

RF Exposure Report

Report No.: SA131029E03H

FCC ID: MQT-T103WiFi3GT

Test Model: xAPT-103WiFi.3G

Series Model: xCE_T103WiFi.3G

Received Date: Aug. 17, 2016

Test Date: Aug. 24, 2016

Issued Date: Dec. 07, 2016

Applicant: XAC AUTOMATION CORP.

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PARK,HSINCHU,TAIWAN

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Release Control Record

Issue No.	Description	Date Issued
SA131029E03H	Original release	Dec. 07, 2016

1 Certificate of Conformity

Product: Terminal

Brand: XAC

Test Model: xAPT-103WiFi.3G

Series Model: xCE_T103WiFi.3G

Sample Status: MASS-PRODUCTION

Applicant: XAC AUTOMATION CORP.

Test Date: Aug. 24, 2016

Standards: FCC Part 2 (Section 2.1093)

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. 07, 2016

Wendy Wu / Specialist

Approved by :



Date: Dec. 07, 2016

May Chen / Manager

2 Evaluation Result

Following FCC KDB 447498 D01 “General SAR test exclusion guidance”

The corresponding SAR Exclusion Threshold condition, listed below:

- 1) The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
$$\left[\frac{\text{max. power of channel, including tune-up tolerance, mW}}{\text{min. test separation distance, mm}} \right] \cdot [\sqrt{f(\text{GHz})}]$$
$$\leq 3.0 \text{ for 1-g SAR and } \leq 7.5 \text{ for 10-g extremity SAR, where}$$
 - $f(\text{GHz})$ is the RF channel transmit frequency in GHz.
 - Power and distance are rounded to the nearest mW and mm before calculation.
 - The result is rounded to one decimal place for comparison. The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.
- 2) At 100 MHz to 6 GHz and for test separation distances > 50 mm, the SAR test exclusion threshold is determined according to the following:
 - a) [Threshold at 50 mm in step 1) + (test separation distance - 50mm) · ($f(\text{MHz})/150$)] mW, at 100MHz to 1500 MHz
 - b) [Threshold at 50 mm in step 1) + (test separation distance - 50 mm) · 10] mW at > 1500 MHz and ≤ 6 GHz
- 3) At frequencies below 100 MHz, the following may be considered for SAR test exclusion.
 - a) The threshold at the corresponding test separation distance at 100 MHz in step 2) is multiplied by $[1 + \log(100/f(\text{MHz}))]$ for test separation distances > 50 mm and < 200 mm.
 - b) The threshold determined by the equation in a) for 50 mm and 100 MHz is multiplied by $\frac{1}{2}$ for test separation distances ≤ 50 mm.
 - c) SAR measurement procedures are not established below 100 MHz. When SAR test exclusion cannot be applied, a KDB inquiry is required to determine SAR evaluation requirements for any test results to be acceptable.

3 Antenna Gain

RFID Antenna Spec.

Brand	Model No.	Antenna Type	Antenna Connector	Gain(dBi)	Frequency (MHz)
XAC	PCB ENIG ANT BOARD (W/KEY) 8006(ROHS)	Loop Antenna	NA	13	13.56

GPRS / WCDMA(UMTS) / HSDPA / EDGE Antenna Spec.

Brand	Model No.	Antenna Type	Antenna Connector	Gain(dBi)	Frequency (MHz)
Ethertronics Inc.	T-000084-01	FPCB	NA	0.14	850
				2.57	1900

WLAN Antenna Spec.

