

FCC CERTIFICATION TEST REPORT

FOR

Applicant	:	Audio Pro AB
Address	:	Garnisonsgatan 52, 25466, Helsingborg, Sweden
Equipment under Test	:	WIFI Player
Model No.	:	LINK1
Trade Mark	:	
FCC ID	:	2AGNC-LINK1
Manufacturer	:	DONGGUAN TRISTAR ELECTRONIC CO., LTD.
Address	:	NO. 24A DONGXING AVE SOUTH, ZHENXINGWEI, TANGXIA TOWN, DONGGUAN CITY, CHINA 523710

Issued By: Dongguan Dongdian Testing Service Co., Ltd.

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REPORT

TABLE OF CONTENTS

	Test report declares.....	4
1.	Summary of test results	5
2.	General test information.....	6
2.1.	Description of EUT	6
2.2.	Accessories of EUT.....	6
2.3.	Assistant equipment used for test.....	6
2.4.	Block diagram of EUT configuration for test	7
2.5.	Deviations of test standard	7
2.6.	Test environment conditions	7
2.7.	Test laboratory.....	7
2.8.	Measurement uncertainty	8
3.	Equipment used during test	9
4.	6dB Bandwidth and 99% Bandwidth.....	10
4.1.	Block diagram of test setup	10
4.2.	Limits	10
4.3.	Test Procedure.....	10
4.4.	Test Result.....	11
4.5.	Original test data(Worse case Antenna1).....	11
5.	Conducted Peak Output Power	16
5.1.	Block diagram of test setup	16
5.2.	Limits	16
5.3.	Test Procedure.....	16
5.4.	Test Result.....	16
6.	Power Spectral Density	17
6.1.	Block diagram of test setup	17
6.2.	Limits	17
6.3.	Test Procedure.....	17
6.4.	Test Result.....	17
6.5.	Original test data(Worse case Antenna1).....	18
6.6.	Band Edge and Spurious Emissions (Conducted).....	23
6.7.	Block diagram of test setup	23
6.8.	Limits	23
6.9.	Test Procedure.....	23
6.10.	Test Result.....	24
6.11.	Original test data(Worse case Antenna1).....	24
7.	Radiated Spurious Emissions	51
7.1.	Block diagram of test setup	51

7.2.	Limit	52
7.3.	Test Procedure.....	53
7.4.	Test result	54
8.	Radiated Band Edge Compliance.....	58
8.1.	Block diagram of test setup	58
8.2.	Limit	58
8.3.	Test Procedure.....	58
8.4.	Test result	58
9.	Power Line Conducted Emission	75
9.1.	Block diagram of test setup	75
9.2.	Power Line Conducted Emission Limits(Class B).....	75
9.3.	Test Procedure.....	75
9.4.	Test Result.....	76
10.	Antenna Requirements	79
10.1.	Limit	79
10.2.	Result.....	79
11.	Test setup photograph	80
12.	Photos of the EUT	82

TEST REPORT DECLARE

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Manufacturer	:	DONGGUAN TRISTAR ELECTRONIC CO., LTD.
Address	:	NO. 24A DONGXING AVE SOUTH, ZHENXINGWEI, TANGXIA TOWN, DONGGUAN CITY, CHINA 523710

Test Standard Used: FCC Rules and Regulations Part 15 Subpart C, RSS-247 Issue 1 May 2015.

Test procedure used: ANSI C63.10:2013, ANSI C63.4:2014, KDB558074 D01 DTS Meas Guidance V03r02, RSS-Gen Issue 4, Nov. 2014.

We Declare:

The equipment described above is tested by Dongguan Dongdian Testing Service Co., Ltd and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and Dongguan Dongdian Testing Service Co., Ltd is assumed of full responsibility for the accuracy and completeness of these tests.

After test and evaluation, our opinion is that the equipment provided for test compliance with the requirement of the above FCC standards.

Report No:	DDT-R17Q0119-2E1		
Date of Test:	Jan. 20, 2017 ~Jan. 24, 2017	Date of Report:	Feb. 22, 2017

Prepared By:


 Leo Liu/Engineer


 Kevin Peng/EMC Manager

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Dongguan Dongdian Testing Service Co., Ltd.

1. Summary of test results

The EUT have been tested according to the applicable standards as referenced below.

Description of Test Item	Standard	Results
6dB Bandwidth and 99% Bandwidth	FCC Part 15: 15.247 RSS-247 Issue 1 clause 5.2 KDB558074	PASS
Conducted Peak Output Power	FCC Part 15: 15.247 RSS-247 Issue 1 clause 5.4 KDB558074	PASS
Power Spectral Density	FCC Part 15: 15.247 RSS-247 Issue 1 clause 5.2 KDB558074	PASS
Band-edge and Spurious Emissions (Conducted)	FCC Part 15: 15.247 RSS-247 Issue 1 clause 5.5 KDB558074	PASS
Radiated Spurious Emissions	FCC Part 15: 15.209 FCC Part 15: 15.247 RSS-Gen Issue 4 clause 7.2.2 RSS-Gen Issue 4 clause 7.2.5 RSS-247 Issue 1 clause 5.2 ANSI C63.10: 2013 ANSI C63.4:2014 KDB558074	PASS
Radiated Band Edge Compliance	FCC Part 15: 15.209 FCC Part 15: 15.247 ANSI C63.10: 2013 ANSI C63.4:2014 KDB558074	PASS
Power Line Conducted Emission	FCC Part 15: 15.207 RSS-Gen Issue 4 clause 7.2.4 ANSI C63.10: 2013 ANSI C63.4:2014	PASS
Antenna requirement	FCC Part 15: 15.203 RSS-Gen Issue 4 clause 7.1.2	PASS

2. General test information

2.1. Description of EUT

EUT* Name	: WIFI Player
Model Number	: LINK1
Channels	: Channel: 11 (for 802.11b/g/n H20) ; Channel : 7 (for 802.11n H40)
Power supply	: DC 5V from Adapter input AC 120V/60Hz
Radio Technology	: IEEE802.11b/g/n
FCC Operation frequency	: IEEE 802.11b: 2412MHz—2462MHz IEEE 802.11g: 2412MHz—2462MHz IEEE 802.11n HT20: 2412MHz—2462MHz IEEE 802.11n HT40:2422MHz—2452MHz
Modulation	: IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20, HT40: OFDM (64QAM, 16QAM, QPSK,BPSK)
Antenna Type	: Integral antenna WIFI antenna 1: 2.87dBi WIFI antenna 2: 2.87dBi WIFI Array gain: 5.88dBi
Smart system	: SISO for 802.11b/g MIMO for 802.11n
Date of Receipt	: Jan. 20, 2017
Sample Type	: Series production

Note1: EUT is the ab.of equipment under test.

Channle information							
CH	Frequency	CH	Frequency	CH	Frequency	CH	Frequency
1	2412	5	2432	9	2452	/	/
2	2417	6	2437	10	2457	/	/
3	2422	7	2442	11	2462	/	/
4	2427	8	2447	/	/	/	/

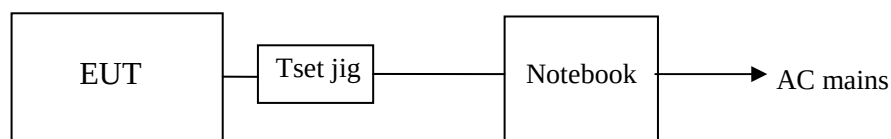
2.2. Accessories of EUT

Description of Accessories	Brand	Model number	Parameter	Remark
SWITCHING POWER SUPPLY	 audio pro	BI12T-050100-I	5V DC 1A	N/A

2.3. Assistant equipment used for test

Description of Assistant equipment	Manufacturer	Model number or Type	EMC Compliance	SN
Notebook	DELL	Latitude D610	FCC DOC	00045-534-136-300

2.4. Block diagram of EUT configuration for test



EUT was connected to control to a special test jig provided by manufacturer which has a standard RSS-232 connector to connect to Notebook, and the Notebook will run a special test software provided by manufacturer to control EUT work in Continuous TX mode (>98% duty cycle), and select test channel, wireless mode and data rate.

Tested mode, channel, and data rate information			
Mode	data rate (Mbps) (see Note)	Channel	Frequency (MHz)
IEEE 802.11b	11	LCH :CH1	2412
	11	MCH: CH6	2437
	11	HCH: CH11	2462
IEEE 802.11g	54	LCH :CH1	2412
	54	MCH: CH6	2437
	54	HCH: CH11	2462
IEEE 802.11n HT20	MSC0	LCH :CH1	2412
	MSC0	MCH: CH6	2437
	MSC0	HCH: CH11	2462
IEEE 802.11n HT40	MCS 7	LCH :CH3	2422
	MCS 7	MCH: CH6	2437
	MCS 7	HCH: CH9	2452
Note: According exploratory test, EUT will have maximum output power in those data rate, so those data rate were used for all test.			

2.5. Deviations of test standard

No Deviation

2.6. Test environment conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature range:	21-25℃
Humidity range:	40-75%
Pressure range:	86-106kPa

2.7. Test laboratory

Dongguan Dongdian Testing Service Co., Ltd

Add: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan City, Guangdong

Province, China, 523808 Tel: +86-0769-22891499 <http://www.dgddt.com>

FCC Registration Number: 270092 Industry Canada site registration number: 10288A-1

2.8. Measurement uncertainty

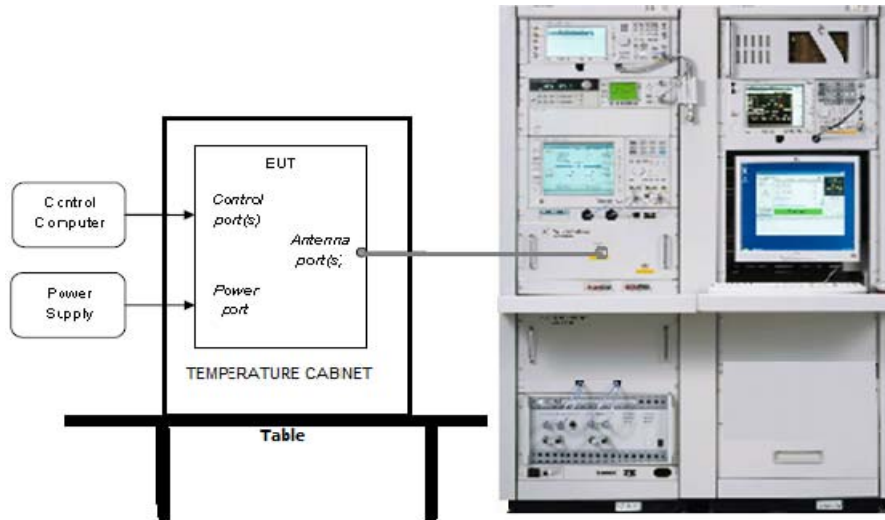
Test Item	Uncertainty
Bandwidth	1.1%
Peak Output Power(Conducted)(Spectrum analyzer)	0.86dB(10 MHz $\leq$ f < 3.6GHz);
	1.38dB(3.6GHz $\leq$ f < 8GHz)
Peak Output Power(Conducted)(Power Sensor)	0.74dB
Power Spectral Density	0.74dB(10 MHz $\leq$ f < 3.6GHz);
	1.38dB(3.6GHz $\leq$ f < 8GHz)
Frequencies Stability	6.7 x 10 ⁻⁸ (Antenna couple method)
	5.5 x 10 ⁻⁸ (Conducted method)
Conducted spurious emissions	0.86dB(10 MHz $\leq$ f < 3.6GHz);
	1.40dB(3.6GHz $\leq$ f < 8GHz)
	1.66dB(8GHz $\leq$ f < 22GHz)
Uncertainty for radio frequency (RBW<20KHz)	3×10 ⁻⁸
Temperature	0.4℃
Humidity	2%
Uncertainty for Radiation Emission test (30MHz-1GHz)	4.70 dB (Antenna Polarize: V)
	4.84 dB (Antenna Polarize: H)
Uncertainty for Radiation Emission test (1GHz-26GHz)	4.10dB(1-6GHz)
	4.40dB (6GHz-18Gz)
	3.54dB (18GHz-26Gz)
Uncertainty for Power line conduction emission test	3.32dB (150KHz-30MHz)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

