
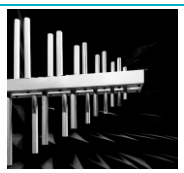
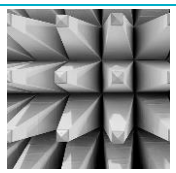

CTC advanced
member of RWTÜV group

Bundesnetzagentur

BNetzA-CAB-02/21-102

TEST REPORT

Test Report No.: 1-3692/21-03-04

Testing Laboratory

CTC advanced GmbH
Untertürkheimer Straße 6 – 10
66117 Saarbrücken/GERMANY
Phone: + 49 681 5 98 - 0
Fax: + 49 681 5 98 - 9075
Internet: https://ctcadvanced.com/
e-mail: mail@ctcadvanced.com

Accredited Testing Laboratory:
The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2018-03) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)
The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate starting with the registration number: D-PL-12076-01.

Applicant

indurad GmbH
Belvedereallee 5
52070 Aachen/GERMANY
Phone: + 49 241 538070-0
Contact: Matthias Rabel
e-mail: matthias.rabel@indurad.com

Manufacturer

indurad GmbH
Belvedereallee 5
52070 Aachen/GERMANY
Phone: + 49 241 538070-0
Contact: Matthias Rabel

Test Standard/s

FCC - Title 47 CFR Part 18: 2022-01	FCC - Title 47 of the Code of Federal Regulations; Chapter I; Part 18 - Industrial, scientific and medical equipment
MP-5: 1986	FCC Methods of measurements of radio noise emissions from industrial, scientific and medical equipment

Test Item

Kind of test item: **iRTT RechargeUnit**
Model name: **iRTT-RU**
detailed information see chapter 6.1 and 6.2 of this test report

This test report is electronically signed and valid without handwritten signature. The public keys can be requested at the test laboratory to verify the electronic signatures.

Test report authorised:

cn=Uli Kraus, o=CTC advanced GmbH, ou=KRA-211122, email=uli.kraus@ctcadvanced.com, c=DE
2022.03.23 10:43:11 +01'00'

Uli Kraus
Head of Department
Electromagnetic Compatibility & Acoustics

Test performed:

cn=Jens Hennemann, o=CTC advanced GmbH, ou=HMN_211123, email=jens.hennemann@ctcadvanced.com, c=DE
2022.03.23 11:03:48 +01'00'

Holger Medrow
Testing Manager
Electromagnetic Compatibility & Acoustics

1 Table of contents

2 General information

2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. CTC advanced GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.
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This test report is electronically signed and valid without handwritten signature. For verification of the electronical signatures, the public keys can be requested at the testing laboratory.

2.2 Application details

Date of receipt of order:	2021-12-21
Date of receipt of test item:	2022-01-04
Start of test[1)]:	2022-01-19
End of test[1)]:	2022-01-19
Person(s) present during the test:	- / -

[1)] Date of each measurement, if not shown in the plot, can be requested. Dates are stored in the measurement software.

3 Test standard/s:

Test Standard	Test Standard Description
FCC - Title 47 CFR Part 18: 2022-01	FCC - Title 47 of the Code of Federal Regulations; Chapter I; Part 18 - Industrial, scientific and medical equipment
MP-5: 1986	FCC Methods of measurements of radio noise emissions from industrial, scientific and medical equipment

4 Test Environment

Temperature:	15°C – 35°C
Relative humidity content:	30 % - 60 %
Air pressure:	860 – 1060 hPa
Power supply of measurement equipment:	230 V / 50 Hz

5 Test Laboratories sub-contracted

---

6 Information about Test Conditions

6.1 Test Item

Kind of test item :	**iRTT RechargeUnit**		
Type identification :	**indurad RadioTransponderTag (iRTT)**		
Equipment classification:	Equipment for fixed use		
Environment classification:	Residential, commercial and light industry		
Supply voltage :	DC Powered 24V		
Ports : **(maximum cable lengths declared by manufacturer)**	**Description**	**Direction**	**Length**
	Signal/power port	In / output	> 3m
Is mounting position / usual operating position defined?			No
Additional information:			
- this is a class A digital device: the instructions furnished the user shall include a statement according to §18 of the used FCC rules - the build in radioparts are not part of this test and are already tested.			

6.1 EUT: Type, S/N etc. and Short Descriptions Used in this Test Report

short descrip-tion*)	EUT	Type	S/N serial number	HW hardware status	SW software status
EUT A	iRTT RechargeUnit	indurad Radio Transponder Tag (iRTT)	fdbf3a	V3	V0.9

*) EUT short description is used to simplify the identification of the EUT in this test report.

6.2 Auxiliary Equipment (AE): Type, S/N etc. and Short Descriptions

AE descrip -tion*)	Auxiliary equipment	Type	S/N serial number	HW hardware status	SW software status
AE A	iRTT-RU	indurad Radio Transponder Tag (iRTT)	4a7286	V3	V3.14
AE B	Power supply	goodbay NTS 1500 9-24V EUP	54799	- / -	- / -

*) AE short description is used to simplify the identification of the auxiliary equipment in this test report.

6.3 EUT Set-up(s)

EUT set-up no.*)	Combination of EUT and AE	Remarks
set. 1	EUT A + AE A +AE B	setup conducted emission
set. 2	EUT A + AE B	setup radiated emission

*) EUT set-up no. is used to simplify the identification of the EUT set-up in this test report.

6.4 EUT Operating Modes

EUT operating mode no.*)	Description of operating modes	Additional information
op. 1	powered,charging	- / -

*) EUT operating mode no. is used to simplify the test report.

7 Summary of Test Results

☒ No deviations from the technical specifications were ascertained
☐ There were deviations from the technical specifications ascertained

7.1 Emission

7.1.1 Enclosure

EMI Phenomenon	Frequency range	Basic standard	Result
Radiated Interference Field Strength	9KHz - 30MHz	FCC Part 18	passed
Radiated Interference Field Strength	30 - 1000 MHz	FCC Part 18	passed

7.1.2 AC Mains Power Input/Output Ports

EMI Phenomenon	Frequency range	Basic standard	Result
Conducted interference voltage	0,15– 30 MHz	FCC Part 18	passed

Remarks:

NA1	Not tested because not required by used standard
NA2	Test not applicable because port does not exists
NA3	Test not applicable because port only for services
NA4	Test not applicable because port lengths not longer than 3m
NA5	Not tested because not required by customer
NA6	Not tested because used frequency < 108 MHz
NA7	Not tested because the device is for vehicular use

7.2 Measurement and Test Set-up

Note: The test configuration is in accordance with the requirements given in the standards in point 3

7.3 Measurement uncertainty

The uncertainty of the measurement equipment fulfils CISPR 16 and the related European and national standards.

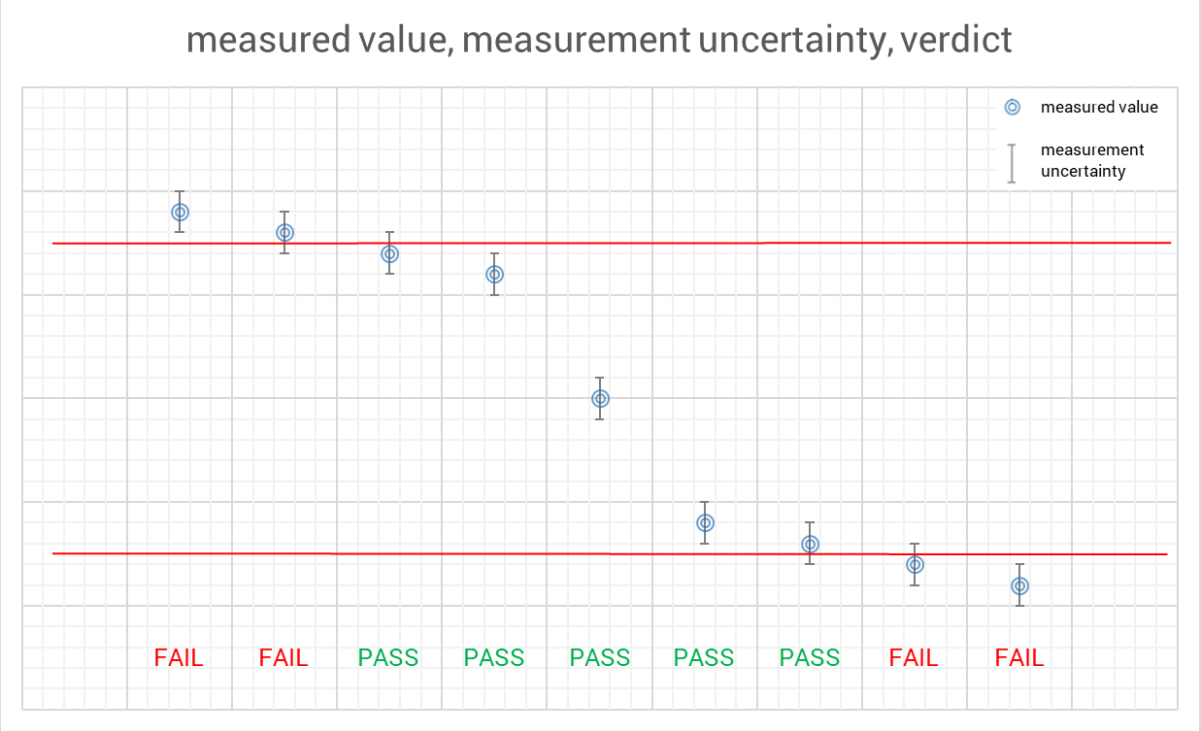
The semi anechoic chamber fulfils the requirements of CISPR 16-1 (ANSI C63.4) for a test volume of 4m ∅.

