



Test report No. : 4790038917B-US-R0-V0
Page : 1 of 69
Issued date : 2022/1/12
FCC ID : RYK-WUBT239ACND

RADIO TEST REPORT

Product : 802.11ac/a/b/g/n 2T2R Wi-Fi + Bluetooth 5.0 USB Dongle
Model Name : WUBT-239ACN(BT) Dongle
FCC ID : RYK-WUBT239ACND
Test Regulation : FCC 47 CFR Part 15 Subpart C (Section 15.247)
Received Date : 2021/8/5
Test Date : 2021/8/9 ~ 2021/10/25
Issued Date : 2022/1/12

Applicant : SparkLAN Communications, Inc.
8F., No.257, Sec. 2, Tiding Blvd., Neihu District, Taipei City
11493, Taiwan (R.O.C.)

Issued By : Underwriters Laboratories Taiwan Co., Ltd.
Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd.,
Zhudong Township, Hsinchu County, Taiwan



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Doc No: 17-EM-F0876 / 6.0



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1. Attestation of Test Results

APPLICANT: SparkLAN Communications, Inc.
 8F., No.257, Sec. 2, Tiding Blvd., Neihu District, Taipei City 11493,
 Taiwan (R.O.C.)

MANUFACTURER: SparkLAN Communications, Inc.
 8F., No.257, Sec. 2, Tiding Blvd., Neihu District, Taipei City 11493,
 Taiwan (R.O.C.)

EUT DESCRIPTION: 802.11ac/a/b/g/n 2T2R Wi-Fi + Bluetooth 5.0 USB Dongle

BRAND: SparkLAN

MODEL: WUBT-239ACN(BT) Dongle

SAMPLE STAGE: Engineering Verification Test sample

DATE of TESTED: 2021/8/9 ~ 2021/10/25

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. 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:

Sally Lu
 Project Handler

Date : 2022/1/12

Approved and Authorized By:

Waternil Guan
 Engineer

Date : 2022/1/12

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2. Summary of Test Results

Summary of Test Results		
FCC Clause	Test Items	Result
15.247(a)(2)	6dB Bandwidth	Note 1
15.247(b)	Conducted Output Power	PASS
15.247(e)	Power Spectral Density	Note 1
15.247(d)	Antenna Port Emission	Note 1
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS
15.207	AC Power Conducted Emission	PASS
15.203	Antenna Requirement	PASS

Note:

1. This prepared for FCC Spot Check Verification Report, the test items and spot-check test data are decided by applicant's engineering judgment, for more details please refer to note 1 and 2 of section 6.1.



3. Test Methodology and Reference Procedures

The tests documented in this report were performed in accordance with 47 CFR FCC Part 2, KDB558074 D01 Meas Guidance v05r02, KDB414788 D01 Radiated Test Site v01r01, ANSI C63.10-2013 and KDB 662911 D01 Multiple Transmitter Output v02r01.

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.

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5. Measurement Uncertainty

For statement of conformity, accuracy method (Section 8.2.4 and 8.2.5 of ISO Guide 98-4) was applied as decision rule for measurement in this test report.

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

Measurement	Frequency	Uncertainty
Conducted disturbance at mains terminals ports	150kHz ~ 30MHz	± 3.1 dB
RF Conducted	9 kHz - 40GHz	± 1.9 dB
Radiated disturbance below 30MHz	9 kHz - 30 MHz	± 1.9 dB
Radiated disturbance below 1 GHz	30MHz ~ 1GHz	± 5.4 dB
Radiated disturbance above 1 GHz	1GHz ~ 40GHz	± 4.7 dB

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6. Equipment under Test

6.1. Description of EUT

Product	802.11ac/a/b/g/n 2T2R Wi-Fi + Bluetooth 5.0 USB Dongle
Brand Name	SparkLAN
Model Name	WUBT-239ACN(BT) Dongle
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 MCS15
Number of Channel	11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40)
Maximum Output Power	802.11b: 23.20 dBm 802.11g: 27.80 dBm 802.11n (HT20): 28.03 dBm 802.11n (HT40): 22.20 dBm
Normal Voltage	5Vdc
Sample ID	Conducted Test: 4197850 Radiated Test: 4197853

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Note:

1. This spot check report was issued based on the re-used report with report number 4790038917A-US-R0-V0 / FCC ID: RYK-WUBT239ACNBT. The technical construction which included circuit diagram, PCB Layout, components and component layout, all electrical construction and mechanical construction are as same as the original device (Model: WUBT-239ACN(BT) [MU]), the differences are add outer case and use PCB antenna only. Therefore, only the output power and worst case of the emission was performed and recorded in this report.
2. The spot check verification data was following the table, and just shows the worst case of the radiated spurious and band edge emission.

Band	Test Item	Test Limit	Original Model			Spot Check Model			Deviation
			WUBT-239ACN(BT) [MU]			WUBT-239ACN(BT) Dongle			
			FCC ID: RYK-WUBT239ACNBT			FCC ID: RYK-WUBT239ACND			
			Mode	Channel	Test Result	Mode	Channel	Test Result	
DTS WLAN 2.4GHz	Band Edge	54 dBuV/m	11b	2412 MHz	40.92 dBuV/m	11b	2412 MHz	44.52 dBuV/m	3.6 dB
	RSE	74 dBuV/m	11b	2437 MHz	51.99 dBuV/m	11b	2437 MHz	51.74 dBuV/m	-0.25 dB
	Band Edge	54 dBuV/m	11g	2417 MHz	39.56 dBuV/m	11g	2417 MHz	44.82 dBuV/m	5.26 dB
	RSE	74 dBuV/m	11g	2437 MHz	52.47 dBuV/m	11g	2437 MHz	52.33 dBuV/m	-0.14 dB
	Band Edge	54 dBuV/m	11n20	2437 MHz	39.6 dBuV/m	11n20	2437 MHz	43.53 dBuV/m	3.93 dB
	RSE	74 dBuV/m	11n20	2437 MHz	50.25 dBuV/m	11n20	2437 MHz	50.25 dBuV/m	0 dB
	Band Edge	54 dBuV/m	11n40	2452 MHz	40.27 dBuV/m	11n40	2452 MHz	41.56 dBuV/m	1.29 dB
	RSE	74 dBuV/m	11n40	2422 MHz	38.66 dBuV/m	11n40	2422 MHz	38.63 dBuV/m	-0.03 dB

Comparison of two models, all test results are under FCC Technical Limit.

