**CETECOM™****CETECOM ICT Services**
consulting - testing - certification >>>

TEST REPORT

Test report no.: 1-6965/13-05-49

Deutsche
Akkreditierungsstelle
D-PL-12076-01-01

Testing laboratory

CETECOM ICT Services GmbH

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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 & Compatibility Testing (RCT)

Applicant

Sony Mobile Communications AB

Nya Vattentorget

22188 Lund / SWEDEN

Phone: +46 46 19 30 00

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e-mail: Micke.nilsson@sonymobile.com

Phone: +46 7 03 22 75 03

Manufacturer

Sony Mobile Communications AB

Nya Vattentorget

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 GPRS/EGPRS 850/900/1800/1900; UMTS HSPA FDDI/II/IV/V/VIII; LTE FDD1/2/3/4/5/7/8/13/17/20; WLAN b/g/n/a/ac; BT 4.0; RFID; A-GPS

Model name: SGP521

Type name: TM-0040-BV

IC: 4170B-TM0040

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:

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Stefan Bös
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Marco Bertolino
Testing Manager

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2 General information

2.1 Notes and disclaimer

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

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

2.2 Application details

Date of receipt of order:	2013-12-09
Date of receipt of test item:	2013-12-02
Start of test:	2013-12-23
End of test:	2014-01-06
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
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4 Test environment

Temperature:	T_{nom}	+22 °C during room temperature tests
	T_{max}	+55 °C during high temperature tests
	T_{min}	-20 °C during low temperature tests
Relative humidity content:		37 %
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 GPRS/EGPRS 850/900/1800/1900; UMTS HSPA FDDI/II/IV/V/VIII; LTE FDD1/2/3/4/5/7/8/13/17/20; WLAN b/g/n/a/ac; BT 4.0; RFID; A-GPS
Type name	:	TM-0040-BV
Model name	:	SGP521
S/N serial number	:	Conducted unit: CB51267QQY Radiated units: CB51267Q5X; CB51267Q47
HW hardware status	:	Prototype build: AP1
SW software status	:	RF test software
Frequency band [MHz]	:	DTS band 5725 MHz to 5850MHz (lowest channel 149 – 5745 MHz; highest channel 165 – 5825 MHz)
Type of radio transmission	:	OFDM
Use of frequency spectrum	:	
Type of modulation	:	BPSK, QPSK, 16 – QAM, 64 – QAM and 256 – QAM
Number of channels	:	5
Antenna	:	Integrated antenna
Power supply	:	3.7 V DC by Li - polymer battery
Temperature range	:	-20°C to +55°C

5.1 Additional information

Test setup- and EUT-photos are included in test report: 1-6965/13-05-01_AnnexA
1-6965/13-05-01_AnnexB
1-6965/13-05-01_AnnexD

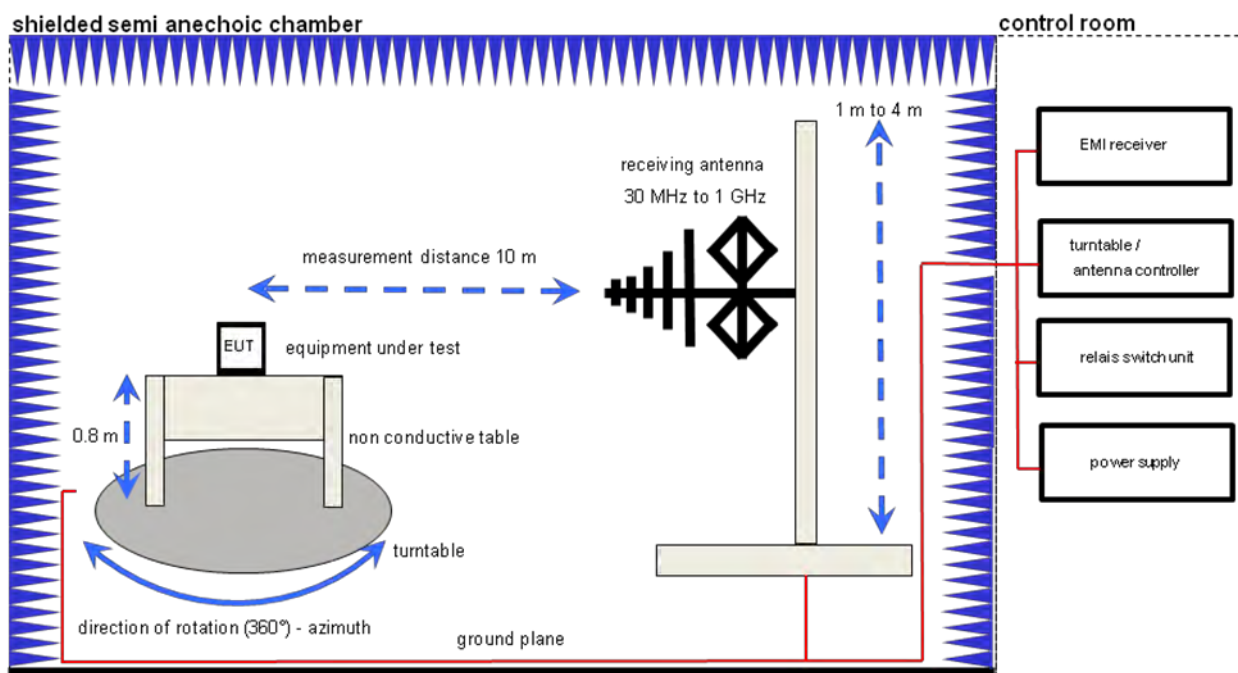
6 Test laboratories sub-contracted

None

7 Description of the test setup

7.1 Radiated measurements chamber F

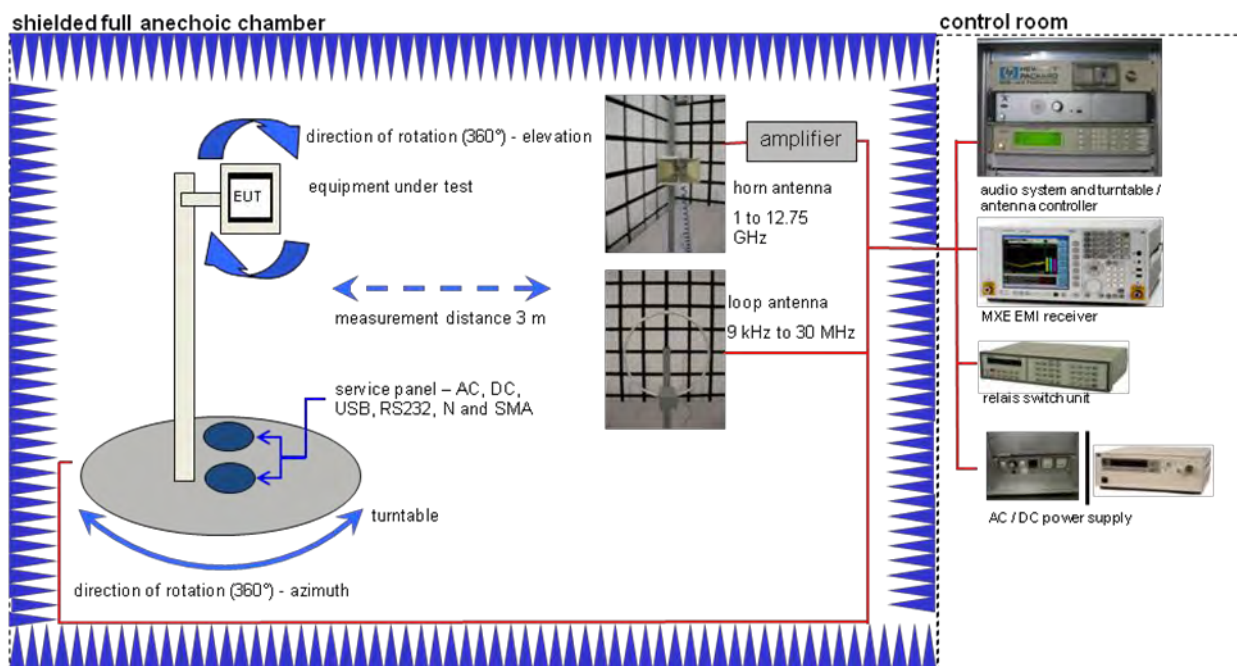
The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 1 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas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

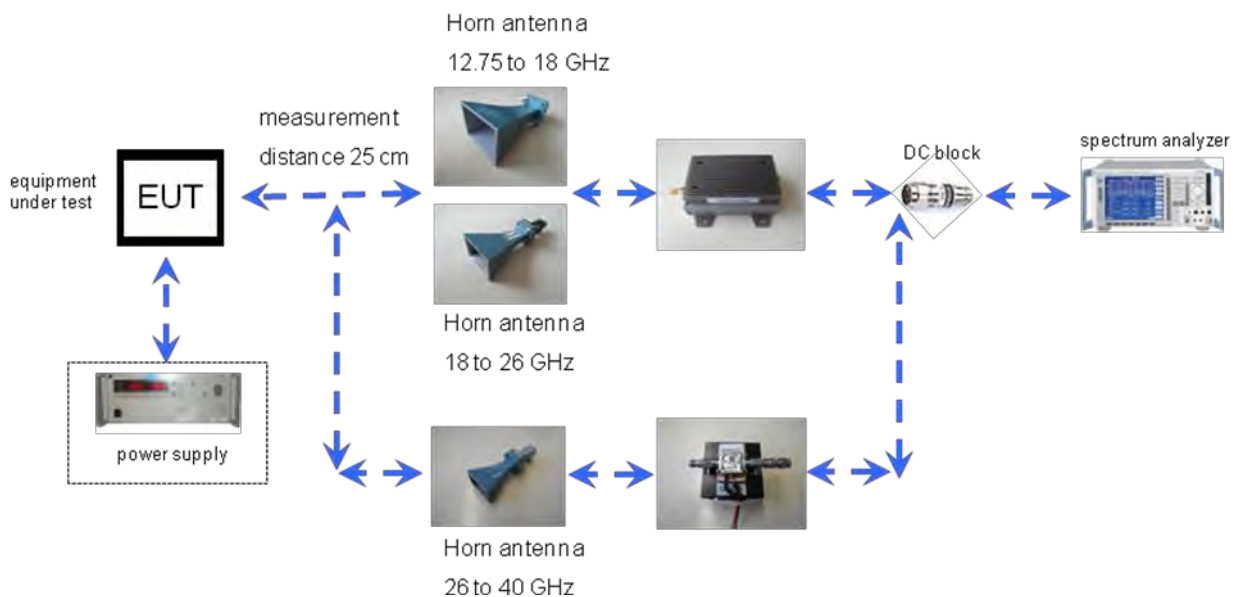
7.2 Radiated measurements chamber C



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	Erft	91350	300001155
Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997
Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143

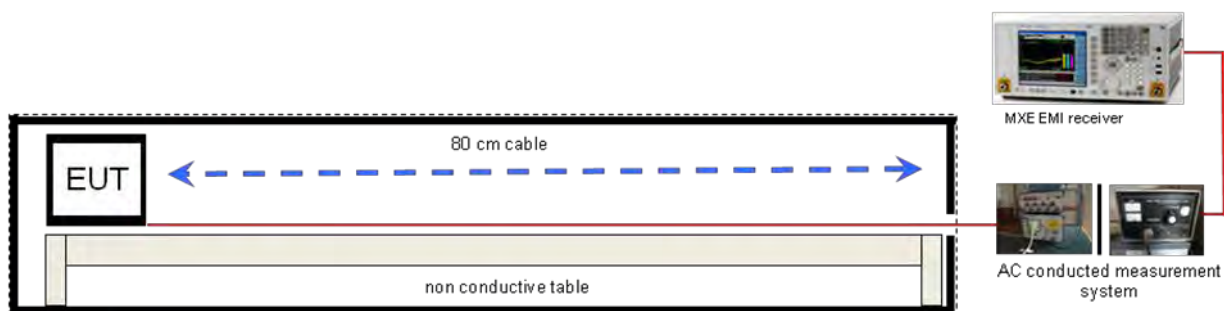
7.3 Radiated measurements 12.75 GHz to 40 GHz



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
Std. Gain Horn Antenna 26.5 to 40.0 GHz	637	Narda	GB42110541	300000510
Microwave System Amplifier, 0.5-26.5 GHz	83017A	HP Meßtechnik	00419	300002268
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

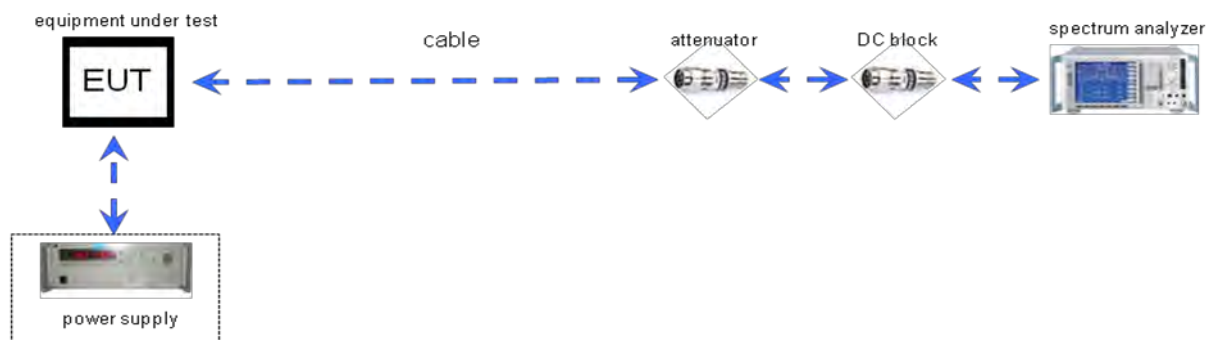
7.4 AC conducted



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	Erft	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	2014-02-07	-/-

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
RSS-Gen.	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	:	1-6965/13-05-49			
Equipment model number:		SGP521			
Certification number	:	4170B-TM0040			
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	:	ISM 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	31.70 mW	35.56 mW	
		5755 – 5835 MHz			35.24 mW
		5775 MHz ac HT80 – mode	31.05 mW		
		Radiated values:			
		Band	a – mode	n/ac HT20 – mode	n/ac HT40 – mode
		5745 – 5825 MHz	37.24 mW	41.78 mW	
		5755 – 5835 MHz			43.35 mW
		5775 MHz ac HT80 – mode	36.48 mW		
Occupied bandwidth (99%-BW)	:	Band	a – mode	n/ac HT20 – mode	n/ac HT40 – mode
		5745 – 5825 MHz	17.90 MHz	18.41 MHz	
		5755 – 5835 MHz			36.79 MHz
		5775 MHz ac HT80 – mode	78.80 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 [dBuV/m @ 3m]	:	42.53 @ 17.23 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:

2014-02-07

Date

Marco Bertolino

Name



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Signature

11 Measurement results

11.1 Identify worst case

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		
	5745 MHz	5785 MHz	5825 MHz
Frequency	48 Mbit/s	48 Mbit/s	48 Mbit/s
OFDM / a – mode	48 Mbit/s	48 Mbit/s	48 Mbit/s
OFDM / n/ac – mode HT20	MCS5	MCS5	MCS5
Frequency	5755 MHz		5795 MHz
OFDM / n/ac – mode HT40	MCS4		MCS6
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] Calculated		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 / 120 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: conducted

Frequency	Maximum output power conducted [dBm]		
	Low channel	Middle channel	High channel
OFDM / a – mode Peak output power conducted	14.81	15.01	14.51
OFDM / ac HT20 – mode Peak output power conducted	15.25	15.51	14.97
OFDM / ac HT40 – mode Peak output power conducted	15.47	-/-	15.16
OFDM / ac HT80 – mode Peak output power conducted	-/-	14.92	-/-
Measurement uncertainty	± 1.5 dB (cond.)		

Result: Passed**Results: radiated**

Frequency	Maximum output power radiated [dBm]		
	Low channel	Middle channel	High channel
OFDM / a – mode Output Power Radiated – EIRP*)	15.71	15.71	14.81
OFDM / ac HT20 – mode Output Power Radiated – EIRP*)	16.15	16.21	15.27
OFDM / ac HT40 – mode Output Power Radiated – EIRP*)	16.37	-/-	15.46
OFDM / ac HT80 – mode Output Power Radiated – EIRP*)	-/-	15.62	-/-
Measurement uncertainty	± 3 dB (rad.)		

*) calculated with Antenna gain

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)

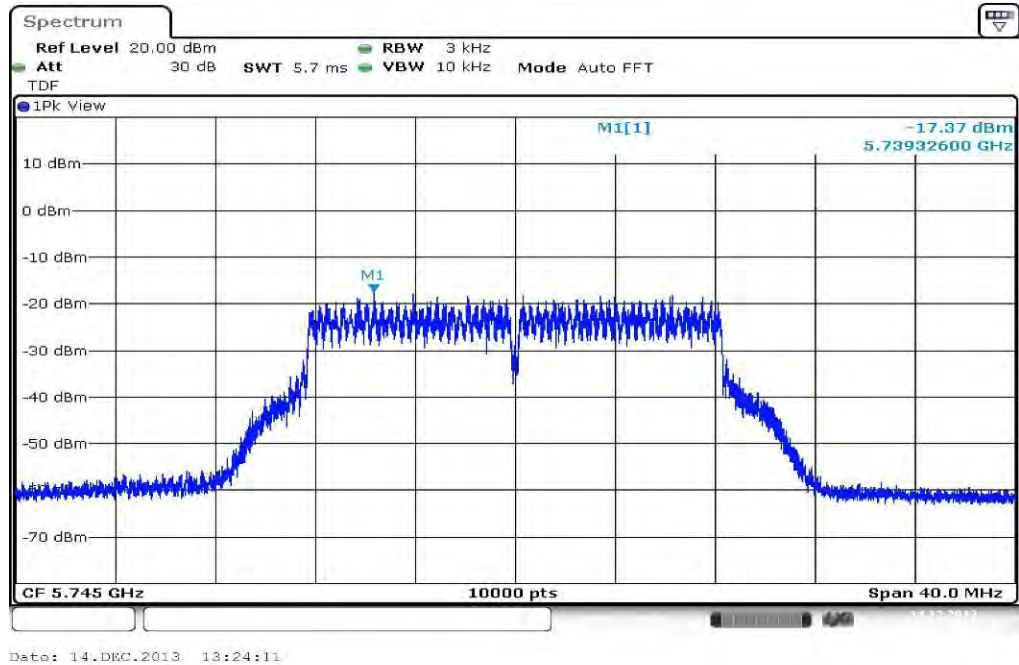
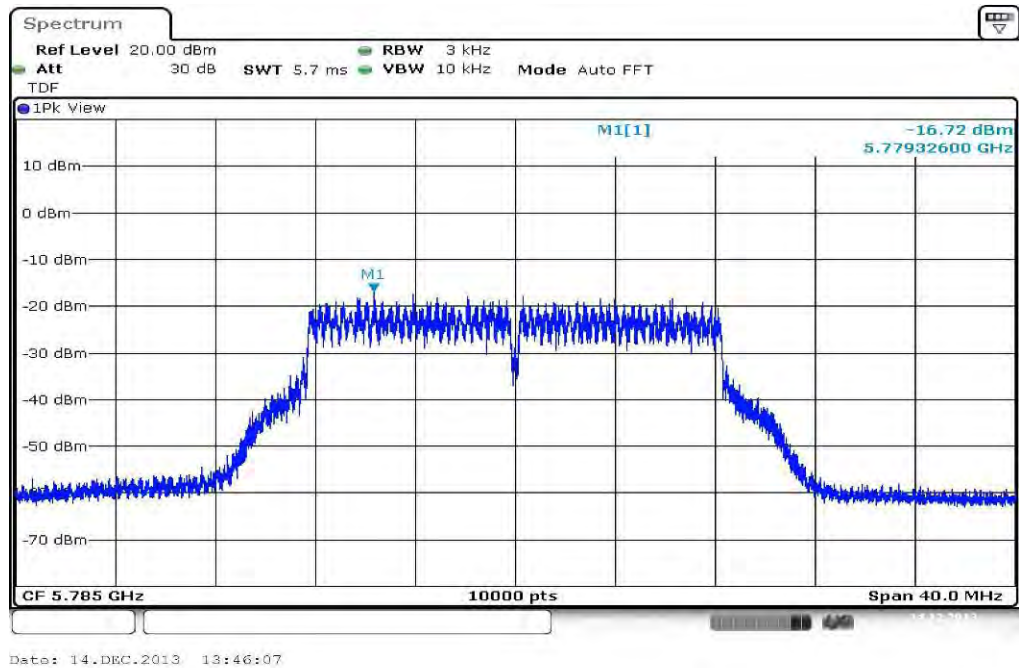
Limits:

FCC	IC
Power Spectral Density	
8 dBm (conducted)	

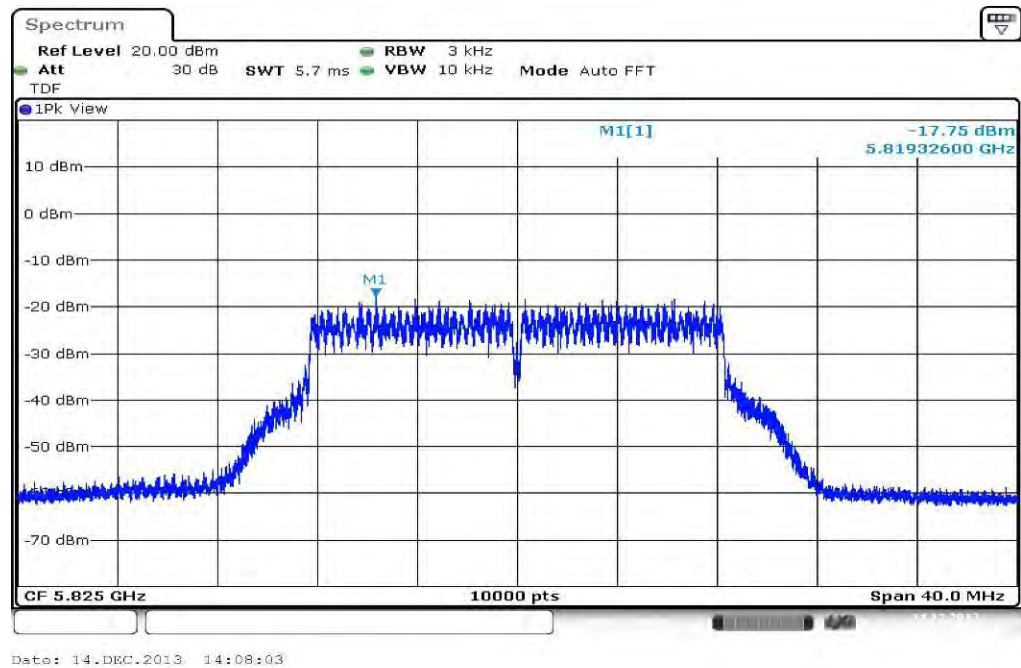
Results:

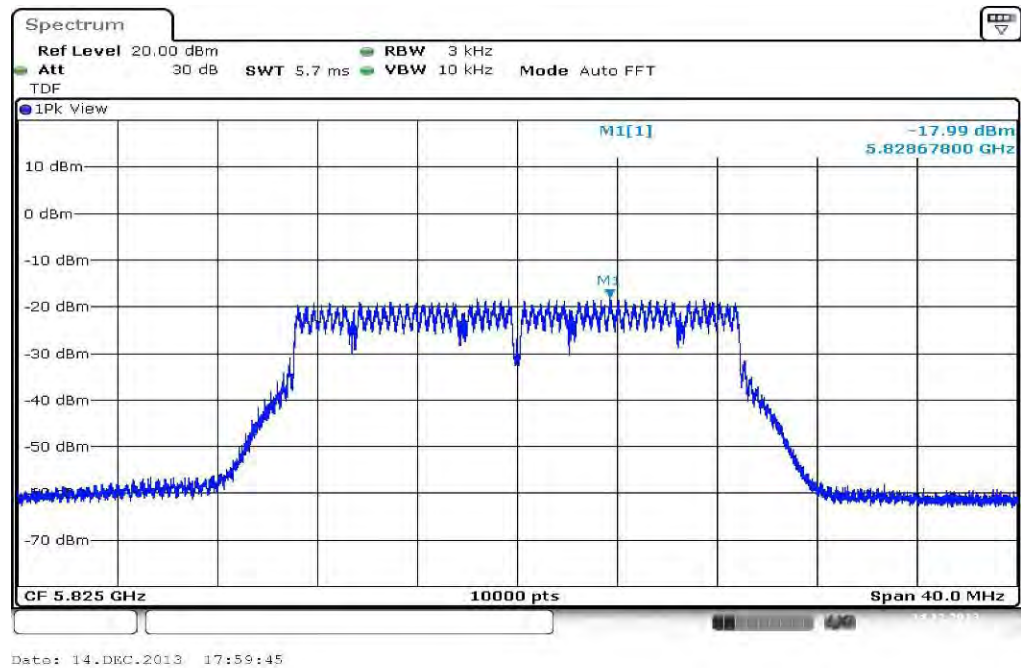
Modulation	Power spectral density [dBm]		
	5745 MHz	5785 MHz	5825 MHz
Frequency			
OFDM / a – mode	-17.37	-16.72	-17.75
OFDM / n/ac – mode HT20	-17.46	-17.18	-17.99
Frequency	5755 MHz		5795 MHz
OFDM / n/ac – mode HT40	-20.31		-20.00
Frequency	5775 MHz		
OFDM / ac – mode HT80	-23.92		
Measurement uncertainty	± 1.5 dB		

