

## RF Exposure Report

**Report No.:** SA150709C20E

**FCC ID:** RSL-TQ4400E

**Test Model:** AT-TQ4400e

**Received Date:** Jul. 09, 2015

**Test Date:** Aug. 01 ~ Oct. 17, 2016

**Issued Date:** Nov. 21, 2016

**Applicant:** Allied Telesis K.K.

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**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

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### Release Control Record

Issue No.	Description	Date Issued
SA150709C20E	Original release.	Nov. 21, 2016

## 1 Certificate of Conformity

**Product:** Outdoor Wireless Access Point

**Brand:** 

**Test Model:** AT-TQ4400e

**Sample Status:** Engineering sample

**Applicant:** Allied Telesis K.K.

**Test Date:** Aug. 01 ~ Oct. 17, 2016

**Standards:** FCC Part 2 (Section 2.1091)  
KDB 447498 D03 (January 17, 2014)  
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 :**  , **Date:** Nov. 21, 2016  
Pettie Chen / Senior Specialist

**Approved by :**  , **Date:** Nov. 21, 2016  
Ken Liu / Senior 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 <sup>2</sup> )	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<sup>2</sup>

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 34cm away from the body of the user. So, this device is classified as **Mobile Device**.

### 3 Calculation Result of Maximum Conducted Power

The following antennas are provided to the EUT

Item	Model Number	Description	Band	Type	Gain (dBi)	Connector	Supplier's model name
1	AT-AN5158-19DP	5GHz, 19dBi gain, dual polarity, panel antenna	5GHz	Panel	19	N type, 2 feed	HG4958-19DP
2	AT-AN5158-16DP	5GHz, 16dBi gain, dual polarity, 120° sector antenna	5GHz	Sector	16	N type, 2 feed	HG5158-16DP-120
3	AT-AN2458-10DP	2.4/5GHz, 10dBi gain, dual polarity, panel antenna	2.4GHz/5GHz	Panel	8dBi/10dBi	N type, 2 feed	HG2458-10DP
4	98615MNXX003	Outdoor 2.4GHz dipole	2.4GHz	Dipole	5	N type	N/A
5	98615UNXX005	Outdoor 5GHz dipole	5GHz	Dipole	7	N type	N/A

The following antenna cables are provided to the EUT.

Item	Model Number	Description	Cable Dia.	Length	Cable loss(dBi)		Supplier's model name
					2.4G	5G	
1	AT-AN0001	RF coaxial cable, 1.2m, N-male to N-male connector	0.240 in. (6.1mm)	4.0ft (1.2m)	-1.62	-3.18	CA-NMNMT004
2	AT-AN0002	RF coaxial cable, 3.0m, N-male to N-male connector	0.405 in. (10.3mm)	10.0ft (3.0m)	-1.82	-2.96	CA3N010
3	AT-AN0003	RF coaxial cable, 6.1m, N-male to N-male connector	0.405 in. (10.3mm)	20.0ft (6.1m)	-2.35	-3.56	CA3N020

\*For 2.4GHz Band: Model: AT-AN0001 was the worst for the final test.

\*For 5GHz Band: Model: AT-AN0002 was the worst for the final test.

The simultaneous operation mode was determined by client as below:

Ant. 3: WLAN 2.4G + Ant. 3: WLAN 5.0G

Ant. 3: WLAN 2.4G + Ant. 2: WLAN 5.0G

Ant. 4: WLAN 2.4G + Ant. 1: WLAN 5.0G

Ant. 3: WLAN 2.4G + Ant. 1: WLAN 5.0G

Frequency Band (MHz)	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
<b>EUT with Antenna 1</b>					
5260-5320	10.89	19.05	34	0.068	1
5500-5700	10.91	19.05	34	0.068	1
5745-5825	19.59	19.05	34	0.503	1
<b>EUT with Antenna 2</b>					
5180-5240	19.07	16.05	34	0.224	1
5260-5320	13.63	16.05	34	0.064	1
5500-5700	13.83	16.05	34	0.067	1
5745-5825	22.59	16.05	34	0.503	1
<b>EUT with Antenna 3</b>					
2412-2462	29.02	9.39	34	0.477	1
5180-5240	21.00	10.05	34	0.088	1
5260-5320	19.41	10.05	34	0.061	1
5500-5700	19.93	10.05	34	0.069	1
5745-5825	27.85	10.05	34	0.424	1
<b>EUT with Antenna 4</b>					
2412-2462	29.02	8.01	34	0.347	1
<b>EUT with Antenna 5</b>					
5180-5240	21.13	10.01	34	0.090	1
5260-5320	20.01	10.01	34	0.069	1
5500-5700	20.54	10.01	34	0.078	1
5745-5825	22.79	10.01	34	0.131	1

Note:

Ant. 1: Directional gain = 19dBi +Cable loss(-2.96) + 10log(2)=19.05dBi

Ant. 2: Directional gain = 16dBi +Cable loss(-2.96) + 10log(2)=16.05dBi

Ant. 3: For 2.4GHz Band: Directional gain = 8dBi +Cable loss(-1.62)+10log(2) = 9.39dBi

For 5.0GHz Band: Directional gain = 10dBi+Cable loss(-2.96)+10log(2)=10.05dBi

Ant. 4: For 2.4GHz: Directional gain = 5dBi + 10log(2) = 8.01dBi

Ant. 5: For 5GHz: Directional gain = 7.00dBi + 10log(2) = 10.01dBi

**CONCLUSION:**

Both of the WLAN 2.4G & WLAN 5G can transmit simultaneously, the formula of calculated the MPE is:

$$CPD1 / LPD1 + CPD2 / LPD2 + \dots \text{etc.} < 1$$

CPD = Calculation power density

LPD = Limit of power density

The simultaneous operation mode was determined by client.

$$\text{Ant. 3: WLAN 2.4G} + \text{Ant. 3: WLAN 5.0G} = 0.477 + 0.424 = 0.901$$

$$\text{Ant. 3: WLAN 2.4G} + \text{Ant. 2: WLAN 5.0G} = 0.477 + 0.503 = 0.980$$

$$\text{Ant. 4: WLAN 2.4G} + \text{Ant. 1: WLAN 5.0G} = 0.347 + 0.503 = 0.850$$

$$\text{Ant. 3: WLAN 2.4G} + \text{Ant. 1: WLAN 5.0G} = 0.477 + 0.503 = 0.980$$

Therefore, the maximum calculation of this situation is 0.980, which is less than the "1" limit.

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