3. Equipment used during test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
RF Connected test					
Spectrum analyzer	R&S	FSU26	1166.1660.26	2016/10/16	1Year
Vertor Signal Generator	Agilent	E8267D	MY52098743	2016/10/20	1Year
Vector Signal Generator	Agilent	N5182A	MY48180737	2016/07/05	1Year
Power Sensor	Agilent	U2021XA	MY55150010	2016/04/18	1Year
Power Sensor	Agilent	U2021XA	MY55150011	2016/04/19	1Year
DC Power Source	MATRIS	MPS-3005L-3	D813058W	2016/10/24	1Year
Attenuator	Mini-Circuits	BW-S10W2	101109	2016/08/18	1Year
RF Cable	Micable	C10-01-01-1	100309	2016/08/18	1Year
Temp&Humi Programmable Chamber	Dongguan Bell	BE-TH-150M3	201208153364	2016/09/23	1Year
Test Software	JS Tonscend	JS1120-2	Ver.2.5	N/A	N/A
USB Data acquisition	Agilent	U2531A	TW55043503	N/A	N/A
Auto control Unit	JS Tonscend	JS0806-2	158060010	N/A	N/A
RE/RF in chamber					
EMI Test Receiver	R&S	ESU8	100316	2016/10/16	1Year
Spectrum analyzer	R&S	FSU26	1166.1660.26	2016/10/16	1Year
Trilog Broadband Antenna	Schwarzbeck	VULB9163	9163-462	2016/10/27	1 Year
Active Loop antenna	Schwarzbeck	FMZB-1519	1519-038	2016/10/27	1 Year
Double Ridged Horn Antenna	R&S	HF907	100276	2016/10/12	1 Year
Pre-amplifier	A.H.	PAM-0118	360	2016/10/16	1 Year
RF Cable	HUBSER	CP-X2	W11.03	2016/10/16	1Year
RF Cable	HUBSER	CP-X1	W12.02	2016/10/16	1 Year
MI Cable	HUBSER	C10-01-01-1M	1091629	2016/10/16	1 Year
Test software	Audix	E3	V 6.11111b	/	/
Conducted disturbance at mains terminals/Telecommunication port					
Test Receiver	R&S	ESU8	100316	2016/10/16	1 Year
LISN 1	R&S	ENV216	101109	2016/10/16	1 Year
LISN 2	R&S	ESH2-Z5	100309	2016/10/16	1 Year
8 Line ISN	R&S	ENY81	100063	2016/10/16	1Year
Pulse Limiter	R&S	ESH3-Z2	101242	2016/10/16	1 Year
CE Cable 1	HUBSER	ESU8/RF2	W10.01	2016/10/16	1 Year
Test software	Audix	E3	V 6.11111b	/	/

4. 6dB Bandwidth and 99% Bandwidth

4.1. Block diagram of test setup



4.2. Limits

For direct sequence systems, the minimum 6dB bandwidth shall be at least 500 KHz

4.3. Test Procedure

- (1) Connect EUT's antenna output to spectrum analyzer by RF cable.
- (2) Set the spectrum analyzer as follows:

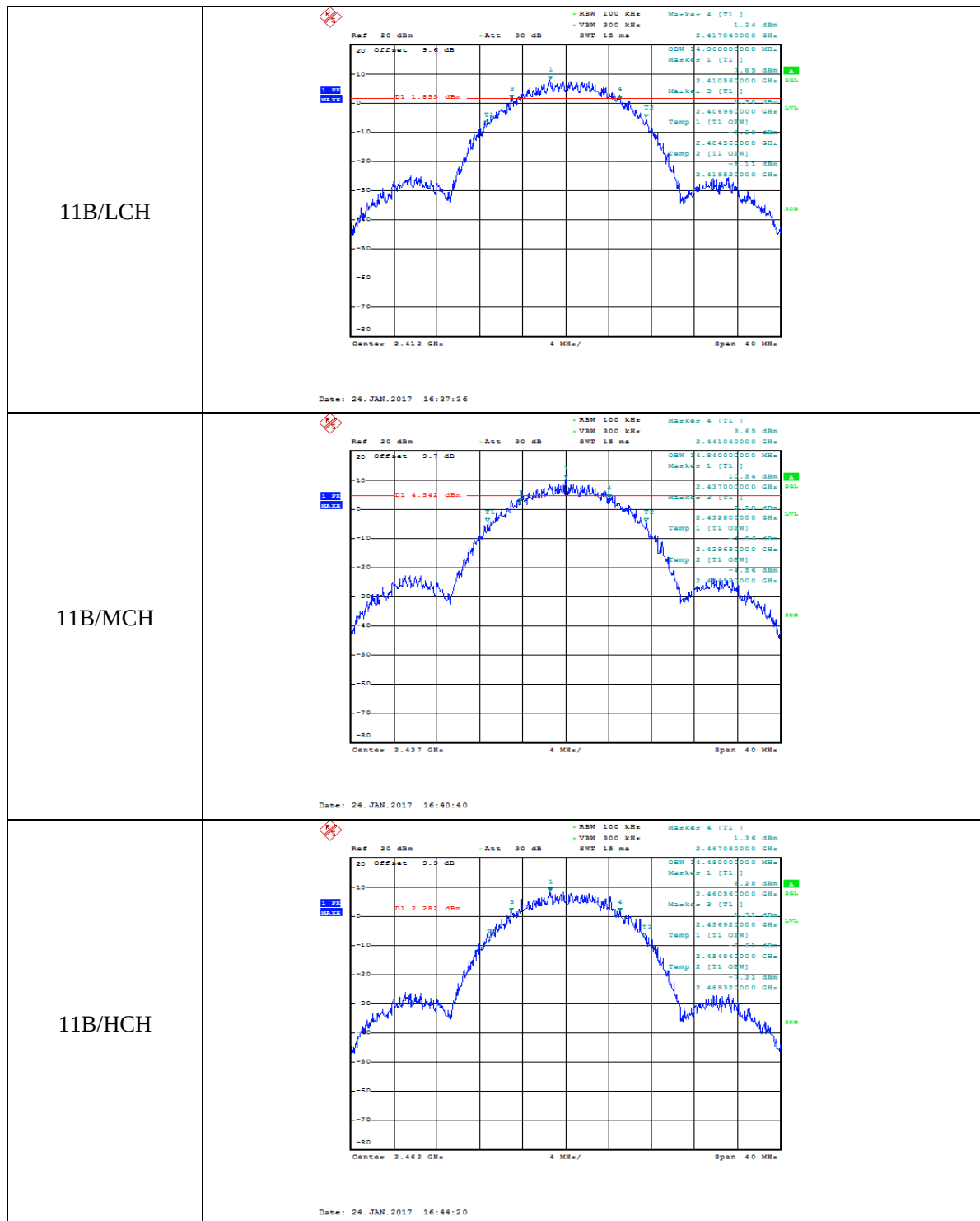
RBW:	100KHz
VBW:	300KHz
Detector Mode:	Peak
Sweep time:	auto
Trace mode	Max hold
- (3) Allow the trace to stabilize, measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

