8.5 CONDUCTED SPURIOUS EMISSION

LIMITS

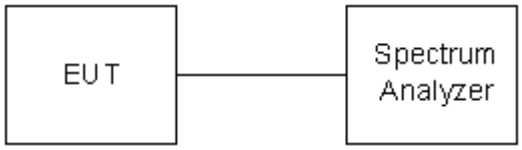
§ 15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the and that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in § 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)).

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSU	200789	JUL. 01, 2013

Remark: *Each piece of equipment is scheduled for calibration once a year.*

TEST SETUP



TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

TEST RESULTS

802.11n HT20 Mode

LOW CHANNEL						
Frequency (MHz)	ChainA (dBm)	ChainB (dBm)	Total (dBm)	Limit (dBm)	Margin (dB)	Result
Fundamental	-0.75	-0.87	--	--	--	--
91.88	-46.69	-	-43.68	-20.75	-22.93	Pass
96.63	-	-45.65	-42.64	-20.75	-21.89	Pass
2400.00	-33.87	-32.01	-29.00	-20.75	-8.25	Pass

MIDDLE CHANNEL						
Frequency (MHz)	ChainA (dBm)	ChainB (dBm)	Total (dBm)	Limit (dBm)	Margin (dB)	Result
Fundamental	-1.43	-1.72	--	--	--	--
120.43	-46.15	-46.72	-43.14	-21.43	-21.71	Pass
2400.00	-48.63	-48.21	-45.20	-21.43	-23.77	Pass
2483.50	-49.10	-48.57	-45.56	-21.43	-24.13	Pass

HIGH CHANNEL						
Frequency (MHz)	ChainA (dBm)	ChainB (dBm)	Total (dBm)	Limit (dBm)	Margin (dB)	Result
Fundamental	-1.39	-0.48	--	--	--	--
144.23	-46.42	-45.86	-42.85	-20.48	-22.37	Pass
2483.50	-36.72	-39.91	-33.71	-20.48	-13.23	Pass

802.11n HT40 Mode

LOW CHANNEL						
Frequency (MHz)	ChainA (dBm)	ChainB (dBm)	Total (dBm)	Limit (dBm)	Margin (dB)	Result
Fundamental	-4.62	-4.22	--	--	--	--
2400.00	-34.89	-33.14	-30.13	-24.22	-5.91	Pass

MIDDLE CHANNEL						
Frequency (MHz)	ChainA (dBm)	ChainB (dBm)	Total (dBm)	Limit (dBm)	Margin (dB)	Result
Fundamental	-4.98	-4.48	--	--	--	--
2400.00	-43.50	-43.04	-40.03	-24.48	-15.55	Pass
2483.50	-46.67	-47.73	-43.66	-24.48	-19.18	Pass

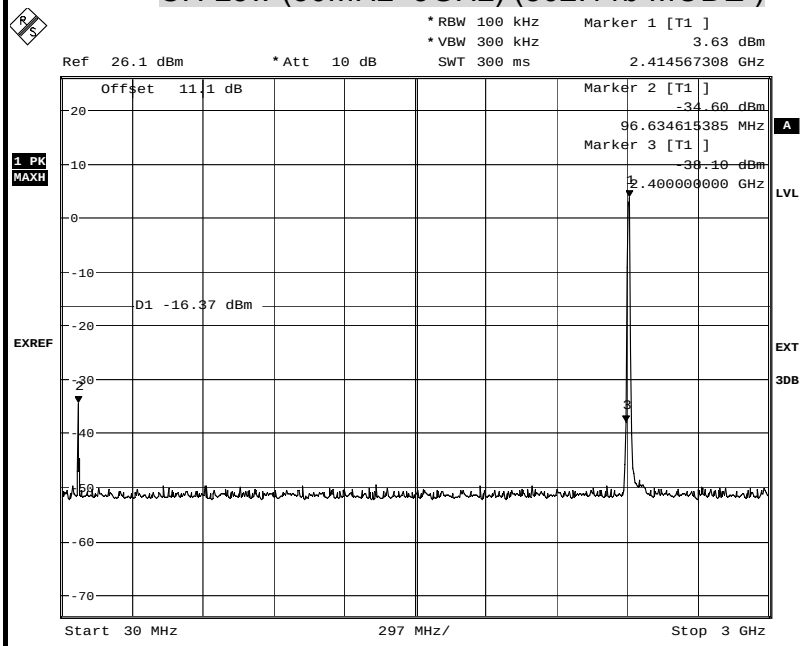
HIGH CHANNEL						
Frequency (MHz)	ChainA (dBm)	ChainB (dBm)	Total (dBm)	Limit (dBm)	Margin (dB)	Result
Fundamental	-3.04	-4.36	--	--	--	--
2483.50	-37.69	-42.14	-34.68	-23.04	-11.64	Pass

Remark:
Total (dBm) = Measure + 10 log(2) dB,
Measure=Choose the max chain value

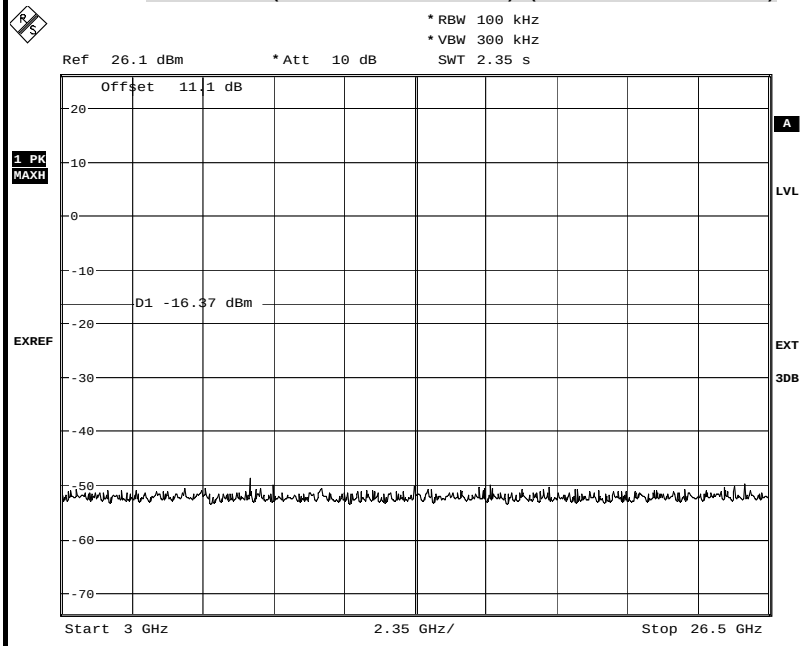
OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

(IEEE 802.11b MODE)

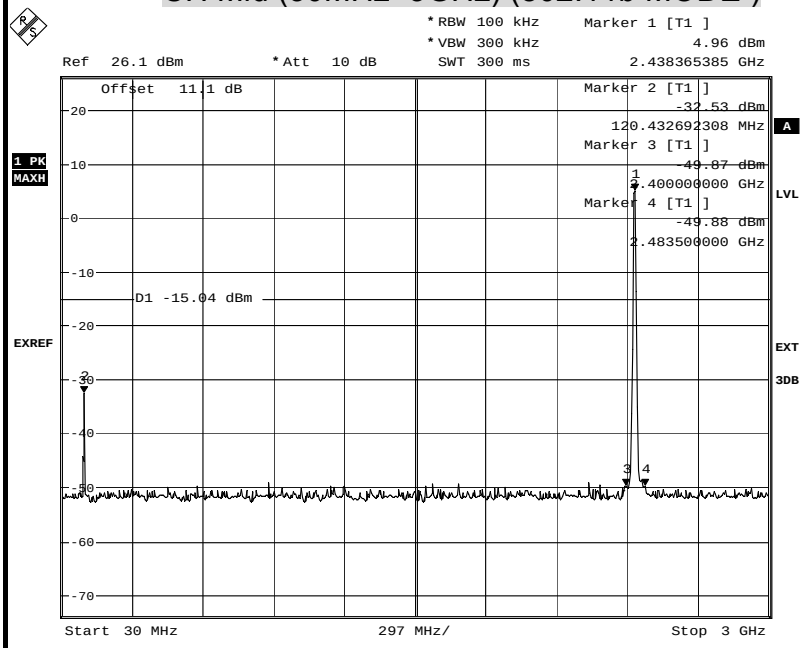
CH Low (30MHz~3GHz) (802.11b MODE)



CH Low (3GHz~26.5GHz) (802.11b MODE)

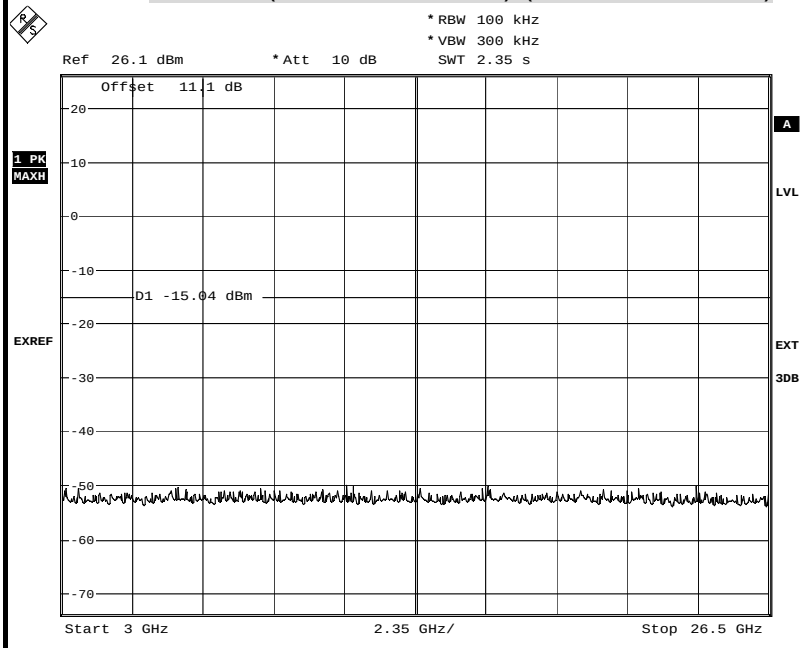


CH Mid (30MHz~3GHz) (802.11b MODE)



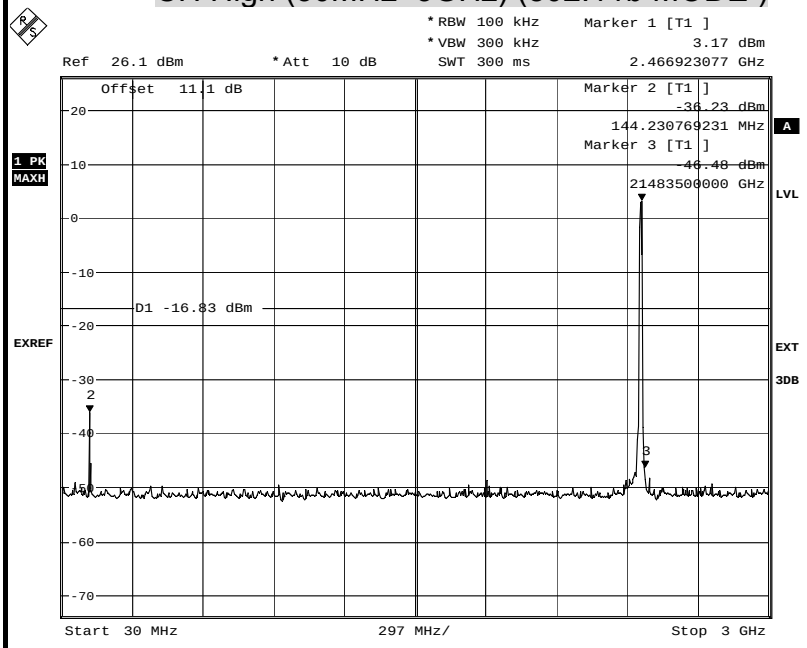
Date: 21.FEB.2013 17:37:24

CH Mid (3GHz~26.5GHz) (802.11b MODE)



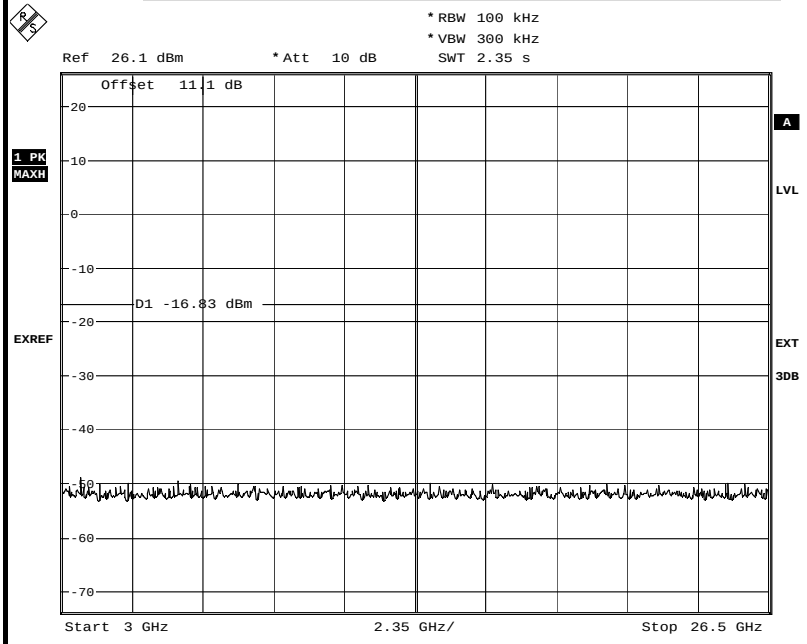
Date: 21.FEB.2013 17:37:43

CH High (30MHz~3GHz) (802.11b MODE)



Date: 21.FEB.2013 17:38:56

CH High (3GHz~26.5GHz) (802.11b MODE)

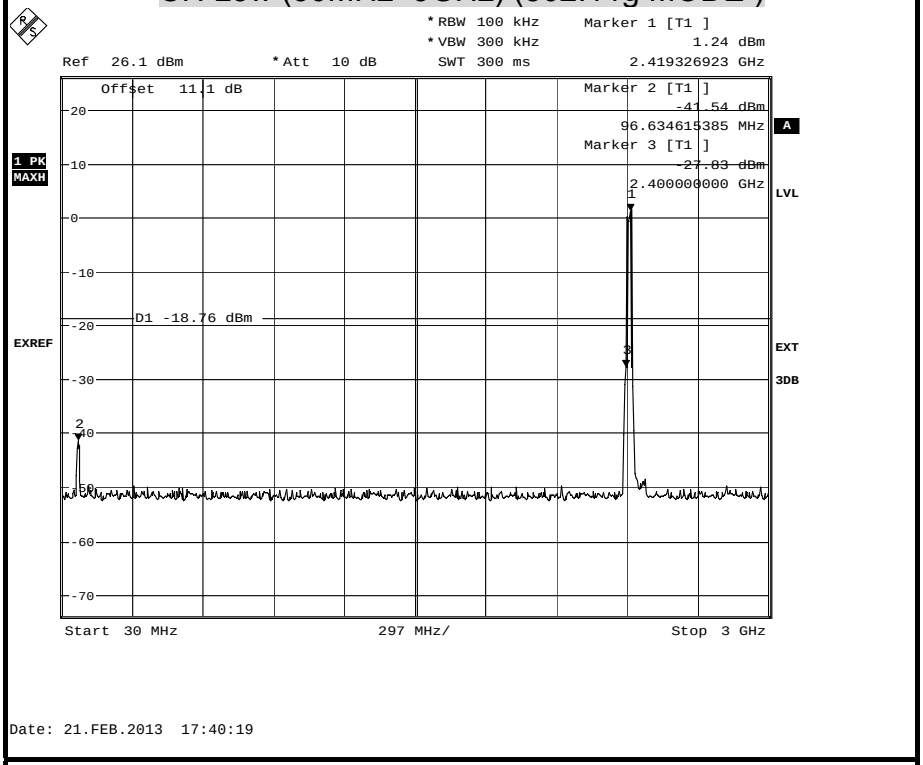


Date: 21.FEB.2013 17:39:13

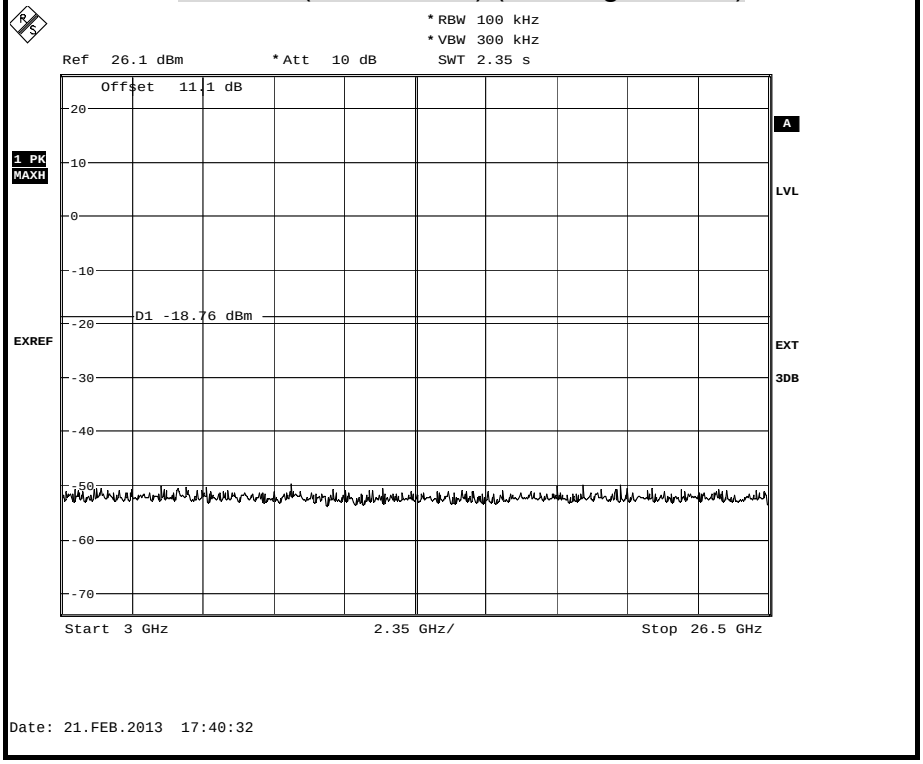
OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

(802.11g MODE)

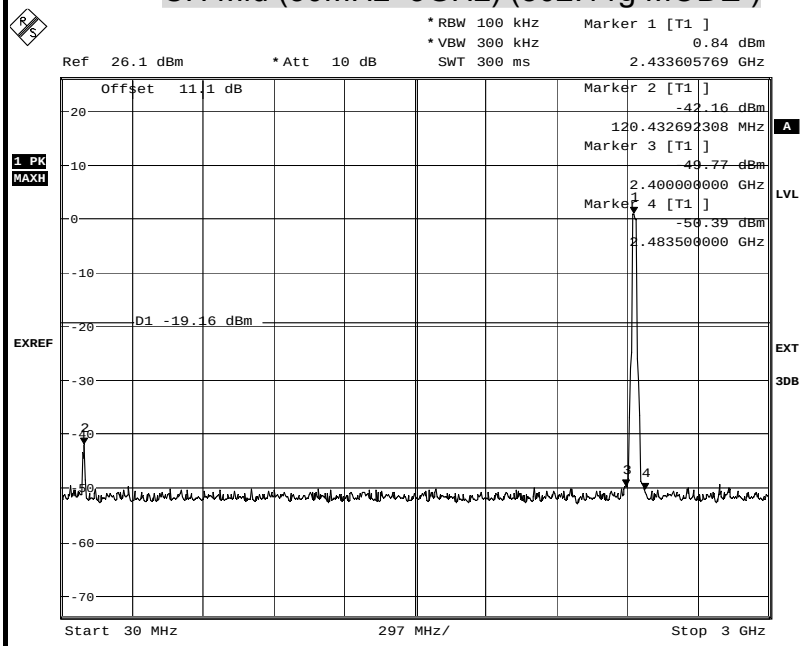
CH Low (30MHz~3GHz) (802.11g MODE)



CH Low (3~26.5GHz) (802.11g MODE)

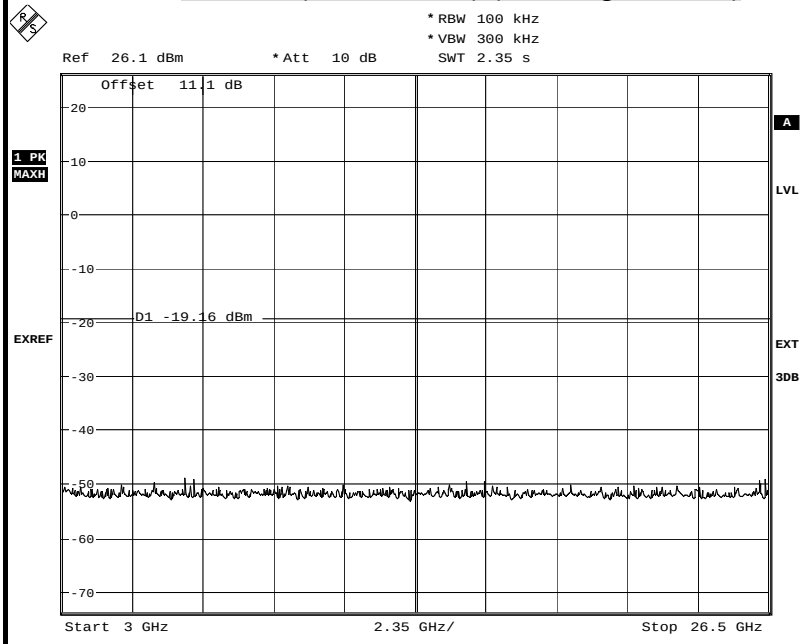


CH Mid (30MHz~3GHz) (802.11g MODE)



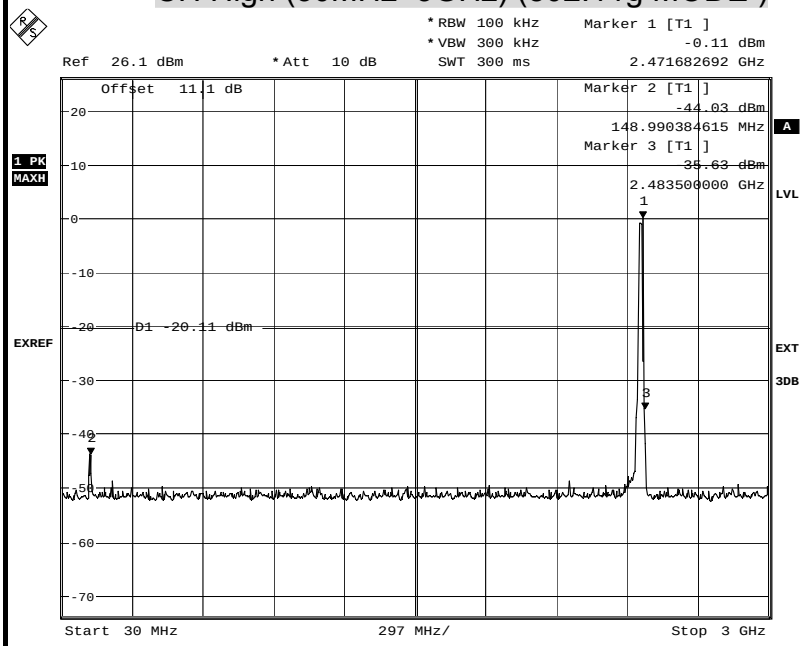
Date: 21.FEB.2013 17:41:25

CH Mid (3~26.5GHz) (802.11g MODE)



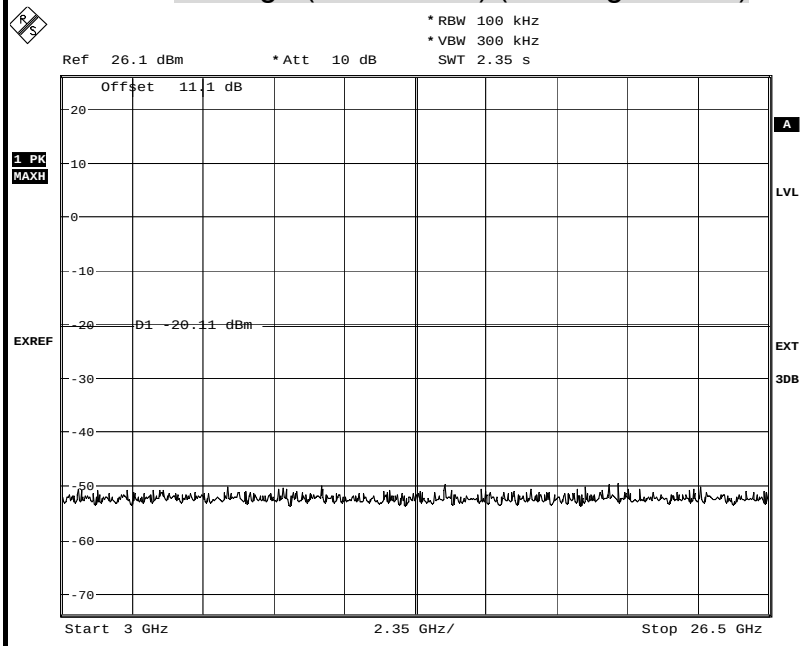
Date: 21.FEB.2013 17:41:50

CH High (30MHz~3GHz) (802.11g MODE)



Date: 21.FEB.2013 17:47:52

CH High (3~26.5GHz) (802.11g MODE)

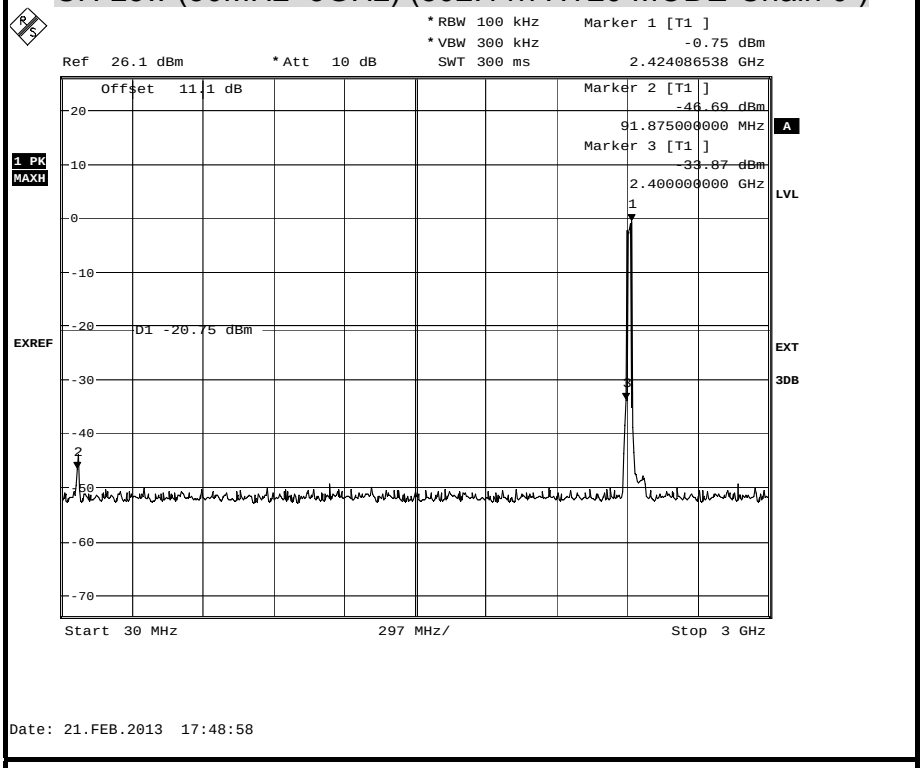


Date: 21.FEB.2013 17:48:07

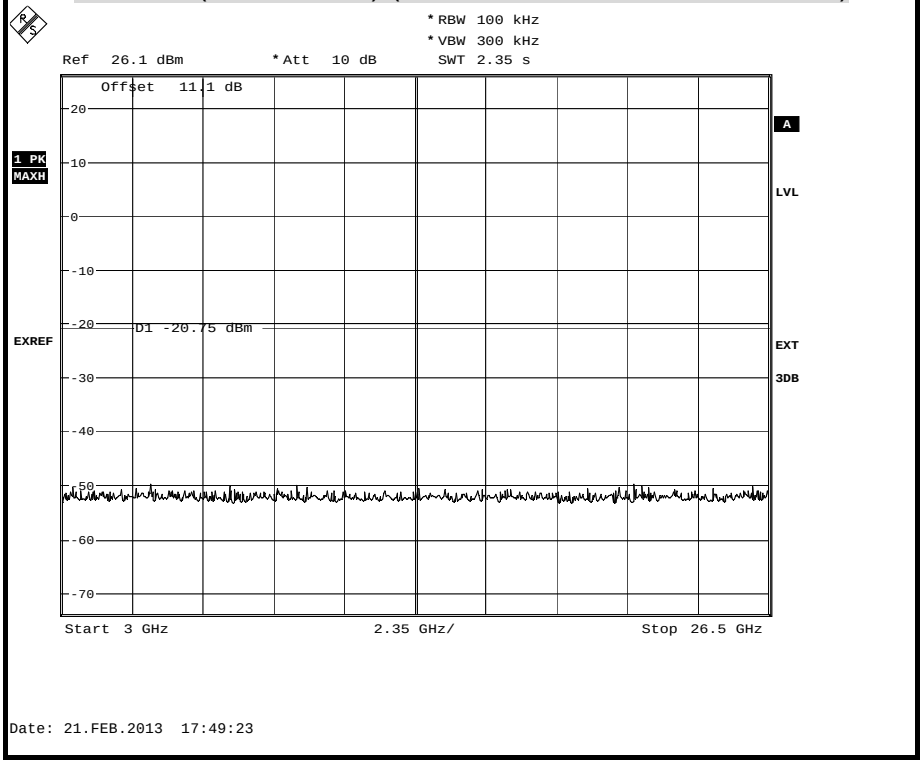
OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

