Variant Radio Test Report

Report No.:	RJ150814C14A
Test Model:	LEM-MS1, LEMS-MS5
Received Date:	Aug. 14, 2015
Test Date:	Nov. 16, 2015
Issued Date:	Aug. 21, 2019
Applicant:	LEOMO, Inc
Address:	TOC Bldg. 7F, 7-22-17 Nishi Gotanda, Shinagawa-ku, Tokyo, 141-0031, Japan
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C.)
Test Location:	No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)

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Release Control Record

Issue No.	Description	Date Issued
RJ150814C14A	Original Release	Aug. 21, 2019

1 Certificate of Conformity

Product: Lemonade Coaching Sensor

Brand: LEOMO, Inc

Test Model: LEM-MS1, LEMS-MS5

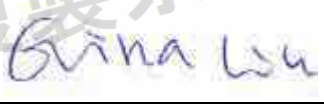
Sample Status: Identical Prototype

Applicant: LEOMO, Inc

Test Date: Nov. 16, 2015

Standards: ARIB STD-T66 (V3.7), MIC notice 88 Appendix 43
Certification Ordinance Article 2-1-19

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 :  , **Date:** Aug. 21, 2019

Gina Liu / Specialist

Approved by :  , **Date:** Aug. 21, 2019

Dylan Chiou / Project Engineer

2 Summary of Test Results

The EUT has been tested according to the following specifications:

Bluetooth EDR

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)	4.4	Spurious Emissions	C
Transmitting Equipment				
F	3.2 (2)	4.5	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)	4.6	Spurious Emissions of Receiver	C
--	--	3.5	Refer to All Articles for Transmitting Antenna	C
Operating Frequency 2400 to 2483.5 MHz				
--	3.7 (1)a	3.4	Radio Frequency / Modulation Section cannot be opened easily	C
--	3.1 (1)	3.1	Communication Method	C
--	3.2 (1)	3.1	Modulation Method	C
--	3.2 (1)	3.1	Spread Spectrum Method	C
--	3.2 (2)	4.5	Antenna Power	C
--	3.6 (2)	4.5	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)	4.3	Spreading Bandwidth	C
--	3.2 (9)	4.3	Spreading Factor	C
--	3.2 (11)	--	Frequency Retention Time (FH Employed)	NA
--	3.4.1(1)	4.8	Interference Prevention Function	C
--	3.4.1(3)	--	Carrier Sense Capability	NA

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

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 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	491.896 Hz
Spurious Emissions	3.508 dB
Output Power Density	2.889 dB
Out of Band Radiated Power	3.93 dB
Frequency Tolerance	6805.18 Hz

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Lemonade Coaching Sensor
Brand	LEOMO, Inc
Test Model	LEM-MS1, LEMS-MS5
Model Difference	Refer to Note
Status of EUT	Identical Prototype
Nominal Voltage	5.0 Vdc (Adapter) 3.7 Vdc (Li-ion battery)
Modulation Type	GFSK, π /4-DQPSK, 8DPSK
Transfer Rate	1/2/3 Mbps
Operating Frequency	2402 ~ 2480 MHz
Number of Channel	79
Rated RF Output Power Density	Refer to Note
Conducted RF Output Power Density	Refer to Note
Radiated RF Output Power Density	Refer to Note
Antenna Type	Refer to Note

Note:

1. This report is issued as a duplicate report to the original BV CPS report no.: RJ150814C14. The difference compared with the original report is adding new model (LEMS-MS5). Due to no effect on any test item, the original test result was kept.
2. All models are listed as below.

Brand	Model	Difference
LEOMO, Inc	LEM-MS1	All models are electrically identical, different model names are for marketing purpose.
	LEMS-MS5	

3. The EUT contains following accessory devices.

Product	Brand	Model	Description
AC Adapter	LEOMO, Inc	LEM-A2021U	I/P: 100-240 Vac, 50-60Hz, 0.7 A O/P: 5 Vdc, 4.8 A
Embedded Battery	LEOMO, Inc	300824P	3.7 Vdc, 30 mAh
L Battery	LEOMO, Inc	LEM-FOXH855	3.7 Vdc, 635 mAh
S Battery	LEOMO, Inc	LEM-FOXS755	3.7 Vdc, 385 mAh
Dock Charger	LEOMO, Inc	LEM-DR2000	3.7 Vdc, 2090 mAh
USB Cable	LEOMO, Inc	LEM-USB1	1 m non-shielded cable w/o core
LCD Panel	LEOMO, Inc	LEM-DL1	3"
Bike Mount	LEOMO, Inc	LEM-BM1	--
Wrist Band	LEOMO, Inc	LEM-WB1	--
Dock	LEOMO, Inc	LEM-DC1	I/P: 5 Vdc , 1.5 A O/P: 5 Vdc, 600 mA 4.2 Vdc, 600 mA
Adjustment Spacer	LEOMO, Inc	LEM-AS1	--
TYPE-R main unit	LEOMO, Inc	LEM-TYPER	--
Sensor Charger	LEOMO, Inc	LEM-SCH1	I/P: 5 Vdc , 1.5 A O/P: 5 Vdc, 210 mA

4. The power table as below:

	Rated Power (mW/MHz)	Total Conducted RF Output Power Density (mW/MHz)	Radiated RF Output Power Density (mW/MHz)
Bluetooth EDR			
Normal mode	0.09000	0.08768	0.09838
AFH mode	0.40000	0.36137	0.40546

5. The antenna used in this EUT is listed as below table:

Item	Type	Gain(dBi)
Frequency		**2400 ~ 2480 MHz**
2.4 GHz	Chip	0.5

6. 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

Bluetooth EDR

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461		

NOTE 1: By means of test software provided by manufacture, the power levels during the tests were set according to the following codes:

NOTE 2: Pre-Scan has been conducted to determine the worst-case mode from packet type; we found the DH5 was the worst case, and chosen for final test. Following test items were selected for the final test as listed below.

Test Items
Spurious emissions
Power density (Antenna power)
Occupied / spreading bandwidth

Modulation type: GFSK		Modulation type: π/4-DQPSK		Modulation type: 8DPSK	
Channel	Power Setting	Channel	Power Setting	Channel	Power Setting
0	Default	0	Default	0	Default
39	Default	39	Default	39	Default
78	Default	78	Default	78	Default

3.3 Test Conditions

Test Conditions	Voltage (Vdc)
V_{normal}	3.7
$V_{max.}$	4.07
$V_{min.}$	3.33

3.4 Assembly

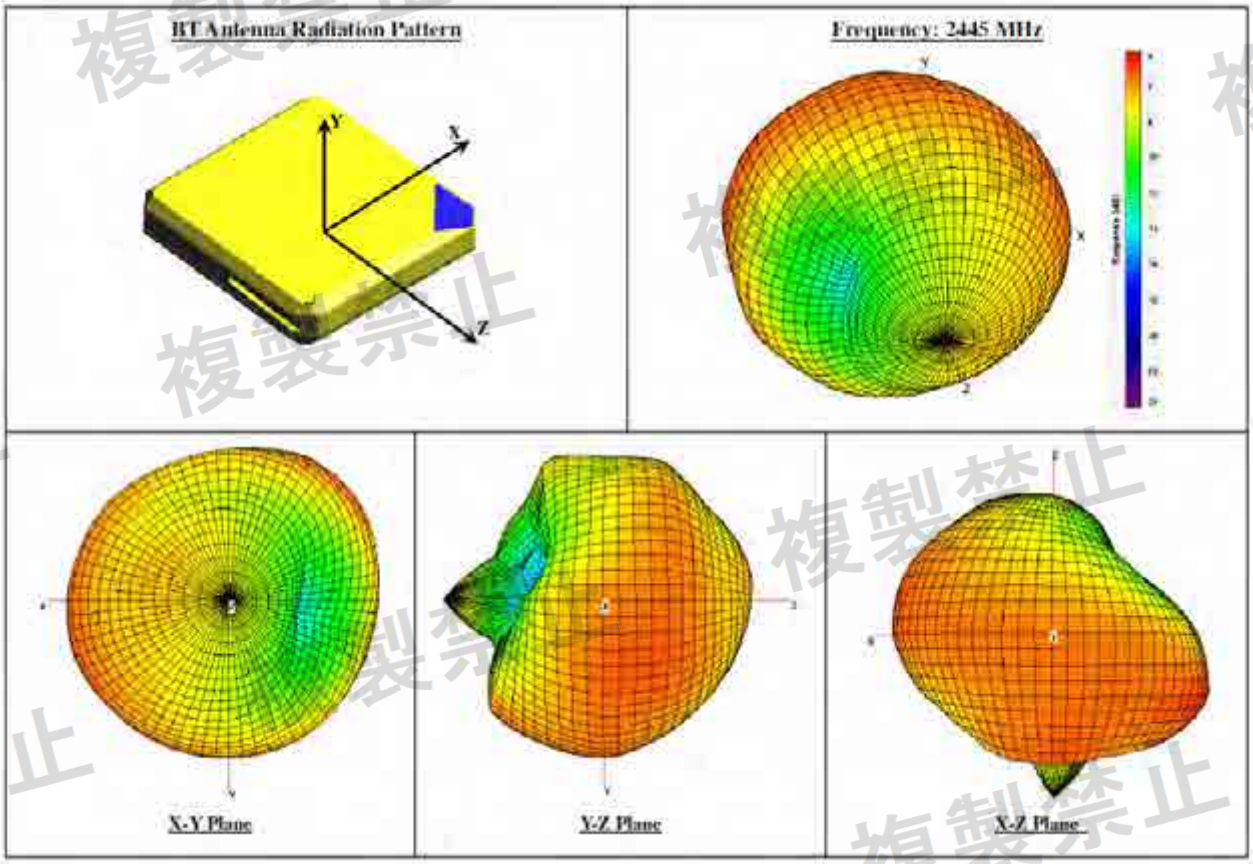
The RF areas for LEM-MS1, LEMS-MS5 are covered by shielding frames.

3.5 Antenna Specifications

3.5.1 Antenna Gain

	Antenna type	Gain (dBi)
Bluetooth	Chip	0.5

3.5.2 Antenna Pattern



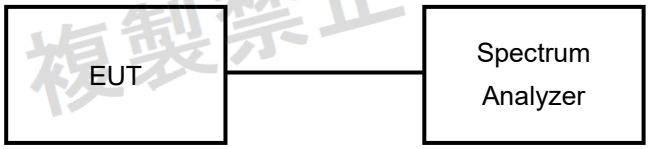
4 Test Results (Bluetooth EDR)

4.1 Frequency Tolerance Measurement

4.1.1 Limits of Frequency Tolerance Measurement

Tolerance of frequency shall be +/- 50 ppm.

4.1.2 Test Setup



4.1.3 Test Results

Modulation: GFSK

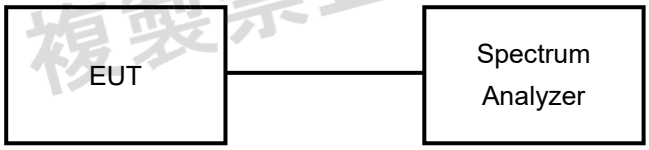
Environmental Conditions		25 deg.C, 60 % RH					
Channel	Frequency (MHz)	Voltage normal		Voltage +10%		Voltage -10%	
		Carrier Frequency (MHz)	Frequency Tolerance (ppm)	Carrier Frequency (MHz)	Frequency Tolerance (ppm)	Carrier Frequency (MHz)	Frequency Tolerance (ppm)
0	2402	2401.970121	-12.439	2401.972108	-11.612	2401.97131	-11.944
39	2441	2440.972211	-11.384	2440.975192	-10.163	2440.974351	-10.508
78	2480	2479.971218	-11.606	2479.971154	-11.631	2479.970897	-11.735

4.2 Occupied Bandwidth Measurement (99 % Power Bandwidth)

4.2.1 Limits of Occupied Bandwidth Measurement

Item	Limit
Occupied Bandwidth	< 83.5 MHz

4.2.2 Test Setup



4.2.3 Test Results

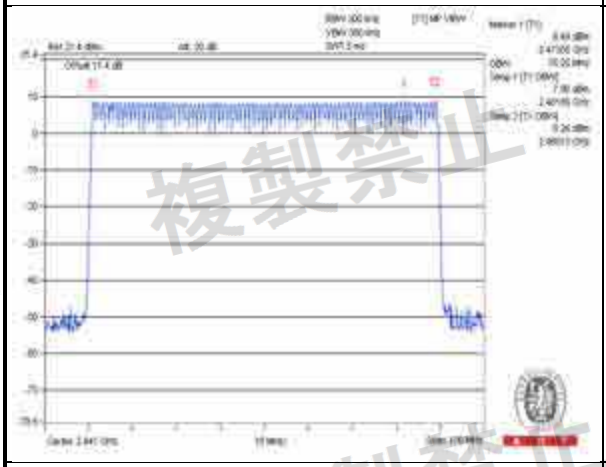
Modulation: GFSK

Normal Mode:

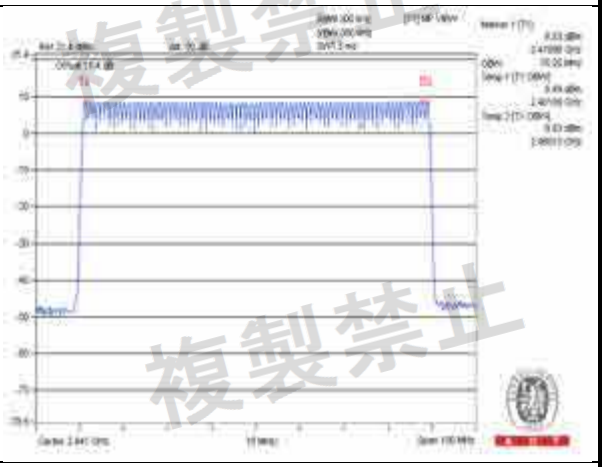
Environmental Conditions	25 deg.C, 60 % RH	
V_{normal}	$V_{+10\%}$	$V_{-10\%}$
Occupied Bandwidth (MHz)	Occupied Bandwidth (MHz)	Occupied Bandwidth (MHz)
78.20	78.20	78.20

Note: 1. For the test plots please refer to the below pages.

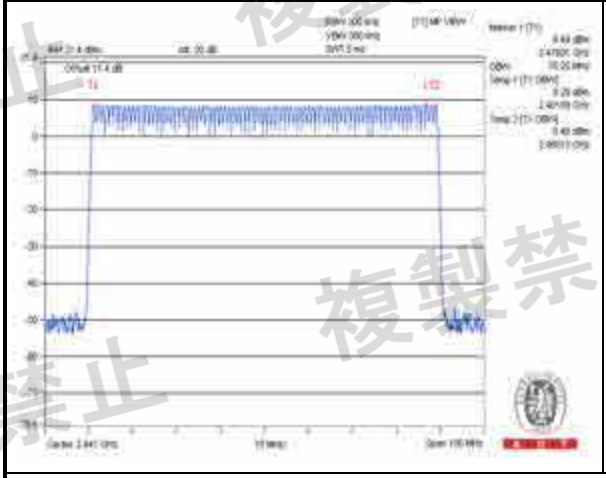
V_{normal}



$V_{+10\%}$



$V_{-10\%}$



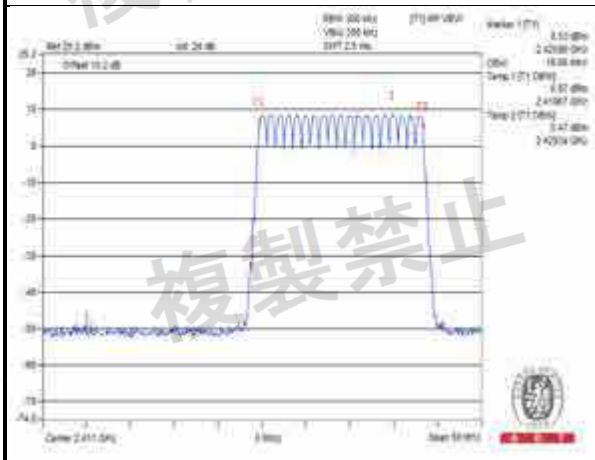
Measurement uncertainty: ± 206.50 Hz

AFH Mode:

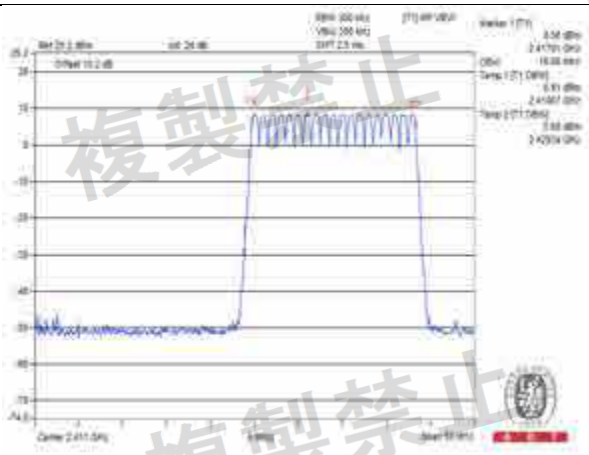
Environmental Conditions	25 deg.C, 60 % RH	
V_{normal}	$V_{+10\%}$	$V_{-10\%}$
Occupied Bandwidth (MHz)	Occupied Bandwidth (MHz)	Occupied Bandwidth (MHz)
18.66	18.66	18.66

Note: 1. For the test plots please refer to the below pages.

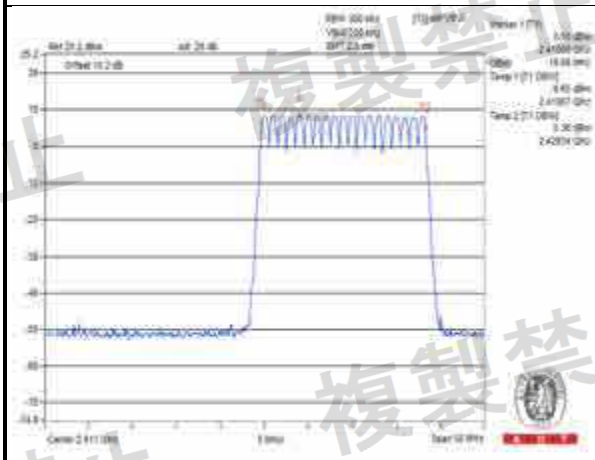
V_{normal}



$V_{+10\%}$



$V_{-10\%}$



Measurement uncertainty: ± 206.50 Hz

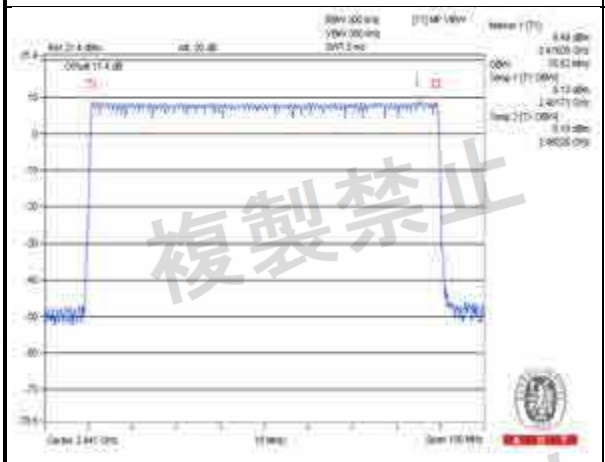
Modulation: π/4-DQPSK

Normal Mode:

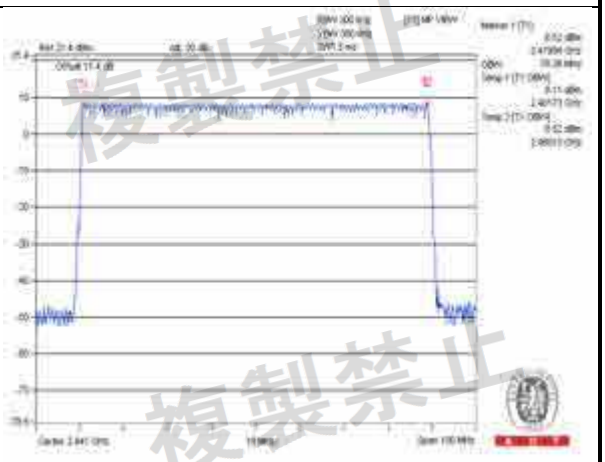
Environmental Conditions	25 deg.C, 60 % RH	
V_{normal}	$V_{+10\%}$	$V_{-10\%}$
Occupied Bandwidth (MHz)	Occupied Bandwidth (MHz)	Occupied Bandwidth (MHz)
78.52	78.36	78.36

Note: 1. For the test plots please refer to the below pages.

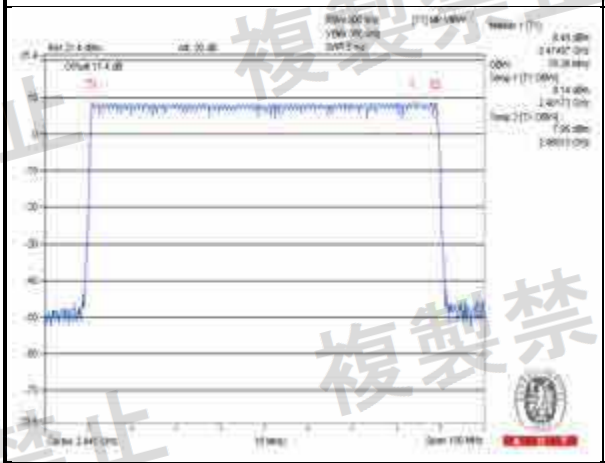
V_{normal}



$V_{+10\%}$



$V_{-10\%}$



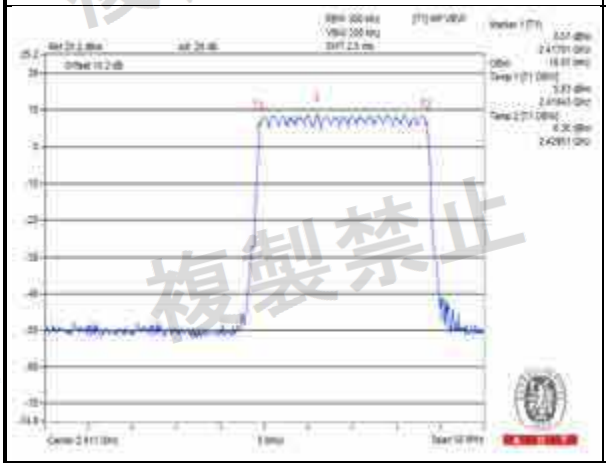
Measurement uncertainty: ± 206.50 Hz

AFH Mode:

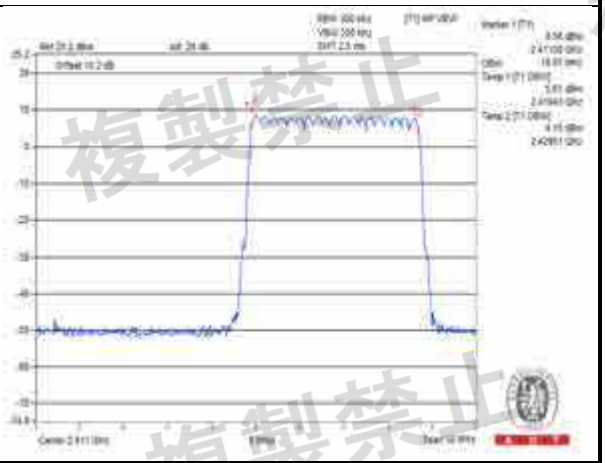
Environmental Conditions	25 deg.C, 60 % RH	
V_{normal}	$V_{+10\%}$	$V_{-10\%}$
Occupied Bandwidth (MHz)	Occupied Bandwidth (MHz)	Occupied Bandwidth (MHz)
19.07	19.07	19.07

Note: 1. For the test plots please refer to the below pages.

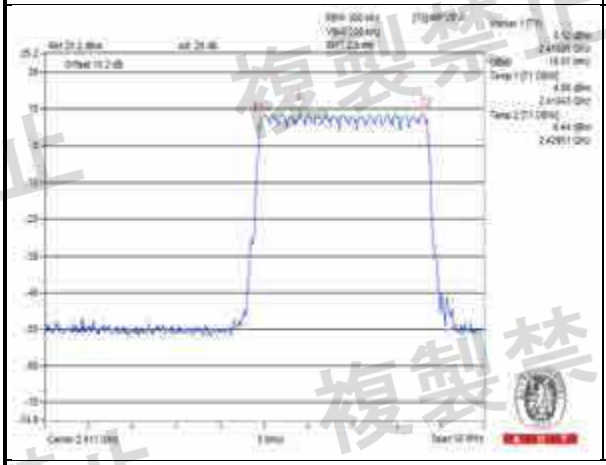
V_{normal}



$V_{+10\%}$



$V_{-10\%}$



Measurement uncertainty: ± 206.50 Hz

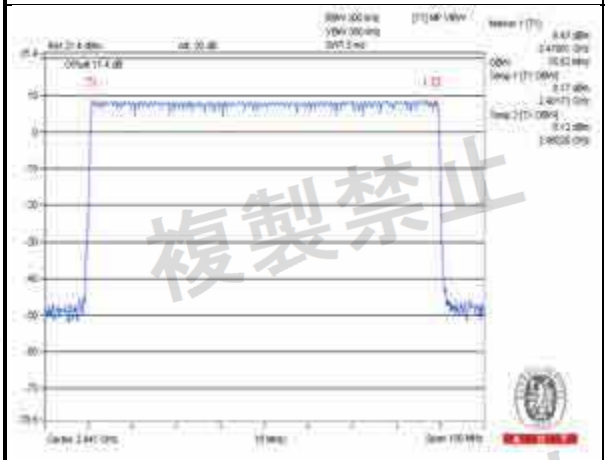
Modulation: 8DPSK

Normal Mode:

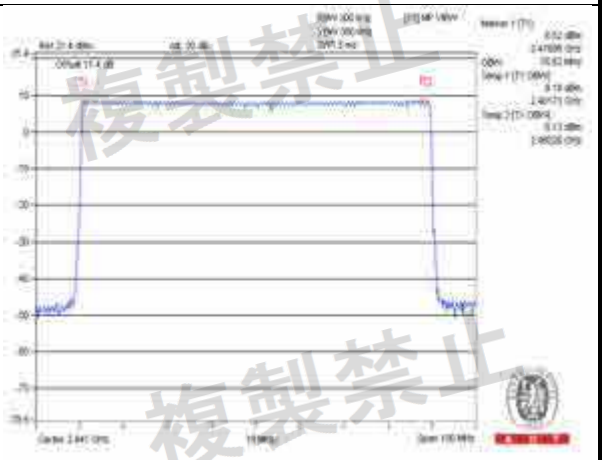
Environmental Conditions	25 deg.C, 60 % RH	
V_{normal}	$V_{+10\%}$	$V_{-10\%}$
Occupied Bandwidth (MHz)	Occupied Bandwidth (MHz)	Occupied Bandwidth (MHz)
78.52	78.52	78.36

Note: 1. For the test plots please refer to the below pages.

