestern til bildet at 1</td> <td>and the provide state of the second state of the second state of the second state of the second state of the se</td> <td></td>	40, двµ∨ура	والقراري ويستعير	A STATE OF A	and hole of the local for the second	ngestern til bildet at 1	and the provide state of the second state of the second state of the second state of the second state of the se	
Stady//m         Image: Stady //m		rayan ya shekara na shekara shekara shekara s			•••		
20 dBg//m         34001 pts         1.7 GHz/         18           20 dBg//m         1.3 GHz         34001 pts         1.7 GHz/         18           2 Marker Peak List         V-Value         No         X-Value         V-Value           1         1.8 S1230 GHz         45 713 GBy//m         6         2.141220 GHz         45 735 GBy//m           2         1.905220 GHz         47.232 GBy//m         7         2.156720 GHz         45 735 GBy//m           3         2.01720 GHz         46.156 GBy//m         9         12.56720 GHz         45 735 GBy//m           3         2.01720 GHz         46.364 GBy//m         9         12.56720 GHz         45.573 GBy//m           5         2.111720 GHz         46.364 GBy//m         9         12.56620 GHz         55.547 GBy//m           9         0.68 SWT 2.1 m; # VBW         1 MHz         Mode Sweep         Frequency Z1.5000001           TDP input         1.42 G3.00 GBp//m         0.061 SWT 2.1 m; # VBW         11.4 49.374         43.9122           1         1.42 G3.00 GBp//m           0         0.8 gW//m         1.42 G3.00 GBp//m         1.42 G3.00 GBp//m         1.42 G3.00 GBp//m         1.42 G3.00	30 dBµV/m						
20 dBµV/m         10 GHz         34001 pts         1.7 GHz/         18           2 Marker Peak List         No         X-Value         V-Value         V-Value <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>							
I.0 GHz         34001 pts         I.7 GHz/         18           2 Marker Peak List         V-Value	20 dBµV/m						
2 Marker Peak List         No         X-Value         No         X-Value         V-Value           1         1.831230 GHz         45.817 GBµ//m         6         2.141220 GHz         45.743 GBµ//m           3         2.017720 GHz         44.5732 GBµ//m         7         2.156720 GHz         44.573 GBµ//m           4         2.06270 GHz         44.573 GBµ//m         8         3.256680 GHz         44.573 GBµ//m           5         2.111720 GHz         44.984 dBµ//m         9         16.566290 GHz         50.002 dBµ//m           5         2.111720 GHz         44.984 dBµ//m         10         17.936250 GHz         51.547 dBµ//m           6         Att         0.08         SWT 21 ms = VBW 31 MHz         Mode Sweep         Frequency 21.5000000           TDP Input1         1.AC PS         Off         Not A         91.65.5620 GHz         42.9300           80 dBµ//m         142 83.500 dBµ//m         142 83.500 dBµ//m         124.9122         14.562 dagg         42.93122           70 dBµ//m         142 83.500 dBµ//m         124.9122         14.568 dagg         24.9122           70 dBµ//m         142 83.500 dBµ//m         14.569 dagg         14.569 dagg         14.569 dagg         14.569 dagg           60 dBµ//m         14.569 dagg </td <td>1.0 GHz</td> <td></td> <td>34001</td> <td>pts</td> <td></td> <td>L.7 GHz/</td> <td>18.0</td>	1.0 GHz		34001	pts		L.7 GHz/	18.0