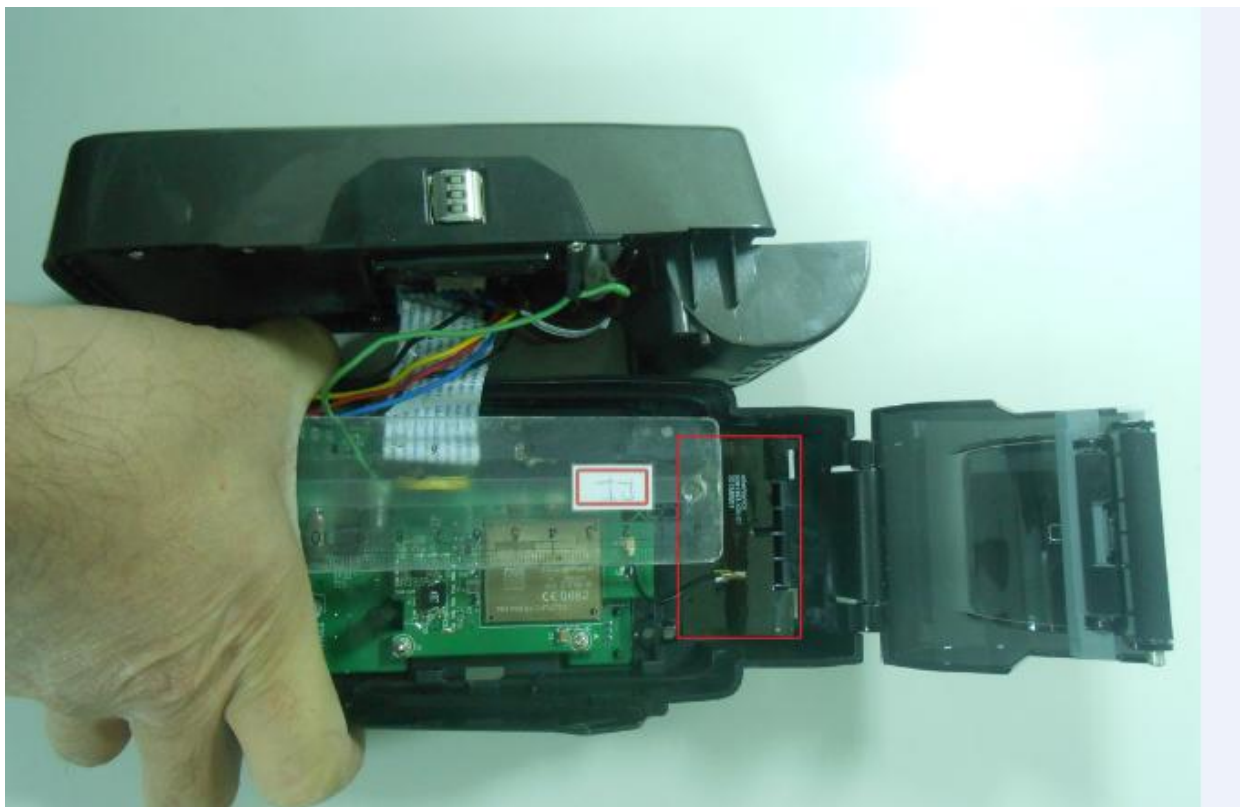
Brand	Model No.	Antenna Type	Antenna Connector	Antenna Gain(dBi) <Including cable loss>	Frequency (MHz)
ACX	AT3216-T2R4 PAA	Chip	NA	1.5	2400-2500

4 SAR Test Exclusion Thresholds

Smallest distance from the antenna and radiating structures or outer surface of the device

The minimum test separation distance is determined by the smallest distance from the antenna and radiating structures or outer surface of the device, according to the host form factor, exposure conditions and platform requirements, to any part of the body or extremity of a user or bystander. (See below figure)





GSM and WCDMA Source-base Time Average Power Table (Cellular mode)

GPRS Mode:

Frequency (MHz)	Conducted power (dBm)	Conducted power (mW)	Source-based time-averaged conducted output power (mW)
848.8	32.3	1698.2	424.6
1909.8	29.4	871	217.8

Note: Calculations for RF Exposure compliance in the cellular and PCS bands are base on the maximum source based time-average power obtained from 2-Slot GPRS operation. The resulting duty cycle factor is 2/8, or 6.02dB.