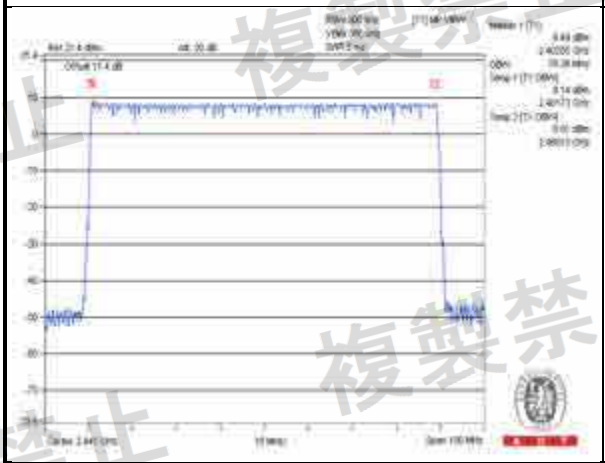
V_{normal}



$V_{+10\%}$



$V_{-10\%}$



Measurement uncertainty: ± 206.50 Hz

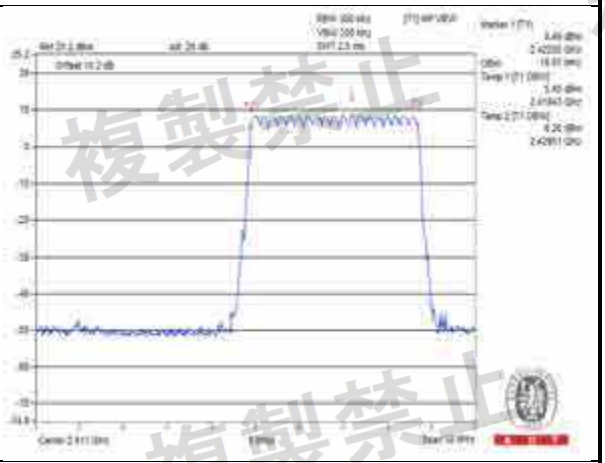
AFH Mode:

Environmental Conditions	25 deg.C, 60 % RH	
V_{normal}	$V_{+10\%}$	$V_{-10\%}$
Occupied Bandwidth (MHz)	Occupied Bandwidth (MHz)	Occupied Bandwidth (MHz)
19.07	19.07	18.99

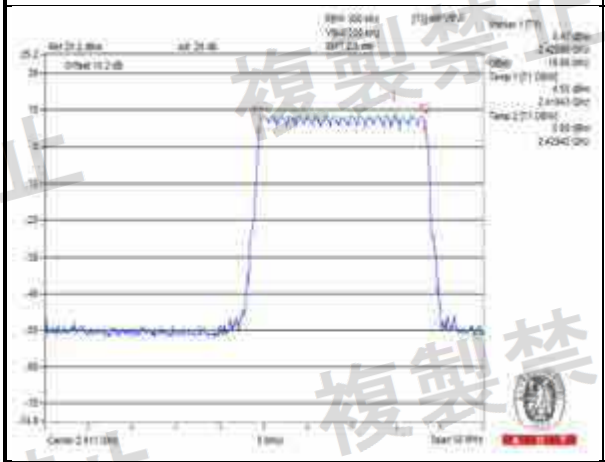
Note: 1. For the test plots please refer to the below pages.

V_{normal}

$V_{+10\%}$



$V_{-10\%}$



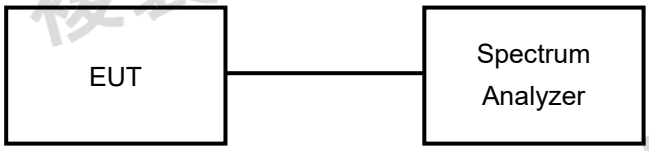
Measurement uncertainty: ± 206.50 Hz

4.3 Spreading Bandwidth Measurement (90 % Power Bandwidth)

4.3.1 Limits of Spreading Bandwidth and Spreading Factor Measurement

Item	Limit	Remark
Spreading Bandwidth	≧ 500 kHz	(For DSSS, FHSS)
Spreading Factor	≧ 5	Operating frequency 2400 to 2483.5 MHz

4.3.2 Test Setup



4.3.3 Test Results

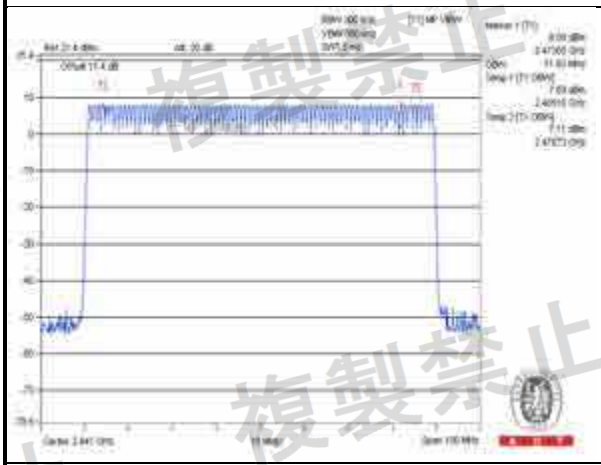
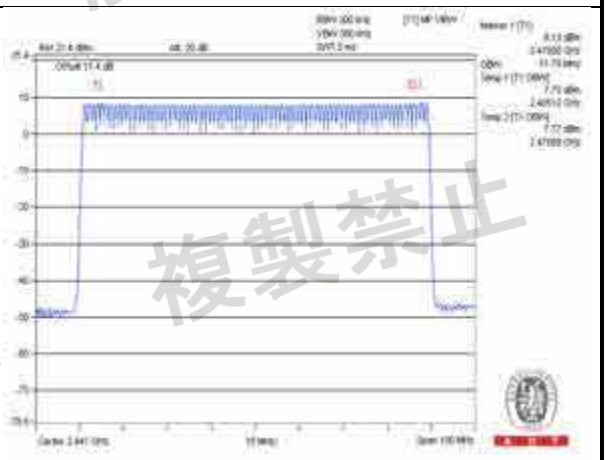
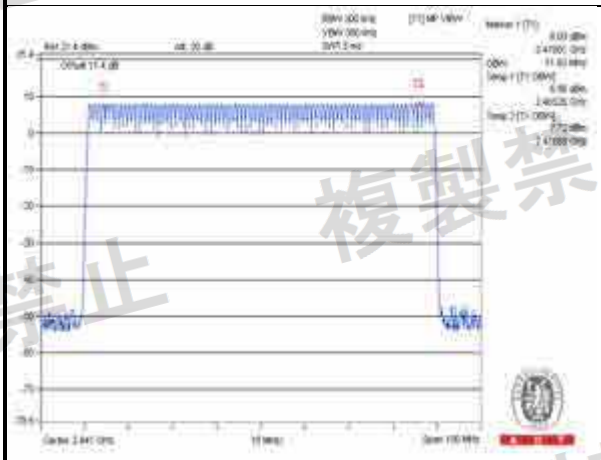
Modulation: GFSK

Normal Mode:

Environmental Conditions		25 deg.C, 60 % RH			
V_{normal}		$V_{+10\%}$		$V_{-10\%}$	
Occupied Bandwidth (MHz)	Spreading Factor	Occupied Bandwidth (MHz)	Spreading Factor	Occupied Bandwidth (MHz)	Spreading Factor
71.63	71.630	71.79	71.790	71.63	71.630

Note: 1. Spreading Factor: 90 % channel power bandwidth / 1.

2. For the test plots please refer to the below pages.

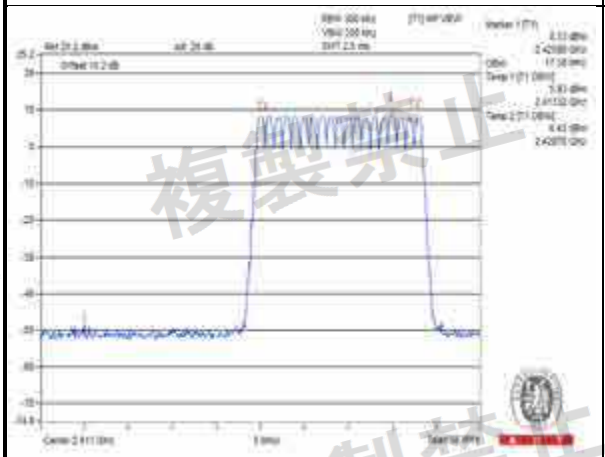
V_{normal}	$V_{+10\%}$
	
$V_{-10\%}$	
	
Measurement uncertainty: ± 206.50 Hz	

AFH Mode:

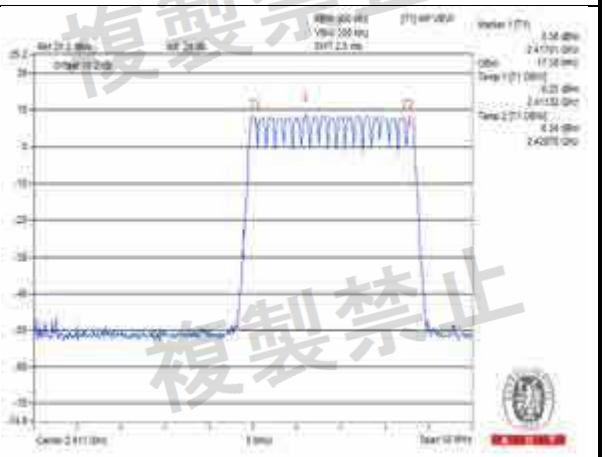
Environmental Conditions		25 deg.C, 60 % RH			
V_{normal}		$V_{+10\%}$		$V_{-10\%}$	
Occupied Bandwidth (MHz)	Spreading Factor	Occupied Bandwidth (MHz)	Spreading Factor	Occupied Bandwidth (MHz)	Spreading Factor
17.38	17.380	17.38	17.380	17.38	17.380

Note: 1. Spreading Factor: 90 % channel power bandwidth / 1.
2. For the test plots please refer to the below pages.

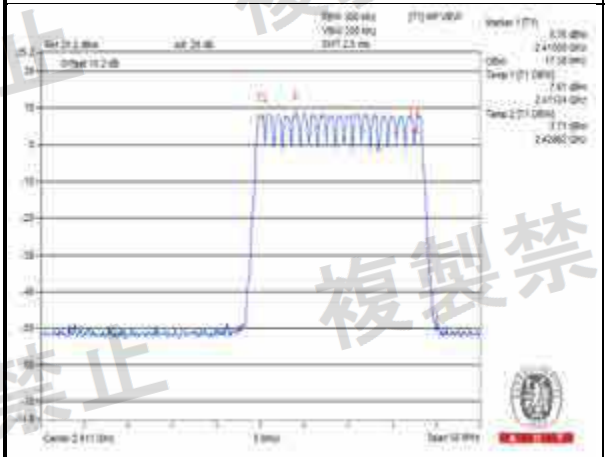
V_{normal}



$V_{+10\%}$



$V_{-10\%}$



Measurement uncertainty: ± 206.50 Hz

Modulation: π/4-DQPSK

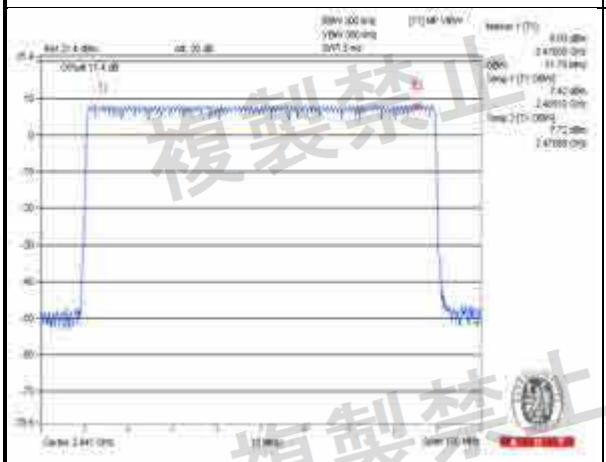
Normal Mode:

Environmental Conditions		25 deg.C, 60 % RH			
V_{normal}		$V_{+10\%}$		$V_{-10\%}$	
Occupied Bandwidth (MHz)	Spreading Factor	Occupied Bandwidth (MHz)	Spreading Factor	Occupied Bandwidth (MHz)	Spreading Factor
71.79	71.790	71.47	71.470	71.63	71.630

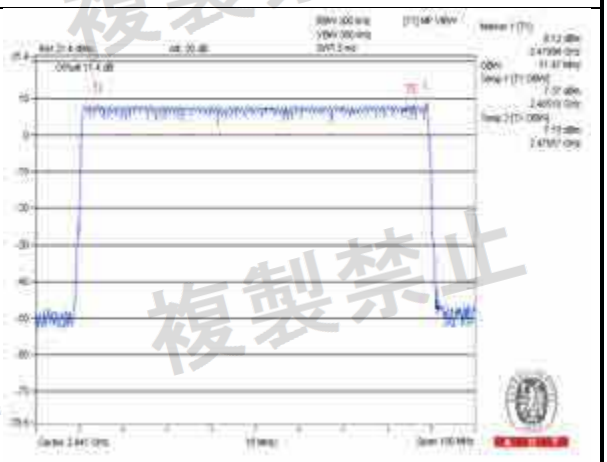
Note: 1. Spreading Factor: 90 % channel power bandwidth / 1.

2. For the test plots please refer to the below pages.

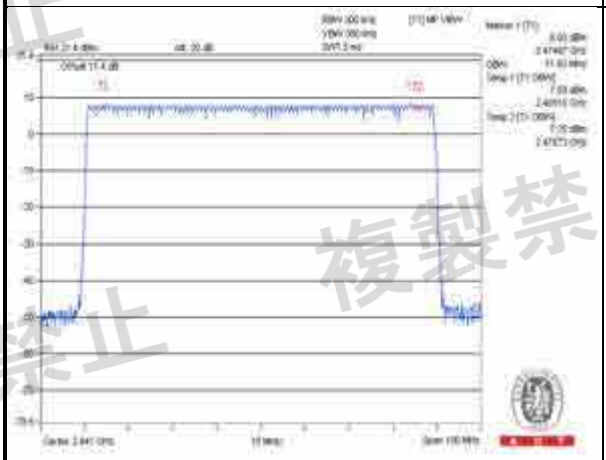
V_{normal}



$V_{+10\%}$



$V_{-10\%}$



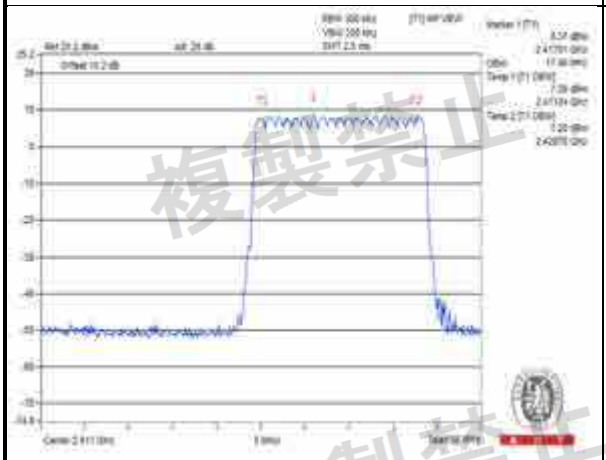
Measurement uncertainty: ± 206.50 Hz

AFH Mode:

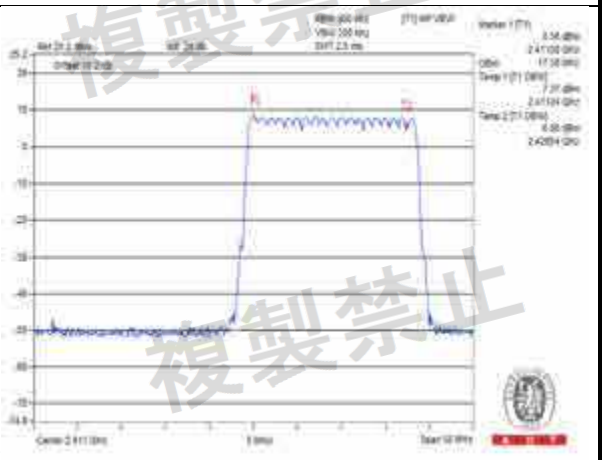
Environmental Conditions		25 deg.C, 60 % RH			
V_{normal}		$V_{+10\%}$		$V_{-10\%}$	
Occupied Bandwidth (MHz)	Spreading Factor	Occupied Bandwidth (MHz)	Spreading Factor	Occupied Bandwidth (MHz)	Spreading Factor
17.46	17.460	17.30	17.300	17.54	17.540

Note: 1. Spreading Factor: 90 % channel power bandwidth / 1.
2. For the test plots please refer to the below pages.

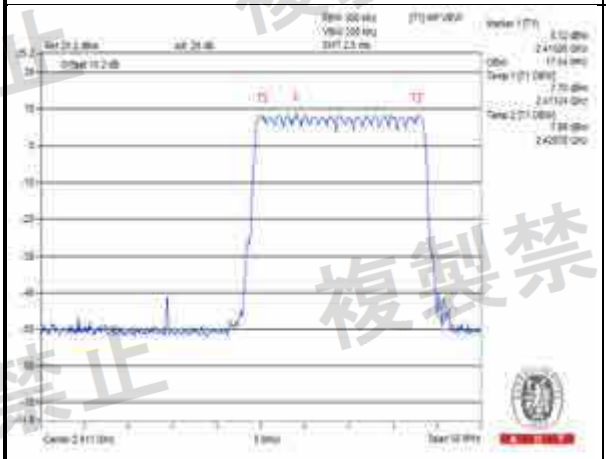
V_{normal}



$V_{+10\%}$



$V_{-10\%}$



Measurement uncertainty: ± 206.50 Hz

Modulation: 8DPSK

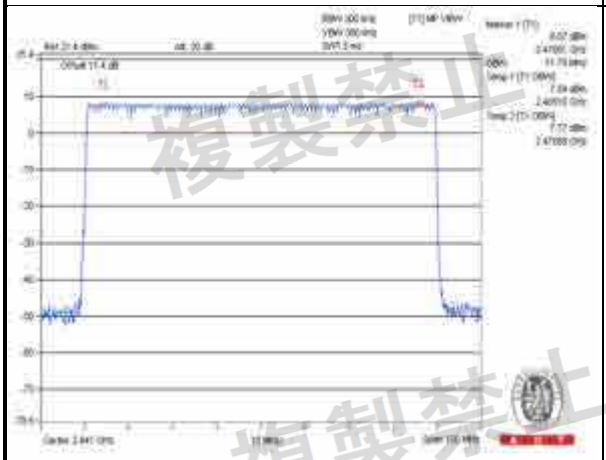
Normal Mode:

Environmental Conditions		25 deg.C, 60 % RH			
V_{normal}		$V_{+10\%}$		$V_{-10\%}$	
Occupied Bandwidth (MHz)	Spreading Factor	Occupied Bandwidth (MHz)	Spreading Factor	Occupied Bandwidth (MHz)	Spreading Factor
71.79	71.790	71.79	71.790	71.79	71.790

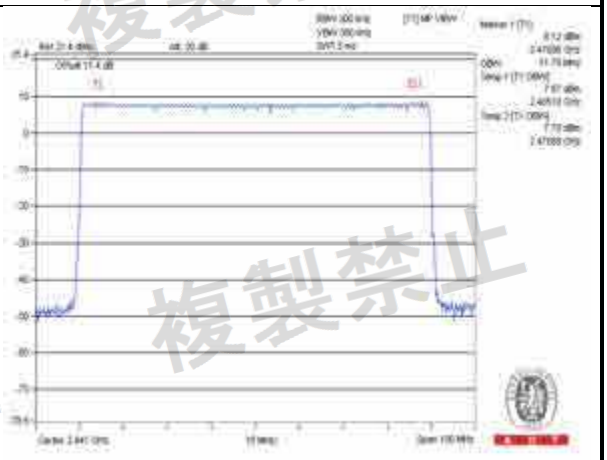
Note: 1. Spreading Factor: 90 % channel power bandwidth / 1.

2. For the test plots please refer to the below pages.

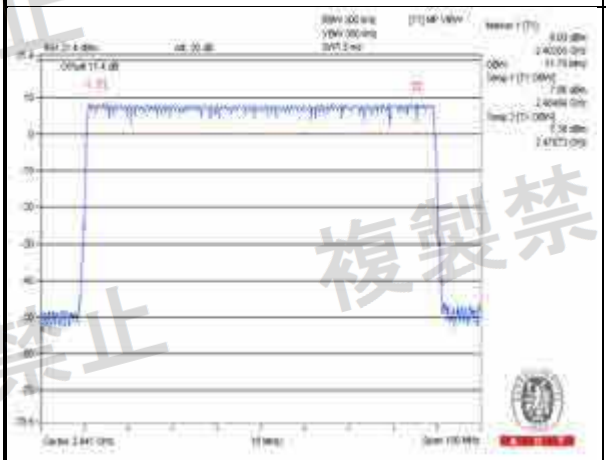
V_{normal}



$V_{+10\%}$



$V_{-10\%}$



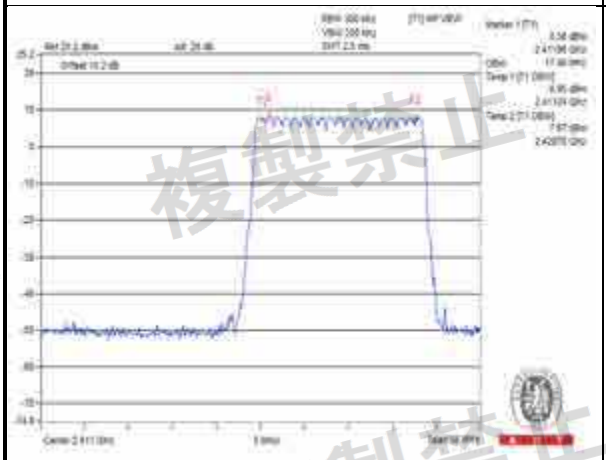
Measurement uncertainty: ± 206.50 Hz

AFH Mode:

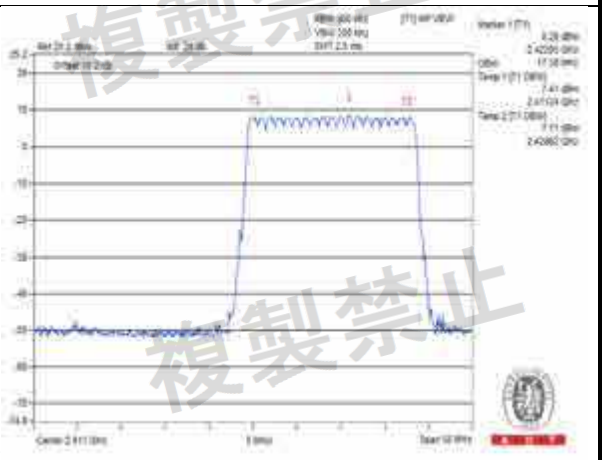
Environmental Conditions		25 deg.C, 60 % RH			
V_{normal}		$V_{+10\%}$		$V_{-10\%}$	
Occupied Bandwidth (MHz)	Spreading Factor	Occupied Bandwidth (MHz)	Spreading Factor	Occupied Bandwidth (MHz)	Spreading Factor
17.46	17.460	17.38	17.380	17.38	17.380

Note: 1. Spreading Factor: 90 % channel power bandwidth / 1.
2. For the test plots please refer to the below pages.

