

Page : 1 of 61

Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

RADIO TEST REPORT

Product: SYNCUP PETS

Model Name : TMUS-SUP-1

FCC ID : 2ASXC-TMO-NBT-01

Test Regulation: FCC 47 CFR Part 15 Subpart C (Section 15.247)

Received Date : May 3, 2019

Test Date : May 3, 2019 ~ May 24, 2019

Issued Date : Aug. 26, 2019

Applicant: T-mobile Usa, Inc.

12920 Se 38th Street, Bellevue, Washington, United States,

98006

Issued By : Underwriters Laboratories Taiwan Co., Ltd.

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd.,

Zhudong Township, Hsinchu County, Taiwan





lesting Laborato 3398

The results reported herein have been performed in accordance with the laboratory's terms of accreditation. This report shall not be reproduced except in full without the written approval of the Laboratory. The results in this report are responsible of the test sample(s) provided by the client only and are not to be used to indicate applicability to other similar products.

Underwriters Laboratories Taiwan Co., Ltd.

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone :+886-2-7737-3000 Facsimile (FAX) :+886-3-583-7948



Page : 2 of 61

Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

REVISION HISTORY

Original Test Report No.: 4789004574-US-R0-V0

Rev. Original	Test report No. 4789004574-US-R0-V0	Date	Page revised	Contents
Original	4789004574-US-R0-V0	Aug. 26, 2019	-	Initial issue

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone :+886-2-7737-3000 Facsimile (FAX) :+886-3-583-7948



Page : 3 of 61

Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

Table Of Contents

1.	Att	estation of Test Results	4
2.	Sui	mmary of Test Results	5
3.	Tes	st Methodology and Procedures	6
4.	Fac	cilities and Accreditation	6
5.	Me	easurement Uncertainty	7
6.	Eq	uipment under Test	8
	6.1.	Description of EUT	8
	6.2.	Channel List	
	6.3.	Test Condition	
	6.4.	Description Of Available Antennas	
	6.5.	Test Mode Applicability and Tested Channel Detail	
	6.6.	Duty cycle	12
7.	Tes	st Equipment	13
8.	Des	scription of Test Setup	15
9.	Tes	st Results	16
	9.1.	6dB Bandwidth	16
	9.2.	Conducted output power	19
	9.3.	Power Spectral Density	
	9.4.	Conducted Out of Band Emission	
	9.5.	Radiated Spurious Emission	
	9.6.	AC Power Line Conducted Emission	47
A	ppend	ix I Radiated Band Edge Measurement	53
A	nnend	ix II Radiated Spurious Emission Measurement	59

Facsimile (FAX) :+886-3-583-7948



Page : 4 of 61

Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

1. Attestation of Test Results

APPLICANT: T-mobile Usa, Inc.

12920 Se 38th Street, Bellevue, Washington, United States, 98006

MANUFACTURER CyberTAN Technology Inc.

No. 99, Park Avenue III Science-based Industrial Park Hsinchu

Taiwan 308

EUT DESCRIPTION: SYNCUP PETS

BRAND: T-Mobile

MODEL: TMUS-SUP-1

SAMPLE STAGE: Engineering sample

DATE of TESTED: May 3, 2019 ~ May 24, 2019

APPLICABLE STANDARDS

STANDARD

Test Results

FCC 47 CFR PART 15 Subpart C (Section 15.247)

PASS

Underwriters Laboratories Taiwan Co., Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by Underwriters Laboratories Taiwan Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Underwriters Laboratories Taiwan Co., Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Underwriters Laboratories Taiwan Co., Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Prepared By:

Approved and Authorized By:

Evelyn Lee Project Handler Date: Aug. 26, 2019

Stanley Wu Date: Aug. 26, 2019

Senior Project Engineer

Underwriters Laboratories Taiwan Co., Ltd.

n lee

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone :+886-2-7737-3000 Facsimile (FAX) :+886-3-583-7948



Page : 5 of 61

Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

2. Summary of Test Results

Summary of Test Results						
FCC Clause	FCC Clause Test Items					
15.247(a)(2)	6dB Bandwidth	PASS				
15.247(b)	Conducted Output Power	PASS				
15.247(e)	Power Spectral Density	PASS				
15.247(d)	Antenna Port Emission	PASS				
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS				
15.207	15.207 AC Power Conducted Emission 15.203 Antenna Requirement					
15.203						

Note:

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone :+886-2-7737-3000 Facsimile (FAX) :+886-3-583-7948

^{1.} For the Radiated Band Edge test plots were recorded in Appendix I, the Radiated Emissions test plots were recorded in Appendix II.



Page : 6 of 61

Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

Doc No: 17-EM-F0876 / 2.0

3. Test Methodology and Procedures

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, KDB558074 D01 DTS Meas Guidance v05r02, KDB414788 D01 Radiated Test Site v01r01, ANSI C63.10-2013.

4. Facilities and Accreditation

Test Location	Underwriters Laboratories Taiwan Co., Ltd.	
Address	Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan	
Accreditation Certificate	Underwriters Laboratories Taiwan Co., Ltd. is accredited by TAF, Laboratory Code 3398. The full scope of accreditation can be viewed at http://accreditation.taftw.org.tw/taf/public/basic/viewApplyItems.action?unitNo=3398	

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan



Page : 7 of 61

Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

Doc No: 17-EM-F0876 / 2.0

5. Measurement Uncertainty

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor k=2.

Test Item	Measurement Frequency Range	K	U(dB)
Conducted disturbance at mains terminals ports	0.15MHz ~ 30MHz	2	1.7
RF Conducted	9 kHz - 40GHz	2	1.0
Radiated disturbance below 30MHz	9 kHz - 30 MHz	2	2.2
Radiated disturbance below 1 GHz	30MHz ~ 1GHz	2	5.3
Radiated disturbance above 1GHz	1GHz ~ 40GHz	2	4.8

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan



Page : 8 of 61

Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

6. Equipment under Test

6.1. Description of EUT

Product	SYNCUP PETS
Brand Name	T-Mobile
Model Name	TMUS-SUP-1
Operating Frequency	2412MHz ~ 2462MHz
Modulation	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Transfer Rate	802.11b: up to 11 Mbps 802.11g: up to 54 Mbps 802.11n: up to MCS7
Number of Channel	11 for 802.11b, 802.11g, 802.11n (HT20)
Maximum Output Power	802.11b: 15.36 dBm 802.11g: 16.93 dBm 802.11n (HT20): 16.63 dBm
Normal Voltage	5Vdc (adapter or host equipment) 3.7Vdc for battery
Hardware Version	V01
Software Version 0.31.10.14	

Note:

1. The EUT incorporates a SISO function. Physically, the EUT provides one completed transmitter and one receiver.

Modulation Mode	Tx,Rx Function
802.11b	1TX,1RX
802.11g	1TX,1RX
802.11n (HT20)	1TX,1RX

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone :+886-2-7737-3000 Facsimile (FAX) :+886-3-583-7948



Page : 9 of 61

Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

2. The EUT contains following accessory devices

Product Brand		Model	Description
PSU Adapter	PHIHONG	AN05A-050E	I/P: 100-240Vac, 50-60Hz, 0.2A O/P: 5.0 Vdc, 1.0A
Battery	Joules Miles	GWB001-A1	3.7 Vdc, 430 mAh
Charging Dock	CyberTAN	N/A	N/A
Collar mount	CyberTAN	N/A	N/A
USB Cable	N/A	N/A	1 meter shielded cable without core
Bands	CyberTAN	N/A	N/A

The above EUT information is declared by manufacturer and for more detailed features description, please refer the manufacturer's or user's manual.

6.2. Channel List

11 channels are provided for 802.11b, 802.11g and 802.11n (HT20):

Channel	Frequency	Channel	Frequency
1	2412MHz	7	2442MHz
2	2417MHz	8	2447MHz
3	2422MHz	9	2452MHz
4	2427MHz	10	2457MHz
5	2432MHz	11	2462MHz
6	2437MHz	-	-

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan



Page : 10 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

Doc No: 17-EM-F0876 / 2.0

6.3. Test Condition

Test Item	Test Site No.	Environmental Condition	Input Power	Test Date	Tested by
Antenna Port Conducted Measurement	SR4	23~25°C / 66~68%RH	3.7Vdc	May 3, 2019 ~ May 6, 2019	Wayne Chen
Radiated Spurious Emission	966-2	24~26°C / 64~68%RH	120Vac / 60 Hz	May 3, 2019 ~ May 24, 2019	Will Chen
AC power Line Conducted Emission	SR1	22~24°C / 58~62%RH	120Vac / 60 Hz	May 23, 2019	Will Chen

FCC Test Firm Registration Number: 498077

6.4. Description Of Available Antennas

Antenna	Brand Name	Model Name	Antenna Type	Antenna Gain(dBi)
Chain (0)	N/A	NB-IOT tracker	Internal	-2.3

Note: The above antenna information was provided from customer and for more detailed features description, please refer the manufacturer's specification or user's manual.