(802.11n HT20 MODE)

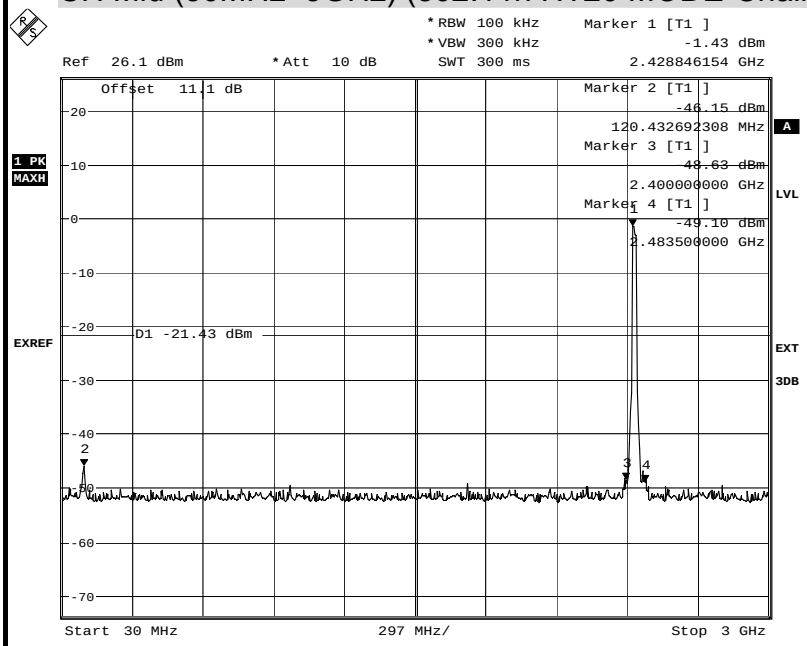
CH Low (30MHz~3GHz) (802.11n HT20 MODE-Chain 0)



CH Low (3~26.5GHz) (802.11n HT20 MODE-Chain 0)

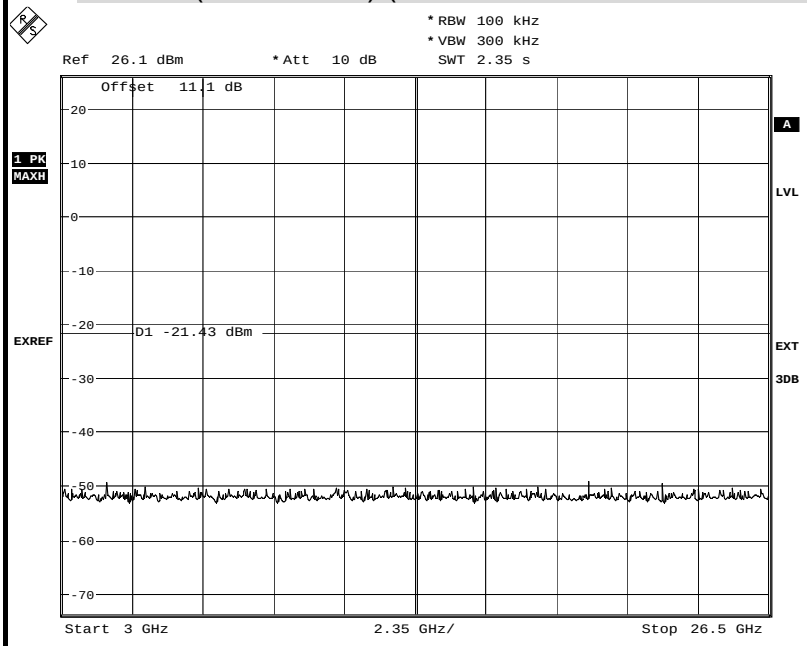


CH Mid (30MHz~3GHz) (802.11n HT20 MODE-Chain 0)



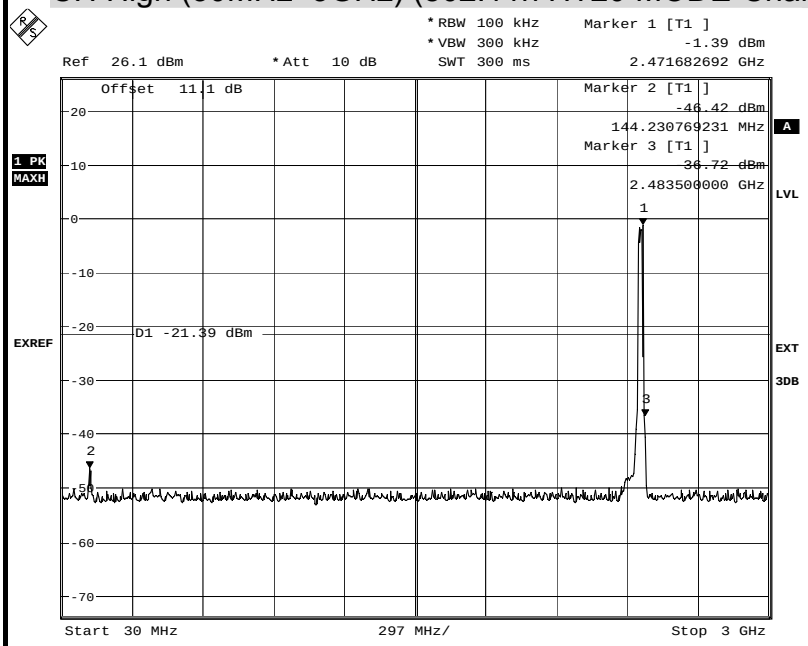
Date: 21.FEB.2013 17:50:29

CH Mid (3~26.5GHz) (802.11n HT20 MODE-Chain 0)

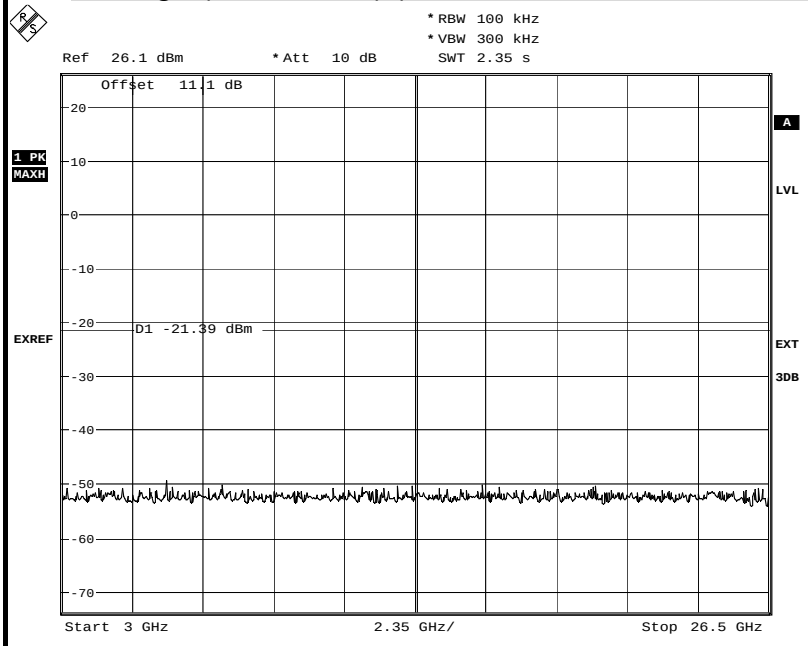


Date: 21.FEB.2013 17:50:49

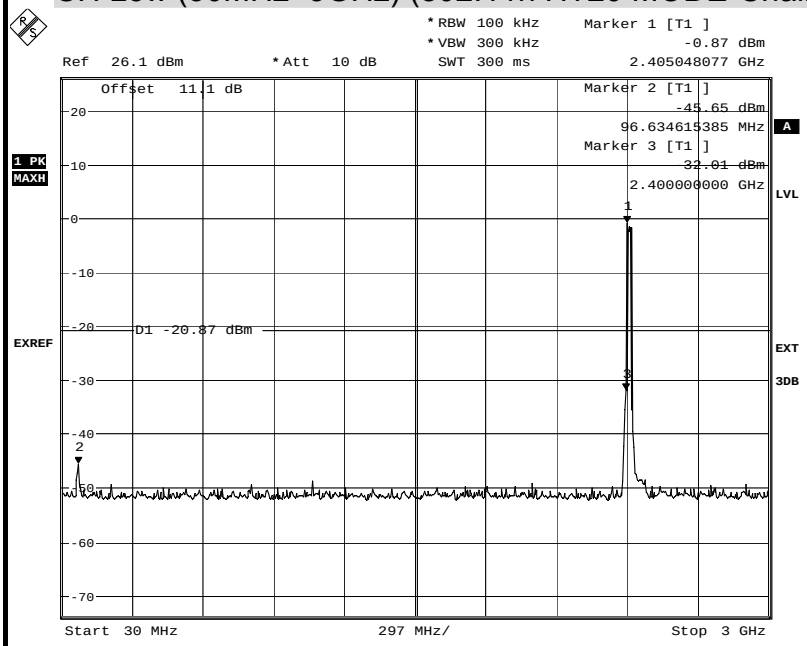
CH High (30MHz~3GHz) (802.11n HT20 MODE-Chain 0)



CH High (3~26.5GHz) (802.11n HT20 MODE-Chain 0)

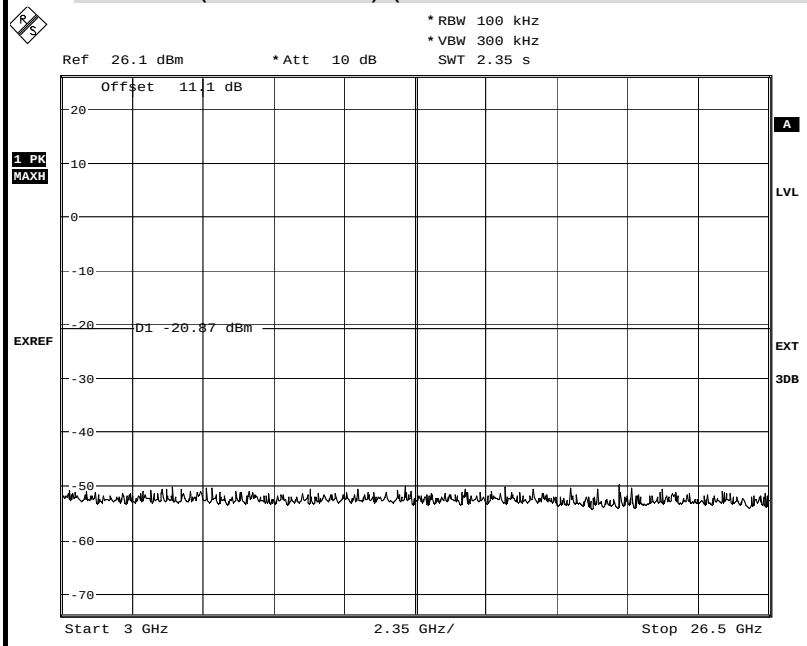


CH Low (30MHz~3GHz) (802.11n HT20 MODE-Chain 1)



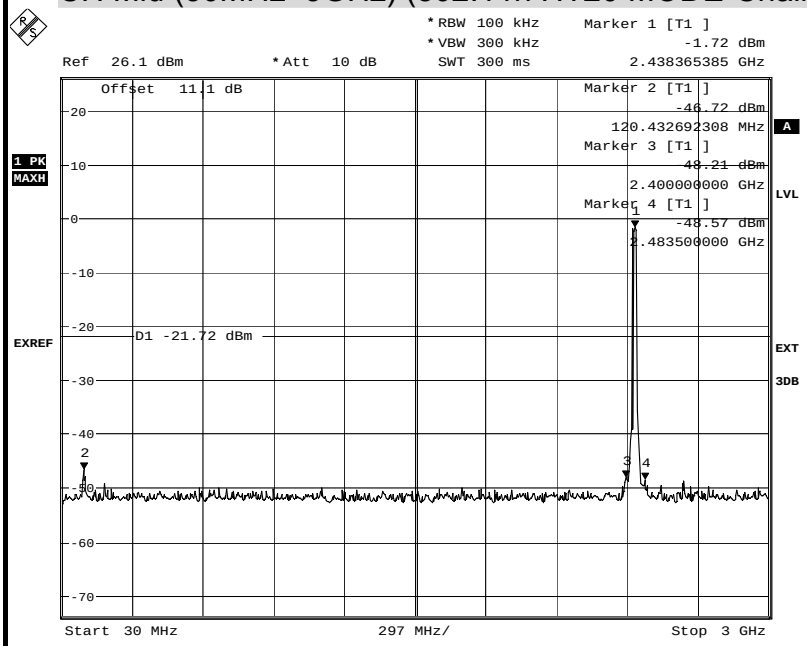
Date: 21.FEB.2013 18:02:55

CH Low (3~26.5GHz) (802.11n HT20 MODE-Chain 1)



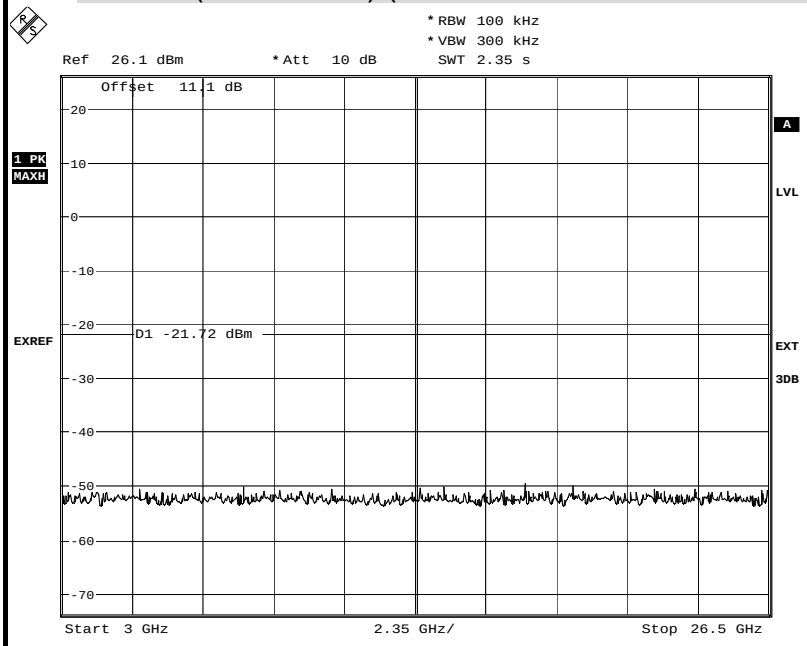
Date: 21.FEB.2013 18:03:08

CH Mid (30MHz~3GHz) (802.11n HT20 MODE-Chain 1)



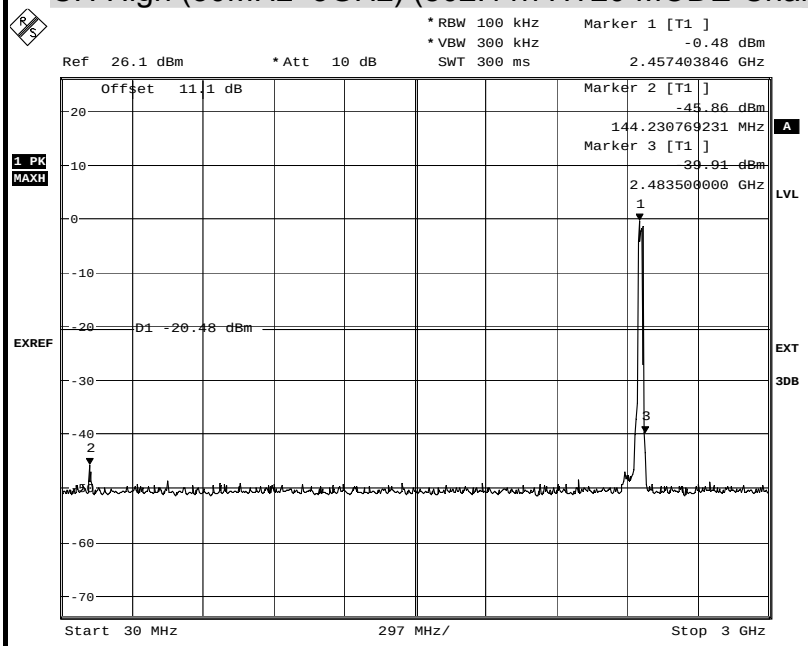
Date: 21.FEB.2013 18:04:17

CH Mid (3~26.5GHz) (802.11n HT20 MODE-Chain 1)



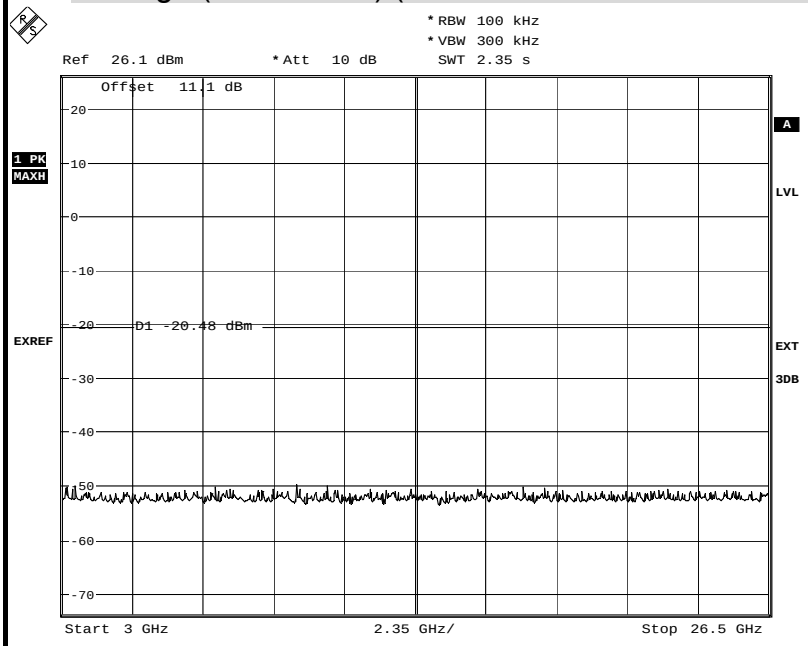
Date: 21.FEB.2013 18:04:32

CH High (30MHz~3GHz) (802.11n HT20 MODE-Chain 1)



Date: 21.FEB.2013 18:11:15

CH High (3~26.5GHz) (802.11n HT20 MODE-Chain 1)

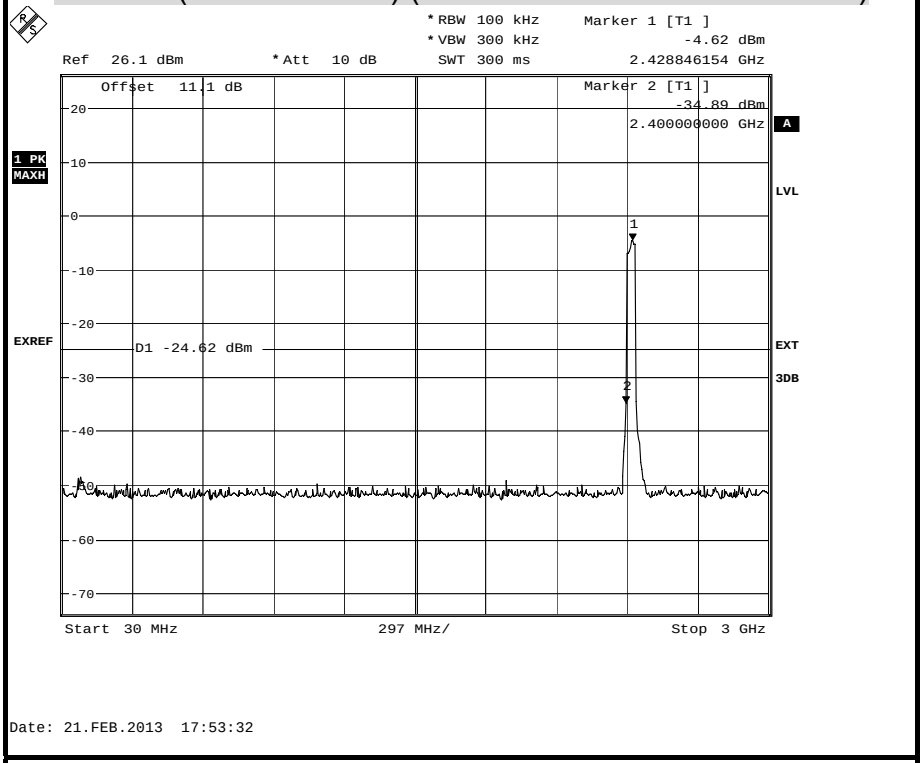


Date: 21.FEB.2013 18:11:33

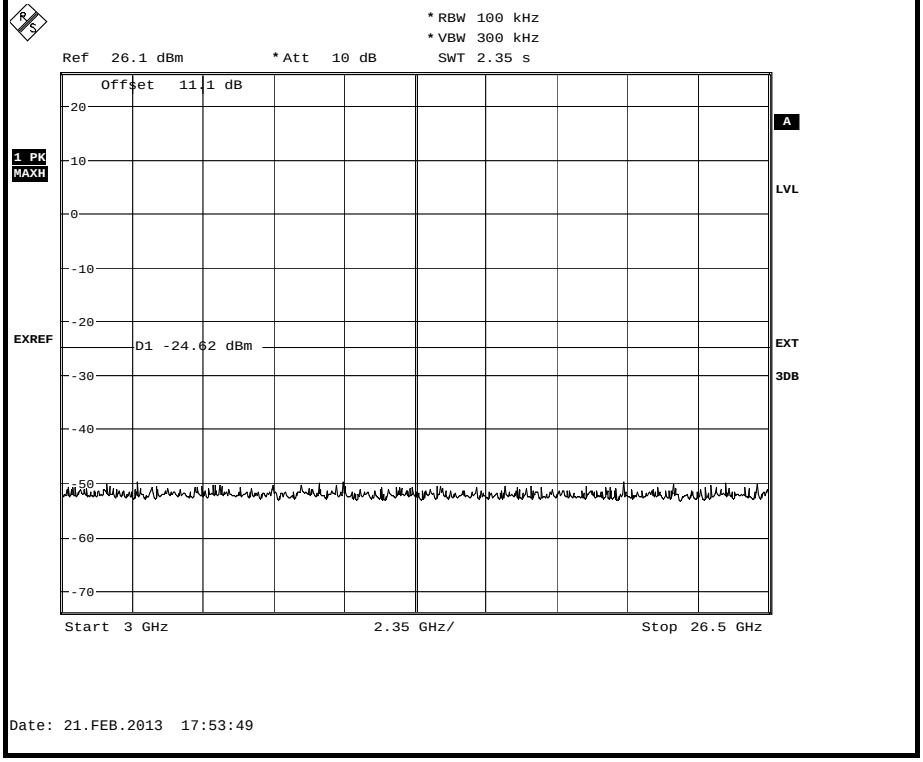
OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

(802.11n HT40 MODE)

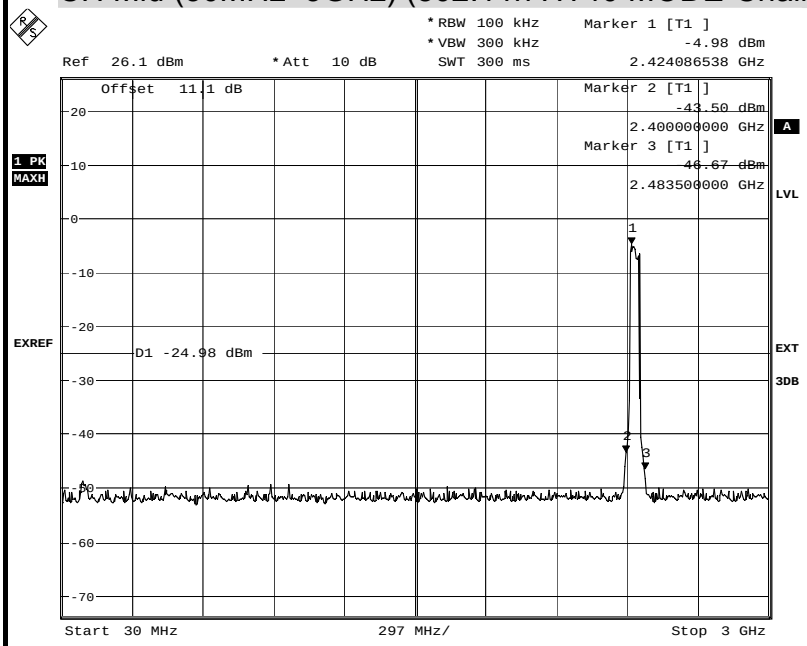
CH Low (30MHz~3GHz) (802.11n HT40 MODE-Chain 0)



CH Low (3~26.5GHz) (802.11n HT40 MODE-Chain 0)

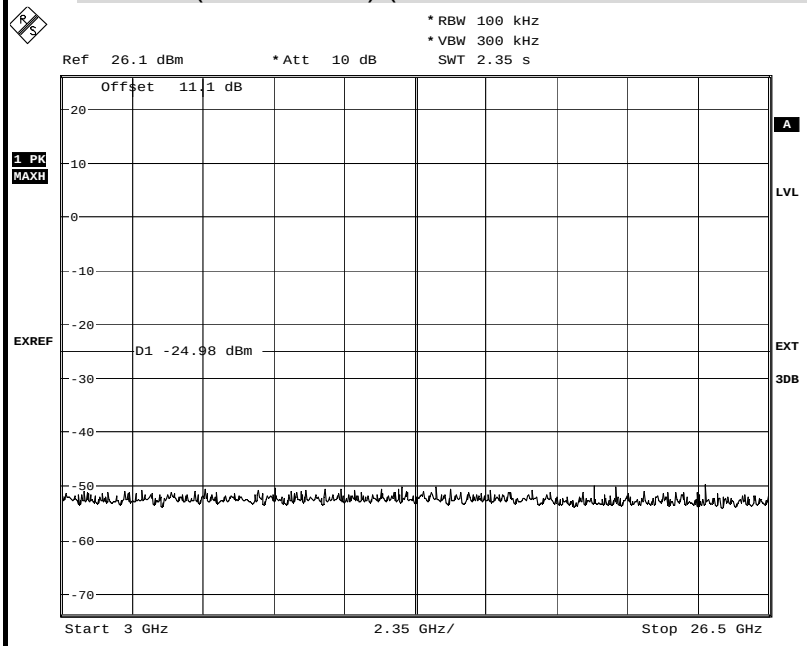


CH Mid (30MHz~3GHz) (802.11n HT40 MODE-Chain 0)



