Wireless test report – 392986-4TRFWL

Applicant:

Eurotech SpA

Product name:

DYGATE-20-30

Model:

DynaGATE-20-30-22

Model variant:

DynaGATE-20-30-00, DynaGATE-20-30-10, DynaGATE-20-30-20

FCC ID:

UKMDG2030

IC Registration number:

21442-DG2030

Specifications:

- FCC 47 CFR Part 15 Subpart C, §15.209
  Radiated emission limits; general requirements.
- RSS-GEN, Issue 5, Mar 2019, Amendment 1, section 8.9
  Transmitter Emission Limits

Date of issue: July 7, 2020

Tested by (name, function and signature)	D Guarnone	(project handler)	Signature:	
Reviewed by (name, function and signature)	P. Barbieri	(verifier)	Signature:	

Test location(s)

Company name	Nemko Spa
Address	Via del Carroccio, 4
City	Biassono
Province	MB
Postal code	20853
Country	Italy
Telephone	+39 039 220 12 01
Facsimile	+39 039 220 12 21
Website	www.nemko.com
Site number	FCC: 682159; IC: 9109A (10 m semi anechoic chamber)

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 contain in this report are within Nemko Spa ISO/IEC 17025 accreditation.

Copyright notification

Table of contents

Section 1. Report summary

1.1 Applicant and manufacturer

Company name	Eurotech SpA
Address	Via Fratelli Solari 3/a – 33020 Amaro (UD) – Italy

1.2 Test specifications

FCC 47 CFR Part 15 Subpart C, §15.209	Radiated emission limits; general requirements.
RSS-GEN, Issue 5, Amendament 1, section 8.9	Transmitter Emission Limits for Licence-Exempt Radio Apparatus

1.3 Test methods

ANSI C63.10 v2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

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
392986-4TRFWL	July 7, 2020	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

2.2 ISED RSS-GEN, Issue 5, Amendament 1 test results

Part	Test description	Verdict
8.9	Transmitter Emission Limits for Licence-Exempt Radio Apparatus	Pass

Section 3. Equipment under test (EUT) details

3.1 Sample information

Receipt date	May 18, 2020
Nemko sample ID number	392986 sample 1/12 and sample 1/1

3.2 EUT information

Product name	DYGATE-20-30
Model	DynaGATE-20-30-22
Model variant	DynaGATE-20-30-00, DynaGATE-20-30-10, DynaGATE-20-30-20
Serial number	H120CRA0003

3.3 Technical information

RSS number and Issue number	RSS-GEN, Issue 5, Mar 2019, Amendment 1, section 8.9
Frequency band	WIFI/ BT/BLE:2400–2483.5 MHz band WIFI: 5150-5250 / 5250-5350 / 5470-5725 / 5725-5850 MHz bands LTE North America Bands
Type of modulation	GFSK, 802.11a/n, OFDM
Emission classification (F1D, G1D, D1D)	F1D, W7D
Transmitter spurious, dBµV/m @3 m	36.9 (@77.1900MHz)
EUT power requirements	24 $V_{DC,}$ via 120 V_{AC} adapter or battery
Antenna information	The EUT uses a unique antenna coupling.

3.4 EUT setup diagram

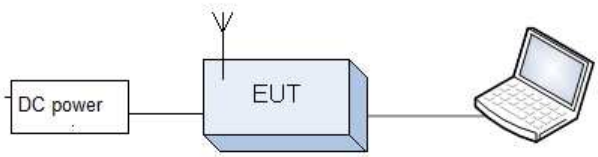


Figure 3.4-1: *Setup diagram*

3.5 Product description and theory of operation

The DynaGATE 20-30 is an IoT Edge Gateway, E-Mark certified, that addresses the challenges of the next-generation applications for smart transportation and fleet management. It combines hardware, software and connectivity to bridge the vehicle with leading Cloud services.
Based on the Intel® Atom™ x5 and x7 (E39xx) processor, with up to 8GB of ECC RAM and 32GB of eMMC, the DynaGATE 20-30 is a fanless, compact unit designed to exceed the requirements of automotive applications: it features extended operating temperature range, IP54 ingress protection, a wide range automotive power supply and a 6-axis sensor (accelerometer + gyroscope). It provides protected USB 2.0 and 3.0, one configurable RS-232/422/485, DI/DOs, and dual CAN bus interfaces - plus, a wide range of connectivity capabilities including two Gigabit Ethernet on M12, up to two LTE Cat 4/6 cellular modem, Wi-Fi, Bluetooth Low Energy, and a GPS with Untethered Dead Reckoning; two mPCIe and one M.2 slots can be reconfigured to host custom expansions and peripherals (Factory Option). Sophisticated power saving and management capabilities include: power monitoring, Wake-On-Ring/SMS and Wake-On-RTC.
Radio modules:
WiFi-Bluetooth module AIRETOS AFX-QCA6174-NX,
GPS module, U45 U-BLOX, NEO-M8U-0-10
LTE module: QUECTEL, EG25-G

3.6 EUT sub assemblies

Table 3.6-1: *EUT sub assemblies*

Description	Brand name	Model/Part number	Serial number
DynaGATE-20-30-22	Eurotech	DynaGATE-20-30-22	H120CRA0003
AC adapter	Sunny	SYS1541-2424	None

3.7 EUT exercise details

EUT was set to continuously transmit mode during tests, by test software provided by client.
The EUT runs a Linux operating system which allows for the testing to be performed using engineering test tools and scripts. Communication with the EUT is via a serial console or Ethernet connection which provides a Linux command line interface for execution of the test tools/scripts. These tools/scripts configure the radio modules to enable continuous transmission with the ability to adjust modulation, frequency and output power as required.

WiFi/BT – using a engineering test tool provided by the silicon vendor allowing for full radio control.
Cellular – using Linux scripts running AT command sequences provided by the cellular radio module vendor allowing for full radio control.

Linux operating system version: 4.9.57-eurotech-ti.

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

The EUT has WIFI and Bluetooth in 2.4 GHz band, WIFI is chosen to be the representative worst-case due to higher output power.

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	2019-01	2021-01
Thermo-hygrometer data loggers	Testo	175-H2	38203337/703	2019-01	2021-01
Barometer	Castle	GPB 3300	072015	2019-12	2020-12

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 ±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:

EUT	Type	Test	Range	Measurement Uncertainty	Notes
Transmitter	Conducted	Frequency error	0.001 MHz ÷ 40 GHz	0.08 ppm	(1)
		Carrier power RF Output Power	0.009 MHz ÷ 30 MHz	1.1 dB	(1)
			30 MHz ÷ 18 GHz	1.5 dB	(1)
			18 MHz ÷ 40 GHz	3.0 dB	(1)
			40 MHz ÷ 140 GHz	5.0 dB	(1)
		Adjacent channel power	1 MHz ÷ 18 GHz	1.4 dB	(1)
		Conducted spurious emissions	0.009 MHz ÷ 18 GHz	3.0 dB	(1)
			18 GHz ÷ 40 GHz	4.2 dB	(1)
			40 GHz ÷ 220 GHz	6.0 dB	(1)
		Intermodulation attenuation	1 MHz ÷ 18 GHz	2.2 dB	(1)
		Attack time – frequency behaviour	1 MHz ÷ 18 GHz	2.0 ms	(1)
		Attack time – power behaviour	1 MHz ÷ 18 GHz	2.5 ms	(1)
		Release time – frequency behaviour	1 MHz ÷ 18 GHz	2.0 ms	(1)
		Release time – power behaviour	1 MHz ÷ 18 GHz	2.5 ms	(1)
		Transient behaviour of the transmitter– Transient frequency behaviour	1 MHz ÷ 18 GHz	0.2 kHz	(1)
		Transient behaviour of the transmitter – Power level slope	1 MHz ÷ 18 GHz	9%	(1)
		Frequency deviation - Maximum permissible frequency deviation	0.001 MHz ÷ 18 GHz	1.3%	(1)
		Frequency deviation - Response of the transmitter to modulation frequencies above 3 kHz	0.001 MHz ÷ 18 GHz	0.5 dB	(1)
		Dwell time	-	3%	(1)
		Hopping Frequency Separation	0.01 MHz ÷ 18 GHz	1%	(1)
		Occupied Channel Bandwidth	0.01 MHz ÷ 18 GHz	2%	(1)
		Modulation Bandwidth	0.01 MHz ÷ 18 GHz	2%	(1)
	Radiated	Radiated spurious emissions	0.009 MHz ÷ 26.5 GHz	6.0 dB	(1)
			26.5 GHz ÷ 66 GHz	8.0 dB	(1)
			66 GHz ÷ 220 GHz	10 dB	(1)
		Effective radiated power transmitter	10 kHz ÷ 26.5 GHz	6.0 dB	(1)
			26.5 GHz ÷ 66 GHz	8.0 dB	(1)
			66 GHz ÷ 220 GHz	10 dB	(1)

EUT	Type	Test	Range	Measurement Uncertainty	Notes
Receiver	Radiated	Radiated spurious emissions	0.009 MHz ÷ 26.5 GHz	6.0 dB	(1)
			26.5 GHz ÷ 66 GHz	8.0 dB	(1)
			66 GHz ÷ 220 GHz	10 dB	(1)
		Sensitivity measurement	1 MHz ÷ 18 GHz	6.0 dB	(1)
	Conducted	Conducted spurious emissions	0.009 MHz ÷ 18 GHz	3.0 dB	(1)
			18 GHz ÷ 40 GHz	4.2 dB	(1)
			40 GHz ÷ 220 GHz	6.0 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 for a normal distribution corresponds to a coverage probability of approximately 95 %

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 (20 Hz ÷ 8 GHz)	Rohde & Schwarz	ESU8	100202	2020-01	2021-01
EMI receiver (20 Hz ÷ 8 GHz)	Rohde & Schwarz	ESW44	101620	2019-08	2020-08
Trilog Antenna (30 MHz ÷ 7 GHz)	Schwarzbeck	VULB 9162	9162-025	2018-07	2021-07
Bilog antenna (1 ÷ 18 GHz)	Schwarzbeck	STLP 9148	9148-123	2018-07	2021-07
Preamplifier (1 ÷ 18 GHz)	Schwarzbeck	BBV 9718	9718-137	2019-09	2020-09
Horn antenna (18 ÷ 40 GHz)	A.H. System	SAS-574	558	2020-01	2023-01
Preamplifier (18 ÷ 40 GHz)	Miteq	JS44-18004000-35-8P-R	1.627	2019-09	2020-09
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
Semi-anechoic chamber	Nemko	10m semi-anechoic chamber	530	2019-09	2021-09
Shielded room	Siemens	10m control room	1947	NCR	NCR
LISN three phase (9 kHz ÷30 MHz)	Rohde & Schwarz	ESH2-Z5	872 460/041	2019-09	2020-09
Shielded room	Siemens	Conducted emission test room	1862	NCR	NCR

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

Section 8. Testing data

8.1 FCC 15.209 and RSS-GEN section 8.9 Radiated emission limits; general requirements

8.1.1 Definitions and limits

FCC:
(f) In accordance with §15.33(a), in some cases the emissions from an intentional radiator must be measured to beyond the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator because of the incorporation of a digital device. If measurements above the tenth harmonic are so required, the radiated emissions above the tenth harmonic shall comply with the general radiated emission limits applicable to the incorporated digital device, as shown in §15.109 and as based on the frequency of the emission being measured, or, except for emissions contained in the restricted frequency bands shown in §15.205, the limit on spurious emissions specified for the intentional radiator, whichever is the higher limit. Emissions which must be measured above the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator and which fall within the restricted bands shall comply with the general radiated emission limits in §15.109 that are applicable to the incorporated digital device.

ISED:
Except when the requirements applicable to a given device state otherwise, emissions from licence‑exempt transmitters shall comply with the field strength limits shown in Table below. Additionally, the level of any transmitter emission shall not exceed the level of the transmitter's fundamental emission.

Table 8.1-1: *FCC §15.209 and RSS-Gen – Radiated emission limits*

Frequency, MHz	Field strength of emissions		Measurement distance, m
	µV/m	dBµV/m	
0.009–0.490	2400/F	$67.6 - 20 \times \log_{10}(F)$	300
0.490–1.705	24000/F	$87.6 - 20 \times \log_{10}(F)$	30
1.705–30.0	30	29.5	30
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

Table 8.1-2: *ISED restricted frequency bands*

MHz	MHz	MHz	GHz
0.090–0.110	12.57675–12.57725	399.9–410	7.25–7.75
0.495–0.505	13.36–13.41	608–614	8.025–8.5
2.1735–2.1905	16.42–16.423	960–1427	9.0–9.2
3.020–3.026	16.69475–16.69525	1435–1626.5	9.3–9.5
4.125–4.128	16.80425–16.80475	1645.5–1646.5	10.6–12.7
4.17725–4.17775	25.5–25.67	1660–1710	13.25–13.4
4.20725–4.20775	37.5–38.25	1718.8–1722.2	14.47–14.5
5.677–5.683	73–74.6	2200–2300	15.35–16.2
6.215–6.218	74.8–75.2	2310–2390	17.7–21.4
6.26775–6.26825	108–138	2483.5–2500	22.01–23.12
6.31175–6.31225	149.9–150.05	2655–2900	23.6–24.0
8.291–8.294	156.52475–156.52525	3260–3267	31.2–31.8
8.362–8.366	156.7–156.9	3332–3339	36.43–36.5
8.37625–8.38675	162.0125–167.17	3345.8–3358	Above 38.6
8.41425–8.41475	167.72–173.2	3500–4400	
12.29–12.293	240–285	4500–5150	
12.51975–12.52025	322–335.4	5350–5460	

Note: Certain frequency bands listed in Table 8.1-2 and above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to related devices are set out in the 200 and 300 series of RSSs.

Table 8.1-3: **FCC restricted frequency bands**

MHz	MHz	MHz	GHz
0.090–0.110	16.42–16.423	399.9–410	4.5–5.15
0.495–0.505	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225	123–138	2200–2300	14.47–14.5
8.291–8.294	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675	156.7–156.9	2690–2900	22.01–23.12
8.41425–8.41475	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025	240–285	3345.8–3358	36.43–36.5
12.57675–12.57725	322–335.4	3600–4400	Above 38.6
13.36–13.41			

8.1.2 Test summary

Test start date	May 29, 2020
Test engineer	D. Giuarnone

8.1.3 Observations, settings and special notes

The spectrum was searched from 30 MHz to 40 GHz.
EUT's LTE and WIFI transmitters were set to transmit continuously, different channel setting has been investigated as per provided by client's setup, only the worst-case is presented.
Radiated measurements were performed at a distance of 3 m for frequency rand below 18 GHz, and 1 m for frequency range above 18 GHz. No inter-modulation products emissions were detected above 18 GHz within 6 dB below the limit.

Spectrum analyzer settings for frequencies below 30 MHz:

Detector mode	Quasi-Peak
Resolution bandwidth	9 kHz
Video bandwidth	30 kHz
Trace mode	Max Hold
Measurement time	100 ms

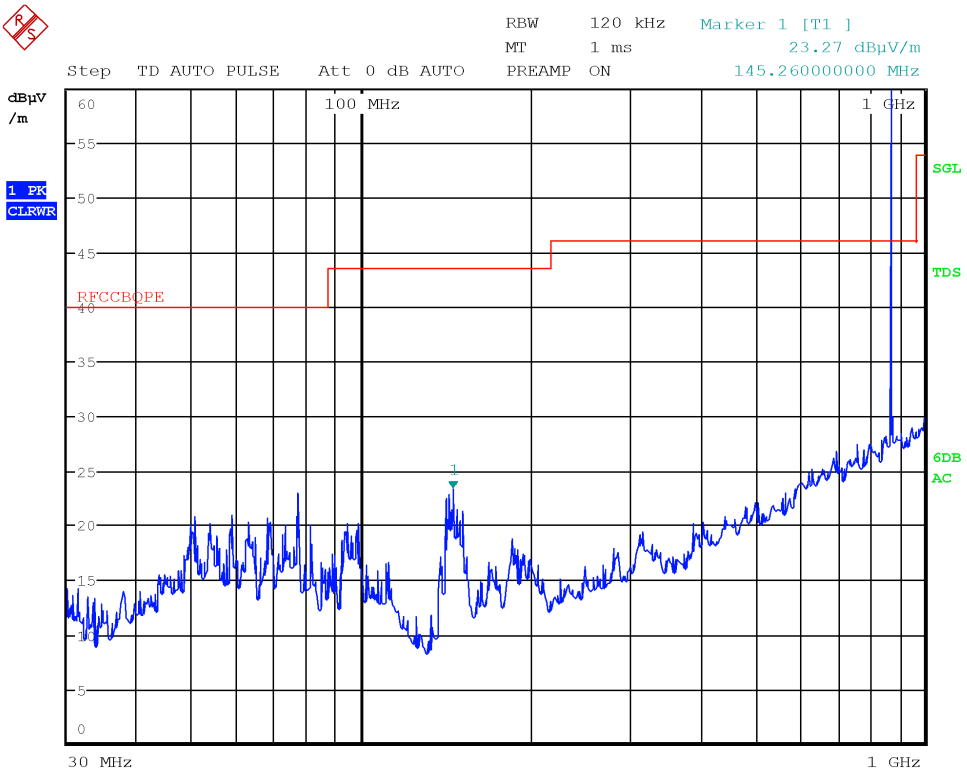
Spectrum analyser settings for radiated measurements within restricted bands 30 MHz to 1 GHz:

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

Spectrum analyser settings for average radiated measurements within restricted bands above 1 GHz:

Resolution bandwidth:	1 MHz
Video bandwidth:	10 Hz
Detector mode:	Peak
Trace mode:	Max Hold

8.1.4 Test data



GSM 836.6 MHz and iwifi 802.11g 6Mbps Multiple Chain
2437 MHz, horizontal polarization

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
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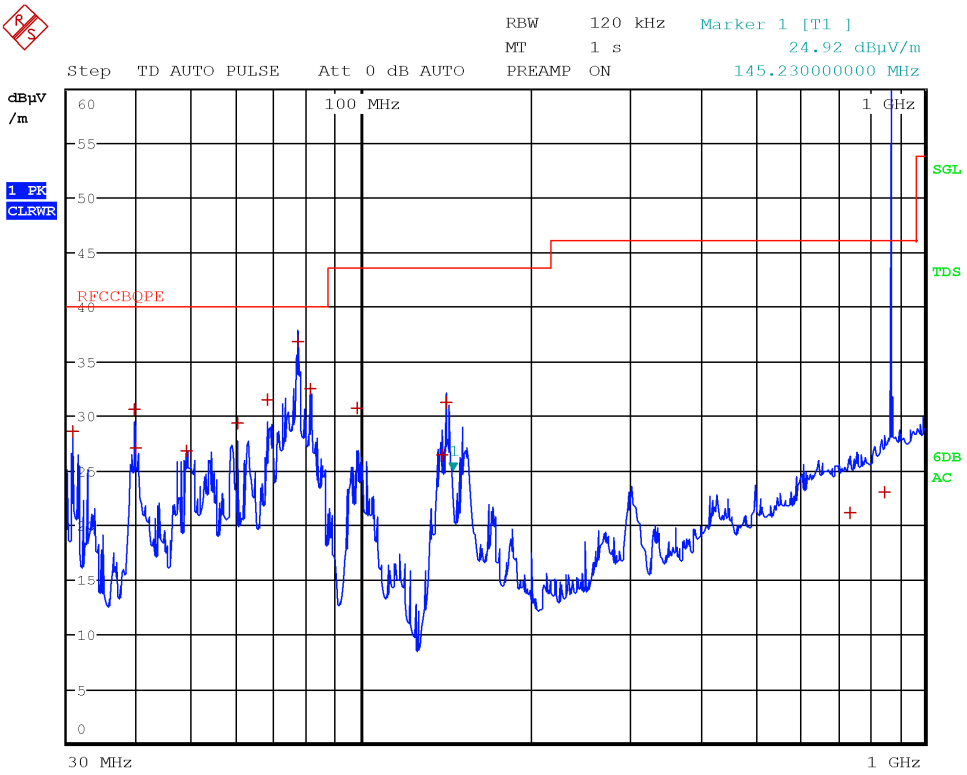
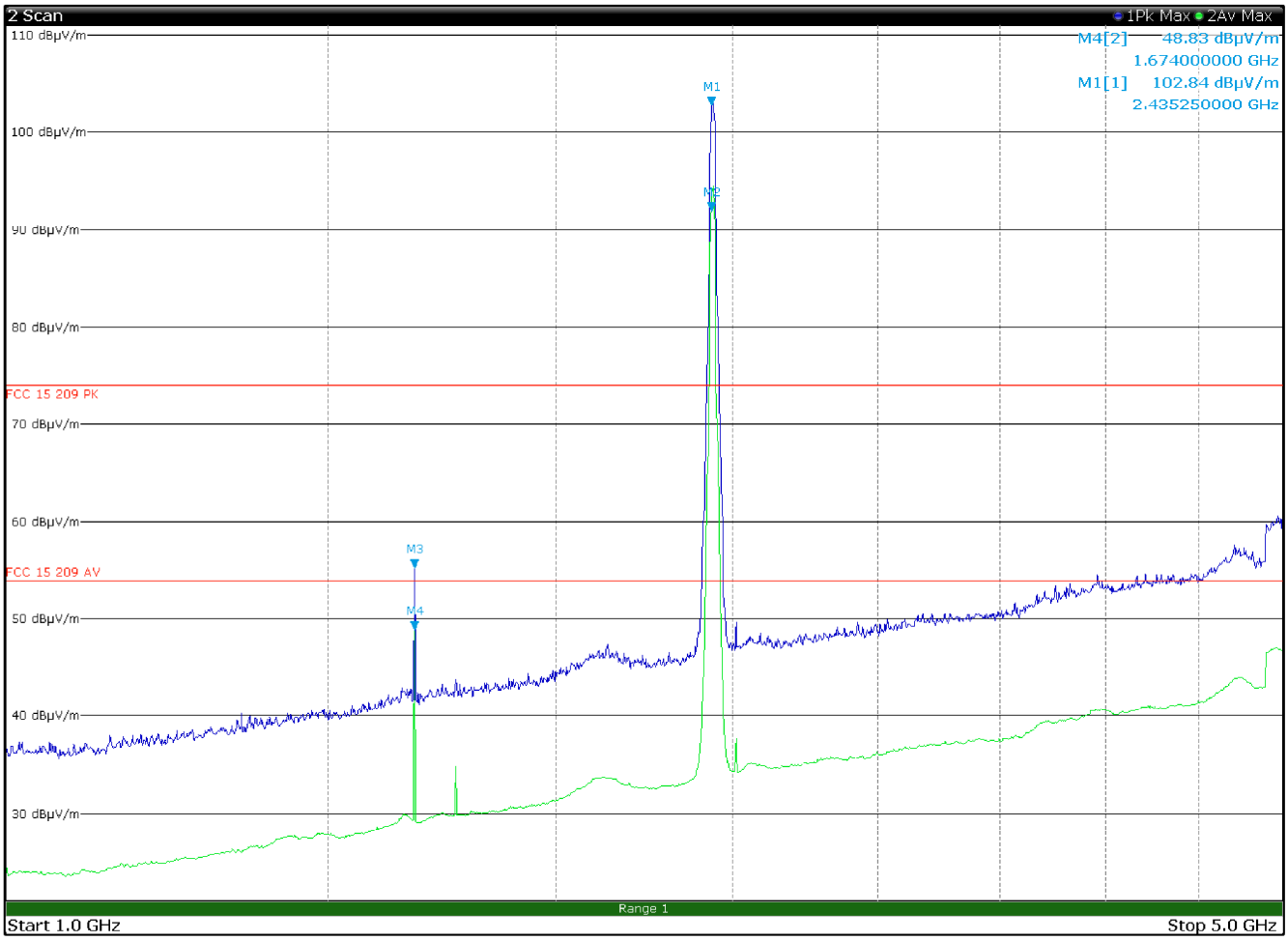


GSM 836.6 MHz and iwifi 802.11g 6Mbps Multiple Chain
2437 MHz, vertical polarization

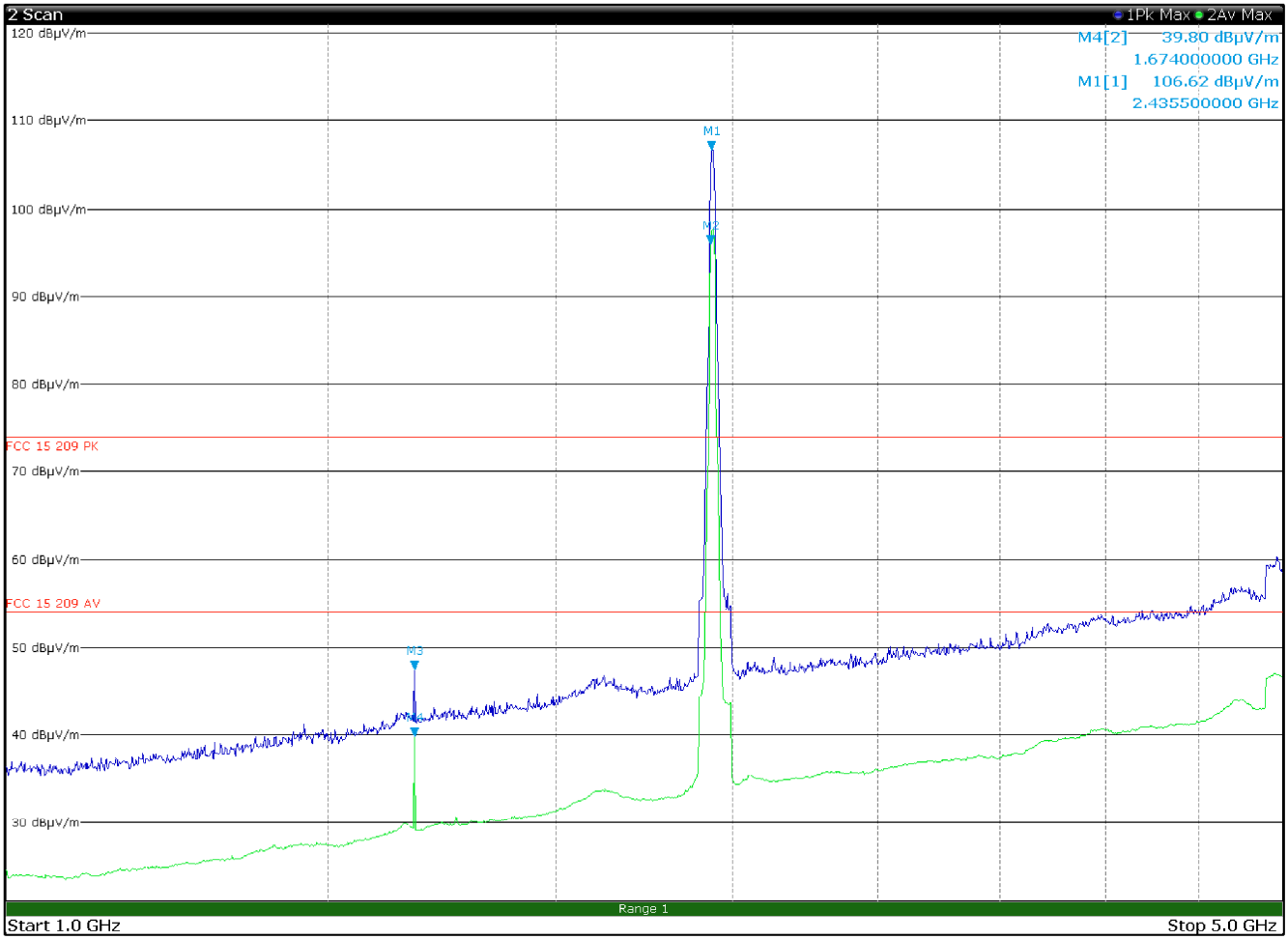
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
30.6000	28.6	40.0	-11.4	QP
39.4500	30.6	40.0	-9.4	QP
39.7200	27.1	40.0	-12.9	QP
49.0200	26.9	40.0	-13.1	QP
60.2100	29.4	40.0	-10.6	QP
68.2500	31.4	40.0	-8.6	QP
77.1900	36.9	40.0	-3.1	QP
81.1800	32.4	40.0	-7.6	QP
98.4300	30.8	43.5	-12.7	QP
139.2300	26.4	43.5	-17.1	QP
141.1800	31.3	43.5	-12.2	QP
737.6100	21.2	46.0	-24.8	QP
851.0100	23.1	46.0	-22.9	QP



3 Marker Table

Wnd	Type	Ref	Trc	X-value	Y-value
Scan	M1		1	**2.43525 GHz**	**102.84 dBµV/m**
Scan	M2		2	**2.43325 GHz**	**91.91 dBµV/m**
Scan	M3		1	**1.674 GHz**	**55.28 dBµV/m**
Scan	M4		2	**1.674 GHz**	**48.83 dBµV/m**

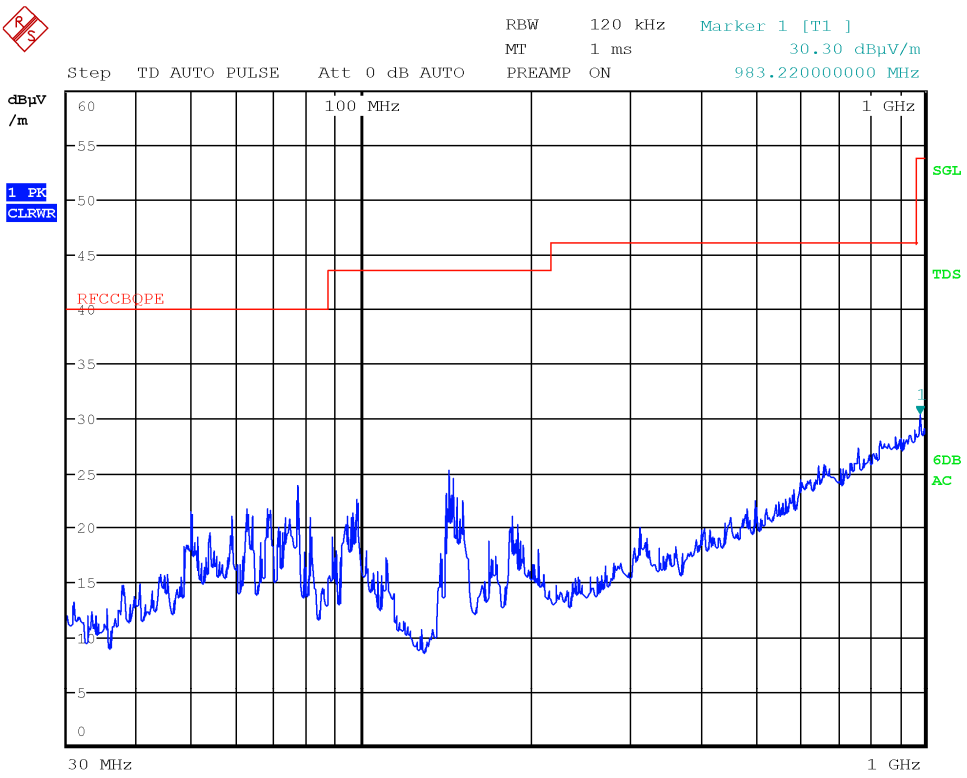
GSM 836.6 MHz and iwifi 802.11g 6Mbps Multiple Chain
2437 MHz, horizontal polarization



3 Marker Table

Wnd	Type	Ref	Trc	X-value	Y-value
Scan	M1		1	**2.4355 GHz**	**106.62 dBµV/m**
Scan	M2		2	**2.4305 GHz**	**95.86 dBµV/m**
Scan	M3		1	**1.674 GHz**	**47.41 dBµV/m**
Scan	M4		2	**1.674 GHz**	**39.8 dBµV/m**

GSM 836.6 MHz and iwifi 802.11g 6Mbps Multiple Chain
2437 MHz, vertical polarization



GSM 1880 MHz and iwifi 802.11g 6Mbps Multiple Chain
2437 MHz, horizontal polarization

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
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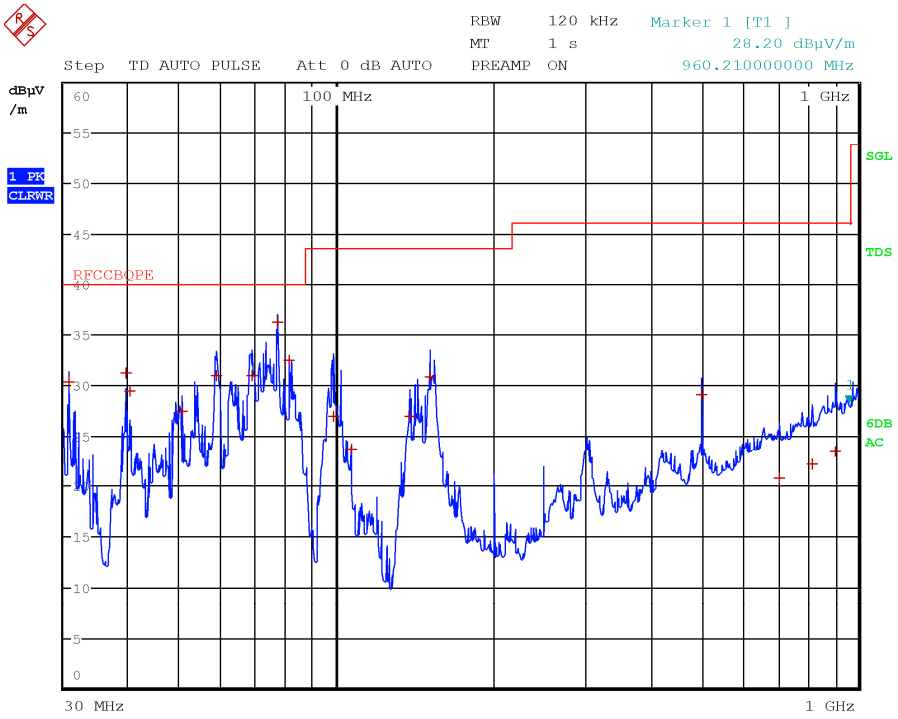
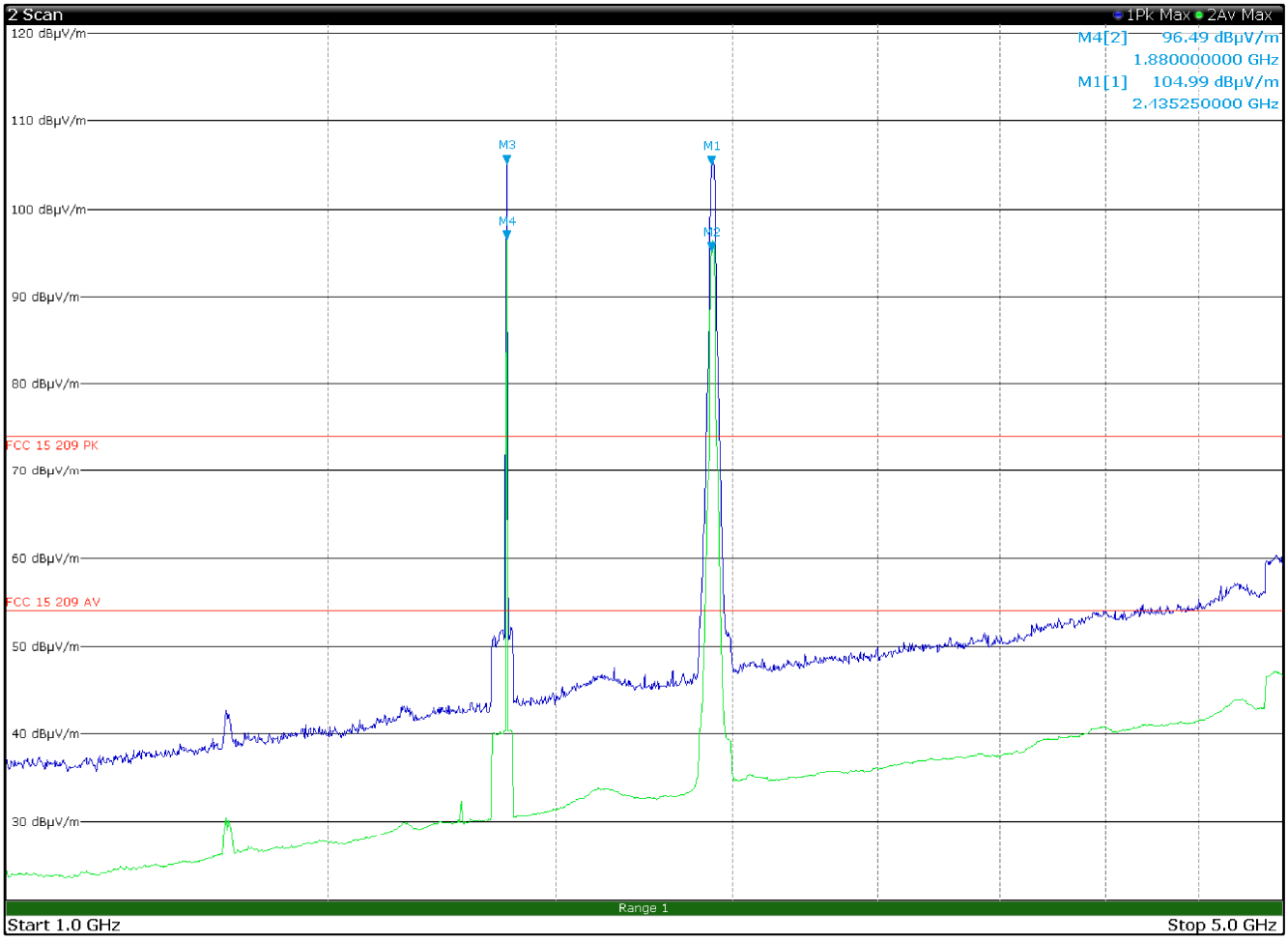


