

RADIO TEST REPORT – REP013845

Type of assessment:

Transmitters co-location

Applicant:

**Andrew Wireless Systems
Industriering 10, Buchdorf 86675 Germany**

Model:

UAP 2 80-85/17E/19/37T

FCC ID:

XS5-UAP2885171937

Specifications:

- ◆ **FCC 47 CFR Part 22 Subpart H, §22.917**
Emission limitations for cellular equipment
- ◆ **FCC 47 CFR Part 24 Subpart E, §24.238**
Emission limitations for Broadband PCS equipment
- ◆ **FCC 47 CFR Part 27 Subpart C, §27.53**
Emission limits for Miscellaneous Wireless Communications Services
- ◆ **FCC 47 CFR Part 90 Subpart I, §90.210**
Emission masks for Private Land Mobile Radio Services

Date of issue: 2023-07-14

P. Barbieri

Tested by

D. Guarnone

Reviewed by



Signature



Signature

Test location(s)

Company name	Nemko Spa
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Province	MB
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Country	Italy
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Website	www.nemko.com
Site number	FCC: 682159

Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report. This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contained in this report are within Nemko Spa ISO/IEC 17025 accreditation.

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Section 1. Report summary

1.1 Applicant and manufacturer

Company name	Andrew Wireless Systems
Address	Industriering 10, Buchdorf 86675 Germany

1.2 Test specifications

FCC 47 CFR Part 22 Subpart H, §22.917	Emission limitations for cellular equipment
FCC 47 CFR Part 24 Subpart E, §24.238	Emission limitations for Broadband PCS equipment
FCC 47 CFR Part 27 Subpart C, §27.53	Emission limits for Miscellaneous Wireless Communications Services
FCC 47 CFR Part 90 Subpart I, §90.210	Emission masks for Private Land Mobile Radio Services

1.3 Test method

ANSI C63.26-2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
KDB 996369 D04	Module Integration Guide
KDB 662911 D015	Indus Booster Basic Meas

1.4 Statement of compliance

In the configuration tested, the EUT was found compliant.

Testing was performed against all relevant requirements of the test standard except as noted in section 1.5 below. Results obtained indicate that the product under test complies in full with the requirements tested. The test results relate only to the items tested.

See "Summary of test results" for full details.

1.5 Exclusions

As per quote, the purpose of this report is verification of transmitters colocation. Only inter-modulation products within restricted bands were assessed, other requirements were excluded from the scope of this report.

1.6 Test report revision history

Revision #	Date of issue	Details of changes made to test report
REP013845	2023-07-14	Original report issued

Section 2. Summary of test results

2.1 FCC Part 15 Subpart C, general requirements test results

Part	Test description	Verdict
§15.209	Radiated emission limits; general requirements.	Pass
§27.53(h)(1)	Emission limits.	Pass
§24.238(a)	Out of band emissions.	Pass
§27.53(l)(1)	Emission limits.	Pass
§90.210(g)(2)	Emission masks	Pass
§22.917(a)	Emission limitations for cellular equipment	Pass

Section 3. Equipment under test (EUT) details

3.1 Sample information

Receipt date	2023-06-30
Nemko sample ID number	PRJ00348370008

3.2 EUT information

Product name	Carrier Access Point Radio Module
Model	UAP 2 80-85/17E/19/37T C-PE
Serial number	FIUPGC2313001

3.3 Technical information

Frequency band	80-B27:	from 862 to 869 MHz
	85-B5:	from 869 to 894 MHz
	17E-B66:	from 2110 to 2180 MHz
	19-B25:	from 1930 to 1995 MHz
	37T C-Band:	from 3700 to 3980 MHz
EUT power requirements	48 V DC from PoE	
Antenna information	The EUT uses four integrated antennas	

3.4 EUT setup diagram

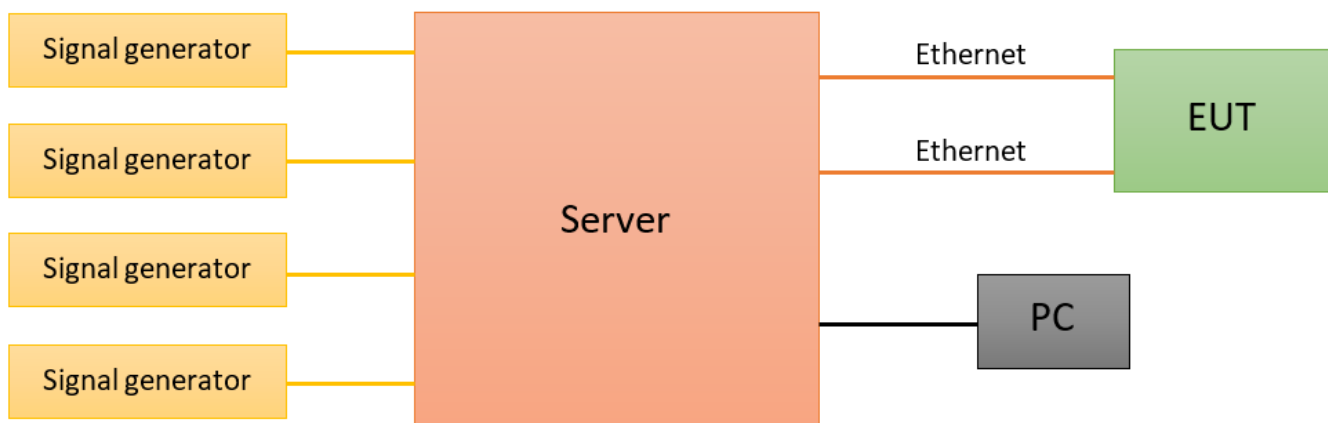


Figure 3.4-1: Setup diagram

3.5 Product description and theory of operation

The EUT is a Carrier Access Point provided with four radio modules equipped with a dedicate integral antenna. The EUT is supplied by PoE.

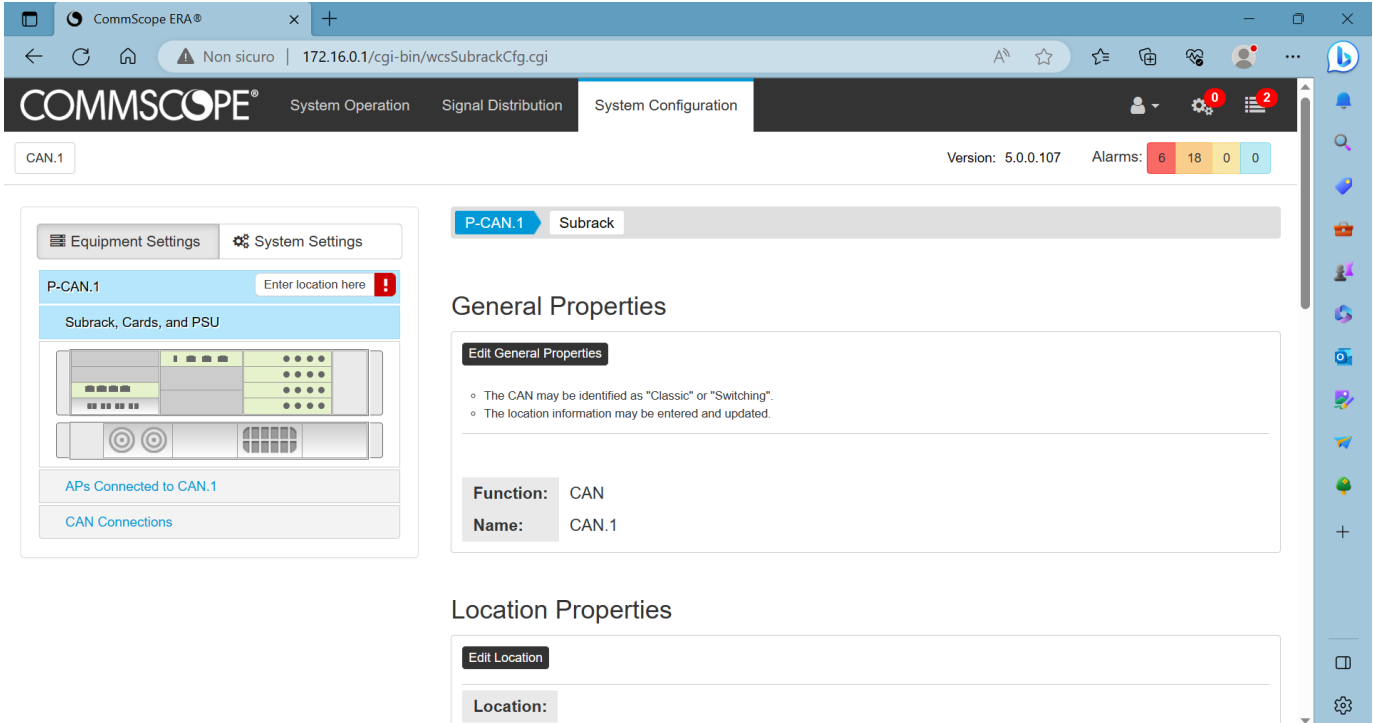
3.6 Equipment Used During Test

Table 3.6-1: Equipment Used During Test

Description	Brand name	Model/Part number	Serial number
Subrack	Commscope	7642110-00	S/N 13017180026
RFD.R1	Commscope	7633229-01	S/N SZBEAG1906A0104
RFD.R2	Commscope	7633229-01	S/N SZBEAG1906A0118
RFD.R3	Commscope	7841277-00	S/N SZBEAQ2235A0033
RFD.R4	Commscope	7841277-00	S/N SZBEAQ2235A0032
SUI.M3	Commscope	7642125-00	S/N SZBEAC1649A0001
CAT.L2	Commscope	7847569-00	S/N SZEAV2224A0004

3.7 EUT exercise details

A signal generator with an AWGN5 signal with 4.1 MHz 99% OBW representative of a 5 MHz LTE channel has been connected to the RF input of the server. The following software (inside the server) has been used:



The screenshot displays the Commscope ERA web interface. The browser address bar shows the URL `172.16.0.1/cgi-bin/wcsSubrackCfg.cgi`. The interface includes a navigation menu with 'System Operation', 'Signal Distribution', and 'System Configuration'. The main content area is titled 'CAN.1' and shows 'P-CAN.1 Subrack' configuration. It features a 'General Properties' section with an 'Edit General Properties' button and a 'Location Properties' section with an 'Edit Location' button. The 'General Properties' section lists:

- Function: CAN
- Name: CAN.1

 The 'Location Properties' section has a 'Location:' field. The interface also displays 'Alarms: 6 18 0 0' and 'Version: 5.0.0.107'.

