



## **BEC INCORPORATED**

### **SAR REPORT**

**TEST STANDARDS:  
FCC Part 15 Subpart C Intentional Radiator  
KDB 447498 D01**

**EUT: Legrand WNRH1 Smart Gateway Switch with Netatmo**

**FCC ID: 2AU5D-WNRH1**

**REPORT#: BEC-2107-03 REV1**

**CUSTOMER:  
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## Revision History

Revision #	Description of Changes	Date of Changes	Date Released
0	Test Report Initial Release	N/A	01/14/2021
1	Antenna Gain is corrected to 1.0 dBi value. Added all modes of Wi-Fi modulation to the report.	03/04/2021	03/08/2021



## 1.0 Administrative Information

### 1.1 General Information Table

<b>Project Number</b>	BEC-2107	
<b>Manufacturer</b>	Legrand	
<b>Model Number</b>	WNRH1	
<b>EUT Radios</b>	Zigbee	Wi-Fi
<b>EUT Serial Number</b>	4	8
<b>EUT Sample Number</b>	2107-04	2107-08
<b>Frequency of Operation</b>	Zigbee: 2405 – 2480 MHz	Wi-Fi: 2412-2462 MHz
<b>Antenna Gain</b>	+ 1.0 dBi	
<b>Software/Firmware Version</b>	certifications_nlg_zb permanent stm32_boot0_app- jtag and TestRadio_v1	nlg-stm32-v2-app
<b>FCC ID</b>	2AU5D-WNRH1	
<b>Zigbee Radio Chip Info</b>	Atmel Model # SAMR21E	
<b>Wi-Fi Radio Chip Info</b>	AMPAK Model # AP6212	
<b>FCC Classification</b>	DTS	
<b>Date Samples Received</b>	12/04/2020	
<b>Condition of Samples Received</b>	Suitable for test	
<b>Sample Type</b>	Production unit	
<b>EUT Description</b>	Legrand Model WNRH1 Smart Gateway Switch with Netatmo	
<b>Applicable FCC Rules</b>	47 CFR Part 2.1093, KDB 447498 D01	



## 2.0 SAR Test Exclusion Parameters and Justification

From KDB 447498 D01:

### 4.3. General SAR test exclusion guidance

#### 4.3.2. Standalone SAR test exclusion considerations

The Maximum Antenna Power used for the RF Exposure Threshold calculation is the highest measured output power shown in the following table for each of the Zigbee and Wi-Fi radios. The tables come from the FCC Part 15C test report for this product.

#### Zigbee Radio

Channel	Modulation	Frequency (MHz)	Measured Level (dBm)	Cable # 962 Loss (dB)	Total		Limit		Margin		Result
					dBm	Watts	dBm	Watts	dBm	Watts	
11	O-QPSK	2405.0	2.66	0.47	3.13	0.0021	30.00	1.000	-26.87	-0.998	Pass
18		2440.0	2.74	0.47	3.21	0.0021	30.00	1.000	-26.79	-0.998	Pass
26		2480.0	2.88	0.47	3.35	0.0022	30.00	1.000	-26.65	-0.998	Pass
11	None	2405.0	3.74	0.47	4.21	0.0026	30.00	1.000	-25.79	-0.997	Pass
18		2440.0	3.72	0.47	4.19	0.0026	30.00	1.000	-25.81	-0.997	Pass
26		2480.0	4.71	0.47	5.18	0.0033	30.00	1.000	-24.82	-0.997	Pass

