
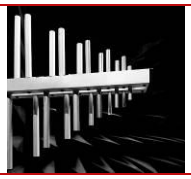
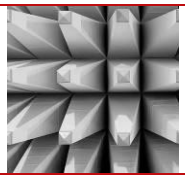

CETECOM™
CETECOM ICT Services
consulting - testing - certification

TEST REPORT

Test report no.: 1-6965/13-13-20

DAkkS Deutsche Akkreditierungsstelle D-PL-12076-01-01

Testing laboratory

CETECOM ICT Services GmbH
Untertuerkheimer Strasse 6 – 10
66117 Saarbruecken / Germany
Phone: + 49 681 5 98 - 0
Fax: + 49 681 5 98 - 9075
Internet: http://www.cetecom.com
e-mail: ict@cetecom.com

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

Sony Mobile Communications AB
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

RSS - 210 Issue 8	Spectrum Management and Telecommunications Radio Standards Specification - Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

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

Test Item

Kind of test item:	**Tablet PC WLAN b/g/n/a/ac; BT 4.0; RFID; A-GPS**
Type name:	**TS-0020-BV**
Model name:	**SGP511**
IC:	**4170B-TS0020**
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:

p. o.

cn=David Lang, o=CETECOM ICT Services GmbH, ou=LNG-131017, email=david.lang@cetecom.com, c=DE
2014.02.05 16:52:46 +01'00'

Stefan Bös
Senior Testing Manager

Test performed:

cn=Andreas Luckenbill, o=CETECOM ICT Services GmbH, ou=LUC-111202, email=andreas.luckenbill@cetecom.com, c=DE
2014.02.05 16:45:14 +01'00'

Andreas Luckenbill
Expert

1 Table of contents

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:	2013-12-19
Date of receipt of test item:	2014-01-14
Start of test:	2014-01-14
End of test:	2014-01-31
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Date	Test standard description
RSS - 210 Issue 8	01.12.2010	Spectrum Management and Telecommunications Radio Standards Specification - Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

3.1 Measurement guidance

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

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:		40 %	
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	**:**	**Tablet PC WLAN b/g/n/a/ac; BT 4.0; RFID; A-GPS**
Type name	**:**	**TS-0020-BV**
Model name	**:**	**SGP511**
S/N serial number	**:**	**Rad. CB51268FN3** **Cond. CB51268F6N, CB51268F4Y**
HW hardware status	**:**	**AP1**
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 **Use of frequency spectrum**	**:** **:**	**OFDM**
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: 1-6965/13-13-01_AnnexA
1-6965/13-13-01_AnnexB
1-6965/13-13-01_AnnexD

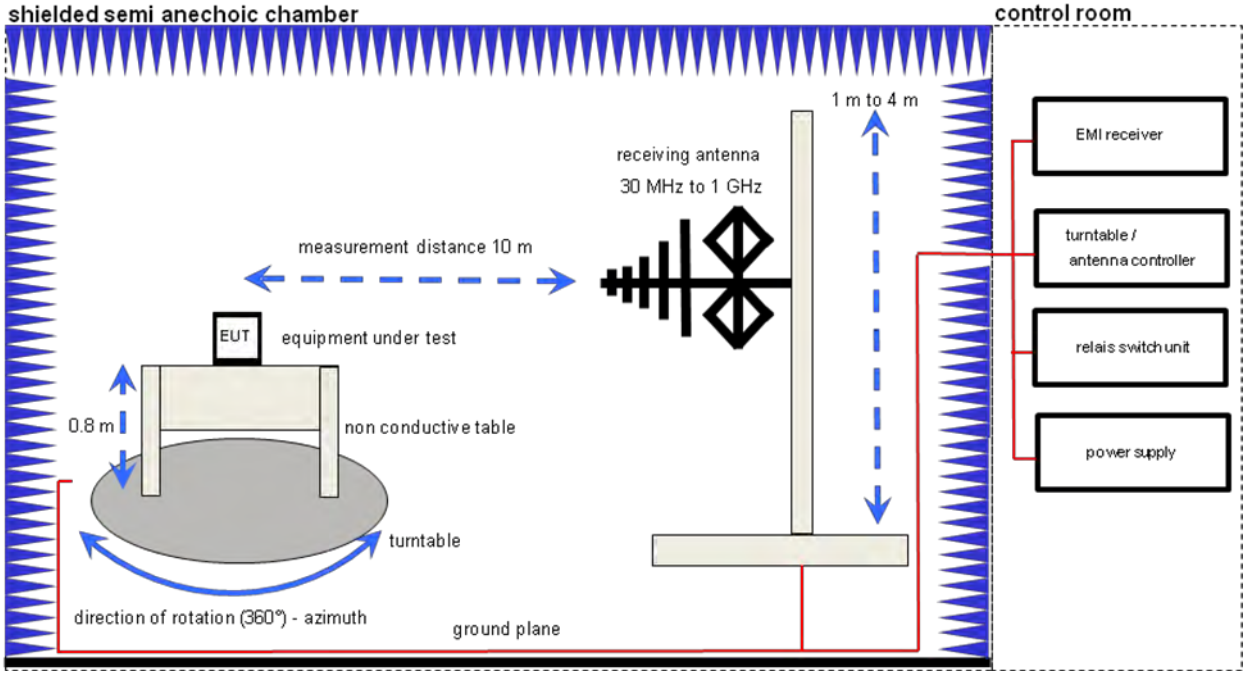
6 Test laboratories sub-contracted

None

7 Description of the test setup

7.1 Radiated measurements chamber F

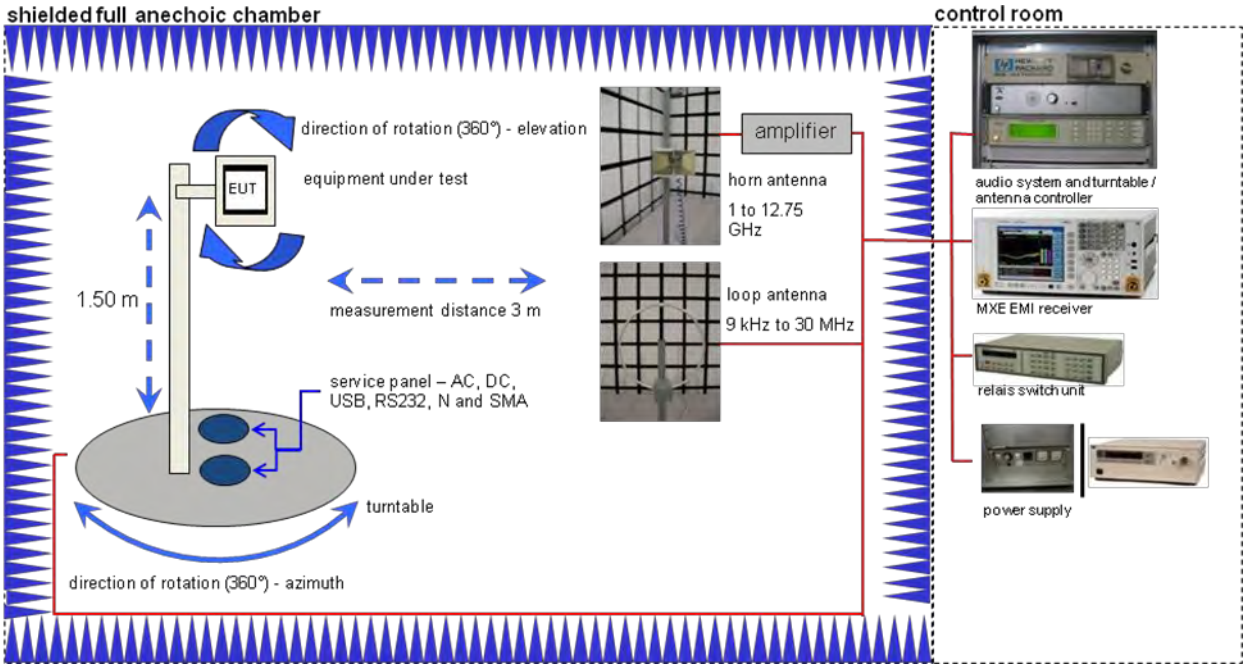
The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 1 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas 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

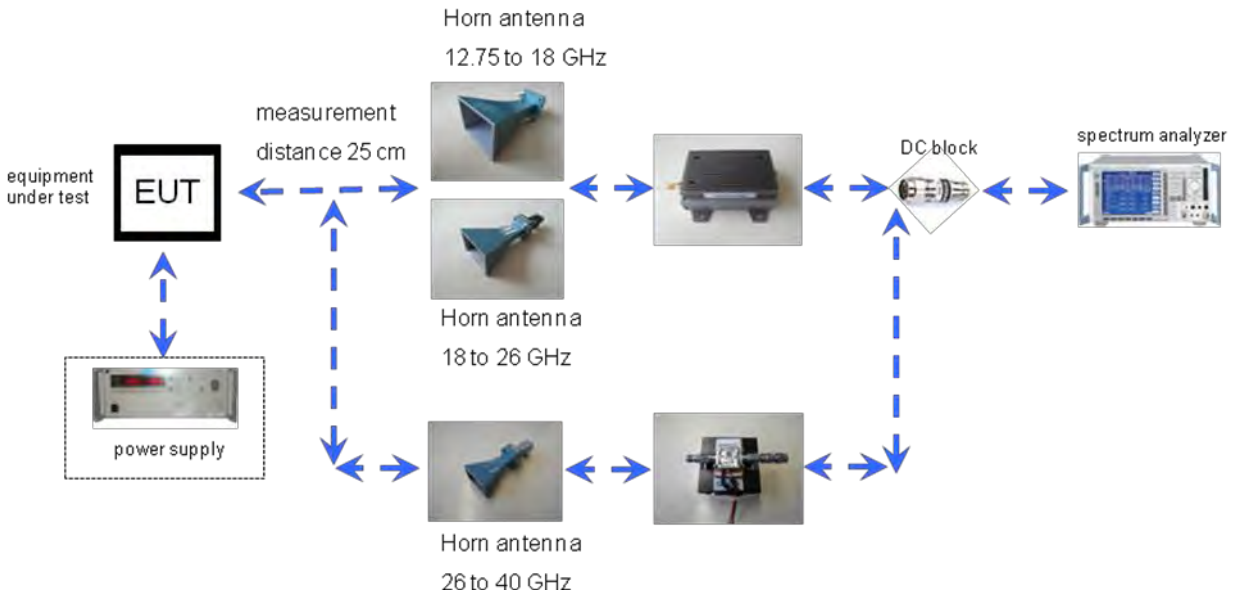
7.2 Radiated measurements chamber C



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

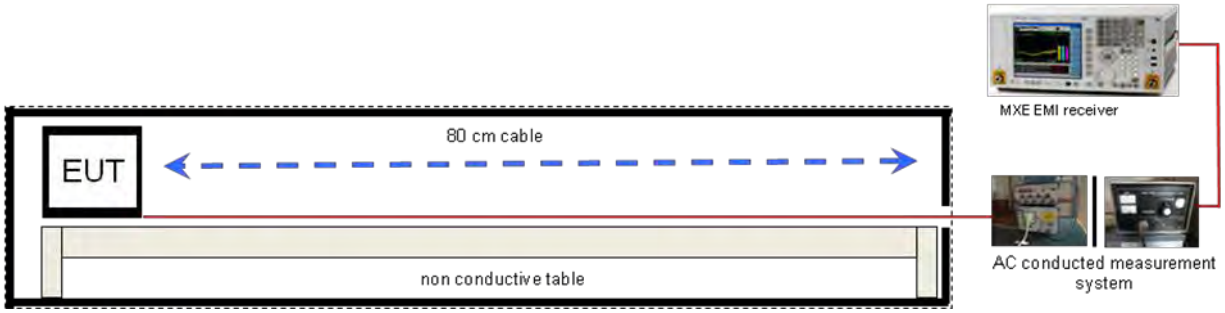
7.3 Radiated measurements 12.75 GHz to 40 GHz



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

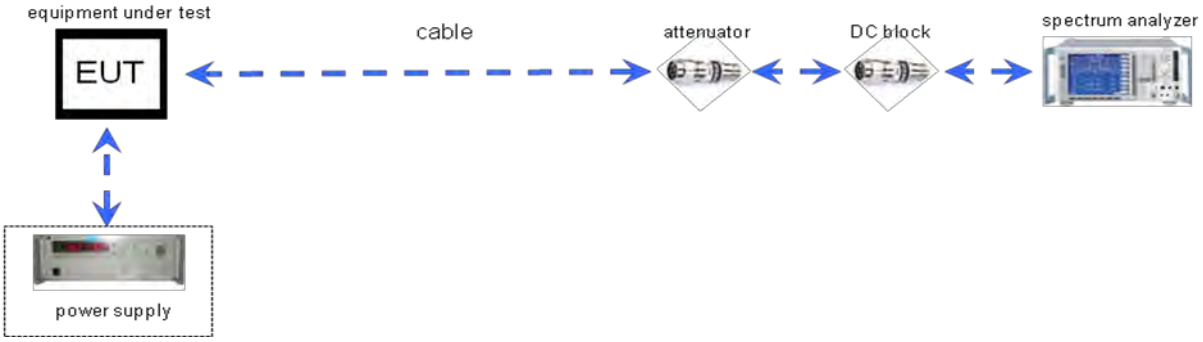
7.4 AC conducted



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

7.5 Conducted measurements



Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517

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	RSS 210, Issue 8	Passed	2014-02-05	-/-

Test specification clause	Test case	Temperature conditions	Power source voltages	Mode	Pass	Fail	NA	NP	Remark
RSS 210 / A8.4(2)	Antenna gain	Nominal	Nominal	OFDM	☒	☐	☐	☐	complies
RSS 210 / A8.2(b)	Power spectral density DTS clause 10.2	Nominal	Nominal	OFDM	☒	☐	☐	☐	complies
RSS 210 / A8.2(a)	Spectrum bandwidth - 6dB bandwidth DTS clause 8.2	Nominal	Nominal	OFDM	☒	☐	☐	☐	complies
RSS 210 / A8.2(a)	Spectrum bandwidth - 20dB bandwidth	Nominal	Nominal	OFDM	☒	☐	☐	☐	complies
RSS-210 / A8.4(4)	Maximum output power DTS clause 9.1.2	Nominal	Nominal	OFDM	☒	☐	☐	☐	complies
RSS-210 / A8.5	TX spurious emissions conducted DTS clause 11.1 & 2	Nominal	Nominal	OFDM	☒	☐	☐	☐	complies
RSS-210 / A8.5	TX spurious emissions radiated	Nominal	Nominal	OFDM	☒	☐	☐	☐	complies
RSS-Gen.	RX spurious emissions radiated	Nominal	Nominal	-/-	☒	☐	☐	☐	complies
RSS-Gen.	TX spurious emissions radiated < 30 MHz	Nominal	Nominal	OFDM	☒	☐	☐	☐	complies
-/-	Conducted emissions < 30 MHz	Nominal	Nominal	OFDM	☒	☐	☐	☐	complies

Note: NA = Not Applicable; NP = Not Performed

9 Additional comments

Reference documents: None

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 RSP100 test report cover sheet / performance test data

Test report number	**:**	**1-6965/13-13-20**			
Equipment model number:		**SGP511**			
Certification number	**:**	**4170B-TS0020**			
Manufacturer (complete address)	**:**	**Sony Mobile Communications AB Nya Vattentornet 22188 Lund / SWEDEN**			
Tested to radio standards specification no.	**:**	**RSS 210, Issue 8**			
Open area test site IC No.	**:**	**IC 3462C-1**			
Frequency range	**:**	**UNII band 5725 MHz to 5850 MHz**			
RF-power (max.)	**:**	**Conducted values:**			
		Band	**a – mode**	**n/ac HT20 – mode**	**n/ac HT40 – mode**
		5745 – 5825 MHz	**66.83 mW**	**62.66 mW**	
		5755 – 5835 MHz			**64.27 mW**
		5775 MHz ac HT80 – mode	**64.57 mW**		
		Radiated values:			
		Band	**a – mode**	**n/ac HT20 – mode**	**n/ac HT40 – mode**
		5745 – 5825 MHz	**76.71 mW**	**77.09 mW**	
		5755 – 5835 MHz			**79.07 mW**
		5775 MHz ac HT80 – mode	**75.86 mW**		
Occupied bandwidth (99%-BW)	**:**	**Band**	**a – mode**	**n/ac HT20 – mode**	**n/ac HT40 – mode**
		5745 – 5825 MHz	**17.85 MHz**	**18.46 MHz**	
		5755 – 5835 MHz			**37.03 MHz**
		5775 MHz ac HT80 – mode	**75.72 MHz**		
Necessary bandwidth (calculated)	**:**	**Band**	**a – mode**	**n/ac HT20 – mode**	**n/ac HT40 – mode**
		5745 – 5825 MHz	**16.88 MHz**	**16.88 MHz**	
		5755 – 5835 MHz			**33.75 MHz**
		5775 MHz ac HT80 – mode	**80 MHz**		
Emission classification	**:**	**(according TRC-43)**	**G7D**		
Type of modulation	**:**	**BPSK, QPSK, 16 – QAM, 64 – QAM, 256 – QAM**			
Antenna information	**:**	**Integrated antenna**			
Transmitter spurious [dBµV/m @ 3m]	**:**	**36 @ 14.43 GHz (peak)**			

ATTESTATION:
DECLARATION OF COMPLIANCE:

I attest that the testing was performed or supervised by me; that the test measurements were made in accordance with the above-mentioned Industry Canada standard(s); and that the equipment identified in this application has been subjected to all the applicable test conditions specified in the Industry Canada standards and all of the requirements of the standard have been met.

Laboratory manager:

2014-02-05	Andreas Luckenbill	cn=Andreas Luckenbill, o=CETECOM ICT Services GmbH, ou=LUC-111202, email=andreas.luckenbill@cetecom.com, c=DE 2014.02.05 16:44:51 +01'00'
Date	Name	Signature

11 Measurement results

11.1 Identify worst case data rate

Measurement:

All modes of the module will be measured with an average powermeter to identify the maximum transmission power on low, mid and high channel. In the case that only one or two channels are available, only these will be measured.

In further tests only the identified worst case modulation scheme or bandwidth will be measured.
Additional the band edge compliance test will be performed in the lowest and highest modulation scheme.

Measurement parameters:

Average Power Meter

Results:

Modulation	Modulation scheme / bandwidth		
Frequency	5745 MHz	5785 MHz	5825 MHz
OFDM / a – mode	6Mbit/s	6Mbit/s	6Mbit/s
OFDM / n/ac – mode HT20	MCS0	MCS0	MCS0
Frequency	5755 MHz		5795 MHz
OFDM / n/ac – mode HT40	MCS0		MCS0
Frequency	5775 MHz		
OFDM / ac – mode HT80	MCS0		

11.2 Antenna gain

Limits:

FCC	IC
Antenna Gain	
6 dBi	

Results:

T_{nom}	V_{nom}	lowest channel 5745 MHz	middle channel 5785 MHz	highest channel 5825 MHz
Gain [dBi] Declared by manufacturer		0.9	0.7	0.3

Result: Passed

11.3 Maximum output power

Description:

Measurement of the maximum output power conducted and radiated. The measurements are performed using the data rate producing the highest conducted output power. The determination of these data rates was performed at the beginning of the tests.

Measurement:

Measurement parameter	
According to: DTS clause 9.1.2	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	1 MHz
Video bandwidth:	3 MHz
Span:	40 MHz / 80 MHz / 160 MHz
Measurement type:	Channel power
Integration bandwidth:	75 % power - bandwidth (DTS BW)
Trace-Mode:	Max hold (allow trace to fully stabilize)

Limits:

FCC	IC
Maximum Output Power	
Conducted: 1.0 W – Antenna Gain max. 6 dBi	

Results: OFDM / a – mode

OFDM / a – mode	Maximum Output Power [dBm]		
Frequency	5745 MHz	5785 MHz	5825 MHz
Output power conducted	17.92	17.79	18.25
Output power radiated	18.82	18.49	18.55
Measurement uncertainty	± 1.5 dB (cond.) / ± 3 dB (rad.)		

Result: Passed

Results: OFDM / n/ac – mode HT20

OFDM / n/ac – mode HT20	Maximum Output Power [dBm]		
Frequency	5745 MHz	5785 MHz	5825 MHz
Output power conducted	17.97	17.83	17.72
Output power radiated	18.87	18.53	18.02
Measurement uncertainty	± 1.5 dB (cond.) / ± 3 dB (rad.)		

Result: Passed

Results: OFDM / n/ac – mode HT40

OFDM / n/ac – mode HT40	Maximum Output Power [dBm]	
Frequency	5755 MHz	5795 MHz
Output power conducted	18.08	17.77
Output power radiated	18.98	18.47
Measurement uncertainty	± 1.5 dB (cond.) / ± 3 dB (rad.)	

Result: Passed

Results: OFDM / ac – mode HT80

OFDM / ac – mode HT80	Maximum Output Power [dBm]
Frequency	5775 MHz
Output power conducted	18.1
Output power radiated	18.8
Measurement uncertainty	± 1.5 dB (cond.) / ± 3 dB (rad.)

Result: **Passed**

11.4 Power spectral density

Description:

Measurement of the power spectral density of a digital modulated system. The measurement is repeated for both modulations at the lowest, middle and highest channel.

Measurement:

Measurement parameter	
According to: DTS clause 10.2	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	3 kHz
Video bandwidth:	10 kHz
Span:	40 MHz / 80 MHz / 160 MHz
Trace-Mode:	Max hold (allow trace to fully stabilize)

Limits:

FCC	IC
Power Spectral Density	
8 dBm (conducted)	

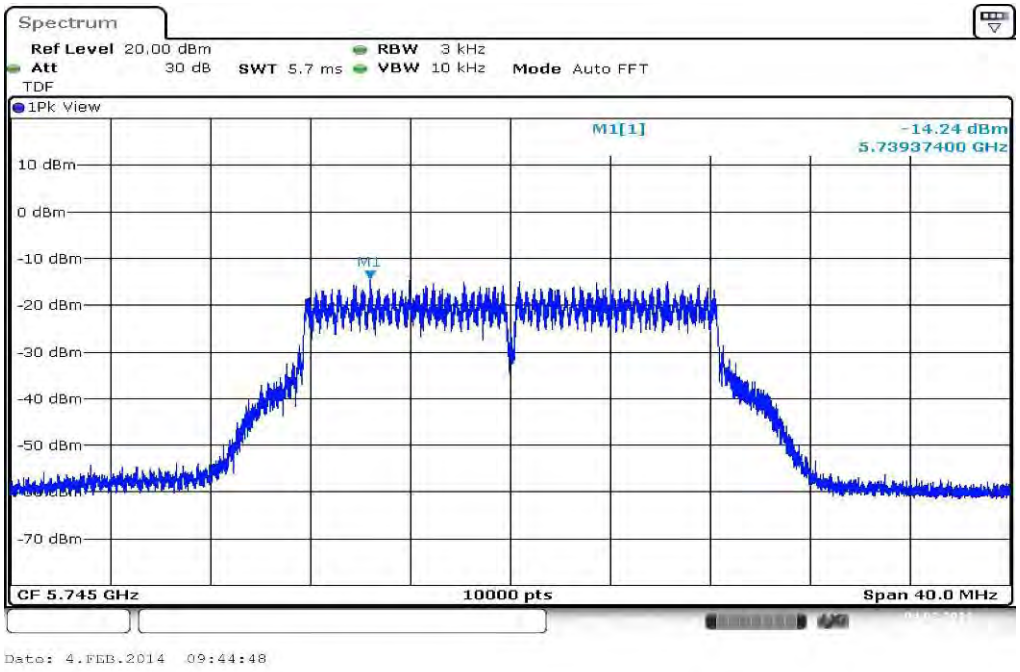
Results:

Modulation	Power Spectral density [dBm]		
Frequency	5745 MHz	5785 MHz	5825 MHz
OFDM / a – mode	-14.24	-13.92	-14.00
OFDM / n/ac – mode HT20	-14.11	-13.89	-14.59
Frequency	5755 MHz		5795 MHz
OFDM / n/ac – mode HT40	-17.39		-17.20
Frequency	5775 MHz		
OFDM / ac – mode HT80	-19.44		
Measurement uncertainty	± 1.5 dB		