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan



Page : 11 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

6.5. Test Mode Applicability and Tested Channel Detail

Test item	Mode	Modulation Technology	Modulation Type	Available Channel	Test Channel	Data Rate
Radiated	802.11b	DSSS	DBPSK	1 to 11	1,6,11	1.0
Emissions	802.11g	OFDM	BPSK	1 to 11	1,6,11	6.0
(Above 1GHz)	802.11n(HT20)	OFDM	BPSK	1 to 11	1,6,11	MCS0
Radiated Emissions (Below 1GHz)	802.11g	OFDM	BPSK	1 to 11	11	6.0
AC Power Line Conducted Emission	802.11g	OFDM	BPSK	1 to 11	11	6.0
Antenna Port	802.11b	DSSS	DBPSK	1 to 11	1,6,11	1.0
Conducted	802.11g	OFDM	BPSK	1 to 11	1,6,11	6.0
Measurement	802.11n(HT20)	OFDM	BPSK	1 to 11	1,6,11	MCS0

Note:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- 2. For below 1 GHz radiated emission and AC power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case.
- 3. For Antenna Port Conducted Measurement, this item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- 4. The fundamental of the EUT was investigated in two orthogonal axes X/Z, it was determined that X axis was worst-case . Therefore, all final radiated testing was performed with the EUT in X axis.
- 5. For 9 kHz to 30 MHz, the loop antenna is studied in three polarization parallel/vertical/ground parallel directions, and parallel polarization has been determined to be the worst case of pre-scan radiation.

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone :+886-2-7737-3000 Facsimile (FAX) :+886-3-583-7948



Page : 12 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

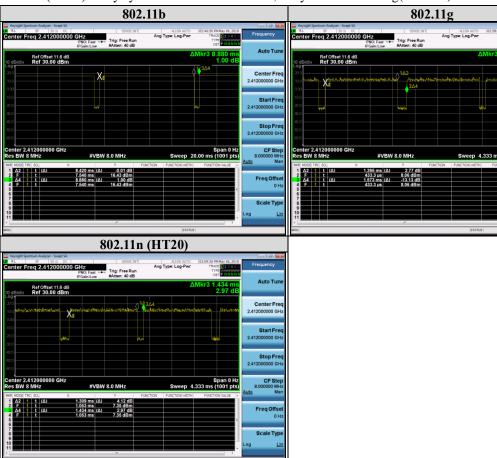
Doc No: 17-EM-F0876 / 2.0

6.6. Duty cycle

802.11b: Duty cycle = 8.42/8.88 = 0.948, Duty factor = 10 * log(1/0.948) = 0.23

802.11g: Duty cycle = 1.395/1.573 = 0.887, Duty factor = $10 * \log(1/0.887) = 0.52$

802.11n (HT20): Duty cycle = 1.309/1.434 = 0.913, Duty factor = 10 * log(1/0.913) = 0.40



Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan



Page : 13 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

7. Test Equipment

		Test Equipme	nt List		
Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
	R	adiated Spuriou	s Emission		_
Spectrum Analyzer	Keysight	N9010A	MY56070827	Nov. 8, 2018	1 year
EMI Test Receiver	Rohde & Schwarz	ESR7	101754	Nov. 8, 2018	1 year
Loop Antenna	ETS lindgren	6502	00213440	Dec. 11, 2018	1 year
Trilog- Broadband Antenna with 5dB Attenuator	Schwarzbeck & EMCI	VULB 9168 & N-6-05	774 & AT- N0538	Jan. 14, 2019	1 year
Horn Antenna (1-18 GHz)	Schwarzbeck	BBHA 9120 D	01690	Jan. 25, 2019	1 year
Horn Antenna(18-40 GHz)	Schwarzbeck	BBHA 9170	781	Jan.16, 2019	1 year
Preamplifier (30- 1000 MHz)	EMCI	EMC330E	980405	Jan. 30, 2019	1 year
Preamplifier (1- 18 GHz)	EMCI	EMC051835BE	980406	Jan. 29, 2019	1 year
Preamplifier (18-40GHz)	EMCI	EMC184040SE E	980426	May 8, 2019	1 year
RF Cable (9 KHz~18 GHz)	UltraPhase & EMC Instrument	A1K50- UP0358- A1K50- 1500&EMC106 -NM-SM- 2500/7000	170111- 4&170219/170 102	Jan. 29, 2019	1 year
RF Cable (18 GHz~40 GHz)	UltraPhase	K1K50- UP0264- K1K50- 2500/2500/600	170214- 2/170214- 6/170111-1	Jan. 29, 2019	1 year

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan



Page : 14 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

		Test Equipm	ent List		
Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
	Antenna	a Port Conduc	ted Measuremen	t	
Spectrum Analyzer	Keysight	N9010A	MY56070834	Nov. 8, 2018	1 year
Pulse Power Sensor	Anrisu	MA2411B	1531202	Dec. 17, 2018	1 year
Power Meter	Anrisu	ML2495A	1645002	Dec. 17, 2018	1 year
	AC po	wer Line Cond	ducted Emission		
EMI Test Receiver	Rohde & Schwarz	ESR7	101753	Nov. 14, 2018	1 year
Two-Line V- Network	Rohde & Schwarz	ENV216	102136	Aug. 5, 2018	1 year
Impuls-Begrenzer Pulse Limiter	Rohde & Schwarz	ESH3-Z2	102219-Qt	Aug. 2, 2018	1 year
Cables	Huber+Suhner	RG 214/U	FCC-BCICF- 4_RF	Jan. 29, 2019	1 year

UL Software					
Description	Name	Version			
Radiated measurement	EZ_EMC	1.1.4.2			
Conducted measurement	Keysight.TestSystem	1.0.0.0			
AC power Line Conducted Emission	EZ_EMC	1.1.4.2			

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone :+886-2-7737-3000 Facsimile (FAX) :+886-3-583-7948 Doc No: 17-EM-F0876 / 2.0



Page : 15 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

8. Description of Test Setup

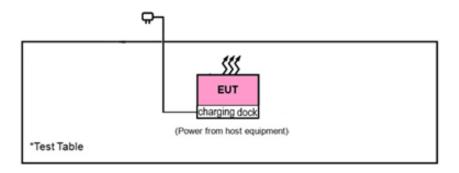
Support Equipment

Item	Equipment	Brand Name	Model Name	P/N
1	Notebook	DELL	Latitude E5470	3JFKWF2

Test Setup

Controlled using a bespoke application (CC3120CC3220RadioTool-1.0.2) on a test Notebook. The application was used to enable a continuous transmission mode and to select the test channels, data rates, modulation schemes and power setting as required.

Setup Diagram for Test



Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone :+886-2-7737-3000 Facsimile (FAX) :+886-3-583-7948



Page : 16 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

9. Test Results

9.1. 6dB Bandwidth

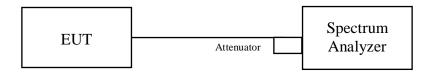
Requirements

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

Test procedure

- a. Set resolution bandwidth (RBW) = 100kHz
- b. Set the video bandwidth (VBW) $\geq 3 \times RBW$, Detector = Peak.
- c. Trace mode = max hold.
- d. Sweep = auto couple.
- e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

Test Setup



Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan



Page : 17 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

Test Data

802.11b

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	9.0788	0.5	Pass
6	2437	9.5475	0.5	Pass
11	2462	9.0825	0.5	Pass

802.11g

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	15.0488	0.5	Pass
6	2437	15.0525	0.5	Pass
11	2462	15.3075	0.5	Pass

802.11n (HT20)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	15.0413	0.5	Pass
6	2437	15.1200	0.5	Pass
11	2462	15.3938	0.5	Pass

Telephone :+886-2-7737-3000 Facsimile (FAX) :+886-3-583-7948 Doc No: 17-EM-F0876 / 2.0



Page : 18 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

Scale Typ

Doc No: 17-EM-F0876 / 2.0



Underwriters Laboratories Taiwan Co., Ltd.

