LAB N° 1356 L

| | |
|---|---|
| **Applicant:** | CUSTOM S.p.A<br>Via Berettine 2/B – 43010 Fontevivo – Parma - Italy<br>Phone: 0521 680111 |
| **Trademark:** | CUSTOM® |
| **Test item:** | Printer MP RANGER USB TH FI BLACK IT |
| **Identification / Type No.:** | **MP350** |
| **FCC ID** | **OAH-5040120** |
| **Order content:** | Photo EUT and test setup according to the following standard: |
| **Test specification:** | **FCC Part 15, Subpart C (15.247)** |
| **Date of receipt:** | 22/02/2022 |
| **Internal storage No.:** | A003216149-003 |
| **Testing period:** | From 30/03/2022 to 20/04/2022 |
| **Place of testing:** | TÜV Rheinland Italia S.r.l.<br>Via E. Mattei, 3<br>20005 Pogliano Milanese – Milano – Italy |
| **Testing laboratory:** | TÜV Rheinland Italia S.r.l.<br>Via E. Mattei, 3<br>20005 Pogliano Milanese – Milano – Italy |
| **Test result:** | **PASS** |

| | | | |
|---|---|---|---|
| **Tested by:** | Francesco Lombardi | **Authorized by:** | Giovanni Molteni |
| **Date:** 16/09/2022 | (Laboratory Technician) | **Date:** 16/09/2022 | (Laboratory Manager) |
| **Position** | Sachverständige(r)/Expert | **Position** | Sachverständige(r)/Expert |

**Condition of the test item at delivery:** *Test item complete and undamaged*

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## 1. General description of test item(s)

| | |
|---|---|
| **Description** | Printer MP RANGER USB TH FI BLACK IT |
| **Model** | MP350 |
| **Serial number** | ESB1026121280071 |
| **Part number** | 911MM010100P33 |
| **Manufacturer** | CUSTOM S.p.A |
| **Country of manufacturer** | Italy |
| **Trademark** | CUSTOM® |
| **Power supply** | DC Power |
| **Supply voltage** | Internal Battery (Technology: Lithium-ion) |
| **Battery model name** | INR18650-2S1P |
| **Battery voltage-capacity** | 7.2V 2.6Ah 18.72Wh |
| **Battery cycle** | 750 |
| **Battery life (print)** | 720 minutes x 300 tickets |
| **Manufacturer (Battery)** | Shenzhen Hypercell Co.,LTD |
| **Equipment type** | Intentional radiator |
| **Hardware version** | St145-c |

| | |
|---|---|
| **Software version** | 1.22 |
| **Dimensions** | 149(L) x 53(H) x 122(P) mm |
| **Weight** | 475gr (with battery included) |
| **Printing width** | 76.2 mm and 80 mm |
| **Operating temperature** | From -10°C to +50°C |
| **Operating humidity (RH)** | Form 10% to 95% |
| **EUT standing** | Portable |
| **Test sample obtaining:** | ☒ Sampling by customer<br>☐ Sampling by TÜV Rheinland Group<br>☐ others: |

## 2. Equipment using during test

Equipment under test

| No. | Product type | Manufacturer | Model | Comments |
|---|---|---|---|---|
| 1 | Printer MP RANGER USB TH FI BLACK IT | CUSTOM S.p.A. | MP350 | --- |

Auxiliary Equipment / Peripherals

| Nr. | Product type | Manufacturer | Model | Comments |
|---|---|---|---|---|
| 1 | Laboratory PC | DELL | --- | - used to enable wireless communication (Bluetooth Low Energy, Bluetooth Enhanced Data Rate & Wi-Fi) on EUT, via software Printerset. |
| | | | | - used ESP_RF_test_tool_v1.1.0, for setting the radio module in the following radio communications: BLE, BT EDR & Wi-Fi |
| 2 | Cradle 1 slot P-Ranger | CUSTOM S.p.A | --- | - used to charge battery |
| 3 | Switching power adapter | CUSTOM S.p.A | POWER SUPPLY FOR CRADLE 4 SLOTS P-RANGER | - use to power supply cradle |

