

| Report No.:<br>File Reference No.: | FCC   | 1911019-01<br>2019-11-13  |
|------------------------------------|---|---|
| Applicant:                         | Foshan SD Technology Co.,   | Ltd.  |
| Product:                           | Eye Massager With Heat  |   |
| Model No.:                         | SD-001(see the page 4 for ac  | dditional models)   |
| Trademark:                         | N/A   |   |
| Test Standards:                    | FCC Part 15.247   |   |
| Test Result:                       | It is herewith confirmed a<br>requirements set up by AN<br>the evaluation of electromag | and found to comply with<br>SI C63.10, FCC Part 15.247<br>netic compatibility |

the for

Approved By

Jack Chung

Jack Chung

Manager

Dated: November 13, 2019

Results appearing herein relate only to the sample tested The technical reports is issued errors and omissions exempt and is subject to withdrawal at

# SHENZHEN TIMEWAY TESTING LABORATORIES

Zone C, 1st Floor, Block B, Jun Xiang Da Building, Zhongshan Park Road West, Tong Le Village, Nanshan District, Shenzhen, China

Tel (755) 83448688, Fax (755) 83442996, E-Mail:info@timeway-lab.com



# **Special Statement:**

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19.

The testing quality system of our laboratory meet with ISO/IEC-17025 requirements, which is approved by CNAS. This approval result is accepted by MRA of APLAC.

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

# **CNAS-LAB Code: L2292**

The EMC Laboratory has been assessed and in compliance with CNAS-CL01 accreditation criteria for testing Laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of testing Laboratories.

# FCC-Registration No.: 744189

The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission. The acceptance letter from the FCC is maintained in our files. Registration No.: 744189.

# Industry Canada (IC) — Registration No.: 5205A

The EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 5205A.

# A2LA (Certification Number:5013.01)

The EMC Laboratory has been accredited by the American Association for Laboratory Accreditation (A2LA). Certification Number:5013.01

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#### 1.0 General Details

#### 1.1 Test Lab Details

Name :SHENZHEN TIMEWAY TESTING LABORATORIES.Address:Zone C, 1st Floor, Block B, Jun Xiang Da Building, Zhongshan Park Road West, Tong Le<br/>Village, Nanshan District, Shenzhen, ChinaTelephone:(755) 83448688Fax:(755) 83442996Site Listed with Federal Communications commission (FCC)Registration Number:744189For 3m Anecho: ChamberSite Listed with Industry Canada of Ottawa, CanadaRegistration Number: IC: 5205AFor 3m Anecho: Chamber

### 1.2 Applicant Details

| Applicant: | Foshan SD Technology Co., Ltd.   |
|------------|--|
| Address:   | Room 501-502, 8TH Building, ShunDe ZhiFu Garden, No.8 Second Ring Road, GaoZan |
|            | Village Committee, XingTan Town, ShunDe District, FoShan City                  |
| Telephone: | 0757-25668818  |
| Fax:       | 0757-25668818  |

### 1.3 Description of EUT

Rating:

| 1                      |  |
|------------------------|--|
| Product:               | Eye Massager With Heat   |
| Manufacturer:          | Foshan SD Technology Co., Ltd.   |
| Address:               | Room 501-502, 8TH Building, ShunDe ZhiFu Garden, No.8 Second Ring Road,      |
|                        | GaoZan Village Committee, XingTan Town, ShunDe District, FoShan City         |
| Brand Name:            | N/A  |
| Model Number:          | SD-001   |
| Additional Model Numbe | er: SD-002, SD-003, SD-005, SD-006, SD-007, SD-008, SD-009, SD-011, YBZ-001, |
| YBZ-002, YBZ-003, YBZ  | Z-006, YBZ-007, YBZ-008, YBZ-009, HYY-001, HYY-002, HYY-003, HYY-005,        |
| HYY-006, HYY-008, TM   | I-001, TM-002, TM-003, TM-005, TM-006, TM-007, TM-008, TM-009,               |
| RF-EM001-JP, RF-EM00   | 01-US, RF-EM001-UK, RF-EM001-AU, RF-EM001                                    |
| Type of Modulation     | GFSK, JT/4DQPSK, 8DPSK for Bluetooth   |
| Frequency range        | 2402-2480MHz for Bluetooth   |
| Channel Spacing        | 1MHz for Bluetooth   |
| Frequency Selection    | By software  |
| Channel Number         | 79 channel for Bluetooth   |
| Antenna:               | PCB antenna used. The gain of the antennas is 2.6dBi                         |

