

TEST REPORT

Of

JAPAN MIC

Product : 7inch digital signage

Brand:  **DayStar**

Model: DS-7N-RK-INT

Model Difference: N/A

Applicant: Daystar Electric Technology Co. Ltd

Address: 1F., No.59, Aly.30, Ln.210, Wende Rd.,
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Test Performed by:

International Standards Laboratory

<LT Lab.>

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Report No.: ISL-18LR219JAP

Issue Date : 2018/07/06

Test results given in this report apply only to the specific sample(s) tested and are traceable to national or international standard through calibration of the equipment and evaluating measurement uncertainty herein.

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VERIFICATION OF COMPLIANCE

Applicant Daystar Electric Technology Co. Ltd

Product Name: 7inch digital signage

Brand Name: 

Model No.: DS-7N-RK-INT

Model Difference: N/A

Date of Test: 2018/06/15 ~ 2018/07/05

Date of EUT Received: 2018/06/15

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
ARIB STD-66	Complied

The above equipment was tested by International Standards Laboratory for compliance with the requirements in the Radio equipment stipulated in the certification ordinance article Article 2, Item (19) Appendix 43, B-1 (2). Item 19 of Article 2 Paragraph 1. The results of testing in this report apply to the product system that was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

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Version

Version No.	Date	Description
00	2018/07/06	Initial creation of document

TABLE OF CONTENTS

PAGE

1.	DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)	5
1.1.	GENERAL INFORMATION	5
1.2.	ANTENNA SPECIFICATION	6
1.3.	ASSEMBLE	6
2.	DESCRIPTION OF TEST MODES	7
3.	GENERAL DESCRIPTION OF APPLIED STANDARDS	7
4.	TEST FACILITY	7
5.	SUPPORT EQUIPMENT	8
6.	SUMMARY OF TESTS	9
6.1.	ANTENNA POWER AND TOLERANCE.....	10
6.2.	FREQUENCY TOLERANCE.....	15
6.3.	OCCUPIED BANDWIDTH.....	17
6.4.	SPREADING BANDWIDTH (90%)	23
6.5.	TRANSMITTER SPURIOUS EMISSIONS.....	29
6.6.	LIMITATION OF COLLATERAL EMISSION OF RECEIVER	54
6.7.	HOPPING DWELL TIME	63
6.8.	ANGULAR WIDTH OF PRINCIPAL RADIATION (AWPR).....	64
6.9.	CARRIER SENSE CAPABILITY	68
	PHOTOGRAPHS OF SETUP	69

1. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)

1.1. GENERAL INFORMATION

General:

Product Name:	7inch digital signage
Brand Name:	
Model Name:	DS-7N-RK-INT
Model Difference:	N/A
Power Supply	12Vdc from adaptor, model: DP30-24120-2A

WLAN: 1TX/1RX

Wi-Fi	Frequency Range (MHz)	Channels	Rated Power Density	Modulation Technology
802.11b	2412 – 2472(DTS)	13	1.3 mW/MHz	DSSS
802.11g	2412 – 2472(DTS)	13	0.5 mW/MHz	OFDM
802.11n (2.4G)	HT20 2412 – 2472(DTS)	13	0.5 mW/MHz	
	HT40 2422 – 2462(DTS)	11	0.15 mW/MH	
Modulation type		CCK, DQPSK, DBPSK for DSSS 256QAM.64QAM. 16QAM, QPSK, BPSK for OFDM		
Antenna Designation		Dipole Antenna WiFi 2.4G Antenna : -2.81 dBi According to KDB662911 D01 SM-MIMO signals could be considered uncorrelated for purposes of directional gain computation. Directional gain = G_{ANT}		

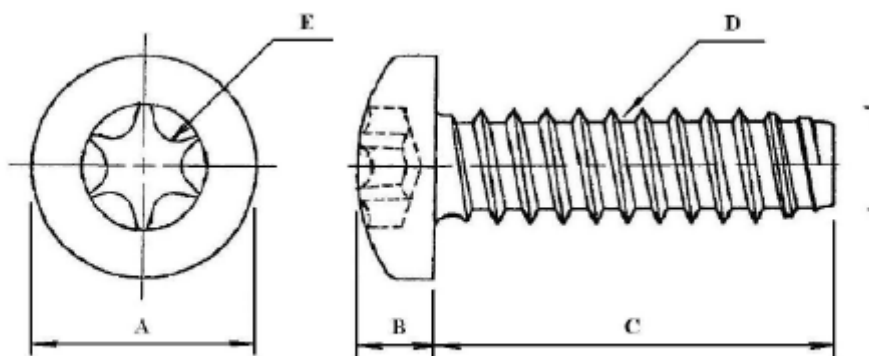
1.2. ANTENNA SPECIFICATION

Antenna Type	Internal linear antenna
Peak Gain	-1.89dBi
Impedance	50.0 ohms
Radiation pattern	Omni

This report applies for 2.4GHz wifi

1.3. ASSEMBLE

Two housings are combined inaccessible by one special screw as below. The plastic housing will be destroyed when trying to open.



2. DESCRIPTION OF TEST MODES

The EUT has been tested at continuous TX and RX modes. And software was used to control the EUT for staying in above description test modes.

Channel low, mid and High with lowest data rate was chosen for testing.

A software tool or a built-in test-mode needs to be reported with the parameter settings for creating the appropriate selection. The software settings shall be reported because of the traceability requirement of the measurements. The settings are depending upon the IEEE standard & mode and the applied modulation. Most common settings are:

802.11 b mode: Channel low (2412MHz), mid (2437MHz) and high (2472MHz) with 1Mbps data rate are chosen for full testing.

802.11 g mode: Channel low (2412MHz) 、 mid (2437MHz) and high (2472MHz) with 6Mbps data rate are chosen for full testing.

802.11 n_20MHz: Lowest (2412MHz), Mid (2437MHz) and Highest (2472MHz) with 6.5 Mbps (The worst case).

802.11 n_40MHz: Lowest (2422MHz), Mid (2437MHz) and Highest (2462MHz) with 13.5 Mbps (The worst case).

Test conditions

Temperature & humidity	Normal
Normal voltage	12 Vdc
Lower extreme voltage	10.8 Vdc
Higher extreme voltage	13.2 Vdc

3. GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT According to the Specifications, it must comply with the requirements of the following standards:

Radio equipment stipulated in the certification ordinance Article 2, Item (19) Appendix 43, B-1 (2) and Item 19 of Article 2 Paragraph 1.

4. TEST FACILITY

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of **International Standards Laboratory** <LT Lab.> No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist., Tao Yuan City 325, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003. FCC Registration Number is: TW1036, Canada Registration Number: 4067B-4.

5. SUPPORT EQUIPMENT

Fig. 5-1 Configuration of Tested System

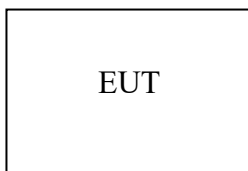


Table 5-1 Equipment Used in Tested System

Item	Equipment	Mrf/Brand	Model Name	Series No	Data Cable	Power Cable
	N/A					

6. SUMMARY OF TESTS

Article reference	Report reference	Parameter	Status (Note 1)
General provisions			
5	6.2	Frequency tolerance	C
6	6.3	Occupied bandwidth	C
7	6.5	Spurious emission	C
Transmitting equipment			
14	6.1	Antenna Power	C
14.2	--	SAR	N/A
15	6.2	Frequency stabilization	C
Transmitting equipment			
20	1.2	Type configuration etc of transmitting antenna	C
22	1.2	Directional pattern of transmitting antenna	C
Receiving equipment			
24	6.6	Spurious emission of receiver	C
26	1.2	Refer to all articles for transmitting antenna	C
Operating frequency 2400-2483.5MHz			
49.20(1); a	1.3	High Frequency/modulation section cannot be operated easily	C
49.20(1); b	1.1	Communication method	C
49.20(1); c	1.1	Communication method	C
49.20(1); d	1.1	Spread Spectrum method	C
49.20(1); e	6.1	Antenna Power	C
49.20(1); f(1)	1.2	Absolute gain of transmitting antenna	C
49.20(1); f(2)	6.8	Angular width of principal radiation (AWPR)	C
49.20(1); g		Number of carriers within 1MHz bandwidth in OFDM	C
49.20(1); h	6.4	Diffusion bandwidth	C
49.20(1); i	6.4	Spreading factor	C
49.20(1); j	6.7	Frequency retention time (FH employed)	N/A
Note 1: C=Confirm NC=Not Confirm NT=Not Tested NA= Not Applicable			

6.1. ANTENNA POWER AND TOLERANCE

6.1.1. Limit:

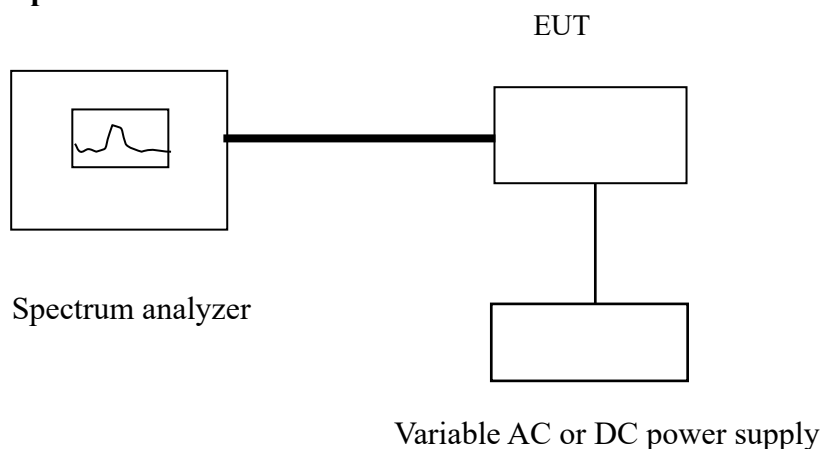
Antenna power: 10mW/MHz

Antenna power tolerance: + 20% to – 80%

6.1.2. Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter 05	Anritsu	ML2495A	1116010	07/28/2017	07/27/2018
Power Sensor 07	DARE	RPR3006W	13I00030SNO34	11/03/2017	11/02/2018
Temperature Chamber	KSON	THS-B4H100	2287	06/28/2018	06/27/2019
DC Power supply	ABM	8185D	N/A	10/06/2017	10/05/2018
AC Power supply	EXTECH	CFC105W	NA	12/25/2017	12/24/2018
Attenuator	Woken	Watt-65m3502	11051601	NA	NA
Splitter	MCLI	PS4-199	12465	12/26/2017	12/25/2019
Spectrum analyzer	keysight	N9010A	MY56070257	05/31/2018	05/30/2019
Spectrum analyzer	R&S	FSP40	100143	08/07/2017	08/06/2018
Test Software	DARE	Radimation Ver:2013.1.23	NA	NA	NA

6.1.3. Test Setup:



6.1.4. Test Procedure:

1. Set the EUT at hopping off and modulation on.
2. Set the ETU operates at channel low, mid and high and normal/Upper/Lower voltage.
3. Connect the EUT to power meter.
4. Record the power level.
5. Varied input voltage to + 10% and - 10% normal voltage and repeat procedure 1 to 4 again.

6.1.5. Test results:

Ambient temperature: 25 °C

Relative humidity: 60 %

Test Date: 2018/06/20

802.11b

Rated Power Density=

1.3 mW/MHz

Antenna Gain=

-2.81 dBi

		Channel Low	Channel Mid	Channel High	Limit
Normal Voltage 12 V	Conducted Power (dBm/MHz)	1.600	1.340	-0.040	N/A
	Conducted Power (mW/MHz)	1.445	1.361	0.991	10mW/MHz
	Power Tolerance	11.188	4.727	-23.782	+20% to -80%
Upper Voltage 13.2 V	Conducted Power (dBm/MHz)	1.570	1.330	-0.030	N/A
	Conducted Power (mW/MHz)	1.435	1.358	0.993	10mW/MHz
	Power Tolerance	10.422	4.486	-23.606	+20% to -80%
Lower Voltage 10.8 V	Conducted Power (dBm/MHz)	1.580	1.350	-0.030	N/A
	Conducted Power (mW/MHz)	1.439	1.365	0.993	10mW/MHz
	Power Tolerance	10.677	4.968	-23.606	+20% to -80%

Remark:

1. Conducted Power (mW/MHz)= $10^{(\text{Conducted Power(dBm/MHz)}/10)}$

2. P (mW/MHz) = Raw power (in mW, measured by power sensor) / [spreading bandwidth (MHz) x duty-cycle]

802.11g

Rated Power Density=

0.5 mW/MHz

Antenna Gain=

-2.81 dBi

		Channel Low	Channel Mid	Channel High	Limit
Normal Voltage 12 V	Conducted Power (dBm/MHz)	-2.750	-3.150	-4.510	N/A
	Conducted Power (mW/MHz)	0.531	0.484	0.354	10mW/MHz
	Power Tolerance	6.177	-3.166	-29.201	+20% to -80%
Upper Voltage 13.2 V	Conducted Power (dBm/MHz)	-2.760	-3.170	-4.500	N/A
	Conducted Power (mW/MHz)	0.530	0.482	0.355	10mW/MHz
	Power Tolerance	5.933	-3.610	-29.037	+20% to -80%
Lower Voltage 10.8 V	Conducted Power (dBm/MHz)	-2.750	-3.140	-4.510	N/A
	Conducted Power (mW/MHz)	0.531	0.485	0.354	10mW/MHz
	Power Tolerance	6.177	-2.942	-29.201	+20% to -80%

Remark:

1. Conducted Power (mW/MHz)= $10^{(\text{Conducted Power(dBm/MHz)}/10)}$

2. P (mW/MHz) = Raw power (in mW, measured by power sensor) / [spreading bandwidth (MHz) x duty-cycle]

802.11n HT20

Rated Power Density=

0.5 mW/MHz

Antenna Gain=

-2.81 dBi

		Channel Low	Channel Mid	Channel High	Limit
Normal Voltage 12 V	Conducted Power (dBm/MHz)	-2.470	-2.800	-4.210	N/A
	Conducted Power (mW/MHz)	0.566	0.525	0.379	10mW/MHz
	Power Tolerance	13.248	4.961	-24.137	+20% to -80%
Upper Voltage 13.2 V	Conducted Power (dBm/MHz)	-2.460	-2.790	-4.230	N/A
	Conducted Power (mW/MHz)	0.568	0.526	0.378	10mW/MHz
	Power Tolerance	13.509	5.203	-24.486	+20% to -80%
Lower Voltage 10.8 V	Conducted Power (dBm/MHz)	-2.450	-2.810	-4.220	N/A
	Conducted Power (mW/MHz)	0.569	0.524	0.378	10mW/MHz
	Power Tolerance	13.771	4.720	-24.311	+20% to -80%

Remark:

1. Conducted Power (mW/MHz)= $10^{(\text{Conducted Power(dBm/MHz)}/10)}$

2. P (mW/MHz) = Raw power (in mW, measured by power sensor) / [spreading bandwidth (MHz) x duty-cycle]

802.11n HT40

Rated Power Density=

0.15 mW/MHz

Antenna Gain=

-2.81 dBi

		Channel Low	Channel Mid	Channel High	Limit
Normal Voltage 12 V	Conducted Power (dBm/MHz)	-7.830	-8.510	-9.250	N/A
	Conducted Power (mW/MHz)	0.165	0.141	0.119	5mW/MHz
	Power Tolerance	9.877	-6.047	-20.767	+20% to -80%
Upper Voltage 13.2 V	Conducted Power (dBm/MHz)	-7.810	-8.510	-9.240	N/A
	Conducted Power (mW/MHz)	0.166	0.141	0.119	5mW/MHz
	Power Tolerance	10.385	-6.047	-20.584	+20% to -80%
Lower Voltage 10.8 V	Conducted Power (dBm/MHz)	-7.820	-8.500	-9.250	N/A
	Conducted Power (mW/MHz)	0.165	0.141	0.119	5mW/MHz
	Power Tolerance	10.131	-5.831	-20.767	+20% to -80%

Remark:

1. Conducted Power (mW/MHz)= $10^{(\text{Conducted Power(dBm/MHz)}/10)}$
2. P (mW/MHz) = Raw power (in mW, measured by power sensor) / [spreading bandwidth (MHz) x duty-cycle]

6.2. FREQUENCY TOLERANCE

6.2.1. Limit:

50ppm

6.2.2. Measurement Equipment Used:

Refer to section 6.1.2 for detail.

6.2.3. Test Setup:

Refer to section 6.1.3 for detail.

6.2.4. Test Procedure:

1. Set the EUT modulation off.
2. Set the ETU operates at channel low, mid and high and normal voltage.
3. Set the spectrum analyzer RBW = 300Hz, VBW=300Hz and Span = 20kHz
4. Max hold, View, Peak High, Mark and snap the screen and record the mark.
5. Varied input voltage to + 10% and - 10% normal voltage and repeat procedure 1 to 4 again.

6.2.5. Test results:

Ambient temperature: 25 °C

Relative humidity: 60 %

Test Date: 2018/06/20

802.11b		Channel Low	Channel Mid	Channel High	Limit
Normal Voltage 12 V	Measured Frequency (MHz)	2412.0200	2436.9700	2472.0500	+/-50ppm
	Frequency Tolerance (ppm)	8.292	-12.310	20.227	
Upper Voltage 13.2 V	Measured Frequency (MHz)	2412.0100	2437.0300	2471.9700	+/-50ppm
	Frequency Tolerance (ppm)	4.146	12.310	-12.136	
Lower Voltage 10.8 V	Measured Frequency (MHz)	2411.9500	2437.0500	2472.0100	+/-50ppm
	Frequency Tolerance (ppm)	-20.730	20.517	4.045	

802.11g		Channel Low	Channel Mid	Channel High	Limit
Normal Voltage 12 V	Measured Frequency (MHz)	2411.9800	2437.0100	2471.9900	+/-50ppm
	Frequency Tolerance (ppm)	-8.292	4.103	-4.045	
Upper Voltage 13.2 V	Measured Frequency (MHz)	2412.0000	2437.0400	2472.0100	+/-50ppm
	Frequency Tolerance (ppm)	0.000	16.414	4.045	
Lower Voltage 10.8 V	Measured Frequency (MHz)	2412.0100	2436.9900	2471.9600	+/-50ppm
	Frequency Tolerance (ppm)	4.146	-4.103	-16.181	

802.11n HT20		Channel Low	Channel Mid	Channel High	Limit
Normal Voltage 12 V	Measured Frequency (MHz)	2412.0100	2436.9600	2472.0200	+/-50ppm
	Frequency Tolerance (ppm)	4.146	-16.414	8.091	
Upper Voltage 13.2 V	Measured Frequency (MHz)	2412.0200	2437.0500	2471.9900	+/-50ppm
	Frequency Tolerance (ppm)	8.292	20.517	-4.045	
Lower Voltage 10.8 V	Measured Frequency (MHz)	2411.9600	2437.0400	2472.0400	+/-50ppm
	Frequency Tolerance (ppm)	-16.584	16.414	16.181	

802.11n HT40		Channel Low	Channel Mid	Channel High	Limit
Normal Voltage 12 V	Measured Frequency (MHz)	2422.0200	2437.0500	2461.9500	+/-50ppm
	Frequency Tolerance (ppm)	8.258	20.517	-20.309	
Upper Voltage 13.2 V	Measured Frequency (MHz)	2422.0000	2436.9500	2462.0100	+/-50ppm
	Frequency Tolerance (ppm)	0.000	-20.517	4.062	
Lower Voltage 10.8 V	Measured Frequency (MHz)	2422.0100	2437.0100	2461.9600	+/-50ppm
	Frequency Tolerance (ppm)	4.129	4.103	-16.247	

6.3. OCCUPIED BANDWIDTH

6.3.1. Limit:

802.11 b/g /n(HT20) < 26MHz

802.11 n(HT40)<38MHz

6.3.2. Measurement Equipment Used:

Refer to section 6.1.2 for detail.

6.3.3. Test Setup:

Refer to section 6.1.3 for detail.

6.3.4. Test Procedure:

1. Set the EUT modulation on.
2. Set the ETU operate at channel low, mid and high and normal voltage.
3. Set the spectrum analyzer RBW = 300kHz, VBW=300kHz, center frequency = 2412MHz, 2437MHz, 2472MHz, 2484MHz and Span = 26MHz
4. Turn on 99% spectrum OBW function on, Max hold, View, and snap the screen and record the mark.
5. Varied input voltage to + 10% and - 10% normal voltage and repeat procedure 1 to 4 again.

6.3.5. Test results:

Ambient temperature: 25 °C

Relative humidity: 60 %

Test Date: 2018/06/20

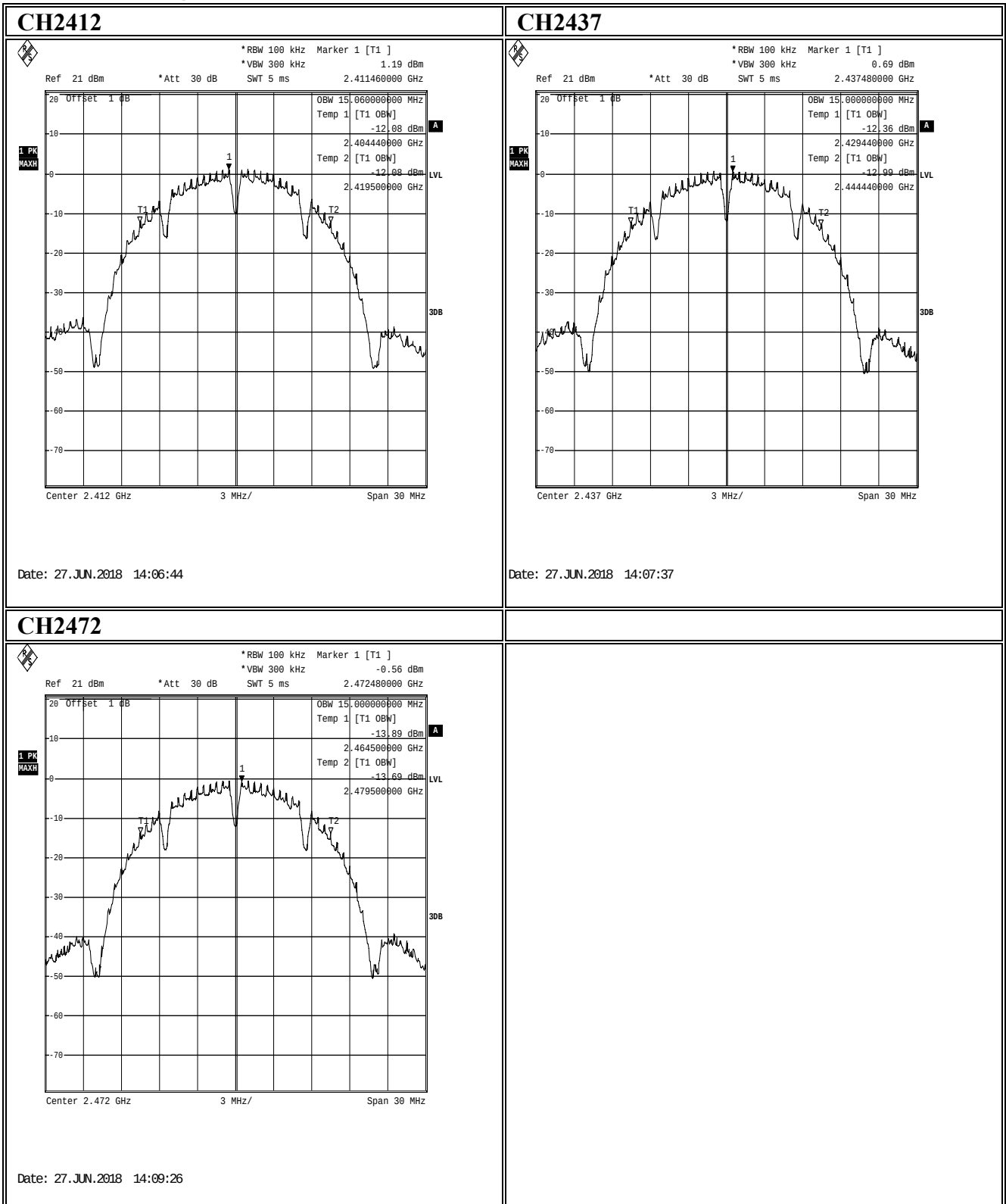
802.11b	CH Low	CH Mid	CH High	Limit	Remark
Normal Voltage 12 V	15.06	15	15	<26MHz	Pass
Upper Voltage 13.2 V	15.06	15.06	15.06	<26MHz	Pass
Lower Voltage 10.8 V	15	15.06	15	<26MHz	Pass

802.11g	CH Low	CH Mid	CH High	Limit	Remark
Normal Voltage 12 V	16.5	16.5	16.5	<26MHz	Pass
Upper Voltage 13.2 V	16.5	16.5	16.5	<26MHz	Pass
Lower Voltage 10.8 V	16.5	16.5	16.5	<26MHz	Pass

