

Report No.: SHEM210800881602

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1 Cover Page

RF Exposure Evaluation Report

Application No.: SHCR2108000032AT **FCC ID:** 2A5PE-YUSHU001

Applicant: Unitree

Address of Applicant: 3rd Floor, Building 1, Fengda Creative Park, No. 88 Dongliu Road, Binjiang

District, Hangzhou, Zhejiang, China

Manufacturer: Unitree

Address of Manufacturer: 3rd Floor, Building 1, Fengda Creative Park, No. 88 Dongliu Road, Binjiang

District, Hangzhou, Zhejiang, China

Factory: Unitree

Address of Factory: 3rd Floor, Building 1, Fengda Creative Park, No. 88 Dongliu Road, Binjiang

District, Hangzhou, Zhejiang, China

Equipment Under Test (EUT):

EUT Name: Quadruped Robot

Model No.: Go1,Go1 Air,Go1 Edu,Go1 Pro,Go1 Max,Go1 Nx,Go1 Pro Max¤

Please refer to section 2 of this report which indicates which model was

actually tested and which were electrically identical.

Standard(s): FCC Rules 47 CFR §2.1091

KDB447498 D01 General RF Exposure Guidance v06

Date of Receipt: 2021-09-02

Date of Test: 2021-11-05 to 2022-01-07 and 2022-05-05

Date of Issue: 2022-05-05

Test Result: Pass*

parlan shaw

Parlam Zhan Laboratory Manager

检验检测专用章

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



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| | Revision Record | | | | | | | |
|---------|----------------------|------------|---|--|--|--|--|--|
| Version | Date | Remark | | | | | | |
| 00 | Original | 2022-03-07 | / | | | | | |
| 01 | Added UWB assessment | 2022-05-05 | / | | | | | |
| | | | | | | | | |

| Authorized for issue by: | | |
|--------------------------|-------------------------------|---|
| | Wade thang | |
| | Wade Zhang / Project Engineer | - |
| | Darlam Zhan | |
| | Parlam Zhan /Reviewer | - |



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SGS

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

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General Information 3

3.1 **General Description of E.U.T.**

DC 22.2V 6Ah Battery Power supply:

Charger:

Model: KS150DU-2520600

Input: AC 100-240V, 50/60Hz, 2.5A

Output: DC 25.2V 6.0A

3.2 Technical Specifications

5G WiFi:

| Operation Frequency: | Band | Mode | Frequency Range(MHz) | Number of channels | | | | |
|----------------------|----------------------------|---------------------------|-------------------------|--------------------|--|--|--|--|
| | UNII Band III | 802.11a/n(HT20)/ac(HT20) | 5745-5825 | 5 | | | | |
| | | 802.11n(HT40)/ac(HT40) | 5755-5795 | 2 | | | | |
| | | 802.11ac(HT80) | 5775 | 1 | | | | |
| Modulation Type: | 802.11a: OFDM (| 64QAM, 16QAM, QPSK, BPSK) | | | | | | |
| | 802.11n: OFDM (| BPSK, QPSK, 16QAM, 64QAM) | | | | | | |
| | 802.11ac: OFDM | (BPSK, QPSK, 16QAM, 64QAM | , 256QAM) | | | | | |
| Date Rate: | 802.11a:6/9/12/18 | 8/24/36/48/54Mbps | | | | | | |
| | 802.11n: MCS0-N | 802.11n: MCS0-MCS7 | | | | | | |
| | 802.11ac: VHT M | ICS0-MCS7 | | | | | | |
| Channel Spacing: | 802.11a/n(HT20) | /ac(HT20): 20MHz | | | | | | |
| | 802.11n(HT40)/a | c(HT40): 40MHz | | | | | | |
| | 802.11ac(HT80): | 80MHz | | | | | | |
| TPC Function: | Not support | | | | | | | |
| DFS Function: | Slaver without ra | dar detection | | | | | | |
| Antenna Gain: | Antenna 1: 4dBi | | | | | | | |
| | Antenna 2: 4dBi | Antenna 2: 4dBi | | | | | | |
| | (Provided by manufacturer) | | | | | | | |
| | Directional gain: | | | | | | | |
| Antenna Type: | Antenna 1: Dipole | | | | | | | |
| | Antenna 2: Dipole | e antenna | | | | | | |

UWB:

| Location for use: | Indoors and Outdoors |
|---------------------|---------------------------------|
| Antenna Gain: | 0dBi (Provided by manufacturer) |
| Antenna Type: | Dipole Antenna |
| Modulation Type: | BPM-BPSK |
| Number of Channels: | 1 |
| Frequency range: | 4492.8MHz (3100MHz-10600MHz) |



