



Japan Radio Test Report (BLE)

Applicant: Leia, Inc

Address of Applicant: 2440 SAND HILL RD 100 MENLO PARK, CA 94025-6900

Equipment Under Test (EUT)

Product Name: LUME PAD

Model No.: LPD-20W

Trade mark: LUME PAD, ZTE, nubia, REDMAGIC

Applicable standards: Article 2 paragraph 1 item (19)
Appendix No.43 Notification No.88 of MIC, 2004

Date of sample receipt: 18 Jul., 2022

Date of Test: 19 Jul., to 24 Aug., 2022

Date of report issued: 25 Aug., 2022

Test Result: PASS*

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

Authorized Signature:



Bruce Zhang
Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the JYT product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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2 Version

Version No.	Date	Description
00	25 Aug., 2022	Original

Tested by:

Tanet Wei

Date:

25 Aug., 2022

Test Engineer

Reviewed by:

Winner Zhang

Date:

25 Aug., 2022

Project Engineer

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4 Test Summary

Report Section	Test Item	Result
6.2	Frequency Deviation	Pass
6.3	Occupied frequency bandwidth and Spread bandwidth	Pass
6.4	Antenna power and deviation	Pass
6.5	Transmitter Spurious Emissions	Pass
6.6	Transmitting antenna absolute gain	N/A
6.7	Main lobe width of transmitting antenna	N/A
6.8	Spurious radiation or extraneous emission strength	Pass
6.9	Interference suppression function	Pass
<p><i>Remark:</i> <i>Pass: The EUT complies with the essential requirements in the standard.</i> <i>The cable insertion loss used by "Antenna Power" and other conduction measurement items is 0.5dB (provided by the customer).</i></p>		

5 General Information

5.1 Client Information

Applicant:	Leia, Inc
Address:	2440 SAND HILL RD 100 MENLO PARK,CA 94025-6900
Manufacturer:	ZTE Corporation
Address:	ZTE Building, Keji South Road, Hi-tech Park, Nanshan District, Shenzhen city, Guangdong Province
Factory:	ZTE Xi'an Terminal Technology Co., Ltd
Address:	Floors 1-4 of Buildings B51& B52, No. 1088, Xifengnan Road, Hi-tech Zone, Xi'an, Shaanxi Province, P.R.China

5.2 General Description of E.U.T.

Product Name:	LUME PAD
Model No.:	LPD-20W
Hardware version:	LPD-20WHW1.0
Software version:	LUME UI_1.0.28_LPD20_US_001
Operation Frequency:	2402MHz~2480MHz
Number of channel:	40
Modulation type:	GFSK
Modulation technology:	Other Modulation
Antenna Type:	Internal Antenna
Antenna gain:	0.78 dBi(declare by applicant)
Power supply:	Rechargeable Li-ion polymer Battery3.85Vdc, 9000mAh

5.3 Test mode

Carrier mode:	Keep the EUT in continuous transmitting mode without modulation.
Modulation mode:	Keep the EUT in continuously transmitting mode with modulation.

5.4 Description of Support Units

The EUT was test as an independent unit

5.5 Laboratory Facility

<p>The test facility is recognized, certified, or accredited by the following organizations:</p> <ul style="list-style-type: none"> ● FCC - Designation No.: CN1211 JianYan Testing Group Shenzhen Co., Ltd. has been accredited as a testing laboratory by FCC(Federal Communications Commission). The test firm Registration No. is 727551. ● ISED – CAB identifier.: CN0021 The 3m Semi-anechoic chamber and 10m Semi-anechoic chamber of JianYan Testing Group Shenzhen Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1. ● CNAS - Registration No.: CNAS L15527 JianYan Testing Group Shenzhen Co., Ltd. is accredited to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L15527. ● A2LA - Registration No.: 4346.01 This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: https://portal.a2la.org/scopepdf/4346-01.pdf
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5.6 Laboratory Location

