

ISED CABid: ES1909

Lab. Company Number: 4621A

Test Report No:
81110RRF.003

Partial Test Report

USA FCC Part 15.247, 15.209

CANADA RSS-247, RSS-Gen

(*) Identification of item tested	1 phase / 3 phase self-supplied Energy Meter
(*) Trademark	CARLO GAVAZZI
(*) Model and /or type reference	EM630 W AV53 X E2 M1 X
Other identification of the product	FCC ID: SNJEM600 IC: 7118D-EM600
(*) Features	Wi-Fi IEEE 802.11 b/g/n 20/40 MHz HW version: 1.0 SW version: 1.0
Applicant	CARLO GAVAZZI CONTROLS S.P.A. VIA SAFFORZE 8 - 32100 BELLUNO - ITALY
Test method requested, standard	USA FCC Part 15.247 (10-1-24 Edition): Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz. USA FCC Part 15.209 (10-1-24 Edition): Radiated emission limits; general requirements. CANADA RSS-247 Issue 4 (July 2025). CANADA RSS-Gen Issue 5 amendment 2 (February 2021). Guidance for Performing Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid Systems Devices Operating Under Section 15.247 of the FCC Rules. 558074 D01 Meas Guidance v05r02 dated April 2, 2019. ANSI C63.10-2020 + Cor.1-2023 + C63.10a-2024 + Errata to C63.10a-2024: American National Standard for Testing Unlicensed Wireless Devices.
Approved by (name / position & signature)	José Manuel Gómez Galván EMC Consumer & RF Lab. Manager  Firmado digitalmente por 53680346W JOSE MANUEL GOMEZ (C:A29507456)
Date of issue	2026-03-06
Report template No	FDT08_27 (*) "Data provided by the client"

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Acronyms

Acronym ID	Acronym Description
	E.I.R.P.
	Raw Rec
	Trd Corr.
	Sig Path
	Preamp
Avg Power	Maximum Average Conducted Output Power
Detector	Detector used
Equipment	Equipment Type
Freq	Frequency
Freq Rng	Frequency Range
MP	Measurement Point
Mod	Modulation
Operation Band	Operation Band
Pol	Polarization
Port	Active Port
RU	Resource Unit
Unwanted Freq	Unwanted Emissions Frequency
Unwanted Lvl	Unwanted Emissions Level

Competences and guarantees

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DEKRA Testing and Certification S.A.U. is an FCC-recognized accredited testing laboratory with appropriate scope of accreditation that covers the performed tests in this report.

DEKRA Testing and Certification S.A.U. is an ISED-recognized accredited testing laboratory, CABid: ES1909, Company Number: 4621A, with the appropriate scope of accreditation that covers the performed tests in this report.

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The results presented in this Test Report apply only to the particular item under test established in this document.

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Uncertainty

Uncertainty (factor $k=2$) was calculated according to the DEKRA Testing and Certification S.A.U. internal document PODT000.

The total uncertainty of the measurement system for the radiated emissions of EUT from 30 MHz to 1 GHz is:
Measurement uncertainty $\leq \pm 5,35$ dB with factor ($k = 2$).

The total uncertainty of the measurement system for the radiated emissions of EUT from 1 GHz to 17 GHz is:
Measurement uncertainty $\leq \pm 4,32$ dB with factor ($k = 2$).

The total uncertainty of the measurement system for the radiated emissions of EUT from 17 GHz to 26 GHz is:
Measurement uncertainty $\leq \pm 5,51$ dB with factor ($k = 2$).

The total uncertainty of the measurement system for the conducted testing of EUT is:
RF Conducted Output Power: Measurement uncertainty $\leq \pm 0,80$ dB

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").
2. The sample consists of a 1 phase / 3 phase self-supplied Energy Meter. EM600 is a 1 phase / 3 phase self-supplied Energy Meter family for DIN rail mounting available in both direct connected (EM640) and transformer operated (EM630) versions and with different communication protocols as options..

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of results. The laboratory is not responsible for such information and it is not covered by accreditation.

Usage of samples

Samples undergoing test have been selected by: The client.

Id	Control Number	Description	Model	Serial N°	Date of Reception	Application
S/01	81110_13	EM600	EM630 W AV53 X E2 M1 X	BZ3110023001A	2025-12-09	Element Under Test
S/02	81110_10	EM600	EM630 W AV53 X E2 M1 X	BZ3110026001A	2025-12-09	Element Under Test

Notes referenced to samples during the project:

Id	Type
S/01	Samples used for radiated testing.
S/02	Samples used for conducted testing.

