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CETECOM ICT Services
consulting - testing - certification

TEST REPORT

Test report no.: 1-4254/12-19-10-B

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

Testing laboratory

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

Applicant

Sony Mobile Communications AB
Nya Vattentornet
22188 Lund / SWEDEN
Phone: +46 46 19 30 00
Fax: +46 46 19 32 95
Contact: Håkan Sjöberg
e-mail: hakan.sjoberg@sonymobile.com
Phone: +46 46 19 35 59

Manufacturer

Sony Mobile Communications AB
Nya Vattentornet
22188 Lund / SWEDEN

Test standard/s

47 CFR Part 15	Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio frequency devices
RSS - 210 Issue 8	Spectrum Management and Telecommunications - Radio Standards Specification Low-power Licence-exempt Radiocommunication Devices (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:	**GSM Mobile Phone GPRS/EGPRS 850/900/1800/1900; UMTS FDDI/FDDV/FDDVI/FDDXIX; HSPA; LTE Band 1; BT3.1; WLAN a/b/g/n; AGPS; RFID, FM Rx**
Model name:	**PM-0000-BV**
FCC ID:	**PY7PM-0000**
IC:	**4170-PM-0000**
Frequency:	ISM band 5725 MHz to 5825 MHz
Technology tested:	WLAN a, n HT20 and n HT40
Antenna:	Integrated antenna
Power Supply:	3.7 V DC by Li-ion battery
Temperature Range:	-20°C to +55 °C

Test report authorised:

2012-05-15 Stefan Bös
Senior Testing Manager

Test performed:

2012-05-15 Marco Bertolino
Testing Manager

1 Table of contents

2 General information

2.1 Notes and disclaimer

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2.2 Application details

Date of receipt of order:	2012-03-27
Date of receipt of test item:	2012-04-25
Start of test:	2012-04-25
End of test:	2012-05-04
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 15	2010-10	Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio frequency devices
RSS - 210 Issue 8	2010-12	Spectrum Management and Telecommunications - Radio Standards Specification Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

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:		48 %	
Barometric pressure:		not relevant for this kind of testing	
Power supply:	V_{nom}	3.7 V	DC by Li-ion battery
	V_{max}	4.1 V	
	V_{min}	3.3 V	

5 Test item

Kind of test item	**:**	**GSM Mobile Phone GPRS/EGPRS 850/900/1800/1900; UMTS FDDI/FDDV/FDDVI/FDDXIX; HSPA; LTE Band 1; BT3.1; WLAN a/b/g/n; AGPS; RFID, FM Rx**
Type identification	**:**	**PM-0000-BV**
S/N serial number	**:**	**Radiated units: CB5A1JYNK9; CB5A1JYNGV** **Conducted units: CB5A1JYNGR; CB5A1JYNK5**
HW hardware status	**:**	**AP1**
SW software status	**:**	**s_atp_hayabusa_0_0_37_0_b**
Frequency band [MHz]	**:**	**ISM band 5725 MHz to 5825 MHz**
Type of radio transmission **Use of frequency spectrum**	**:** **:**	**OFDM**
Channel access method	**:**	**FDMA**
Type of modulation	**:**	**QPSK, 16 – QAM, 64 – QAM**
Number of channels	**:**	**5**
Antenna	**:**	**Integrated antenna**
Power supply	**:**	**3.7 V DC by Li-ion battery**
Temperature range	**:**	**-20°C to +55 °C**

6 Test laboratories sub-contracted

None

7 Summary of measurement results

☒ **No deviations from the technical specifications were ascertained**

☐ There were deviations from the technical specifications ascertained

TC Identifier	Description	Verdict	Date	Remark
RF-Testing	CFR Part 15 RSS 210, Issue 8	Passed	2012-05-15	-/-

Test specification clause	Test case	Temperature conditions	Power source voltages	Mode	Pass	Fail	NA	NP	Remark
§15.247(b)(4) RSS 210 / A8.4(2)	Antenna gain	Nominal	Nominal	OFDM	☒	☐	☐	☐	complies
§15.247(e) RSS 210 / A8.2(b)	Power spectral density	Nominal	Nominal	OFDM	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.247(a)(2) RSS 210 / A8.2(a)	Spectrum bandwidth of a FHSS system 6dB bandwidth	Nominal	Nominal	OFDM	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.247(a)(2) RSS 210 / A8.2(a)	Spectrum bandwidth of a FHSS system 20dB bandwidth	Nominal	Nominal	OFDM	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.247(b)(3) RSS-210 / A8.4(4)	Maximum output power	Nominal	Nominal	OFDM	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.247(d) RSS-210 / A8.5	Band edge compliance conducted	Nominal	Nominal	OFDM	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.205 RSS-210 / A8.5	Band edge compliance radiated	Nominal	Nominal	OFDM	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.247(d) RSS-210 / A8.5	TX spurious emissions conducted	Nominal	Nominal	OFDM	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.247(d) RSS-210 / A8.5	TX spurious emissions radiated	Nominal	Nominal	OFDM	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.109 RSS-Gen.	RX spurious emissions radiated	Nominal	Nominal	-/-	☒	☐	☐	☐	complies
§15.209(a) RSS-Gen	TX spurious emissions radiated < 30 MHz	Nominal	Nominal	OFDM	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.107(a)	Conducted emissions < 30 MHz	Nominal	Nominal	OFDM	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies

Note: NA = Not Applicable; NP = Not Performed

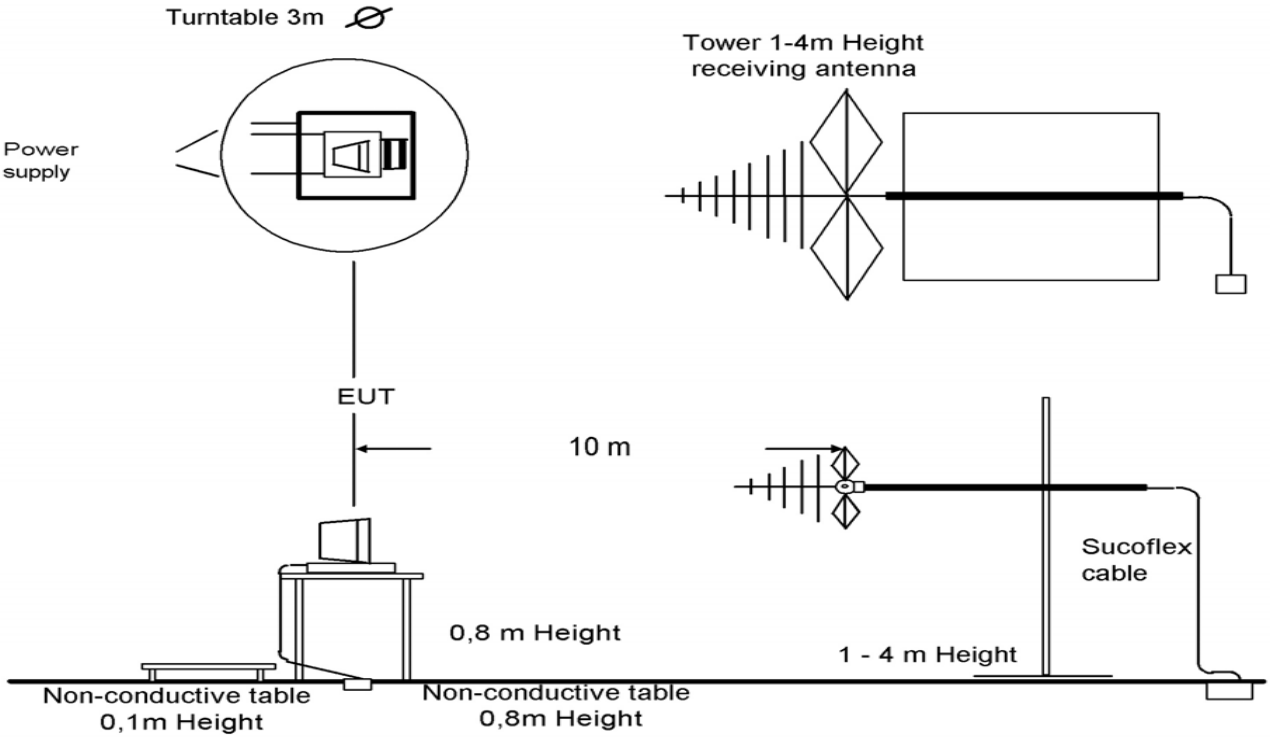
8 RF measurements

8.1 Description of test setup

8.1.1 Radiated measurements

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 25 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 C63.2-1996 clause 15 and ANSI C63.4-2009 clause 4.1.5. 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 C63-4-2009 clause 4.2.
Antennas are confirmed with ANSI C63.2-1996 item 15.

Semi anechoic chamber



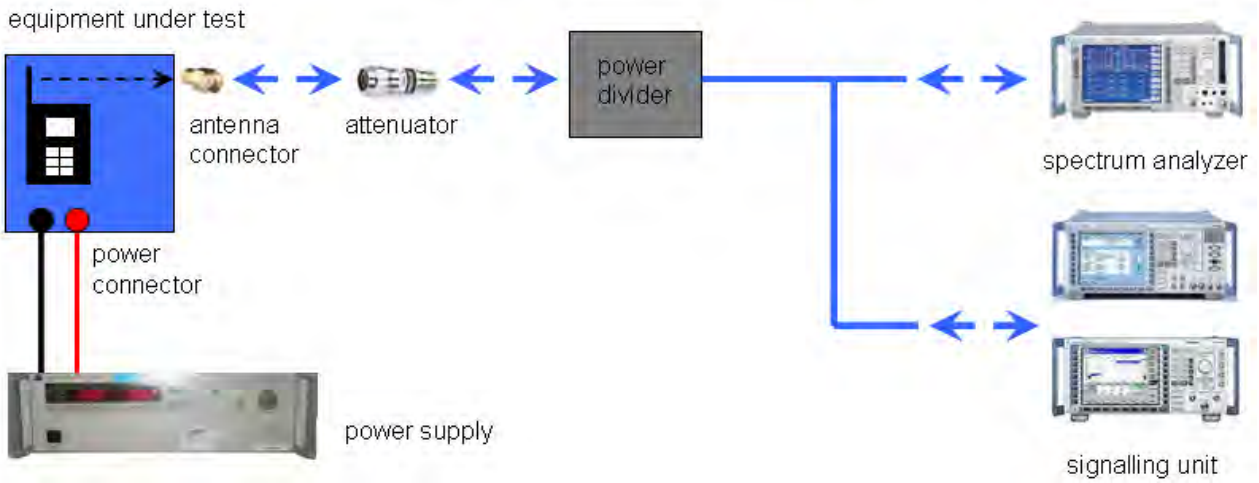
Picture 1: Diagram radiated measurements

9 kHz - 30 MHz:	active loop antenna
30 MHz – 1 GHz:	tri-log antenna
> 1 GHz:	horn antenna

The EUT is powered by an external power supply with nominal voltage. The signalling is performed from outside the chamber with a signalling unit (CMU200 or other) by air link using signalling antenna.

8.1.2 Conducted measurements

The EUT's RF signal is coupled out by the antenna connector which is supplied by the manufacturer. The signal is first 10dB attenuated before it is power divided (~6dB loss per branch). One of the signal paths is connected to the communication base Station (CMU200 or other), the other one is connected to the spectrum analyzer. The specific losses for both signal paths are first checked within a calibration. The measurement readings on the signalling unit/spectrum analyzer are corrected by the specific test set-up loss. The attenuator, power divider, signalling unit and the spectrum analyzer are impedance matched on 50 Ohm.



Picture 2: Diagram conducted measurements

8.2 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

8.3 RSP100 test report cover sheet / performance test data

Test report number	:	1-4254/12-19-10-B
Equipment model number	:	PM-0000-BV
Certification number	:	4170-PM-0000
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 5825 MHz (lowest channel 5745 MHz, highest channel 5825 MHz)
RF-power [W] (max.)	:	Conducted output power: 18.45 mW (OFDM / a – mode) 19.82 mW (OFDM / n – mode HT20) 17.66 mW (OFDM / n – mode HT40) Radiated output power: 12.22 mW (OFDM / a – mode) 13.27 mW (OFDM / n – mode HT20) 11.94 mW (OFDM / n – mode HT40)
Occupied bandwidth (99%-BW) [kHz]	:	OFDM / a – mode: 17.39 MHz OFDM / n – mode HT20: 18.03 MHz OFDM / n – mode HT40: 36.73 MHz
Type of modulation	:	QPSK, 16 – QAM and 64 – QAM
Emission designator (TRC-43)	:	17M4G7D (OFDM / a – mode) 18M0G7D (OFDM / n – mode HT 20) 36M7G7D (OFDM / n – mode HT 40)
Antenna information	:	Integrated antenna
Transmitter spurious (worst case) [dBµV/m @ 3m]:		45 @ 12 GHz (noise floor)
Receiver spurious (worst case) [dBµV/m @ 3m]:		45 @ 12 GHz (noise floor)

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:

2012-05-15	Marco Bertolino	
Date	Name	Signature

9 Measurement results

9.1 Output power verification (conducted)

Description:

Measurement of the maximum output power conducted. This measurement is performed only at the middle channel in both modes and all data rates to determine the data rate per mode which results in the highest output power. This mode will be selected for all further measurements.

Used measurement option: 5.2.1.1 PK1

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	5s
Resolution bandwidth:	> EBW
Video bandwidth:	≥ 3 x RBW (or the maximum of the analyzer)
Span:	Zero span
Trace-Mode:	Max hold (allow trace to fully stabilize)

Results:

OFDM / a – mode	Maximum Output Power Conducted [dBm]							
Data Rate [MBit/s]	6	9	12	18	24	36	48	54
Ch 157 - 5785 MHz	12.57	11.64	11.52	12.34	11.12	11.22	11.02	10.97
Measurement uncertainty	± 0.5 dB							

OFDM / n – mode HT20	Maximum Output Power Conducted [dBm]							
Data Rate [MBit/s]	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Ch 157 - 5785 MHz	11.44	11.56	12.93	12.41	11.90	12.24	11.73	10.92
Measurement uncertainty	± 0.5 dB							

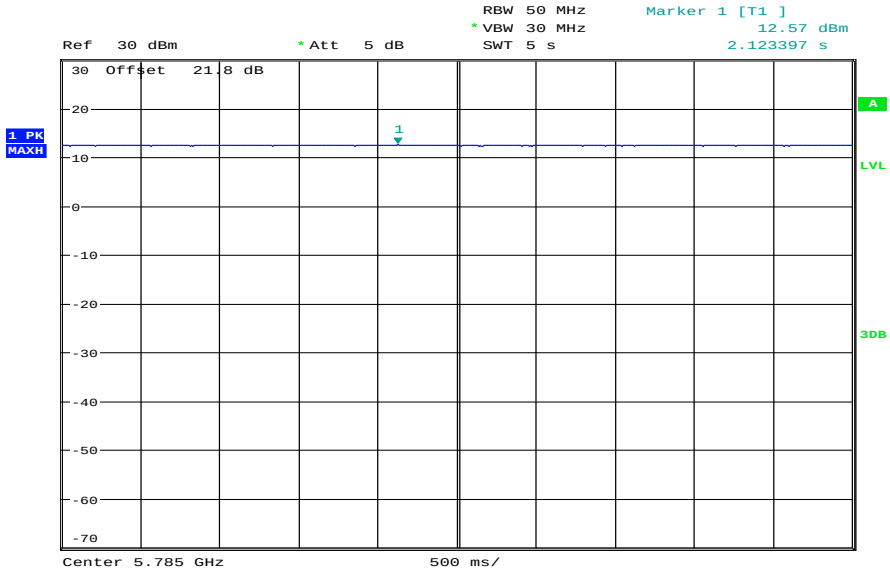
OFDM / n – mode HT40	Maximum Output Power Conducted [dBm]							
Data Rate [MBit/s]	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Ch 157 - 5755 MHz	12.03	11.29	11.29	10.70	10.77	10.73	11.99	10.36
Measurement uncertainty	± 0.5 dB							

Result: **Selected data rate for all measurements:**

OFDM / g – mode:	**6 MBit/s**
OFDM / n – mode HT20:	**MCS2**
OFDM / n – mode HT40:	**MCS0**

Plots: a – mode

Plot 1: 6 Mbit/s



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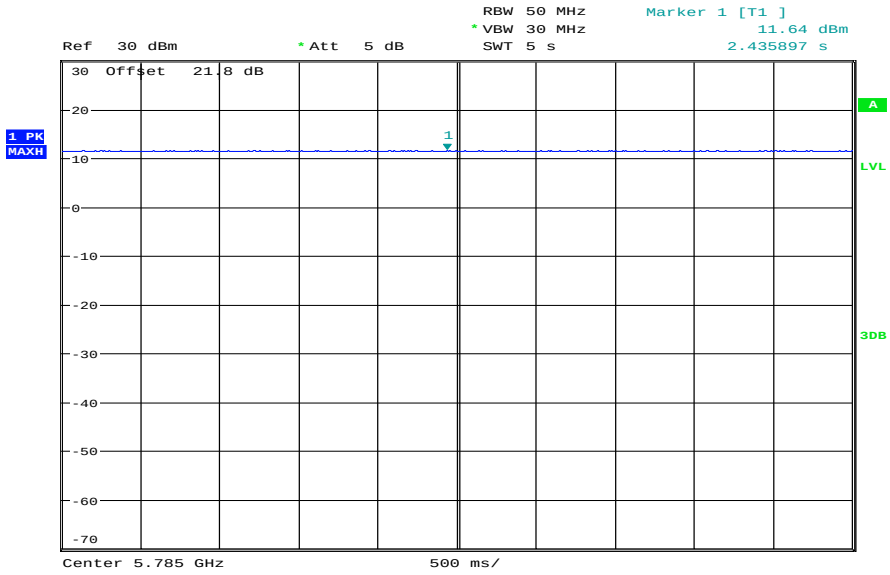
Plot 2: 9 Mbit/s



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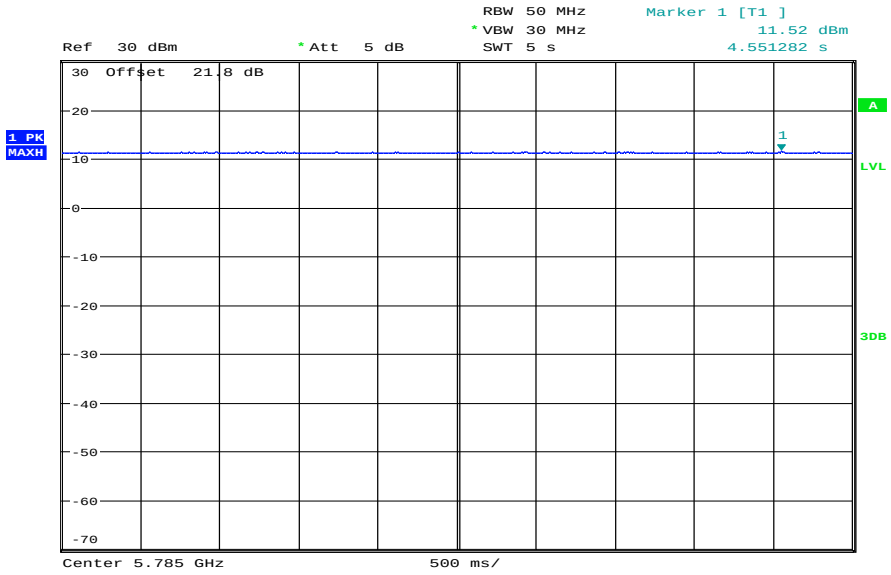
Plot 3: 12 Mbit/s



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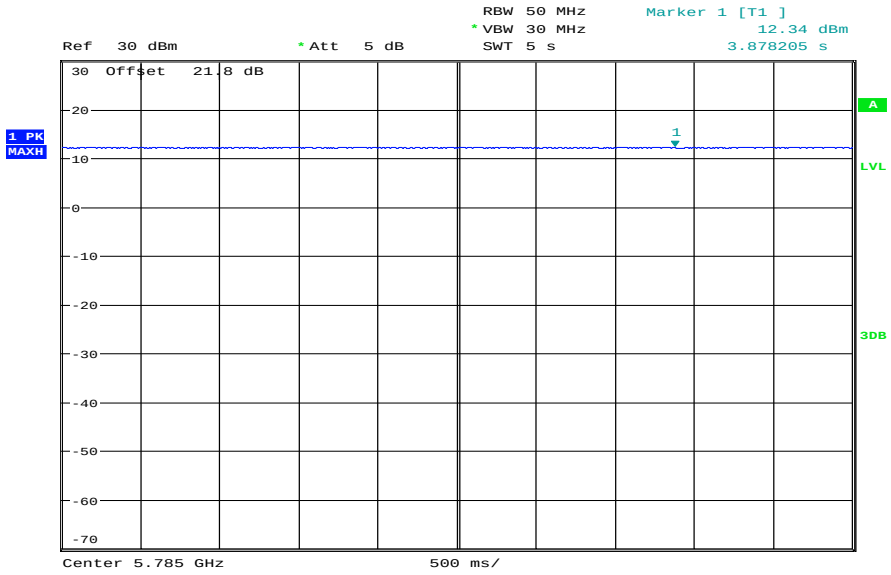
Plot 4: 18 Mbit/s



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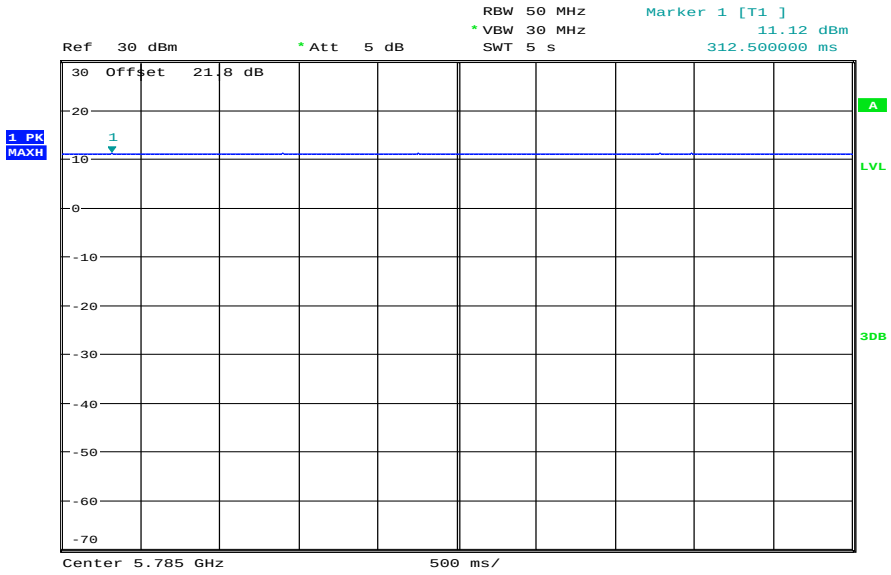
Plot 5: 24 Mbit/s



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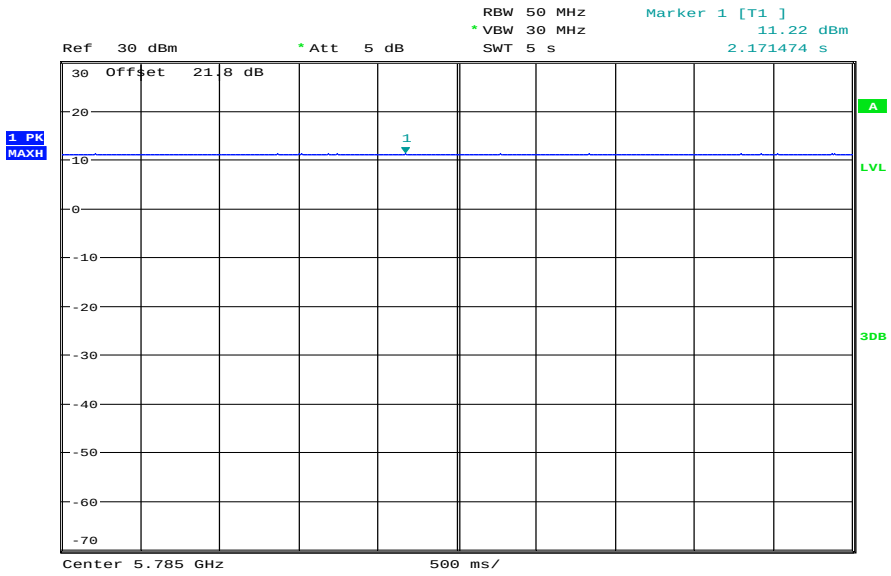
Plot 6: 36 Mbit/s



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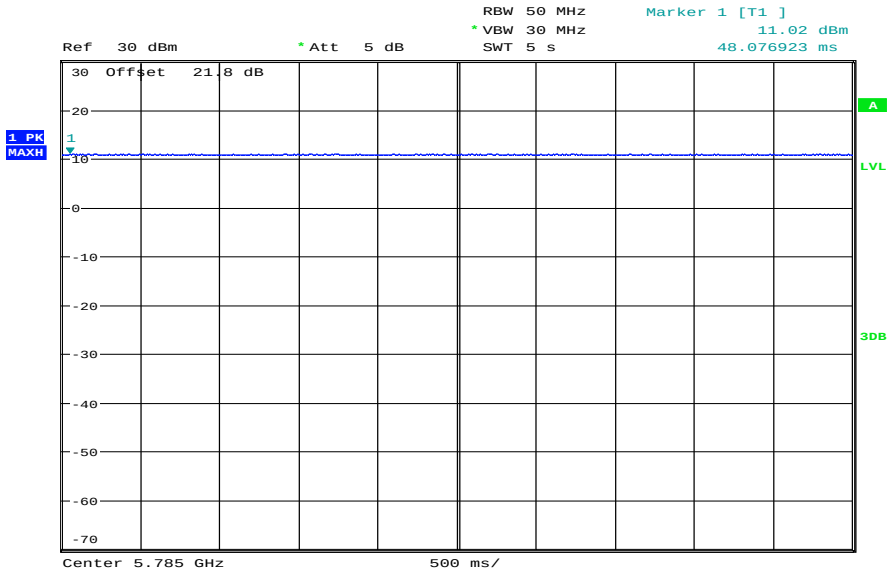
Plot 7: 48 Mbit/s



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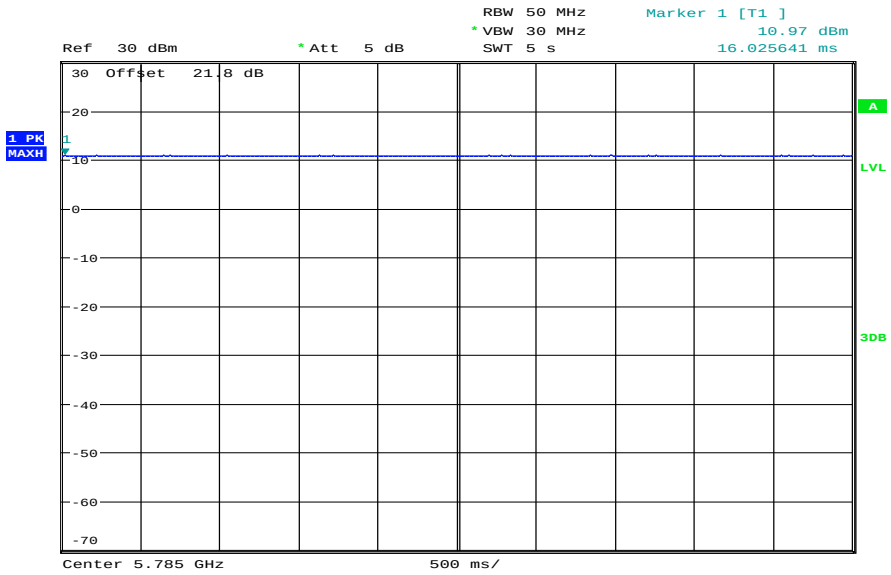
Plot 8: 54 Mbit/s