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan



Page : 19 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

9.2. Conducted output power

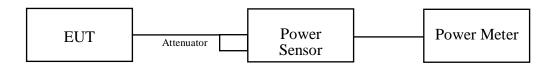
Requirements

For systems using digital modulation in the 2400-2483.5 MHz bands: 1 Watt.

Test Procedure

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

Test Setup



Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan



Page : 20 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

Test Data

802.11b

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	33.04	15.19	30	Pass
6	2437	25.18	14.01	30	Pass
11	2462	34.36	15.36	30	Pass

802.11g

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	49.32	16.93	30	Pass
6	2437	40.36	16.06	30	Pass
11	2462	46.34	16.66	30	Pass

802.11n (HT20)

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	46.03	16.63	30	Pass
6	2437	40.18	16.04	30	Pass
11	2462	44.36	16.47	30	Pass

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone :+886-2-7737-3000 Facsimile (FAX) :+886-3-583-7948



Page : 21 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

9.3. Power Spectral Density

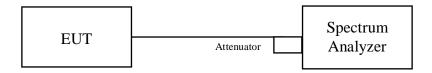
Requirements

The Maximum of Power Spectral Density Measurement is 8dBm in any 3 kHz.

Test procedure

- a. Set analyzer center frequency to DTS channel center frequency.
- b. Set the span to 1.5 times the DTS bandwidth.
- c. Set the RBW to: $3 \text{ kHz} \le \text{RBW} \le 100 \text{ kHz}$.
- d. Set the VBW \geq 3 × RBW.
- e. Detector = peak.
- f. Sweep time = auto couple.
- g. Trace mode = max hold.
- h. Allow trace to fully stabilize.
- i. Use the peak marker function to determine the maximum amplitude level within the RBW.

Test Setup



Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan



Page : 22 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

Test Data

802.11b

Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
1	2412	-11.981	8	Pass
6	2437	-12.481	8	Pass
11	2462	-12.072	8	Pass

802.11g

Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
1	2412	-18.711	8	Pass
6	2437	-14.768	8	Pass
11	2462	-18.121	8	Pass

802.11n (HT20)

Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail	
1	2412	-16.471	8	Pass	
6	2437	-14.968	8	Pass	
11	2462	-17.699	8	Pass	

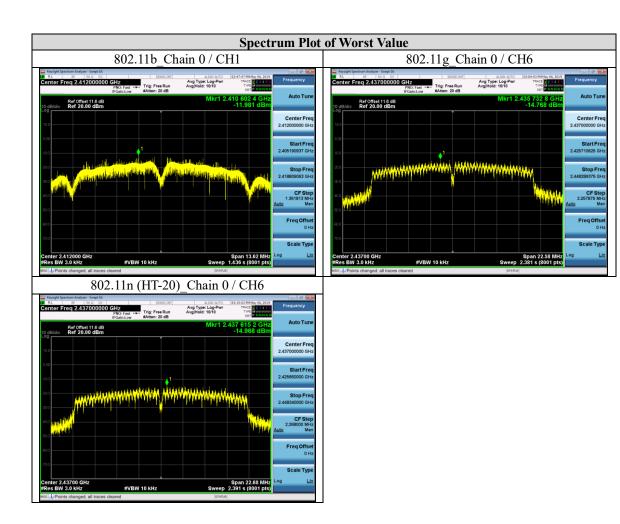
Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone :+886-2-7737-3000 Facsimile (FAX) :+886-3-583-7948



Page : 23 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01



Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone :+886-2-7737-3000 Facsimile (FAX) :+886-3-583-7948



Page : 24 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

9.4. Conducted Out of Band Emission

Requirements

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b) (3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209 (a) is not required.

Test procedure

Measurement Procedure REF

- 1. Set the RBW = 100 kHz.
- 2. Set the VBW \geq 300 kHz.
- 3. Set the span to 1.5 times the DTS bandwidth.
- 4. Detector = peak.
- 5. Sweep time = auto couple.
- 6. Trace mode = max hold.
- 7. Allow trace to fully stabilize.
- 8. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

Measurement Procedure OOBE

- 1. Set RBW = 100 kHz.
- 2. Set VBW \geq 300 kHz.
- 3. Detector = peak.
- 4. Sweep = auto couple.
- 5. Trace Mode = max hold.
- 6. Allow trace to fully stabilize.
- 7. Use the peak marker function to determine the maximum amplitude level.

Test Setup



Underwriters Laboratories Taiwan Co., Ltd.

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone :+886-2-7737-3000

Facsimile (FAX) :+886-3-583-7948 Doc No: 17-EM-F0876 / 2.0

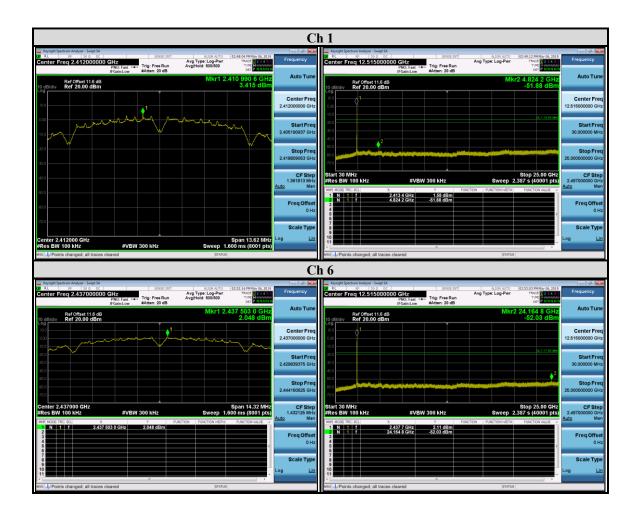


Page : 25 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

Doc No: 17-EM-F0876 / 2.0

Test Data

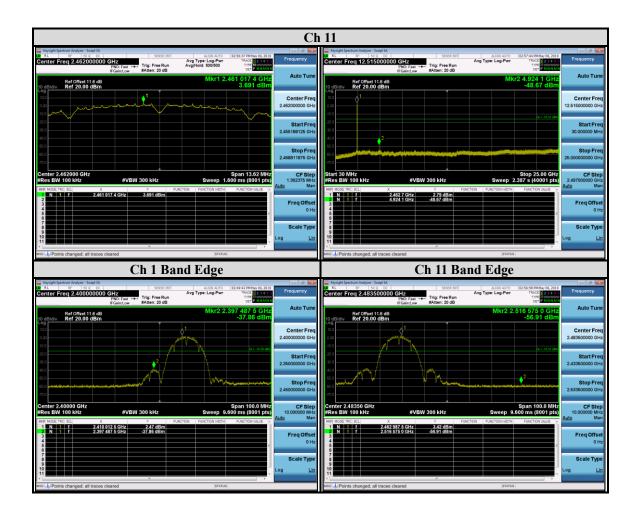


Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan



Page : 26 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01



Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

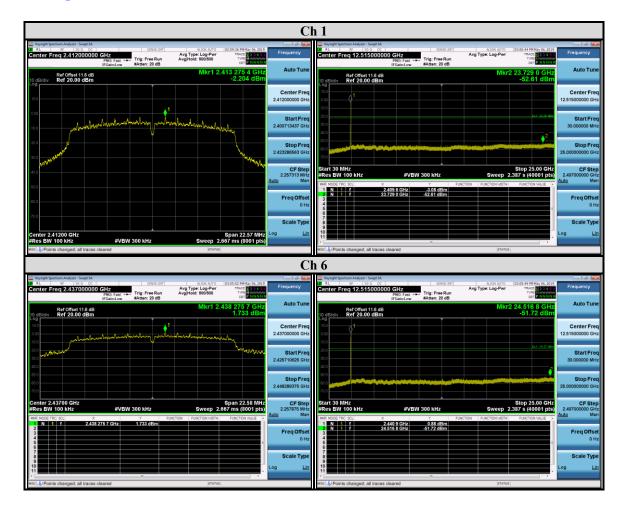
Telephone :+886-2-7737-3000 Facsimile (FAX) :+886-3-583-7948