Input/Output ports

| No. | Name | Type | Cable length | Cable shielded | Comments |
|---|---|---|---|---|---|
| **1** | Enclosure port | Plastic | --- | --- | closed by snaps |
| **2** | AC power port | --- | --- | --- | port not present |
| **3** | DC power port | Internal battery | --- | --- | Battery model: INR18650-2S1P |
| **4** | Signal control port | --- | | | port not present |
| **5** | Wired network port | --- | | | port not present |

EUT modification

| |
|---|
| None |

## 3. Radio module identification (Bluetooth Low Energy)

| BLE module & Antenna technical data | |
|---|---|
| Module manufacturer | ESPRESSIF |
| Radio type | Transceiver |
| Chip radio | ESP32-PICO-D4 |
| Type of equipment | ☐ stand-alone equipment<br>☒ combined equipment<br>☐ multi-radio equipment |
| ETS Category | Bluetooth Low Energy |
| Bluetooth Channel / Frequency | 2402 - 2480MHz |
| Number of channels | 40 |
| Channel bandwidth | 1MHz |
| Channel separation | 2MHz |
| Modulation type | ☐ Frequency hopping (FHSS) equipment (Bluetooth classic)<br>☒ Wideband data transmission (non-FHSS equipment) (BLE) |
| Modulation | GFSK |
| Sensitivity | -97 dBm |
| Transmit operating mode | ☒ single antenna<br>☐ multiple antennas, no beamforming<br>☐ multiple antennas, with beamforming |
| With regard adaptivity, the type of equipment | ☐ non-adaptive equipment<br>☐ adaptive equipment<br>☒ Equipment that can operate in both an adaptive and non-adaptive mode; |

| | |
|---|---|
| Spectrum access mechanism | ☐ LBT (Listen Before Talk) Technique<br>☐ DAA (Detect And Avoid) Technique<br>☒ Duty cycle |
| Environmental equipment | ☒ Test only in normal conditions<br>☐ Test in normal conditions and extreme conditions |
| Equipment that support a geo-location capability | ☐ Yes<br>☒ No |

## 4. Channel list Bluetooth Low Energy

| CHANNEL | FREQUENCY | CHANNEL | FREQUENCY | CHANNEL | FREQUENCY | CHANNEL | FREQUENCY |
|---|---|---|---|---|---|---|---|
| 0 | 2402 | 10 | 2422 | 20 | 2442 | 30 | 2462 |
| 1 | 2404 | 11 | 2424 | 21 | 2444 | 31 | 2464 |
| 2 | 2406 | 12 | 2426 | 22 | 2446 | 32 | 2466 |
| 3 | 2408 | 13 | 2428 | 23 | 2448 | 33 | 2468 |
| 4 | 2410 | 14 | 2430 | 24 | 2450 | 34 | 2470 |
| 5 | 2412 | 15 | 2432 | 25 | 2452 | 35 | 2472 |
| 6 | 2414 | 16 | 2434 | 26 | 2454 | 36 | 2474 |
| 7 | 2416 | 17 | 2436 | 27 | 2456 | 37 | 2476 |
| 8 | 2418 | 18 | 2438 | 28 | 2458 | 38 | 2478 |
| 9 | 2420 | 19 | 2440 | 29 | 2460 | 39 | 2480 |