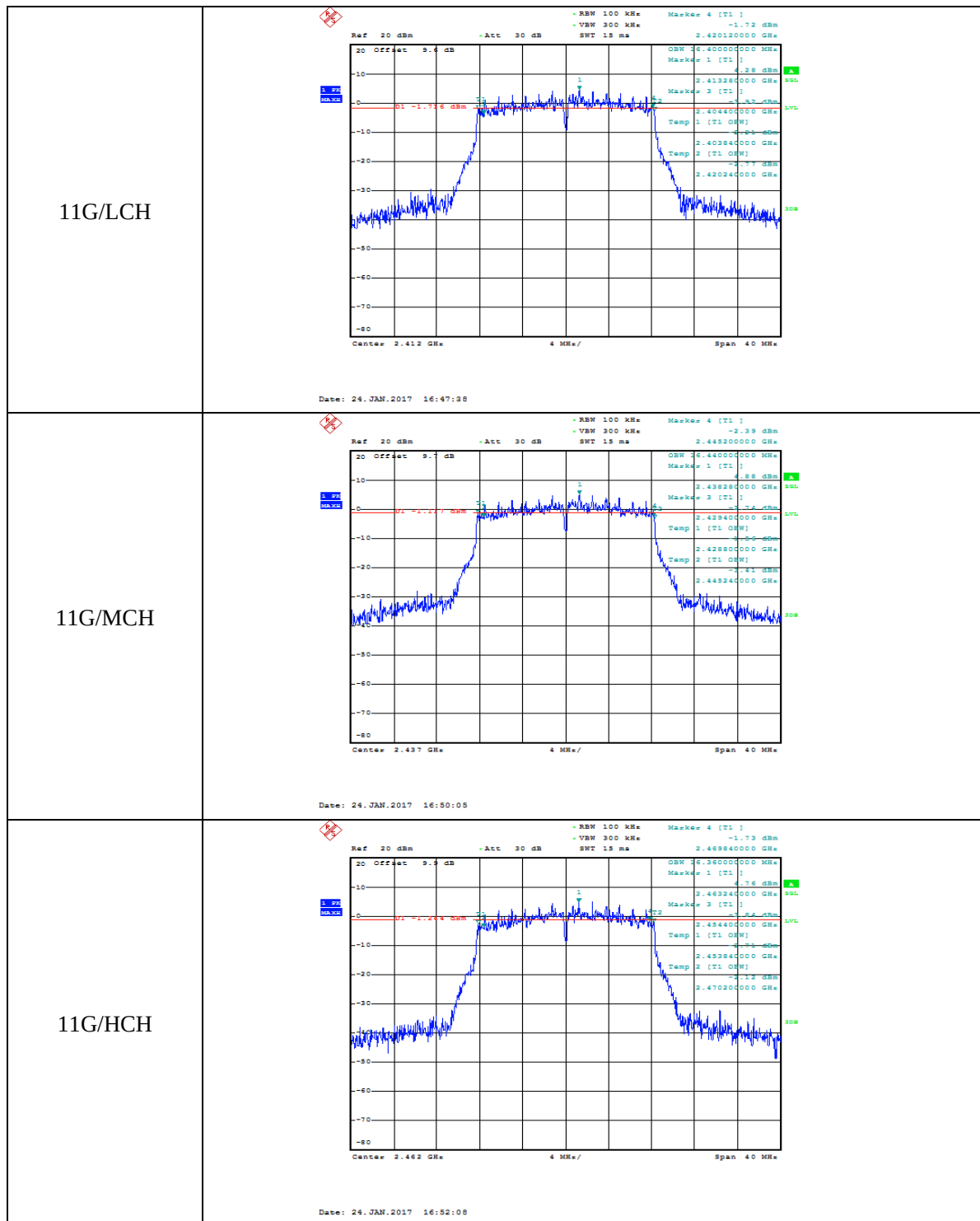
4.4. Test Result

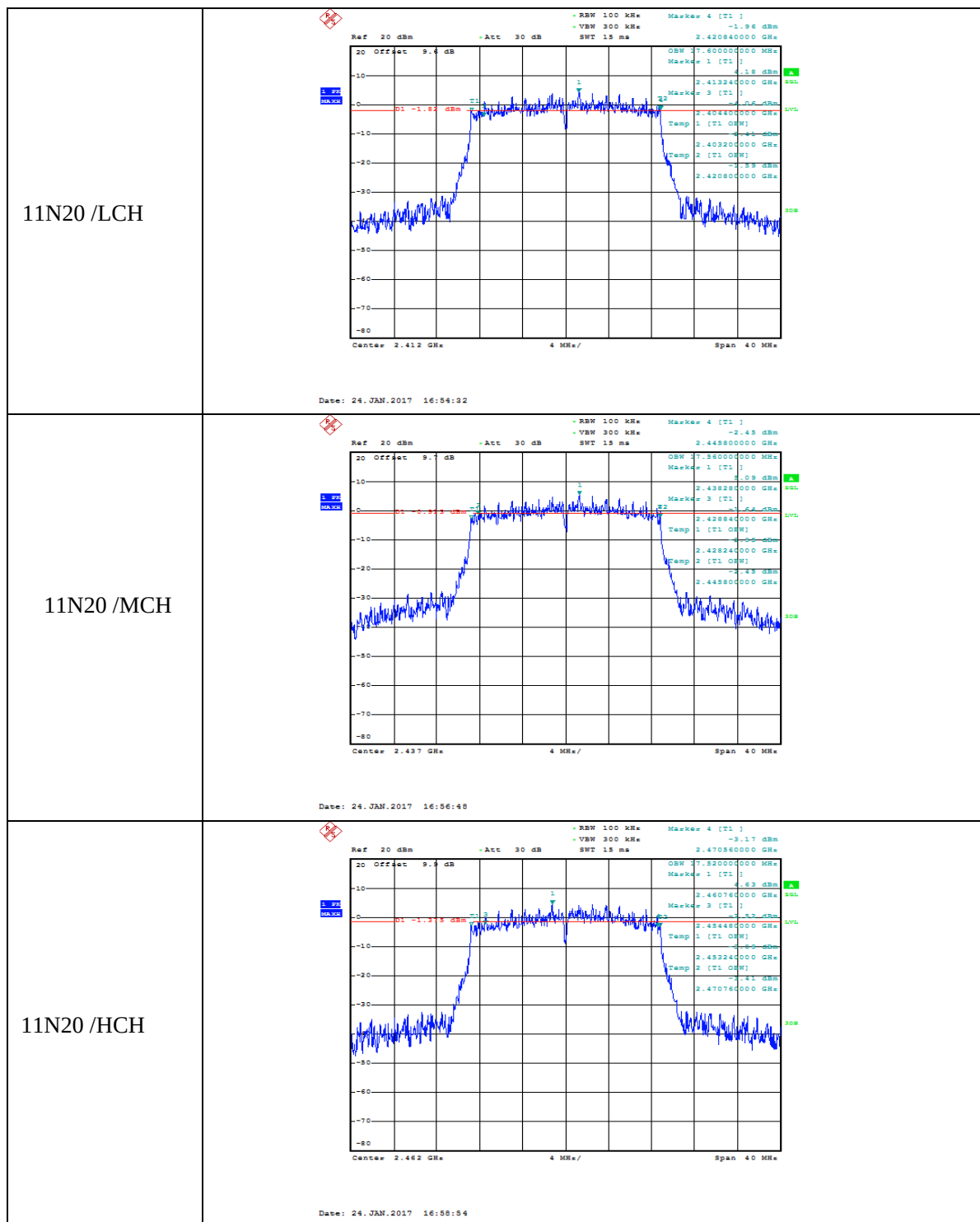
EUT Set Mode	CH or Frequency	6 dB bandwidth	99% dB bandwidth
		Result (MHz)	Result (MHz)
Antenna 1			
11b	CH1	10.080	14.960
	CH6	8.240	14.840
	CH11	10.160	14.480
11g	CH1	15.720	16.400
	CH6	15.800	16.440
	CH11	15.440	16.360
11n HT 20	CH1	16.440	17.600
	CH6	16.960	17.560
	CH11	16.080	17.520
11n HT 40	CH3	28.960	35.760
	CH6	35.280	35.840
	CH9	32.720	35.840
Antenna 2			
11b	CH1	10.056	14.940
	CH6	8.230	14.840
	CH11	10.150	14.430
11g	CH1	15.710	16.430
	CH6	15.810	16.420
	CH11	15.430	16.320
11n HT 20	CH1	16.430	17.630
	CH6	16.950	17.540
	CH11	16.070	17.520
11n HT 40	CH3	28.960	35.750
	CH6	35.230	35.830
	CH9	32.710	35.820
Limit: >500KHz		Conclusion: PASS	
Test Date : Jan. 24, 2017		Test Engineer : Toby	

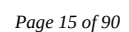
4.5. Original test data(Worse case Antenna 1)

Graphs









5. Conducted Peak Output Power

5.1. Block diagram of test setup

Same as section 4.1

5.2. Limits

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.3. Test Procedure

- (1) Connect each EUT's antenna output to power sensor by RF cable and attenuator
- (2) Measure the Peak output power of each antenna port by power sensor.

5.4. Test Result

EUT Set Mode	CH	Result(dBm) Peak		
		Antenna 1	Antenna 2	Antenna 1+2
11b	CH1	17.59	17.56	N/A
	CH6	18.25	18.24	N/A
	CH11	18.01	18.03	N/A
11g	CH1	14.33	14.33	N/A
	CH6	15.19	15.14	N/A
	CH11	14.75	14.34	N/A
11n HT20	CH1	14.30	14.52	17.42
	CH6	15.03	15.43	18.24
	CH11	14.77	14.23	17.52
11n HT40	CH3	11.38	11.45	14.43
	CH6	11.90	11.23	14.59
	CH9	12.04	12.45	15.26
Limit: 30dBm (Peak power)				Conclusion: PASS
Test Date : Jan. 24, 2017				Test Engineer : Toby

6. Power Spectral Density

6.1. Block diagram of test setup

Same as scetion 4.1

6.2. Limits

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

6.3. Test Procedure

(1) Connect EUT's antenna output to spectrum analyzer by RF cable.

(2) Set the spectrum analyzer as follows:

Center frequency	DTS Channel center frequency
RBW:	$3\text{ kHz} \leq \text{RBW} \leq 100\text{ kHz}$
VBW:	$\geq 3\text{RBW}$
Span	1.5times the DTS bandwidth
Detector Mode:	Peak
Sweep time:	auto
Trace mode	Max hold

(3) Allow the trace to stabilize, use the peak marker function to determine the maximum amplitude level within the RBW.

(4) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

6.4. Test Result

EUT Set Mode	CH or Frequency	Antenna 1 Result(dBm)	Antenna 2 Result(dBm)	Antenna 1+2 Result(dBm)
11b	CH1	4.08	4.05	N/A
	CH6	6.29	6.28	N/A
	CH11	6.06	6.04	N/A
11g	CH1	-1.05	-1.06	N/A
	CH6	-1.37	-1.38	N/A
	CH11	-0.14	-0.15	N/A
11n HT 20	CH1	0.47	0.46	3.48
	CH6	-0.62	-0.60	2.40
	CH11	0.39	0.38	3.40
11n HT 40	CH3	-3.34	-3.34	-0.33
	CH6	-3.73	-3.72	-0.71
	CH9	-3.92	-3.90	-0.90
Limit: <8dBm/3KHz			Conclusion: PASS	

Test Engineer : Toby

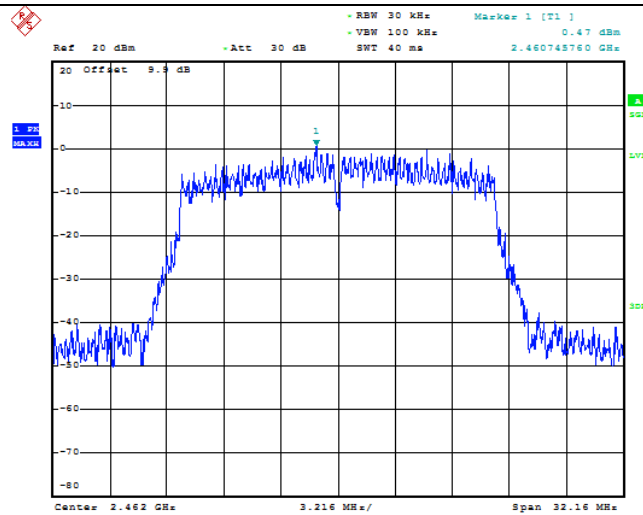
Graphs

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Page 19 of 90

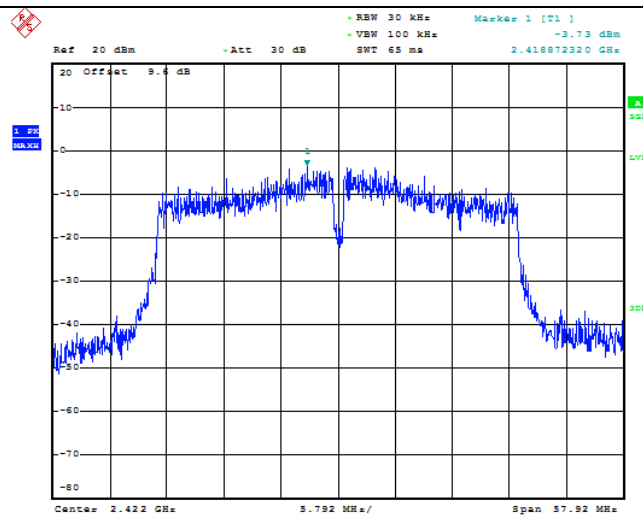
Page 20 of 90

11N20 /HCH



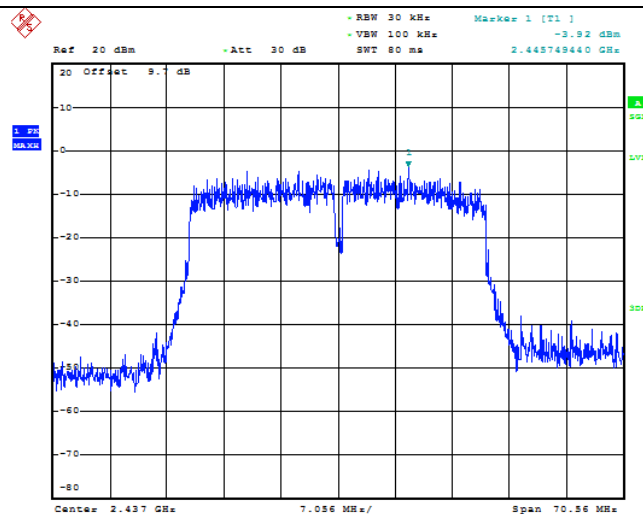
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11N40 /LCH