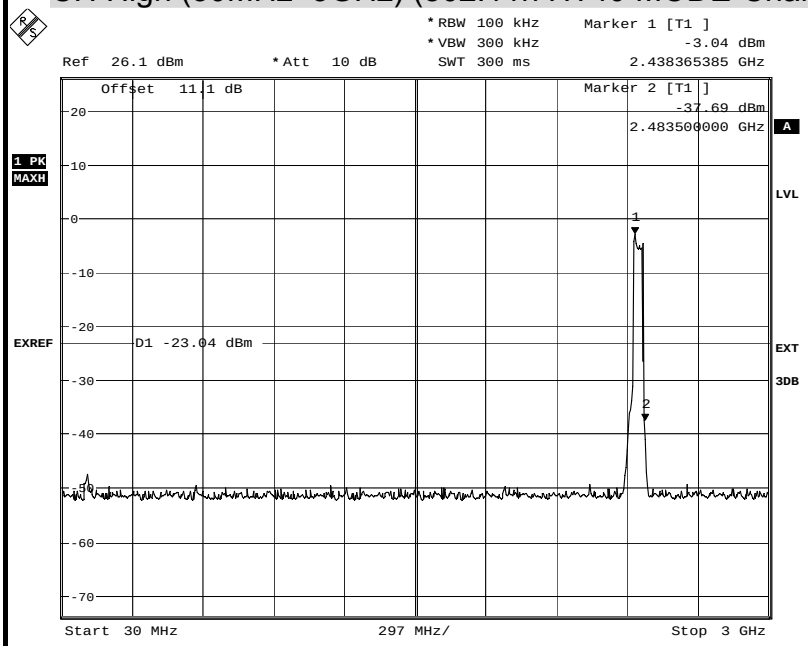
Date: 21.FEB.2013 17:55:01

CH Mid (3~26.5GHz) (802.11n HT40 MODE-Chain 0)



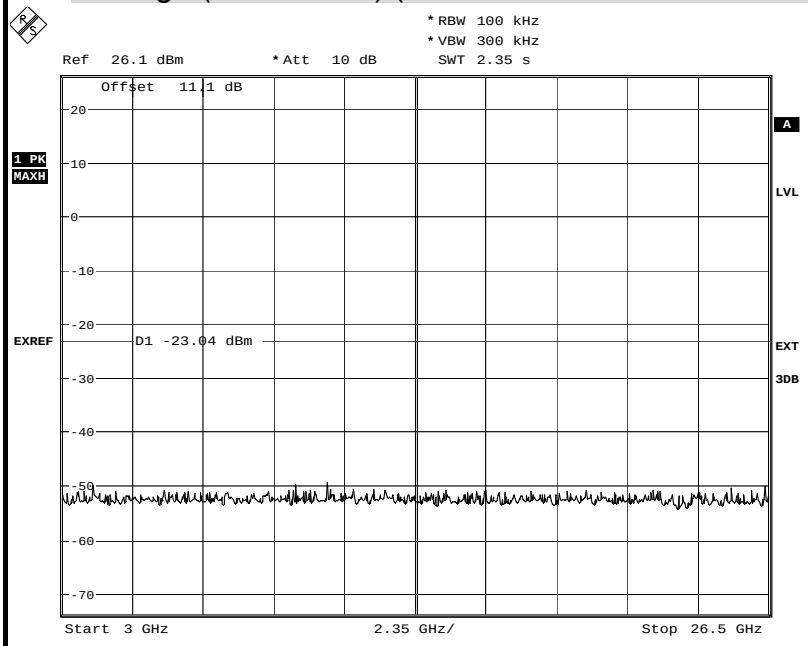
Date: 21.FEB.2013 17:55:13

CH High (30MHz~3GHz) (802.11n HT40 MODE-Chain 0)



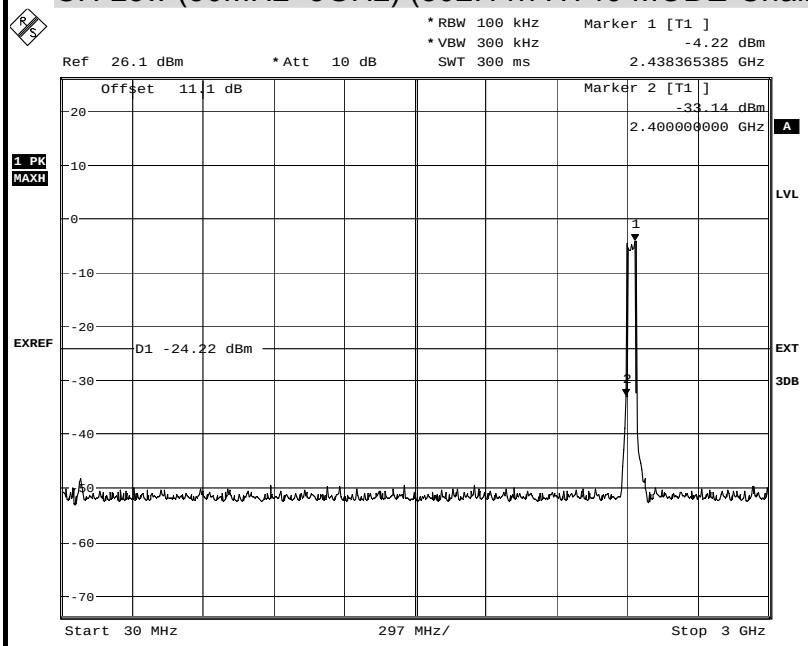
Date: 21.FEB.2013 17:56:27

CH High (3~26.5GHz) (802.11n HT40 MODE-Chain 0)



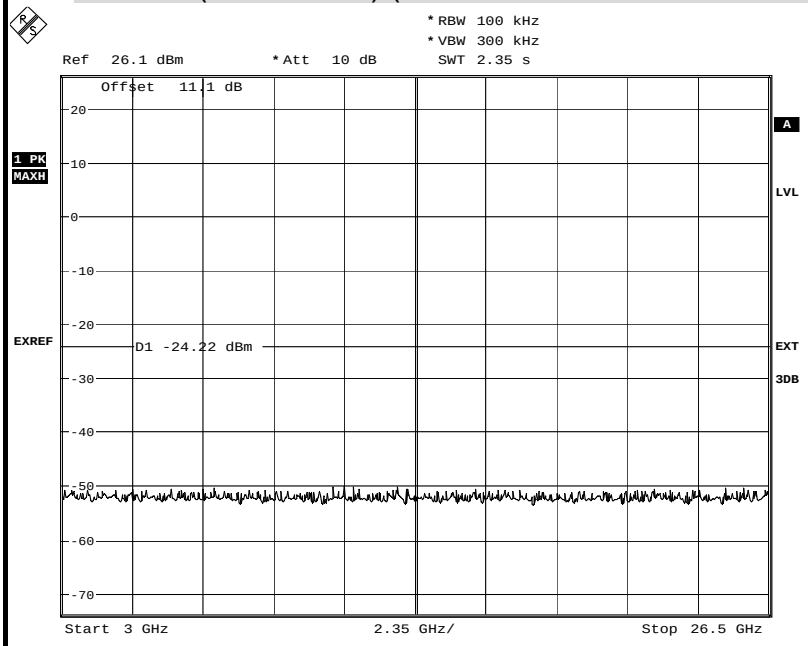
Date: 21.FEB.2013 17:56:38

CH Low (30MHz~3GHz) (802.11n HT40 MODE-Chain 1)



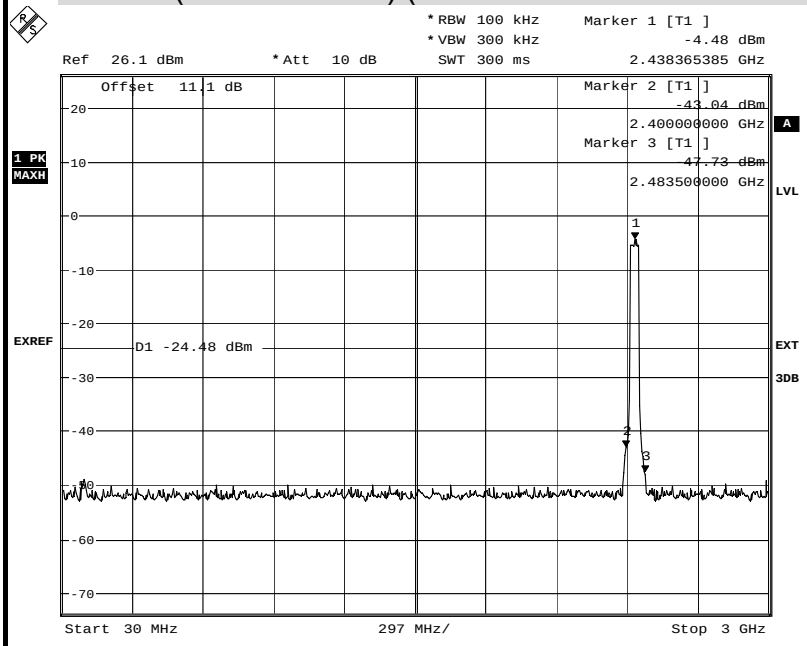
Date: 21.FEB.2013 17:58:30

CH Low (3~26.5GHz) (802.11n HT40 MODE-Chain 1)



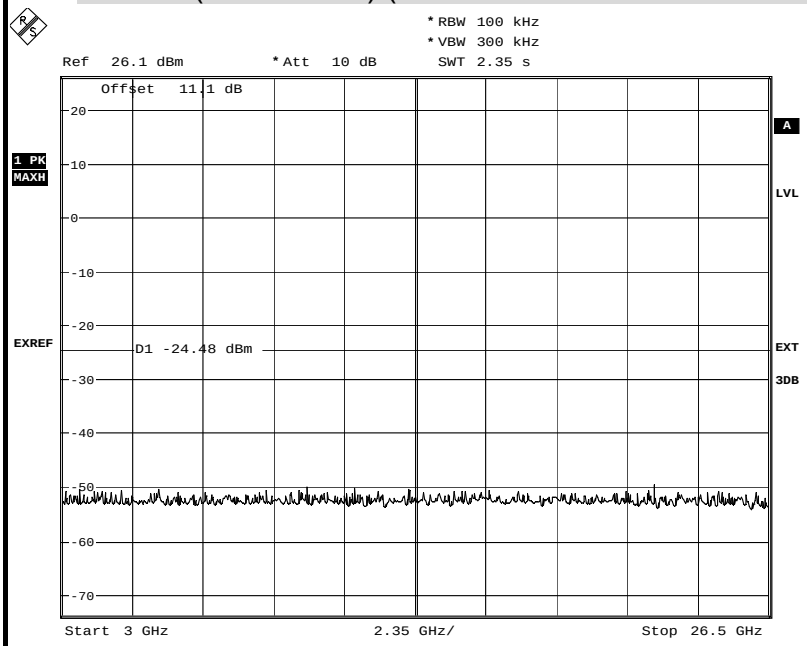
Date: 21.FEB.2013 17:58:47

CH Mid (30MHz~3GHz) (802.11n HT40 MODE-Chain 1)



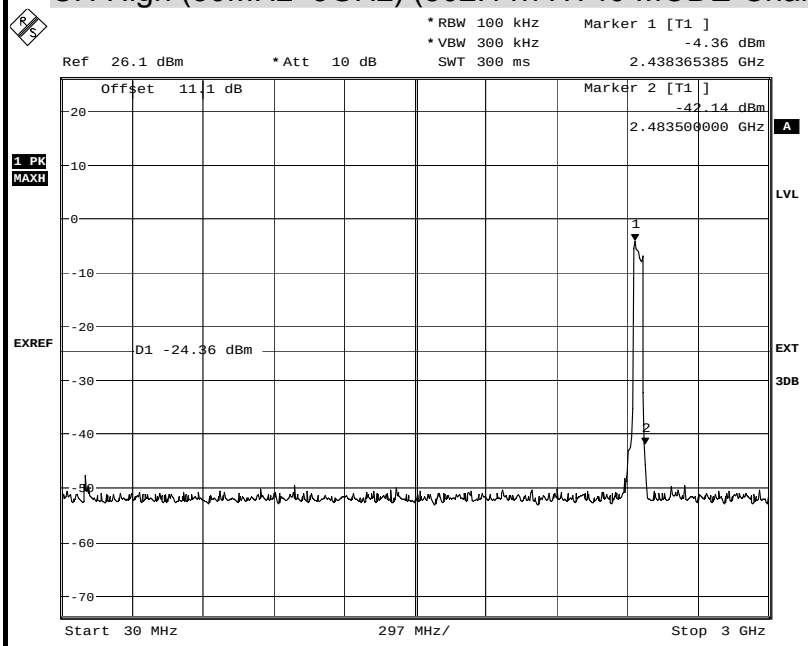
Date: 21.FEB.2013 17:59:44

CH Mid (3~26.5GHz) (802.11n HT40 MODE-Chain 1)



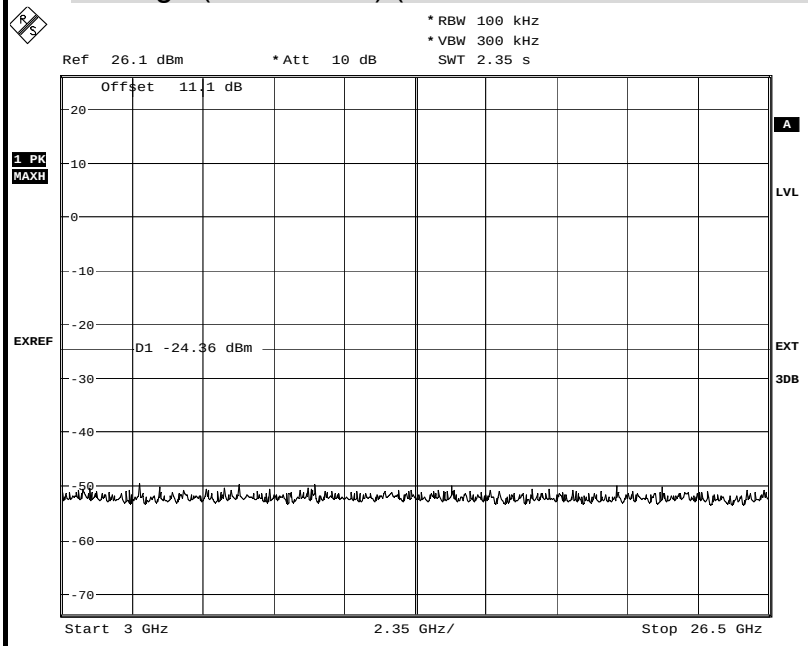
Date: 21.FEB.2013 17:59:57

CH High (30MHz~3GHz) (802.11n HT40 MODE-Chain 1)



Date: 21.FEB.2013 18:00:54

CH High (3~26.5GHz) (802.11n HT40 MODE-Chain 1)



Date: 21.FEB.2013 18:01:09

8.6 RADIATED EMISSIONS

8.6.1 TRANSMITTER RADIATED SUPURIOUS EMSSIONS

LIMITS

§ 15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 -1710	10.6 -12.7
6.26775 - 6.26825	108 -121.94	1718.8 - 1722.2	13.25 -13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 – 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 -16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3338	36.43 - 36.5
12.57675 - 12.57725	322 -335.4	3600 - 4400	([2])
13.36 - 13.41			

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

[2] Above 38.6

§ 15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown is Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§ 15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table :

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz, However, operation within these frequency bands is permitted under other sections of this Part, e-g, Sections 15.231 and 15.241.

§ 15.209 (b) In the emission table above, the tighter limit applies at the band edges.

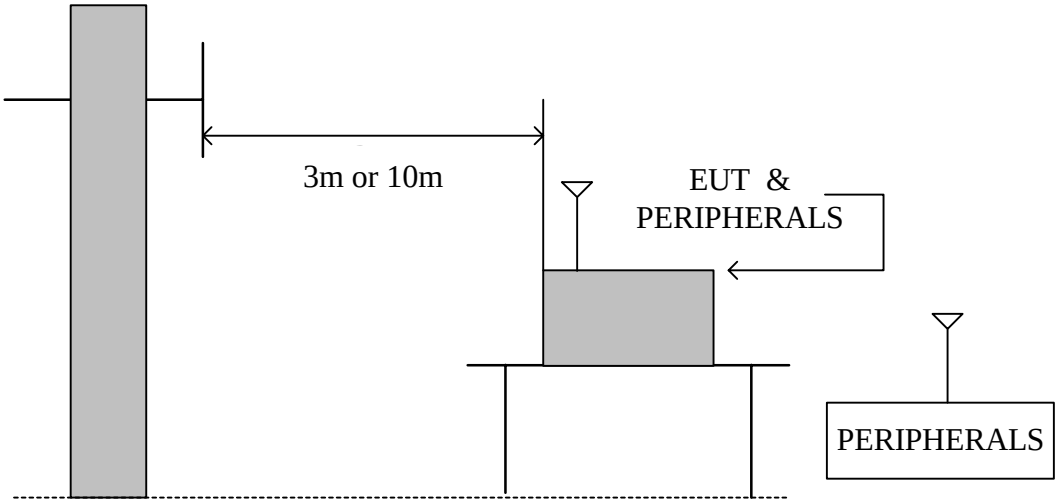
TEST EQUIPMENTS

The following test equipments are utilized in making the measurements contained in this report.

Open Area Test Site # 6				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
TYPE N COAXIAL CABLE	SUHNER	CHA9513	6	DEC. 18, 2013
BI-LOG Antenna	Sunol	JB1	A070506-2	SEP. 26, 2013
LOOP ANTENNA	EMCO	6502	8905-2356	JUN. 10, 2013
Pre-Amplifier	HP	8447F	NCR	NCR
EMI Receiver	R&S	ESVS10	833206/012	JUN. 26, 2013
Horn Antenna	Com-Power	AH-118	071032	DEC. 05, 2013
3116 Double Ridge Antenna (40G)	ETS-LINDGREN	3116	00078900	DEC. 27, 2013
Turn Table	Yo Chen	001	----------	N.C.R.
Antenna Tower	AR	TP1000A	309874	N.C.R.
Controller	CT	SC101	----------	N.C.R.
RF Swicth	E-INSTRUMENT TELH LTD	ERS-180A	EC1204141	N.C.R
Power Meter	Anritsu	ML2487A	6K00003888	MAY. 20, 2013
Power Sensor	Anritsu	MA2491A	33265	MAY. 20, 2013
Temp./Humidity Chamber	K.SON	THS-M1	242	AUG. 08, 2013
DC Power Source	LOKO	DSP-5050	L1507009282	N.C.R
Spectrum Analyzer	R&S	FSU	200789	JUL. 01, 2013
Spectrum Analyzer	R&S	FSEM	830270/015	NCR

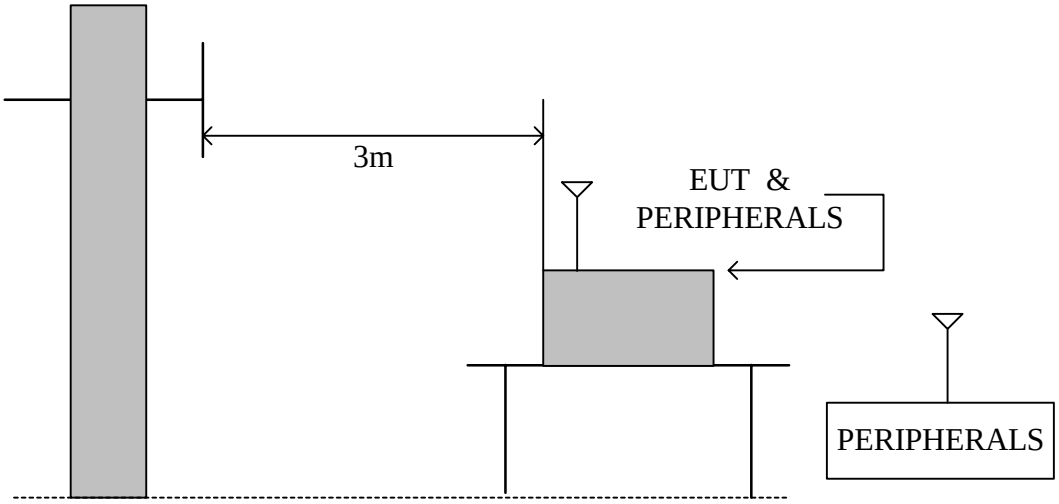
TEST SETUP

The diagram below shows the test setup that is utilized to make the measurements for emission from 30 to 1GHz.



Antenna Elevation Variable

The diagram below shows the test setup that is utilized to make the measurements for emission above 1GHz.



Antenna Elevation Variable

TEST PROCEDURE

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.

b. White measuring the radiated emission below 1GHz, the EUT was set 3/10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. White measuring the radiated emission above 1GHz, the EUT was set 3 meters away from the interference-receiving antenna

c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarization of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

g. The tests were performed in accordance with KDB 558074 5.4 .

NOTE：

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.

2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection and frequency above 1GHz.

3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.

4. No emission is found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz)

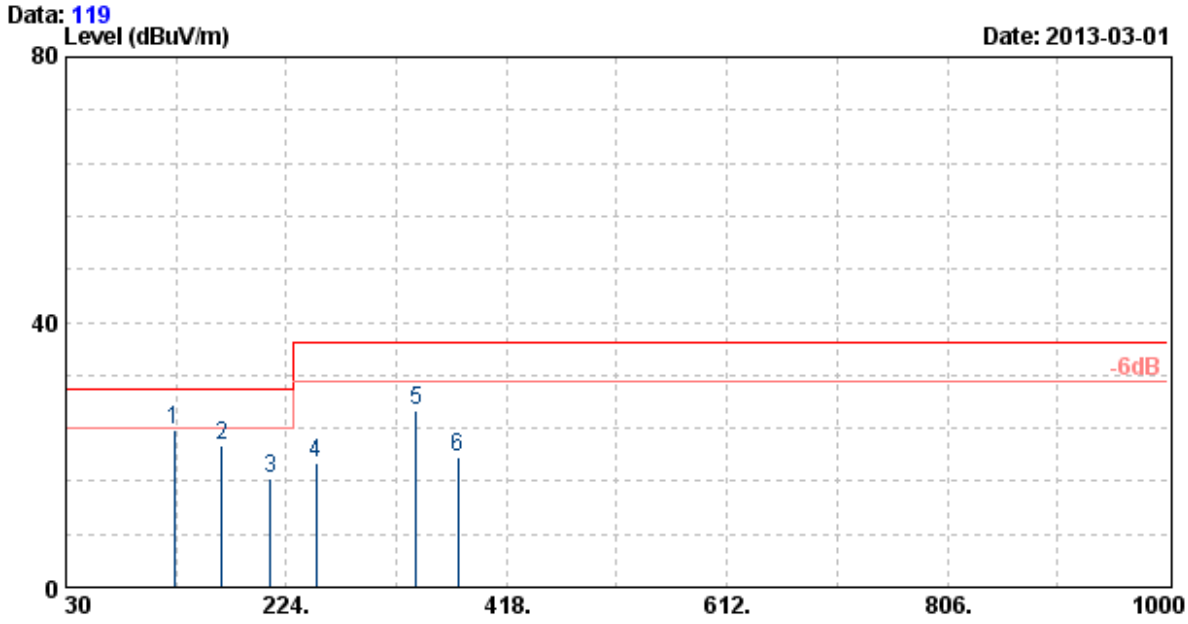
TEST RESULTS

No non-compliance noted.

8.6.2 WORST-CASE RADIATED EMISSION BELOW 1 GHz

Model No.	DIR-508L	**Test Mode**	X axis_NAS mode
Environmental Conditions	27 ℃, 60% RH	**Resolution Bandwidth**	120 kHz
Antenna Pole	Vertical	**Antenna Distance**	10m
Detector Function:	Quasi-peak.	**Tested By**	Ted Huang
Test Site	OATS 5		

(The chart below shows the highest readings taken from the final data.)



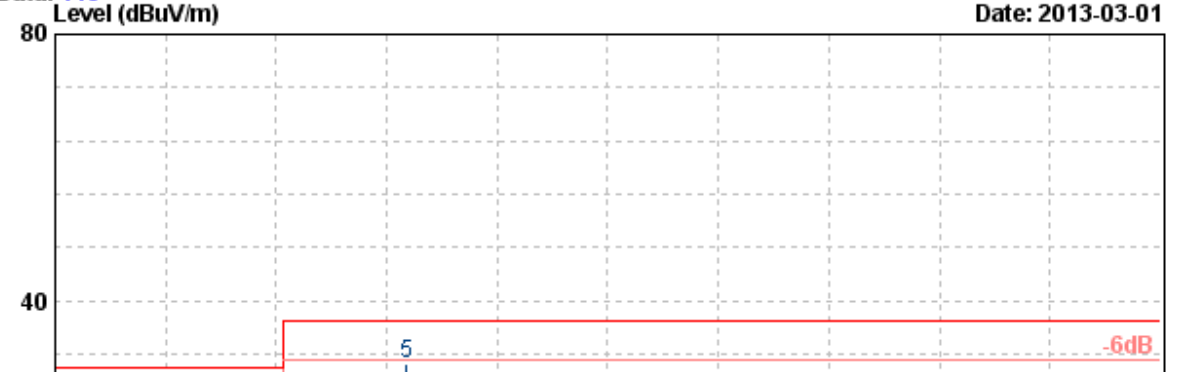
Trace: (Discrete)

Freq. MHz	Reading Level dBuV	Antenna Factor dB/m	Cable Loss dB	Measure Level dBuV/m	Limit dBuV/m	Over Limit dBuV/m	Detector
125.00	7.60	13.68	2.39	23.66	30.00	-6.34	QP
167.63	6.40	12.03	2.86	21.28	30.00	-8.72	QP
210.18	1.40	11.73	3.19	16.32	30.00	-13.68	QP
250.00	3.50	11.87	3.51	18.88	37.00	-18.12	QP
338.45	8.50	14.15	4.04	26.69	37.00	-10.31	QP
375.00	0.50	15.00	4.23	19.72	37.00	-17.28	QP

Note: 1. QP= Quasi-peak Reading.
2. The other emission levels were very low against the limit

Model No.	DIR-508L	**Test Mode**	X axis_NAS mode
Environmental Conditions	27 ℃, 60% RH	**Resolution Bandwidth**	120 kHz
Antenna Pole	Horizontal	**Antenna Distance**	10m
Detector Function	Quasi-peak.	**Tested By**	Ted Huang
Test Site	OATS 5		

(The chart below shows the highest readings taken from the final data.)