The table below shows the measurement uncertainties for each measurement method. The expended uncertainty (k=2 or 95%) was calculated with worst case values.

Measurement Method	Frequency area Impulse duration time	Description	Expanded uncertainty (k=2 or 95%)
Radiated Emission MP 5	9kHz – 18 GHz	- / -	± 4.28 dB
Conducted Emission ANSI C63.4	9 kHz – 30 MHz	- / -	± 3.49 dB

7.4 Reporting statements of conformity – decision rule

Only the measured values related to their corresponding limits will be used to decide whether the equipment under test meets the requirements of the test standards listed in chapter 3.
The measurement uncertainty is mentioned in this test report, see chapter above, but is not taken into account - neither to the limits nor to the measurement results. Measurement results with a smaller margin to the corresponding limits than the measurement uncertainty have a potential risk of more than 5% that the decision might be wrong."



7.5 Limits

Equipment	operating frequency	RF power generated by equipment (watts)	field strength limit (µV/m)	distance (meters)
any type unless otherwise specified	any ISM frequency	below 500 500 or more	25 25xSQRT(power/500)	300 [1]300
	any non ISM frequency	below 500 500 or more	15 15xSQRT(power/500)	300 [1]300
industrial heaters and RF stabilized arc welders	on or below 5,725MHz above 5,725MHz	any any	10 ([2])	1600 ([2])
medical diathermy	any ISM frequency any non ISM frequency	any any	25 15	300 300
ultrasonic	below 490kHz	below 500 500 and more	2,400/F(kHz) 2,400/F(kHz)x SQRT(power/500)	300 [3]300
	490 to 1,600kHz above 1,600kHz	any any	24,000/F(kHz) 15	30 30
induction cooking ranges	below 90kHz on or above 90kHz	any any	1,500 300	[4]30 [4]30

1 Field strength may not exceed 10 µV/m at 1600 meters. Consumer equipment operating below 1000 MHz is not permitted the increase in field strength otherwise permitted here for power over 500 watts.

2 Reduced to the greatest extent possible.

3 Field strength may not exceed 10 µV/m at 1600 meters. Consumer equipment is not permitted the increase in field strength otherwise permitted here for over 500 watts.

4 Induction cooking ranges manufactured prior to February 1, 1980, shall be subject to the field strength limits for miscellaneous ISM equipment.

8 Detailed test results - Emission

8.1 Conducted Emission

8.1.1 Instrumentation for Test (see equipment list)

G 1	G 2	F 21									

8.1.2 Test Plan

EUT set-up	set 1		
Operating mode	**Port / Line**	**Limit**	**Result**
op 1	AC power line	FCC part 18	passed

Remark :	Powered by external power supply (120V / 60Hz)

8.1.3 Conducted Limits (Power-Line)

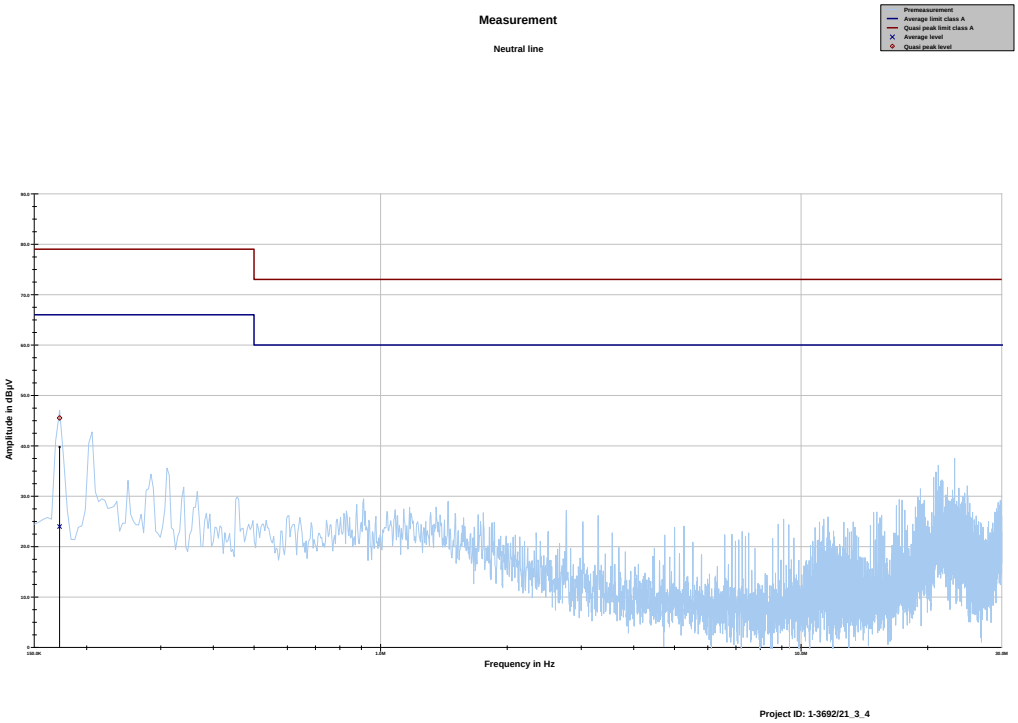
	FCC part 18	
Frequency- range	**Quasi-Peak (dBµV)**	**Average (dBµV)**
0,15 MHz – 0,5 MHz	79	66
0,5 MHz -5 MHz	73	60
5 MHz -30 MHz	73	60

8.1.4 Calibration Information

Device	Serial number	Internal Number	Calibration valid until	Calibration interval
ESCI	100083	3000003312	12 / 2022	12 month
VISN ESH 3-Z5	893045/004	300000584	12 / 2023	24 month

Remarks: All emission components and the shielded room were checked weekly
Cable loss: 0.6 to 2.4 dB (150kHz to 30 MHz)

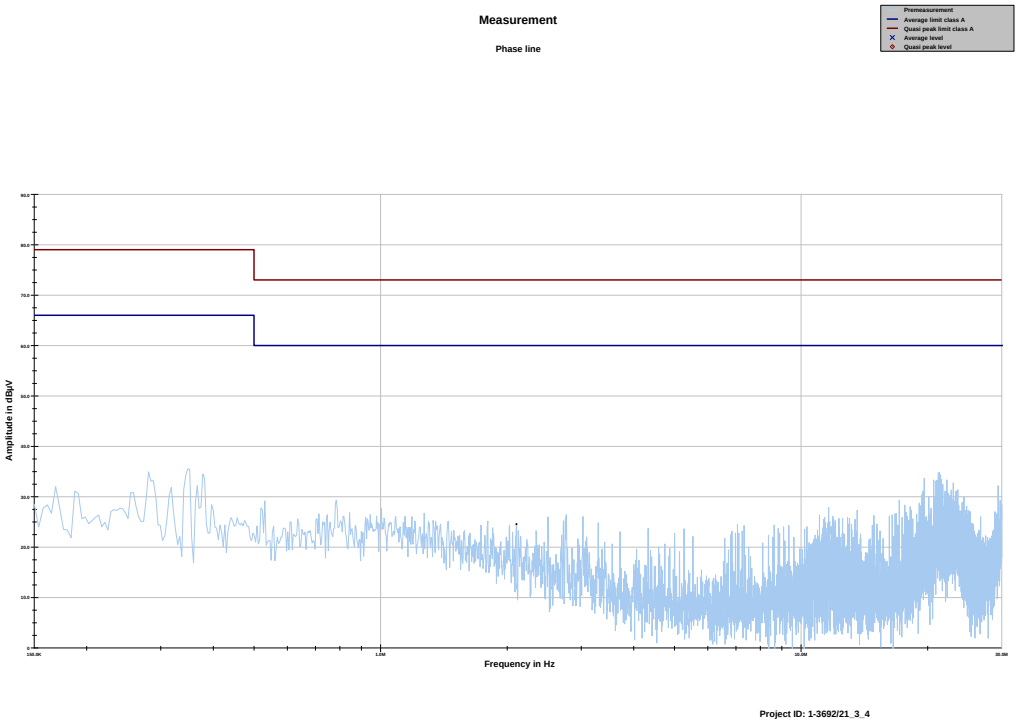
8.1.5 Test Results of Main



Neutral line tbl
, , , Project ID: 1-3692/21_3_4

Frequency	Quasi peak level	Margin quasi peak	Limit QP	Average level	Margin Average	Limit AV
MHz	dBµV	dB	dBµV	dBµV	dB	dBµV
0.172387	45.52	33.48	79.000	23.97	42.03	66.000

