RF Exposure Report
FCC Part 2.1091

EUT Name: Powerview Motorized Shades

Model Name: 1004000722, 1012000246, 1012000416, 1012000236, 1012000369

Prepared for:

Hunter Douglas Window Fashions Division
1 Duette Way
Broomfield, CO, 80020
USA

Prepared by:

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Statement of Compliance

Manufacturer:	Hunter Douglas Window Fashions Division 1 Duette Way, Broomfield, CO, 80020, USA
Name of Equipment:	Powerview Motorized Shades
Model Name	1004000722, 1012000246, 1012000416, 1012000236, 1012000369
Application of Regulations:	FCC Part 2.1091

Guidance Documents:

FCC Part 2.1091

Test Methods:

FCC Part 1.1310, KDB 447498 D01

The electromagnetic compatibility test and documented data described in this report has been performed and recorded by TUV Rheinland, in accordance with the standards and procedures listed herein. As the responsible authorized agent of the EMC laboratory, I hereby declare that the equipment described above has been shown to be compliant with the EMC requirements of the stated regulations and standards based on these results. If any special accessories and/or modifications were required for compliance, they are listed in this report.

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Rachana Khanduri	May 26, 2021	Richard Decker	May 26, 2021
Test Engineer	Date	Laboratory Signatory	Date

Test Cert. # 3331.02

1 Product Specifications

1.1 *Product Description*

The 1004000722, 1012000246, 1012000416, 1012000236, 1012000369 is assembled into various motor assemblies and fabricated into Hunter Douglas window coverings that include a fabric member that is rolled around an aluminum tube, or stacked on itself without a tube. The DC brushed motor rotates the tube to deploy and retract the fabric. User inputs to the system include a push button on the motor module, a TTL level serial port, and 2.4GHz RF signals. The RF protocol used is Bluetooth 5 (Low Energy) and is implemented with Nordic NRF52840 series SoC (system on chips).

Model differences:
1004000722 PCBA, PV3 LUM 2.0
1012000246 PCBA, PVG3, NPD, STK, MAIN
1012000416 PCBA, PVG3, NPD, RLR
1012000236 RECVR; PVG3, SAT RCVR, PCBA
1012000369 PCBA, PVG3, NPD, AC RADIO

Model 1012000416 is considered worst case and used for testing.

1.2 *Product Specifications*

EUT Specifications	
Exposure Type	☒ General Population / Uncontrolled ☐ Occupational / Controlled
Multiple Antenna Feeds:	☐ Yes, and how many ☒ No
Hardware Version	1.0
Software Version	1.0.0
Transmitter Frequency Band	2400 MHz to 2483.5 MHz
Power Setting @ Operating Channel	+8dBm
Antenna Type	Removable Antenna
Antenna Gain	1.58 dBi
Note: Information supplied by the customer and can affect the validity of results.	

1.3 *Air Interfaces*

Air Interface	Supported Capabilities	Modulation	Maximum Duty Cycle	Band	Frequency Range (MHz)	Maximum Output Power (dBm)
Proprietary Radio	N/A	GFSK	100%	N/A	2400 – 2483.5	7.08

2 RF Exposure Evaluation

2.1 *Purpose*

In this document, we evaluate the RF Exposure to human body due the intentional transmission from the transmitter (EUT). The limit for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 is followed. Through the Friis transmission formula and the maximum gain of the antenna, we can calculate the distance, away from the product, where the limit of MPE is reached.

Although the Friis transmission formula is a far field assumption, the calculated result of that is an over-prediction for near field power density. We will take that as the worst case to specify the safety range.

2.2 *RF Exposure Limit*

According to FCC 1.1310 table 1: The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b)

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Average Time (minutes)**
(A)Limits For Occupational / Control Exposures				
0.3-1.34	614	1.63	*(100)	6
1.34-30	1842/f	4.89/f	*($900/f^2$)	6
30-300	61.4	0.163	1.0	6
30-1500	…	…	F/300	6
1500-100000	…	…	1.0	6
(B)Limits For General Population / Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*($180/f^2$)	30
30-300	27.5	0.073	0.2	30
30-1500	…	…	F(MHz)/1500MHz	30
1500-100000	…	…	1.0	30

F = Frequency in MHz

*=Plane wave equivalent density

2.3 *Assessment Methods*

The Friss transmission formula: Pd = (Pout*G) / (4*π*R2)

Where;

Pd = power density in mW/cm2
Pout = output power to antenna in mW
G = gain of antenna in linear scale
$\pi \approx 3.1416$
R = distance between observation point and center of the radiator in cm

Ref.: David K. Cheng, Field and Wave Electromagnetics, Second Edition, Page 640, Eq. (11-133).

2.4 *Assessment Calculation*

The maximum output power and antenna gain is declared by the manufacturer and used in this assessment. The minimum RF exposure distance during normal operation is 20cm.

Stand Alone Analysis

Frequency Band (MHz)	Operating Freq (MHz)	Max. Conducted Power (dBm)	Numeric Antenna Gain (dBi)	EIRP (dBm)	Power Density (mW/cm^2)	Power Density Limit (mW/cm^2)	Result (Pass/Fail)
2400-2483.5	2480MHz	7.08	1.58	8.66	0.00146	1	Pass

2.5 *Conclusion*

The above result had shown that the device complied with MPE requirement at a prediction distance of 20cm.