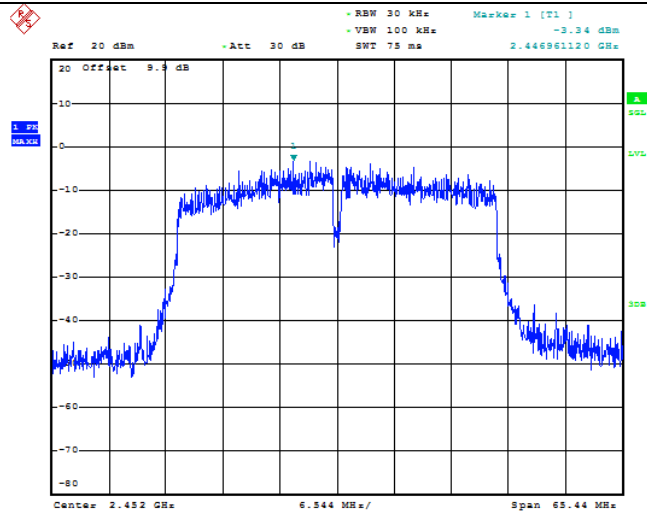
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11N40 /MCH



Date: 24.JAN.2017 17:04:24

11N40 /HCH



Date: 24.JAN.2017 17:06:25

6.6. Band Edge and Spurious Emissions (Conducted)

6.7. Block diagram of test setup

Same as section 4.1

6.8. Limits

In any 100kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.

6.9. Test Procedure

(1) Connect EUT's antenna output to spectrum analyzer by RF cable.

(2) Establish a reference level by using the following procedure:

Center frequency	DTS Channel center frequency
RBW:	100KHz
VBW:	300KHz
Span	1.5times the DTS bandwidth
Detector Mode:	Peak
Sweep time:	auto
Trace mode	Max hold

(3) Allow the trace to stabilize, use the peak marker function to determine the maximum peak power level to establish the reference level.

(4) Set the spectrum analyzer as follows:

RBW:	100KHz
VBW:	300KHz
Span	Encompass frequency range to be measured
Number of measurement points	$\geq \text{span/RBW}$
Detector Mode:	Peak
Sweep time:	auto
Trace mode	Max hold

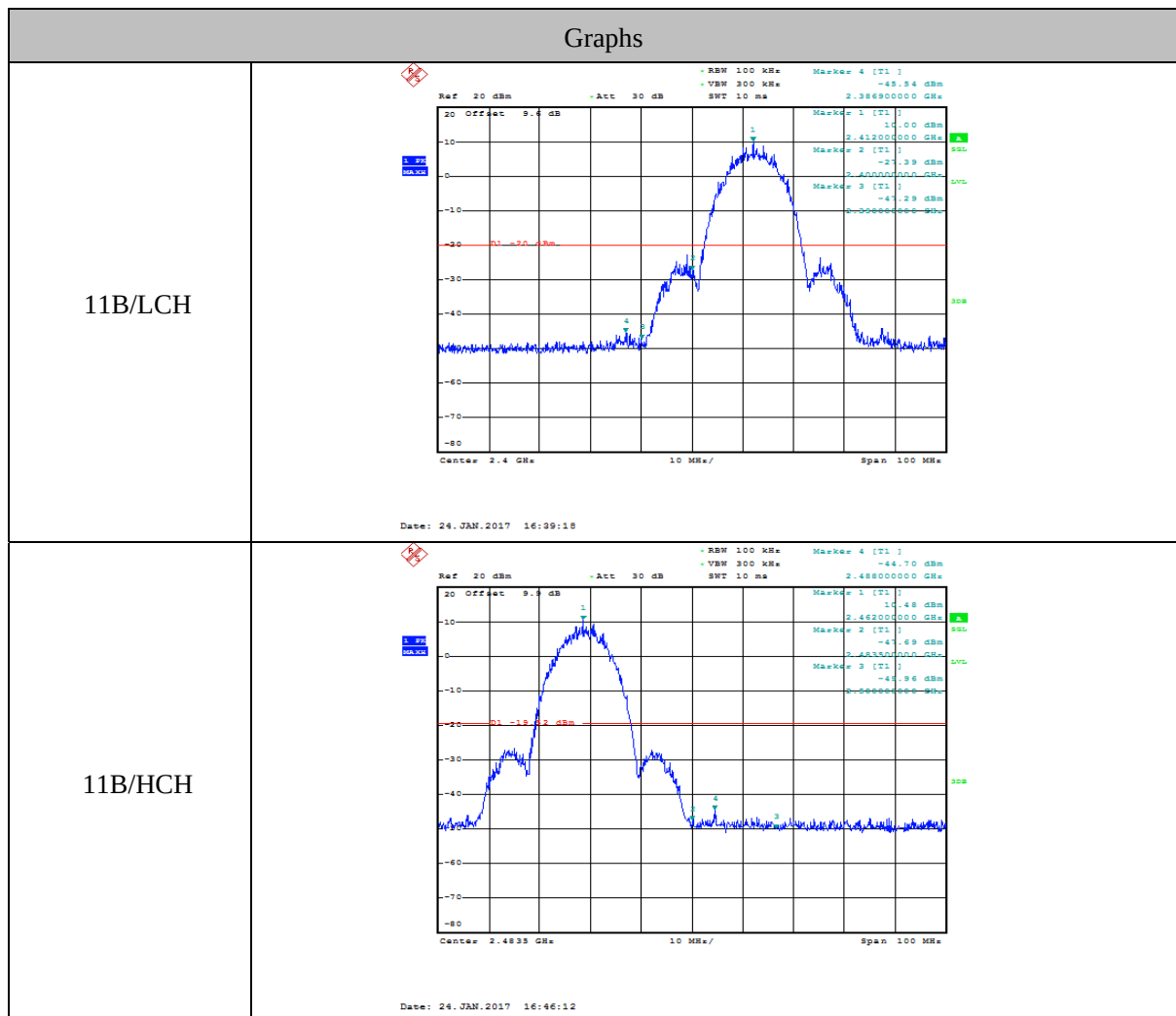
(5) Allow the trace to stabilize, use the peak marker function to determine the maximum amplitude of all unwanted emissions outside of the authorized frequency band

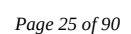
6.10. Test Result

EUT Set Mode	CH or Frequency	Result (dBm)	EUT Set Mode	CH or Frequency	Result (dBm)
11b	CH1	PASS	11n HT 20	CH1	PASS
	CH6	PASS		CH6	PASS
	CH11	PASS		CH11	PASS
11g	CH1	PASS	11n HT 40	CH3	PASS
	CH6	PASS		CH6	PASS
	CH11	PASS		CH9	PASS
Test Date : Jan. 24, 2017			Test Engineer : Toby		

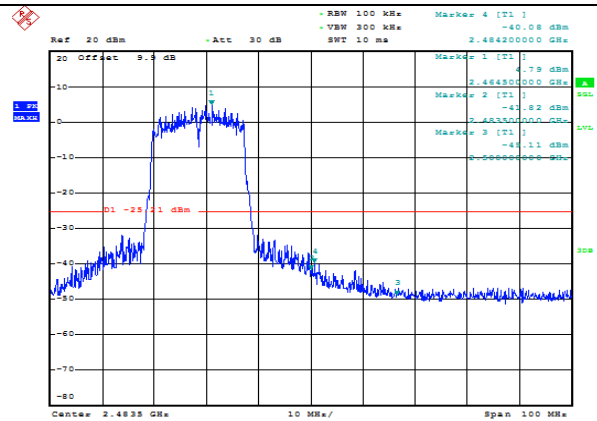
6.11. Original test data(Worse case Antenna 1)

Band Edge:



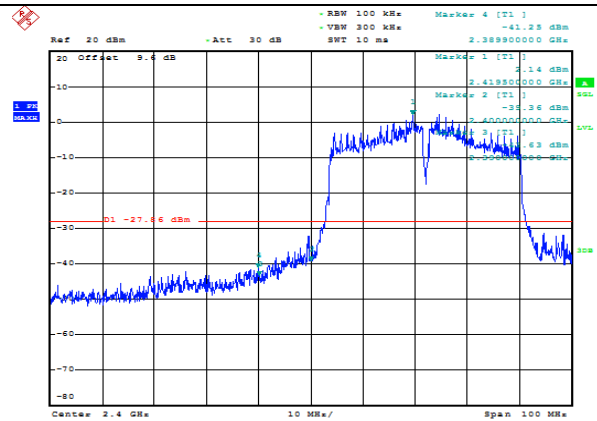


11N20 /HCH



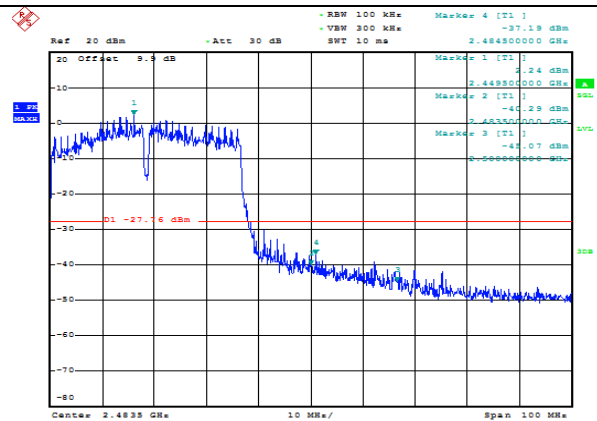
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11N40 /LCH



