



## BEC INCORPORATED

### CERTIFICATION APPLICATION TEST REPORT

#### TEST STANDARDS:

FCC Part 15 Subpart C, IC RSS-Gen, IC RSS-247  
DTS Intentional Radiator

#### EUT:

**Legrand Model WNAL33 Adorne Wireless Home/Away Scene Controller  
Switch with Netatmo and Legrand Model WNAL43 Adorne Wireless  
Wake/Sleep Scene Controller Switch with Netatmo**

**FCC ID: 2AU5D-AHAWs  
ISED ID: 25764-AHAWs**

**REPORT#: BEC-2141-01**

**TEST DATES: 05/06/2021 – 05/18/2021**

#### CUSTOMER:

**Pass & Seymour/Legrand  
50 Boyd Avenue  
Syracuse, NY 13209**

**PREPARED BY:**   
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## Revision History

Revision #	Description of Changes	Date of Changes	Date Released
0	Test Report Initial Release	N/A	05/25/2021



## 1.0 Administrative Information

### 1.1 Project General Information

<b>Project Number</b>	BEC-2141			
<b>Manufacturer</b>	Legrand			
<b>EUT Description</b>	Legrand Model WNAL33 Adorne Home/Away Wireless Smart Switch			
<b>EUT Description</b>	Legrand Model WNAL43 Adorne Wake/Sleep Wireless Smart Switch			
<b>EUT Test Models</b>	WNAL33	WNAL33	WNAL43	WNAL43
<b>EUT Test Types</b>	SMA connector at antenna port and radio test software	Standard antenna and radio test software	SMA connector at antenna port and radio test software	Standard antenna and radio test software
<b>EUT Serial Numbers</b>	None	None	None	None
<b>EUT Samples</b>	2141-01	2141-02	2141-03	2141-04
<b>FCC ID</b>	2AU5D-AHAWs			
<b>ISED ID</b>	25764- AHAWs			
<b>Zigbee Radio Chip Manufacturer</b>	Atmel			
<b>Zigbee Radio Chip Model</b>	SAMR21E			
<b>Radio Type</b>	Zigbee			
<b>Frequency of Operation</b>	2405 – 2480 MHz			
<b>Modulation Type</b>	O-QPSK			
<b>Antenna Gain</b>	+ 1.1 dBi			
<b>FCC Classification</b>	Digital Transmission System (DTS)			
<b>Samples Received</b>	05/06/2021			
<b>Condition Received</b>	Suitable for test			
<b>Sample Type</b>	Production units			
<b>Firmware Version</b>	BNLT_42.bin			
<b>Applicable FCC Rules</b>	FCC Rules Part 15.247: Operation within the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz Direct Sequence System			
<b>Applicable ISED Rules</b>	RSS-Gen: General Requirements for Compliance of Radio Apparatus & RSS-247: Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and License-Exempt Local Area Network (LE-LAN) Devices			



## 1.2 Preface

This report documents product testing conducted to verify compliance of the specified EUT with applicable standards and requirements as identified herein. EUT, test instrument configurations, test procedures, and recorded data are generally described in this report. The reader is referred to the applicable test standards for detailed procedures. The following table summarizes the test results obtained during this evaluation.

## 1.3 Laboratory and Customer Information

<b>Test Laboratory Location</b>	BEC Incorporated 970 East High Street Pottstown, PA 19464
<b>Test Personnel</b>	Paul Banker / Steve Fanella / JR Fanella
<b>BEC Laboratory Number FCC Registration</b>	US1118
<b>BEC Laboratory Number ISED Registration</b>	7342A-1
<b>Test Performed For</b>	Pass & Seymour/Legrand 50 Boyd Avenue Syracuse, NY 13209
<b>Customer Technical Contacts</b>	Joshua Haines and Collin Richards
<b>Customer Reference Number</b>	PO # SP117450-802



## 1.4 Measurement Uncertainty

Measurement	Measurement Distance	Range	Measurement Limit	Expanded Uncertainty
Radiated Disturbance Open Area Test Site	3 Meter	30 MHz – 1 GHz	Class A or B	3.93
Conducted Disturbance AC Mains	N/A	150 kHz – 30 MHz	Class A or B	2.69
Radio Frequency	N/A	1 MHz – 26.5 GHz	N/A	±0.086 ppm
RF power, conducted	N/A	1 MHz – 26.5 GHz	N/A	±1.48 dB
Conducted spurious emission of transmitter, valid up to 6 GHz	N/A	150 kHz – 26.5 GHz	N/A	±2.73 dB
Occupied Bandwidth	N/A	1 MHz – 26.5 GHz	N/A	±2 %
Temperature	N/A	15 – 35° C	N/A	±0.5 °C
Humidity	N/A	20 – 95 %	N/A	±2.5%

No adjustments to measured data presented in this report are required because all values of uncertainty are less than the CISPR 16-4-2:2018 recommendations. These uncertainties have a coverage factor of  $k = 2$ , which yields approximately a 95% level of confidence for the near-normal distribution typical of most measurement results.



## 1.5 Test Result Summary Table

The Legrand Models WNAL33 and WNAL43 were tested and found to be compliant to the sections of the FCC Part 15 Subpart C and RSS-Gen RSS-247 standards listed below:

Report Section	FCC Part 15, Subpart C	RSS-Gen	RSS-247	Test Description	Result
<a href="#">4.1</a>	15.203(b)	Annex A 10(g)		Antenna Requirement	<b>PASS</b>
<a href="#">4.2</a>	15.204	8.3		External RF power amplifiers and antenna modifications	<b>PASS</b>
<a href="#">4.3</a>	15.207	7.2		Conducted Limits (AC Power) 150 kHz – 30 MHz	<b>PASS</b>
<a href="#">4.4</a>	15.205(a) 15.209	8.9, 8.10	3.3	Emissions in Non-Restricted and Restricted Frequency Band 30 MHz – 25 GHz	<b>PASS</b>
<a href="#">4.5</a>	15.247(a)(2)		5.2 (a)	6 dB Occupied Bandwidth	<b>PASS</b>
<a href="#">4.6</a>		6.7		99% Occupied Bandwidth	<b>PASS</b>
<a href="#">4.7</a>	15.247(b)(3)		5.4 (d)	Maximum Conducted (Peak) Power Output and EIRP	<b>PASS</b>
<a href="#">4.8</a>	15.247(d)		5.5	Emissions in Restricted Frequency Bands 30 MHz – 25 GHz	<b>PASS</b>
<a href="#">4.9</a>	15.247(e)		5.2 (b)	DTS maximum power spectral density level in the fundamental emission	<b>PASS</b>
<a href="#">4.10</a>	15.247(d)		5.5	DTS band-edge emission measurements	<b>PASS</b>

**Rationale for EUT operation:** The EUT was tested using a Zigbee radio which contained test software that utilized O-QPSK modulation used in normal operation.



## **1.6 Condition of Received Sample**

An evaluation of the EUT was conducted in order to verify test subject identity and condition and to ensure suitability for testing. No evidence of physical damage was noted. The test item condition was deemed acceptable for the performance of the requested test services.

## **1.7 Climatic Environment**

Unless noted elsewhere in this report, the following were the ambient conditions in the laboratory during testing:

Temperature:  $22^{\circ} \pm 5^{\circ}$

Humidity:  $50\% \pm 20\%$

Barometric Pressure:  $1000\text{mb} \pm 20\%$

## **1.8 Test Equipment**

All test equipment is checked to manufacturer's specifications and, when applicable, have current N.I.S.T. traceable, ISO 9002 conforming certificates of calibration. Test equipment used for the tests described herein is listed in Appendix A.



## 2.0 Equipment Under Test

Unless otherwise noted in the individual test results sections, testing was performed on the EUT as follows.

### 2.1 EUT Description

The WNAL33 Home/Away is a wireless switch from the Adorne collection, manufactured by Legrand. The WNAL33 switch uses a CR2032 battery to power a Zigbee radio that operates at 2.4 GHz controlled by the Netatmo Smart Lighting System. The WNAL33 scene controller allows for an end user configurable, preset lighting scene. The user can switch between the Leave Home and Back Home lighting scenes with a single press of the switch.

The WNAL43 Wake/Sleep is a wireless switch from the Adorne collection, manufactured by Legrand. The WNAL43 switch uses a CR2032 battery to power a Zigbee radio that operates at 2.4 GHz controlled by the Netatmo Smart Lighting System. The WNAL43 scene controller allows for an end user configurable, preset lighting scene. The user can switch between the Wake and Sleep lighting scenes with a single press of the switch.

### 2.2 Product Category

FCC Part 15, Subpart C (Section 15.247), IC RSS-Gen, IC RSS-247

### 2.3 Product Classification

47 CFR Part 15, Subpart C, Section 15.247 “DTS Operation within the band of 900 – 928 MHz, 2400 – 2483.5 MHz, and 5725 – 5850 MHz.”



## 2.4 Test Configuration

Samples of the Legrand Model WNALX3 Adorne Home/Away and Wake/Sleep Wireless Smart Switches with Zigbee, were tested at the Low Channel 11 at 2405 MHz, Middle Channel 18 at 2440 MHz and High Channel 26 at 2480 MHz. The Legrand Models WNAL33 and WNAL43 models with Zigbee radio samples contained control software that can utilize the O-QPSK modulation used in normal operation. The control software also allowed the tester to select an un-modulated transmit signal for the radio of the unit under test or to place the radio in a receive mode. The highest amplitude was determined to be when the radio transmitted with modulation.

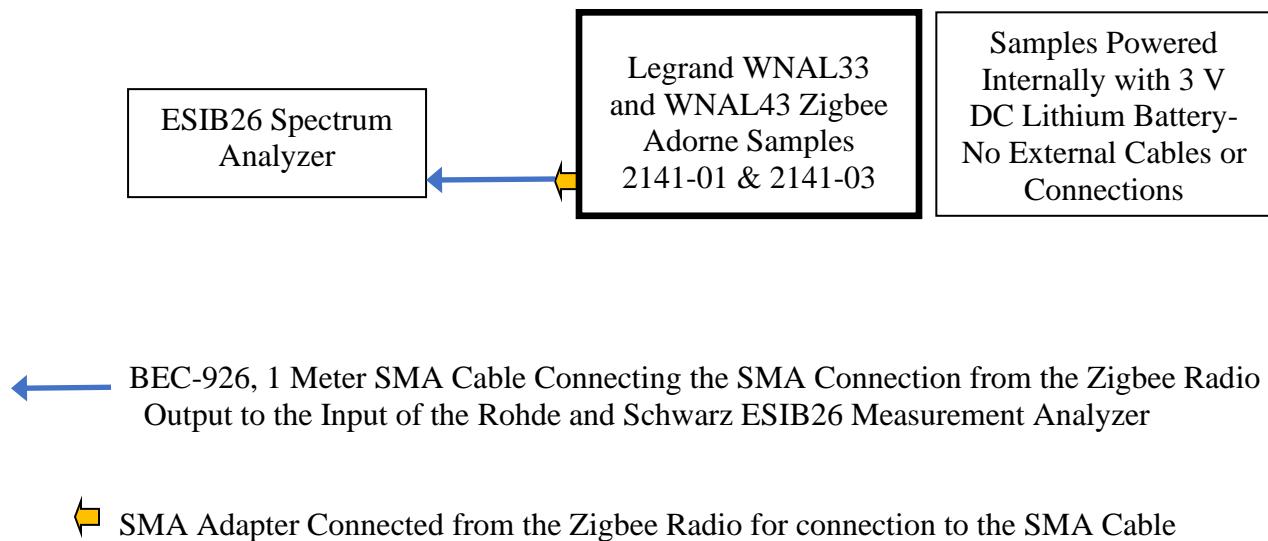
## 2.5 Test Configuration Rationale

Samples of the Legrand Models WNAL33 and WNAL43, with Zigbee radio, were powered under battery power and were supplied with software which controlled the operation of the Zigbee radio in a manner consistent with normal use.

## 2.6 Test Configuration Diagrams – Zigbee Radio

Block diagrams of the EUT configuration showing interconnection cables are illustrated below. The drawing shows the physical hardware layout used for the tests along with I/O cables and AC power distribution. Diagrams show the Conducted Measurement configuration connection and Radiated Measurement configuration connection when testing the Zigbee Radio.

### 2.6.1 Zigbee Configuration – Conducted Measurement





## 2.6.2 Zigbee Configuration – Radiated Measurement

Legrand WNAL33 and WNAL43 Zigbee Adorne Samples 2141-02 & 2141-04	Samples Powered Internally with 3 V DC Lithium Battery-No External Cables or Connections
--	--

## 2.7 EUT Information, Interconnection Cabling and Support Equipment

### EUT Hardware

Description	Manufacturer	Model	Serial Number	Sample Number
Adorne Home/Away Wireless Smart Switch - Antenna Conducted Sample	Legrand	WNAL33	No Serial Number	2141-01
Adorne Wake/Sleep Wireless Smart Switch - Antenna Conducted Sample		WNAL43	No Serial Number	2141-02
Adorne Home/Away Wireless Smart Switch - Radiated Emissions Sample		WNAL33	No Serial Number	2141-03
Adorne Wake/Sleep Wireless Smart Switch - Radiated Emissions Sample		WNAL43	No Serial Number	2141-04

### Interconnection Cable List (Conducted Measurement Test Setup)

Manufacturer	Model	Type	Shielding	Length	Description
Suhner	S04272B	High Frequency RF Cable 1 to 40 GHz	Double Braid	1 Meter	Measurement Cable from the Antenna SMA Connector to the R&S ESIB26 Receiver. Asset # BEC-962

### Support Equipment

Description	Manufacturer	Model #	Serial #
3 V DC Lithium Battery	Panasonic	CR2032	No Serial Number



## 2.8 Test Signals and Test Modulation

By design this product does not have an external modulation input connector, therefore, normal internally generated modulation was used. When evaluating the type of signal that would generate the highest output amplitude there was no difference between the un-modulated carrier and the modulated carrier. The testing was performed using modulated signals.

### 2.8.1 Zigbee Radio - Test Signals and Modulation

The EUT transmits to a discrete frequency on a specific channel. The Legrand WNALX3 with Zigbee radio has 16 Channels available. The 16 Channels and frequencies that can be transmitted by the EUT are as follows:

Zigbee Channel	Frequency (MHz)	Zigbee Channel	Frequency (MHz)
11	2405	19	2445
12	2410	20	2450
13	2415	21	2455
14	2420	22	2460
15	2425	23	2465
16	2430	24	2470
17	2435	25	2475
18	2440	26	2480

For the required testing, the EUT was configured to transmit at low Channel 11 (2405 MHz), middle Channel 18 (2440 MHz) and high Channel 26 (2480 MHz). The Zigbee radio utilizes one modulation, O-QPSK.

## 2.9 Grounding

A ground connection to the metal plate was used during radiated emissions testing. However, the circuit board of the EUT is isolated from the metal plate.

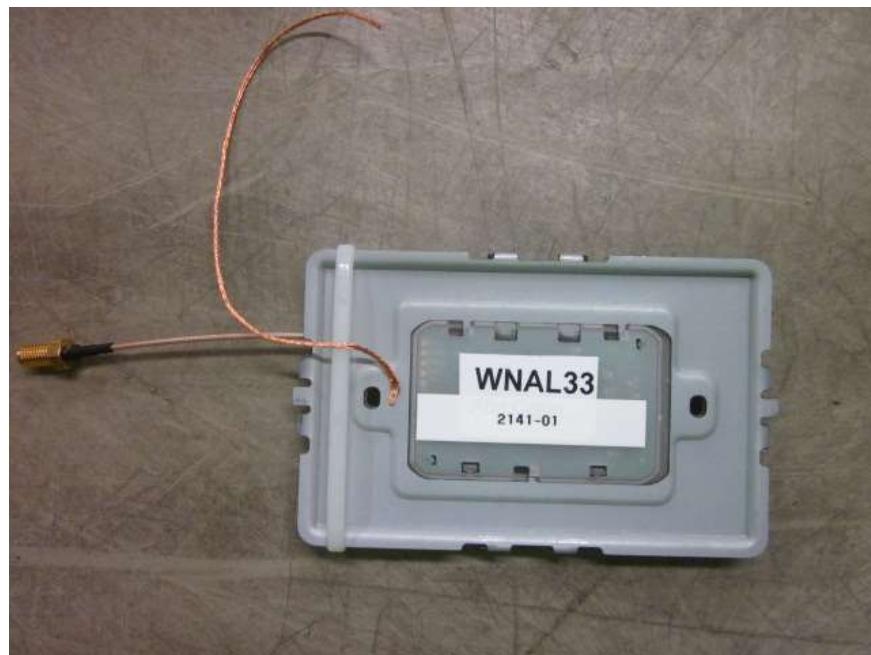
## 2.10 EUT Modifications

With the exception for the attachment of an SMA connector directly to the antenna output on the main board of the Legrand Model WNALX3, no modifications were made to the test samples.



