

TEST REPORT

Test report no.: 1-6965/13-08-10



Deutsche
Akkreditierungsstelle
D-PL-12076-01-01

Testing laboratory

CETECOM ICT Services GmbH
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Accredited Testing Laboratory:

The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS). The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-01
Area of Testing:
Radio Communications & EMC (RCE)

Applicant

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Nya Vattentornet
22188 Lund / SWEDEN
Phone: +46 46 19 30 00
Fax: -/-
Contact: Mikael Nilsson
e-mail: Micke.nilsson@sonymobile.com
Phone: +46 7 03 22 75 03

Manufacturer

Sony Mobile Communications AB
Nya Vattentornet
22188 Lund / SWEDEN

Test standard/s

47 CFR Part 15 Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices

For further applied test standards please refer to section 3 of this test report.

Test Item

Kind of test item: Smart Phone GPRS/EGPRS 850/900/1800/1900; UMTS HSPA FDDI/III/IV/V/VIII; WLAN b/g/n/a/ac; BT 4.0; RFID; A-GPS
Type name: PM-0744-BV
FCC ID: PY7PM-0744
Frequency: DTS band 5725 MHz to 5850 MHz (lowest channel 149 – 5745 MHz; highest channel 165 – 5825 MHz)
Technology tested: WLAN (OFDM/a – mode; n/ac HT20 / HT40 – mode and ac HT80 – mode)
Antenna: Integrated antenna
Power supply: 3.7 V DC by Li - polymer battery
Temperature range: -20°C to +55°C

This test report is electronically signed and valid without handwriting signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

Test report authorised:



Stefan Bös
Senior Testing Manager

Test performed:



Christoph Schneider
Expert

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2 General information

2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.

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This test report is electronically signed and valid without handwritten signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

2.2 Application details

Date of receipt of order:	2013-12-17
Date of receipt of test item:	2013-12-17
Start of test:	2014-01-13
End of test:	2014-01-16
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 15		Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices

3.1 Measurement guidance

DTS : KDB 558074	2013-04	Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247
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4 Test environment

Temperature:	T_{nom}	+22 °C during room temperature tests
	T_{max}	+55 °C during high temperature tests
	T_{min}	-20 °C during low temperature tests
Relative humidity content:		45 %
Barometric pressure:		not relevant for this kind of testing
Power supply:	V_{nom}	3.7 V DC by Li - polymer battery
	V_{max}	4.2 V
	V_{min}	3.3 V

5 Test item

Kind of test item	:	Smart Phone GPRS/EGPRS 850/900/1800/1900; UMTS HSPA FDDI/II/IV/V/VIII; WLAN b/g/n/a/ac; BT 4.0; RFID; A-GPS
Type name	:	PM-0744-BV
S/N serial number	:	CB5A1W45MZ
HW hardware status	:	AP1.1
SW software status	:	RF test software
Frequency band [MHz]	:	DTS band 5725 MHz to 5850 MHz (lowest channel 149 – 5745 MHz; highest channel 165 – 5825 MHz)
Type of radio transmission	:	OFDM
Use of frequency spectrum	:	
Type of modulation	:	BPSK, QPSK, 16 – QAM, 64 – QAM and 256 – QAM
Number of channels	:	5
Antenna	:	Integrated antenna
Power supply	:	3.7 V DC by Li - polymer battery
Temperature range	:	-20°C to +55 °C

5.1 Additional information

Test setup- and EUT-photos are included in test report: 1-6965/13-08-01_AnnexA
 1-6965/13-08-01_AnnexB
 1-6965/13-08-01_AnnexD

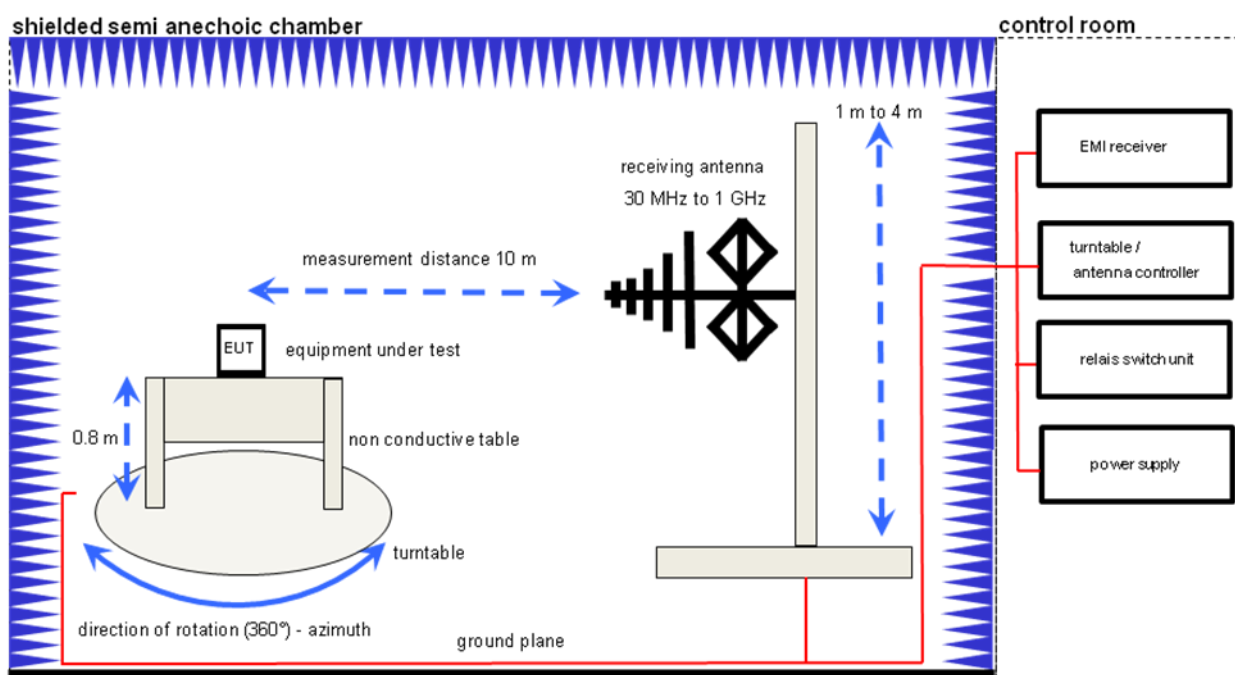
6 Test laboratories sub-contracted

None

7 Description of the test setup

7.1 Radiated measurements chamber F

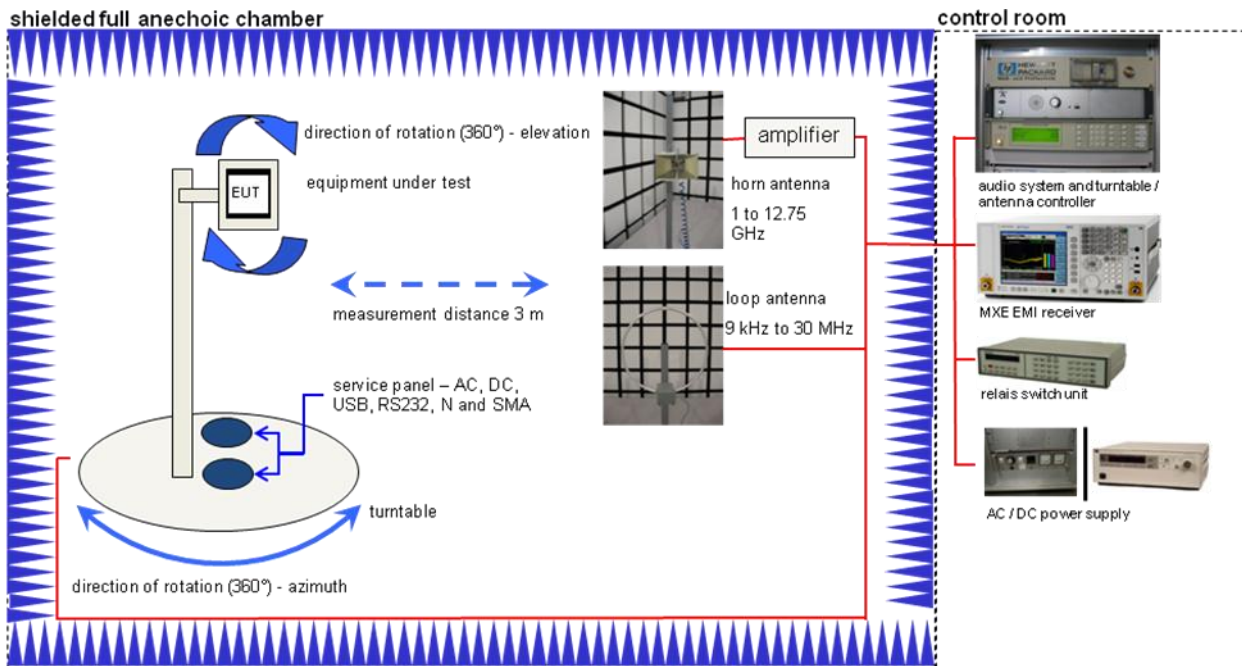
The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 1 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas are confirmed with specifications ANSI C63. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test setups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received. The wanted and unwanted emissions are received by spectrum analysers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63.



Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
Switch-Unit	3488A	HP Meßtechnik	2719A14505	300000368
DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04466	300000580
EMI Test Receiver	ESCI 3	R&S	100083	300003312
Amplifier	JS42-00502650-28-5A	MITEQ	1084532	300003379
Antenna Tower	Model 2175	ETS-LINDGREN	64762	300003745
Positioning Controller	Model 2090	ETS-LINDGREN	64672	300003746
Turntable Interface-Box	Model 105637	ETS-LINDGREN	44583	300003747
TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787

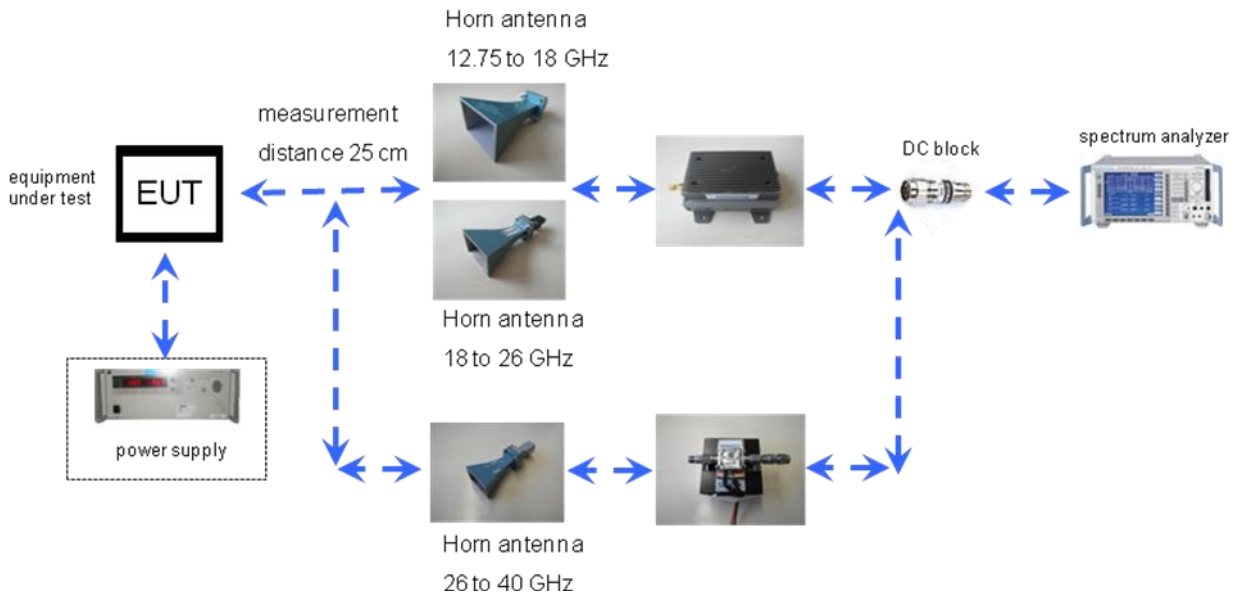
7.2 Radiated measurements chamber C



Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405
Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789
Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032
Active Loop Antenna	6502	EMCO	8905-2342	300000256
Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996
Switch / Control Unit	3488A	HP Meßtechnik	*	300000199
Switch / Control Unit	3488A	HP Meßtechnik	2719A15013	300001156
Isolating Transformer	MPL IEC625 Bus Regeltrenntravo	Erfi	91350	300001155
Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997
Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143

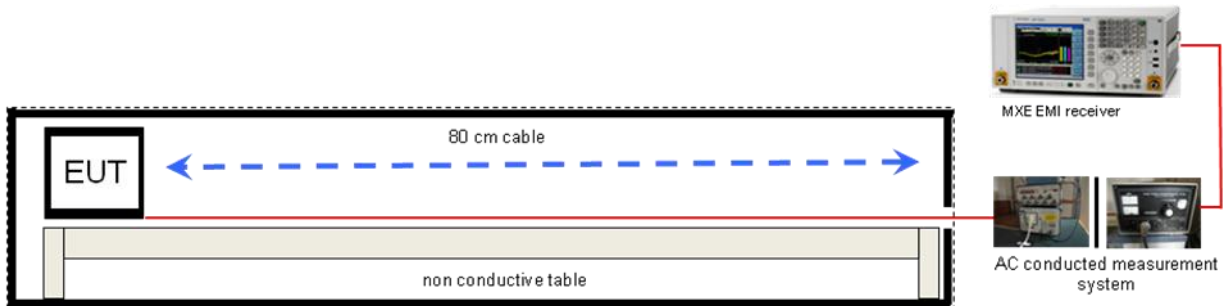
7.3 Radiated measurements 12.75 GHz to 40 GHz



Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
Std. Gain Horn Antenna 12.4 to 18.0 GHz	639	Narda	8402	300000787
Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda	8205	300002442
Microwave System Amplifier, 0.5-26.5 GHz	83017A	HP Meßtechnik	00419	300002268
Std. Gain Horn Antenna 26.5-40.0 GHz	V637	Narda	7911	300001751
Broadband Low Noise Amplifier 18-50 GHz	CBL18503070-XX	CERNEX	19338	300004273
Spectrum Analyzer 20 Hz - 50 GHz	FSU50	R&S	200012	300003443
Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517

7.4 AC conducted



Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405
Isolating Transformer	MPL IEC625 Bus Regeltrenntravo	Erfi	91350	300001155
Switch / Control Unit	3488A	HP Meßtechnik	*	300000199
Switch / Control Unit	3488A	HP Meßtechnik	2719A15013	300001168
Artificial Mains 9 kHz to 30 MHz	ESH3-Z5	R&S	828576/020	300001210

8 Summary of measurement results

- No deviations from the technical specifications were ascertained
- There were deviations from the technical specifications ascertained

TC Identifier	Description	Verdict	Date	Remark
RF-Testing	CFR Part 15	Passed	2014-01-27	-/-

Test specification clause	Test case	Temperature conditions	Power source voltages	Mode	Pass	Fail	NA	NP	Remark
§15.247(b)(4)	Antenna gain	Nominal	Nominal	OFDM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
§15.247(e)	Power spectral density DTS clause 10.2	Nominal	Nominal	OFDM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
§15.247(a)(2)	Spectrum bandwidth - 6dB bandwidth DTS clause 8.2	Nominal	Nominal	OFDM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
§15.247(a)(2)	Spectrum bandwidth - 20dB bandwidth	Nominal	Nominal	OFDM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
§15.247(b)(3)	Maximum output power DTS clause 9.1.2	Nominal	Nominal	OFDM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
§15.247(d)	TX spurious emissions conducted DTS clause 11.1 & 2	Nominal	Nominal	OFDM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
§15.247(d)	TX spurious emissions radiated	Nominal	Nominal	OFDM	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.109	RX spurious emissions radiated	Nominal	Nominal	-/-	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.209(a)	TX spurious emissions radiated < 30 MHz	Nominal	Nominal	OFDM	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.107(a) §15.207	Conducted emissions < 30 MHz	Nominal	Nominal	OFDM	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies

Note: NA = Not Applicable; NP = Not Performed

9 Additional comments

Reference documents: See main report: 1-6965/13-04-18-A / PY7PM-0740 (conducted values)

Special test descriptions: None

Configuration descriptions: None

Test mode:

- No test mode available.
Iperf was used to ping another device with the largest support packet size
- Special software is used.
EUT is transmitting pseudo random data by itself

10 Measurement results

10.1 TX spurious emissions radiated

Description:

Measurement of the radiated spurious emissions in transmit mode. The measurement is performed at the lowest, middle and highest channel. The measurement is repeated for all modulations.

Measurement:

Measurement parameter	
Detector:	Peak / Quasi Peak / RMS
Sweep time:	Auto
Resolution bandwidth:	F > 1 GHz: 1 MHz F < 1 GHz: 100 kHz
Video bandwidth:	3 x RBW Remeasurement: 10 Hz / 3 MHz
Span:	30 MHz to 40 GHz
Trace-Mode:	Max Hold
Measured Modulation	<input checked="" type="checkbox"/> OFDM a – mode <input checked="" type="checkbox"/> OFDM n/ac – mode HT20 <input checked="" type="checkbox"/> OFDM n/ac – mode HT40 <input checked="" type="checkbox"/> OFDM ac – mode HT80

The modulation with the highest output power was used to perform the transmitter spurious emissions. If spurious were detected a re-measurement was performed on the detected frequency with each modulation.

Limits:

FCC	IC	
TX Spurious Emissions Radiated		
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. Attenuation below the general limits specified in Section 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)).		
Frequency (MHz)	Field Strength (dBµV/m)	Measurement distance
30 - 88	30.0	10
88 – 216	33.5	10
216 – 960	36.0	10
Above 960	54.0	3

Results: OFDM / a – mode

TX Spurious Emissions Radiated [dBµV/m]								
OFDM / a – mode								
5745 MHz			5785 MHz			5825 MHz		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.		
No emissions detected above 1 GHz.			No emissions detected above 1 GHz.			No emissions detected above 1 GHz.		
Measurement uncertainty			± 3 dB					

Results: OFDM / n/ac – mode HT20

TX Spurious Emissions Radiated [dBµV/m]								
OFDM / n/ac – mode HT20								
5745 MHz			5785 MHz			5825 MHz		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.		
No emissions detected above 1 GHz.			No emissions detected above 1 GHz.			No emissions detected above 1 GHz.		
Measurement uncertainty			± 3 dB					

Results: OFDM / n/ac – mode HT40

TX Spurious Emissions Radiated [dBµV/m]					
OFDM / n/ac – mode HT40					
5755 MHz			5795 MHz		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.		
No emissions detected above 1 GHz.			No emissions detected above 1 GHz.		
Measurement uncertainty			± 3 dB		

Results: OFDM / ac – mode HT80

TX Spurious Emissions Radiated [dB μ V/m]		
OFDM / ac – mode HT80		
5775 MHz		
F [MHz]	Detector	Level [dB μ V/m]
For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.		
No emissions detected above 1 GHz.		
Measurement uncertainty	\pm 3 dB	

Result: Passed

Note: The limit was recalculated with 20 dB / decade (Part 15.31) for all radiated spurious emissions 30 MHz to 1 GHz from 3 meter limit to a 10 meter distance. (40dB/decade for emissions < 30MHz)

Plots: OFDM / a – mode

Plot 1: Lowest channel, 30 MHz to 1 GHz, vertical & horizontal polarization

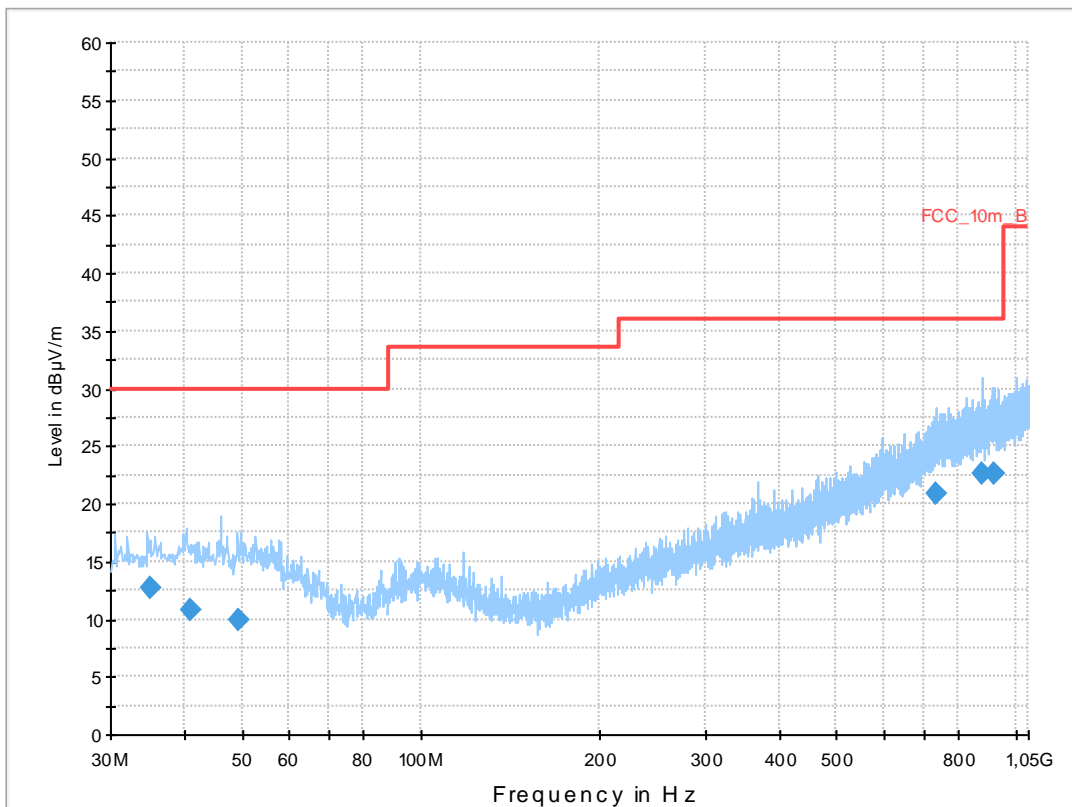
Common Information

EUT: PM-0744-BV
 Serial Number: CB5A1W45MZ
 Test Description: FCC part 15 C class B @ 10 m
 Operating Conditions: WLAN a-mode CH 149
 Operator Name: Hennemann
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Receiver: [ESC1 3]
 Level Unit: dBµV/m

