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File Number **24/36403474**

TECHNICAL REPORT
Human exposure

Petitioner's Reference:	Verisure Sàrl		
Company Address:	Chemin Jean-Baptiste Vandelle 3, Versoix, Geneva, Switzerland		
Represented by:	James Barnett		
PMN:	Wi-Fi Extender		
Brand:	Verisure	HMN:	GWL-WXTND 489937
Sample #1:	3N75 UMVP	Applus Id:	25556-0001
Sample #2:	3N75 UKMW	Applus Id:	25556-0003
Result:	**complies**		

It has been tested and complies with the applicable standard. See test result summary section.

Applicable Standard:	
EMC standard/s:	**FCC 47 CFR Part 2 Subpart J (October 2023)[1]**

[1]The latest modifications of the standard. published at the date of the tests reported in this document. have been considered.

Dates and Test Site:	Applus Barcelona, Bellaterra
Equipment Reception Date	December 12, 2023

Test Manager: Javier Miguel Nadales Lisbona
Date of issue: Bellaterra, October 21, 2024

JORGE GEIS ESTRADA
Firmado digitalmente por JORGE GEIS ESTRADA
Fecha: 2024.10.22 14:50:57 +02'00'

EMC & Wireless Technical Manager
Electrical and Electronics
LGAI Technological Center S.A.

1 INDEX

2 GENERAL DESCRIPTION OF TEST ITEMS

2.1 EQUIPMENT DESCRIPTION

This information has been provided by the customer and it is not covered by the accreditation. LGAI does not assume any responsibility from it.

EQUIPMENT DESCRIPTION			
Description	Wi-Fi Extender which can also be controlled and monitored over our proprietary radio protocol over Sub-GHz ISM (SRD).		
EUT Version	**FVIN**	**HVIN**	
	1.0.6	A1	
Power supply	1 PH + N	120 V	60 Hz
Equipment Size	**Length**	**Width**	**Height**
	17.5 cm	10.5 cm	2 cm

Table 1: Equipment description

Technology #1	ISM
Modulation	GFSK
Operating Frequency Band	902 – 928 MHz
Maximum RF Output Power [dBm]	14
Operating Channel(s) Width(s) [MHz]	1
Equipment Type	DTS
Number of Hopping Channels	N/A
Emission Designator	--
FCC ID	2A93W-GWL-WXTND

Table 2: Technology #1 description

Technology #2	WiFi2G4
Modulation	B, G & N20
Operating Frequency Band	2400 MHz – 2483.5 MHz
Maximum RF Output Power [dBm]	30
Operating Channel(s) Width(s) [MHz]	20
Equipment Type	DTS
Number of Hopping Channels	N/A
Emission Designator	--
FCC ID	2A93W-GWL-WXTND

Table 3: Technology #2 description

Technology #3	WiFi5G
Modulation	A, N & AC
Operating Frequency Band U-NII-1	5150 MHz – 5250 MHz
Operating Frequency Band U-NII-2A	5250MHz – 5350 MHz
Operating Frequency Band U-NII-2C	5470 MHz – 7250 MHz
Operating Frequency Band U-NII-3	5725 MHz – 5850 MHz
Maximum RF Output Power [dBm]	30
Operating Channel(s) Width(s) [MHz]	20, 40 & 80
Equipment Type	DTS
Number of Hopping Channels	N/A
Emission Designator	--
FCC ID	2A93W-GWL-WXTND

Table 4: Technology #3 description

RF FEATURES					
	Communication Technology	**Radio Chipset**	**Brand**	**Module Model**	**Antenna Gain [dBi]**
Description	ISM	Si4463-C2A-GM	Silicon Labs	N/A	-1
	WiFi 2G4	SYN4375B4XKFFBG/ BCM4375B4XKFFBG[2]	Synaptics / Broadcom[2]	N/A	+2.57[1]
	WiFi 5G	SYN4375B4XKFFBG/ BCM4375B4XKFFBG[2]	Synaptics / Broadcom[2]	N/A	+2.72[1]

Table 5: RF Features

Note [1]: For MIMO transmission mode, antenna gain calculations are based on KDB 662911 D01 Multiple Transmitter Output v02r01. Considering that the customer has declared Cyclic Delay Diversity mode.

Note [2]: This is not dual source, just that Synaptics purchased this business line from Broadcom and the PN is renamed, some documentation may refer to those 2 PN

2.2 PHOTOGRAPHS

Photographs identifying the equipment under test and its auxiliaries, as well as assembly photographs for radiated and conducted tests, can be found in the document with ID: 24/36403478M2

3 TEST RESULTS

3.1 HUMAN EXPOSURES STANDARDS

3.1.1 Test Parameters

3.1.1.1 Requirements

According to the standard FCC 47 CFR Part 2 Subpart J and KDB 447498 D01.

For operations within the frequency range of 300 kHz and 6 GHz (inclusive). the limits for maximum permissible exposure (MPE). derived from whole-body SAR limits and listed in Table 1 in paragraph (e)(1) of this section. may be used instead of whole-body SAR limits as set forth in paragraphs (a) through (c) of this section to evaluate the environmental impact of human exposure to RF radiation as specified in § 1.1307(b) of this part. except for portable devices as defined in § 2.1093 of this chapter as these evaluations shall be performed according to the SAR provisions in § 2.1093.