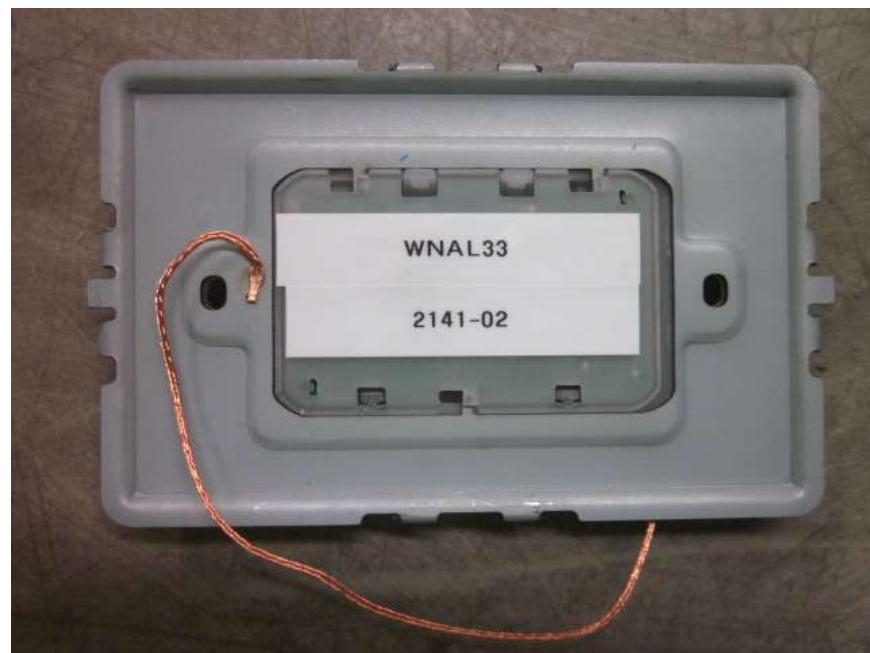
## 2.11 EUT Pictures Legrand WNALX3 Series Zigbee Radio Samples

LEGRAND WNAL33 SAMPLE 2141-01 FRONT AND BACK SIDE



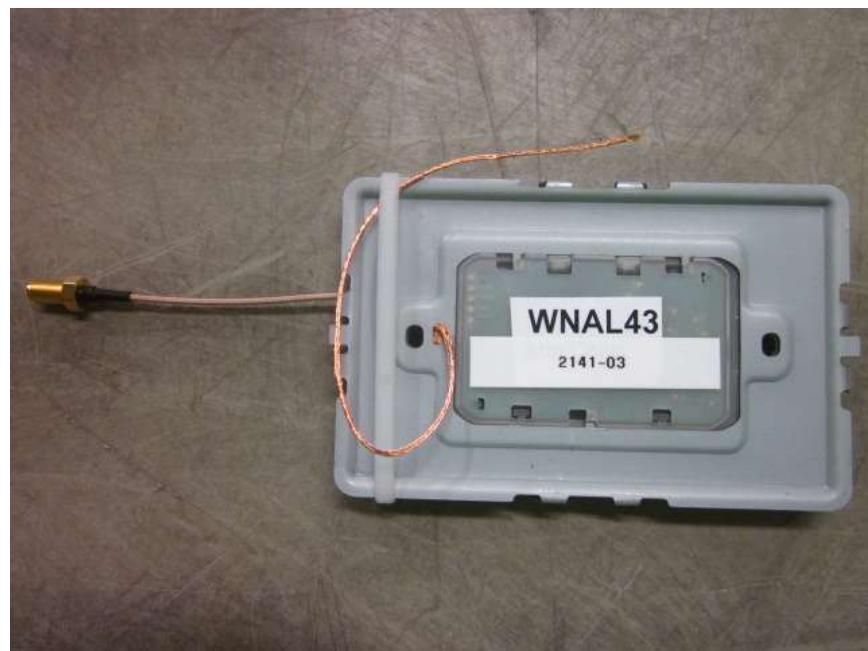
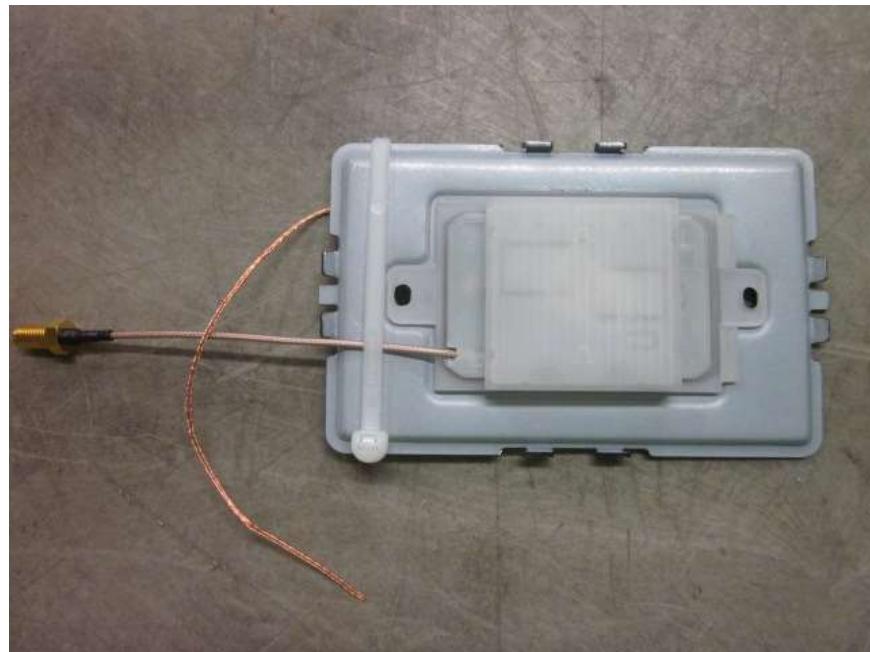


LEGRAND WNAL33 SAMPLE 2141-02 FRONT AND BACK SIDE





### LEGRAND WNAL43 SAMPLE 2141-03 FRONT AND BACK SIDE





LEGRAND WNAL43 SAMPLE 2141-04 FRONT AND BACK SIDE





## **3.0 Applicable Requirements, Methods, and Procedures**

### **3.1 Applicable Requirements**

The results of the measurement of the radio disturbance characteristics of the EUT described herein may be applied and where appropriate, provide a presumption of compliance to one or more of the following requirements or to other requirements at the discretion of the customer, regulatory agencies, or other entities.

#### **3.1.1 FCC Requirements**

Code of Federal Regulations: Title 47 – Telecommunication

Chapter I - Federal Communications Commission

Sub-chapter A – General

Part 15 – Radio Frequency Devices

Subpart C - Intentional Radiators

#### **3.1.2 Industry Canada Requirements**

RSS-Gen Issue 5: General Requirements for Compliance of Radio Apparatus

RSS-247 Issue 2: Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices.

#### **3.1.3 Basic Test Methods and Test Procedures**

558074 D01 DTS Meas Guidance v05r02, Guidance for Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating under Section 15.247 of the FCC Rules.

ANSI C63.10-2013, American National Standard for Compliance Testing of Unlicensed Wireless Devices.

## **3.2 Deviations or Exclusions from the Requirements**

No deviations or exclusions were made.



## 4.0 Test Results

### 4.1 Antenna Requirement (47 CFR 15.203)(RSS-GEN ANNEX A (10)(g))

The antenna used by the Legrand Model WNALX3 Series is a quarter-wave, inverted F wire antenna. The antenna is a trace on the PCB inside the enclosure. There are no detachable parts of the antenna. The antenna is not replaceable, nor changeable, and therefore complies with the requirements of this section.

### 4.2 External RF power amps/antenna modifications (47 CFR 15.204)(RSS-GEN 8.3)

There are no RF power amplifier kits available to be used with the Legrand Model WNALX3 Series. There are no detachable parts of the antenna. The antenna is not replaceable, nor changeable, and therefore complies with the requirements of this section.

### 4.3 Conducted Emissions AC Power Port (47 CFR 15.207)(RSS-GEN 7.2)

The Legrand Model WNALX3 Series with Zigbee radio is a battery powered unit and therefore does not require the Conducted Emissions AC Power Port testing.

### 4.4 Emissions in Non-Restricted and Restricted Frequency Bands, 30 MHz - 25 GHz (47 CFR 15.205, 15.209)(RSS-GEN 8.9, 8.10)

The emissions from the Legrand Model WNALX3 with Zigbee Radio, which fall in the restricted bands of operation, detailed in this section, comply with the limits of 15.209. The Legrand Model WNALX3 was tested at three frequencies: Low (2405 MHz), Middle (2440 MHz) and High (2480 MHz). The modulation was O-QPSK.

Measurement of the signals was performed with the EUT on a turntable and a variable height antenna mast at 3 meters distance. The signals residing in restricted bands of operation are designated in the tables below.



#### **4.4.1 Radiated Spurious Emissions Test Facility**

##### **OATS**

The Open Area Test Site (OATS) is an all-weather facility with a wooden enclosure that contains a ground level 4-foot diameter turntable capable of rotating equipment 360 degrees. The enclosure is free of reflective metallic objects and extraneous electromagnetic signals. This non-metallic enclosure and the 3 and 10 meter test range existing outside the enclosure rest upon a protective insulating material, which in turn covers a flat, metal, continuous ground plane.

Instrumentation for remote control of the antenna mast, turntable, and other equipment are controlled by personnel indoors. The EUT and support peripherals required for EUT operation were placed on a table 80 cm high for tabletop equipment or directly on the turntable surface for floor standing equipment.

The test site complies with the attenuation measurements specified in ANSI C63.4.

##### **SR#1**

The Semi-Anechoic Shielded Room (SR#1) is a ferrite and absorber lined chamber which houses a 5-foot diameter turntable capable of rotating equipment 360 degrees and antenna mast for Horizontal and Vertical polarity measurements. The enclosure is free of reflective metallic objects and extraneous electromagnetic signals. This 3-meter shielded enclosure has a raised computer floor with metal tile bottoms providing a continuous ground plane.

Instrumentation for remote control of the antenna mast, turntable, and other equipment are controlled by personnel outside the chamber. The EUT and support peripherals required for EUT operation were placed on a table 80 cm high for tabletop equipment or directly on the turntable surface for floor standing equipment.



#### **4.4.2 Emissions in Non-Restricted and Restricted Frequency Bands Test Procedure**

##### **Radiated Emissions 30 MHz – 40 GHz**

The EMI receiver was set to quasi-peak mode for frequencies from 30MHz to 1GHz and the appropriate CISPR bandwidths were employed. The receiver was set to average mode for frequencies above 1GHz with the appropriate CISPR bandwidths were employed.

Three orthogonal positions of the EUTs were evaluated for maximum emissions. The position of the EUTs placed **flat** on the horizontal surface of the 80-cm table was determined to be the axis that produced the highest emissions **for the Legrand WNALX3 models**.

Significant emissions found during the preliminary scans were maximized by rotating the turntable and varying the antenna height. Both horizontal and vertical antenna polarities were also investigated for suspect emissions. The signals are maximized and measured using the in house generated RADE or off the shelf TILE software. The support equipment and test item(s) were powered off in turn to determine the source of the emissions where appropriate.

Field strengths were calculated as follows:

$$\text{Field Strength (dB}\mu\text{V/m)} = \text{Meter Reading (dB}\mu\text{V)} + \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)} - \text{Amplifier Gain (dB)}$$

The EUTs were tested in the 30 to 1000 MHz, 1 to 18 GHz and then 18 to 25 GHz frequency ranges. Both the Legrand Model WNALX3 with Zigbee radio samples were tested with the radio transmitting at low, middle and high frequencies and while in receive mode (non-transmission). The Zigbee radio was tested with modulated transmission signals.

The following tables are the highest emissions recorded and summarized. The use of the 15.209 limit table for restricted band emissions is not required but ensures compliance to 15.205 and 15.209. The signals in the tables that fall into the restricted bands, described in 15.205, are marked with an asterisk.

Photographs of the radiated emissions test setups are in Appendix A of this radio grant submission.



#### 4.4.3 Emissions in Frequency Bands 30 MHz – 1000 MHz WNAL33 Zigbee Radio (05/14/2021 – 05/17/2021)

Radiated emissions scans, 30 – 1000 MHz, were made for the EUT configured for the low, middle and high transmission frequencies and in Rx mode. The transmission signal was modulated at maximum output.

##### Legrand Model WNAL33 Zigbee Radio, Low Channel 11, 2405 MHz, Modulated

Frequency	Corrected		Antenna Polarity	Turntable Angle	Antenna Height	Correction Factor	FCC Part15.205/209 RSS-GEN/247		Result
	Peak Level	QP Level					QP Limit	QP Margin	
MHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	
31.918	23.53	19.22	H	151	146	-1.74	40.00	-20.78	Pass
30.798	22.96	20.30	V	288	233	-0.82	40.00	-19.70	Pass
111.926*	16.33	15.43	V	188	130	-7.54	43.52	-28.09	Pass
130.834*	17.32	14.00	H	273	252	-6.78	43.52	-29.52	Pass
197.529	15.48	13.08	V	082	254	-7.36	43.52	-30.44	Pass
345.181	18.70	16.02	V	087	111	-4.61	46.02	-30.00	Pass
533.748	23.36	20.33	H	090	140	-1.49	46.02	-25.69	Pass
586.537	23.82	21.16	V	001	217	-0.59	46.02	-24.86	Pass
648.393	24.53	21.98	H	282	101	0.39	46.02	-24.04	Pass
828.763	26.90	25.01	H	286	255	3.12	46.02	-21.01	Pass
939.042	28.79	25.95	H	318	157	4.35	46.02	-20.07	Pass
942.859	28.70	25.96	V	342	149	4.44	46.02	-20.06	Pass

\*Restricted Band Signal

##### Legrand Model WNAL33 Zigbee Radio, Middle Channel 18, 2440 MHz, Modulated

Frequency	Corrected		Antenna Polarity	Turntable Angle	Antenna Height	Correction Factor	FCC Part15.205/209 RSS-GEN/247		Result
	Peak Level	QP Level					QP Limit	QP Margin	
MHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	
30.343	23.25	20.38	H	011	218	-0.60	40.00	-19.62	Pass
30.883	23.66	20.16	V	098	157	-0.86	40.00	-19.84	Pass
113.093*	19.23	16.31	V	286	103	-7.31	43.52	-27.21	Pass
120.506*	18.31	14.86	H	347	138	-6.67	43.52	-28.66	Pass
202.043	16.19	13.17	V	283	120	-7.35	43.52	-30.35	Pass
307.218	17.52	15.41	V	085	111	-4.97	46.02	-30.61	Pass
479.576	22.04	19.39	H	038	217	-2.16	46.02	-26.63	Pass
548.898	23.77	20.05	V	343	232	-1.50	46.02	-25.97	Pass
726.214	26.11	23.45	H	084	120	1.48	46.02	-22.57	Pass
862.253	29.89	24.80	H	328	101	3.37	46.02	-21.22	Pass
946.840	28.01	25.93	V	206	195	4.47	46.02	-20.09	Pass

\*Restricted Band Signal



## Legrand Model WNAL33 Zigbee Radio, High Channel 26, 2480 MHz, Modulated

Frequency	Corrected		Antenna Polarity	Turntable Angle	Antenna Height	Correction Factor	FCC Part15.205/209 RSS-GEN/247		Result
	Peak Level	QP Level					QP Limit	QP Margin	
MHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	
31.233	22.39	19.88	V	359	183	-1.12	40.00	-20.12	Pass
870.007	29.60	25.04	H	181	103	3.42	46.02	-20.98	Pass
913.036	28.73	26.48	V	187	225	4.25	46.02	-19.54	Pass
933.248	29.58	25.98	V	211	105	4.28	46.02	-20.04	Pass
938.115	29.11	26.07	H	110	139	4.42	46.02	-19.95	Pass
955.424	28.06	25.85	V	303	158	4.53	46.02	-20.17	Pass
957.270	28.79	25.92	H	009	158	4.58	46.02	-20.10	Pass
959.665	28.46	25.93	V	142	150	4.69	46.02	-20.09	Pass
960.418*	29.69	26.03	H	292	213	4.69	53.98	-27.95	Pass
965.390*	28.99	26.06	H	028	178	4.73	53.98	-27.92	Pass

\*Restricted Band Signal

## Legrand Model WNAL33 Zigbee Radio, Rx Mode

Frequency	Corrected		Antenna Polarity	Turntable Angle	Antenna Height	Correction Factor	FCC Part15.205/209 RSS-GEN/247		Result
	Peak Level	QP Level					QP Limit	QP Margin	
MHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	
910.310	29.39	25.56	V	120	147	4.16	46.02	-20.46	Pass
919.965	29.34	25.72	H	213	120	4.23	46.02	-20.30	Pass
922.913	28.84	25.86	H	051	169	4.26	46.02	-20.16	Pass
940.878	29.17	25.96	V	308	167	4.36	46.02	-20.06	Pass
944.473	28.83	25.98	V	319	100	4.40	46.02	-20.04	Pass
944.966	29.00	25.97	H	342	205	4.45	46.02	-20.05	Pass
946.644	29.20	26.03	H	359	208	4.47	46.02	-19.99	Pass
952.838	28.19	25.80	V	309	119	4.52	46.02	-20.22	Pass
956.571	29.30	25.74	V	360	150	4.54	46.02	-20.28	Pass
958.657	28.90	25.87	H	111	180	4.67	46.02	-20.15	Pass

\*Restricted Band Signal

**Test Results:** The Legrand Model WNAL33, with Zigbee Radio, complies with the requirements of 47 CFR Part 15.205, 15.209 and RSS-Gen Section 8.10 for non-restricted and restricted bands of operation, between 30 MHz – 1 GHz, with a margin of 19.54 dB.



#### 4.4.4 Emissions in Frequency Bands 1 - 18 GHz WNAL33 Zigbee Radio Test Results (05/11/2021 and 05/12/2021)

Radiated emissions scans, 1 – 18 GHz, were made for the EUT configured for the low, middle and high transmission frequencies and in Rx mode. The transmission signal was modulated at maximum output.

##### Legrand Model WNAL33 Zigbee Radio, Low Channel 11, 2405 MHz, Modulated

Frequency	Corrected		Antenna Polarity	Azimuth	Antenna Height	Correction Factor	FCC 15.205/209 RSS-GEN/247				Result
	Peak Level	Avg Level					Peak Limit	Peak Margin	Avg Limit	Avg Margin	
GHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	dBuV/m	dB	
4.8091*	49.50	41.30	V	119	148	1.61	73.98	-24.48	53.98	-12.68	PASS
4.9377*	39.92	29.64	H	101	190	1.84	73.98	-34.06	53.98	-24.34	PASS
6.8652	44.07	33.64	H	162	101	3.65	73.98	-29.91	53.98	-20.34	PASS
8.2735*	46.53	37.16	V	318	237	5.64	73.98	-27.45	53.98	-16.82	PASS
8.5336	48.28	37.55	H	031	120	6.16	73.98	-25.70	53.98	-16.43	PASS
9.6181	57.23	48.53	V	221	223	7.23	73.98	-16.75	53.98	-5.45	PASS
10.0829	47.96	38.02	H	004	105	6.56	73.98	-26.02	53.98	-15.96	PASS
12.7037	48.69	39.73	V	336	220	8.83	73.98	-25.29	53.98	-14.25	PASS
14.6505	57.22	47.47	H	357	196	12.74	73.98	-16.76	53.98	-6.51	PASS
16.6301	57.55	46.87	H	211	113	12.01	73.98	-16.43	53.98	-7.11	PASS

\*Restricted Band Signal

##### Legrand Model WNAL33 Zigbee Radio, Middle Channel 18, 2440 MHz, Modulated

Frequency	Corrected		Antenna Polarity	Azimuth	Antenna Height	Correction Factor	FCC 15.205/209 RSS-GEN/247				Result
	Peak Level	Avg Level					Peak Limit	Peak Margin	Avg Limit	Avg Margin	
GHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	dBuV/m	dB	
4.8792*	46.52	39.98	V	113	125	1.81	73.98	-27.46	53.98	-14.00	PASS
4.8810*	44.42	34.03	H	357	248	1.81	73.98	-29.56	53.98	-19.95	PASS
7.3672*	46.54	34.85	V	197	146	4.68	73.98	-27.44	53.98	-19.13	PASS
7.5042*	45.14	35.07	H	105	206	4.62	73.98	-28.84	53.98	-18.91	PASS
9.7580	57.52	49.22	V	217	228	6.82	73.98	-16.46	53.98	-4.76	PASS
9.7620	49.44	40.22	H	330	213	6.81	73.98	-24.54	53.98	-13.76	PASS
12.2085	49.92	40.14	H	046	167	8.34	73.98	-24.06	53.98	-13.84	PASS
12.2096	49.29	40.23	V	116	238	8.34	73.98	-24.69	53.98	-13.75	PASS
14.6659	57.01	47.64	H	291	196	12.68	73.98	-16.97	53.98	-6.34	PASS
14.6828	56.60	47.32	V	189	187	12.62	73.98	-17.38	53.98	-6.66	PASS
17.0711	62.30	50.70	H	197	150	15.00	73.98	-11.68	53.98	-3.28	PASS

\*Restricted Band Signal



## Legrand Model WNAL33 Zigbee Radio, High Channel 26, 2480 MHz, Modulated

Frequency	Corrected		Antenna Polarity	Azimuth	Antenna Height	Correction Factor	FCC 15.205/209 RSS-GEN/247				Result
	Peak Level	Avg Level					Peak Limit	Peak Margin	Avg Limit	Avg Margin	
GHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	dBuV/m	dB	
4.8654*	38.60	28.99	H	258	105	1.79	73.98	-35.38	53.98	-24.99	PASS
4.9591*	43.04	33.35	V	115	101	1.85	73.98	-30.94	53.98	-20.63	PASS
7.9121	47.05	35.96	H	003	216	5.10	73.98	-26.93	53.98	-18.02	PASS
8.5513	46.46	37.54	H	099	115	6.19	73.98	-27.52	53.98	-16.44	PASS
9.9220	56.71	45.91	V	208	221	6.61	73.98	-17.27	53.98	-8.07	PASS
11.0653*	49.29	38.69	H	231	211	6.80	73.98	-24.69	53.98	-15.29	PASS
12.4416*	49.56	40.31	V	313	190	8.55	73.98	-24.42	53.98	-13.67	PASS
13.6449	54.97	45.58	H	073	138	11.58	73.98	-19.01	53.98	-8.40	PASS
14.8295	56.30	46.78	V	249	222	11.92	73.98	-17.68	53.98	-7.20	PASS
16.2959	53.98	44.65	H	176	101	9.91	73.98	-20.00	53.98	-9.33	PASS

\*Restricted Band Signal

## Legrand Model WNAL33 Zigbee Radio, Rx Mode

Frequency	Corrected		Antenna Polarity	Azimuth	Antenna Height	Correction Factor	FCC 15.205/209 RSS-GEN/247				Result
	Peak Level	Avg Level					Peak Limit	Peak Margin	Avg Limit	Avg Margin	
GHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	dBuV/m	dB	
1.2448	31.33	21.11	V	093	101	-11.99	73.98	-42.65	53.98	21.11	PASS
3.5961	38.23	27.31	V	301	193	-1.24	73.98	-35.75	53.98	27.31	PASS
3.6535*	37.42	27.92	H	130	102	-0.85	73.98	-36.56	53.98	27.92	PASS
6.8566	44.64	34.04	H	201	126	3.66	73.98	-29.34	53.98	34.04	PASS
8.13653*	45.55	36.72	H	148	123	5.46	73.98	-28.43	53.98	36.72	PASS
8.1427*	45.69	37.06	V	143	151	5.46	73.98	-28.29	53.98	37.06	PASS
9.1335*	48.72	37.82	H	262	242	6.94	73.98	-25.26	53.98	37.82	PASS
9.4637*	48.52	37.98	V	286	166	7.68	73.98	-25.46	53.98	37.98	PASS
10.4017	48.26	37.68	V	288	144	6.48	73.98	-25.72	53.98	37.68	PASS
10.5096	47.20	37.95	H	195	110	6.55	73.98	-26.78	53.98	37.95	PASS
11.2219*	49.13	39.25	V	155	100	7.08	73.98	-24.85	53.98	39.25	PASS
14.1058	57.00	47.64	H	149	181	12.69	73.98	-16.98	53.98	47.64	PASS

\*Restricted Band Signal

**Test Results:** The Legrand Model WNAL33 with Zigbee Radio complies with the requirements of 47 CFR Part 15.205, 15.209 and RSS-Gen Section 8.10 for non-restricted and restricted bands of operation between 1 – 18 GHz with an Average Margin of 3.28 dB.