No         X-Value         Y-Value         Y-Value         Y-Value         Y-Value         Y-Value         Y-Value           1         1.31230 GHz         43.817 GBL//m         7         2.150720 GHz         43.825 GHz         43.825 GBL//m         7         2.150720 GHz         43.925 GBL//m         7         7         2.150720 GHz         43.925 GBL//m         7         7         2.150720 GHz         9         3.1547 GBL//m         7         7         2.150720 GHz         9         7         9         7         9         7         9         7         9         7         9         7         9         9         7         9         9         7         9         9         9         7         9         9         9         7         9         9         9 <td>2 Marker Peak</td> <td>List</td> <td>1</td> <td></td> <td></td> <td></td> <td></td>	2 Marker Peak	List	1				
2       1.906220 GHz       47.232 dBu//m       7       2.156720 GHz       44.573 dBu//m         4       2.069720 GHz       44.956 dBu//m       9       16.566290 GHz       50.902 dBu//m         4       2.069720 GHz       44.954 dBu//m       9       16.566290 GHz       50.902 dBu//m         Ref Level 87.00 dBu//m       •       RBW 1 MHz       •       10       17.936250 GHz       51.547 dBu//m         Ref Level 87.00 dBu//m       •       RBW 1 MHz       •       •       RBW 1 MHz       •       •       Frequency 21.500000         Torput       1.62 PS 0 GHz       •       Notch       0 Hz       •       Frequency 21.5000000         Torput       *       1.62 PS 0 GHz       •       Notch       0 Hz       •       •         90 dBu//m       •	1	1.831230 GHz	45.817	value ′dBµV/m	6	2.141220 GHz	45.745 dBµV/m
4         2.069720 GHz         44.964 dBµV/m         9         16.566290 GHz         50.902 dBµV/m           8         2.111720 GHz         46.364 dBµV/m         10         17.936250 GHz         51.547 dBµV/m           Att         0.86 SWT 21 ms         RBW 1 MHz         Mode Sweep         Frequency 21.5000000           Input         0.85 SWT 21 ms         0.65 SWT 21 ms         Ref Level 37.00 dBµV/m         Frequency 21.5000000           TDF input         0.85 SWT 21 ms         0.67 Notch         Off         Tot         Tot           1         0.48 SWT 21 ms         0.68 SWT 21 ms         Mode Sweep         Frequency 21.5000000           TDF input         "FS 18-40", "CABLESO-11-014"         Imput         M1[1] 49-97 d         24.9122           90 dBµV/m         H2 83.500 dBµV/m         0         M2[2] 45.68 d         24.9122           70 dBµV/m         Imput         10         10         10         10           80 dBµV/m         Imput         10         10         10         10         10           80 dBµV/m         Imput         Imput         Imput         10         10         10         10         10           90 dBµV/m         Imput         Imput         Imput         Imput <t< td=""><td>23</td><td>1.906220 GHz 2.017720 GHz</td><td>47.232 48.156</td><td>? dBµV/m 5 dBµV/m</td><td>7</td><td>2.156720 GHz 3.258680 GHz</td><td>45.852 dBµV/m 44.573 dBµV/m</td></t<>	23	1.906220 GHz 2.017720 GHz	47.232 48.156	? dBµV/m 5 dBµV/m	7	2.156720 GHz 3.258680 GHz	45.852 dBµV/m 44.573 dBµV/m
Ref Level 87.00 dBµV/m         RBW 1 MHz 0 dB SWT 21 ms # VBW 3 MHz Input 1 AC PS 0 off Notch Off         Frequency 21.500000           TDF Input 1 AC PS 0 off Notch Off         1000000000000000000000000000000000000	4	2 060720 CUS	44.984	LdBuV/m	-		