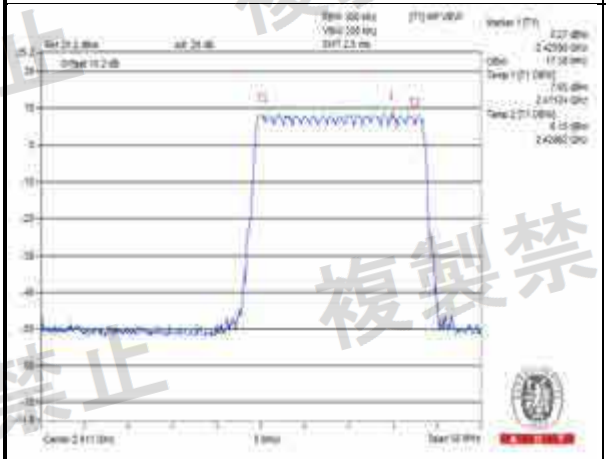
V_{normal}



$V_{+10\%}$



$V_{-10\%}$



Measurement uncertainty: ± 206.50 Hz

4.4 Spurious Emissions for Transmitter Measurement

4.4.1 Limits of Spurious Emissions

Frequencies (MHz)	Limit
Operating frequency 2400 to 2483.5 MHz	
30.0 to 1000.0 MHz	≦ 0.25 uW/100 kHz
1000.0 to 2387 MHz	≦ 2.5 uW/MHz
2387.0 to 2400.0 MHz	≦ 25 uW/MHz
2483.5 to 2496.5 MHz	≦ 25 uW/MHz
2496.5 to 12500.0 MHz	≦ 2.5 uW/MHz

4.4.2 Test Setup

4.4.3 Test Results

Modulation: GFSK

Environmental Conditions		25 deg.C, 60 % RH					
Test Channel		Ch 0 (2402MHz)		Ch 39 (2441MHz)		Limit	Result
Test Condition	Frequency Range	Frequency (MHz)	Measured Value	Frequency (MHz)	Measured Value		
V_{normal}	30.0 MHz to 1000.0 MHz	617.820	**0.004505uW**	666.320	**0.005394uW**	0.25uW	PASS
	1000.0 MHz to 2387.0 MHz	2381.452	0.012044uW	2262.170	0.011372uW	2.5uW	PASS
	2387.0 MHz to 2400.0 MHz	2400.000	19.662097uW	2394.306	**0.020435uW**	25uW	PASS
	2483.5 MHz to 2496.5 MHz	2485.866	0.01451uW	2494.160	0.01623uW	25uW	PASS
	2496.5 MHz to 12500.0 MHz	3596.885	0.013134uW	2756.591	0.013842uW	2.5uW	PASS
$V_{+10\%}$	30.0 MHz to 1000.0 MHz	873.900	0.00444uW	127.000	0.004164uW	0.25uW	PASS
	1000.0 MHz to 2387.0 MHz	2328.746	**0.025509uW**	2381.452	0.011157uW	2.5uW	PASS
	2387.0 MHz to 2400.0 MHz	2400.000	18.69055uW	2397.816	0.015986uW	25uW	PASS
	2483.5 MHz to 2496.5 MHz	2495.460	0.014422uW	2490.416	**0.016725uW**	25uW	PASS
	2496.5 MHz to 12500.0 MHz	3656.906	0.015155uW	3556.871	0.012634uW	2.5uW	PASS
$V_{-10\%}$	30.0 MHz to 1000.0 MHz	363.680	0.00444uW	383.080	0.004748uW	0.25uW	PASS
	1000.0 MHz to 2387.0 MHz	2342.616	0.01259uW	2370.356	**0.011694uW**	2.5uW	PASS
	2387.0 MHz to 2400.0 MHz	2400.000	**19.729351uW**	2389.210	0.015885uW	25uW	PASS
	2483.5 MHz to 2496.5 MHz	2490.000	**0.014539uW**	2484.878	0.015418uW	25uW	PASS
	2496.5 MHz to 12500.0 MHz	3516.857	**0.015495uW**	3636.899	**0.014665uW**	2.5uW	PASS

Environmental Conditions		25 deg.C, 60 % RH			
Test Channel		Ch 78 (2480 MHz)		Limit	Result
Test Condition	Frequency Range	Frequency (MHz)	Measured Value		
V_{normal}	30.0 MHz to 1000.0 MHz	179.380	**0.004648uW**	0.25uW	PASS
	1000.0 MHz to 2387.0 MHz	2295.458	**0.01249uW**	2.5uW	PASS
	2387.0 MHz to 2400.0 MHz	2397.348	0.015405uW	25uW	PASS
	2483.5 MHz to 2496.5 MHz	2483.500	0.189681uW	25uW	PASS
	2496.5 MHz to 12500.0 MHz	3616.892	**0.014194uW**	2.5uW	PASS
$V_{+10\%}$	30.0 MHz to 1000.0 MHz	734.220	0.004549uW	0.25uW	PASS
	1000.0 MHz to 2387.0 MHz	2331.520	0.012485uW	2.5uW	PASS
	2387.0 MHz to 2400.0 MHz	2396.282	0.015893uW	25uW	PASS
	2483.5 MHz to 2496.5 MHz	2483.500	**0.19589uW**	25uW	PASS
	2496.5 MHz to 12500.0 MHz	4137.074	0.013352uW	2.5uW	PASS
$V_{-10\%}$	30.0 MHz to 1000.0 MHz	1000.000	0.003968uW	0.25uW	PASS
	1000.0 MHz to 2387.0 MHz	2370.356	0.010342uW	2.5uW	PASS
	2387.0 MHz to 2400.0 MHz	2392.096	**0.016259uW**	25uW	PASS
	2483.5 MHz to 2496.5 MHz	2483.500	0.1933uW	25uW	PASS
	2496.5 MHz to 12500.0 MHz	3636.899	0.012054uW	2.5uW	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

Measurement uncertainty: ± 3.93dB

V_{normal}
Channel 39

Measurement uncertainty: ± 3.93dB

V_{normal}
Channel 78

Measurement uncertainty: ± 3.93dB

$V_{+10\%}$
Channel 0

Measurement uncertainty: ± 3.93dB

$V_{+10\%}$
Channel 39

Measurement uncertainty: ± 3.93dB

$V_{+10\%}$
Channel 78

Measurement uncertainty: ± 3.93dB

V-10%
Channel 0

Measurement uncertainty: ± 3.93dB

V-10%
Channel 39

Measurement uncertainty: ± 3.93dB

V-10%
Channel 78

Measurement uncertainty: ± 3.93dB

Modulation: π/4-DQPSK

Environmental Conditions		25 deg.C, 60 % RH					
Test Channel		Ch 0 (2402 MHz)		Ch 39 (2441 MHz)		Limit	Result
Test Condition	Frequency Range	Frequency (MHz)	Measured Value	Frequency (MHz)	Measured Value		
V_{normal}	30.0 MHz to 1000.0 MHz	897.180	0.003836uW	493.660	0.004039uW	0.25uW	PASS
	1000.0 MHz to 2387.0 MHz	2367.582	**0.089596uW**	2367.582	0.018686uW	2.5uW	PASS
	2387.0 MHz to 2400.0 MHz	2400.000	**Note 3**	2394.696	0.037869uW	25uW	PASS
	2483.5 MHz to 2496.5 MHz	2487.504	0.016686uW	2488.258	0.03928uW	25uW	PASS
	2496.5 MHz to 12500.0 MHz	4097.060	0.013622uW	4397.165	0.017151uW	2.5uW	PASS
$V_{+10\%}$	30.0 MHz to 1000.0 MHz	371.440	0.003896uW	788.540	0.004237uW	0.25uW	PASS
	1000.0 MHz to 2387.0 MHz	2359.260	0.033066uW	2384.226	**0.024273uW**	2.5uW	PASS
	2387.0 MHz to 2400.0 MHz	2400.000	Note 3	2394.904	**0.042656uW**	25uW	PASS
	2483.5 MHz to 2496.5 MHz	2491.560	0.018846uW	2492.418	0.037963uW	25uW	PASS
	2496.5 MHz to 12500.0 MHz	3616.892	**0.01442uW**	3676.913	0.014472uW	2.5uW	PASS
$V_{-10\%}$	30.0 MHz to 1000.0 MHz	879.720	**0.00477uW**	125.060	**0.005066uW**	0.25uW	PASS
	1000.0 MHz to 2387.0 MHz	2367.582	0.027604uW	2373.130	0.020479uW	2.5uW	PASS
	2387.0 MHz to 2400.0 MHz	2400.000	Note 3	2393.656	0.037067uW	25uW	PASS
	2483.5 MHz to 2496.5 MHz	2486.542	**0.019536uW**	2486.152	**0.039706uW**	25uW	PASS
	2496.5 MHz to 12500.0 MHz	4497.200	0.014061uW	4117.067	**0.018768uW**	2.5uW	PASS

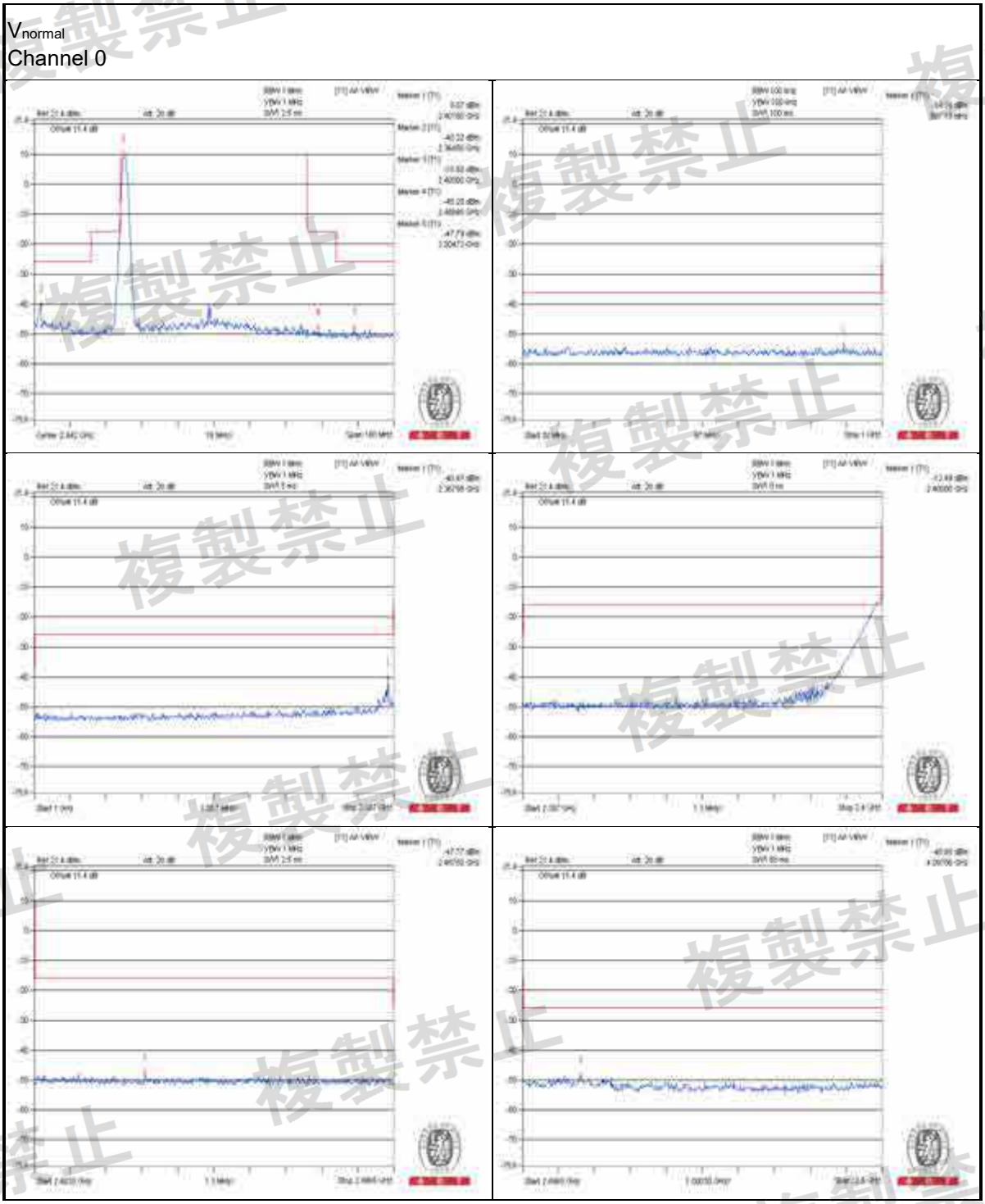
Environmental Conditions		25 deg.C, 60 % RH			
Test Channel		Ch 78 (2480 MHz)		Limit	Result
Test Condition	Frequency Range	Frequency (MHz)	Measured Value		
V_{normal}	30.0 MHz to 1000.0 MHz	646.920	**0.004593uW**	0.25uW	PASS
	1000.0 MHz to 2387.0 MHz	2387.000	0.012589uW	2.5uW	PASS
	2387.0 MHz to 2400.0 MHz	2394.956	**0.025782uW**	25uW	PASS
	2483.5 MHz to 2496.5 MHz	2483.500	0.319194uW	25uW	PASS
	2496.5 MHz to 12500.0 MHz	2496.500	0.024526uW	2.5uW	PASS
$V_{+10\%}$	30.0 MHz to 1000.0 MHz	132.820	0.004008uW	0.25uW	PASS
	1000.0 MHz to 2387.0 MHz	2364.808	**0.020129uW**	2.5uW	PASS
	2387.0 MHz to 2400.0 MHz	2399.324	0.017484uW	25uW	PASS
	2483.5 MHz to 2496.5 MHz	2483.500	**0.408531uW**	25uW	PASS
	2496.5 MHz to 12500.0 MHz	2516.507	**0.028448uW**	2.5uW	PASS
$V_{-10\%}$	30.0 MHz to 1000.0 MHz	224.000	0.004122uW	0.25uW	PASS
	1000.0 MHz to 2387.0 MHz	2378.678	0.013129uW	2.5uW	PASS
	2387.0 MHz to 2400.0 MHz	2394.592	0.019413uW	25uW	PASS
	2483.5 MHz to 2496.5 MHz	2483.578	0.359529uW	25uW	PASS
	2496.5 MHz to 12500.0 MHz	2536.514	0.021898uW	2.5uW	PASS

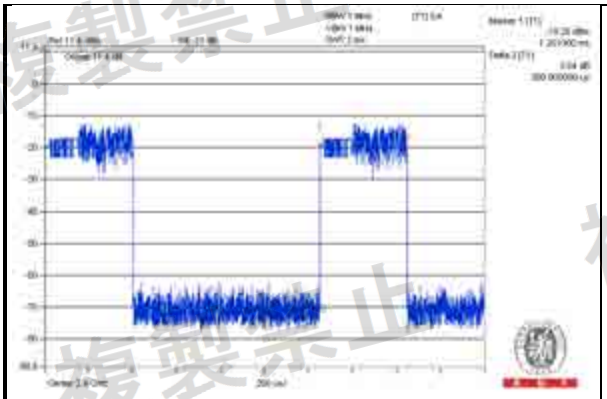
Note:
1. The worst value in each frequency range v.s. each channel has been marked by boldface.
2. The spectrum plots are attached on the following pages.

3. Take the value of total data point (501 points) and calculate the total power.
   Divides total power by 501 data point to get the average value.

Test Condition	Max power / Zero span (dBm)	Average power (dBm)	Average power (mW)
Ch 0			
V_{normal}	-19.20	-17.902712	16.207978
$V_{+10\%}$	-19.51	-17.892395	16.246527
$V_{-10\%}$	-19.84	-17.889346	16.257935

