

TEST REPORT

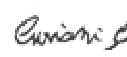
FCC CFR 47 Part 15 Subpart B

and

ICES-003

Report Reference No. 320636-1TRFFCC

Tested by
(name, function and signature) P. Barbieri (project handler) 

Approved by
(name, function and signature) G. Curioni (verifier) 

Date of issue 2017-01-24

Testing Laboratory **Nemko Spa**

Address Via del Carroccio, 4 – 20853 Biassono (MB) – Italy

Testing location Nemko Spa

Address Via del Carroccio, 4 – 20853 Biassono (MB) – Italy

Registration number: 481407 and 9109A

Applicant's name **Univet Srl**

Address Via Giovanni Prati, 87 – 25086 Rezzato (BS) – Italy

Test specification:

Standard FCC CFR 47 Part 15 Subpart B – ICES-003 Issue 6

Conducted emission ☒

Radiated emission ☒

Test procedure Nemko WM L0077, WM L0177 and WM L1002

Test Report Form No. FCCTRF


TRF Originator Nemko Spa

Master TRF 2014-03

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Test item description **Multi-lens optical system**

Trade Mark  **UNIVET**
OPTICAL TECHNOLOGIES

Manufacturer Univet Srl

Address of manufacturer Via Giovanni Prati, 87 – 25086 Rezzato (BS) – Italy

Model EOS HP – Control unit

Model EOS HP – Remote control

Ratings CONTROL UNIT: 3.7 V 6400 mAh Li-ion rechargeable battery

Ratings RF REMOTE CONTROLLER: 3 V CR2032 battery

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The test report merely corresponds to the tested sample.

The phase of sampling / collection of equipment under test is carried out by the customer.

Test Report No. :	320636-1TRFFCC	2017-01-24
		Date of issue

Short description of the EuT	Copy of marking plate
The EUT is a portable LED light system. The exclusive multi-lens optical system creates a clear, perfectly round and uniform spot. Connection cable could be easily replaced without affecting the optical system. Lightweight control unit guarantees 8 hours of working time at maximum brightness. Intuitive control buttons allow the adjustment of light intensity in 5 discrete steps or in a continuous mode. The device records the last brightness setting and keep it stored for following use. A Bluetooth remote controller allows the user to remotely switch ON and OFF the device and to adjust the light brightness without touching the control unit.	See photos
Number of tested samples:	1
Serial number:	CONTROL UNIT: 160018 RF REMOTE CONTROLLER: 160022
Internal operating frequency:	2.5 GHz
Class:	B
Device type:	Portable
Accessories and detachable parts included:	The E.U.T. is composed by two units
Other options included:	-
Testing	
Date of receipt of test sample:	2017-01-16
Testing commenced on:	2017-01-16
Testing concluded on:	2017-01-23
Possible test case verdicts:	
test case does not apply to the test object:	N (Not applicable)
test object does meet the requirement:	P (Pass)
test object does not meet the requirement:	F (Fail)
Symbols used in this test report	
<input checked="" type="checkbox"/> The crossed square indicates that the listed condition or equipment is applicable for this report.	
<input type="checkbox"/> The empty square indicates that the listed condition or equipment is not applicable for this report.	
Throughout this report point is used as decimal separator.	
The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.	

Verdict according to the standards listed at page 5:	Pass
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PROJECT HISTORY		
Report number	Modification to the report / comments	Date
320636-1TRFFCC	First release	2017-01-24
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REMARKS		
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PRODUCT VARIANTS		
Variant model	Difference against the main model	Additional test performed
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REMARKS		
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1 TEST STANDARDS

The tests were performed according to following standards and procedures.

NEMKO WM L0177: General routines for using instruments at Nemko

NEMKO WM L1002: Measurement Uncertainty - Policy and Statement

NEMKO WM L0077: General routines to perform EMC tests

FCC CFR 47 Part 15 Subpart B

Code of Federal Regulations – Title 47 – Part 15 Radio Frequency Devices – Subpart B Unintentional radiation

ICES-003 Issue 6 (January 2016)

Code of Federal Regulations – Title 47 – Part 15 Radio Frequency Devices – Subpart B Unintentional radiation

The main standard above contains references to other standards, which are listed below.

ANSI C63.4 (2014)

'Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz'

CISPR 22 (2008)

Information technology equipment — Radio disturbance characteristics — Limits and methods of measurement

2 SUMMARY OF TEST RESULTS

FCC Part 15 Subpart B requirements			
Part	Test description	Frequency range	Verdict
§15.107	Conducted emission	150 kHz to 30 MHz	P
§15.109	Radiated emission	30 MHz to 12.75 GHz	P
ICES-003 requirements			
Test description		Frequency range	Verdict
Conducted emission		150 kHz to 30 MHz	P
Radiated emission		30 MHz to 12.75 GHz	P
GENERAL REMARKS			
The EUT has been tested with an AC/DC adapter provided by the manufacture (not under test).			

3 EQUIPMENT UNDER TEST

3.1 Power supply system utilised

Power supply voltage:	<input checked="" type="checkbox"/>	230V/50 Hz / 1 ϕ	<input type="checkbox"/>	115V/60Hz / 1 ϕ
	<input type="checkbox"/>	400V/50 Hz 3PE	<input type="checkbox"/>	400V/50 Hz 3NP
	<input checked="" type="checkbox"/>	3.0 V DC	<input checked="" type="checkbox"/>	3.7 V DC

3.2 EuT operation modes

Mode	Description
1	Battery charging with the light switched off and without radio link (RX mode)

3.3 EuT configuration modes

The EuT was configured to measure its highest possible radiation level. The test modes selected are according to EuT instruction manual.

Mode	Description
1	The EUT has been tested with the battery charger connected to the control unit. In this configuration, the radio link is not operate and the led lamp was not connected (the DC cable of the AC/DC adapter is connected on the same connector).