Project ID - 1-3692/21_3_4
EUT - iRTT-RU
Operating mode - powered,charging only sample



Phase line tbl
Project ID: 1-3692/21_3_4

Frequency	Quasi peak level	Margin quasi peak	Limit QP	Average level	Margin average	Limit AV
MHz	dBµV	dB	dBµV	dBµV	dB	dBµV

Project ID - 1-3692/21_3_4
EUT - iRTT-RU
Operating mode - powered,charging only sample

8.1.6 Signal strength calculation

Calculation formula:
SS = UR + CF + VC

List of abbreviations:

SS	►	signal strength
UR	►	voltage at the receiver
CF	►	loss of the cable and filter (passband filter 130 kHz – 30 MHz)
VC	►	correction factor of the ISN (ESH3-Z5)

List with correction factors:

Frequency [MHz]	CF [dB]	VC [dB]
0,150	9,80	1,42
1,000	9,80	0,41
5,000	9,90	0,32
10,000	9,90	0,23
15,000	10,00	0,39
20,000	10,00	1,19
25,000	10,20	1,55
30,000	10,30	1,31

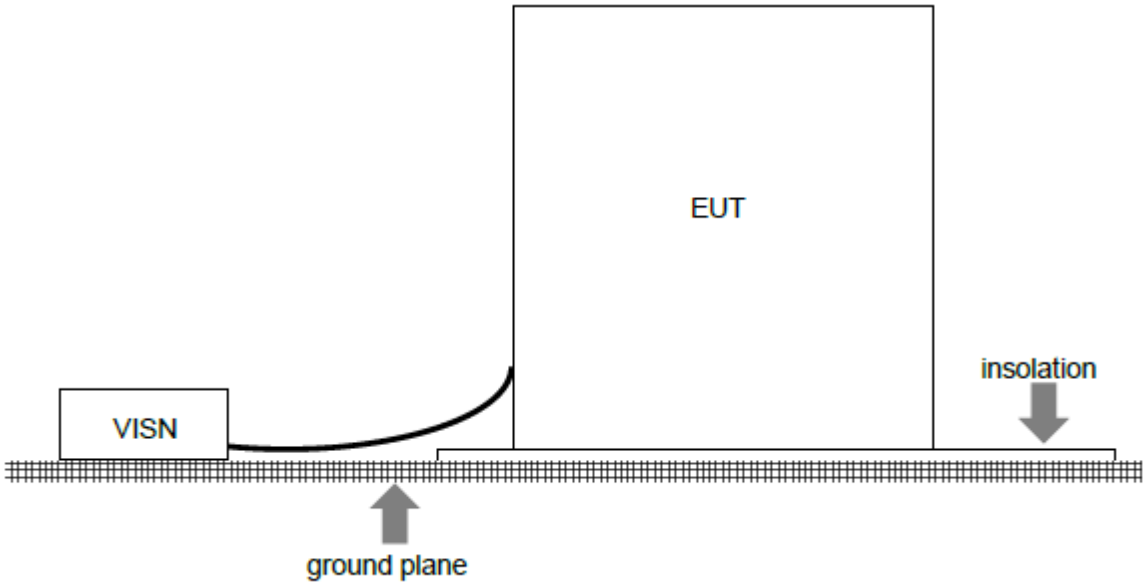
Example calculation:
For example at 10,000 000 MHz the measured Voltage (UR) is 37,62 dBµV, the loss of the cable and filter (CF) is 9,90 dB and the correction factor of the ISN (VC) is 0,23 dB the final result will be calculated:
SS [dBµV] = 37,62 [dBµV] + 9,90 [dB] + 0,23 [dB] = 47,75 [dBµV] (244, 06 µV)

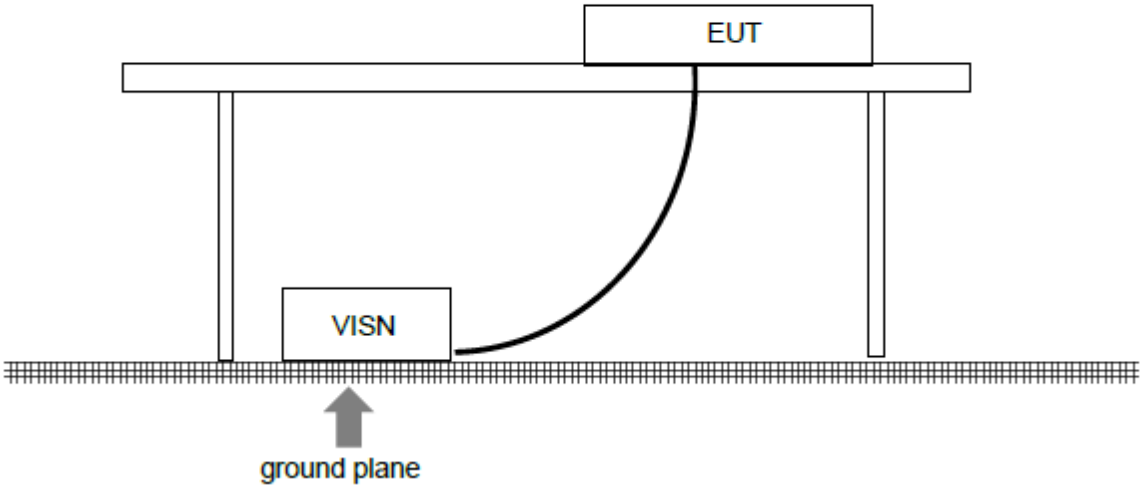
8.1.7 Version of test software

Software Version: TILE 7.3.0.15

8.1.8 Test Set-up

According to EMC basic standard **ANSI C 63.4**





8.2 Electromagnetic Radiated Emissions (Distance 3 m)

8.2.1 Instrumentation for Test (see equipment list)

F 1	F 5	F 6	F 7	F 8	F 28	F 34					

8.2.2 Test Plan

EUT set-up	set 2		
Operating mode	**Application**	**Limit**	**Result**
op 1	Enclosure	FCC part 18	passed

Remarks:	Powered by external power supply (24V DC)

8.2.3 Radiated Limits

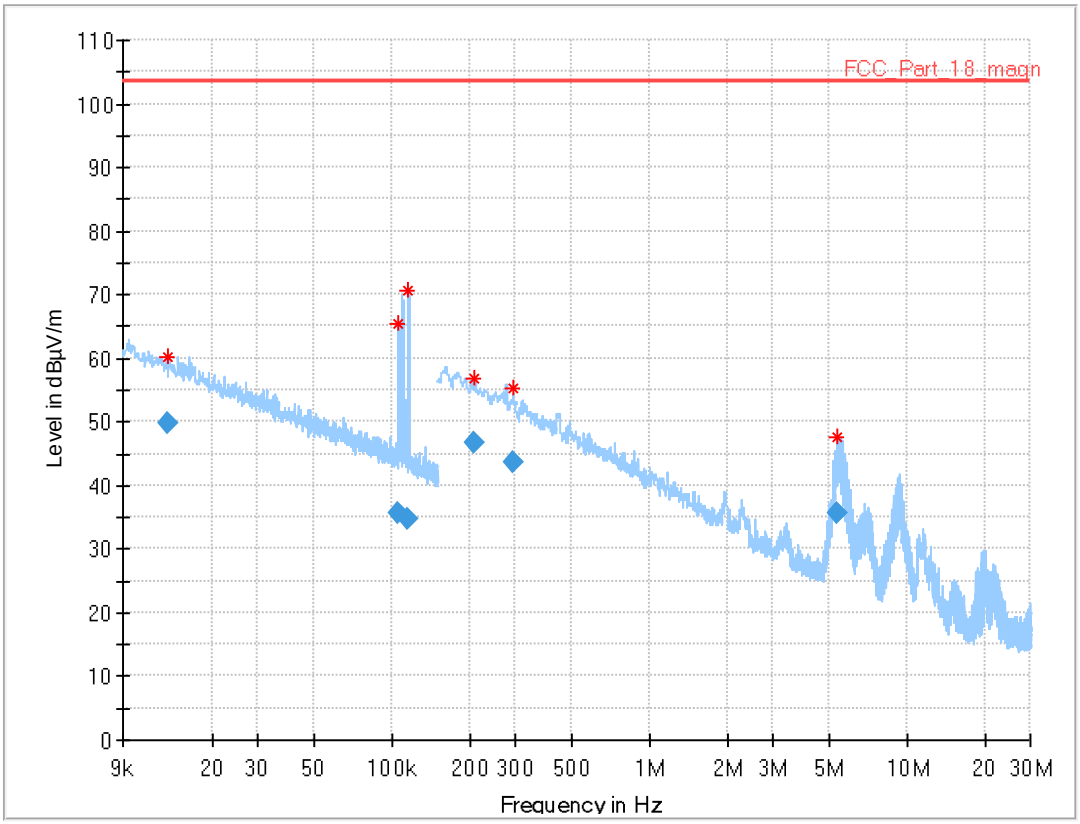
	FCC part 18
9KHz - 30 MHz	23,52dBµV/m@300m or 103,52dBµV/m@3m

