



# RF EXPOSURE EVALUATION REPORT

**FCC ID** : 2AVVJ-5273  
**Equipment** : Digital Media Receiver  
**Model Name** : L4S3RE  
**Applicant** : Coral Creep LLC  
BROWNSBORO CROSSING  
9850 VON ALLEN COURT, SUITE 201, LOUISVILLE, KENTUCKY,  
40241  
**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**

<b>1. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT) .....</b>	<b>4</b>
<b>2. MAXIMUM RF AVERAGE OUTPUT POWER AMONG PRODUCTION UNITS .....</b>	<b>5</b>
<b>3. RF EXPOSURE LIMIT INTRODUCTION .....</b>	<b>9</b>
<b>4. RADIO FREQUENCY RADIATION EXPOSURE EVALUATION .....</b>	<b>10</b>
4.1. Standalone Power Density Calculation .....	10
4.2. Collocated Power Density Calculation.....	10



### History of this test report

Report No.	Version	Description	Issued Date
FA012305-01	Rev. 01	Initial issue of report	Jul. 03, 2020
FA012305-01	Rev. 02	Update antenna gain of LoRa to 2.92 dBi	Jul. 22, 2020



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

Product Feature & Specification	
<b>EUT Type</b>	Digital Media Receiver
<b>Model Name</b>	L4S3RE
<b>FCC ID</b>	2AVVJ-5273
<b>Wireless Technology and Frequency Range</b>	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 ~ 2475 MHz
<b>Mode</b>	WLAN: 802.11a/b/g/n/ac HT20/HT40/VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE LoRa: 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
Bluetooth	13.5	12	12	6.5

Band / Mode	Average Power (dBm)		
	250K		
	2405 MHz	2440 MHz	2475 MHz
Zigbee	14.5	13.5	10.5

Band / Mode	Average Power (dBm)		
	902.5 MHz	914.5 MHz	926.5 MHz
LoRa DTS	20.5	21.5	21.0

Band / Mode	Average Power (dBm)		
	902.2 MHz	915 MHz	927.8 MHz
LoRa FHSS	21.5	21.5	21.0

Band / Mode	Average Power (dBm)		
	902.2 MHz	915 MHz	927.8 MHz
FSK FHSS 50kbps	21.5	21.5	21.0

Band / Mode	Average Power (dBm)		
	902.4 MHz	914.8 MHz	927.6 MHz
FSK FHSS 150kbps	21.5	21.5	21.0

Band / Mode	Average Power (dBm)		
	902.5 MHz	915 MHz	927.5 MHz
FSK FHSS 250kbps	21.5	21.5	21.0



2.4GHz WLAN ANT 0+1	Mode	Channel	Frequency (MHz)	Data Rate	Tune-Up Limit
	802.11b	CH 1	2412	1Mbps	20.50
		CH 6	2437		20.00
		CH 11	2462		20.00
		CH 12	2467		18.00
		CH 13	2472		14.50
	802.11g	CH 1	2412	6Mbps	19.00
		CH 6	2437		20.00
		CH 11	2462		18.50
		CH 12	2467		16.00
		CH 13	2472		13.50
	802.11n-HT20	CH 1	2412	MCS0	18.50
		CH 6	2437		20.00
		CH 11	2462		18.50
		CH 12	2467		16.00
CH 13		2472	9.50		

5.2GHz WLAN ANT 0+1	Mode	Channel	Frequency (MHz)	Data Rate	Tune-Up Limit
	802.11a	CH 36	5180	6Mbps	19.50
		CH 44	5220		19.00
		CH 48	5240		19.00
	802.11n-HT20	CH 36	5180	MCS0	19.00
		CH 44	5220		19.00
		CH 48	5240		19.00
	802.11n-HT40	CH 38	5190	MCS0	19.00
		CH 46	5230		18.50
	802.11ac-VHT20	CH 36	5180	MCS0	19.00
		CH 44	5220		19.00
		CH 48	5240		18.50
	802.11ac-VHT40	CH 38	5190	MCS0	19.00
		CH 46	5230		18.50
	802.11ac-VHT80	CH 42	5210	MCS0	18.50