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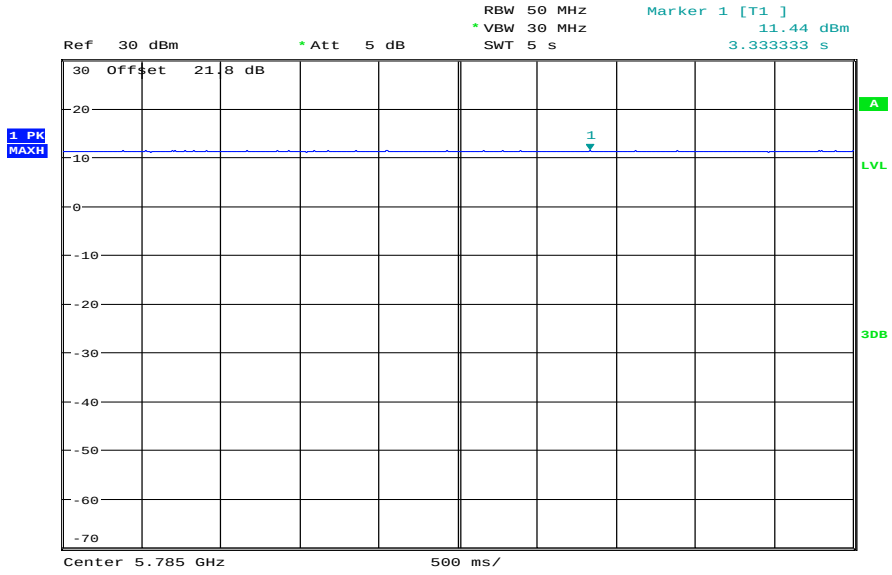
Plots: n – mode HT20

Plot 1: MCS0



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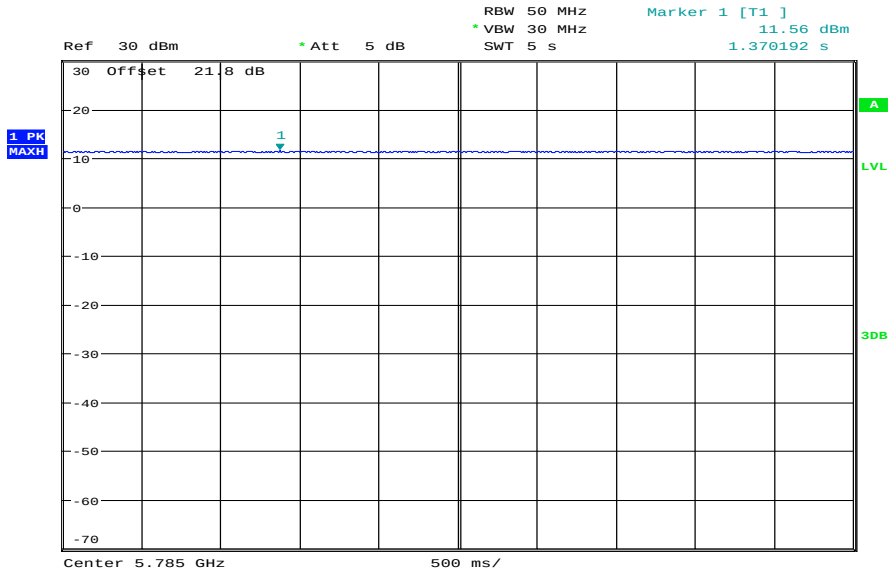
Plot 2: MCS1



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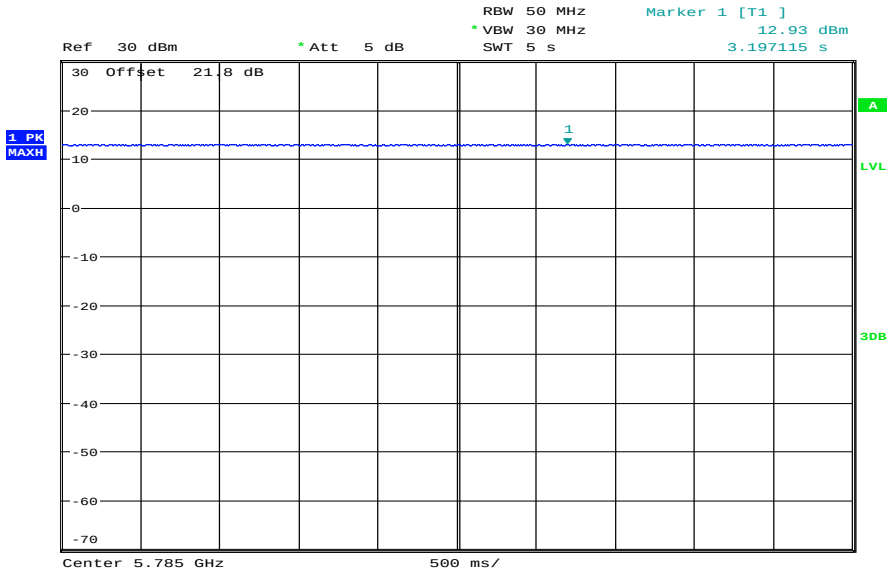
Plot 3: MCS2



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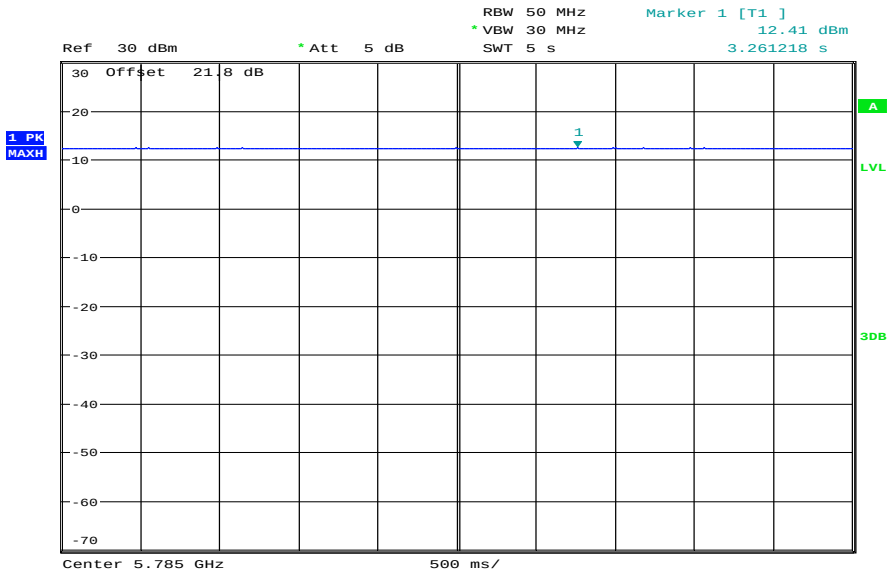
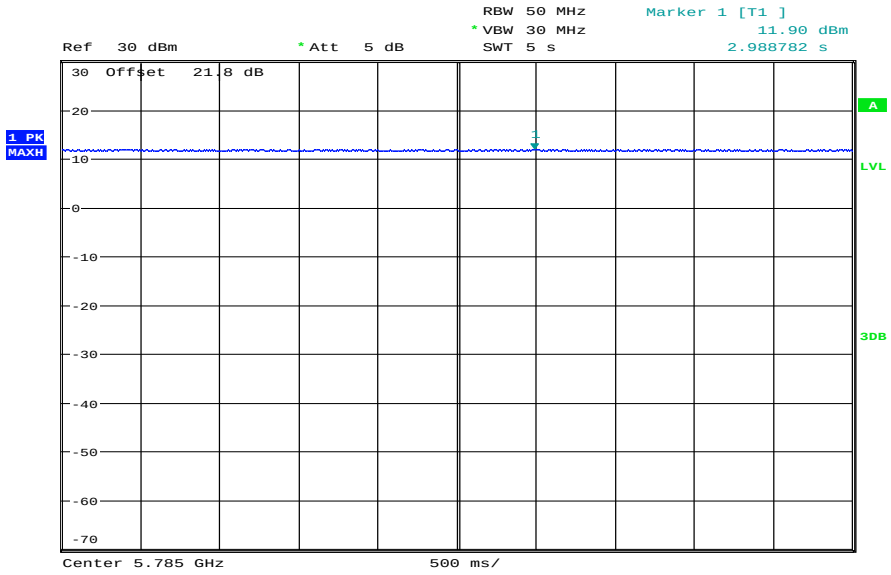
Plot 4: MCS3



Date: 27.APR.2012 08:11:13

Plot 5: MCS4



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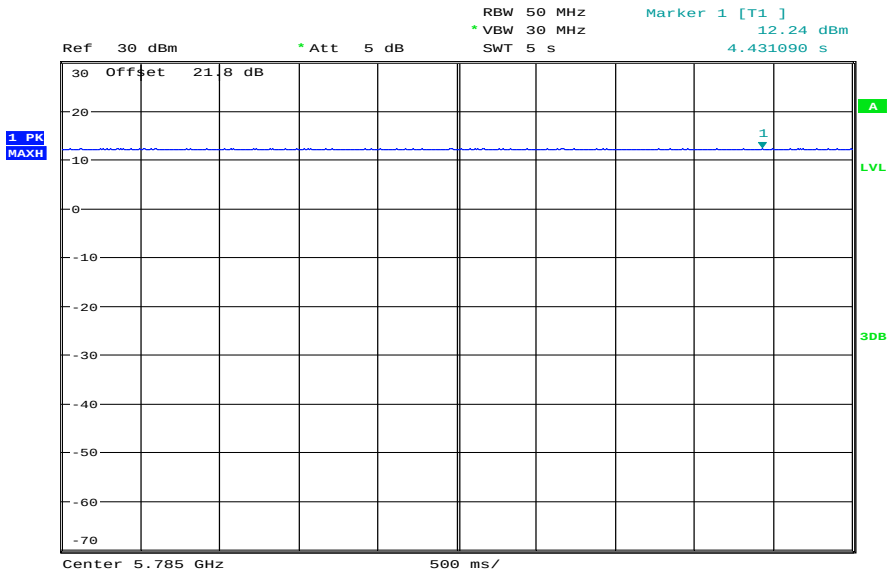
Plot 6: MCS5



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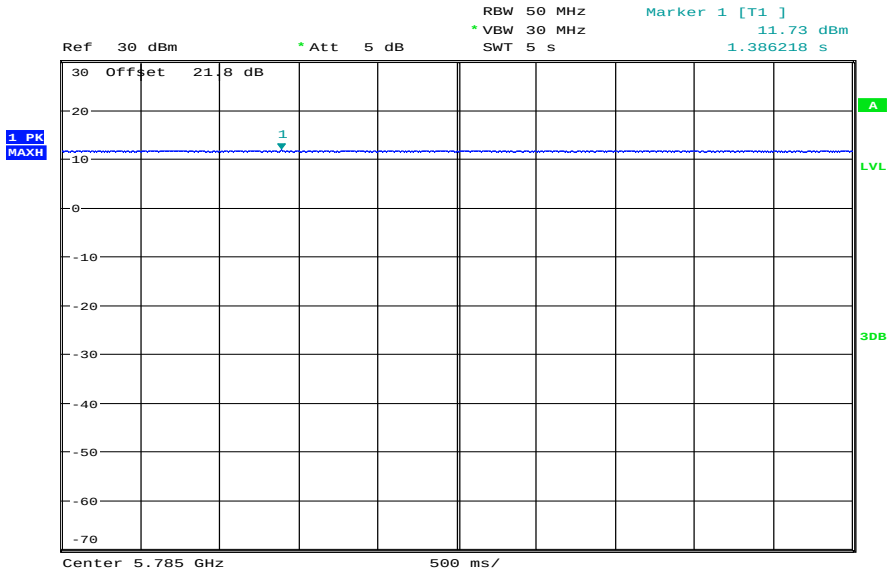
Plot 7: MCS6



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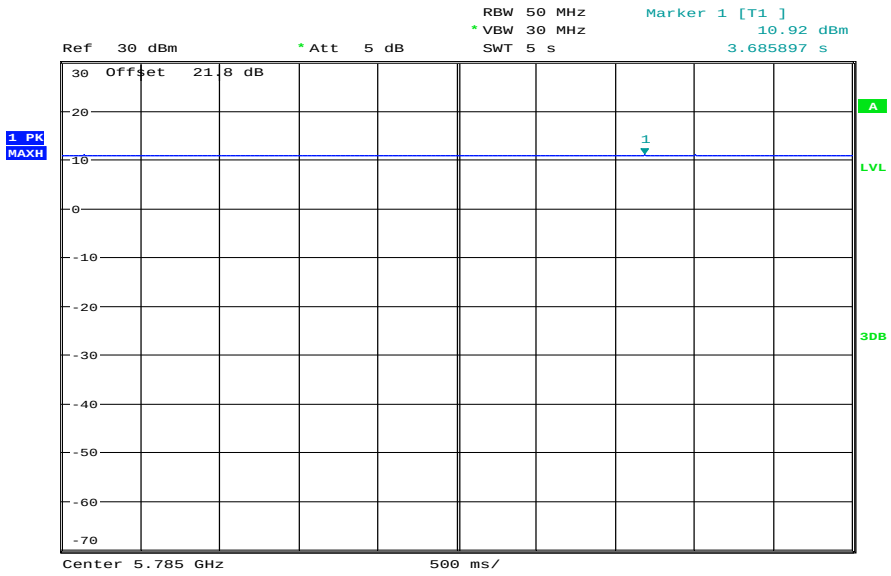
Plot 8: MCS7



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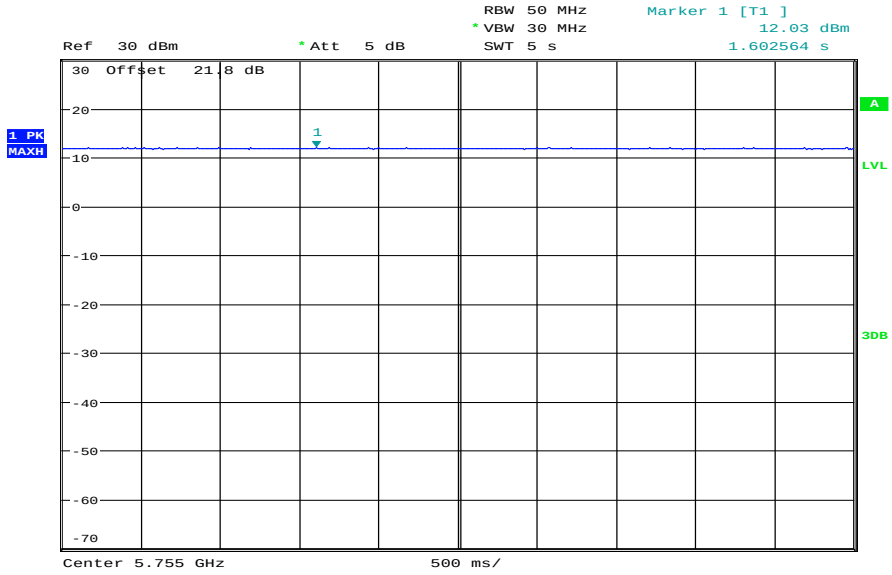
Plots: n – mode HT40

Plot 1: MCS0



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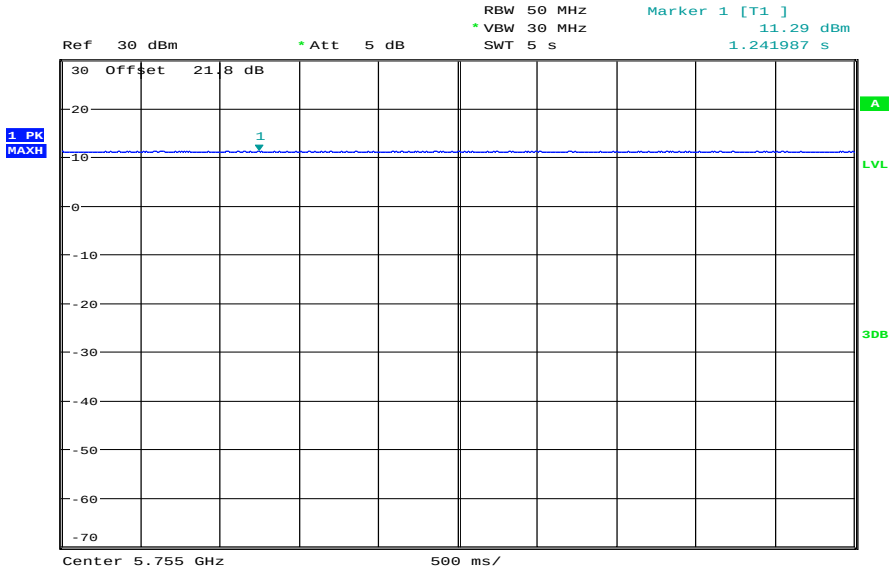
Plot 2: MCS1



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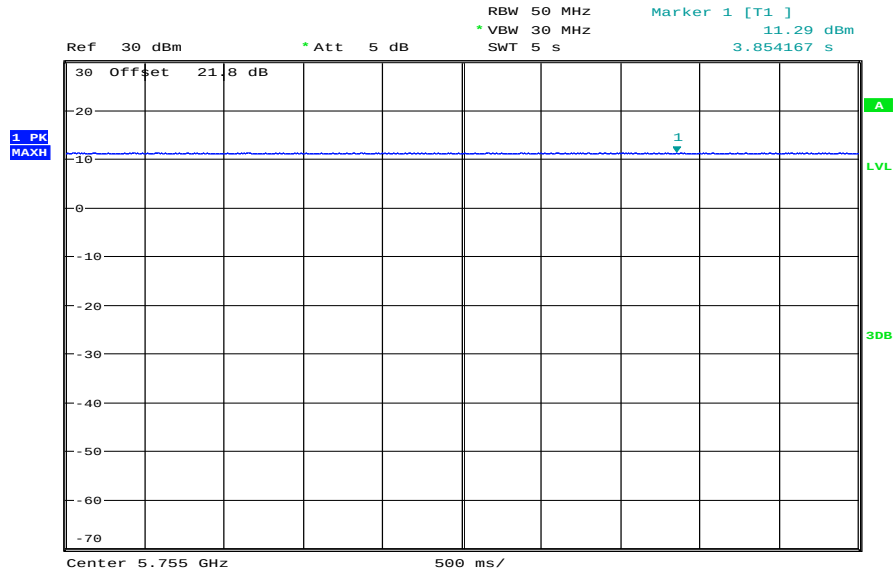
Plot 3: MCS2



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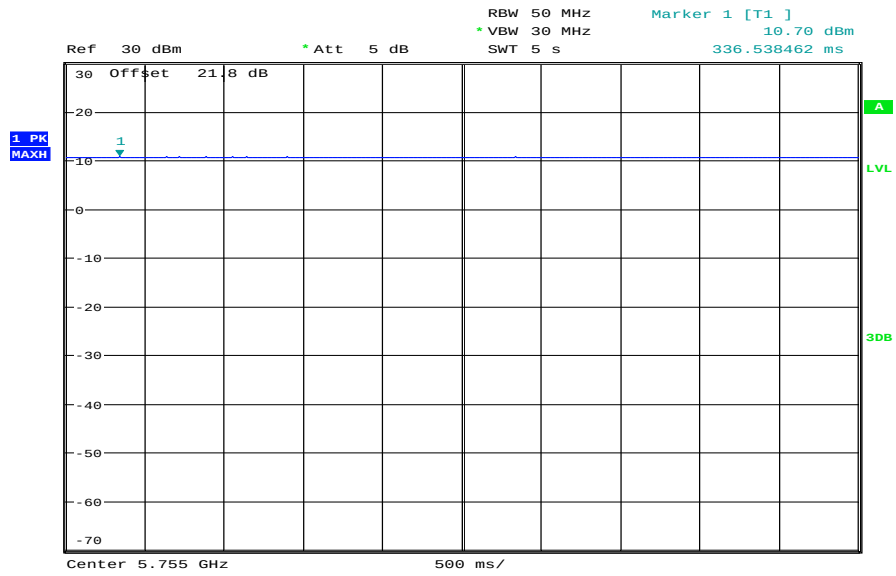
Plot 4: MCS3



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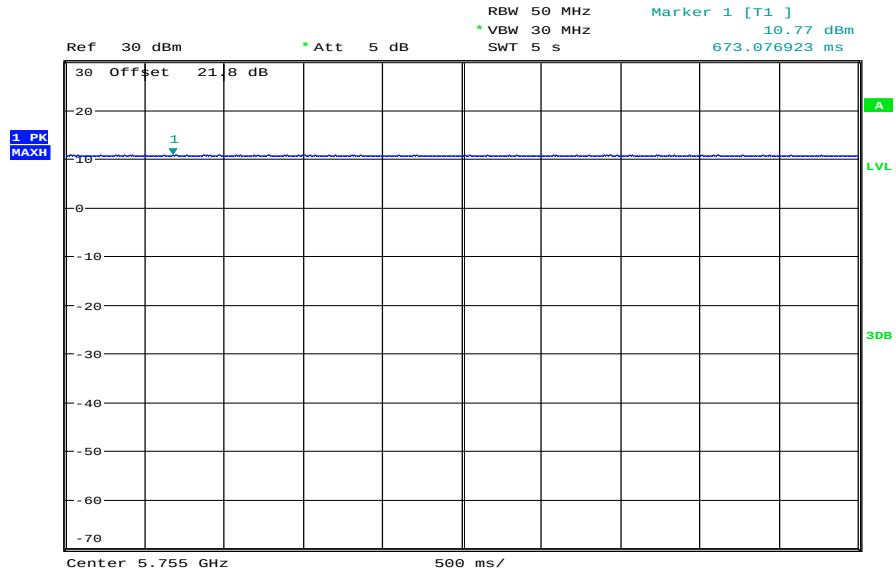
Plot 5: MCS4



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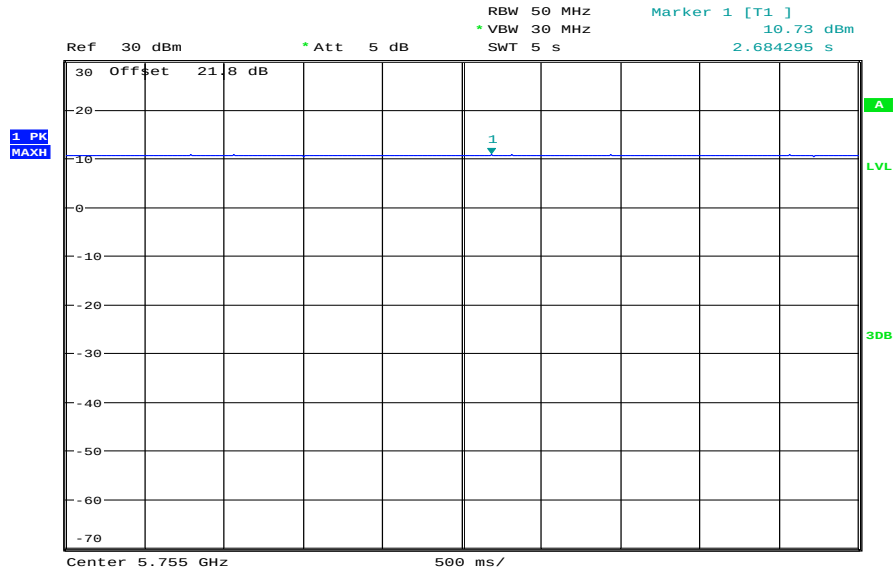
Plot 6: MCS5



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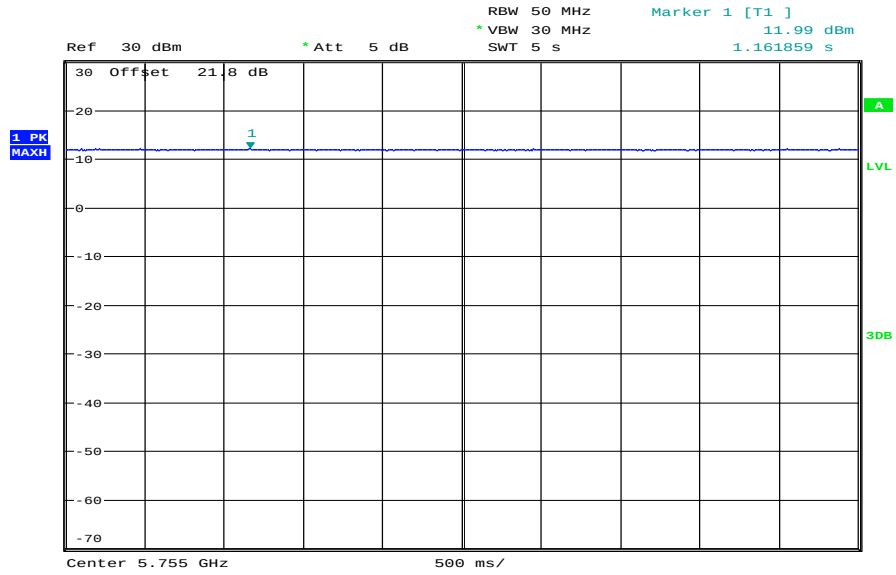
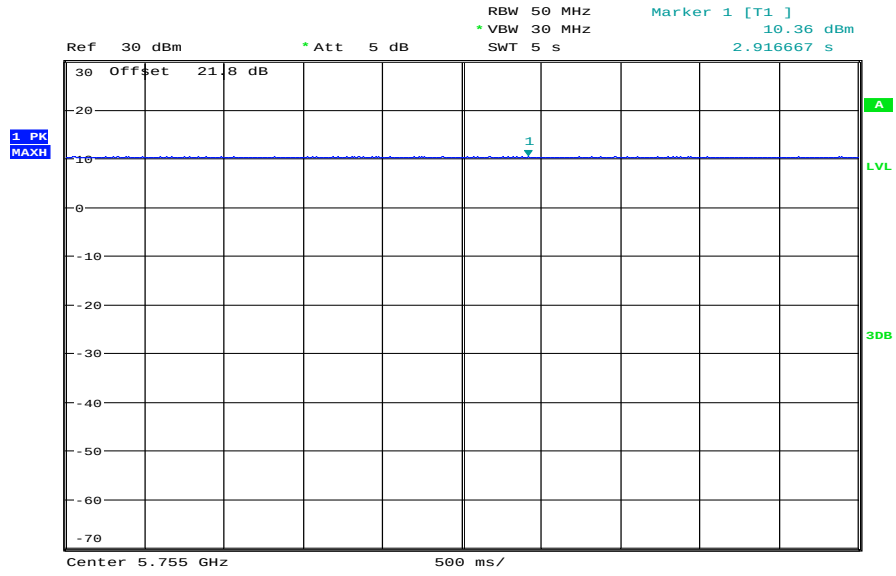
Plot 7: MCS6



Date: 27.APR.2012 08:41:24

Plot 8: MCS7



Date: 27.APR.2012 08:42:26

9.2 Antenna gain

Measurement:

The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module.

Measurement parameters:

Measurement parameter	
Detector:	Peak
Sweep time:	5s
Resolution bandwidth:	3 MHz
Video bandwidth:	10 MHz
Trace-Mode:	Max hold

Limits:

FCC	IC
Antenna Gain	
6 dBi	

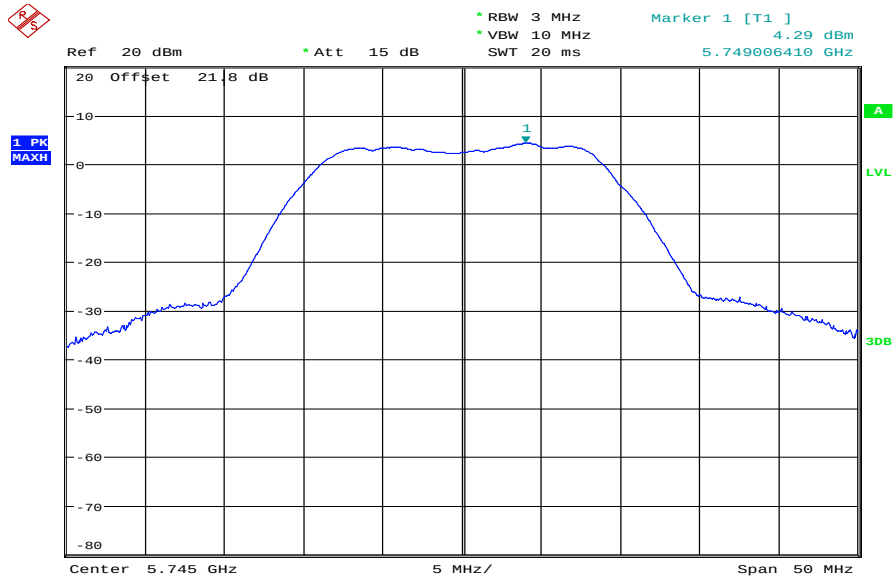
Results:

T_{nom}	V_{nom}	lowest channel 5745 MHz	middle channel 5785 MHz	highest channel 5825 MHz
Conducted power [dBm]		4.29	4.85	4.87
Radiated power [dBm]		2.89	3.15	2.30
Gain [dBi] Calculated		-1.40	-1.70	-2.57
Measurement uncertainty		± 1.5 dB (cond.) / ± 3 dB (rad.)		