Remarks:	- the measurements have been performed @3m distance, therefore the limit line was recalculated accordingly (distance correction for 300m: 40log(300/3)=80dB)

8.2.4 Test Results

Common Information

EUT:	iRTT-RU
Serial number:	
Test description:	FCC part 18@3m x-axis
Operating condition:	powered, charging
Operator name:	SCR
Comment:	DC 24V

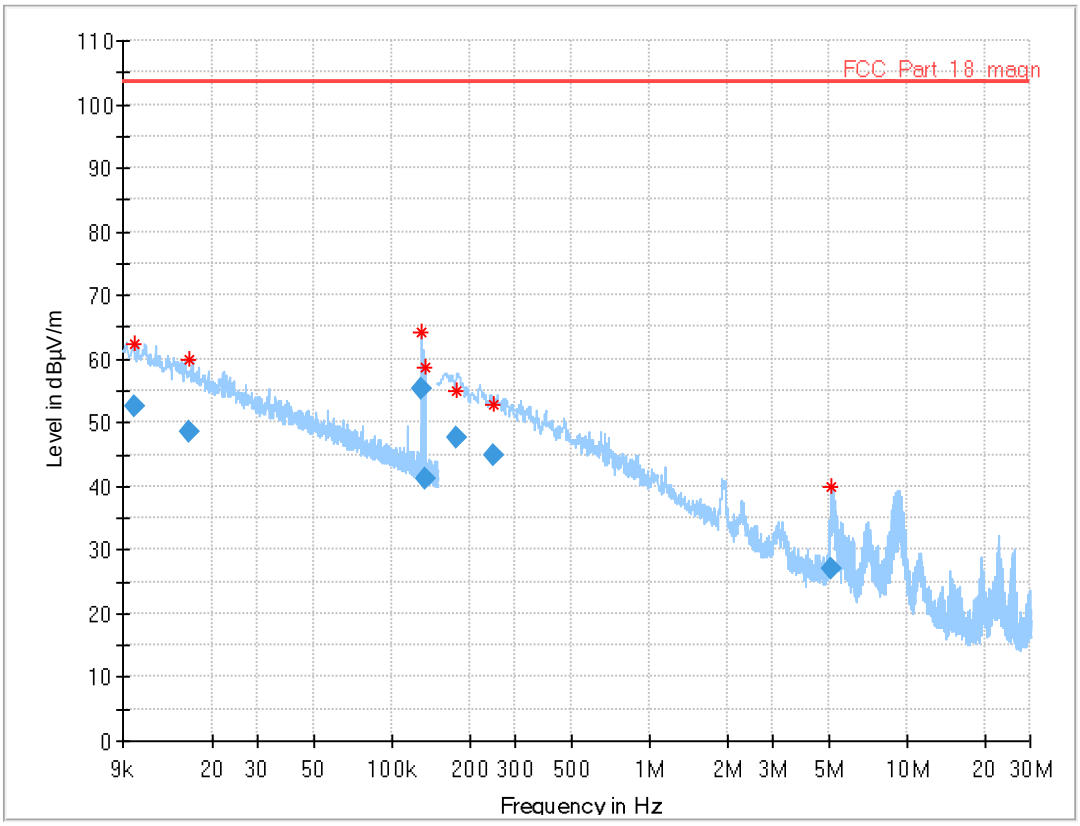


Final_Result

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)
0.013	49.80	103.5	53.7	1000	0.2	V	153
0.105	35.52	103.5	68.0	1000	0.2	V	184
0.115	34.64	103.5	68.9	1000	0.2	V	153
0.208	46.57	103.5	57.0	1000	9.0	V	268
0.292	43.71	103.5	59.8	1000	9.0	V	51
5.359	35.70	103.5	67.8	1000	9.0	V	0

Common Information

EUT:	iRTT-RU
Serial number:	
Test description:	FCC part 18 – y axis
Operating condition:	powered,charging,
Operator name:	SCR
Comment:	24V DC

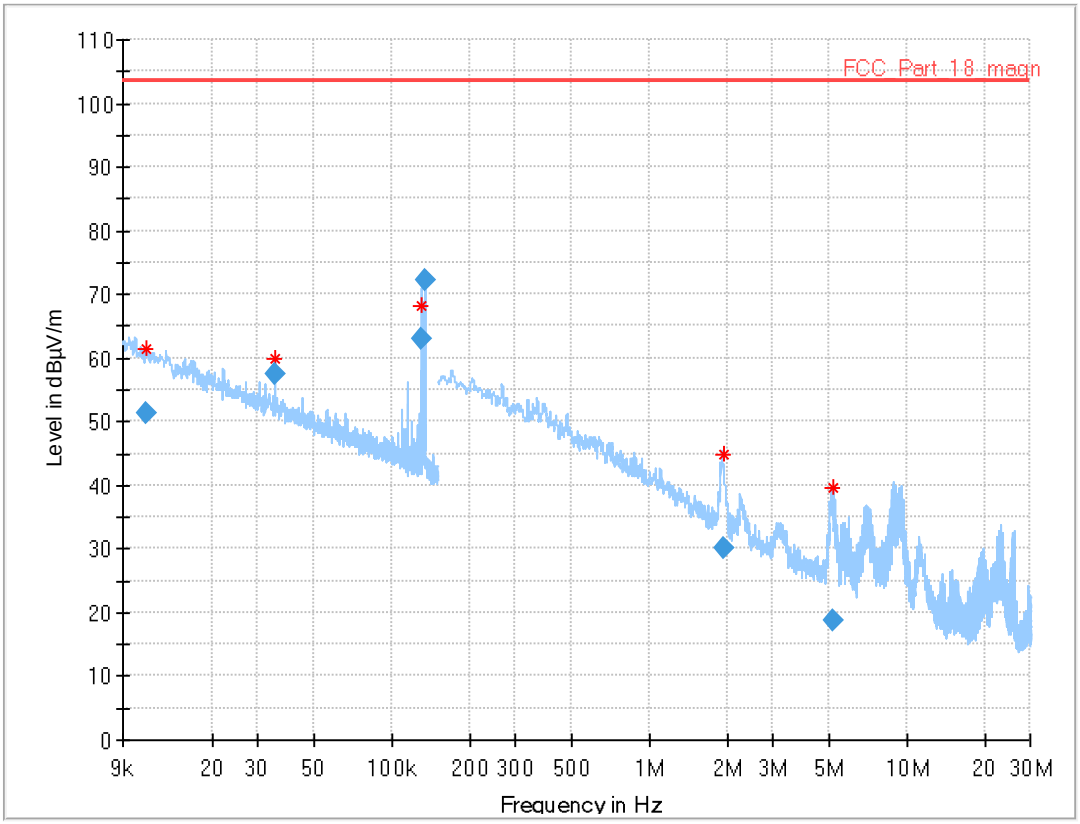


Final_Result

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)
0.010	52.48	103.5	51.0	1000	0.2	V	289
0.016	48.67	103.5	54.8	1000	0.2	V	109
0.130	55.44	103.5	48.1	1000	0.2	V	274
0.134	41.31	103.5	62.2	1000	0.2	V	168
0.176	47.75	103.5	55.8	1000	9.0	V	0
0.248	45.00	103.5	58.5	1000	9.0	V	262
5.075	26.99	103.5	76.5	1000	9.0	V	0

Common Information

EUT:	iRTT-RU
Serial number:	
Test description:	FCC part 18@3m – z axis
Operating condition:	powered,charging
Operator name:	SCR
Comment:	24V DC



