

FCC Test Report

Report No: WD-RF-R-190342-C0

Product Name : Time Clock
Model Name : NT8000X-XX(X can be 0~9 or a~z or A~Z or blank)
Series Model Name : NT8000Y-YY(Y can be 0~9 or a~z or A~Z or blank)
FCC ID : 2ASPA NOVATIME-OEM
Applicant : NOVAtime Technology, Inc.
Received Date : Feb. 18, 2019
Tested Date : May. 09, 2019 ~ Jun. 26, 2019
Applicable Standard : 47 CFR FCC Part 15, Subpart C (Section 15.247)
KDB 558074 D01 DTS Meas. Guidance v05
ANSI C63.10 : 2013



Wendell Industrial Co., Ltd
Wendell Electrical Testing Lab.

Caution:

This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted.

The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment.

Please note that the measurement uncertainty are provided for informational purpose only and are not used in determining the Pass/Fail results.

This report must not be used to claim product endorsement by TAF or any agency of the government.

The test report shall not be reproduced without the written approval of Wendell Industrial Co., Ltd..

Test Report

Issued Date: June 26, 2019

Project No.: 19Q021808

Product Name	Time Clock
Trade Name	NOVAtime Technology, Inc.
Model Name	NT8000X-XX(X can be 0~9 or a~z or A~Z or blank)
Series Model Name	NT8000Y-YY(Y can be 0~9 or a~z or A~Z or blank)
FCC ID	2ASPANOVATIME-OEM
Applicant	NOVAtime Technology, Inc.
Manufacturer	unitech electronics co., ltd.
EUT Rated Voltage	AC 100 ~ 240V / 50 or 60Hz 、PoE
EUT Test Voltage	AC 120V / 60Hz
EUT Supports Radios Application	WLAN 802.11a/b/g WLAN 802.11n (HT20/HT40) Bluetooth BR/EDR/LE RFID
Applicable Standard	47 CFR FCC Part 15, Subpart C (Section 15.247) KDB 558074 D01 DTS Meas. Guidance v05 ANSI C63.10 : 2013
Output Power	18.75 dBm
Test Result	Complied

Documented :



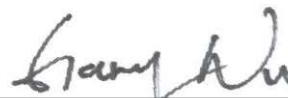
(Specialist / Emma Lu)

Technical Engineer :



(Deputy Section Manager / Jack Chang)

Approved :



(Project Manager / Gary Wu)

Table of Contents

Document Revision History	5
Summary of Test Result	6
1 Generation Information	7
1.1 Applicant	7
1.2 Manufacturer	7
1.3 Description of Equipment under Test	7
1.4 Test Mode Applicability And Tested Channel Detail	10
1.5 Configuration of Tested System	12
1.6 EUT Exercise Software	12
1.7 Tested System Details	13
1.8 Test Facility	14
1.9 Measurement Uncertainty	15
1.10 List of Test Equipment	16
2 Test Result	19
2.1 Antenna Requirement	19
2.1.1 Standard Applicable	19
2.1.2 Antenna Connected Construction	19
2.1.3 Antenna Gain	19
2.2 Peak Output Power Measurement	20
2.2.1 Limit	20
2.2.2 Test Setup	20
2.2.3 Test Procedure	20
2.2.4 Test Result	21
2.3 6dB Bandwidth Measurement	23
2.3.1 Limit	23
2.3.2 Test Setup	23
2.3.3 Test Procedure	23
2.3.4 Test Result	24
2.4 Power Spectral Density Measurement	28
2.4.1 Limit	28
2.4.2 Test Setup	28
2.4.3 Test Procedure	28
2.4.4 Test Result	29
2.5 Conducted Band Edges and Spurious Emission Measurement	33
2.5.1 Limit	33
2.5.2 Test Setup	33
2.5.3 Test Procedure	33
2.5.4 Test Result	34
2.6 Radiated Band Edges and Spurious Emission Measurement	46
2.6.1 Limit	46
2.6.2 Test Setup	47
2.6.3 Test Procedure	48
2.6.4 Duty Cycle	49
2.6.5 Test Result of Radiated Band Edge Measurement	49
2.6.6 Test Result of Radiated Spurious Emission Measurement	66
2.7 AC Conducted Emissions Measurement	93

2.7.1	Limit	93
2.7.2	Test Setup.....	93
2.7.3	Test Procedure.....	94
2.7.4	Test Result	95

Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

Document Revision History

Report No.	Issue date	Description
WD-RF-R-190342-C0	June 26, 2019	Initial report

Summary of Test Result

Ref. Std. Clause	Test Items	Result
15.203 15.247(C)	Antenna Requirement	Pass
15.247(b)	Peak Output Power	Pass
15.247(a)(2)	6dB Bandwidth	Pass
15.247(e)	Power Spectral Density	Pass
15.247(d)	Conducted Band Edges and Conducted Spurious Emission	Pass
15.247(d)	Radiated Band Edges and Radiated Spurious Emission	Pass
15.207	AC Conducted Emission	Pass

1 Generation Information

1.1 Applicant

NOVAtime Technology, Inc.
9680 Haven Avenue, Suite #200, Rancho Cucamonga, CA 91730

1.2 Manufacturer

unitech electronics co., ltd.
5Fl., No.136, Lane 235, Pao-Chiao Rd., Hsin-Tien Dist, New Taipei City, Taiwan 231, R.O.C.