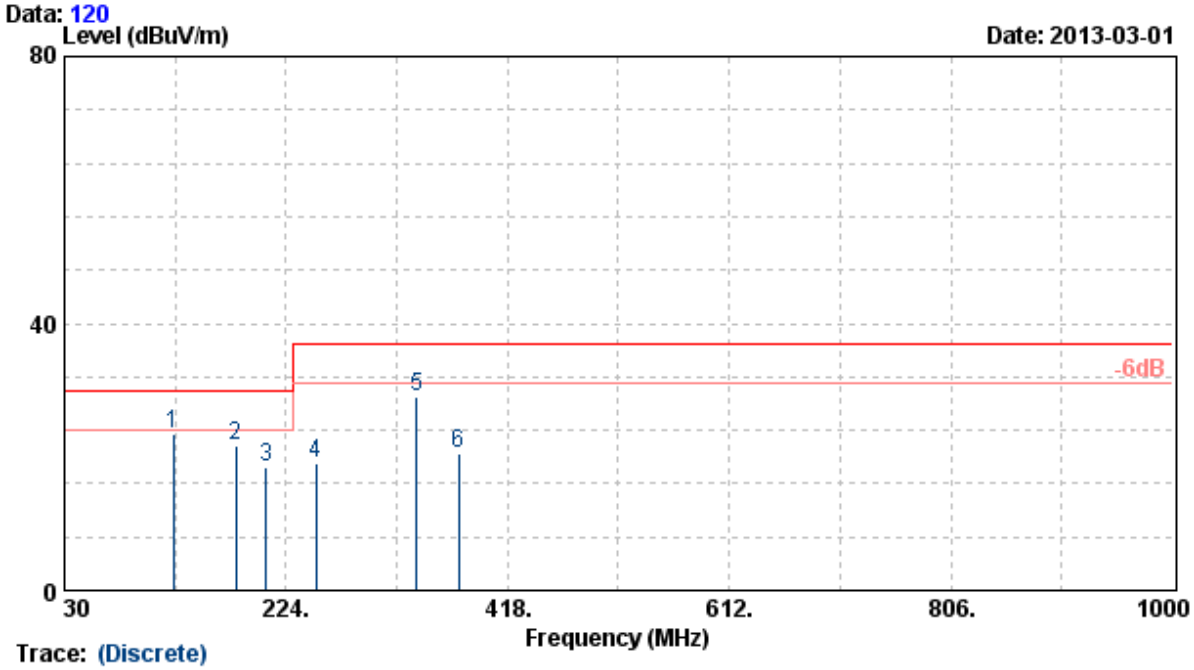
Trace: (Discrete)

Freq. MHz	Reading Level dBuV	Antenna Factor dB/m	Cable Loss dB	Measure Level dBuV/m	Limit dBuV/m	Over Limit dBuV/m	Detector
125.00	0.40	13.68	2.39	16.46	30.00	-13.54	QP
182.03	7.40	11.48	2.97	21.85	30.00	-8.15	QP
209.78	4.80	11.83	3.18	19.81	30.00	-10.19	QP
250.00	3.20	11.87	3.51	18.58	37.00	-18.42	QP
338.55	12.20	14.15	4.04	30.39	37.00	-6.61	QP
375.00	0.50	15.00	4.23	19.72	37.00	-17.28	QP

Note: 1. QP= Quasi-peak Reading.
2. The other emission levels were very low against the limit

Model No.	DIR-508L	**Test Mode**	Y axis_NAS mode
Environmental Conditions	27 ℃, 60% RH	**Resolution Bandwidth**	120 kHz
Antenna Pole	Vertical	**Antenna Distance**	10m
Detector Function:	Quasi-peak.	**Tested By**	Ted Huang
Test Site	OATS 5		

(The chart below shows the highest readings taken from the final data.)



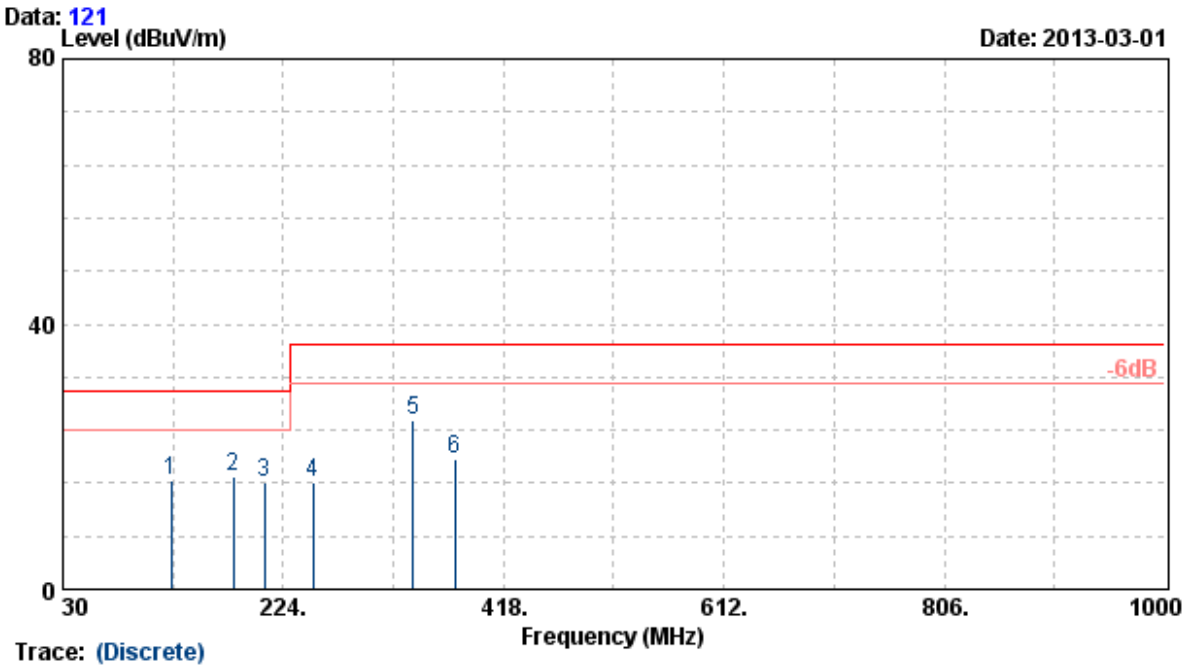
Trace: (Discrete)

Freq. MHz	Reading Level dBuV	Antenna Factor dB/m	Cable Loss dB	Measure Level dBuV/m	Limit dBuV/m	Over Limit dBuV/m	Detector
125.00	7.30	13.68	2.39	23.36	30.00	-6.64	QP
180.20	7.40	11.34	2.95	21.69	30.00	-8.31	QP
206.88	3.25	12.10	3.16	18.51	30.00	-11.49	QP
250.00	3.60	11.87	3.51	18.98	37.00	-18.02	QP
338.45	10.80	14.15	4.04	28.99	37.00	-8.01	QP
375.00	1.20	15.00	4.23	20.42	37.00	-16.58	QP

Note: 1. QP= Quasi-peak Reading.
2. The other emission levels were very low against the limit

Model No.	DIR-508L	**Test Mode**	Y axis_NAS mode
Environmental Conditions	27 ℃, 60% RH	**Resolution Bandwidth**	120 kHz
Antenna Pole	Horizontal	**Antenna Distance**	10m
Detector Function	Quasi-peak.	**Tested By**	Ted Huang
Test Site	OATS 5		

(The chart below shows the highest readings taken from the final data.)



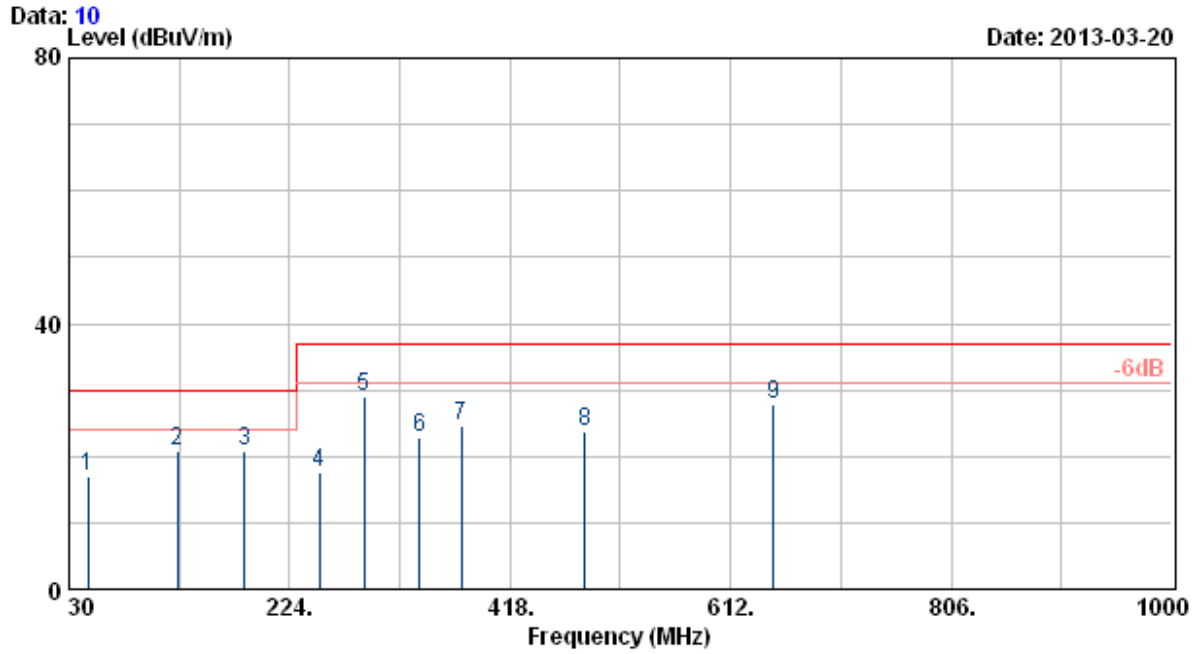
Trace: (Discrete)

Freq. MHz	Reading Level dBuV	Antenna Factor dB/m	Cable Loss dB	Measure Level dBuV/m	Limit dBuV/m	Over Limit dBuV/m	Detector
125.00	0.40	13.68	2.39	16.46	30.00	-13.54	QP
180.20	2.70	11.34	2.95	16.99	30.00	-13.01	QP
207.40	0.80	12.01	3.16	15.97	30.00	-14.03	QP
250.00	0.80	11.87	3.51	16.18	37.00	-20.82	QP
338.45	7.20	14.15	4.04	25.39	37.00	-11.61	QP
375.00	0.40	15.00	4.23	19.62	37.00	-17.38	QP

Note: 1. QP= Quasi-peak Reading.
2. The other emission levels were very low against the limit

Model No.	DIR-508L	**Test Mode**	X axis_3G mode
Environmental Conditions	27 ℃, 60% RH	**Resolution Bandwidth**	120 kHz
Antenna Pole	Vertical	**Antenna Distance**	10m
Detector Function:	Quasi-peak.	**Tested By**	Shiang Su
Test Site	OATS 7		

(The chart below shows the highest readings taken from the final data.)

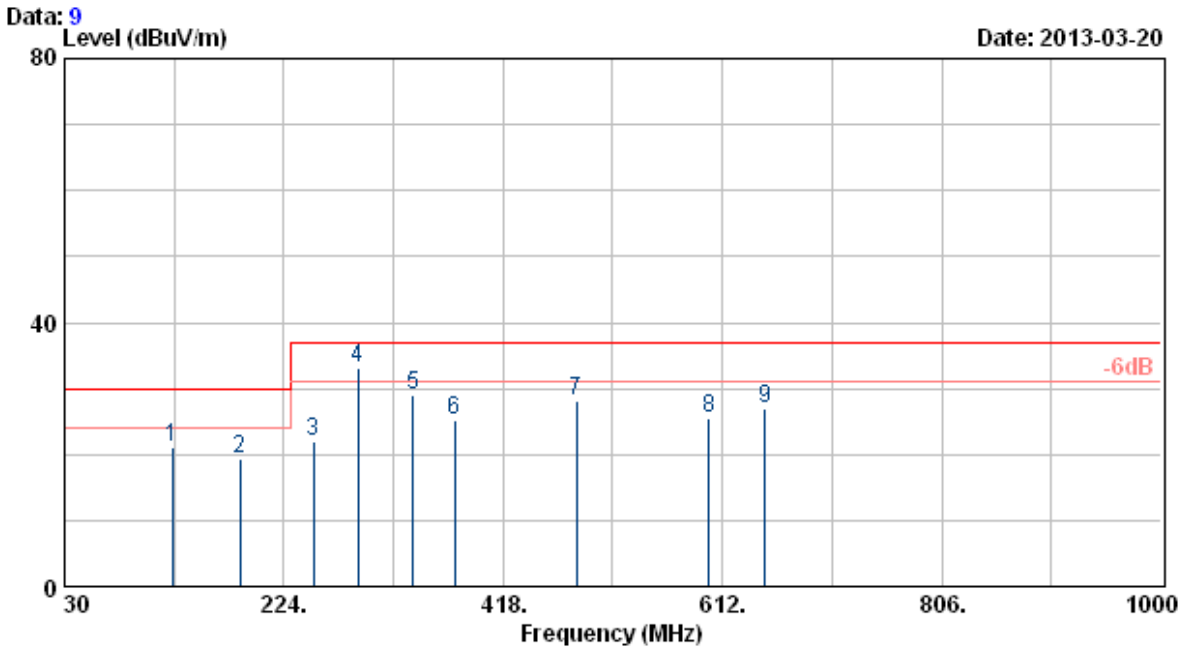


Freq. MHz	Reading Level dBuV	Antenna Factor dB/m	Cable Loss dB	Measure Level dBuV/m	Limit dBuV/m	Over Limit dBuV/m	Detector
46.82	6.48	9.03	1.43	16.94	30.00	-13.06	QP
125.00	4.90	13.67	2.28	20.84	30.00	-9.16	QP
184.59	6.40	11.58	2.88	20.86	30.00	-9.14	QP
250.00	2.10	11.88	3.50	17.48	37.00	-19.52	QP
290.01	11.78	13.47	3.82	29.07	37.00	-7.93	QP
338.46	4.59	14.14	4.21	22.94	37.00	-14.06	QP
375.00	5.10	14.91	4.51	24.51	37.00	-12.49	QP
483.70	0.89	17.41	5.37	23.66	37.00	-13.34	QP
650.00	1.30	19.91	6.55	27.76	37.00	-9.24	QP

Note: 1. QP= Quasi-peak Reading.
2. The other emission levels were very low against the limit

Model No.	DIR-508L	**Test Mode**	X axis_3G mode
Environmental Conditions	26.3 ℃, 47% RH	**Resolution Bandwidth**	120 kHz
Antenna Pole	Horizontal	**Antenna Distance**	10m
Detector Function	Quasi-peak.	**Tested By**	Shiang Su
Test Site	OATS 7		

(The chart below shows the highest readings taken from the final data.)

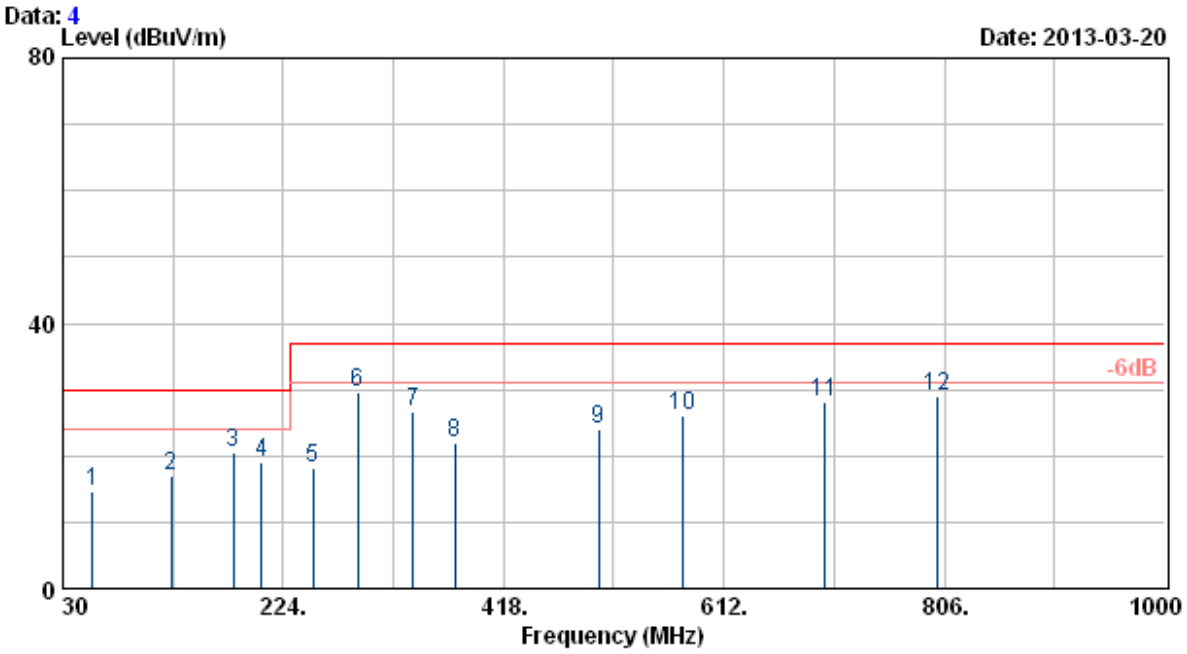


Freq. MHz	Reading Level dBuV	Antenna Factor dB/m	Cable Loss dB	Measure Level dBuV/m	Limit dBuV/m	Over Limit dBuV/m	Detector
125.00	5.30	13.67	2.28	21.24	30.00	-8.76	QP
185.46	4.72	11.66	2.90	19.28	30.00	-10.73	QP
250.00	6.70	11.80	3.50	22.00	37.00	-15.00	QP
290.00	15.87	13.47	3.82	33.15	37.00	-3.85	QP
338.46	10.78	14.14	4.21	29.13	37.00	-7.87	QP
375.00	5.72	14.91	4.51	25.13	37.00	-11.87	QP
483.34	5.47	17.39	5.36	28.22	37.00	-8.78	QP
600.00	0.57	18.55	6.30	25.42	37.00	-11.58	QP
650.00	0.37	19.91	6.55	26.83	37.00	-10.17	QP

Note: 1. QP= Quasi-peak Reading.
2. The other emission levels were very low against the limit

Model No.	DIR-508L	**Test Mode**	Y axis_3G mode
Environmental Conditions	26.3 ℃, 47% RH	**Resolution Bandwidth**	120 kHz
Antenna Pole	Vertical	**Antenna Distance**	10m
Detector Function:	Quasi-peak.	**Tested By**	Shiang Su
Test Site	OATS 7		

(The chart below shows the highest readings taken from the final data.)

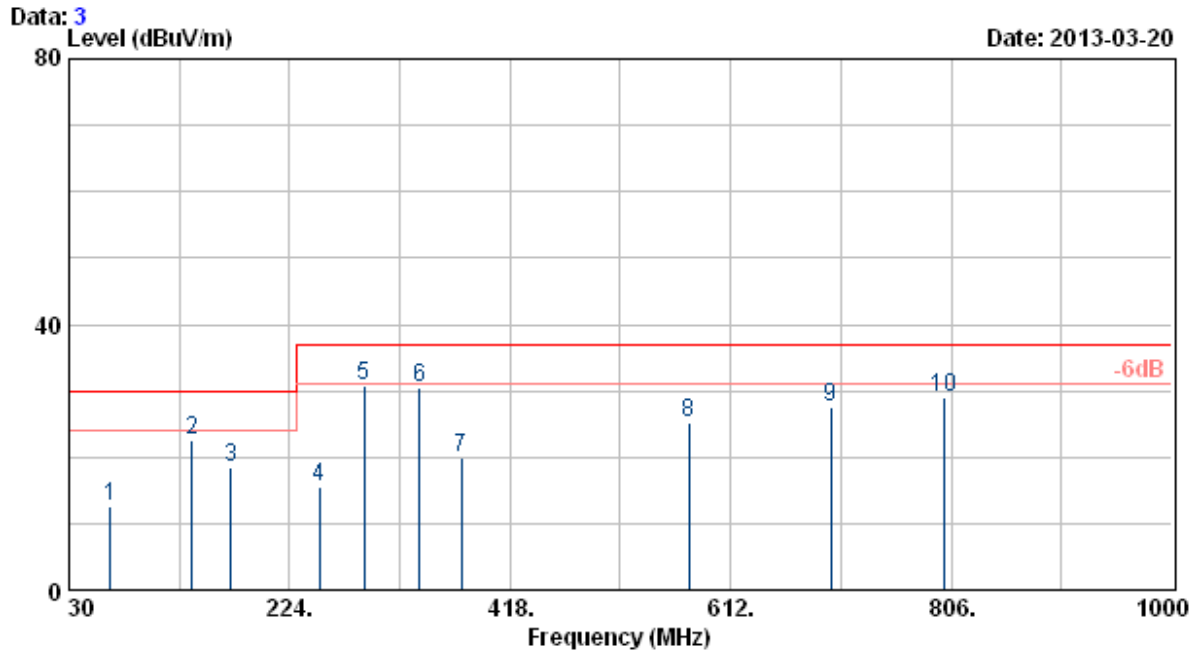


Freq. MHz	Reading Level dBuV	Antenna Factor dB/m	Cable Loss dB	Measure Level dBuV/m	Limit dBuV/m	Over Limit dBuV/m	Detector
56.25	5.32	7.72	1.56	14.60	30.00	-15.40	QP
125.00	0.99	13.67	2.28	16.93	30.00	-13.07	QP
180.12	6.51	11.29	2.80	20.60	30.00	-9.40	QP
205.00	3.57	12.28	3.23	19.08	30.00	-10.92	QP
250.00	2.67	11.88	3.50	18.05	37.00	-18.95	QP
290.00	12.39	13.47	3.82	29.68	37.00	-7.32	QP
338.25	8.37	14.14	4.21	26.72	37.00	-10.28	QP
375.00	2.50	14.91	4.51	21.91	37.00	-15.09	QP
502.00	0.80	17.71	5.52	24.03	37.00	-12.97	QP
575.00	1.61	18.44	6.10	26.14	37.00	-10.86	QP
700.00	0.89	20.37	6.80	28.06	37.00	-8.94	QP
800.00	0.26	21.19	7.60	29.05	37.00	-7.95	QP

Note: 1. QP= Quasi-peak Reading.
2. The other emission levels were very low against the limit

Model No.	DIR-508L	**Test Mode**	Y axis_3G mode
Environmental Conditions	26.3 ℃, 47% RH	**Resolution Bandwidth**	120 kHz
Antenna Pole	Horizontal	**Antenna Distance**	10m
Detector Function	Quasi-peak.	**Tested By**	Shiang Su
Test Site	OATS 7		

(The chart below shows the highest readings taken from the final data.)



Freq. MHz	Reading Level dBuV	Antenna Factor dB/m	Cable Loss dB	Measure Level dBuV/m	Limit dBuV/m	Over Limit dBuV/m	Detector
66.54	2.83	8.10	1.67	12.60	30.00	-17.40	QP
138.44	7.14	12.99	2.49	22.61	30.00	-7.39	QP
172.27	4.11	11.67	2.69	18.47	30.00	-11.53	QP
250.00	0.21	11.80	3.50	15.51	37.00	-21.49	QP
290.02	13.53	13.47	3.82	30.82	37.00	-6.18	QP
338.33	12.25	14.14	4.21	30.60	37.00	-6.40	QP
375.00	0.38	14.91	4.51	19.79	37.00	-17.21	QP
575.00	0.76	18.44	6.10	25.29	37.00	-11.71	QP
700.00	0.37	20.37	6.80	27.54	37.00	-9.46	QP
800.00	0.13	21.19	7.60	28.92	37.00	-8.08	QP

Note: 1. QP= Quasi-peak Reading.
2. The other emission levels were very low against the limit

8.6.3 TRANSMITTER RADIATED EMISSION ABOVE 1 GHz

Product Name	N300 Portable Router and Chargerr	Test Date	2013/02/25
Model	DIR-508L	Test By	John Chen
Test Mode	IEEE 802.11b TX (CH Low)	TEMP& Humidity	22.4℃, 62%

	TX / IEEE 802.11b mode / CH Low				Measurement Distance at 3m				Horizontal polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1000.00	52.76	24.80	1.72	45.10	0.30	34.48	74.00	-39.52	P
*	1000.00	44.39	24.80	1.72	45.10	0.30	26.11	54.00	-27.89	A
*	4824.07	62.57	33.47	3.84	45.07	0.40	55.20	74.00	-18.80	P
*	4824.07	58.13	33.47	3.84	45.07	0.40	50.76	54.00	-3.24	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

	TX / IEEE 802.11b mode / CH Low				Measurement Distance at 3m				Vertical polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1000.00	54.95	24.80	1.72	45.10	0.30	36.67	74.00	-37.33	P
*	1000.00	46.72	24.80	1.72	45.10	0.30	28.44	54.00	-25.56	A
*	4824.03	63.95	33.47	3.84	45.07	0.40	56.58	74.00	-17.42	P
*	4824.03	59.64	33.47	3.84	45.07	0.40	52.27	54.00	-1.73	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

REMARK:

1. *AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: 2.4GHz~2.5GHz Filter Insertion Loss*
2. *Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz*
3. *The result basic equation calculation is as follow:*
   Level = Reading + AF + Cable – Preamp + Filter , Margin = Level-Limit
4. *The other emission levels were 20dB below the limit*
5. *The test limit distance is 3M limit.*

Product Name	N300 Portable Router and Charger	Test Date	2013/02/25
Model	DIR-508L	Test By	John Chen
Test Mode	IEEE 802.11b TX (CH Middle)	TEMP& Humidity	22.4℃, 62%

	TX / IEEE 802.11b mode / CH Middle				Measurement Distance at 3m				Horizontal polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1000.05	53.14	24.80	1.72	45.10	0.30	34.86	74.00	-39.14	P
*	1000.05	44.59	24.80	1.72	45.10	0.30	26.31	54.00	-27.69	A
*	4874.08	63.15	33.65	3.85	45.13	0.40	55.92	74.00	-18.08	P
*	4874.08	58.70	33.65	3.85	45.13	0.40	51.47	54.00	-2.53	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

I

	TX / IEEE 802.11b mode / CH Middle				Measurement Distance at 3m				Vertical polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1000.03	55.39	24.80	1.72	45.10	0.30	37.11	74.00	-36.89	P
*	1000.03	47.06	24.80	1.72	45.10	0.30	28.78	54.00	-25.22	A
*	4874.16	63.83	33.65	3.85	45.13	0.40	56.60	74.00	-17.40	P
*	4874.16	59.18	33.65	3.85	45.13	0.40	51.95	54.00	-2.05	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

REMARK:

1. *AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: 2.4GHz~2.5GHz Filter Insertion Loss*
2. *Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz*
3. *The result basic equation calculation is as follow:*
   Level = Reading + AF + Cable – Preamp + Filter , Margin = Level-Limit
4. *The other emission levels were 20dB below the limit*
5. *The test limit distance is 3M limit.*

Product Name	N300 Portable Router and Charger	Test Date	2013/02/25
Model	DIR-508L	Test By	John Chen
Test Mode	IEEE 802.11b TX (CH High)	TEMP& Humidity	22.4℃, 62%

	TX / IEEE 802.11b mode / CH High				Measurement Distance at 3m				Horizontal polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1000.05	52.67	24.80	1.72	45.10	0.30	34.39	74.00	-39.61	P
*	1000.05	44.36	24.80	1.72	45.10	0.30	26.08	54.00	-27.92	A
*	4924.11	61.91	33.83	3.86	45.18	0.40	54.82	74.00	-19.18	P
*	4924.11	57.21	33.83	3.86	45.18	0.40	50.12	54.00	-3.88	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

	TX / IEEE 802.11b mode / CH High				Measurement Distance at 3m				Vertical polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1000.01	54.75	24.80	1.72	45.10	0.30	36.47	74.00	-37.53	P
*	1000.01	46.28	24.80	1.72	45.10	0.30	28.00	54.00	-26.00	A
*	4924.02	63.27	33.83	3.86	45.18	0.40	56.18	74.00	-17.82	P
*	4924.02	59.41	33.83	3.86	45.18	0.40	52.32	54.00	-1.68	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

REMARK:

1. *AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: 2.4GHz~2.5GHz Filter Insertion Loss*
2. *Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz*
3. *The result basic equation calculation is as follow:*
   Level = Reading + AF + Cable – Preamp + Filter , Margin = Level-Limit
4. *The other emission levels were 20dB below the limit*
5. *The test limit distance is 3M limit.*

Product Name	N300 Portable Router and Charger	Test Date	2013/02/25
Model	DIR-508L	Test By	John Chen
Test Mode	IEEE 802.11g TX (CH Low)	TEMP& Humidity	22.4℃, 62%