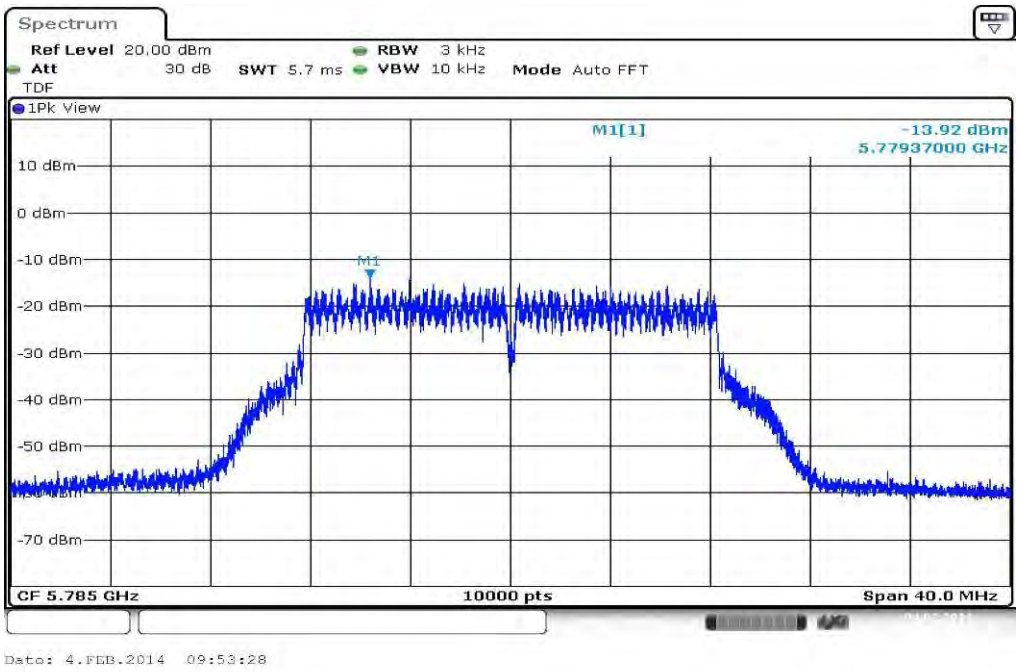
Result: Passed

Plots: OFDM / a – mode

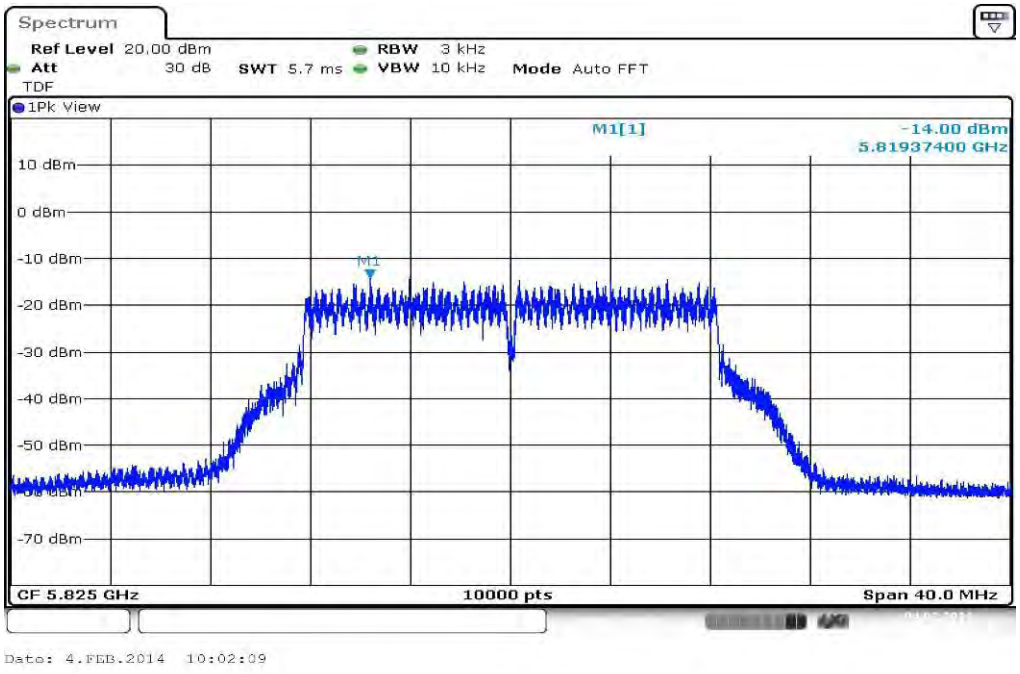
Plot 1: TX mode, lowest channel



Plot 2: TX mode, middle channel

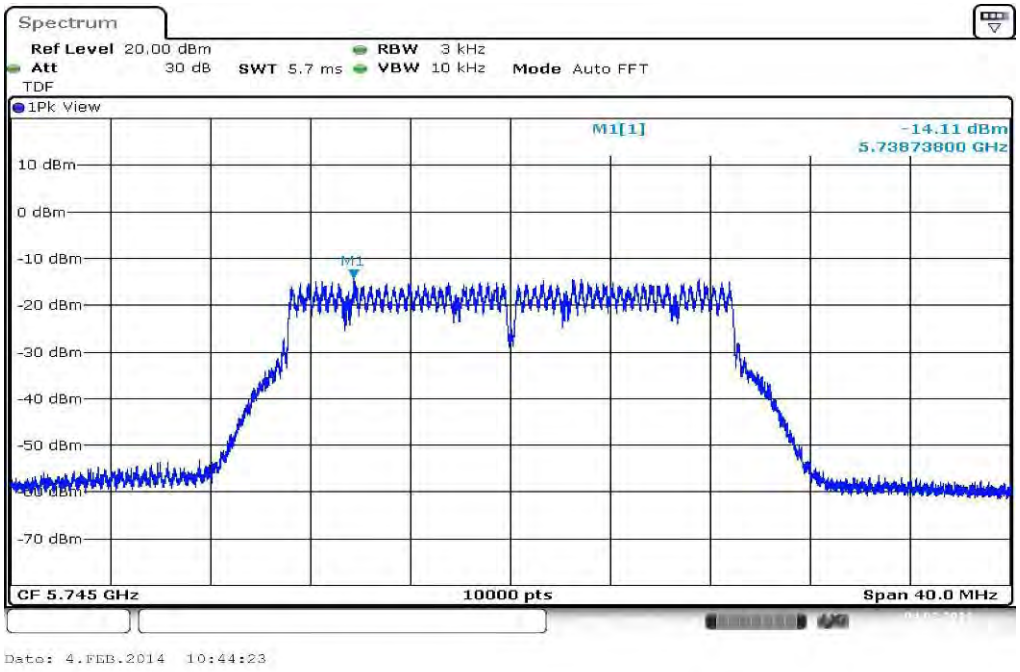


Plot 3: TX mode, highest channel

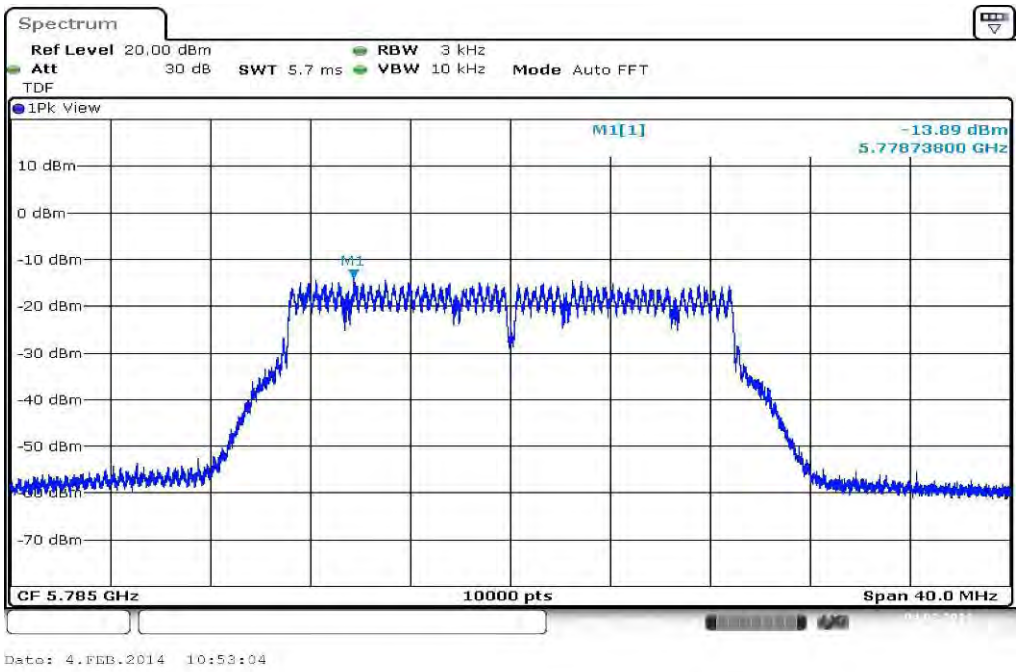


Plots: OFDM / n/ac – mode HT20

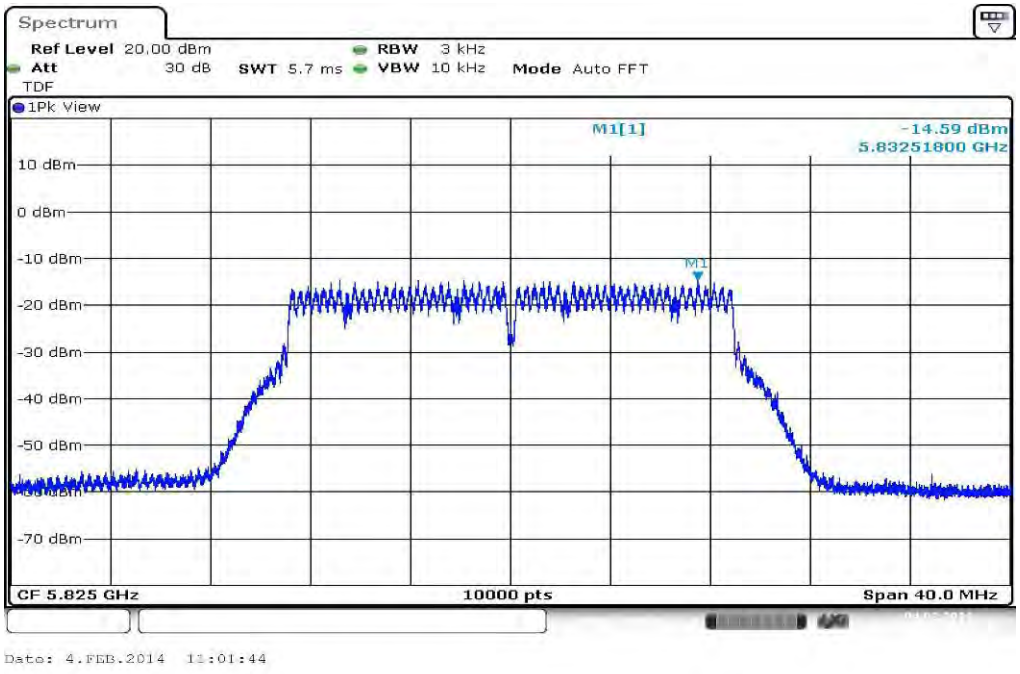
Plot 1: TX mode, lowest channel



Plot 2: TX mode, middle channel

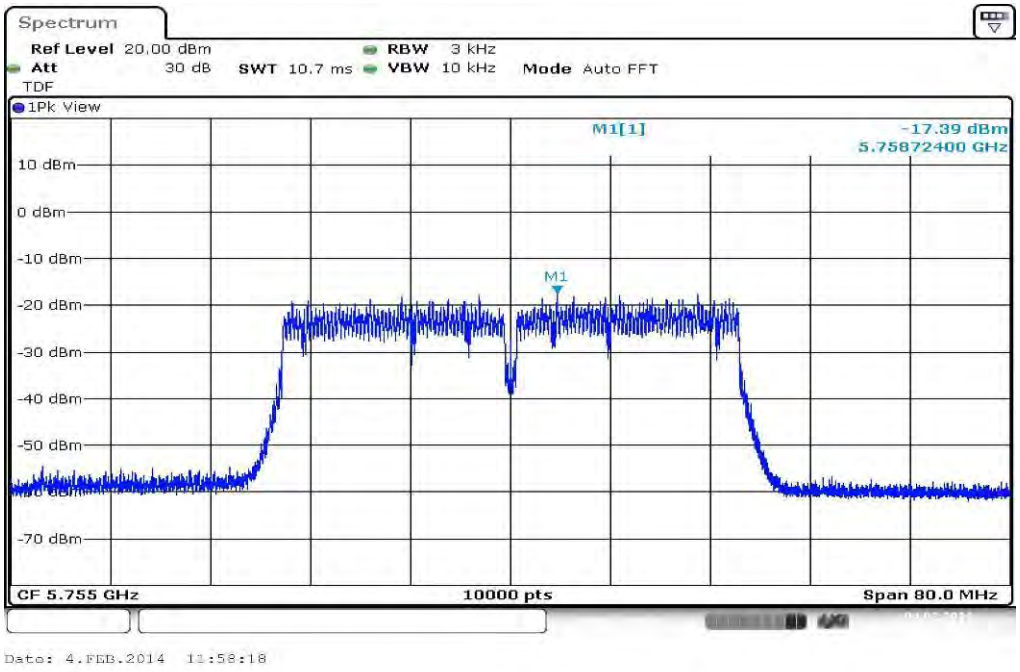


Plot 3: TX mode, highest channel

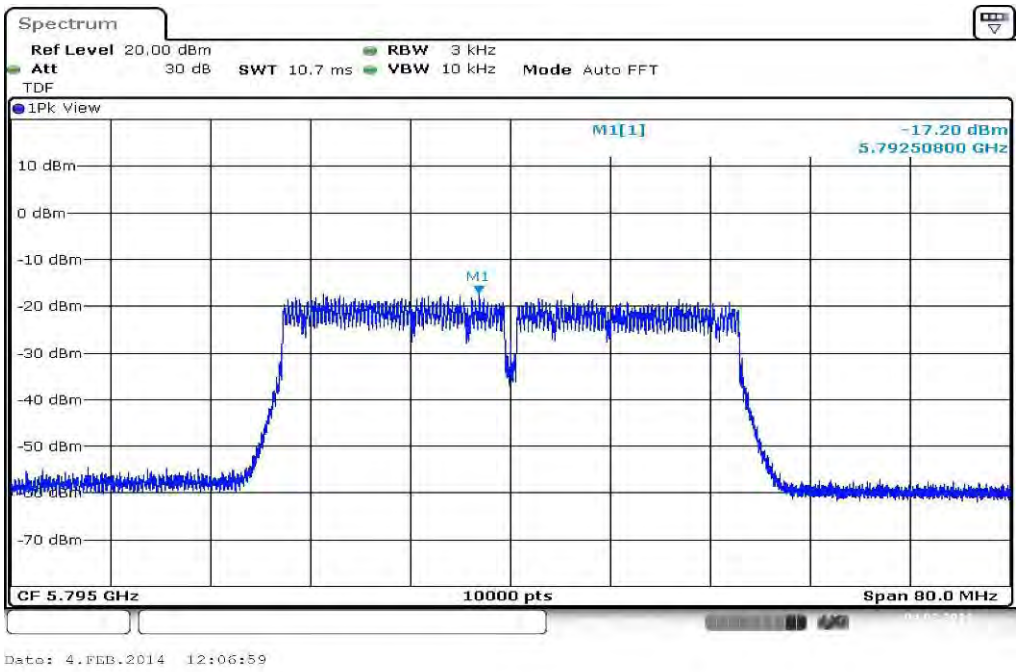


Plots: OFDM / n/ac – mode HT40

Plot 1: TX mode, lowest channel

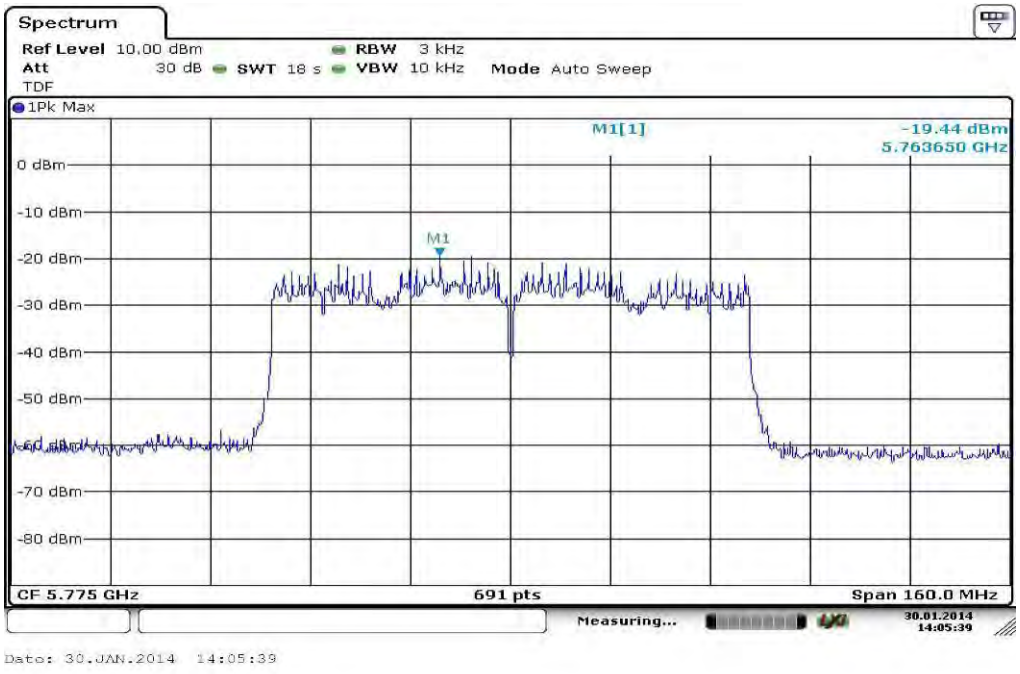


Plot 2: TX mode, highest channel



Plots: OFDM / ac – mode HT80

Plot 1: TX mode, lowest channel



11.5 Spectrum bandwidth – 6 dB

Description:

Measurement of the 6 dB bandwidth of the modulated signal.

Measurement:

Measurement parameter	
According to: DTS clause 8.2	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	100 kHz
Video bandwidth:	300 kHz
Span:	40 MHz / 80 MHz / 160 MHz
Measurement procedure:	Measurement of the 75% bandwidth using the integration function of the analyzer
Trace-Mode:	Max hold (allow trace to stabilize)

Limits:

FCC	IC
Spectrum Bandwidth – 6 dB	
Systems using digital modulation techniques may operate in the 2400–2483.5 MHz band. The minimum 6 dB bandwidth shall be at least 500 kHz.	

Results: OFDM / a – mode

Modulation	6 dB bandwidth [MHz]		
Frequency	5745 MHz	5785 MHz	5825 MHz
OFDM / a – mode 6 Mbit/s	12.46	12.31	12.41
Measurement uncertainty	± RBW		

Result: Passed

Results: OFDM / n/ac – mode HT20

Modulation	6 dB bandwidth [MHz]		
Frequency	5745 MHz	5785 MHz	5825 MHz
OFDM / n/ac – mode HT20 MCS0	13.18	13.09	13.07
Measurement uncertainty	± RBW		

Result: Passed

Results: OFDM / n/ac – mode HT40

Modulation	6 dB bandwidth [MHz]	
Frequency	5755 MHz	5795 MHz
OFDM / n/ac – mode HT40 MCS0	27.02	27.26
Measurement uncertainty	± RBW	

Result: Passed

Results: OFDM / n/ac – mode HT40

Modulation	6 dB bandwidth [MHz]
Frequency	5775 MHz
OFDM / n/ac – mode HT40 MCS0	53.14
Measurement uncertainty	± RBW

Result: Passed

11.6 Spectrum bandwidth – 20 dB

Description:

Measurement of the 20 dB bandwidth of the modulated signal.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	1 - 5% of the DTS BW but not exceed 100 kHz
Video bandwidth:	≥ 3 x RBW
Span:	Complete signal
Measurement procedure:	Measurement of the 99% bandwidth using the integration function of the analyzer
Trace-Mode:	Max hold (allow trace to stabilize)

Limits:

-/-	IC
Spectrum Bandwidth – 20 dB	
Systems using digital modulation techniques may operate in the 2400–2483.5 MHz band. The minimum 6 dB bandwidth shall be at least 500 kHz.	

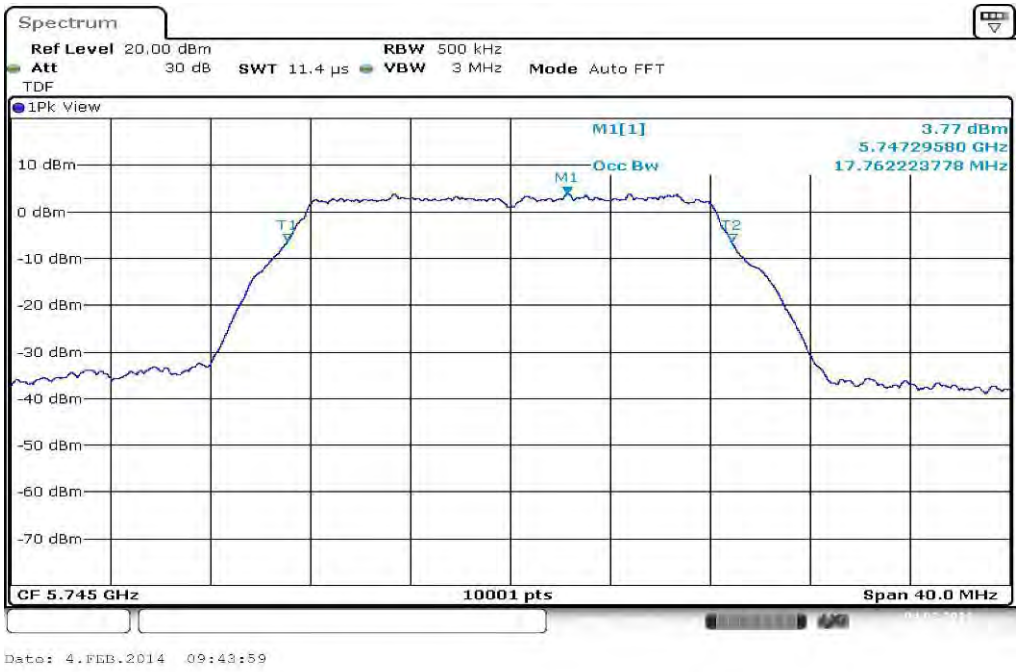
Results:

Modulation / Frequency	20 dB bandwidth [MHz]		
	Lowest channel	Middle channel	Highest channel
OFDM / a – mode	17.76	17.85	17.81
OFDM / n/ac – mode HT20	18.53	18.39	18.42
OFDM / n/ac – mode HT40	36.79		36.87
OFDM / ac – mode HT80	75.72		
Measurement uncertainty	± RBW		

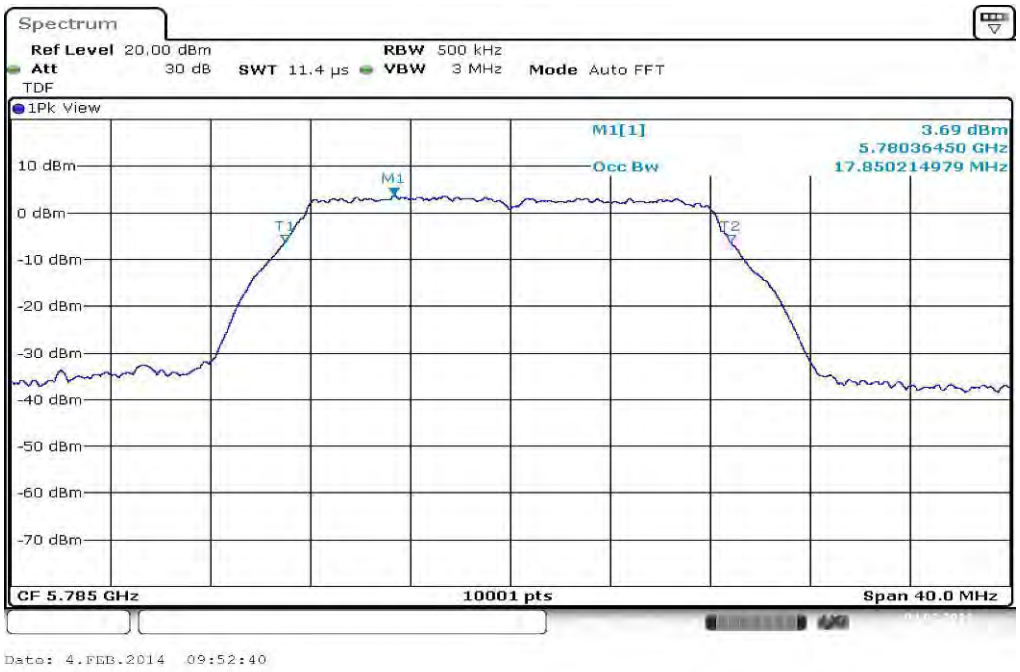
Result: Passed

Plots: OFDM / a – mode

Plot 1: TX mode, lowest channel



Plot 2: TX mode, middle channel



Plot 3: TX mode, highest channel

Plots: OFDM / n/ac – mode HT20

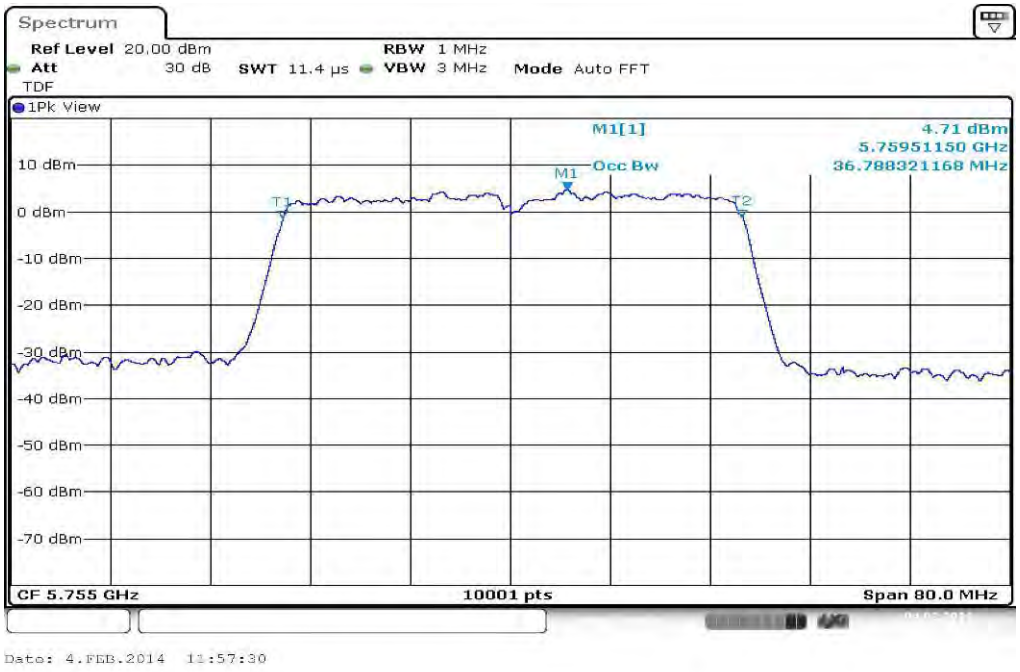
Plot 1: TX mode, lowest channel

Plot 2: TX mode, middle channel

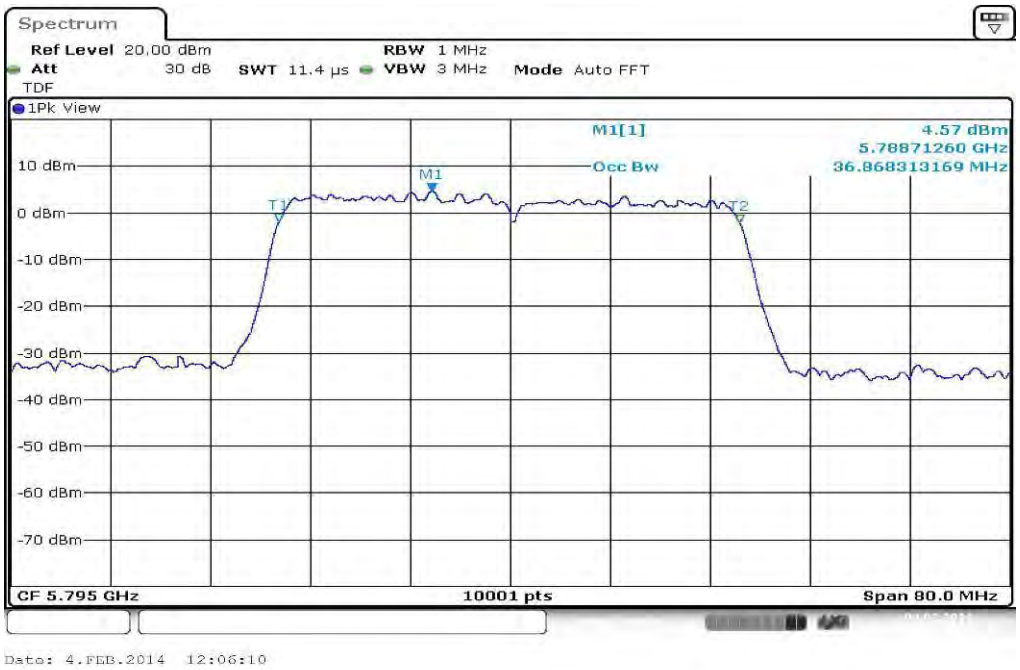
Plot 3: TX mode, highest channel

Plots: OFDM / n/ac – mode HT40

Plot 1: TX mode, lowest channel

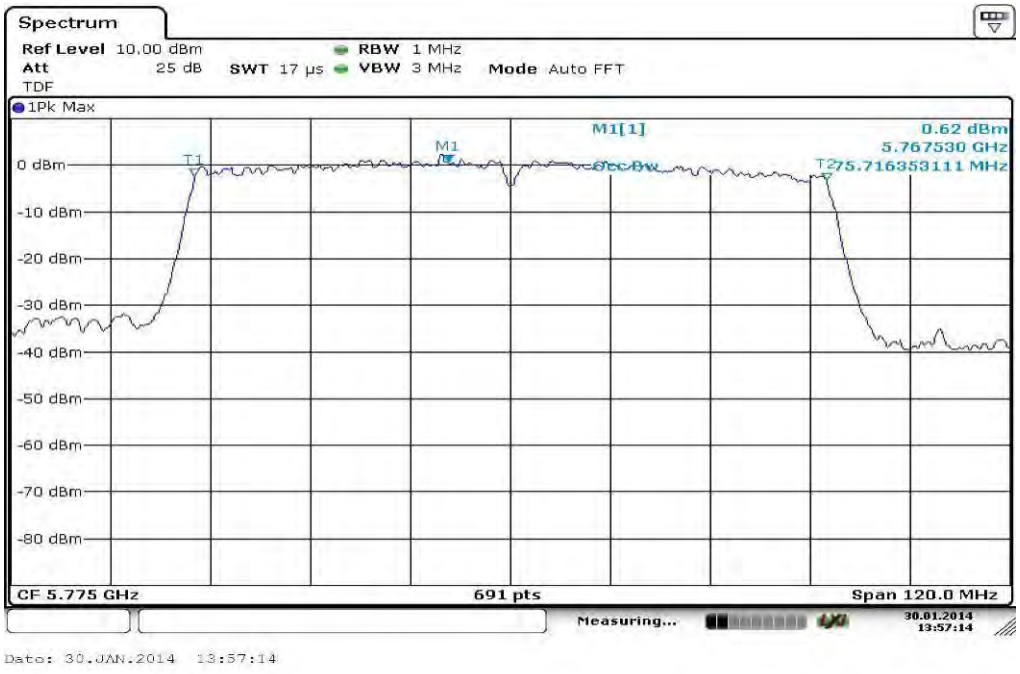


Plot 2: TX mode, highest channel



Plots: OFDM / ac – mode HT80

Plot 1: TX mode, mid channel



11.7 TX spurious emissions conducted

Description:

Measurement of the conducted 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	
According to: DTS clause 11.1 & 2	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	100 kHz
Video bandwidth:	500 kHz
Span:	9 kHz to 40 GHz
Trace-Mode:	Max Hold

Limits:

FCC	IC
TX Spurious Emissions Conducted	
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	

Results: OFDM / a – mode

TX Spurious Emissions Conducted					
OFDM / a – mode					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
5745		-0.48	30 dBm		Operating frequency
All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
5785		-0.56	30 dBm		Operating frequency
All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
5825		-0.25	30 dBm		Operating frequency
All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
Measurement uncertainty		± 3 dB			

Result: Passed

Results: OFDM / n/ac – mode HT20

TX Spurious Emissions Conducted					
OFDM / n/ac – mode HT20					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
5745		-0.55	30 dBm		Operating frequency
All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
5785		-0.46	30 dBm		Operating frequency
All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
5825		-0.94	30 dBm		Operating frequency
All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
Measurement uncertainty		± 3 dB			

Result: Passed

Results: OFDM / n/ac – mode HT40

TX Spurious Emissions Conducted					
OFDM / n/ac – mode HT40					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
5755		-3.91	30 dBm		Operating frequency
All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
5785		-3.71	30 dBm		Operating frequency
All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
Measurement uncertainty		± 3 dB			

Result: **Passed**

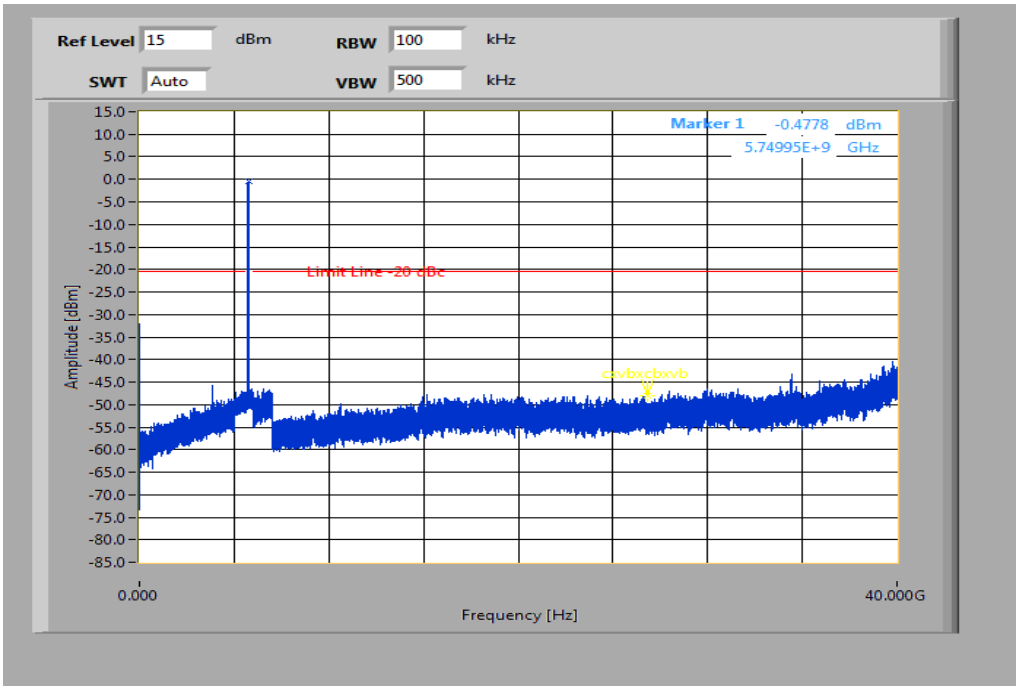
Results: OFDM / ac – mode HT80

TX Spurious Emissions Conducted					
OFDM / ac – mode HT80					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
5775		-6.41	30 dBm		Operating frequency
All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
Measurement uncertainty		± 3 dB			

Result: **Passed**

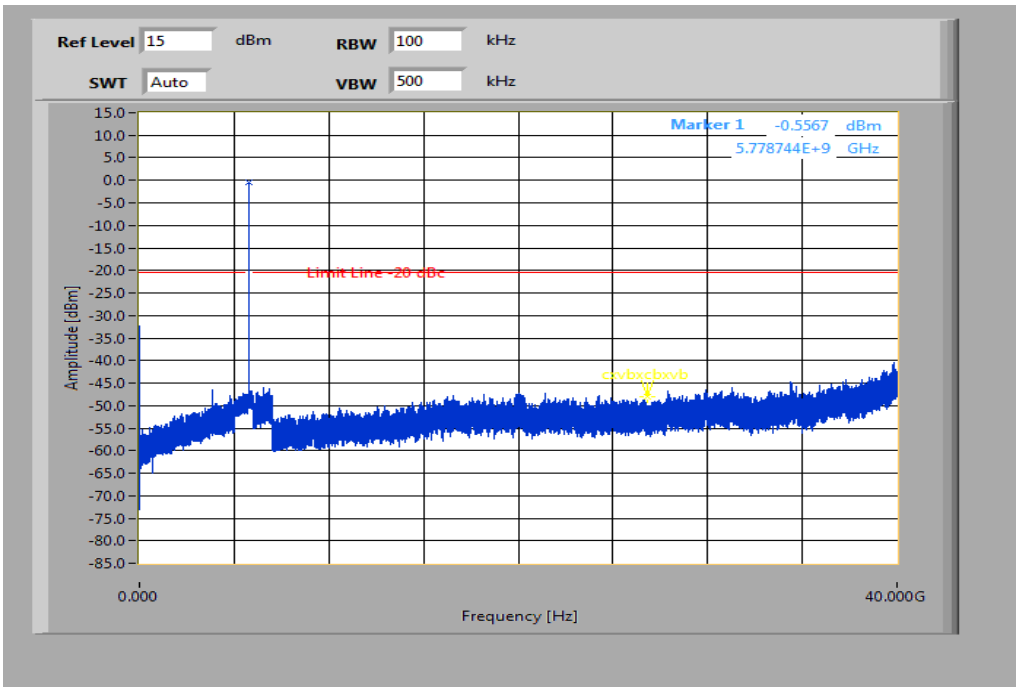
Plots: OFDM / a – mode

Plot 1: TX mode, lowest channel, up to 40 GHz



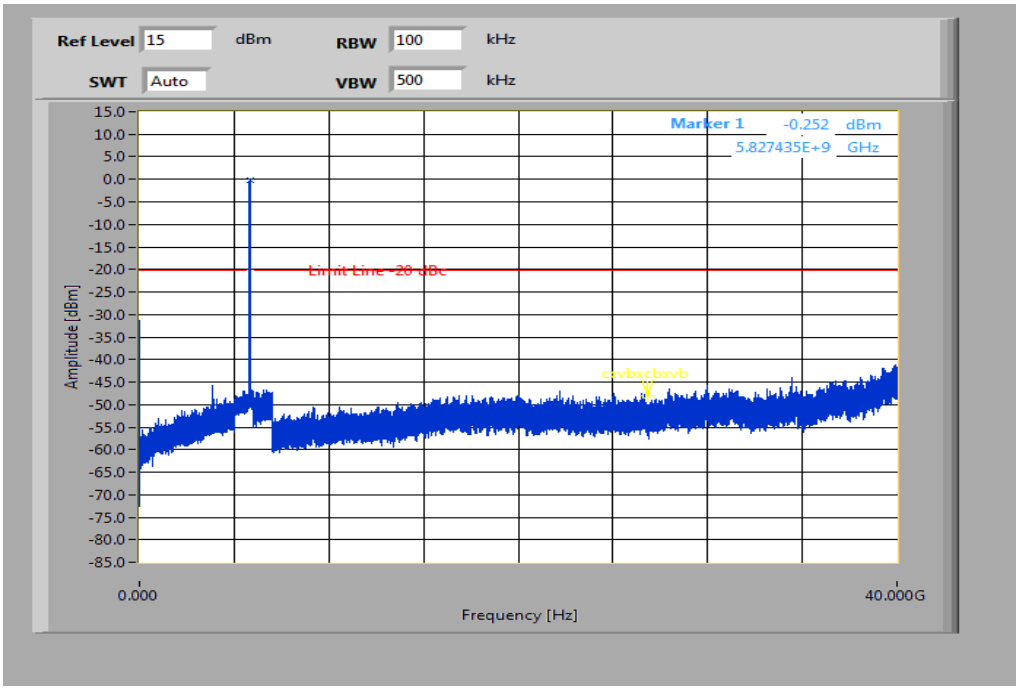
The peak at the beginning of the plot is the LO from the SA.

Plot 2: TX mode, middle channel, up to 40 GHz



The peak at the beginning of the plot is the LO from the SA.

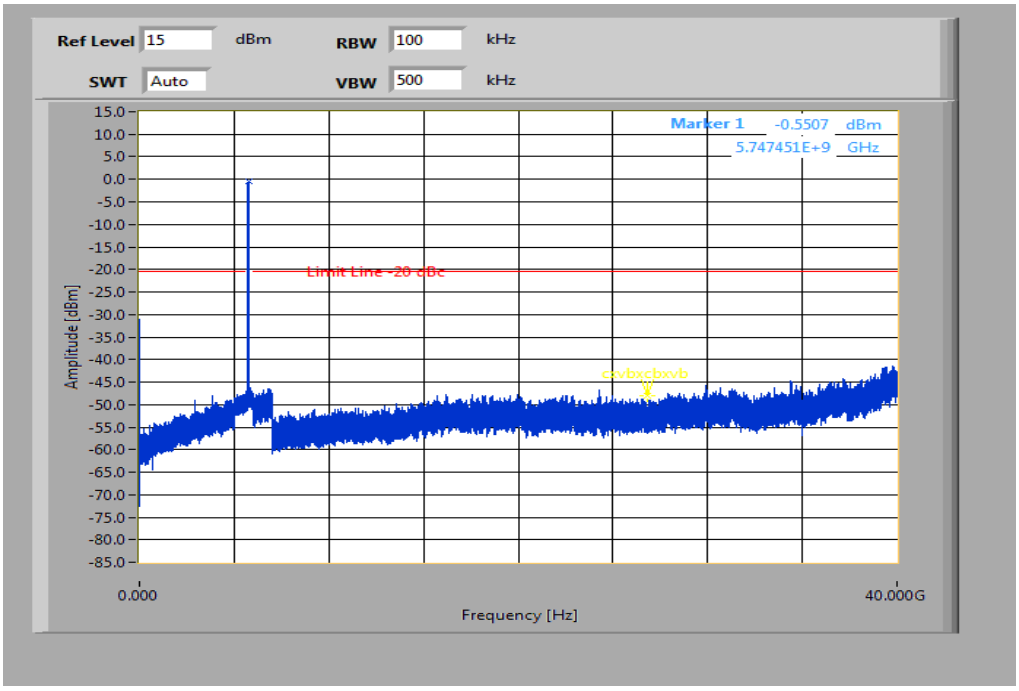
Plot 3: TX mode, highest channel, up to 40 GHz



The peak at the beginning of the plot is the LO from the SA.

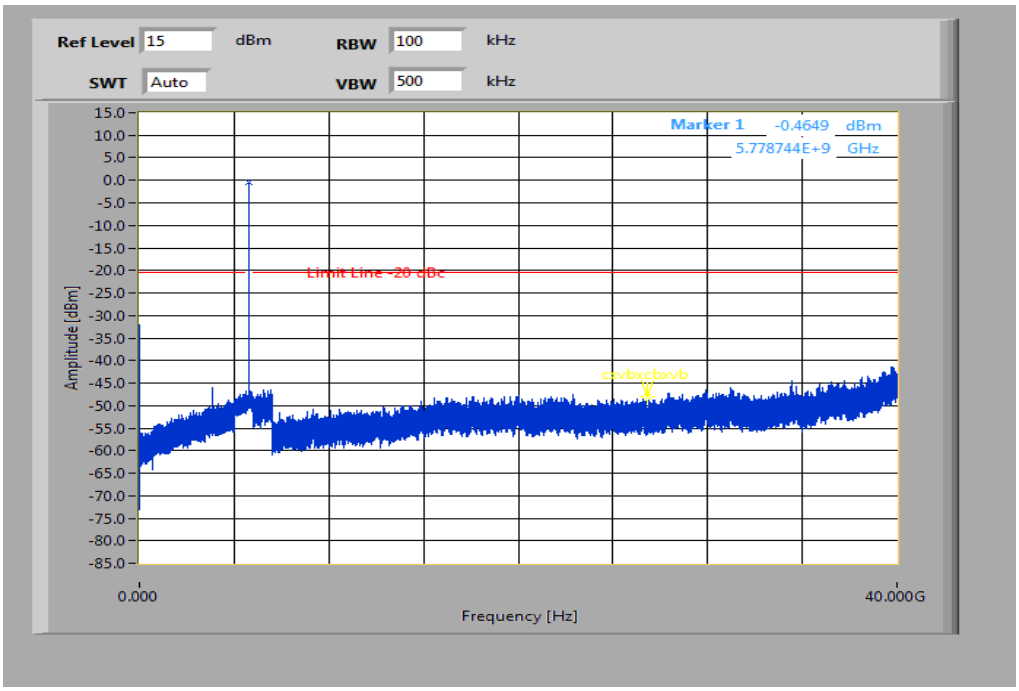
Plots: OFDM / n/ac – mode HT20

Plot 1: TX mode, lowest channel, up to 40 GHz



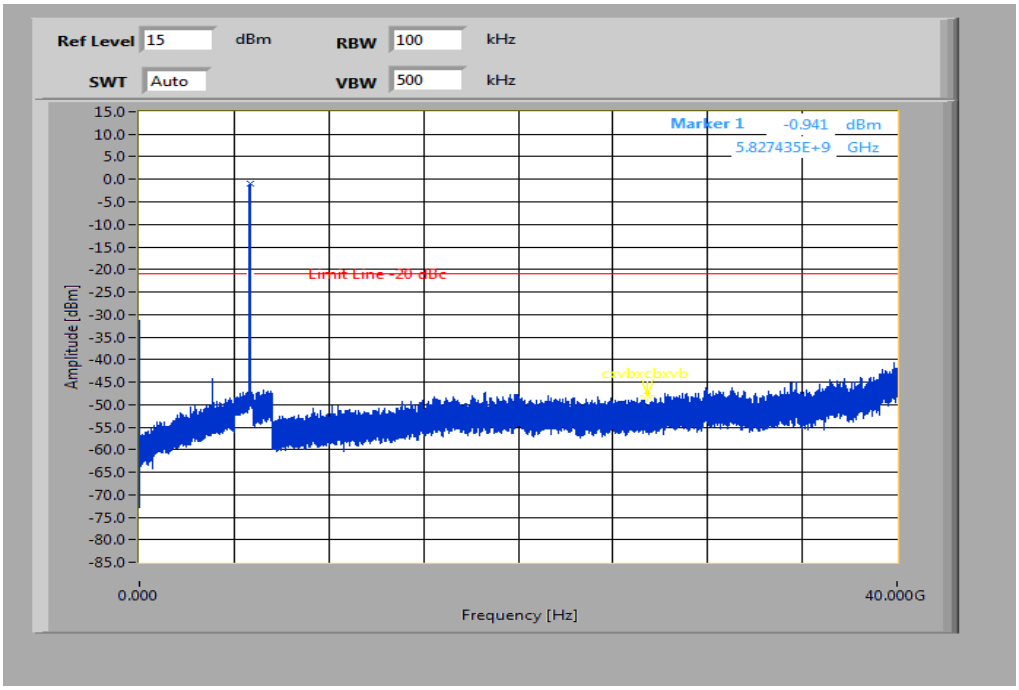
The peak at the beginning of the plot is the LO from the SA.

Plot 2: TX mode, middle channel, up to 40 GHz



The peak at the beginning of the plot is the LO from the SA.

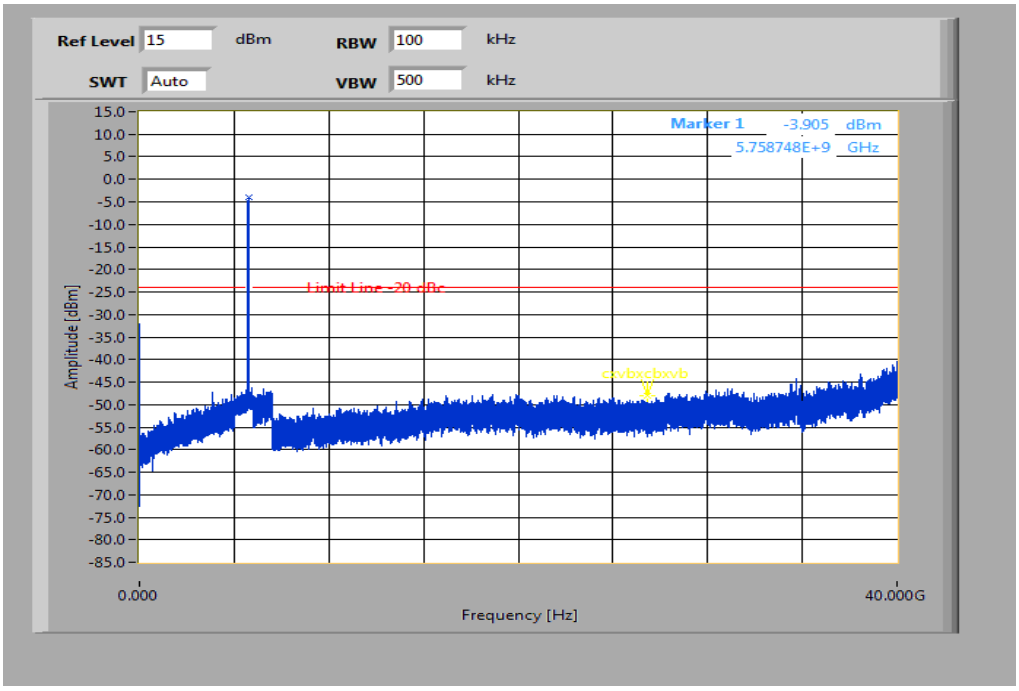
Plot 3: TX mode, highest channel, up to 40 GHz



The peak at the beginning of the plot is the LO from the SA.

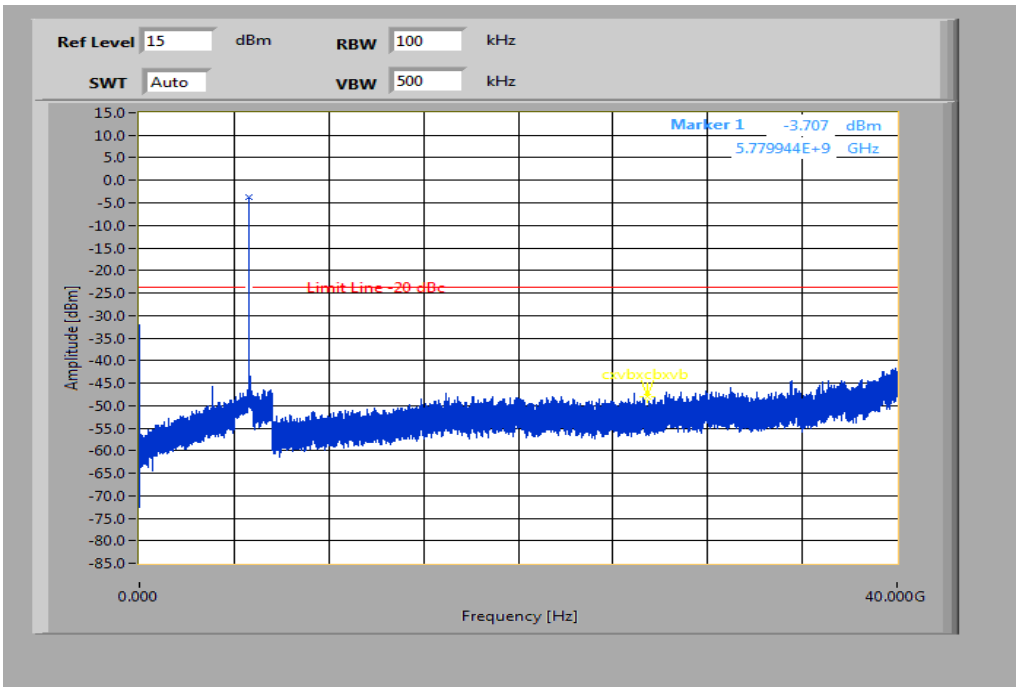
Plots: OFDM / n/ac – mode HT40

Plot 1: TX mode, lowest channel, up to 40 GHz



The peak at the beginning of the plot is the LO from the SA.

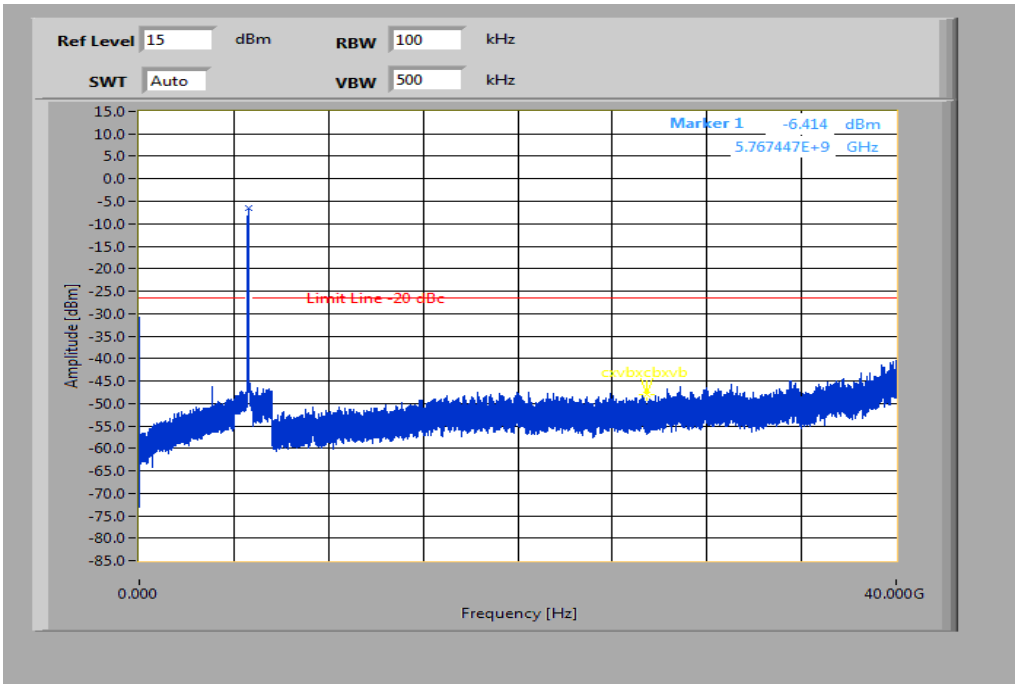
Plot 2: TX mode, highest channel, up to 40 GHz



The peak at the beginning of the plot is the LO from the SA.

Plots: OFDM / ac – mode HT80

Plot 1: TX mode, lowest channel, up to 40 GHz



The peak at the beginning of the plot is the LO from the SA.

11.8 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	☒ OFDM a – mode ☒ OFDM n/ac – mode HT20 ☒ OFDM n/ac – mode HT40 ☒ 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.		
Above 1 GHz: All detected peak emissions are below the average limit! See plots!			Above 1 GHz: All detected peak emissions are below the average limit! See plots!			Above 1 GHz: All detected peak emissions are below the average limit! See plots!		
Measurement uncertainty			± 3 dB					

Results: OFDM / n/ac – mode HT20

TX Spurious Emissions Radiated [dBµV/m]								
OFDM / n – 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.		
Above 1 GHz: All detected peak emissions are below the average limit! See plots!			Above 1 GHz: All detected peak emissions are below the average limit! See plots!			Above 1 GHz: All detected peak emissions are below the average limit! See plots!		
Measurement uncertainty			± 3 dB					

Results: OFDM / n/ac – mode HT40

TX Spurious Emissions Radiated [dBµV/m]					
OFDM / n – 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.		
Above 1 GHz: All detected peak emissions are below the average limit! See plots!			Above 1 GHz: All detected peak emissions are below the average limit! See plots!		
Measurement uncertainty			± 3 dB		

Results: OFDM / ac – mode HT80

TX Spurious Emissions Radiated [dBµV/m]		
OFDM / ac – mode HT80		
5775 MHz		
F [MHz]	Detector	Level [dBµV/m]
For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.		
Above 1 GHz: All detected peak emissions are below the average limit! See plots!		
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: OFDM / a – mode

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

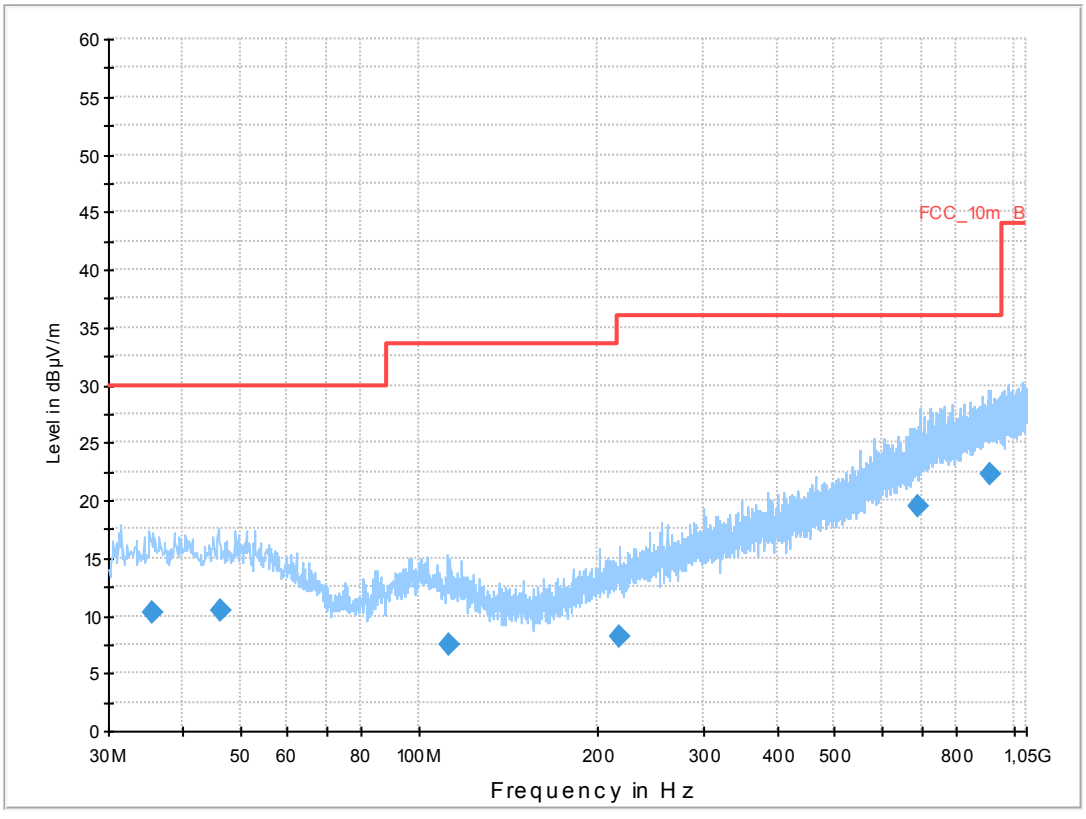
Common Information

EUT:	TS-0020-BV
Serial Number:	CB51268FMT
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	WLAN a-mode TX Ch 149
Operator Name:	Wolsdorfer
Comment:	battery powered

Scan Setup: STAN_Fin [EMI radiated]

