

RF EXPOSURE EVALUATION REPORT

FCC ID : 2AUPE-8959
Equipment : Digital Media Receiver
Model Name : T4E4AT
Applicant : Turley White LLC
35 Village Road, Suite 100 Middleton,
MA 01949 United States
Standard : 47 CFR Part 2.1091

We, SPORTON INTERNATIONAL INC has been evaluated this product in accordance with 47 CFR Part 2.1091 and it complies with applicable limit.

The results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 1190) and the FCC designation No. TW1190 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC evaluation.



Approved by: Cona Huang / Deputy Manager

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



Table of Contents

1. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)	4
2. MAXIMUM RF AVERAGE OUTPUT POWER AMONG PRODUCTION UNITS	5
3. RF EXPOSURE LIMIT INTRODUCTION	10
4. RADIO FREQUENCY RADIATION EXPOSURE EVALUATION	11
4.1. Standalone Power Density Calculation	11
4.2. Collocated Power Density Calculation.....	11



History of this test report

Report No.	Version	Description	Issued Date
FA020110-01	Rev. 01	Initial issue of report	Jul. 21, 2020

**1. Description of Equipment Under Test (EUT)**

Product Feature & Specification	
EUT Type	Digital Media Receiver
Model Name	T4E4AT
FCC ID	2AUPE-8959
Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2412 MHz ~ 2472 MHz WLAN 5.2GHz Band: 5150 MHz ~ 5250 MHz WLAN 5.3GHz Band: 5250 MHz ~ 5350 MHz WLAN 5.6GHz Band: 5470 MHz ~ 5725 MHz WLAN 5.8GHz Band: 5725 MHz ~ 5825 MHz Bluetooth: 2400 MHz ~ 2483.5 MHz LoRa: 902MHz ~ 928MHz Zigbee: 2405 MHz ~ 2480 MHz
Mode	WLAN: 802.11a/b/g/n/ac HT20/HT40/VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE LoRa/FSK: DTS/FHSS Zigbee: BPSK

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

Reviewed by: Jason Wang

Report Producer: Daisy Peng

2. Maximum RF average output power among production units

Band / Mode	Average Power (dBm)			
	BR / EDR			GFSK
	1M	2M	3M	LE/BLE 1M/2M
Bluetooth	14	12.5	12.5	6

Band / Mode	Average Power (dBm)			
	250K			
	2405 MHz	2435 MHz	2475 MHz	2480 MHz
Zigbee	16.5	16.5	16.5	7.5

Band / Mode	Average Power (dBm)		
	902.5 MHz	914.5 MHz	926.5 MHz
LoRa DTS	18.5	18.5	18

Band / Mode	Average Power (dBm)		
	902.2 MHz	915 MHz	927.8 MHz
LoRa FHSS	18.5	18.5	18

Band / Mode	Average Power (dBm)		
	902.2 MHz	915 MHz	927.8 MHz
FSK FHSS 50kbps	18.5	18.5	18

Band / Mode	Average Power (dBm)		
	902.4 MHz	914.8 MHz	927.6 MHz
FSK FHSS 150kbps	18.5	18.5	18

Band / Mode	Average Power (dBm)		
	902.5 MHz	915 MHz	927.5 MHz
FSK FHSS 250kbps	18.5	18.5	18

2.4GHz WLAN ANT 1+2 (CDD)					
2.4GHz WLAN ANT 1+2	Mode	Channel	Frequency (MHz)	Data Rate	Tune-Up Limit
	802.11b	CH 1	2412	1Mbps	19
		CH 6	2437		19
		CH 11	2462		19.5
		CH 12	2467		17.5
		CH 13	2472		14.5
	802.11g	CH 1	2412	6Mbps	19
		CH 6	2437		19
		CH 11	2462		19.5
		CH 12	2467		14.5
		CH 13	2472		9
	802.11n-HT20	CH 1	2412	MCS0	18.5
		CH 6	2437		19
		CH 11	2462		19.5
		CH 12	2467		14.5
		CH 13	2472		7.5

5.2GHz WLAN ANT 1+2 (CDD)					
5.2GHz WLAN ANT 1+2	Mode	Channel	Frequency (MHz)	Data Rate	Tune-Up Limit
	802.11a	CH 36	5180	6Mbps	20.5
		CH 44	5220		20.5
		CH 48	5240		20.5
	802.11n-HT20	CH 36	5180	MCS0	20
		CH 44	5220		20
		CH 48	5240		20
	802.11n-HT40	CH 38	5190	MCS0	19
		CH 46	5230		20
	802.11ac-VHT20	CH 36	5180	MCS0	20
		CH 44	5220		20
		CH 48	5240		20
	802.11ac-VHT40	CH 38	5190	MCS0	19
		CH 46	5230		20
	802.11ac-VHT80	CH 42	5210	MCS0	18