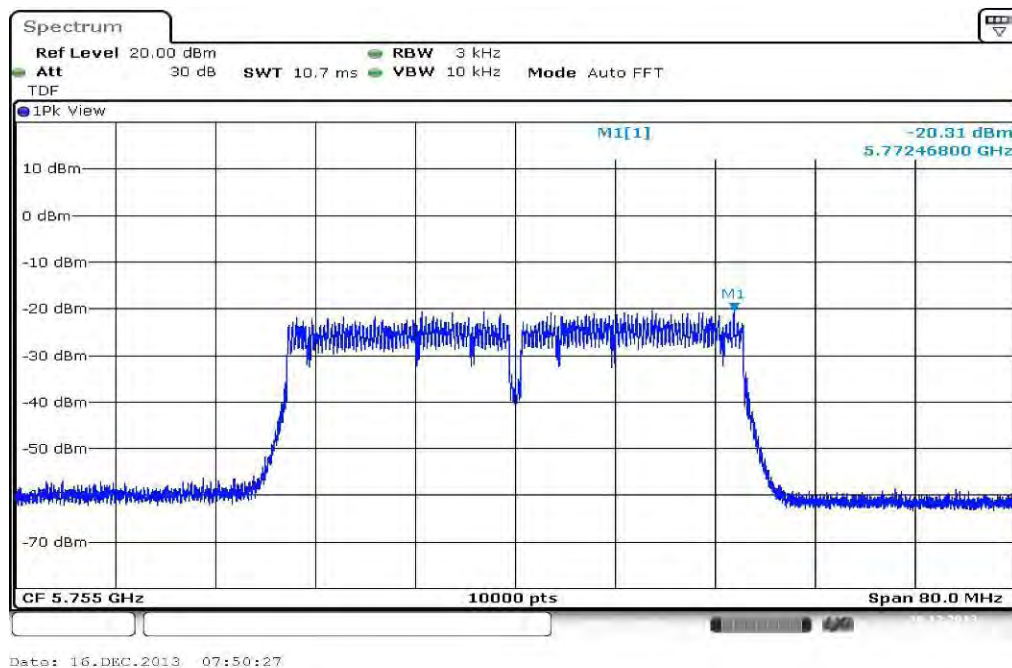
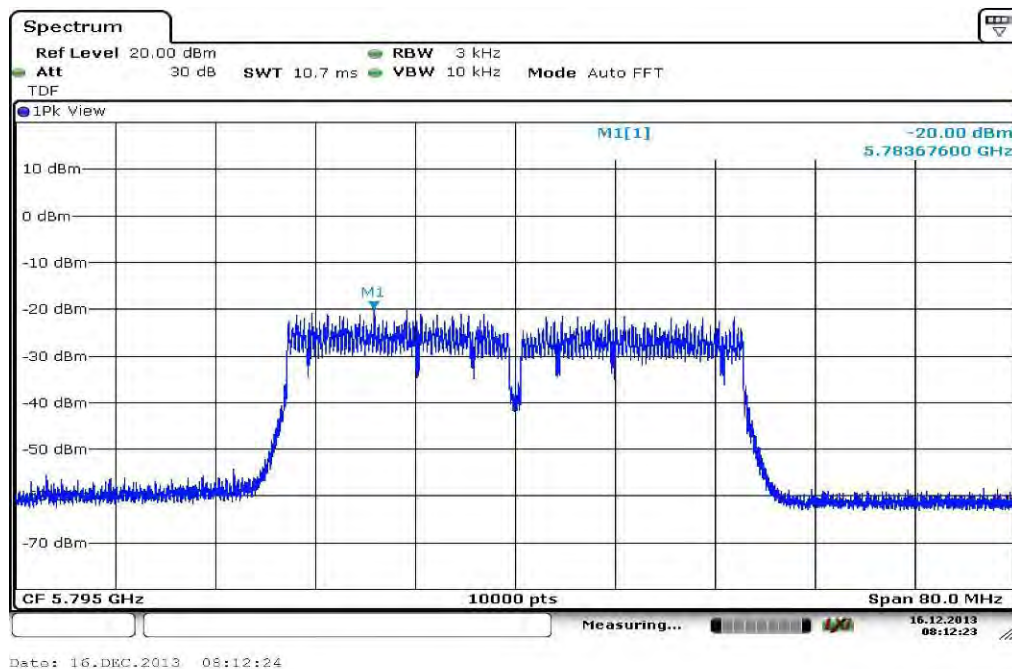
Result: **Passed**

Plots: OFDM / a – mode**Plot 1: TX mode, lowest channel****Plot 2: TX mode, middle channel**

Plot 3: TX mode, highest channel

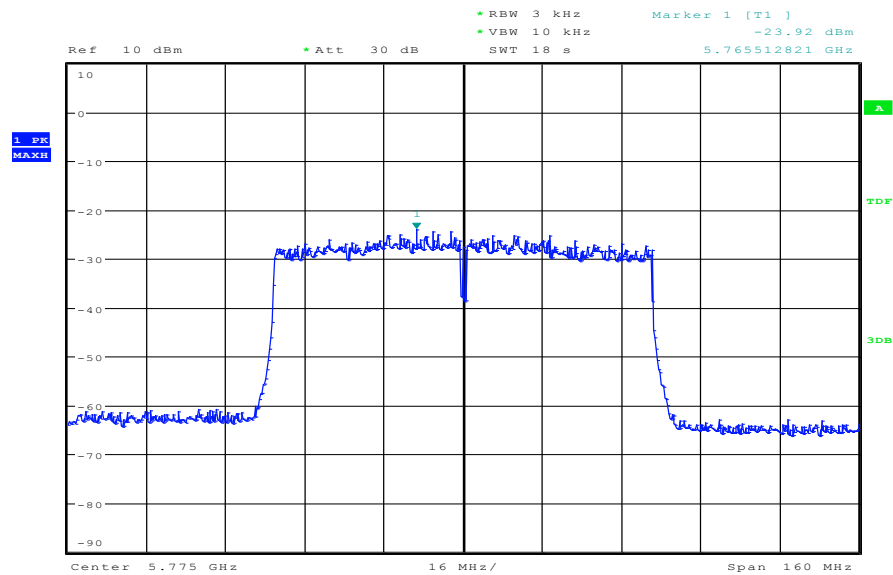


Plot 3: TX mode, highest channel

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



Date: 7.JAN.2014 09:53:11

11.5 DTS bandwidth

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:

Modulation Frequency	6 dB bandwidth [MHz]		
	Lowest channel	Middle channel	Highest channel
OFDM / a – mode	12.43	12.29	12.36
OFDM / n/ac – mode HT20	13.30	13.17	13.24
OFDM / n/ac – mode HT40	27.17		27.41
OFDM / ac – mode HT80	53.33		
Measurement uncertainty	± RBW		

Result: Passed

11.6 Occupied bandwidth

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 used span
Video bandwidth:	$\geq 3 \times \text{RBW}$
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:

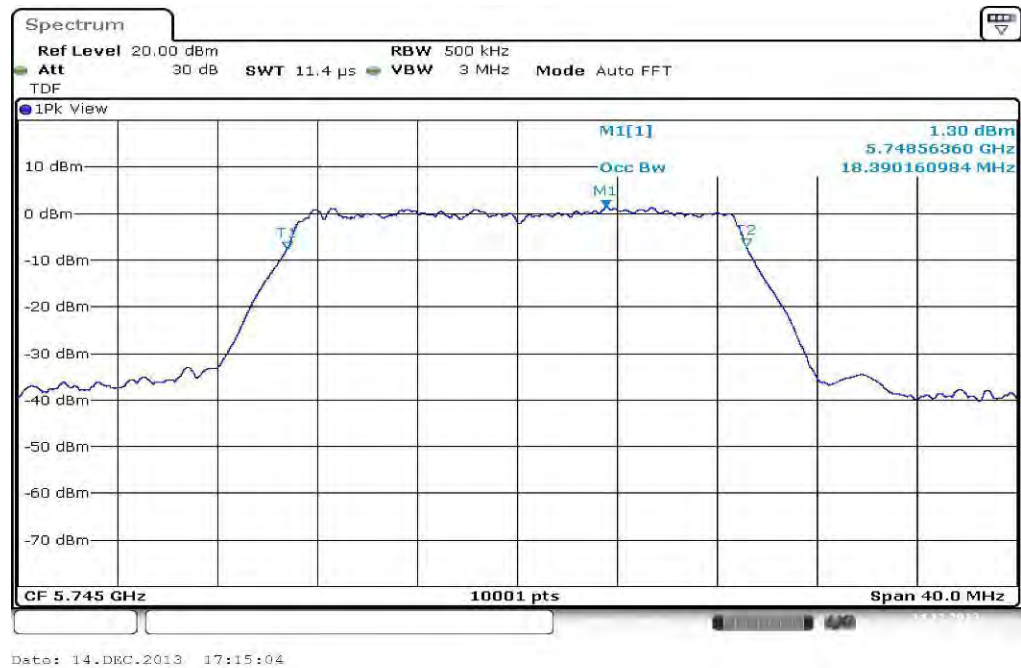
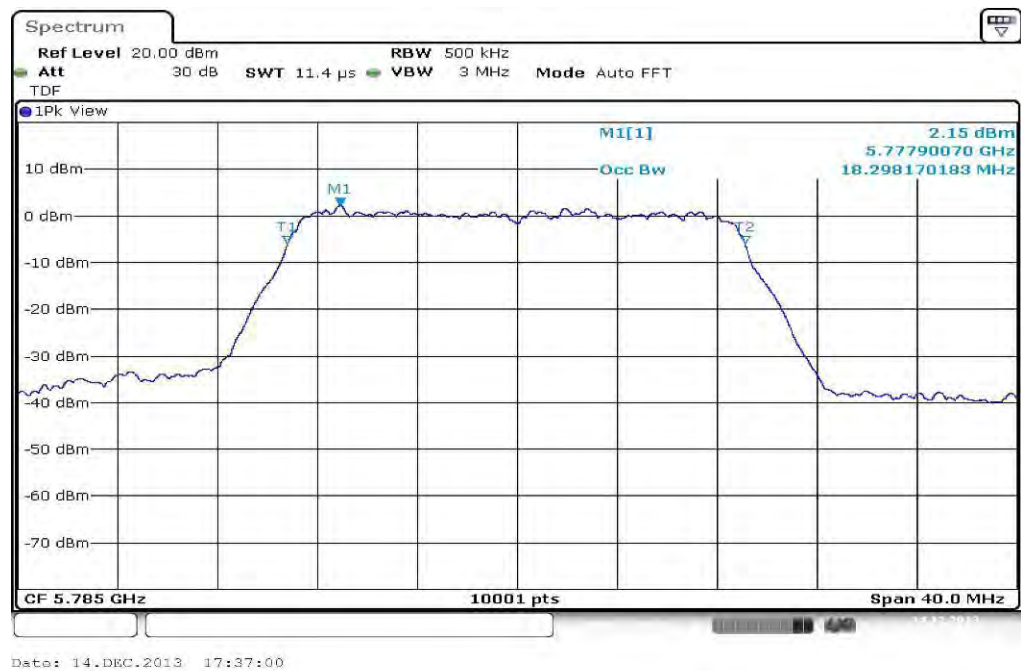
Modulation Frequency	20 dB bandwidth [MHz]		
	Lowest channel	Middle channel	Highest channel
OFDM / a – mode	17.90	17.82	17.86
OFDM / n/ac – mode HT20	18.39	18.30	18.41
OFDM / n/ac – mode HT40	36.72		36.79
OFDM / ac – mode HT80	78.80		
Measurement uncertainty	$\pm \text{RBW}$		

Result: Passed

Plots: OFDM / a – mode**Plot 1: TX mode, lowest channel****Plot 2: TX mode, middle channel**

Plot 3: TX mode, highest channel



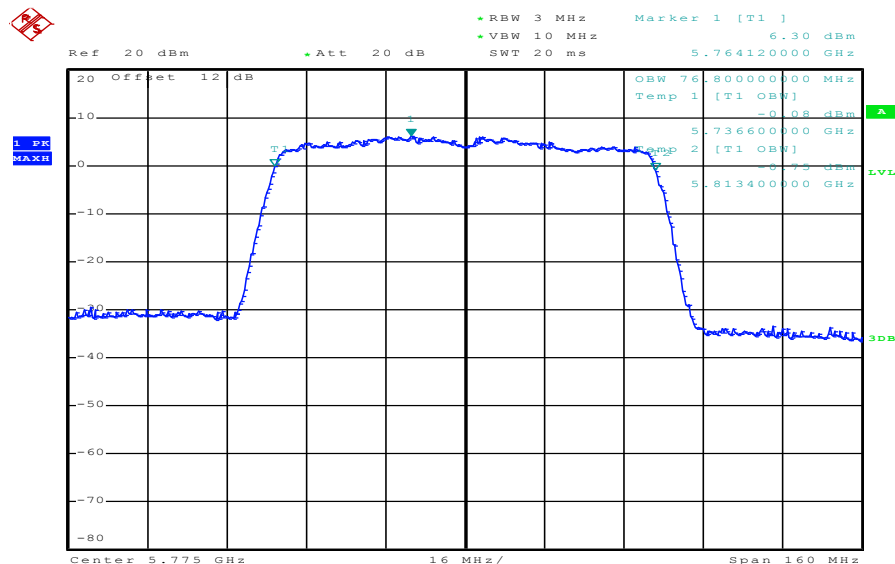
Plots: OFDM / n/ac – mode HT20**Plot 1: TX mode, lowest channel****Plot 2: TX mode, middle channel**

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



Date: 7.JAN.2014 13:43:28

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 25 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		-3.49	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
5785		-3.17	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
5825		-3.74	30 dBm		Operating frequency
No peaks detected. 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		-4.13	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
5785		-3.44	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
5825		-4.34	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
Measurement uncertainty		± 3 dB			

Result: Passed

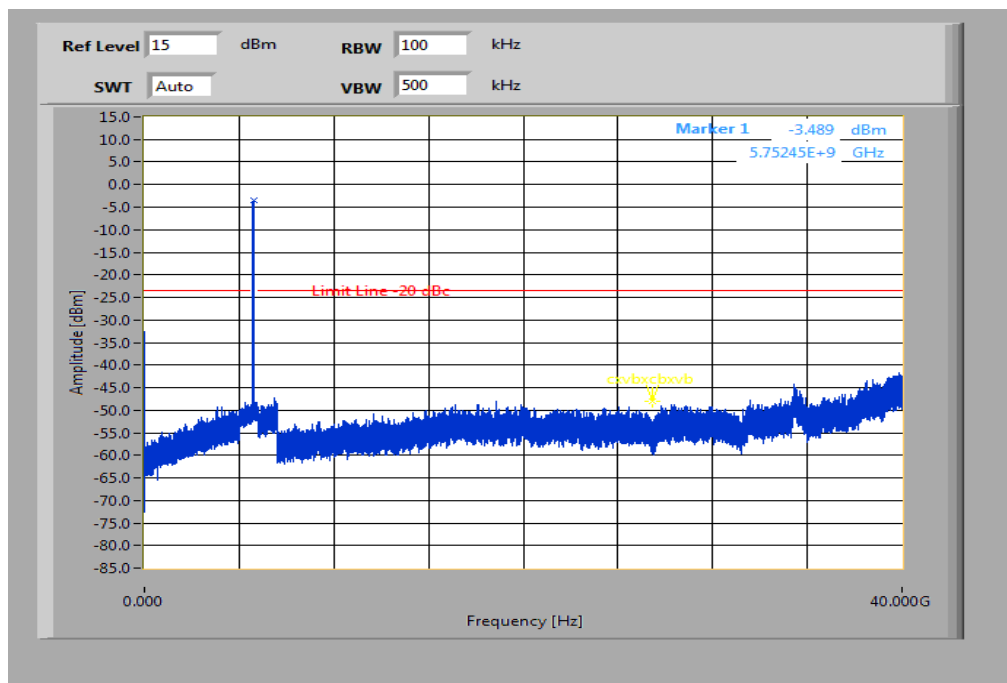
Results: OFDM / n/ac – mode HT40

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		-6.43	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
5785		-6.74	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
Measurement uncertainty			± 3 dB		

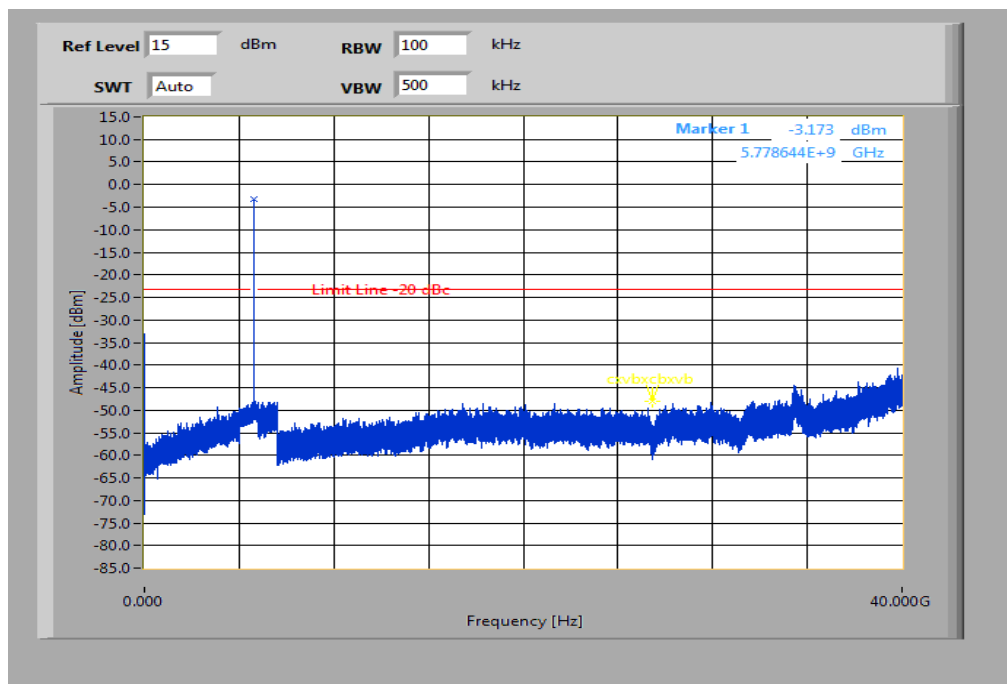
Result: Passed**Results: OFDM / ac – mode HT80**

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		-10.22	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
Measurement uncertainty			± 3 dB		

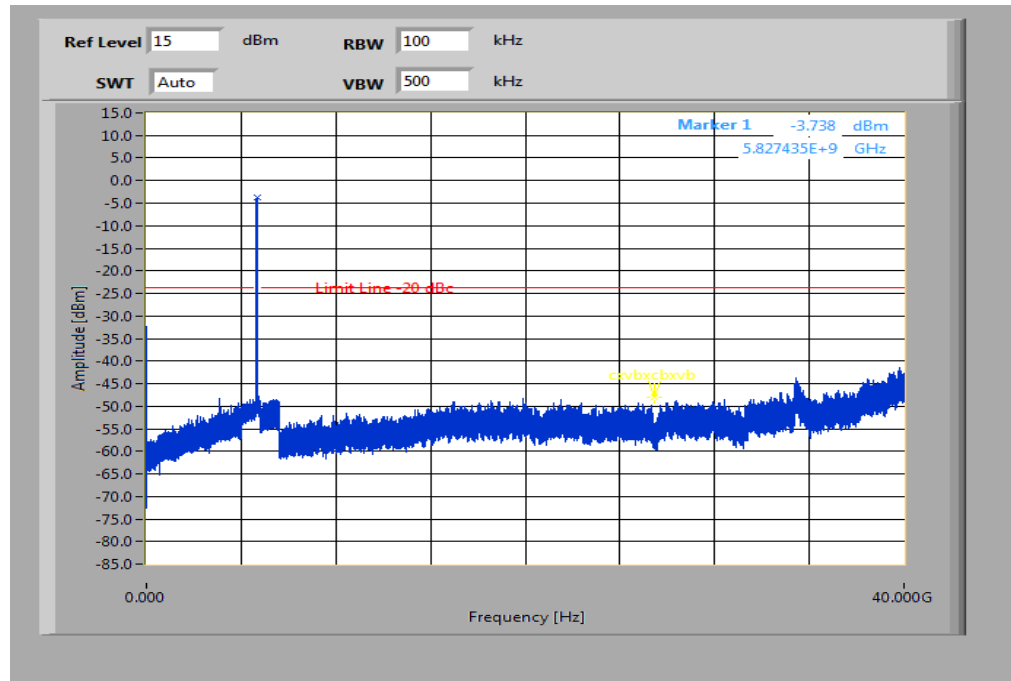
Result: Passed

Plots: OFDM / a – mode**Plot 1:** TX mode, lowest channel, up to 40 GHz

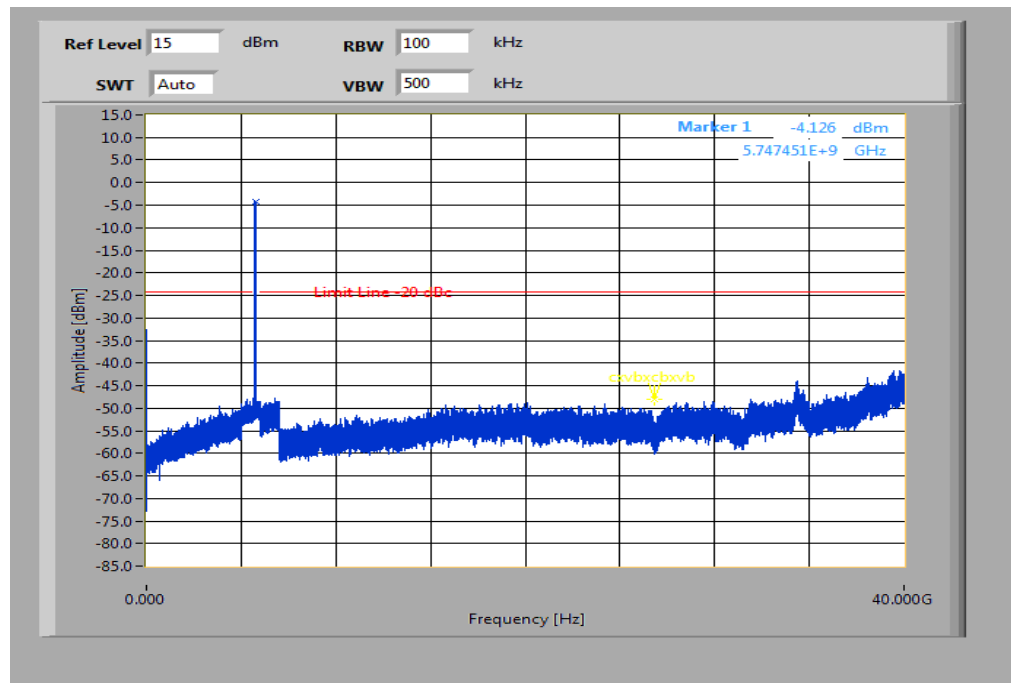
The peak at the beginning of the plot is the LO from the SA.

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

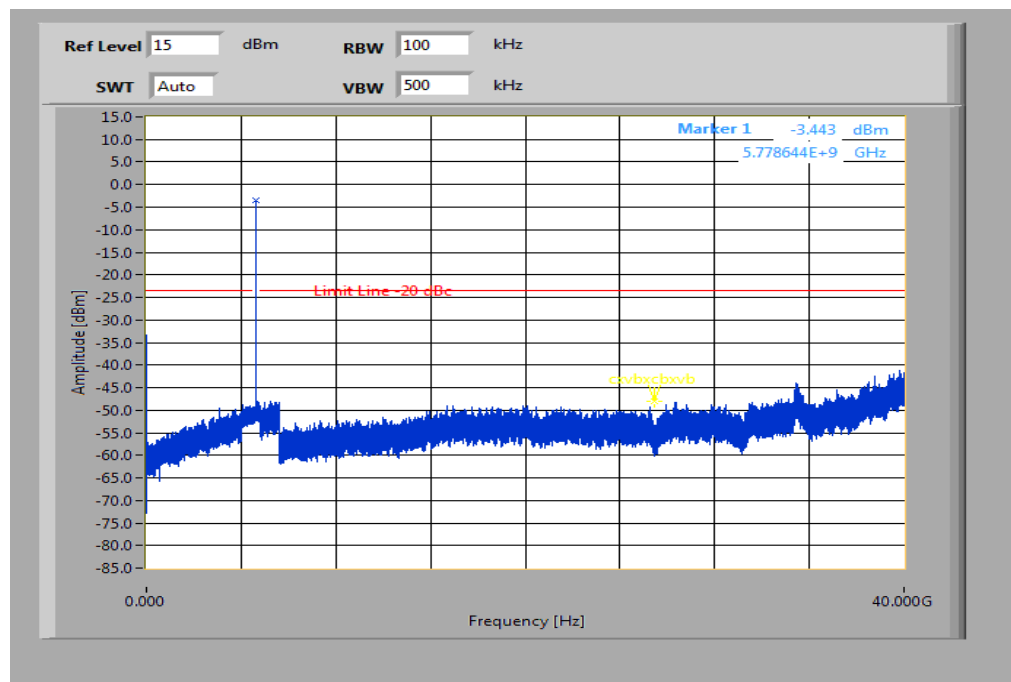
The peak at the beginning of the plot is the LO from the SA.