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LTE:

| Hardware Version: | R1.0 | | | | | | |
|---------------------|---|------------------|------------------|--|--|--|--|
| Software Version: | EG25GGBR07A06M4G | | | | | | |
| Sample Type: | ☐ Portable Device, ☑Module | | | | | | |
| Antenna Type: | ⊠ External, ☐ Integrated | | | | | | |
| Antenna Gain: | GSM850: 2.29dBi; GSM1900:1.59dBi WCDMA BAND II:1.59dBi WCDMA BAND VI:2dBi WCDMA BAND V:2.29dBi LTE BAND 2:1.59dBi; LTE BAND 4:2dBi; LTE BAND 5:2.29dBi; LTE BAND 7: 3dBi; LTE BAND 12: 3.26dBi; LTE BAND 13: 4.45dBi; LTE BAND 25: 1.59dBi; LTE BAND 26: 2.53dBi; LTE BAND 38: 2.06dBi; | | | | | | |
| Characteristics | LTE BAND 41: 3dBi; Description | | | | | | |
| Orial acteriotics | | | | | | | |
| Dadia Custom Tuna | ☐ GSM ☐ UMTS | | | | | | |
| Radio System Type | | | | | | | |
| | ☑ LTE | T | | | | | |
| | BAND | TX | RX | | | | |
| | GSM850 | 824 to 849 MHz | 869 to 894 MHz | | | | |
| | GSM1900 | 1850 to 1910 MHz | 1930 to 1990 MHz | | | | |
| | UMTS BAND II | 1850 to 1910 MHz | 1930 to 1990 MHz | | | | |
| | UMTS BAND IV | 1710 to 1755 MHz | 2110 to 2155 MHz | | | | |
| Supported Frequency | UMTS BAND V | 824 to 849 MHz | 869 to 894 MHz | | | | |
| Range | LTE BAND 2 | 1850 to 1910 MHz | 1930 to 1990 MHz | | | | |
| | LTE BAND 4 | 1710 to 1755 MHz | 2110 to 2155 MHz | | | | |
| | LTE BAND 5 | 824 to 849 MHz | 869 to 894 MHz | | | | |
| | LTE BAND 7 | 2500 to 2570 MHz | 2620 to 2690 MHz | | | | |
| | LTE BAND 12 | 699 to 716 MHz | 729 to 746 MHz | | | | |



