

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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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

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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 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/cm²

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 ²) | Limit (mW/cm ²) |
|---------------------------|-----------------|--------------------|---------------|-------------------------------------|-----------------------------|
| EUT with Antenna 1 | | | | | |
| 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 |
| EUT with Antenna 2 | | | | | |
| 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 |
| EUT with Antenna 3 | | | | | |
| 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 |
| EUT with Antenna 4 | | | | | |
| 2412-2462 | 29.02 | 8.01 | 34 | 0.347 | 1 |
| EUT with Antenna 5 | | | | | |
| 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 +etc. < 1

CPD = Calculation power density

LPD = Limit of power density

The simultaneous operation mode was determined by client.

Ant. 3: WLAN 2.4G + Ant. 3: WLAN 5.0G = 0.477 + 0.424 = 0.901

Ant. 3: WLAN 2.4G + Ant. 2: WLAN 5.0G = 0.477 + 0.503 = 0.980

Ant. 4: WLAN 2.4G + Ant. 1: WLAN 5.0G = 0.347 + 0.503 = 0.850

Ant. 3: WLAN 2.4G + 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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