3. The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and two receivers.

Modulation Mode	Tx,Rx Function
802.11b	2TX,2RX
802.11g	2TX,2RX
802.11n (HT20)	2TX,2RX
802.11n (HT40)	2TX,2RX

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

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6.2. Channel List

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

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

7 channels are provided for 802.11n (HT40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
3	2422	7	2442
4	2427	8	2447
5	2432	9	2452
6	2437	-	-

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6.3. Test Condition

Test Item	Test Site No.	Environmental Condition	Input Power	Test Date	Tested by
Antenna Port Conducted Measurement	SR4	23~26°C/ 60~65%RH	5Vdc	2021/08/09~ 2021/10/25	Mike Cai
Radiated Spurious Emission	966-2	23~26°C/ 60~65%RH	5Vdc	2021/09/06~ 2021/10/22	Patrick Kuan/ Mike Cai
AC power Line Conducted Emission	SR1	23~26°C/ 60~65%RH	5Vdc	2021/10/07~ 2021/10/08	Mike Cai

FCC Test Firm Registration Number: 498077

6.4. Description of Available Antennas

Ant. No.	Transmitter Circuit	Brand Name	Model Name	Ant. Type	Maximum Gain (dBi)	Remark
1	Chain (0)	SparkLAN	N/A	PCB	2.4GHz: 0.7 5GHz: 4.24	Ant L
	Chain (1)	SparkLAN	N/A	PCB	2.4GHz: 0.25 5GHz: 3.83	Ant R

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.

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6.5. Test Mode Applicability and Tested Channel Detail

- For AC power line conducted emissions, the pre-scan has been determined by AC power 120Vac/60Hz (worst case).
- The fundamental of the EUT with PCB Antenna was investigated in three orthogonal axes X-Y/Y-Z/X-Z, it was determined that Y-Z plane was worst-case. Therefore, all final radiated testing was performed with the EUT in Y-Z plane.
- 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.
- For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel), parallel and perpendicular are the worst orientations, therefore testing was performed on these two orientations only.
- For below 1 GHz radiated emission and AC power line conducted emission have performed all modes of operation were investigated and the worst-case emissions are reported.
- 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).

Test Item	Mode	Modulation Technology	Modulation Type	Available Channel	Test Channel	Data Rate
Radiated Emissions (Above 1GHz)	802.11b	DSSS	DBPSK	1 to 11	1,2,6,10,11	1 Mbps
	802.11g	OFDM	BPSK	1 to 11	1,2,6,10,11	6 Mbps
	802.11n20	OFDM	BPSK	1 to 11	1,2,6,10,11	MCS0
	802.11n40	OFDM	BPSK	3 to 9	3,6,9	MCS0
Radiated Emissions (Below 1GHz)	802.11n20	OFDM	BPSK	1 to 11	6	MCS0
AC Power Line Conducted Emission	802.11n20	OFDM	BPSK	1 to 11	6	MCS0
Conducted Output Power	802.11b	DSSS	DBPSK	1 to 11	1,2,6,10,11	1 Mbps
	802.11g	OFDM	BPSK	1 to 11	1,2,6,10,11	6 Mbps
	802.11n20	OFDM	BPSK	1 to 11	1,2,6,10,11	MCS0
	802.11n40	OFDM	BPSK	3 to 9	3,6,9	MCS0

Simultaneously transmission condition:

Condition	Technology	
1	WLAN (2.4GHz), Chain0	Bluetooth, Chain1
2	WLAN (5GHz), Chain0	Bluetooth Chain1

Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.