3.4 Input/Output Ports

Port	Name	Type*	Cable Max. >3m	Cable Shielded	Description
0	ENCLOSURE	N/E	—	—	—
1	AC mains	AC	<input type="checkbox"/>	<input type="checkbox"/>	Direct plug-in
2	DC power port	DC	<input type="checkbox"/>	<input type="checkbox"/>	Two wires cable from adapter (145 cm)
3	Led lamp port	I/O	<input type="checkbox"/>	<input type="checkbox"/>	Two wires cable (180 cm)
*Note: AC = AC Power Port DC = DC Power Port N/E = Non-Electrical I/O = Signal/Control Input or Output Port TP = Telecommunication Ports					

3.5 Equipment Used During Test

Use*	Product Type	Manufacturer	Model	Comments
EUT	Control unit	Univet Srl	EOS HP- Control unit	—
EUT	Remote control	Univet Srl	EOS HP – Remote control	—
AE	Battery charger	Univet Srl	A241-0503000I	—
Note: * Use EUT - Equipment Under Test AE - Auxiliary/Associated Equipment (Not Subjected to Test) SIM - Simulator (Not Subjected to Test)				

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

Nemko Spa
 Via del Carroccio, 4
 20853 Biassono (MB) - Italy

Tests site/benches are in accordance with applicable standard/s, and have been utilized by Nemko Spa testing engineer(s).

4.2 Environmental conditions

Unless different values are declared in the test case, following ambient conditions apply for the tests:

Ambient temperature: 18÷33 °C

Relative Humidity: 30÷60 %

Atmospheric pressure: 980÷1060 hPa

4.3 Test equipment used for the monitoring of the environmental conditions

Equipment	Manufacturer	Model	Serial N°
Thermo hygrometer data loggers	Testo	175-H2	20012380/305
Barometer	MSR	MSR145B	330080

4.4 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report according to CISPR 16-4-2 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements" and is documented in the Nemko Spa Technical Procedure WML1002. 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. Hereafter the best measurement capability for Nemko Spa laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Disturbance 3m, 10m Chamber	Antenna distance 1m, 3m, 10m (30÷200) MHz	5.0 dB	(1)
	Antenna distance 1m, 3m, 10m (0.2÷6) GHz	5.2 dB	(1)
	Antenna distance 1m, 3m (6÷18) GHz	5.8 dB	(1)
	Antenna distance 1m, 3m (18÷40) GHz	7.2 dB	(1)
Conducted Disturbance	9 kHz ÷ 150 kHz with AMN	3.8 dB	(1)
	150 kHz ÷ 30 MHz with AMN	3.4 dB	(1)
	150 kHz ÷ 30 MHz with AAN	4.6 dB	(1)
	9 kHz ÷ 30 MHz with voltage probe	2.9 dB	(1)
	9 kHz ÷ 30 MHz with current probe	2.9 dB	(1)

NOTES:

(1) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$ which has been derived from the assumed normal probability distribution with infinite degrees of freedom and for a coverage probability of 95 %;

5 TEST CONDITIONS AND RESULTS

5.1 Conducted emissions

5.1.1 Photo documentation of the test set-up



5.1.2 Test method

Measurements were made on a ground plane that extends 1-meter minimum beyond all sides of the system under test. All power was connected to the system through Line Impedance Stabilization Networks (LISN). Conducted voltage measurements on mains lines were made at the output of the LISN.

5.1.3 Limits for AC mains port

Except for Class A digital devices, for equipment 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 limits in the following table, as measured using a 50 μ H/50ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-Peak	Average
0.15 to 0.50	66 to 56*	59 to 46*
0.50 to 5	56	46
5 to 30	60	50

*The limits decrease linearly with the logarithm of the frequency

For a Class A digital device 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 limits in the following table, as measured using a 50 μ H/50 ohms LISN. Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-Peak	Average
0.15 to 0.50	79	66
0.50 to 30	73	60

5.1.4 Test result

Verdict:	<input checked="" type="checkbox"/> P <input type="checkbox"/> F <input type="checkbox"/> N
Frequency range:	0.15MHz - 30MHz
Kind of test site:	Shielded room
Remarks:	

5.1.5 Test equipment used

Equipment	Manufacturer	Model	Serial N°
EMI receiver 20 Hz ÷ 8 GHz	R&S	ESU8	100202
LISN 9 kHz ÷ 30 MHz	R&S	ESH2-Z5	872 460/041
Shielded room	Siemens	Conducted emission test room	1862

