Plots: OFDM / ac – mode HT80

Plot 1: 30 MHz to 1 GHz, 5210 MHz, vertical & horizontal polarization

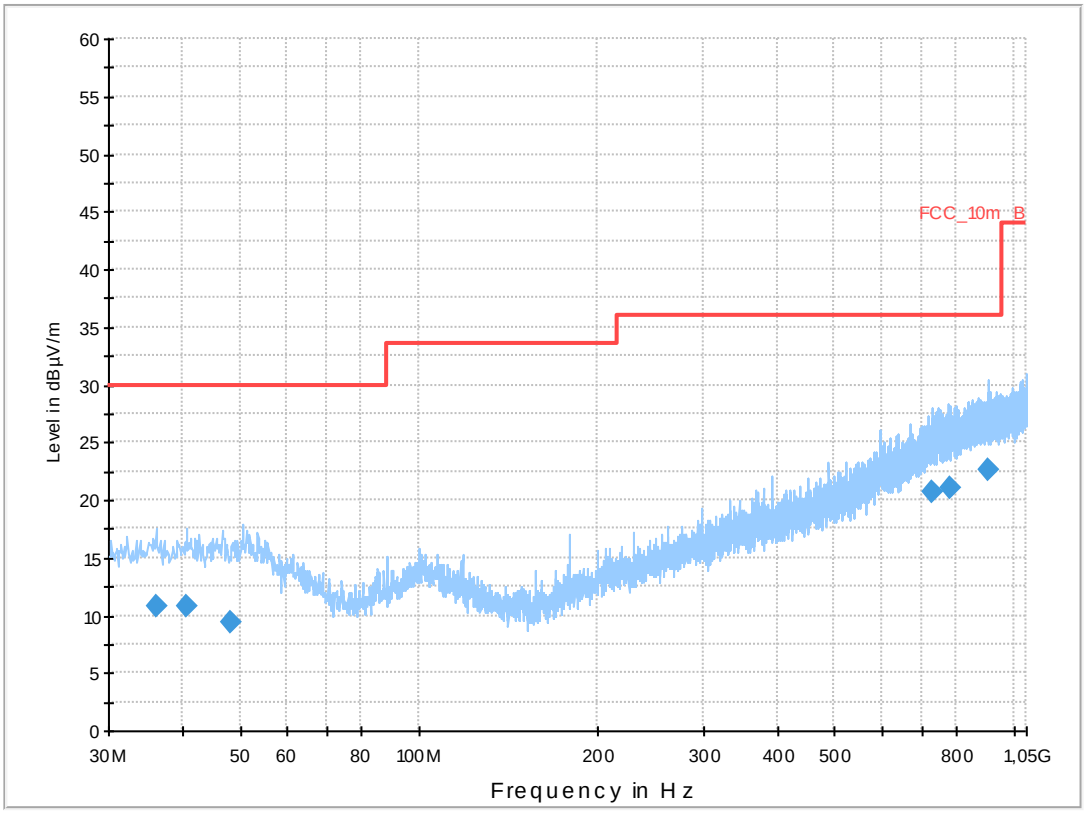
Common Information

EUT:	PM-0744-BV
Serial Number:	CB5A1W45MZ
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	WLAN ac-mode (HT80) CH42
Operator Name:	Hennemann
Comment:	battery powered

Scan Setup: STAN_Fin [EMI radiated]

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

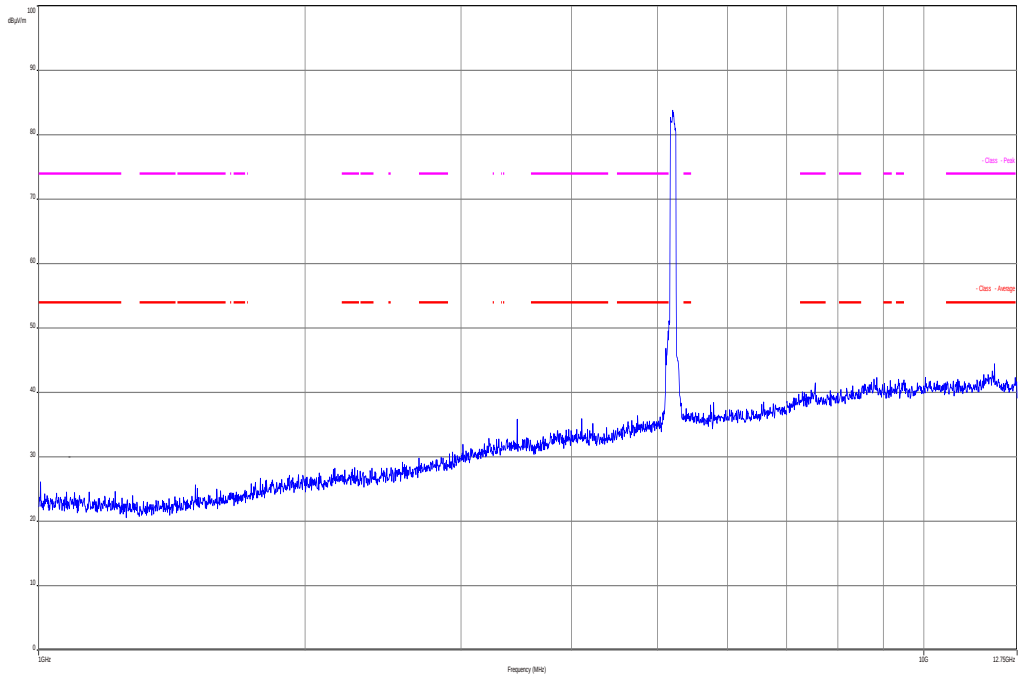
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



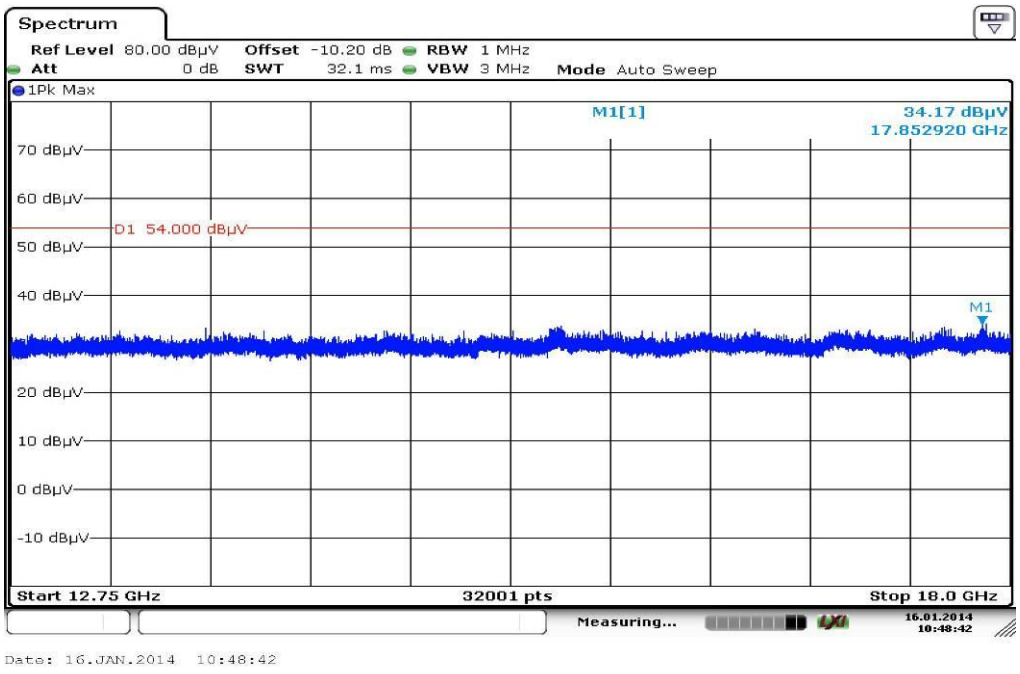
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
36.004350	10.8	1000.0	120.000	170.0	V	0.0	13.1	19.2	30.0	
40.583250	10.8	1000.0	120.000	162.0	H	10.0	13.4	19.2	30.0	
48.216000	9.4	1000.0	120.000	121.0	V	10.0	13.3	20.6	30.0	
729.175200	20.6	1000.0	120.000	170.0	H	-5.0	23.2	15.4	36.0	
781.121100	21.1	1000.0	120.000	143.0	V	280.0	23.7	14.9	36.0	
905.096400	22.6	1000.0	120.000	170.0	H	190.0	25.2	13.4	36.0	

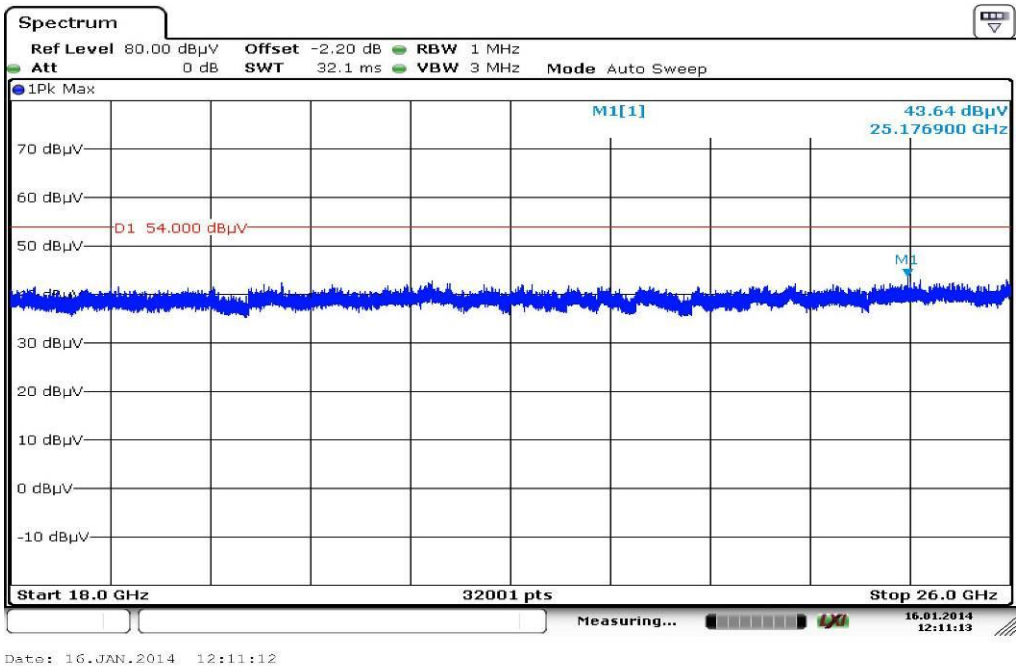
Plot 2: 1 GHz to 12.75 GHz, 5210 MHz, vertical & horizontal polarization