GSM 1880 MHz and iwifi 802.11g 6Mbps Multiple Chain
2437 MHz, vertical polarization

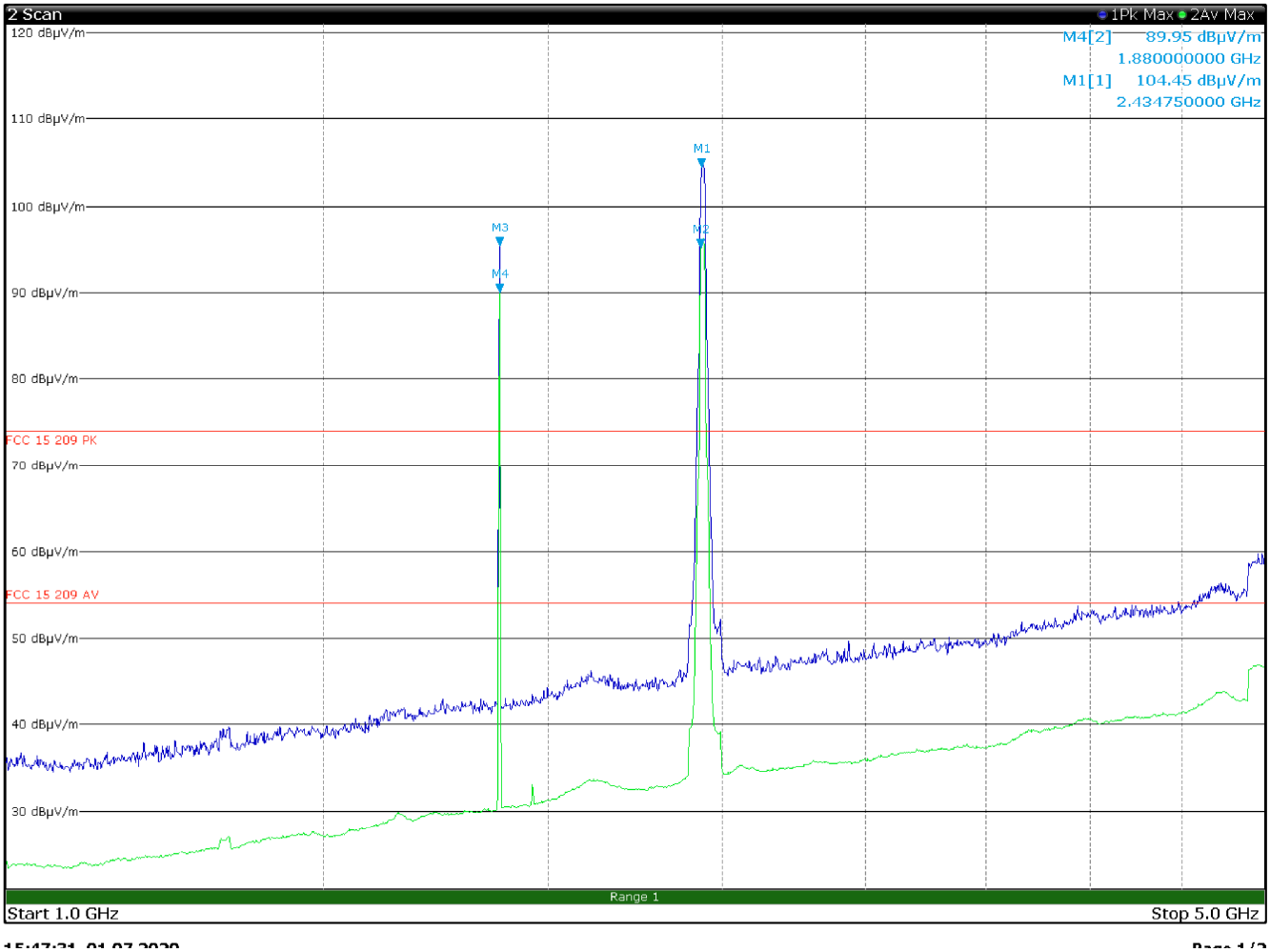
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
30.6000	30.3	40.0	-9.7	QP
39.4800	31.2	40.0	-8.8	QP
40.1100	29.4	40.0	-10.6	QP
50.4300	27.4	40.0	-12.6	QP
58.7100	30.9	40.0	-9.1	QP
68.9700	31.0	40.0	-9.0	QP
77.1900	36.3	40.0	-3.7	QP
81.2100	32.6	40.0	-7.4	QP
98.4900	27.0	43.5	-16.5	QP
106.7100	23.6	43.5	-19.9	QP
138.3900	27.0	43.5	-16.5	QP
151.5600	30.9	43.5	-12.6	QP
500.0100	29.1	46.0	-16.9	QP
706.8300	20.8	46.0	-25.2	QP
817.4400	22.2	46.0	-23.8	QP
904.8600	23.5	46.0	-22.5	QP



3 Marker Table

Wnd	Type	Ref	Trc	X-value	Y-value
Scan	M1		1	**2.43525 GHz**	**104.99 dBµV/m**
Scan	M2		2	**2.433 GHz**	**95.15 dBµV/m**
Scan	M3		1	**1.88 GHz**	**105.13 dBµV/m**
Scan	M4		2	**1.88 GHz**	**96.49 dBµV/m**

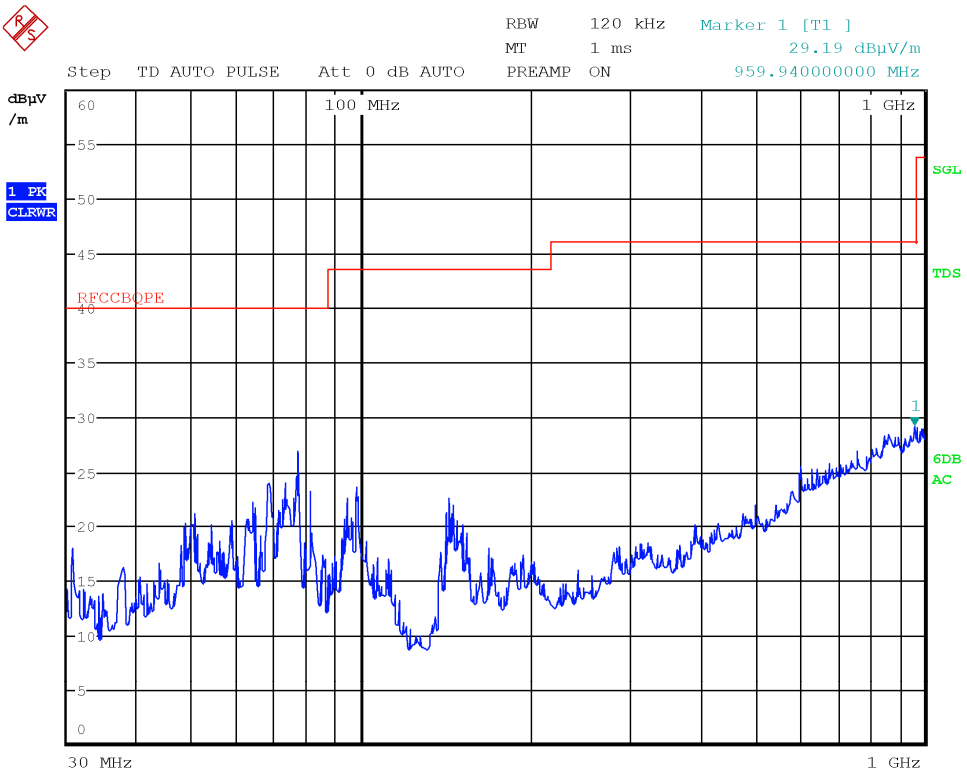
GSM 1880 MHz and iwifi 802.11g 6Mbps Multiple Chain
2437 MHz, horizontal polarization



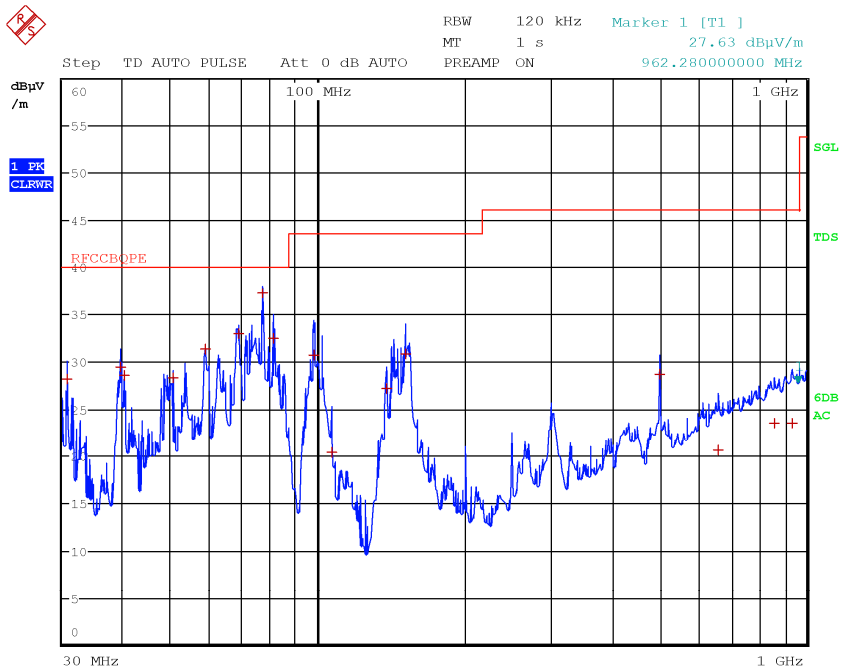
3 Marker Table

Wnd	Type	Ref	Trc	X-value	Y-value
Scan	M1		1	**2.43475 GHz**	**104.45 dBµV/m**
Scan	M2		2	**2.4325 GHz**	**95.08 dBµV/m**
Scan	M3		1	**1.88 GHz**	**95.32 dBµV/m**
Scan	M4		2	**1.88 GHz**	**89.95 dBµV/m**

GSM 1880 MHz and iwifi 802.11g 6Mbps Multiple Chain
2437 MHz, vertical polarization

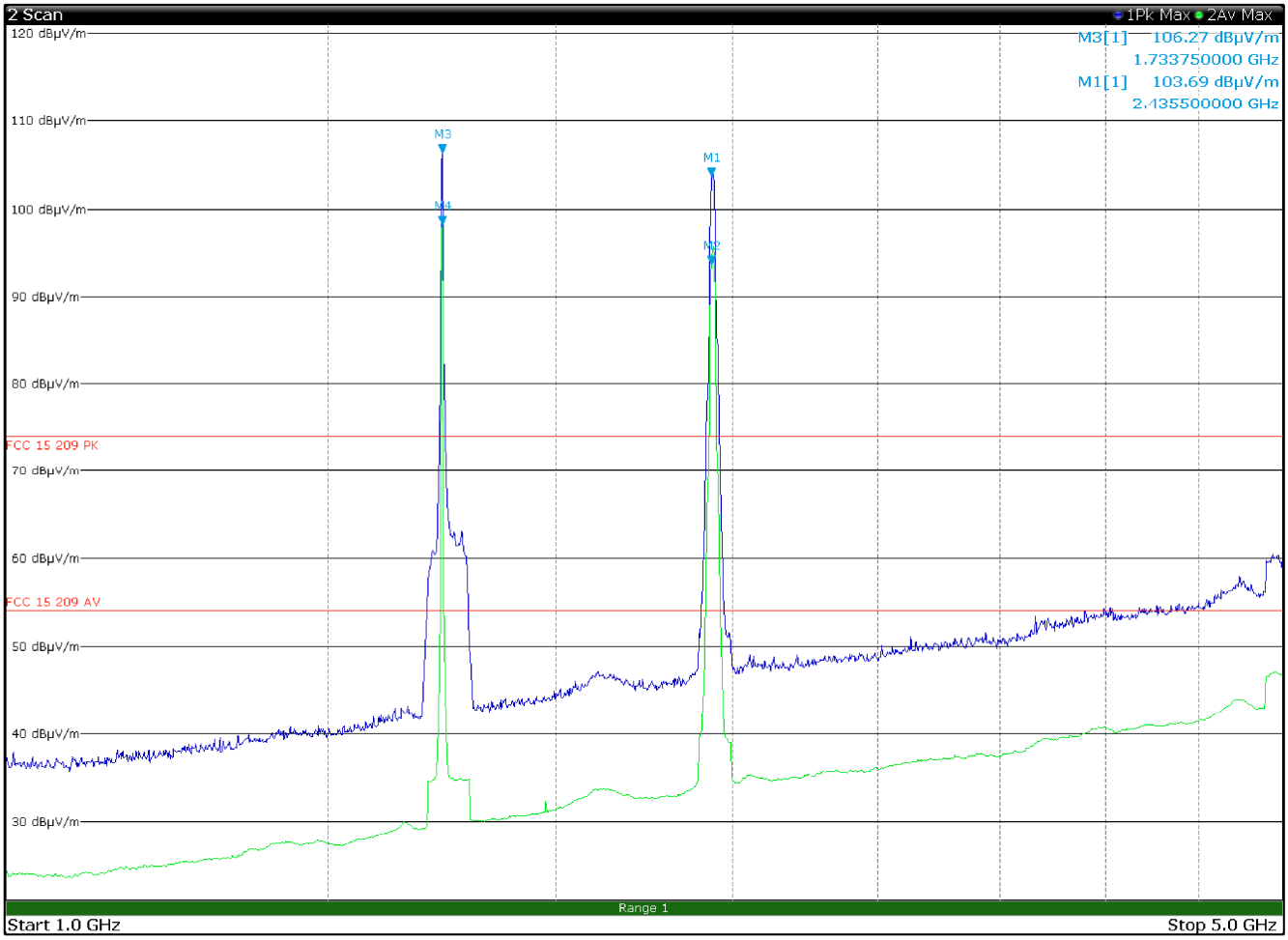


WCDMA/UMTS IV 1732.6 MHz and iwifi 802.11g 6Mbps Multiple Chain
2437 MHz, horizontal polarization



WCDMA/UMTS IV 1732.6 MHz and wifi 802.11g 6Mbps Multiple Chain
2437 MHz, vertical polarization

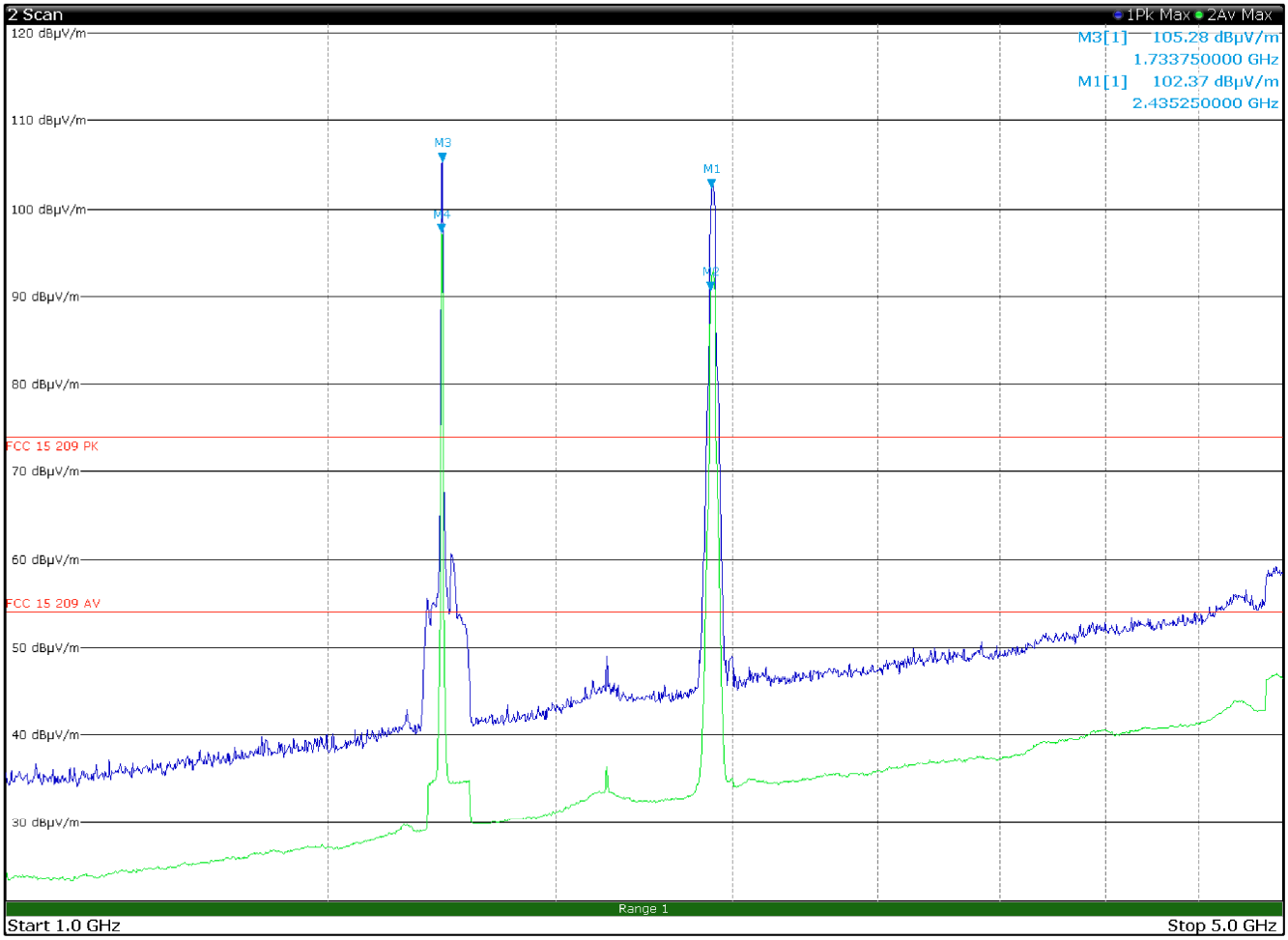
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
30.6000	30.3	40.0	-9.7	QP
39.4800	31.2	40.0	-8.8	QP
40.1100	29.4	40.0	-10.6	QP
50.4300	27.4	40.0	-12.6	QP
58.7100	30.9	40.0	-9.1	QP
68.9700	31.0	40.0	-9.0	QP
77.1900	36.3	40.0	-3.7	QP
81.2100	32.6	40.0	-7.4	QP
98.4900	27.0	43.5	-16.5	QP
106.7100	23.6	43.5	-19.9	QP
138.3900	27.0	43.5	-16.5	QP
151.5600	30.9	43.5	-12.6	QP
500.0100	29.1	46.0	-16.9	QP
706.8300	20.8	46.0	-25.2	QP
817.4400	22.2	46.0	-23.8	QP



3 Marker Table

Wnd	Type	Ref	Trc	X-value	Y-value
Scan	M1		1	**2.4355 GHz**	**103.69 dBµV/m**
Scan	M2		2	**2.4335 GHz**	**93.57 dBµV/m**
Scan	M3		1	**1.73375 GHz**	**106.27 dBµV/m**
Scan	M4		2	**1.733 GHz**	**98.21 dBµV/m**

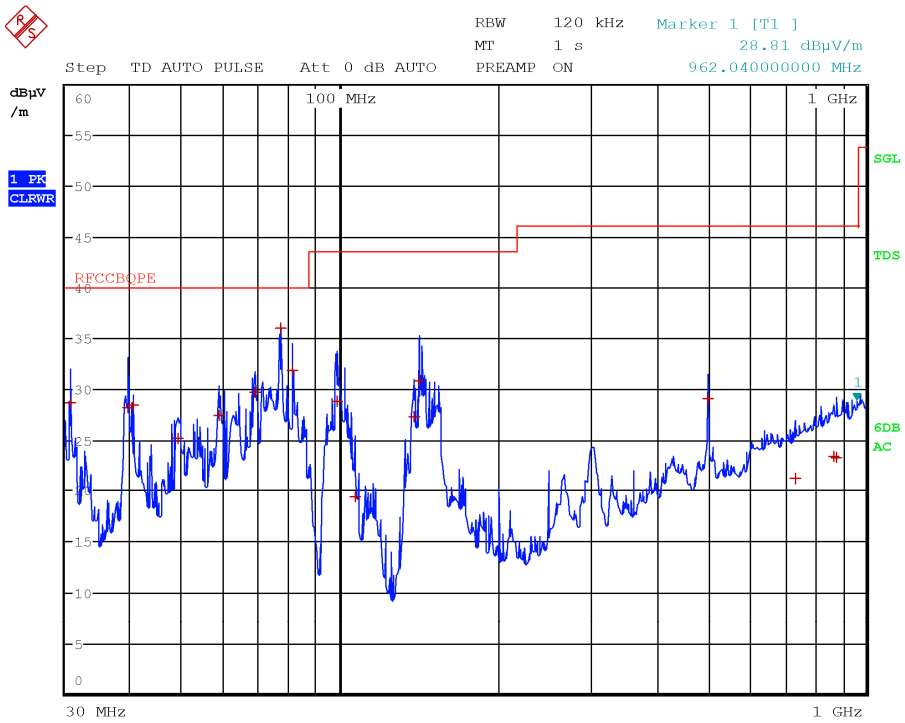
WCDMA/UMTS IV 1732.6 MHz and iwifi 802.11g 6Mbps Multiple Chain
2437 MHz, horizontal polarization



3 Marker Table

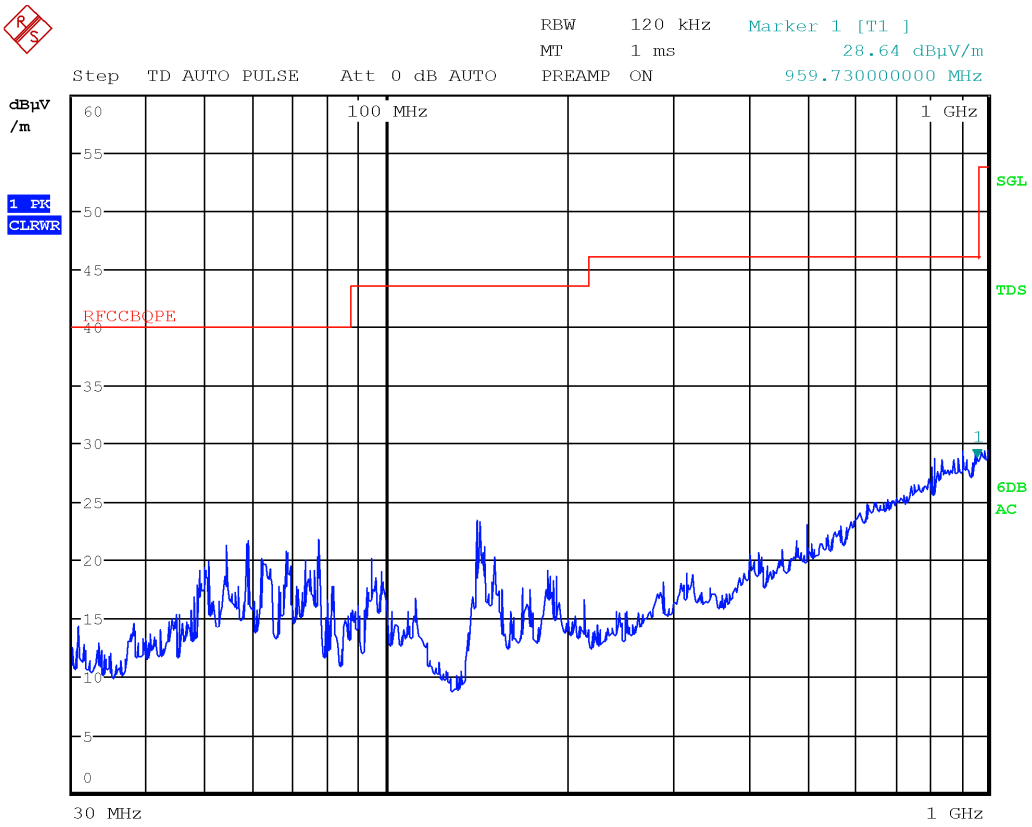
Wnd	Type	Ref	Trc	X-value	Y-value
Scan	M1		1	**2.43525 GHz**	**102.37 dBµV/m**
Scan	M2		2	**2.43075 GHz**	**90.6 dBµV/m**
Scan	M3		1	**1.73375 GHz**	**105.28 dBµV/m**
Scan	M4		2	**1.7325 GHz**	**97.16 dBµV/m**

WCDMA/UMTS IV 1732.6 MHz and iwifi 802.11g 6Mbps Multiple Chain
2437 MHz, vertical polarization



LTE B41 (5MHz) 2593 MHz and iwifi 802.11g 6Mbps Multiple Chain
2437 MHz, vertical polarization

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
77.1900	36.0	40.0	-4.0	QP
81.2100	31.9	40.0	-8.1	QP
69.0000	29.7	40.0	-10.3	QP
30.6300	28.7	40.0	-11.3	QP
40.3200	28.5	40.0	-11.5	QP
39.4500	28.3	40.0	-11.7	QP
58.7700	27.5	40.0	-12.5	QP
141.1800	30.9	43.5	-12.6	QP
98.4900	28.8	43.5	-14.7	QP
49.0800	25.2	40.0	-14.8	QP
138.3900	27.3	43.5	-16.2	QP
500.0100	29.2	46.0	-16.8	QP
867.1800	23.4	46.0	-22.6	QP
880.1700	23.3	46.0	-22.7	QP



LTE B41 (5MHz) 2593 MHz and iwifi 802.11g 6Mbps Multiple Chain
2437 MHz, horizontal polarization

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
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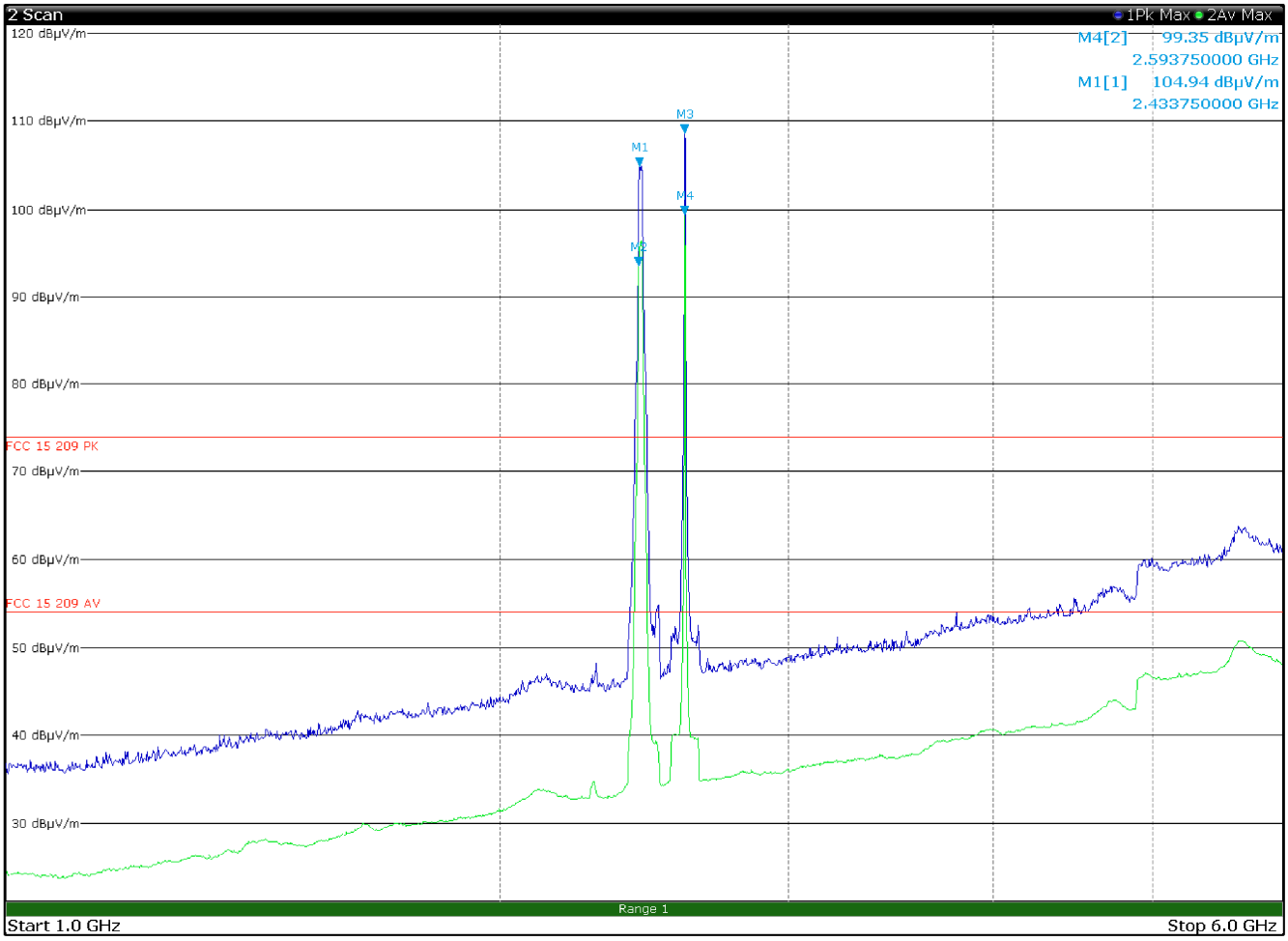
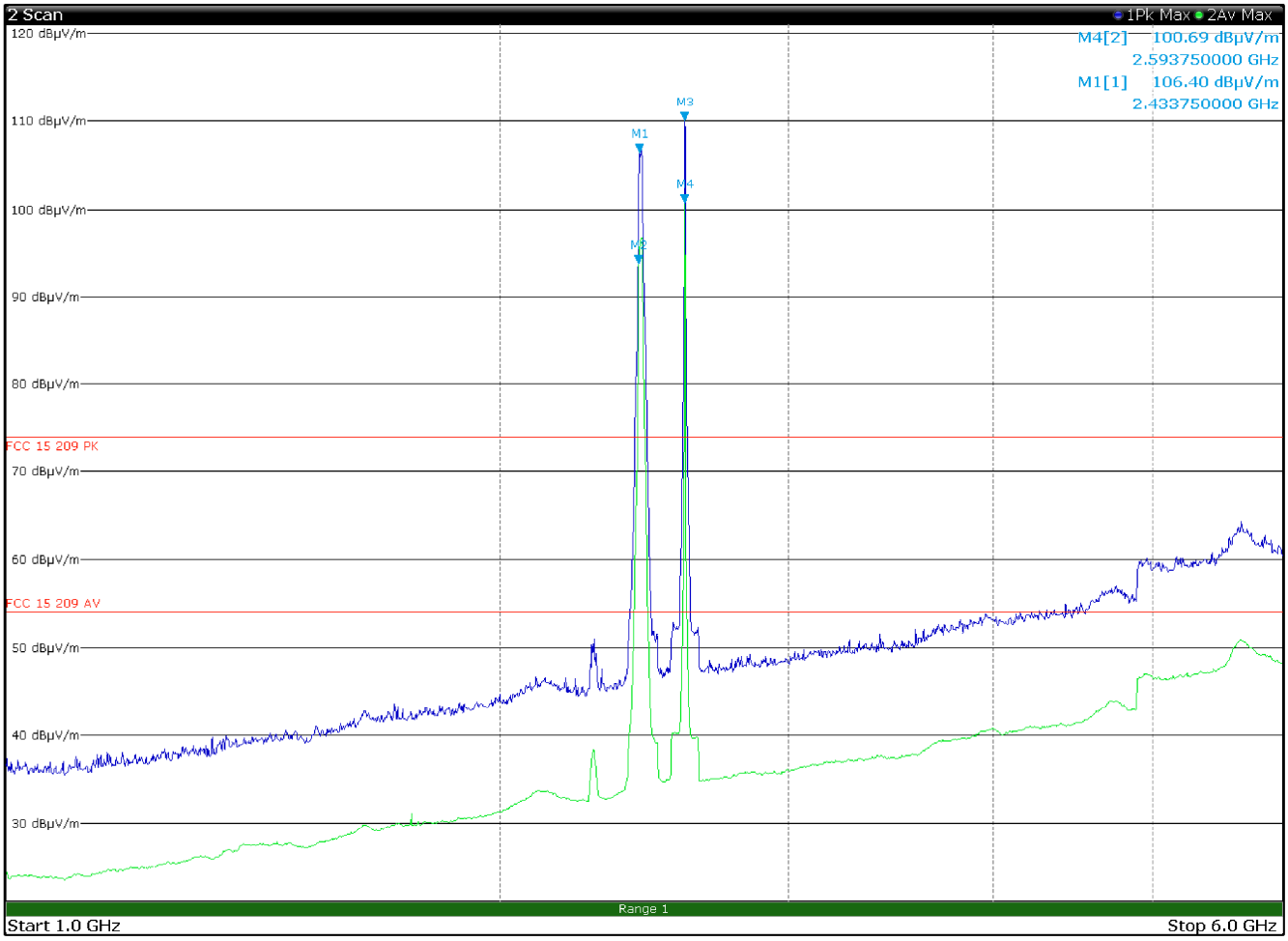


3 Marker Table

Wnd	Type	Ref	Trc	X-value	Y-value
Scan	M1		1	**2.43375 GHz**	**104.94 dBµV/m**
Scan	M2		2	**2.4305 GHz**	**93.44 dBµV/m**
Scan	M3		1	**2.593 GHz**	**108.65 dBµV/m**
Scan	M4		2	**2.59375 GHz**	**99.35 dBµV/m**

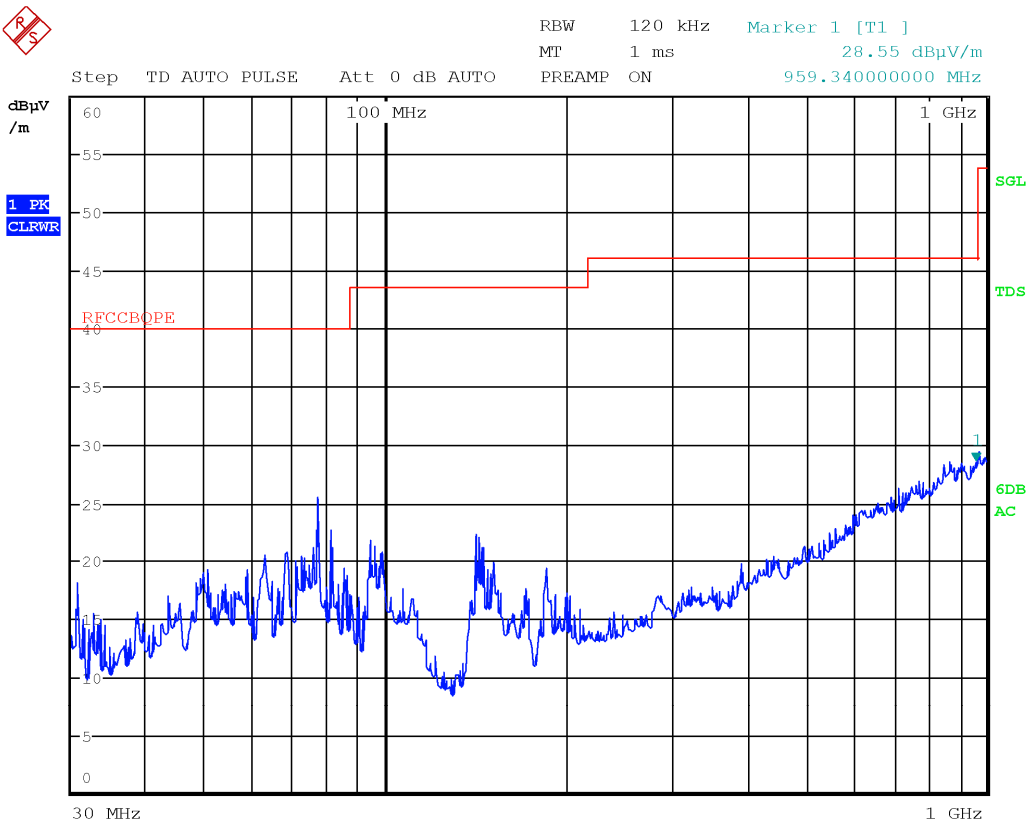
LTE B41 (5MHz) 2593 MHz and iwifi 802.11g 6Mbps Multiple Chain
2437 MHz, vertical polarization