1.3 Description of Equipment under Test

Product Name	Time Clock
Model No.	NT8000X-XX(X can be 0~9 or a~z or A~Z or blank)
Series Model No.	NT8000Y-YY(Y can be 0~9 or a~z or A~Z or blank)
FCC ID	2ASPA NOVATIME-OEM
Frequency Range	802.11b/g/n-20MHz: 2412~2462MHz 802.11n-40MHz: 2422~2452MHz
Number of Channels	802.11b/g/n-20MHz: 11, n-40MHz: 7
Data Rate	802.11b: 1-11Mbps, 802.11g: 6-54Mbps, 802.11n: up to 150Mbps
Channel separation	802.11b/g/n: 5 MHz
Type of Modulation	802.11b:DSSS (DBPSK, DQPSK, CCK) 802.11g/n:OFDM (BPSK, QPSK, 16QAM, 64QAM)
Antenna Information	Refer to the table "Antenna List"
EUT Supports Radios Application	WLAN 802.11a/b/g WLAN 802.11n (HT20/HT40) Bluetooth BR/EDR/LE RFID
EUT Rated Voltage	AC 100 ~ 240V / 50 or 60Hz 、PoE
EUT Test Voltage	AC 120V / 60Hz

The EUT uses following adapter.

Trade Name	ENG Electric co., Ltd.
Model No.	6A-601DB12
Input Power	AC 100 ~ 240V / 50 or 60Hz 、PoE
Output Power	DC 12V/5.0A
Power Line	Non-shielded, 1 Core, 1.5m

Antenna List

No.	Manufacturer	Model No.	Antenna Type	Peak Gain
1	JOYMAX	TBF-UT01MPXX-752	Dipole	5 dBi for 2.4GHz

Remark: The antenna of EUT is conforming to FCC 15.203

Channel List

802.11b/g/n HT20		802.11n HT40	
Channel	Frequency(MHz)	Channel	Frequency(MHz)
01	2412	--	--
02	2417	--	--
03	2422	03	2422
04	2427	04	2427
05	2432	05	2432
06	2437	06	2437
07	2442	07	2442
08	2447	08	2447
09	2452	09	2452
10	2457	--	--
11	2462	--	--

Test Frequencies in each operating band

Frequency range over which the device operates in each operating band (Note 1)	Number of test frequencies required	Location of test frequencies inside the operating frequency range (Note 1,2)
≤ 1 MHz	1	near centre
> 1 MHz and ≤ 10 MHz	2	1 near high end, 1 near low end
> 10 MHz	3	1 near high end, 1 near centre, and 1 near low end

Note 1: The frequency range over which the device operates in a given operating band is the difference between the highest and lowest frequencies on which the device can be tuned within that given operating band. The frequency range can be smaller than or equal to the operating band, but cannot be greater than the operating band.

Note 2: In the third column of table 1, “near” means as close as possible to or at the centre / low end / high end of the frequency range over which the device operates.

Firmware / Software Version

1	Product Name	Time Clock
2	Model No.	NT8000X-XX(X can be 0~9 or a~z or A~Z or blank)
3	Test SW Version	QRCT_ver.3.0.268.0
4	RF power setting in TEST SW	☐ RF power setting was not able to alter during testing. ☒ RF power setting was able to alter during testing. (See the following table)

Parameters of test software setting

Type of Modulation	Channel	Frequency (MHz)	Set Value
802.11b	01	2412	16.5
	06	2437	19.0
	11	2462	14.0
802.11g	01	2412	10.0
	06	2437	12.0
	11	2462	10.0
802.11n HT20	01	2412	10.0
	06	2437	12.0
	11	2462	10.0
802.11n HT40	03	2422	11.0
	06	2437	11.0
	09	2452	10.0

1.4 Test Mode Applicability And Tested Channel Detail

1. This device is a Time Clock with a built-in Wi-Fi 、Bluetooth and RFID transceiver.
2. Main model: NT8000X-XX (X can be 0~9 or a~z or A~Z or blank), series model: NT8000Y-YY (Y can be 0~9 or a~z or A~Z or blank). The difference lies in the fingerprint recognizer function.
3. The EUT supports "Power over Ethernet" and "Adapter", the worst case is the adapter power supply. The final test mode selects the adapter power and records it in the report.
4. FCC ID: 2ASPA NOVATIME-EM, 2ASPA NOVATIME-HID and 2ASPA NOVATIME-OEM use the same WIFI and Bluetooth modules, be used platform Time Clock, the platform is used identical internal printed circuit board layouts, have a common design and components, differ only in the 125kHz and 13.56MHz modular.
5. These tests were performed on a sample of equipment to demonstrate compliance with 47 CFR FCC Part 15, Subpart C (Section 15.247).
6. Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports.
7. The worst case was found when positioned on X axis for radiated emission. Following test modes were selected for the final test, and the final worst case is recorded in the report:

EUT Configure Mode	RE < 1G	RE ≥ 1G	ACM	ACP	Description
--	☒	☒	☒	☐	Transmit WIFI
--	☐	☐	☐	☒	Normal Link

Note : RE<1G: Radiated Emission below 1GHz

RE≥1G: Radiated Emission above 1GHz

ACM: Antenna Port Conducted Measurement

ACP: AC Power Line Conducted Emission

Following channel(s) was (were) selected for the final test as listed below:

Radiated Spurious Emission Measurement(Below 1GHz):

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
--	802.11b	1 ~ 11	06	DSSS	1

Radiated Spurious Emission Measurement(Above 1GHz):

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
--	802.11b	1 ~ 11	01, 06, 11	DSSS	1
--	802.11g	1 ~ 11	01, 06, 11	OFDM	6
--	802.11n HT20	1 ~ 11	01, 06, 11	OFDM	6.5
--	802.11n HT40	3 ~ 9	03, 06, 09	OFDM	13.5

Radiated Band Edge Emission Measurement(Above 1GHz):

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
--	802.11b	1 ~ 11	01, 11	DSSS	1
--	802.11g	1 ~ 11	01, 11	OFDM	6
--	802.11n HT20	1 ~ 11	01, 11	OFDM	6.5
--	802.11n HT40	3 ~ 9	03, 09	OFDM	13.5

Peak Output Power, 6dB Bandwidth, Power Spectral Density, Conducted Spurious Emission:

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
--	802.11b	1 ~ 11	01, 06, 11	DSSS	1
--	802.11g	1 ~ 11	01, 06, 11	OFDM	6
--	802.11n HT20	1 ~ 11	01, 06, 11	OFDM	6.5
--	802.11n HT40	3 ~ 9	03, 06, 09	OFDM	13.5

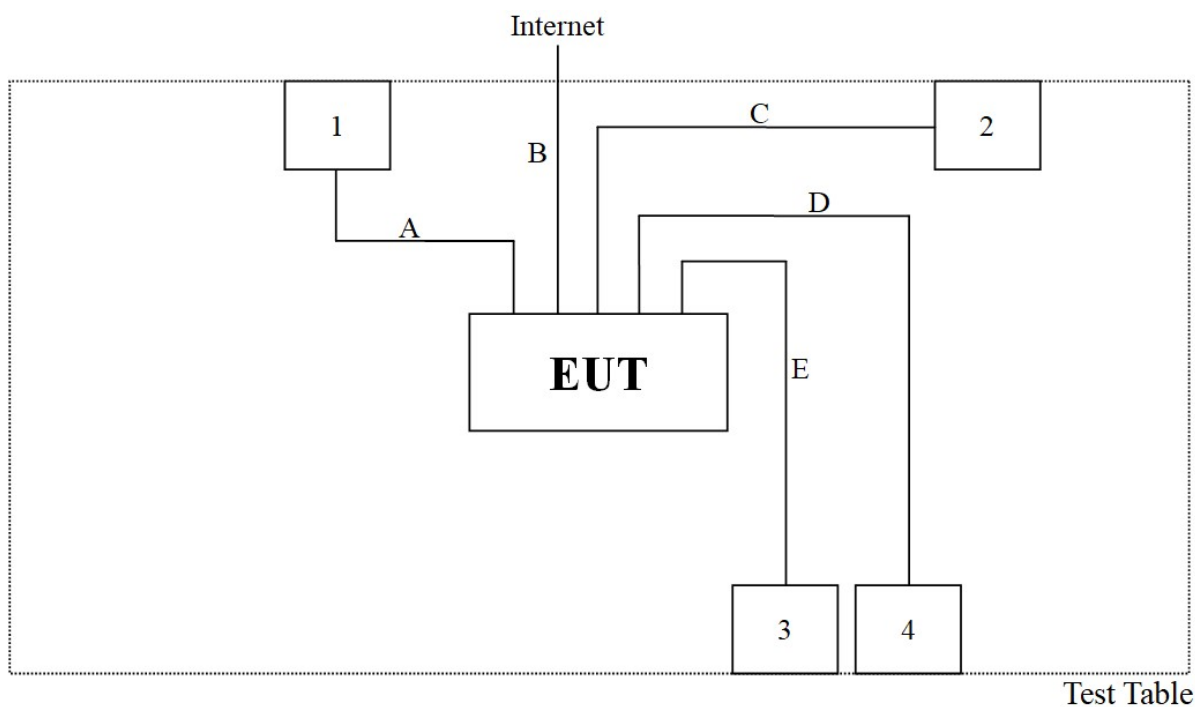
Conducted Band Edges:

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
--	802.11b	1 ~ 11	01, 11	DSSS	1
--	802.11g	1 ~ 11	01, 11	OFDM	6
--	802.11n HT20	1 ~ 11	01, 11	OFDM	6.5
--	802.11n HT40	3 ~ 9	03, 09	OFDM	13.5

AC Conducted Emission:

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
--	802.11b	1 ~ 11	06	DSSS	1

1.5 Configuration of Tested System



1.6 EUT Exercise Software

1. Setup the EUT as shown in Section 1.5
2. Execute software “QRCT_ver.3.0.268.0”.
3. Configure the test mode, the test channel, and the data rate.
4. Press “OK” to start the continuous transmit.
5. Verify that the EUT works properly.