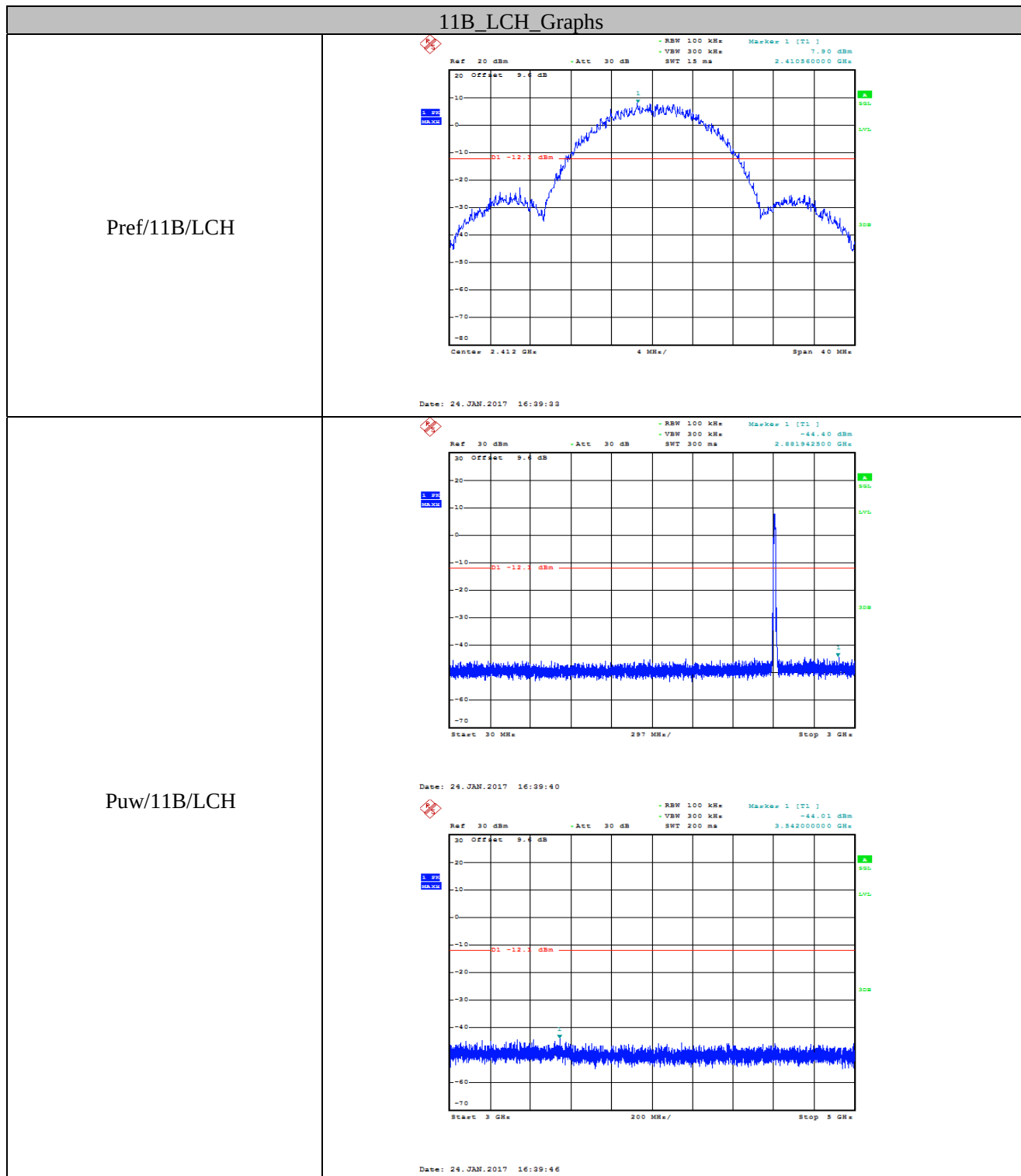
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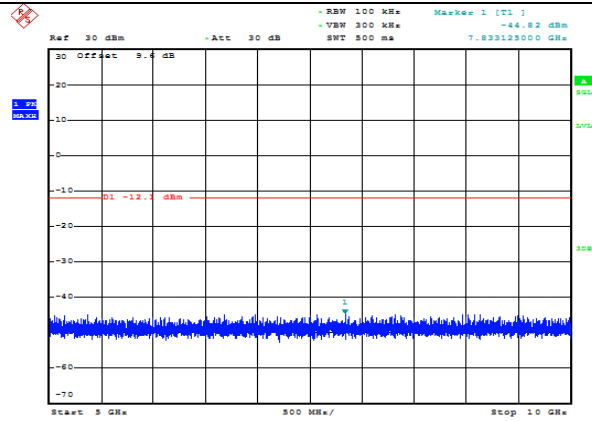
11N40 /HCH



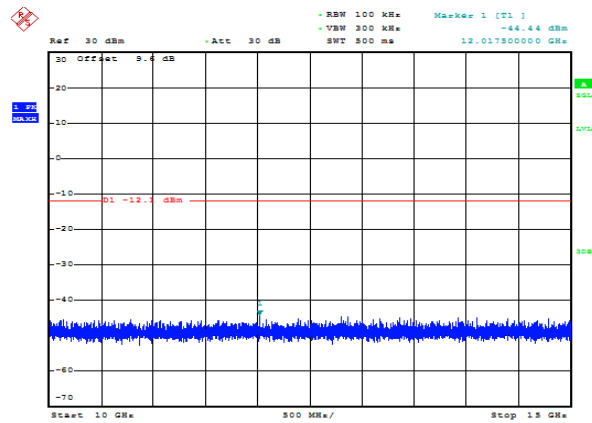
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Spurious Emissions (Worse case mode):

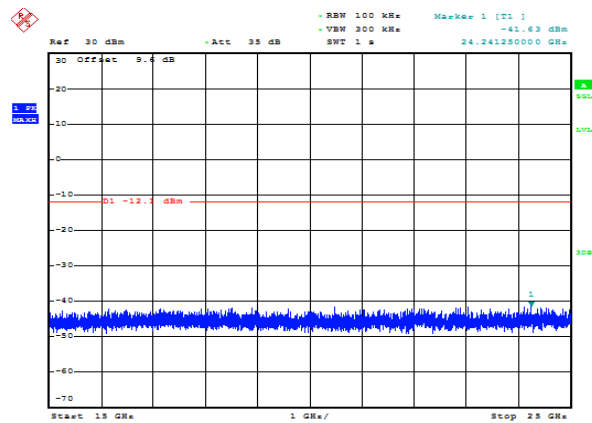




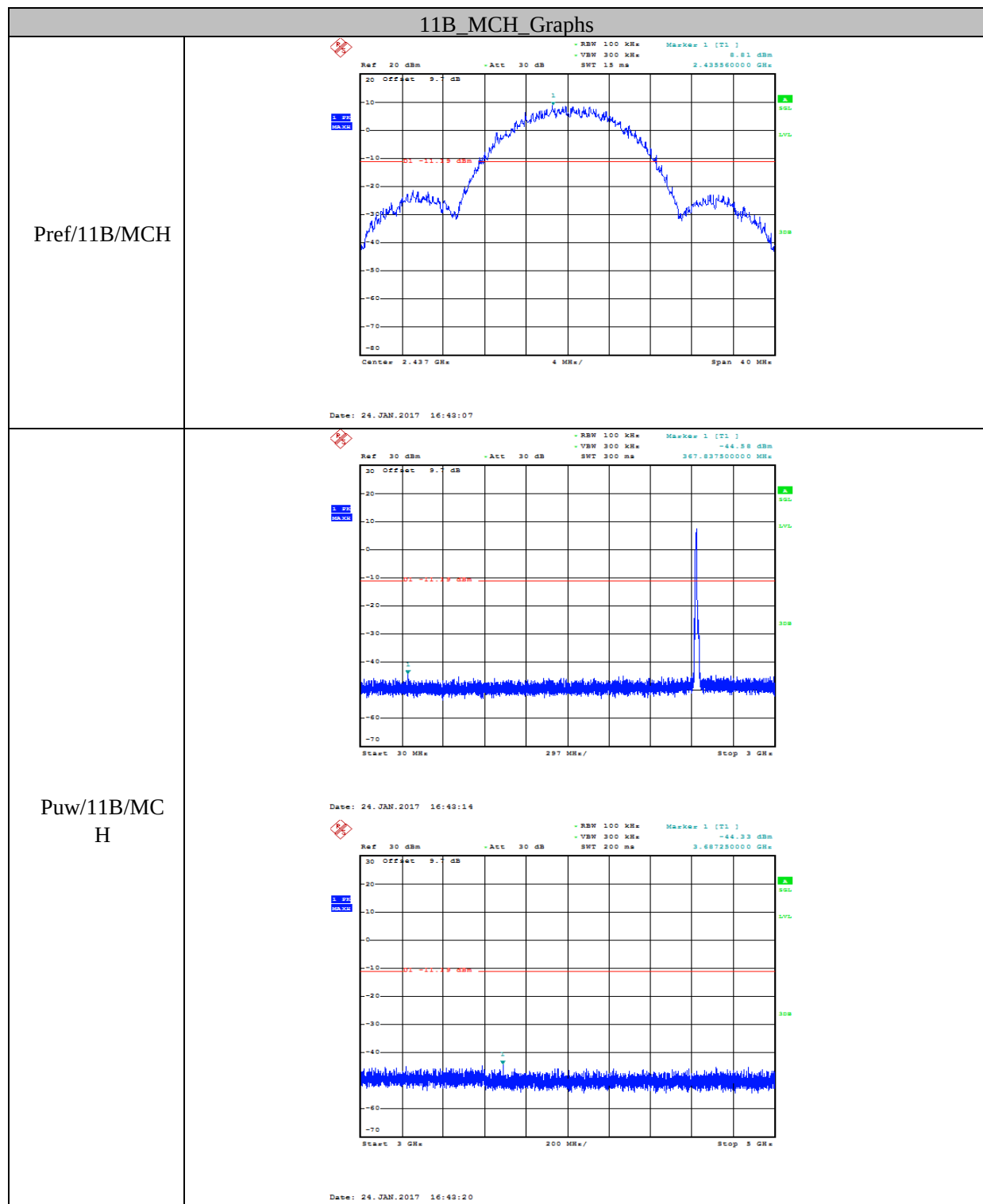
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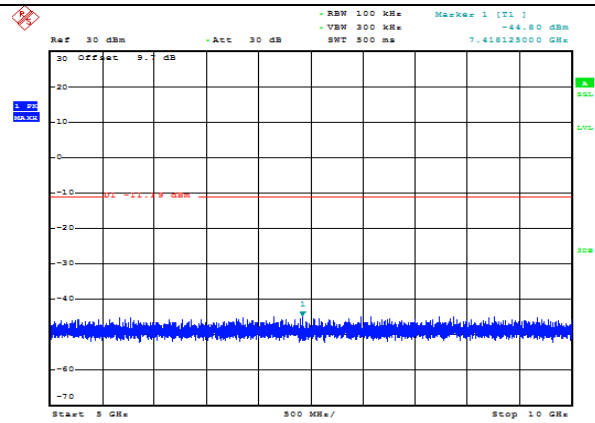


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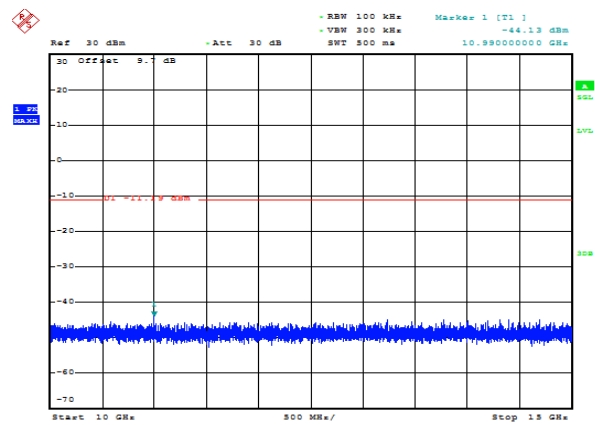


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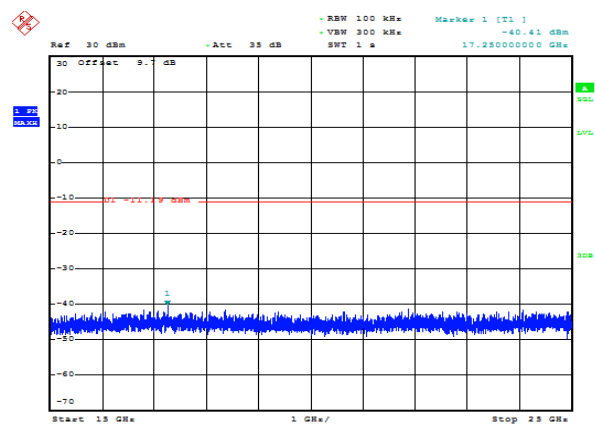