5.1.6 Test protocol

Test point: Phase line
 Operation mode:
 Configuration mode:
 Remarks: -

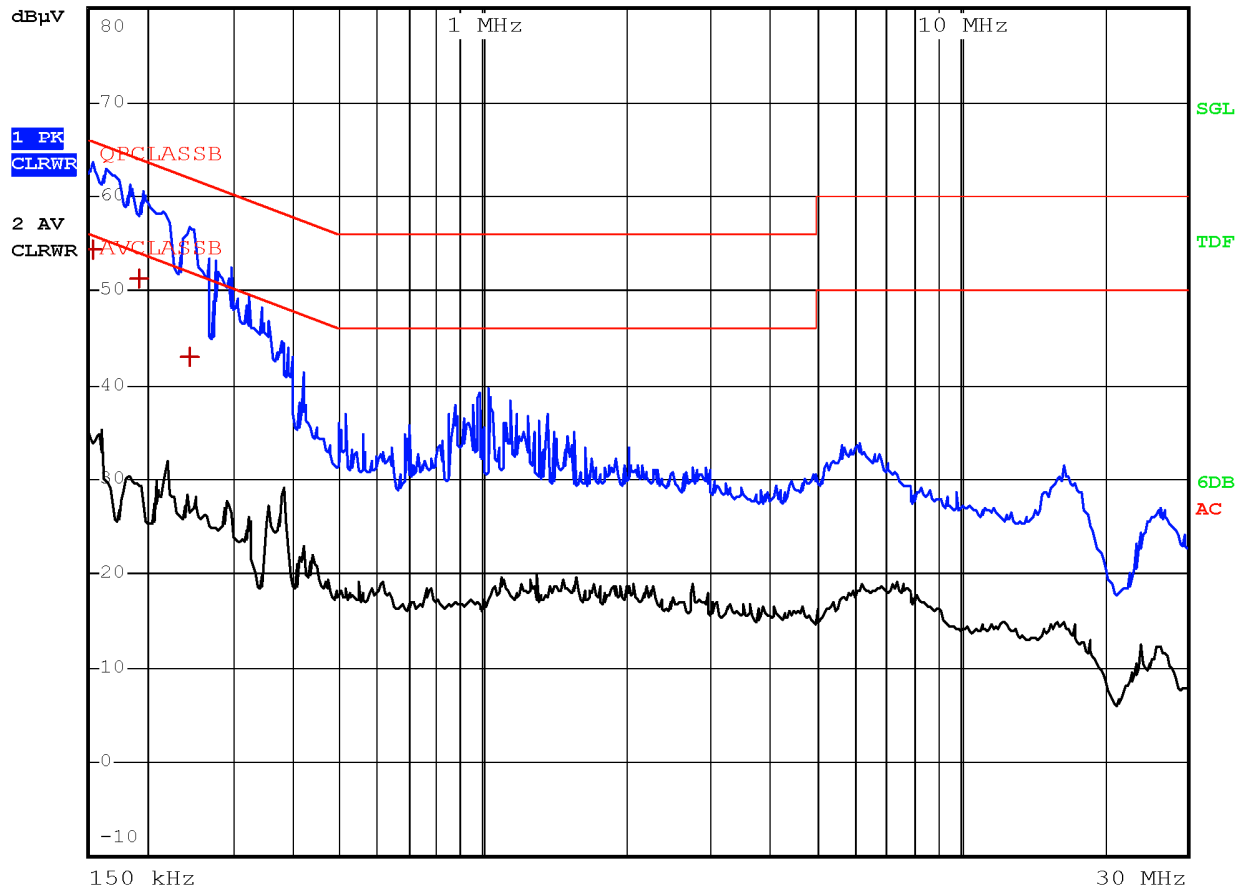
Verdict: Pass



RBW 9 kHz

MT 1 s

Att 0 dB AUTO PREAMP OFF



Frequency (MHz)	Level (dBμV)	Limit (dBμV)	Margin (dB)	Detector
0.1540	54.4	65.8	-11.4	QP
0.1940	51.3	63.9	-12.5	QP
0.2420	43.1	62.0	-18.9	QP

