Report No.: SZEM210200138307
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# RF Exposure Evaluation Report

| | |
|---|---|
| **Application No.:** | SZEM2102001383CR |
| **Applicant:** | DT Research, Inc. |
| **Address of Applicant:** | 3RD FL NO 36 WUQUAN 7TH RD WUGU DISTRICT, NEW TAIPEI, Taiwan |
| **Manufacturer:** | DT Research, Inc. |
| **Address of Manufacturer:** | 2000 Concourse Drive, San Jose, CA 95131, USA |
| **Factory:** | DT Research, Inc. Taiwan Branch |
| **Address of Factory:** | 6F., No.36 Wuquan 7 th Rd., Wugu Dist. New Taipei City 248 Taiwan |
| **Product Name:** | Battery-Powered all-in-one computer |
| **Model No.:** | 582XXX-XXX (X=blank, A-Z or 0-9) ♣ |
| ♣ | Please refer to section 4.1 of this report which indicates which model was actually tested and which were electrically identical. |
| **Trade Mark:** | DT Research |
| **FCC ID:** | YE3600-AX200NG |
| **Standards:** | 47 CFR Part 1.1307<br>47 CFR Part 1.1310<br>47 CFR Part 2.1091 |
| **Date of Receipt:** | 2021-02-01 |
| **Date of Test:** | 2021-02-14 to 2021-03-10 |
| **Date of Issue:** | 2021-03-12 |
| **Test Result :** | **PASS*** |

* In the configuration tested, the EUT complied with the standards specified above.

Keny Xu
EMC Laboratory Manager

SGS-CSTC Standards Technical Services Co.,Ltd. Shenzhen Branch (Testing Center) EMC Laboratory.


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# 2 Version

| Revision Record | | | | |
|---|---|---|---|---|
| **Version** | **Chapter** | **Date** | **Modifier** | **Remark** |
| 01 | | 2021-03-12 | | Original |
| | | | | |
| | | | | |

| | | | | |
|---|---|---|---|---|
| **Authorized for issue by:** | | | | |
| | |  | | |
| | | **Edison Li/Project Engineer** | | |
| | |  | | |
| | | **Eric Fu/Reviewer** | | |



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# 3 Contents

# 4 General Information

## 4.1 General Description of EUT

| | |
|---|---|
| Power adapter: | AC Adapter<br>Model: EM11011M-190<br>Input: AC 100-240V, 2.0~1.0A, 50/60Hz<br>Output: DC 19V, 6.31A, 120W<br><br>Li-ion Rechargeable Battery Pack<br>Model: ACC-006-591<br>3INR19/66-3 DC:10.9V 8250mAh/90Wh<br>Rated Capacity: 8250mAh<br>Charge Current: 3.0A Max<br>Nominal Voltage: 10.9V<br>Charge Voltage: 12.3V Max |
| Test voltage: | AC 120V, 60Hz or AC 230V, 50Hz<br>Note: Both nominal AC 120V, 60Hz and AC 240 V, 50Hz are required for testing in accordance with FCC KDB174176, this report only shows the results of the worst test result(AC 120V, 60Hz); |
| Port: | DC-out(Optional) ports, Audio jack ports, DC-in ports, Ethernet ports, COM ports, HDMI ports, USB ports, Power buttons, Function buttons, LED reading light, Battery packs(Optional) |
| Cable(s): | DC cable:114cm with a ferrite core |
| Internal Source: | More than 108MHz |
| Sample Type: | Fixed device |
| Classification: | Uncontrolled Environment |
| For Bluetooth Classic: | |
| Operation Frequency: | 2402MHz to 2480MHz |
| Bluetooth Version: | Bluetooth V5.0 |
| Spectrum Spread Technology: | Frequency Hopping Spread Spectrum(FHSS) |
| Modulation Type: | GFSK, π/4DQPSK, 8DPSK |