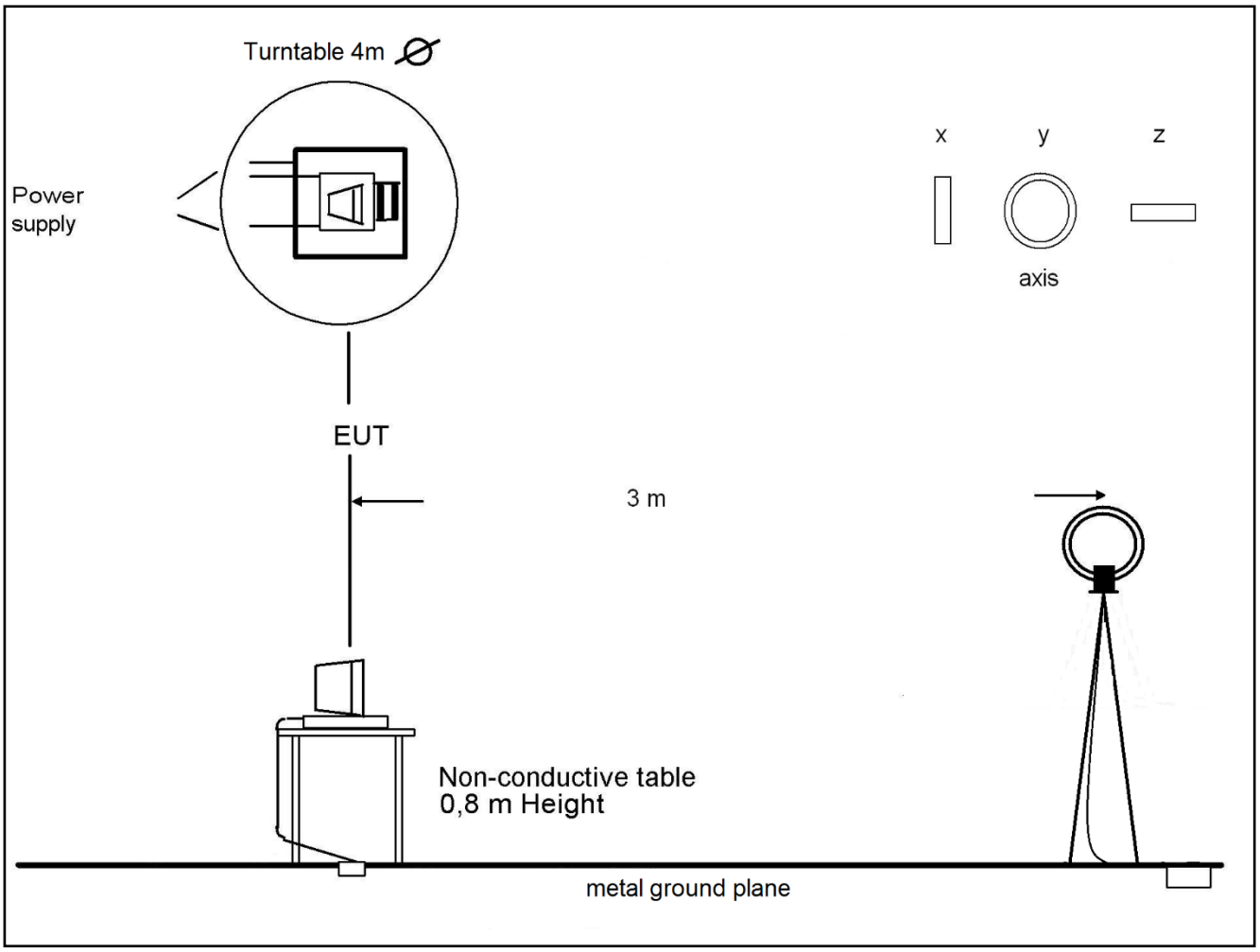
Final_Result

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)
0.011	51.18	103.5	52.3	1000	0.2	V	21
0.035	57.49	103.5	46.0	1000	0.2	V	63
0.130	62.98	103.5	40.5	1000	0.2	V	339
0.134	72.21	103.5	31.3	1000	0.2	V	63
1.926	30.09	103.5	73.4	1000	9.0	V	131
5.196	18.75	103.5	84.8	1000	9.0	V	355

8.2.5 Hardware Set-up

Frequency Range:	9 kHz - 30 MHz
Receiver:	ESR 3 [ESR 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.42
Signal Path:	LOOP-Ant FW 1.0
Antenna:	EMCO6502
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12
Software version:	V10.59.0

8.2.6 Test set-up



8.2.7 Sequence of testing

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- If the EUT is a tabletop system, a nonconducting table with 0.8 m height is used, which is placed on the ground plane.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC or DC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance 3 m (see ANSI C 63.4) – see test details.
- EUT is set into operation.

Premeasurement

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized successively in x, y and z axis
- The antenna height is 2 m.
- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

Final measurement

- The final measurement is performed for at least six highest peaks according to the requirements of the ANSI C63.4.
- Based on antenna and turntable positions at which the peak values are measured the software maximize the peaks by changing turntable position ± 45°
- The final measurement is done with average detector (as described in FCC/OET MP-5).
- Final levels, frequency, measuring time, bandwidth, antenna height, antenna position, turntable angle, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement with marked maximum final results and the limit is stored.

8.2.8 Signal strength calculation

Calculation formula:
$SS = U_R + CL + AF$

List of abbreviations:

SS	►	signal strength
U_R	►	voltage at the receiver
CL	►	loss of the cable
AF	►	antenna factor

List with correction factors:

Frequency [MHz]	CL [dB]	AF [1/m]
0,009	0,20	17,60
0,015	0,20	11,17
1,000	0,30	10,96
10,000	0,40	9,90
22,000	0,40	6,56
30,000	0,40	3,40

Example calculation:
For example at 1,000 MHz the measured Voltage (U_R) is 12,35 dBµV, the loss of the cable (CL) is 0,30 dB and the antenna factor (AF) is 10,96 dB (m^{-1}) the final result will be calculated:
SS [dBµV/m] = 12,35 [dBµV] + 0,30 [dB] + 10,96 [dB (m^{-1})] = 23,61 [dBµV/m] (15,1 µV/m)

8.3 Electromagnetic Radiated Emissions (Distance 10 m)

8.3.1 Instrumentation for Test (see equipment list)

F 1	F 2	F 4b	F 5	F 6	F 7	F 8	F 28				

8.3.2 Test Plan

EUT set-up	set 2		
Operating mode	**Application**	**Limit**	**Result**
op 1	Enclosure	FCC part 18	passed

Remarks:	Powered by external power supply (24V DC)

8.3.3 Radiated Limits

Frequency- range	**FCC part 18**
30 MHz – 1000 MHz	23,52dBµV/m@300m or 53 dBµV/m@10m
	* This values are recalculated from the limits at 300m antenna distance in §18.305 of the FCC rules

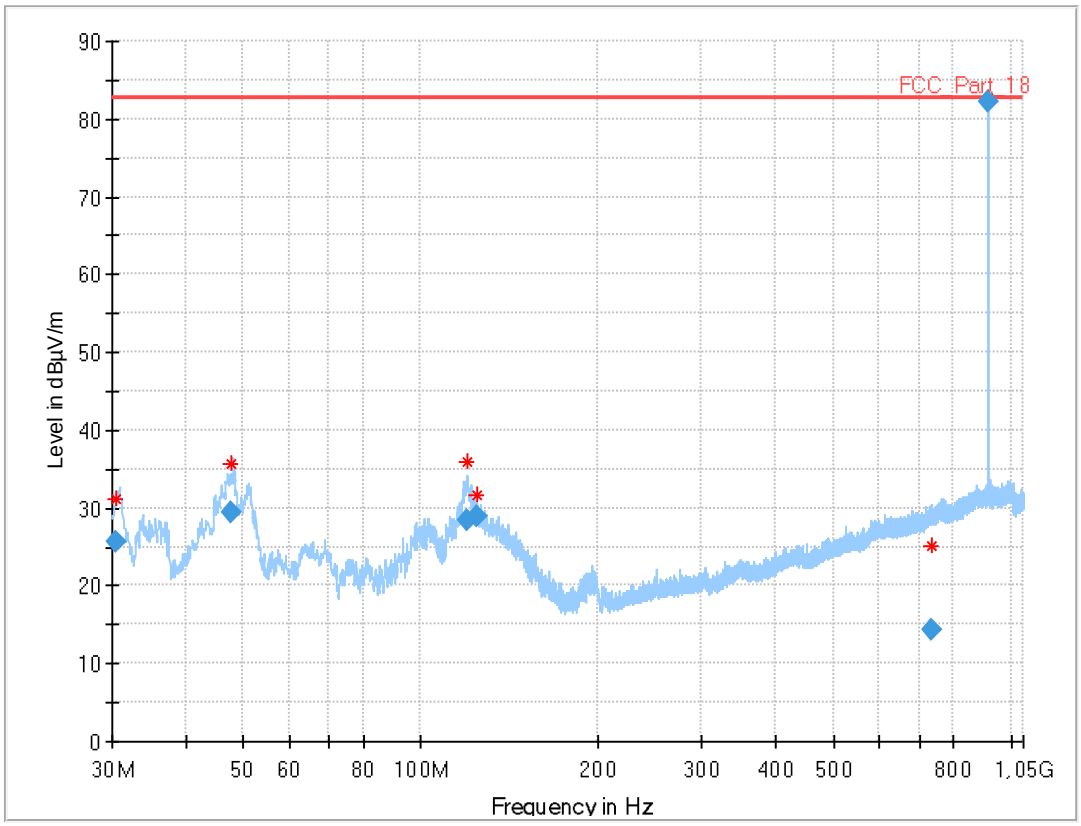
8.3.4 Calibration Information

Device	**Serial number**	**Internal Number**	**Calibration valid until**	**Calibration interval**
ESR 3	1316.3003K03-102587-ct	300005771	12 / 2022	12 month
Trilog Antenna	9163-1029	300005379	08 / 2023	24 month
Remarks: System check of all relevant devices and the chamber (weekly)				