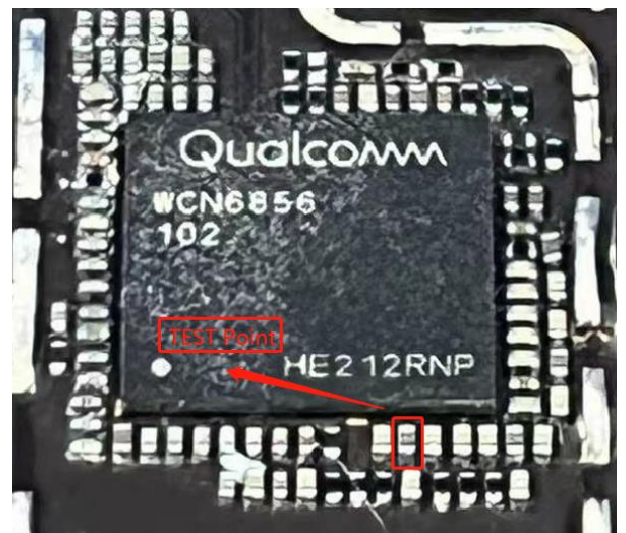
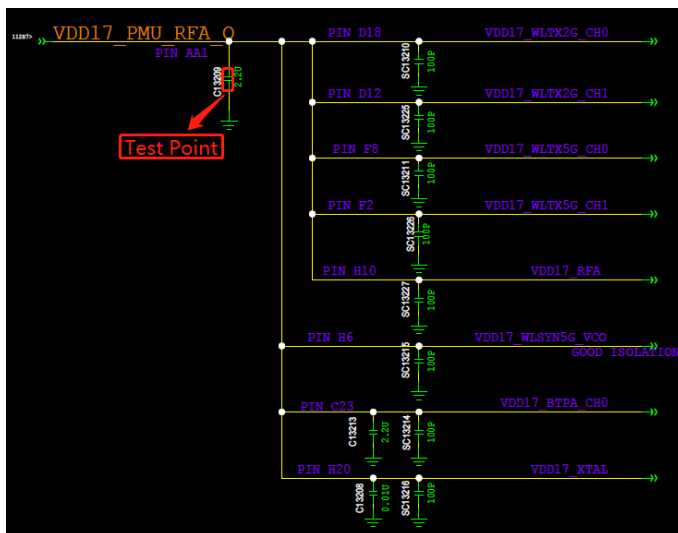
<p>JianYan Testing Group Shenzhen Co., Ltd. Address: No.101, Building 8, Innovation Wisdom Port, No.155 Hongtian Road, Huangpu Community, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, People's Republic of China. Tel: +86-755-23118282, Fax: +86-755-23116366 Email: info-JYTee@lets.com, Website: http://jyt.lets.com</p>

5.7 Environment of test site

Temperature:	Normal: 25~35°C
Humidity:	Normal: 45~75% RH
Atmospheric Pressure:	1010 mbar
Test Voltage:	Nominal: 3.85Vdc Extreme: 3.50Vdc for low voltage, 4.40Vdc for high voltage

Note: For extreme voltage test, we have tested the relationship between the external power supply and RF IC power supply. Base on the test results, only the normal voltage was selected to perform all items. The details information as below:

External power supply	IC power supply	Deviation from normal	Deviation
3.85V	3.28V	---	---
3.50V	3.28V	0.00V	0.00%
4.40V	3.28V	0.00V	0.00%



5.8 Test Instruments list

Test Equipment	Manufacturer	Model No.	Manage No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)	Cal. By	Remark
Spectrum Analyzer	Keysight	N9010B	WXJ004-3	10-27-2021	10-26-2022	CCIC	3
Power Detector Box	MWRFTTEST	MW100-PSB	WXJ007-4	11-19-2021	11-18-2022	CCIC	3
RF Control Unit	MWRFTTEST	MW100-RFCB	WXG006	N/A			
Test Software	MWRFTTEST	MTS 8310	Version: 2.0.0.0				
<i>Remark:</i> <div>1. Calibration conducted by the National Institute of Information and Communications Technology (NICT) in japan (hereinafter referred to as *NICT*) or a designated calibration agency under Article 102-18 paragraph (1) in JRL.</div> <div>2. Correction conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Act (Act No.51 of 1992)</div> <div>3. Calibration conducted in countries except Japan, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph (1).</div> <div>4. Calibration, etc. conducted by using measuning instruments and other equipment listed in the right column of appended table No. 3, which shall have been given any type of calibration, etc. listed above from (2) to (4).</div> <div>From JRL Article 24-2, paragraph 4, Item 2</div>							