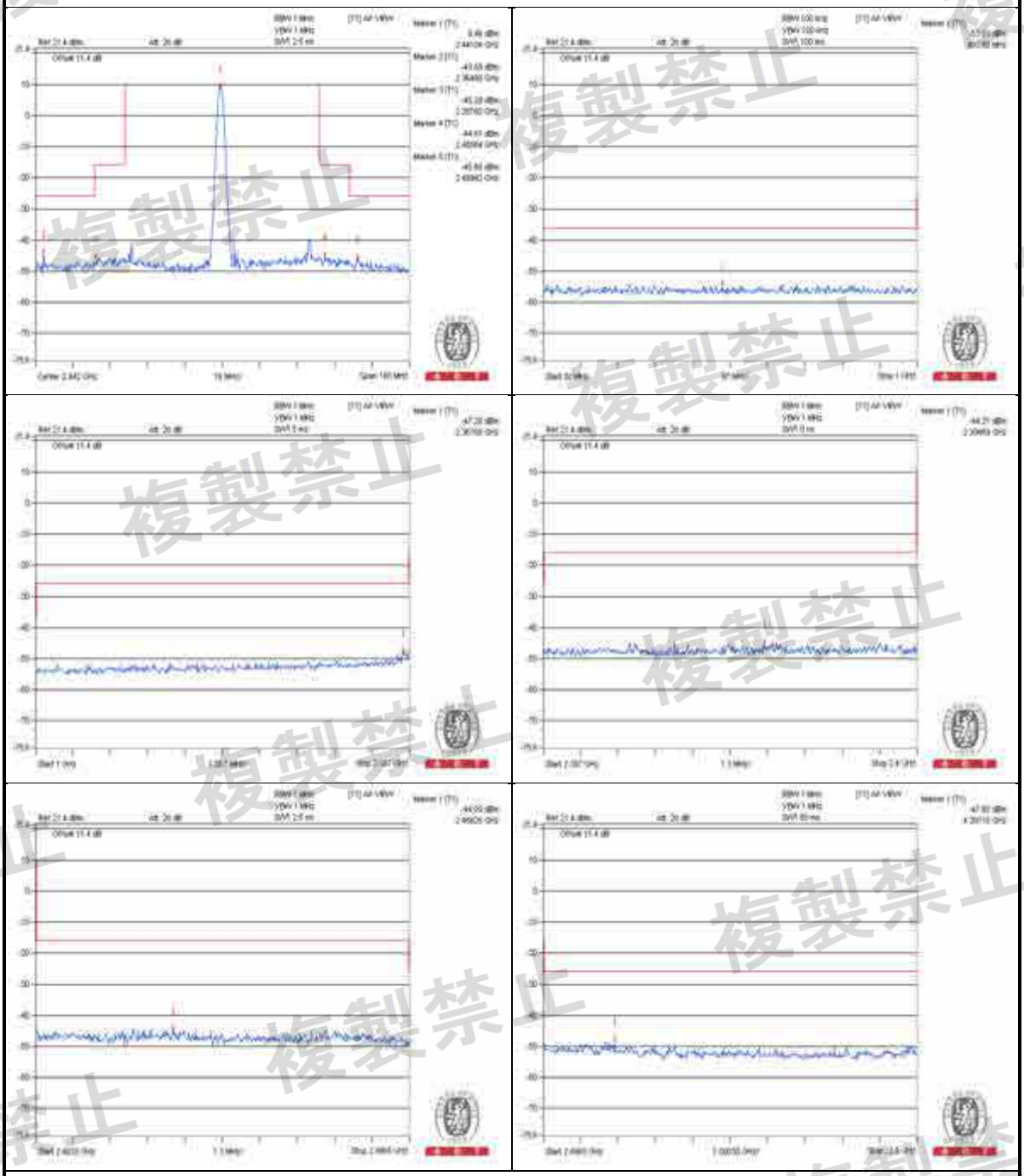
V_{normal}
Channel 0





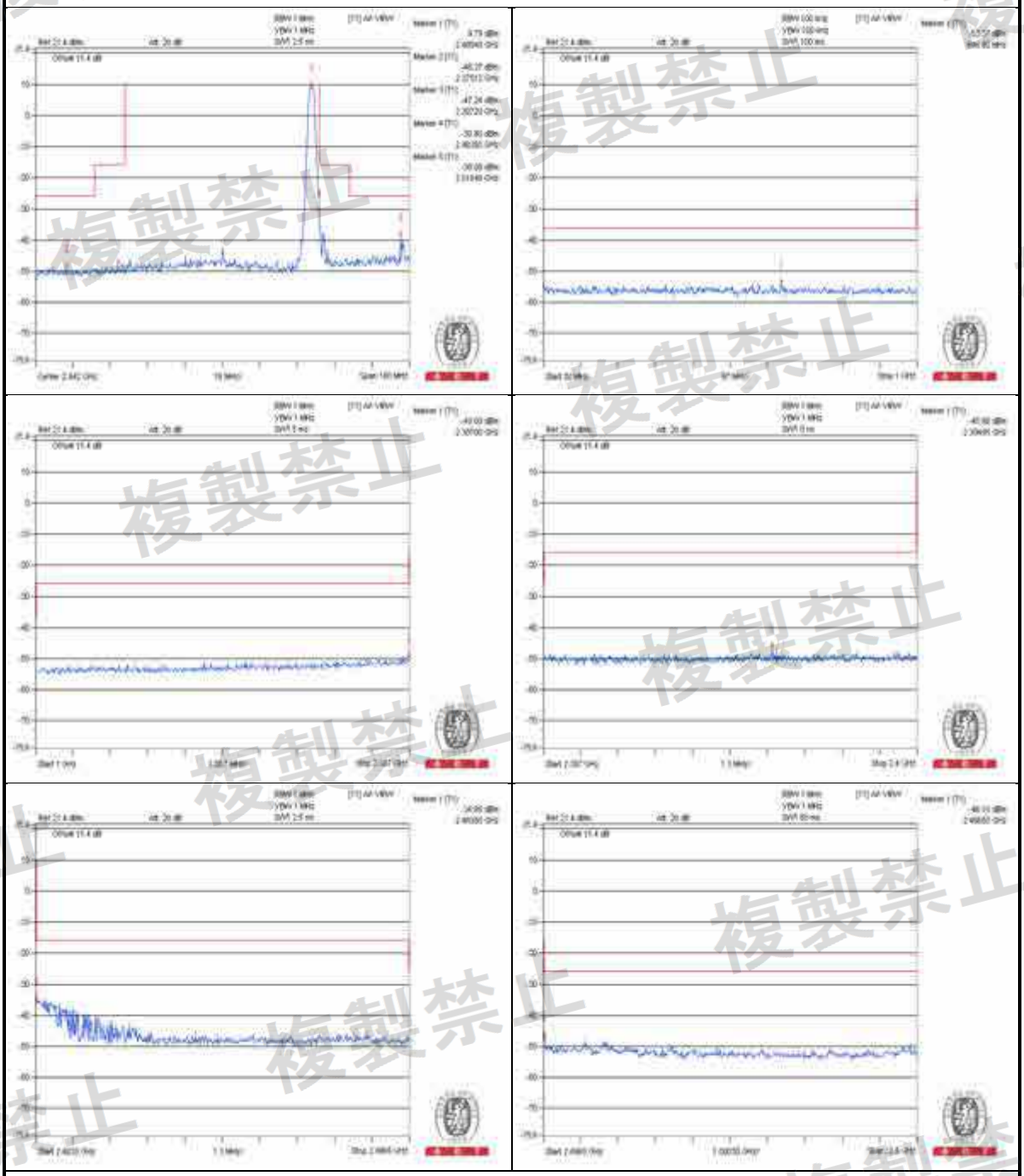
Measurement uncertainty: ± 3.93dB

V_{normal}
Channel 39



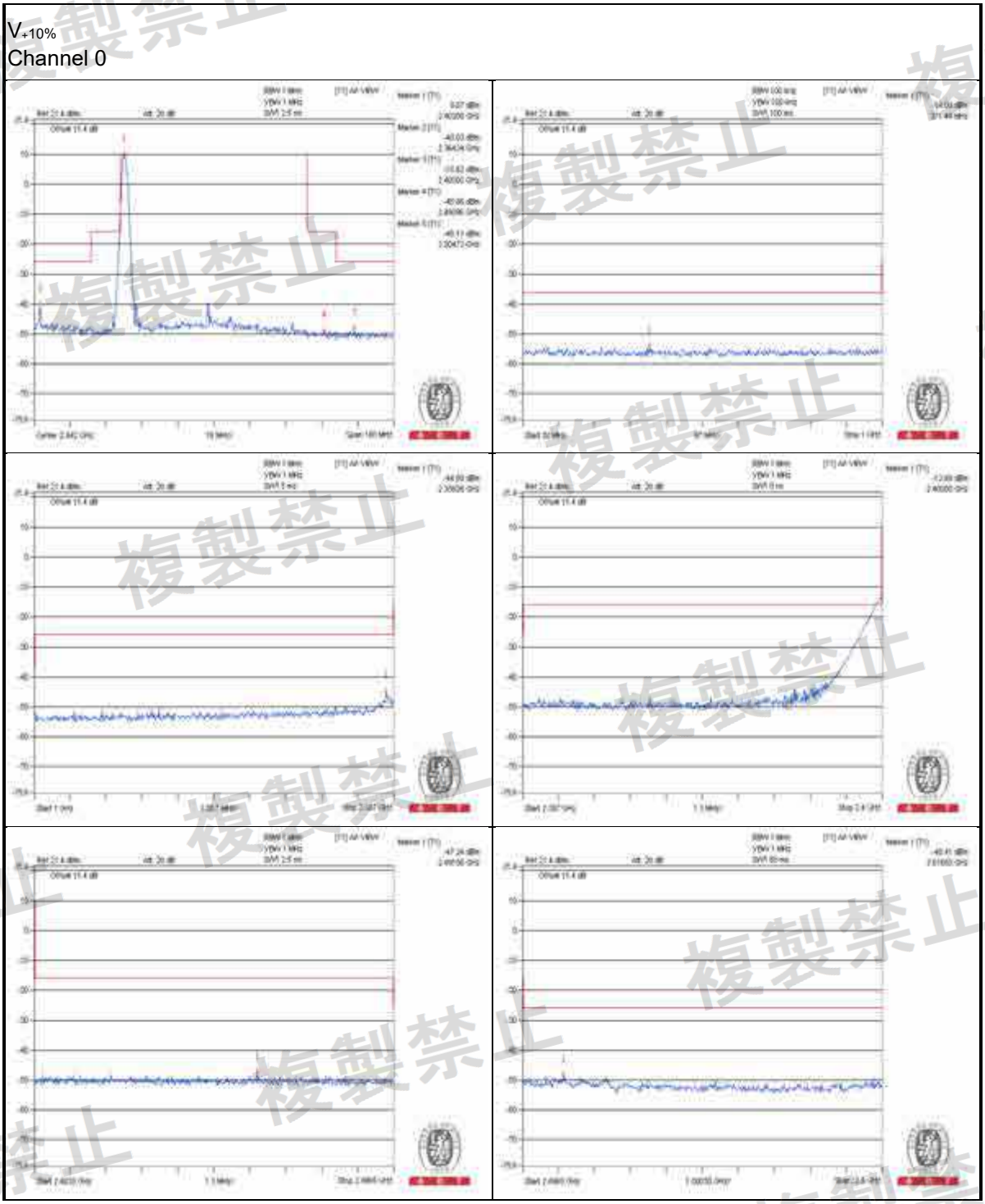
Measurement uncertainty: ± 3.93dB

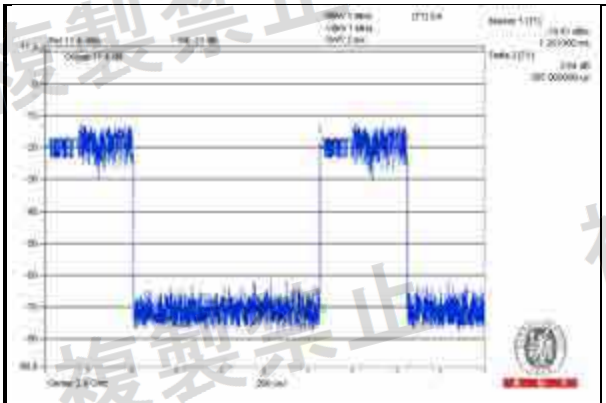
V_{normal}
Channel 78



Measurement uncertainty: ± 3.93dB

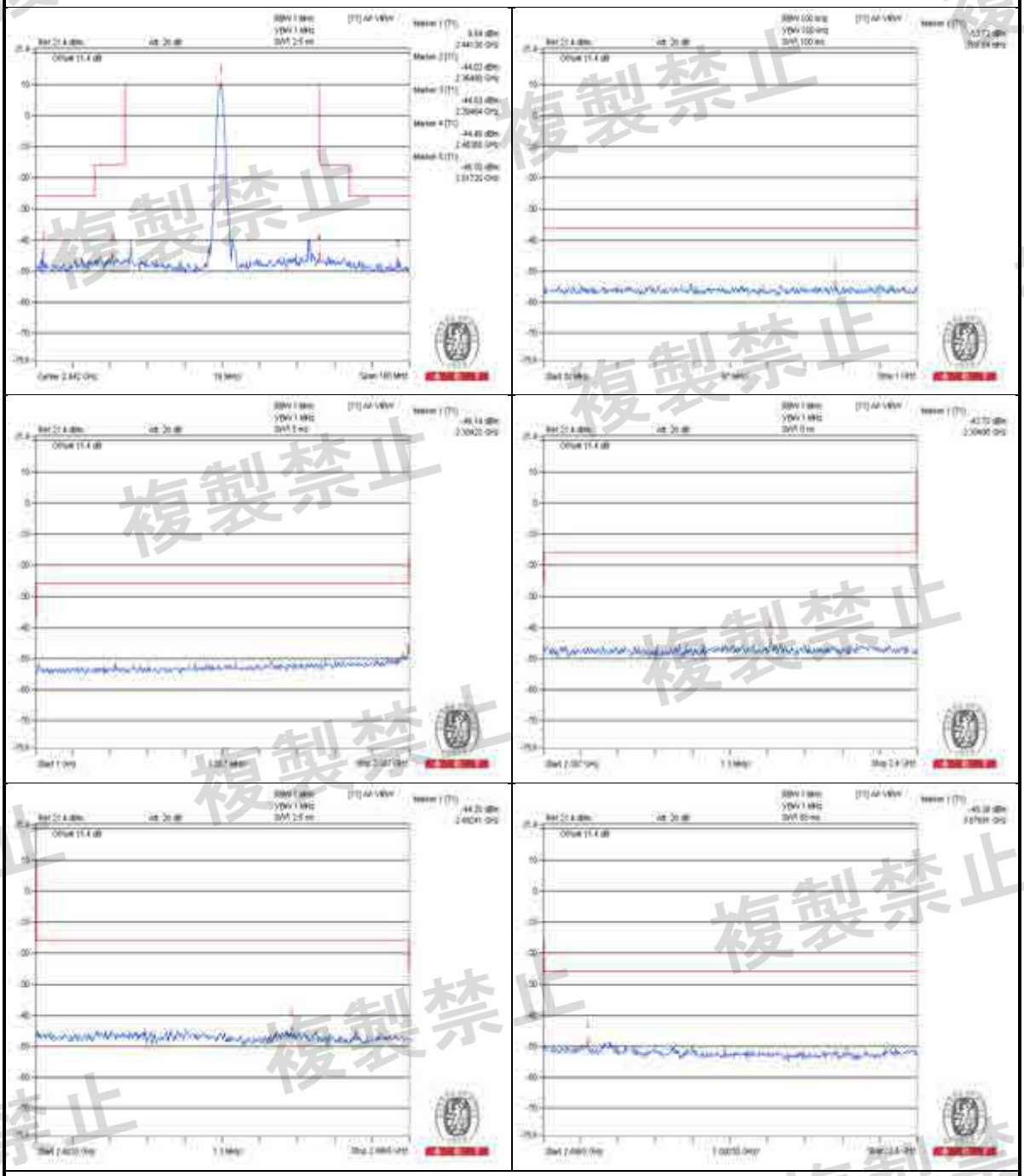
$V_{+10\%}$
Channel 0





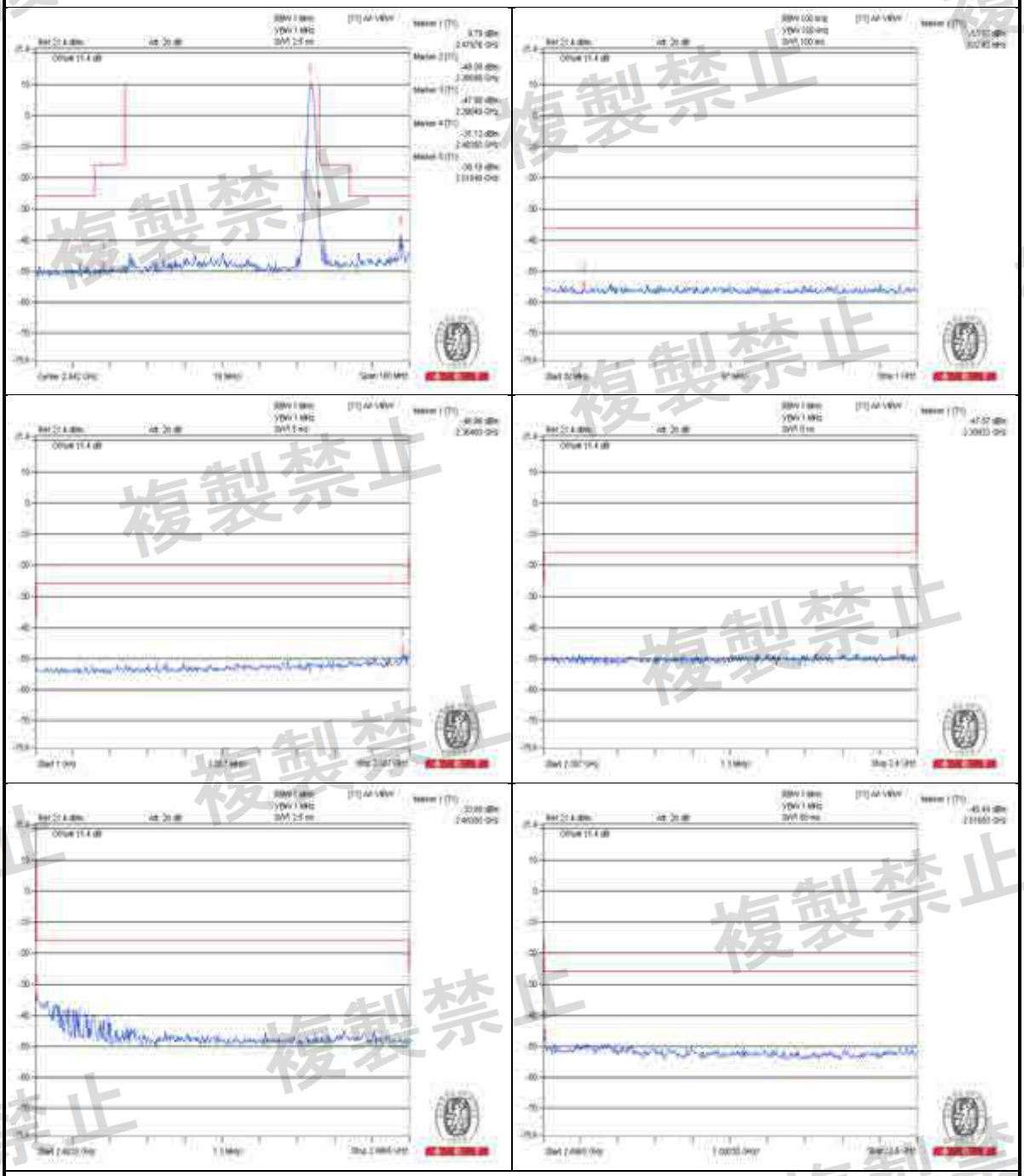
Measurement uncertainty: ± 3.93dB

$V_{+10\%}$
Channel 39



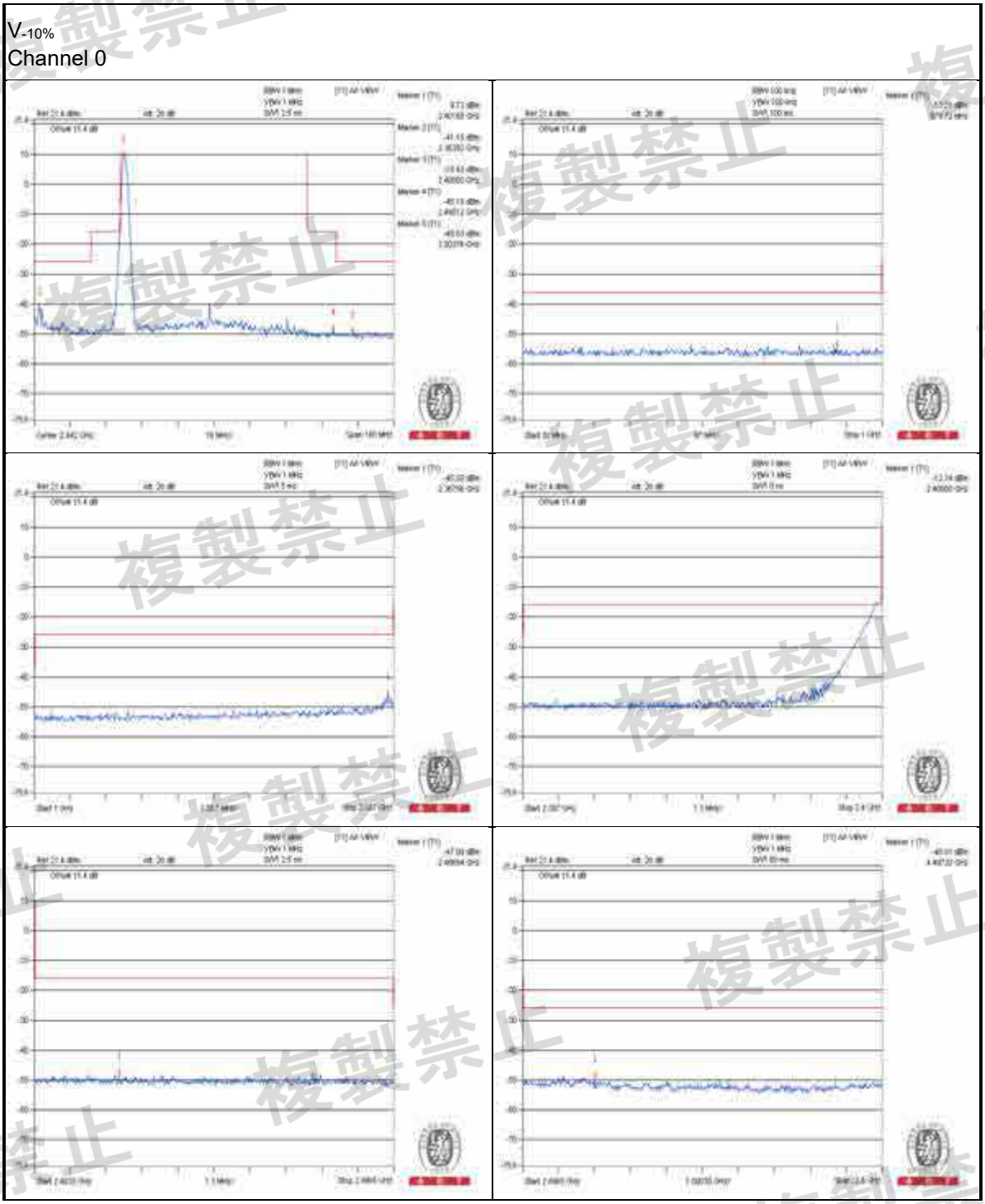
Measurement uncertainty: ± 3.93dB

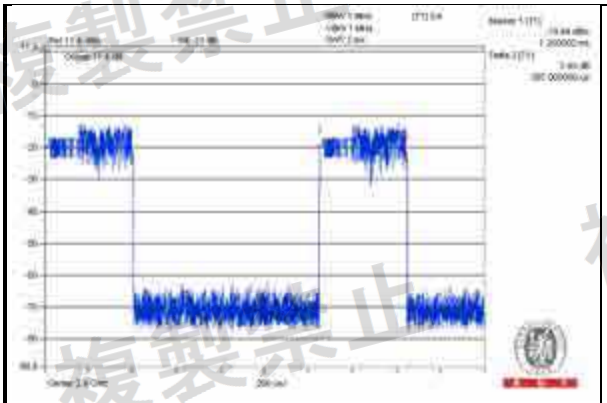
$V_{+10\%}$
Channel 78



Measurement uncertainty: ± 3.93dB

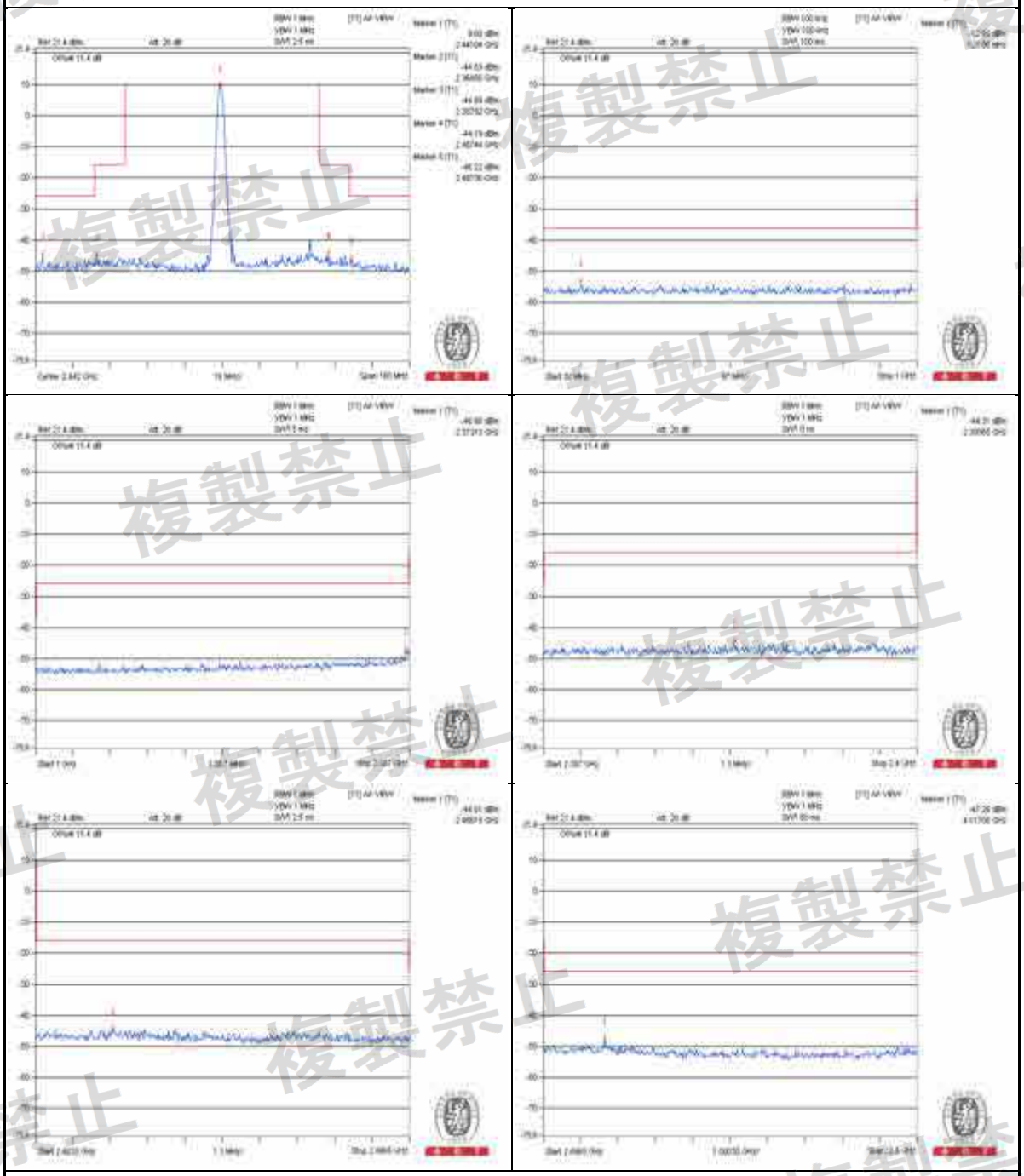
V-10%
Channel 0





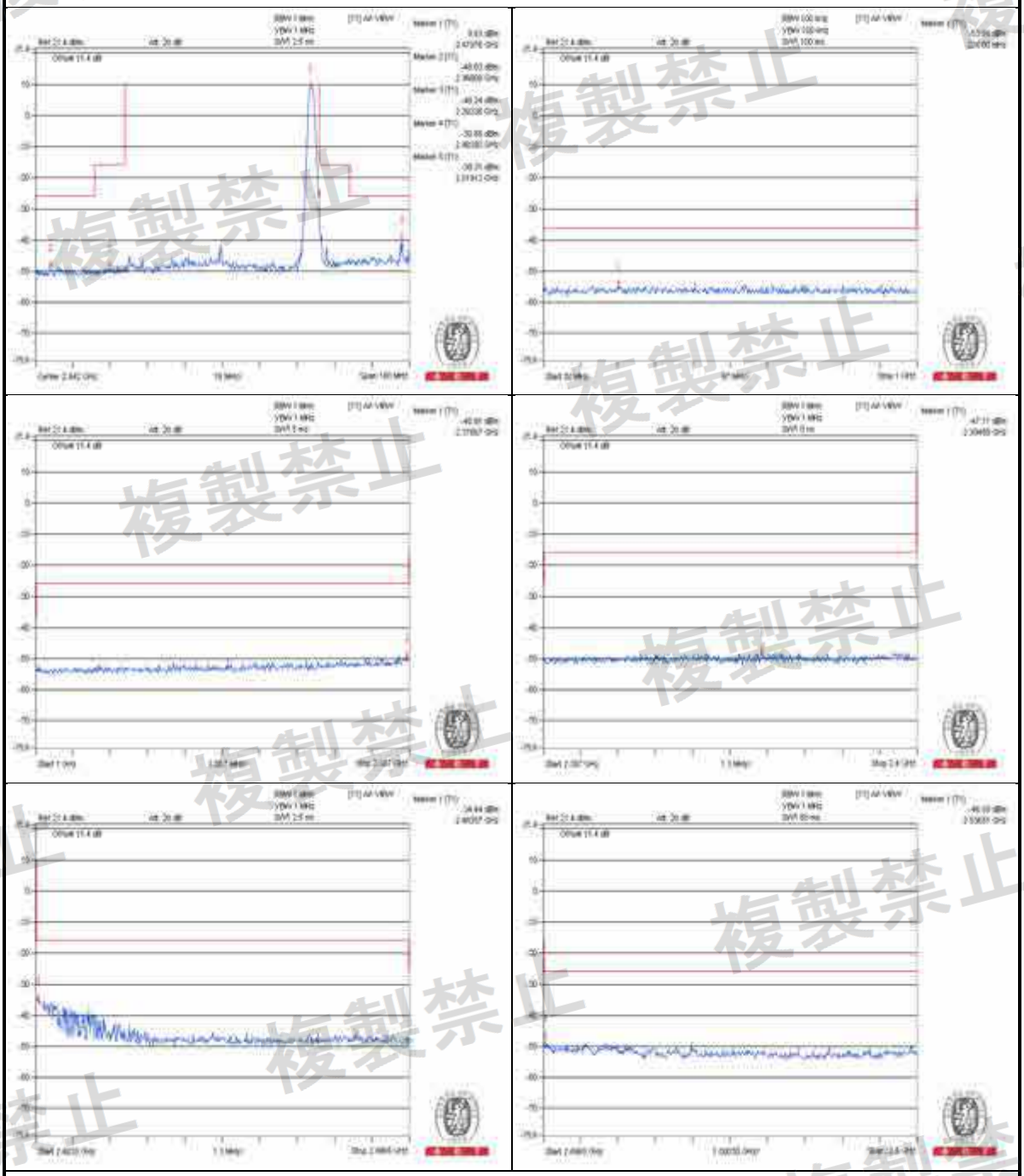
Measurement uncertainty: ± 3.93dB

V-10%
Channel 39



Measurement uncertainty: ± 3.93dB

V-10%
Channel 78



Measurement uncertainty: ± 3.93dB

Modulation: 8DPSK

Environmental Conditions		25 deg.C, 60 % RH					
Test Channel		Ch 0 (2402 MHz)		Ch 39 (2441 MHz)		Limit	Result
Test Condition	Frequency Range	Frequency (MHz)	Measured Value	Frequency (MHz)	Measured Value		
V_{normal}	30.0 MHz to 1000.0 MHz	439.340	0.004354uW	264.740	0.004333uW	0.25uW	PASS
	1000.0 MHz to 2387.0 MHz	2356.486	0.028039uW	2387.000	**0.031892uW**	2.5uW	PASS
	2387.0 MHz to 2400.0 MHz	2400.000	**Note 3**	2392.980	0.041213uW	25uW	PASS
	2483.5 MHz to 2496.5 MHz	2486.048	**0.018147uW**	2489.506	0.046542uW	25uW	PASS
	2496.5 MHz to 12500.0 MHz	3596.885	0.013843uW	3596.885	0.01661uW	2.5uW	PASS
$V_{+10\%}$	30.0 MHz to 1000.0 MHz	617.820	**0.004692uW**	619.760	**0.004473uW**	0.25uW	PASS
	1000.0 MHz to 2387.0 MHz	2367.582	**0.079941uW**	2387.000	0.019088uW	2.5uW	PASS
	2387.0 MHz to 2400.0 MHz	2400.000	Note 3	2395.034	0.038991uW	25uW	PASS
	2483.5 MHz to 2496.5 MHz	2485.112	0.014682uW	2487.192	0.050054uW	25uW	PASS
	2496.5 MHz to 12500.0 MHz	4837.319	**0.015856uW**	2496.500	**0.016849uW**	2.5uW	PASS
$V_{-10\%}$	30.0 MHz to 1000.0 MHz	743.920	0.00405uW	94.020	0.004227uW	0.25uW	PASS
	1000.0 MHz to 2387.0 MHz	2362.034	0.022554uW	2381.452	0.024739uW	2.5uW	PASS
	2387.0 MHz to 2400.0 MHz	2400.000	Note 3	2392.850	**0.044788uW**	25uW	PASS
	2483.5 MHz to 2496.5 MHz	2483.708	0.017648uW	2485.892	**0.060794uW**	25uW	PASS
	2496.5 MHz to 12500.0 MHz	4357.151	0.01224uW	4077.053	0.016512uW	2.5uW	PASS

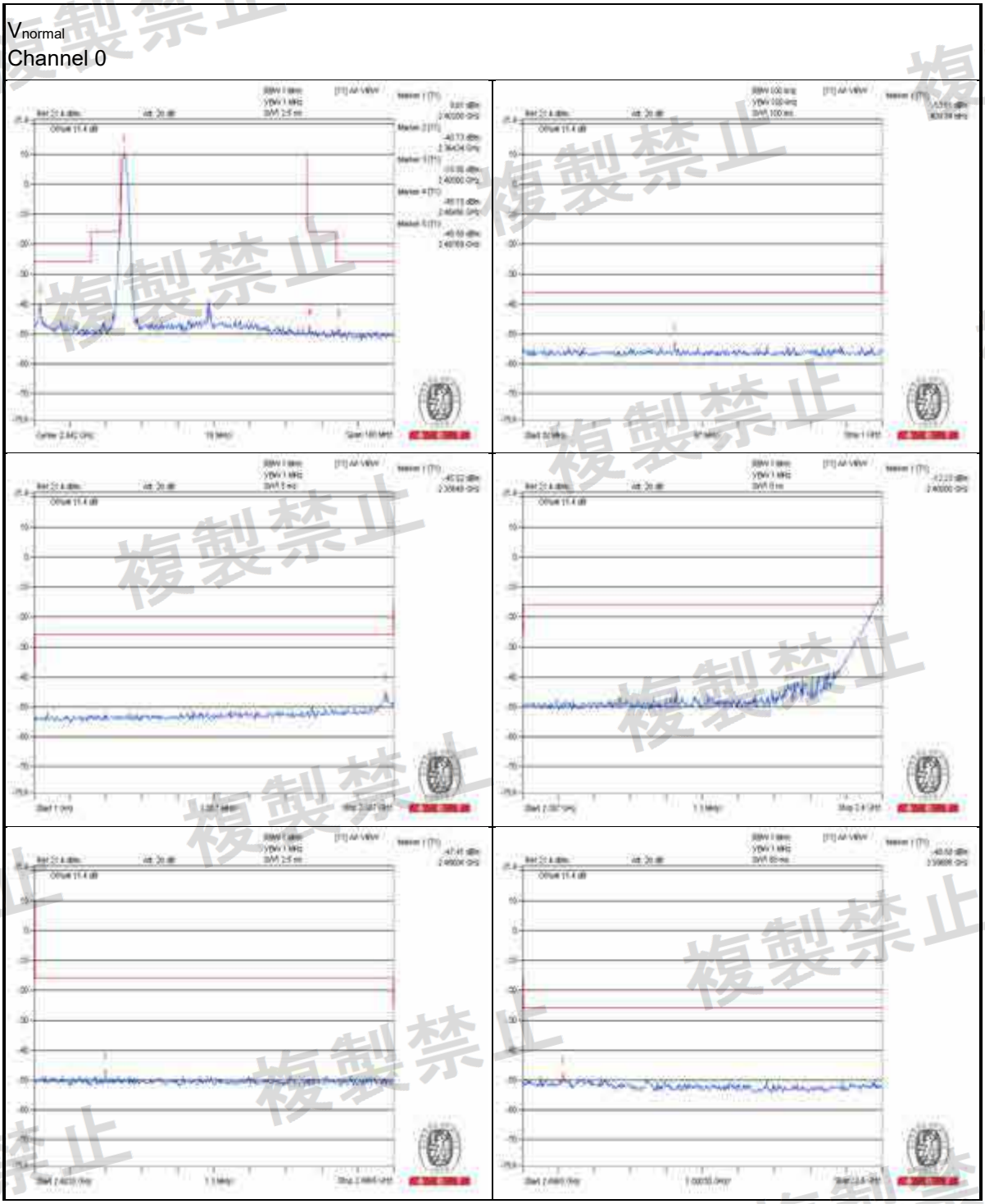
Environmental Conditions		25 deg.C, 60 % RH			
Test Channel		Ch 78 (2480 MHz)		Limit	Result
Test Condition	Frequency Range	Frequency (MHz)	Measured Value		
V_{normal}	30.0 MHz to 1000.0 MHz	181.320	0.004312uW	0.25uW	PASS
	1000.0 MHz to 2387.0 MHz	2303.780	0.010866uW	2.5uW	PASS
	2387.0 MHz to 2400.0 MHz	2398.648	0.018563uW	25uW	PASS
	2483.5 MHz to 2496.5 MHz	2483.500	0.317113uW	25uW	PASS
	2496.5 MHz to 12500.0 MHz	2536.514	0.015687uW	2.5uW	PASS
$V_{+10\%}$	30.0 MHz to 1000.0 MHz	600.360	**0.00456uW**	0.25uW	PASS
	1000.0 MHz to 2387.0 MHz	2387.000	0.010529uW	2.5uW	PASS
	2387.0 MHz to 2400.0 MHz	2399.532	**0.019534uW**	25uW	PASS
	2483.5 MHz to 2496.5 MHz	2483.500	**0.323776uW**	25uW	PASS
	2496.5 MHz to 12500.0 MHz	2496.500	**0.020417uW**	2.5uW	PASS
$V_{-10\%}$	30.0 MHz to 1000.0 MHz	165.800	0.004484uW	0.25uW	PASS
	1000.0 MHz to 2387.0 MHz	2356.486	**0.011701uW**	2.5uW	PASS
	2387.0 MHz to 2400.0 MHz	2398.050	0.017128uW	25uW	PASS
	2483.5 MHz to 2496.5 MHz	2483.500	0.318361uW	25uW	PASS
	2496.5 MHz to 12500.0 MHz	2496.500	0.017352uW	2.5uW	PASS

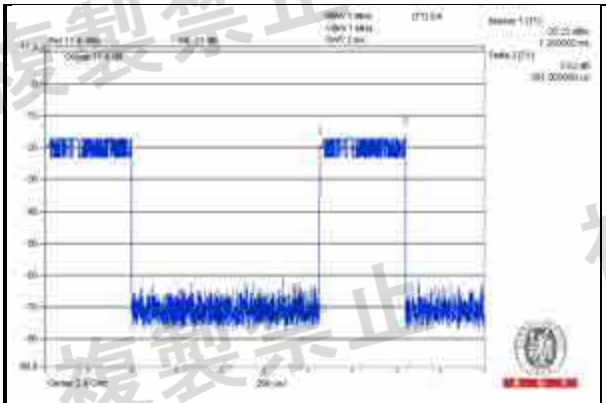
Note:
1. The worst value in each frequency range v.s. each channel has been marked by boldface.
2. The spectrum plots are attached on the following pages.