Test point: Neutral line
Operation mode:
Configuration mode:
Remarks: -

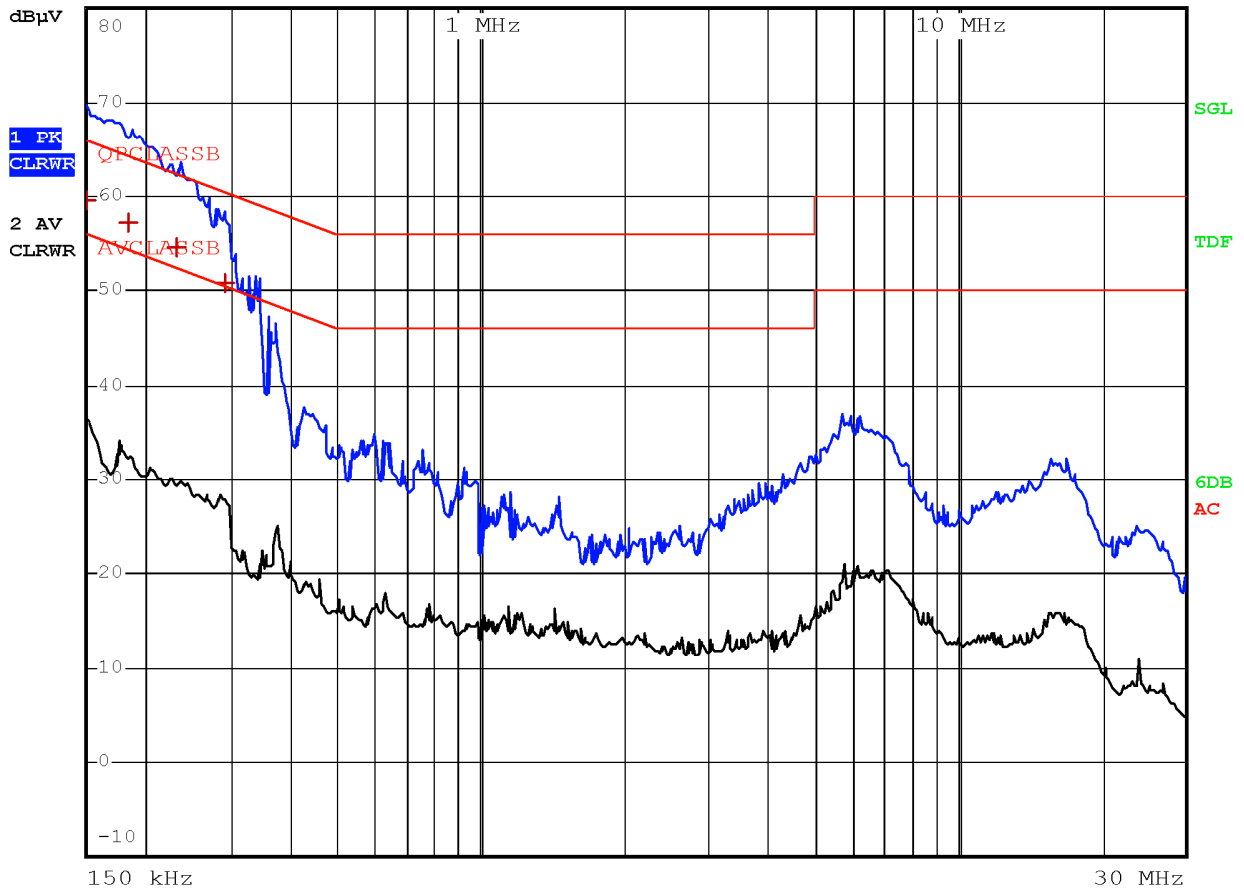
Verdict: Pass



RBW 9 kHz

MT 1 s

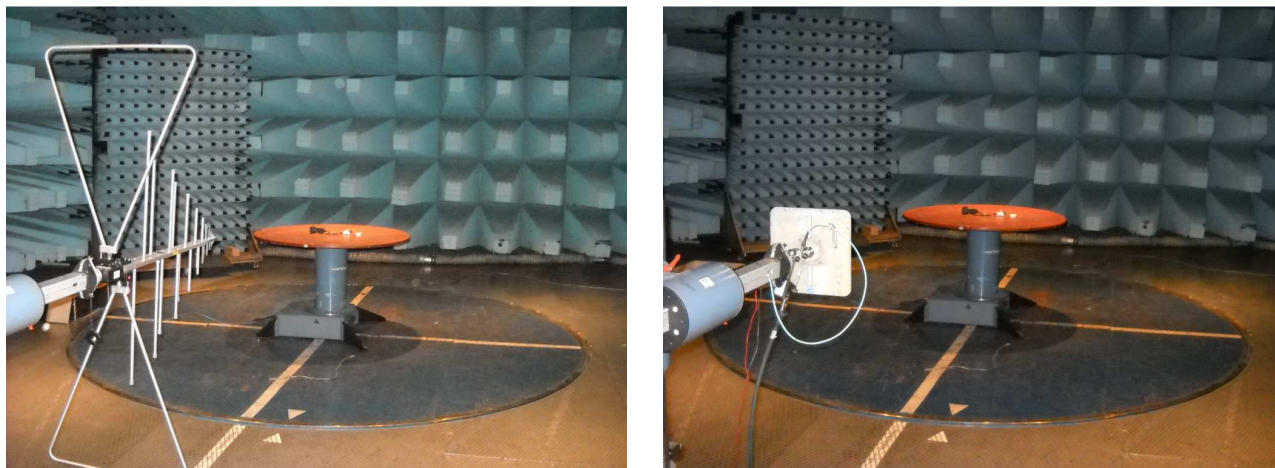
Att 0 dB AUTO PREAMP OFF



Frequency (MHz)	Level (dBμV)	Limit (dBμV)	Margin (dB)	Detector
0.1500	59.7	66.0	-6.3	QP
0.1860	57.3	64.2	-6.9	QP
0.2340	54.6	62.3	-7.7	QP
0.2900	50.8	60.5	-9.7	QP

5.2 Radiated emissions

5.2.1 Photo documentation of the test set-up



5.2.2 Test method

Measurements were made on a semi anechoic chamber. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3 or 10 meters with the receive antenna located at a fixed height (from 1 to 4 meter) in both horizontal and vertical polarities. Final measurements (quasi-peak) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4 meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.

5.2.3 Limits for enclosure

Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency of emission (MHz)	Field strength ($\mu\text{V/m}$)	Field strength ($\text{dB}\mu\text{V/m}$)
30–88	100	40.0
88–216	150	43.5
216–960	200	46.0
Above 960	500	54.0

The field strength of radiated emissions from a Class A digital device, as determined at a distance of 10 meters, shall not exceed the following:

Frequency of emission (MHz)	Field strength ($\mu\text{V/m}$)	Field strength ($\text{dB}\mu\text{V/m}$)
30–88	90	39.0
88–216	150	43.5
216–960	210	46.4
Above 960	300	49.5

5.2.4 Test result

Verdict:	<input checked="" type="checkbox"/> P <input type="checkbox"/> F <input type="checkbox"/> N
Frequency range:	30MHz – 12.5GHz
Kind of test site:	Semi anechoic chamber
Measurement distance:	3 m
<p>Remarks: for an unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a radiated emission limit is specified, up to the frequency shown as follow:</p> <p>If the intentional radiator operates at frequency upper than 1.705 MHz and lowers than 108 MHz the upper frequency of measurement range is 1000 MHz.</p> <p>If the intentional radiator operates at frequency upper than 108 MHz and lowers than 500 MHz the upper frequency of measurement range is 2000 MHz.</p> <p>If the intentional radiator operates at frequency upper than 500 MHz and lowers than 1000 MHz the upper frequency of measurement range is 5000 MHz.</p> <p>If the intentional radiator operates at frequency above 1000 MHz the upper frequency of measurement range is 5th harmonic of the highest frequency or 40 GHz, whichever is lower.</p> <p>If the intentional radiator operates at or above 10 GHz and below 30 GHz to the fifth harmonic of the highest fundamental frequency or to 100 GHz, whichever is lower.</p> <p>If the intentional radiator operates at or above 30 GHz to the fifth harmonic of the highest fundamental frequency or to 200 GHz, whichever is lower, unless specified otherwise elsewhere in the rules.</p>	

5.2.5 Test equipment used

Equipment	Manufacturer	Model	Serial N°
Trilog Broadband Antenna 25 ÷ 8000 MHz	Schwarzbeck	VULB 9162	9162-025
Bilog antenna 1 ÷ 18 GHz	Schwarzbeck	STLP 9148-123	123
Broadband preamplifier	Schwarzbeck	BBV 9718	9718-137
Spectrum Analyzer 9kHz-40GHz	R&S	FSEK	848255/005
EMI receiver 20 Hz ÷ 8 GHz	R&S	ESU8	100202
Turn-table	R&S	HCT	835 803/03
Antenna mast	R&S	HCM	836 529/05
Controller	R&S	HCC	836 620/7
Semi-anechoic chamber	Nemko	10m semi-anechoic chamber	530
Shielded room	Siemens	10m control room	1947

5.2.6 Test protocol

Antenna polarization: Horizontal
Operation mode: 1
Configuration mode: 1
Remarks: Frequency range: 30 MHz to 1000 MHz

