

Johnson & Johnson Surgical Vision, Inc. RF Exposure Exhibit

SCOPE OF WORK

MPE CALCULATION – VERITAS VISION SYSTEM (CONSOLE)

REPORT NUMBER

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RF Exposure Exhibit (mobile devices)

Report Number: 104086841LAX-015RF

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Model(s) Evaluated: VRT680300

Standards: **FCC Part 1 Subpart I, September 2020**

Procedures Implementing the National Environmental Policy Act of 1969
§1.1307 Actions that may have a significant environmental effect, for which
Environmental Assessments (EAs) must be prepared.

ISED RSS-102 Issue 5, March 19, 2015

Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus
(All Frequency Bands)

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Table of Contents

<i>Johnson & Johnson Surgical Vision, Inc</i>	1
1 <i>Introduction and Conclusion</i>	4
2 <i>Evaluation Summary</i>	4
3 <i>Client Information</i>	5
4 <i>Description of Equipment Under Test and Variant Models</i>	5
5 <i>Power Density Calculation</i>	6
6 <i>Revision History</i>	9

1 Introduction and Conclusion

This evaluation report covers for a mobile device subject to routine environmental evaluation for RF exposure. A mobile device is defined as a transmitting device designed to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons.

The evaluation indicated in section 2.0 were performed on the product constructed as described in section 4.0. The remaining sections are the verbatim text from the actual evaluation during the investigation. These sections include the evaluation name, the specified Method, and Results. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product evaluated **complies** with the requirements of the standard(s) indicated. The results obtained in this report pertain only to the item(s) evaluated. Intertek does not make any claims of compliance for samples or variants which were not evaluated.

2 Evaluation Summary

Section	Test full name	Result
3	Client Information	-
4	Description of Equipment Under Evaluation and Variant Models	-
5	System Setup and Method	-
6	Power Density Calculation (FCC §1.1310; ISED RSS-102 Issue 5)	Compliant
7	Revision History	-

3 Client Information

This EUT was evaluated at the request of:

Client: Johnson & Johnson Surgical Vision, Inc.
1700 East St., Andrew Place
Santa Ana, CA 92705
USA

Contact: Kathryn Lockwood
Telephone: 714 247 8677
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4 Description of Equipment Under Test and Variant Models

Manufacturer: Johnson & Johnson Surgical Vision, Inc.
1700 East St., Andrew Place
Santa Ana, CA 92705
USA

Description of Equipment Under Test (provided by client)

The equipment under test is the console of the Veritas Vision System. The Veritas Vision System is a multi-functional tool for use in anterior segment surgery procedures. The console contains the following transmitters:

1. Three (3) of Bluetooth Low Energy – Remote Control Receiver, ALP/Veritas Master Receiver, ALP/ Veritas Slave Receiver
2. Two (2) of Bluetooth 2.0 – ACP Master Receiver, ACP Slave Receiver
3. One (1) of certified Wi-Fi transmitter module (FCC ID: PPD-AR5B97, IC: 4104A-AR5B97)

All transmitters operate at 2.4 GHz. ACP radios and ALP radios do not function/transmit simultaneously.

PCB serial numbers:

Remote Control Receiver: 1938000036 (radiated), 1938000031 (conducted)
ALP/Veritas Receiver: 1910000461 (radiated), 1803000147 (conducted, P2), 143800020 (conducted, P1)
ACP Receiver (Rear Panel Connector PCBA): 1917000193

Equipment Under Test Power Configuration			
Rated Voltage	Rated Current	Rated Frequency	Number of Phases
90-264 Vac	-	47-63Hz	1

Variant Models: None.

5 Power Density Calculation

5.1 Requirement(s)

FCC §1.1310 Radiofrequency radiation exposure limits

Table 1 below sets forth limits for Maximum Permissible Exposure (MPE) to radiofrequency electromagnetic field.

Table 1 – Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power Density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	*900/f ²	6
30-300	61.4	0.163	1.0	6
300-1,500			f/300	6
1,500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*100	30
1.34-30	842/f	2.19/f	*180/f ²	30
30-300	27.5	0.073	0.2	30
300-1,500			f/1500	30
1,500-100,000			1.0	30

F = frequency in MHz

* = Plane-wave equivalent power density

ISED RSS-102 Issue 5

Table 2 below sets forth limits for the RF field strength.

