Report Reference ID:	257328TRFEMC

Test specification:	Title 47 - Telecommunication Chapter I - Federal Communications Commission Subchapter A - General Part 15 - Radio Frequency Devices Subpart C - Intentional Radiators **§15.247** - Operation within the bands 902–928 MHz, 2400–2483.5 MHz and 5725–5850 MHz

Applicant:	INPECO Spa a Socio Unico
Apparatus:	Barcode label printer (Bluetooth and WiFi)
Model:	ProTube
FCC ID:	Y2K-PROTUBE001

Testing laboratory:	**Nemko Italy Spa** Via del Carroccio, 4 20853 Biassono (MB) – Italy Telephone: +39 039 2201201 Facsimile: +39 039 2201221
Registration number:	**481407**

	Name and title	**Date**
Tested by:	G. Curioni, Wireless/EMC Specialist	2014-10-10
Reviewed by:	D. Guarnone, Wireless/EMC Specialist	2014-10-10

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Section 1: Report summary

1.1 Test specification

Specifications	**FCC Part 15 Subpart C, 15.247** Operation within the bands 902–928 MHz, 2400–2483.5 MHz and 5725–5850 MHz.

1.2 Statement of compliance

Compliance	In the configuration tested the EUT was found compliant Yes ☒ No ☐ This report contains an assessment of apparatus against specifications based upon tests carried out on samples submitted at Nemko Canada Inc. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15; Subpart C. Radiated tests were conducted in accordance with ANSI C63.4-2003.

1.3 Exclusions

Exclusions	None

1.4 Registration number

Test site FCC ID number	481407

1.5 Test report revision history

Revision #	Details of changes made to test report
257328TRFFCC	Original report issued
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1.6 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 Canada's ISO/IEC 17025 accreditation.

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Section 2: Summary of test results

2.1 FCC Part 15 Subpart C – Intentional Radiators, test results

General requirements for FCC Part 15		
Part	Test description	Verdict
§15.31(e)	Variation of power source	N/A
§15.31(m)	Number of operating frequencies	N/A
§15.203	Antenna requirement	Pass
§15.207(a)	Conducted limits	N/A
Specific requirements for FCC Part 15 Subpart C, 15.247		
Part	Test description	Verdict
§15.247(a)(1)(i)	Frequency hopping systems operating in the 902–928 MHz band	N/A
§15.247(a)(1)(ii)	Frequency hopping systems operating in the 5725–5850 MHz band	N/A
§15.247(a)(1)(iii)	Frequency hopping systems operating in the 2400–2483.5 MHz band	N/A
§15.247(a)(2)	Minimum 6 dB bandwidth for systems using digital modulation techniques	N/A
§15.247(b)(1)	Maximum peak output power of frequency hopping systems operating in the 2400–2483.5 MHz band and 5725–5850 MHz band	N/A
§15.247(b)(2)	Maximum peak output power of Frequency hopping systems operating in the 902–928 MHz band	N/A
§15.247(b)(3)	Maximum peak output power of systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands	N/A
§15.247(b)(4)	Maximum peak output power	N/A
§15.247(c)(1)	Fixed point-to-point operation with directional antenna gains greater than 6 dBi	N/A
§15.247(c)(2)	Transmitters operating in the 2400–2483.5 MHz band that emit multiple directional beams	N/A
§15.247(d)	Spurious emissions	Pass
§15.247(e)	Power spectral density for digitally modulated devices	N/A
§15.247(f)	Time of occupancy for hybrid systems	N/A
Notes: testing for Class 2 Permissive Change to add antenna in a specific host (printer)		

Section 3: Equipment under test (EUT) and application details

3.1 Applicant details		
Applicant complete business name	Name:	Inpeco Spa a Socio Unico
	Federal Registration Number (FRN):	0020359642
	Grantee code	Y2K
Mailing address	Address: City: Province/State: Post code: Country:	Via Givoletto 15 Val della Torre Torino 10040 Italy

3.2 Modular equipment	
a) Single modular approval	Single modular approval Yes ☐ No ☒
b) Limited single modular approval	Limited single modular approval Yes ☒ No ☐

3.3 Product details		
FCC ID	Grantee code:	Y2K
	Product code:	-PROTUBE001
Equipment class	B	
Description of product as it is marketed	Barcode label printer for tubes with integrated radio module	
	Model name/number:	ProTube
	Serial number:	Not provided

3.4 Application purpose	
Type of application	☐ Original certification ☐ Change in identification of presently authorized equipment Original FCC ID: Grant date: ☒ Class II permissive change or modification of presently authorized equipment

3.5 Composite/related equipment	
a) Composite equipment	The EUT is a composite device subject to an additional equipment authorization Yes ☐ No ☒
b) Related equipment	The EUT is part of a system that operates with, or is marketed with, another device that requires an equipment authorization Yes ☐ No ☒
c) Related FCC ID	If either of the above is “yes”: ☐ has been granted under the FCC ID(s) listed below: ☐ is in the process of being filled under the FCC ID(s) listed below: ☐ is pending with the FCC ID(s) listed below: ☐ has a mix of pending and granted statues under the FCC ID(s) listed below: i FCC ID: ii FCC ID:

3.6 Sample information	
Receipt date:	2014-04-10
Nemko sample ID number:	3/3

3.7 EUT technical specifications	
Operating band:	Bluetooth (2402-2480 MHz), IEEE 802.11b/g/n (2412-2472 MHz)
Operating frequency	Bluetooth (2402-2480 MHz), IEEE 802.11b/g/n (2412-2472 MHz)
Modulation type:	Bluetooth (FHSS), IEEE 802.11b/g/n (11b, DSSS, 11g/n-20: OFDM)
Occupied bandwidth:	Module already FCC certified See FCC ID: Y2K-PROTUBE001
Channel spacing:	Module already FCC certified See FCC ID: Y2K-PROTUBE001
Emission designator:	Module already FCC certified See FCC ID: Y2K-PROTUBE001
Antenna type:	Built-in permanent fixed antenna
Power source:	Printer: 24 Vdc Adapter: AC/DC Switching Adapter MEAN WELL model GS120A24-P1M Pri: 100-240 V□; 50/60 Hz; 1,4 A - Sec: 24 V ; 5,0 A; 120 W max

3.8 Operation of the EUT during testing	
Details:	Bluetooth mode switched on, Wi-Fi mode switched on

3.9 EUT setup diagram

setup diagram

Section 4: Engineering considerations

4.1 Modifications incorporated in the EUT	
Modifications	Modifications performed to the EUT during this assessment None ☒ Yes ☐, performed by Client ☐ or Nemko ☐ Details:

4.2 Deviations from laboratory tests procedures	
Deviations	Deviations from laboratory test procedures None ☒ Yes ☐ - details are listed below:

4.3 Technical judgment	
Judgment	None

Section 5: Test conditions

5.1 Power source and ambient temperatures	
Normal temperature, humidity and air pressure test conditions	Temperature: 15–30 °C Relative humidity: 20–75 % Air pressure: 86–106 kPa When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.
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

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	Antenna distance 3m, 10m (30÷200) MHz	5.0 dB	(1)
	Antenna distance 3m (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)
Clicks	9 kHz ÷ 150 kHz	3.8 dB	(1)
	150 kHz ÷ 30 MHz	3.4 dB	(1)
Disturbance Power	30 MHz ÷300 MHz	4.5 dB	(1)
Frequency	10 Hz ÷ 1 kHz	0.2%	(1)
	1kHz ÷ 40GHz	10^{-6}	(1)
Harmonic Current Emission	50 Hz ÷ 2 kHz	2%	(1)
Voltage Fluctuation Emission	--	2%	(1)
Radiated Immunity	20 MHz ÷ 3 GHz	2.8 dB	(1)
Conducted RF Immunity	9 kHz ÷ 230 MHz	3.0 dB	(1)
ESD Immunity	Amplitude	10%	(1)
Burst Immunity	Amplitude	10%	(1)
	Duration	30%	
Surge Immunity	Amplitude	10%	(1)
	Front Time	20% or 30%	
	Half Value	20% or 30%	
Dips Immunity	Amplitude	5%	(1)
	Duration	5%	
Magnetic Field Immunity	50 Hz	2.0dB	(1)
Damped Magnetic Field Immunity	100 kHz, 1 MHz	3 dB ampl. 10% freq.	(1)
Oscillatory Wave Immunity	Amplitude - 100 kHz, 1 MHz	10%	(1)
	Front Time - 100 kHz, 1 MHz	20%	(1)
	Oscillation frequency - 100 kHz, 1 MHz	10%	(1)
Low Frequency Immunity	15 Hz ÷ 150 kHz	2.2 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 %.

Section 7: Test equipment

7.1 Test equipment list

Equipment	Manufacturer	Model No.	Asset/Serial No.	Next cal.
Semi-anechoic chamber	Nemko Spa	10m Semi-anechoic chamber	530	09/2016
Antenna Trilog 25 MHz- 8 GHz	Schwarzbeck	Vulb 9162	9162-025	05/2015
Antenna 1-18 GHz	Schwarzbeck	STPL 9148	STPL 9148-123	02/2015
Antenna Double Ridged Horn	RF Spin	DRH40	061106A40	08/2016
Preamplifier 1-18	Schwarzbeck	BBV 9718	9718-137	11/2014
Preamplifier 18-40 GHz	Miteq	JS44-18004000-35-8P-R	1648665+1648789	11/2014
Coaxial cable	Huber+Suhner	EMI 10-01.1+EMI 10-01.2	1.510+1.511	09/2015
Coaxial cable	Huber+Suhner	EMI 3.01+EMI 3.02	1.654+1.655	09/2015

Note: N/A = Not applicable, NCR = No cal required, COU = Cal on use

Section 8: Testing data

8.1 Clause 15.247(d) Spurious emissions

§ 15.247 Operation within the bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz.

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Special notes

§15.209 – Radiated emission limits

Frequency (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Measurement distance (m)
0.009–0.490	2400/F	67.6−20log(F)	300
0.490–1.705	24000/F	87.6−20log(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:
- F = fundamental frequency in kHz
- 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.

§15.205 – Restricted bands of operation

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			

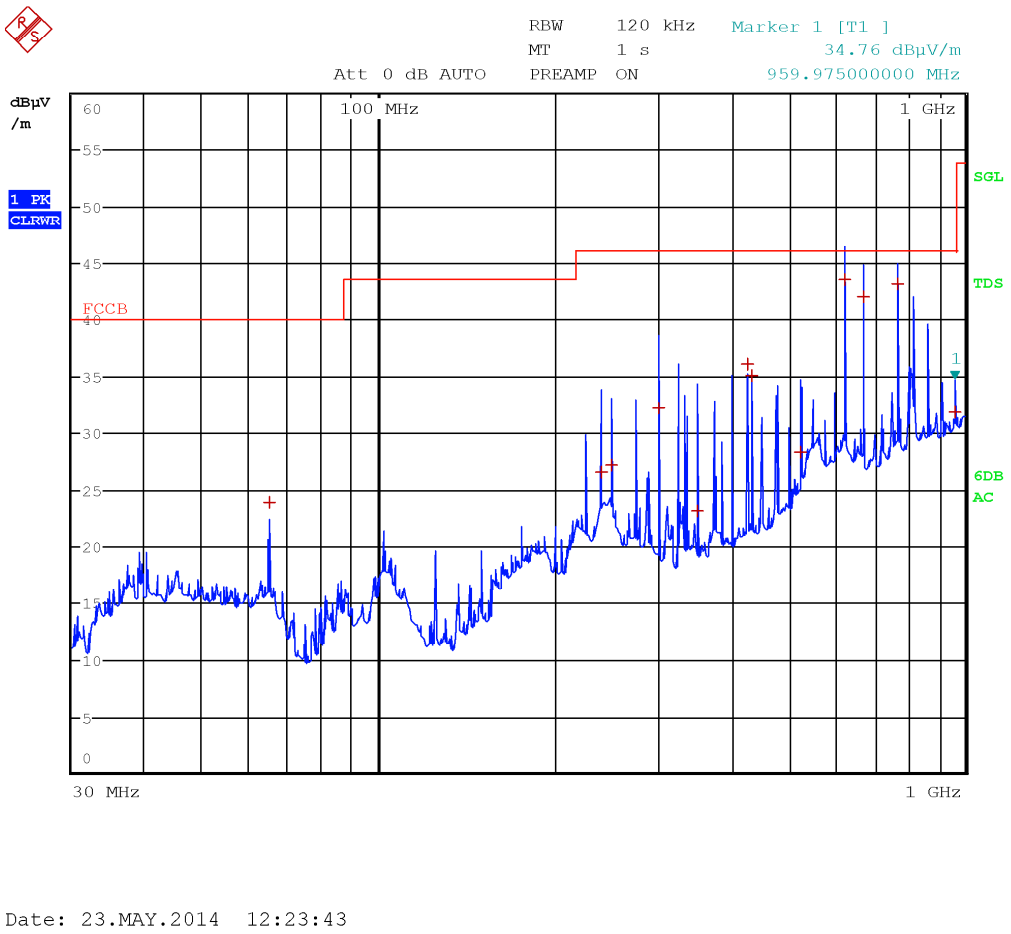
- The spectrum was searched from 30 MHz to the 10th harmonic.
- The EUT was measured on three orthogonal axis.
- All measurements were performed at a distance of 3 m.
- All measurements were performed:
  - below 30 MHz: using a quasi-peak detector with 9 kHz/30 kHz RBW/VBW,
  - within 30–1000 MHz range: using a quasi-peak detector with 120 kHz/300 kHz RBW/VBW,
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
    - and using peak detector with 1 MHz/10 Hz RBW/VBW for average results
    - or using average detector with 1 MHz/3 MHz RBW/VBW for average results
    - or using a duty cycle/average factor for average results calculations.

Test data
Duty cycle/average factor calculations §15.35(c) When the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. **Duty cycle/average factor calculations:** $$Duty\,cycle/average\,factor = 20 \times \log_{10}\left(\frac{Tx_{100\,ms}}{100\,ms}\right)$$

Test data, continued

Radiated measurement Bluetooth 30-1000 MHz frequency Hopping

H pol.



Radiated Measurements

No emissions were detected within 10 dB of limit inside the 15.205 Restricted bands.

- All measurements were performed at a distance of 3 m.
- All measurements performed:
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
  - and using average detector with 1 MHz/3 MHz RBW/VBW for average results

Test data, continued

Radiated measurement Bluetooth 30-1000 MHz frequency Hopping

H pol.