Verdict: Pass

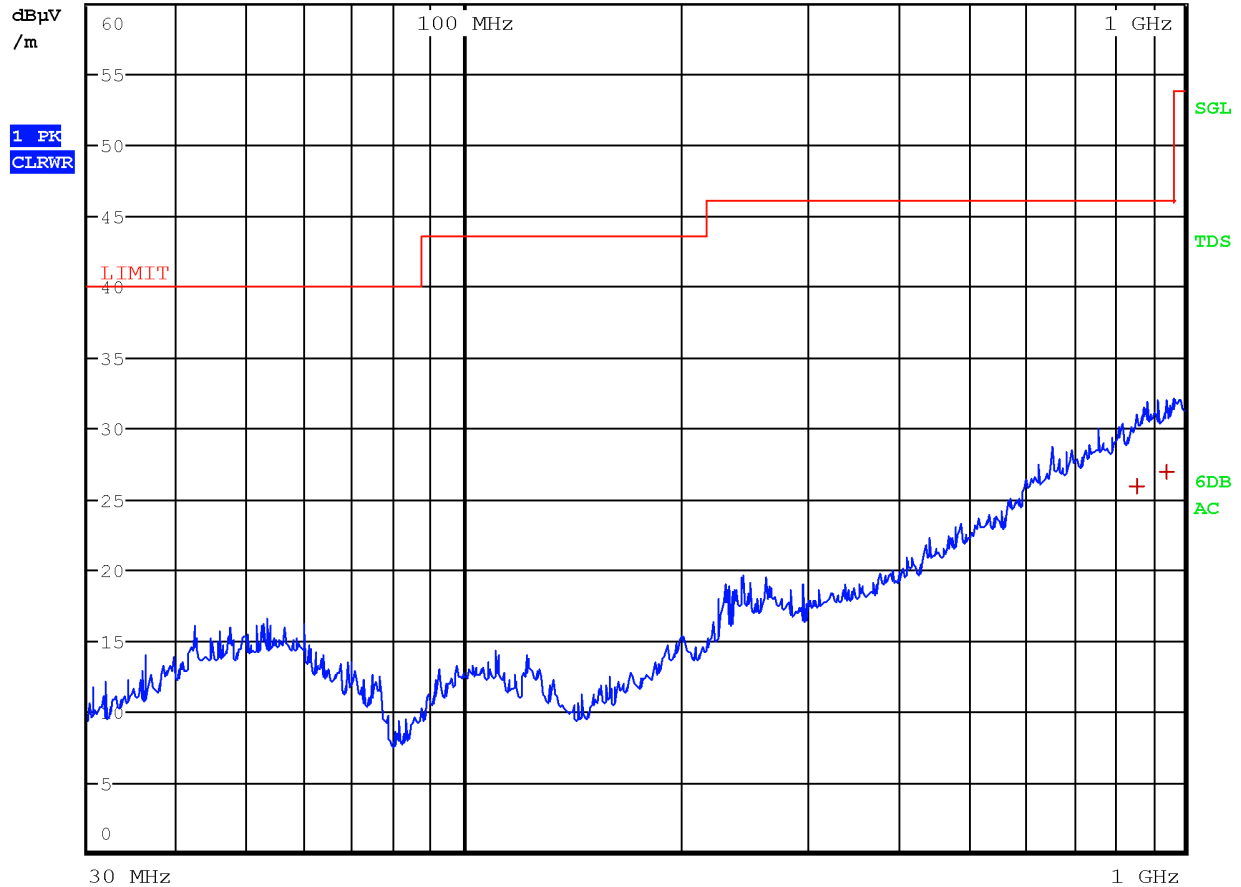


RBW 120 kHz

MT 1 s

Att 0 dB AUTO

PREAMP ON



Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
860.7750	25.8	46.0	-20.2	QP
943.6750	27.0	46.0	-19.1	QP

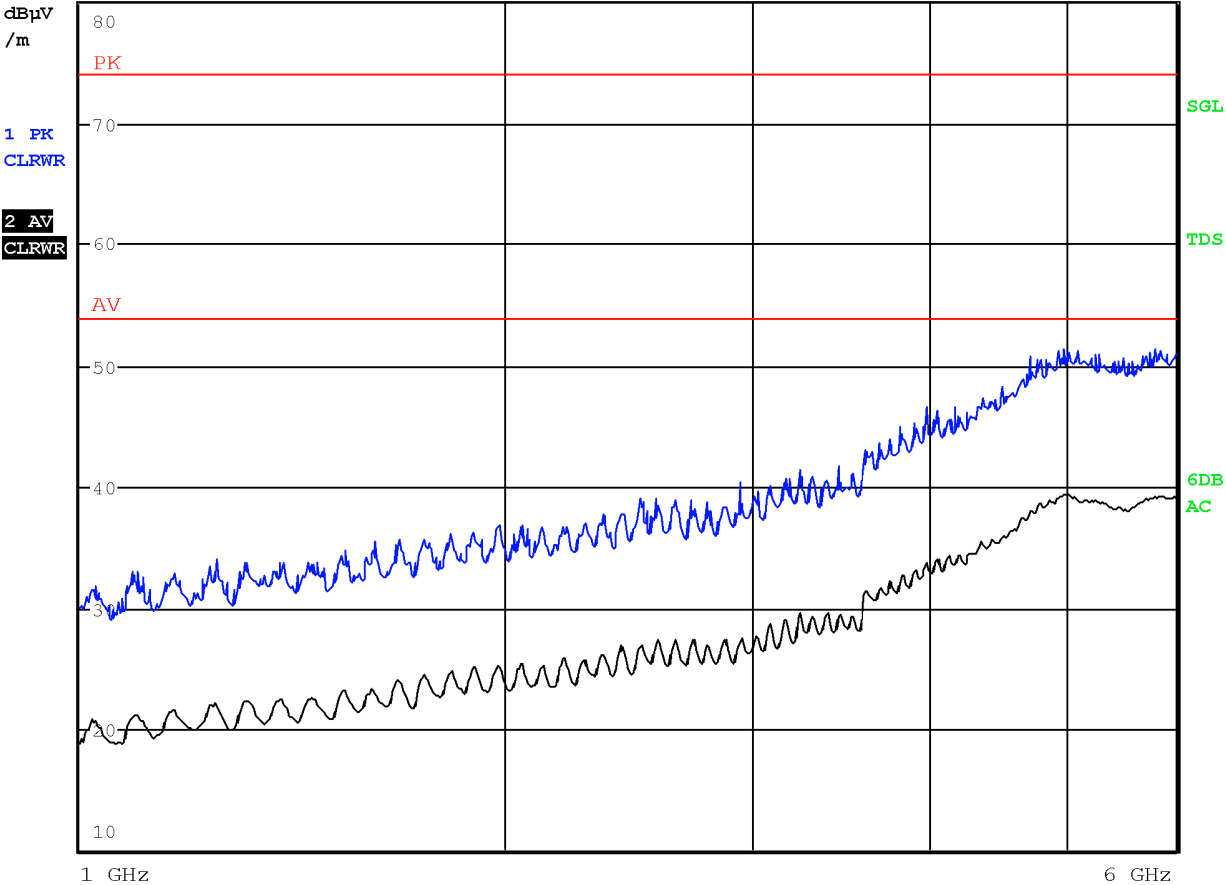
Antenna polarization: Horizontal
Operation mode: 1
Configuration mode: 1
Remarks: Frequency range: 1000 MHz to 6000 MHz