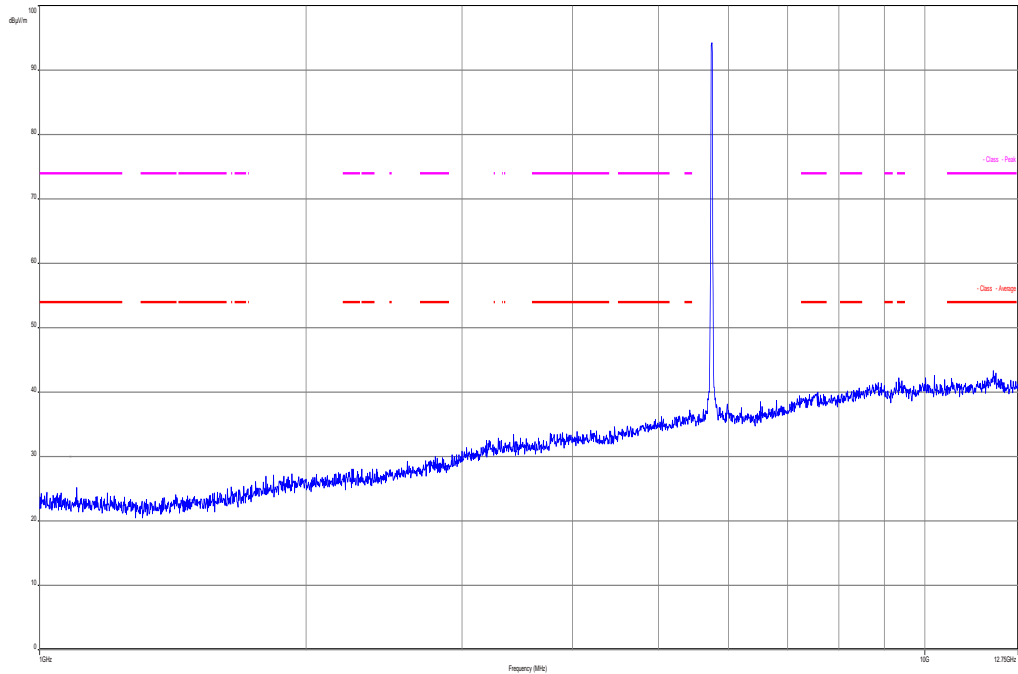
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



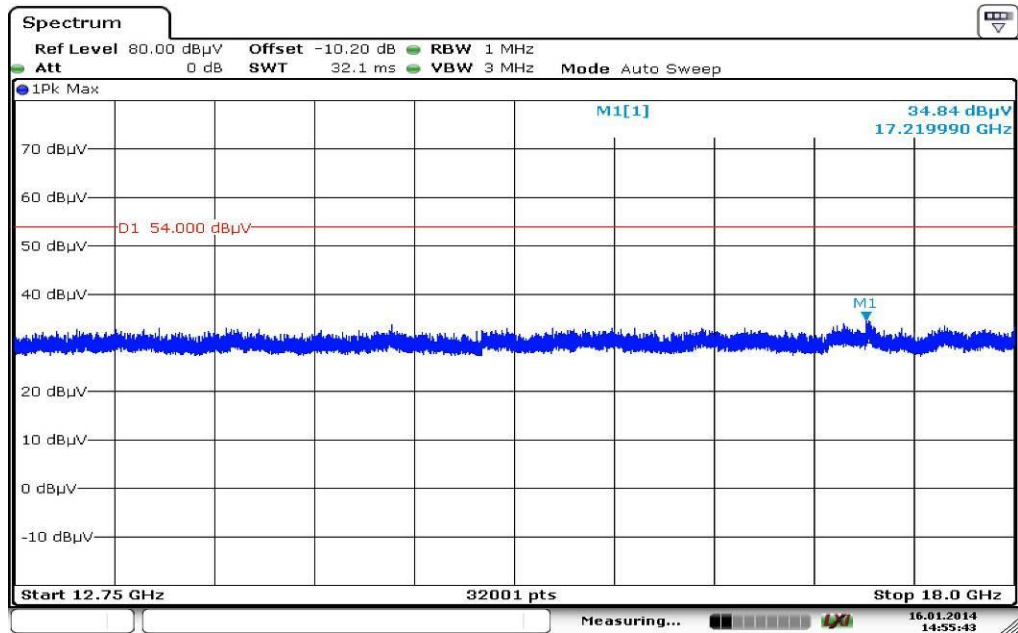
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
35.022150	12.7	1000.0	120.000	142.0	V	261.0	13.0	17.3	30.0	
40.774350	10.9	1000.0	120.000	121.0	V	81.0	13.4	19.1	30.0	
49.494450	9.9	1000.0	120.000	170.0	V	10.0	13.4	20.1	30.0	
734.926500	20.8	1000.0	120.000	170.0	V	92.0	23.3	15.2	36.0	
880.213350	22.6	1000.0	120.000	170.0	V	260.0	24.9	13.4	36.0	
917.963850	22.6	1000.0	120.000	104.0	H	10.0	25.3	13.4	36.0	

Plot 2: Lowest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

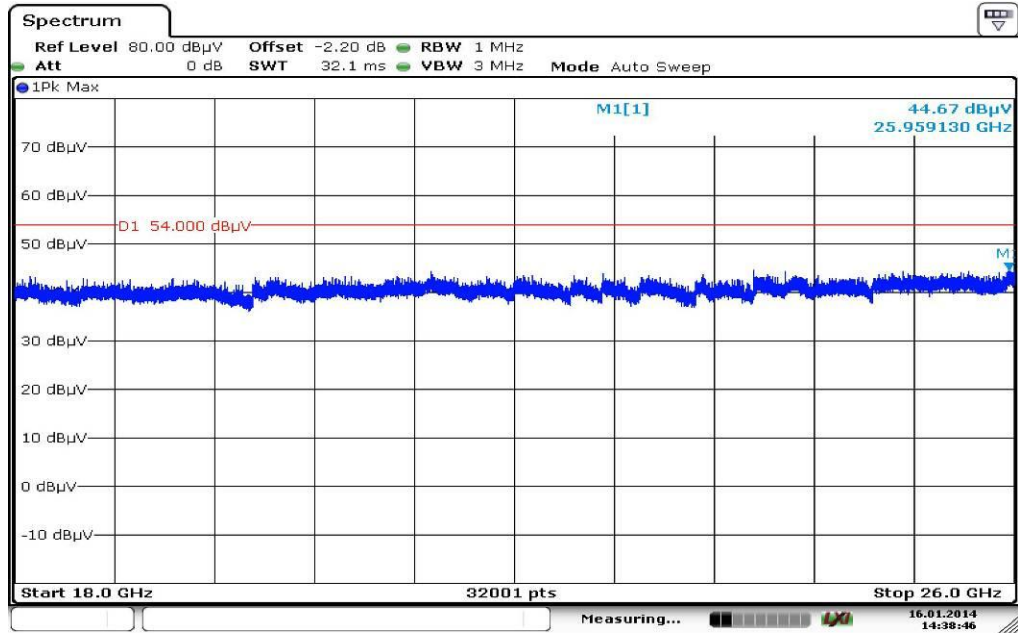


Plot 3: Lowest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



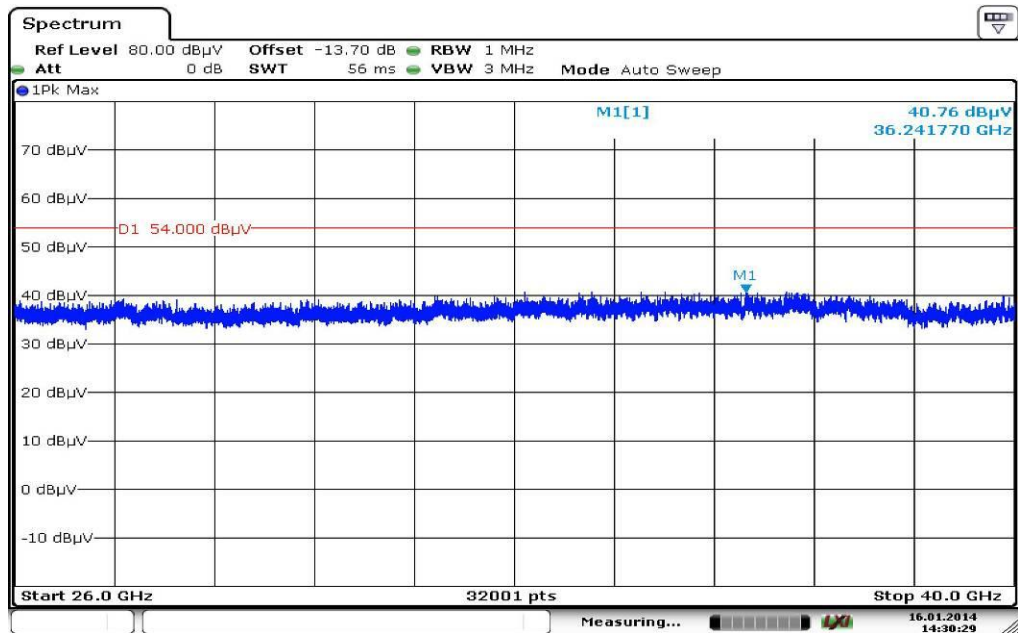
Date: 16.JAN.2014 14:55:43

Plot 4: Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 16.JAN.2014 14:38:46

Plot 5: Lowest channel, 26 GHz to 40 GHz, vertical & horizontal polarization



Date: 16.JAN.2014 14:30:29

Plot 6: Middle channel, 30 MHz to 1 GHz, vertical & horizontal polarization

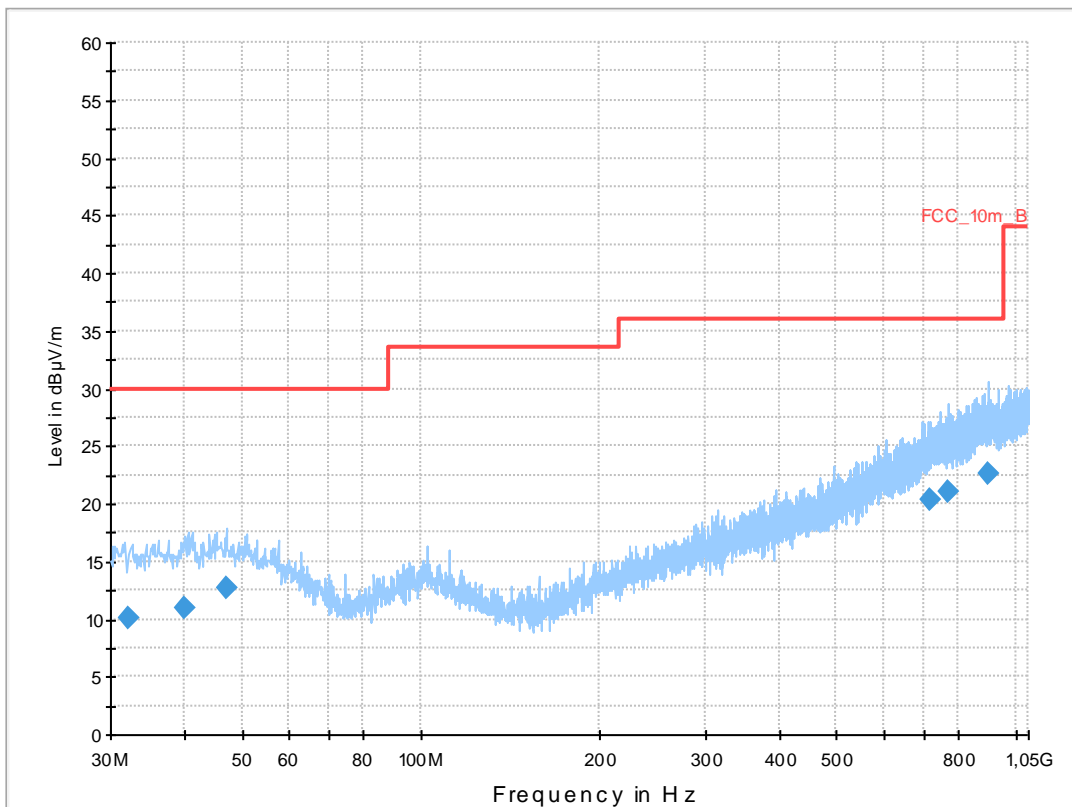
Common Information

EUT: PM-0744-BV
 Serial Number: CB5A1W45MZ
 Test Description: FCC part 15 C class B @ 10 m
 Operating Conditions: WLAN a-mode CH 157
 Operator Name: Hennemann
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Receiver: [ESC1 3]
 Level Unit: dBµV/m

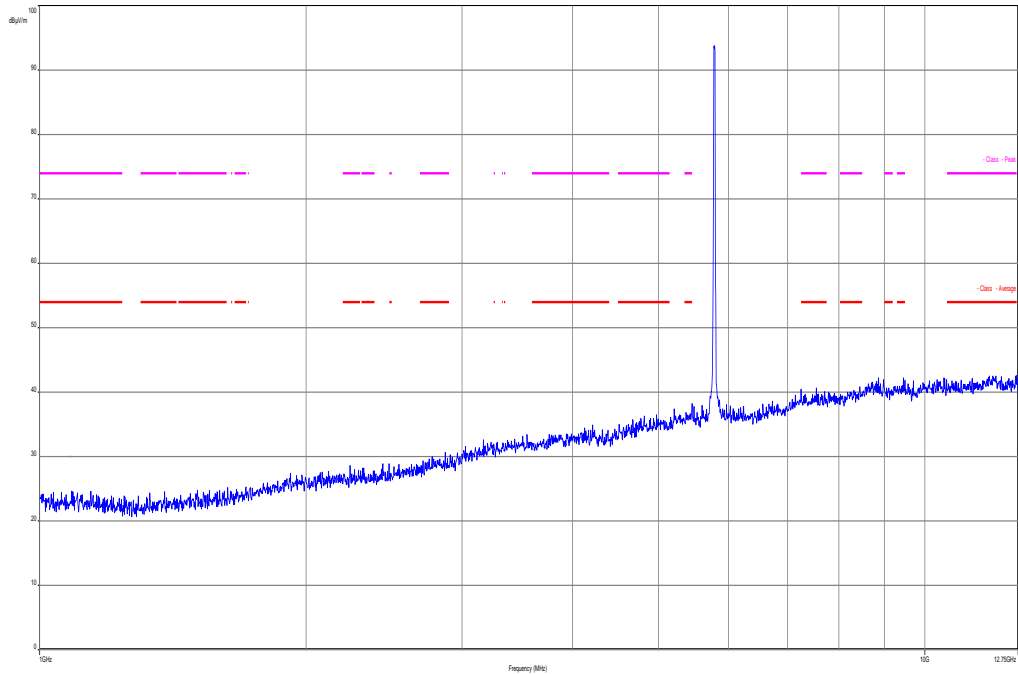
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



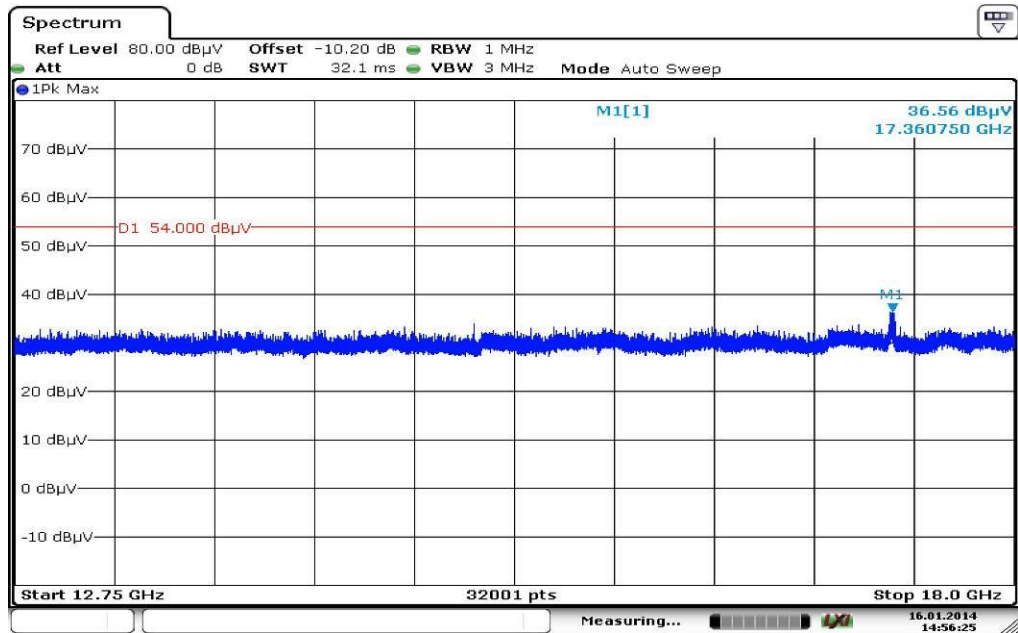
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
32.198550	10.1	1000.0	120.000	170.0	V	-10.0	12.7	19.9	30.0	
40.095600	10.9	1000.0	120.000	170.0	V	190.0	13.4	19.1	30.0	
46.998750	12.7	1000.0	120.000	111.0	V	92.0	13.3	17.3	30.0	
716.146500	20.4	1000.0	120.000	170.0	V	175.0	22.9	15.6	36.0	
770.842950	21.1	1000.0	120.000	120.0	V	2.0	23.7	14.9	36.0	
898.159800	22.7	1000.0	120.000	170.0	H	0.0	25.2	13.4	36.0	

Plot 7: Middle channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

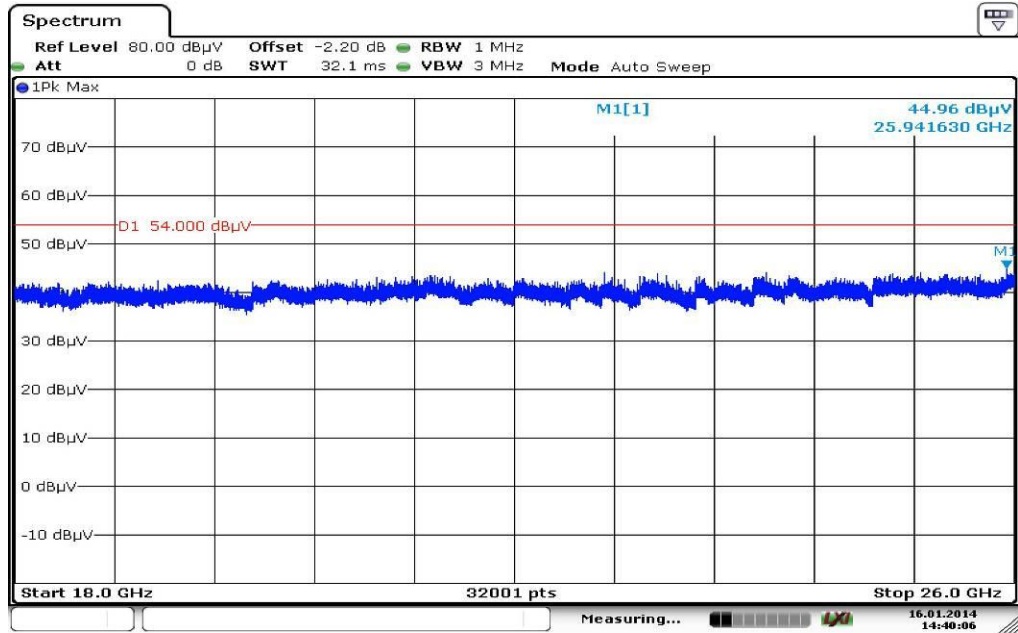


Plot 8: Middle channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization

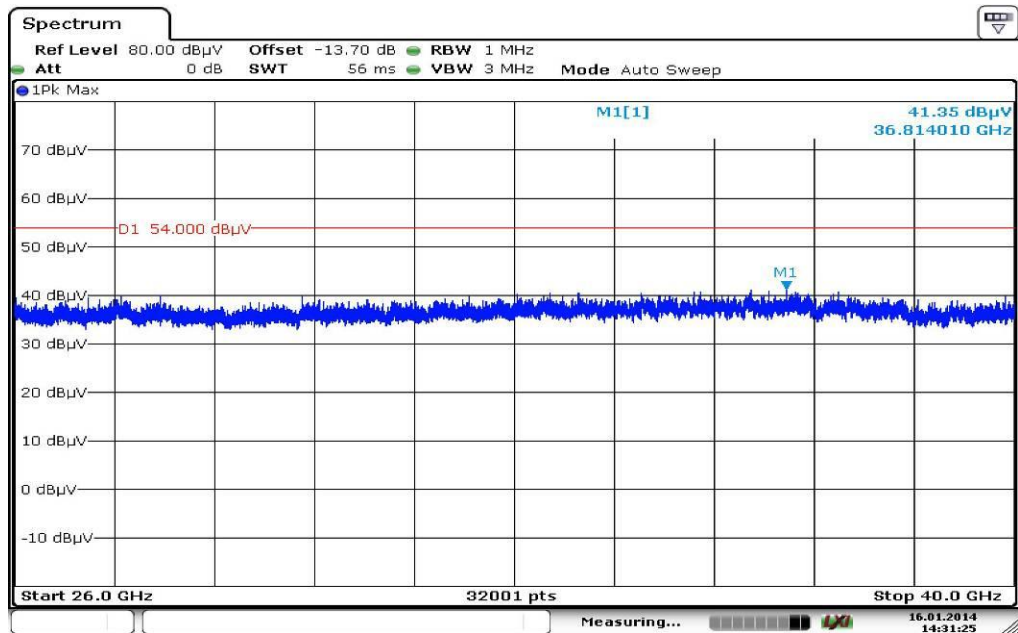


Date: 16.JAN.2014 14:56:25

Plot 9: Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Plot 10: Middle channel, 26 GHz to 40 GHz, vertical & horizontal polarization