Table 2 – RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency range (MHz)	Electric field strength (V/m rms)	Magnetic field strength (A/m rms)	Power Density (W/m ²)	Reference Period (minutes)
0.003-10	83	90	-	Instantaneous*
0.1-10	-	0.73/f	-	6**
1.1-10	87/f ^{0.5}	-	-	6**
10-20	27.46	0.0728	-2	6
20-48	58.07/f ^{0.25}	0.1540/f ^{0.25}	8.944/f ^{0.5}	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 f ^{0.3417}	0.008335 f ^{0.3417}	0.02619 f ^{0.6834}	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/f ^{1.2}
150000-300000	0.158 f ^{0.5}	4.21 x 10 ⁻⁴ f ^{0.5}	6.67 x 10 ⁻⁵ f	616000/f ^{1.2}

Note: f is frequency in MHz. *Based on nerve stimulation (NS)

**Based on specific absorption rate (SAR)

5.2 Method

An MPE evaluation was performed in order to show that the device was compliant with FCC §2.1091 and ISED RSS-102. The maximum power density was calculated for each transmitter at a separation distance of 20 cm. The calculation was performed using the maximum gain from the internal and external antennas declared by the manufacturer.

The maximum permissible exposure (MPE) is predicted by using the following equation:

$$S = PG/4\pi R^2$$

where: S = power density (in appropriate units, e.g. mW/cm²)

P = power input to the antenna (in appropriate units, e.g., mW)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

5.3 Results:

The sample tested was found to Comply. The calculated maximum power density at 20 cm distance is less than the limits for general population / uncontrolled exposure.

5.4 Data:

Maximum peak output power (Provided by Johnson & Johnson Surgical Vision, Inc., FCC ID: PPD-AR5B97) *						
802.11b (2437 MHz)	802.11g (2437 MHz)	802.11n20 (2437 MHz)	802.11n40 (2437 MHz)			
85.507 mW / 19.32 dBm	266.073 mW / 24.25 dBm	267.917 mW / 24.28 dBm	251.768 mW / 24.01 dBm			

*: Data were taken from the FCC filing, FCC ID: PPD-AR5B97 (provided by Johnson & Johnson Surgical Vision, Inc.). Intertek takes no responsibility for the accuracy of the data.

Technology	Frequency (MHz)	Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	PD (mW/cm ²)	FCC PD Limits (mW/cm ²)	% of FCC Limit	PD (W/m ²)	ISED PD Limits (W/m ²)	% of ISED Limit
802.11b*	2437	19.32	3.20	22.52	178.65	0.0355	1	3.55	0.3554	5.4040	6.58
802.11g*	2437	24.25	3.20	27.45	555.90	0.1106	1	11.06	1.1059	5.4040	20.47
802.11n20*	2437	24.28	3.20	27.48	559.76	0.1114	1	11.14	1.1136	5.4040	20.61
802.11n40*	2437	24.01	3.20	27.21	526.02	0.1046	1	10.46	1.0465	5.4040	19.37
BLE (Remote Control)	2402	-3.88	2.45	-1.43	0.72	0.0001	1	0.01	0.0014	5.3508	0.03
BLE (ALP)	2480	-1.82	2.50	0.68	1.17	0.0002	1	0.02	0.0023	5.4689	0.04
BT (ACP)	2441	-4.03	2.50	-1.53	0.70	0.0001	1	0.01	0.0014	5.4100	0.03

*: Data were taken from the FCC filing, FCC ID: PPD-AR5B97 (provided by Johnson & Johnson Surgical Vision, Inc.) Intertek takes no responsibility for the accuracy of the data.

5.4 Data (Continued)

Using the following equation to calculate total power density:

$$\sum_{i=1}^n \frac{S_i}{(MPE)_i} \leq 1$$

Where S_i – power density for $i = 1, 2, \dots, n$
 n – number of antennas transmitting simultaneously,
 $(MPE)_i$ – limit of MPE for $i = 1, 2, \dots, n$

For the worst-case calculation, 802.11n20 + BLE (Remote Control) + BLE (ALP):

FCC: $\sum(S_i/MPE_i) = 11.14 + 0.01 + 0.02 = 11.17 \text{ %} < 100 \text{ %}$
ISED Canada: $\sum(S_i/MPE_i) = 20.61 + 0.03 + 0.04 = 20.68 \text{ %} < 100 \text{ %}$

6 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	September 16, 2020	104086841LAX-015RF	GL	KV	Original Issue