#### **4.4.5 Emissions in Frequency Bands 18 – 25 GHz WNAL33 Zigbee Radio (05/18/2021)**

Radiated emissions scans, 18 -25 GHz, were made for the EUT configured for the low, middle and high transmission frequencies and in Rx mode. The transmission signal was modulated at maximum output.

The result of the emissions scans showed no measurable signals between 18 and 25 GHz while the WNAL33 Transmitted low, middle, high channels and in Receive Mode.

**Test Results:** The Legrand Model WNAL33 with Zigbee Radio complies with the requirements of 47 CFR Part 15.205 and RSS-Gen Section 8.10 for non-restricted and restricted bands of operation between 18 and 25 GHz.



#### 4.4.6 Emissions in Frequency Bands 30 MHz – 1000 MHz WNAL43 Zigbee Radio (05/17/2021)

Radiated emissions scans, 30 – 1000 MHz, were made for the EUT configured for the low, middle and high transmission frequencies and in Rx mode. The transmission signal was modulated at maximum output.

##### Legrand Model WNAL43 Zigbee Radio, Low Channel 11, 2405 MHz, Modulated

Frequency	Corrected		Antenna Polarity	Turntable Angle	Antenna Height	Correction Factor	FCC Part15.205/209 RSS-GEN/247		Result
	Peak Level	QP Level					QP Limit	QP Margin	
MHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	
887.983	28.94	25.54	H	232	195	3.71	46.02	-20.48	Pass
915.176	29.68	25.52	H	079	120	4.16	46.02	-20.50	Pass
918.410	29.79	25.76	V	282	240	4.23	46.02	-20.26	Pass
937.547	29.67	26.08	H	000	120	4.38	46.02	-19.94	Pass
937.937	27.11	26.10	V	016	104	4.42	46.02	-19.92	Pass
958.478	28.88	25.93	V	011	245	4.67	46.02	-20.09	Pass
959.741	28.60	25.96	V	328	199	4.69	46.02	-20.06	Pass
960.730*	28.79	26.03	H	092	105	4.70	53.98	-27.95	Pass
985.804*	29.68	26.59	V	185	149	4.91	53.98	-27.39	Pass
988.139*	30.14	26.57	H	218	157	4.99	53.98	-27.41	Pass

\*Restricted Band Signal

##### Legrand Model WNAL43 Zigbee Radio, Mid Channel 18, 2440 MHz, Modulated

Frequency	Corrected		Antenna Polarity	Turntable Angle	Antenna Height	Correction Factor	FCC Part15.205/209 RSS-GEN/247		Result
	Peak Level	QP Level					QP Limit	QP Margin	
MHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	
915.626	27.71	25.55	H	067	197	4.21	46.02	-20.47	Pass
916.190	29.81	25.68	V	286	167	4.24	46.02	-20.34	Pass
928.154	29.82	25.89	V	262	149	4.27	46.02	-20.13	Pass
932.299	30.18	25.97	V	004	112	4.20	46.02	-20.05	Pass
939.602	30.03	25.99	H	144	206	4.35	46.02	-20.03	Pass
942.086	29.51	25.97	V	251	206	4.36	46.02	-20.05	Pass
945.195	29.80	26.03	V	085	120	4.45	46.02	-19.99	Pass
948.760	29.31	25.86	H	345	168	4.47	46.02	-20.16	Pass
953.484	28.51	25.90	H	207	157	4.52	46.02	-20.12	Pass
970.898*	29.53	26.24	H	164	235	4.81	53.98	-27.74	Pass

\*Restricted Band Signal



## Legrand Model WNAL43 Zigbee Radio, High Channel 26, 2480 MHz, Modulated

Frequency	Corrected		Antenna Polarity	Turntable Angle	Antenna Height	Correction Factor	FCC Part15.205/209 RSS-GEN/247		Result
	Peak Level	QP Level					QP Limit	QP Margin	
MHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	
880.359	28.99	25.55	V	160	129	3.60	46.02	-20.47	Pass
916.105	28.04	25.62	H	149	233	4.24	46.02	-20.40	Pass
927.309	28.88	25.90	V	001	129	4.27	46.02	-20.12	Pass
928.509	29.14	25.95	H	055	178	4.27	46.02	-20.07	Pass
932.553	28.72	25.94	H	001	187	4.23	46.02	-20.08	Pass
941.947	29.01	25.86	V	234	223	4.36	46.02	-20.16	Pass
951.912	29.38	25.80	H	112	168	4.51	46.02	-20.22	Pass
957.967	28.59	25.96	V	039	247	4.66	46.02	-20.06	Pass
959.376	30.37	25.83	V	241	110	4.68	46.02	-20.19	Pass
992.762*	29.19	26.39	H	286	100	4.94	53.98	-27.59	Pass

\*Restricted Band Signal

## Legrand Model WNAL43 Zigbee Radio, Rx Mode

Frequency	Corrected		Antenna Polarity	Turntable Angle	Antenna Height	Correction Factor	FCC Part15.205/209 RSS-GEN/247		Result
	Peak Level	QP Level					QP Limit	QP Margin	
MHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	
30.410	23.89	20.51	V	092	150	-0.63	40.00	-19.49	Pass
821.034	27.00	24.77	V	223	101	3.07	46.02	-21.25	Pass
895.075	28.27	25.57	H	291	130	3.80	46.02	-20.45	Pass
900.545	27.77	25.42	H	270	168	3.96	46.02	-20.60	Pass
932.841	27.15	26.04	V	087	119	4.26	46.02	-19.98	Pass
941.990	29.59	25.99	V	184	209	4.36	46.02	-20.03	Pass
946.886	29.28	26.09	H	023	176	4.47	46.02	-19.93	Pass
958.445	28.62	25.83	H	147	100	4.67	46.02	-20.19	Pass
959.245	29.51	26.10	V	179	167	4.68	46.02	-19.92	Pass
959.694	30.08	26.02	H	269	157	4.69	46.02	-20.00	Pass

\*Restricted Band Signal

**Test Results:** The Legrand Model WNAL43, with Zigbee Radio, complies with the requirements of 47 CFR Part 15.205, 15.209 and RSS-Gen Section 8.10 for non-restricted and restricted bands of operation, between 30 MHz – 1 GHz, with a margin of 19.49 dB.



#### 4.4.7 Emissions in Frequency Bands 1 - 18 GHz WNAL43 Zigbee Radio Test Results (05/11/2021 and 05/12/2021)

Radiated emissions scans, 1 – 18 GHz, were made for the EUT configured for the low, middle and high transmission frequencies and in Rx mode. The transmission signal was modulated at maximum output.

##### Legrand Model WNAL43 Zigbee Radio, Low Channel 11, 2405 MHz, Modulated

Frequency	Corrected		Antenna Polarity	Azimuth	Antenna Height	Correction Factor	FCC 15.205/209 RSS-GEN/247				Result
	Peak Level	Avg Level					Peak Limit	Peak Margin	Avg Limit	Avg Margin	
GHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	dBuV/m	dB	
4.8039*	39.33	28.44	H	324	102	1.58	73.98	-34.65	53.98	-25.54	PASS
4.8091*	45.96	38.79	V	139	151	1.60	73.98	-28.02	53.98	-15.19	PASS
5.2098	39.93	30.16	V	049	104	2.75	73.98	-34.05	53.98	-23.82	PASS
5.2287	39.51	30.23	H	126	214	2.77	73.98	-34.47	53.98	-23.75	PASS
6.7809	43.80	34.01	V	190	115	3.62	73.98	-30.18	53.98	-19.97	PASS
7.2470	43.89	34.33	V	166	119	4.35	73.98	-30.09	53.98	-19.65	PASS
7.3216*	43.93	34.62	H	341	158	4.58	73.98	-30.05	53.98	-19.36	PASS
8.6416	47.10	37.42	H	297	125	6.39	73.98	-26.88	53.98	-16.56	PASS
9.6151	48.83	37.98	V	111	171	7.25	73.98	-25.15	53.98	-16.00	PASS
9.6818	47.77	37.84	H	041	249	7.00	73.98	-26.21	53.98	-16.14	PASS
12.0312*	49.64	40.23	H	224	238	8.31	73.98	-24.34	53.98	-13.75	PASS
12.0352*	49.76	39.85	V	261	191	8.31	73.98	-24.22	53.98	-14.13	PASS

\*Restricted Band Signal

##### Legrand Model WNAL43 Zigbee Radio, Mid Channel 18, 2440 MHz, Modulated

Frequency	Corrected		Antenna Polarity	Azimuth	Antenna Height	Correction Factor	FCC 15.205/209 RSS-GEN/247				Result
	Peak Level	Avg Level					Peak Limit	Peak Margin	Avg Limit	Avg Margin	
GHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	dBuV/m	dB	
4.8812*	43.32	34.00	V	142	131	1.81	73.98	-30.66	53.98	-19.98	PASS
4.8812*	43.98	34.50	H	274	240	1.81	73.98	-30.00	53.98	-19.48	PASS
7.3064*	44.09	34.80	V	000	101	4.53	73.98	-29.89	53.98	-19.18	PASS
7.3149*	43.23	34.76	V	155	217	4.56	73.98	-30.75	53.98	-19.22	PASS
7.3371*	44.96	34.65	H	284	210	4.63	73.98	-29.02	53.98	-19.33	PASS
8.1038*	46.71	36.87	H	130	207	5.43	73.98	-27.27	53.98	-17.11	PASS
9.7522	46.75	37.10	V	147	121	6.82	73.98	-27.23	53.98	-16.88	PASS
9.7580	55.98	48.81	V	219	214	6.82	73.98	-18.00	53.98	-5.17	PASS
9.7626	48.50	38.34	H	129	246	6.81	73.98	-25.48	53.98	-15.64	PASS
12.1993*	49.15	40.20	V	330	237	8.33	73.98	-24.83	53.98	-13.78	PASS
12.2140*	50.89	40.19	H	001	146	8.34	73.98	-23.09	53.98	-13.79	PASS
14.6589	56.25	47.30	H	007	228	12.71	73.98	-17.73	53.98	-6.68	PASS

\*Restricted Band Signal



## Legrand Model WNAL43 Zigbee Radio, High Channel 26, 2480 MHz, Modulated

Frequency	Corrected		Antenna Polarity	Azimuth	Antenna Height	Correction Factor	FCC 15.205/209 RSS-GEN/247				Result
	Peak Level	Avg Level					Peak Limit	Peak Margin	Avg Limit	Avg Margin	
	GHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	dBuV/m	dB
4.9588*	42.11	31.21	V	123	102	1.85	73.98	-31.87	53.98	-22.77	PASS
4.9675*	39.80	29.45	H	218	124	1.87	73.98	-34.18	53.98	-24.53	PASS
5.6837	40.52	30.61	H	116	143	3.12	73.98	-33.46	53.98	-23.37	PASS
7.4557*	43.96	35.15	H	191	146	4.69	73.98	-30.02	53.98	-18.83	PASS
7.4622*	45.62	34.83	V	180	246	4.68	73.98	-28.36	53.98	-19.15	PASS
9.9184	51.15	42.51	H	322	242	6.61	73.98	-22.83	53.98	-11.47	PASS
9.9219	60.21	50.61	V	220	260	6.61	73.98	-13.77	53.98	-3.37	PASS
12.3994*	49.90	40.25	V	334	147	8.45	73.98	-24.08	53.98	-13.73	PASS
12.4093*	49.66	40.21	H	359	103	8.48	73.98	-24.32	53.98	-13.77	PASS
14.8839	55.45	46.75	V	310	222	11.68	73.98	-18.53	53.98	-7.23	PASS
14.9047	55.70	46.69	H	159	135	11.58	73.98	-18.28	53.98	-7.29	PASS

\*Restricted Band Signal

## Legrand Model WNAL43 Zigbee Radio, Rx Mode

Frequency	Corrected		Antenna Polarity	Azimuth	Antenna Height	Correction Factor	FCC 15.205/209 RSS-GEN/247				Result
	Peak Level	Avg Level					Peak Limit	Peak Margin	Avg Limit	Avg Margin	
	GHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	dBuV/m	dB
1.5477*	30.50	20.49	V	043	203	-10.51	73.98	-43.48	53.98	-33.49	PASS
2.1248	33.84	23.47	V	343	197	-6.72	73.98	-40.14	53.98	-30.51	PASS
2.8695*	33.63	24.65	V	024	220	-3.93	73.98	-40.35	53.98	-29.33	PASS
5.3008	39.23	29.96	H	299	161	3.00	73.98	-34.75	53.98	-24.02	PASS
7.6288*	44.30	35.02	H	082	183	4.62	73.98	-29.68	53.98	-18.96	PASS
8.0799*	46.05	37.03	V	133	120	5.41	73.98	-27.93	53.98	-16.95	PASS
9.9021	46.74	37.32	H	294	102	6.63	73.98	-27.24	53.98	-16.66	PASS
10.7388*	48.46	37.93	V	335	101	6.60	73.98	-25.52	53.98	-16.05	PASS
12.3350*	49.35	40.08	H	124	206	8.41	73.98	-24.63	53.98	-13.90	PASS
12.9181	53.37	43.21	V	169	207	9.35	73.98	-20.61	53.98	-10.77	PASS
13.7466	55.16	45.72	H	304	102	11.70	73.98	-18.82	53.98	-8.26	PASS
14.1864	56.48	47.78	H	137	104	12.86	73.98	-17.50	53.98	-6.20	PASS

\*Restricted Band Signal

**Test Results:** The Legrand Model WNAL43 with Zigbee Radio complies with the requirements of 47 CFR Part 15.205, 15.209 and RSS-Gen Section 8.10 for non-restricted and restricted bands of operation between 1 – 18 GHz with an Average Margin of 3.37 dB.



#### **4.4.8 Emissions in Frequency Bands 18 – 25 GHz WNAL43 Zigbee Radio (05/18/2021)**

Radiated emissions scans, 18 -25 GHz, were made for the EUT configured for the low, middle and high transmission frequencies and in Rx mode. The transmission signal was modulated at maximum output.

The result of the emissions scans showed no measurable signals between 18 and 25 GHz while the WNAL43 Transmitted low, middle, high channels and in Receive Mode.

**Test Results:** The Legrand Model WNAL43 with Zigbee Radio complies with the requirements of 47 CFR Part 15.205 and RSS-Gen Section 8.10 for non-restricted and restricted bands of operation between 18 and 25 GHz.



## 4.5 DTS Bandwidth (FCC Section 15.247(a)(2) RSS-247 5.2(a))

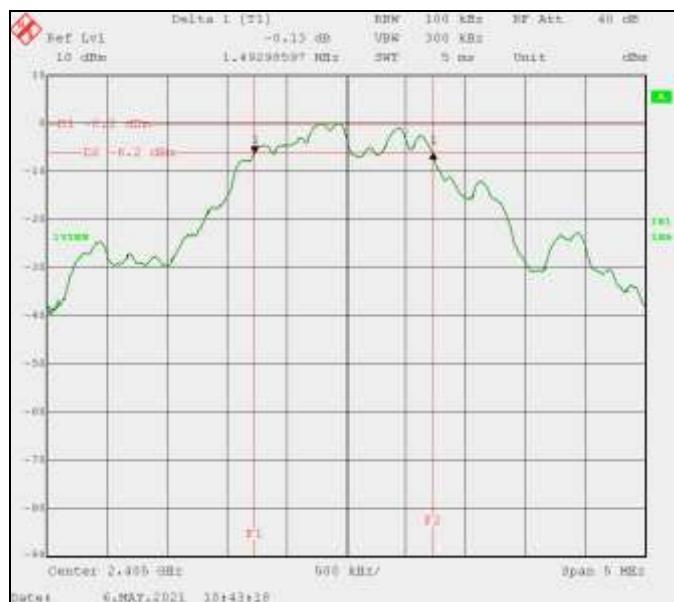
### 4.5.1 DTS Bandwidth – Test Procedure

The procedure of KDB 550874 D01 Section 8.2, references ANSI C63.10, Section 11.8, Option 1 for the measurement of the DTS Bandwidth. The Spectrum Analyzer settings are listed below. O-QPSK modulation was used.

SA Settings			ANSI C63.10 Requirement
Span	5	MHz	2 to 5 times OBW
RBW	100	kHz	1 - 5 % of OBW (min 100 kHz)
VBW	300	kHz	≈3 times RBW
Sweep Time	5	ms	Auto

### 4.5.1.1 DTS Bandwidth Test Results WNAL33 Zigbee Radio (05/06/2021)

Legrand WNAL33 Zigbee Radio Low channel 11, 2405 MHz, O-QPSK Modulation





## Legrand WNAL33 Zigbee Radio Middle channel 18, 2440 MHz, O-QPSK Modulation



## Legrand WNAL33 Zigbee Radio High channel 26, 2480 MHz, O-QPSK Modulation



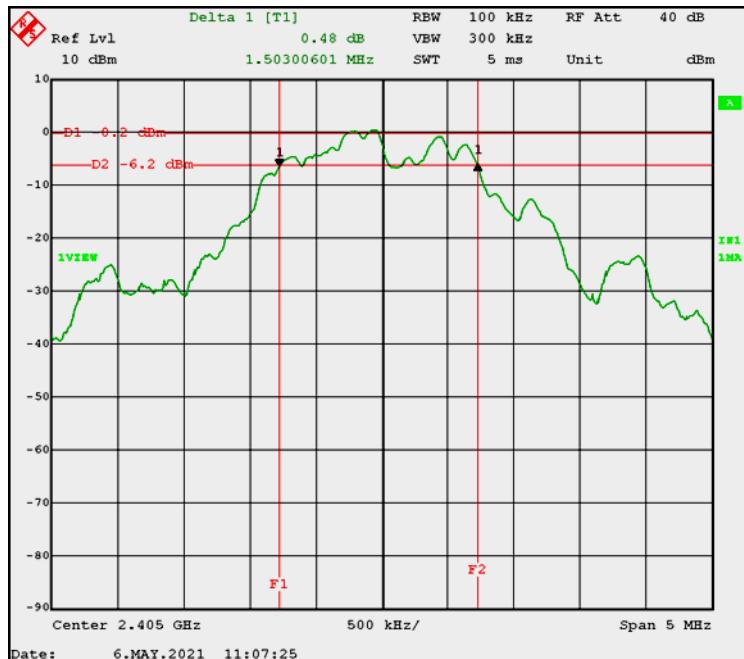
Channel	Frequency	Measured 6 dB BW		Margin	Result	
		MHz	kHz	kHz	kHz	
11	2405.0	2405.0	1492.99	500.00	992.99	Pass
18	2440.0	2440.0	1482.97	500.00	982.97	Pass
26	2480.0	2480.0	1492.99	500.00	992.99	Pass

**Test Results:** The 6 dB Occupied Bandwidth measurements for the Legrand Model WNAL33 with Zigbee Radio were measured and are compliant to the minimum bandwidth requirements. The results are also used to select bandwidths and frequency spans for other radio measurements.

