
MPE REPORT

Report No.: SRTC2018-9004(F)-18102401(D)

Product Name: HVAC Controller

Product Model: CPO-PC400-UW

Applicant: Honeywell (Beijing) Technology Solutions Lab Co., Ltd.

Manufacturer: Honeywell (Beijing) Technology Solutions Lab Co., Ltd.

Specification: FCC Part §2.1091, §2.1093, §1.1307(b), §1.1310 (2019)

FCC ID: 2ARTN-00001

The State Radio_monitoring_center Testing Center (SRTC)

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1 GENERAL INFORMATION

1.1 Notes of the test report

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1.2 Information about the testing laboratory

| | |
|--------------------|--|
| Company: | The State Radio_monitoring_center Testing Center (SRTC) |
| Address: | 15th Building, No.30 Shixing Street, Shijingshan District, P.R.China |
| City: | Beijing |
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1.3 Applicant's details

| | |
|--------------------|--|
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| Address: | A1 Building, C&W Industry Zone, No.14 Jiuxianqiao Road, Chaoyang District, Beijing, 100015, P.R. China |
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| Fax: | --- |
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1.4 Manufacturer's details

| | |
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2 DESCRIPTION OF THE DEVICE UNDER TEST

2.1 Final Equipment Build Status

Bluetooth

| | |
|-------------------|----------------------------|
| Frequency Range | 2.402GHz~2.480GHz |
| Number of Channel | 79 |
| Modulation Type | GFSK, $\pi/4$ DQPSK, 8DPSK |
| Duplex Mode | TDD |
| Channel Spacing | 1MHz |
| Data Rate | 1Mbps, 2 Mbps, 3 Mbps |
| Power Supply | Charger or DC Power Supply |
| Hardware Version | 100100 |
| Software Version | 3.0.9.X |
| SN | Sample 8# |
| Antenna type | Refer to Note1 |
| Antenna connector | Refer to Note1 |

Note1: The antenna provide to the EUT, please refer to the following table:

| SN | Brand | Model | Antenna gain | Frequency band(GHz) | Antenna type | Connector Type |
|------|-------|-------|--------------|---------------------|------------------------|----------------|
| Ant1 | adam | N/A | 2.9 | 2.4GHz~2.4835GHz | Fixed External Antenna | N/A |
| Ant3 | linx | N/A | 2.8 | 2.4GHz~2.4835GHz | Fixed External Antenna | N/A |

Bluetooth BLE

| | |
|-------------------|----------------------------|
| Frequency Range | 2.402GHz~2.480GHz |
| Number of Channel | 40 |
| Modulation Type | GFSK |
| Equipment Class | DTS |
| Channel Spacing | 2MHz |
| Data Rate | 1Mbps |
| Power Supply | Charger or DC Power Supply |
| Hardware Version | 100100 |
| Software Version | 3.0.9.X |
| SN | Sample 8# |
| Antenna type | Refer to Note2 |
| Antenna connector | Refer to Note2 |

Note2: The antenna provide to the EUT, please refer to the following table:

| SN | Brand | Model | Antenna gain | Frequency band(GHz) | Antenna type | Connector Type |
|------|-------|-------|--------------|---------------------|------------------------|----------------|
| Ant1 | adam | N/A | 2.9 | 2.4GHz~2.4835GHz | Fixed External Antenna | N/A |
| Ant3 | linx | N/A | 2.8 | 2.4GHz~2.4835GHz | Fixed External Antenna | N/A |

WLAN 2.4GHz

| | |
|-----------------------------|--|
| Frequency Range | 2.412GHz~2.462GHz |
| Number of Channel For 20MHz | 11 |
| Number of Channel For 40MHz | 7 |
| Modulation Type | DBPSK/DQPSK/CCK/BPSK/QPSK/16QAM/64QAM |
| Duplex Mode | TDD |
| Channel Spacing | 5MHz |
| Data Rate | 802.11b:1Mbps-11Mbps 802.11g:6Mbps-54Mbps 802.11n HT20:MCS0-MCS7 802.11n HT40:MCS0-MCS7 |
| Power Supply | Charger or DC Power Supply |
| Hardware Version | 100100 |
| Software Version | 3.0.9.X |
| SN | Sample 8# |
| Antenna type | Refer to Note3 |
| Antenna connector | Refer to Note3 |

Note: The antenna provide to the EUT, please refer to the following table:

| SN | Brand | Model | Antenna gain | Frequency band(GHz) | Antenna type | Connector Type |
|------|-------|-------|--------------|---------------------|------------------------|----------------|
| Ant1 | adam | N/A | 2.9 | 2.4GHz~2.4835GHz | Fixed External Antenna | N/A |
| Ant3 | linx | N/A | 2.8 | 2.4GHz~2.4835GHz | Fixed External Antenna | N/A |