Section 3:

Equipment under test (EUT) details



CommScope ERA® | 172.16.0.1/cgi-bin/signalDistribution.cgi

ID	Operator / Description	Band	Downlink	ARFCN	Type(DSS Pair)	Cell ID	MIMO	Status
<input checked="" type="checkbox"/> 1.0.R1.1	PCS1900	PCS 1900	1962.5 MHz	unknown	manual	9	MIMO 2x2 AP0	
<input checked="" type="checkbox"/> 1.0.R1.2	PCS1900	PCS 1900	1962.5 MHz	unknown	manual	9	MIMO 2x2 AP1	
<input checked="" type="checkbox"/> 1.0.R1.3	CELL800	CEL 800	864.5 MHz	unknown	manual	5	MIMO 2x2 AP0	
<input checked="" type="checkbox"/> 1.0.R1.4	CELL800	CEL 800	864.5 MHz	unknown	manual	5	MIMO 2x2 AP1	
<input checked="" type="checkbox"/> 1.0.R2.1	AWS1700	AWS 1700	2145.0 MHz	unknown	manual	11	MIMO 2x2 AP0	
<input checked="" type="checkbox"/> 1.0.R2.2	AWS1700	AWS 1700	2145.0 MHz	unknown	manual	11	MIMO 2x2 AP1	
<input checked="" type="checkbox"/> 1.0.R4.1	Band 37T - 100MHz - Low	Band 37T 100MHz Low	3750.0 MHz	unknown	manual	1	MIMO 2x2 AP0	
<input checked="" type="checkbox"/> 1.0.R4.2	Band 37T - 100MHz - Low	Band 37T 100MHz Low	3750.0 MHz	unknown	manual	1	MIMO 2x2 AP1	

Cancel Delete Save

CommScope ERA® | 172.16.0.1/cgi-bin/signalDistribution.cgi

ID	Operator / Description	Band	Downlink	ARFCN	Type(DSS Pair)	Cell ID	MIMO	Status
<input checked="" type="checkbox"/> 1.0.R1.1	PCS1900	PCS 1900	1962.5 MHz	unknown	manual	9	MIMO 2x2 AP0	
<input checked="" type="checkbox"/> 1.0.R1.2	PCS1900	PCS 1900	1962.5 MHz	unknown	manual	9	MIMO 2x2 AP1	
<input checked="" type="checkbox"/> 1.0.R2.1	AWS1700	AWS 1700	2145.0 MHz	unknown	manual	11	MIMO 2x2 AP0	
<input checked="" type="checkbox"/> 1.0.R2.2	AWS1700	AWS 1700	2145.0 MHz	unknown	manual	11	MIMO 2x2 AP1	
<input checked="" type="checkbox"/> 1.0.R2.3	CELL850	CEL 850	881.5 MHz	unknown	manual	6	MIMO 2x2 AP0	
<input checked="" type="checkbox"/> 1.0.R2.4	CELL850	CEL 850	881.5 MHz	unknown	manual	6	MIMO 2x2 AP1	
<input checked="" type="checkbox"/> 1.0.R4.1	Band 37T - 100MHz - Low	Band 37T 100MHz Low	3750.0 MHz	unknown	manual	1	MIMO 2x2 AP0	
<input checked="" type="checkbox"/> 1.0.R4.2	Band 37T - 100MHz - Low	Band 37T 100MHz Low	3750.0 MHz	unknown	manual	1	MIMO 2x2 AP1	

Cancel Delete Save

Section 4. Engineering considerations

4.1 Modifications incorporated in the EUT

There were no modifications performed to the EUT during this assessment.

4.2 Technical judgment

None

4.3 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures.

Section 5. Test conditions

5.1 Atmospheric conditions

In the laboratory, the following ambient conditions are respected for each test reported below:

Temperature	18 – 33 °C
Relative humidity	25 – 70 %
Air pressure	860 – 1060 mbar

The following instruments are used to monitor the environmental conditions:

Equipment	Manufacturer	Model no.	Asset no.	Cal date	Next cal.
Thermo-hygrometer data loggers	Testo	175-H2	20012380/305	2022-12	2024-12
Thermo-hygrometer data loggers	Testo	175-H2	38203337/703	2022-12	2024-12
Barometer	Castle	GPB 3300	072015	2023-05	2024-05

5.2 Power supply range

The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages $\pm 5\%$, for which the equipment was designed.

Section 6. Measurement uncertainty

6.1 Uncertainty of measurement

The measurement uncertainty was calculated for each test and quantity listed in this test report, according to CISPR 16-4-2 and other specific test standard and is documented in Nemko Spa working manual WML1002.

The assessment of conformity for each test performed on the equipment is performed not taking into account the measurement uncertainty. The two following possible verdicts are stated in the report:

P (Pass) - The measured values of the equipment respect the specification limit at the points tested. The specific risk of false accept is up to 50% when the measured result is close to the limit.

F (Fail) - One or more measured values of the equipment do not respect the specification limit at the points tested. The specific risk of false reject is up to 50% when the measured result is close to the limit.

Hereafter Nemko's measurement uncertainties are reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Disturbance	Antenna distance 1 m, 3 m, 10 m 0.009 ÷ 200 MHz	5.0 dB	(1)
	Antenna distance 1 m, 3 m, 10 m 200 ÷ 1000 MHz	5.2 dB	(1)
	Antenna distance 1 m, 3 m, 10 m 1 ÷ 6 GHz	5.2 dB	(1)
	Antenna distance 1 m, 3 m 6 ÷ 18 GHz	5.5 dB	(1)
	Antenna distance 1 m, 3 m 18 ÷ 40 GHz	7.2 dB	(1)
Radiated Disturbance with large loop antenna system (LLAS)	0.009 ÷ 30 MHz	3.3 dB	(1)
Conducted Disturbance	0.02 ÷ 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)
	150 kHz ÷ 30 MHz with current probe	2.9 dB	(1)
Frequency	10 Hz ÷ 1 kHz	0.2 %	(1)
	1 kHz ÷ 40 GHz	10 ⁻⁶	(1)
Electromagnetic fields (EMF)	Magnetic, Electric and Electromagnetic fields: 0 Hz ÷ 40 GHz	25 %	(1)
Electrical quantities (voltage, current, resistance)	AC/DC Voltage 10 mV ÷ 1000 V 0÷100 kHz AC/DC Current 0.1 mA ÷ 400 A 0÷1 kHz Resistance 100 mΩ ÷ 10 MΩ	2.5 %	(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 for a normal distribution corresponds to a coverage probability of approximately 95 %

(2) The instruments used for this immunity test is according to the tolerances requested by the applicable standard

(3) The reported expanded uncertainty of measurement is related to the stimulus quantity

Section 7. Test equipment

7.1 Test equipment list

Table 7.1-1: Equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
EMI receiver	Rohde & Schwarz	ESU8	100202	2022-09	2023-09
EMI receiver	Rohde & Schwarz	ESW44	101620	2022-08	2023-08
Spectrum Analyzer	Rohde & Schwarz	FSW43	101767	2023-01	2024-01
Trilog Antenna	Schwarzbeck	VULB 9162	9162-025	2021-07	2024-07
Antenna Trilog	Schwarzbeck	VULB 9168	9168-242	2021-06	2024-06
Bilog antenna	Schwarzbeck	STLP 9148	9148-123	2021-06	2024-06
Double Ridge Horn Antenna	RFSpin	DRH40	061106A40	2023-05	2026-05
Broadband Amplifier	Schwarzbeck	BBV9718C	00121	2023-03	2024-03
Preamplifier	Schwarzbeck	BBV9718	BBV9718-137	2023-05	2024-05
Controller	Maturo	FCU3.0	10041	NCR	NCR
Tilt antenna mast	Maturo	TAM4.0-E	10042	NCR	NCR
Turntable	Maturo	TT4.0-5T	2.527	NCR	NCR
3m Semi anechoic chamber	Comtest	SAC-3	1711-150	2022-09	2024-09
Semi-anechoic chamber	Nemko S.p.a.	10m semi-anechoic chamber	530	2021-09	2023-09

Note: NCR - no calibration required, VOU - verify on use



Section 8. Testing data

8.1 Radiated emission limits

8.1.1 Definitions and limits

§2.947(f):

A composite system is a system that incorporates different devices contained either in a single enclosure or in separate enclosures connected by wire or cable. If the individual devices in a composite system are subject to different technical standards, each such device must comply with its specific standards. In no event may the measured emissions of the composite system exceed the highest level permitted for an individual component. Testing for compliance with the different standards shall be performed with all of the devices in the system functioning. If the composite system incorporates more than one antenna or other radiating source and these radiating sources are designed to emit at the same time, measurements of conducted and radiated emissions shall be performed with all radiating sources that are to be employed emitting.