3. Take the value of total data point (501 points) and calculate the total power. Divides total power by 501 data point to get the average value.

Test Condition	Max power / Zero span (dBm)	Average power (dBm)	Average power (mW)
Ch 0			
V_{normal}	-20.22	-19.240723	11.910437
$V_{+10\%}$	-19.88	-19.232097	11.934117
$V_{-10\%}$	-20.06	-19.238386	11.916848

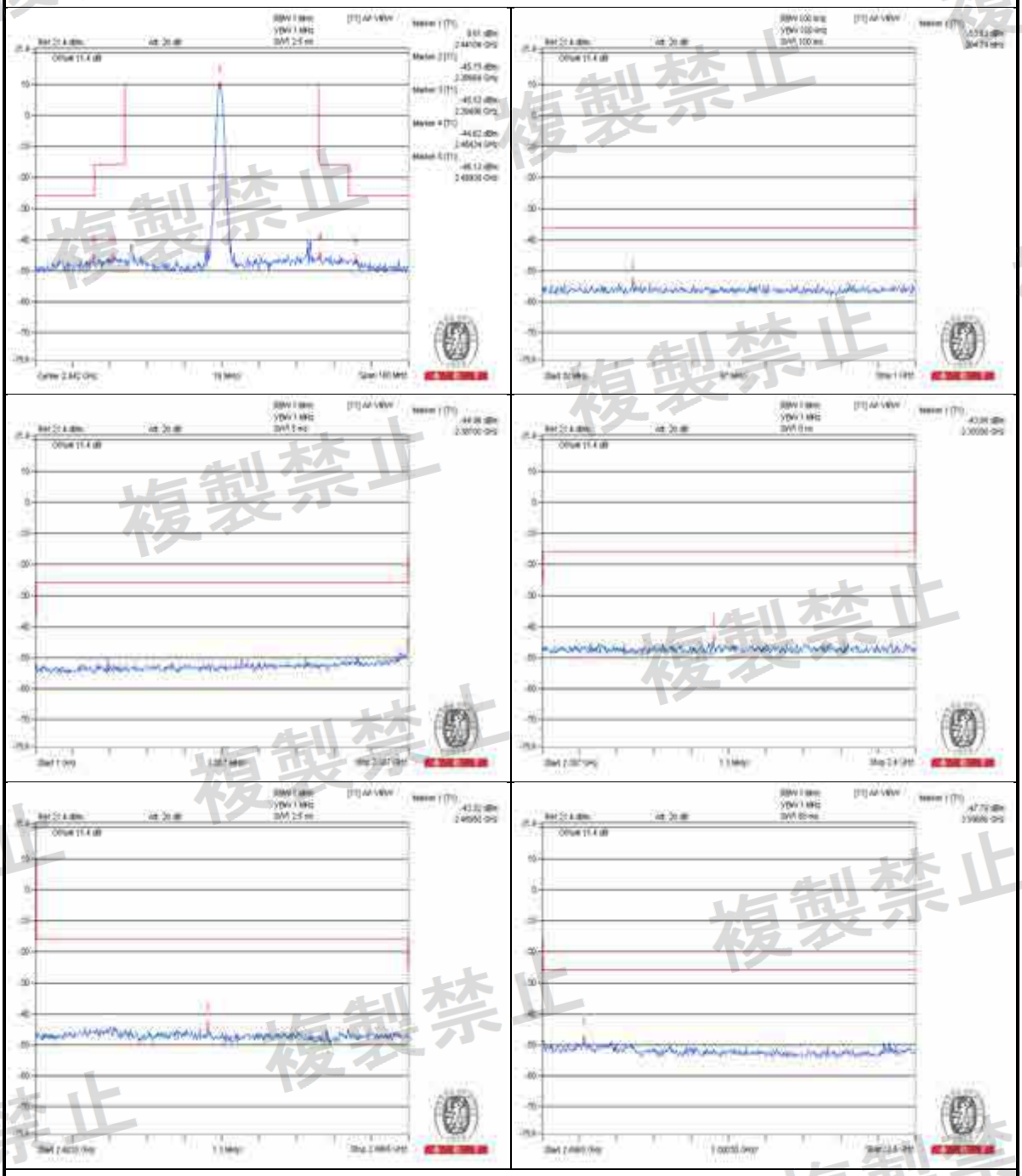
V_{normal}
Channel 0





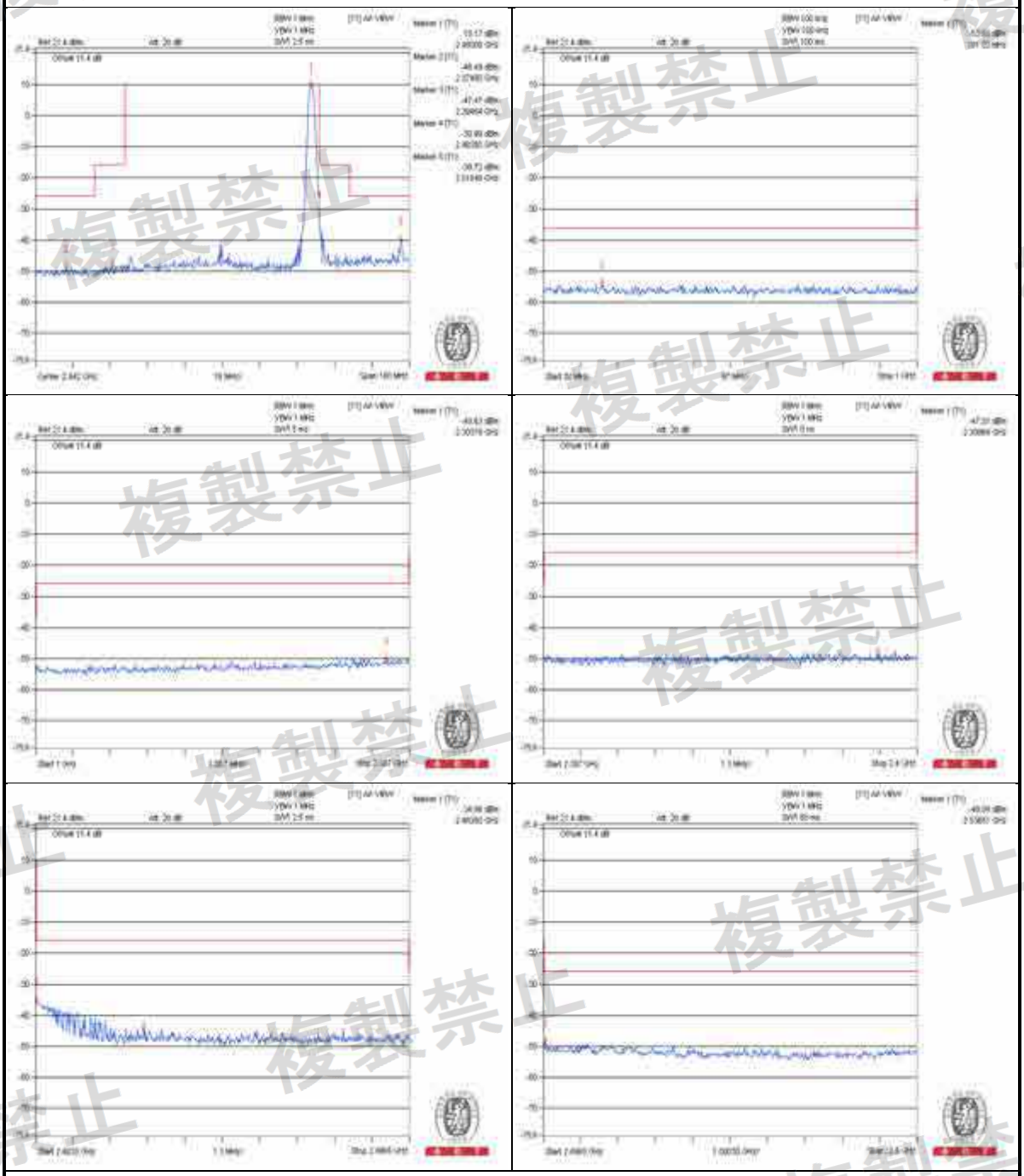
Measurement uncertainty: ± 3.93dB

V_{normal}
Channel 39



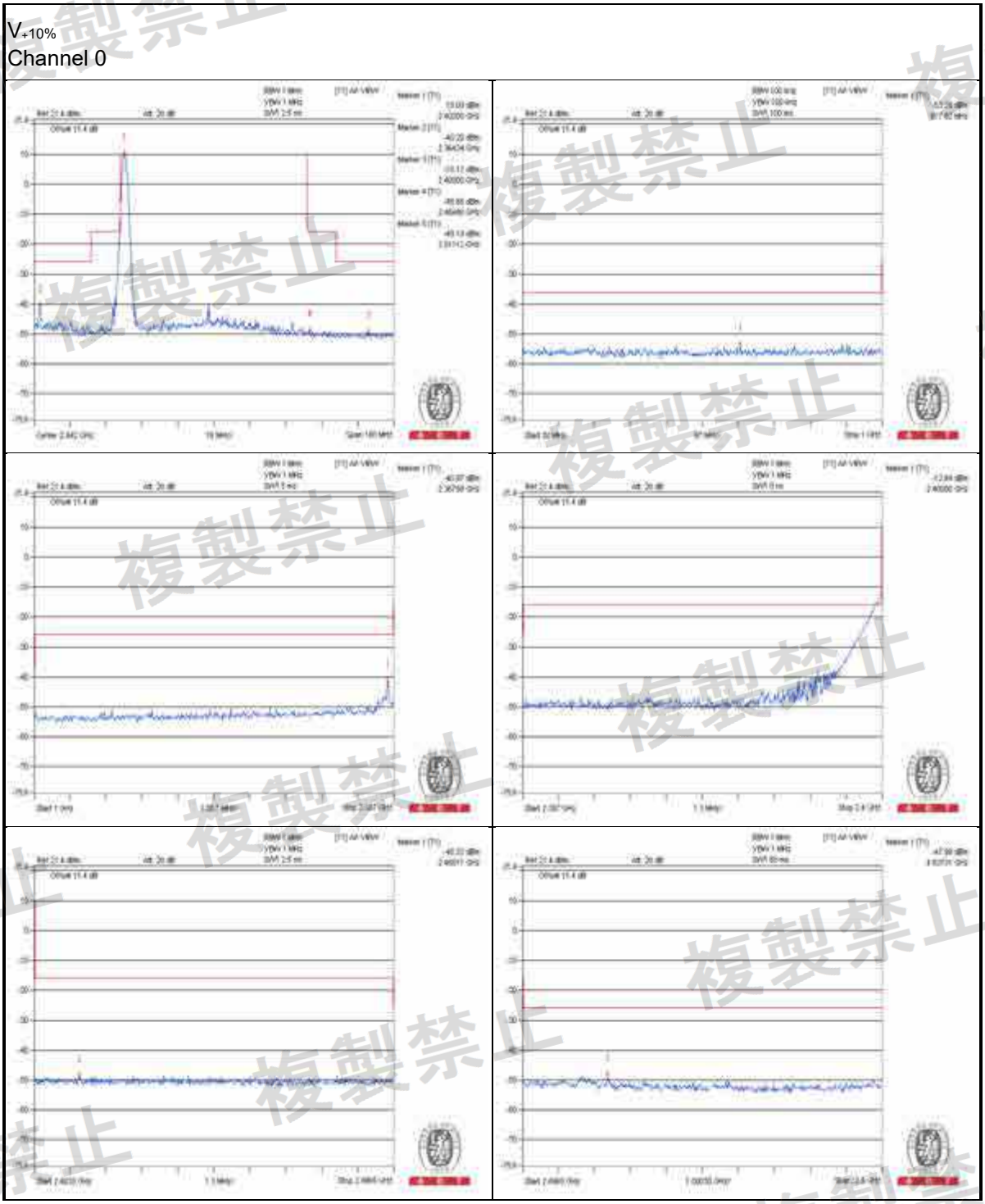
Measurement uncertainty: ± 3.93dB

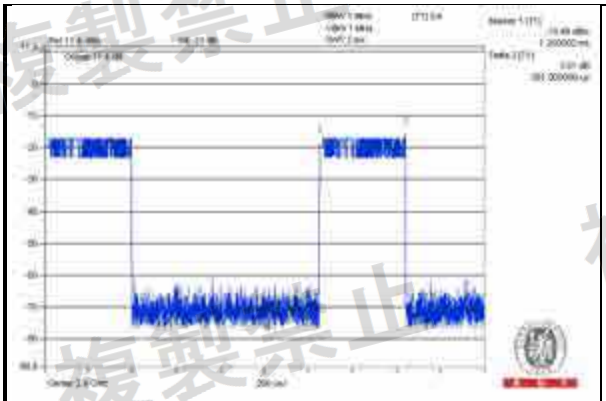
V_{normal}
Channel 78



Measurement uncertainty: ± 3.93dB

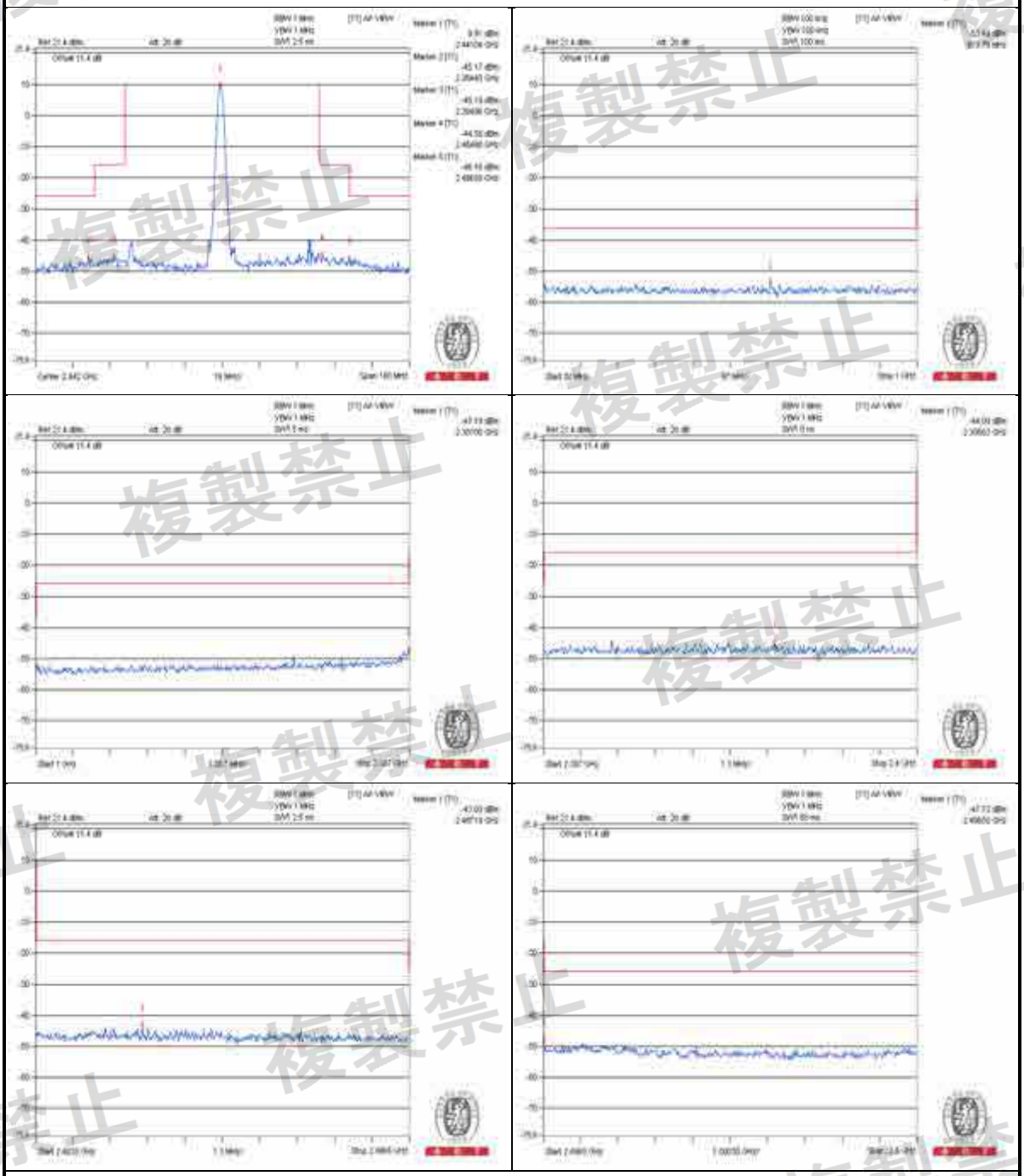
$V_{+10\%}$
Channel 0





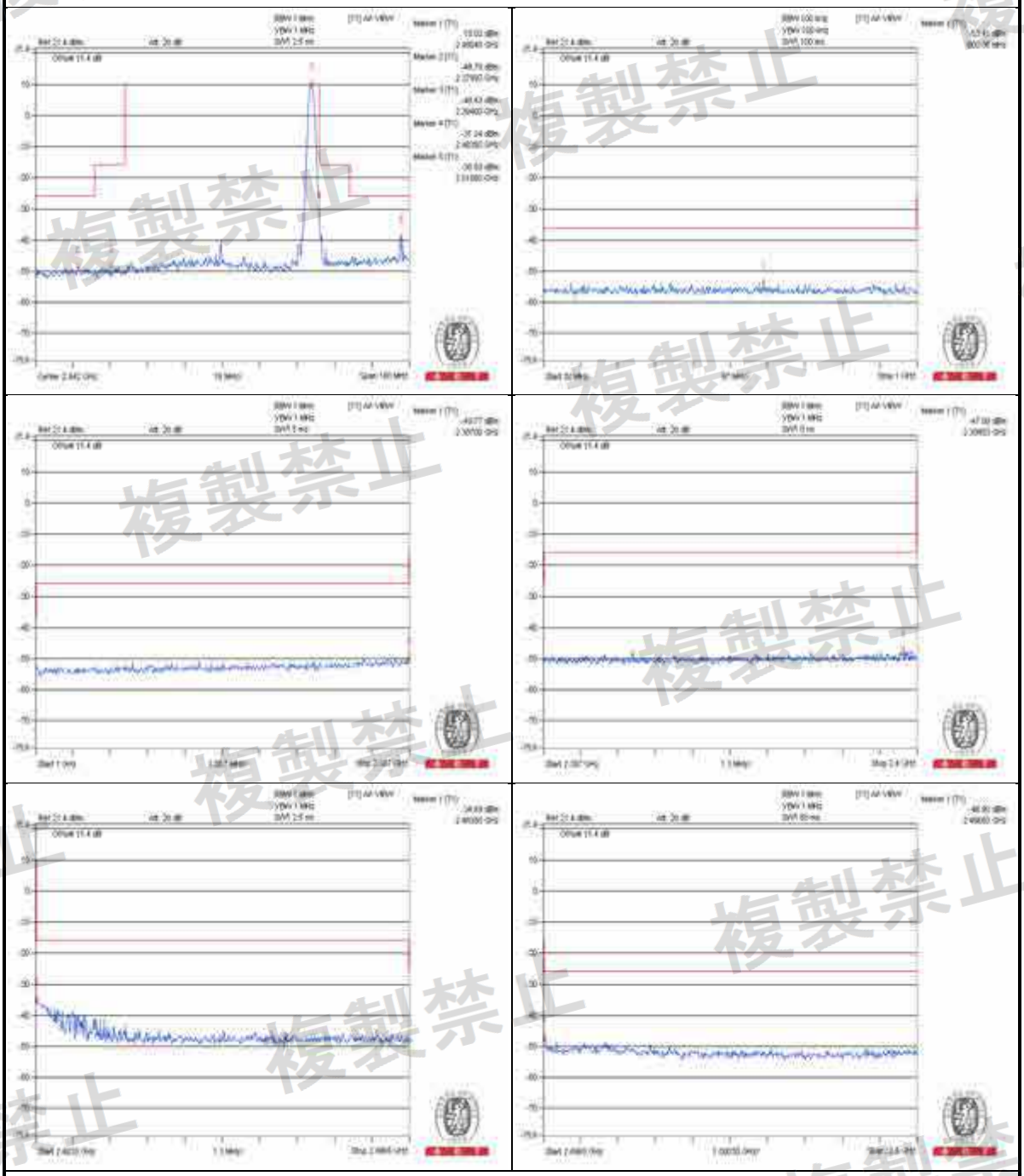
Measurement uncertainty: ± 3.93dB

$V_{+10\%}$
Channel 39



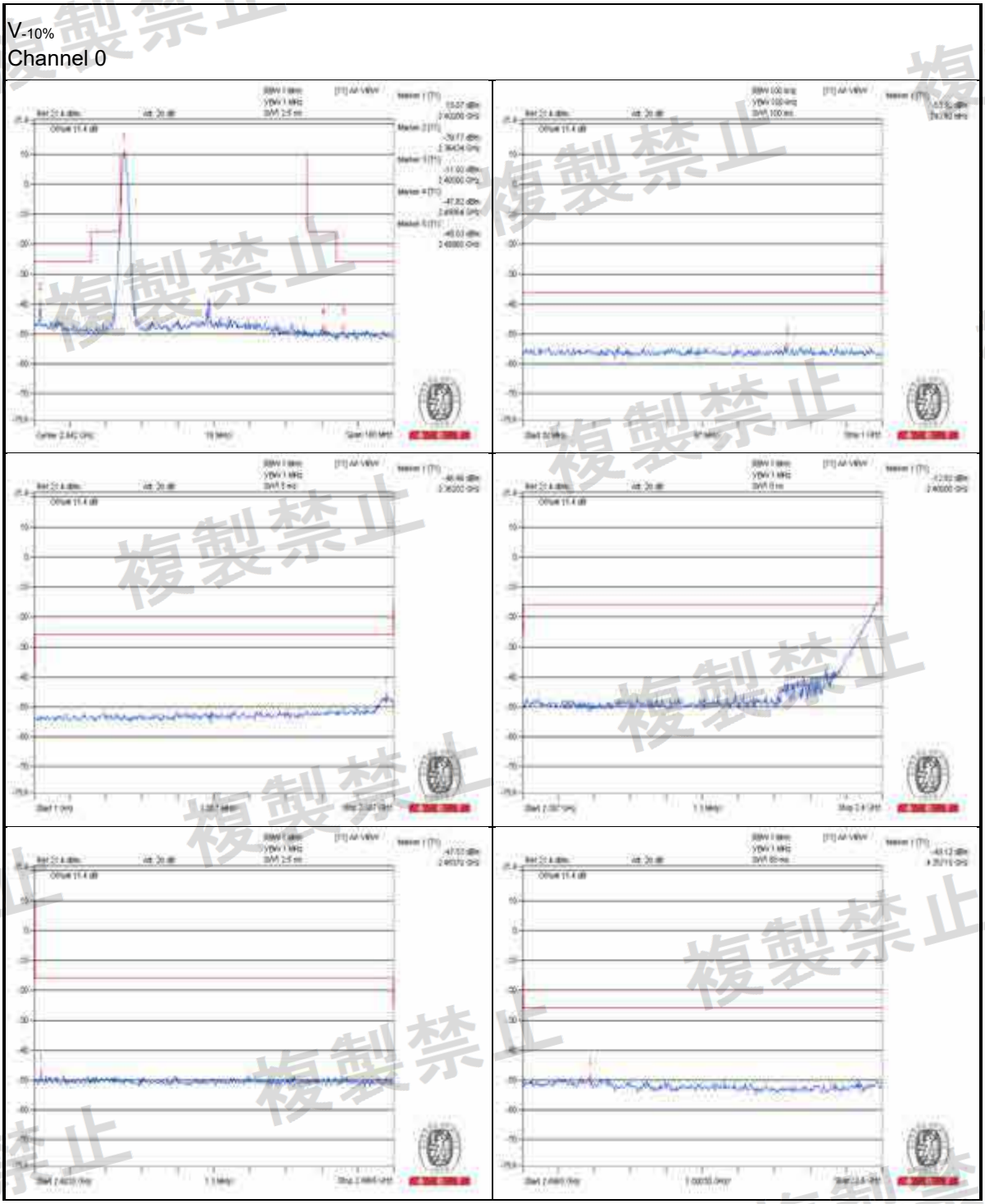
Measurement uncertainty: ± 3.93dB

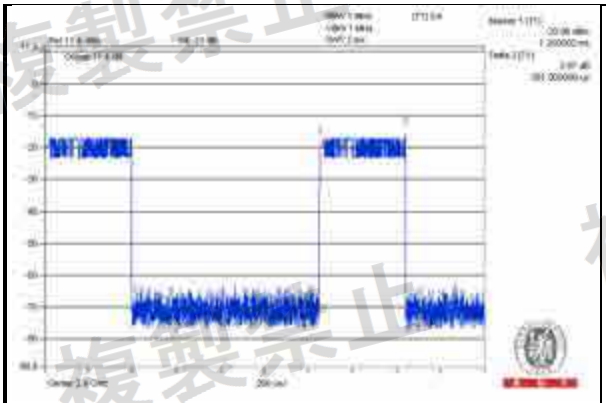
$V_{+10\%}$
Channel 78



Measurement uncertainty: ± 3.93dB

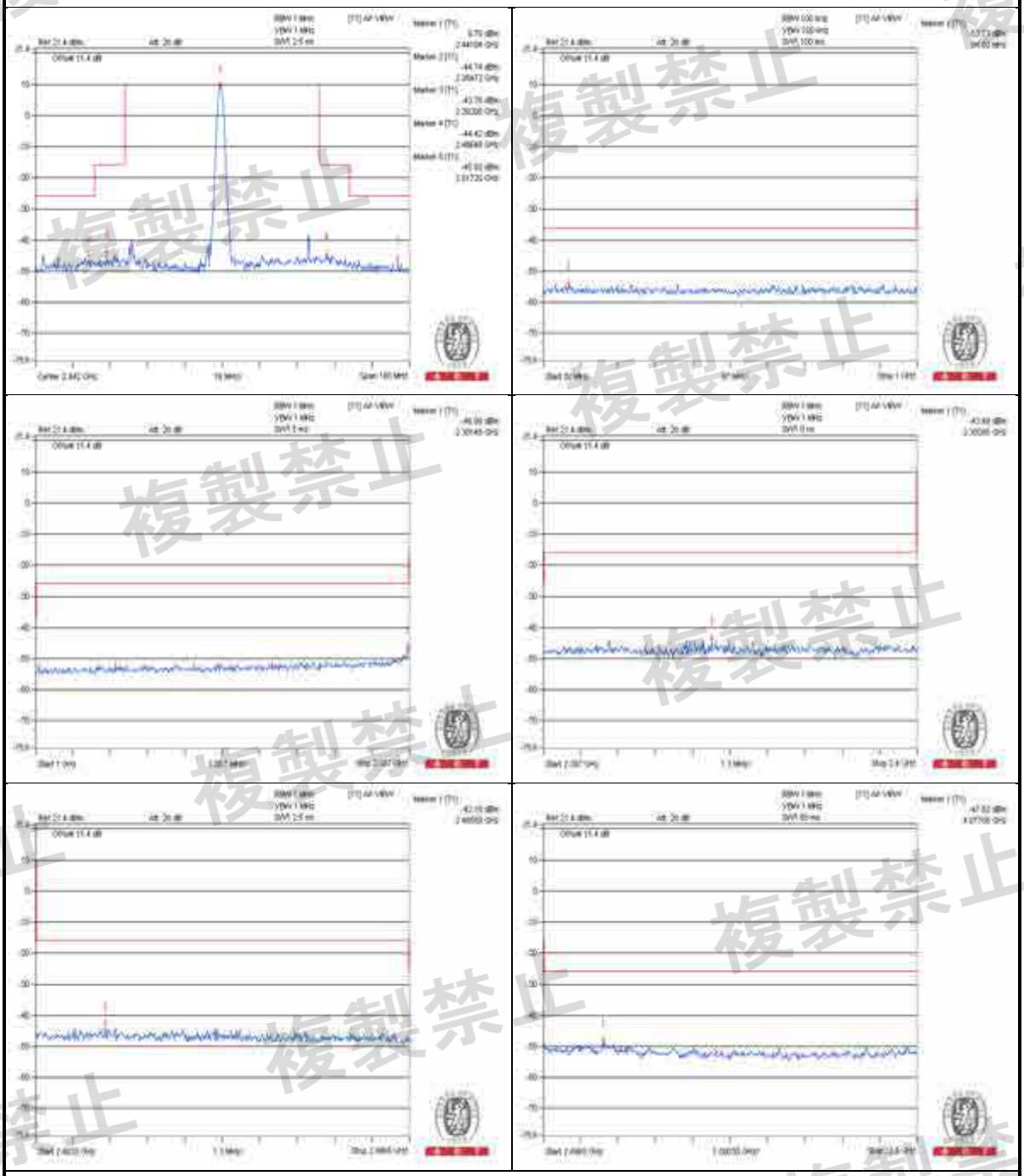
V-10%
Channel 0





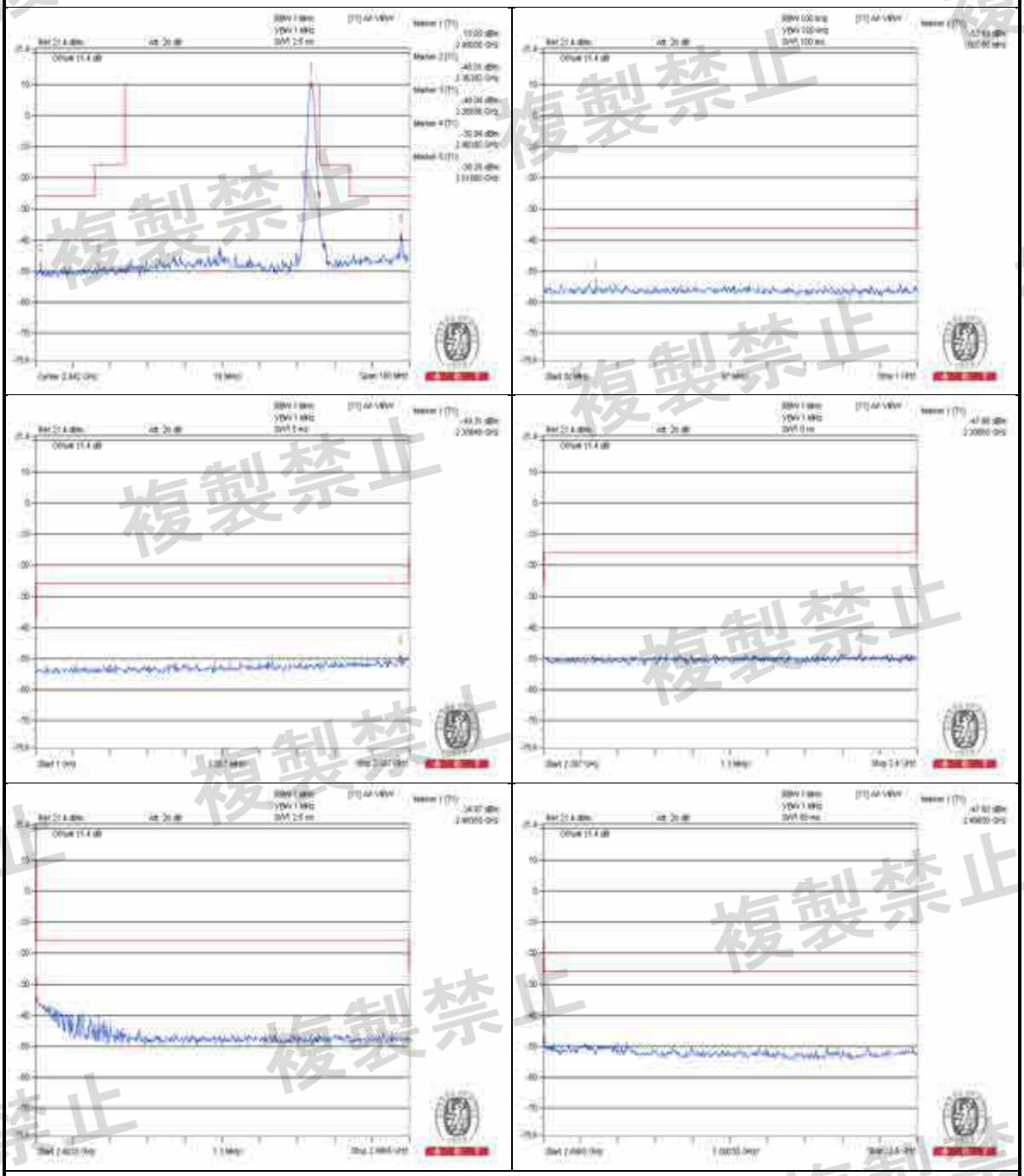
Measurement uncertainty: ± 3.93dB

V-10%
Channel 39



Measurement uncertainty: ± 3.93dB

V-10%
Channel 78



Measurement uncertainty: ± 3.93dB

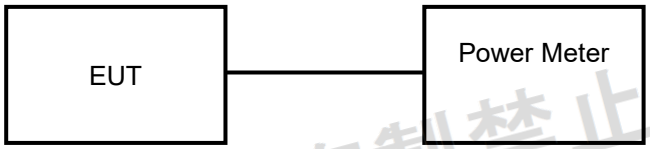
4.5 Antenna Power Measurement

4.5.1 Limits of Antenna Power

Modulation System	Frequency Band Used	Antenna Power (Max.)	EIRP (Max.)	
			Omni-Directional Case	Directional Case
DS	2400 – 2483.5 MHz	10 mW/MHz	12.14 dBm/MHz (16.37 mW/MHz)	22.14 dBm/MHz (163.68 mW/MHz)
OFDM (Note 1)	2400 – 2483.5 MHz	10 mW/MHz	12.14 dBm/MHz (16.37 mW/MHz)	22.14 dBm/MHz (163.68 mW/MHz)
OFDM (Note 2)	2400 – 2483.5 MHz	5 mW/MHz	9.14 dBm/MHz (8.20mW/MHz)	19.14 dBm/MHz (82.04 mW/MHz)
FH	2400 – 2483.5 MHz	3 mW/MHz	6.91 dBm/MHz (4.91 mW/MHz)	16.91 dBm/MHz (49.10 mW/MHz)
Other than the above	2400 – 2483.5 MHz	10 mW	12.14 dBm (16.368 mW)	22.14 dBm (163.68 mW)

Note:
1. Occupied bandwidth is less than 26 MHz
2. Occupied bandwidth is more than 26 MHz and less than 38 MHz
3. The half-power beam width for directional antenna shall be 360/A degrees or less, where A is a ratio which causes the EIRP concerned to exceed the omni-directional EIRP upper limit.
4. Tolerance of antenna power shall be +20 % (upper value) and –80 % (lower value).

4.5.2 Test Setup



Output Power Density (mW/MHz) = Total Output Power (mW) / Spread Bandwidth (MHz)
Average power sensor was used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

4.5.3 Test Results

Modulation: GFSK

Environmental Conditions	26 deg.C, 60 % RH		
Test Condition	Conducted RF output power (dBm)		
	Channel 0 2402 MHz	Channel 39 2441 MHz	Channel 78 2480 MHz
V_{normal}	**7.98000**	7.80000	7.97000
$V_{+10\%}$	7.50120	7.33200	7.49180
$V_{-10\%}$	7.57621	7.40532	7.56672

Normal Mode:

Environmental Conditions	26 deg.C, 60 % RH			
Test Condition	Conducted RF Output Power Density (mW/MHz)			
	Channel 0 2402 MHz	Channel 39 2441 MHz	Channel 78 2480 MHz	Max. Limit (mW/MHz)
V_{normal}	**0.08768**	0.08412	0.08748	3
$V_{+10\%}$	0.07835	0.07536	0.07818	3
$V_{-10\%}$	0.07990	0.07681	0.07972	3
Rated Power	0.09000			
Tolerance of Antenna Power	0.02 ~ 0.1080			

Note: 1.Conducted of output power density = Conducted output power / Spread-Spectrum.
2. Set EUT to transmit continuously wave (duty-cycle = 1) to test.
3. Output Power Tolerance (%) = {(0.08768 - 0.09000) / 0.09000} * 100 = -2.58 %.

AFH Mode:

Environmental Conditions	26 deg.C, 60 % RH			
Test Condition	Conducted RF Output Power Density (mW/MHz)			
	Channel 0 2402 MHz	Channel 39 2441 MHz	Channel 78 2480 MHz	Max. Limit (mW/MHz)
V_{normal}	**0.36137**	0.34670	0.36054	3
$V_{+10\%}$	0.32365	0.31128	0.32295	3
$V_{-10\%}$	0.32928	0.31658	0.32857	3
Rated Power	0.40000			
Tolerance of Antenna Power	0.08 ~ 0.4800			

Note: 1.Conducted of output power density = Conducted output power / Spread-Spectrum.
2. Set EUT to transmit continuously wave (duty-cycle = 1) to test.
3. Output Power Tolerance (%) = {(0.36137 - 0.40000) / 0.40000} * 100 = -9.66 %.

Chip Antenna with 0.5 dBi gain

Normal Mode:

Environmental Conditions	25 Deg.C, 60 % RH			
Test Condition	Radiated RF Output Power Density (mW/MHz)			
	Channel 0 2402 MHz	Channel 39 2441 MHz	Channel 78 2480 MHz	Max. Limit (mW/MHz)
V_{normal}	**0.09838**	0.09439	0.09815	4.910
$V_{+10\%}$	0.08791	0.08455	0.08772	4.910
$V_{-10\%}$	0.08965	0.08619	0.08945	4.910

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.

AFH Mode:

Environmental Conditions	25 Deg.C, 60 % RH			
Test Condition	Radiated RF Output Power Density (mW/MHz)			
	Channel 0 2402 MHz	Channel 39 2441 MHz	Channel 78 2480 MHz	Max. Limit (mW/MHz)
V_{normal}	**0.40546**	0.38900	0.40453	4.910
$V_{+10\%}$	0.36314	0.34926	0.36235	4.910
$V_{-10\%}$	0.36946	0.35521	0.36866	4.910

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.

Modulation: π/4-DQPSK

Environmental Conditions	26 deg.C, 60 % RH		
Test Condition	Conducted RF output power (dBm)		
	Channel 0 2402 MHz	Channel 39 2441 MHz	Channel 78 2480 MHz