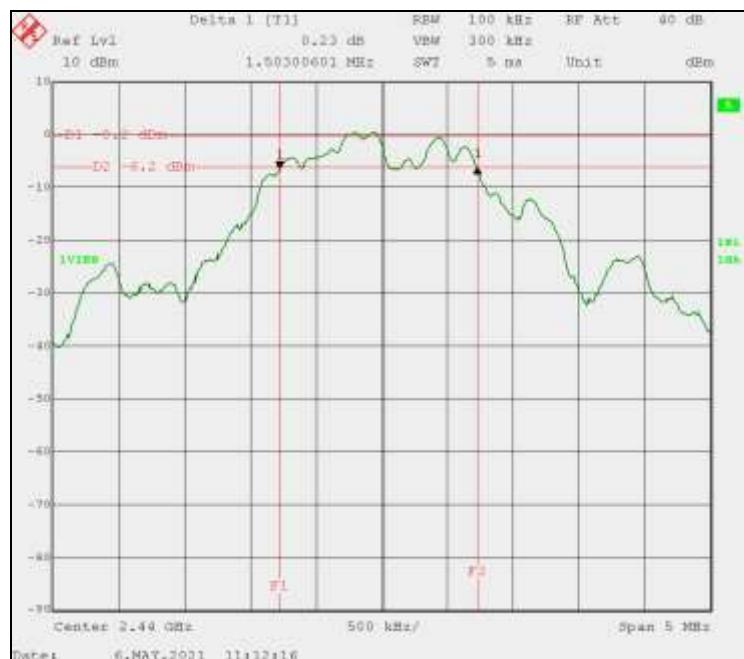


#### 4.5.1.2 DTS Bandwidth Test Results WNAL43 Zigbee Radio (05/06/2021)

##### Legrand WNAL43 Zigbee Radio Low channel 11, 2405 MHz, O-QPSK Modulation

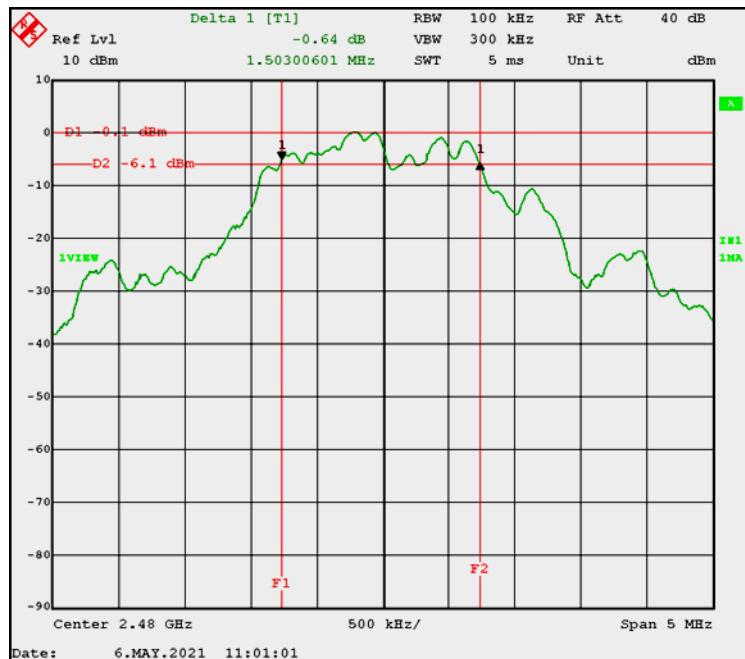


##### Legrand WNAL43 Zigbee Radio Middle channel 18, 2440 MHz, O-QPSK Modulation





## Legrand WNAL43 Zigbee Radio High channel 26, 2480 MHz, O-QPSK Modulation



Channel	Frequency	Measured 6 dB BW	47 CFR 15.247(a)(2) & RSS-247 5.2 Minimum Limit	Margin	Result
	MHz	kHz	kHz		
11	2405.0	1503.01	500.00	1003.01	Pass
18	2440.0	1503.01	500.00	1003.01	Pass
26	2480.0	1503.01	500.00	1003.01	Pass

**Test Results:** The 6 dB Occupied Bandwidth measurements for the Legrand Model WNAL43 with Zigbee Radio were measured and are compliant to the minimum bandwidth requirements. The results are also used to select bandwidths and frequency spans for other radio measurements.



## 4.6 99% Occupied Bandwidth (RSS-247 5.2(a))

### 4.6.1 99% Occupied Bandwidth Test Procedure

RSS-GEN requires the measurement of the 99% bandwidth of the transmitter. The Zigbee radio utilizes only O-QPSK modulation.

ANSI C63.10, Section 6.9.3 permits the use of the automated, bandwidth measurement utility of the spectrum analyzer was used to measure the 99% bandwidth at each of the low, middle and high operating frequencies. The SA settings are listed in the table below.

Spectrum Analyzer Settings for 99% Occupied Bandwidth measurements:

SA Settings			ANSI C63.10 requirement
Span	5	MHz	(1.5 to 5 times OBW)
RBW	50	kHz	(1 to 5% of OBW)
VBW	200	kHz	$\geq(3 \times \text{RBW})$
Sweep Time	5	ms	Auto



#### 4.6.1.1 99% BW, WNAL33 Zigbee Radio Test Results (05/10/2021)

## Legrand WNAL33 Zigbee Radio Low channel 11, 2405 MHz, O-QPSK Modulation



## Legrand WNAL33 Zigbee Radio Mid channel 18, 2440 MHz, O-QPSK Modulation





## Legrand WNAL33 Zigbee Radio High channel 26, 2480 MHz, O-QPSK Modulation



Channel	Frequency (MHz)	99% Occupied BW (MHz)
11	2405.0	2.375
18	2440.0	2.415
26	2480.0	2.445

**Test Results:** The 99% Occupied Bandwidth measurements for the Legrand Model WNAL33 with Zigbee Radio are displayed above and included in the ISED Un-licensed Radio application.

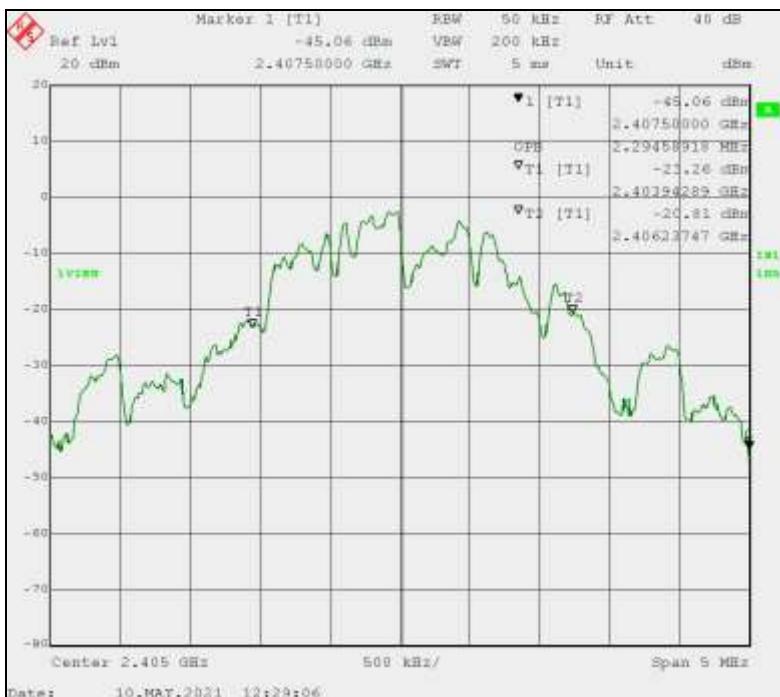


#### 4.6.1.2 99% BW, WNAL43 Zigbee Radio Test Results (05/10/2021)

## Legrand WNAL43 Zigbee Radio Low channel 11, 2405 MHz, O-QPSK Modulation



Legrand WNAL43 Zigbee Radio Mid channel 18, 2440 MHz, O-QPSK Modulation





## Legrand WNAL43 Zigbee Radio High channel 26, 2480 MHz, O-QPSK Modulation



Channel	Frequency (MHz)	99% Occupied BW (MHz)
11	2405.0	2.345
18	2440.0	2.295
26	2480.0	2.405

**Test Results:** The 99% Occupied Bandwidth measurements for the Legrand Model WNAL43 with Zigbee Radio are displayed above and included in the ISED Un-licensed Radio application.



## 4.7 Maximum Conducted (Peak) Output Power and EIRP (FCC Part 15.247(b)(3), RSS-247 Section 5.4(d))

### 4.7.1 Maximum Conducted (Peak) Output Power Test Procedure

A conducted power measurement of the output frequency of the Zigbee radio was measured according to the guidance of KDB 550874 D01, Section 8.3.1.2. The modulated, transmitter output signal is wide-band and noise-like. Further guidance from the KDB document identified ANSI C63.10, Section 11.9.2.2.2., (Method AVGSA-1), as the measurement procedure. Spectrum analyzer parameters are listed for the Zigbee radio maximum conducted (peak) output power. The un-modulated carrier was also measured for comparison.

#### 4.7.1.1 Maximum Conducted (Peak) Output Power WNAL33 Zigbee Radio O-QPSK Modulation Test Results (05/11/2021)

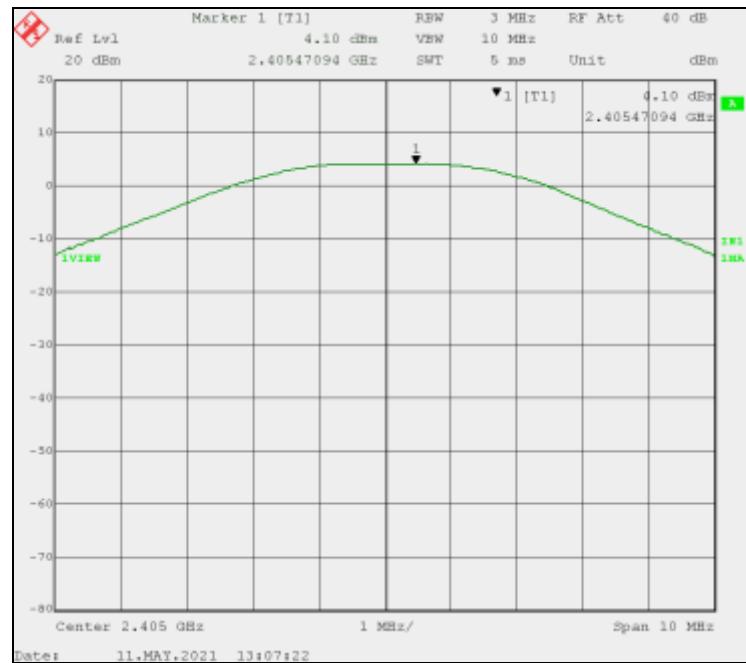
##### Spectrum Analyzer Settings for Zigbee Radio Measurements

Zigbee Radio, O-QPSK modulation			
Spec Analyzer Settings		ANSI C63.10 requirement	
Span	10	MHz	$\geq 3 \times \text{RBW}$
RBW	3	MHz	$\text{RBW} \geq \text{DTS BW}$
VBW	10	MHz	$\geq 3 \times \text{RBW}$
Sweep	5	ms	Auto

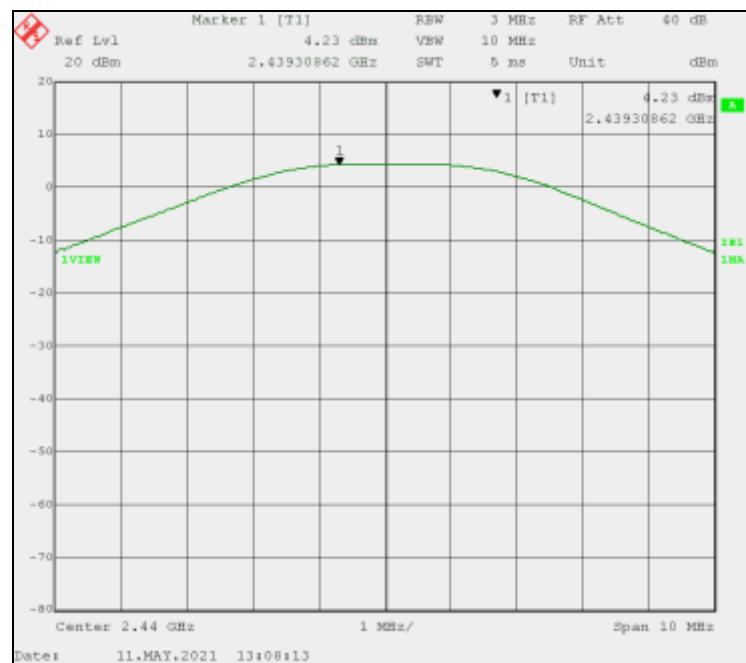
The spectrum analyzer utilized Peak Detection for measurement.



Legrand Model WNAL33 Zigbee Radio  
Low Channel 11, 2405 MHz, O-QPSK Modulation

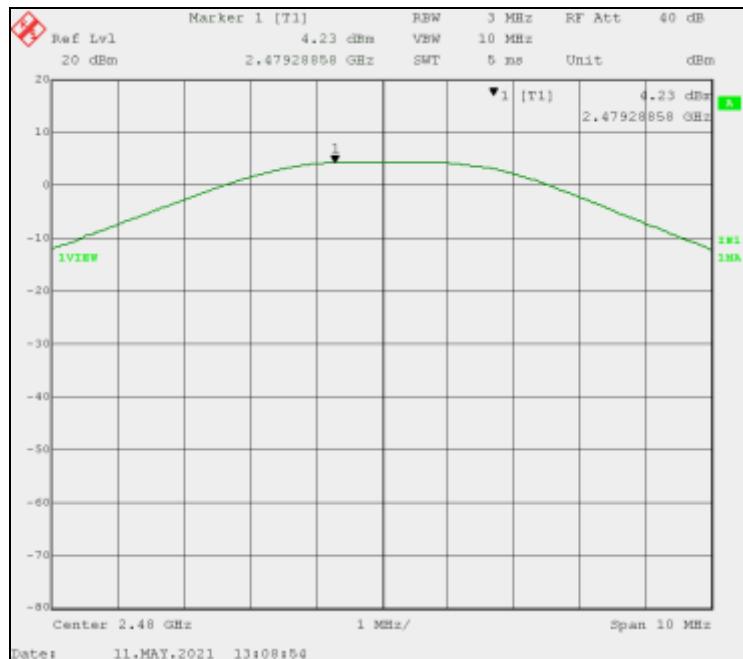


Legrand Model WNAL33 Zigbee Radio  
Middle Channel 18, 2440 MHz, O-QPSK Modulation

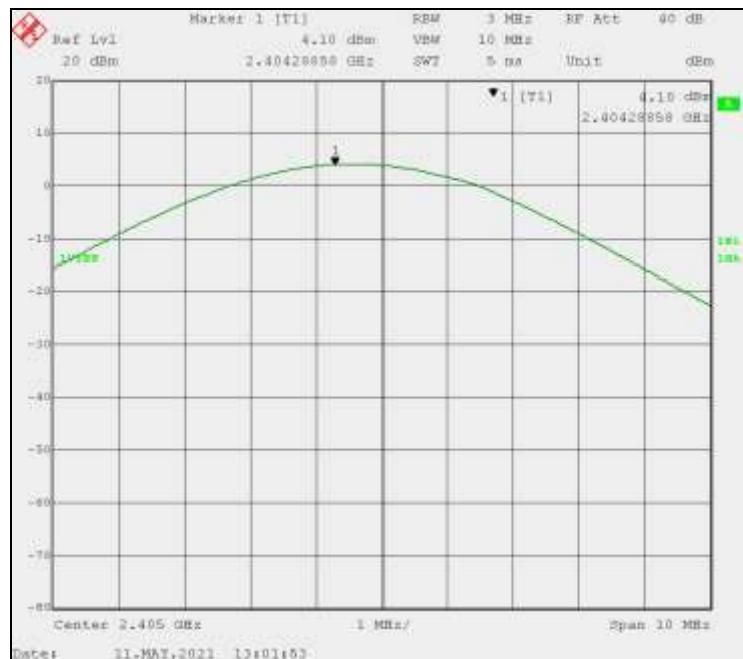




## Legrand Model WNAL33 Zigbee Radio High Channel 26, 2480 MHz, O-QPSK Modulation

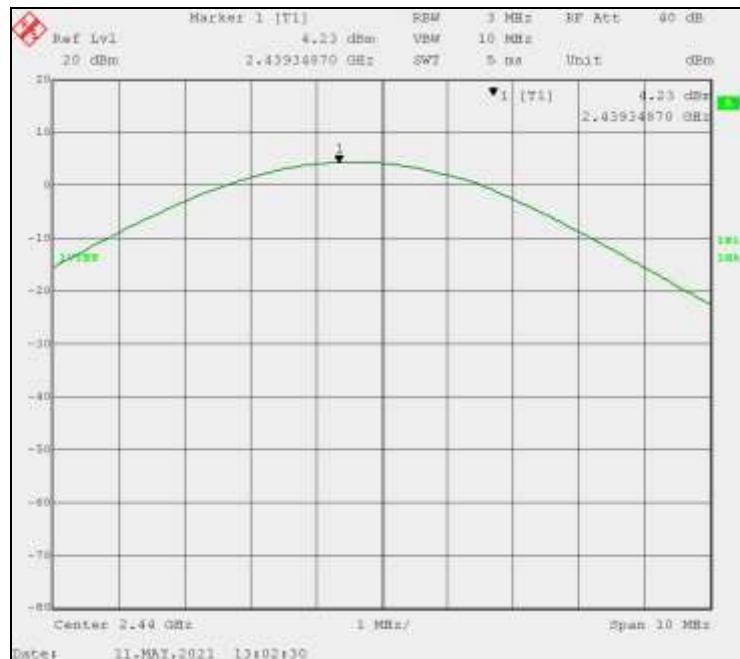


Legrand Model WNAL33 Zigbee Radio  
Low Channel 11, 2405 MHz, No modulation

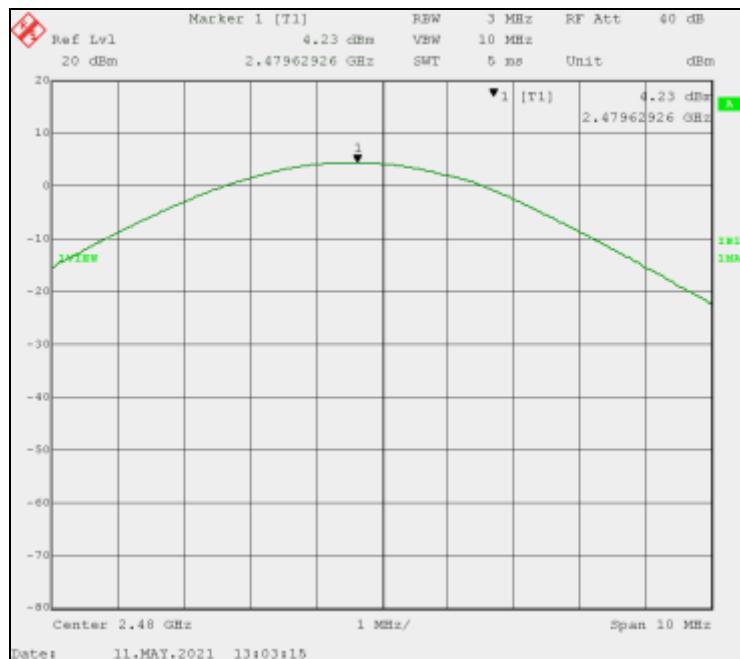




Legrand Model WNAL33 Zigbee Radio  
Middle Channel 18, 2440 MHz, No modulation



Legrand Model WNAL33 Zigbee Radio  
High Channel 26, 2480 MHz, No modulation





Channel	Modulation	Frequency (GHz)	Measured Level	Cable # 962 Loss	Total		Limit		Margin		Result
					dBm	Watts	dBm	Watts	dBm	Watts	
11	O-QPSK	2405.0	4.10	0.47	4.57	0.0029	30.00	1.000	-25.43	-0.997	Pass
18		2440.0	4.23	0.47	4.70	0.0030	30.00	1.000	-25.30	-0.997	Pass
26		2480.0	4.23	0.47	4.70	0.0030	30.00	1.000	-25.30	-0.997	Pass