5.3GHz WLAN ANT 0+1	Mode	Channel	Frequency (MHz)	Data Rate	Tune-Up Limit
	802.11a	CH 52	5260	6Mbps	19.00
		CH 60	5300		19.50
		CH 64	5320		19.50
	802.11n-HT20	CH 52	5260	MCS0	19.00
		CH 60	5300		19.50
		CH 64	5320		19.50
	802.11n-HT40	CH 54	5270	MCS0	19.00
		CH 62	5310		19.00
	802.11ac-VHT20	CH 52	5260	MCS0	19.00
CH 60		5300	19.50		
CH 64		5320	19.50		
802.11ac-VHT40	CH 54	5270	MCS0	19.00	
	CH 62	5310		18.50	
802.11ac-VHT80	CH 58	5290	MCS0	15.50	

5.5GHz WLAN ANT 0+1	Mode	Channel	Frequency (MHz)	Data Rate	Tune-Up Limit
	802.11a	CH 100	5500	6Mbps	19.50
		CH 116	5580		19.50
		CH 140	5700		18.00
		CH 144	5720		19.50
	802.11n-HT20	CH 100	5500	MCS0	19.50
		CH 116	5580		19.50
		CH 140	5700		17.50
		CH 144	5720		19.50
	802.11n-HT40	CH 102	5510	MCS0	18.50
		CH 110	5550		19.50
		CH 134	5670		19.00
		CH 142	5710		19.00
	802.11ac-VHT20	CH 100	5500	MCS0	19.50
		CH 116	5580		19.50
		CH 140	5700		17.50
		CH 144	5720		19.50
	802.11ac-VHT40	CH 102	5510	MCS0	18.50
		CH 110	5550		19.50
		CH 134	5670		19.00
CH 142		5710	19.00		
802.11ac-VHT80	CH 106	5530	MCS0	17.50	
	CH 122	5610		19.00	
	CH 138	5690		18.50	



	Mode	Channel	Frequency (MHz)	Data Rate	Tune-Up Limit
5.8GHz WLAN ANT 0+1	802.11a	CH 149	5745	MCS0	19.50
		CH 157	5785		19.50
		CH 165	5825		19.00
	802.11n-HT20	CH 149	5745	MCS0	19.50
		CH 157	5785		19.50
		CH 165	5825		19.00
	802.11n-HT40	CH 151	5755	MCS0	19.50
		CH 159	5795		19.50
	802.11ac-VHT20	CH 149	5745	MCS0	19.50
		CH 157	5785		19.50
		CH 165	5825		19.00
	802.11ac-VHT40	CH 151	5755	MCS0	19.00
CH 159		5795	19.00		
802.11ac-VHT80	CH 155	5775	MCS0	19.00	





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.

Table with 5 columns: Frequency range (MHz), Electric field strength (V/m), Magnetic field strength (A/m), Power density (mW/cm²), Averaging time (minutes). It is divided into two sections: (A) Limits for Occupational/Controlled Exposures and (B) Limits for General Population/Uncontrolled Exposure.

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 = PG / (4πR²)

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 <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Power Density / Limit
2.4GHz WLAN	3.71	20.50	24.210	0.264	263.633	0.052	1.000	0.052
5GHz WLAN	4.08	19.50	23.580	0.228	228.034	0.045	1.000	0.045
Bluetooth	5.22	13.50	18.720	0.074	74.473	0.015	1.000	0.015
LoRa	2.92	21.50	24.420	0.277	276.694	0.055	0.601	0.092
Zigbee	4.99	14.50	19.490	0.089	88.920	0.018	1.000	0.018

### **4.2. Collocated Power Density Calculation**

<WLAN+BT+LoRa>

WLAN Power Density / Limit	Bluetooth Power Density / Limit	LoRa Power Density / Limit	$\Sigma$ (Power Density / Limit) of WLAN+Bluetooth+LoRa
0.052	0.015	0.092	0.159

**Note:**

1.  $\Sigma$  (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.
2. Considering the WLAN module collocation with the Bluetooth and LoRa transmitter of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1, and MPE of 3 collocated transmitters is compliant

<BT+LoRa+Zigbee>

Bluetooth Power Density / Limit	LoRa Power Density / Limit	Zigbee Power Density / Limit	$\Sigma$ (Power Density / Limit) of Bluetooth+ LoRa+Zigbee
0.015	0.092	0.018	0.125

**Note:**

1.  $\Sigma$  (Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for Bluetooth+LoRa+Zigbee.
2. Considering the Bluetooth module collocation with the 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 3 collocated transmitters is compliant

## **Conclusion:**

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