§27.53(h)(1):

General protection levels. Except as otherwise specified below, for operations in the 1695–1710 MHz, 1710–1755 MHz, 1755–1780 MHz, 1915–1920 MHz, 1995–2000 MHz, 2000–2020 MHz, 2110–2155 MHz, 2155–2180 MHz, and 2180–2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB.

§27.53(l)(1):

For base station operations in the 3700–3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed –13 dBm/MHz. Compliance with this paragraph (l)(1) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

§24.238(a):

Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

§90.210(g)(2):

On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least $43 + 10 \log(P)$ dB.

§22.917(a):

Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

KDB 996369 §3.2:

Because the host needs an equipment authorization as an unintentional radiator for compliance as an individual unintentional radiator following 15.33 (b), the additional recommended composite investigation testing can be done as a part of this event with all the transmitter(s) active. The frequency spectrum to be investigated for this composite investigation testing at a minimum is based on the 15.33 (b) table. The highest frequency generated or used in the device or on which the device operates or tunes (MHz) shall include the frequencies of the transmitters and comply with the limits of 15.109 or the highest level permitted for an individual component. Filters to prevent measurement system overload may be required.

Table 8.1-1: General radiated emission limits

Frequency, MHz	Field strength of emissions		Measurement distance, m
	µV/m	dBµV/m	
30–88	100	40.0	3
88–216	150	43.5	3
216–960	200	46.0	3
above 960	500	54.0	3

Notes: In the emission table above, the tighter limit applies at the band edges. For frequencies above 1 GHz the limit on peak RF emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test

8.1.2 Test summary

Test start date	2023-07-04
Test engineer	P. Barbieri

8.1.3 Observations, settings and special notes

The spectrum was searched from 30 MHz to the 5th harmonic.

Radiated measurements were performed at a distance of 3 m.

According to ANSI C63.26 the field strength has been measured. The limit of -13 dBm has been converted with the following formula:
 $\text{dBm} = \text{dB}\mu\text{V/m}$

Spectrum analyser settings for radiated measurements below 1 GHz:

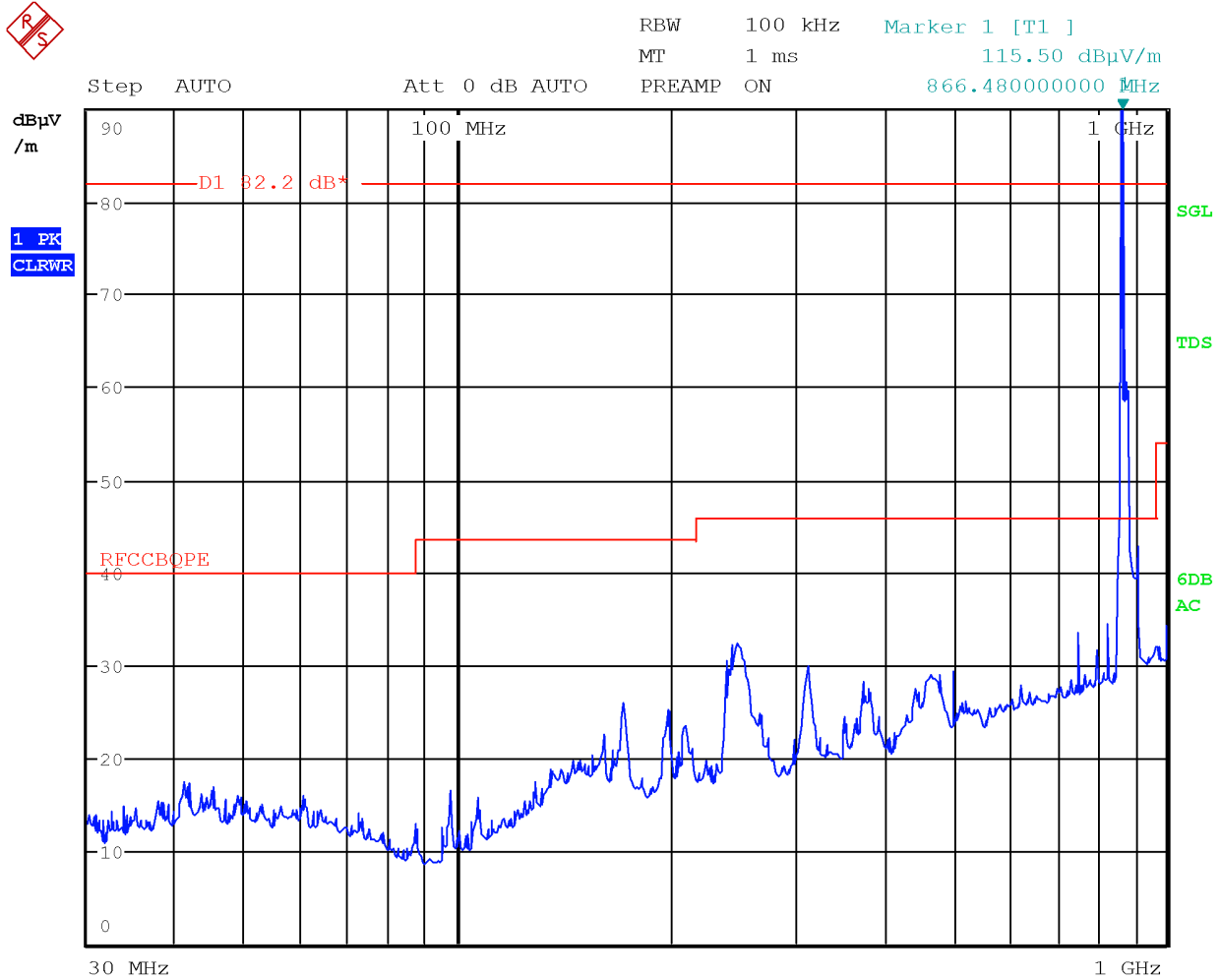
Resolution bandwidth:	100 kHz
Video bandwidth:	300 kHz
Detector mode:	Peak
Trace mode:	Max Hold

Spectrum analyser settings for radiated measurements above 1 GHz:

Resolution bandwidth:	1 MHz
Video bandwidth:	3 MHz
Detector mode:	Peak
Trace mode:	Max Hold

Resolution bandwidth:	1 MHz
Video bandwidth:	3 MHz
Detector mode:	Average
Trace mode:	Max Hold