Verdict: Pass



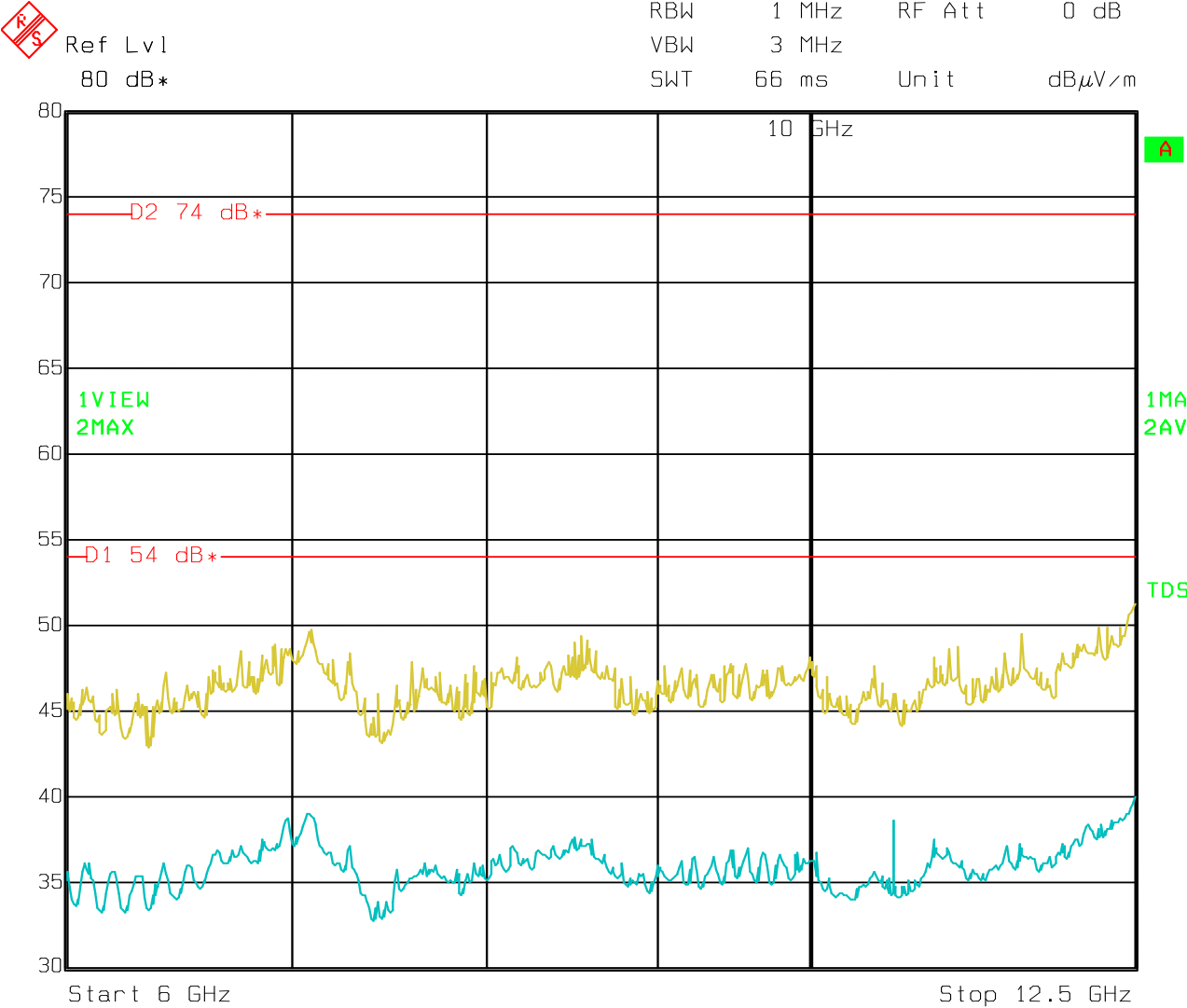
RBW 1 MHz
MT 1 s
PREAMP OFF

Att 0 dB AUTO



Antenna polarization: Horizontal
Operation mode: 1
Configuration mode: 1
Remarks: Frequency range: 6 GHz to 12.5 GHz

Verdict: Pass



Antenna polarization: Vertical
Operation mode: 1
Configuration mode: 1
Remarks: Frequency range: 30 MHz to 1000 MHz