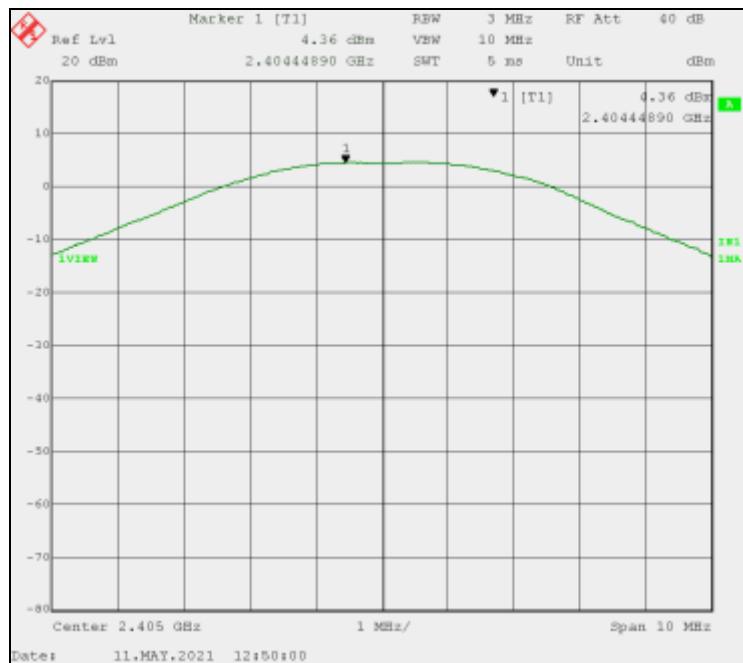
Channel	Modulation	Frequency (GHz)	Measured Level	Cable # 962 Loss	Total		Limit		Margin		Result
					dBm	Watts	dBm	Watts	dBm	Watts	
11	None	2405.0	4.10	0.47	4.57	0.0029	30.00	1.000	-25.43	-0.997	Pass
18		2440.0	4.23	0.47	4.70	0.0030	30.00	1.000	-25.30	-0.997	Pass
26		2480.0	4.23	0.47	4.70	0.0030	30.00	1.000	-25.30	-0.997	Pass

**Test Results:** The Maximum Conducted (Peak) Power Output measurements for the Legrand Model WNAL33 with Zigbee Radio, modulated with O-QPSK and un-modulated, are compliant to the requirements of 47 CFR Part 15.247(b)(3) and ISED, RSS-247 Section 5.4(d).

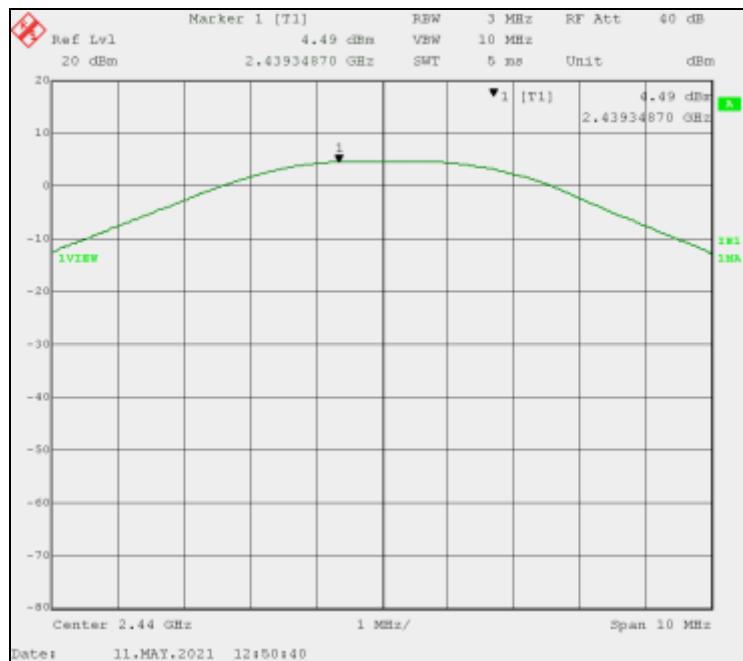


#### 4.7.1.2 Maximum Conducted (Peak) Output Power WNAL43 Zigbee Radio O-QPSK Modulation Test Results (05/11/2021)

Legrand Model WNAL43 Zigbee Radio  
Low Channel 11, 2405 MHz, O-QPSK Modulation

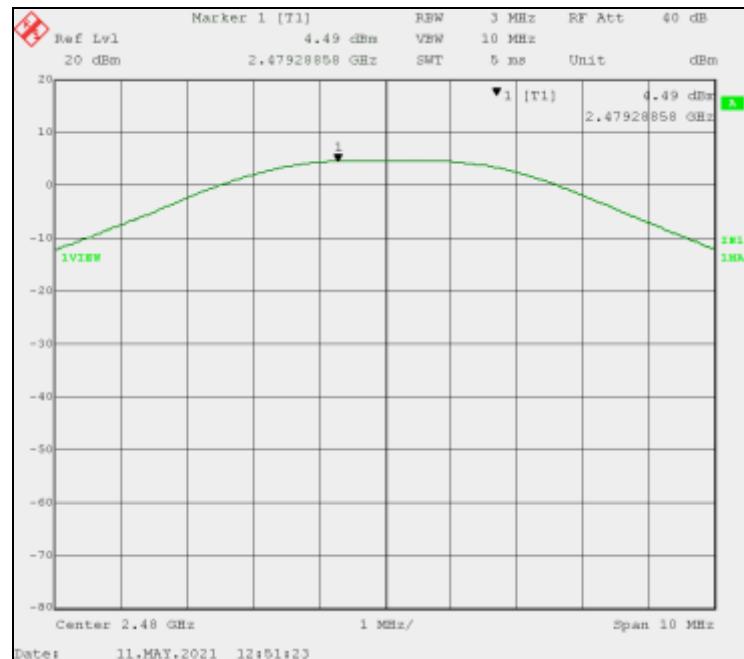


Legrand Model WNAL43 Zigbee Radio  
Middle Channel 18, 2440 MHz, O-QPSK Modulation

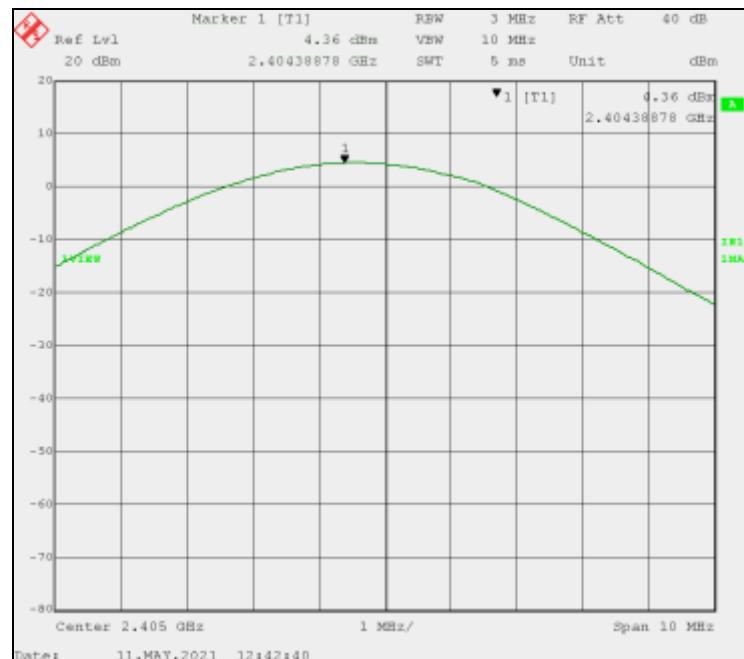




## Legrand Model WNAL43 Zigbee Radio High Channel 26, 2480 MHz, O-QPSK Modulation

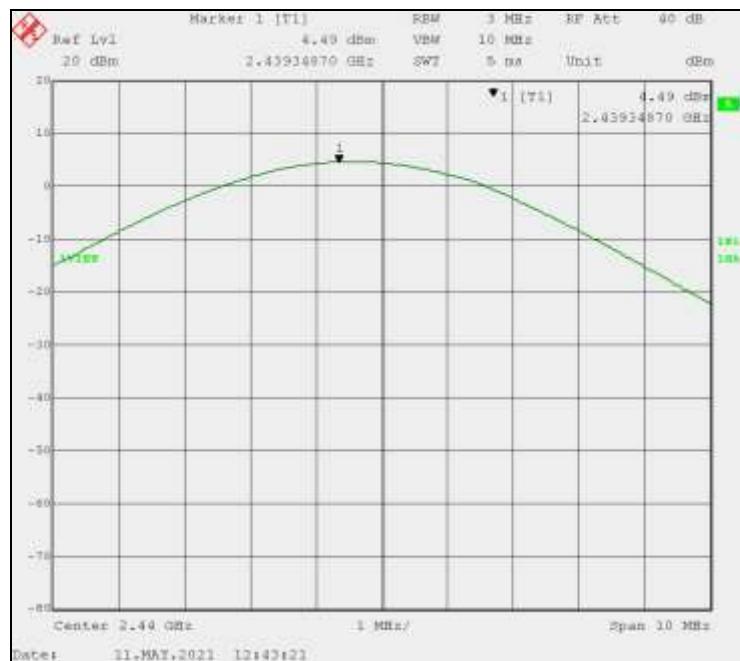


Legrand Model WNAL43 Zigbee Radio  
Low Channel 11, 2405 MHz, No modulation

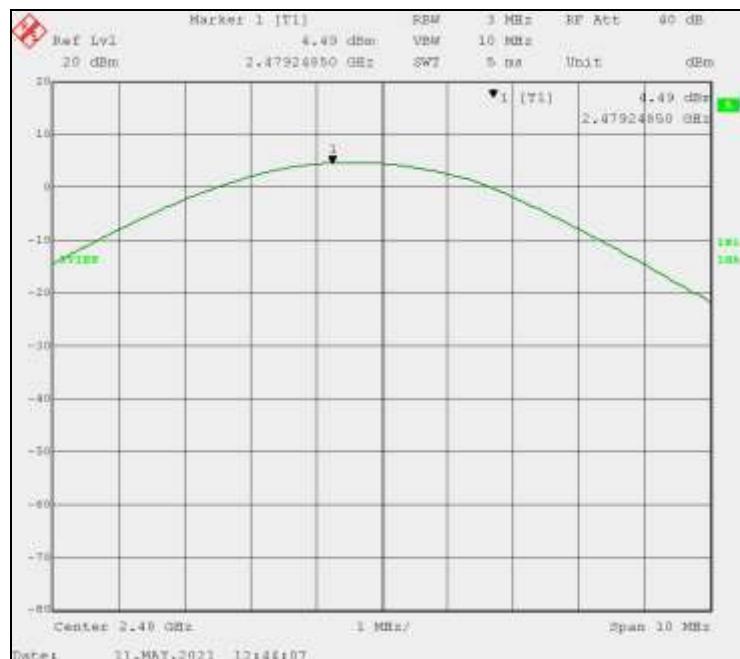




Legrand Model WNAL43 Zigbee Radio  
Middle Channel 18, 2440 MHz, No modulation



Legrand Model WNAL43 Zigbee Radio  
High Channel 26, 2480 MHz, No modulation





Channel	Modulation	Frequency (GHz)	Measured Level	Cable # 962 Loss	Total		Limit		Margin		Result
					dBm	Watts	dBm	Watts	dBm	Watts	
11	O-QPSK	2405.0	4.36	0.47	4.83	0.0030	30.00	1.000	-25.17	-0.997	Pass
18		2440.0	4.49	0.47	4.96	0.0031	30.00	1.000	-25.04	-0.997	Pass
26		2480.0	4.49	0.47	4.96	0.0031	30.00	1.000	-25.04	-0.997	Pass

Channel	Modulation	Frequency (GHz)	Measured Level	Cable # 962 Loss	Total		Limit		Margin		Result
					dBm	Watts	dBm	Watts	dBm	Watts	
11	None	2405.0	4.36	0.47	4.83	0.0030	30.00	1.000	-25.17	-0.997	Pass
18		2440.0	4.49	0.47	4.96	0.0031	30.00	1.000	-25.04	-0.997	Pass
26		2480.0	4.49	0.47	4.96	0.0031	30.00	1.000	-25.04	-0.997	Pass

**Test Results:** The Maximum Conducted (Peak) Power Output measurements for the Legrand Model WNAL43 with Zigbee Radio, modulated with O-QPSK and un-modulated, are compliant to the requirements of 47 CFR Part 15.247(b)(3) and ISED, RSS-247 Section 5.4(d).



## 4.7.2 EIRP Level WNALX3 Zigbee Radio Test Results (05/11/2021)

The Innovation, Science and Economic Development Canada (ISED), RSS-247 requires the calculation of the Effective Isotropic Radiated Power (EIRP) for the Legrand Model WNALX3 with Zigbee Radio. Below is the tabular data, using measured power levels from the previous section.

### 4.7.2.1 EIRP Level WNAL33 Zigbee Radio Test Results

Channel	Modulation	Frequency (GHz)	Transmitter Output		Antenna Gain		EIRP				Result	
			Total		Isotropic	Numeric	Total		Limit	Margin		
			dBm	Watts			dBm	Watts				
11	O-QPSK	2405.0	4.57	0.0029	1.10	1.288	5.67	0.0037	4.00	-3.9963	Pass	
18		2440.0	4.70	0.0030	1.10	1.288	5.80	0.0038	4.00	-3.9962	Pass	
26		2480.0	4.70	0.0030	1.10	1.288	5.80	0.0038	4.00	-3.9962	Pass	

Channel	Modulation	Frequency (GHz)	Transmitter Output		Antenna Gain		EIRP				Result	
			Total		Isotropic	Numeric	Total		Limit	Margin		
			dBm	Watts			dBm	Watts				
11	None	2405.0	4.57	0.0029	1.10	1.288	5.67	0.0037	4.00	-3.9963	Pass	
18		2440.0	4.70	0.0030	1.10	1.288	5.80	0.0038	4.00	-3.9962	Pass	
26		2480.0	4.70	0.0030	1.10	1.288	5.80	0.0038	4.00	-3.9962	Pass	

### 4.7.2.2 EIRP Level WNAL43 Zigbee Radio Test Results

Channel	Modulation	Frequency (GHz)	Transmitter Output		Antenna Gain		EIRP				Result	
			Total		Isotropic	Numeric	Total		Limit	Margin		
			dBm	Watts			dBm	Watts				
11	O-QPSK	2405.0	4.83	0.0030	1.10	1.2882	5.93	0.0039	4.00	-3.9961	Pass	
18		2440.0	4.96	0.0031	1.10	1.2882	6.06	0.0040	4.00	-3.9960	Pass	
26		2480.0	4.96	0.0031	1.10	1.2882	6.06	0.0040	4.00	-3.9960	Pass	

Channel	Modulation	Frequency (GHz)	Transmitter Output		Antenna Gain		EIRP				Result	
			Total		Isotropic	Numeric	Total		Limit	Margin		
			dBm	Watts			dBm	Watts				
11	None	2405.0	4.83	0.0030	1.10	1.2882	5.93	0.0039	4.00	-3.9961	Pass	
18		2440.0	4.96	0.0031	1.10	1.2882	6.06	0.0040	4.00	-3.9960	Pass	
26		2480.0	4.96	0.0031	1.10	1.2882	6.06	0.0040	4.00	-3.9960	Pass	

**Test Results:** The Effective Isotropic Radiated Power measurements for the Legrand Model WNALX3 with Zigbee Radio, modulated with O-QPSK and un-modulated, are compliant to the requirements of ISED, RSS-247 Section 5.4(d).

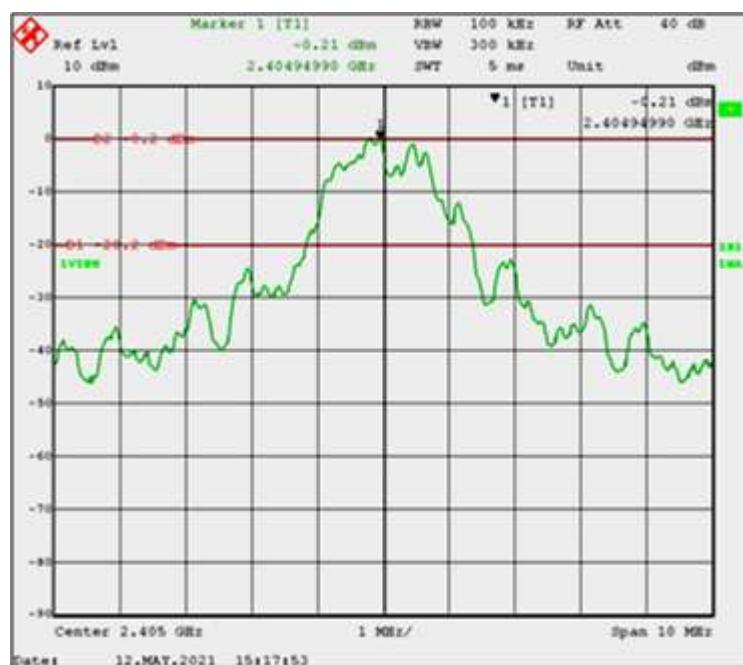
## 4.8 Emissions in Non-restricted Frequency Bands 30 MHz – 25 GHz (FCC Section 15.247(d), RSS-247 Sec.5)

### 4.8.1 Emissions in Non-restricted Frequency Bands 30 MHz – 25 GHz Test Procedure

The results in this section, for the WNAL33 and WNAL43 depict the highest emissions, while transmitting with modulation on Channels 11 and 18 respectively. The channels not presented and Receive modes were measured and showed similar but lower emissions. Spectrum Analyzer screens for low, middle, high channels and Receive Mode were recorded and are available upon request. Spectrum Analyzer RBW was 100 kHz, VBW was 300 kHz and Span varied.

