



RF EXPOSURE EVALUATION REPORT

FCC ID : 2AQIQ-6247
Equipment : HDMI Digital Media Receiver
Model Name : E9L29Y
Applicant : MX Processing LLC
309 Fellowship Road
East Gate Center, Suite 200
Mount Laurel, New Jersey 08054
Standard : 47 CFR Part 2.1091

We, SPORTON INTERNATIONAL INC has been evaluated in accordance with 47 CFR Part 2.1091 for the device and pass the limit.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

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Approved by: Jones Tsai / Manager

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History of this test report

Report No.	Version	Description	Issued Date
FA832126-02	Rev. 01	Initial issue of report	Aug. 20, 2018

1. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	HDMI Digital Media Receiver
Model Name	E9L29Y
FCC ID	2AQIQ-6247
Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2412 MHz ~ 2472 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz WLAN 5.5GHz Band: 5500 MHz ~ 5720 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Mode	802.11a/b/g/n/ac HT20/HT40/VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE

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: Eric Huang

Report Producer: Wan Liu

2. Maximum RF average output power among production units

2.1. When in normal operation:

<Non-beamforming mode>

Band / Mode	Average Power (dBm)			
	BR / EDR			v5.0 LE
	1M	2M	3M	GFSK
Bluetooth	6	4.5	4	6

2.4GHz WLAN	Mode	Channel	Frequency (MHz)	Data Rate	Tune-Up Limit		
					Ant 1	Ant 2	Ant 1+2
	802.11b	CH 1	2412	1Mbps	19	21	22.5
		CH 6	2437		18	23	22
		CH 11	2462		17.5	23	22.5
		CH 12	2467		17.5	20.5	21.5
		CH13	2472		15	14.5	17.5
	802.11g	CH 1	2412	6Mbps	18.5	17.5	20.5
		CH 6	2437		21	20.5	23
		CH 11	2462		16.5	18.5	21
		CH 12	2467		13.5	16	15.5
		CH13	2472		11.5	15	14
	802.11n-HT20	CH 1	2412	MCS0	18	16.5	19.5
		CH 6	2437		20	20	23
		CH 11	2462		16	17.5	19.5
		CH 12	2467		13.5	12	15.5
		CH13	2472		10	11	14

5.2GHz WLAN	Mode	Channel	Frequency (MHz)	Data Rate	Tune-Up Limit		
					Ant 1	Ant 2	Ant 1+2
	802.11a	CH 36	5180	6Mbps	19.5	15.5	18.5
		CH 44	5220		20	20	21
		CH 48	5240		20	20	21
	802.11n-HT20	CH 36	5180	MCS0	19	15	19
		CH 44	5220		19.5	19.5	21.5
		CH 48	5240		19.5	19.5	21.5
	802.11n-HT40	CH 38	5190	MCS0	15	10	13.5
		CH 46	5230		19	18.5	21
	802.11ac-VHT20	CH 36	5180	MCS0	18.5	15	18.5
		CH 44	5220		19.5	19.5	21
		CH 48	5240		19.5	19.5	21
	802.11ac-VHT40	CH 38	5190	MCS0	15	10	13.5
		CH 46	5230		19	18	21
	802.11ac-VHT80	CH 42	5210	MCS0	11	9	11

5.3GHz WLAN	Mode	Channel	Frequency (MHz)	Data Rate	Tune-Up Limit		
					Ant 1	Ant 2	Ant 1+2
	802.11a	CH 52	5260	6Mbps	20	20	20.5
		CH 60	5300		20	20	21
		CH 64	5320		18.5	16.5	19.5
	802.11n-HT20	CH 52	5260	MCS0	19.5	19.5	20.5
		CH 60	5300		19.5	19.5	21
		CH 64	5320		18	16	19
	802.11n-HT40	CH 54	5270	MCS0	19	19	21
		CH 62	5310		14	11	13.5
	802.11ac-VHT20	CH 52	5260	MCS0	19.5	19.5	20
		CH 60	5300		19.5	19.5	20.5
		CH 64	5320		18	16	18.5
	802.11ac-VHT40	CH 54	5270	MCS0	19	19	20.5
		CH 62	5310		14	11	13.5
	802.11ac-VHT80	CH 58	5290	MCS0	11	10	12