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

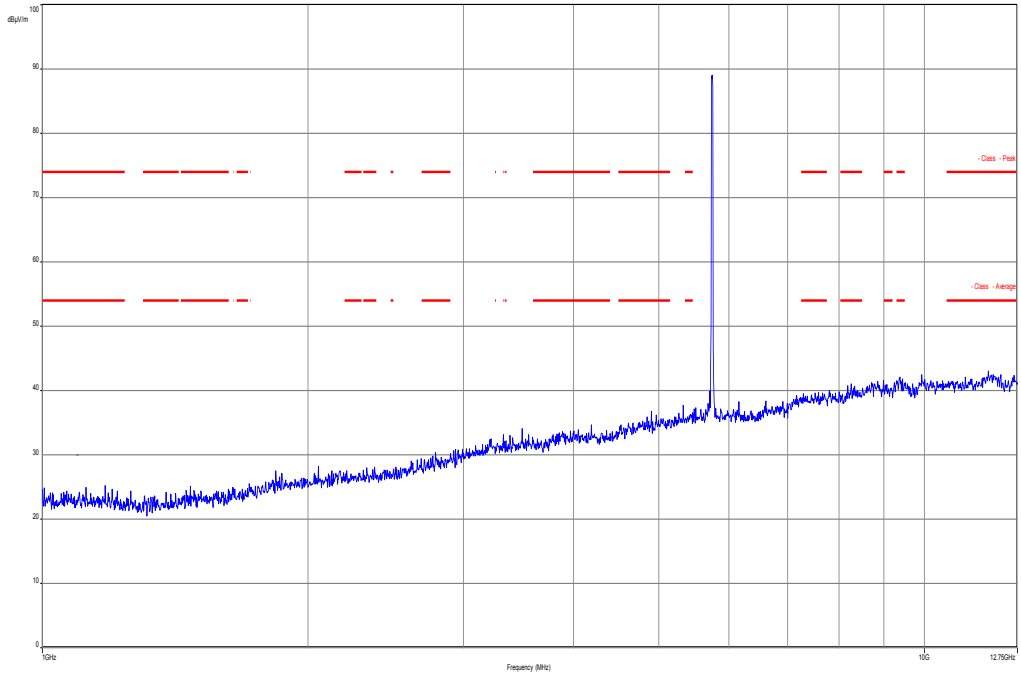
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



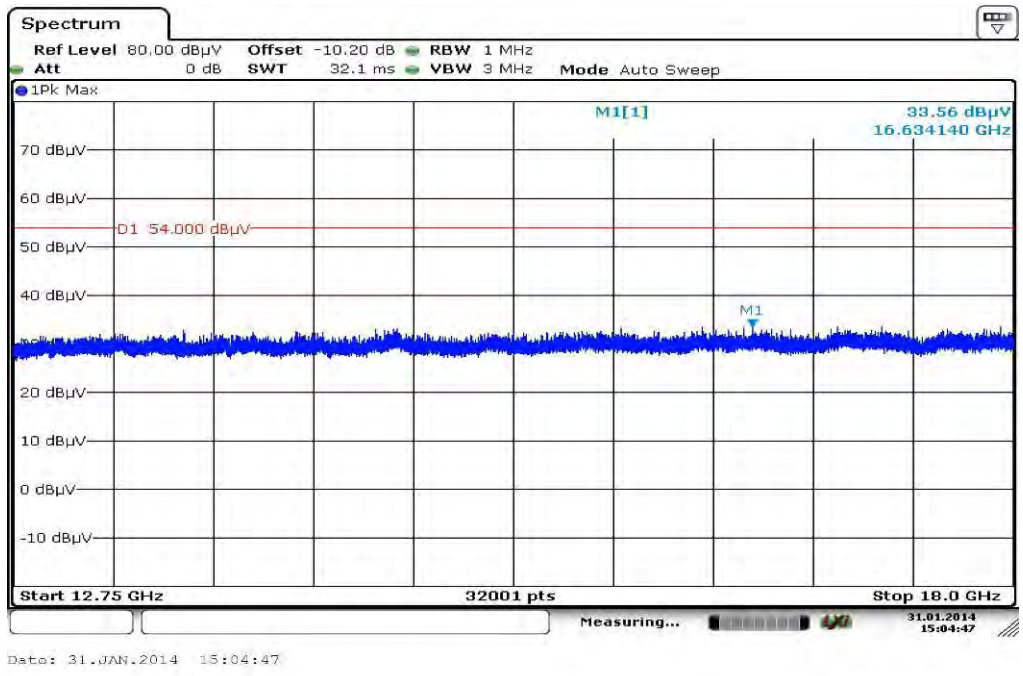
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
35.578500	10.3	1000.0	120.000	132.0	H	272.0	13.1	19.7	30.0	
46.303650	10.4	1000.0	120.000	98.0	V	170.0	13.3	19.6	30.0	
112.587150	7.5	1000.0	120.000	132.0	H	260.0	10.8	26.0	33.5	
217.348200	8.3	1000.0	120.000	170.0	V	10.0	12.3	27.7	36.0	
692.874900	19.6	1000.0	120.000	170.0	H	267.0	22.3	16.4	36.0	
916.339650	22.2	1000.0	120.000	170.0	V	-10.0	25.3	13.8	36.0	

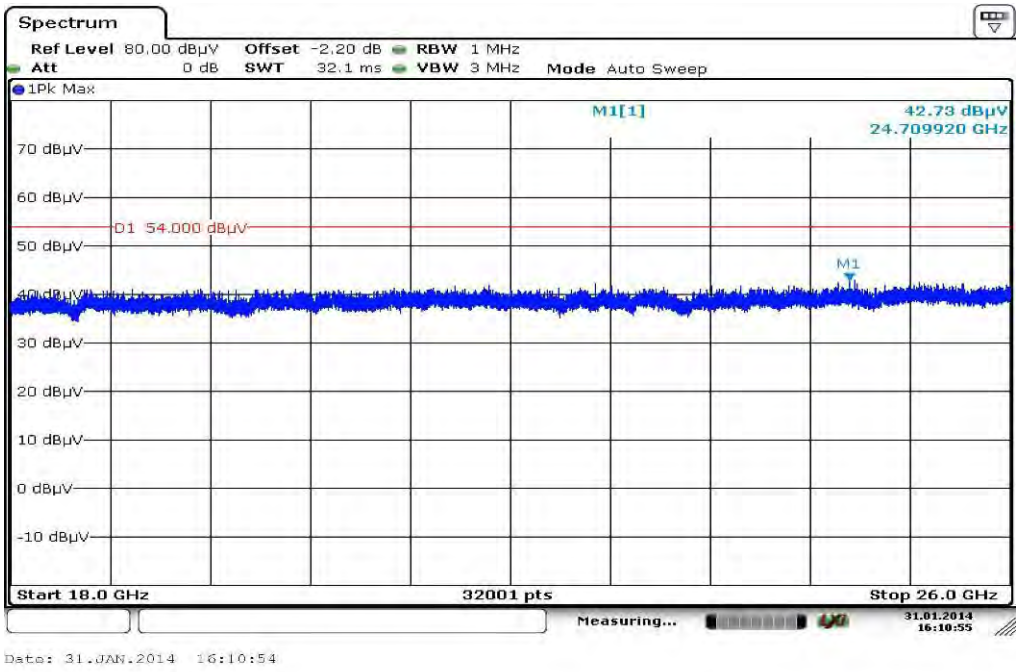
Plot 2: Lowest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization



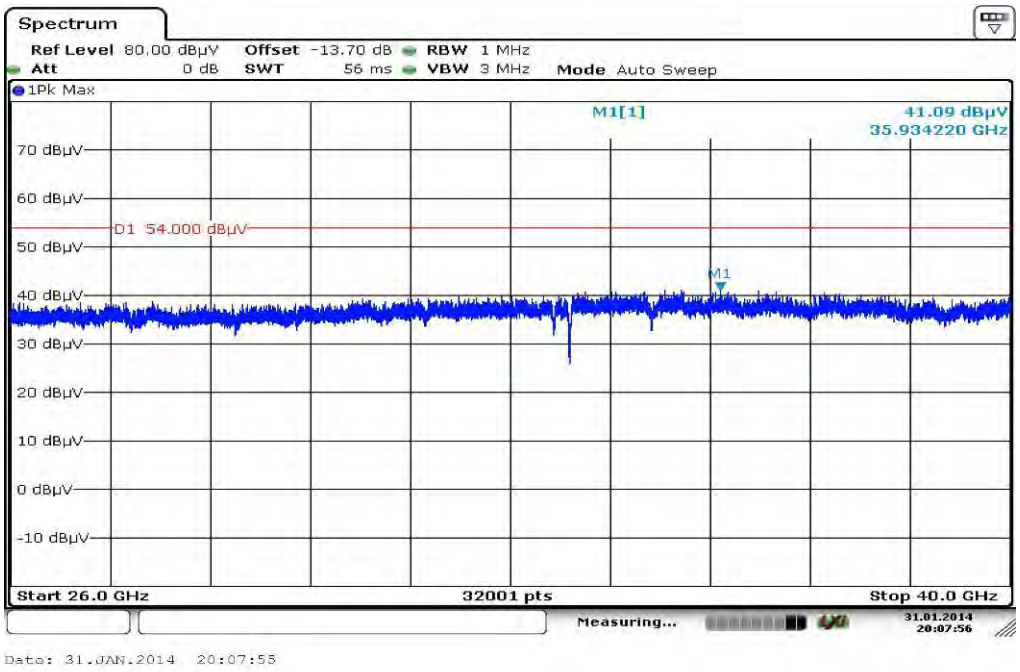
Plot 3: Lowest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



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



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



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

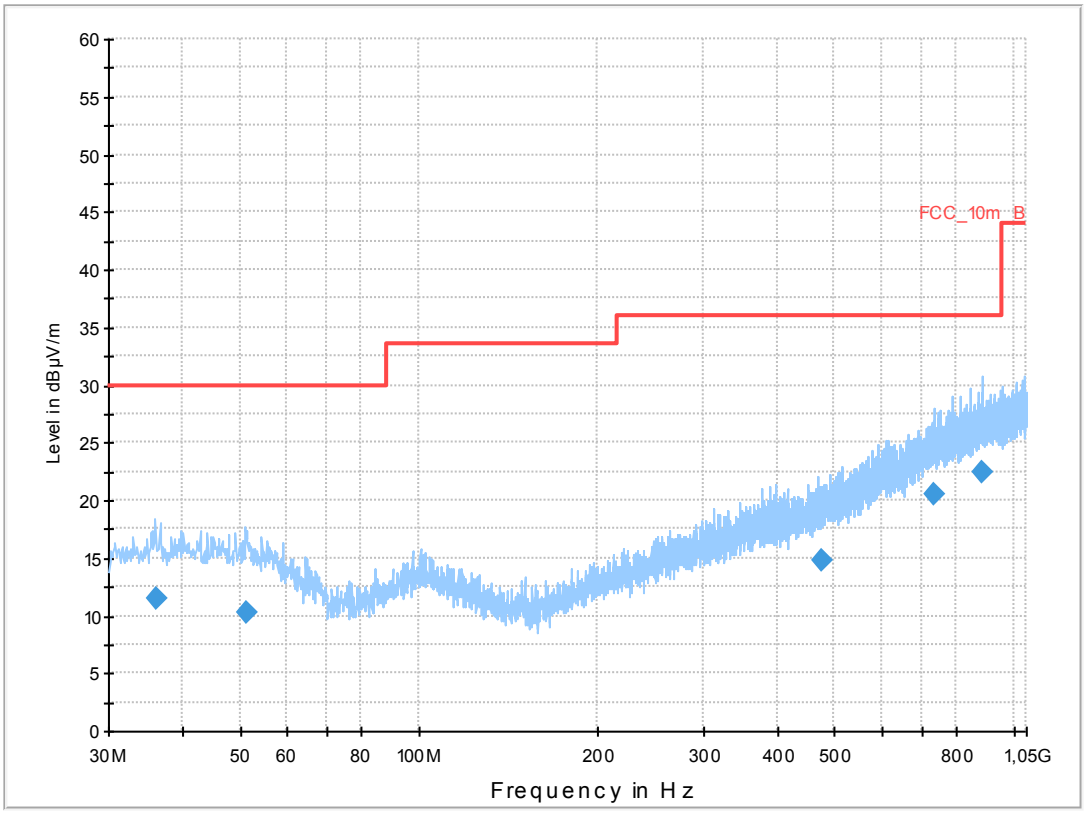
Common Information

EUT:	TS-0020-BV
Serial Number:	CB51268FMT
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	WLAN a-mode TX Ch 157
Operator Name:	Wolsdorfer
Comment:	battery powered

Scan Setup: STAN_Fin [EMI radiated]

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

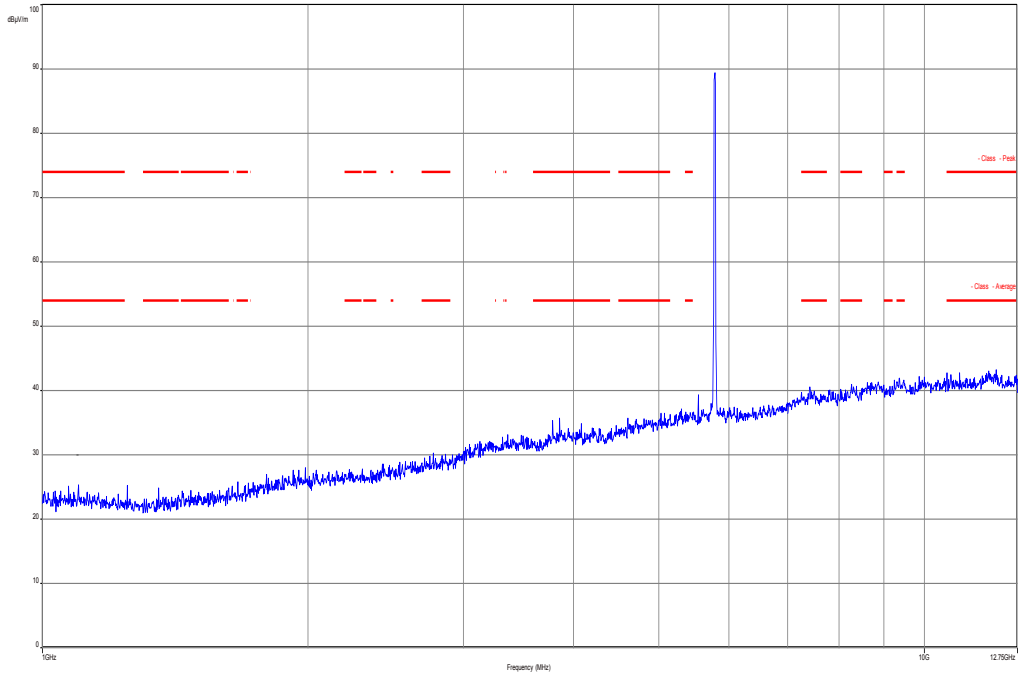
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



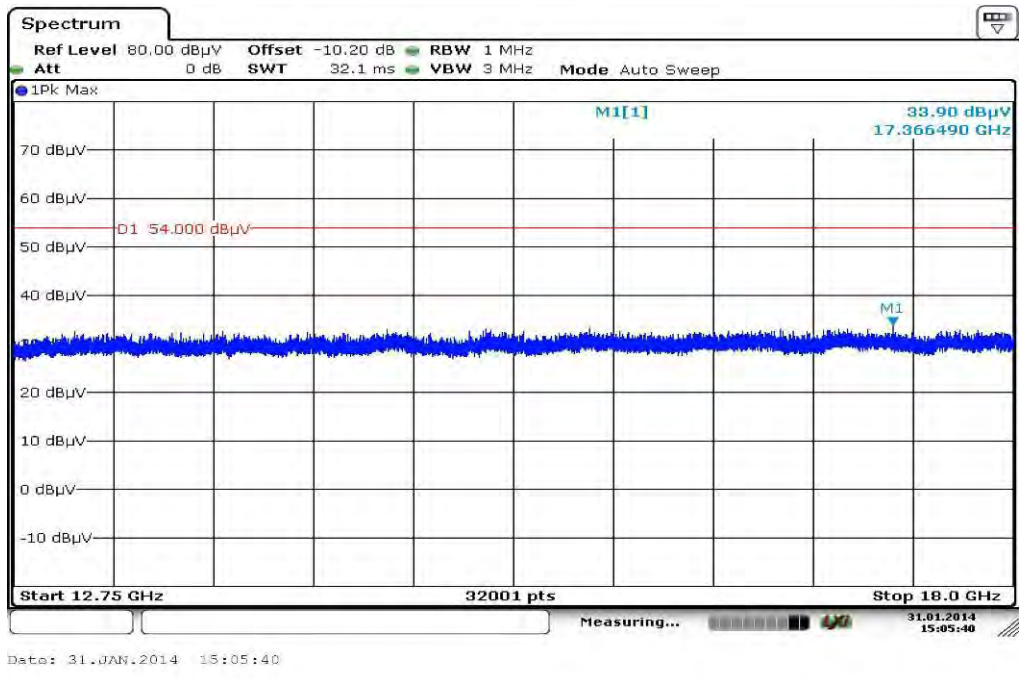
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
36.050700	11.4	1000.0	120.000	98.0	V	183.0	13.1	18.6	30.0	
51.132000	10.3	1000.0	120.000	170.0	H	10.0	13.3	19.7	30.0	
475.619700	14.8	1000.0	120.000	170.0	H	81.0	18.2	21.2	36.0	
733.232850	20.6	1000.0	120.000	120.0	V	81.0	23.3	15.4	36.0	
884.926500	22.4	1000.0	120.000	170.0	V	81.0	25.0	13.6	36.0	

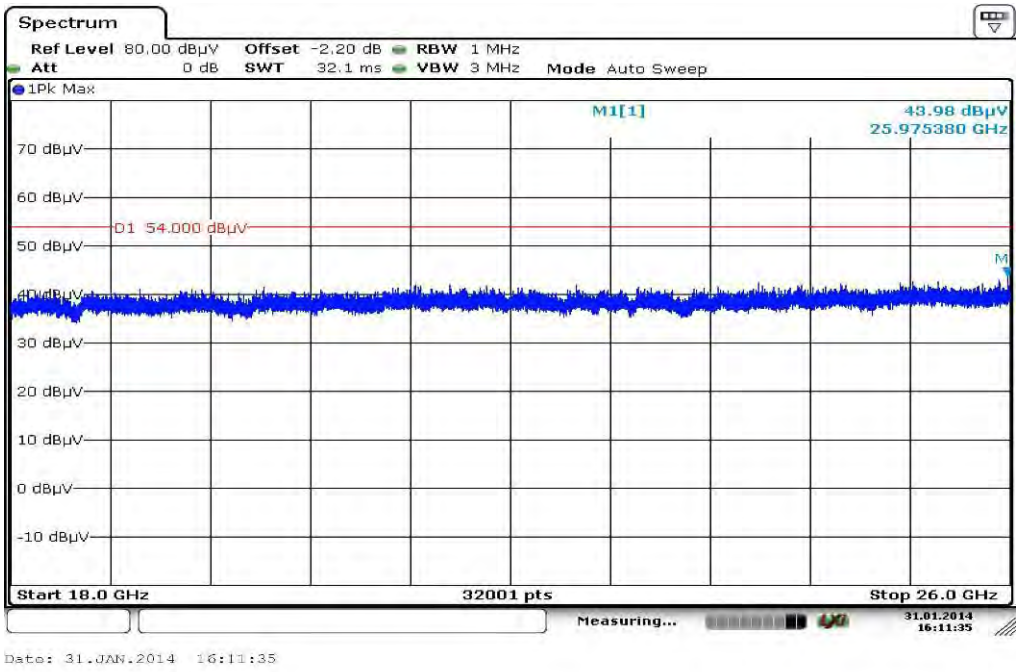
Plot 7: Middle channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization



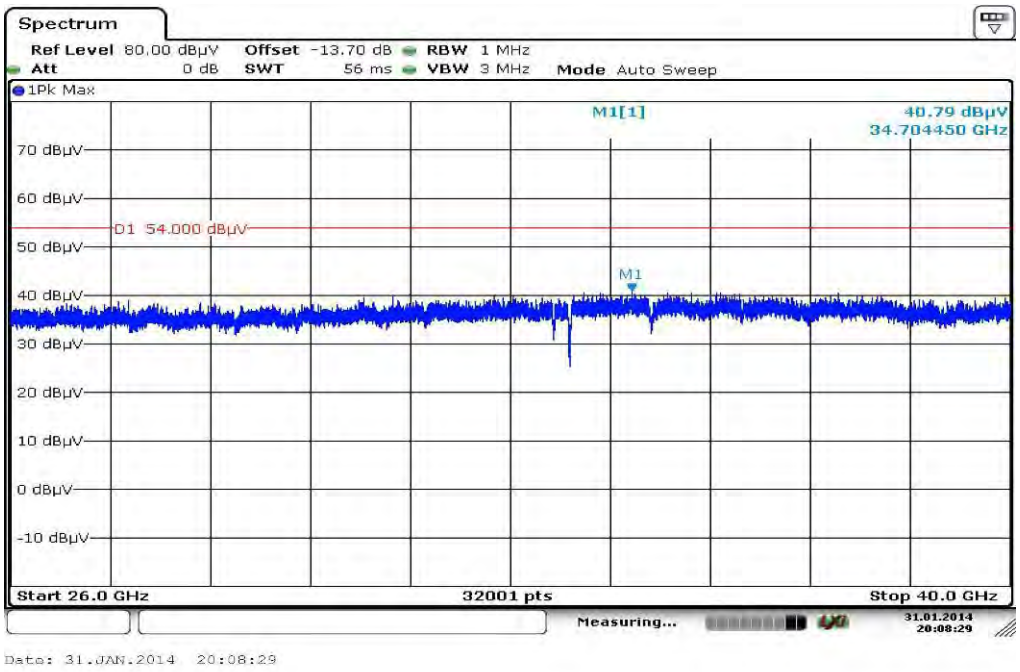
Plot 8: Middle channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



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

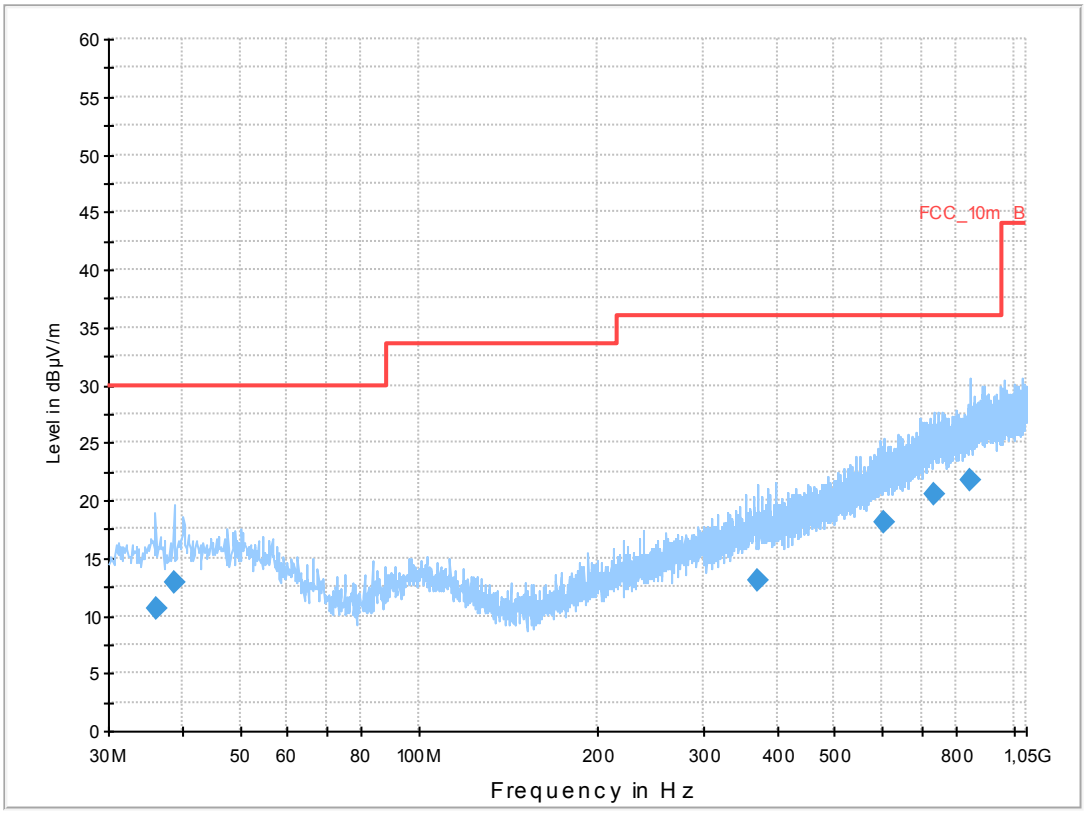
Common Information

EUT:	TS-0020-BV
Serial Number:	CB51268FMT
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	WLAN a-mode TX Ch 165
Operator Name:	Wolsdorfer
Comment:	battery powered

Scan Setup: STAN_Fin [EMI radiated]

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

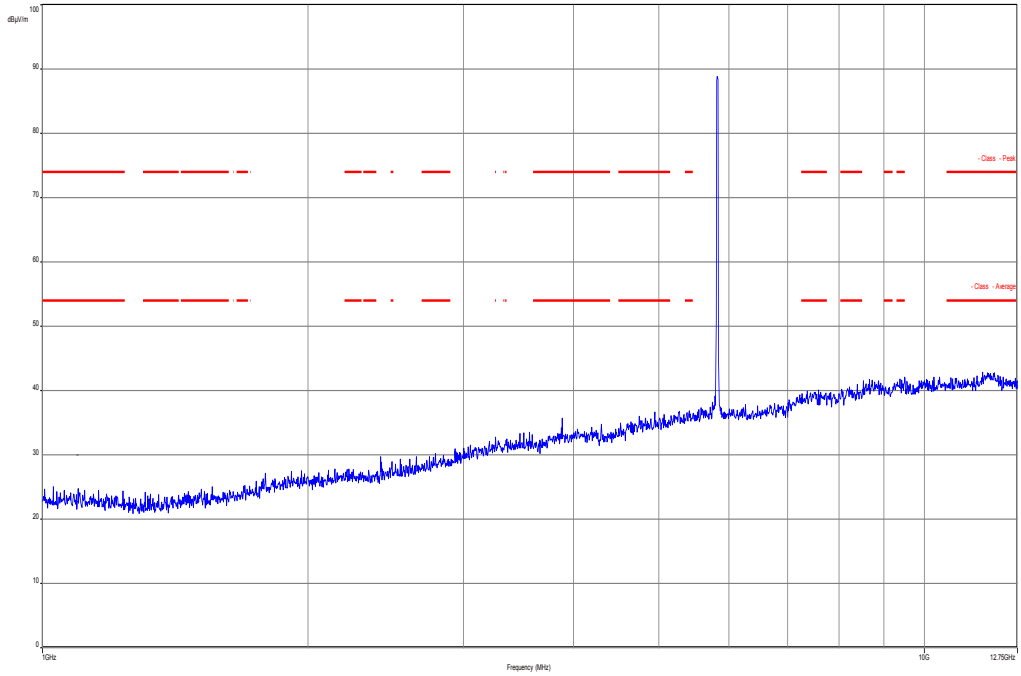
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



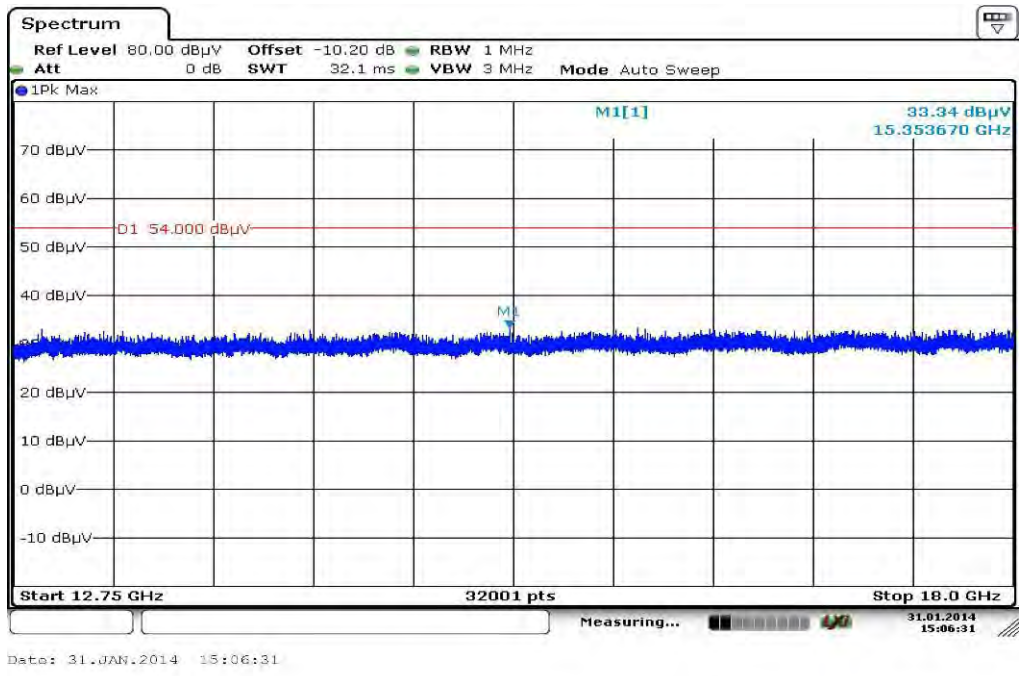
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
36.267300	10.6	1000.0	120.000	170.0	V	2.0	13.1	19.4	30.0	
38.680200	12.9	1000.0	120.000	98.0	V	270.0	13.3	17.1	30.0	
372.005250	13.0	1000.0	120.000	124.0	V	2.0	16.4	23.0	36.0	
604.001700	18.1	1000.0	120.000	160.0	H	10.0	20.8	17.9	36.0	
733.143450	20.6	1000.0	120.000	170.0	H	182.0	23.3	15.4	36.0	
...	...	...	...	...	...	...	...	...	...	...

