

EMC Test Report***Application for Grant of Equipment Authorization***

Innovation, Science and Economic Development Canada
RSS-Gen Issue 5 / RSS-216 Issue 2
FCC Part 15 Subpart C

Model: SCWCX01

IC CERTIFICATION #: 11508A-SCWCX01
FCC ID: 2AAZF-SCWCX01

APPLICANT: Intuitive Surgical Inc.
1266 Kifer Road Building 101
Sunnyvale, CA 94086

TEST SITE(S): NTS Labs LLC
41039 Boyce Road.
Fremont, CA. 94538-2435

IC SITE REGISTRATION #: 2845B-3; 2845B-4, 2845B-5, 2845B-7

PROJECT NUMBER: PR172107

REPORT DATE: August 7, 2023

RE-ISSUED DATE: March 18, 2024

FINAL TEST DATES: June 20 and 24, August 2 and 3,
November 1, 2023, February 22 and 26, 2024

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NTS Labs LLC

Project number PR172107
Report Date: August 7, 2023, Re-Issued Date: March 18, 2024

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NTS Labs LLC

Project number PR172107
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REVISION HISTORY

Rev#	Date	Comments	Modified By
-	August 7, 2023	First release	
1	November 23, 2023	Corrected typographical error in FCC ID on page 9, Changed specification to RSS-216 with new radiated emissions test results	dwb
2	March 18, 2024	Added new test results for WPT load separated from the coil 0 mm and 6mm..	dwb

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SCOPE

An electromagnetic emissions test has been performed on the Intuitive Surgical Inc. model SCWCX01, pursuant to the following rules:

RSS-Gen Issue 5

RSS-216 Issue 2 "Wireless Power Transfer Devices", WPT Source Type 1 Device
FCC Part 15 Subpart C

Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in the following reference standards and as outlined in NTS Labs LLC test procedures:

ANSI C63.10-2013

ICES-001

The intentional radiator above has been tested in a simulated typical installation to demonstrate compliance with the relevant Industry Canada performance and procedural standards.

Final system data was gathered in a mode that tended to maximize emissions by varying orientation of EUT, orientation of power and I/O cabling, antenna search height, and antenna polarization.

Every practical effort was made to perform an impartial test using appropriate test equipment of known calibration. All pertinent factors have been applied to reach the determination of compliance.

NTS Labs LLC is accredited by the A2LA, certificate number 0214.26, to perform the test(s) listed in this report, except where noted otherwise.

OBJECTIVE

The primary objective of the manufacturer is compliance with the regulations outlined in the previous section.

Prior to marketing in the USA, all unlicensed transmitters and transceivers require certification. Receive-only devices operating between 30 MHz and 960 MHz are subject to either certification or a manufacturer's declaration of conformity, with all other receive-only devices exempt from the technical requirements.

Prior to marketing in Canada, Class I transmitters, receivers and transceivers require certification. Class II devices are required to meet the appropriate technical requirements but are exempt from certification requirements.

Certification is a procedure where the manufacturer submits test data and technical information to a certification body and receives a certificate or grant of equipment authorization upon successful completion of the certification body's review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units, which are subsequently manufactured.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

STATEMENT OF COMPLIANCE

The tested sample of Intuitive Surgical Inc. model SCWCX01 complied with the requirements of the following regulations:

Industry Canada RSS-Gen Issue 5
RSS-216 Issue 2 "Wireless Power Transfer Devices"
FCC Part 15 Subpart C

Maintenance of compliance is the responsibility of the manufacturer. Any modifications to the product should be assessed to determine their potential impact on the compliance status of the device with respect to the standards detailed in this test report.

The test results recorded herein are based on a single type test of Intuitive Surgical Inc. model SCWCX01 and therefore apply only to the tested sample. The sample was selected and prepared by Tony Permsombut of Intuitive Surgical Inc..

DEVIATIONS FROM THE STANDARDS

No deviations were made from the published requirements listed in the scope of this report.

TEST RESULTS SUMMARY
DEVICES OPERATING UNDER THE GENERAL LIMITS

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.209		Transmitter Fundamental Signal Emissions, 120-148.5 kHz	-10.1 dB μ V/m @ 125 kHz (-35.8 dB)	Refer to table in limits section	Complies
15.209		Transmitter Radiated Spurious Emissions, 0.009 - 30 MHz	-11.2 dB μ V/m @ 372 kHz (-27.4 dB)	Refer to table in limits section	Complies

Note 1 Pass/Fail criteria defined by standards listed above.

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
	RSS-216 ICES-001 Table 2	Transmitter Radiated Spurious Emissions, 0.009 - 30 MHz	32.7 dB μ A/m @ 0.120 MHz (-15.0 dB)	ICES-001	Complies
	RSS-216 ICES-001 Table 4	Transmitter Radiated Spurious Emissions, 30 - 1,000 MHz	23.9 dB μ A/m @ 0.127 MHz (-21.8 dB)	ICES-001	Complies

Note 2 Pass/Fail criteria defined by standards listed above.

GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS

FCC Rule Part	RSS Rule part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.203	-	RF Connector	Integral antenna	Unique or integral antenna required	Complies
15.207	RSS-216 ICES-001 Table 1	AC Conducted Emissions	42.2 dB μ V @ 24.324 MHz (-7.8 dB)	Refer to page 18	Complies
-	RSS-GEN 8.4	User Manual		Statement of Compliance	Complies
-	RSP 100 RSS-GEN 6.7	Occupied Bandwidth	66 Hz	Information only	N/A

Note 3 Pass/Fail criteria defined by standards listed above.

MEASUREMENT UNCERTAINTIES

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level and were calculated in accordance with UKAS document LAB 34.

Measurement Type	Measurement Unit	Frequency Range	Expanded Uncertainty
Radiated emission (field strength)	dB μ V/m	0.009 to 30 MHz	\pm 5.5 dB
		25 to 1000 MHz	\pm 3.6 dB
		1000 to 40000 MHz	\pm 6.0 dB
Conducted Emissions (AC Power)	dB μ V	0.15 to 30 MHz	\pm 2.4 dB

EQUIPMENT UNDER TEST (EUT) DETAILS**GENERAL**

The Intuitive Surgical Inc. model SCWCX01, hereafter referred as EUT, is a combination of active NFC tag 13.56 MHz and Wireless Power Transfer (WPT) 120 - 148.5 MHz transmitter (aka. Phone Charger) for use in da Vinci Surgical System (an endoscopic instrument control system manufactured by Intuitive Surgical, Inc.) which is intended to assist in the accurate control of endoscopic instruments. The active NFC tag is designed to assist with touchless login to da Vinci Surgical System using mobile phone or tablet without manual PIN entry. The WPT is designed to charge mobile phone or tablet. Since the EUT would be installed in da Vinci Surgical System cart during normal operation and could be placed in any position, the EUT was treated as tabletop equipment during testing to simulate the end-user environment. The electrical rating of the EUT is 12 Volts DC.

The sample was received on May 3, 2023 and tested on June 20 and 24, August 2 and 3, November 1, 2023, February 22 and 26, 2024. The EUT consisted of the following component(s):

Company	Model	Description	Serial Number	FCC ID
Intuitive Surgical	SCWCX01	WPT Transmitter	FNV22280098	2AAZF-SCWCX01

OTHER EUT DETAILS

The EUT is unmodulated.

ANTENNA SYSTEM

The antenna system consists of a loop antenna.

ENCLOSURE

The EUT has no enclosure. It is designed to be installed within the enclosure of a medical instrument.

MODIFICATIONS

No modifications were made to the EUT during the time the product was at NTS Labs LLC.

SUPPORT EQUIPMENT

The following equipment was used as support equipment for testing:

Company	Model	Description	Serial Number	FCC ID
BK Precision	1550	Power Supply	238B21160	-
Google	Pixel 6	Phone	355273352135002	A4RG9S9B
Wurth Elektronik	760308MP2	WPT Load	6006650176	-

EUT INTERFACE PORTS

The I/O cabling configuration during testing was as follows:

Port	Connected To	Description	Cable(s)	
			Shielded or Unshielded	Length(m)
DC Input	Power Supply	Two wire	Unshielded	0.3
Power Supply AC	Mains	Three wire	Unshielded	1.6

EUT OPERATION

During testing, the EUT was constantly transmitting at between 120-148.5 kHz and communicating with the phone at 13.56 MHz.

TEST SITE**GENERAL INFORMATION**

Final test measurements were taken at the test sites listed below. Pursuant to section 2.948 of the FCC's Rules and section 6.2 of RSS-GEN, NTS Labs LLC has been recognized as an accredited test laboratory by the Commission and Innovation, Science and Economic Development Canada. A description of the facilities employed for testing is maintained by NTS Labs LLC.

Site	Designation / Registration Numbers FCC	Designation / Registration Numbers Canada	Location
Chamber 7	US1031	US0027	41039 Boyce Road Fremont, CA 94538-2435

ANSI C63.4 recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement. The test site(s) contain separate areas for radiated and conducted emissions testing. Results from testing performed in this chamber have been correlated with results from an open area test site. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent requirements of ANSI C63.4.

CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions testing is performed in conformance with ANSI C63.10. Measurements are made with the EUT connected to the public power network through a nominal, standardized RF impedance, which is provided by a line impedance stabilization network, known as a LISN. A LISN is inserted in series with each current-carrying conductor in the EUT power cord.

RADIATED EMISSIONS CONSIDERATIONS

The FCC has determined that radiation measurements made in a shielded enclosure are not suitable for determining levels of radiated emissions. Radiated measurements are performed in an open field environment or in a semi-anechoic chamber. The test sites are maintained free of conductive objects within the CISPR defined elliptical area incorporated in ANSI C63.4 guidelines and meet the Normalized Site Attenuation (NSA) requirements of ANSI C63.4.

MEASUREMENT INSTRUMENTATION**RECEIVER SYSTEM**

An EMI receiver as specified in CISPR 16-1-1 is used for emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 2000 MHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary. The receiver automatically sets the required bandwidth for the CISPR detector used during measurements. If the repetition frequency of the signal being measured is below 20Hz, peak measurements are made in lieu of Quasi-Peak measurements.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. Average measurements above 1000MHz are performed on the spectrum analyzer using the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz, unless the signal is pulsed in which case the average (or video) bandwidth of the measuring instrument is reduced to onset of pulse desensitization and then increased.

INSTRUMENT CONTROL COMPUTER

Software is used to view and convert receiver measurements to the field strength at an antenna or voltage developed at the LISN measurement port, which is then compared directly with the appropriate specification limit. This provides faster, more accurate readings by performing the conversions described under Sample Calculations within the Test Procedures section of this report. Results are printed in a graphic and/or tabular format, as appropriate. A personal computer is used to record all measurements made with the receivers. The software used for radiated and conducted emissions measurements is NTS Labs, LLC EMI Test Software (rev 2.10)

LINE IMPEDANCE STABILIZATION NETWORK (LISN)

Line conducted measurements utilize a fifty microhenry Line Impedance Stabilization Network as the monitoring point. The LISN used also contains a 250 uH CISPR adapter. This network provides for calibrated radio frequency noise measurements by the design of the internal low pass and high pass filters on the EUT and measurement ports, respectively.

FILTERS/ATTENUATORS

External filters and precision attenuators are often connected between the receiving antenna or LISN and the receiver. This eliminates saturation effects and non-linear operation due to high amplitude transient events.

ANTENNAS

A loop antenna is used below 30 MHz. For the measurement range 30 MHz to 1000 MHz either a combination of a biconical antenna and a log periodic or a bi-log antenna is used. Above 1000 MHz, horn antennas are used. The antenna calibration factors to convert the received voltage to an electric field strength are included with appropriate cable loss and amplifier gain factors to determine an overall site factor, which is then programmed into the test receivers or incorporated into the test software.

ANTENNA MAST AND EQUIPMENT TURNTABLE

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height. Measurements below 30 MHz are made with the loop antenna at a fixed height of 1m above the ground plane.

ANSI C63.10 specifies that the test height above ground for table mounted devices shall be 80 centimeters. Floor mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material from 3 to 12 mm if the device is normally used on a non-conductive floor as specified in ANSI C63.4. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

INSTRUMENT CALIBRATION

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications. All antennas are calibrated at regular intervals with respect to tuned half-wave dipoles. An exhibit of this report contains the list of test equipment used and calibration information.

TEST PROCEDURES

EUT AND CABLE PLACEMENT

The regulations require that interconnecting cables be connected to the available ports of the unit and that the placement of the unit and the attached cables simulate the worst case orientation that can be expected from a typical installation, so far as practicable. To this end, the position of the unit and associated cabling is varied within the guidelines of ANSI C63.10, and the worst-case orientation is used for final measurements.