Test sample description

Ports..... :	Port name and description	Cable					
		Specified max length [m]	Attached during test	Shielded	Coupled to patient ⁽³⁾		
		Measurement input L1,L2,L3,N + Current transfromer terminals	>3m	[X]	[]	[]	
		MBUS + digital input	>3m	[X]	[]	[]	
		2 x Ethernet RJ45 port	>3m	[X]	[]	[]	
.....		[]	[]	[]			
Supplementary information to the ports..... :							
Rated power supply	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	[X]	AC: 208V to 480V phase to phase	[X]	[X]	[X]	[X]	[]
	[]	DC:					
Rated Power							
Clock frequencies..... :	Up to 240MHz internal to microprocessor chip						
Other parameters							
Software version	1.0						
Hardware version	1.0						
Dimensions in cm (W x H x D)	88mm x 90mm x 58mm						
Mounting position	[]	Table top equipment					
	[]	Wall/Ceiling mounted equipment					
	[]	Floor standing equipment					
	[]	Hand-held equipment					
	[X]	Other: DIN rail mounting					
Modules/parts..... :	Module/parts of test item		Type	Manufacturer			
							
Accessories (not part of the test item)	Description		Type	Manufacturer			
							
Documents as provided by the applicant..... :	Description		File name	Issue date			
							

Identification of the client

CARLO GAVAZZI CONTROLS S.P.A.
VIA SAFFORZE 8 - 32100 BELLUNO - ITALY

Testing period and place

Test Location	DEKRA TESTING AND CERTIFICATION S.A.U. C/ Severo Ochoa, 6 - Parque Tecnológico de Andalucía; 29590 Campanillas (Málaga) (Location B)
Date (start)	2026-02-23
Date (finish)	2026-02-25

Document history

Report number	Date	Description
81110RRF.003	2026-03-06	First release.

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %

In the semianechoic chamber, the following limits were not exceeded during the test.

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %

Remarks and comments

The tests have been performed by the technical personnel: Fernando Chito Solis and Pablo Redondo Reyes.

Used instrumentation:

Control No.	Equipment	Model	Manufacturer	Next Calibration
06064	SEMIANECHOIC ABSORBER LINED CHAMBER	SAC-3	Frankonia	N/A
06329	SHIELDED ROOM	--	FRANKONIA	N/A
06126	ETHERNET TEMPERATURE AND HUMIDITY LOGGER	HWg-STE	HW GROUP	2026-04-22
06132	ETHERNET TEMPERATURE AND HUMIDITY LOGGER	HWg-STE	HW GROUP	2026-04-28
05641	HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2027-10-23
08788	PREAMPLIFIER 30dB 500MHz-18GHz	BBV 9718 C	SCHWARZBECK	2027-02-19
04612	HORN ANTENNA 1-18GHz	BBHA 9120 D	SCHWARZBECK MESS-ELEKTRONIK	2027-10-15
09360	PRE-AMPLIFIER G>40dB 1-18 GHz	BLMA 0118-1M	BONN ELEKTRONIK	2026-09-19
07414	PREAMPLIFIER BOX	-	INTERNO	2027-01-14
08866	EMI TEST RECEIVER 2Hz-44GHz	ESW44	ROHDE AND SCHWARZ	2026-06-12
04609	AC POWER SUPPLY	6490	CHROMA	N/A
07759	DIGITAL MULTIMETER	175	FLUKE	2026-11-05
04848	SOFTWARE FOR EMC/RF TESTING	EMC32	ROHDE AND SCHWARZ	N/A
06793	SHIELDED ROOM	S101	ETS LINDGREN	N/A
06611	TEMPERATURE AND HUMIDITY PROBE	HWg-STE	HW GROUP	2026-04-21
07794	SIGNAL AND SPECTRUM ANALYZER 10Hz-40GHz	FSV40	ROHDE AND SCHWARZ	2027-06-10
07798	WMS32	WMS32	ROHDE AND SCHWARZ	N/A

Testing verdicts

Fail	F
Inconclusive	I
Not applicable	N/A
Not measured	N/M
Pass	P

Summary

Appendix A: 802.11bgn 1X1

FCC PART 15 PARAGRAPH/ RSS-247			
Requirement – Test case	Verdict	Remark	Location
FCC 15.247 (a)(2) / RSS-247 6.3.1. (a) 6 dB Bandwidth	N/M		
FCC 15.247 (b) / RSS-247 6.3.2. Maximum output power and antenna gain	P		Location B
FCC 15.247 (d) / RSS-247 6.6 Band-edge emissions compliance (Transmitter)	N/M		
FCC 15.247 (e) / RSS-247 6.3.1. (b) Power spectral density	N/M		
FCC 15.247 (d) / RSS-247 6.6. Emission limitations radiated (Transmitter)	P		Location B
<u>Supplementary information and remarks:</u> (1) Test not requested by the client. (2) Only worst-case channel and modulation test case was performed.			

Appendix A: Test results. 802.11 B/G/N 1x1

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FCC 47 CFR PART 15.247 / RSS-247	16
<i>FCC 15.247 (b) / RSS-247 6.3.2 Maximum Conducted Output Power</i>	16
<i>FCC 15.247 (d) / RSS-247 6.6 Emission limitations radiated (Transmitter)</i>	17

TEST CONDITIONS

(*): Data provided by the client.