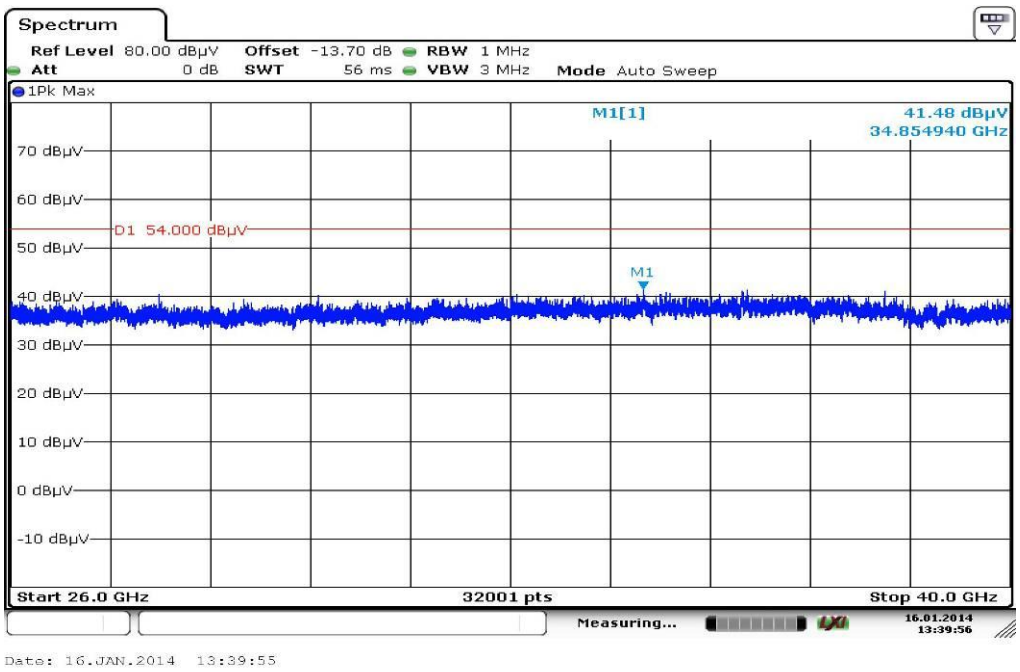
Plot 3: 12.75 GHz to 18 GHz, 5210 MHz, vertical & horizontal polarization



Plot 4: 18 GHz to 26 GHz, 5210 MHz, vertical & horizontal polarization



Plot 5: 26 GHz to 40 GHz, 5210 MHz, vertical & horizontal polarization



Plot 6: 30 MHz to 1 GHz, 5290 MHz, vertical & horizontal polarization

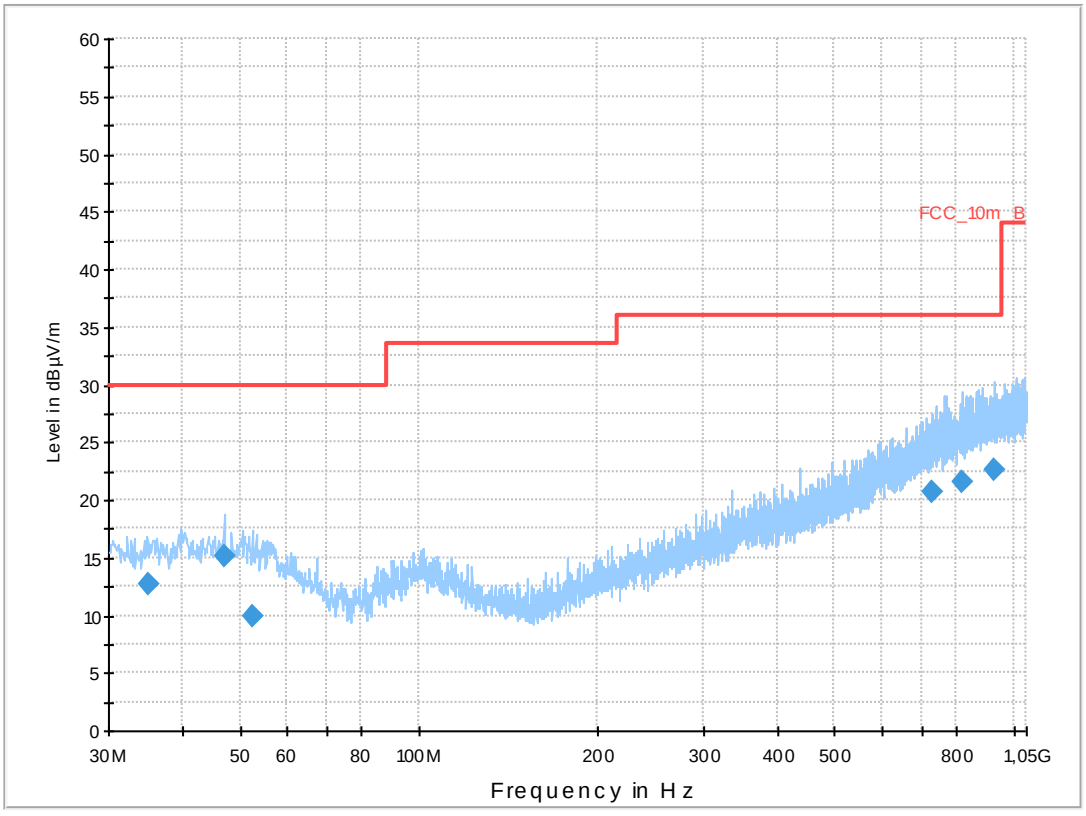
Common Information

EUT:	PM-0744-BV
Serial Number:	CB5A1W45MZ
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	WLAN ac-mode (HT80) CH58
Operator Name:	Hennemann
Comment:	battery powered

Scan Setup: STAN_Fin [EMI radiated]

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

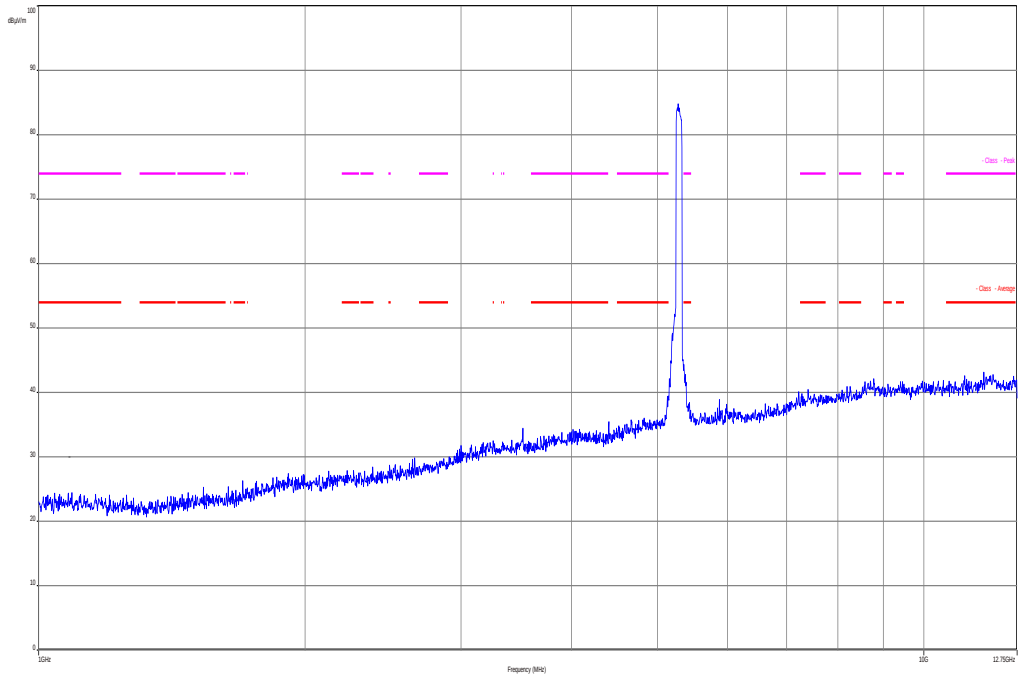
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



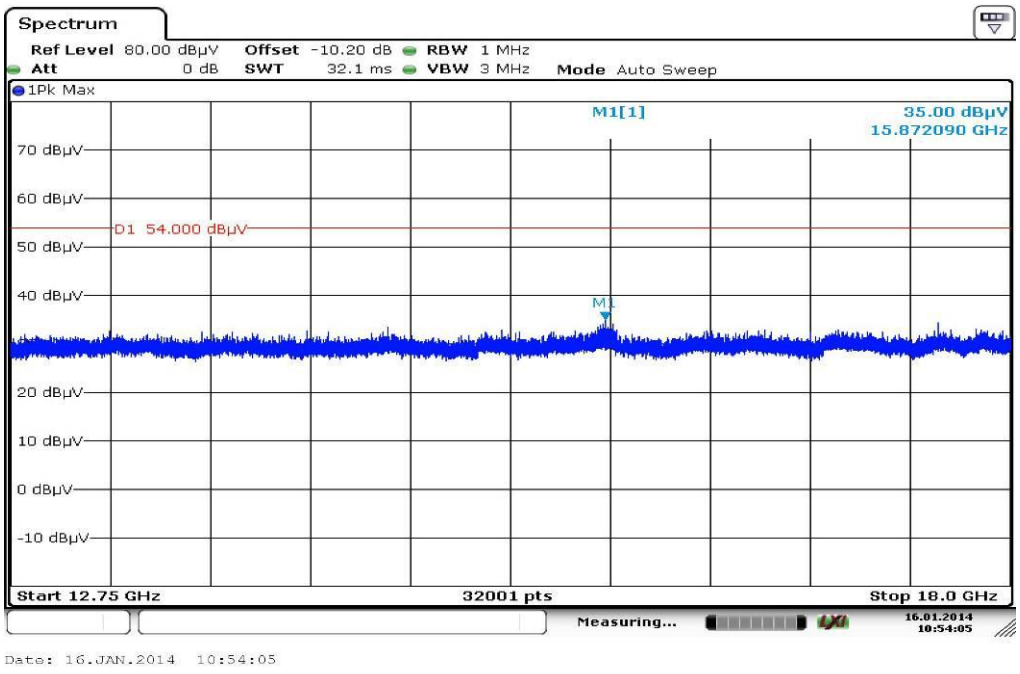
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
35.029050	12.7	1000.0	120.000	121.0	V	267.0	13.0	17.3	30.0	
46.992750	15.1	1000.0	120.000	98.0	V	190.0	13.3	14.9	30.0	
52.485000	9.9	1000.0	120.000	104.0	V	176.0	13.1	20.1	30.0	
727.718400	20.7	1000.0	120.000	105.0	V	2.0	23.1	15.3	36.0	
821.447400	21.6	1000.0	120.000	154.0	H	2.0	24.1	14.4	36.0	
927.125550	22.6	1000.0	120.000	170.0	V	92.0	25.3	13.4	36.0	