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

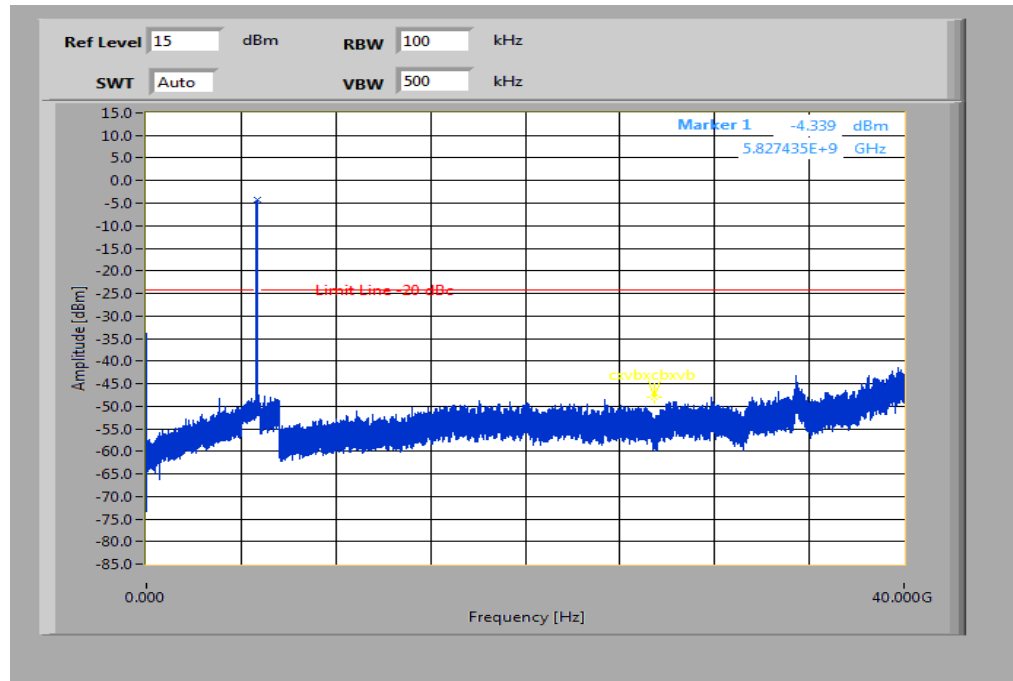
The peak at the beginning of the plot is the LO from the SA.

Plots: OFDM / n/ac – mode HT20**Plot 1: TX mode, lowest channel, up to 40 GHz**

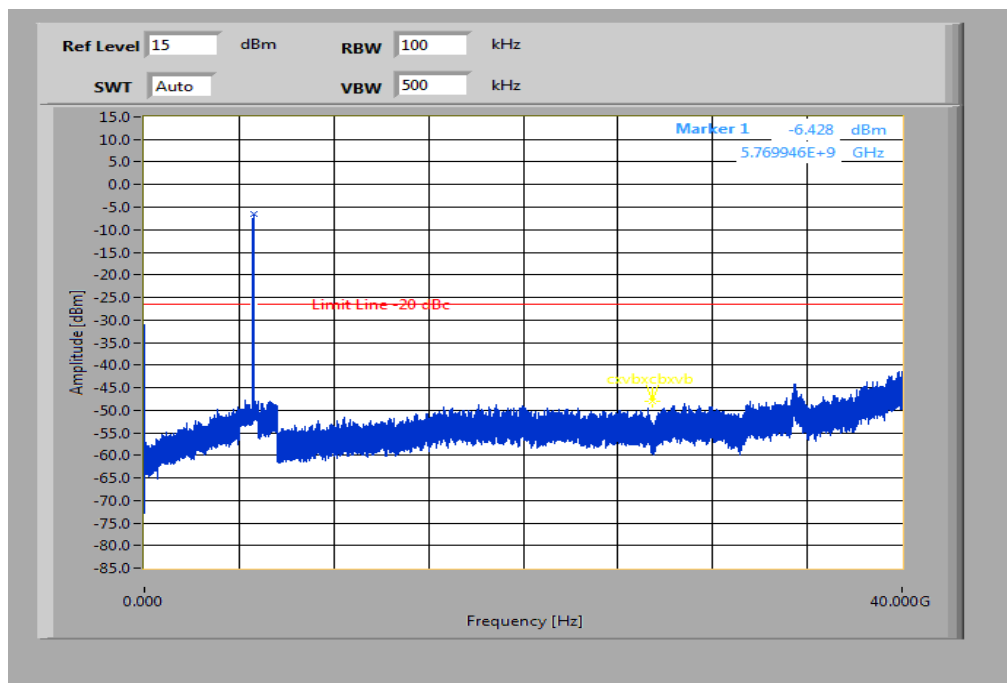
The peak at the beginning of the plot is the LO from the SA.

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

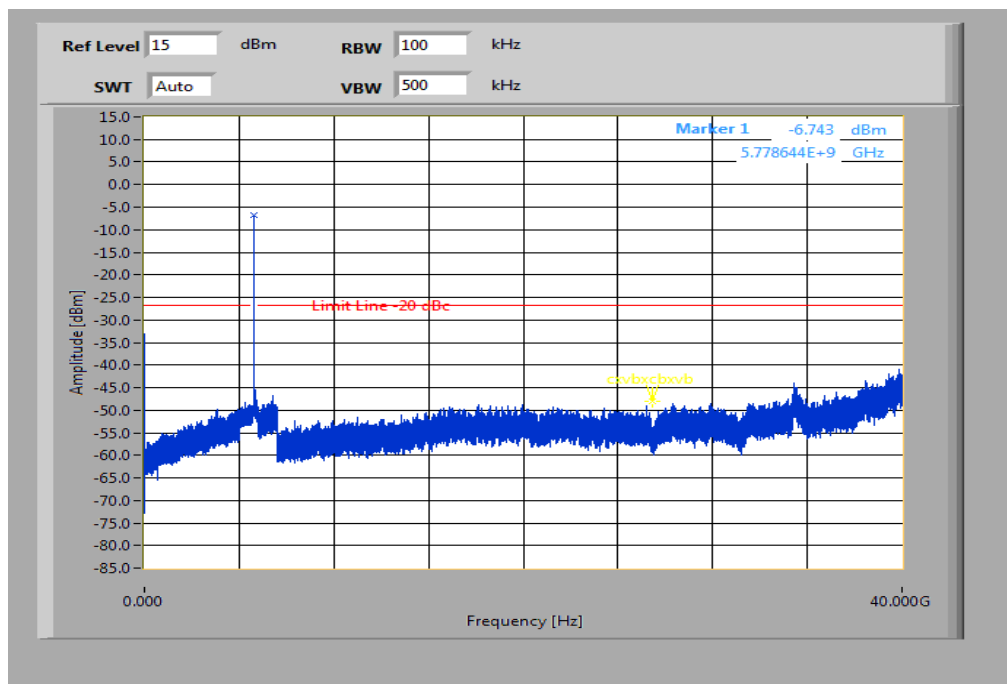
The peak at the beginning of the plot is the LO from the SA.

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.

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 (dB μ V/m)	Measurement distance
30 - 88	30.0	10
88 – 216	33.5	10
216 – 960	36.0	10
Above 960	54.0	3

Results: 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: No emissions detected.			Above 1 GHz: No emissions detected.			Above 1 GHz: No emissions detected.		
Measurement uncertainty			± 3 dB					

Results: OFDM / n/ac – mode HT20

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

Results: OFDM / n/ac – mode HT40

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

Results: OFDM / ac – mode HT80

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

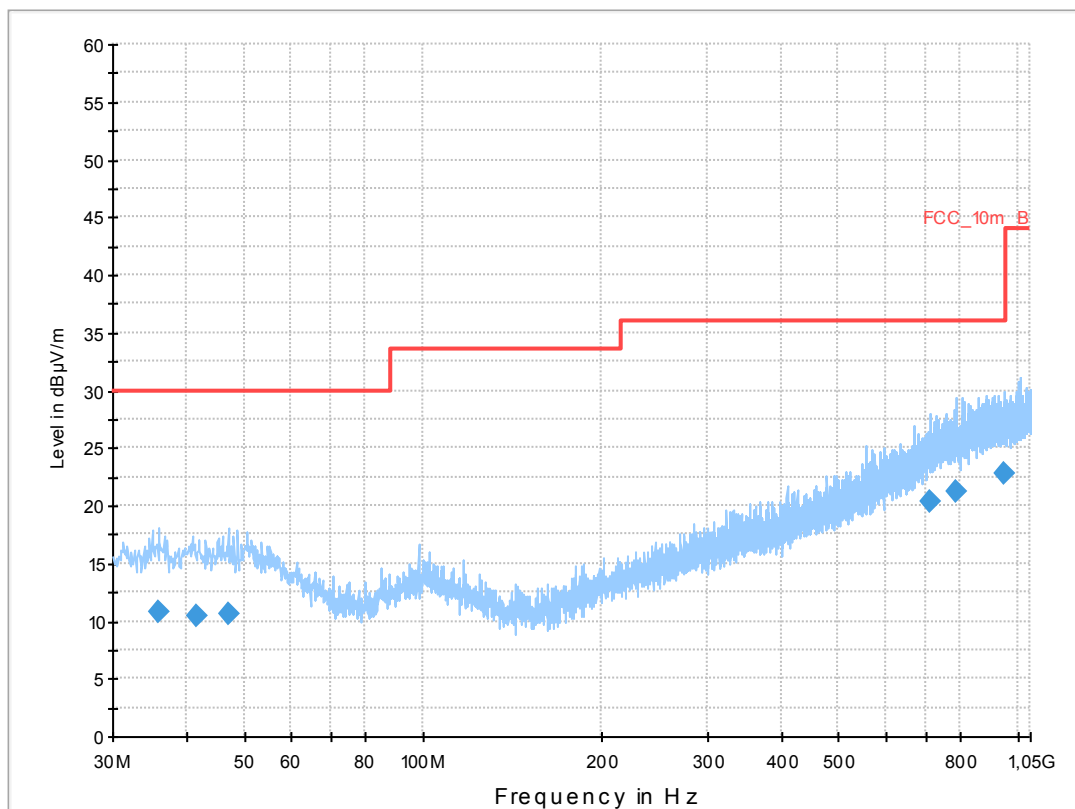
Common Information

EUT: TM-0040-BV
 Serial Number: CB51267Q67
 Test Description: FCC part 15 class B @ 10 m
 Operating Conditions: w-lan a-mode tx ch 149
 Operator Name: Hennemann
 Comment: battery powered

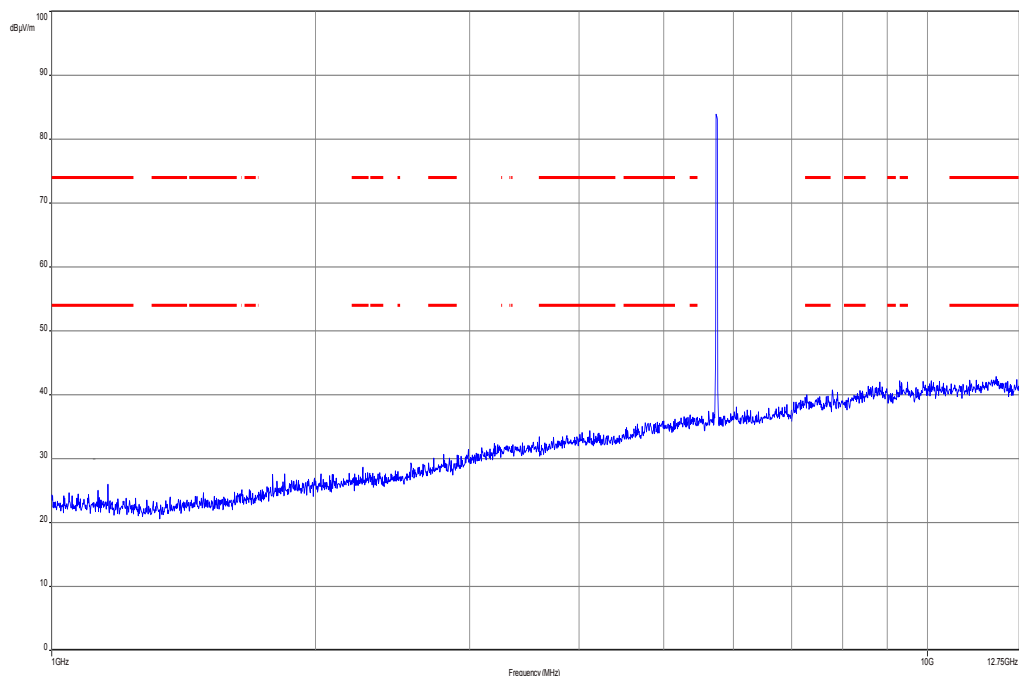
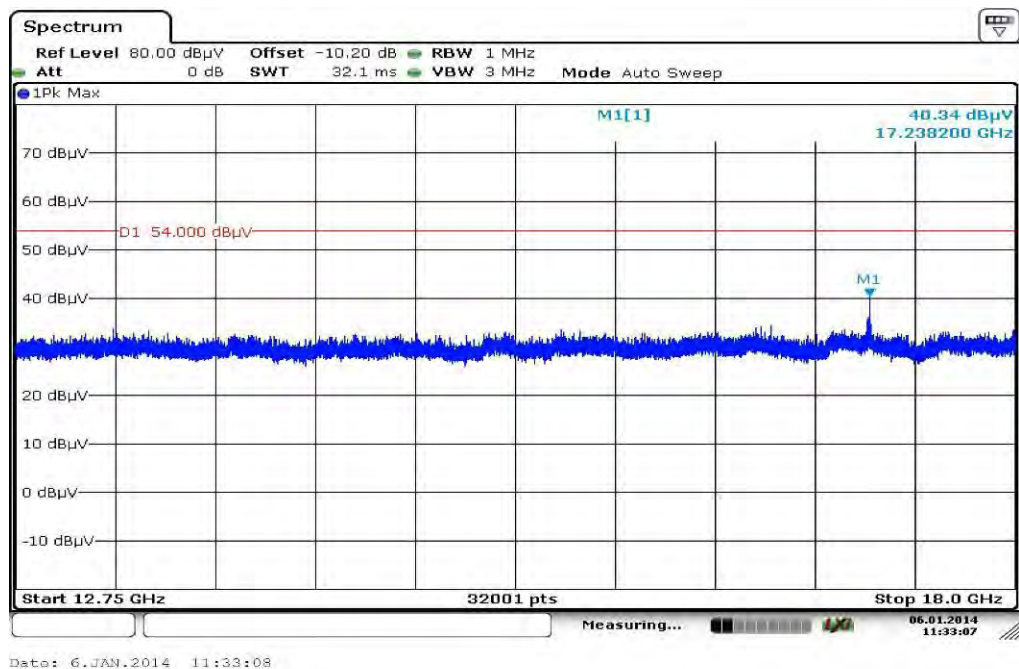
Scan Setup: STAN_Fin [EMI radiated]

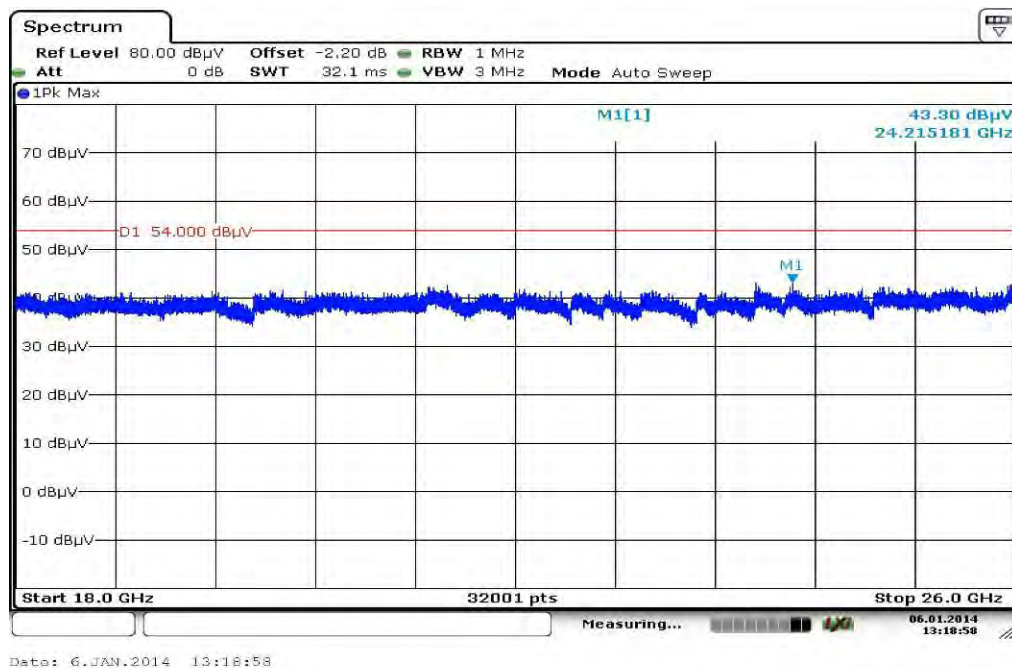
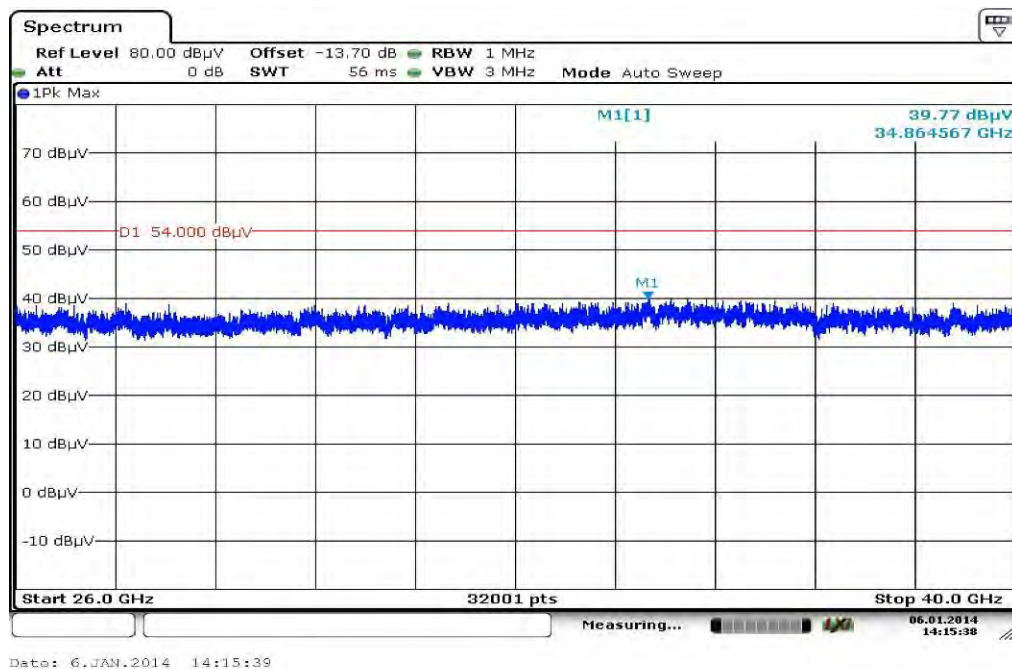
Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dB μ V/m

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 (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
35.896800	10.7	1000.0	120.000	170.0	H	100.0	13.1	19.3	30.0	
41.483850	10.5	1000.0	120.000	134.0	H	10.0	13.4	19.5	30.0	
47.106000	10.7	1000.0	120.000	98.0	V	190.0	13.3	19.3	30.0	
714.422700	20.4	1000.0	120.000	170.0	H	81.0	22.8	15.6	36.0	
790.054650	21.2	1000.0	120.000	155.0	H	88.0	23.8	14.8	36.0	
947.282550	22.7	1000.0	120.000	143.0	V	10.0	25.3	13.3	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

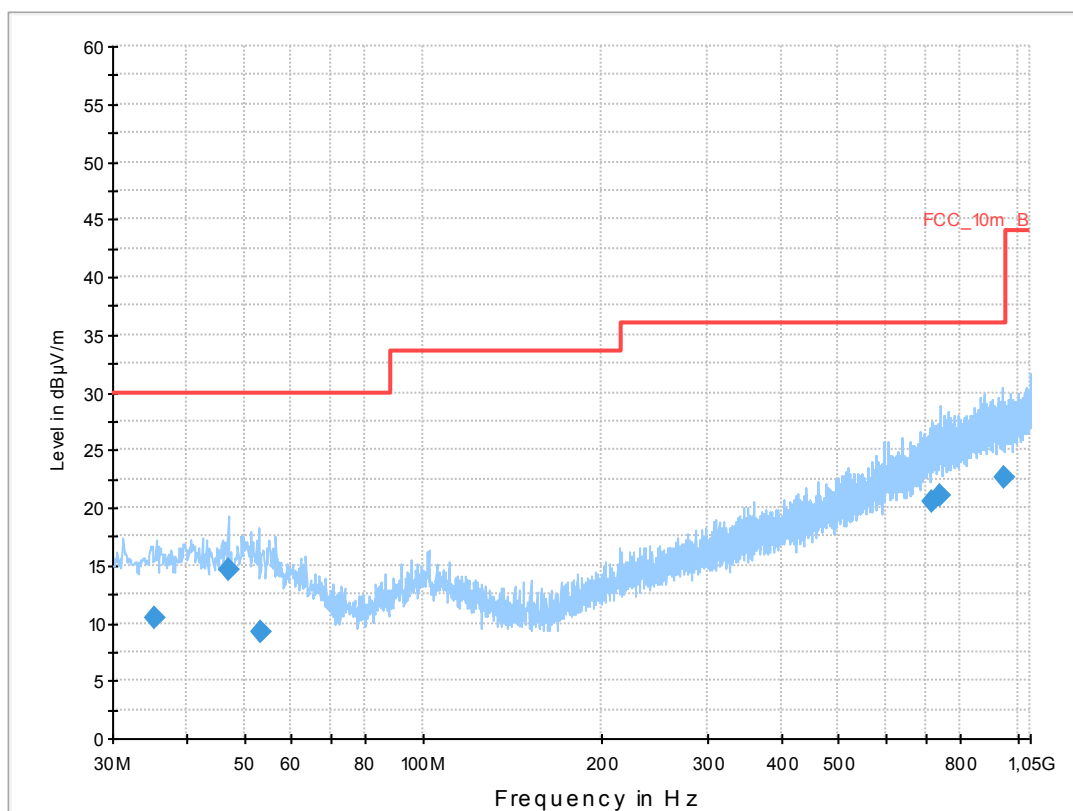
Common Information

EUT: TM-0040-BV
 Serial Number: CB51267Q67
 Test Description: FCC part 15 class B @ 10 m
 Operating Conditions: w-lan a-mode tx ch 157
 Operator Name: Hennemann
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