| | | | | |
|---|---|---|---|---|
| Number of Channels: | 79 | | | |
| Channel Spacing: | 1MHz | | | |
| Antenna Type: | PIFA Antenna | | | |
| Antenna Gain: | 2.9dBi | | | |
| For Bluetooth LE: | | | | |
| Operation Frequency: | 2402MHz to 2480MHz | | | |
| Bluetooth Version: | V5.0 | | | |
| Channel Spacing: | 2MHz | | | |
| Modulation Type: | GFSK | | | |
| Number of Channels: | 40 | | | |
| Antenna Type: | PIFA Antenna | | | |
| Antenna Gain: | 2.9dBi | | | |
| For 802.11b/g/n: | | | | |
| Operation Frequency: | 802.11b/g/n/ax(HT20): 2412MHz to 2472MHz<br>802.11n/ax(HT40): 2422MHz to 2462MHz | | | |
| Modulation Type: | 802.11b: DSSS (CCK, DQPSK, DBPSK)<br>802.11g: OFDM (BPSK, QPSK, 16QAM, 64QAM)<br>802.11n(HT20 and HT40): OFDM (BPSK, QPSK, 16QAM, 64QAM)<br>802.11ax(HT20 and HT40): OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM) | | | |
| Channel Numbers: | 802.11b/g, 802.11n/ax HT20: 13 Channels<br>802.11n/ax HT40: 9 Channels | | | |
| Antenna Type: | PIFA Antenna | | | |
| Antenna Gain: | Antenna1: 2.4dBi, Antenna2: 2.9dBi<br>Note: MIMO for 802.11n/ax. | | | |
| For 802.11a/n/ac/ax: | | | | |
| Operation Frequency: | Band | Mode | Frequency Range(MHz) | Number of channels |
| | UNII Band I | 802.11a/n/ax(HT20) | 5180-5240 | 4 |
| | | 802.11n/ax(HT40) | 5190-5230 | 2 |
| | | 802.11ac/ax(HT80) | 5210 | 1 |
| | | 802.11ac/ax(HT160) | 5250 | 1 |
| | UNII Band II-A | 802.11a/n/ax(HT20) | 5260-5320 | 4 |
| | | 802.11n/ax(HT40) | 5270-5310 | 2 |


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| | | | | |
|---|---|---|---|---|
| | | 802.11ac/ax(HT80) | 5290 | 1 |
| | UNII Band II-C | 802.11a/n/ax(HT20) | 5500-5720 | 12 |
| | | 802.11n/ax(HT40) | 5510-5710 | 6 |
| | | 802.11ac/ax(HT80) | 5530-5690 | 3 |
| | | 802.11ac/ax(HT160) | 5570 | 1 |
| | UNII Band III | 802.11a/n/ax(HT20) | 5745-5825 | 5 |
| | | 802.11n/ax(HT40) | 5755-5795 | 2 |
| | | 802.11ac/ax(HT80) | 5775 | 1 |
| Modulation Type: | 802.11a: OFDM (64QAM,16QAM, QPSK, BPSK)<br>802.11n: OFDM (256QAM, 64QAM,16QAM, QPSK, BPSK)<br>802.11ac: OFDM (256QAM, 64QAM,16QAM, QPSK, BPSK)<br>802.11ax: OFDM (1024QAM, 256QAM, 64QAM,16QAM, QPSK, BPSK) | | | |
| DFS Function: | Slave without radar detection | | | |
| TPC Function: | Not support | | | |
| Antenna Type: | PIFA Antenna | | | |
| Antenna Gain: | Antenna1: 3.9dBi, Antenna2: 3.5dBi<br>Note: MIMO for 802.11n/ac/ax. | | | |

Remark:

Model No.: 582XXX-XXX (X=blank, A-Z or 0-9)

Only the model 582T was tested, since according to the declaration from the applicant, the electrical circuit design, layout, components used, internal wiring and functions were identical for all the above models, with only difference on model no. and External ports(with DC OUT Port or without DC OUT Port).

## 4.2 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China 518057

Telephone: +86 (0) 755 2601 2053 Fax: +86 (0) 755 2671 0594

No tests were sub-contracted.

## 4.3 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

**• A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

**• VCCI**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

**• FCC –Designation Number: CN1178**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

**• Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

## 4.4 Deviation from Standards

None.

## 4.5 Abnormalities from Standard Conditions

None.

## 4.6 Other Information Requested by the Customer

None.



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# 5 RF Exposure Evaluation

## 5.1 RF Exposure Compliance Requirement

### 5.1.1 Limits

According to FCC Part1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in part1.1307(b)

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 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

Friis Formula

Friis transmission formula: Pd = (Pout*G)/(4* Pi * $R^2$)

Where

Pd = power density in $mW/cm^2$

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

For Uncontrolled Environment, the MPE limit of 1500MHz to 100000MHz is 1.0 $mW/cm^2$ . If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