V_{normal}	**7.93000**	7.72000	7.89000
$V_{+10\%}$	7.45420	7.25680	7.41660
$V_{-10\%}$	7.52874	7.32937	7.49077

Normal Mode:

Environmental Conditions	26 deg.C, 60 % RH			
Test Condition	Conducted RF Output Power Density (mW/MHz)			
	Channel 0 2402 MHz	Channel 39 2441 MHz	Channel 78 2480 MHz	Max. Limit (mW/MHz)
V_{normal}	**0.08648**	0.08240	0.08569	3
$V_{+10\%}$	0.07786	0.07440	0.07719	3
$V_{-10\%}$	0.07903	0.07548	0.07834	3
Rated Power	0.09000			
Tolerance of Antenna Power	0.02 ~ 0.1080			

Note: 1.Conducted of output power density = Conducted output power / Spread-Spectrum.
2. Set EUT to transmit continuously wave (duty-cycle = 1) to test.
3. Output Power Tolerance (%) = {(0.08648 – 0.09000) / 0.09000} * 100 = -3.91 %.

AFH Mode:

Environmental Conditions	26 deg.C, 60 % RH			
Test Condition	Conducted RF Output Power Density (mW/MHz)			
	Channel 0 2402 MHz	Channel 39 2441 MHz	Channel 78 2480 MHz	Max. Limit (mW/MHz)
V_{normal}	**0.35560**	0.33881	0.35233	3
$V_{+10\%}$	0.32164	0.30735	0.31887	3
$V_{-10\%}$	0.32273	0.30825	0.31992	3
Rated Power	0.40000			
Tolerance of Antenna Power	0.08 ~ 0.4800			

Note: 1.Conducted of output power density = Conducted output power / Spread-Spectrum.
2. Set EUT to transmit continuously wave (duty-cycle = 1) to test.
3. Output Power Tolerance (%) = {(0.35560 – 0.40000) / 0.40000} * 100 = -11.10 %.

Chip Antenna with 0.5 dBi gain

Normal Mode:

Environmental Conditions	26 deg.C, 60 % RH			
Test Condition	Radiated RF Output Power Density (mW/MHz)			
	Channel 0 2402 MHz	Channel 39 2441 MHz	Channel 78 2480 MHz	Max. Limit (mW/MHz)
V_{normal}	**0.09704**	0.09246	0.09615	4.910
$V_{+10\%}$	0.08736	0.08347	0.08660	4.910
$V_{-10\%}$	0.08867	0.08469	0.08790	4.910

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.

AFH Mode:

Environmental Conditions	26 deg.C, 60 % RH			
Test Condition	Radiated RF Output Power Density (mW/MHz)			
	Channel 0 2402 MHz	Channel 39 2441 MHz	Channel 78 2480 MHz	Max. Limit (mW/MHz)
V_{normal}	**0.39898**	0.38015	0.39533	4.910
$V_{+10\%}$	0.36089	0.34485	0.35778	4.910
$V_{-10\%}$	0.36211	0.34587	0.35896	4.910

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.

Modulation: 8DPSK

Environmental Conditions	26 deg.C, 60 % RH		
Test Condition	Conducted RF output power (dBm)		
	Channel 0 2402 MHz	Channel 39 2441 MHz	Channel 78 2480 MHz
V_{normal}	**7.92000**	7.72000	7.89000
$V_{+10\%}$	7.44480	7.25680	7.41660
$V_{-10\%}$	7.51925	7.32937	7.49077

Normal Mode:

Environmental Conditions	26 deg.C, 60 % RH			
Test Condition	Conducted RF Output Power Density (mW/MHz)			
	Channel 0 2402 MHz	Channel 39 2441 MHz	Channel 78 2480 MHz	Max. Limit (mW/MHz)
V_{normal}	**0.08629**	0.08240	0.08569	3
$V_{+10\%}$	0.07734	0.07407	0.07684	3
$V_{-10\%}$	0.07868	0.07531	0.07817	3
Rated Power	0.09000			
Tolerance of Antenna Power	0.02 ~ 0.1080			

Note: 1.Conducted of output power density = Conducted output power / Spread-Spectrum.
2. Set EUT to transmit continuously wave (duty-cycle = 1) to test.
3. Output Power Tolerance (%) = {(0.08629 – 0.09000) / 0.09000} * 100 = -4.12 %.

AFH Mode:

Environmental Conditions	26 deg.C, 60 % RH			
Test Condition	Conducted RF Output Power Density (mW/MHz)			
	Channel 0 2402 MHz	Channel 39 2441 MHz	Channel 78 2480 MHz	Max. Limit (mW/MHz)
V_{normal}	**0.35478**	0.33881	0.35233	3
$V_{+10\%}$	0.31947	0.30594	0.31740	3
$V_{-10\%}$	0.32499	0.31109	0.32287	3
Rated Power	0.40000			
Tolerance of Antenna Power	0.08 ~ 0.4800			

Note: 1.Conducted of output power density = Conducted output power / Spread-Spectrum.
2. Set EUT to transmit continuously wave (duty-cycle = 1) to test.
3. Output Power Tolerance (%) = {(0.35478 – 0.40000) / 0.40000} * 100 = -11.31 %.

Chip Antenna with 0.5 dBi gain

Normal Mode:

Environmental Conditions	26 deg.C, 60 % RH			
Test Condition	Radiated RF Output Power Density (mW/MHz)			
	Channel 0 2402 MHz	Channel 39 2441 MHz	Channel 78 2480 MHz	Max. Limit (mW/MHz)
V_{normal}	**0.09681**	0.09246	0.09615	4.910
$V_{+10\%}$	0.08678	0.08310	0.08622	4.910
$V_{-10\%}$	0.08828	0.08450	0.08770	4.910

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.

AFH Mode:

Environmental Conditions	26 deg.C, 60 % RH			
Test Condition	Radiated RF Output Power Density (mW/MHz)			
	Channel 0 2402 MHz	Channel 39 2441 MHz	Channel 78 2480 MHz	Max. Limit (mW/MHz)
V_{normal}	**0.39807**	0.38015	0.39533	4.910
$V_{+10\%}$	0.35845	0.34327	0.35613	4.910
$V_{-10\%}$	0.36465	0.34905	0.36227	4.910

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

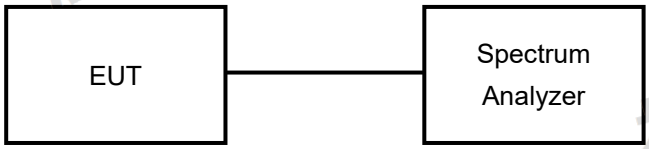
2. Formula: Radiated RF output power density = Conducted RF output power density + Antenna Gain.

4.6 Spurious Emissions for Receiver

4.6.1 Limits of Spurious Emissions for Receiver

Frequencies (MHz)	Limit
Below 1 GHz	≦4 nW (-54 dBm)
Above 1 GHz	≦20 nW (-47 dBm)

4.6.2 Test Setup



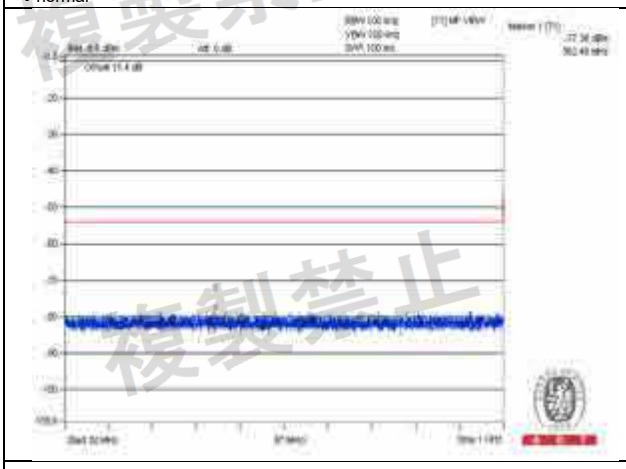
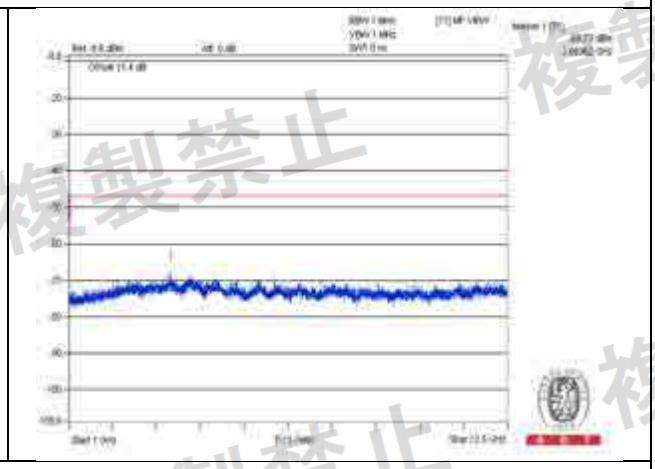
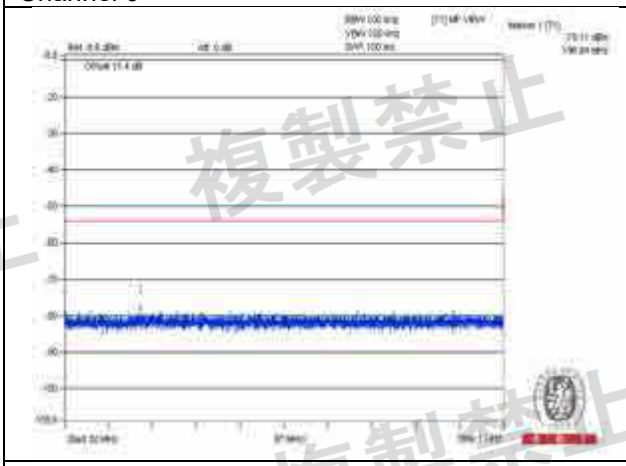
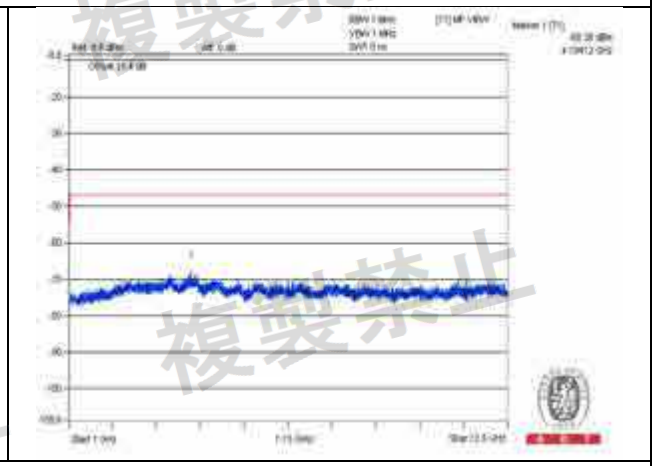
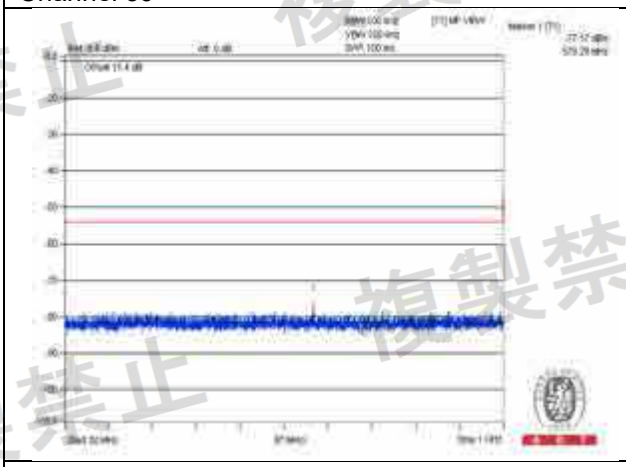
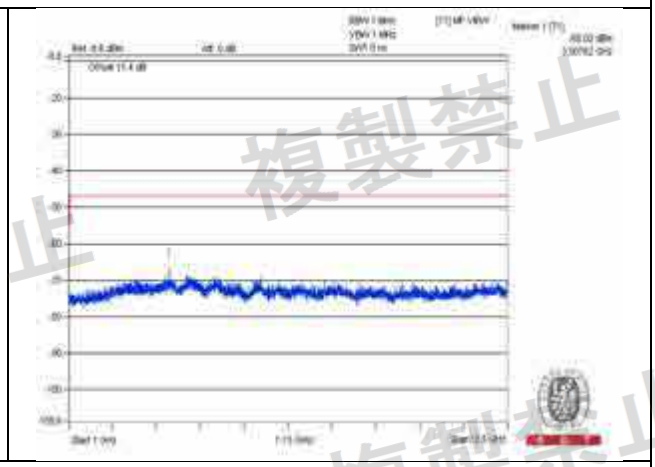
4.6.3 Test Result