EDIT PEAK LIST (Final Measurement Results)

Trace1: FCCB
Trace2: ---
Trace3: ---

	TRACE	FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1	Quasi Peak	65.075 MHz	23.89	-16.10
1	Quasi Peak	240 MHz	26.53	-19.48
1	Quasi Peak	250 MHz	27.19	-18.83
1	Quasi Peak	300 MHz	32.18	-13.83
1	Quasi Peak	350 MHz	23.12	-22.89
1	Quasi Peak	425 MHz	36.06	-9.95
1	Quasi Peak	432 MHz	35.15	-10.86
1	Quasi Peak	525.025 MHz	28.26	-17.75
1	Quasi Peak	623.975 MHz	43.50	-2.51
1	Quasi Peak	672 MHz	42.07	-3.94
1	Quasi Peak	767.975 MHz	43.13	-2.88
1	Quasi Peak	959.975 MHz	31.82	-14.19

Date: 23.MAY.2014 12:23:09

Radiated Measurements

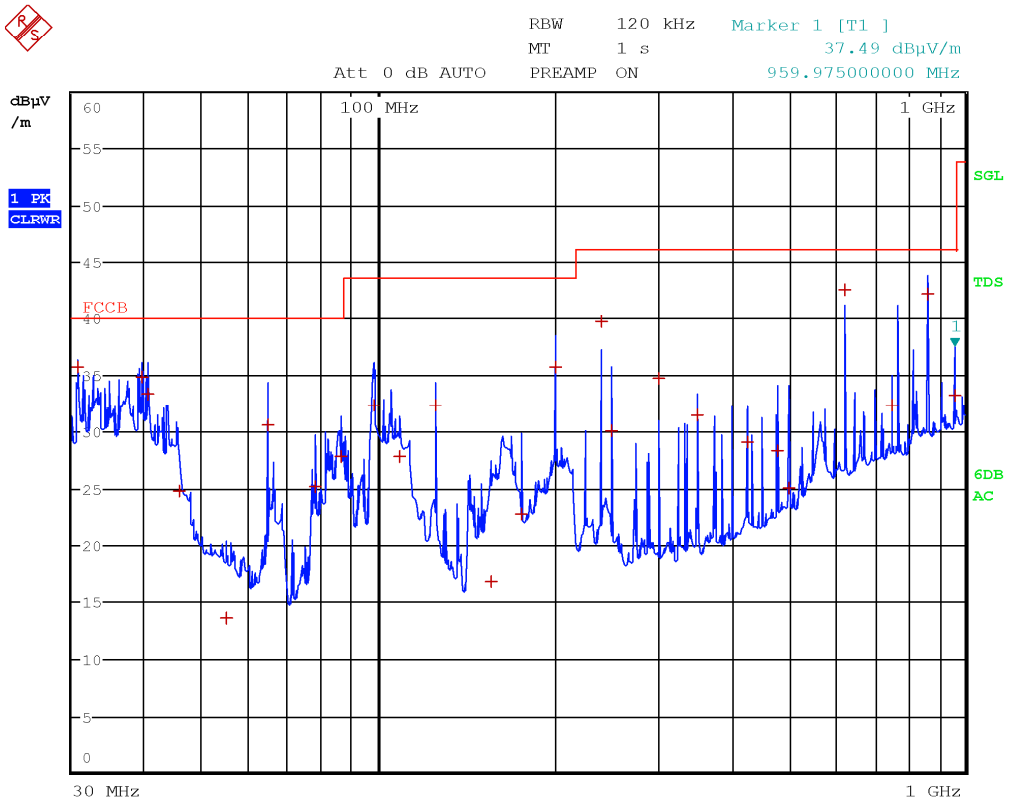
No emissions were detected within 10 dB of limit inside the 15.205 Restricted bands.

- All measurements were performed at a distance of 3 m.
- All measurements performed:
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
  - and using average detector with 1 MHz/3 MHz RBW/VBW for average results

Test data, continued

Radiated measurement Bluetooth 30-1000 MHz frequency Hopping

V pol.



Date: 23.MAY.2014 11:52:42

Radiated Measurements

No emissions were detected within 10 dB of limit inside the 15.205 Restricted bands.

- All measurements were performed at a distance of 3 m.
- All measurements performed:
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
  - and using average detector with 1 MHz/3 MHz RBW/VBW for average results

Test data, continued

Radiated measurement Bluetooth 30-1000 MHz frequency Hopping

V pol. Tab 1

EDIT PEAK LIST (Final Measurement Results)

Trace1:	FCCB
Trace2:	---
Trace3:	---

TRACE	FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1 Quasi Peak	30.625 MHz	35.69	-4.30
1 Quasi Peak	39.525 MHz	34.89	-5.10
1 Quasi Peak	40.325 MHz	33.38	-6.61
1 Quasi Peak	45.775 MHz	24.78	-15.21
1 Quasi Peak	55.1 MHz	13.50	-26.49
1 Quasi Peak	64.8 MHz	30.61	-9.38
1 Quasi Peak	77.9 MHz	25.14	-14.85
1 Quasi Peak	86.05 MHz	27.85	-12.14
1 Quasi Peak	98.425 MHz	32.30	-11.21
1 Quasi Peak	108.825 MHz	27.85	-15.66
1 Quasi Peak	125 MHz	32.33	-11.18
1 Quasi Peak	155.85 MHz	16.83	-26.68
1 Quasi Peak	175 MHz	22.74	-20.77
1 Quasi Peak	200 MHz	35.78	-7.73
1 Quasi Peak	240 MHz	39.77	-6.24
1 Quasi Peak	250 MHz	30.06	-15.95
1 Quasi Peak	300 MHz	34.67	-11.34
1 Quasi Peak	350 MHz	31.50	-14.51
1 Quasi Peak	425 MHz	29.09	-16.92
1 Quasi Peak	480 MHz	28.34	-17.68

Date: 23.MAY.2014 11:50:31

Radiated Measurements

No emissions were detected within 10 dB of limit inside the 15.205 Restricted bands.

- All measurements were performed at a distance of 3 m.
- All measurements performed:
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
  - and using average detector with 1 MHz/3 MHz RBW/VBW for average results

Test data, continued

Radiated measurement Bluetooth 30-1000 MHz frequency Hopping

V pol. Tab 2

EDIT PEAK LIST (Final Measurement Results)

Trace1:	FCCB
Trace2:	---
Trace3:	---

TRACE	FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1 Quasi Peak	500 MHz	24.96	-21.05
1 Quasi Peak	624 MHz	42.56	-3.45
1 Quasi Peak	750.025 MHz	32.29	-13.72
1 Quasi Peak	863.975 MHz	42.14	-3.87
1 Quasi Peak	959.975 MHz	33.26	-12.75

Date: 23.MAY.2014 11:52:18

Radiated Measurements

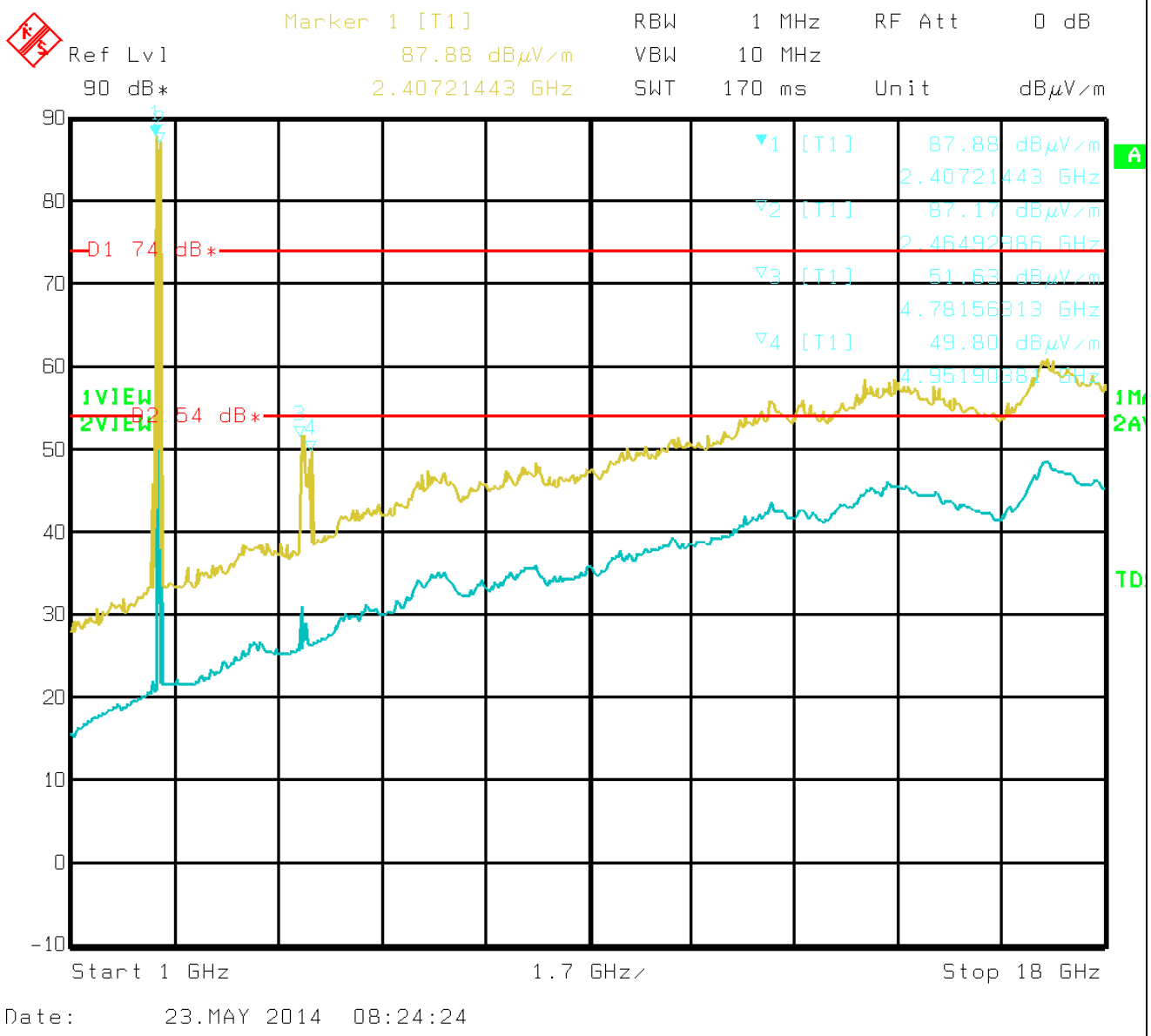
No emissions were detected within 10 dB of limit inside the 15.205 Restricted bands.

- All measurements were performed at a distance of 3 m.
- All measurements performed:
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
  - and using average detector with 1 MHz/3 MHz RBW/VBW for average results

Test data, continued

Radiated measurement Bluetooth 1-18 GHz frequency Hopping

H pol.



Radiated Measurements

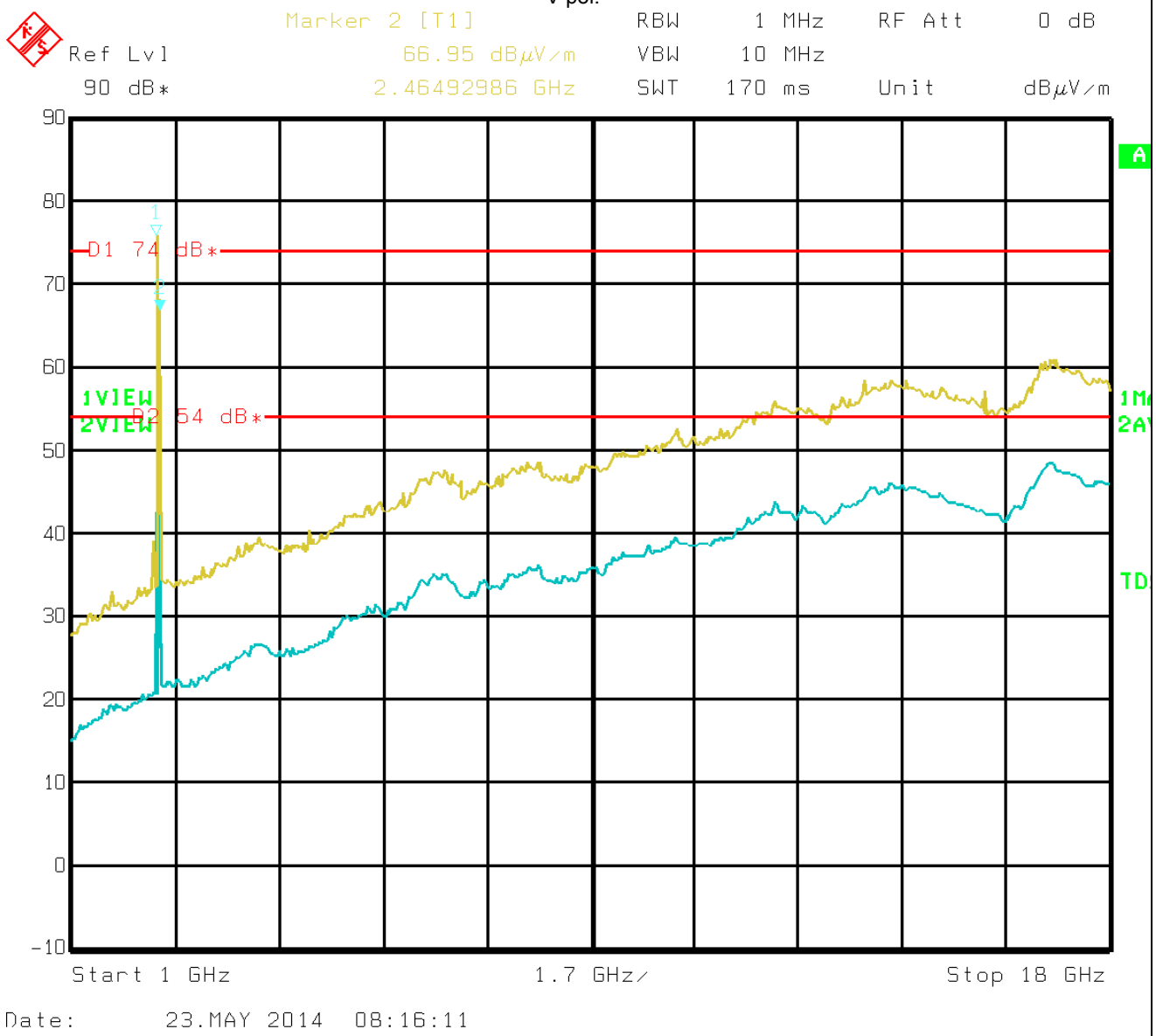
No emissions were detected within 10 dB of limit inside the 15.205 Restricted bands.

- All measurements were performed at a distance of 3 m.
- All measurements performed:
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
  - and using average detector with 1 MHz/3 MHz RBW/VBW for average results

Test data, continued

Radiated measurement Bluetooth 1-18 GHz frequency Hopping

V pol.



