



Radio Test Report (BT LE)

Report No.: RJ180808D03

Test Model: RGP0052

Received Date: Aug. 8, 2018

Test Date: Sep. 7, 2018

Issued Date: Sep. 12, 2018

Applicant: Corsair Memory, Inc.

Address: 47100 Bayside Pkwy, Fremont, CA 94538, USA

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

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Release Control Record

Issue No.	Description	Date Issued
RJ180808D03	Original release.	Sep. 12, 2018



1 Certificate of Conformity

Product: Wireless Mouse

Brand: Corsair

Test Model: RGP0052

Sample Status: Engineering sample

Applicant: Corsair Memory, Inc.

Test Date: Sep. 7, 2018

Standards: ARIB STD-T66 (V3.7), MIC notice 88 Appendix 43

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by : Annie Chang, **Date:** Sep. 12, 2018
Annie Chang / Senior Specialist

Approved by : Rex Lai, **Date:** Sep. 12, 2018
Rex Lai / Associate Technical Manager



2 Summary of Test Results

The EUT has been tested according to the following specifications:

Notice 88 Appendix 43 Reference	ARIB STD-T66 Ref.	Report Reference	Parameter	Test Results (Note)
General Provisions				
C	3.2 (4)	4.1	Frequency tolerance	C
D	3.2 (7)	4.2	Occupied bandwidth	C
E	3.2 (6)	4.3	Spurious emissions	C
Transmitting Equipment				
F	--	4.4	Antenna power	C
--	--	--	SAR	NA
Transmitting Antenna				
--	--	3.5	Type, configuration, etc. of transmitting antenna	C
--	--	3.5	Direction pattern of transmitting antenna	C
Receiving Equipment				
G	3.3 (1)	4.5	Spurious emissions of receiver	C
--	--	3.5	Refer to all articles for transmitting antenna	C
Operating Frequency 2400 to 2483.5MHz				
--	3.7 (1)	3.2	High Frequency	C
--	3.7 (1)	3.4	Modulation section cannot be opened easily	C
--	3.1 (1)	3.1	Communication method	C
--	3.2 (1)a	3.1	Modulation method	C
--	3.2 (1)a	3.1	Spread spectrum method	C
--	3.2 (2)	4.4	Antenna power	C
--	3.6 (2)	4.4	Absolute gain of transmitting antenna	C
--	3.6 (2)	--	Angular width of principal radiation (AWPR)	NA
--	3.2 (10)	--	Number of carriers within 1 MHz bandwidth in OFDM	NA
--	3.2 (8)	--	Spreading bandwidth	NA
--	3.2 (9)	--	Spreading factor	NA
--	3.2 (11)	--	Frequency retention time (FH employed)	NA
--	3.4.1(1)	4.6	Interference Prevention Function	C
--	3.4.1(3)	--	Carrier Sense Capability	NA

Note: C = Conform NC = Not Conform NT = Not Tested NA = Not Applicable



2.1 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration	Calibration Authority
ROHDE & SCHWARZ Spectrum Analyzer	FSV40	101042	Sep. 29, 2017	Sep. 28, 2018	ETC
ROHDE & SCHWARZ Signal Generator	SMR 40	100231	Jun. 27, 2018	Jun. 26, 2019	ETC
Anritsu Power Sensor	MA2411B	0738404	Apr. 26, 2018	Apr. 25, 2019	ETC
Anritsu Power Meter	ML2495A	0842014	Apr. 26, 2018	Apr. 25, 2019	ETC
KEYSIGHT MIMO Powermeasurement Test set	U2021XA	U2021XA-001	Jun. 4, 2018	Jun. 3, 2019	ETC
KEYSIGHT Spectrum Analyzer	N9030A	MY54490260	Aug. 3, 2018	Aug. 2, 2019	ETC
KEYSIGHT MXG Vector Signal Generator	N5182B	MY53052658	May 24, 2018	May 23, 2019	ETC

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2.2 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in TR 100 028-1.

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Parameter	Uncertainty
Occupied Bandwidth	206.50 Hz
Spurious emissions	3.93 dB
Output power density	1.11 dB
Out of band radiated power	3.93 dB
Frequency Tolerance	603.76 Hz

2.3 Modification Record

There were no modifications required for compliance.



3 General Information

3.1 General Description of EUT

Product	Wireless Mouse
Brand	Corsair
Test Model	RGP0052
Status of EUT	Engineering Sample
Nominal Voltage	3.7Vdc from battery (For Wireless mode) 5Vdc from USB interface (For Wired mode and Charging mode)
Modulation Type	GFSK
Transfer Rate	1Mbps
Operating Frequency	2402 ~ 2480MHz
Number of Channel	40
Rated RF Output Power Density	1.0 mW
Conducted RF Output Power Density	1.07895mW
Radiated RF Output Power Density	1.18304mW
Antenna Type	Printed antenna with 0.4dBi gain
Antenna Connector	N/A
Accessory Device	N/A
Data Cable Supplied	Shielded USB cable (1.7m)

Note: The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.



3.2 Description of Test Modes

40 channels are provided to this EUT:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (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: The channels which were indicated in bold type of the above channel list were selected as representative test channel. Therefore only the data of the test channels were recorded in this report.

By means of test software provided by manufacture, the power levels during the tests were set according to the following codes:

Channel	Power setting
0	0
19	0
39	0



3.3 Test Conditions

Test Conditions		Voltage (Vdc)
V_{normal}	-	3.7
$V_{max.}$	+10%	4.07 (Note)
$V_{min.}$	-10%	3.33 (Note)

Note: After checking the fluctuation of input voltage to the circuit of the radio part (excluding the power supply) of the equipment to be tested, the fluctuation less than $\pm 1\%$ when input voltage from an external supply into the equipment fluctuates $\pm 10\%$, therefore, the test is carried out only at the normal voltage.

3.4 Assembly

The EUT used a kind of particular screw, which could not be operated by a tool bought in the market. Only means of brute force will be able to open it.