Verdict: Pass

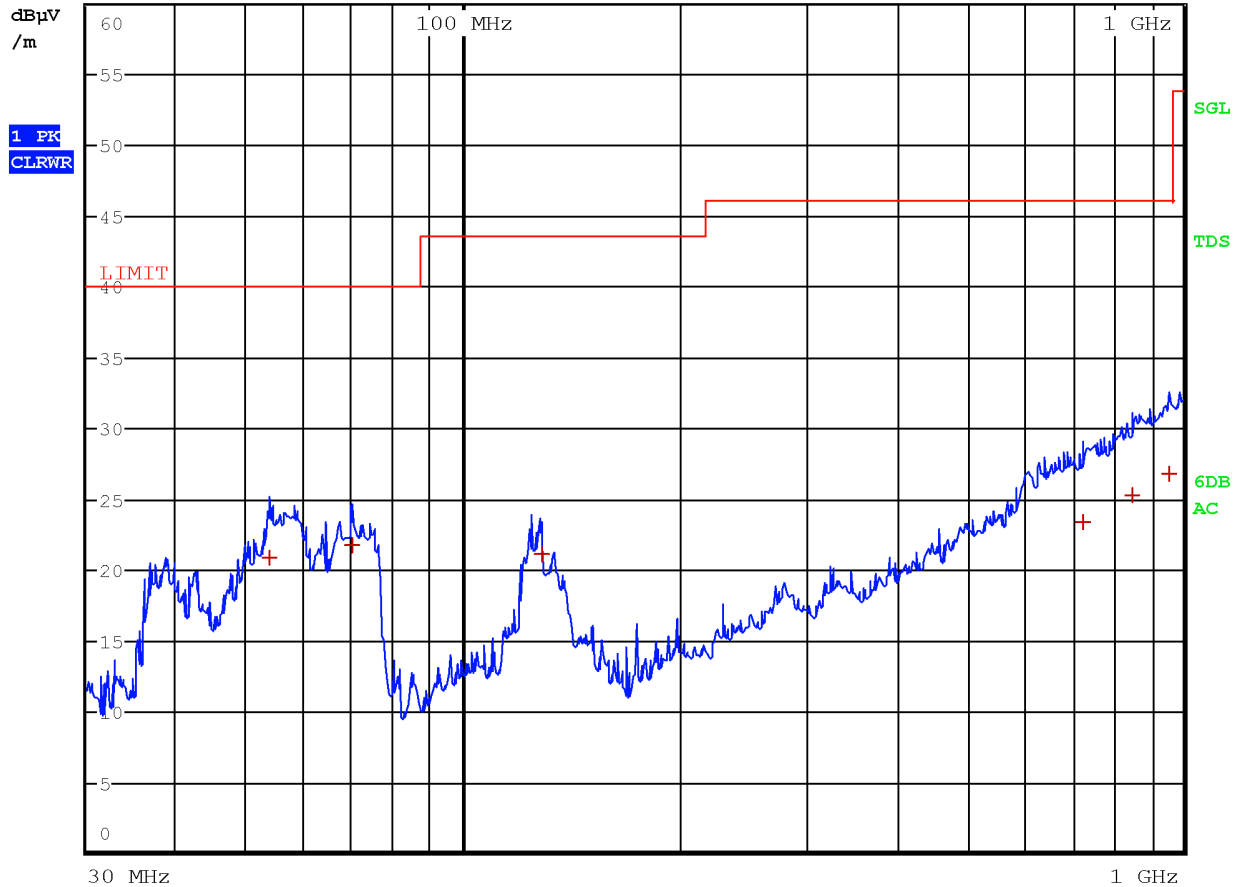


RBW 120 kHz

MT 1 s

Att 0 dB AUTO

PREAMP ON



Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
53.7250	20.9	40.0	-19.1	QP
70.1000	21.7	40.0	-18.3	QP
128.4500	21.2	43.5	-22.4	QP
724.6250	23.4	46.0	-22.6	QP
850.3250	25.3	46.0	-20.7	QP
958.2250	26.8	46.0	-19.2	QP

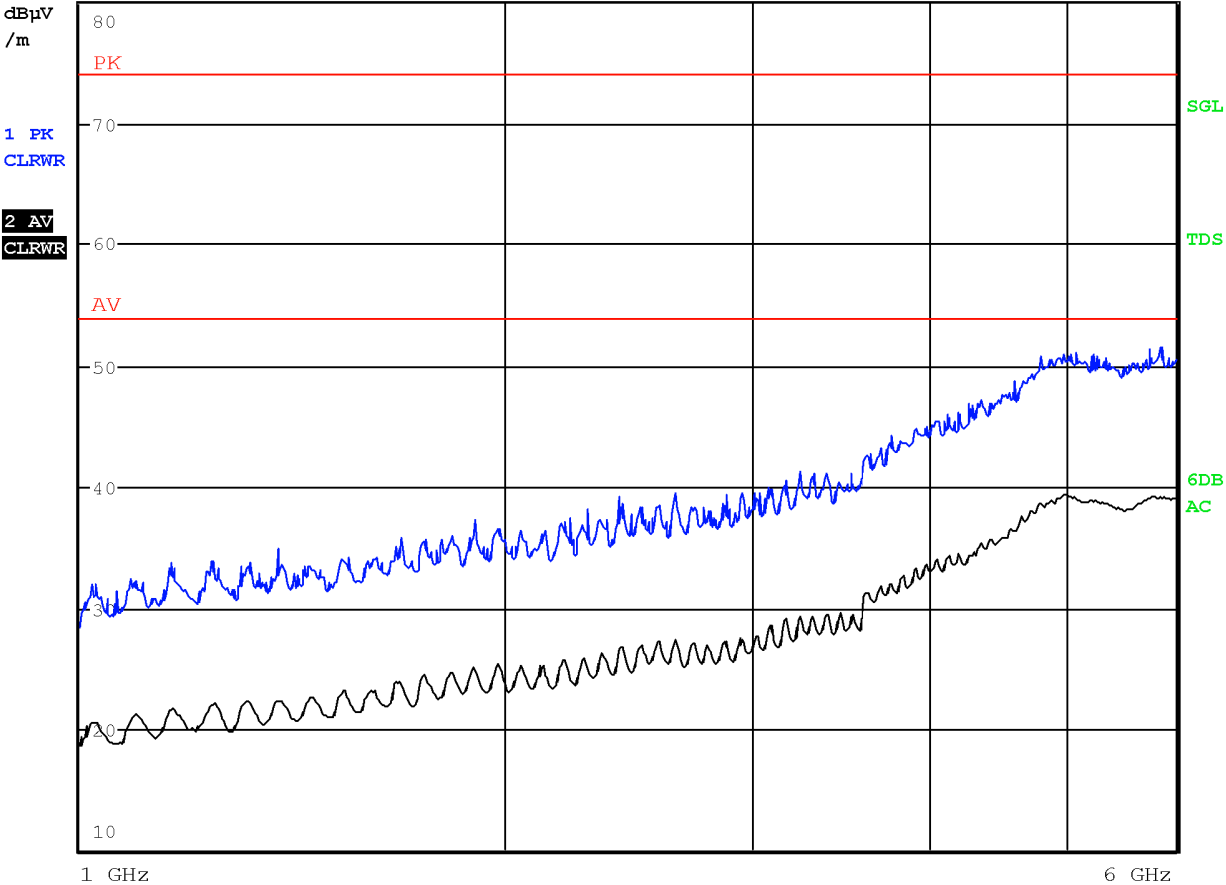
Antenna polarization: Vertical
Operation mode: 1
Configuration mode: 1
Remarks: Frequency range: 1000 MHz to 6000 MHz