6 Test results and Measurement Data

6.1 Test Configuration of EUT

Channel list and Channels selected to perform the tests

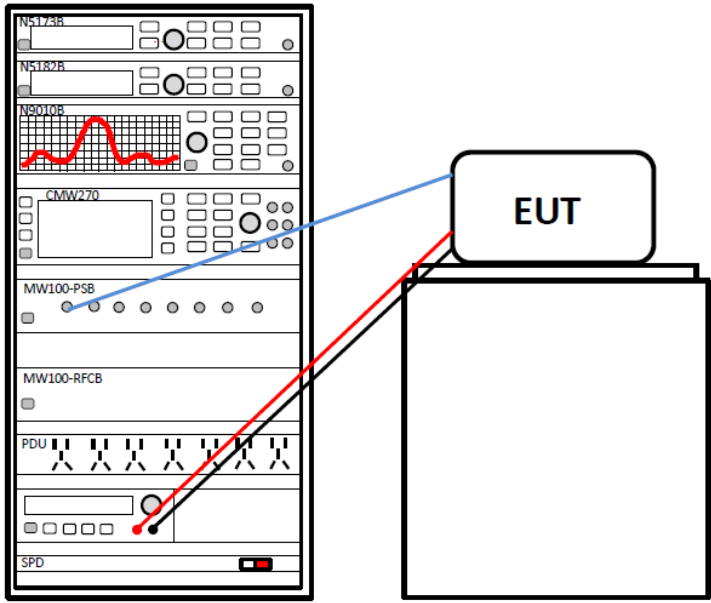
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
0	2402MHz	10	2422MHz	20	2442MHz	30	2462MHz
1	2404MHz	11	2424MHz	21	2444MHz	31	2464MHz
2	2406MHz	12	2426MHz	22	2446MHz	32	2466MHz
3	2408MHz	13	2428MHz	23	2448MHz	33	2468MHz
4	2410MHz	14	2430MHz	24	2450MHz	34	2470MHz
5	2412MHz	15	2432MHz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

Remark: Channel 0, 20&39 selected for test.

Test configuration for each items

Report Section	Test Channel	Test Conditions	Test mode
6.2	L, M, H	Normal	Carrier
6.3	L, M, H	Normal	Modulation
6.4	L, M, H	Normal	Modulation
6.5	L, M, H	Normal	Modulation
6.6	L, M, H	Normal	Modulation
6.7	M	Normal	Modulation
6.8	L, M, H	Normal	Modulation
6.9	/	Normal	Modulation