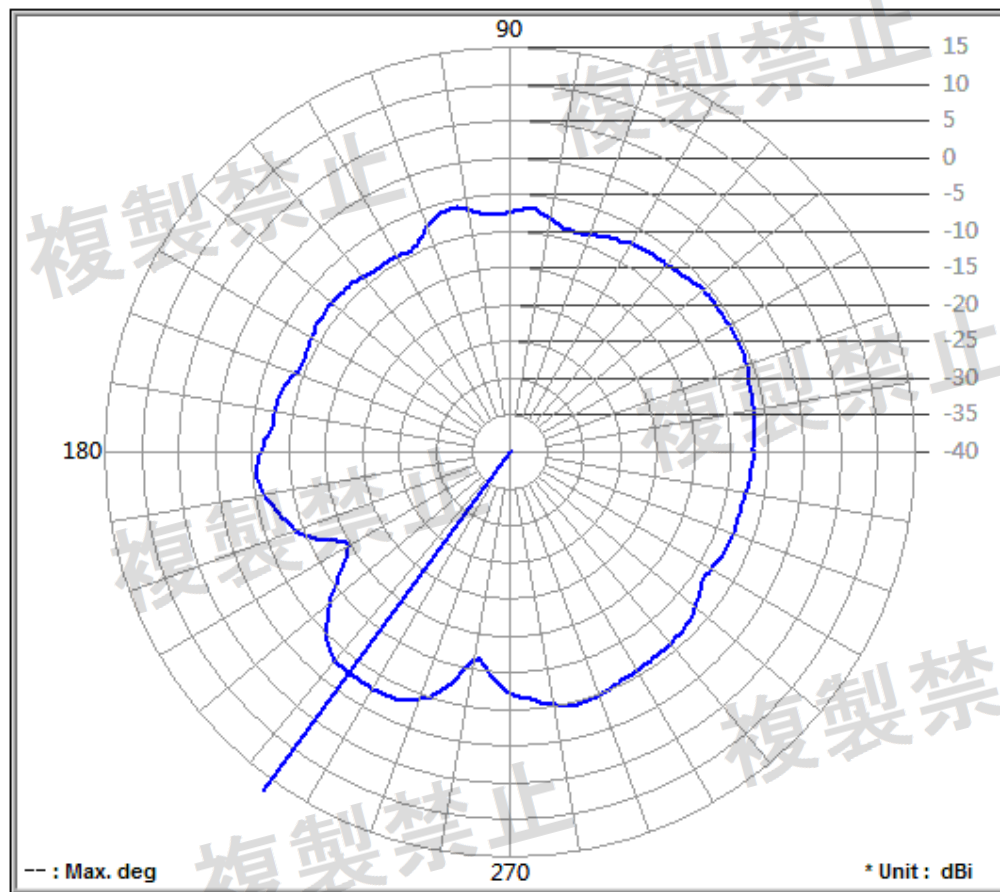


3.5 Antenna Specifications

3.5.1 Antenna Gain

Antenna Type	Max. Gain (dBi)
Printed antenna	0.4dBi

3.5.2 Antenna Pattern



Frequency (MHz) : 2402.00

Antenna Polarity : Horizontal

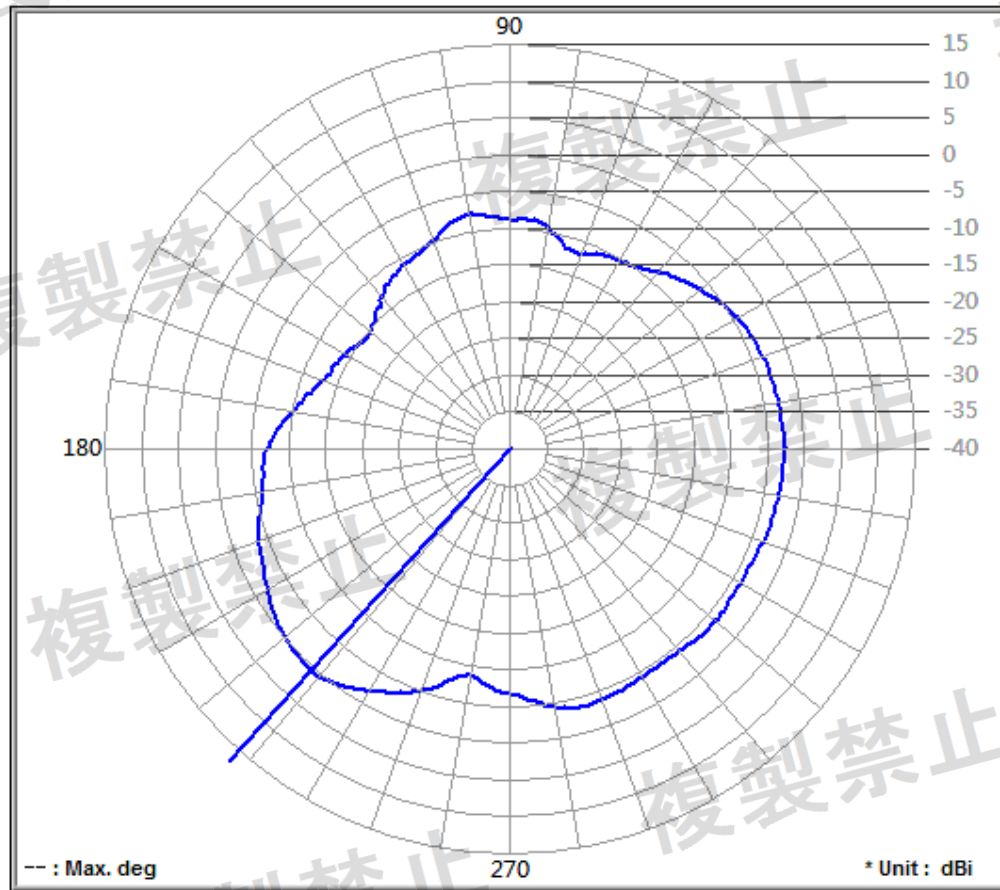
Average Value (dBi) : -6.74

Maximum Value (dBi) : -2.84

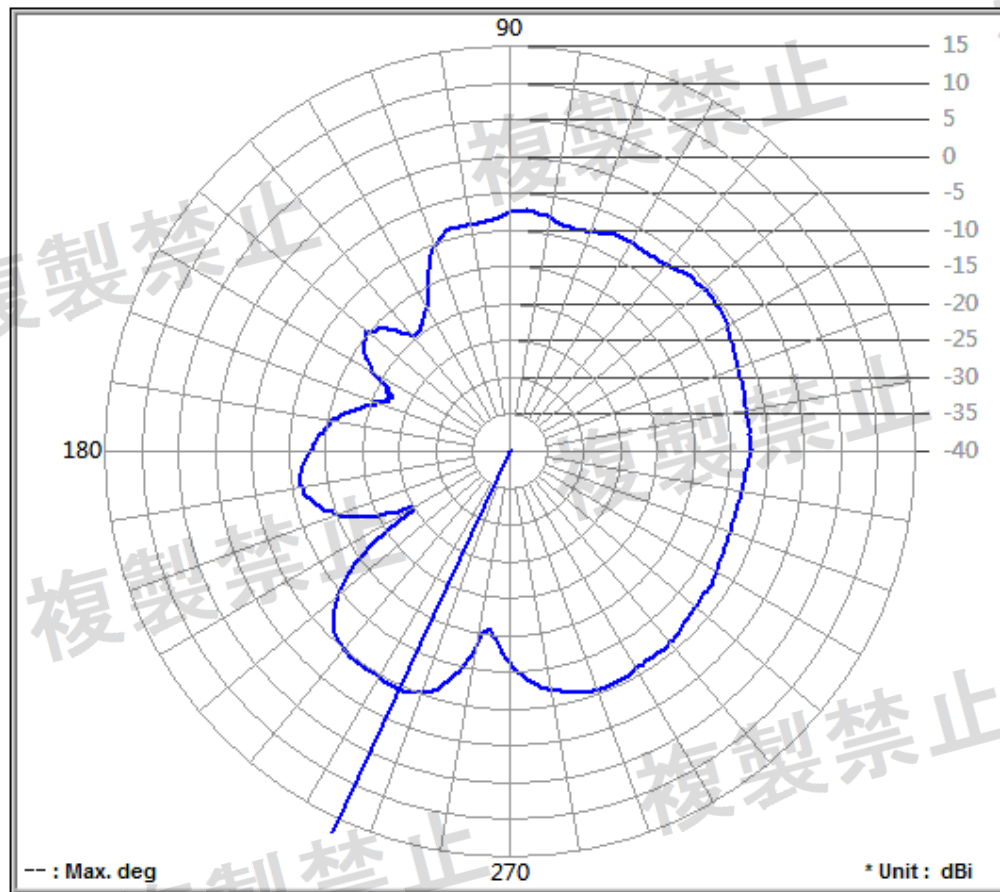
Maximum Value (degree) : 234

Minimum Value (dBi) : -14.79

Minimum Value (degree) : 210



Frequency (MHz):	2402.00	Antenna Polarity:	Vertical	Average Value (dBi):	-4.99
Maximum Value (dBi):	0.40	Maximum Value (degree):	228		
Minimum Value (dBi):	-15.47	Minimum Value (degree):	143		



Frequency (MHz) : 2440.00

Antenna Polarity : Horizontal

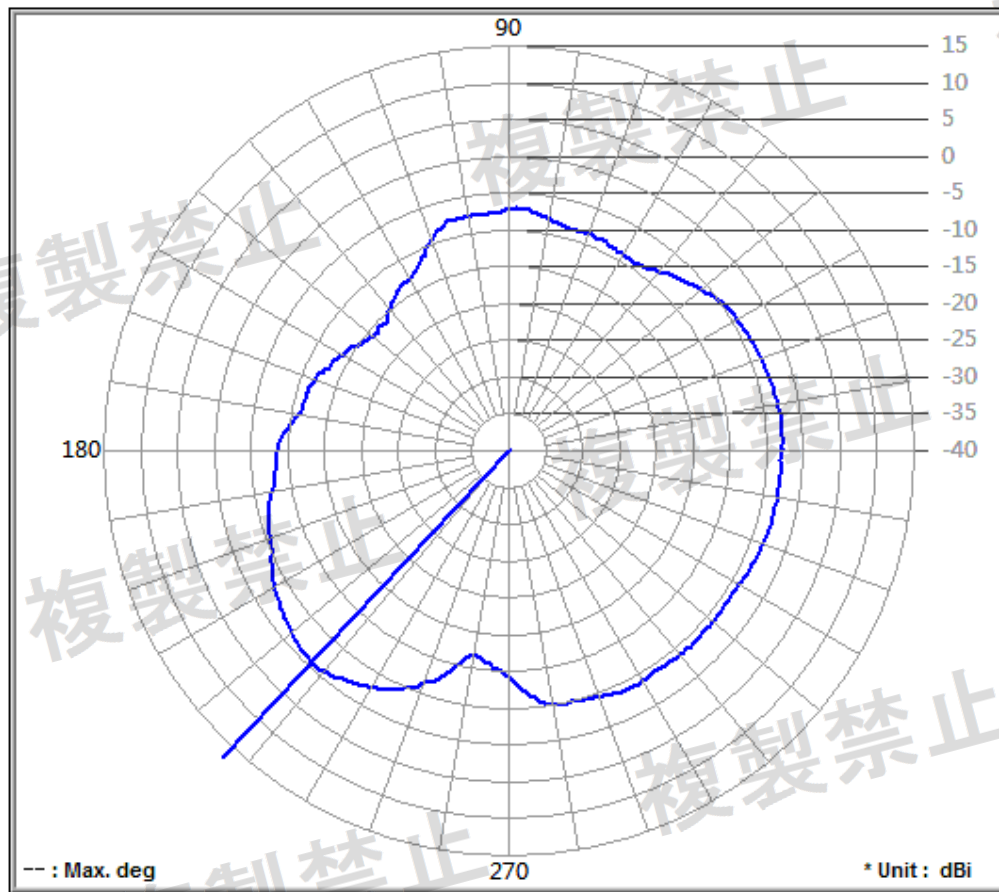
Average Value (dBi) : -8.29

Maximum Value (dBi) : -4.32

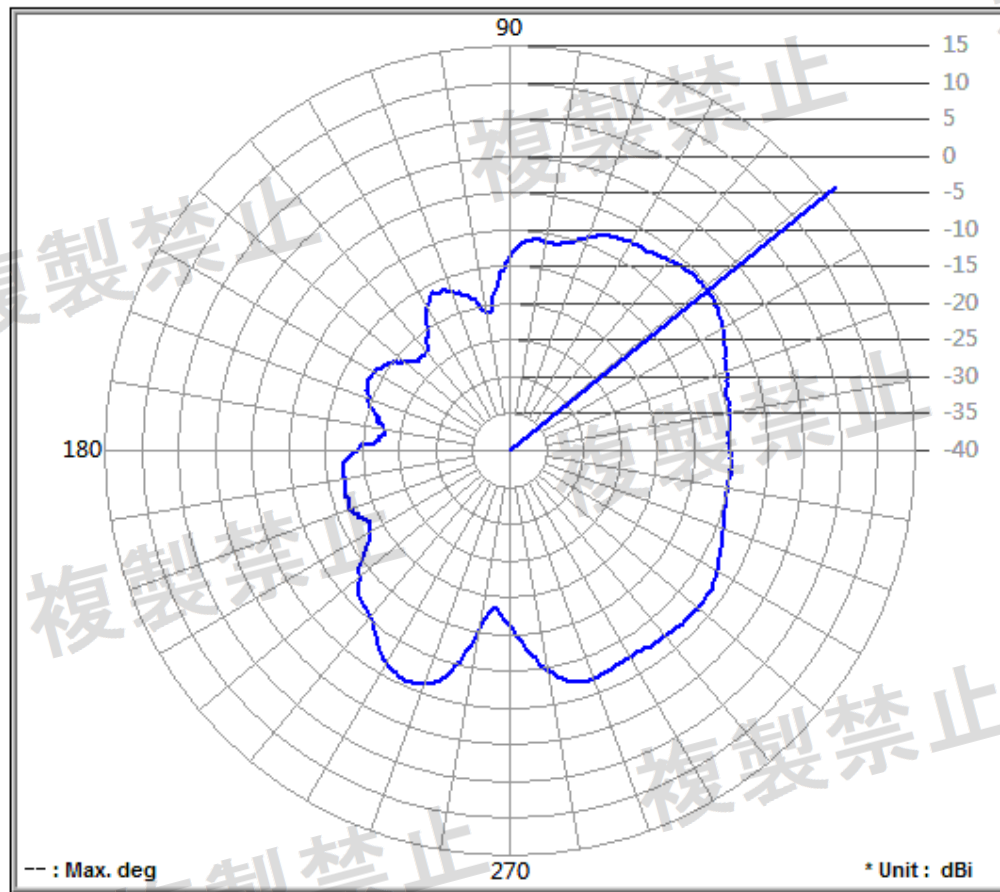
Maximum Value (degree) : 245

Minimum Value (dBi) : -24.89

Minimum Value (degree) : 209



Frequency (MHz) : 2440.00 Antenna Polarity : Vertical Average Value (dBi) : -5.45
Maximum Value (dBi) : -0.73 Maximum Value (degree) : 227
Minimum Value (dBi) : -16.08 Minimum Value (degree) : 138



Frequency (MHz) : 2480.00

Antenna Polarity : Horizontal

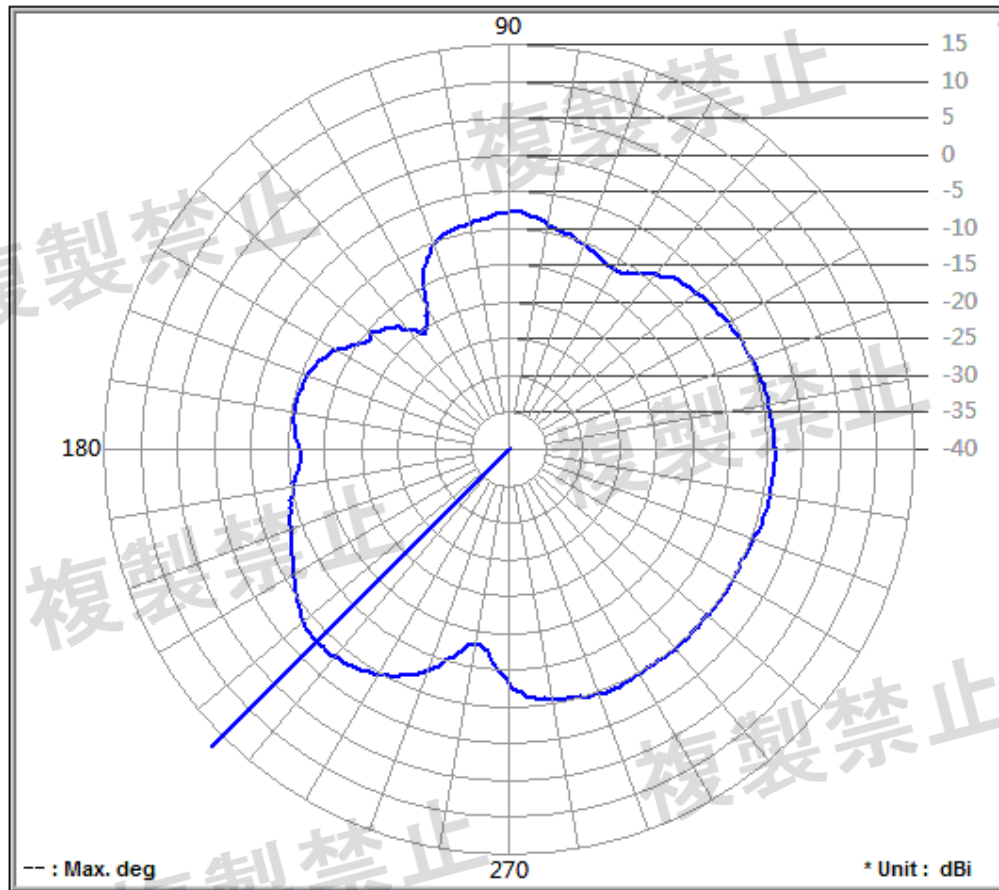
Average Value (dBi) : -9.98

Maximum Value (dBi) : -5.33

Maximum Value (degree) : 39

Minimum Value (dBi) : -22.91

Minimum Value (degree) : 171



Frequency (MHz) : 2480.00	Antenna Polarity : Vertical	Average Value (dBi) : -6.80
Maximum Value (dBi) : -3.01	Maximum Value (degree) : 225	
Minimum Value (dBi) : -20.71	Minimum Value (degree) : 126	