8.3.5 Test Results

Common Information

EUT:	iRTT-RU
Serial number:	
Test description:	FCC part 18
Operating condition:	powered,charging
Operator name:	SCR
Comment:	24V DC



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
30.573	25.59	82.6	57.0	1000	120.0	106.0	V	298	13
47.636	29.46	82.6	53.1	1000	120.0	200.0	V	101	15
120.133	28.39	82.6	54.2	1000	120.0	122.0	V	259	11
124.927	28.81	82.6	53.8	1000	120.0	148.0	V	248	10
736.263	14.26	82.6	68.3	1000	120.0	200.0	V	13	23
914.986	82.19	82.6	0.4	1000	120.0	107.0	H	131	26

8.3.6 Hardware Set-up

Subrange 1	
Frequency Range:	30 MHz - 2 GHz
Receiver:	ESR 3 [ESR 3] @ GPIB0 (ADR 20), SN 1316.3003K03/102587, FW 3.46 SP1
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163
Antenna Tower:	Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12
Software version:	EMC32 V10.59.0

8.3.7 Sequence of testing

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- If the EUT is a tabletop system, a nonconducting table with 0.8 m height is used, which is placed on the ground plane.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 10 m or 3 m (see ANSI C 63.4) – see test details.
- EUT is set into operation.

Premeasurement

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height changes from 1 m to 3 m.
- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

Final measurement

- The final measurement is performed for at least six highest peaks according to the requirements of the ANSI C63.4.
- Based on antenna and turntable positions at which the peak values are measured the software maximize the peaks by changing turntable position ± 45° and antenna height between 1 and 4 m.
- The final measurement is done with quasi-peak detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement with marked maximum final results and the limit is stored.

8.3.8 Signal strength calculation

Calculation formula:
$SS = U_R + CL + AF$

List of abbreviations:

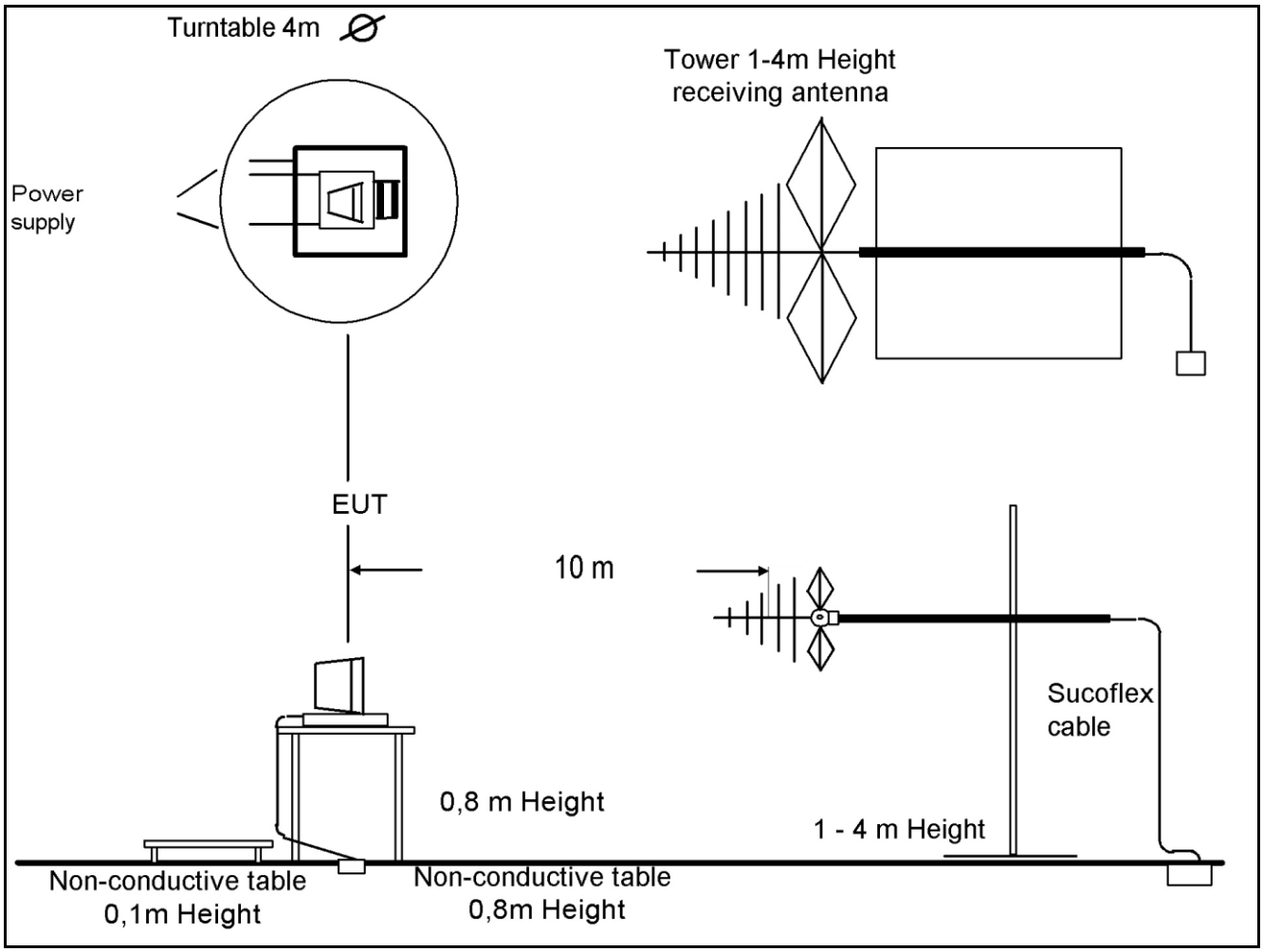
SS	►	signal strength
U_R	►	voltage at the receiver
CL	►	loss of the cable
AF	►	antenna factor

List with correction factors:

Frequency [MHz]	CL [dB]	AF [1/m]
30,000	0,20	12,30
100,000	0,60	11,30
200,000	1,10	10,60
300,000	1,30	13,20
400,000	1,60	15,30
500,000	1,90	16,80
600,000	2,00	18,80
700,000	2,20	20,30
800,000	2,30	21,50
900,000	2,40	22,80
1000,000	2,50	23,30

Example calculation:
For example at 500,000 000 MHz the measured Voltage (U_R) is 12,35 dBµV, the loss of the cable (CL) is 1,90 dB and the antenna factor (AF) is 16,80 dB (m^{-1}) the final result will be calculated:
SS [dBµV/m] = 12,35 [dBµV] + 1,90 [dB] + 16,80 [dB (m^{-1})] = 31,05 [dBµV/m] (35,69 µV/m)

8.3.9 Test Set-up



9 Test equipment and ancillaries used for tests

To simplify the identification of the test equipment and/or ancillaries which were used, the reporting of the relevant test cases only refer to the test item number as specified in the table below.