1.7 Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

No.	Product	Manufacturer	Model No.	Serial No.	Power Cord
1	Adapter	ENG Electric co., Ltd.	6A-601DB12	N/A	Non-shielded, 1 Core, 1.5m
2	Notebook PC	acer	N16Q1	NXVF4TA023742254147600	Non-shielded, 1 Core, 0.8m
3	USB Keyboard	Lemel	5105U	G6450015686	Non-shielded, Non-Core, 1.5m
4	USB Mouse	Lemel	M83	201707K31002387	Non-shielded, Non-Core, 1.5m

No.	Signal Cable Type	Signal cable Description
A	Power Cable	Non-shielded, 1 Core, 1.5m
B	LAN Cable	Non-shielded, Non-Core, 10m
C	USB Cable	Shielded, Non-Core, 1m
D	USB Mouse	Non-shielded, Non-Core, 1.5m
E	USB Keyboard	Non-shielded, Non-Core, 1.5m

1.8 Test Facility

Items	Required (IEC 60068-1)	Actual
Temperature (°C)	15-35	25
Humidity (% RH)	25-75	65
Barometric pressure (mbar)	860-1060	1001

Description: Accredited by TAF

Accredited Number: 2965

Issued by: Wendell Industrial Co., Ltd

Lab Address: 6F/6F-1, No.188, Baoqiao Rd., Xindian Dist.,
New Taipei City 23145, Taiwan R.O.C

Test Lab: Wendell Electrical Testing Lab.

Test Location: No.67-9, Shimen Rd., Tucheng Dist.,
New Taipei City 236, Taiwan R.O.C

FCC Accreditation Number: TW2965

FCC Designation Number: TW1118

1.9 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence (level based on a coverage factor K=2)

Measurement Project	Measuring Range	Expended Uncertainty
AC Conducted Emission	0.150 ~ 30 MHz	2.9 dB
Radiated Emission	0.009 ~ 30 MHz	3.8 dB
	30 ~ 1000 MHz	3.5 dB
	1000 ~ 18000 MHz	3.7 dB
	18000 ~ 40000 MHz	3.8 dB
Unwanted Emission Strength Measurement	1000 ~ 6000 MHz	2.5 dB
RF Power, Conducted	1000 ~ 6000 MHz	1.3 dB
Occupied Bandwidth	1000 ~ 6000 MHz	3 %
Power Density	1000 ~ 6000 MHz	1.4 dB
Duty Cycle	1000 ~ 6000 MHz	2.4 %
DC Power Supply	0.5 ~ 30 V	1.7 %
Temperature	15 ~ 30 °C	0.8 °C
Humidity	40 ~ 80 %	3.8 %

Note: Please note that the measurement uncertainty are provided for informational purpose only and are not used in determining the Pass/Fail results.

1.10 List of Test Equipment

For Conducted measurements / RF Conducted Measurement Room

Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
✓ Spectrum analyzer	Keysight	N9010A	MY54200737	2018/10/24	2019/10/23
✓ Wideband Peak Power Meter	Anritsu	ML2495A	1733007	2018/10/25	2019/10/24
✓ Pulse Power Sensor + Precision Adaptor	Anritsu	MA2411B	1726022	2018/10/25	2019/10/24
Temperature Chamber	TAICHY	MHK-225LK	1061121	2019/4/29	2020/4/28
Wireless Connectivity Tester	R&S	CMW270	101307	2019/4/24	2020/4/23
✓ Attenuator	MVE	MVE2211-10	CT-9-056	2018/8/6	2019/8/5
Attenuator	MVE	MVE2211-20	CT-9-057	2018/8/6	2019/8/5
Attenuator	MVE	MVE2211-30	CT-9-058	2018/8/6	2019/8/5
Power Divider	MVE	MVE8546	170826003	2018/8/9	2019/8/8
Power Splitter	MVE	MVE8547	170302047	2018/8/9	2019/8/8
DC Power Supply	GW INSTEK	GPC-3060D	GER817636	2018/8/9	2019/8/8

Remark:

1. All equipments are calibrated every one year.
2. The test instruments marked with “✓” are used to measure the final test results.

For AC Conduction measurements / Conducted Room

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
✓	EMI Test Receiver	R&S	ESR3	102309	2019/5/16	2020/5/15
✓	2-Line V-Network LISN	R&S	ENV216	101185	2019/5/20	2020/5/19
✓	LISN	SCHWARZBECK	NSLK 8127RC	05028	2019/5/20	2020/5/19
✓	Transient Limiter	EM Electronics Corporation	EM-7600	857	2019/5/16	2020/5/15
✓	50ohm Cable	EMCI	EMCCFD300-BM-BM-5000	170613	2019/5/16	2020/5/15
✓	50 ohm terminal impedance	HUBER+SUHNER	50 ohm terminal impedance	CT-1-109-1	2019/5/13	2020/5/12

Remark:

1. All equipments are calibrated every one year.
2. The test instruments marked with “✓” are used to measure the final test results.
3. Test Software version: FARAD EZ-EMC Ver.EMC-CON 3A1