POWER SUPPLY (*):

Vnominal: 480 Vac
Type of Power Supply: External power supply.

ANTENNA (*):

Type of Antenna: PCB antenna
Maximum Declared Antenna Gain: +2.87 dBi

TEST FREQUENCIES (*):

Modulation	Data rates	Low Channel	Middle Channel	High Channel
802.11b:	1 Mbit/s	2412 MHz	2437 MHz	2462 MHz
802.11g:	6 Mbit/s	2412 MHz	2437 MHz	2462 MHz
802.11n:	HT20 MCS0 6.5 Mbit/s	2412 MHz	2437 MHz	2462 MHz
802.11n:	HT40 MCS0 6.5 Mbit/s	2422 MHz	2437 MHz	2452 MHz

During transmitter test the EUT was controlled by a SW tool provided by the client to operate in a continuous transmit mode on the modulation schemes and test channels as required.

CONDUCTED MEASUREMENTS:

The equipment under test was set up in a shielded room and it is connected to the TS8997 using a low loss RF cable. The reading of the spectrum analyser is corrected taking into account the cable loss.



RADIATED MEASUREMENTS:

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna (Bilog antenna for the range between 30 MHz to 1000 MHz and 1 GHz-17 GHz Double ridge horn antenna) is situated at a distance of 3 m and at a distance of 1.5 m for the frequency range 17 GHz-26 GHz (17 GHz-40 GHz horn antenna).

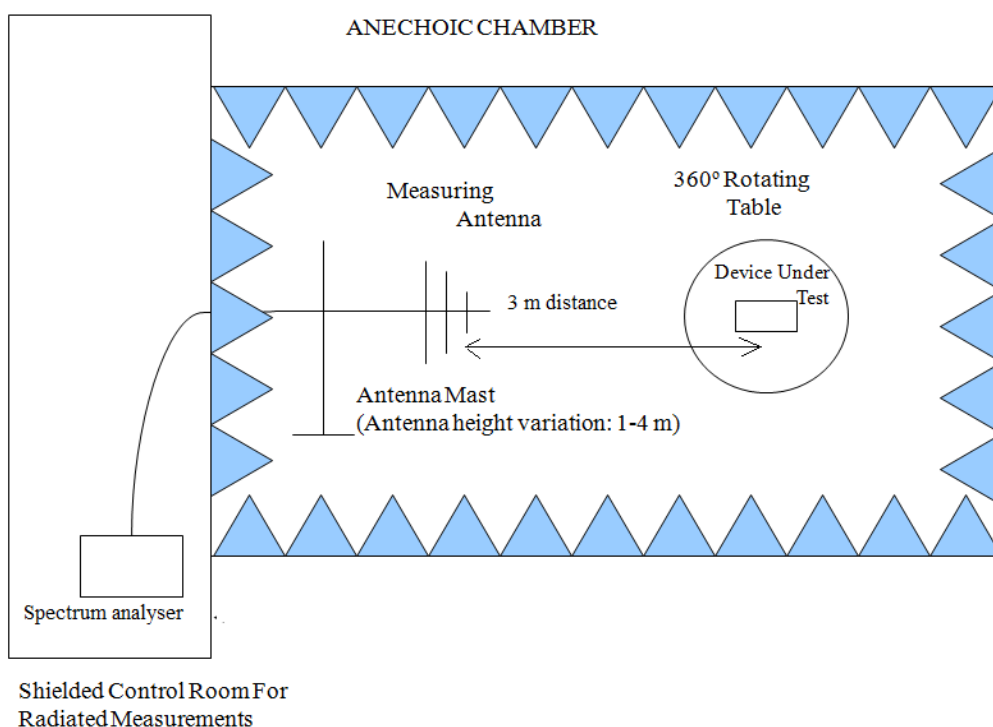
For radiated emissions in the range 17 GHz-26 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height (Bilog antenna and Double ridge horn antenna) was varied from 1 to 4 meters to find the maximum radiated emission.

