Japan Radio Test Report

Report No.	:	BTL-JPAP-4-2004T143
Equipment	:	7 inch Touch Screen Surface mount
Model Name	:	M201923005, TS-770-B-S, TS-770-W-S
Brand Name	:	CRESTRON
Applicant	:	Crestron Electronics, Inc.
Address	:	15 Volvo Drive, Rockleigh, NJ 07647
Factory	:	JABIL CIRCUIT DE MEXICO , S. DE RL DE C.V.
Address	:	Parque Industrial Guadalajara Technology Park Km. 12.5. Carretera a Nogales Avenida Guadalupe #225, Esquina con Av. Inglaterra. Zapopan Jalisco
Function	:	RLAN (W52)
Standard(s)	:	Article 2 Paragraph 1 Item 19-3 of the Certification Ordinance MIC Notice No.88 Appendix No.45
Date of Receipt	:	2020/4/24
Date of Test	:	2020/4/24~ 2020/5/20
Issued Date	:	2020/6/2

The above equipment has been tested and found in compliance with the requirement of the above standards by BTL Inc.

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Declaration

BTL represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

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Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

Please note that the measurement uncertainty is provided for informational purpose only and are not use in determining the Pass/Fail results.

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REPORT ISSUED HISTORY

Report Version	Description	Issued Date
R00	Original Issue.	2020/6/2

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1 SUMMARY OF TEST RESULTS

Section Number	Description of Test	ORRE	Result
3.1	Frequency Tolerance	Clause 3	Pass
3.2	Occupied Bandwidth	Clause 4	Pass
3.3	Unwanted Emission Intensity	Clause 5	Pass
3.4	Antenna Power Error	Clause 6	Pass
3.5	Adjacent Channel Power and Out of Band Leakage Power	Clause 7	Pass
3.6	Limitation of Collateral Emission of Receiver	Clause 8	Pass
3.7	Radio Interference Prevention Capability	Clause 9	Pass
3.8	Transmission Burst Length	Clause 10	Pass
--	Transmission Power Control Function (TPC)	Clause 11	N/A
3.9	Carrier Sense Capability	Clause 12	Pass
--	Dynamic Frequency Selection (DFS)	--	N/A
--	Number of carrier	--	49-20
3.10	Construction Protection Confirmation	--	49-20
--	Warning indication for ‘indoor use only’	--	MIC No.48

NOTE:
(1) ”N/A” denotes test is not applicable in this Test Report.
(2) The report format version is TP.1.1.1.

Measurement Method	MIC Notice No.88 Appendix No.45
Test Condition	Conductive, RF test program provided by the customer was used to control the operating channel as well as the output power level.

Abbreviations
For the purposes of the present document, the following abbreviations apply:

NC	Normal Condition
EC	Extreme Condition
EUT	Equipment Under Test
DS	Direct spreading
FH	Frequency hopping
OFDM	Orthogonal frequency division multiplexing

1.1 TEST FACILITY

The test facilities used to collect the test data in this report:
☒ **SR06:** No. 68-1, Ln. 169, Sec. 2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan (R.O.C.)

1.2 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty	Remark
Frequency Tolerance / 99% & 90% Bandwidth	$\pm 6.25\times10^{-7}$	Confidence levels of 95%
Antenna power / Unwanted Emission Strength / Secondary Radiated Emission Strength	±0.5dB	Confidence levels of 95%
Transmission Antenna Gain	±3.72dB	Confidence levels of 95%
Carrier Sense Capability	±0.76dB	Confidence levels of 95%

1.3 TEST ENVIRONMENT CONDITIONS

Test Item	Environment Condition	Tested by
Frequency Tolerance	24.5 °C, 56.6 %	Jay Kao
Occupied Bandwidth	24.5 °C, 56.6 %	Jay Kao
Unwanted Emission Intensity	24.5 °C, 56.6 %	Jay Kao
Antenna Power Error	24.5 °C, 56.6 %	Jay Kao
Adjacent Channel Power and Out of Band Leakage Power	24.5 °C, 56.6 %	Jay Kao
Limitation of Collateral Emission of Receiver	24.5 °C, 56.6 %	Jay Kao
Radio Interference Prevention Capability	24.5 °C, 56.6 %	Jay Kao
Transmission Burst Length	24.5 °C, 56.6 %	Jay Kao
Carrier Sense Capability	24.5 °C, 56.6 %	Jay Kao

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2 GENERAL INFORMATION

2.1 DESCRIPTION OF EUT

Equipment	7 inch Touch Screen Surface mount
Model Name	M201923005, TS-770-B-S, TS-770-W-S
Brand Name	CRESTRON
Model Difference	M201923005 includes two series: TS-770-B-S, TS-770-W-S All modes are identical to each other except below: B: Black, W: White, S: Smooth
Power Source	DC voltage supplied from POE.
Power Rating	I/P: 48 VDC 350mA (802.3at type 1), 48 VDC 600mA (802.3at type 2)
Products Covered	N/A
Operation Frequency	W52: 5180 MHz to 5240 MHz
Modulation Type	OFDM
Data Rate	IEEE 802.11a: 54/48/36/24/18/12/9/6 Mbps IEEE 802.11n: up to 150 Mbps IEEE 802.11ac: up to 433 Mbps
Occupied Bandwidth (Maximum)	IEEE 802.11a: 17.90 MHz IEEE 802.11n (HT20): 18.90 MHz IEEE 802.11n (HT40): 36.64 MHz IEEE 802.11ac (VHT80): 75.52 MHz
Software version	BSP Version: msm8953_64-userdebug 8.1.0.2.2.1 56 dev-keys
Hardware version	REV: 2.0
Antenna Power (Rated)	IEEE 802.11a: 1.5066 mW/MHz IEEE 802.11n (HT20): 1.4859 mW/MHz IEEE 802.11n (HT40): 0.6871 mW/MHz IEEE 802.11ac (VHT80): 0.3162 mW/MHz
Antenna Power (Maximum Conducted)	IEEE 802.11a: 1.5066 mW/MHz IEEE 802.11n (HT20): 1.4859 mW/MHz IEEE 802.11n (HT40): 0.6871 mW/MHz IEEE 802.11ac (VHT80): 0.3162 mW/MHz
Test Model	M201923005
Sample Status	Engineering Sample
EUT Modification(s)	N/A

NOTE:
(1) For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
(2) Channel List:

IEEE 802.11a IEEE 802.11n (HT20) IEEE 802.11ac (VHT20)		IEEE 802.11n (HT40) IEEE 802.11ac (VHT40)		IEEE 802.11ac (VHT80)	
Channel (CH)	Frequency (MHz)	Channel (CH)	Frequency (MHz)	Channel (CH)	Frequency (MHz)
36	5180	38	5190	42	5210
40	5200	46	5230		
44	5220				
48	5240				

(3) Table for Filed Antenna:

Ant.	Brand	Model	Type	Connector	Gain (dBi)
1	YAGEO	TS WLAN MAIN	PIFA	IPEX	1.86

2.2 DESCRIPTION OF TEST MODES

The test system was pre-tested based on the consideration of all possible combinations of EUT operation modes according to test plan.
Following mode(s) as (were) found to be the worst case(s) and selected for the final test.

Test Mode	Description
1	IEEE 802.11a_5180/5200/5240 MHz
2	IEEE 802.11n (HT20)_5180/5200/5240 MHz
3	IEEE 802.11n (HT40)_5190/5230 MHz
4	IEEE 802.11ac (VHT80)_5210 MHz

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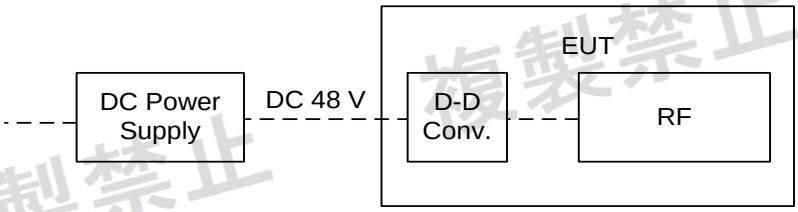
Power Supply Voltage Fluctuation Test



Voltage fluctuation test	Normal Voltage	High Voltage + 10% of Normal Voltage	Low Voltage - 10% of Normal Voltage
Input: DC Power (V)	48	52.8	43.2
Output: DC Power (V)	3.01	3.01	2.98
Voltage Variation (%)	-	0.000000	-0.996678

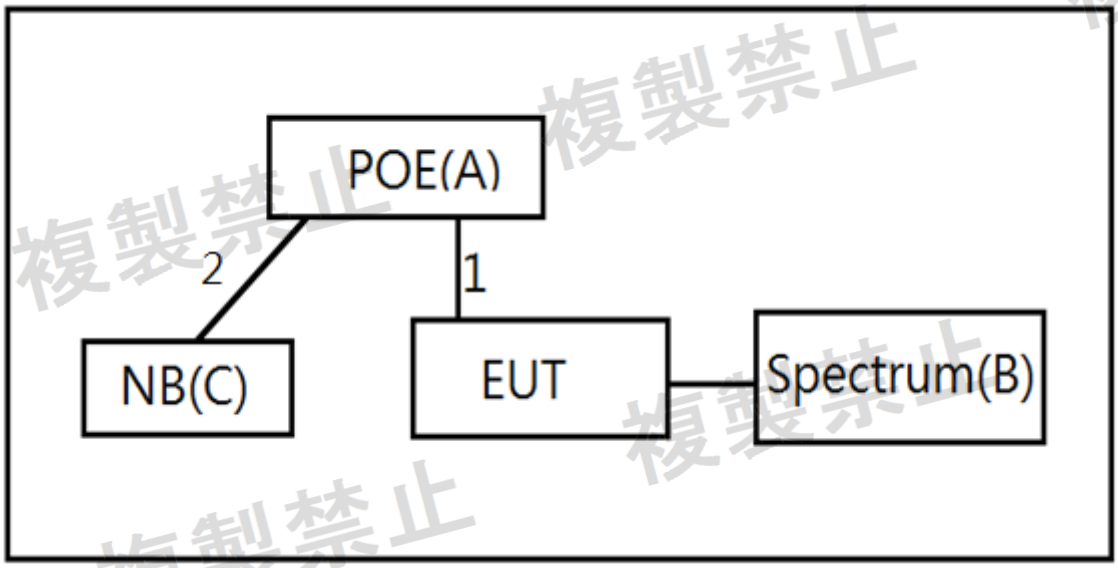
Measurement point

NOTE:
Voltage Variation (%)
= (Output High or Low Voltage - Output Normal Voltage)/Output Normal Voltage * 100

During the input supply voltage to the EUT from the external power source is varied by ± 10%, if output voltage had been confirmed that the fluctuation of power supply to the RF circuit of EUT (excluding power source) is equal to or less than ± 1%.
Exempt extremely high and low supply voltage condition tests, EUT only operated in normal voltage to test all regulation.

2.3 TESTED CONFIGURATION DIAGRAM

Equipment letters and Cable numbers refer to item numbers described in the tables of clause 2.4.



2.4 SUPPORT UNITS

Item	Equipment	Brand	Model No.	Series No.	Remarks
A	MANAGED POE SWITCH	CRESTRON	CEN-SWPOE-16	1838NEJ12912	Supplied by test requester.
B	Spectrum Analyzer	R&S	FSP40	NA	Furnished by test lab.
C	NB	HP	240 G5	5CG7163832	Furnished by test lab.

Item	Shielded	Ferrite Core	Length	Cable Type	Remarks
1	YES	NO	2m	RJ45	Supplied by test requester.
2	YES	NO	1m	RJ45	Furnished by test lab.

2.5 PARAMETERS OF TEST SOFTWARE

Test Software Version	QRCT 4			
Frequency (MHz) / Mode	5180	5200	5240	Data Rate
IEEE 802.11a	14	14	14	6 Mbps
IEEE 802.11n (HT20)	14	14	14	MCS 0
Frequency (MHz) / Mode	5190	5230		Data Rate
IEEE 802.11n (HT40)	13.5	13.5		MCS 0
Frequency (MHz) / Mode	5210			Data Rate
IEEE 802.11ac (VHT80)	13			MCS 0

3 TEST RESULTS

3.1 FREQUENCY TOLERANCE TEST

3.1.1 LIMIT

Item	Limits (See Article 5, Table1 of the Ordinance Regulating Radio Equipment)
Frequency Tolerance	≤ 20 ppm

3.1.2 MEASURING INSTRUMENTS AND SETTING

Please refer to section 4 in this report. The following table is the setting of the spectrum.

Spectrum Parameter	Setting
Span Frequency	500 kHz
RBW / VBW	30 kHz / 30 kHz

3.1.3 TEST PROCEDURE

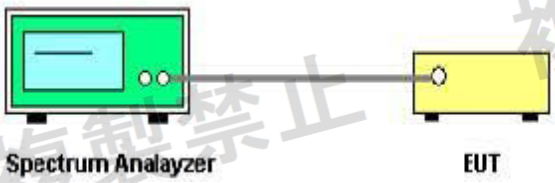
Test method which surpass to Claus 3 of Annex No.45 of MIC Notification No.88.

a. Frequency accuracy of SA shall be less than 10% of limits tolerance (2 ppm).
b. Setting of SA is following as: RBW: 30 kHz / VBW: 30 kHz / SPAN: 500 kHz AT: 30 dB / Ref: 20 dBm.
c. Center Frequency: The center frequency of testing for EUT.
d. Sweep time: Auto.
e. Sweep mode: Continuous sweep.
f. Detect mode: Positive peak.
g. Mark function: Frequency Counter (Resolution 100 Hz).
h. EUT have transmitted absence of modulation signal and fixed channelize. f is using the mark cursor to mark the peak frequency value, fc is declaring of channel frequency. Then the frequency error formula is (fc - f) / fc x 106 ppm and the limit is less than ± 20 ppm.

3.1.4 DEVIATION FROM TEST STANDARD

No deviation.

3.1.5 TEST SETUP



3.1.6 EUT OPERATING CONDITIONS

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

3.1.7 TEST RESULT

Please refer to the APPENDIX A.

3.2 OCCUPIED BANDWIDTH TEST

3.2.1 LIMIT

Item	Limits (See Article 6, Table 2 and Article 49-20, Item 1-h, i of the Ordinance Regulating Radio Equipment)
Occupied Bandwidth	≤ 19 MHz (20 MHz Mode OFDM, DSSS, Other) ≤ 38 MHz (40 MHz Mode OFDM) ≤ 78 MHz (80 MHz Mode OFDM)

3.2.2 MEASURING INSTRUMENTS AND SETTING

Please refer to section 4 in this report. The following table is the setting of the spectrum.

Spectrum Parameter	Setting
Span Frequency	50 MHz for 20 MHz mode 80 MHz for 40 MHz mode 160 MHz for 80 MHz mode
RBW / VBW	300 kHz
Sweep Time	Auto

3.2.3 TEST PROCEDURE

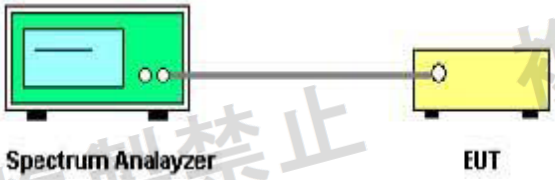
Test method which surpass to Clause 4 of Annex No.45 of MIC Notification No.88.

a. Setting of SA is following as: RBW: 300 kHz / VBW: 300 kHz / SPAN: 50 MHz for 20 MHz mode / 80 MHz for 40 MHz mode / 160 MHz for 80 MHz mode / AT: 30 dB Ref: 20 dBm / Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak / Trace mode: Max hold
b. EUT have transmitted the maximum modulation signal and fixed channelize. SA set to 99 % of occupied bandwidth to measure occupied bandwidth. The limit is less than table 4.2.1.

3.2.4 DEVIATION FROM TEST STANDARD

No deviation.

3.2.5 TEST SETUP



3.2.6 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

3.2.7 TEST RESULT

Please refer to the APPENDIX B.

3.3 UNWANTED EMISSION INTENSITY TEST

3.3.1 LIMIT

Item	Limits (See Article 7, Table 3 of the Ordinance Regulating Radio Equipment)
TX Spurious Emission	OBW ≤ 18MHz: 30 to 5140 MHz ≤ 2.5 µW/MHz (-26 dBm/MHz) 5360 to 26000 MHz ≤ 2.5 µW/MHz (-26 dBm/MHz)
	18 MHz < OBW ≤ 19 MHz: 30 to 5135 MHz ≤ 2.5 µW/MHz (-26 dBm/MHz) 5365 to 26000 MHz ≤ 2.5 µW/MHz (-26 dBm/MHz)

3.3.2 MEASURING INSTRUMENTS AND SETTING

Please refer to section 4 in this report. The following table is the setting of the spectrum.

Spectrum Parameter	Setting
Attenuation	Auto
RBW / VBW	1 MHz
Detector	Peak
Trace	Max Hold

3.3.3 TEST PROCEDURE

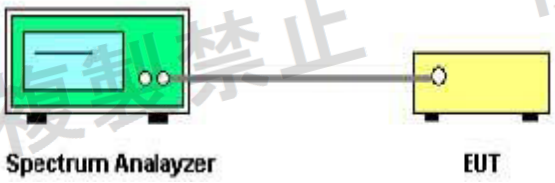
Test method which surpass to Clause 5 of Annex No.45 of MIC Notification No.88.

a. EUT have transmitted the maximum modulation signal and fixed channelize.
b. Setting of SA is following as: RBW: 1 MHz / VBW: 1 MHz / AT: 30 dB / Ref: 20 dBm / Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak / Trace mode: Max hold.
c. Setting of SA is following as 30 MHz and stop frequency 5140 MHz / 5135 MHz. Then to mark peak reading value + cable loss shall be less than 2.5 µW.
d. SA adjusted to start frequency 5360 MHz / 5365 MHz and stop frequency 26000 MHz. Then to mark peak reading value + cable loss shall be less than 2.5 µW.