Input : 5V, 1A, or Built-in 3.7V, 1200mAh Li-ion battery

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- 1.4 Submitted Sample: 1 Samples
- 1.5 Test Duration 2019-11-04 to 2019-11-13
- 1.6 Test Uncertainty Conducted Emissions Uncertainty =3.6dB Radiated Emissions below 1GHz Uncertainty =4.7dB Radiated Emissions above 1GHz Uncertainty =6.0dB Conducted Power Uncertainty =6.0dB Occupied Channel Bandwidth Uncertainty =5%
- 1.7 Test Engineer

Terry Tang

The sample tested by

Print Name: Terry Tang

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| 2.0 Test Equipment |              |              |              |              |            |
|--------------------|--------------|--------------|--------------|--------------|------------|
| Instrument Type    | Manufacturer | Model        | Serial No.   | Date of Cal. | Due Date   |
| ESPI Test Receiver | R&S          | ESPI 3       | 100379       | 2019-06-21   | 2020-06-20 |
| TWO                | R&S          | E7112 75     | 100204       | 2010 06 21   | 2020 06 20 |
| Line-V-NETW        |              | EZHJ-ZJ      | 100294       | 2019-00-21   | 2020-00-20 |
| TWO                | R&S          | E7112 75     | 100252       | 2010 06 21   | 2020 06 20 |
| Line-V-NETW        |              | EZH3-Z3      | 100233       | 2019-06-21   | 2020-06-20 |
| Impuls-Begrenzer   | R&S          | ESH3-Z2      | 100281       | 2019-06-21   | 2020-06-20 |
| Loop Antenna       | EMCO         | 6507         | 00078608     | 2019-06-20   | 2020-06-20 |
| Spectrum           | R&S          | FSIQ26       | 100292       | 2019-06-21   | 2020-06-20 |
| Horn Antenna       | A-INFO       | LB-180400-KF | J211060660   | 2019-06-21   | 2020-06-20 |
| Horn Antenna       | R&S          | BBHA 9120D   | 9120D-631    | 2018-07-09   | 2021-07-08 |
| Power meter        | Anritsu      | ML2487A      | 6K00003613   | 2019-08-22   | 2020-08-21 |
| Power sensor       | Anritsu      | MA2491A      | 32263        | 2019-08-22   | 2020-08-21 |
| Bilog Antenna      | Schwarebeck  | VULB9163     | 9163/340     | 2018-07-04   | 2021-07-03 |
| 9*6*6 Anechoic     |              |              | N/A          | 2018-02-07   | 2021-02-06 |
| EMI Test Receiver  | RS           | ESVB         | 826156/011   | 2019-06-21   | 2020-06-20 |
| EMI Test Receiver  | RS           | ESH3         | 860904/006   | 2019-06-21   | 2020-06-20 |
| Spectrum           | HP/Agilent   | ESA-L1500A   | US37451154   | 2019-06-21   | 2020-06-20 |
| Spectrum           | HP/Agilent   | E4407B       | MY50441392   | 2019-06-21   | 2020-06-20 |
| Spectrum           | RS           | FSP          | 1164.4391.38 | 2019-01-20   | 2020-01-19 |
| DE Cable           | Zhanadi      | ZT26-NJ-NJ-8 |              | 2010 0( 21   | 2020 06 20 |
| KF Cable           | Znengui      | M/FA         |              | 2019-06-21   | 2020-06-20 |
| RF Cable           | Zhengdi      | 7m           |              | 2019-06-21   | 2020-06-20 |
| RF Switch          | EM           | EMSW18       | 060391       | 2019-06-21   | 2020-06-20 |
| Pre-Amplifier      | Schwarebeck  | BBV9743      | #218         | 2019-06-21   | 2020-06-20 |
| Pre-Amplifier      | HP/Agilent   | 8449B        | 3008A00160   | 2019-06-21   | 2020-06-20 |
| LISN               | SCHAFFNER    | NNB42        | 00012        | 2019-01-08   | 2020-01-07 |