Plot 11: Highest channel, 30 MHz to 1 GHz, vertical & horizontal polarization

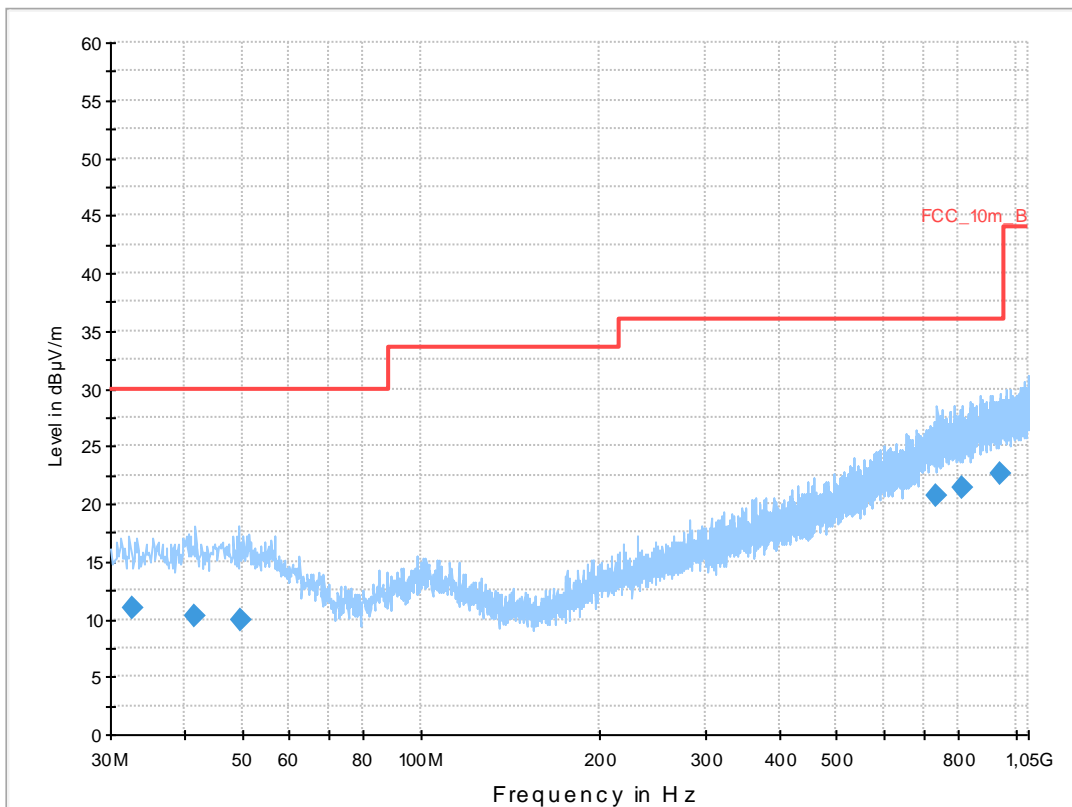
Common Information

EUT: PM-0744-BV
 Serial Number: CB5A1W45MZ
 Test Description: FCC part 15 C class B @ 10 m
 Operating Conditions: WLAN a-mode CH 165
 Operator Name: Hennemann
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Receiver: [ESC1 3]
 Level Unit: dBµV/m

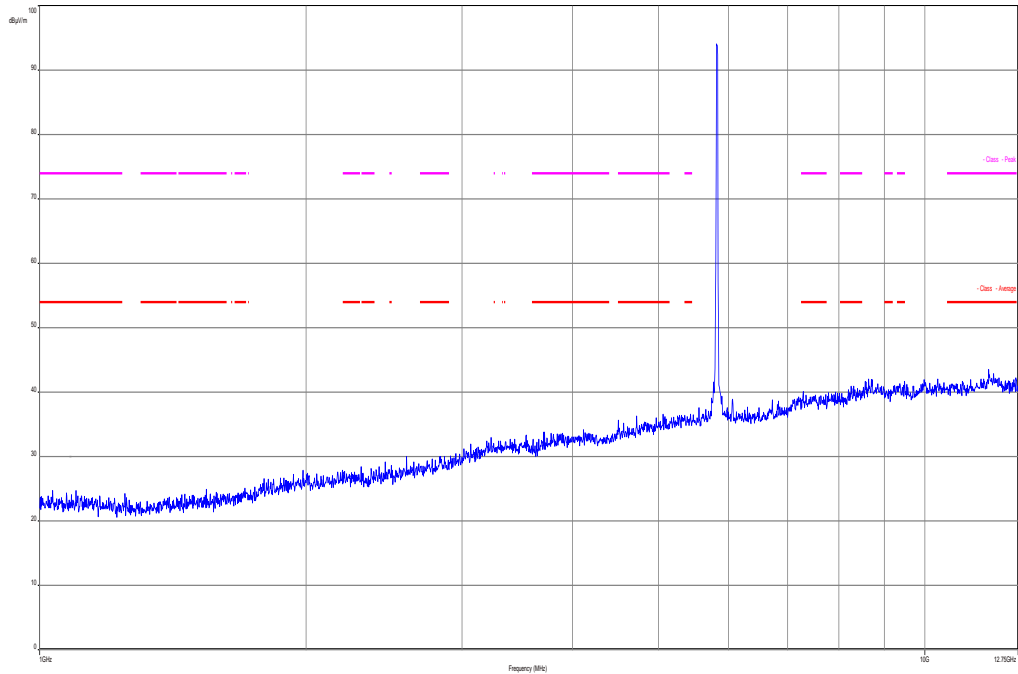
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



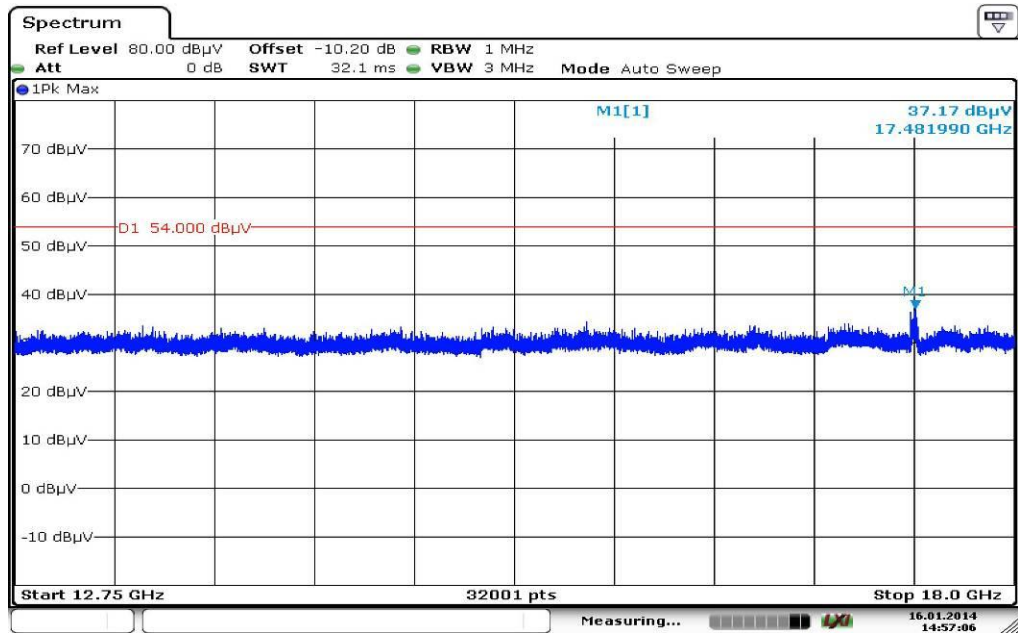
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
32.796900	10.9	1000.0	120.000	132.0	V	280.0	12.8	19.1	30.0	
41.586600	10.3	1000.0	120.000	170.0	H	80.0	13.4	19.7	30.0	
49.522650	9.9	1000.0	120.000	98.0	H	2.0	13.4	20.1	30.0	
734.606850	20.8	1000.0	120.000	170.0	V	85.0	23.3	15.2	36.0	
812.782050	21.4	1000.0	120.000	98.0	H	10.0	24.0	14.6	36.0	
941.737350	22.6	1000.0	120.000	170.0	V	180.0	25.3	13.4	36.0	

Plot 12: Highest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

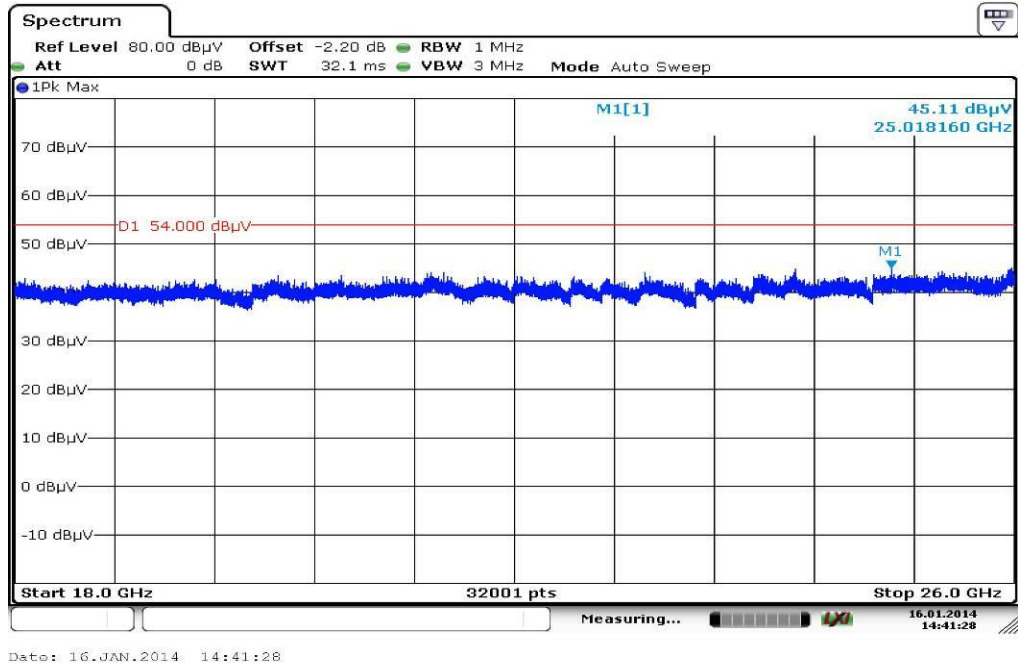


Plot 13: Highest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization

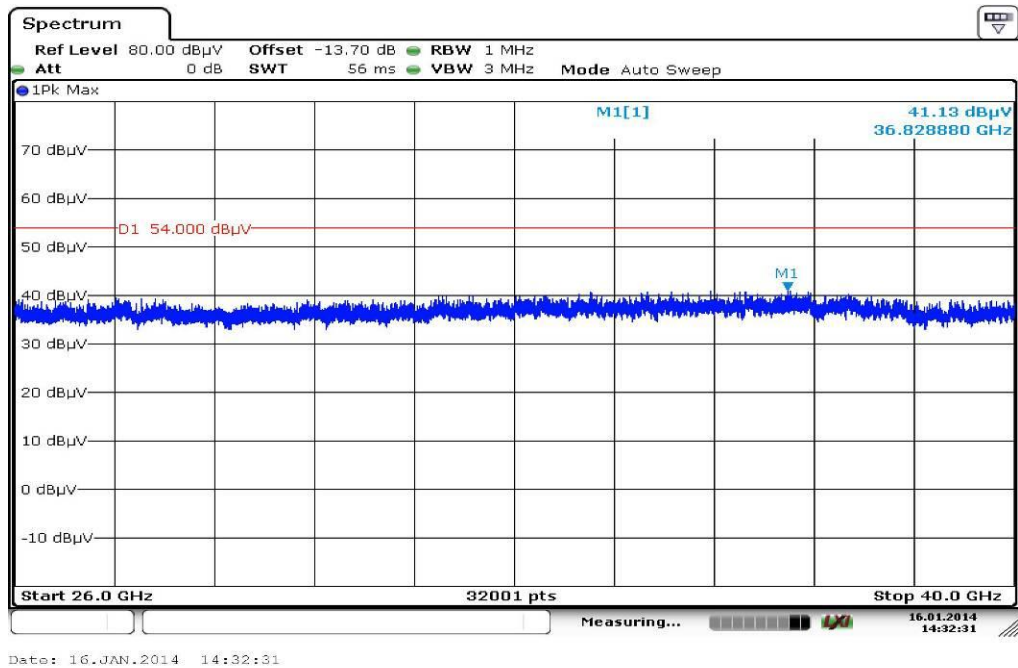


Date: 16.JAN.2014 14:57:05

Plot 14: Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Plot 15: Highest channel, 26 GHz to 40 GHz, vertical & horizontal polarization



Plots: OFDM / n/ac – mode HT20

Plot 1: Lowest channel, 30 MHz to 1 GHz, vertical & horizontal polarization

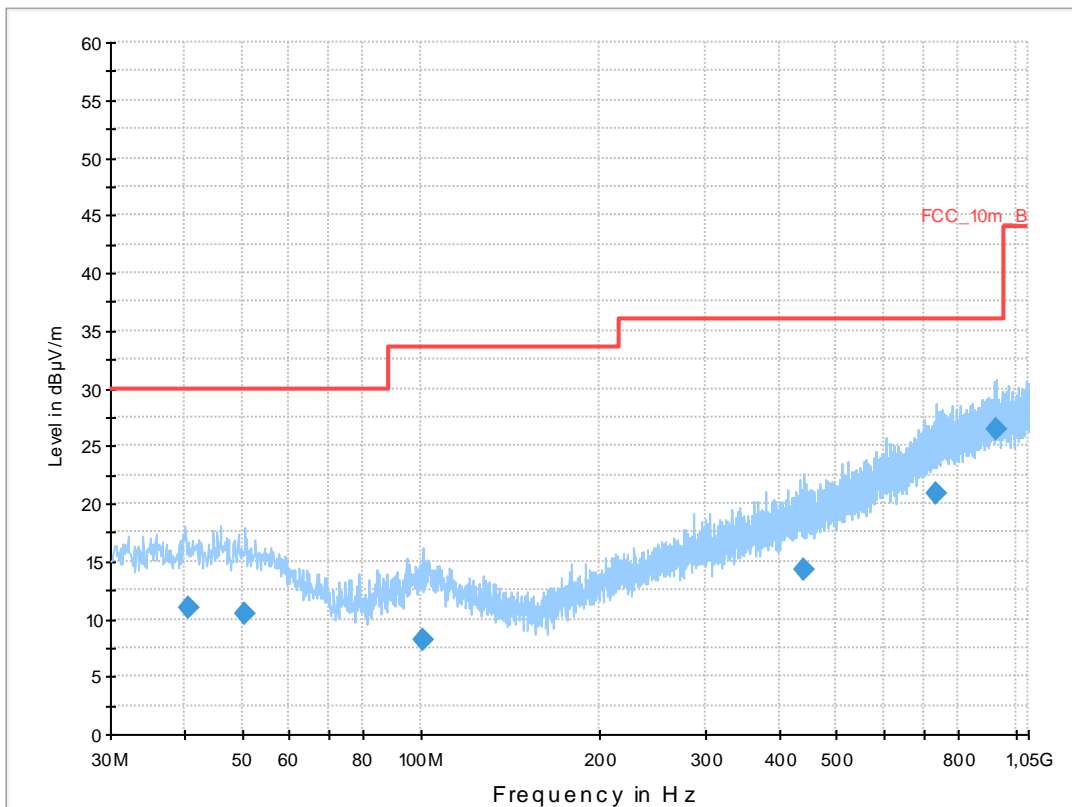
Common Information

EUT: PM-0744-BV
 Serial Number: CB5A1W45MZ
 Test Description: FCC part 15 C class B @ 10 m
 Operating Conditions: WLAN n-mode (HT20) CH 149
 Operator Name: Hennemann
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Receiver: [ESC1 3]
 Level Unit: dBµV/m

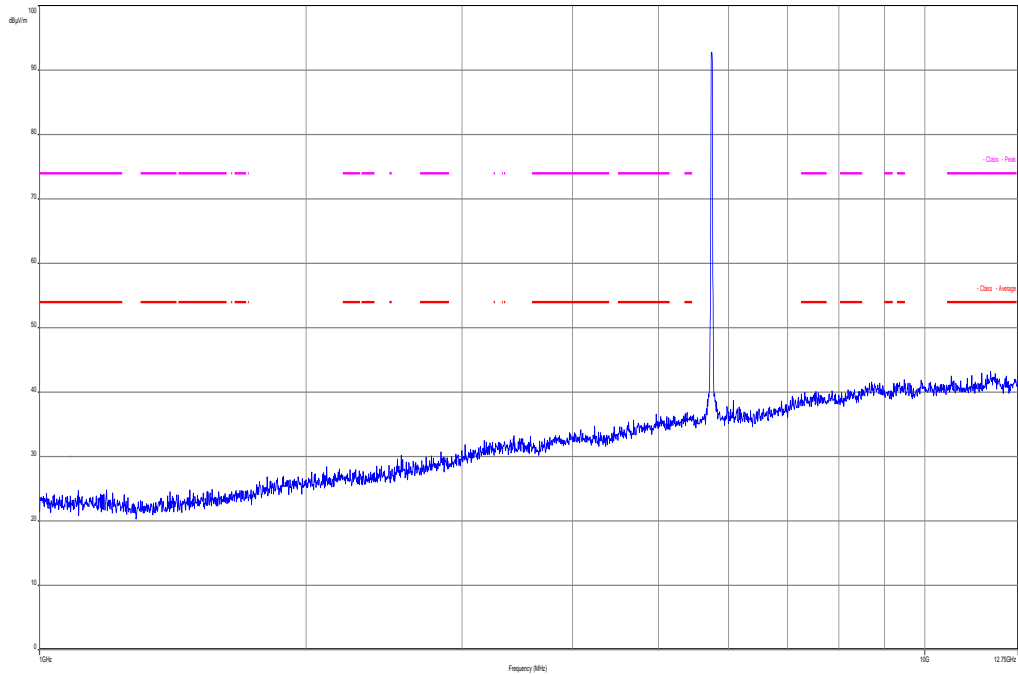
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