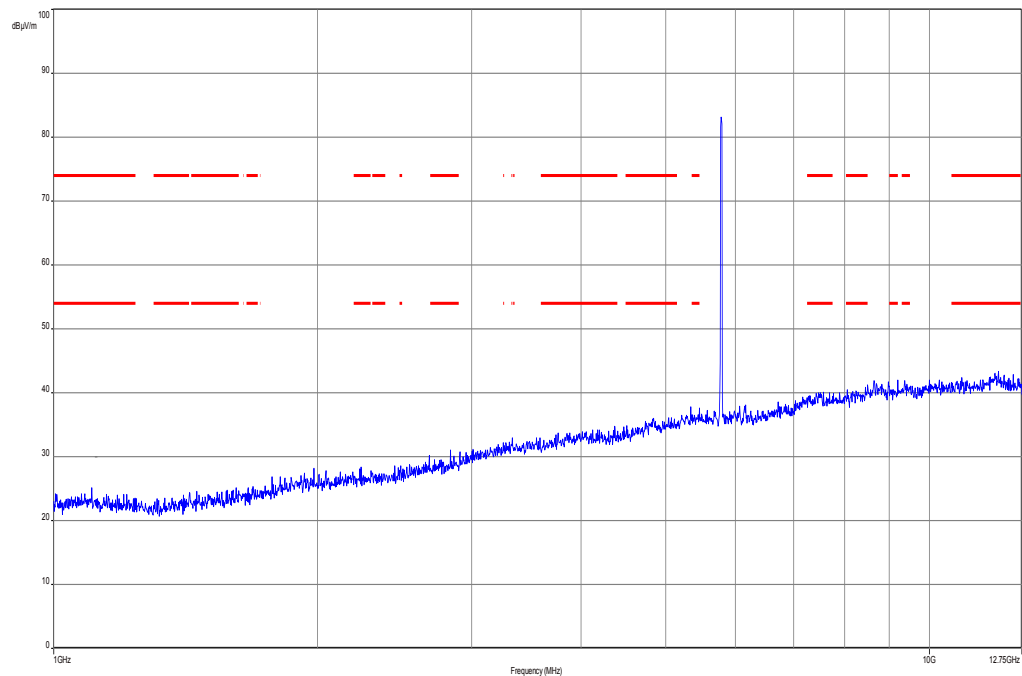
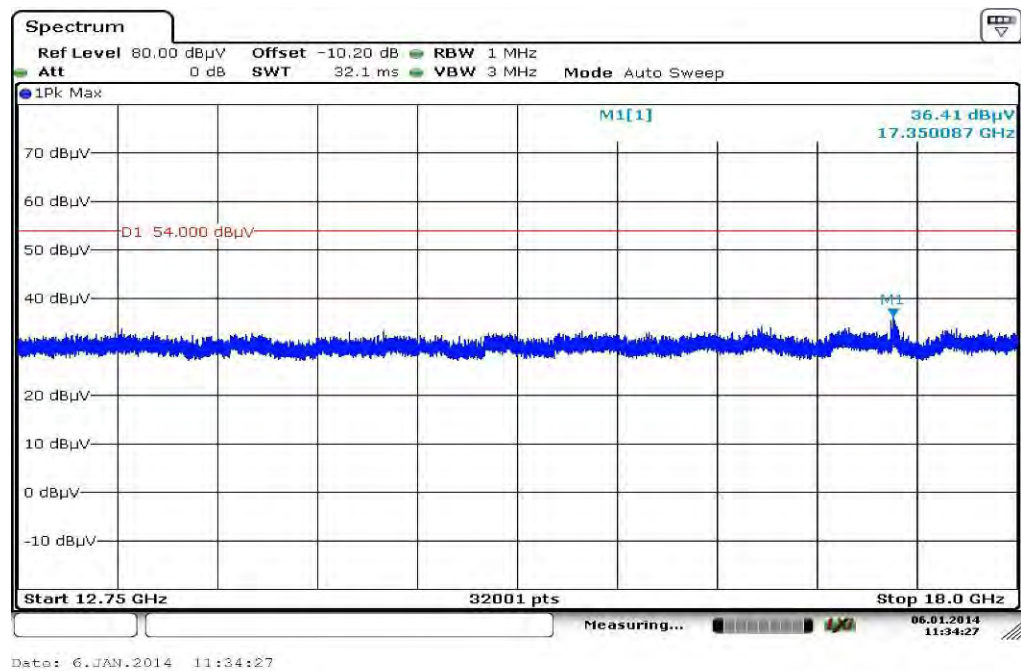
Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dB μ V/m

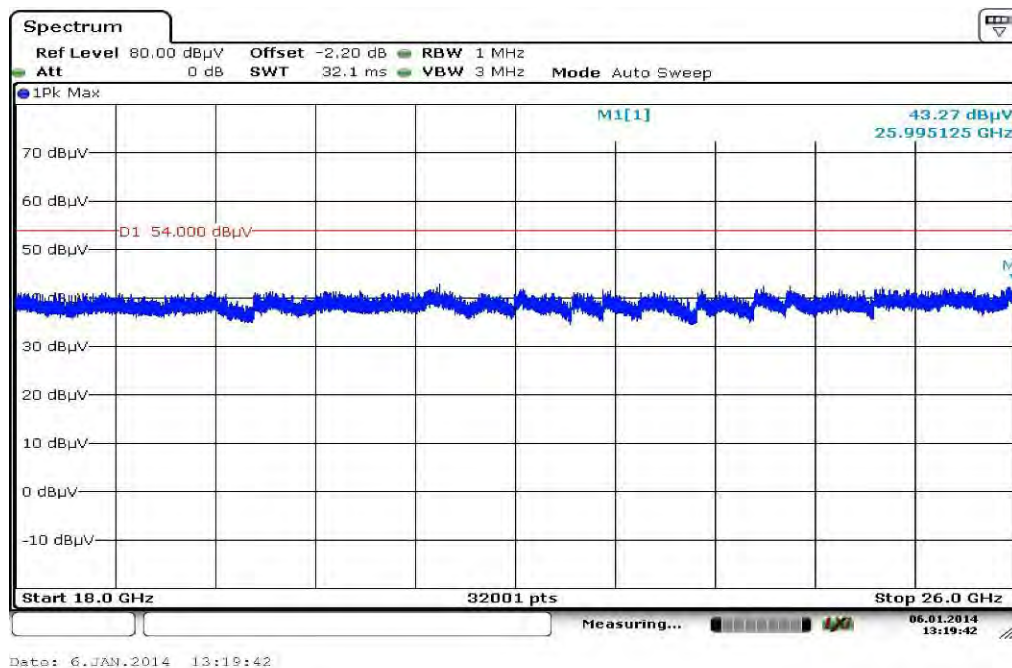
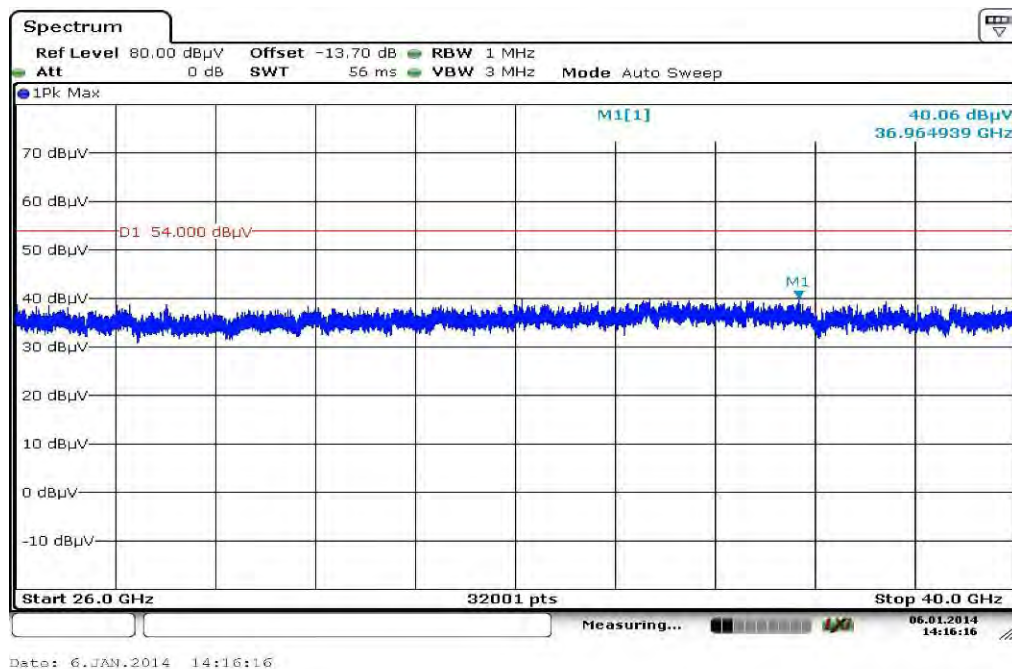
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
35.324550	10.4	1000.0	120.000	170.0	H	270.0	13.1	19.6	30.0	
46.982700	14.5	1000.0	120.000	98.0	V	10.0	13.3	15.5	30.0	
53.487600	9.2	1000.0	120.000	112.0	H	3.0	13.0	20.8	30.0	
717.559800	20.6	1000.0	120.000	170.0	H	175.0	22.9	15.4	36.0	
741.541950	21.0	1000.0	120.000	170.0	H	-10.0	23.5	15.0	36.0	
945.786000	22.7	1000.0	120.000	98.0	H	100.0	25.3	13.3	36.0	

Plot 7: Middle channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization**Plot 8:** Middle channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization

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

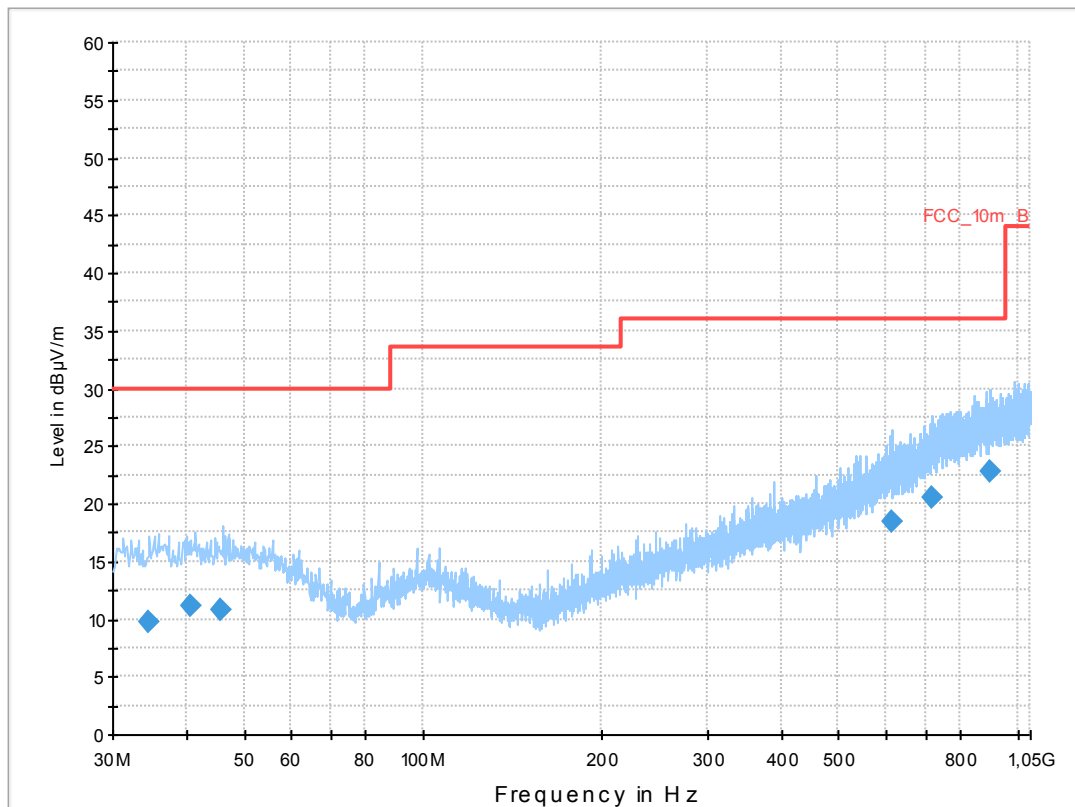
Common Information

EUT: TM-0040-BV
 Serial Number: CB51267Q67
 Test Description: FCC part 15 class B @ 10 m
 Operating Conditions: w-lan a-mode tx ch 165
 Operator Name: Hennemann
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

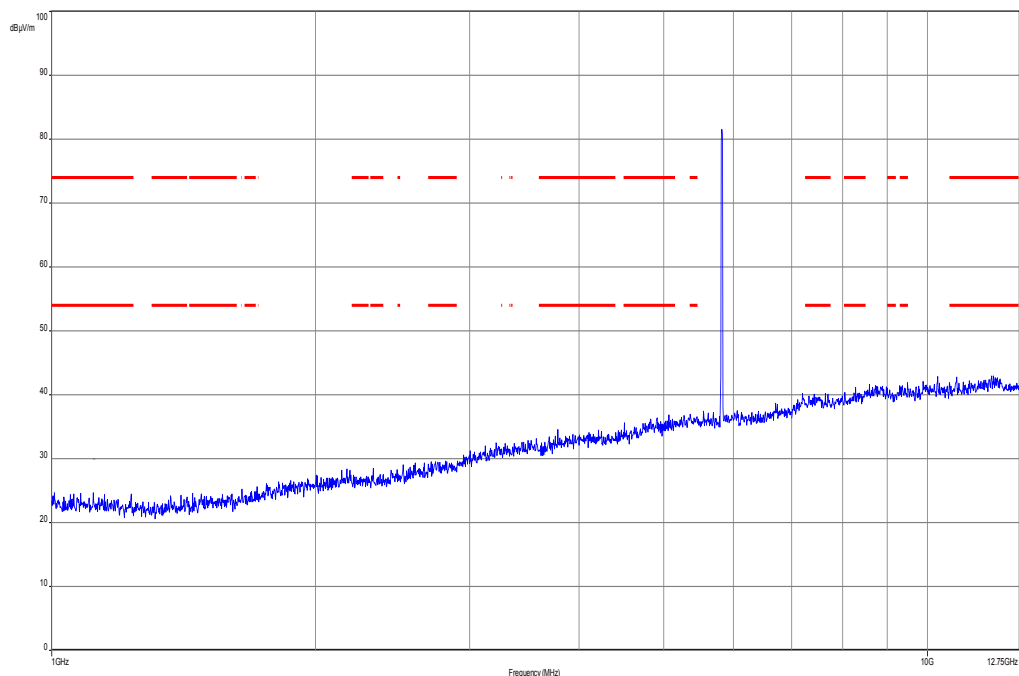
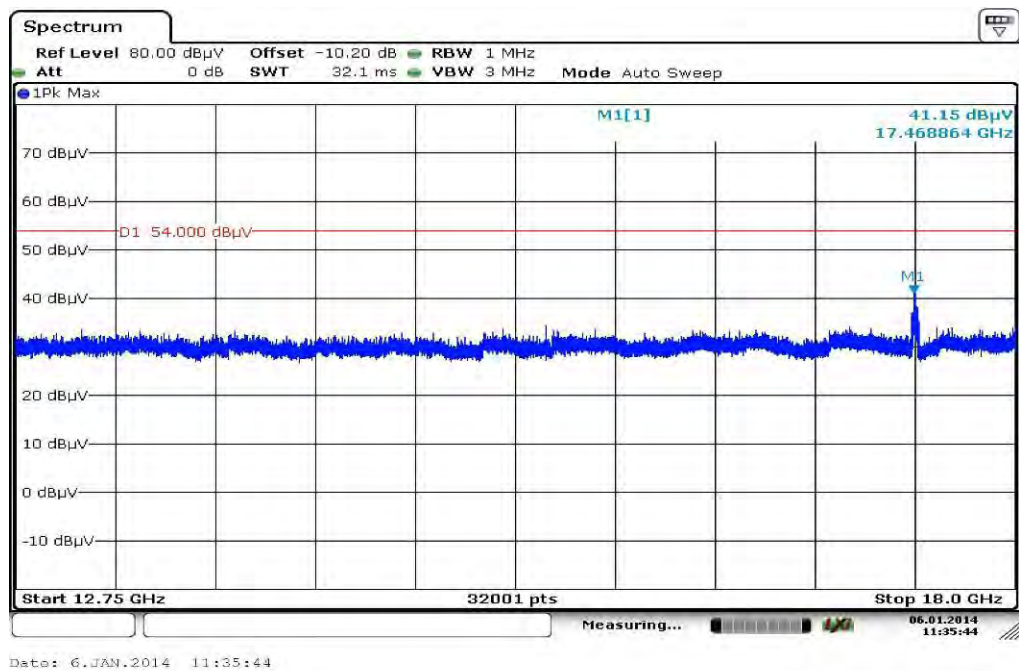
Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dB μ V/m

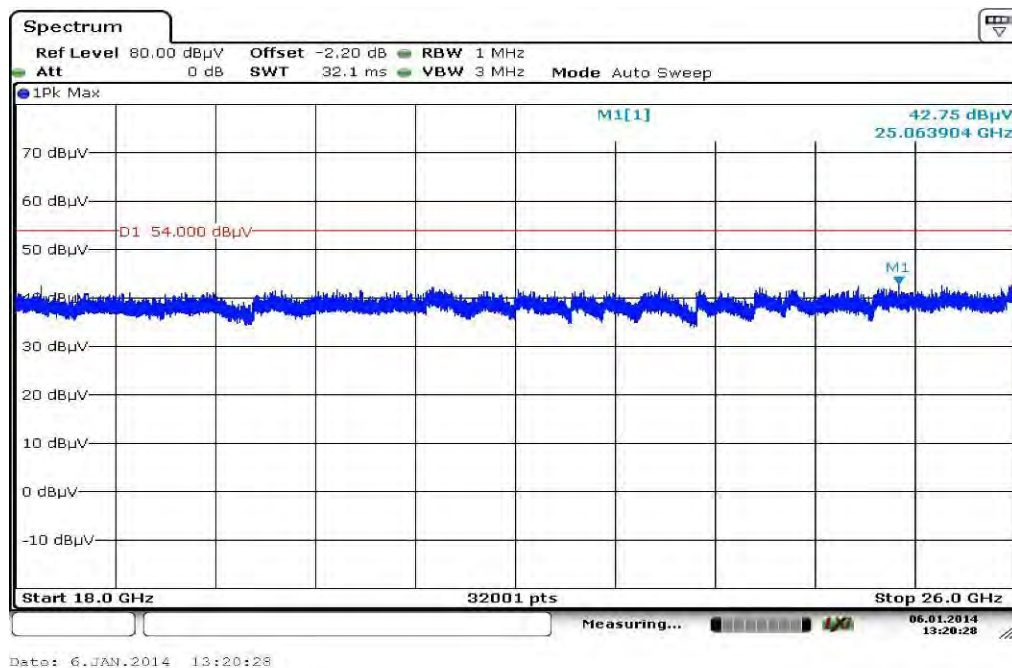
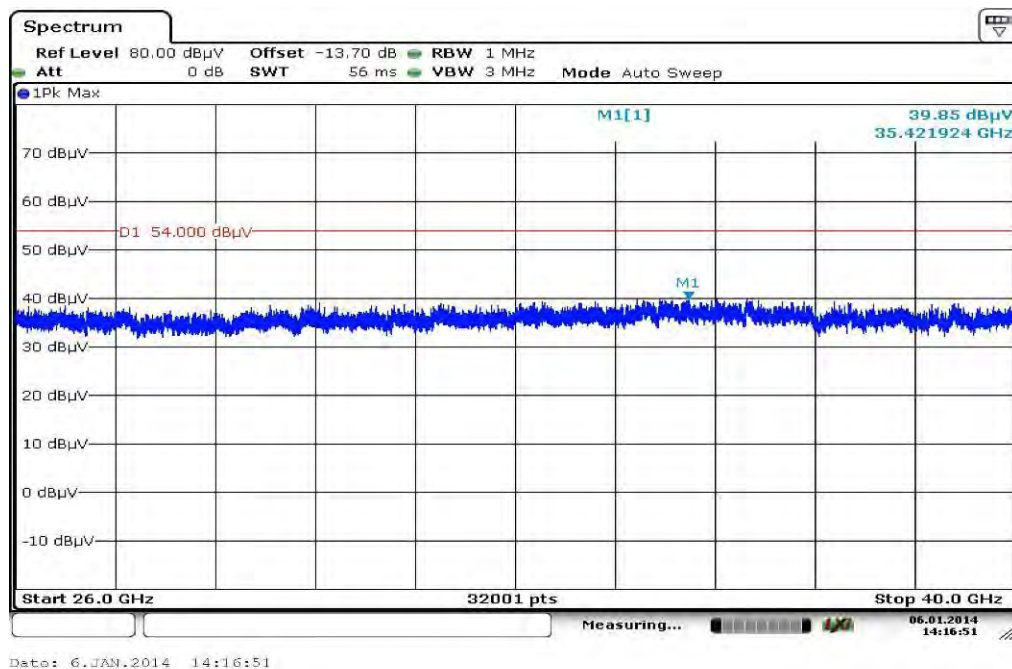
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
34.605000	9.8	1000.0	120.000	170.0	H	0.0	13.0	20.2	30.0	
40.506600	11.1	1000.0	120.000	170.0	V	260.0	13.4	18.9	30.0	
45.560250	10.7	1000.0	120.000	120.0	V	170.0	13.3	19.3	30.0	
613.808100	18.4	1000.0	120.000	146.0	H	183.0	20.9	17.6	36.0	
720.241800	20.5	1000.0	120.000	170.0	H	190.0	23.0	15.5	36.0	
901.266450	22.8	1000.0	120.000	170.0	V	171.0	25.2	13.2	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 – mode 20MHz

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

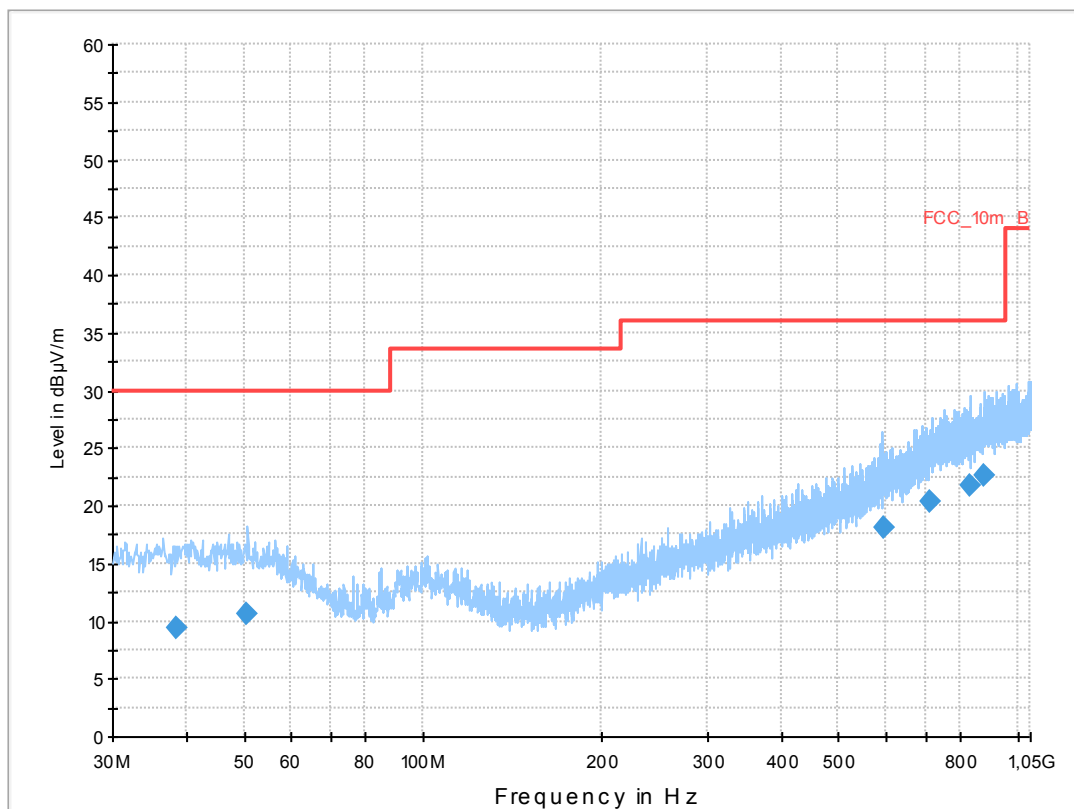
Common Information

EUT: TM-0040-BV
 Serial Number: CB51267Q67
 Test Description: FCC part 15 class B @ 10 m
 Operating Conditions: w-lan n-mode (HT20) tx ch 149
 Operator Name: Hennemann
 Comment: battery powered