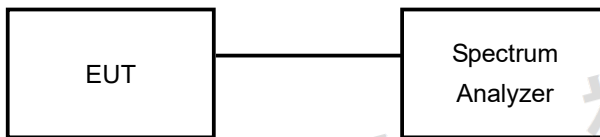
4 Test Results

4.1 Frequency Tolerance Measurement

4.1.1 Limits of Frequency Tolerance Measurement

Tolerance of frequency shall be +/- 50ppm

4.1.2 Test Setup



4.1.3 Test Results

Environmental Conditions		25deg.C, 76% RH					
Channel	Frequency (MHz)	Voltage normal		Voltage +10%		Voltage -10%	
		Carrier frequency (MHz)	Frequency tolerance (ppm)	Carrier frequency (MHz)	Frequency tolerance (ppm)	Carrier frequency (MHz)	Frequency tolerance (ppm)
0	2402	2401.996600	-1.415	2401.996500	-1.457	2401.996600	-1.415
19	2440	2439.996500	-1.434	2439.996500	-1.434	2439.996500	-1.434
39	2480	2479.996300	-1.491	2479.996400	-1.451	2479.996500	-1.411

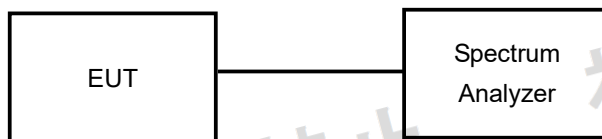


4.2 Occupied Bandwidth Measurement (99% power bandwidth)

4.2.1 Limits of Occupied Bandwidth Measurement

Item	Limit	Remark
Occupied bandwidth	<26MHz	-

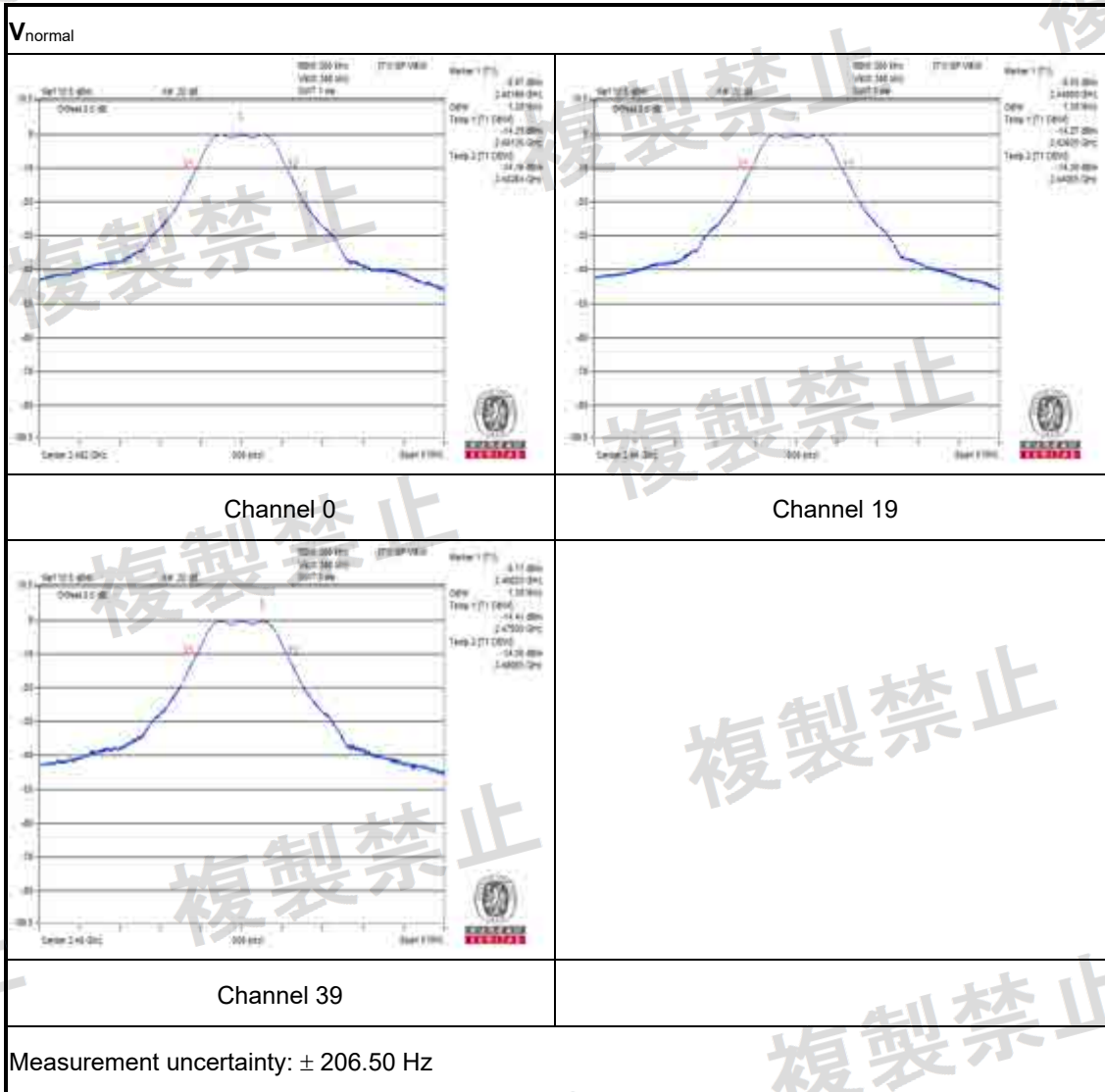
4.2.2 Test Setup

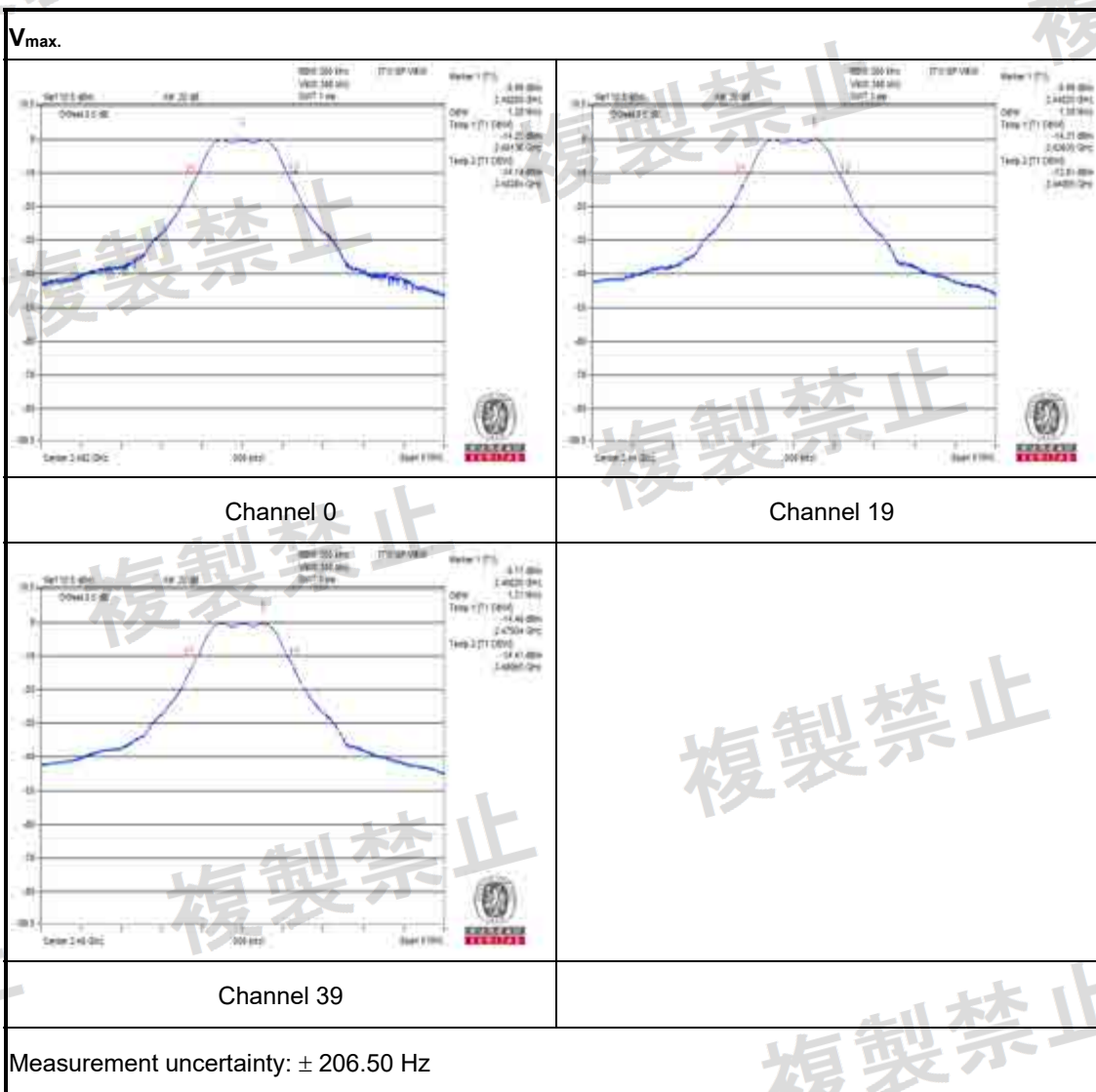


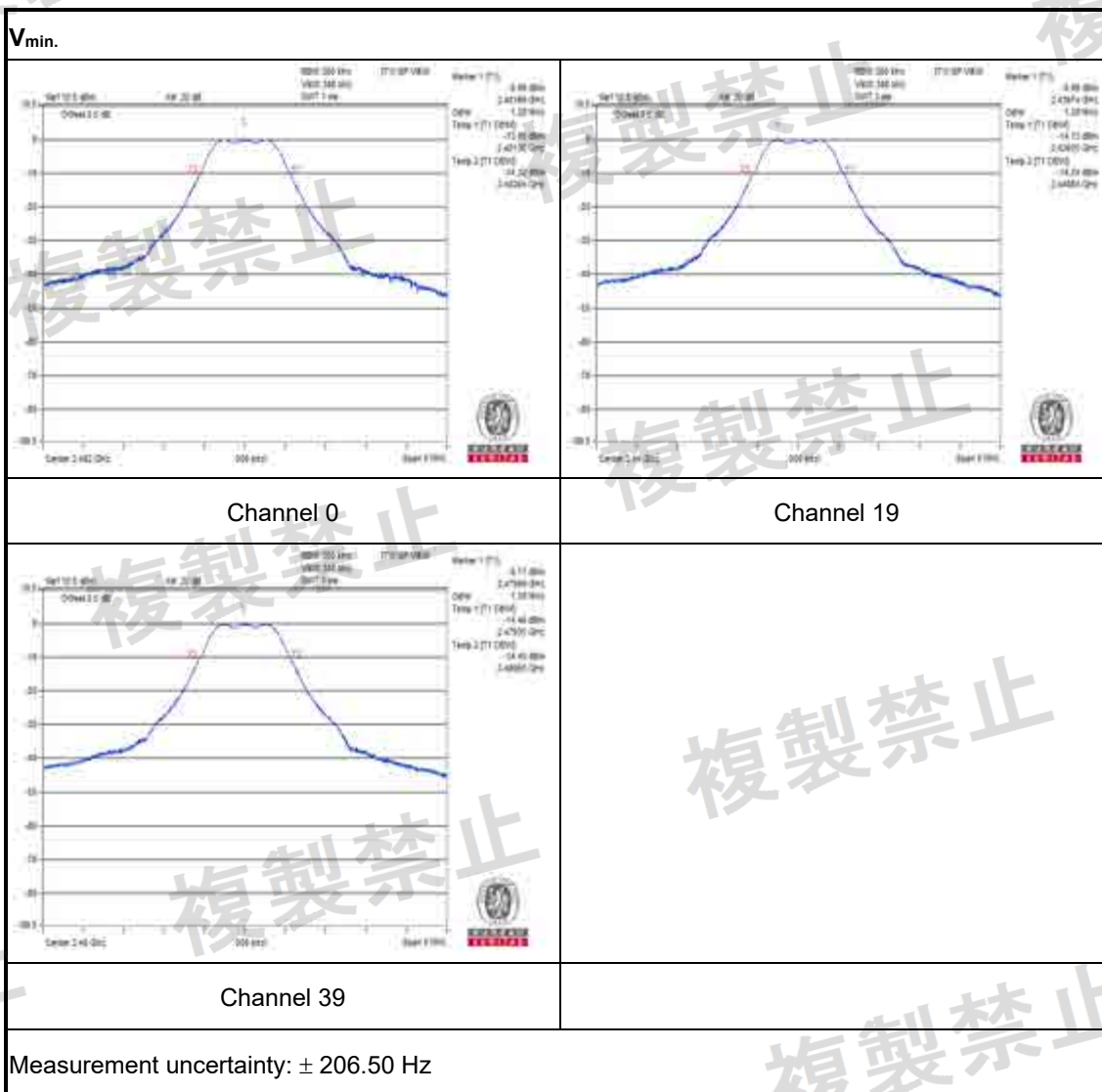
4.2.3 Test Results

Environmental Conditions		25deg.C, 76% RH		
Channel	Frequency (MHz)	V _{normal}	V _{max.}	V _{min.}
		Occupied Bandwidth (MHz)	Occupied Bandwidth (MHz)	Occupied Bandwidth (MHz)
0	2402	1.29	1.28	1.28
19	2440	1.30	1.30	1.29
39	2480	1.30	1.31	1.30

Note: For the test plots please refer to the below pages.







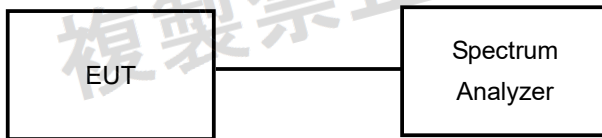


4.3 Spurious Emissions for Transmitter Measurement

4.3.1 Limits of Spurious Emissions

Frequencies (MHz)	Limit
Operating frequency 2400 to 2483.5MHz	
30.0MHz to 1000.0MHz	$\leq 0.25 \text{ uW/100kHz}$
1000.0MHz to 2387MHz	$\leq 2.5 \text{ uW/MHz}$
2387.0MHz to 2400.0MHz	$\leq 25 \text{ uW/MHz}$
2483.5MHz to 2496.5MHz	$\leq 25 \text{ uW/MHz}$
2496.5MHz to 12500.0MHz	$\leq 2.5 \text{ uW/MHz}$

4.3.2 Test Setup





4.3.3 Test Results

Environmental Conditions		25deg.C, 76% RH					
Test Channel		CH 0 (2402MHz)		CH 19 (2440MHz)		Limit	Result
Test Condition	Frequency Range	Frequency (MHz)	Measured Value	Frequency (MHz)	Measured Value		
V _{normal}	30.0MHz to 1000.0MHz	229.820	0.000229uW	191.990	0.000432uW	0.25uW	PASS