3.3.4 DEVIATION FROM TEST STANDARD

No deviation.

3.3.5 TEST SETUP



3.3.6 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

3.3.7 TEST RESULT

Please refer to the APPENDIX C.

3.4 ANTENNA POWER ERROR TEST

3.4.1 LIMIT

Item	Limits (See Article 14 and 49-20 Item 1-e of the Ordinance Regulating Radio Equipment)
Antenna Power Density EIRP Power Density	OBW ≤ 19 MHz: ≤ 10 mW/MHz 38 MHz ≥ OBW > 19 MHz: ≤ 5 mW/MHz 78 MHz ≥ OBW > 38 MHz: ≤ 2.5 mW/MHz
Antenna Power Error	+20% ~ -80%, W56: +50% ~ -50% (Base on manufacturer declare antenna power density)

3.4.2 MEASURING INSTRUMENTS AND SETTING

Please refer to section 4 in this report. The following table is the setting of the spectrum.

Spectrum Parameter	Setting
Attenuation	30 dB
Span	0 MHz
RBW	1 MHz
VBW	1 MHz
Detector	Positive Peak
Trace	Max Hold
Sweep Time	Auto

3.4.3 TEST PROCEDURE

Test method which surpass to Clause 6 of Annex No.45 of MIC Notification No.88.
Step 1:
Connect the UUT to the spectrum analyser and use the following settings:

- Centre Frequency: The centre frequency of the channel under test.
- Resolution BW: 1 MHz.
- Video BW: 1 MHz.
- Span: Wide enough to cover the complete power envelope of the signal of the UUT.
- Detector: Peak.
- Trace Mode: Max Hold.

Step 2:
When the trace is complete, find the peak value of the power envelope and record the frequency.

Step 3:
Make the following changes to the settings of the spectrum analyser:

- Centre Frequency: Equal to the frequency recorded in step 2.
- Span: 3 MHz.
- Resolution BW: 1 MHz.
- Video BW: 1 MHz.
- Sweep time: 1 minute.
- Detector: Average (see note).
- Trace Mode: Max Hold.

NOTE: The detector mode "Average" is often referred to as "RMS Average" or "Sample" but do not use Video Average.

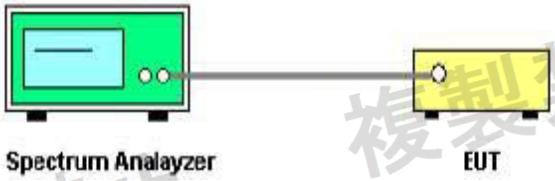
Step 4:
When the trace is complete, capture the trace, for example using the "View" option on the spectrum analyser. Find the peak value of the trace and place the analyser marker on this peak. This level is recorded as the highest mean power (spectral power density) D in a 1 MHz band.

Step 5:
The maximum e.i.r.p. spectral density is calculated from the above measured power density (D), the observed duty cycle x (see clause 5.7.2.2, step 1), and the applicable antenna assembly gain "G" in dBi, according to the formula below. If more than one antenna assembly is intended for this power setting, the gain of the antenna assembly with the highest gain shall be used.
PD = D + G + 10 log (1/x)

3.4.4 DEVIATION FROM TEST STANDARD

No deviation.

3.4.5 TEST SETUP



3.4.6 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

3.4.7 TEST RESULT

Please refer to the APPENDIX D.

3.5 ADJACENT CHANNEL LEAKAGE POWER AND OUT-BAND LEAKAGE POWER TEST

3.5.1 LIMIT

Item	Limits
Adjacent Channel Leakage Power	≥ 25 dB f ± 20 MHz (OBW: 18 MHz) f ± 40 MHz (OBW: 38 MHz) f ± 80 MHz (OBW: 78 MHz)
	≥ 40 dB f ± 40 MHz (OBW: 18 MHz) f ± 80 MHz (OBW: 38 MHz)

Item	Limits
Out-band Leakage Power (For IEEE 802.11a/n (HT20)/ac (VHT20))	OBW ≤ 18 MHz : 5140 to 5142 MHz: ≤ 2.5 μW/MHz (-26 dBm/MHz) 18 MHz < OBW ≤ 19 MHz: 5135 to 5142 MHz: ≤ 2.5 μW/MHz (-26 dBm/MHz)
	5142 to 5150 MHz: ≤ 15 μW/MHz (-18.24 dBm/MHz)
	5250 to 5251 MHz: ≤ 1000 to 100 μW/MHz (0 to -10 dBm/MHz)
	5251 to 5260 MHz: ≤ 100 to 15.8 μW/MHz (-10 to -18 dBm/MHz)
	5260 to 5266.7 MHz: ≤ 15.8 to 2.5μW/MHz (-18 to -26 dBm/MHz)
	OBW ≤ 18 MHz : 5266.7 to 5360 MHz: ≤ 2.5 μW/MHz (-26 dBm/MHz) 18 MHz < OBW ≤ 19 MHz: 5266.7 to 5365 MHz: ≤ 2.5 μW/MHz (-26 dBm/MHz)

Item	Limits
Out-band Leakage Power (For IEEE 802.11n (HT40)/ac (VHT40))	5100 to 5141.6 MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)
	5141.6 to 5150 MHz Limit ≤ 15 μW/MHz (-18.24 dBm/MHz)
	5250 to 5251 MHz Limit ≤ 500 ~ 50 μW/MHz (-3.01 ~ -13.01 dBm/MHz)
	5251 to 5270 MHz Limit ≤ 50 ~ 7.9 μW/MHz (-13.01 ~ -21.01 dBm/MHz)
	5270 to 5278.4 MHz Limit ≤ 7.9 ~ 2.5μW/MHz (-21.01 ~ -26.05 dBm/MHz)
	5278.4 to 5400 MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)

Item	Limits
Out-band Leakage Power (For IEEE 802.11ac (VHT80))	5020 to 5123.2 MHz: ≤ 2.5 μW/MHz (-26 dBm/MHz)
	5123.2 to 5150 MHz: ≤ 15 μW/MHz (-18.24 dBm/MHz)
	5250 to 5251 MHz: ≤ 250 to 25 μW/MHz (-6 to -16.02 dBm/MHz)
	5251 to 5290 MHz: ≤ 25 to 4 μW/MHz (-16.02 to -24.02 dBm/MHz)
	5290 to 5296.7 MHz: ≤ 4 to 2.5 μW/MHz (-24.02 to -26.03 dBm/MHz)
	5296.7 to 5480 MHz: ≤ 2.5 μW/MHz (-26 dBm/MHz)

3.5.2 MEASURING INSTRUMENTS AND SETTING

Please refer to section 4 in this report. The following table is the setting of the spectrum.

Spectrum Parameter	Setting
Attenuation	Auto
RBW / VBW	300 kHz (Adjacent Channel Leakage Power) 1 MHz (Out-band Leakage Power)
Trace	Max Hold
Sweep Time	Auto

3.5.3 TEST PROCEDURE

Test method which surpass to Clause 7 of Annex No.45 of MIC Notification No.88.

For Adjacent Channel Leakage Power:

a. EUT have transmitted the maximum modulation signal and fixed channelize.
b. Setting of SA is following as: RBW: 300 kHz / VBW: 300 kHz / SPAN: 20 MHz / AT: 30 dB Ref: 20 dBm / Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak / Trace mode: Max hold.
c. SA set the Channel Power Function and Channel Bandwidth: 18 MHz and Center Frequency: The center frequency of testing for EUT (Such as 5180 MHz). Then SA automatically calculate the channel power of EUT and A is representative of this channel power.
d. SA set the Channel Power Function and Channel Bandwidth: 18 MHz and Center Frequency: The center frequency of testing for EUT (Such as 5180 MHz) ± 20 MHz. Then SA automatically calculate the first adjacent channel power of EUT and B is representative of this first adjacent channel power.
e. SA set the Channel Power Function and Channel Bandwidth: 18 MHz and Center Frequency: The center frequency of testing for EUT (Such as 5180 MHz) ± 40 MHz. Then SA automatically calculate the second adjacent channel power of EUT and C is representative of this first adjacent channel power.
f. Conclusion that A - B is more than 25 dB and A - C is more than 40 dB.

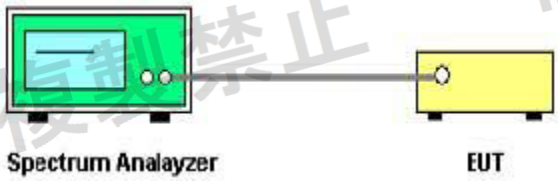
For Out-band Leakage Power:

a. Setting of SA is following as: RBW: 1 MHz / VBW: 1 MHz / SPAN: Refer limits table / AT: 30 dB Ref: 20 dBm / Sweep: Auto / Sweep Mode: Single sweep / Detect mode: Peak / Trace mode: Max hold.
b. Sweep with every specified sweep bandwidth and find maximum power value of each band. Then transform the found values of “Pa” to “Poa” using following formula and if corresponding EIRP “Poa” (dBm/MHz) satisfies regulated limitation, skip the next procedure 3 and record the “Poa” as measurement results. Poa is calculated by following formula Poa = Pa +Gt -Lf Pa: found values in the measurement of out of band leakage power (dBm/MHz) Gt: Antenna gain at the frequency of the found values (dBi) Lf: Cable loss at the frequency of the found values (dB)
c. If the “Poa” calculated from the found “Pa” with the following formula is over the regulated limit, set the spectrum analyzer according to following as: RBW: 1 MHz / VBW: 1 MHz / SPAN: 0 MHz / AT: 30 dB Ref: 20 dBm / Sweep: Auto / Sweep Mode: Continuous sweep / Detect mode: Sample / Trace mode: Average.

3.5.4 DEVIATION FROM TEST STANDARD

No deviation.

3.5.5 TEST SETUP



3.5.6 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

3.5.7 TEST RESULT

Please refer to the APPENDIX E.

3.6 LIMITATION OF COLLATERAL EMISSION OF RECEIVER TEST

3.6.1 LIMIT

Item	Limits (See Article 24, Paragraph 2 of the Ordinance Regulating Radio Equipment)
RX Spurious Emission	≤ 4 nW (-54 dBm) (f < 1 GHz)
	≤ 20 nW (-47 dBm) (1 GHz ≤ f)
Measurement range: 30 MHz - 5th harmonics.	

3.6.2 MEASURING INSTRUMENTS AND SETTING

Please refer to section 4 in this report. The following table is the setting of the spectrum.

Spectrum Parameter	Setting
Attenuation	Auto
RBW	100 kHz (below 1 GHz emissions) 1 MHz (above 1 GHz emissions)
VBW	100 kHz (below 1 GHz emissions) 1 MHz (above 1 GHz emissions)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

3.6.3 TEST PROCEDURE

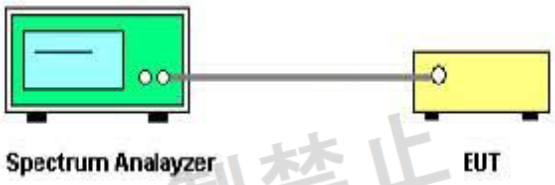
Test method which surpass to Clause 8 of Annex No.45of MIC Notification No.88.

a. EUT have the continuous reception mode and fixed only one channelize.
b. Setting of SA is following as RBW / VBW: 100 kHz (below 1 GHz emissions) / 1 MHz (above 1 GHz emissions) AT: 10 dB / Ref: 0 dBm / Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak / Trace mode: Max hold.
c. SA set RBW: 100 kHz and VBW: 100 kHz. Then adjust to start frequency 30 MHz and stop frequency 1000 MHz. Search to mark peak reading value + cable loss shall be less than 4 nW.
d. SA set RBW: 1 MHz and VBW: 1 MHz. Then adjust to start frequency 1000 MHz and stop frequency 12500 MHz. Search to mark peak reading value + cable loss shall be less than 20 nW.
e. If power level of lower emissions are more than 1/10 of limit (0.4 nW for f < 1 GHz, 2 nW for f ≥ 1 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.

3.6.4 DEVIATION FROM TEST STANDARD

No deviation.

3.6.5 TEST SETUP



3.6.6 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously reception mode.

3.6.7 TEST RESULT

Please refer to the APPENDIX F.

3.7 RADIO INTERFERENCE PREVENTION CAPABILITY TEST

3.7.1 LIMIT

Item	Limits (See Article 9-4, Item9-C of the Ordinance Regulating Radio Equipment)
Identification code	≥ 48 bits

3.7.2 MEASURING INSTRUMENTS AND SETTING

PC with NetTool	Setting
MAC IP List	MAC Scan

3.7.3 TEST PROCEDURE

Test method which surpass to Clause 9 of Annex No.45 of MIC Notification No.88.

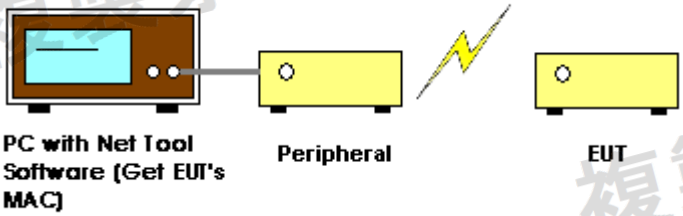
a. In the case that the EUT has the function of automatically transmitting the identification code:
   i. Transmit the predetermined identification codes form EUT.
   ii. Check the transmitted identification codes with the demodulator.

b. In the case of receiving the identification code:
   i. Transmit the predetermined identification codes form the counterpart.
   ii. Check if communication is normal.
   iii. Transmit the signals other than predetermined ID codes form the counterpart.
   iv. Check if the EUT stops the transmission, or if it displays that identification codes are different from the predetermined ones.

3.7.4 DEVIATION FROM TEST STANDARD

No deviation.

3.7.5 TEST SETUP



3.7.6 EUT OPERATING CONDITIONS

The EUT was programmed to be in normal transmitting mode.

3.7.7 TEST RESULT

Test Mode	IEEE 802.11a
Test Voltage	Normal Voltage
Test Result	Good (identification code: [00:0a:f5:c3:a7:30])

3.8 TRANSMISSION BURST LENGTH TEST

3.8.1 LIMIT

Item	Limits
Transmission Burst Length	≤ 4 msec

3.8.2 MEASURING INSTRUMENTS AND SETTING

Please refer to section 4 in this report. The following table is the setting of the spectrum.

Spectrum Parameter	Setting
Attenuation	Auto
RBW / VBW	1 MHz
Span	0 MHz
Sweep	Single
Detector	Peak
Trigger mode	Video

3.8.3 TEST PROCEDURE

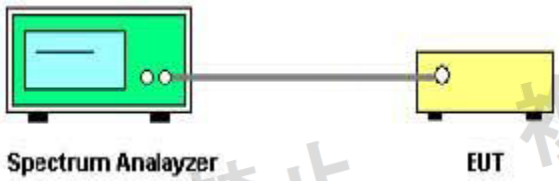
Test method which surpass to Clause 10 of Annex No.45 of MIC Notification No.88.

a. The transmitter output (antenna port) was connected to the spectrum analyzer.
b. Set RBW of spectrum analyzer to 1 MHz and VBW to 1 MHz.
c. Use a video trigger with the trigger level set to enable triggering only on full pulses.
d. Sweep Time is more than once pulse time.
e. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
f. Measure the maximum time duration of one single pulse.

3.8.4 DEVIATION FROM TEST STANDARD

No deviation.

3.8.5 TEST SETUP



3.8.6 EUT OPERATING CONDITIONS

The EUT was programmed to be in normal transmitting mode on 6 Mbps.

3.8.7 TEST RESULT

Please refer to the APPENDIX G.

3.9 CARRIER SENSING FUNCTION TEST

3.9.1 LIMIT

Item	Limits (See Article 49-20, Item 1-k of the Ordinance Regulating Radio Equipment)
Carrier Sense	Good – EUT stop RF transmission signal after carrier inject to EUT. (On 22.79 + Gr - 20 * log(f) [dBm] (Gr: dBi; f: MHz) or 100 mV/m)

3.9.2 MEASURING INSTRUMENTS AND SETTING

Please refer to section 4 in this report. The following table is the setting of the spectrum.

Spectrum Parameter	Setting
Attenuation	Auto
RBW / VBW	1 MHz
Span	0 MHz
Sweep	Continuous
Detector	Peak
Trigger mode	Video

3.9.3 TEST PROCEDURE

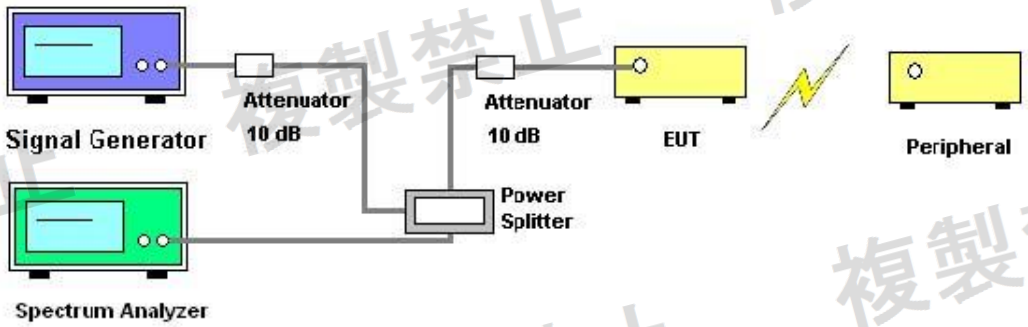
Test method which surpass to Clause 12 of Annex No.45 of MIC Notification No.88.

a. SSG adjusted the frequency as same as the EUT transmitted signal and emitted the absence of modulation from SSG and power level is (On 22.79 + Gr - 20 * log(f) [dBm] (Gr: dBi; f: MHz). Then turn off the RF signal of SSG.
b. EUT have transmitted the maximum modulation signal and fixed channelize.
c. Setting of SA is following as: RBW: 1 MHz / VBW: 1 MHz / SPAN: 50 MHz / AT: 10 dB /Ref: 0 dBm / Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak.
d. SSG RF Signal On.
e. EUT shall be stop the transmitted any signal and SSG RF Signal Off. Then EUT will be continuous transmitted signal.