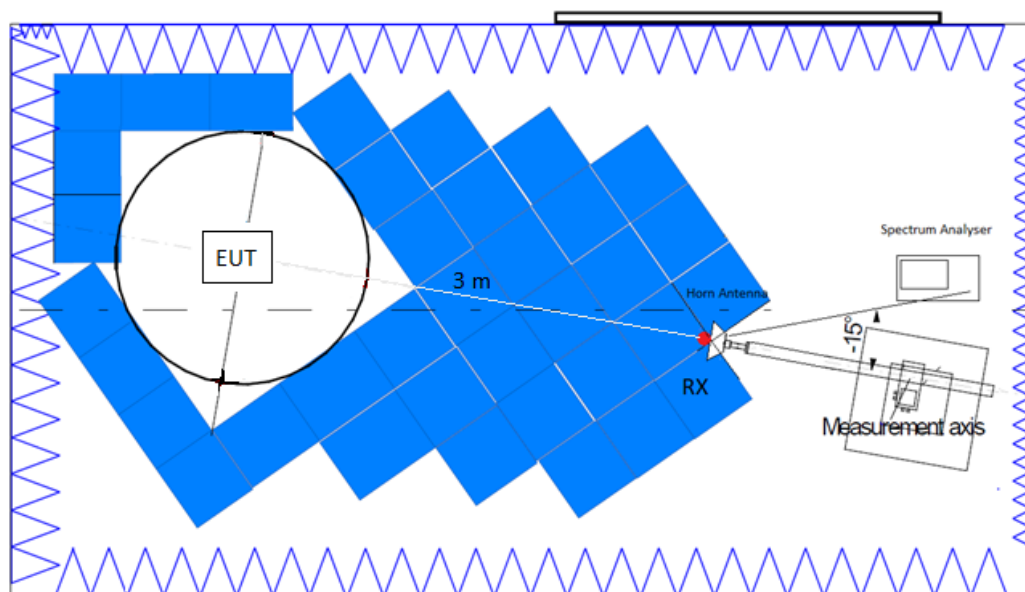
Measurements were made in both horizontal and vertical planes of polarization.

A resolution bandwidth/video bandwidth of 100 kHz / 300 kHz was used for frequencies below 1 GHz and 1 MHz / 3 MHz for frequencies above 1 GHz.

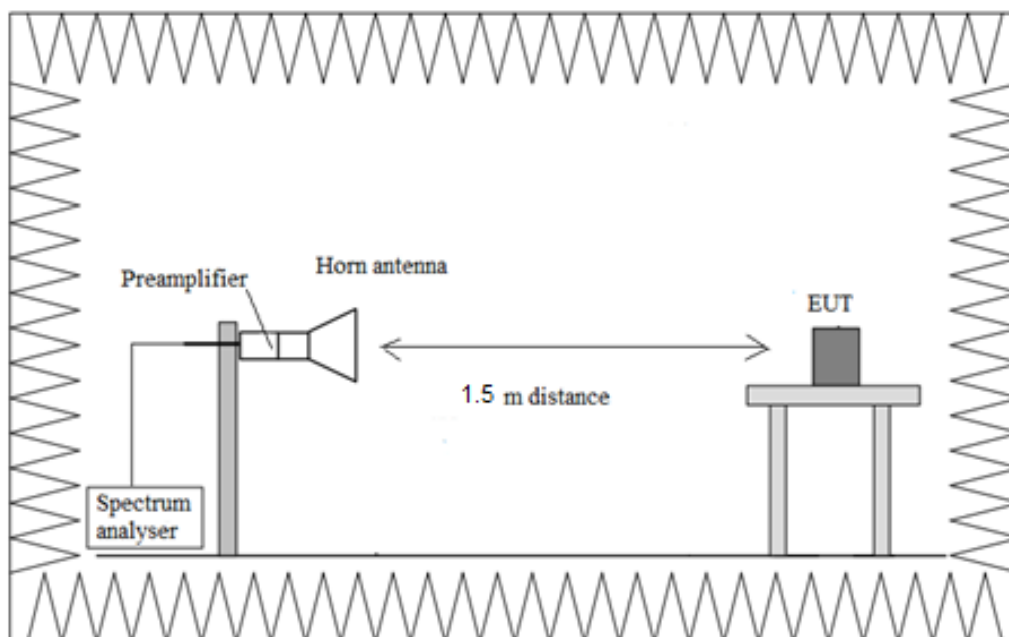
Radiated measurements setup from 30 MHz to 1 GHz:



Radiated measurements setup from 1 GHz to 17 GHz:



Radiated measurements setup $f > 17$ GHz:



SAMPLE CALCULATION

For radiated measurements:

Values measures by the test receiver / analyzer are converted to field strength, in dBuV/m, at the regulatory distance using the following calculation:

$$\text{Unwanted Lvl (dBuV/m)} = \text{Raw Rec (dBuV)} + \text{Preamp (dB)} + \text{Trd Corre. (dB/m)} + \text{SigPath (dB)}$$

Where,

Raw Rec (dBuV): Measured voltage in the receiver / spectrum analyzer in dBuV

Preamp (dB): Path loses due to preamplifier

Trd Corr. (dB/m): Antenna factor in dB/m

SigPath (dB) = Cable loss (dB) – External Gain amplifier (dB) – Distance factor (dB)

Cable loss (dB): Cable loss

External Gain amplifier (dB): Gain from external amplifier (when used)

Distance factor (dB): Distance factor in dB. When measurement distance is different to limit distance

The field strength, calculated by this way is compared with the regulatory limit.

TEST CASES DETAILS

FCC 47 CFR Part 15.247 / RSS-247

FCC 15.247 (b) / RSS-247 6.3.2 Maximum Conducted Output Power

Limits

For systems using digital modulation in the 2400-2483.5 MHz band: 1 watt (30 dBm).
The e.i.r.p. shall not exceed 4 W (36 dBm) (Canada).