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| | LTE BAND 13 | 777 to 787 MHz | 746 to 756 MHz | |
|--|---|---|--|--|
| | LTE BAND 25 | 1850 to 1915MHz | 1930 to 1995 MHz | |
| | LTE BAND 26 (814 to 824 MHz) | 814 to 824MHz | 859 to 869 MHz | |
| | LTE BAND 26 (824 to 849 MHz) | 824 to 849 MHz | 869 to 894 MHz | |
| | LTE BAND 38 | 2570 to 2620MHz | 2570 to 2620MHz | |
| | LTE BAND 41 | 2496 to 2690MHz | 2496 to 2690MHz | |
| Target TX Output Power | GSM850:35 dBm GSM1900: 32dBm UMTS BAND II: 25dBm UMTS BAND IV: 25dBm UMTS BAND V: 25dBm LTE BAND 2: 25dBm LTE BAND 4: 25dBm LTE BAND 5: 25dBm LTE BAND 7: 25dBm LTE BAND 12: 25dBm LTE BAND 13: 25dBm LTE BAND 13: 25dBm LTE BAND 26: 25dBm LTE BAND 26: 25dBm LTE BAND 38: 25dBm LTE BAND 38: 25dBm LTE BAND 41: 25dBm | | | |
| | CCM austana: | NO 2 MILE | | |
| | GSM system: | ⊠0.2 MHz | | |
| | UMTS system: | ⊠0.2 MHz | | |
| | | | | |
| | UMTS system: | | 5 MHz; ⊠10 MHz; | |
| | UMTS system: LTE BAND 2 | | 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz | |
| 0 | UMTS system: LTE BAND 2 LTE BAND 4 | | 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz | |
| Supported Channel | UMTS system: LTE BAND 2 LTE BAND 4 LTE BAND 5 | | 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz 15 MHz, ⊠20 MHz | |
| Supported Channel Bandwidth | UMTS system: LTE BAND 2 LTE BAND 4 LTE BAND 5 LTE BAND 7 | □ 5 MHz □ 1.4 MHz; □ 3 MHz; □ 5 MHz □ 1.5 MHz, □ 20 MHz □ 1.4 MHz; □ 3 MHz; □ 5 MHz, □ 20 MHz □ 1.4 MHz; □ 3 MHz; □ 5 MHz; □ 1.4 MHz; □ 3 MHz; □ 5 MHz; □ 1.4 MHz; □ 3 MHz; □ 5 MHz; □ 1.4 MHz; □ 1.4 MHz; □ 1.4 MHz; □ 1.4 MHz; □ 1.5 MHz | 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz 15 MHz, ⊠20 MHz 5 MHz; ⊠10 MHz | |
| | UMTS system: LTE BAND 2 LTE BAND 4 LTE BAND 5 LTE BAND 7 LTE BAND 12 | | 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz 15 MHz, ⊠20 MHz 5 MHz; ⊠10 MHz | |
| | UMTS system: LTE BAND 2 LTE BAND 4 LTE BAND 5 LTE BAND 7 LTE BAND 12 LTE BAND 13 LTE BAND 25 | □ 5 MHz □ 1.4 MHz; □ 3 MHz; □ 5 MHz □ 1.5 MHz, □ 20 MHz □ 1.4 MHz; □ 3 MHz; □ 5 MHz, □ 20 MHz □ 1.4 MHz; □ 1.0 MHz; □ 1.4 MHz; □ 3 MHz; □ 5 MHz; □ 1.4 MHz | 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz 15 MHz, ⊠20 MHz 5 MHz; ⊠10 MHz | |
| | UMTS system: LTE BAND 2 LTE BAND 4 LTE BAND 5 LTE BAND 7 LTE BAND 12 LTE BAND 13 | □ 5 MHz □ 1.4 MHz; □ 3 MHz; □ 5 MHz □ 1.5 MHz, □ 20 MHz □ 1.4 MHz; □ 3 MHz; □ 5 MHz; □ 1.4 MHz; □ 1.4 MHz; □ 1.4 MHz; □ 1.4 MHz; □ 3 MHz; □ 5 MHz; □ 1.4 MHz; □ 1.5 MHz □ 1.5 MHz, □ 1.5 MHz □ 1.5 MHz, □ 1.5 MHz □ 1.5 | 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz 15 MHz, ⊠20 MHz 5 MHz; ⊠10 MHz 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz; | |
| | UMTS system: LTE BAND 2 LTE BAND 4 LTE BAND 5 LTE BAND 7 LTE BAND 12 LTE BAND 13 LTE BAND 25 LTE BAND 26(814-824) LTE BAND 26(824-849) | □ 5 MHz □ 1.4 MHz; □ 3 MHz; □ 5 MHz □ 15 MHz, □ 20 MHz □ 1.4 MHz; □ 3 MHz; □ 5 MHz; □ 1.4 | 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz 15 MHz, ⊠20 MHz 5 MHz; ⊠10 MHz 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz; | |
| | UMTS system: LTE BAND 2 LTE BAND 4 LTE BAND 5 LTE BAND 7 LTE BAND 12 LTE BAND 13 LTE BAND 25 LTE BAND 25 | □ 5 MHz □ 1.4 MHz; □ 3 MHz; □ 5 MHz □ 1.5 MHz, □ 20 MHz □ 1.4 MHz; □ 3 MHz; □ 5 MHz; □ 1.4 | 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz 15 MHz, ⊠20 MHz 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz; | |
| | UMTS system: LTE BAND 2 LTE BAND 4 LTE BAND 5 LTE BAND 7 LTE BAND 12 LTE BAND 13 LTE BAND 25 LTE BAND 26(814-824) LTE BAND 26(824-849) LTE BAND38 | □ 5 MHz □ 1.4 MHz; □ 3 MHz; □ 5 MHz □ 15 MHz, □ 20 MHz □ 1.4 MHz; □ 3 MHz; □ 5 MHz; □ 1.4 | 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz 15 MHz, ⊠20 MHz 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz; | |
| Bandwidth Characteristics | UMTS system: LTE BAND 2 LTE BAND 4 LTE BAND 5 LTE BAND 7 LTE BAND 12 LTE BAND 13 LTE BAND 25 LTE BAND 26(814-824) LTE BAND 26(824-849) LTE BAND 38 LTE BAND41 Description | □ 5 MHz □ 1.4 MHz; □ 3 MHz; □ 5 MHz □ 1.5 MHz, □ 20 MHz □ 1.5 MHz, □ 20 MHz □ 1.5 MHz; □ 1.0 MHz; □ 1.4 MHz; □ 1.0 MHz; □ 1.4 MHz; □ 1.0 MHz □ 1.4 MHz; □ 1.0 MHz □ 1.4 MHz; □ 1.5 MHz □ 1.5 MHz; □ 1.5 MHz □ 1.5 MHz; □ | 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz 15 MHz, ⊠20 MHz 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz; | |