	TX / IEEE 802.11g mode / CH Low				Measurement Distance at 3m				Horizontal polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1000.00	52.94	24.80	1.72	45.10	0.30	34.66	74.00	-39.34	P
*	1000.00	45.37	24.80	1.72	45.10	0.30	27.09	54.00	-26.91	A
*	4824.00	60.57	33.47	3.84	45.07	0.40	53.20	74.00	-20.80	P
*	4824.00	49.38	33.47	3.84	45.07	0.40	42.01	54.00	-11.99	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

	TX / IEEE 802.11g mode / CH Low				Measurement Distance at 3m				Vertical polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1000.00	56.91	24.80	1.72	45.10	0.30	38.63	74.00	-35.37	P
*	1000.00	48.05	24.80	1.72	45.10	0.30	29.77	54.00	-24.23	A
*	4824.04	61.84	33.47	3.84	45.07	0.40	54.47	74.00	-19.53	P
*	4824.04	50.96	33.47	3.84	45.07	0.40	43.59	54.00	-10.41	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

REMARK:

1. *AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: 2.4GHz~2.5GHz Filter Insertion Loss*
2. *Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz*
3. *The result basic equation calculation is as follow:*
   Level = Reading + AF + Cable – Preamp + Filter , Margin = Level-Limit
4. *The other emission levels were 20dB below the limit*
5. *The test limit distance is 3M limit.*

Product Name	N300 Portable Router and Charger	Test Date	2013/02/25
Model	DIR-508L	Test By	John Chen
Test Mode	IEEE 802.11g TX (CH Middle)	TEMP& Humidity	22.4℃, 62%

	TX / IEEE 802.11g mode / CH Middle				Measurement Distance at 3m				Horizontal polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1000.02	53.14	24.80	1.72	45.10	0.30	34.86	74.00	-39.14	P
*	1000.02	45.92	24.80	1.72	45.10	0.30	27.64	54.00	-26.36	A
*	4874.08	60.90	33.65	3.85	45.13	0.40	53.67	74.00	-20.33	P
*	4874.08	50.03	33.65	3.85	45.13	0.40	42.80	54.00	-11.20	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

	TX / IEEE 802.11g mode / CH Middle				Measurement Distance at 3m				Vertical polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1000.00	55.71	24.80	1.72	45.10	0.30	37.43	74.00	-36.57	P
*	1000.00	47.36	24.80	1.72	45.10	0.30	29.08	54.00	-24.92	A
*	4874.06	62.39	33.65	3.85	45.13	0.40	55.16	74.00	-18.84	P
*	4874.06	51.44	33.65	3.85	45.13	0.40	44.21	54.00	-9.79	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

REMARK:

1. *AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: 2.4GHz~2.5GHz Filter Insertion Loss*
2. *Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz*
3. *The result basic equation calculation is as follow:*
   Level = Reading + AF + Cable – Preamp + Filter , Margin = Level-Limit
4. *The other emission levels were 20dB below the limit*
5. *The test limit distance is 3M limit.*

Product Name	N300 Portable Router and Charger	Test Date	2013/02/25
Model	DIR-508L	Test By	John Chen
Test Mode	IEEE 802.11g TX (CH High)	TEMP& Humidity	22.4℃, 62%

	TX / IEEE 802.11g mode / CH High				Measurement Distance at 3m				Horizontal polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1000.00	53.62	24.80	1.72	45.10	0.30	35.34	74.00	-38.66	P
*	1000.00	45.70	24.80	1.72	45.10	0.30	27.42	54.00	-26.58	A
*	4924.02	60.13	33.83	3.86	45.18	0.40	53.04	74.00	-20.96	P
*	4924.02	48.85	33.83	3.86	45.18	0.40	41.76	54.00	-12.24	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

	TX / IEEE 802.11g mode / CH High				Measurement Distance at 3m				Vertical polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1000.02	55.42	24.80	1.72	45.10	0.30	37.14	74.00	-36.86	P
	1000.02	46.81	24.80	1.72	45.10	0.30	28.53	54.00	-25.47	A
*	4924.02	62.35	33.83	3.86	45.18	0.40	55.26	74.00	-18.74	P
*	4924.02	50.66	33.83	3.86	45.18	0.40	43.57	54.00	-10.43	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

REMARK:

1. *AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: 2.4GHz~2.5GHz Filter Insertion Loss*
2. *Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz*
3. *The result basic equation calculation is as follow:*
   Level = Reading + AF + Cable – Preamp + Filter , Margin = Level-Limit
4. *The other emission levels were 20dB below the limit*
5. *The test limit distance is 3M limit.*

Product Name	N300 Portable Router and Charger	Test Date	2013/02/25
Model	DIR-508L	Test By	John Chen
Test Mode	IEEE 802.11n HT20 TX (CH Low)	TEMP& Humidity	22.4℃, 62%

	TX / IEEE 802.11n HT20 mode / CH Low				Measurement Distance at 3m				Horizontal polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1000.03	53.14	24.80	1.72	45.10	0.30	34.86	74.00	-39.14	P
*	1000.03	44.95	24.80	1.72	45.10	0.30	26.67	54.00	-27.33	A
*	4824.05	64.88	33.47	3.84	45.07	0.40	57.51	74.00	-16.49	P
*	4824.05	53.18	33.47	3.84	45.07	0.40	45.81	54.00	-8.19	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

	TX / IEEE 802.11n HT20 mode / CH Low				Measurement Distance at 3m				Vertical polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1000.00	56.15	24.80	1.72	45.10	0.30	37.87	74.00	-36.13	P
*	1000.00	47.66	24.80	1.72	45.10	0.30	29.38	54.00	-24.62	A
*	4823.49	65.73	33.46	3.84	45.07	0.40	58.36	74.00	-15.64	P
*	4823.49	54.36	33.46	3.84	45.07	0.40	46.99	54.00	-7.01	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

REMARK:

1. *AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: 2.4GHz~2.5GHz Filter Insertion Loss*
2. *Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz*
3. *The result basic equation calculation is as follow:*
   Level = Reading + AF + Cable – Preamp + Filter , Margin = Level-Limit
4. *The other emission levels were 20dB below the limit*
5. *The test limit distance is 3M limit.*

Product Name	N300 Portable Router and Charger	Test Date	2013/02/25
Model	DIR-508L	Test By	John Chen
Test Mode	IEEE 802.11n HT20 TX (CH Middle)	TEMP& Humidity	22.4℃, 62%

	TX / IEEE 802.11n HT20 mode / CH Middle				Measurement Distance at 3m				Horizontal polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1000.00	54.62	24.80	1.72	45.10	0.30	36.34	74.00	-37.66	P
*	1000.00	45.16	24.80	1.72	45.10	0.30	26.88	54.00	-27.12	A
*	4874.10	65.88	33.65	3.85	45.13	0.40	58.65	74.00	-15.35	P
*	4874.10	53.40	33.65	3.85	45.13	0.40	46.17	54.00	-7.83	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

	TX / IEEE 802.11n HT20 mode / CH Middle				Measurement Distance at 3m				Vertical polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1000.01	55.14	24.80	1.72	45.10	0.30	36.86	74.00	-37.14	P
*	1000.01	47.39	24.80	1.72	45.10	0.30	29.11	54.00	-24.89	A
*	4874.08	64.62	33.65	3.85	45.13	0.40	57.39	74.00	-16.61	P
*	4874.08	55.13	33.65	3.85	45.13	0.40	47.90	54.00	-6.10	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

REMARK:

1. *AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: 2.4GHz~2.5GHz Filter Insertion Loss*
2. *Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz*
3. *The result basic equation calculation is as follow:*
   Level = Reading + AF + Cable – Preamp + Filter , Margin = Level-Limit
4. *The other emission levels were 20dB below the limit*
5. *The test limit distance is 3M limit.*

Product Name	N300 Portable Router and Charger	Test Date	2013/02/25
Model	DIR-508L	Test By	John Chen
Test Mode	IEEE 802.11n HT20 TX (CH High)	TEMP& Humidity	22.4℃, 62%

	TX / IEEE 802.11n HT20 mode / CH High				Measurement Distance at 3m				Horizontal polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1000.04	53.28	24.80	1.72	45.10	0.30	35.00	74.00	-39.00	P
*	1000.04	44.49	24.80	1.72	45.10	0.30	26.21	54.00	-27.79	A
*	4924.13	63.67	33.83	3.86	45.18	0.40	56.58	74.00	-17.42	P
*	4924.13	52.84	33.83	3.86	45.18	0.40	45.75	54.00	-8.25	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

	TX / IEEE 802.11n HT20 mode / CH High				Measurement Distance at 3m				Vertical polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1000.01	55.27	24.80	1.72	45.10	0.30	36.99	74.00	-37.01	P
*	1000.01	47.09	24.80	1.72	45.10	0.30	28.81	54.00	-25.19	A
*	4924.06	64.16	33.83	3.86	45.18	0.40	57.07	74.00	-16.93	P
*	4924.06	54.30	33.83	3.86	45.18	0.40	47.21	54.00	-6.79	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

REMARK:

1. *AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: 2.4GHz~2.5GHz Filter Insertion Loss*
2. *Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz*
3. *The result basic equation calculation is as follow:*
   Level = Reading + AF + Cable – Preamp + Filter , Margin = Level-Limit
4. *The other emission levels were 20dB below the limit*
5. *The test limit distance is 3M limit.*

Product Name	N300 Portable Router and Charger	Test Date	2013/02/25
Model	DIR-508L	Test By	John Chen
Test Mode	IEEE 802.11n HT40 TX (CH Low)	TEMP& Humidity	22.4℃, 62%

	TX / IEEE 802.11n HT40 mode / CH Low				Measurement Distance at 3m				Horizontal polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1000.04	53.87	24.80	1.72	45.10	0.30	35.59	74.00	-38.41	P
*	1000.04	45.10	24.80	1.72	45.10	0.30	26.82	54.00	-27.18	A
*	4844.05	59.14	33.54	3.84	45.09	0.40	51.83	74.00	-22.17	P
*	4844.05	48.39	33.54	3.84	45.09	0.40	41.08	54.00	-12.92	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

	TX / IEEE 802.11n HT40 mode / CH Low				Measurement Distance at 3m				Vertical polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1000.00	56.91	24.80	1.72	45.10	0.30	38.63	74.00	-35.37	P
*	1000.00	48.02	24.80	1.72	45.10	0.30	29.74	54.00	-24.26	A
*	4843.52	60.08	33.54	3.84	45.09	0.40	52.76	74.00	-21.24	P
*	4843.52	49.22	33.54	3.84	45.09	0.40	41.90	54.00	-12.10	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

REMARK:

1. *AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: 2.4GHz~2.5GHz Filter Insertion Loss*
2. *Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz*
3. *The result basic equation calculation is as follow:*
   Level = Reading + AF + Cable – Preamp + Filter , Margin = Level-Limit
4. *The other emission levels were 20dB below the limit*
5. *The test limit distance is 3M limit.*

Product Name	N300 Portable Router and Charger	Test Date	2013/02/25
Model	DIR-508L	Test By	John Chen
Test Mode	IEEE 802.11n HT40 TX (CH Middle)	TEMP& Humidity	22.4℃, 62%

	TX / IEEE 802.11n HT40 mode / CH Middle				Measurement Distance at 3m				Horizontal polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1000.02	53.62	24.80	1.72	45.10	0.30	35.34	74.00	-38.66	P
*	1000.02	45.81	24.80	1.72	45.10	0.30	27.53	54.00	-26.47	A
*	4873.86	60.65	33.65	3.85	45.13	0.40	53.42	74.00	-20.58	P
*	4873.86	49.13	33.65	3.85	45.13	0.40	41.90	54.00	-12.10	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

	TX / IEEE 802.11n HT40 mode / CH Middle				Measurement Distance at 3m				Vertical polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1000.01	55.15	24.80	1.72	45.10	0.30	36.87	74.00	-37.13	P
*	1000.01	47.00	24.80	1.72	45.10	0.30	28.72	54.00	-25.28	A
*	4873.94	61.22	33.65	3.85	45.13	0.40	53.99	74.00	-20.01	P
*	4873.94	49.87	33.65	3.85	45.13	0.40	42.64	54.00	-11.36	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

REMARK:

1. *AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: 2.4GHz~2.5GHz Filter Insertion Loss*
2. *Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz*
3. *The result basic equation calculation is as follow:*
   Level = Reading + AF + Cable – Preamp + Filter , Margin = Level-Limit
4. *The other emission levels were 20dB below the limit*
5. *The test limit distance is 3M limit.*

Product Name	N300 Portable Router and Charger	Test Date	2013/02/25
Model	DIR-508L	Test By	John Chen
Test Mode	IEEE 802.11n HT40 TX (CH High)	TEMP& Humidity	22.4℃, 62%

	TX / IEEE 802.11n HT40 mode / CH High				Measurement Distance at 3m				Horizontal polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1000.02	54.13	24.80	1.72	45.10	0.30	35.85	74.00	-38.15	P
*	1000.02	45.46	24.80	1.72	45.10	0.30	27.18	54.00	-26.82	A
*	4904.26	58.91	33.76	3.86	45.16	0.40	51.76	74.00	-22.24	P
*	4904.26	48.02	33.76	3.86	45.16	0.40	40.87	54.00	-13.13	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

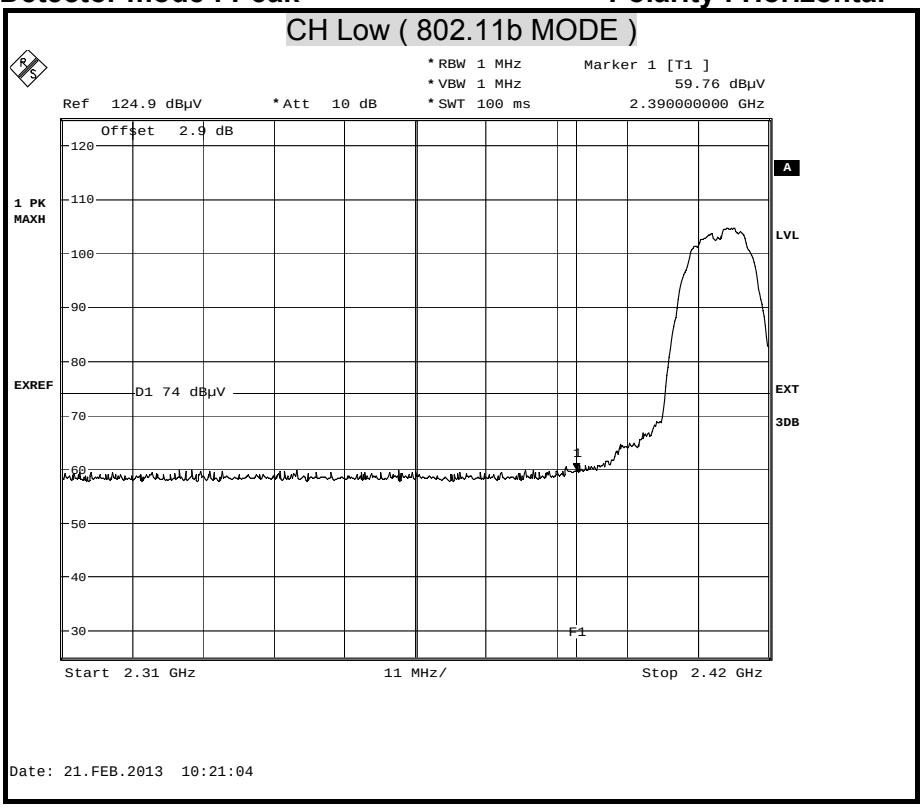
	TX / IEEE 802.11n HT40 mode / CH High				Measurement Distance at 3m				Vertical polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	1000.02	57.46	24.80	1.72	45.10	0.30	39.18	74.00	-34.82	P
*	1000.02	48.39	24.80	1.72	45.10	0.30	30.11	54.00	-23.89	A
*	4903.77	60.28	33.75	3.86	45.16	0.40	53.13	74.00	-20.87	P
*	4903.77	50.57	33.75	3.86	45.16	0.40	43.42	54.00	-10.58	A
	N/A	------	------	------	------	------	------	------	------	P
	N/A	------	------	------	------	------	------	------	------	A

REMARK:

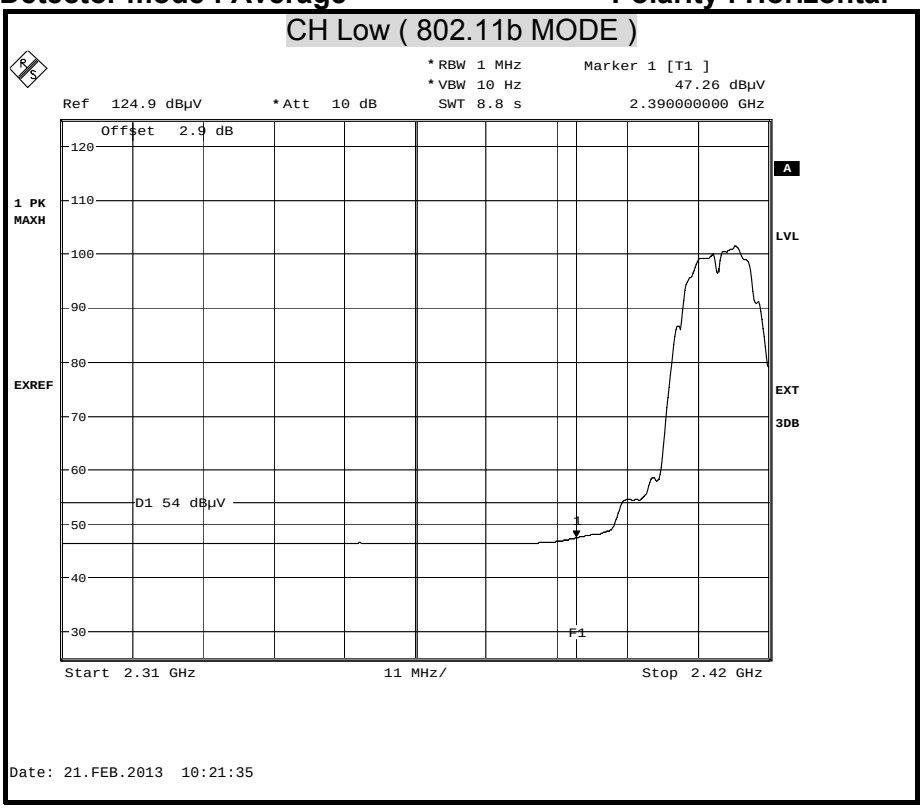
1. *AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: 2.4GHz~2.5GHz Filter Insertion Loss*
2. *Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz*
3. *The result basic equation calculation is as follow:*
   Level = Reading + AF + Cable – Preamp + Filter , Margin = Level-Limit
4. *The other emission levels were 20dB below the limit*
5. *The test limit distance is 3M limit.*

8.6.4 RESTRICTED BAND EDGES

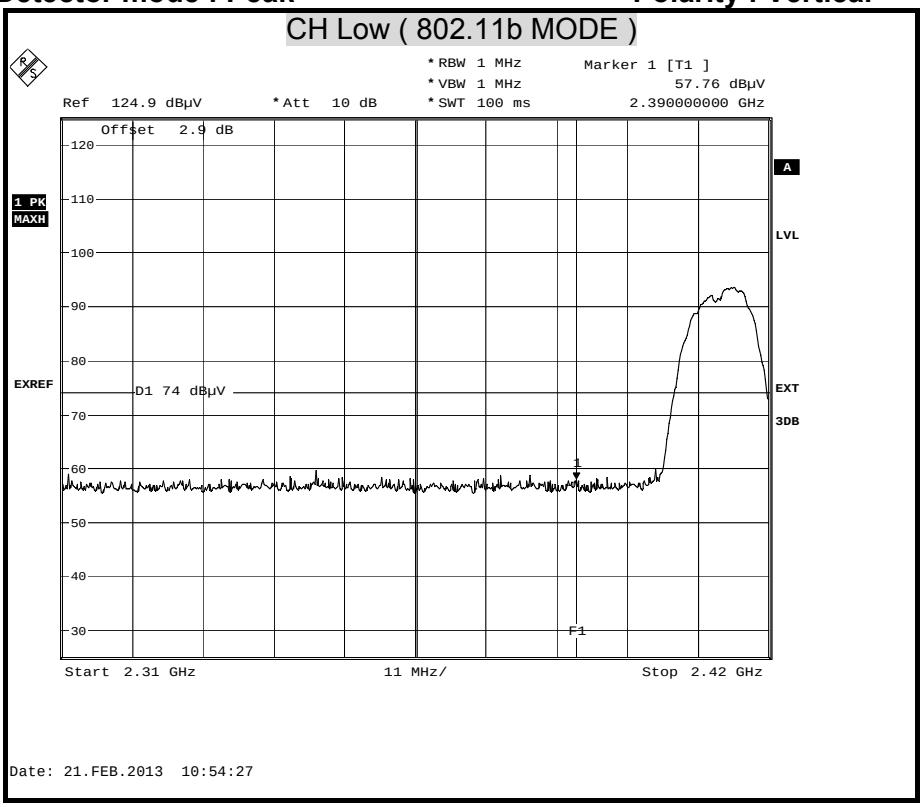
Detector mode : Peak **Polarity : Horizontal**



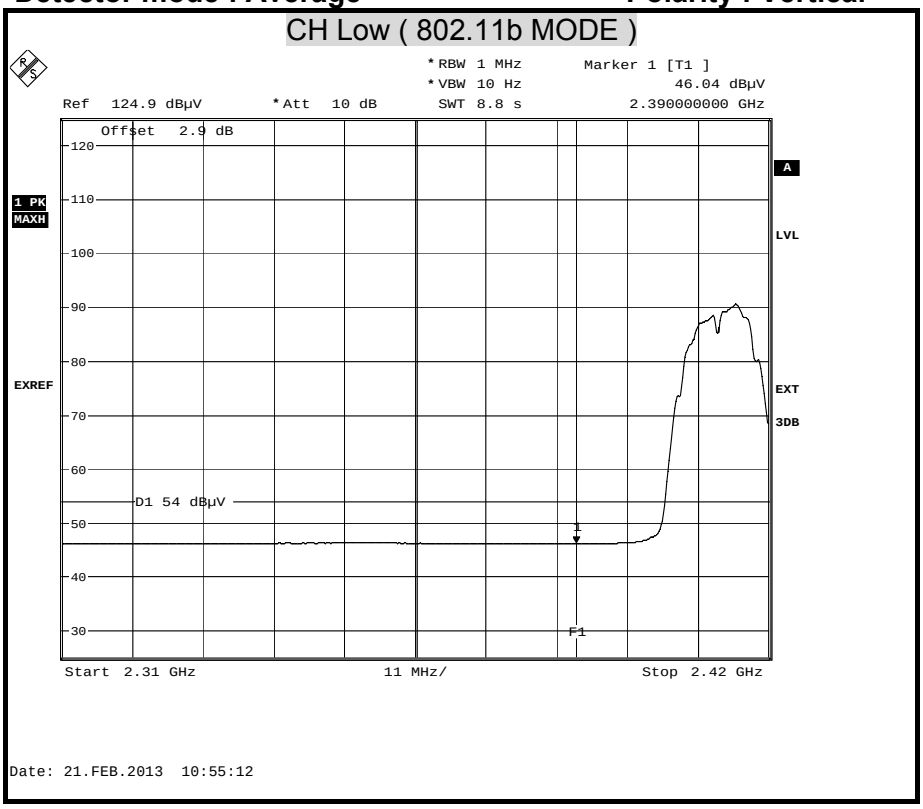
Detector mode : Average **Polarity : Horizontal**



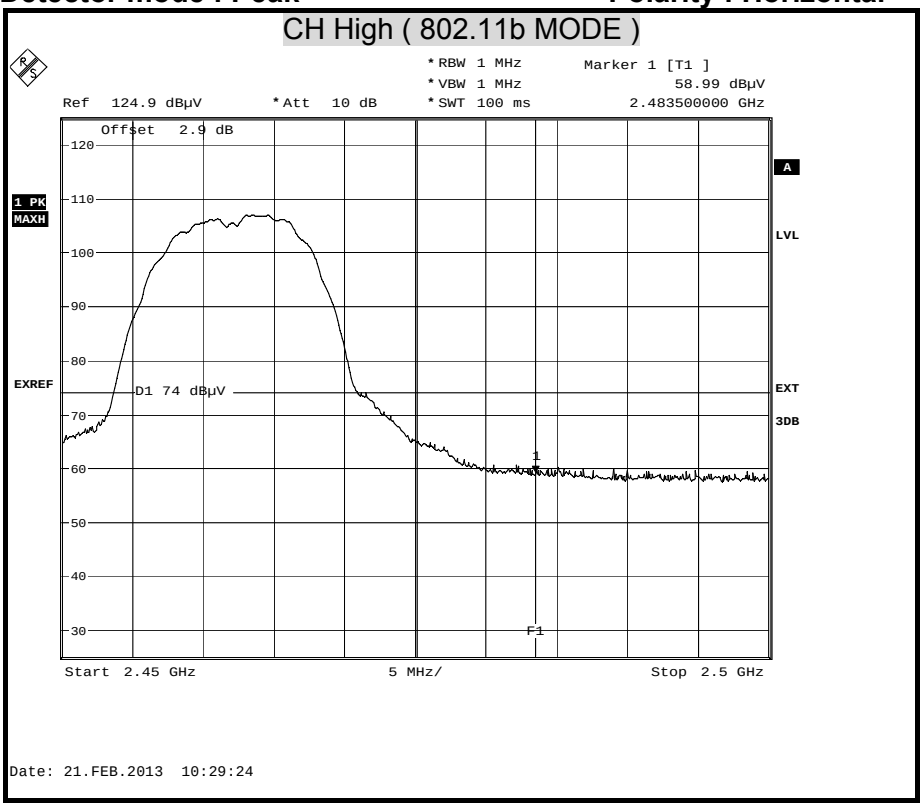
Detector mode : Peak **Polarity : Vertical**



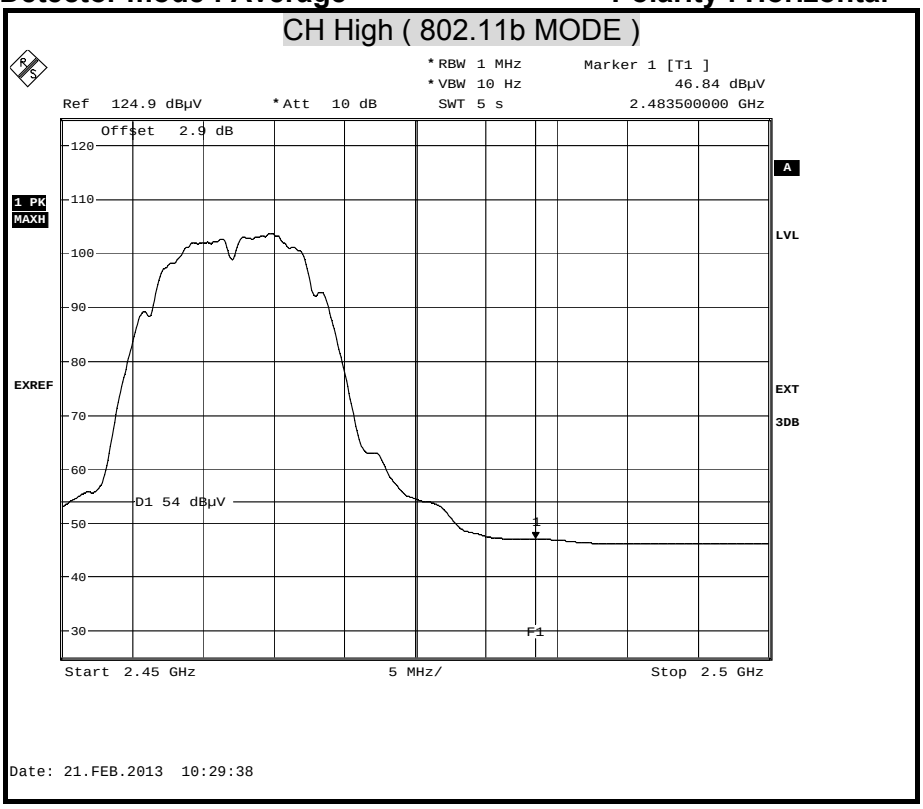
Detector mode : Average **Polarity : Vertical**