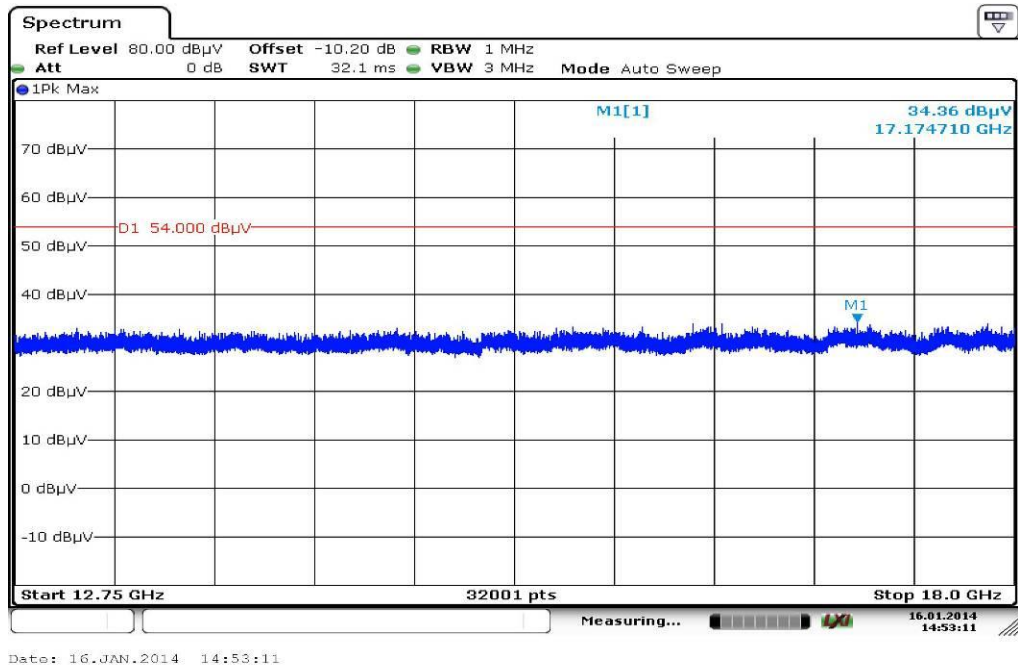
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
40.453950	11.0	1000.0	120.000	98.0	V	280.0	13.4	19.0	30.0	
50.620200	10.5	1000.0	120.000	170.0	H	-2.0	13.3	19.5	30.0	
100.466850	8.2	1000.0	120.000	153.0	H	280.0	11.9	25.3	33.5	
441.026700	14.3	1000.0	120.000	170.0	V	100.0	17.5	21.7	36.0	
733.712700	20.8	1000.0	120.000	98.0	H	81.0	23.3	15.2	36.0	
927.368400	26.4	1000.0	120.000	170.0	V	280.0	25.3	9.6	36.0	

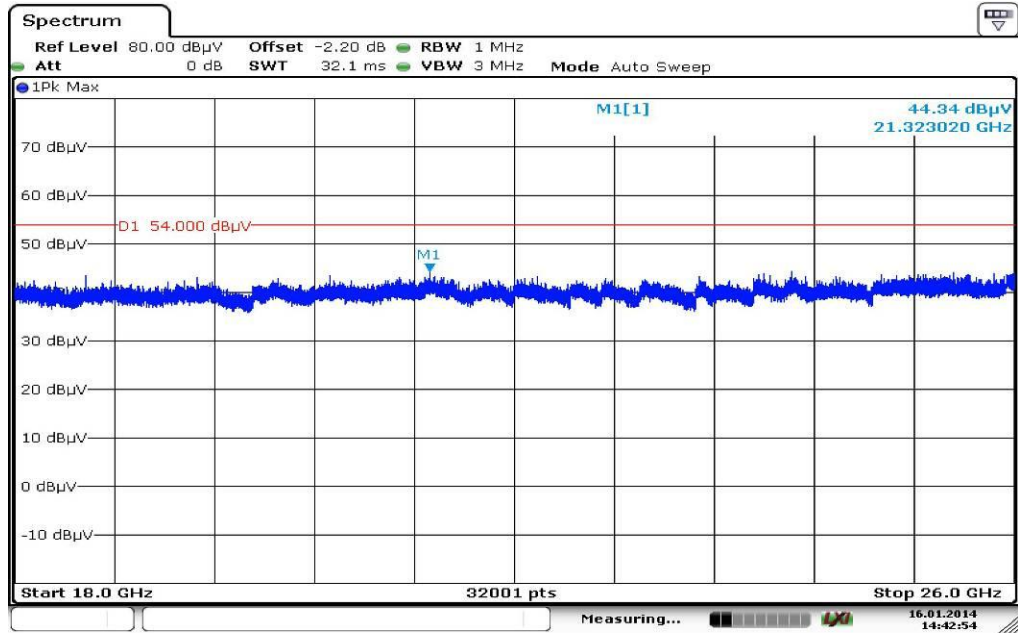
Plot 2: Lowest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization



Plot 3: Lowest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization

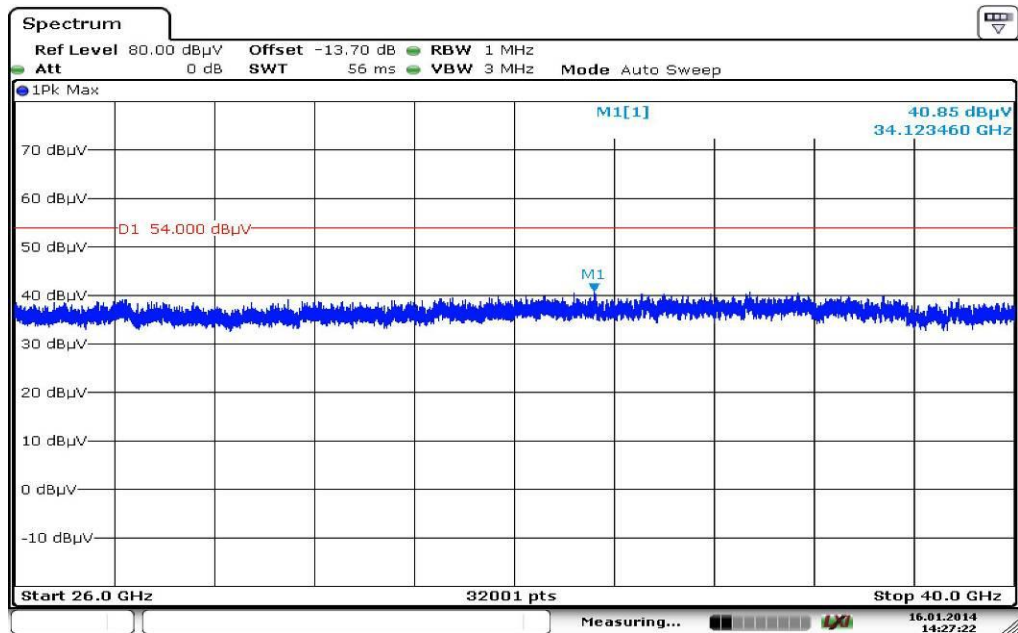


Plot 4: Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 16.JAN.2014 14:42:54

Plot 5: Lowest channel, 26 GHz to 40 GHz, vertical & horizontal polarization



Date: 16.JAN.2014 14:27:21

Plot 6: Middle channel, 30 MHz to 1 GHz, vertical & horizontal polarization

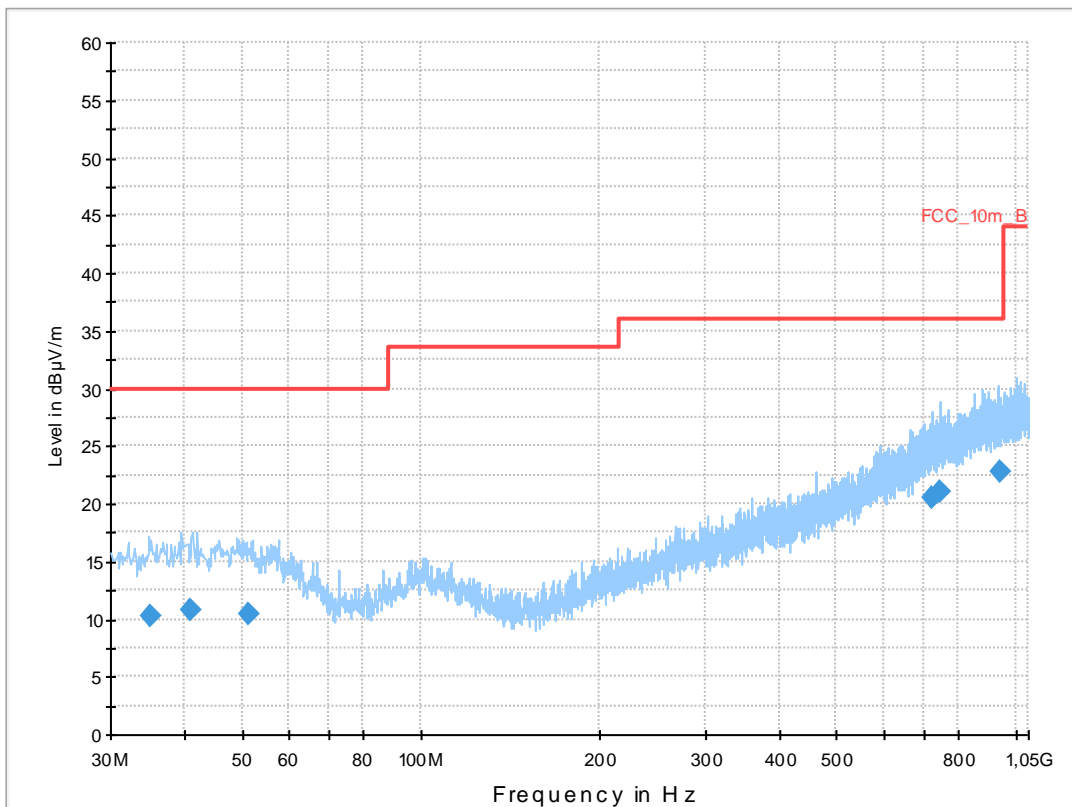
Common Information

EUT: PM-0744-BV
 Serial Number: CB5A1W45MZ
 Test Description: FCC part 15 C class B @ 10 m
 Operating Conditions: WLAN n-mode (HT20) CH 157
 Operator Name: Hennemann
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Receiver: [ESC1 3]
 Level Unit: dBµV/m

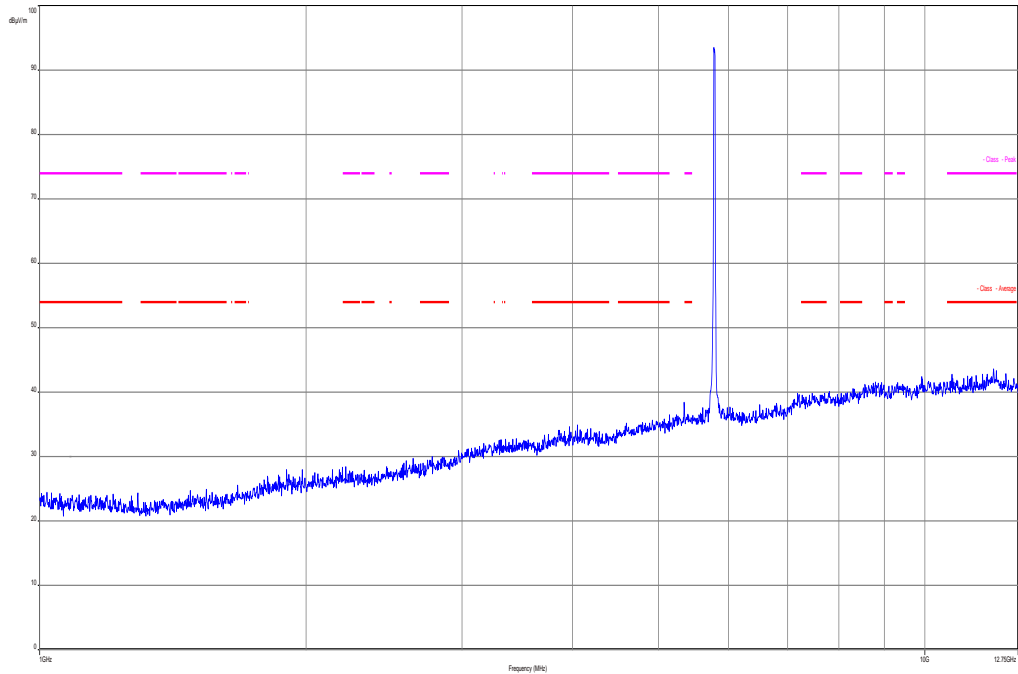
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



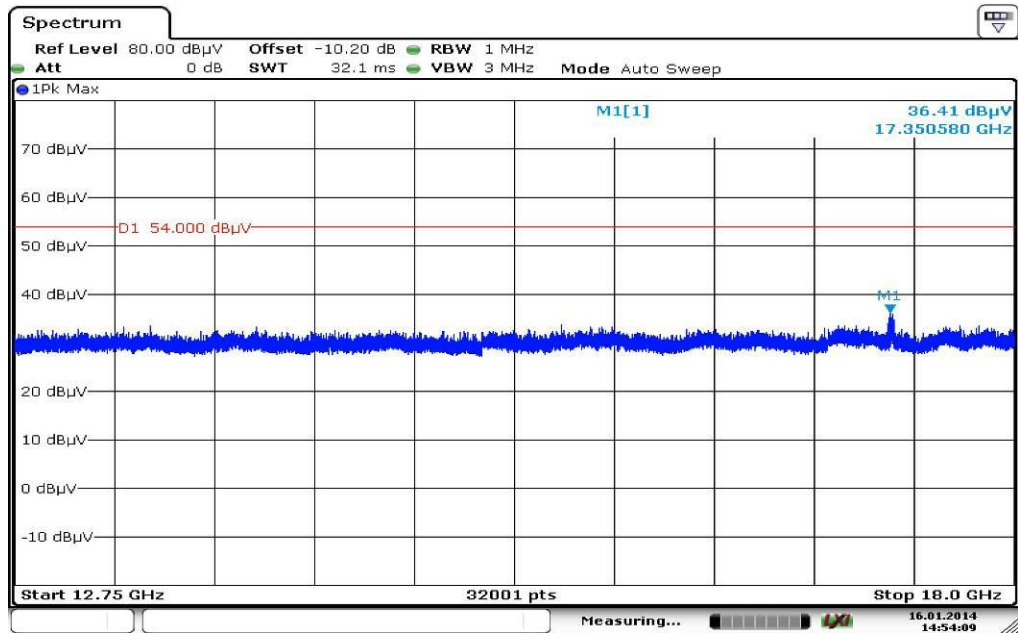
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
35.145750	10.3	1000.0	120.000	170.0	H	-10.0	13.0	19.7	30.0	
40.799700	10.9	1000.0	120.000	162.0	V	100.0	13.4	19.1	30.0	
51.427350	10.4	1000.0	120.000	170.0	V	10.0	13.2	19.6	30.0	
723.521100	20.6	1000.0	120.000	142.0	H	182.0	23.1	15.4	36.0	
746.989200	21.0	1000.0	120.000	170.0	H	-9.0	23.6	15.0	36.0	
938.431800	22.7	1000.0	120.000	170.0	V	280.0	25.3	13.3	36.0	

Plot 7: Middle channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

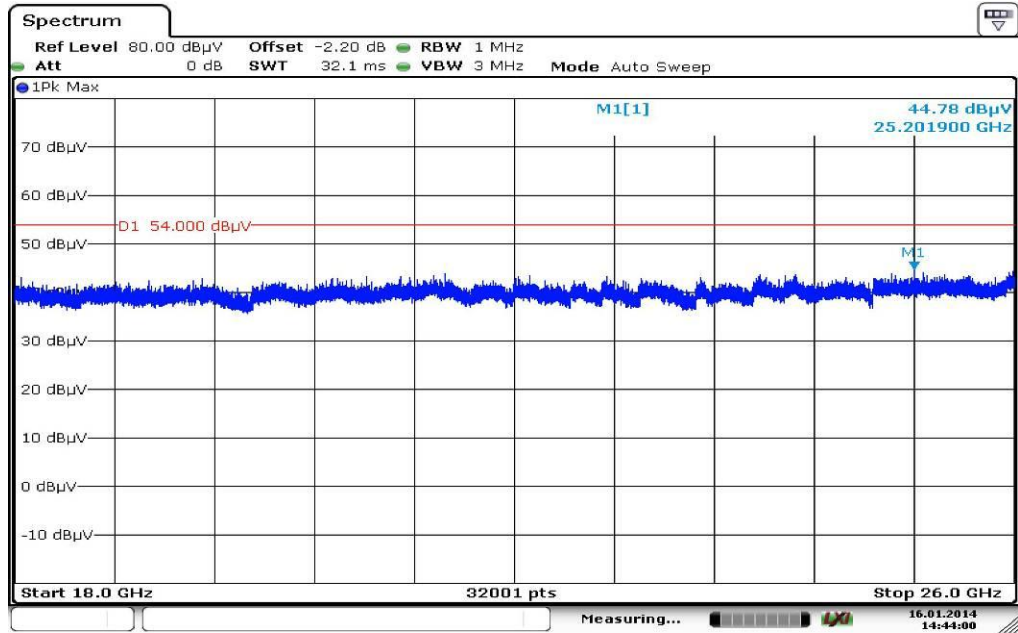


Plot 8: Middle channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



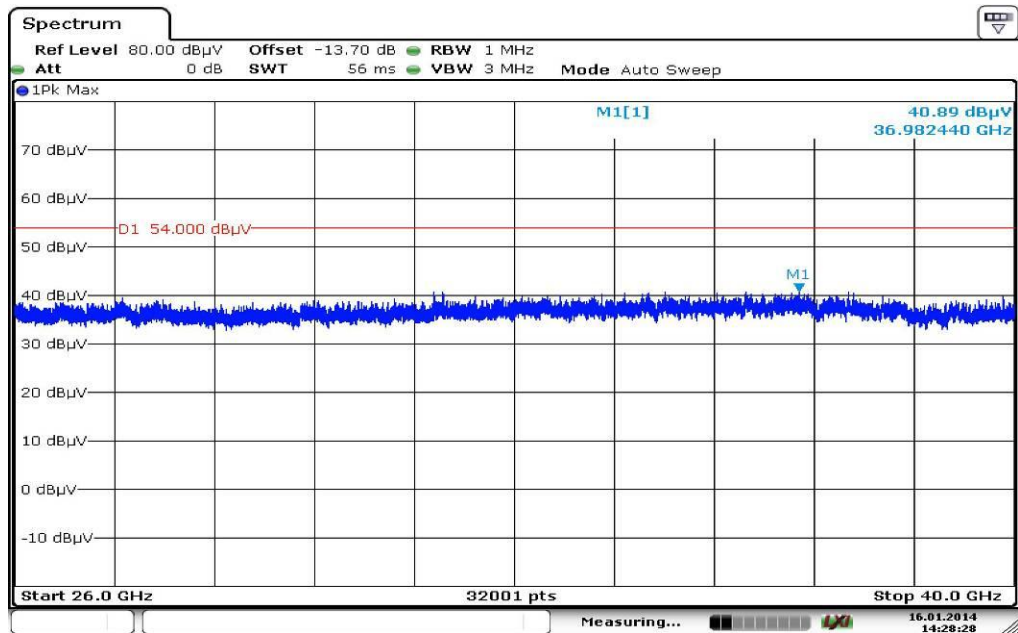
Date: 16.JAN.2014 14:54:09

Plot 9: Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 16.JAN.2014 14:44:00

Plot 10: Middle channel, 26 GHz to 40 GHz, vertical & horizontal polarization



Date: 16.JAN.2014 14:28:28

Plot 11: Highest channel, 30 MHz to 1 GHz, vertical & horizontal polarization

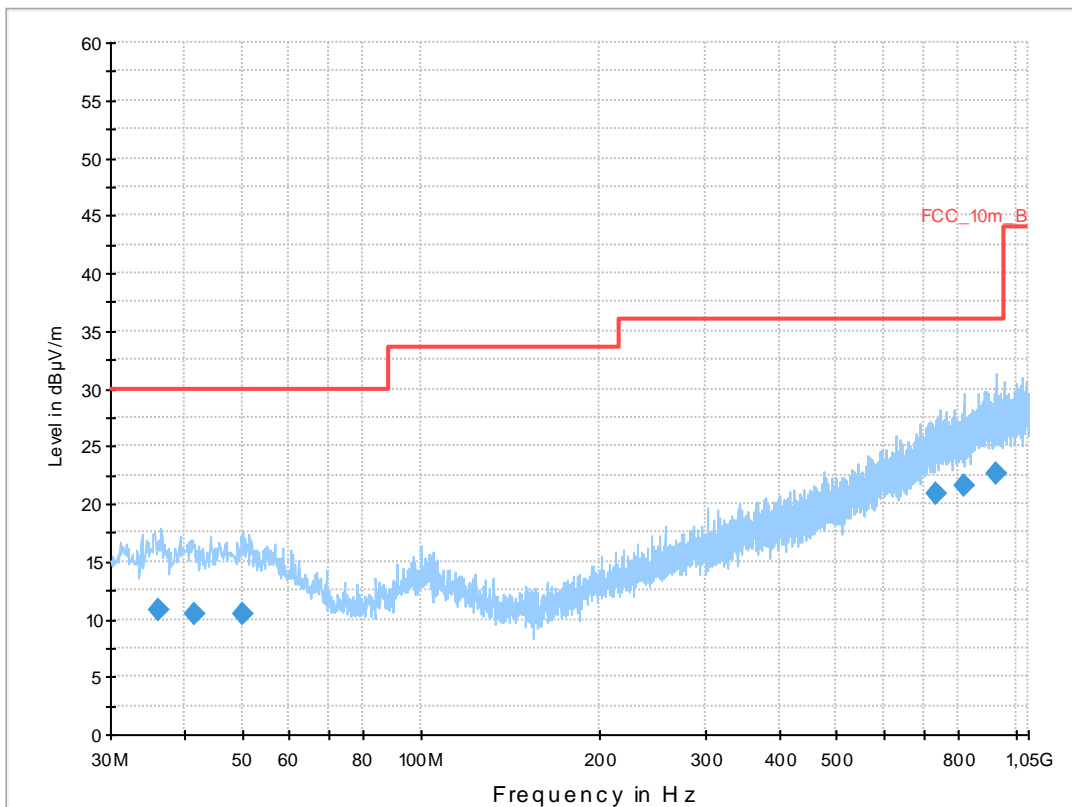
Common Information

EUT: PM-0744-BV
 Serial Number: CB5A1W45MZ
 Test Description: FCC part 15 C class B @ 10 m
 Operating Conditions: WLAN n-mode (HT20) CH 165
 Operator Name: Hennemann
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Receiver: [ESC1 3]
 Level Unit: dBµV/m