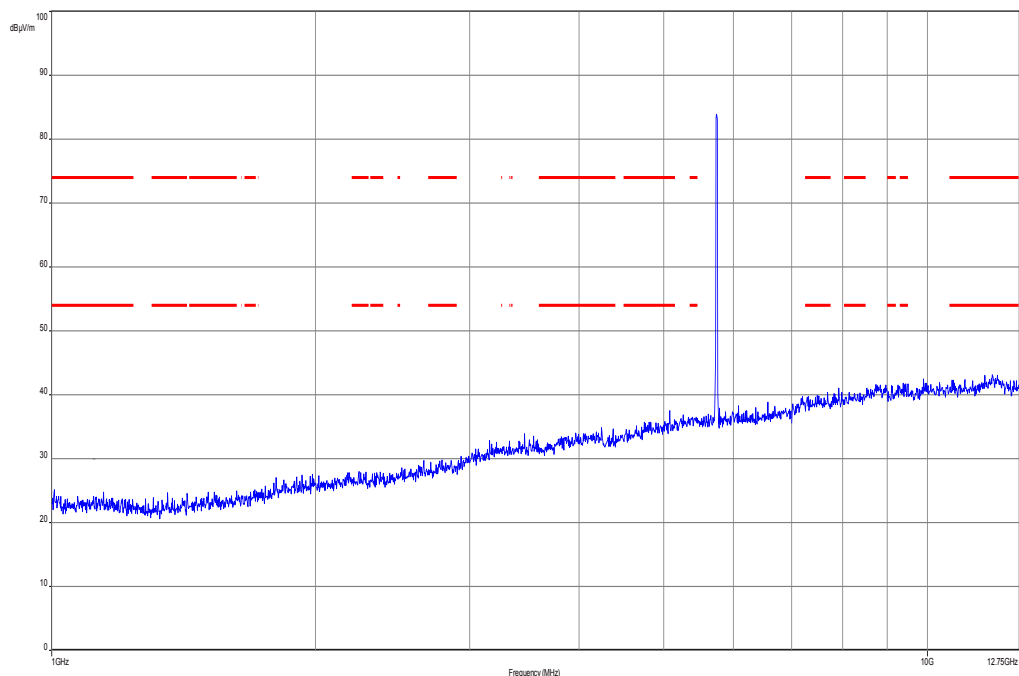
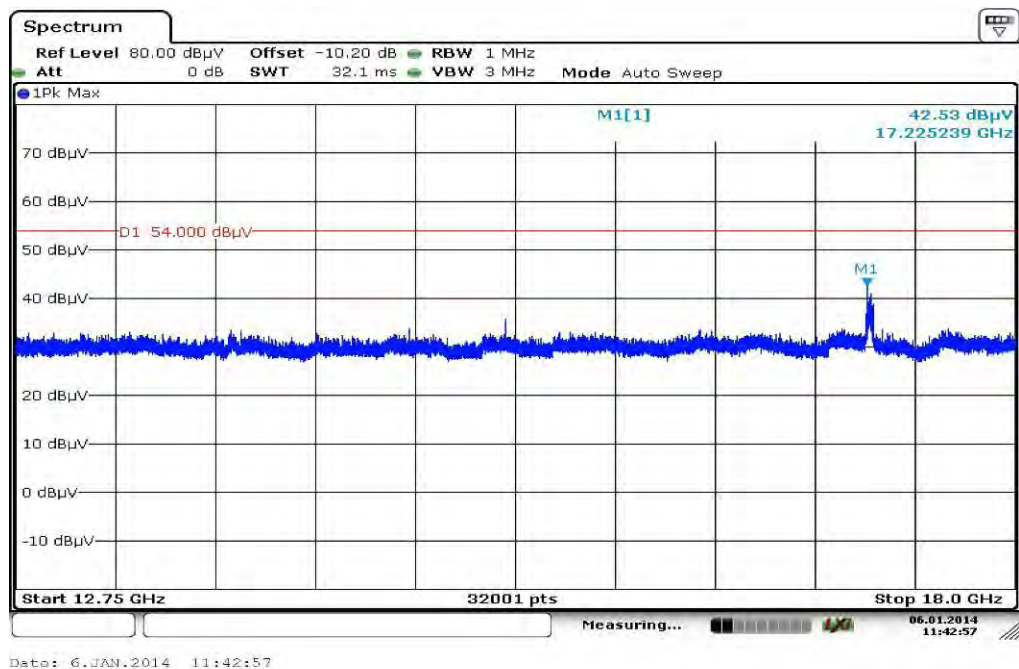
Scan Setup: STAN_Fin [EMI radiated]

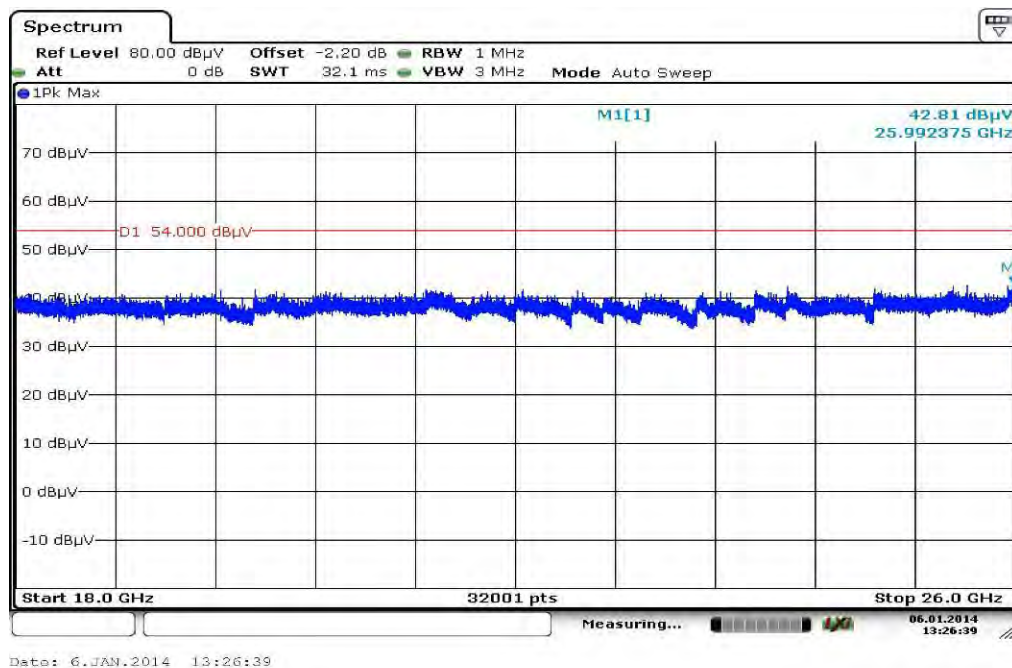
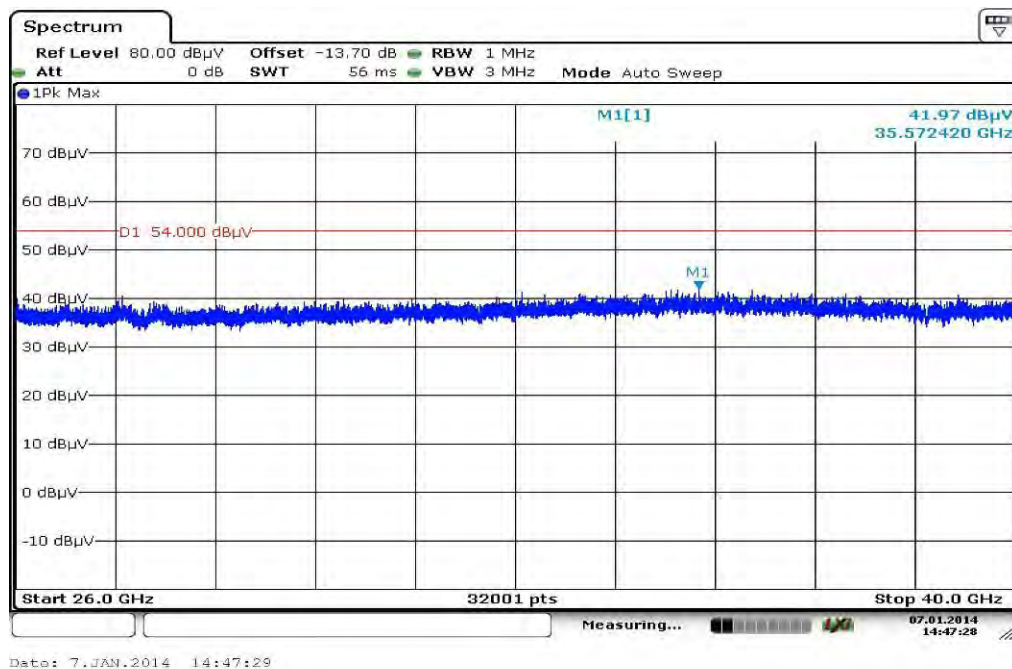
Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dB μ V/m

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 (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
38.520900	9.5	1000.0	120.000	170.0	H	170.0	13.3	20.5	30.0	
50.568750	10.6	1000.0	120.000	170.0	V	272.0	13.3	19.4	30.0	
593.725800	18.1	1000.0	120.000	170.0	H	2.0	20.6	17.9	36.0	
714.991200	20.4	1000.0	120.000	120.0	V	80.0	22.9	15.6	36.0	
830.477550	21.8	1000.0	120.000	170.0	H	268.0	24.3	14.2	36.0	
879.280350	22.6	1000.0	120.000	170.0	V	86.0	24.9	13.4	36.0	

Plot 2: Lowest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization**Plot 3:** Lowest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization

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

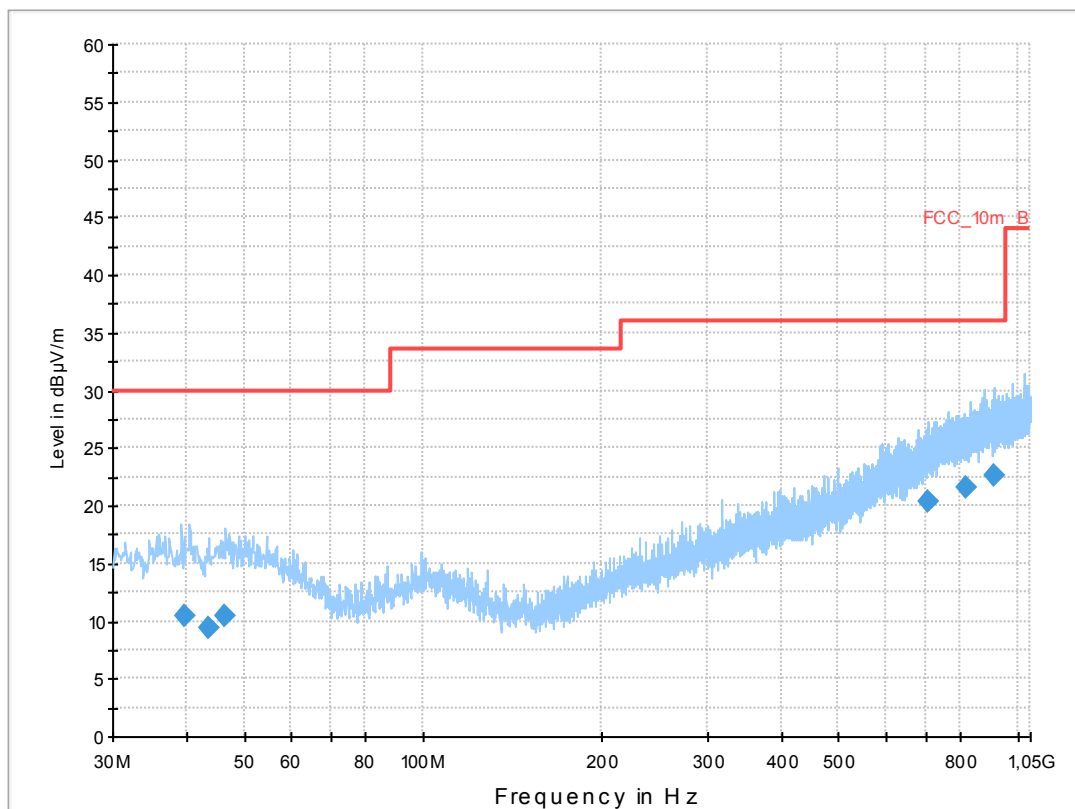
Common Information

EUT: TM-0040-BV
 Serial Number: CB51267Q67
 Test Description: FCC part 15 class B @ 10 m
 Operating Conditions: w-lan n-mode (HT20) tx ch 157
 Operator Name: Hennemann
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

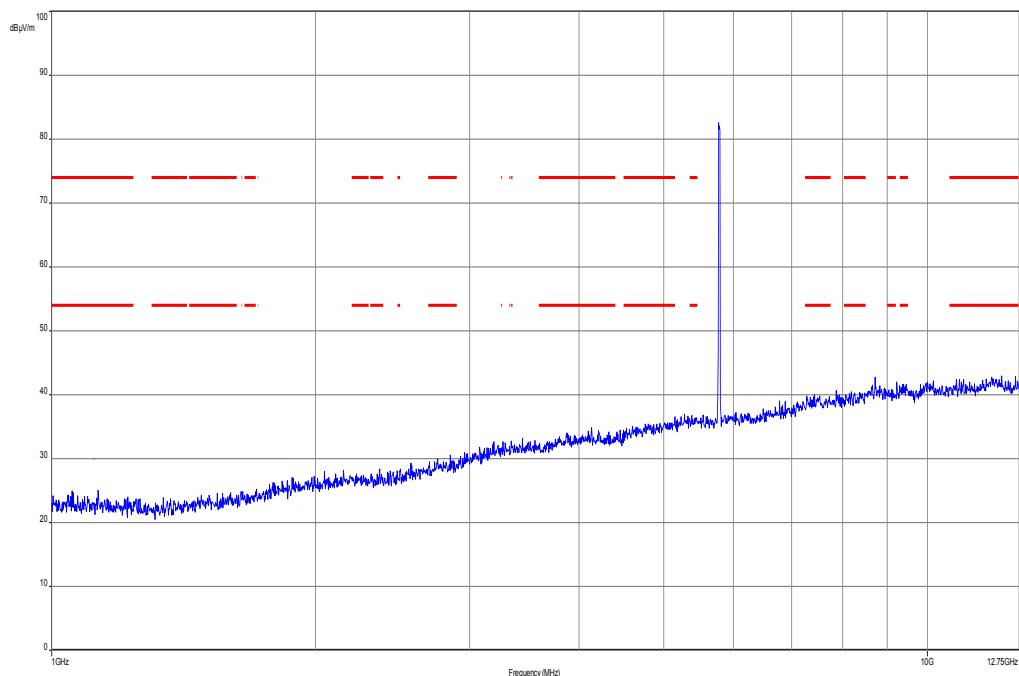
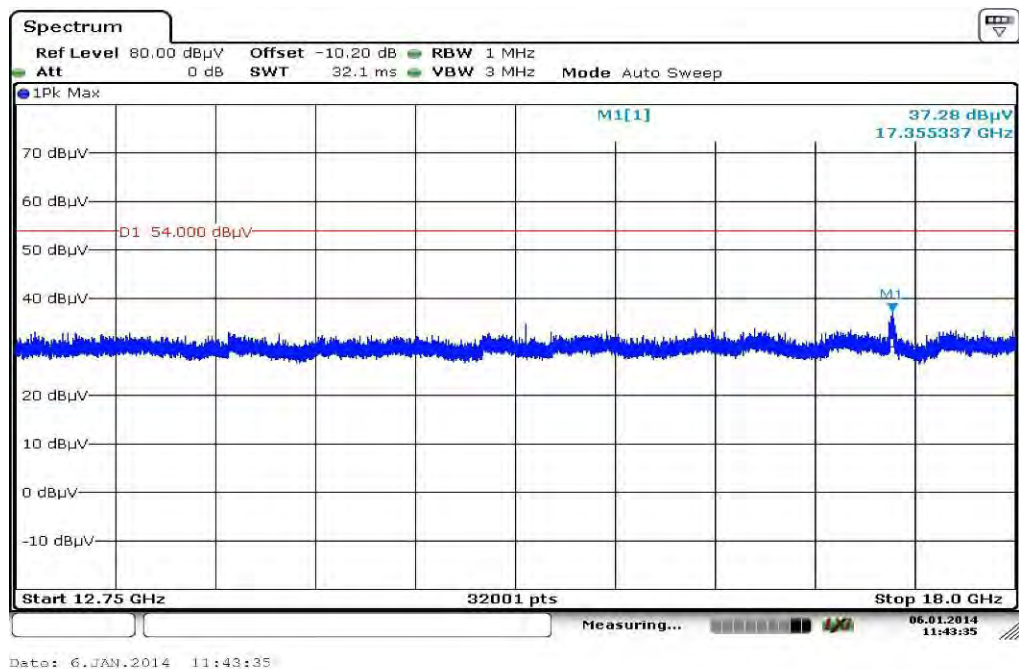
Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dB μ V/m

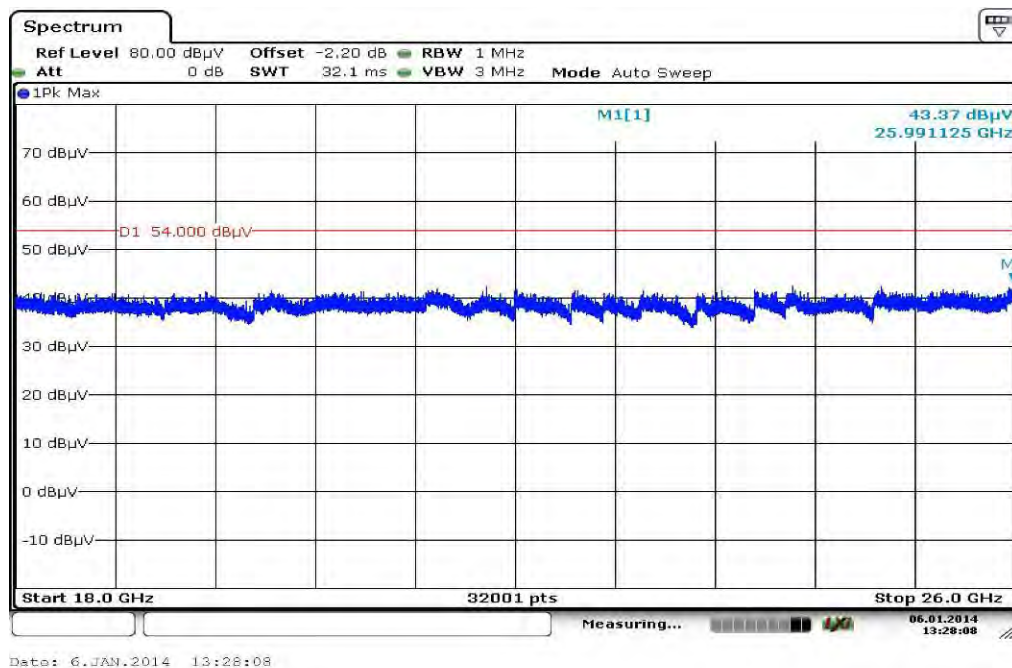
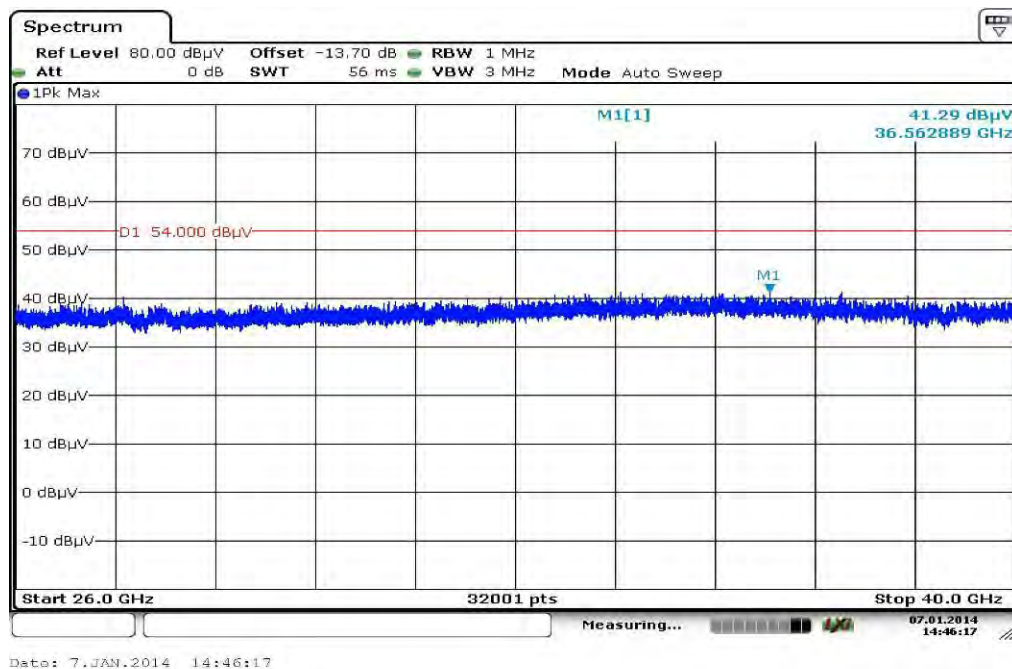
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
39.744900	10.5	1000.0	120.000	170.0	H	268.0	13.4	19.5	30.0	
43.495950	9.3	1000.0	120.000	170.0	H	175.0	13.3	20.7	30.0	
46.467900	10.4	1000.0	120.000	170.0	H	175.0	13.3	19.6	30.0	
705.552450	20.3	1000.0	120.000	170.0	V	100.0	22.6	15.7	36.0	
822.092850	21.6	1000.0	120.000	170.0	H	-5.0	24.1	14.4	36.0	
913.230300	22.7	1000.0	120.000	151.0	H	10.0	25.2	13.3	36.0	

Plot 7: Middle channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization**Plot 8:** Middle channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization

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

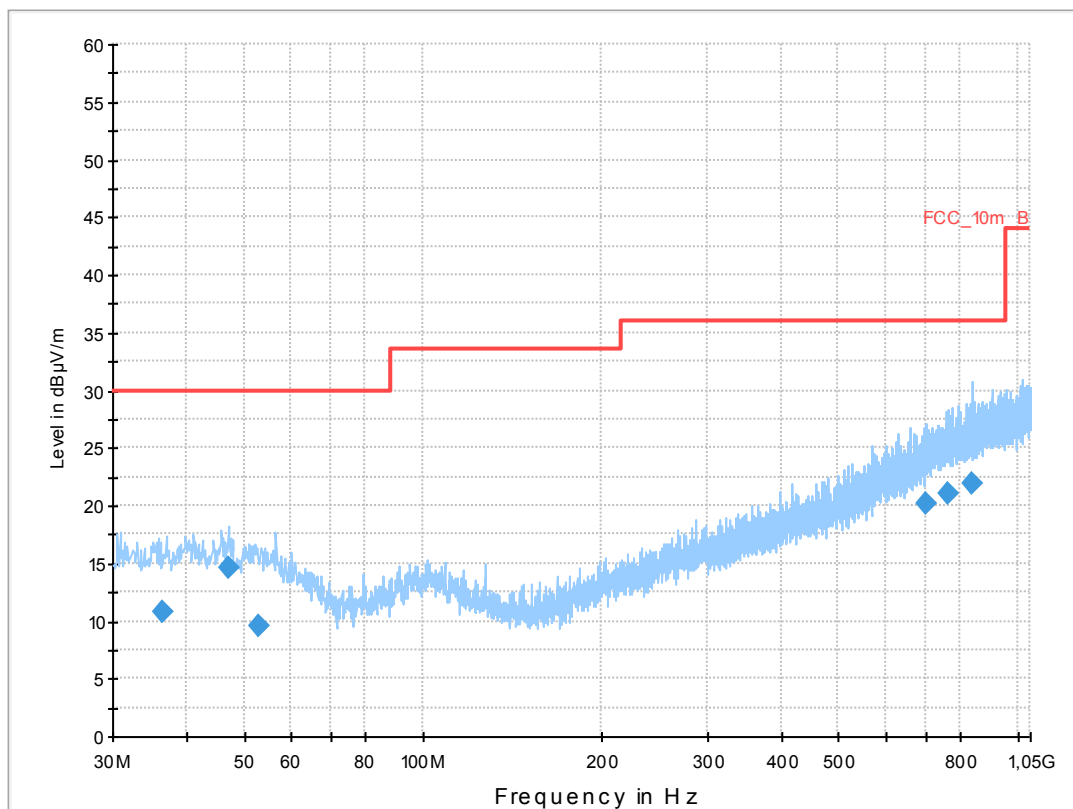
Common Information

EUT: TM-0040-BV
 Serial Number: CB51267Q67
 Test Description: FCC part 15 class B @ 10 m
 Operating Conditions: w-lan n-mode (HT20) tx ch 165
 Operator Name: Hennemann
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