Page : 27 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

802.11g



Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

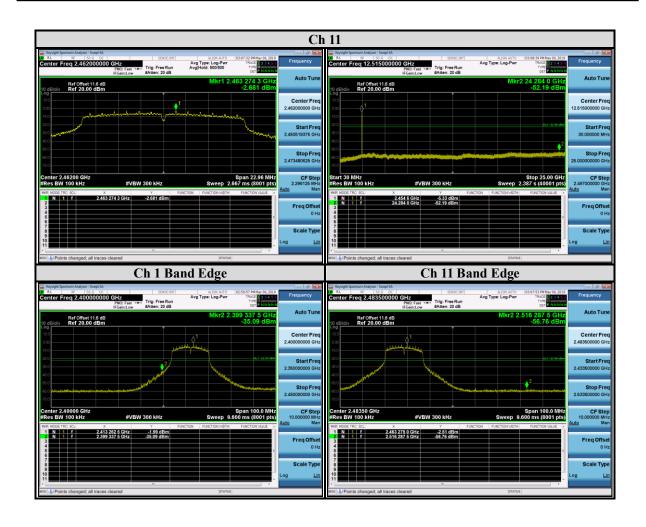
Telephone :+886-2-7737-3000 Facsimile (FAX) :+886-3-583-7948



Page : 28 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

Doc No: 17-EM-F0876 / 2.0



Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan



Page : 29 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

802.11n (HT20)



Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

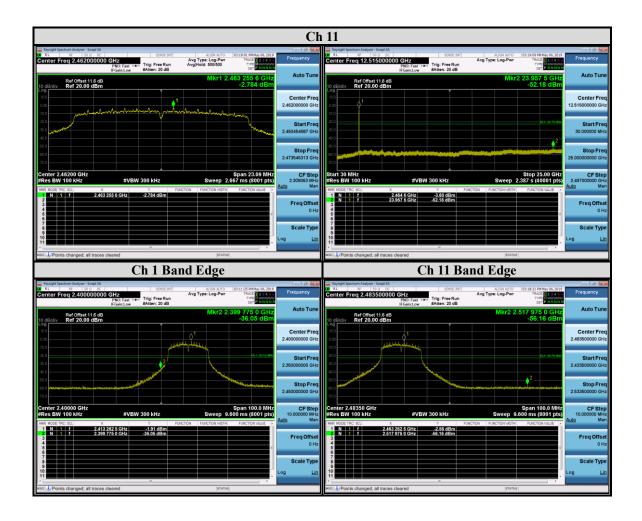
Telephone :+886-2-7737-3000 Facsimile (FAX) :+886-3-583-7948



Page : 30 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

Doc No: 17-EM-F0876 / 2.0



Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan



Page : 31 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

9.5. Radiated Spurious Emission

Requirements

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

Frequency(MHz)	Field strength (microvolts/meter)	Measurement distance (meters)	
0.009-0.490	2400/F(kHz)	300	
0.490-1.705	24000/F(kHz)	30	
1.705-30.0	30	30	
30-88	100	3	
88-216	150	3	
216-960	200	3	
Above 960	500	3	

NOTE:

- 1. The lower limit shall apply at the transition frequencies.
- 2. Emission level $(dBuV/m) = 20 \log Emission level (uV/m)$.
- 3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan



Page : 32 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

Test Procedures

[For $9 \text{ kHz} \sim 30 \text{ MHz}$]

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.

- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. For measurement below 30MHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

[For above 30 MHz]

- a. The EUT was placed on the top of a rotating table 0.8 meters (for $30 \text{MHz} \sim 1 \text{GHz}$) / 1.5 meters (for above 1 GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations 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 rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
- f. The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Underwriters Laboratories Taiwan Co., Ltd.

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone :+886-2-7737-3000 Facsimile (FAX) :+886-3-583-7948



Page : 33 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

Note:

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

- b. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
- c. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is \geq 1/T (Duty cycle < 98%) or 10Hz (Duty cycle \geq 98%) for Average detection (AV) at frequency above 1GHz.

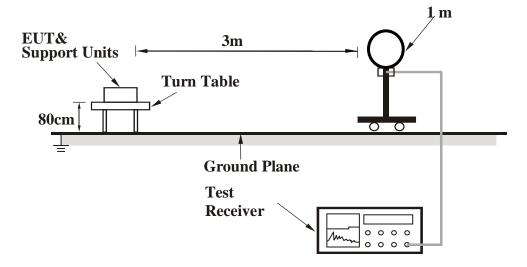
C6'4'	Average			
Configuration	RBW	VBW		
802.11b		1 kHz		
802.11g	1MHz	1 kHz		
802.11n (HT20)		1 kHz		

Note: Refer to section 6.6 for duty cycle.

d. All modes of operation were investigated and the worst-case emissions are reported.

Test Setup

<Frequency Range 9 kHz ~ 30 MHz>



Underwriters Laboratories Taiwan Co., Ltd.

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

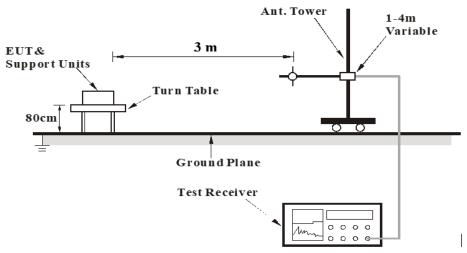
Telephone :+886-2-7737-3000 Facsimile (FAX) :+886-3-583-7948



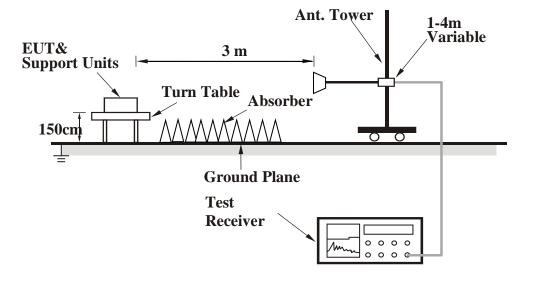
Page : 34 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

<Frequency Range 30 MHz ~ 1 GHz >



< Frequency Range above 1 GHz>



For the actual test configuration, please refer to the Setup Configurations.

Underwriters Laboratories Taiwan Co., Ltd.

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone :+886-2-7737-3000 Facsimile (FAX) :+886-3-583-7948



Page : 35 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

Doc No: 17-EM-F0876 / 2.0

Test Data

Above 1GHz Data

802.11b

EUT Test Condition		Measurement Detail		
Channel	Channel 1	Frequency Range	1 GHz ~ 26.5 GHz	

	Antenna Polarity & Test Distance: Horizontal at 3 m						
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2389.000	53.90	-7.60	46.30	74.00	-27.70	peak
@	2412.000	101.67	-7.61	94.06	-	-	peak
-	2386.200	41.23	-7.62	33.61	54.00	-20.39	AVG
@	2412.000	98.49	-7.61	90.88	-	-	AVG
*	4019.200	51.64	-4.85	46.79	74.00	-27.21	peak
*	4824.000	48.79	-3.04	45.75	74.00	-28.25	peak
		Antenna Po	larity & Test	Distance: Ver	rtical at 3 m		
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2388.600	54.18	-7.60	46.58	74.00	-27.42	peak
@	2412.000	98.02	-7.61	90.41	-	-	peak
-	2388.600	41.18	-7.60	33.58	54.00	-20.42	AVG
@	2412.000	94.91	-7.61	87.30	-	-	AVG
*	4021.750	51.62	-4.86	46.76	74.00	-27.24	peak
*	4824.000	43.56	-3.04	40.52	74.00	-33.48	peak

Remarks:

- 1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
- 2. Margin(dB) = Result value (dBuV/m) Limit value (dBuV/m).
- 3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) Preamp Factor (dB).
- 4. "@": Fundamental Frequency.
- 5. " * ": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
- 6. The other emission levels were very low against the limit.

Underwriters Laboratories Taiwan Co., Ltd.

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan



Page : 36 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

Doc No: 17-EM-F0876 / 2.0

EUT Test Condition		Measurement Detail		
Channel	Channel 6	Frequency Range	1 GHz ~ 26.5 GHz	

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2374.000	53.83	-7.65	46.18	74.00	-27.82	peak
@	2437.000	100.88	-7.69	93.19	-	-	peak
-	2496.200	53.71	-7.59	46.12	74.00	-27.88	peak
-	2389.227	41.21	-7.60	33.61	54.00	-20.39	AVG
<u>@</u>	2437.000	97.85	-7.69	90.16	-	-	AVG
-	2483.500	41.65	-7.63	34.02	54.00	-19.98	AVG
*	4060.000	55.45	-4.89	50.56	74.00	-23.44	peak
*	4874.000	42.45	-3.02	39.43	74.00	-34.57	peak
		Antenna Po	larity & Test	Distance: Vei	rtical at 3 m		
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2313.800	53.73	-7.47	46.26	74.00	-27.74	peak
<u>@</u>	2437.000	97.19	-7.69	89.50	-	-	peak
-	2486.800	53.45	-7.62	45.83	74.00	-28.17	peak
-	2313.400	41.04	-7.47	33.57	54.00	-20.43	AVG
@	2437.000	94.01	-7.69	86.32	-	-	AVG
-	2483.500	41.26	-7.63	33.63	54.00	-20.37	AVG
*	4060.850	56.65	-4.90	51.75	74.00	-22.25	peak
*	4874.000	41.02	-3.02	38.00	74.00	-36.00	peak

Remarks:

- 1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
- 2. Margin(dB) = Result value (dBuV/m) Limit value (dBuV/m).
- 3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) Preamp Factor (dB).
- 4. "@": Fundamental Frequency.
- 5. " * ": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
- 6. The other emission levels were very low against the limit.