| Bandwidth Characteristics Designation of | UMTS system: LTE BAND 2 LTE BAND 4 LTE BAND 5 LTE BAND 7 LTE BAND 12 LTE BAND 13 LTE BAND 25 LTE BAND 26(814-824) LTE BAND 26(824-849) LTE BAND 38 LTE BAND41 Description GSM850 | □ 5 MHz □ 1.4 MHz;□ 3 MHz;□ 5 MHz,□ 15 MHz,□ 20 MHz □ 1.4 MHz;□ 3 MHz;□ 5 MHz;□ 10 MHz;□ 5 MHz;□ 10 MHz;□ 5 MHz;□ 10 MHz;□ 5 MHz;□ 10 MHz;□ 15 MHz;□ 10 MHz;□ 15 MHz;□ 10 MHz;□ 15 MHz;□ 10 MHz | 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz 15 MHz, ⊠20 MHz 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz; | |
| Bandwidth Characteristics | UMTS system: LTE BAND 2 LTE BAND 4 LTE BAND 5 LTE BAND 7 LTE BAND 12 LTE BAND 13 LTE BAND 25 LTE BAND 26(814-824) LTE BAND 26(824-849) LTE BAND 38 LTE BAND 41 Description GSM850 GSM1900 | □ 5 MHz □ 1.4 MHz; □ 3 MHz; □ 5 MHz □ 1.4 MHz; □ 3 MHz; □ 5 MHz □ 1.4 MHz; □ 3 MHz; □ 5 MHz; □ 1.4 MHz; □ 3 MHz; □ 5 MHz; □ 1.4 MHz; □ 1.4 MHz; □ 1.4 MHz; □ 1.4 MHz; □ 3 MHz; □ 5 MHz □ 1.4 MHz; □ 3 MHz; □ 5 MHz □ 1.4 MHz; □ 3 MHz; □ 5 MHz □ 1.4 MHz; □ 3 MHz; □ 5 MHz □ 1.4 MHz; □ 3 MHz; □ 5 MHz □ 1.4 MHz; □ 3 MHz; □ 5 MHz □ 1.4 MHz; □ 3 MHz; □ 5 MHz □ 1.4 MHz; □ 1.5 MHz □ 1.4 MHz; □ 1.4 MHz; □ 1.5 MHz □ 1.4 MHz; □ 1.5 MHz □ 1.5 MHz □ 1.5 MHz □ 1.5 MHz; □ 1.5 | 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz 15 MHz, ⊠20 MHz 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz; | |
| Characteristics Designation of Emissions | UMTS system: LTE BAND 2 LTE BAND 4 LTE BAND 5 LTE BAND 7 LTE BAND 12 LTE BAND 13 LTE BAND 25 LTE BAND 26(814-824) LTE BAND 26(824-849) LTE BAND 38 LTE BAND 38 LTE BAND 41 Description GSM850 GSM1900 UMTS BAND II | □ 5 MHz □ 1.4 MHz;□ 3 MHz;□ 5 MHz,□ 15 MHz,□ 20 MHz □ 1.4 MHz;□ 3 MHz;□ 5 MHz,□ 15 MHz,□ 20 MHz □ 1.4 MHz;□ 3 MHz;□ 5 MHz;□ 10 MHz;□ 1.4 MHz;□ 3 MHz;□ 5 MHz;□ 10 MHz □ 1.4 MHz;□ 3 MHz;□ 5 MHz;□ 15 MHz,□ 20 MHz □ 1.4 MHz;□ 3 MHz;□ 5 MHz;□ 15 MHz;□ 10 MHz;□ 15 MHz;□ 10 MHz; | 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz 15 MHz, ⊠20 MHz 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz; | |
| Characteristics Designation of Emissions (Remark: the necessary | UMTS system: LTE BAND 2 LTE BAND 4 LTE BAND 5 LTE BAND 7 LTE BAND 12 LTE BAND 13 LTE BAND 25 LTE BAND 26(814-824) LTE BAND 26(824-849) LTE BAND 38 LTE BAND 38 LTE BAND 41 Description GSM850 GSM1900 UMTS BAND II UMTS BAND IV | □ 5 MHz □ 1.4 MHz;□ 3 MHz;□ 5 MHz,□ 15 MHz,□ 20 MHz □ 1.4 MHz;□ 3 MHz;□ 5 MHz,□ 10 MHz;□ 10 | 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz 15 MHz, ⊠20 MHz 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz; | |
| Characteristics Designation of Emissions (Remark: the necessary bandwidth of which is | UMTS system: LTE BAND 2 LTE BAND 4 LTE BAND 5 LTE BAND 7 LTE BAND 12 LTE BAND 13 LTE BAND 25 LTE BAND 26(814-824) LTE BAND 26(824-849) LTE BAND 38 LTE BAND 38 LTE BAND 41 Description GSM850 GSM1900 UMTS BAND II UMTS BAND IV UMTS BAND V | □ 5 MHz □ 1.4 MHz;□ 3 MHz;□ 5 MHz □ 1.5 MHz,□ 20 MHz □ 1.4 MHz;□ 3 MHz;□ 5 MHz,□ 20 MHz □ 1.4 MHz;□ 3 MHz;□ 5 MHz;□ 10 MHz;□ 5 MHz;□ 10 MHz □ 1.4 MHz;□ 3 MHz;□ 5 MHz;□ 15 MHz;□ 3 MHz;□ 5 MHz;□ 15 MHz;□ 3 MHz;□ 5 MHz;□ 15 MHz;□ 10 MHz;□ 15 MHz;□ 10 MHz;□ 15 MHz;□ 10 MHz;□ 15 MHz;□ 10 MHz;□ | 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz 15 MHz, ⊠20 MHz 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz; | |
| Characteristics Designation of Emissions (Remark: the necessary | UMTS system: LTE BAND 2 LTE BAND 4 LTE BAND 5 LTE BAND 7 LTE BAND 12 LTE BAND 13 LTE BAND 25 LTE BAND 26(814-824) LTE BAND 26(824-849) LTE BAND 38 LTE BAND 38 LTE BAND 41 Description GSM850 GSM1900 UMTS BAND II UMTS BAND IV | □ 5 MHz □ 1.4 MHz;□ 3 MHz;□ 5 MHz,□ 15 MHz,□ 20 MHz □ 1.4 MHz;□ 3 MHz;□ 5 MHz,□ 10 MHz;□ 10 | 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz 15 MHz, ⊠20 MHz 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz; 5 MHz; ⊠10 MHz; | |