## 5. Radio module identification (Bluetooth Basic Rate / Enhanced Data Rate)

| **Bluetooth Basic Rate / Enhanced Data Rate module & Antenna technical data** | |
|---|---|
| Module manufacturer | ESPRESSIF |
| Radio type | Transceiver |
| Chip radio | ESP32-PICO-D4 |
| Type of equipment | ☐ stand-alone equipment<br>☒ combined equipment<br>☐ multi-radio equipment |
| ETS Category | Bluetooth - BR & EDR |
| Bluetooth Channel / Frequency | 2402 - 2480MHz |
| Number of channels | 79 |
| Channel bandwidth | 1MHz |
| Channel separation | 1MHz |
| Modulation type | ☒ Frequency hopping (FHSS) equipment (Bluetooth classic)<br>☐ Wideband data transmission (non-FHSS equipment) (BLE) |
| Sensitivity | -97 dBm |
| Transmit operating mode | ☒ single antenna<br>☐ multiple antennas, no beamforming<br>☐ multiple antennas, with beamforming |
| With regard adaptivity, the type of equipment | ☐ non-adaptive equipment<br>☐ adaptive equipment<br>☒ Equipment that can operate in both an adaptive and non-adaptive mode; |

| | |
|---|---|
| Spectrum access mechanism | ☐ LBT (Listen Before Talk) Technique<br>☐ DAA (Detect And Avoid) Technique<br>☒ Duty cycle |
| Environmental equipment | ☒ Test only in normal conditions<br>☐ Test in normal conditions and extreme conditions |
| Equipment that support a geo-location capability | ☐ Yes<br>☒ No |

## 6. Channel list Bluetooth Basic Rate / Enhanced Data Rate

| CHANNEL | FREQUENCY | CHANNEL | FREQUENCY | CHANNEL | FREQUENCY | CHANNEL | FREQUENCY |
|---|---|---|---|---|---|---|---|
| 0 | 2402 | 20 | 2422 | 40 | 2442 | 60 | 2462 |
| 1 | 2403 | 21 | 2423 | 41 | 2443 | 61 | 2463 |
| 2 | 2404 | 22 | 2424 | 42 | 2444 | 62 | 2464 |
| 3 | 2405 | 23 | 2425 | 43 | 2445 | 63 | 2465 |
| 4 | 2406 | 24 | 2426 | 44 | 2446 | 64 | 2466 |
| 5 | 2407 | 25 | 2427 | 45 | 2447 | 65 | 2467 |
| 6 | 2408 | 26 | 2428 | 46 | 2448 | 66 | 2468 |
| 7 | 2409 | 27 | 2429 | 47 | 2449 | 67 | 2469 |
| 8 | 2410 | 28 | 2430 | 48 | 2450 | 68 | 2470 |
| 9 | 2411 | 29 | 2431 | 49 | 2451 | 69 | 2471 |
| 10 | 2412 | 30 | 2432 | 50 | 2452 | 70 | 2472 |
| 11 | 2413 | 31 | 2433 | 51 | 2453 | 71 | 2473 |
| 12 | 2414 | 32 | 2434 | 52 | 2454 | 72 | 2474 |
| 13 | 2415 | 33 | 2435 | 53 | 2455 | 73 | 2475 |
| 14 | 2416 | 34 | 2436 | 54 | 2456 | 74 | 2476 |
| 15 | 2417 | 35 | 2437 | 55 | 2457 | 75 | 2477 |
| 16 | 2418 | 36 | 2438 | 56 | 2458 | 76 | 2478 |
| 17 | 2419 | 37 | 2439 | 57 | 2459 | 77 | 2479 |
| 18 | 2420 | 38 | 2440 | 58 | 2460 | 78 | 2480 |
| 19 | 2421 | 39 | 2441 | 59 | 2461 | | |

## 7. Radio module identification (Wi-Fi)

| **Wi-Fi module & Antenna technical data** | |
|---|---|
| Module manufacturer | ESPRESSIF |
| Radio type | Transceiver |
| Chip radio | ESP32-PICO-D4 |
| Type of equipment | ☐ stand-alone equipment<br>☒ combined equipment<br>☐ multi-radio equipment |
| Protocols | 802.11 b/g/n (802.11n up to 150 Mbps) |
| Frequency range | 2400 – 2500GHz |
| Channel bandwidth | 22MHz |
| Channel separation | 5MHz |
| Number of channel | 11 |
| Modulation type | ☐ Frequency hopping (FHSS) equipment<br>☒ Wideband data transmission (non-FHSS equipment) (DSS, CCK, OFDM, HT20, HT40, MCS32) |
| Sensitivity | DSSS, 1 Mbps -98dBm<br>CCK, 11 Mbps -91dBm<br>OFDM, 6 Mbps -93dBm<br>OFDM, 54 Mbps -75dBm<br>HT20, MCS0 -93dBm<br>HT20, MCS7 -73dBm<br>HT40, MCS0 -90dBm<br>HT40, MCS7 -70dBm<br>MCS32 -89dBm |
| Transmit operating mode | ☒ single antenna<br>☐ multiple antennas, no beamforming<br>☐ multiple antennas, with beamforming |