Radiated Measurements

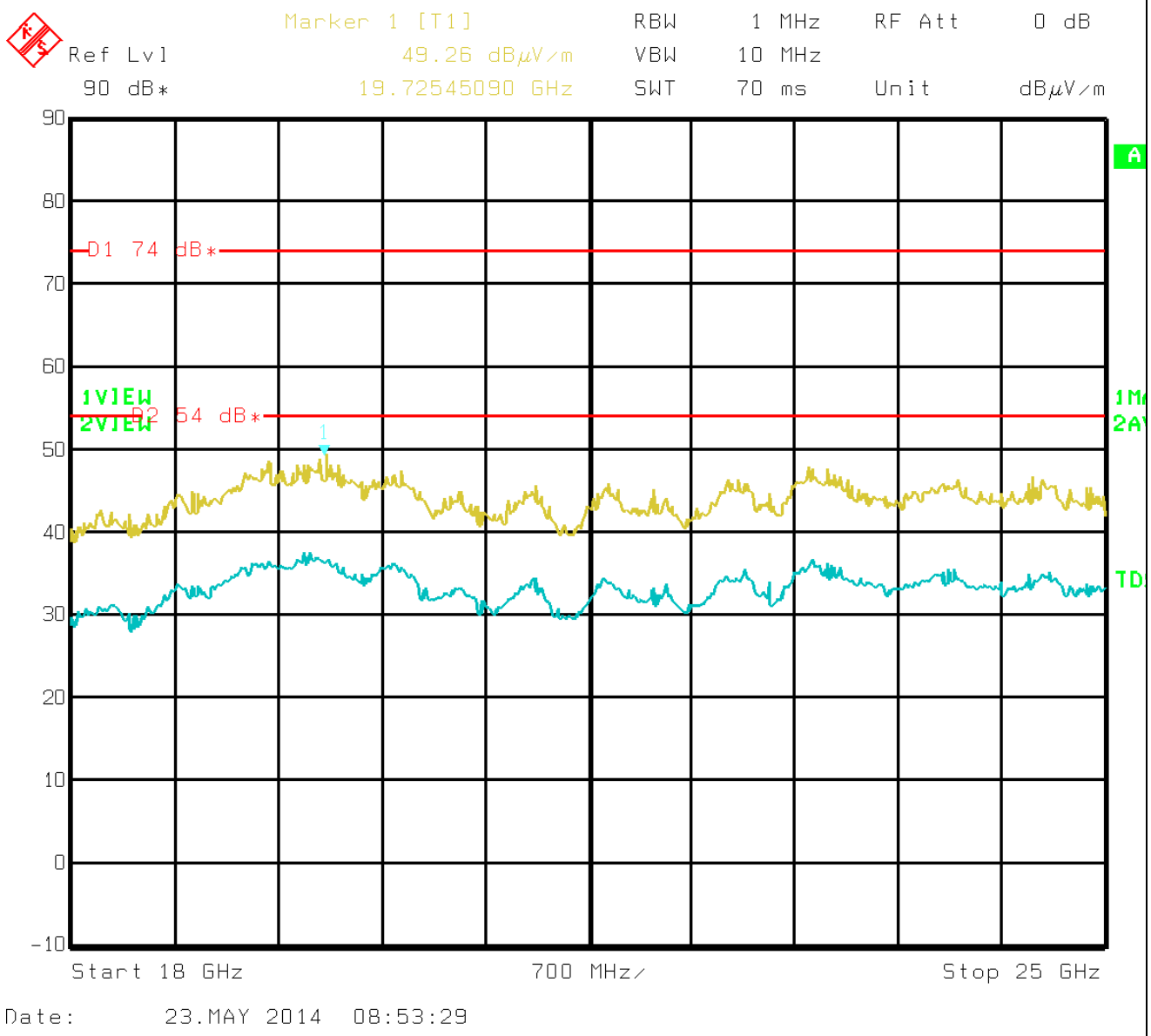
No emissions were detected within 10 dB of limit inside the 15.205 Restricted bands.

- All measurements were performed at a distance of 3 m.
- All measurements performed:
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
  - and using average detector with 1 MHz/3 MHz RBW/VBW for average results

Test data, continued

Radiated measurement Bluetooth 18-25 GHz frequency Hopping

H pol.



Radiated Measurements

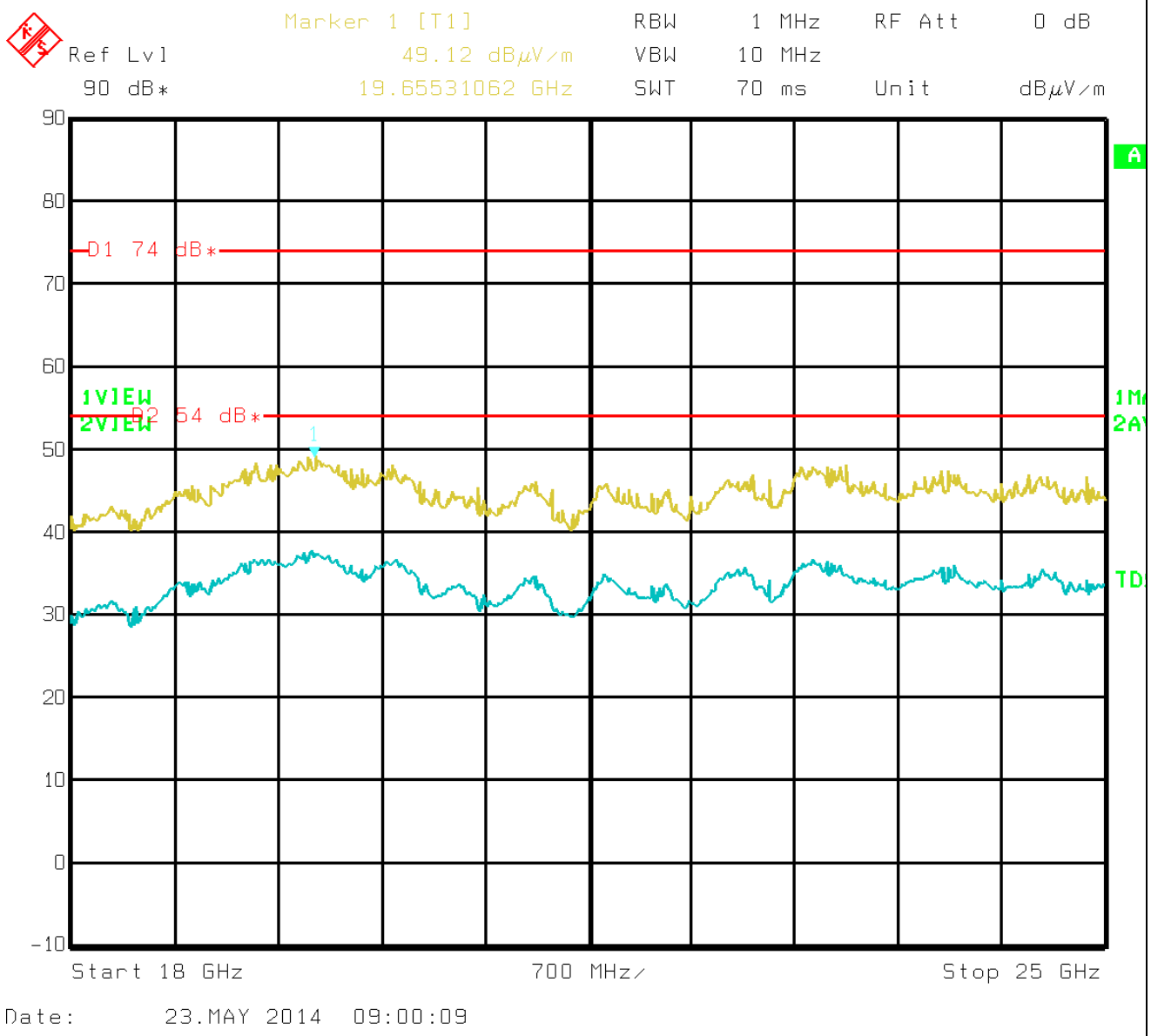
No emissions were detected within 10 dB of limit inside the 15.205 Restricted bands.

- All measurements were performed at a distance of 3 m.
- All measurements performed:
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
  - and using average detector with 1 MHz/3 MHz RBW/VBW for average results

Test data, continued

Radiated measurement Bluetooth 18-25 GHz frequency Hopping

V pol.



Radiated Measurements

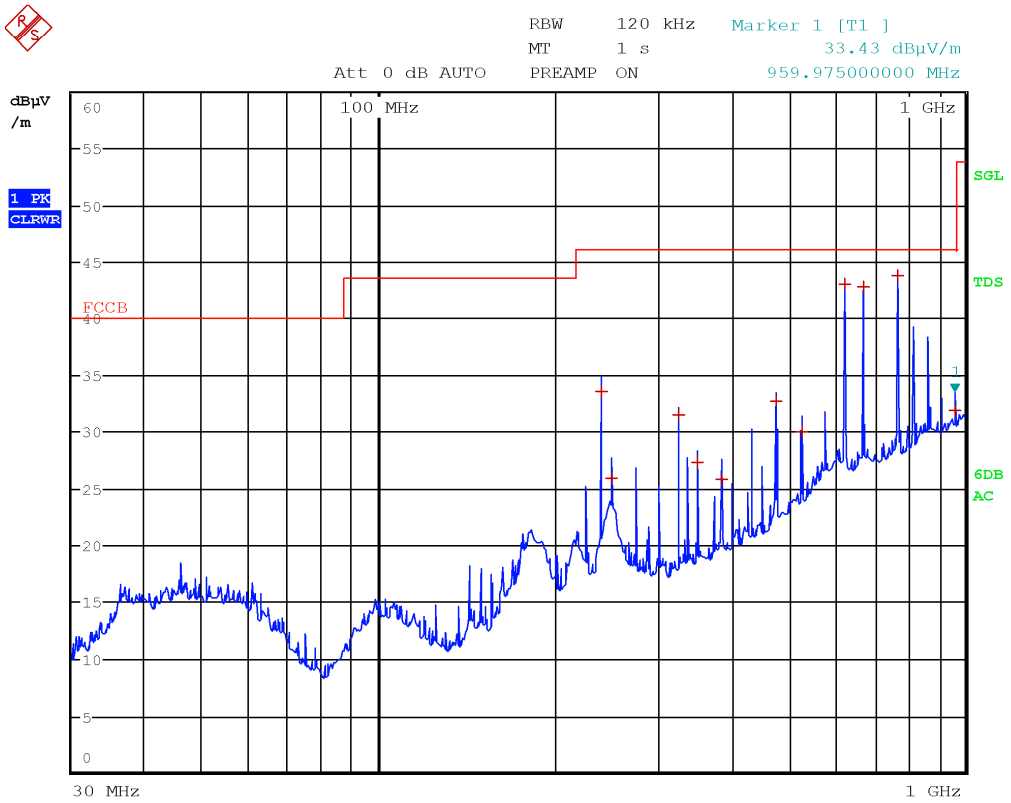
No emissions were detected within 10 dB of limit inside the 15.205 Restricted bands.

- All measurements were performed at a distance of 3 m.
- All measurements performed:
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
  - and using average detector with 1 MHz/3 MHz RBW/VBW for average results

Test data, continued

Radiated measurement Wi Fi 30-1000 MHz

IEEE 802.11b CH 1 (Low) H polarization



Radiated Measurements

No emissions were detected within 10 dB of limit inside the 15.205 Restricted bands.

- All measurements were performed at a distance of 3 m.
- All measurements performed:
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
  - and using average detector with 1 MHz/3 MHz RBW/VBW for average results

Test data, continued

Radiated measurement Wi Fi 30-1000 MHz

IEEE 802.11b CH1 (Low) H Polarization

EDIT PEAK LIST (Final Measurement Results)

Trace1:	FCCB
Trace2:	---
Trace3:	---

TRACE	FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1 Quasi Peak	240 MHz	33.58	-12.44
1 Quasi Peak	250 MHz	25.93	-20.09
1 Quasi Peak	325 MHz	31.44	-14.57
1 Quasi Peak	350 MHz	27.24	-18.77
1 Quasi Peak	384 MHz	25.72	-20.29
1 Quasi Peak	475 MHz	32.73	-13.28
1 Quasi Peak	528 MHz	29.88	-16.13
1 Quasi Peak	623.975 MHz	43.04	-2.97
1 Quasi Peak	672 MHz	42.77	-3.24
1 Quasi Peak	767.975 MHz	43.74	-2.27
1 Quasi Peak	959.975 MHz	31.88	-14.13

Date: 23.MAY.2014 13:20:10

Radiated Measurements

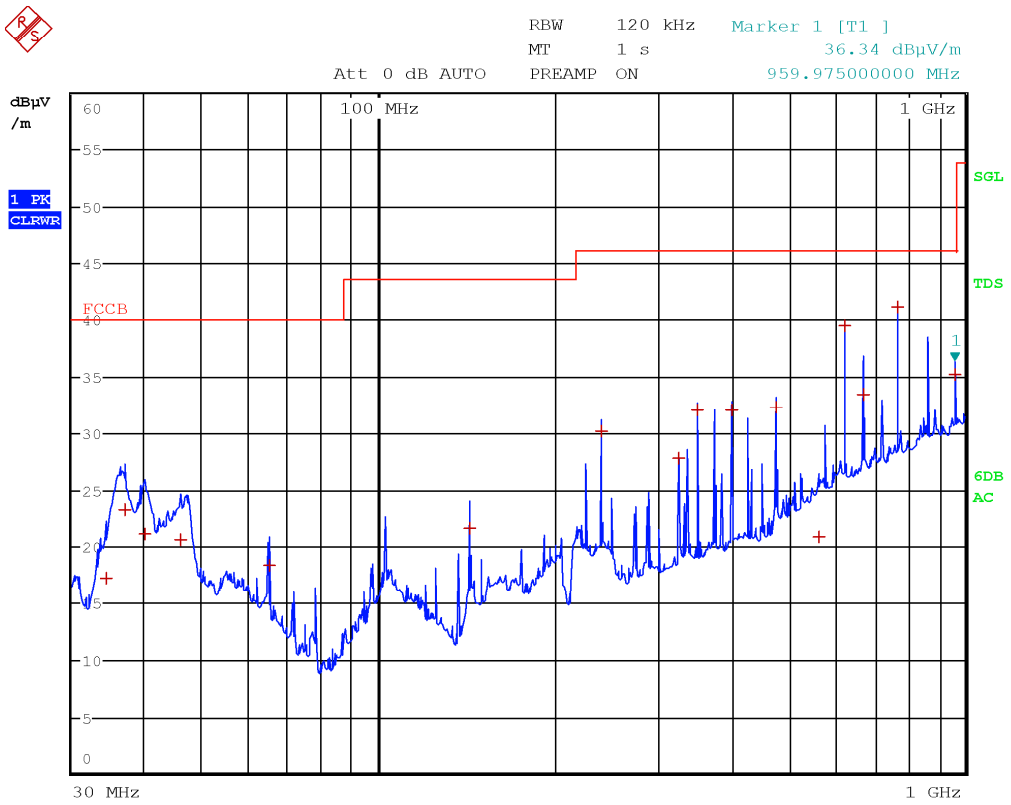
No emissions were detected within 10 dB of limit inside the 15.205 Restricted bands.

- All measurements were performed at a distance of 3 m.
- All measurements performed:
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
  - and using average detector with 1 MHz/3 MHz RBW/VBW for average results

Test data, continued

Radiated measurement Wi Fi 30-1000 MHz

IEEE 802.11b CH 1 (Low) V polarization



Date: 23.MAY.2014 13:12:44

Radiated Measurements

No emissions were detected within 10 dB of limit inside the 15.205 Restricted bands.