Results

Modulation: 802.11b (DSSS 1 Mbit/s) (worst-case)

Test according to FCC title 47 part 15 §15.247(b), KDB 558074 D01 DTS Meas Guidance v05r02 and ANSI C63.10-2020 + Cor.1-2023 + C63.10a-2024 + Errata to C63.10a-2024: American National Standard for Testing Unlicensed Wireless Devices 11.9.2.3.2.

Operation Band (MHz)	Equipment	Freq (MHz)	Avg Power (dBm)	E.I.R.P. (dBm)
[2400, 2483.5]	Digital Transmission System (DTS)	2412.00000	15.39	18.26

Verdict

Pass

FCC 15.247 (d) / RSS-247 6.6 Emission limitations radiated (Transmitter)

Limits

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)/RSS-Gen):

Frequency Range (MHz)	Field strength ($\mu\text{V/m}$)	Field strength ($\text{dB}\mu\text{V/m}$)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	30
1.705 - 30.0	30	-	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

RSS-247: Attenuation below the general field strength limits specified in RSS-Gen is not required.

Frequency range tested for Radiated emissions:

Start frequency: no radiofrequency signal generated in the device found below 10th sub-harmonic, no further investigation required.

Stop frequency: it has been performed the radiated spurious emissions until 10th harmonic.

Modulation: 802.11b (DSSS 1 Mbit/s) (worst-case)

Results

Freq Rng (GHz)	Freq (MHz)	Port	Unwanted Freq (MHz)	Unwanted Lvl (dBµV/m)	Pol	Detector	Sig Path (dB)	Preamp (dB)	Trd Corr. (dB/m)	Raw Rec (dBµV)
[0.03, 1]	2412.00000	1	31.261	32.11	V	PK	-43.1	3.0	15.5	52.8
			31.261	28.22	V	QP	-43.1	3.0	15.5	56.7
			38.504	32.12	V	PK	-43.1	3.0	11.2	56.3
			38.504	27.36	V	QP	-43.1	3.0	11.2	61.1
			51.308	33.55	V	PK	-42.9	3.0	6.8	66.7
			51.308	29.51	V	QP	-42.9	3.0	6.8	62.6
			56.869	27.43	V	PK	-42.9	3.0	6.5	60.8
			56.869	21.63	V	QP	-42.9	3.0	6.5	55.0
			62.592	25.85	V	PK	-42.8	3.0	6.6	59.0
			62.592	18.50	V	QP	-42.8	3.0	6.6	51.6
			68.509	24.57	V	PK	-42.7	3.0	6.9	48.7
			68.509	15.96	V	QP	-42.7	3.0	6.9	57.3
			74.620	25.60	V	PK	-42.6	3.0	7.0	51.7
			74.620	19.15	V	QP	-42.6	3.0	7.0	58.2
			100.002	31.30	V	PK	-42.2	3.0	7.9	62.7
			100.002	29.32	V	QP	-42.2	3.0	7.9	60.7
			124.995	33.25	V	PK	-42.1	3.0	7.6	64.7
			124.995	31.28	V	QP	-42.1	3.0	7.6	62.7
			149.989	29.36	V	PK	-41.9	3.0	9.5	56.5
			149.989	27.05	V	QP	-41.9	3.0	9.5	58.8
			249.996	40.52	V	PK	-41.3	3.0	12.2	66.6
			249.996	39.71	V	QP	-41.3	3.0	12.2	65.7
			299.983	41.48	V	PK	-41.0	3.0	13.1	64.8
			299.983	39.84	V	QP	-41.0	3.0	13.1	66.4
			349.971	35.95	H	PK	-41.0	3.0	15.6	57.2
			349.971	34.87	H	QP	-41.0	3.0	15.6	58.3
			399.990	42.20	H	PK	-40.8	3.0	18.2	61.8
			399.990	41.53	H	QP	-40.8	3.0	18.2	61.2
			424.984	36.94	H	PK	-40.6	3.0	18.8	54.7
			424.984	35.94	H	QP	-40.6	3.0	18.8	55.7
			449.978	41.79	H	PK	-40.4	3.0	18.3	60.9
			449.978	41.02	H	QP	-40.4	3.0	18.3	60.2
			499.997	45.84	H	PK	-40.2	3.0	19.4	63.7
			499.997	45.43	H	QP	-40.2	3.0	19.4	63.3
			549.985	42.09	V	PK	-40.4	3.0	21.2	58.2
			549.985	41.07	V	QP	-40.4	3.0	21.2	57.2

Verdict

Pass

Attachments

Operation Band MHz = [2400, 2483.5]

Frequency Range GHz = [0.03, 1]