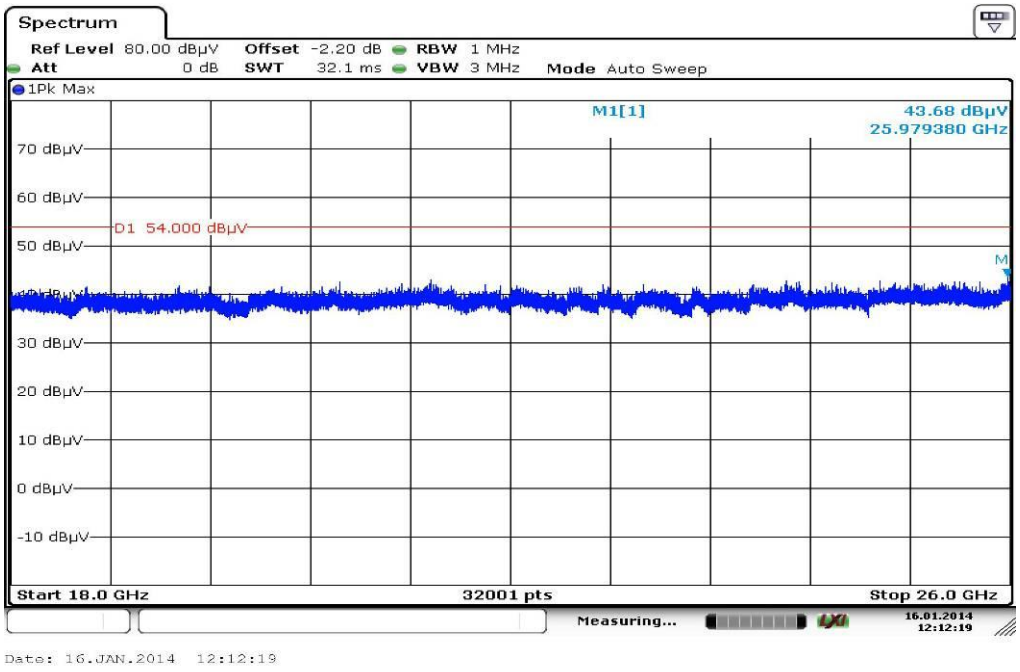
Plot 7: 1 GHz to 12.75 GHz, 5290 MHz, vertical & horizontal polarization



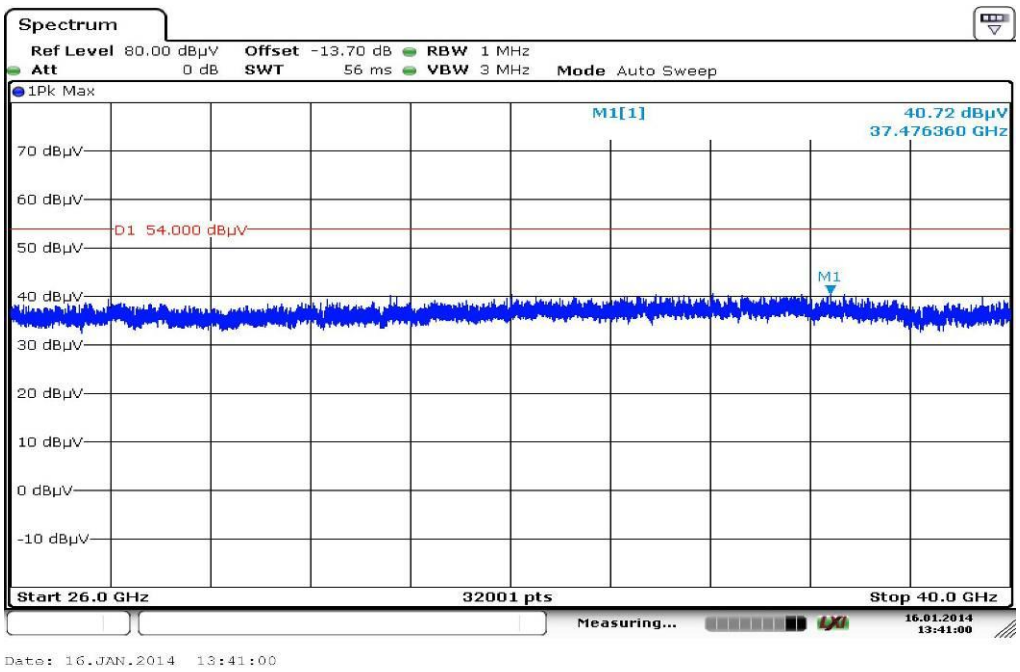
Plot 8: 12.75 GHz to 18 GHz, 5290 MHz, vertical & horizontal polarization



Plot 9: 18 GHz to 26 GHz, 5290 MHz, vertical & horizontal polarization



Plot 10: 26 GHz to 40 GHz, 5290 MHz, vertical & horizontal polarization



Plot 11: 30 MHz to 1 GHz, 5530 MHz, vertical & horizontal polarization

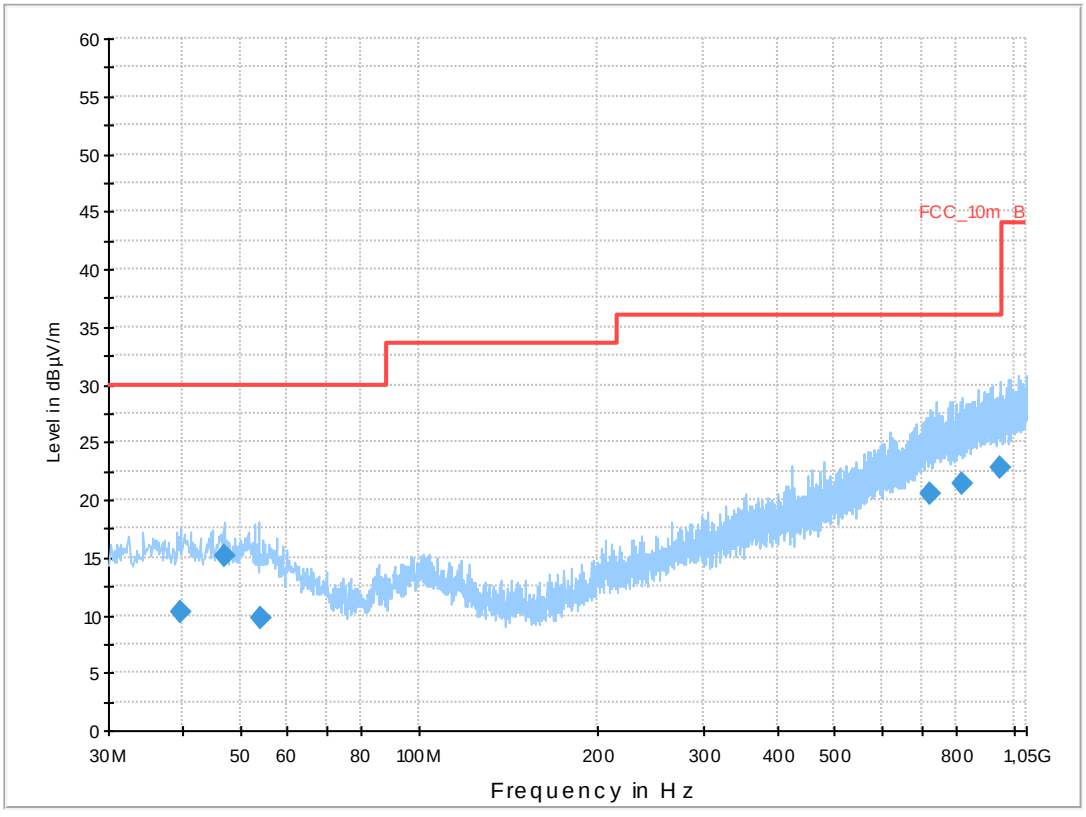
Common Information

EUT:	PM-0744-BV
Serial Number:	CB5A1W45MZ
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	WLAN ac-mode (HT80) CH106
Operator Name:	Hennemann
Comment:	battery powered

Scan Setup: STAN_Fin [EMI radiated]

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

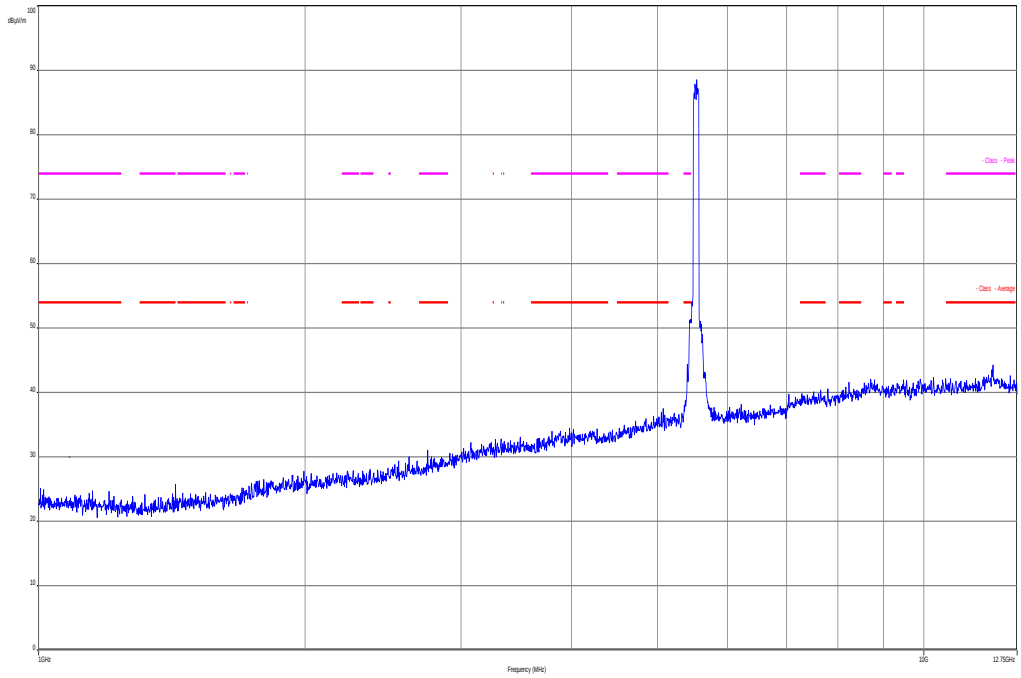
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