For Radiated measurements / 9x6x6 Semi Anechoic Room

Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
✓ Spectrum Analyzer	Keysight	N9010A	MY52220228	2019/4/25	2020/4/24
✓ EMI Receiver	Keysight	N9038A	MY51210173	2018/12/5	2019/12/4
✓ Pre-Amplifier	EMEC	EMC330	060668	2018/10/16	2019/10/15
✓ Pre-Amplifier	EMCI	EMC051845SE	980525	2018/10/11	2019/10/10
✓ Pre-Amplifier	EMCI	EMC184045SE	980515	2018/10/10	2019/10/9
✓ Pre-Amplifier	EMEC	EM01G18G	060648	2018/10/11	2019/10/10
✓ Cable	EMEC	EM-CB400	105060103	2018/10/18	2019/10/17
✓ Cable	EMEC	EM-CB400	105060102	2018/10/18	2019/10/17
✓ Cable	EMEC	EM-CB400	105060101	2018/10/18	2019/10/17
✓ Cable	EMCI	EMC102-KM-KM-600	170637	2018/10/10	2019/10/9
✓ Cable	HUBER+SUHNER	SF102	MY2751/2	2018/10/10	2019/10/9
✓ Cable	EMCI	EMC102-KM-KM-3000	170635	2018/10/10	2019/10/9
✓ Loop Antenna	EMCI	LPA600	277	2018/4/19	2020/4/18
✓ TRILOG super broad Antenna	Schwarzbeck	VULB 9168	VULB 9168-700 & 1421	2018/10/19	2019/10/18
✓ Horn Antenna	Schwarzbeck	BBHA 9120D	01557	2018/10/9	2019/10/8
✓ Horn Antenna	Schwarzbeck	BBHA 9170	703	2018/10/11	2019/10/10
✓ RF Filter	EMEC	BRF-2400-2500	002	2018/10/10	2019/10/9
RF Filter	EMEC	BRF-5150-5350	104	2018/10/10	2019/10/9
RF Filter	EMEC	BRF-5470-5725	092	2018/10/10	2019/10/9
RF Filter	EMEC	BRF-5725-5875	091	2018/10/10	2019/10/9
✓ RF Filter	EMEC	HPF-2800	002	2018/10/10	2019/10/9
RF Filter	EMEC	HPF-5850	059	2018/10/10	2019/10/9

Remark:

1. The test instruments marked with “✓” are used to measure the final test results.
2. Test Software version: FARAD EZ-EMC Ver.WD-03A1-1

2 Test Result

2.1 Antenna Requirement

2.1.1 Standard Applicable

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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

An intentional radiator shall be designed to ensure that no antenna other than as furnished by the responsible party shall be used with the device. If transmitting antennas of directional gain greater than 6dBi are using the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi, for compliance to FCC 47CFR 15.247 (c) requirements.

2.1.2 Antenna Connected Construction

Non-standard antenna connector is used.

2.1.3 Antenna Gain

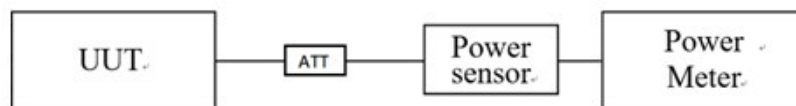
No.	Manufacturer	Model No.	Antenna Type	Peak Gain
1	JOYMAX	TBF-UT01MPXX-752	Dipole	5 dBi for 2.4GHz

2.2 Peak Output Power Measurement

2.2.1 Limit

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 1W. If transmitting antenna of directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

2.2.2 Test Setup



2.2.3 Test Procedure

1. Enable the EUT transmit continuously.
2. Let EUT be connected to the power meter, and record the max. reading.
3. Measurement using a gated RF average power meter, since this measurement is made only during the ON time of the transmitter, no duty cycle correction is required.

2.2.4 Test Result

802.11b

Frequency (MHz)	Peak power (dBm)			Limit (dBm)	Result
	Chain A	Chain B	Total		
2412	17.86	--	--	≤ 30	Pass
2437	18.75	--	--	≤ 30	Pass
2462	16.17	--	--	≤ 30	Pass

Remark:

1. Peak Power = Reading value on power meter + cable loss
2. $10 \log(X/\text{mW}) = \text{dBm}$, $X=1$ watt (Limit)
1 watt = 30 dBm

802.11g

Frequency (MHz)	Peak power (dBm)			Limit (dBm)	Result
	Chain A	Chain B	Total		
2412	16.88	--	--	≤ 30	Pass
2437	16.83	--	--	≤ 30	Pass
2462	17.48	--	--	≤ 30	Pass

Remark:

1. Peak Power = Reading value on power meter + cable loss
2. $10 \log(X/\text{mW}) = \text{dBm}$, $X=1$ watt (Limit)
1 watt = 30 dBm

802.11n HT20

Frequency (MHz)	Peak power (dBm)			Limit (dBm)	Result
	Chain A	Chain B	Total		
2412	17.29	--	--	≤ 30	Pass
2437	16.68	--	--	≤ 30	Pass
2462	17.61	--	--	≤ 30	Pass

Remark:

1. Peak Power = Reading value on power meter + cable loss
2. $10 \log(X/\text{mW}) = \text{dBm}$, $X=1 \text{ watt}$ (Limit)
1 watt = 30 dBm

802.11n HT40

Frequency (MHz)	Peak power (dBm)			Limit (dBm)	Result
	Chain A	Chain B	Total		
2422	17.37	--	--	≤ 30	Pass
2437	16.54	--	--	≤ 30	Pass
2452	17.41	--	--	≤ 30	Pass

Remark:

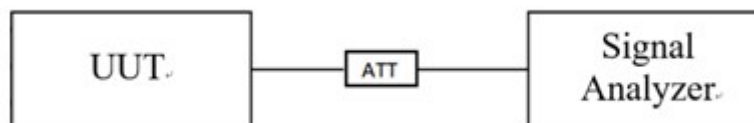
1. Peak Power = Reading value on power meter + cable loss
2. $10 \log(X/\text{mW}) = \text{dBm}$, $X=1 \text{ watt}$ (Limit)
1 watt = 30 dBm

2.3 6dB Bandwidth Measurement

2.3.1 Limit

The minimum 6 dB bandwidth shall be at least 500 kHz.

