

## RF Exposure Evaluation Report

Report Reference No.....: MTEB23040077-H

FCC ID.....: 2A4WZ-WS01M1

Compiled by

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Date of issue.....: April 14,2023

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**Applicant's name.....:** ENGINE TECHNOLOGY LIMITED

Address .....: No.2, Hangtian South Road, Longquanyi District, Chengdu City, Sichuan Province

**Test specification/ Standard .....:** 47 CFR Part 1.1307;47 CFR Part 1.1310  
KDB447498D01 General RF Exposure Guidance v06

TRF Originator.....: Shenzhen Most Technology Service Co., Ltd.

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**Test item description .....:** ULTRA SHORT FOCAL INTELLIGENT PROJECTOR

Trade Mark .....:  WITSEER

Manufacturer .....: ENGINE TECHNOLOGY LIMITED

Model/Type reference .....: WS01-M10

Listed Models .....: WS01-M11,WS01-M12

Modulation Type.....: GFSK,  $\pi/4$ DQPSK, 8DPSK/CCK/DSSS/ OFDM

Operation Frequency.....: GFSK,  $\pi/4$ DQPSK, 8DPSK: From 2402 - 2480MHz  
CCK/DSSS/ OFDM :From 2412 - 2462MHz  
OFDM:5180MHz-5240MHz

Rating .....: DC 19V by Adapter  
(Input: AC 100-240V~50/60Hz 1.8A  
Output: DC 19V=4.7A MAX)

Hardware version .....: P9\_MAIN\_V2.X

Software version .....: 2.X.X.X\_XXXXXXXXX

Result .....: **PASS**

## TEST REPORT

Equipment under Test : ULTRA SHORT FOCAL INTELLIGENT PROJECTOR

Model /Type : WS01-M10

Listed Models : WS01-M11,WS01-M12

Remark : Only the appearance color and outer packaging are different.

Applicant : ENGINE TECHNOLOGY LIMITED

Address : No.2, Hangtian South Road, Longquanyi District, Chengdu City,  
Sichuan Province

Manufacturer : ENGINE TECHNOLOGY LIMITED

Address : No.2, Hangtian South Road, Longquanyi District, Chengdu City,  
Sichuan Province

|                     |             |
|---------------------|-------------|
| <b>Test Result:</b> | <b>PASS</b> |
|---------------------|-------------|

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

## 1. Revision History

| Revision | Issue Date | Revisions     | Revised By |
|----------|------------|---------------|------------|
| 00       | 2023.04.14 | Initial Issue | Alisa Luo  |
|          |            |               |            |
|          |            |               |            |

## 2. SAR Evaluation

### 2.1 RF Exposure Compliance Requirement

#### 2.1.1 Standard Requirement

According to KDB447498D01 General RF Exposure Guidance v06

##### 4.3.1. Standalone SAR test exclusion considerations

Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Exclusion Threshold condition, listed below, is satisfied.

#### 2.1.2 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<br>(MHz)                                       | Electric field<br>strength<br>(V/m) | Magnetic field<br>strength<br>(A/m) | Power density<br>(mW/cm <sup>2</sup> ) | Averaging time<br>(minutes) |
|----------------------------------------------------------------|-------------------------------------|-------------------------------------|----------------------------------------|-----------------------------|
| <b>(A) Limits for Occupational/Controlled Exposures</b>        |                                     |                                     |                                        |                             |
| 0.3–3.0 .....                                                  | 614                                 | 1.63                                | *(100)                                 | 6                           |
| 3.0–30 .....                                                   | 1842/f                              | 4.89/f                              | *(900/f <sup>2</sup> )                 | 6                           |
| 30–300 .....                                                   | 61.4                                | 0.163                               | 1.0                                    | 6                           |
| 300–1500 .....                                                 | .....                               | .....                               | f/300                                  | 6                           |
| 1500–100,000 .....                                             | .....                               | .....                               | 5                                      | 6                           |
| <b>(B) Limits for General Population/Uncontrolled Exposure</b> |                                     |                                     |                                        |                             |
| 0.3–1.34 .....                                                 | 614                                 | 1.63                                | *(100)                                 | 30                          |
| 1.34–30 .....                                                  | 824/f                               | 2.19/f                              | *(180/f <sup>2</sup> )                 | 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:  $P_d = (P_{out} * G) / (4 * \pi * R^2)$  Where

$P_d$  = power density in mW/cm<sup>2</sup>

$P_{out}$  = output power to antenna in mW

G = gain of antenna in linear scale

$\pi$  = 3.1416

R = distance between observation point and center of the radiator in cm

$P_d$  is the limit of MPE, 1 mW/cm<sup>2</sup>. 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.