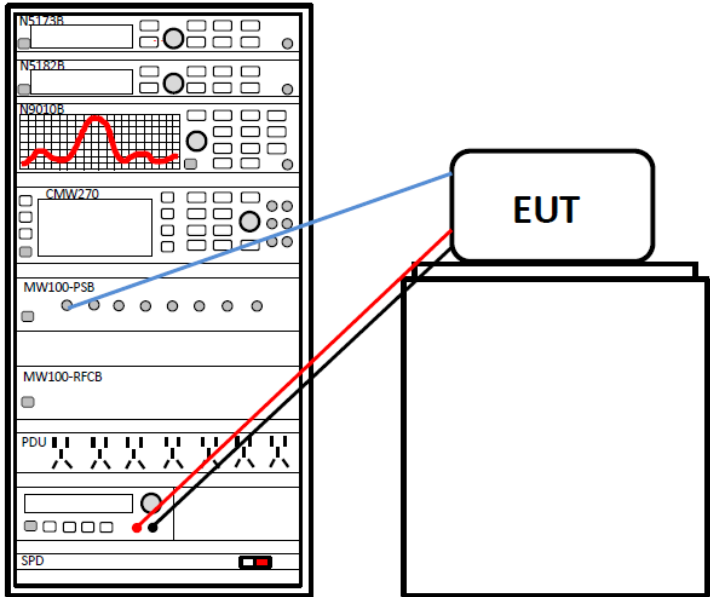
6.2 Frequency Deviation

Test Requirement:	Article 2 paragraph 1 item (19)
Test Method:	Appendix No.43 Notification No.88 of MIC, 2004 section 3
Test Frequency Range:	2400~2483.5MHz
Limit:	± 50 ppm
Test setup:	
Test procedure:	<ol style="list-style-type: none"> 1. Frequency accuracy of SA shall be less than 10% of limits tolerance (5ppm) 2. Setting of SA is following as: RBW:10 kHz / VBW:10 kHz 3. Center Frequency: The center frequency of testing for EUT 4. Sweep time: Auto 5. Sweep mode: Continuous sweep 6. Detect mode: Positive peak 7. EUT have transmitted absence of modulation signal and fixed channelize. f is using the mark cursor to mark the peak frequency value, f_c is declaring of channel frequency. Then the frequency error formula is $(f-f_c)/f_c \times 10^6$ ppm and the limit is less than ± 50 ppm.
Test Instruments:	Refer to section 5.8 for details
Test Uncertainty:	$\pm 1 \times 10^{-8}$
Test results:	Pass

Measurement Data: See to Appendix A – BLE-1M PHY, Appendix A – BLE-2M PHY, Appendix A – BLE-Coded PHY,S=2, Appendix A – BLE-Coded PHY,S=8.

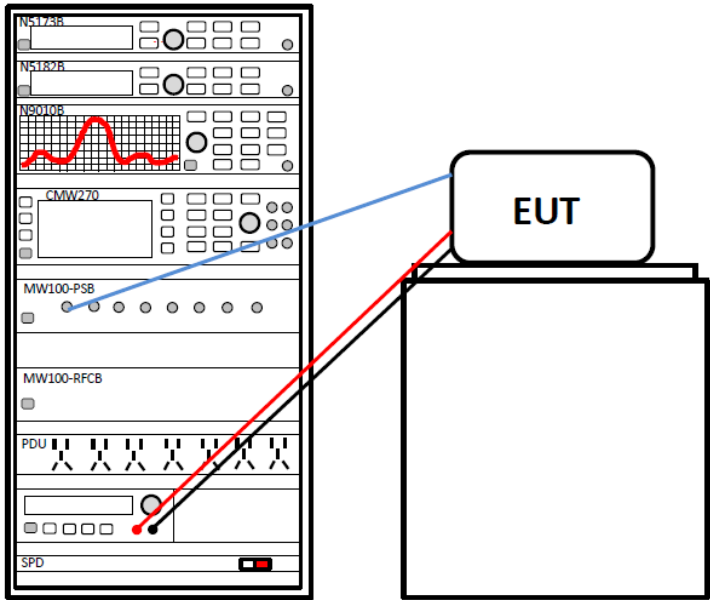
6.3 Occupied frequency bandwidth and Spread bandwidth

Test Requirement:	Article 2 paragraph 1 item (19)
Test Method:	Appendix No.43 Notification No.88 of MIC, 2004 section 4

Limit:	26 MHz for Occupied bandwidth 500 kHz for Spread bandwidth
Test setup:	
Test procedure:	<ol style="list-style-type: none"> 1. Setting of SA is following as: RBW:300 kHz / VBW: 300 kHz / Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak / Trace mode: Max hold 2. EUT have transmitted the maximum modulation signal and fixed channelize (For DSSS or OFDM Device) or continuous maximum power of hopping mode (For FHSS14 Device). SA set to 99% of occupied bandwidth to measure occupied bandwidth. The limit is less than 26 MHz (For DSSS or OFDM Device) or 83.5 MHz (For FHSS Device). 3. SA set to 90% of occupied bandwidth to measure Spread Spectrum Bandwidth and must greater than 500 kHz.
Test Instruments:	Refer to section 5.8 for details
Test Uncertainty:	$\pm 1 \times 10^{-8}$
Test results:	Pass