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| the measured occupied | | 4M48G7D;4M49W7D |
|-----------------------|--------------------------|------------------------------------|
| bandwidths for each | | 8M93G7D;8M93W7D |
| | | 13M5G7D;13M5W7D |
| type of channel | | 17M9G7D;17M9W7D |
| bandwidth | | 1M10G7D;1M09W7D |
| configuration.) | | 2M70G7D;2M69W7D |
| | | 4M48G7D;4M49W7D |
| | LTE BAND 4 | 8M93G7D;8M91W7D |
| | | 13M4G7D;13M4W7D |
| | | 17M9G7D;13M4W7D |
| | | 1M09G7D;1M09W7D |
| | | 2M70G7D;2M69W7D; |
| | LTE BAND 5 | 4M48G7D;4M49W7D |
| | | |
| | | 8M93G7D;8M93W7D |
| | | 4M48G7D;4M49W7D 8M93G7D;8M91W7D |
| | LTE BAND 7 | |
| | | 13M5G7D;13M4W7D |
| | | 17M9G7D;17M9W7D |
| | LTE BAND 12 | 1M09G7D;1M09W7D |
| | | 2M70G7D;2M69W7D |
| | | 4M48G7D;4M50W7D |
| | | 8M93G7D;8M93W7D |
| | LTE BAND13 | 4M48G7D;4M49W7D |
| | | 8M91G7D;8M91W7D |
| | LTE BAND 25 | 1M09G7D;1M09W7D |
| | | 2M70G7D;2M69W7D |
| | | 4M47G7D;4M49W7D |
| | ETE BAILD 23 | 8M91G7D;8M95W7D |
| | | 13M5G7D;13M4W7D |
| | | 17M9G7D;17M9W7D |
| | | 1M09G7D;1M09W7D |
| | LTE BAND 26 (814-824) | 2M70G7D;2M69W7D |
| | | 4M48G7D;4M50W7D |
| to to | | 8M91G7D;8M91W7D |
| | | 1M09G7D;1M09W7D |
| | LTE BAND 26 | 2M70G7D;2M69W7D |
| | (824-849) | 4M48G7D;4M49W7D |
| | (024-049) | 8M95G7D;8M93W7D |
| | | 13M5G7D;13M4W7D |
| | | 4M48G7D;4M49W7D |
| | LTE DAND OO | 8M91G7D;8M91W7D |
| | LTE BAND 38 | 13M5G7D;13M5W7D |
| | | 17M8G7D;17M8W7D |
| | | 4M48G7D;4M50W7D |
| | LTE BAND 44 | 8M91G7D;8M91W7D |
| | LTE BAND 41 | 13M5G7D;13M5W7D |
| | | 17M9G7D;17M9W7D |
| | | |