	1000.0MHz to 2387MHz	2273.950	0.003565uW	2248.300	0.003784uW	2.5uW	PASS
	2387.0MHz to 2400.0MHz	2399.970	1.099006uW	2389.340	0.00207uW	25uW	PASS
	2483.5MHz to 2496.5MHz	2491.810	0.003758uW	2489.270	0.002323uW	25uW	PASS
	2496.5MHz to 12500.0MHz	4802.300	0.008511uW	4877.330	0.009817uW	2.5uW	PASS
V _{max.}	30.0MHz to 1000.0MHz	191.990	0.000327uW	191.990	0.000321uW	0.25uW	PASS
	1000.0MHz to 2387MHz	2210.150	0.003681uW	2248.990	0.004797uW	2.5uW	PASS
	2387.0MHz to 2400.0MHz	2400.000	1.137627uW	2393.930	0.002153uW	25uW	PASS
	2483.5MHz to 2496.5MHz	2491.490	0.003548uW	2496.180	0.0025uW	25uW	PASS
	2496.5MHz to 12500.0MHz	4802.300	0.009661uW	4877.330	0.010257uW	2.5uW	PASS
V _{min.}	30.0MHz to 1000.0MHz	191.990	0.00031uW	812.300	0.000236uW	0.25uW	PASS
	1000.0MHz to 2387MHz	2210.850	0.003776uW	2248.990	0.003715uW	2.5uW	PASS
	2387.0MHz to 2400.0MHz	2400.000	1.172195uW	2389.990	0.001995uW	25uW	PASS
	2483.5MHz to 2496.5MHz	2491.850	0.003311uW	2486.350	0.002564uW	25uW	PASS
	2496.5MHz to 12500.0MHz	4802.300	0.007998uW	4877.330	0.009397uW	2.5uW	PASS

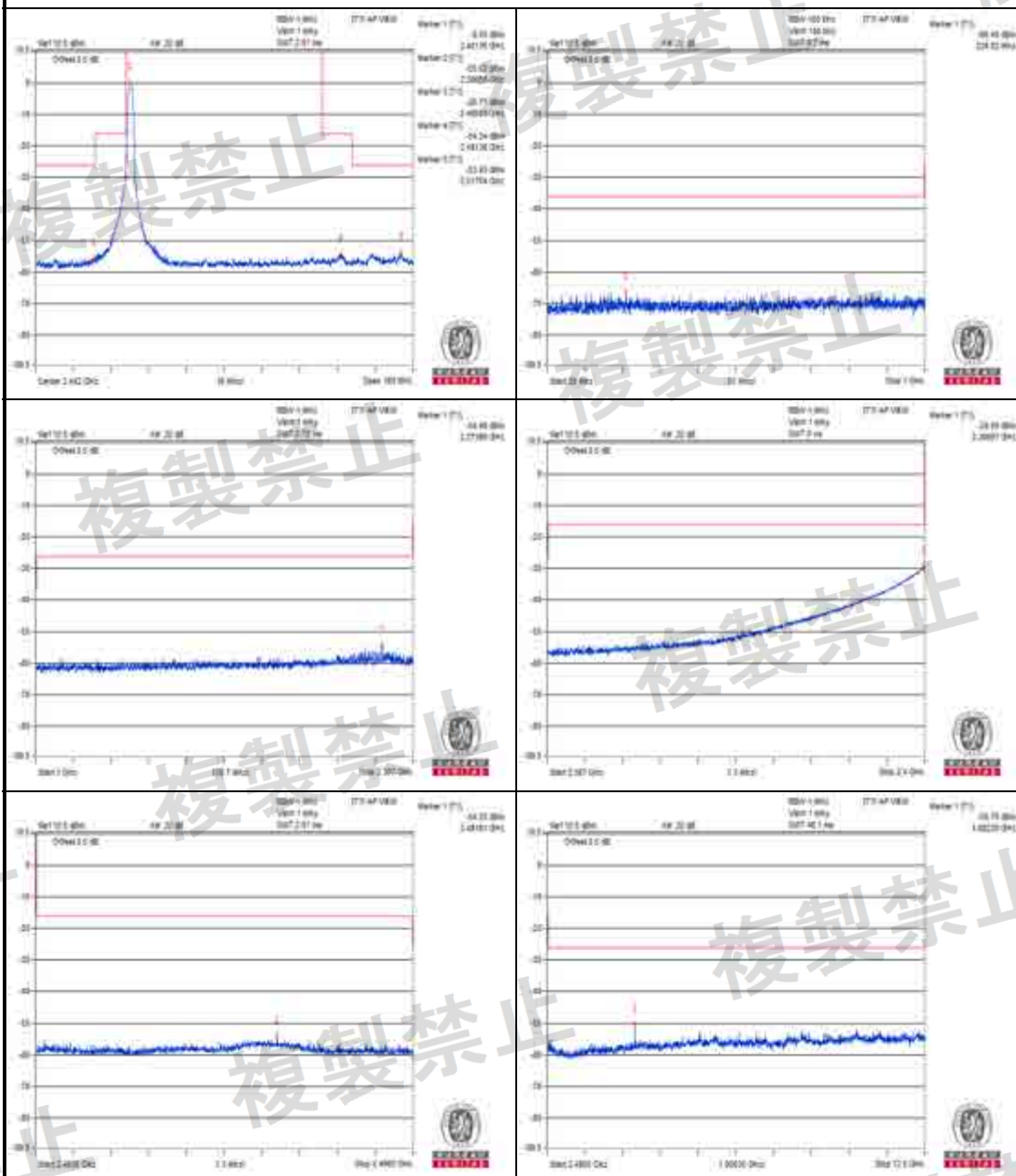


Environmental Conditions		25deg.C, 76% RH			
Test Channel		CH 39 (2480MHz)		Limit	Result
Test Condition	Frequency Range	Frequency (MHz)	Measured Value		
V _{normal}	30.0MHz to 1000.0MHz	88.680	0.000297uW	0.25uW	PASS
	1000.0MHz to 2387MHz	2352.320	0.004842uW	2.5uW	PASS
	2387.0MHz to 2400.0MHz	2391.300	0.003048uW	25uW	PASS
	2483.5MHz to 2496.5MHz	2483.530	0.101391uW	25uW	PASS
	2496.5MHz to 12500.0MHz	4957.360	0.009078uW	2.5uW	PASS
V _{max.}	30.0MHz to 1000.0MHz	191.990	0.000292uW	0.25uW	PASS
	1000.0MHz to 2387MHz	2353.010	0.005093uW	2.5uW	PASS
	2387.0MHz to 2400.0MHz	2390.720	0.003148uW	25uW	PASS
	2483.5MHz to 2496.5MHz	2483.510	0.104472uW	25uW	PASS
	2496.5MHz to 12500.0MHz	4957.360	0.007396uW	2.5uW	PASS
V _{min.}	30.0MHz to 1000.0MHz	914.640	0.000334uW	0.25uW	PASS
	1000.0MHz to 2387MHz	2353.010	0.004977uW	2.5uW	PASS
	2387.0MHz to 2400.0MHz	2390.690	0.003228uW	25uW	PASS
	2483.5MHz to 2496.5MHz	2483.500	0.102565uW	25uW	PASS
	2496.5MHz to 12500.0MHz	4957.360	0.009772uW	2.5uW	PASS

NOTE: The worst value in each frequency range v.s. each channel has been marked by boldface.