Frequency Range [MHz]	Electic field strength [V/m]	Magnetic field strength [A/m]	Power density [mW/cm^2]	Avering time [minutes]
Limits for Occupational / Controlled Exposure				
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 - 100000	-	-	5	<6
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 - 100000	-	-	1.0	<30

Table 6: Requirements – Human exposure - FCC

f=frequency
*=Plane-wave equivalent power density

3.1.2 Test Results

3.1.2.1 Sample #2.ISM. EIRP

For the evaluation of the RF exposure. The conducted average power for ISM technology is obtained from the test report with ID: 24/36403476M2

Modulation	Channel	Central Frequency [MHz]	EIRP RMS [dBm]	E.I.R.P [mW]
GFSK	Low	917.5	12.93	19.63
	Middle	919.5	12.93	19.63
	High	925.5	13.03	20.09

Table 7: Average Power - ISM

3.1.2.2 Sample #1. WiFi2G4. EIRP

For the evaluation of the RF exposure. the RMS power for WiFi2G4 technology is obtained from the test report with ID: 24/36403475M1

Modulation	Channel	Central Frequency [MHz]	EIRP RMS [dBm]	E.I.R.P [mW]
Mode B	Low	2412	17.50	56.23
	Middle	2437	17.10	51.29
	High	2462	16.80	47.86
Mode G	Low	2412	18.20	66.07
	Middle	2437	18.40	69.18
	High	2462	18.40	69.18
Mode N20	Low	2412	16.40	43.65
	Middle	2437	16.70	46.77
	High	2462	16.60	45.71

Table 8: RMS Power - WiFi2G4

3.1.2.3 Sample #1. WiFi5G. EIRP

For the evaluation of the RF exposure. the RMS Power for WiFi5G technology is obtained from the test report with ID: 24/36403477M1

Band	Modulation	Channel	Central Frequency [MHz]	EIRP RMS [dBm]	E.I.R.P [mW]
U-NII-1	Mode A20	Low	5180	21.60	144.54
		Middle	5200	21.40	138.04
		High	5240	20.90	123.03
	Mode AC20	Low	5180	19.70	93.33
		Middle	5200	19.30	85.11
		High	5240	18.90	77.63
	Mode N20	Low	5180	21.90	154.88
		Middle	5200	21.80	151.36
		High	5240	21.30	134.90
	Mode AC40	Low	5190	18.60	72.44
		High	5230	18.20	66.07
	Mode N40	Low	5190	20.90	123.03
		High	5230.	20.60	114.82
	AC80	Low	5210	18.40	69.18

Table 9: RMS Power - WiFi5G U-NII-1

Band	Modulation	Channel	Central Frequency [MHz]	EIRP RMS [dBm]	E.I.R.P [mW]
U-NII-2A	Mode A20	Low	5260	20.10	102.33
		Middle	5280	20.00	100.00
		High	5320	20.40	109.65
	Mode AC20	Low	5260	19.30	85.11
		Middle	5280	19.20	83.18
		High	5320	19.90	97.72
	Mode N20	Low	5260	19.90	97.72
		Middle	5280	19.80	95.50
		High	5320	20.00	100.00
	Mode AC40	Low	5270	19.30	85.11
		High	5310	19.20	83.18
	Mode N40	Low	5270	18.80	75.86
		High	5310	21.10	128.83
	AC80	Low	5290	20.90	123.03

Table 10: RMS Power - WiFi5G U-NII-2A

Band	Modulation	Channel	Central Frequency [MHz]	EIRP RMS [dBm]	E.I.R.P [mW]
U-NII-2C	Mode A20	Low	5500	21.10	128.83
		Middle	5580	20.90	123.03
		High	5700	21.20	131.83
	Mode AC20	Low	5500	19.20	83.18
		Middle	5580	19.20	83.18
		High	5700	19.30	85.11
	Mode N20	Low	5500	21.70	147.91
		Middle	5580	21.50	141.25
		High	5700	21.50	141.25
	Mode AC40	Low	5590	18.70	74.13
		Middle	5610	18.60	72.44
		High	5670	18.70	74.13
	Mode N40	Low	5590	21.00	125.89
		Middle	5610	21.10	128.83
		High	5670	18.70	74.13
	AC80	Low	5530	18.20	66.07
		High	5610	18.20	66.07

Table 11: RMS Power - WiFi5G U-NII-2C

Band	Modulation	Channel	Central Frequency [MHz]	EIRP RMS [dBm]	E.I.R.P [mW]
U-NII-3	Mode A20	Low	5745	21.60	144.54
		Middle	5785	21.10	128.83
		High	5825	21.50	141.25
	Mode AC20	Low	5745	19.10	81.28
		Middle	5785	18.60	72.44
		High	5825	19.10	81.28
	Mode N20	Low	5745	21.50	141.25
		Middle	5785	20.90	123.03
		High	5825	19.20	83.18
	Mode AC40	Low	5755	19.30	85.11
		High	5795	18.80	75.86
	Mode N40	Low	5755	21.70	147.91
		High	5795	21.40	138.04
	AC80	Low	5775	18.70	74.13

Table 12: RMS Power - WiFi5G U-NII-3

Therefore. through the following equation. is computed the power density at each frequency transmitted band for a minimum distance of 20 cm between the DUT and the person to comply with the power density limit.

$$S = \frac{EIRP}{4 * \pi * d^2}$$

Where:

S = Power density (mW/cm^2)

EIRP = Radiated output power of an isotropic antenna (mW)

d = Distance to the center of radiation of the antenna (cm). Limit for MPE = 20 cm.