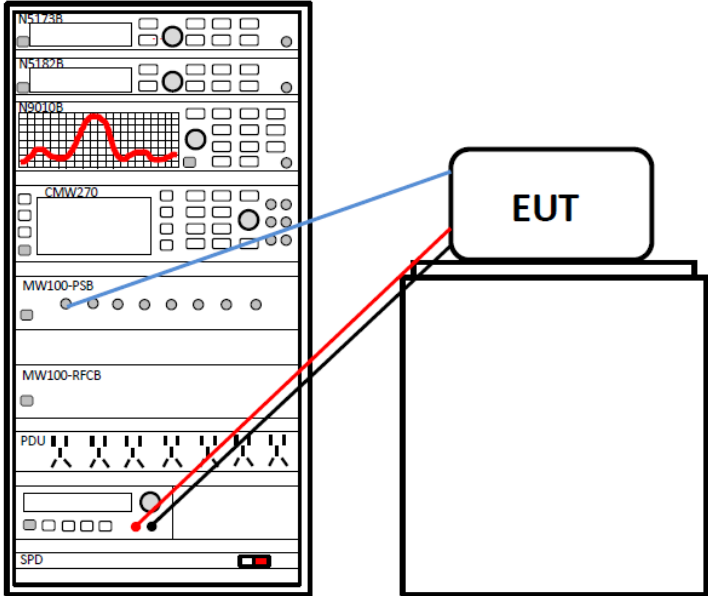
Measurement Data: See to Appendix A – BLE-1M PHY, Appendix A – BLE-2M PHY, Appendix A – BLE-Coded PHY,S=2, Appendix A – BLE-Coded PHY,S=8.

6.4 Antenna power and deviation

Test Requirement:	Article 2 paragraph 1 item (19)
Test Method:	Appendix No.43 Notification No.88 of MIC, 2004 section 6
Equipment setup:	RBW=3MHz, VBW=3MHz, detector=Peak
Limit:	Antenna Power: 10mW, Deviation: + 20%≥ and ≥ -80%
Test setup:	
Test Procedure	<ol style="list-style-type: none"> 1. Connect the UUT to the spectrum analyzer and use the following settings: Centre Frequency: The centre frequency of the channel under test. RBW: 3MHz/VBW: 10MHz/ Span: Wide enough to cover the complete power envelope of the signal of the EUT. / Detector: Peak. / Trace Mode: Max Hold. 2. When the trace is complete, find the peak value of the power envelope and record the frequency. 3. Calculated the Maximum deviation and recorded the results. $\text{Deviation} = (\text{Antenna Power} - \text{Rated Output Power}) / \text{Rated Output Power} * 100\%$
Test Instruments:	Refer to section 5.8 for details
Test Uncertainty:	± 0.96 dB
Test results:	Pass

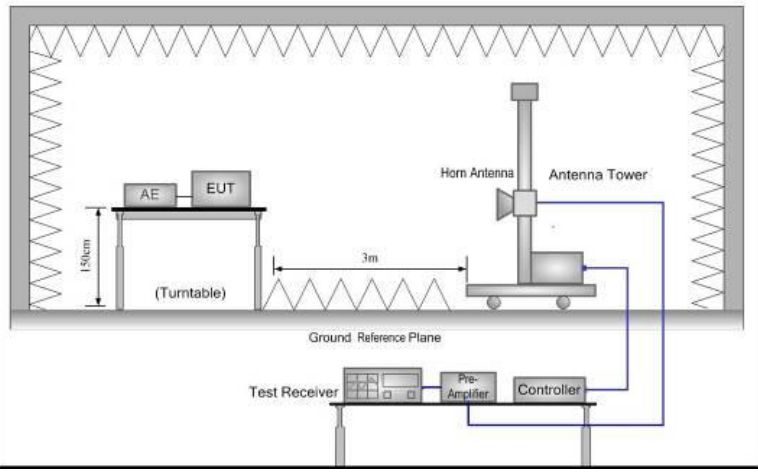
Measurement Data: See to Appendix A – BLE-1M PHY, Appendix A – BLE-2M PHY, Appendix A – BLE-Coded PHY,S=2, Appendix A – BLE-Coded PHY,S=8.