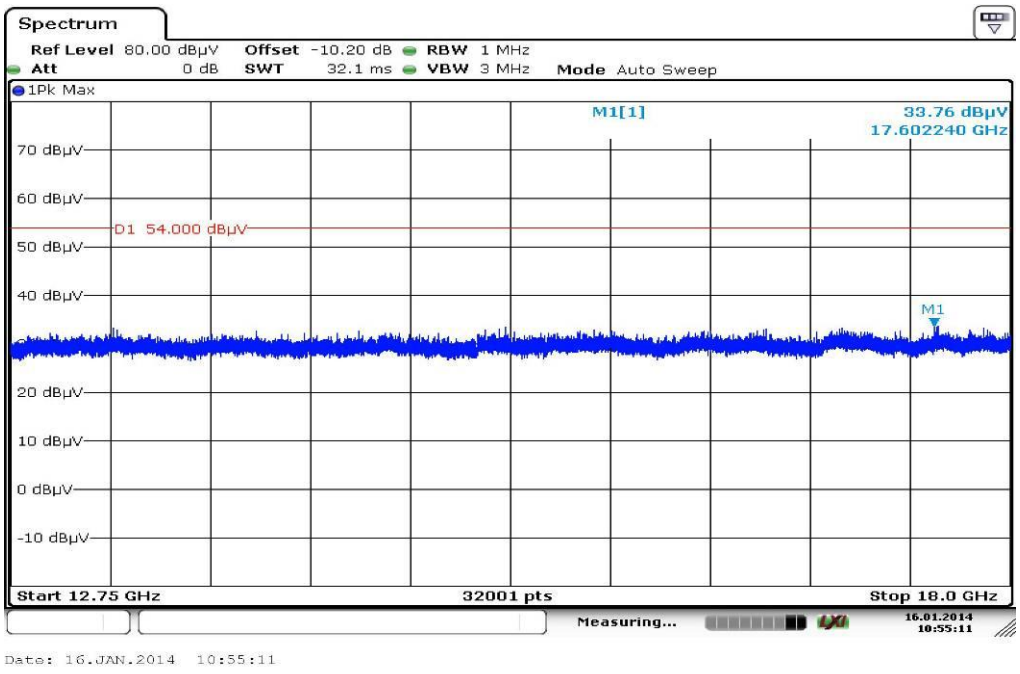
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
39.523950	10.2	1000.0	120.000	170.0	H	182.0	13.4	19.8	30.0	
47.002050	15.1	1000.0	120.000	98.0	V	273.0	13.3	14.9	30.0	
54.155550	9.7	1000.0	120.000	160.0	V	0.0	13.0	20.3	30.0	
723.061500	20.6	1000.0	120.000	170.0	H	280.0	23.0	15.4	36.0	
816.056850	21.4	1000.0	120.000	98.0	V	273.0	24.0	14.6	36.0	
948.074250	22.7	1000.0	120.000	170.0	H	0.0	25.3	13.3	36.0	

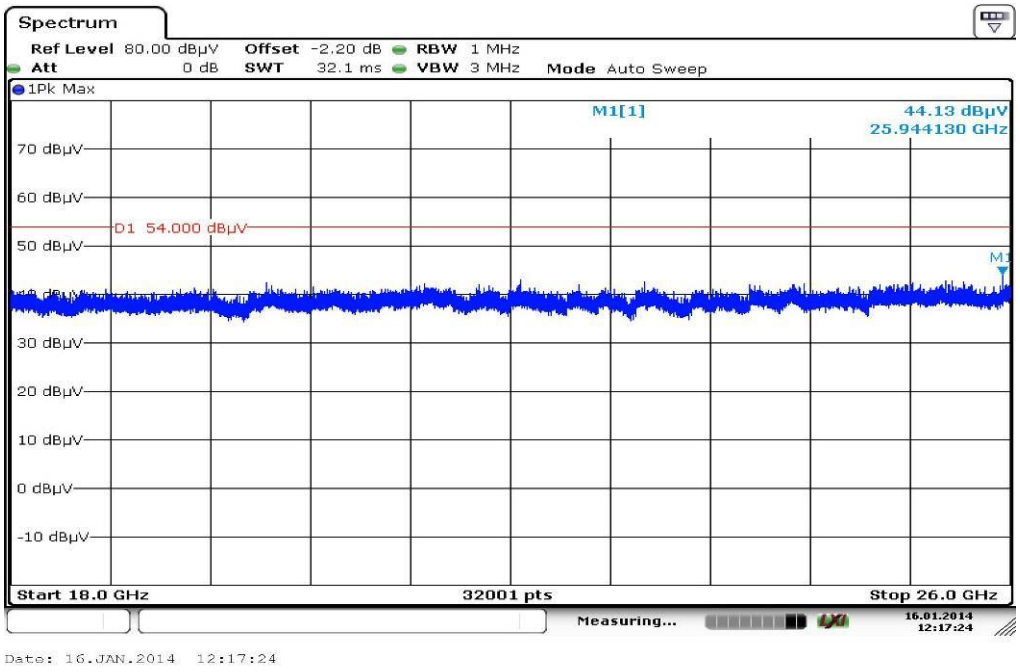
Plot 12: 1 GHz to 12.75 GHz, 5530 MHz, vertical & horizontal polarization



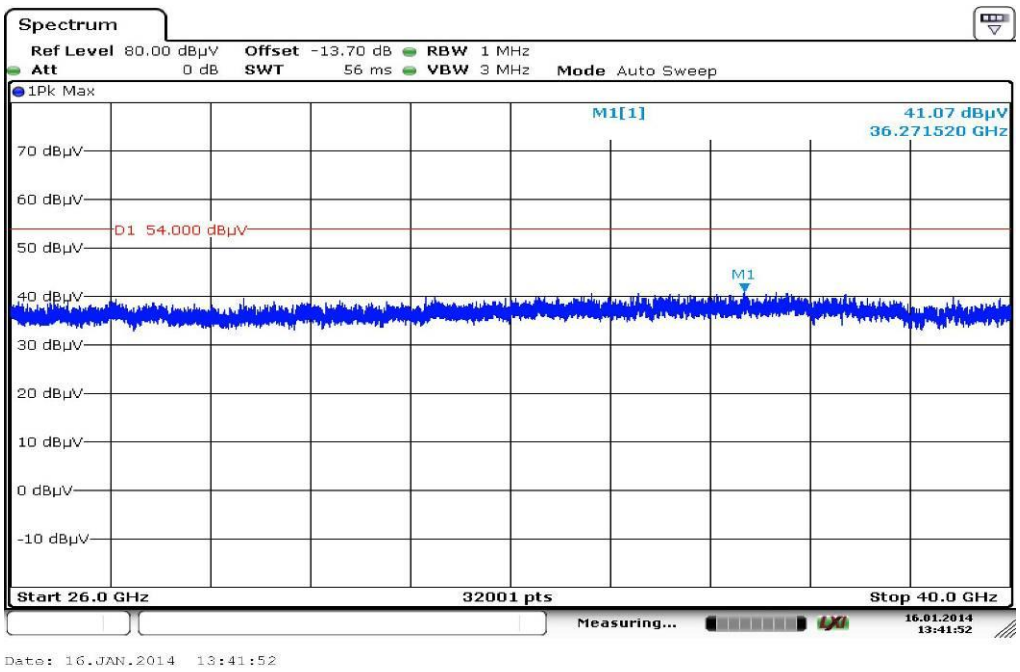
Plot 13: 12.75 GHz to 18 GHz, 5530 MHz, vertical & horizontal polarization



Plot 14: 18 GHz to 26 GHz, 5530 MHz, vertical & horizontal polarization



Plot 15: 26 GHz to 40 GHz, 5530 MHz, vertical & horizontal polarization



Plot 16: 30 MHz to 1 GHz, 5610 MHz, vertical & horizontal polarization

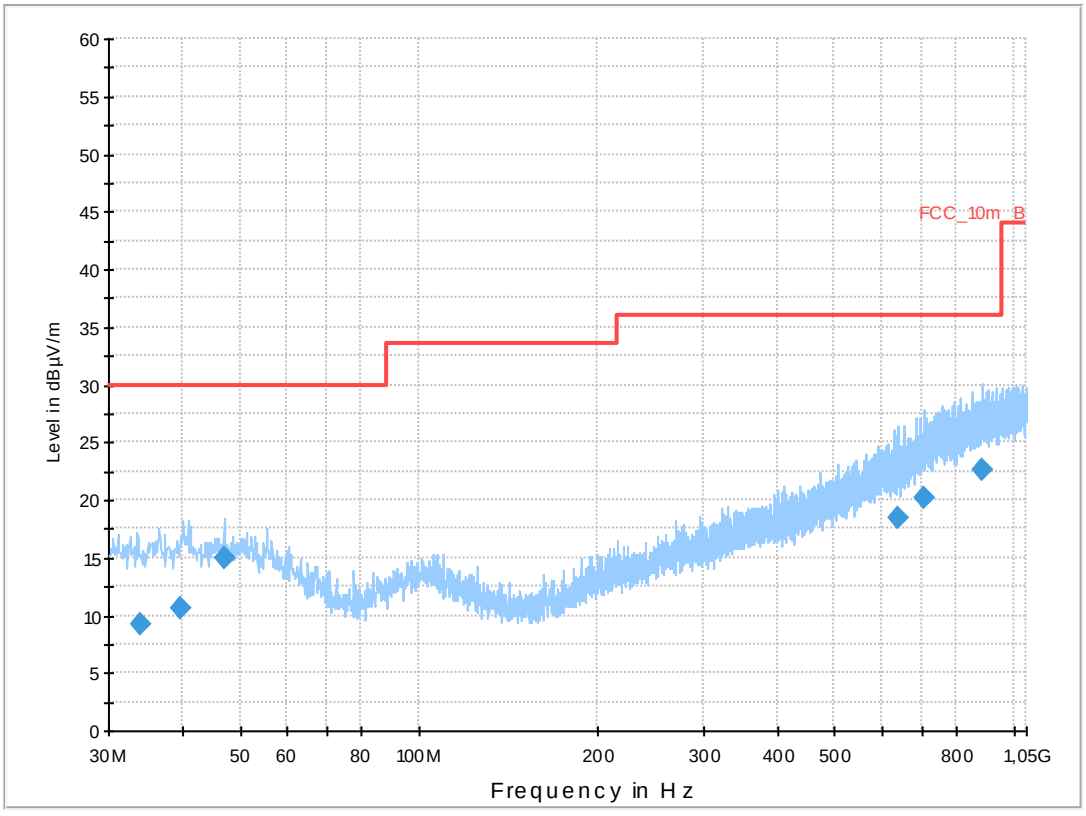
Common Information

EUT:	PM-0744-BV
Serial Number:	CB5A1W45MZ
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	WLAN ac-mode (HT80) CH122
Operator Name:	Hennemann
Comment:	battery powered

Scan Setup: STAN_Fin [EMI radiated]