Underwriters Laboratories Taiwan Co., Ltd.

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan



Page : 37 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

EUT Test Condition		Measurement Detail			
Channel	Channel 11	Frequency Range	1 GHz ~ 26.5 GHz		

	Antenna Polarity & Test Distance: Horizontal at 3 m									
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark			
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)				
<u>@</u>	2462.000	103.30	-7.69	95.61	-	-	peak			
-	2487.400	54.47	-7.62	46.85	74.00	-27.15	peak			
@	2462.000	100.14	-7.69	92.45	-	-	AVG			
-	2483.500	42.09	-7.63	34.46	54.00	-19.54	AVG			
*	4102.500	51.87	-4.65	47.22	74.00	-26.78	peak			
*	4924.000	44.50	-3.00	41.50	74.00	-32.50	peak			
		Antenna Po	larity & Test	Distance: Vei	rtical at 3 m					
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark			
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)				
<u>@</u>	2462.000	100.39	-7.69	92.70	-	-	peak			
-	2484.000	53.99	-7.63	46.36	74.00	-27.64	peak			
@	2462.000	97.31	-7.69	89.62	-	-	AVG			
-	2483.500	41.85	-7.63	34.22	54.00	-19.78	AVG			
*	4102.500	52.93	-4.65	48.28	74.00	-25.72	peak			
	4924.000	41.69	-3.00	38.69	74.00	-35.31	peak			

Remarks:

- 1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
- 2. Margin(dB) = Result value (dBuV/m) Limit value (dBuV/m).
- 3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) Preamp Factor (dB).
- 4. "@": Fundamental Frequency.
- 5. " * ": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
- 6. The other emission levels were very low against the limit.

Underwriters Laboratories Taiwan Co., Ltd.

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone :+886-2-7737-3000 Facsimile (FAX) :+886-3-583-7948



Page : 38 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

Doc No: 17-EM-F0876 / 2.0

802.11g

EUT Test Condition		Measurement Detail			
Channel	Channel 1	Frequency Range	1 GHz ~ 26.5 GHz		

		Antenna Pola	arity & Test I	Distance: Hori	zontal at 3 m		
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2390.000	59.53	-7.60	51.93	74.00	-22.07	peak
@	2412.000	103.46	-7.61	95.85	-	-	peak
-	2390.000	43.06	-7.60	35.46	54.00	-18.54	AVG
@	2412.000	93.92	-7.61	86.31	-	-	AVG
*	4017.500	50.89	-4.84	46.05	74.00	-27.95	peak
*	4824.000	42.20	-3.04	39.16	74.00	-34.84	peak
		Antenna Po	larity & Test	Distance: Ver	rtical at 3 m		
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2390.000	53.94	-7.60	46.34	74.00	-27.66	peak
@	2412.000	97.84	-7.61	90.23	-	-	peak
-	2390.000	41.37	-7.60	33.77	54.00	-20.23	AVG
@	2412.000	88.30	-7.61	80.69	-	-	AVG
*	4018.350	58.20	-4.84	53.36	74.00	-20.64	peak
*	4824.000	41.52	-3.04	38.48	74.00	-35.52	peak

Remarks:

- 1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
- 2. Margin(dB) = Result value (dBuV/m) Limit value (dBuV/m).
- 3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) Preamp Factor (dB).
- 4. "@": Fundamental Frequency.
- 5. " * ": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
- 6. The other emission levels were very low against the limit.

Underwriters Laboratories Taiwan Co., Ltd.

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan



Page : 39 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

EUT Test Condition		Measurement Detail			
Channel	Channel 6	Frequency Range	1 GHz ~ 26.5 GHz		

	Antenna Polarity & Test Distance: Horizontal at 3 m									
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark			
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)				
-	2326.000	53.57	-7.55	46.02	74.00	-27.98	peak			
<u>@</u>	2437.000	103.15	-7.69	95.46	-	-	peak			
-	2483.500	53.89	-7.63	46.26	74.00	-27.74	peak			
-	2388.600	41.04	-7.60	33.44	54.00	-20.56	AVG			
@	2437.000	93.80	-7.69	86.11	-	-	AVG			
-	2483.500	41.60	-7.63	33.97	54.00	-20.03	AVG			
*	4058.300	52.82	-4.91	47.91	74.00	-26.09	peak			
*	4874.000	43.16	-3.02	40.14	74.00	-33.86	peak			
		Antenna Po	larity & Test	Distance: Vei	rtical at 3 m					
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark			
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)				
-	2347.000	54.25	-7.70	46.55	74.00	-27.45	peak			
<u>@</u>	2437.000	96.84	-7.69	89.15	-	-	peak			
-	2485.400	54.38	-7.63	46.75	74.00	-27.25	peak			
-	2326.800	41.00	-7.55	33.45	54.00	-20.55	AVG			
@	2437.000	87.56	-7.69	79.87	-	-	AVG			
-	2483.500	40.97	-7.63	33.34	54.00	-20.66	AVG			
*	4057.450	54.90	-4.92	49.98	74.00	-24.02	peak			
*	4874.000	40.64	-3.02	37.62	74.00	-36.38	peak			

Remarks:

- 1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
- 2. Margin(dB) = Result value (dBuV/m) Limit value (dBuV/m).
- 3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) Preamp Factor (dB).
- 4. "@": Fundamental Frequency.
- 5. " * ": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
- 6. The other emission levels were very low against the limit.

Underwriters Laboratories Taiwan Co., Ltd.

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone :+886-2-7737-3000 Facsimile (FAX) :+886-3-583-7948



Page : 40 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

EUT Test Condition		Measurement Detail			
Channel	Channel 11	Frequency Range	1 GHz ~ 26.5 GHz		

		Antenna Pola	rity & Test I	Distance: Hori	zontal at 3 m		
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
@	2462.000	102.04	-7.69	94.35	-	-	peak
-	2483.500	59.93	-7.63	52.30	74.00	-21.70	peak
@	2462.000	92.67	-7.69	84.98	-	-	AVG
-	2483.500	43.50	-7.63	35.87	54.00	-18.13	AVG
*	4105.050	50.01	-4.63	45.38	74.00	-28.62	peak
*	4924.000	40.90	-3.00	37.90	74.00	-36.10	peak
		Antenna Po	larity & Test	Distance: Ver	rtical at 3 m		
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
<u>@</u>	2462.000	95.57	-7.69	87.88	-	-	peak
-	2483.500	53.04	-7.63	45.41	74.00	-28.59	peak
<u>@</u>	2462.000	85.98	-7.69	78.29	-	-	AVG
-	2483.500	41.51	-7.63	33.88	54.00	-20.12	AVG
*	4099.950	49.88	-4.65	45.23	74.00	-28.77	peak
*	4924.000	40.55	-3.00	37.55	74.00	-36.45	peak

Remarks:

- 1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
- 2. Margin(dB) = Result value (dBuV/m) Limit value (dBuV/m).
- 3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) Preamp Factor (dB).
- 4. "@": Fundamental Frequency.
- 5. " * ": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
- 6. The other emission levels were very low against the limit.

Underwriters Laboratories Taiwan Co., Ltd.