3.9.4 DEVIATION FROM TEST STANDARD

No deviation.

3.9.5 TEST SETUP



3.9.6 EUT OPERATING CONDITIONS

The EUT was programmed to be in normal transmitting mode.

3.9.7 TEST RESULT

Please refer to the APPENDIX H.

3.10 CONSTRUCTION PROTECTION CONFIRMATION

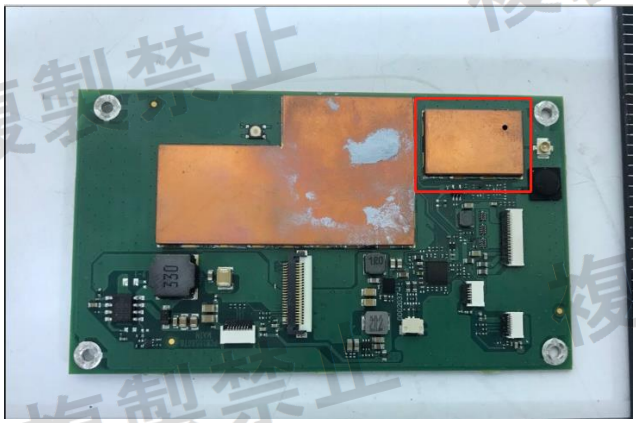
3.10.1 LIMIT

(See Article 49-20, Item1-a of the Ordinance Regulating Radio Equipment)
The high-frequency section and modulation section of the radio equipment except for the antenna system shall not be capable of being opened easily.

3.10.2 CONFIRMATION METHOD

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

Tick the appropriate item	
	1. Sealed with special screws.
	2. Plastic chassis is being welded using ultrasonic waves.
	3. Chassis is glued using a special adhesive.
	4. Metal covers are spot-fused.
	5. Cover is specially interlocked.
	6. RF and Modulation components are covered with shielding case and this shielding case is soldered.
X	7. Shield case is welded at RF and modulation parts, and ID-ROM is welded using the BGA Method.
	8. Shield case is welded at RF and modulation parts, and ID-ROM is glued at its lead with a special adhesive
	9. Shield case is welded at RF and modulation parts, and ID-ROM is glued with a non-transparent laminating agent.
	10. RF and Modulation parts are mounted on PCB with surface mount technology, and there is no any adjustable part on PCB or adjustable parts are not exposed.



4 LIST OF MEASURING EQUIPMENTS

Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Validity Date	Calibration Agency
Spectrum Analyzer	R&S	FSP40	100129	2019/5/23	2020/5/22	Great & Vast Technology Co., Ltd
Power Meter	Anritsu	ML2495A	1128008	2019/6/20	2020/6/19	ETC
Power Sensor	Anritsu	MA2411B	1126001	2019/6/20	2020/6/19	ETC

Remark:

1. “N/A” denotes no model name, no serial no. or no calibration specified.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

5 EUT TEST PHOTO

Please refer to document Appendix No.: TP-2004T143-JPAP-1 (APPENDIX-TEST PHOTOS).

6 EUT PHOTOS

Please refer to document Appendix No.: EP-2004T143-1 (APPENDIX-EUT PHOTOS).

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APPENDIX A REQUENCY TOLERANCE

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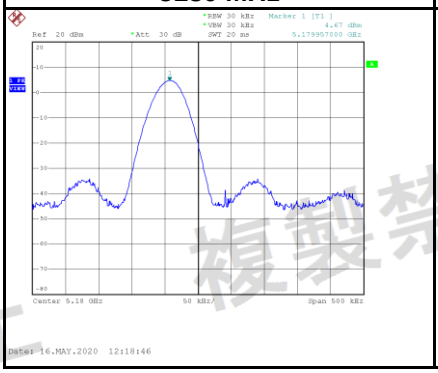
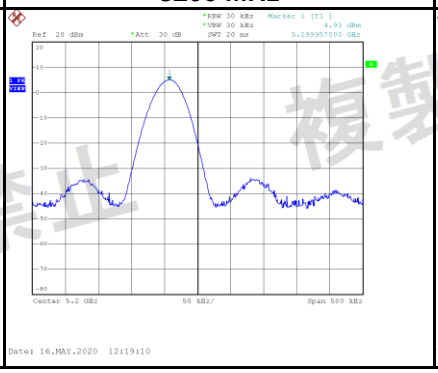
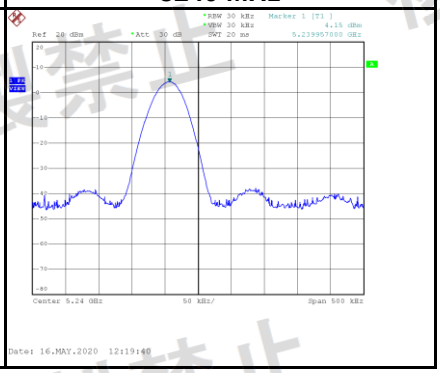
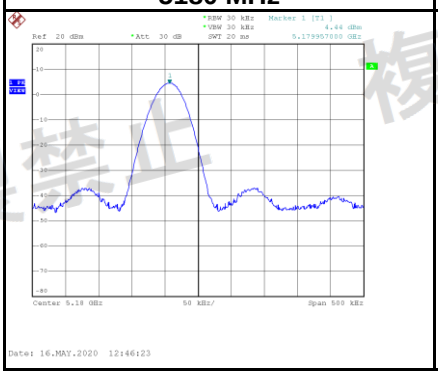
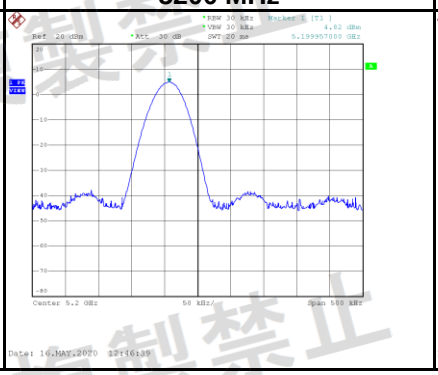
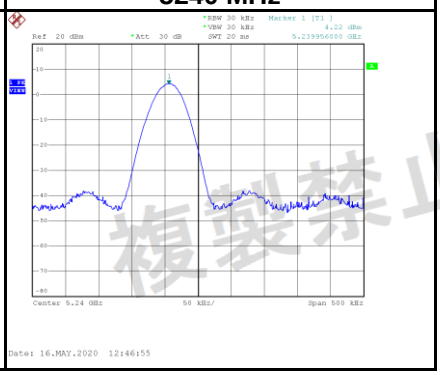
Test Mode	IEEE 802.11a			
Test Voltage (V)	Normal Voltage			Remark
Test Frequency (MHz)	5180	5200	5240	Low/Middle/High of test frequency range
Measured Frequency (MHz)	5179.957	5199.957	5239.957	
Frequency Tolerance (ppm)	8.30	8.27	8.21	Limit ≤ 20 ppm

Normal Voltage

5180 MHz	5200 MHz	5240 MHz
		

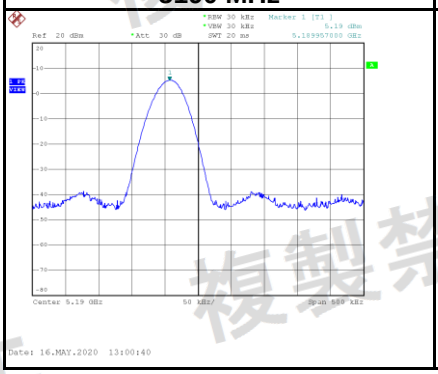
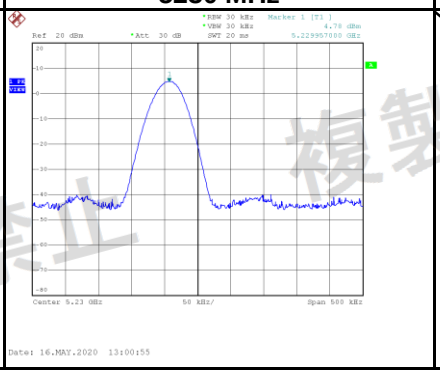
Test Mode	IEEE 802.11n (HT20)			
Test Voltage (V)	Normal Voltage			Remark
Test Frequency (MHz)	5180	5200	5240	Low/Middle/High of test frequency range
Measured Frequency (MHz)	5179.957	5199.957	5239.956	
Frequency Tolerance (ppm)	8.30	8.27	8.40	Limit ≤ 20 ppm

Normal Voltage

5180 MHz	5200 MHz	5240 MHz
		

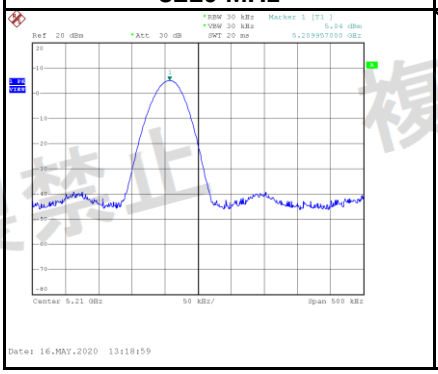
Test Mode	IEEE 802.11n (HT40)			
Test Voltage (V)	Normal Voltage			Remark
Test Frequency (MHz)	5190	5230		Low/Middle/High of test frequency range
Measured Frequency (MHz)	5189.957	5229.957		
Frequency Tolerance (ppm)	8.29	8.22		Limit ≤ 20 ppm

Normal Voltage

5190 MHz	5230 MHz	
		

Test Mode	IEEE 802.11ac (VHT80)			
Test Voltage (V)	Normal Voltage			Remark
Test Frequency (MHz)	5210			Low/Middle/High of test frequency range
Measured Frequency (MHz)	5209.957			
Frequency Tolerance (ppm)	8.25			Limit ≤ 20 ppm

Normal Voltage

5210 MHz		
		

APPENDIX B OCCUPIED BANDWIDTH (99%) AND SPREAD-SPECTRUM BANDWIDTH (90%) / SPREADING FACTOR (DIFFUSION RATE)

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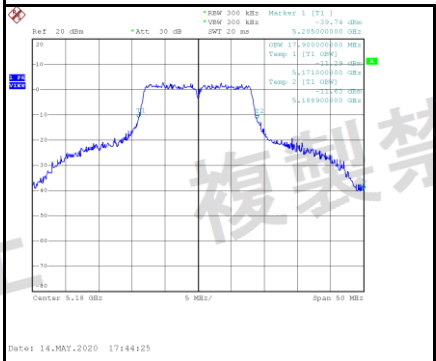
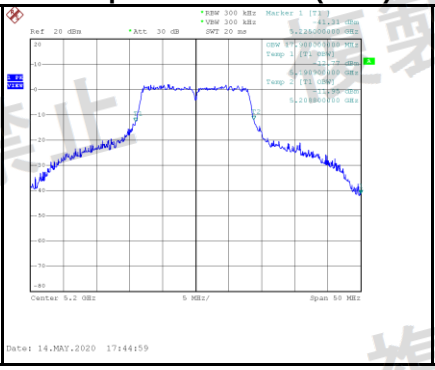
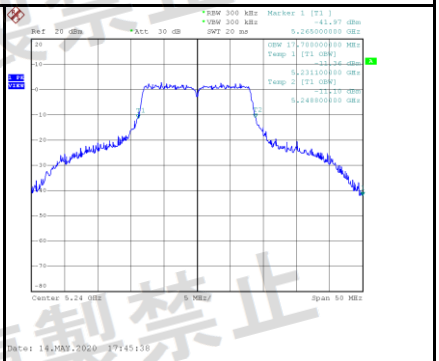
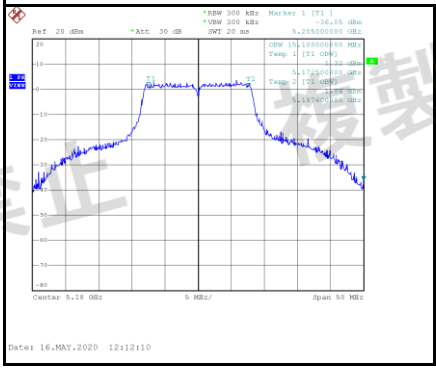
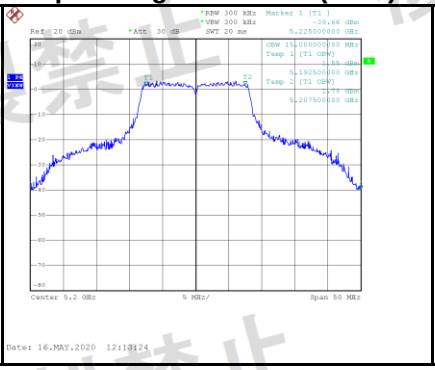
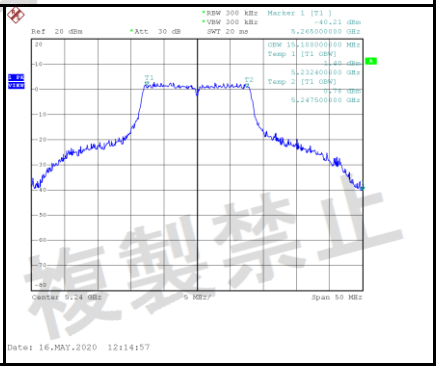
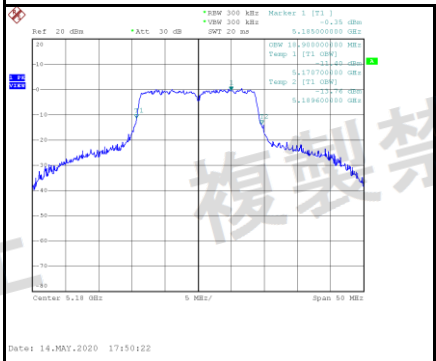
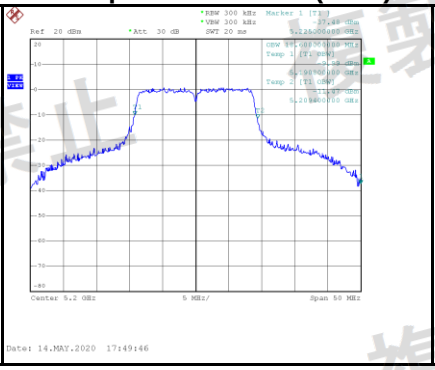
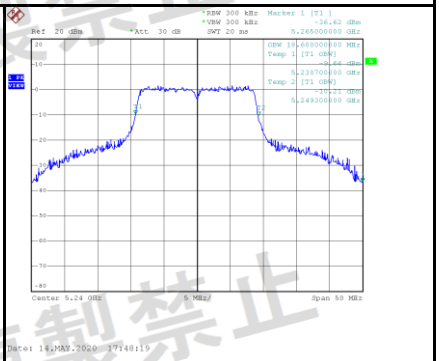
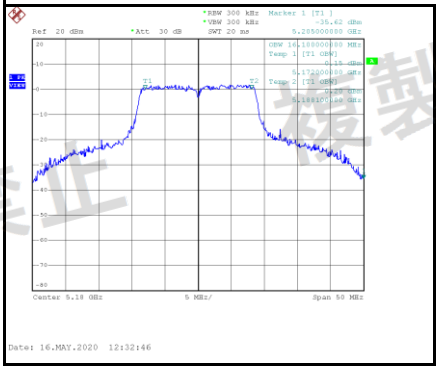
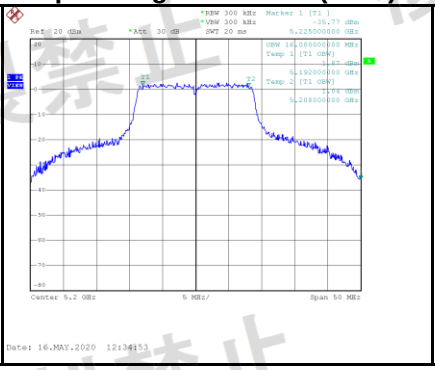
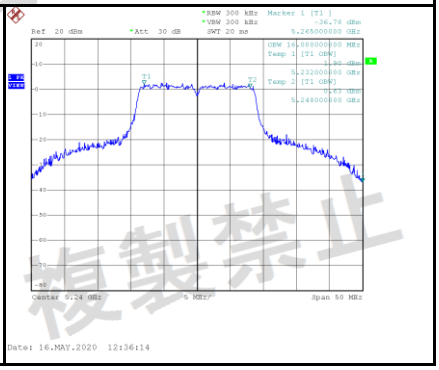
Test Mode	IEEE 802.11a			
Test Voltage (V)	Normal Voltage			Remark
Test Frequency (MHz)	5180	5200	5240	Low/Middle/High of test frequency range
Occupied Bandwidth (MHz)	17.90	17.90	17.70	Limit ≤ 19 MHz
Spreading Bandwidth (MHz)	15.10	15.00	15.10	

Normal Voltage

5180 MHz	5200 MHz	5240 MHz
Occupied Bandwidth (99 %)		
		
Spreading Bandwidth (90 %)		
		

