Maximum Permissible Exposure Report

Product	:	4K UHD Wireless Presentation Receiver
Model Name	:	WFD-5000 PRO
FCC ID	:	BY4WFD5000PRO
Test Regulation	:	47 CFR FCC Part 2.1091
Received Date	:	2021/8/18 , 2021/11/22
Test Date	:	2021/8/18 ~ 2021/12/2
Issued Date	:	2022/1/11
Applicant	:	Trans Electric Co., Ltd 771 Sec.2 Chungsan Rd, Huatang, Changhua, Taiwan 503
Issued By	:	Underwriters Laboratories Taiwan Co., Ltd. Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Testing Laboratory
3398

REVISION HISTORY

Original Test Report No.: 4790186607-US-R2-V0

Rev.	Test report No.	Date	Page revised	Contents
Original	4790186607-US-R2-V0	2022/1/11	-	Initial issue

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1. Attestation of Test Results

APPLICANT:	Trans Electric Co., Ltd 771 Sec.2 Chungsan Rd, Huatang, Changhua, Taiwan 503
MANUFACTURER:	Trans Electric Co., Ltd 771 Sec.2 Chungsan Rd, Huatang, Changhua, Taiwan 503
EUT DESCRIPTION:	4K UHD Wireless Presentation Receiver
BRAND:	PX
MODEL:	WFD-5000 PRO
SAMPLE STAGE:	Engineering Verification Test sample

APPLICABLE STANDARDS	
STANDARD	**Test Results**
47 CFR FCC PART 2.1091	PASS

Underwriters Laboratories Taiwan Co., Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by Underwriters Laboratories Taiwan Co., Ltd. based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Underwriters Laboratories Taiwan Co., Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Underwriters Laboratories Taiwan Co., Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Prepared By:

Sally Lu Date : 2022/1/11
Project Handler

Approved and Authorized By:

Waternil Guan Date : 2022/1/11
Engineer

Test Methodology and Reference Procedures

The tests documented in this report were performed in accordance with KDB 447498 D01 General RF Exposure Guidance v06.

2. Facilities and Accreditation

Test Location	Underwriters Laboratories Taiwan Co., Ltd.
Address	Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan
Accreditation Certificate	Underwriters Laboratories Taiwan Co., Ltd. is accredited by TAF, Laboratory Code 3398.

3. Equipment Under Test

3.1. Description of EUT

Product Name	4K UHD Wireless Presentation Receiver	
Brand Name	PX	
Model Name	WFD-5000 PRO	
Operating Frequency	WLAN	**2.4GHz:** 2412MHz ~ 2462MHz **5GHz:** 5180MHz ~ 5240MHz 5745MHz ~ 5825MHz
Modulation	WLAN	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM
Number of Channel	2.4G WLAN 2412 ~ 2462 MHz	11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40)
	5G WLAN 5180 ~ 5240 MHz	4 for 802.11a, 802.11n (HT20), 802.11ac (VHT20)
		2 for 802.11n (HT40), 802.11ac (VHT40)
		1 for 802.11ac (VHT80)
	5G WLAN 5745 ~ 5825 MHz	5 for 802.11a, 802.11n (HT20), 802.11ac (VHT20)
		2 for 802.11n (HT40), 802.11ac (VHT40)
		1 for 802.11ac (VHT80)
Normal Voltage	5Vdc from adapter	
Sample ID	Conducted Test: 4194515, 4423811 Radiated Test: 4194514, 4423811	
Software Version	00.0003.07.20190211	

Note:

1. The EUT provides one completed transmitters and one receivers.

Modulation Mode	Tx,Rx Function
802.11a	1TX,1RX
802.11b	1TX,1RX
802.11g	1TX,1RX
802.11n (HT20)	1TX,1RX
802.11n (HT40)	1TX,1RX
802.11ac (VHT20)	1TX,1RX
802.11ac (VHT40)	1TX,1RX
802.11ac (VHT80)	1TX,1RX

2. The EUT contains following accessory devices:

Product	Brand	Model	Description
Type C USB Cable	PX	F1563G	Length: 1m

3. The EUT have two optional crystal as the following table:

Brand Name	Model	Location
HSIA	CH3227.000A20A3H	Y1
HSIA	X32-27.000-20	Y1

These two kinds of crystal are not RF-related circuits, and it doesn't affect the performance of the RF. Per pretest, CH3227.000A20A3H with the worst characteristics. The presentation of test reports is represented by this model.

4. The above EUT information is declared by manufacturer and for more detailed features description, please refer the manufacturer's or user's manual.

3.2. Description of Available Antennas

Ant. No.	Transmitter Circuit	Brand Name	Model Name	Ant. Type	Maximum Gain (dBi)
1	Chain (0)	PX	PX_Wifi	PCB PIFA	2.4GHz: -7 5GHz: -7

Note: The above antenna information was provided from customer and for more detailed features description, please refer the manufacturer's specification or user's manual.

4. Requirement

Limits for General Population/Uncontrolled Exposure

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (E) (V/m)**	**Magnetic Field Strength (H) (A/m)**	**Power Density (S) (mW/cm^2)**	**Averaging Time |E|2, |H|2 or S (minutes)**
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	*180/f^2	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30
Note 1: f = frequency in MHz, * means Plane-wave equivalent power density				
Note 2: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.				

Power Density (S) is calculated by the following formula:

$S=(P*G)/4\pi R^2$

where: S = power density (in appropriate units, e.g. mW/cm^2)
P = power input to the antenna (in appropriate units, e.g., mW)
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 (appropriate units, e.g., cm)

5. Radio Frequency Radiation Exposure Evaluation

WLAN 2.4GHz

Evaluation Frequency (MHz)	Max. Average power (dBm)	Directional Gain (dBi)	Max. EIRP (dBm)	Max. EIRP (mW)	Power density @ 20 cm (mW/cm^2)	Limit (mW/cm^2)
2412 ~ 2462	16.92	-7.00	9.92	9.817	0.00195	1

WLAN 5GHz

Evaluation Frequency (MHz)	Max. Average power (dBm)	Directional Gain (dBi)	Max. EIRP (dBm)	Max. EIRP (mW)	Power density @ 20 cm (mW/cm^2)	Limit (mW/cm^2)
5180 ~ 5240	15.00	-7.00	8.00	6.310	0.00126	1
5745 ~ 5825	15.05	-7.00	8.05	6.383	0.00127	1

Note:
1. Max. EIRP (dBm) = Max. Average power (dBm) + Antenna Gain (dBi)
2. Max. EIRP (mW) = $10^{(\text{Max. EIRP (dBm)} / 10)}$
3. Power density (mW/cm^2) = Max. EIRP (mW) / [$4 \times \pi \times (\text{calculated distance})^2$], the calculated distance is 20 cm.

Conclusion:

The WLAN 2.4GHz and WLAN 5GHz 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

WLAN 2.4GHz + WLAN 5GHz = 0.00195 + 0.00127 = 0.00322

Therefore the maximum calculations of above situations are less than the “1” limit.

According to 47 CFR §2.1091, the RF exposure analysis concludes that the RF Exposure is FCC compliant.

END OF REPORT