Modulation	Channel	Central Frequency [MHz]	Power Density [mW/cm²]	Result
GFSK	Low	917.5	0.0039	PASS
	Middle	919.5	0.0039	PASS
	High	925.5	0.0039	PASS

Table 13: Power density - ISM

Modulation	Channel	Central Frequency [MHz]	Power Density [mW/cm²]	Result
Mode B	Low	2412	0.0111	PASS
	Middle	2437	0.0102	PASS
	High	2462	0.0095	PASS
Mode G	Low	2412	0.0131	PASS
	Middle	2437	0.0137	PASS
	High	2462	0.0137	PASS
Mode N20	Low	2412	0.0086	PASS
	Middle	2437	0.0093	PASS
	High	2462	0.0090	PASS

Table 14: Power density - WiFi2G4

Band	Modulation	Channel	Central Frequency [MHz]	Power Density [mW/cm²]	Result
U-NII-1	Mode A20	Low	5180	0.0287	PASS
		Middle	5200	0.0274	PASS
		High	5240	0.0244	PASS
	Mode AC20	Low	5180	0.0185	PASS
		Middle	5200	0.0169	PASS
		High	5240	0.0154	PASS
	Mode N20	Low	5180	0.0308	PASS
		Middle	5200	0.0301	PASS
		High	5240	0.0268	PASS
	Mode AC40	Low	5190	0.0144	PASS
		High	5230	0.0131	PASS
	Mode N40	Low	5190	0.0244	PASS
		High	5230.	0.0228	PASS
	AC80	Low	5210	0.0137	PASS

Table 15: Power density - WiFi5G U-NII-1

Band	Modulation	Channel	Central Frequency [MHz]	Power Density [mW/cm²]	Result
U-NII-2A	Mode A20	Low	5260	0.0203	PASS
		Middle	5280	0.0198	PASS
		High	5320	0.0218	PASS
	Mode AC20	Low	5260	0.0169	PASS
		Middle	5280	0.0165	PASS
		High	5320	0.0194	PASS
	Mode N20	Low	5260	0.0194	PASS
		Middle	5280	0.0189	PASS
		High	5320	0.0198	PASS
	Mode AC40	Low	5270	0.0169	PASS
		High	5310	0.0165	PASS
	Mode N40	Low	5270	0.0150	PASS
		High	5310	0.0256	PASS
	AC80	Low	5290	0.0244	PASS

Table 16: Power density - WiFi5G U-NII-2A

Band	Modulation	Channel	Central Frequency [MHz]	Power Density [mW/cm²]	Result
U-NII-2C	Mode A20	Low	5500	0.0256	PASS
		Middle	5580	0.0244	PASS
		High	5700	0.0262	PASS
	Mode AC20	Low	5500	0.0165	PASS
		Middle	5580	0.0165	PASS
		High	5700	0.0169	PASS
	Mode N20	Low	5500	0.0294	PASS
		Middle	5580	0.0281	PASS
		High	5700	0.0281	PASS
	Mode AC40	Low	5590	0.0147	PASS
		Middle	5610	0.0144	PASS
		High	5670	0.0147	PASS
	Mode N40	Low	5590	0.0250	PASS
		Middle	5610	0.0256	PASS
		High	5670	0.0147	PASS
	AC80	Low	5530	0.0131	PASS
		High	5610	0.0131	PASS

Table 17: Power density - WiFi5G U-NII-2C

Band	Modulation	Channel	Central Frequency [MHz]	Power Density [mW/cm^2]	Result
U-NII-3	Mode A20	Low	5745	0.0287	PASS
		Middle	5785	0.0256	PASS
		High	5825	0.0281	PASS
	Mode AC20	Low	5745	0.0161	PASS
		Middle	5785	0.0144	PASS
		High	5825	0.0161	PASS
	Mode N20	Low	5745	0.0281	PASS
		Middle	5785	0.0244	PASS
		High	5825	0.0165	PASS
	Mode AC40	Low	5755	0.0169	PASS
		High	5795	0.0150	PASS
	Mode N40	Low	5755	0.0294	PASS
		High	5795	0.0274	PASS
	AC80	Low	5775	0.0147	PASS

Table 18: Power density - WiFi5G U-NII-3

4 Uncertainty

Test Type	Test Description	Uncertainty
Emissions	RF output power measurements [Conducted]	±1.3 dB

Table 19: Uncertainties - Maximum Peak Conducted Output Power

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by a coverage factor k=2, which for normal distribution corresponds to a coverage probability of approximately 95%.