Input         1AC         PS         Off         Notch         Off           TDF Input1 "FS18-00" "CABLESO-11-014"         IP3 M5X = 287         IP3 M5X = 287         IP3 M5X = 287           IFrequency Sweep         IP3 83.500 dBµV/m         M1[1] 49.37 d         24.9122           0 dBµV/m         IP3 83.500 dBµV/m         M2[2] 45.68 d         24.9122           70 dBµV/m         IP3 M5X = 287         M2[2] 45.68 d         24.9122           70 dBµV/m         IP3 M5X = 287         M2[2] 45.68 d         24.9122           70 dBµV/m         IP3 M5X = 287         M2[2] 45.68 d         24.9122           70 dBµV/m         IP3 M5X = 287         M2[2] 45.68 d         24.9122           70 dBµV/m         IP3 M5X = 287         M2[2] 45.68 d         24.9122           60 dBµV/m         IP3 M5X = 287         M2[2] 45.68 d         24.9122           90 dBµV/m         IP3 M5X = 287         IP3 M5X = 287         IP3 M5X = 287           90 dBµV/m         IP3 M5X = 287         IP3 M5X = 287         IP3 M5X = 287           90 dBµV/m         IP3 M5X = 287         IP3 M5X = 287         IP3 M5X = 287           90 dBµV/m         IP3 M5X = 287         IP3 M5X = 287         IP3 M5X = 287           1 0 dBµV/m         IP3 M5X = 287         IP3 M5X = 287 </th <th>5</th> <th>2.009720 GHz 2.111720 GHz</th> <th>46.364</th> <th>l dBµV/m</th> <th>9 10</th> <th>16.566290 GHz 17.936250 GHz</th> <th>50.902 dBµV/m 51.547 dBµV/m</th>	5	2.009720 GHz 2.111720 GHz	46.364	l dBµV/m	9 10	16.566290 GHz 17.936250 GHz	50.902 dBµV/m 51.547 dBµV/m
I Frequency Sweep         I Ek Max         2 Ek Max         2 Ek Max         2 Ek           80         dBµV/m         M1[1]         49.37         49.3500         M1[2]         49.373         dBµV/m         M1[2]         49.373         dBµV/m         M1[2]         49.373         dBµV/m         M2[2]         45.68         24.9122           70         dBµV/m         M2[2]         45.68         24.9122         49.373         dBµV/m         M2[2]         45.68         24.9122           70         dBµV/m         M2[2]         45.68         24.9122         49.373         dBµV/m         M2[2]         45.68         24.9122           70         dBµV/m         M2[2]         45.68         24.9122         49.373         dBµV/m         M2[2]         45.68         49.373         dBµV/m         M2[2]         45.68         49.373         dBµV/m         M2[2]         49.	Ref Level 87.	2.009720 GH2 2.111720 GHz 00 dBµV/m 0 dB <b>SWT</b> 2	46.364 ● RBW 1 MHz 21 ms ● VBW 3 MHz 1	Mode Sweep	9 10	16.566290 GHz 17.936250 GHz	50.902 dBµV/m 51.547 dBµV/m
H2 83.500 dBµV/m         MI[1] 43.37           80 dBµV/m         24.9122           70 dBµV/m         24.9122           70 dBµV/m         24.9122           60 dBµV/m         24.9122           70 dBµV/m         24.9122           70 dBµV/m         24.9122           70 dBµV/m         24.9122           80 dBµV/m         24.9122           70 dBµV/m         24.9122           80 dBµV/m         24.912           80 dBµV/m         24.9	S Ref Level 87. Att Input TDF Input1 "FS1	2.009720 GH2 2.111720 GHz 00 dBµV/m 0 dB SWT 2 1 AC PS 18-40","CABLE50-11-	46.364 • RBW 1 MHz 1 ms • VBW 3 MHz 1 01f Notch Off -014"	dBμV/m 	9 10	16.566290 GHz 17.936250 GHz	50.902 dBμV/m 51.547 dBμV/m Frequency 21.5000000