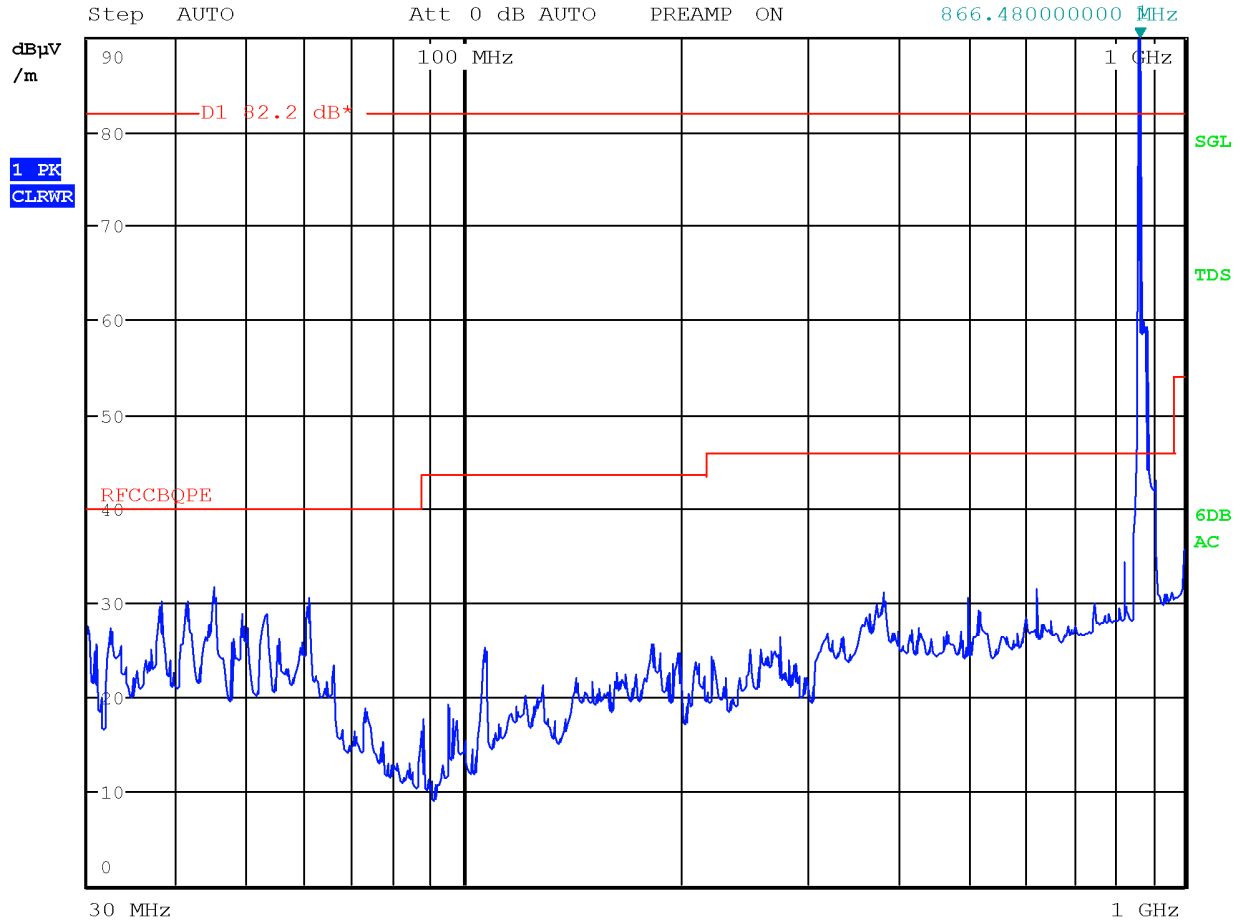
8.1.4 Test data



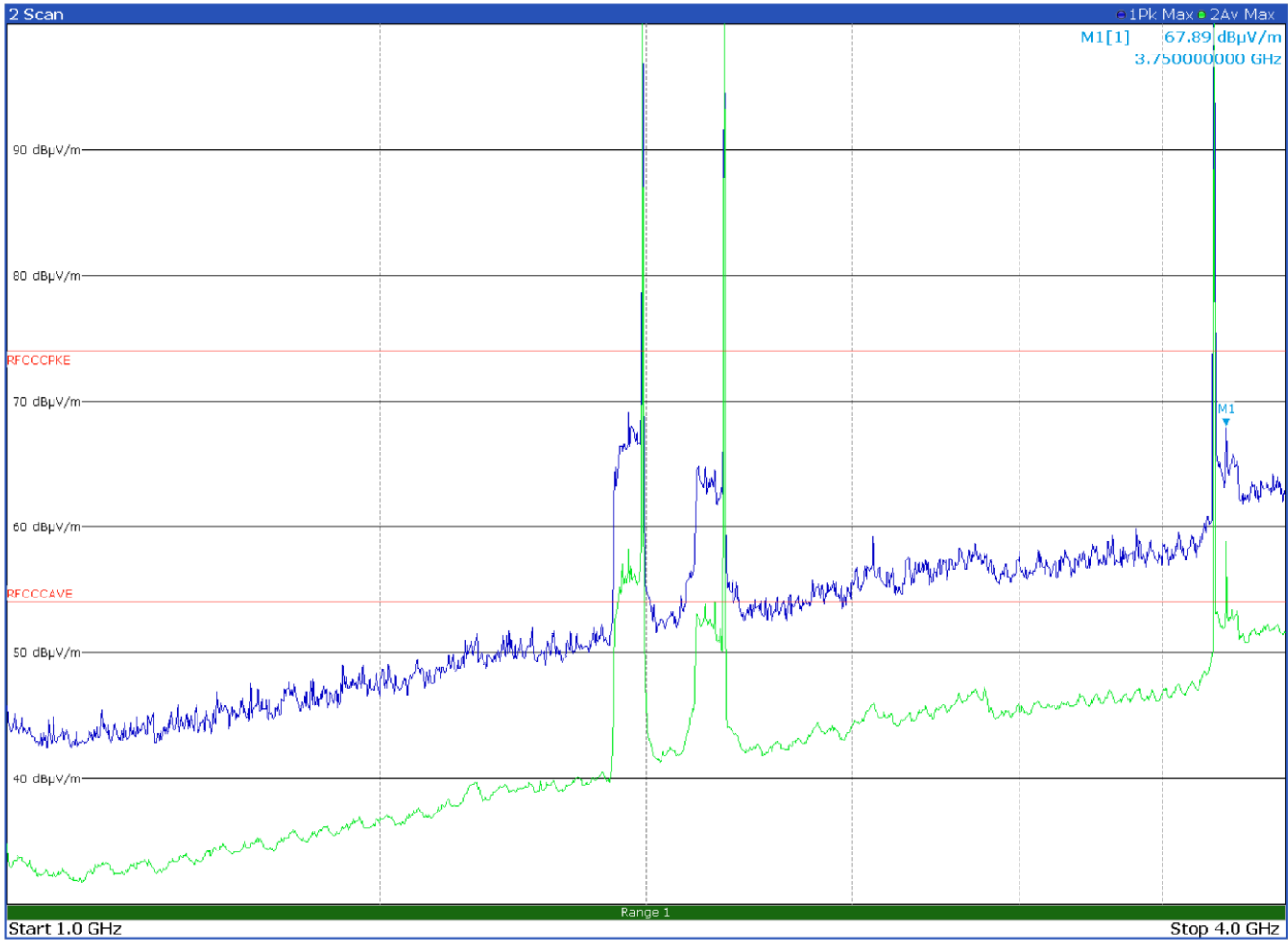
Radiated emission in the frequency range 30 to 1000 MHz with antenna in horizontal polarization (80-B27 band)
Limits exceeded by the carriers. No intermodulation products found



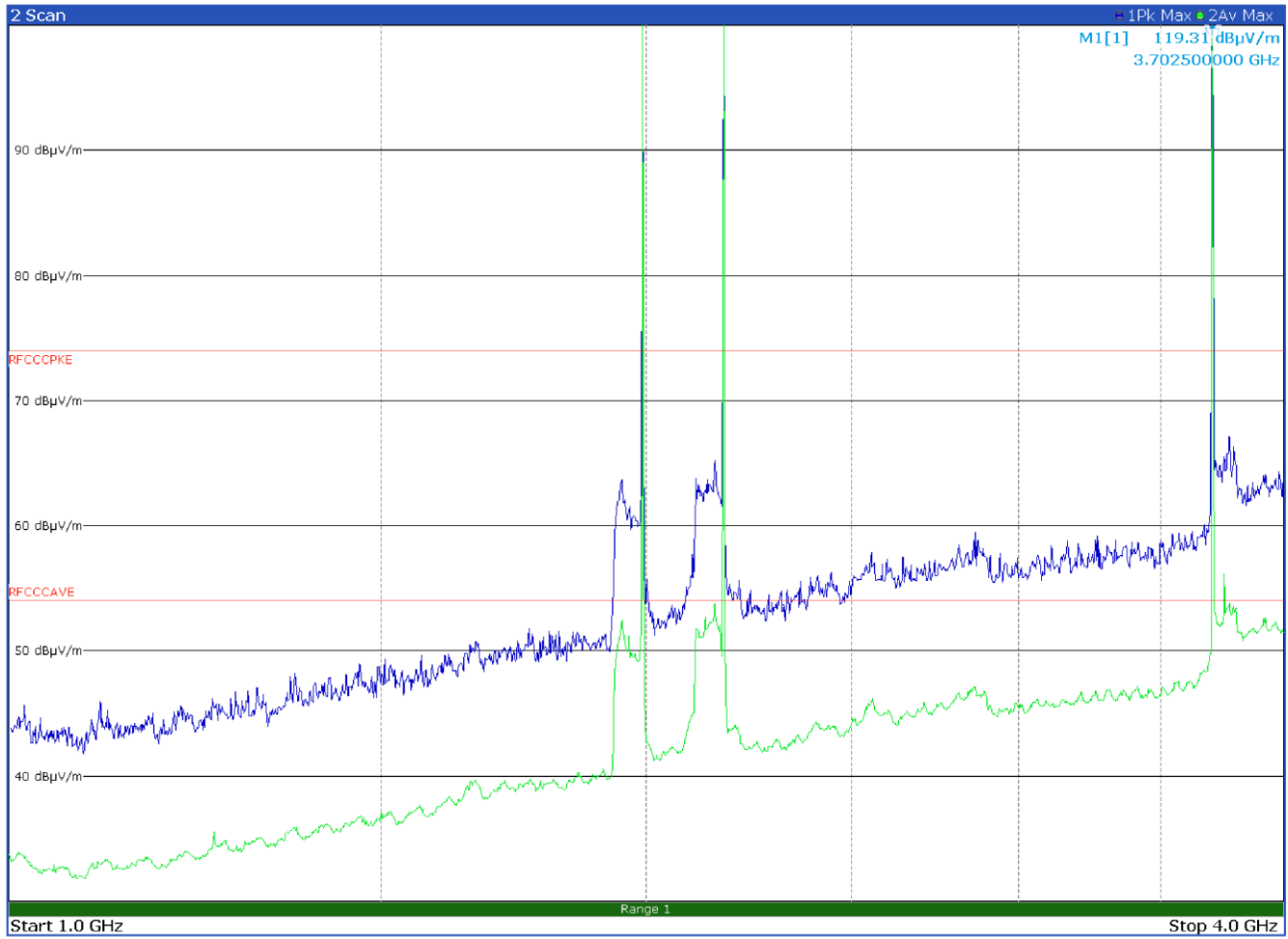
RBW 100 kHz Marker 1 [T1]
MT 1 ms 116.07 dBμV/m
PREAMP ON 866.48000000 MHz