6.5 Transmitter Spurious Emissions

Test Requirement:	Article 2 paragraph 1 item (19)
Test Method:	Appendix No.43 Notification No.88 of MIC, 2004 section 7
Equipment setup:	Below 1 GHz: RBW=100 kHz, VBW=100 kHz, detector=Peak Above 1 GHz: RBW=1 MHz, VBW=1 MHz, detector=Peak
Limit:	30MHz~1000MHz:2.5 μ W/MHz(-26dBm); 1000MHz~2387MHz: 2.5 μ W/MHz (-26dBm); 2387MHz~ 2400MHz:25 μ W/MHz (-16dBm) 2483.5 MHz~ 2496.5MHz : 25 μ W/MHz (-16dBm); 2496.5MHz~12.75 GHz : 2.5 μ W/MHz (-26dBm)
Test setup:	
Test Procedure	<ol style="list-style-type: none"> 1. EUT have transmitted the maximum modulation signal and fixed channelize. 2. Setting of SA is following as: Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak / Trace mode: Max hold. 3. Setting of SA is following as 30 MHz and stop frequency 1000 MHz Then to mark peak reading value + cable loss shall be less than 2.5μW. 4. Setting of SA is following as 1000 MHz and stop frequency 2387 MHz, and then to mark peak reading value + cable loss shall be less than 2.5μW. 5. SA adjusted to start frequency 2387 MHz and stop frequency 2400 MHz, then to mark peak reading value + cable loss shall be less than 25μW. 6. SA adjusted to start frequency 2483.5 MHz and stop frequency 2496.5 MHz , then to mark peak reading value + cable loss shall be less than 25μW 7. SA adjusted to start frequency 2496.5 MHz and stop frequency 12750 MHz, then to mark peak reading value + cable loss shall be less than 2.5μW.
Test Instruments:	Refer to section 5.8 for details
Test Uncertainty:	± 0.96 dB
Test results:	Pass

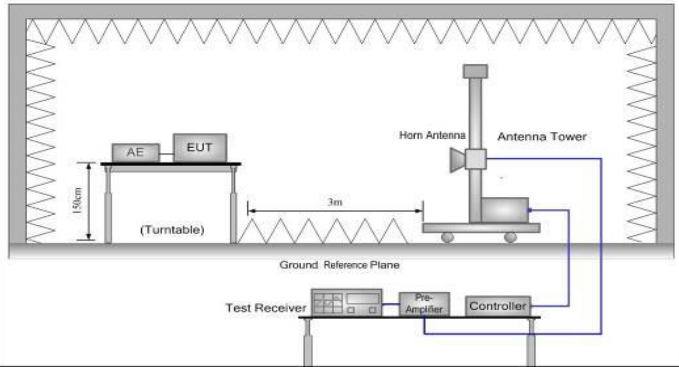
Measurement Data: See to Appendix A – BLE-1M PHY, Appendix A – BLE-2M PHY, Appendix A – BLE-Coded PHY,S=2, Appendix A – BLE-Coded PHY,S=8.