80 dBµV/m       M2[2] 45.68 d         70 dBµV/m       M2[2] 45.68 d         60 dBµV/m       M2[2] 45.68 d         50 dBµV/m       M2[2] 45.68 d         60 dBµV/m       M2[2] 45.68 d         50 dBµV/m       M2[2] 45.68 d         60 dBµV/m       M2[2] 45.68 d         70 dBµV/m       M2[2] 45.68 d         10 dBµV/m       M2[2] 45.68 d         11 24.912260 GHz       49.373 dBµV/m	5 Ref Level 87. Att Input TDF Input1 "FS1 I Frequency S	2.009/20 GH2 2.111720 GHz 00 dBµV/m 0 dB SWT 2 1 AC PS 18-40","CABLE50-11- weep	46.364 • RBW 1 MHz 21 ms • VBW 3 MHz 1 Off Notch Off -014"	dBµV/m Mode Sweep	9 10	16.566290 GHz 17.936250 GHz	50.902 dBµV/m 51.547 dBµV/m Frequency 21.5000000 ● 1Pk Max ● 28m
70 dBµV/m         1002 H00 dBµV/m<	S Ref Level 87. Att Input TDF Input1 "FSJ I Frequency St	2.01720 GH2 2.111720 GH2 0 dB wV/m 0 dB swr 2 1 AC Ps 18-40","CABLE50-11- weep	46.364	dBµV/m ∙ Mode Sweep	9 10	16.566290 GHz 17.936250 GHz	50.902 dBµV/m 51.547 dBµV/m Frequency 21.5000000 • 1Pk Max • 2Rm M1[1] 49.37 dB 24.91225
70 dBµV/m       10 d2 500 d0 0000000000000000000000000000	S Ref Level 87. Att Input TDF Input1 "FS1 I Frequency S 80 dBµV/m-	2.01720 GHz 2.111720 GHz 0 dB wV/m 0 dB swr 2 1 AC Ps 13-40","CABLE50-11- weep	46.364	Mode Sweep	9 10	16.566290 GHz 17.936250 GHz	50.902 dBµ//m 51.547 dBµ//m Frequency 21.5000000 1Pk Max 22Rm M1[1] 49.37 dB 24.91225 M2[2] 45.68 dB
Image: Source and the source of the sourc	S Ref Level 87. Att Input TDF Input1 "FS1 I Frequency S 80 dBµV/m-	2.111720 GHz 2.111720 GHz 0 dB swr 2 1 AC PS 18-40","CABLE50-11- weep	46.364 ■ RBW 1 MHz 21 ms ● VBW 3 MHz 1 Off Notch Off -014" H2 83.500 dBµV/m	i dBµV/m Mode Sweep	9 10	16.566290 GHz 17.936250 GHz	50.902 dBµ//m 51.547 dBµ//m Frequency 21.5000000 1Pk Max • 2Rm M1[1] 49.37 dE 24.91225 M2[2] 45.68 dE 24.91225
60 dBpV/m       1	S           Ref Level 87.           Att           Input           TDF Input1 "FS1           I Frequency S           80 dBµV/m           70 dBµV/m	2.111720 GHz 2.111720 GHz 0 dB swr 2 1 AC Ps 18-40","CABLE50-11- weep	46.364	dBµV/m 	9 10	16.566290 GHz 17.936250 GHz	50.902 dBµ//m 51.547 dBµ//m Frequency 21.5000000 1Pk Max = 2Rm M1[1] 49.37 dE 24.91225 M2[2] 45.68 dE 24.91225
S0 dBµV/m     db da bit is strategies and the second strategies and th	З           Ref Level 87.           Att Input           TDF Input1 "FS1           I Frequency S'           80 dBµV/m           70 dBµV/m	2.111720 GHz 2.111720 GHz 0 dB wT 2 1 AC PS 18-40", "CABLE50-11- weep	46.364	Mode Sweep	9 10	16.566290 GHz 17.936250 GHz	50.902 dBµV/m 51.547 dBµV/m Frequency 21.5000000 1Pk Max • 2Rm M1[1] 49.37 dB 24.91225 M2[2] 45.68 dB 24.91225
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display in the second of th	5           Ref Level 87.           • Att Input           TDF Input1 "FS1           TFrequency St           80 dBµV/m           70 dBµV/m           60 dBµV/m	2.111720 GHz 2.111720 GHz 0 dB wV/m 0 dB sWT 2 1 AC Ps 18-40", "CABLE50-11- weep	46.364	Mode Sweep	9 10	16.566290 GHz 17.936250 GHz	50.902 dBµV/m 51.547 dBµV/m Frequency 21.5000000 1Pk Max •2Rm M1[1] 49.37 dE 24.91225 M2[2] 45.68 dE 24.91225