5.5GHz WLAN	Mode	Channel	Frequency (MHz)	Data Rate	Tune-Up Limit		
					Ant 1	Ant 2	Ant 1+2
	802.11a	CH 100	5500	6Mbps	20	19	19.5
		CH 116	5580		20	20	19
		CH 140	5700		15.5	15	17
		CH 144	5720		20	20	20.5
	802.11n-HT20	CH 100	5500	MCS0	19.5	18.5	20
		CH 116	5580		19.5	19.5	19
		CH 140	5700		14	15	18
		CH 144	5720		19.5	19.5	20.5
	802.11n-HT40	CH 102	5510	MCS0	17	15	17
		CH 110	5550		19	19	21
		CH 134	5670		19	19	21
		CH 142	5710		19	19	20.5
	802.11ac-VHT20	CH 100	5500	MCS0	19.5	18.5	19.5
		CH 116	5580		19.5	19.5	19
		CH 140	5700		14	15	17.5
		CH 144	5720		19.5	19.5	20
	802.11ac-VHT40	CH 102	5510	MCS0	17	15	17
		CH 110	5550		19	19	20.5
		CH 134	5670		18.5	19	20.5
		CH 142	5710		18.5	19	20.5
	802.11ac-VHT80	CH 106	5530	MCS0	12	10	13
		CH 122	5610		19	18	20
		CH 138	5690		19	19	20.5

	Mode	Channel	Frequency (MHz)	Data Rate	Tune-Up Limit		
					Ant 1	Ant 2	Ant 1+2
5.8GHz WLAN	802.11a	CH 149	5745	MCS0	20	20	23
		CH 157	5785		20	20	23
		CH 165	5825		20	20	23
	802.11n-HT20	CH 149	5745	MCS0	19.5	19.5	22.5
		CH 157	5785		19.5	19.5	22.5
		CH 165	5825		19.5	19.5	22.5
	802.11n-HT40	CH 151	5755	MCS0	19	19	22
		CH 159	5795		19	19	22
	802.11ac-VHT20	CH 149	5745	MCS0	19.5	19.5	22.5
		CH 157	5785		19.5	19.5	22.5
		CH 165	5825		19.5	19.5	22.5
	802.11ac-VHT40	CH 151	5755	MCS0	19	19	22
		CH 159	5795		19	19	22
	802.11ac-VHT80	CH 155	5775	MCS0	18.5	18.5	21

<Beamforming mode>

	Mode	Channel	Frequency (MHz)	Data Rate	Tune-Up Limit
					Ant 1+2
5.2GHz WLAN	802.11ac-VHT20	CH 36	5180	MCS0	18.5
		CH 44	5220		21
		CH 48	5240		21.5
	802.11ac-VHT40	CH 38	5190	MCS0	14
		CH 46	5230		21
	802.11ac-VHT80	CH 42	5210	MCS0	12

	Mode	Channel	Frequency (MHz)	Data Rate	Tune-Up Limit
					Ant 1+2
5.3GHz WLAN	802.11ac-VHT20	CH 52	5260	MCS0	19.5
		CH 60	5300		19.5
		CH 64	5320		19.5
	802.11ac-VHT40	CH 54	5270	MCS0	19.5
		CH 62	5310		14
	802.11ac-VHT80	CH 58	5290	MCS0	13

5.5GHz WLAN	Mode	Channel	Frequency (MHz)	Data Rate	Tune-Up Limit Ant 1+2
	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	16.5
		CH 110	5550		19.5
		CH 134	5670		19.5
		CH 142	5710		19.5
	802.11ac-VHT80	CH 106	5530	MCS0	13.5
		CH 122	5610		19.5
		CH 138	5690		19