- All measurements were performed at a distance of 3 m.
- All measurements performed:
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
  - and using average detector with 1 MHz/3 MHz RBW/VBW for average results

Test data, continued

Radiated measurement Wi Fi 30-1000 MHz

IEEE 802.11b CH 1 (Low) V Polarization

EDIT PEAK LIST (Final Measurement Results)

Trace1: FCCB
Trace2: ---
Trace3: ---

TRACE		FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1	Quasi Peak	34.35 MHz	17.18	-22.81
1	Quasi Peak	36.85 MHz	23.27	-16.72
1	Quasi Peak	39.975 MHz	21.16	-18.83
1	Quasi Peak	45.925 MHz	20.55	-19.44
1	Quasi Peak	65.05 MHz	18.35	-21.64
1	Quasi Peak	143.025 MHz	21.63	-21.88
1	Quasi Peak	240 MHz	30.17	-15.84
1	Quasi Peak	325 MHz	27.78	-18.23
1	Quasi Peak	350 MHz	32.06	-13.95
1	Quasi Peak	400 MHz	32.06	-13.96
1	Quasi Peak	475 MHz	32.32	-13.70
1	Quasi Peak	564.675 MHz	20.87	-25.14
1	Quasi Peak	623.975 MHz	39.57	-6.44
1	Quasi Peak	671.975 MHz	33.40	-12.61
1	Quasi Peak	767.975 MHz	41.10	-4.91
1	Quasi Peak	959.975 MHz	35.22	-10.79

Date: 23.MAY.2014 13:12:15

Radiated Measurements

No emissions were detected within 10 dB of limit inside the 15.205 Restricted bands.

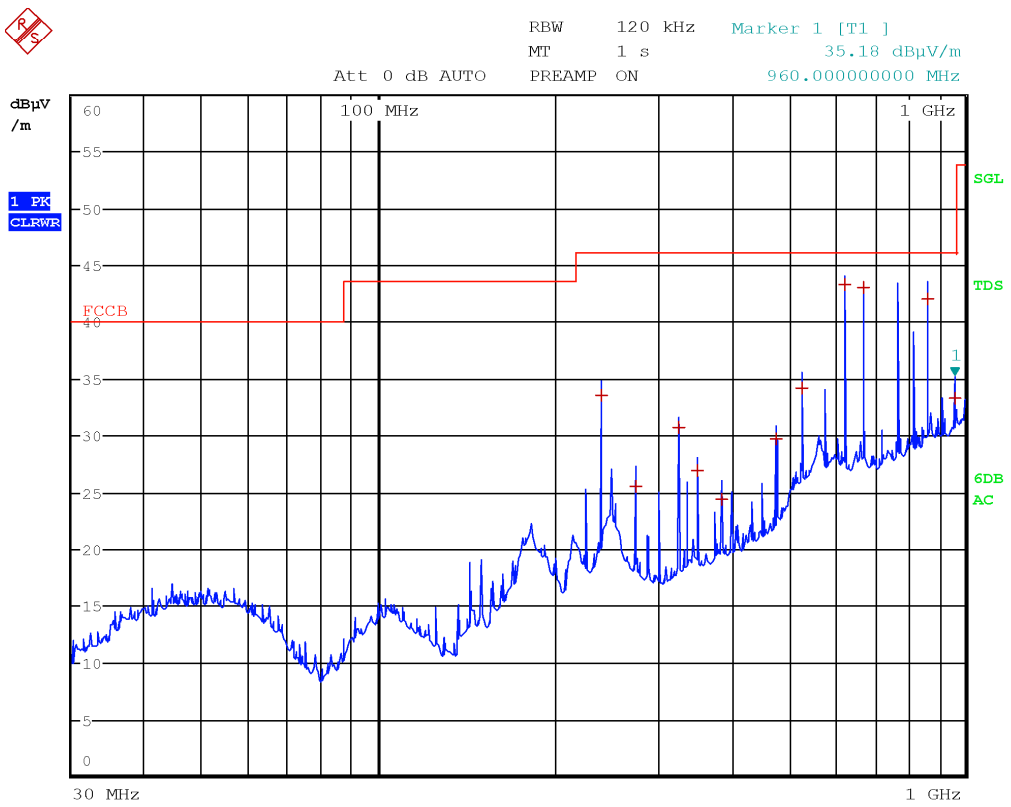
- All measurements were performed at a distance of 3 m.
- All measurements performed:
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
  - and using average detector with 1 MHz/3 MHz RBW/VBW for average results

*

Test data, continued

Radiated measurement Wi Fi 30-1000 MHz

IEEE 802.11b CH 6 (Mid) H polarization



Radiated Measurements

No emissions were detected within 10 dB of limit inside the 15.205 Restricted bands.

- All measurements were performed at a distance of 3 m.
- All measurements performed:
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
  - and using average detector with 1 MHz/3 MHz RBW/VBW for average results

Test data, continued

Radiated measurement Wi Fi 30-1000 MHz

IEEE 802.11b CH 6 (Mid) H polarization

EDIT PEAK LIST (Final Measurement Results)

Trace1:	FCCB
Trace2:	---
Trace3:	---

TRACE	FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1 Quasi Peak	240 MHz	33.62	-12.39
1 Quasi Peak	275 MHz	25.58	-20.43
1 Quasi Peak	325 MHz	30.74	-15.27
1 Quasi Peak	350 MHz	26.91	-19.10
1 Quasi Peak	384 MHz	24.40	-21.61
1 Quasi Peak	475 MHz	29.63	-16.38
1 Quasi Peak	527.975 MHz	34.18	-11.83
1 Quasi Peak	623.975 MHz	43.35	-2.66
1 Quasi Peak	671.975 MHz	42.98	-3.03
1 Quasi Peak	864 MHz	42.06	-3.95
1 Quasi Peak	959.975 MHz	33.36	-12.65

Date: 23.MAY.2014 13:36:18

Radiated Measurements

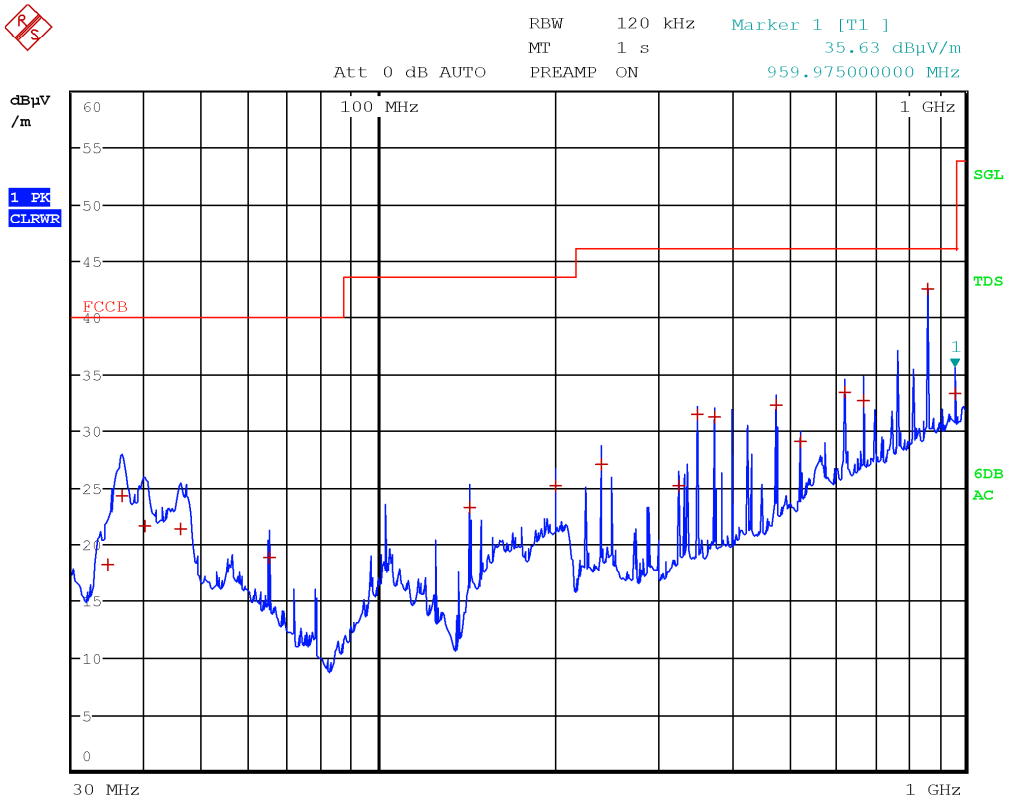
No emissions were detected within 10 dB of limit inside the 15.205 Restricted bands.

- All measurements were performed at a distance of 3 m.
- All measurements performed:
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
  - and using average detector with 1 MHz/3 MHz RBW/VBW for average results

Test data, continued

Radiated measurement Wi Fi 30-1000 MHz

IEEE 802.11b CH 6 (Mid) V polarization



Radiated Measurements

No emissions were detected within 10 dB of limit inside the 15.205 Restricted bands.

- All measurements were performed at a distance of 3 m.
- All measurements performed:
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
  - and using average detector with 1 MHz/3 MHz RBW/VBW for average results

Test data, continued

Radiated measurement Wi Fi 30-1000 MHz

IEEE 802.11b CH 6 (Mid) V polarization

EDIT PEAK LIST (Final Measurement Results)

Trace1:	FCCB
Trace2:	---
Trace3:	---

TRACE	FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1 Quasi Peak	34.5 MHz	18.20	-21.79
1 Quasi Peak	36.45 MHz	24.27	-15.72
1 Quasi Peak	39.95 MHz	21.57	-18.42
1 Quasi Peak	45.9 MHz	21.42	-18.57
1 Quasi Peak	65.1 MHz	18.86	-21.13
1 Quasi Peak	143.125 MHz	23.31	-20.20
1 Quasi Peak	200 MHz	25.09	-18.42
1 Quasi Peak	240 MHz	27.07	-18.94
1 Quasi Peak	325 MIz	25.18	20.83
1 Quasi Peak	350 MHz	31.46	-14.55
1 Quasi Peak	375 MHz	31.17	-14.84
1 Quasi Peak	475 MHz	32.29	-13.73
1 Quasi Peak	525 MHz	29.00	-17.01
1 Quasi Peak	623.975 MHz	33.45	-12.56
1 Quasi Peak	672 MHz	32.70	-13.32
1 Quasi Peak	863.975 MHz	42.58	-3.43
1 Quasi Peak	959.975 MHz	33.35	-12.66

Date: 23.MAY.2014 13:29:33

Radiated Measurements

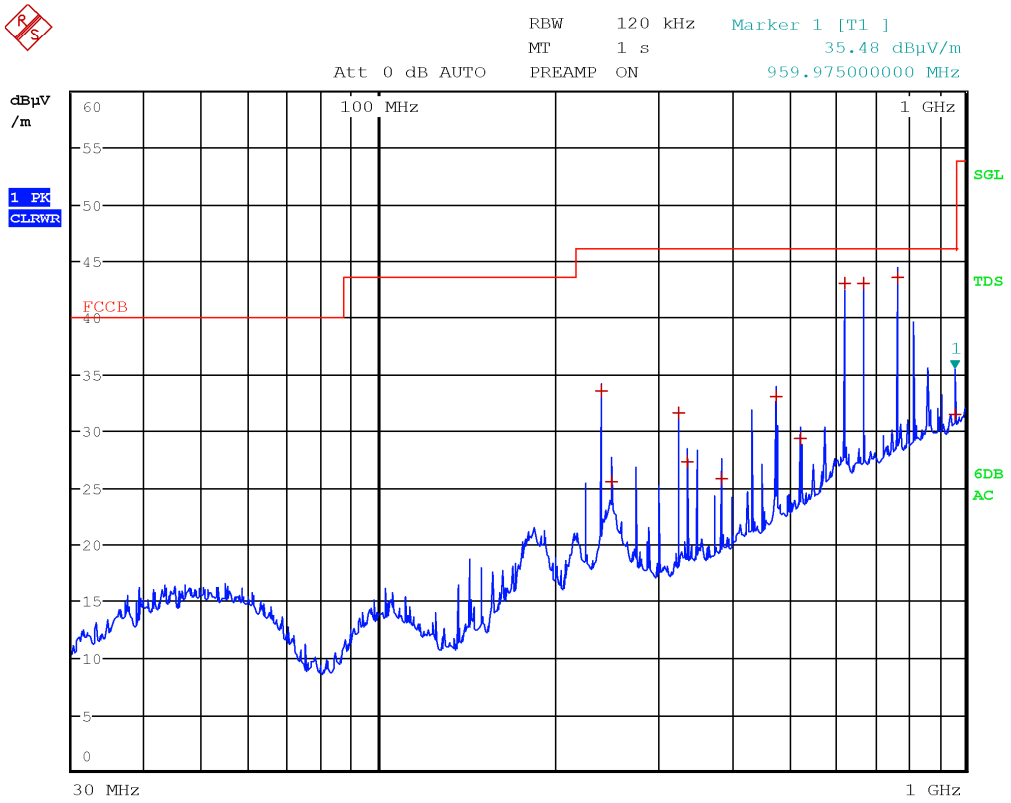
No emissions were detected within 10 dB of limit inside the 15.205 Restricted bands.

- All measurements were performed at a distance of 3 m.
- All measurements performed:
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
  - and using average detector with 1 MHz/3 MHz RBW/VBW for average results

Test data, continued

Radiated measurement Wi Fi 30-1000 MHz

IEEE 802.11b CH 11 (High) H polarization



Date: 23.MAY.2014 13:51:42

Radiated Measurements

No emissions were detected within 10 dB of limit inside the 15.205 Restricted bands.