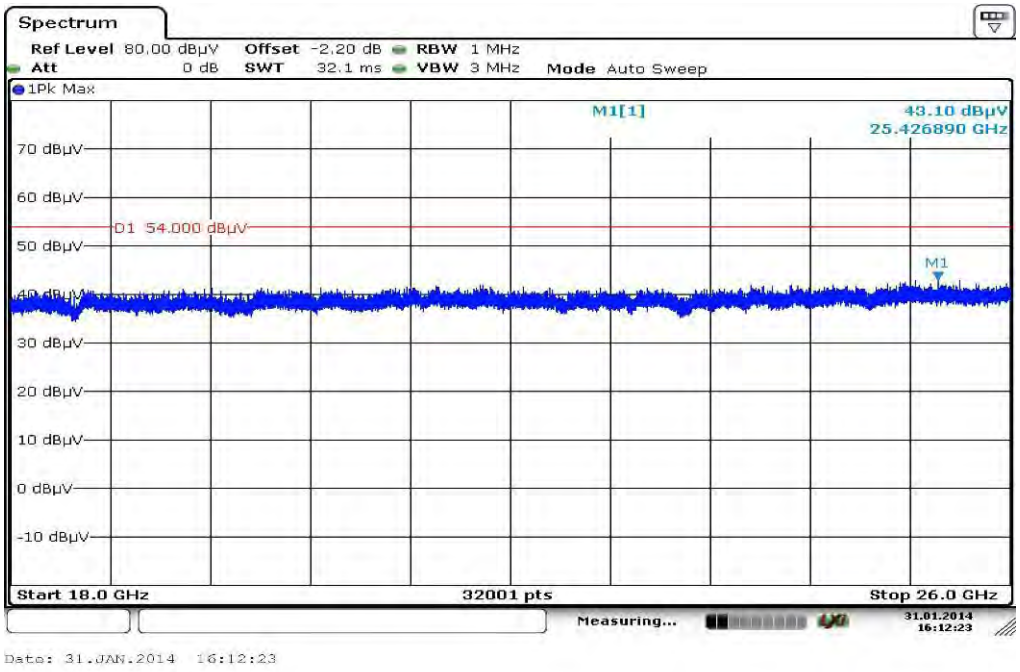
Plot 12: Highest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization



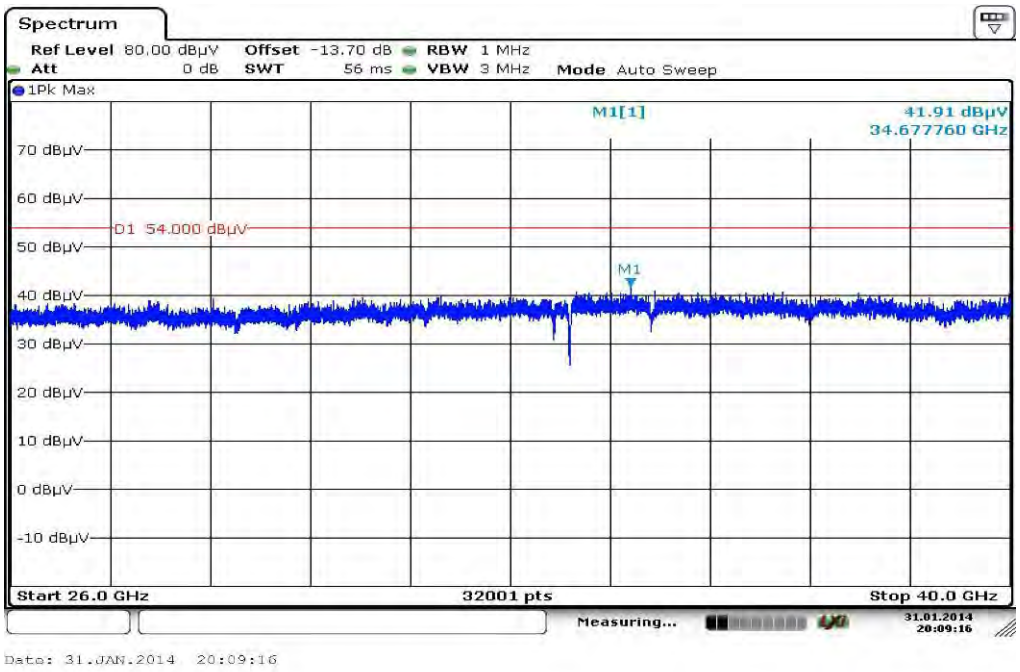
Plot 13: Highest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



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 HT20 – mode

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

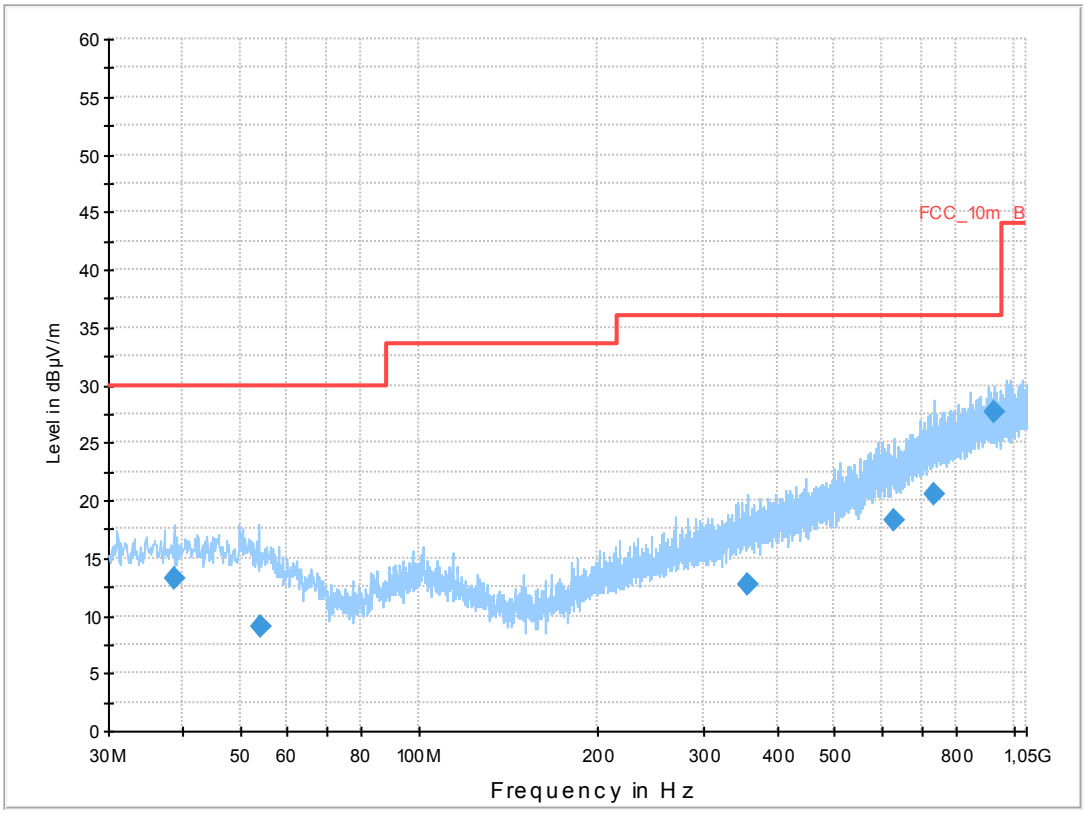
Common Information

EUT:	TS-0020-BV
Serial Number:	CB51268FMT
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	WLAN n-mode (HT20) TX Ch 149
Operator Name:	Wolsdorfer
Comment:	battery powered

Scan Setup: STAN_Fin [EMI radiated]

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

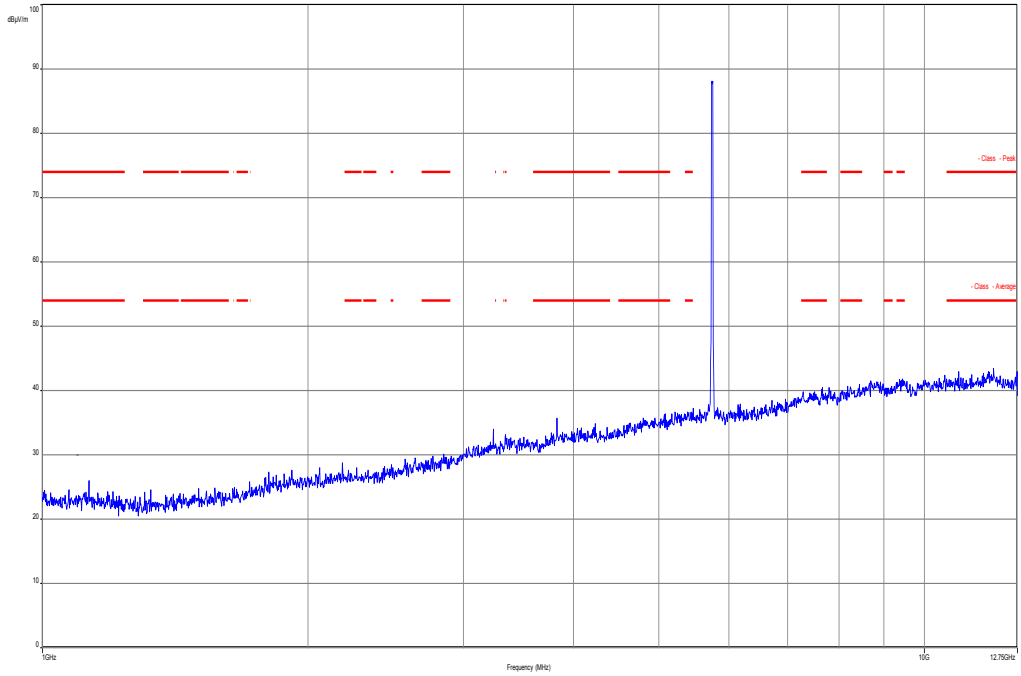
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



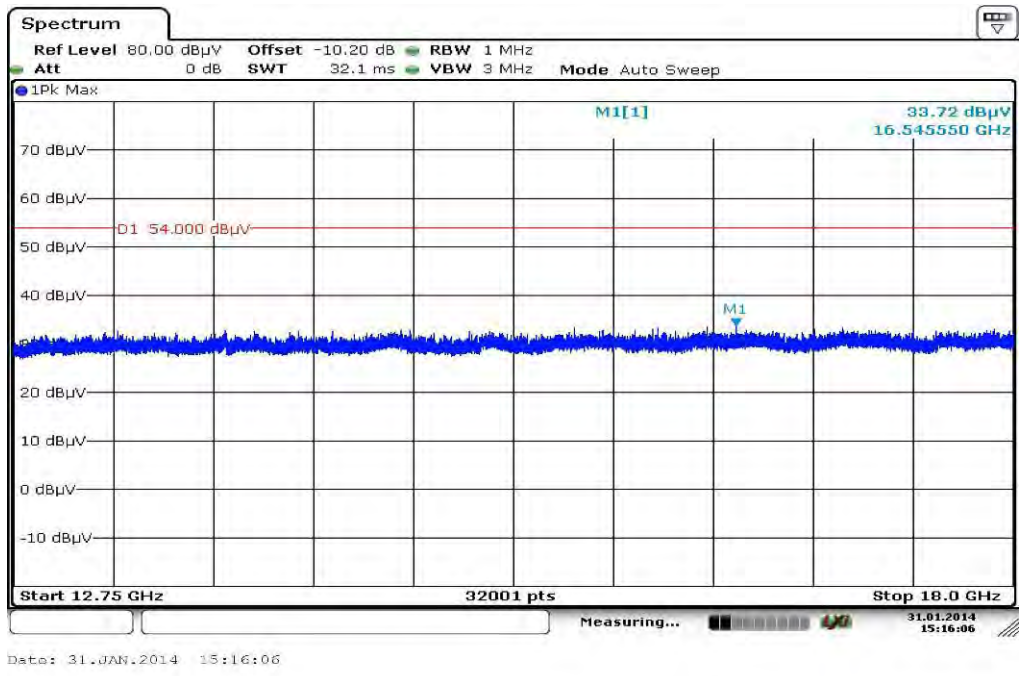
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
38.687700	13.1	1000.0	120.000	105.0	V	175.0	13.3	16.9	30.0	
54.168150	9.1	1000.0	120.000	98.0	H	171.0	13.0	20.9	30.0	
356.357100	12.7	1000.0	120.000	170.0	H	177.0	16.2	23.3	36.0	
629.081550	18.3	1000.0	120.000	170.0	V	2.0	21.0	17.7	36.0	
733.515300	20.6	1000.0	120.000	170.0	H	175.0	23.3	15.4	36.0	
927.409350	27.6	1000.0	120.000	98.0	V	-2.0	25.3	8.4	36.0	

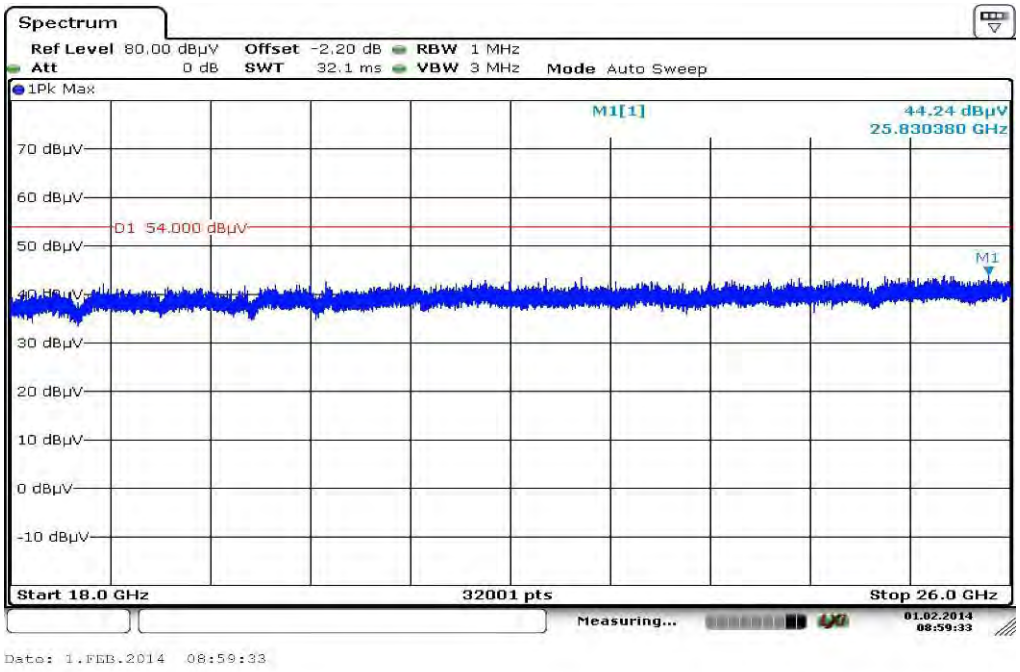
Plot 2: Lowest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization



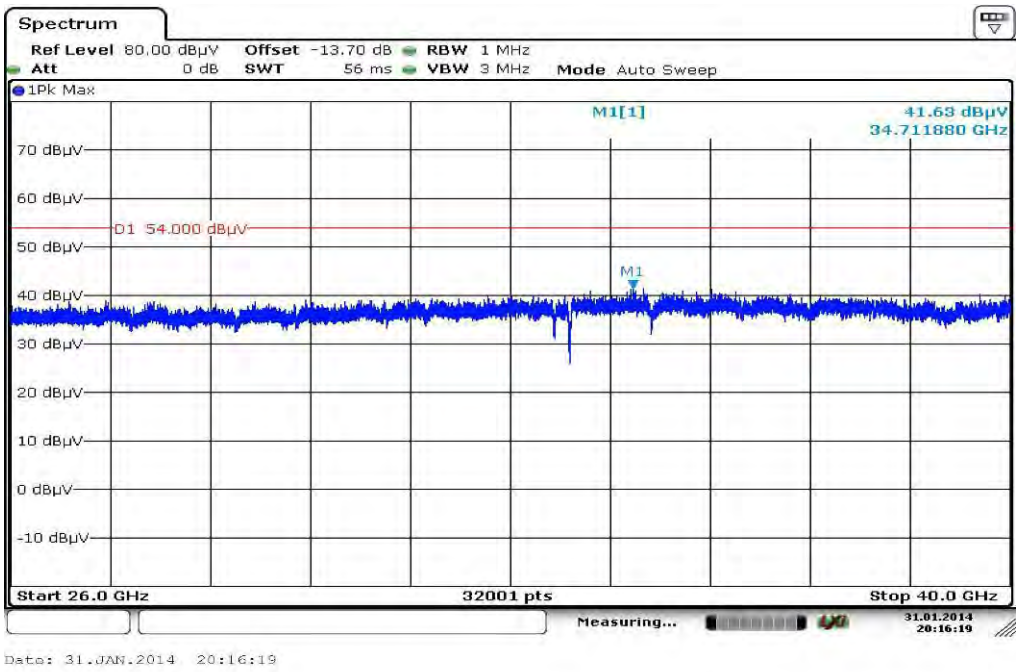
Plot 3: Lowest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



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



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



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

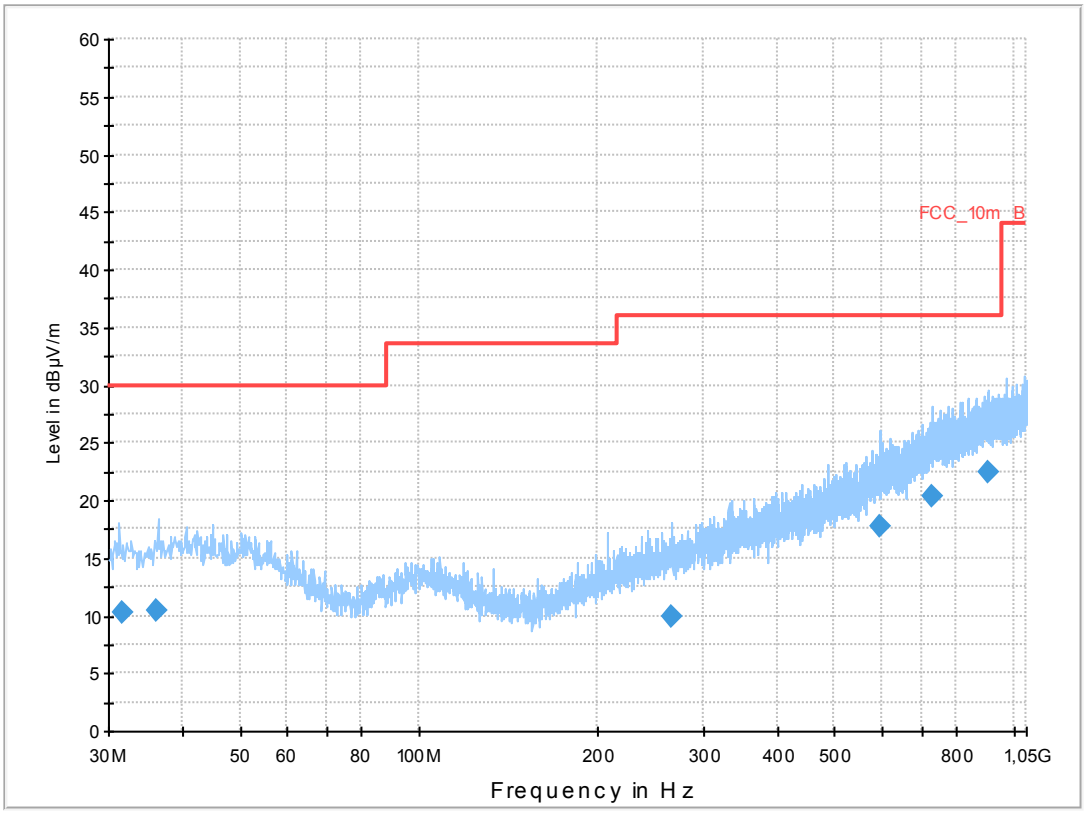
Common Information

EUT:	TS-0020-BV
Serial Number:	CB51268FMT
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	WLAN n-mode (HT20) TX Ch 157
Operator Name:	Wolsdorfer
Comment:	battery powered

Scan Setup: STAN_Fin [EMI radiated]

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

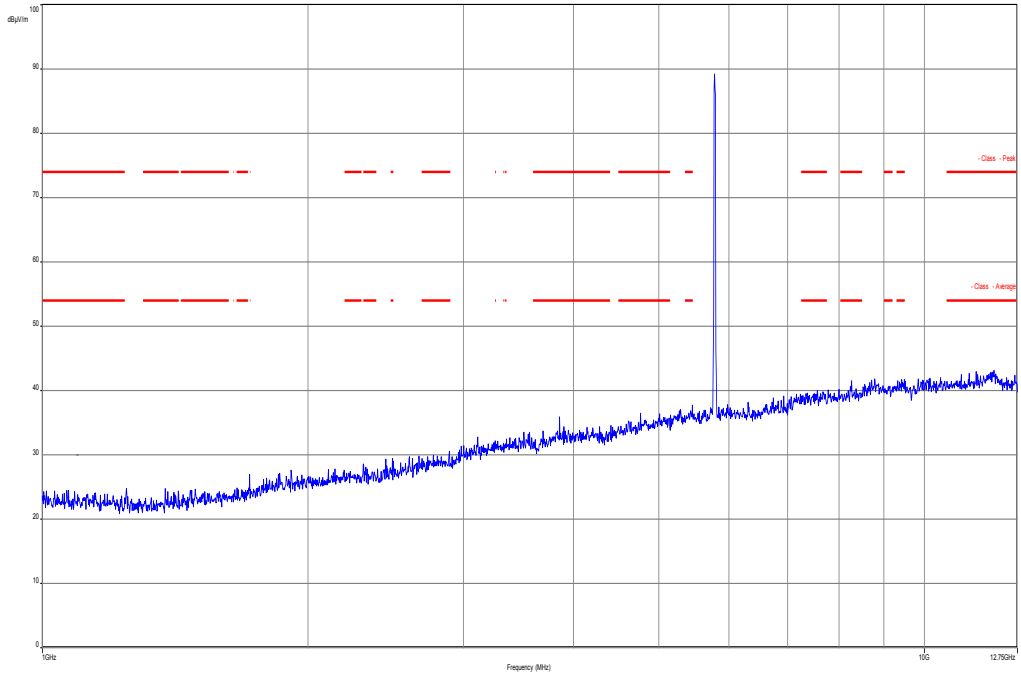
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



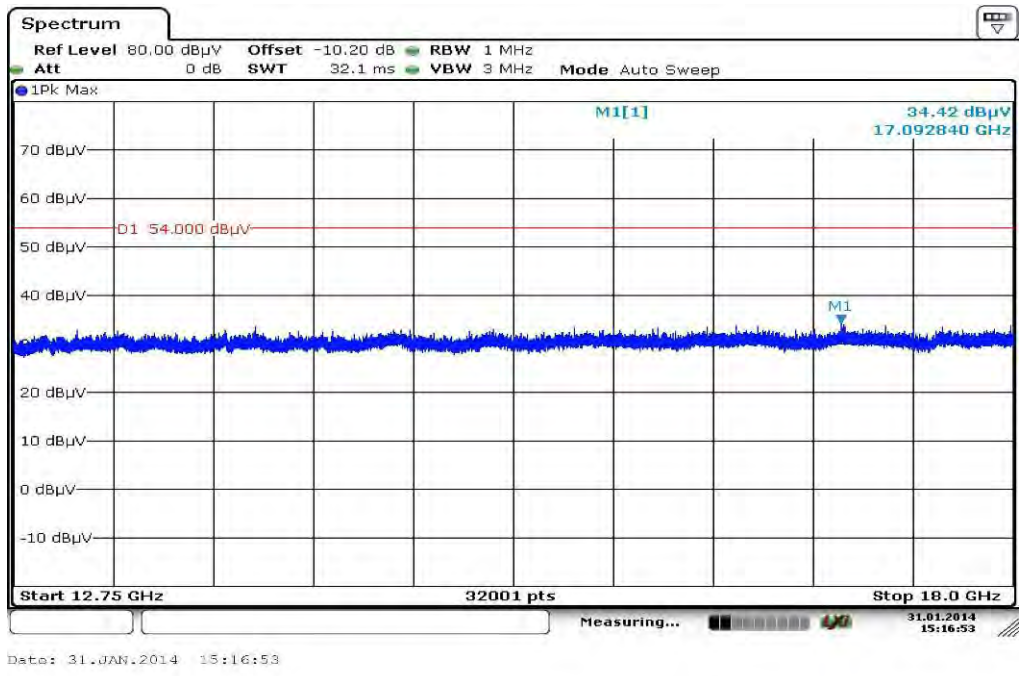
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
31.702950	10.3	1000.0	120.000	170.0	V	178.0	12.7	19.7	30.0	
36.206100	10.4	1000.0	120.000	155.0	H	269.0	13.1	19.6	30.0	
265.893450	9.9	1000.0	120.000	170.0	V	190.0	13.7	26.1	36.0	
593.842200	17.8	1000.0	120.000	170.0	V	-10.0	20.6	18.2	36.0	
728.512350	20.4	1000.0	120.000	170.0	V	81.0	23.2	15.6	36.0	
902.661900	22.4	1000.0	120.000	161.0	H	81.0	25.2	13.6	36.0	