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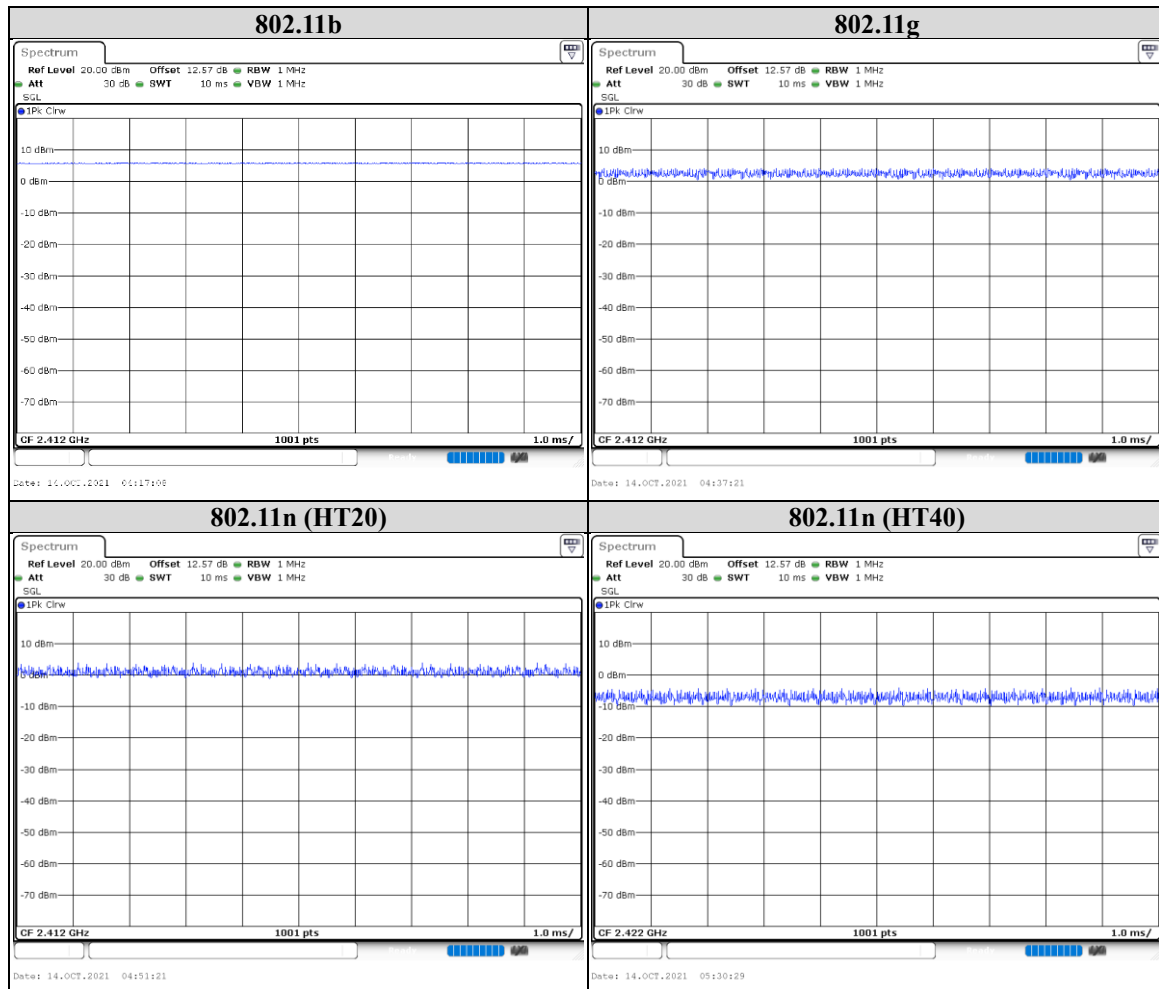
6.6. Duty cycle

802.11b: Duty cycle = 1/1 = 100%, duty cycle of test signal is $\geq 98\%$, duty factor is not required.

802.11g: Duty cycle = 1/1 = 100%, duty cycle of test signal is $\geq 98\%$, duty factor is not required.

802.11n(HT20): Duty cycle = 1/1 = 100%, duty cycle of test signal is $\geq 98\%$, duty factor is not required.

802.11n(HT40): Duty cycle = 1/1 = 100%, duty cycle of test signal is $\geq 98\%$, duty factor is not required.





7. Test Equipment

Test Equipment List					
Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Expired date
Radiated Spurious Emission					
Spectrum Analyzer	Keysight	N9010A	MY56070827	2020/11/11	2021/11/10
EMI Test Receiver	Rohde & Schwarz	ESR7	101754	2020/12/11	2021/12/10
Loop Antenna	ETS lindgren	6502	00213440	2020/12/25	2021/12/24
Trilog-Broadband Antenna with 5dB Attenuator	Schwarzbeck & EMCI	VULB 9168 & N-6-05	774 & AT-N0538	2021/1/13	2022/1/12
Horn Antenna (1-18 GHz)	Schwarzbeck	BBHA 9120 D	01690	2020/12/30	2021/12/29
Horn Antenna (18-40 GHz)	Schwarzbeck	BBHA 9170	781	2020/12/30	2021/12/29
Preamplifier (30-1000 MHz)	EMCI	EMC330E	980405	2021/6/8	2022/6/7
Preamplifier (1-18 GHz)	EMCI	EMC051835BE	980406	2021/2/3	2022/2/2
Preamplifier (18-40GHz)	EMCI	EMC184040SEE	980426	2021/5/19	2022/5/18
Cables	Hanyitek	K1K50-UP0264-K1K50-2500	170214-4 & 170425-2	2021/1/22	2022/1/21
Cables	Hanyitek	K1K50-UP0264-K1K50-2500	170214-1 & 170214-2	2021/1/22	2022/1/21

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Test Equipment List					
Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Expired date
Antenna Port Conducted Measurement					
Spectrum Analyzer	Keysight	N9010A	MY56070834	2020/11/6	2021/11/5
Pulse Power Sensor	Anritsu	MA2411B	1531202	2020/12/21	2021/12/20
Power Meter	Anritsu	ML2495A	1645002	2020/12/21	2021/12/20
AC power Line Conducted Emission					
EMI Test Receiver	Rohde & Schwarz	ESR7	101753	2020/11/17	2021/11/16
Two-Line V-Network	Rohde & Schwarz	ENV216	102136	2021/8/30	2022/8/29
Impuls-Begrenzer Pulse Limiter	Rohde & Schwarz	ESH3-Z2	102219-Qt	2021/8/26	2022/8/25
Cables	TITAN	CFD200	T0732ACFD20 020A300-1	2021/3/2	2022/3/1

UL Software		
Description	Name	Version
Radiated measurement	e3	6.191211 (V6)
Conducted measurement	RF Conducted Test Tools	ver 2.4.0.620b
AC power Line Conducted Emission	EZ_EMCC	UL-3A1.2

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8. Description of Test Setup

Support Equipment

ID	Equipment	Brand Name	Model Name	S/N	Remark
A	Laptop	Lenovo	T460	PC0FWU5Y	Provide by lab

I/O Cables

ID	Equipment	Brand Name	Model Name	Length (m)	Remark
1	USB Cable	fujiei	Z08145	1	Provide by lab

Test Setup

Controlled using a bespoke application (RTL8822CU MP Diagnostic Program 0.0001.1020.2018) 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.