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#### 3.0 **Technical Details**

#### 3.1 Summary of test results

| ording to the following specif            | ications:   |   |
|---|---|---|
| CFR 47 Section                            | Result  | Notes   |
| 15.203, 15.247(b)(4)                      | PASS  | Complies  |
| 15.247 (b)(1), (4)                        | PASS  | Complies  |
| 15.247(a)(1)                              | PASS  | Complies  |
| 15.247 (a)(1)                             | PASS  | Complies  |
| 15.247(a)(iii), 15.247(b)(1)              | PASS  | Complies  |
| 15.247(a)(iii)                            | PASS  | Complies  |
| 15.247(d),15.205(a),<br>15.209 (a),15.109 | PASS  | Complies  |
| 15.207(a), 15.107                         | PASS  | Complies  |
| 15.247(i), 1.1307(b)(1)                   | PASS  | Complies  |
|   | CFR 47 Section<br>15.203, 15.247(b)(4)<br>15.247 (b)(1), (4)<br>15.247 (a)(1)<br>15.247 (a)(1)<br>15.247 (a)(1)<br>15.247 (a)(iii)<br>15.247 (a)(iii)<br>15.247 (a), 15.205 (a),<br>15.209 (a), 15.109<br>15.207 (a), 15.107<br>15.247 (i), 1.1307 (b)(1) | CFR 47 Section       Result         15.203, 15.247(b)(4)       PASS         15.247 (b)(1), (4)       PASS         15.247 (a)(1)       PASS         15.247 (a),15.205 (a),<br>15.209 (a),15.109       PASS         15.207 (a), 15.107       PASS         15.247 (i), 1.1307 (b)(1)       PASS |

#### 3.2 **Test Standards**

FCC Part 15 Subpart & Subpart C, Paragraph 15.247

#### 4.0 **EUT Modification**

No modification by SHENZHEN TIMEWAY TESTING LABORATORIES.

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## 5. Power Line Conducted Emission Test

5.1 Schematics of the test



EUT: Equipment Under Test

5.2 Test Method and test Procedure

The EUT was tested according to ANSI C63.10-2013. The Frequency spectrum From 0.15MHz to 30MHz was investigated. The LISN used was 50ohm/50uH as specified by section 5.1 of ANSI C63.10–2013. Test Voltage: 120V~60Hz

Block diagram of Test setup



5.3 Configuration of The EUT

The EUT was configured according to ANSI C63.10-2013. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

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### A. EUT

| Device                 | Manufacturer                   | Model  | FCC ID         |
|------------------------|--------------------------------|--------|----------------|
| Eye Massager With Heat | Foshan SD Technology Co., Ltd. | SD-001 | 2AU45-RP-EM001 |

#### B. Internal Device

| Device | Manufacturer | Model | Rating |
|--------|--------------|-------|--------|
|        |              |       |        |

#### C. Peripherals

| Device       | Manufacturer Model |                | Rating                           |
|--------------|--------------------|----------------|----------------------------------|
| Power Supply | h.TV               | S012BB80500200 | Input: 100-240V~, 50/60Hz, 0.5A; |
|              |                    |                | Output: DC5V, 2A                 |

# 5.4 EUT Operating Condition

Operating condition is according to ANSI C63.10-2013.

- A Setup the EUT and simulators as shown on follow
- B Enable AF signal and confirm EUT active to normal condition

| -         |                   |                  |               |                         |               |  |  |  |  |
|-----------|-------------------|------------------|---------------|-------------------------|---------------|--|--|--|--|
| Frequency |                   | Class A Lim      | its (dB µ V)  | Class B Limits (dB µ V) |               |  |  |  |  |
|           | (MHz)             | Quasi-peak Level | Average Level | Quasi-peak Level        | Average Level |  |  |  |  |
|           | $0.15~\sim~0.50$  | 79.0             | 66.0          | 66.0~56.0*              | 56.0~46.0*    |  |  |  |  |
|           | $0.50~\sim~5.00$  | 73.0             | 60.0          | 56.0                    | 46.0          |  |  |  |  |
|           | $5.00 \sim 30.00$ | 73.0             | 60.0          | 60.0                    | 50.0          |  |  |  |  |

# 5.5 Power line conducted Emission Limit according to Paragraph 15.107,15.207

Notes: 1. \*Decreasing linearly with logarithm of frequency.