Result: **Passed**

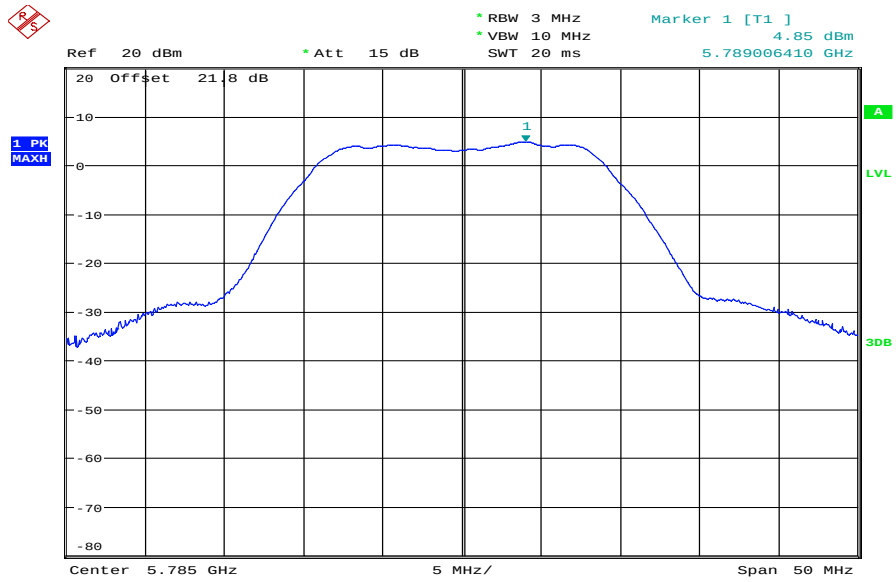
Plots: conducted power for gain calculation

Plot 1: low channel



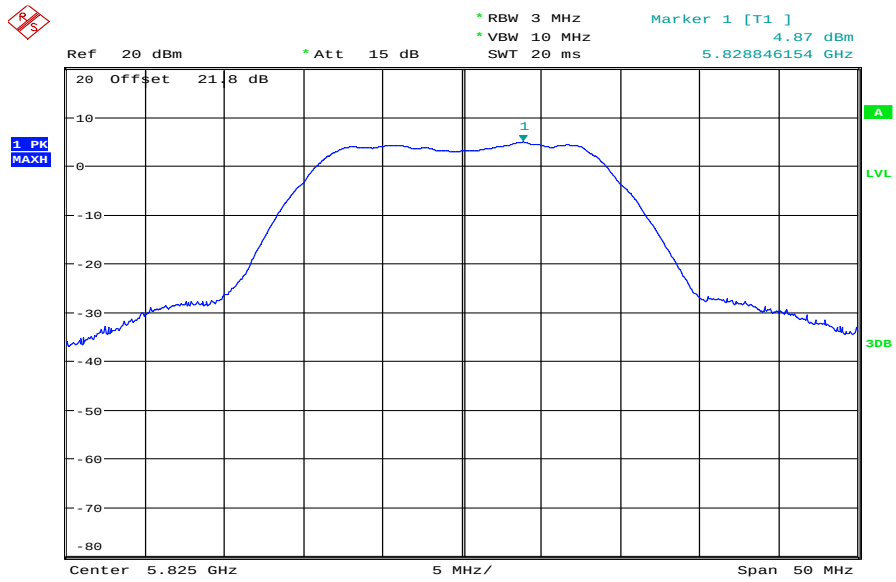
Date: 30.APR.2012 07:38:30

Plot 2: middle channel



Date: 30.APR.2012 07:39:33

Plot 3: high channel



9.3 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.

Used measurement option: 5.2.1.1 PK1

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	5s
Resolution bandwidth:	> EBW
Video bandwidth:	≥ 3 x RBW (or the maximum of the analyzer)
Span:	Zero span
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
Peak Output Power Conducted	12.02	12.57	12.66
Output Power Radiated – EIRP*)	10.62	10.87	10.09
Measurement uncertainty	± 1.5 dB (cond.) / ± 3 dB (rad.)		

*) calculated with Antenna gain

Result: **Passed**

Results: OFDM / n – mode HT20

OFDM / n – mode HT20	Maximum Output Power [dBm]		
Frequency	5745 MHz	5785 MHz	5825 MHz
Peak Output Power Conducted	12.37	12.93	12.97
Output Power Radiated – EIRP*)	10.97	11.23	10.40
Measurement uncertainty	± 1.5 dB (cond.) / ± 3 dB (rad.)		

*) calculated with Antenna gain

Result: **Passed**

Results: OFDM / n – mode HT40

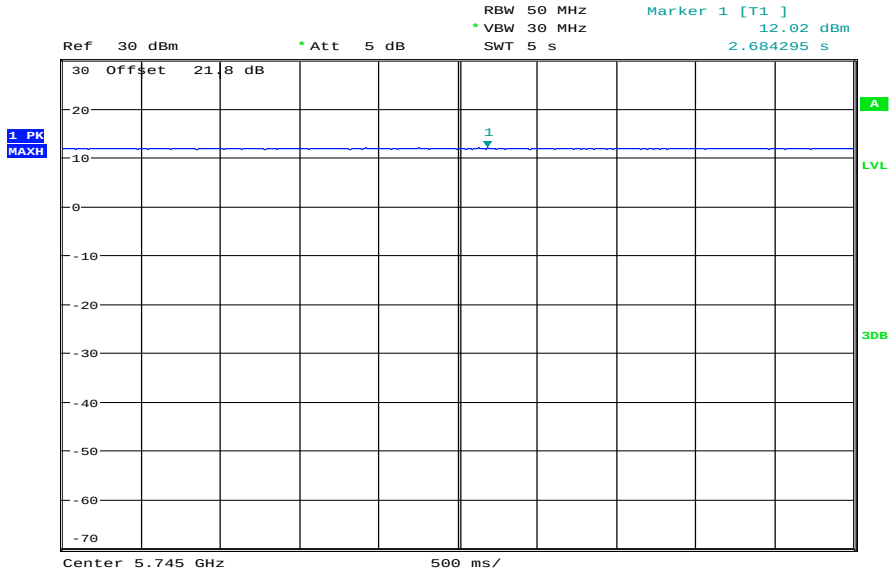
OFDM / n – mode HT40	Maximum Output Power [dBm]		
Frequency	5755 MHz	5795 MHz	-/-
Peak Output Power Conducted	12.03	12.47	-/-
Output Power Radiated – EIRP*)	10.63	10.77	-/-
Measurement uncertainty	± 1.5 dB (cond.) / ± 3 dB (rad.)		

*) calculated with Antenna gain

Result: **Passed**

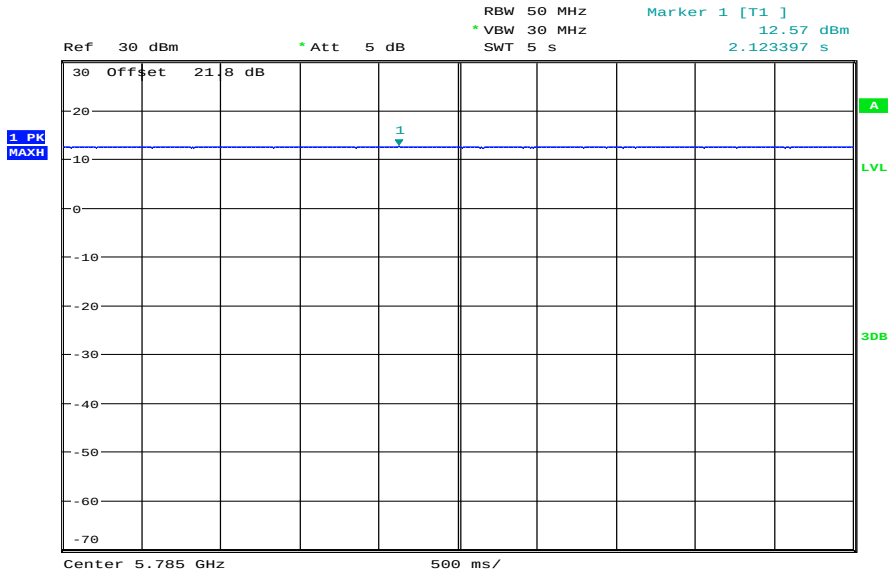
Plots: OFDM / a – mode

Plot 1: TX mode, lowest channel



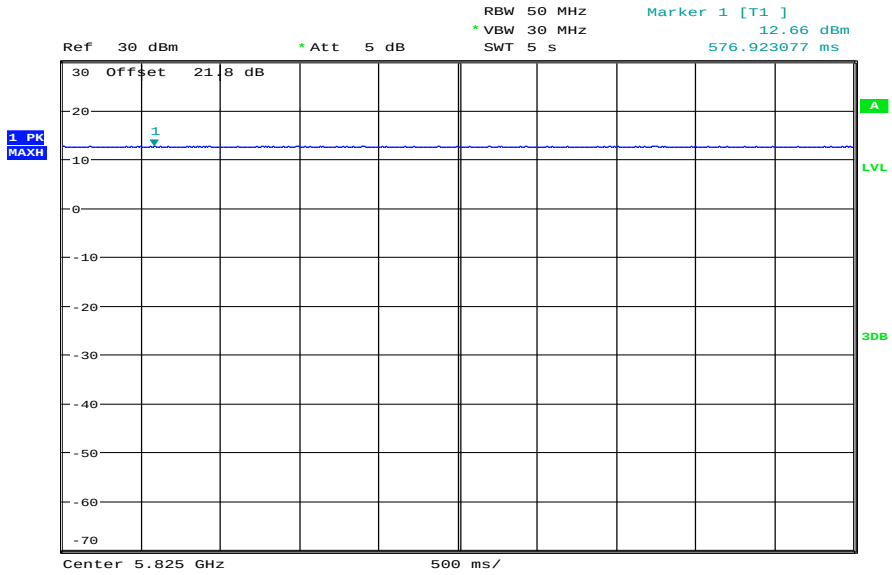
Date: 27.APR.2012 08:00:00

Plot 2: TX mode, middle channel



Date: 27.APR.2012 07:41:28

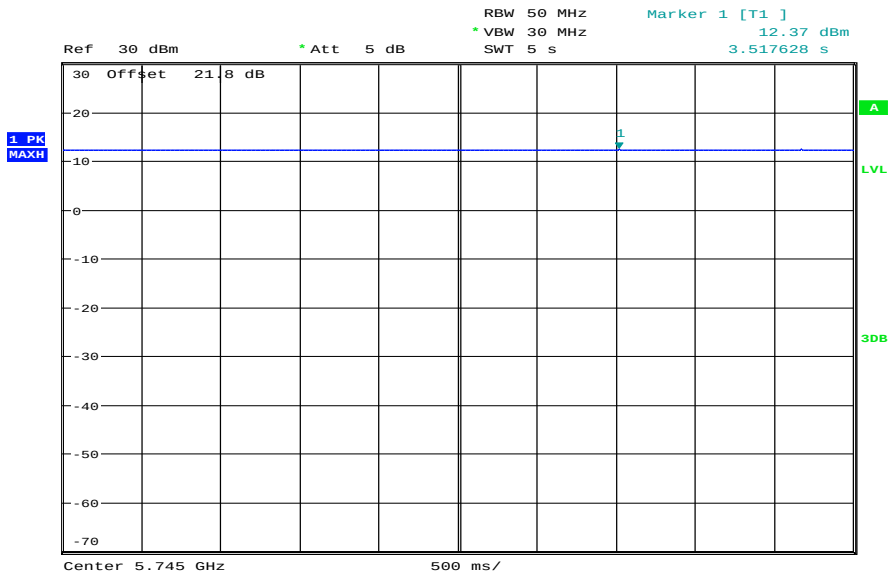
Plot 3: TX mode, highest channel



Date: 27.APR.2012 08:01:38

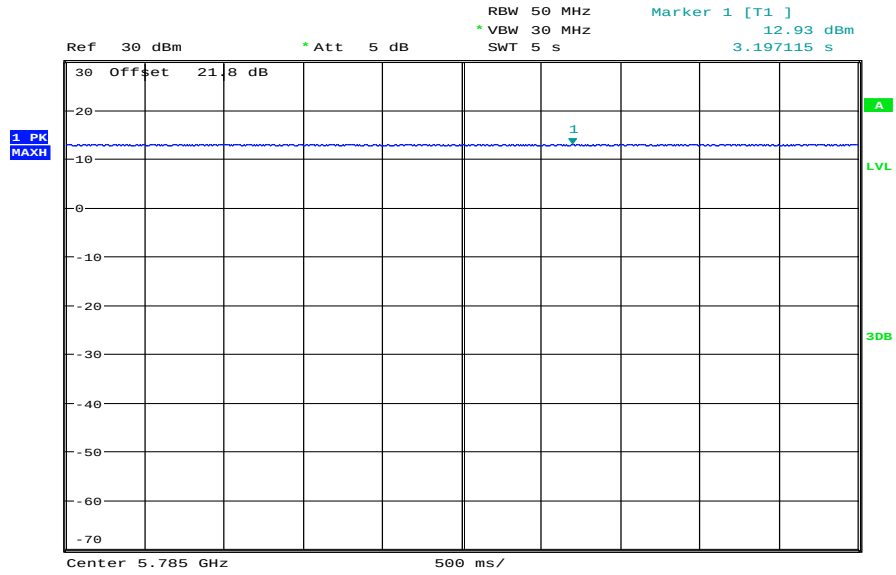
Plots: OFDM / n – mode HT20

Plot 1: TX mode, lowest channel



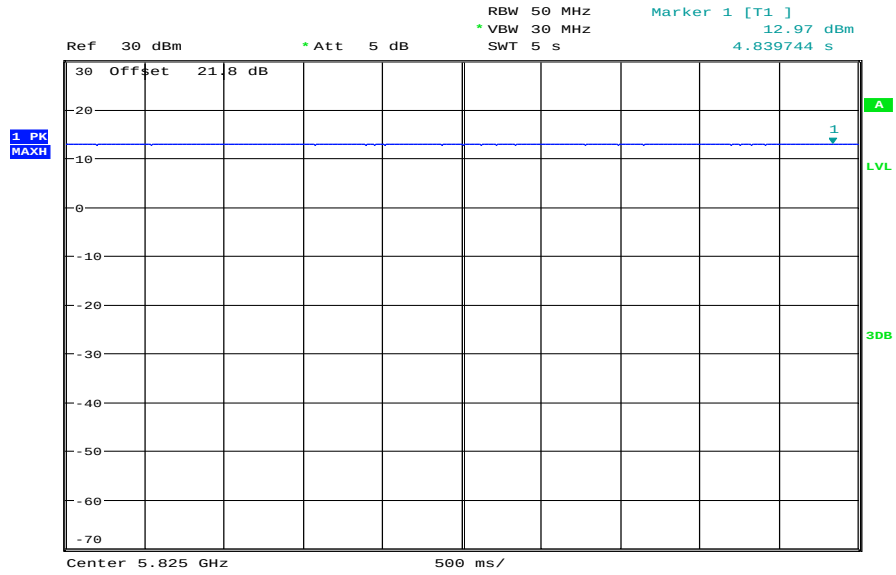
Date: 27.APR.2012 08:22:35

Plot 2: TX mode, middle channel



Date: 27.APR.2012 08:09:39

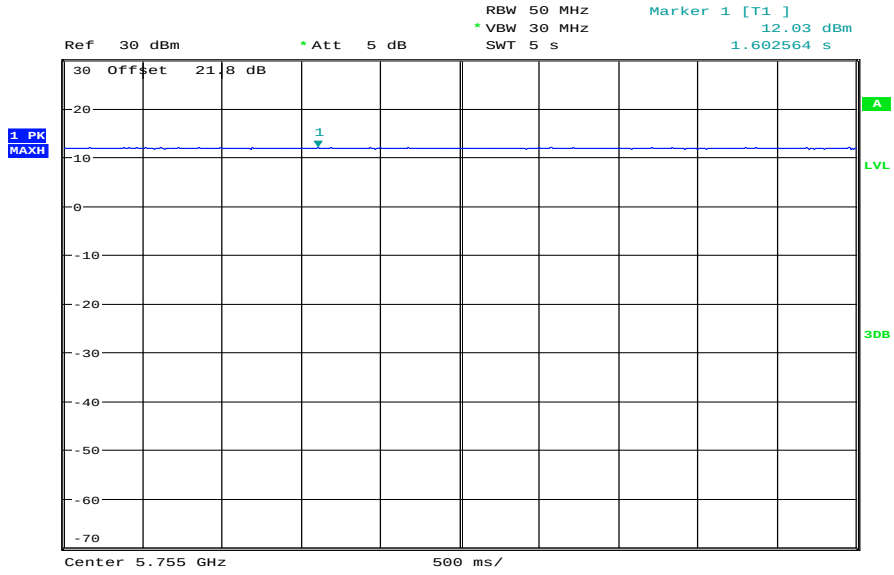
Plot 3: TX mode, highest channel



Date: 27.APR.2012 08:24:40

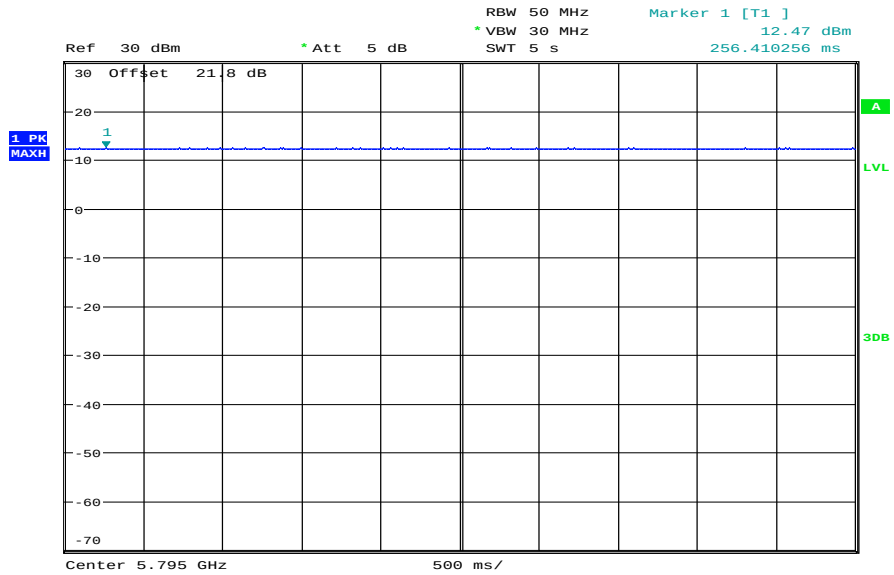
Plots: OFDM / n – mode HT40

Plot 1: TX mode, channel 149



Date: 27.APR.2012 08:34:13

Plot 2: TX mode, channel 157



Date: 27.APR.2012 08:44:00

9.4 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.

Used measurement option: 5.3.1 PKPSD

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	100 kHz
Video bandwidth:	≥ 300 kHz
Span:	5 - 30 % greater than the EBW
Trace-Mode:	Max hold (allow trace to fully stabilize)
Bandwidth correction:	10 log (3kHz / 100kHz) = -15.2 dB

Limits:

FCC	IC
Power Spectral Density	
8 dBm (conducted)	

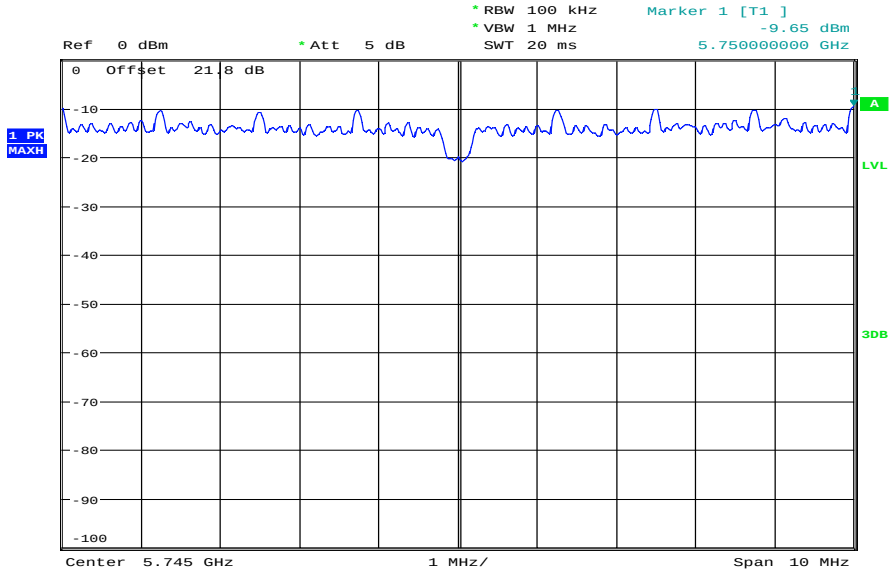
Results:

Modulation	Power Spectral density [dBm]		
Frequency	5745 MHz	5785 MHz	5825 MHz
OFDM / a – mode measured value (100 kHz)	-9.65	-9.02	-8.97
OFDM / a – mode re-calculated value (to 3 kHz)	-24.85	-24.22	-24.17
OFDM / n – mode HT20 measured value (100 kHz)	-9.66	-9.02	-8.96
OFDM / n – mode HT20 re-calculated value (to 3 kHz)	-24.86	-24.22	-24.16
Frequency	5755 MHz	5795 MHz	-/-
OFDM / n – mode HT40 measured value (100 kHz)	-12.34	-11.84	-/-
OFDM / n – mode HT40 re-calculated value (to 3 kHz)	-27.54	-27.04	-/-
Measurement uncertainty	± 1.5 dB		