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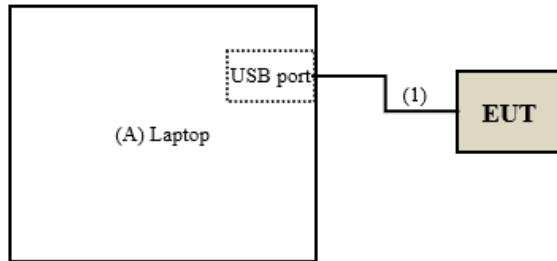
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Setup Diagram for Radiated Spurious Emission Test



Under Table

Remote Site

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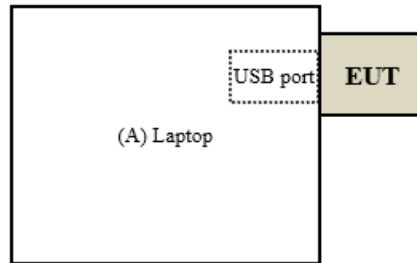
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Setup Diagram for AC Power Line Conducted Emission Test



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9. Test Results

9.1. Conducted Output Power

Requirements

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

Note:

1. Directional Gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{Gn/20})^2 / N_{ANT}]$ dBi.

N_{ANT} : Number of Transmit Antennas

$G1, G2, \dots, Gn$: Gain of Individual Antennas

2. Per KDB 662911 Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

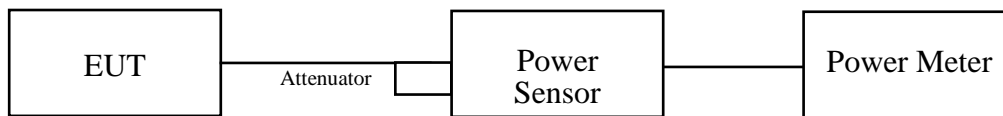
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT} ;

Array Gain = $5 \log(N_{ANT}/N_{SS})$ dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \geq 5$.

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



The loss between RF output port of the EUT and the input port of the Power Meter has been taken into consideration.

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Test Data

Peak Power

802.11b

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	15.06	14.51	60.256	17.80	30	PASS
2	2417	17.59	16.34	100.462	20.02	30	PASS
6	2437	20.98	19.23	208.93	23.20	30	PASS
10	2457	16.44	15.02	75.858	18.80	30	PASS
11	2462	15.45	14.03	60.395	17.81	30	PASS

802.11g

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	21.17	21.04	258.226	24.12	30	PASS
2	2417	24.15	23.75	496.592	26.96	30	PASS
6	2437	25.23	24.30	602.56	27.80	30	PASS
10	2457	22.99	22.81	389.942	25.91	30	PASS
11	2462	19.68	19.85	189.671	22.78	30	PASS

802.11n (HT20)

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	18.06	18.45	133.968	21.27	30	PASS
2	2417	23.22	22.71	396.278	25.98	30	PASS
6	2437	25.41	24.60	635.331	28.03	30	PASS
10	2457	21.01	20.78	246.037	23.91	30	PASS
11	2462	17.02	18.10	114.815	20.60	30	PASS

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802.11n (HT40)

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	17.02	17.18	102.565	20.11	30	PASS
6	2437	18.86	19.50	165.959	22.20	30	PASS
9	2452	16.18	16.58	86.896	19.39	30	PASS

Average Power (Reference Only)

802.11b

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	13.34	12.20	38.194	15.82
2	2417	15.25	14.72	63.096	18.00
6	2437	18.68	17.56	130.918	21.17
10	2457	14.56	13.12	49.091	16.91
11	2462	13.43	12.31	39.084	15.92

802.11g

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	11.62	11.59	28.973	14.62
2	2417	14.73	14.18	55.847	17.47
6	2437	18.41	17.59	126.765	21.03
10	2457	13.44	13.28	43.351	16.37
11	2462	10.18	9.75	19.861	12.98

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802.11n (HT20)

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	10.13	10.28	20.989	13.22
2	2417	14.27	13.90	51.286	17.10
6	2437	18.38	17.31	122.744	20.89
10	2457	12.48	12.16	34.119	15.33
11	2462	8.99	9.20	16.255	12.11

802.11n (HT40)

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
3	2422	8.84	9.33	16.218	12.10
6	2437	11.04	11.64	27.29	14.36
9	2452	8.26	8.52	13.804	11.40

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9.2. 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.

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Test Procedures

[For 9 kHz ~ 30 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 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) 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.

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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.

Configuration	Average	
	RBW	VBW
802.11b	1MHz	10Hz
802.11g		10Hz
802.11n (HT20)		10Hz
802.11n (HT40)		10Hz

Note: Refer to section 6.6 for duty cycle.

- d. All modes of operation were investigated (includes all external accessories) and the worst-case emissions are reported.
- e. Test data of Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
- f. Test data of Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
- g. Test data of Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
- h. Test data of Notation "@" = Fundamental Frequency
- i. Test data of Notation "*" = The peak result under 20 dB above and complies with AVG limit, AVG result is deemed to comply with AVG limit.

