RF Exposure Report

Report No.:	SA170816E06G
FCC ID:	TK4WLT674
Test Model:	WLT674
Received Date:	Aug. 18, 2015
Test Date:	Sep. 23 to Oct. 01, 2015
Issued Date:	Oct. 04, 2018
Applicant:	Compex Systems Pte. Ltd.
Address:	No. 9 Harrison Road, #05-01 Singapore 369651
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.
Test Location (1):	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
Test Location (2):	No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan R.O.C.

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Release Control Record

Issue No.	Description	Date Issued
SA170816E06G	Original release.	Oct. 04, 2018

1 Certificate of Conformity

Product:	Wireless M.2 Type A/E with BLE Module
Brand:	Compex
Test Model:	WLT674
Sample Status:	ENGINEERING SAMPLE
Applicant:	Compex Systems Pte. Ltd.
Test Date:	Sep. 23 to Oct. 01, 2015
Standards:	FCC Part 2 (Section 2.1091) KDB 447498 D01 IEEE C95.1

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 : Mary Ko , **Date:** Oct. 04, 2018

Mary Ko / Specialist

Approved by : , **Date:** Oct. 04, 2018

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				
300-1500	…	…	F/1500	30
1500-100,000	…	…	1.0	30

F = Frequency in MHz

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	Ant. Type	2.4GHz Gain with cable loss (dBi)	5GHz Gain with cable loss (dBi)	2.4GHz Cable Loss (dBi)	5GHz Cable Loss (dBi)	Connector Type	Cable Length (mm)
Chain (0)	WNC	81-EBJ15.005	PIFA	3.00	Band 1&2: 2.56 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: 3.31 Band 4: 2.42	1.15	Band 1&2: 1.70 Band 3: 1.74 Band 4: 1.79	IPEX	300
Antenna Set 2									
Transmitter Circuit	Brand	Model	Ant. Type	2.4GHz Gain with cable loss (dBi)	5GHz Gain with cable loss (dBi)	2.4GHz Cable Loss (dBi)	5GHz Cable Loss (dBi)	Connector Type	Cable Length (mm)
Chain (0)	INPAQ	DAM-I6-H-DB-800-10-17	Dipole	1.13	Band 1&2: 1.33 Band 3: -0.63 Band 4: -0.97	NA	NA	SMA RP Plug	900
Chain (1)	INPAQ	DAM-I6-H-DB-800-10-17	Dipole	1.29	Band 1&2: 1.94 Band 3: -0.49 Band 4: -0.93	NA	NA	SMA RP Plug	900

3 Calculation Result Of Maximum Conducted Power

For WLAN: 15.247 (2.4GHz):

802.11b

Frequency Band (MHz)	Max power Avg. (dBm)	Max power Avg. (mW)	Antenna gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
2412-2472	23.51	224.404	4.22	20	0.11797	1.00

NOTE: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 4.22dBi

2. This power includes tune-up tolerance range.

802.11g

Frequency Band (MHz)	Max power Avg. (dBm)	Max power Avg. (mW)	Antenna gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
2412-2472	22.51	178.25	4.22	20	0.09370	1.00

NOTE: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 4.22dBi

2. This power includes tune-up tolerance range.

VHT20

Frequency Band (MHz)	Max power Avg. (dBm)	Max power Avg. (mW)	Antenna gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
2412-2472	22.51	178.25	4.22	20	0.09370	1.00

NOTE: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 4.22dBi

2. This power includes tune-up tolerance range.

VHT40

Frequency Band (MHz)	Max power Avg. (dBm)	Max power Avg. (mW)	Antenna gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
2422-2462	21.51	141.59	4.22	20	0.07443	1.00

NOTE: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 4.22dBi

2. This power includes tune-up tolerance range.

For WLAN: 15.407 (5GHz):

802.11a

Frequency Band (MHz)	Max power Avg. (dBm)	Max power Avg. (mW)	Antenna gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
5180 - 5240, 5260 - 5320	22.01	158.866	4.65	20	0.09221	1.00
5500 - 5720	22.01	158.866	2.45	20	0.05556	1.00
5745 - 5825	23.01	200	2.06	20	0.06394	1.00

NOTE: 1. 5150~5250MHz: Directional gain = 10 log[($10^{G1/20}$ + $10^{G2/20}$)^2 / 2] = 4.65dBi

2. 5250~5350MHz: Directional gain = 10 log[($10^{G1/20}$ + $10^{G2/20}$)^2 / 2] = 4.65dBi

