



RF Exposure Evaluation Declaration

For

Product Name : 802.11n Wireless ADSL2+ Gateway

MODEL: P-660N-T1A

Trade Name: ZyXEL

FCC ID: I88P660NT1A

Report No.: KS100623B02-RP

Issued to

ZyXEL Communications Corporation

**No. 6, Innovation Rd.II Science Based Industrial
Park,Hsin-Chu,Taiwan**

Prepared by

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Test Report Certification

Product name:	802.11n Wireless ADSL2+ Gateway
Model Number:	P-660N-T1A
Trade Name:	ZyXEL
FCC ID:	I88P660NT1A
Device Category:	Production unit
Date of Receipt:	July 14, 2010
Applicant:	ZyXEL Communications Corporation No. 6, Innovation Rd.II Science Based Industrial Park,Hsin-Chu,Taiwan
Manufacturer:	ZyXEL Communications (WuXi) CO., Ltd Wuxi 60#-E,Minshan Road,New District,Wuxi Jiangsu, PRC
Applicable Standard	FCC OET 65
Test Result	Complied
Performed Location	KunShan Laboratory No.10 Weiye Rd., Innovation park, Eco&Tec, Development Zone, KunShan City, Jiangsu, China. TEL: +86-512-5735-5888 / FAX: +86-512-5737-0818 FCC Registration Number: 238958

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1. FACILITIES AND ACCREDITATIONS

1.1. FACILITIES

All measurement facilities used to collect the measurement data are located at

No.10 Weiye Rd., Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, China.

The sites are constructed in conformance with the requirements of ANSI C63.4:2003 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

1.2. ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

USA	A2LA, FCC
Japan	VCCI
Canada	INDUSTRY CANADA,
Taiwan	TAF
China	CNAS

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

Canada	Industry Canada
Japan	VCCI
Taiwan	BSMI
USA	FCC

Copies of granted accreditation certificates are available for downloading from our web site, <http://www.ccsrf.com>



2. RF EXPOSURE EVALUATION

2.1. LIMITS

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

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)
(A) Limits for Occupational/ Control Exposures				
300-1500	--	--	F/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/ Uncontrolled Exposures				
300-1500	--	--	F/1500	6
1500-100,000	--	--	1	30

F= Frequency in MHz

Calculation

$$\text{Given } E = \frac{\sqrt{30 \times P \times G}}{d} \quad \& \quad S = \frac{E^2}{3770}$$

Where E = Field strength in Volts / meter

P = Power in Watts

G = Numeric antenna gain

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

S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{3770d^2}$$

Changing to units of mW and cm, using:

$$P \text{ (mW)} = P \text{ (W)} / 1000 \text{ and}$$

$$d \text{ (cm)} = d \text{ (m)} / 100$$

Yields

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2}$$

Where d = Distance in cm

P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm²



2.2. EUT SPECIFICATION

EUT	802.11n Wireless ADSL2+ Gateway
Frequency band (Operating)	<input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input type="checkbox"/> WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz <input type="checkbox"/> WLAN: 5.745GHz ~ 5.825GHz <input type="checkbox"/> Others
Device category	<input type="checkbox"/> Portable (<20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others
Exposure classification	<input type="checkbox"/> Occupational/Controlled exposure (S = 5mW/cm ²) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm ²)
Antenna diversity	<input type="checkbox"/> Single antenna <input checked="" type="checkbox"/> Multiple antennas <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input checked="" type="checkbox"/> Tx/Rx diversity
Max. output power	IEEE 802.11b mode: 14.38dBm(27.4mW) IEEE 802.11g mode: 15.12dBm(32.5mW) IEEE 802.11gn Standard-20 MHz Channel mode:14.92dBm(31.0mW) IEEE 802.11gn Wide-40 MHz Channel mode: 15.25dBm(33.5mW)
Antenna gain (Max)	Gain 3.5dBi(2.24)(2.4GHz)
Evaluation applied	<input checked="" type="checkbox"/> MPE Evaluation* <input type="checkbox"/> SAR Evaluation <input type="checkbox"/> N/A

Remark:

1. DTS device is not subject to routine RF evaluation; MPE estimate is used to justify the compliance.
2. For mobile or fixed location transmitters, no SAR consideration applied. The maximum power density is 1.0 mW/cm² even if the calculation indicates that the power density would be larger.



2.3. TEST RESULT OF RF EXPOSURE EVALUATION

Antenna Gain:

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 3.5dBi or 2.24 in Numeric Antenna gain.

Output Power into Antenna & RF Exposure Evaluation Distance:

Test Mode	Frequency Band (MHz)	Maximum Output Power to Antenna (mW)	Power Density at d = 20 cm (mW/cm ²)
IEEE 802.11b	2.412GHz ~ 2.462	27.4	0.0122
IEEE 802.11g	2.412GHz ~ 2.462	32.5	0.0145
IEEE 802.11gn (20MHz)	2.412GHz ~ 2.462	31.0	0.0138
IEEE 802.11gn (40MHz)	2.422GHz ~ 2.452	33.5	0.0149

(For mobile or fixed location transmitters, the maximum power density is 1.0 mW/cm² even if the calculation indicates that the power density would be larger.)