Lab Code: 200167-0

FCC PART 15 SUBPART 247

MEASUREMENT AND TEST REPORT

For

HOSPIRA, INC

755 Jarvis Drive
Morgan Hill, CA 95037

FCCID: STJ-16026
Model: SYMBIQ

This Report Concerns:	**Product Type:**
☒ Class II permissive change	Dual Channel Infuser

Test Engineer:	Choon Sian Ooi 
Report No.:	R0611131-PC
Report Date:	2006-11-27
Reviewed By:	VP of Engineering: Hans Mellberg 
Prepared By: (12)	Bay Area Compliance Laboratories Corp. (BACL) 1274 Anvilwood Ave. Sunnyvale, CA 94089 Tel: (408) 732-9162 Fax: (408) 732-9164

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *Hospira, Inc.* Product, *FCC ID: STJ-16026,* or the "EUT" as referred to this report is a *Portable Dual Channel Infuser* device used in a health care facility to pump fluids into a patient in a controlled manner. The Infuser can deliver fluids, solutions, drugs, agents, nutritionals, electrolytes, blood and blood products for parenteral, enteral, intravenous, intra-arterial, subcutaneous, epidural or irrigation routes of administration. The device uses a piston pump which is powered electrically. The device uses a piston pump which is powered electrically. The device operates using a digitally controlled pump to propel the fluid through two infusers using narrow tubes that determine flow rate. The device includes the capability to detect fault conditions, such as air in, or blockage of the infusion line and in which case it activates an alarm. The Symbiq Infusion System is intended for use primarily in a hospital setting or for at-home care provided by an adequately trained professional.

EUT Photo

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Additional photos in Exhibit C

Mechanical Description

The *Hospira Inc.* product, *FCC ID: STJ-16026* is a *Dual Channel Infuser* that measures approximately: 170 mmL x 100 mmW x 210 mmH. The EUT operates at the frequency range of 2412– 2462MHz.*

** All testing was performed on a production representative sample provided by the manufacturer with serial number: 001*

Objective

This type approval report is prepared on behalf of *Hospira, Inc.* in accordance with Part 2, Subpart J, Part 15, Subparts A, B and C of the Federal Communication Commissions rules.

The objective is to determine continued compliance with FCC 15.247 Standard's limits rules for Conducted Emissions and Radiated Emissions after the class II permissive change made by Hospira Inc.

It is affirmed by *Hospira, Inc.* that FCC ID: STJ-16026 Portable Dual Channel Infuser is electrically identical to the device of the same FCC ID tested by BACL in project R0603293. The only changes that have been made to the EUT are mechanical; an additional infuser channel has been added and pump system power delivery has been modified resulting in minor digital circuitry layout changes to accommodate the mechanical changes. No change has been made to the RF part of the EUT. This change affects those tests pertaining to unintentional radiated emissions, and conducted emissions as both the chassis and power supply have been altered in order to make allowances for the infuser channel addition.

**Please see description of changes letter submitted with this report*

Related Submittal(s)/Grant(s)

This Permissive Change II report has been compiled on behalf of Hospira Inc. and contains only those tests preformed to verify continued compliance after the modifications detailed in the objective were made. The original FCC ID: *STJ-16026* was granted in April 2006. Please refer to Bay Area Compliance Laboratories Corp. project number: R0603293 for complete tests and their results.

Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.4-2003.

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the values ranging from $\pm$2.0 dB for Conducted Emissions tests and $\pm$4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL Corp.

Detailed instrumentation measurement uncertainties can be found in BACL Corp. report QAP-018.

Test Facility

The Test site used by BACL Corp. to collect radiated and conducted emissions measurement data is located at it's facility in Sunnyvale, California, USA.

Test site at BACL Corp. has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the test methods and procedures set forth in ANSI C63.4-2003& TIA/EIA-603.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC registration number: 90464 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The current scope of accreditations is attached hereinafter and can also be found at http://ts.nist.gov/ts/htdocs/210/214/scopes/2001670.htm

SYSTEM TEST CONFIGURATION

The host system was configured for testing according to ANSI C63.4-2003.