3. 5470~5725MHz: Directional gain = 10 log[($10^{G1/20}$ + $10^{G2/20}$)^2 / 2] = 2.45dBi

4. 5470~5725MHz: Directional gain = 10 log[($10^{G1/20}$ + $10^{G2/20}$)^2 / 2] = 2.06dBi

5. This power includes tune-up tolerance range.

802.11ac (VHT20)

Frequency Band (MHz)	Max power Avg. (dBm)	Max power Avg. (mW)	Antenna gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
5180 - 5240, 5260 - 5320	22.01	158.866	4.65	20	0.09221	1.00
5500 - 5720	22.01	158.866	2.45	20	0.05556	1.00
5745 - 5825	23.01	200	2.06	20	0.06394	1.00

NOTE: 1. 5150~5250MHz: Directional gain = 10 log[($10^{G1/20}$ + $10^{G2/20}$)^2 / 2] = 4.65dBi

2. 5250~5350MHz: Directional gain = 10 log[($10^{G1/20}$ + $10^{G2/20}$)^2 / 2] = 4.65dBi

3. 5470~5725MHz: Directional gain = 10 log[($10^{G1/20}$ + $10^{G2/20}$)^2 / 2] = 2.45dBi

4. 5470~5725MHz: Directional gain = 10 log[($10^{G1/20}$ + $10^{G2/20}$)^2 / 2] = 2.06dBi

5. This power includes tune-up tolerance range.

802.11ac (VHT40)

Frequency Band (MHz)	Max power Avg. (dBm)	Max power Avg. (mW)	Antenna gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
5190 - 5230 5270 - 5310	22.01	158.866	4.65	20	0.09221	1.00
5510 - 5710	22.01	158.866	2.45	20	0.05556	1.00
5755 - 5795	23.01	200	2.06	20	0.06394	1.00

NOTE: 1. 5150~5250MHz: Directional gain = 10 log[($10^{G1/20}$ + $10^{G2/20}$)^2 / 2] = 4.65dBi

2. 5250~5350MHz: Directional gain = 10 log[($10^{G1/20}$ + $10^{G2/20}$)^2 / 2] = 4.65dBi

3. 5470~5725MHz: Directional gain = 10 log[($10^{G1/20}$ + $10^{G2/20}$)^2 / 2] = 2.45dBi

4. 5470~5725MHz: Directional gain = 10 log[($10^{G1/20}$ + $10^{G2/20}$)^2 / 2] = 2.06dBi

5. This power includes tune-up tolerance range.

802.11ac (VHT80)

Frequency Band (MHz)	Max power Avg. (dBm)	Max power Avg. (mW)	Antenna gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
5210 - 5290	18.01	63.246	4.65	20	0.03671	1.00
5530 - 5690	21.01	126.192	2.45	20	0.04413	1.00
5775	22.01	158.866	2.06	20	0.05079	1.00

NOTE: 1. 5150~5250MHz: Directional gain = 10 log[($10^{G1/20}$ + $10^{G2/20}$)^2 / 2] = 4.65dBi

2. 5250~5350MHz: Directional gain = 10 log[($10^{G1/20}$ + $10^{G2/20}$)^2 / 2] = 4.65dBi

3. 5470~5725MHz: Directional gain = 10 log[($10^{G1/20}$ + $10^{G2/20}$)^2 / 2] = 2.45dBi

4. 5470~5725MHz: Directional gain = 10 log[($10^{G1/20}$ + $10^{G2/20}$)^2 / 2] = 2.06dBi

5. This power includes tune-up tolerance range.

For BT-EDR:

Frequency Band (MHz)	Max power Avg. (dBm)	Max power Avg. (mW)	Antenna gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
2402-2480	11.50	14.125	1.29	20	0.00378	1.00

NOTE: 1. This power includes tune-up tolerance range.

For BT-LE:

Frequency Band (MHz)	Max power Avg. (dBm)	Max power Avg. (mW)	Antenna gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
2402-2480	3	1.995	1.29	20	0.00053	1.00

NOTE: 1. This power includes tune-up tolerance range.

Conclusion:

Both of the Bluetooth and WLAN (5GHz) can transmit simultaneously, the formula of calculated the MPE is:

CPD_1 / LPD_1 + CPD_2 / LPD_2 + ……etc. < 1

CPD = Calculation power density

LPD = Limit of power density

Therefore, the worst-case situation is 0.09221 / 1 + 0.00378 / 1 = 0.096, which is less than “1”.

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