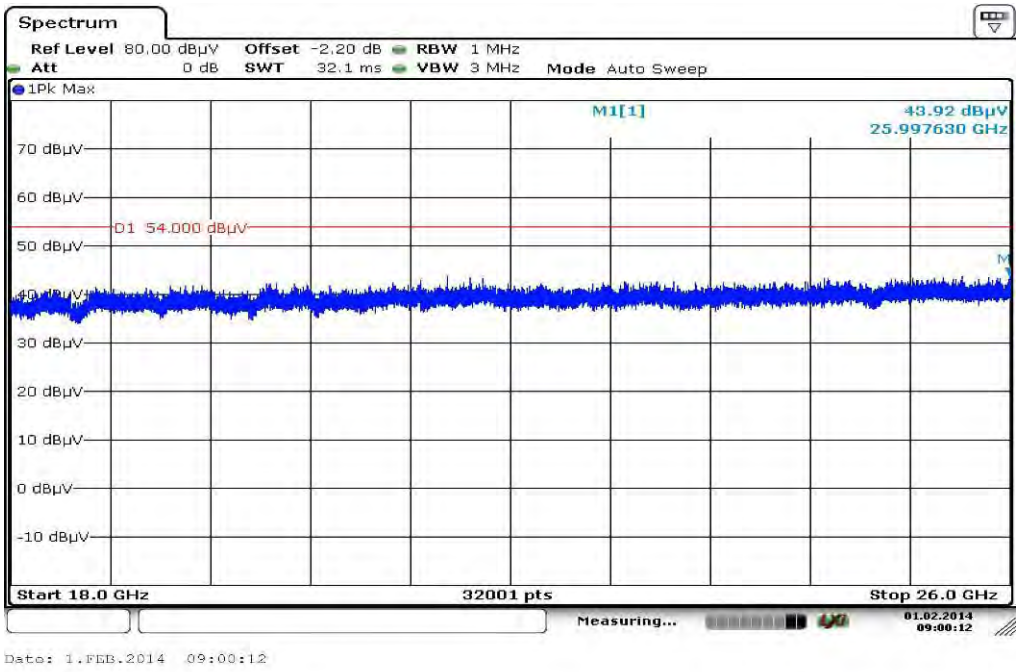
Plot 7: Middle channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization



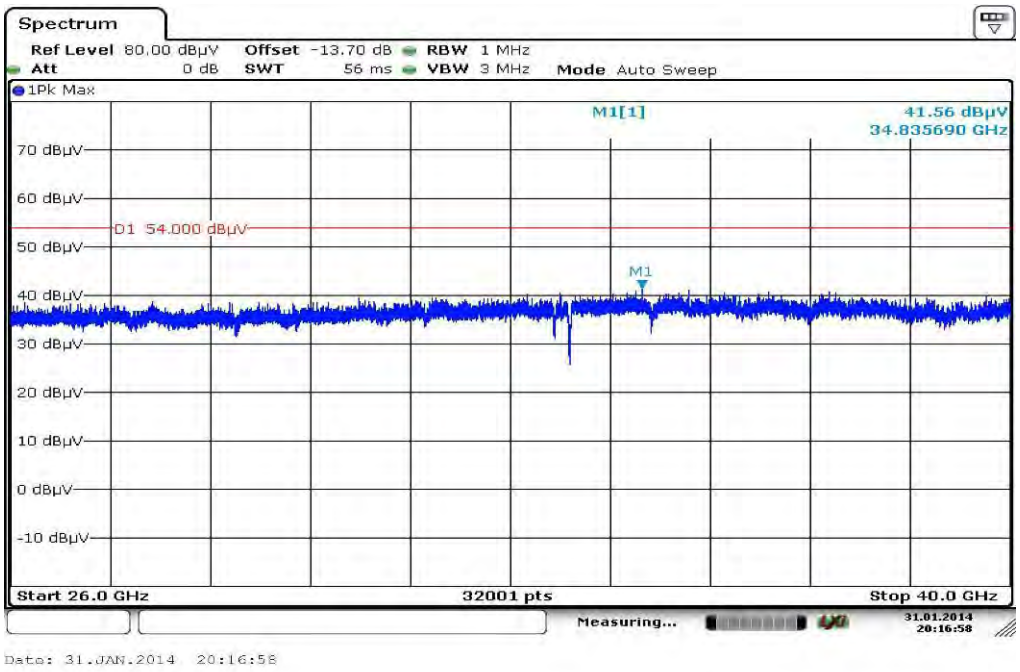
Plot 8: Middle channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



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

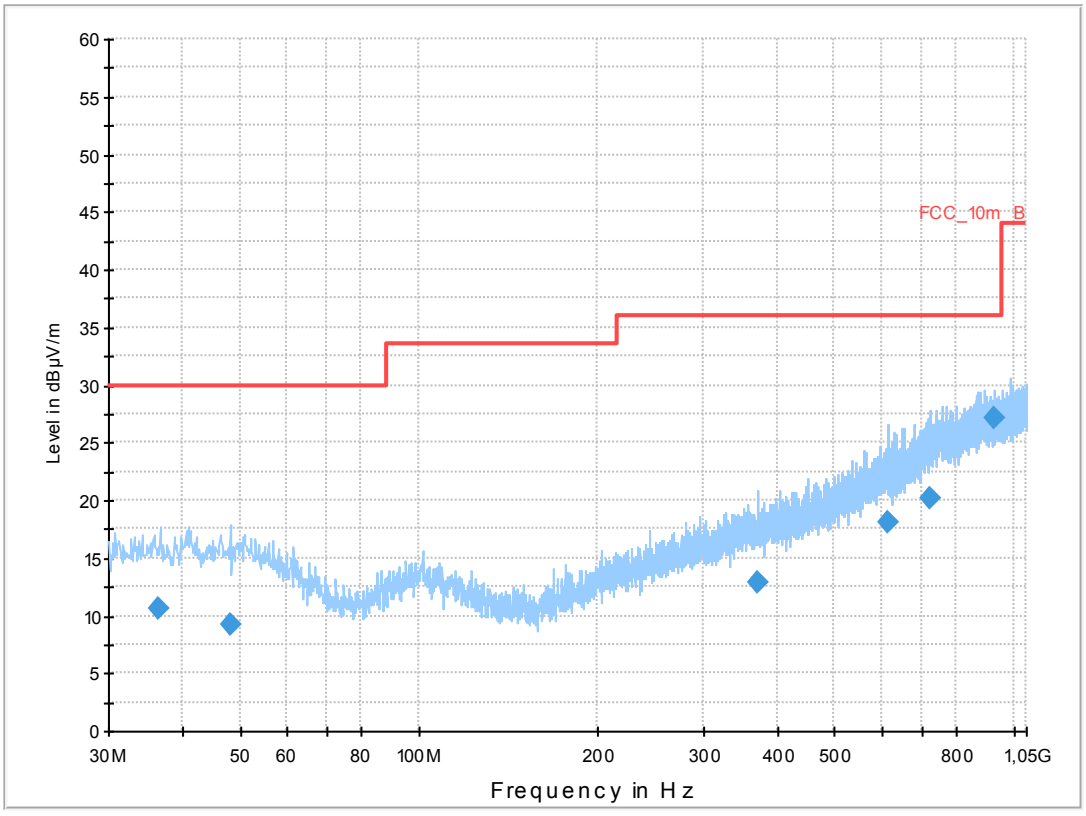
Common Information

EUT:	TS-0020-BV
Serial Number:	CB51268FMT
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	WLAN n-mode (HT20) TX Ch 165
Operator Name:	Wolsdorfer
Comment:	battery powered

Scan Setup: STAN_Fin [EMI radiated]

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

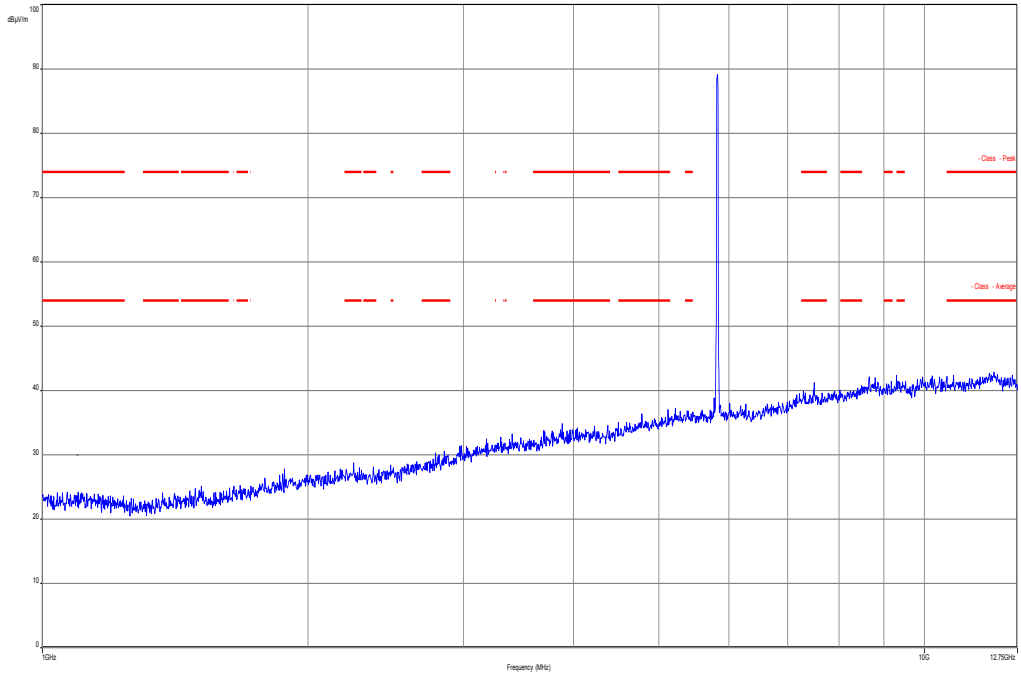
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



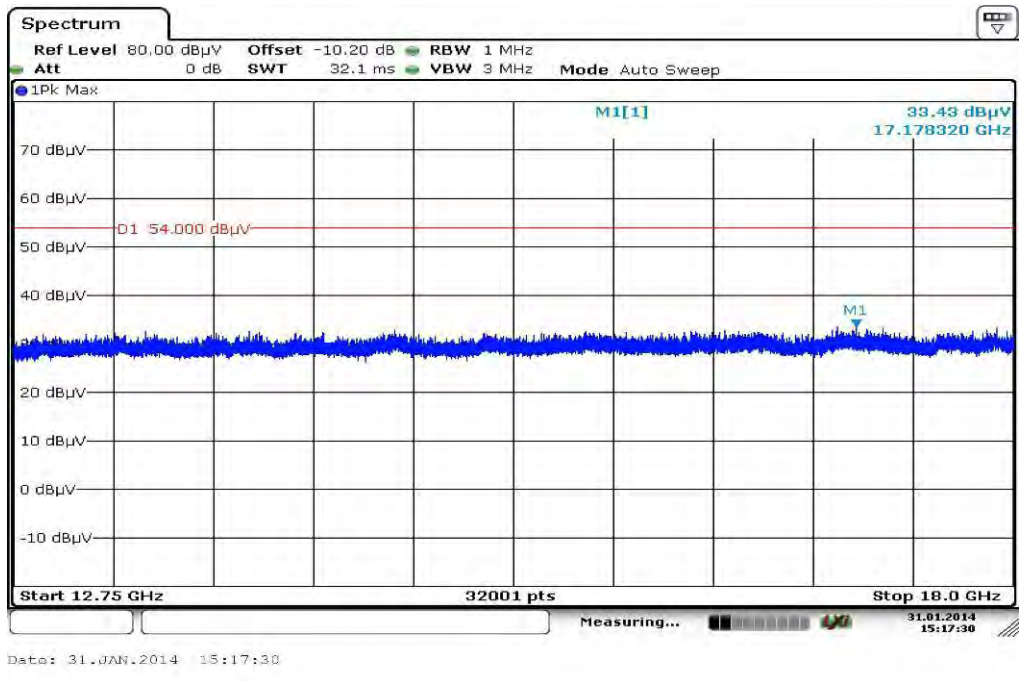
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
36.431400	10.5	1000.0	120.000	153.0	V	180.0	13.1	19.5	30.0	
48.017250	9.2	1000.0	120.000	170.0	V	261.0	13.3	20.8	30.0	
370.064550	12.9	1000.0	120.000	170.0	V	178.0	16.4	23.1	36.0	
614.913300	18.0	1000.0	120.000	170.0	V	-5.0	20.9	18.0	36.0	
721.975050	20.2	1000.0	120.000	170.0	H	100.0	23.0	15.8	36.0	
927.407700	27.1	1000.0	120.000	170.0	V	170.0	25.3	8.9	36.0	

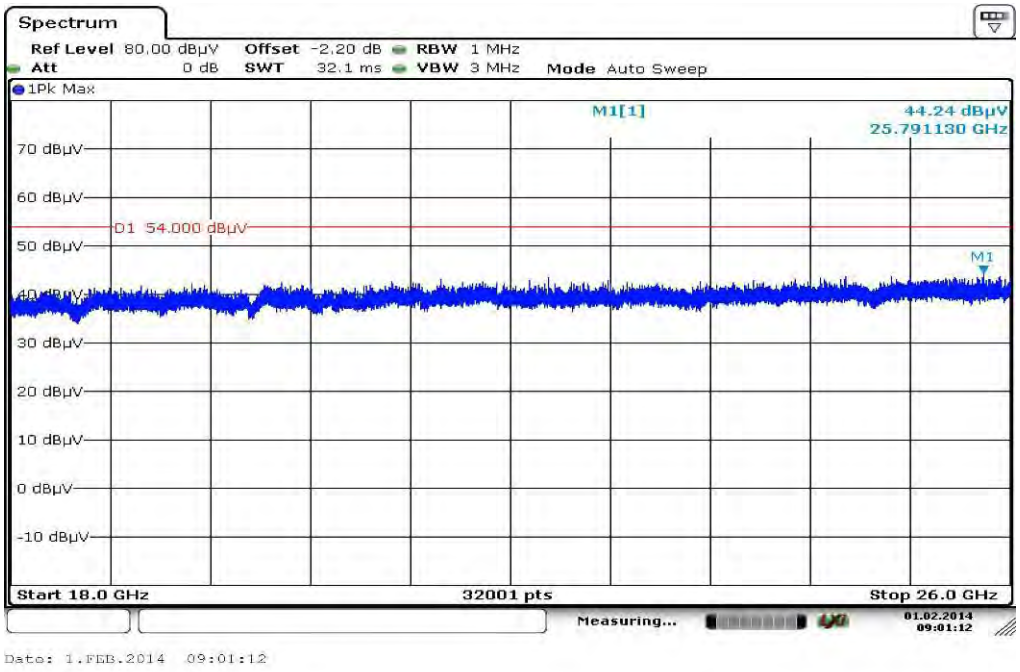
Plot 12: Highest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization



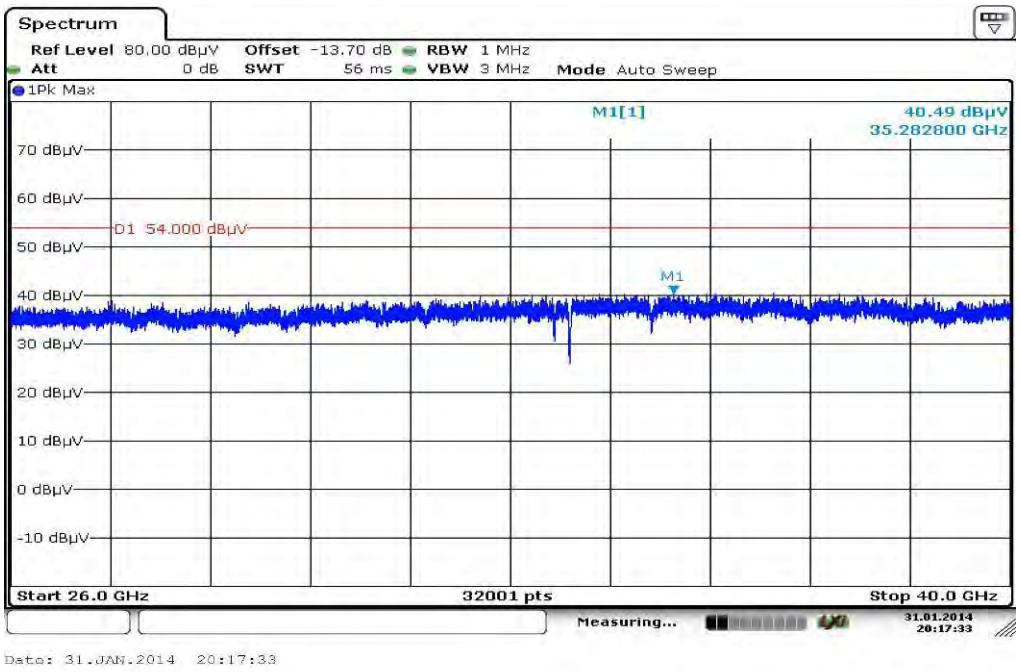
Plot 13: Highest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



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 HT40 – mode

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

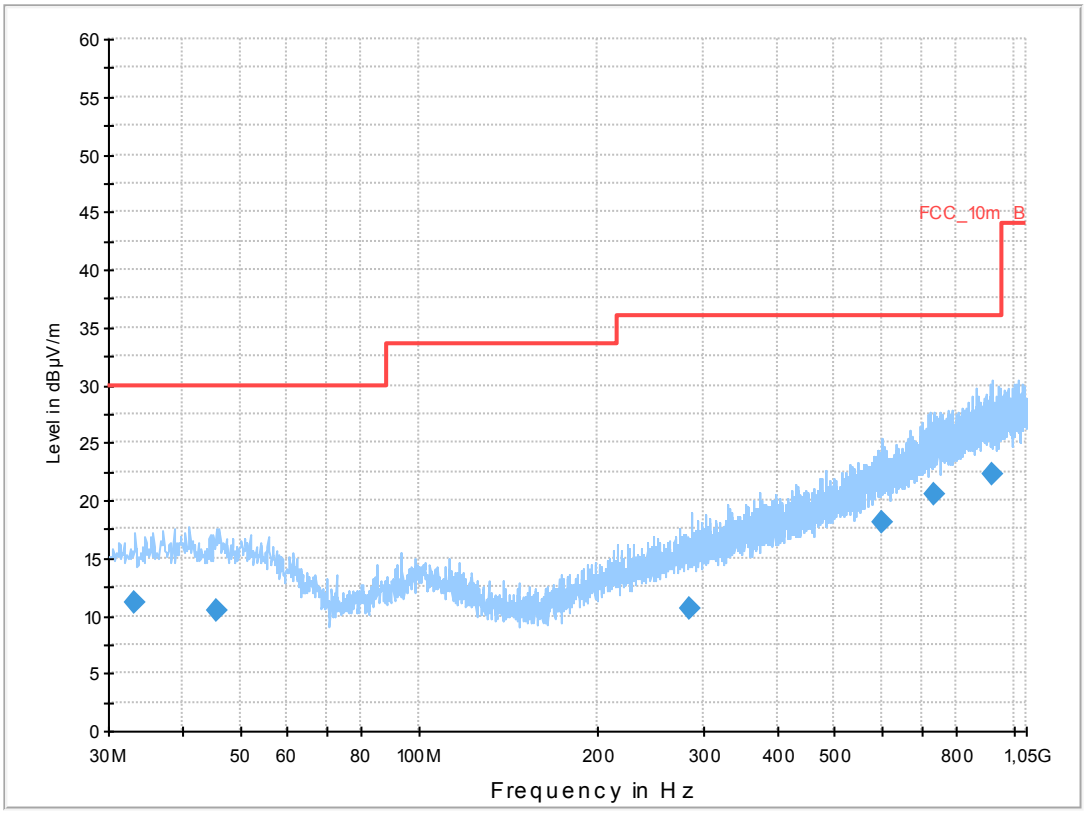
Common Information

EUT:	TS-0020-BV
Serial Number:	CB51268FMT
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	WLAN n-mode (HT40) TX Ch 151
Operator Name:	Wolsdorfer
Comment:	battery powered

Scan Setup: STAN_Fin [EMI radiated]

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

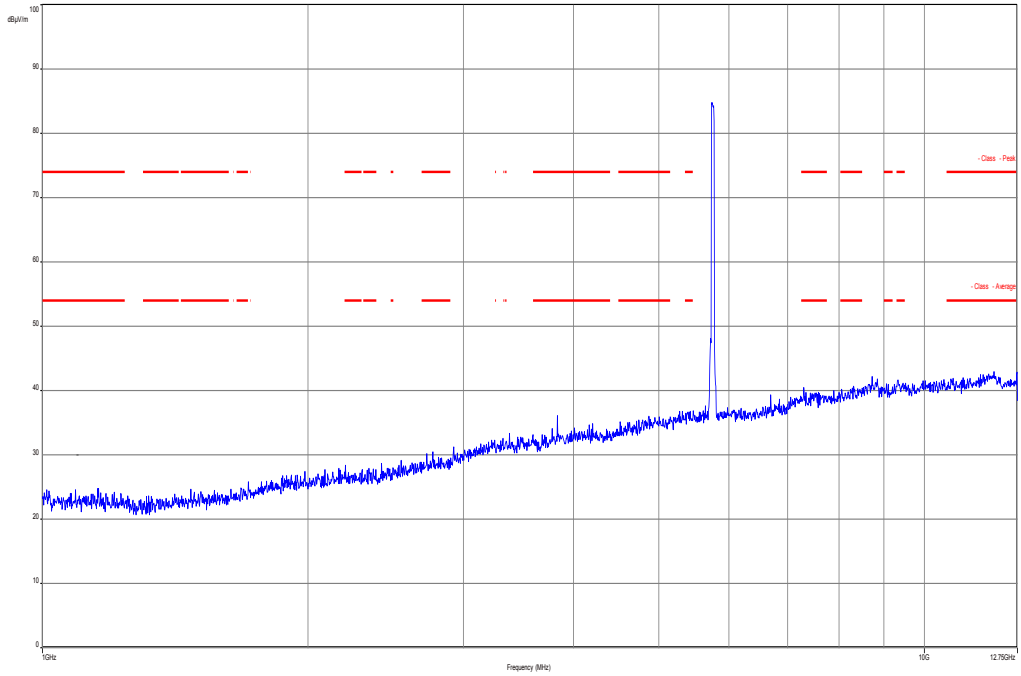
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



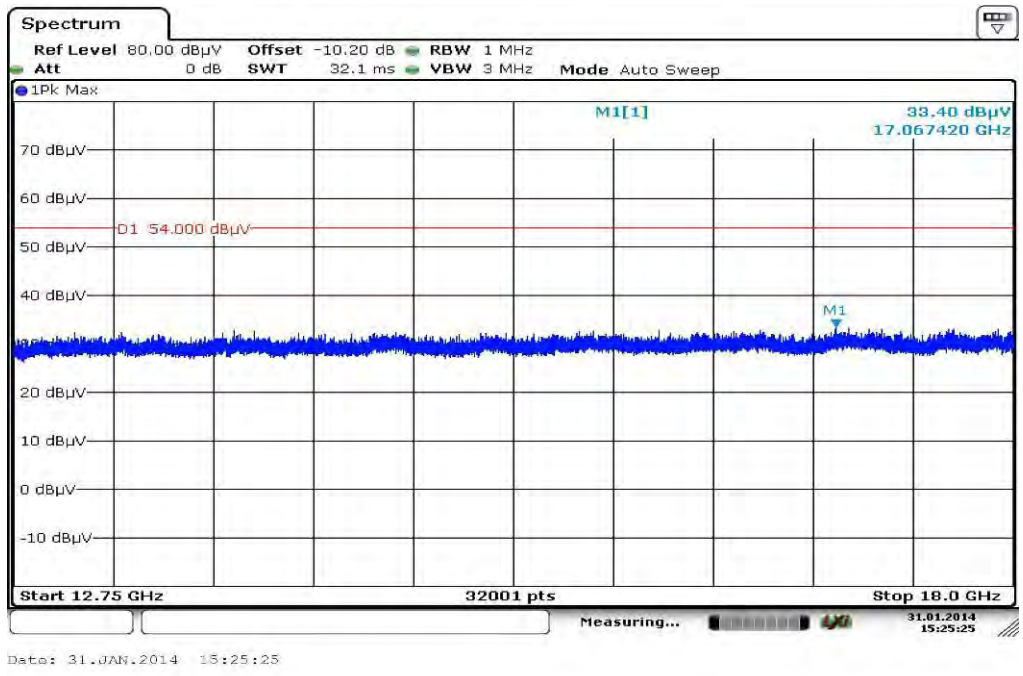
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
33.221700	11.2	1000.0	120.000	98.0	V	170.0	12.8	18.8	30.0	
45.737100	10.4	1000.0	120.000	132.0	H	170.0	13.3	19.6	30.0	
285.971100	10.6	1000.0	120.000	170.0	V	175.0	14.2	25.4	36.0	
601.809450	18.1	1000.0	120.000	121.0	H	100.0	20.8	17.9	36.0	
732.995700	20.5	1000.0	120.000	120.0	V	-10.0	23.3	15.5	36.0	
921.822000	22.3	1000.0	120.000	170.0	H	260.0	25.3	13.7	36.0	

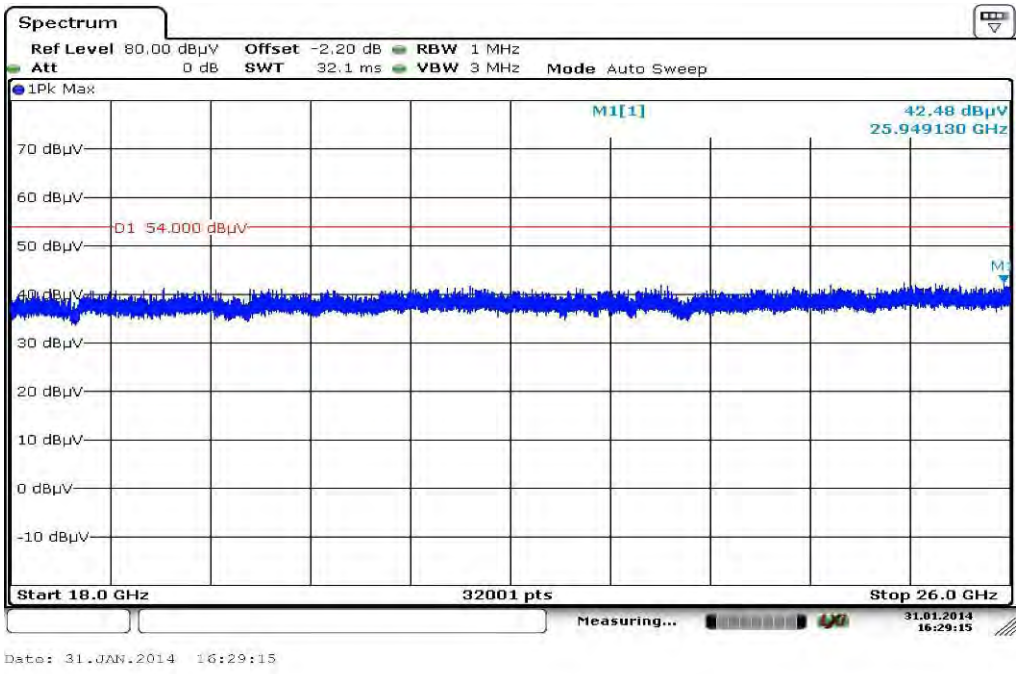
Plot 2: Lowest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization



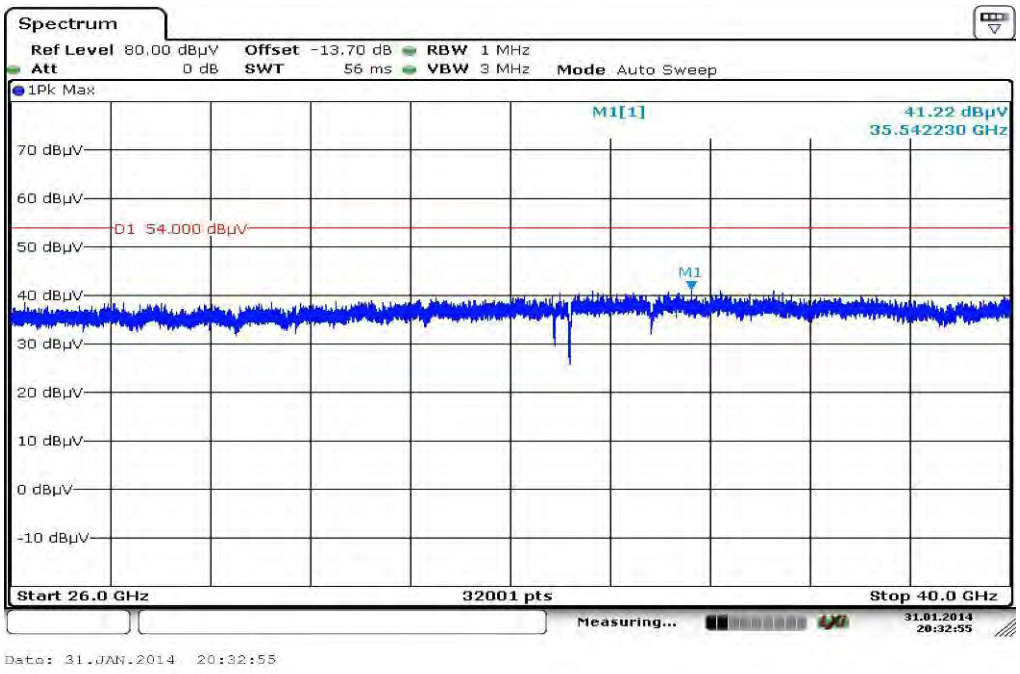
Plot 3: Lowest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