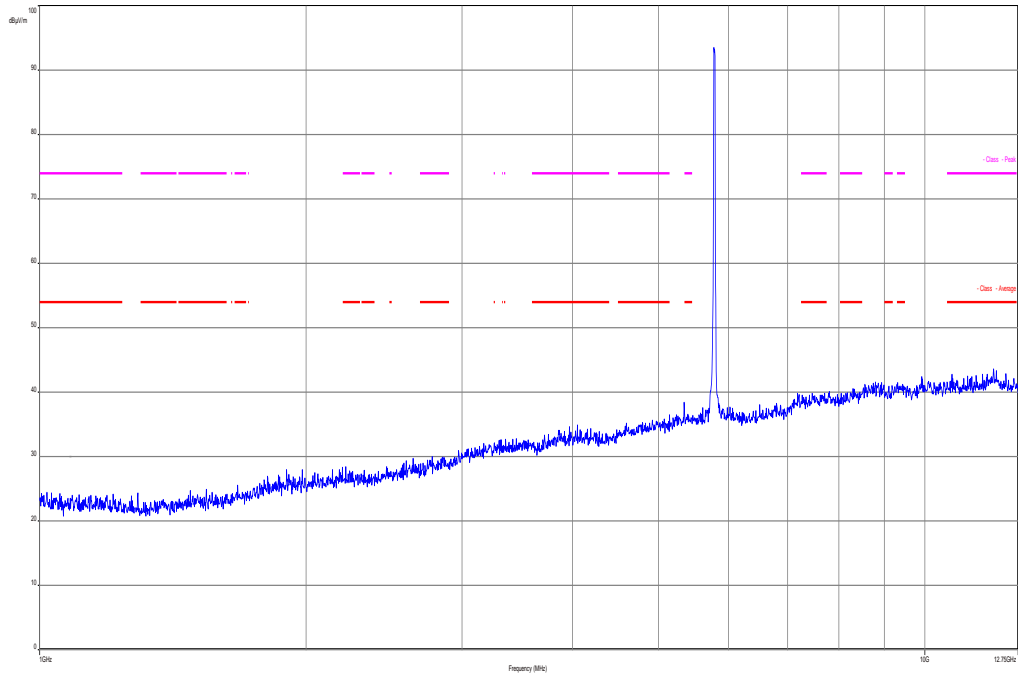
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



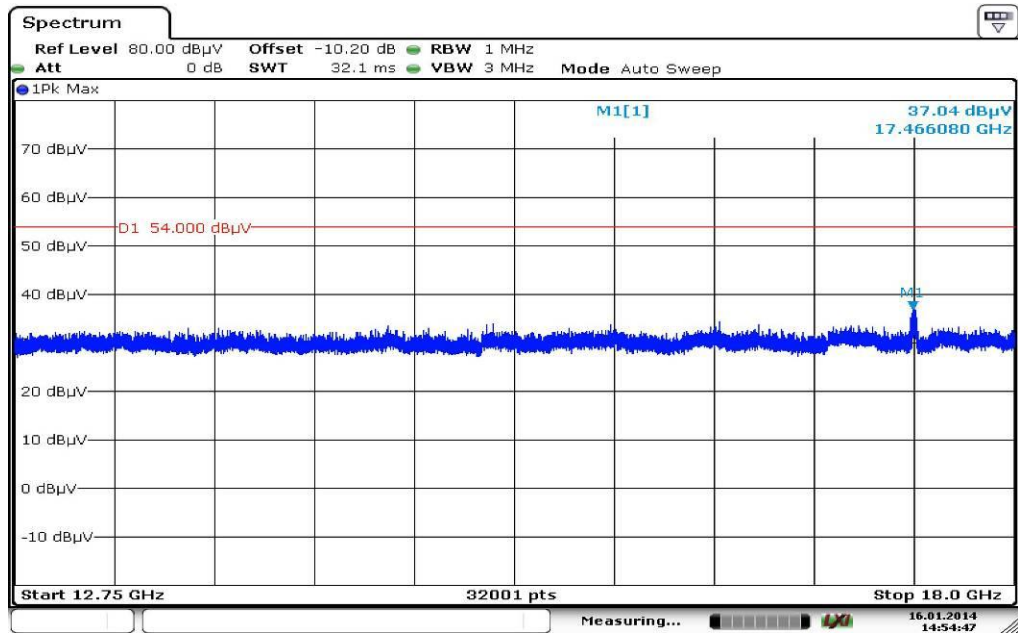
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
36.030450	10.8	1000.0	120.000	170.0	H	265.0	13.1	19.2	30.0	
41.521350	10.4	1000.0	120.000	170.0	V	100.0	13.4	19.6	30.0	
50.253150	10.4	1000.0	120.000	170.0	V	266.0	13.3	19.6	30.0	
733.626150	20.8	1000.0	120.000	170.0	V	280.0	23.3	15.2	36.0	
821.018850	21.6	1000.0	120.000	132.0	V	170.0	24.1	14.4	36.0	
926.977800	22.6	1000.0	120.000	170.0	V	80.0	25.3	13.4	36.0	

Plot 12: Highest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

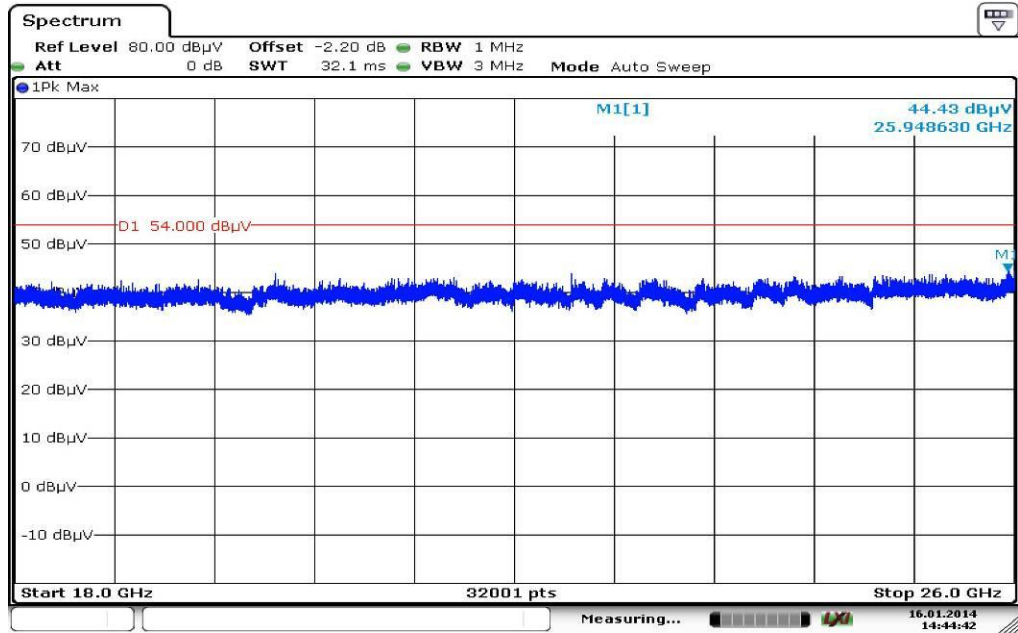


Plot 13: Highest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



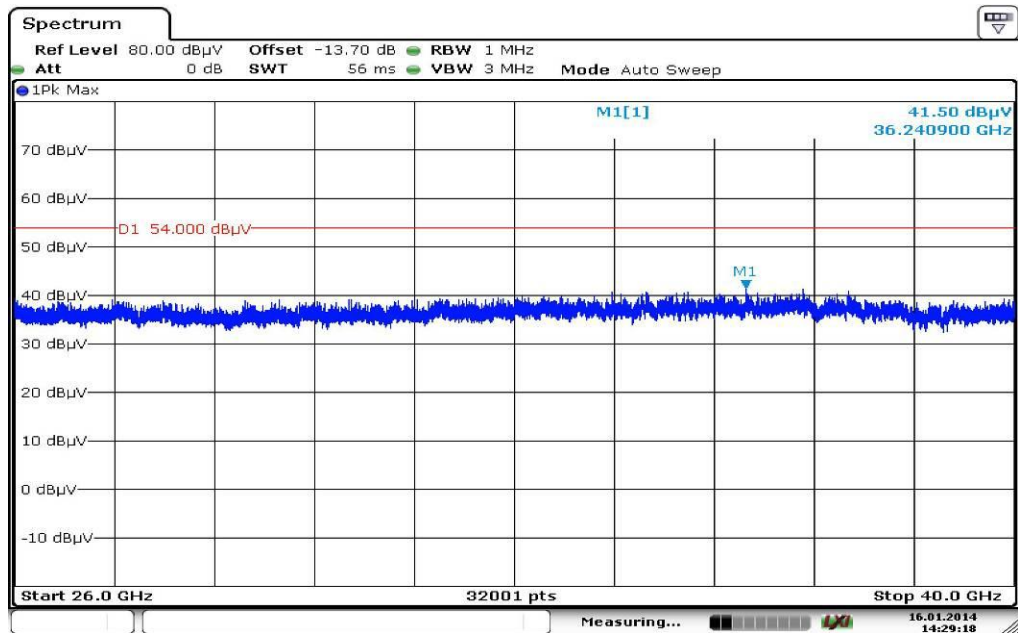
Date: 16.JAN.2014 14:54:47

Plot 14: Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 16.JAN.2014 14:44:42

Plot 15: Highest channel, 26 GHz to 40 GHz, vertical & horizontal polarization



Date: 16.JAN.2014 14:29:18

Plots: OFDM / n/ac – mode HT40

Plot 1: Lowest channel, 30 MHz to 1 GHz, vertical & horizontal polarization

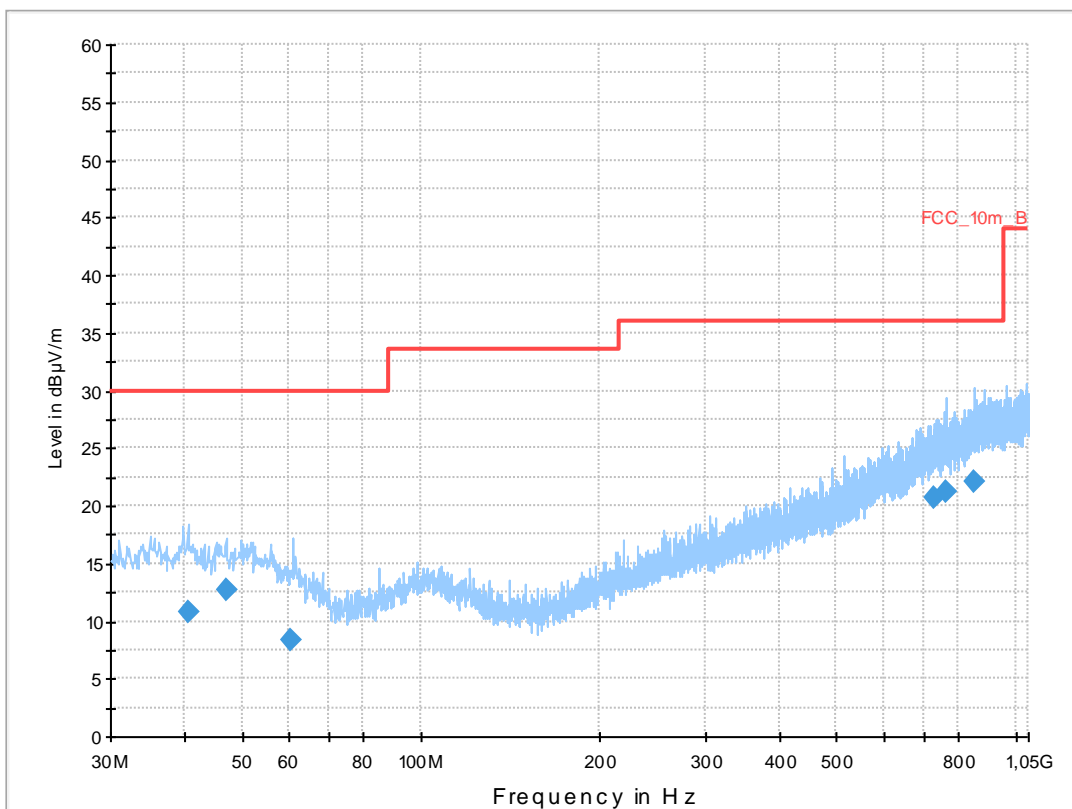
Common Information

EUT: PM-0744-BV
 Serial Number: CB5A1W45MZ
 Test Description: FCC part 15 C class B @ 10 m
 Operating Conditions: WLAN n-mode (HT40) CH 151
 Operator Name: Hennemann
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Receiver: [ESC1 3]
 Level Unit: dBµV/m

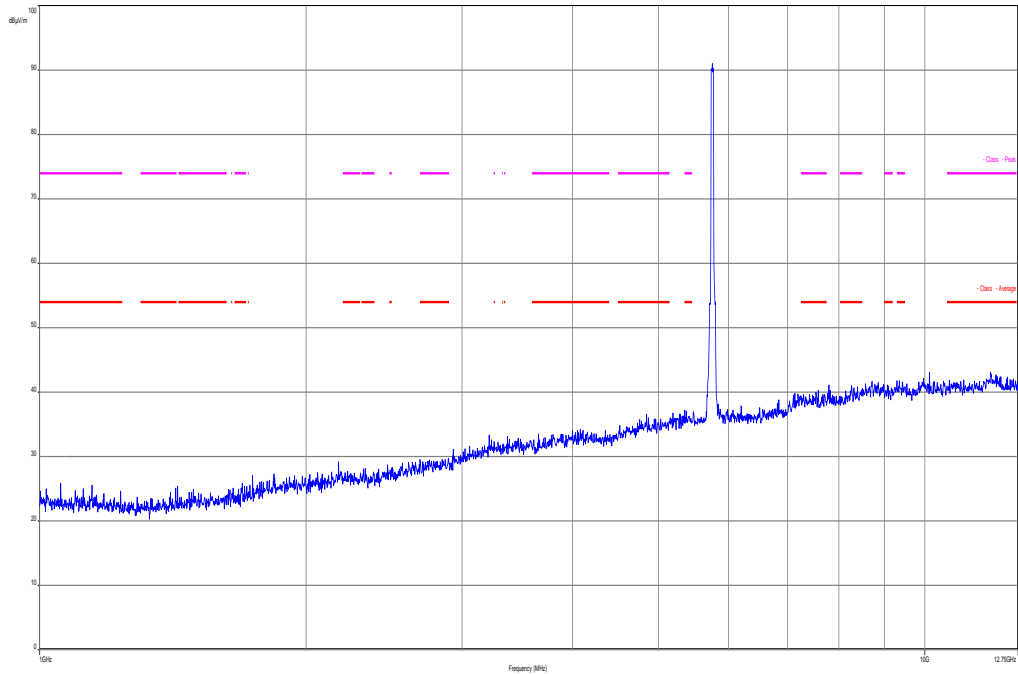
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



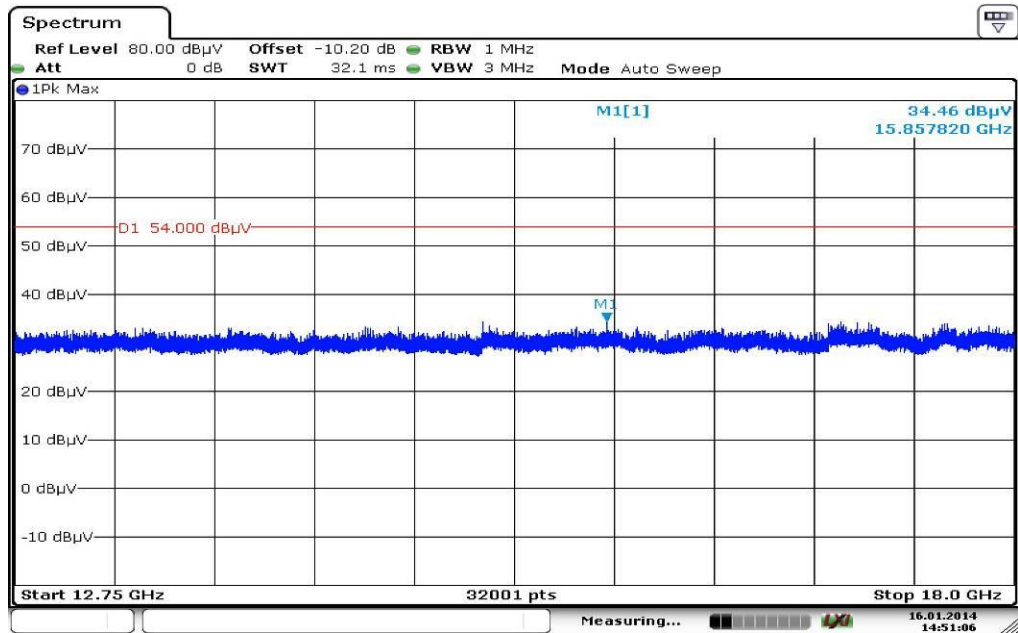
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
40.506000	10.8	1000.0	120.000	111.0	H	170.0	13.4	19.2	30.0	
46.987200	12.6	1000.0	120.000	120.0	V	0.0	13.3	17.4	30.0	
60.420000	8.4	1000.0	120.000	170.0	H	280.0	11.5	21.6	30.0	
731.641200	20.7	1000.0	120.000	170.0	V	265.0	23.2	15.3	36.0	
761.401500	21.2	1000.0	120.000	111.0	V	190.0	23.7	14.8	36.0	
852.458550	22.1	1000.0	120.000	170.0	V	280.0	24.6	13.9	36.0	

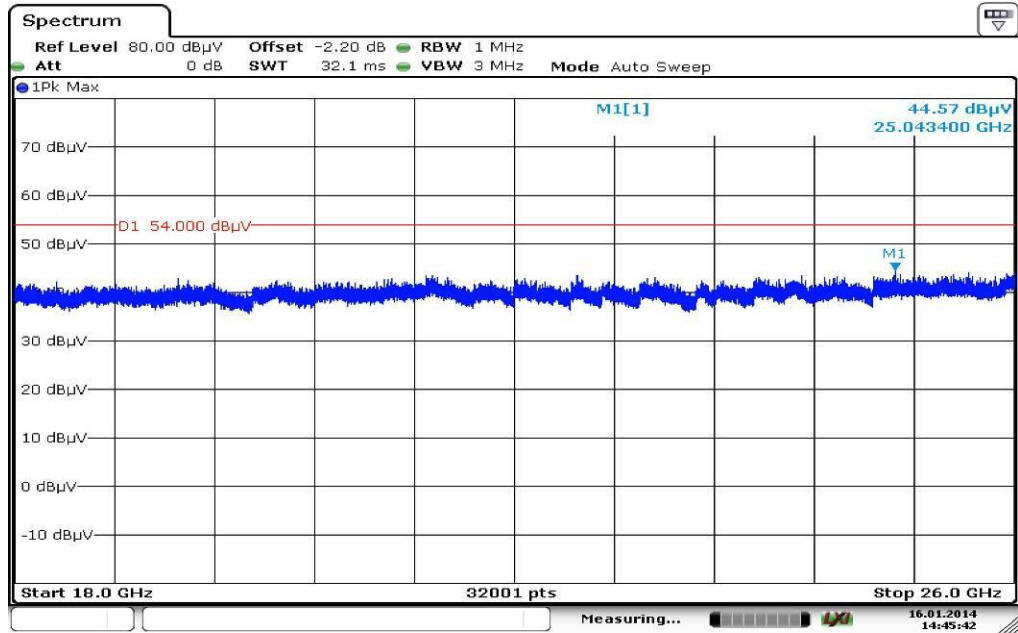
Plot 2: Lowest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization



Plot 3: Lowest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization

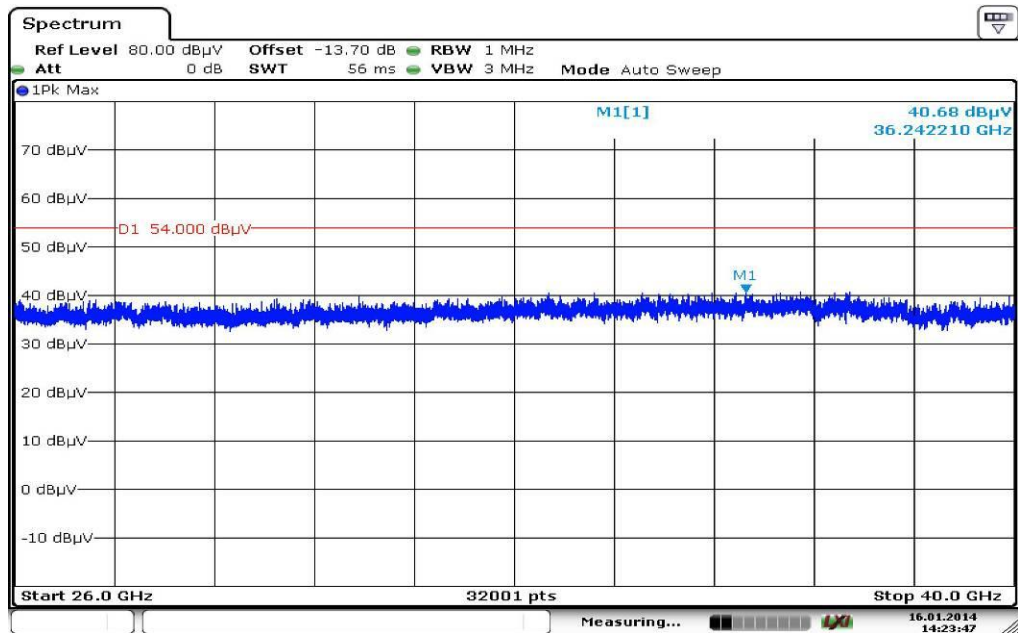


Plot 4: Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 16.JAN.2014 14:45:41