WLAN 5GHz

| | |
|-------------------|--|
| Frequency Band(s) | U-NII-1:5150MHz-5250MHz U-NII-2A:5250MHz-5350MHz U-NII-2C:5470MHz-5725MHz U-NII-3:5725MHz-5850MHz |
| DFS | Client Without Radar Detection |
| Modulation Type | 802.11a 802.11n (HT20/HT40) 802.11ac (VHT20/VHT40/VHT80) |
| Power Supply | Charger or DC Power Supply |
| Hardware Version | 100100 |
| Software Version | 3.0.9.X |
| SN | Sample 8# |
| Antenna type | Refer to Note4 |
| Antenna connector | Refer to Note4 |

Note4: The antenna provide to the EUT, please refer to the following table:

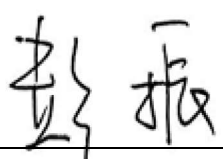

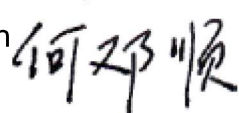
| SN | Brand | Model | Antenna gain | Frequency band(GHz) | Antenna type | Connecter Type |
|------|-------|-------|--------------|---------------------|------------------------|----------------|
| Ant1 | adam | N/A | 4.4 | 5.150GHz~5.250GHz | Fixed External Antenna | N/A |
| Ant1 | adam | N/A | 6.0 | 5.250GHz~5.350GHz | Fixed External Antenna | N/A |
| Ant1 | adam | N/A | 5.5 | 5.470GHz~5.725GHz | Fixed External Antenna | N/A |
| Ant1 | adam | N/A | 3.6 | 5.725GHz~5.850GHz | Fixed External Antenna | N/A |
| Ant3 | linx | N/A | 4.5 | 5.150GHz~5.250GHz | Fixed External Antenna | N/A |
| Ant3 | linx | N/A | 4.5 | 5.250GHz~5.350GHz | Fixed External Antenna | N/A |
| Ant3 | linx | N/A | 4.5 | 5.470GHz~5.725GHz | Fixed External Antenna | N/A |
| Ant3 | linx | N/A | 2.9 | 5.725GHz~5.850GHz | Fixed External Antenna | N/A |

3 REFERENCE SPECIFICATION

| Specification | Version | Title |
|---------------|------------------|---|
| 2.1091 | 2019 | Radiofrequency radiation exposure evaluation: mobile devices. |
| 2.1093 | 2019 | Radiofrequency radiation exposure evaluation: portable devices. |
| 1.1307(b) | 2019 | Actions that may have a significant environmental effect, for which Environmental Assessments (EAs) must be prepared. |
| 1.1310 | 2019 | Radiofrequency radiation exposure limits. |
| KDB447498 | October 23, 2015 | RF exposure procedures and equipment authorization policies for mobile and portable devices |

4 RESULT SUMMARY

| No. | Test case | FCC reference |
|-----|-----------------|---|
| 1 | MPE Calculation | FCC Part §2.1091, FCC Part §2.1093, FCC Part §1.1307(b) FCC Part §1.1310 KDB 447498 |

| | |
|--|--|
| This Test Report Is Issued by: Mr. Peng Zhen  | Checked by: Mr. Li Bin  |
| Tested by: Mr. He Dengshun  | Issued date: 20200213 |

5 TEST RESULTS

5.1 Average Power Output Test Result

BT output power

| Modulation type | Average power output (dBm) | | |
|-----------------|----------------------------|-------------------|-------------------|
| | 2402MHz (Ch0) | 2441MHz (Ch39) | 2480MHz (Ch78) |
| GFSK | 2.38 | 3.17 | 3.20 |
| $\pi/4$ DQPSK | -1.96 | -1.61 | -1.92 |
| 8DPSK | -1.98 | -1.60 | -1.92 |

BT BLE output power

| Modulation type | Average power output (dBm) | | |
|-----------------|----------------------------|-------------------|-------------------|
| | 2402MHz (Ch0) | 2440MHz (Ch19) | 2480MHz (Ch39) |
| GFSK (LE) | -4.28 | -3.89 | -5.20 |

WLAN 2.4GHz

| Modulation type | Average power output (dBm) | | |
|-----------------|----------------------------|---------|---------|
| | 2412MHz | 2437MHz | 2462MHz |
| 11b | 16.41 | 16.37 | 16.38 |
| 11g | 15.02 | 14.98 | 15.24 |
| 11n HT20 | 14.48 | 14.46 | 14.85 |
| Modulation type | Average power output (dBm) | | |
| | 2422MHz | 2437MHz | 2452MHz |
| 11n HT40 | 15.37 | 15.42 | 15.52 |

WLAN 5GHz
U-NII-1

| Test Mode | Average Power(dBm) | | |
|-----------------|--------------------|----------|---------|
| | 5180 MHz | 5200 MHz | 5240MHz |
| 802.11a | 13.89 | 14.48 | 15.27 |
| 802.11n(HT20) | 13.44 | 14.04 | 14.86 |
| 802.11ac(VHT20) | 11.83 | 12.25 | 13.19 |

| Test Mode | Average Power(dBm) | |
|-----------------|--------------------|----------|
| | 5190 MHz | 5230 MHz |
| 802.11n(HT40) | 13.58 | 14.65 |
| 802.11ac(VHT40) | 12.06 | 13.01 |

| Test Mode | Average Power(dBm) |
|-----------------|--------------------|
| | 5210 MHz |
| 802.11ac(VHT80) | 12.20 |