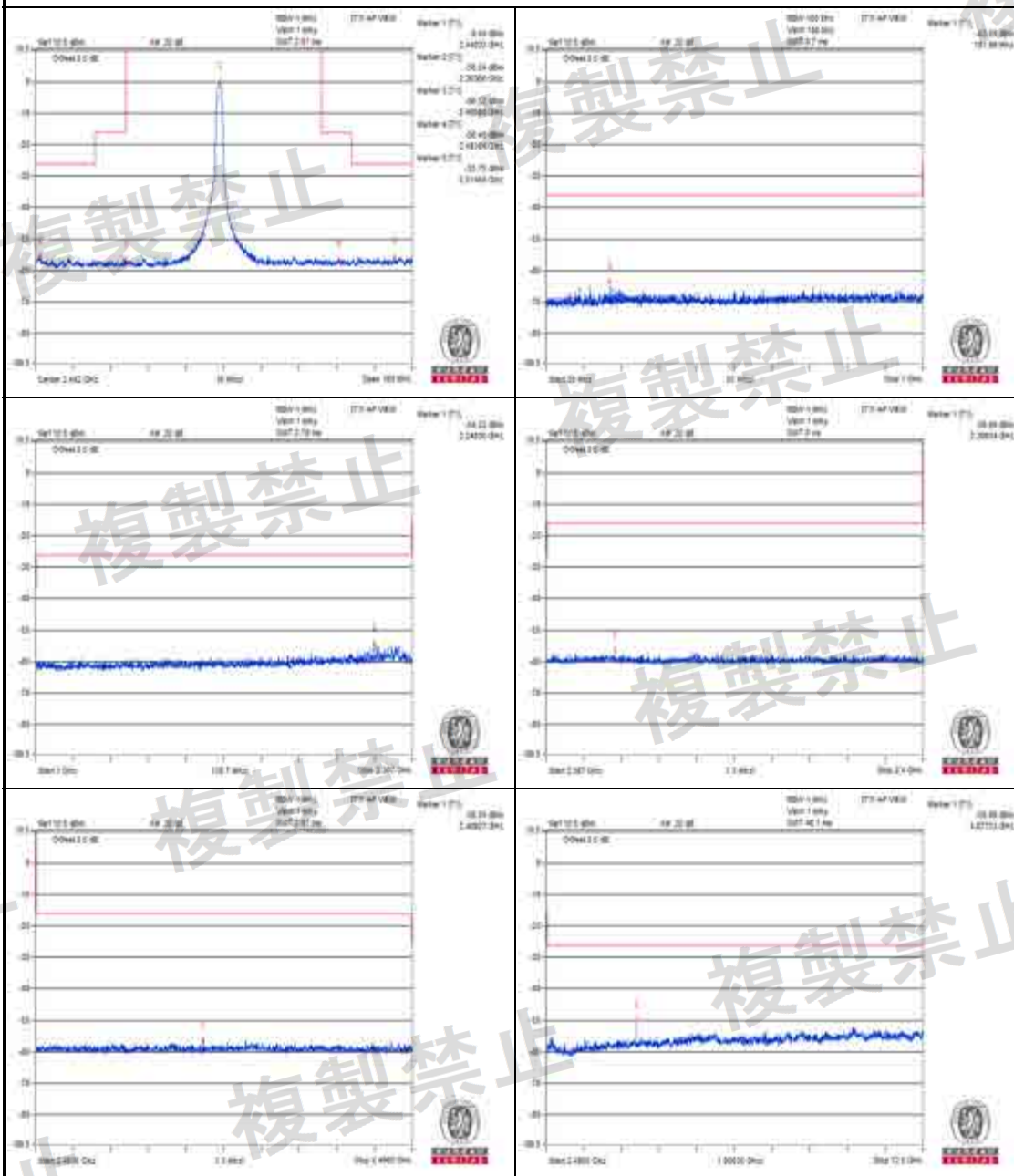
V_{normal}
Channel 0



Measurement uncertainty: $\pm 3.93\text{dB}$



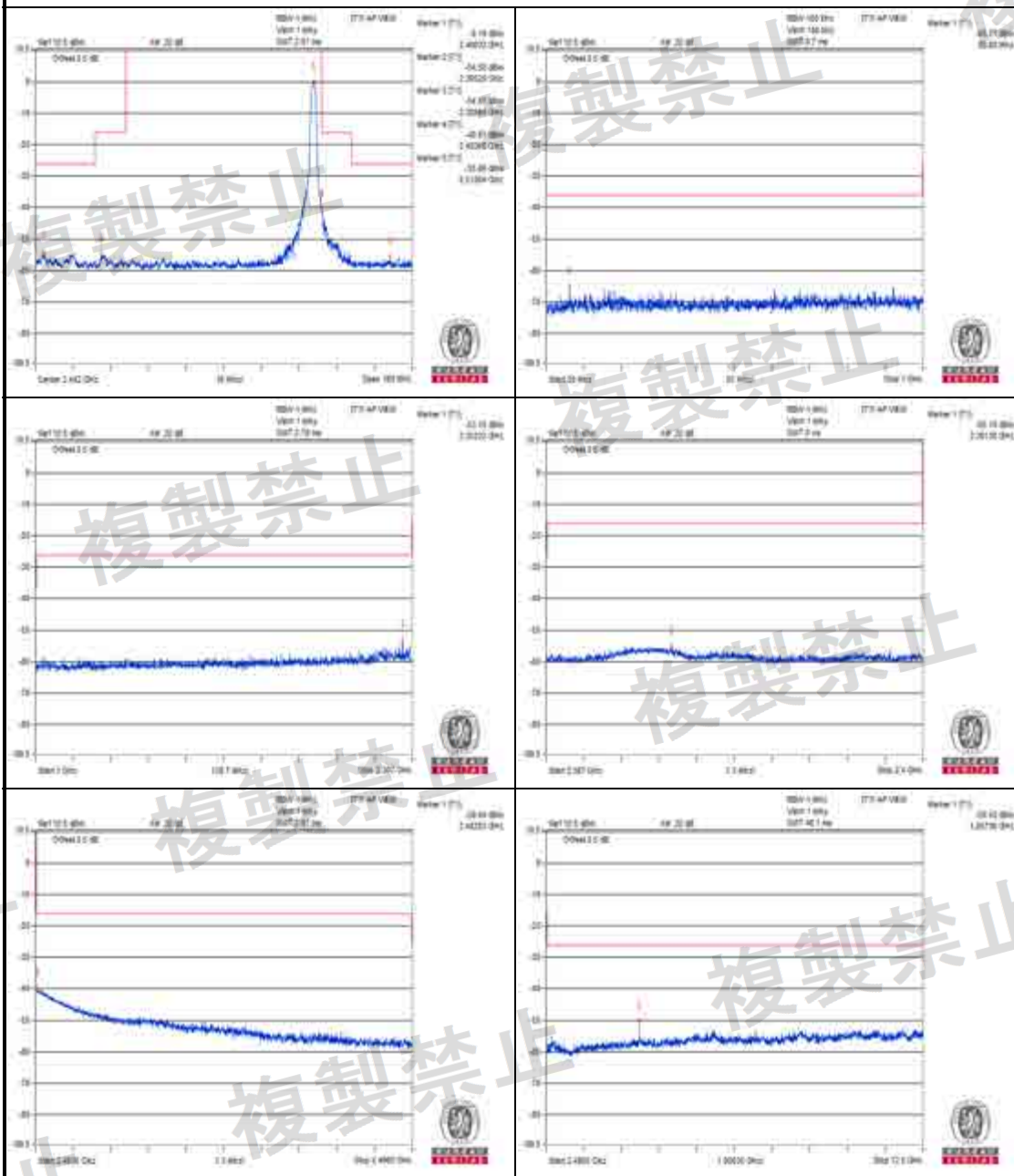
V_{normal} Channel 19



Measurement uncertainty: $\pm 3.93\text{dB}$



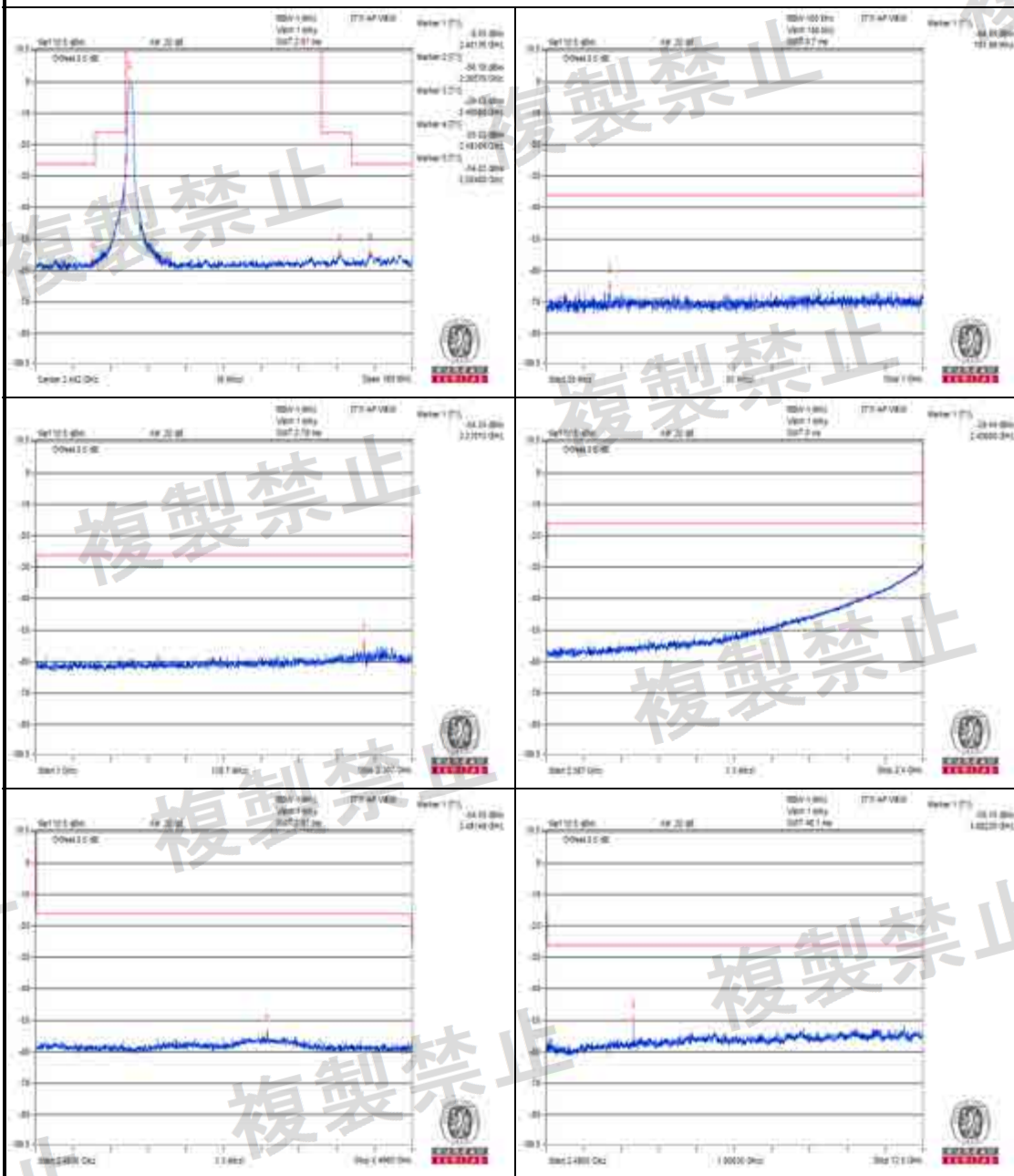
V_{normal} Channel 39



Measurement uncertainty: $\pm 3.93\text{dB}$



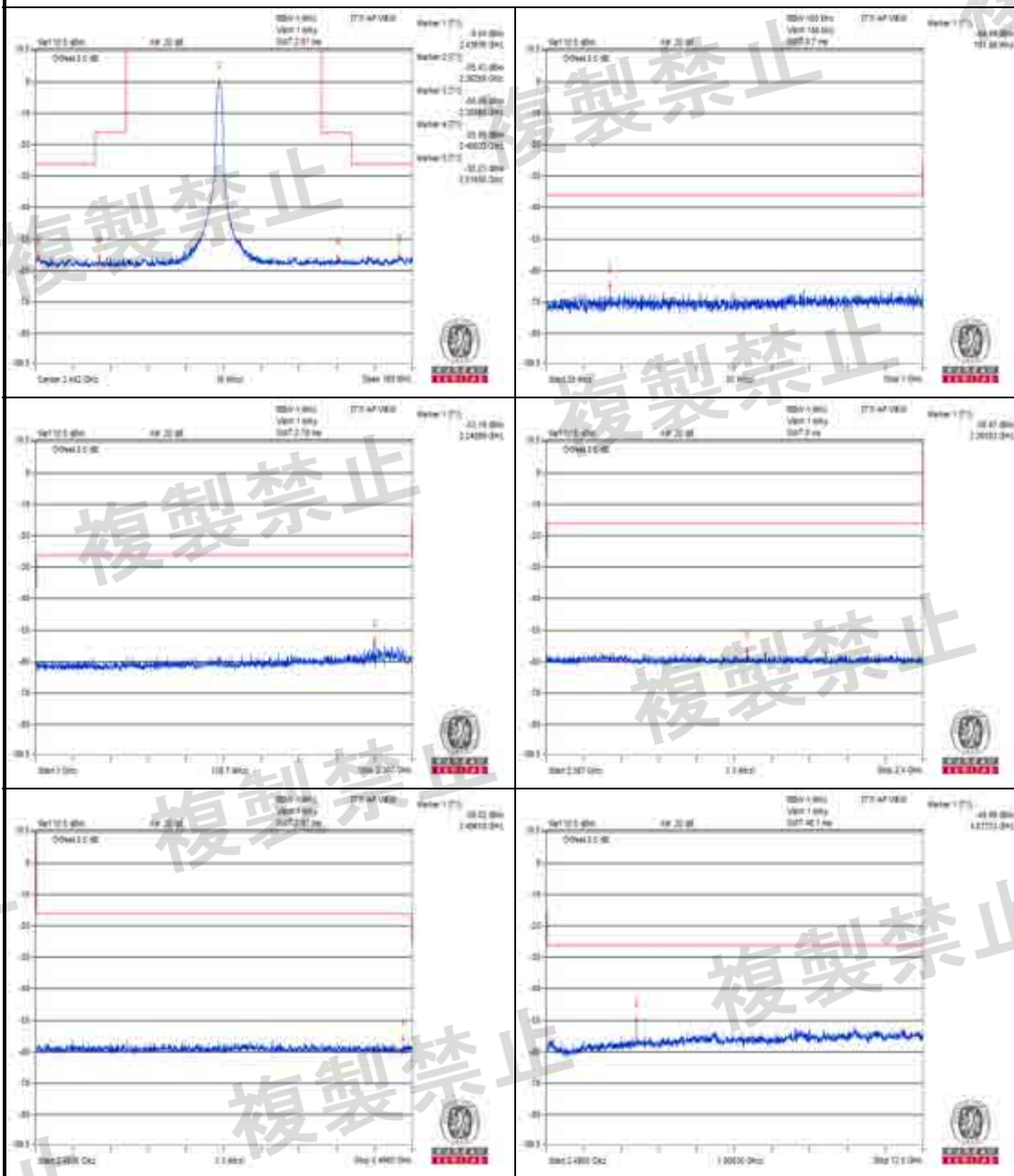
Vmax.
Channel 0



Measurement uncertainty: $\pm 3.93\text{dB}$



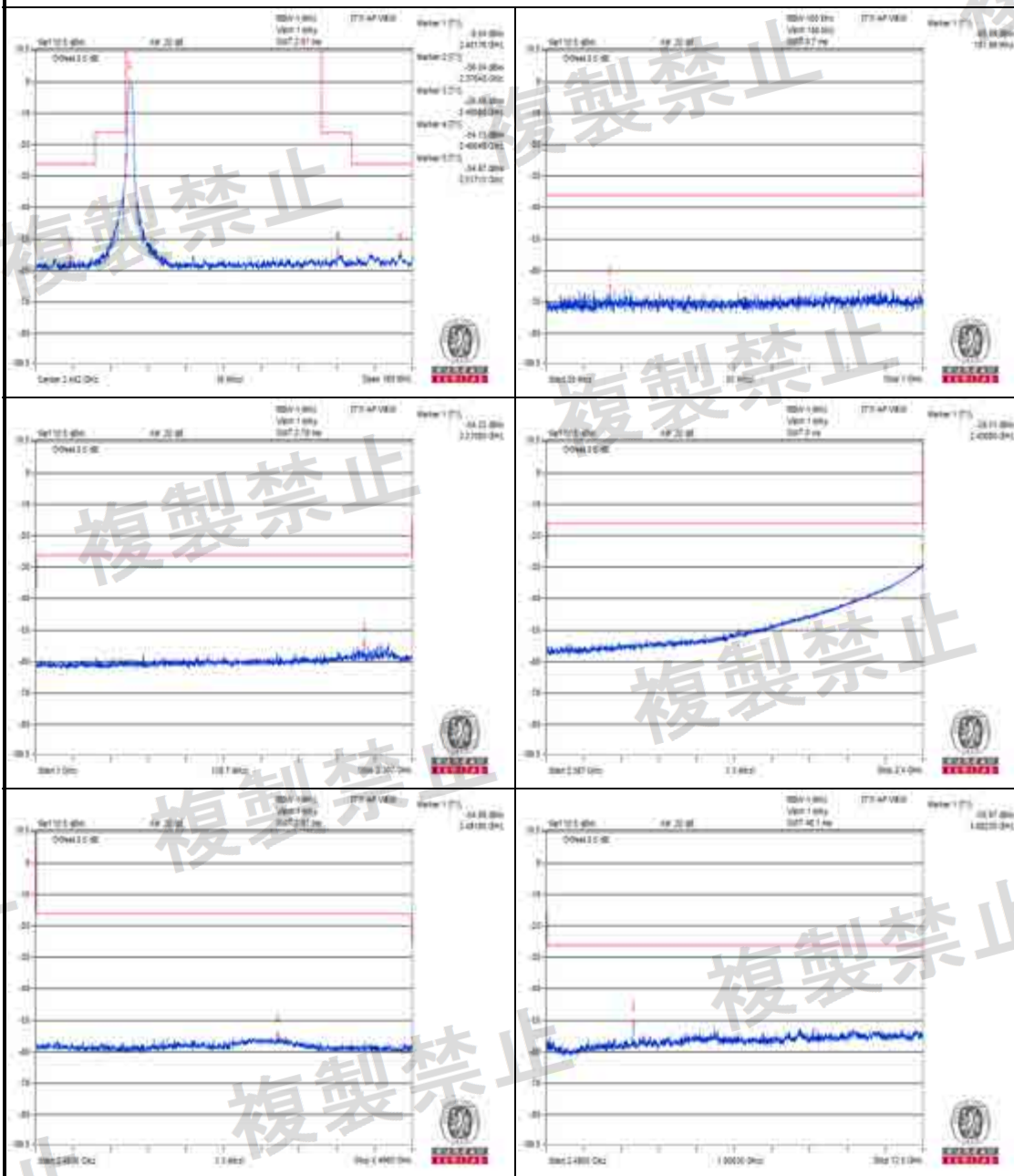
V_{max}.
Channel 19



Measurement uncertainty: $\pm 3.93\text{dB}$



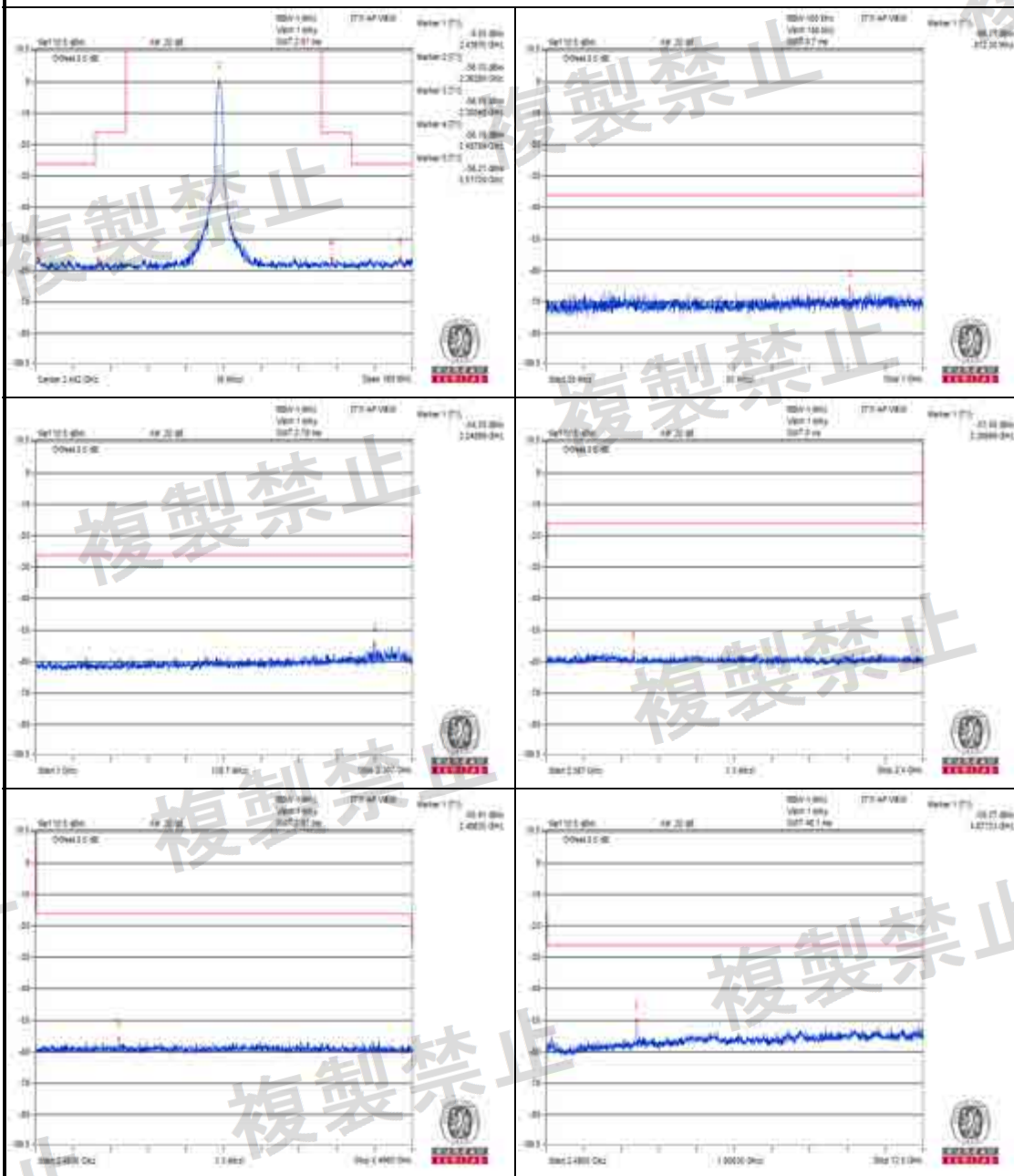
V_{min}.
Channel 0



Measurement uncertainty: $\pm 3.93\text{dB}$



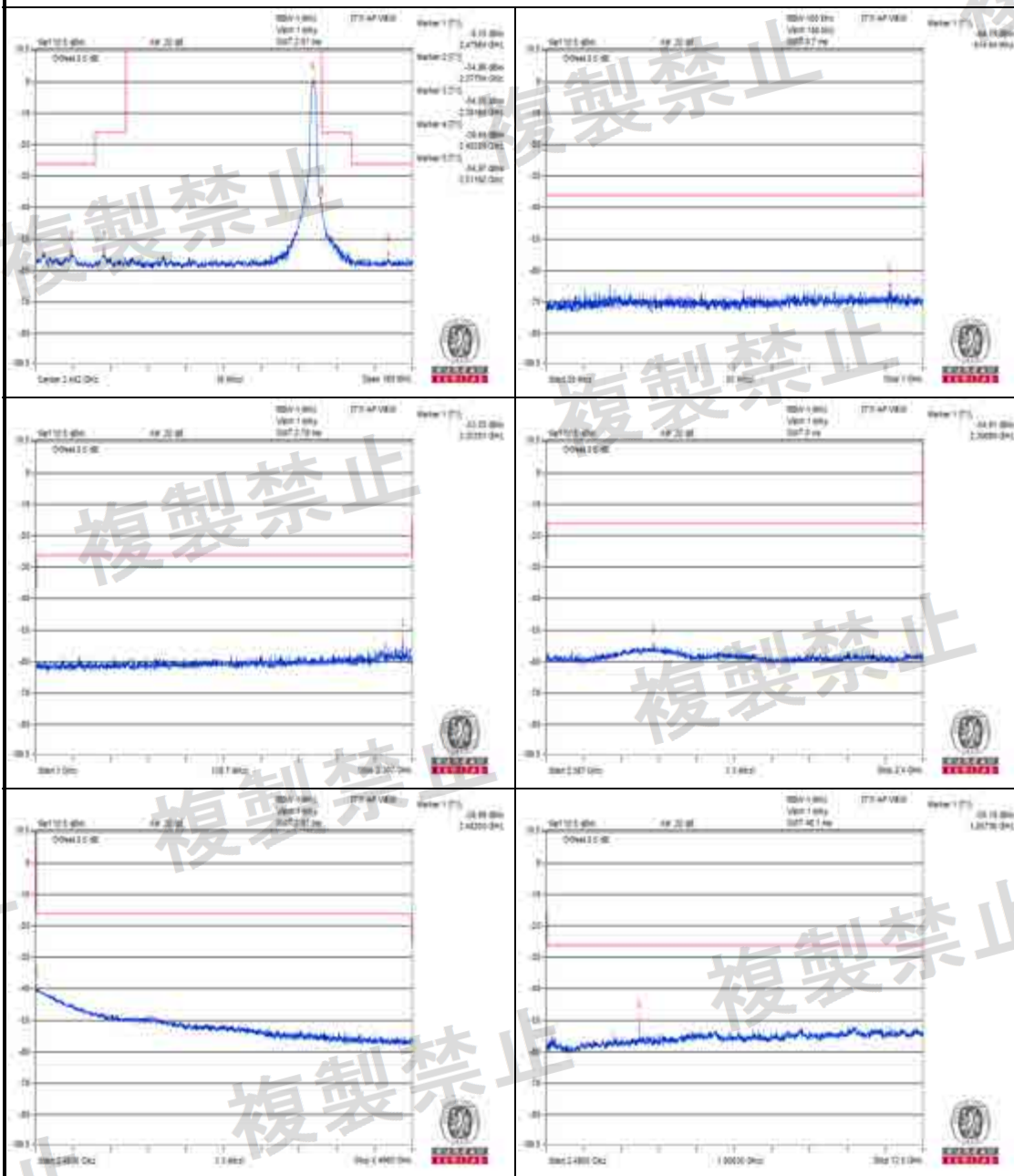
V_{min}.
Channel 19



Measurement uncertainty: $\pm 3.93\text{dB}$



V_{min}.
Channel 39



Measurement uncertainty: $\pm 3.93\text{dB}$



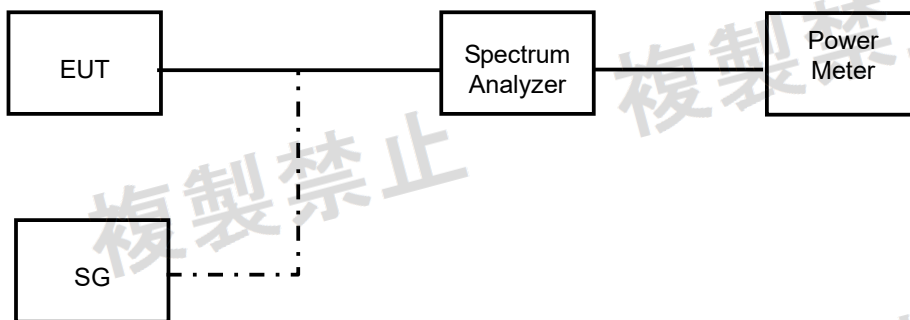
4.4 Antenna Power Measurement

4.4.1 Limits of Antenna Power

Antenna power shall be 10 mW or less.

Tolerance of antenna power shall be +20% (upper value) and -80% (lower value).

4.4.2 Test Setup





4.4.3 Test Results

Environmental Conditions	25deg.C, 76% RH			