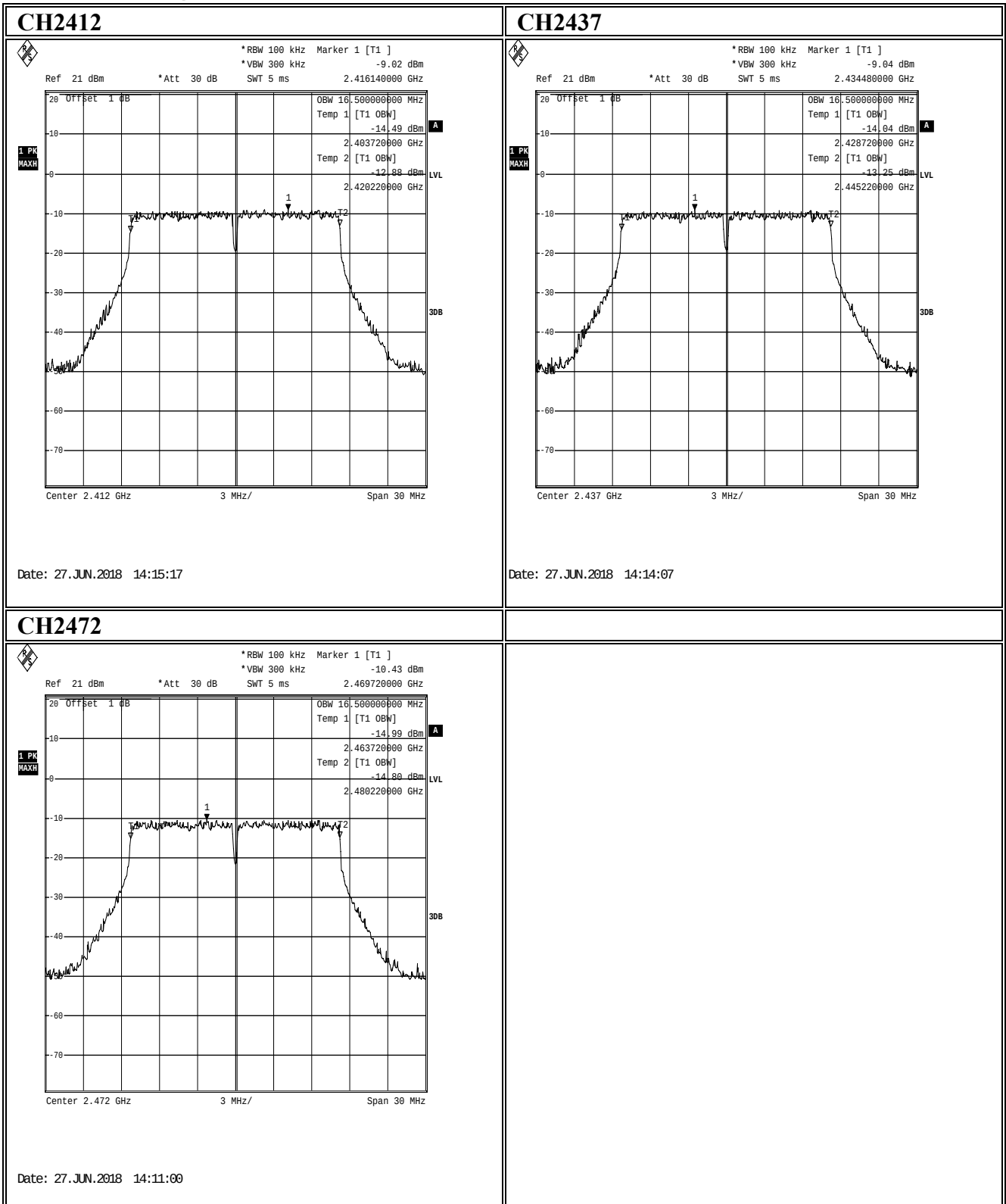
802.11n HT20	CH Low	CH Mid	CH High	Limit	Remark
Normal Voltage 12 V	17.7	17.7	17.76	<26MHz	Pass
Upper Voltage 13.2 V	17.76	17.76	17.76	<26MHz	Pass
Lower Voltage 10.8 V	17.76	17.7	17.76	<26MHz	Pass

802.11n HT40	CH Low	CH Mid	CH High	Limit	Remark
Normal Voltage 12 V	36	36	36	<38MHz	Pass
Upper Voltage 13.2 V	35.9	36	36	<38MHz	Pass
Lower Voltage 10.8 V	35.9	36	36	<38MHz	Pass

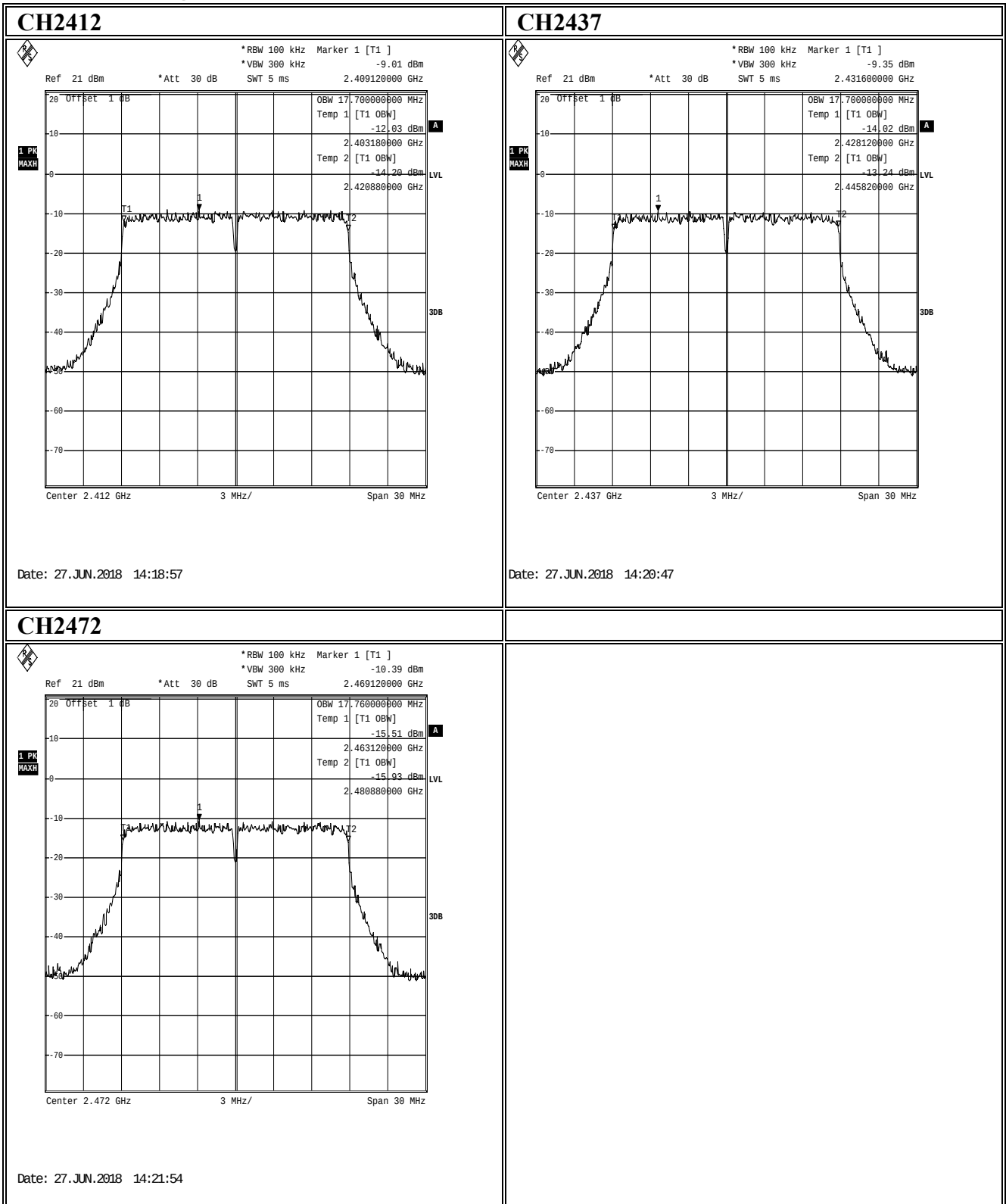
Normal voltage for 802.11b:



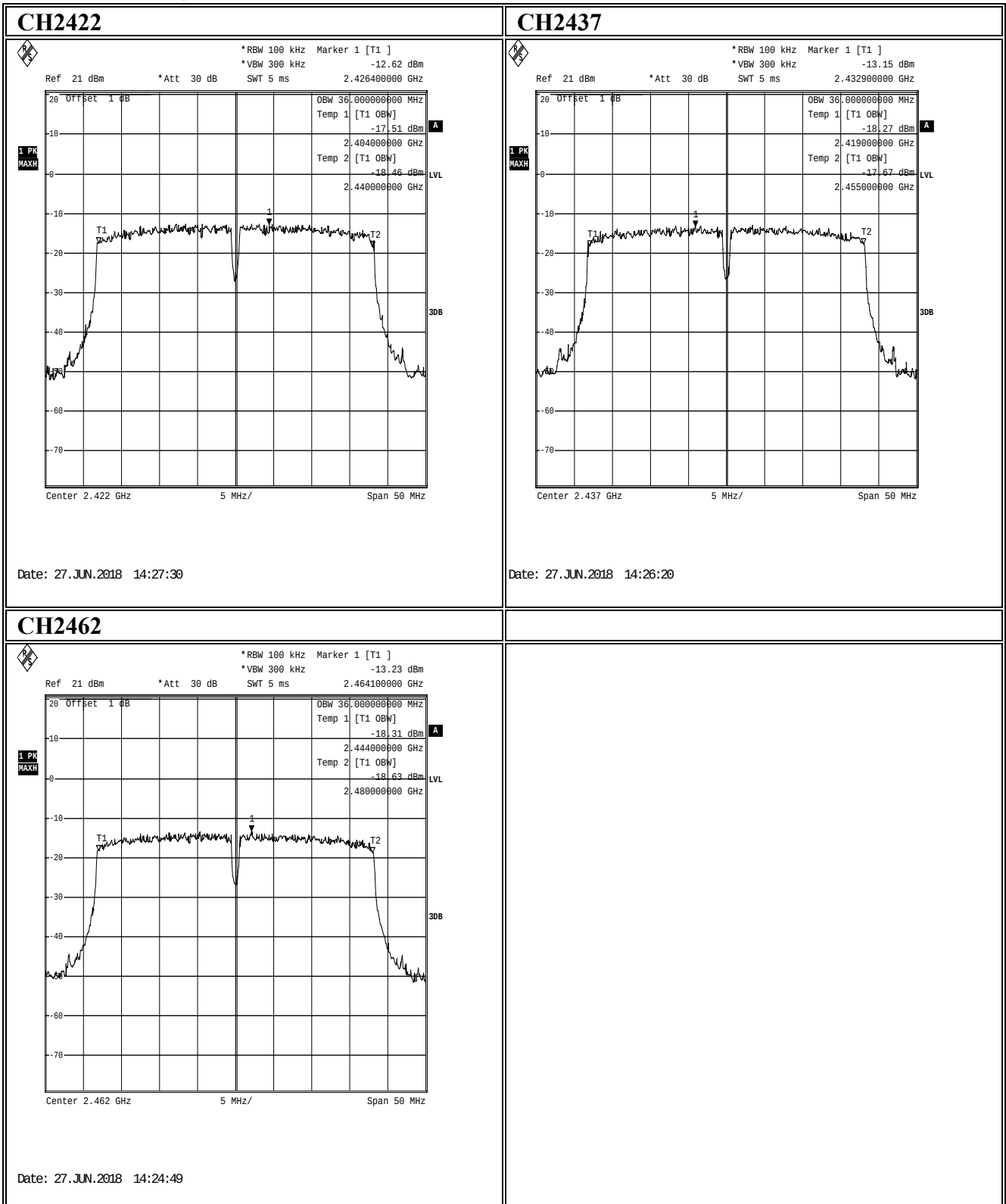
Normal voltage for 802.11g:



Normal voltage for 802.11n HT20:



Normal voltage for 802.11n HT40:



6.4. SPREADING BANDWIDTH (90%)

6.4.1. Limit:

> 500kHz

Spread Factor for DS system: 1~13ch>5, 14ch >10

6.4.2. Measurement Equipment Used:

Refer to section 6.1.2 for detail.

6.4.3. Test Setup:

Refer to section 6.1.3 for detail.

6.4.4. Test Procedure:

1. Set the EUT modulation on.
2. Set the ETU operate at channel low, mid and high and normal voltage.
3. Set the spectrum analyzer RBW = 300kHz, VBW=300kHz, center frequency =2412MHz, 2437MHz, 2472MHz and Span = 50MHz
4. Turn on 90% spectrum OBW function, Max hold, View, and snap the screen and record the mark.
5. Varied input voltage to + 10% and - 10% normal voltage and repeat procedure 1 to 4 again.

6.4.5. Test results:

Ambient temperature: 25 °C Relative humidity: 60 % Test Date: 2018/06/20

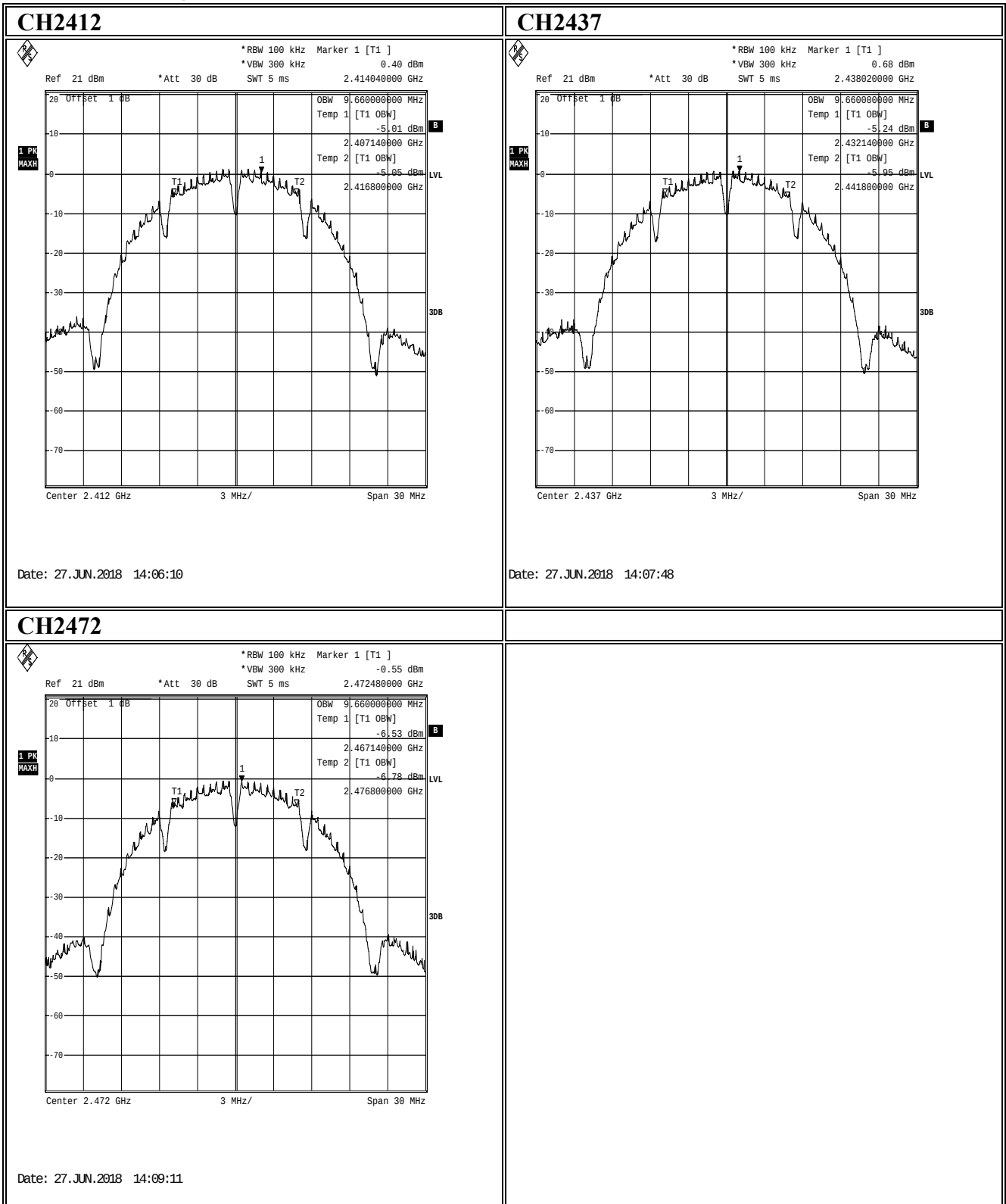
802.11b	CH Low	CH Mid	CH High	Limit	Symbol Rated kBd	Spread Factor Min.Value	Limit
Normal Voltage 12 V	9.66	9.66	9.66	>500kHz	1.375	7.03	>5
Upper Voltage 13.2 V	9.72	9.66	9.66	>500kHz	1.375	7.03	>5
Lower Voltage 10.8 V	9.66	9.66	9.66	>500kHz	1.375	7.03	>5

802.11g	CH Low	CH Mid	CH High	Limit	Symbol Rated kBd	Spread Factor Min.Value	Limit
Normal Voltage 12 V	14.94	14.94	14.94	>500kHz	1.5	9.96	>5
Upper Voltage 13.2 V	14.88	14.94	14.94	>500kHz	1.5	9.92	>5
Lower Voltage 10.8 V	14.88	14.88	14.94	>500kHz	1.5	9.92	>5

802.11n HT20	CH Low	CH Mid	CH High	Limit	Symbol Rated kBd	Spread Factor Min.Value	Limit
Normal Voltage 12 V	15.9	15.9	15.96	>500kHz	1.5	10.60	>5
Upper Voltage 13.2 V	15.96	15.9	15.9	>500kHz	1.5	10.60	>5
Lower Voltage 10.8 V	15.9	15.9	15.9	>500kHz	1.5	10.60	>5

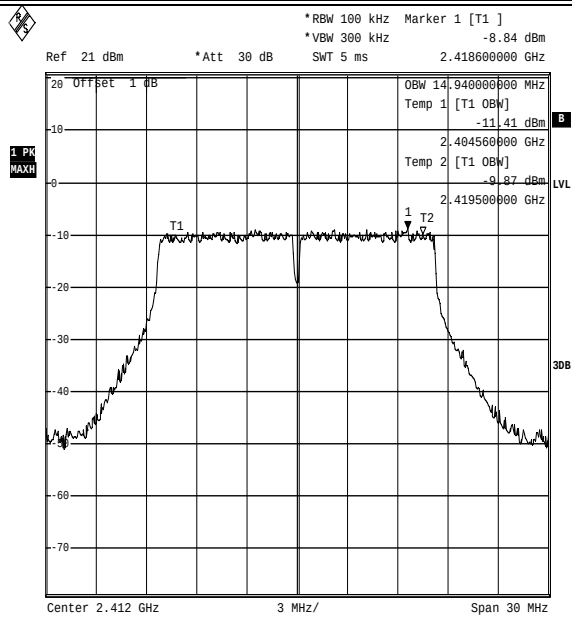
802.11n HT40	CH Low	CH Mid	CH High	Limit	Symbol Rated kBd	Spread Factor Min.Value	Limit
Normal Voltage 12 V	31.2	31.4	31.5	>500kHz	1.875	16.64	>5
Upper Voltage 13.2 V	31.2	31.5	31.4	>500kHz	1.875	16.64	>5
Lower Voltage 10.8 V	31.4	31.4	31.5	>500kHz	1.875	16.75	>5

Normal voltage for 802.11b:



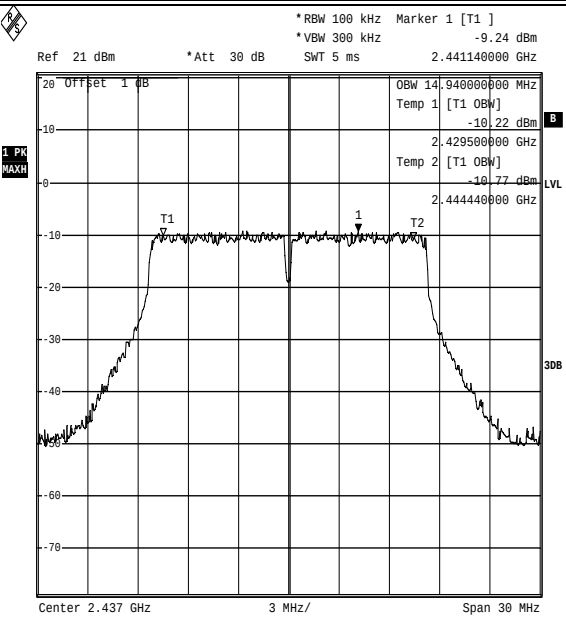
Normal voltage for 802.11g:

CH2412



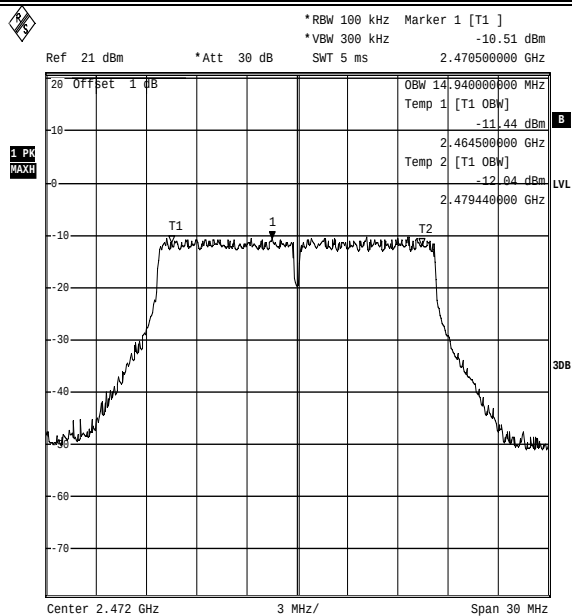
Date: 27.JUN.2018 14:15:29

CH2437



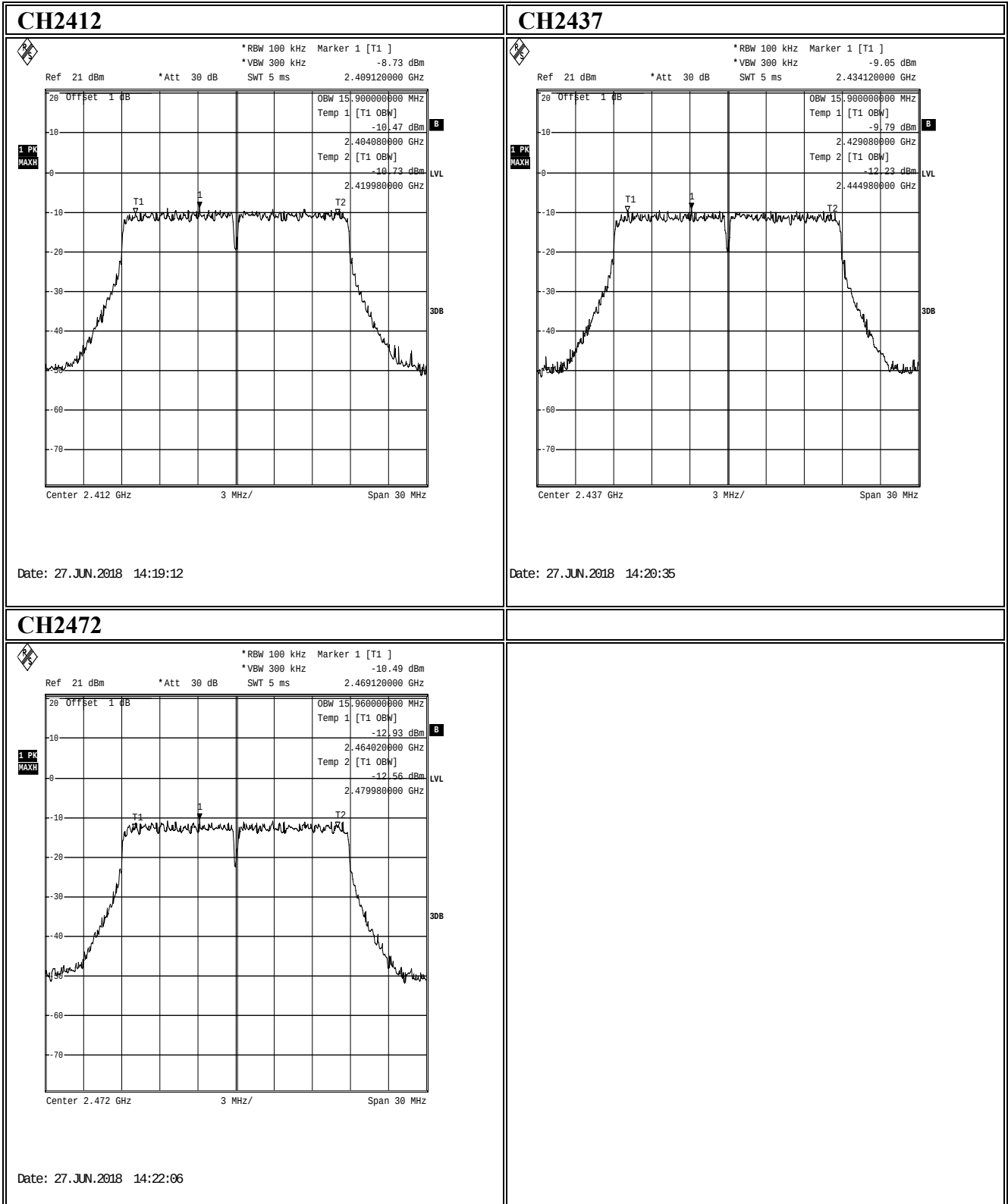
Date: 27.JUN.2018 14:12:25

CH2472

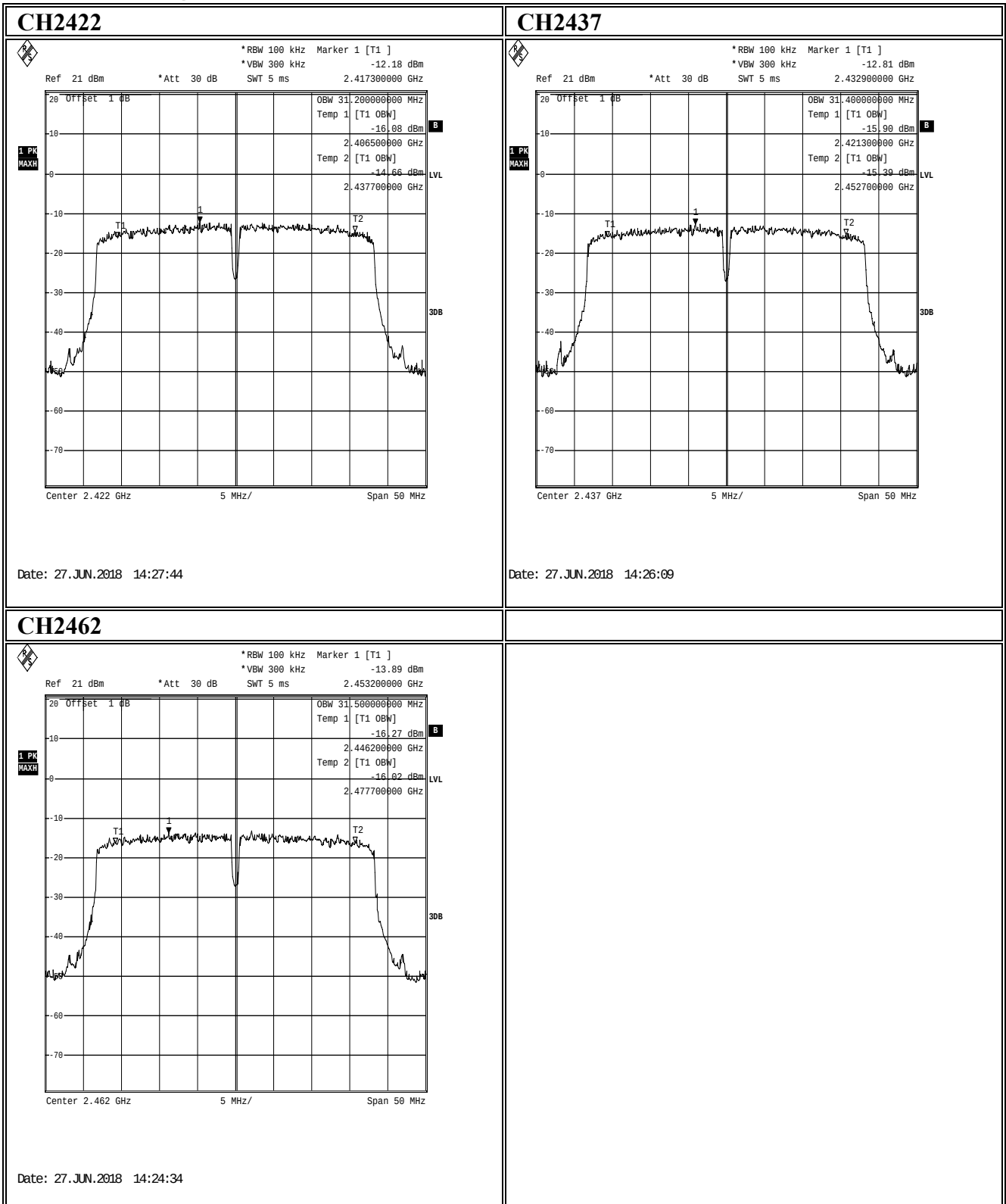


Date: 27.JUN.2018 14:10:51

Normal voltage for 802.11n HT20:



Normal voltage for 802.11n HT40:



6.5. TRANSMITTER SPURIOUS EMISSIONS

6.5.1. Limit:

Frequency below 2.387 and above 2.4965GHz :2.5uW

Frequency between 2.387 – 2.400GHz, 2.4835-2.4965GHz: 25uW

6.5.2. Measurement Equipment Used:

Refer to section 6.1.2 for detail.

6.5.3. Test Setup:

Refer to section 6.1.3 for detail.

6.5.4. Test Procedure:

1. Set the EUT at hopping off and modulation on.
2. Set the ETU operate at channel low, mid and high and normal voltage.
3. Set the spectrum analyzer Ref level= -10dBm; attenuation=0dB;RBW=100kHz, BW=100kHz , Sweep = auto Start=10MHz, Stop=1000MHz. Max hold view, mark highest level.
4. Set the spectrum analyzer Ref level= -10dBm; attenuation=0dB;RBW=1MHz, BW=1MHz , Sweep = auto Start=1000MHz, Stop=2387MHz. Max hold view, mark highest level.
5. Set the spectrum analyzer Ref level= -10dBm; attenuation=0dB; RBW=1MHz, RBW=1MHz, Sweep = auto, Start=2387MHz, Stop=2400MHz. Max hold view, mark highest level.
6. Set the spectrum analyzer Ref level= -10dBm; attenuation=0dB; RBW=1MHz, BW=1MHz, Sweep = auto Start=2483.5MHz, Stop=2496.5MHz. Max hold view, mark highest level.
7. Set the spectrum analyzer Ref level= -10dBm; attenuation=0dB; RBW=1MHz, BW=1MHz, Sweep = auto, Start=2496.5MHz, Stop=26GHz.Max hold view, mark highest level.
8. Varied input voltage to + 10% and - 10% normal voltage and repeat procedure 1 to 7 again.
9. The Worst data was report.

6.5.5. Test Results:

Refer to next page for plots.

Ambient temperature: 25 °C

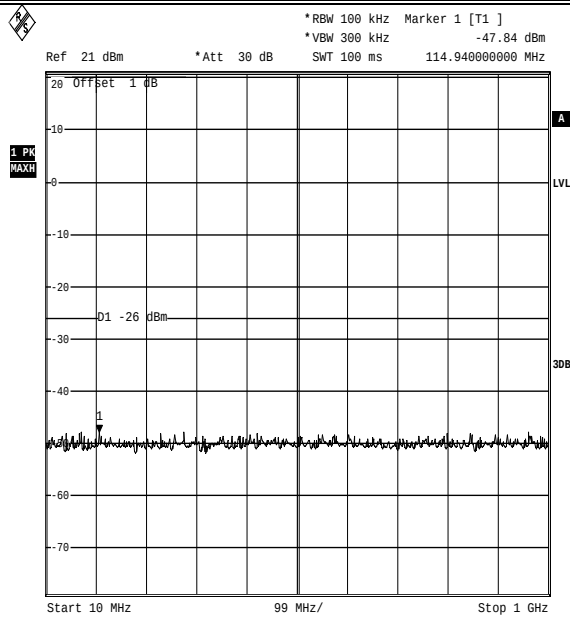
Relative humidity: 60 %

Test Date: 2018/06/23

802.11b:

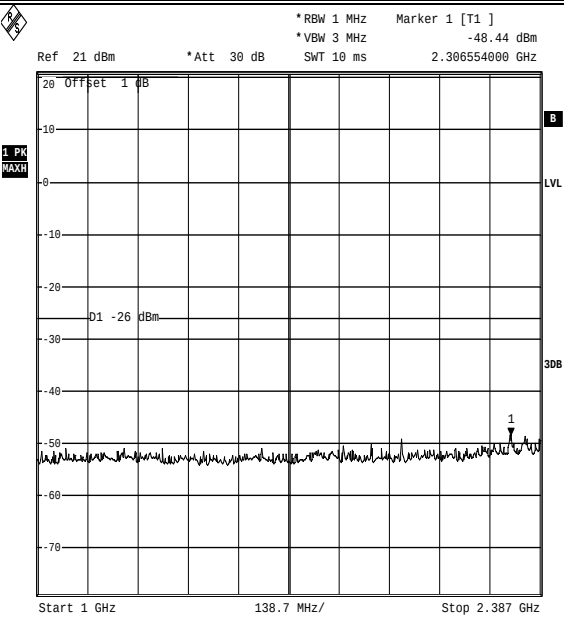
Test Plots: Normal Voltage: Channel Low

30MHz – 1000MHz



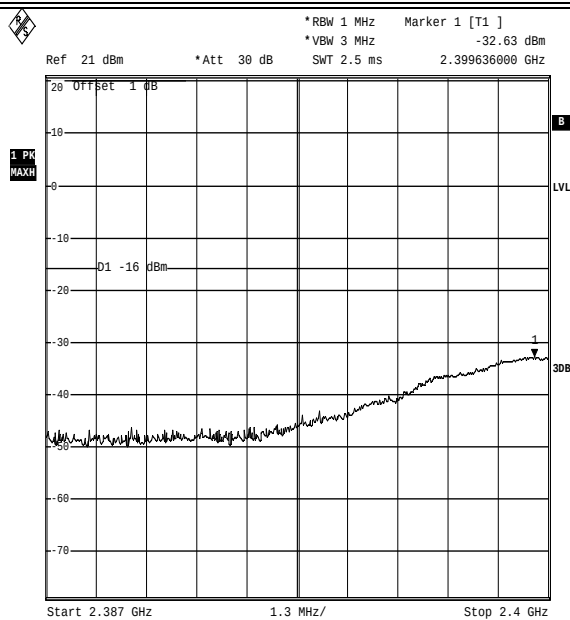
Date: 27.JUN.2018 17:13:00

1000MHz – 2387MHz



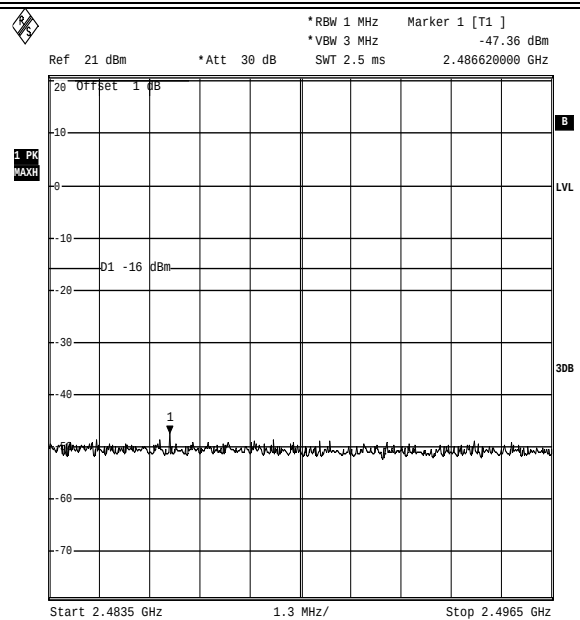
Date: 27.JUN.2018 17:18:16

2387MHz – 2400MHz

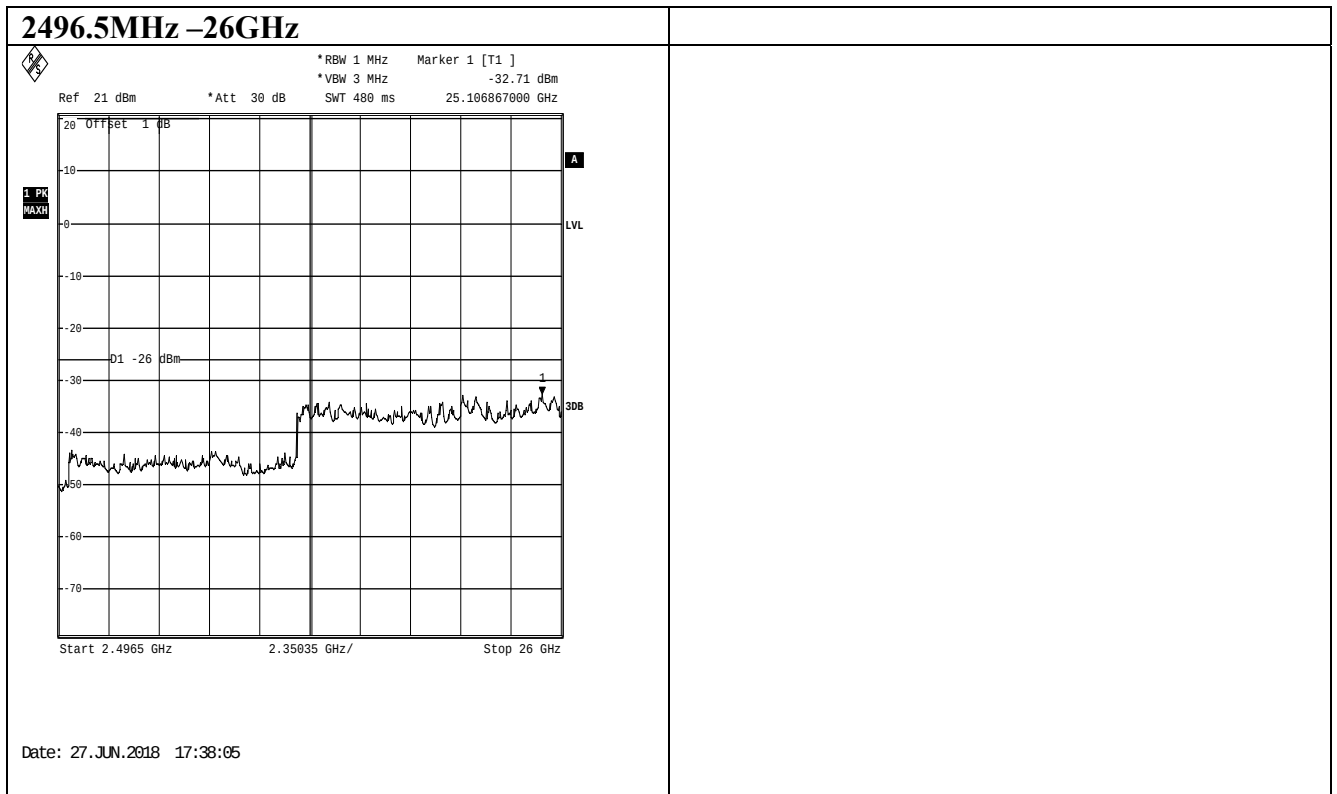


Date: 27.JUN.2018 17:24:05

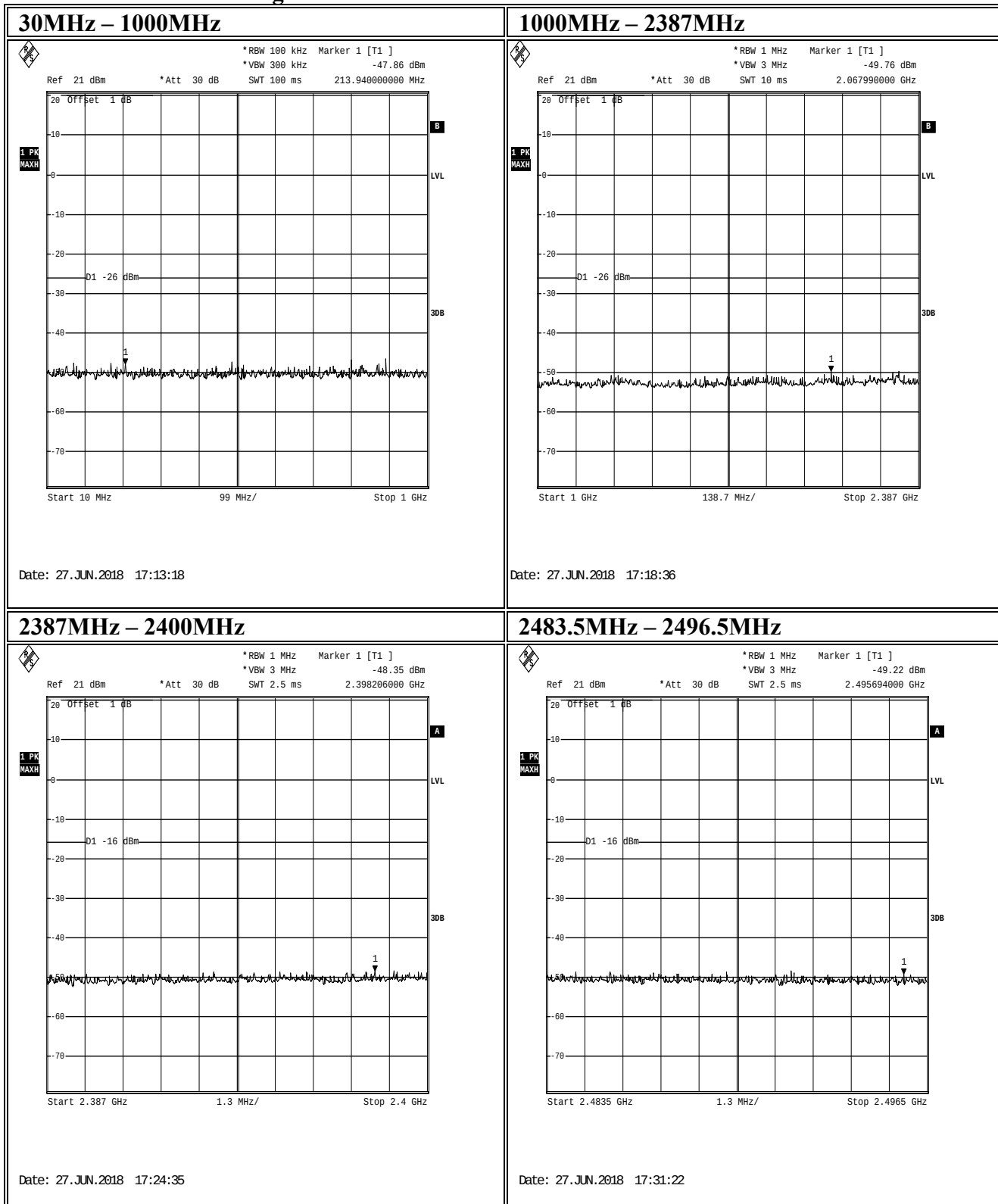
2483.5MHz – 2496.5MHz

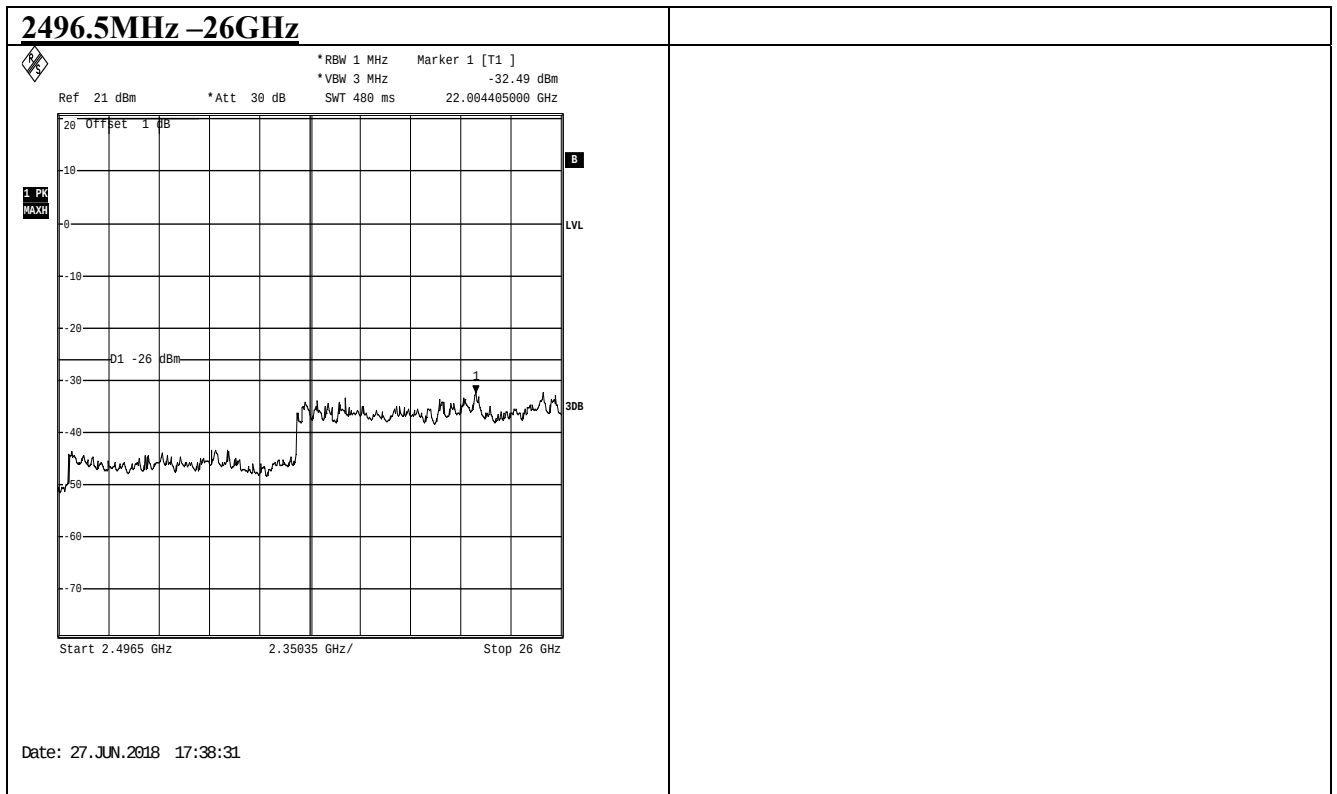


Date: 27.JUN.2018 17:30:58



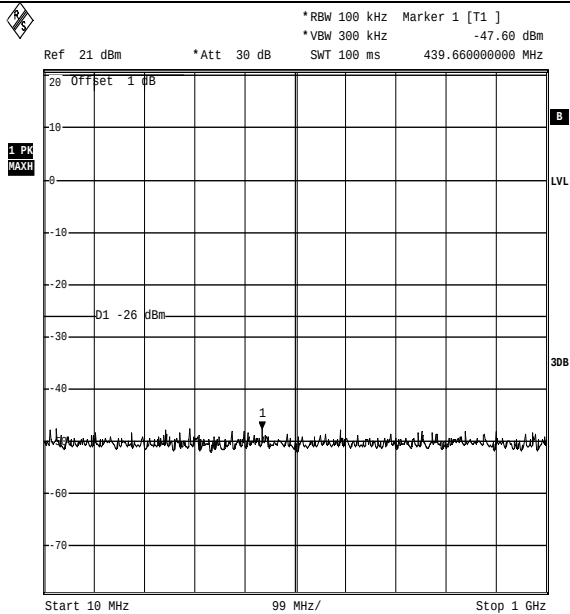
Test Plots: Normal Voltage: Channel Mid





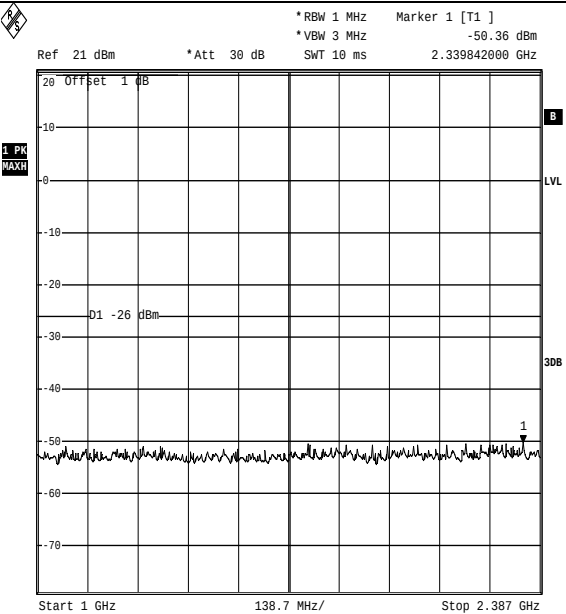
Test Plots: Normal Voltage: Channel High