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

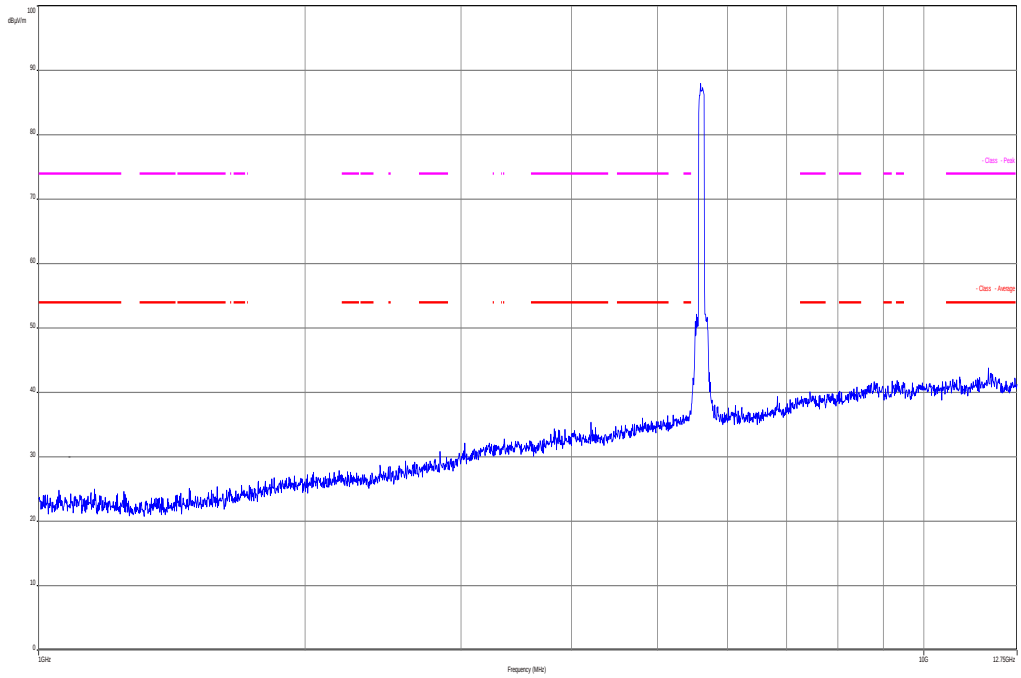
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



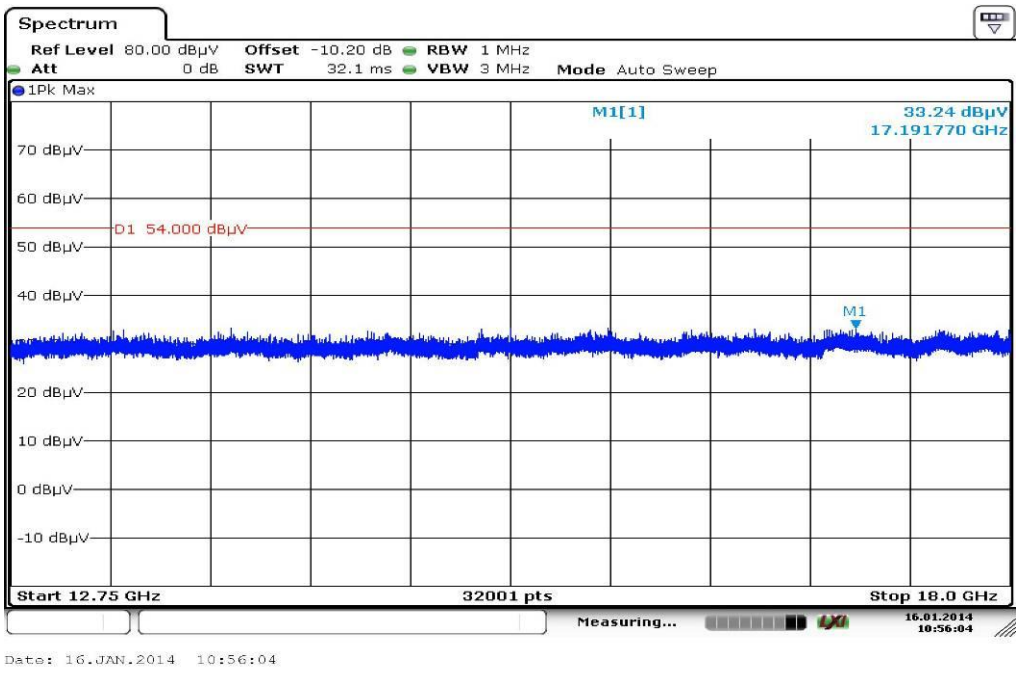
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
33.868650	9.2	1000.0	120.000	152.0	H	182.0	12.9	20.8	30.0	
39.659400	10.5	1000.0	120.000	98.0	V	100.0	13.4	19.5	30.0	
47.011350	14.9	1000.0	120.000	98.0	V	190.0	13.3	15.1	30.0	
639.624450	18.5	1000.0	120.000	98.0	V	170.0	21.0	17.5	36.0	
705.639600	20.2	1000.0	120.000	170.0	V	10.0	22.6	15.8	36.0	
883.235550	22.6	1000.0	120.000	98.0	H	90.0	25.0	13.4	36.0	

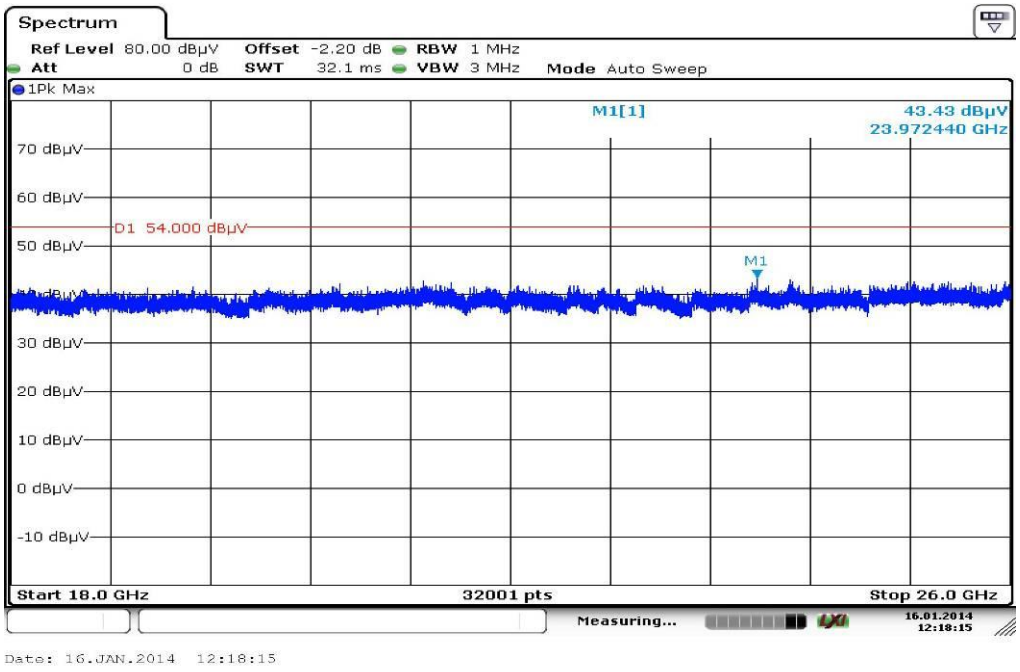
Plot 17: 1 GHz to 12.75 GHz, 5610 MHz, vertical & horizontal polarization



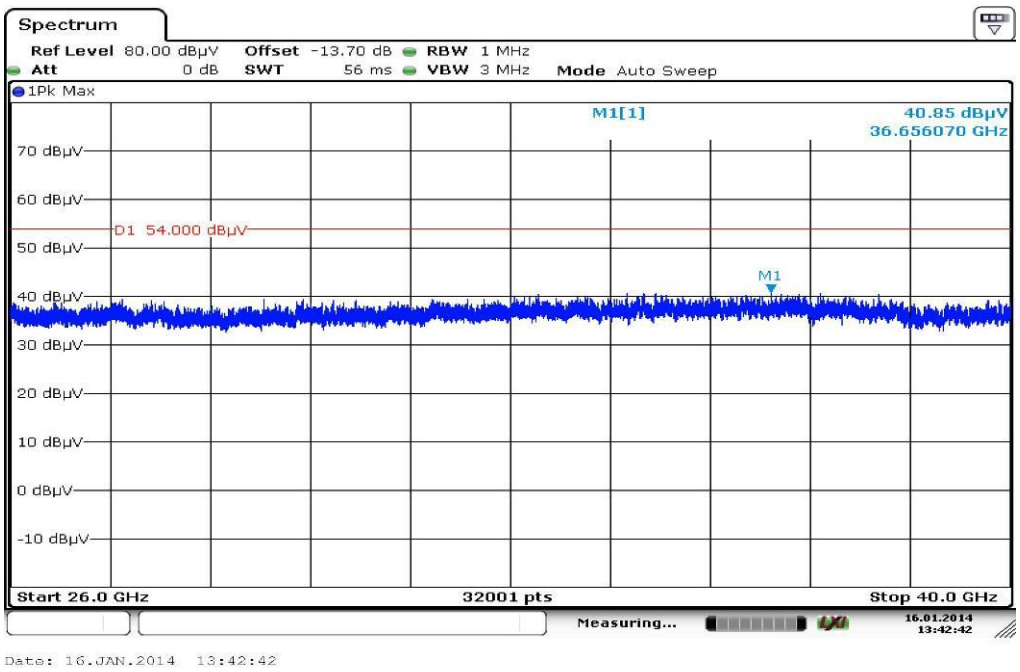
Plot 18: 12.75 GHz to 18 GHz, 5610 MHz, vertical & horizontal polarization



Plot 19: 18 GHz to 26 GHz, 5610 MHz, vertical & horizontal polarization



Plot 20: 26 GHz to 40 GHz, 5610 MHz, vertical & horizontal polarization



10.3 RX spurious emissions radiated

Description:

Measurement of the radiated spurious emissions in idle/receive mode.

