REPORT No.: SZ21040315W01

TEST REPORT

APPLICANT	:	A&D Company,Limited
PRODUCT NAME	:	BLE data logging thermometer
MODEL NAME	:	AD-5626
BRAND NAME	:	AND
TEST RULE	:	MIC Notice No.88 Appendix No.43, Item 19
STANDARD(S)	:	MIC Ordinance Regulating Radio Equipment Article 49.20.
RECEIPT DATE	:	2021-04-23
TEST DATE	:	2021-05-04 to 2021-05-13
ISSUE DATE	:	2021-05-27

Edited by: Zeng Xiaoying (Rapporteur)

Approved by: Peng Huarui (Supervisor)

MORLAB

SHENZHEN MORLAB COMMUNICATIONS TECHNOLOGY Co., Ltd.
FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road,
Block67, BaoAn District, ShenZhen ,GuangDong Province, P. R. China

Tel: 86-755-36698555 Fax: 86-755-36698525
Http://www.morlab.cn E-mail: service@morlab.cn

DIRECTORY

Change History		
Version	Date	Reason for change
1.0	2021-05-27	First edition

1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	A&D Company,Limited
Applicant Address:	1-243,Asahi,Kitamoto-shi,Saitama,364-8585,Japan
Manufacturer:	REAC INDUSTRIAL CO., LTD.
Manufacturer Address:	ZHONGFANG GONG YE QU, SHATOU GUAN LI QU, CHANGAN TOWN, DONGGUAN CITY, GUANGDONG, P. R. CHINA

1.2. Equipment Under Test (EUT) Description

Product Name:	BLE data logging thermometer	
Serial No.:	(N/A, marked #1 by test site)	
Hardware Version:	AD5626(MA)R4	
Software Version:	VE01	
Equipment Type:	Bluetooth LE	
Bluetooth Version:	4.2	
Modulation Technology:	GFSK	
Data Rate:	1Mbps	
Operating Frequency Range:	2402MHz – 2480MHz (at interval of 2MHz)	
Power Supply:	Battery	
Test Voltage:	Normal(NV):	3.0V
	Lowest(LV):	3.3V
	Highest(HV):	2.7V

Note 1: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

1.3. Table for Filed Antenna

Antenna Manufacture:	N/A
Brand Name:	N/A
Model Name:	N/A
Antenna Type:	PCB Antenna
Antenna Gain:	0.37dBi

1.4. Table for Carrier Frequency

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
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**

Note 1: The black bold channels were selected for test.

1.5. Table for Test Modes

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Channel
Frequency Error	Un-modulation	0/19/39
Occupied Bandwidth and Spread-spectrum Bandwidth / Factor	GFSK	0/19/39
Unwanted Emission Intensity	GFSK	0/19/39
Antenna Power Error	GFSK	0/19/39
Limitation of Collateral Emission of Receiver	GFSK	0/19/39
Transmission Antenna Gain	GFSK	0/19/39
Transmission Radiation Angle Width	GFSK	0/19/39
Radio Interference Prevention Capability	GFSK	0/19/39

1.6. Summary of the Test Result

Applied Rule: MIC Notice No.88 Appendix No.43, Item 19				
No.	**Description of Test**	**Test Engineer**	**Result**	**Method determination /Remark**
1	Frequency Error	Su Xiaoxian	PASS	No deviation
2	Occupied Bandwidth and Spread-spectrum Bandwidth / Factor	Su Xiaoxian	PASS	No deviation
3	Unwanted Emission Intensity	Su Xiaoxian	PASS	No deviation
4	Antenna Power Error	Su Xiaoxian	PASS	No deviation
5	Limitation of Collateral Emission of Receiver	Su Xiaoxian	PASS	No deviation
6	Transmission Antenna Gain (E.I.R.P. Antenna Power)	N/A	$N/A_{Note\ 1}$	N/A
7	Transmission Radiation Angle Width (3dB Beamwidth)	N/A	$N/A_{Note\ 1}$	N/A
8	Radio Interference Prevention Capability	Su Xiaoxian	PASS	No deviation
9	Construction Protection Confirmation	N/A	PASS	No deviation

Note 1: The test item will not be applied to the transmission antenna which has a gain of 2.14dBi or less.

Note 2: Additions to, deviation, or exclusions from the method shall be judged in the "method determination" column of add, deviate or exclude from the specific method shall be explained in the "Remark" of the above table.

Note 3: When the test result is a critical value, we will use the measurement uncertainty give the judgment result based on the 95% risk level.

1.7. Environmental Conditions

Temperature (°C):	5-35
Relative Humidity (%):	45-85
Atmospheric Pressure (kPa):	86-106

2. Test Results

2.1. Frequency Error Measurement

2.1.1.Limit

Item	Limits
Frequency Tolerance	±50ppm

2.1.2.Measuring Instruments and Setting

The following table is the setting of the spectrum.

Spectrum Parameter	Setting
Span Frequency	50kHz
RB/VB	10 kHz / 30 kHz

2.1.3.Test Procedures

1. Frequency accuracy of SA shall be less than 10% of limits tolerance (5ppm)
2. Setting of SA is following as: RB: 10kHz /VB: 30kHz / SPAN: 50kHz
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. Mark function: Frequency Counter (Resolution 100Hz)
8. 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 $(f_c-f)/f_c\times10^6$ppm and the limit is ±50ppm.

2.1.4.Test Setup Layout

2.1.5.Test Deviation

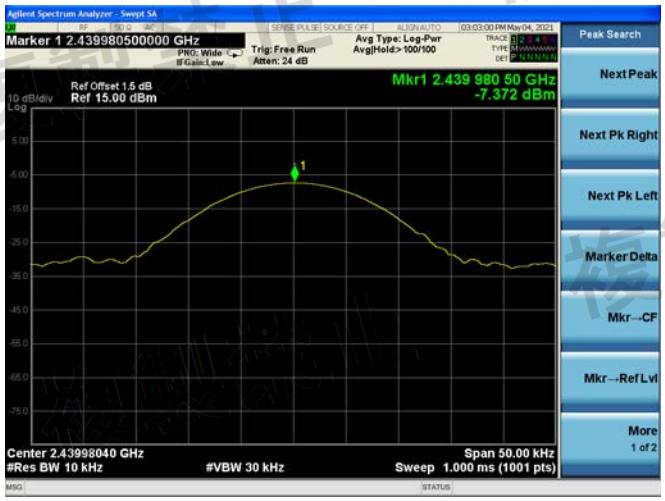
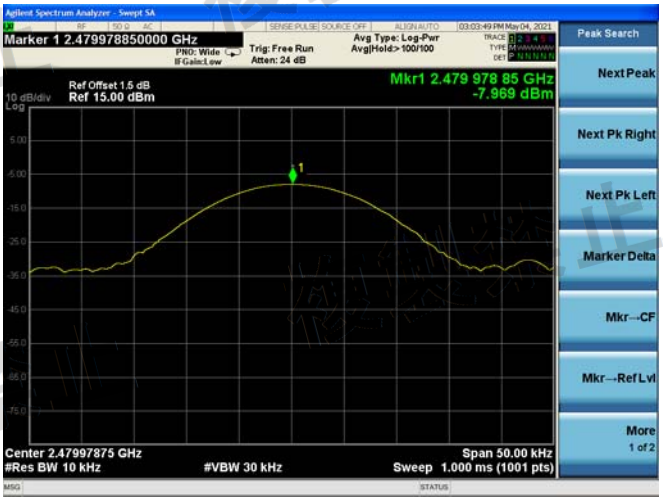
There is no deviation with the original standard.