The EUT was tested in the normal (native) operating mode to represent *worst*-case results during the final qualification test.

EUT Exercise Software

The software is provided by customer. The EUT exercise program used during radiated and conducted testing was designed to exercise the system components. The test software, PRISM Test Appliance, Version: 3.1.3, runs with Windows terminal program under Windows 98/2000/ME/XP operating system. The support equipment used was one Laptop model: Dell Latitude No.: D610.

Once loaded, the Tx channel was set to low, mid and high for testing.

Equipment Modifications

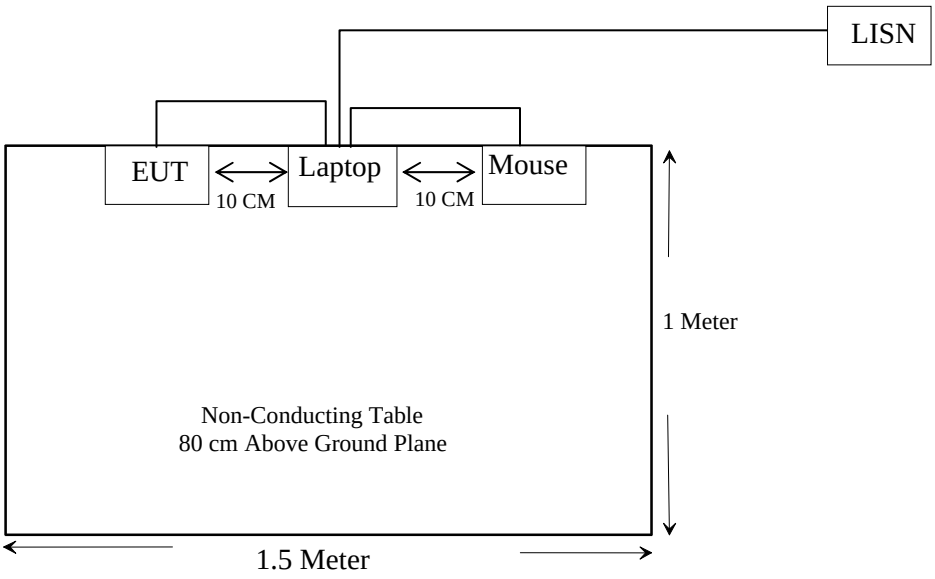
No modifications were made to the EUT.

EUT Internal Configuration

Manufacturer	Description	Model	Serial Number
Hospira, Inc	Main Board with Microprocessor	EPA1079218	U16241004
NEC	Monitor Control View Board	84PW013-D	T155R1
NAM	Internal Power Supply	AP4014-PS	06050192AB
NAM	Internal Power Manager	AP4014-DS	06050066AC
Hospira, Inc	RF Board	V51951A	D722905-006

Test Setup Block Diagrams

Radiated Emissions



SUMMARY OF TEST RESULTS FOR FCC PART 15

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.247(e)(i) §2.1093	RF Exposure	Pls. refer to SAR report**
§15.203	Antenna Requirement	Pls. refer to original report*
§ 15.207 (a)	Conducted Emissions	Compliant
§2.1051 & §15.247(d)	Spurious Emissions at Antenna Port	Pls. refer to original report*
§15.205, §15.209 & §15.247(c)	Radiated Emissions	Compliant
§15.247 (a) (1)	Hopping Channel Separation	Pls. refer to original report*
§15.247 (a) (1)	Channel Bandwidth	Pls. refer to original report*
§15.247 (a) (1) (iii)	Number of Hopping Frequencies Used	Pls. refer to original report*
§15.247 (a) (1) (iii)	Dwell Time of Each Frequency	Pls. refer to original report*
§15.247 (b)(3)	Maximum Peak Output Power	Pls. refer to original report*
§ 15.247 (d)	100 kHz Bandwidth of Frequency Band Edge	Pls. refer to original report*