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



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



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

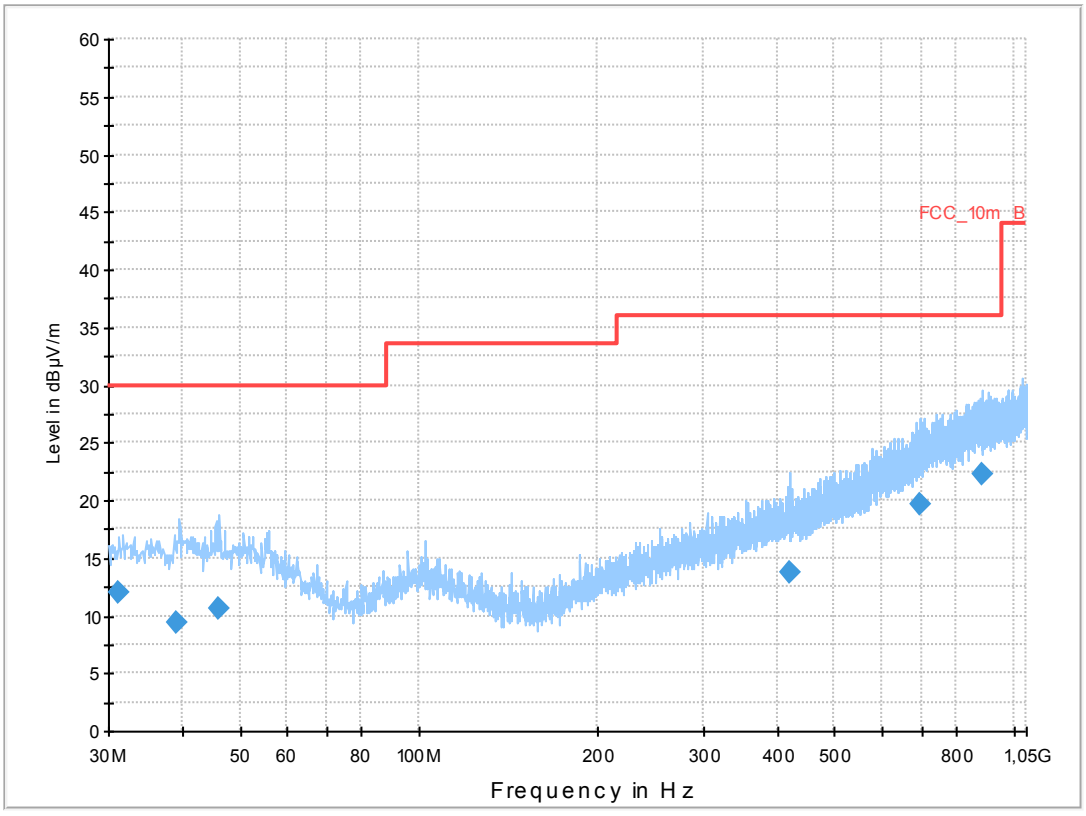
Common Information

EUT:	TS-0020-BV
Serial Number:	CB51268FMT
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	WLAN n-mode (HT40) TX Ch 159
Operator Name:	Wolsdorfer
Comment:	battery powered

Scan Setup: STAN_Fin [EMI radiated]

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

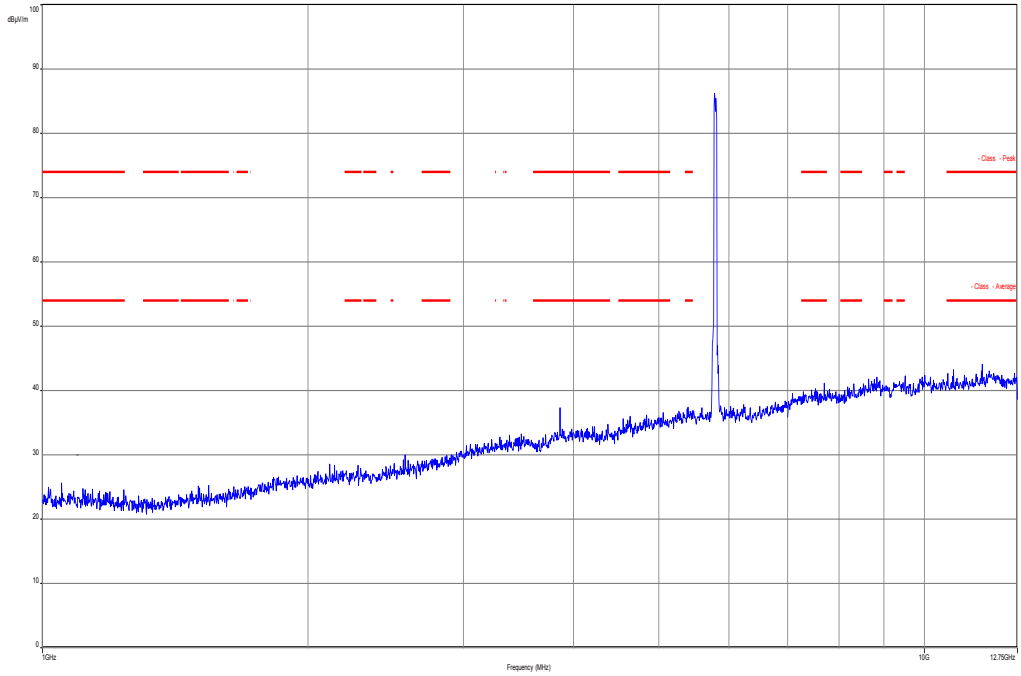
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



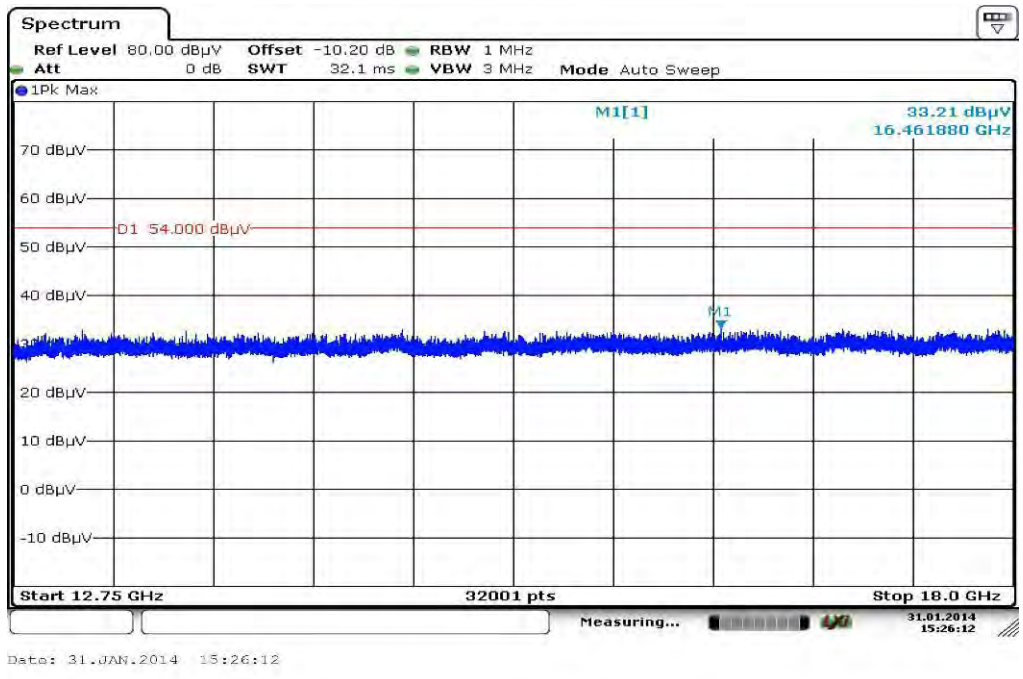
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
31.305450	12.0	1000.0	120.000	170.0	V	268.0	12.6	18.0	30.0	
38.986500	9.5	1000.0	120.000	154.0	H	267.0	13.4	20.5	30.0	
45.956700	10.6	1000.0	120.000	170.0	V	272.0	13.3	19.4	30.0	
421.318500	13.7	1000.0	120.000	98.0	H	10.0	17.2	22.3	36.0	
696.136650	19.6	1000.0	120.000	159.0	V	180.0	22.4	16.4	36.0	
886.980750	22.2	1000.0	120.000	170.0	H	190.0	25.0	13.8	36.0	

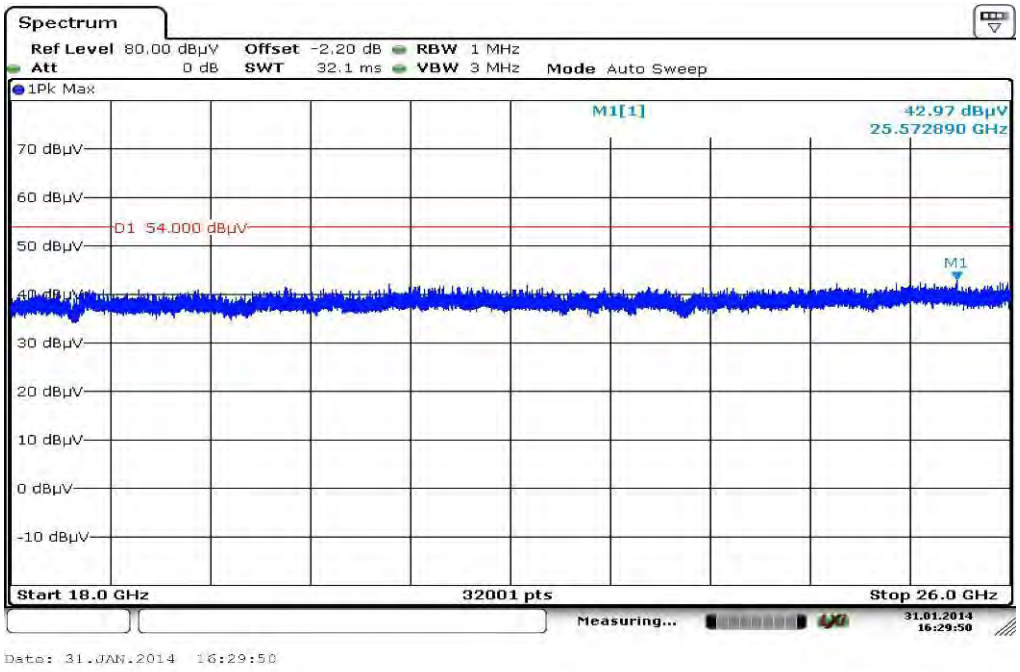
Plot 7: Highest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization



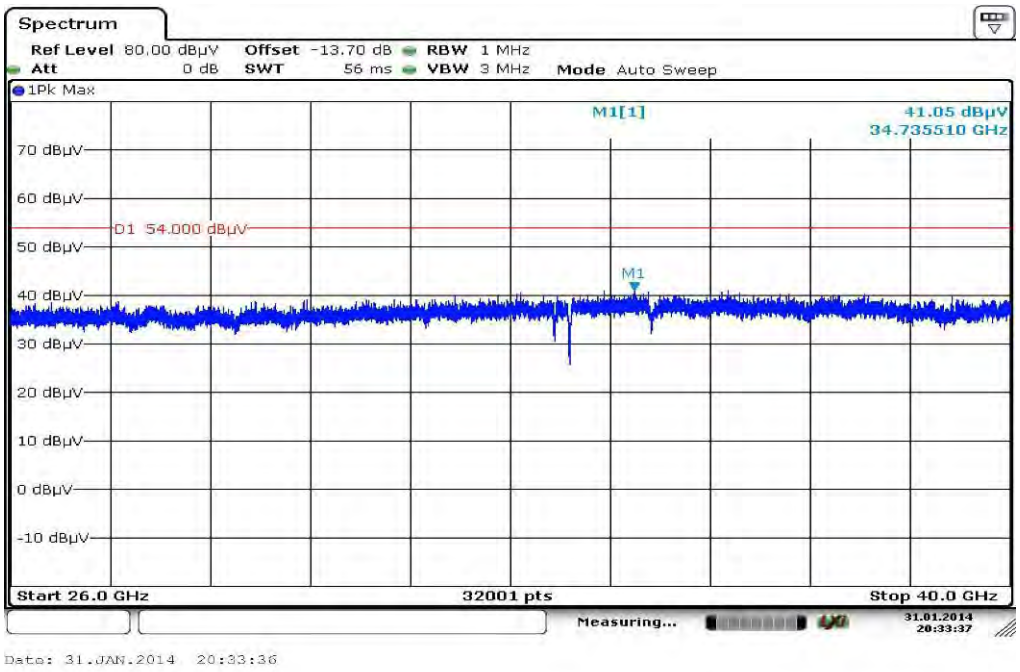
Plot 8: Highest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



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 HT80 – mode

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

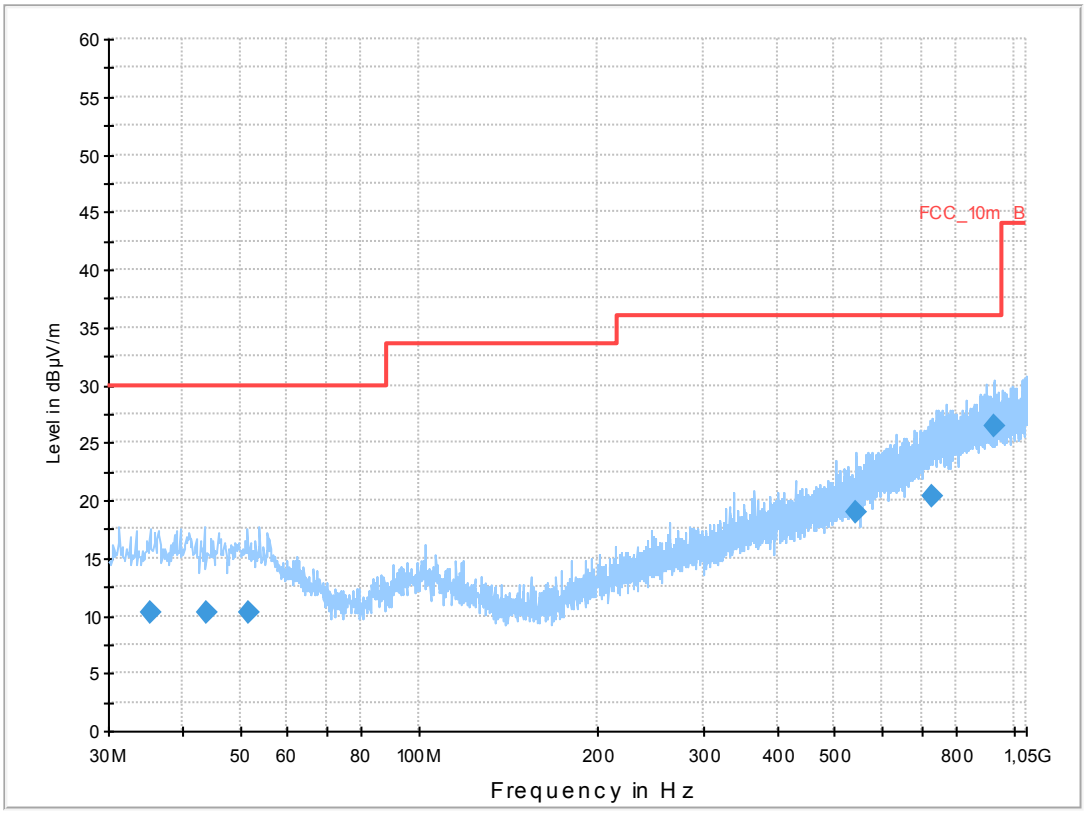
Common Information

EUT:	TS-0020-BV
Serial Number:	CB51268FMT
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	WLAN ac-mode (HT80) TX Ch 155
Operator Name:	Wolsdorfer
Comment:	battery powered

Scan Setup: STAN_Fin [EMI radiated]

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

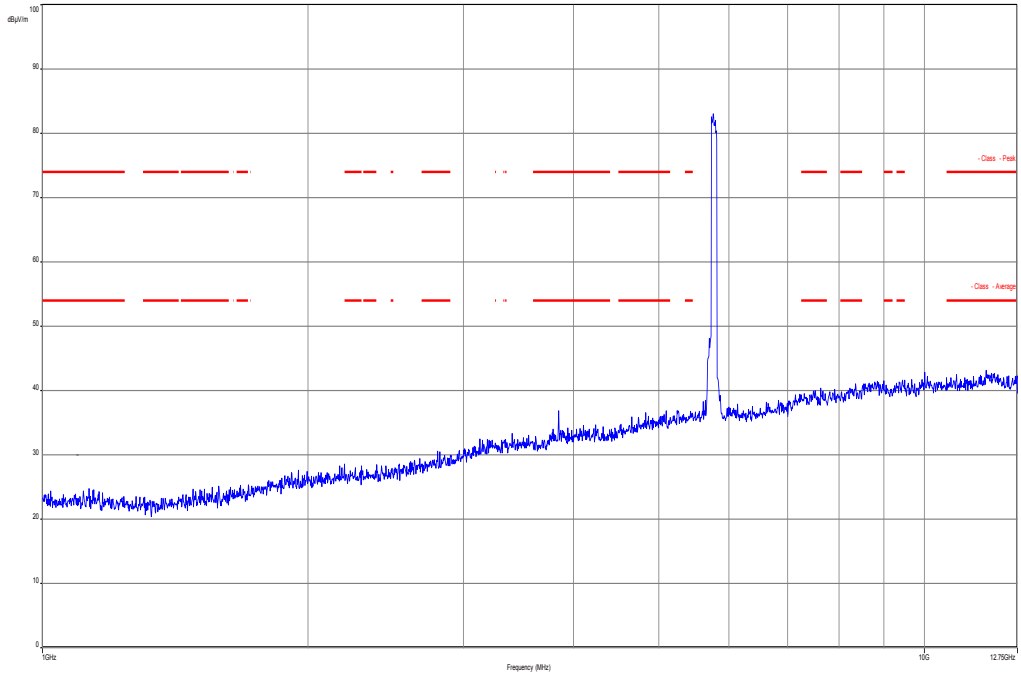
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



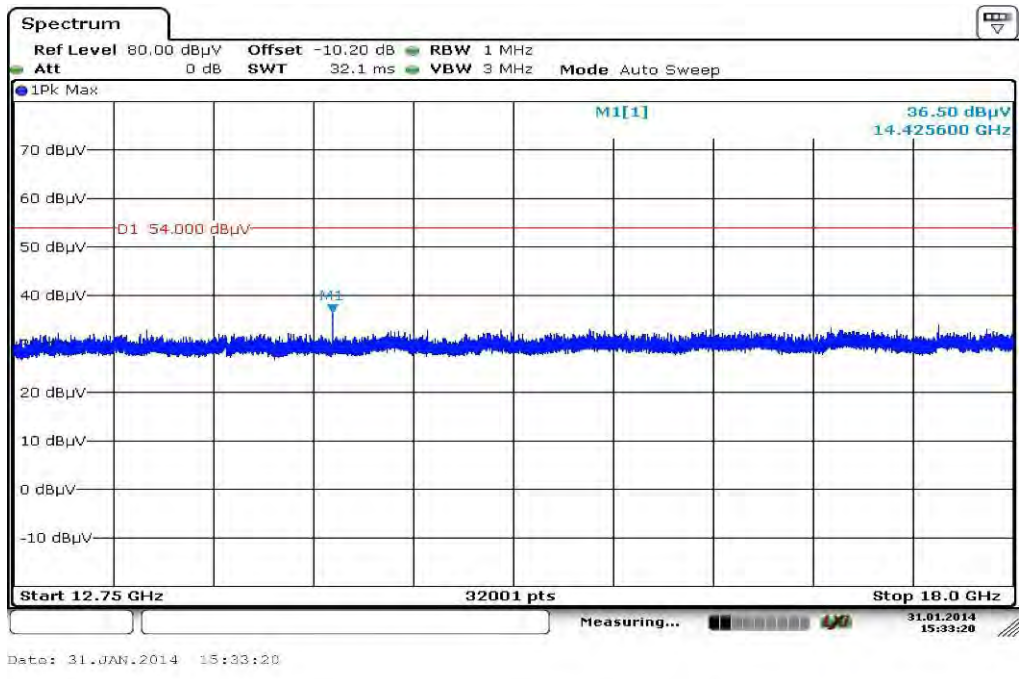
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
35.331600	10.2	1000.0	120.000	170.0	H	10.0	13.1	19.8	30.0	
43.784250	10.3	1000.0	120.000	98.0	V	-2.0	13.3	19.7	30.0	
51.596550	10.3	1000.0	120.000	170.0	V	280.0	13.2	19.7	30.0	
544.001250	19.0	1000.0	120.000	170.0	H	-1.0	19.3	17.0	36.0	
726.216300	20.3	1000.0	120.000	170.0	V	270.0	23.1	15.7	36.0	
927.414900	26.4	1000.0	120.000	170.0	V	190.0	25.3	9.6	36.0	

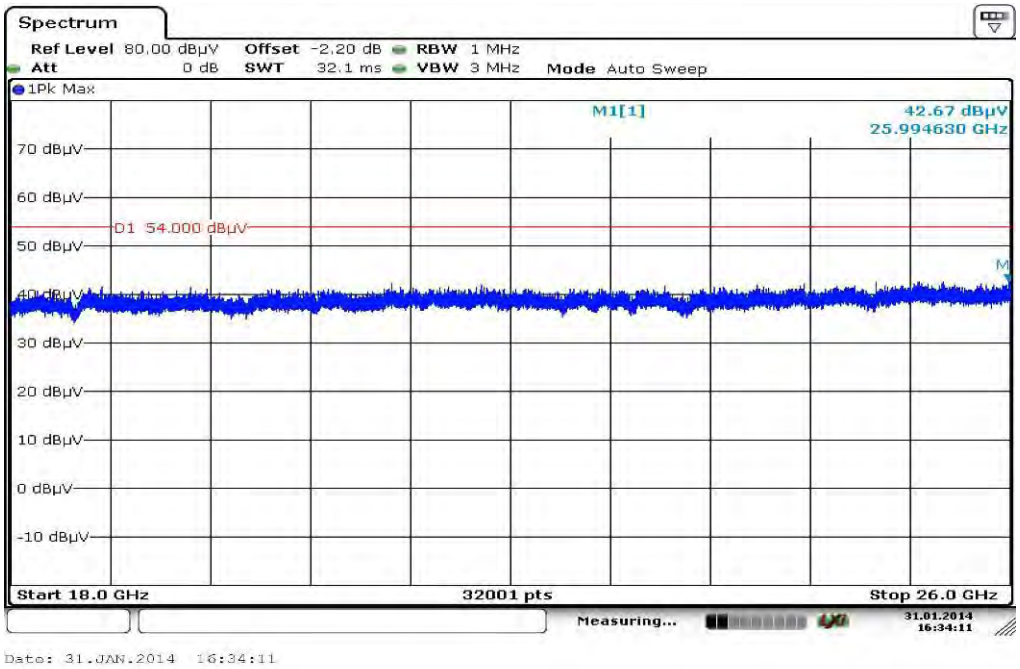
Plot 2: 1 GHz to 12.75 GHz, vertical & horizontal polarization



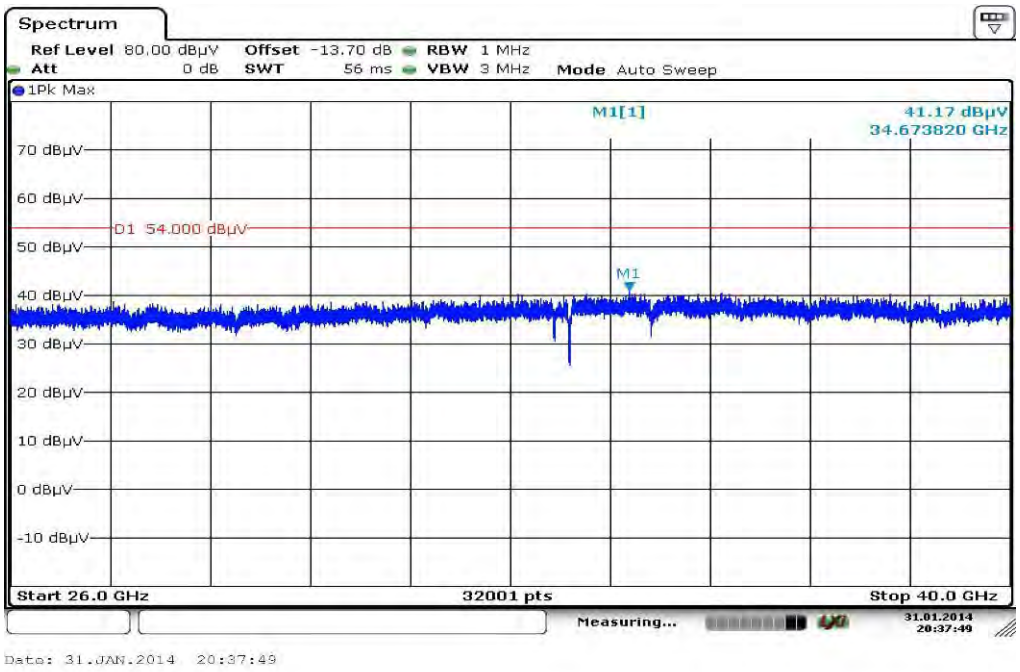
Plot 3: 12.75 GHz to 18 GHz, vertical & horizontal polarization



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



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



11.9 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 40 GHz
Trace-Mode:	Max Hold

Limits:

FCC		IC
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.		
Above 1 GHz: All detected peak emissions are below the average limit! See plots!		
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

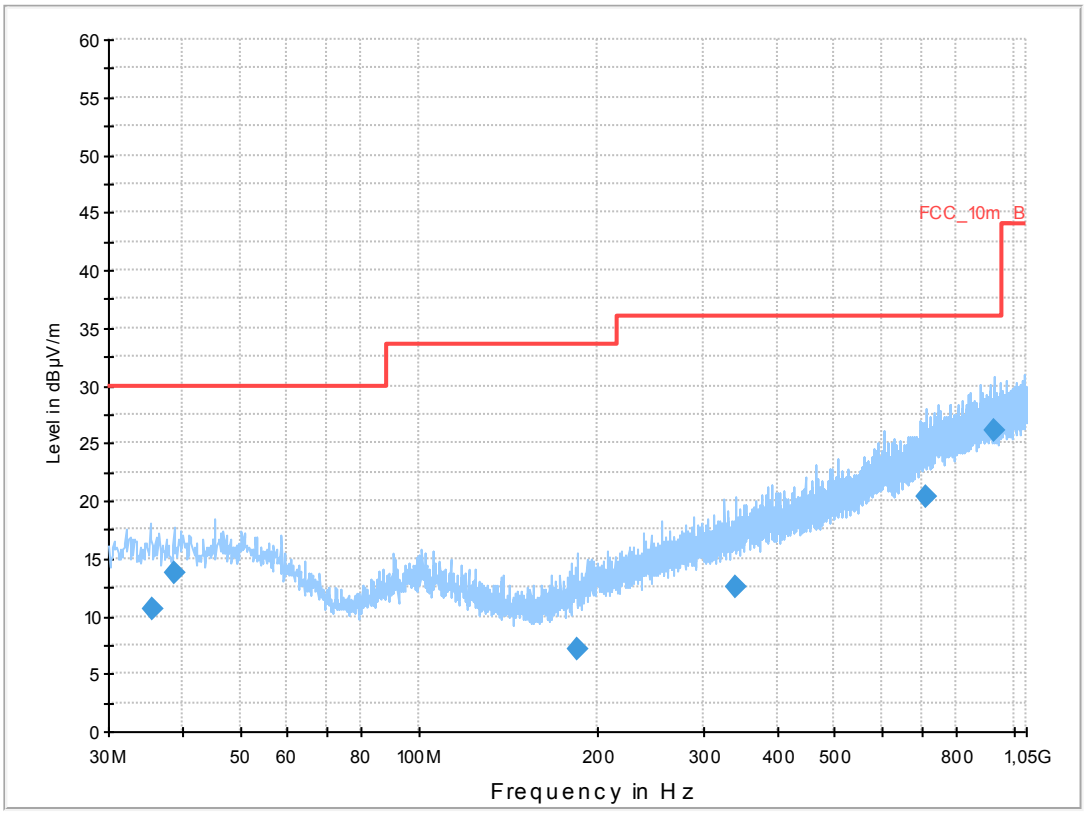
Common Information

EUT:	TS-0020-BV
Serial Number:	CB51268FN3
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	wlan idle
Operator Name:	Wolsdorfer
Comment:	battery powered