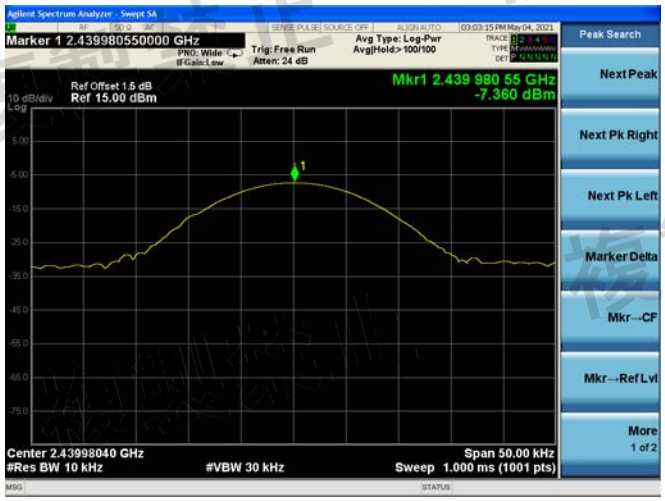
2.1.6.EUT Operation during Test

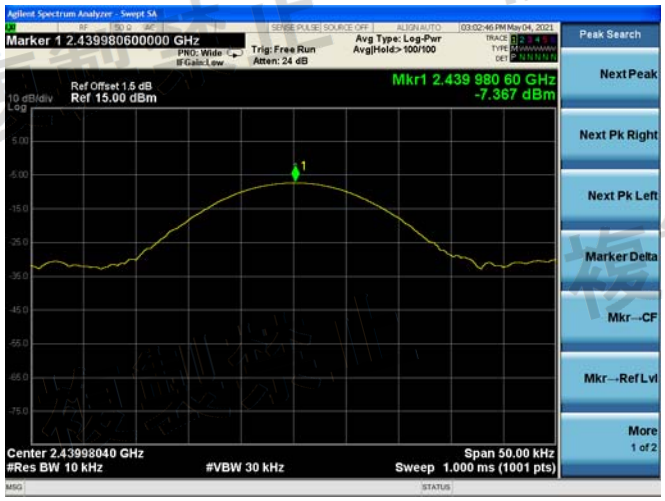
The EUT was placed on the test table and programmed in un-modulation function.

2.1.7.Test Result

Test Voltage	Channel	Frequency f_c (MHz)	Test Frequency f (MHz)	Frequency Error (ppm)	Verdict
LV	0	2402	2401.9798	-8.41	PASS
	19	2440	2439.9805	-7.99	PASS
	39	2480	2479.9789	-8.51	PASS
NV	0	2402	2401.9798	-8.41	PASS
	19	2440	2439.9806	-7.95	PASS
	39	2480	2479.9789	-8.51	PASS
HV	0	2402	2401.9799	-8.37	PASS
	19	2440	2439.9806	-7.95	PASS
	39	2480	2479.9787	-8.59	PASS

Frequency Error	
CH0, 2402MHz, LV	**CH19, 2440MHz, LV**
	
CH39, 2480MHz, LV	
	

Frequency Error	
CH0, 2402MHz, NV	**CH19, 2440MHz, NV**
	
CH39, 2480MHz, NV	
	

Frequency Error	
CH0, 2402MHz, HV	**CH19, 2440MHz, HV**
	
CH39, 2480MHz, HV	
	

2.2. Occupied Bandwidth

2.2.1.Limit

Item	Limits
Occupied Band Width	FH≤83.5MHz; OFDM, DS≤26MHz; Others≤26MHz;

2.2.2.Measuring Instruments and Setting

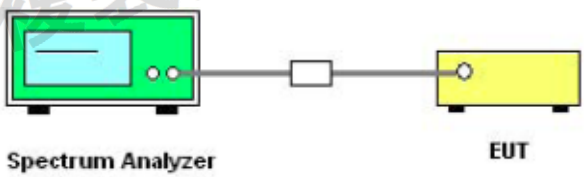
The following table is the setting of the spectrum.

Spectrum Parameter	Setting
Span Frequency	3MHz
RB/VB	100KHz/300 kHz

2.2.3.Test Procedures

1. Setting of SA is following as: RB: 100 kHz / VB: 300 kHz / SPAN: 3MHz / 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 FHSS Device). SA set to 99% of occupied Bandwidth to measure occupied Bandwidth. The limit is less than 26MHz (For DSSS or OFDM Device) or 83.5MHz (For FHSS Device).
3. SA set to 90% of occupied Bandwidth to measure Spread Spectrum Bandwidth and must greater than 500kHz.
4. Spread Spectrum Factor = Spread Spectrum Bandwidth/ modulation rate of EUT.
5. Spread Spectrum Factor limit is greater than 5

2.2.4.Test Setup Layout



2.2.5.Test Deviation

There is no deviation with the original standard.

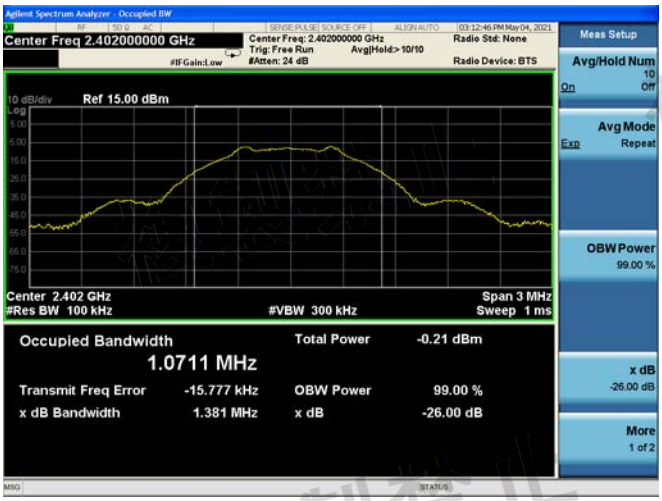
2.2.6.EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