** BACL report R0603293*
*** BACL report R0611131-SAR*

§15.207 (a) - CONDUCTED EMISSIONS

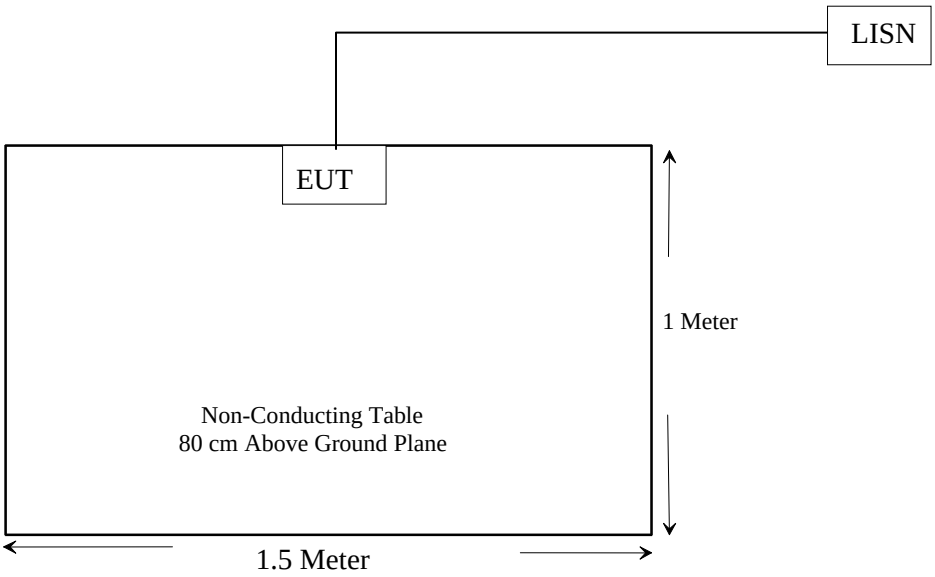
As per FCC Section 15.207 Conducted limits:

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5 0.5-5 5-30	66 to 56 * 56 60	56 to 46 * 46 50

** Decreases with the logarithm of the frequency.*

Test Setup Block Diagram



Test Setup

The measurement was performed in a shielded 5 m chamber, using test setup standards as per ANSI C63.4 – 2003 measurement procedure. The specification used was FCC Class B limits.

External I/O cables were draped along the edge of the test table and bundled when necessary.

The EUT was connected to LISN-1.

Test Procedure

During the conducted emissions test, the power cord of the EUT was connected to the mains outlet of the LISN-1.

Maximizing procedure was performed on the six (6) highest provided emissions of the EUT.

All the data were recorded in the peak detection mode, quasi-peak and, or, average. Quasi-Peak readings are distinguished with a "QP". Average readings are distinguished with an "Ave".

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
R&S	Receiver, EMI Test	ESCS30	100176	2006-3-16
R&S	LISN, Artificial Mains	ESH2-Z5	871884/039	2005-11-14

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	27° C
Relative Humidity:	78%
ATM Pressure:	1024 mbar

**The testing was performed by Choon Sian Ooi 2006-11-13.*

Summary of Test Results

According to the data recorded in the following table, the EUT complied with the FCC Standard's Conducted Emissions limits for Class B devices, with the *worst* margin reading of:

-15.6 dB at **0.413000 MHz** in the **Neutral** conductor

Please refer to the following plots and their respective tables for specific test results