3 Marker Table

Wnd	Type	Ref	Trc	X-value	Y-value
Scan	M1		1	**2.43375 GHz**	**106.4 dBµV/m**
Scan	M2		2	**2.4305 GHz**	**93.65 dBµV/m**
Scan	M3		1	**2.593 GHz**	**110.03 dBµV/m**
Scan	M4		2	**2.59375 GHz**	**100.69 dBµV/m**

LTE B41 (5MHz) 2593 MHz and iwifi 802.11g 6Mbps Multiple Chain
2437 MHz, horizontal polarization



LTE B41 (5MHz) 2593 MHz and wifi 802.11a 6Mbps Multiple Chain
5300 MHz, horizontal polarization

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
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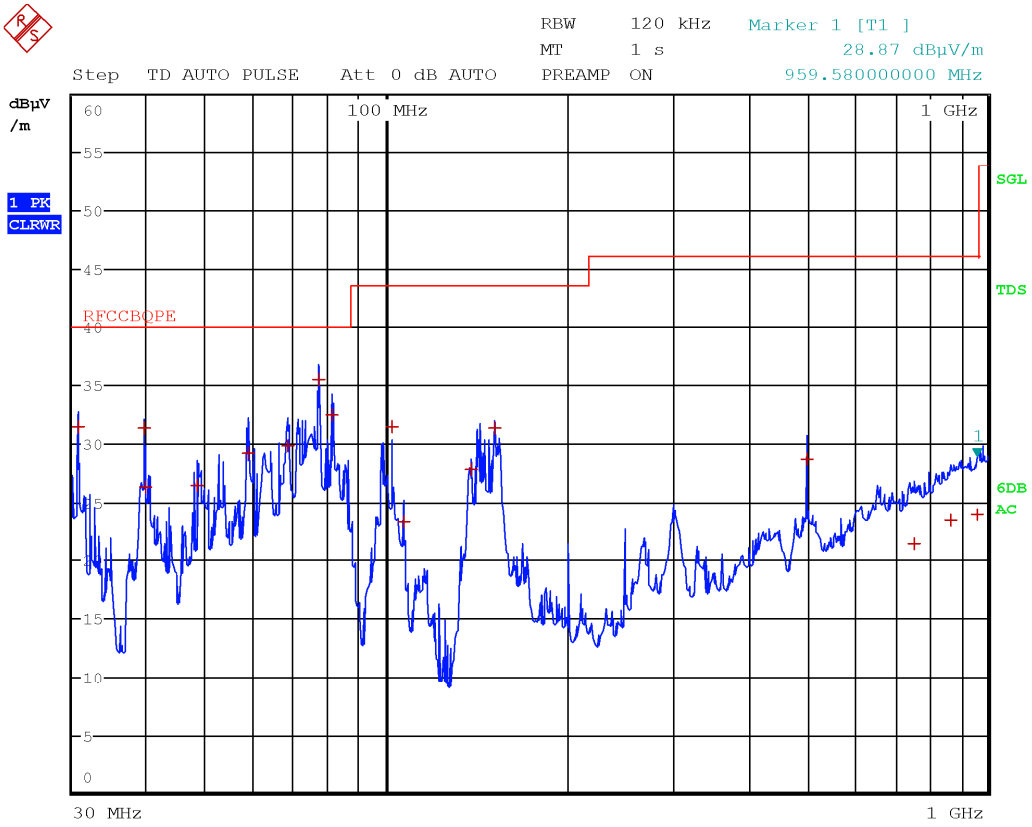
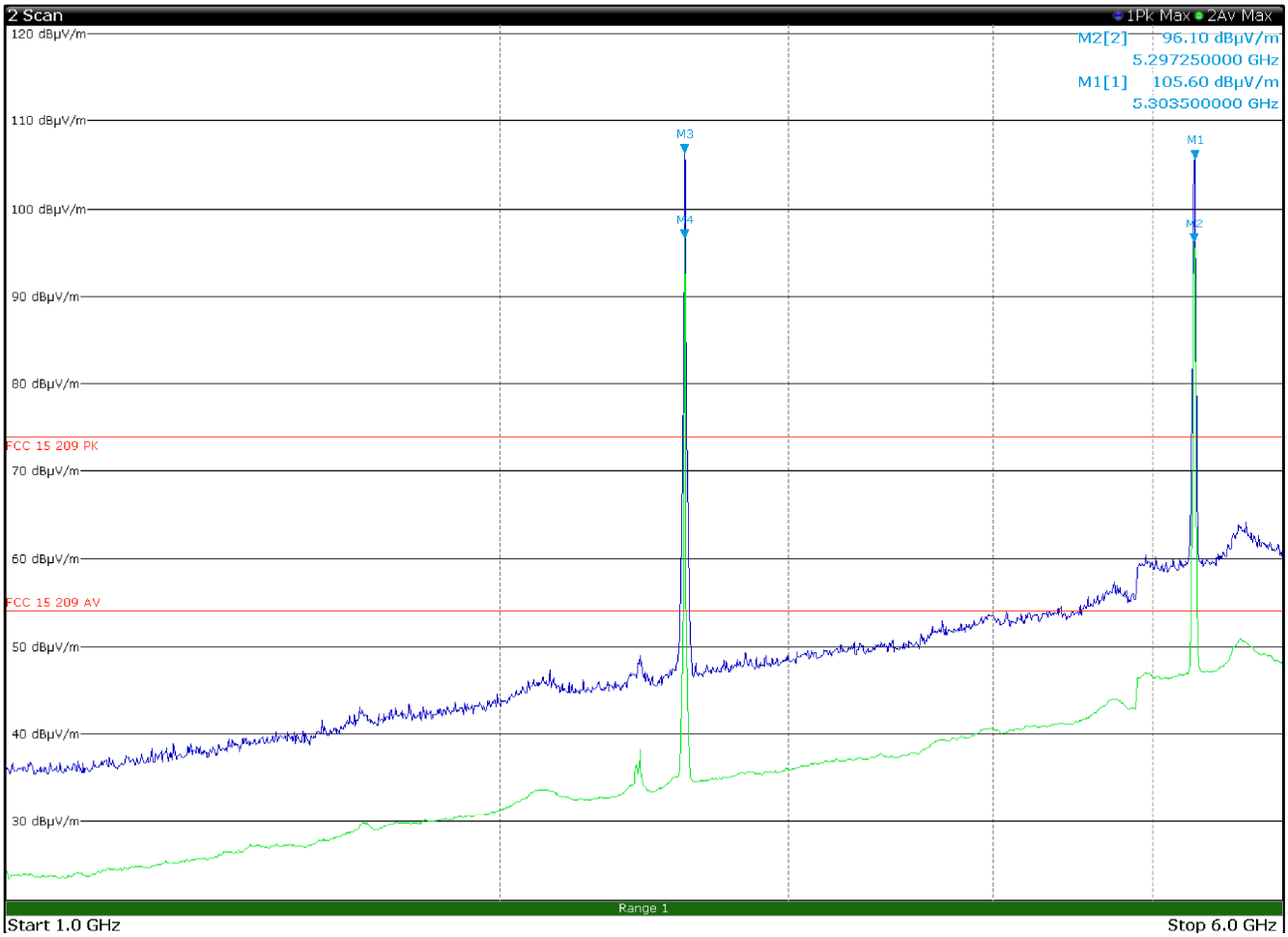


LTE B41 (5MHz) 2593 MHz and wifi 802.11a 6Mbps Multiple Chain
5300 MHz, vertical polarization

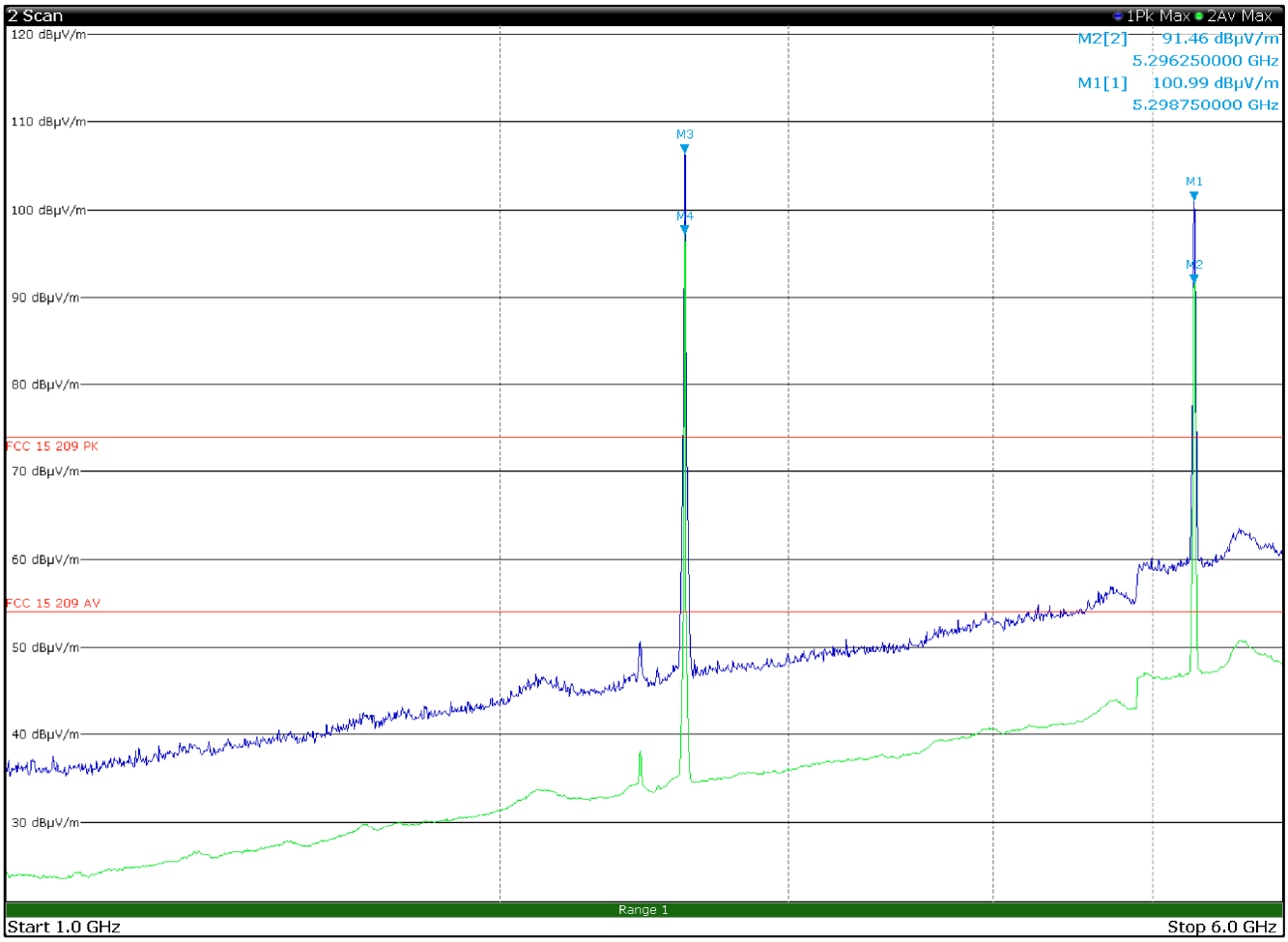
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
77.1900	35.5	40.0	-4.5	QP
81.2100	32.5	40.0	-7.5	QP
30.6000	31.5	40.0	-8.5	QP
39.4800	31.3	40.0	-8.7	QP
68.4600	29.9	40.0	-10.1	QP
58.7100	29.2	40.0	-10.8	QP
101.8800	31.4	43.5	-12.1	QP
151.5600	31.4	43.5	-12.1	QP
48.4500	26.5	40.0	-13.5	QP
39.7200	26.4	40.0	-13.6	QP
138.4200	27.8	43.5	-15.7	QP
499.9800	28.7	46.0	-17.3	QP
106.7100	23.3	43.5	-20.2	QP
959.5800	24.0	46.0	-22.0	QP
867.8700	23.4	46.0	-22.6	QP
754.2000	21.5	46.0	-24.5	QP



3 Marker Table

Wnd	Type	Ref	Trc	X-value	Y-value
Scan	M1		1	**5.3035 GHz**	**105.6 dBµV/m**
Scan	M2		2	**5.29725 GHz**	**96.1 dBµV/m**
Scan	M3		1	**2.593 GHz**	**106.31 dBµV/m**
Scan	M4		2	**2.59175 GHz**	**96.51 dBµV/m**

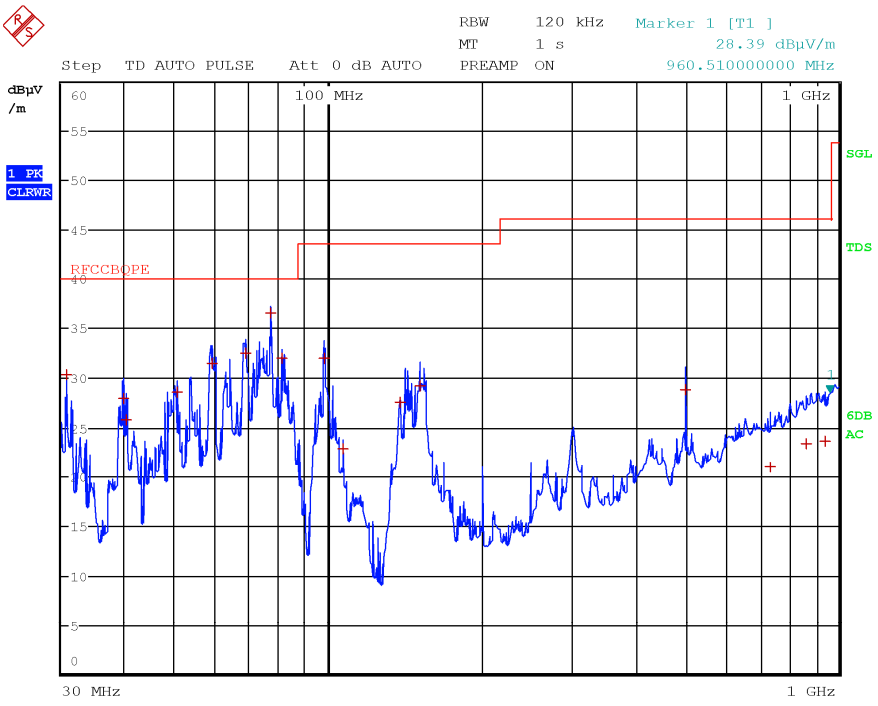
LTE B41 (5MHz) 2593 MHz and wifi 802.11a 6Mbps Multiple Chain
5300 MHz, horizontal polarization



3 Marker Table

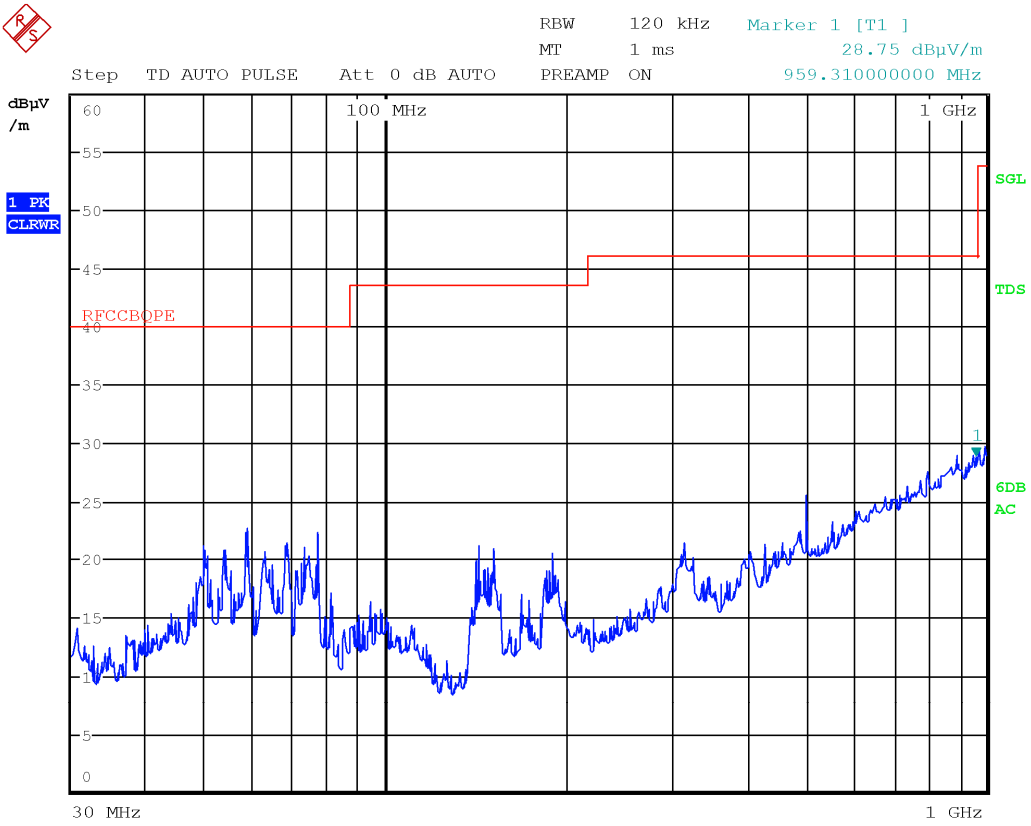
Wnd	Type	Ref	Trc	X-value	Y-value
Scan	M1		1	**5.29875 GHz**	**100.99 dBµV/m**
Scan	M2		2	**5.29625 GHz**	**91.46 dBµV/m**
Scan	M3		1	**2.592 GHz**	**106.37 dBµV/m**
Scan	M4		2	**2.592 GHz**	**97.1 dBµV/m**

LTE B41 (5MHz) 2593 MHz and wifi 802.11a 6Mbps Multiple Chain
5300 MHz, vertical polarization



WCDMA/UMTS IV 1732.6 MHz and wifi 802.11a Multiple Chain 5300 MHz, vertical polarization

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
77.1900	36.6	40.0	-3.4	QP
69.0000	32.5	40.0	-7.5	QP
81.2100	32.0	40.0	-8.0	QP
59.3100	31.5	40.0	-8.5	QP
30.6000	30.4	40.0	-9.6	QP
50.4300	28.6	40.0	-11.4	QP
98.4300	32.0	43.5	-11.5	QP
39.6600	28.0	40.0	-12.0	QP
40.0800	25.8	40.0	-14.2	QP
151.5600	29.2	43.5	-14.3	QP
138.3900	27.6	43.5	-15.9	QP
499.9800	28.8	46.0	-17.2	QP
106.7100	22.9	43.5	-20.6	QP
938.9100	23.6	46.0	-22.4	QP
865.3200	23.4	46.0	-22.6	QP
732.2400	21.1	46.0	-24.9	QP



WCDMA/UMTS IV 1732.6 MHz and wifi 802.11a Multiple Chain 5300 MHz, horizontal polarization

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
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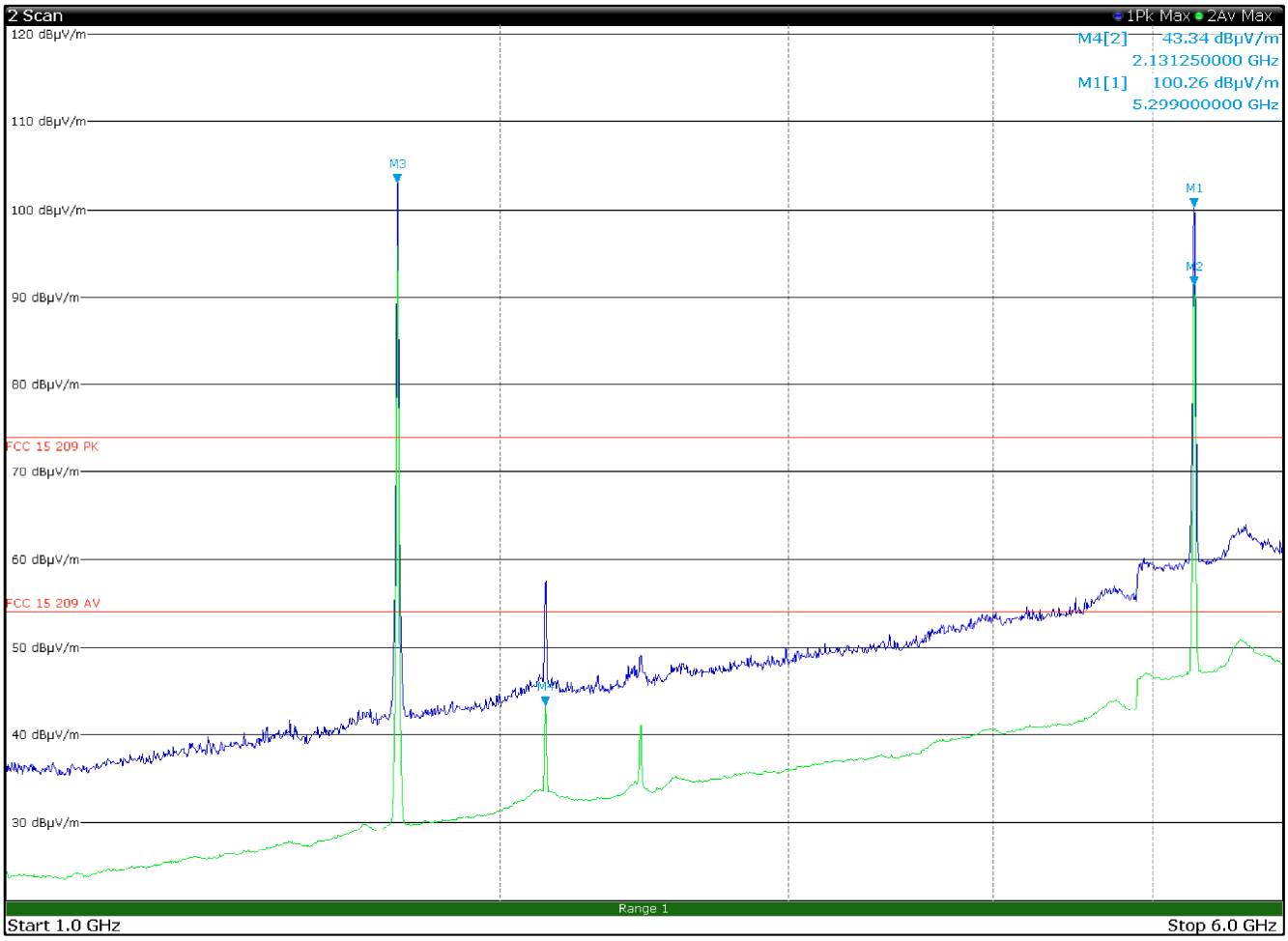
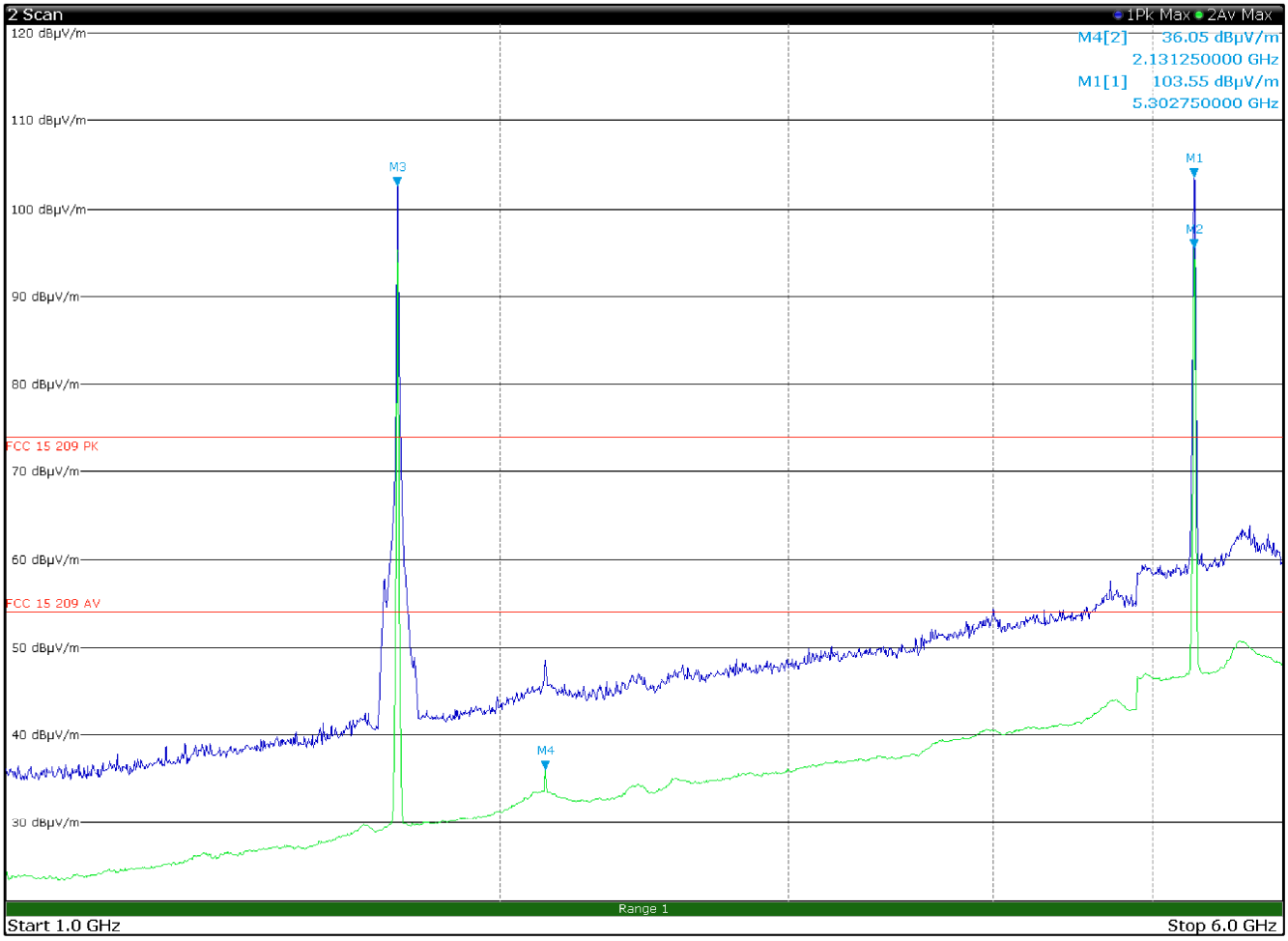


3 Marker Table

Wnd	Type	Ref	Trc	X-value	Y-value
Scan	M1		1	**5.299 GHz**	**100.26 dBµV/m**
Scan	M2		2	**5.29675 GHz**	**91.28 dBµV/m**
Scan	M3		1	**1.73175 GHz**	**103.03 dBµV/m**
Scan	M4		2	**2.13125 GHz**	**43.34 dBµV/m**

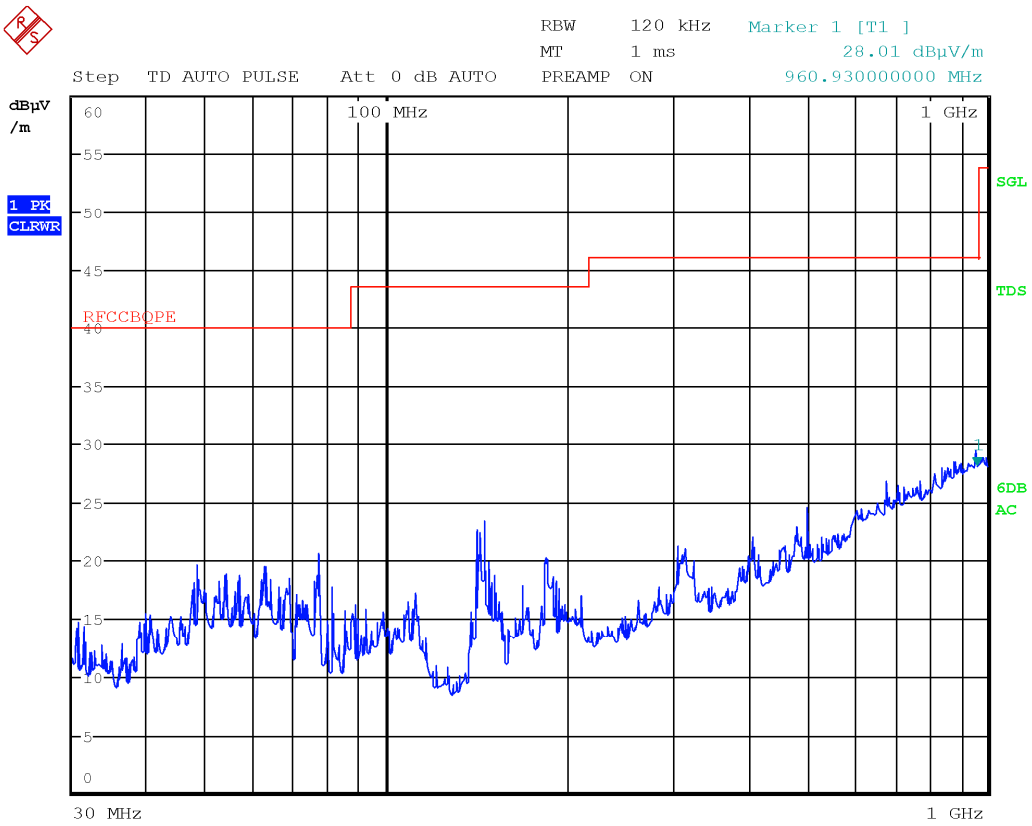
WCDMA/UMTS IV 1732.6 MHz and wifi 802.11a Multiple Chain 5300 MHz, vertical polarization



3 Marker Table

Wnd	Type	Ref	Trc	X-value	Y-value
Scan	M1		1	**5.30275 GHz**	**103.55 dBµV/m**
Scan	M2		2	**5.29775 GHz**	**95.49 dBµV/m**
Scan	M3		1	**1.73175 GHz**	**102.59 dBµV/m**
Scan	M4		2	**2.13125 GHz**	**36.05 dBµV/m**

WCDMA/UMTS IV 1732.6 MHz and wifi 802.11a Multiple Chain 5300 MHz, horizontal polarization



GSM 1880 MHz and wifi 802.11a Multiple Chain 5300 MHz, horizontal polarization

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
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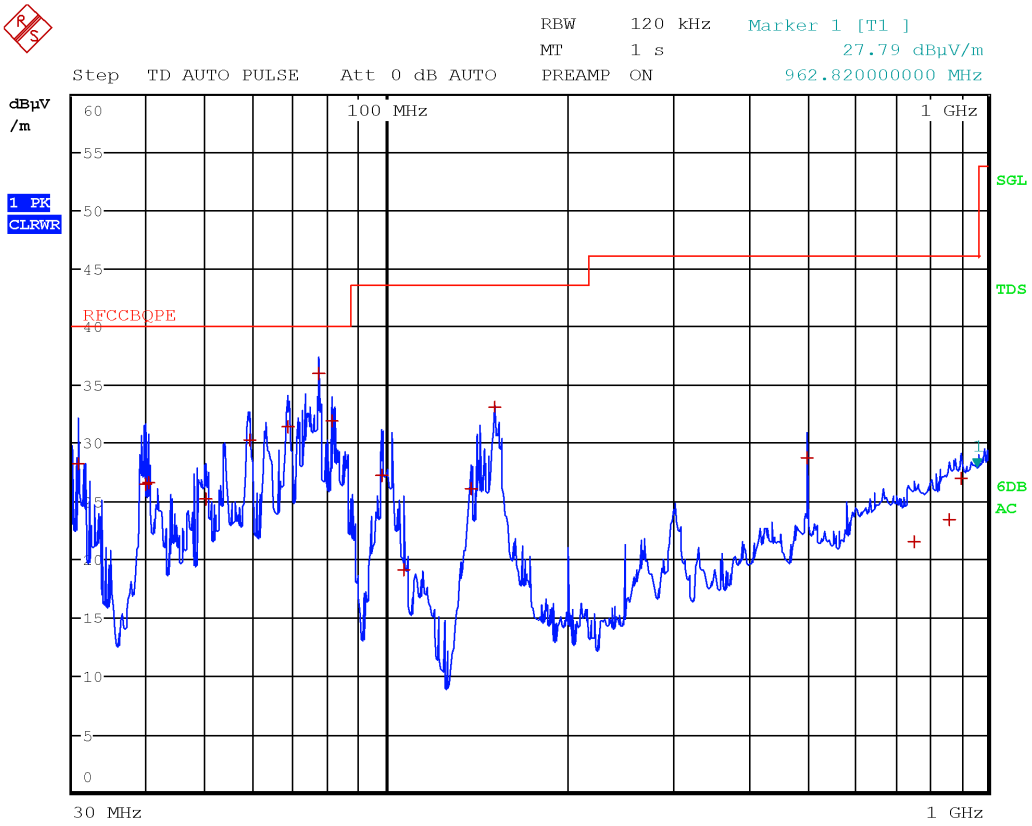
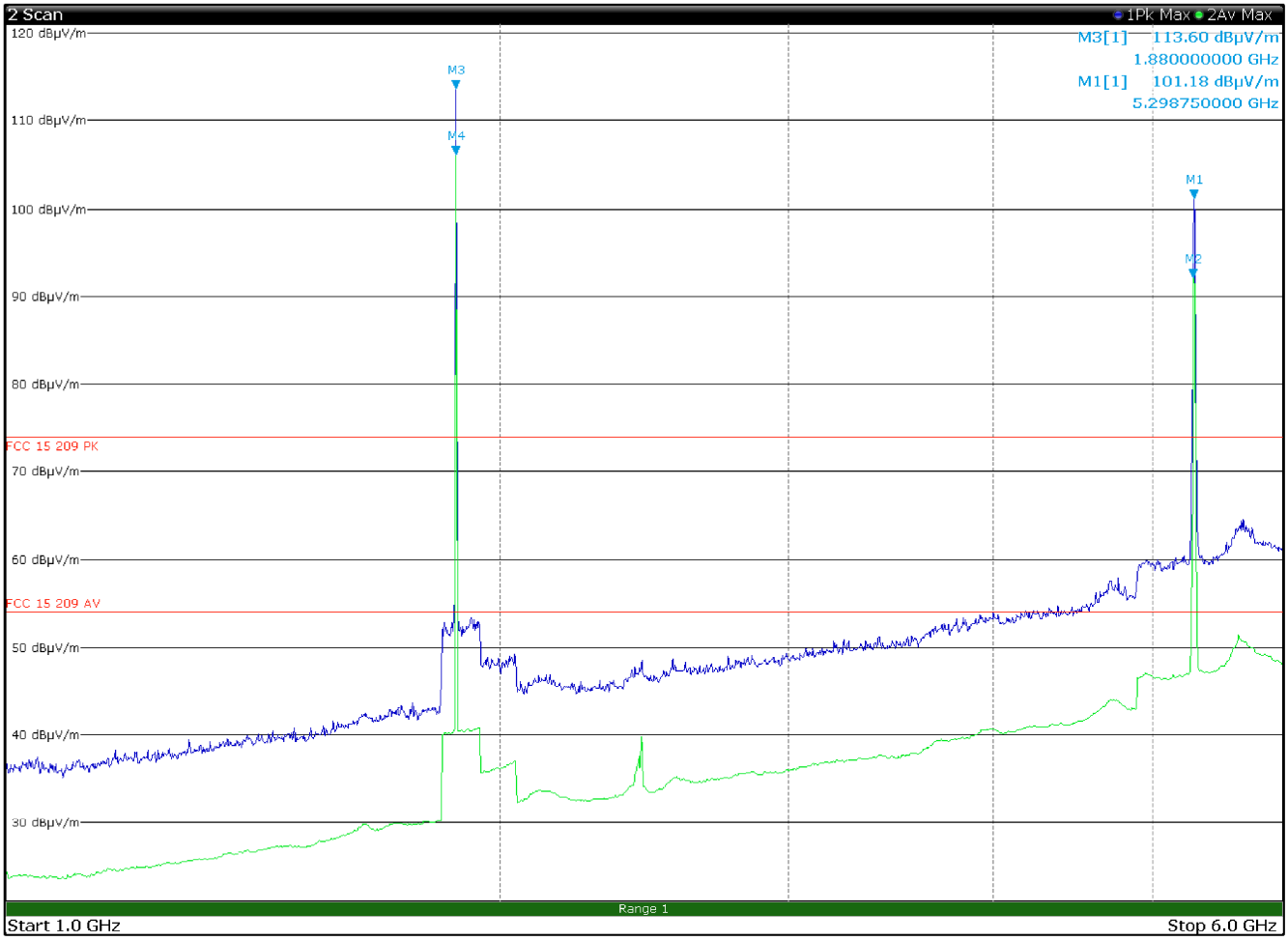