Plot 5: Lowest channel, 26 GHz to 40 GHz, vertical & horizontal polarization



Date: 16.JAN.2014 14:23:47

Plot 6: Highest channel, 30 MHz to 1 GHz, vertical & horizontal polarization

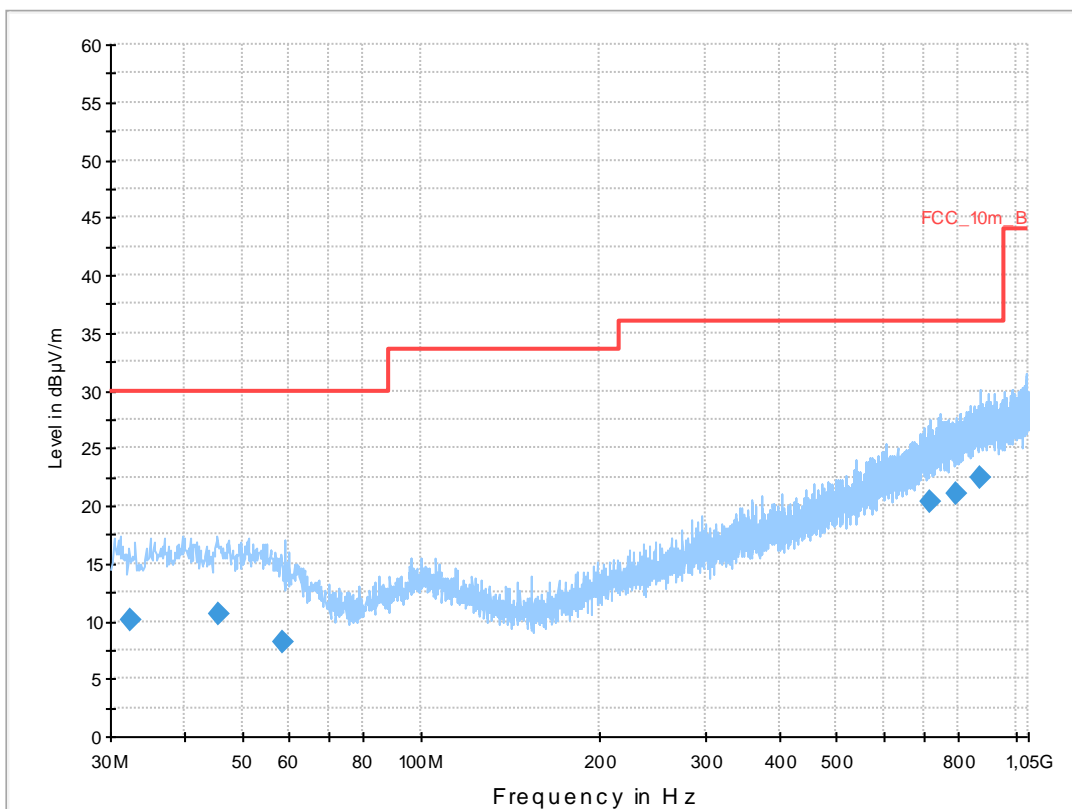
Common Information

EUT: PM-0744-BV
 Serial Number: CB5A1W45MZ
 Test Description: FCC part 15 C class B @ 10 m
 Operating Conditions: WLAN n-mode (HT40) CH 159
 Operator Name: Hennemann
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Receiver: [ESC1 3]
 Level Unit: dBµV/m

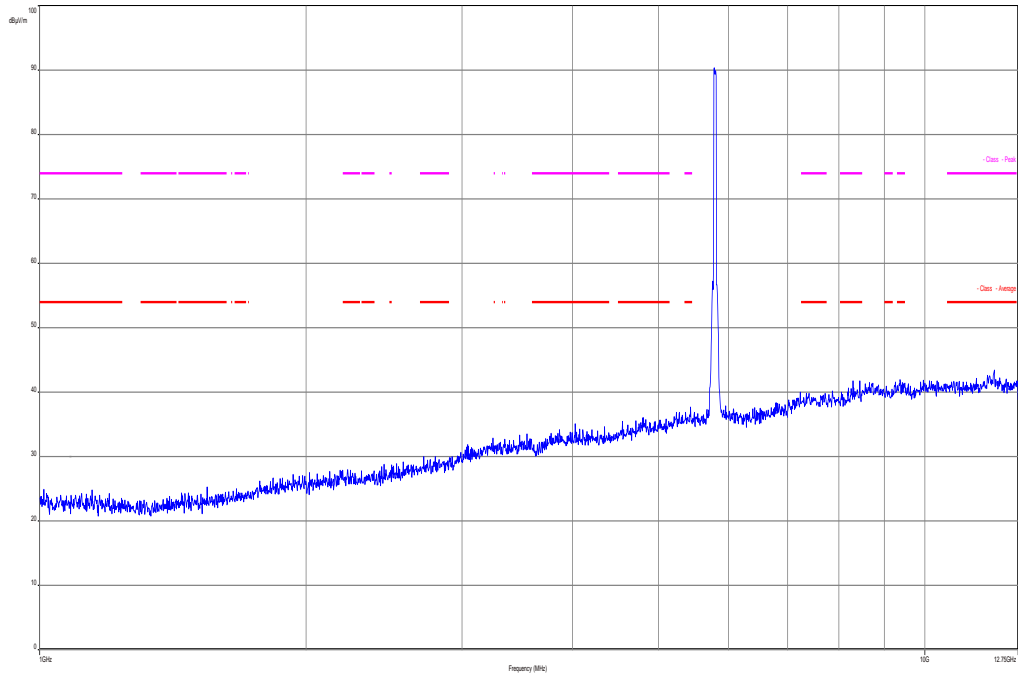
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



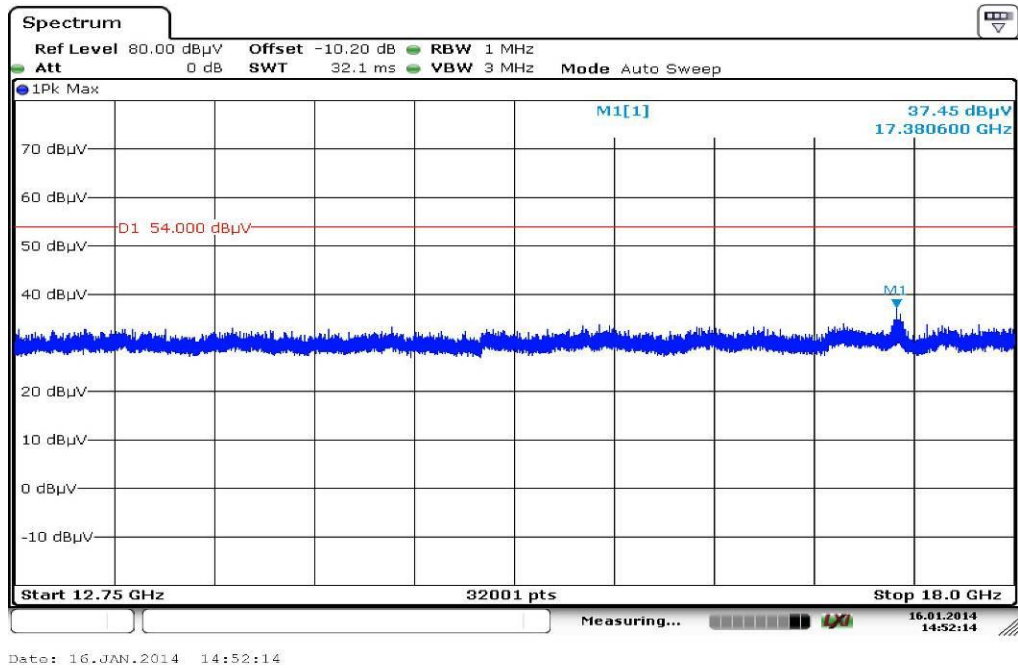
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
32.335650	10.0	1000.0	120.000	153.0	V	87.0	12.8	20.0	30.0	
45.495300	10.5	1000.0	120.000	170.0	H	10.0	13.3	19.5	30.0	
58.584000	8.3	1000.0	120.000	170.0	V	190.0	12.0	21.7	30.0	
715.869450	20.4	1000.0	120.000	170.0	V	280.0	22.9	15.6	36.0	
795.198000	21.1	1000.0	120.000	170.0	V	260.0	23.8	14.9	36.0	
871.237350	22.4	1000.0	120.000	170.0	H	280.0	24.8	13.6	36.0	

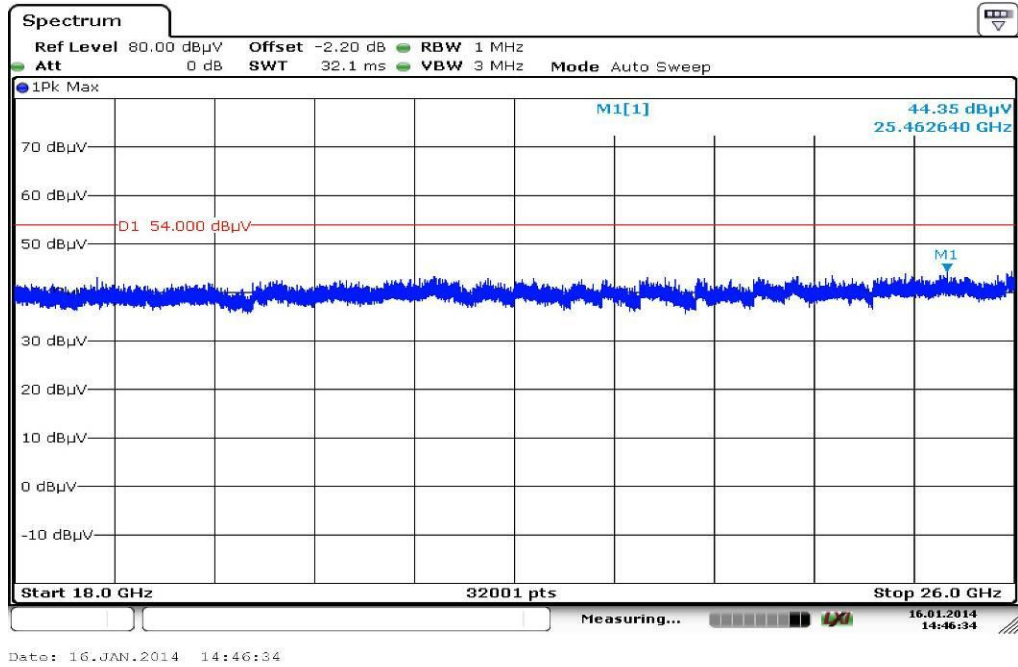
Plot 7: Highest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization



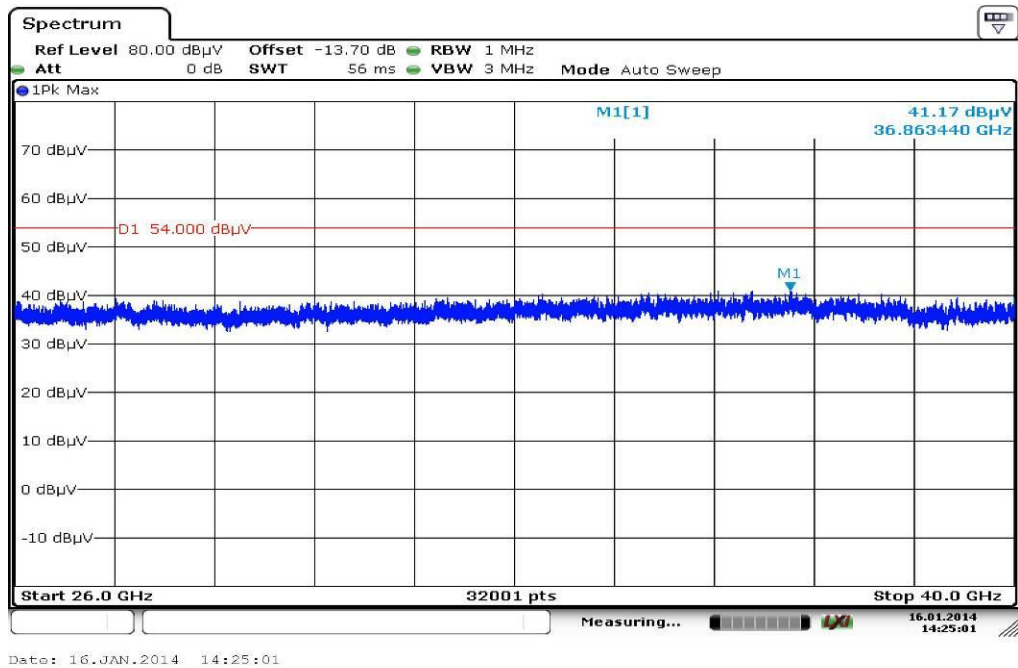
Plot 8: Highest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Plot 9: Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Plot 10: Highest channel, 26 GHz to 40 GHz, vertical & horizontal polarization



Plots: OFDM / ac – mode HT80

Plot 1: 30 MHz to 1 GHz, vertical & horizontal polarization

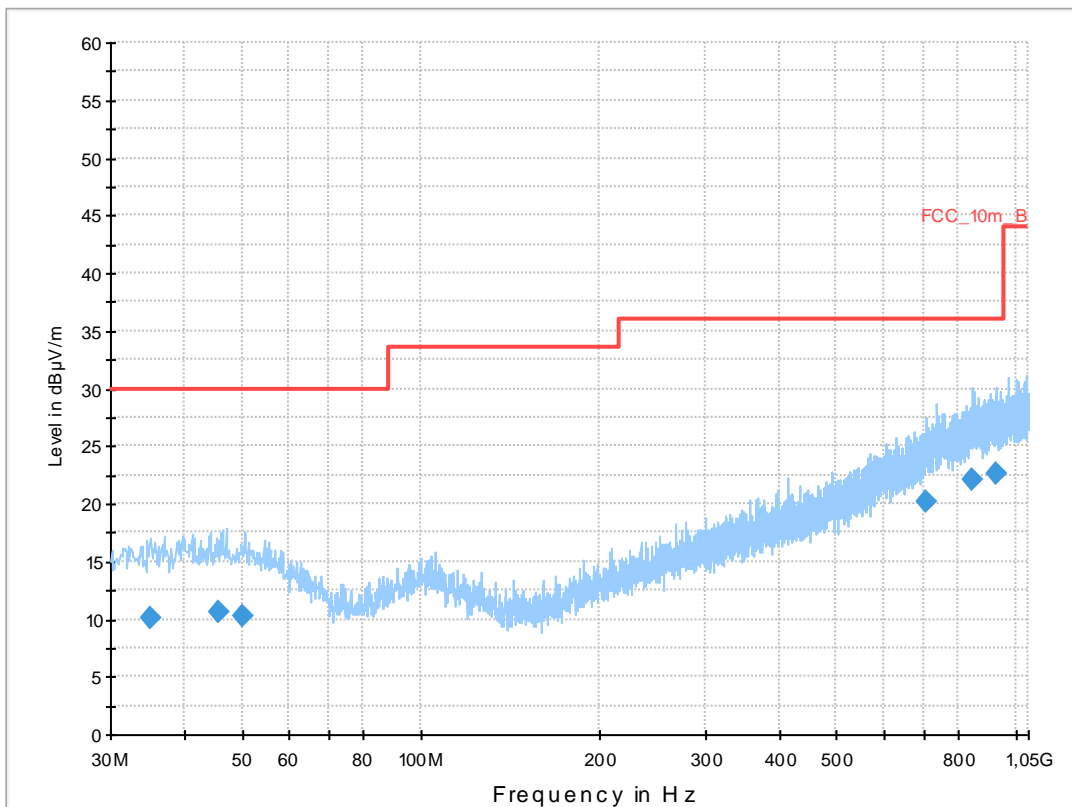
Common Information

EUT: PM-0744-BV
 Serial Number: CB5A1W45MZ
 Test Description: FCC part 15 C class B @ 10 m
 Operating Conditions: WLAN ac-mode (HT80) CH 155
 Operator Name: Hennemann
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Receiver: [ESC1 3]
 Level Unit: dBµV/m

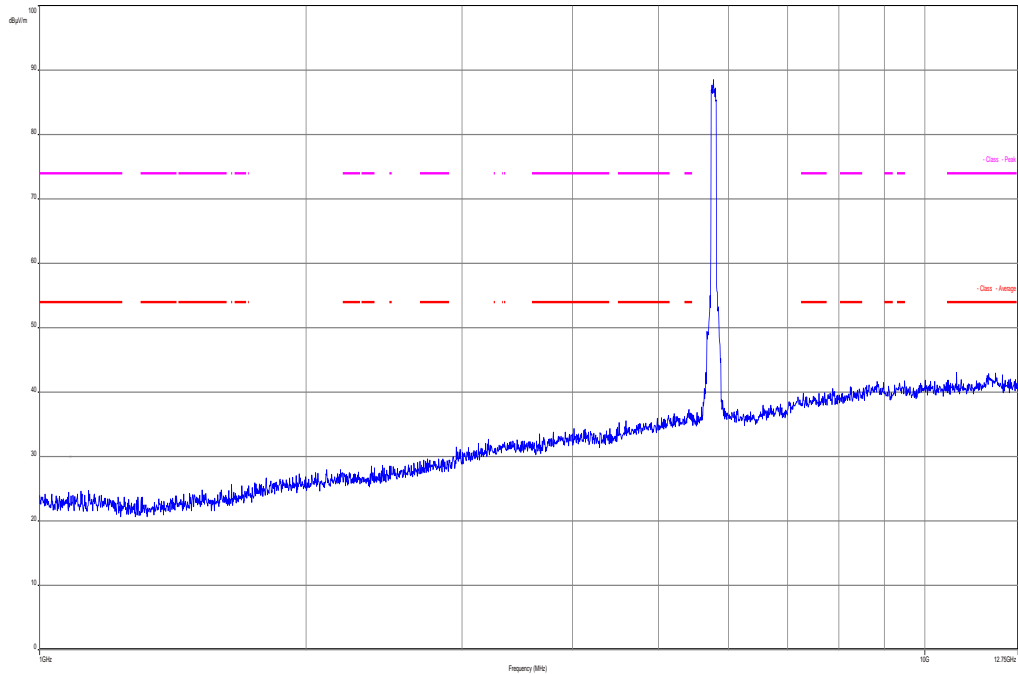
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



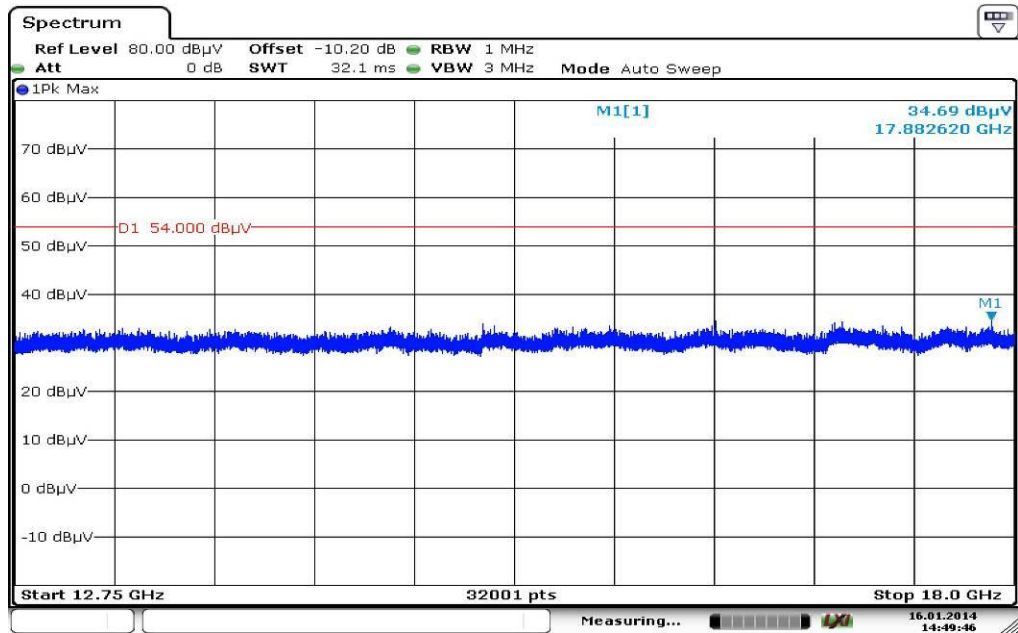
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
34.923750	10.1	1000.0	120.000	132.0	H	100.0	13.0	19.9	30.0	
45.677550	10.6	1000.0	120.000	143.0	H	175.0	13.3	19.4	30.0	
50.077350	10.3	1000.0	120.000	170.0	H	81.0	13.4	19.7	30.0	
708.058650	20.2	1000.0	120.000	104.0	V	-2.0	22.7	15.8	36.0	
845.422800	22.0	1000.0	120.000	98.0	H	180.0	24.5	14.0	36.0	
923.783100	22.6	1000.0	120.000	170.0	H	182.0	25.3	13.4	36.0	