Result: **Passed**

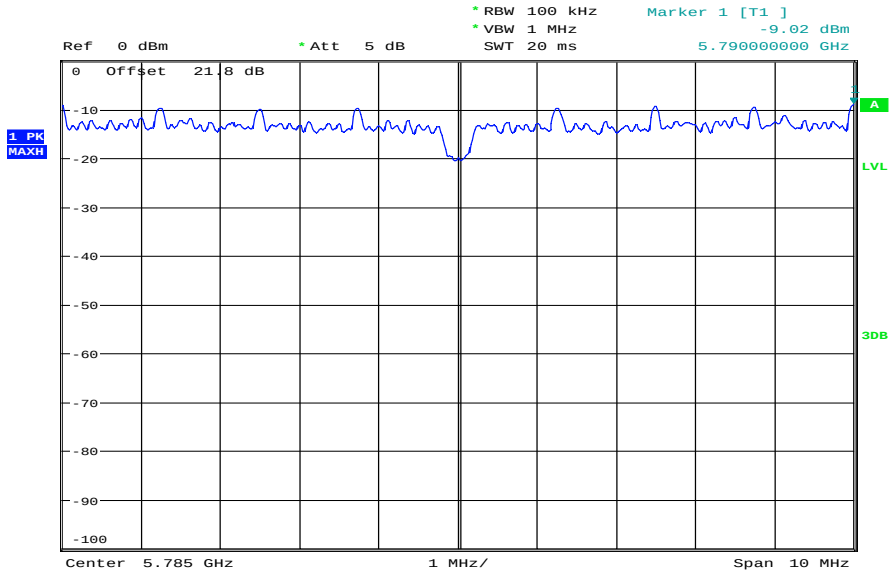
Plots: OFDM / a – mode

Plot 1: TX mode, lowest channel



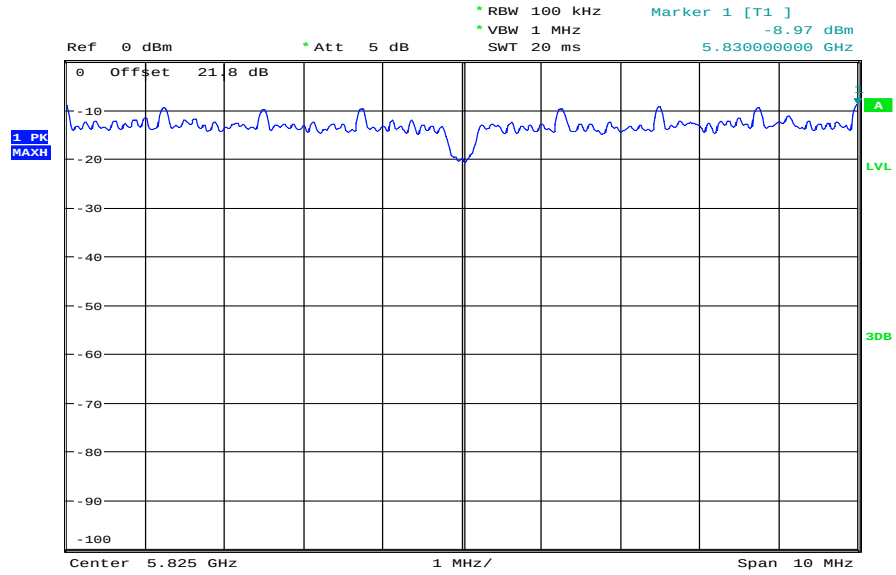
Date: 27.APR.2012 09:59:04

Plot 2: TX mode, middle channel



Date: 27.APR.2012 09:58:07

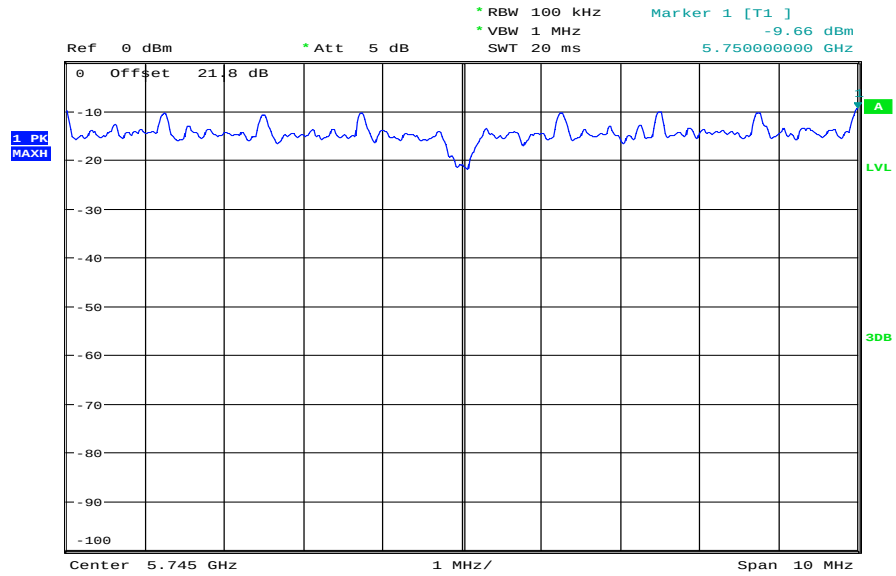
Plot 3: TX mode, highest channel



Date: 27.APR.2012 09:57:10

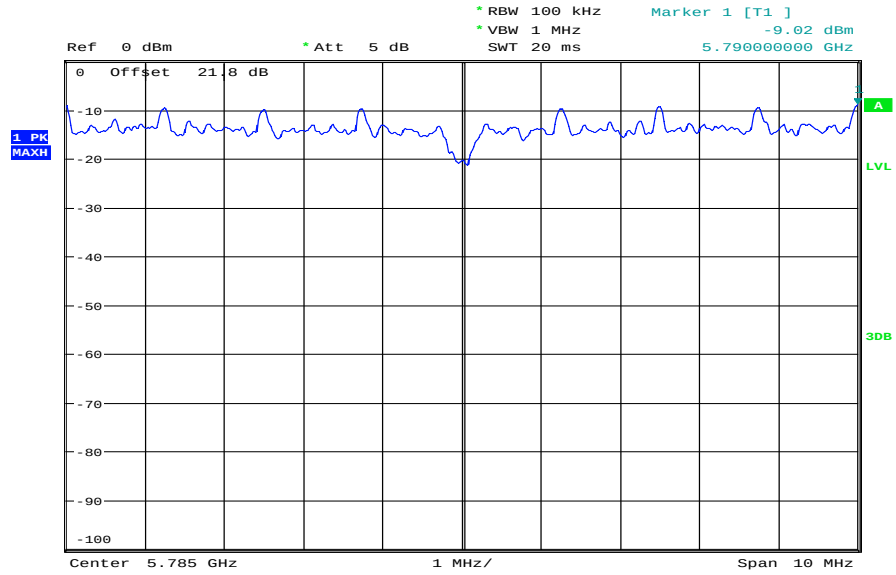
Plots: OFDM / n – mode HT20

Plot 1: TX mode, lowest channel



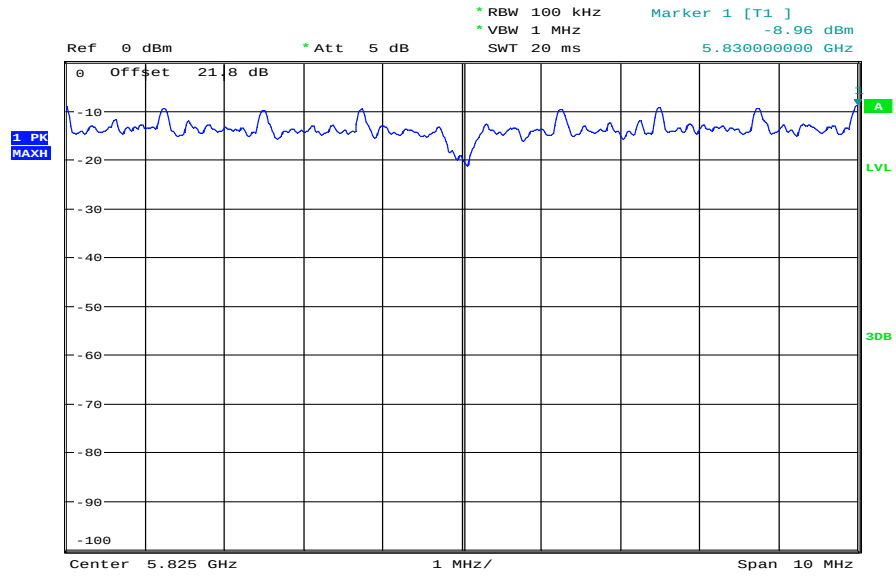
Date: 27.APR.2012 09:52:37

Plot 2: TX mode, middle channel



Date: 27.APR.2012 09:53:53

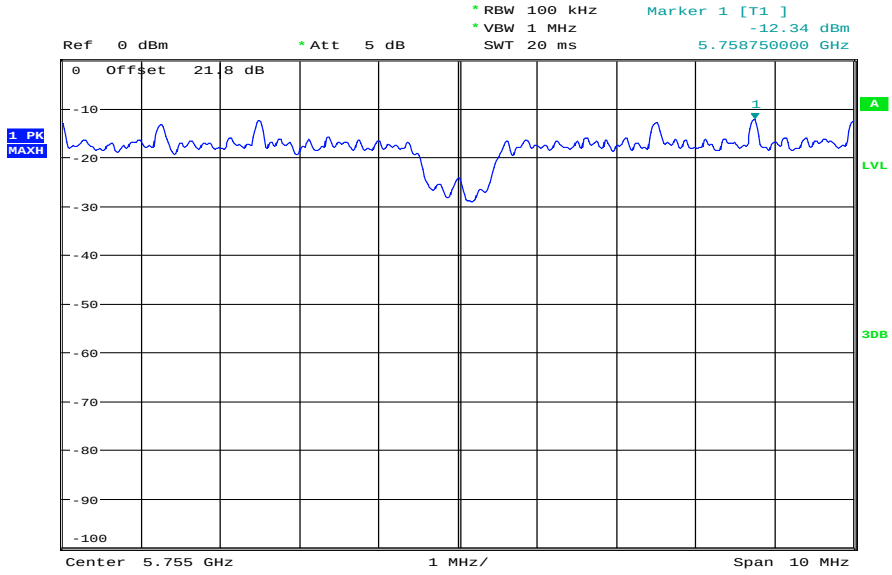
Plot 3: TX mode, highest channel



Date: 27.APR.2012 09:55:34

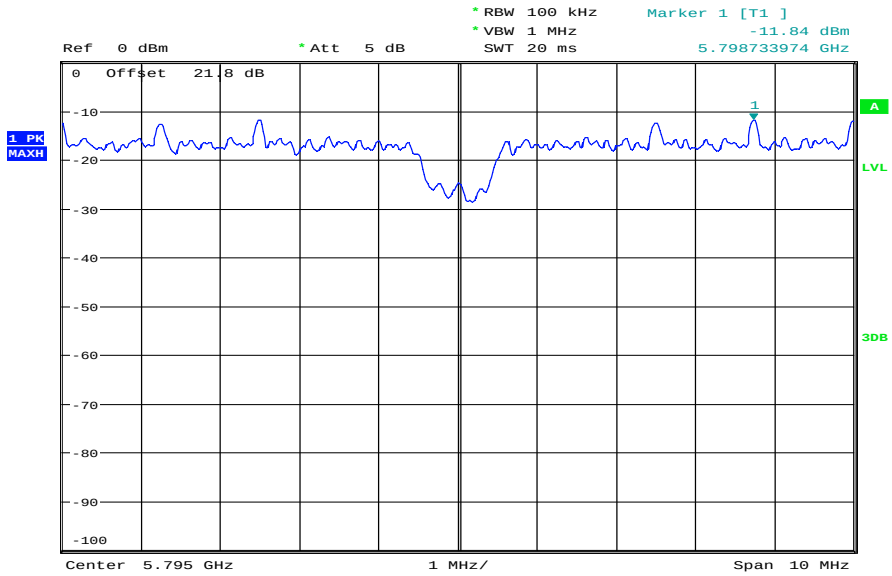
Plots: OFDM / n – mode HT40

Plot 1: TX mode, channel 149



Date: 27.APR.2012 09:50:52

Plot 3: TX mode, channel 157



Date: 27.APR.2012 09:49:20

9.5 Spectrum bandwidth of a FHSS system – 6 dB / 75 % power bandwidth (EBW)

Description:

Measurement of the 6 dB / 75 % power bandwidth of the modulated signal.

Used measurement option: 5.1.2.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	1 - 5% of emission bandwidth
Video bandwidth:	≥ 3 x RBW
Span:	> complete emission
Trace-Mode:	Max hold (allow trace to stabilize)
Measurement option:	Automatic bandwidth measurement (75% power)

Limits:

FCC	IC
Spectrum Bandwidth of a FHSS System – 6 dB / 75 % power bandwidth (EBW)	
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.	

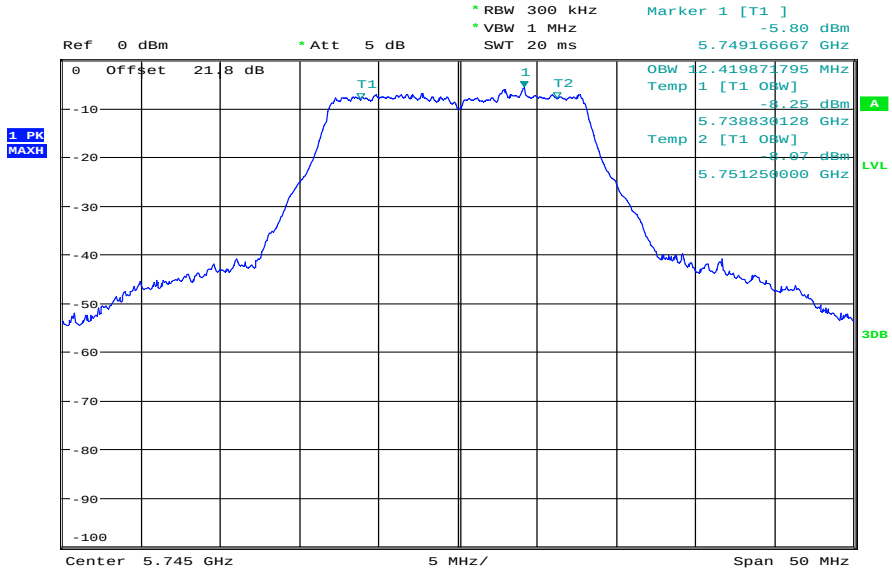
Results:

Modulation	6 dB / 75 % power bandwidth [MHz] (EBW)		
	Low channel	Middle channel	High channel
OFDM / a – mode	12.42	12.50	12.50
OFDM / n – mode HT20	13.30	13.22	13.30
OFDM / n – mode HT40	26.35	-/-	26.35
Measurement uncertainty	± RBW		

Result: Passed

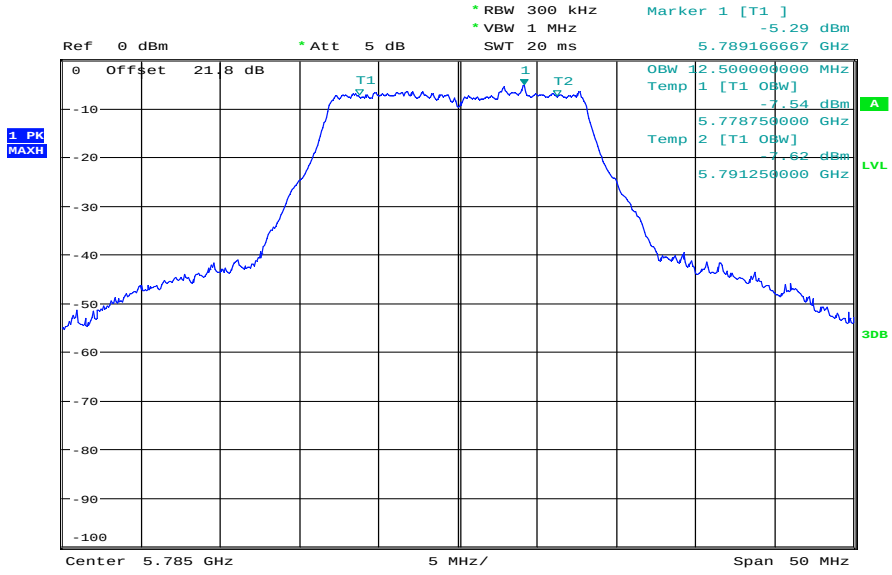
Plots: OFDM / a – mode

Plot 1: TX mode, lowest channel



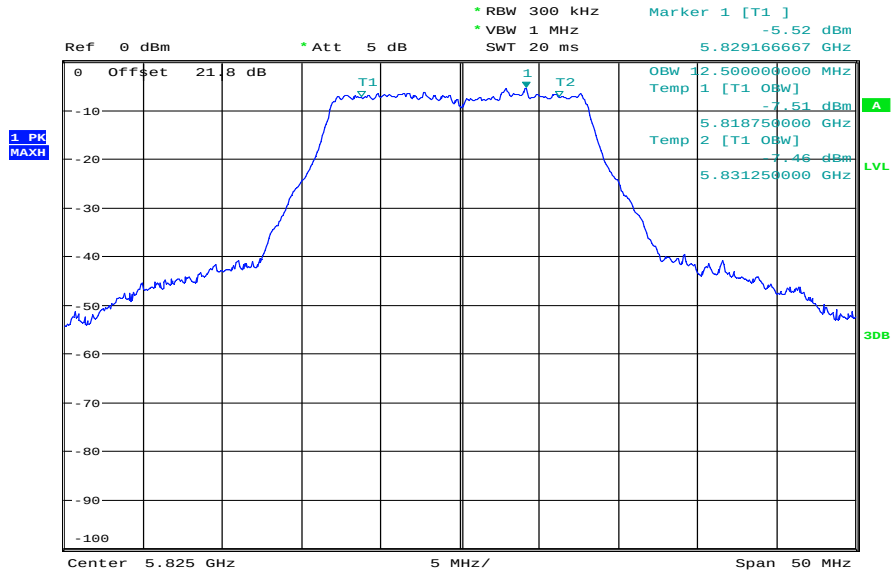
Date: 27.APR.2012 09:13:09

Plot 2: TX mode, middle channel



Date: 27.APR.2012 09:16:17

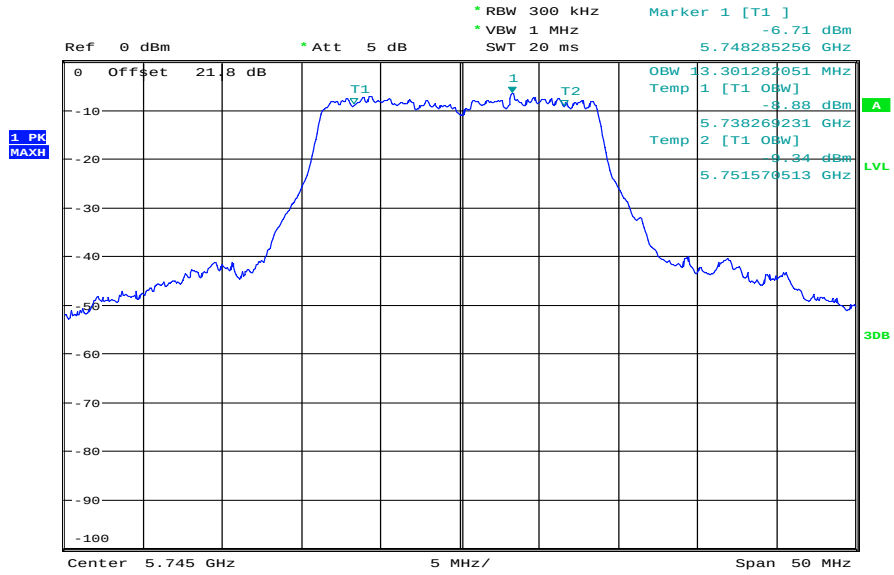
Plot 3: TX mode, highest channel



Date: 27.APR.2012 09:17:35

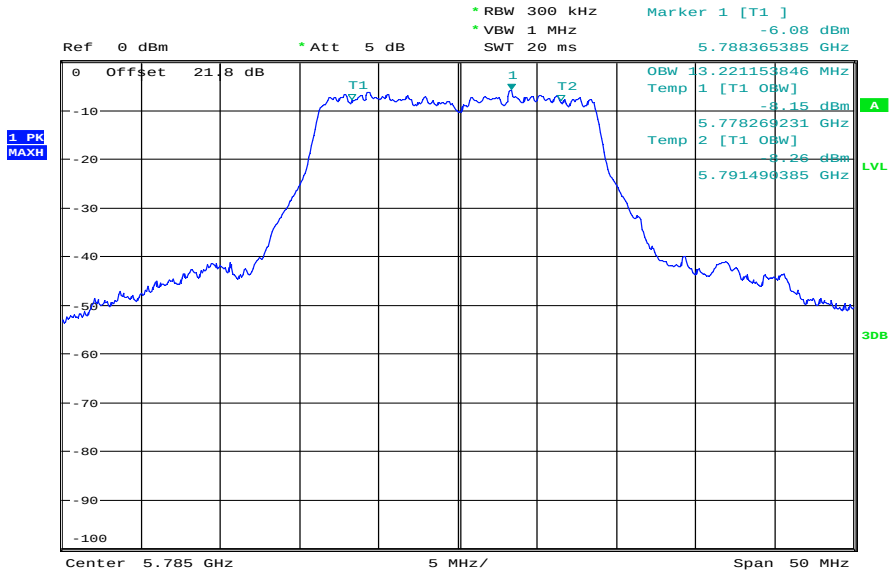
Plots: OFDM / n – mode HT20

Plot 1: TX mode, lowest channel



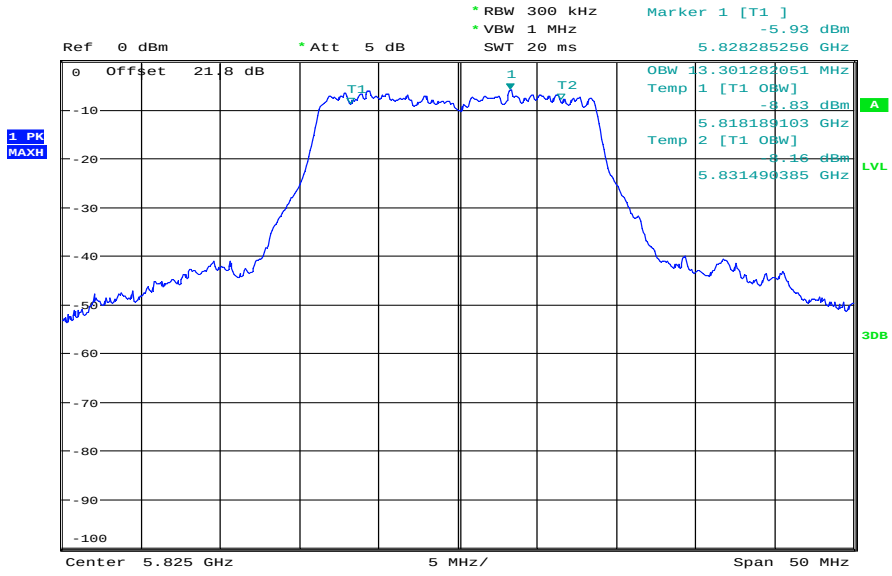
Date: 27.APR.2012 09:28:29

Plot 2: TX mode, middle channel



Date: 27.APR.2012 09:29:47

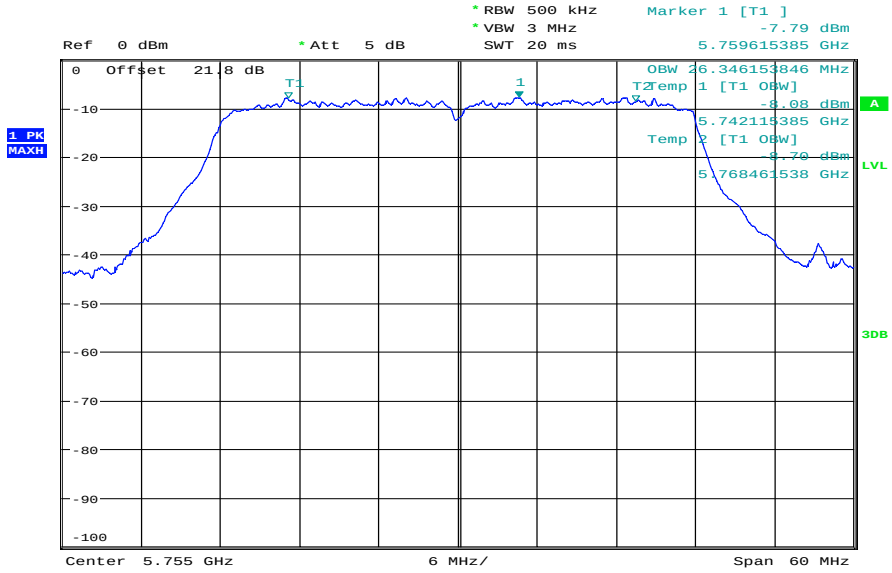
Plot 3: TX mode, highest channel



Date: 27.APR.2012 09:33:04

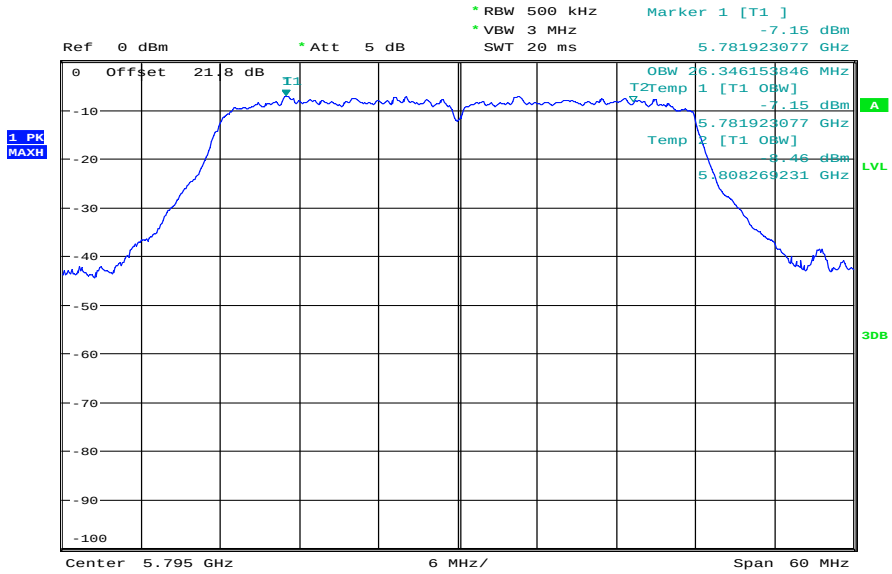
Plots: OFDM / n – mode HT40

Plot 1: TX mode, channel 149



Date: 27.APR.2012 09:35:40

Plot 3: TX mode, channel 157



Date: 27.APR.2012 09:39:07

9.6 Spectrum bandwidth of a FHSS system – 20 dB / 99 % power bandwidth

Description:

Measurement of the 20 dB / 99% power bandwidth of the modulated signal.

Used measurement option: 5.1.2.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	1 - 5% of emission bandwidth
Video bandwidth:	≥ 3 x RBW
Span:	> complete emission
Trace-Mode:	Max hold (allow trace to stabilize)
Measurement option:	Automatic bandwidth measurement (99% power)

Limits:

FCC	IC
Spectrum Bandwidth of a FHSS System – 20 dB / 99 % power bandwidth	
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.	

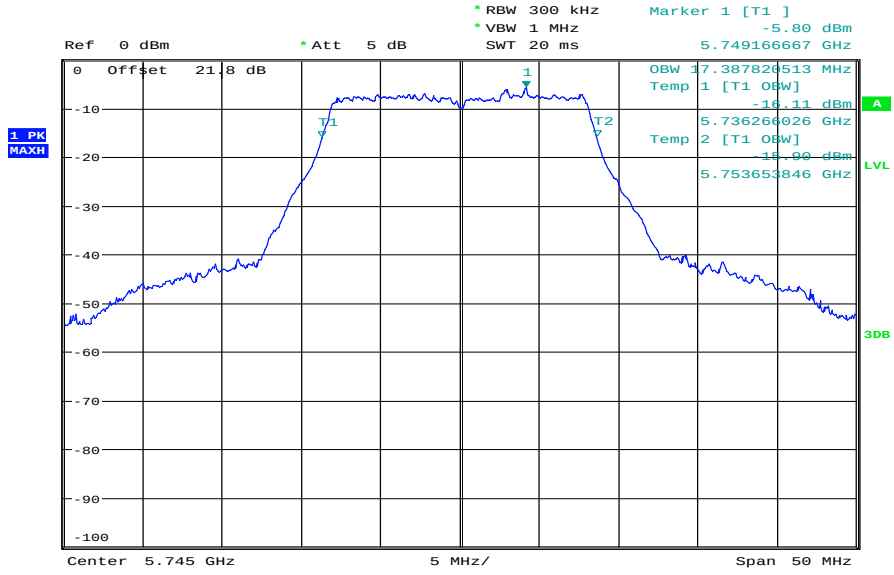
Results:

Modulation	20 dB / 99 % power bandwidth [MHz]		
	Low channel	Middle channel	High channel
OFDM / a – mode	17.39	17.39	17.39
OFDM / n – mode HT20	18.03	18.03	18.03
OFDM / n – mode HT40	36.73	-/-	36.73
Measurement uncertainty	± RBW		