Conducted Emissions Test plots and Data: **Line One**

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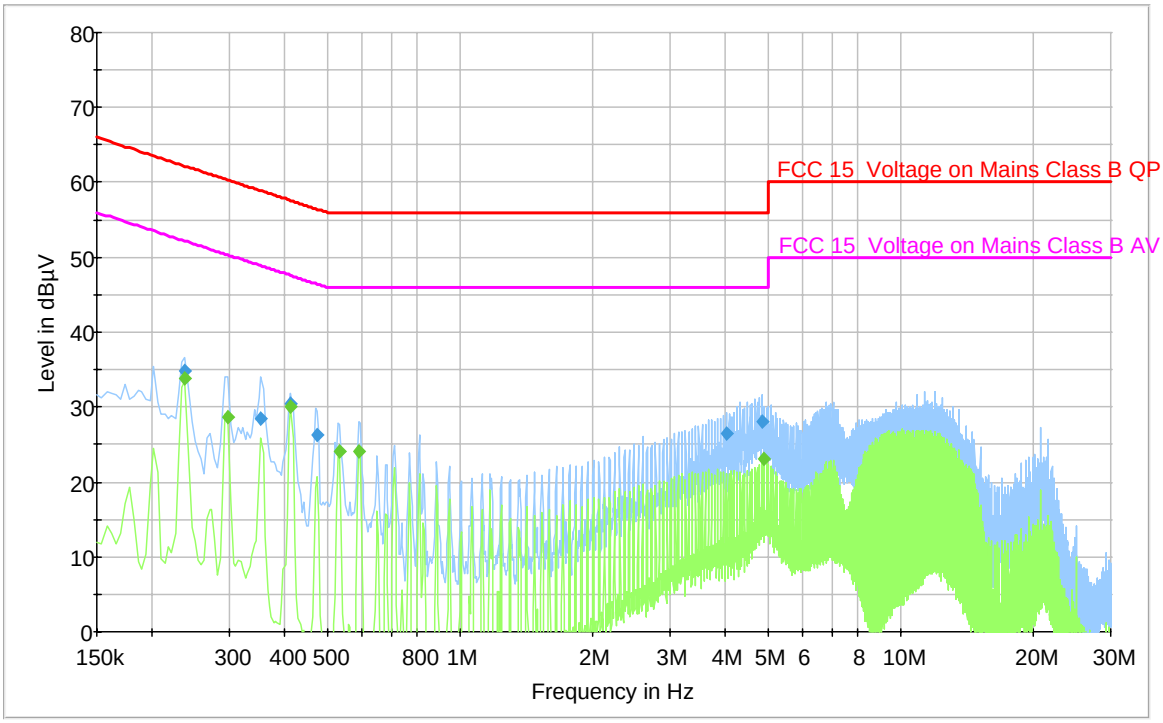