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone :+886-2-7737-3000 Facsimile (FAX) :+886-3-583-7948



Page : 41 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

802.11n (HT-20)

EUT Test Condition		Measurement Detail				
Channel	Channel 1	Frequency Range	1 GHz ~ 26.5 GHz			

	Antenna Polarity & Test Distance: Horizontal at 3 m									
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark			
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)				
-	2390.000	55.94	-7.60	48.34	74.00	-25.66	peak			
<u>@</u>	2412.000	102.81	-7.61	95.20	-	-	peak			
-	2390.000	42.79	-7.60	35.19	54.00	-18.81	AVG			
<u>@</u>	2412.000	93.12	-7.61	85.51	-	-	AVG			
*	4016.650	49.90	-4.84	45.06	74.00	-28.94	peak			
*	4824.000	45.96	-3.04	42.92	74.00	-31.08	peak			
		Antenna Po	larity & Test	Distance: Ver	rtical at 3 m					
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark			
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)				
-	2390.000	54.65	-7.60	47.05	74.00	-26.95	peak			
<u>@</u>	2412.000	98.18	-7.61	90.57	-	-	peak			
-	2390.000	41.60	-7.60	34.00	54.00	-20.00	AVG			
<u>@</u>	2412.000	87.91	-7.61	80.30	-	-	AVG			
*	4021.750	54.93	-4.86	50.07	74.00	-23.93	peak			
*	4824.000	40.62	-3.04	37.58	74.00	-36.42	peak			

Remarks:

- 1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
- 2. Margin(dB) = Result value (dBuV/m) Limit value (dBuV/m).
- $\label{eq:correction} 3. \quad \text{Correction Factor } (dB/m) = \\ \text{Antenna Factor } (dBuV/m) + \\ \text{Cable Loss } (dB) \\ \text{Preamp Factor } (dB).$
- 4. "@": Fundamental Frequency.
- 5. " * ": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
- 6. The other emission levels were very low against the limit.

Underwriters Laboratories Taiwan Co., Ltd.

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone :+886-2-7737-3000 Facsimile (FAX) :+886-3-583-7948



Page : 42 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

EUT Test Condition		Measurement Detail			
Channel	Channel 6	Frequency Range	1 GHz ~ 26.5 GHz		

	Antenna Polarity & Test Distance: Horizontal at 3 m									
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark			
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)				
-	2385.000	54.80	-7.62	47.18	74.00	-26.82	peak			
<u>@</u>	2437.000	103.12	-7.69	95.43	-	-	peak			
-	2485.800	54.56	-7.63	46.93	74.00	-27.07	peak			
-	2388.540	41.08	-7.60	33.48	54.00	-20.52	AVG			
@	2437.000	93.53	-7.69	85.84	-	-	AVG			
-	2483.500	41.52	-7.63	33.89	54.00	-20.11	AVG			
*	4060.000	54.91	-4.89	50.02	74.00	-23.98	peak			
*	4874.000	42.33	-3.02	39.31	74.00	-34.69	peak			
		Antenna Po	larity & Test	Distance: Vei	rtical at 3 m					
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark			
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)				
-	2325.400	54.28	-7.55	46.73	74.00	-27.27	peak			
@	2437.000	100.41	-7.69	92.72	-	-	peak			
-	2491.400	53.66	-7.61	46.05	74.00	-27.95	peak			
-	2387.407	41.17	-7.62	33.55	54.00	-20.45	AVG			
<u>@</u>	2437.000	90.88	-7.69	83.19	-	-	AVG			
-	2483.500	41.38	-7.63	33.75	54.00	-20.25	AVG			
*	4060.000	57.08	-4.89	52.19	74.00	-21.81	peak			
*	4874.000	40.90	-3.02	37.88	74.00	-36.12	peak			

Remarks:

- 1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
- 2. Margin(dB) = Result value (dBuV/m) Limit value (dBuV/m).
- 3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) Preamp Factor (dB).
- 4. "@": Fundamental Frequency.
- 5. " * ": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
- 6. The other emission levels were very low against the limit.

Underwriters Laboratories Taiwan Co., Ltd.

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone :+886-2-7737-3000 Facsimile (FAX) :+886-3-583-7948



Page : 43 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

Doc No: 17-EM-F0876 / 2.0

EUT Test Condition		Measurement Detail		
Channel	Channel 11	Frequency Range	1 GHz ~ 26.5 GHz	

	Antenna Polarity & Test Distance: Horizontal at 3 m								
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark		
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)			
@	2462.000	102.39	-7.69	94.70	-	-	peak		
-	2483.500	58.28	-7.63	50.65	74.00	-23.35	peak		
@	2462.000	92.87	-7.69	85.18	-	-	AVG		
-	2483.500	43.44	-7.63	35.81	54.00	-18.19	AVG		
*	4102.500	48.98	-4.65	44.33	74.00	-29.67	peak		
*	4924.000	40.07	-3.00	37.07	74.00	-36.93	peak		
		Antenna Po	larity & Test	Distance: Vei	rtical at 3 m				
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark		
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)			
<u>@</u>	2462.000	96.87	-7.69	89.18	-	-	peak		
-	2483.500	54.21	-7.63	46.58	74.00	-27.42	peak		
@	2462.000	87.33	-7.69	79.64	-	-	AVG		
-	2483.500	41.80	-7.63	34.17	54.00	-19.83	AVG		
*	4102.500	47.96	-4.65	43.31	74.00	-30.69	peak		
*	4924.000	40.69	-3.00	37.69	74.00	-36.31	peak		

Remarks:

- 1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
- 2. Margin(dB) = Result value (dBuV/m) Limit value (dBuV/m).
- 3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) Preamp Factor (dB).
- 4. "@": Fundamental Frequency.
- 5. " * ": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
- 6. The other emission levels were very low against the limit.

Underwriters Laboratories Taiwan Co., Ltd.

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan



Page : 44 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

Below 1GHz Data

No non-compliance noted:

KDB 414788 D01 OATS and Chamber Correlation Justification

- Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.
- OATs and chamber correlation testing had been performed and chamber measured test results is the worst case test result.

Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30m open area test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

9 kHz ~ 30 MHz Data

The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan



Page : 45 of 61 Issued date : Aug. 26,

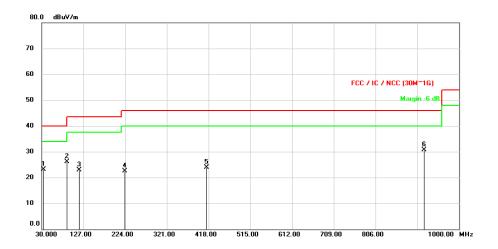
Issued date : Aug. 26, 2019 FCC ID : 2ASXC-TMO-NBT-01

30 MHz ~ 1 GHz Data

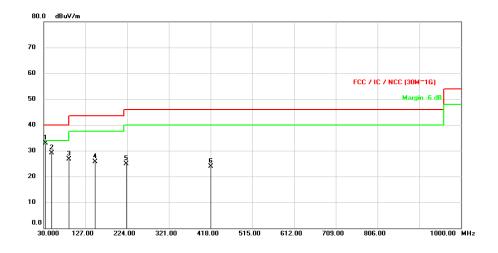
802.11g

EUT Test Condition		Measurement Detail		
Channel	Channel 11	Frequency Range	30 MHz ~ 1 GHz	

Horizontal



Vertical



Underwriters Laboratories Taiwan Co., Ltd.

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone :+886-2-7737-3000 Facsimile (FAX) :+886-3-583-7948



Page : 46 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

Doc No: 17-EM-F0876 / 2.0

Antenna Polarity & Test Distance: Horizontal at 3 m								
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark	
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)		
-	33.8800	39.44	-16.41	23.03	40.00	-16.97	peak	
-	88.5880	47.22	-21.15	26.07	43.50	-17.43	peak	
-	117.2353	40.87	-17.99	22.88	43.50	-20.62	peak	
-	222.7713	39.99	-17.45	22.54	46.00	-23.46	peak	
-	414.0230	35.01	-11.11	23.90	46.00	-22.10	peak	
-	917.7117	32.95	-2.17	30.78	46.00	-15.22	peak	
		Antenna Po	larity & Test	Distance: Ver	rtical at 3 m			
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark	
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)		
-	34.0417	49.30	-16.39	32.91	40.00	-7.09	peak	
-	47.6217	44.22	-15.02	29.20	40.00	-10.80	peak	
-	88.7497	47.91	-21.17	26.74	43.50	-16.76	peak	
-	148.5016	41.10	-15.33	25.77	43.50	-17.73	peak	
-	222.7390	42.39	-17.45	24.94	46.00	-21.06	peak	
_	417.0623	34.85	-11.03	23.82	46.00	-22.18	peak	

Remarks:

- 1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
- $2. \quad Margin(dB) = Result \ value \ (dBuV/m) \ \ Limit \ value \ (dBuV/m).$
- $\label{eq:correction} \textbf{3.} \quad \text{Correction Factor } (dB/m) = \text{Antenna Factor } (dBuV/m) + \text{Cable Loss } (dB) \text{ Preamp Factor } (dB).$
- 4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
- 5. The other emission levels were very low against the limit.