Result: Passed

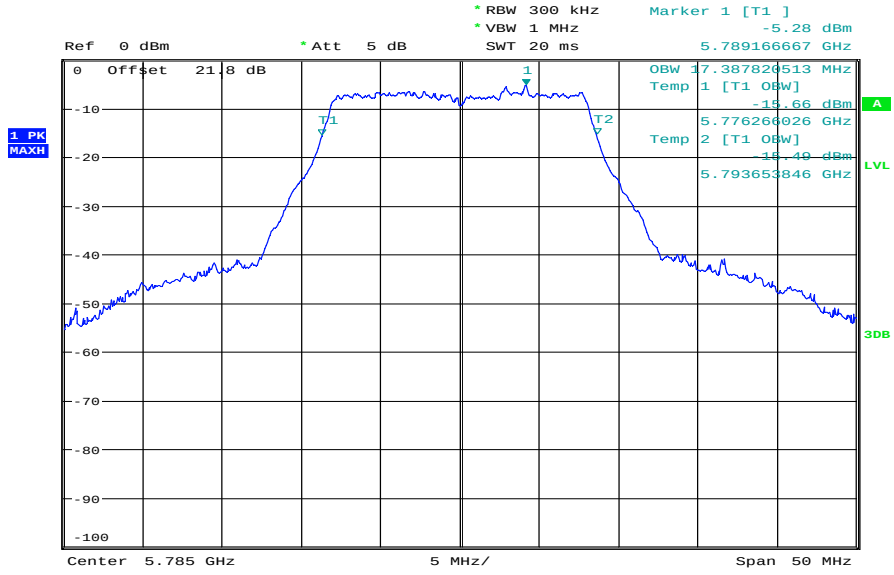
Plots: OFDM / a – mode

Plot 1: TX mode, lowest channel



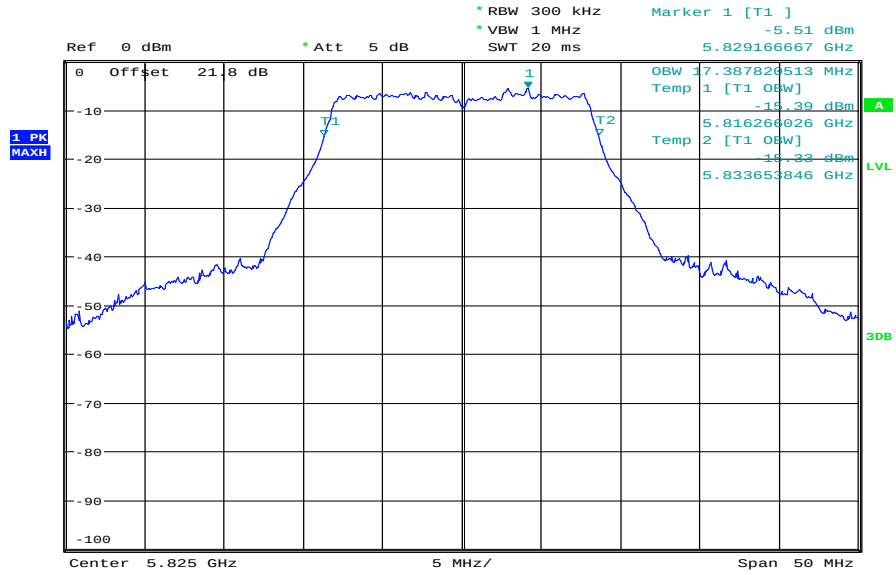
Date: 27.APR.2012 09:14:27

Plot 2: TX mode, middle channel



Date: 27.APR.2012 09:15:41

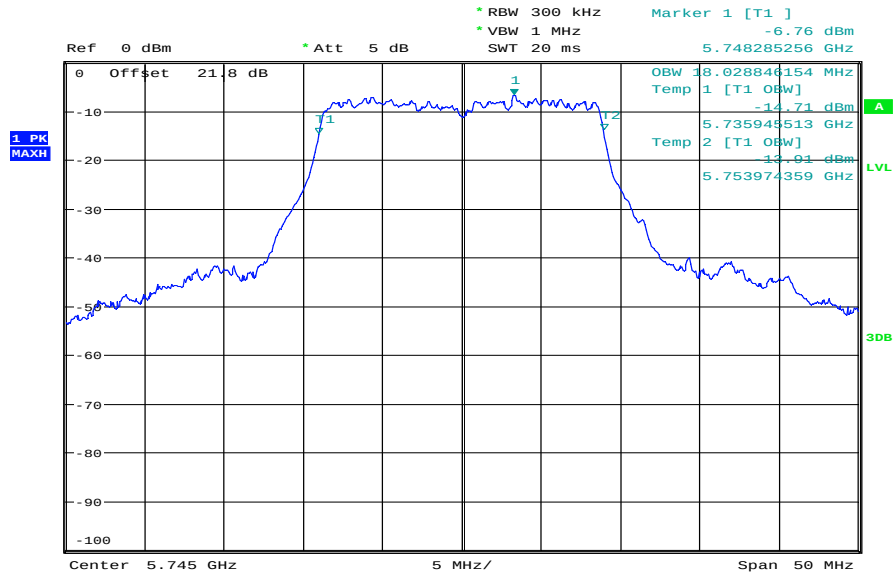
Plot 3: TX mode, highest channel



Date: 27.APR.2012 09:18:35

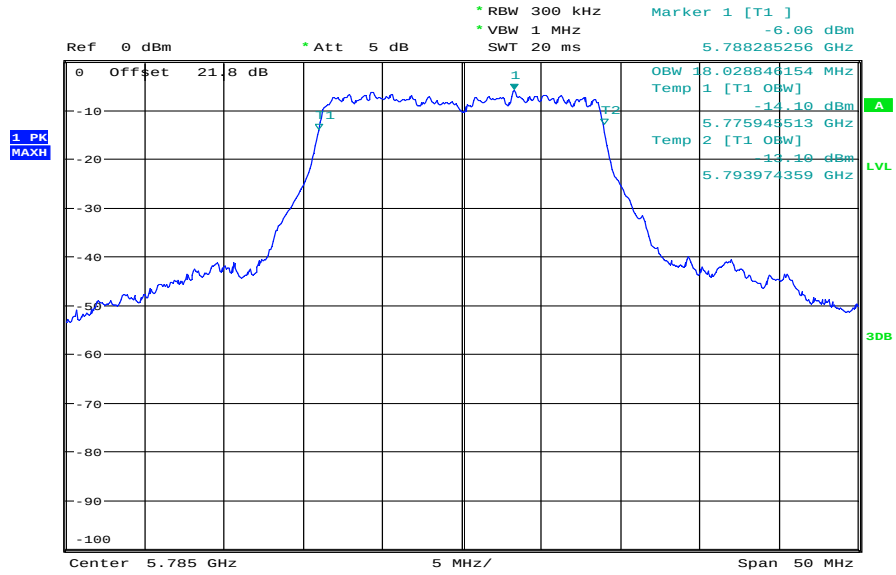
Plots: OFDM / n – mode HT20

Plot 1: TX mode, lowest channel



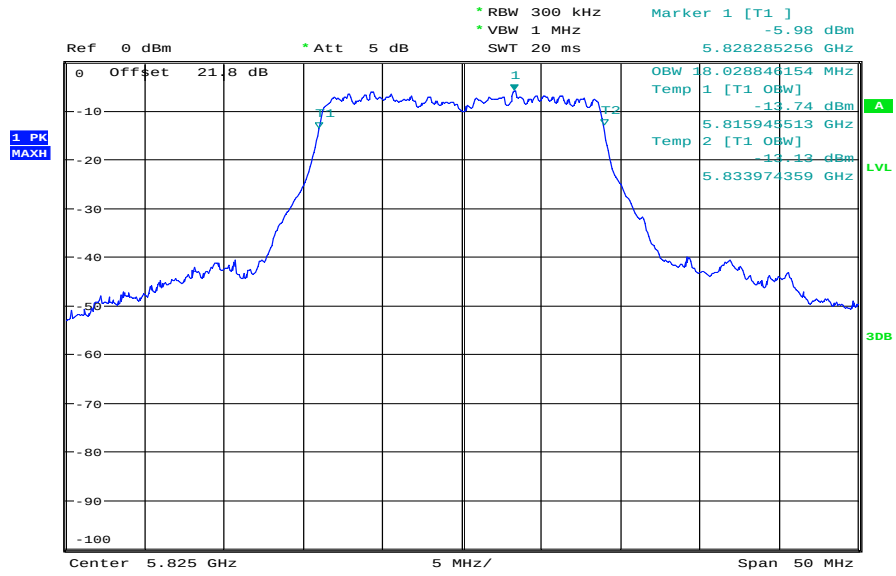
Date: 27.APR.2012 09:21:11

Plot 2: TX mode, middle channel



Date: 27.APR.2012 09:30:46

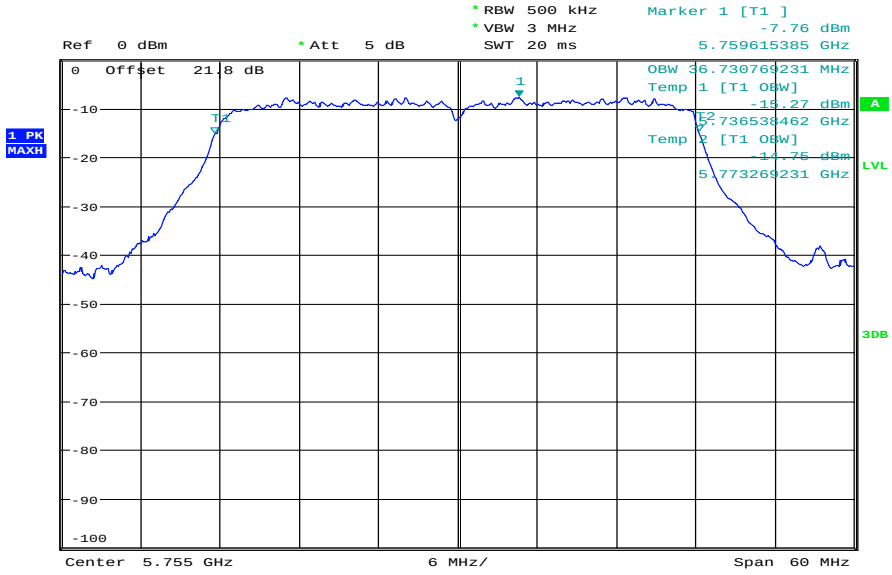
Plot 3: TX mode, highest channel



Date: 27.APR.2012 09:32:13

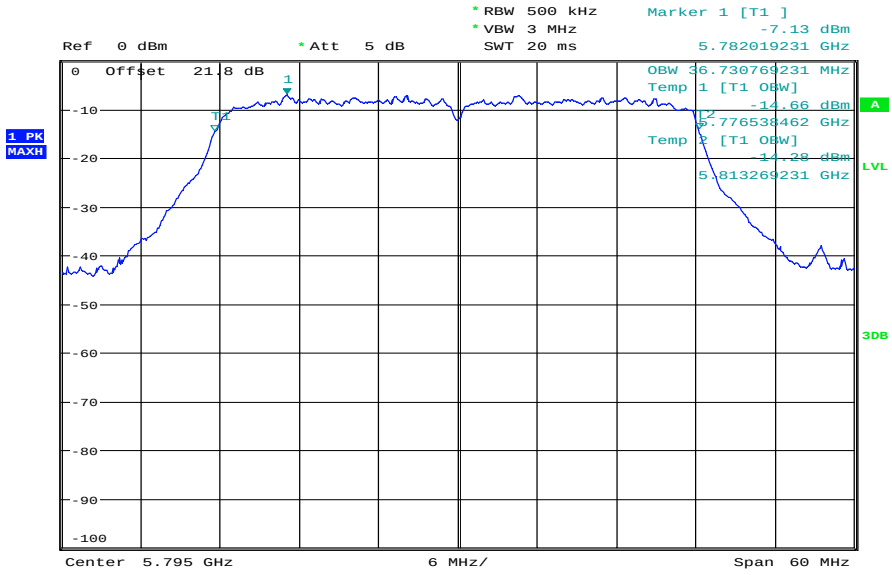
Plots: OFDM / n – mode HT40

Plot 1: TX mode, channel 149



Date: 27.APR.2012 09:37:12

Plot 3: TX mode, channel 157



Date: 27.APR.2012 09:38:25

9.7 Band edge compliance conducted

Not applicable! No restricted band close to used band!

9.8 Band edge compliance radiated

Not applicable! No restricted band close to used band!

9.9 TX spurious emissions conducted

Description:

Measurement of the conducted spurious emissions in transmit mode. The measurement is performed at channel 1, 6 and 11. The measurement is repeated for all modulations.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	1s / 100 MHz
Resolution bandwidth:	F < 1 GHz: 100 kHz F > 1 GHz: 100 kHz
Video bandwidth:	F < 1 GHz: 500 kHz F > 1 GHz: 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		-8.80	30 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
5785		-8.13	30 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
5825		-8.55	30 dBm		Operating frequency
No critical 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 – mode HT20

TX Spurious Emissions Conducted					
OFDM / n – mode HT20					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
5745		-8.68	30 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
5785		-8.09	30 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
5825		-8.06	30 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
Measurement uncertainty		± 3 dB			

Result: **Passed**

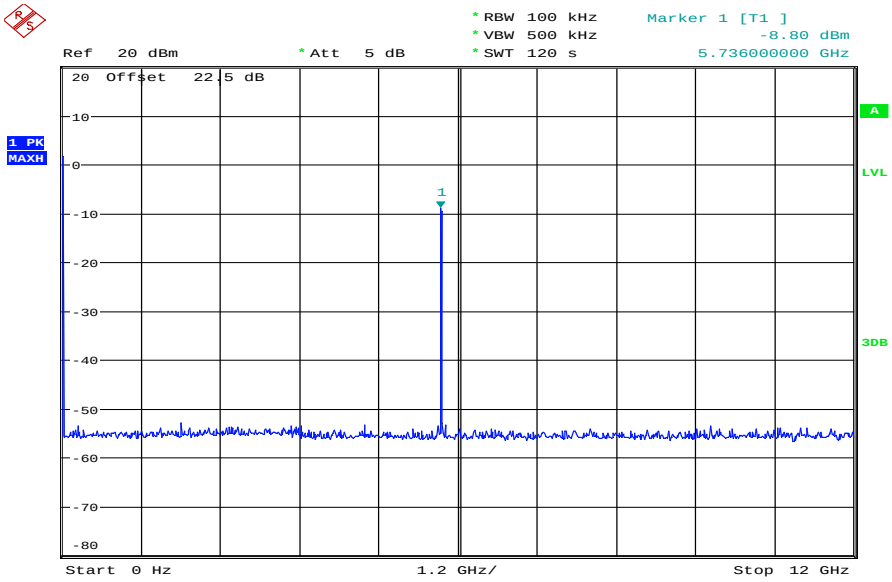
Results: OFDM / n – mode HT40

TX Spurious Emissions Conducted OFDM / n – mode HT40					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
5755		-11.19	30 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
5795		-11.10	30 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
			30 dBm		Operating frequency
-/-			-20 dBc (peak) -30 dBc (average)		complies
Measurement uncertainty			± 3 dB		

Result: **Passed**

Plots: OFDM / a – mode

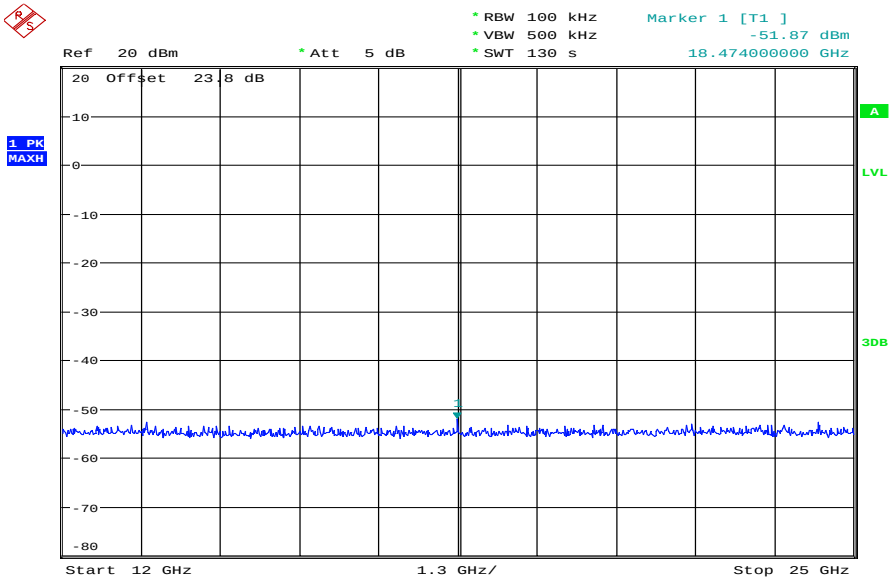
Plot 1: TX mode, lowest channel, up to 12 GHz



Date: 27.APR.2012 10:10:13

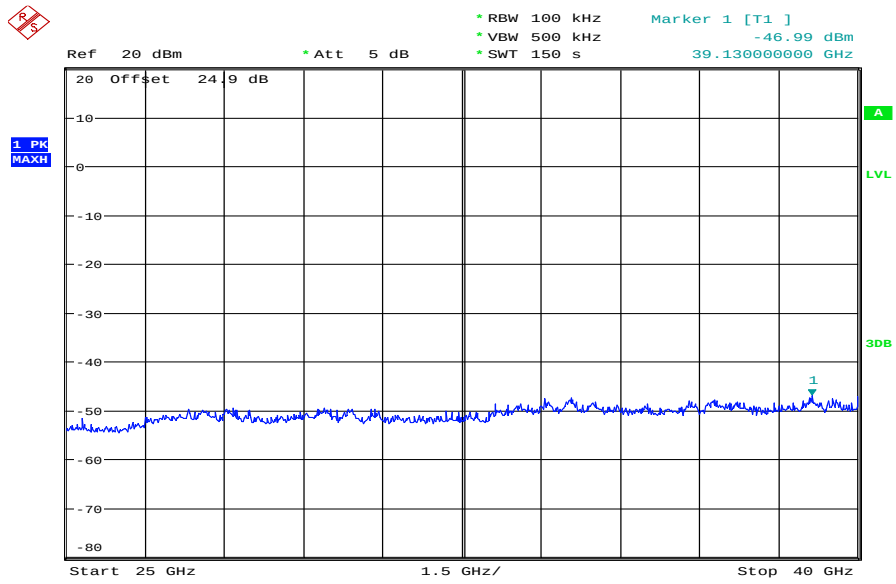
The peak at the beginning of the plot is the LO from the SA.

Plot 2: TX mode, lowest channel, up to 25 GHz

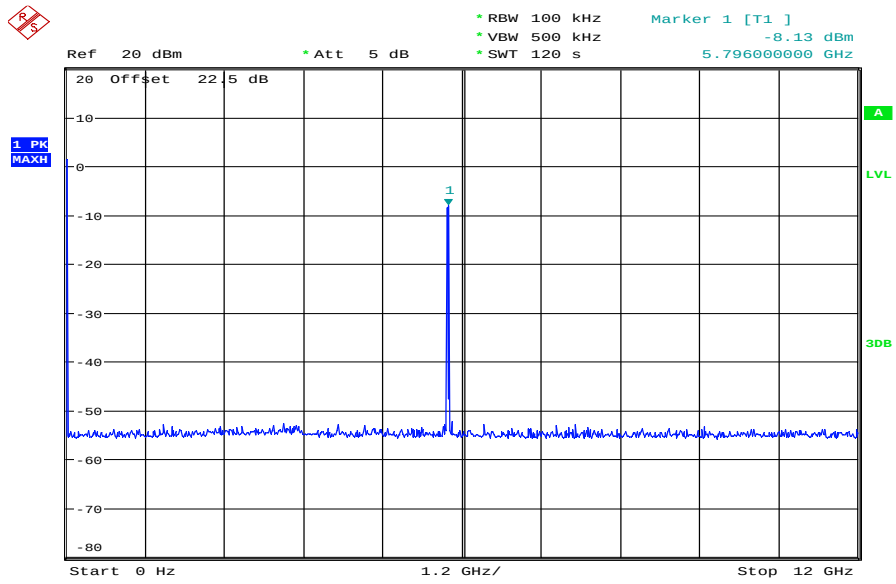


Date: 27.APR.2012 10:42:20

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

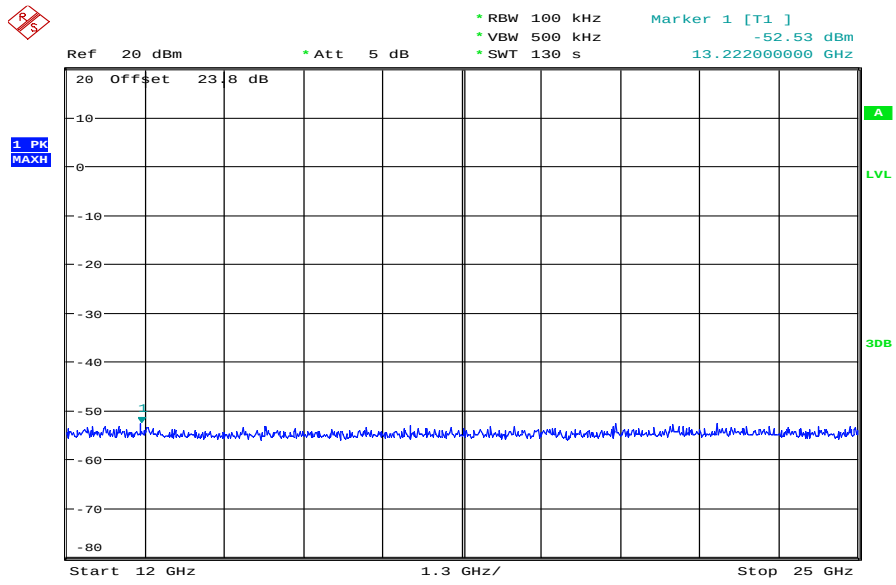


Plot 4: TX mode, middle channel, up to 12 GHz

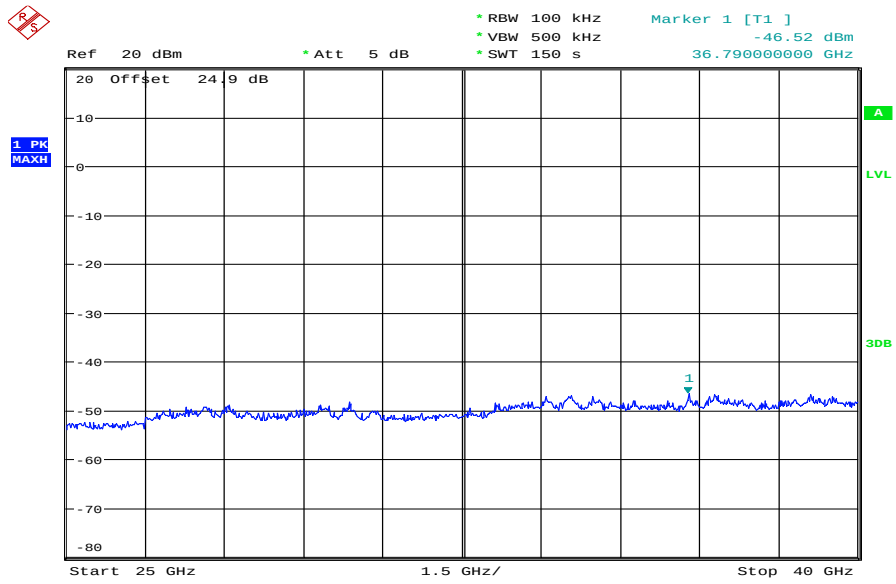


The peak at the beginning of the plot is the LO from the SA.

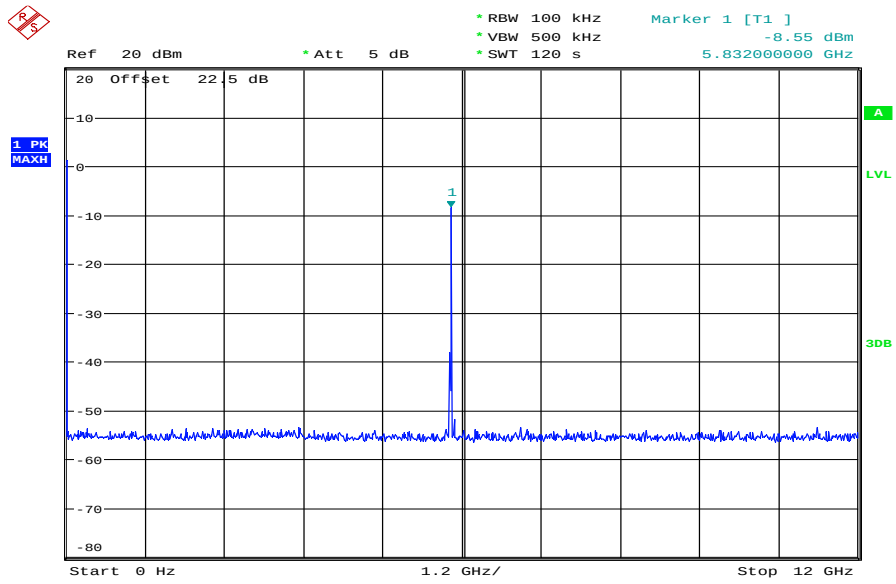
Plot 5: TX mode, middle channel, up to 25 GHz



Plot 6: TX mode, middle channel, up to 40 GHz



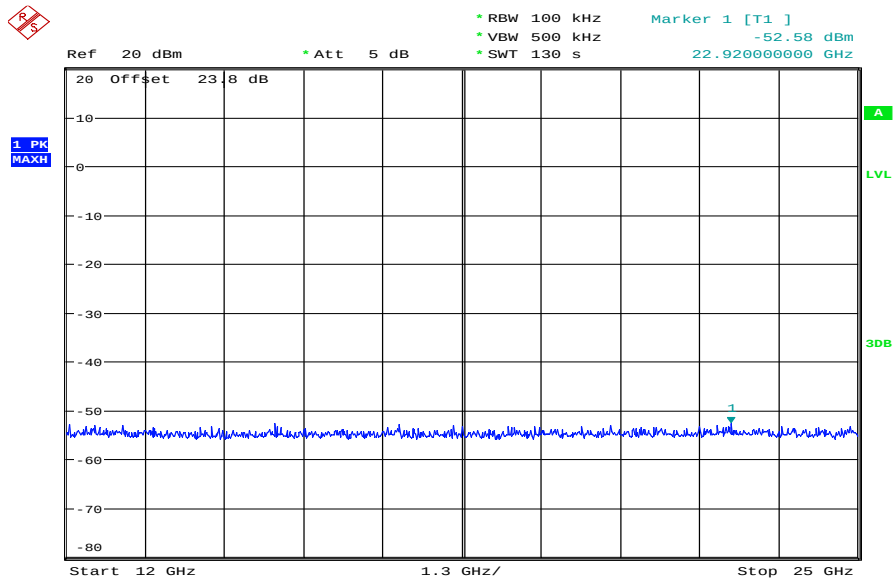
Plot 7: TX mode, highest channel, up to 12 GHz



Date: 27.APR.2012 10:24:34

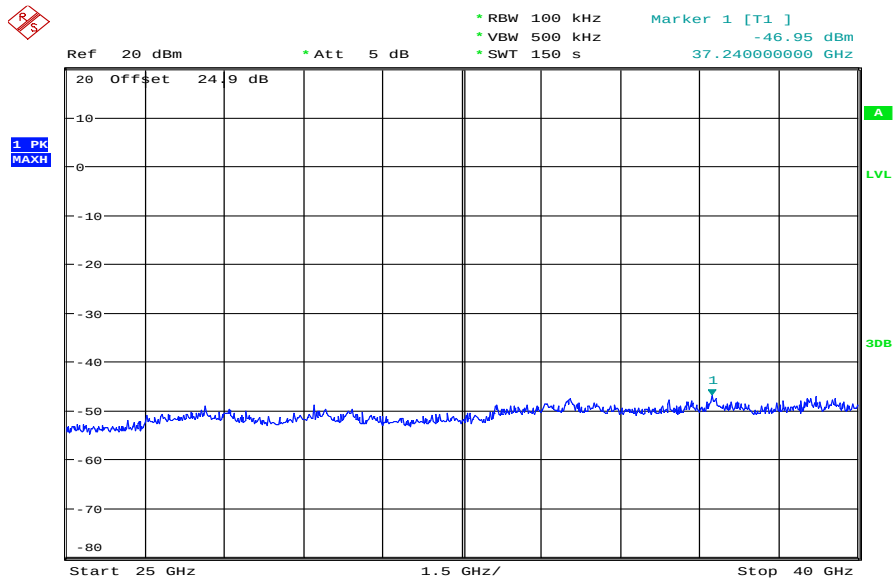
The peak at the beginning of the plot is the LO from the SA.

Plot 8: TX mode, highest channel, up to 25 GHz



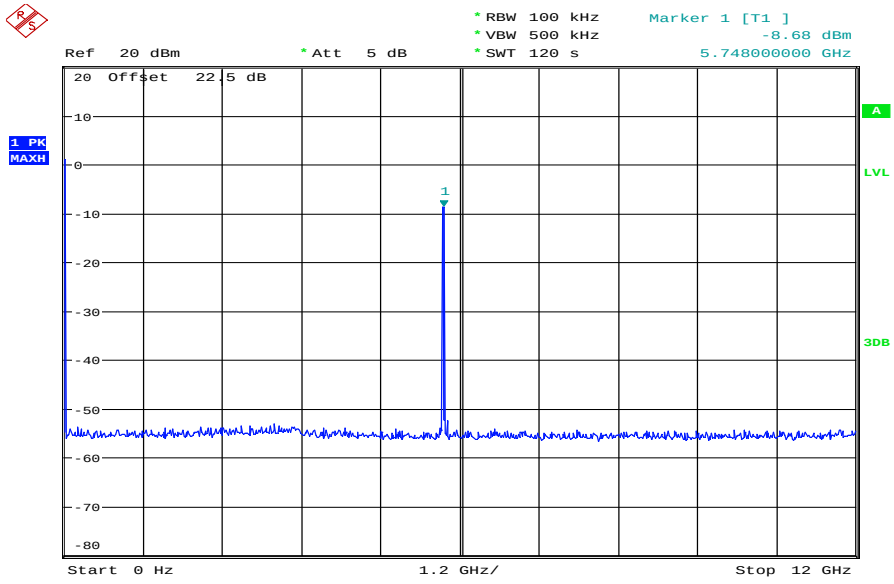
Date: 27.APR.2012 10:47:30

Plot 9: TX mode, highest channel, up to 40 GHz



Plots: OFDM / n – mode HT20

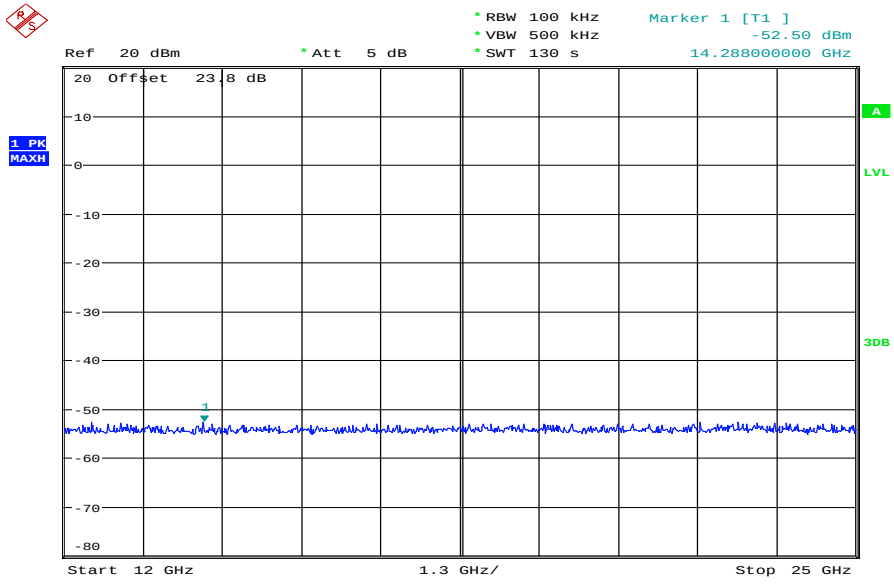
Plot 1: TX mode, lowest channel, up to 12 GHz



Date: 27.APR.2012 10:28:09

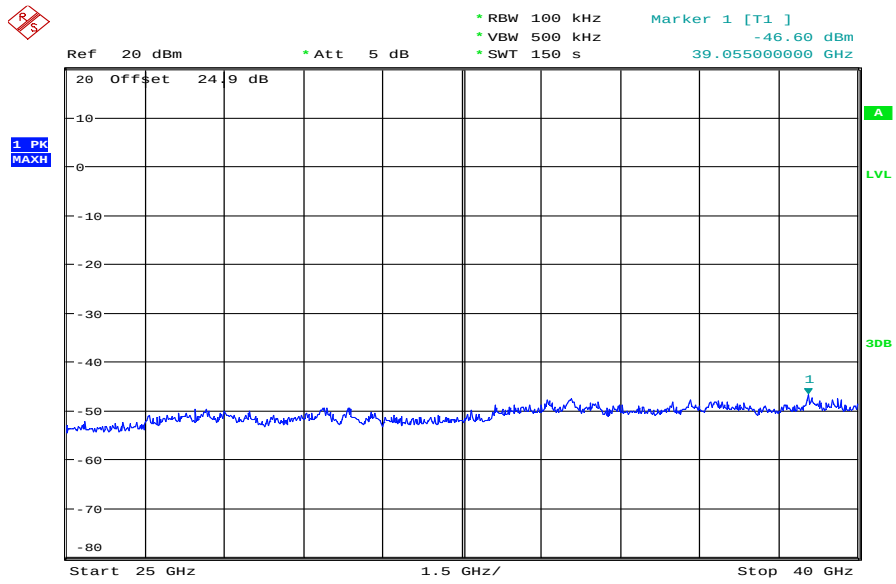
The peak at the beginning of the plot is the LO from the SA.