### 4.8.2 Emissions in Non-restricted Frequency Bands 30 MHz – 25 GHz 30 dB Reference Measurement.

#### 4.8.2.1 WNAL33 Zigbee Radio Reference Measurement, Channel 11 (05/12/2021)

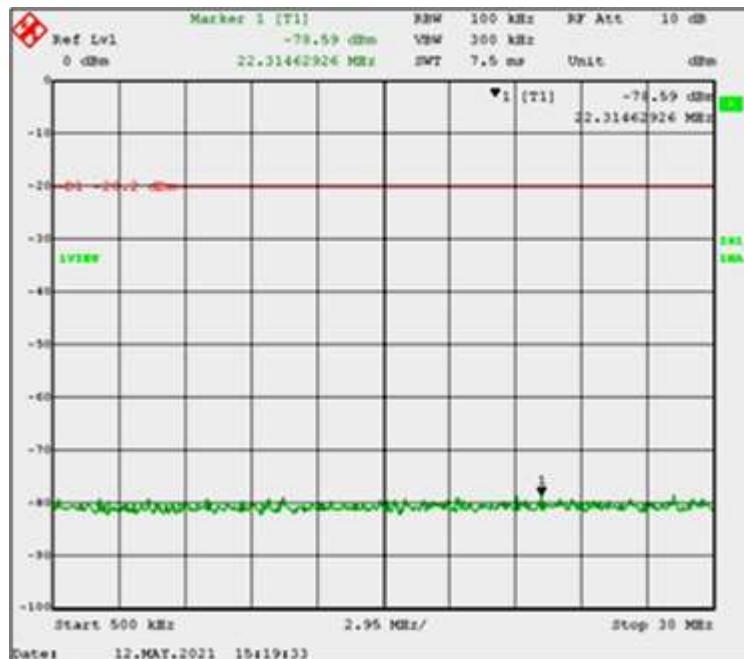


The peak level of -0.2 dBm is the maximum peak output of the Legrand Model WNAL33 with Zigbee Radio transmitting with modulation on Channel 11 at full power. The conducted spurious emissions from the antenna port must be 20 dB down from this peak. The resultant limit is therefore -20.2 dBm. This limit is displayed on the plots below.

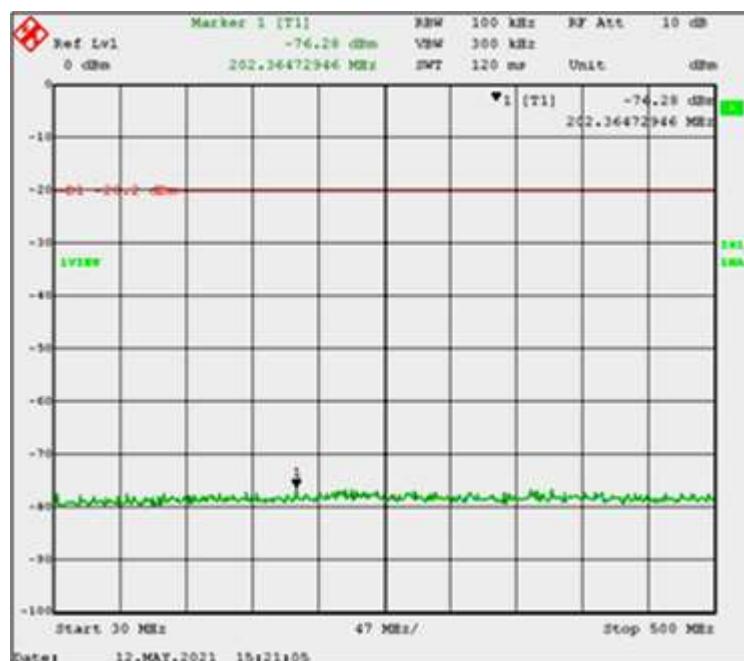


#### 4.8.2.2 Emissions in Non-restricted Frequency Bands WNAL33 Zigbee Radio Test Results (05/12/2021)

WNAL33 Zigbee Radio Transmitting: 500 kHz – 30 MHz (Without High Pass Filter)

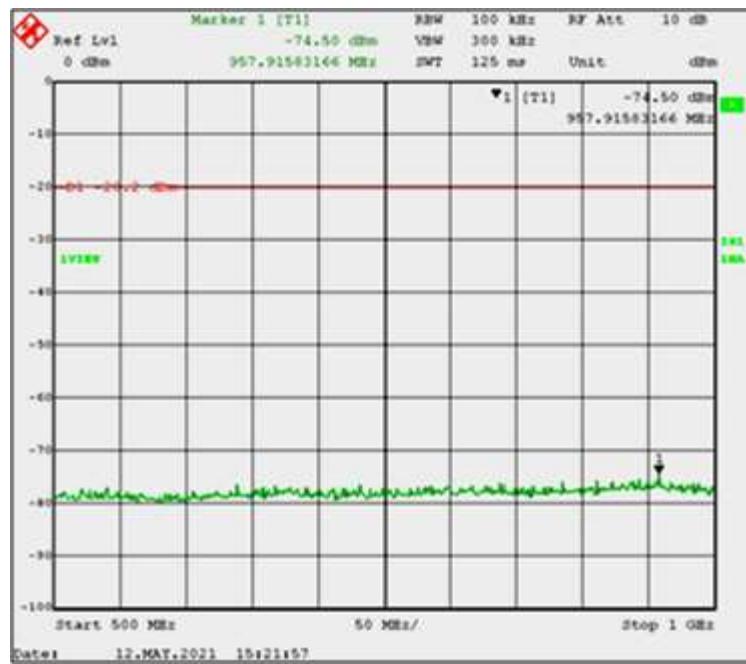


WNAL33 Zigbee Radio Transmitting: 30 MHz – 500 MHz (Without High Pass Filter)

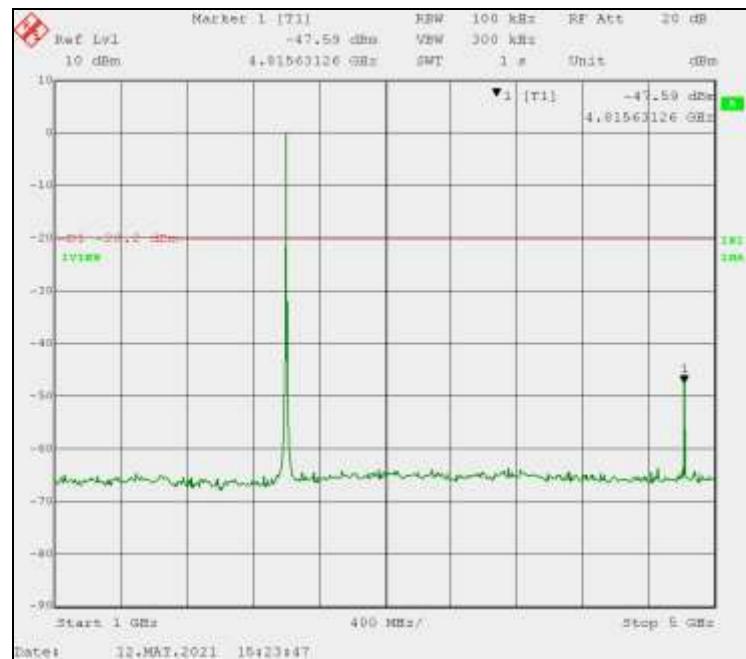




### WNAL33 Zigbee Radio Transmitting (Without High Pass Filter): 500 MHz – 1 GHz

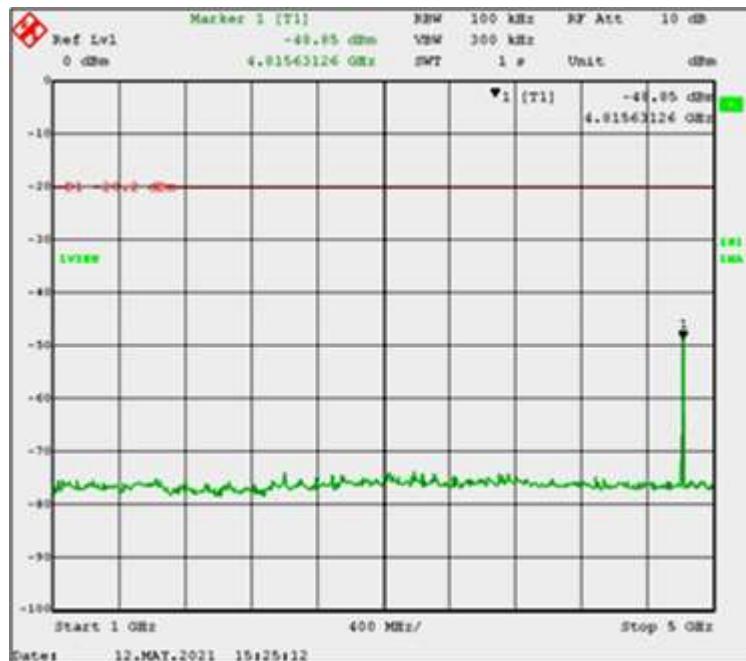


### WNAL33 Zigbee Radio Transmitting (Without High Pass Filter Installed): 1 GHz – 5 GHz

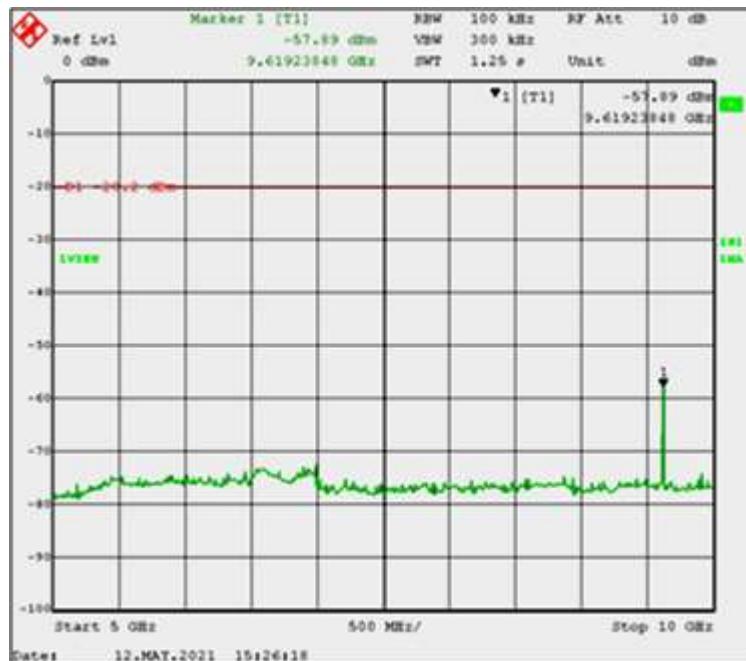




WNAL33 Zigbee Radio Transmitting (With High Pass Filter Installed): 1 GHz – 5 GHz

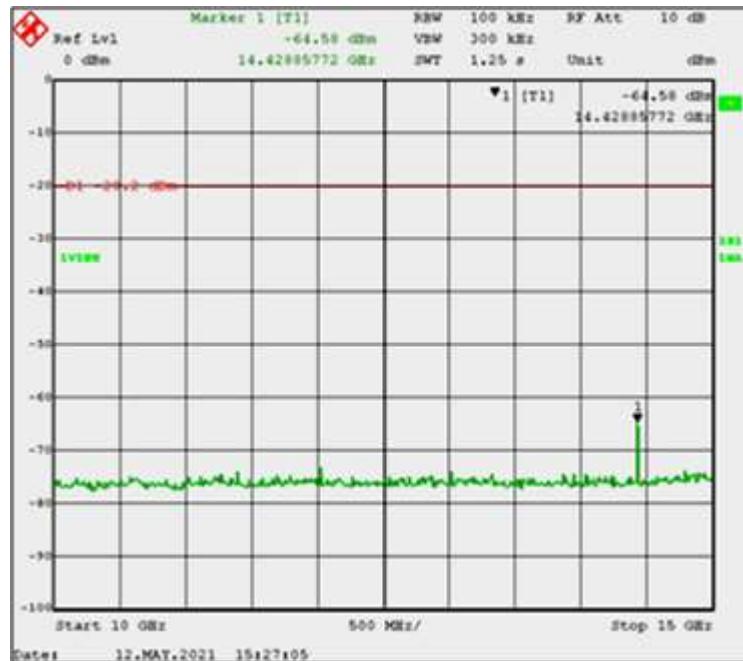


WNAL33 Zigbee Radio Transmitting (With High Pass Filter Installed): 5 GHz – 10 GHz

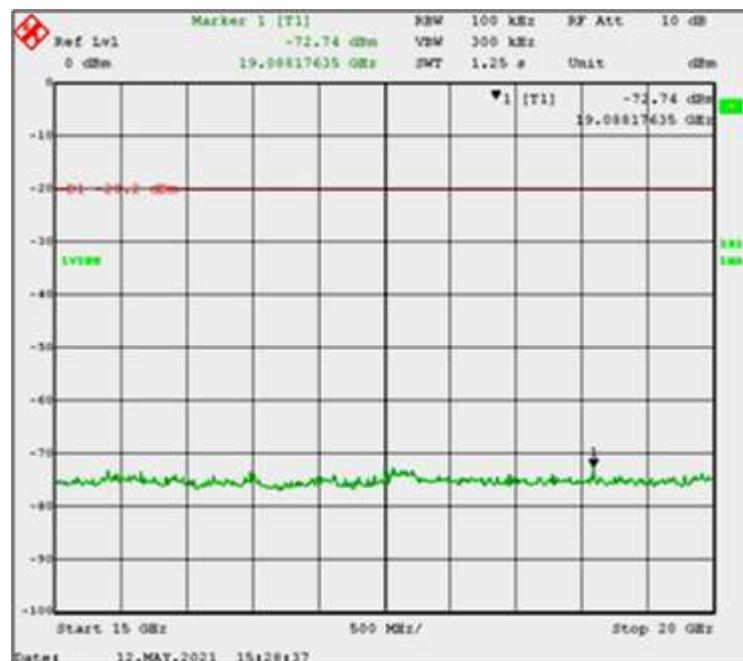




WNAL33 Zigbee Radio Transmitting (With High Pass Filter Installed): 10 GHz – 15 GHz

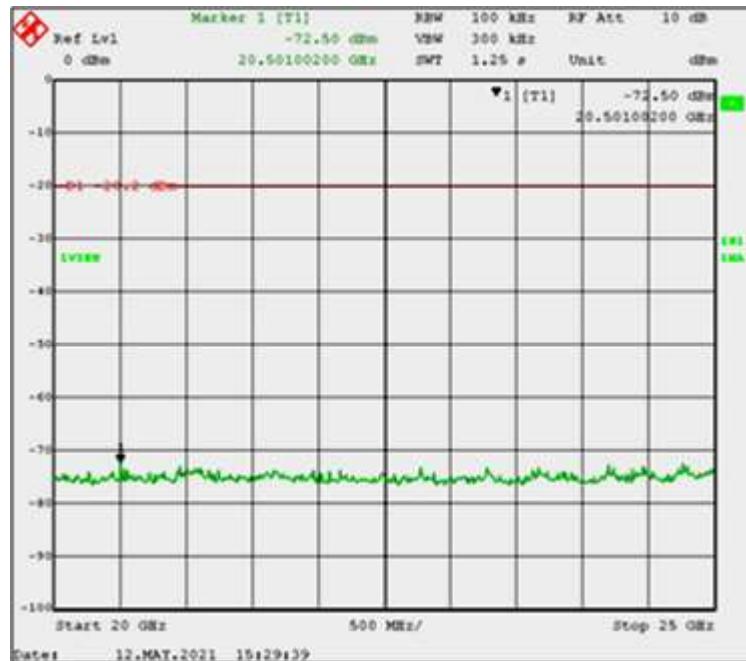


WNAL33 Zigbee Radio Transmitting (With High Pass Filter Installed): 15 GHz – 20 GHz





WNAL33 Zigbee Radio Transmitting (With High Pass Filter Installed): 20 GHz – 25 GHz



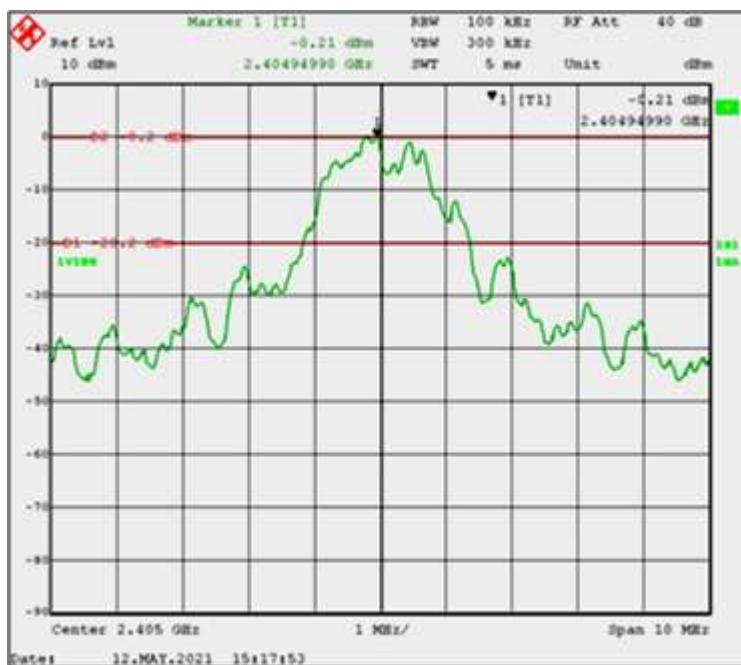
#### Highest peak emissions from the Spectrum Analyzer Screens:

Frequency	Peak	20 dB below	Margin	Result
		Max Peak Reference		
MHz	dBm	dBc	dB	
957.916	-74.50	-20.20	-54.30	PASS
4815.631	-48.85	-20.20	-28.65	PASS
9619.239	-57.89	-20.20	-37.69	PASS
14428.858	-64.58	-20.20	-44.38	PASS
19088.176	-72.74	-20.20	-52.54	PASS
20501.002	-72.50	-20.20	-52.30	PASS

**Test Results:** Emissions in Non-Restricted Frequency Bands, measured from the Legrand Model WNAL33 Zigbee Radio, transmitting with modulation on Channel 11, comply with the requirements of 47 CFR Part 15.247 (d) with 28.65 dB of margin.



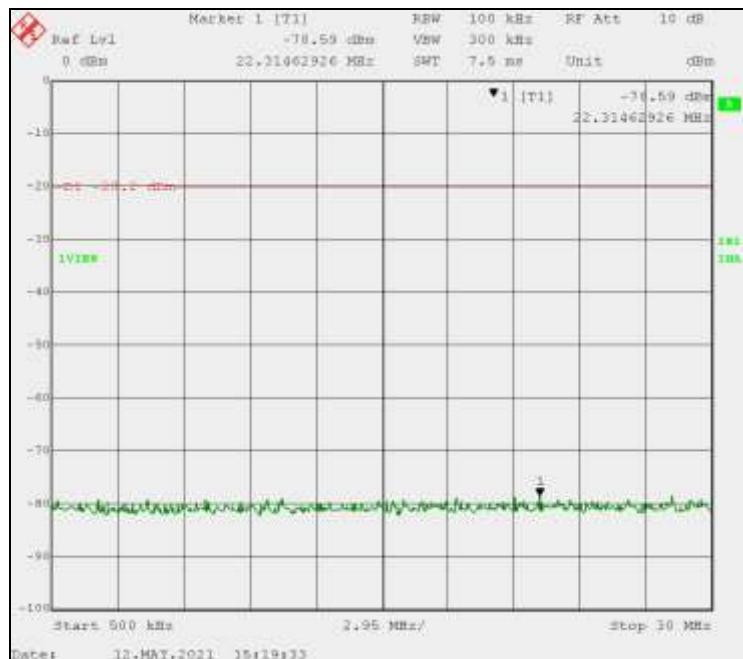
#### 4.8.2.3 WNAL43 Zigbee Radio Reference Measurement, Channel 18 (05/12/2021)



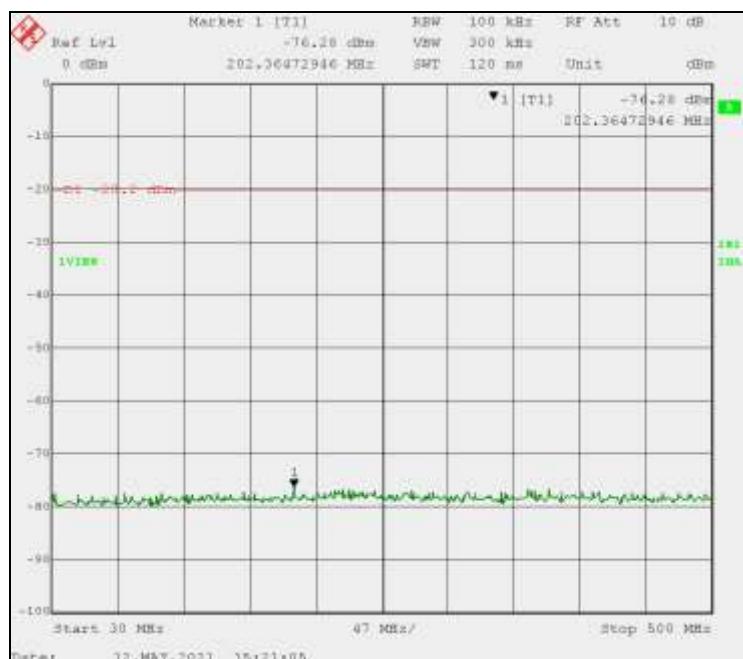
The peak level of -0.2 dBm is the maximum peak output of the Legrand Model WNAL43 Zigbee Radio transmitting with modulation on Channel 18 at full power. The conducted spurious emissions from the antenna port must be 20 dB down from this peak. The resultant limit is therefore -20.2 dBm. This limit is displayed on the plots below.