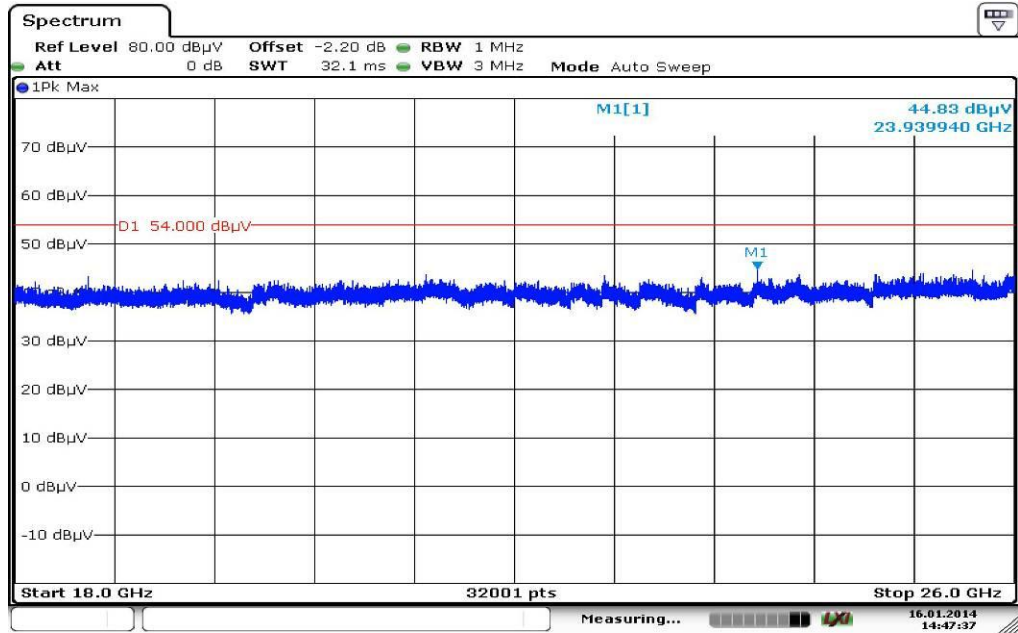
Plot 2: 1 GHz to 12.75 GHz, vertical & horizontal polarization



Plot 3: 12.75 GHz to 18 GHz, vertical & horizontal polarization

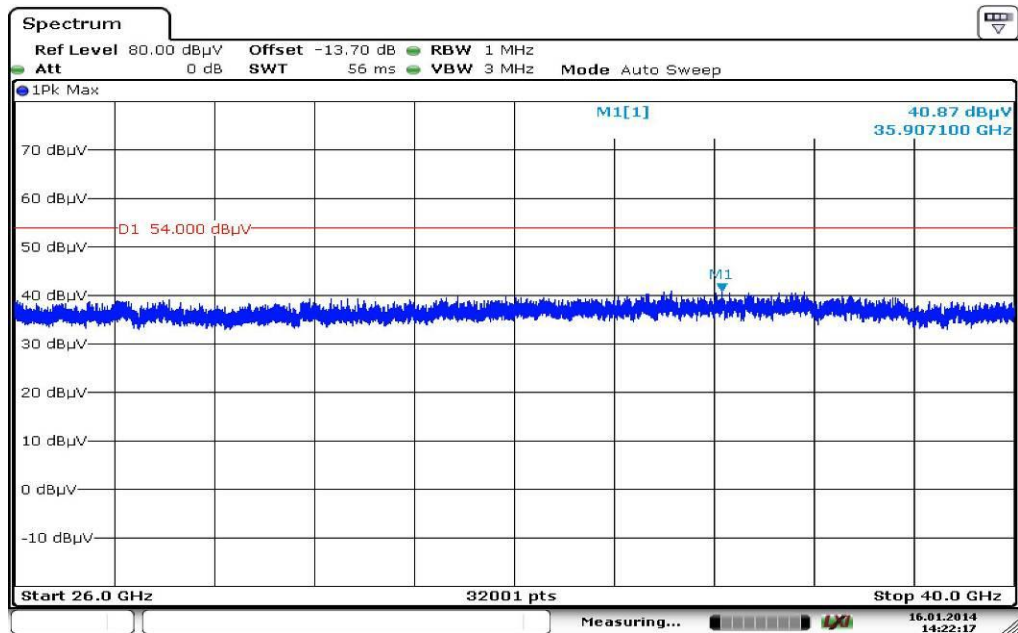


Plot 4: 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 16.JAN.2014 14:47:36

Plot 5: 26 GHz to 40 GHz, vertical & horizontal polarization



Date: 16.JAN.2014 14:22:17

10.2 RX spurious emissions radiated

Description:

Measurement of the radiated spurious emissions in idle/receive mode. The results are valid for both modes.

Measurement:

Measurement parameter	
Detector:	Peak / Quasi Peak / RMS
Sweep time:	Auto
Resolution bandwidth:	F > 1 GHz: 1 MHz F < 1 GHz: 100 kHz
Video bandwidth:	3 x RBW Remeasurement: 10 Hz / 3 MHz
Span:	30 MHz to 25 GHz
Trace-Mode:	Max Hold

Limits:

FCC		IC
RX Spurious Emissions Radiated		
Frequency (MHz)	Field Strength (dB μ V/m)	Measurement distance
30 - 88	30.0	10
88 – 216	33.5	10
216 – 960	36.0	10
Above 960	54.0	3

Results:

RX Spurious Emissions Radiated [dB μ V/m]		
F [MHz]	Detector	Level [dB μ V/m]
For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.		
Measurement uncertainty	± 3 dB	

Result: **Passed.**

Note: The limit was recalculated with 20 dB / decade (Part 15.31) for all radiated spurious emissions 30 MHz to 1 GHz from 3 meter limit to a 10 meter distance. (40dB/decade for emissions < 30MHz)

Plots: RX / Idle – mode

Plot 1: 30 MHz to 1 GHz, vertical & horizontal polarization

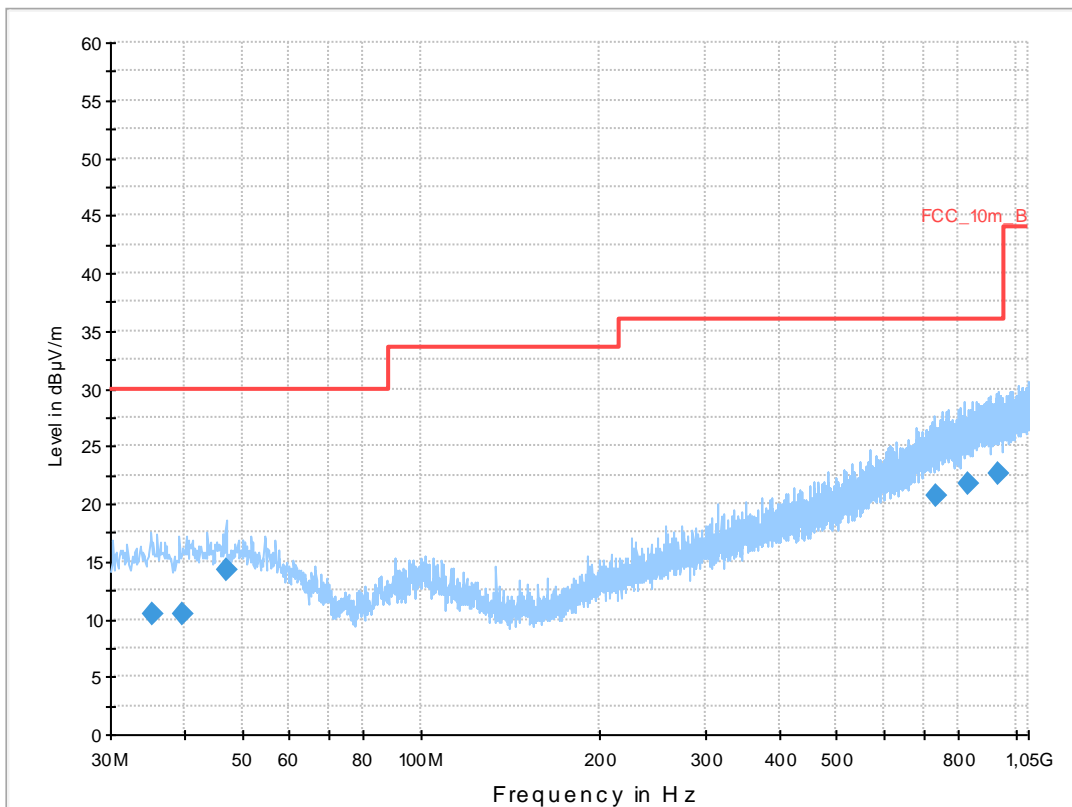
Common Information

EUT: PM-0744-BV
 Serial Number: CB5A1W45MZ
 Test Description: FCC part 15 class B @ 10 m
 Operating Conditions: WLAN RX
 Operator Name: Hennemann
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Receiver: [ESC1 3]
 Level Unit: dBµV/m

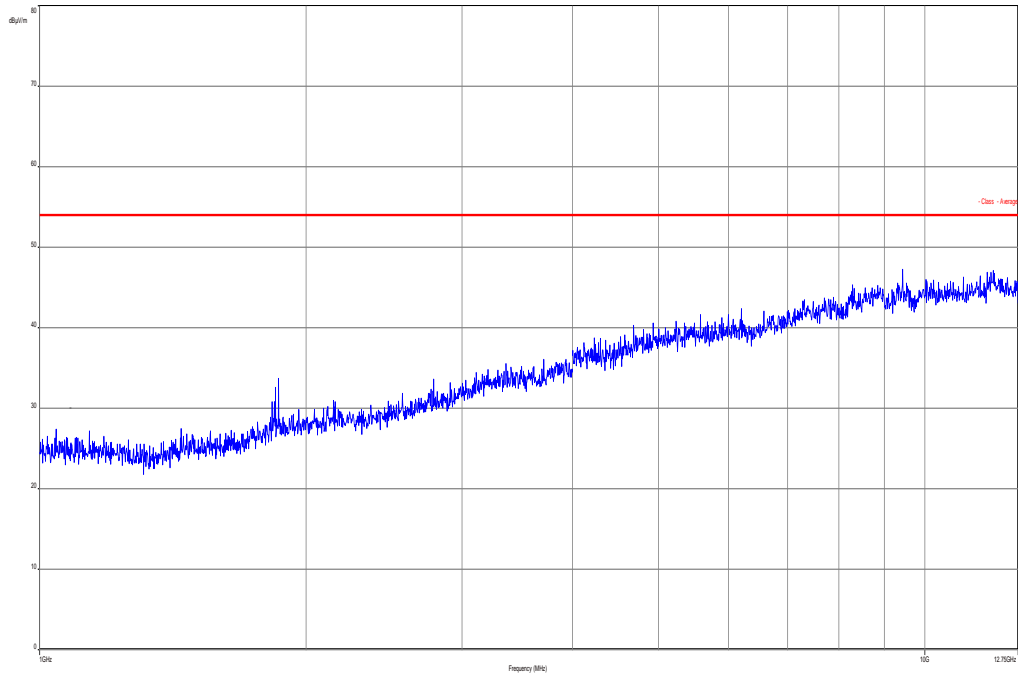
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



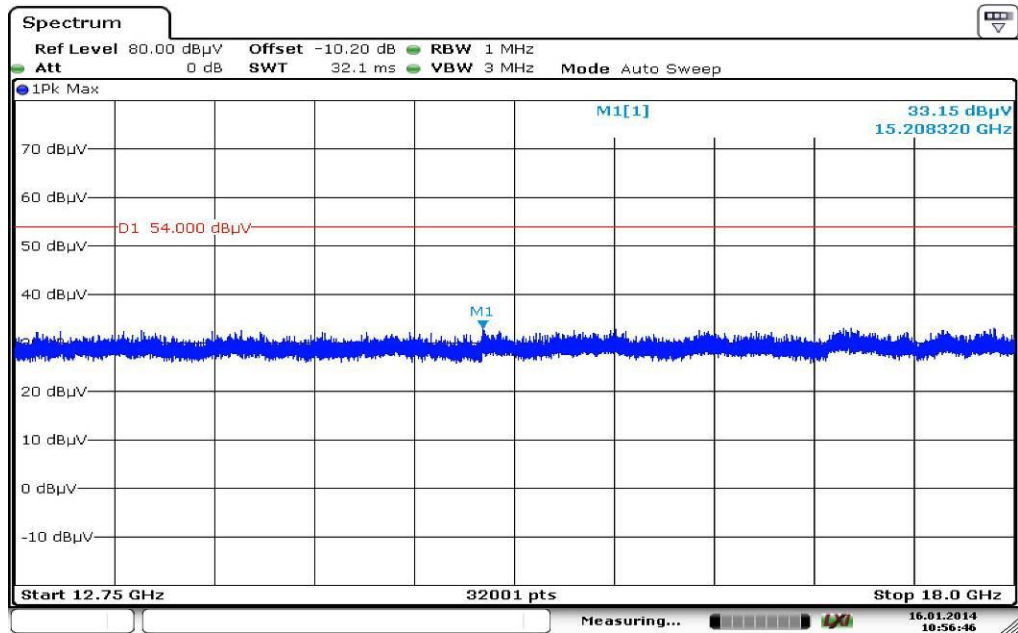
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
35.435700	10.5	1000.0	120.000	170.0	H	-10.0	13.1	19.5	30.0	
39.682050	10.4	1000.0	120.000	98.0	H	2.0	13.4	19.6	30.0	
47.017050	14.3	1000.0	120.000	104.0	V	88.0	13.3	15.7	30.0	
731.994150	20.7	1000.0	120.000	170.0	V	10.0	23.2	15.3	36.0	
831.397500	21.8	1000.0	120.000	170.0	H	10.0	24.3	14.2	36.0	
934.410750	22.6	1000.0	120.000	161.0	V	190.0	25.3	13.4	36.0	

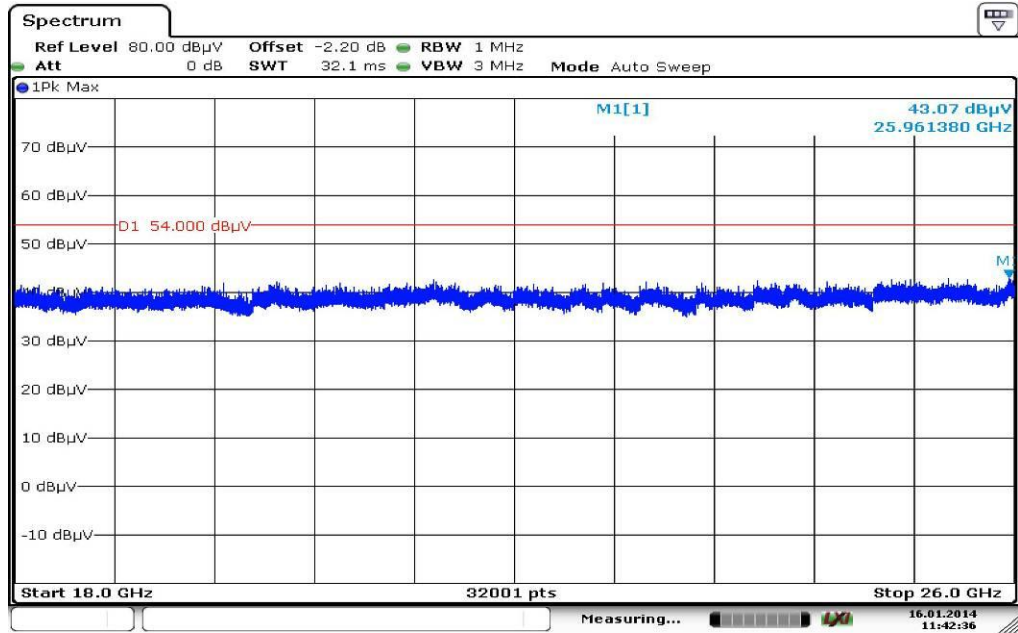
Plot 2: 1 GHz to 12.75 GHz, vertical & horizontal polarization



Plot 3: 12.75 GHz to 18 GHz, vertical & horizontal polarization

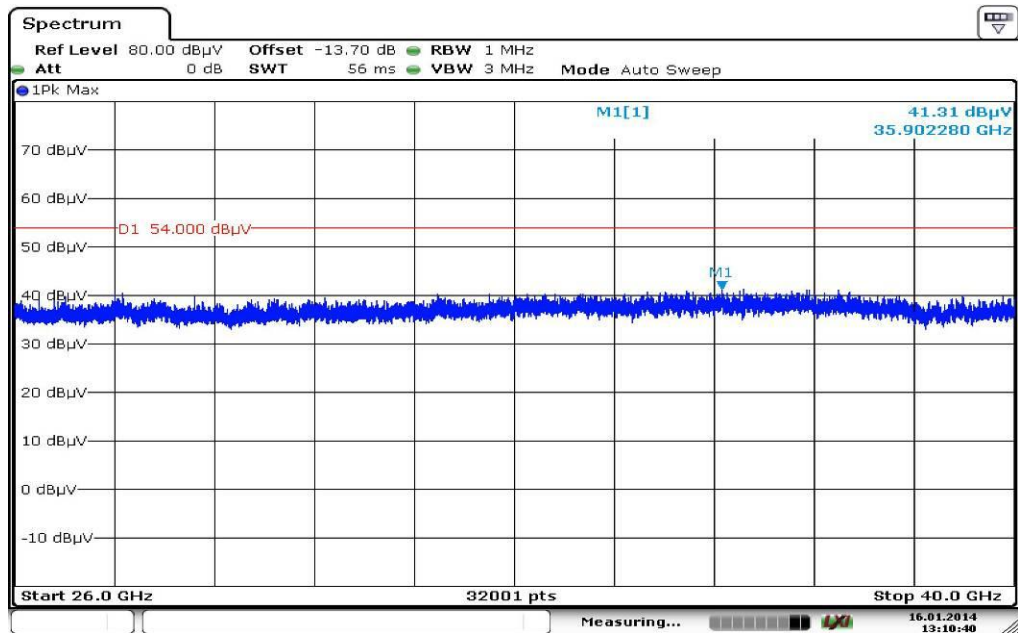


Plot 4: 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 16.JAN.2014 11:42:36

Plot 5: 26 GHz to 40 GHz, vertical & horizontal polarization



Date: 16.JAN.2014 13:10:40

10.3 Spurious emissions radiated < 30 MHz

Description:

Measurement of the radiated spurious emissions in transmit mode below 30 MHz. The EUT is set to mid channel. This measurement is representative for all channels and modes. If peaks are found the lowest channel and the highest channel will be measured too. The measurement is performed with the data rate producing the highest output power. The limits are recalculated to a measurement distance of 3 m with 40 dB/decade according CFR Part 2.