2. The tighter limit shall apply at the transition frequencies

# 5.6 Test Results

The frequency spectrum from 0.15MHz to 30MHz was investigated. All reading are quasi-peak values with a resolution bandwidth of 9kHz.

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A: Conducted Emission on Live Terminal (150kHz to 30MHz) **EUT Operating Environment** Humidity: 65%RH Atmospheric Pressure: 101 KPa Temperature: 26°C **EUT set Condition: Keep Bluetooth Transmitting Equipment Level: Class B Results: PASS** Please refer to following diagram for individual 80.0 dBuV Qp: AVG: 40 An Margan Margan and Marganda 0.0 (MHz) 5 30.000 0.150 0.5

| No.   | Mk. | Freq.   | Reading<br>Level | Correct<br>Factor | Measure-<br>ment | Limit | Over   |          |         |
|-------|-----|---------|------------------|-------------------|------------------|-------|--------|----------|---------|
|       |     | MHz     | dBuV             | dB                | dBuV             | dBuV  | dB     | Detector | Comment |
| <br>1 | *   | 0.4872  | 24.50            | 9.77              | 34.27            | 56.22 | -21.95 | QP       |         |
| <br>2 |     | 0.4872  | 10.30            | 9.77              | 20.07            | 46.22 | -26.15 | AVG      |         |
| <br>3 |     | 18.6236 | 15.00            | 10.60             | 25.60            | 60.00 | -34.40 | QP       |         |
| 4     |     | 18.6236 | 2.30             | 10.60             | 12.90            | 50.00 | -37.10 | AVG      |         |
| 5     |     | 29.9147 | 6.50             | 11.29             | 17.79            | 60.00 | -42.21 | QP       |         |
| <br>6 |     | 29.9147 | -4.00            | 11.29             | 7.29             | 50.00 | -42.71 | AVG      |         |

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| No | . Mk. | Freq.   | Reading<br>Level | Correct<br>Factor | Measure-<br>ment | Limit | Over   |          |         |
|----|-------|---------|------------------|-------------------|------------------|-------|--------|----------|---------|
|    |       | MHz     | dBuV             | dB                | dBuV             | dBuV  | dB     | Detector | Comment |
| 1  |       | 0.4910  | 26.80            | 9.77              | 36.57            | 56.15 | -19.58 | QP       |         |
| 2  | *     | 0.4910  | 20.30            | 9.77              | 30.07            | 46.15 | -16.08 | AVG      |         |
| 3  |       | 18.7551 | 15.00            | 10.61             | 25.61            | 60.00 | -34.39 | QP       |         |
| 4  |       | 18.7551 | 3.20             | 10.61             | 13.81            | 50.00 | -36.19 | AVG      |         |

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#### 6 Radiated Emission Test

- 6.1 Test Method and test Procedure:
- The EUT was tested according to ANSI C63.10-2013. The radiated test was performed at Timeway EMC Laboratory. This site is on file with the FCC laboratory division, Registration No. 744189
- (2) The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.10-2013.
- (3) The frequency spectrum from 30 MHz to 25GHz was investigated. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 kHz. For measurement above 1GHz, peak values with RBW=VBW=1MHz and PK detector. AV value with RBW=1MHz, VBW=10Hz and PK detector. Measurements were made at 3 meters.
- (4) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.
- (5) Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limit), and are distinguished with a "**QP**" in the data table.
- (6) The antenna polarization : Vertical polarization and Horizontal polarization.



Block diagram of Test setup

- 6.2 Configuration of The EUT Same as section 5.3 of this report
- 6.3 EUT Operating Condition

Same as section 5.4 of this report.