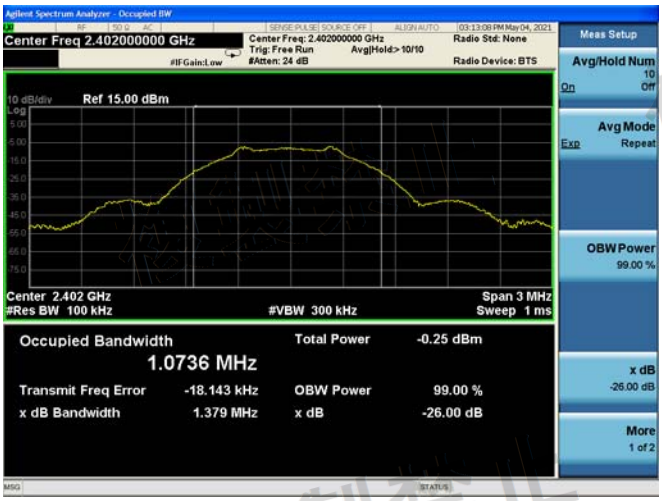
2.2.7.Test Result

Results of Occupied Bandwidth

Test Voltage	Channel	Frequency (MHz)	Measured 99% Occupied Bandwidth (MHz)	Verdict
LV	0	2402	1.071	PASS
	19	2440	1.073	PASS
	39	2480	1.085	PASS
NV	0	2402	1.070	PASS
	19	2440	1.075	PASS
	39	2480	1.085	PASS
HV	0	2402	1.074	PASS
	19	2440	1.077	PASS
	39	2480	1.083	PASS

99% Occupied Bandwidth	
CH0, 2402MHz, LV	**CH19, 2440MHz, LV**
	
CH39, 2480MHz, LV	
	

99% Occupied Bandwidth	
CH0, 2402MHz, NV	**CH19, 2440MHz, NV**
	
CH39, 2480MHz, NV	
	

99% Occupied Bandwidth	
CH0, 2402MHz, HV	**CH19, 2440MHz, HV**
	
CH39, 2480MHz, HV	
	

2.3. Unwanted Emission Intensity Measurement

2.3.1.Limit

Item	Limits
TX Spurious Emission	≦2.5 μW/MHz (30MHz≦f<2387MHz ; 2496.5MHz<f)
	≦25 μW/MHz (2387MHz≦f<2400MHz); (2483.5MHz<f≦2496.5MHz)

2.3.2.Measuring Instruments and Setting

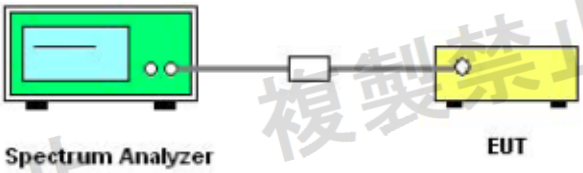
The following table is the setting of the spectrum.

Spectrum Parameter	Setting
Attenuation	Auto
RB/VB	100KHz/100KHz(below 1GHz emissions); 1MHz/1MHz(above 1GHz emissions)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

2.3.3.Test Procedures

1. EUT have transmitted the maximum modulation signal and fixed channelize.
2. Setting of SA is following as: RB/VB: 100 kHz/100kHz (below 1GHz emissions), 1MHz/1MHz (above 1GHz emissions) / Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak / Trace mode: Max hold
3. Setting of SA is following as 30MHz and stop frequency 2387MHz Then to mark peak reading value + cable loss shall be less than 2.5μW.
4. SA adjusted to start frequency 2387MHz and stop frequency 2400MHz. Then to mark peak reading value + cable loss shall be less than 25μW.
5. SA adjusted to start frequency 2483.5MHz and stop frequency 2496.5MHz. Then to mark peak reading value + cable loss shall be less than 25μW
6. SA adjusted to start frequency 2496.5MHz and stop frequency 12500MHz. Then to mark peak reading value + cable loss shall be less than 2.5μW

2.3.4.Test Setup Layout



2.3.5.Test Deviation

There is no deviation with the original standard.

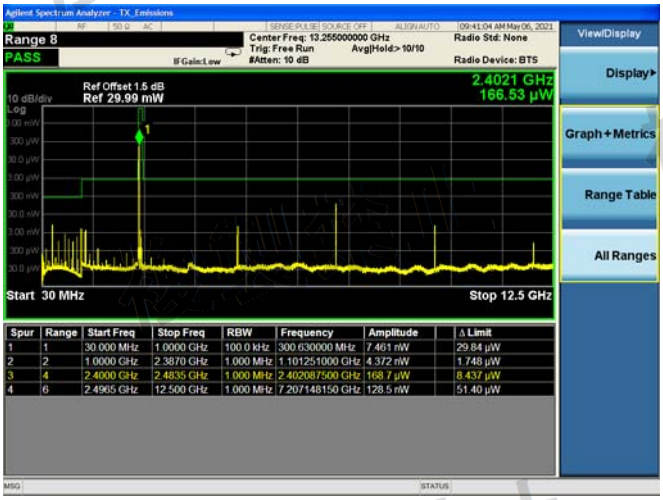
2.3.6.EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

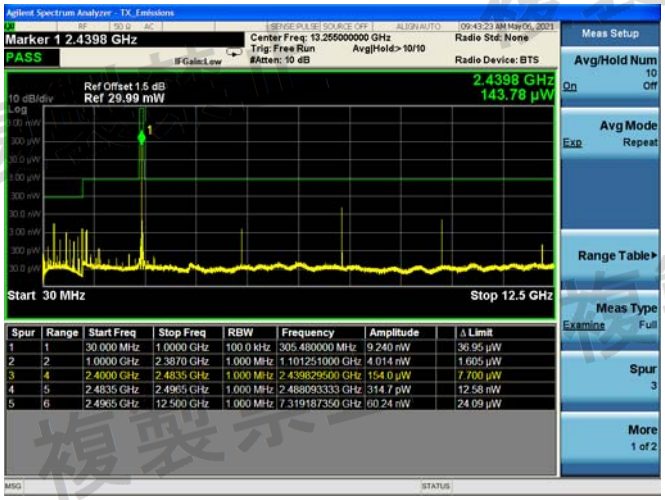
2.3.7.Test Result

Test Channel	Test Frequency (MHz)	Test Result Value	Limit	Verdict
		Max Value		
0	30~1000	<0.25μW/100kHz	0.25μW/100kHz	PASS
	1000~2387	<2.5μW/MHz	2.5μW/MHz	PASS
	2387~2400	<25μW/MHz	25μW/MHz	PASS
	2483.5~2496.5	<25μW/MHz	25μW/MHz	PASS
	2496.5~12500	<2.5μW/MHz	2.5μW/MHz	PASS
19	30~1000	<0.25μW/100kHz	0.25μW/100kHz	PASS
	1000~2387	<2.5μW/MHz	2.5μW/MHz	PASS
	2387~2400	<25μW/MHz	25μW/MHz	PASS
	2483.5~2496.5	<25μW/MHz	25μW/MHz	PASS
	2496.5~12500	<2.5μW/MHz	2.5μW/MHz	PASS
39	30~1000	<0.25μW/100kHz	0.25μW/100kHz	PASS
	1000~2387	<2.5μW/MHz	2.5μW/MHz	PASS
	2387~2400	<25μW/MHz	25μW/MHz	PASS
	2483.5~2496.5	<25μW/MHz	25μW/MHz	PASS
	2496.5~12500	<2.5μW/MHz	2.5μW/MHz	PASS