GSM 1880 MHz and wifi 802.11a Multiple Chain 5300 MHz, vertical polarization

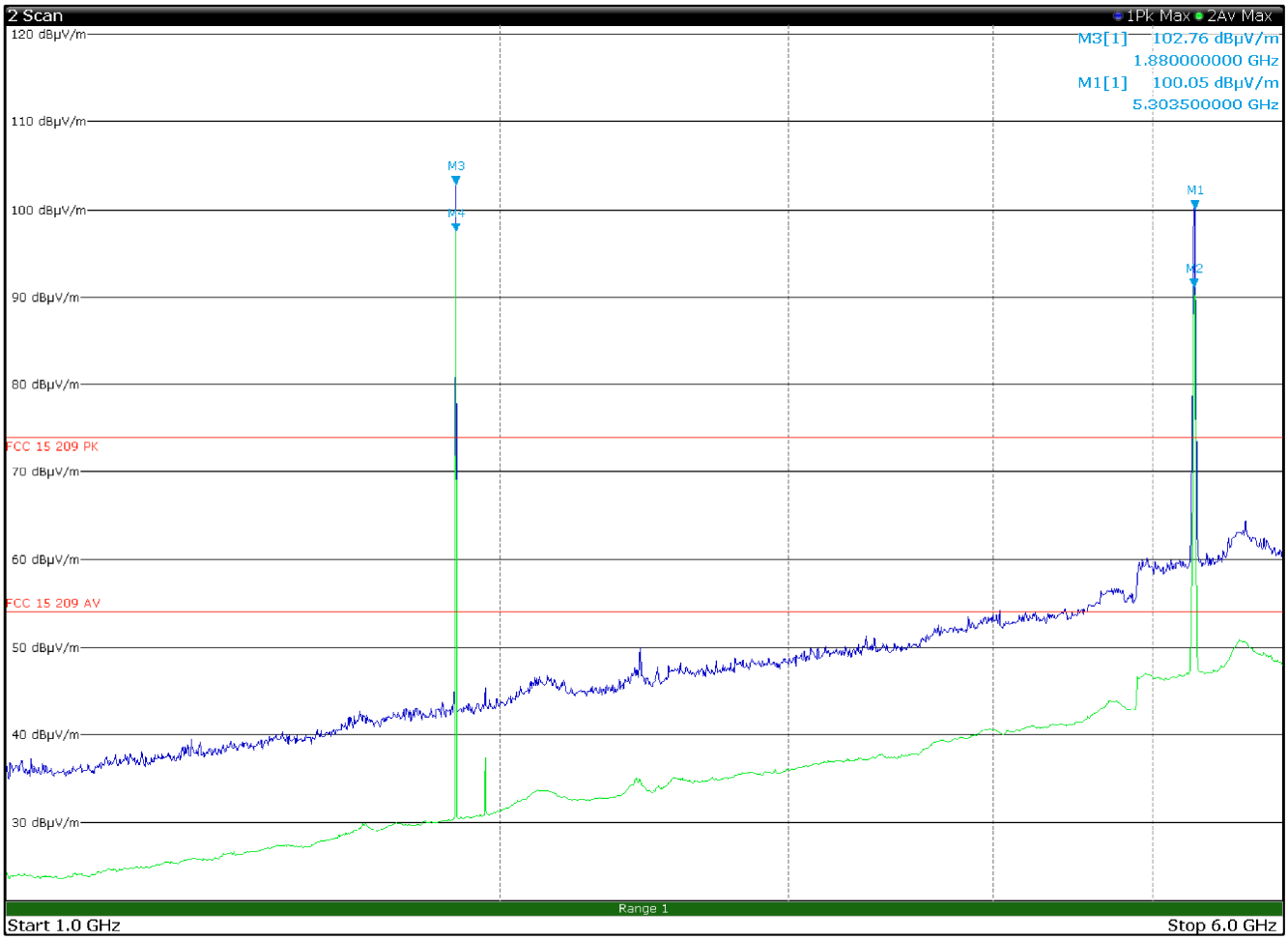
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
77.1900	36.0	40.0	-4.0	QP
81.2100	31.9	40.0	-8.1	QP
68.4600	31.4	40.0	-8.6	QP
59.3400	30.3	40.0	-9.7	QP
151.5900	33.1	43.5	-10.4	QP
30.6300	28.3	40.0	-11.7	QP
40.1100	26.6	40.0	-13.4	QP
39.6300	26.5	40.0	-13.5	QP
49.8600	25.2	40.0	-14.8	QP
98.4300	27.2	43.5	-16.3	QP
499.9800	28.8	46.0	-17.2	QP
138.4500	26.1	43.5	-17.4	QP
906.2400	27.0	46.0	-19.0	QP
863.3700	23.4	46.0	-22.6	QP
106.6500	19.2	43.5	-24.3	QP
752.9700	21.5	46.0	-24.5	QP



3 Marker Table

Wnd	Type	Ref	Trc	X-value	Y-value
Scan	M1		1	**5.29875 GHz**	**101.18 dBµV/m**
Scan	M2		2	**5.296 GHz**	**92.04 dBµV/m**
Scan	M3		1	**1.88 GHz**	**113.6 dBµV/m**
Scan	M4		2	**1.88 GHz**	**106.04 dBµV/m**

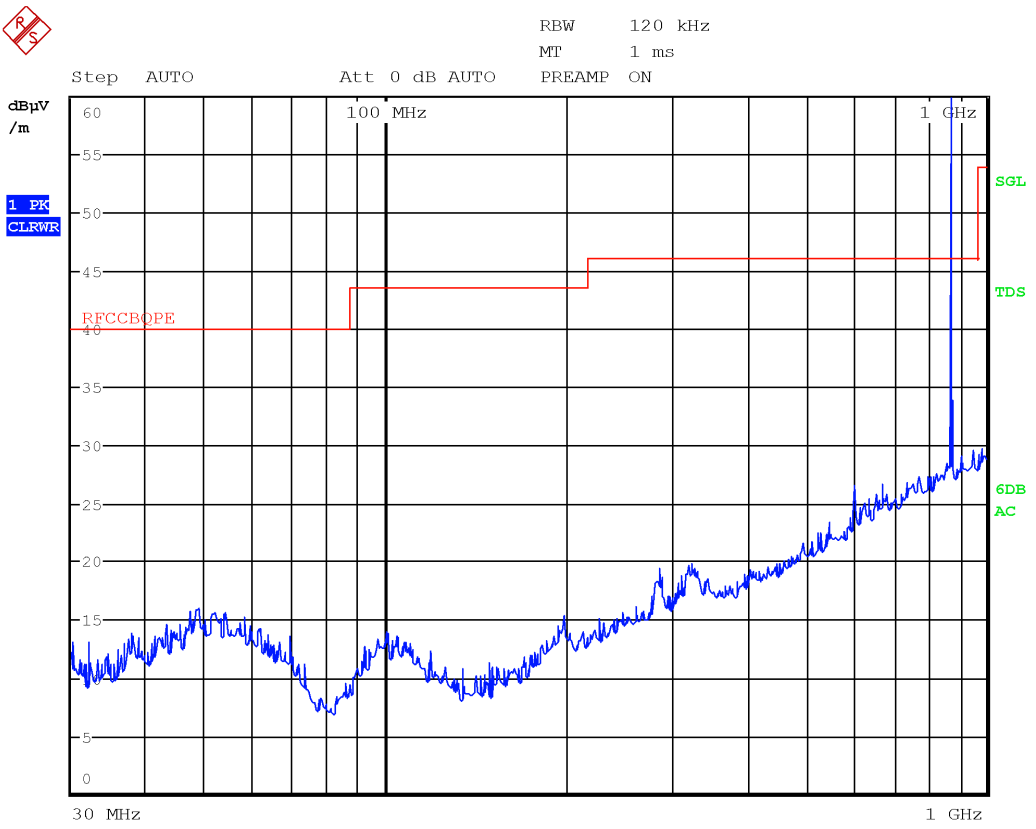
GSM 1880 MHz and wifi 802.11a Multiple Chain 5300 MHz, horizontal polarization



3 Marker Table

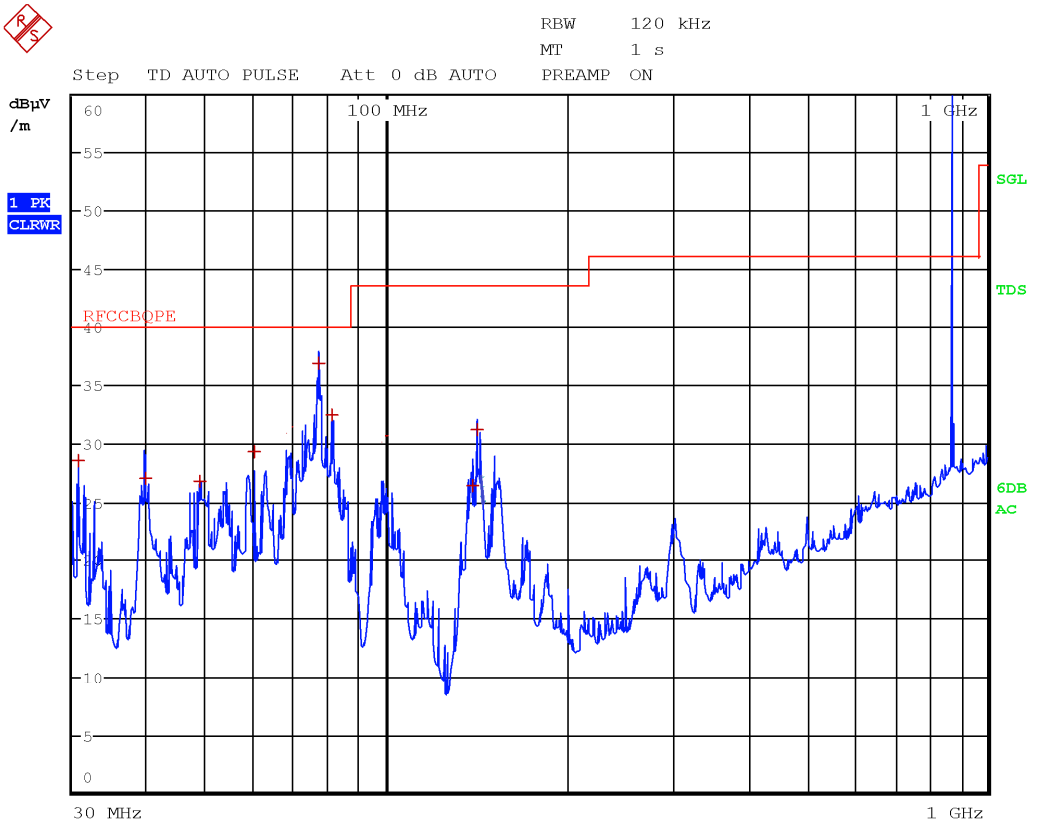
Wnd	Type	Ref	Trc	X-value	Y-value
Scan	M1		1	**5.3035 GHz**	**100.05 dBµV/m**
Scan	M2		2	**5.297 GHz**	**91.08 dBµV/m**
Scan	M3		1	**1.88 GHz**	**102.76 dBµV/m**
Scan	M4		2	**1.88 GHz**	**97.39 dBµV/m**

GSM 1880 MHz and wifi 802.11a Multiple Chain 5300 MHz,vertical polarization



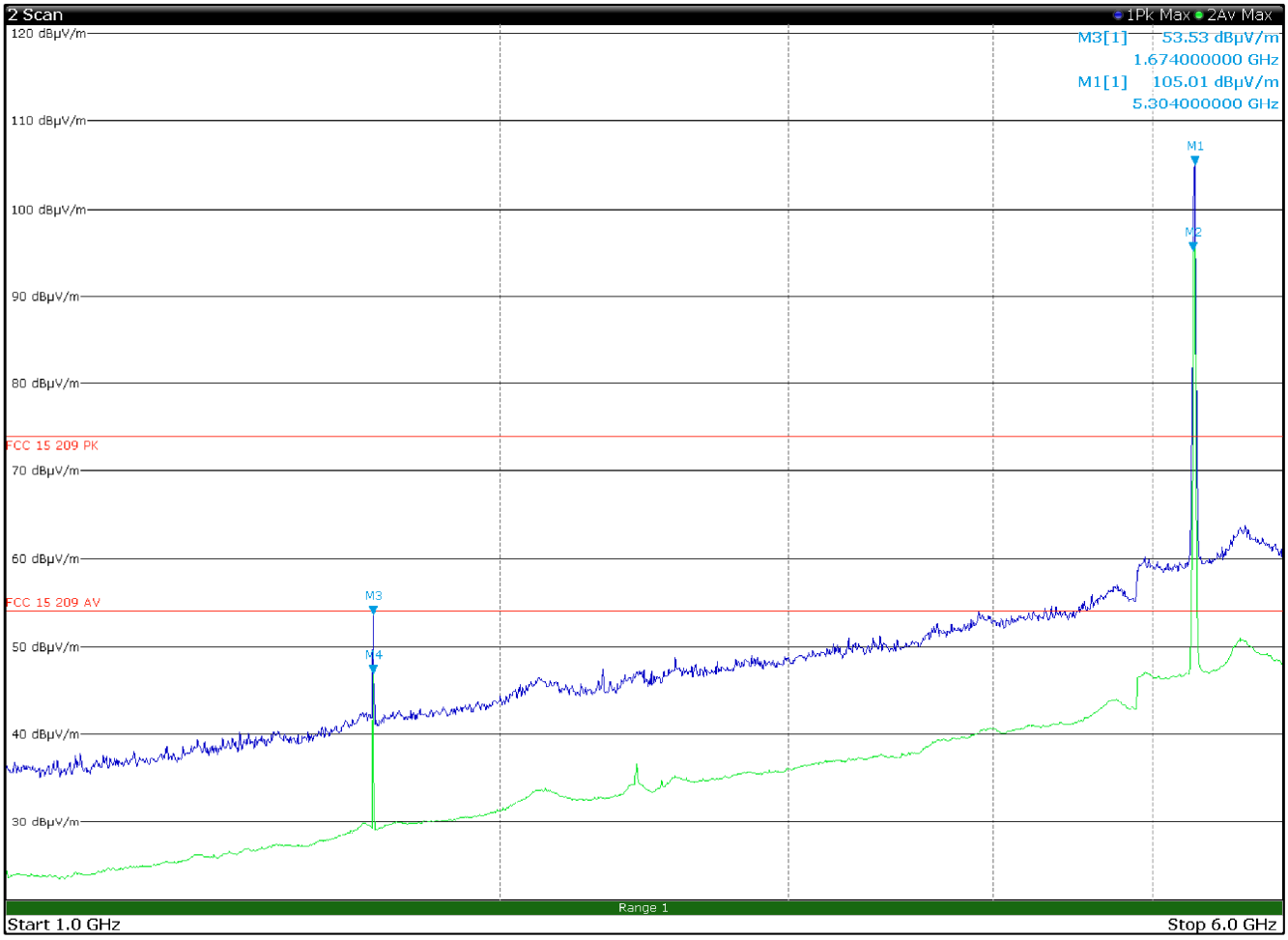
GSM 836.6 MHz and wifi 802.11a 6Mbps Multiple Chain 5300 MHz,horizontal polarization

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
77.1900	36.0	40.0	-4.0	QP



GSM 836.6 MHz and wifi 802.11a 6Mbps Multiple Chain 5300 MHz,vertical polarization

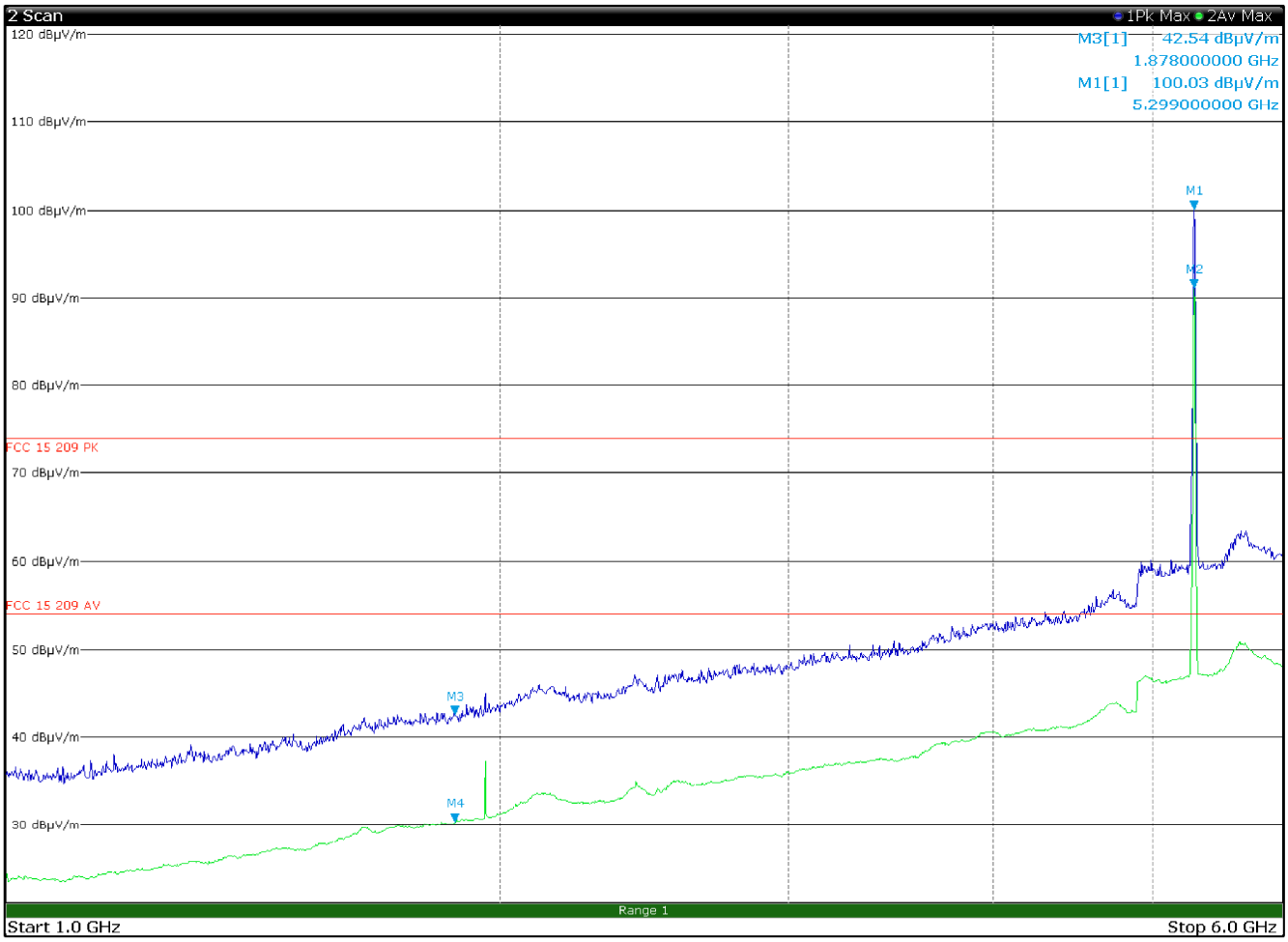
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
30.6000	28.6	40.0	-11.4	QP
39.4500	30.6	40.0	-9.4	QP
39.7200	27.1	40.0	-12.9	QP
49.0200	26.9	40.0	-13.1	QP
60.2100	29.4	40.0	-10.6	QP
68.2500	31.4	40.0	-8.6	QP
77.1900	36.9	40.0	-3.1	QP
81.1800	32.4	40.0	-7.6	QP
98.4300	30.8	43.5	-12.7	QP



3 Marker Table

Wnd	Type	Ref	Trc	X-value	Y-value
Scan	M1		1	**5.304 GHz**	**105.01 dBµV/m**
Scan	M2		2	**5.296 GHz**	**95.11 dBµV/m**
Scan	M3		1	**1.674 GHz**	**53.53 dBµV/m**
Scan	M4		2	**1.674 GHz**	**46.82 dBµV/m**

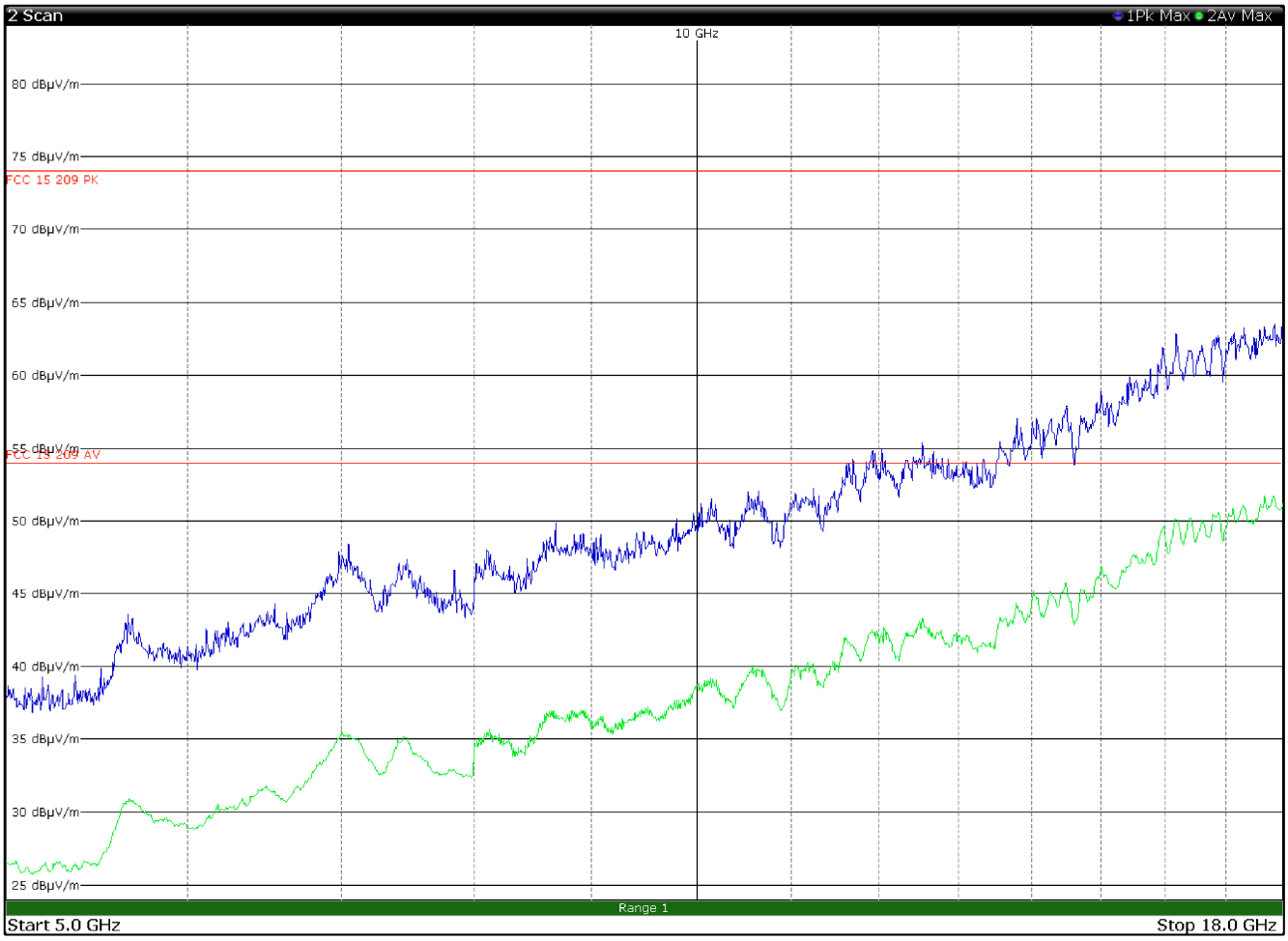
GSM 836.6 MHz and wifi 802.11a 6Mbps Multiple Chain 5300 MHz,horizontal polarization



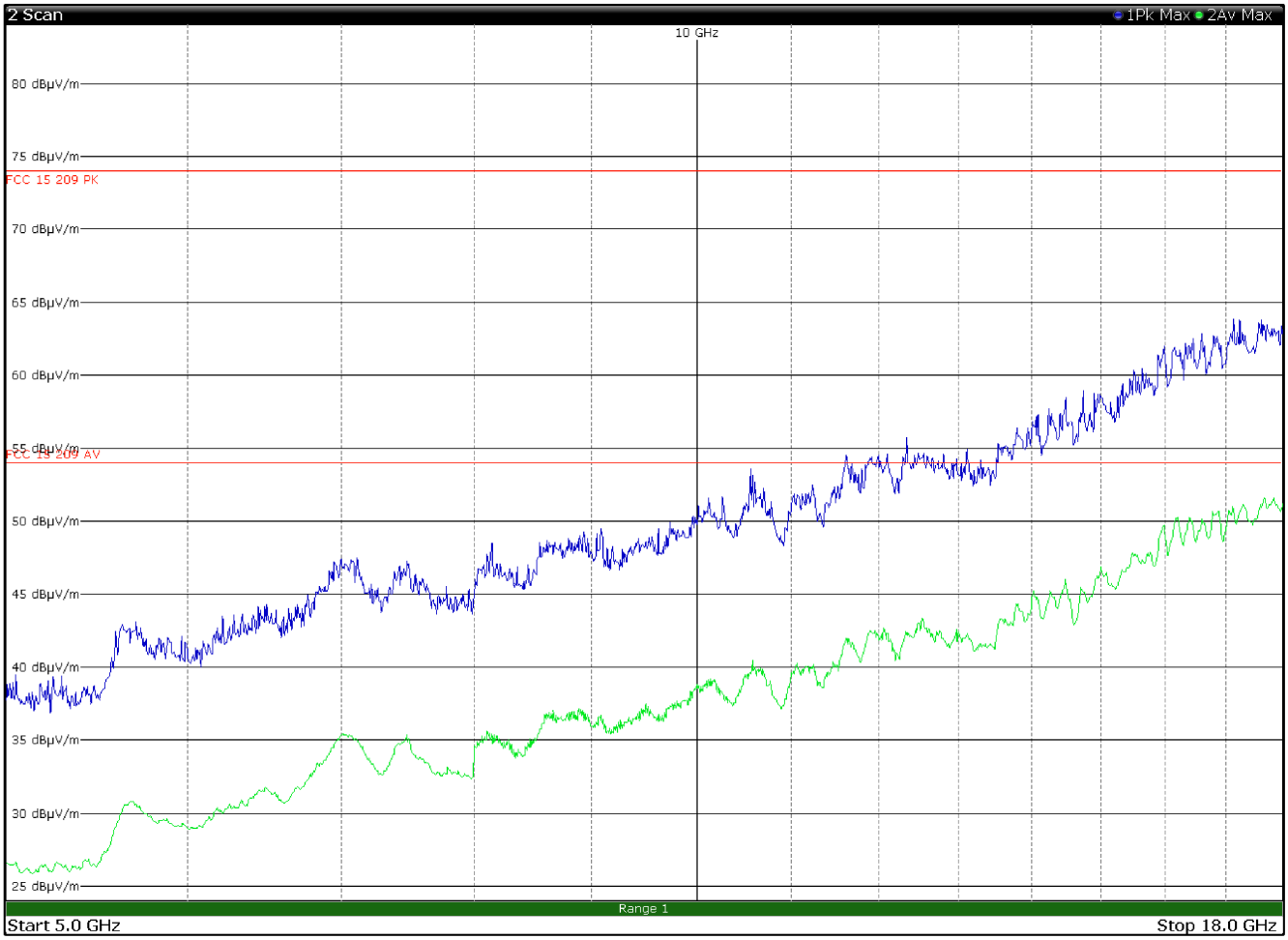
3 Marker Table

Wnd	Type	Ref	Trc	X-value	Y-value
Scan	M1		1	**5.299 GHz**	**100.03 dBµV/m**
Scan	M2		2	**5.297 GHz**	**91.12 dBµV/m**
Scan	M3		1	**1.878 GHz**	**42.54 dBµV/m**
Scan	M4		2	**1.8785 GHz**	**30.27 dBµV/m**

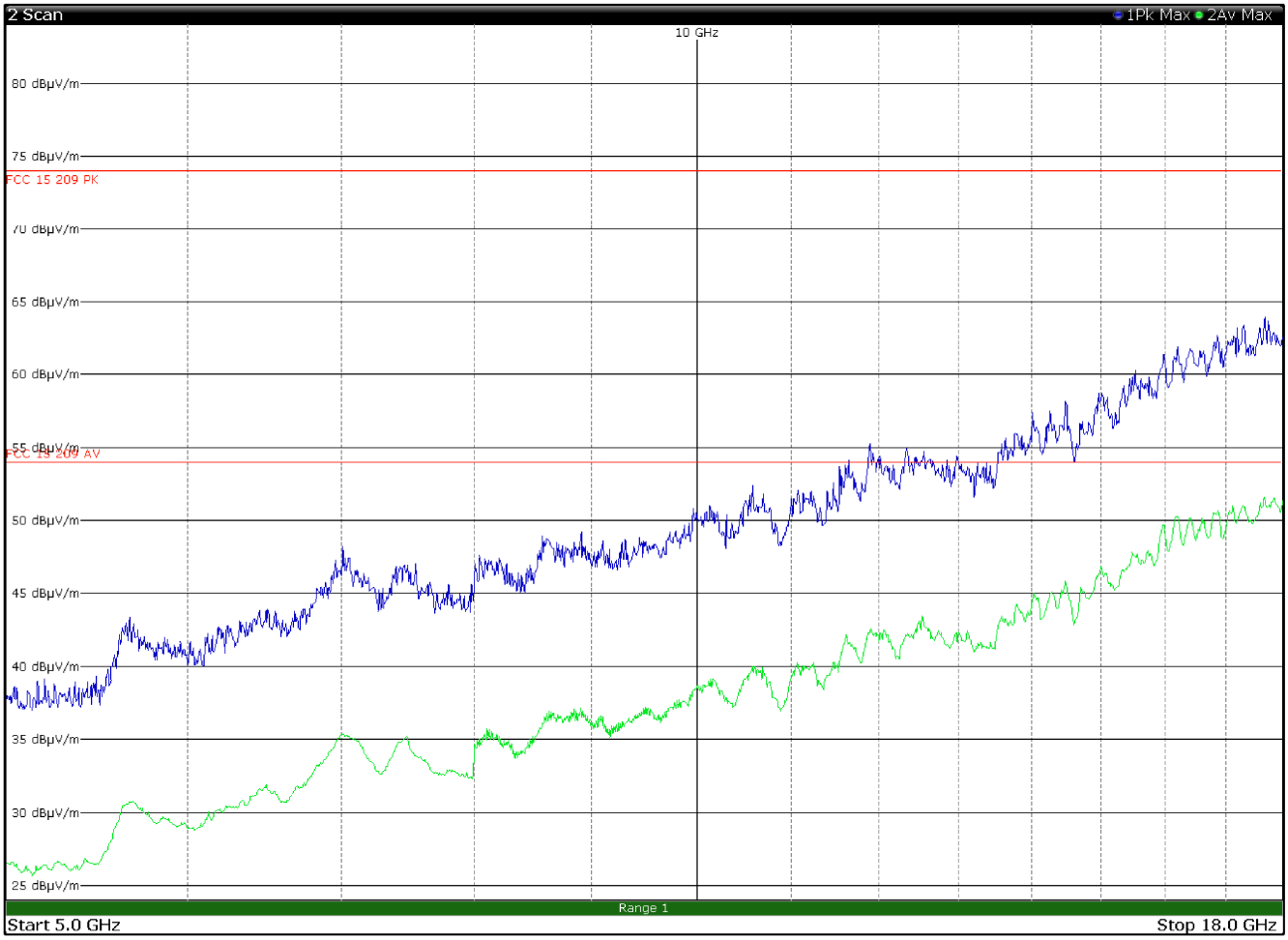
GSM 836.6 MHz and wifi 802.11a 6Mbps Multiple Chain 5300 MHz,vertical polarization



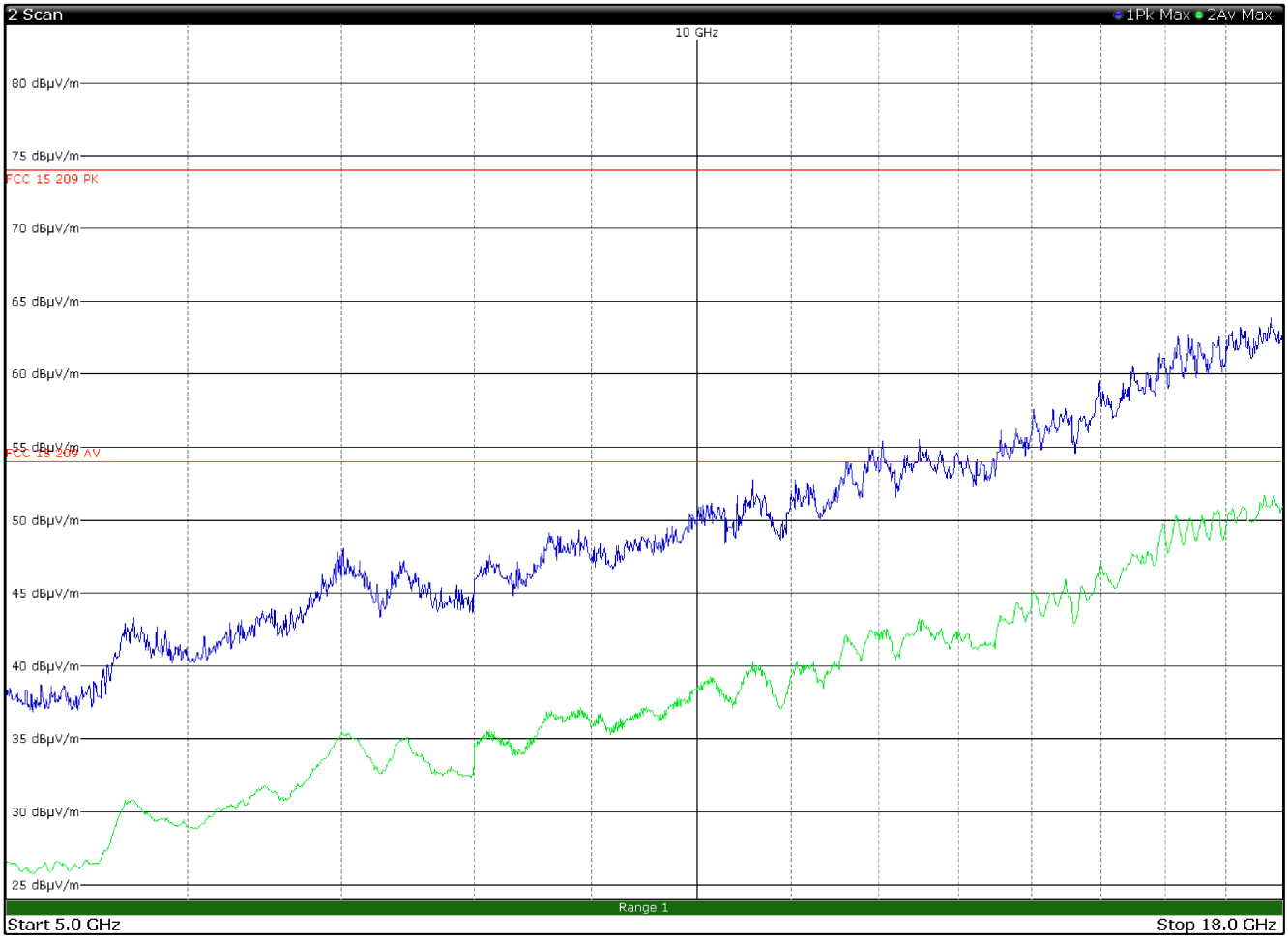
GSM 836.6 MHz and wifi 802.11a 6Mbps Multiple Chain 5300 MHz,vertical polarization