SAR Test Exclusion Thresholds (Cellular mode)

Frequency	Max. Power (mW) ^{*1}	Min. test separation distance (mm)	SAR test exclusion power thresholds ^{*2} (mW)	Result
848.8	424.6	90	633.3786	Pass
1909.8	217.8	90	671.3546	Pass

^{*1} Max. power obtained from maximum source based time average power.

^{*2} Calculate SAR test exclusion thresholds from “ 1) & 2) ” formulas. (base on 10-g extremity SAR exclusion thresholds)

WiFi Power Table

Mode	Frequency (MHz)	Peak Conducted power (dBm)	Average Conducted power (dBm)
11b	2412	19.41	17.53
	2437	19.53	17.64
	2462	19.49	17.56
11g	2412	21.80	16.56
	2437	21.81	16.57
	2462	21.72	16.43
11n-HT20	2412	21.02	15.30
	2437	21.10	15.42
	2462	21.07	15.40
11n-HT40	2412	21.15	15.36
	2437	21.17	15.40
	2462	21.10	15.33

Maximum Average power for WiFi Mode:

Mode	Frequency (MHz)	Average Conducted power (dBm)	Average Conducted power (mW)
11b	2437	17.64	58.076

Mode	Frequency(MHz)	Time Average Power(mW)
11b	2437	0.00194

Note: The device utilizes IEEE 802.11bgn (WiFi) for complete the payment authentication with the credit card center office. The typical processing time for each transaction is 30 seconds from the user touches or holds the device to the approval of transaction from the credit card company. The product transmits only shortly (maximum 0.001 sec during 30 seconds of authentication period with credit card companies) per transaction. Note: the Transmitter turn-on time 0.001 sec is based on the fact that the slowest air-interface speed for 11bgn is 1Mbps (802.11b) for WiFi technology and the EUT send only 1k bytes per transaction. Accordingly, the EUT uses $1k/1Mbps=0.001$ sec to complete 1k data upload.

Time average power:

Average power experienced by the user = max power x radio-on duty cycle during the operation (30 sec typically, from user touch or hold the device to credit card companies approve or disapprove the transaction) equal to below:

$$58.076 \text{ mW} \times (0.001/30 \text{ sec}) = 0.00194 \text{ mW}$$

SAR Test Exclusion Thresholds (WiFi Mode)

Frequency (GHz)	Time Average Power (mW)	Min. test separation distance (mm)	SAR test exclusion calculation value ^(NOTE 2)	10-g extremity SAR test exclusion thresholds	Result
2.412 ~ 2.462	0.00194	5	0.0006057	7.5	Pass

NOTE: 1. The antenna type is Chip antenna with 1.5dBi gain.
2. Calculate SAR test exclusion thresholds from condition "1" formulas.

RFID Power Table

Mode	Frequency (MHz)	Electric field (dBuV/m) @10m	EIRP (dBm)
RFID	13.56	81.9	-13.33

Field strength is then converted to EIRP as follows:

(i) $EIRP = (E^2 \cdot d) / 30$

where:

E is the field strength in V/m;

d is the measurement distance in meters;

EIRP is the equivalent isotropically radiated power in watts.

(ii) Working in dB units, the above equation is equivalent to: $EIRP[dBm] = E[dB\mu V/m] + 20 \log(d[meters]) - 104.77$

(iii) Or, if d is 3 meters: $EIRP[dBm] = E[dB\mu V/m] - 95.23$

SAR Test Exclusion Thresholds (RFID Mode)

Frequency (MHz)	Max. Power (mW)* ¹	Min. test separation distance (mm)	SAR test exclusion power thresholds * ² (mW)	Result
13.56	0.04645	≤ 50 mm	592.927	Pass

*¹ Max. power obtained from maximum EIRP.

*² Calculate SAR test exclusion thresholds from “3)” formulas. (base on 10-g extremity SAR exclusion thresholds)

5 Conclusion

Since Source-base time average power is below SAR test exclusion power thresholds, the SAR evaluation is not required.

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