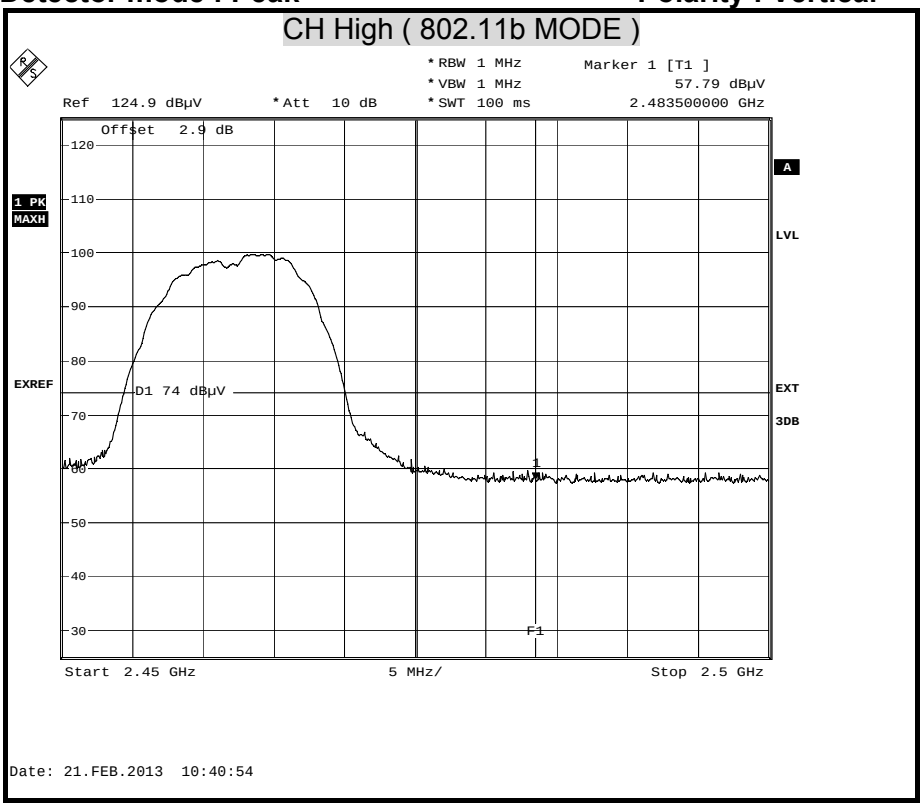
Detector mode : Peak **Polarity : Horizontal**



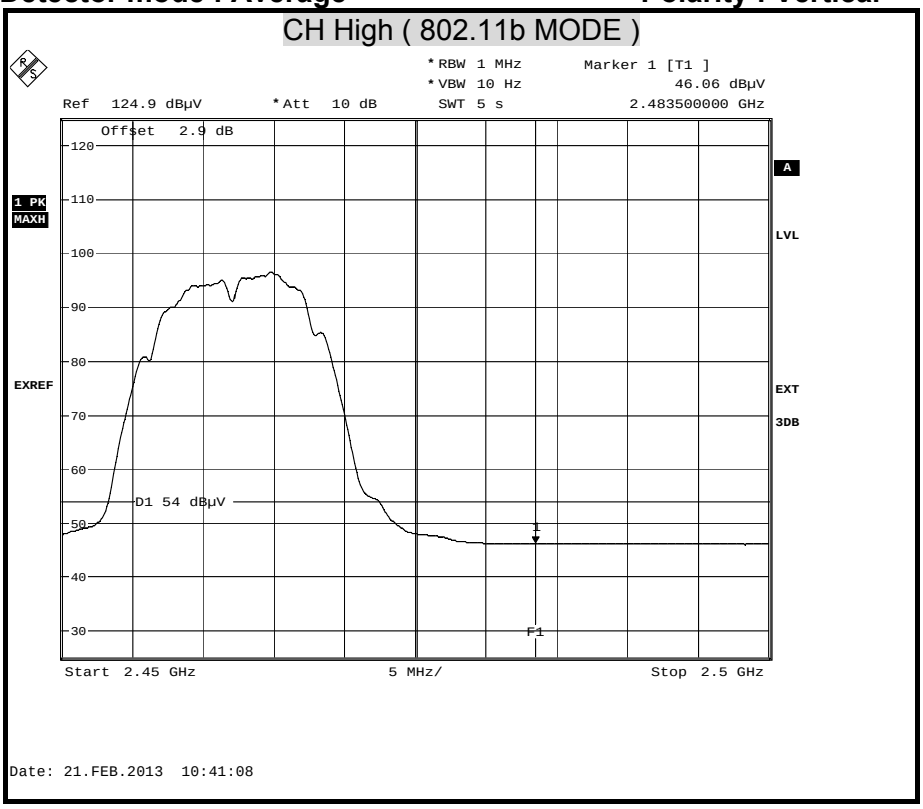
Detector mode : Average **Polarity : Horizontal**



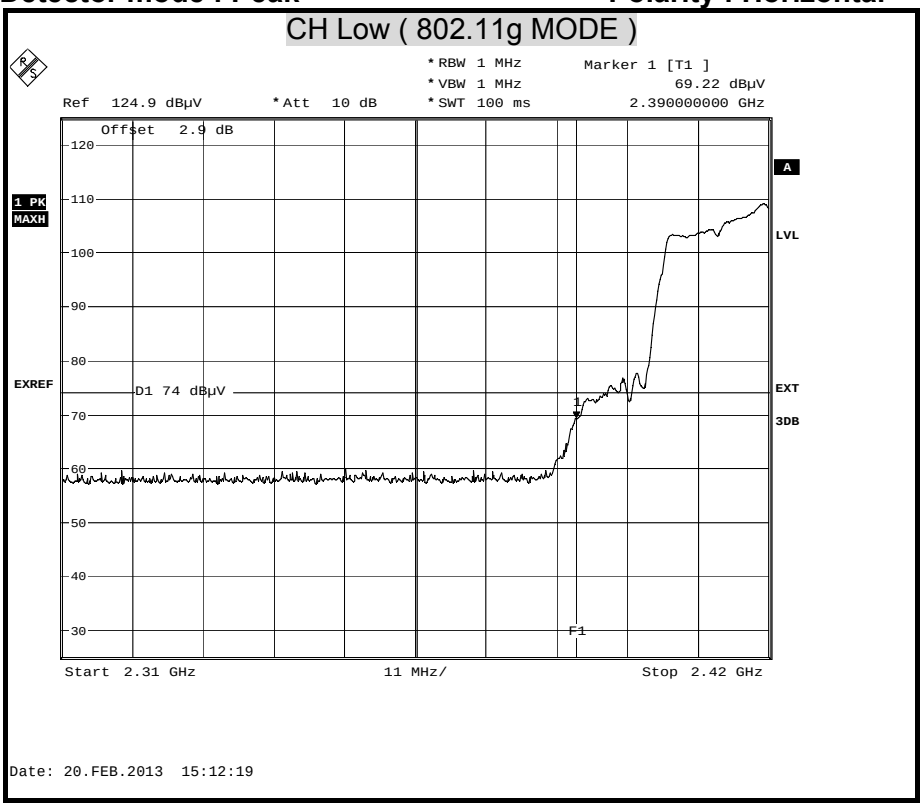
Detector mode : Peak **Polarity : Vertical**



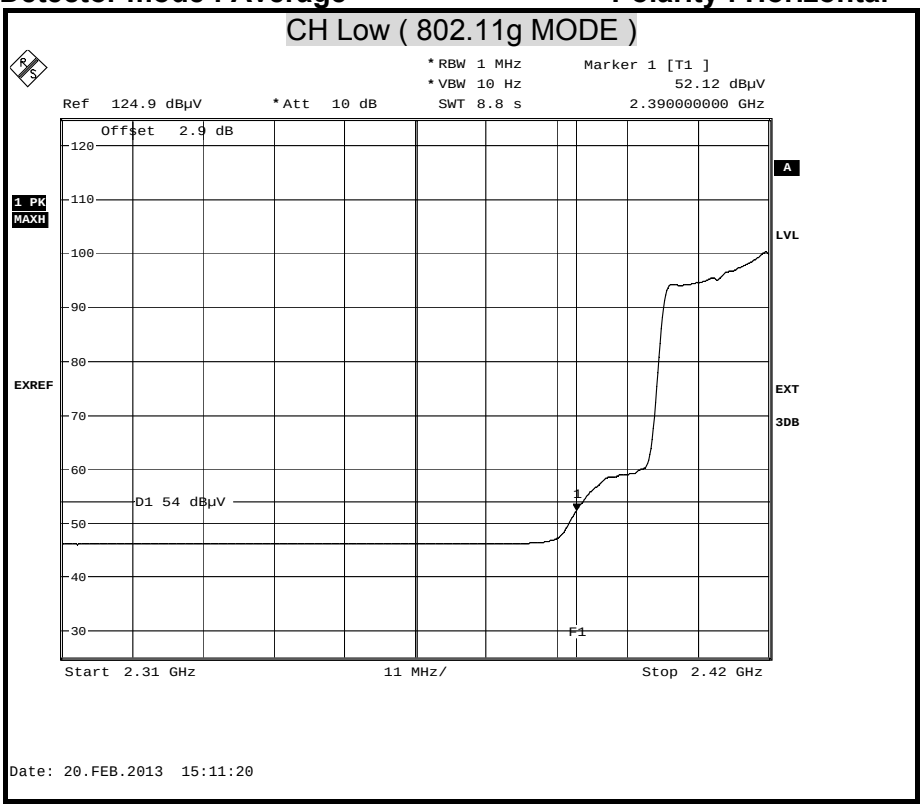
Detector mode : Average **Polarity : Vertical**



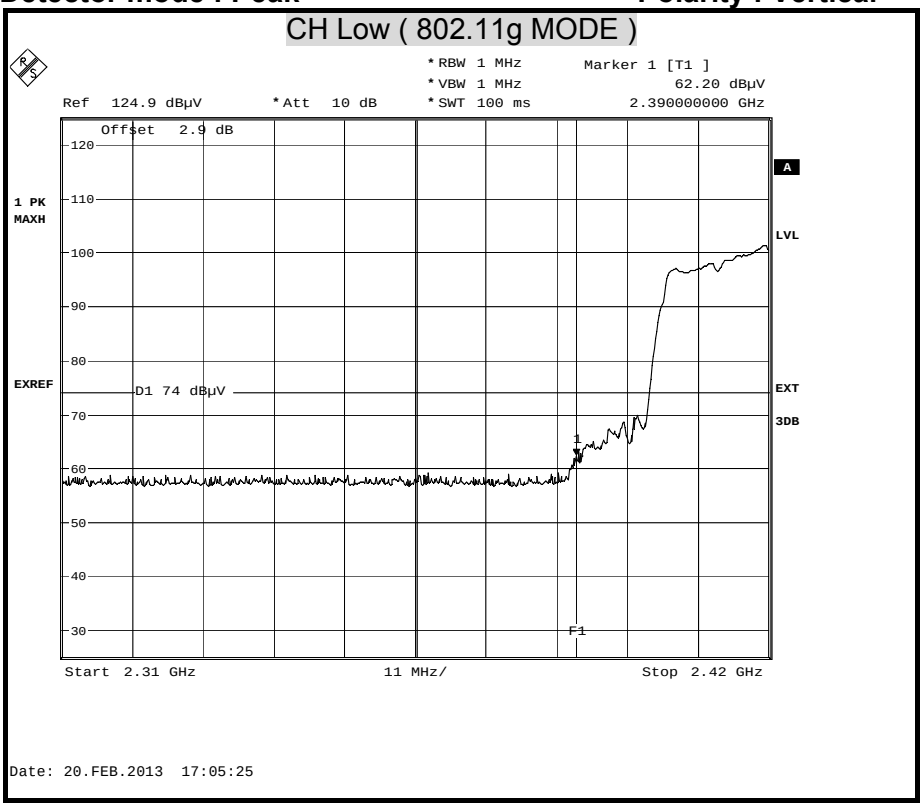
Detector mode : Peak **Polarity : Horizontal**



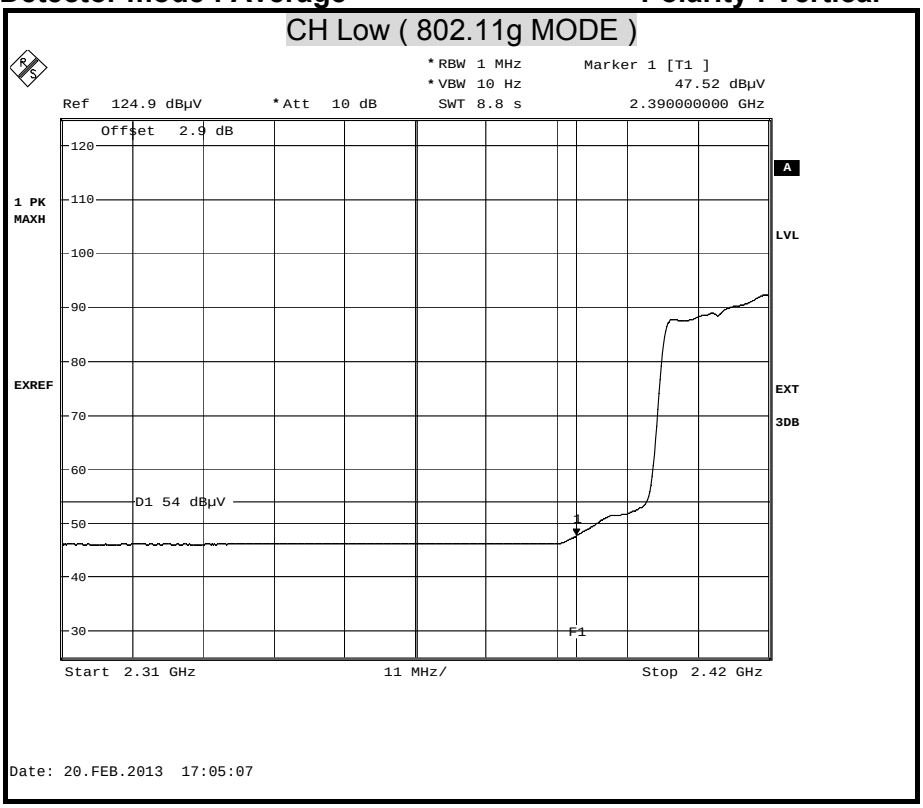
Detector mode : Average **Polarity : Horizontal**



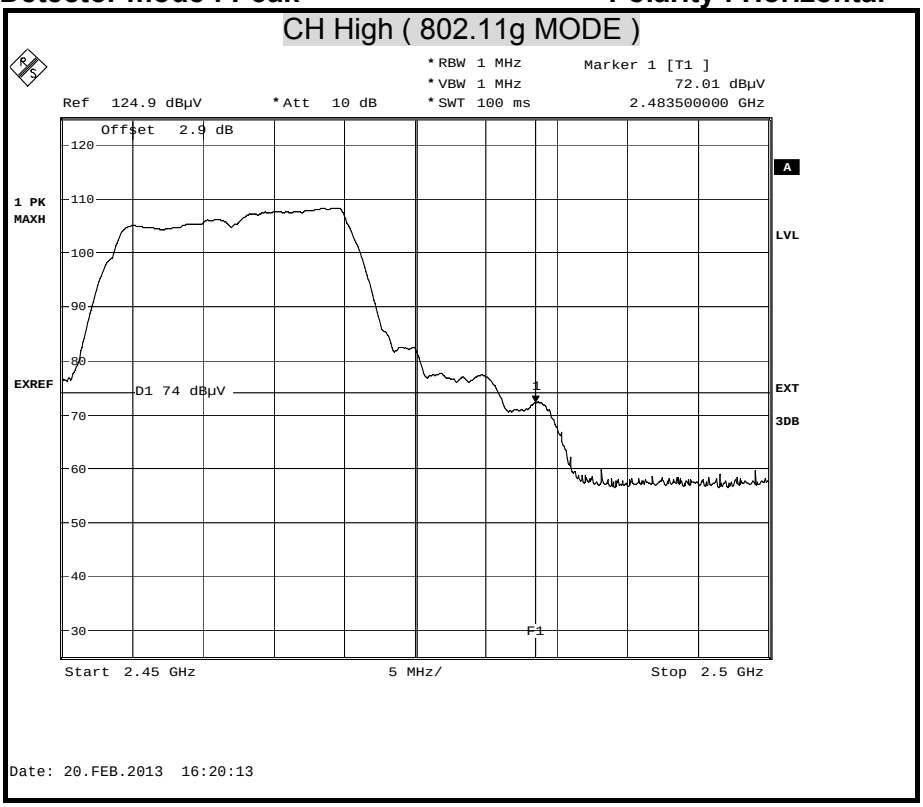
Detector mode : Peak **Polarity : Vertical**



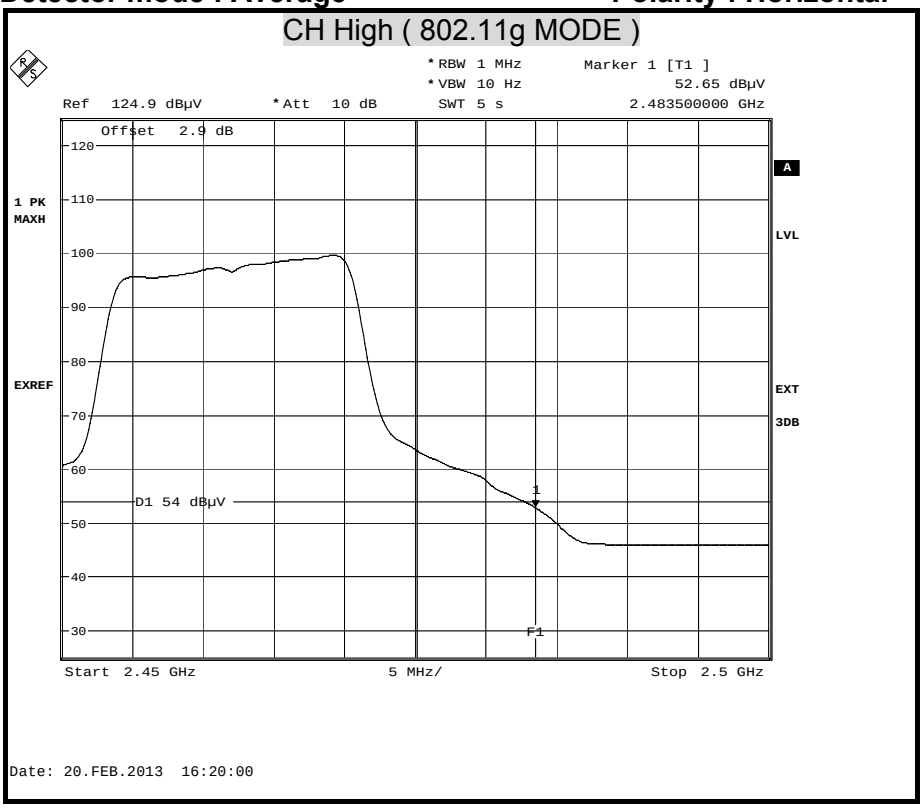
Detector mode : Average **Polarity : Vertical**



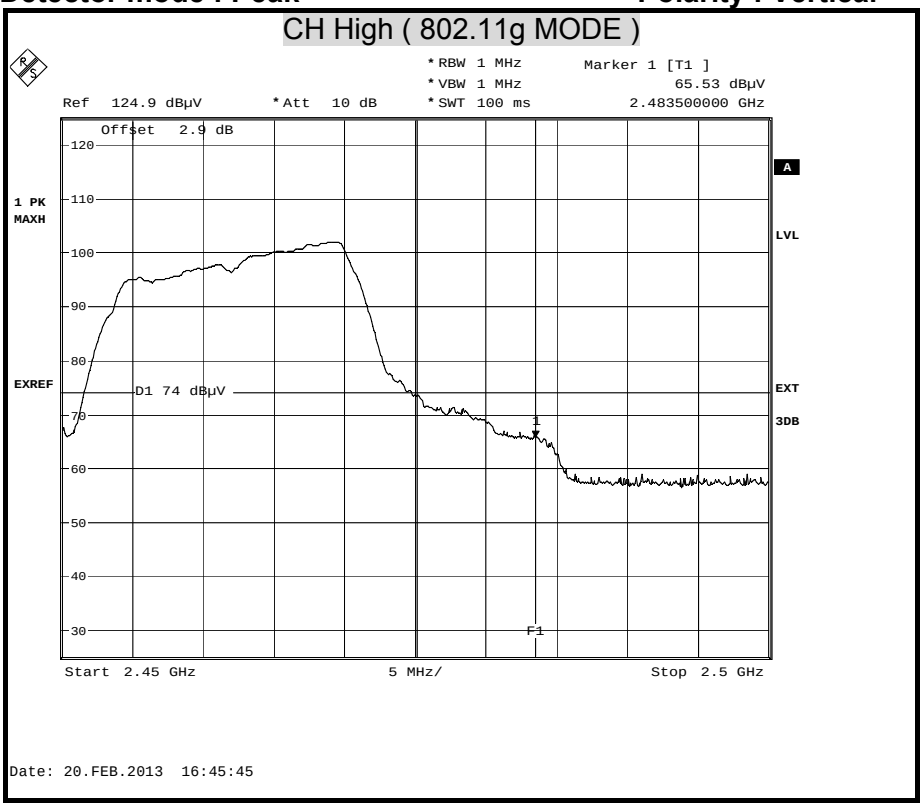
Detector mode : Peak **Polarity : Horizontal**



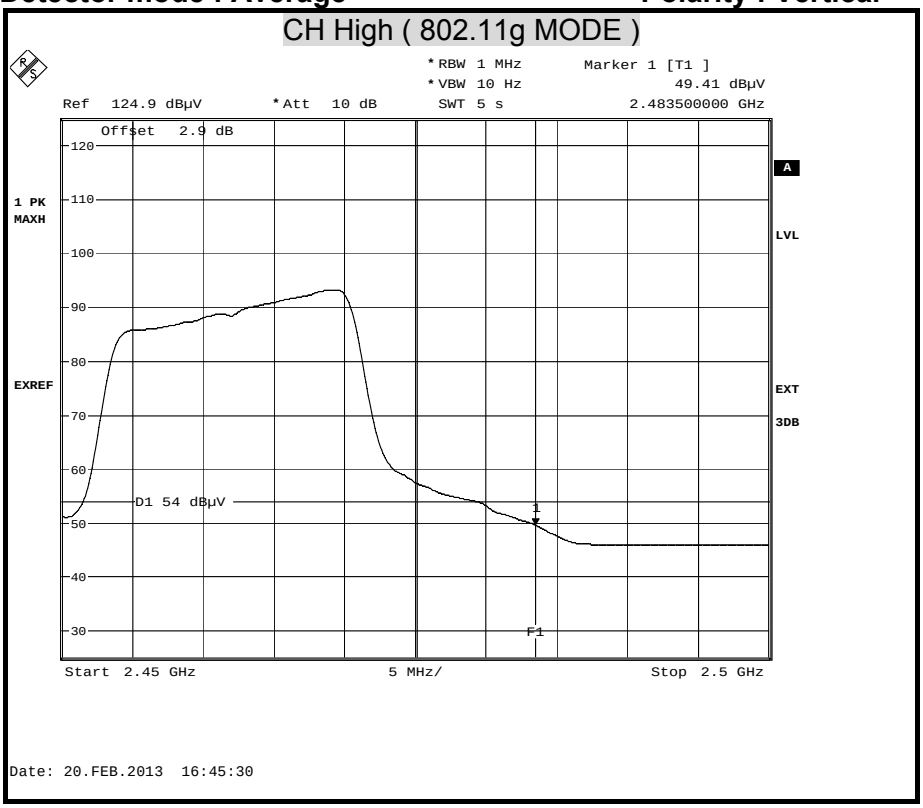
Detector mode : Average **Polarity : Horizontal**



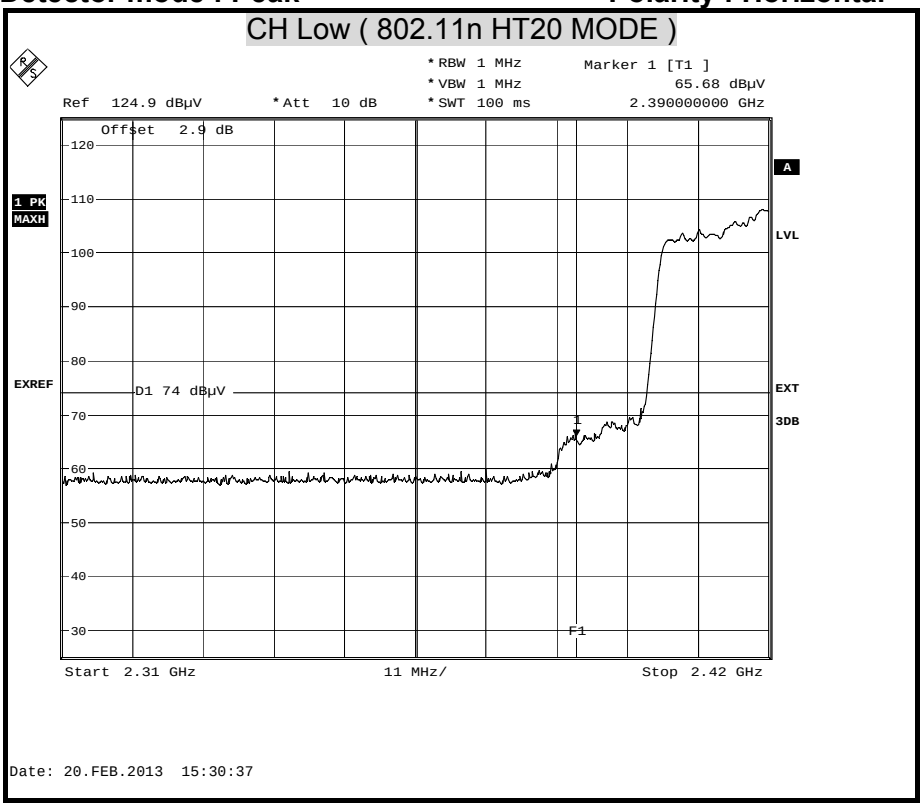
Detector mode : Peak **Polarity : Vertical**



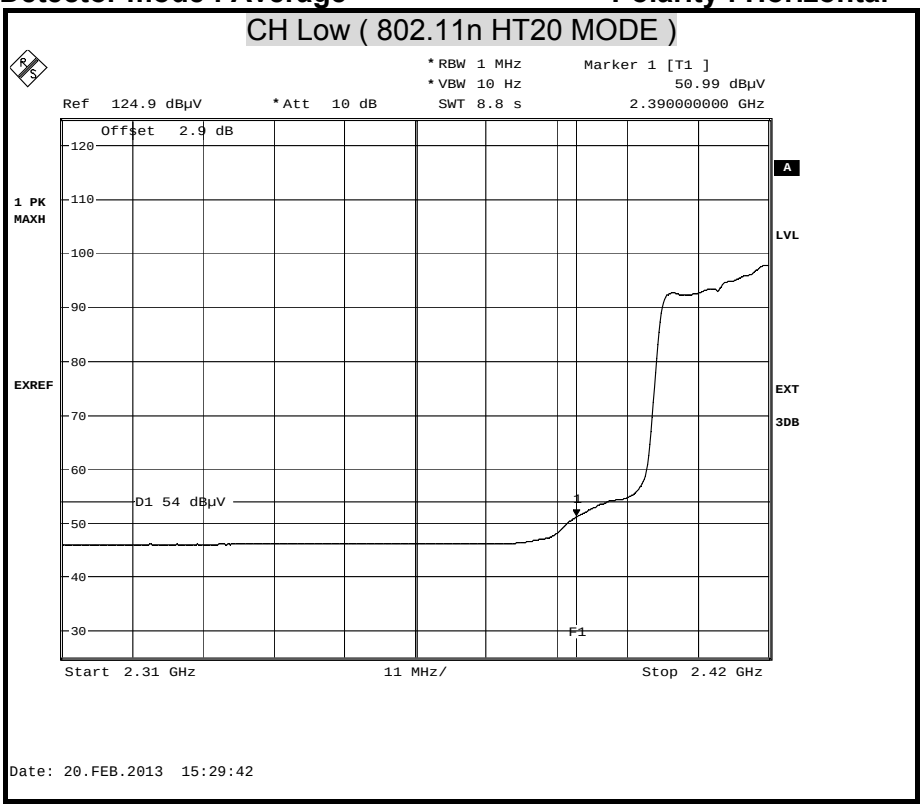
Detector mode : Average **Polarity : Vertical**