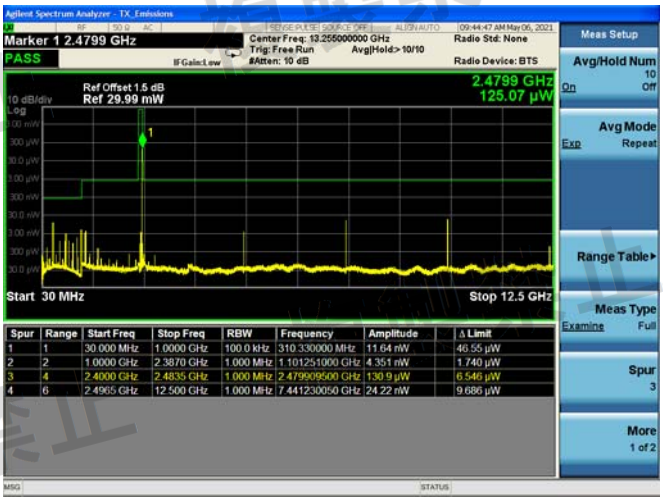
30MHz – 12.5GHz, CH0, 2402MHz, LV



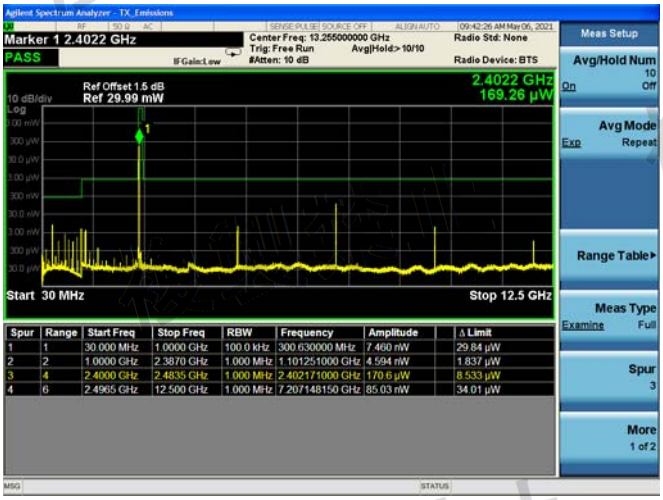
30MHz – 12.5GHz, CH19, 2440MHz, LV



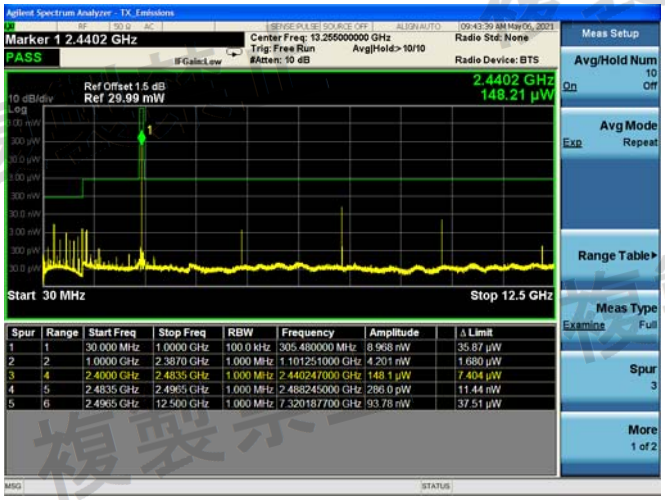
30MHz – 12.5GHz, CH39, 2480MHz, LV



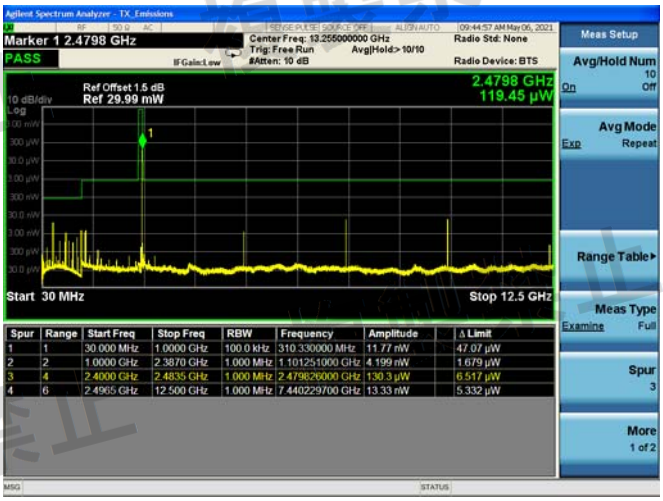
30MHz – 12.5GHz, CH0, 2402MHz, NV



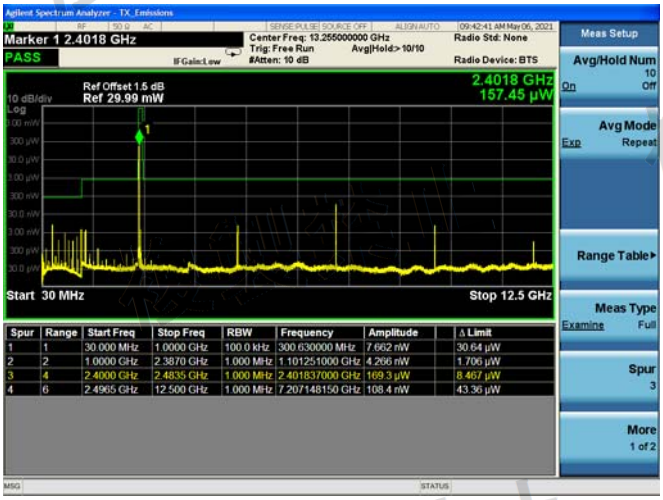
30MHz – 12.5GHz, CH19, 2440MHz, NV



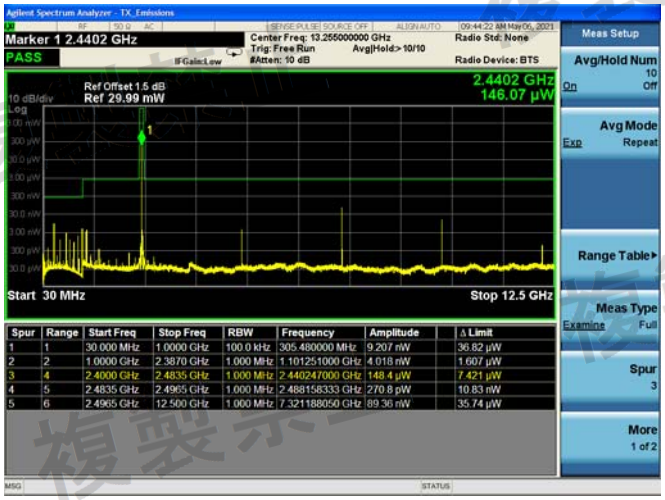
30MHz – 12.5GHz, CH39, 2480MHz, NV



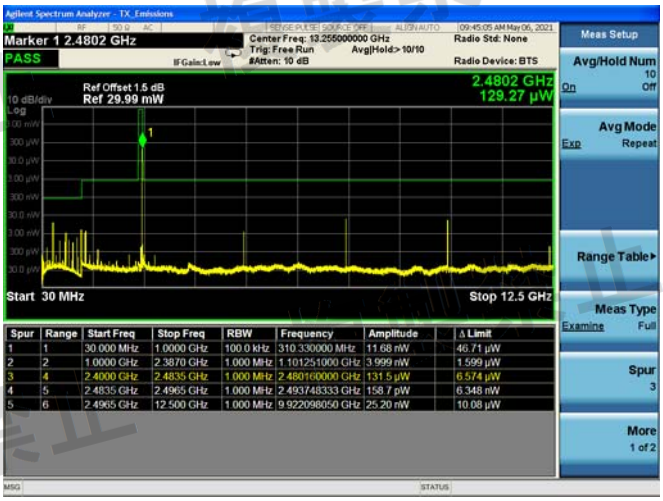
30MHz – 12.5GHz, CH0, 2402MHz, HV



30MHz – 12.5GHz, CH19, 2440MHz, HV



30MHz – 12.5GHz, CH39, 2480MHz, HV



Note1: The spurious emissions mask that displayed on the plots is composed of several frequency ranges below:

Range	Start Freq. (MHz)	Stop Freq. (MHz)	RBW	VBW	Detector Type	Trace Mode	Limit (µW)
1	30	1000	100kHz	100kHz	Peak	Max Hold	0.25
2	1000	2387	1MHz	1MHz	Peak	Max Hold	2.5
3	2387	2400	1MHz	1MHz	Peak	Max Hold	25
4	2400	2483.5	1MHz	1MHz	Peak	Max Hold	20000
5	2483.5	2496.5	1MHz	1MHz	Peak	Max Hold	25
6	2496.5	12500	1MHz	1MHz	Peak	Max Hold	2.5

Note 2: Only the spurious with the minimum margin from the limit line will be displayed in the mark table (The lower window on the test plots).

2.4. Antenna Power Error Measurement

2.4.1.Limit

Item	Limits
Antenna Power Density	≤ 3 mW/MHz (FH form 2400~2483.5MHz) ≤ 10 mW/MHz (OFDM, DS from 2400~2483.5MHz,802.11b/g/n20) ≤ 5 mW/MHz (OFDM, from 2400~2483.5MHz,802.11n40) ≤10 mW (Other from 2400~2483.5MHz)
Antenna Power Error	+20%, -80% (Base on manufacturer declare antenna power density)

2.4.2.Measuring Instruments and Setting

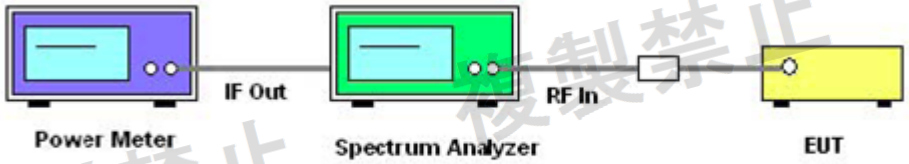