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3.3 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. E&E Lab 588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China

Tel: +86 21 6191 5666 Fax: +86 21 6191 5678

No tests were sub-contracted.

3.4 Test Facility

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

CNAS (No. CNAS L0599)

CNAS has accredited SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• A2LA (Certificate No. 6332.01)

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. is accredited by the American Association for Laboratory Accreditation(A2LA).

• FCC (Designation Number: CN1301)

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been recognized as an accredited testing laboratory.

• ISED (CAB Identifier: CN0020)

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. EMC Laboratory has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory Company Number: 8617A

• VCCI (Member No.: 3061)

The 3m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-13868, C-14336, T-12221, G-10830 respectively.



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4 **Test Standards and Limits**

FCC Radiofrequency radiation exposure limits:

According to §1.1310, the limit for general population/uncontrolled exposures

| Frequency | Power density(mW/cm²) | Averaging time(minutes) | | |
|---------------|-----------------------|-------------------------|--|--|
| 300MHz~1.5GHz | f/1500 | 30 | | |
| 1.5GHz~100GHz | 1.0 | 30 | | |



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5 Measurement and Calculation

5.1 Maximum transmit power

The Power Data is based on the RF Test Report SHCR210800003202-5G WiFi.

| | Test | P | Power [dBm] | | | Power [mW] | | | |
|-----------|---------|-------|-------------|-------|-------|------------|-------|--|--|
| Test Mode | Channel | ANT1 | ANT2 | MIMO | ANT1 | ANT2 | MIMO | | |
| 11A | 5745 | 13.65 | 14.31 | N/A | 23.17 | 26.98 | N/A | | |
| 11A | 5785 | 13.58 | 13.84 | N/A | 22.80 | 24.21 | N/A | | |
| 11A | 5825 | 13.58 | 14.1 | N/A | 22.80 | 25.70 | N/A | | |
| 11N20 | 5745 | 12.92 | 14.09 | 16.55 | 19.59 | 25.64 | 45.19 | | |
| 11N20 | 5785 | | 13.98 | 16.73 | 22.08 | 25.00 | 47.10 | | |
| 11N20 | 5825 | 13.55 | 13.84 | 16.71 | 22.65 | 24.21 | 46.88 | | |
| 11N40 | 5755 | 14.17 | 15 | 17.62 | 26.12 | 31.62 | 57.81 | | |
| 11N40 | 5795 | 14.4 | 14.86 | 17.65 | 27.54 | 30.62 | 58.21 | | |
| 11AC20 | 5745 | 12.95 | 13.92 | 16.47 | 19.72 | 24.66 | 44.36 | | |
| 11AC20 | 5785 | 13.41 | 14.2 | 16.83 | 21.93 | 26.30 | 48.19 | | |
| 11AC20 | 5825 | 13.51 | 14 | 16.77 | 22.44 | 25.12 | 47.53 | | |
| 11AC40 | 5755 | 14.09 | 15.12 | 17.65 | 25.64 | 32.51 | 58.21 | | |
| 11AC40 | 5795 | 14.41 | 14.93 | 17.69 | 27.61 | 31.12 | 58.75 | | |
| 11AC80 | 5775 | 14.55 | 15.2 | 17.90 | 28.51 | 33.11 | 61.66 | | |

The Power Data is based on the RF Test Report SHCR210800003203-UWB.

| | Measured |
|-----------------|-----------------|
| Frequency (MHz) | Radiated Output |
| | Power (dBm) |
| 4492.8 | -53.61 |



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The Power Data is based on the RF Test Report HR/2019/1001601-LTE.

