EN 62311 EMF EVALUATION REPORT

FOR

Applicant	**:**	Protech Electronics & Technology Limited
Address	**:**	12A floor, Building 12, ZHX Innovation Industrial City, No. 12th, Ganli 6 Road, Jihua Street, Longgang District, Shenzhen, China
Equipment under Test	**:**	Wireless Extender
Model No.	**:**	PET100W, PET100W-R
Trade Mark	**:**	/
Manufacturer	**:**	Protech Electronics & Technology Limited
Address	**:**	12A floor, Building 12, ZHX Innovation Industrial City, No. 12th, Ganli 6 Road, Jihua Street, Longgang District, Shenzhen, China

Issued By: Dongguan Dongdian Testing Service Co., Ltd.

Add: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan City, Guangdong Province, China, 523808

Tel: +86-0769-38826678, **E-mail:** ddt@dgddt.com, http://www.dgddt.com

REPORT

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TEST REPORT DECLARE

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Address	:	12A floor, Building 12, ZHX Innovation Industrial City, No. 12th, Ganli 6 Road, Jihua Street, Longgang District, Shenzhen, China

Test Assess Standard Used:

EN 62311:2008, Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz – 300 GHz)

We Declare:

The equipment described above is tested and assessed by Dongguan Dongdian Testing Service Co., Ltd and in the configuration assessed the equipment complied with the standards specified above. The assessed results are contained in this test report and Dongguan Dongdian Testing Service Co., Ltd is assumed of full responsibility for the accuracy and completeness of these assess.

After test and evaluation, our opinion is that the equipment provided for test compliance with the requirement of the above CE standards.

Report No:	DDT-R19080620-1E3		
Date of Receipt:	Aug. 15, 2019	**Date of Test:**	Aug. 15, 2019 ~ Sep. 12, 2019

Prepared By: ***Approved By:***

Sam Li

Sam Li/Engineer ***Damon Hu/EMC Manager***

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Dongguan Dongdian Testing Service Co., Ltd.

Revision history

Rev.	Revisions	Issue Date	Revised By
---	Initial issue	Sep. 16, 2019	

1 General information

1.1. Description of Equipment

EUT* Name	:	Wireless Extender
Model Number	:	PET100W, PET100W-R
Model Differences		PET100W-T is a transmitting signal equipment, PET100W-R is a receiving signal equipment.
EUT function description	:	Please reference user manual of this device
Power supply	:	DC 5V, powered by an external adapter
Hardware Version	:	V1.1
Software Version	:	V1.0.0.5
Radio Specification	:	IEEE802.11a
Operation frequency	:	5765MHz
Modulation	:	IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK)
Transmitter rate	:	IEEE 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps
Antenna Type	:	Dedicated SMA antenna, maximum PK gain: 5 dBi
Sample Type	:	Series production

1.2. Assess Standard

EN 62311:2008: Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz – 300 GHz)

1.3. Assess laboratory

Dongguan Dongdian Testing Service Co., Ltd.

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CNAS Accreditation No. L6451; A2LA Accreditation No. 3870.01

FCC Designation Number: CN1182; FCC Test Firm Registration Number: 540522

Industry Canada site registration number: 10288A-1

2 Limit

2.1. Basic Restrictions Reference levels

Council Recommendation 99/519/EC Annex II

Basic restrictions for electric, magnetic and electromagnetic fields (0Hz to 300GHz)

Frequency range	Magnetic flux density (mT)	Current density (Ma/m2) (rms)	Whole body average SAR (W/kg)	Localised SAR (head and trunk) (W/kg)	Localised SAR (limbs) (W/kg)	Power density (W/m2)
0Hz	40	-	-	-	-	-
>0-1Hz	-	8	-	-	-	-
1-4Hz	-	8/f	-	-	-	-
4-1000Hz	-	2	-	-	-	-
1000Hz-100kHz	-	f/500	-	-	-	-
100kHz-10MHz	-	f/500	0.08	2	4	-
10MHz-10GHz	-	-	0.08	2	4	-
10-300GHz	-	-	-	-	-	10

Note:

(1) f is the frequency in Hz.

(2) The basic restriction on the current density is intended to protect against acute exposure effects on central nervous system tissues in the head and trunk of the body and includes a safety factor. The basic restrictions for ELF fields are based on established adverse effects on the central nervous system. Such acute effects are essentially instantaneous and there is no scientific justification to modify the basic restrictions for exposure of short duration. However, since the basic restriction refers to adverse effects on the central nervous system, this basic restriction may permit higher current densities in body tissues other than the central nervous system under the same exposure conditions.

(3) Because of electrical inhomogeneity of the body, current densities should be averaged over a cross section of 1cm2 perpendicular to the current direction.

(4) For frequencies up to 100 kHz, peak current density values can be obtained by multiplying the rms value by √2(=1.414). For pulses of duration tp the equivalent frequency to apply in the basic restrictions should be calculated as=1/(2tp)

(5) For frequencies up to 100kHz and for pulsed magnetic fields, the maximum current density associated with the pulses can be calculated from the rise/fall times and the maximum rate of change of magnetic flux density. The induced current density can then be compared with the appropriate basic restriction.

(6) All SAR values are to be averaged over any six-minute period.