### WNAL33 Zigbee Radio Transmitting: 500 kHz – 30 MHz (Without High Pass Filter)

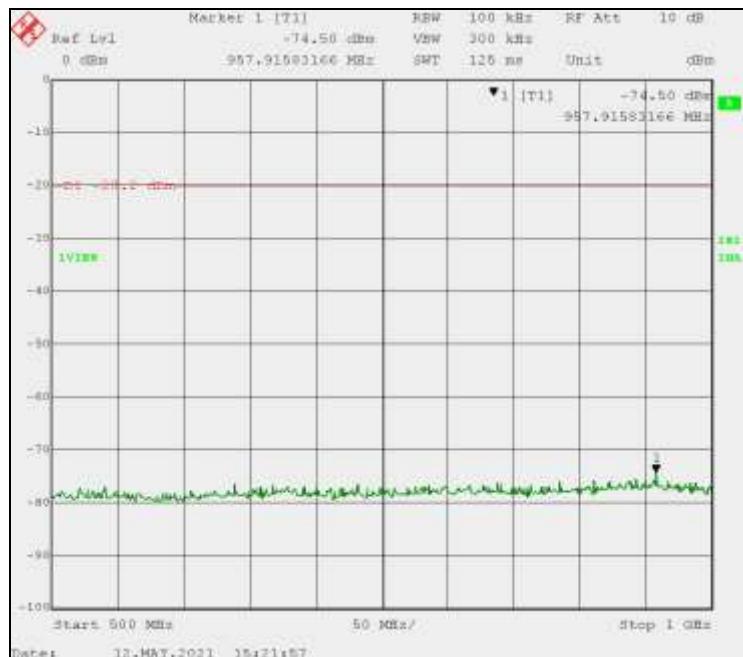


### WNAL33 Zigbee Radio Transmitting: 30 MHz – 500 MHz (Without High Pass Filter)

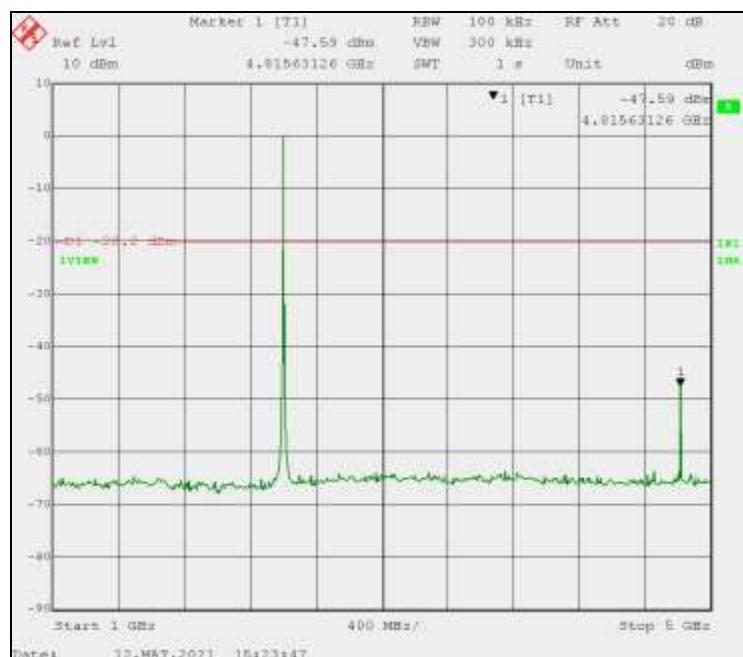




### WNAL33 Zigbee Radio Transmitting (Without High Pass Filter): 500 MHz – 1 GHz

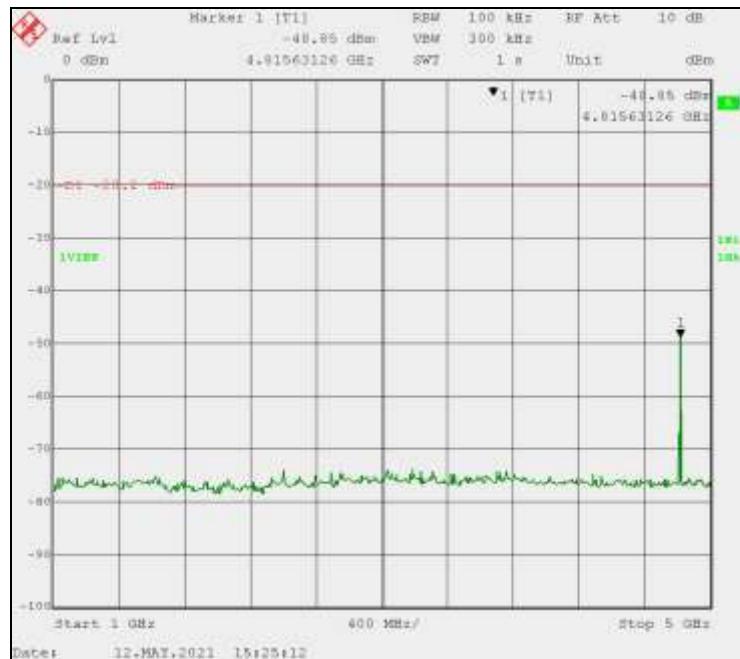


### WNAL33 Zigbee Radio Transmitting (Without High Pass Filter Installed): 1 GHz – 5 GHz

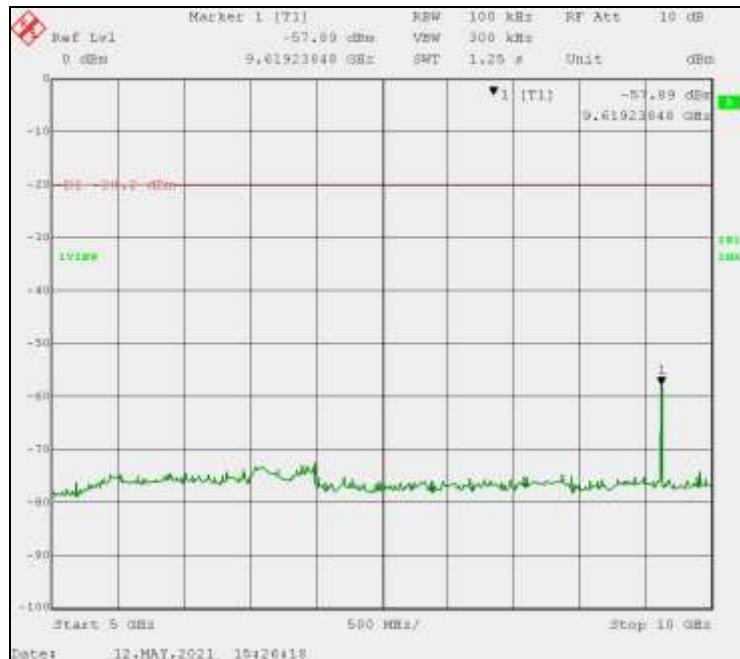




### WNAL33 Zigbee Radio Transmitting (With High Pass Filter Installed): 1 GHz – 5 GHz

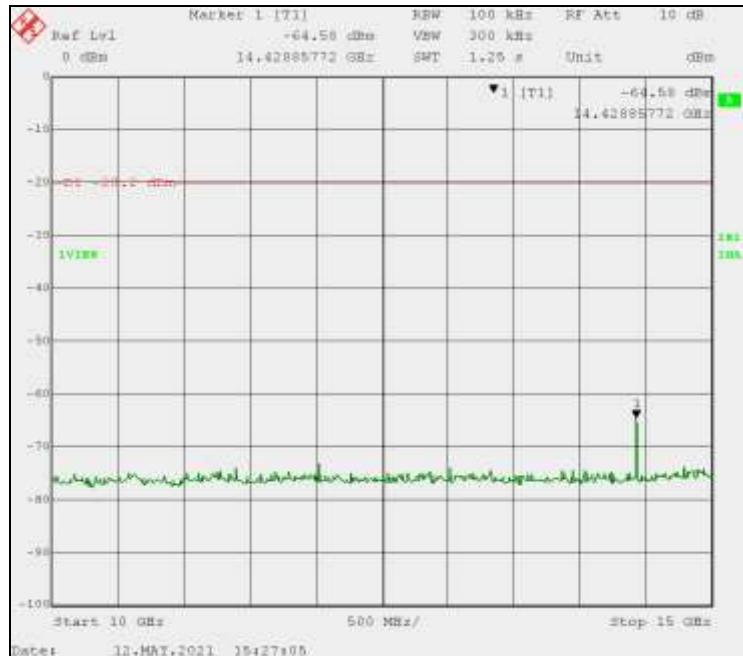


### WNAL33 Zigbee Radio Transmitting (With High Pass Filter Installed): 5 GHz – 10 GHz

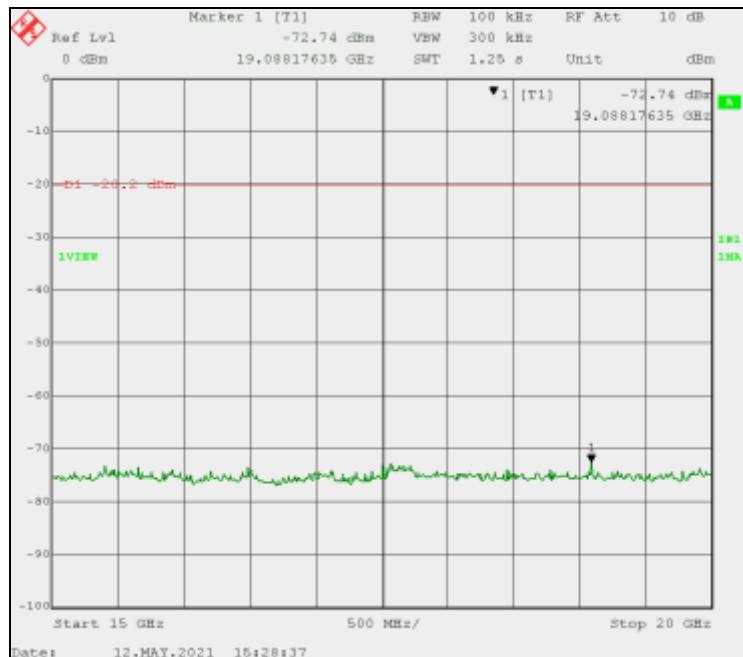




### WNAL33 Zigbee Radio Transmitting (With High Pass Filter Installed): 10 GHz – 15 GHz

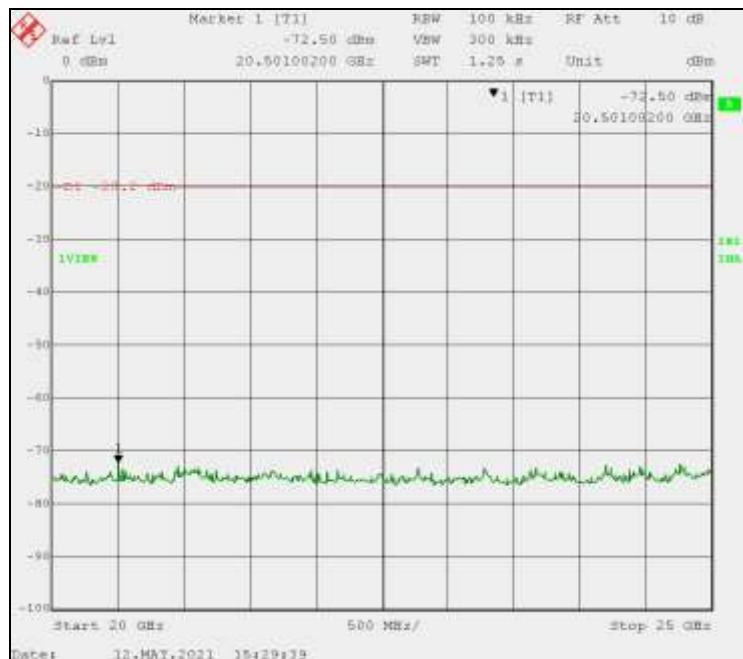


### WNAL33 Zigbee Radio Transmitting (With High Pass Filter Installed): 15 GHz – 20 GHz





## WNAL33 Zigbee Radio Transmitting (With High Pass Filter Installed): 20 GHz – 25 GHz



### Highest peak emissions from the Spectrum Analyzer Screens:

Frequency	Peak	20 dB below Max Peak Reference	Margin	Result
MHz	dBm	dBc	dB	
958.918	-75.11	-20.20	-54.91	PASS
4879.760	-63.67	-20.20	-43.47	PASS
7316.456	-73.37	-20.20	-53.17	PASS
9769.539	-49.36	-20.20	-29.16	PASS
17655.310	-71.70	-20.20	-51.50	PASS
21042.080	-72.86	-20.20	-52.66	PASS

**Test Results:** Emissions in Non-Restricted Frequency Bands, measured from the Legrand Model WNAL33 Zigbee Radio, transmitting with modulation on Channel 18, comply with the requirements of 47 CFR Part 15.247 (d) with 29.16 dB of margin.



## 4.9 Power Spectral Density (FCC Section 15.247(e), RSS-247 Section 5.2(b))

### 4.9.1 Power Spectral Density Test Procedure

A conducted, peak, power measurement of the output frequency was measured for the Legrand WNAL33 and WNAL43 for each of the low, middle and high operating frequencies with modulation. The Zigbee radio was modulated with O-QPSK. Peak conducted output power, as directed by ANSI C63.10, Section 11.9.1.1. Therefore, method PKPSD of Section 11.10.2, with 3 kHz bandwidth, was used to measure Power Spectral Density. The Spectrum Analyzer settings:

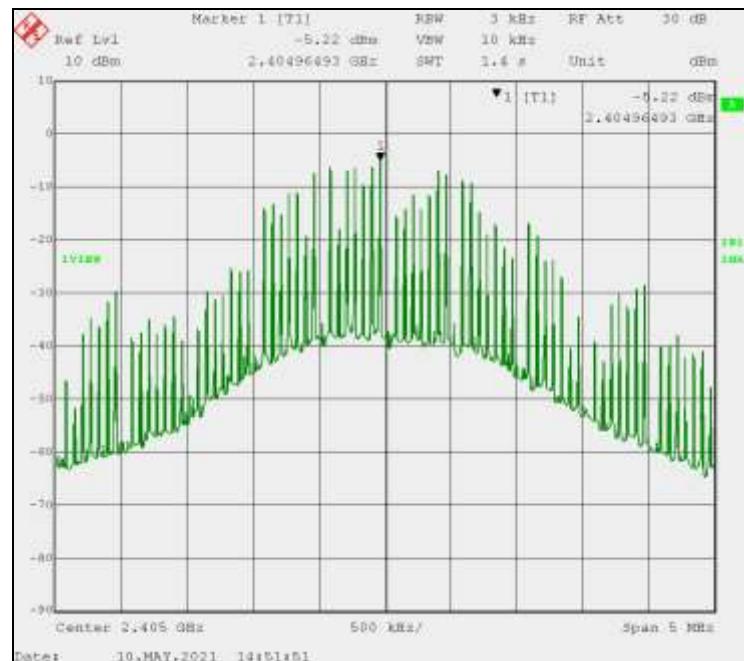
Zigbee Radio, O-QPSK modulation			
Spec Analyzer Settings			ANSI C63.10 requirement
Span	3	kHz	$\geq 1.5 \times \text{RBW}$
RBW	10	kHz	$3 \text{ kHz} \geq \text{RBW} \geq 100 \text{ kHz}$
VBW	5	MHz	$\geq 3 \times \text{RBW}$
Sweep	1.4	s	Auto

#### 4.9.1.1 Power Spectral Density WNAL33 Zigbee Radio Test Results (05/10/2021)

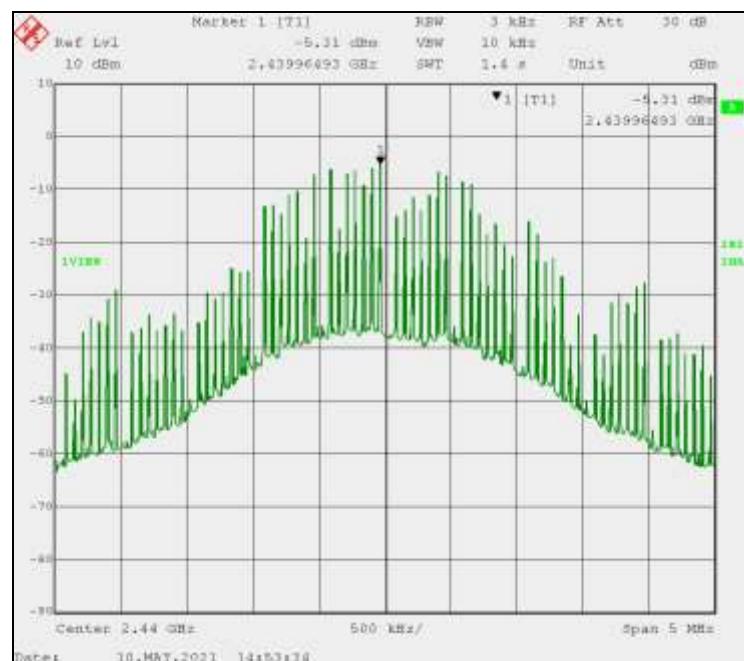
Channel	Modulation	Frequency (MHz)	Measured Level (dBm)	Cable # 814 Loss (dB)	Total dBm	Limit dBm	Margin dBm
11	O-QPSK	2405.0	-5.22	0.47	-4.75	8.00	-12.75
18		2440.0	-5.31	0.47	-4.84	8.00	-12.84
26		2480.0	-5.51	0.47	-5.04	8.00	-13.04