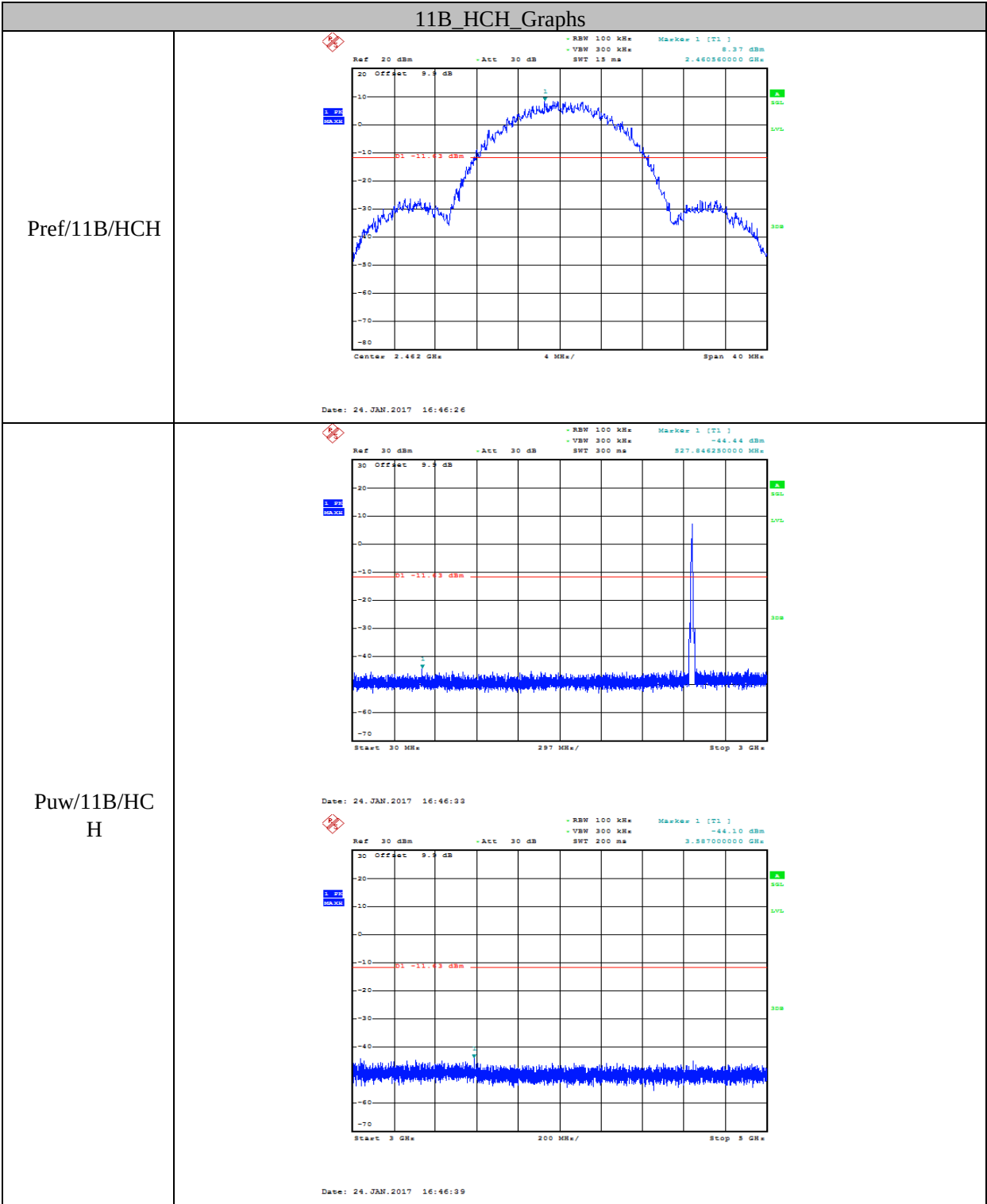
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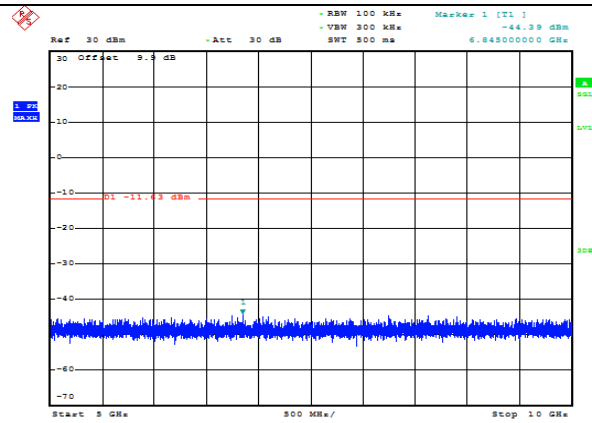


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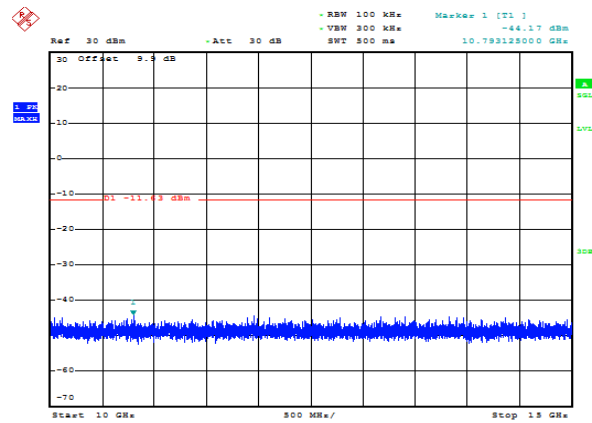


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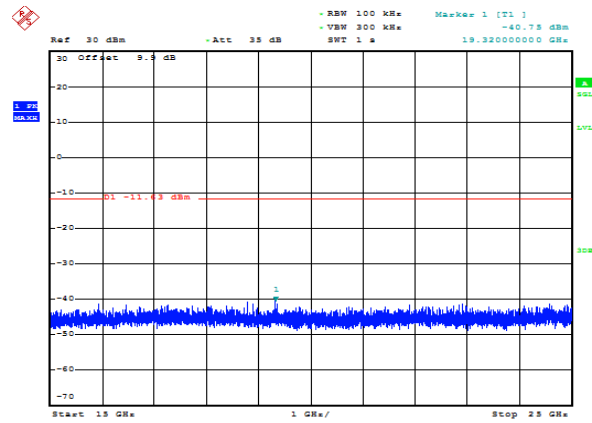




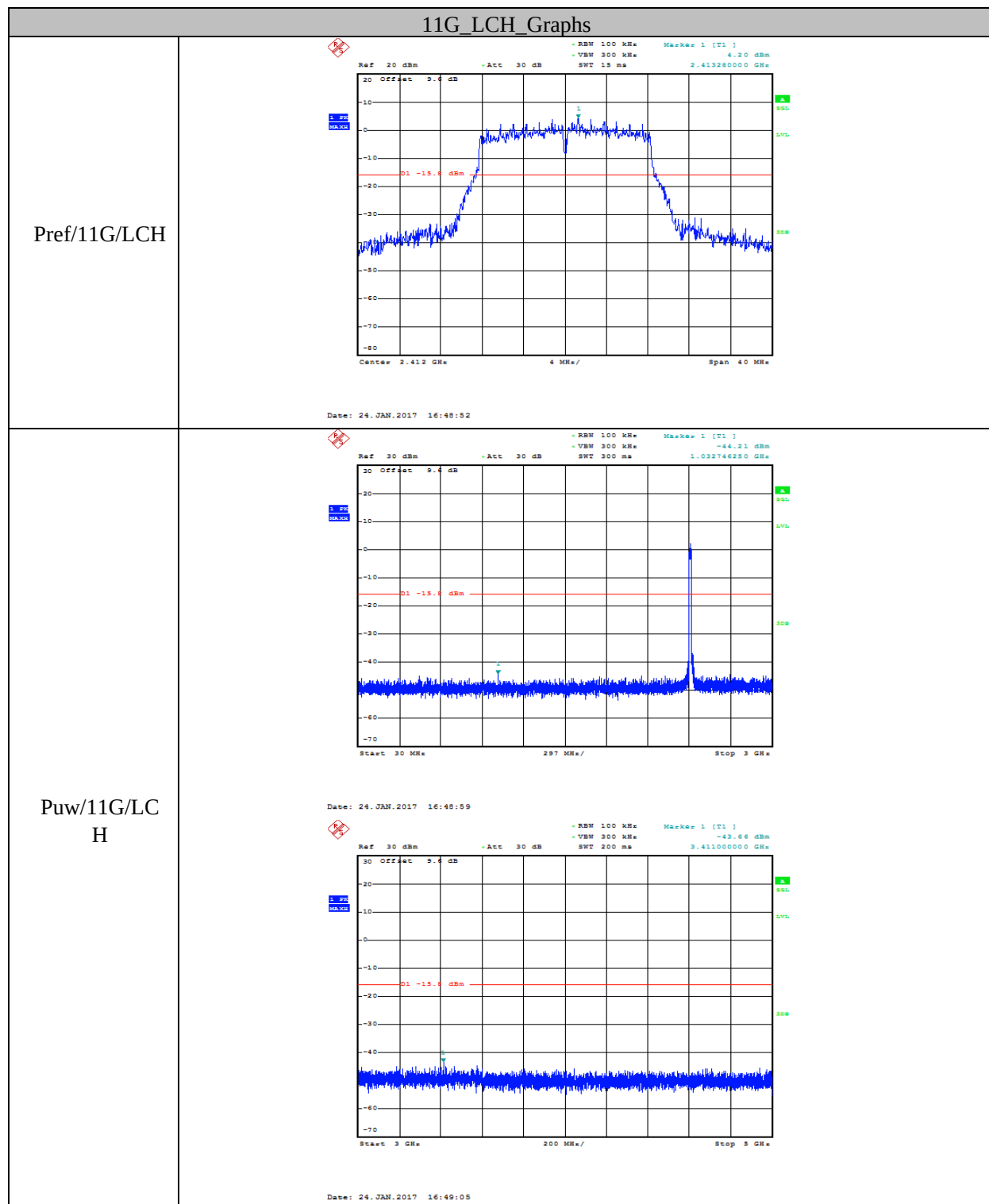
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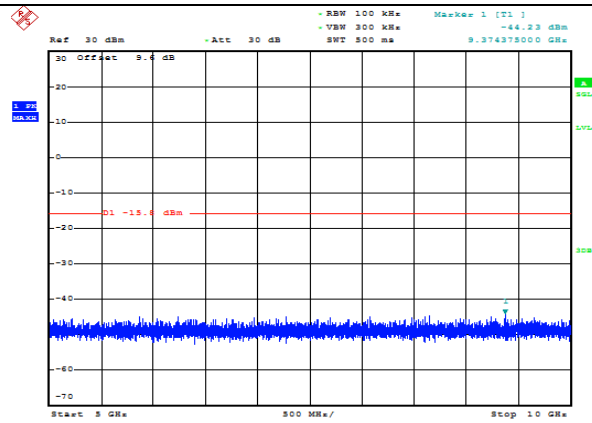