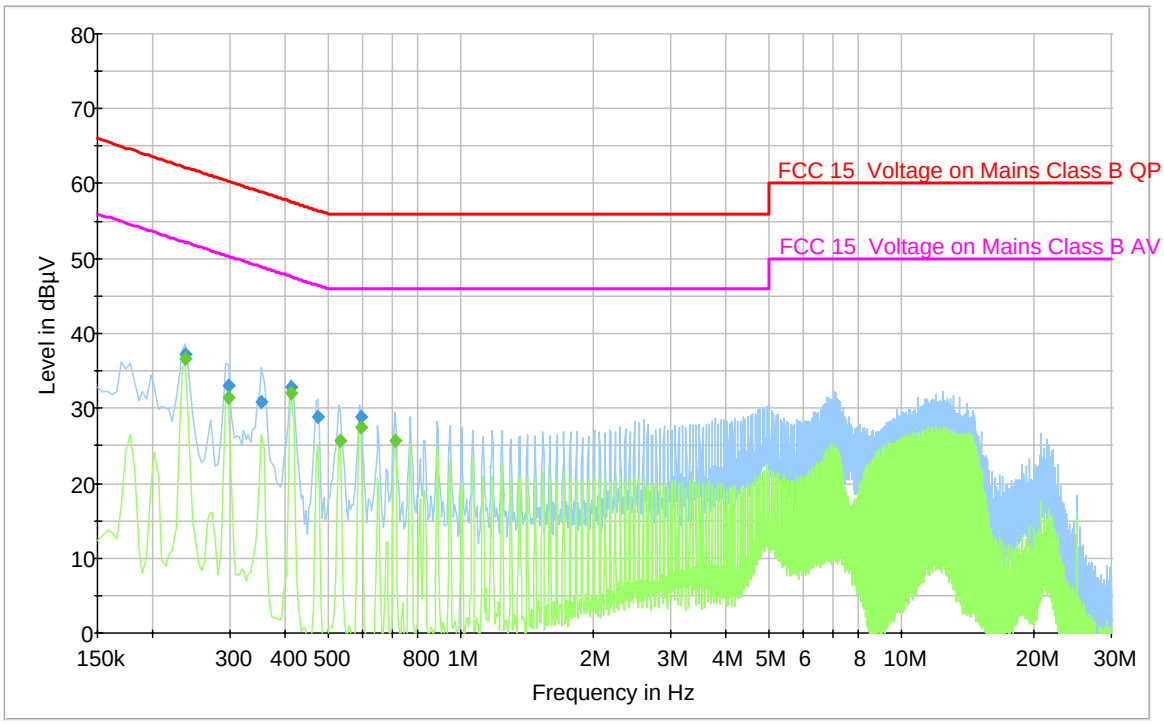
Quasi-Peak Measurements

Frequency (MHz)	Quasi-Peak (dBµV)	Line	Limit (dBµV)	Margin (dB)
0.413000	30.5	L1	57.6	-27.1
0.237000	34.8	L1	62.2	-27.4
4.849000	28.0	L1	56.0	-28
4.021000	26.5	L1	56.0	-29.5
0.473000	26.3	L1	56.5	-30.2
0.353000	28.6	L1	58.9	-30.3

Average Measurements

Frequency (MHz)	Average (dBµV)	Line	Limit (dBµV)	Margin (dB)
0.413000	30.1	L1	47.6	-17.5
0.237000	33.9	L1	52.2	-18.3
0.297000	28.7	L1	50.3	-21.6
0.533000	24.1	L1	46.0	-21.9
0.589000	24.2	L1	46.0	-21.8
4.909000	23.1	L1	46.0	-22.9

Neutral Line:



Quasi-Peak Measurements

Frequency (MHz)	Quasi-Peak (dBµV)	Line	Limit (dBµV)	Margin (dB)
0.413000	32.8	N	57.6	-24.8
0.237000	37.3	N	62.2	-24.9
0.593000	28.9	N	56.0	-27.1
0.297000	33.1	N	60.3	-27.2
0.473000	28.9	N	56.5	-27.6
0.353000	30.8	N	58.9	-28.1

Average Measurements

Frequency (MHz)	Average (dBµV)	Line	Limit (dBµV)	Margin (dB)
0.413000	31.9	N	47.6	-15.7
0.237000	36.5	N	52.2	-15.7
0.593000	27.6	N	46.0	-18.4
0.297000	31.4	N	50.3	-18.9
0.533000	25.8	N	46.0	-20.2
0.709000	25.7	N	46.0	-20.3

§15.205, §15.209 & §15.247(c) - RADIATED EMISSIONS

Applicable Standard: as per 15.209(a)

(a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength (microvolts/meter)	Measurement Distance (meters)
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 **	3
88-216	150 **	3
216-960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.

Test Setup

The radiated emissions tests were performed at three meters in 5 m shielded semi-anechoic chamber, using the setup in accordance with ANSI C63.4-2003. The specification used was the FCC 15 Subpart C limits.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Sonoma Instruments	Pre amplifier	317	260406	2006-02-03
Agilent	Pre amplifier	8449B	3008A01978	2006-08-21
Sunol Science	Combination Antenna	JB3 Antenna	A013105	2006-02-11
DRG	Horn Antenna	SAS-200/571	261	2006-04-20
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.595 0K03	100044	2005-12-14
Sunol Science	System Controller	SC99V	122303-1	N/R
Rohde & Schwarz	Artificial-Mains Network	ESH2-Z5	871884/039	2005-11-14
Agilent	Spectrum analyzer	8565EC	3946A00131	2006-01-11

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	20-22° C
Relative Humidity:	40-50%
ATM Pressure:	1012-1014 mbar

**The testing was performed by Choon Sian Ooi on 2006-11-13.*

Test Procedure

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance with all installation combinations.