WNAL33 Zigbee Radio Low Channel 11, 2405 MHz PSD

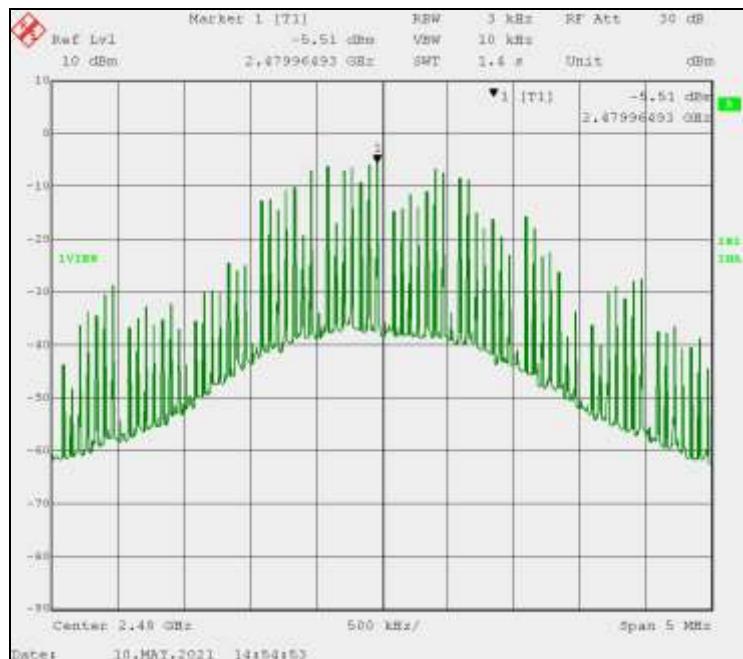


WNAL33 Zigbee Radio Middle Channel 18, 2440 MHz PSD





### WNAL33 Zigbee Radio High Channel 26, 2480 MHz PSD



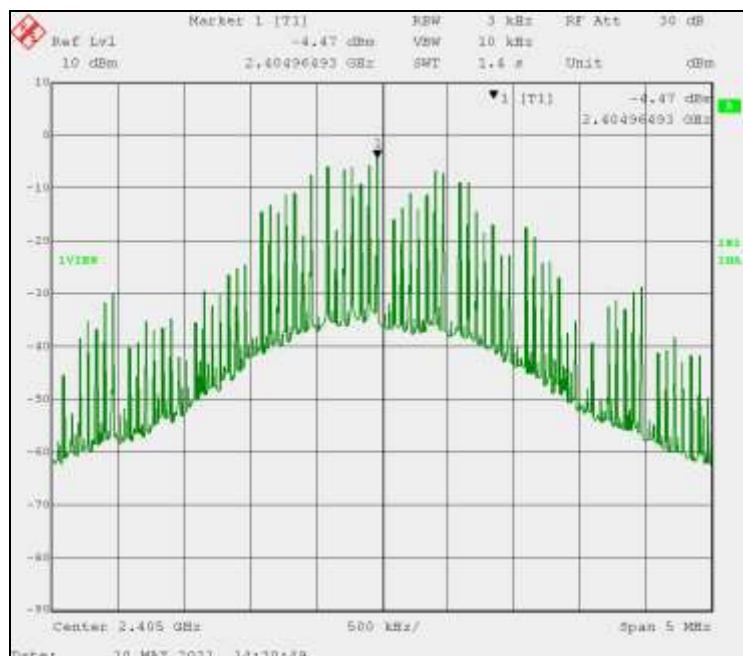
**Test Results:** The Power Spectral Density measurements of the Legrand Model WNAL33 with Zigbee Radio are compliant with the limits specified in FCC Section 15.247(e) with margin of 12.75 dB.



#### 4.9.1.2 Power Spectral Density WNAL43 Zigbee Radio Test Results (05/10/2021)

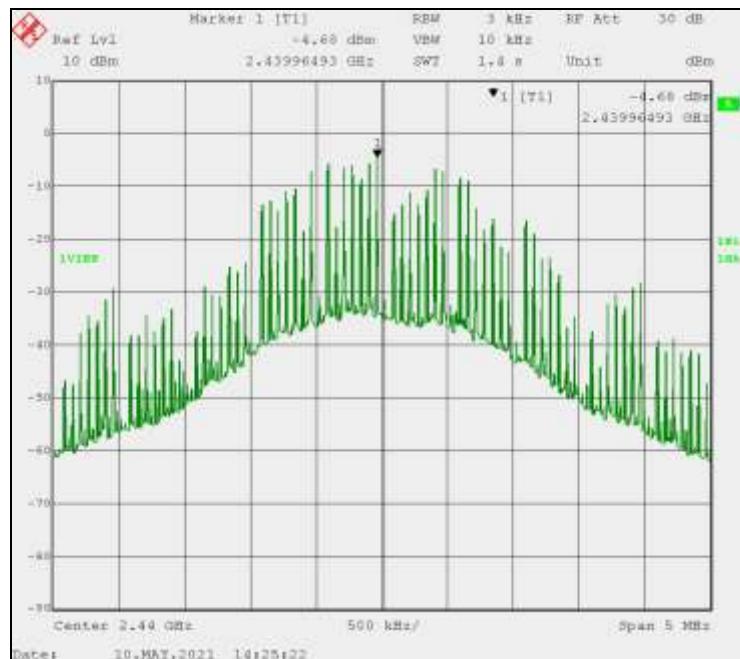
Channel	Modulation	Frequency (MHz)	Measured Level (dBm)	Cable # 814 Loss (dB)	Total		Margin
					dBm	dBm	
11	O-QPSK	2405.0	-4.47	0.47	-4.00	8.00	-12.00
18		2440.0	-4.68	0.47	-4.21	8.00	-12.21
26		2480.0	-5.24	0.47	-4.77	8.00	-12.77

#### WNAL43 Zigbee Radio Low Channel 11, 2405 MHz PSD

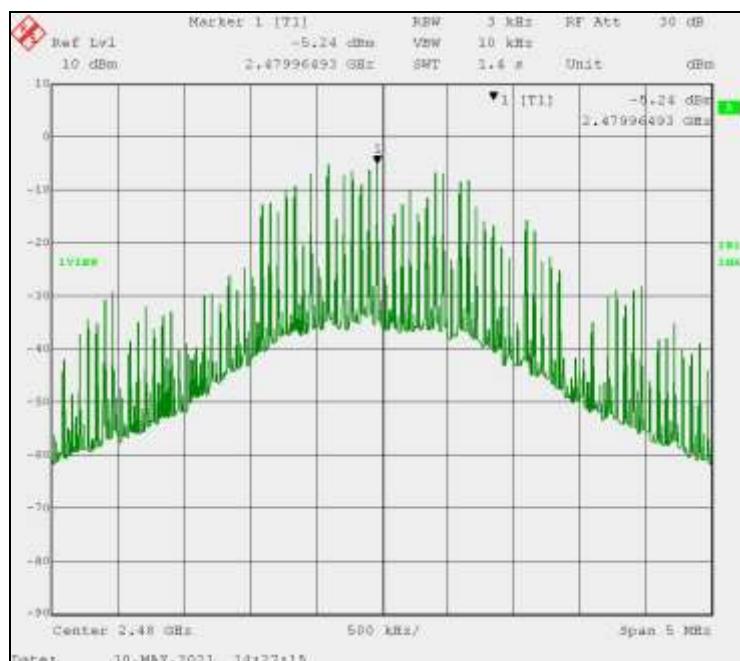




### WNAL43 Zigbee Radio Middle Channel 18, 2440 MHz PSD



### WNAL43 Zigbee Radio High Channel 26, 2480 MHz PSD



**Test Results:** The Power Spectral Density measurements of the Legrand Model WNAL43 with Zigbee Radio are compliant with the limits specified in FCC Section 15.247(e) with margin of 12.00 dB.



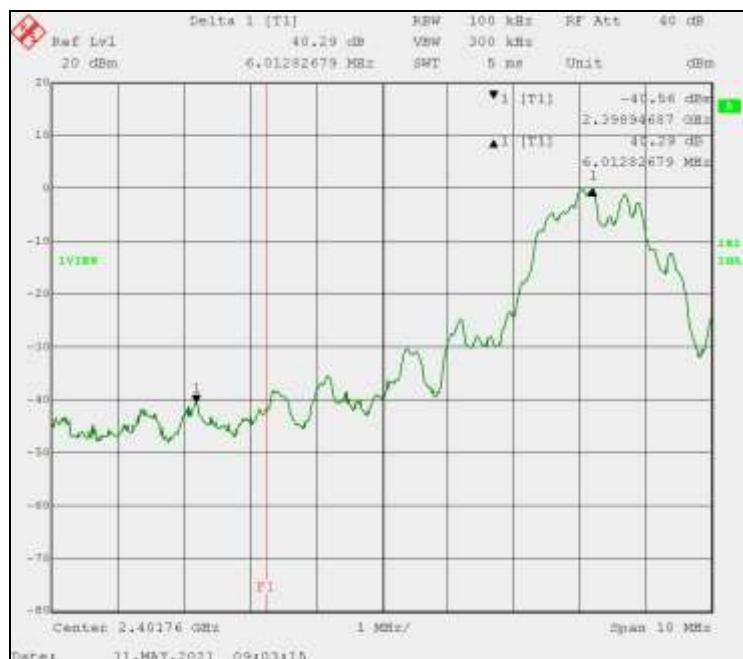
## 4.10 Band Edge Measurement (FCC Part 15.247(d), RSS-247 5.5)

### 4.10.1 Band Edge Measurement Test Procedure

The measurements of the authorized band edge for the WNALX3 Zigbee radios were made using the antenna conducted test procedure described in Section 6.10.4 of ANSI C63.10. The restricted band edge measurement was made using Section 6.10.5. The EUT transmitted with modulation on the low and high channels.

#### 4.10.1.1 Lower Authorized Band Edge Test Result – WNAL33 (05/11/2021)

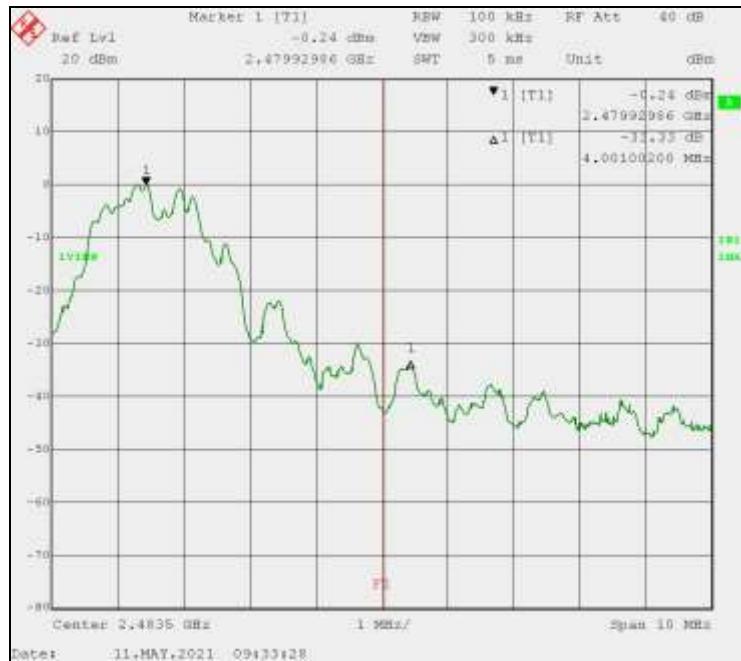
##### Zigbee Radio transmitting at 2.405 GHz, O-QPSK



The authorized band begins at 2.400 GHz. The lowest operating frequency of the EUT is 2.405 GHz. The screen above shows the low channel modulated emission profile. Normal Marker  $\blacktriangledown 1$  is at the highest emission outside the authorized band. Delta Marker  $\blacktriangle 1$ , marks the highest emission level in the authorized band. The red, vertical line  $F1$  is the Authorized Band boundary at 2.40 GHz. The value of Delta Marker  $\blacktriangle$  is the difference between the two markers. The limit is 20 dB, the value is 40.29 dB.

#### 4.10.1.2 Upper Restricted Band Edge Test Result – WNAL33 (05/11/2021)

##### Zigbee Radio transmitting at 2.48 GHz, O-QPSK



The restricted band begins at 2.4835 GHz. The highest operating frequency of the EUT is 2.480 GHz. The screen above shows channel 28, modulated transmission emission profile. Normal Marker ▼1 is at the highest emission within the authorized band. Delta Marker ▲1, marks the highest emission in the restricted band. The red, vertical line F1 is the Restricted Band boundary at 2.4835 GHz. The value of Delta Marker ▲1 is the difference between the two markers. The limit is 20 dB, the value is 33.33 dB.

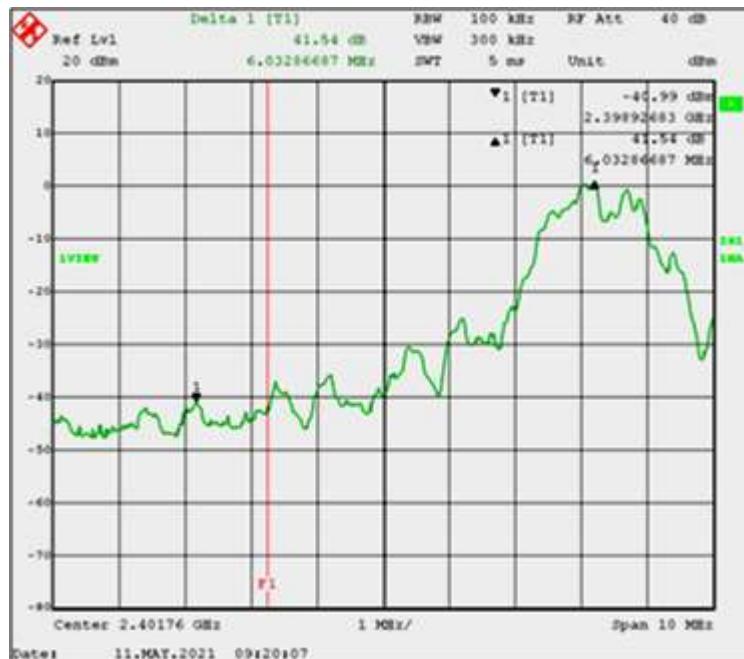
Band Edge / Freq (GHz)	Modulation	Fundamental Frequency Carrier		Band-edge Peak Level	Delta	Limit	Margin
		MHz	dBm				
Lower / 2.400	O-QPSK	2405.0	-0.27	-40.56	40.29	20.00	-20.29
Upper / 2.4835		2480.0	-0.24	-33.57	33.33	20.00	-13.33

**Test Results:** Band-edge measurement of the Legrand Model WNAL33 Zigbee Radio, transmitting with O-QPSK modulation, is compliant to the FCC and ISED limits with margin of 13.33 dB.



#### 4.10.1.3 Lower Authorized Band Edge Test Result – WNAL43 (05/11/2021)

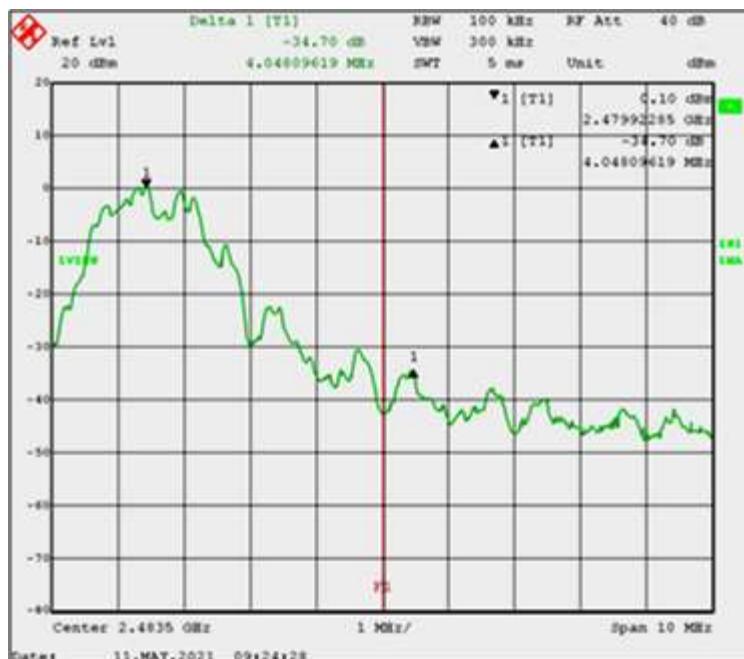
Zigbee Radio transmitting at 2.405 GHz, O-QPSK



The authorized band begins at 2.400 GHz. The lowest operating frequency of the EUT is 2.405 GHz. The screen above shows the low channel modulated emission profile. Normal Marker  $\nabla 1$  is at the highest emission outside the authorized band. Delta Marker  $\blacktriangle 1$ , marks the highest emission level in the authorized band. The red, vertical line  $F1$  is the Authorized Band boundary at 2.40 GHz. The value of Delta Marker  $\blacktriangle$  is the difference between the two markers. The limit is 20 dB, the value is 41.54 dB.

#### 4.10.1.4 Upper Restricted Band Edge Test Result – WNAL43 (05/11/2021)

Zigbee Radio transmitting at 2.48 GHz, O-QPSK



The restricted band begins at 2.4835 GHz. The highest operating frequency of the EUT is 2.480 GHz. The screen above shows channel 28, modulated transmission emission profile. Normal Marker ▼1 is at the highest emission within the authorized band. Delta Marker ▲1, marks the highest emission in the restricted band. The red, vertical line F1 is the Restricted Band boundary at 2.4835 GHz. The value of Delta Marker ▲1 is the difference between the two markers. The limit is 20 dB, the value is 34.70 dB.

Band Edge / Freq (GHz)	Modulation	Fundamental Frequency Carrier		Band-edge Peak Level	Delta	Limit	Margin
		MHz	dBm				
Lower / 2.400	O-QPSK	2405.0	0.55	-40.99	41.54	20.00	-21.54
Upper / 2.4835		2480.0	0.10	-34.60	34.70	20.00	-14.70

**Test Results:** Band-edge measurement of the Legrand Model WNAL43 Zigbee Radio, transmitting with O-QPSK modulation, is compliant to the FCC and ISED limits with margin of 14.70 dB.



## **Appendix A – Legrand WNALX3 with Zigbee Radio Test Setup Pictures**

SEE APPENDIX A titled “Appendix A Legrand WNALX3 with Zigbee Radio Test Setup Pictures”



## Appendix B – Test Equipment

Equipment	Manufacturer	Model #	Serial #	BEC #	Calibration Date	Calibration Cycle	Calibration Due Date
EMI Receiver (20 Hz – 26.5 GHz)	Rohde & Schwarz	ESIB 26	836119/006	1010	07/02/19	3 Years	07/02/22
Antenna (30 MHz - 6 GHz)	Sunol Sciences	JB6	A022108	712	06/26/18	3 Years	06/26/21
Amplifier (.09 – 1300 MHz)	Hewlett Packard	8447F	3313A06658	807	01/13/21	2 Years	01/13/23
EMC Analyzer (9 kHz - 1.8 GHz)	Hewlett Packard	8593EM	3710A00214	1026	03/23/20	3 Years	03/23/23
Amplifier System (0.5 – 50 GHz)	Hewlett Packard	83015A 83017A	3123A00360 & 3332A00219	1027	10/13/20	2 Years	10/13/22
Double Ridged Horn Antenna (1 - 18 GHz)	Eaton	3115	2113	836	01/08/19	3 Years	01/08/22
Shielded Room #1	ETS Lindgren	12-2/2-0	4078	859	05/17/18	3 Years	08/17/22
OATS Site (30 MHz – 1 GHz)	BEC	N/A	N/A	705	08/03/20	1 Year	08/03/21
Intentional Radiator Testing High Frequency RF Test Cable	Suhner	S04272B	N/A	962	08/03/20	1 Year	08/03/21
Temp/Humidity Meter	Control Company	4096	151872672	780	04/08/19	2 Years	10/13/22
Software (Tile Instrument Control System)	Quantum Change/EMC Systems	Version 3	N/A	N/A	No Cal. Required	No Cal. Required	No Cal. Required
Radiated Emissions Test Software	BEC	RADE	2.2	N/A	No Cal. Required	No Cal. Required	No Cal. Required