Verdict: Pass



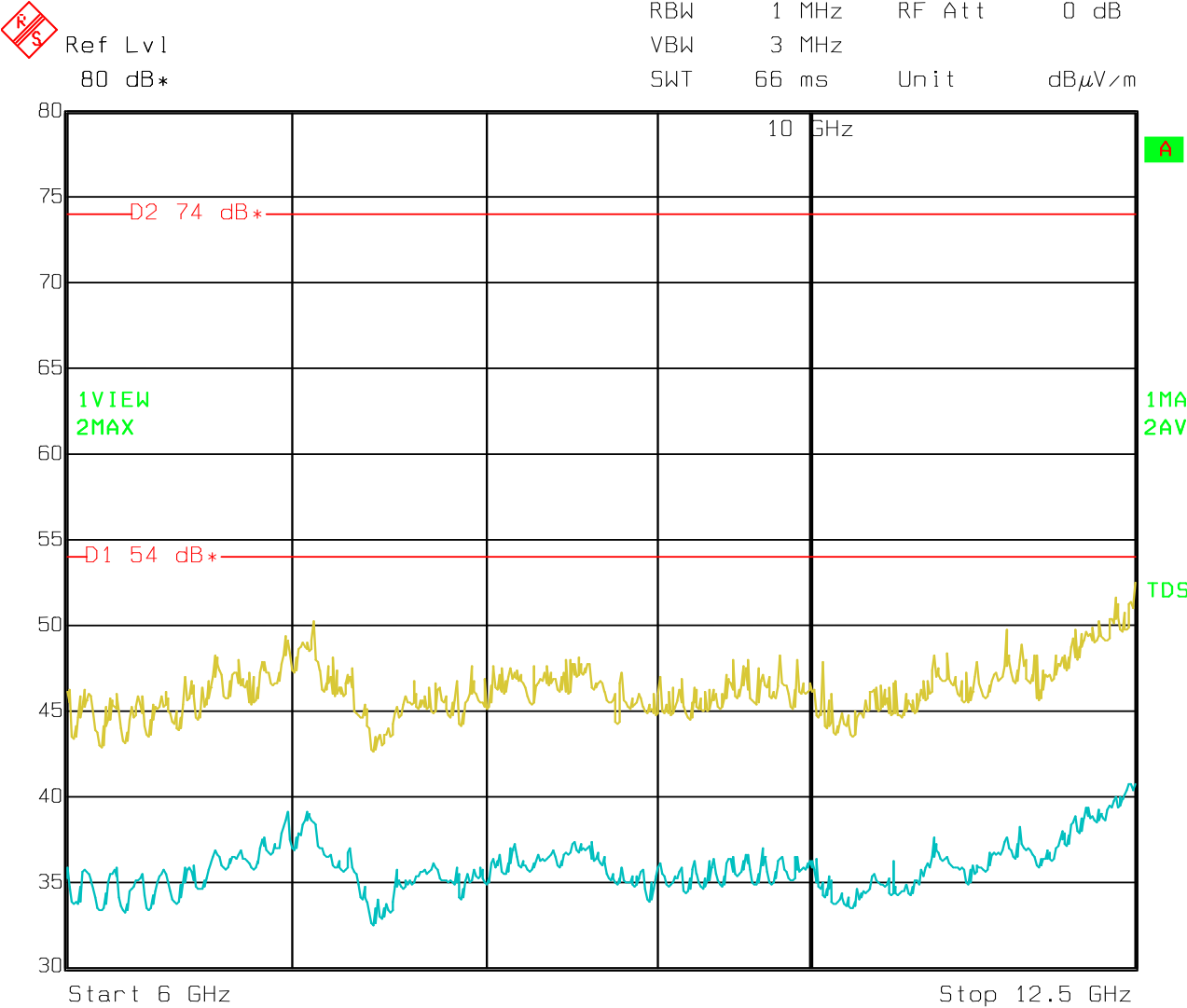
RBW 1 MHz
MT 1 s
PREAMP OFF

Att 0 dB AUTO

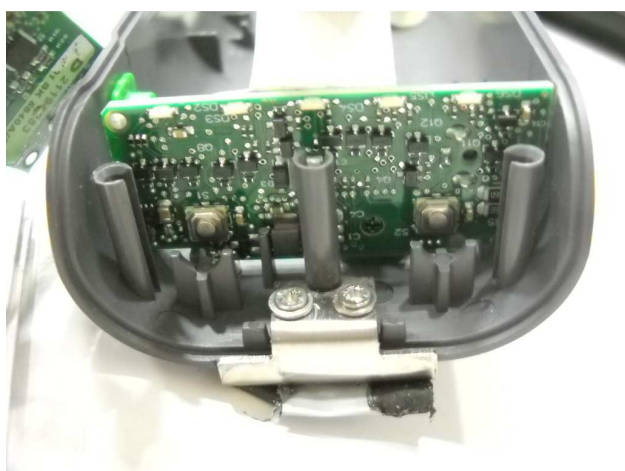
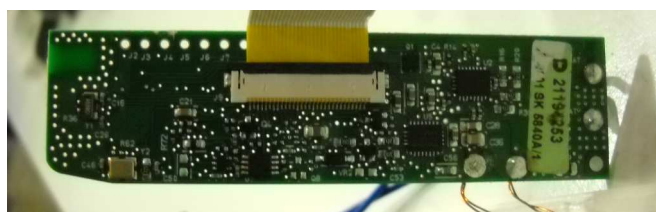


Antenna polarization: Vertical
Operation mode: 1
Configuration mode: 1
Remarks: Frequency range: 6 GHz to 12.5 GHz

Verdict: Pass



6 EUT PHOTOS





Control unit marking plate



Remote control marking plate