2.3.2 Test Setup



2.3.3 Test Procedure

1. Enable the EUT transmit continuously.
2. Spectrum analyzer set:
 - a) RBW = 100 kHz
 - b) VBW $\geq$ 3 RBW
 - c) Detector = peak
 - d) Sweep time = auto couple
 - e) Trace mode = max hold.

2.3.4 Test Result

802.11b

Frequency (MHz)	6dB BW (kHz)		Limit (kHz)	Result
	Chain A	Chain B		
2412	9059	--	≥ 500	Pass
2437	9058	--	≥ 500	Pass
2462	8105	--	≥ 500	Pass



802.11g

Frequency (MHz)	6dB BW (kHz)		Limit (kHz)	Result
	Chain A	Chain B		
2412	16370	--	≥ 500	Pass
2437	16450	--	≥ 500	Pass
2462	16380	--	≥ 500	Pass



802.11n HT20

Frequency (MHz)	6dB BW (kHz)		Limit (kHz)	Result
	Chain A	Chain B		
2412	17590	--	≥ 500	Pass
2437	17630	--	≥ 500	Pass
2462	17590	--	≥ 500	Pass



802.11n HT40

Frequency (MHz)	6dB BW (kHz)		Limit (kHz)	Result
	Chain A	Chain B		
2422	35110	--	≥ 500	Pass
2437	36270	--	≥ 500	Pass
2452	35110	--	≥ 500	Pass



2.4 Power Spectral Density Measurement

2.4.1 Limit

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

2.4.2 Test Setup



2.4.3 Test Procedure

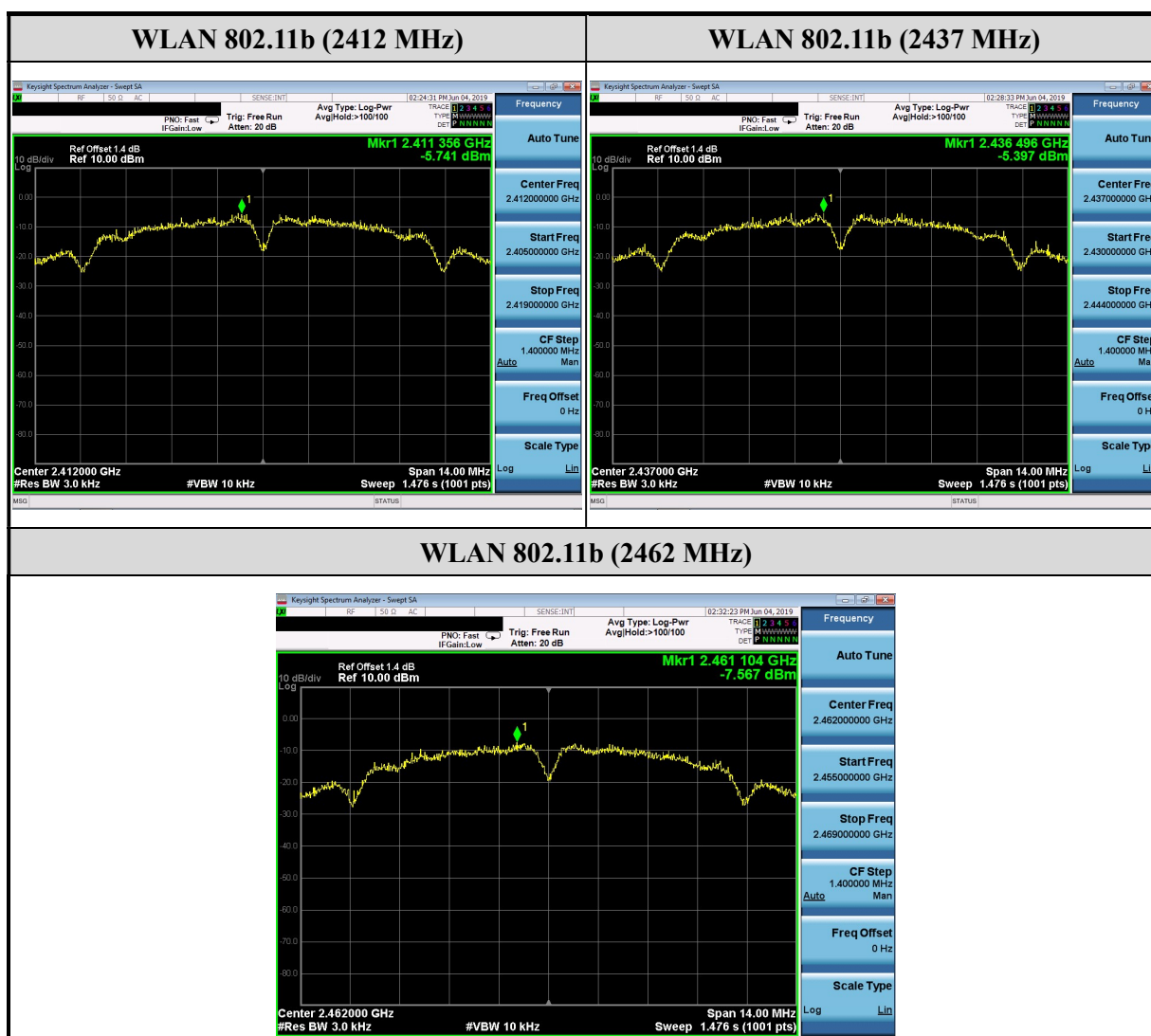
1. Enable the EUT transmit continuously.
2. Spectrum analyzer set:
 - a) RBW = 3 kHz ~ 100 kHz
 - b) VBW $\geq$ 3 RBW
 - c) Span = 1.5 times DTS Channel 6dB Bandwidth
 - d) Detector = peak
 - e) Sweep time = auto couple
 - f) Trace mode = max hold.