Plot 2: TX mode, lowest channel, up to 25 GHz



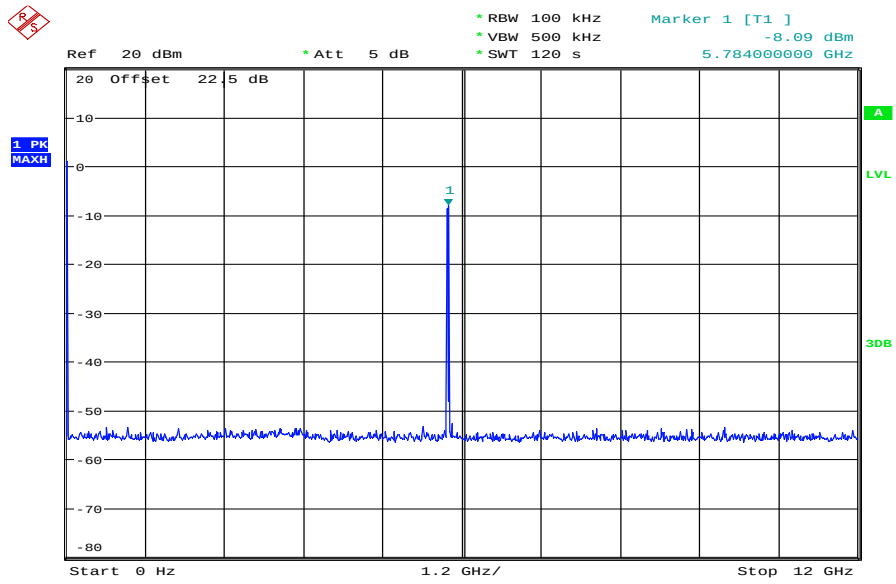
Date: 27.APR.2012 10:58:11

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



Date: 27.APR.2012 11:21:36

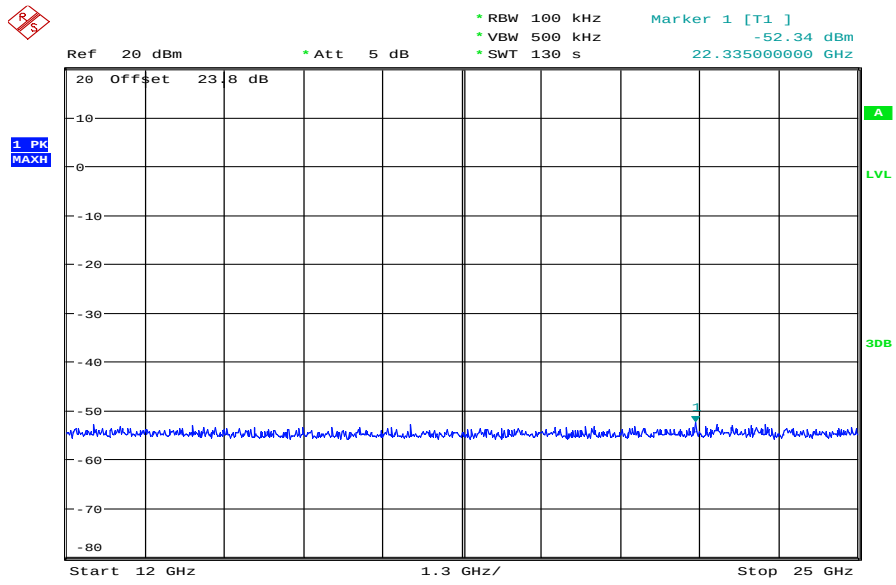
Plot 4: TX mode, middle channel, up to 12 GHz



Date: 27.APR.2012 10:30:45

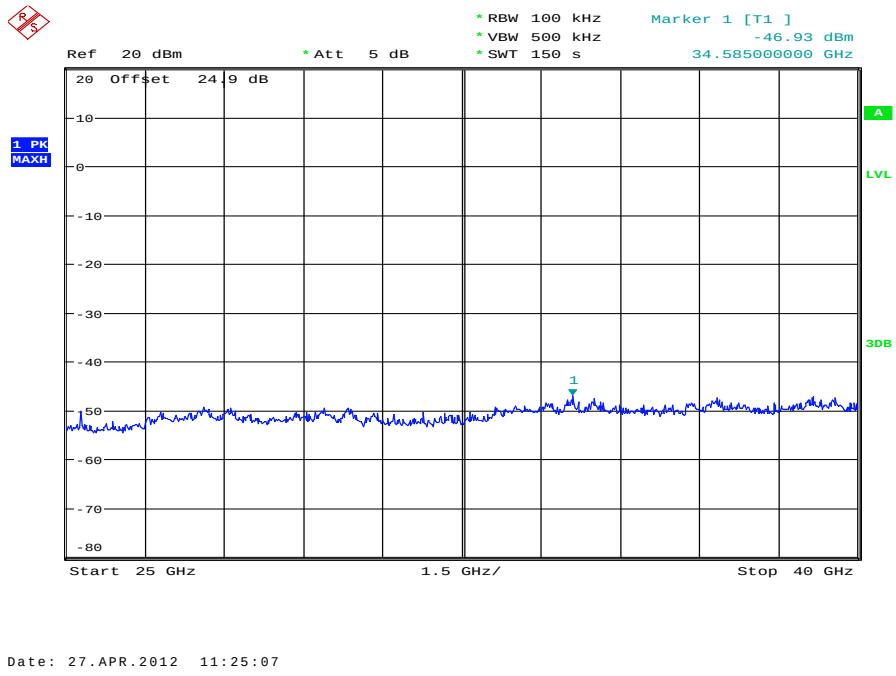
The peak at the beginning of the plot is the LO from the SA.

Plot 5: TX mode, middle channel, up to 25 GHz

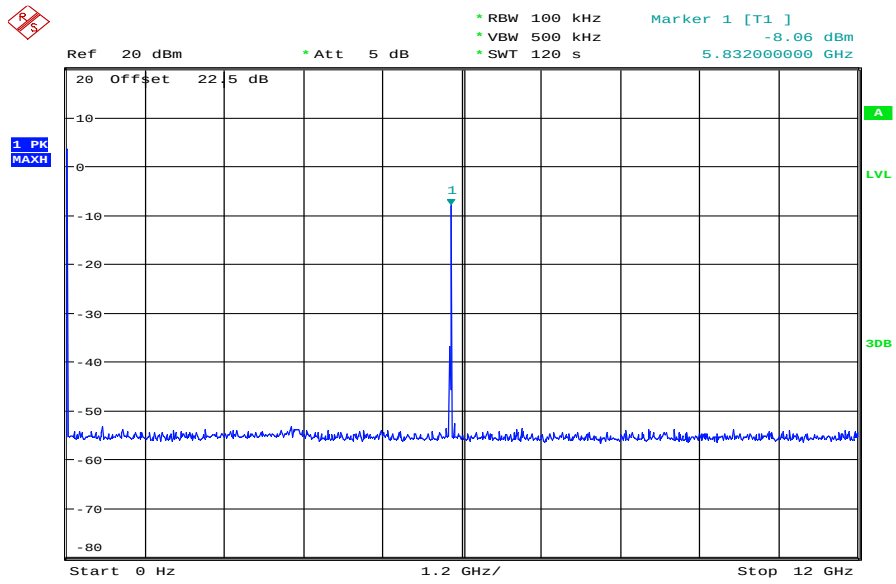


Date: 27.APR.2012 11:01:00

Plot 6: TX mode, middle channel, up to 40 GHz



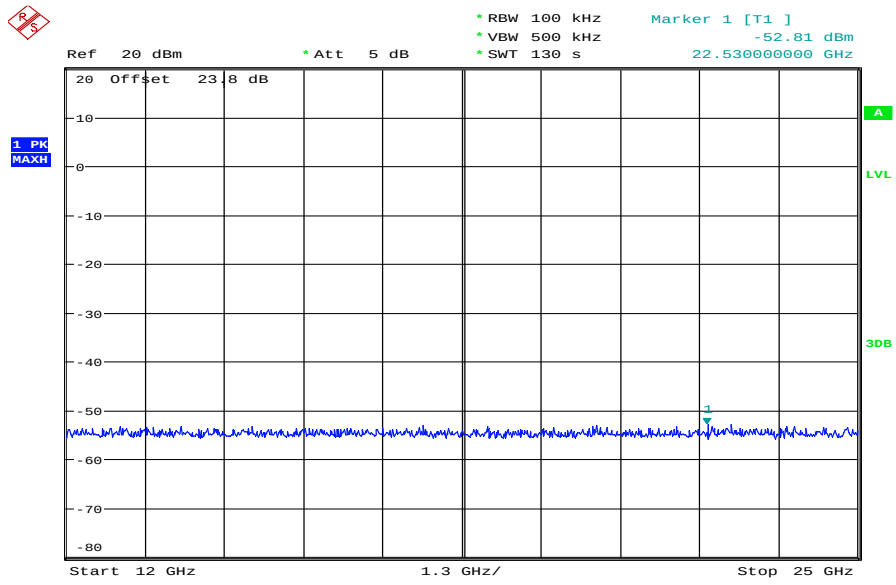
Plot 7: TX mode, highest channel, up to 12 GHz



Date: 27.APR.2012 10:33:24

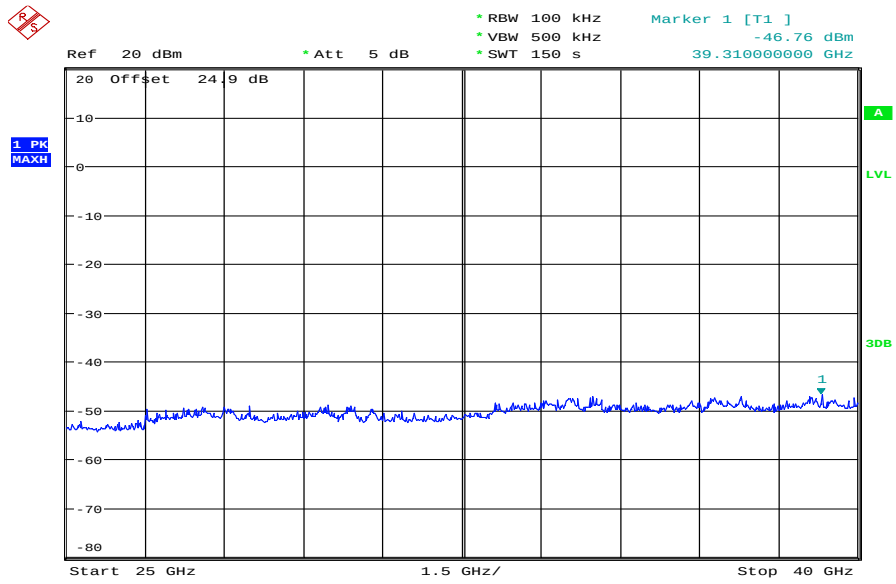
The peak at the beginning of the plot is the LO from the SA.

Plot 8: TX mode, highest channel, up to 25 GHz



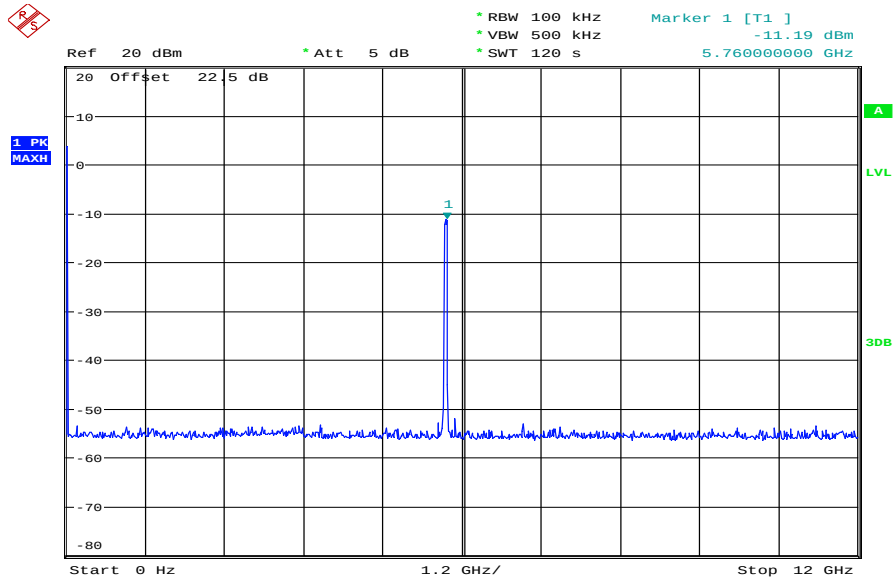
Date: 27.APR.2012 11:04:19

Plot 9: TX mode, highest channel, up to 40 GHz



Plots: OFDM / n – mode HT40

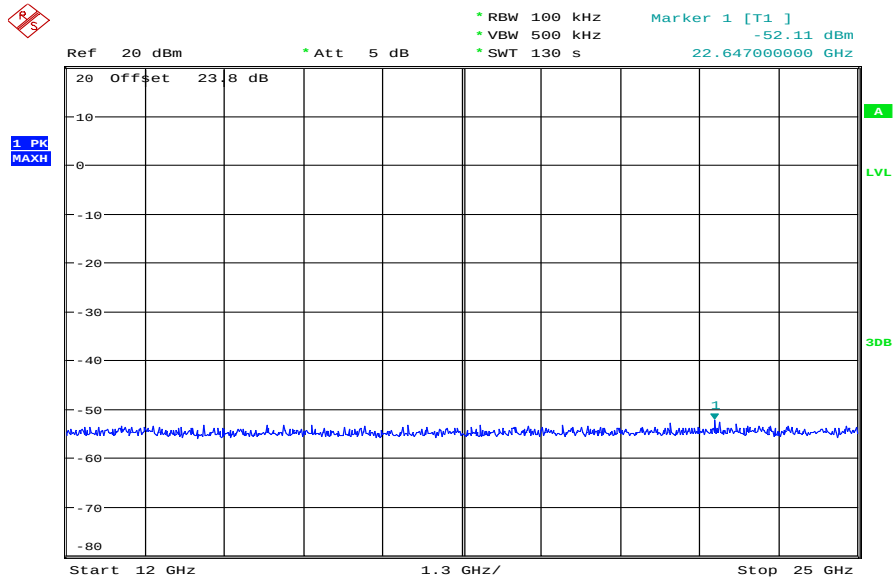
Plot 1: TX mode, lowest channel, up to 12 GHz



Date: 27.APR.2012 10:36:07

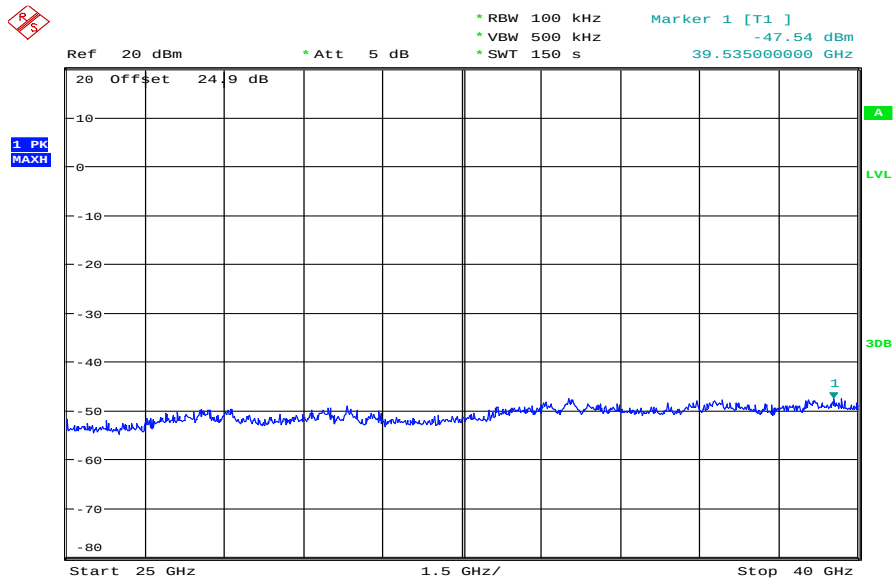
The peak at the beginning of the plot is the LO from the SA.

Plot 2: TX mode, lowest channel, up to 25 GHz



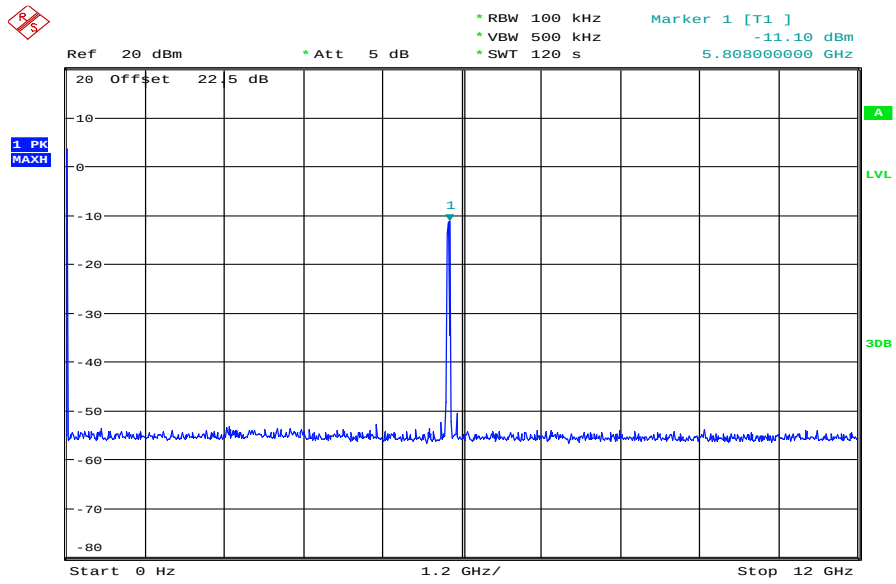
Date: 27.APR.2012 11:07:04

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



Date: 27.APR.2012 11:18:18

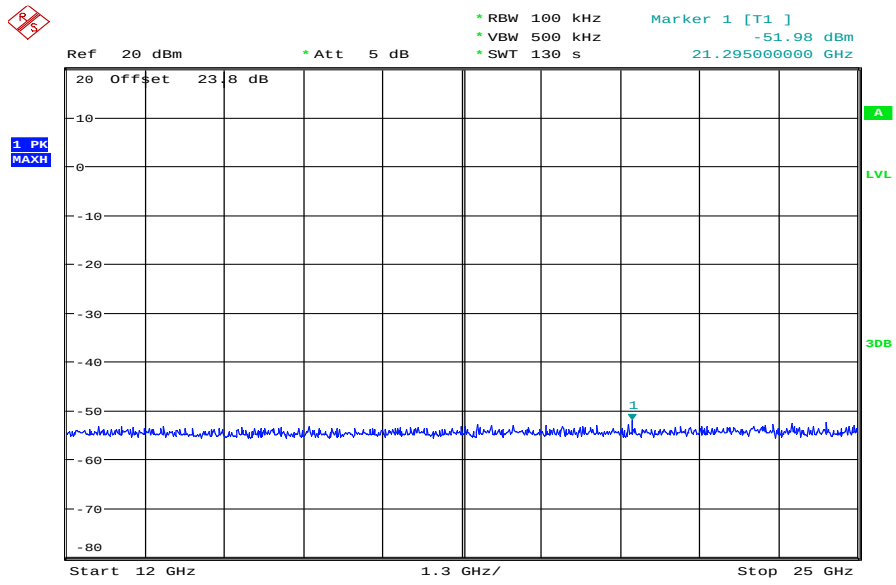
Plot 4: TX mode, highest channel, up to 12 GHz



Date: 27.APR.2012 10:38:43

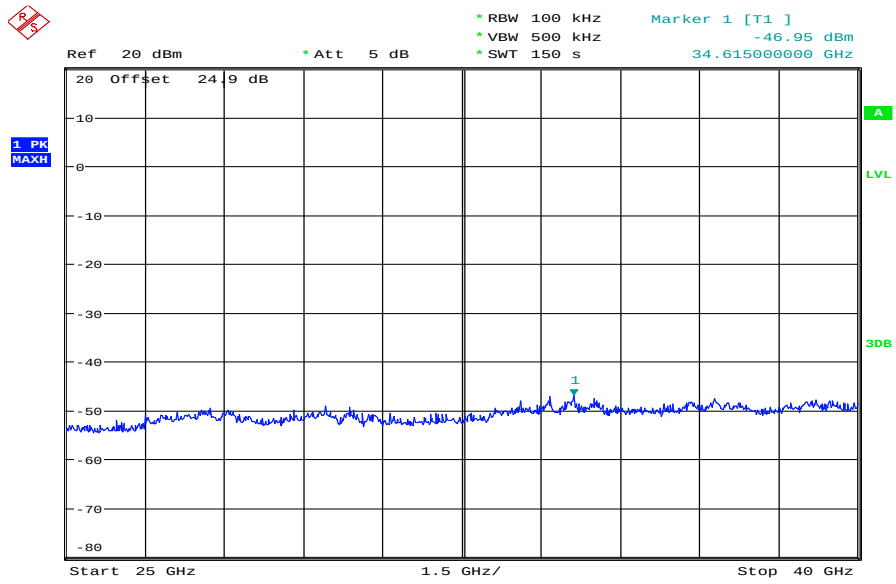
The peak at the beginning of the plot is the LO from the SA.

Plot 5: TX mode, highest channel, up to 25 GHz



Date: 27.APR.2012 11:11:47

Plot 6: TX mode, highest channel, up to 40 GHz



9.10 TX spurious emissions radiated

Description:

Measurement of the radiated spurious emissions in transmit mode. The measurement is performed at channel 1, 6 and 11. 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:	Sweep: 100 kHz Remeasurement: 10 Hz / 3 MHz
Span:	30 MHz to 25 GHz
Trace-Mode:	Max Hold
Measured Modulation	☒ OFDM a – mode ☒ OFDM n – mode HT20 ☒ OFDM n – mode HT40

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]
No peaks found.			No peaks found.			No peaks found.		
Measurement uncertainty			± 3 dB					

Result: **Passed**

Results: OFDM / n – 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]
No peaks found.			No peaks found.			No peaks found.		
Measurement uncertainty			± 3 dB					

Result: **Passed**

Results: OFDM / n – 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]	F [MHz]	Detector	Level [dBµV/m]
No peaks found.			No peaks found.			-		
Measurement uncertainty			± 3 dB					

Result: **Passed**

Note: Results of OFDM n – mode are added to show the compliance with the standard.

Plots: OFDM / n – mode

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

Common Information

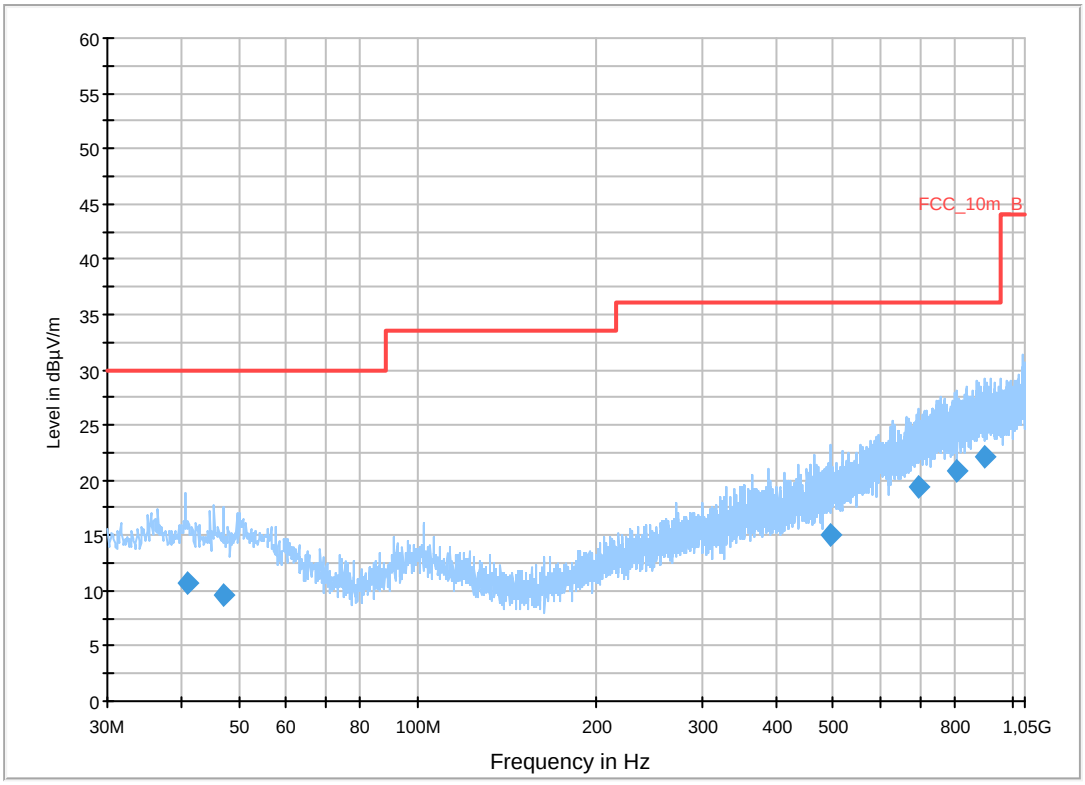
EUT:	PM-0000-BV
Serial Number:	CB5A1JYNGV | IMEI: 00440245-009369-9
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	WLAN TX ch149 + charging
Operator Name:	Wolsdorfer
Comment:	AC: 115V/60Hz

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

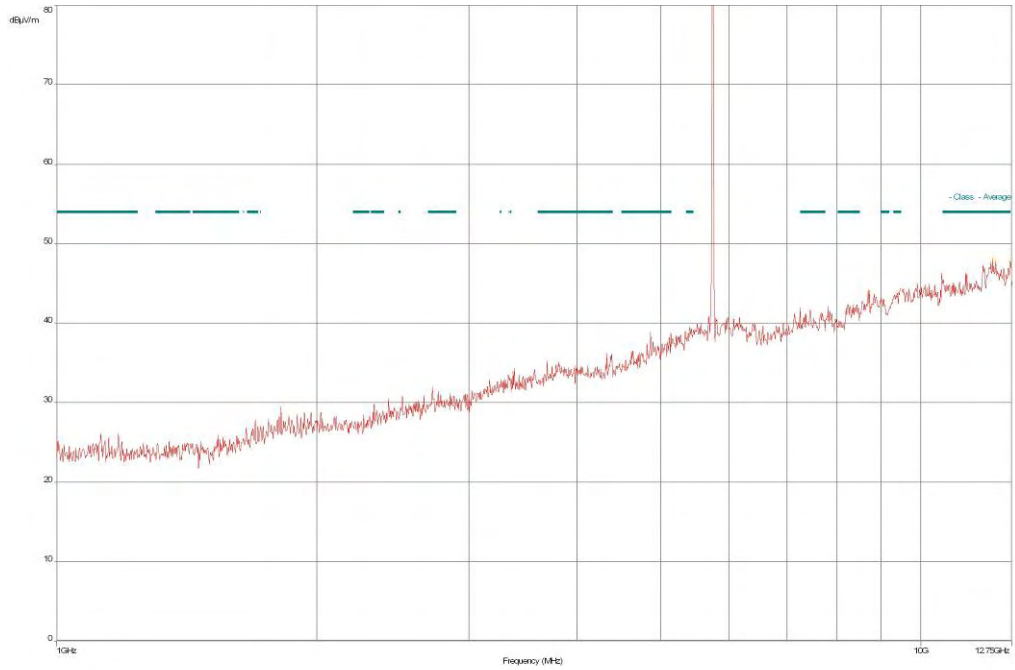
FCC_10m(B)_3



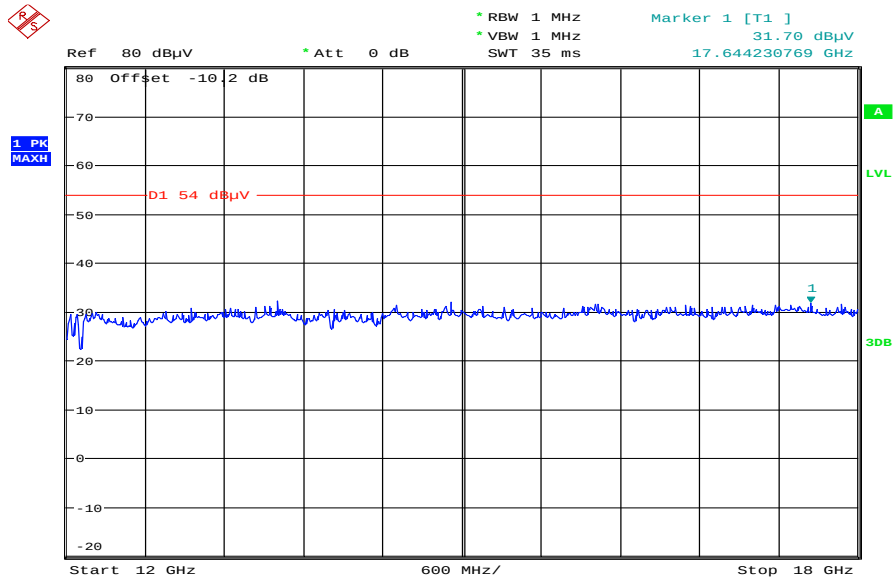
Final Result 1

Frequency (MHz)	Quasi Peak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polariza	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
40.932600	10.7	1000.0	120.00	98.0	V	178.0	13.4	19.3	30.0	
47.070600	9.6	1000.0	120.00	170.0	V	10.0	13.3	20.4	30.0	
493.075200	15.0	1000.0	120.00	170.0	V	10.0	18.6	21.0	36.0	
695.215800	19.4	1000.0	120.00	170.0	V	190.0	22.4	16.6	36.0	
806.178150	20.8	1000.0	120.00	162.0	V	100.0	23.9	15.2	36.0	
899.773950	22.2	1000.0	120.00	120.0	V	88.0	25.2	13.8	36.0	