- All measurements were performed at a distance of 3 m.
- All measurements performed:
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
  - and using average detector with 1 MHz/3 MHz RBW/VBW for average results

Test data, continued

Radiated measurement Wi Fi 30-1000 MHz

IEEE 802.11b CH 11 (High) H polarization

EDIT PEAK LIST (Final Measurement Results)

Trace1:	FCCB
Trace2:	---
Trace3:	---

TRACE	FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1 Quasi Peak	240 MHz	33.61	-12.41
1 Quasi Peak	249.975 MHz	25.53	-20.48
1 Quasi Peak	325 MHz	31.61	-14.40
1 Quasi Peak	336 MHz	27.31	-18.70
1 Quasi Peak	383.975 MHz	25.81	-20.21
1 Quasi Peak	475 MHz	33.10	-12.91
1 Quasi Peak	525 MHz	29.30	-16.71
1 Quasi Peak	623.975 MHz	43.10	-2.91
1 Quasi Peak	671.975 MHz	43.00	-3.01
1 Quasi Peak	767.975 MHz	43.56	-2.45
1 Quasi Peak	959.975 MHz	31.46	-14.56

Date: 23.MAY.2014 13:51:15

Radiated Measurements

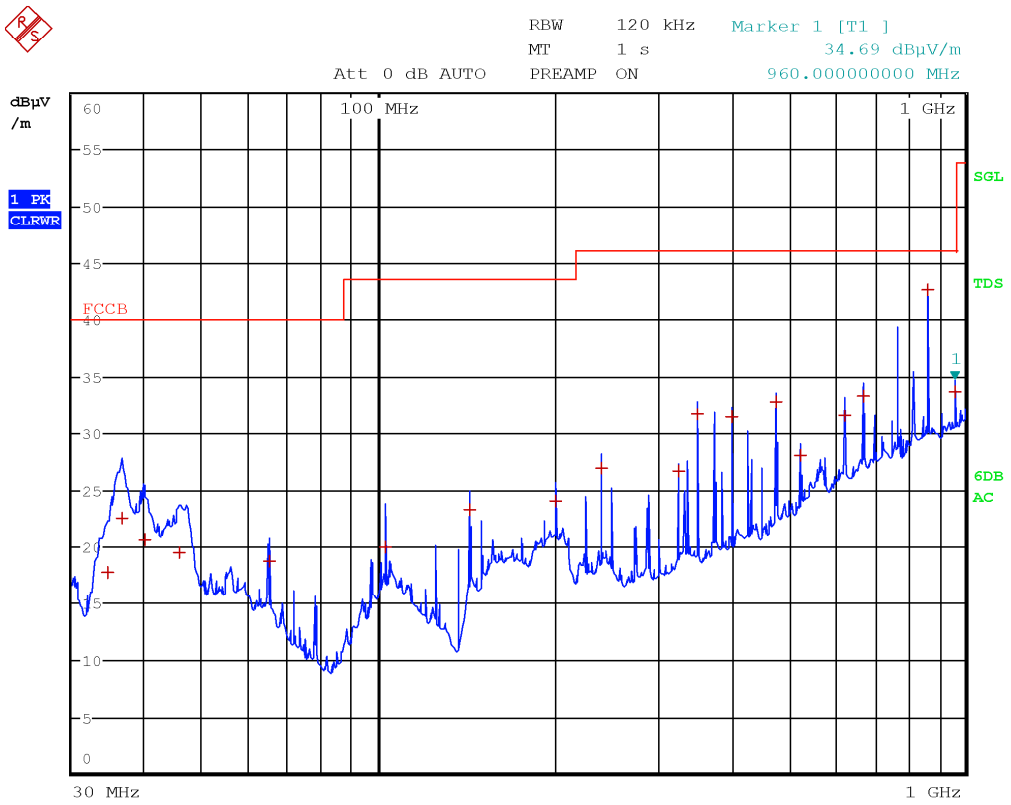
No emissions were detected within 10 dB of limit inside the 15.205 Restricted bands.

- All measurements were performed at a distance of 3 m.
- All measurements performed:
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
  - and using average detector with 1 MHz/3 MHz RBW/VBW for average results

Test data, continued

Radiated measurement Wi Fi 30-1000 MHz

IEEE 802.11b CH 11 (High) V polarization



Date: 23.MAY.2014 13:45:49

Radiated Measurements

No emissions were detected within 10 dB of limit inside the 15.205 Restricted bands.

- All measurements were performed at a distance of 3 m.
- All measurements performed:
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
  - and using average detector with 1 MHz/3 MHz RBW/VBW for average results

Test data, continued

Radiated measurement Wi Fi 30-1000 MHz

IEEE 802.11b CH 11 (High) V polarization

EDIT PEAK LIST (Final Measurement Results)

Trace1:	FCCB
Trace2:	---
Trace3:	---

TRACE	FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1 Quasi Peak	34.425 MHz	17.76	-22.23
1 Quasi Peak	36.525 MHz	22.51	-17.49
1 Quasi Peak	39.85 MHz	20.57	-19.43
1 Quasi Peak	45.7 MHz	19.50	-20.49
1 Quasi Peak	65.075 MHz	18.68	-21.31
1 Quasi Peak	102.8 MHz	20.03	-23.48
1 Quasi Peak	143.275 MHz	23.24	-20.27
1 Quasi Peak	200 MHz	23.95	-19.56
1 Quasi Peak	240 MHz	26.96	-19.05
1 Quasi Peak	325 MHz	26.60	-19.41
1 Quasi Peak	350 MHz	31.76	-14.25
1 Quasi Peak	400 MHz	31.38	-14.63
1 Quasi Peak	475 MHz	32.81	-13.20
1 Quasi Peak	525 MHz	28.00	-18.01
1 Quasi Peak	623.975 MHz	31.51	-14.50
1 Quasi Peak	672 MHz	33.32	-12.69
1 Quasi Peak	863.975 MHz	42.66	-3.36
1 Quasi Peak	959.975 MHz	33.77	-12.25

Date: 23.MAY.2014 13:45:20

Radiated Measurements

No emissions were detected within 10 dB of limit inside the 15.205 Restricted bands.

- All measurements were performed at a distance of 3 m.
- All measurements performed:
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
  - and using average detector with 1 MHz/3 MHz RBW/VBW for average results

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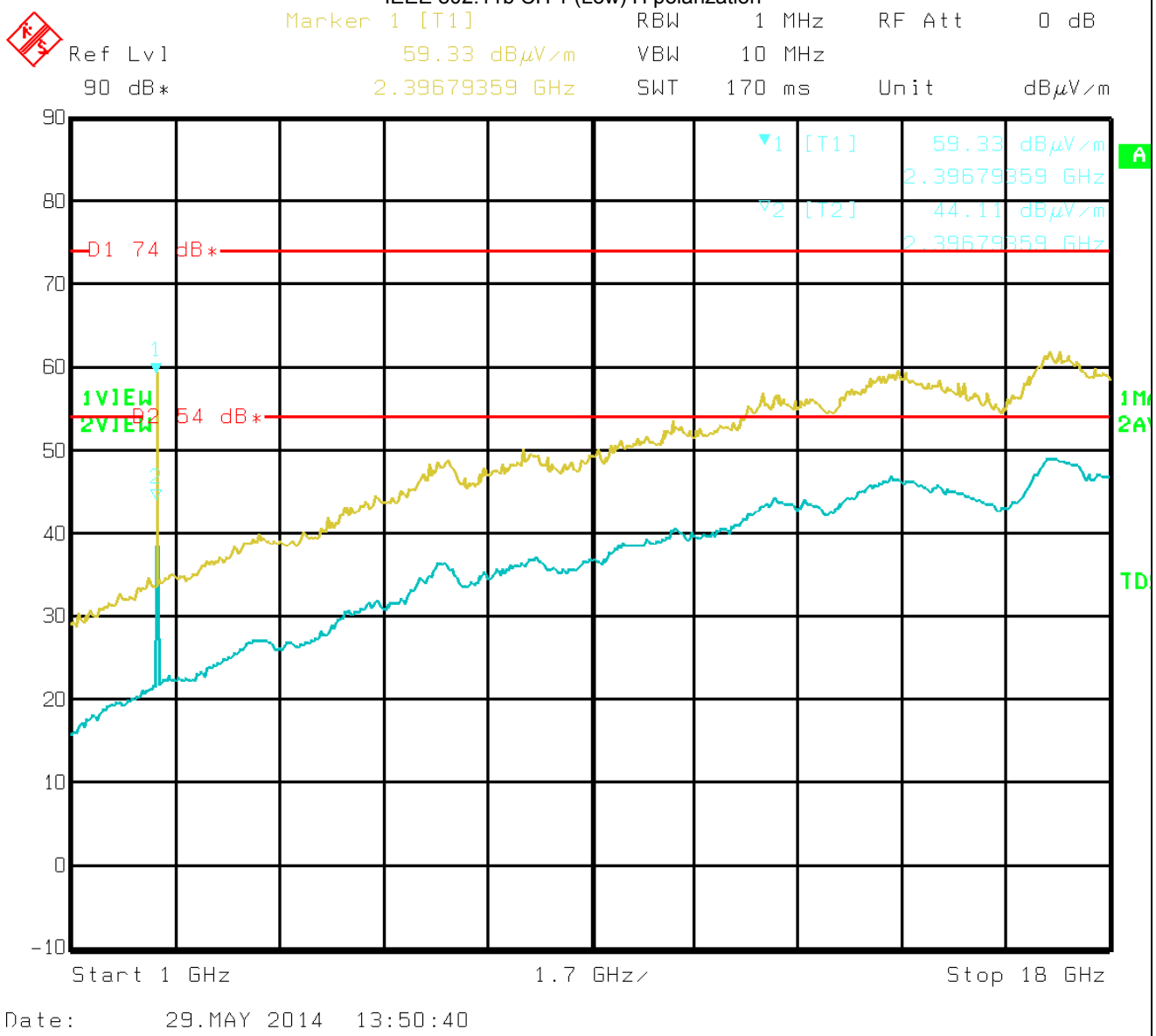
Test data, continued

Radiated measurement Wi Fi 1-18 GHz

IEEE 802.11b CH 1 (Low) H polarization



Radiated Measurements

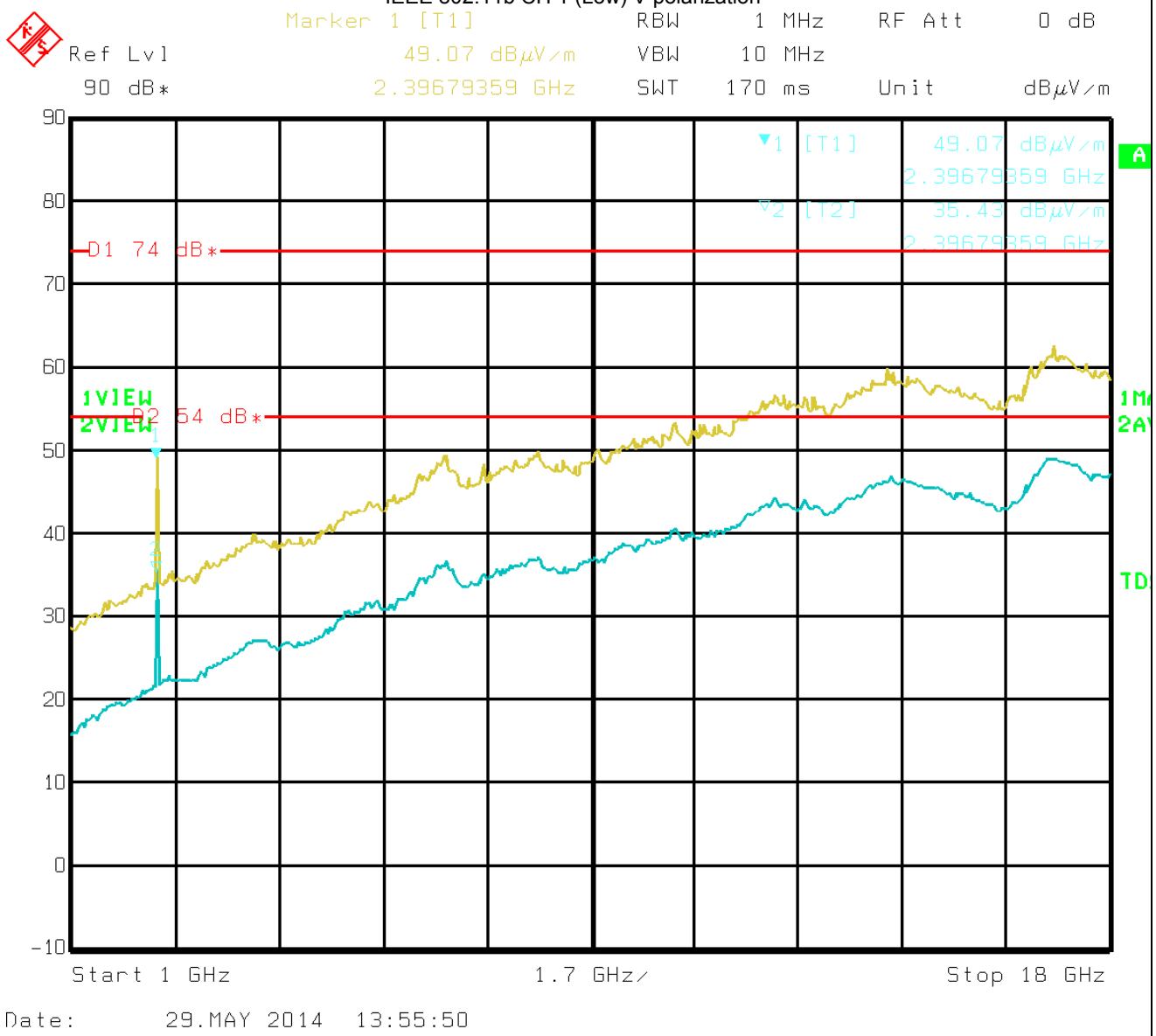
No emissions were detected within 10 dB of limit inside the 15.205 Restricted bands.

- All measurements were performed at a distance of 3 m.
- All measurements performed:
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
  - and using average detector with 1 MHz/3 MHz RBW/VBW for average results

Test data, continued

Radiated measurement Wi Fi 1-18 GHz

IEEE 802.11b CH 1 (Low) V polarization



Radiated Measurements

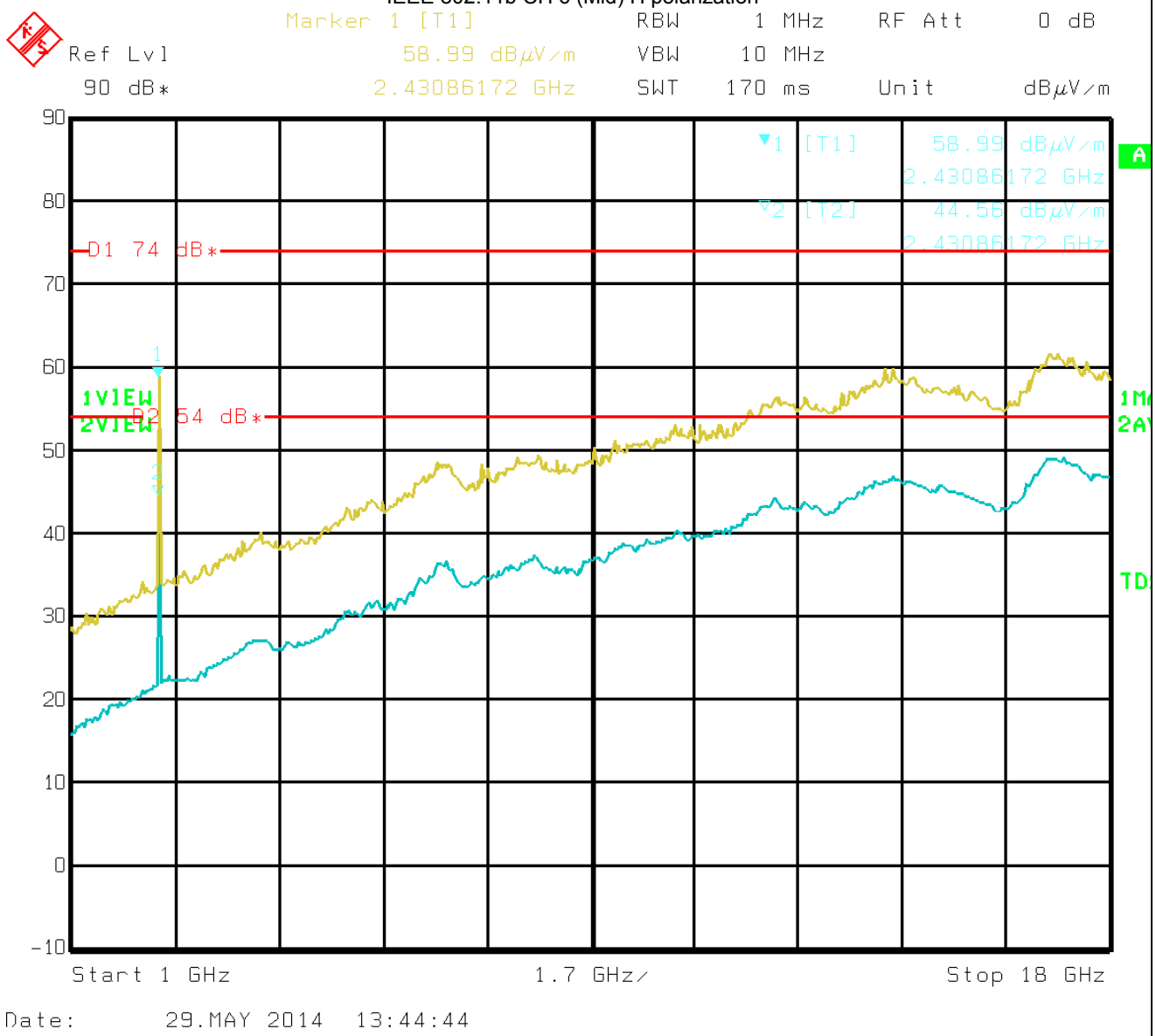
No emissions were detected within 10 dB of limit inside the 15.205 Restricted bands.