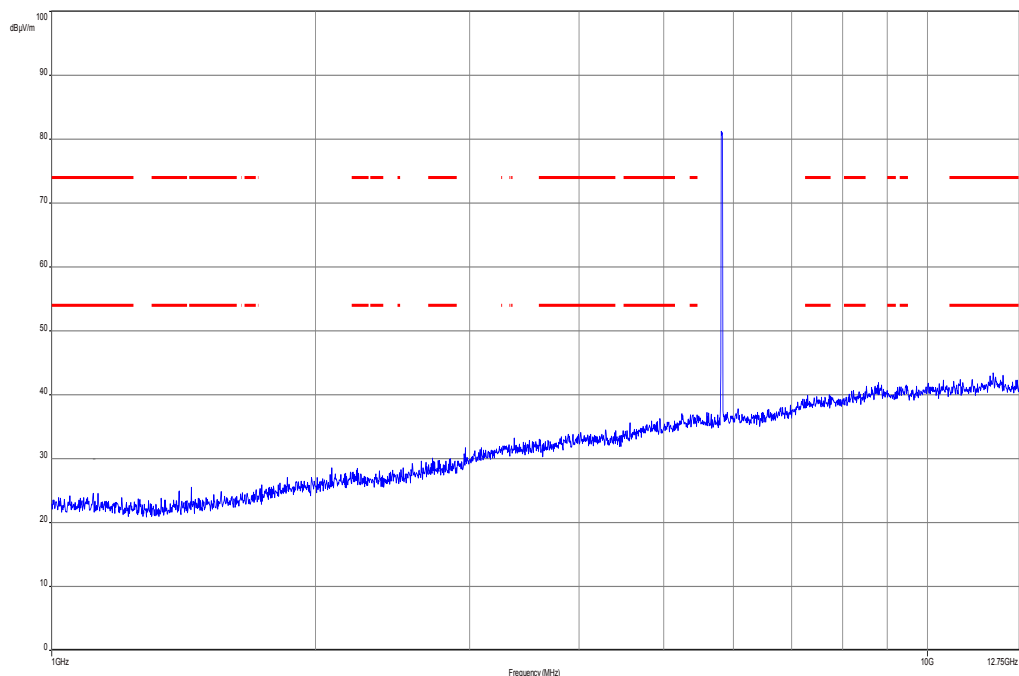
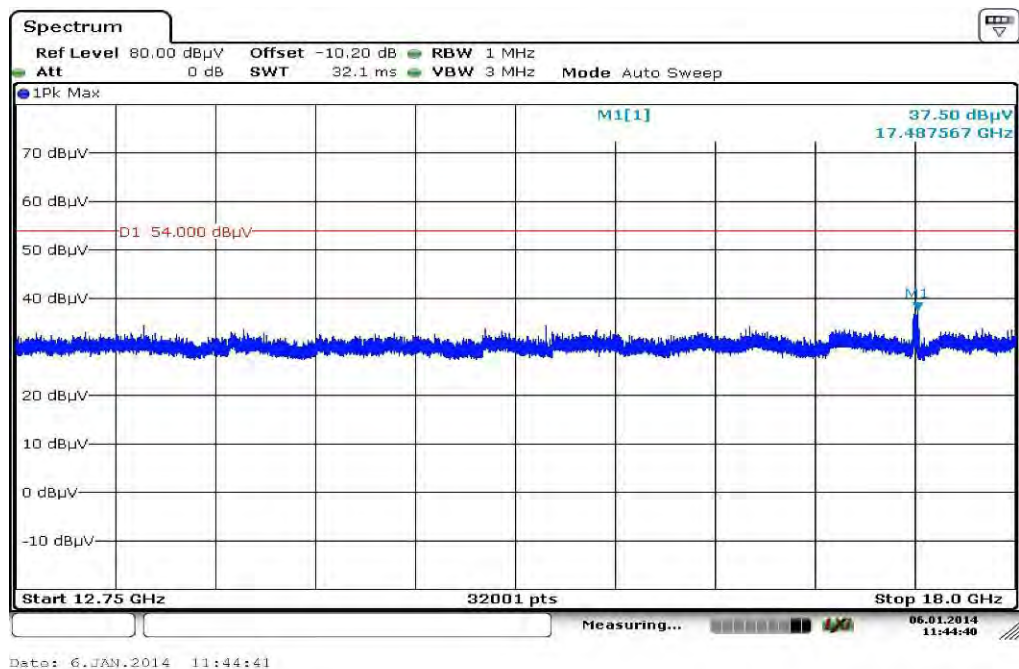
Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dBμV/m

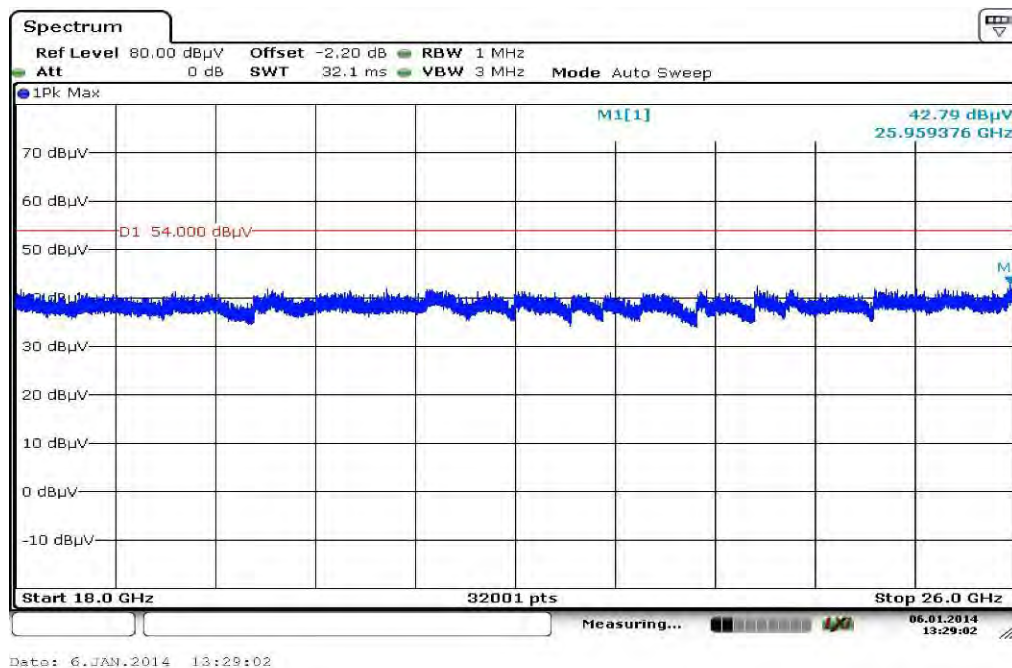
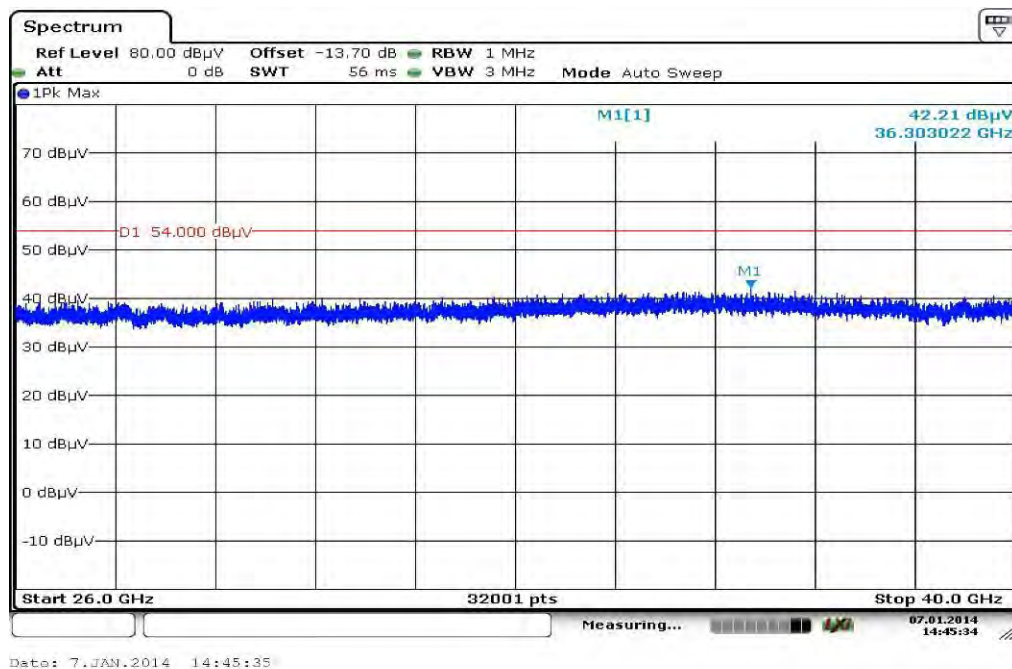
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



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
36.350400	10.8	1000.0	120.000	170.0	V	2.0	13.1	19.2	30.0	
46.987050	14.6	1000.0	120.000	98.0	V	90.0	13.3	15.4	30.0	
53.023800	9.5	1000.0	120.000	111.0	V	280.0	13.1	20.5	30.0	
699.849000	20.1	1000.0	120.000	170.0	H	270.0	22.5	15.9	36.0	
764.683500	21.1	1000.0	120.000	170.0	V	3.0	23.7	14.9	36.0	
840.129000	21.9	1000.0	120.000	170.0	H	81.0	24.4	14.1	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

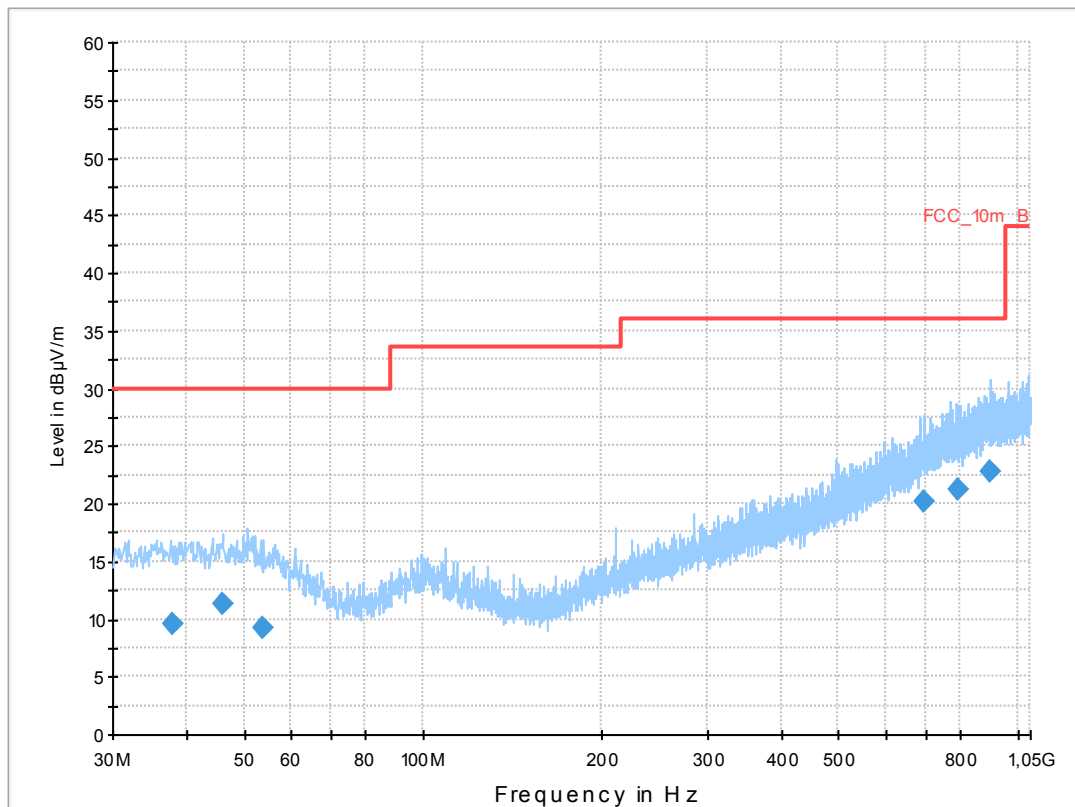
Plots: OFDM / n/ac – mode 40 MHz**Plot 1:** Lowest channel, 30 MHz to 1 GHz, vertical & horizontal polarization**Common Information**

EUT: TM-0040-BV
 Serial Number: CB51267Q67
 Test Description: FCC part 15 class B @ 10 m
 Operating Conditions: w-lan n-mode (HT40) tx ch 151
 Operator Name: Hennemann
 Comment: battery powered

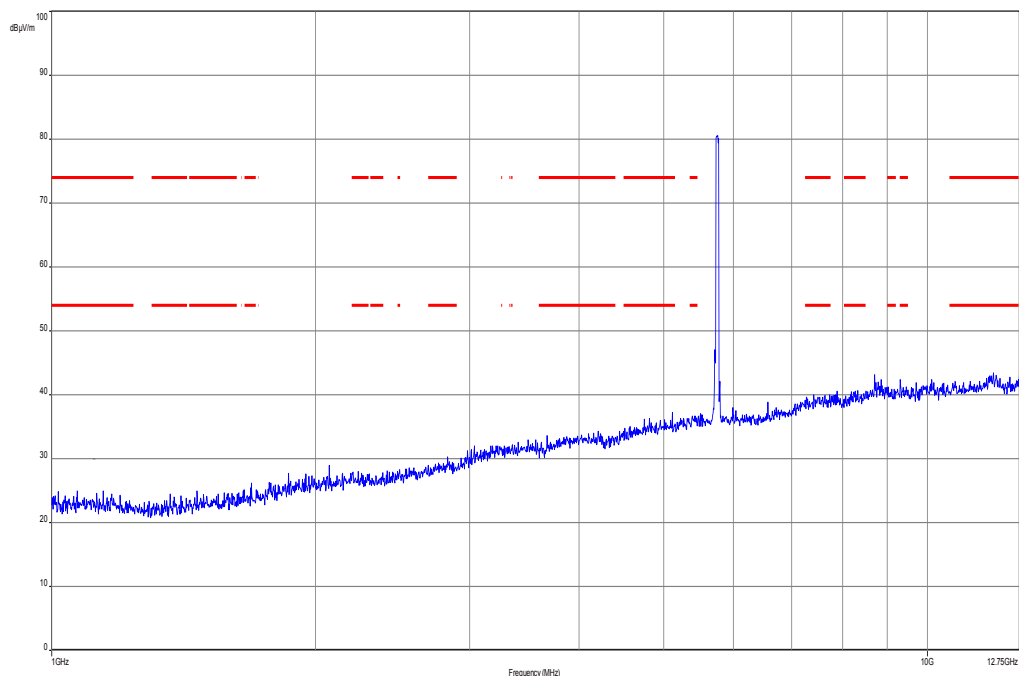
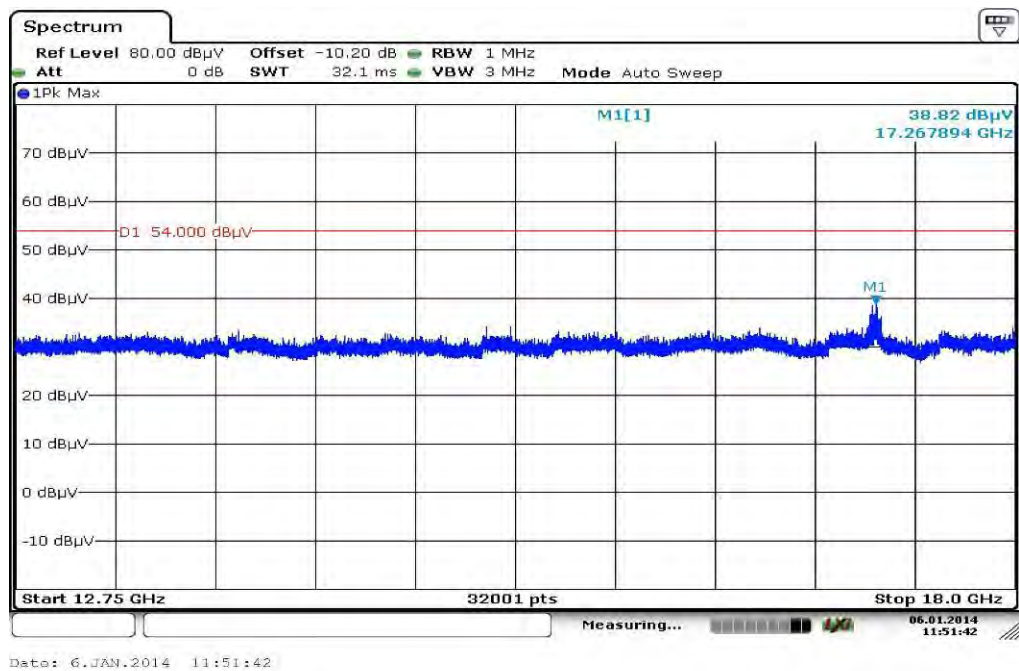
Scan Setup: STAN_Fin [EMI radiated]

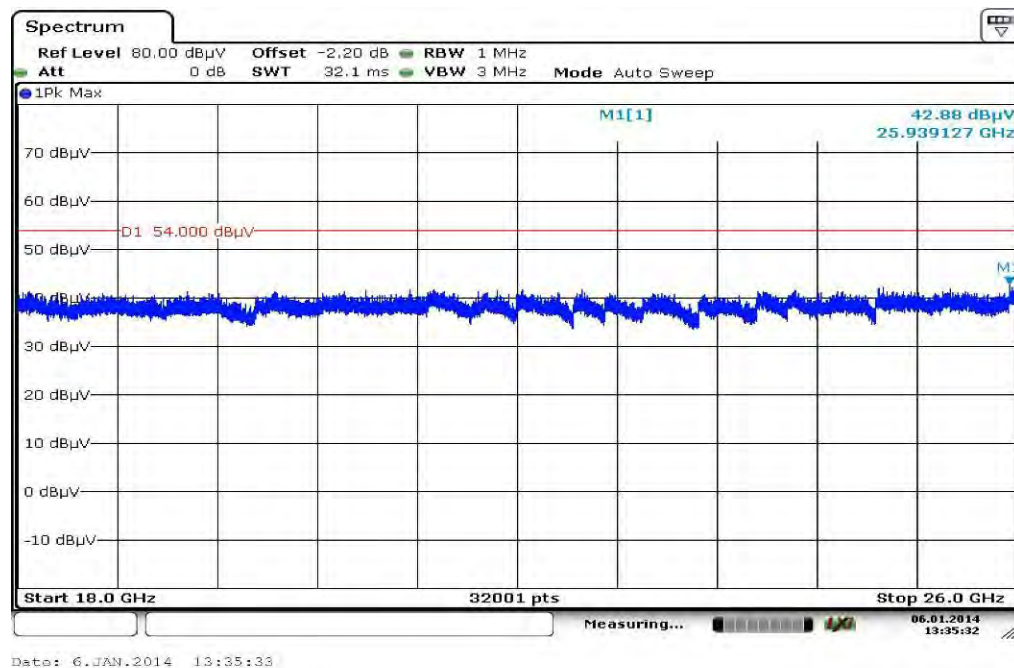
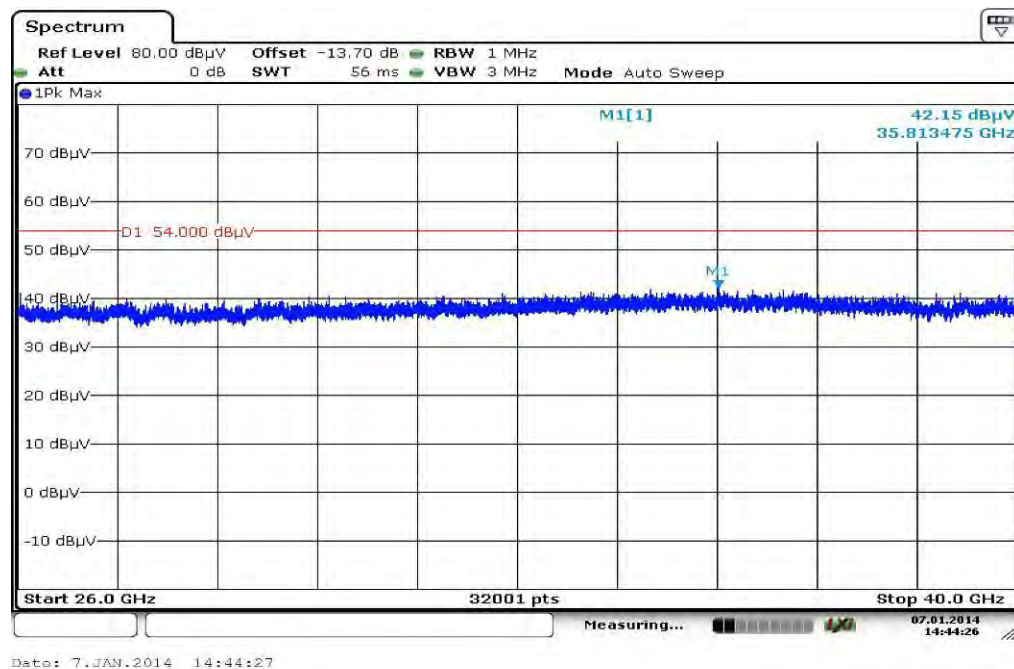
Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dBμV/m

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
37.928850	9.5	1000.0	120.000	170.0	H	10.0	13.3	20.5	30.0	
46.066050	11.2	1000.0	120.000	98.0	V	86.0	13.3	18.8	30.0	
53.529150	9.3	1000.0	120.000	104.0	H	260.0	13.0	20.8	30.0	
698.406750	20.1	1000.0	120.000	170.0	V	190.0	22.5	15.9	36.0	
793.497000	21.2	1000.0	120.000	170.0	H	280.0	23.8	14.8	36.0	
899.641500	22.8	1000.0	120.000	170.0	H	100.0	25.2	13.2	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

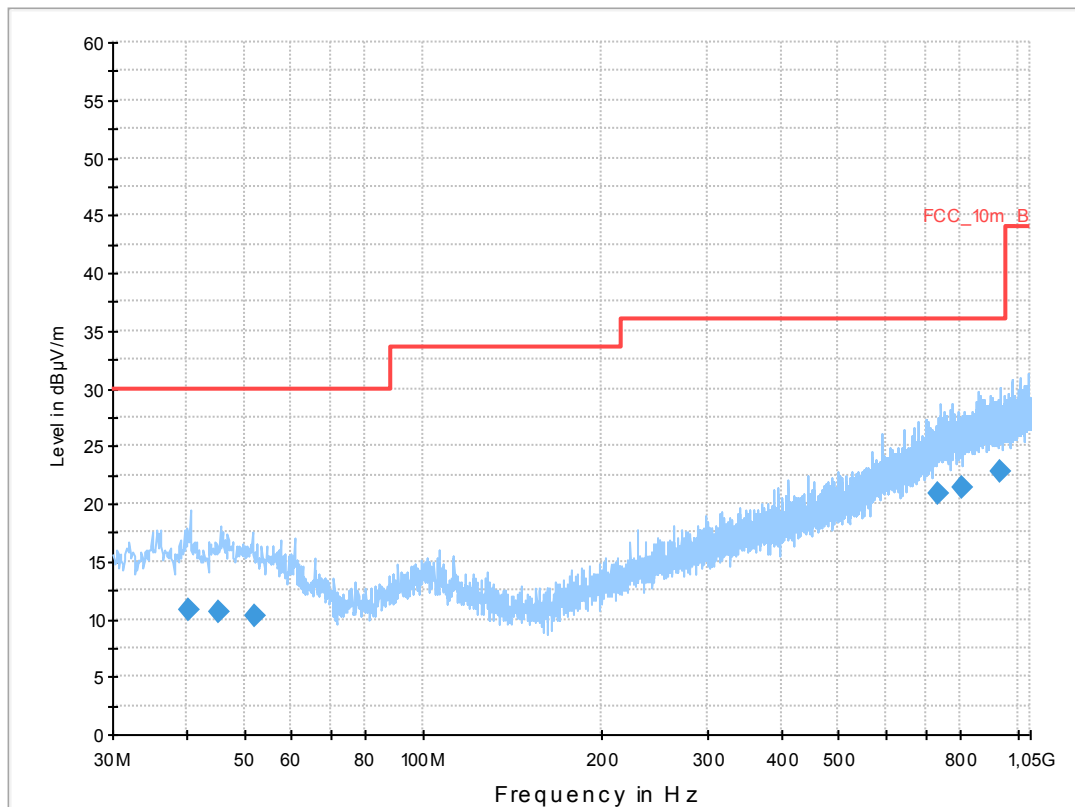
Common Information

EUT: TM-0040-BV
 Serial Number: CB51267Q67
 Test Description: FCC part 15 class B @ 10 m
 Operating Conditions: w-lan n-mode (HT40) tx ch 159
 Operator Name: Hennemann
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