All data was recorded in the peak detection mode. Quasi-peak readings were performed only when an emission was found to be marginal (within -4 dB of specification limits), and is distinguished with a "**QP**" in the data table.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corrected Amplitude = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emissions are 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corrected Amplitude - Class B Limit

Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.247's standards limit for Class B devices, and had the worst margin of:

For 30-1000MHZ (Spurious Emissions)

-9.4 dB at **595.996250 MHz** in the **Vertical** polarization

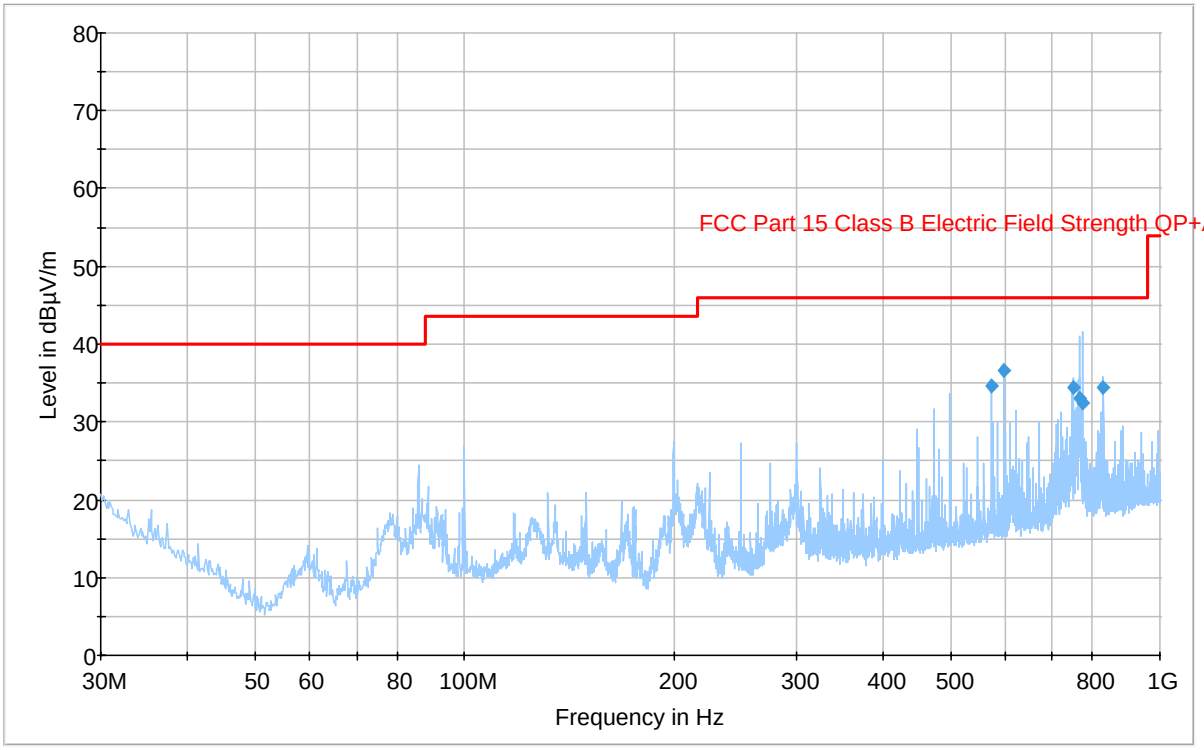
Radiated spurious emissions above 1GHz

-15.9 dB at **1099.0000 MHz** in the **Vertical** polarization, 1GHz –25GHz**, Low Channel**

-20.94 dB at **1099.0000 MHz** in the **Vertical** polarization, 1GHz – 25GHz**, Middle Channel**

-15.1dB at **1099.0000 MHz** in the **Horizontal** polarization, 1GHz – 25GHz**, High Channel**

30-1000MHZ



Frequency (MHz)	QuasiPeak (dBµV/m)	Antenna height (cm)	Polarity (V or H)	Turntable position (degrees)	Limit (dBµV/m)	Margin (dB)
595.996250	36.6	100.7	V	98.0	46.0	-9.4
571.441250	34.5	100.7	V	86.0	46.0	-11.5
749.983750	34.4	113.2	H	51.0	46.0	-11.6
829.462500	34.4	101.0	V	5.0	46.0	-11.6
767.201250	33.0	118.2	V	14.0	46.0	-13.0
774.172500	32.4	140.9	V	117.0	46.0	-13.6