Measurement:

Measurement parameter	
Detector:	Quasi Peak below 1 GHz (alternative Peak) Peak above 1 GHz / RMS
Sweep time:	Auto
Resolution bandwidth:	F < 1 GHz: 100 kHz F > 1 GHz: 1 MHz
Video bandwidth:	F < 1 GHz: 100 kHz F > 1 GHz: ≥ 3 MHz /10 Hz
Span:	30 MHz to 40 GHz
Trace-Mode:	Max Hold / Average with 100 counts + 20 log (1 / X) for duty cycle lower than 100 %

Limits:

RX Spurious Emissions Radiated		
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:

RX Spurious Emissions Radiated [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.		
All detected peaks are below the average limit!		
Measurement uncertainty	± 3 dB	

Result: Passed

Plots: RX / Idle – mode

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

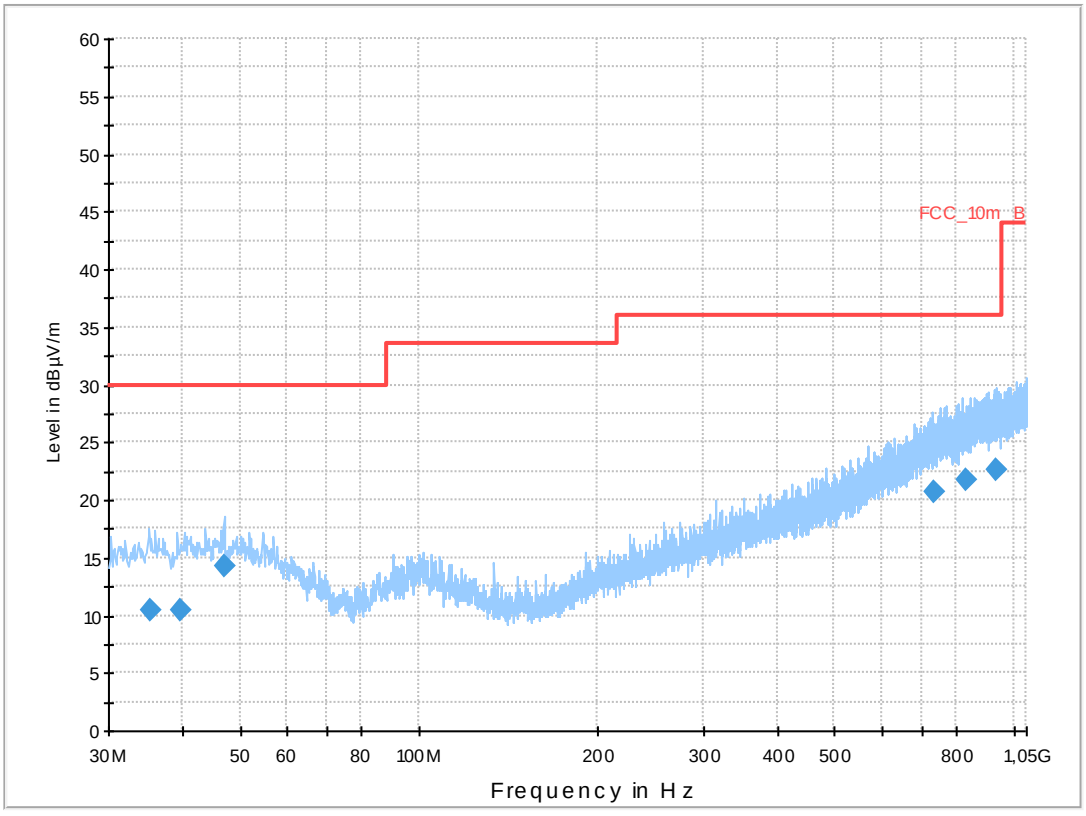
Common Information

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:	[ESCI 3]
Level Unit:	dBµV/m

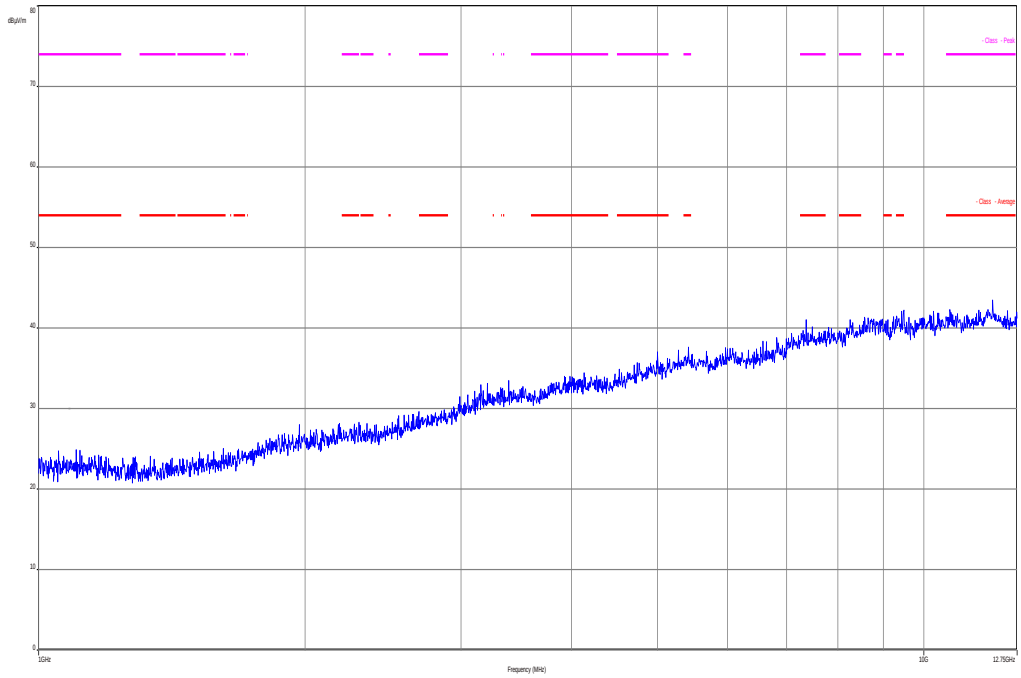
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



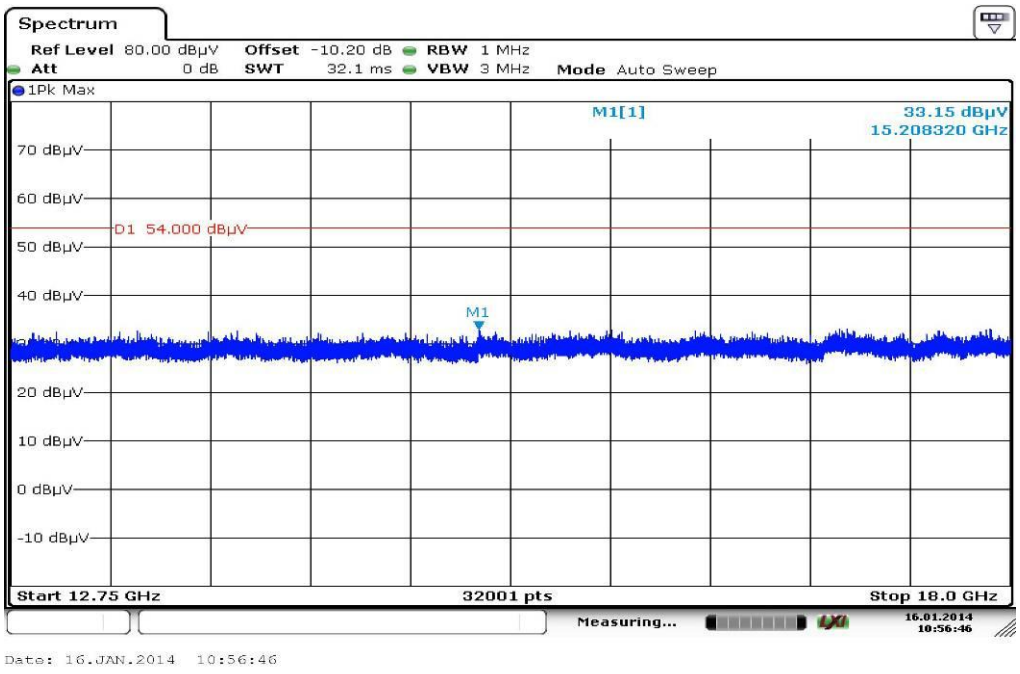
Final Result 1

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	

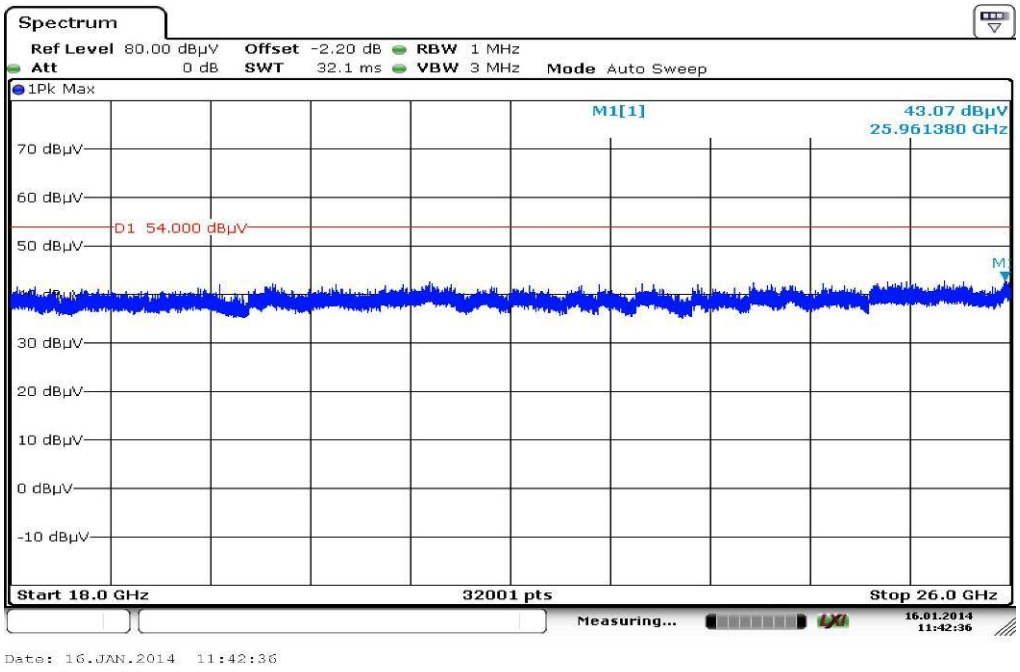
Plot 2: 1 GHz to 12.75 GHz, vertical & horizontal polarization



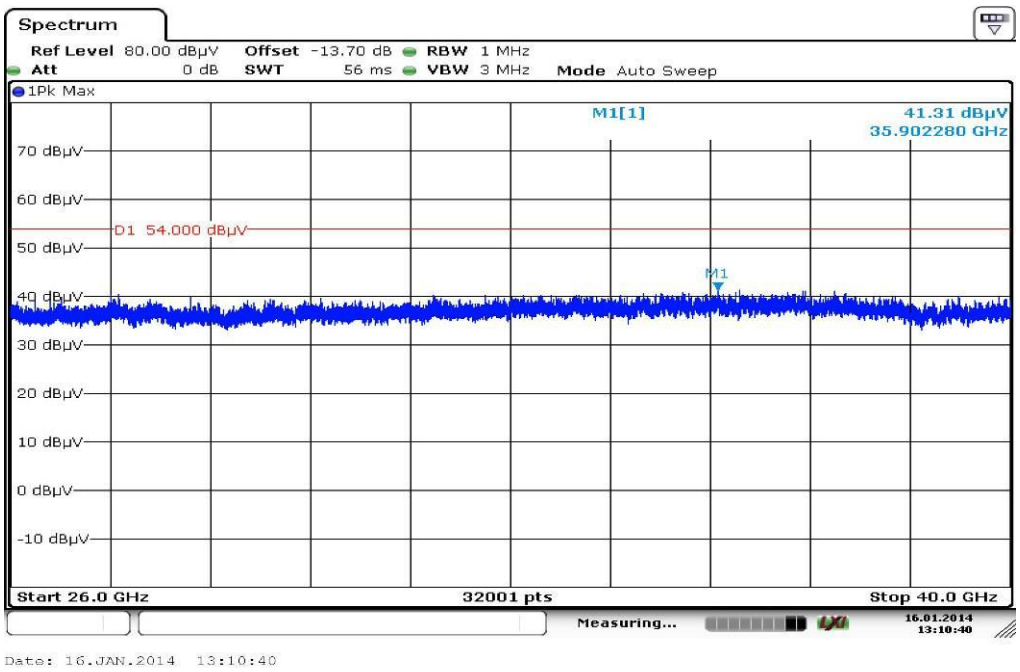
Plot 3: 12 GHz to 18 GHz, vertical & horizontal polarization