5.3GHz WLAN ANT 1+2(CDD)					
5.3GHz WLAN ANT 1+2	Mode	Channel	Frequency (MHz)	Data Rate	Tune-Up Limit
	802.11a	CH 52	5260	6Mbps	20.5
		CH 60	5300		20.5
		CH 64	5320		20.5
	802.11n-HT20	CH 52	5260	MCS0	20
		CH 60	5300		20.5
		CH 64	5320		19.5
	802.11n-HT40	CH 54	5270	MCS0	20
		CH 62	5310		19
	802.11ac-VHT20	CH 52	5260	MCS0	20
		CH 60	5300		20
		CH 64	5320		19.5
	802.11ac-VHT40	CH 54	5270	MCS0	20
		CH 62	5310		19
	802.11ac-VHT80	CH 58	5290	MCS0	17.5

5.5GHz WLAN ANT 1+2(CDD)					
5.5GHz WLAN ANT 1+2	Mode	Channel	Frequency (MHz)	Data Rate	Tune-Up Limit
	802.11a	CH 100	5500	6Mbps	19
		CH 116	5580		19
		CH 140	5700		17.5
		CH 144	5720		20
	802.11n-HT20	CH 100	5500	MCS0	20
		CH 116	5580		20
		CH 140	5700		17
		CH 144	5720		19.5
	802.11n-HT40	CH 102	5510	MCS0	18.5
		CH 110	5550		19.5
		CH 134	5670		19
		CH 142	5710		19.5
	802.11ac-VHT20	CH 100	5500	MCS0	19.5
		CH 116	5580		19.5
		CH 140	5700		17
		CH 144	5720		19.5
	802.11ac-VHT40	CH 102	5510	MCS0	18.5
		CH 110	5550		19.5
		CH 134	5670		19
		CH 142	5710		19.5
	802.11ac-VHT80	CH 106	5530	MCS0	17
		CH 122	5610		19.5
		CH 138	5690		19.5

5.8GHz WLAN ANT 1+2 (CDD)					
5.8GHz WLAN ANT 1+2	Mode	Channel	Frequency (MHz)	Data Rate	Tune-Up Limit
	802.11a	CH 149	5745	MCS0	19.5
		CH 157	5785		19.5
		CH 165	5825		20
	802.11n-HT20	CH 149	5745	MCS0	19.5
		CH 157	5785		19.5
		CH 165	5825		20
	802.11n-HT40	CH 151	5755	MCS0	19.5
		CH 159	5795		19.5
	802.11ac-VHT20	CH 149	5745	MCS0	19.5
		CH 157	5785		19.5
		CH 165	5825		20
	802.11ac-VHT40	CH 151	5755	MCS0	19.5
		CH 159	5795		19.5
	802.11ac-VHT80	CH 155	5775	MCS0	19

3. RF Exposure Limit Introduction

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f ²)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
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

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$S = \frac{PG}{4\pi R^2}$$

Where:

S = Power Density

P = Output Power at Antenna Terminals

G = Gain of Transmit Antenna (linear gain)

R = Distance from Transmitting Antenna

4. Radio Frequency Radiation Exposure Evaluation

4.1. Standalone Power Density Calculation

Band	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
2.4GHz WLAN	4.89	19.50	24.390	0.275	274.789	0.055	1.000	0.055
5GHz WLAN	4.32	20.50	24.820	0.303	303.389	0.060	1.000	0.060
Bluetooth	2.34	14.00	16.340	0.043	43.053	0.009	1.000	0.009
LoRa/FSK	-0.48	18.50	18.020	0.063	63.387	0.013	0.601	0.021
Zigbee	2.15	16.50	18.650	0.073	73.282	0.015	1.000	0.015

4.2. Collocated Power Density Calculation

WLAN Power Density / Limit	Bluetooth Power Density / Limit	LoRa / FSK Power Density / Limit	Zigbee Power Density / Limit	Σ (Power Density / Limit) of WLAN+Bluetooth+LoRa/FSK+Zigbee
0.060	0.009	0.021	0.015	0.105

Note:

1. Σ (Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for WLAN + Bluetooth + LoRa + Zigbee.
2. Considering the WLAN module collocation with the Bluetooth, LoRa and Zigbee transmitter of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1, and MPE of 4 collocated transmitters is compliant

Conclusion:

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