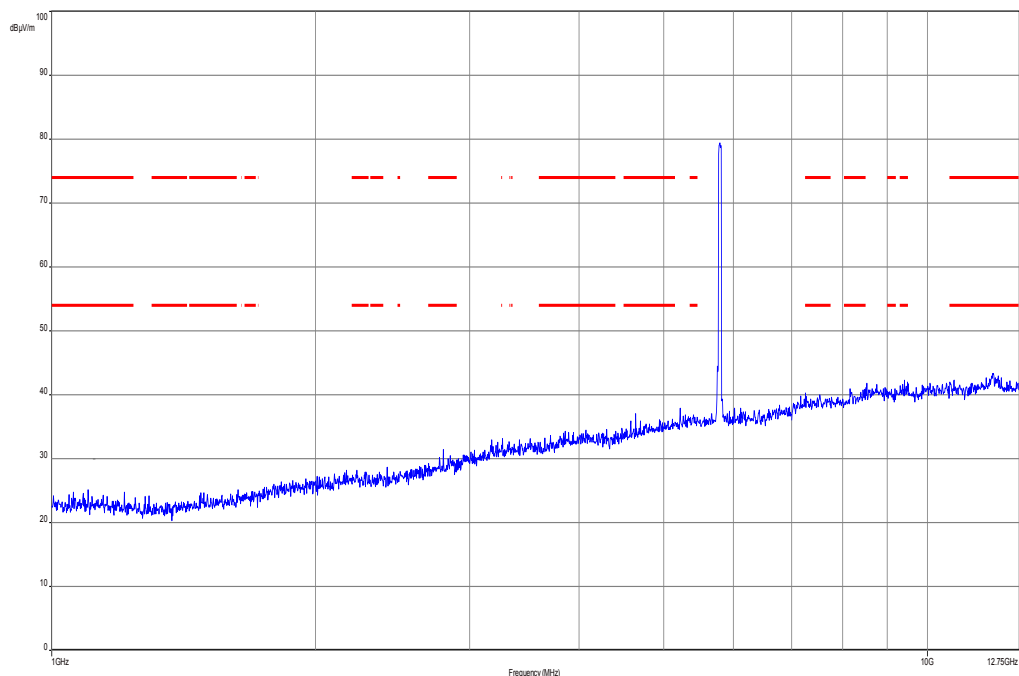
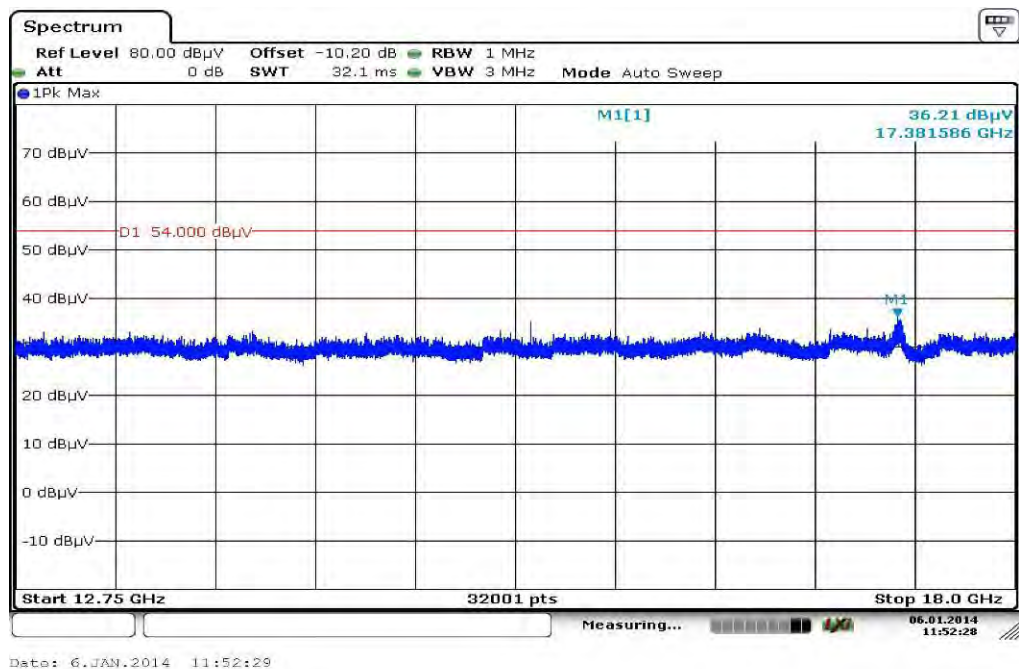
Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dB μ V/m

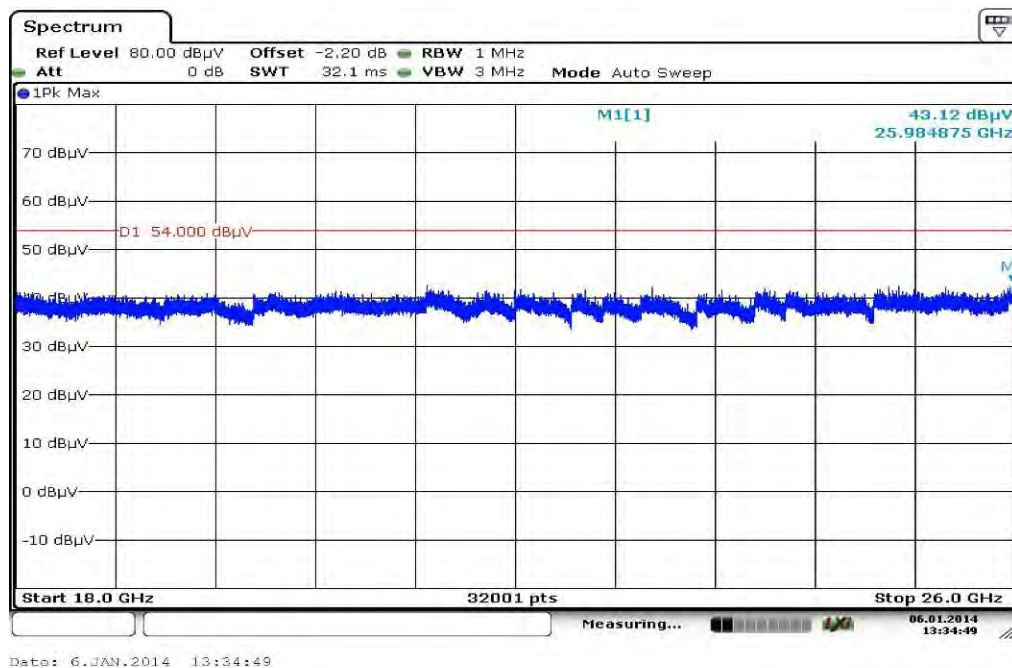
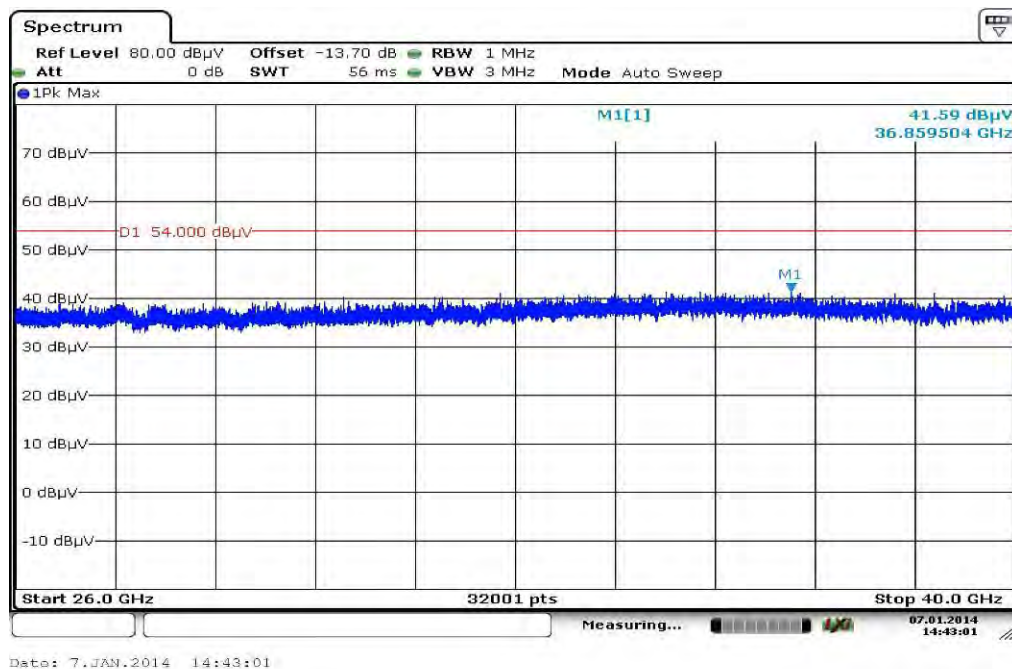
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
40.145250	10.8	1000.0	120.000	170.0	H	280.0	13.4	19.2	30.0	
45.398700	10.7	1000.0	120.000	170.0	H	81.0	13.3	19.3	30.0	
52.008900	10.2	1000.0	120.000	105.0	V	3.0	13.2	19.8	30.0	
732.823800	20.9	1000.0	120.000	170.0	H	280.0	23.3	15.1	36.0	
805.861200	21.4	1000.0	120.000	170.0	V	3.0	23.9	14.6	36.0	
932.280300	22.8	1000.0	120.000	170.0	H	100.0	25.3	13.2	36.0	

Plot 7: Highest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization**Plot 8:** Highest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization

Plot 9: Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization**Plot 10:** Highest channel, 26 GHz to 40 GHz, vertical & horizontal polarization

Plots: OFDM / ac – mode 80 MHz

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

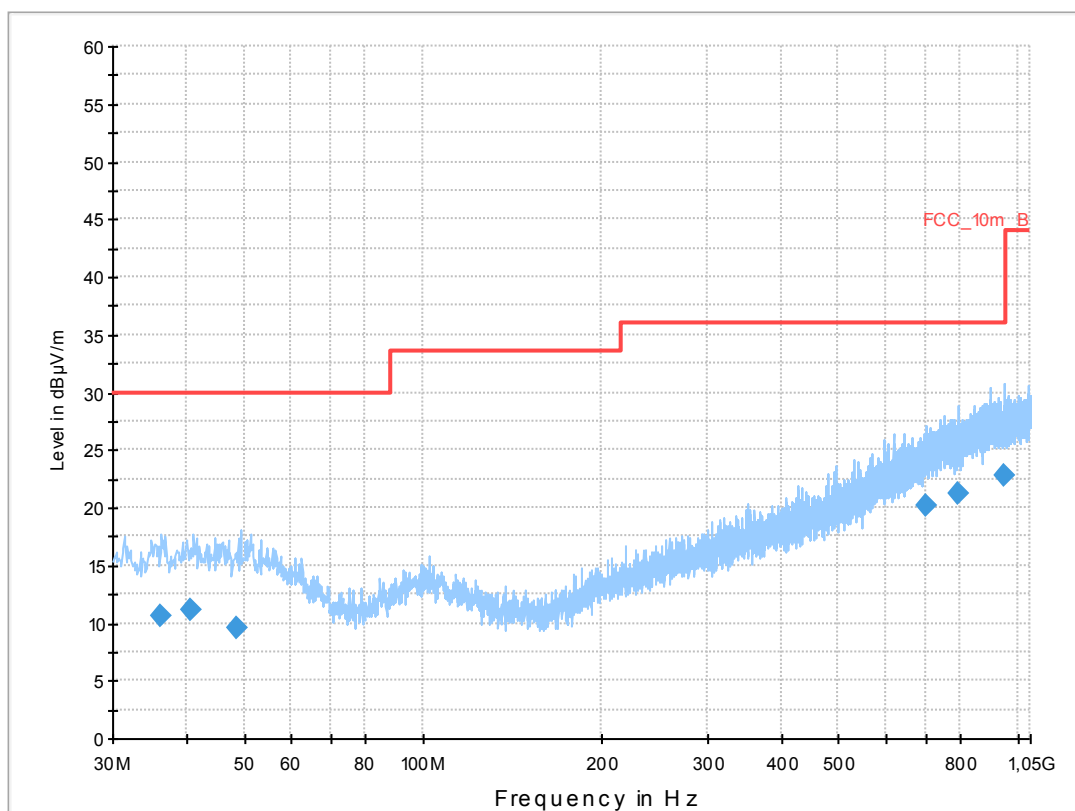
Common Information

EUT: TM-0040-BV
 Serial Number: CB51267Q67
 Test Description: FCC part 15 class B @ 10 m
 Operating Conditions: w-lan ac-mode (HT80) tx ch 155
 Operator Name: Hennemann
 Comment: battery powered

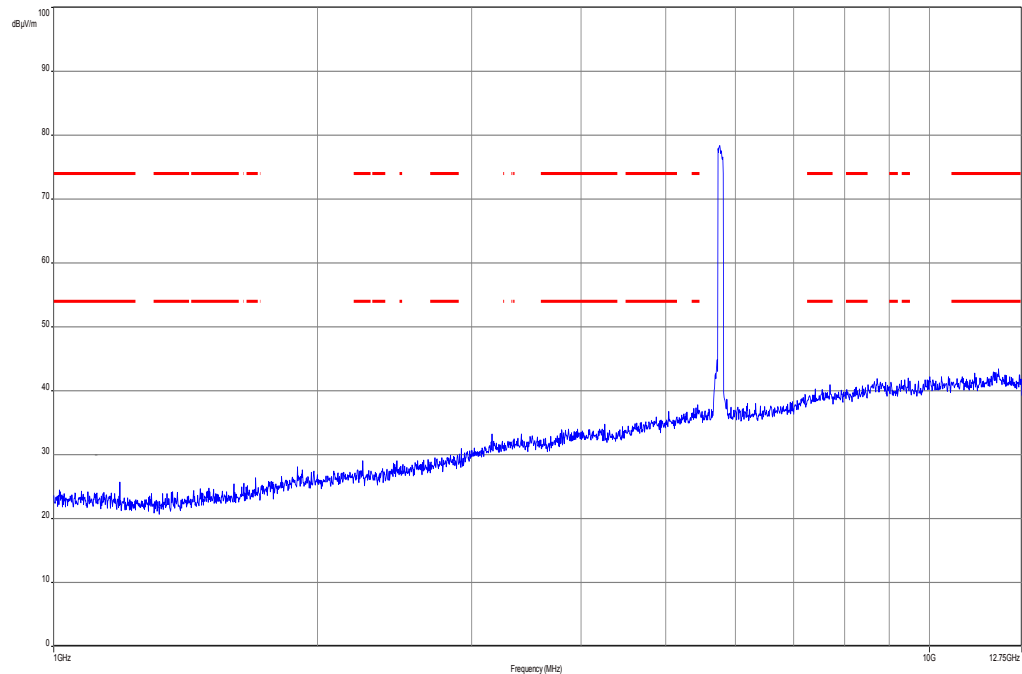
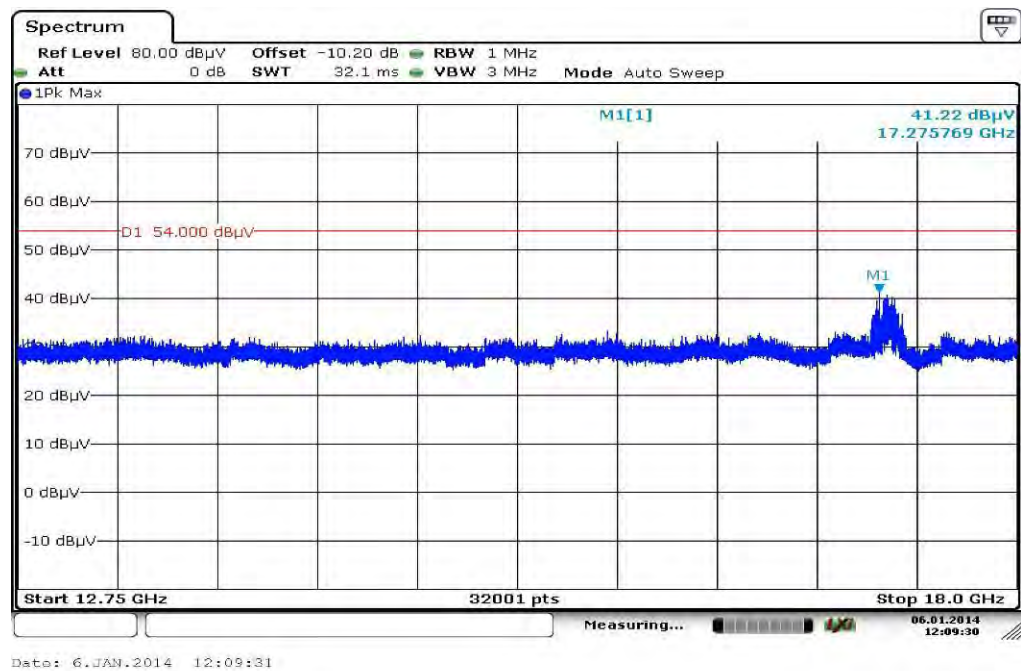
Scan Setup: STAN_Fin [EMI radiated]

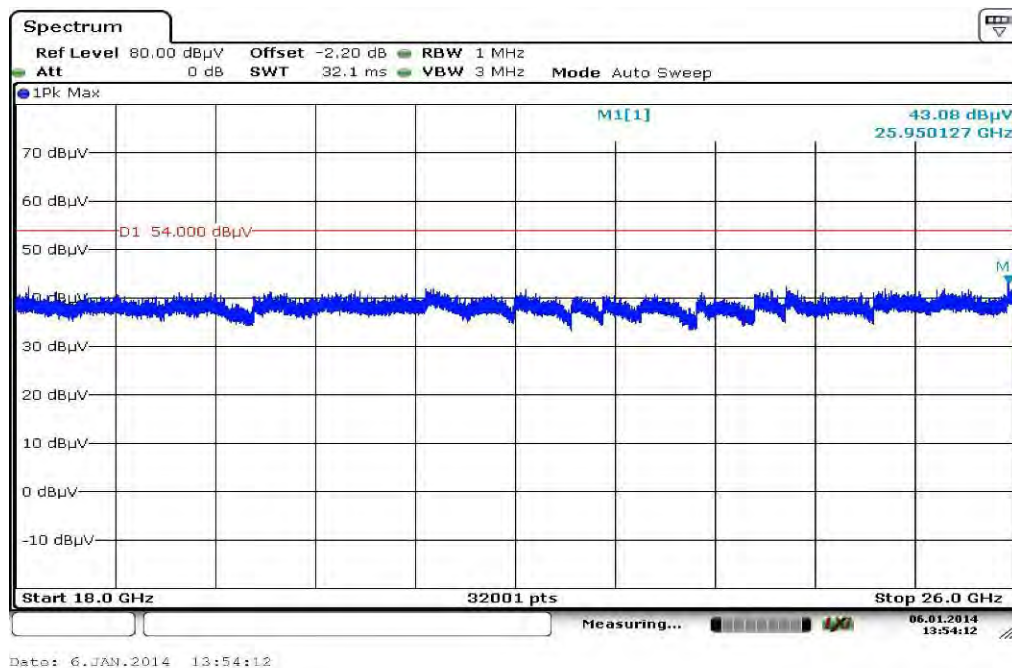
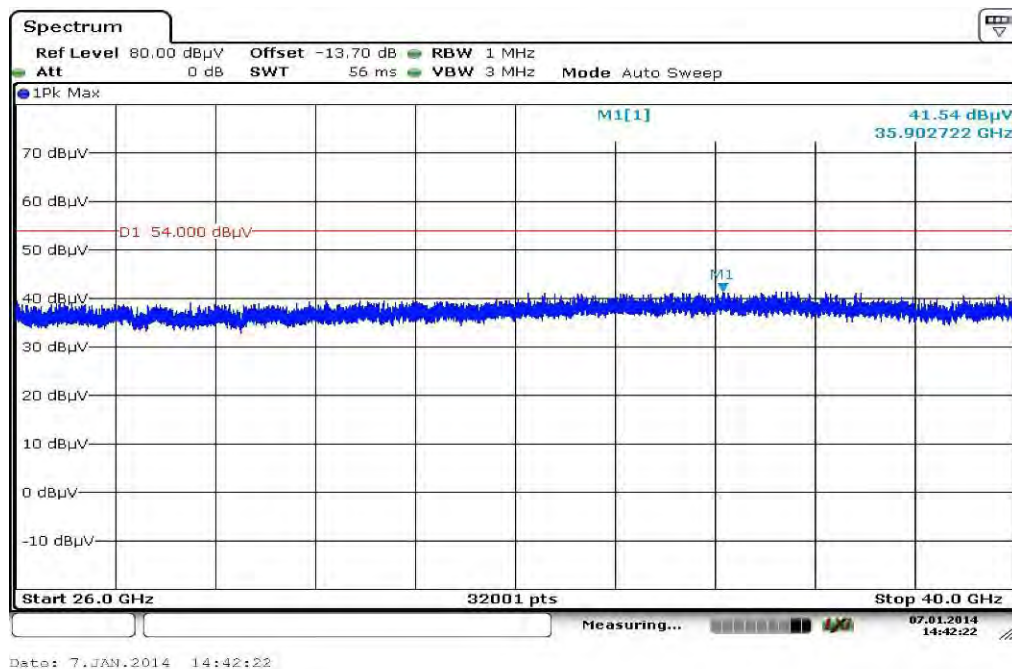
Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dBμV/m

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
36.275250	10.7	1000.0	120.000	170.0	H	100.0	13.1	19.3	30.0	
40.485750	11.1	1000.0	120.000	98.0	V	10.0	13.4	18.9	30.0	
48.723150	9.5	1000.0	120.000	170.0	V	87.0	13.3	20.5	30.0	
702.923400	20.2	1000.0	120.000	170.0	V	270.0	22.6	15.8	36.0	
796.561200	21.2	1000.0	120.000	170.0	H	190.0	23.8	14.8	36.0	
948.120300	22.8	1000.0	120.000	143.0	H	10.0	25.3	13.2	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 (dB μ V/m)	Measurement distance
30 - 88	30.0	10
88 - 216	33.5	10
216 - 960	36.0	10
Above 960	54.0	3

Results:

RX Spurious Emissions Radiated [dB μ V/m]		
F [MHz]	Detector	Level [dB μ V/m]
For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.		
Above 1 GHz: No emissions detected.		
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)

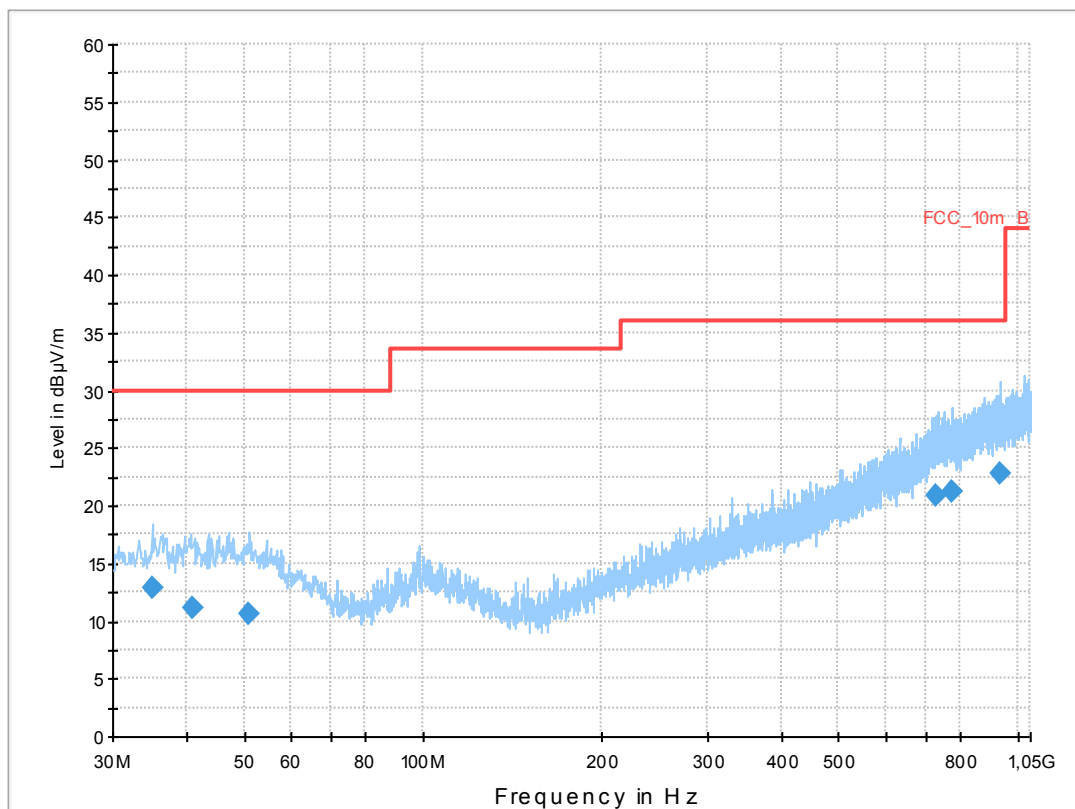
Plots: RX / Idle – mode**Plot 1:** 30 MHz to 1 GHz, vertical & horizontal polarization**Common Information**

EUT: TM-0040-BV
 Serial Number: CB51267Q5X
 Test Description: FCC part 15 class B @ 10 m
 Operating Conditions: w-lan idle
 Operator Name: Hennemann
 Comment: battery powered