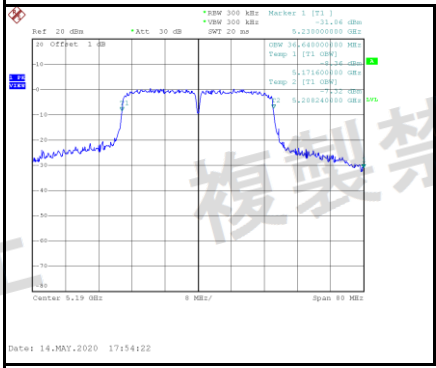
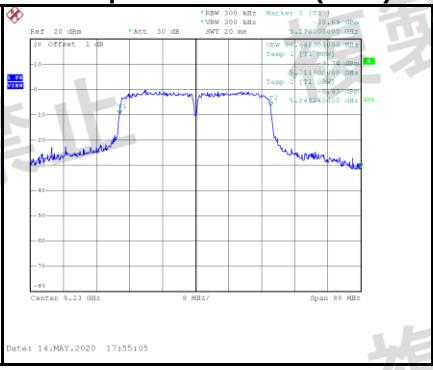
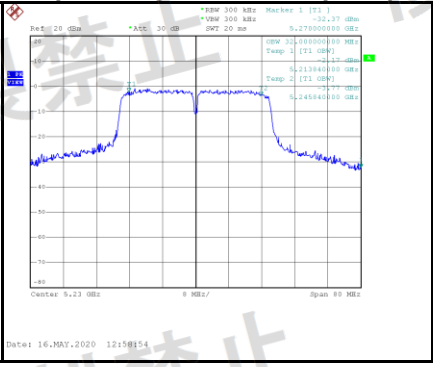
Test Mode	IEEE 802.11n (HT20)			
Test Voltage (V)	Normal Voltage			Remark
Test Frequency (MHz)	5180	5200	5240	Low/Middle/High of test frequency range
Occupied Bandwidth (MHz)	18.90	18.60	18.60	Limit ≤ 19 MHz
Spreading Bandwidth (MHz)	16.10	16.00	16.00	

Normal Voltage

5180 MHz	5200 MHz	5240 MHz
Occupied Bandwidth (99 %)		
		
Spreading Bandwidth (90 %)		
		

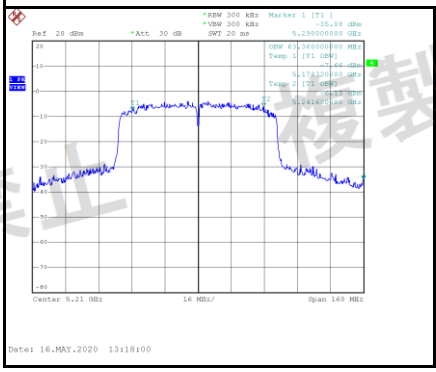
Test Mode	IEEE 802.11n (HT40)			
Test Voltage (V)	Normal Voltage			Remark
Test Frequency (MHz)	5190	5230		Low/Middle/High of test frequency range
Occupied Bandwidth (MHz)	36.64	36.64		Limit ≤ 38 MHz
Spreading Bandwidth (MHz)	32.00	32.00		

Normal Voltage

5190 MHz	5230 MHz	
Occupied Bandwidth (99 %)		
		
Spreading Bandwidth (90 %)		
		

Test Mode	IEEE 802.11ac (VHT80)			
Test Voltage (V)	Normal Voltage			Remark
Test Frequency (MHz)	5210			Low/Middle/High of test frequency range
Occupied Bandwidth (MHz)	75.52			Limit ≤ 78 MHz
Spreading Bandwidth (MHz)	63.36			

Normal Voltage

5210 MHz		
Occupied Bandwidth (99 %)		
Spreading Bandwidth (90 %)		
		

APPENDIX C UNWANTED EMISSION INTENSITY

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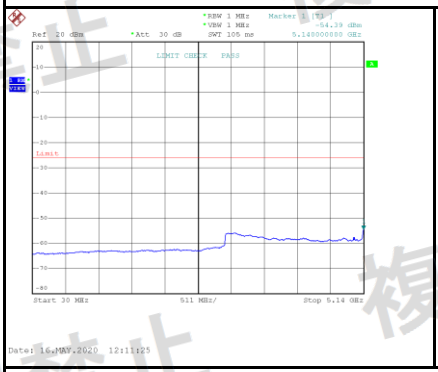
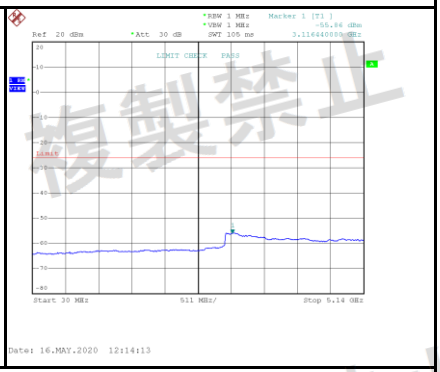
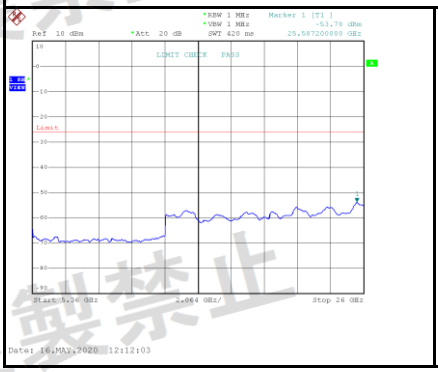
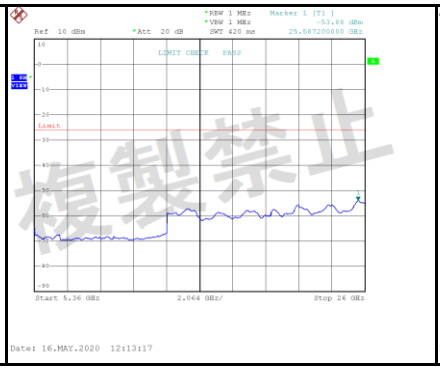
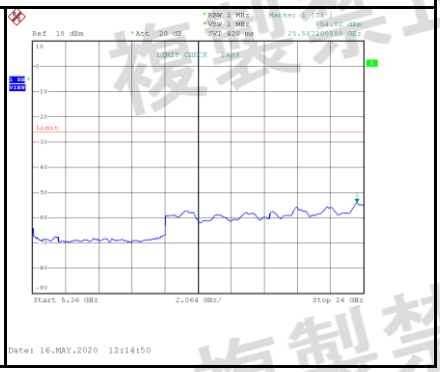
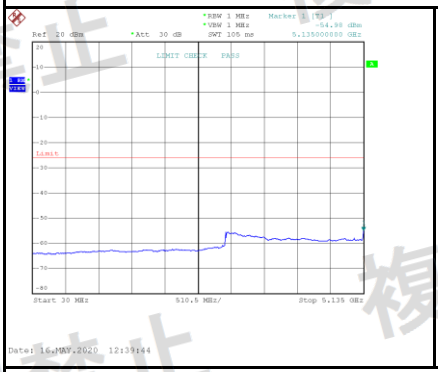
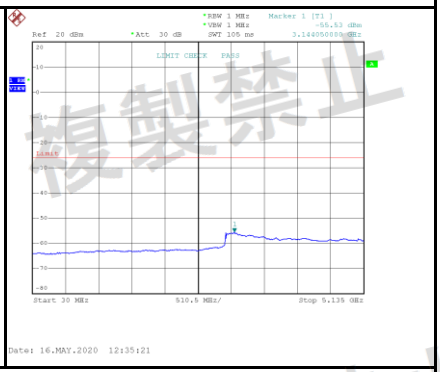
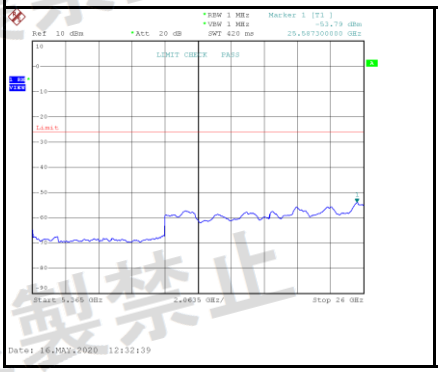
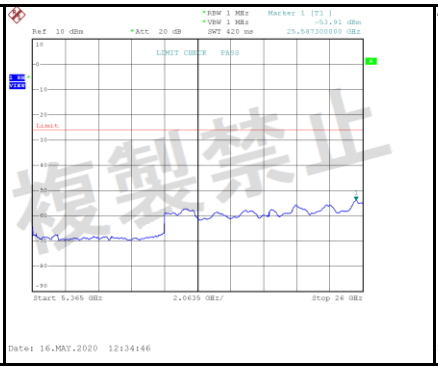
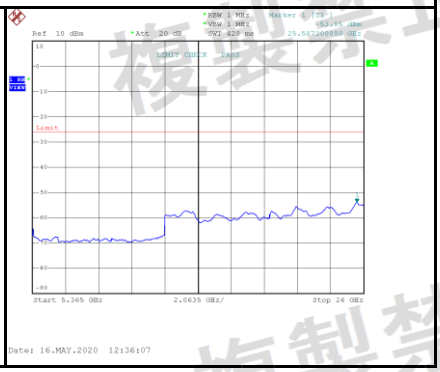
Test Mode		IEEE 802.11a				
Test Voltage		V	Normal Voltage			Remark
Test Frequency		MHz	5180	5200	5240	Low/Middle/High of test frequency range
Unwanted Emission Intensity	※1	Worst Frequency (MHz)	5140.00	3147.10	3116.44	
		Raw (dBm/MHz)	-54.39	-55.95	-55.86	
		Cable Loss (dB)	1.29	1.29	1.29	
		Measured (dBm/MHz)	-53.10	-54.66	-54.57	30 to 5135 MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)
		Measured (μW/MHz)	0.0049	0.0034	0.0035	
	※8	Worst Frequency (MHz)	25587.20	25587.20	25587.20	
		Raw (dBm/MHz)	-53.78	-53.88	-54.02	
		Cable Loss (dB)	5.59	5.59	5.59	
		Measured (dBm/MHz)	-48.19	-48.29	-48.43	5365 to 26000 MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)
		Measured (μW/MHz)	0.0152	0.0148	0.0144	
NOTE: Measured Value = Raw + Cable Loss						

Normal Voltage

5180 MHz	5200 MHz	5240 MHz
※1: 30 MHz to 5135 MHz		
		
※8: 5365 MHz to 26000 MHz		
		

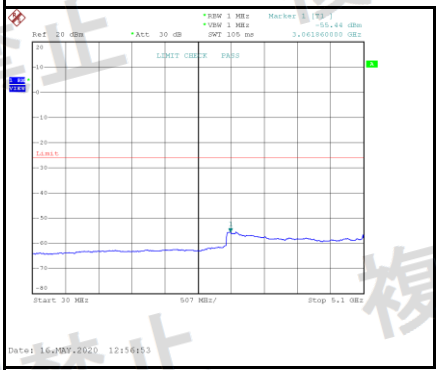
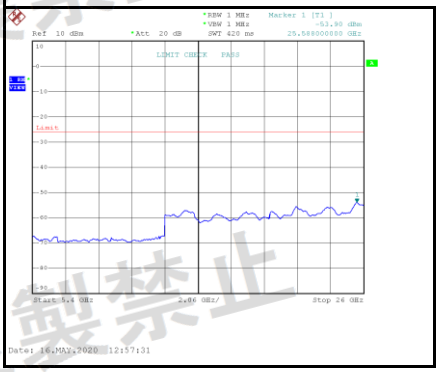
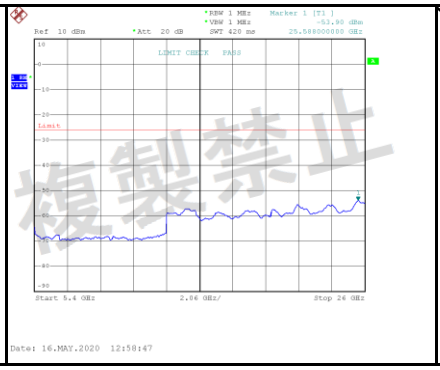
Test Mode		IEEE 802.11n (HT20)				
Test Voltage		V	Normal Voltage			Remark
Test Frequency		MHz	5180	5200	5240	Low/Middle/High of test frequency range
Unwanted Emission Intensity	※1	Worst Frequency (MHz)	5135.00	3133.84	3144.05	
		Raw (dBm/MHz)	-54.98	-55.90	-55.53	
		Cable Loss (dB)	1.29	1.29	1.29	
		Measured (dBm/MHz)	-53.69	-54.61	-54.24	30 to 5135 MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)
		Measured (μW/MHz)	0.0043	0.0035	0.0038	
	※8	Worst Frequency (MHz)	25587.30	25587.30	25587.30	
		Raw (dBm/MHz)	-53.79	-53.91	-53.85	
		Cable Loss (dB)	5.59	5.59	5.59	
		Measured (dBm/MHz)	-48.20	-48.32	-48.26	5365 to 26000 MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)
		Measured (μW/MHz)	0.0151	0.0147	0.0149	
NOTE: Measured Value = Raw + Cable Loss						

Normal Voltage

5180 MHz	5200 MHz	5240 MHz
※1: 30 MHz to 5135 MHz		
		
※8: 5365 MHz to 26000 MHz		
		

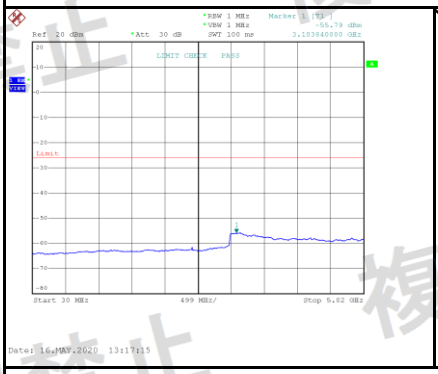
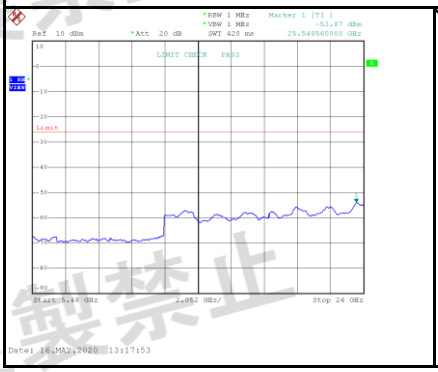
Test Mode		IEEE 802.11n (HT40)				
Test Voltage		V	Normal Voltage			Remark
Test Frequency		MHz	5190	5230		Low/Middle/High of test frequency range
Unwanted Emission Intensity	※1	Worst Frequency (MHz)	3061.86	3011.16		
		Raw (dBm/MHz)	-55.44	-55.43		
		Cable Loss (dB)	1.29	1.29		
		Measured (dBm/MHz)	-54.15	-54.14		30 to 5100 MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)
		Measured (μW/MHz)	0.0038	0.0039		
	※8	Worst Frequency (MHz)	25588.00	25588.00		
		Raw (dBm/MHz)	-53.90	-53.90		
		Cable Loss (dB)	5.59	5.59		
		Measured (dBm/MHz)	-48.31	-48.31		5400 to 26000 MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)
		Measured (μW/MHz)	0.0148	0.0148		
NOTE: Measured Value = Raw + Cable Loss						

Normal Voltage

5190 MHz	5230 MHz	
※1: 30 MHz to 5100 MHz		
		
※8: 5400 MHz to 26000 MHz		
		

Test Mode		IEEE 802.11ac (VHT80)				
Test Voltage		V	Normal Voltage			Remark
Test Frequency		MHz	5210			Low/Middle/High of test frequency range
Unwanted Emission Intensity	※1	Worst Frequency (MHz)	3103.84			
		Raw (dBm/MHz)	-55.79			
		Cable Loss (dB)	1.29			
		Measured (dBm/MHz)	-54.50			30 to 5020 MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)
		Measured (μW/MHz)	0.0035			
	※8	Worst Frequency (MHz)	25548.56			
		Raw (dBm/MHz)	-53.87			
		Cable Loss (dB)	5.59			
		Measured (dBm/MHz)	-48.28			5480 to 26000 MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)
		Measured (μW/MHz)	0.0149			
NOTE: Measured Value = Raw + Cable Loss						

