RF Exposure Report

Report No.:	SA140808E04W
FCC ID:	RYK-261ACNBT
Test Model:	WNSQ-261ACN(BT)
Series Model:	WPEQ-261ACN(BT)
Received Date:	Oct. 26, 2017
Test Date:	Dec. 11, 2017
Issued Date:	Dec. 18, 2017
Applicant:	SparkLAN Communications, Inc.
Address:	8F., No.257, Sec. 2, Tiding Blvd., Neihu District, Taipei City 11493, Taiwan (R.O.C.)
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.

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Release Control Record

Issue No.	Description	Date Issued
SA140808E04W	Original release.	Dec. 18, 2017

1 Certificate of Conformity

Product:	802.11ac/b/g/n Wi-Fi+BT Module
Brand:	Sparklan
Test Model:	WNSQ-261ACN(BT)
Series Model:	WPEQ-261ACN(BT)
Sample Status:	R&D SAMPLE
Applicant:	SparkLAN Communications, Inc.
Test Date:	Dec. 11, 2017
Standards:	FCC Part 2 (Section 2.1091) KDB 447498 D01 General RF Exposure Guidance v06 IEEE C95.1-1992

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : _____ , **Date:** Dec. 18, 2017

Wendy Wu / Specialist

Approved by : _____ , **Date:** Dec. 18, 2017

May Chen / Manager

2 RF Exposure

2.1 Limits For Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (minutes)
Limits For General Population / Uncontrolled Exposure				
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	($180/f^2$)*	30
30-300	27.5	0.073	0.2	30
300-1500	…	…	f/1500	30
1500-100,000	…	…	1.0	30

f = Frequency in MHz ; *Plane-wave equivalent power density

2.2 MPE Calculation Formula

$Pd = (Pout*G) / (4*pi*r^2)$

where

Pd = power density in mW/cm^2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

2.3 Classification

The antenna of this product, under normal use condition, is at least 20cm away from the body of the user. So, this device is classified as **Mobile Device**.

2.4 Antenna Gain

Antenna set 1									
Transmitter Circuit	Brand	Model	Antenna Type	2.4GHz Gain with cable loss (dBi)	5GHz Gain with cable loss (dBi)	2.4GHz Cable Loss (dBi)	5G Cable Loss (dBi)	Connector Type	Cable Length (mm)
Chain (0)	WNC	81-EBJ15.005	PIFA	3.62	Band 1&2: 3.08 Band 3: 4.76 Band 4: 4.76	1.15	Band 1&2:1.70 Band 3: 1.74 Band 4: 1.79	IPEX	300
Chain (1)	WNC	81-EBJ15.005	PIFA	3.62	Band 1&2: 3.08 Band 3: 4.76 Band 4: 4.76	1.15	Band 1&2:1.70 Band 3: 1.74 Band 4: 1.79	IPEX	300

Antenna set 2							
Transmitter Circuit	Brand	Model	Antenna Type	2.4GHz Gain with cable loss (dBi)	5GHz Gain with cable loss (dBi)	Connector Type	Cable Length (mm)
Chain (0)	Tongda	T-543-8201044-A (Ant 1)	PIFA	3.572	Band 1&2: 3.002 Band 3: 4.546 Band 4: 4.416	IPEX	77
Chain (1)	Tongda	T-543-8201044-A (Ant 2)	PIFA	3.325	Band 1&2: 2.942 Band 3: 4.622 Band 4: 4.586	IPEX	71

Antenna set 3							
Transmitter Circuit	Brand	Model	Antenna Type	2.4GHz Gain with cable loss (dBi)	5GHz Gain with cable loss (dBi)	Connector Type	Cable Length (mm)
Chain (0)	Wanshih	R3410110203 WSS003	Dipole	2.02	Band 1&2: 1.93 Band 3&4: 2.03	RP-SMA	150
Chain (1)	Wanshih	R3410110203 WSS003	Dipole	2.02	Band 1&2: 1.93 Band 3&4: 2.03	RP-SMA	150

Antenna set 4							
Transmitter Circuit	Brand	Model	Antenna Type	2.4GHz Gain with cable loss (dBi)	5GHz Gain with cable loss (dBi)	Connector Type	Cable Length (mm)
Chain (0)	Long Cheng	FDE_ACBSMA-BGP	Dipole	3.27	Band 1&2&3: 5.436 Band 4: 5.96	RP-SMA	150
Chain (1)	Long Cheng	FDE_ACBSMA-BGP	Dipole	3.27	Band 1&2&3: 5.436 Band 4: 5.96	RP-SMA	150

2.5 Calculation Result of Maximum Conducted Power

For WLAN:

Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
2412-2462	334.326	6.63	20	0.30613	1
5180-5240	78.14	8.45	20	0.10879	1
5260-5320	77.025	8.45	20	0.10724	1
5500-5720	70.29	8.45	20	0.09786	1
5745-5825	65.617	8.97	20	0.10298	1

NOTE:
2.4GHz: Directional gain = 3.62dBi + 10log(2) = 6.63dBi
5GHz:
UNII-1~2C: Directional gain = 5.44dBi + 10log(2) = 8.45dBi
UNII-3: Directional gain = 5.96dBi + 10log(2) = 8.97dBi

For BT-EDR:

Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
2402-2480	4.188	3.62	20	0.00192	1

For BT-LE:

Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
2402-2480	0.9099	3.62	20	0.00042	1

Conclusion:

The formula of calculated the MPE is:

CPD1 / LPD1 + CPD2 / LPD2 + ……etc. < 1

CPD = Calculation power density

LPD = Limit of power density

WLAN (5GHz) + Bluetooth = 0.10879 / 1 + 0.00192 / 1 = 0.11071

Therefore the maximum calculations of above situations are less than the "1" limit.

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