No.	Instrument/Ancillary	Manufacturer	Type	Serial-No.	Internal identification
	Radiated emission in chamber F				
F-1	Control Computer	F+W		2934939v001	300005258
F-2	Trilog-Antenna	Schwarzbeck	VULB 9163	9163-1029	300005379
F-4b	Switch	Netgear	GS108P	26V12A3H50336	300000368
F-5	EMI Test receiver	R&S	ESR	1316.3003K03-102587-ct	300005771
F-6	Turntable Interface-Box	EMCO / ETS-LINDGREN	Model 105637	44583	300003747
F-7	Tower/Turntable Controller	EMCO / ETS-LINDGREN	Model 2090	64672	300003746
F-8	Tower	EMCO / ETS-LINDGREN	Model 2175	64762	300003745
F-9	Ultra Notch-Filter Rejected band Ch. 62	WRCD		9	
	Radiated immunity in chamber F				
F-10	Control Computer	F+W		2934939v001	300005258
F-11	Signal Generator	R&S	SMB 100A	1406.6000k02-113856	300005266
F-13	RF-Amplifier	Bonn	BLWA 0860-250/100D	035491	300003210
F-14	Stacked Logper Antenna	Schwarzbeck	STLP 9129	200	300006249
F-14a	Bicon-Antenna	EMCO	3109	8906-2309	300000575
F-14b	Bicon-Antenna	Schwarzbeck	Balun VHBD 9134 elements BBFA 9146	3011 0057	300005385
F-15	RF-Amplifier	ar	1000LM20	20562	-/-
F-16	Directional Coupler	ar	DC7144A	312786	300003411
F-16a	Directional coupler	emv	DC 2000	9401-1677	300000592
F-18	Power Meter	R&S	NRP2	104973	300005114
F-19	Power sensor	R&S	NRP-Z91	103332	300005114-1
F-20	Power sensor	R&S	NRP-Z91	103333	300005114-2
F-35	RF- Amplifier	Bonn	BLMA 2060-5	097392A	300003908
F-36	Stacked Microwave Log.-Per. Antenna	Schwarzbeck	STLP9149	9149-044	300003919
	Harmonics and flicker in front of chamber F				
F-21	Flicker and Harmonics Test System	Spitzenberger & Spies	PHE4500/B I PHE4500/B II	B5983 B5984	300003314
F-21a	Power Supply	HBS Electronic	ACS-1600-PS	2002-001247-0	300006074
F-28	Power Supply	Hewlett Packard	6032 A	2920 A 04466	300000580
	Radiated emission in chamber F > 1GHz				
F-29	Horn antenna	Schwarzbeck	BBHA 9120 B	188	300003896
F-30	Amplifier	ProNova	0518C-138	005	F 024
F-31	Amplifier	Miteq	42-00502650-28-5A	1103782	300003379
F-32	Horn antenna	EMCO	3115	9107-3697	300001605
F-33	Spectrum Analyzer	R&S	FSU26	200809	300003874
F-34	Loop antenna	EMCO	6502	8905-2342	300000256

No.	Instrument/Ancillary	Manufacturer	Type	Serial-No.	Internal identification
	Conducted emission in chamber G				
G-1	EMI Receiver	R&S	ESCI	100083	300003312
G-2	V-ISN	Rohde & Schwarz	ESH 3-Z5	892475/017	300002209
G-2a	V-ISN	Rohde & Schwarz	ESH 2-Z5	892602/024	300000587
G-3	2-Wire ISN	Schaffner	ISN T200	19075	300003422
G-4	4-Wire ISN	Schaffner	ISN T400	22325	300003423
G-5	Shielded wire ISN	Schaffner	ISN ST08	22583	300003433
G-6	Unshielded 8 wire ISN	Teseq	ISN T800	26113	300003833
G-7	Unshielded 8 wire ISN	Teseq	ISN T8-Cat. 6	26374	300003851
G-8	RF Current probe	Solar	9134-1	100254	300004163
G-9	V-ISN	Schaffner	ISN PLC-150	21579	300003318
G-10	V-ISN	Schaffner	ISN PLC-25-30	21584	300003319
G 10a	PLC Filter	TESEQ	Filter PLC	23436	300003598
G 10b	Coupling unit 75 Ohm	Fiedler	AC	----	300003272.04
	Conducted immunity in chamber G				
G-11	Signal generator	R&S	SMG	8610647025	300000204.01
G-12	RF-Amplifier	BONN	BSA 0125-75	066502-01	300003545
G-13	Power Meter	R&S	URV 5	837723/025	300002844.01
G-14	Power Sensor	R&S	URV 5-Z2	832874/021	300002239
G-15	Directional coupler	emv	DC 2000	9401-1677	300000592
G-16	Attenuator 6dB	Alan	50HP6-100 N	121048 0348	300003148
G-17	EM-Injection Clamp	FCC	203i	232	300000626
G-18	CDN	FCC	FCC-801-M3-16	237	300000627
G-19	CDN	FCC	FCC-801-T2	78	300000629
G-20	CDN	FCC	FCC-801-AF 2	62	300000630
G-21	CDN	FCC	FCC-801-AF 4	61	300000631
G-22	CDN	FCC	FCC-801-M1	2027	300002761
G-23	CDN	TESEQ	CDN M016S	38741	300004847
G-23a	CDN	TESEQ	CDN M516A	35049	300004848
G-24	transformer for 50Hz Loop Antenna	EM-Test	MC2630	0200-10	300002659.01
G-25	50Hz Loop Antenna	EM-Test	MS 100	none	300002659
	ESD in chamber G				
G-30	ESD generator	Schlöder	SESD 30000	511333	300005097
	Emission on bench in chamber G				
G-31	Absorbing Clamp	R&S	MDS-21	832 231/006	300000527
	generic in chamber G				
G-32	power supply	Hewlett Packard	6038A	2848A06673	300001512
	Conducted interference in chamber G				
G 33	Arbitrary Function Generator	33521B	Keysight	MY52702534	300005023
G 34	Audio amplifier	Crown 5002VZ	MACRO-TECH 5002VZ	8001641218	300004094
G 35	Shunt	Schwarzbeck	Shunt 9570	9570118	300004107
G 36	Coupling network	EM-Test	CN 200N1	P1322118851	300004742

10 Observations

No observations, exceeding those reported with the single test cases, have been made.

Annex A Photographs of the test set-up

Photo 1: Setup conducted emission

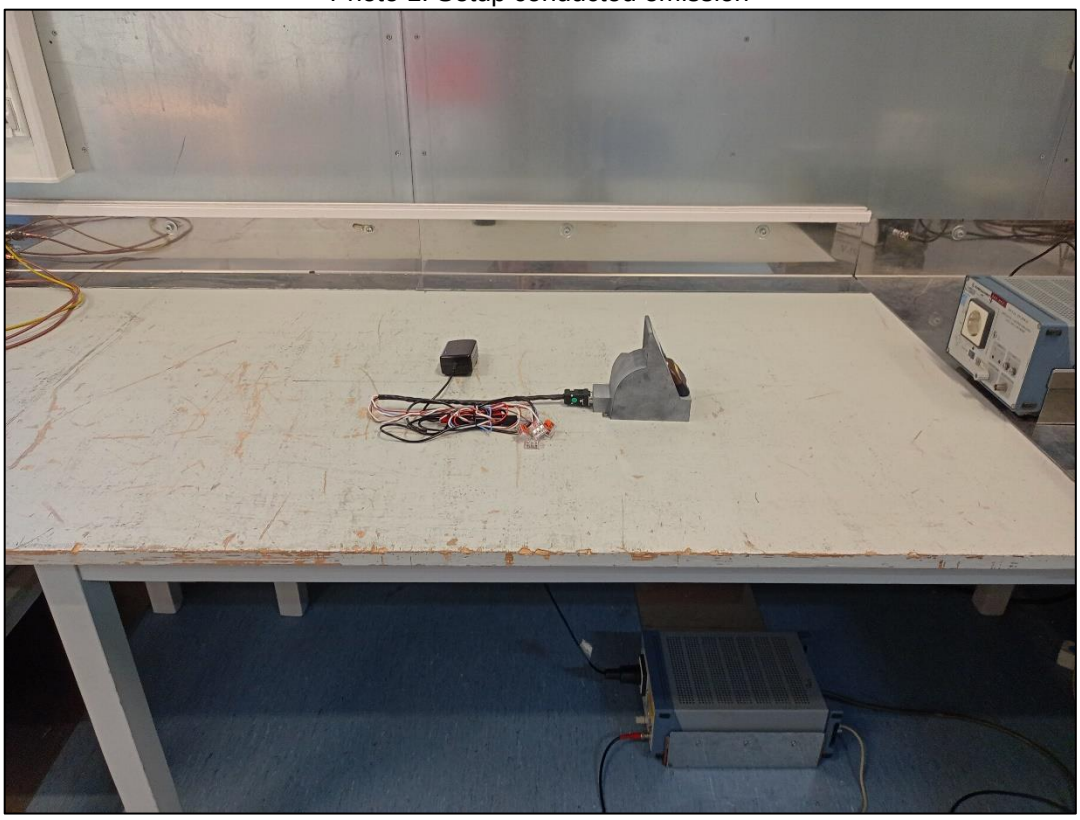
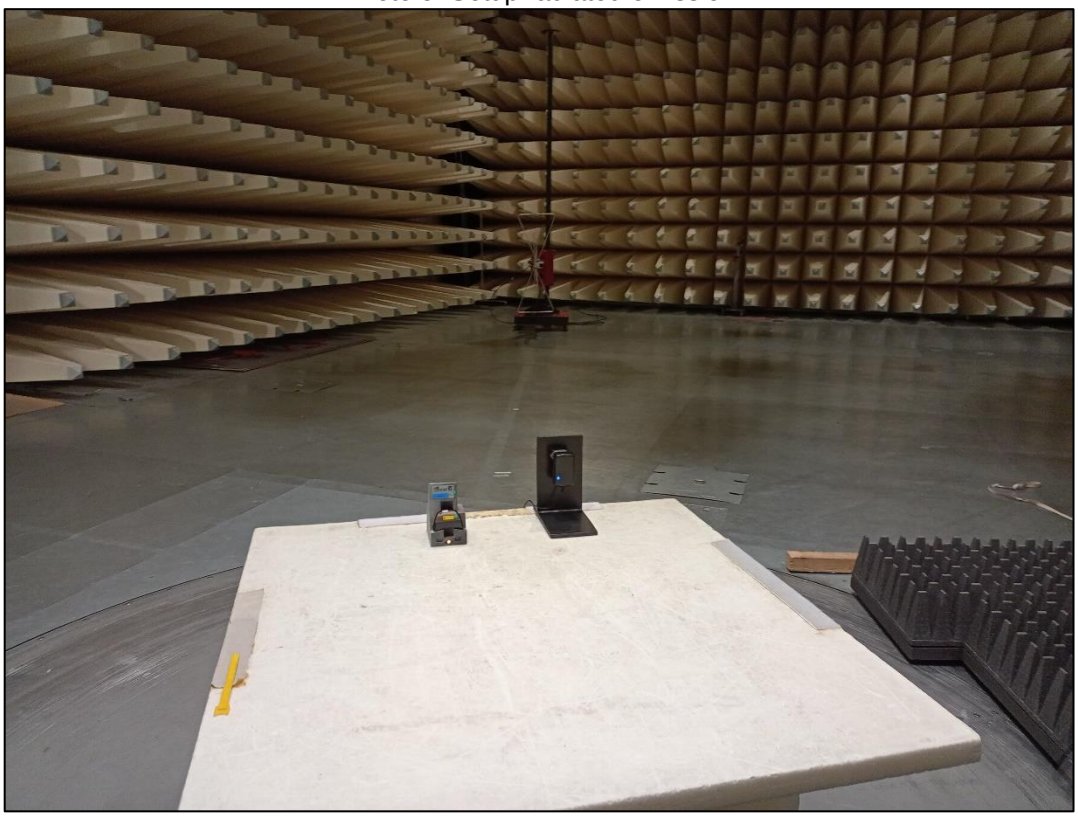


