



Test report No. : 4789558386-US-R5-V0  
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Issued date : Jan. 8, 2021  
FCC ID : RYK-WPEB265AXIBT

# Maximum Permissible Exposure Report

**Product** : IEEE 802.11ax/ac/a/b/g/n 2x2 WiFi with Bluetooth5.0 Combo Module

**Model Name** : WPEB-265AXI(BT) [R33]

**Series Model** : WPEB-265AXI(BT) [B18], WPEB-265AXI(BT) [B33],  
WPEB-265AXI(BT) [R18],  
AP12275\_PB18, AP12275\_PB33, AP12275\_PR18,  
AP12275\_PR33

**FCC ID** : RYK-WPEB265AXIBT

**Test Regulation** : 47 CFR FCC Part 2.1091

**Received Date** : Aug. 12, 2020

**Issued Date** : Jan. 8, 2021

**Applicant** : SparkLAN Communications, Inc.  
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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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## 1. Attestation of Test Results

**APPLICANT:** SparkLAN Communications, Inc.  
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 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:** IEEE 802.11ax/ac/a/b/g/n 2x2 WiFi with Bluetooth5.0 Combo Module

**MODEL:** WPEB-265AXI(BT) [R33]

**SERIES MODEL:** WPEB-265AXI(BT) [B18], WPEB-265AXI(BT) [B33],  
 WPEB-265AXI(BT) [R18],  
 AP12275\_PB18, AP12275\_PB33, AP12275\_PR18, AP12275\_PR33

**SAMPLE STAGE:** Identical Prototype

<b>APPLICABLE STANDARDS</b>	
<b>STANDARD</b>	<b>Test Results</b>
47 CFR FCC PART 2.1091	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:

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 Project Handler

Date : Jan. 8, 2021

Approved and Authorized By:

*Water Nil Guan*

Waternil Guan  
 Engineer

Date : Jan. 8, 2021

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## 2. Test Methodology and Reference Procedures

The tests documented in this report were performed in accordance with KDB 447498 D01 General RF Exposure Guidance v06.

## 3. Facilities and Accreditation

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

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## 4. Equipment Under Test

### 4.1. Description of EUT

<b>Product</b>	IEEE 802.11ax/ac/a/b/g/n 2x2 WiFi with Bluetooth5.0 Combo Module	
<b>Model Name</b>	WPEB-265AXI(BT) [R33]	
<b>Series Model</b>	WPEB-265AXI(BT) [B18], WPEB-265AXI(BT) [B33], WPEB-265AXI(BT) [R18], AP12275_PB18, AP12275_PB33, AP12275_PR18, AP12275_PR33	
<b>Operating Frequency</b>	Bluetooth EDR	2402MHz ~ 2480MHz
	Bluetooth LE	2402MHz ~ 2480MHz
	WLAN	<b>2.4GHz:</b> 2412MHz ~ 2462MHz <b>5GHz:</b> 5180 ~ 5240 MHz, 5260 ~ 5320 MHz 5500 ~ 5720 MHz, 5745 ~ 5825 MHz
<b>Modulation</b>	Bluetooth EDR	GFSK, $\pi/4$ -DQPSK, 8DPSK
	Bluetooth LE	GFSK
	WLAN	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDMA
<b>Number of Channel</b>	Bluetooth EDR	79
	Bluetooth LE	40

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<b>Number of Channel</b>	2.4G WLAN 2412 ~ 2462 MHz	11 for 802.11b, 802.11g, 802.11n (HT20)
	5G WLAN 5180 ~ 5240 MHz	4 for 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20)
		2 for 802.11n (HT40), 802.11 ac (VHT40), 802.11ax (HE40)
		1 for 802.11ac (VHT80), 802.11ax (HE80)
	5G WLAN 5260 ~ 5320 MHz	4 for 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20)
		2 for 802.11n (HT40), 802.11 ac (VHT40), 802.11ax (HE40)
		1 for 802.11ac (VHT80), 802.11ax (HE80)
	5G WLAN 5500 ~ 5720 MHz	12 for 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20)
		6 for 802.11n (HT40), 802.11 ac (VHT40), 802.11ax (HE40)
		3 for 802.11ac (VHT80), 802.11ax (HE80),
	5G WLAN 5745 ~ 5825 MHz	5 for 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20)
		2 for 802.11n (HT40), 802.11 ac (VHT40), 802.11ax (HE40)
1 for 802.11ac (VHT80), 802.11ax (HE80)		
<b>Normal Voltage</b>	3.3 Vdc	
<b>S/N</b>	20B65C2100002	
<b>Software Version</b>	N/A	

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Note:

- All model PCB layout and RF Module are the same, but some ICs and resistors are different. The configuration of all related components are shown in the table below.

Main Model Name		
Brand	Model	Components
SparkLAN	WPEB-265AXI(BT) [R33]	U3,U4: MULTI-VOLTAGE LEVEL TRANSLATOR R4,R17,R22,R23,R24,R25: 33K ohm R26,R27,R28,R29,R30,R31: 33K ohm R1,R13,R15,R16,R20,R21: 0 ohm
Series Model Name		
Brand	Model	Components
SparkLAN	WPEB-265AXI(BT) [B33]	U4: MULTI-VOLTAGE LEVEL TRANSLATOR R4,R17,R26,R27,R28,R29,R30,R31: 33K ohm R1,R13,R15,R16,R20,R21: 0 ohm U5: USB-TO-UART DATA TRANSFER
	WPEB-265AXI(BT) [B18]	R4,R17,R30,R31: 33K ohm R1,R13,R15,R16,R20,R21,R5,R7,R9,R11: 0 ohm U5: USB-TO-UART DATA TRANSFER
	WPEB-265AXI(BT) [R18]	R4,R17,R30,R31: 33K ohm R1,R13,R15,R16,R20,R21,R5:50m ohm R6,R7,R8,R9,R10,R11,R12: 50m ohm
Ampak	AP12275_PB33	Same as WPEB-265AXI(BT) [B33], marketing purpose only.
	AP12275_PB18	Same as WPEB-265AXI(BT) [B18], marketing purpose only.
	AP12275_PR33	Same as WPEB-265AXI(BT) [R33], marketing purpose only.
	AP12275_PR18	Same as WPEB-265AXI(BT) [R18], marketing purpose only.