### 5.1.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

### 5.1.3 EUT RF Exposure Evaluation

## 1) Test Results

**For Bluetooth Classic:**

The max tune-up tolerance power Into Antenna & RF Exposure Evaluation Distance:

| Antenna | Max Antenna Gain (dBi) | Max Antenna Gain (Numeric) | Max tune-up tolerance power (dBm) | Max tune-up Tolerance power to Antenna (mW) | Power Density at R = 20 cm ($mW/cm^2$) | Limit ($mW/cm^2$) | MPE Ratios | Result |
|---|---|---|---|---|---|---|---|---|
| Ant1 | 2.9 | 1.95 | 11 | 12.59 | 0.0049 | 1 | 0.0049 | PASS |

Note: Refer to report No. 181210-03.TR05 or EUT test Max Conducted Peak Output Power value.
The distancer (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

**For Bluetooth LE:**

The max tune-up tolerance power Into Antenna & RF Exposure Evaluation Distance:

| Antenna | Max Antenna Gain (dBi) | Max Antenna Gain (Numeric) | Max tune-up tolerance power (dBm) | Max tune-up Tolerance power to Antenna (mW) | Power Density at R = 20 cm ($mW/cm^2$) | Limit ($mW/cm^2$) | MPE Ratios | Result |
|---|---|---|---|---|---|---|---|---|
| Ant1 | 2.9 | 1.95 | 10.50 | 11.22 | 0.0044 | 1 | 0.0044 | PASS |

Note: Refer to report No. 181210-03.TR04 or EUT test Max Conducted Peak Output Power value.
The distancer (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

**For 2.4G WiFi:**

The max tune-up tolerance power Into Antenna & RF Exposure Evaluation Distance:

| Antenna | Max Antenna Gain (dBi) | Max Antenna Gain (Numeric) | Max tune-up tolerance power (dBm) | Max tune-up Tolerance power to Antenna (mW) | Power Density at R = 20 cm ($mW/cm^2$) | Limit ($mW/cm^2$) | MPE Ratios | Result |
|---|---|---|---|---|---|---|---|---|
| Ant2 | 2.9 | 1.95 | 14.5 | 28.18 | 0.0109 | 1 | 0.0109 | PASS |

Note: Refer to report No. 181210-03.TR04 or EUT test Max Conducted Peak Output Power value.
The distancer (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.


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**For 5G WiFi:**

The max tune-up tolerance power Into Antenna & RF Exposure Evaluation Distance:

| Antenna | Max Antenna Gain (dBi) | Max Antenna Gain (Numeric) | Max tune-up tolerance power (dBm) | Max tune-up Tolerance power to Antenna (mW) | Power Density at R = 20 cm ($mW/cm^2$) | Limit ($mW/cm^2$) | MPE Ratios | Result |
|---|---|---|---|---|---|---|---|---|
| Ant2 | 4.7 | 2.95 | 13.5 | 22.39 | 0.0131 | 1 | 0.0131 | PASS |

Note: Refer to report No. 181210-03.TR01 or EUT test Max Conducted Peak Output Power value.
The distancer (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

**For 2.4G WiFi MIMO:**

The max tune-up tolerance power Into Antenna & RF Exposure Evaluation Distance:

| Antenna | Max Antenna Gain (dBi) | Max Antenna Gain (Numeric) | Max tune-up tolerance power (dBm) | Max tune-up Tolerance power to Antenna (mW) | Power Density at R = 20 cm ($mW/cm^2$) | Limit ($mW/cm^2$) | MPE Ratios | Result |
|---|---|---|---|---|---|---|---|---|
| Ant1+2 | 5.91 | 3.90 | 17.27 | 53.33 | 0.0414 | 1 | 0.0414 | PASS |

Note: Direectional Gain= $G_{ANT}$ + 10*log($N_{ANT}/N_{SS}$)= 2.9+10*log(2/1)=5.91dBi.

**For 5G WiFi MIMO:**

The max tune-up tolerance power Into Antenna & RF Exposure Evaluation Distance:

| Antenna | Max Antenna Gain (dBi) | Max Antenna Gain (Numeric) | Max tune-up tolerance power (dBm) | Max tune-up Tolerance power to Antenna (mW) | Power Density at R = 20 cm ($mW/cm^2$) | Limit ($mW/cm^2$) | MPE Ratios | Result |
|---|---|---|---|---|---|---|---|---|
| Ant2 | 7.71 | 5.90 | 16.51 | 44.77 | 0.0526 | 1 | 0.0526 | PASS |

Note: Direectional Gain= $G_{ANT}$ + 10*log($N_{ANT}/N_{SS}$)= 4.7+10*log(2/1)=7.71dBi.

Note: The Bluetooth, 2.4G WiFi and 5G WiFi cannot synchronous transmission at the same time.

-End of Report-



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