2.4.4 Test Result

802.11b

Frequency (MHz)	Power Spectral Density (dBm)			Limit (dBm)	Result
	Chain A	Chain B	Total		
2412	-5.741	--	--	≤ 8	Pass
2437	-5.397	--	--	≤ 8	Pass
2462	-7.567	--	--	≤ 8	Pass

Remark: PSD = Reading value on spectrum analyzer + cable loss



802.11g

Frequency (MHz)	Power Spectral Density (dBm)			Limit (dBm)	Result
	Chain A	Chain B	Total		
2412	-13.675	--	--	≤ 8	Pass
2437	-16.956	--	--	≤ 8	Pass
2462	-14.825	--	--	≤ 8	Pass

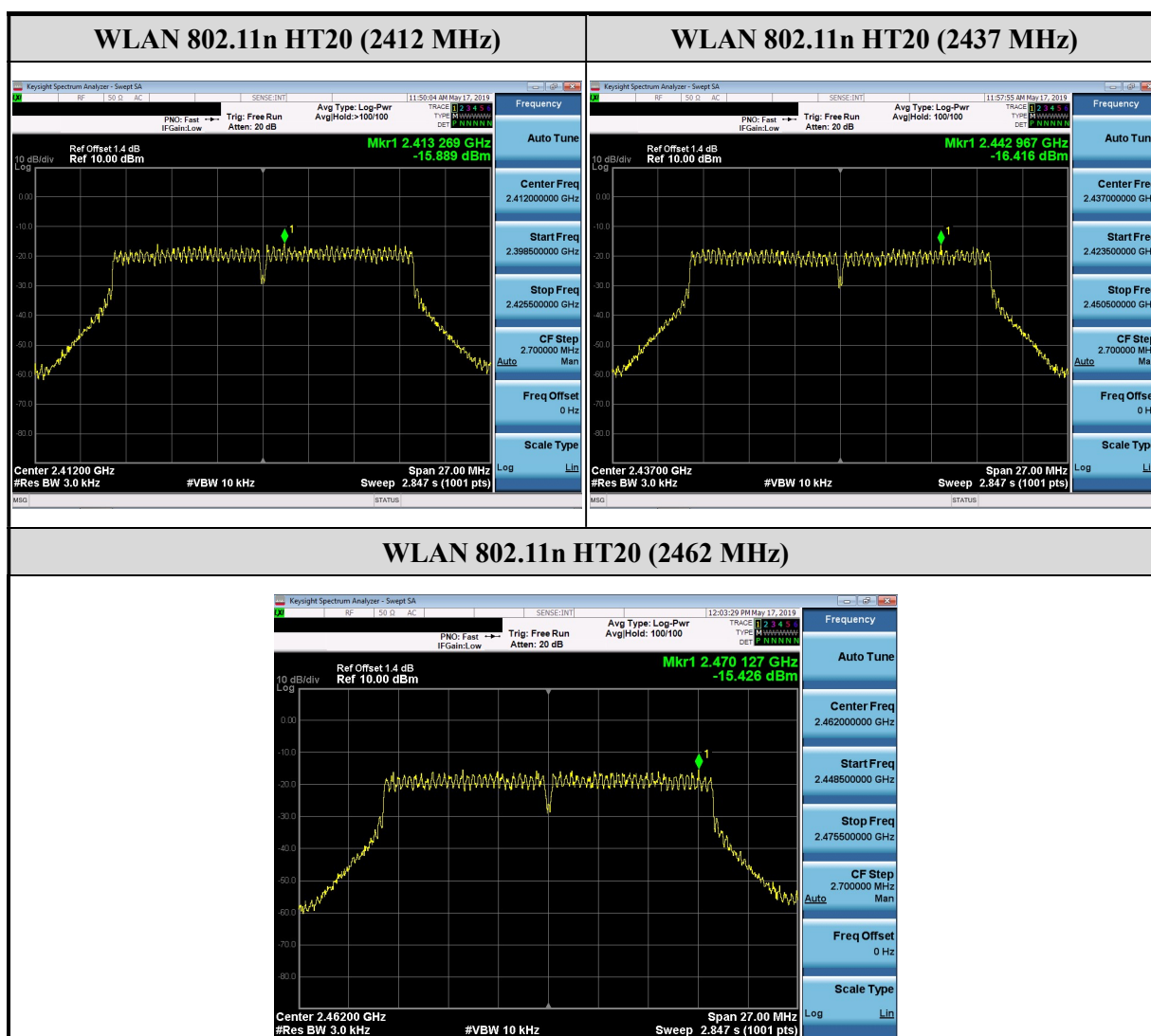
Remark: PSD = Reading value on spectrum analyzer + cable loss