Test Condition	Conducted RF Output Power Density (mW)			
	CH 0 (2402MHz)	CH 19 (2440MHz)	CH 39 (2480MHz)	Max. Limit (mW)
V _{normal}	1.07399	1.06414	1.04472	10
V _{max.}	1.07895	1.07152	1.04954	10
V _{min.}	1.06660	1.05682	1.03992	10
Rated Power	1.0			
Tolerance of Antenna Power	0.2 ~ 1.2			

Printed antenna with antenna gain: 0.4dBi

Environmental Conditions	25deg.C, 76% RH			
Test Condition	Radiated RF Output Power Density (mW)			
	CH 0 (2402MHz)	CH 19 (2440MHz)	CH 39 (2480MHz)	Max. Limit (mW)
V _{normal}	1.17761	1.16681	1.14551	16.368
V _{max.}	1.18304	1.17490	1.15080	16.368
V _{min.}	1.16950	1.15878	1.14025	16.368

Note: 1. The radiated RF output power density is a "calculated" value derived from the conducted value.

2. Formula: Radiated RF output power density = Conducted RF output power density + Antenna Gain.



4.5 Spurious Emissions for Receiver

4.5.1 Limits of Spurious Emissions For Receiver

Frequencies (MHz)	Limit
Below 1GHz	$\leq 4\text{nW}$ (-54dBm)
Above 1GHz	$\leq 20\text{nW}$ (-47dBm)

4.5.2 Test Setup





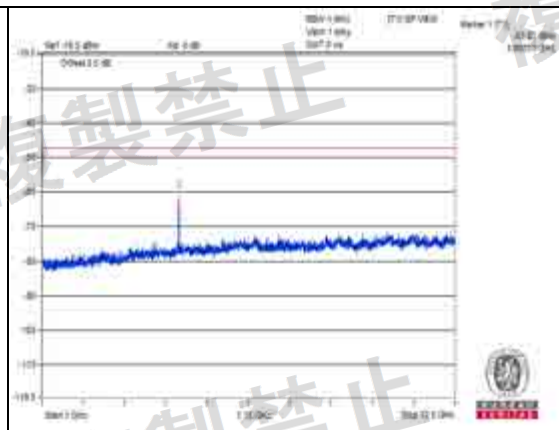
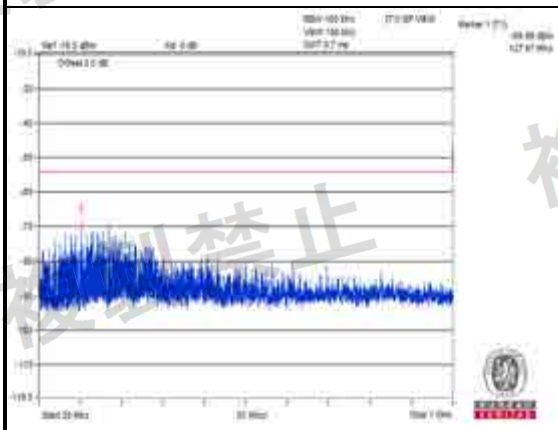
4.5.3 Test Result

Environmental Conditions		25deg.C, 76% RH					