CONDUCTED EMISSIONS

Conducted emissions are measured at the plug end of the power cord supplied with the EUT. Excess power cord length is wrapped in a bundle between 30 and 40 centimeters in length near the center of the cord. Preliminary measurements are made to determine the highest amplitude emission relative to the specification limit for all the modes of operation. Placement of system components and varying of cable positions are performed in each mode. A final peak mode scan is then performed in the position and mode for which the highest emission was noted on all current carrying conductors of the power cord.

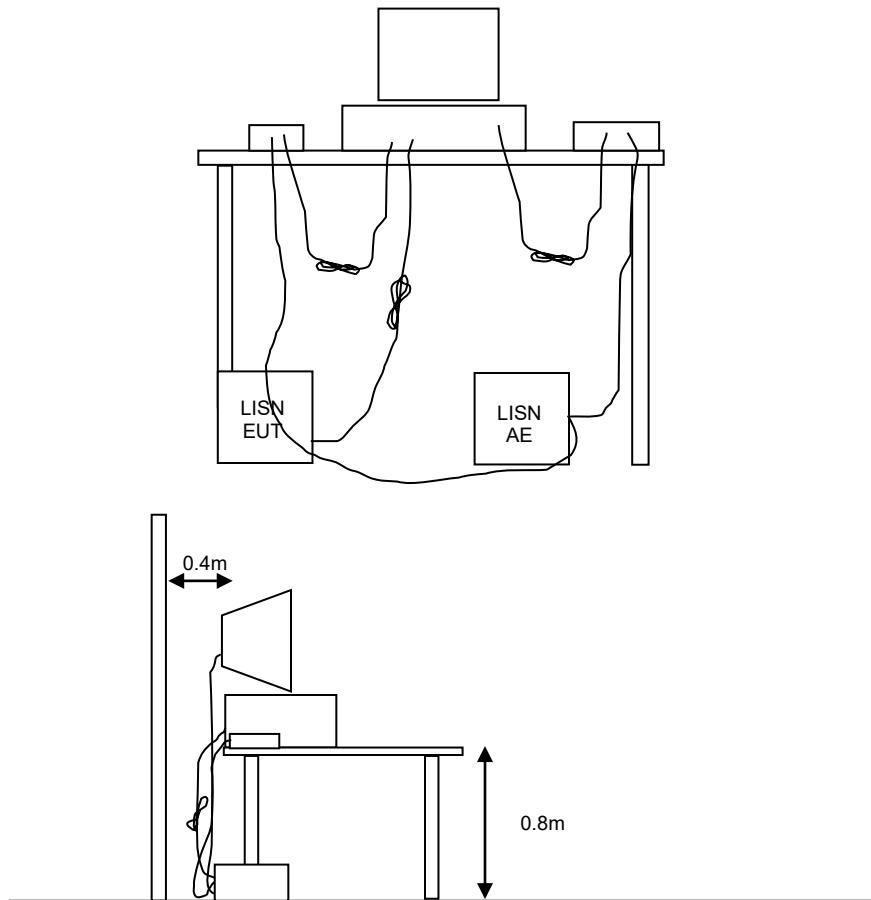


Figure 1 Typical Conducted Emissions Test Configuration

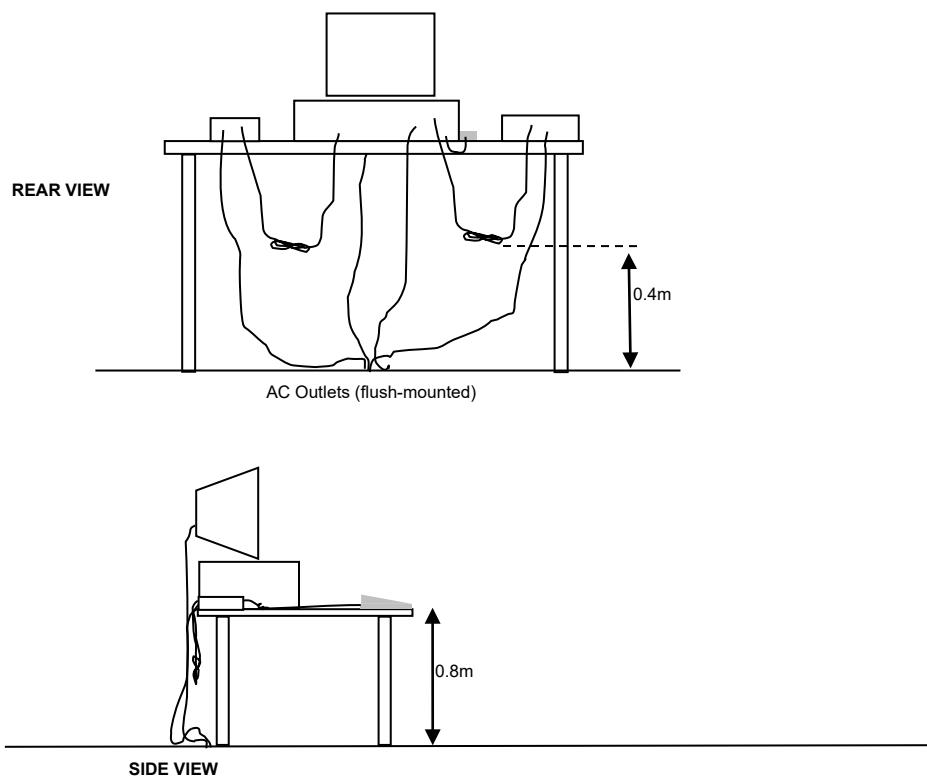
RADIATED EMISSIONS

A preliminary scan of the radiated emissions is performed in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed, one scan for each antenna polarization (horizontal and vertical; loop parallel and perpendicular to the EUT). During the preliminary scans, the EUT is rotated through 360°, the antenna height is varied (for measurements above 30 MHz) and cable positions are varied to determine the highest emission relative to the limit. Preliminary scans may be performed in a fully anechoic chamber for the purposes of identifying the frequencies of the highest emissions from the EUT.

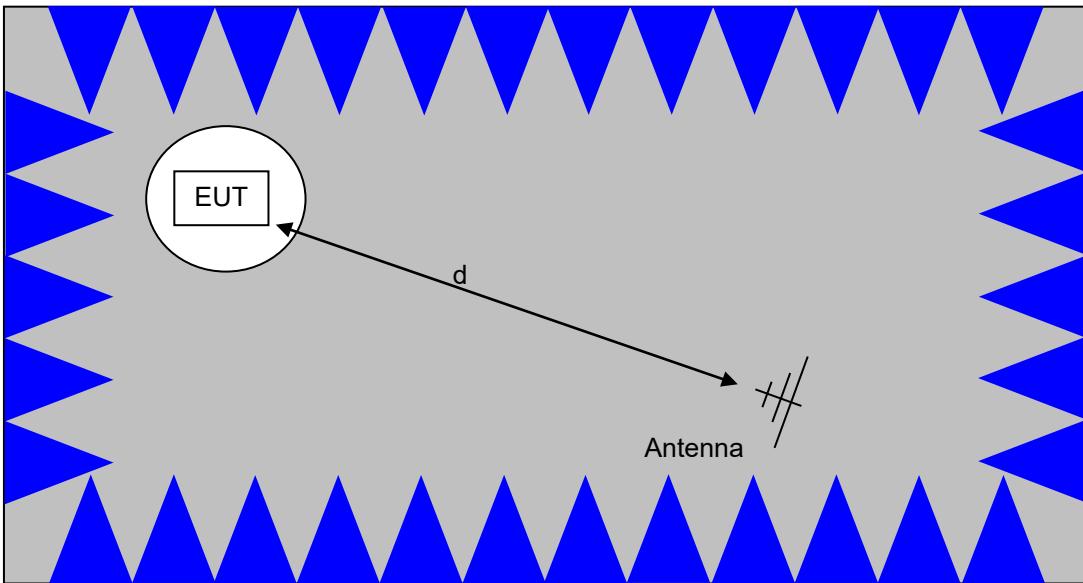
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

Final maximization is a phase in which the highest amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth, which results in the highest emission is then maintained while varying the antenna height from one to four meters (for measurements above 30 MHz, measurements below 30 MHz are made with the loop antenna at a fixed height of 1m). The result is the identification of the highest amplitude for each of the highest peaks. Each recorded level is corrected in the receiver using appropriate factors for cables, connectors, antennas, and preamplifier gain.

When testing above 18 GHz, the receive antenna is located at 1meter from the EUT and the antenna height is restricted to a maximum of 2.5 meters.

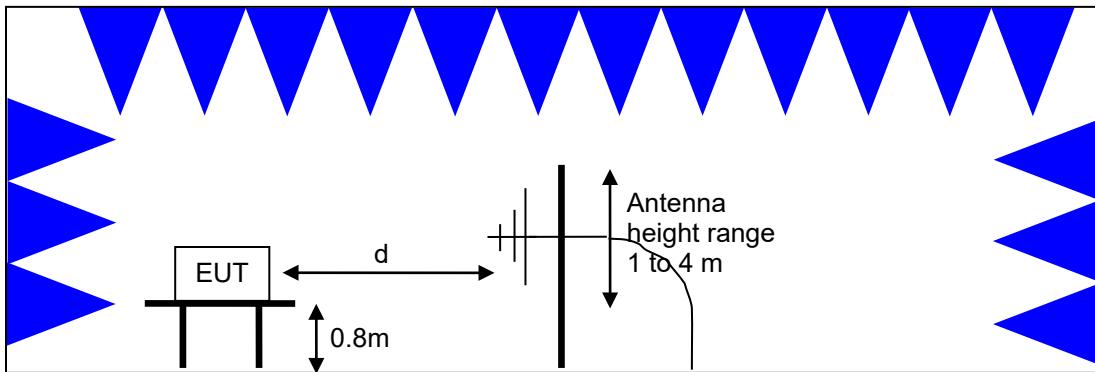


Typical Test Configuration for Radiated Field Strength Measurements



The anechoic materials on the walls and ceiling ensure compliance with the normalized site attenuation requirements of CISPR 16 / CISPR 22 / ANSI C63.4 for an alternate test site at the measurement distances used.

Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.



Test Configuration for Radiated Field Strength Measurements
Semi-Anechoic Chamber, Plan and Side Views

BANDWIDTH MEASUREMENTS

The 6dB, 20dB, 26dB and/or 99% signal bandwidth are measured using the bandwidths recommended by ANSI C63.10 and RSS-GEN.

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

The limits for conducted emissions are given in units of microvolts, and the limits for radiated emissions are given in units of microvolts per meter at a specified test distance. Data is measured in the logarithmic form of decibels relative to one microvolt, or dB microvolts (dBuV). For radiated emissions, the measured data is converted to the field strength at the antenna in dB microvolts per meter (dBuV/m). The results are then converted to the linear forms of uV and uV/m for comparison to published specifications.

For reference, converting the specification limits from linear to decibel form is accomplished by taking the base ten logarithm, then multiplying by 20. These limits in both linear and logarithmic form are as follows:

CONDUCTED EMISSIONS SPECIFICATION LIMITS: FCC §15.207; §FCC 15.107(a), AND RSS-GEN

The table below shows the limits for the emissions on the AC power line from an intentional radiator and a receiver.

Frequency (MHz)	Average Limit (dBuV)	Quasi Peak Limit (dBuV)
0.150 to 0.500	Linear decrease on logarithmic frequency axis between 56.0 and 46.0	Linear decrease on logarithmic frequency axis between 66.0 and 56.0
0.500 to 5.000	46.0	56.0
5.000 to 30.000	50.0	60.0

GENERAL TRANSMITTER RADIATED EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for the spurious emissions from transmitters that fall in restricted bands¹ (with the exception of transmitters operating under FCC Part 15 Subpart D), the limits for all emissions from a low power device operating under the general rules of RSS-GEN (Tables 5 and 6) and FCC §15.209.

Frequency Range (MHz)	Limit (uV/m)	Limit (dBuV/m @ 3m)
0.009-0.490	2400/F _{KHz} @ 300m	67.6-20*log ₁₀ (F _{KHz}) @ 300m
0.490-1.705	24000/F _{KHz} @ 30m	87.6-20*log ₁₀ (F _{KHz}) @ 30m
1.705 to 30	30 @ 30m	29.5 @ 30m
30 to 88	100 @ 3m	40 @ 3m
88 to 216	150 @ 3m	43.5 @ 3m
216 to 960	200 @ 3m	46.0 @ 3m
Above 960	500 @ 3m	54.0 @ 3m

Note: RSS-GEN expresses the limits below 30 MHz in terms of magnetic field strength but are equivalent to the values in the table for electric field strength above assuming a 377 ohm field impedance.

SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

Receiver readings are compared directly to the conducted emissions specification limit (decibel form) as follows:

$$R_r - S = M$$

where:

R_r = Receiver Reading in dBuV

S = Specification Limit in dBuV

M = Margin to Specification in +/- dB

¹ The restricted bands are detailed in FCC 15.205, RSS-GEN Table7

SAMPLE CALCULATIONS - RADIATED EMISSIONS

Receiver readings are compared directly to the specification limit (decibel form). The receiver internally corrects for cable loss, preamplifier gain, and antenna factor. The calculations are in the reverse direction of the actual signal flow, thus cable loss is added and the amplifier gain is subtracted. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

A distance factor, when used for electric field measurements above 30MHz, is calculated by using the following formula:

$$F_d = 20 * \text{LOG10} (D_m / D_s)$$

where:

F_d = Distance Factor in dB

D_m = Measurement Distance in meters

D_s = Specification Distance in meters

For electric field measurements below 30MHz the extrapolation factor is either determined by making measurements at multiple distances or a theoretical value is calculated using the formula:

$$F_d = 40 * \text{LOG10} (D_m / D_s)$$

Measurement Distance is the distance at which the measurements were taken and Specification Distance is the distance at which the specification limits are based. The antenna factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

The margin of a given emission peak relative to the limit is calculated as follows:

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

R_r = Receiver Reading in dBuV/m

F_d = Distance Factor in dB

R_c = Corrected Reading in dBuV/m

L_s = Specification Limit in dBuV/m

M = Margin in dB Relative to Spec

Appendix A Test Equipment Calibration Data

Manufacturer	Description	Model	Asset #	Calibrated	Cal Due
Conducted Emissions - AC Power Ports, 20-Jun-23					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	WC022452	N/A	N/A
ETS-Lindgren	EMC Chamber #7, Inner Dimensions (LxWxH): 24' x 38' x 20'	CH 7 (FACT-5)	WC055569	8/8/2022	11/6/2023
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	WC064445	6/30/2022	6/30/2023
Fischer Custom Communications	LISN, 25A, 150kHz to 30MHz, 25 Amp	FCC-LISN-50-25-2-09	WC064532	9/8/2022	9/8/2023
Rohde & Schwarz	EMI Test Receiver, 20Hz-40GHz	ESI	WC068000	7/21/2022	7/21/2023
Radiated Emissions, 9 kHz - 1,000 MHz, 02-Aug-23					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	WC022452	N/A	
ETS-Lindgren	EMC Chamber #3, Inner Dimensions (LxWxH): 39'6" x 63'1" x 28'	CH 3 (FACT-10)	WC055565	7/31/2022	12/11/2023
Rhode & Schwarz	Loop Antenna	HFH2-Z2	WC062457	2/17/2022	2/17/2024
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	WC064454	6/7/2021	9/22/2023
Com-Power	RF Preamplifier	PAM-103	WC072429	11/23/2022	11/23/2023
Rohde & Schwarz	EMI Test Receiver, 20Hz-7GHz	ESIB 7	WC064989	1/4/2023	1/4/2024
Radiated Emissions, 30 - 1,000 MHz, 01-Nov-23					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	WC022452	N/A	
ETS-Lindgren	EMC Chamber #3, Inner Dimensions (LxWxH): 39'6" x 63'1" x 28'	CH 3 (FACT-10)	WC055565	7/31/2022	12/11/2023
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	WC064536	5/4/2023	5/4/2025
Com-Power	RF Preamplifier	PAM-103	WC072429	11/23/2022	11/23/2023
Rohde & Schwarz	EMI Test Receiver, 9kHz-7GHz	ESR 7	WC078725	3/14/2023	3/14/2024
Radiated Emissions, 9 kHz - 30 MHz, 22, 26-Feb-24					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	WC022452	N/A	
Rhode & Schwarz	Loop Antenna	HFH2-Z2	WC062457	1/24/2024	1/24/2026
Rhode & Schwarz	EMI Test Receiver, 20Hz-26.5GHz	ESI	WC071498	7/12/2023	7/12/2024



NTS Labs LLC

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Appendix B Test Data

TL172107-RA-SCWCX01 Pages 23 – 36
TL172107-RACA-SCWCX01 Pages 37 - 48



EMC Test Data

Client: Intuitive Surgical Inc.	PR Number: PR172107
Product SCWCX01	T-Log Number: TL172107-RA-SCWCX01
System Configuration:	Project Manager: Deepa Shetty
Contact: Tony Permsombut	Project Engineer: David Bare
Emissions Standard(s): FCC part 15 & RSS-210	Class: -
Immunity Standard(s): -	Environment: Radio

EMC Test Data

For The

Intuitive Surgical Inc.

Product

SCWCX01

Date of Last Test: 2/26/2024

EAR-Controlled Data



EMC Test Data

Client: Intuitive Surgical Inc.	PR Number: PR172107
Model: SCWCX01	T-Log Number: TL172107-RA-
Contact: Tony Permsombut	Project Manager: Deepa Shetty
Standard: FCC part 15 & RSS-210	Project Engineer: David Bare Class: -

Radiated Emissions

(NTS Silicon Valley, Fremont Facility, Semi-Anechoic Chamber)

Test Specific Details

Objective: The objective of this test session is to final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 2/22 & 2/26/2024
Test Engineer: M. Birgani & D. Bare
Test Location: Fremont Chamber #7

Config. Used: 1
Config Change: None
Host Unit Voltage 12VDC Battery

General Test Configuration

The EUT and any local support equipment were located on the turntable for radiated emissions testing.

The test distance and extrapolation factor (if applicable) are detailed below.

Note, preliminary testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. Maximized testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

Ambient Conditions:

Temperature: 20.2-23.4 °C
Rel. Humidity: 38-46 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	Radiated Emissions 0.009- 30 MHz	FCC part 15.209	Pass	-11.2 dB μ V/m @ 0.372 MHz (-27.4 dB)
2	Radiated Emissions 0.009- 30 MHz	FCC part 15.209	Pass	-0.30 dB μ V/m @ 0.680 MHz (-33.0 dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

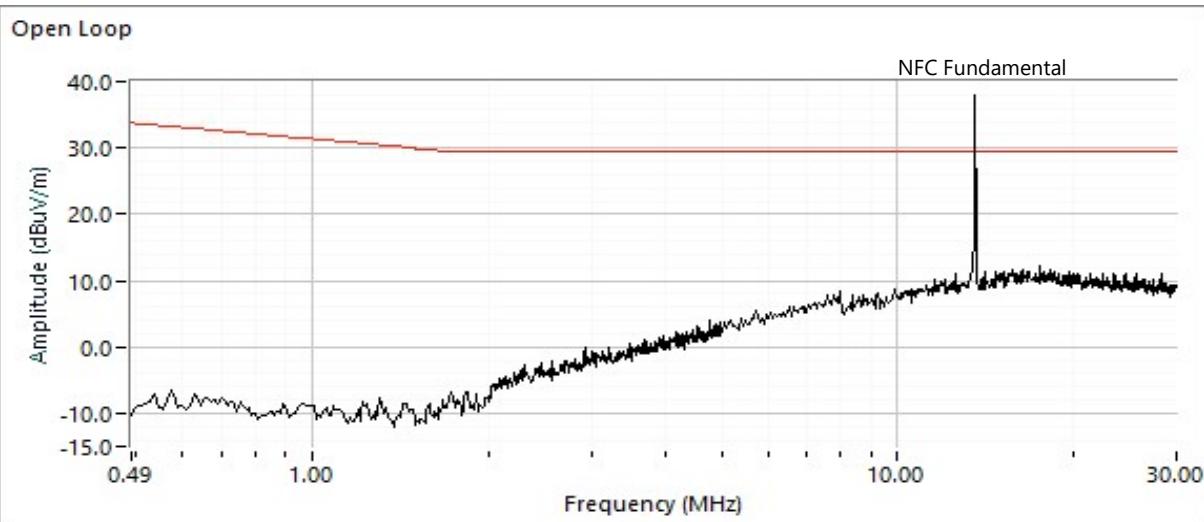
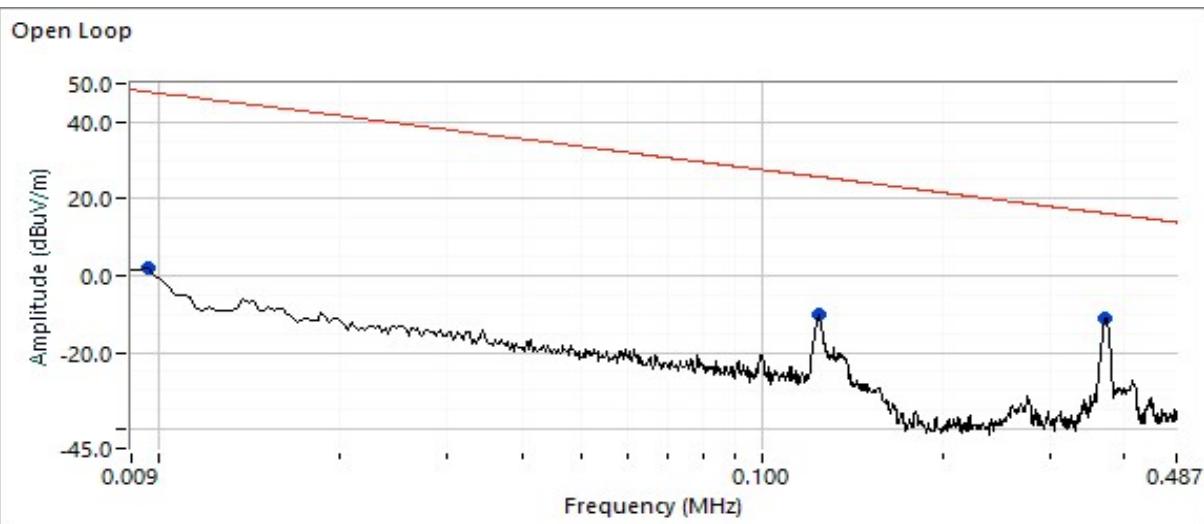
No deviations were made from the requirements of the standard.

Note: The distance between EUT and WPT load is reported on each run.

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
0.009 - 0.490MHz	3	300	Per ANSI C63.10
0.49 - 30 MHz	3	30	Per ANSI C63.10

Client: Intuitive Surgical Inc.	PR Number: PR172107
Model: SCWCX01	T-Log Number: TL172107-RA-
Contact: Tony Permsombut	Project Manager: Deepa Shetty
Standard: FCC part 15 & RSS-210	Project Engineer: David Bare
	Class: -

Run #1: Radiated Emissions, 0.009 - 30 MHz, FCC part 15 (Distance between EUT and WPT load: 0mm)