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan



Page : 47 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

9.6. AC Power Line Conducted Emission

Requirements

Frequency (MHz)	Conducted limit (dBμV)				
Frequency (MHZ)	Quasi-peak	Average			
0.15 - 0.5	66 - 56	56 - 46			
0.50 - 5.0	56	46			
5.0 - 30	60	50			

Note:

- 1. The lower limit shall apply at the transition frequencies.
- 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

Test Procedures

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit 20dB) was not recorded.

NOTE: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

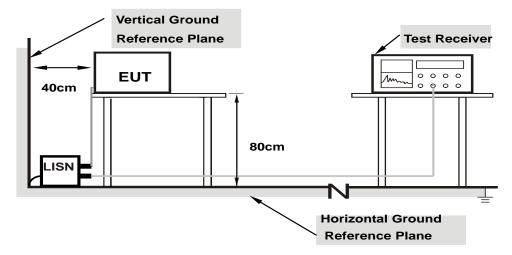
Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan



Page : 48 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

Test Setup



Note: 1.Support units were connected to second LISN.

For the actual test configuration, please refer to the Setup Configurations.

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone :+886-2-7737-3000 Facsimile (FAX) :+886-3-583-7948



Page : 49 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

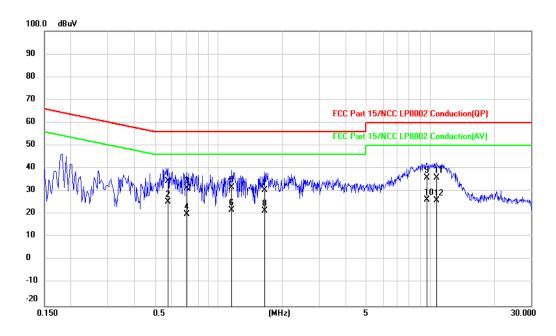
Doc No: 17-EM-F0876 / 2.0

Test Data

802.11g

EUT Test Condition		Measurement Detail		
Channel	Channel 11	Frequency Range	150 kHz ~ 30 MHz	

Phase of Power: Line (L)



Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan



Page : 50 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

Doc No: 17-EM-F0876 / 2.0

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	dB	(dBuV)	(dBuV)	(dB)	
1	0.5780	14.88	19.67	34.55	56.00	-21.45	QP
2	0.5780	5.64	19.67	25.31	46.00	-20.69	AVG
3	0.7060	11.85	19.68	31.53	56.00	-24.47	QP
4	0.7060	0.30	19.68	19.98	46.00	-26.02	AVG
5	1.1580	12.21	19.68	31.89	56.00	-24.11	QP
6	1.1580	2.04	19.68	21.72	46.00	-24.28	AVG
7	1.6580	10.99	19.69	30.68	56.00	-25.32	QP
8	1.6580	1.72	19.69	21.41	46.00	-24.59	AVG
9	9.6700	16.20	19.80	36.00	60.00	-24.00	QP
10	9.6700	6.41	19.80	26.21	50.00	-23.79	AVG
11	10.7860	16.24	19.80	36.04	60.00	-23.96	QP
12	10.7860	6.16	19.80	25.96	50.00	-24.04	AVG

Remarks:

- 1. Result value (dBuV) = Reading value (dBuV) + Correction Factor (dB)
- 2. Margin(dB) = Result value (dBuV) Limit value (dBuV)
- 3. Correction Factor(dB) = Insertion loss(dB) + Cable loss(dB)
- 4. The other emission levels were very low against the limit.

Underwriters Laboratories Taiwan Co., Ltd.

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

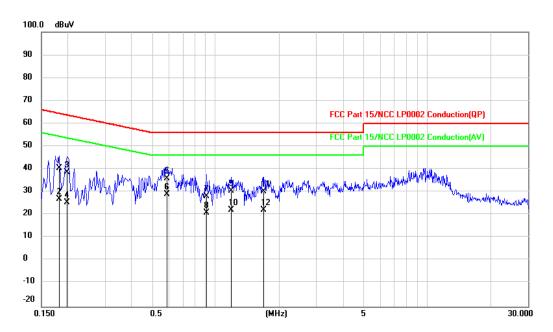


Page : 51 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

Doc No: 17-EM-F0876 / 2.0

Phase of Power: Neutral (N)



Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan



Page : 52 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

Doc No: 17-EM-F0876 / 2.0

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	dB	(dBuV)	(dBuV)	(dB)	
1	0.1819	20.86	19.68	40.54	64.40	-23.86	QP
2	0.1819	7.13	19.68	26.81	54.40	-27.59	AVG
3	0.1980	19.03	19.68	38.71	63.69	-24.98	QP
4	0.1980	5.86	19.68	25.54	53.69	-28.15	AVG
5	0.5899	16.33	19.67	36.00	56.00	-20.00	QP
6	0.5899	9.36	19.67	29.03	46.00	-16.97	AVG
7	0.9060	8.54	19.68	28.22	56.00	-27.78	QP
8	0.9060	1.28	19.68	20.96	46.00	-25.04	AVG
9	1.1860	10.77	19.68	30.45	56.00	-25.55	QP
10	1.1860	2.39	19.68	22.07	46.00	-23.93	AVG
11	1.6940	10.60	19.69	30.29	56.00	-25.71	QP
12	1.6940	2.60	19.69	22.29	46.00	-23.71	AVG

Remarks:

- 1. Result value (dBuV) = Reading value (dBuV) + Correction Factor (dB)
- 2. Margin(dB) = Result value (dBuV) Limit value (dBuV)
- 3. Correction Factor(dB) = Insertion loss(dB) + Cable loss(dB)
- 4. The other emission levels were very low against the limit.

Underwriters Laboratories Taiwan Co., Ltd.

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan



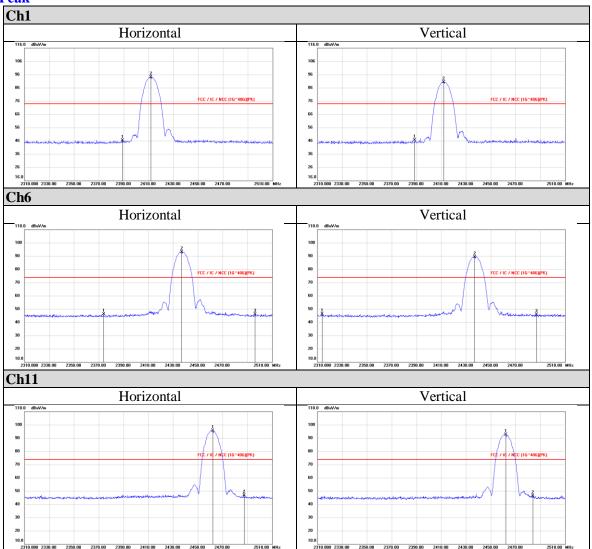
Page : 53 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

Appendix I Radiated Band Edge Measurement

802.11b

Peak



Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone :+886-2-7737-3000 Facsimile (FAX) :+886-3-583-7948

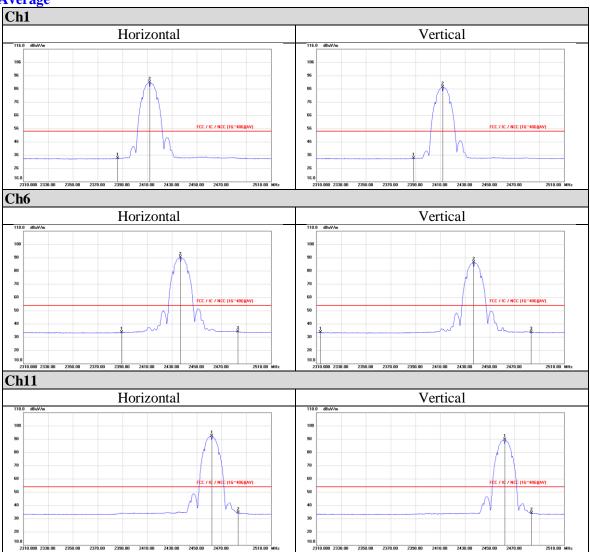


Page : 54 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

Doc No: 17-EM-F0876 / 2.0





Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan



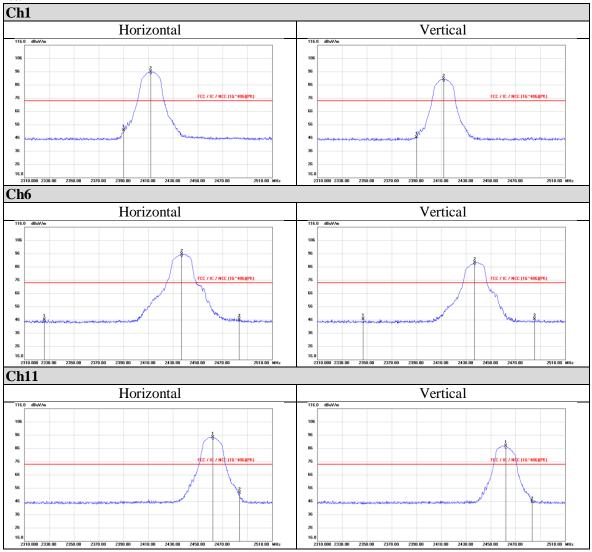
Page : 55 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