Test Channel		CH 0 (2402MHz)		CH 19 (2440MHz)		Limit	Result
Test Condition	Frequency Range	Frequency (MHz)	Measured Value	Frequency (MHz)	Measured Value		
V _{normal}	Below 1GHz	127.970	0.102329nW	127.970	0.099541nW	4nW	PASS
	Above 1GHz	4800.750	0.547016nW	4878.370	0.674528nW	20nW	PASS
V _{max.}	Below 1GHz	127.970	0.096161nW	127.970	0.100693nW	4nW	PASS
	Above 1GHz	4800.750	0.548277nW	4878.370	0.620869nW	20nW	PASS
V _{min.}	Below 1GHz	127.970	0.102802nW	127.970	0.1nW	4nW	PASS
	Above 1GHz	4800.750	0.53827nW	4878.370	0.60256nW	20nW	PASS
Test Channel		CH 39 (2480MHz)				Limit	Result
Test Condition	Frequency Range	Frequency (MHz) Measured Value		Measured Value			
V _{normal}	Below 1GHz	127.970		0.09594nW		4nW	PASS
	Above 1GHz	4958.870		0.374111nW		20nW	PASS
V _{max.}	Below 1GHz	127.970		0.092897nW		4nW	PASS
	Above 1GHz	4958.870		0.389045nW		20nW	PASS
V _{min.}	Below 1GHz	191.990		0.097949nW		4nW	PASS
	Above 1GHz	4958.870		0.37325nW		20nW	PASS

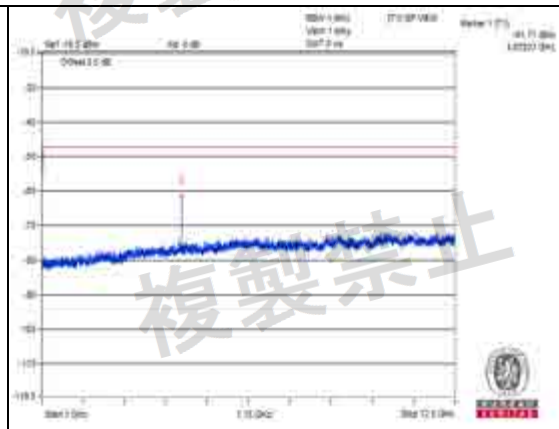
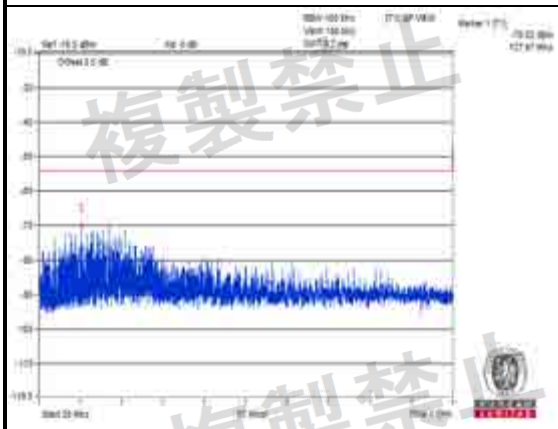
Note: 1. The worst value in each frequency range v.s. each channel has been marked by boldface.
2. The spectrum plots are attached on the following pages.