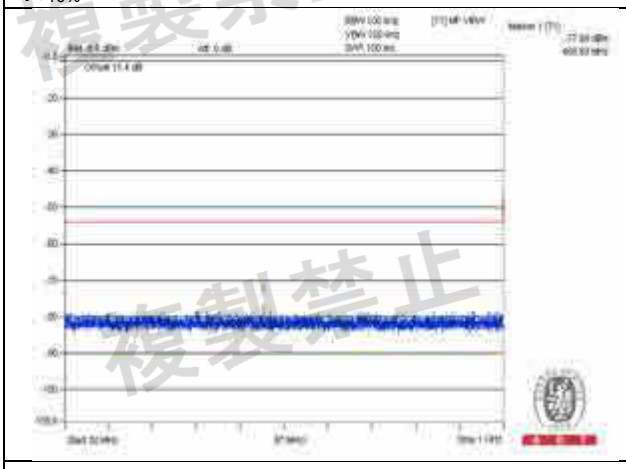
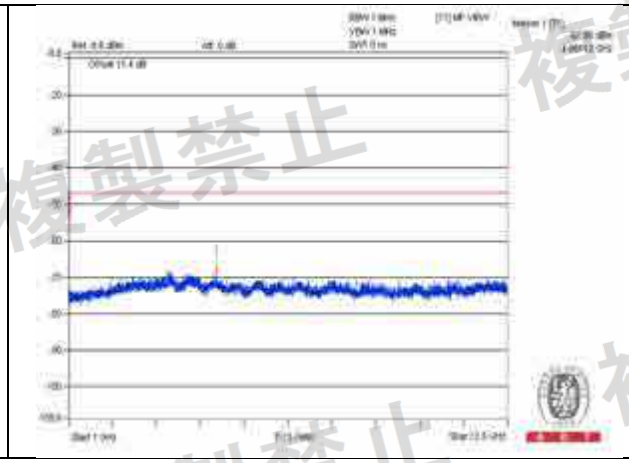
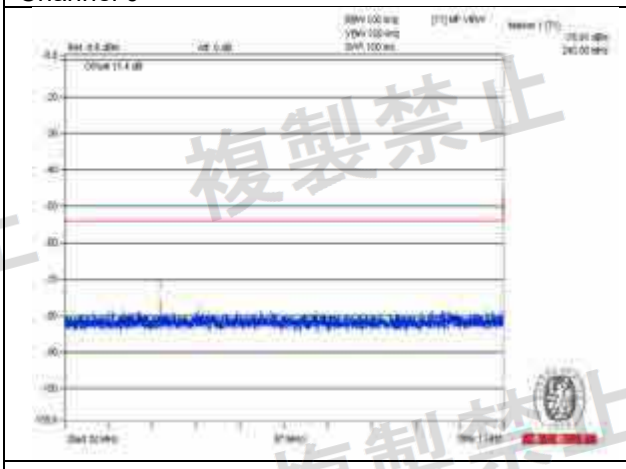
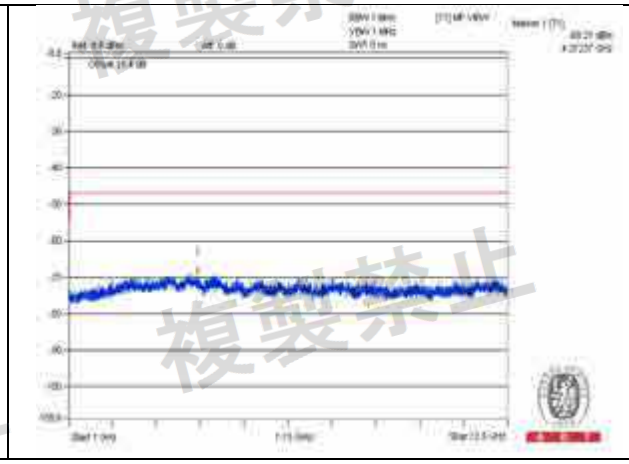
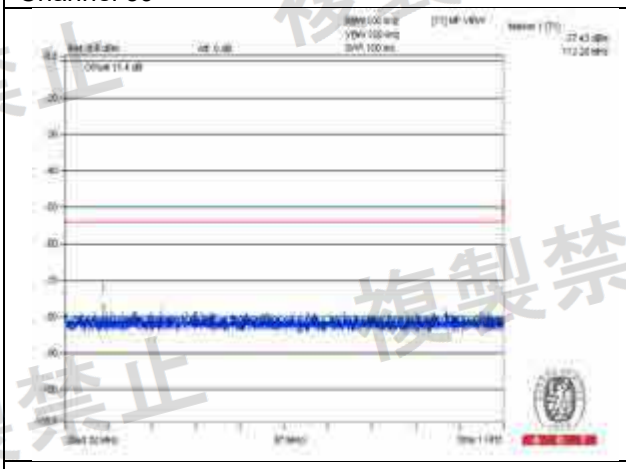
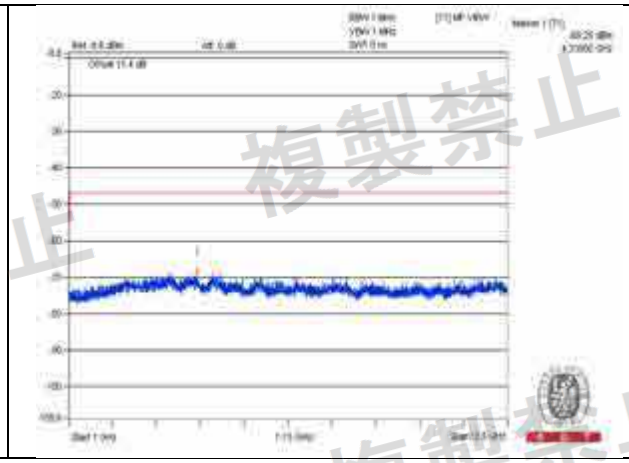
Environmental Conditions		25 deg.C, 60 % RH					
Test Channel		Channel 0 (2402 MHz)		Channel 39 (2441 MHz)		Limit	Result
Test Condition	Frequency Range	Frequency (MHz)	Measured Value	Frequency (MHz)	Measured Value		
V_{normal}	Below 1 GHz	362.467	**0.018325nW**	196.840	0.01542nW	4nW	PASS
	Above 1 GHz	3653.625	0.133824nW	4194.125	0.145105nW	20nW	PASS
$V_{+10\%}$	Below 1 GHz	468.683	0.01701nW	240.005	**0.020355nW**	4nW	PASS
	Above 1 GHz	4861.125	**0.163518nW**	4372.375	0.15067nW	20nW	PASS
$V_{-10\%}$	Below 1 GHz	789.753	0.017802nW	240.005	0.016589nW	4nW	PASS
	Above 1 GHz	4047.500	0.134017nW	4096.375	**0.181927nW**	20nW	PASS

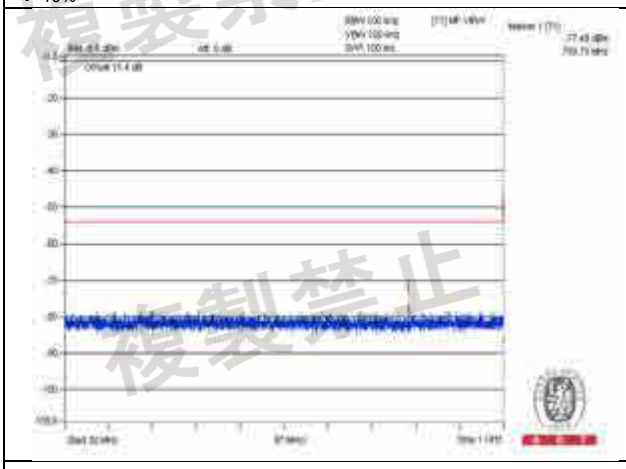
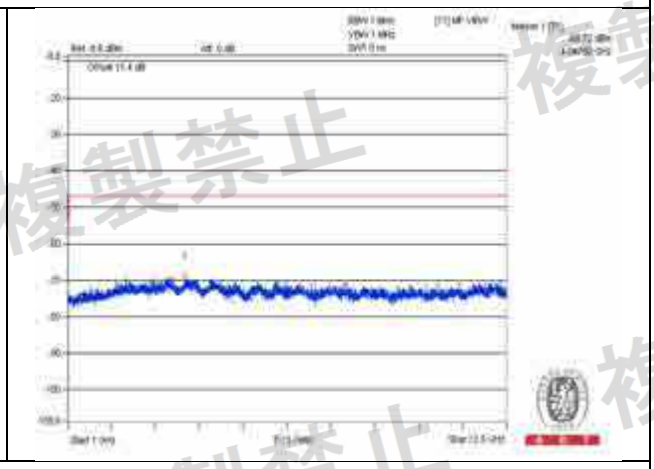
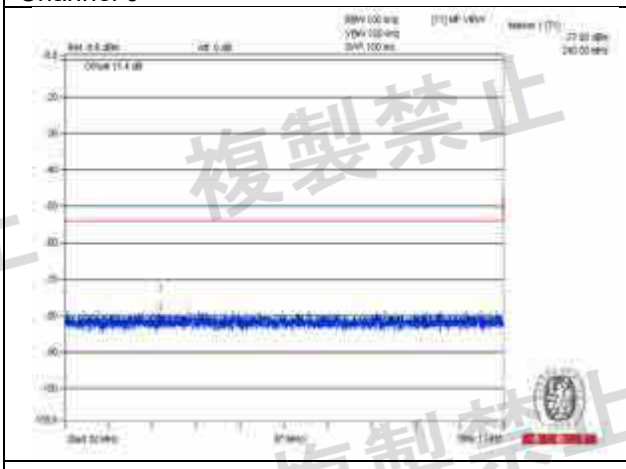
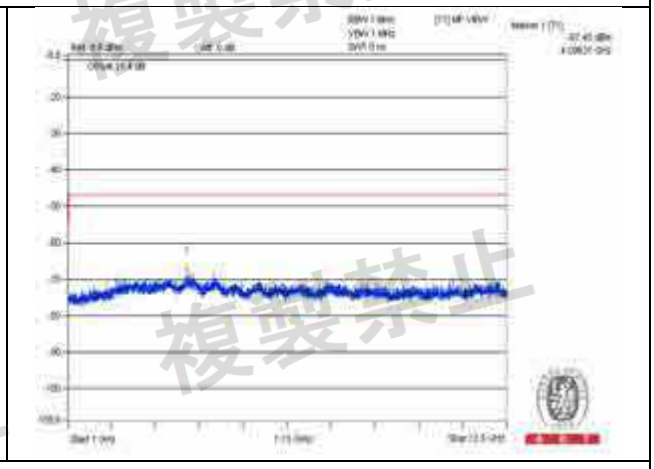
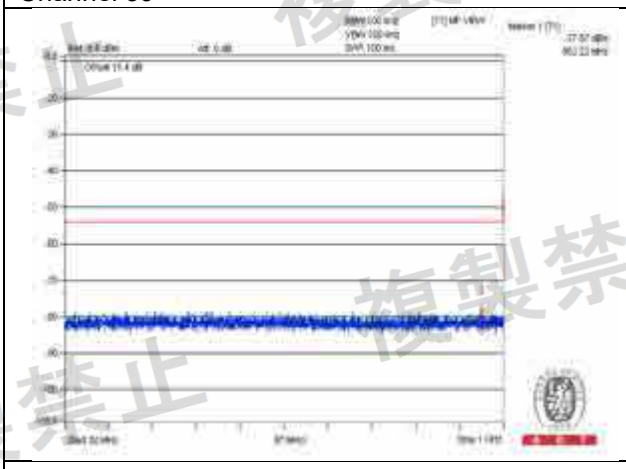
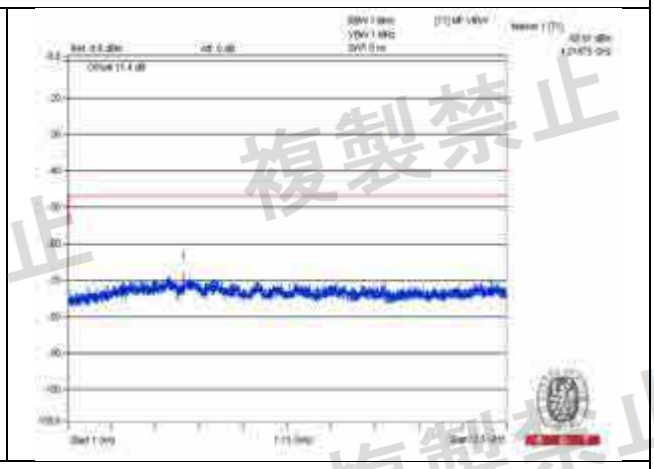
Test Channel		Channel 78 (2480 MHz)		Limit	Result
Test Condition	Frequency Range	Frequency (MHz) Measured Value	Measured Value		
V_{normal}	Below 1 GHz	578.293	**0.019146nW**	4nW	PASS
	Above 1 GHz	3607.625	**0.157051nW**	20nW	PASS
$V_{+10\%}$	Below 1 GHz	112.207	0.018041nW	4nW	PASS
	Above 1 GHz	4335.000	0.149332nW	20nW	PASS
$V_{-10\%}$	Below 1 GHz	952.227	0.016298nW	4nW	PASS
	Above 1 GHz	4018.750	0.137689nW	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 39	
	
Channel 78	
Measurement uncertainty: ± 3.93dB	

$V_{+10\%}$	
	
Channel 0	
	
Channel 39	
	
Channel 78	
Measurement uncertainty: ± 3.93dB	

$V_{-10\%}$
 
Channel 0
 
Channel 39
 
Channel 78
Measurement uncertainty: ± 3.93dB

4.7 Dwell Time

4.7.1 Limits of Dwell Time

The frequency retention time in the frequency hopping method shall be 0.4 seconds or less. The total sum of the frequency retention time in any frequency within the time obtained by multiplying the diffusion rate by 0.4 second shall be 0.4 second or shorter.

Formula:

(Normal mode) dwell time = [diffusion rate/ 79] x duty-cycle x 0.4 seconds

(AFH mode) dwell time = [diffusion rate/20] x duty-cycle x 0.4 sec

4.7.2 Test Setup

4.7.3 Test Result

Modulation: GFSK

Normal Mode:

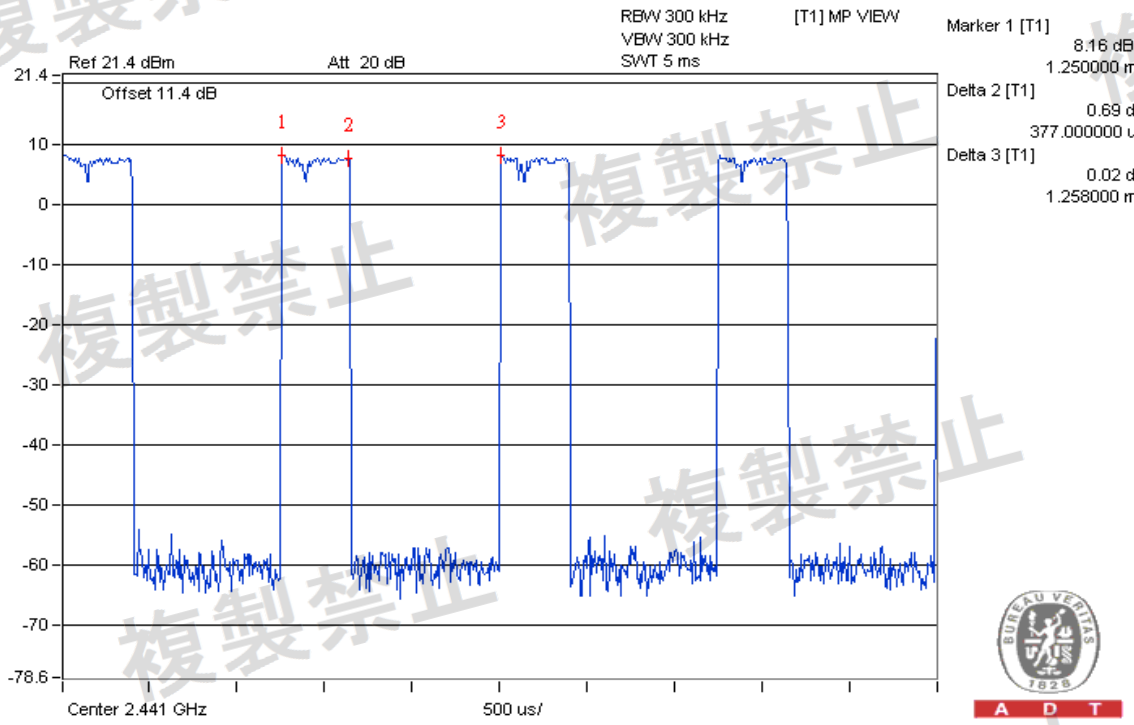
Test Condition	Mode	Spreading Rate	[Spreading Rate/79]*0.4	Duty Cycle	Result (msec)	Limit (msec)
V_{normal}	DH1	71.63	0.363	0.300	108.900	400
	DH3	71.63	0.363	0.643	233.409	400
	DH5	71.63	0.363	0.764	277.332	400
$V_{+10\%}$	DH1	71.79	0.363	0.300	108.900	400
	DH3	71.79	0.363	0.643	233.409	400
	DH5	71.79	0.363	0.764	277.332	400
$V_{-10\%}$	DH1	71.63	0.363	0.300	108.900	400
	DH3	71.63	0.363	0.643	233.409	400
	DH5	71.63	0.363	0.764	277.332	400

AFH Mode:

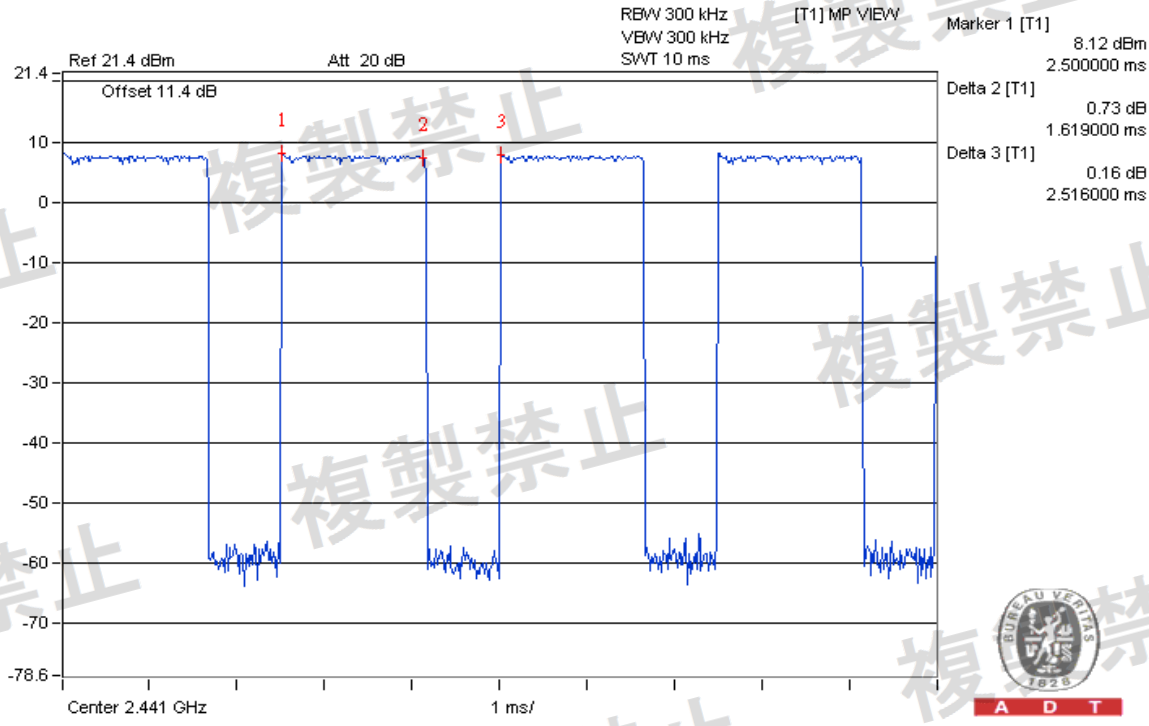
Test Condition	Mode	Spreading Rate	[Spreading Rate/20]*0.4	Duty Cycle	Result (msec)	Limit (msec)
V_{normal}	DH1	17.38	0.348	0.300	104.400	400
	DH3	17.38	0.348	0.643	223.764	400
	DH5	17.38	0.348	0.764	265.872	400
$V_{+10\%}$	DH1	17.30	0.346	0.300	103.800	400
	DH3	17.30	0.346	0.643	222.478	400
	DH5	17.30	0.346	0.764	264.344	400
$V_{-10\%}$	DH1	17.30	0.346	0.300	103.800	400
	DH3	17.30	0.346	0.643	222.478	400
	DH5	17.30	0.346	0.764	264.344	400

NOTE: Test plots of the transmitting time slot are shown on following pages.