40 dbjuV/m         1 <th1< th="">         1         <th1< th=""> <th1< <="" td=""><td>5           Ref Level 87.           Att Input           TDF Input1 "FS1           1 Frequency S1           80 dBµV/m           60 dBµV/m           50 dBµV/m</td><td>2.111720 GHz 2.111720 GHz 0 dB wV/m 0 dB sWT 2 1 AC Ps 18-40", "CABLE50-11- weep</td><td>46.364</td><td>Mode Sweep</td><td>9 10</td><td>16.566290 GHz 17.936250 GHz</td><td>50.902 dBµV/m 51.547 dBµV/m Frequency 21.5000000 1Pk Max •2Rm M1[1] 49.37 dB 24.91225 M2[2] 45.68 dB 24.91225</td></th1<></th1<></th1<>	5           Ref Level 87.           Att Input           TDF Input1 "FS1           1 Frequency S1           80 dBµV/m           60 dBµV/m           50 dBµV/m	2.111720 GHz 2.111720 GHz 0 dB wV/m 0 dB sWT 2 1 AC Ps 18-40", "CABLE50-11- weep	46.364	Mode Sweep	9 10	16.566290 GHz 17.936250 GHz	50.902 dBµV/m 51.547 dBµV/m Frequency 21.5000000 1Pk Max •2Rm M1[1] 49.37 dB 24.91225 M2[2] 45.68 dB 24.91225
30 dBµV/m         20 dBµV/m         14001 pts         700.0 MHz/         25.           18.0 GHz         14001 pts         700.0 MHz/         25.           2 Marker Peak List         V-Value         V-Value         V-Value           1         24.912260 GHz         49.373 dBµV/m         No         X-Value         Y-Value	5           Ref Level 87.           Att Input TDF input1 "FS1           1 Frequency St           80 dBµV/m           70 dBµV/m           60 dBµV/m           50 dBµV/m	2.111720 GH2 2.111720 GH2 00 dBµV/m 0 dB SWT 2 1 AC PS 18-40", "CABLE50-11- weep	46.364	dBµV/m 	9 10	16.566290 GHz 17.936250 GHz	50.902 dBµV/m 51.547 dBµV/m Frequency 21.5000000 • 1Pk Max • 2Rm M1[1] 49.37 dE 24.91225 M2[2] 45.68 dE 24.91225 M2[2] 45.68 dE 24.91225
30 dBµV/m         20 dBµV/m <t< td=""><td>5           Ref Level 87.           Att Input TDF input1 "FS1           TFrequency St B0 dBµV/m           60 dBµV/m           50 dBµV/m           60 dBµV/m           10 dBµV/m</td><td>2.009/20 GH2 2.111720 GH2 00 dBµV/m 0 dB SWT 2 1 AC PS 18-40", "CABLE50-11- weep</td><td>46.364</td><td>dBµV/m dode Sweep</td><td>9 10</td><td>16.566290 GHz 17.936250 GHz</td><td>50.902 dBµV/m 51.547 dBµV/m Frequency 21.5000000 • 1Pk Max • 2Rm M1[1] 49.37 dE 24.91225 M2[2] 45.68 dE 24.91225 M2[2] 45.68 dE 24.91225</td></t<>	5           Ref Level 87.           Att Input TDF input1 "FS1           TFrequency St B0 dBµV/m           60 dBµV/m           50 dBµV/m           60 dBµV/m           10 dBµV/m	2.009/20 GH2 2.111720 GH2 00 dBµV/m 0 dB SWT 2 1 AC PS 18-40", "CABLE50-11- weep	46.364	dBµV/m dode Sweep	9 10	16.566290 GHz 17.936250 GHz	50.902 dBµV/m 51.547 dBµV/m Frequency 21.5000000 • 1Pk Max • 2Rm M1[1] 49.37 dE 24.91225 M2[2] 45.68 dE 24.91225 M2[2] 45.68 dE 24.91225
20 dBµV/m         Image: Constraint of the second seco	S           Ref Level 87.           Att Input           TDF Input1 "FS1           TFrequency St           80 dBµV/m           70 dBµV/m           60 dBµV/m           50 dBµV/m           40 dBµV/m	2.009/20 GH2 2.111720 GH2 00 dBµV/m 0 dB SWT 2 1 AC PS 18-40", "CABLE50-11- weep	46.364	dBµV/m 	9 10	16.566290 GHz 17.936250 GHz	50.902 dBµV/m 51.547 dBµV/m Frequency 21.5000000 • 1Pk Max • 2Rm M1[1] 49.37 dE 24.91225 M2[2] 45.68 dE 24.91225 M2[2] 45.68 dE 24.91225