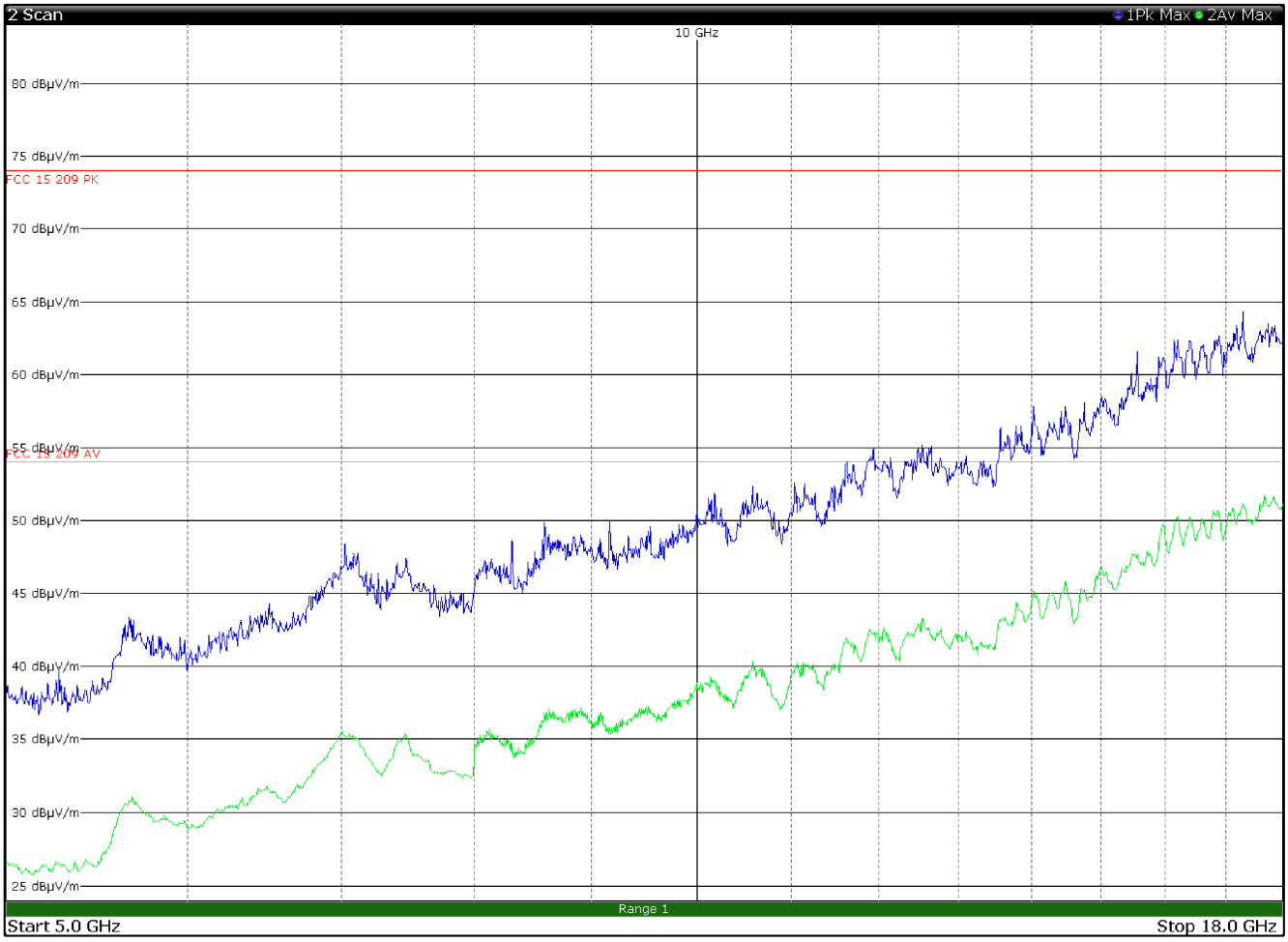
GSM 836.6 MHz and wifi 802.11a 6Mbps Multiple Chain 5300 MHz,horizontal polarization



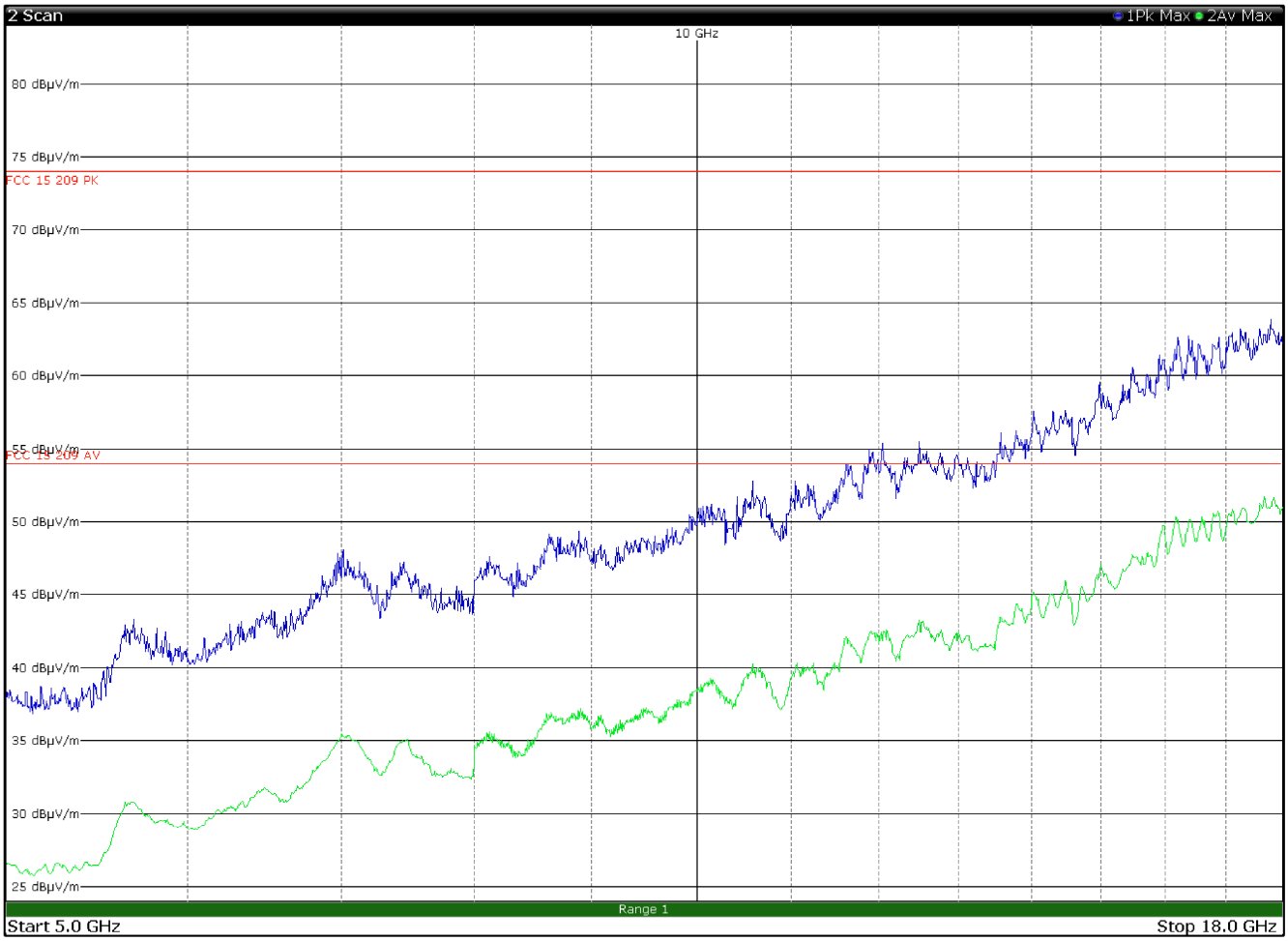
GSM 1880 MHz and wifi 802.11a 6Mbps Multiple Chain 5300 MHz,horizontal polarization



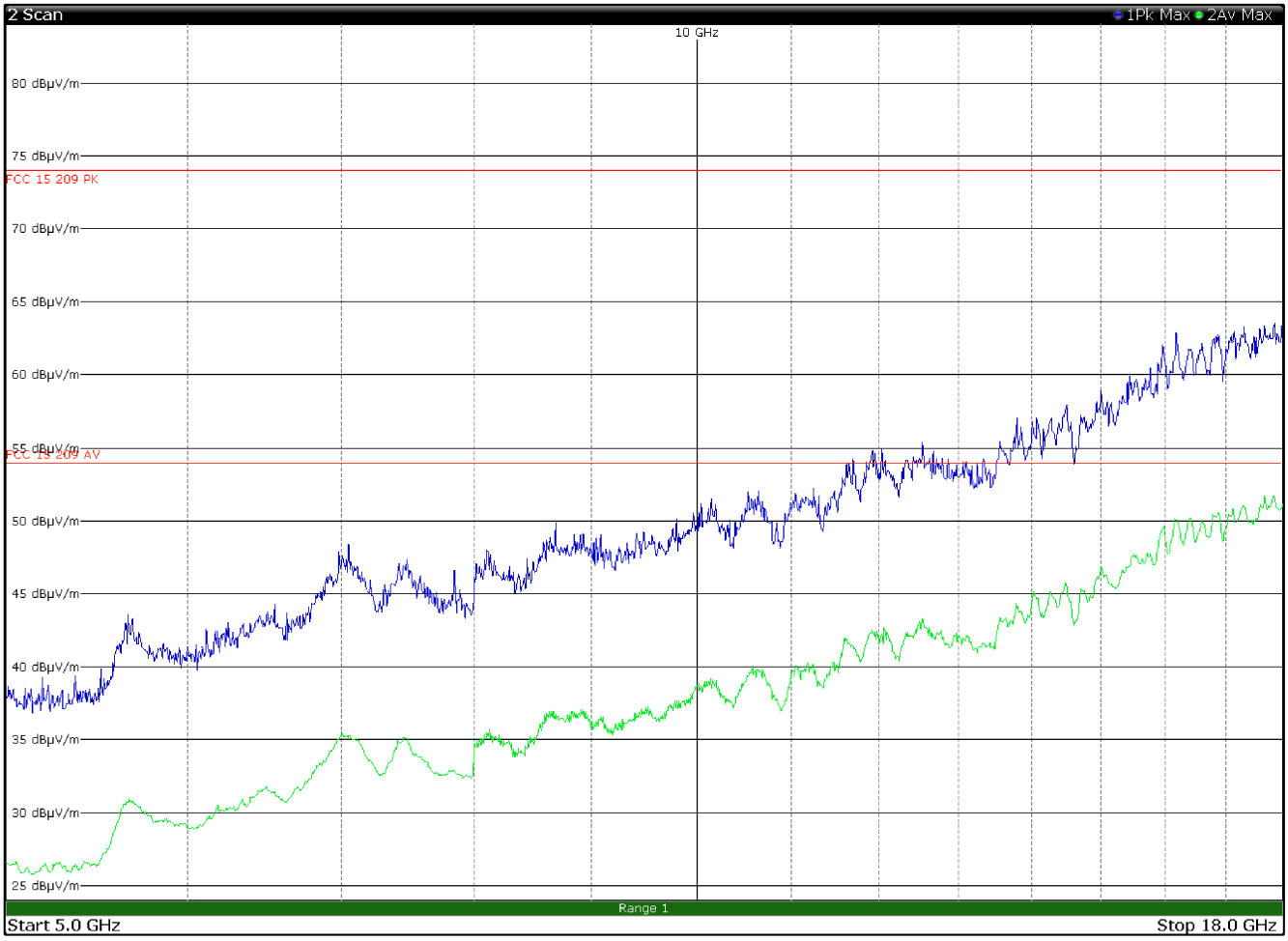
GSM 1880 MHz and wifi 802.11a 6Mbps Multiple Chain 5300 MHz,vertical polarization



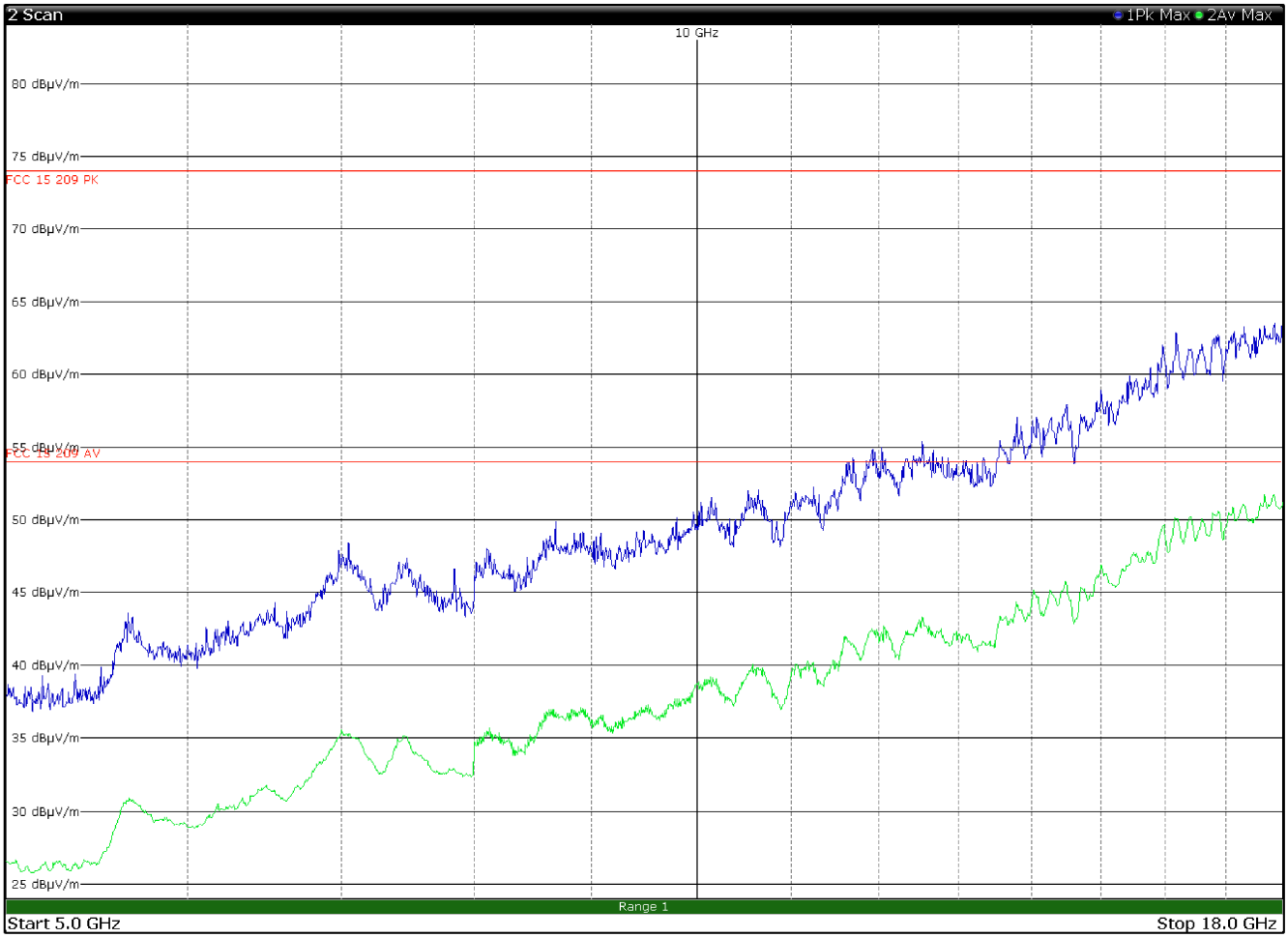
WCDMA/UMTS IV 1732.6 MHz and wifi 802.11a Multiple Chain 5300 MHz, horizontal polarization



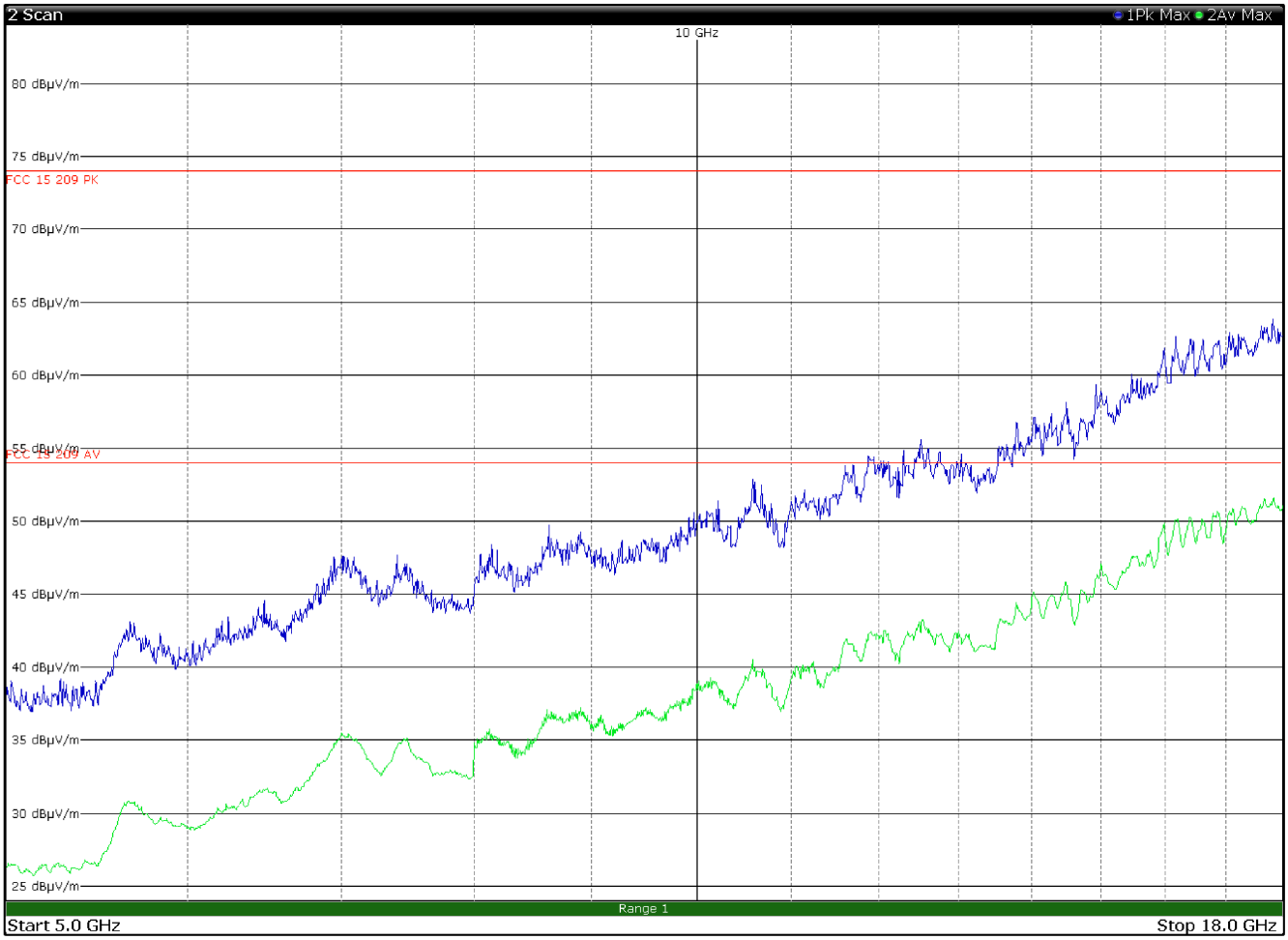
WCDMA/UMTS IV 1732.6 MHz and wifi 802.11a Multiple Chain 5300 MHz, vertical polarization



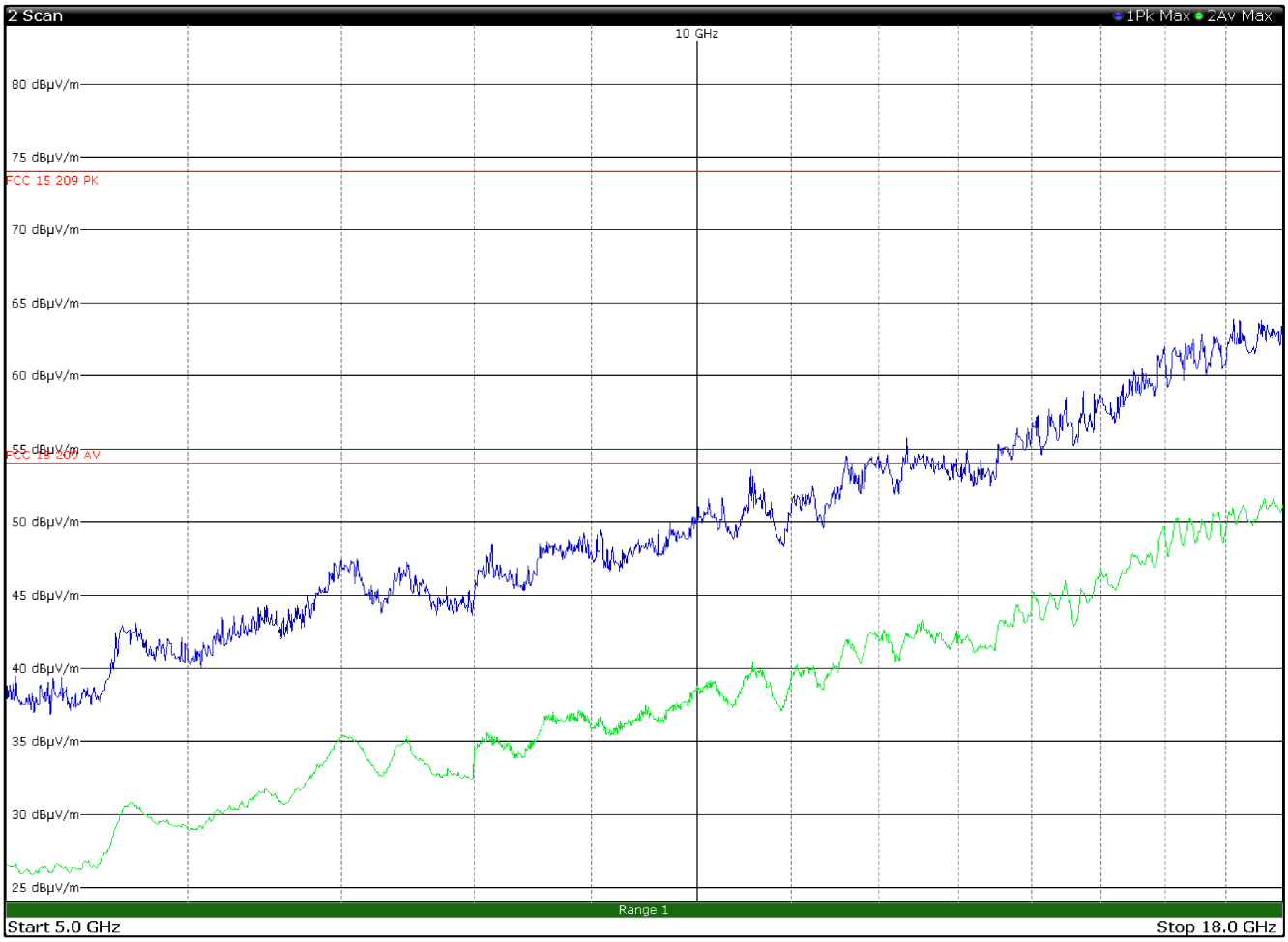
LTE B41 (5MHz) 2593 MHz and wifi 802.11a 6Mbps Multiple Chain
5300 MHz, vertical polarization



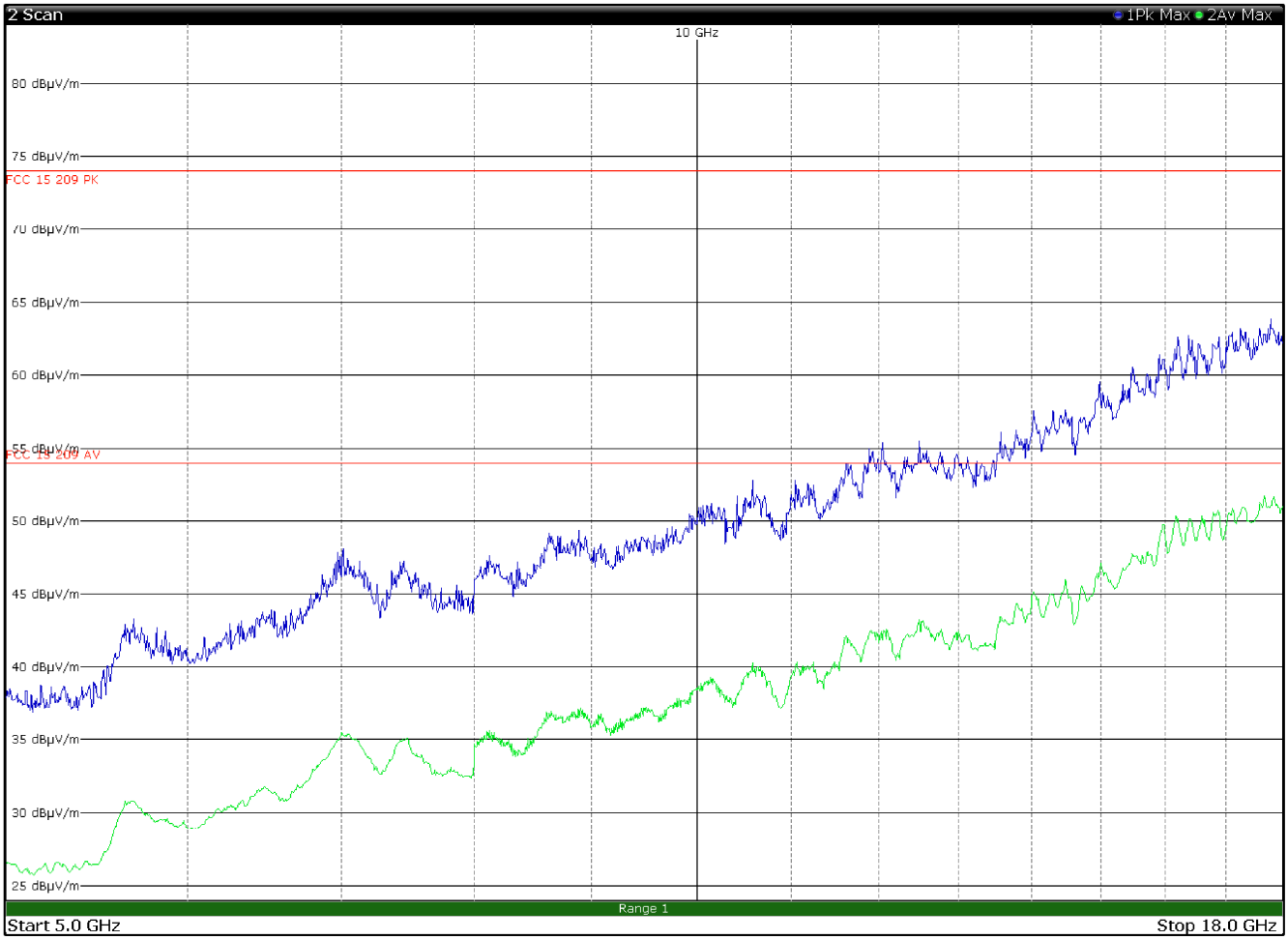
LTE B41 (5MHz) 2593 MHz and wifi 802.11a 6Mbps Multiple Chain
5300 MHz, horizontal polarization



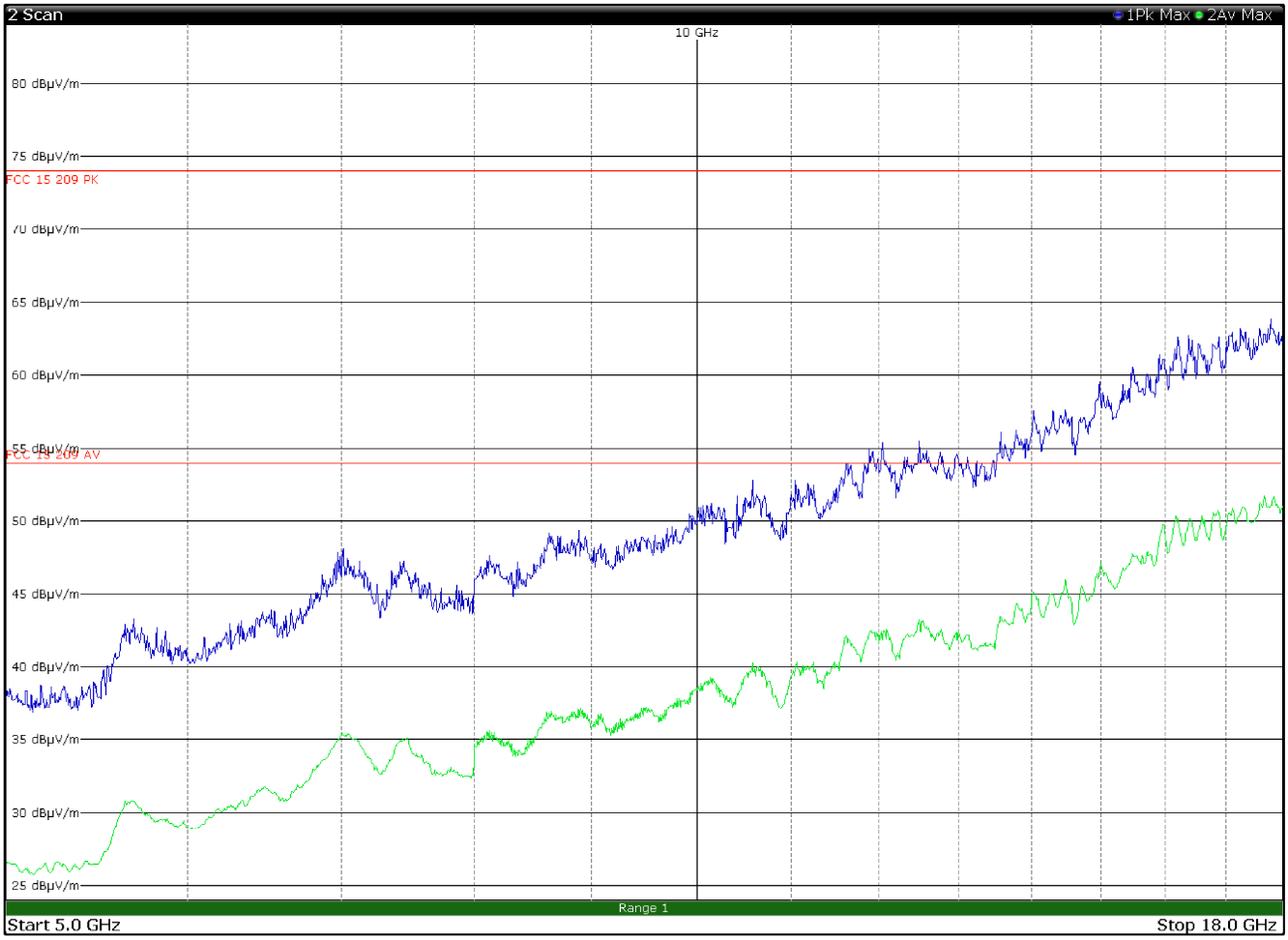
LTE B41 (5MHz) 2593 MHz and iwifi 802.11g 6Mbps Multiple Chain
2437 MHz, vertical polarization



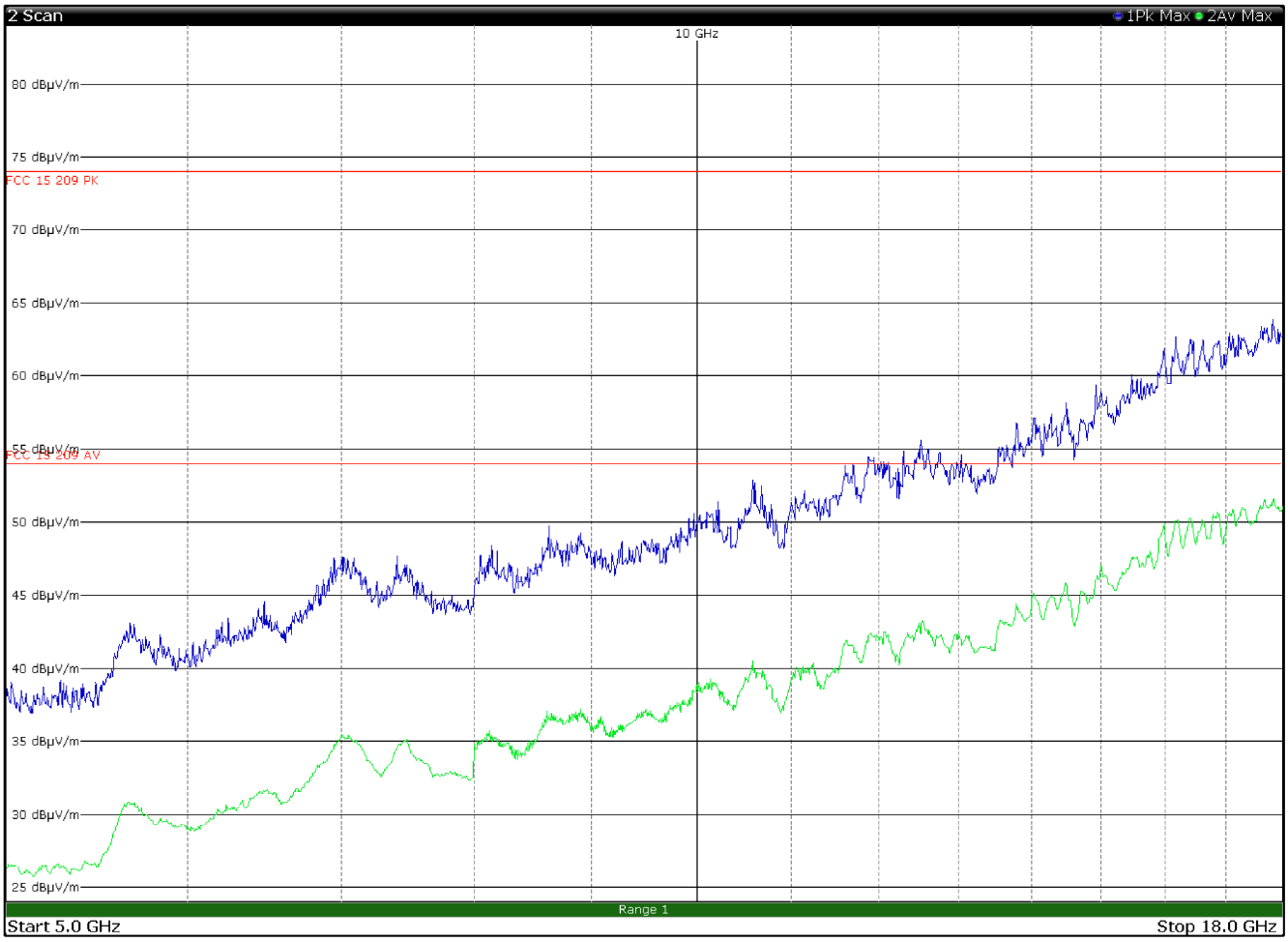
LTE B41 (5MHz) 2593 MHz and iwifi 802.11g 6Mbps Multiple Chain
2437 MHz,horizontal polarization