Normal Voltage

5210 MHz		
※1: 30 MHz to 5020 MHz		
		
※8: 5480 MHz to 26000 MHz		
		

APPENDIX D ANTENNA POWER ERROR

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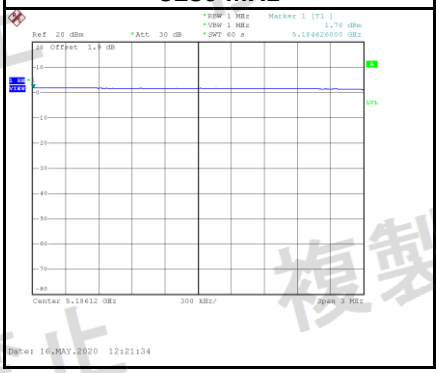
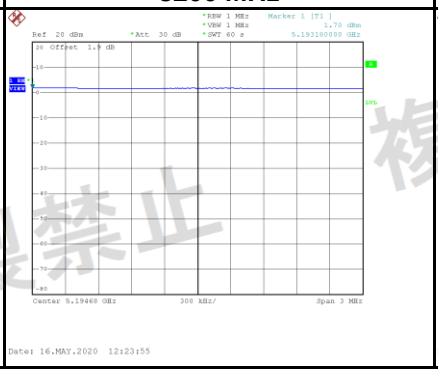
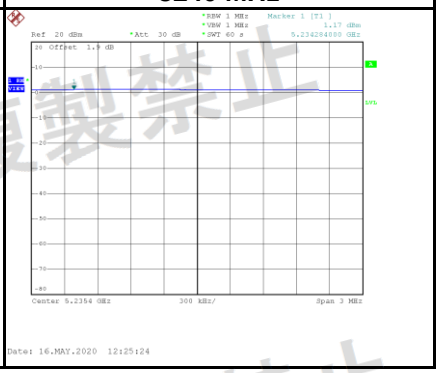
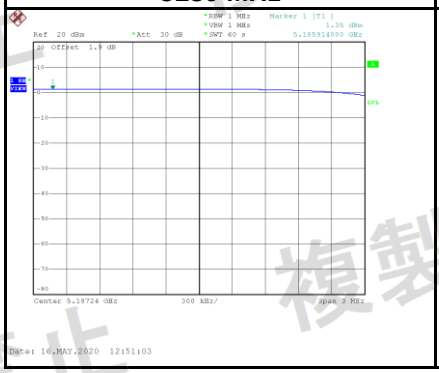
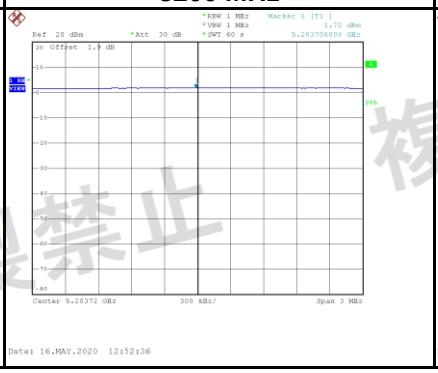
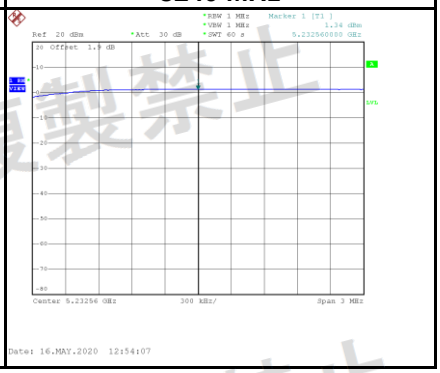
Test Mode	IEEE 802.11a				
Test Voltage	V	Normal Voltage			Remark
Test Frequency	MHz	5180	5200	5240	Low/Middle/High of test frequency range
Rated Power	mW/MHz	1.5066			
Antenna Gain	dBi	1.86			
Antenna Power Density (Conducted)	dBm/MHz	1.78	1.70	1.17	Limit ≤ 10 mW/MHz (10 dBm/MHz)
	mW/MHz	1.5066	1.4791	1.3092	
Antenna Power Error	%	0.00	-1.83	-13.10	Limit + 20% ~ - 80%
EIRP Power Density	dBm/MHz	3.64	3.56	3.03	Limit ≤ 10 mW/MHz (10 dBm/MHz)
	mW/MHz	2.3121	2.2699	2.0091	

Normal Voltage

5180 MHz	5200 MHz	5240 MHz
		

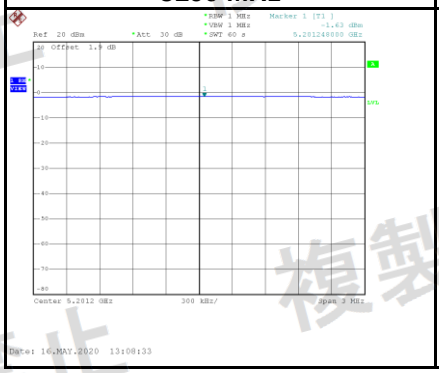
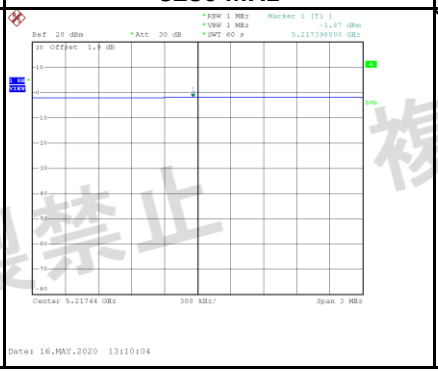
Test Mode	IEEE 802.11n (HT20)				
Test Voltage	V	Normal Voltage			Remark
Test Frequency	MHz	5180	5200	5240	Low/Middle/High of test frequency range
Rated Power	mW/MHz	1.4859			
Antenna Gain	dBi	1.86			
Antenna Power Density (Conducted)	dBm/MHz	1.35	1.72	1.34	Limit ≤ 10 mW/MHz (10 dBm/MHz)
	mW/MHz	1.3646	1.4859	1.3614	
Antenna Power Error	%	-8.16	0.00	-8.38	Limit + 20% ~ - 80%
EIRP Power Density	dBm/MHz	3.21	3.58	3.20	Limit ≤ 10 mW/MHz (10 dBm/MHz)
	mW/MHz	2.0941	2.2803	2.0893	

Normal Voltage

5180 MHz	5200 MHz	5240 MHz
		

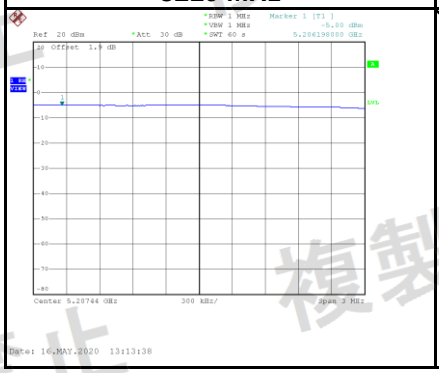
Test Mode	IEEE 802.11n (HT40)				
Test Voltage	V	Normal Voltage			Remark
Test Frequency	MHz	5190	5230		Low/Middle/High of test frequency range
Rated Power	mW/MHz	0.6871			
Antenna Gain	dBi	1.86			
Antenna Power Density (Conducted)	dBm/MHz	-1.63	-1.87		Limit ≤ 5 mW/MHz (7 dBm/MHz)
	mW/MHz	0.6871	0.6501		
Antenna Power Error	%	0.00	-5.38		Limit + 20% ~ - 80%
EIRP Power Density	dBm/MHz	0.23	-0.01		Limit ≤ 5 mW/MHz (7 dBm/MHz)
	mW/MHz	1.0544	0.9977		

Normal Voltage

5190 MHz	5230 MHz	
		

Test Mode	IEEE 802.11ac (VHT80)				
Test Voltage	V	Normal Voltage			Remark
Test Frequency	MHz	5210			Low/Middle/High of test frequency range
Rated Power	mW/MHz	0.3162			
Antenna Gain	dBi	1.86			
Antenna Power Density (Conducted)	dBm/MHz	-5.00			Limit ≤ 2.5 mW/MHz (4 dBm/MHz)
	mW/MHz	0.3162			
Antenna Power Error	%	0.00			Limit + 20% ~ - 80%
EIRP Power Density	dBm/MHz	-3.14			Limit ≤ 2.5 mW/MHz (4 dBm/MHz)
	mW/MHz	0.4853			

Normal Voltage

5210 MHz		
		

APPENDIX E ADJACENT CHANNEL POWER AND OUT OF BAND LEAKAGE POWER

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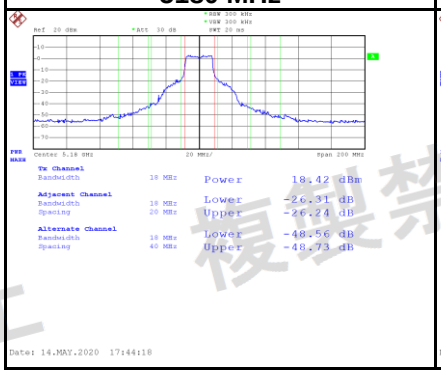
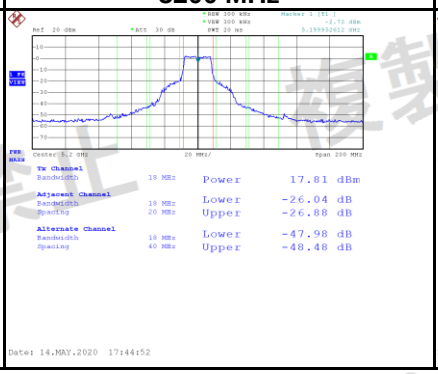
Test Mode	IEEE 802.11a					
Test Voltage		V	Normal Voltage			Remark
Test Frequency		MHz	5180	5200	5240	Low/Middle/High of test frequency range
Adjacent Channel Leakage Power	-20 MHz	dB	26.31	26.04	27.68	Limit ≥ 25 dB
	+20 MHz	dB	26.24	26.88	27.31	Limit ≥ 25 dB
	-40 MHz	dB	48.56	47.98	48.47	Limit ≥ 40 dB
	+40 MHz	dB	48.73	48.48	47.48	Limit ≥ 40 dB

Normal Voltage

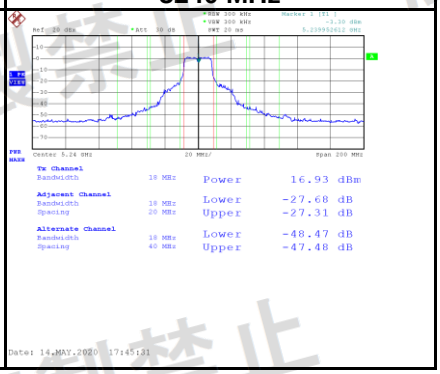
5180 MHz



5200 MHz



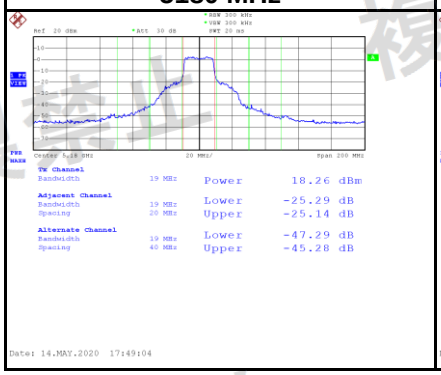
5240 MHz



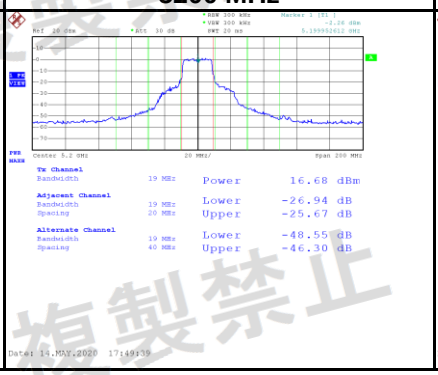
Test Mode	IEEE 802.11n (HT20)					
Test Voltage		V	Normal Voltage			Remark
Test Frequency		MHz	5180	5200	5240	Low/Middle/High of test frequency range
Adjacent Channel Leakage Power	-20 MHz	dB	25.29	26.94	26.39	Limit ≥ 25 dB
	+20 MHz	dB	25.14	25.67	25.57	Limit ≥ 25 dB
	-40 MHz	dB	47.29	48.55	47.02	Limit ≥ 40 dB
	+40 MHz	dB	45.28	46.30	46.23	Limit ≥ 40 dB

Normal Voltage

5180 MHz



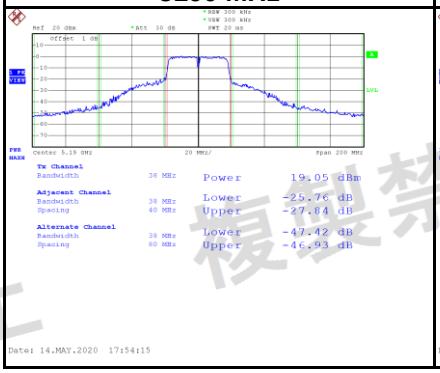
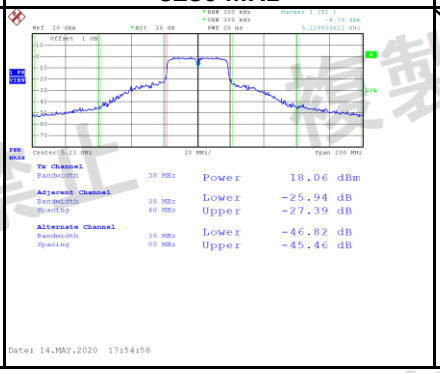
5200 MHz



5240 MHz

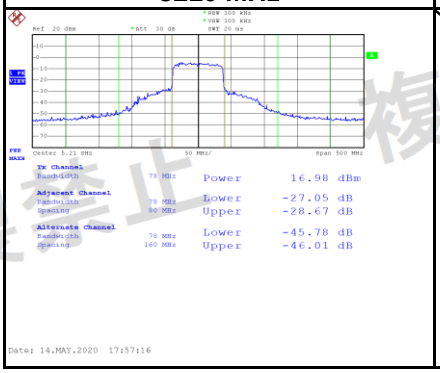
Test Mode	IEEE 802.11n (HT40)					
Test Voltage		V	Normal Voltage			Remark
Test Frequency		MHz	5190	5230		Low/Middle/High of test frequency range
Adjacent Channel Leakage Power	-20 MHz	dB	25.76	25.94		Limit ≥ 25 dB
	+20 MHz	dB	27.84	27.39		Limit ≥ 25 dB
	-40 MHz	dB	47.42	46.82		Limit ≥ 40 dB
	+40 MHz	dB	46.93	45.46		Limit ≥ 40 dB

Normal Voltage

5190 MHz	5230 MHz	
		

Test Mode	IEEE 802.11ac (HT80)					
Test Voltage		V	Normal Voltage			Remark
Test Frequency		MHz	5210			Low/Middle/High of test frequency range
Adjacent Channel Leakage Power	-80 MHz	dB	27.05			Limit ≥ 25 dB
	+80 MHz	dB	28.67			Limit ≥ 25 dB

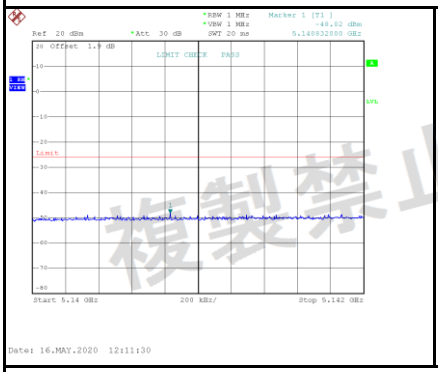
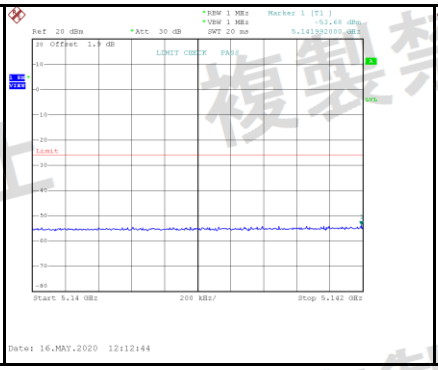
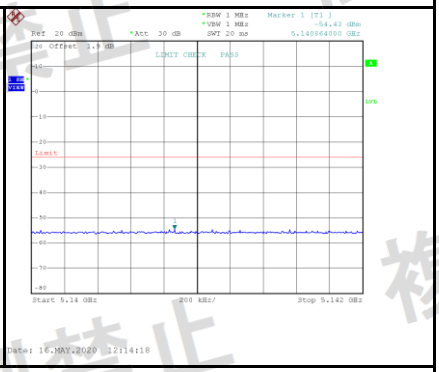
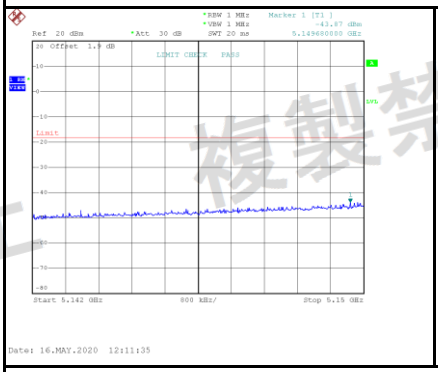
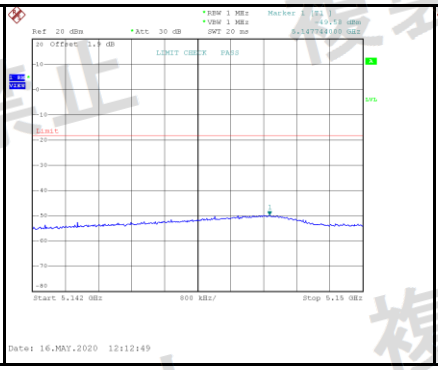
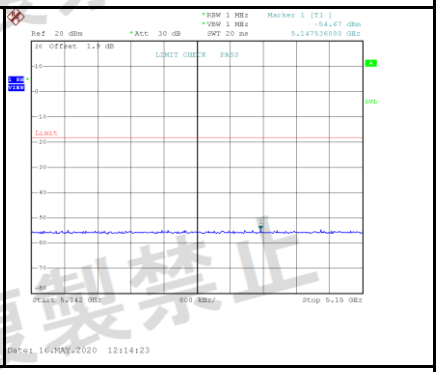
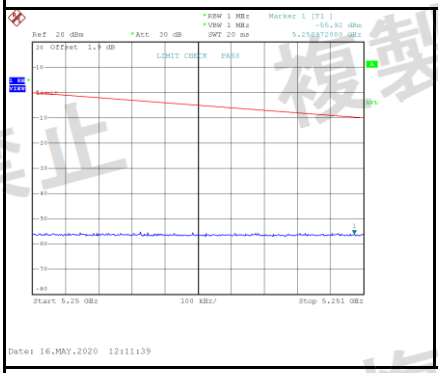
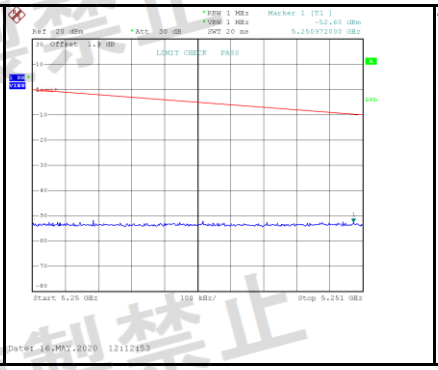
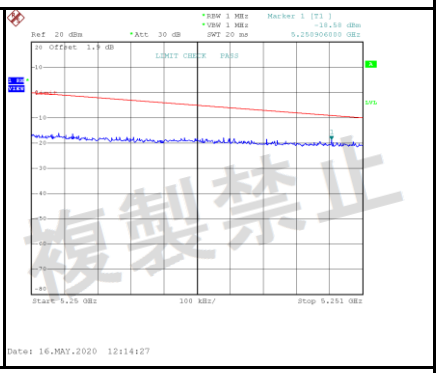
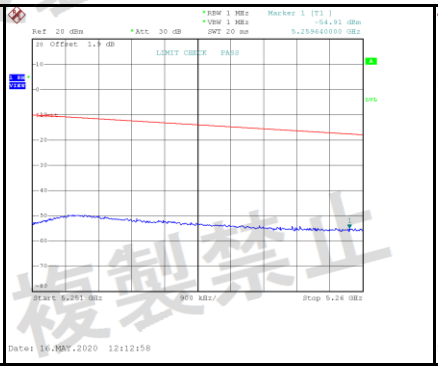
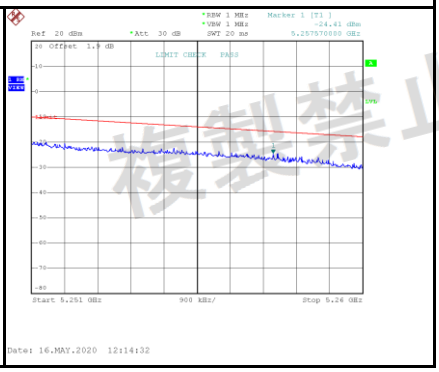
Normal Voltage