20 dBµV/m         Image: Marker Peak List         14001 pts         700.0 MHz/         25           2 Marker Peak List         Image: Marker Peak Li	S           Ref Level 87.           Att Input           TDF input1 "FS1           TFrequency S3           80 dBµV/m           70 dBµV/m           60 dBµV/m           50 dBµV/m           40 dBµV/m           30 dBµV/m	2.01720 GH2 2.11720 GH2 00 dBµV/m 0 dB SWT 2 1 AC PS 18-40", "CABLE50-11- weep	46.364	dBµV/m 	9 10	16.566290 GHz 17.936250 GHz	50.902 dBµV/m 51.547 dBµV/m Frequency 21.5000000 1Pk Max • 2Rm M1[1] 49.37 dB 24.91225 M2[2] 45.68 dB 24.91225 M2[2] 45.68 dB 24.91225 M2[2] 45.68 dB 24.91225
20 dBpV/m         14001 pts         700.0 MHz/         25           18.0 GHz         14001 pts         700.0 MHz/         25           2 Marker Peak List         No         X-Value         Y-Value           1         24.912260 GHz         49.373 dBµV/m         No         X-Value         Y-Value	S           Ref Level 87.           Att Input TDF Input1 "FS1           TFrequency S           80 dBµV/m           70 dBµV/m           60 dBµV/m           50 dBµV/m           30 dBµV/m	2.01720 GH2 2.11720 GH2 00 dBµV/m 0 dB SWT 2 1 AC PS 18-40", "CABLE50-11- weep	46.364	Mode Sweep	9 10		50.902 dBµV/m 51.547 dBµV/m Frequency 21.5000000 1Pk Max 22Rm M1[1] 49.37 dB 24.91225 M2[2] 45.68 dB 45.68 dB 45.68 dB 45
I 36.0 GHZ         I 4001 pts         700.0 MHZ/         25           2 Marker Peak List         No         X-Value         Y-Value           1         24.912260 GHz         49.373 dBµV/m         Y-Value         Y-Value	S           Ref Level 87.           Att Input TDF Input1 "FS1           TFrequency SS           80 dBµV/m           70 dBµV/m           60 dBµV/m           50 dBµV/m           30 dBµV/m           30 dBµV/m	2.01720 GH2 2.11720 GH2 00 dBµV/m 0 dB SWT 2 1 AC PS 18-40", "CABLE50-11- weep	46.364		9 10		50.902 dBµV/m 51.547 dBµV/m Frequency 21.5000000 1Pk Max •2Rm M1[1] 49.37 dB 24.91225 M2[2] 45.68 dB 4.91225 M2[2] 4.9125 M2[2] 4.912
No         X-Value         Y-Value         No         X-Value         Y-Value           1         24.912260 GHz         49.373 dBµV/m            Y-Value         Y-Va	3           Ref Level 87.           Att Input TDF input1 "FS1           1 Frequency St B0 dBµV/m           60 dBµV/m           50 dBµV/m           30 dBµV/m           30 dBµV/m           20 dBµV/m           10 dBµV/m	2.01720 GH2 2.11720 GH2 00 dBµV/m 0 dB SWT 2 1 AC PS 18-40", "CABLE50-11- weep	46.364				50.902 dBµV/m 51.547 dBµV/m Frequency 21.5000000 1Pk Max •2Rm M1[1] 49.37 dB 24.91225 M2[2] 45.68 dB 45.68 dB 45.68 dB 45.68 dB 45.68 dB 45.6
1 24.912260 GHZ 49.373 aBµV/m	3           Ref Level 87.           Att Input TDF input1 "FS1           TFrequency State           80 dBµV/m           60 dBµV/m           50 dBµV/m           30 dBµV/m           30 dBµV/m           20 dBµV/m           10 dBµV/m           20 dBµV/m	2.01720 GH2 2.111720 GH2 00 dBµV/m 0 dB SWT 2 1 AC PS 18-40", "CABLE50-11- weep	46.364	Add Sweep		16.566290 GHz 17.936250 GHz	50.902 dBµV/m 51.547 dBµV/m Frequency 21.5000000 1Pk Max •2Rm M1[1] 49.37 dB 24.91225 M2[2] 45.68 dB 25.68 dB 25.6
	3           Ref Level 87.           Att Input TDF Input1 "FS1           1 Frequency St B0 dBµV/m           60 dBµV/m           50 dBµV/m           50 dBµV/m           30 dBµV/m           30 dBµV/m           20 dBµV/m           18.0 GHz           2 Marker Peak No	2.01720 GH2 2.111720 GH2 00 dBµV/m 0 dB SWT 2 1 AC PS 18-40", "CABLE50-11- weep	46.364	Adde Sweep	9 10	16.566290 GHz 17.936250 GHz	50.902 dBµV/m 51.547 dBµV/m Frequency 21.5000000 1Pk Max 22Rm M1[1] 49.37 dB 24.91225 M2[2] 45.68 dB 25.68 dB 25.6