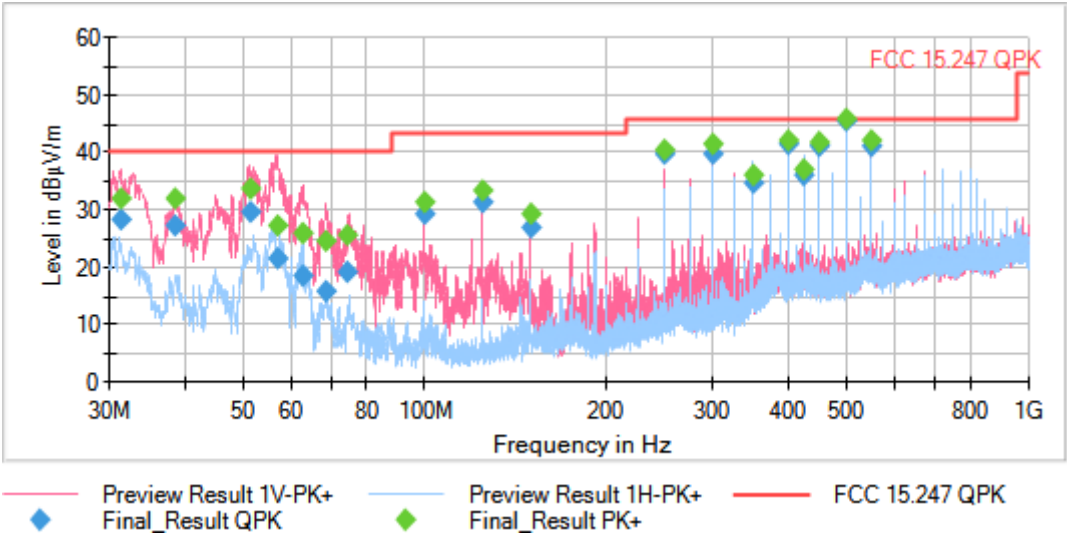
Equipment Type = Digital Transmission System (DTS)

Frequency MHz = 2412.00000

Active Port = 1

Modulation = 802.11b (DSSS 1 Mbit/s)

Images:



Tables:

Spectrum Analyzer Parameters

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
30 MHz - 1 GHz	32,333 kHz	PK+	100 kHz	Coupled	0 dB

Operation Band MHz = [2400, 2483.5]

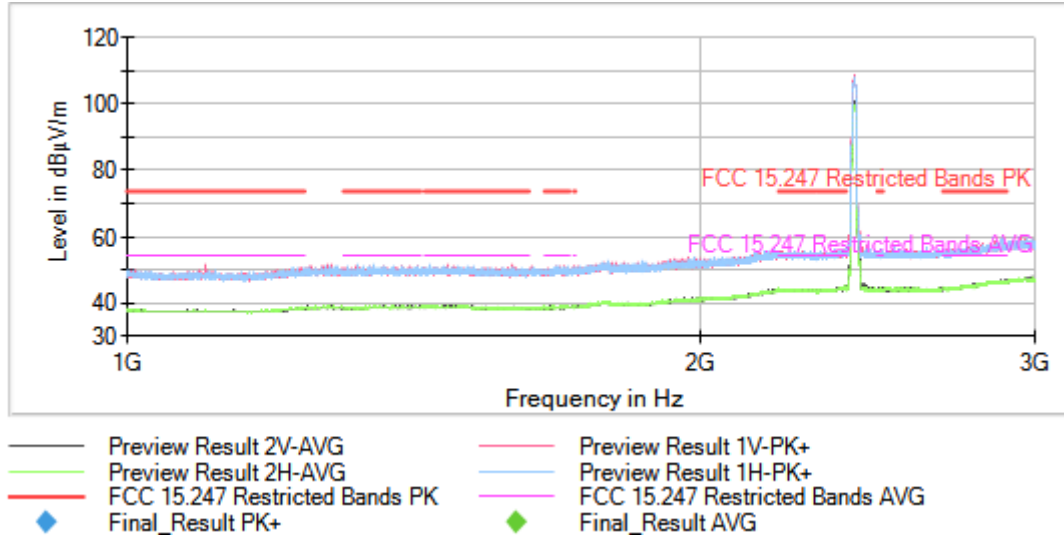
Frequency Range GHz = [1, 3]