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

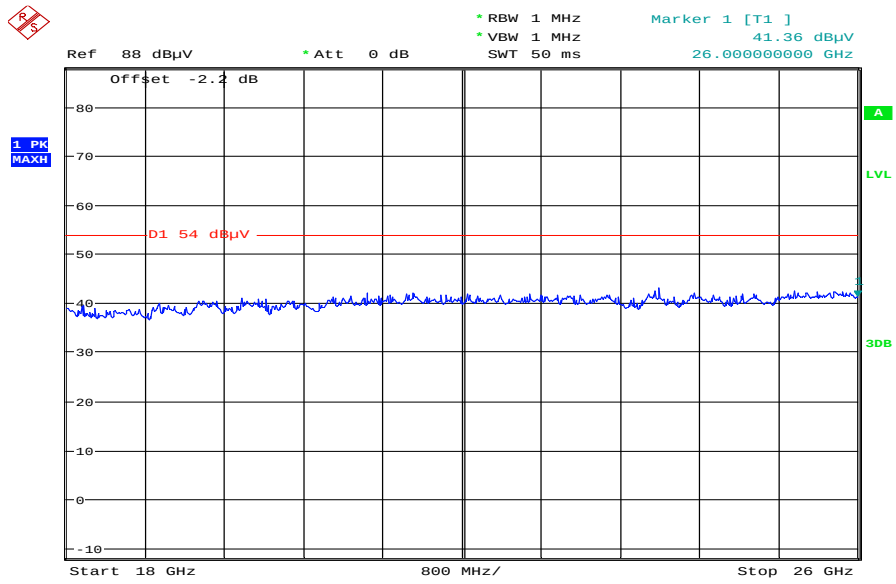


Plot 3: Lowest channel, 12 GHz to 18 GHz, vertical & horizontal polarization



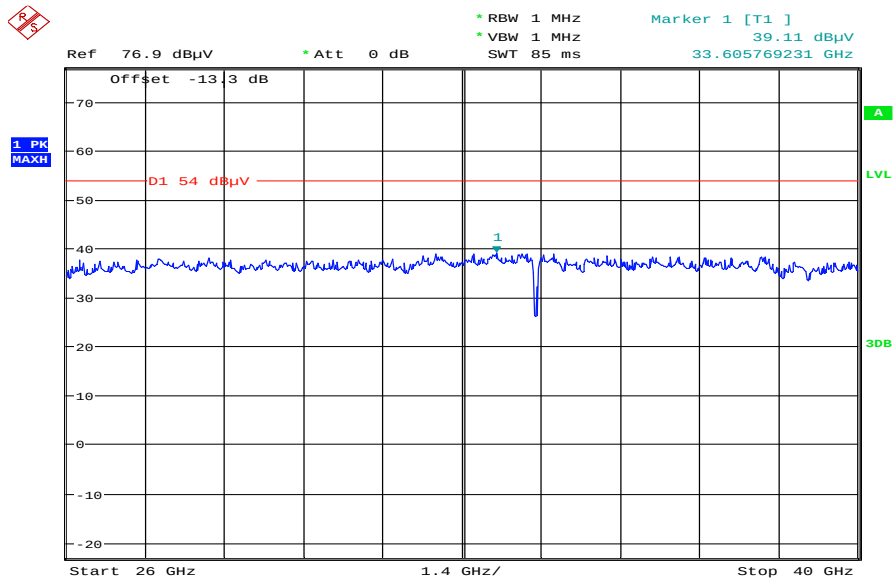
Date: 30.APR.2012 10:15:13

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



Date: 30.APR.2012 10:09:44

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



Date: 30.APR.2012 10:04:03

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

Common Information

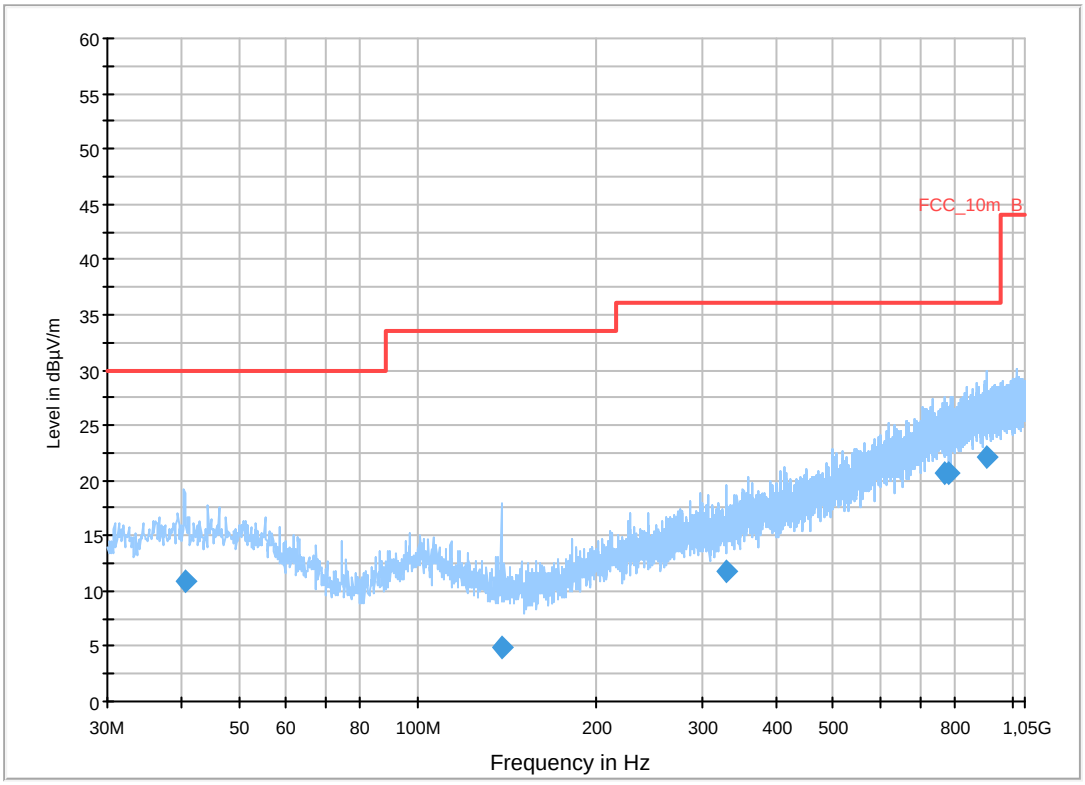
EUT:	PM-0000-BV
Serial Number:	CB5A1JYNGV | IMEI: 00440245-009369-9
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	WLAN TX ch157 + charging
Operator Name:	Wolsdorfer
Comment:	AC: 115V/60Hz

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

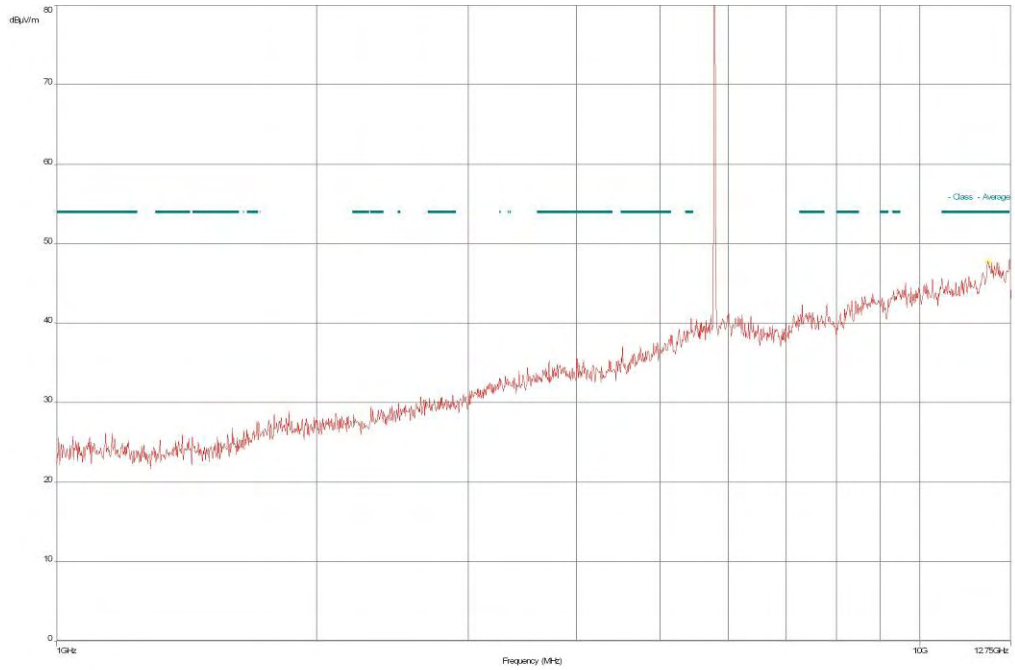
FCC_10m(B)_3



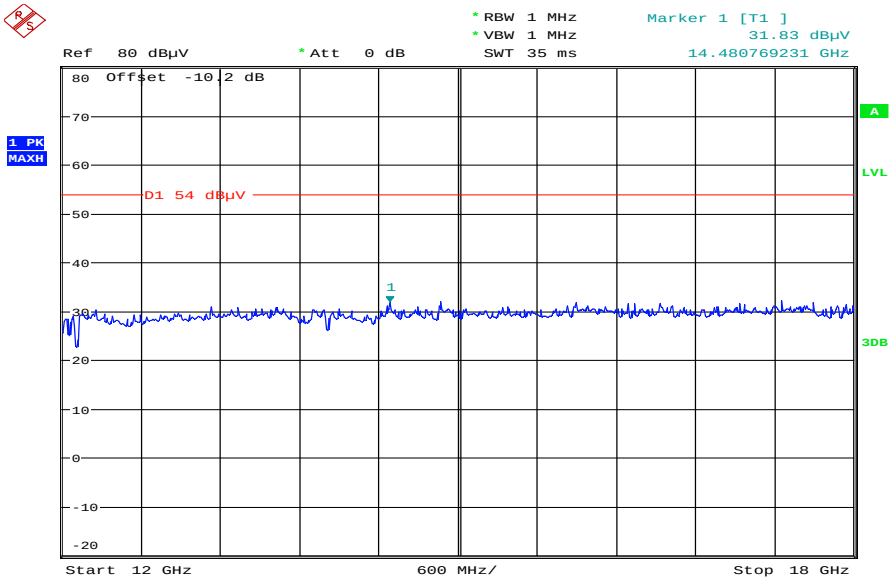
Final Result 1

Frequency (MHz)	Quasi Peak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polariza	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
40.553400	10.8	1000.0	120.00	162.0	V	88.0	13.4	19.2	30.0	
138.156600	4.9	1000.0	120.00	156.0	H	268.0	8.8	28.6	33.5	
331.001250	11.9	1000.0	120.00	109.0	V	-5.0	15.5	24.1	36.0	
768.333450	20.7	1000.0	120.00	98.0	H	88.0	23.7	15.3	36.0	
784.515000	20.7	1000.0	120.00	170.0	H	10.0	23.8	15.3	36.0	
908.209650	22.2	1000.0	120.00	98.0	V	280.0	25.2	13.8	36.0	

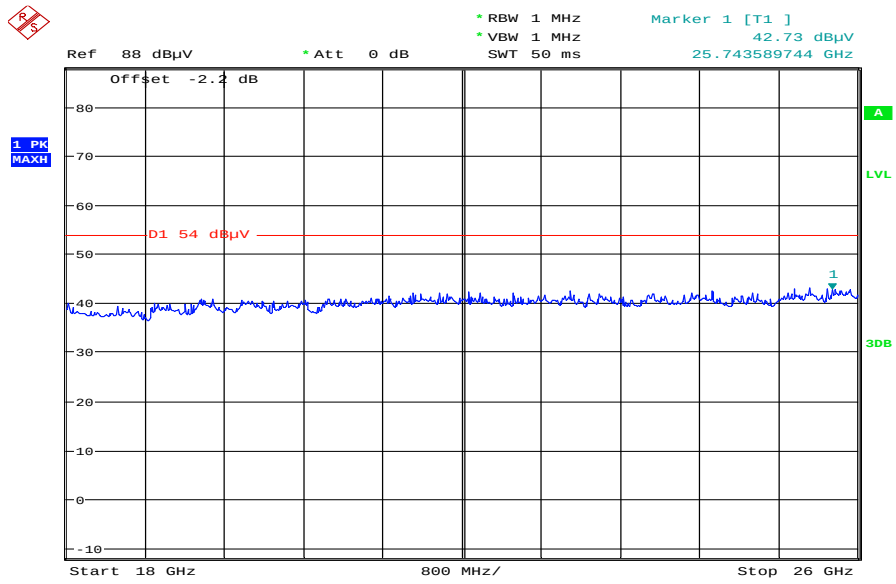
Plot 7: Middle channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization



Plot 8: Middle channel, 12 GHz to 18 GHz, vertical & horizontal polarization

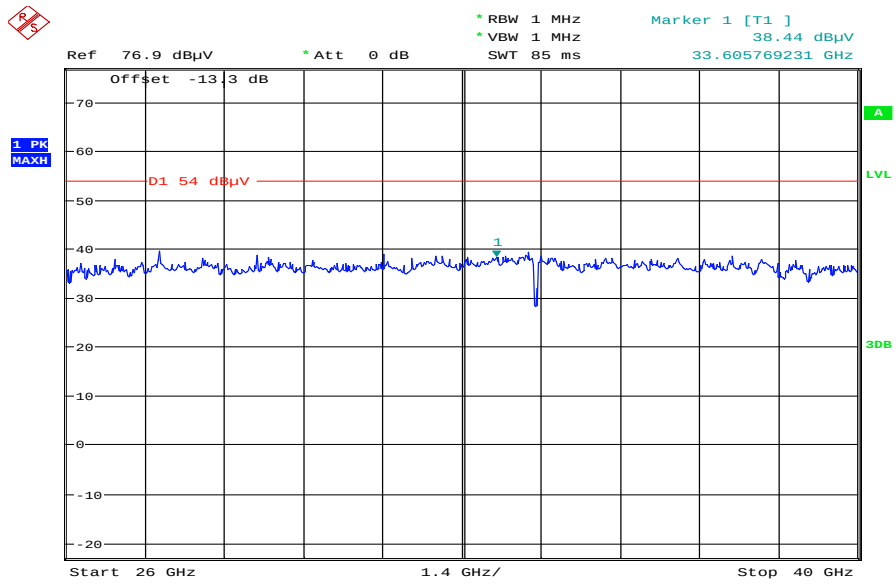


Plot 9: Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 30.APR.2012 10:10:20

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



Date: 30.APR.2012 10:04:34

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

Common Information

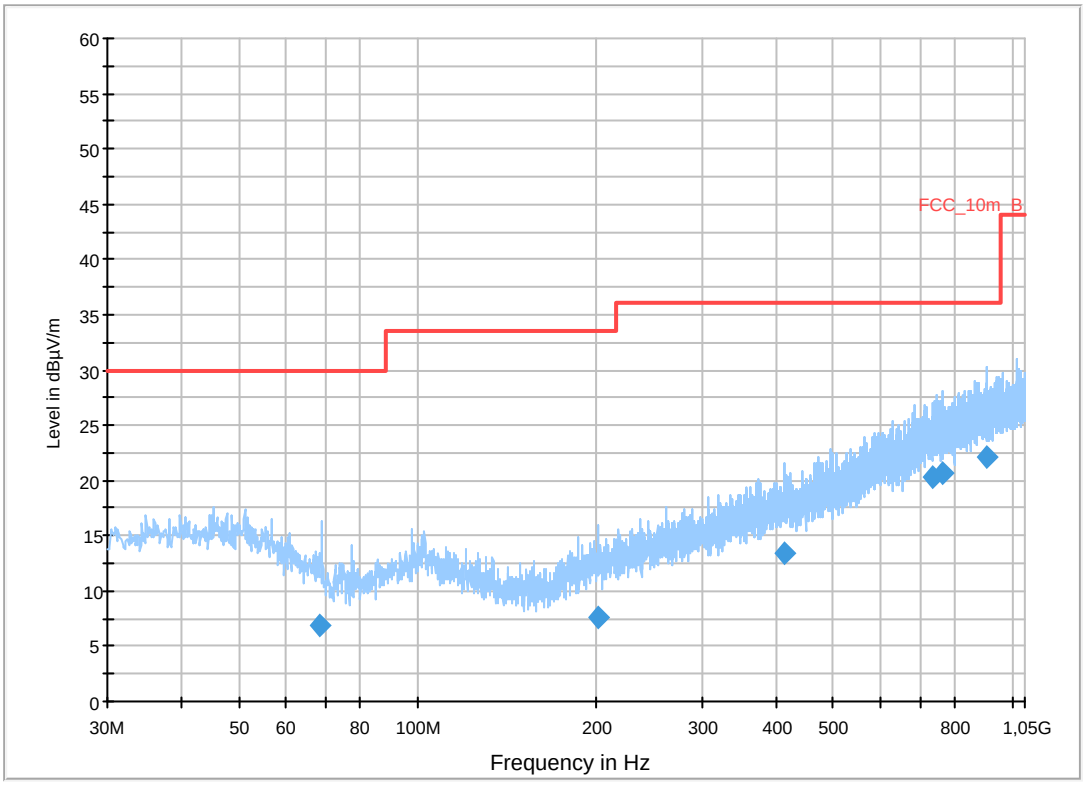
EUT:	PM-0000-BV
Serial Number:	CB5A1JYNGV | IMEI: 00440245-009369-9
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	WLAN TX ch165 + charging
Operator Name:	Wolsdorfer
Comment:	AC: 115V/60Hz

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

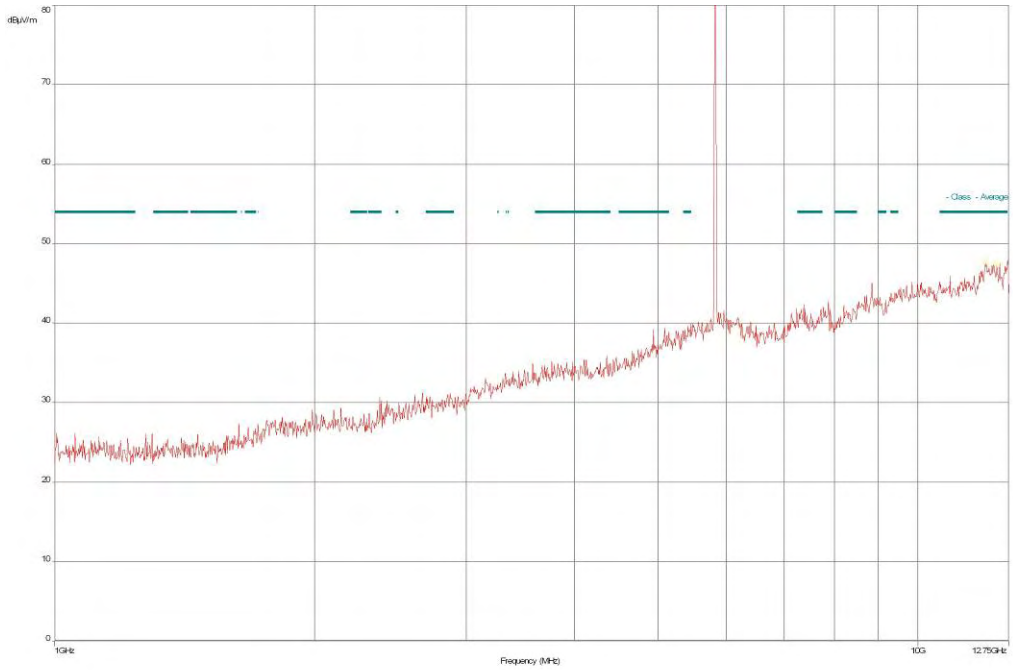
FCC_10m(B)_3



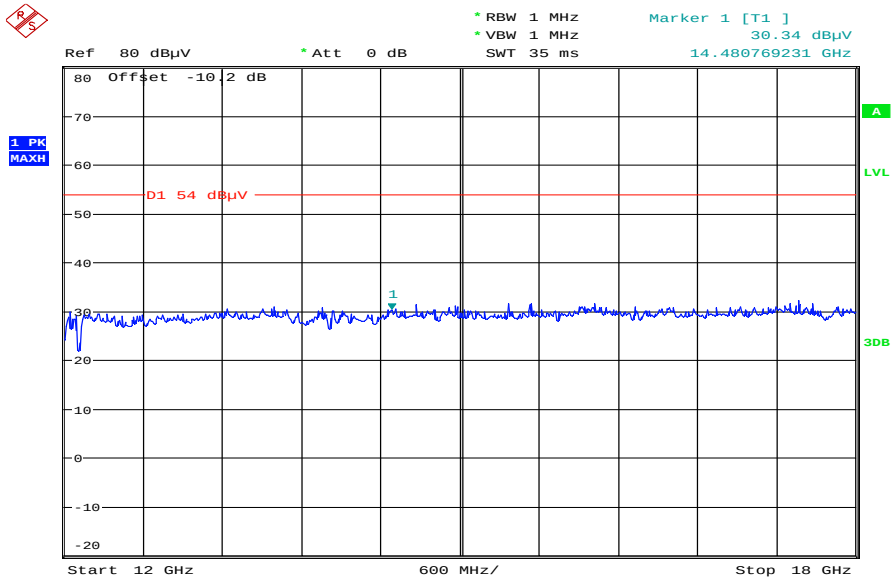
Final Result 1

Frequency (MHz)	Quasi Peak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polariza	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
68.360250	7.0	1000.0	120.00	170.0	V	268.0	9.6	23.0	30.0	
200.698950	7.7	1000.0	120.00	134.0	V	171.0	11.7	25.8	33.5	
414.054450	13.3	1000.0	120.00	133.0	V	10.0	17.1	22.7	36.0	
733.433100	20.3	1000.0	120.00	170.0	H	190.0	23.3	15.7	36.0	
761.721600	20.7	1000.0	120.00	98.0	V	171.0	23.7	15.3	36.0	
906.995100	22.2	1000.0	120.00	170.0	V	10.0	25.2	13.8	36.0	

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

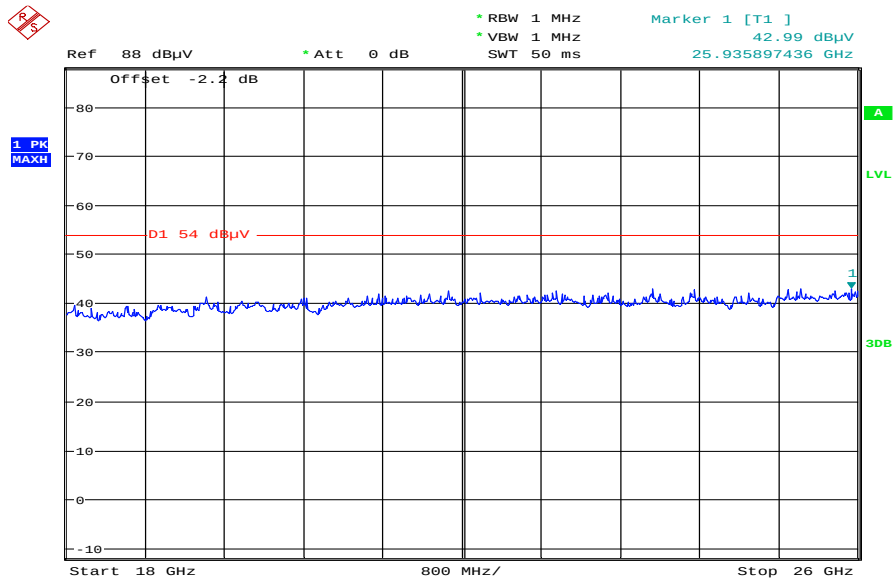


Plot 13: Highest channel, 12 GHz to 18 GHz, vertical & horizontal polarization



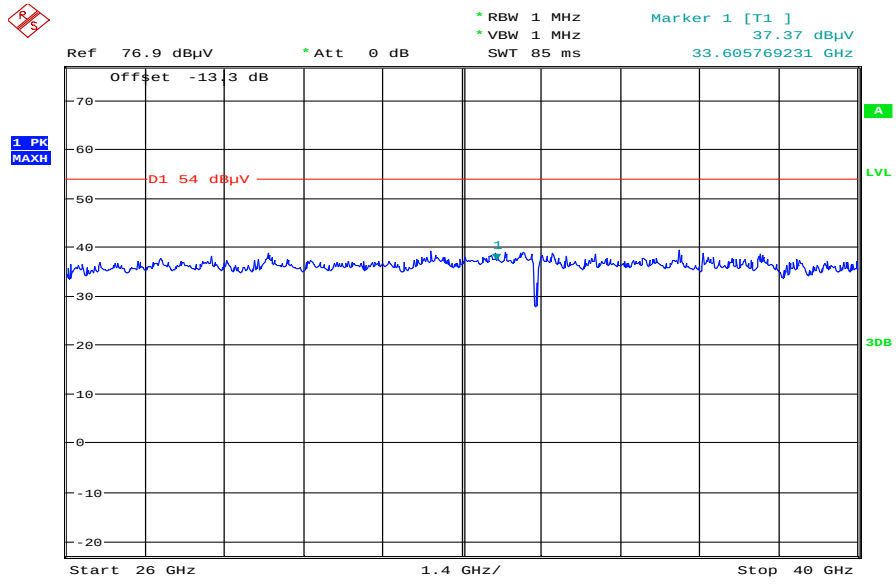
Date: 30.APR.2012 10:16:14

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



Date: 30.APR.2012 10:10:52

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



Date: 30.APR.2012 10:05:13

9.11 RX spurious emissions radiated

Description:

Measurement of the radiated spurious emissions in idle/receive mode. The results are valid for all 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:	Sweep: 100 kHz Remeasurement: 10 Hz / 3 MHz
Span:	30 MHz to 25 GHz
Trace-Mode:	Max Hold

Limits:

FCC		IC
RX Spurious Emissions Radiated		
Frequency (MHz)	Field Strength (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]
No peaks found.		
Measurement uncertainty	± 3 dB	

Result: **Passed.**

Plots: RX / Idle – mode

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

Common Information

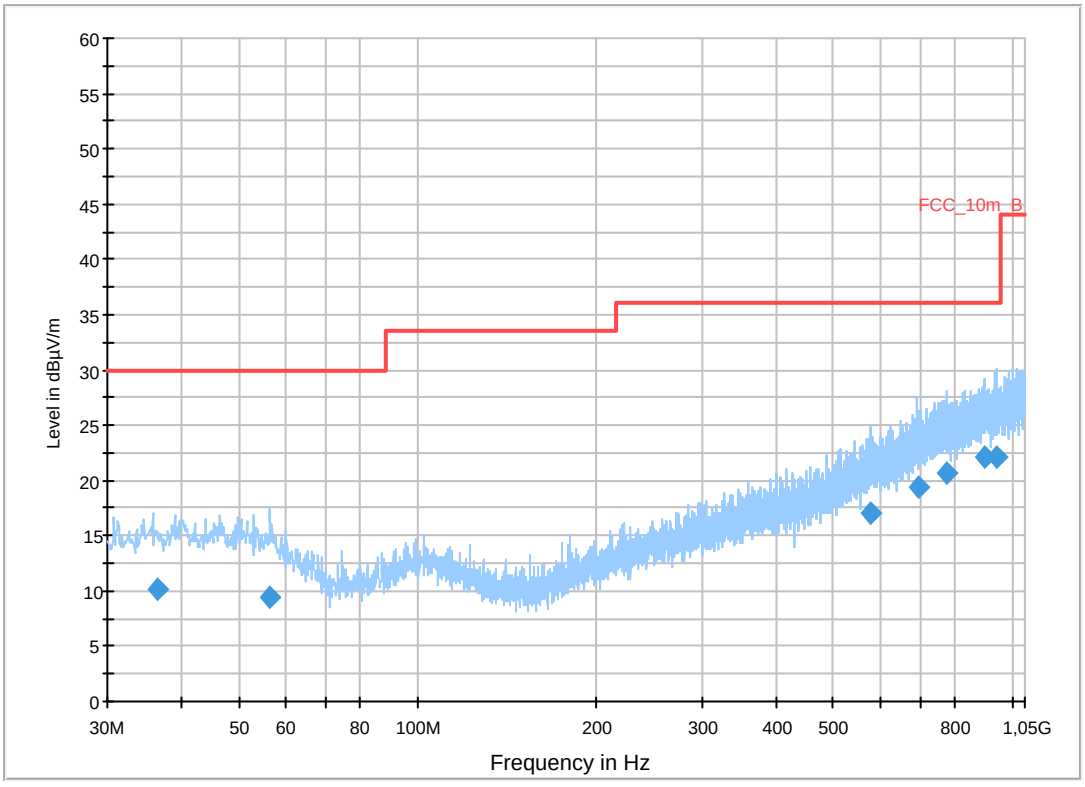
EUT:	PM-0000-BV
Serial Number:	CB5A1JYNGV | IMEI: 00440245-009369-9
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	WLAN RX + charging
Operator Name:	Wolsdorfer
Comment:	AC: 115V/60Hz