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# 6.4 Radiated Emission Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below:

#### Frequencies in restricted band are complied to limit on Paragraph 15.209 and 15.109 and RSS-210

| Frequency Range (MHz) | Distance (m) | Field strength (dB $\mu$ V/m) |
|-----------------------|--------------|-------------------------------|
| 30-88                 | 3            | 40.0                          |
| 88-216                | 3            | 43.5                          |
| 216-960               | 3            | 46.0                          |
| Above 960             | 3            | 54.0                          |

Note: 1. RF Voltage  $(dBuV) = 20 \log RF$  Voltage (uV)

2. In the Above Table, the higher limit applies at the band edges.

3. Distance refers to the distance in meters between the measuring instrument antenna and the EUT

4. 8DPSK was the worse case because it has highest output power

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# **Test result** General Radiated Emission Data and Harmonics Radiated Emission Data

### Radiated Emission In Horizontal/Vertical (30MHz----1000MHz)

EUT set Condition: Keep Bluetooth Transmitting

Pass

**Results:** 

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Test Figure:





| No. | Frequency | Results  | Factor | Limit    | Over Limit | Detector | Table (o) | Height | ANT | Verdict |
|-----|-----------|----------|--------|----------|------------|----------|-----------|--------|-----|---------|
|     | (MHz)     | (dBuV/m) | (dB)   | (dBuV/m) | (dB)       |          |           | (cm)   |     |         |
| 1   | 390.022   | 24.58    | -8.88  | 46.0     | -21.42     | Peak     | 254.00    | 100    | Н   | Pass    |
| 2   | 494.029   | 25.90    | -7.12  | 46.0     | -20.10     | Peak     | 191.00    | 100    | Н   | Pass    |

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# Page 16 of 85

Test Figure:



| No. | Frequency | Results  | Factor | Limit    | Over Limit | Detector | Table (o) | Height | ANT | Verdict |
|-----|-----------|----------|--------|----------|------------|----------|-----------|--------|-----|---------|
|     | (MHz)     | (dBuV/m) | (dB)   | (dBuV/m) | (dB)       |          |           | (cm)   |     |         |
| 1   | 106.611   | 16.05    | -13.36 | 43.5     | -27.45     | Peak     | 56.00     | 100    | V   | Pass    |

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#### **Test Figures above 1GHz:**

Please refer to the following test plots for details:

#### Low Channel: Vertical



| No. | Frequency | Results  | Factor (dB) | Limit    | Over Limit | Detector | Table  | Height | ANT | Verdict |
|-----|-----------|----------|-------------|----------|------------|----------|--------|--------|-----|---------|
|     | (MHz)     | (dBuV/m) |             | (dBuV/m) | (dB)       |          | (o)    | (cm)   |     |         |
| 2   | 4802.799  | 41.99    | 3.12        | 54.0     | -12.01     | Peak     | 224.00 | 100    | V   | Pass    |

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| No. | Frequency | Results  | Factor | Limit    | Over Limit | Detector | Table (o) | Height | ANT | Verdict |
|-----|-----------|----------|--------|----------|------------|----------|-----------|--------|-----|---------|
|     | (MHz)     | (dBuV/m) | (dB)   | (dBuV/m) | (dB)       |          |           | (cm)   |     |         |
| 2   | 4802.799  | 44.70    | 3.12   | 54.0     | -9.30      | Peak     | 338.00    | 100    | н   | Pass    |

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| No. | Frequency | Results  | Factor | Limit    | Over Limit | Detector | Table (o) | Height | ANT | Verdict |
|-----|-----------|----------|--------|----------|------------|----------|-----------|--------|-----|---------|
|     | (MHz)     | (dBuV/m) | (dB)   | (dBuV/m) | (dB)       |          |           | (cm)   |     |         |
| 2   | 4879.280  | 44.44    | 3.20   | 54.0     | -9.56      | Peak     | 208.00    | 100    | н   | Pass    |

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**Note: 1. Level = Reading + AF + Cable - Preamp** 

2. For the radiated emissions above 18G, it is the floor noise.

3. The measured PK value less than the AV limit, no necessary to take down the AV measurement result.

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# 7.0 20dB Bandwidth Measurement

# 7.1 Regulation

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

# 7.2 Limits of 20dB Bandwidth Measurement

N/A

# 7.3 Test Procedure.

1. Check the calibration of the measuring instrument (spectrum analyzer) using either an internal calibrator or a known signal from an external generator.