- All measurements were performed at a distance of 3 m.
- All measurements performed:
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
  - and using average detector with 1 MHz/3 MHz RBW/VBW for average results

Test data, continued

Radiated measurement Wi Fi 1-18 GHz

IEEE 802.11b CH 6 (Mid) H polarization



Radiated Measurements

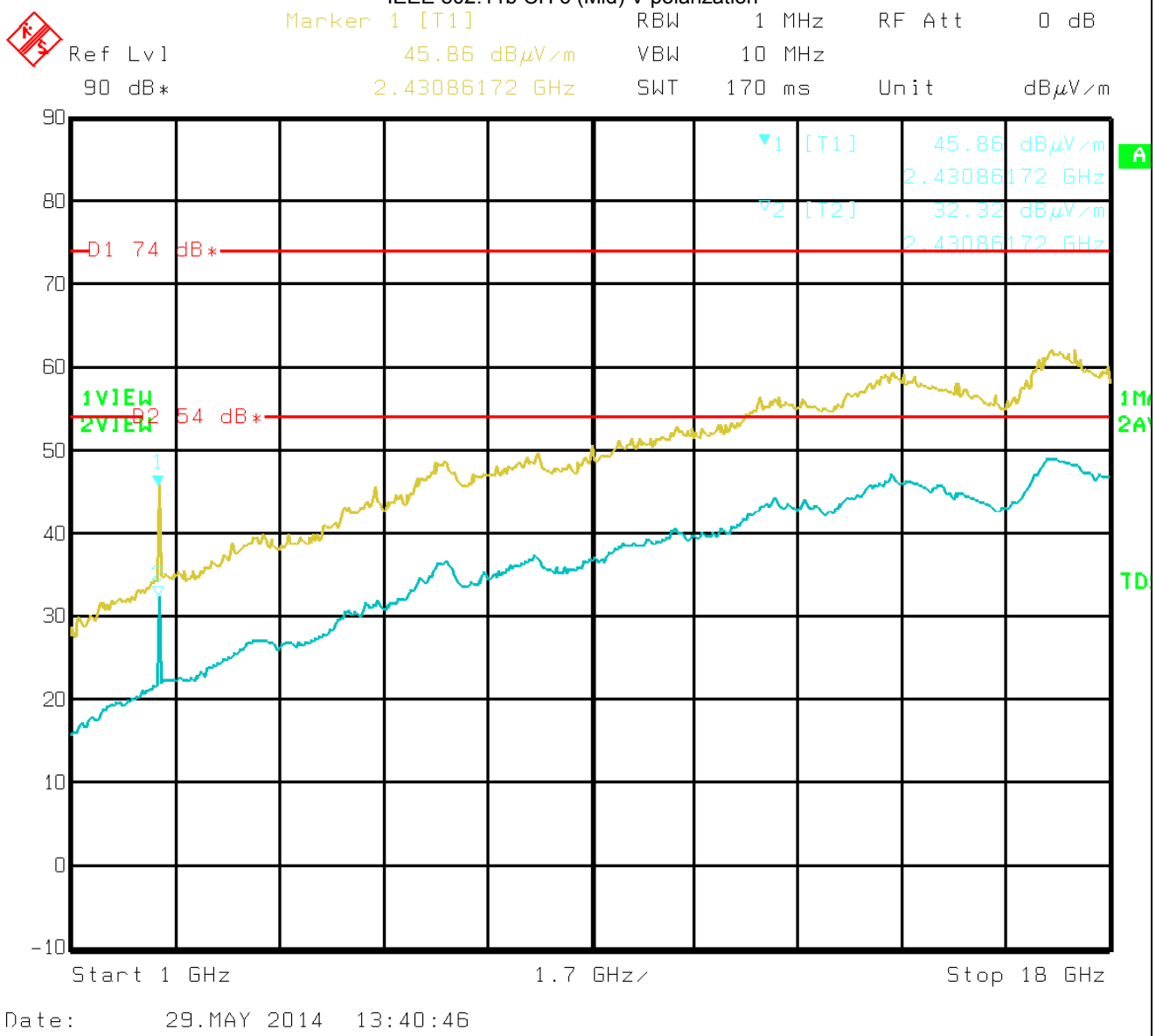
No emissions were detected within 10 dB of limit inside the 15.205 Restricted bands.

- All measurements were performed at a distance of 3 m.
- All measurements performed:
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
  - and using average detector with 1 MHz/3 MHz RBW/VBW for average results

Test data, continued

Radiated measurement Wi Fi 1-18 GHz

IEEE 802.11b CH 6 (Mid) V polarization



Radiated Measurements

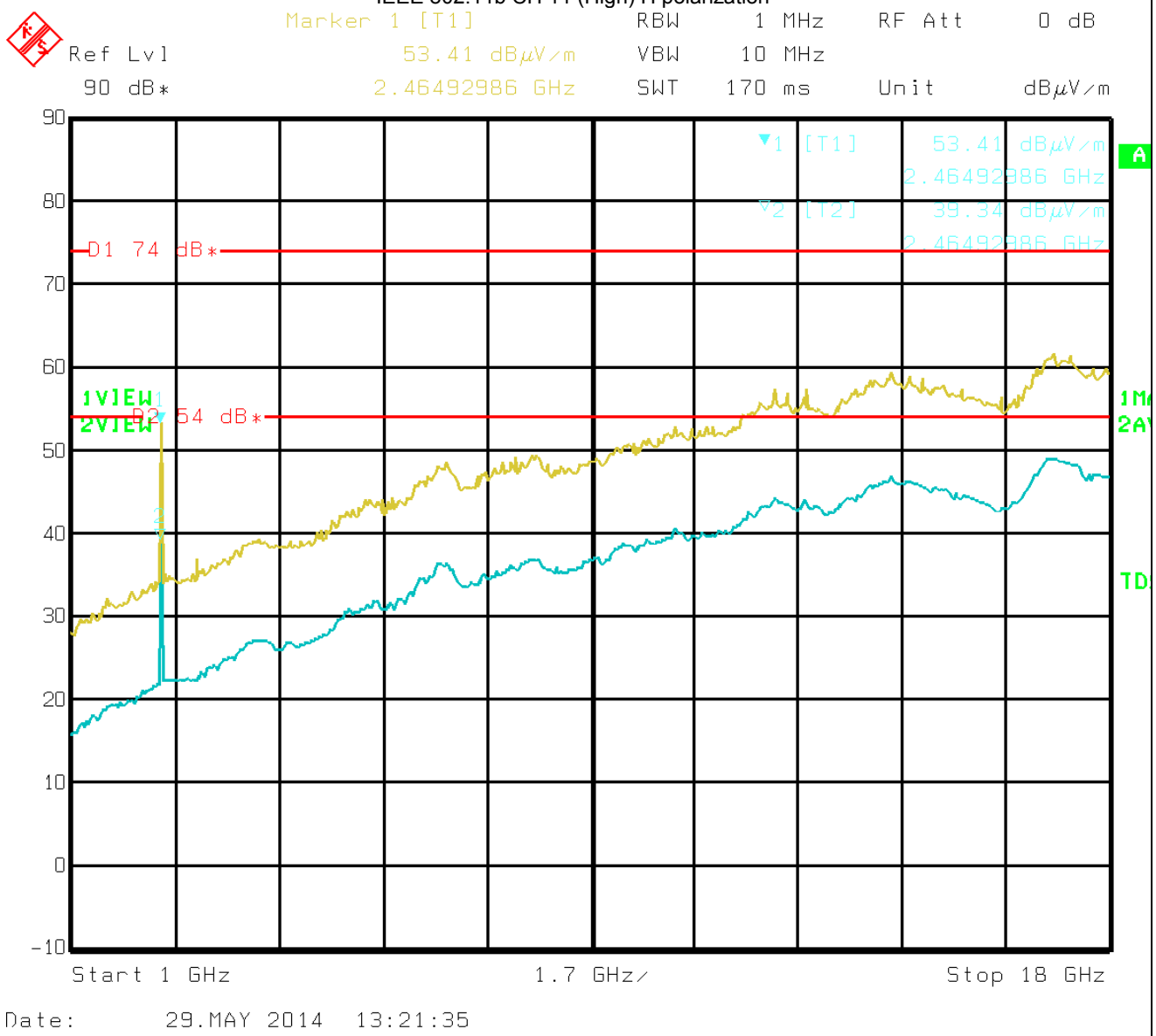
No emissions were detected within 10 dB of limit inside the 15.205 Restricted bands.

- All measurements were performed at a distance of 3 m.
- All measurements performed:
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
  - and using average detector with 1 MHz/3 MHz RBW/VBW for average results

Test data, continued

Radiated measurement Wi Fi 1-18 GHz

IEEE 802.11b CH 11 (High) H polarization



Radiated Measurements

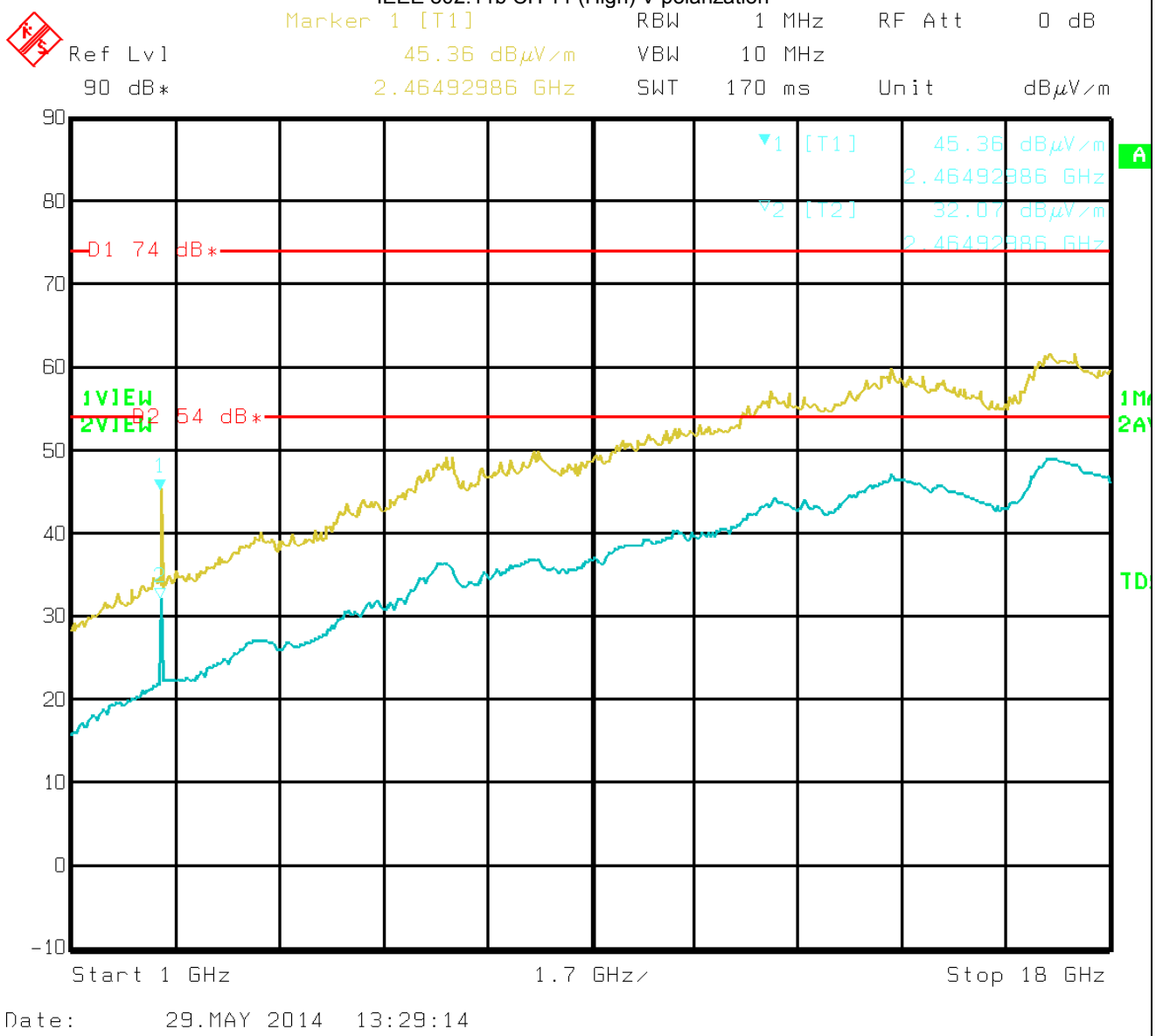
No emissions were detected within 10 dB of limit inside the 15.205 Restricted bands.

- All measurements were performed at a distance of 3 m.
- All measurements performed:
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
  - and using average detector with 1 MHz/3 MHz RBW/VBW for average results

Test data, continued

Radiated measurement Wi Fi 1-18 GHz

IEEE 802.11b CH 11 (High) V polarization



Radiated Measurements

No emissions were detected within 10 dB of limit inside the 15.205 Restricted bands.