| Operating Band | Frequency (MHz) | Antenna Gain (dBi) | Max Conducted Average Output Power (dBm) | Output Power to Antenna (dBm) | EIRP(ERP) Limit (dBm) | Output Power to Antenna (mw) | Power Density at R = 20 cm (mW/cm2) | Limit (mW/cm2) | Gain according to EIRP (dBi) | Gain according to Pd (dBi) | Max Gain Allowed (dBi) | conclusion |
|-------------------|--------------------|--------------------------|---|---|-----------------------------|---------------------------------------|---|-------------------|---------------------------------------|----------------------------------|------------------------------|------------|
| GSM850 | 824.2 | 2.29 | 25.81 | 25.95 | 38.45 | 381.0658 | 0.1284 | 0.5495 | 14.79 | 8.60 | 8.60 | Pass |
| GSM1900 | 1850.2 | 1.59 | 22.81 | 24.40 | 33.00 | 190.9853 | 0.0548 | 1.0000 | 10.19 | 14.20 | 10.19 | Pass |
| WCDMAB2 | 1852.4 | 1.59 | 25.00 | 26.59 | 33.00 | 316.2278 | 0.0907 | 1.0000 | 8.00 | 12.01 | 8.00 | Pass |
| WCDMA B4 | 1712.4 | 2.00 | 25.00 | 27.00 | 30.00 | 316.2278 | 0.0997 | 1.0000 | 5.00 | 12.01 | 5.00 | Pass |
| WCDMAB5 | 826.4 | 2.29 | 25.00 | 25.14 | 38.45 | 316.2278 | 0.1066 | 0.5509 | 15.60 | 9.42 | 9.42 | Pass |
| LTE B2 | 1850.7 | 1.59 | 25.00 | 26.59 | 33.00 | 316.2278 | 0.0907 | 1.0000 | 8.00 | 12.01 | 8.00 | Pass |
| LTE B4 | 1710.7 | 2.00 | 25.00 | 27.00 | 30.00 | 316.2278 | 0.0997 | 1.0000 | 5.00 | 12.01 | 5.00 | Pass |
| LTE B5 | 824.70 | 2.29 | 25.00 | 25.14 | 38.45 | 316.2278 | 0.1066 | 0.5498 | 15.60 | 9.41 | 9.41 | Pass |
| LTE B7 | 2502.50 | 3.00 | 25.00 | 28.00 | 33.00 | 316.2278 | 0.1255 | 1.0000 | 8.00 | 12.01 | 8.00 | Pass |
| LTE B12 | 699.70 | 3.26 | 25.00 | 26.11 | 34.77 | 316.2278 | 0.1333 | 0.4665 | 11.92 | 8.70 | 8.70 | Pass |
| LTE B13 | 779.50 | 4.45 | 25.00 | 27.30 | 34.77 | 316.2278 | 0.1753 | 0.5197 | 11.92 | 9.16 | 9.16 | Pass |
| LTE B25 | 1850.7 | 1.59 | 25.00 | 26.59 | 33.00 | 316.2278 | 0.0907 | 1.0000 | 8.00 | 12.01 | 8.00 | Pass |
| LTE B26(814-824) | 814.7 | 2.53 | 25.00 | 25.38 | 50.00 | 316.2278 | 0.1126 | 0.5431 | 27.15 | 9.36 | 9.36 | Pass |
| LTE B26(824-849) | 824.7 | 2.53 | 25.00 | 25.38 | 38.45 | 316.2278 | 0.1126 | 0.5498 | 15.60 | 9.41 | 9.41 | Pass |
| LTE B38 | 2572.5 | 2.06 | 25.00 | 27.06 | 33.00 | 316.2278 | 0.1011 | 1.0000 | 8.00 | 12.01 | 8.00 | Pass |
| LTE B41 | 2498.5 | 3.00 | 25.00 | 28.00 | 33.00 | 316.2278 | 0.1255 | 1.0000 | 8.00 | 12.01 | 8.00 | Pass |



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5.2 MPE Calculation

According to the formula $S=P/4\pi R^2$, we can calculate S which is MPE.

Note:

- 1) P (mW)
- 2) R = distance to the center of radiation of antenna (in meter) = 20cm
- 3) MPE limit = 1mW/cm²

For 5GHz WiFi:

The max. antenna gain is

dBi

| Max. Conducted Power P(mW) | Gain in Linear Scale G | Operation Distance R(cm) | Power Density (mW/cm²) | Limit (mW/cm²) | Result |
|-------------------------------------|------------------------------|--------------------------------|------------------------------|-------------------|--------|
| 33.11 | 2.512 | 20 | 0.01655 | 1 | Pass |

In MIMO mode:

The max. antenna gain is

7.01 dBi

| Max. Conducted Power P(mW) | Gain in Linear Scale G | Operation Distance R(cm) | Power Density (mW/cm ²) | Limit (mW/cm²) | Result |
|-------------------------------------|------------------------------|--------------------------------|---|-------------------|--------|
| 61.66 | 5.023 | 20 | 0.06162 | 1 | Pass |