U-NII-2A

| Test Mode | Average Power(dBm) | | |
|-----------------|--------------------|----------|---------|
| | 5260 MHz | 5300 MHz | 5320MHz |
| 802.11a | 14.82 | 15.29 | 15.76 |
| 802.11n(HT20) | 14.50 | 14.80 | 15.38 |
| 802.11ac(VHT20) | 12.66 | 13.07 | 13.60 |

| Test Mode | Average Power(dBm) | |
|-----------------|--------------------|----------|
| | 5270 MHz | 5310 MHz |
| 802.11n(HT40) | 14.36 | 14.98 |
| 802.11ac(VHT40) | 12.71 | 13.28 |

| Test Mode | Average Power(dBm) |
|-----------------|--------------------|
| | 5290 MHz |
| 802.11ac(VHT80) | 12.69 |

U-NII-2C

| Test Mode | Average Power(dBm) | | |
|-----------------|--------------------|----------|---------|
| | 5500 MHz | 5560 MHz | 5700MHz |
| 802.11a | 15.75 | 15.83 | 15.48 |
| 802.11n(HT20) | 15.37 | 15.50 | 14.78 |
| 802.11ac(VHT20) | 13.63 | 13.73 | 13.02 |

| Test Mode | Average Power(dBm) | |
|-----------------|--------------------|----------|
| | 5510 MHz | 5670 MHz |
| 802.11n(HT40) | 15.61 | 15.59 |
| 802.11ac(VHT40) | 13.74 | 13.67 |

| Test Mode | Average Power(dBm) |
|-----------------|--------------------|
| | 5690 MHz |
| 802.11ac(VHT80) | 12.95 |

U-NII-3

| Test Mode | Average Power(dBm) | | |
|-----------------|--------------------|---------|---------|
| | 5745MHz | 5785MHz | 5825MHz |
| 802.11a | 15.74 | 15.16 | 15.49 |
| 802.11n(HT20) | 15.11 | 14.80 | 14.99 |
| 802.11ac(VHT20) | 13.67 | 13.04 | 13.50 |

| Test Mode | Average Power(dBm) | |
|-----------------|--------------------|----------|
| | 5755 MHz | 5795 MHz |
| 802.11n(HT40) | 15.24 | 14.91 |
| 802.11ac(VHT40) | 13.46 | 13.12 |

| Test Mode | Average Power(dBm) |
|-----------------|--------------------|
| | 5775 MHz |
| 802.11ac(VHT80) | 13.09 |

5.2 Calculation result

FCC LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

(A) Limits for Occupational/Controlled Exposure

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/cm ²) | Averaging Time E ² , H ² or S (minutes) |
|-----------------------|-----------------------------------|-----------------------------------|---|---|
| 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

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/cm ²) | Averaging Time E ² , H ² or S (minutes) |
|-----------------------|-----------------------------------|-----------------------------------|---|---|
| 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

Calculation procedure:

According to §2.1091, §2.1093, §1.1307(b) and §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

$$The\ S = PG / (4\pi R^2)$$

Where S = power density in mW/cm²

P = transmit power in mW

G = numeric gain of transmit antenna

R = distance (cm)

The calculations in the table below use the highest gain of antenna for client EUT. These calculations represent worst case in terms of the exposure levels.

| Mode/Band | Freq (MHz) | Power | | Antenna Gain | | R (cm) | S (mW/cm ²) | Limits (mW/cm ²) |
|--------------|------------|-------|--------|--------------|-----------|--------|-------------------------|------------------------------|
| | | (dBm) | (mW) | (dBi) | (Numeric) | | | |
| Bluetooth | 2480 | 3.20 | 2.089 | 2.9 | 1.950 | 20 | 0.001 | 1.00 |
| Bluetooth LE | 2440 | -3.89 | 0.408 | 2.9 | 1.950 | 20 | 0.001 | 1.00 |
| WLAN2.4GHz | 2412 | 16.41 | 43.752 | 2.9 | 1.950 | 20 | 0.017 | 1.00 |
| WLAN5.2GHz | 5240 | 15.27 | 33.651 | 4.5 | 2.818 | 20 | 0.019 | 1.00 |
| WLAN5.3GHz | 5320 | 15.76 | 37.670 | 6.0 | 3.981 | 20 | 0.030 | 1.00 |
| WLAN5.6GHz | 5560 | 15.83 | 38.282 | 5.5 | 3.548 | 20 | 0.027 | 1.00 |
| WLAN5.8GHz | 5745 | 15.74 | 37.497 | 3.6 | 2.291 | 20 | 0.017 | 1.00 |

Note: 1mW/cm² from §1.1310 Table 1.

Evaluation for Simultaneous Mode for BT and UNII

Worst case: 0.001/1+0.030/1=0.031<1, Compliance.

According to the KDB447498 D01 section 7.1 determine the device is exclusion from test.

---End of Test Report---