Photo 2: Setup radiated emission

Photo 3: Setup radiated emission

Photo 4: Setup radiated emission

Photo 5: Setup radiated emission



Annex B Photographs of the EUT

Photo 6: Photograph of EUT

Photo 7: Photograph of EUT Side view

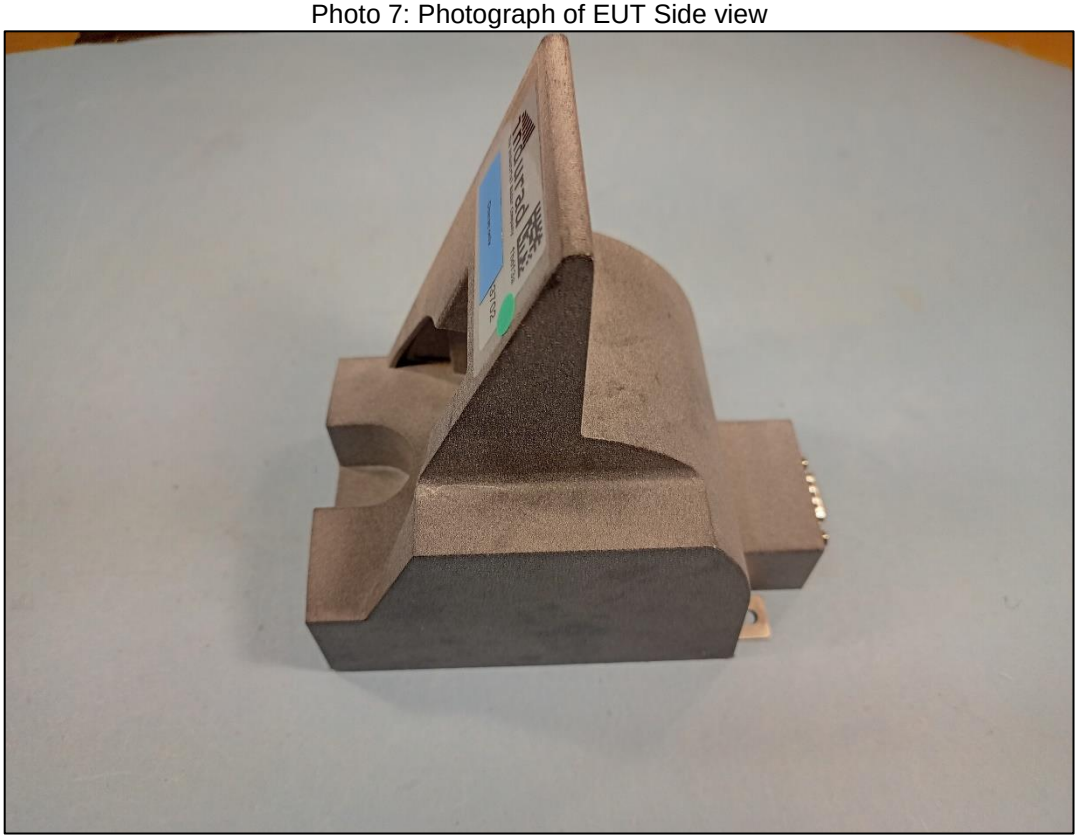


Photo 8: Photograph of EUT downside

Photo 9: Photograph of EUT rear view

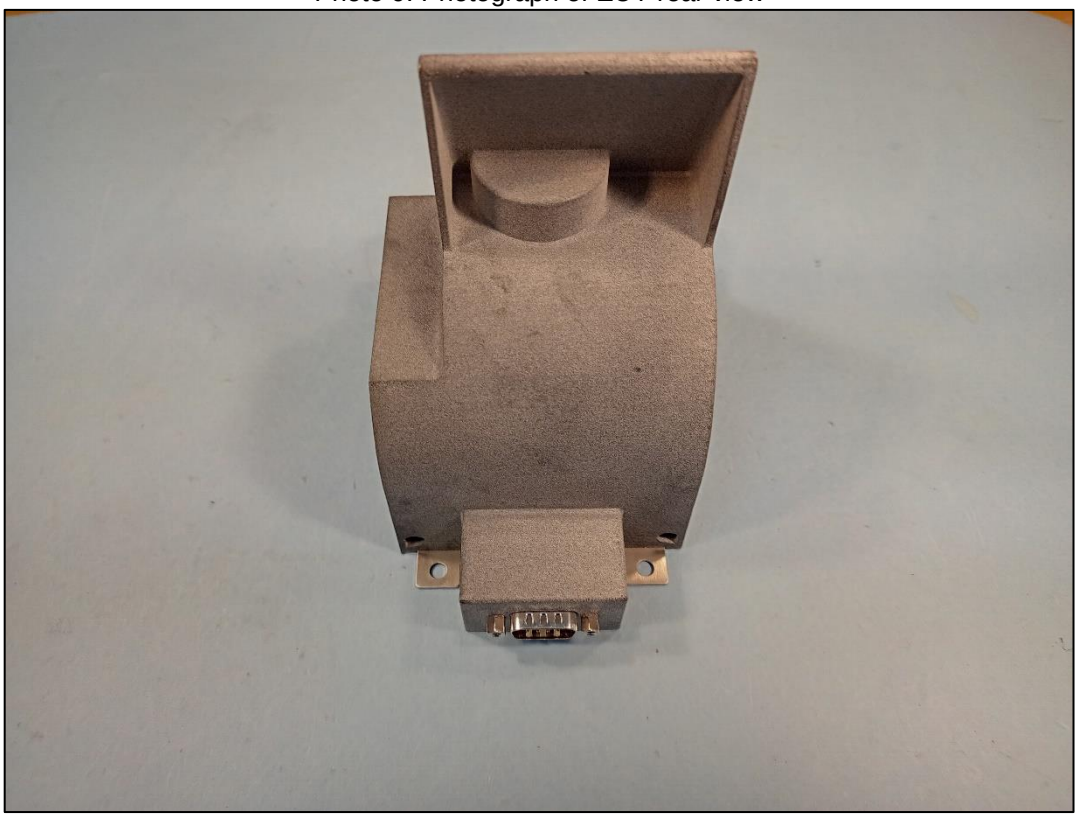


Photo 10: Photograph of AE

Photo 11: Photograph of AE

Annex C Document history

Version	Applied changes	Date of release
- / -	Initial release	2022-03-23

Annex D Further information

Glossary

DUT	-	Device under Test
EMC	-	Electromagnetic Compatibility
EUT	-	Equipment under Test
FCC	-	Federal Communication Commission
FCC ID	-	Company Identifier at FCC
HW	-	Hardware
IC	-	Industry Canada
Inv. No.	-	Inventory number
N/A	-	not applicable
S/N	-	Serial Number
SW	-	Software