For GSM/LTE:

| Operating Band | Frequency (MHz) | Antenna Gain (dBi) | Max Conducted Average Output Power (dBm) | Output Power to Antenna (dBm) | EIRP(ERP) Limit (dBm) | Output Power to Antenna (mw) | Power Density at R = 20 cm (mW/cm2) | Limit (mW/cm2) | Gain according to EIRP (dBi) | Gain according to Pd (dBi) | Max Gain Allowed (dBi) | conclusion |
|-------------------|--------------------|--------------------------|---|---|-----------------------------|---------------------------------------|---|-------------------|---------------------------------------|----------------------------------|------------------------------|------------|
| GSM850 | 824.2 | 2.29 | 25.81 | 25.95 | 38.45 | 381.0658 | 0.1284 | 0.5495 | 14.79 | 8.60 | 8.60 | Pass |
| GSM1900 | 1850.2 | 1.59 | 22.81 | 24.40 | 33.00 | 190.9853 | 0.0548 | 1.0000 | 10.19 | 14.20 | 10.19 | Pass |
| WCDMAB2 | 1852.4 | 1.59 | 25.00 | 26.59 | 33.00 | 316.2278 | 0.0907 | 1.0000 | 8.00 | 12.01 | 8.00 | Pass |
| WCDMAB4 | 1712.4 | 2.00 | 25.00 | 27.00 | 30.00 | 316.2278 | 0.0997 | 1.0000 | 5.00 | 12.01 | 5.00 | Pass |
| WCDMAB5 | 826.4 | 2.29 | 25.00 | 25.14 | 38.45 | 316.2278 | 0.1066 | 0.5509 | 15.60 | 9.42 | 9.42 | Pass |
| LTE B2 | 1850.7 | 1.59 | 25.00 | 26.59 | 33.00 | 316.2278 | 0.0907 | 1.0000 | 8.00 | 12.01 | 8.00 | Pass |
| LTE B4 | 1710.7 | 2.00 | 25.00 | 27.00 | 30.00 | 316.2278 | 0.0997 | 1.0000 | 5.00 | 12.01 | 5.00 | Pass |
| LTE B5 | 824.70 | 2.29 | 25.00 | 25.14 | 38.45 | 316.2278 | 0.1066 | 0.5498 | 15.60 | 9.41 | 9.41 | Pass |
| LTE B7 | 2502.50 | 3.00 | 25.00 | 28.00 | 33.00 | 316.2278 | 0.1255 | 1.0000 | 8.00 | 12.01 | 8.00 | Pass |
| LTE B12 | 699.70 | 3.26 | 25.00 | 26.11 | 34.77 | 316.2278 | 0.1333 | 0.4665 | 11.92 | 8.70 | 8.70 | Pass |
| LTE B13 | 779.50 | 4.45 | 25.00 | 27.30 | 34.77 | 316.2278 | 0.1753 | 0.5197 | 11.92 | 9.16 | 9.16 | Pass |
| LTE B25 | 1850.7 | 1.59 | 25.00 | 26.59 | 33.00 | 316.2278 | 0.0907 | 1.0000 | 8.00 | 12.01 | 8.00 | Pass |
| LTE B26(814-824) | 814.7 | 2.53 | 25.00 | 25.38 | 50.00 | 316.2278 | 0.1126 | 0.5431 | 27.15 | 9.36 | 9.36 | Pass |
| LTE B26(824-849) | 824.7 | 2.53 | 25.00 | 25.38 | 38.45 | 316.2278 | 0.1126 | 0.5498 | 15.60 | 9.41 | 9.41 | Pass |
| LTE B38 | 2572.5 | 2.06 | 25.00 | 27.06 | 33.00 | 316.2278 | 0.1011 | 1.0000 | 8.00 | 12.01 | 8.00 | Pass |
| LTE B41 | 2498.5 | 3.00 | 25.00 | 28.00 | 33.00 | 316.2278 | 0.1255 | 1.0000 | 8.00 | 12.01 | 8.00 | Pass |



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For UWB:

The max. antenna gain is 0 dBi

| Max. Conducted Power P(mW) | Gain in Linear Scale G | Operation Distance R(cm) | Power Density (mW/cm ²) | Limit (mW/cm²) | Result |
|----------------------------|------------------------------|--------------------------------|--|-------------------|--------|
| 0.000004355 | 1.000 | 20 | 0.000000001 | 1 | Pass |

Consider the GSM/LTE Module, UWB and 5G WIFI module can simultaneous transmitting, so the maximum rate of MPE is 0.06162/1+0.1284/0.5495+0.000000001/1=0.295 mW/cm²<1 mW/cm². So according to the KDB447498 section 7.2 determine the device is exclusion from SAR test..

-- End of the Report--



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