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



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



10.4 Spurious emissions radiated < 30 MHz

Description:

Measurement of the radiated spurious emissions in transmit mode and receive mode below 30 MHz. The EUT is set first to middle channel. This measurement is representative for all channels and modes. If critical peaks are found the lowest channel and the highest channel will be measured too. Then the EUT is set to receive or idle mode. 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:

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

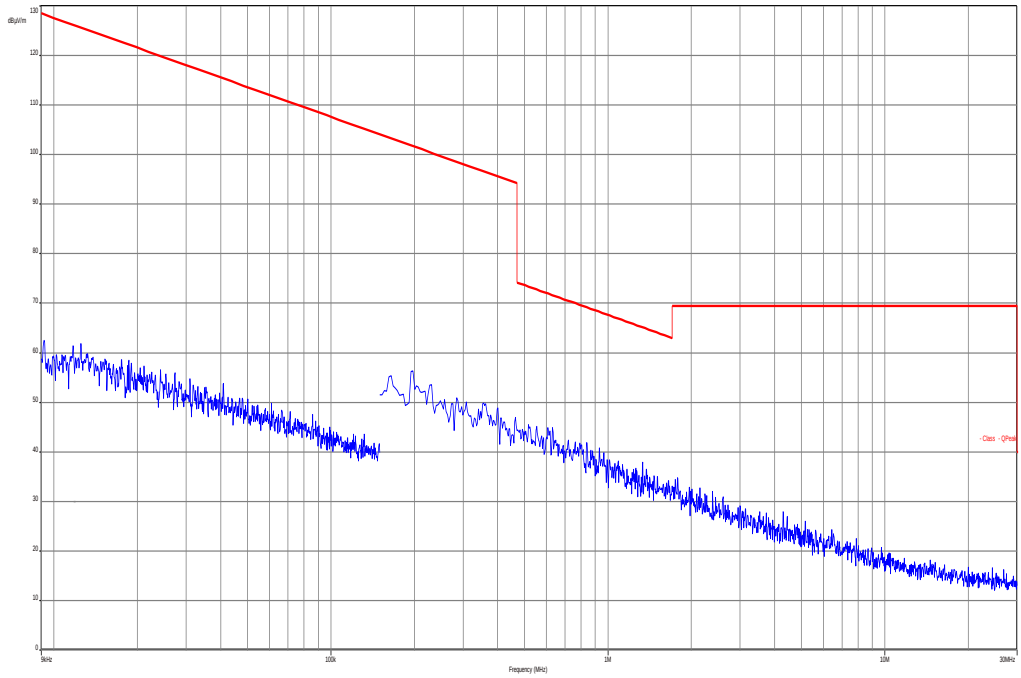
Results:

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

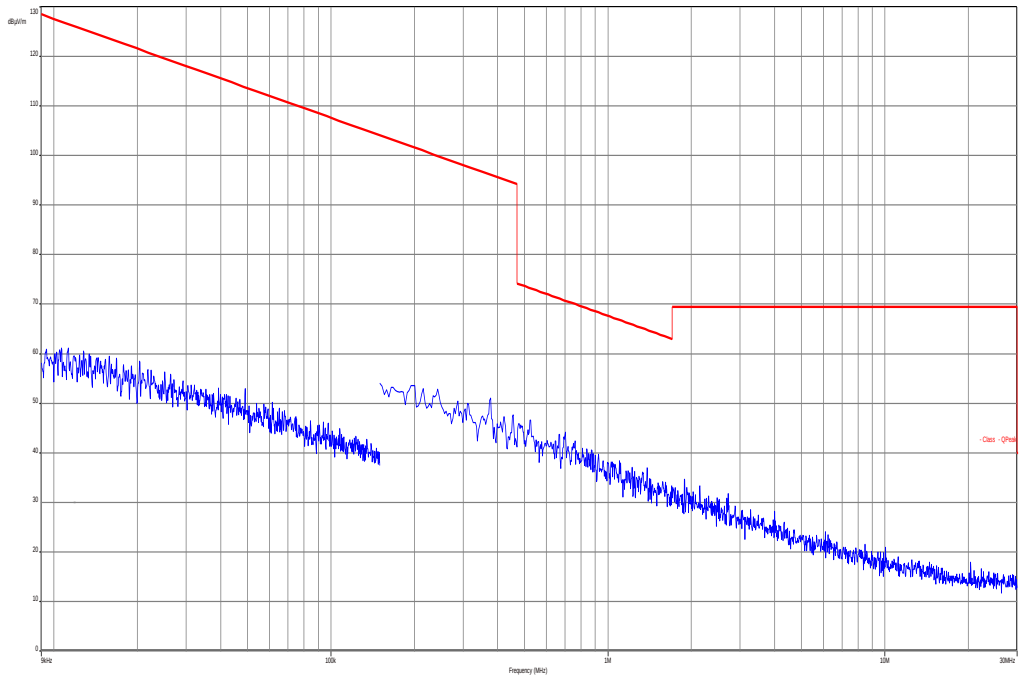
Result: **Passed**

Plots:

Plot 1: 9 kHz to 30 MHz, TX mode



Plot 2: 9 kHz to 30 MHz, RX mode



10.5 Spurious emissions conducted < 30 MHz

Description:

Measurement of the conducted spurious emissions in transmit mode below 30 MHz. The EUT is set to middle channel. If critical peaks are found the lowest channel and the highest channel will be measured too. Both power lines, phase and neutral line, are measured. Found peaks are remeasured 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: 9 kHz
Resolution bandwidth:	F > 150 kHz: 100 kHz
Span:	150 kHz to 30 MHz
Trace-Mode:	Max Hold

Limits:

Spurious Emissions Conducted < 30 MHz		
Frequency (MHz)	Quasi-Peak (dBµV/m)	Average (dBµV/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

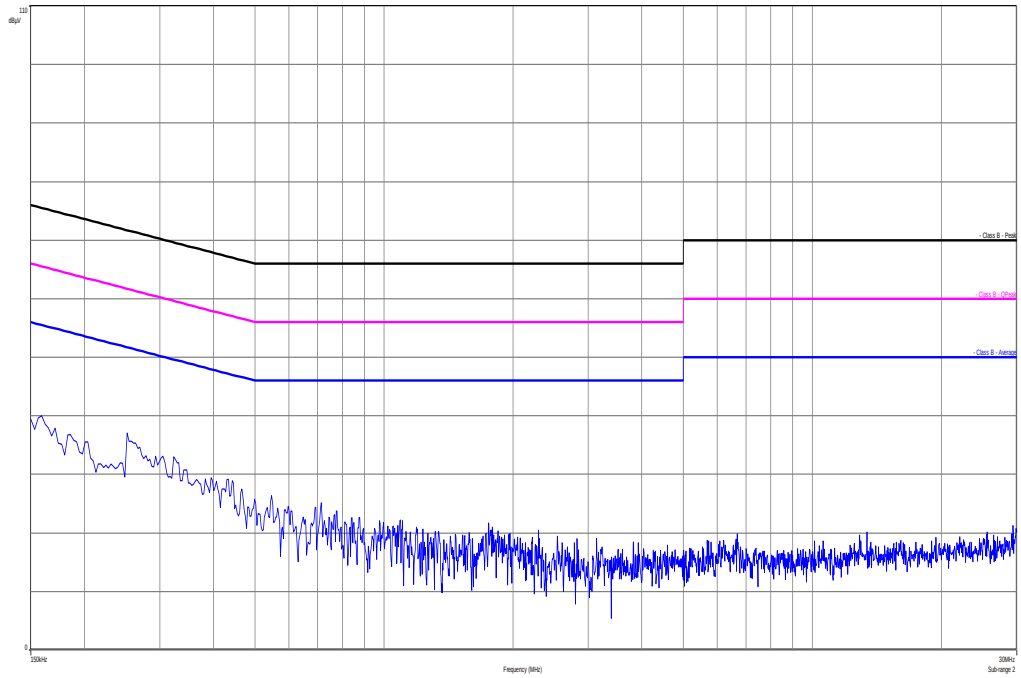
Results:

Spurious Emissions Conducted < 30 MHz [dBµV/m]		
F [MHz]	Detector	Level [dBµV/m]
No peaks found		
Measurement uncertainty	± 3 dB	

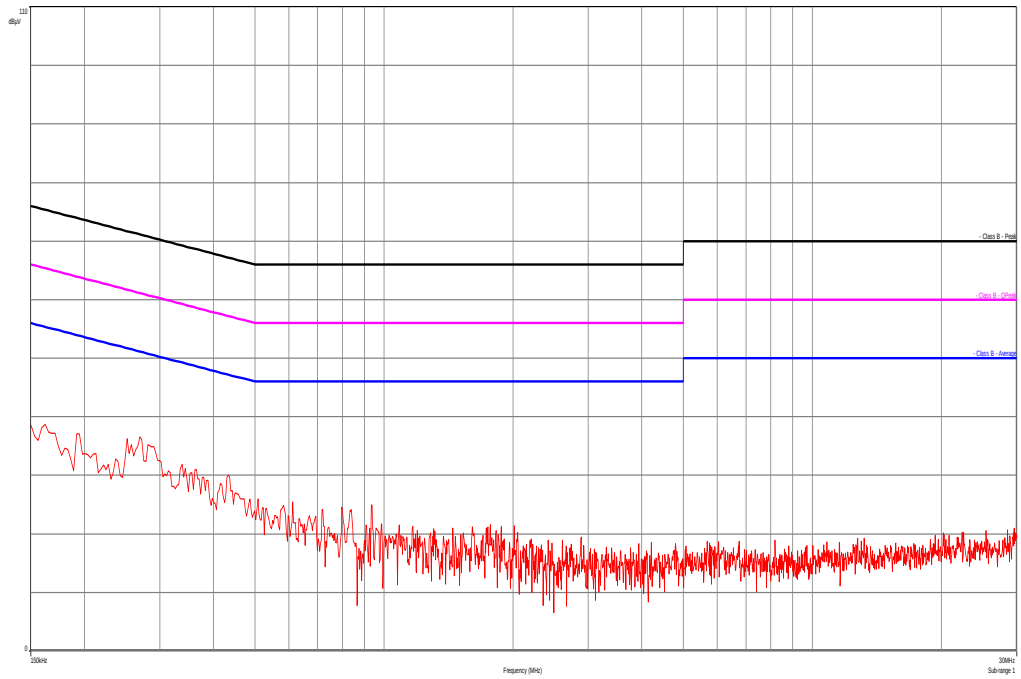
Result: **Passed**

Plots:

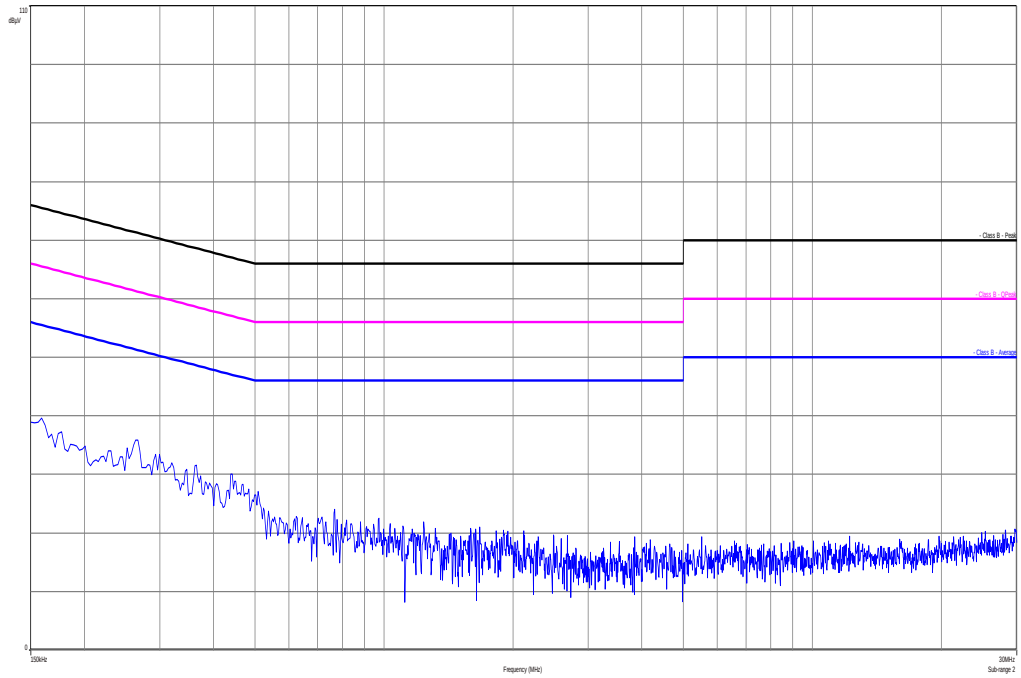
Plot 1: 150 kHz to 30 MHz / phase Line, TX mode



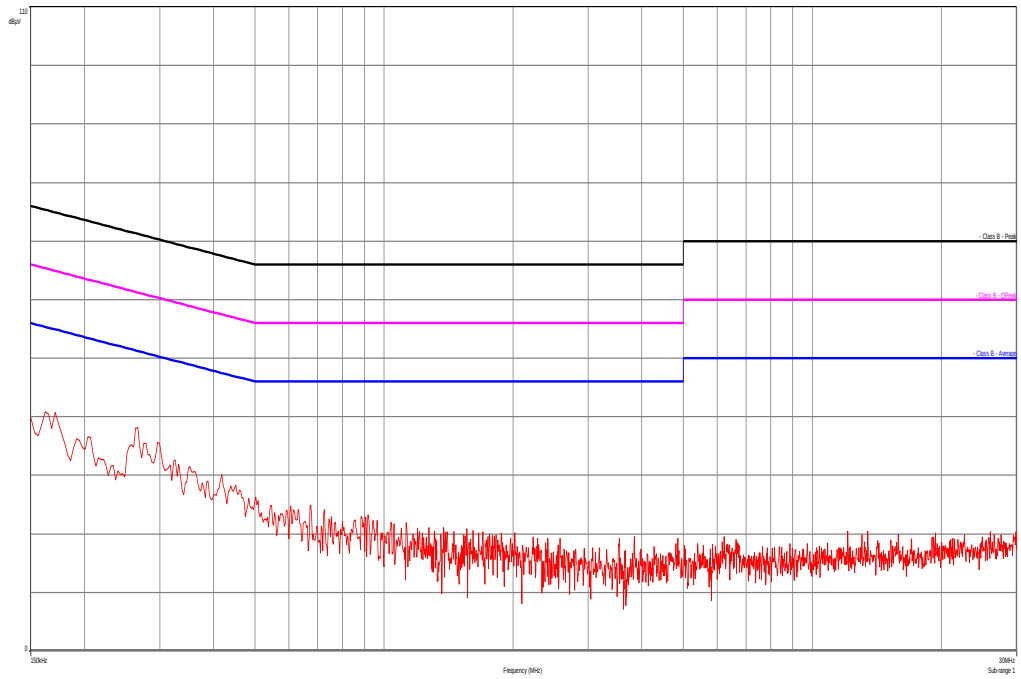
Plot 2: 150 kHz to 30 MHz / neutral Line, TX mode



Plot 3: 150 kHz to 30 MHz / phase Line, RX mode



Plot 4: 150 kHz to 30 MHz / neutral Line, RX mode



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;B5979	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	Schwarzbeck	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.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vlKl!	08.05.2013	08.05.2015
13	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev		
14	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	*	300000199	ne		
15	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	2719A15013	300001156	ne		
16	9	Isolating Transformer	MPL IEC625 Bus Regeltrennt ravo	Erfi	91350	300001155	ne		
17	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
18	90	Active Loop Antenna 10 kHz to 30 MHz	6502	Kontron Psychotech	8905-2342	300000256	k	13.06.2013	13.06.2015
19	n. a.	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne		
20	n. a.	MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405	k	21.02.2013	21.02.2014
21	11b	Microwave System Amplifier, 0.5-26.5 GHz	83017A	HP Meßtechnik	00419	300002268	ev		
22	A026	Std. Gain Horn Antenna 12.4 to	639	Narda	8402	300000787	k	22.07.2013	22.07.2015

		18.0 GHz							
23	A029	Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda	8205	300002442	k	19.07.2013	19.07.2015
24	A031	Std. Gain Horn Antenna 26.5 to 40.0 GHz	637	Narda		300000510	k	19.07.2013	19.07.2015
25	n. a.	Spectrum Analyzer 20 Hz - 50 GHz	FSU50	R&S	200012	300003443	Ve	09.10.2012	09.10.2014
26	n. a.	Broadband Low Noise Amplifier 18-50 GHz	CBL18503 070-XX	CERNEX	19338	300004273	ne		
27	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
vlkI!	Attention: extended calibration interval		
NK!	Attention: not calibrated	*)	next calibration ordered / currently in progress

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	2014-01-31

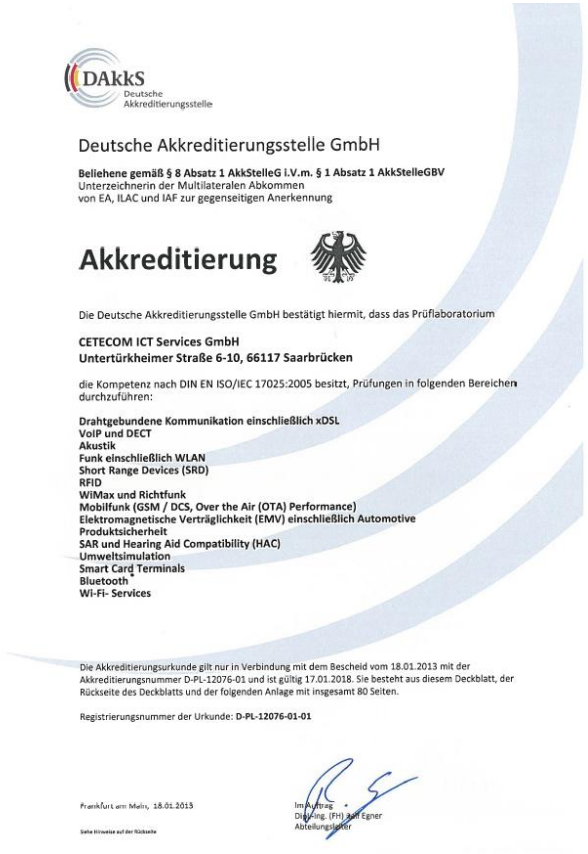
Annex B Further information

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



DAkkS
Deutsche Akkreditierungsstelle

Deutsche Akkreditierungsstelle GmbH

Beliehene gemäß § 8 Absatz 1 AkkStelleG i.V.m. § 1 Absatz 1 AkkStelleGBV
Unterzeichnerin der Multilateralen Abkommen
von EA, ILAC und IAF zur gegenseitigen Anerkennung

Akkreditierung

Die Deutsche Akkreditierungsstelle GmbH bestätigt hiermit, dass das Prüflaboratorium

CETECOM ICT Services GmbH
Untertürkheimer Straße 6-10, 66117 Saarbrücken

die Kompetenz nach DIN EN ISO/IEC 17025:2005 besitzt, Prüfungen in folgenden Bereichen durchzuführen:

Drahtgebundene Kommunikation einschließlich xDSL
VoIP und DECT
Akustik
Funk einschließlich WLAN
Short Range Devices (SRD)
RFID
WiMax und Richtfunk
Mobilfunk (GSM / DCS, Over the Air (OTA) Performance)
Elektromagnetische Verträglichkeit (EMV) einschließlich Automotive
Produktsicherheit
SAR und Hearing Aid Compatibility (HAC)
Umweltsimulation
Smart Card Terminals
Bluetooth
Wi-Fi- Services

Die Akkreditierungsurkunde gilt nur in Verbindung mit dem Bescheid vom 18.01.2013 mit der Akkreditierungsnummer D-PL-12076-01 und ist gültig 17.01.2018. Sie besteht aus diesem Deckblatt, der Rückseite des Deckblatts und der folgenden Anlage mit insgesamt 80 Seiten.

Registrierungsnummer der Urkunde: **D-PL-12076-01-01**

Frankfurt am Main, 18.01.2013

Im Auftrag
Dipl.-Ing. (FH) Axel Egner
Abteilungsleiter

Siehe Hinweise auf der Rückseite

Back side of certificate

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Die Akkreditierung erfolgte gemäß des Gesetzes über die Akkreditierungsstelle (AkkStelleG) vom 31. Juli 2009 (BGBl. I S. 2625) sowie der Verordnung (EG) Nr. 765/2008 des Europäischen Parlaments und des Rates vom 9. Juli 2008 über die Vorschriften für die Akkreditierung und Marktüberwachung im Zusammenhang mit der Vermarktung von Produkten (Abl. L 218 vom 9. Juli 2008, S. 30).
Die DAkkS ist Unterzeichnerin der Multilateralen Abkommen zur gegenseitigen Anerkennung der European co-operation for Accreditation (EA), des International Accreditation Forum (IAF) und der International Laboratory Accreditation Cooperation (ILAC). Die Unterzeichner dieser Abkommen erkennen ihre Akkreditierungen gegenseitig an.

Der aktuelle Stand der Mitgliedschaft kann folgenden Webseiten entnommen werden:
EA: www.european-accreditation.org
ILAC: www.ilac.org
IAF: www.iaf.nu

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