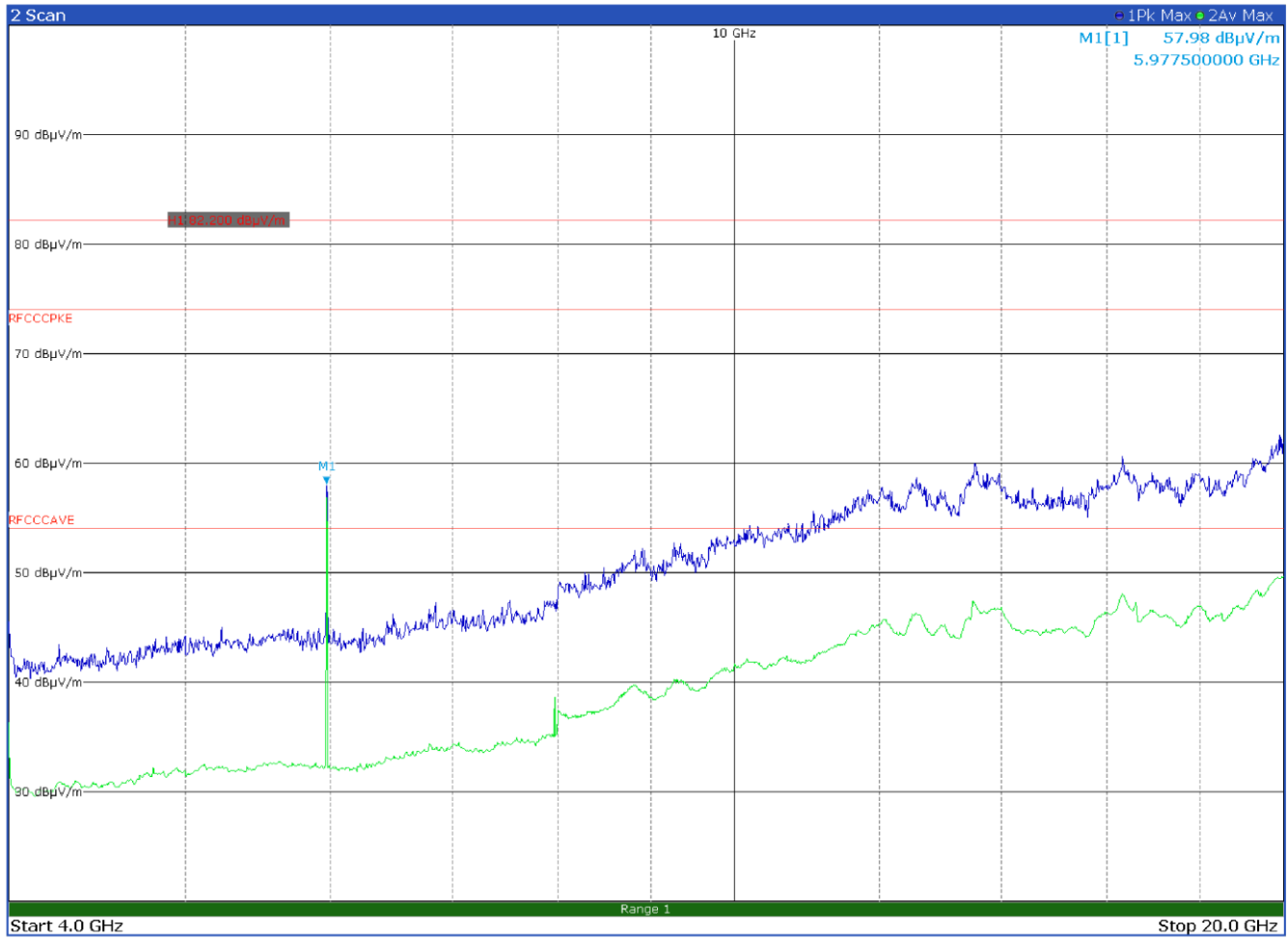
Radiated emission in the frequency range 30 to 1000 MHz with antenna in vertical polarization (80-B27 band)
Limits exceeded by the carriers. No intermodulation products found



Radiated emission in the frequency range 1 to 4 GHz with antenna in horizontal polarization (80-B27 band)
Limits exceeded by the carriers. No intermodulation products found

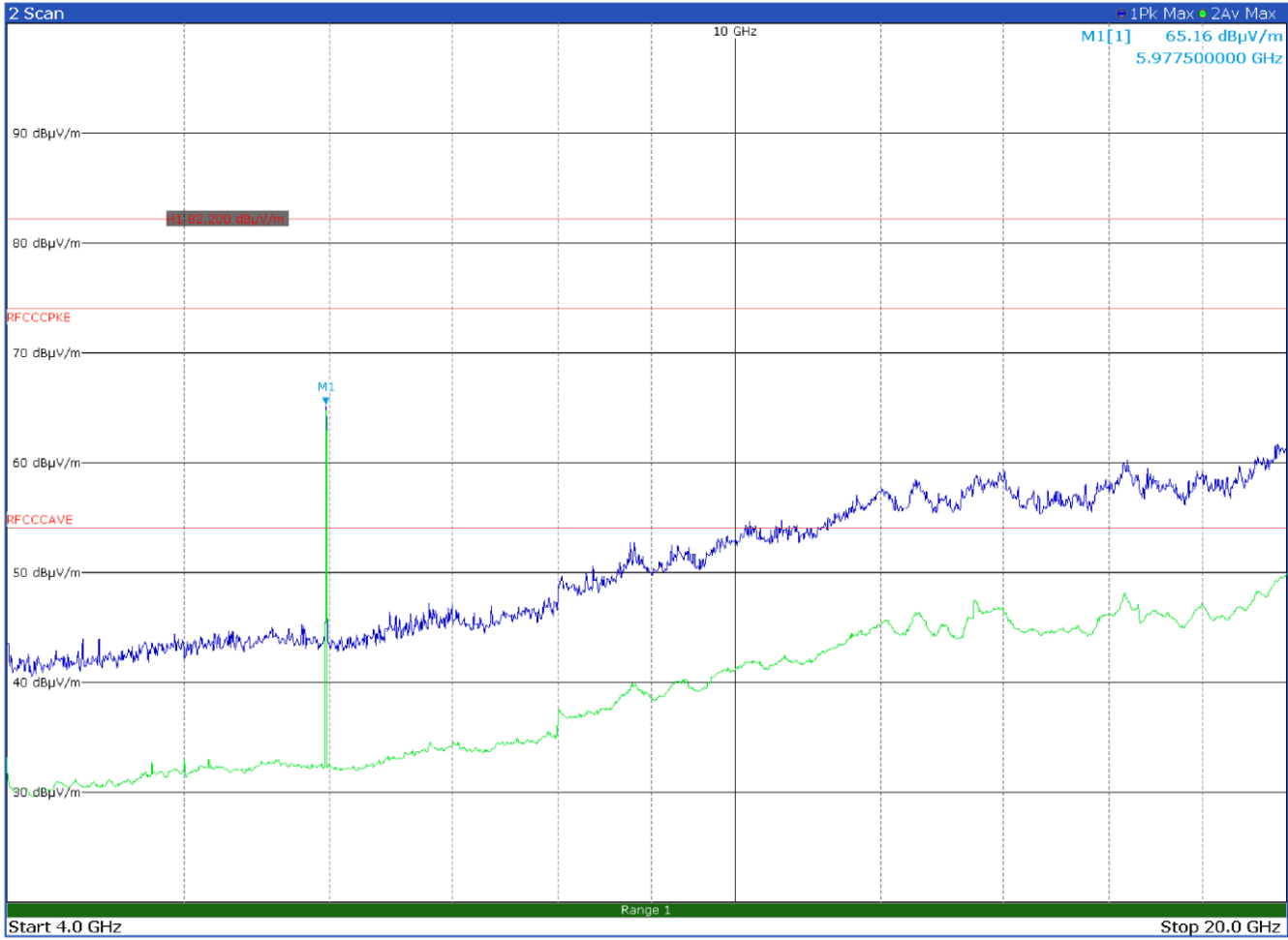


Radiated emission in the frequency range 1 to 4 GHz with antenna in vertical polarization (80-B27 band)
Limits exceeded by the carriers. No intermodulation products found



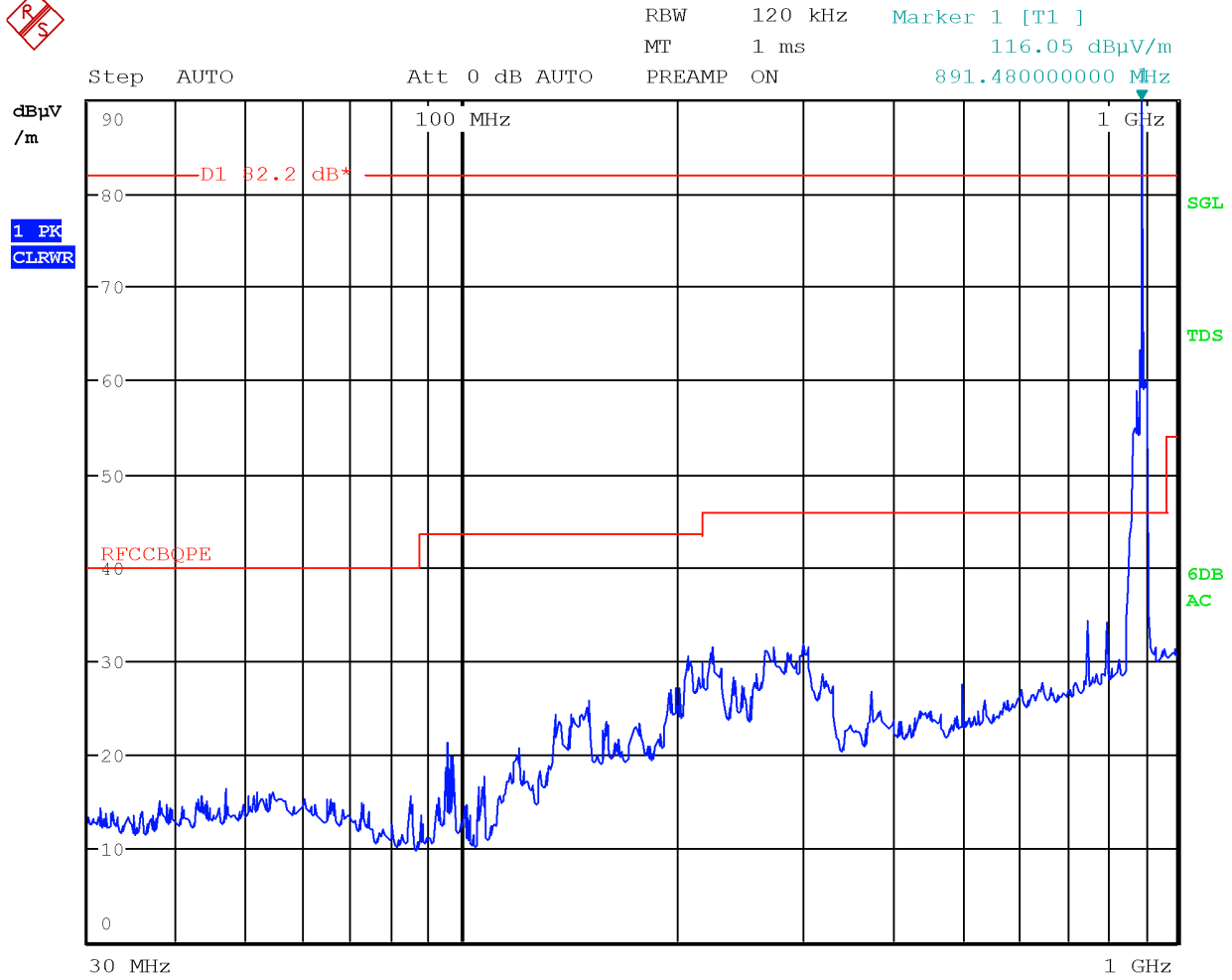
Radiated emission in the frequency range 4 to 20 GHz with antenna in horizontal polarization (80-B27 band)

Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector
5977.50	58.0	82.2	-24.2	Pk



Radiated emission in the frequency range 4 to 20 GHz with antenna in vertical polarization (80-B27 band)

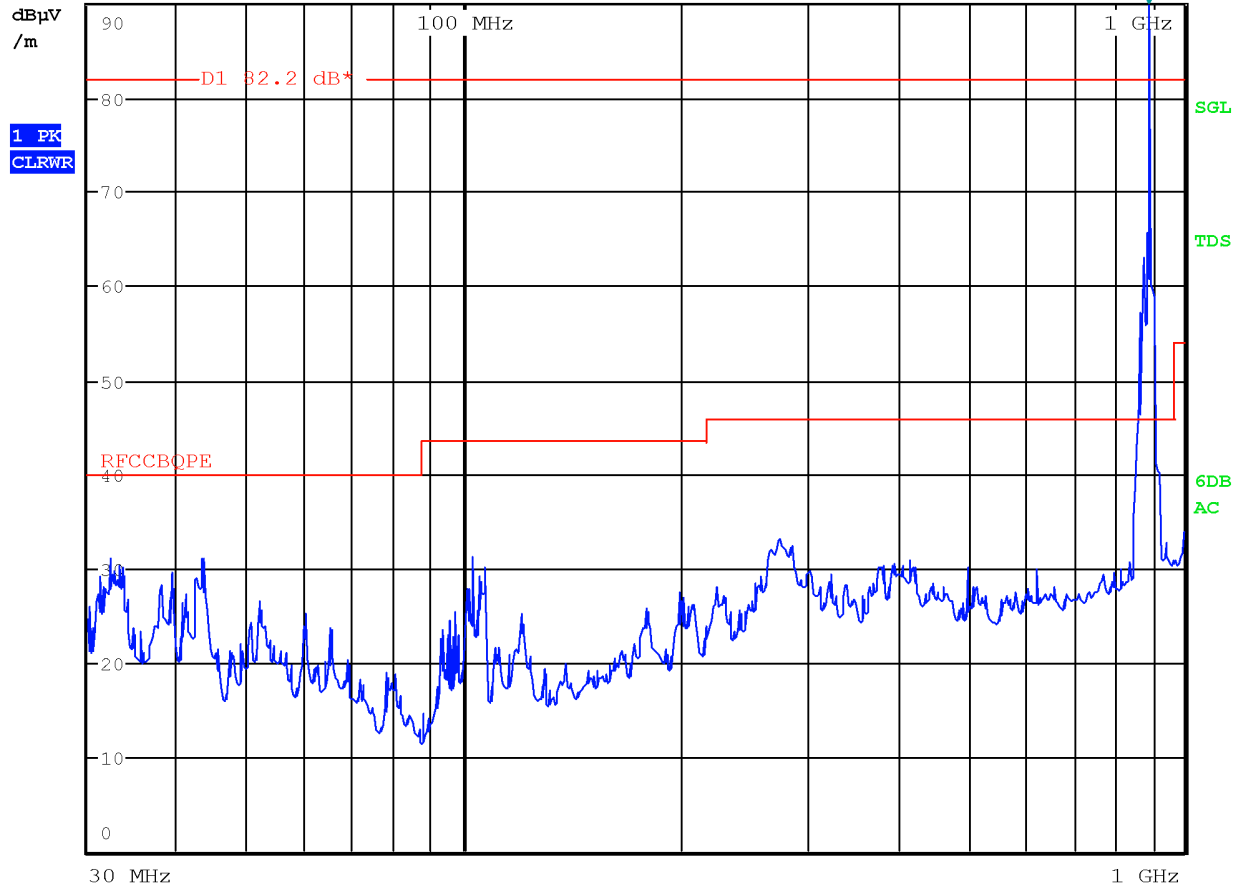
Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector
5977.50	65.2	82.2	-17.0	Pk



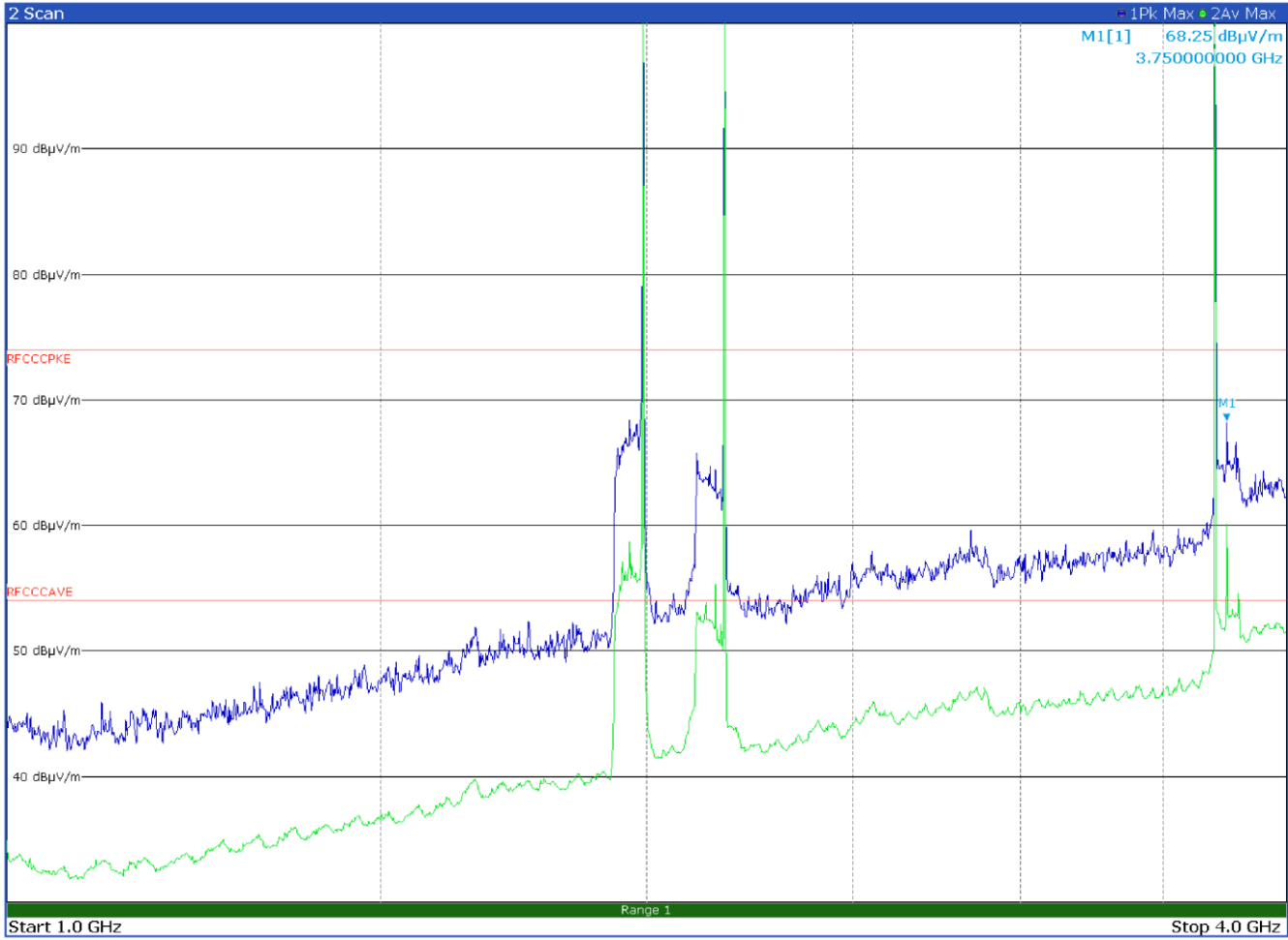
Radiated emission in the frequency range 30 to 1000 MHz with antenna in horizontal polarization (85-B5 band)
Limits exceeded by the carriers. No intermodulation products found