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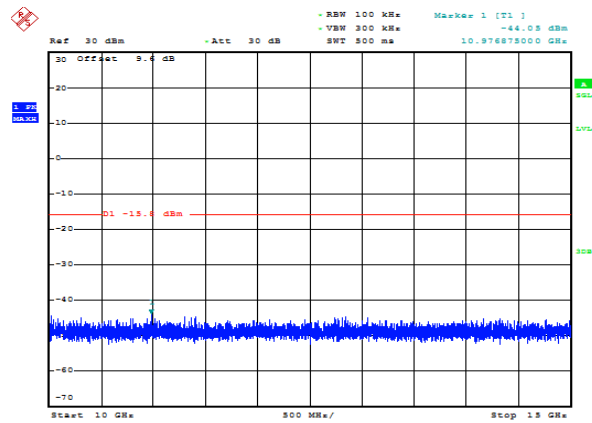


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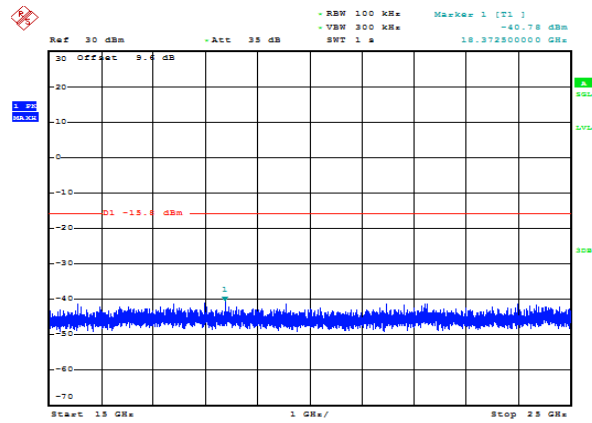




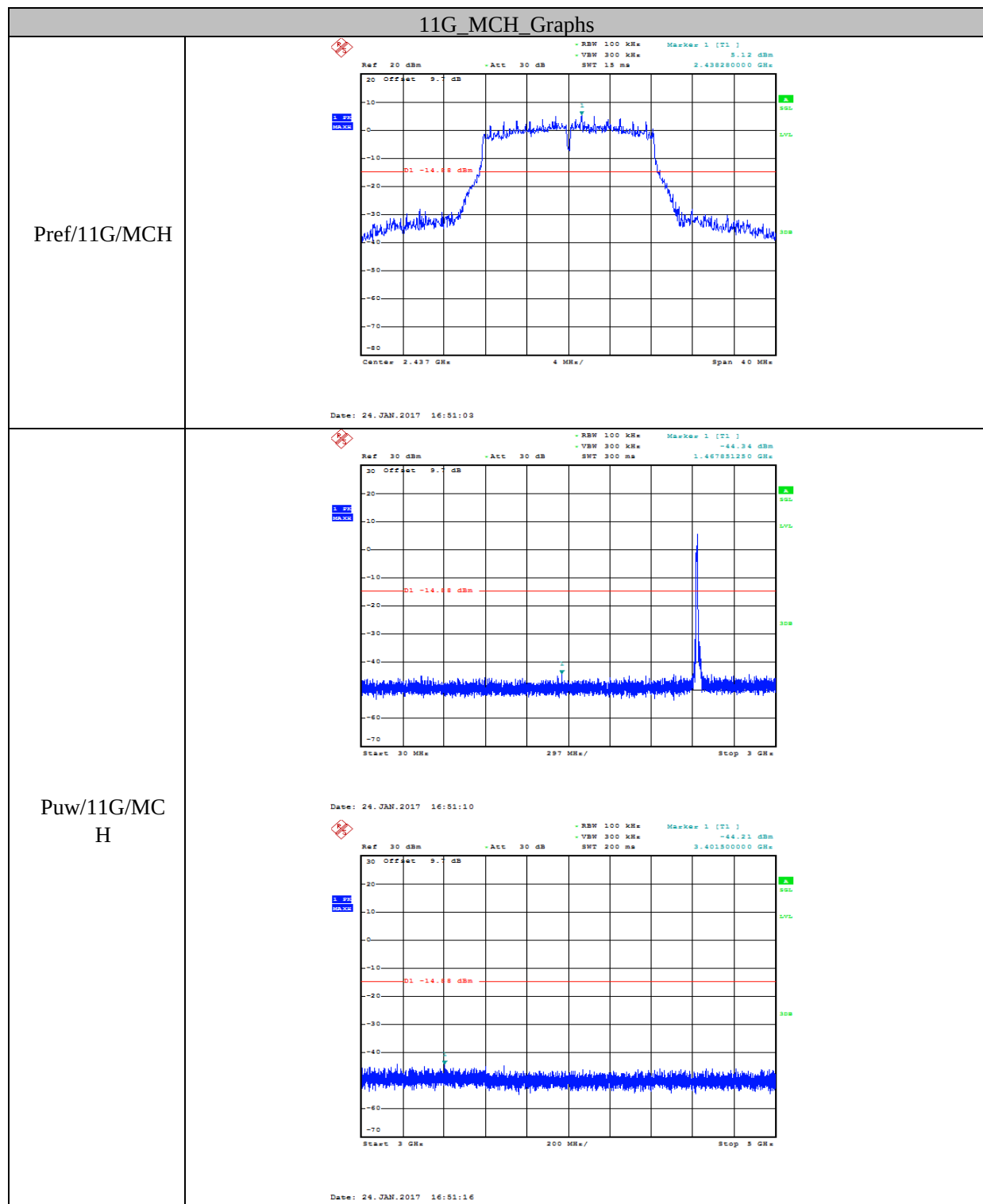
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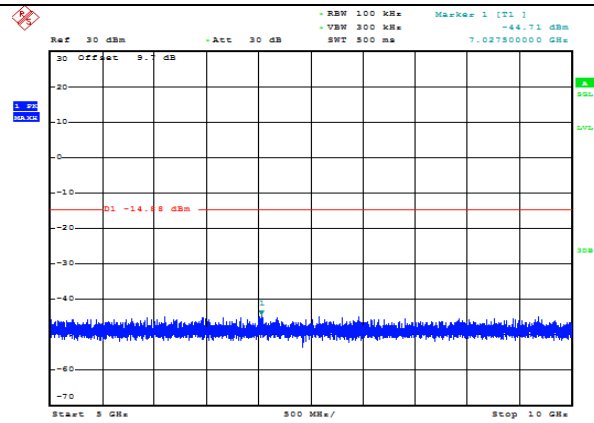


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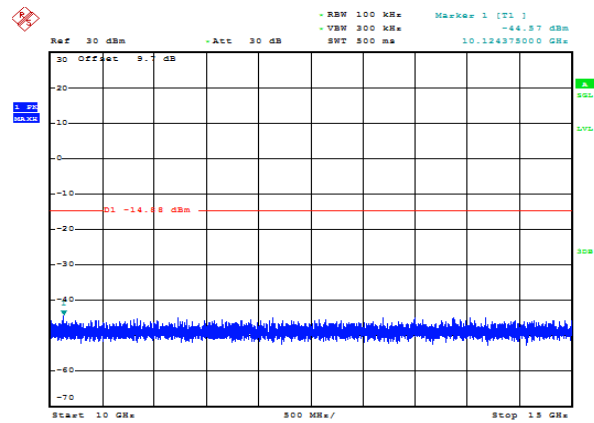


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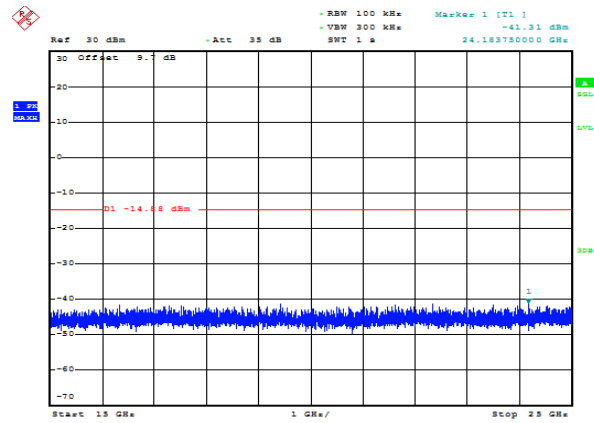




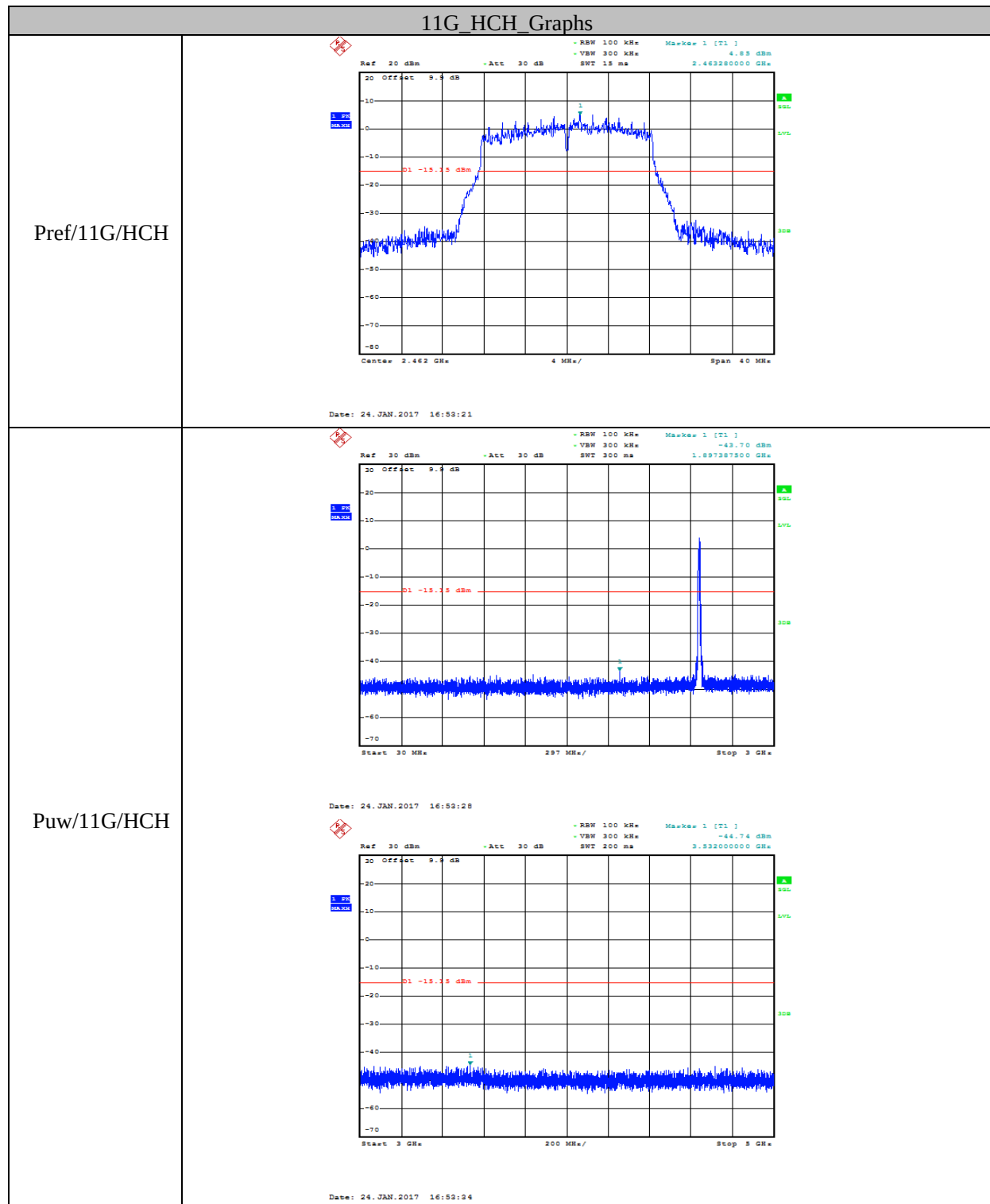
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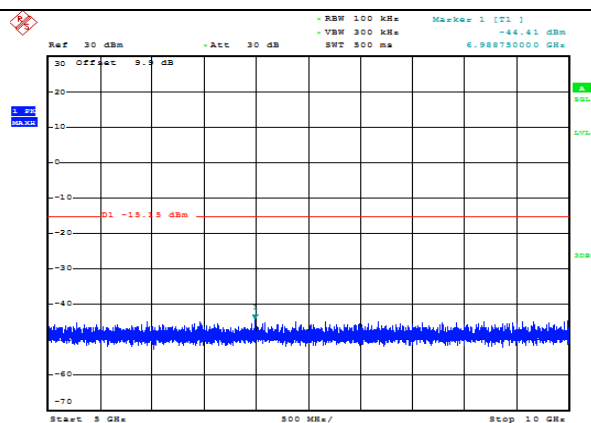