5210 MHz		
		

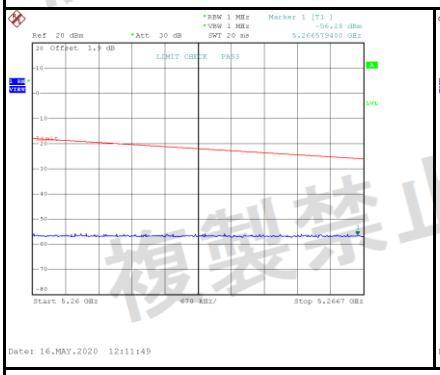
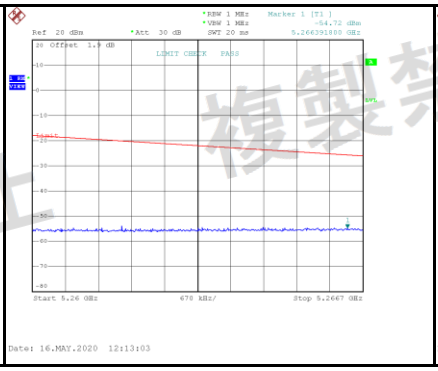
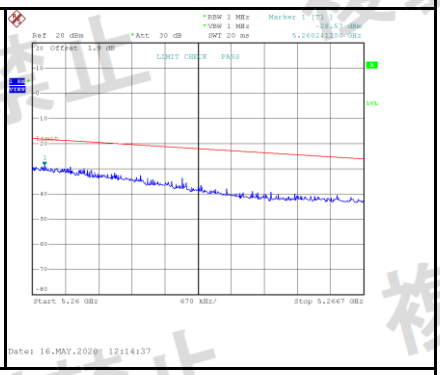
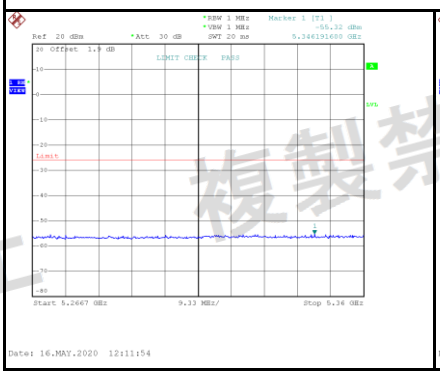
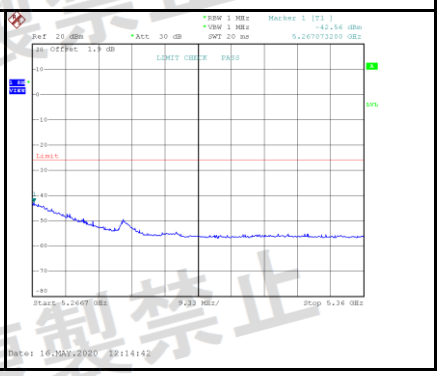
Test Mode		IEEE 802.11a				
Test Voltage		V	Normal Voltage			Remark
Test Frequency		MHz	5180	5200	5240	Low/Middle/High of test frequency range
Out of Band Leakage Power	※2	Worst Frequency (MHz)	5140.83	5141.99	5140.86	
		Raw (dBm/MHz)	-48.02	-53.68	-54.43	
		Cable Loss (dB)	3.15	3.15	3.15	
		Measured (dBm/MHz)	-44.87	-50.53	-51.28	5140 to 5142 MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)
		Measured (μW/MHz)	0.0326	0.0089	0.0074	
	※3	Worst Frequency (MHz)	5149.68	5147.74	5147.54	
		Raw (dBm/MHz)	-43.87	-49.58	-54.67	
		Cable Loss (dB)	3.15	3.15	3.15	
		Measured (dBm/MHz)	-40.72	-46.43	-51.52	5142 to 5150 MHz Limit ≤ 15 μW/MHz (-18.24 dBm/MHz)
		Measured (μW/MHz)	0.0847	0.0228	0.0070	
	※4	Worst Frequency (MHz)	5250.97	5250.97	5250.91	
		Raw (dBm/MHz)	-55.92	-52.60	-18.58	
		Cable Loss (dB)	3.15	3.15	3.15	
		Measured (dBm/MHz)	-52.77	-49.45	-15.43	5250 to 5251 MHz Limit ≤ 1000 to 100 μW/MHz (0 to -10 dBm/MHz)
		Measured (μW/MHz)	0.0053	0.0114	28.6418	
NOTE: Measured Value = Raw + Cable Loss						

Test Voltage		V	Normal Voltage			Remark
Test Frequency		MHz	5180	5200	5240	Low/Middle/High of test frequency range
Out of Band Leakage Power	※5	Worst Frequency (MHz)	5259.80	5259.64	5257.57	
		Raw (dBm/MHz)	-56.09	-54.91	-24.41	
		Cable Loss (dB)	3.15	3.15	3.15	
		Measured (dBm/MHz)	-52.94	-51.76	-21.26	5251 to 5260 MHz Limit ≤ 100 to 15.8 μW/MHz (-10 to -18 dBm/MHz)
		Measured (μW/MHz)	0.0051	0.0067	7.4817	
	※6	Worst Frequency (MHz)	5266.58	5266.39	5260.24	
		Raw (dBm/MHz)	-56.28	-54.72	-28.57	
		Cable Loss (dB)	3.15	3.15	3.15	
		Measured (dBm/MHz)	-53.13	-51.57	-25.42	5260 to 5266.7 MHz Limit ≤ 15.8 to 2.5μW/MHz (-18 to -26 dBm/MHz)
		Measured (μW/MHz)	0.0049	0.0070	2.8708	
	※7	Worst Frequency (MHz)	5346.19	5267.45	5267.07	
		Raw (dBm/MHz)	-55.32	-54.50	-42.56	
		Cable Loss (dB)	3.15	3.15	3.15	
		Measured (dBm/MHz)	-52.17	-51.35	-39.41	5266.7 to 5365 MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)
		Measured (μW/MHz)	0.0061	0.0073	0.1146	
NOTE: Measured Value = Raw + Cable Loss						

Normal Voltage

5180 MHz	5200 MHz	5240 MHz
※2: 5135 MHz to 5142 MHz		
		
※3: 5142 MHz to 5150 MHz		
		
※4: 5250 MHz to 5251 MHz		
		
※5 5251 MHz to 5260 MHz		
		

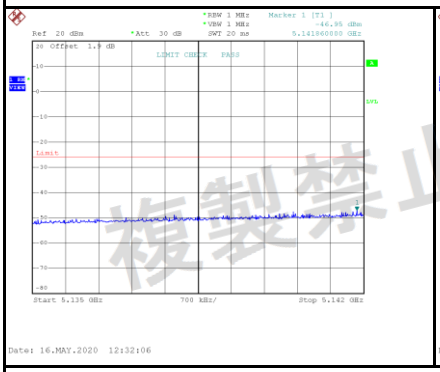
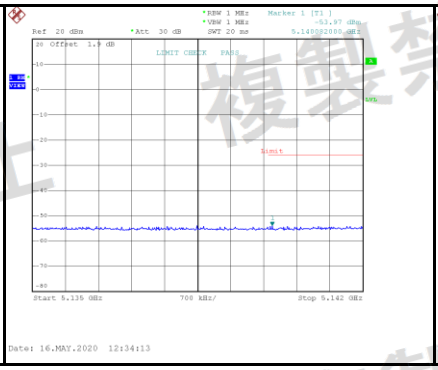
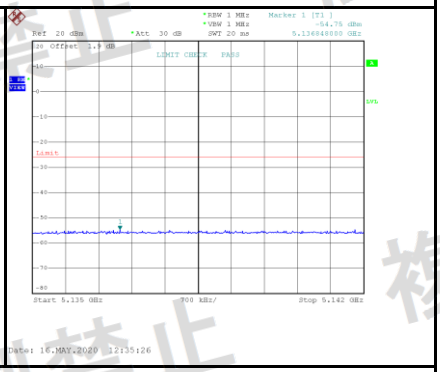
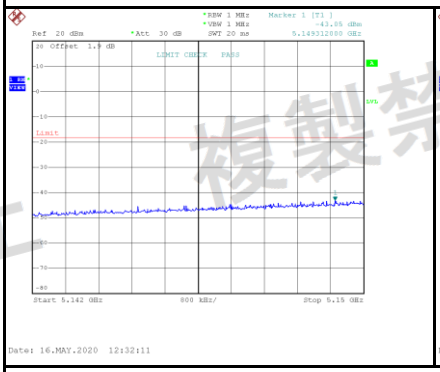
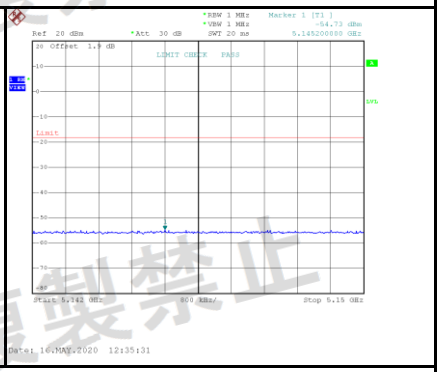
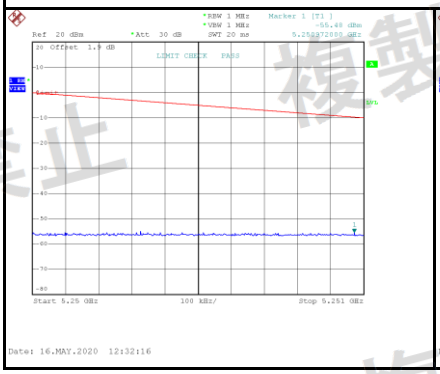
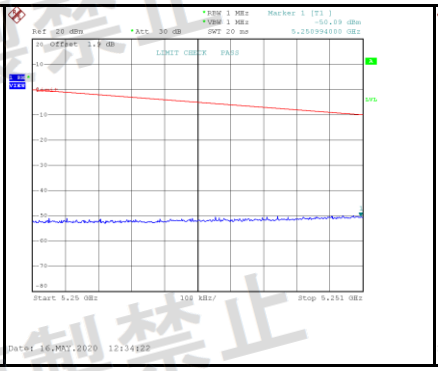
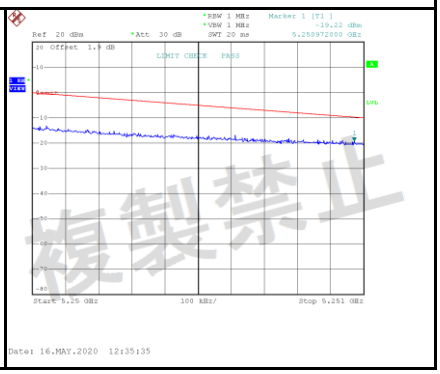
Normal Voltage

5180 MHz	5200 MHz	5240 MHz
※6: 5260 MHz to 5266.7 MHz		
		
※7: 5266.7 MHz to 5365 MHz		
		

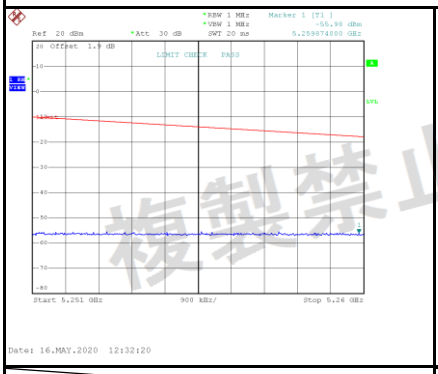
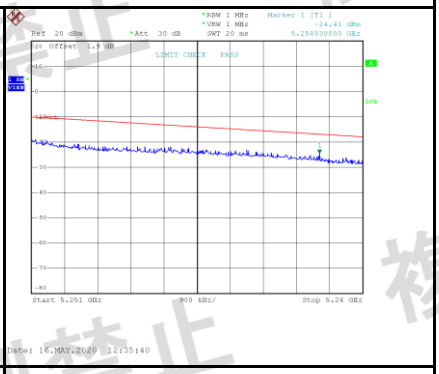
Test Mode		IEEE 802.11n (HT20)				
Test Voltage		V	Normal Voltage			Remark
Test Frequency		MHz	5180	5200	5240	Low/Middle/High of test frequency range
Out of Band Leakage Power	※2	Worst Frequency (MHz)	5141.86	5140.08	5136.85	
		Raw (dBm/MHz)	-46.95	-53.97	-54.75	
		Cable Loss (dB)	3.15	3.15	3.15	
		Measured (dBm/MHz)	-43.80	-50.82	-51.60	5135 to 5142 MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)
		Measured (μW/MHz)	0.0417	0.0083	0.0069	
	※3	Worst Frequency (MHz)	5149.31	5148.53	5145.20	
		Raw (dBm/MHz)	-43.05	-49.04	-54.73	
		Cable Loss (dB)	3.15	3.15	3.15	
		Measured (dBm/MHz)	-39.90	-45.89	-51.58	5142 to 5150 MHz Limit ≤ 15 μW/MHz (-18.24 dBm/MHz)
		Measured (μW/MHz)	0.1023	0.0258	0.0070	
	※4	Worst Frequency (MHz)	5250.97	5250.99	5250.97	
		Raw (dBm/MHz)	-55.48	-50.09	-19.22	
		Cable Loss (dB)	3.15	3.15	3.15	
		Measured (dBm/MHz)	-52.33	-46.94	-16.07	5250 to 5251 MHz Limit ≤ 1000 to 100 μW/MHz (0 to -10 dBm/MHz)
		Measured (μW/MHz)	0.0058	0.0202	24.7172	
NOTE: Measured Value = Raw + Cable Loss						

Test Voltage		V	Normal Voltage			Remark
Test Frequency		MHz	5180	5200	5240	Low/Middle/High of test frequency range
Out of Band Leakage Power	※5	Worst Frequency (MHz)	5259.87	5259.68	5258.83	
		Raw (dBm/MHz)	-55.98	-53.97	-31.70	
		Cable Loss (dB)	3.15	3.15	3.15	
		Measured (dBm/MHz)	-52.83	-50.82	-28.55	5251 to 5260 MHz Limit ≤ 100 to 15.8 μW/MHz (-10 to -18 dBm/MHz)
		Measured (μW/MHz)	0.0052	0.0083	1.3964	
	※6	Worst Frequency (MHz)	5266.69	5265.95	5260.39	
		Raw (dBm/MHz)	-55.91	-53.76	-32.76	
		Cable Loss (dB)	3.15	3.15	3.15	
		Measured (dBm/MHz)	-52.76	-50.61	-29.61	5260 to 5266.7 MHz Limit ≤ 15.8 to 2.5μW/MHz (-18 to -26 dBm/MHz)
		Measured (μW/MHz)	0.0053	0.0087	1.0940	
	※7	Worst Frequency (MHz)	5365.00	5267.09	5267.68	
		Raw (dBm/MHz)	-54.38	-54.59	-41.83	
		Cable Loss (dB)	3.15	3.15	3.15	
		Measured (dBm/MHz)	-51.23	-51.44	-38.68	5266.7 to 5365 MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)
		Measured (μW/MHz)	0.0075	0.0072	0.1355	
NOTE: Measured Value = Raw + Cable Loss						