The following table is the setting of the power meter.

Power Meter Parameter	Setting
Filter No.	Auto
Measurement time	0.135 s ~ 26 s
Used Average Sensor	NRV-Z55

2.4.1.Test Procedures

1. A power meter is connected on the IF output port of the spectrum analyzer.
2. Adjust the spectrum analyzer to have the center frequency the same with the measured carrier. RBW=VBW=1MHz, detector mode is positive peak. Turn off the averaging function and use zero span.
3. The calibrating signal power shall be reduced to 0 dBm and it shall be verified that the power meter reading also reduces by 10 dB.
4. Connect the equipment to be measured. Using the following settings of the spectrum analyzer in combination with "max hold" function, find the frequency of highest power output in the power envelope: center frequency equal to operating frequency; RBW & VBW: 1 MHz; detector mode: positive peak; averaging: off; span: 3 times the spectrum width; amplitude: adjust for middle of the instrument's range. The frequency found shall be recorded.
5. Set the center frequency of the spectrum analyzer to the found frequency and switch to zero span. The power meter indicates the measured power density “P_t”.
6. Calculate antenna power density by the formula below PD = P_t + 10*log(1/x). x: The duty cycle of the EUT in continuously transmitting mode
7. Antenna Power Error is definition that actual measure antenna power tolerance between + 20% to - 80% power range that base on manufacturer declare the conducted power density.

2.4.2.Test Setup Layout



2.4.3.Test Deviation

There is no deviation with the original standard.