| | |
|---|---|
| With regard adaptivity, the type of equipment | ☐ non-adaptive equipment<br>☐ adaptive equipment<br>☒ Equipment that can operate in both an adaptive and non-adaptive mode; |
| Spectrum access mechanism | ☐ LBT (Listen Before Talk) Technique<br>☐ DAA (Detect And Avoid) Technique<br>☒ Duty cycle |
| Environmental equipment | ☒ Test only in normal conditions<br>☐ Test in normal conditions and extreme conditions |
| Equipment that support a geo-location capability | ☐ Yes<br>☒ No |

## 8. Channel list Wi-Fi

| CHANNEL | FREQUENCY | CHANNEL | FREQUENCY | CHANNEL | FREQUENCY |
|---|---|---|---|---|---|
| 1 | 2412 | 6 | 2437 | 11 | 2462 |
| 2 | 2417 | 7 | 2442 | | |
| 3 | 2422 | 8 | 2447 | | |
| 4 | 2427 | 9 | 2452 | | |
| 5 | 2432 | 10 | 2457 | | |

| | | |
|---|---|---|
| Antenna | Description: | AMCA31-2R450G-S1F-T3 |
| | Peak Gain: | 0.5 dBi |
| | Type: | ☐ External antenna<br>☒ Dedicated antenna<br>☐ Integral antenna |
| | Frequency | 2450 MHz |
| | Impedance | 50 Ω |
| | Manufacturer | ABRACON LLC |

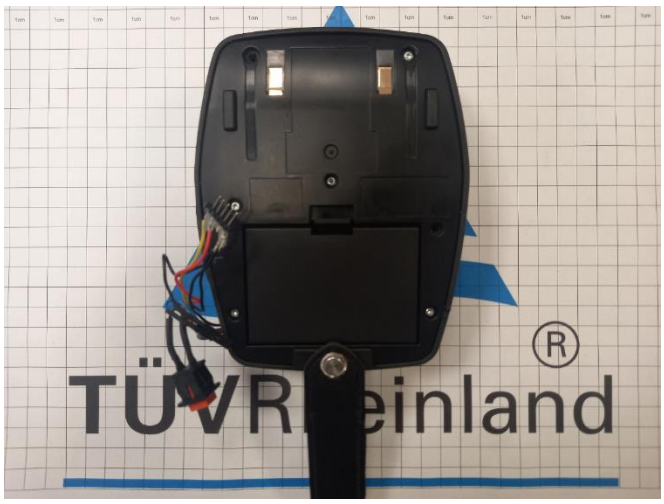
| | | |
|---|---|---|
| Antenna | Description: | Chip-Antenna WE-MCA |
| | Peak Gain: | 0.5 dBi |
| | Type: | ☐ External antenna<br>☒ Dedicated antenna<br>☐ Integral antenna |
| | Frequency | 2400 - 2500 MHz |
| | Impedance | 50 Ω |
| | Manufacturer | WÜRTH ELEKTRONIK |

*Note: The test has been performed with Antenna AMCA31-2R450G-S1F-T3, manufacturer Abracon.*

## 9. Change history

| Test report number | List of revisions | Date |
|---|---|---|
| IT22O6EX 001 | First edition | 16/09/2022 |

## 10. EUT identification (external photos)

| Picture 1 | Picture 2 |
|---|---|
| |  |
| Picture 3 | Picture 4 |
| | |

**--- END OF TEST REPORT ---**