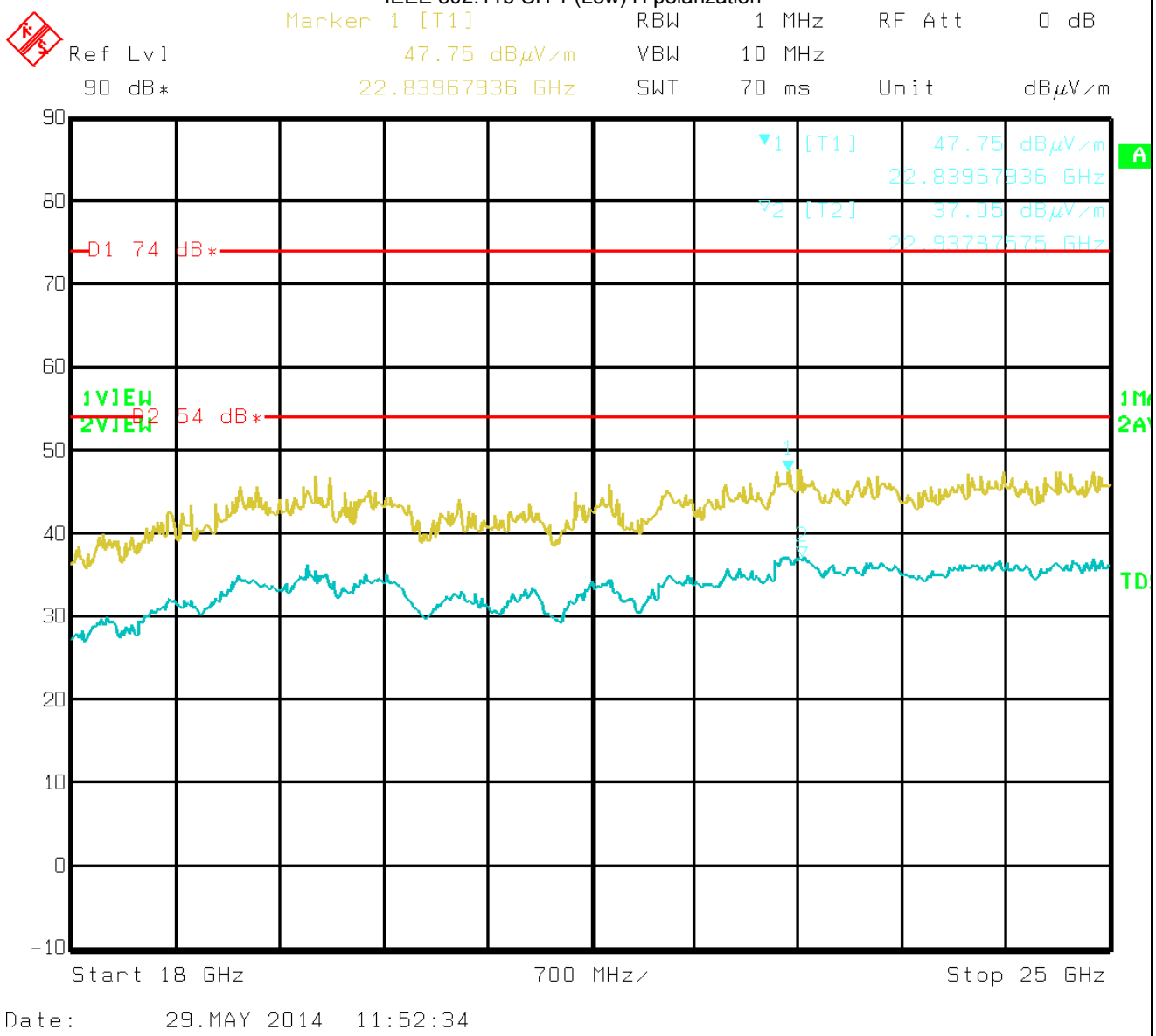
- All measurements were performed at a distance of 3 m.
- All measurements performed:
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
  - and using average detector with 1 MHz/3 MHz RBW/VBW for average results

****

Test data, continued

Radiated measurement Wi Fi 18-25 GHz

IEEE 802.11b CH 1 (Low) H polarization



Radiated Measurements

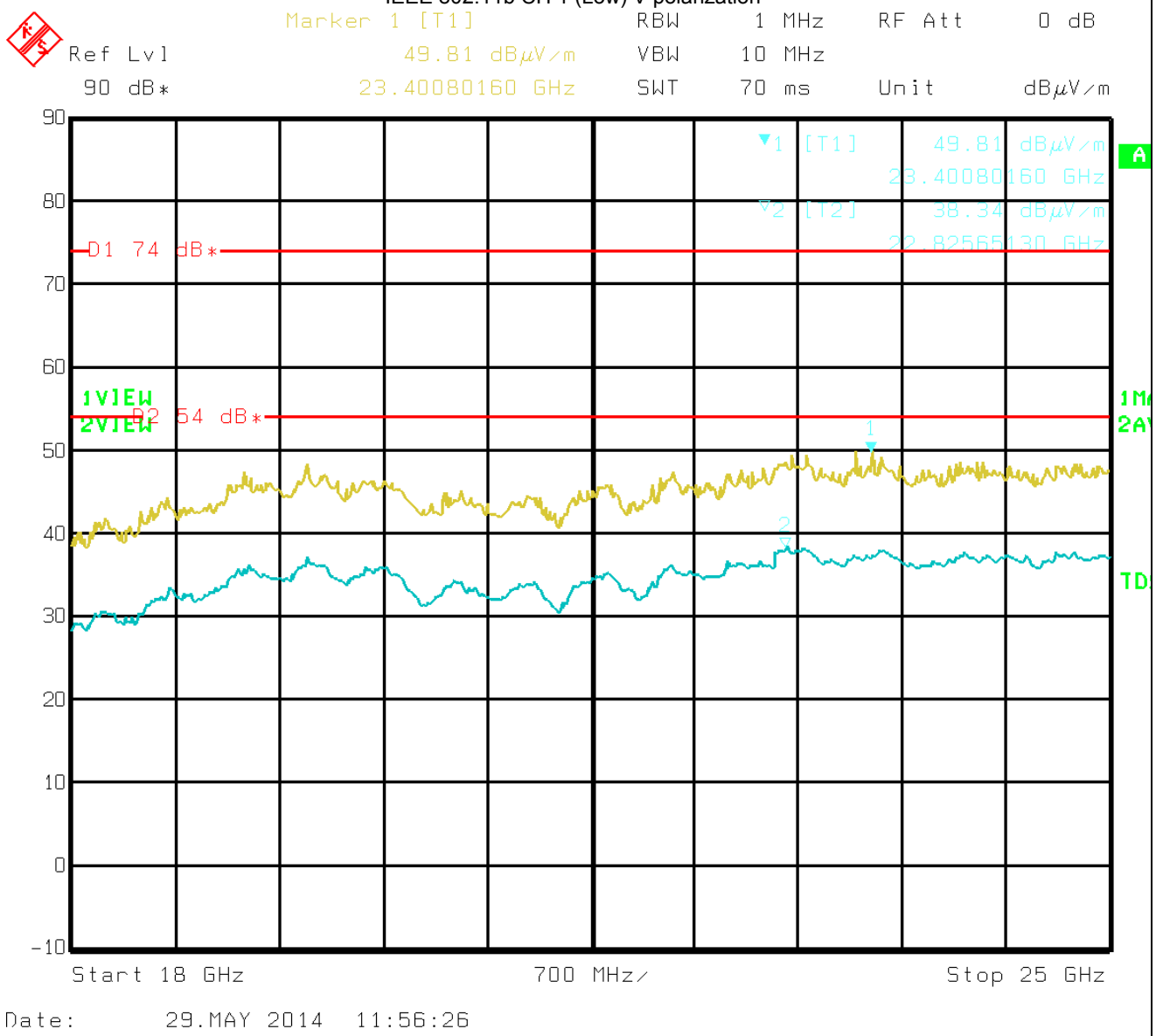
No emissions were detected within 10 dB of limit inside the 15.205 Restricted bands.

- All measurements were performed at a distance of 3 m.
- All measurements performed:
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
  - and using average detector with 1 MHz/3 MHz RBW/VBW for average results

Test data, continued

Radiated measurement Wi Fi 18-25 GHz

IEEE 802.11b CH 1 (Low) V polarization



Radiated Measurements

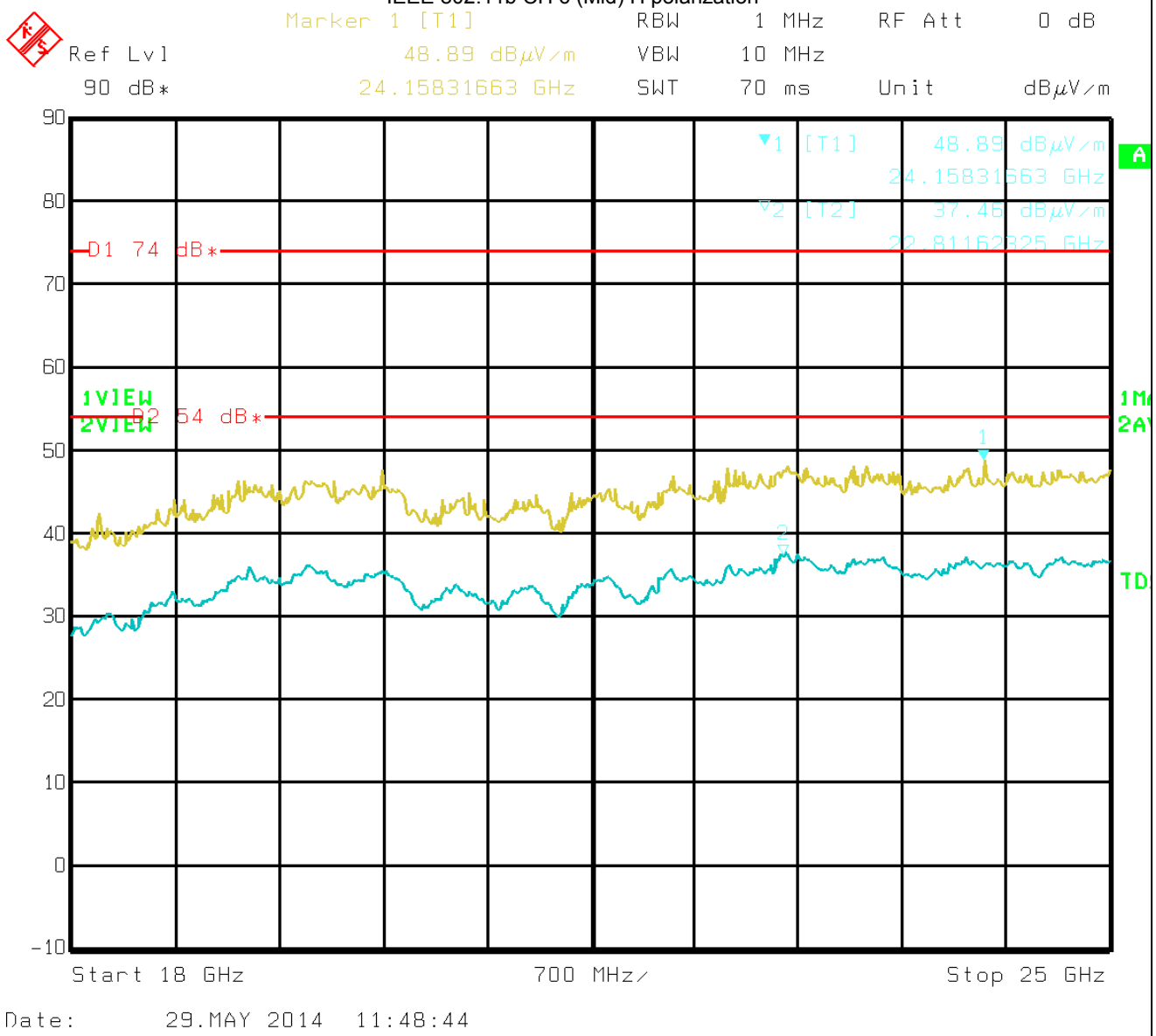
No emissions were detected within 10 dB of limit inside the 15.205 Restricted bands.

- All measurements were performed at a distance of 3 m.
- All measurements performed:
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
  - and using average detector with 1 MHz/3 MHz RBW/VBW for average results

Test data, continued

Radiated measurement Wi Fi 18-25 GHz

IEEE 802.11b CH 6 (Mid) H polarization



Radiated Measurements

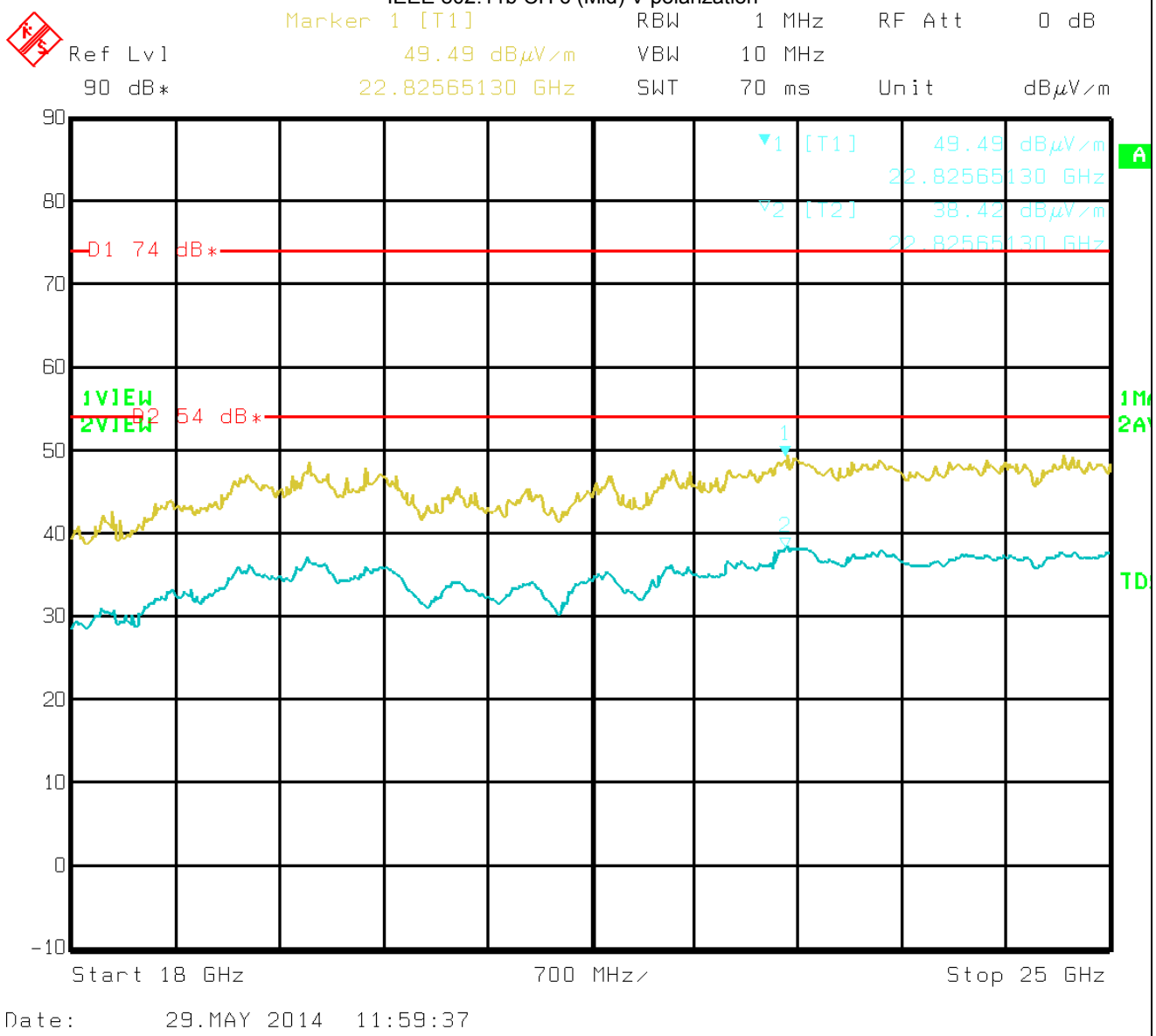
No emissions were detected within 10 dB of limit inside the 15.205 Restricted bands.