### 2.1.3 EUT RF Exposure

Antenna Gain: 2.55dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.4 in linear scale. Output Power Into Antenna & RF Exposure Evaluation Distance:

#### WIFI 2.4G

| 802.11b          |                         |                         |                       |
|------------------|-------------------------|-------------------------|-----------------------|
| Test channel     | Peak Output Power (dBm) | Tune up tolerance (dBm) | Maximum tune-up Power |
|                  |                         |                         | (dBm)                 |
| Lowest(2412 MHz) | 17.51                   | $17.51 \pm 1$           | 18.51                 |
| Middle(2437MHz)  | 17.88                   | $17.88 \pm 1$           | 18.88                 |
| Highest(2462MHz) | 16.16                   | $16.16 \pm 1$           | 17.16                 |

| 802.11g          |                         |                         |                       |
|------------------|-------------------------|-------------------------|-----------------------|
| Test channel     | Peak Output Power (dBm) | Tune up tolerance (dBm) | Maximum tune-up Power |
|                  |                         |                         | (dBm)                 |
| Lowest(2412 MHz) | 15.13                   | $15.13 \pm 1$           | 16.13                 |
| Middle(2437MHz)  | 15.84                   | $15.84 \pm 1$           | 16.84                 |
| Highest(2462MHz) | 13.16                   | $13.16 \pm 1$           | 14.16                 |

| 802.11n(HT20)    |                         |                         |                       |
|------------------|-------------------------|-------------------------|-----------------------|
| Test channel     | Peak Output Power (dBm) | Tune up tolerance (dBm) | Maximum tune-up Power |
|                  |                         |                         | (dBm)                 |
| Lowest(2412 MHz) | 14.12                   | $14.12 \pm 1$           | 15.12                 |
| Middle(2437MHz)  | 15.22                   | $15.22 \pm 1$           | 16.22                 |
| Highest(2462MHz) | 12.57                   | $12.57 \pm 1$           | 13.57                 |

#### WIFI

| Worst case: 802.11n(HT20) |                                           |                                          |                    |                                                  |       |        |
|---------------------------|-------------------------------------------|------------------------------------------|--------------------|--------------------------------------------------|-------|--------|
| Channel                   | Maximum Peak Conducted Output Power (dBm) | Maximum Peak Conducted Output Power (MW) | Antenna Gain (dBi) | Power Density at R = 20 cm (mW/cm <sup>2</sup> ) | Limit | Result |
| Highest(2412 MHz)         | 18.88                                     | 77.26                                    | 2.55               | 0.026                                            | 1.0   | Pass   |

Note: 1) Refer to report **MTEB23040077-R2** for EUT test Max Conducted average Output Power value.

Note: 2)  $P_d = (P_{out} * G) / (4 * \pi * R^2) = (77.26 * 1.79) / (4 * 3.1416 * 20^2) = 0.027$

Note: 3) EUT's Bluetooth module is more than 20cm away from the human body.

## BT classic

| GFSK             |                         |                         |                       |
|------------------|-------------------------|-------------------------|-----------------------|
| Test channel     | Peak Output Power (dBm) | Tune up tolerance (dBm) | Maximum tune-up Power |
|                  |                         |                         | (dBm)                 |
| Lowest(2402MHz)  | -2.517                  | $-2.517 \pm 1$          | -1.517                |
| Middle(2441MHz)  | -1.756                  | $-1.756 \pm 1$          | -0.756                |
| Highest(2480MHz) | -1.552                  | $-1.552 \pm 1$          | -0.552                |

| $\pi$ /4DQPSK    |                         |                         |                       |
|------------------|-------------------------|-------------------------|-----------------------|
| Test channel     | Peak Output Power (dBm) | Tune up tolerance (dBm) | Maximum tune-up Power |
|                  |                         |                         | (dBm)                 |
| Lowest(2402MHz)  | -1.502                  | $-1.502 \pm 1$          | -0.502                |
| Middle(2441MHz)  | -0.813                  | $-0.813 \pm 1$          | 0.187                 |
| Highest(2480MHz) | -0.670                  | $-0.670 \pm 1$          | 0.330                 |

| 8DPSK            |                         |                         |                       |
|------------------|-------------------------|-------------------------|-----------------------|
| Test channel     | Peak Output Power (dBm) | Tune up tolerance (dBm) | Maximum tune-up Power |
|                  |                         |                         | (dBm)                 |
| Lowest(2402MHz)  | -1.069                  | $-1.069 \pm 1$          | -0.069                |
| Middle(2441MHz)  | -0.377                  | $-0.377 \pm 1$          | 0.623                 |
| Highest(2480MHz) | -0.253                  | $-0.253 \pm 1$          | 0.747                 |

| Worst case: 8DPSK |                                           |                                          |                    |                                                  |       |        |
|-------------------|-------------------------------------------|------------------------------------------|--------------------|--------------------------------------------------|-------|--------|
| Channel           | Maximum Peak Conducted Output Power (dBm) | Maximum Peak Conducted Output Power (MW) | Antenna Gain (dBi) | Power Density at R = 20 cm (mW/cm <sup>2</sup> ) | Limit | Result |
| Highest(2441 MHz) | 0.623                                     | 1.15                                     | 2.55               | 0.0004                                           | 1.0   | Pass   |

Note: 1) Refer to report **MTEB23040077-R1** for EUT test Max Conducted average Output Power value.