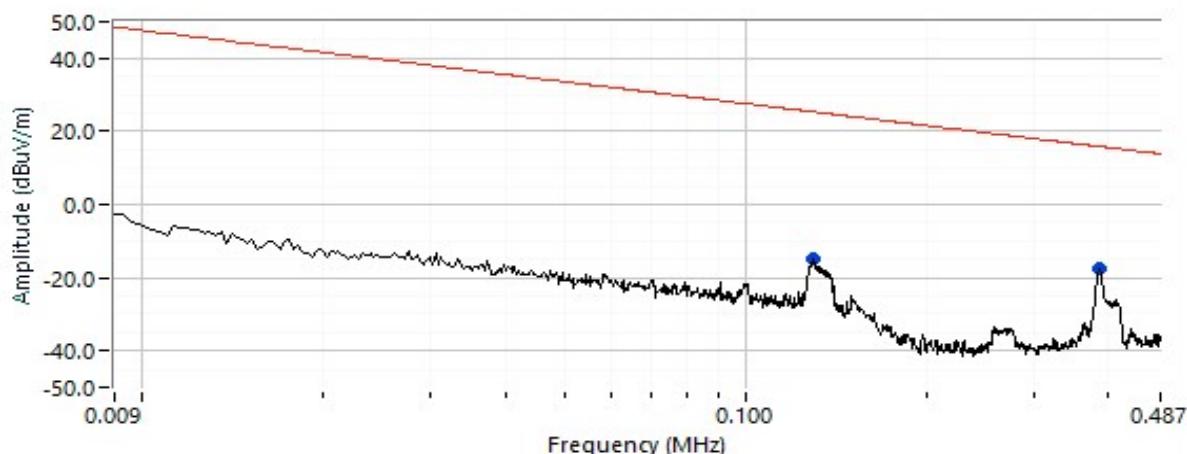




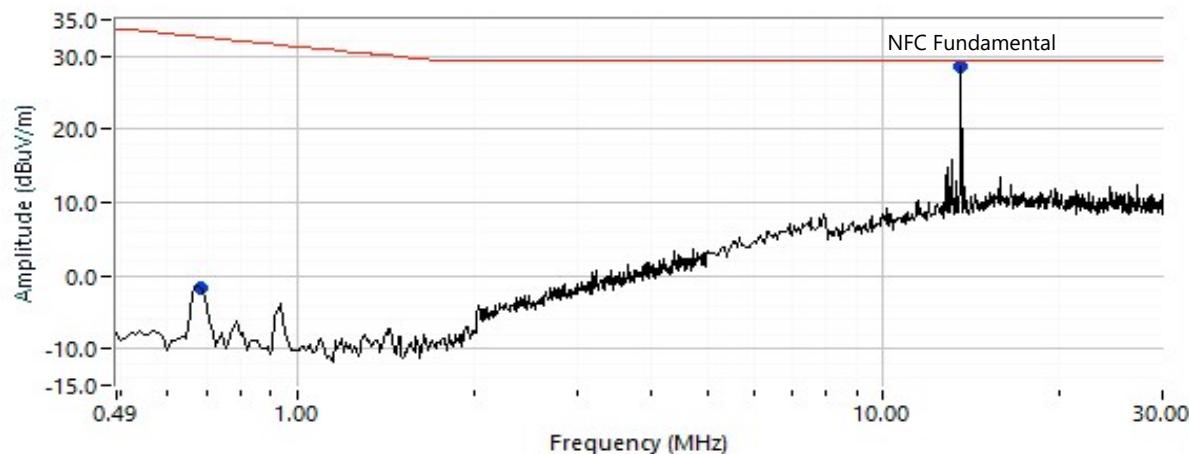
EMC Test Data

Client: Intuitive Surgical Inc.	PR Number: PR172107
Model: SCWCX01	T-Log Number: TL172107-RA-
Contact: Tony Permsombut	Project Manager: Deepa Shetty
Standard: FCC part 15 & RSS-210	Project Engineer: David Bare Class: -

Close Loop



Close Loop



EAR-Controlled Data



EMC Test Data

Client: Intuitive Surgical Inc.	PR Number: PR172107
Model: SCWCX01	T-Log Number: TL172107-RA-
Contact: Tony Permsombut	Project Manager: Deepa Shetty
Standard: FCC part 15 & RSS-210	Project Engineer: David Bare Class: -

Run #1: Radiated Emissions, 0.009 - 30 MHz, FCC part 15 (Distance between EUT and WPT load: 0mm)

Peak readings captured during pre-scan

Frequency	Level	Pol	FCC 15.225/209		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	O/C	Limit	Margin	PK/QP/AVG	degrees	meters	
0.010	1.8	O	48.0	-46.2	Peak	140	1.0	<i>Peak reading with QP limit</i>
0.125	-10.1	O	25.7	-35.8	Peak	22	1.0	<i>Peak reading with QP limit</i>
0.372	-11.2	O	16.2	-27.4	Peak	41	1.0	<i>Peak reading with QP limit</i>
0.707	-1.3	O	32.5	-33.8	Peak	222	1.0	<i>Peak reading with QP limit</i>
0.129	-14.9	C	25.4	-40.3	Peak	128	1.0	<i>Peak reading with QP limit</i>
0.386	-17.5	C	15.9	-33.4	Peak	97	1.0	<i>Peak reading with QP limit</i>
0.680	-1.6	C	32.7	-34.3	Peak	107	1.0	<i>Peak reading with QP limit</i>
13.567	38.2	O	84.0	-45.8	Peak	42	1.0	NFC Fundamental
13.560	28.6	C	84.0	-55.4	Peak	85	1.0	NFC Fundamental

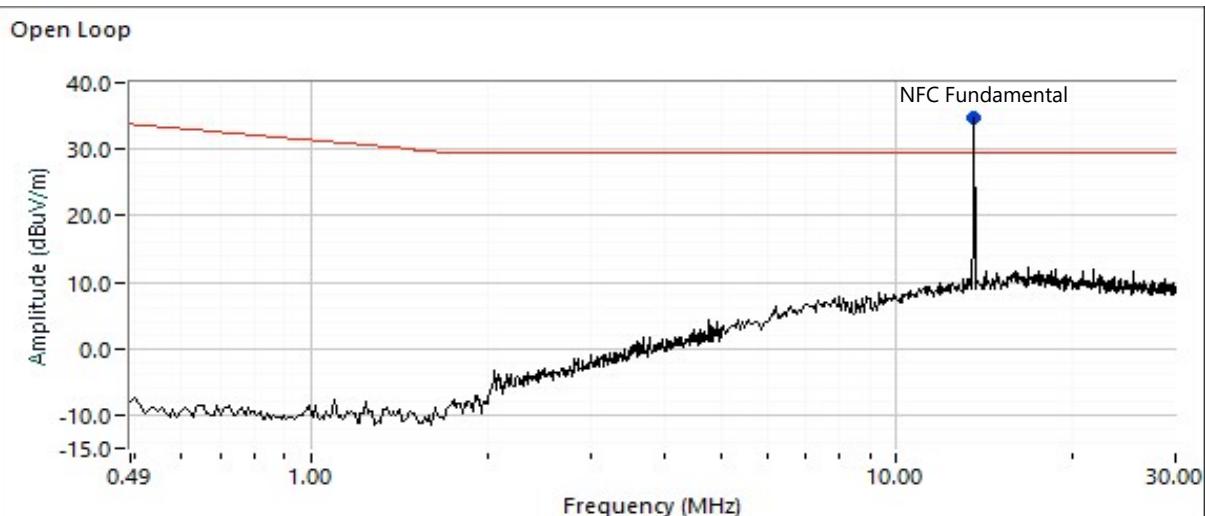
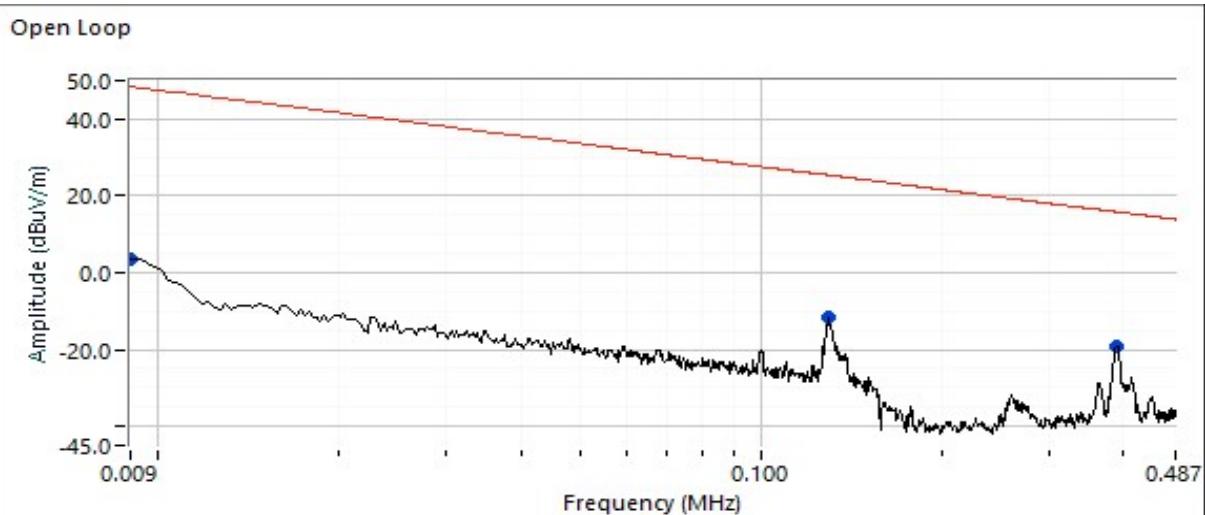
Quasi-peak readings

Frequency	Level	Pol	FCC 15.225/209		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	O/C	Limit	Margin	PK/QP/AVG	degrees	meters	
None required as all peak readings were more then 20 dB below the limit								

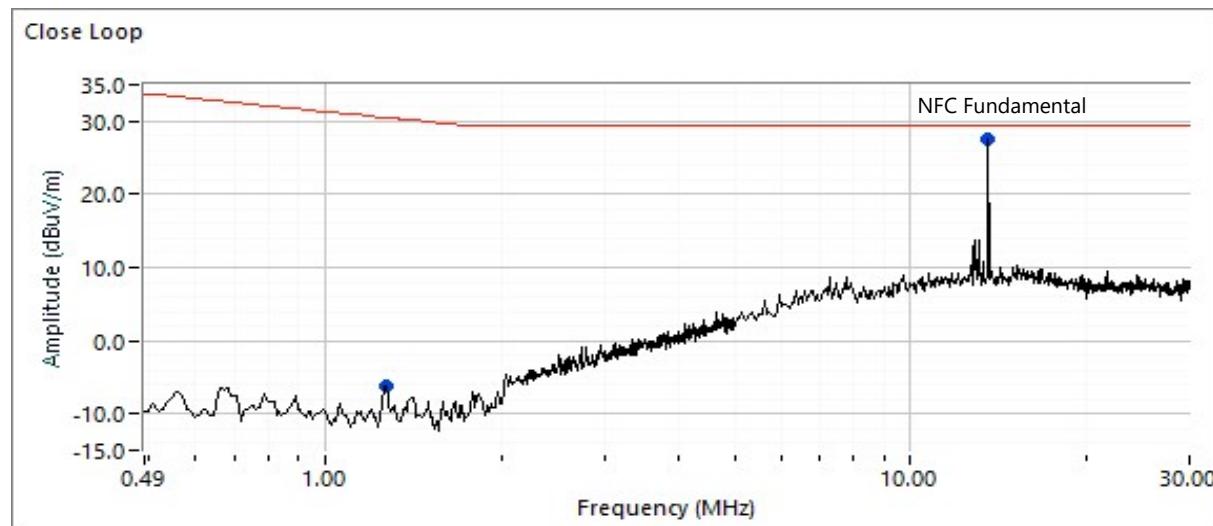
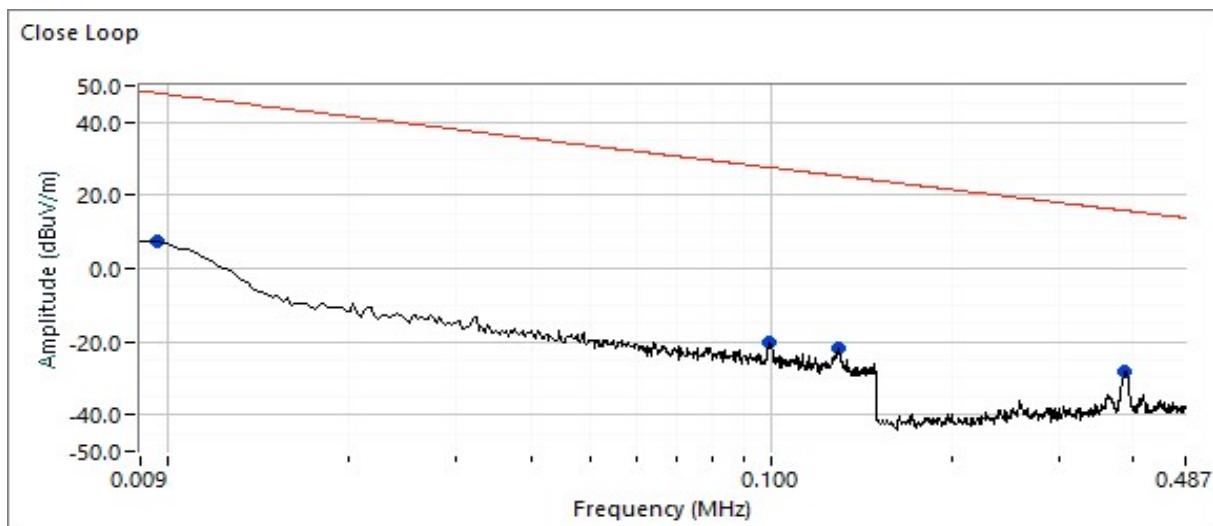
Client: Intuitive Surgical Inc.
 Model: SCWCX01
 Contact: Tony Permsombut
 Standard: FCC part 15 & RSS-210