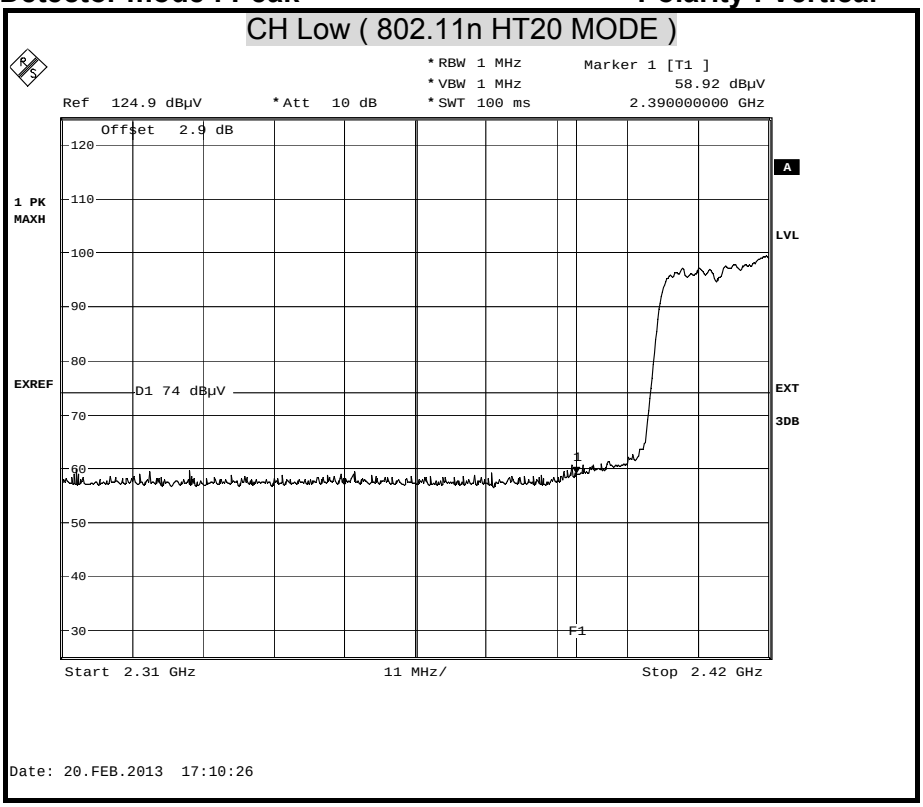
Detector mode : Peak **Polarity : Horizontal**



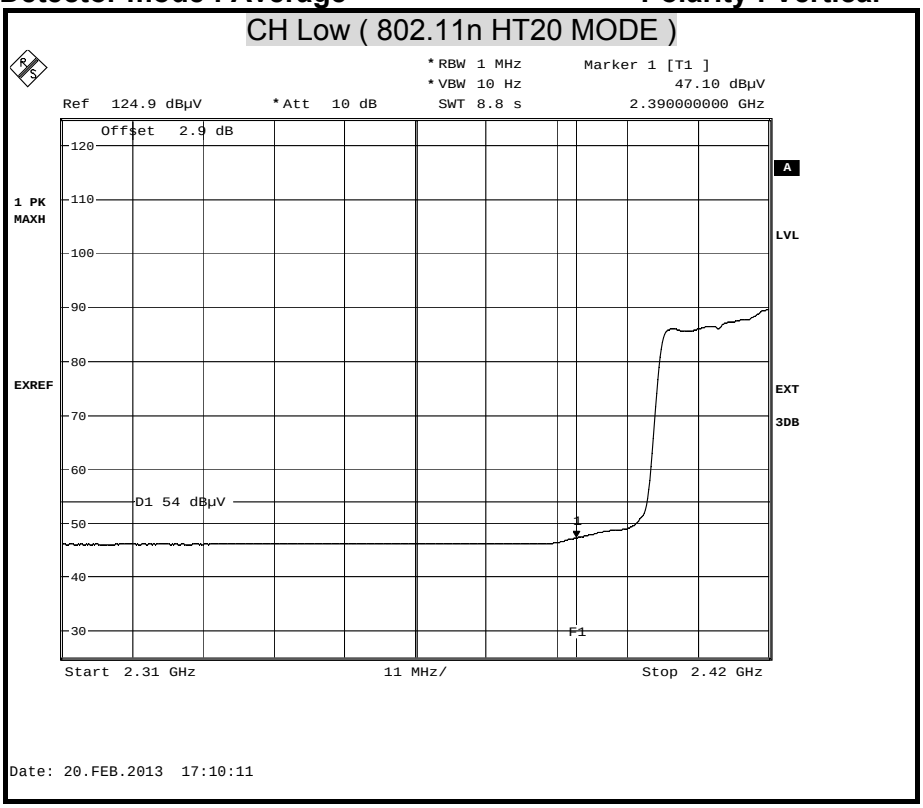
Detector mode : Average **Polarity : Horizontal**



Detector mode : Peak **Polarity : Vertical**

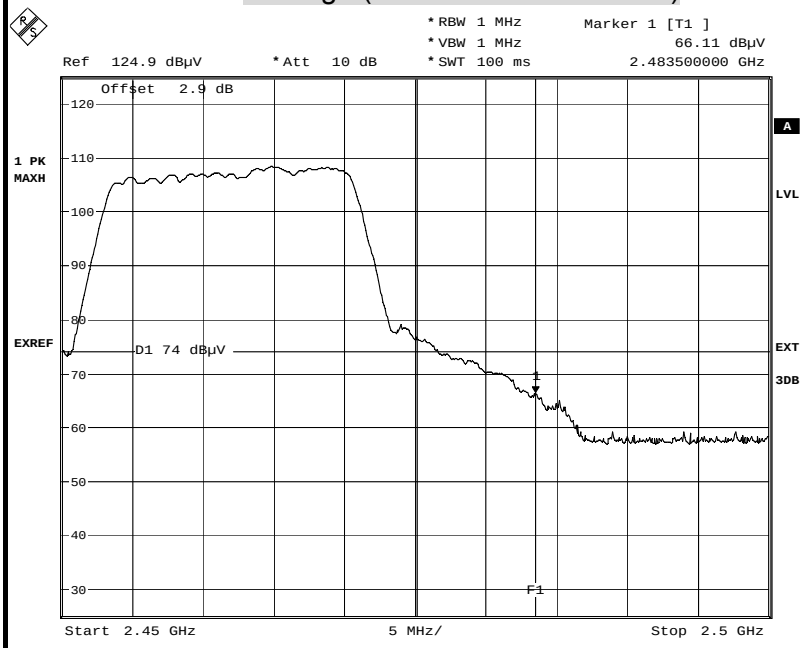


Detector mode : Average **Polarity : Vertical**



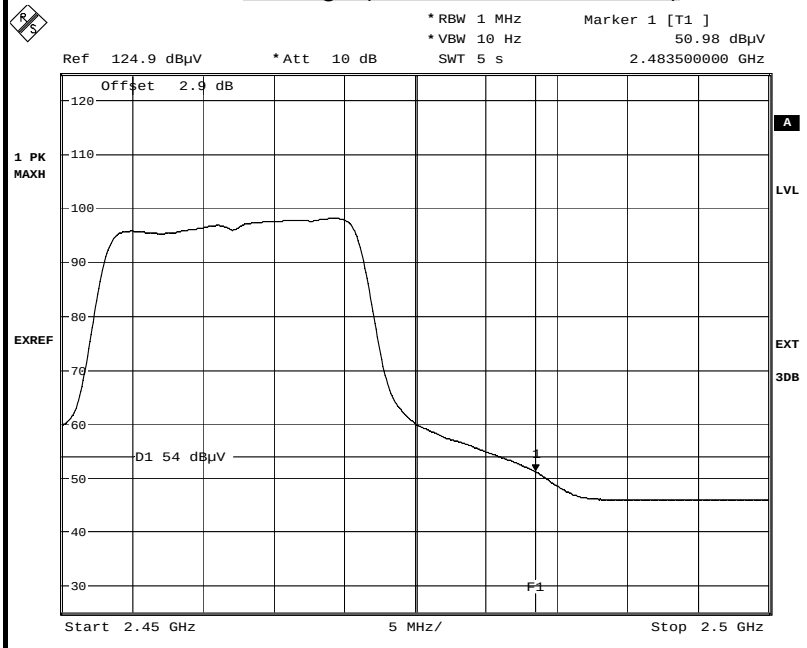
Detector mode : Peak **Polarity : Horizontal**

CH High (802.11n HT20 MODE)

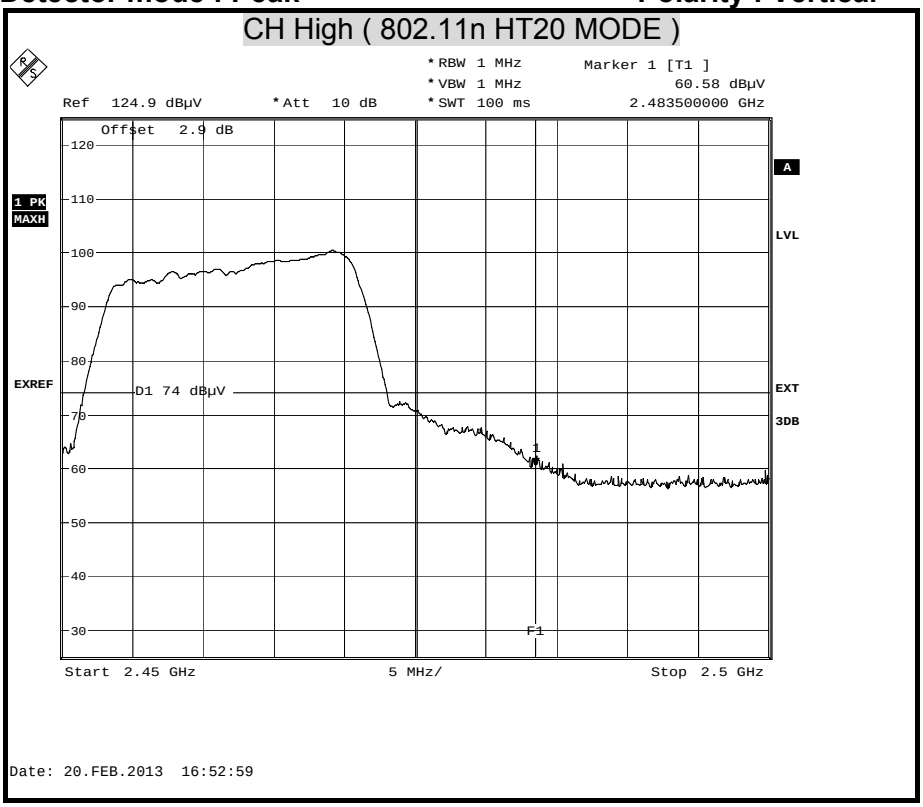


Detector mode : Average **Polarity : Horizontal**

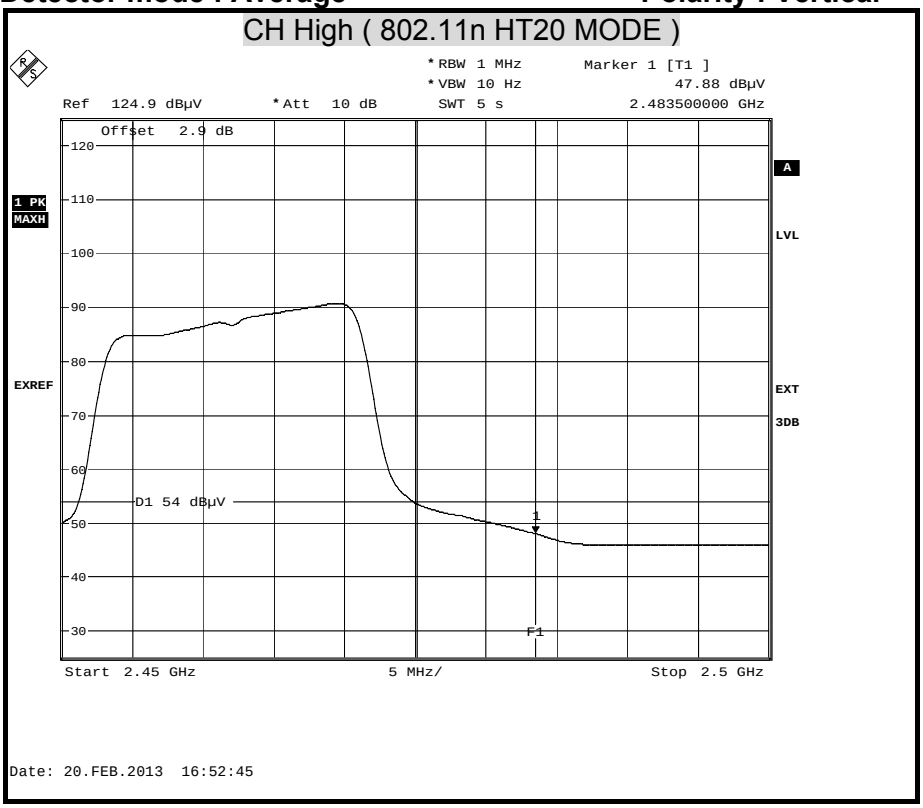
CH High (802.11n HT20 MODE)



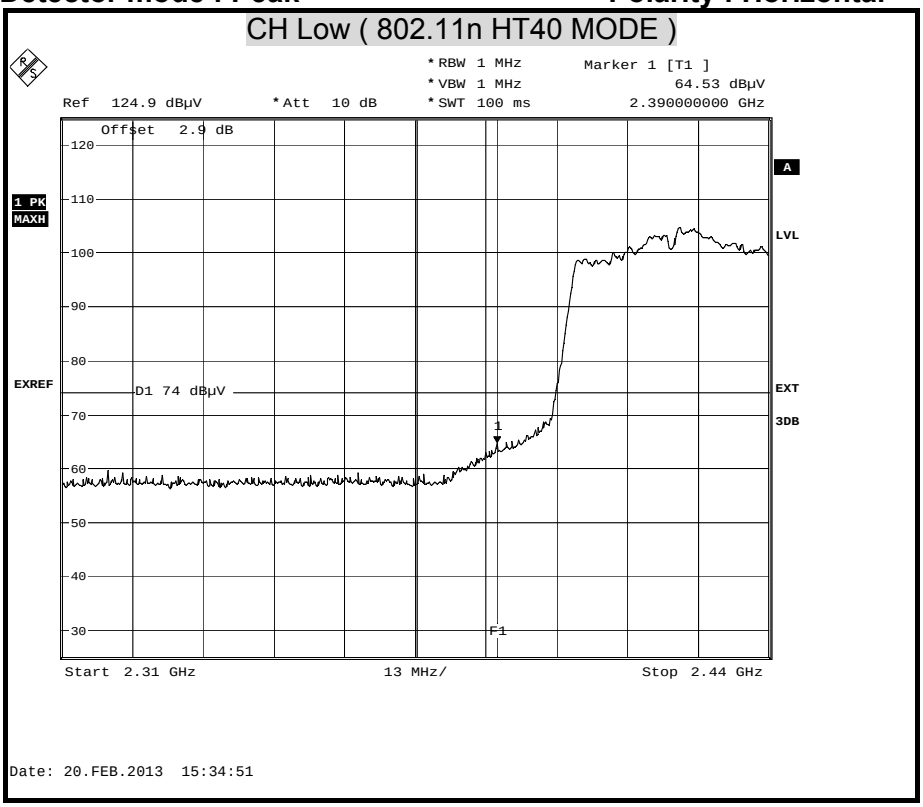
Detector mode : Peak **Polarity : Vertical**



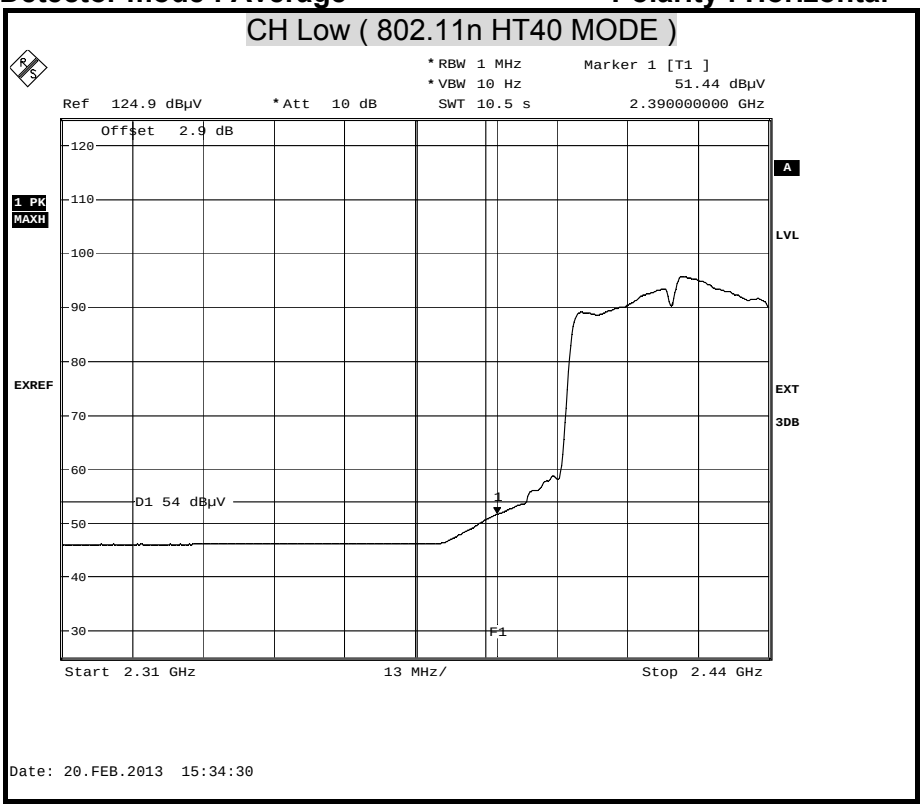
Detector mode : Average **Polarity : Vertical**



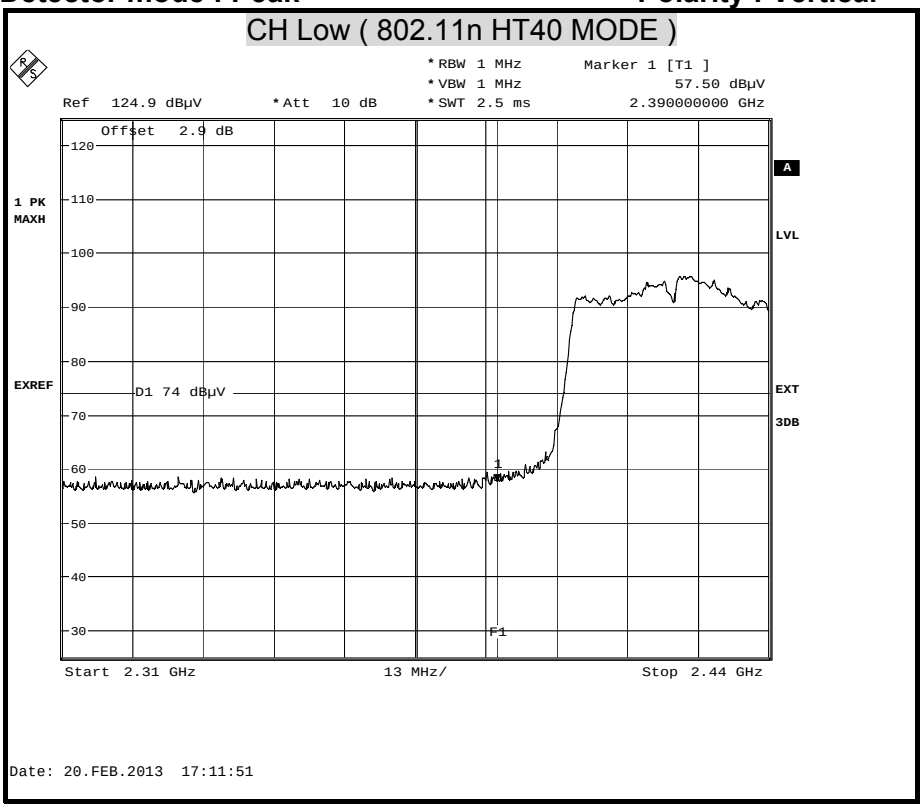
Detector mode : Peak **Polarity : Horizontal**



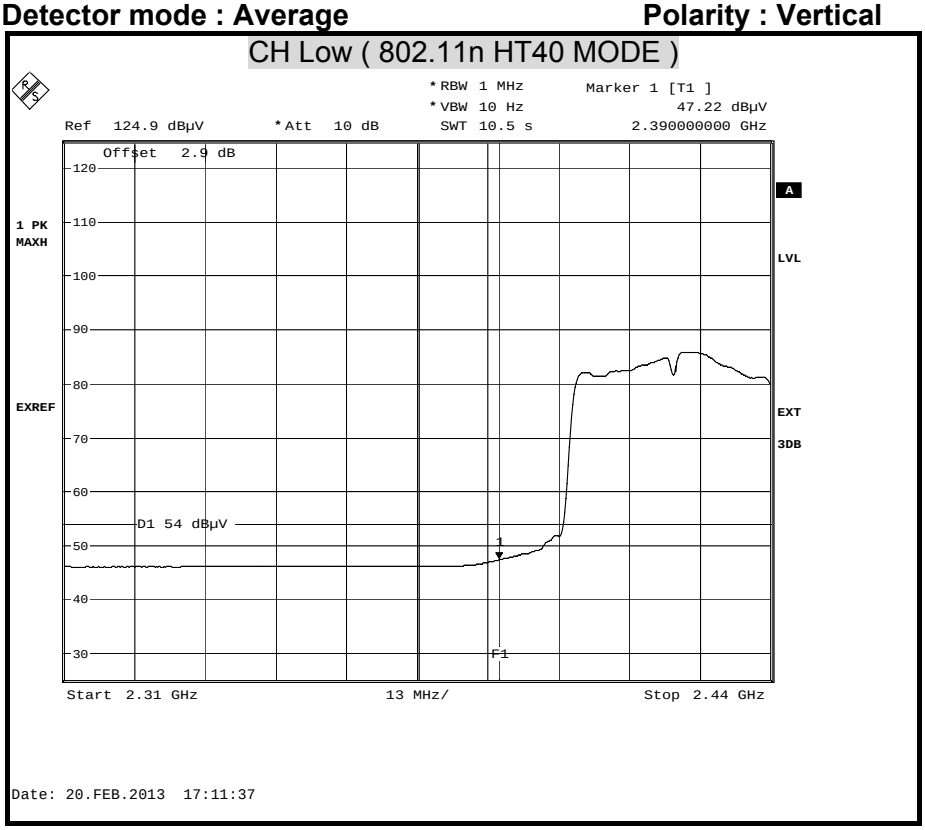
Detector mode : Average **Polarity : Horizontal**



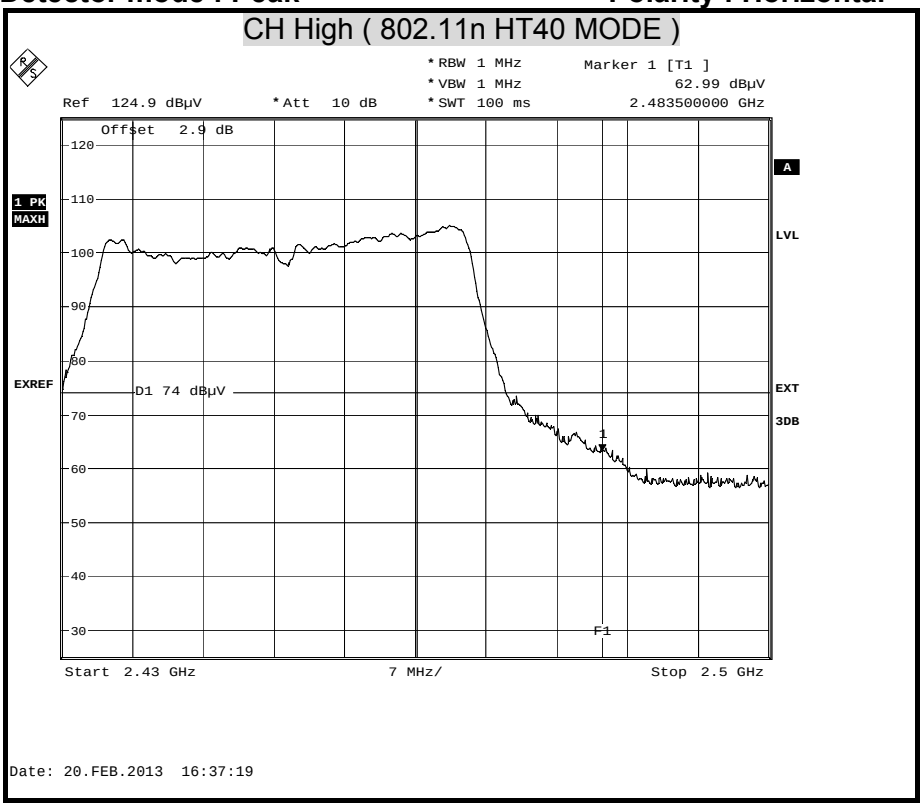
Detector mode : Peak **Polarity : Vertical**



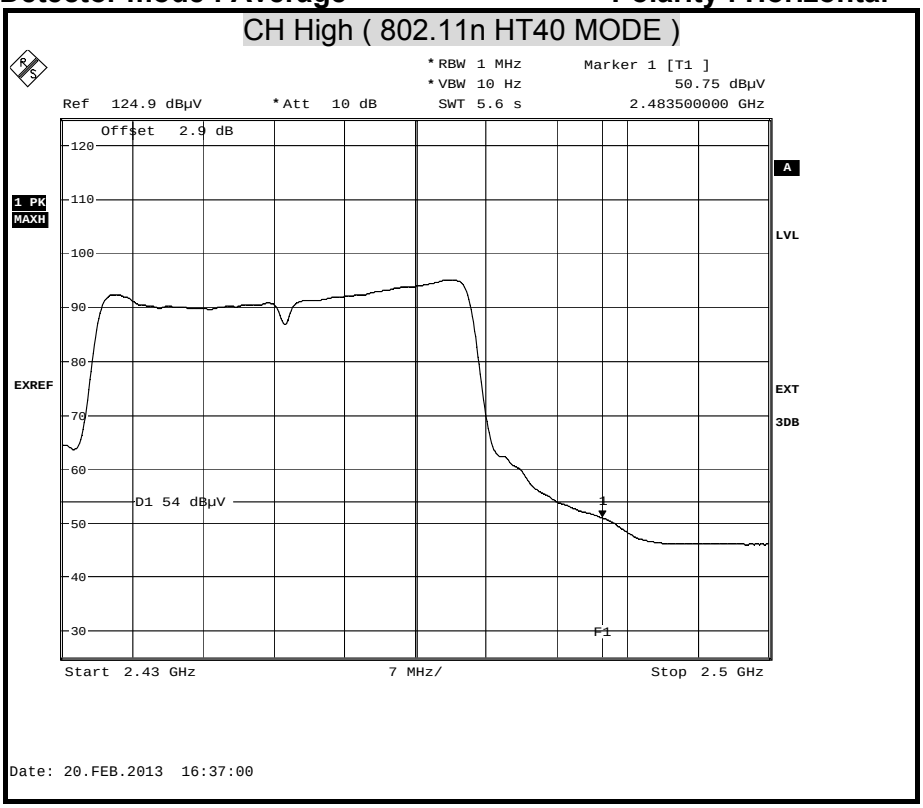
Detector mode : Average **Polarity : Vertical**