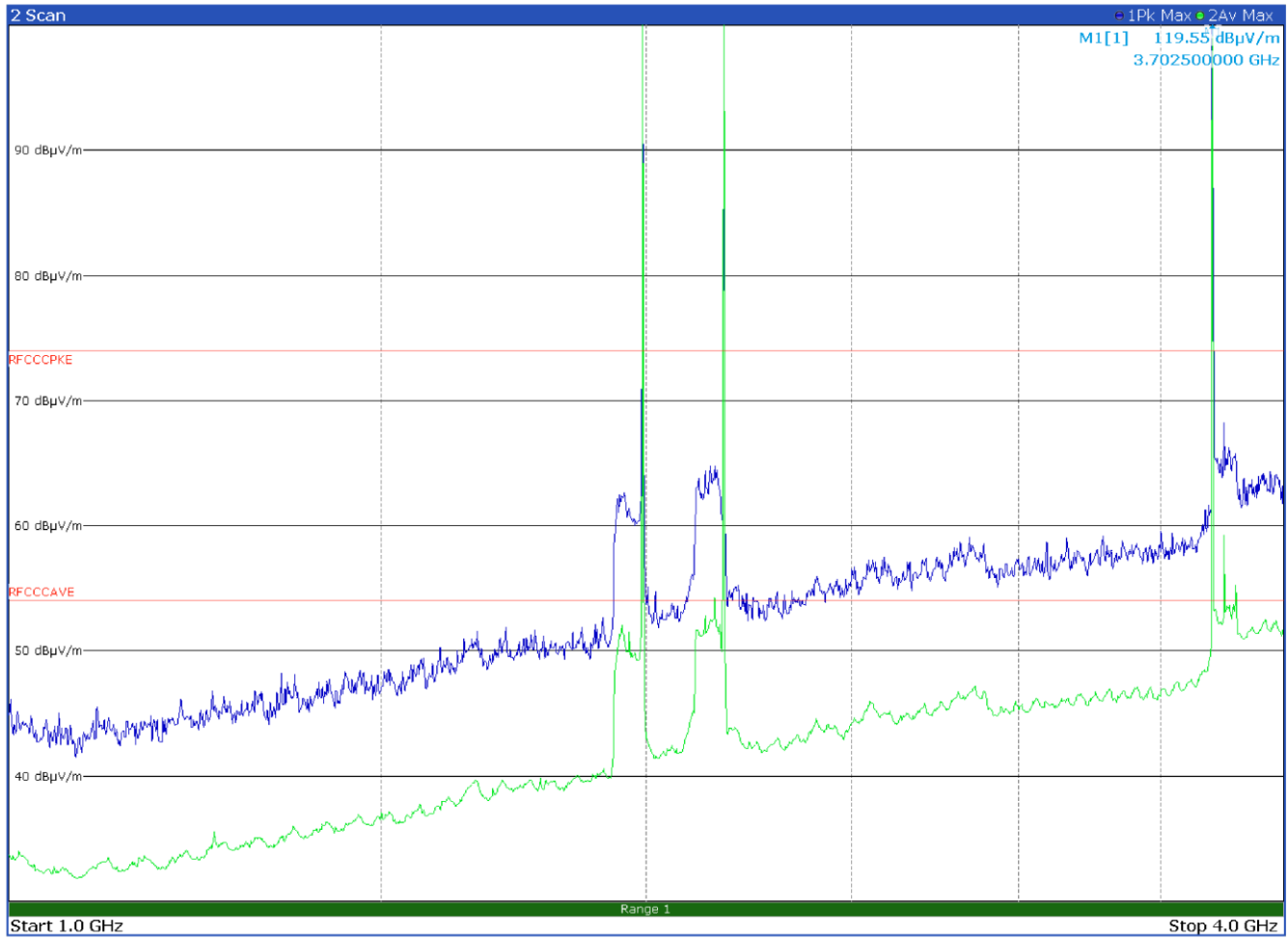
RBW 120 kHz Marker 1 [T1]
 MT 1 ms 118.62 dBμV/m
 Step AUTO Att 0 dB AUTO PREAMP ON 891.48000000 MHz



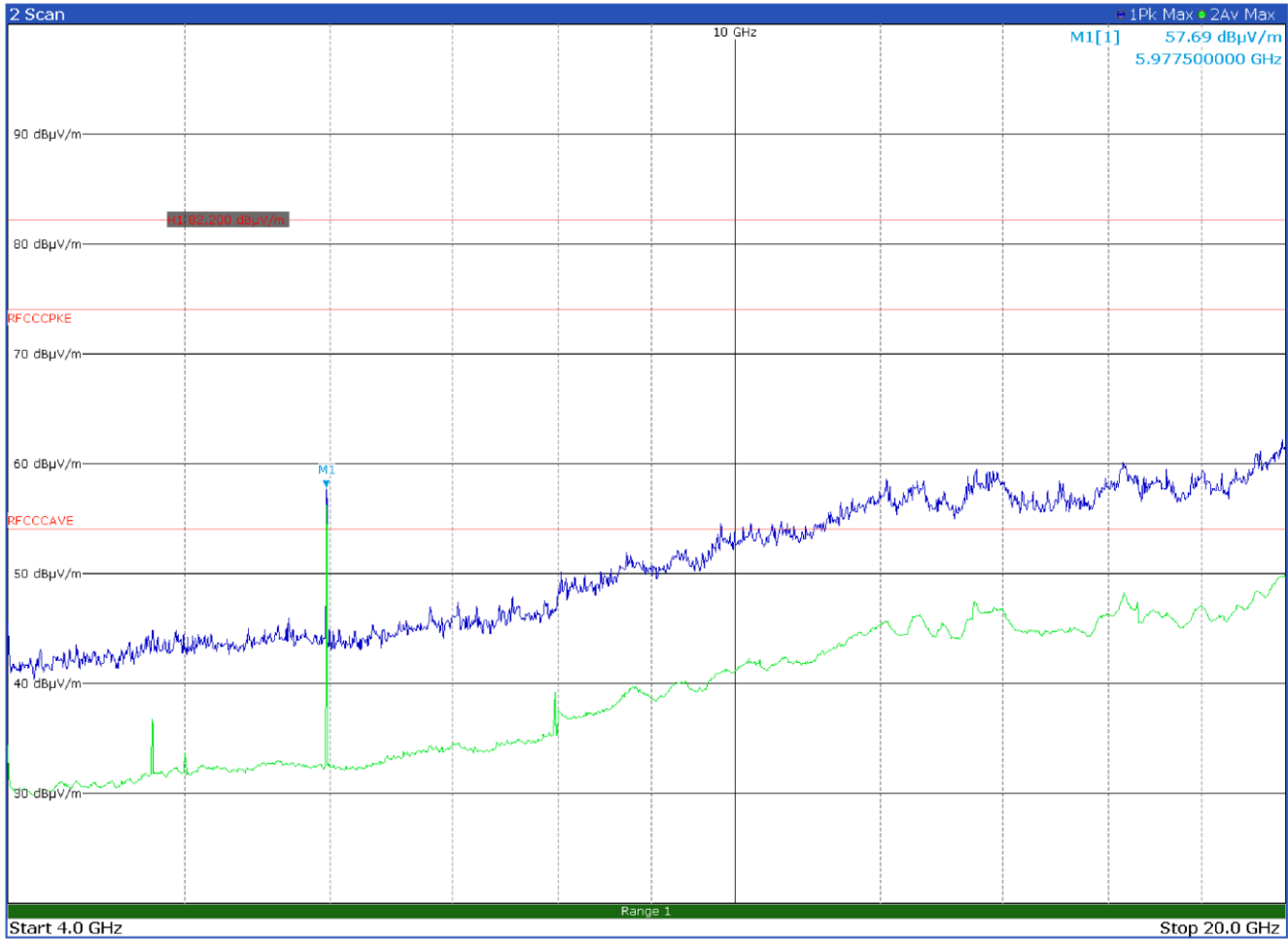
Radiated emission in the frequency range 30 to 1000 MHz with antenna in vertical polarization (85-B5 band)
 Limits exceeded by the carriers. No intermodulation products found



Radiated emission in the frequency range 1 to 4 GHz with antenna in horizontal polarization (85-B5 band)
Limits exceeded by the carriers. No intermodulation products found