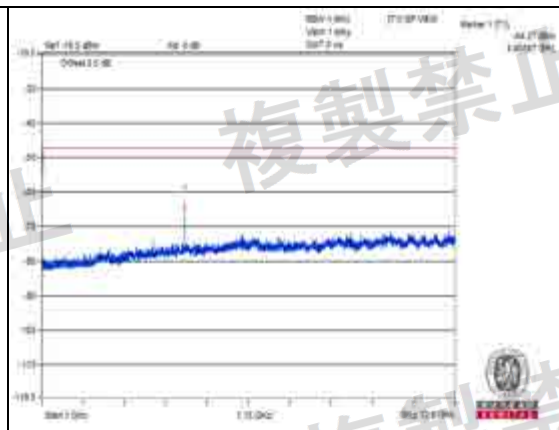
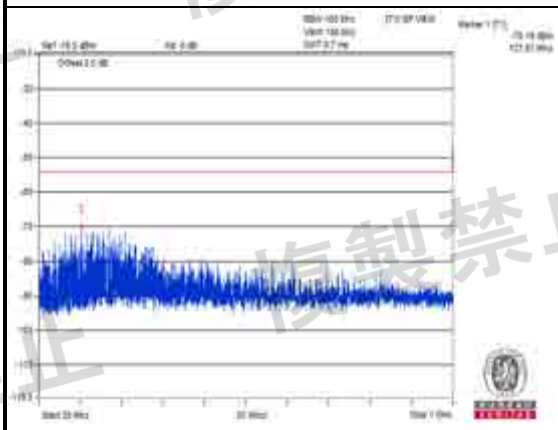
V_{normal}



Channel 0



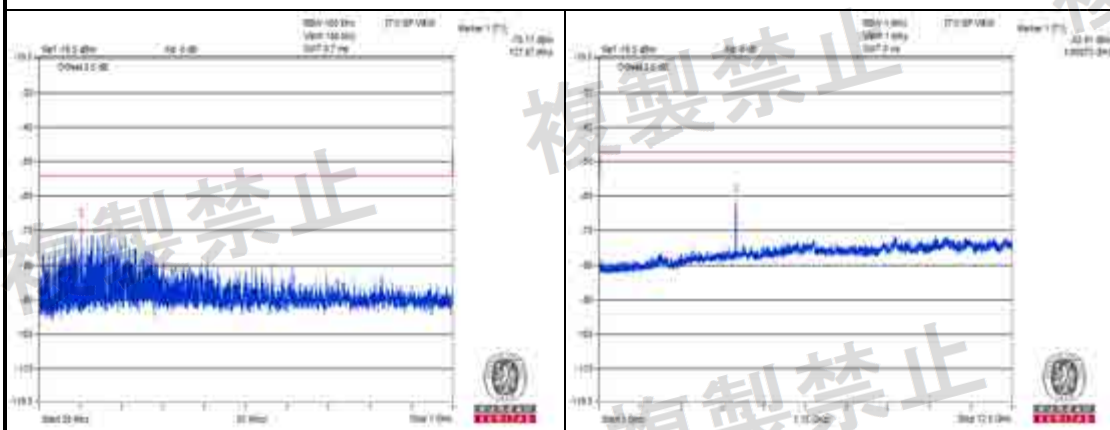
Channel 19



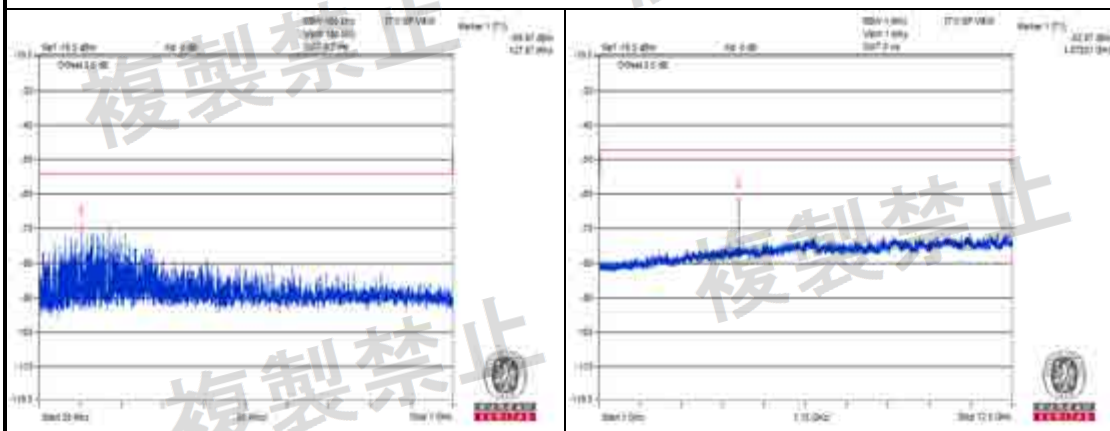
Channel 39

Measurement uncertainty: $\pm 3.93\text{dB}$

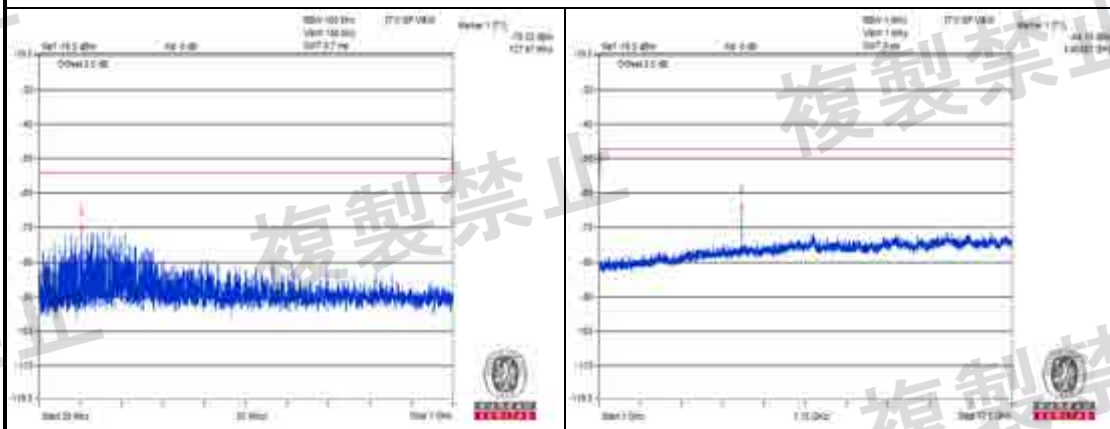
V_{max}.



Channel 0



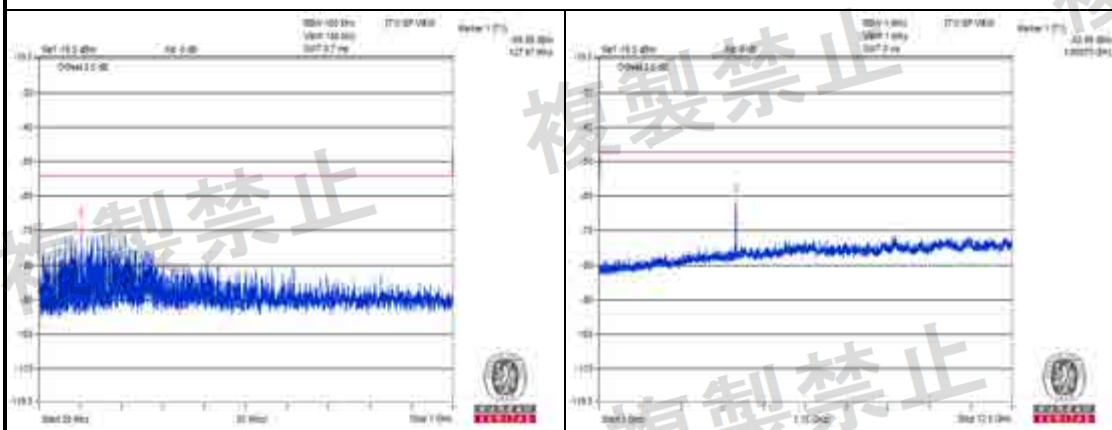
Channel 19



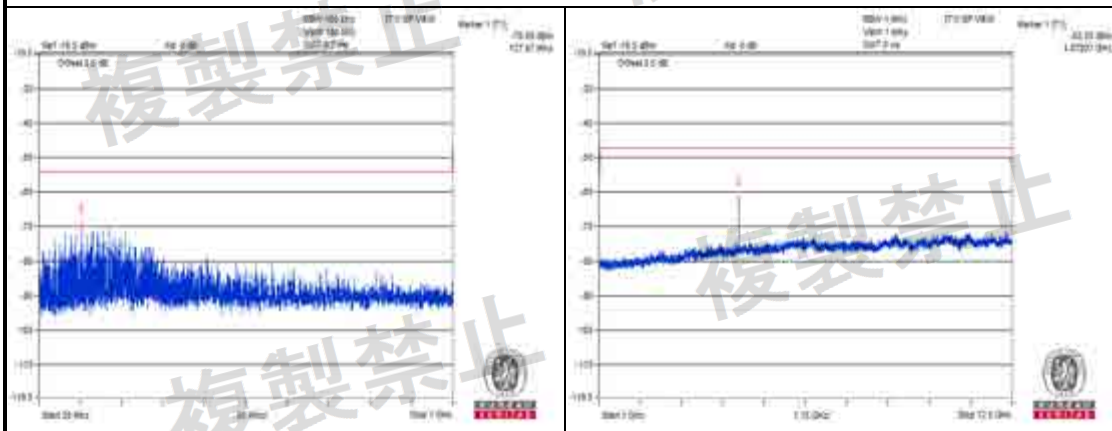
Channel 39

Measurement uncertainty: $\pm 3.93\text{dB}$

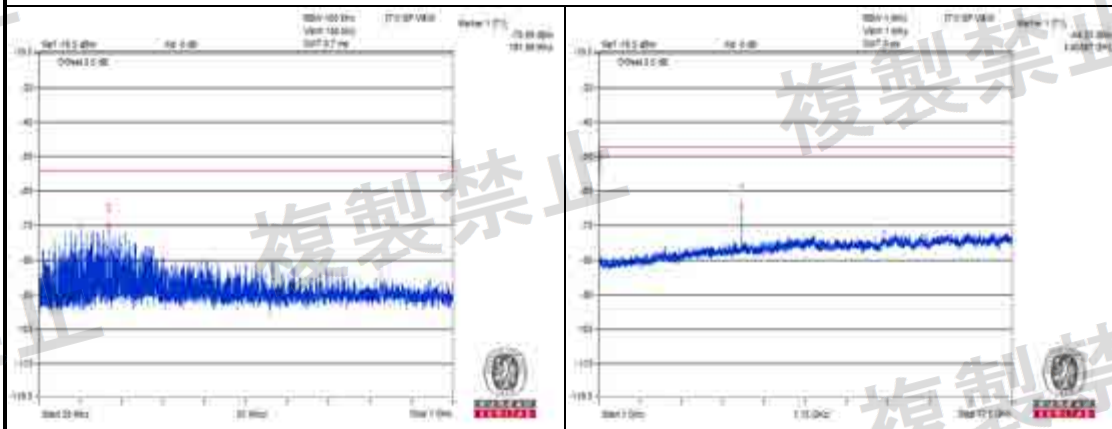
V_{min}.



Channel 0



Channel 19



Channel 39

Measurement uncertainty: $\pm 3.93\text{dB}$

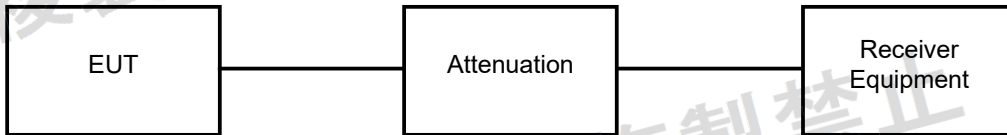


4.6 Interference Prevention Function

4.6.1 Limits of Interference Prevention Function

NA

4.6.2 Test Setup



4.6.3 Test Results

Environmental Conditions	25deg.C, 76% RH
Link Mode	Test Result
Bluetooth	PASS



5 Photographs of the Test Configuration





Appendix - Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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The address and road map of all our labs can be found in our web site also.

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