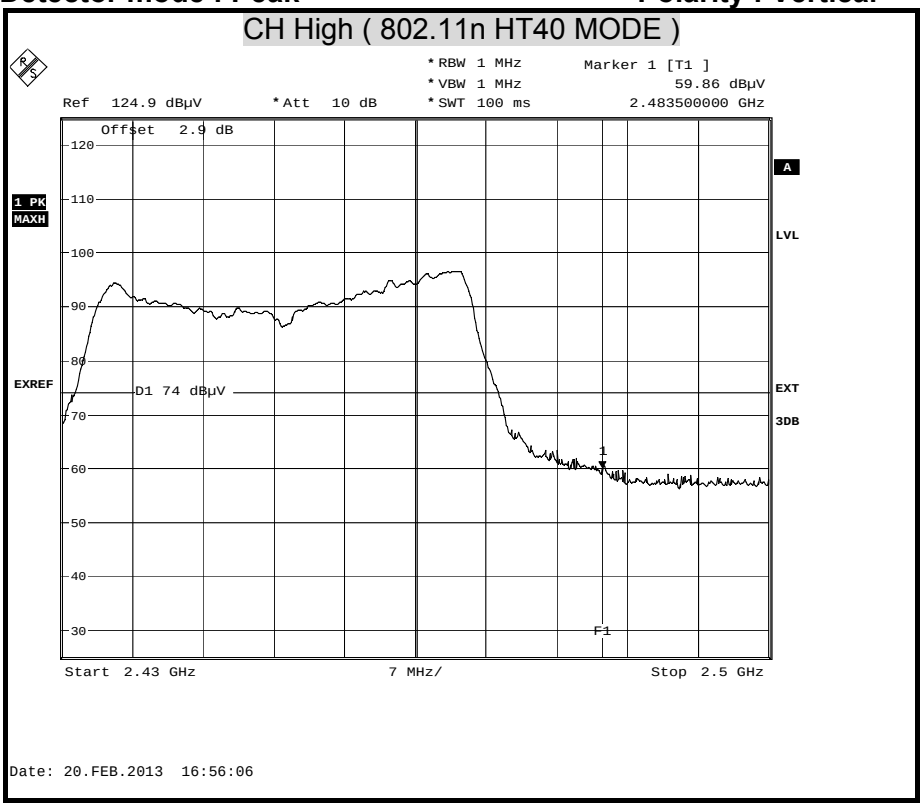
Detector mode : Peak **Polarity : Horizontal**



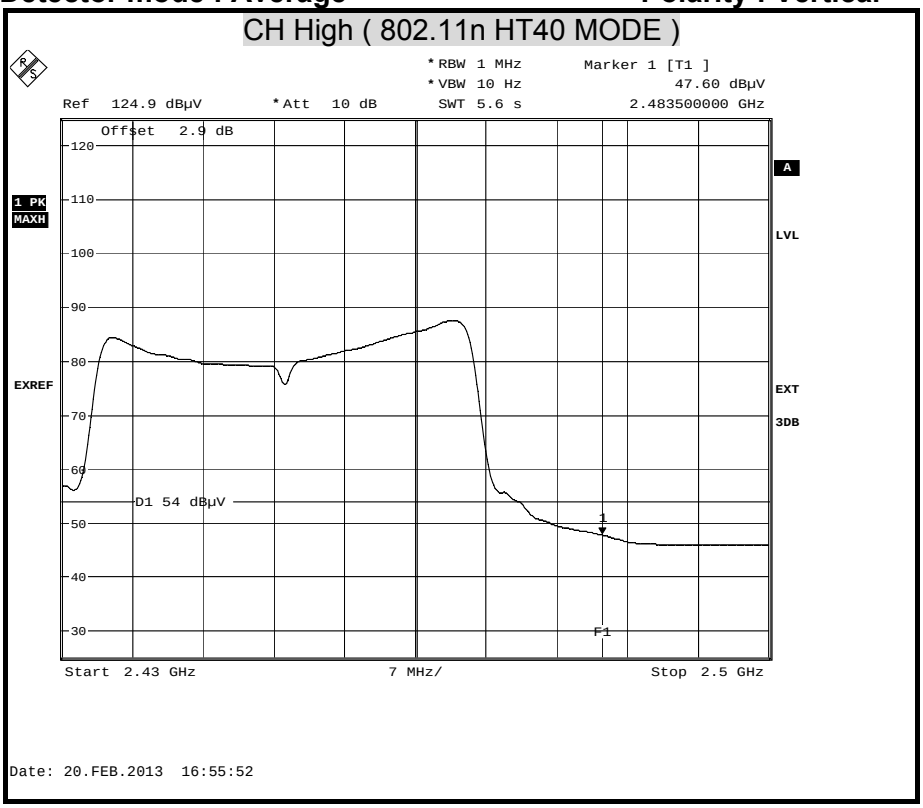
Detector mode : Average **Polarity : Horizontal**



Detector mode : Peak **Polarity : Vertical**



Detector mode : Average **Polarity : Vertical**



8.7 POWERLINE CONDUCTED EMISSIONS

LIMITS

§ 15.207 (a) Except as shown in paragraph (b) and (c) this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

The lower limit applies at the boundary between the frequency ranges.

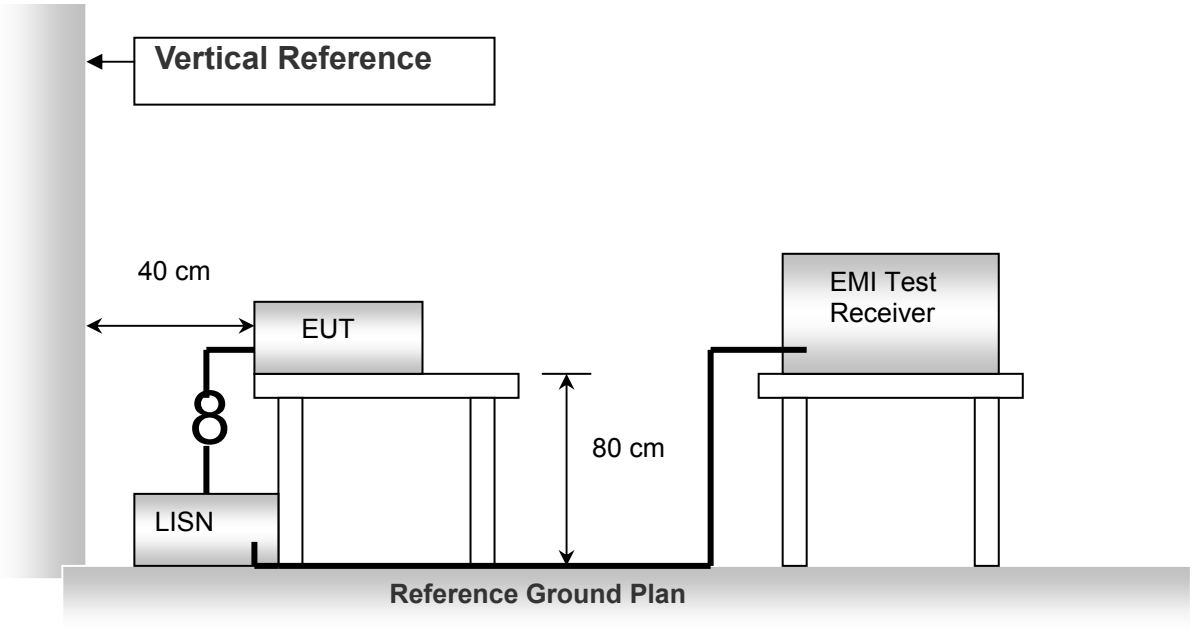
Frequency of Emission (MHz)	Conducted limit (dBμv)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56	56 to 46
0.5 - 5	56	46
5 - 30	60	50

TEST EQUIPMENTS

The following test equipments are used during the conducted power line tests：

Conducted Emission room #1				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
L.I.S.N.	SCHWARZBECK	NNLK 8130	8130124	SEP. 30, 2013
	Rohde & Schwarz	ESH 3-Z5	840062/021	JUL. 31, 2013
TEST RECEIVER	Rohde & Schwarz	ESCS 30	100348	JUL. 23, 2013
TYPE N COAXIAL CABLE	CCS	BNC50	11	OCT. 30, 2013
Test S/W	e-3 (5.04211c) R&S (2.27)			

TEST SETUP



TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80cm above the horizontal ground plane. The EUT IS CONFIGURED IN ACCORDANCE WITH ANSI C63.4.

The resolution bandwidth is set to 9 kHz for both quasi-peak detection and average detection measurements.

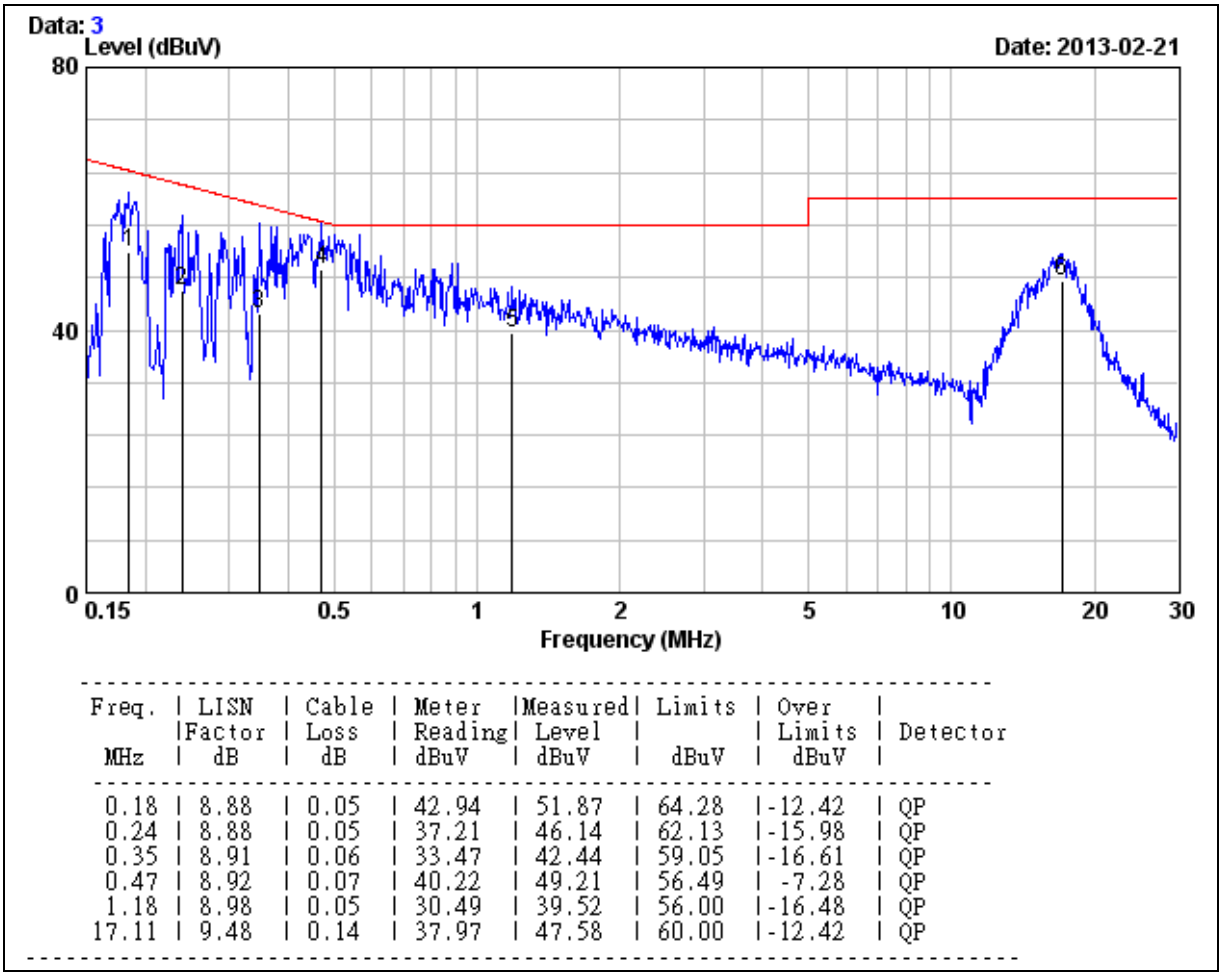
Line conducted data is recorded for both NEUTRAL and LINE.

TEST RESULTS

No non-compliance noted.

Model	DIR-508L	Test Date	2013/02/21
TEMP& Humidity	20℃, 58%	Test By	Weici Lo
Test Mode	Y axis_NAS mode		

LINE

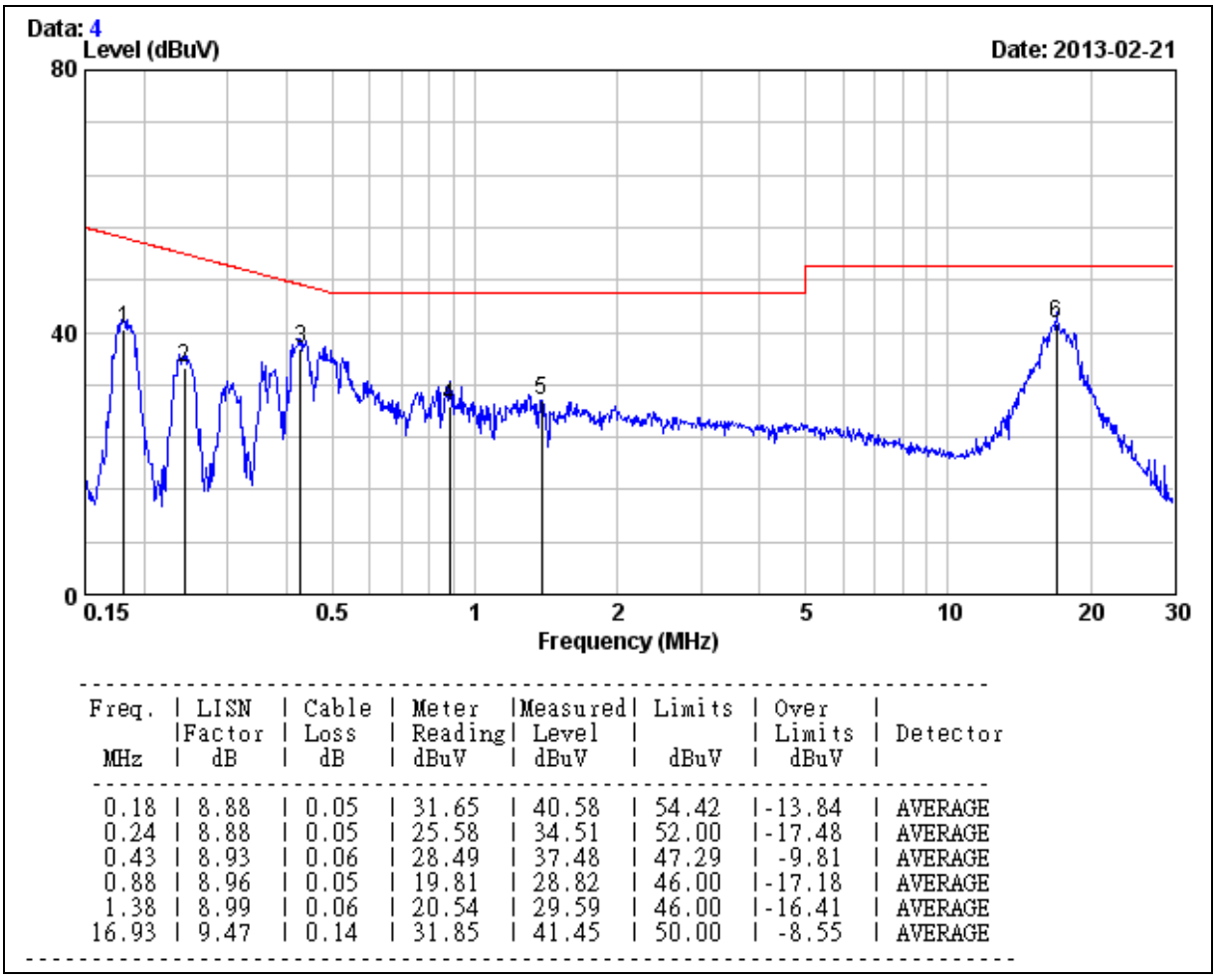


Freq. MHz	LISN Factor dB	Cable Loss dB	Meter Reading dBuV	Measured Level dBuV	Limits dBuV	Over Limits dBuV	Detector
0.18	8.88	0.05	42.94	51.87	64.28	-12.42	QP
0.24	8.88	0.05	37.21	46.14	62.13	-15.98	QP
0.35	8.91	0.06	33.47	42.44	59.05	-16.61	QP
0.47	8.92	0.07	40.22	49.21	56.49	-7.28	QP
1.18	8.98	0.05	30.49	39.52	56.00	-16.48	QP
17.11	9.48	0.14	37.97	47.58	60.00	-12.42	QP

REMARKS： 1. Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB)
2. Over Limit value (dB) = Level (dBuV) – Limit Line (dBuV)

Model	DIR-508L	Test Date	2013/02/21
TEMP& Humidity	20℃, 58%	Test By	Weici Lo
Test Mode	Y axis_NAS mode		

LINE

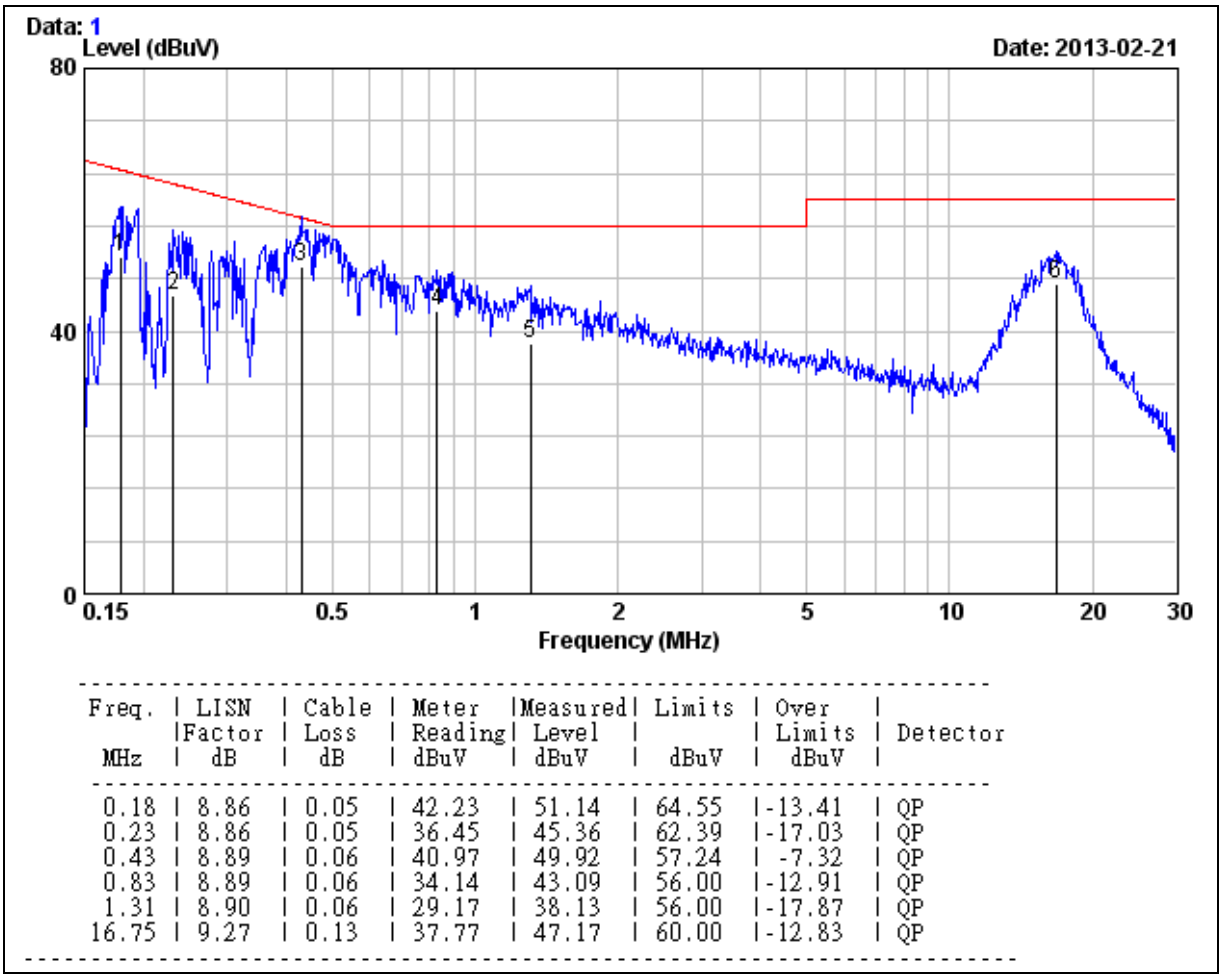


Freq. MHz	LISN Factor dB	Cable Loss dB	Meter Reading dBuV	Measured Level dBuV	Limits dBuV	Over Limits dBuV	Detector
0.18	8.88	0.05	31.65	40.58	54.42	-13.84	AVERAGE
0.24	8.88	0.05	25.58	34.51	52.00	-17.48	AVERAGE
0.43	8.93	0.06	28.49	37.48	47.29	-9.81	AVERAGE
0.88	8.96	0.05	19.81	28.82	46.00	-17.18	AVERAGE
1.38	8.99	0.06	20.54	29.59	46.00	-16.41	AVERAGE
16.93	9.47	0.14	31.85	41.45	50.00	-8.55	AVERAGE

REMARKS： 1. Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB)
2. Over Limit value (dB) = Level (dBuV) – Limit Line (dBuV)

Model	DIR-508L	Test Date	2013/02/21
TEMP& Humidity	20℃, 58%	Test By	Weici Lo
Test Mode	Y axis_NAS mode		

NEUTRAL

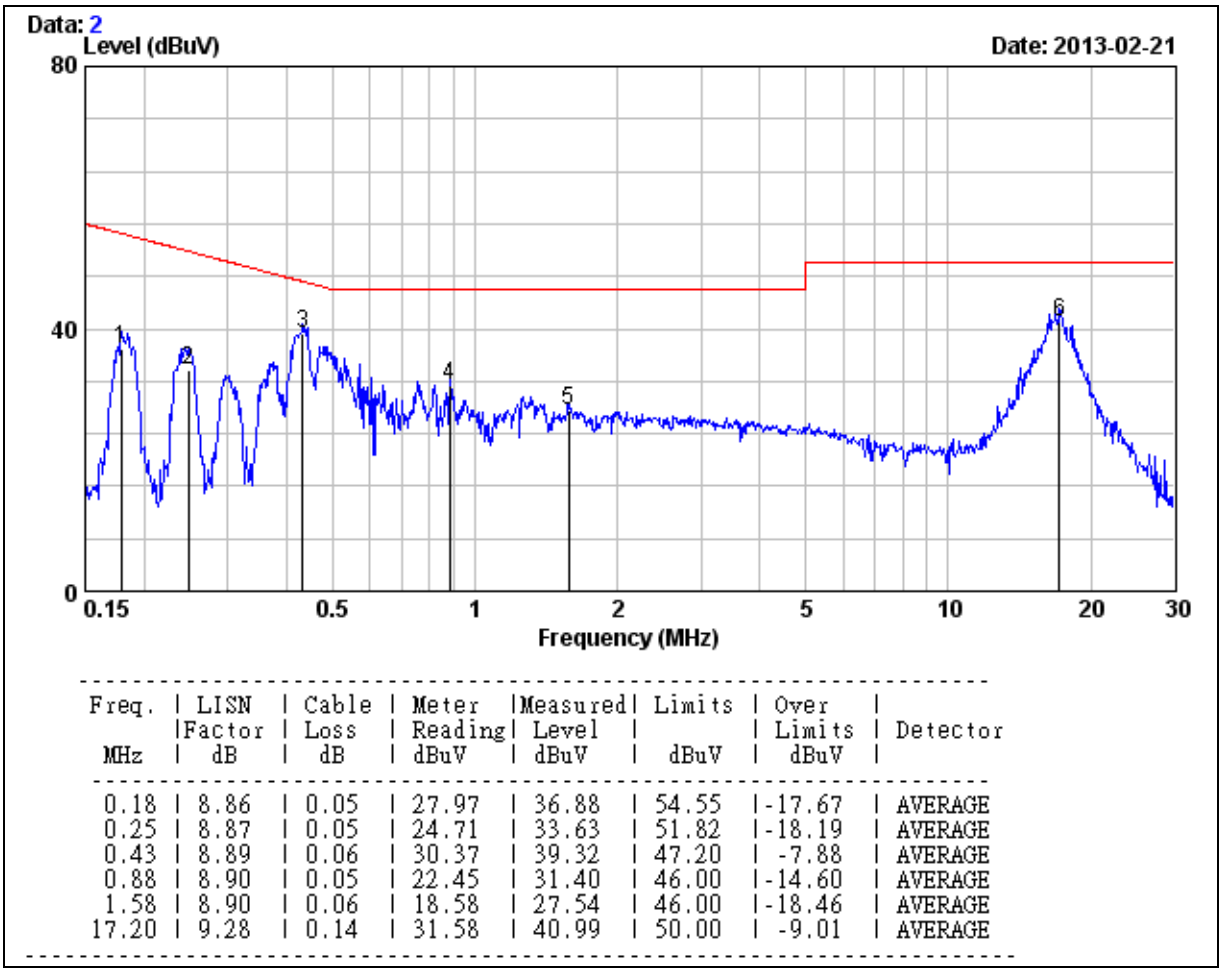


Freq. MHz	LISN Factor dB	Cable Loss dB	Meter Reading dBuV	Measured Level dBuV	Limits dBuV	Over Limits dBuV	Detector
0.18	8.86	0.05	42.23	51.14	64.55	-13.41	QP
0.23	8.86	0.05	36.45	45.36	62.39	-17.03	QP
0.43	8.89	0.06	40.97	49.92	57.24	-7.32	QP
0.83	8.89	0.06	34.14	43.09	56.00	-12.91	QP
1.31	8.90	0.06	29.17	38.13	56.00	-17.87	QP
16.75	9.27	0.13	37.77	47.17	60.00	-12.83	QP

REMARKS： 1. Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB)
2. Over Limit value (dB) = Level (dBuV) – Limit Line (dBuV)

Model	DIR-508L	Test Date	2013/02/21
TEMP& Humidity	20℃, 58%	Test By	Weici Lo
Test Mode	Y axis_NAS mode		

NEUTRAL



Freq. MHz	LISN Factor dB	Cable Loss dB	Meter Reading dBuV	Measured Level dBuV	Limits dBuV	Over Limits dBuV	Detector
0.18	8.86	0.05	27.97	36.88	54.55	-17.67	AVERAGE
0.25	8.87	0.05	24.71	33.63	51.82	-18.19	AVERAGE
0.43	8.89	0.06	30.37	39.32	47.20	-7.88	AVERAGE
0.88	8.90	0.05	22.45	31.40	46.00	-14.60	AVERAGE
1.58	8.90	0.06	18.58	27.54	46.00	-18.46	AVERAGE
17.20	9.28	0.14	31.58	40.99	50.00	-9.01	AVERAGE

REMARKS： 1. Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB)
2. Over Limit value (dB) = Level (dBuV) – Limit Line (dBuV)

9. ANTENNA REQUIREMENT

9.1 STANDARD APPLICABLE

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

9.2 ANTENNA CONNECTED CONSTRUCTION

The antenna spec. as below:

Antenna (2T2R)
Type: PCB antenna
Manufacturer: WHA YU INDUSTRIAL CO., LTD.
Model: C381-510209-A
Gain: 3.79 dBi
Model: C381-510210-A
Gain: 3.72 dBi