2. Set the spectrum analyzer as follows: Span =3MHz, RBW =30 kHz, VBW=100 kHz, Sweep = auto Detector function = peak, Trace = max hold

3. Measure the highest amplitude appearing on spectral display and record the level to calculate results. 6. Repeat above procedures until all frequencies measured were complete.

# 7.4 Test Result

#### **Type of Modulation: GFSK**

| EUT      | Eye M                      | lassager With Heat                             | Model         | SD-001     |
|----------|----------------------------|--|---------------|------------|
| Mode     | Ke                         | ep Transmitting                                | Input Voltage | DC3.7V     |
| Temperat | ure                        | 24 deg. C,                                     | Humidity      | 56% RH     |
| Channel  | Channel Frequency<br>(MHz) | annel Frequency 20 dB Bandwidth<br>(MHz) (kHz) |               | Pass/ Fail |
| Low      | 2402                       | 889  |               | Pass       |
| Middle   | 2441 889                   |  |               | Pass       |
| High     | 2480                       | 885  |               | Pass       |

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# Test Figure:





Date: 12.NOV.2019 10:10:41

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# **Test Result**

### **Type of Modulation:** Л/4DQPSK

| EUT      | Eyel                       | Massager With Heat                              | Model SD-001  |            |  |
|----------|----------------------------|---|---------------|------------|--|
| Mode     | Mode Keep Transmitting     |   | Input Voltage | DC3.7V     |  |
| Temperat | ure                        | 24 deg. C,                                      | , Humidity    |            |  |
| Channel  | Channel Frequency<br>(MHz) | nannel Frequency 20 dB Bandwidth<br>(MHz) (kHz) |               | Pass/ Fail |  |
| Low      | 2402                       | 1266  |               | Pass       |  |
| Middle   | 2441 1274                  |   |               | Pass       |  |
| High     | 2480                       | 1274  |               | Pass       |  |

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# Test Figure:





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3. High Channel



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# **Test Result Type of Modulation: 8DPSK**

| EUT      | Eye                        | Massager With Heat                            | Model         | SD-001     |
|----------|----------------------------|---|---------------|------------|
| Mode     | К                          | eep Transmitting                              | Input Voltage | DC3.7V     |
| Temperat | ure                        | 24 deg. C,                                    | Humidity      | 56% RH     |
| Channel  | Channel Frequency<br>(MHz) | nnel Frequency 20 dB Bandwidth<br>(MHz) (kHz) |               | Pass/ Fail |
| Low      | 2402                       | 1266  |               | Pass       |
| Middle   | 2441                       | 2441 1258                                     |               | Pass       |
| High     | 2480                       | 2480 1274                                     |               | Pass       |

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# Test Figure:





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# 8. Maximum Output Power 8.1 Regulation

According to \$15.247(b)(1), for frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5MHz band:0.125 watts. According to \$15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

# 8.2 Limits of Maximum Output Power

The Maximum Output Power Measurement is 30dBm.

### 8.3 Test Procedure

1. Check the calibration of the measuring instrument (spectrum analyzer) using either an internal calibrator or a known signal from an external generator.

2. Set the spectrum analyzer as follows: Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel; RBW > the 20 dB bandwidth of the emission being measured; VBW = RBW=3MHz;

Sweep = 60s; Detector function = PK; Trace = max hold

3. Measure the highest amplitude appearing on spectral display and record the level to calculate results.

4. Repeat above procedures until all frequencies measured were complete.

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# 8.4Test Results Type of Modulation: GFSK

| EUT         |    | Eye N                     | lassager With Heat             |    | Model                           | SD-001     |
|-------------|----|---------------------------|--------------------------------|----|---------------------------------|------------|
| Mode        |    | Ke                        | ep Transmitting                |    | Voltage                         | DC3.7V     |
| Temperature |    |                           | 24 deg. C, Hun                 |    | idity                           | 56% RH     |
| Channel     | Cl | nannel Frequency<br>(MHz) | Max. Power Output (dBm<br>Peak | l) | Peak<br>Power<br>Limit<br>(dBm) | Pass/ Fail |
| Low         |    | 2402                      | -5.18                          |    | 30                              | Pass       |
| Middle      |    | 2441                      | -7.36                          |    | 30                              | Pass       |
| High        |    | 2480                      | -9.21                          |    | 30                              | Pass       |