#### Wi-Fi Radio

Channel	Modulation	Frequency (MHz)	Measured Level (dBm)	Cable # 962	Duty Cycle	Total		Limit		Margin		Result
						dBm	Watts	dBm	Watts	dBm	Watts	
1	DBPSK 1 Mbps	2412.0	17.58	0.47	0.00	18.05	0.0638	30.00	1.0000	-11.95	-0.936	Pass
6		2437.0	17.67	0.47	0.00	18.14	0.0652	30.00	1.0000	-11.86	-0.935	Pass
11		2462.0	17.78	0.47	0.00	18.25	0.0668	30.00	1.0000	-11.75	-0.933	Pass
1	64 QAM 36 Mbps	2412.0	8.82	0.47	0.91	10.20	0.0105	30.00	1.0000	-19.80	-0.990	Pass
6		2437.0	8.69	0.47	0.91	10.07	0.0102	30.00	1.0000	-19.93	-0.990	Pass
11		2462.0	9.11	0.47	0.91	10.49	0.0112	30.00	1.0000	-19.51	-0.989	Pass
1	MCS4 43.3 Mbps	2412.0	8.41	0.47	0.95	9.83	0.0096	30.00	1.0000	-20.17	-0.990	Pass
6		2437.0	8.40	0.47	0.95	9.82	0.0096	30.00	1.0000	-20.18	-0.990	Pass
11		2462.0	8.40	0.47	0.95	9.82	0.0096	30.00	1.0000	-20.18	-0.990	Pass

The separation distance used in the calculation is 20 centimeters. This distance is derived from the usage of the product. The Legrand WNRH1 is wall-mounted, adjacent to other electrical switches and controls used in homes and businesses. People will not dwell within 20 cm of the device.



### 3.0 SAR Test Exclusion Calculation

The table in Appendix B, SAR Test Exclusion Thresholds for 100 MHz – 6 GHz and  $\geq 50$  mm does not include the operating frequency or separation distance. Therefore, the following calculation, from paragraph 4.3.1 (b)(2) was used to determine the SAR Test Exclusion Threshold for 1g body and 10g extremity SAR Test Exclusion Threshold.

$$\{[\text{Power allowed at numeric threshold for 50 mm in step a)}] + [(\text{test separation distance} - 50 \text{ mm}) * 10] \text{ mW}$$

#### Zigbee Radio

Channel	Modulation	1 g SAR numeric threshold	Separation Distance	Frequency	SAR Test Exclusion Threshold	EUT Power Output	Margin
		(mw)	(mm)	(MHz)	(mW)	(mW)	(mW)
11	O-QPSK	3	200	2405.0	1503.0	3.0	-1500.0
18				2440.0		3.0	-1500.0
26				2480.0		3.0	-1500.0
11	None			2405.0		3.0	-1500.0
18				2440.0		3.0	-1500.0
26				2480.0		4.0	-1499.0

Channel	Modulation	10 g SAR numeric threshold	Separation Distance	Frequency	SAR Test Exclusion Threshold	EUT Power Output	Margin
		(mw)	(mm)	(MHz)	(mW)	(mW)	(mW)
11	O-QPSK	8	200	2405.0	1508.0	3.0	-1505.0
18				2440.0		3.0	-1505.0
26				2480.0		3.0	-1505.0
11	None			2405.0		3.0	-1505.0
18				2440.0		3.0	-1505.0
26				2480.0		4.0	-1504.0



## Wi-Fi Radio

Channel	Mod	1 g SAR numeric threshold	Separation Distance	Frequency	SAR Test Exclusion	EUT Power	Margin
		(mw)					
1	DBPSK (1 Mbps)	3	200	2412.0	1503	63.8	-1439.2
6				2437.0	1503	65.2	-1437.8
11				2462.0	1503	66.8	-1436.2

Channel	Mod	10 g SAR numeric threshold	Separation Distance	Frequency	SAR Test Exclusion	EUT Power	Margin
		(mw)					
1	16 QAM (36 Mbps)	7.5	200	2412.0	1507.5	10.5	-1497.0
6				2437.0	1507.5	10.2	-1497.3
11				2462.0	1507.5	11.2	-1496.3

Channel	Mod	10 g SAR numeric	Separation	Frequency	SAR Test	EUT	Margin
		(mw)					
1	MCS4 16 QAM (43.3 Mbps)	7.5	200	2412.0	1507.5	9.6	-1497.9
6				2437.0	1507.5	9.6	-1497.9
11				2462.0	1507.5	9.6	-1497.9

**Results:** The Legrand WNRH1 with Zigbee and Wi-Fi radios, complies with SAR Test Exclusion Thresholds shown in the tables. Therefore, SAR evaluation is not required.