PR Number: PR172107
 T-Log Number: TL172107-RA-
 Project Manager: Deepa Shetty
 Project Engineer: David Bare
 Class: -

Run #2: Radiated Emissions, 0.009 - 30 MHz, FCC part 15 (Distance between EUT and WPT Load: 6mm)



Client: Intuitive Surgical Inc.	PR Number: PR172107
Model: SCWCX01	T-Log Number: TL172107-RA-
Contact: Tony Permsombut	Project Manager: Deepa Shetty
Standard: FCC part 15 & RSS-210	Project Engineer: David Bare Class: -





EMC Test Data

Client: Intuitive Surgical Inc.	PR Number: PR172107
Model: SCWCX01	T-Log Number: TL172107-RA-
Contact: Tony Permsombut	Project Manager: Deepa Shetty
Standard: FCC part 15 & RSS-210	Project Engineer: David Bare Class: -

Run #2: Preliminary Radiated Emissions, 0.009 - 30 MHz, FCC part 15 (Distance between EUT and WPT Load: 6mm)

Peak readings captured during pre-scan

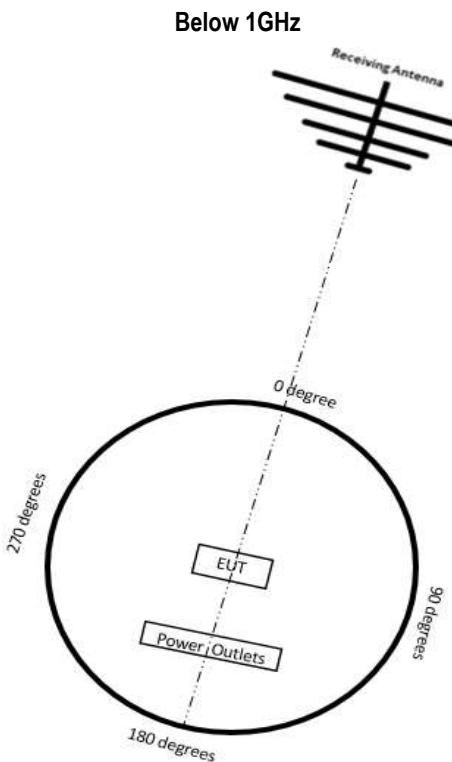
Frequency	Level	Pol	FCC 15.225/209		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	O/C	Limit	Margin	PK/QP/AVG	degrees	meters	
0.009	3.7	O	48.5	-44.8	Peak	159	1.0	Peak reading with QP limit
0.130	-11.5	O	25.3	-36.8	Peak	109	1.0	Peak reading with QP limit
0.389	-19.3	O	15.8	-35.1	Peak	51	1.0	Peak reading with QP limit
0.680	-0.3	O	32.7	-33.0	Peak	18	1.0	Peak reading with QP limit
1.267	-6.3	C	30.5	-36.8	Peak	63	1.0	Peak reading with QP limit
0.010	7.7	C	48.0	-40.3	Peak	51	1.0	Peak reading with QP limit
0.100	-20.2	C	27.6	-47.8	Peak	13	1.0	Peak reading with QP limit
0.129	-21.7	C	25.4	-47.1	Peak	120	1.0	Peak reading with QP limit
0.387	-28.3	C	15.8	-44.1	Peak	310	1.0	Peak reading with QP limit
13.567	34.7	O	84.0	-49.3	Peak	46	1.0	NFC Fundamental
13.560	27.6	C	84.0	-56.4	Peak	95	1.0	NFC Fundamental

Note 1: O: Open Loop and C: Close Loop

Quasi-peak readings

Frequency	Level	Pol	FCC 15.225/209		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	O/C	Limit	Margin	PK/QP/AVG	degrees	meters	
None required as all peak readings were more than 20 dB below the limit								

Client: Intuitive Surgical Inc.	PR Number: PR172107
Model: SCWCX01	T-Log Number: TL172107-RA-
Contact: Tony Permsombut	Project Manager: Deepa Shetty
Standard: FCC part 15 & RSS-210	Project Engineer: David Bare Class: -





EMC Test Data

Client:	Intuitive Surgical Inc.	PR Number:	PR172107
Model:	SCWCX01	T-Log Number:	TL172107-RA-SCWCX01
Contact:	Tony Permsombut	Project Manager:	Deepa Shetty
Standard:	FCC part 15 & RSS-210	Project Engineer:	David Bare
		Class:	-

Conducted Emissions

(NTS Silicon Valley, Fremont Facility, Semi-Anechoic Chamber)

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 6/20/2023 Config. Used: 1
Test Engineer: Rafael Varelas Config Change: None
Test Location: Fremont Chamber #7 Host Unit Voltage: 120V/60Hz

General Test Configuration

For tabletop equipment, the EUT was located on a foam table inside the semi-anechoic chamber, 40 cm from a vertical coupling plane and 80cm from the LISN.

Ambient Conditions: Temperature: 23.4 °C
Rel. Humidity: 38 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power, 120V/60Hz	FCC 15.207(a)	Pass	41.2 dB μ V @ 26.158 MHz (-8.8 dB)
2	CE, AC Power, 120V/60Hz	FCC 15.207(a)	Pass	42.2 dB μ V @ 24.324 MHz (-7.8 dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

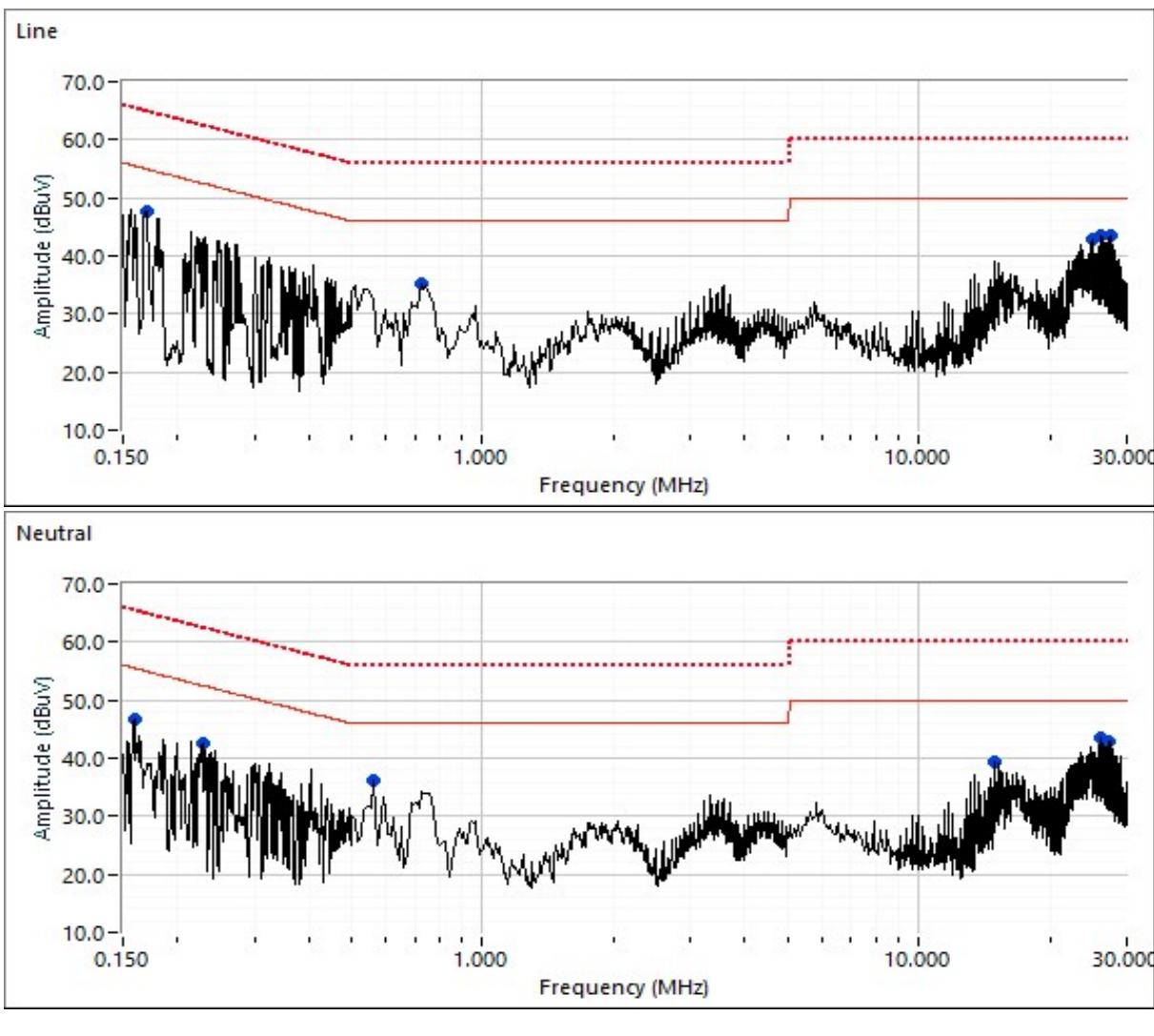


EMC Test Data

Client: Intuitive Surgical Inc.	PR Number: PR172107
Model: SCWCX01	T-Log Number: TL172107-RA-SCWCX01
Contact: Tony Permsombut	Project Manager: Deepa Shetty
Standard: FCC part 15 & RSS-210	Project Engineer: David Bare Class: -

Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz

PS: BK Precision, w/o Pixel 6A phone, SCUP-05(120kHz-160kHz), NFC Terminated to 50 Ohm, w/o Inductor (3.3uH)





EMC Test Data

Client: Intuitive Surgical Inc.	PR Number: PR172107
Model: SCWCX01	T-Log Number: TL172107-RA-SCWCX01
Contact: Tony Permsombut	Project Manager: Deepa Shetty
Standard: FCC part 15 & RSS-210	Project Engineer: David Bare Class: -

Preliminary peak readings captured during pre-scan (peak readings vs. average limit)

Frequency MHz	Level dB μ V	AC Line	FCC 15.207(a)		Detector QP/AVG	Comments
			Limit	Margin		
0.158	46.6	Neutral	55.5	-8.9	Peak	
0.227	42.7	Neutral	52.5	-9.8	Peak	
0.547	36.2	Neutral	46.0	-9.8	Peak	
26.158	43.6	Neutral	50.0	-6.4	Peak	
27.326	42.9	Neutral	50.0	-7.1	Peak	
14.906	39.3	Neutral	50.0	-10.7	Peak	
0.170	47.7	Line 1	54.9	-7.2	Peak	
0.732	35.1	Line 1	46.0	-10.9	Peak	
24.990	42.8	Line 1	50.0	-7.2	Peak	
26.158	43.4	Line 1	50.0	-6.6	Peak	
27.619	43.4	Line 1	50.0	-6.6	Peak	

Final quasi-peak and average readings

Frequency MHz	Level dB μ V	AC Line	FCC 15.207(a)		Detector QP/AVG	Comments
			Limit	Margin		
26.158	41.2	Line 1	50.0	-8.8	AVG	AVG (0.10s)
26.158	40.8	Neutral	50.0	-9.2	AVG	AVG (0.10s)
27.326	39.9	Neutral	50.0	-10.1	AVG	AVG (0.10s)
27.619	39.5	Line 1	50.0	-10.5	AVG	AVG (0.10s)
14.906	38.1	Neutral	50.0	-11.9	AVG	AVG (0.10s)
24.990	36.7	Line 1	50.0	-13.3	AVG	AVG (0.10s)
26.158	42.5	Neutral	60.0	-17.5	QP	QP (1.00s)
26.158	42.5	Line 1	60.0	-17.5	QP	QP (1.00s)
27.326	42.4	Neutral	60.0	-17.6	QP	QP (1.00s)
27.619	42.0	Line 1	60.0	-18.0	QP	QP (1.00s)
24.990	40.9	Line 1	60.0	-19.1	QP	QP (1.00s)
14.906	38.9	Neutral	60.0	-21.1	QP	QP (1.00s)
0.170	30.1	Line 1	55.0	-24.9	AVG	AVG (0.10s)
0.158	40.4	Neutral	65.6	-25.2	QP	QP (1.00s)
0.170	38.9	Line 1	65.0	-26.1	QP	QP (1.00s)
0.158	17.8	Neutral	55.6	-37.8	AVG	AVG (0.10s)