Doc No: 17-EM-F0876 / 2.0

802.11g

Peak



Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

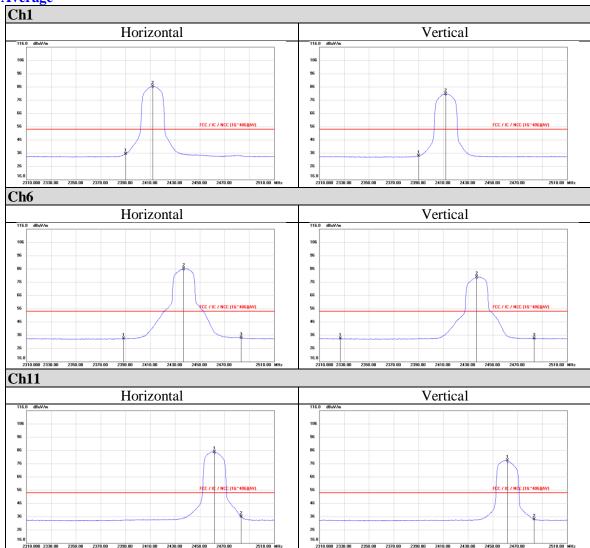


Page : 56 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

Doc No: 17-EM-F0876 / 2.0





Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

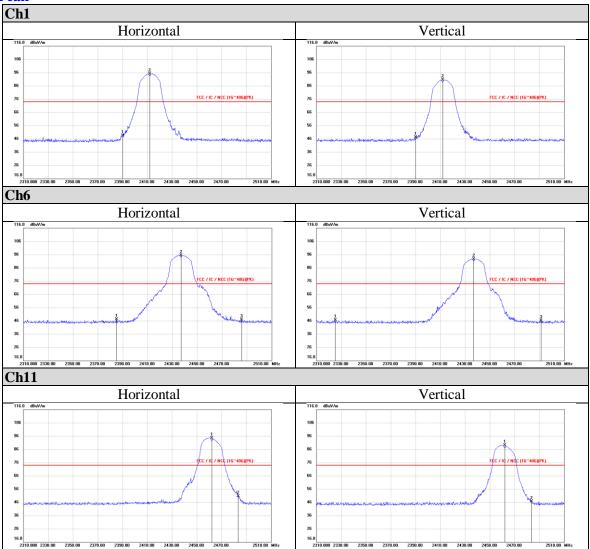


Page : 57 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

802.11n (HT-20)

Peak



Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

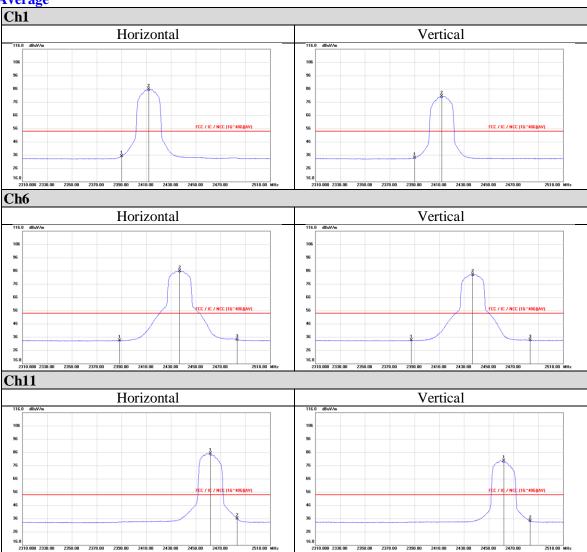
Telephone :+886-2-7737-3000 Facsimile (FAX) :+886-3-583-7948



Page : 58 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01





Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

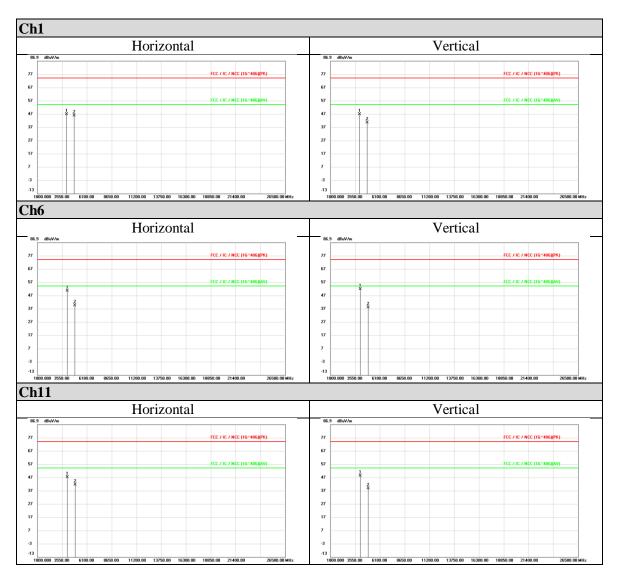


Page : 59 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

Appendix II Radiated Spurious Emission Measurement

802.11b



Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone :+886-2-7737-3000 Facsimile (FAX) :+886-3-583-7948

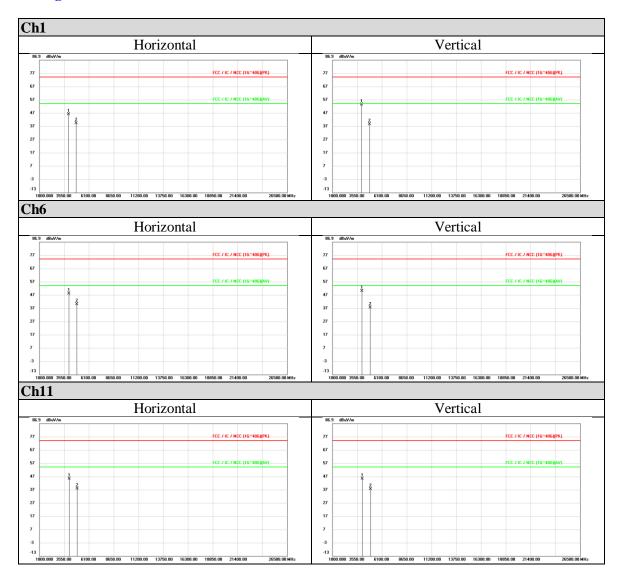


Page : 60 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

Doc No: 17-EM-F0876 / 2.0

802.11g



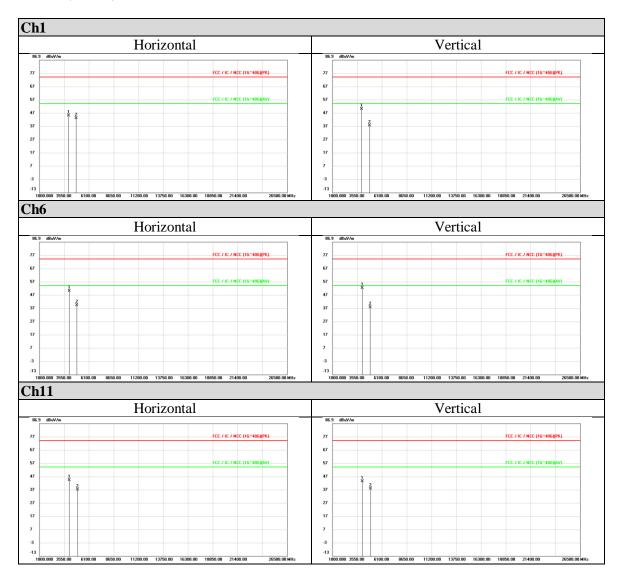
Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan



Page : 61 of 61 Issued date : Aug. 26, 2019

FCC ID : 2ASXC-TMO-NBT-01

802.11n (HT-20)



Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone :+886-2-7737-3000 Facsimile (FAX) :+886-3-583-7948