2.4.4.EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

2.4.5.Test Result

Duty cycle =1, Manufacturer declare the conducted power =0.18mW

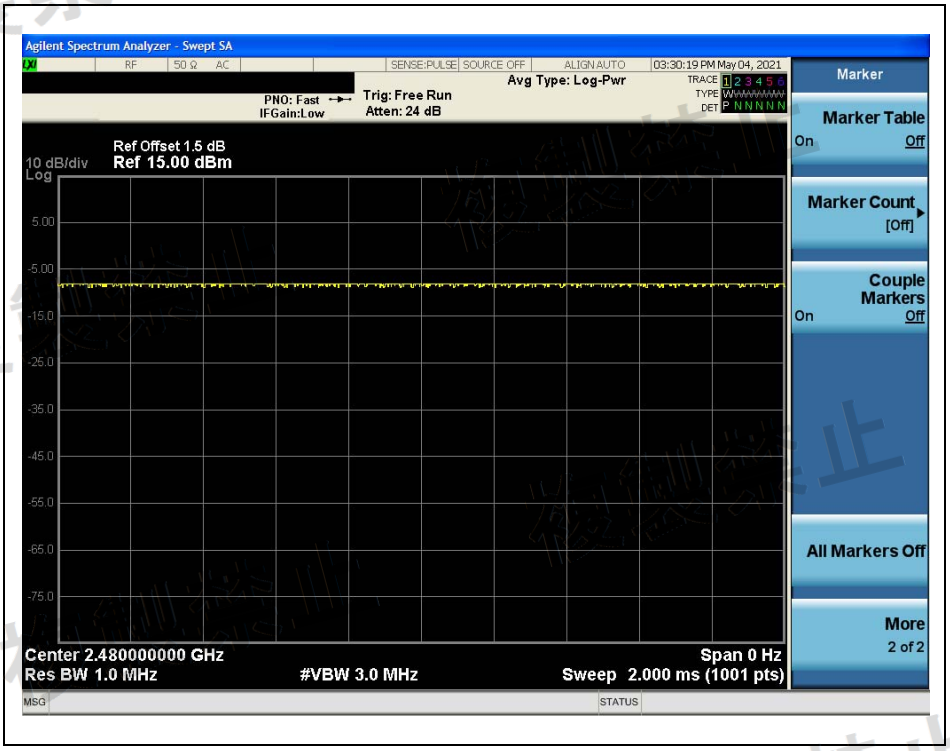
Channel	Test Voltage	Test Value P_t(dBm)	Antenna Power P(dBm)	Antenna Power P (mW)	Antenna Power Error	Verdict
2402	LV	-6.97	-6.97	0.20	11.11%	PASS
	NV	-6.90	-6.90	0.20	11.11%	PASS
	HV	-6.78	-6.78	0.21	16.67%	PASS
2440	LV	-7.34	-7.34	0.18	0.00%	PASS
	NV	-7.38	-7.38	0.18	0.00%	PASS
	HV	-7.44	-7.44	0.18	0.00%	PASS
2480	LV	-7.97	-7.97	0.16	-11.11%	PASS
	NV	-8.01	-8.01	0.16	-11.11%	PASS
	HV	-8.20	-8.20	0.15	-16.67%	PASS

Note: Antenna Power tolerance = $(P-P_c)/P_c$

$$P = P_t+10*\log(1/x)$$

P: Antenna Power; x: Duty cycle;

P_t: Test Value; P_c: The conducted power declared by manufacturer.


Agilent Spectrum Analyzer - Swept SA
RF
50 Ω AC
SENSE:PULSE
SOURCE OFF
ALIGN AUTO
03:30:19 PM May 04, 2021
Avg Type: Log-Pwr
TRACE 1 2 3 4 5 6
TYPE W
DET P N N N N N
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 24 dB
Ref Offset 1.5 dB
10 dB/div
Log
Ref 15.00 dBm
5.00
-5.00
-15.0
-25.0
-35.0
-45.0
-55.0
-65.0
-75.0
Center 2.480000000 GHz
Res BW 1.0 MHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 2.000 ms (1001 pts)
MSG
STATUS
Marker
Marker Table
On Off
Marker Count
[Off]
Couple Markers
On Off
All Markers Off
More
2 of 2

(Duty cycle)

2.5. Limitation of Collateral Emission of Receiver Measurement

2.5.1.Limit

Item	Limits
RX Spurious Emission:	≤4nW (f<1GHz)
	≤20nW (1GHz≤f)

2.5.2.Measuring Instruments and Setting

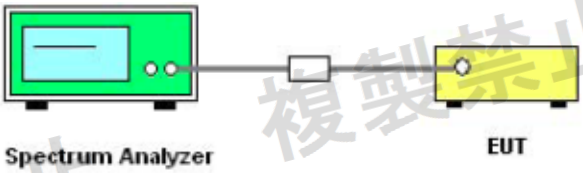
The following table is the setting of the spectrum.

Spectrum Parameter	Setting
Attenuation	Auto
RB/VB	100KHz/100KHz(below 1GHz emissions) ; 1MHz/1MHz(above 1GHz emissions)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

2.5.3.Test Procedures

1. EUT has the continuous reception mode and fixed only one channelize.
2. Setting of SA is following as Setting of SA is following as: RB/VB: 100 kHz/100kHz(below 1GHz emissions), 1MHz/1MHz(above 1GHz emissions) / Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak / Trace mode: Max hold.
3. Adjust to start frequency 30MHz and stop frequency 1000MHz. Search to mark peak reading value + cable loss shall be less than 4nW.
4. Adjust to start frequency 1000MHz and stop frequency 12500MHz. Search to mark peak reading value + cable loss shall be less than 20nW.
5. If power level of lower emissions are more than 1/10 of limit (0.4nW for f < 1GHz, 2nW for f≥ 1GHz), 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.

2.5.4.Test Setup Layout



2.5.5.Test Deviation

There is no deviation with the original standard.

2.5.6.EUT Operation during Test

The EUT was programmed to be in continuously receiving mode.

2.5.7.Test Result

Test Channel	Test Frequency (MHz)	Measured Max. Emission(nW)	Limit (nW)	Verdict
0	30~1000	<4	≤4 (f<1GHz); ≤20 (1GHz≤f)	PASS
	1000~12500	<20		PASS
19	30~1000	< 4	≤4 (f<1GHz); ≤20 (1GHz≤f)	PASS
	1000~12500	<20		PASS
39	30~1000	< 4	≤4 (f<1GHz); ≤20 (1GHz≤f)	PASS
	1000~12500	<20		PASS

30MHz – 12.5GHz, CH0, 2402MHz, LV

30MHz – 12.5GHz, CH19, 2440MHz, LV

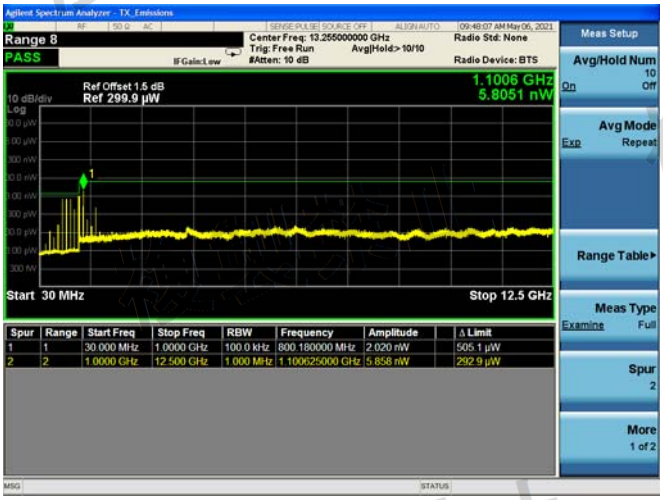
30MHz –12.5GHz, CH39, 2480MHz, LV

30MHz – 12.5GHz, CH0, 2402MHz, NV

30MHz – 12.5GHz, CH19, 2440MHz, NV

30MHz –12.5GHz, CH39, 2480MHz, NV

30MHz – 12.5GHz, CH0, 2402MHz, HV



30MHz – 12.5GHz, CH19, 2440MHz, HV

30MHz –12.5GHz, CH39, 2480MHz, HV

Note 1: The spurious emissions mask that displayed on the plots is composed of several frequency ranges below:

Range	Start Freq. (MHz)	Stop Freq. (MHz)	RBW	VBW	Detector Type	Trace Mode	Limit (nW)
1	30	1000	100kHz	100kHz	Peak	Max Hold	4
2	1000	12500	1MHz	1MHz	Peak	Max Hold	20

Note 2: Only the spurious with the minimum margin from the limit line will be displayed in the mark table (The lower window on the test plots).