Scan Setup: STAN_Fin [EMI radiated]

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

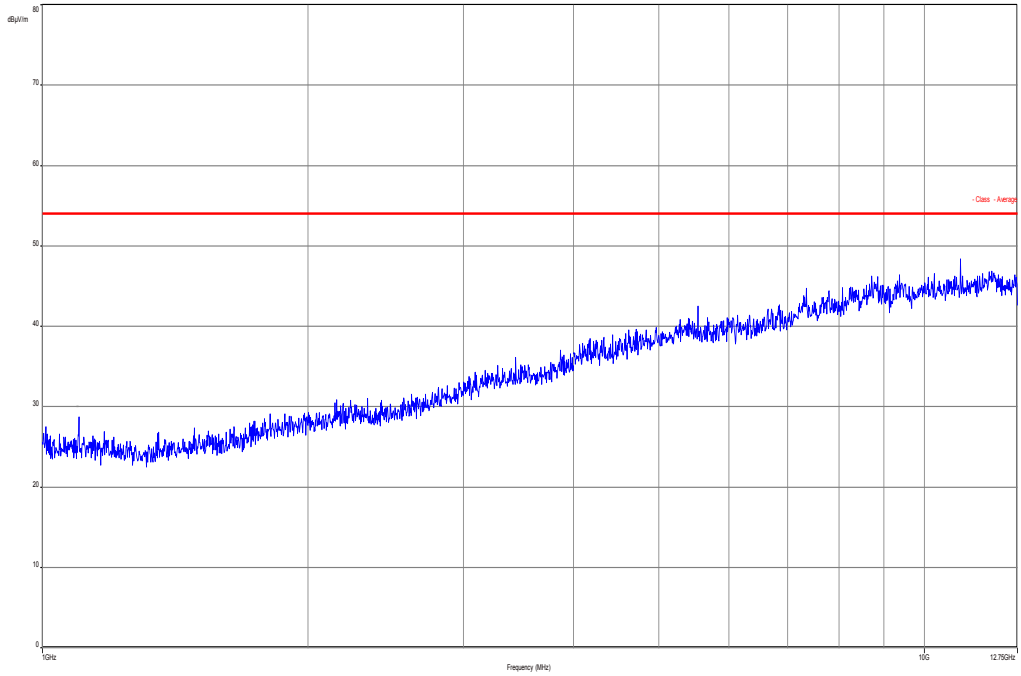
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



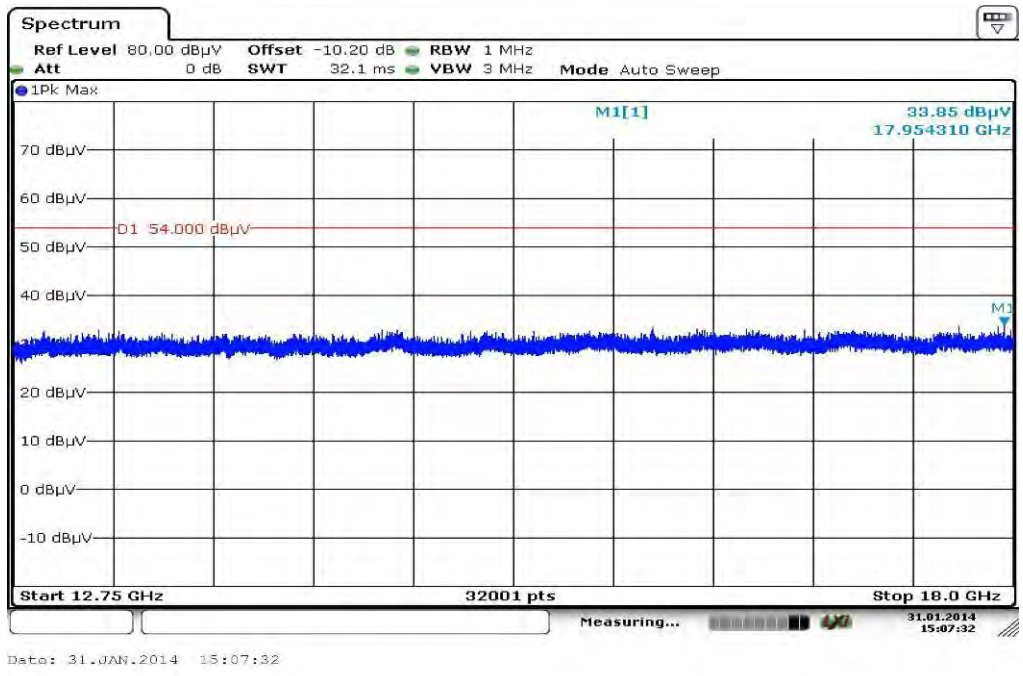
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
35.511750	10.6	1000.0	120.000	132.0	H	190.0	13.1	19.4	30.0	
38.696250	13.7	1000.0	120.000	98.0	V	268.0	13.3	16.3	30.0	
183.855600	7.2	1000.0	120.000	170.0	H	190.0	10.7	26.3	33.5	
340.353600	12.6	1000.0	120.000	98.0	V	180.0	15.8	23.4	36.0	
714.690600	20.4	1000.0	120.000	121.0	H	0.0	22.8	15.6	36.0	
927.418500	26.0	1000.0	120.000	98.0	V	260.0	25.3	10.0	36.0	

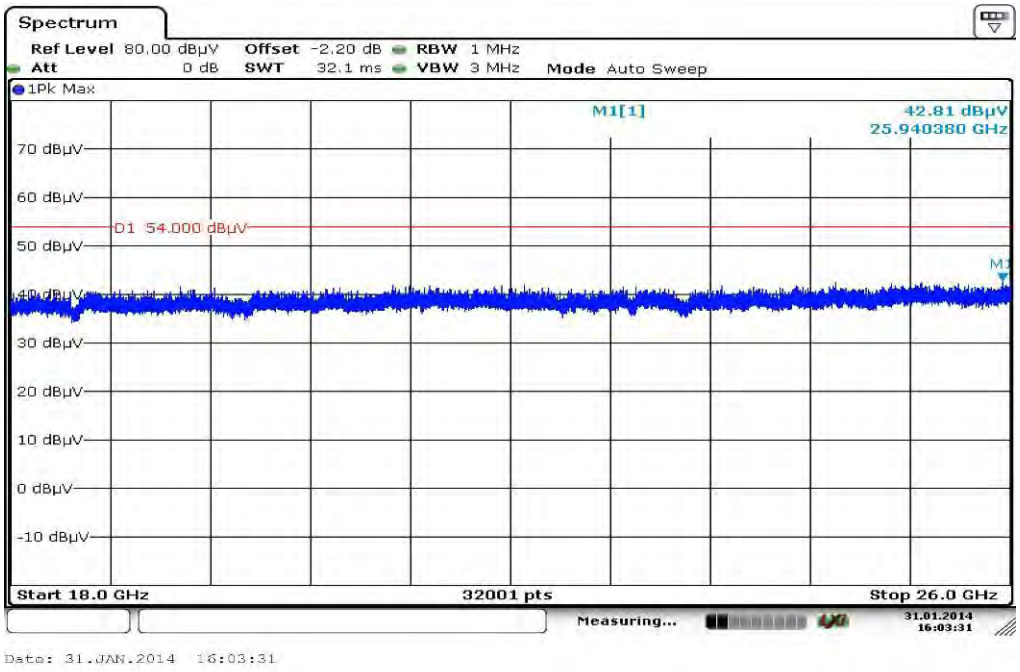
Plot 2: 1 GHz to 12.75 GHz, vertical & horizontal polarization



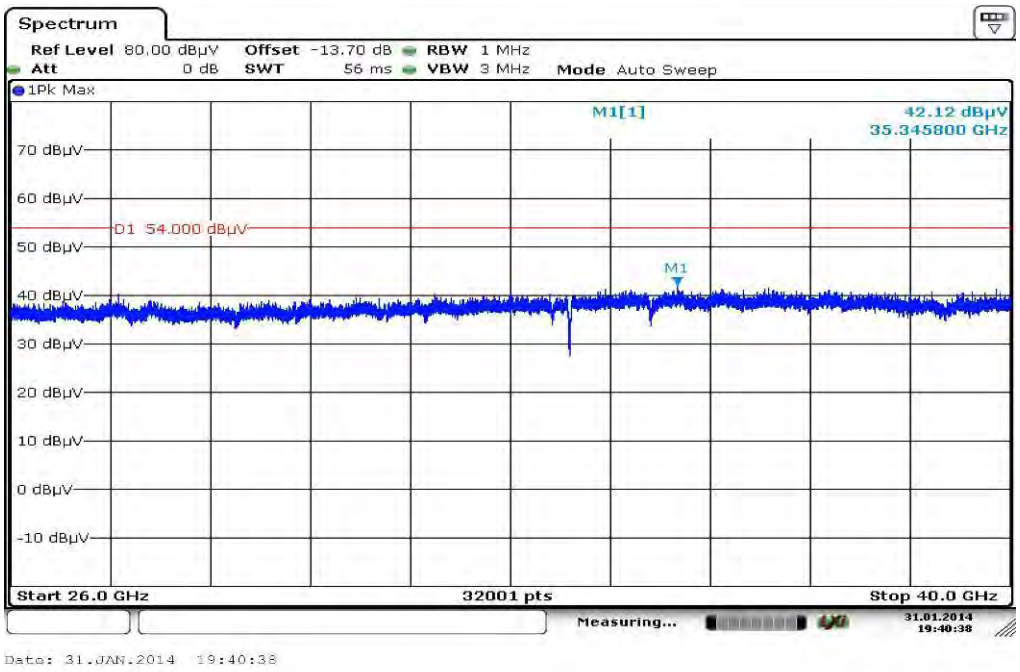
Plot 3: 12.75 GHz to 18 GHz, vertical & horizontal polarization



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



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



11.10 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

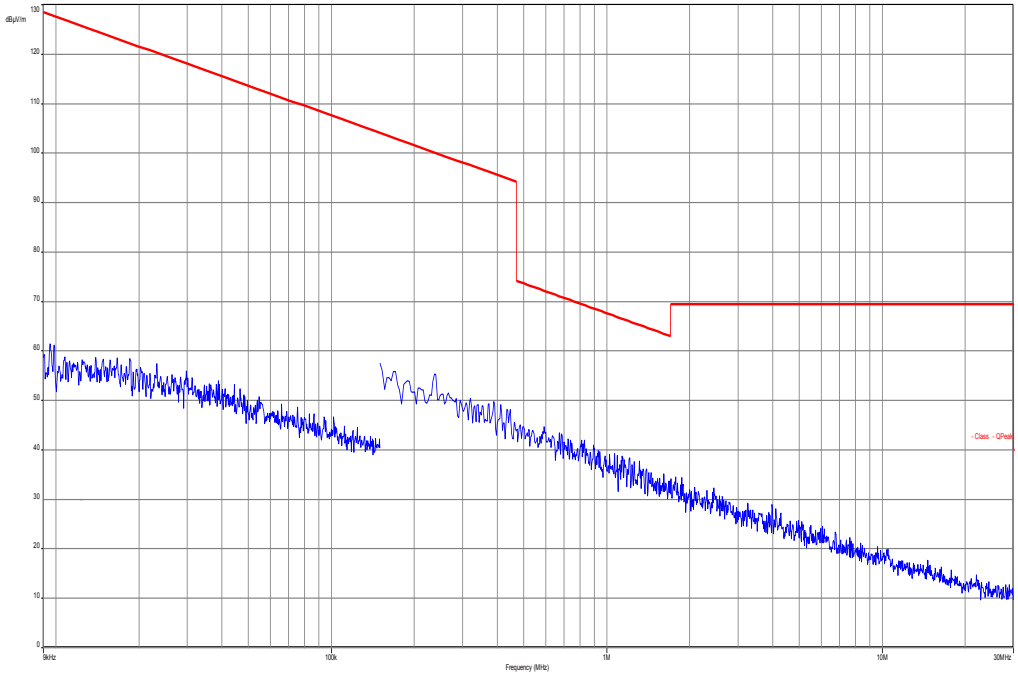
Results:

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

Result: Passed

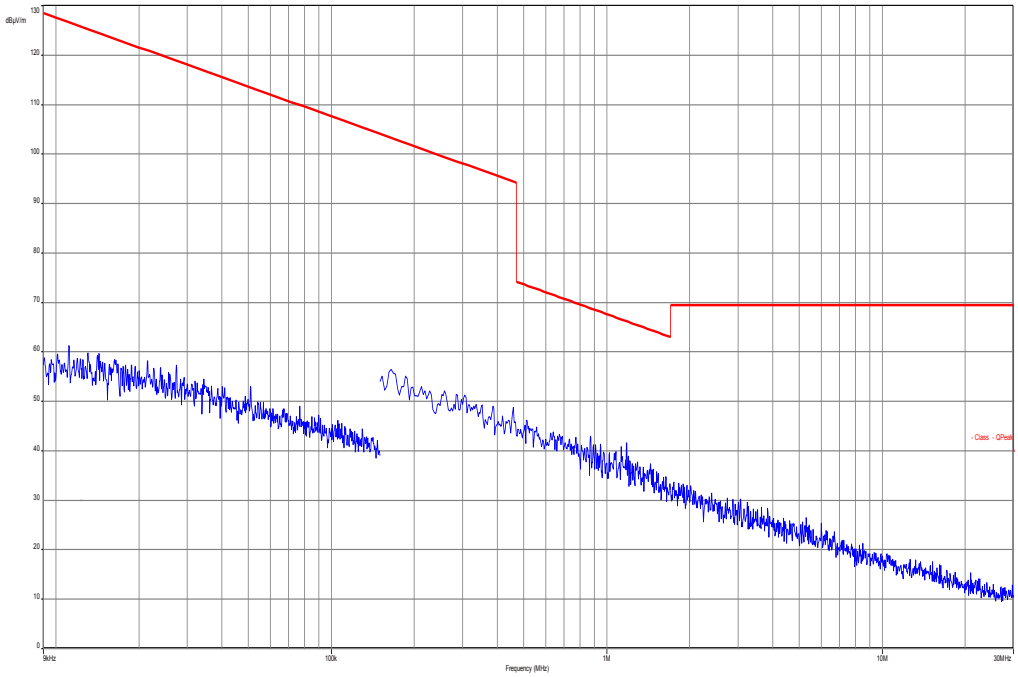
Plots: TX mode

Plot 1: 9 kHz to 30 MHz



Plots: RX / Idle – mode

Plot 1: 9 kHz to 30 MHz



11.11 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 (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

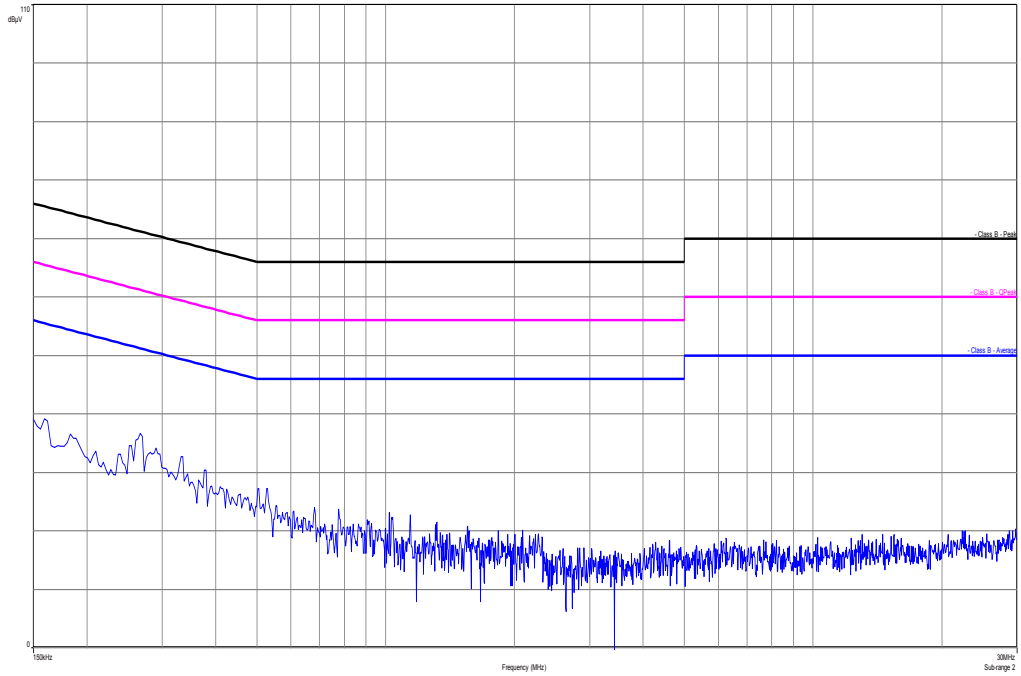
Results:

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

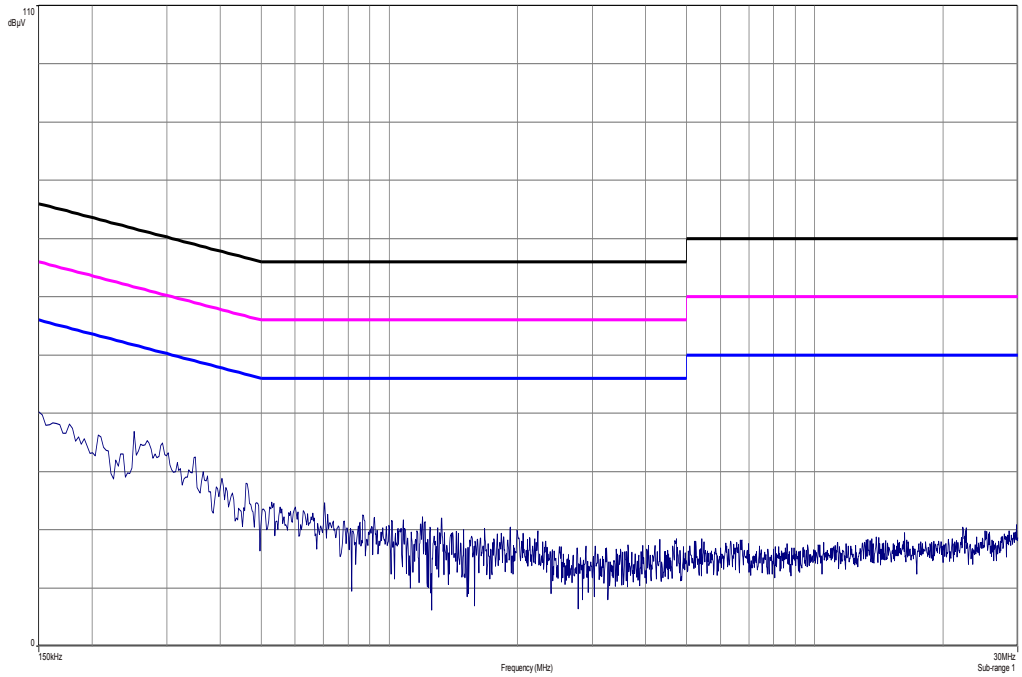
Result: Passed

Plots:

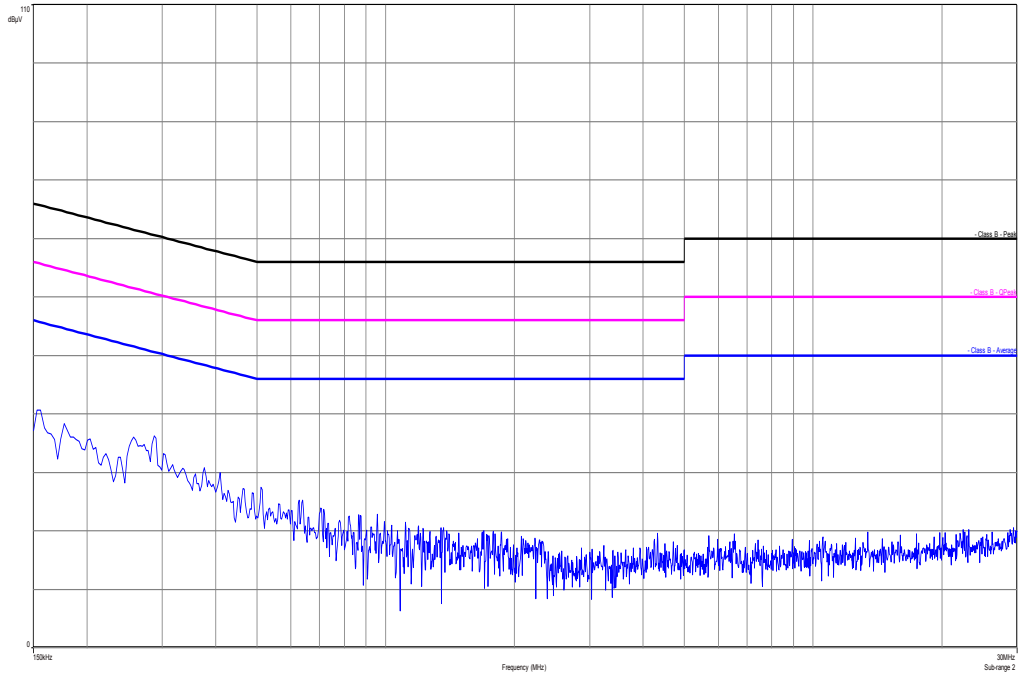
Plot 1: TX mode, 150 kHz to 30 MHz, phase line



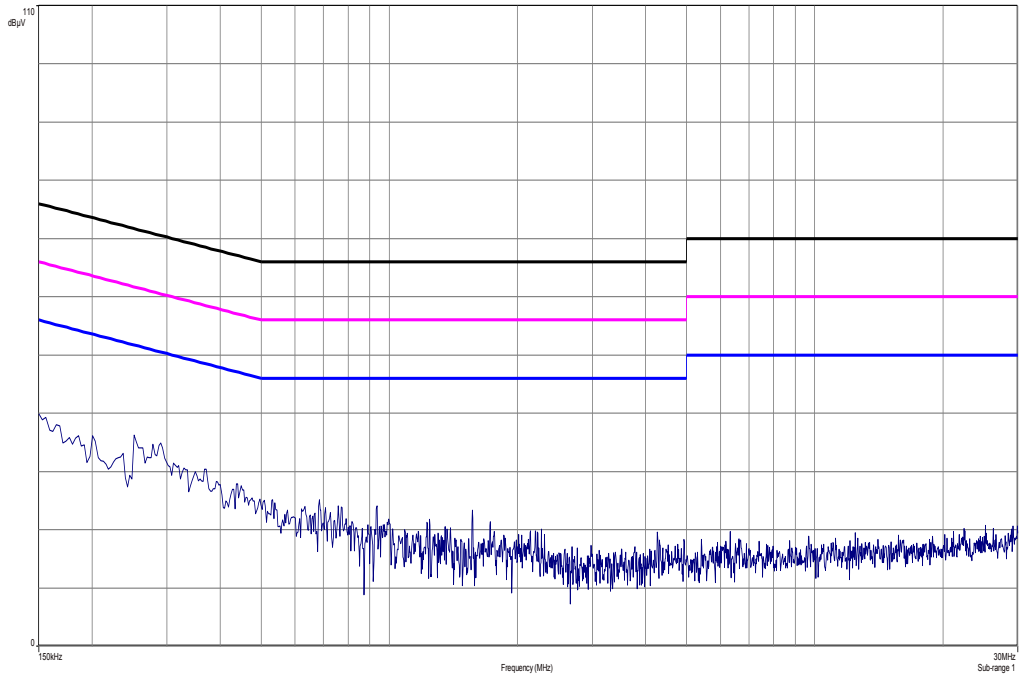
Plot 2: TX mode, 150 kHz to 30 MHz, neutral line



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



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



12 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	n. a.	EMI Test Receiver	ESCI 3	R&S	100083	300003312	k	27.01.2014	27.01.2015
3	n. a.	Antenna Tower	Model 2175	ETS-LINDGREN	64762	300003745	izw		
4	n. a.	Positioning Controller	Model 2090	ETS-LINDGREN	64672	300003746	izw		
5	n. a.	Turntable Interface-Box	Model 105637	ETS-LINDGREN	44583	300003747	izw		
6	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787	k	12.04.2012	12.04.2014
7	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vIKl!	08.05.2013	08.05.2015
8	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev		
9	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	*	300000199	ne		
10	9	Artificial Mains 9 kHz to 30 MHz	ESH3-Z5	R&S	828576/020	300001210	Ve	06.01.2012	29.01.2015
11	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	2719A15013	300001156	ne		
12	9	Isolating Transformer	MPL IEC625 Bus Regeltrennt ravo	Erfi	91350	300001155	ne		
13	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
14	90	Active Loop Antenna 10 kHz to 30 MHz	6502	Kontron Psychotech	8905-2342	300000256	k	13.06.2013	13.06.2015
15	n. a.	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne		
16	n. a.	Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789	ne		
17	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	vIKl!	14.10.2011	14.10.2014
18	n. a.	MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405	k	21.02.2013	21.02.2014
19	11b	Microwave System Amplifier, 0.5-26.5 GHz	83017A	HP Meßtechnik	00419	300002268	ev		
20	A026	Std. Gain Horn Antenna 12.4 to 18.0 GHz	639	Narda	8402	300000787	k	22.07.2013	22.07.2015
21	A029	Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda	8205	300002442	k	19.07.2013	19.07.2015
22	A031	Std. Gain Horn Antenna 26.5 to 40.0 GHz	637	Narda		300000510	k	19.07.2013	19.07.2015

23	n. a.	Broadband Low Noise Amplifier 18-50 GHz	CBL18503 070-XX	CERNEX	19338	300004273	ne		
24	n. a.	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517	k	21.01.2014	21.01.2015

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
vlkl!	Attention: extended calibration interval		
NK!	Attention: not calibrated	*)	next calibration ordered / currently in progress

13 Observations

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

Annex A Document history

Version	Applied changes	Date of release
	Initial release	2014-02-05

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) Arn Egner
Abteilungsleiter

Back side of certificate

Deutsche Akkreditierungsstelle GmbH

Standort Berlin
Spittelmarkt 10
10117 Berlin

Standort Frankfurt am Main
Gartenstraße 6
60594 Frankfurt am Main

Standort Braunschweig
Bundesallee 100
38116 Braunschweig

Die auszugsweise Veröffentlichung der Akkreditierungsurkunde bedarf der vorherigen schriftlichen Zustimmung der Deutsche Akkreditierungsstelle GmbH (DAkkS). Ausgenommen davon ist die separate Weiterverbreitung des Deckblattes durch die umseitig genannte Konformitätsbewertungsstelle in unveränderter Form.

Es darf nicht der Anschein erweckt werden, dass sich die Akkreditierung auch auf Bereiche erstreckt, die über den durch die DAkkS bestätigten Akkreditierungsbereich hinausgehen.

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