Equipment Type = Digital Transmission System (DTS) Frequency MHz = 2412.00000

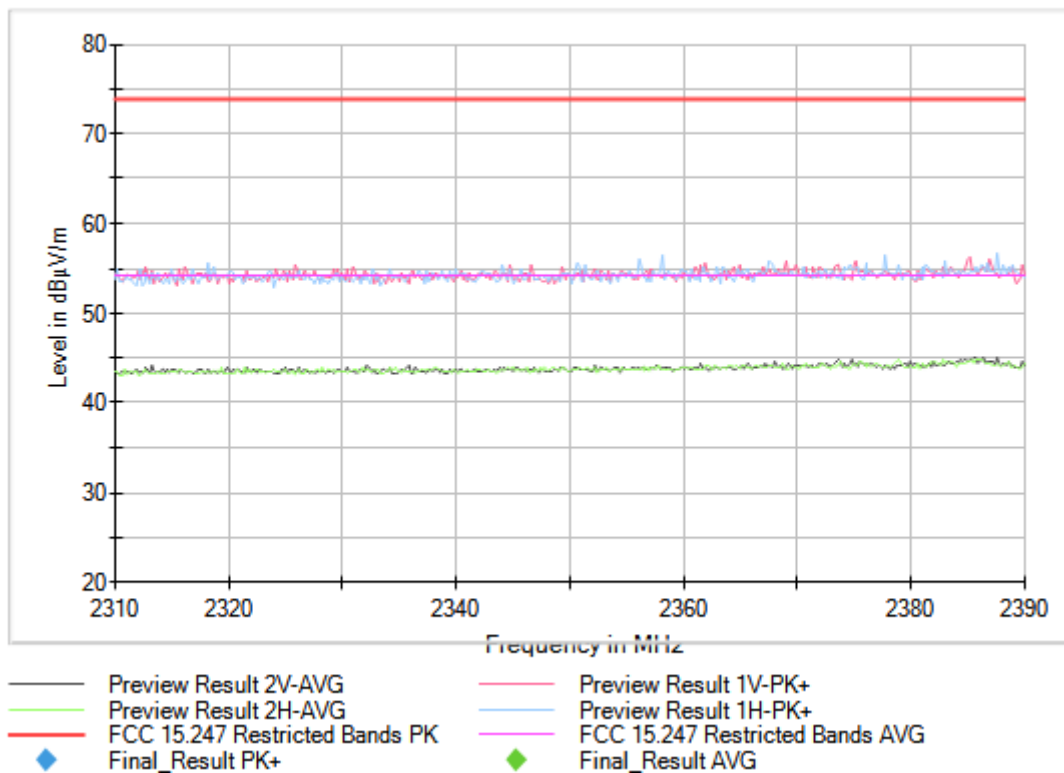
Active Port = 1

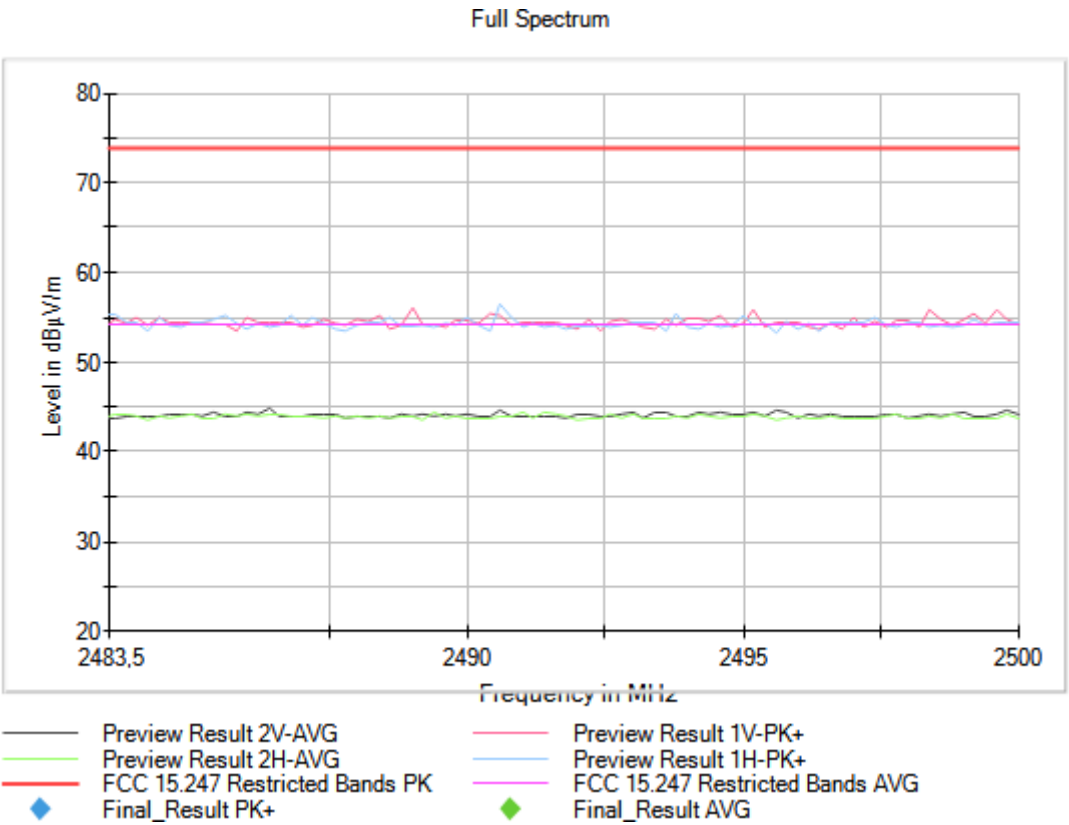
Modulation = 802.11b (DSSS 1 Mbit/s)

Images:



Full Spectrum





Tables:
Spectrum Analyzer Parameters

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
1 GHz - 3 GHz	200 kHz	PK+	1 MHz	1 s	0 dB

Operation Band MHz = [2400, 2483.5]

Equipment Type = Digital Transmission System (DTS)

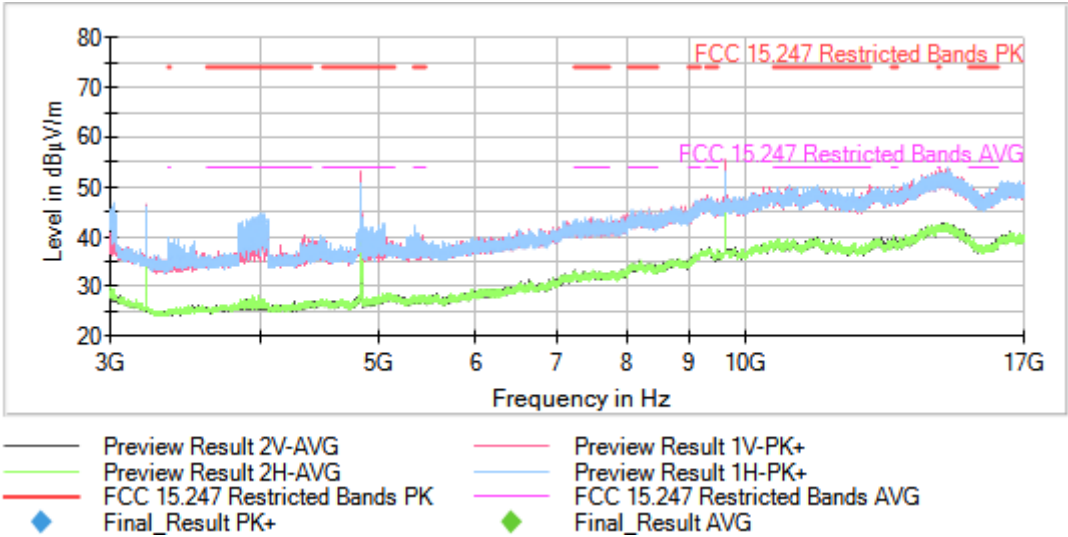
Active Port = 1

Frequency Range GHz = [3, 17]

Frequency MHz = 2412.00000

Modulation = 802.11b (DSSS 1 Mbit/s)

Images:



Tables:

Spectrum Analyzer Parameters

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
3 GHz - 17 GHz	466.667 kHz	PK+	1 MHz	1 s	0 dB

Operation Band MHz = [2400, 2483.5]

Frequency Range GHz = [17, 26]

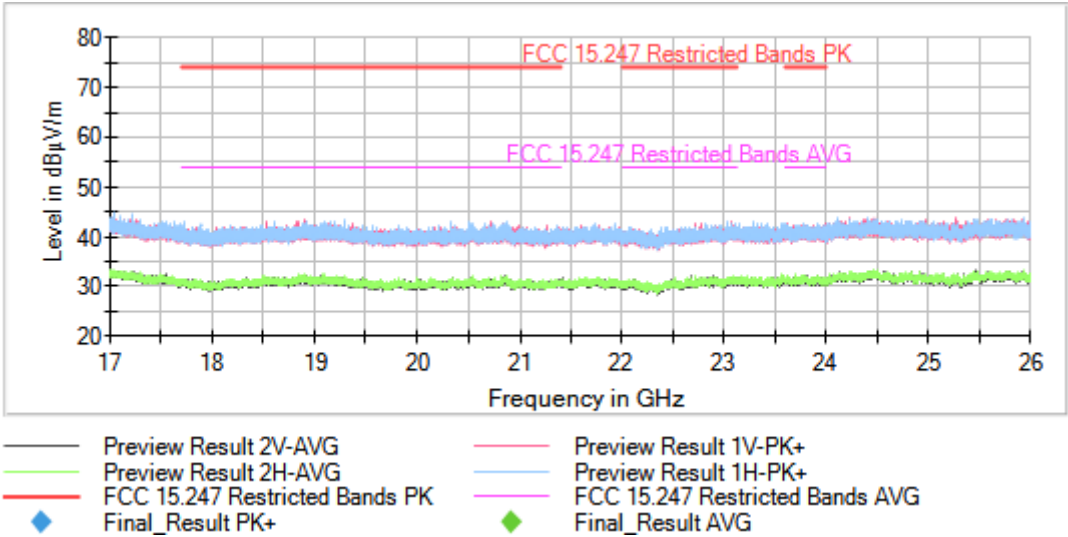
Equipment Type = Digital Transmission System (DTS)

Frequency MHz = 2412.00000

Active Port = 1

Modulation = 802.11b (DSSS 1 Mbit/s)

Images:



Tables:

Spectrum Analyzer Parameters

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
17 GHz - 26 GHz	300 kHz	PK+	1 MHz	1 s	0 dB