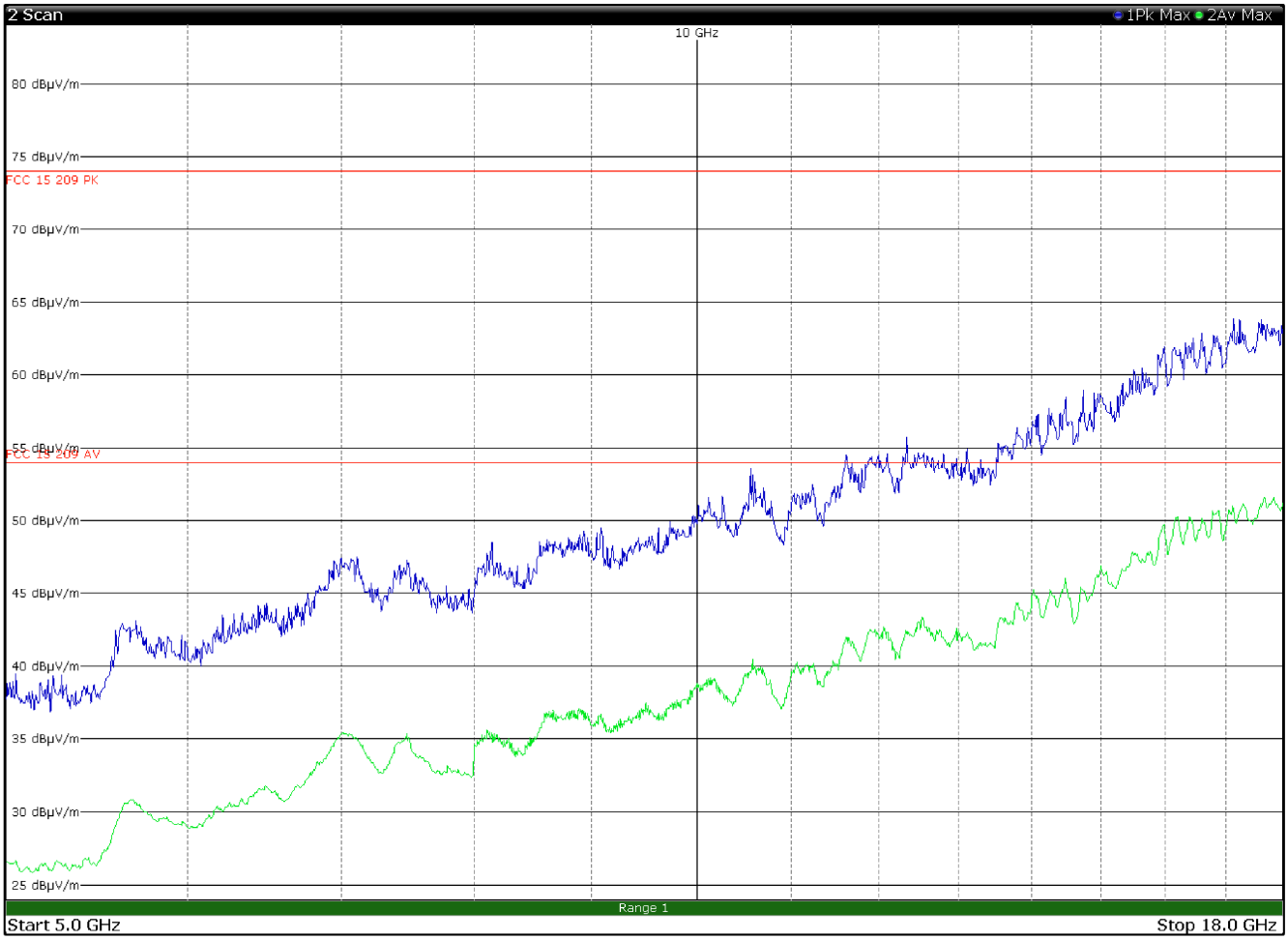
GSM 836.6 MHz and iwifi 802.11g 6Mbps Multiple Chain
2437 MHz, horizontal polarization



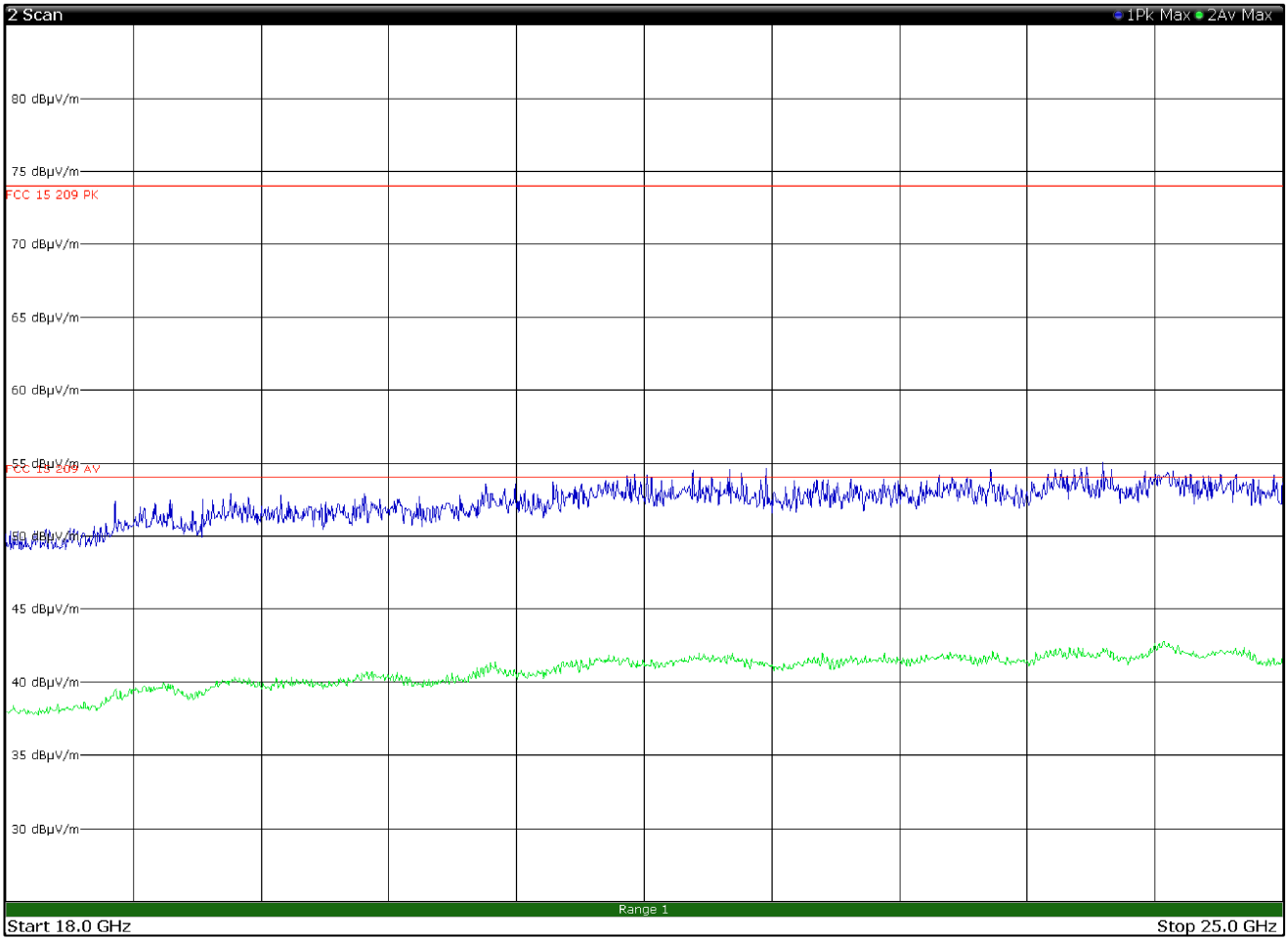
GSM 836.6 MHz and iwifi 802.11g 6Mbps Multiple Chain
2437 MHz, vertical polarization



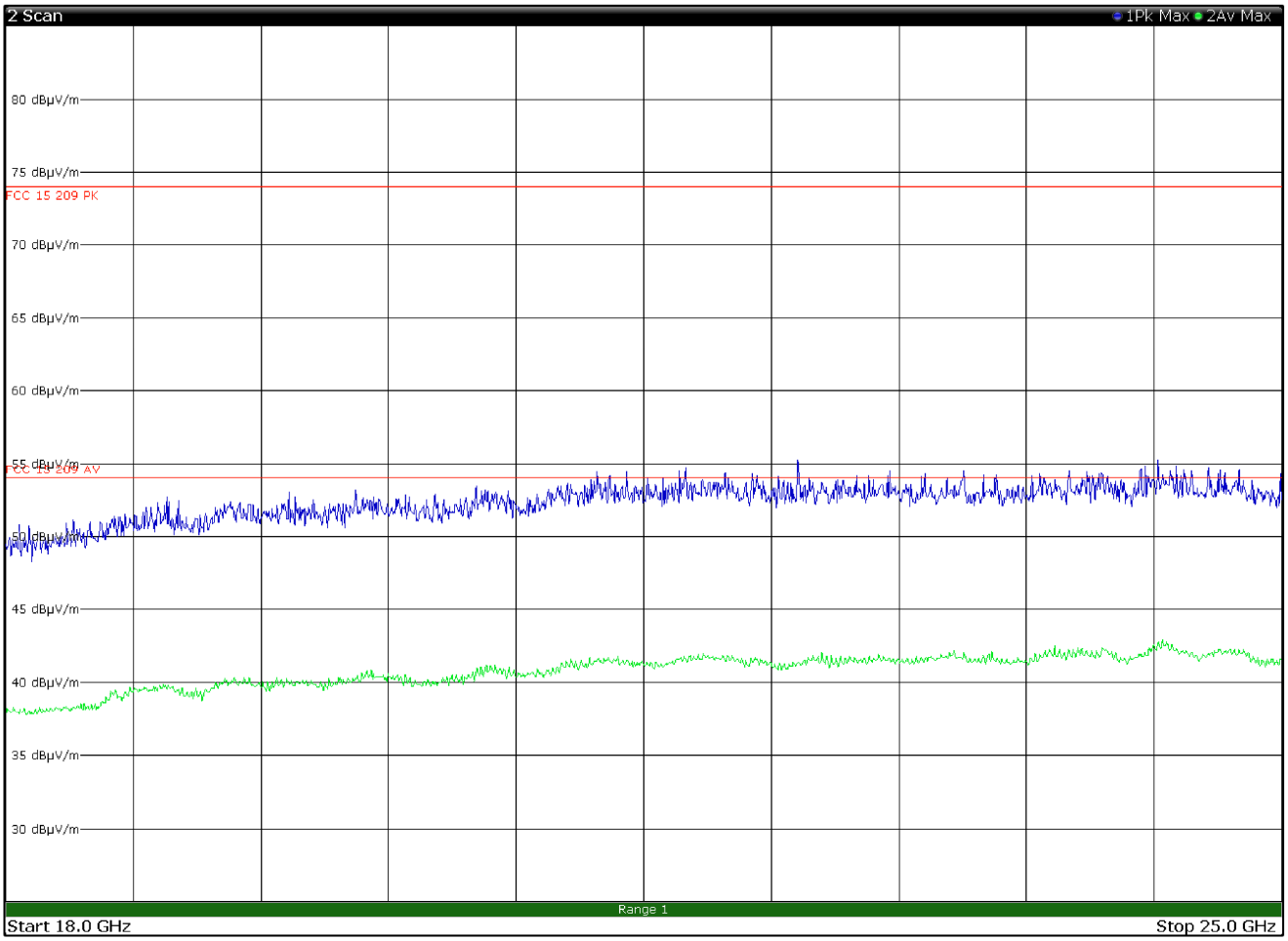
GSM 1880 MHz and iwifi 802.11g 6Mbps Multiple Chain
2437 MHz, horizontal polarization



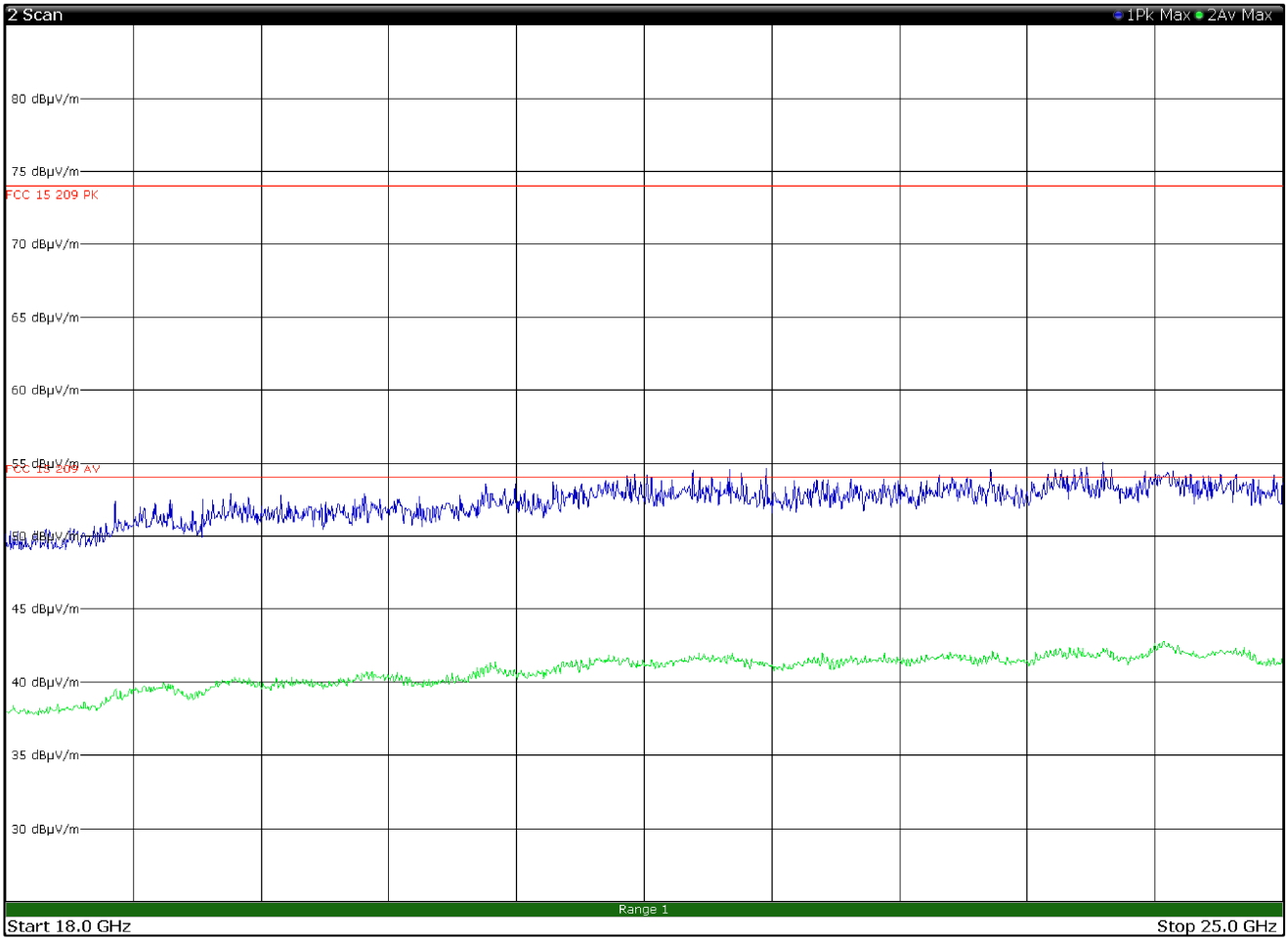
GSM 1880 MHz and iwifi 802.11g 6Mbps Multiple Chain
2437 MHz, horizontal polarization



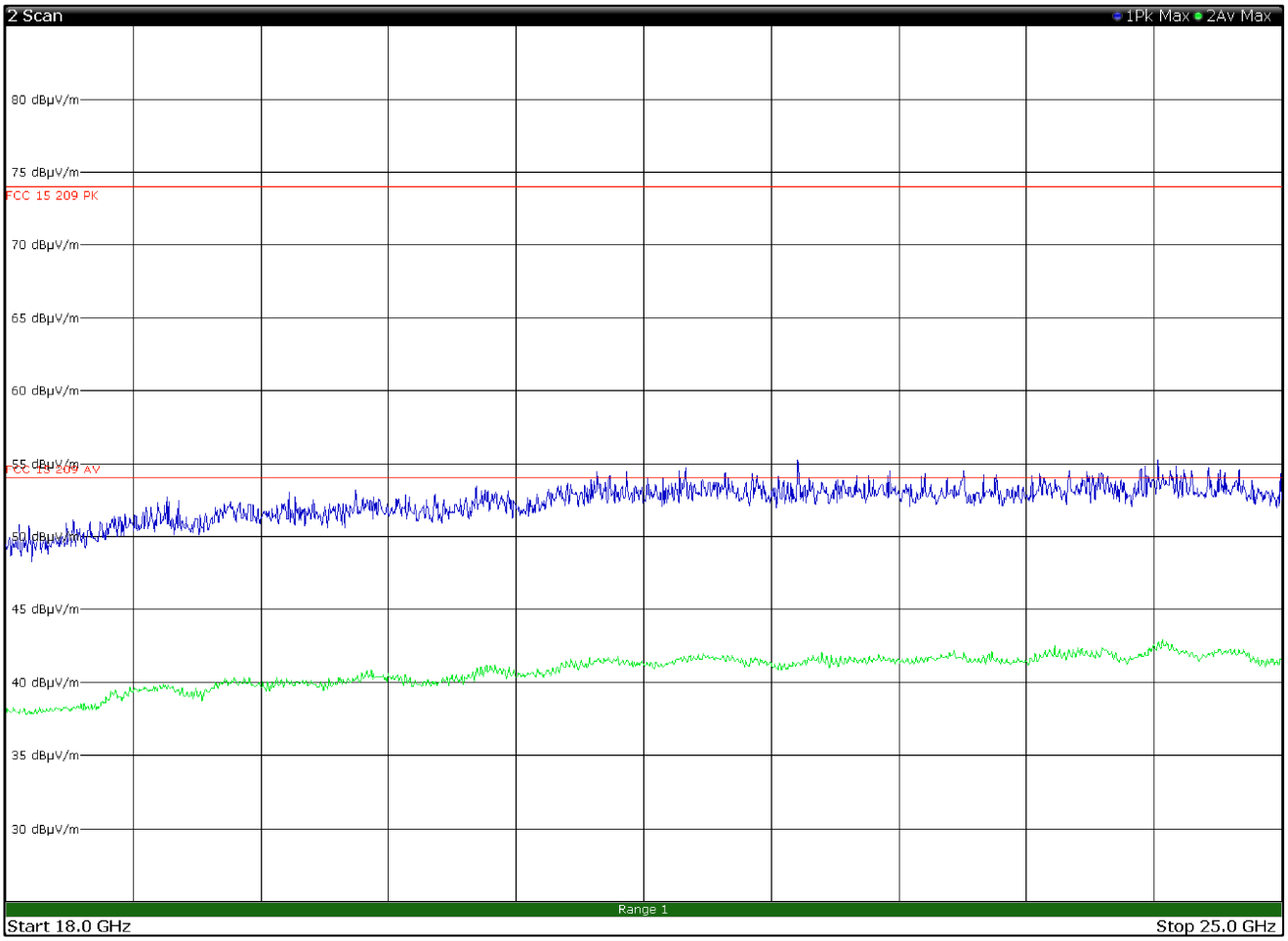
GSM 1880 MHz and iwifi 802.11g 6Mbps Multiple Chain
2437 MHz, horizontal polarization



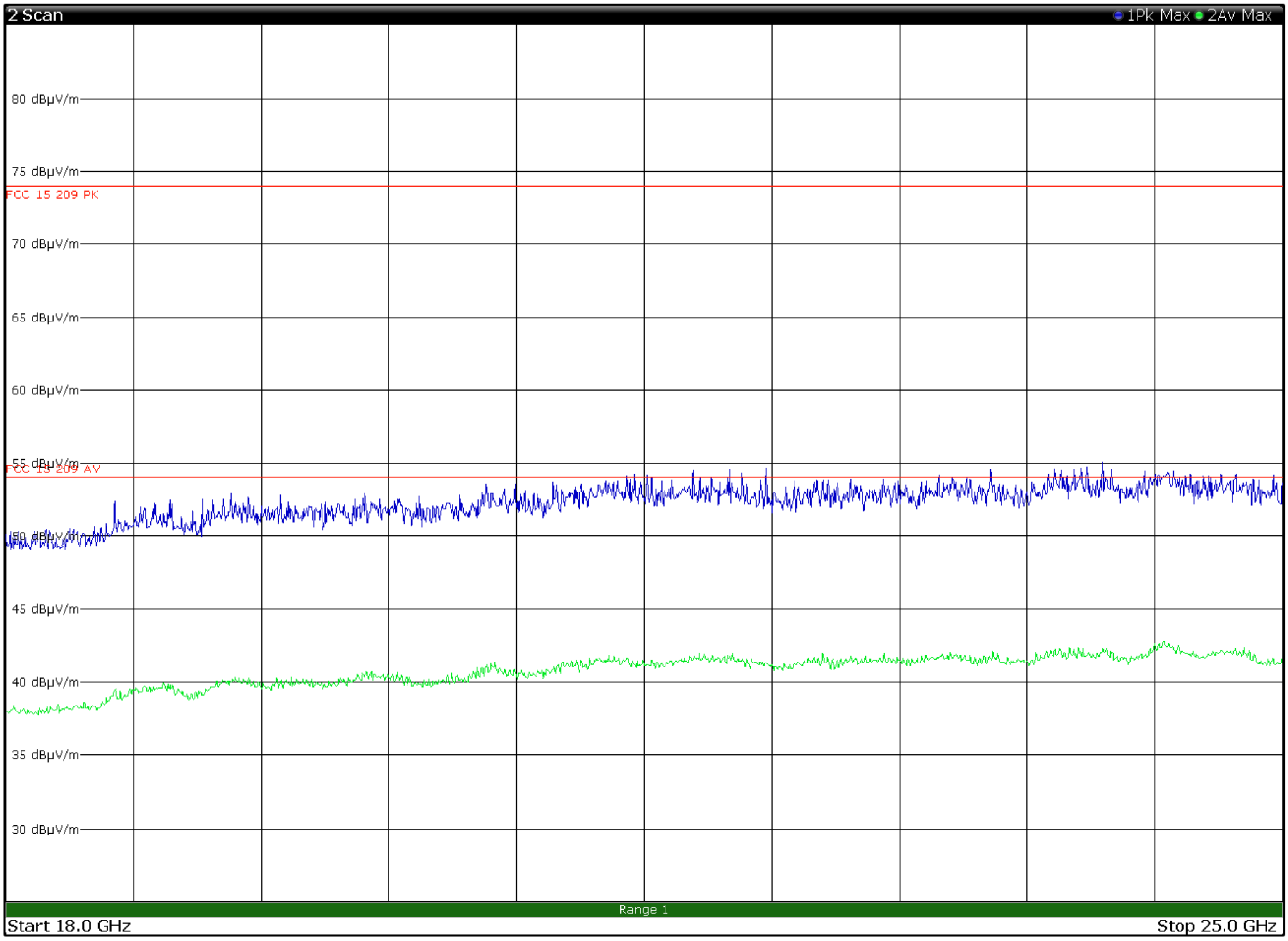
GSM 1880 MHz and iwifi 802.11g 6Mbps Multiple Chain
2437 MHz, vertical polarization



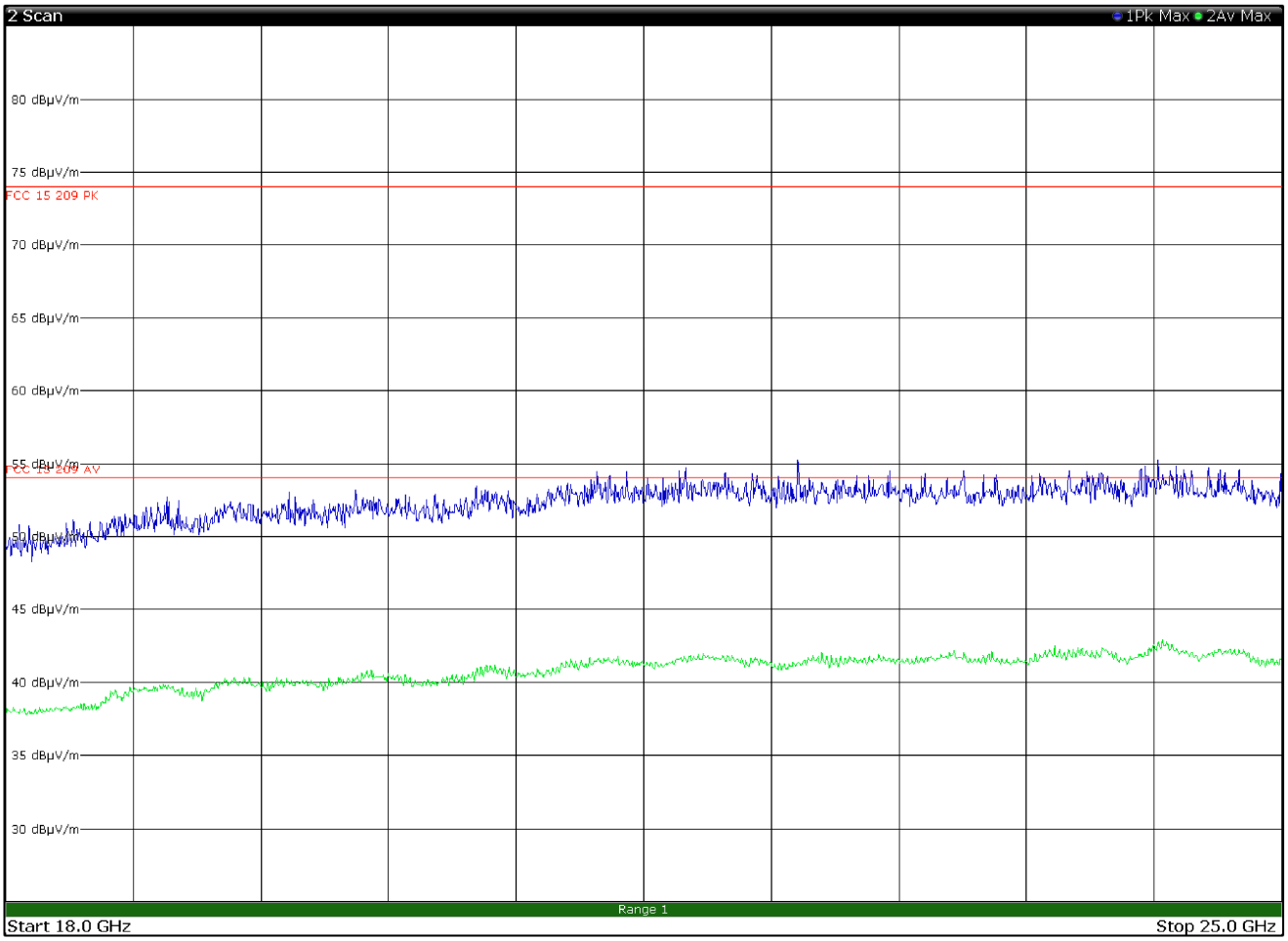
GSM 836.6 MHz and iwifi 802.11g 6Mbps Multiple Chain
2437 MHz, horizontal polarization



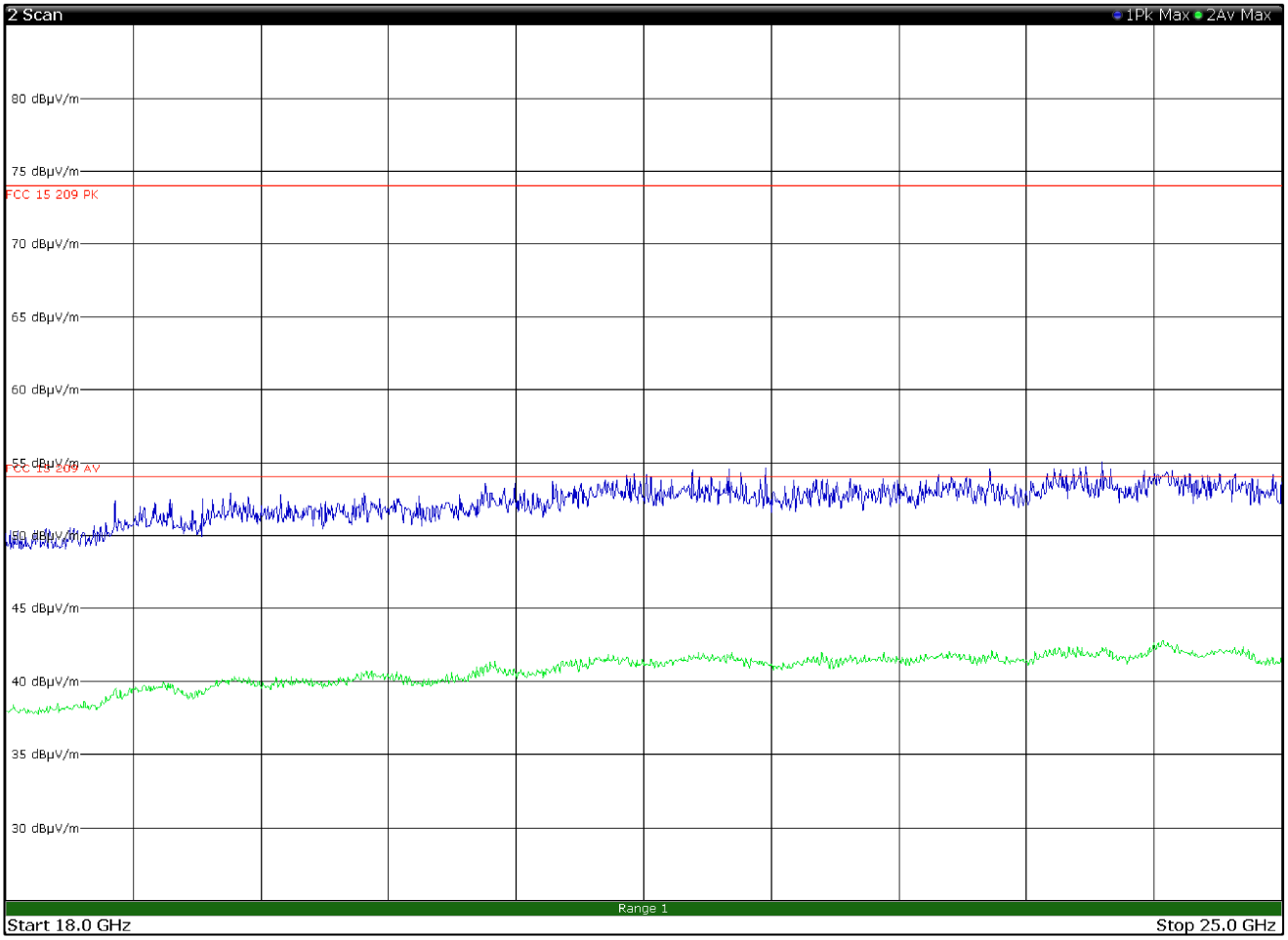
GSM 836.6 MHz and iwifi 802.11g 6Mbps Multiple Chain
2437 MHz, vertical polarization



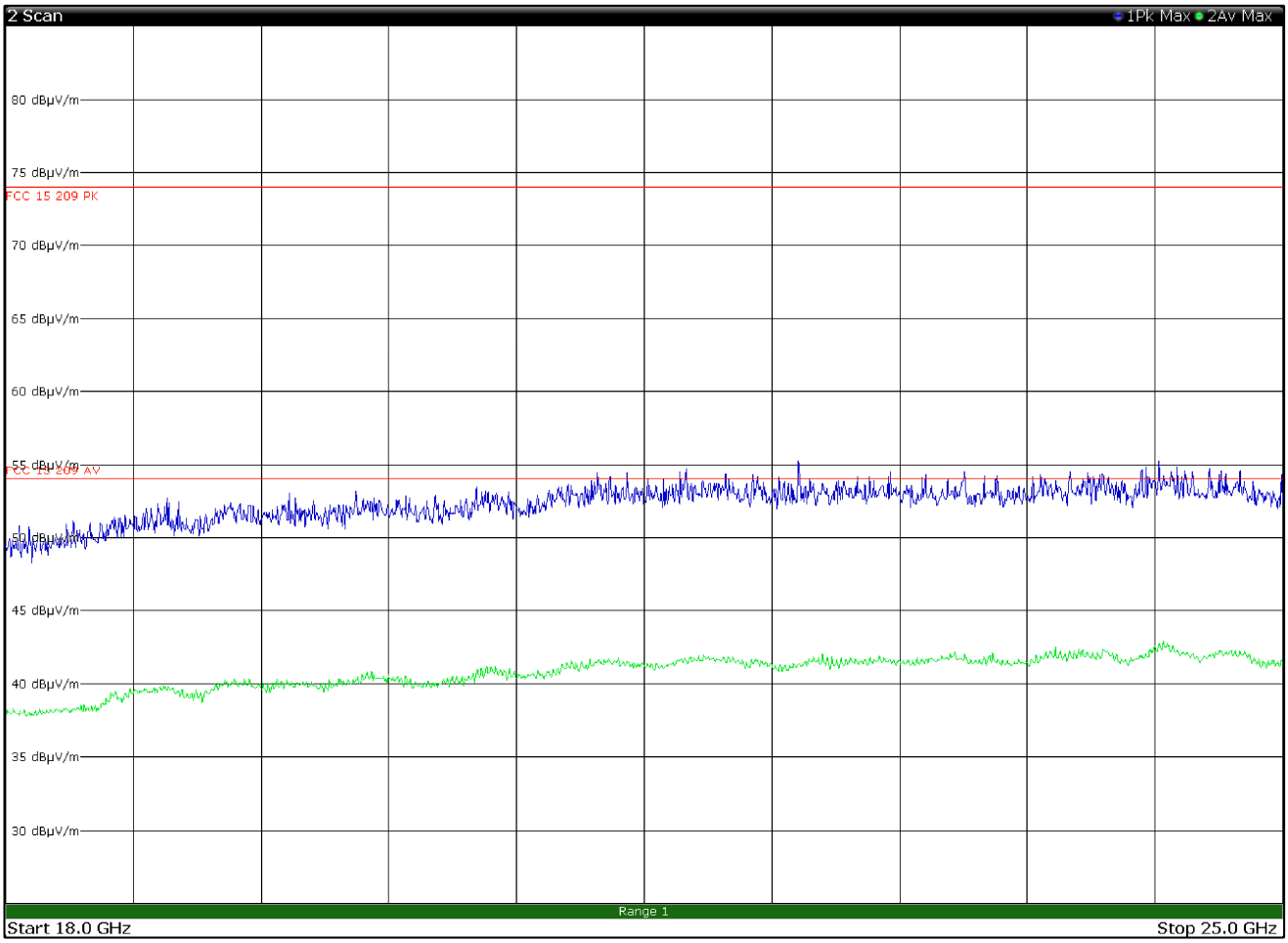
LTE B41 (5MHz) 2593 MHz and iwifi 802.11g 6Mbps Multiple Chain
2437 MHz, horizontal polarization