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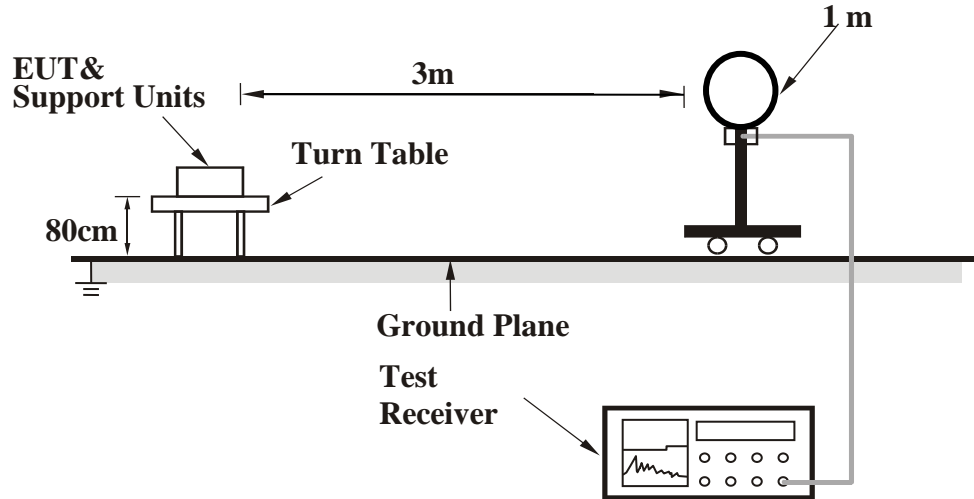
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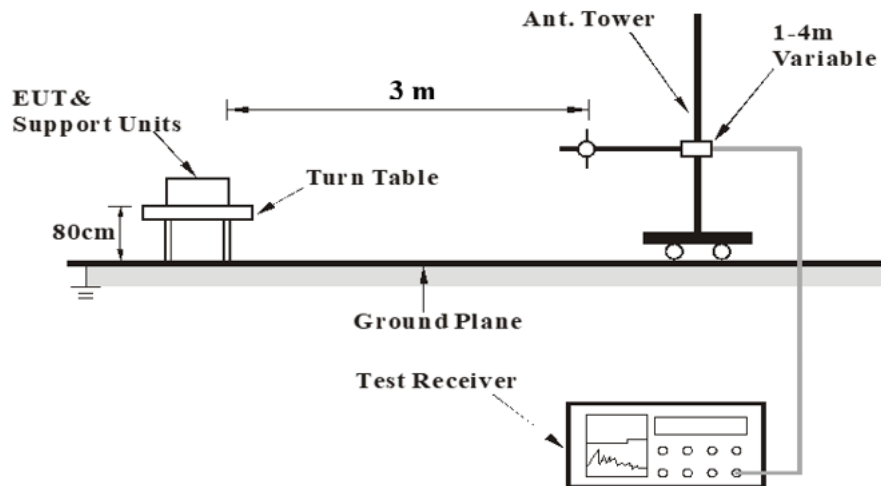
Doc No: 17-EM-F0876 / 6.0

Test Setup

<Frequency Range 9 kHz ~ 30 MHz>

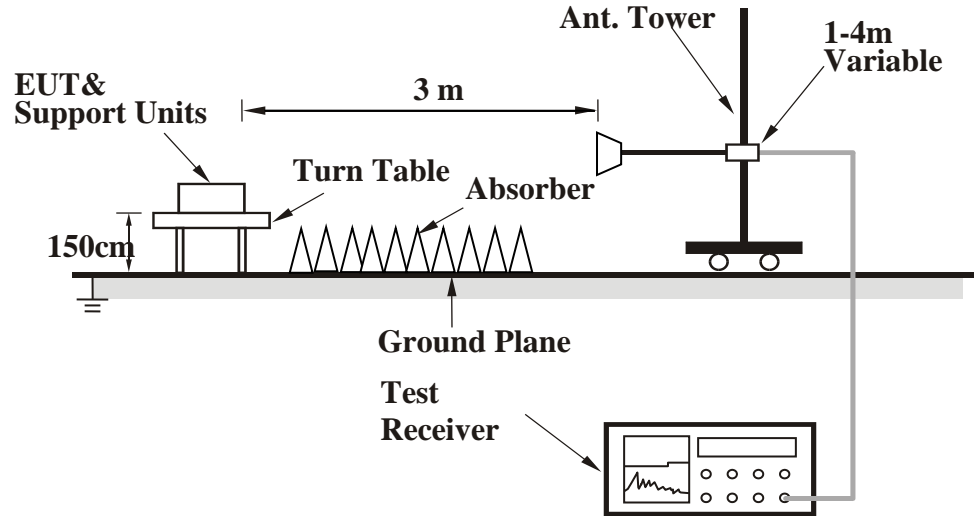


<Frequency Range 30 MHz ~ 1 GHz >





<Frequency Range above 1 GHz>



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



Test Data

Above 1G

Mode	802.11b	Channel	1
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Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal		2332.04	38.42	6.1	44.52	54	-9.48	AVG
		2389.04	43.79	6.1	49.89	74	-24.11	PK
	@	2412	99.76	6.13	105.89	N/A	N/A	PK
	@	2412	93.77	6.13	99.9	N/A	N/A	AVG
	*	4824	35.43	2.55	37.98	74	-36.02	PK
Vertical		2389.8	43.48	6.1	49.58	74	-24.42	PK
		2389.99	37.64	6.1	43.74	54	-10.26	AVG
	@	2412	102.9	6.13	109.03	N/A	N/A	PK
	@	2412	96.4	6.13	102.53	N/A	N/A	AVG
	*	4824	35.19	2.55	37.74	74	-36.26	PK