Normal Voltage

5180 MHz	5200 MHz	5240 MHz
※2: 5135 MHz to 5142 MHz		
		
※3: 5142 MHz to 5150 MHz		
		
※4: 5250 MHz to 5251 MHz		
		

Normal Voltage

5180 MHz	5200 MHz	5240 MHz
※5: 5251 MHz to 5260 MHz		
		
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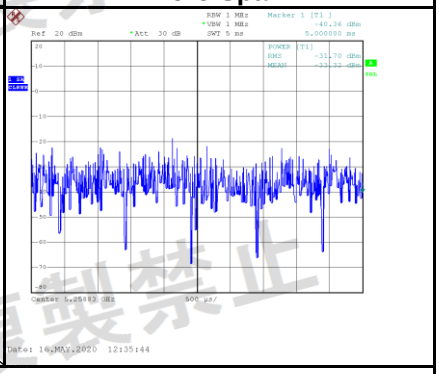
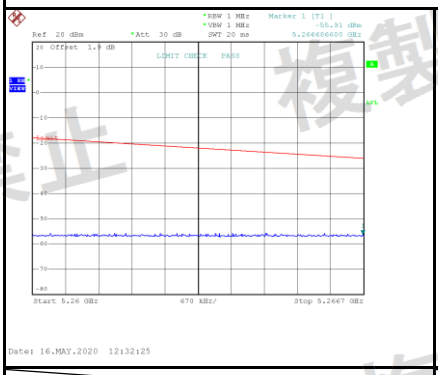
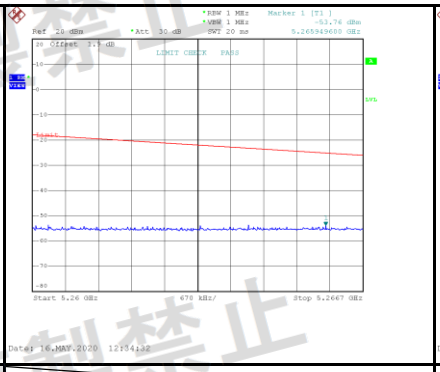
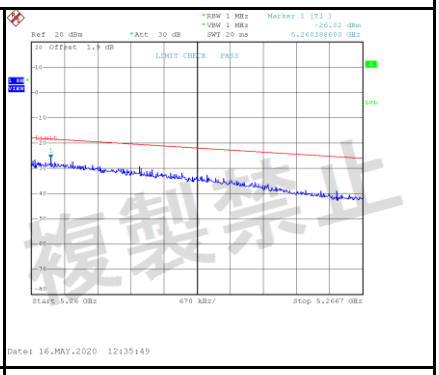
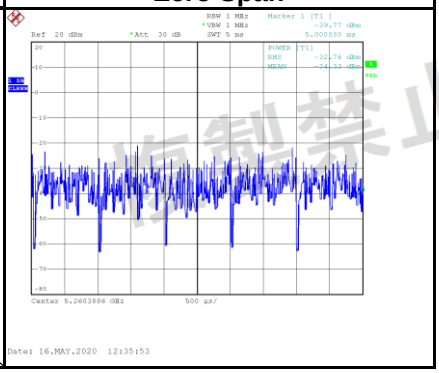
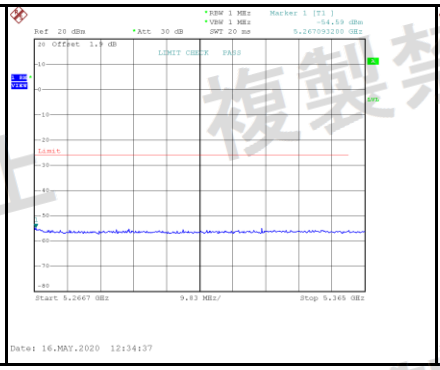
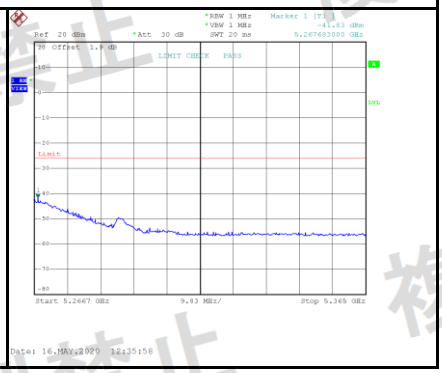
		
※6: 5260 MHz to 5266.7 MHz		
		
		Zero Span
		

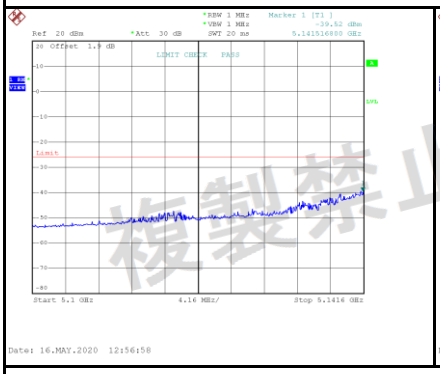
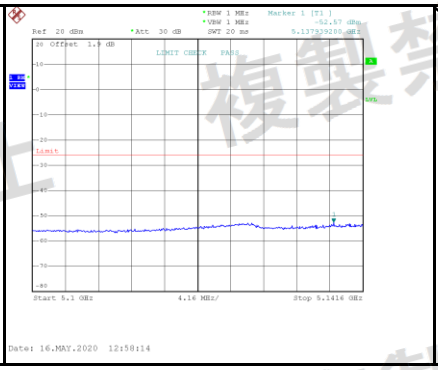
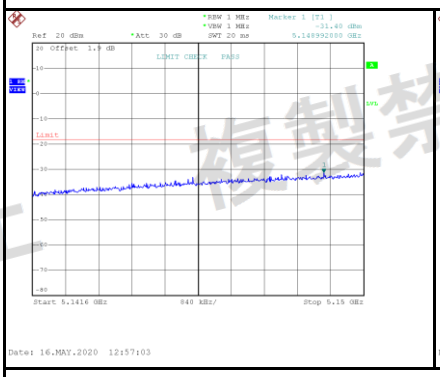
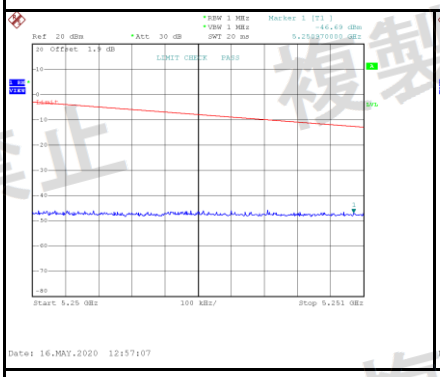
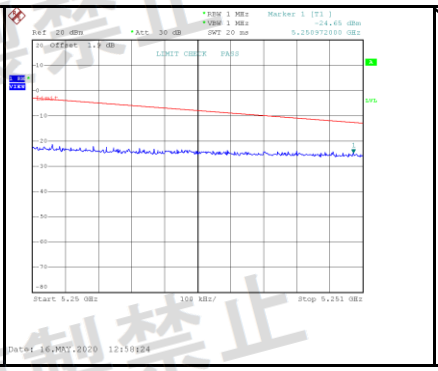
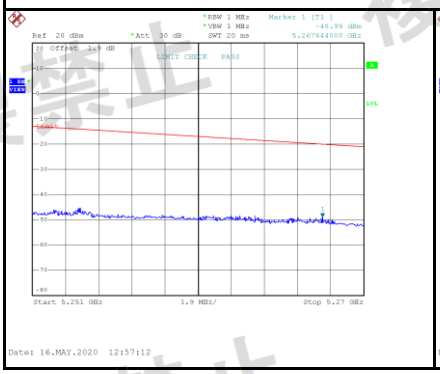
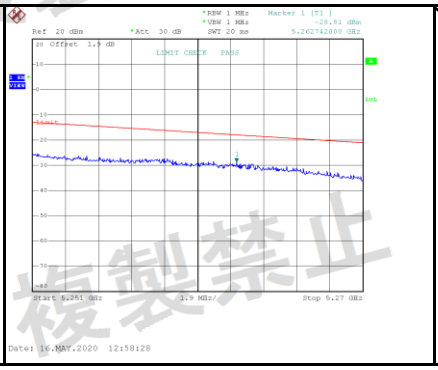
Normal Voltage

5180 MHz	5200 MHz	5240 MHz
※7: 5266.7 MHz to 5365 MHz		
		

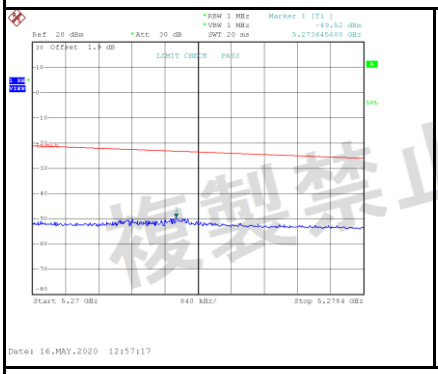
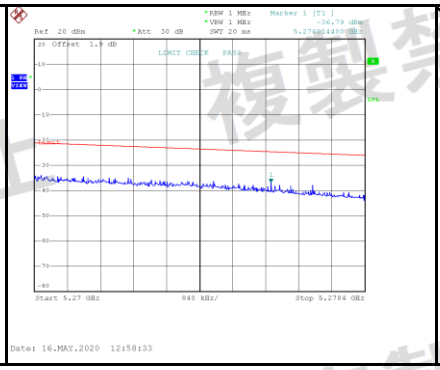
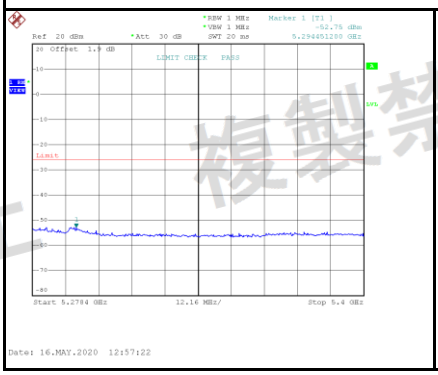
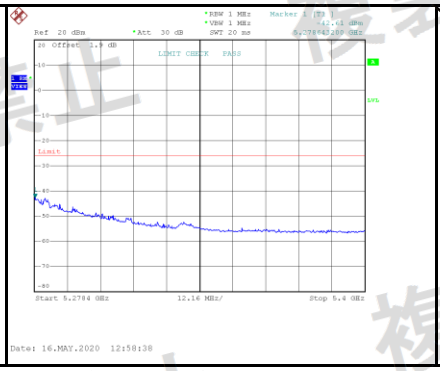
Test Mode		IEEE 802.11n (HT40)				
Test Voltage		V	Normal Voltage			Remark
Test Frequency		MHz	5190	5230		Low/Middle/High of test frequency range
Out of Band Leakage Power	※2	Worst Frequency (MHz)	5141.52	5137.94		
		Raw (dBm/MHz)	-39.52	-52.57		
		Cable Loss (dB)	3.15	3.15		
		Measured (dBm/MHz)	-36.37	-49.42		5100 to 5141.6 MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)
		Measured (μW/MHz)	0.2307	0.0114		
	※3	Worst Frequency (MHz)	5148.99	5149.63		
		Raw (dBm/MHz)	-31.40	-52.23		
		Cable Loss (dB)	3.15	3.15		
		Measured (dBm/MHz)	-28.25	-49.08		5141.6 to 5150 MHz Limit ≤ 15 μW/MHz (-18.24 dBm/MHz)
		Measured (μW/MHz)	1.4962	0.0124		
	※4	Worst Frequency (MHz)	5250.97	5250.97		
		Raw (dBm/MHz)	-46.69	-24.65		
		Cable Loss (dB)	3.15	3.15		
		Measured (dBm/MHz)	-43.54	-21.50		5250 to 5251 MHz Limit ≤ 500 to 50 μW/MHz (-3.01 to -13.01 dBm/MHz)
		Measured (μW/MHz)	0.0443	7.0795		
NOTE: Measured Value = Raw + Cable Loss						

Test Voltage		V	Normal Voltage			Remark
Test Frequency		MHz	5190	5230		Low/Middle/High of test frequency range
Out of Band Leakage Power	※5	Worst Frequency (MHz)	5267.64	5262.74		
		Raw (dBm/MHz)	-48.99	-28.81		
		Cable Loss (dB)	3.15	3.15		
		Measured (dBm/MHz)	-45.84	-25.66		5251 to 5270 MHz Limit ≤ 50 to 7.9 μW/MHz (-13.01 to -21.01 dBm/MHz)
		Measured (μW/MHz)	0.0261	2.7164		
	※6	Worst Frequency (MHz)	5273.65	5276.01		
		Raw (dBm/MHz)	-49.52	-36.79		
		Cable Loss (dB)	3.15	3.15		
		Measured (dBm/MHz)	-46.37	-33.64		5270 to 5278.4 MHz Limit ≤ 7.9 to 2.5μW/MHz (-21.01 to -26 dBm/MHz)
		Measured (μW/MHz)	0.0231	0.4325		
	※7	Worst Frequency (MHz)	5294.45	5278.64		
		Raw (dBm/MHz)	-52.75	-42.61		
		Cable Loss (dB)	3.15	3.15		
		Measured (dBm/MHz)	-49.60	-39.46		5278.4 to 5400 MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)
		Measured (μW/MHz)	0.0110	0.1132		
NOTE: Measured Value = Raw + Cable Loss						

Normal Voltage

5190 MHz	5230 MHz	
※2: 5100 MHz to 5141.6 MHz		
		
※3: 5141.6 MHz to 5150 MHz		
		
※4: 5250 MHz to 5251 MHz		
		
※5: 5251 MHz to 5270 MHz		
		

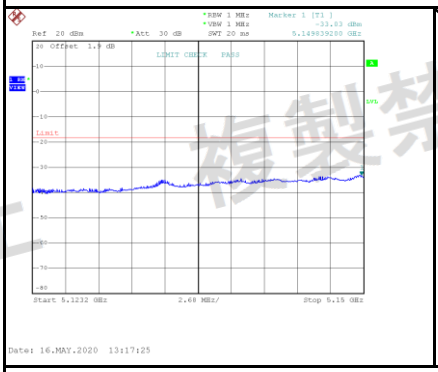
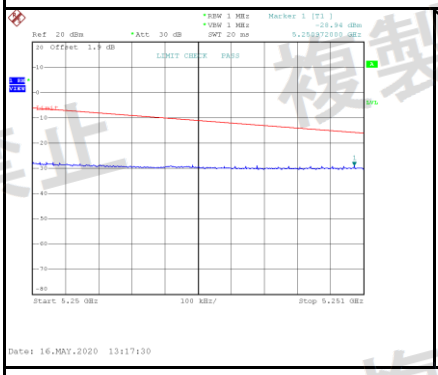
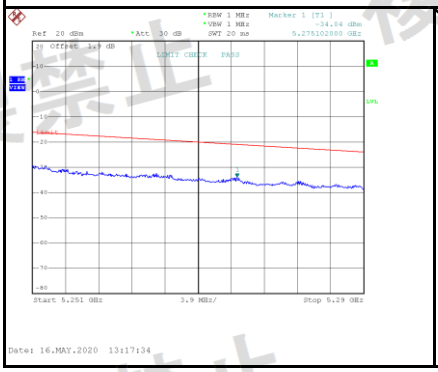
Normal Voltage

5190 MHz	5230 MHz	
※6: 5270 MHz to 5278.4 MHz		
		
※7: 5278.4 MHz to 5400 MHz		
		

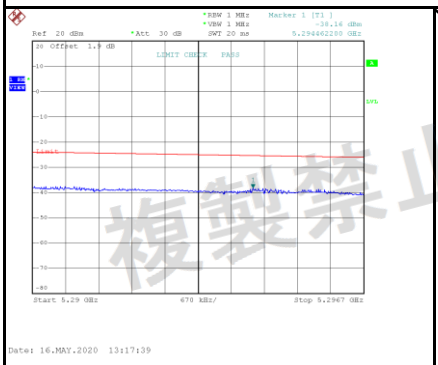
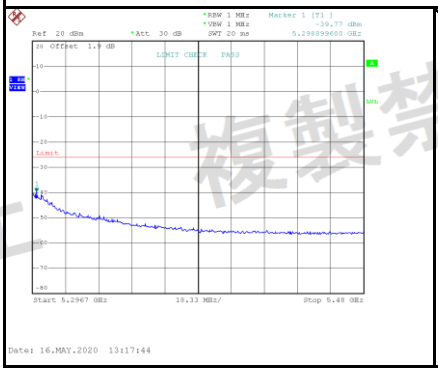
Test Mode		IEEE 802.11ac (VHT80)				
Test Voltage		V	Normal Voltage			Remark
Test Frequency		MHz	5210			Low/Middle/High of test frequency range
Out of Band Leakage Power	※2	Worst Frequency (MHz)	5121.55			
		Raw (dBm/MHz)	-39.64			
		Cable Loss (dB)	3.15			
		Measured (dBm/MHz)	-36.49			5020 to 5123.2 MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)
		Measured (μW/MHz)	0.2244			
	※3	Worst Frequency (MHz)	5149.84			
		Raw (dBm/MHz)	-33.03			
		Cable Loss (dB)	3.15			
		Measured (dBm/MHz)	-29.88			5123.2 to 5150 MHz Limit ≤ 15 μW/MHz (-18.24 dBm/MHz)
		Measured (μW/MHz)	1.0280			
	※4	Worst Frequency (MHz)	5250.97			
		Raw (dBm/MHz)	-28.94			
		Cable Loss (dB)	3.15			
		Measured (dBm/MHz)	-25.79			5250 to 5251 MHz Limit ≤ 250 to 25 μW/MHz (-6 to -16.02 dBm/MHz)
		Measured (μW/MHz)	2.6363			
NOTE: Measured Value = Raw + Cable Loss						

Test Voltage		V	Normal Voltage			Remark
Test Frequency		MHz	5210			Low/Middle/High of test frequency range
Out of Band Leakage Power	※5	Worst Frequency (MHz)	5275.10			
		Raw (dBm/MHz)	-34.04			
		Cable Loss (dB)	3.15			
		Measured (dBm/MHz)	-30.89			5251 to 5290 MHz Limit ≤ 25 to 4 μW/MHz (-16.02 to -24.02 dBm/MHz)
		Measured (μW/MHz)	0.8147			
	※6	Worst Frequency (MHz)	5294.46			
		Raw (dBm/MHz)	-38.16			
		Cable Loss (dB)	3.15			
		Measured (dBm/MHz)	-35.01			5290 to 5296.7 MHz Limit ≤ 4 to 2.5 μW/MHz (-24.02 to -26.03 dBm/MHz)
		Measured (μW/MHz)	0.3155			
	※7	Worst Frequency (MHz)	5298.90			
		Raw (dBm/MHz)	-39.77			
		Cable Loss (dB)	3.15			
		Measured (dBm/MHz)	-36.62			5296.7 to 5480 MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)
		Measured (μW/MHz)	0.2178			
NOTE: Measured Value = Raw + Cable Loss						