6.6 Transmitting antenna absolute gain

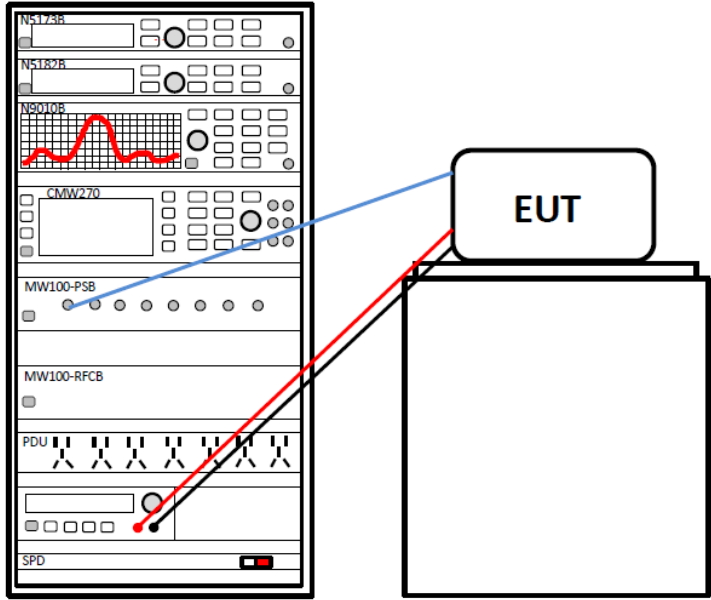
Test Requirement:	Article 2 paragraph 1 item (19)
Test Method:	Appendix No.43 Notification No.88 of MIC, 2004 section 8
Equipment setup:	RBW=1MHz, VBW=3MHz, Frequency range= 2400MHz~2483.5MHz, Detector = Peak
Test setup:	
Test procedure	<ol style="list-style-type: none"> 1. Set EUT and measuring antenna at the same height and roughly facing each other. 2. Move the measuring antenna height up and down within $\pm 50\text{cm}$ of EUT height and swing it to find the maximum output of the measuring antenna. The output level at the spectrum analyzer is read as "E". 3. Remove the EUT from the turn table and put the replacing antenna facing to measuring antenna at same height. Set the standard signal generator (SSG) at same frequency and transmit on then receive the signal 4. Swing the replacing antenna give a maximum receiving level. 5. Move the measuring antenna height up and down within $\pm 50\text{cm}$ of replacing antenna height and swing it to find the maximum receiving level. 6. Set SSG output power at P_t to give the equivalent output level of "E" or calculate P_t with SSG output which gives the nearest of "E" and difference ($\pm 1\text{dB}$). Record the P_t. 7. Calculate EIRP by the formula below $\text{EIRP} = G_t - L + P_t$. G_t: gain of replacing antenna (dBi) L: feeder loss between SSG and replacing antenna P_t: Output power of the SSG 8. If the antenna for the EUT has circular polarization, sum of V-field and H-field will be result if measuring antenna is linear polarization.
Test Instruments:	Refer to section 5.8 for details
Test results:	Pass

Measurement Data: See to Appendix A – BLE-1M PHY, Appendix A – BLE-2M PHY, Appendix A – BLE-Coded PHY,S=2, Appendix A – BLE-Coded PHY,S=8.

6.7 Main lobe width of transmitting antenna

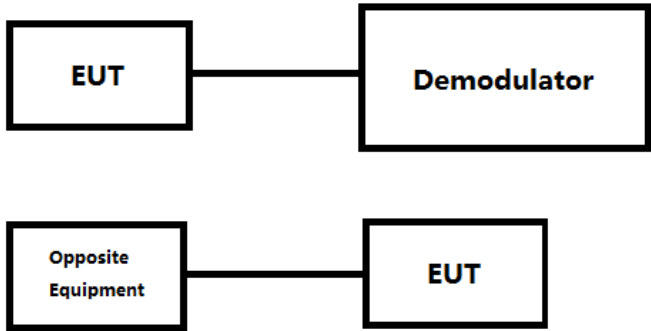
Test Requirement:	Article 2 paragraph 1 item (19)
Test Method:	Appendix No.43 Notification No.88 of MIC, 2004 section 9
Equipment setup:	RBW=1 MHz, VBW=1 kHz, Span = 0, Detector=Peak
Requirement:	The receiving power at the side lobes except the main lobe (Θ_0) is 3dB lower or more than the maximum receiving power
Test setup:	
Test Procedure:	<ol style="list-style-type: none"> (1) Put the radio equipment and the test antenna approximately to face each other. (2) Set the spectrum analyzer as the above. Adjust its reference level so as to observe the receiving power in its suitable receiving condition. (3) Adjust the radio equipment rotating horizontally and vertically so as to coincide to the maximum power direction. (4) Changing the height of the test antenna between +50cm against the height of the radio equipment and adjusting its direction too, look out a maximum point of the receiving power. The indication of the spectrum analyzer at this point is referred as "E". (5) Using the equivalent isotropic radiation power (PE) which was already measured, calculate the allowable main lobe width (Θ_0) concerning horizontal and vertical planes. Allowable main lobe width (Θ_0) = $360/A$ here, Θ_0 : Allowable main lobe width of the transmitting antenna of the radio equipment (half-width) ($^\circ$) PE : Equivalent isotropic radiation power of the radio equipment (dBm) A : This is calculated as the equivalent isotropic radiation power divided by absolute gain 2.14dBi of transmitting antenna being fed by average antenna power 10mW (10mW/MHz for the orthogonal frequency division multiplexing system, the direct diffusion system, the frequency hopping system, the compound system of direct diffusion and frequency hopping, and the compound system of orthogonal frequency division multiplexing and frequency hopping. (6) Rotating the radio equipment horizontally a round as possible, confirm that the receiving power at the side lobes except main lobe width (Θ_0) is lower than 3dB or more of the maximum receiving power "E". (7) Once put the radio equipment back to the state (3). Inclining the radio equipment vertically as far as possible (more than 90 degree; it may be possible to measure referring "6. Other conditions"), confirm that the receiving power at the side lobes except main lobe width (Θ_0) is lower than 3dB or more of the maximum receiving power "E".
Test Instruments:	Refer to section 5.8 for details
Test results:	This test item not requirement for EIRP less than 12.14 dBm. Because the EIRP of EUT is less than 12.14 dBm, so not requirement.