(7) Localised SAR averaging mass is any 10g of contiguous tissue; the maximum SAR so obtained should be the value used for the estimation of exposure. These 10g of tissue are intended to be a mass of contiguous tissue with nearly homogeneous electrical properties. In specifying a contiguous mass of tissue, it is recognised that this concept can be used in computational dosimetry but may present difficulties for direct physical measurements. A simple geometry such as cubic tissue mass can be used provided that the calculated dosimetric quantities have conservation values relative to the exposure guidelines.

(8) For pulses of duration tp the equivalent frequency to apply in the basic restrictions should be calculated as=1/(2tp). Additionally, for pulsed exposures, in the frequency range 0,3 to 10GHz and for localised exposure of the head, in order to limit and avoid auditory effects caused by thermoelastic expansion, an additional basic restriction is recommended. This is that SA should not exceed 2mJ kg-1 averaged over 10g of tissue.

2.2. Reference Levels

Council Recommendation 99/519/EC Annex III

Reference levels for electric, magnetic and electromagnetic fields (0Hz to 300GHz)

Frequency range	E-field strength (V/m)	H-field strength (A/m)	B-field (μT)	Equivalent plane wave power density Seq (W/m2)
0-1Hz	-	$3,2\times10^4$	4×10^4	-
1-8Hz	1000	$3,2\times10^4/f^2$	$4\times10^4/f^2$	-
8-25Hz	1000	4000/f	5000/f	-
0.025Hz-0,8kHz	250/f	4/f	5/f6,25	-
0,8-3kHz	250/f	5	6,25	-
3-150kHz	87	5	6,25	-
0,15-1MHz	87	0.73/f	0,92/f	-
1-10MHz	$87/f^{1/2}$	0.73/f	0,92/f	-
10-400MHz	28	0.073	0,092	2
400-2000MHz	$1,375\ f^{1/2}$	$0,0037\ f^{1/2}$	$0,0046f^{1/2}$	f/200
2-300GHz	61	0,16	0,20	10

Note:

(1) As indicated in the frequency range column.

(2) For frequencies between 100kHz and 10GHz, Seq, E2, H2 and B2 are to be averaged over any six-minute period.

(3) For frequencies exceeding 10GHz, Seq, E2, H2 and B2 are to be averaged over any 68/.1.05-minute period (.in GHz).

(4) No E-field value is provided for frequencies <1Hz, which are effectively static electric fields. For most people the annoying perception of surface electric charges will not occur at field strengths less than 20kV/m. Spark discharges causing stress or annoyance should be avoided.

2.3. Limit calculations for radiated electric field strength measurement

For the calculation of the limits, the near field proportionality factor 1/d3 has been used. For ten times the distance, the level is decreased by the cubical, giving 60 dB.

Frequency range	EMF Limit V/m at 0.3m	Limit V/m at 3m	Limit (add. span)
30MHz 400MHz	28V/m(149dBuV/m)	89dBuV/m	69dBuV/m
400MHz – 2GHz	27.5V/m- 61.5V/m	89dBuV/m----- 95dBuV/m	69dBuV/m------- 75dBuV/m
	149dBuV/m – 155dBuV/m		
2GHz – 300GHz	61V/m(155dBuV/m)	95dBuV/m	75dBuV/m

To deal with reflexions, other effects due to the measurement in 3 m distance and to deal with a measurement uncertainty of at least 5 dB, an additional span of 20 dB has been added. For additional three times the distance, the level is decreased by additional 30 dB.

Frequency range	Limit V/m at 0.3m	Limit V/m at 3m	Limit (add. span)
30MHz 400MHz	28V/m(149dBuV/m)	69dBuV/m	39dBuV/m
400MHz – 2GHz	27.5V/m- 61.5V/m	69dBuV/m	39dBuV/m
	149dBuV/m – 155dBuV/m	75dBuV/m	45dBuV/m
2GHz – 300GHz	61V/m(155dBuV/m)	75dBuV/m	45dBuV/m

Limits for radiated field according to EN 55022 / CISPR 22 for a class B appliance:

Frequecncy Range	Limit dBuV/m at 3m Peak	Limit dBuV/m at 3m QP or Average
30MHz – 230MHz	/	40dBuV/m quasi-peak
230MHz -1GHz	/	47dBuV/m quasi-peak
1GHz-3GHz	70dBuV/m peak	50dBuV/m average
3GHz-6GHz	74dBuV/m peak	54dBuV/m average

Conclusion: If the requirements for radiated emissions according to EN 55022 / CISPR 22 or other standards with the same limits are fulfilled, also the EMF requirements for the measured frequency range are fulfilled.

3 Assess Result of fundamental emission

3.1. Details of Assess

Predication of MPE limit at a given distance

Equation from Annex A of EN 62311

$$E=\frac{\sqrt{30PG}}{r}$$

Where: E= E-field strength (V/m)

P=power input to antenna (Watt)

G=power gain of the antenna in the direction of interest relative to an isotropic radiator

r=distance to the center of radiation of the antenna

From the maximum EUT RF output power, the minimum mobile separation distance, r=0.2m, as well as the gain of the used antenna is 5 dBi, the RF power density can be obtained.

Mode	Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (Max.) (dBm)	Output Power (W)	Antenna Gain (Numeric)	E-field strength at 20 cm (V/m)	E-field strength Limit (V/m)
5G WIFI	5765	20.00	13.91	0.0246	3.16	7.64	61.00

END OF REPORT