- All measurements were performed at a distance of 3 m.
- All measurements performed:
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
  - and using average detector with 1 MHz/3 MHz RBW/VBW for average results

Test data, continued

Radiated measurement Wi Fi 18-25 GHz

IEEE 802.11b CH 6 (Mid) V polarization



Radiated Measurements

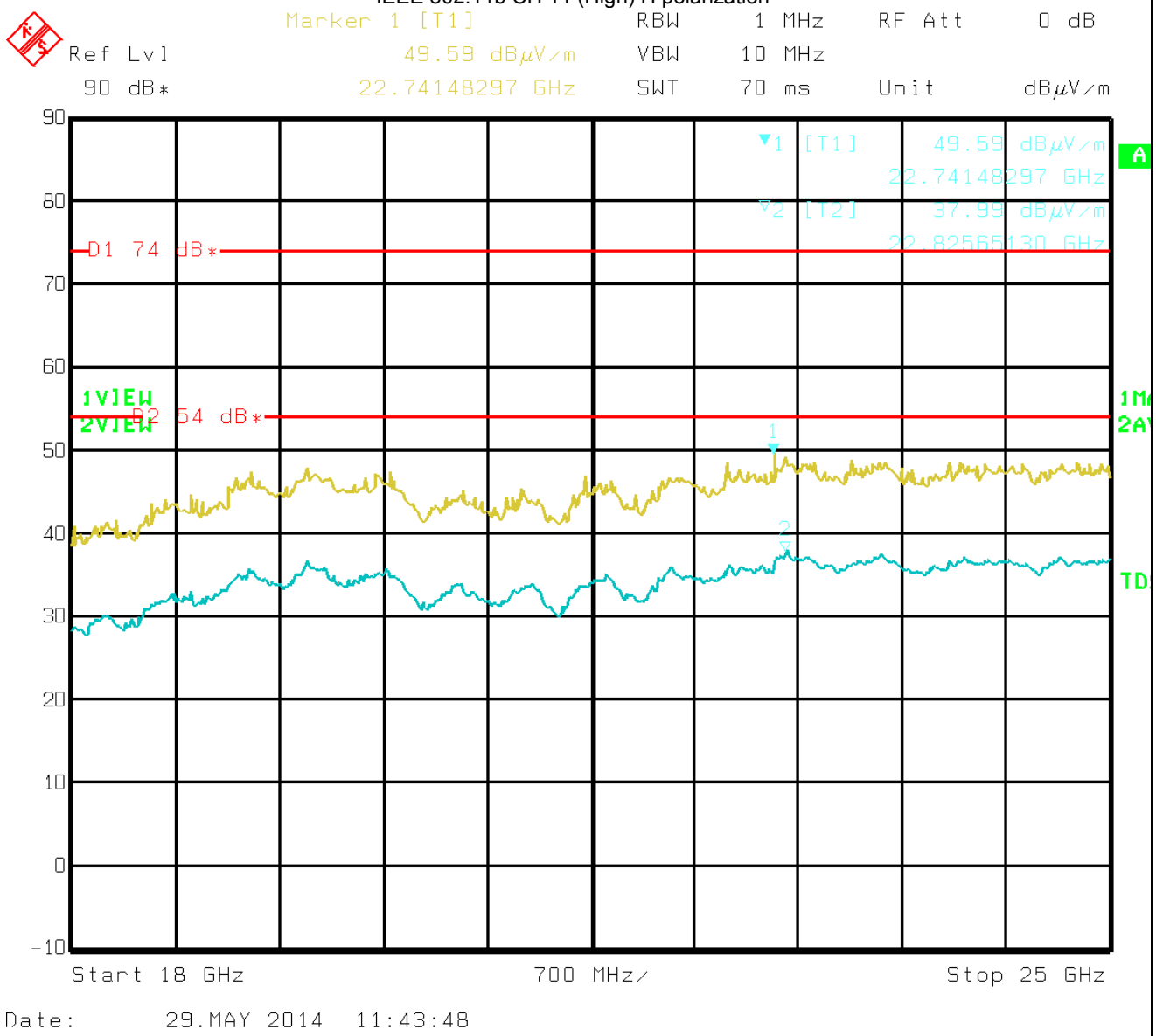
No emissions were detected within 10 dB of limit inside the 15.205 Restricted bands.

- All measurements were performed at a distance of 3 m.
- All measurements performed:
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
  - and using average detector with 1 MHz/3 MHz RBW/VBW for average results

Test data, continued

Radiated measurement Wi Fi 18-25 GHz

IEEE 802.11b CH 11 (High) H polarization



Radiated Measurements

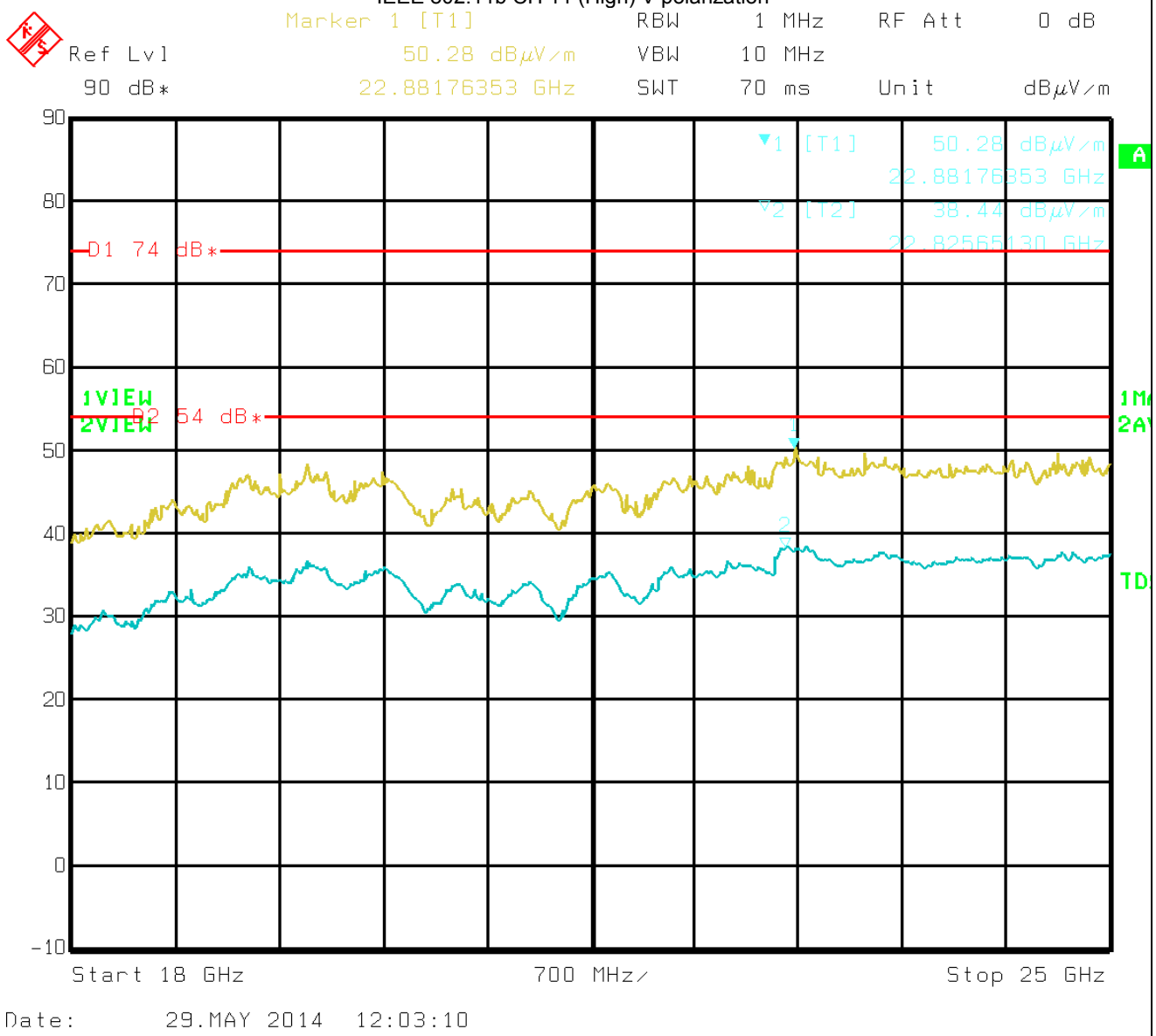
No emissions were detected within 10 dB of limit inside the 15.205 Restricted bands.

- All measurements were performed at a distance of 3 m.
- All measurements performed:
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
  - and using average detector with 1 MHz/3 MHz RBW/VBW for average results

Test data, continued

Radiated measurement Wi Fi 18-25 GHz

IEEE 802.11b CH 11 (High) V polarization



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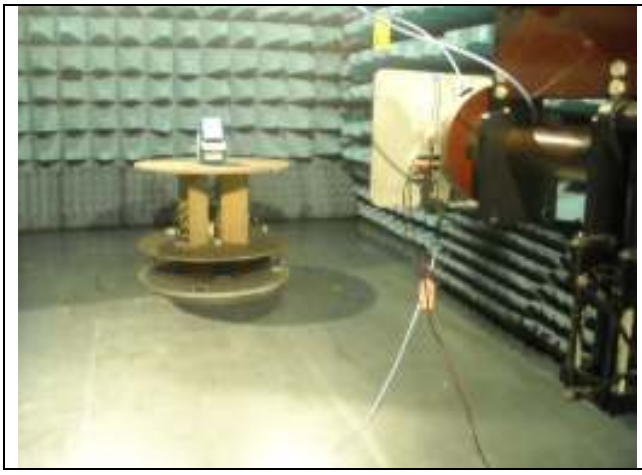
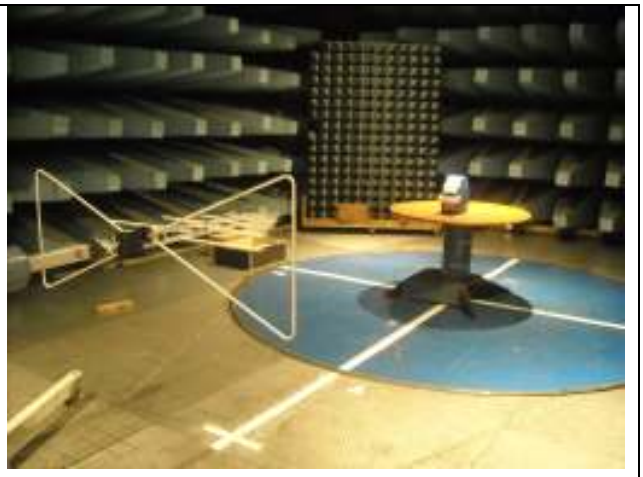
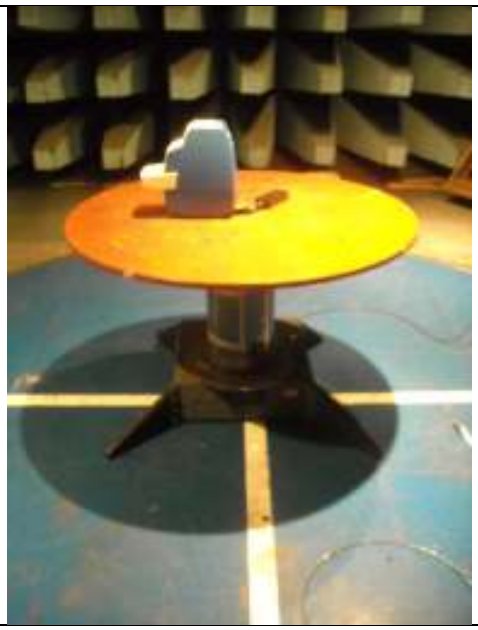
Setup photos



Setup photos



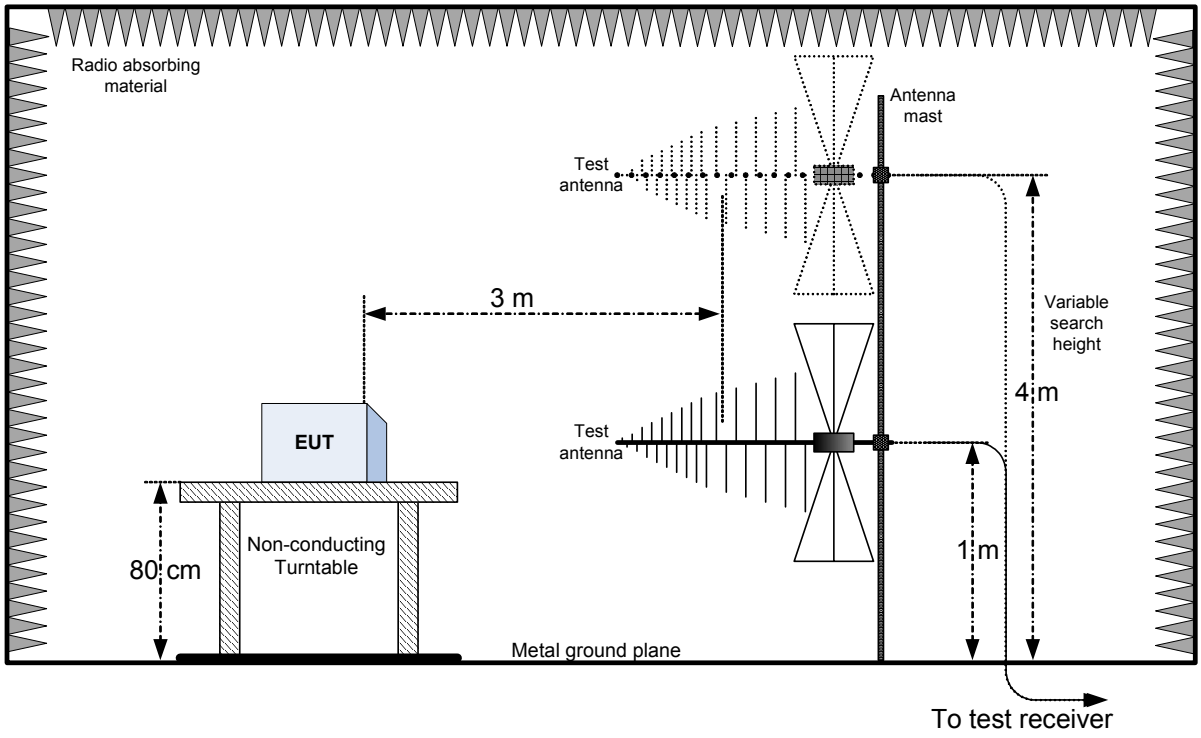
Setup photos



Setup photos

Section 9: Block diagrams of test set-ups

Radiated emissions set-up



Section 10: EUT photos

EUT

Bluetooth & Wi Fi module

Position of RF module inside host

External antenna replacing the antenna integrated on the module

RF Module (and relevant labelling)
Already FCC certified FCC ID:Y2K-PROTUBE001

Host