Normal Voltage

5210 MHz		
※2: 5020 MHz to 5123.2 MHz		
※3: 5123.2 MHz to 5150 MHz		
		
※4: 5250 MHz to 5251 MHz		
		
※5: 5251 MHz to 5290 MHz		
		

Normal Voltage

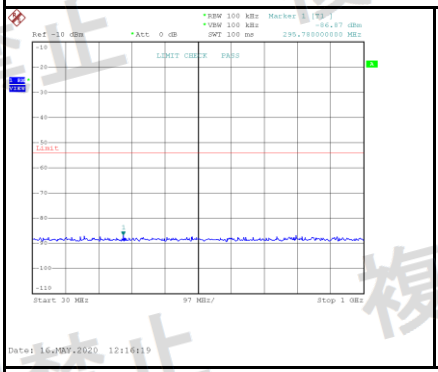
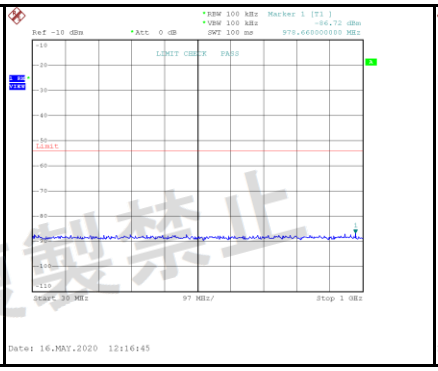
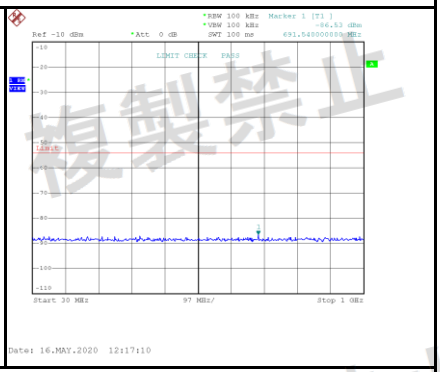
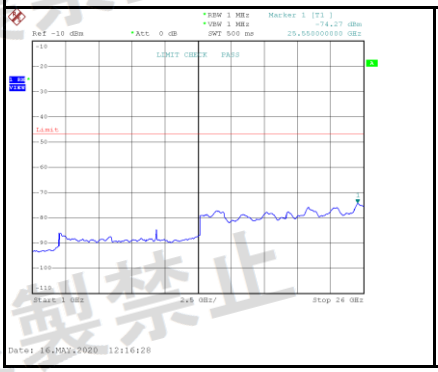
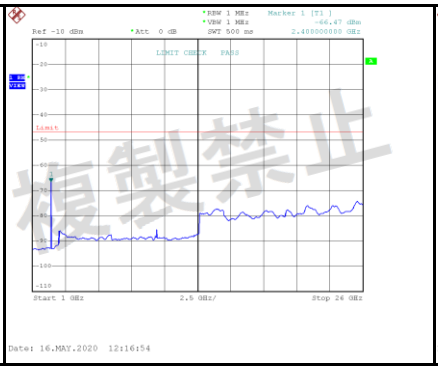
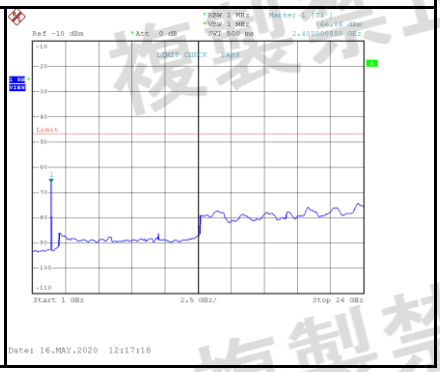
5210 MHz		
※6: 5290 MHz to 5296.7 MHz		
		
※7: 5296.7 MHz to 5480 MHz		
		

APPENDIX F LIMITATION OF COLLATERAL EMISSION OF RECEIVER

複製禁止

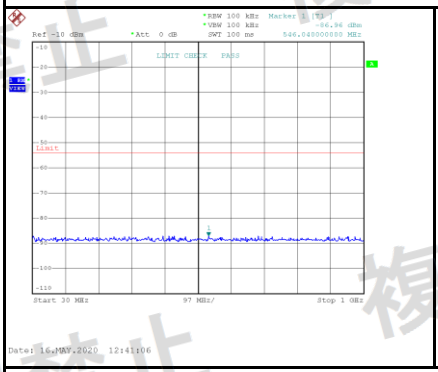
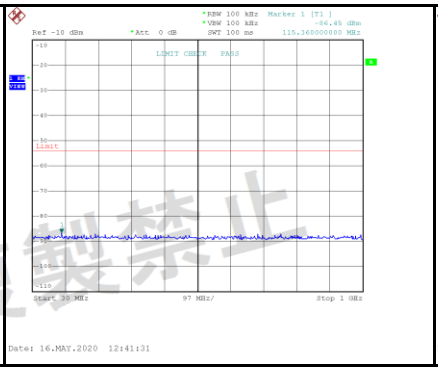
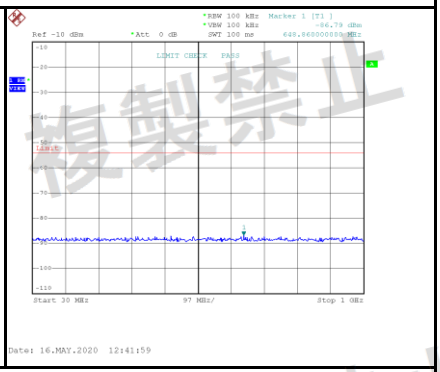
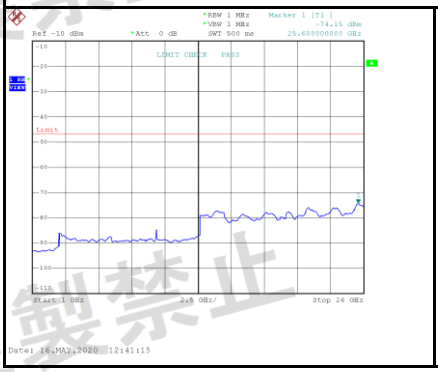
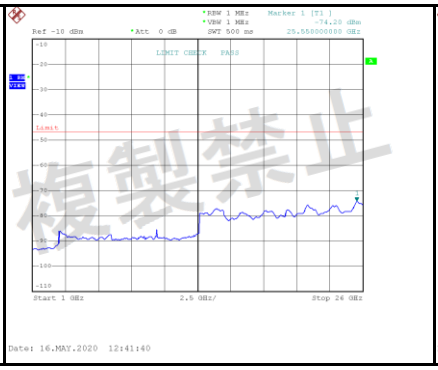
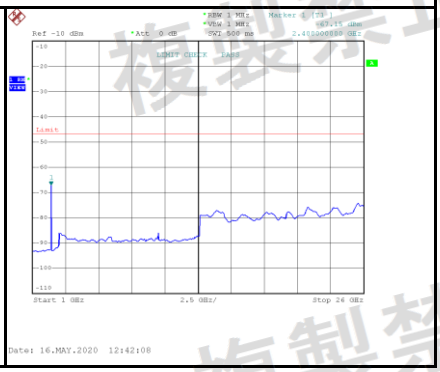
Test Mode		IEEE 802.11a				
Test Voltage		V	Normal Voltage			Remark
Test Frequency		MHz	5180	5200	5240	Low/Middle/High of test frequency range
Unwanted Emission Intensity	※1	Worst Frequency (MHz)	295.78	978.66	691.54	
		Raw (dBm)	-86.87	-86.72	-86.53	
		Cable Loss (dB)	0.56	0.56	0.56	
		Measured (dBm)	-86.31	-86.16	-85.97	30 MHz to 1 GHz Limit ≤ 4 nW (-54 dBm)
		Measured (nW)	0.0023	0.0024	0.0025	
	※2	Worst Frequency (MHz)	25550.00	2400.00	2400.00	
		Raw (dBm)	-74.27	-66.47	-66.16	
		Cable Loss (dB)	5.59	1.02	1.02	
		Measured (dBm)	-68.68	-65.45	-65.14	1 GHz to 26 GHz Limit ≤ 20 nW (-47 dBm)
		Measured (nW)	0.1355	0.2851	0.3062	
NOTE: Measured Value = Raw + Cable Loss						

Normal Voltage

5180 MHz	5200 MHz	5240 MHz
※1: 30 MHz to 1 GHz		
		
※2: 1 GHz to 26 GHz		
		

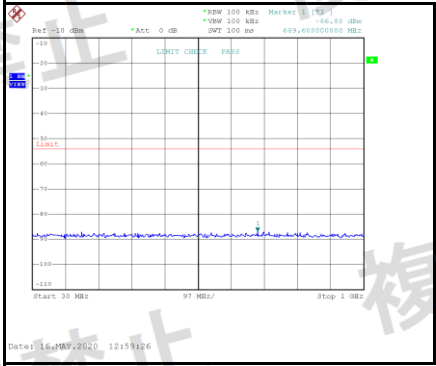
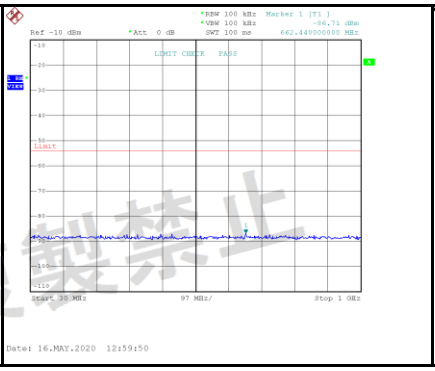
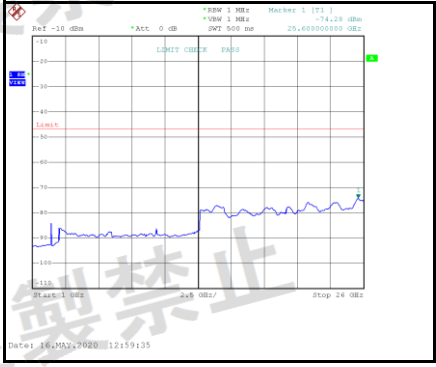
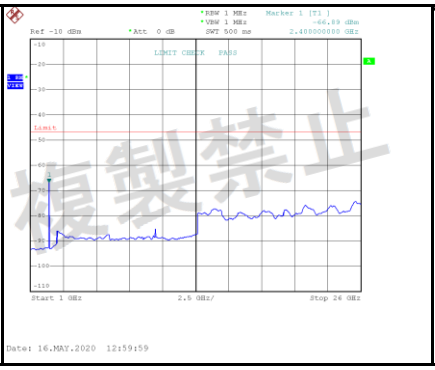
Test Mode		IEEE 802.11n (HT20)				
Test Voltage		V	Normal Voltage			Remark
Test Frequency		MHz	5180	5200	5240	Low/Middle/High of test frequency range
Unwanted Emission Intensity	※1	Worst Frequency (MHz)	546.04	115.36	648.86	
		Raw (dBm)	-86.96	-86.45	-86.79	
		Cable Loss (dB)	0.56	0.56	0.56	
		Measured (dBm)	-86.40	-85.89	-86.23	30 MHz to 1 GHz Limit ≤ 4 nW (-54 dBm)
		Measured (nW)	0.0023	0.0026	0.0024	
	※2	Worst Frequency (MHz)	25600.00	25550.00	2400.00	
		Raw (dBm)	-74.15	-74.20	-67.15	
		Cable Loss (dB)	5.59	5.59	1.02	
		Measured (dBm)	-68.56	-68.61	-66.13	1 GHz to 26 GHz Limit ≤ 20 nW (-47 dBm)
		Measured (nW)	0.1393	0.1377	0.2438	
NOTE: Measured Value = Raw + Cable Loss						

Normal Voltage

5180 MHz	5200 MHz	5240 MHz
※1: 30 MHz to 1 GHz		
		
※2: 1 GHz to 26 GHz		
		

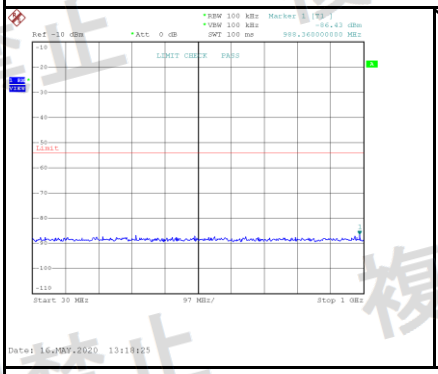
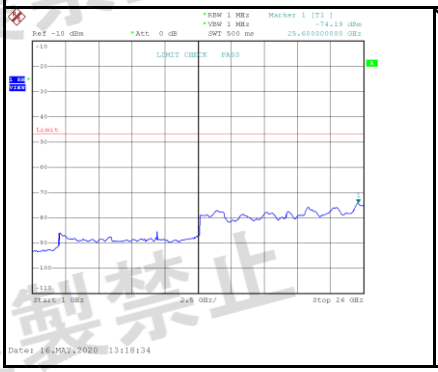
Test Mode		IEEE 802.11n (HT40)				
Test Voltage		V	Normal Voltage			Remark
Test Frequency		MHz	5190	5230		Low/Middle/High of test frequency range
Unwanted Emission Intensity	※1	Worst Frequency (MHz)	689.60	662.44		
		Raw (dBm)	-86.80	-86.71		
		Cable Loss (dB)	0.56	0.56		
		Measured (dBm)	-86.24	-86.15		30 MHz to 1 GHz Limit ≤ 4 nW (-54 dBm)
		Measured (nW)	0.0024	0.0024		
	※2	Worst Frequency (MHz)	25600.00	2400.00		
		Raw (dBm)	-74.28	-66.89		
		Cable Loss (dB)	5.59	1.02		
		Measured (dBm)	-68.69	-65.87		1 GHz to 26 GHz Limit ≤ 20 nW (-47 dBm)
		Measured (nW)	0.1352	0.2588		
NOTE: Measured Value = Raw + Cable Loss						

Normal Voltage

5190 MHz	5230 MHz	
※1: 30 MHz to 1 GHz		
		
※2: 1 GHz to 26 GHz		
		

Test Mode		IEEE 802.11ac (VHT80)				
Test Voltage		V	Normal Voltage			Remark
Test Frequency		MHz	5210			Low/Middle/High of test frequency range
Unwanted Emission Intensity	※1	Worst Frequency (MHz)	988.36			
		Raw (dBm)	-86.43			
		Cable Loss (dB)	0.56			
		Measured (dBm)	-85.87			30 MHz to 1 GHz Limit ≤ 4 nW (-54 dBm)
		Measured (nW)	0.0026			
	※2	Worst Frequency (MHz)	25600.00			
		Raw (dBm)	-74.19			
		Cable Loss (dB)	5.59			
		Measured (dBm)	-68.60			1 GHz to 26 GHz Limit ≤ 20 nW (-47 dBm)
		Measured (nW)	0.1380			
NOTE: Measured Value = Raw + Cable Loss						

Normal Voltage

5210 MHz		
※1: 30 MHz to 1 GHz		
		
※2: 1 GHz to 26 GHz		
		

APPENDIX G TRANSMISSION BURST LENGTH

複製禁止

Test Mode	IEEE 802.11a				
Test Voltage	V	Normal Voltage			Remark
Test Frequency	MHz	5180	5200	5240	Low/Middle/High of test frequency range
Transmission Burst Length	msec	0.1000	0.1000	0.1000	Limit ≤ 4 msec

Test Mode	IEEE 802.11n (HT20)				
Test Voltage	V	Normal Voltage			Remark
Test Frequency	MHz	5180	5200	5240	Low/Middle/High of test frequency range
Transmission Burst Length	msec	0.1000	0.1000	0.1000	Limit ≤ 4 msec

Test Mode	IEEE 802.11n (HT40)				
Test Voltage	V	Normal Voltage			Remark
Test Frequency	MHz	5190	5230		Low/Middle/High of test frequency range
Transmission Burst Length	msec	0.1000	0.1000		Limit ≤ 4 msec

Test Mode	IEEE 802.11ac (VHT80)				
Test Voltage	V	Normal Voltage			Remark
Test Frequency	MHz	5210			Low/Middle/High of test frequency range
Transmission Burst Length	msec	0.1000			Limit ≤ 4 msec

APPENDIX H CARRIER SENSE CAPABILITY

複製禁止

Test Mode	IEEE 802.11a				
Test Voltage	V	Normal Voltage			Remark
Test Frequency	MHz	5180	5200	5240	Low/Middle/High of test frequency range
Carrier Sensing Function (100 mV/m)	OK / NG	OK	OK	OK	Pin = 22.79 + Gr - 20 * log(f) [dBm]
NOTE: It's conditionally passed, the carrier frequency = the receiver of center frequency + 500 kHz.					

Test Mode	IEEE 802.11n (HT20)				
Test Voltage	V	Normal Voltage			Remark
Test Frequency	MHz	5180	5200	5240	Low/Middle/High of test frequency range
Carrier Sensing Function (100 mV/m)	OK / NG	OK	OK	OK	Pin = 22.79 + Gr - 20 * log(f) [dBm]
NOTE: It's conditionally passed, the carrier frequency = the receiver of center frequency + 500 kHz.					

Test Mode	IEEE 802.11n (HT40)				
Test Voltage	V	Normal Voltage			Remark
Test Frequency	MHz	5190	5230		Low/Middle/High of test frequency range
Carrier Sensing Function (100 mV/m)	OK / NG	OK	OK		Pin = 22.79 + Gr - 20 * log(f) [dBm]

Test Mode	IEEE 802.11ac (VHT80)				
Test Voltage	V	Normal Voltage			Remark
Test Frequency	MHz	5210			Low/Middle/High of test frequency range
Carrier Sensing Function (100 mV/m)	OK / NG	OK			Pin = 22.79 + Gr - 20 * log(f) [dBm]
NOTE: It's conditionally passed, the carrier frequency = the receiver of center frequency + 500 kHz.					

End of Test Report