Measurement:

Measurement parameter	
Detector:	Peak / Quasi Peak
Sweep time:	Auto
Video bandwidth:	F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz
Resolution bandwidth:	F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz
Span:	9 kHz to 30 MHz
Trace-Mode:	Max Hold

Limits:

FCC		IC
TX Spurious Emissions Radiated < 30 MHz		
Frequency (MHz)	Field Strength (dBµV/m)	Measurement distance
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30

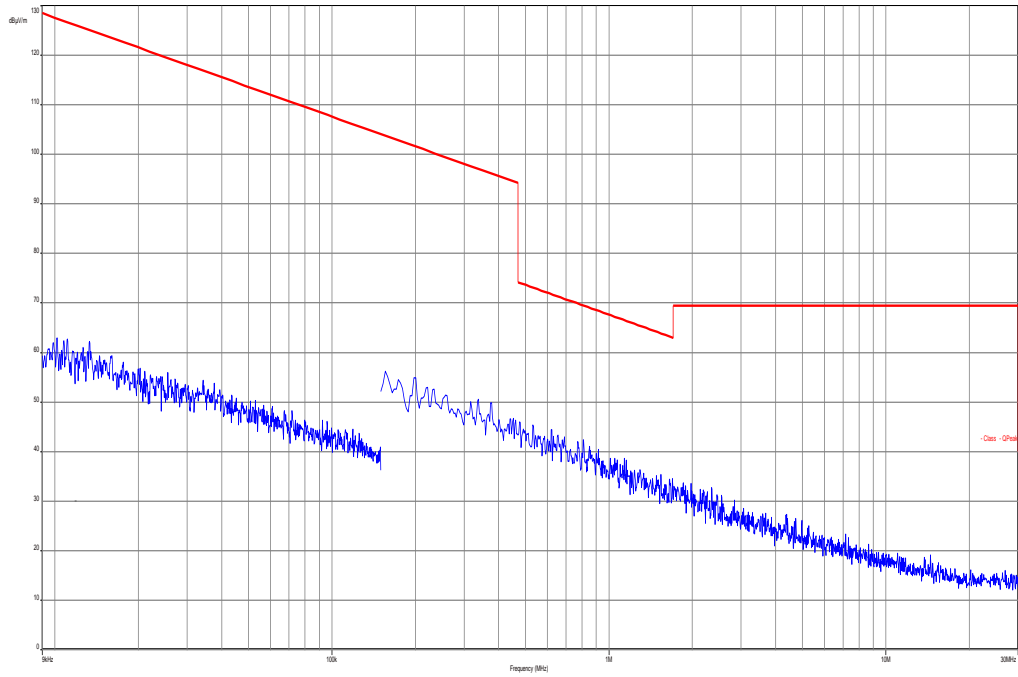
Results:

TX Spurious Emissions Radiated < 30 MHz [dBµV/m]		
F [MHz]	Detector	Level [dBµV/m]
No peaks detected.		
Measurement uncertainty	± 3 dB	

Result: Passed

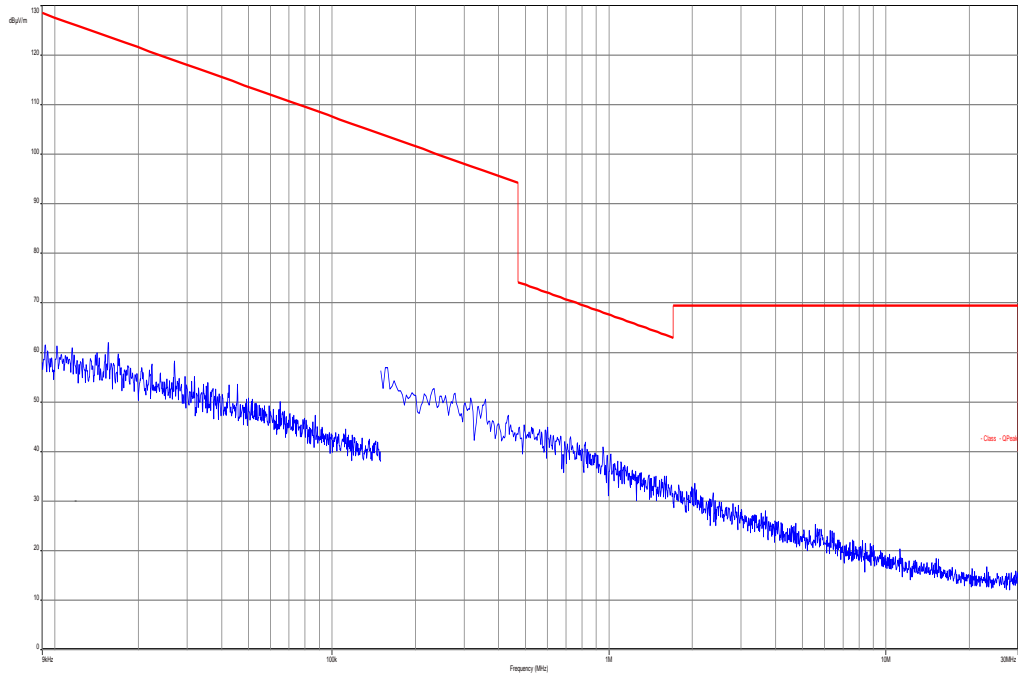
Plots: TX mode

Plot 1: 9 kHz to 30 MHz



Plots: RX / Idle – mode

Plot 1: 9 kHz to 30 MHz



10.4 Spurious emissions conducted < 30 MHz

Description:

Measurement of the conducted spurious emissions in transmit mode below 30 MHz. The EUT is set to mid channel. If peaks are found the lowest channel and the highest channel will be measured too. The measurement is performed with the data rate producing the highest output power. Both power lines, phase and neutral line, are measured. Found peaks are re-measured with average and quasi peak detection to show compliance to the limits.

Measurement:

Measurement parameter	
Detector:	Peak - Quasi Peak / Average
Sweep time:	Auto
Video bandwidth:	F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz
Resolution bandwidth:	F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz
Span:	9 kHz to 30 MHz
Trace-Mode:	Max Hold

Limits:

FCC		IC	
TX Spurious Emissions Conducted < 30 MHz			
Frequency (MHz)	Quasi-Peak (dB μ V/m)	Average (dB μ V/m)	
0.15 – 0.5	66 to 56*	56 to 46*	
0.5 – 5	56	46	
5 – 30.0	60	50	

*Decreases with the logarithm of the frequency

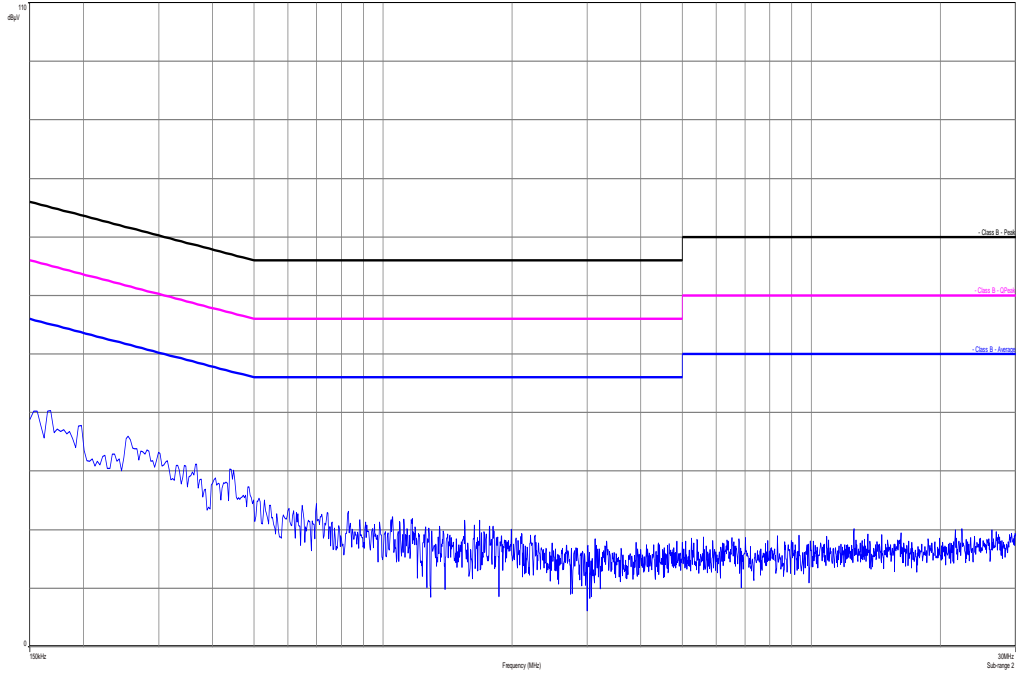
Results:

TX Spurious Emissions Conducted < 30 MHz [dB μ V/m]		
F [MHz]	Detector	Level [dB μ V/m]
No peaks detected. All detected peak values are below the average limits.		
Measurement uncertainty	± 3 dB	

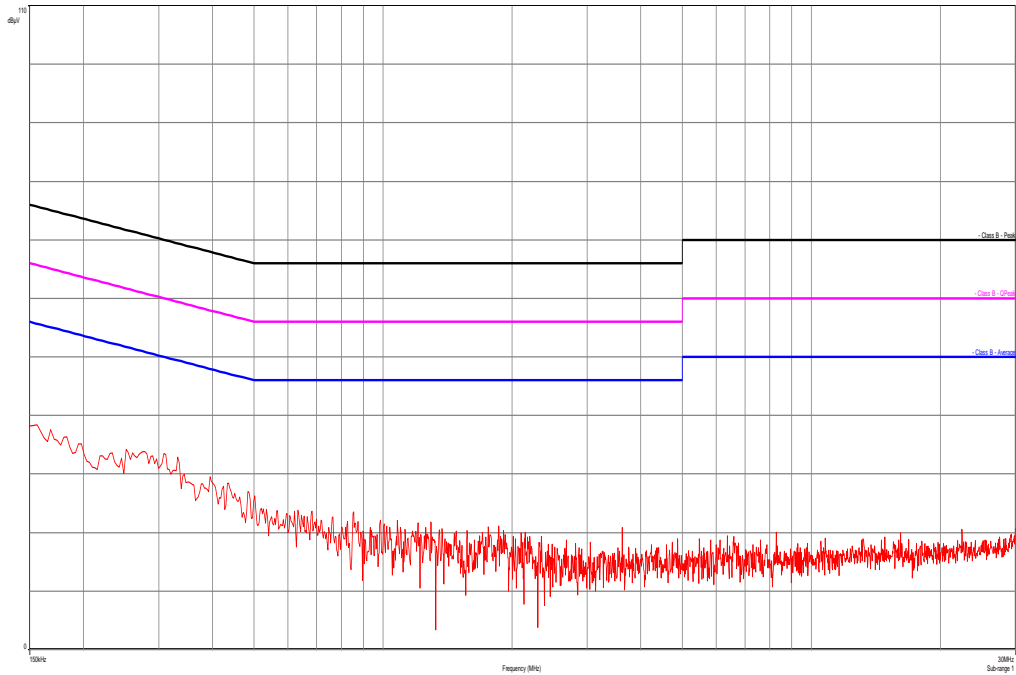
Result: Passed

Plots:

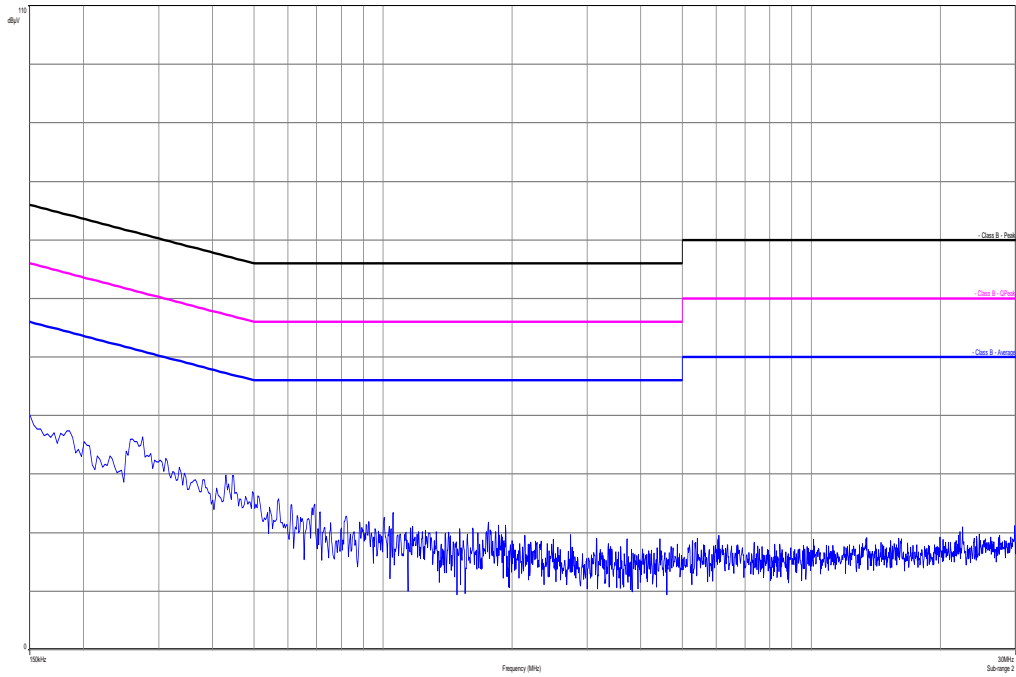
Plot 1: TX mode, 150 kHz to 30 MHz, phase line



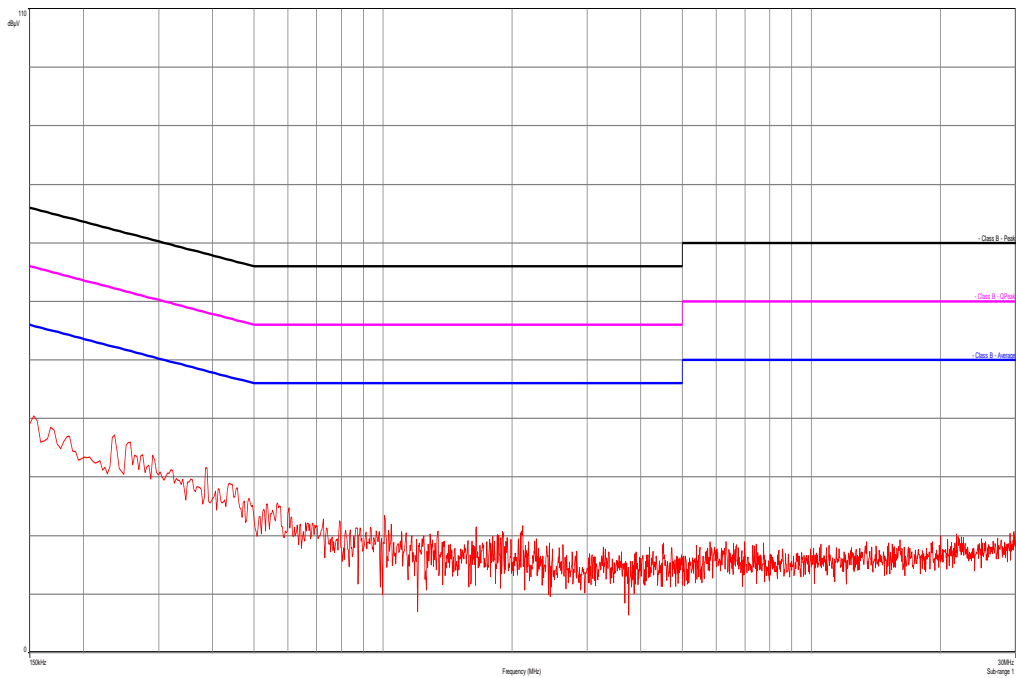
Plot 2: TX mode, 150 kHz to 30 MHz, neutral line



Plot 3: RX / Idle – mode, 150 kHz to 30 MHz, phase line



Plot 4: RX / Idle – mode, 150 kHz to 30 MHz, neutral line



11 Test equipment and ancillaries used for tests

Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, rf-generating and signalling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Labor/Item).

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	45	Switch-Unit	3488A	HP Meßtechnik	2719A14505	300000368	g		
2	50	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04466	300000580	ne		
3	n. a.	software	SPS_PHE 1.4f	Spitzberger & Spieß	B5981; 5D1081;B597 9	300000210	ne		
4	n. a.	EMI Test Receiver	ESCI 3	R&S	100083	300003312	k	09.01.2013	09.01.2014
5	n. a.	Analyzer- Reference- System (Harmonics and Flicker)	ARS 16/1	SPS	A3509 07/0 0205	300003314	Ve	14.07.2011	14.01.2014
6	n. a.	Amplifier	JS42- 00502650- 28-5A	MITEQ	1084532	300003379	ev		
7	n. a.	Antenna Tower	Model 2175	ETS- LINDGREN	64762	300003745	izw		
8	n. a.	Positioning Controller	Model 2090	ETS- LINDGREN	64672	300003746	izw		
9	n. a.	Turntable Interface-Box	Model 105637	ETS- LINDGREN	44583	300003747	izw		
10	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbe ck	295	300003787	k	12.04.2012	12.04.2014
11	n. a.	Spectrum- Analyzer	FSU26	R&S	200809	300003874	k	16.01.2013	16.01.2014
12	n. a.	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2818A03450	300001040	Ve	12.01.2012	12.01.2015
13	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vIKI!	08.05.2013	08.05.2015
14	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev		
15	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	*	300000199	ne		
16	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	2719A15013	300001156	ne		
17	9	Isolating Transformer	MPL IEC625 Bus Regeltrennt ravo	Erfi	91350	300001155	ne		
18	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
19	90	Active Loop Antenna 10 kHz to 30 MHz	6502	Kontron Psychotech	8905-2342	300000256	k	13.06.2013	13.06.2015
20	n. a.	Amplifier	js42- 00502650- 28-5a	Parzich GMBH	928979	300003143	ne		
21	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbe ck	371	300003854	vIKI!	14.10.2011	14.10.2014

22	n. a.	MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405	k	21.02.2013	21.02.2014
23	11b	Microwave System Amplifier, 0.5-26.5 GHz	83017A	HP Meßtechnik	00419	300002268	ev		
24	A026	Std. Gain Horn Antenna 12.4 to 18.0 GHz	639	Narda	8402	300000787	k	22.07.2013	22.07.2015
25	A029	Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda	8205	300002442	k	19.07.2013	19.07.2015
26	n. a.	Spectrum Analyzer 20 Hz - 50 GHz	FSU50	R&S	200012	300003443	Ve	09.10.2012	09.10.2014
27	n. a.	Broadband Low Noise Amplifier 18-50 GHz	CBL18503 070-XX	CERNEX	19338	300004273	ne		
28	n. a.	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517	k	22.10.2012	22.01.2014

Agenda: Kind of Calibration

k	calibration / calibrated	EK	limited calibration
ne	not required (k, ev, izw, zw not required)	zw	cyclical maintenance (external cyclical maintenance)
ev	periodic self verification	izw	internal cyclical maintenance
Ve	long-term stability recognized	g	blocked for accredited testing
vlk!	Attention: extended calibration interval	*	next calibration ordered / currently in progress
NK!	Attention: not calibrated		

12 Observations

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

Annex A Document history

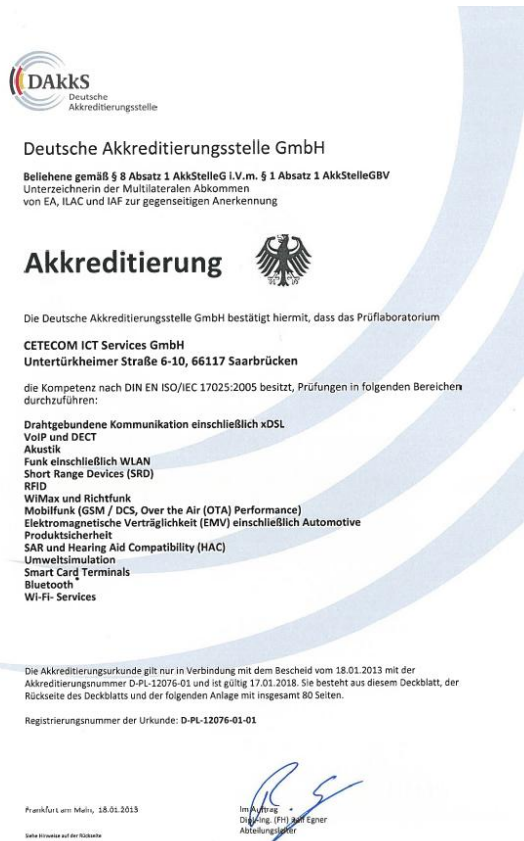
Version	Applied changes	Date of release
1.0	Initial release	2014-01-27

Annex B Further information**Glossary**

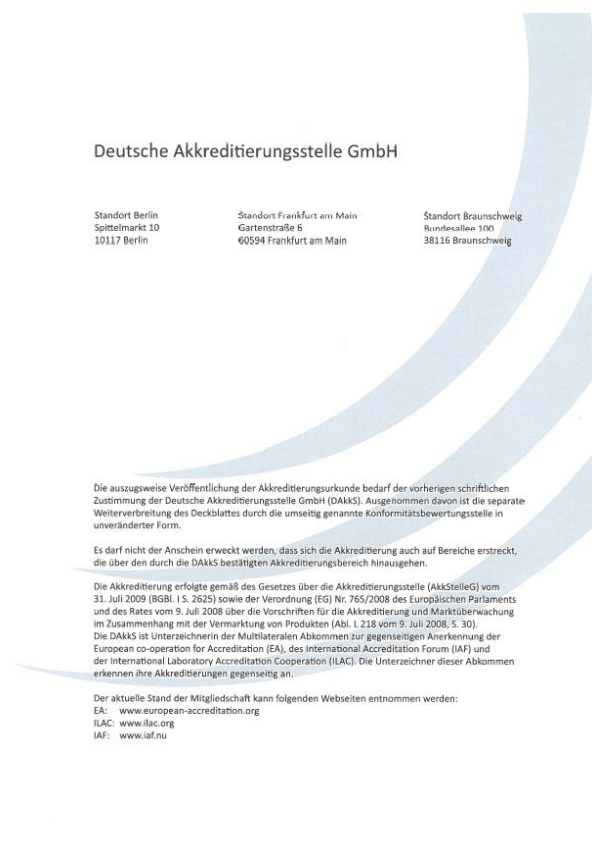
AVG	-	Average
DUT	-	Device under test
EMC	-	Electromagnetic Compatibility
EN	-	European Standard
EUT	-	Equipment under test
ETSI	-	European Telecommunications Standard Institute
FCC	-	Federal Communication Commission
FCC ID	-	Company Identifier at FCC
HW	-	Hardware
IC	-	Industry Canada
Inv. No.	-	Inventory number
N/A	-	Not applicable
PP	-	Positive peak
QP	-	Quasi peak
S/N	-	Serial number
SW	-	Software

Annex C Accreditation Certificate

Front side of certificate



Back side of certificate



Note:

The current certificate including annex is published on our website (see link below) or may be received from CETECOM ICT Services on request.

<http://www.cetecom.com/eu/de/cetecom-group/europa/deutschland-saarbruecken/akkreditierungen.html>