30MHz – 1000MHz



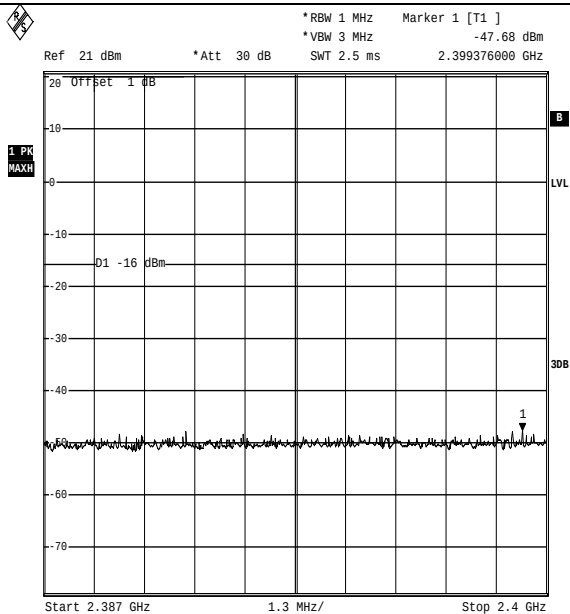
Date: 27.JUN.2018 17:13:31

1000MHz – 2387MHz



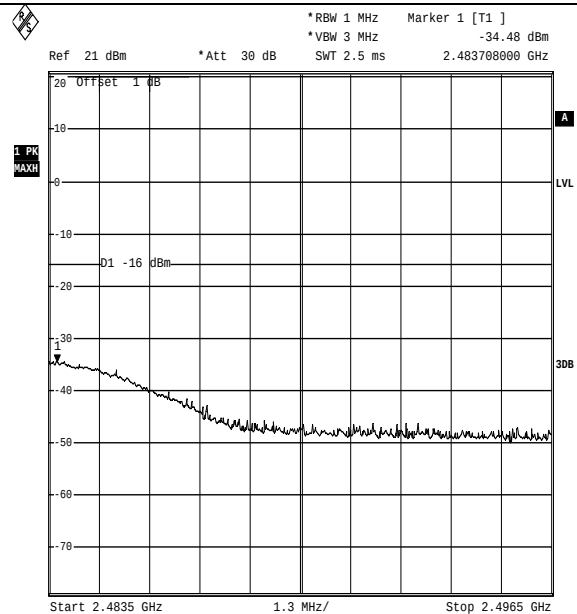
Date: 27.JUN.2018 17:19:02

2387MHz – 2400MHz

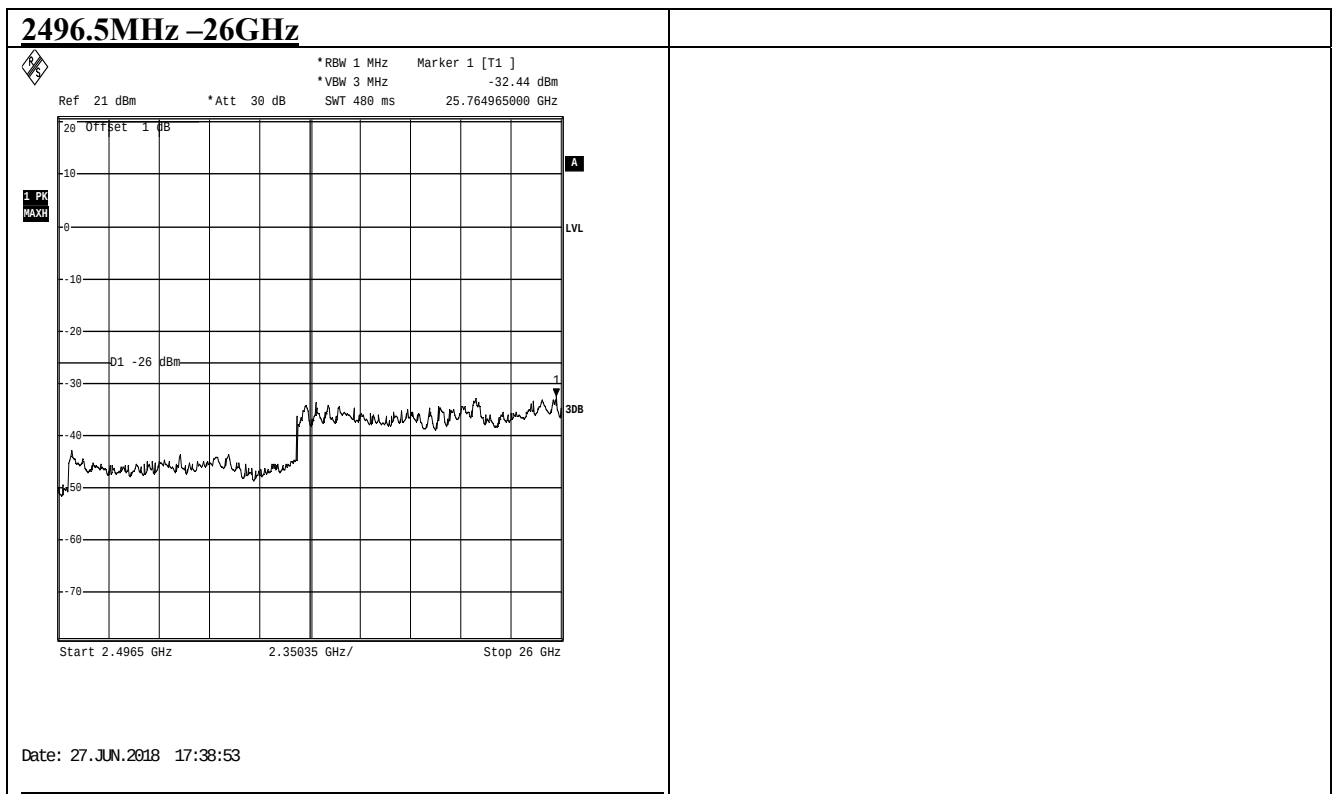


Date: 27.JUN.2018 17:24:54

2483.5MHz – 2496.5MHz



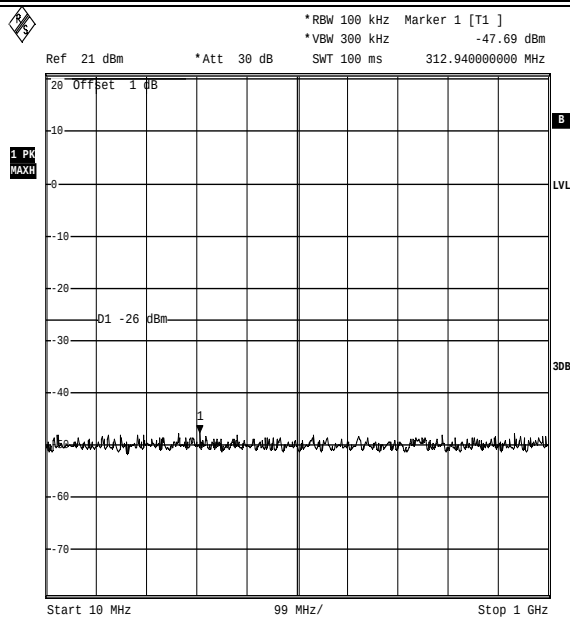
Date: 27.JUN.2018 17:32:29



802.11g:

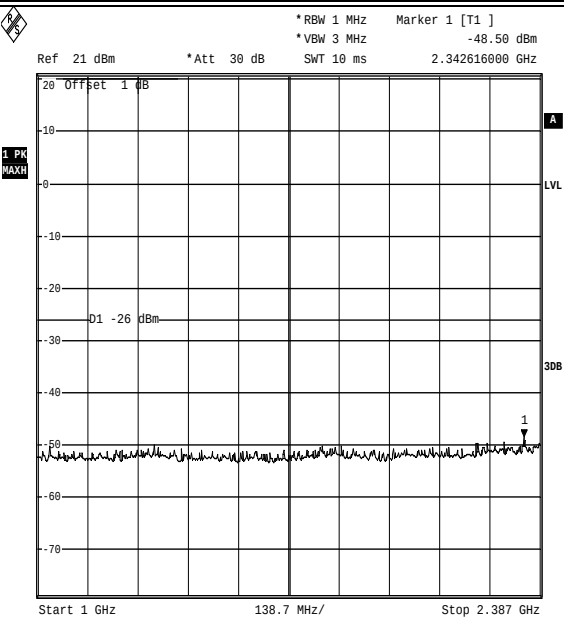
Test Plots: Normal Voltage: Channel Low

30MHz – 1000MHz



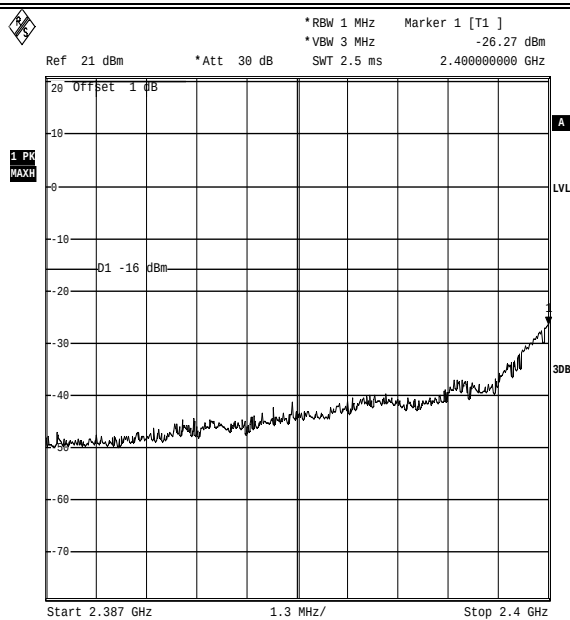
Date: 27.JUN.2018 17:14:08

1000MHz – 2387MHz



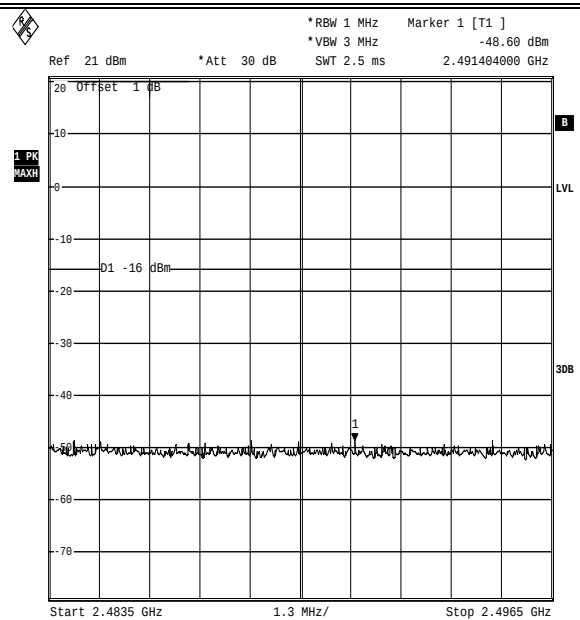
Date: 27.JUN.2018 17:19:41

2387MHz – 2400MHz

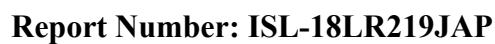


Date: 27.JUN.2018 17:25:37

2483.5MHz – 2496.5MHz

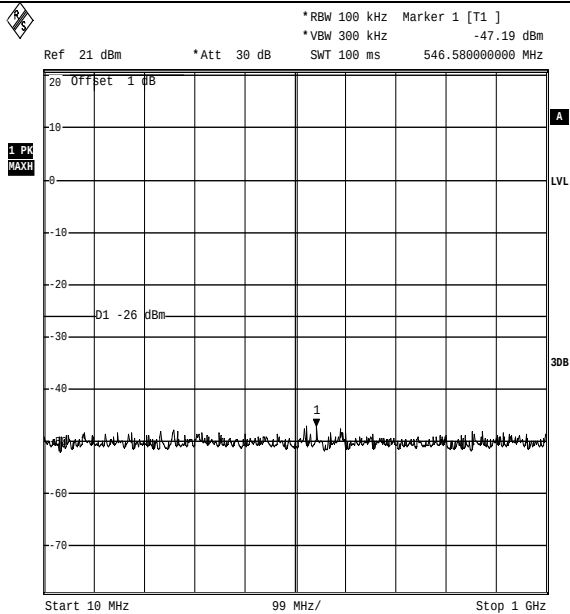


Date: 27.JUN.2018 17:33:06



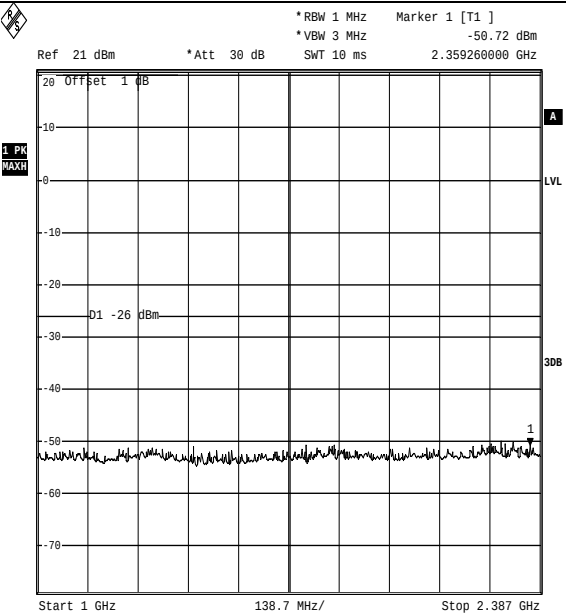
Test Plots: Normal Voltage: Channel Mid

30MHz – 1000MHz



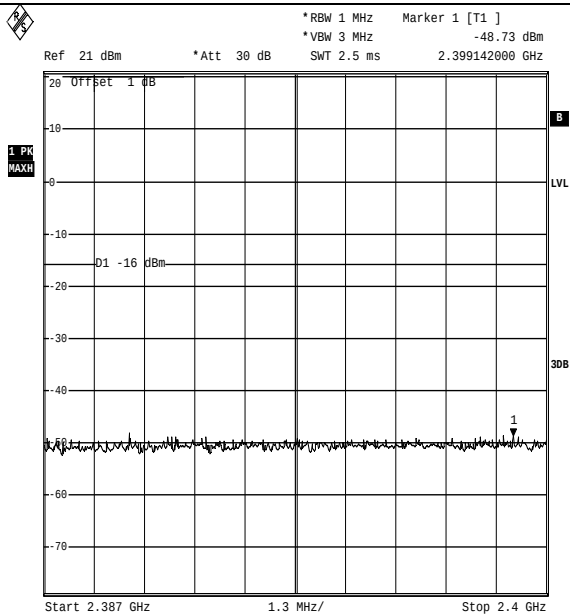
Date: 27.JUN.2018 17:14:27

1000MHz – 2387MHz



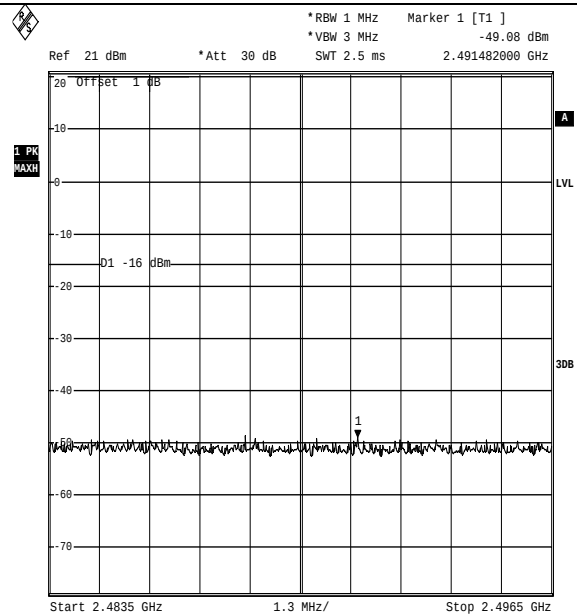
Date: 27.JUN.2018 17:20:15

2387MHz – 2400MHz

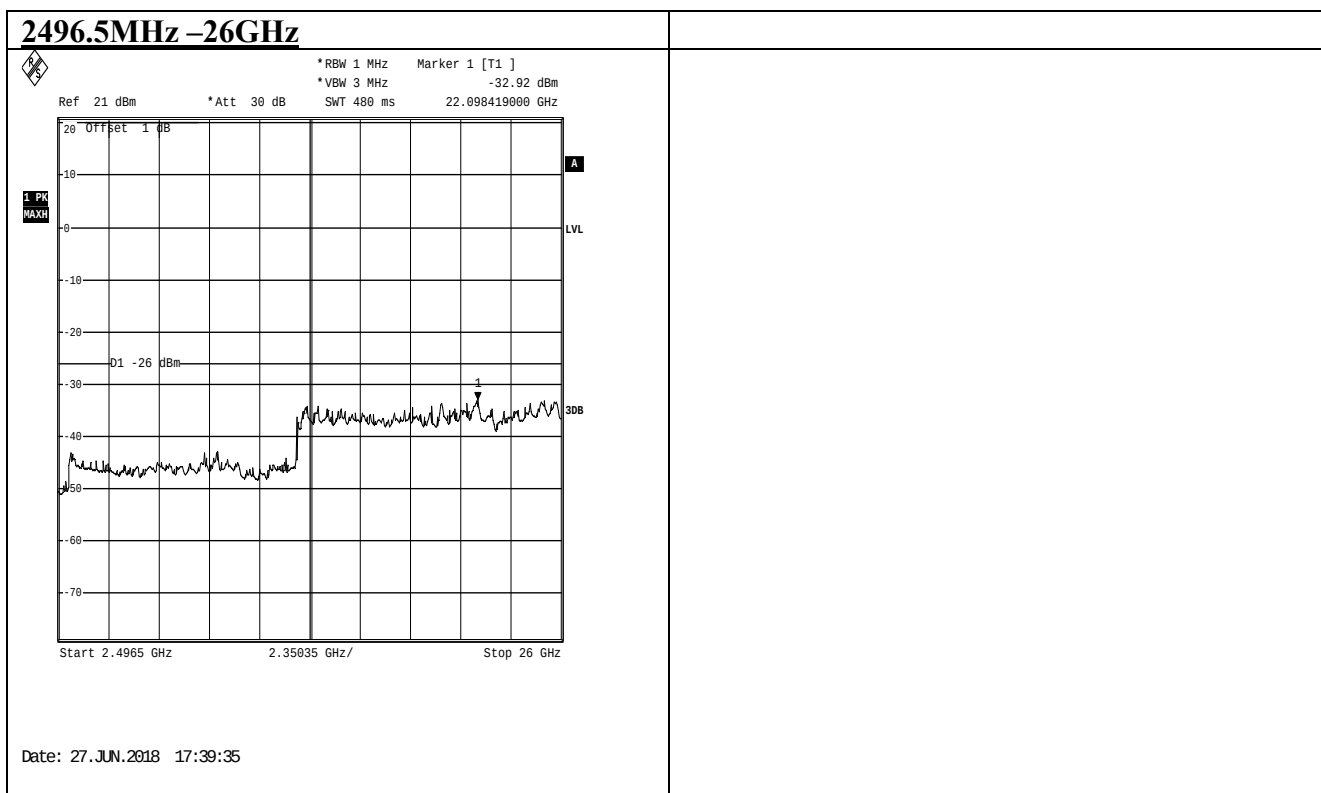


Date: 27.JUN.2018 17:26:10

2483.5MHz – 2496.5MHz

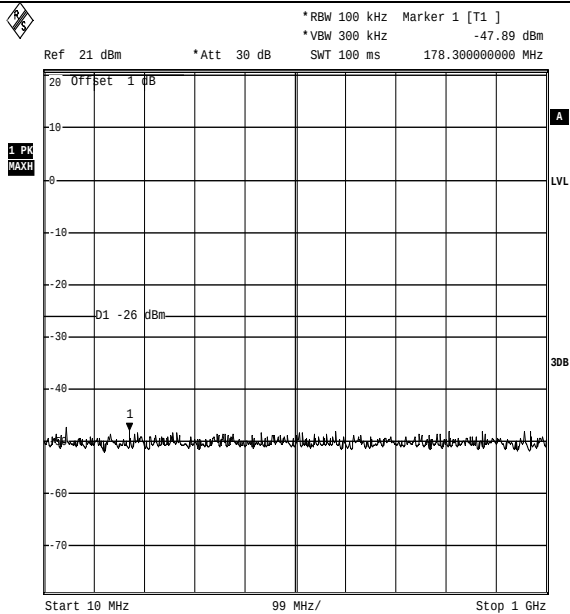


Date: 27.JUN.2018 17:33:26



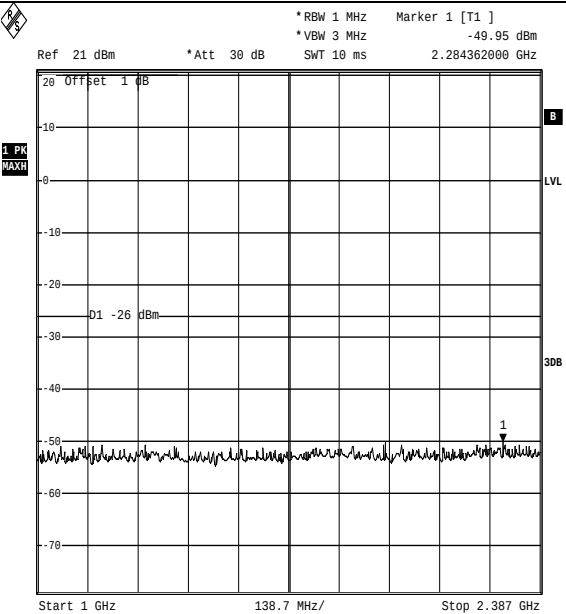
Test Plots: Normal Voltage: Channel High

30MHz – 1000MHz



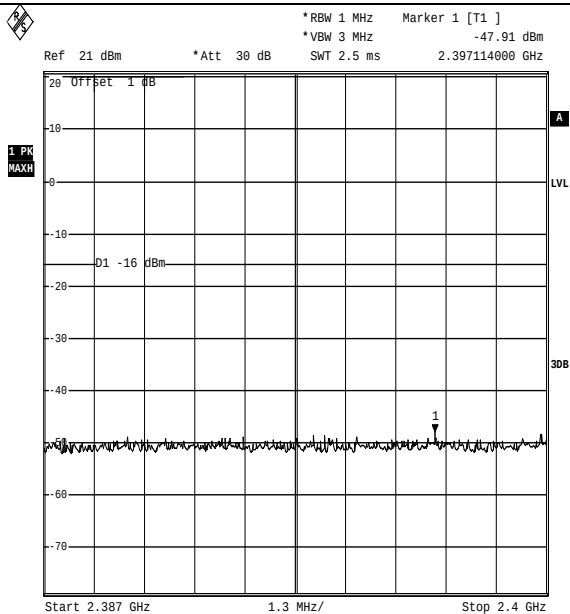
Date: 27.JUN.2018 17:14:41

1000MHz – 2387MHz



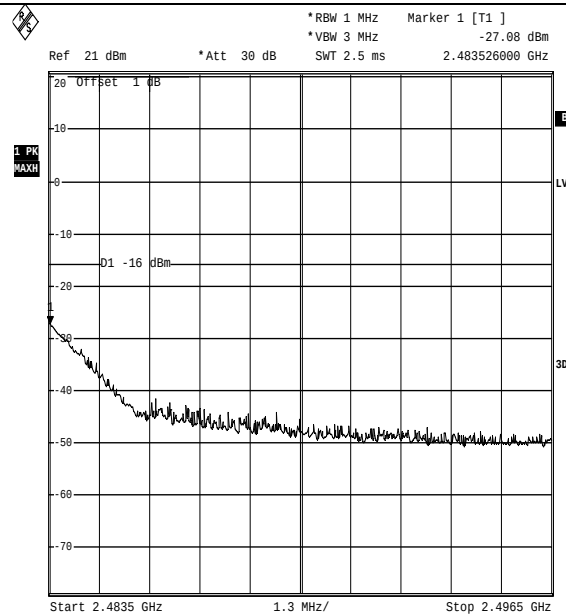
Date: 27.JUN.2018 17:20:33

2387MHz – 2400MHz

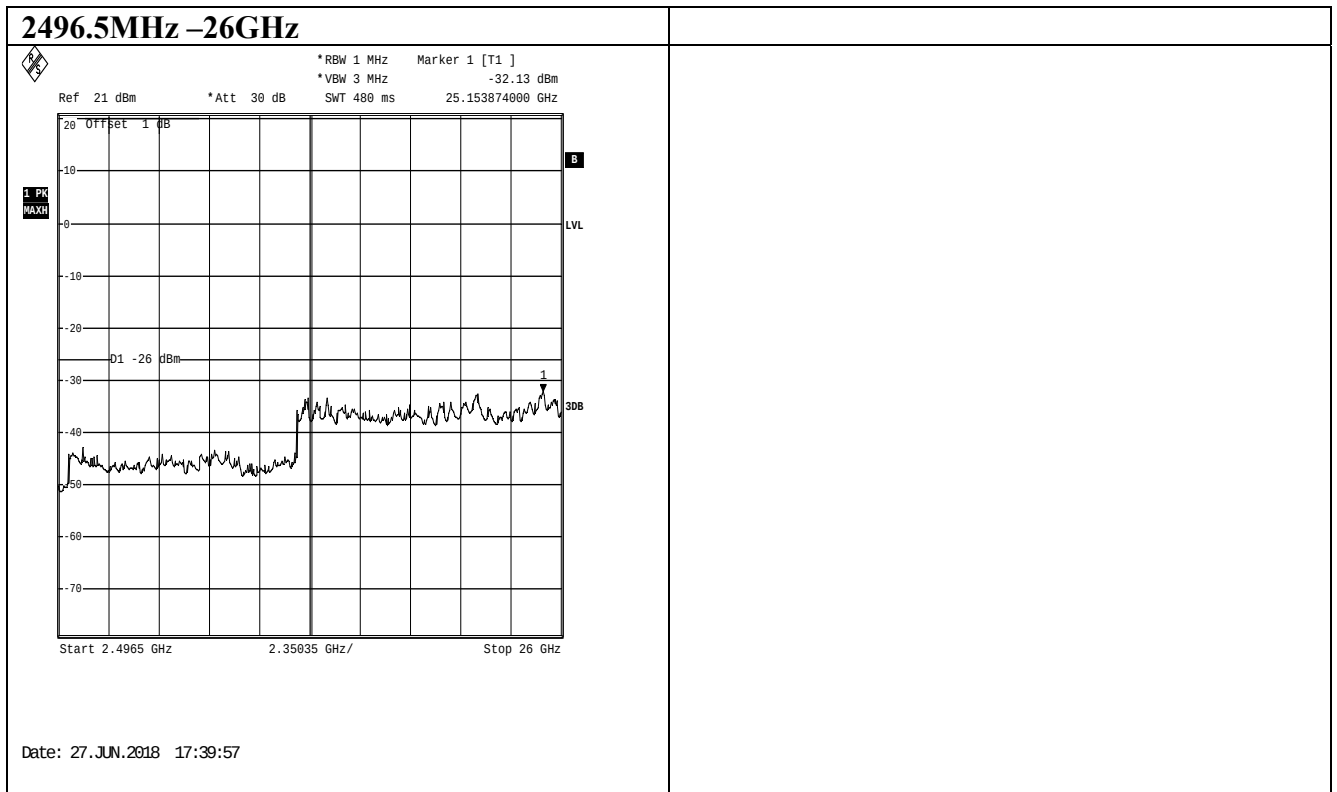


Date: 27.JUN.2018 17:26:31

2483.5MHz – 2496.5MHz



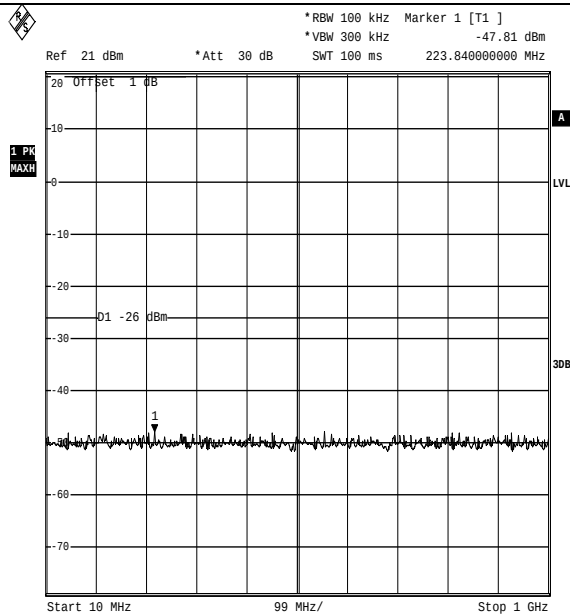
Date: 27.JUN.2018 17:33:58



802.11n HT20:

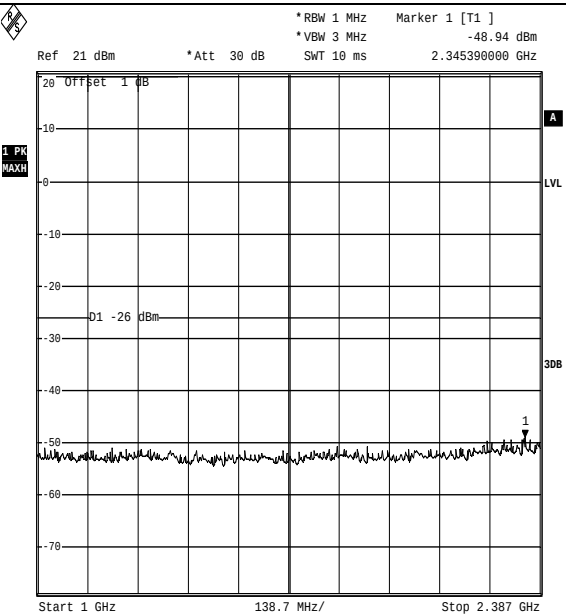
Test Plots: Normal Voltage: Channel Low

30MHz – 1000MHz



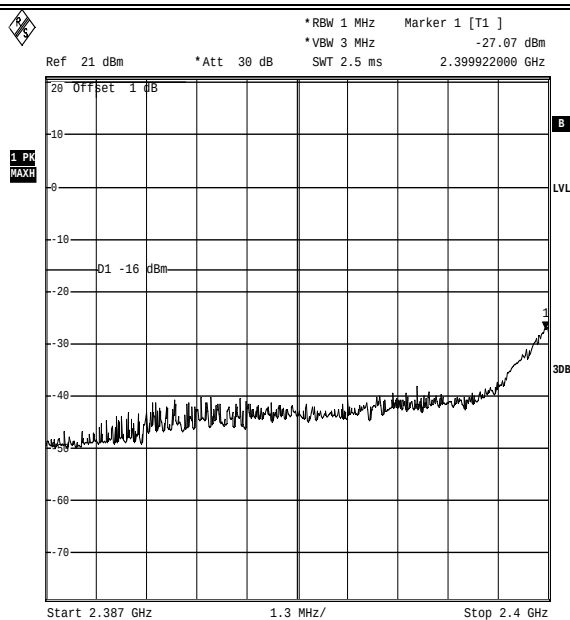
Date: 27.JUN.2018 17:15:15

1000MHz – 2387MHz



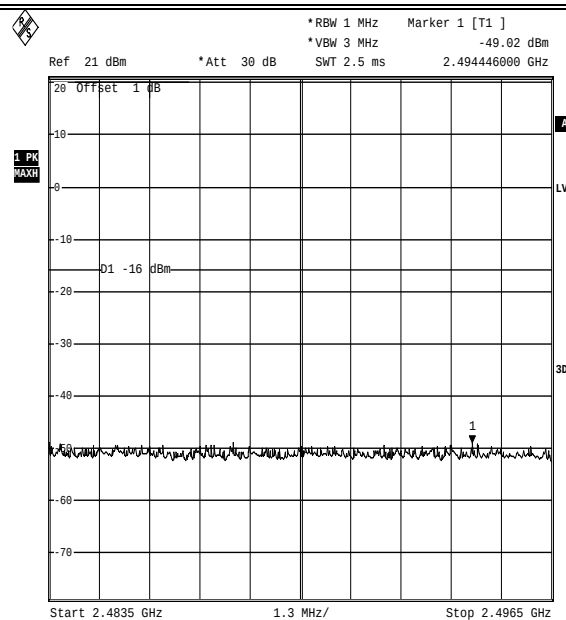
Date: 27.JUN.2018 17:20:57

2387MHz – 2400MHz

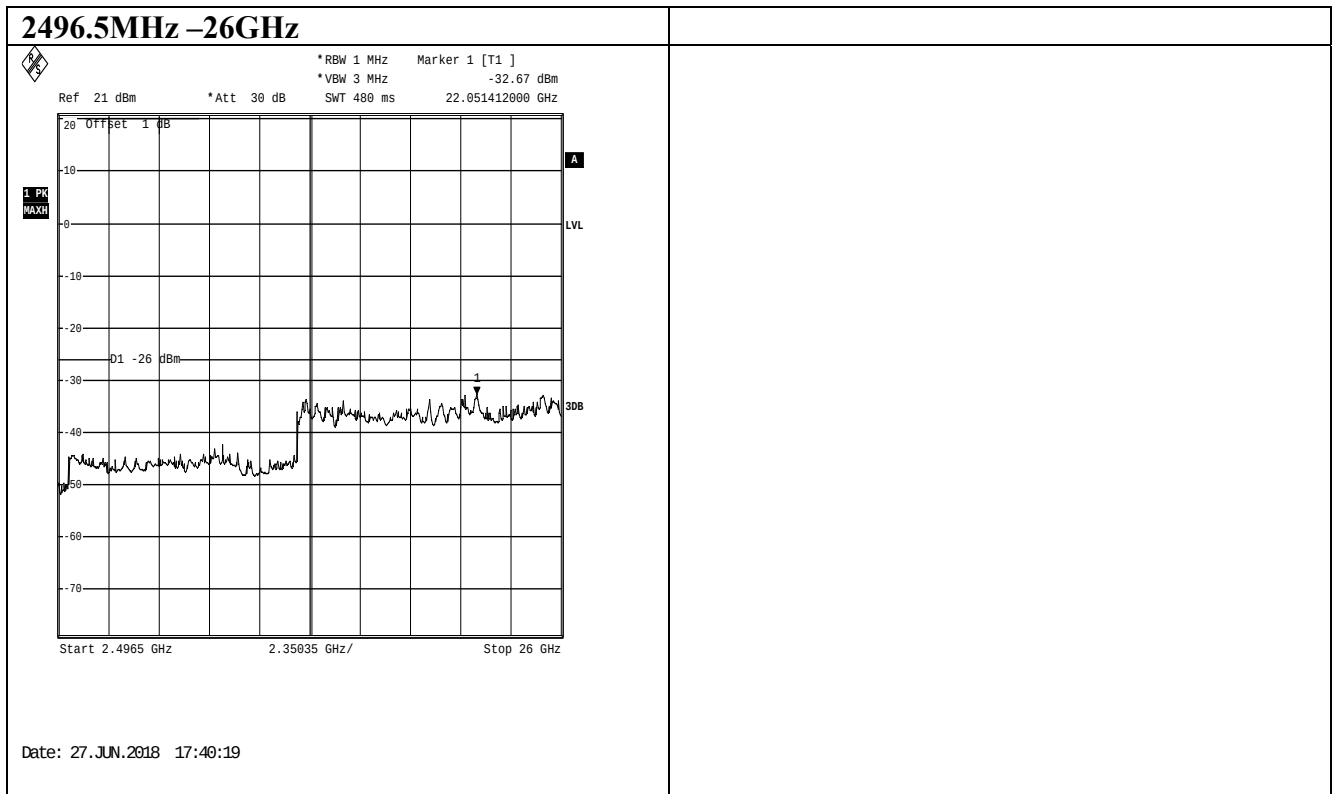


Date: 27.JUN.2018 17:27:08

2483.5MHz – 2496.5MHz

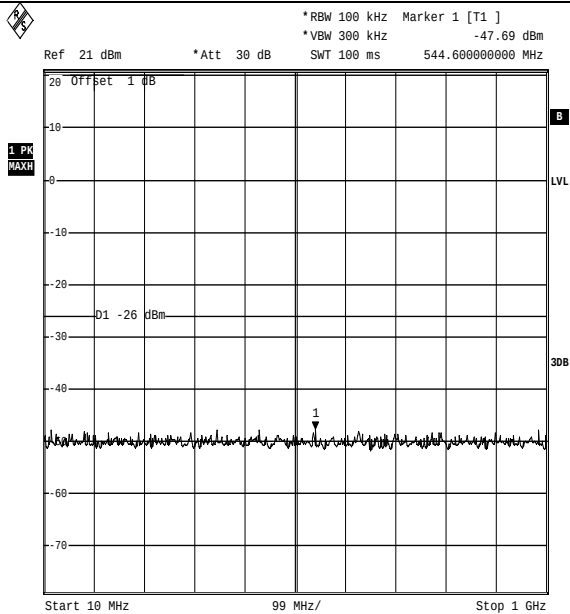


Date: 27.JUN.2018 17:34:37



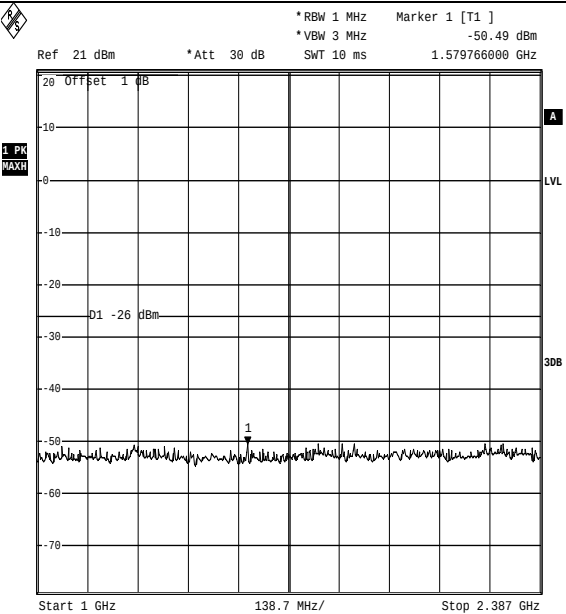
Test Plots: Normal Voltage: Channel Mid

30MHz – 1000MHz



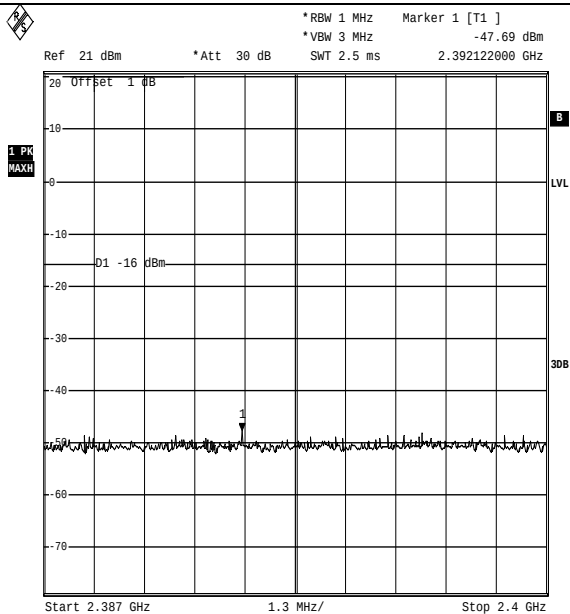
Date: 27.JUN.2018 17:15:38

1000MHz – 2387MHz



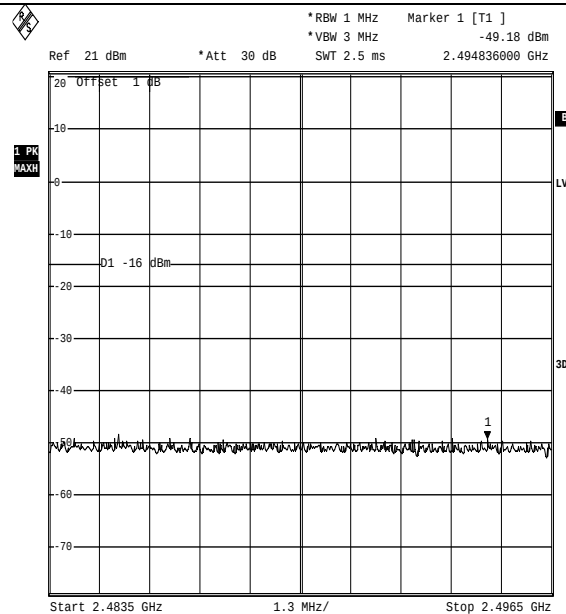
Date: 27.JUN.2018 17:21:13

2387MHz – 2400MHz

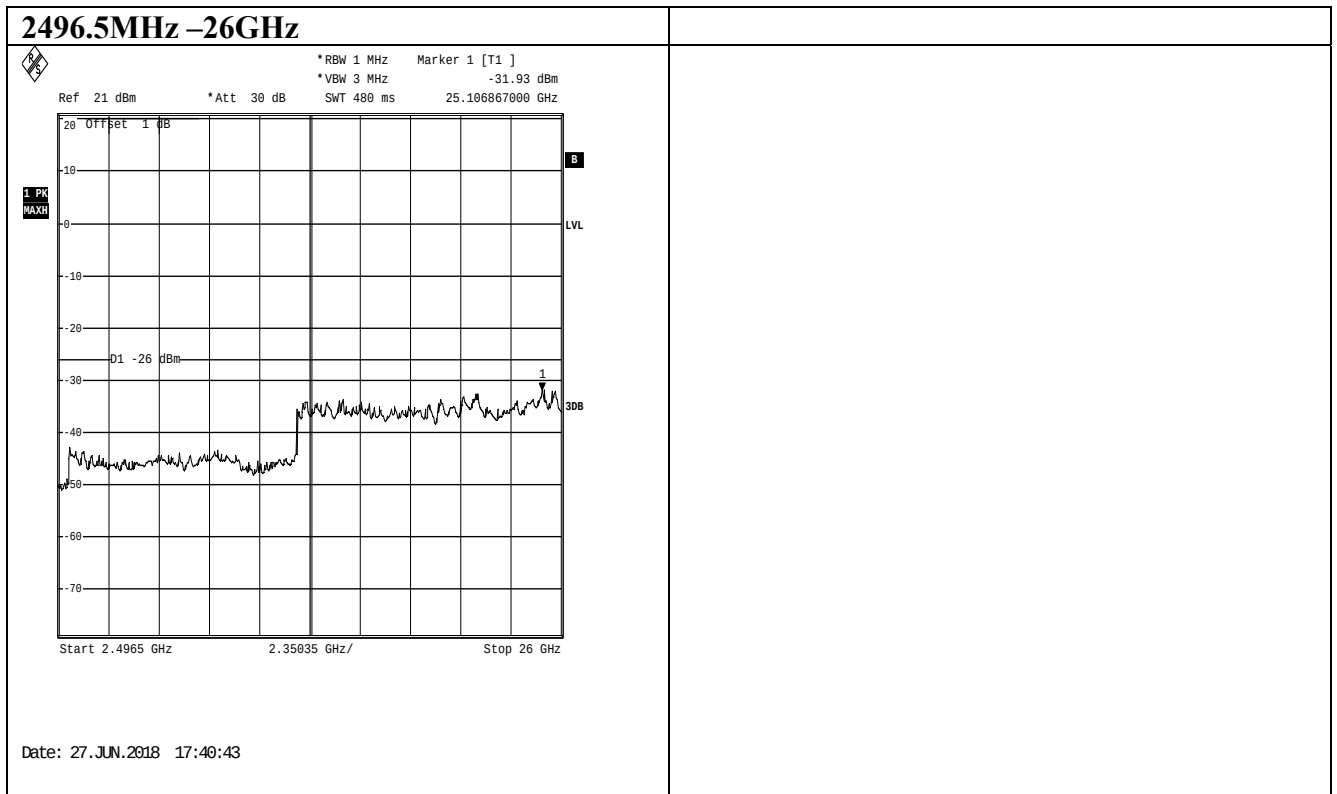


Date: 27.JUN.2018 17:28:04

2483.5MHz – 2496.5MHz

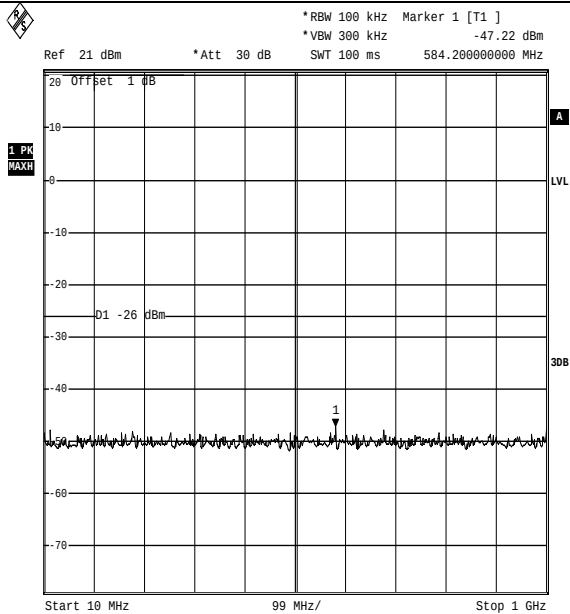


Date: 27.JUN.2018 17:34:56



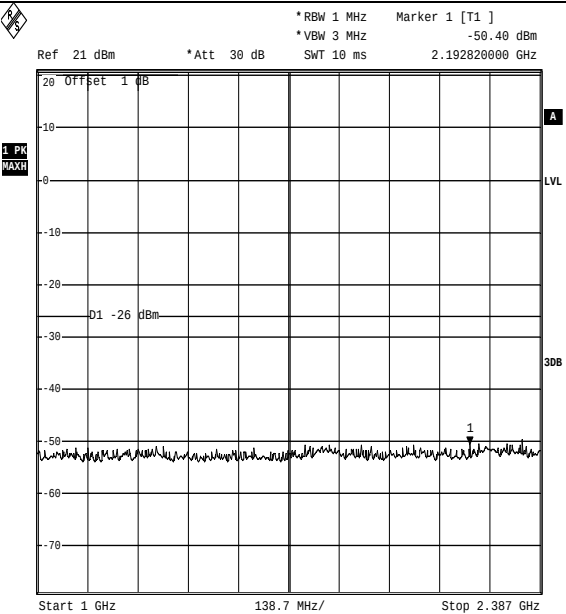
Test Plots: Normal Voltage: Channel High

30MHz – 1000MHz



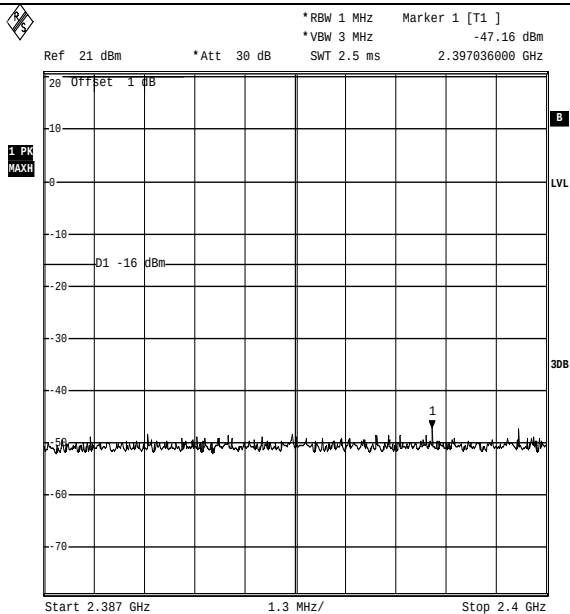
Date: 27.JUN.2018 17:16:04

1000MHz – 2387MHz



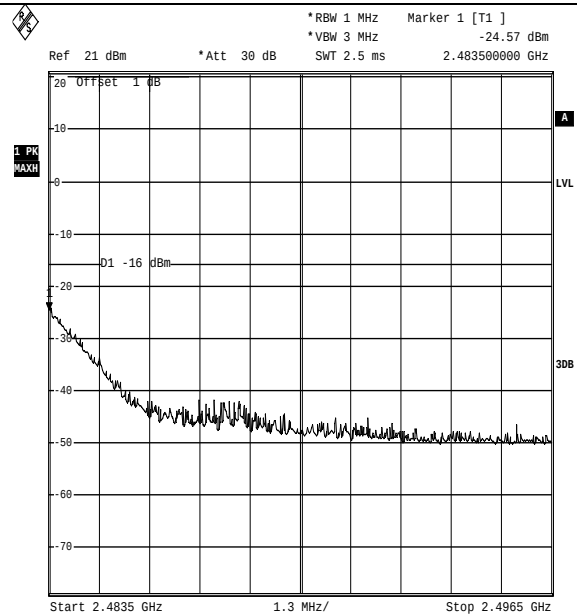
Date: 27.JUN.2018 17:21:40

2387MHz – 2400MHz

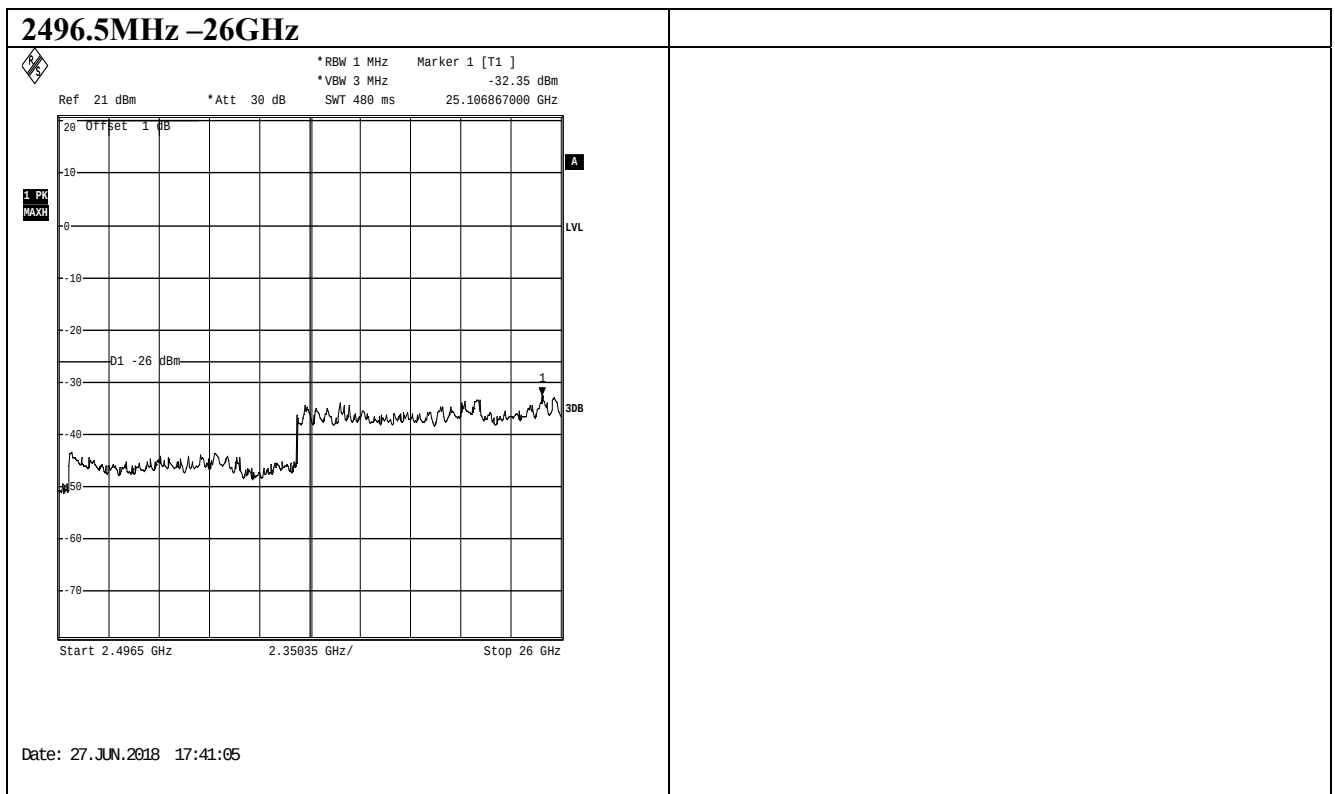


Date: 27.JUN.2018 17:28:34

2483.5MHz – 2496.5MHz



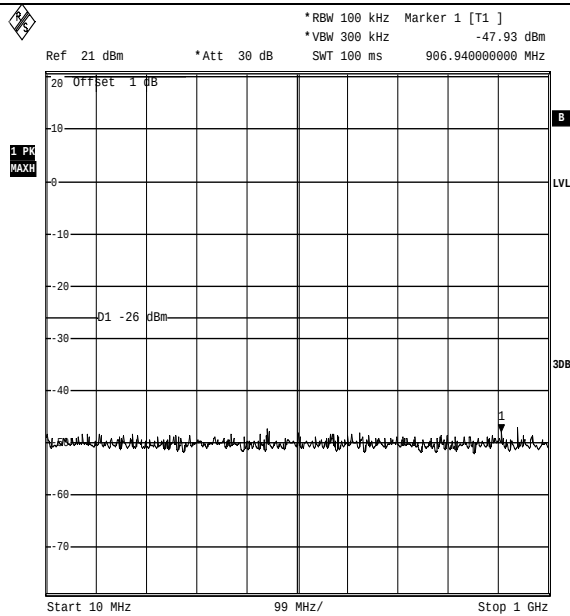
Date: 27.JUN.2018 17:35:24



802.11n HT40:

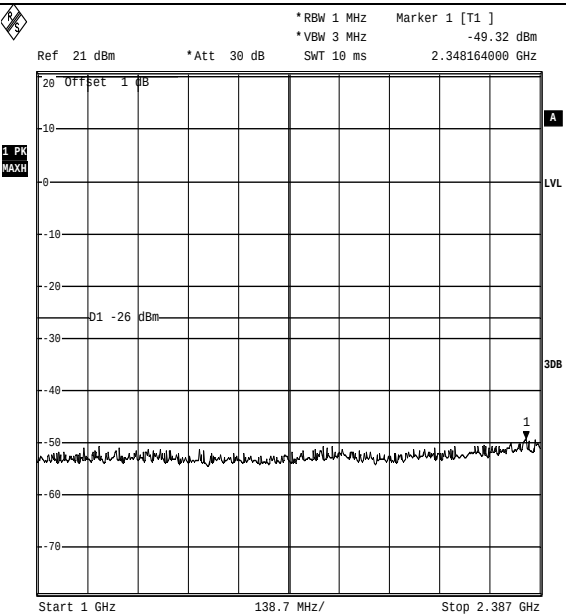
Test Plots: Normal Voltage: Channel Low

30MHz – 1000MHz



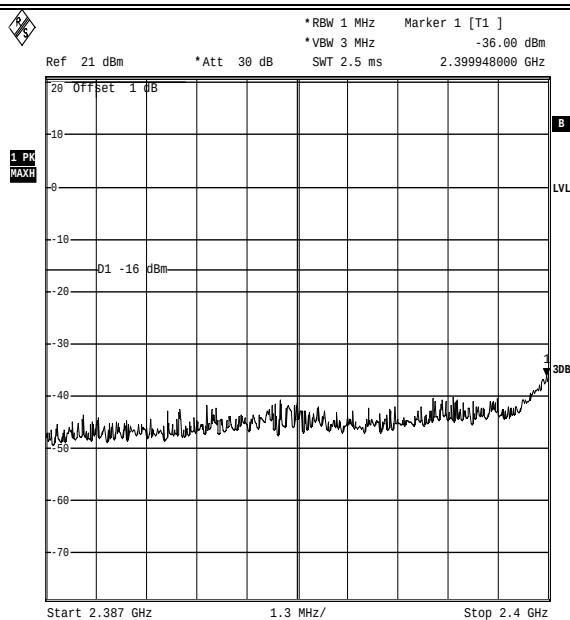
Date: 27.JUN.2018 17:16:30

1000MHz – 2387MHz



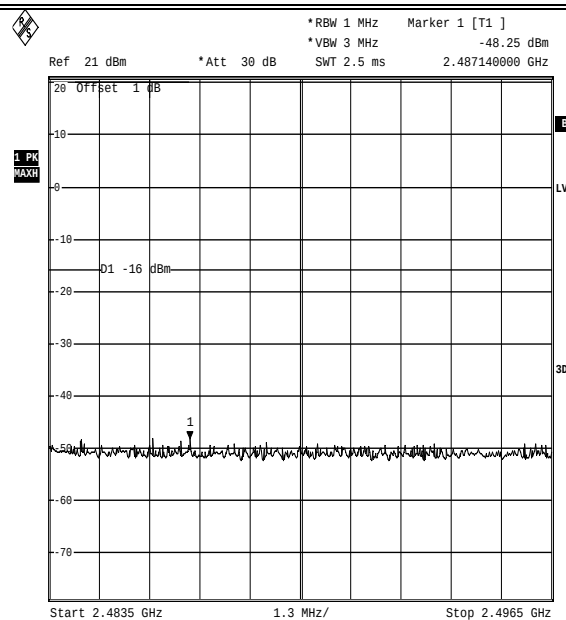
Date: 27.JUN.2018 17:22:13

2387MHz – 2400MHz

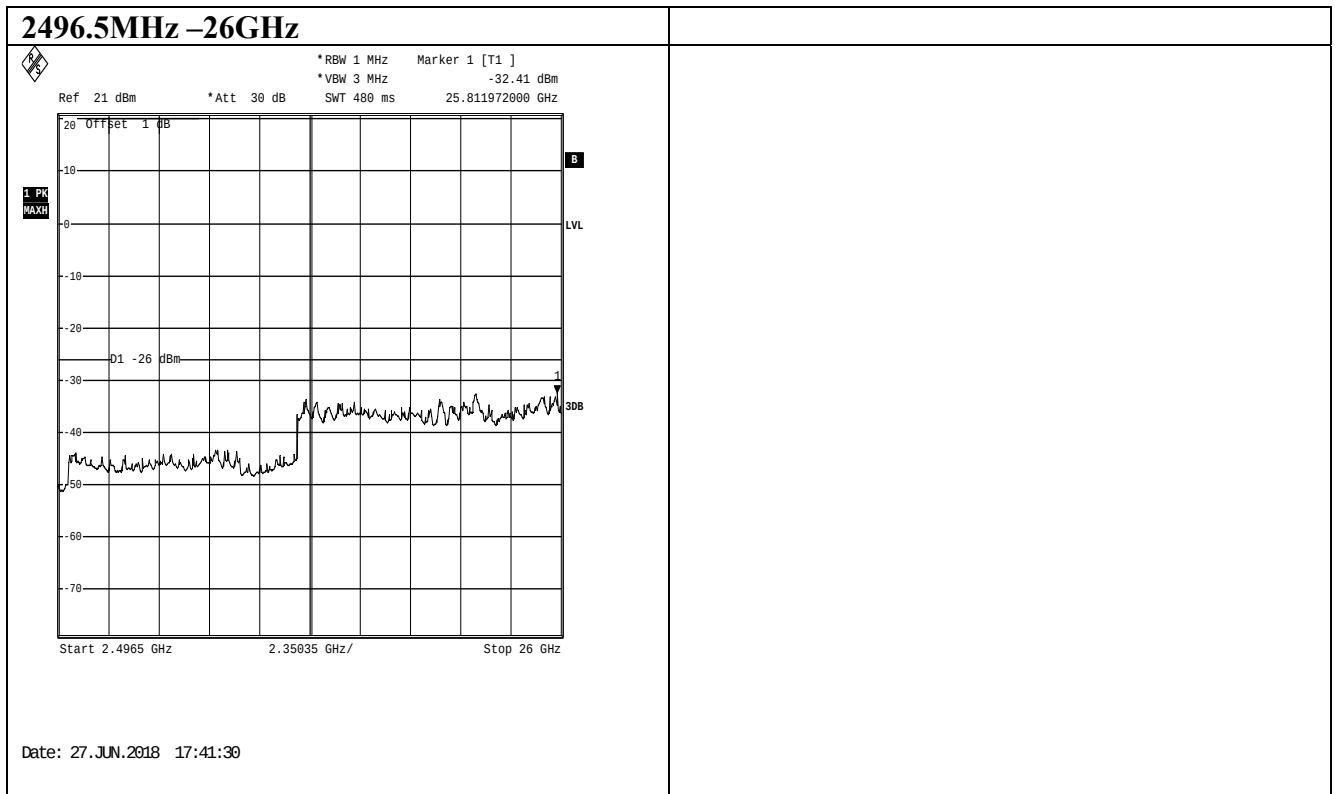


Date: 27.JUN.2018 17:29:05

2483.5MHz – 2496.5MHz

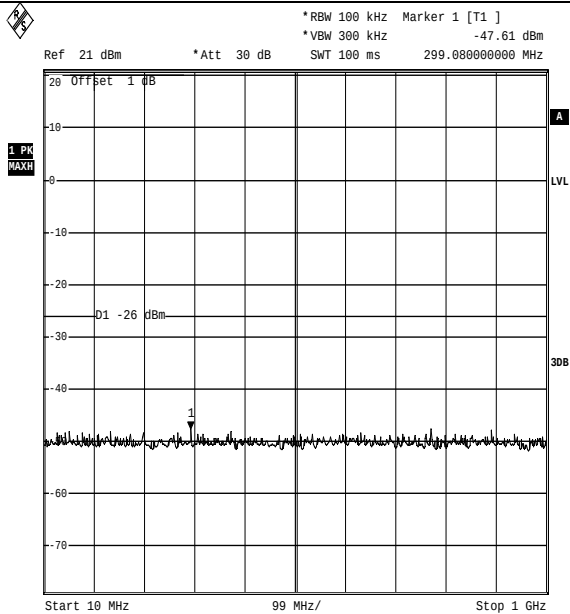


Date: 27.JUN.2018 17:36:05



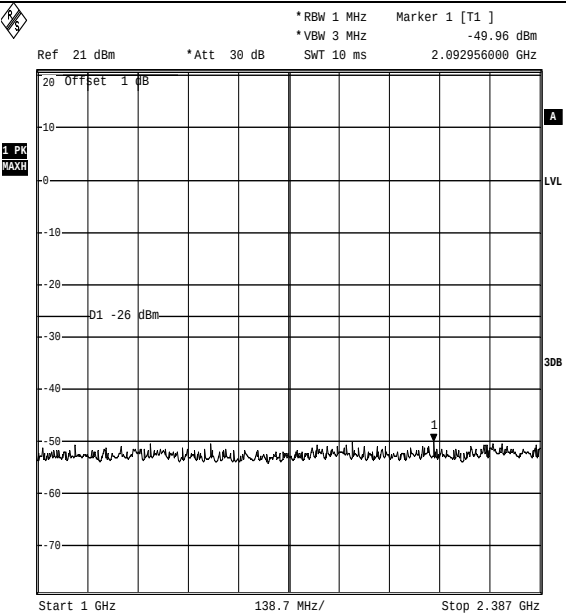
Test Plots: Normal Voltage: Channel Mid

30MHz – 1000MHz



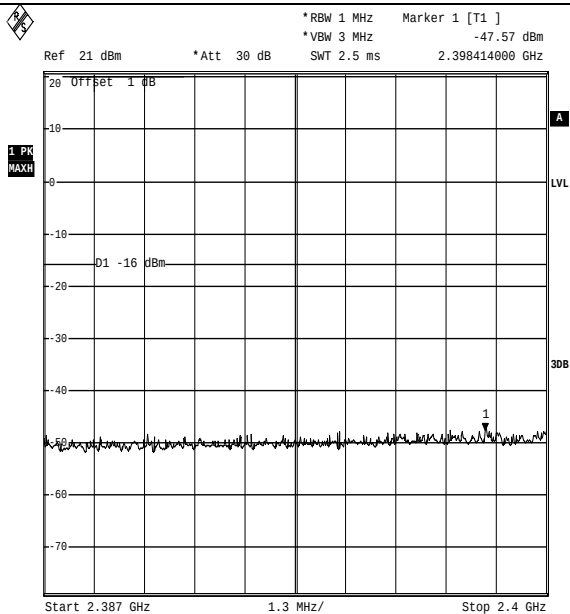
Date: 27.JUN.2018 17:16:58

1000MHz – 2387MHz



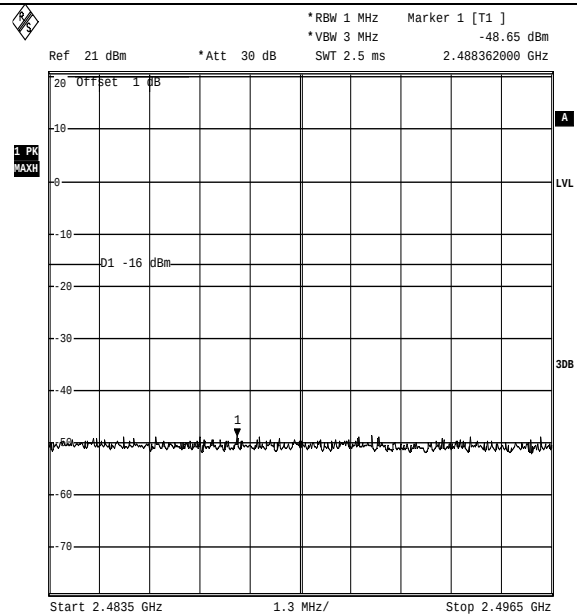
Date: 27.JUN.2018 17:22:30

2387MHz – 2400MHz

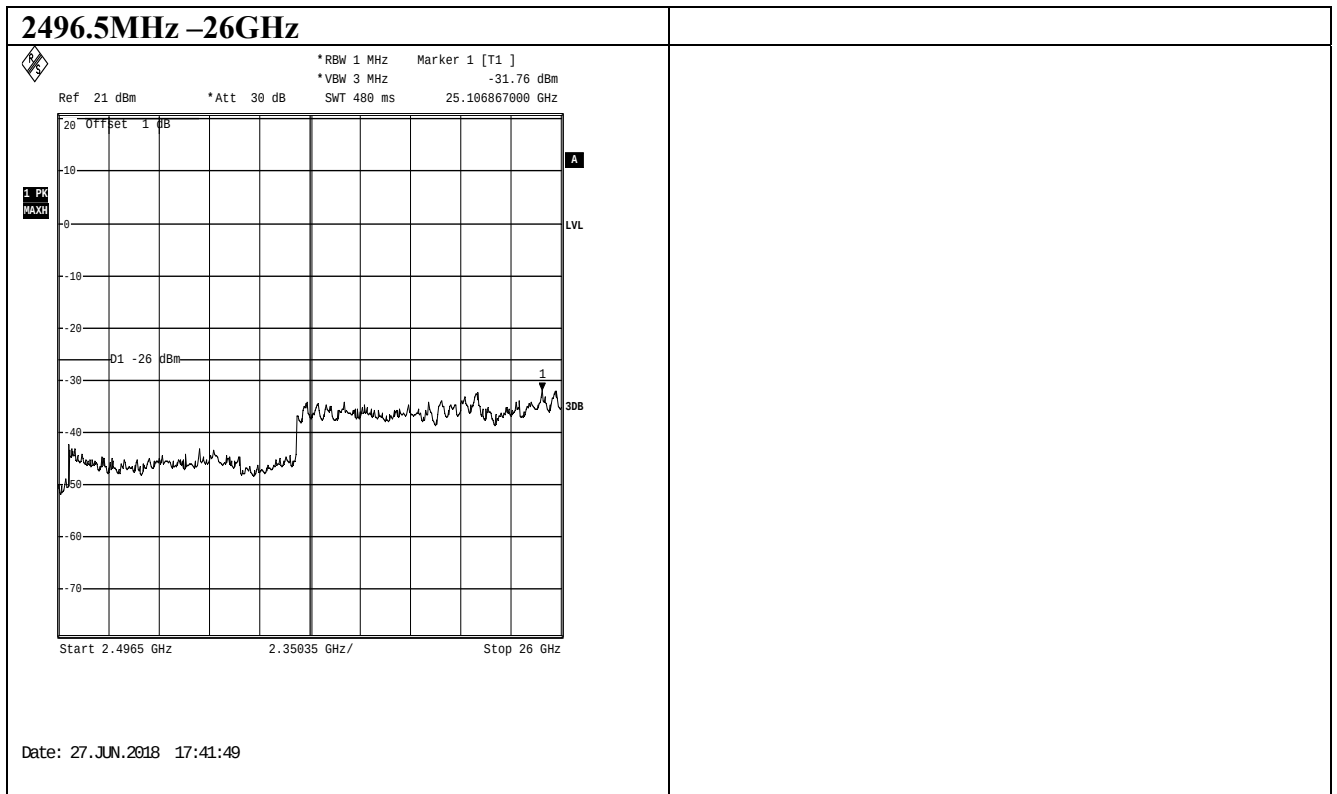


Date: 27.JUN.2018 17:29:30

2483.5MHz – 2496.5MHz

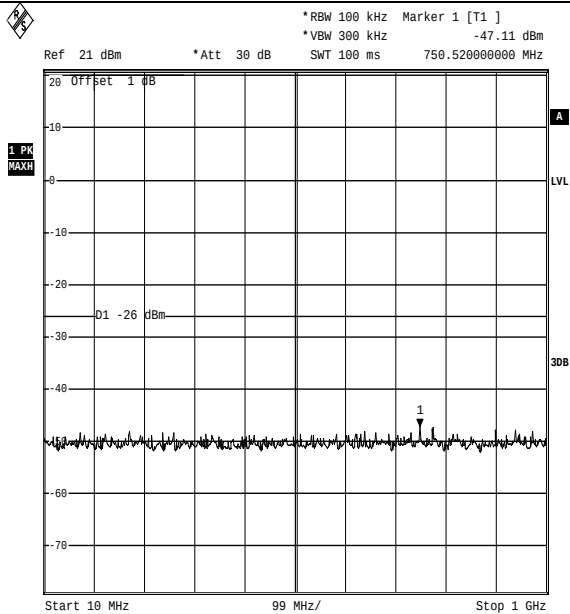


Date: 27.JUN.2018 17:36:26



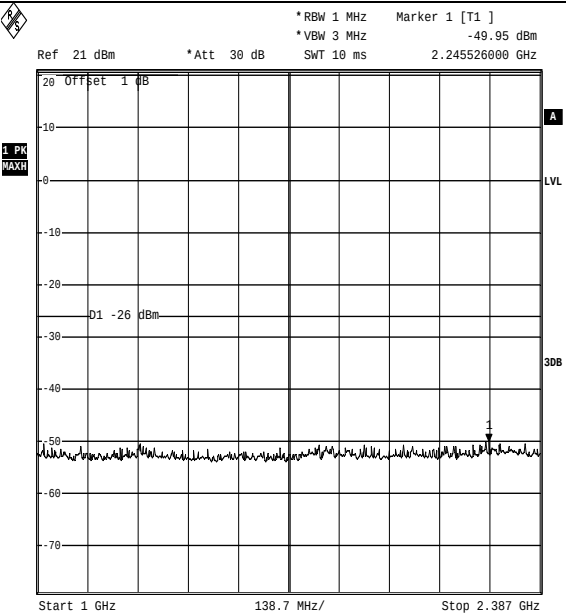
Test Plots: Normal Voltage: Channel High

30MHz – 1000MHz



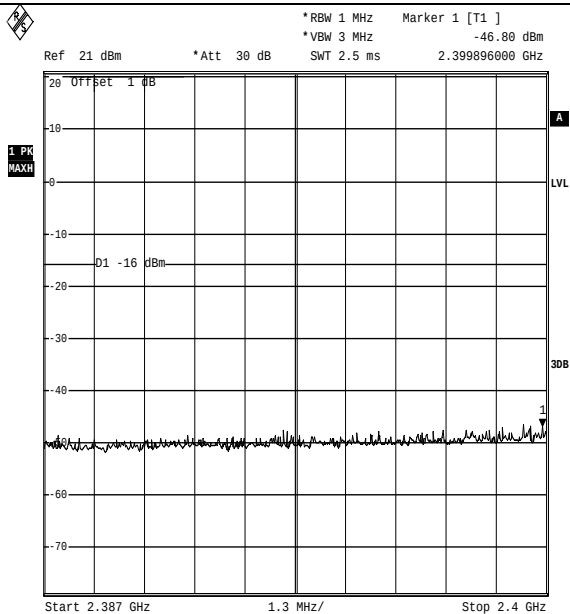
Date: 27.JUN.2018 17:17:12

1000MHz – 2387MHz



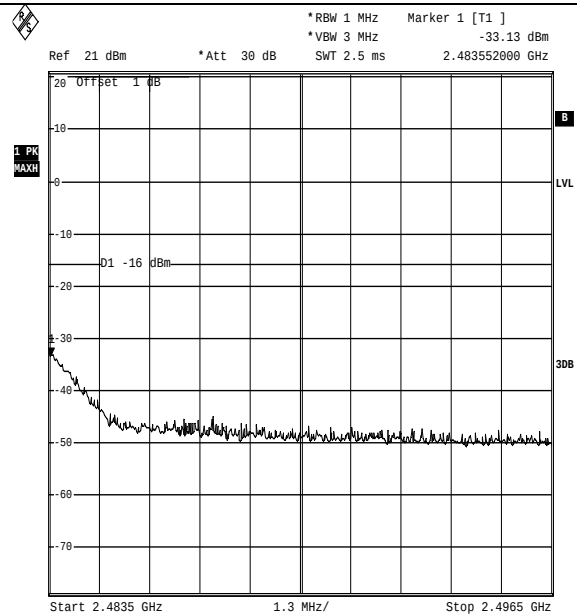
Date: 27.JUN.2018 17:22:55

2387MHz – 2400MHz

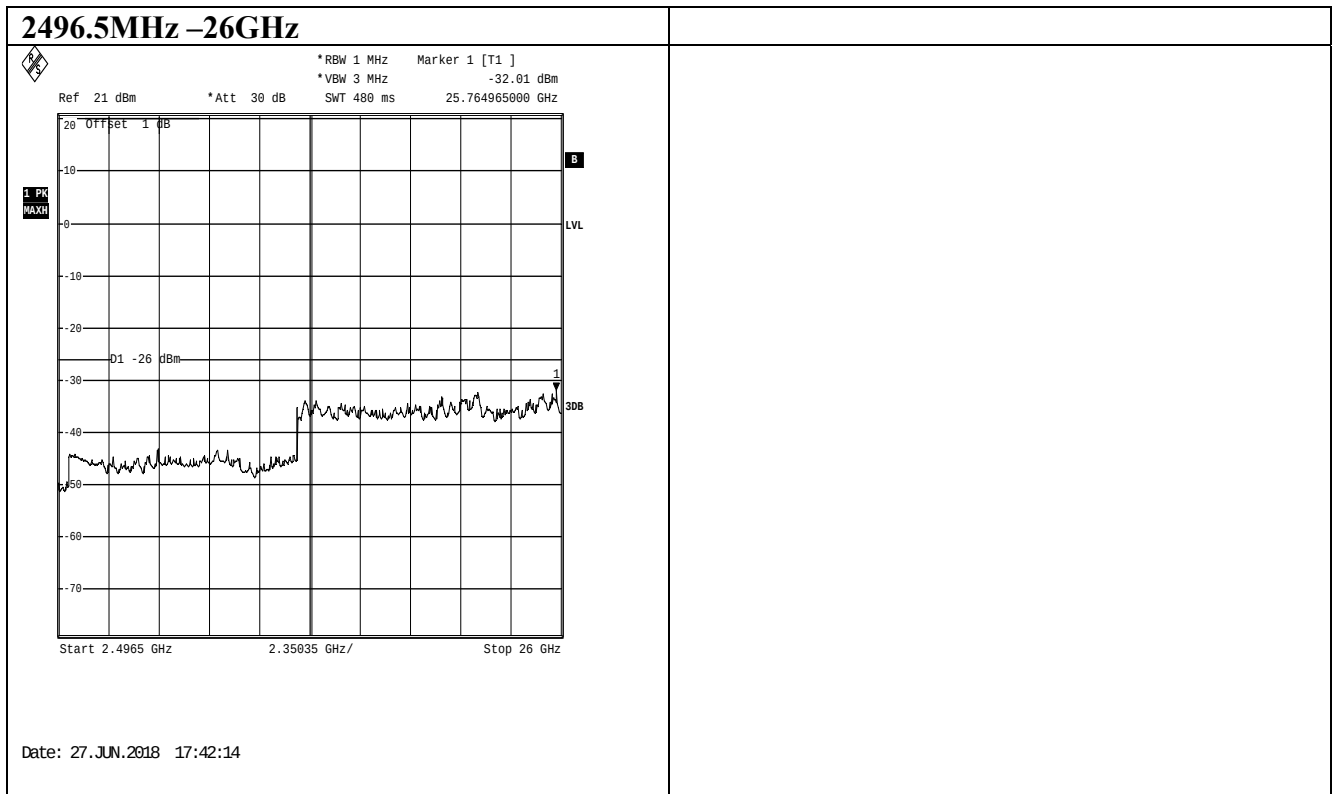


Date: 27.JUN.2018 17:29:57

2483.5MHz – 2496.5MHz



Date: 27.JUN.2018 17:36:56



6.6. LIMITATION OF COLLATERAL EMISSION OF RECEIVER

6.6.1. Limit:

Frequency below 1GHz : 4nW

Frequency above 1GHz : 20nW

6.6.2. Measurement Equipment Used:

Refer to section 6.1.2 for detail.