Radiated spurious emissions above 1GHZ:

Low Channel: 2412 MHz

Frequency	Reading	Direction	Height	Polar	Antenna Factor	Cable loss	Cable 2 loss	Amplifier	Correction Factor	15.247	15.247	Comments
MHz	dBuV/m	Degrees	Meter	H / V	dB/m	dB	dB	dB	dBuV/m	Limit (dBuV/m)	Margin	
2412.00	103.9	185	1.5	V	28.3	2.1	0.4	36.4	98.3	-	-	Fund/Peak
2412.00	97.4	185	1.5	V	28.3	2.1	0.4	36.4	91.8	-	-	Fund/Ave
2412.00	106.7	218.62	1.5	H	28.3	2.1	0.4	36.4	101.1	-	-	Fund/Peak
2412.00	99.6	218.62	1.5	H	28.3	2.1	0.4	36.4	94.0	-	-	Fund/Ave
1099.00	48.6	183.87	1.6	V	23.5	1.3	0.3	35.6	38.1	54	-15.9	Ave
4824.00	35.5	167	1.4	V	33.4	2.7	0.5	35.2	36.9	54	-17.1	Ave
1249.00	44.2	196	1.4	H	24.3	1.5	0.3	35.2	35.1	54	-18.9	Ave
4824.00	51.2	167	1.4	V	33.4	2.7	0.5	35.2	52.6	74	-21.4	Peak
1099.00	61.3	183.87	1.6	V	23.5	1.3	0.3	35.6	50.8	74	-23.2	Peak
4824.00	38.1	50	1.5	H	24.3	2.7	0.5	35.2	30.4	54	-23.6	Ave
1249.00	39.0	236	1.2	H	24.3	1.5	0.3	35.2	29.9	54	-24.1	Ave
2037.00	46.1	188	2.1	V	28.7	1.9	0.4	36.2	40.9	67.4	-26.5	Ave
1099.00	37.5	220	1.7	H	23.5	1.3	0.3	35.6	27.0	54	-27.0	Ave
4824.00	50.5	50	1.5	H	24.3	2.7	0.5	35.2	42.8	74	-31.2	Peak
1099.00	52.6	220	1.7	H	23.5	1.3	0.3	35.6	42.1	74	-31.9	Peak
1249.00	50.8	196	1.4	V	24.3	1.5	0.3	35.2	41.7	74	-32.3	Peak
1249.00	50.6	236	1.2	V	24.3	1.5	0.3	35.2	41.5	74	-32.5	Peak
2037.00	51.6	188	2.1	V	28.7	1.9	0.4	36.2	46.4	83.9	-37.5	Peak
2037.00	46.5	276.36	2.0	H	28.7	1.9	0.4	36.2	41.3	79.6	-38.3	Ave
2037.00	51.4	276.37	2.0	H	28.7	1.9	0.4	36.2	46.2	86.7	-40.5	Peak