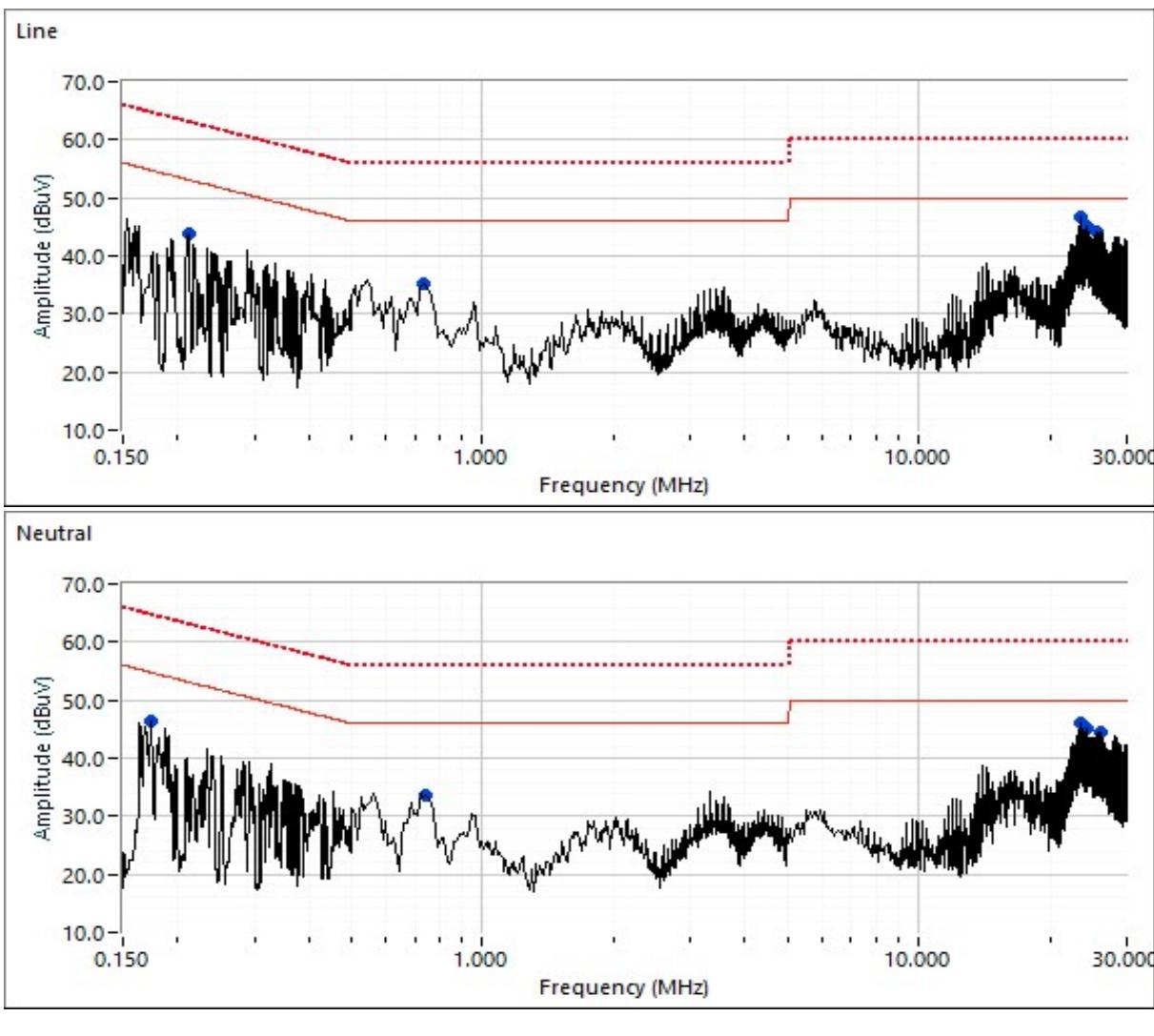


EMC Test Data

Client: Intuitive Surgical Inc.	PR Number: PR172107
Model: SCWCX01	T-Log Number: TL172107-RA-SCWCX01
Contact: Tony Permsombut	Project Manager: Deepa Shetty
Standard: FCC part 15 & RSS-210	Project Engineer: David Bare Class: -

Run #2: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz

PS: BK Precision, w/o Pixel 6A phone, SCUP-05(100kHz-133kHz), NFC Terminated to 50 Ohm, w/o Inductor (3.3uH)





EMC Test Data

Client:	Intuitive Surgical Inc.	PR Number:	PR172107
Model:	SCWCX01	T-Log Number:	TL172107-RA-SCWCX01
Contact:	Tony Permsombut	Project Manager:	Deepa Shetty
Standard:	FCC part 15 & RSS-210	Project Engineer:	David Bare
		Class:	-

Preliminary peak readings captured during pre-scan (peak readings vs. average limit)

Frequency MHz	Level dB μ V	AC Line	FCC 15.207(a) Limit	Margin	Detector QP/AVG	Comments
0.211	43.7	Line 1	53.1	-9.4	Peak	
0.735	35.3	Line 1	46.0	-10.7	Peak	
23.430	46.6	Line 1	50.0	-3.4	Peak	
24.324	45.0	Line 1	50.0	-5.0	Peak	
25.468	44.2	Line 1	50.0	-5.8	Peak	
0.175	46.3	Neutral	54.8	-8.5	Peak	
0.744	33.7	Neutral	46.0	-12.3	Peak	
23.430	46.1	Neutral	50.0	-3.9	Peak	
24.323	45.1	Neutral	50.0	-4.9	Peak	
26.107	44.6	Neutral	50.0	-5.4	Peak	

Final quasi-peak and average readings

Frequency MHz	Level dB μ V	AC Line	FCC 15.207(a) Limit	Margin	Detector QP/AVG	Comments
24.324	42.2	Line 1	50.0	-7.8	AVG	AVG (0.10s)
24.323	42.0	Neutral	50.0	-8.0	AVG	AVG (0.10s)
23.430	41.9	Line 1	50.0	-8.1	AVG	AVG (0.10s)
25.468	41.9	Line 1	50.0	-8.1	AVG	AVG (0.10s)
26.107	41.8	Neutral	50.0	-8.2	AVG	AVG (0.10s)
23.430	41.7	Neutral	50.0	-8.3	AVG	AVG (0.10s)
23.430	46.1	Neutral	60.0	-13.9	QP	QP (1.00s)
23.430	45.9	Line 1	60.0	-14.1	QP	QP (1.00s)
24.324	44.4	Line 1	60.0	-15.6	QP	QP (1.00s)
24.323	44.4	Neutral	60.0	-15.6	QP	QP (1.00s)
26.107	44.0	Neutral	60.0	-16.0	QP	QP (1.00s)
25.468	43.4	Line 1	60.0	-16.6	QP	QP (1.00s)
0.211	34.4	Line 1	63.2	-28.8	QP	QP (1.00s)
0.211	19.3	Line 1	53.2	-33.9	AVG	AVG (0.10s)



EMC Test Data

Client:	Intuitive Surgical Inc.	PR Number:	PR172107
Product	SCWCX01	T-Log Number:	TL172107-RACA-SCWCX01
System Configuration:		Project Manager:	Deepa Shetty
Contact:	Tony Permsombut	Project Engineer:	David Bare
Emissions Standard(s):	RSS-216	Class:	-
Immunity Standard(s):	-	Environment:	Radio

EMC Test Data

For The

Intuitive Surgical Inc.

Product

SCWCX01

Date of Last Test: 2/26/2024

EAR-Controlled Data



EMC Test Data

Client:	Intuitive Surgical Inc.	PR Number:	PR172107
Product:	SCWCX01	T-Log Number:	TL172107-RACA- SCWCX01
		Project Manager:	Deepa Shetty
Contact:	Tony Permsombut	Project Engineer:	David Bare
Standard:	RSS-216	Class:	-

Radiated Emissions

(NTS Silicon Valley, Fremont Facility, Semi-Anechoic Chamber)

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 2/26/2024

Config. Used: 1

Test Engineer: D. Bare

Config Change: None

Test Location: Fremont Chamber #7

Host Unit Voltage Battery (12.0 VDC)

General Test Configuration

The EUT was located on the turntable for radiated emissions testing. The EUT was tested in all three orthogonal orientations.

The test distance and extrapolation factor (if applicable) are detailed below.

Note, preliminary testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. Maximized testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

Ambient Conditions:

Temperature: 20.2 °C

Rel. Humidity: 46 %

Summary of Results

Run #	Test Performed	Limit	Result	Value / Margin
1	Transmitter Radiated Spurious Emissions 9 kHz - 30 MHz, M - Field	ICES-001	Pass	32.7 dB μ A/m @ 0.120 MHz (-15.0 dB)
3	Transmitter Radiated Spurious Emissions 9 kHz - 30 MHz, M - Field	ICES-001	Pass	23.9 dB μ A/m @ 0.127 MHz (-21.8 dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.



EMC Test Data

Client:	Intuitive Surgical Inc.	PR Number:	PR172107
Product:	SCWCX01	T-Log Number:	TL172107-RACA- SCWCX01
		Project Manager:	Deepa Shetty
Contact:	Tony Permsombut	Project Engineer:	David Bare
Standard:	RSS-216	Class:	-

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
9 kHz - 30 MHz	3	3	0.0
30 MHz - 1000 MHz	10	10	0.0

Limits for Spurious

Freq (MHz)	RBW (kHz)	Limit (dBuA/m) @ 3m
0.009	0.07	9
0.07	0.15	9
0.15	30	9

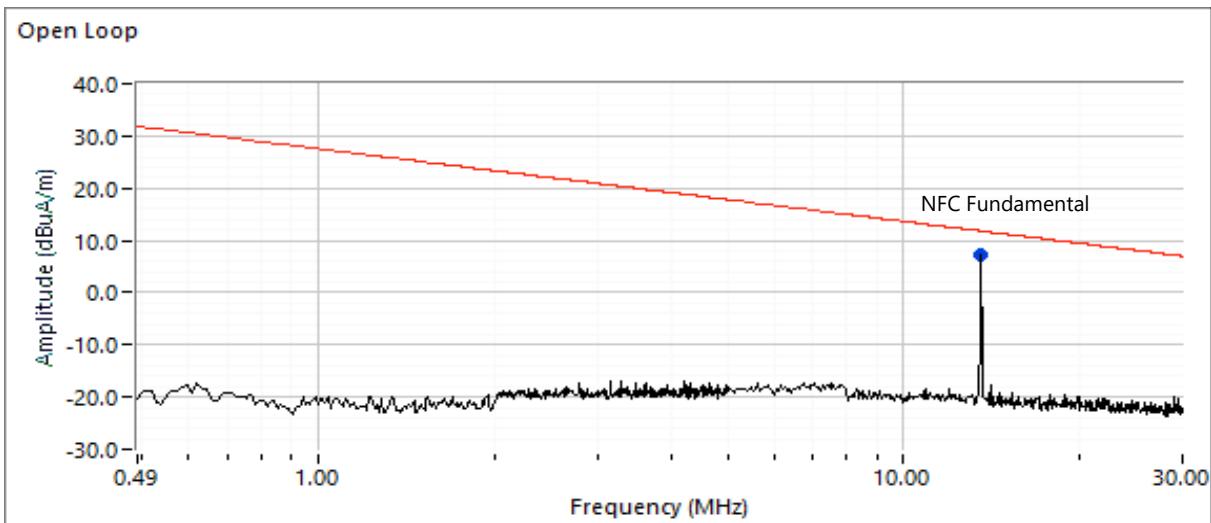
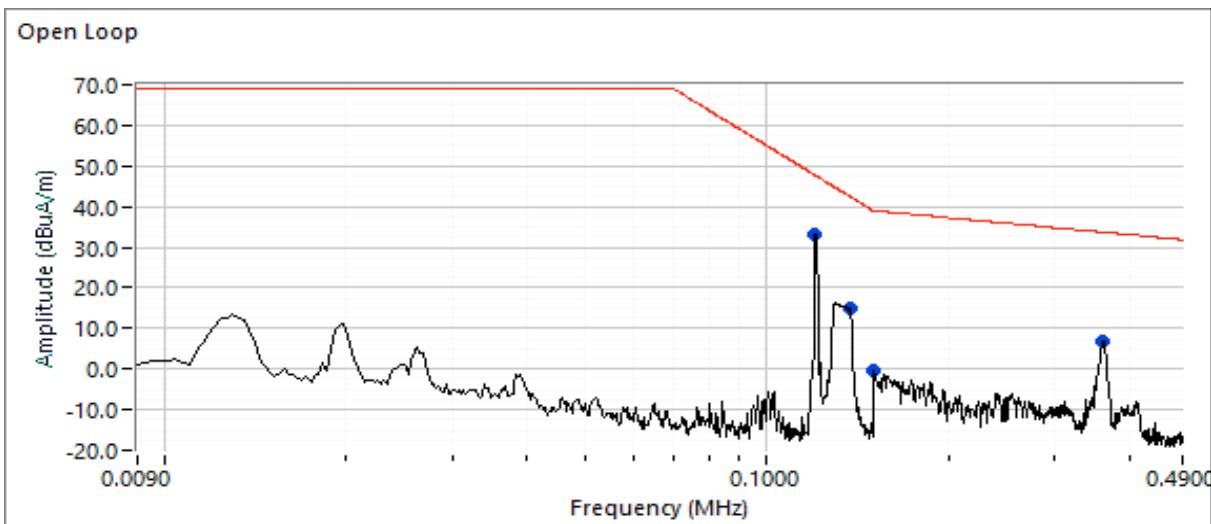
Limits for Spurious