6.6.3. Test Setup:

Refer to section 6.1.3 for detail.

6.6.4. Test Procedure:

1. Setup the EUT at hopping off and modulation on.
2. Setup the ETU operate at channel low, mid and high and normal voltage.
3. Set the spectrum analyzer Ref level: -10dBm; attenuation=0dB;RBW=100kHz, VBW=100kHz, Sweep = auto, Start=10MHz, Stop=1GHz. Max hold view, mark highest level.
4. Set the spectrum analyzer Ref level: -10dBm, attenuation=0dB;RBW=1MHz, VBW=1MHz, Sweep = auto, Start=1GHz, Stop=13GHz. Max hold view, mark highest level
5. Varied input voltage to + 10% and - 10% normal voltage and repeat procedure 1 to 4 again.
6. The Worst data was report.

6.6.5. Test Results:

Refer to next page for plots.

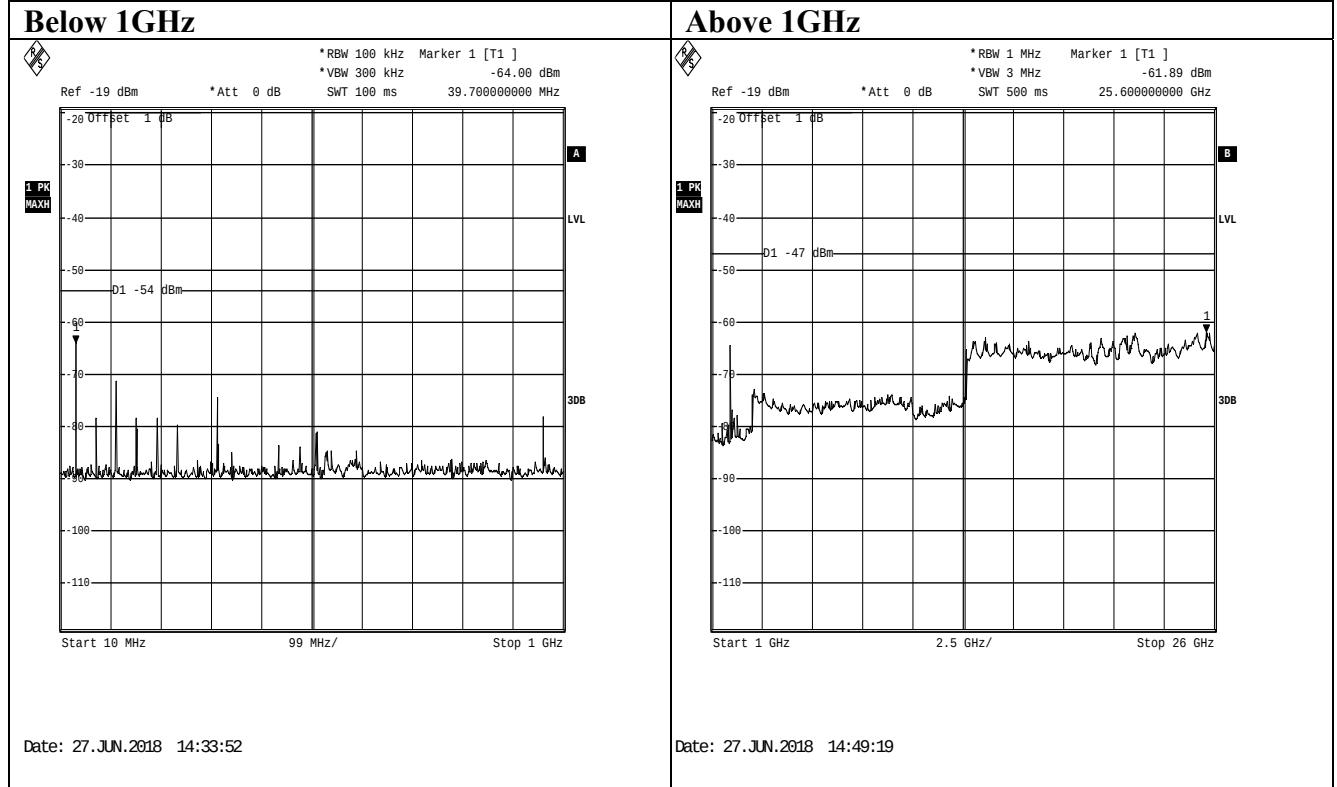
Ambient temperature: 25 °C

Relative humidity: 60 %

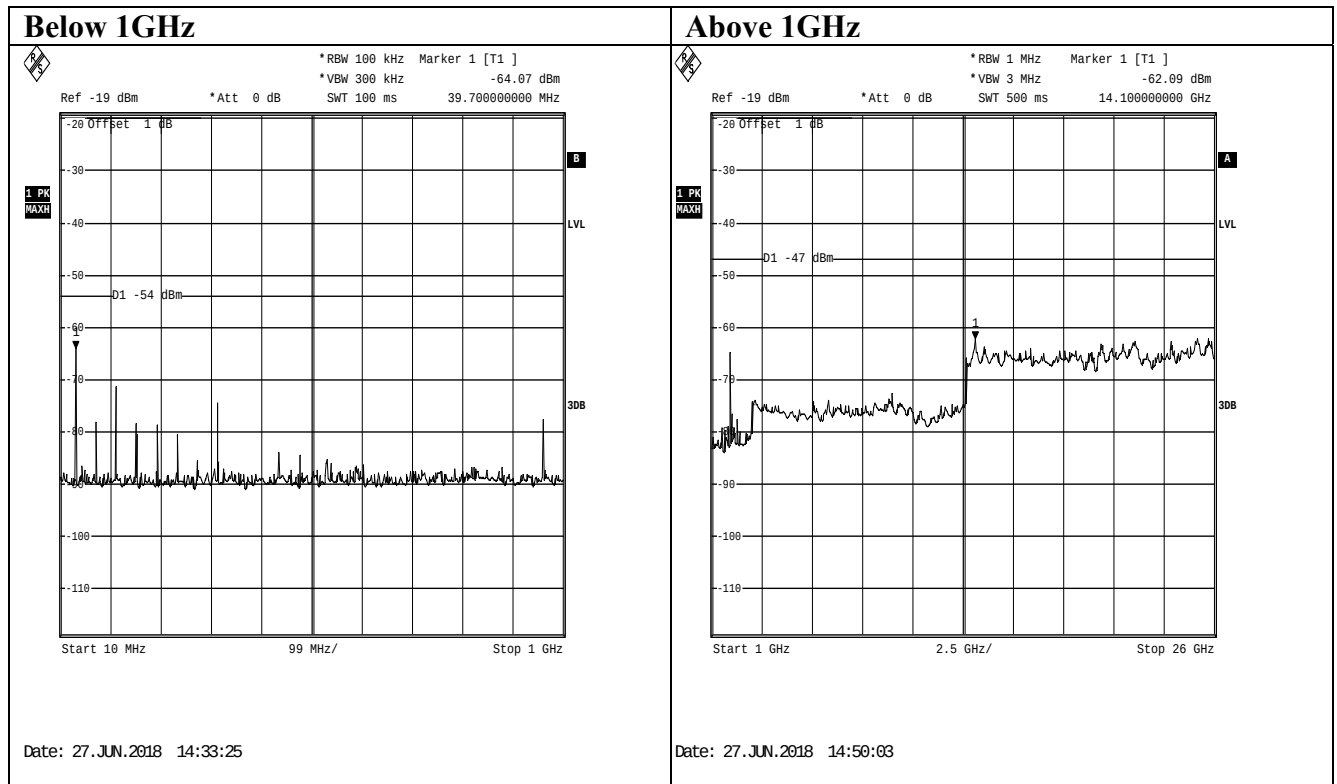
Test Date: 2018/06/23

Normal Voltage for 802.11b:

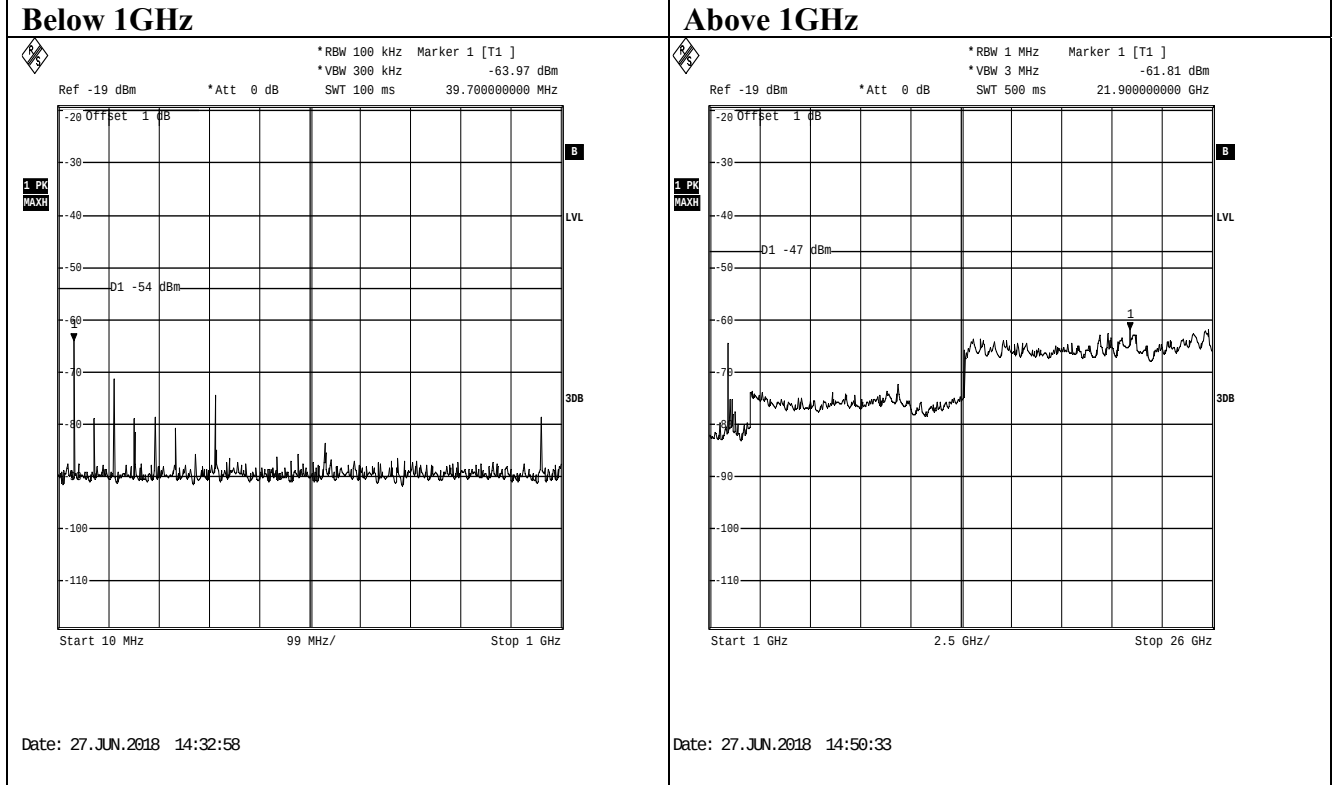
Channel Low



Channel Mid

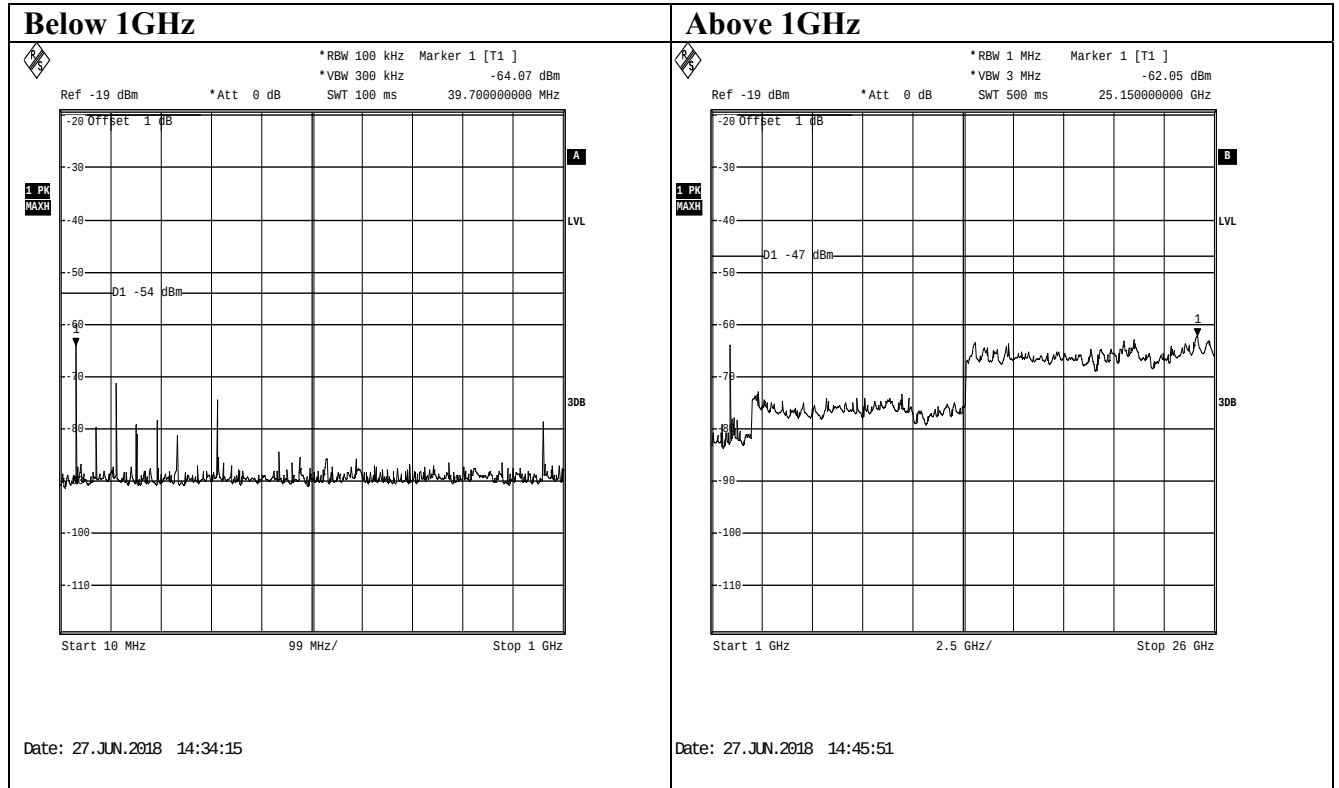


Channel High

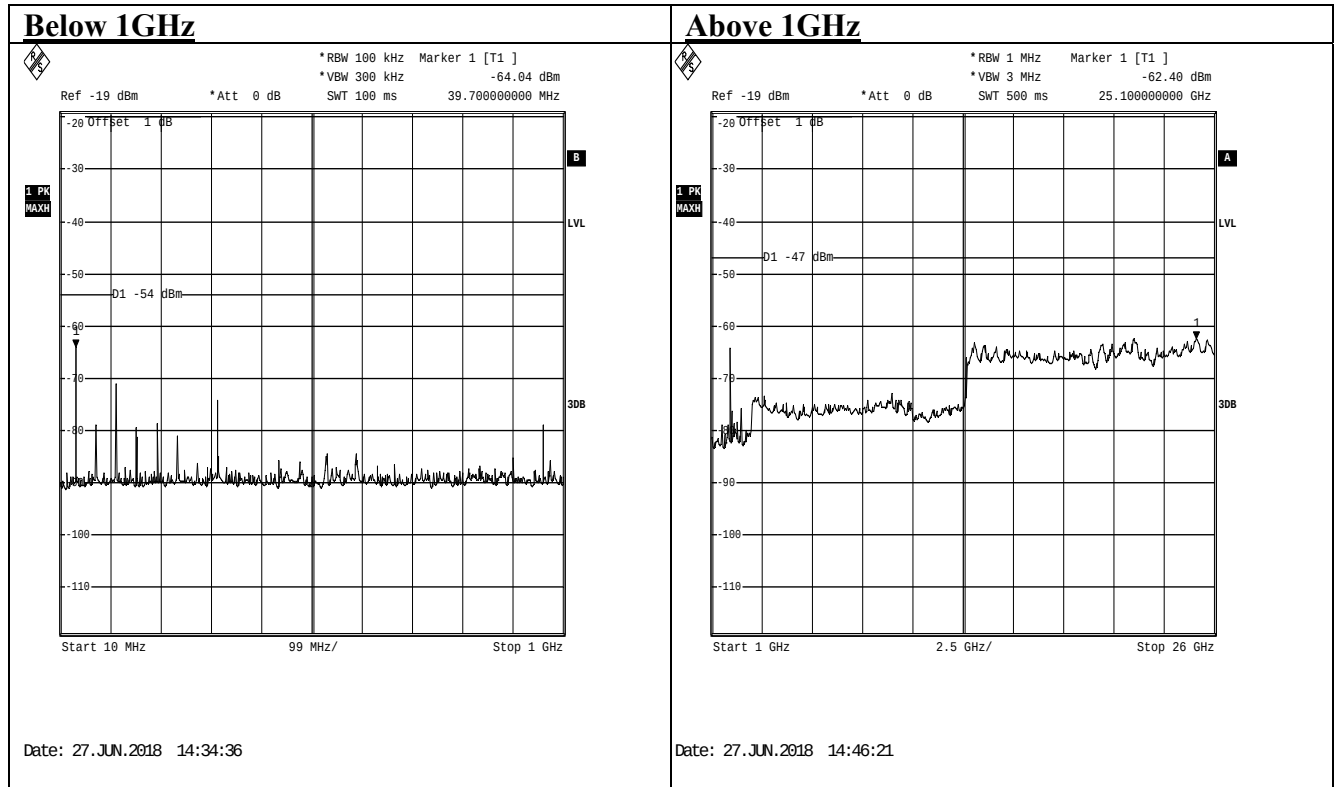


Normal Voltage for 802.11g:

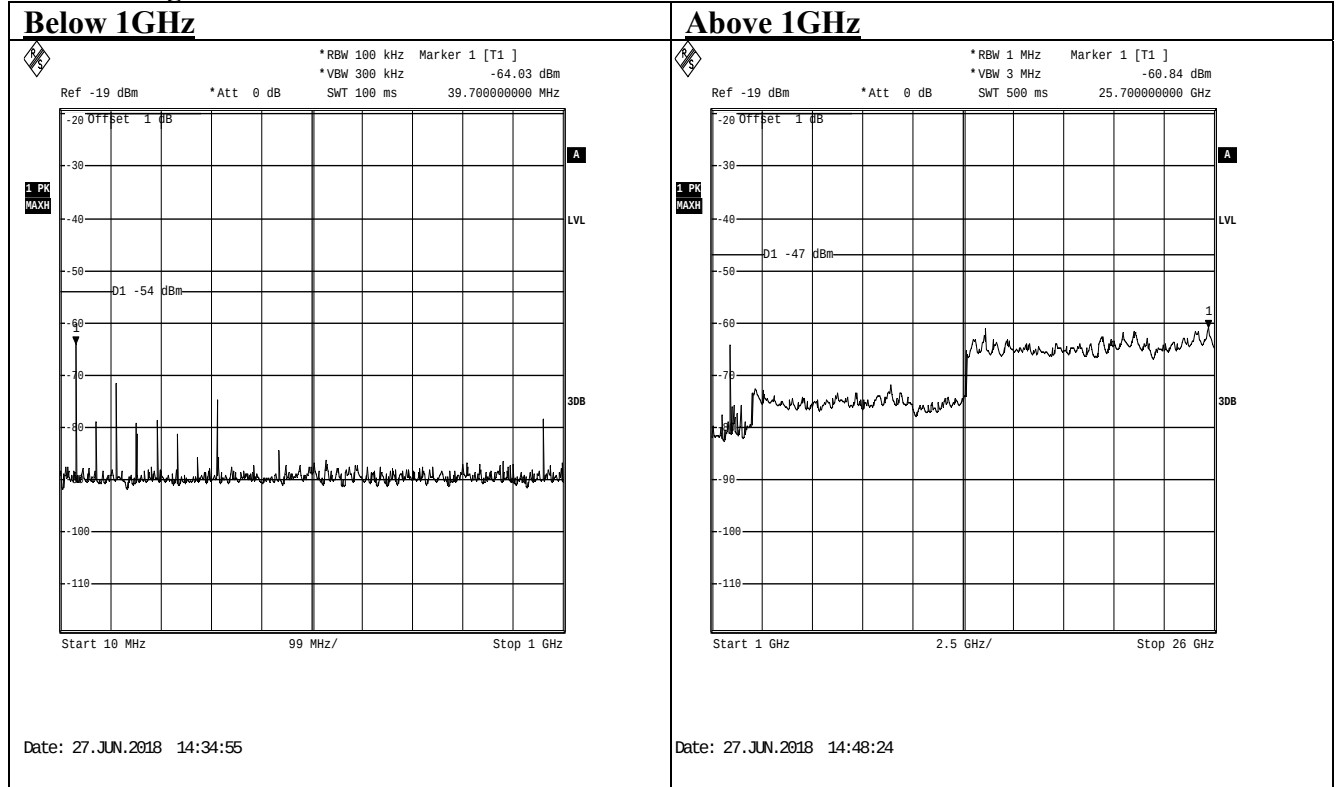
Channel Low



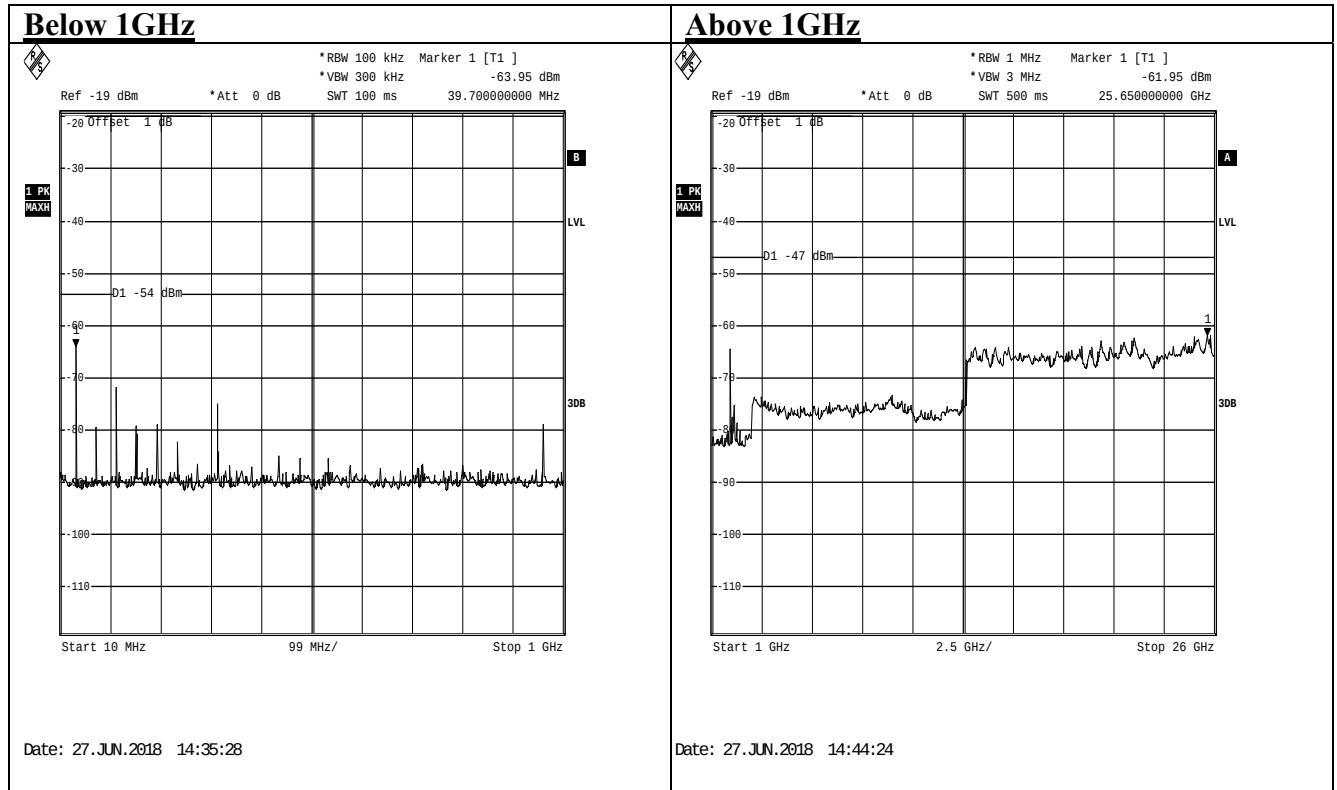
Channel Mid



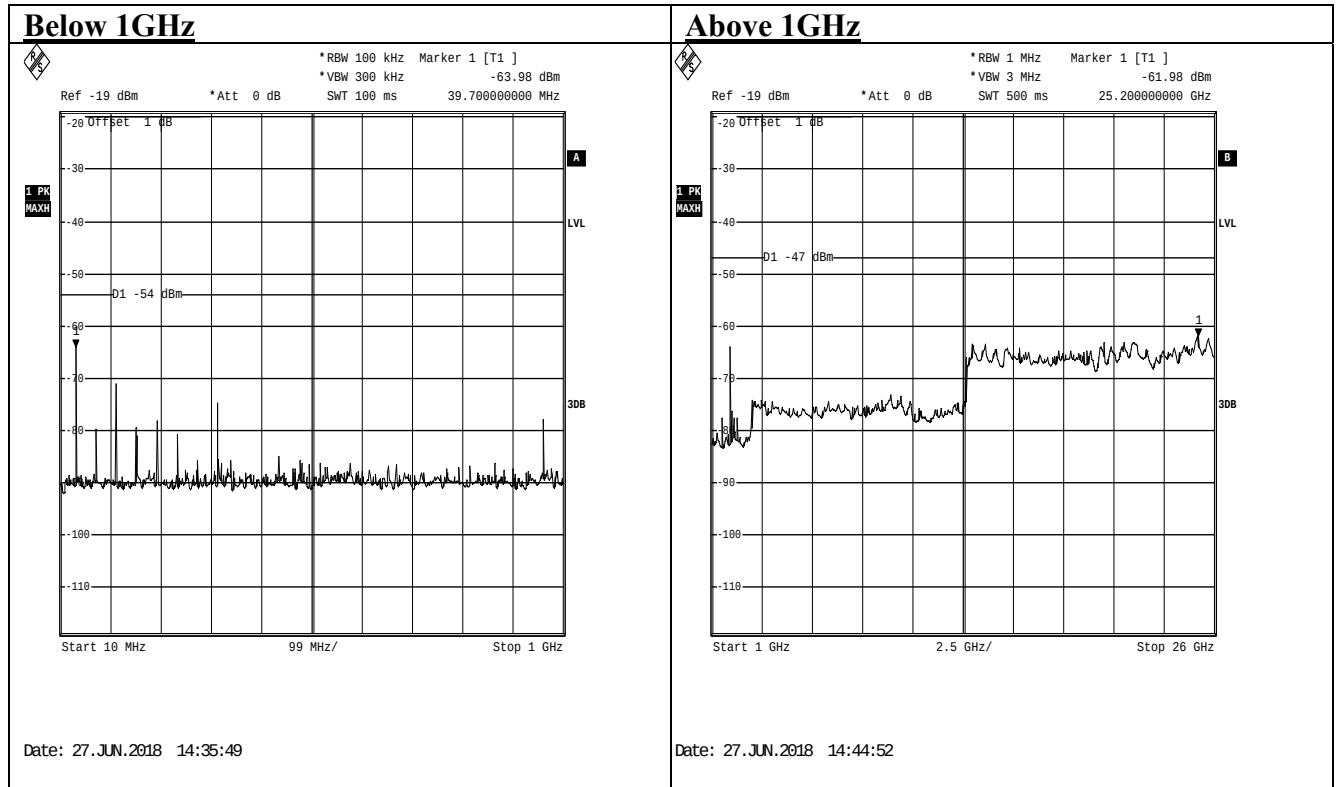
Channel High



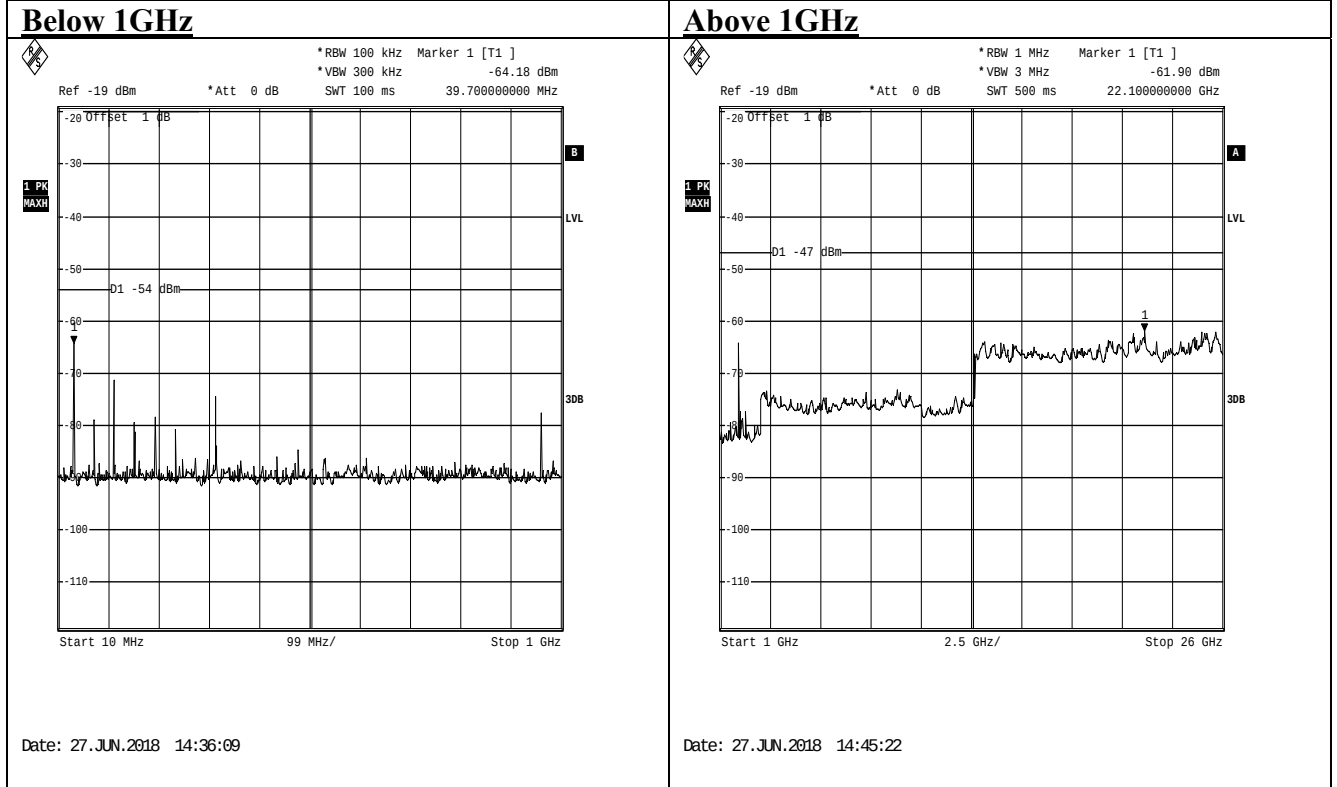
**Normal Voltage 802.11n HT20:
Channel Low**



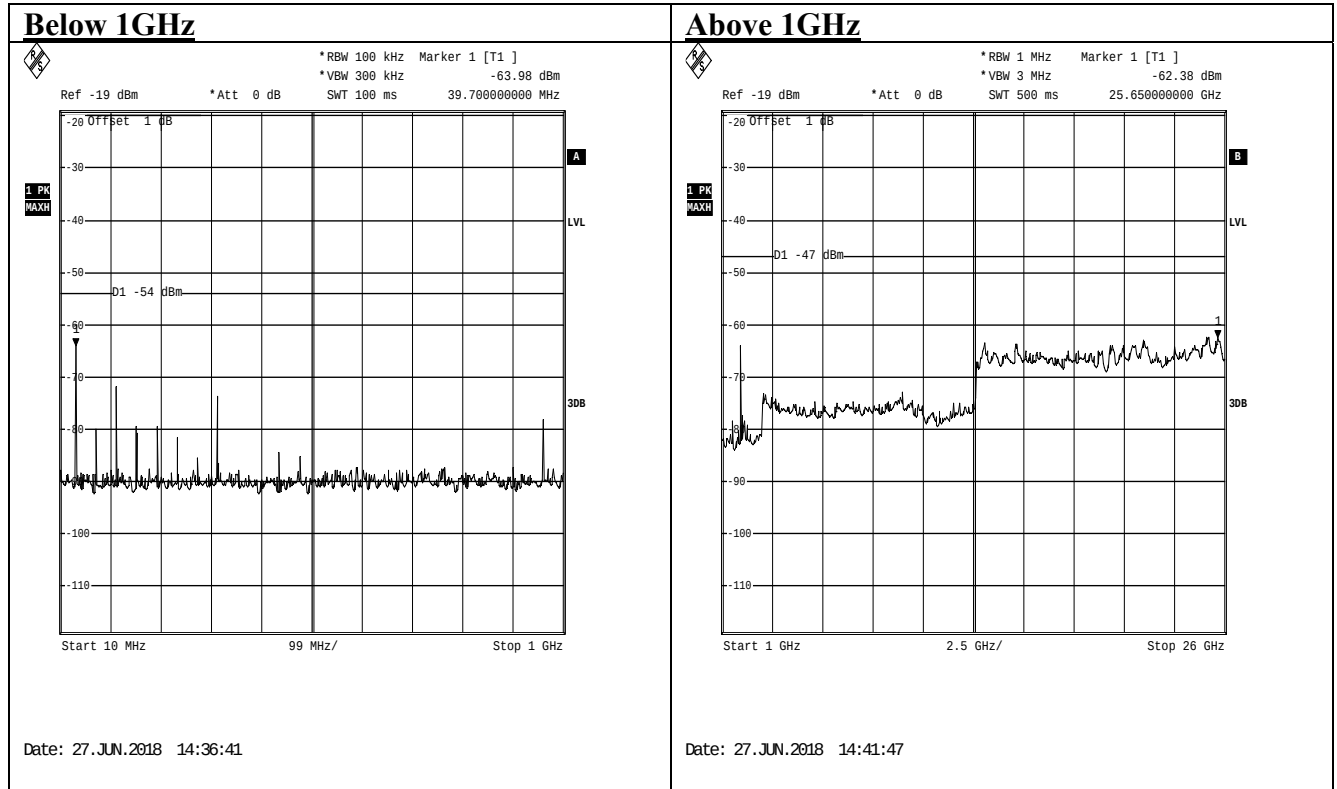
Channel Mid



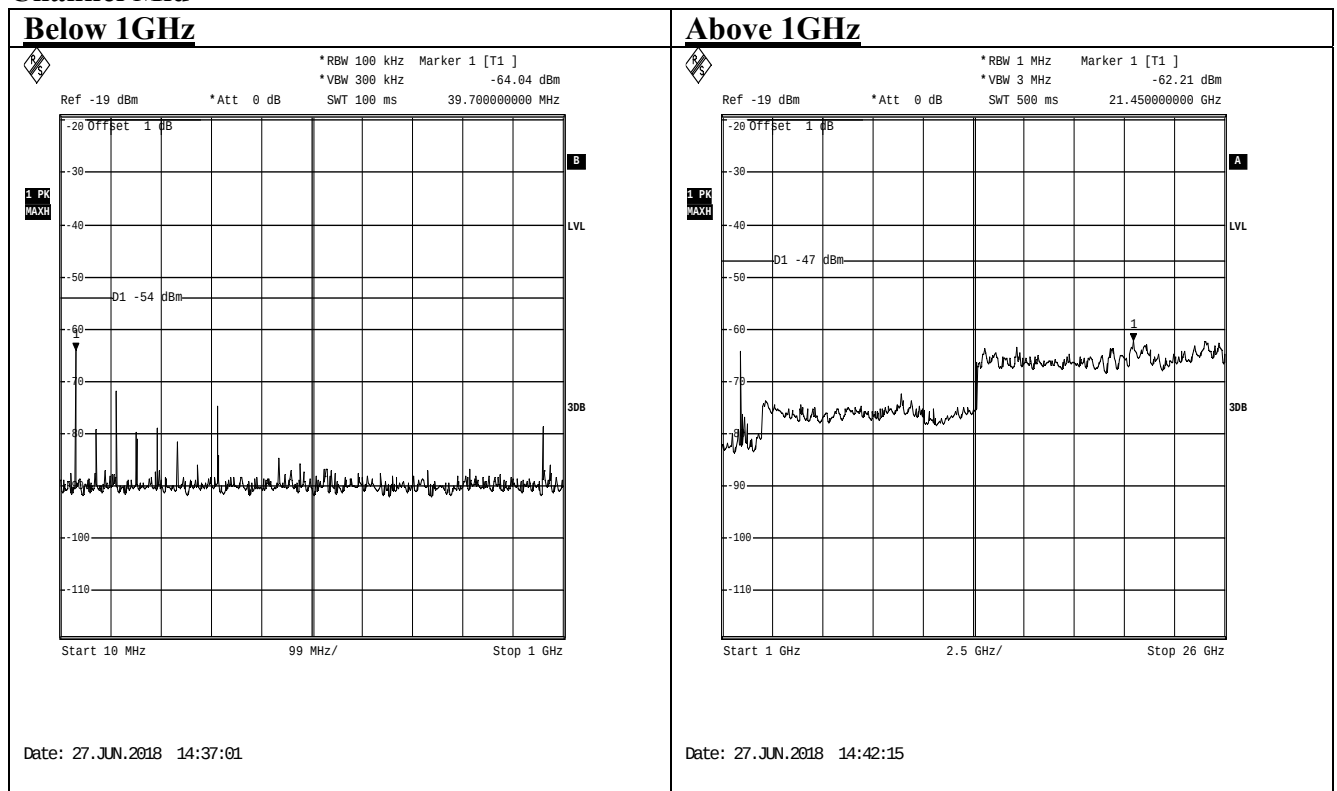
Channel High



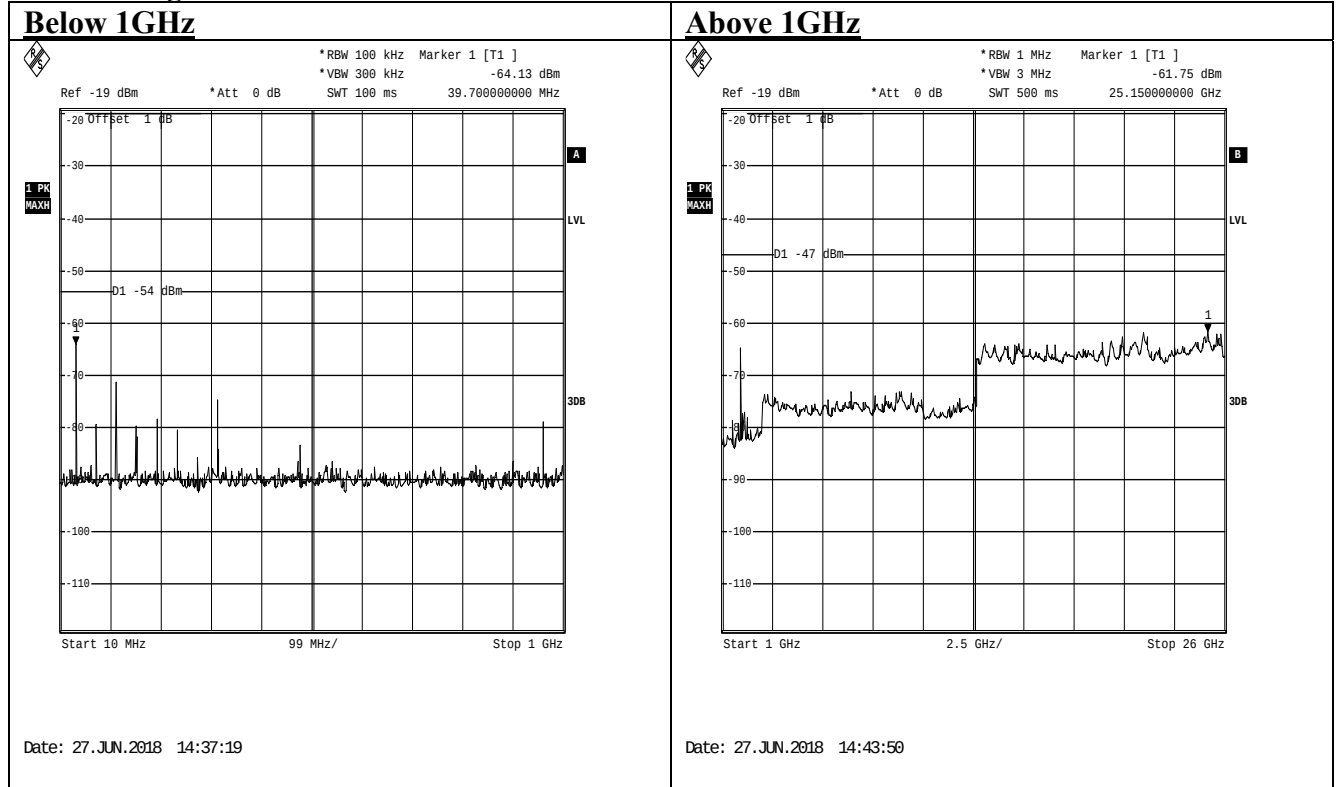
Normal Voltage 802.11n HT40:
Channel Low



Channel Mid



Channel High



6.7. HOPPING DWELL TIME

6.7.1. Limit:

$\leq 0.4\text{s}$ in one 28.5 sec period

6.7.2. Measurement Equipment Used:

Refer to section 6.1.2 for detail.

6.7.3. Test Setup:

Refer to section 6.1.3 for detail.

6.7.4. Test Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW, VBW=1MHz, Span = 0Hz , Adjust Sweep = 30s.
5. Repeat above procedures until all frequency measured were complete.

6.7.5. Test Results:

N/A

6.8. ANGULAR WIDTH OF PRINCIPAL RADIATION (AWPR)

The angular width of principal radiation (AWPR), which follows from the antenna pattern specifications, shall satisfy the expression $360/A$ degree.

To be assessed:

$AWPR < 360/A$ (degree)

A represent the value determined by dividing equivalent isotropic radiated power by the value obtained by applying an antenna power with the mean power of 10 mW to the transmitting antenna with its absolute gain being 2.14 dBi.

Antenna gain=		-2.81	dBi		
802.11b					
		CH Low	CH Mid	CH High	Channel 2484
Normal Voltage 12 V	Conducted power (mW/MHz)	1.445	1.361	0.991	1.000
	Radiated power (dBm/MHz)	-1.21	-1.47	-2.85	-2.81
	Radiated power (mW/MHz)	0.757	0.713	0.519	0.524
	Constant A	0.757 /16.4<1	0.713 /16.4<1	0.519 /16.4<1	0.524/16.4<1
Upper Voltage 13.2 V	Conducted power (mW/MHz)	1.435	1.358	0.993	1.000
	Radiated power (dBm/MHz)	-1.24	-1.48	-2.84	-2.81
	Radiated power (mW/MHz)	0.752	0.711	0.520	0.524
	Constant A	0.752 /16.4<1	0.711 /16.4<1	0.520 /16.4<1	0.524/16.4<1
Lower Voltage 10.8 V	Conducted power (mW/MHz)	1.439	1.365	0.993	1.000
	Radiated power (dBm/MHz)	-1.23	-1.46	-2.84	-2.81
	Radiated power (mW/MHz)	0.753	0.714	0.520	0.524
	Constant A	0.753 /16.4<1	0.714 /16.4<1	0.520 /16.4<1	0.524/16.4<1

In these cases, according to article 49.20 (f)(2) of the Regulations the constant A should be equalized to 1.

As a result AWPR, 360 degrees, which is always satisfied.

802.11g

Antenna gain= -2.81 dBi

		CH Low	CH Mid	CH High
Normal Voltage 12 V	Conducted power (mW/MHz)	0.531	0.484	0.354
	Radiated power (dBm/MHz)	-5.56	-5.96	-7.32
	Radiated power (mW/MHz)	0.278	0.254	0.185
	Constant A	0.278 /16.4<1	0.254 /16.4<1	0.185 /16.4<1
Upper Voltage 13.2 V	Conducted power (mW/MHz)	0.530	0.482	0.355
	Radiated power (dBm/MHz)	-5.57	-5.98	-7.31
	Radiated power (mW/MHz)	0.277	0.252	0.186
	Constant A	0.277 /16.4<1	0.252 /16.4<1	0.186 /16.4<1
Lower Voltage 10.8 V	Conducted power (mW/MHz)	0.531	0.485	0.354
	Radiated power (dBm/MHz)	-5.56	-5.95	-7.32
	Radiated power (mW/MHz)	0.278	0.254	0.185
	Constant A	0.278 /16.4<1	0.254 /16.4<1	0.185 /16.4<1

In these cases, according to article 49.20 (f)(2) of the Regulations the constant A should be equalized to 1.

As a result AWPR, 360 degrees, which is always satisfied.

802.11n HT20

Antenna gain= -2.81 dBi

		CH Low	CH Mid	CH High
Normal Voltage 12 V	Conducted power (mW/MHz)	0.566	0.525	0.379
	Radiated power (dBm/MHz)	-5.28	-5.61	-7.02
	Radiated power (mW/MHz)	0.296	0.275	0.199
	Constant A	0.296 /16.4<1	0.275 /16.4<1	0.199 /16.4<1
Upper Voltage 13.2 V	Conducted power (mW/MHz)	0.568	0.526	0.378
	Radiated power (dBm/MHz)	-5.27	-5.60	-7.04
	Radiated power (mW/MHz)	0.297	0.275	0.198
	Constant A	0.297 /16.4<1	0.275 /16.4<1	0.198 /16.4<1
Lower Voltage 10.8 V	Conducted power (mW/MHz)	0.569	0.524	0.378
	Radiated power (dBm/MHz)	-5.26	-5.62	-7.03
	Radiated power (mW/MHz)	0.298	0.274	0.198
	Constant A	0.298 /16.4<1	0.274 /16.4<1	0.198 /16.4<1

In these cases, according to article 49.20 (f)(2) of the Regulations the constant A should be equalized to 1.

As a result AWPR, 360 degrees, which is always satisfied.

802.11n HT40

Antenna gain= -2.81 dBi

		CH Low	CH Mid	CH High
Normal Voltage 12 V	Conducted power (mW/MHz)	0.165	0.141	0.119
	Radiated power (dBm/MHz)	-10.64	-11.32	-12.06
	Radiated power (mW/MHz)	0.086	0.074	0.062
	Constant A	0.086 /16.4<1	0.074 /16.4<1	0.062 /16.4<1
Upper Voltage 13.2 V	Conducted power (mW/MHz)	0.166	0.141	0.119
	Radiated power (dBm/MHz)	-10.62	-11.32	-12.05
	Radiated power (mW/MHz)	0.087	0.074	0.062
	Constant A	0.087 /16.4<1	0.074 /16.4<1	0.062 /16.4<1
Lower Voltage 10.8 V	Conducted power (mW/MHz)	0.165	0.141	0.119
	Radiated power (dBm/MHz)	-10.63	-11.31	-12.06
	Radiated power (mW/MHz)	0.086	0.074	0.062
	Constant A	0.086 /16.4<1	0.074 /16.4<1	0.062 /16.4<1

In these cases, according to article 49.20 (f)(2) of the Regulations the constant A should be equalized to 1.

As a result AWPR, 360 degrees, which is always satisfied.

6.9. CARRIER SENSE CAPABILITY

6.9.1. Limit:

Shall not transmit when received signal level is above 100 mV

Automatic cessation of transmitting is required when the electric field strength is exceeding E (mV/m):

Antenna Voltage (in dBm) = 22.79 + max. antenna Gain - 20 x Log f (f in MHz)

This voltage will be generated in the direction of the max. Gain.

2.4GHz					Antenna Gain(dBi)		dBm
Channel Low	2412 MHz:	Pcs=	22.79	+	-2.81	-20log(2412)=	-47.67
Channel Mid	2437 MHz:	Pcs=	22.79	+	-2.81	-20log(2437)=	-47.76
Channel High	2472 MHz:	Pcs=	22.79	+	-2.81	-20log(2472)=	-47.88

6.9.2. Measurement Equipment Used:

Refer to section 6.1.2 for detail.

6.9.3. Test Setup:

Refer to section 6.1.3 for detail.

6.9.4. Test Procedure:

1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port through splitter to spectrum
2. Set center frequency of spectrum analyzer = operating frequency.
3. Set the spectrum analyzer as RBW, VBW=1MHz, Span = 50MHz , Sweep = Auto.
4. EUT link to device set it in normal mode
4. used spectrum analyzer trigger function and delta mark function

6.9.5. Test Results:

PASS

APPENDIX 1

PHOTOGRAPHS OF SETUP

Test Setup