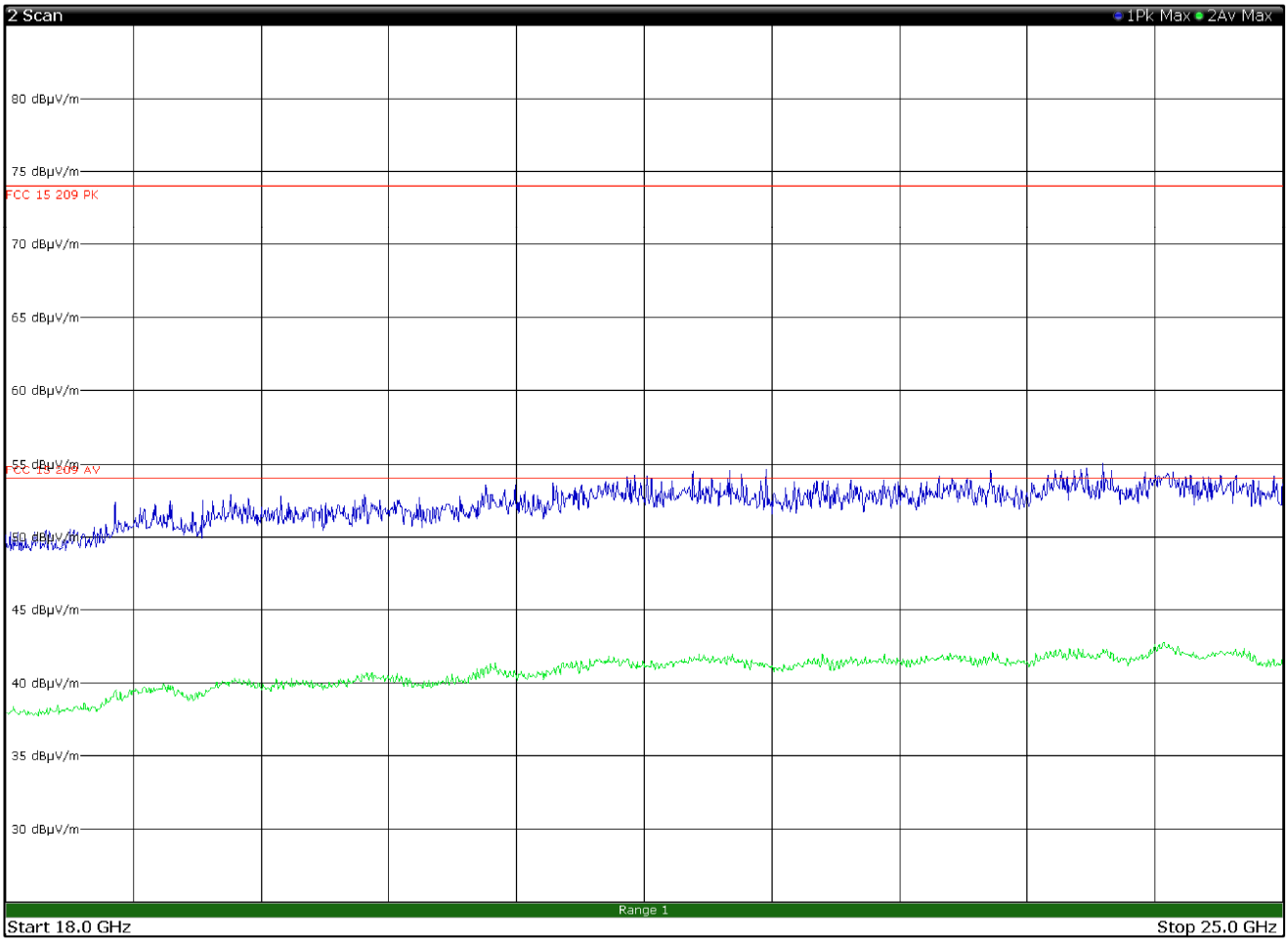
LTE B41 (5MHz) 2593 MHz and iwifi 802.11g 6Mbps Multiple Chain
2437 MHz, vertical polarization



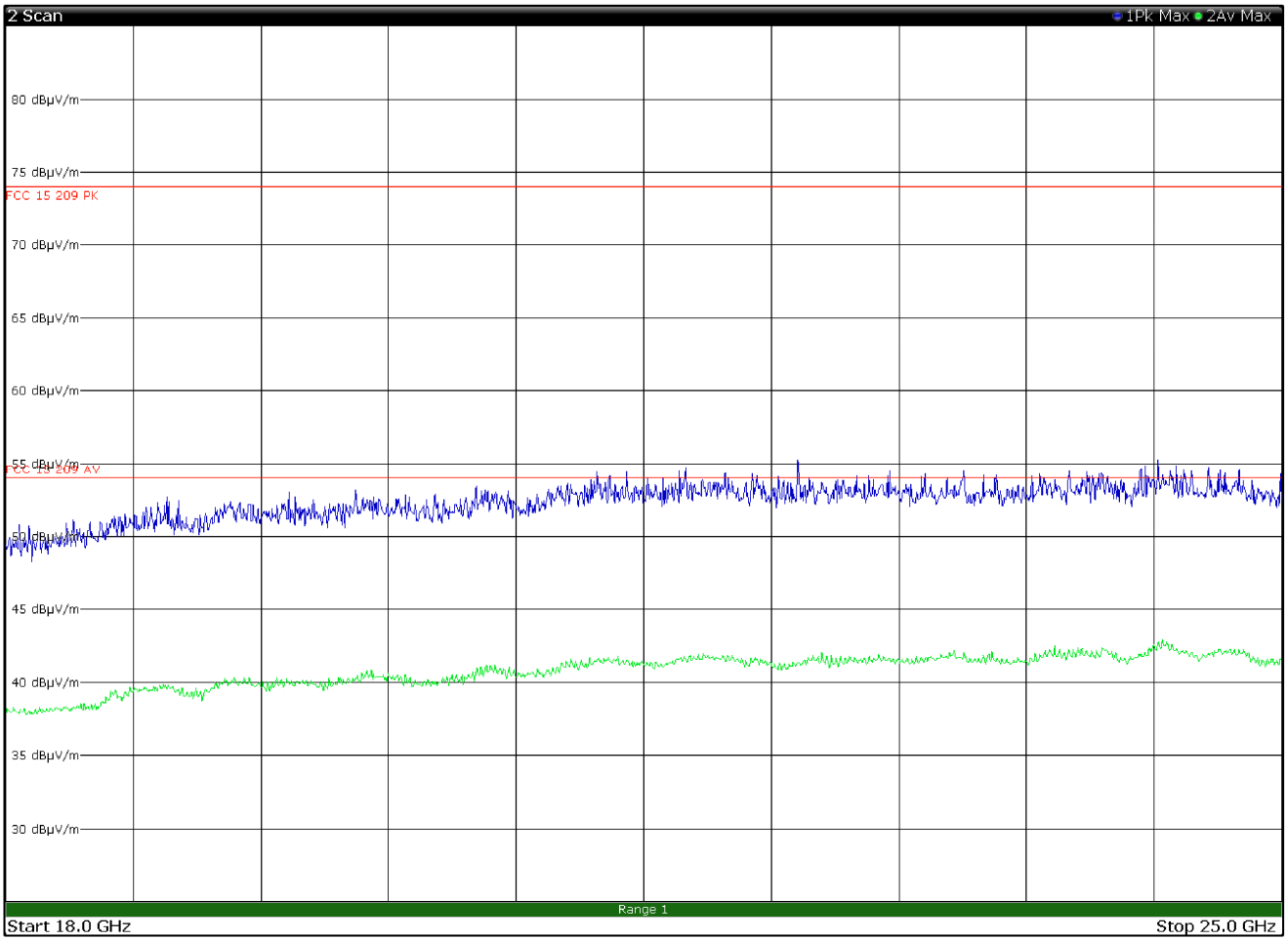
WCDMA/UMTS IV 1732.6 MHz and iwifi 802.11g 6Mbps Multiple Chain
2437 MHz, horizontal polarization



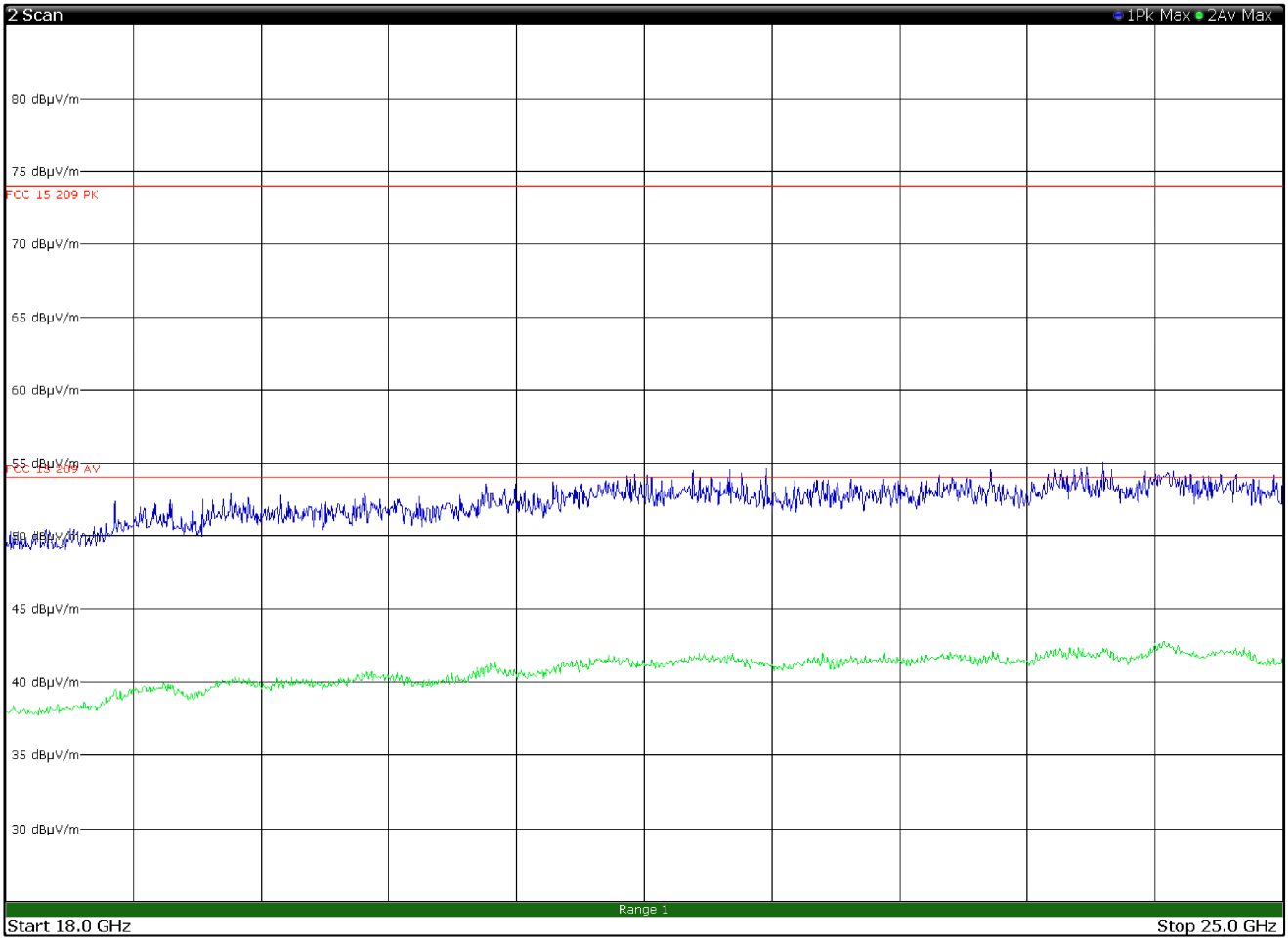
WCDMA/UMTS IV 1732.6 MHz and iwifi 802.11g 6Mbps Multiple Chain
2437 MHz, vertical polarization



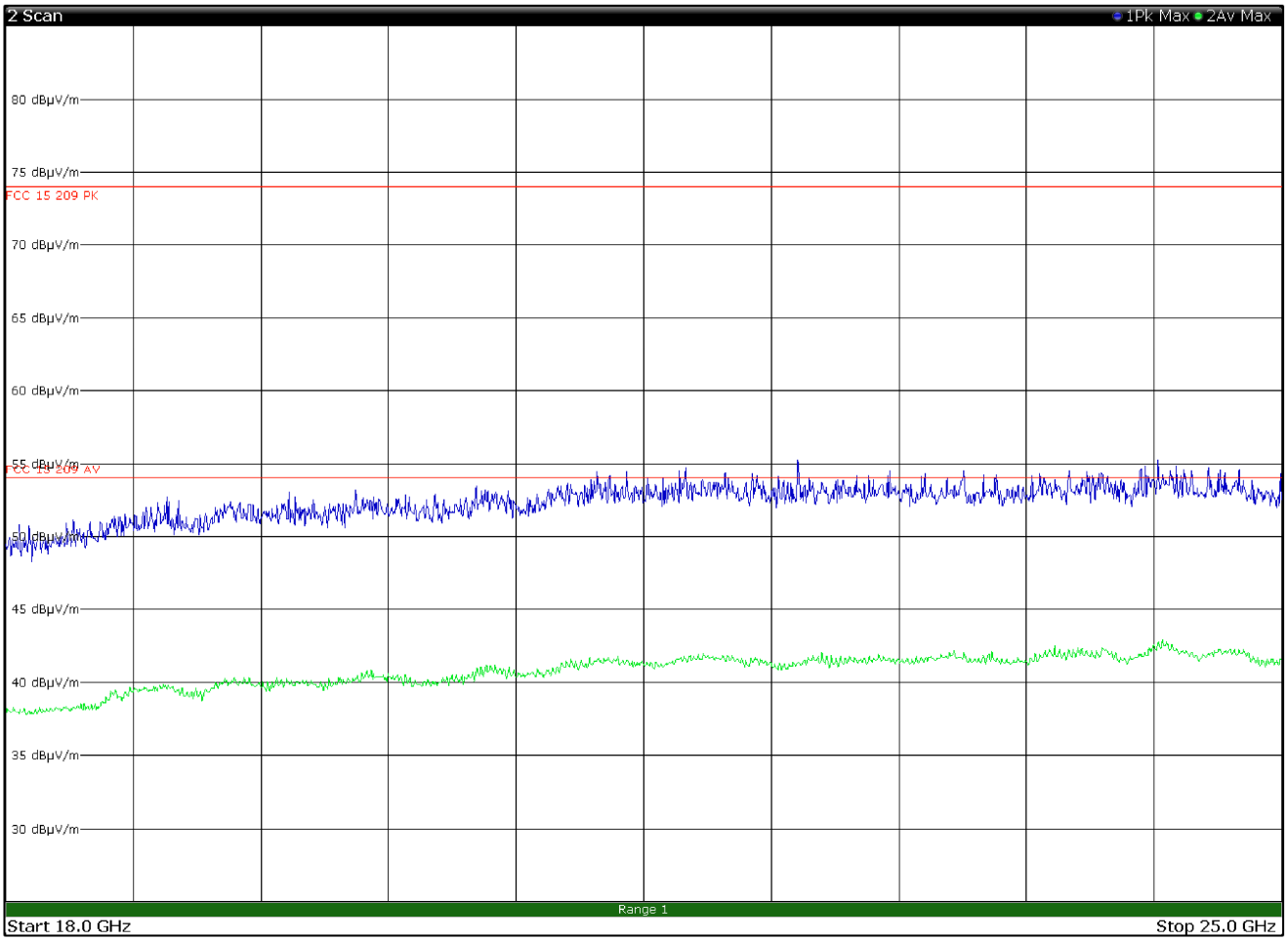
GSM 1880 MHz and iwifi 802.11a 6Mbps Multiple Chain
5300 MHz, horizontal polarization



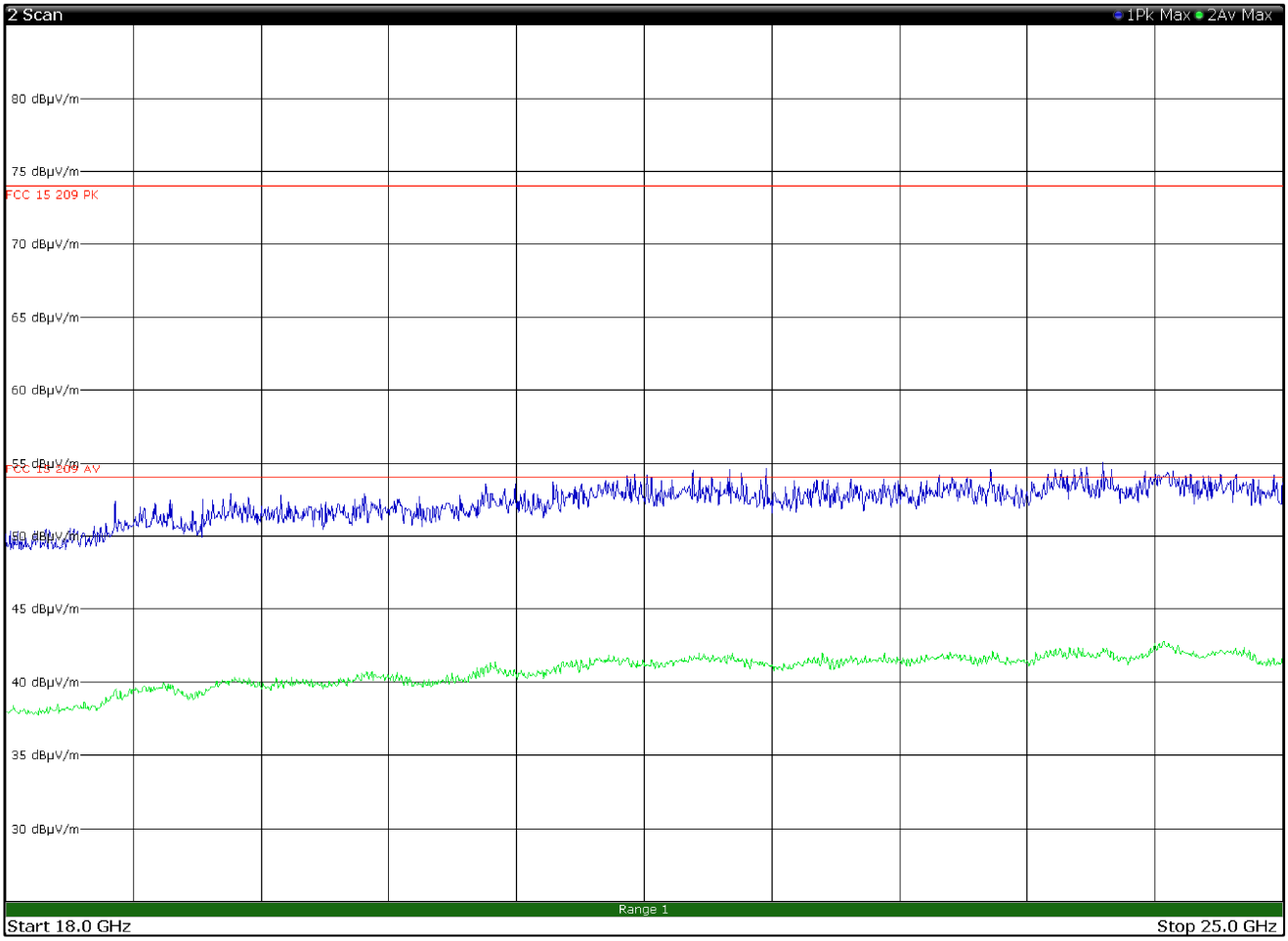
GSM 1880 MHz and iwifi 802.11a 6Mbps Multiple Chain
5300 MHz, vertical polarization



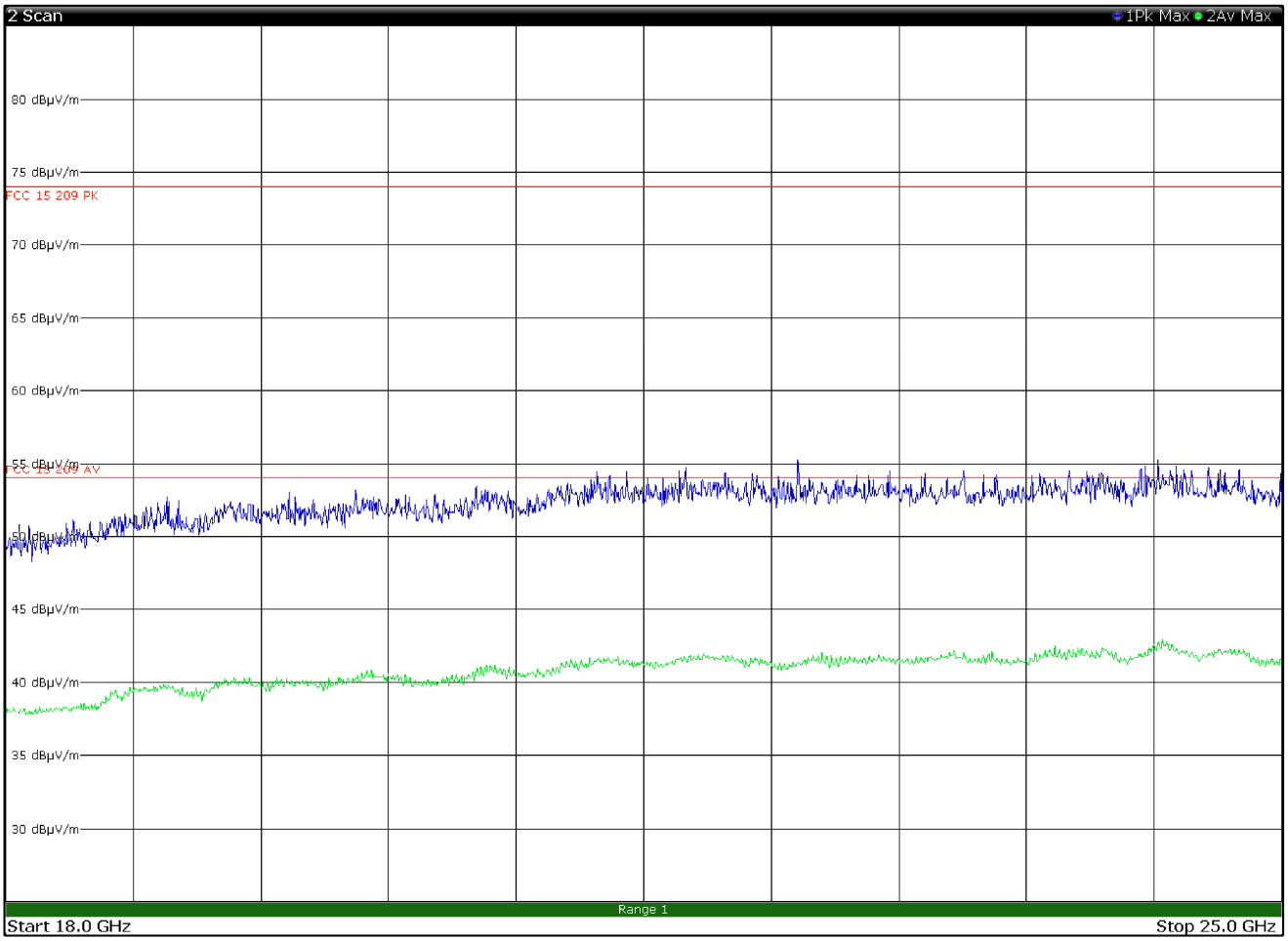
GSM 836.6 MHz and iwifi 802.11a 6Mbps Multiple Chain
5300 MHz, horizontal polarization



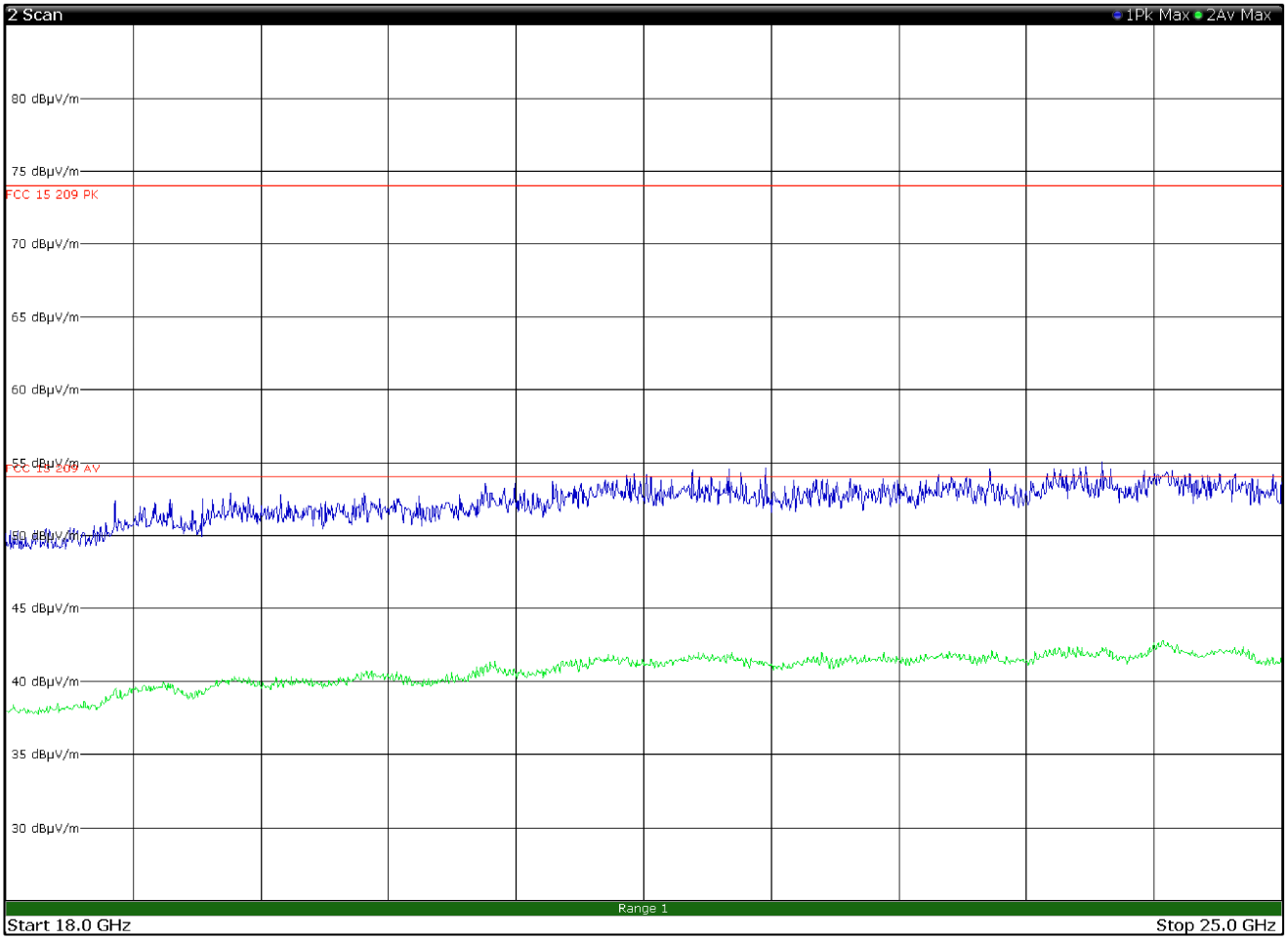
GSM 836.6 MHz and iwifi 802.11a 6Mbps Multiple Chain
5300 MHz, vertical polarization



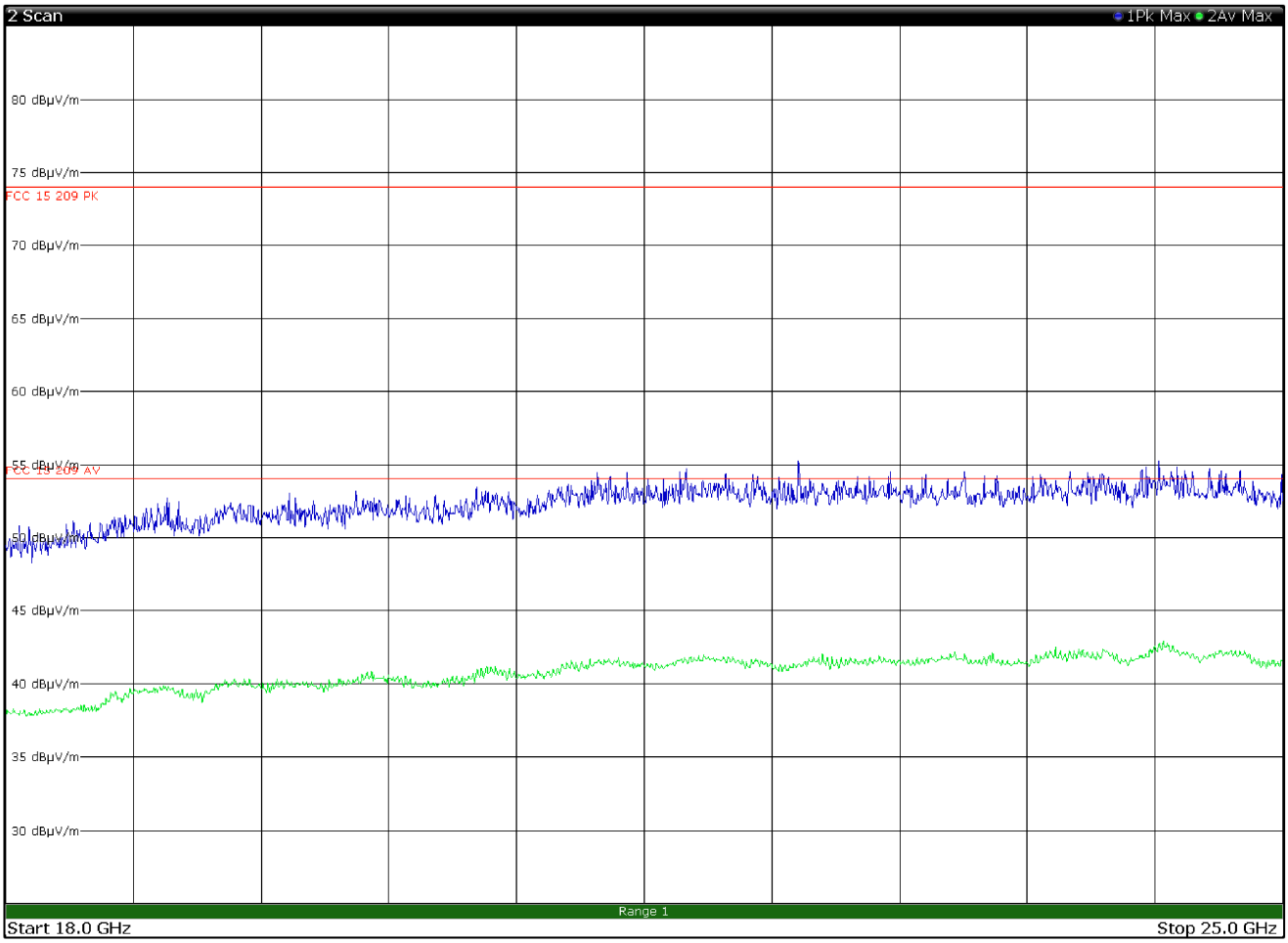
LTE B41 (5MHz) 2593 MHz and iwifi 802.11a 6Mbps Multiple Chain
5300 MHz, horizontal polarization



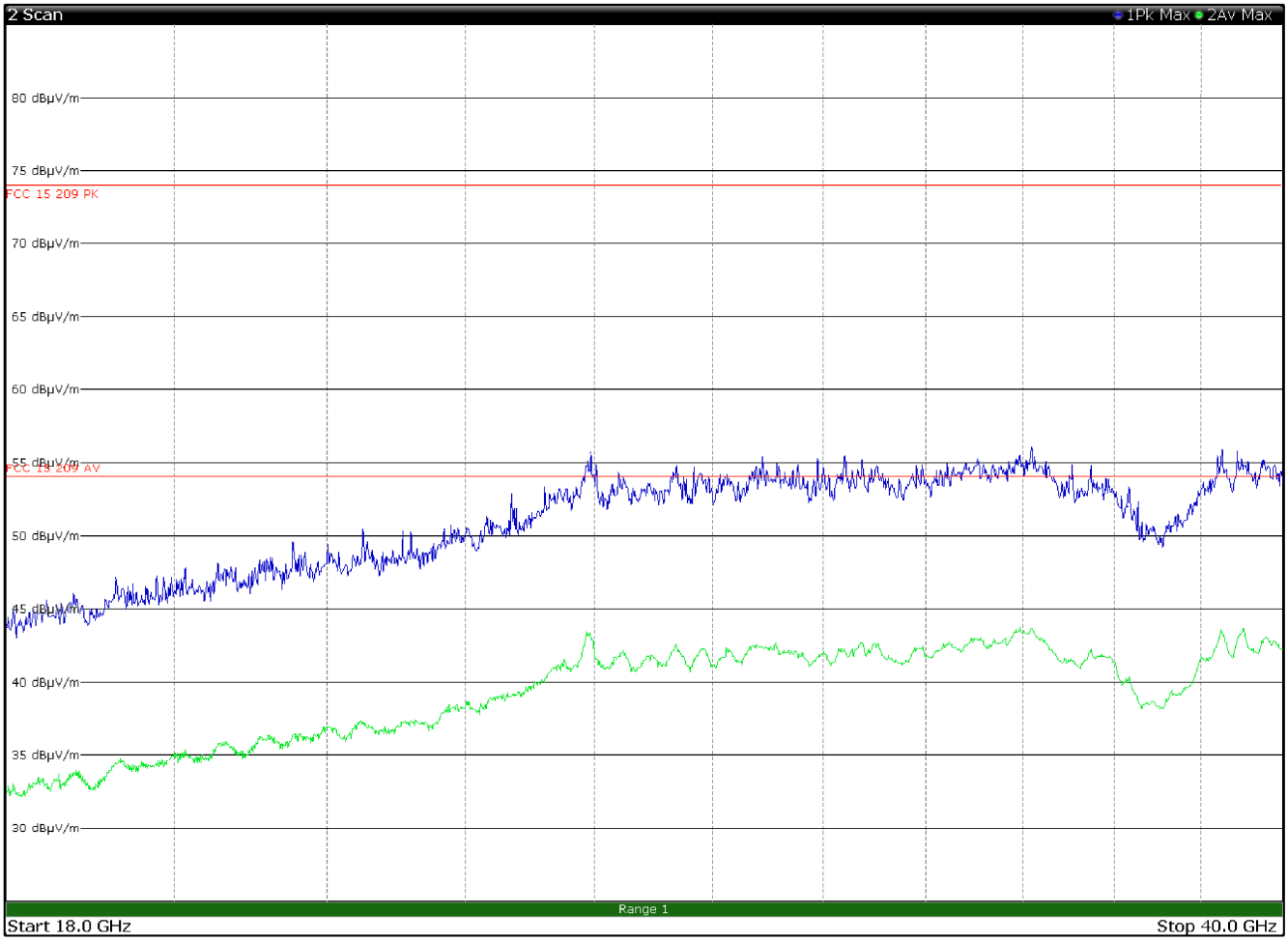
LTE B41 (5MHz) 2593 MHz and iwifi 802.11a 6Mbps Multiple Chain
5300 MHz, vertical polarization



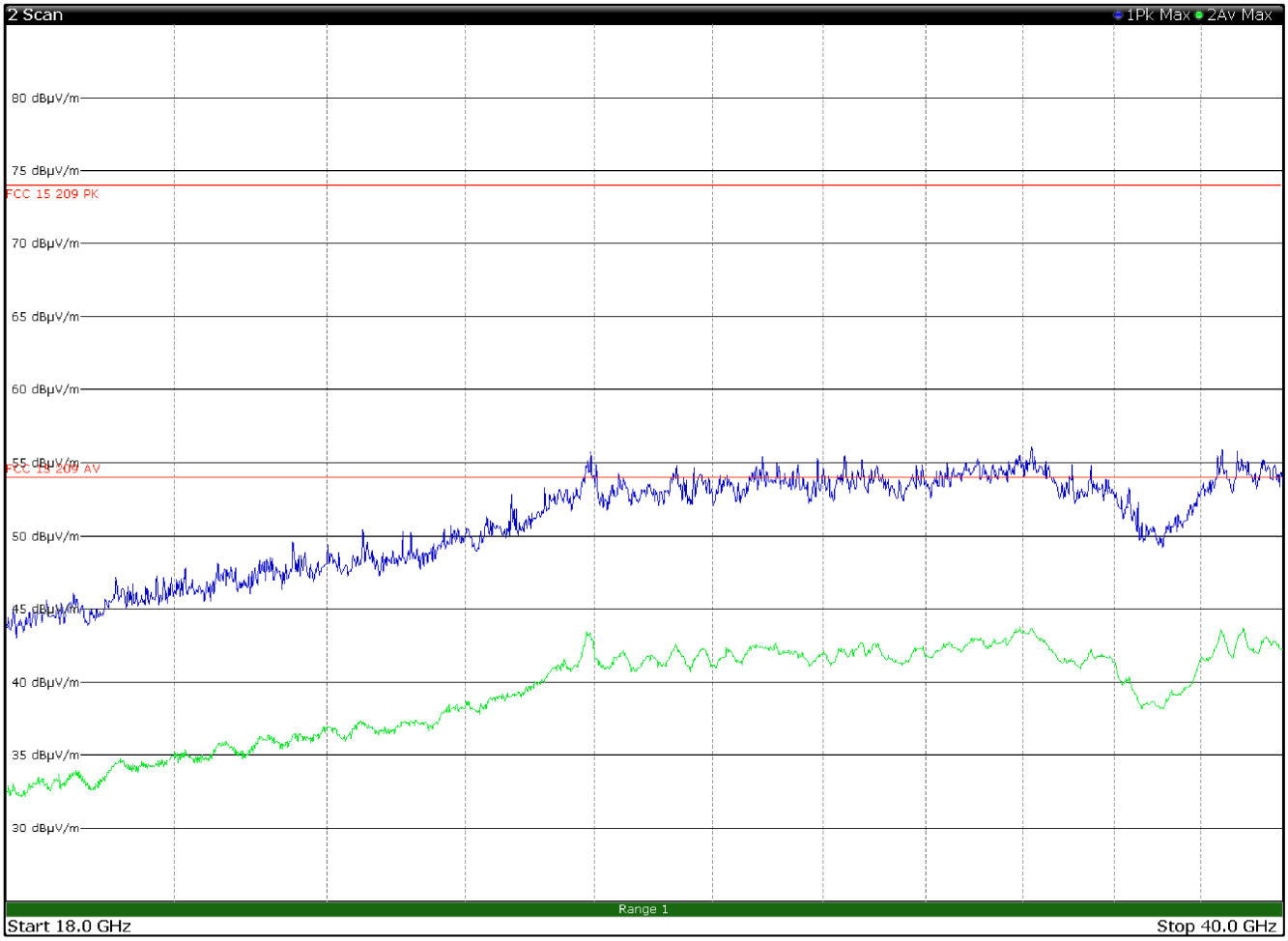
WCDMA/UMTS IV 1732.6 MHz and iwifi 802.11a 6Mbps Multiple Chain
5300 MHz, horizontal polarization