Note: 1. the result basic equation calculation as follow:

Max. Power Output = Power Reading + Cable loss + Attenuator

- 2. The worse case was recorded
- 3. The Peak power was measured

#### **Type of Modulation:** Л/**4DQPSK**

| EUT         | Eye N                      | lassager With Heat           |  | Model                           | SD-001     |
|-------------|----------------------------|------------------------------|--|---------------------------------|------------|
| Mode Ke     |                            | ep Transmitting              |  | Voltage                         | DC3.7V     |
| Temperature |                            | 24 deg. C, Hu                |  | idity                           | 56% RH     |
| Channel     | Channel Frequency<br>(MHz) | Max. Power Output (dBm) Peak |  | Peak<br>Power<br>Limit<br>(dBm) | Pass/ Fail |
| Low         | 2402                       | -3.11                        |  | 30                              | Pass       |
| Middle      | 2441                       | -5.37                        |  | 30                              | Pass       |
| High        | 2480                       | -7.11                        |  | 30                              | Pass       |

Note: 1. the result basic equation calculation as follow:

Max. Power Output = Power Reading + Cable loss + Attenuator

- 2. The worse case was recorded
- 3. The Peak power was measured

The report refers only to the sample tested and does not apply to the bulk.

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**Type of Modulation: 8DPSK** 

| EUT Eye Massager With Heat |                   |                        | Model                   |                | SD-001     |  |
|----------------------------|-------------------|------------------------|-------------------------|----------------|------------|--|
| Mode Kee                   |                   | ep Transmitting        |                         | ıt Voltage     | DC3.7V     |  |
| Temperature                |                   | 24 deg. C,             | Hı                      | umidity        | 56% RH     |  |
| Channel                    | Channel Frequency | Max. Power Output (dBm | Max. Power Output (dBm) |                | Pass/ Fail |  |
| Chamiler                   | (MHz)             | Peak                   |                         | Limit<br>(dBm) |            |  |
| Low                        | 2402              | -2.41                  |                         | 30             | Pass       |  |
| Middle                     | 2441              | -5.32                  |                         | 30             | Pass       |  |
| High                       | 2480              | -6.30                  |                         | 30             | Pass       |  |

Note: 1. the result basic equation calculation as follow:

Max. Power Output = Power Reading + Cable loss + Attenuator

2. The worse case was recorded

3. The Peak power was measured

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# 9. Carrier Frequency Separation

## 9.1 Regulation

According to §15.247(a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

# 9.2 Limits of Carrier Frequency Separation

The Maximum Power Spectral Density Measurement is 25kHz or two-thirds of the 20dB bandwidth of the hopping Channel which is great.

# 9.3 Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.

2. Set the spectrum analyzer as follows: Span = wide enough to capture the peaks of two adjacent channels: Resolution (or IF) Bandwidth (RBW)  $\geq 1\%$  of the span; Video (or Average) Bandwidth (VBW)  $\geq RBW$ ; Sweep = auto; Detector function = peak; Trace = max hold

3. Measure the separation between the peaks of the adjacent channels using the marker-delta function.

4. Repeat above procedures until all frequencies measured were complete.

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#### 9.4Test Result

#### **Type of Modulation: GFSK**

| EUT                          | Eye Massager Wi | Model                                       | SD-001        |            |      |
|------------------------------|-----------------|---|---------------|------------|------|
| Mode                         | Hopping On      |   | Input Voltage | DC3.7V     |      |
| Temperature                  | 24 deg. C,      |   | Humidity      | 56% RH     |      |
| Carrier Frequency Separation |                 | Limit Pass/ Fa                              |               | Pass/ Fail |      |
| 1.002MHz                     |                 | $\geq$ 25 kHz or 2/3 of the 20 dB bandwidth |               |            | Pass |