Freq (MHz)	RBW (kHz)	Limit (dBuV/m) @ 10m
30	230	120
230	1000	120

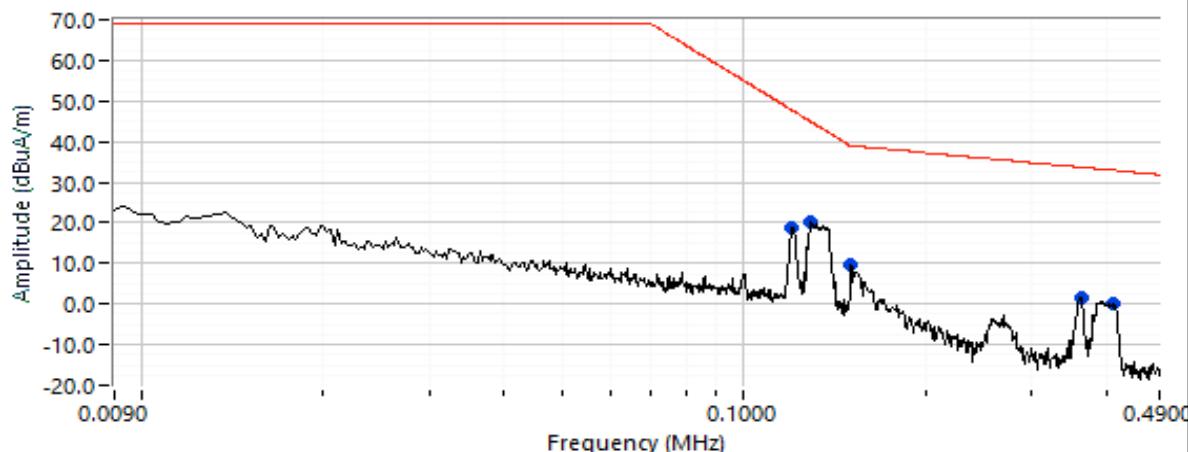
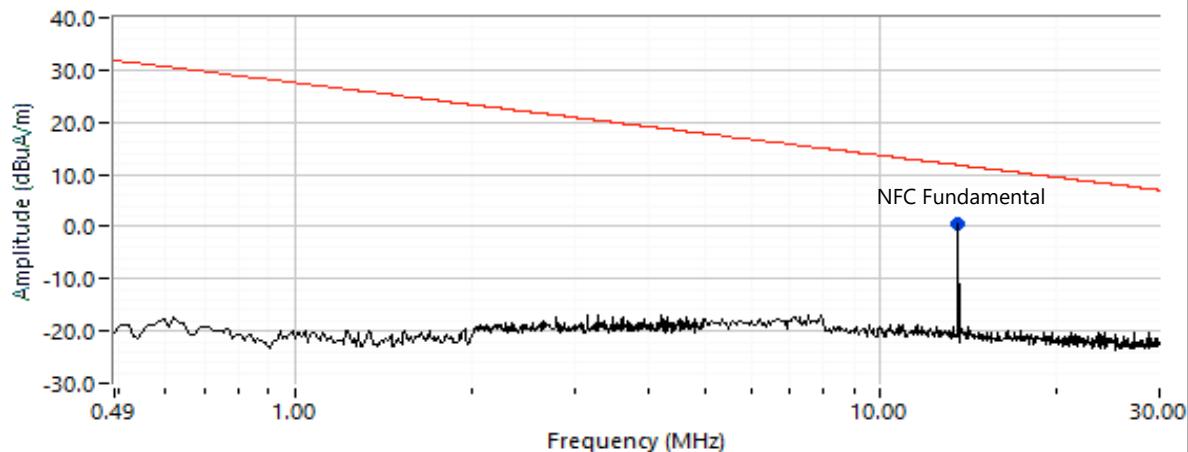
Note: The distance between EUT and WPT load is reported on each run.

Client:	Intuitive Surgical Inc.	PR Number:	PR172107
Product:	SCWCX01	T-Log Number:	TL172107-RACA-SCWCX01
Contact:	Tony Permsombut	Project Manager:	Deepa Shetty
Standard:	RSS-216	Project Engineer:	David Bare
		Class:	-

Run #1: 9 kHz - 30 MHz M - Field Radiated Emissions (Distance between EUT and WPT load: 0mm)



Client:	Intuitive Surgical Inc.	PR Number:	PR172107
Product:	SCWCX01	T-Log Number:	TL172107-RACA-SCWCX01
Contact:	Tony Permsombut	Project Manager:	Deepa Shetty
Standard:	RSS-216	Project Engineer:	David Bare
		Class:	-

Closed Loop

Closed Loop




EMC Test Data

Client:	Intuitive Surgical Inc.	PR Number:	PR172107
Product:	SCWCX01	T-Log Number:	TL172107-RACA-SCWCX01
		Project Manager:	Deepa Shetty
Contact:	Tony Permsombut	Project Engineer:	David Bare
Standard:	RSS-216	Class:	-

Run #1: 9 kHz - 30 MHz M - Field Radiated Emissions (Distance between EUT and WPT load: 0mm)

Peak readings captured during pre-scan

Frequency	Level	Pol	ICES-001		Detector	Azimuth	Height	Comments
MHz	dB μ A/m	O/C	Limit	Margin	Pk/QP/Avg	degrees	meters	
0.120	32.9	O	47.7	-14.8	Peak	189	1.0	
0.137	14.9	O	42.6	-27.7	Peak	152	1.0	
0.150	-0.5	O	39.0	-39.5	Peak	49	1.0	
0.362	6.8	O	33.7	-26.9	Peak	196	1.0	
0.120	19.0	C	47.8	-28.8	Peak	282	1.0	
0.129	20.3	C	44.9	-24.6	Peak	70	1.0	
0.150	9.6	C	39.0	-29.4	Peak	27	1.0	
0.363	1.6	C	33.7	-32.1	Peak	284	1.0	
0.410	0.1	C	32.9	-32.8	Peak	292	1.0	
13.560	0.4	C	44.0	-43.6	Peak	56	1.0	NFC Fundamental (RSS-210 limit)
13.560	7.4	O	44.0	-36.6	Peak	342	1.0	NFC Fundamental (RSS-210 limit)

Quasi-peak readings

Frequency	Level	Pol	ICES-001		Detector	Azimuth	Height	Comments
MHz	dB μ A/m	O/C	Limit	Margin	Pk/QP/Avg	degrees	meters	
0.120	32.7	O	47.7	-15.0	QP	188	1.0	

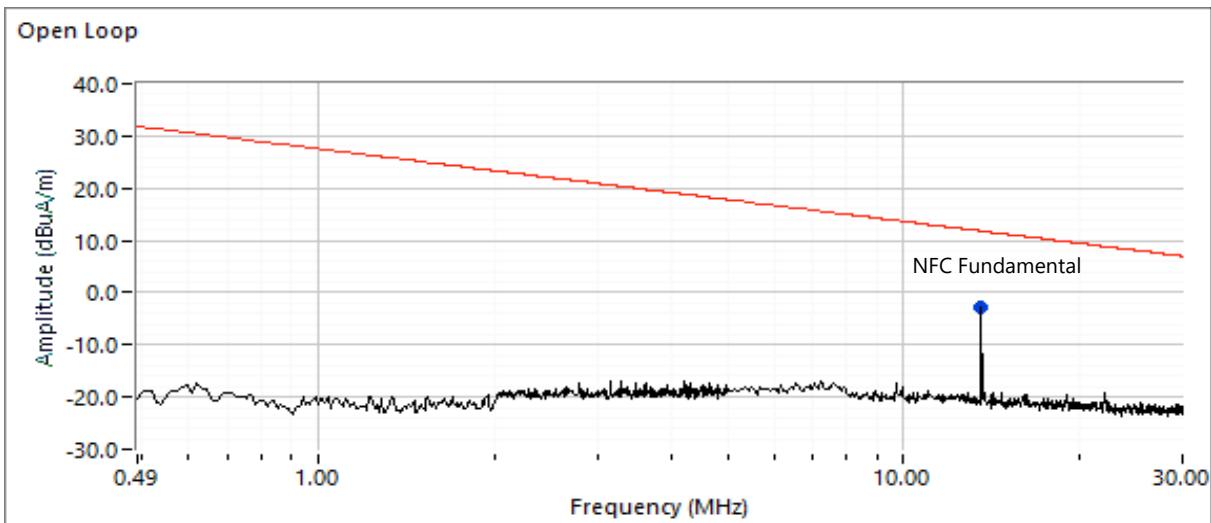
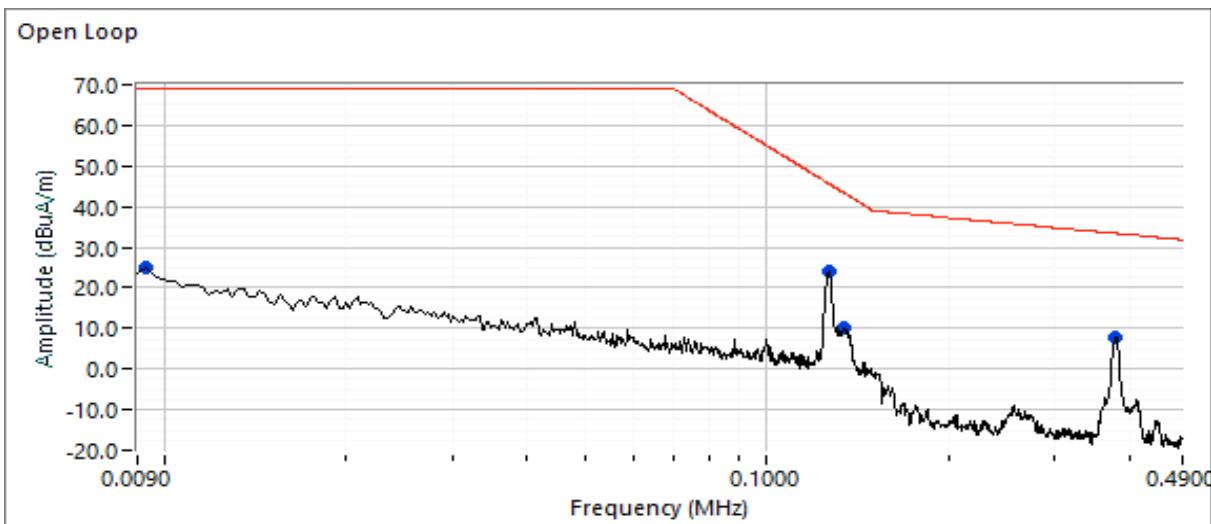
Note 1: For polarity O = Open loop (coaxial) and C = Close loop (coplaner)

Run #2: Preliminary Radiated Emissions, 30 - 1,000 MHz (Distance between EUT and WPT load: 0mm)

Performed November 1, 2023 - Refer to those separate results

Client:	Intuitive Surgical Inc.	PR Number:	PR172107
Product:	SCWCX01	T-Log Number:	TL172107-RACA-SCWCX01
Contact:	Tony Permsombut	Project Manager:	Deepa Shetty
Standard:	RSS-216	Project Engineer:	David Bare
		Class:	-

Run #3: 9 kHz - 30 MHz M - Field Radiated Emissions (Distance between EUT and WPT load: 6mm)