5.8GHz WLAN	Mode	Channel	Frequency (MHz)	Data Rate	Tune-Up Limit Ant 1+2
	802.11ac-VHT20	CH 149	5745	MCS0	22.5
		CH 157	5785		22.5
		CH 165	5825		22.5
	802.11ac-VHT40	CH 151	5755	MCS0	22
		CH 159	5795		22
	802.11ac-VHT80	CH 155	5775	MCS0	20.5

2.2. When in co-location active:

<Non-beamforming mode>

Band / Mode	Average Power (dBm)
	v5.0 2M
	GFSK
Bluetooth	6

2.4GHz WLAN	Mode	Channel	Frequency (MHz)	Data Rate	Tune-Up Limit Ant 1
	802.11b	CH 1	2412	1Mbps	16.5
		CH 6	2437		17.5
		CH 11	2462		17
	802.11g	CH 1	2412	6Mbps	14
		CH 6	2437		16
		CH 11	2462		14.5
	802.11n-HT20	CH 1	2412	MCS0	14
		CH 6	2437		16
		CH 11	2462		13

5.2GHz WLAN	Mode	Channel	Frequency (MHz)	Data Rate	Tune-Up Limit Ant 2
	802.11n-HT20	CH 36	5180	MCS0	15
	802.11ac-VHT20	CH 36	5180	MCS0	15
	802.11ac-VHT80	CH 42	5210	MCS0	8.5

5.3GHz WLAN	Mode	Channel	Frequency (MHz)	Data Rate	Tune-Up Limit Ant 1+2
	802.11n-HT20	CH 64	5320	MCS0	19
	802.11ac-VHT20	CH 64	5320	MCS0	18.5

5.5GHz WLAN	Mode	Channel	Frequency (MHz)	Data Rate	Tune-Up Limit	
					Ant 1	Ant 1+2
	802.11n-HT20	CH 140	5700	MCS0	14	18
	802.11ac-HT40	CH 102	5510	MCS0	15	
	802.11ac-VHT20	CH 140	5700	MCS0	14	17.5
	802.11ac-VHT40	CH 102	5510	MCS0	15	

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

<For non-beamforming mode>

Band	Frequency (MHz)	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
Bluetooth	2402.0	1.10	6.00	7.100	0.005	5.129	0.001	1.000	0.001
2.4GHz WLAN Ant1	2412.0	3.21	21.00	24.210	0.264	263.633	0.052	1.000	0.052
2.4GHz WLAN Ant2	2412.0	1.10	23.00	24.100	0.257	257.040	0.051	1.000	0.051
2.4GHz WLAN Ant1+2	2412.0	3.21	23.00	26.210	0.418	417.830	0.083	1.000	0.083
5GHz WLAN Ant1	5180.0	2.45	20.00	22.450	0.176	175.792	0.035	1.000	0.035
5GHz WLAN Ant2	5180.0	6.40	20.00	26.400	0.437	436.516	0.087	1.000	0.087
5GHz WLAN Ant1+2	5180.0	6.40	23.00	29.400	0.871	870.964	0.173	1.000	0.173

Note:

1. For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band.
2. The maximum output power is used for above table calculation.

<For beamforming mode>

Band	Frequency (MHz)	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
5GHz WLAN Ant1+2	5180.0	7.87	22.50	30.370	1.089	1088.930	0.217	1.000	0.217

Note:

1. For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band.
2. This device supports Beamforming for WLAN 5GHz VHT20/VHT40/VHT80 only; therefore, in the table above which consider maximum directional Gain 7.87dBi for Beamforming mode.

4.2. Collocated Power Density Calculation

WLAN Power Density / Limit	Bluetooth Power Density / Limit	Σ (Power Density / Limit) of WLAN+Bluetooth
0.217	0.001	0.218

Note:

1. The table above has considered the worst case collocate condition of power density for all radio transmitter.
2. 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.
3. Considering the EIRP performance listed in the table above, the aggregated (power density / limit) is smaller than 1, and MPE of all collocated transmitters is compliant

Conclusion:

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