## **Test Plots**



Date: 12.NOV.2019 09:51:45

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#### **Type of Modulation:** Л/4DQPSK

| EUT                          | Eye Massager Wi | Model                                   | SD-001   |            |      |
|------------------------------|-----------------|---|----------|------------|------|
| Mode                         | Hopping O       | Input Voltage                           | DC3.7V   |            |      |
| Temperature                  | 24 deg. C,      |   | Humidity | 56% RH     |      |
| Carrier Frequency Separation |                 | Limit                                   |          | Pass/ Fail |      |
| 1.002MHz                     |                 | $\geq 25$ kHz or 2/3 of 20 dB bandwidth |          |            | Pass |

# **Test Plots**



Date: 12.NOV.2019 13:38:19

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#### **Type of Modulation: 8DPSK**

| EUT                          | Eye Massager Wi | Model              | SD-001             |        |            |
|------------------------------|-----------------|--------------------|--------------------|--------|------------|
| Mode                         | Hopping O       | Input Voltage      | DC3.7V             |        |            |
| Temperature                  | 24 deg. C,      |                    | Humidity           | 56% RH |            |
| Carrier Frequency Separation |                 |                    | Limit Pass/ F.     |        | Pass/ Fail |
|                              | 1.002MHz        | $\geq 25$ kHz or 2 | 2/3 of 20 dB bandy | width  | Pass       |

# **Test Plots**



Date: 12.NOV.2019 14:23:32

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# **10. Number of Hopping Channels 10.1 Regulation**

According to §15.247(a)(1)(iii), frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used. According to §15.247(b)(1), for frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

# **10.2 Limits of Number of Hopping Channels**

The frequency hopping systems in the 2400-2483.5MHz band shall use at least 15 channels.

### **10.3 Test Procedure**

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.

2. Set the spectrum analyzer as follows: Span = the frequency band of operation; RBW=100 kHz, VBW=300 kHz; Sweep = auto; Detector function = peak; Trace = max hold

3. Record the number of hopping channels.

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#### **10.4Test Result**

#### **Type of Modulation: GFSK**

| EUT                 | Eye Massager With Heat |                | Model          | SD-001 |            |
|---------------------|------------------------|----------------|----------------|--------|------------|
| Mode                | Hopping On             |                | Input Voltage  | DC3.7V |            |
| Temperature         | 24 deg. C,             |                | Humidity       | 56% RH |            |
| Operating Frequency |                        | Number of hopp | oing channels  | Limit  | Pass/ Fail |
| 2402-2480MHz        |                        | 79             | $\geq 15$ Pass |        |            |

# **Test Plot**



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# **Type of Modulation:** Л/4DQPSK

| EUT                 | Eye Massager With Heat |                            | Model            |        | SD-001     |
|---------------------|------------------------|----------------------------|------------------|--------|------------|
| Mode                | Hopping On             |                            | Input<br>Voltage | DC3.7V |            |
| Temperature         | 24 deg. C,             |                            | Humidity         | 56% RH |            |
| Operating Frequency |                        | Number of hopping channels | Limit            |        | Pass/ Fail |
| 2402-2480MHz        |                        | 79                         | ≥15              |        | Pass       |

# **Test Plot**



Date: 12.NOV.2019 12:55:11

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#### **Type of Modulation: 8DPSK**

| EUT                 | Eye Massager With Heat |                              | М     | odel    |                | SD-001 |
|---------------------|------------------------|------------------------------|-------|---------|----------------|--------|
| Mode                | Hopping On             |                              | Input | Voltage | DC3.7V         |        |
| Temperature         | 24 deg. C,             |                              | Humi  | dity    | 56% RH         |        |
| Operating Frequency |                        | Number of hoppin<br>channels | ng    | Liı     | nit Pass/ Fail |        |
| 2402-2480MHz        |                        | 79                           |       | 2       | $\geq$ 15 Pass |        |

## **Test Plot**



Date: 12.NOV.2019 12:47:31

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