Note: The measurement distance for 18 - 25 GHz frequency range was changed to 1 m therefore the limit lines are adjusted and increased by 9.5 dB.



#### 5.5 Emission bandwidth

For test instruments and accessories used see section 6 Part MB.

#### 5.5.1 Description of the test location

Test location: AREA 4

#### 5.5.2 Photo documentation of the test set-up

For detailed photos of the test set-up see Attachment B.

#### 5.5.3 Test protocol



OBW 99

#### **Remarks:**

None

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### 5.6 Antenna application

#### 5.6.1 Applicable standard

According to FCC Part 15C, Section 15.203(a):

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section.

#### 5.6.2 Result

The EUT uses an integrated antenna. No other antenna than that furnished by the responsible party or external power amplifier can be applied by a customer.

The antenna of the EUT meets the requirement of FCC Part 15C, Section 15.203 and 15.204.

The requirements are **FULFILLED**.

Remarks: None.



### 6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used, in addition to the test accessories, are calibrated and verified regularly.

Test ID	Model Type	Equipment No.	Next Calib.	Last Calib.	Next Verif.	Last Verif.
A 4	BAT-EMC 3.19.1.24 ESCI ESH 2 - Z 5 N-4000-BNC N-1500-N	01-02/68-13-001 02-02/03-15-001 02-02/20-05-004 02-02/50-05-138 02-02/50-05-140	24/06/2021 31/10/2021	24/06/2020 31/10/2019	04/11/2020	04/05/2020
CPR 1	ESH 3 - Z 2 ESCI	02-02/03-05-005	04/12/2022	04/12/2019	12/11/2020	12/05/2020
	HFH 2 - Z 2 NW-2000-NB KK-EF393/U-16N-21N20 m KK-SD_7/8-2X21N-33,0M	02-02/24-15-001 02-02/50-05-113 02-02/50-12-018 02-02/50-15-028	01/04/2021	01/04/2020		
MB	ESW 26 HFRAE 5161 _ 50 kHz-120	02-02/03-17-002 02-02/24-11-004	16/01/2021	16/01/2020		
SER 1	ESCI HFH 2 - Z 2 NW-2000-NB KK-EF393/U-16N-21N20 m KK-SD_7/8-2X21N-33,0M	02-02/03-05-005 02-02/24-15-001 02-02/50-05-113 02-02/50-12-018 02-02/50-15-028	04/12/2020 01/04/2021	04/12/2019 01/04/2020		
SER 2	ESVS 30 VULB 9168 NW-2000-NB KK-EF393/U-16N-21N20 m KK-SD_7/8-2X21N-33,0M	02-02/03-05-006 02-02/24-05-005 02-02/50-05-113 02-02/50-12-018 02-02/50-15-028	15/07/2021 19/09/2020	15/07/2020 19/07/2019		
SER 3	ESW26 AMF-6D-01002000-22-10P	02-02/03-17-002 02-02/17-15-004	16/01/2021	16/01/2020		
	3117 BBHA 9170 KMS102-1 m 18N-20 BAM 4.5-P NCD KK-SF106-2X11N-6,5M BAT-EMC 3.19.1.24	02-02/24-05-009 02-02/24-05-013 02-02/50-11-014 02-02/50-17-003 02-02/50-17-024 02-02/50-17-025 02-02/50-18-016 02-02/68-13-001	18/06/2021 19/05/2023	18/06/2020 19/05/2020	14/01/2021	14/01/2020

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