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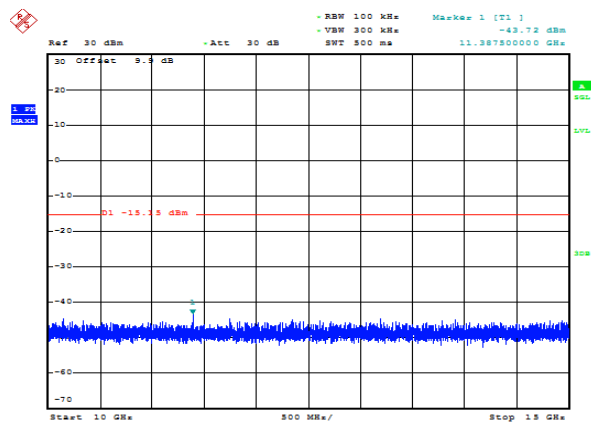


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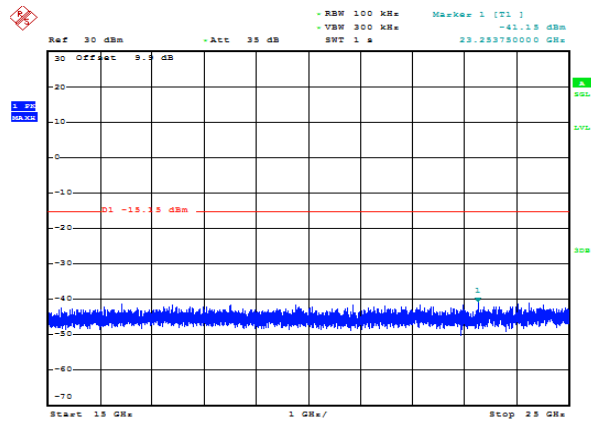




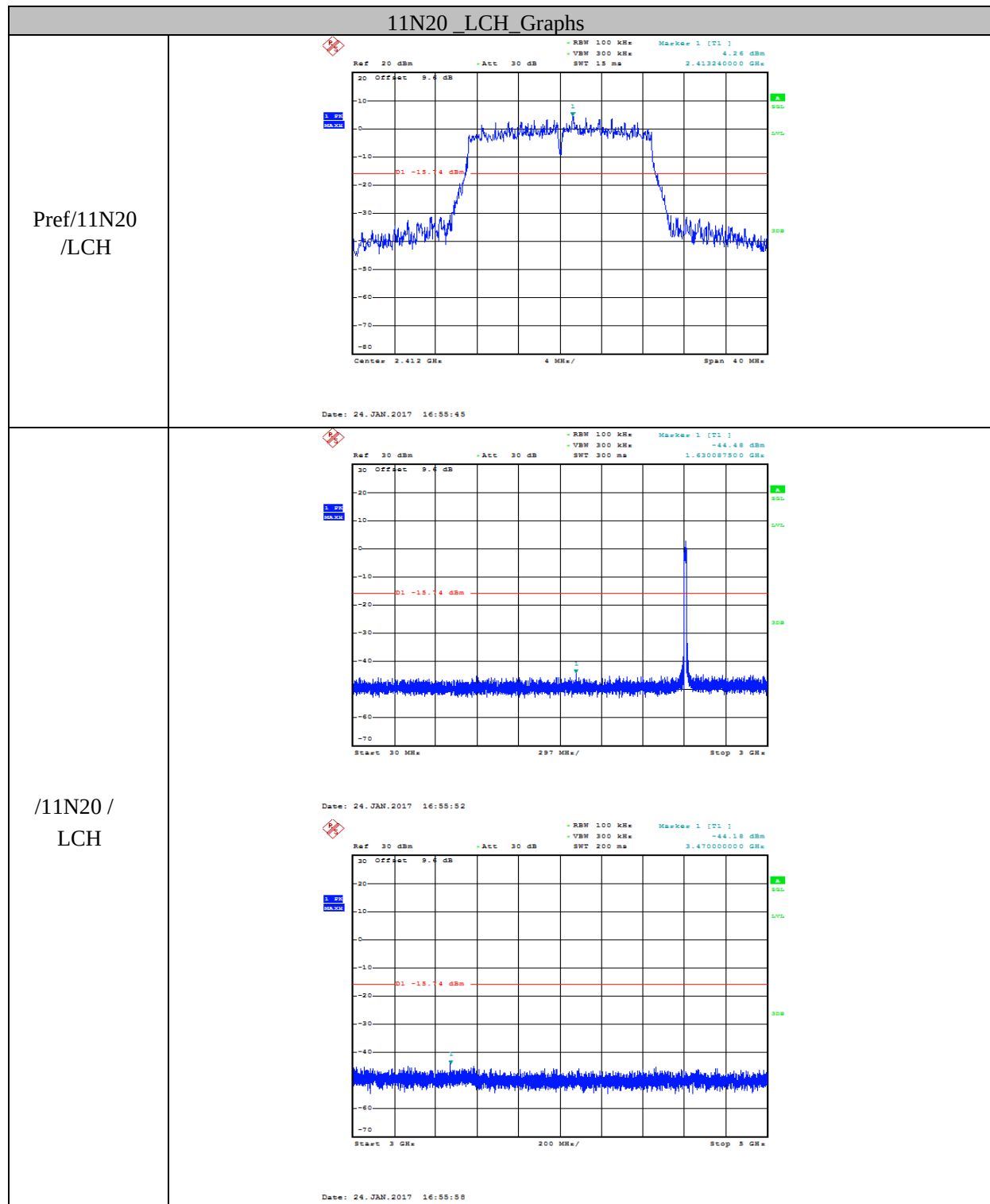
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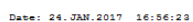


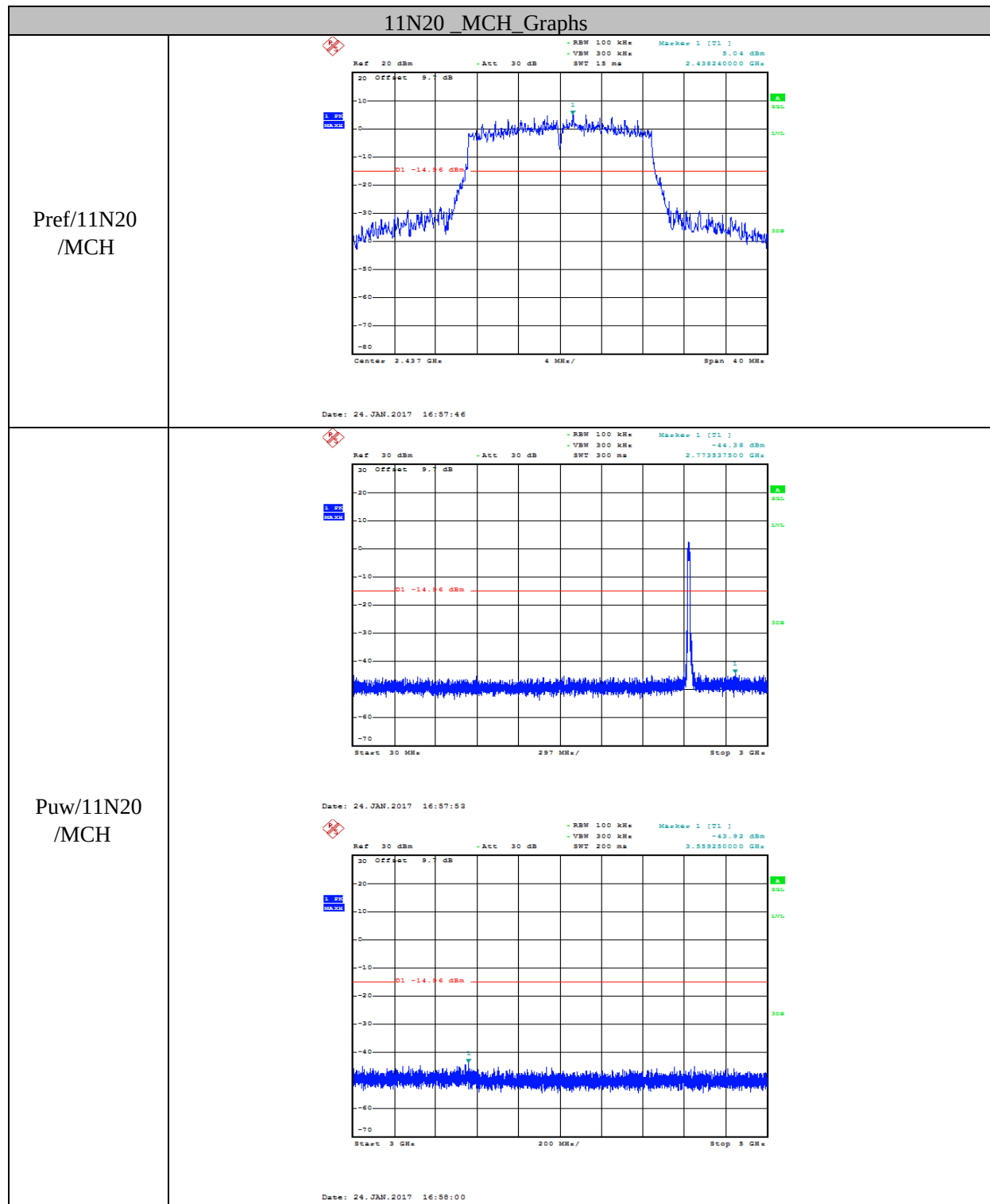
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Date: 24. JAN. 2017 16:59:59







Date: 24.JAN.2017 16:58:08

Date: 24.JAN.2017 16:58:16

Date: 24.JAN.2017 16:58:24

Page 43 of 90