2.6. Transmission Antenna Gain (E.I.R.P. Antenna Power) Measurement

2.6.1.Limit

Item	Limits
E.I.R.P. Power	12.14dBm/MHz or 22.14 dBm/MHz (OFDM,DS from 2400~2483.5MHz,802.11b/g/n20) 9.13dBm/MHz or 19.13 dBm/MHz (OFDM, from 2400~2483.5MHz,802.11n40) 12.14dBm or 22.14 dBm (Others from 2400~2483.5MHz) 6.91 dBm/MHz or 16.91 dBm/MHz(FH from 2400~2483.5MHz)
Note: This test item will not be applied to the transmission antenna which has a gain of 2.14dBi or less.	

2.6.2.Measuring Instruments and Setting

The following table is the setting of the spectrum.

Spectrum Parameter	Setting
RB/VB	1MHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

2.6.3.Test Procedures

1. Set the EUT and measuring antenna at the same height and roughly facing each other.
2. Move the measuring antenna height up and down within ± 50cm 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 ± 50cm of replacing antenna height and swing it to find the maximum receiving level.
6. Set the 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 (± 1dB). Record the P_t.
7. Calculate E.I.R.P. by the formula below E.I.R.P. = G_t – L + P_t.

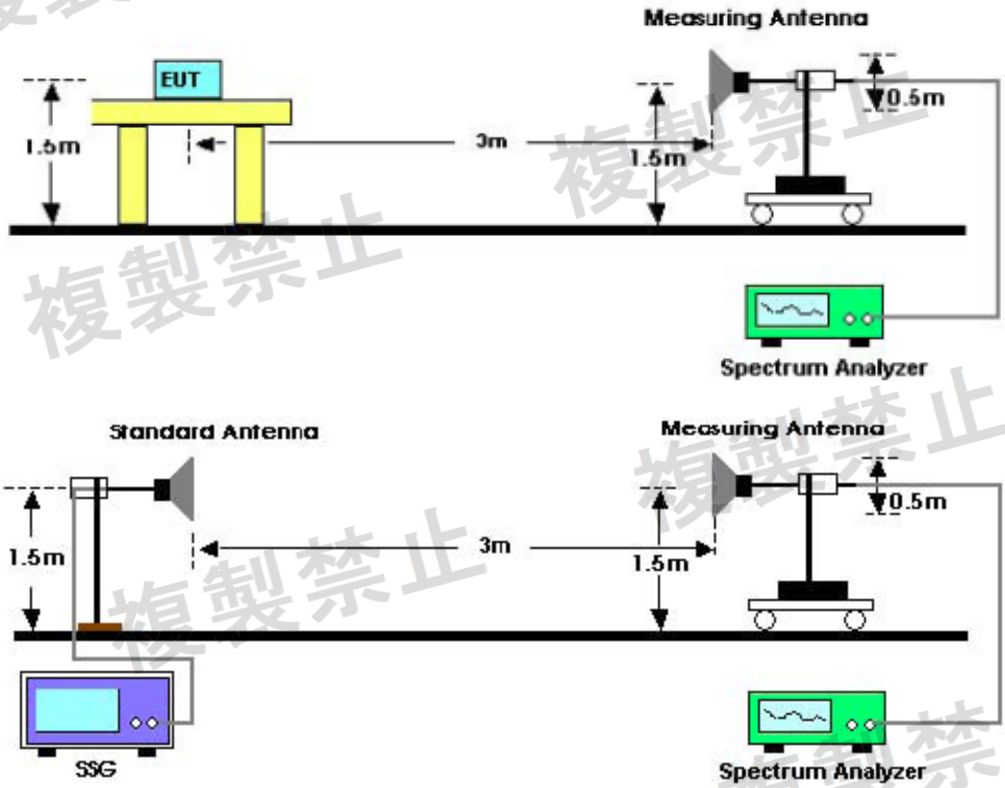
G_t: gain of replacing antenna (dBi)

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.

2.6.4.Test Setup Layout



2.6.5.Test Deviation

There is no deviation with the original standard.

2.6.6.EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

2.6.7.Test Result

Note: This test item will not be applied to the transmission antenna which has a gain of 2.14dBi or less.

2.7. Transmission Radiation Angle Width (3dB Beamwidth) Measurement

2.7.1.Limit

Item	Limits
3dB antenna beamwidth	360/A (If A<1; then A=1) A = {E.I.R.P./ 12.14 for DS, OFDM, Other Digital Methods} or A = {E.I.R.P./ 6.91 for FHSS operating in 2400MHz-2483.5MHz}
Note: This test item will not be applied to the transmission antenna which has a gain of 2.14dBi or less	

2.7.2.Measuring Instruments and Setting

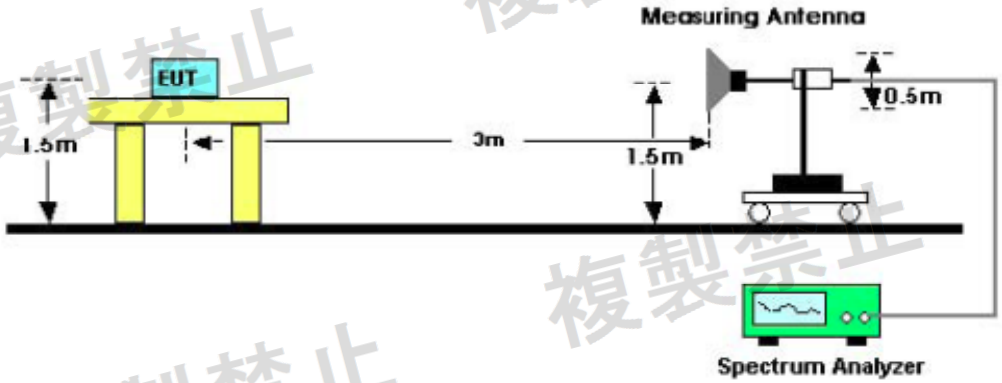
The following table is the setting of the spectrum.