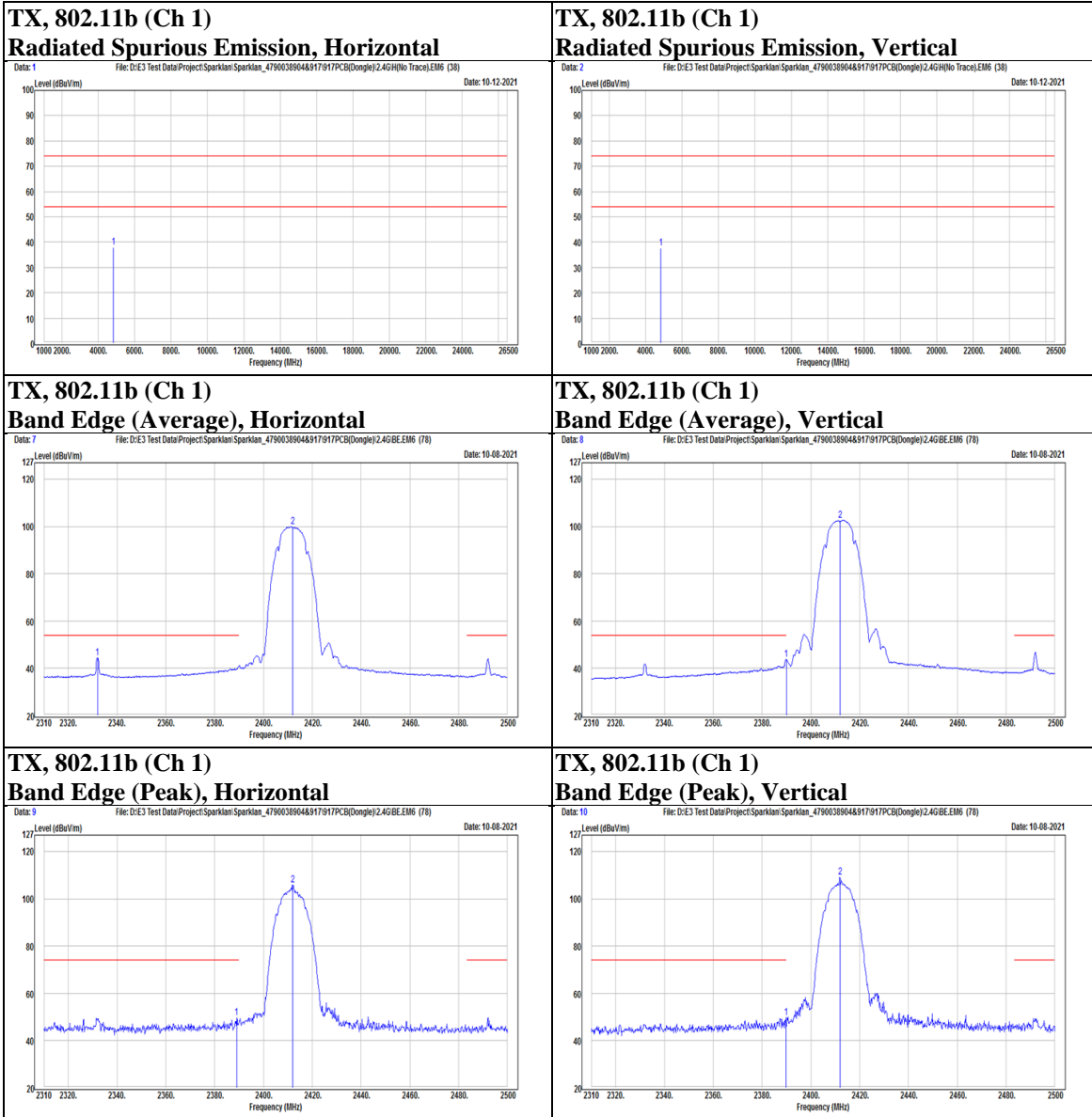
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Mode	802.11b	Channel	2
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Polarization	Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
		(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
Horizontal		2336.98	37.36	6.08	43.44	54	-10.56	AVG
		2337.36	43.3	6.08	49.38	74	-24.62	PK
	@	2417	98.12	6.13	104.25	N/A	N/A	PK
	@	2417	92.82	6.13	98.95	N/A	N/A	AVG
	*	4834	34.99	2.61	37.6	74	-36.4	PK
Vertical		2336.98	35	6.08	41.08	54	-12.92	AVG
		2389.99	44.41	6.1	50.51	74	-23.49	PK
	@	2417	102.05	6.13	108.18	N/A	N/A	PK
	@	2417	96.95	6.13	103.08	N/A	N/A	AVG
	*	4834	34.96	2.61	37.57	74	-36.43	PK

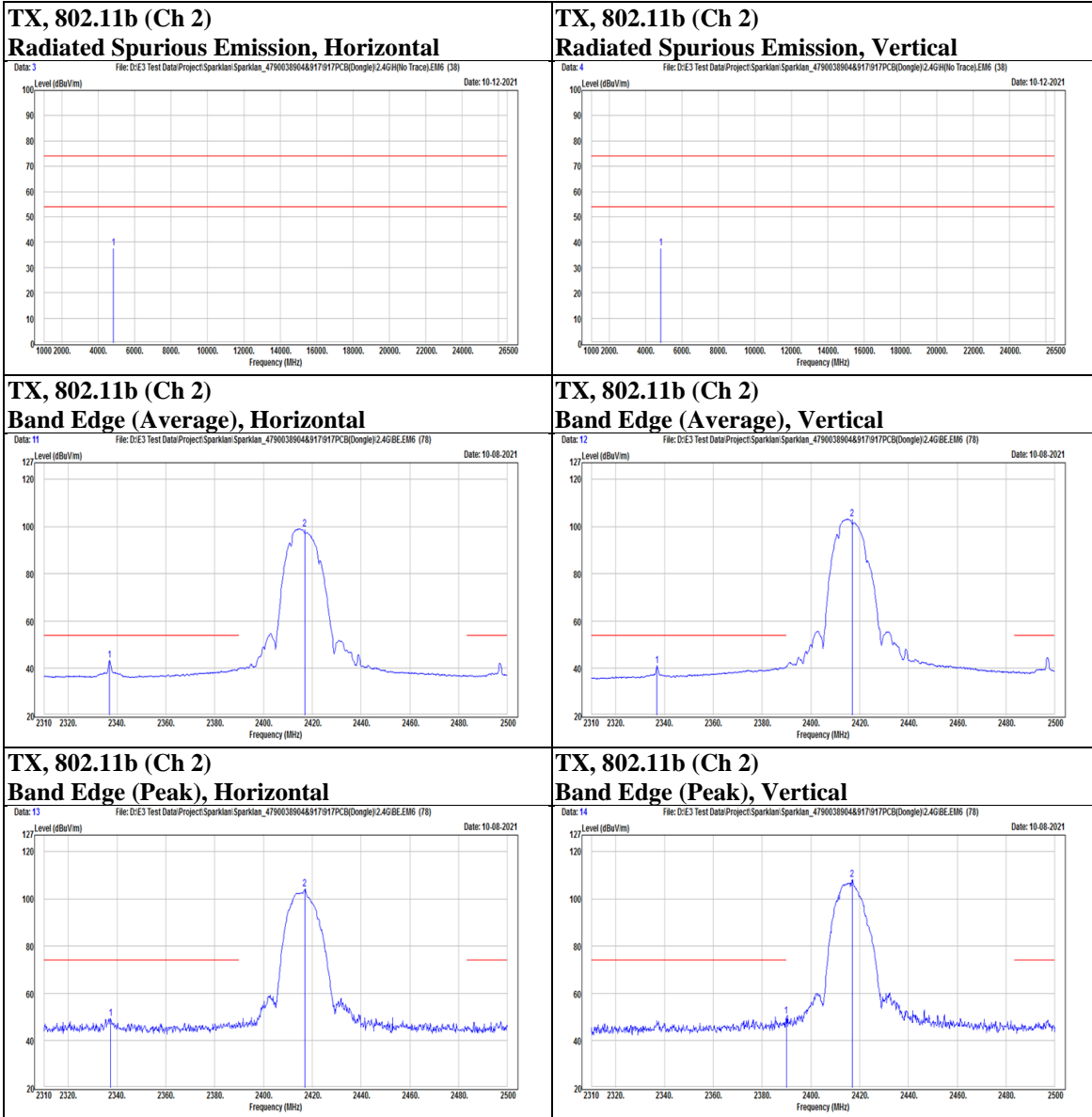
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Mode	802.11b	Channel	6
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Polarization	Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
		(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
Horizontal		2314.94	42.86	6.18	49.04	74	-24.96	PK
		2356.93	35.21	6.04	41.25	54	-12.75	AVG
	@	2437	103.31	6.12	109.43	N/A	N/A	PK
	@	2437	98.75	6.12	104.87	N/A	N/A	AVG
		2483.66	31.36	6.1	37.46	54	-16.54	AVG
		2491.07	41.86	6.1	47.96	74	-26.04	PK
	*	4874	35.43	2.66	38.09	74	-35.91	PK
Vertical		2356.93	42.47	6.04	48.51	74	-25.49	PK
		2356.93	33.39	6.04	39.43	54	-14.57	AVG
	@	2437	105.68	6.12	111.8	N/A	N/A	PK
	@	2437	100.71	6.12	106.83	N/A	N/A	AVG
		2484.99	33.13	6.1	39.23	54	-14.77	AVG
		2488.22	42.63	6.1	48.73	74	-25.27	PK
	*	4874	35.55	2.66	38.21	74	-35.79	PK
	*	7311	41.12	10.62	51.74	74	-22.26	PK