Note: 2)  $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2) = (1.15 \cdot 1.79) / (4 \cdot 3.1416 \cdot 20^2) = 0.0004$

Note: 3) EUT's Bluetooth module is more than 20cm away from the human body.

## WIFI 5G

| IEEE for 802.11a |                         |                         |                       |
|------------------|-------------------------|-------------------------|-----------------------|
| Test channel     | Peak Output Power (dBm) | Tune up tolerance (dBm) | Maximum tune-up Power |
|                  |                         |                         | (dBm)                 |
| 36               | 12.30                   | $12.30 \pm 1$           | 13.30                 |
| 40               | 11.82                   | $11.82 \pm 1$           | 12.82                 |
| 48               | 12.58                   | $12.58 \pm 1$           | 13.58                 |

| IEEE for 802.11n(HT20) |                         |                         |                       |
|------------------------|-------------------------|-------------------------|-----------------------|
| Test channel           | Peak Output Power (dBm) | Tune up tolerance (dBm) | Maximum tune-up Power |
|                        |                         |                         | (dBm)                 |
| 36                     | 13.36                   | $13.36 \pm 1$           | 14.36                 |
| 40                     | 13.30                   | $13.30 \pm 1$           | 14.30                 |
| 48                     | 15.20                   | $15.20 \pm 1$           | 16.20                 |

| IEEE for 802.11n(HT40) |                         |                         |                       |
|------------------------|-------------------------|-------------------------|-----------------------|
| Test channel           | Peak Output Power (dBm) | Tune up tolerance (dBm) | Maximum tune-up Power |
|                        |                         |                         | (dBm)                 |
| 38                     | 15.30                   | $15.30 \pm 1$           | 16.30                 |
| 46                     | 15.01                   | $15.01 \pm 1$           | 16.01                 |

| IEEE for 802.11ac(HT20) |                         |                         |                       |
|-------------------------|-------------------------|-------------------------|-----------------------|
| Test channel            | Peak Output Power (dBm) | Tune up tolerance (dBm) | Maximum tune-up Power |
|                         |                         |                         | (dBm)                 |
| 36                      | 14.30                   | $14.30 \pm 1$           | 15.30                 |
| 40                      | 13.55                   | $13.55 \pm 1$           | 13.55                 |
| 48                      | 15.41                   | $15.41 \pm 1$           | 15.41                 |

| IEEE for 802.11ac(HT40) |                         |                         |                       |
|-------------------------|-------------------------|-------------------------|-----------------------|
| Test channel            | Peak Output Power (dBm) | Tune up tolerance (dBm) | Maximum tune-up Power |
|                         |                         |                         | (dBm)                 |
| 38                      | 14.01                   | $14.01 \pm 1$           | 15.01                 |
| 46                      | 13.30                   | $13.30 \pm 1$           | 14.30                 |

| IEEE for 802.11ac(HT80) |                            |                            |                       |
|-------------------------|----------------------------|----------------------------|-----------------------|
| Test channel            | Peak Output Power<br>(dBm) | Tune up tolerance<br>(dBm) | Maximum tune-up Power |
|                         |                            |                            | (dBm)                 |
| 42                      | 13.59                      | $13.59 \pm 1$              | 14.59                 |

| Worst case: IEEE for 802.11a |                                           |                                           |              |                               |       |        |
|------------------------------|-------------------------------------------|-------------------------------------------|--------------|-------------------------------|-------|--------|
| Channel                      | Maximum Peak<br>Conducted<br>Output Power | Maximum Peak<br>Conducted Output<br>Power | Antenna Gain | Power Density<br>at R = 20 cm | Limit | Result |
|                              | (dBm)                                     | (MW)                                      | (dBi)        | (mW/cm <sup>2</sup> )         |       |        |
| Lowest<br>(5180MHz)          | 16.30                                     | 42.65                                     | 2.71         | 0.0015                        | 1.0   | Pass   |

Note: 1) Refer to report MTEB22120172-R3 for EUT test Max Conducted average Output Power value.

.....THE END OF REPORT.....