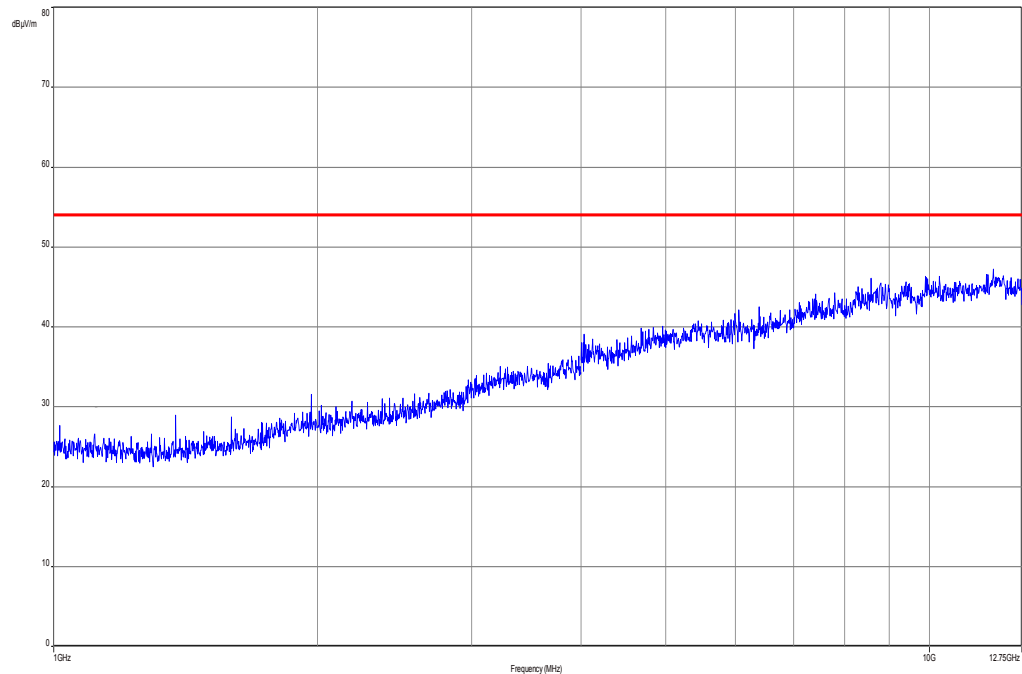
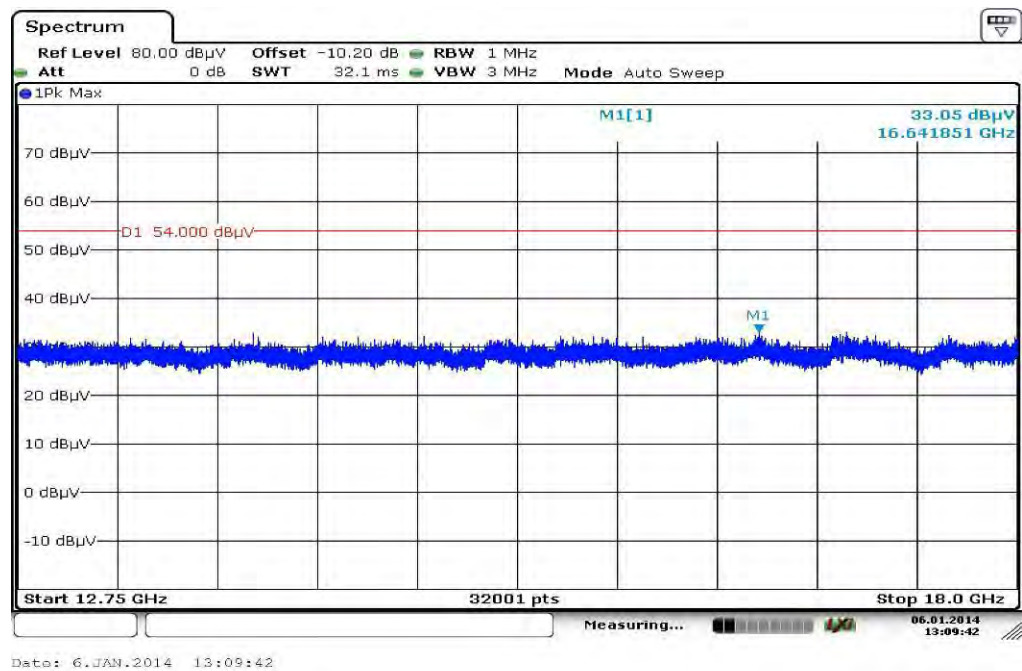
Scan Setup: STAN_Fin [EMI radiated]

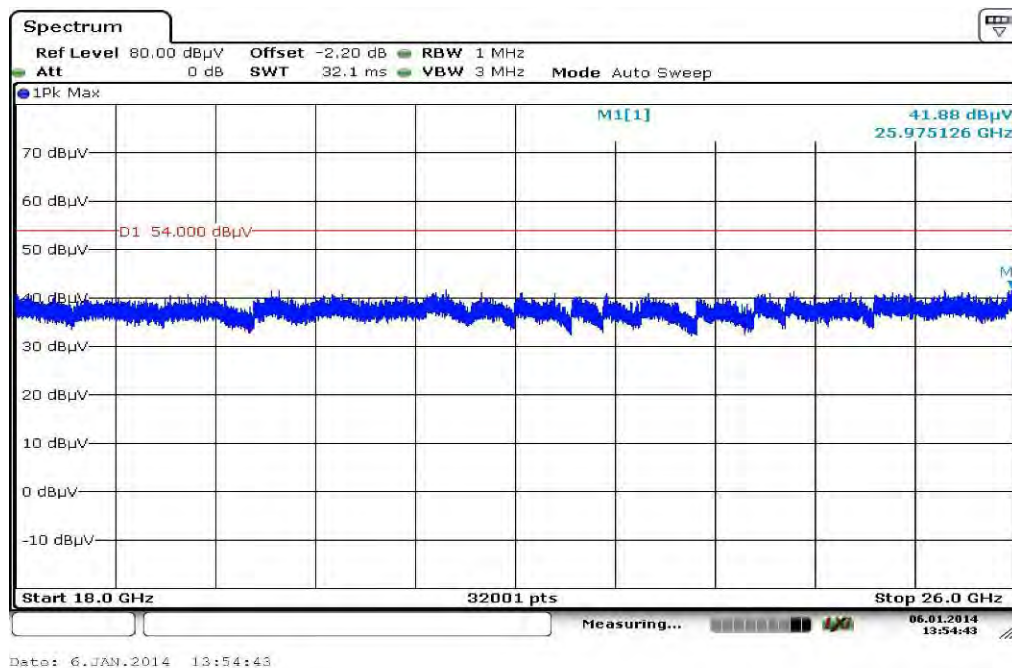
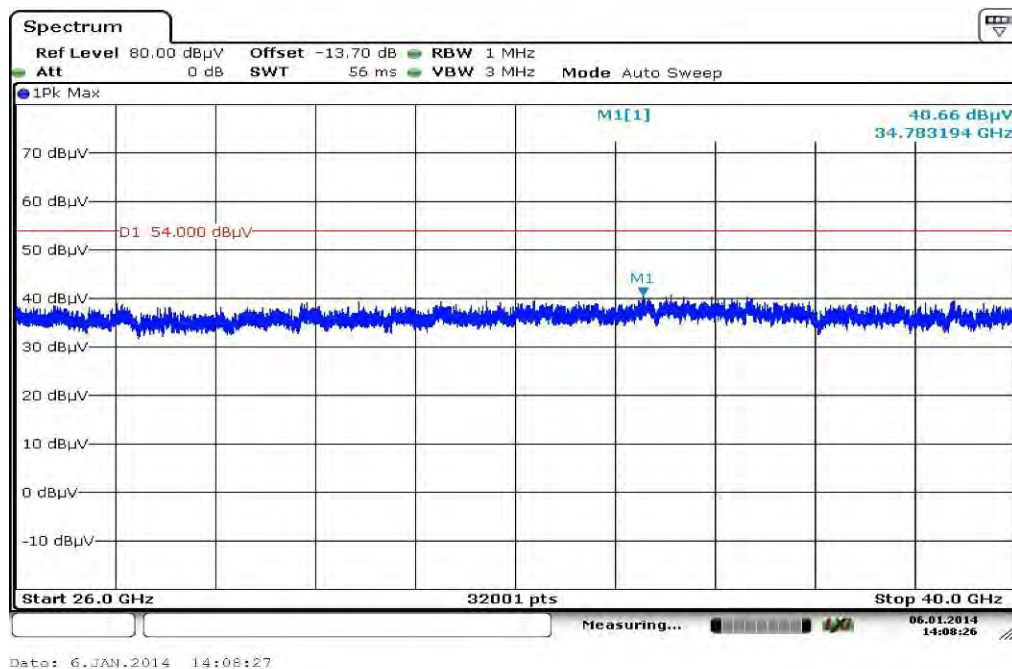
Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dBμV/m

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
35.043300	12.9	1000.0	120.000	111.0	V	100.0	13.0	17.1	30.0	
40.978500	11.1	1000.0	120.000	104.0	V	170.0	13.4	18.9	30.0	
51.018600	10.7	1000.0	120.000	105.0	V	182.0	13.3	19.3	30.0	
730.311300	20.8	1000.0	120.000	120.0	H	-5.0	23.2	15.2	36.0	
773.669700	21.3	1000.0	120.000	170.0	V	10.0	23.7	14.7	36.0	
937.372650	22.8	1000.0	120.000	170.0	V	80.0	25.3	13.2	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

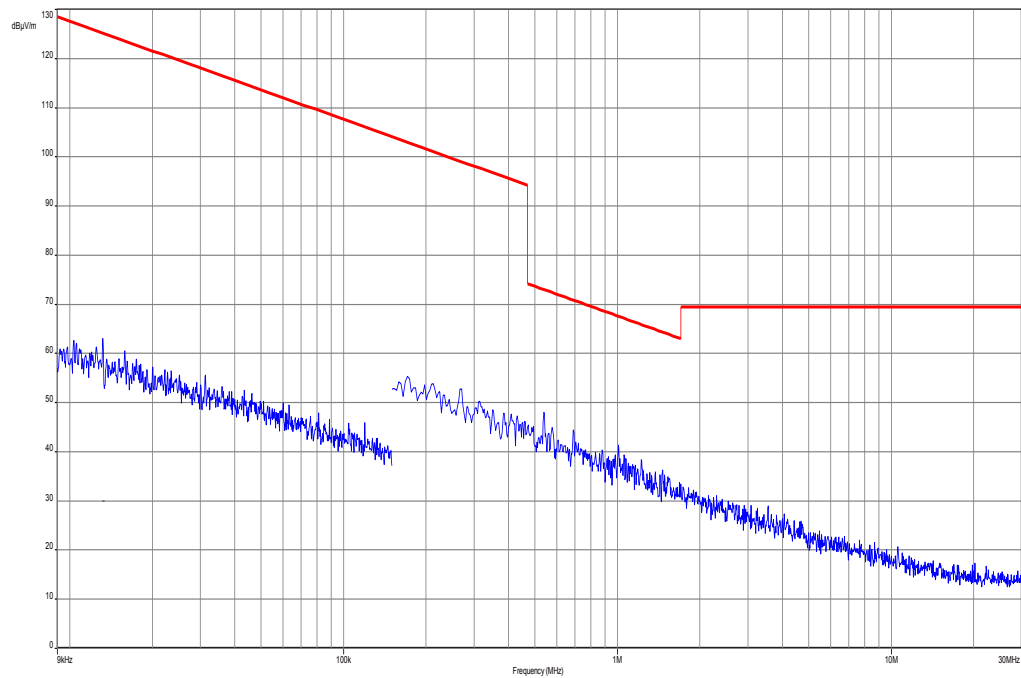
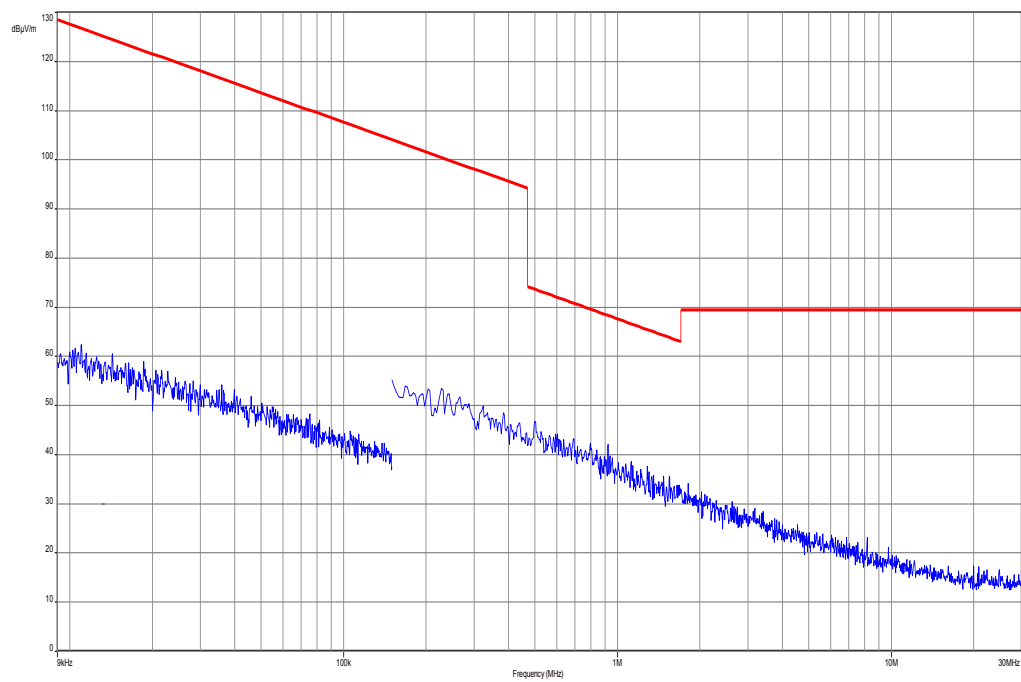
Limits:

FCC		IC
TX Spurious Emissions Radiated < 30 MHz		
Frequency (MHz)	Field Strength (dB μ V/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 [dB μ V/m]		
F [MHz]	Detector	Level [dB μ V/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:

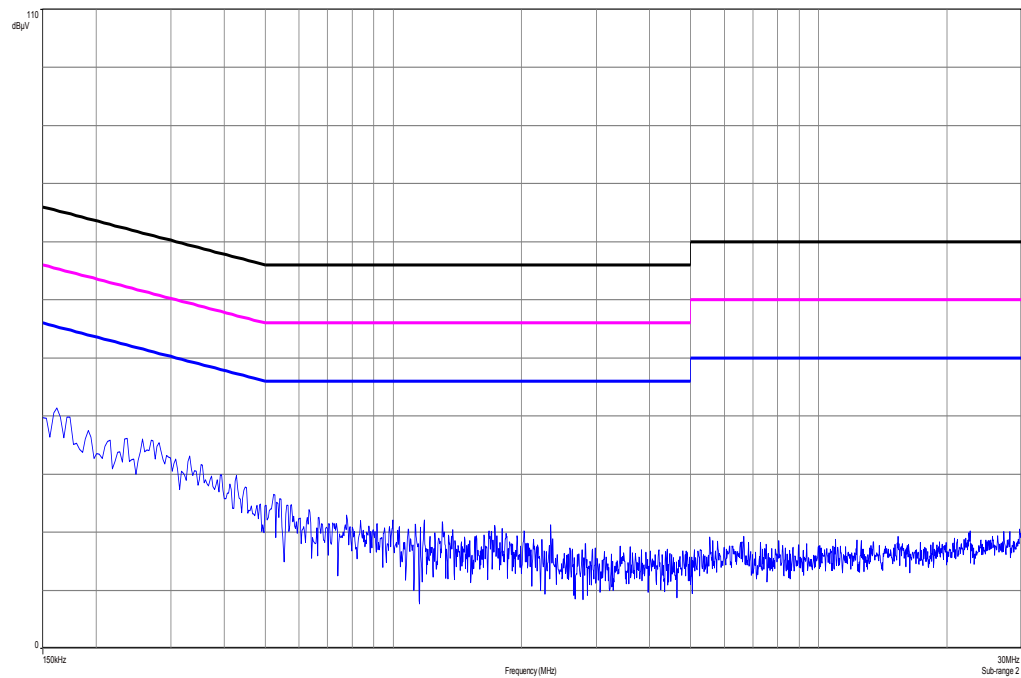
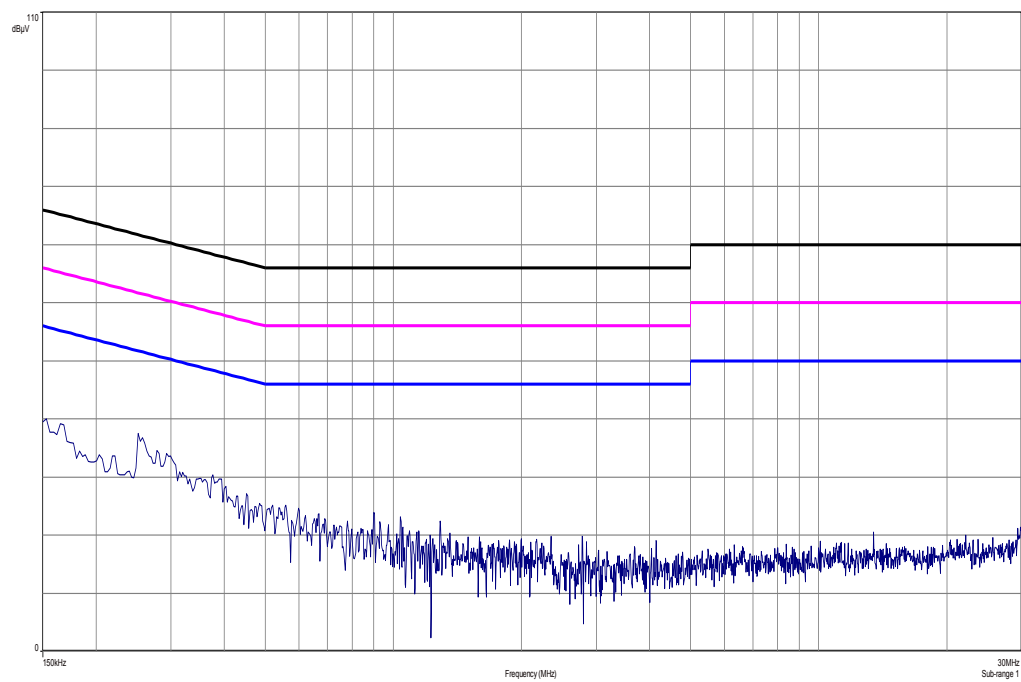
FCC		IC
TX Spurious Emissions Conducted < 30 MHz		
Frequency (MHz)	Quasi-Peak (dB μ V/m)	Average (dB μ V/m)
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30.0	60	50

*Decreases with the logarithm of the frequency

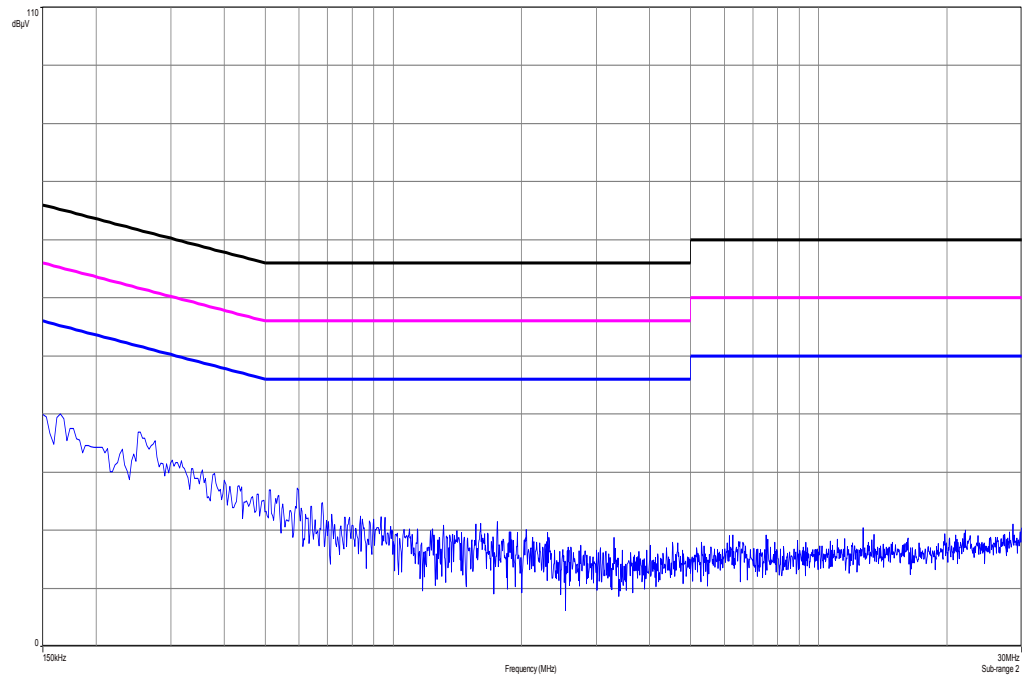
Results:

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

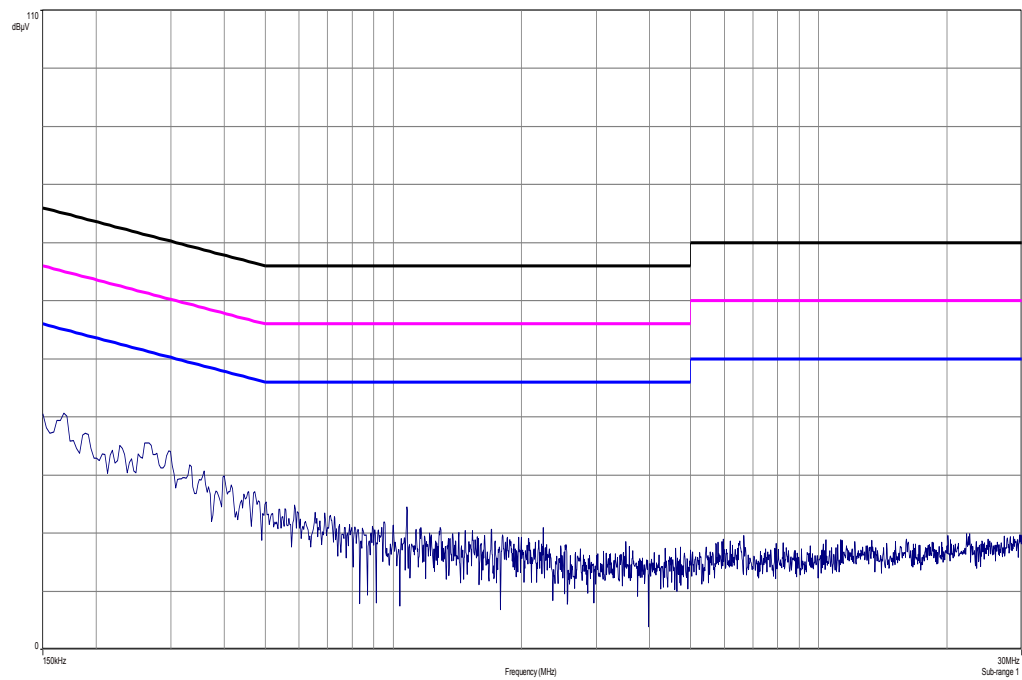
Result: Passed

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	50	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04466	300000580	ne		
3	n. a.	software	SPS_PHE 1.4f	Spitzberger & Spieß	B5981; 5D1081;B597 9	300000210	ne		
4	n. a.	EMI Test Receiver	ESCI 3	R&S	100083	300003312	k	09.01.2013	09.01.2014
5	n. a.	Analyzer- Reference- System (Harmonics and Flicker)	ARS 16/1	SPS	A3509 07/0 0205	300003314	Ve	14.07.2011	14.01.2014
6	n. a.	Amplifier	JS42- 00502650- 28-5A	MITEQ	1084532	300003379	ev		
7	n. a.	Antenna Tower	Model 2175	ETS- LINDGREN	64762	300003745	izw		
8	n. a.	Positioning Controller	Model 2090	ETS- LINDGREN	64672	300003746	izw		
9	n. a.	Turntable Interface-Box	Model 105637	ETS- LINDGREN	44583	300003747	izw		
10	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbe ck	295	300003787	k	12.04.2012	12.04.2014
11	n. a.	Spectrum- Analyzer	FSU26	R&S	200809	300003874	k	16.01.2013	16.01.2014
12	n. a.	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2818A03450	300001040	Ve	12.01.2012	12.01.2015
13	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vIKI!	08.05.2013	08.05.2015
14	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev		
15	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	*	300000199	ne		
16	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	2719A15013	300001156	ne		
17	9	Isolating Transformer	MPL IEC625 Bus Regeltrennt ravo	Erfi	91350	300001155	ne		
18	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
19	90	Active Loop Antenna 10 kHz to 30 MHz	6502	Kontron Psychotech	8905-2342	300000256	k	13.06.2013	13.06.2015
20	n. a.	Amplifier	js42- 00502650- 28-5a	Parzich GMBH	928979	300003143	ne		
21	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbe ck	371	300003854	vIKI!	14.10.2011	14.10.2014
22	n. a.	MXE EMI Receiver 20 Hz	N9038A	Agilent Technologi	MY51210197	300004405	k	21.02.2013	21.02.2014

		bis 26.5 GHz		es					
23	11b	Microwave System Amplifier, 0.5-26.5 GHz	83017A	HP Meßtechnik	00419	300002268	ev		
24	A026	Std. Gain Horn Antenna 12.4 to 18.0 GHz	639	Narda	8402	300000787	k	22.07.2013	22.07.2015
25	A029	Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda	8205	300002442	k	19.07.2013	19.07.2015
26	A031	Std. Gain Horn Antenna 26.5 to 40.0 GHz	637	Narda	GB42110541	300000510	k	19.07.2013	19.07.2015
27	n. a.	Spectrum Analyzer 20 Hz - 50 GHz	FSU50	R&S	200012	300003443	Ve	09.10.2012	09.10.2014
28	n. a.	Broadband Low Noise Amplifier 18-50 GHz	CBL18503 070-XX	CERNEX	19338	300004273	ne		
29	n. a.	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517	k	22.10.2012	22.01.2014
30	n. a.	Power Supply 0-20V, 0-5A	6632B	Agilent Technologies	GB42110541	400000562	vlKI!	10.01.2013	10.01.2016

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

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	2014-02-07

Annex B Further information**Glossary**

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

Annex C Accreditation Certificate

Front side of certificate



Back side of certificate



Note:

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

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