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Ademco Inc. MPE REPORT

SCOPE OF WORK

MPE CALCULATION
ON THE ADT5AIO2 HOME SECURITY PANEL

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MPE TEST REPORT

Report Number: 104517828LEX-007.1

Project Number: G104517828

Report Issue Date: 2/3/2021

Product Name: ADT5AIO2 Home Security Panel

Standards: FCC Part 1.1310 Limits for Maximum
Permissible Exposure (MPE)

RSS-102 Issue 5 RF Field Strength Limits for
Devices Used by the General Public

Tested by:
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Client:
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1 Introduction and Conclusion

The tests indicated in section 2.0 were performed on the product constructed as described in section 4.0. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results and raw Data. 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 tested **complies** with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

2 Test Summary

Section	Test full name	Result
9	FCC Part 1.1310 Limits for Maximum Permissible Exposure (MPE) (Limits for General Population / Uncontrolled Exposure)	Pass
	RSS-102 Issue 5 RF Field Strength Limits (For Devices Used by the General Public)	Pass



3 Client Information

This product was tested at the request of the following:

Client Information	
Client Name:	Ademco Inc.
Address:	2 Corporate Center Drive Suite 100 Melville, NY 11747 USA
Contact:	Divya Venkat
Telephone:	+1(763) 954-4816
Email:	Divya.venkat@resideo.com
Manufacturer Information	
Manufacturer Name:	Ademco Inc.
Manufacturer Address:	2 Corporate Center Drive Suite 100 Melville, NY 11747 USA



4 Description of Equipment under Test and Variant Models

Equipment Under Test	
Product Name	ADT5AIO2 Home Security Panel
Model Number	ADT5AIO2
Serial Number	Test Sample 1
Supported Transmit Bands	RF6: 2405 – 2475MHz BLE: 2402 – 2480MHz
Receive Date	12/15/2020
Test Start Date	2/3/2021
Test End Date	2/3/2021
Device Received Condition	Good
Test Sample Type	Production
Rated Voltage	120VAC / 60Hz (into AC / DC Power Adapter)
RF6 Antennas	Antenna 1: 4.8dBi Gain Antenna 2: 4.2dBi Gain The antenna gain values were provided by the client and may impact compliance.
BLE Antenna	2.9dBi Gain The antenna gain values were provided by the client and may impact compliance.
Description of Equipment Under Test (provided by client)	
The ADT5AIO2 Home Security Panel was a touch screen security panel with wireless connectivity.	

4.1 Variant Models:

There were no variant models covered by this evaluation.



5 Antenna Gains and Output Power:

The antenna gain values were provided by the client and may impact compliance. The output powers shown below were measured during testing of this product.

Panel	Antenna	Gain (dBi)	Output Power (dBm)
7AIO	RF6 ANT1	4.8 dBi	21.99dBm
	RF6 ANT2	4.2 dBi	21.98dBm
	BLE	2.9 dBi	2.12dBm

Note: the output powers used were measured from ADT7AIO2 panel which used the same radios. The antenna gains reflect the actual antenna gains for the ADT5AIO2 Home Security Panel.

**6 FCC Limits**

§ 1.1310: The criteria listed in table 1 shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

Part 1.1310 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 Exposures				
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
300–1500 .....	.....	.....	f/300	6
1500–100,000 .....	.....	.....	5	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
300–1500 .....	.....	.....	f/1500	30
1500–100,000 .....	.....	.....	1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

**7 RSS-102 Issue 5 Exposure Limits:**

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)				
Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m ²)	Reference Period (minutes)
0.003-10 ²¹	83	90	-	Instantaneous*
0.1-10	-	0.73/ <i>f</i>	-	6**
1.1-10	87/ <i>f</i> ^{0.5}	-	-	6**
10-20	27.46	0.0728	-2	6
20-48	58.07/ <i>f</i> ^{0.25}	0.1540/ <i>f</i> ^{0.25}	8.944/ <i>f</i> ^{0.5}	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 <i>f</i> ^{0.3417}	0.008335 <i>f</i> ^{0.3417}	0.02619 <i>f</i> ^{0.6834}	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ <i>f</i> ^{1.2}
150000-300000	0.158 <i>f</i> ^{0.5}	4.21 x 10 ⁻⁴ <i>f</i> ^{0.5}	6.67 x 10 ⁻⁵ <i>f</i>	616000/ <i>f</i> ^{1.2}

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



8 Test Procedure

An MPE evaluation for was performed in order to show that the device was compliant with the general population exposure limits from FCC §2.1091 and RSS-102 Issue 5. The maximum power density was calculated for each transmitter band at a separation distance of 20cm using the maximum declared output power including tune up tolerance.

For each transmitter the maximum RF exposure at a 20 cm distance using the formula:

$$\text{Conducted Power}_{mW} = 10^{\text{Conducted Power (dBm)}/10}$$

$$\text{Power Density} = \frac{\text{Conducted Power}_{mW} \times \text{Ant. Gain}}{4\pi \times (20_{cm})^2}$$

For transmitters that could operate simultaneously, the MPE to limit ratio for each was calculated and then summed. If the sum of the MPE to limit ratios was less than 1, that specific combination of transmitters was deemed to comply.



9 Results:

The calculated maximum power density at 20cm distance was equal to or less than the required limits for general population exposure for FCC Part 1.1310 and RSS-102 Issue 5.

The BLE and RF6 radios could transmit simultaneously and compliance is demonstrated by summing the limit to MPE ratios for each transmitter and showing that the sum is less than 1

FCC MPE Data

Duty Cycle	100 (%)							
Separation Dist.	20 (cm)							
Operating Mode	Frequency (MHz)	Declared Max Cond. Power (Inc. Tolerance) (dBm)	Duty Cycle Adjusted Cond. Output Power (dBm)	Antenna Gain (dB)	MPE Value (mW/cm ²)	MPE Limit (mW/cm ²)	Margin to Limit (mW/cm ²)	MPE / Limit Ratio (for Co-Location)
BLE	2402	2.12	2.12	2.9	0.0006	1.00	0.9994	0.0006
RF6 Antenna 1	2405	21.99	21.99	4.8	0.0950	1.00	0.9050	0.0950
RF6 Antenna 2	2405	21.98	21.98	4.2	0.0826	1.00	0.9174	0.0826
Simultaneous Transmission MPE / Limit Ratio SUM =								0.1782

Note: the actual duty cycle in usage will be lower than the 100% used in the calculation above. 100% duty cycle represents absolute worst case.

RSS-102 Issue 5 MPE Data

Duty Cycle	100 (%)							
Separation Dist.	20 (cm)							
Operating Mode	Frequency (MHz)	Declared Max Cond. Power (Inc. Tolerance) (dBm)	Duty Cycle Adjusted Cond. Output Power (dBm)	Antenna Gain (dB)	MPE Value (W/m ²)	MPE Limit (W/m ²)	Margin to Limit (W/m ²)	MPE / Limit Ratio (for Co-Location)
BLE	2402	2.12	-0.08	2.9	0.0038	5.35	5.3470	0.000712
RF6 Antenna 1	2405	21.99	21.99	4.8	0.9500	5.36	4.4054	0.177395
RF6 Antenna 2	2405	21.98	21.98	4.2	0.8255	5.36	4.5298	0.154149
Simultaneous Transmission MPE / Limit Ratio SUM =								0.332255

Note: the actual duty cycle in usage will be lower than the 100% used in the calculation above. 100% duty cycle represents absolute worst case.



10 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	2/3/2021	104517828LEX-007.1	BCT	BZ	Original Issue