- The EUT provides two completed transmitters and two receivers.

Modulation Mode	Tx,Rx Function
802.11a	2TX,2RX
802.11b	1TX,1RX
802.11g	2TX,2RX
802.11n (HT20)	2TX,2RX
802.11n (HT40)	2TX,2RX
802.11ac (VHT20)	2TX,2RX
802.11ac (VHT40)	2TX,2RX
802.11ac (VHT80)	2TX,2RX
802.11ax (HE20)	2TX,2RX
802.11ax (HE40)	2TX,2RX
802.11ax (HE80)	2TX,2RX

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3. The EUT contains following accessory.

Product	Brand	Model	Description
Dipole Antenna 1	SparkLAN	AD-103AG	2.4GHz: 2.02dBi 5GHz: 2.03dBi RP-SMA
Dipole Antenna 2	SparkLAN	AD-302N	2.4GHz: 3.14dBi 5GHz: 2.73dBi RP-SMA
Dipole Antenna 3	SparkLAN	AD-303N	2.4GHz: 3.14dBi 5GHz: 3.24dBi RP-SMA

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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## 4.2. Description Of Available Antennas

Ant. No.	Brand Name	Model Name	Ant. Type	Ant. Gain (dBi)	
				2.4GHz	5GHz
0	SparkLAN	AD-103AG	Dipole	2.02	2.03
1	SparkLAN	AD-302N	Dipole	3.14	2.73
2	SparkLAN	AD-303N	Dipole	3.14	3.24

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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## 5. Requirement

Limits for General Population/Uncontrolled Exposure

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	*180/f <sup>2</sup>	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30
Note 1: f = frequency in MHz, * means Plane-wave equivalent power density				
Note 2: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.				

Power Density (S) is calculated by the following formula:

$$S = (P \cdot G) / 4\pi R^2$$

where: S = power density (in appropriate units, e.g. mW/ cm<sup>2</sup>)

P = power input to the antenna (in appropriate units, e.g., mW)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

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## 6. Radio Frequency Radiation Exposure Evaluation

### Non-Beamforming mode

#### Bluetooth EDR

Evaluation Frequency (MHz)	Max. Average power (dBm)	Antenna Gain (dBi)	Max. EIRP (dBm)	Max. EIRP (mW)	Power density @ 20 cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
2402 ~ 2480	6.18	3.14	9.32	8.551	0.0017	1

#### Bluetooth LE

Evaluation Frequency (MHz)	Max. Average power (dBm)	Antenna Gain (dBi)	Max. EIRP (dBm)	Max. EIRP (mW)	Power density @ 20 cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
2402 ~ 2480	8.54	3.14	11.68	14.723	0.0029	1

#### WLAN 2.4GHz

Evaluation Frequency (MHz)	Max. Average power (dBm)	Directional Gain (dBi)	Max. EIRP (dBm)	Max. EIRP (mW)	Power density @ 20 cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
2412 ~ 2462	20.99	6.15	27.14	517.607	0.103	1

#### WLAN 5GHz

Evaluation Frequency (MHz)	Max. Average power (dBm)	Directional Gain (dBi)	Max. EIRP (dBm)	Max. EIRP (mW)	Power density @ 20 cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
5180 ~ 5240	18.31	6.25	24.56	285.759	0.057	1
5260 ~ 5320	18.50	6.25	24.75	298.538	0.059	1
5500 ~ 5720	18.28	6.25	24.53	283.792	0.056	1
5745 ~ 5825	18.47	6.25	24.72	296.483	0.059	1

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## Beamforming mode

### WLAN 2.4GHz

Evaluation Frequency (MHz)	Max. Average power (dBm)	Directional Gain (dBi)	Max. EIRP (dBm)	Max. EIRP (mW)	Power density @ 20 cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
2412 ~ 2462	20.80	6.15	26.95	495.450	0.099	1

### WLAN 5GHz

Evaluation Frequency (MHz)	Max. Average power (dBm)	Directional Gain (dBi)	Max. EIRP (dBm)	Max. EIRP (mW)	Power density @ 20 cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
5180 ~ 5240	17.92	6.25	24.17	261.216	0.052	1
5260 ~ 5320	17.89	6.25	24.14	259.418	0.052	1
5500 ~ 5720	17.88	6.25	24.13	258.821	0.051	1
5745 ~ 5825	17.87	6.25	24.12	258.226	0.051	1

Note:

1. Max. EIRP (dBm) = Max. Average power (dBm) + Antenna Gain (dBi)
2. Max. EIRP (mW) =  $10^{(\text{Max. EIRP (dBm)} / 10)}$
3. Power density (mW/cm<sup>2</sup>) = Max. EIRP (mW) / [  $4 \times \pi \times (\text{calculated distance})^2$  ], the calculated distance is 20 cm.

### Conclusion:

According to 47 CFR §2.1091, the RF exposure analysis concludes that the RF Exposure is FCC compliant.

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