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

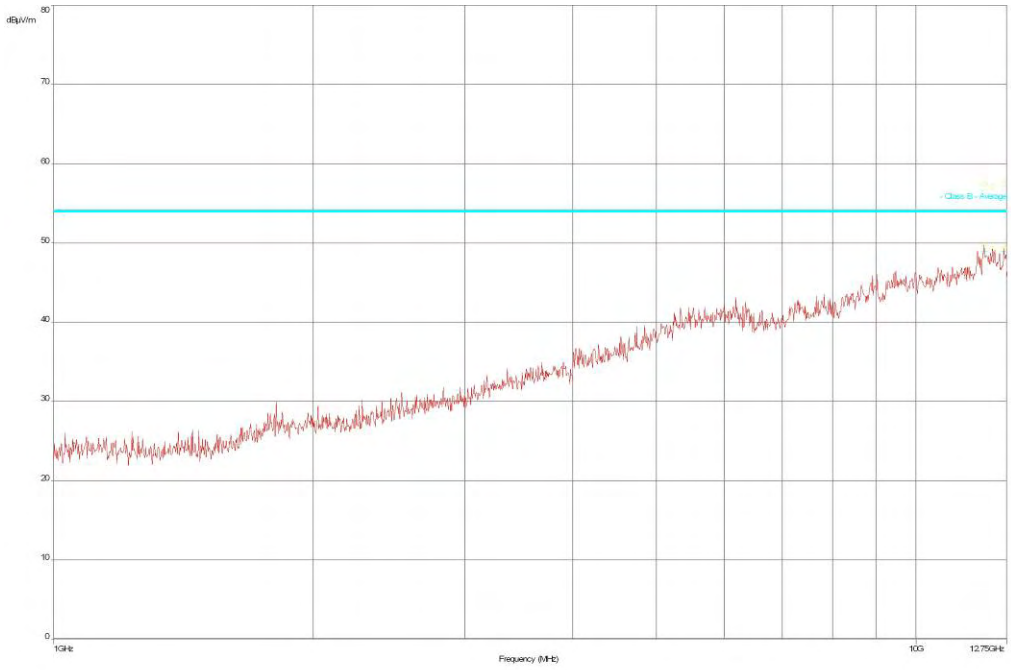
FCC_10m(B)_3



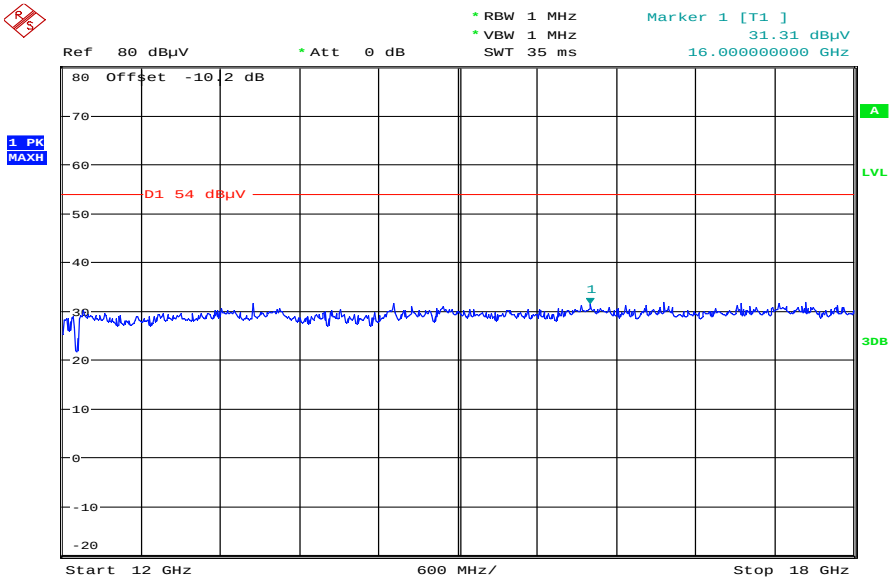
Final Result 1

Frequency (MHz)	Quasi Peak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polariza	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
36.308700	10.2	1000.0	120.00	170.0	V	81.0	13.1	19.8	30.0	
56.140950	9.3	1000.0	120.00	170.0	H	90.0	12.6	20.7	30.0	
575.578950	17.1	1000.0	120.00	170.0	V	0.0	20.1	18.9	36.0	
693.219450	19.4	1000.0	120.00	170.0	V	-2.0	22.3	16.6	36.0	
774.075150	20.7	1000.0	120.00	170.0	H	267.0	23.7	15.3	36.0	
898.613400	22.2	1000.0	120.00	111.0	H	280.0	25.2	13.8	36.0	

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

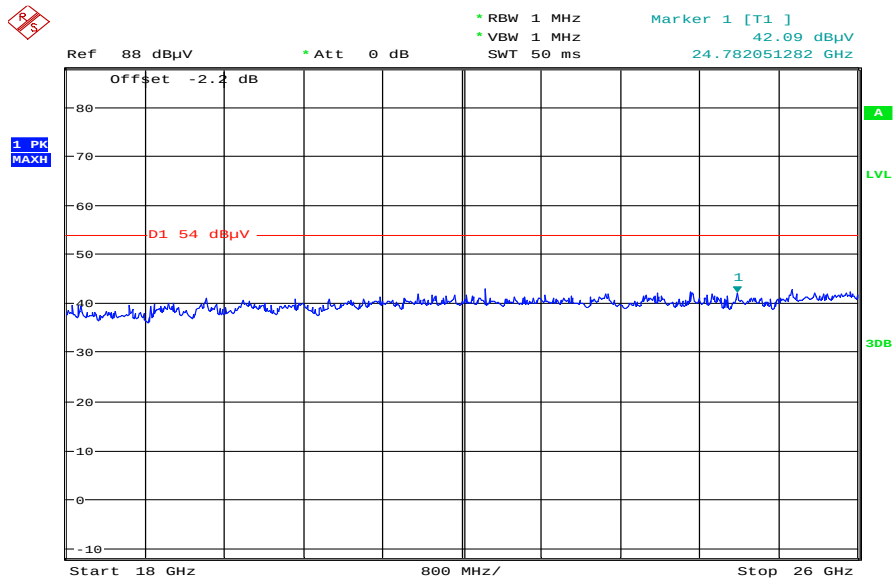


Plot 3: 12 GHz to 18 GHz, vertical & horizontal polarization



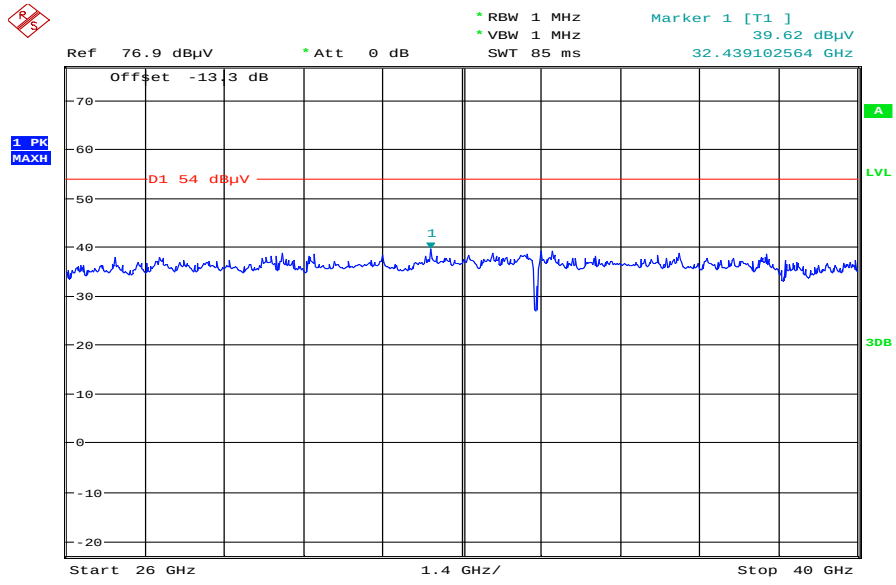
Date: 30.APR.2012 10:18:06

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



Date: 30.APR.2012 10:13:12

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



Date: 30.APR.2012 10:07:36

9.12 TX spurious emissions radiated < 30 MHz

Description:

Measurement of the radiated spurious emissions in transmit mode below 30 MHz. The EUT is set to channel 6. This measurement is representative for all channels and modes. If critical peaks are found channel 1 and channel 11 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

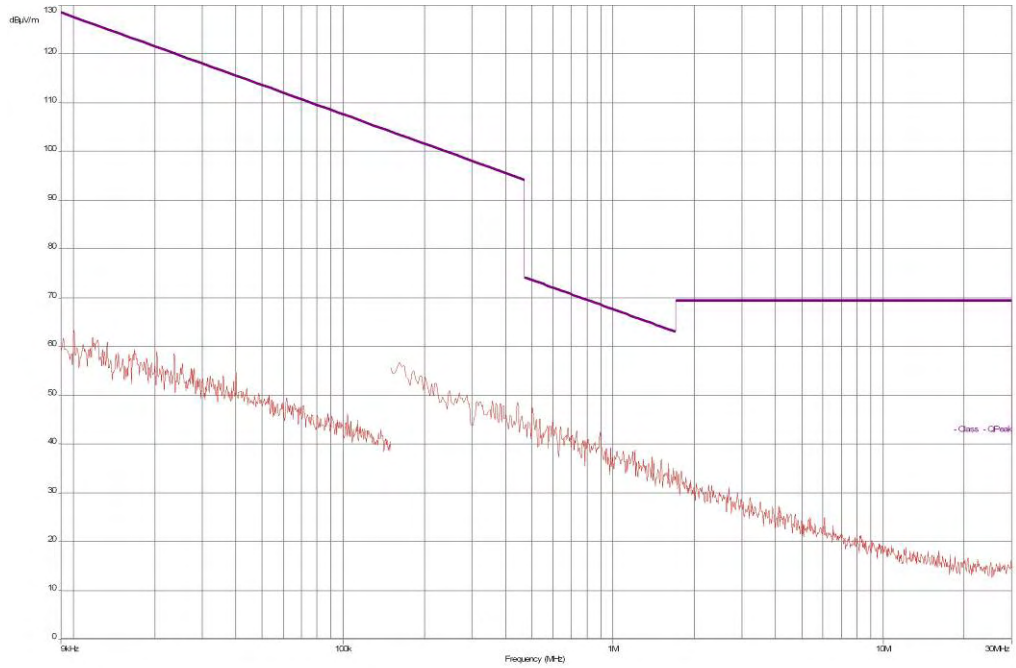
Results:

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

Result: Passed

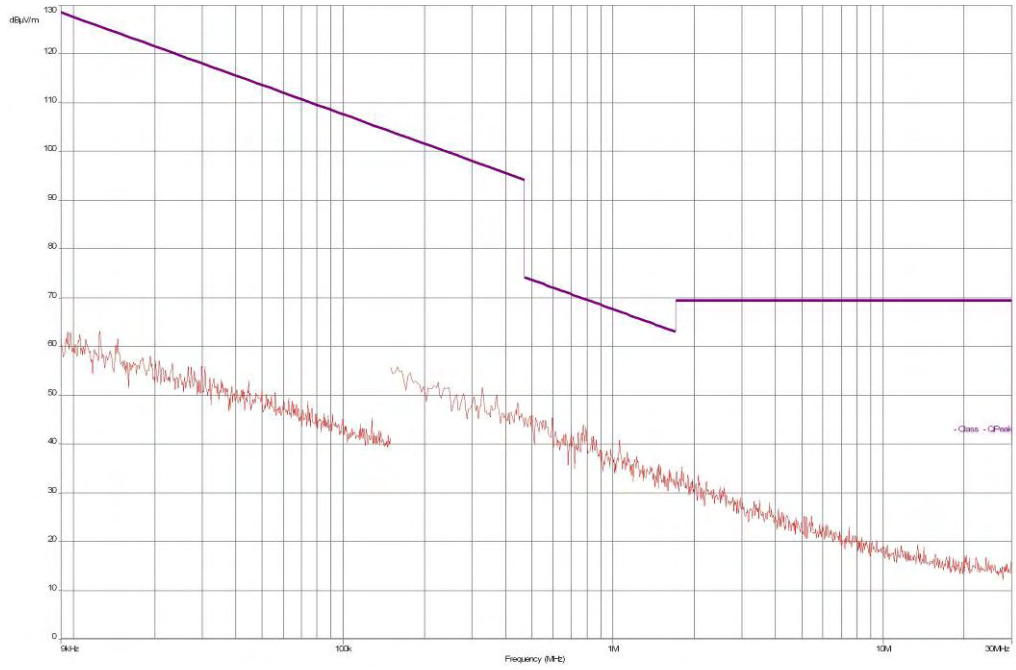
Plots: TX mode

Plot 1: 9 kHz to 30 MHz



Plots: RX / Idle – mode

Plot 1: 9 kHz to 30 MHz



9.13 TX spurious emissions conducted < 30 MHz

Description:

Measurement of the conducted spurious emissions in transmit mode below 30 MHz. The EUT is set to channel 6. This measurement is repeated for DSSS and OFDM modulation. If critical peaks are found channel 1 and channel 11 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

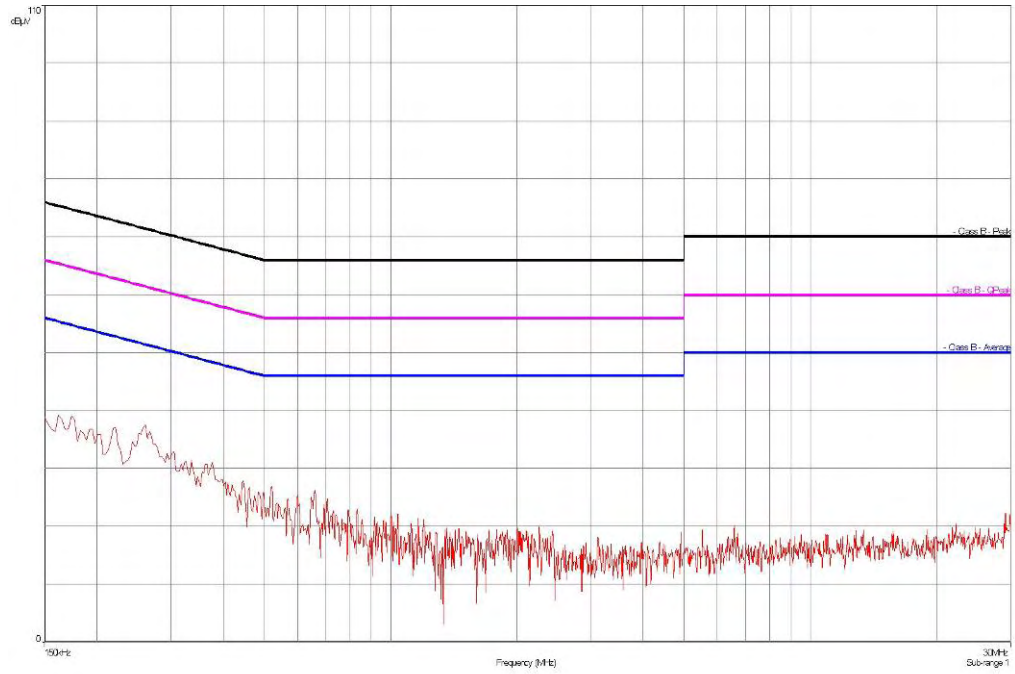
Results:

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

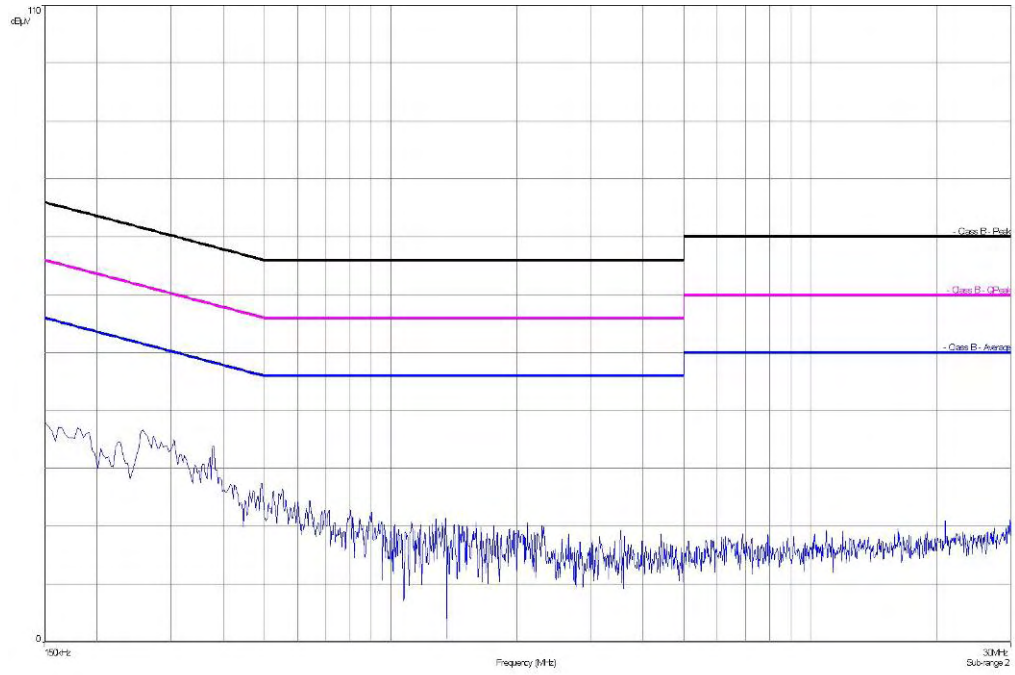
Result: **Passed**

Plots:

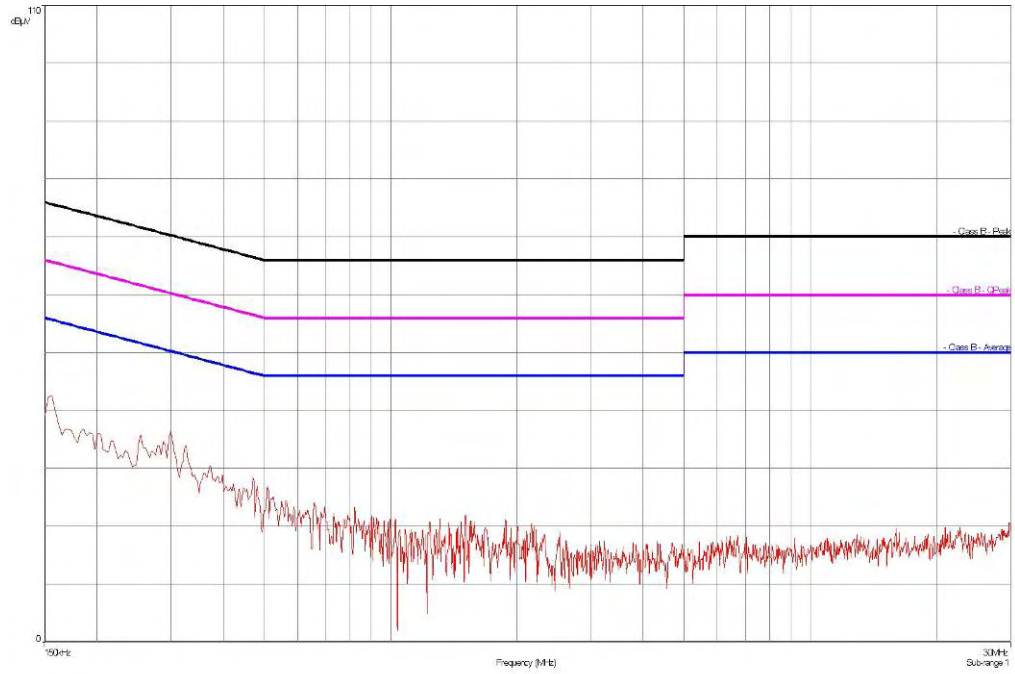
Plot 1: TX mode, 9 kHz to 30 MHz, phase line



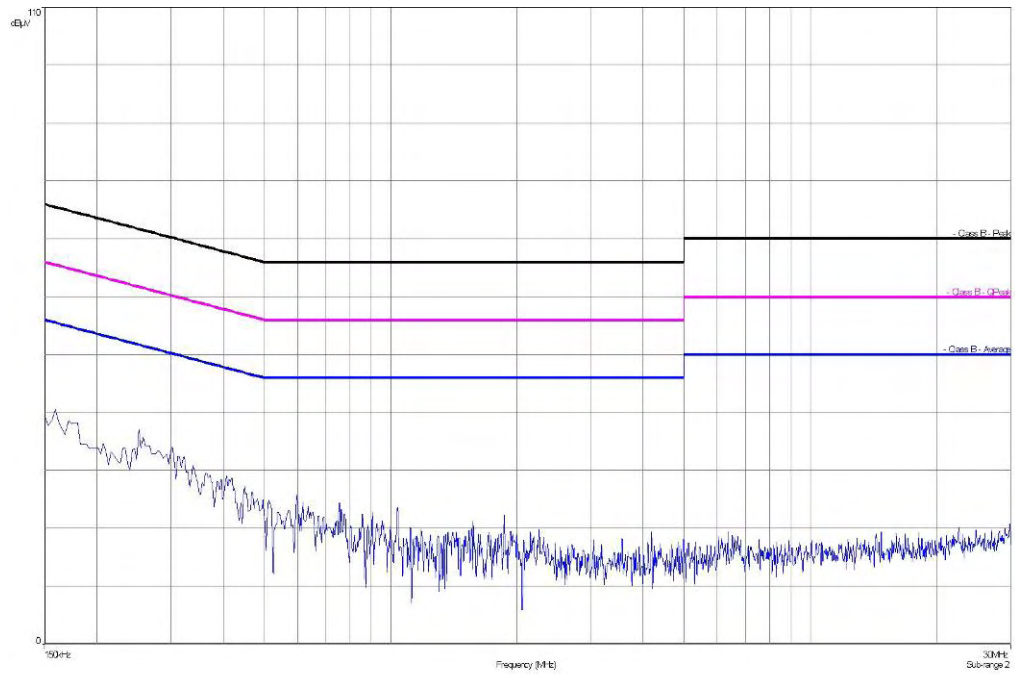
Plot 2: TX mode, 9 kHz to 30 MHz, neutral line



Plot 3: RX / Idle – mode, 9 kHz to 30 MHz, phase line



Plot 4: RX / Idle – mode, 9 kHz to 30 MHz, neutral line



10 Test equipment and ancillaries used for tests

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

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

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	45	Switch-Unit	3488A	HP Meßtechnik	2719A14505	300000368	g		
2	50	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04466	300000580	ne		
3	n. a.	software	SPS_PHE 1.4f	Spitzberger & Spieß	B5981; 5D1081;B5979	300000210	ne		
4	n. a.	EMI Test Receiver	ESCI 1166.5950.03	R&S	100083	300003312	k	04.01.2012	04.01.2014
5	n. a.	Analyzer-Reference-System (Harmonics and Flicker)	ARS 16/1	SPS	A3509 07/00205	300003314	k	14.07.2011	14.07.2013
6	n. a.	Amplifier	JS42-00502650-28-5A	MITEQ	1084532	300003379	ev		
7	n. a.	Antenna Tower	Model 2175	ETS-LINDGREN	64762	300003745	izw		
8	n. a.	Positioning Controller	Model 2090	ETS-LINDGREN	64672	300003746	izw		
9	n. a.	Turntable Interface-Box	Model 105637	ETS-LINDGREN	44583	300003747	izw		
10	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787	k		
11	n. a.	Spectrum-Analyzer	FSU26	R&S	200809	300003874	k	06.01.2012	06.01.2014
12	n. a.	Isolating Transformer	RT5A	Grundig	8041	300001626	g		
13	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vIKI!	11.05.2011	11.05.2013
14	n. a.	Active Loop Antenna	6502	EMCO	2210	300001015	ne		
15	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996		23.03.2009	
16	n. a.	Relais Matrix	3488A	HP Meßtechnik	2719A15013	300001156	ne		
17	n. a.	Relais Matrix	PSU	R&S	890167/024	300001168	ne		
18	n. a.	Isolating Transformer	RT5A	Grundig	9242	300001263	ne		
19	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
20	n. a.	Switch / Control Unit	3488A	HP	2605e08770	300001443	ne		
21	n. a.	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne		
22	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	vIKI!	14.10.2011	14.10.2014
23	n. a.	MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	3000042xx	k	19.12.2011	19.12.2012

24	CR 79	Std. Gain Horn Antenna 26.5-40.0 GHz	V637	Narda	7911	300001751	ne		
25	11b	Microwave System Amplifier, 0.5-26.5 GHz	83017A	HP Meßtechnik	00419	300002268	ev	10.03.2011	
26	A026	Std. Gain Horn Antenna 12.4 to 18.0 GHz	639	Narda		300000787	ne		
27	A029	Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda		300002442	ne		
28	n. a.	Spectrum Analyzer 20 Hz - 50 GHz	FSU50	R&S	200012	300003443	ve	01.07.2010	01.07.2012

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

11 Observations

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

Annex F Accreditation Certificate

DAkkS Deutsche Akkreditierungsstelle

Deutsche Akkreditierungsstelle GmbH
German Accreditation Body

Entrusted according to Section 8 subsection1 AkkStelleG in connection with Section 1 subsection 1 AkkStelleGBV
Signatory to the Multilateral Agreements of
EA, ILAC and IAF for Mutual Recognition

Accreditation

The Deutsche Akkreditierungsstelle GmbH (German Accreditation Body) attests that the testing laboratory

CETECOM ICT Services GmbH
Untertürkheimer Straße 6-10
66117 Saarbrücken

is competent under the terms of DIN EN ISO/IEC 17025:2005 to carry out tests in the following fields:

Wired communications and DECT
Acoustic
Radio
Short Range Devices (SRD)
RFID
WiMax and Richtfunk
Mobile radio (GSM / DCS), Over the Air (OTA) Performance
Electromagnetic Compatibility (EMC) incl. Automotive
Product safety
SAR and Hearing Aid Compatibility (HAC)
Environmental simulation
Smart Card Terminals
Bluetooth
WI-FI-Services

The accreditation certificate shall only apply in connection with the notice of accreditation of 13.04.2011 with the accreditation number D-PL-12076-01 and is valid until 03.09.2014. It comprises the cover sheet, the reverse side of the cover sheet and the following annex with a total of 62 pages.

Registration number of the certificate: **D-PL-12076-01-01**

Frankfurt am Main, 13.04.2011

This document is a translation. The definitive version is the original German accreditation certificate.

Front side of certificate

Deutsche Akkreditierungsstelle GmbH

Office Berlin
Spittelmarkt 10
10117 Berlin

Office Frankfurt am Main
Gartenstraße 6
60594 Frankfurt am Main

Office Braunschweig
Bundesallee 100
38116 Braunschweig

The publication of extracts of the accreditation certificate is subject to the prior written approval by Deutsche Akkreditierungsstelle GmbH (DAkkS). Exempted is the unchanged form of separate disseminations of the cover sheet by the conformity assessment body mentioned overleaf.

No impression shall be made that the accreditation also extends to fields beyond the scope of accreditation attested by DAkkS.

The accreditation was granted pursuant to the Act on the Accreditation Body (AkkStelleG) of 31 July 2009 (Federal Law Gazette I p. 2625) and the Regulation (EC) No 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products (Official Journal of the European Union L 218 of 9 July 2008, p. 30). DAkkS is a signatory to the Multilateral Agreements for Mutual Recognition of the European co-operation for Accreditation (EA), International Accreditation Forum (IAF) and International Laboratory Accreditation Cooperation (ILAC). The signatories to these agreements recognise each other's accreditations.

The up-to-date state of membership can be retrieved from the following websites:
EA: www.european-accreditation.org
ILAC: www.ilac.org
IAF: www.iaf.nu

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/fileadmin/de/CETECOM_D_Saarbruecken/accreditations_Jan_2010/DAKKS_Akkredi_Urk_EN17025-En_incl_Annex.pdf