Spectrum Parameter	Setting
RB	1 MHz
VB	1 KHz
Y scale	5 dB
Detector	Peak
Trace	Max Hold

2.7.3.Test Procedures

1. Set the EUT and measuring antenna at the same height and roughly facing each other.
2. Set spectrum analyzer with condition in section 4.7.2 and tune reference level to observe receiving signal position.
3. Rotate directions of the EUT horizontally and erotically to find the maximum receiving power.
4. Move the measuring antenna height up and down within ± 50cm of EUT height and swing it to find the maximum output of measuring antenna. The output level at the spectrum analyzer is read as “E”
5. Calculate permitted radiation angle in horizontal and vertical using E.I.R.P. measured in another test method.
6. Calculate 3dB antenna beam width by the formula below 360/A (If A<1; then A=1). A = {E.I.R.P. Power [mW] / 16.36 for DS, OFDM} or A = {E.I.R.P. Power [mW] / 4.9 for FH}

2.7.4.Test Setup Layout



2.7.5.Test Deviation

There is no deviation with the original standard.

2.7.6.EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

2.7.7.Test Result

Note: This test item will not be applied to the transmission antenna which has a gain of 2.14dBi or less.

2.8. Radio Interference Prevention Capability Measurement

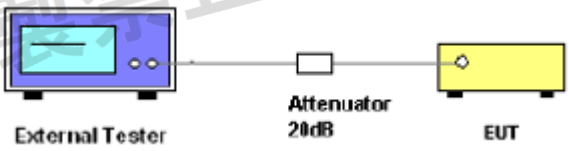
2.8.1.Limit

Item	Limits
Identification	≥ 48 bits

2.8.2.Test Procedures

1. In the case that the EUT has the function of automatically transmitting the identification code: a. Transmit the predetermined identification codes form EUT. b. Check the transmitted identification codes with the demodulator.
2. In the case of receiving the identification code: a. Transmit the predetermined identification codes form the counterpart. b. Check if communication is normal. c. Transmit the signals other than predetermined ID codes form the counterpart. d. check if the EUT stops the transmission, or if it displays that identification codes are different from the predetermined ones.

2.8.3.Test Setup Layout



2.8.4.Test Deviation

There is no deviation with the original standard.

2.8.5.EUT Operation during Test

The EUT was programmed to be in normal mode.

2.8.6.Test Result

The identification function is good.

2.9. Construction Protection Confirmation Method Limit

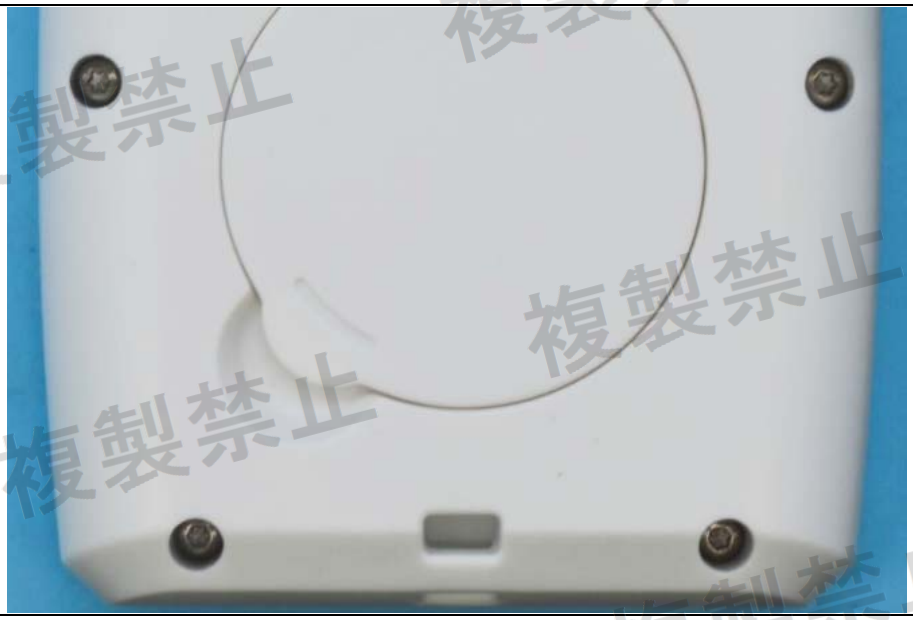
The high-frequency section and modulation section of the radio equipment except for the antenna system shall not be capable of being opened easily.

2.9.1. Confirmation Method

The RF and modulation portions are protected against illegal modification as following method:

Protected Method	Description
Special screw	RF and Modulation components are covered within RF module case of EUT and this case is sealed with special screws to protect anybody to open this case. Then use the special tool and slot to compress tightly and protect the outer cover is not opened easily.

2.9.2. Reference Documents

Reference Documents	Item
Photo	

Annex A Test Uncertainty

Test Items	Uncertainty	Remark
Frequency Error / 99% & 90% Bandwidth	±1.75×10^{-6}	Confidence levels of 95%
Antenna Power	±0.849dB	Confidence levels of 95%
TX-RX Spurious Emissions	±0.614dB	Confidence levels of 95%
Transmission Antenna Gain	±2.49dB	Confidence levels of 95%
Temperature	±0.8℃	Confidence levels of 95%
Humidity	±4.1%	Confidence levels of 95%
DC / AC Power Source	±0.04%	Confidence levels of 95%

Annex B Testing Laboratory Information

1. Identification of the Responsible Testing Laboratory

Laboratory Name:	Morlab Laboratory of Shenzhen Morlab Communications Technology Co., Ltd.
Laboratory Address:	FL.1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China
Telephone:	+86 755 36698555
Facsimile:	+86 755 36698525

2. Identification of the Responsible Testing Location

Name:	Morlab Laboratory of Shenzhen Morlab Communications Technology Co., Ltd.
Address:	FL.1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China

3. Test Equipments Utilized

Description	Manufacturer	Model	Serial No.	Cal. Date	Due Date
EXA Signal Analyzer	Agilent	N9010A	MY53470836	2021.03.25	2022.03.24
DC Power Supply	IVYTECH	IV3610	1709D361010	2020.10.26	2021.10.25
Power Sensor	Agilent	U202IXA	MY54210011	2021.03.25	2022.03.24
Radio Communication Tester	R&S	CMW500	108950	2021.03.25	2022.03.24
RF Cable	CB01	RF01	Morlab	N/A	N/A
Note 1: The equipments were calibrated by CCIC (Shenzhen) Metrology&Testing Service Co.,Ltd and Shenzhen Academy of Metrology and Quality Inspection. **Note 2:** The cable loss is 0dB.					

List of Software Used

Description	Manufacturer	Software Version
Test System	Tonscend	V2.6
Power Panel	Agilent	V3.8

END OF REPORT