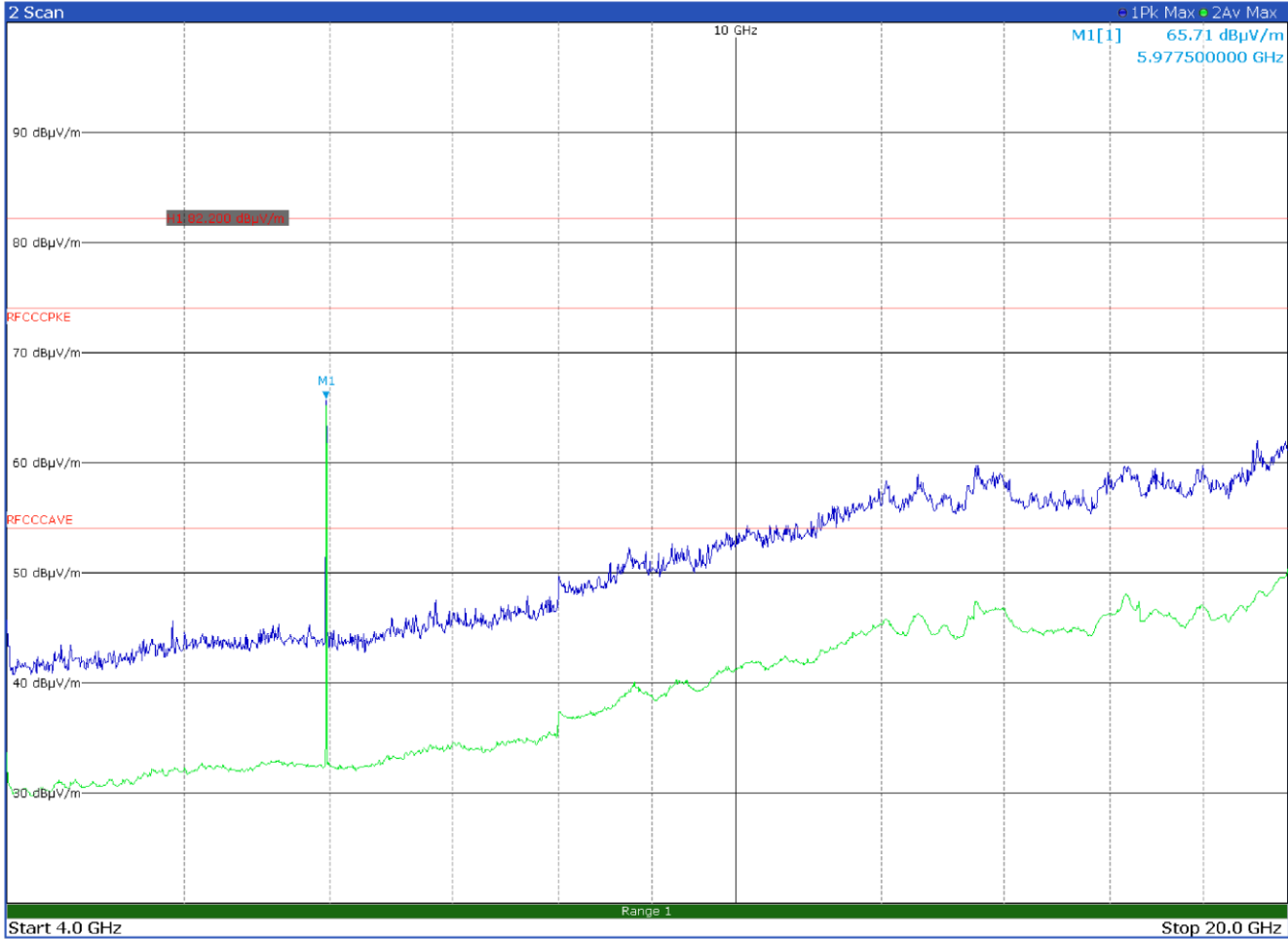


Radiated emission in the frequency range 1 to 4 GHz with antenna in vertical polarization (85-B5 band)
Limits exceeded by the carriers. No intermodulation products found



Radiated emission in the frequency range 4 to 20 GHz with antenna in horizontal polarization (85-B5 band)

Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector
5977.50	57.7	82.2	-24.5	Pk

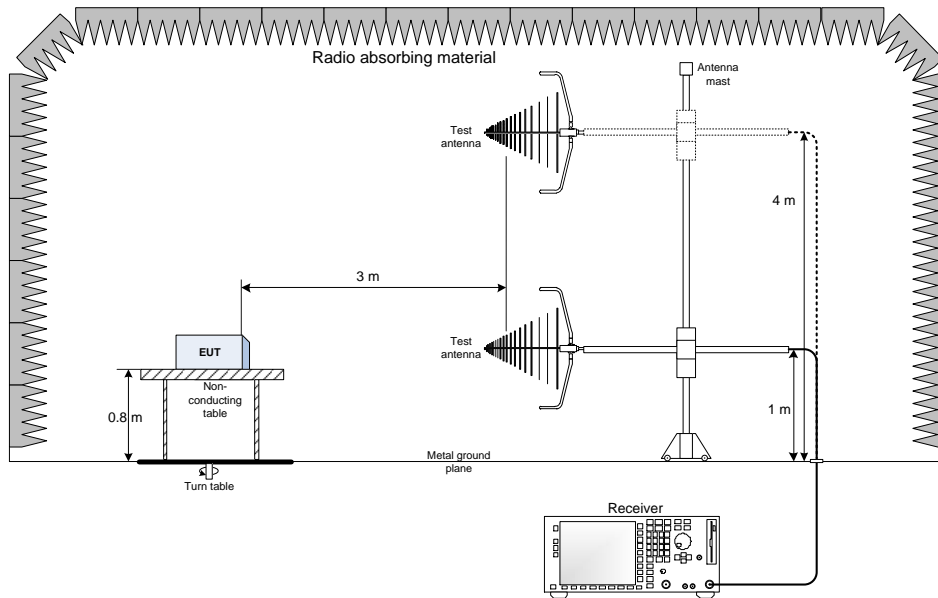


Radiated emission in the frequency range 4 to 20 GHz with antenna in vertical polarization (85-B5 band)

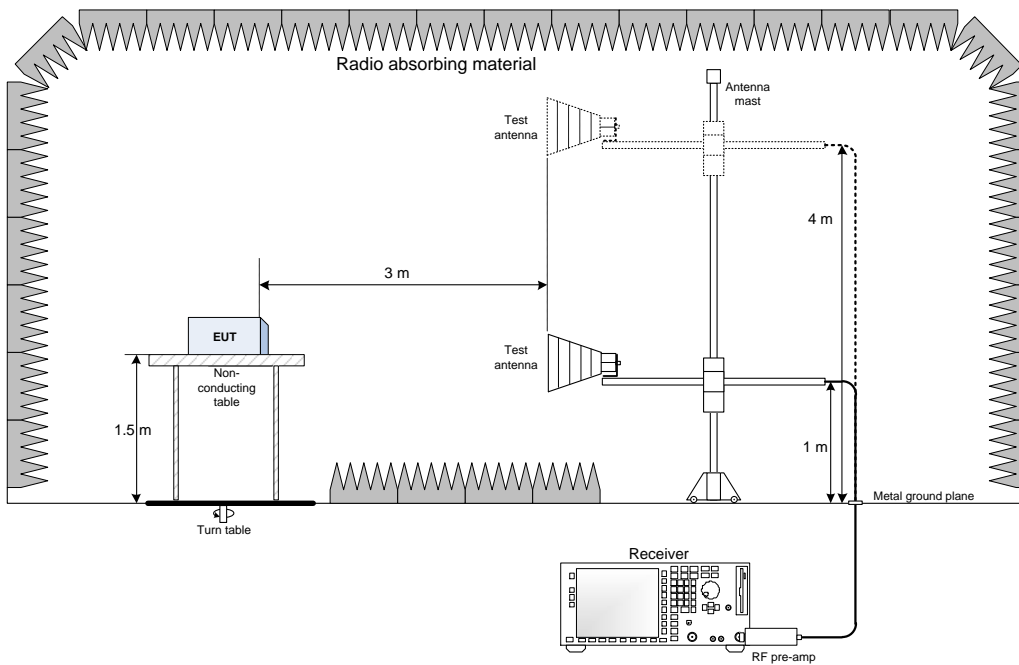
Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector
5977.50	65.7	82.2	-16.5	Pk

Section 9. Block diagrams of test set-ups

9.1 Radiated emissions set-up for frequencies below 1 GHz



9.2 Radiated emissions set-up for frequencies above 1 GHz

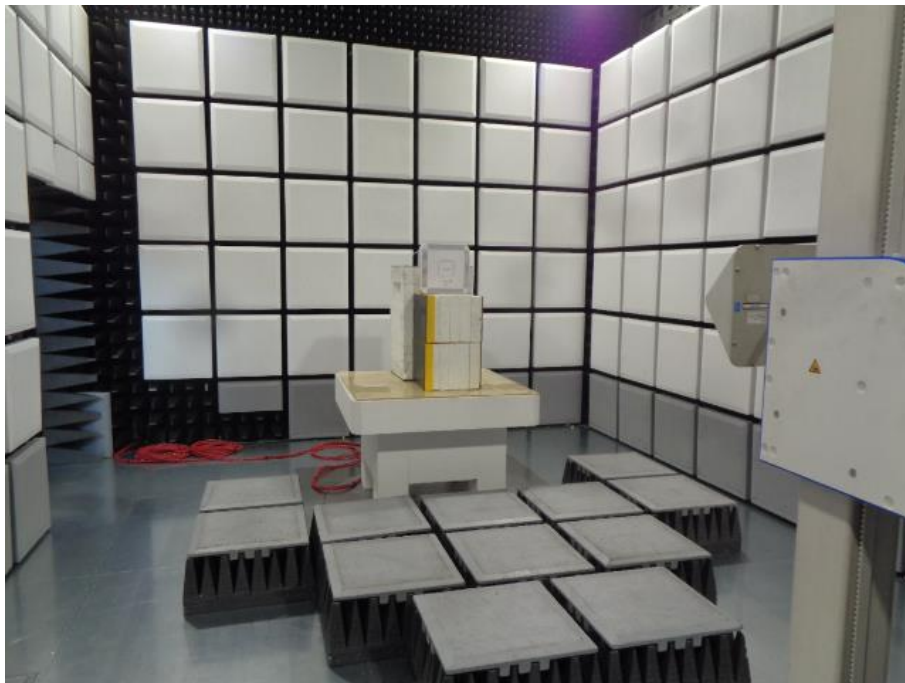


Section 10. Photos

10.1 Photos of the test set-up



Radiated emission below 1 GHz



Radiated emission above 1 GHz

10.2 Photos of the EUT



(End of report)