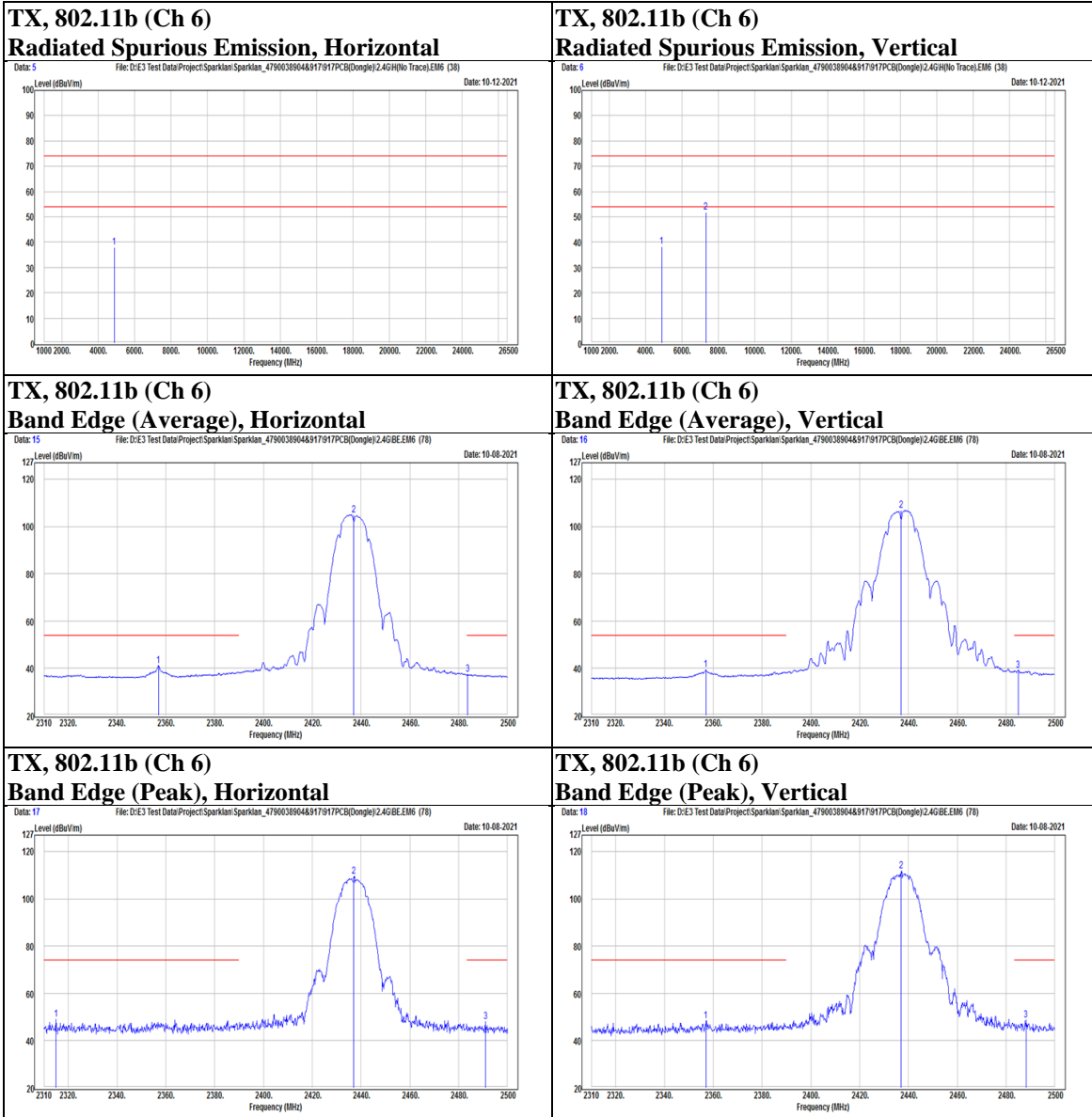
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Mode	802.11b	Channel	10
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Polarization	Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
		(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
Horizontal	@	2457	98.2	6.12	104.32	N/A	N/A	PK
	@	2457	92.85	6.12	98.97	N/A	N/A	AVG
		2487.27	32.09	6.11	38.2	54	-15.8	AVG
		2487.65	41.56	6.1	47.66	74	-26.34	PK
	*	4914	35.81	2.63	38.44	74	-35.56	PK
Vertical	@	2457	101.41	6.12	107.53	N/A	N/A	PK
	@	2457	95.74	6.12	101.86	N/A	N/A	AVG
		2484.61	34.35	6.1	40.45	54	-13.55	AVG
		2490.12	44.63	6.1	50.73	74	-23.27	PK
	*	4914	35.35	2.63	37.98	74	-36.02	PK