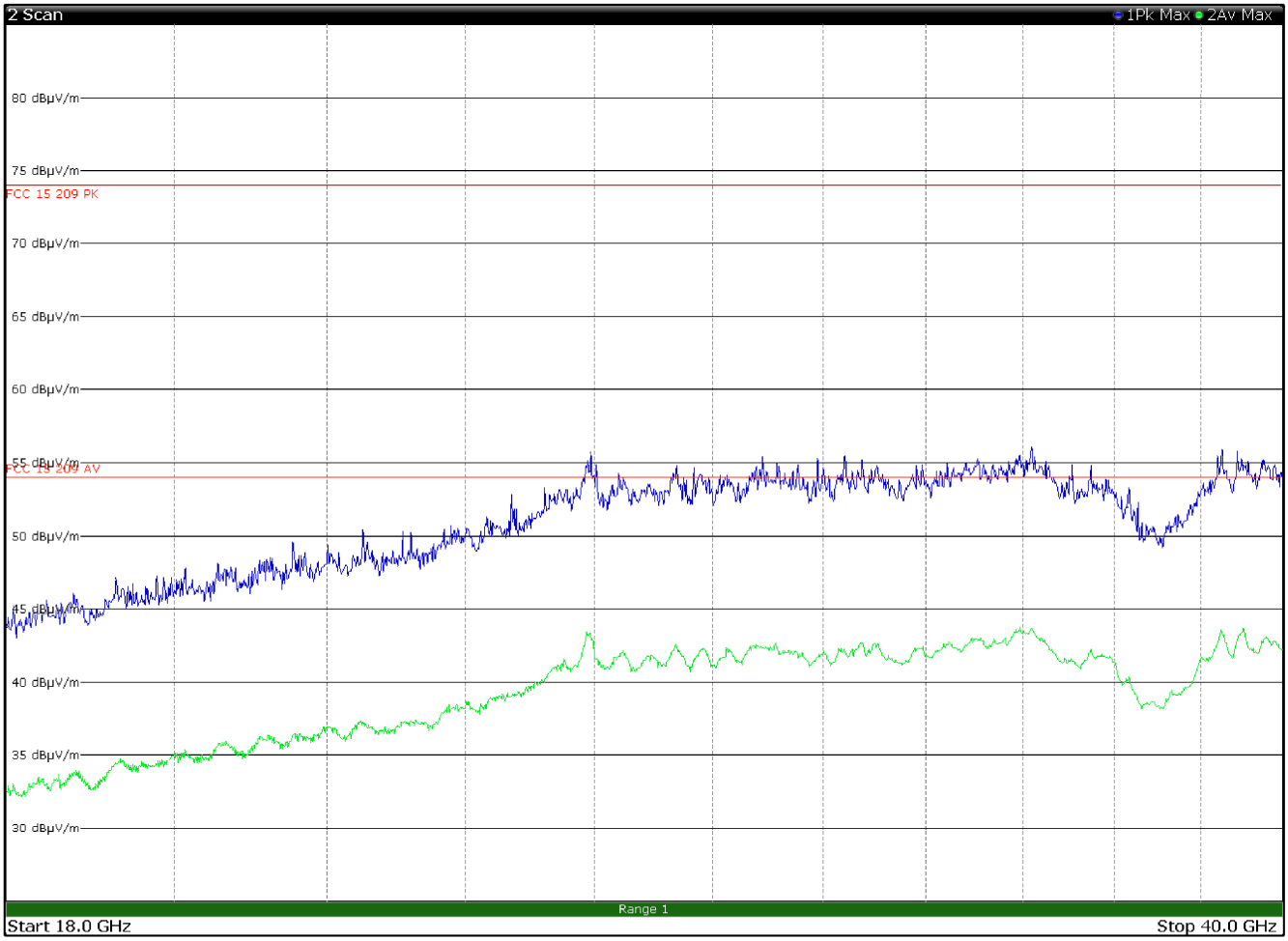
WCDMA/UMTS IV 1732.6 MHz and iwifi 802.11a6Mbps Multiple Chain
5300 MHz, vertical polarization



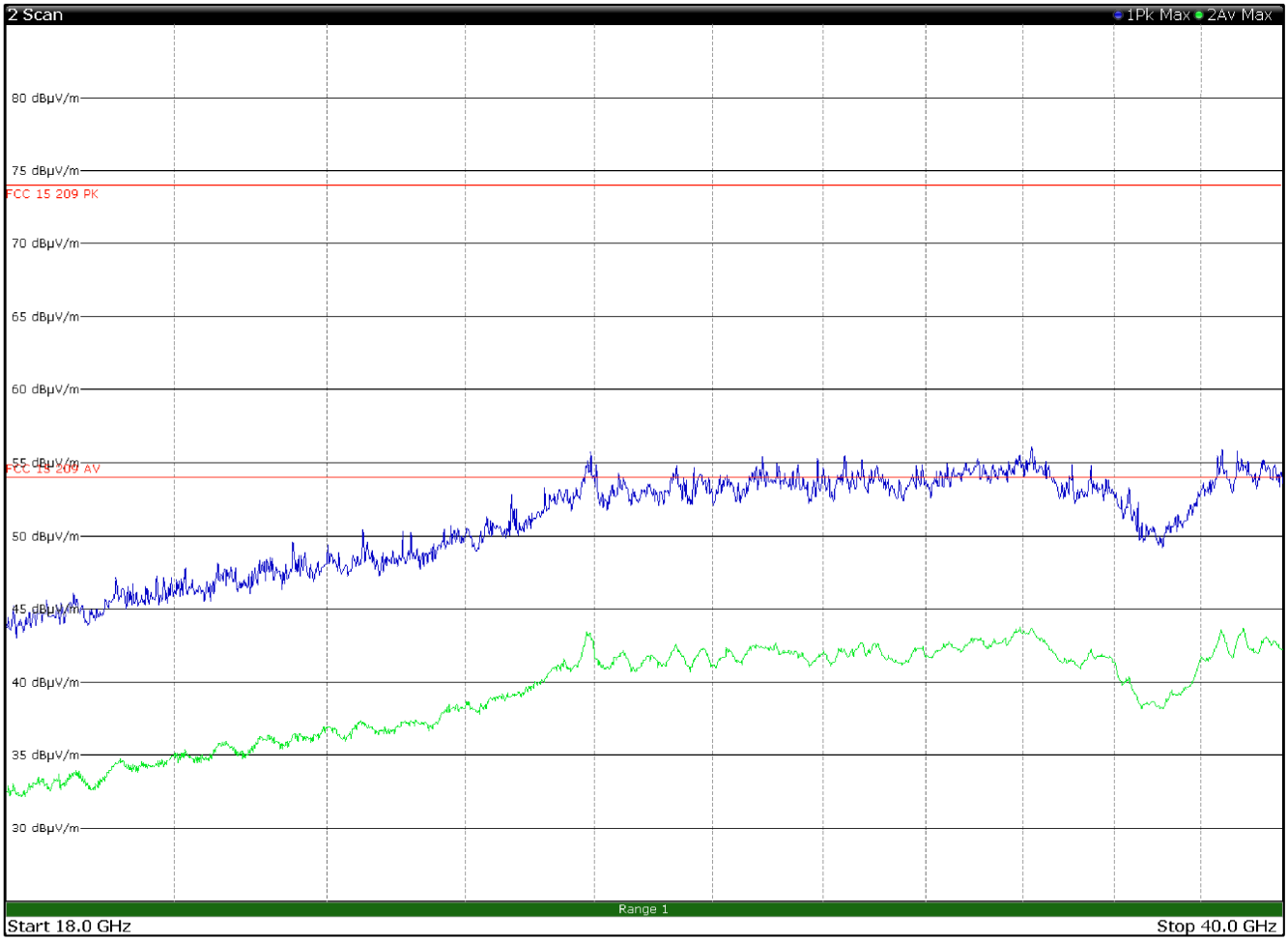
WCDMA/UMTS IV 1732.6 MHz and iwifi 802.11a6Mbps Multiple Chain
5300 MHz, vertical polarization



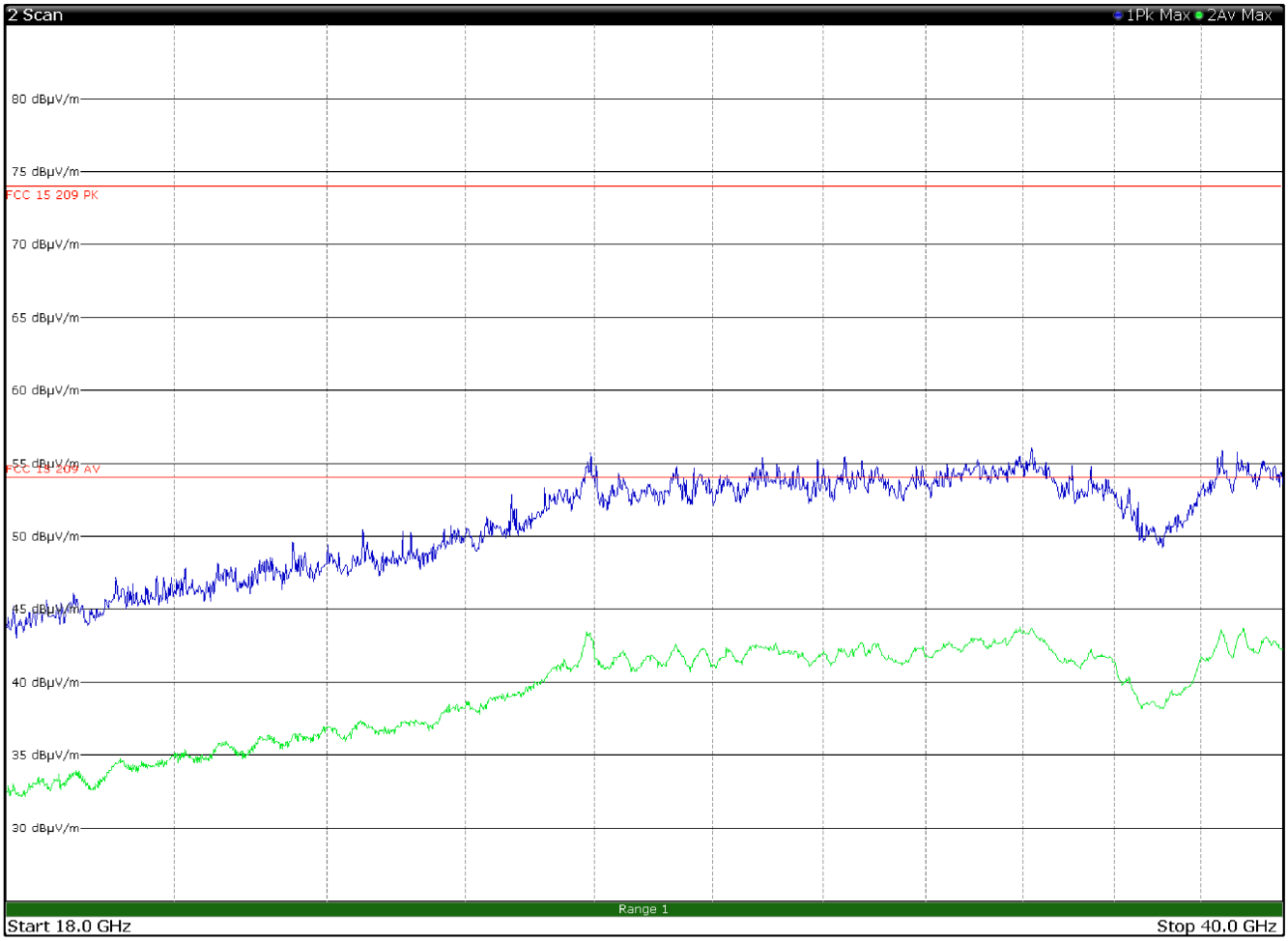
WCDMA/UMTS IV 1732.6 MHz and iwifi 802.11a6Mbps Multiple Chain
5300 MHz, horizontal polarization



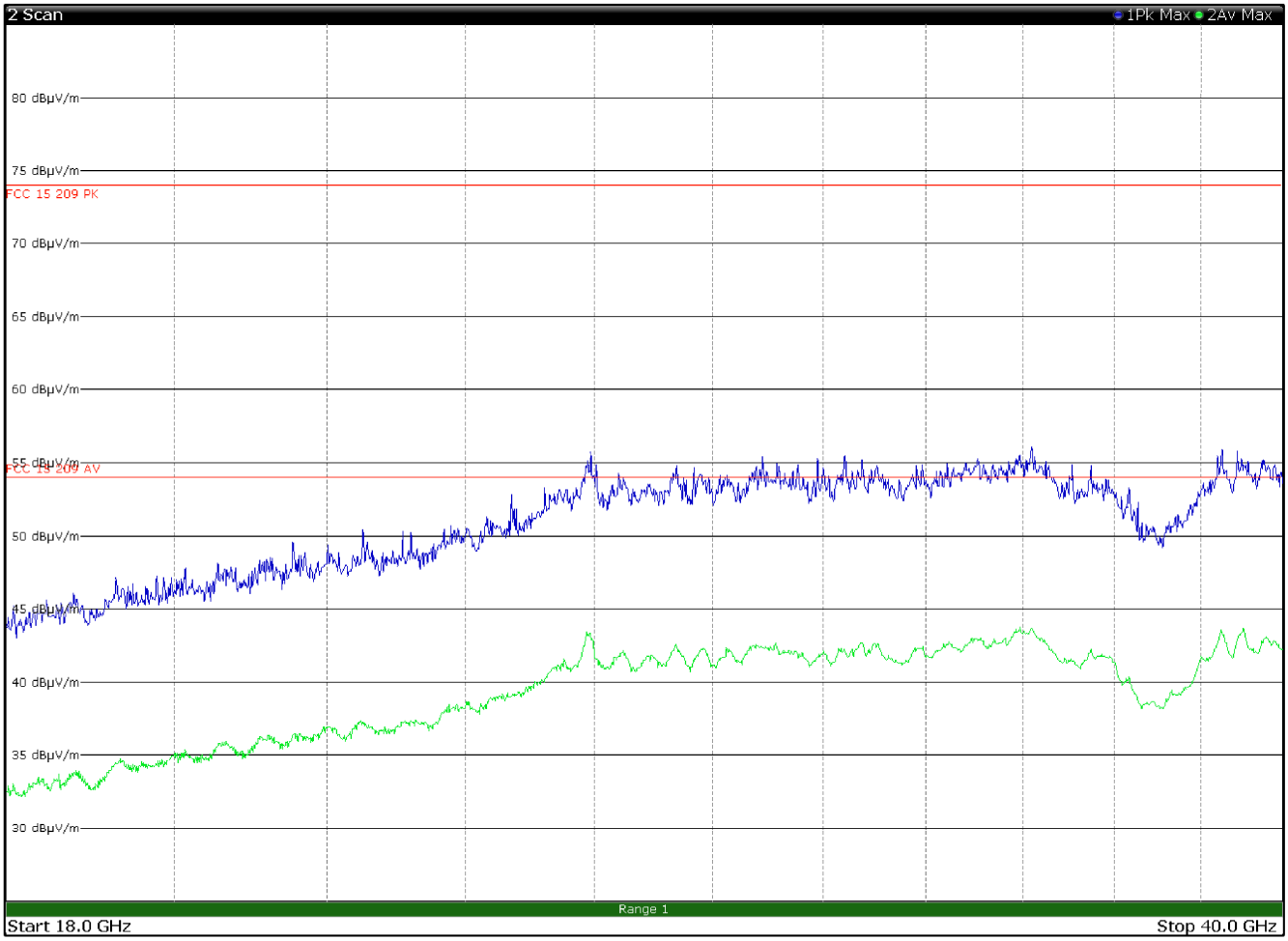
LTE B41 (5MHz) 2593 and iwifi 802.11a6Mbps Multiple Chain
5300 MHz, vertical polarization



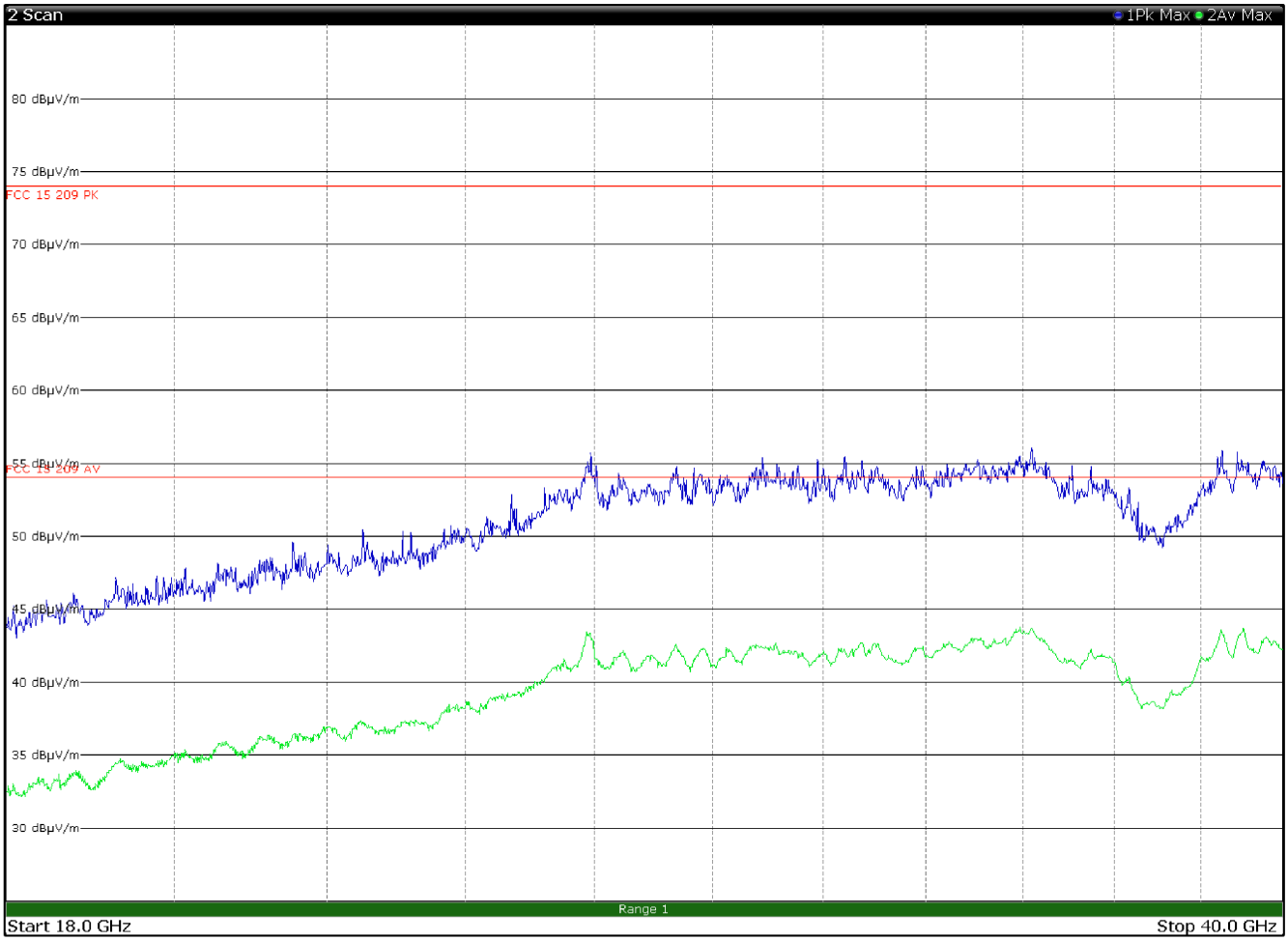
LTE B41 (5MHz) 2593 and iwifi 802.11a6Mbps Multiple Chain
5300 MHz, horizontal polarization



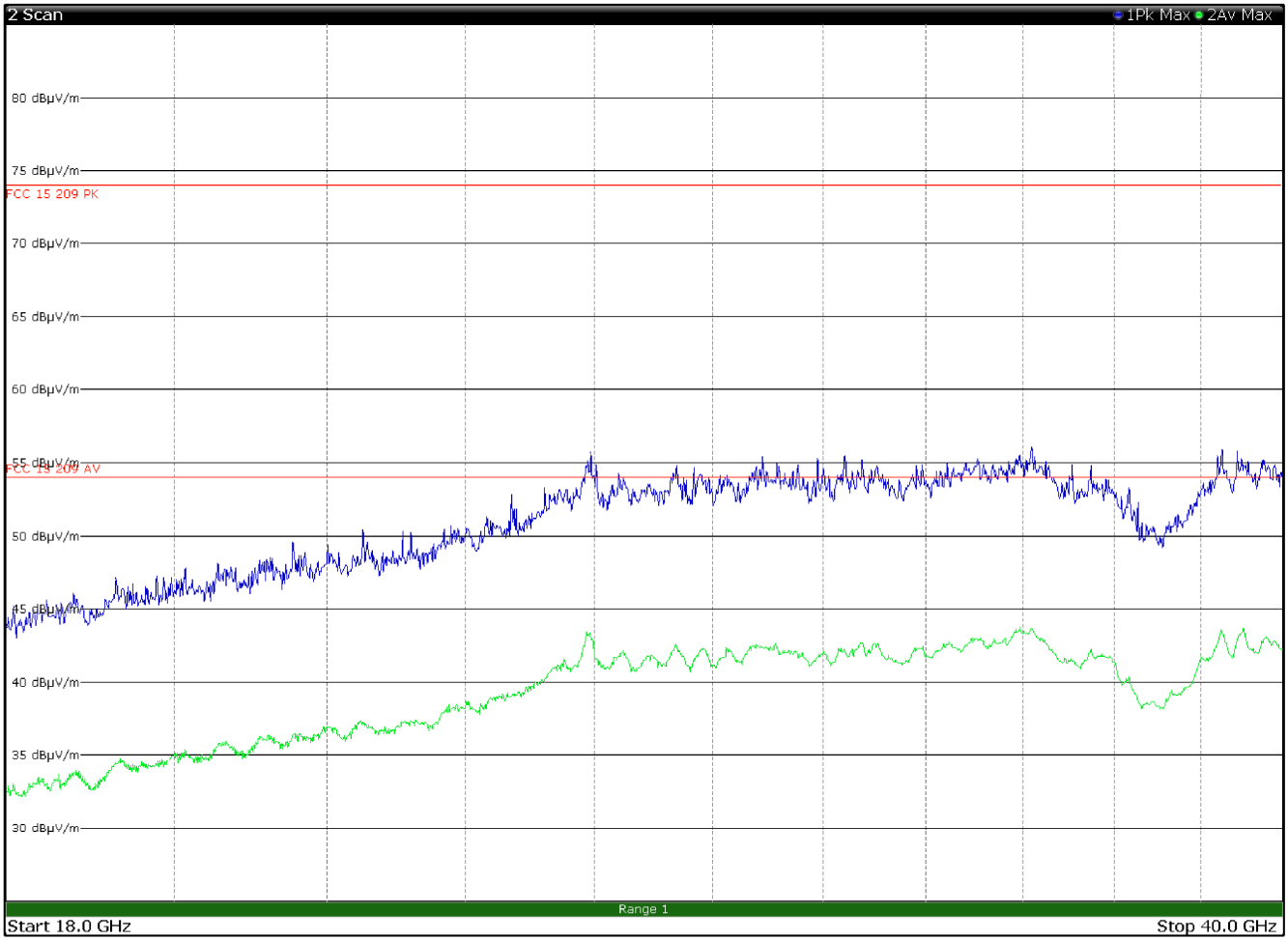
GSM 836.6 MHz and and iwifi 802.11a6Mbps Multiple Chain
5300 MHz, vertical polarization



GSM 836.6 MHz and and iwifi 802.11a6Mbps Multiple Chain
5300 MHz, horizontal polarization



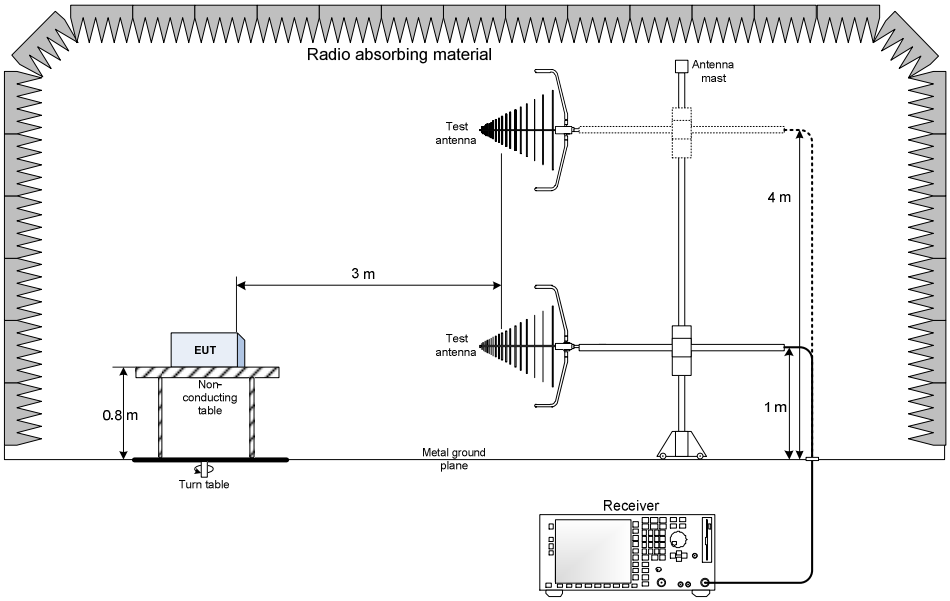
GSM 1880 MHz and and iwifi 802.11a6Mbps Multiple Chain
5300 MHz, vertical polarization



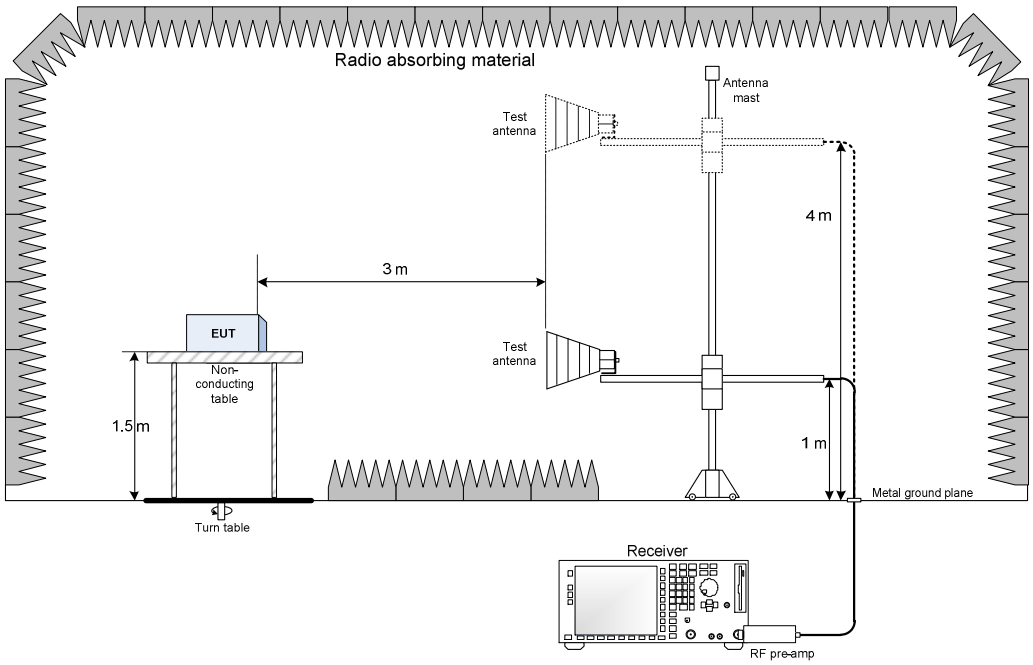
GSM 1880 MHz and and iwifi 802.11a6Mbps Multiple Chain
5300 MHz, horizontal polarization

Section 9. Block diagrams of test set-ups

9.1 Radiated emissions set-up for frequencies below 1 GHz

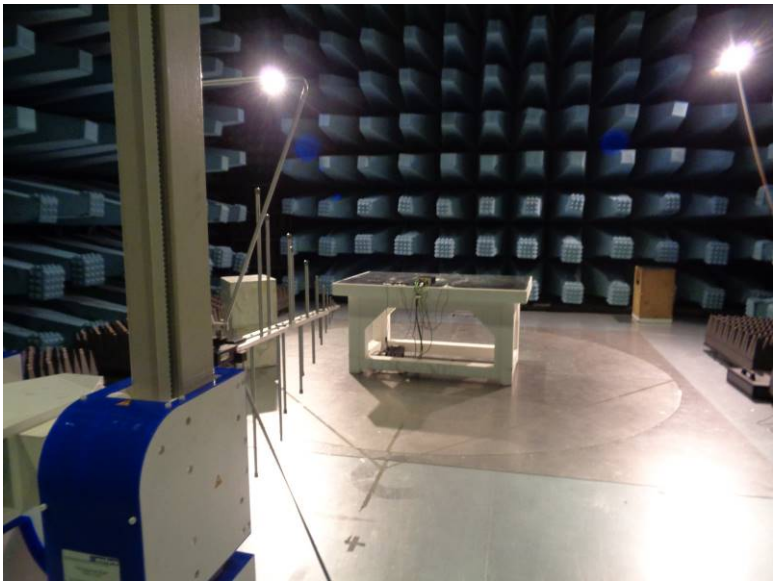


9.2 Radiated emissions set-up for frequencies above 1 GHz

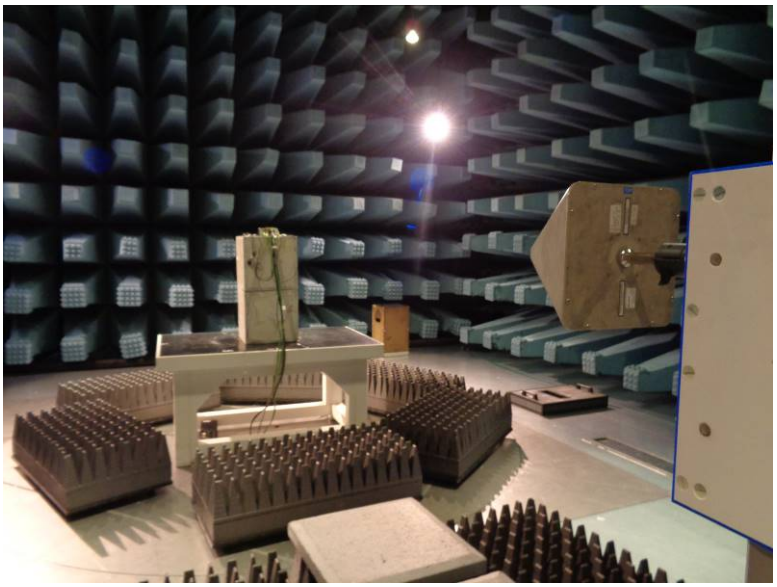


Section 10. Photos

10.1 Photos of the test set-up

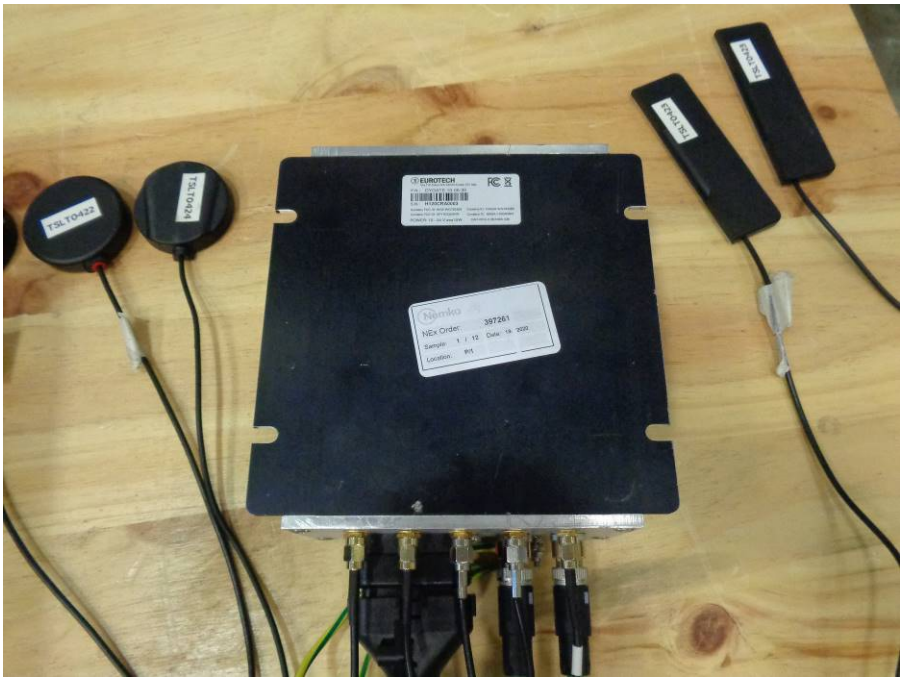


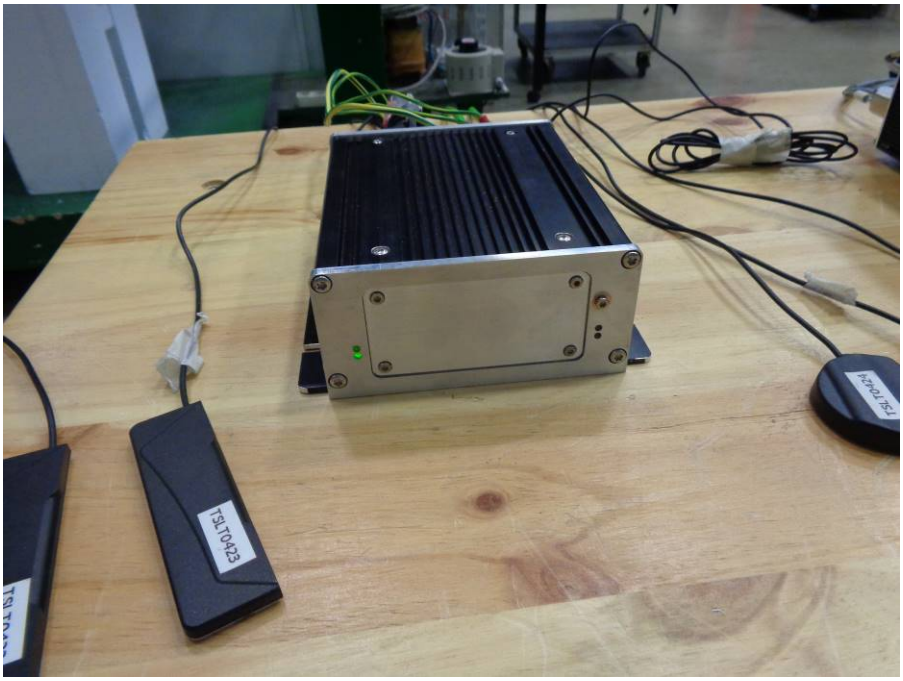
Radiated emission below 1 GHz



Radiated emission above 1 GHz

10.2 Photos of the EUT





(End of report)