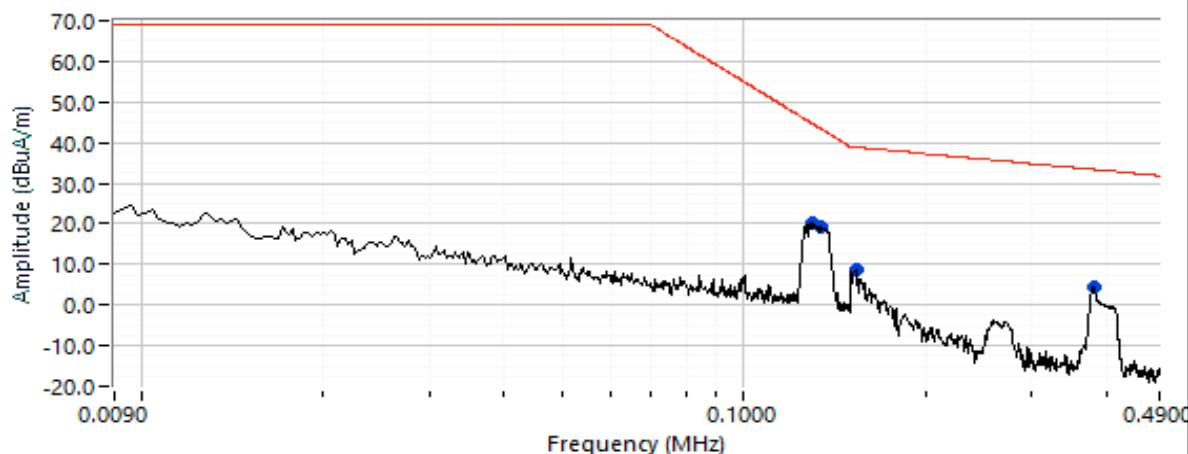




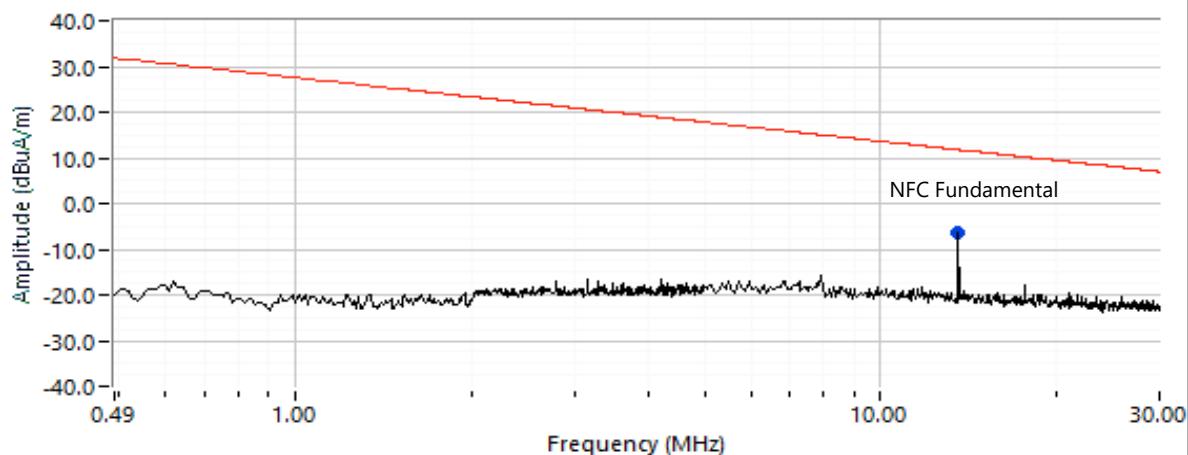
EMC Test Data

Client:	Intuitive Surgical Inc.	PR Number:	PR172107
Product:	SCWCX01	T-Log Number:	TL172107-RACA-SCWCX01
Contact:	Tony Permsombut	Project Manager:	Deepa Shetty
Standard:	RSS-216	Project Engineer:	David Bare
		Class:	-

Closed Loop



Closed Loop





EMC Test Data

Client:	Intuitive Surgical Inc.	PR Number:	PR172107
Product:	SCWCX01	T-Log Number:	TL172107-RACA- SCWCX01
		Project Manager:	Deepa Shetty
Contact:	Tony Permsombut	Project Engineer:	David Bare
Standard:	RSS-216	Class:	-

Run #3: 9 kHz - 30 MHz M - Field Radiated Emissions (Distance between EUT and WPT load: 6mm)

Peak readings captured during pre-scan

Frequency	Level	Pol	ICES-001		Detector	Azimuth	Height	Comments
MHz	dB μ A/m	O/C	Limit	Margin	Pk/QP/Avg	degrees	meters	
0.127	23.9	O	45.7	-21.8	Peak	264	1.0	
0.009	25.1	O	69.0	-43.9	Peak	360	1.0	
0.135	10.1	O	43.3	-33.2	Peak	282	1.0	
0.380	8.0	O	33.4	-25.4	Peak	265	1.0	
0.130	20.3	C	44.7	-24.4	Peak	170	1.0	
0.134	19.1	C	43.5	-24.4	Peak	89	1.0	
0.153	8.7	C	38.9	-30.2	Peak	357	1.0	
0.381	4.2	C	33.4	-29.2	Peak	16	1.0	
13.560	-3.0	O	44.0	-47.0	Peak	95	1.0	NFC Fundamental (RSS-210 limit)
13.560	-6.5	C	44.0	-50.5	Peak	107	1.0	NFC Fundamental (RSS-210 limit)

Quasi-peak readings

Frequency	Level	Pol	ICES-001		Detector	Azimuth	Height	Comments
MHz	dB μ A/m	O/C	Limit	Margin	Pk/QP/Avg	degrees	meters	
None required as all peak readings were more than 20 dB below the limit								

Note 1: For polarity O = Open loop (coaxial) and C = Close loop (coplaner)



EMC Test Data

Client:	Intuitive Surgical Inc.	PR Number:	PR172107
Product:	SCWCX01	T-Log Number:	TL172107-RACA- SCWCX01
		Project Manager:	Deepa Shetty
Contact:	Tony Permsombut	Project Engineer:	David Bare
Standard:	RSS-216	Class:	-

Radiated Emissions

(NTS Silicon Valley, Fremont Facility, Semi-Anechoic Chamber)

Test Specific Details

Objective: The objective of this test session is to perform engineering evaluation testing of the EUT with respect to the specification listed above.

Date of Test: 11/1/2023

Config. Used: 1

Test Engineer: Rafael Varelas

Config Change: None

Test Location: Fremont Chamber #3

EUT Voltage: Battery (12.0 VDC)

General Test Configuration

The EUT and any local support equipment were located on the turntable for radiated emissions testing.

The test distance and extrapolation factor (if applicable) are detailed under each run description.

Note, preliminary testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. Maximized testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

Ambient Conditions:

Temperature: 22.4 °C

Rel. Humidity: 35 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	Radiated Emissions 30 - 1000 MHz, Preliminary	ICES-001	Eval	Refer to individual runs
2	Radiated Emissions 30 - 1000 MHz, Maximized	ICES-001	Pass	29.3 dB μ V/m @ 147.64 MHz (-0.7 dB)

Modifications Made During Testing

Modifications are detailed under each run description.

Deviations From The Standard

No deviations were made from the requirements of the standard.



EMC Test Data

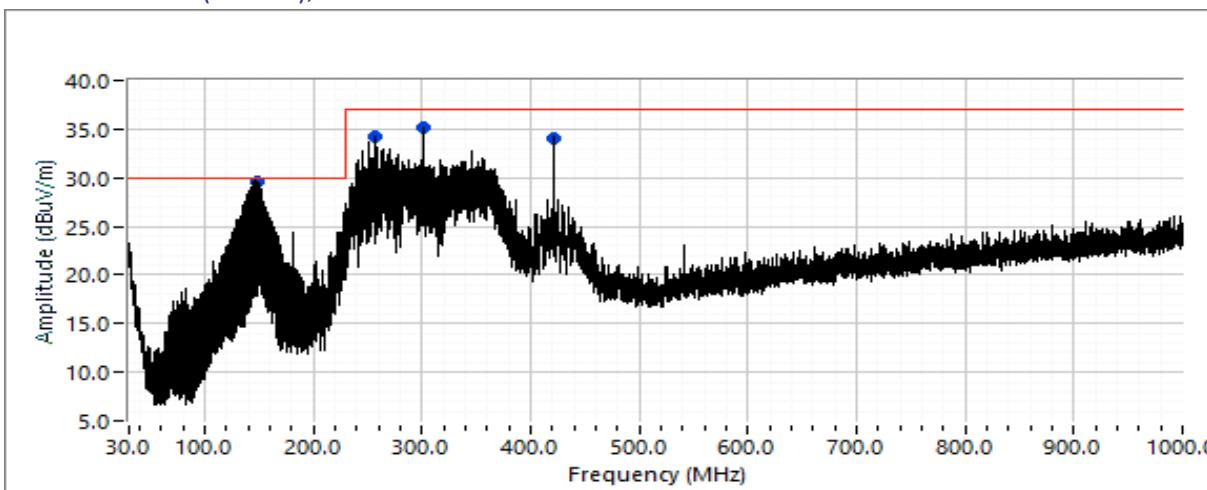
Client:	Intuitive Surgical Inc.	PR Number:	PR172107
Product:	SCWCX01	T-Log Number:	TL172107-RACA- SCWCX01
		Project Manager:	Deepa Shetty
Contact:	Tony Permsombut	Project Engineer:	David Bare
Standard:	RSS-216	Class:	-

Run #2: Preliminary Radiated Emissions, 30 - 1000 MHz

Test Parameters for Preliminary Scan(s)			
Frequency Range (MHz)	Prescan Distance (meters)	Limit Distance (meters)	Extrapolation Factor (dB, applied to data)
30 - 1000	10	10	0.0

EUT and Test Configuration Details (Engineering Evaluation Tests Only):

2 solid core ferrites (Fair-Rite); PN:2661626402



Preliminary peak readings captured during pre-scan

Frequency	Level	Pol	ICES-001		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	PK/QP/AVG	degrees	meters	
147.643	29.6	H	30.0	-0.4	Peak	342	4.0	
257.194	34.3	H	37.0	-2.7	Peak	22	3.5	
300.811	35.1	H	37.0	-1.9	Peak	17	3.0	
421.154	34.0	H	37.0	-3.0	Peak	111	2.0	

Preliminary quasi-peak readings (no manipulation of EUT interface cables)

Frequency	Level	Pol	ICES-001		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	PK/QP/AVG	degrees	meters	
147.643	29.3	H	30.0	-0.7	QP	360	4.0	QP (1.00s)
300.811	32.7	H	37.0	-4.3	QP	12	3.0	QP (1.00s)



EMC Test Data

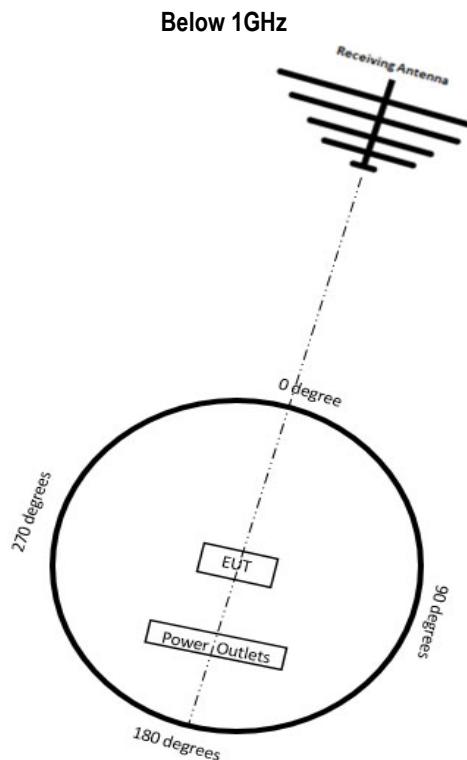
Client:	Intuitive Surgical Inc.	PR Number:	PR172107
Product:	SCWCX01	T-Log Number:	TL172107-RACA- SCWCX01
		Project Manager:	Deepa Shetty
Contact:	Tony Permsombut	Project Engineer:	David Bare
Standard:	RSS-216	Class:	-

Run #2: Maximized Readings From Run #1

Test Parameters for Maximized Reading(s)				
Frequency Range (MHz)	Test Distance (meters)	Limit Distance (meters)	Extrapolation Factor (dB, applied to data)	
30 - 1000	10	10	0.0	

Maximized quasi-peak readings

Frequency	Level	Pol	ICES-001		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	PK/QP/AVG	degrees	meters	
147.643	29.3	H	30.0	-0.7	QP	360	4.0	QP (1.00s)
300.811	32.7	H	37.0	-4.3	QP	12	3.0	QP (1.00s)





NTS Labs LLC

Project number PR172107
Report Date: August 7, 2023, Re-Issued Date: March 18, 2024

End of Report

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