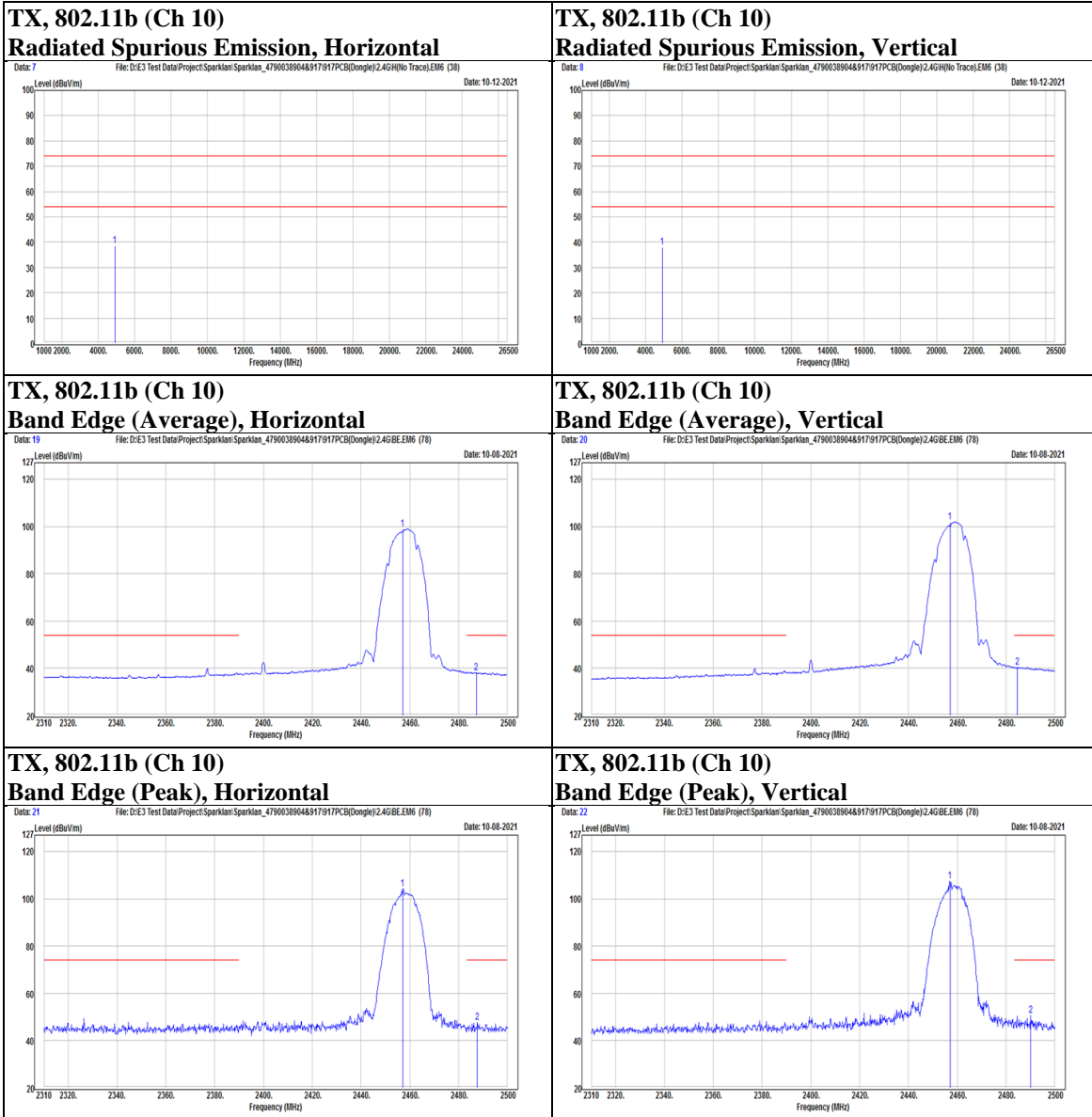
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Mode	802.11b	Channel	11
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Polarization	Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
		(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
Horizontal	@	2462	96.08	6.12	102.2	N/A	N/A	PK
	@	2462	90.39	6.12	96.51	N/A	N/A	AVG
		2484.04	34.26	6.1	40.36	54	-13.64	AVG
		2496.2	41.81	6.1	47.91	74	-26.09	PK
	*	4924	34.47	2.61	37.08	74	-36.92	PK
Vertical	@	2462	101.11	6.12	107.23	N/A	N/A	PK
	@	2462	95.33	6.12	101.45	N/A	N/A	AVG
		2483.85	36.75	6.1	42.85	54	-11.15	AVG
		2484.99	44.41	6.1	50.51	74	-23.49	PK
	*	4924	35.09	2.61	37.7	74	-36.3	PK

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