Middle Channel: 2437 MHz

Frequency	Reading	Direction	Height	Polar	Antenna Factor	Cable loss	Cable 2 loss	Amplifier	Correction Factor	15.247	15.247	Comments
MHz	dBuV/m	Degrees	Meter	H / V	dB/m	dB	dB	dB	dBuV/m	Limit (dBuV/m)	Margin	
2437.00	105.0	0	1.6	V	28.3	2.1	0.4	36.4	99.4	-	-	Fund/Peak
2437.00	98.4	0.0	1.6	V	28.3	2.1	0.4	36.4	92.8	-	-	Fund/Ave
2437.00	107.0	233	1.6	H	28.3	2.1	0.4	36.4	101.4	-	-	Fund/Peak
2437.00	99.1	233	1.6	H	28.3	2.1	0.4	36.4	93.5	-	-	Fund/Ave
1099.00	44.2	237	1.5	V	23.3	1.4	0.3	35.6	33.6	54	-20.4	Ave
1099.00	42.0	121	1.8	H	23.3	1.4	0.3	35.6	31.4	54	-22.6	Ave
1394.00	57.7	149	1.3	V	24.8	1.6	0.3	35.5	48.9	74	-25.1	Peak
4874.00	37.5	173.4	1.5	V	23.3	2.7	0.5	35.2	28.8	54	-25.2	Ave
4874.00	36.6	131.5	1.5	H	23.3	2.7	0.5	35.2	27.9	54	-26.1	Ave
1394.00	35.8	149	1.3	V	24.8	1.6	0.3	35.5	27.0	54	-27.0	Ave
1394.00	35.7	352	1.5	H	24.8	1.6	0.3	35.5	26.9	54	-27.1	Ave
1394.00	53.6	180	1.0	H	24.8	1.6	0.3	35.5	44.8	74	-29.2	Peak
4874.00	51.3	173.4	1.5	V	23.3	2.7	0.5	35.2	42.6	74	-31.4	Peak
4874.00	49.2	131.5	1.5	H	23.3	2.7	0.5	35.2	40.5	74	-33.5	Peak
1099.00	51.0	237	1.5	V	23.3	1.4	0.3	35.6	40.4	74	-33.6	Peak
1099.00	50.7	237	1.8	H	23.3	1.4	0.3	35.6	40.1	74	-33.9	Peak
2062.00	45.3	67.2	1.4	V	28.7	1.9	0.4	36.2	40.1	78.4	-38.3	Ave
2062.00	44.9	254	1.8	H	28.7	1.9	0.4	36.2	39.7	78.4	-38.7	Ave
2062.00	50.3	254	1.8	H	28.7	1.9	0.4	36.2	45.1	85	-39.9	Peak
2062.00	50.2	67.2	1.4	V	28.7	1.9	0.4	36.2	45.0	85	-40.0	Peak

High Channel: 2462 MHz

Frequency	Reading	Direction	Height	Polar	Antenna Factor	Cable loss	Cable 2 loss	Amplifier	Correction Factor	15.247	15.247	Comments
MHz	dBuV/m	Degrees	Meter	H / V	dB/m	dB	dB	dB	dBuV/m	Limit (dBuV/m)	Margin	
2462.00	100.8	245	2.3	V	28.9	2.1	0.4	36.4	95.8	-	-	Fund/Peak
2462.00	93.2	245	2.3	V	28.9	2.1	0.4	36.4	88.2	-	-	Fund/Ave
2462.00	104.2	206	1.2	H	28.9	2.1	0.4	36.4	99.2	-	-	Fund/Peak
2462.00	96.5	206	1.2	H	28.9	2.1	0.4	36.4	91.5	-	-	Fund/Ave
1099.00	49.3	222	1.3	V	23.5	1.4	0.3	35.6	38.9	54	-15.1	Ave
1249.00	42.8	192	1.4	V	24.6	1.5	0.3	35.2	34.0	54	-20.0	Ave
1249.00	40.1	239.6	1.4	H	24.6	1.5	0.3	35.2	31.3	54	-22.7	Ave
1099.00	41.6	152	1.7	H	23.5	1.4	0.3	35.6	31.2	54	-22.8	Ave
1099.00	60.1	222	1.3	V	23.5	1.4	0.3	35.6	49.7	74	-24.3	Peak
1099.00	54.7	152	1.7	H	23.5	1.4	0.3	35.6	44.3	74	-29.7	Peak
1249.00	50.7	192	1.4	V	24.6	1.5	0.3	35.2	41.9	74	-32.1	Peak
1249.00	49.1	239.1	1.4	H	24.6	1.5	0.3	35.2	40.3	74	-33.7	Peak
2087.00	45.1	303	2.0	V	28.1	1.9	0.4	36.2	39.3	73.2	-33.9	Ave
2087.00	46.3	248	1.5	H	28.1	1.9	0.4	36.2	40.5	76.5	-36.0	Ave
2087.00	50.5	303	2.0	V	28.1	1.9	0.4	36.2	44.7	80.8	-36.1	Peak
2087.00	51.2	248	1.5	H	28.1	1.9	0.4	36.2	45.4	84.2	-38.8	Peak