6.8 Spurious radiation or extraneous emission strength for Receiver part

Test Requirement:	Article 2 paragraph 1 item (19)
Test Method:	Appendix No.43 Notification No.88 of MIC, 2004 section 5
Equipment Setup:	RBW = 100 kHz,VBW= 100 kHz for below 1 GHz RBW = 1 MHz, VBW = 1 MHz for above 1 GHz
Limit:	4 nW for below 1 GHz, 20 nW for above 1 GHz
Test setup:	
Test Procedure:	<ol style="list-style-type: none"> 1. EUT have the continuous reception mode and fixed only one channelize. 2. Setting of SA is following as RB / VB: 100 kHz (below 1GHz emissions) / 1 MHz (above 1GHz emissions) / AT: 10dB / Ref: 0dBm / Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak / Trace mode: Max hold 3. SA set RB: 100 kHz and VB: 100 kHz. Then adjust to start frequency 30MHz and stop frequency 1000 MHz. Search to mark peak reading value + cable loss shall be less than 4nW 4. SA set RB: 1MHz and VB: 1MHz. Then adjust to start frequency 1000MHz and stop frequency 12750 MHz. Search to mark peak reading value + cable loss shall be less than 20 nW 5. If power level of lower emissions are more than 1/10 of limit (0.4nW for $f < 1\text{GHz}$, 2 nW for $f \geq 1\text{GHz}$), all those are to be indicated in the 2nd and 3rd lines. If others are 1/10 or less more of the limit, no necessary to be indicated.
Test Instruments:	Refer to section 5.8 for details
Test Uncertainty	$\pm 0.96 \text{ dB}$
Test results:	Pass

Measurement Data: See to Appendix A – BLE-1M PHY, Appendix A – BLE-2M PHY, Appendix A – BLE-Coded PHY,S=2, Appendix A – BLE-Coded PHY,S=8.

6.9 Interference suppression function

Test Requirement:	Article 2 paragraph 1 item (19)
Test Method:	Appendix No.43 Notification No.88 of MIC, 2004 section 10
Requirement:	<ol style="list-style-type: none"> 1. The demodulator shall be able to demodulate the transmitting signal from the radio equipment and to display contents of the identification code. 2. The opposite equipment shall be able to transmit the identification code as same as the transmitting signal from the radio equipment
Test setup:	
Test Procedure:	<ol style="list-style-type: none"> 1. The radio equipment with automatic transmitting function of identification code <ol style="list-style-type: none"> A. Transmit the assigned identification code from the radio equipment. B. Confirm the identification code received by the demodulator. 2. The radio equipment with automatic receiving function of identification code <ol style="list-style-type: none"> A. Transmit the assigned identification code from the opposite equipment. B. Confirm that the usual communication is available. C. Transmit the identification code distinct from the assigned one from the opposite equipment. D. Confirm that the radio equipment is stopped or an indication is displayed as the identification code is different.
Test Instruments:	Refer to section 5.8 for details
Test results:	Pass.

Please refer to the below address:

98FC84007854

7 Test Setup Photo



8 EUT Constructional Details

Reference to the test report No.: JYTSZ-R12-2201396

-----End of report-----