802.11n HT20

Frequency (MHz)	Power Spectral Density (dBm)			Limit (dBm)	Result
	Chain A	Chain B	Total		
2412	-15.889	--	--	≤ 8	Pass
2437	-16.416	--	--	≤ 8	Pass
2462	-15.426	--	--	≤ 8	Pass

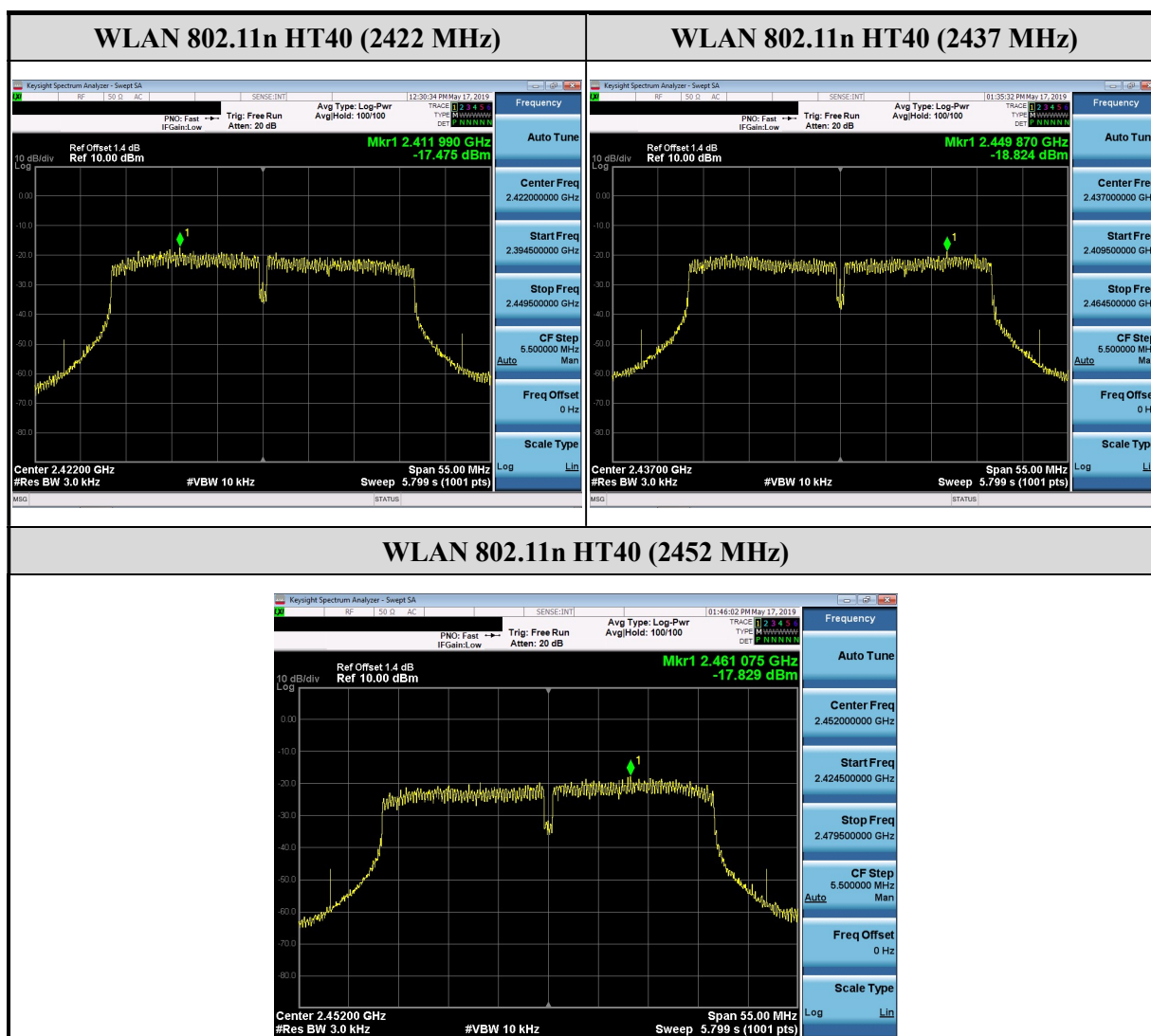
Remark: PSD = Reading value on spectrum analyzer + cable loss



802.11n HT40

Frequency (MHz)	Power Spectral Density (dBm)			Limit (dBm)	Result
	Chain A	Chain B	Total		
2422	-17.475	--	--	≤ 8	Pass
2437	-18.824	--	--	≤ 8	Pass
2452	-17.829	--	--	≤ 8	Pass

Remark: PSD = Reading value on spectrum analyzer + cable loss



2.5 Conducted Band Edges and Spurious Emission Measurement

2.5.1 Limit

In any 100 KHz 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 20dB below that in the 100KHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in must also comply with the radiated emission limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB

2.5.2 Test Setup



2.5.3 Test Procedure

1. Enable the EUT transmit continuously.
2. Spectrum analyzer set :
 - a) RBW = 100 kHz
 - b) VBW $\geq$ 3 RBW
 - c) Detector = peak
 - d) Sweep time = auto couple
 - e) Trace mode = max hold.