V_{normal}



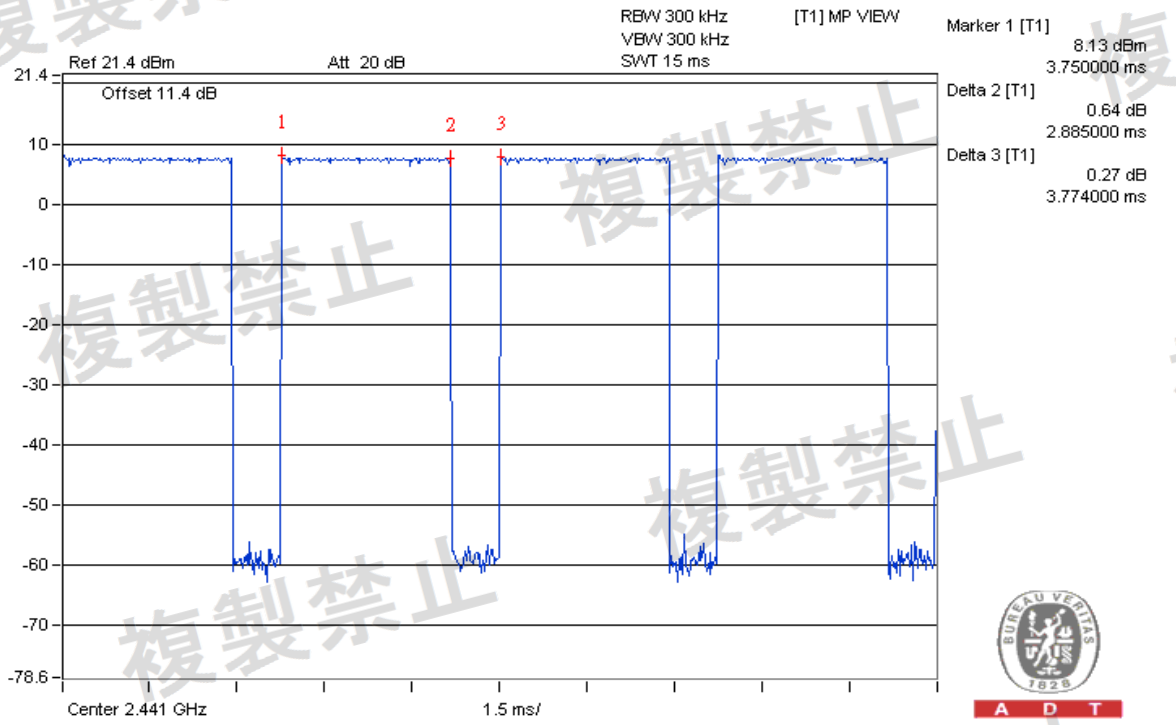
DH1



DH3

Measurement uncertainty: ± 3.93dB

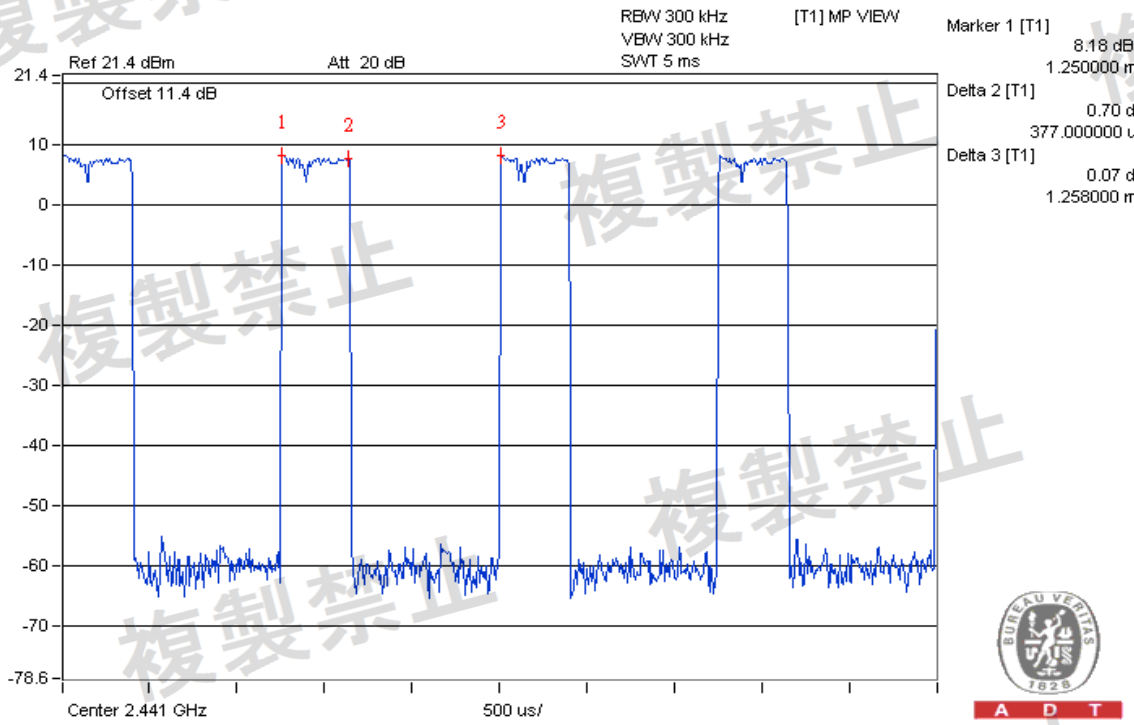
V_{normal}



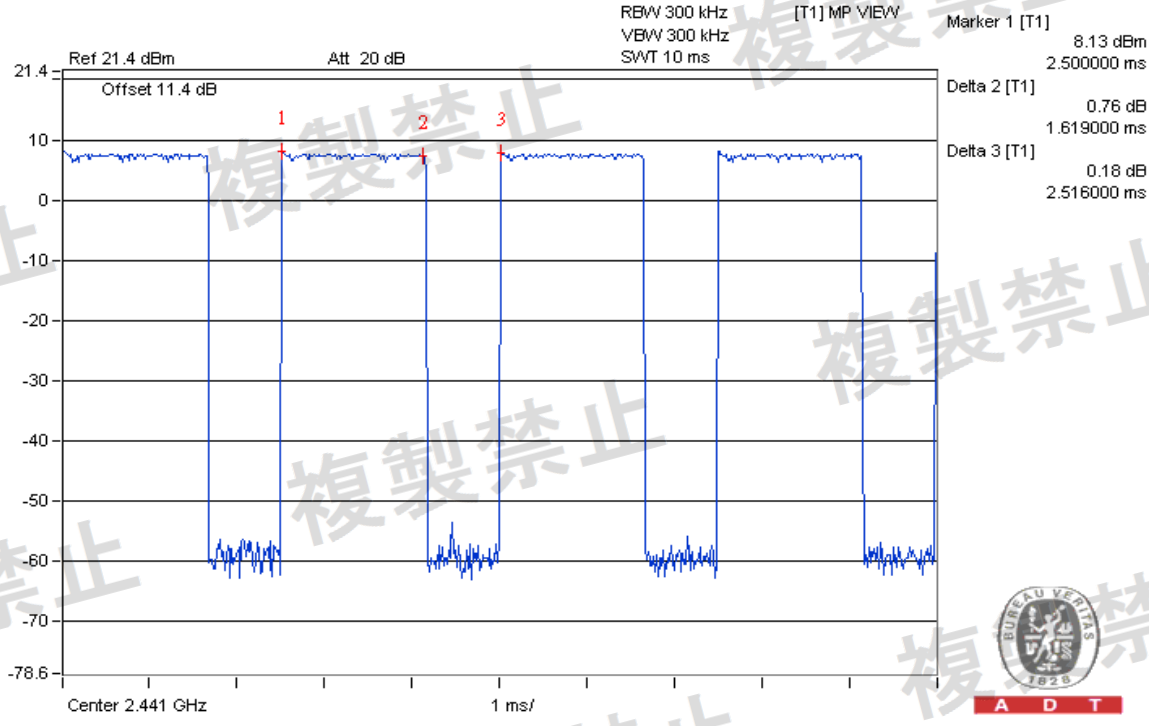
DH5

Measurement uncertainty: ± 3.93dB

$V_{+10\%}$

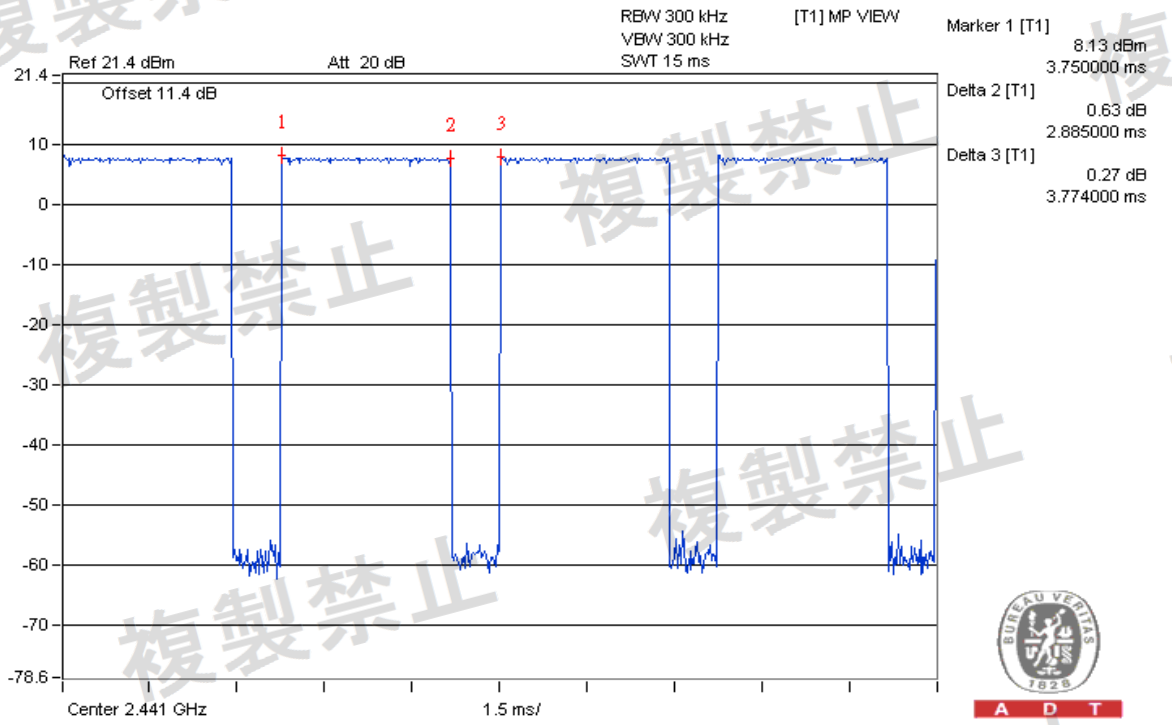


DH1

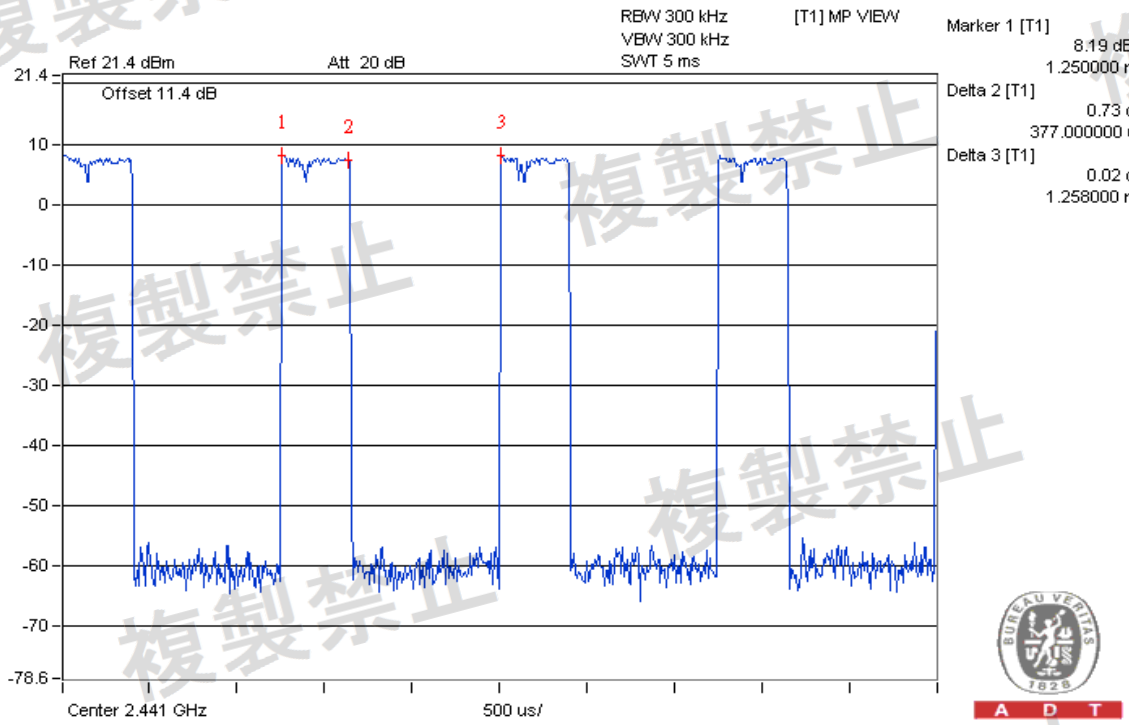


DH3

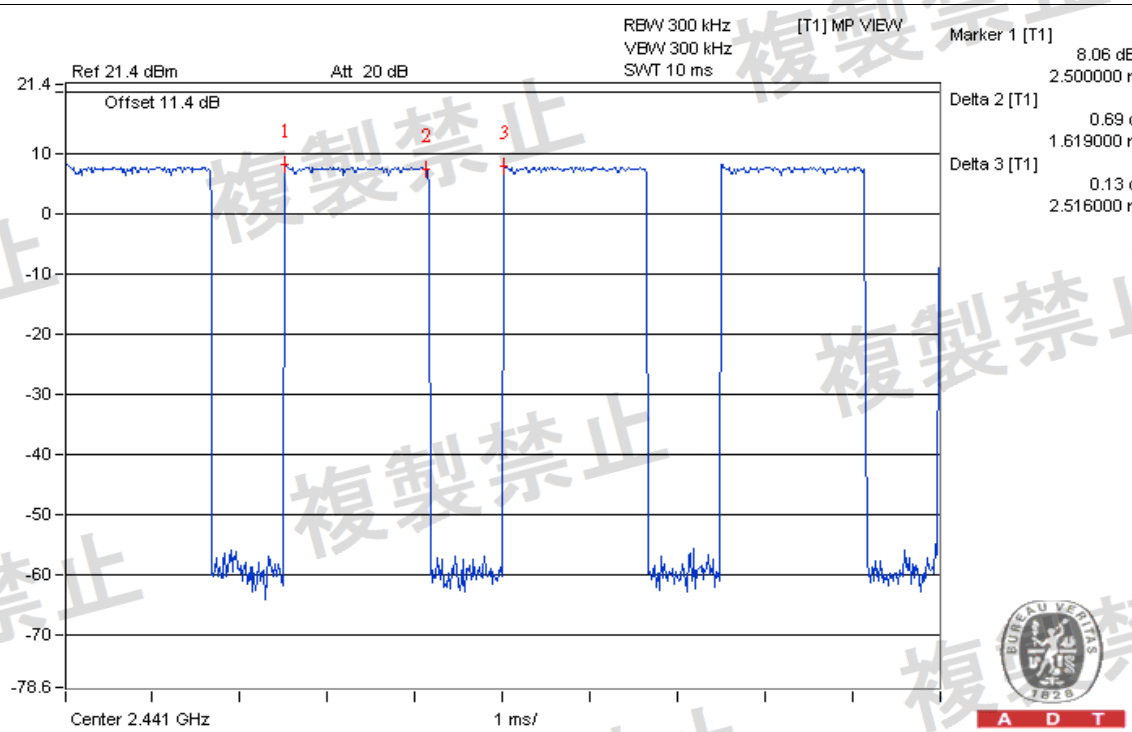
Measurement uncertainty: ± 3.93dB

$V_{+10\%}$

DH5
Measurement uncertainty: ± 3.93dB

$V_{-10\%}$

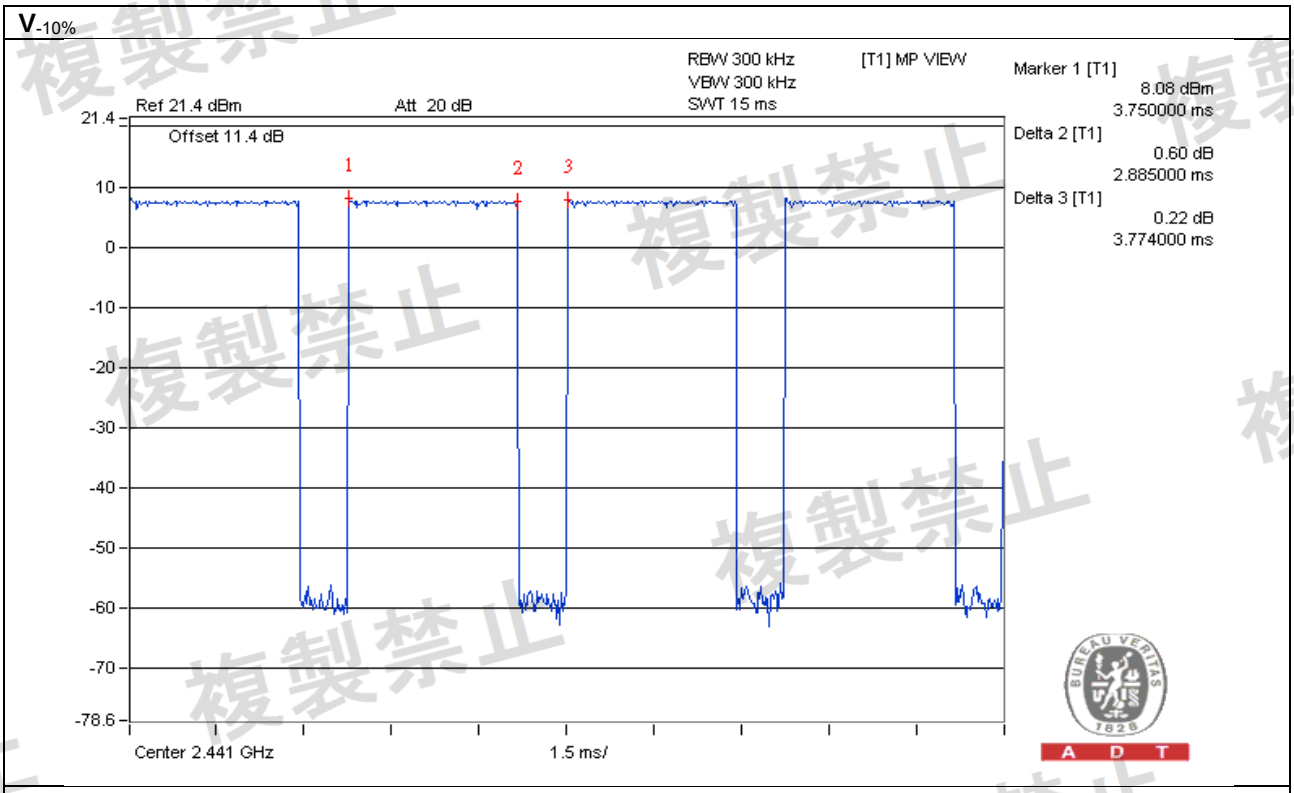


DH1



DH3

Measurement uncertainty: ± 3.93dB



DH5

Measurement uncertainty: ± 3.93dB

Modulation: π/4-DQPSK

Normal Mode:

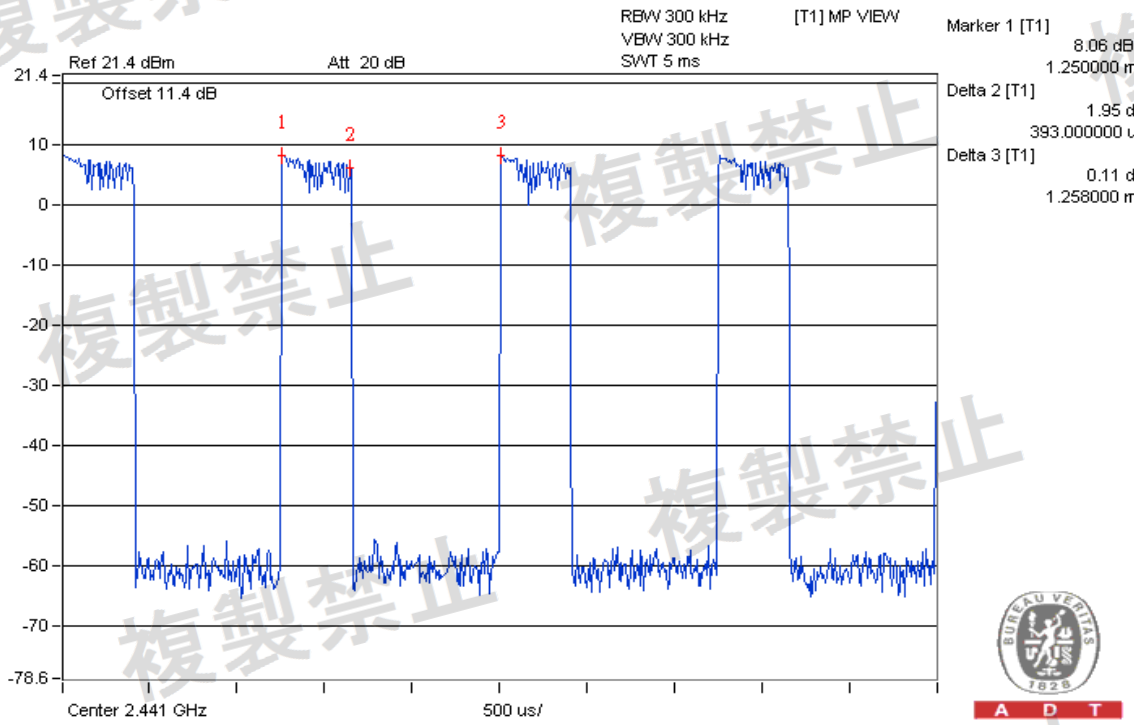
Test Condition	Mode	Spreading Rate	[Spreading Rate/79]*0.4	Duty Cycle	Result (msec)	Limit (msec)
V_{normal}	DH1	71.79	0.363	0.312	113.256	400
	DH3	71.79	0.363	0.656	238.128	400
	DH5	71.79	0.363	0.764	277.332	400
$V_{+10\%}$	DH1	71.47	0.362	0.312	112.944	400
	DH3	71.47	0.362	0.656	237.472	400
	DH5	71.47	0.362	0.764	276.568	400
$V_{-10\%}$	DH1	71.63	0.363	0.312	113.256	400
	DH3	71.63	0.363	0.656	238.128	400
	DH5	71.63	0.363	0.764	277.332	400

AFH Mode:

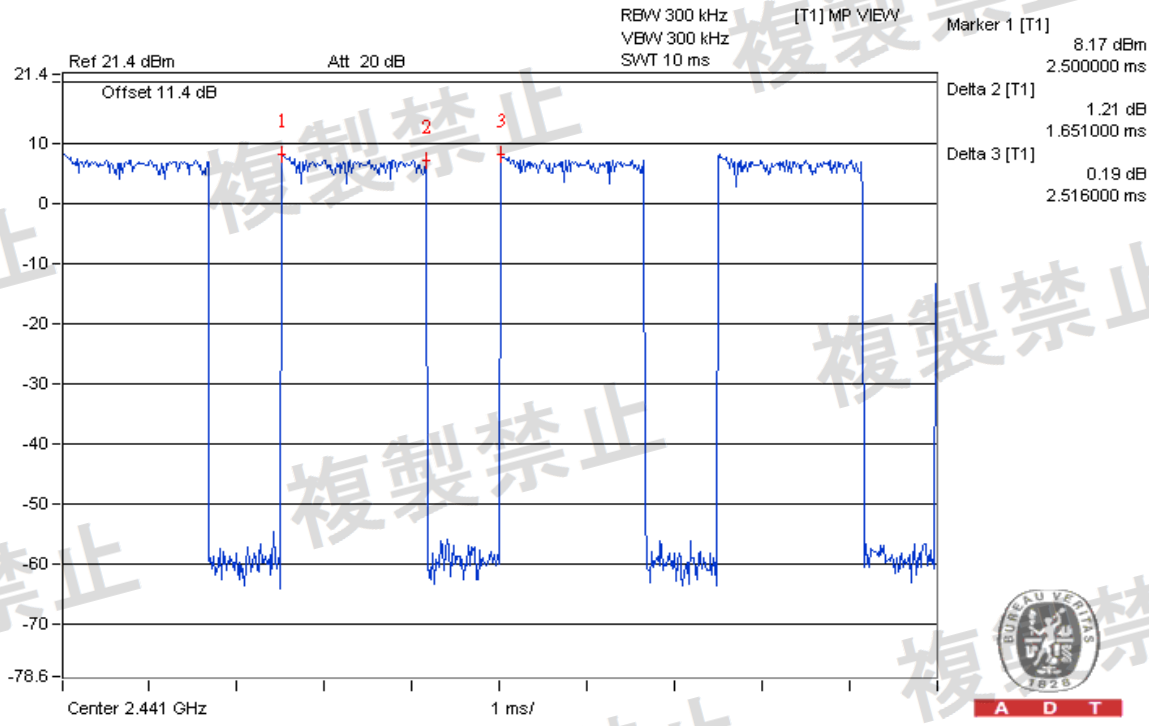
Test Condition	Mode	Spreading Rate	[Spreading Rate/20]*0.4	Duty Cycle	Result (msec)	Limit (msec)
V_{normal}	DH1	17.30	0.346	0.312	107.952	400
	DH3	17.30	0.346	0.656	226.976	400
	DH5	17.30	0.346	0.764	264.344	400
$V_{+10\%}$	DH1	17.38	0.348	0.312	108.576	400
	DH3	17.38	0.348	0.656	228.288	400
	DH5	17.38	0.348	0.764	265.872	400
$V_{-10\%}$	DH1	17.30	0.346	0.312	107.952	400
	DH3	17.30	0.346	0.656	226.976	400
	DH5	17.30	0.346	0.764	264.344	400

NOTE: Test plots of the transmitting time slot are shown on following pages.

V_{normal}



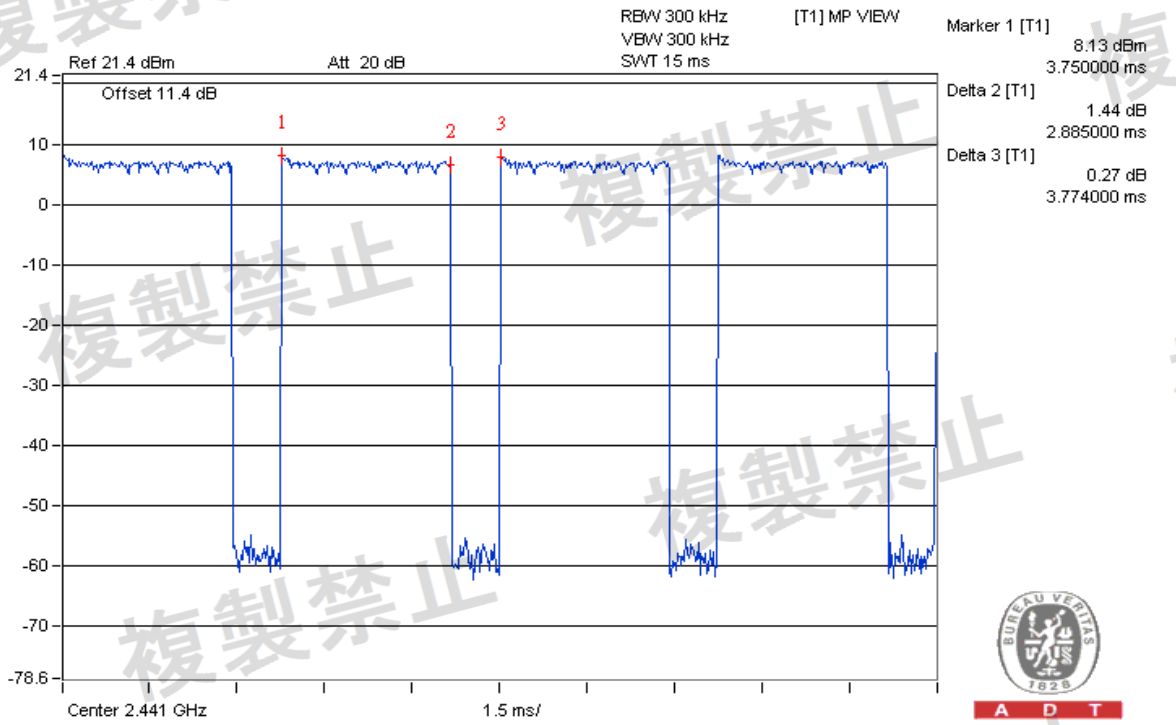
DH1



DH3

Measurement uncertainty: ± 3.93dB

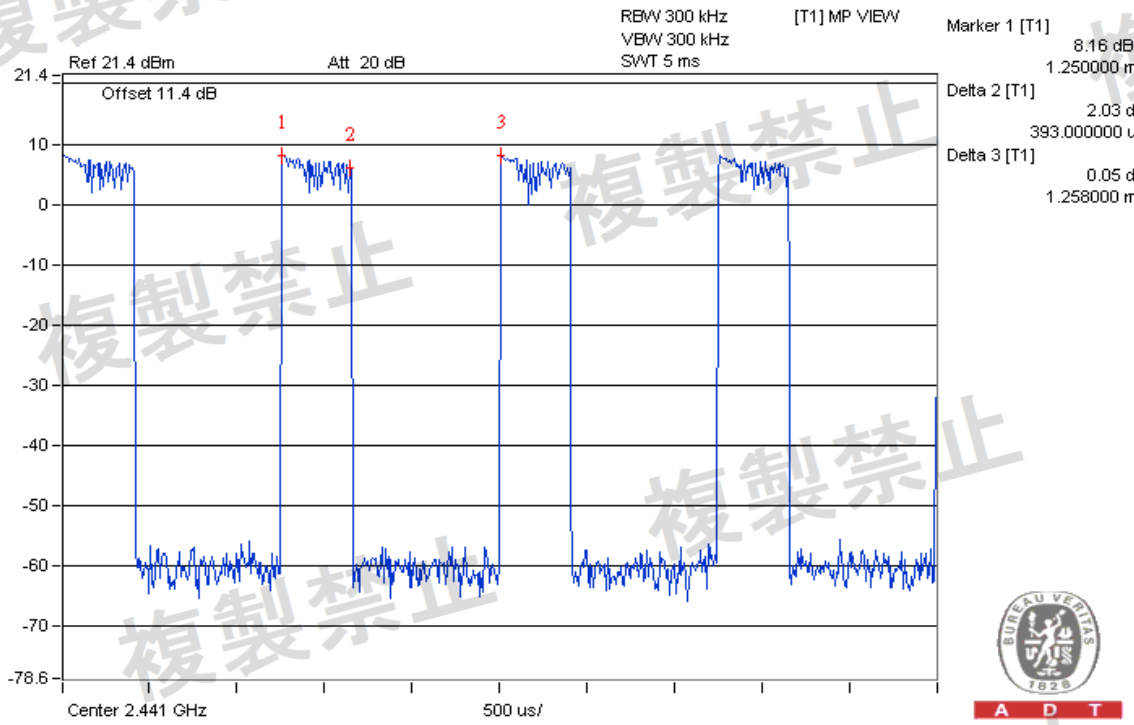
V_{normal}



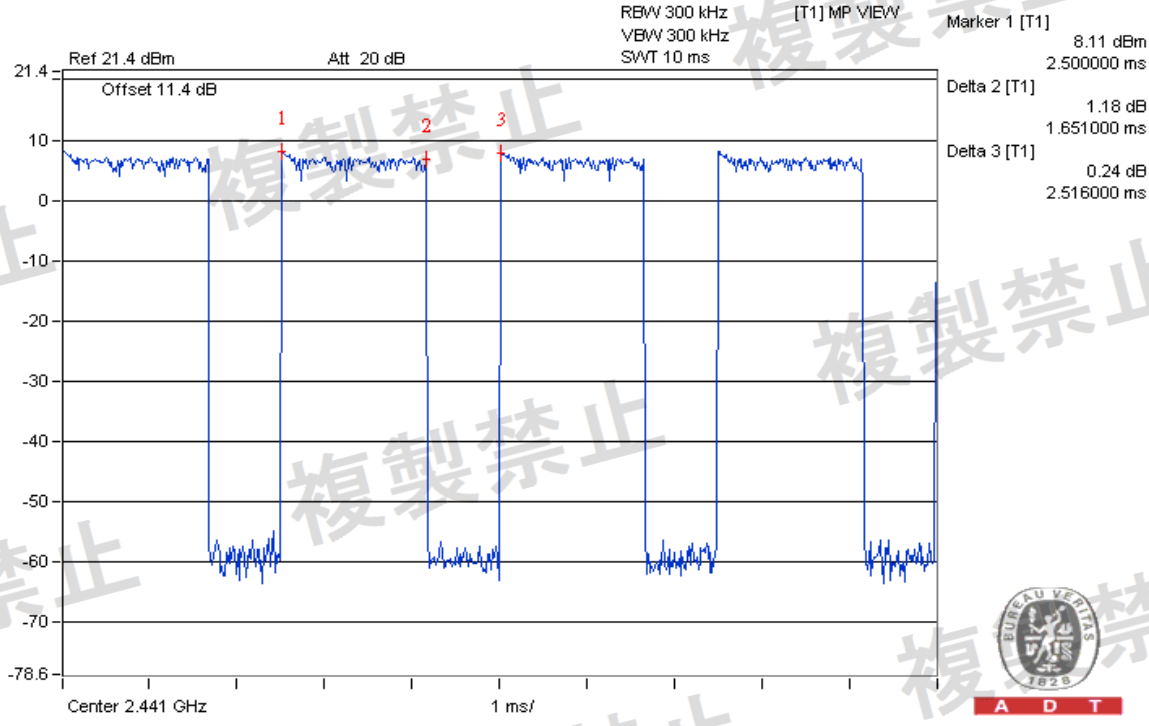
DH5

Measurement uncertainty: ± 3.93dB

$V_{+10\%}$

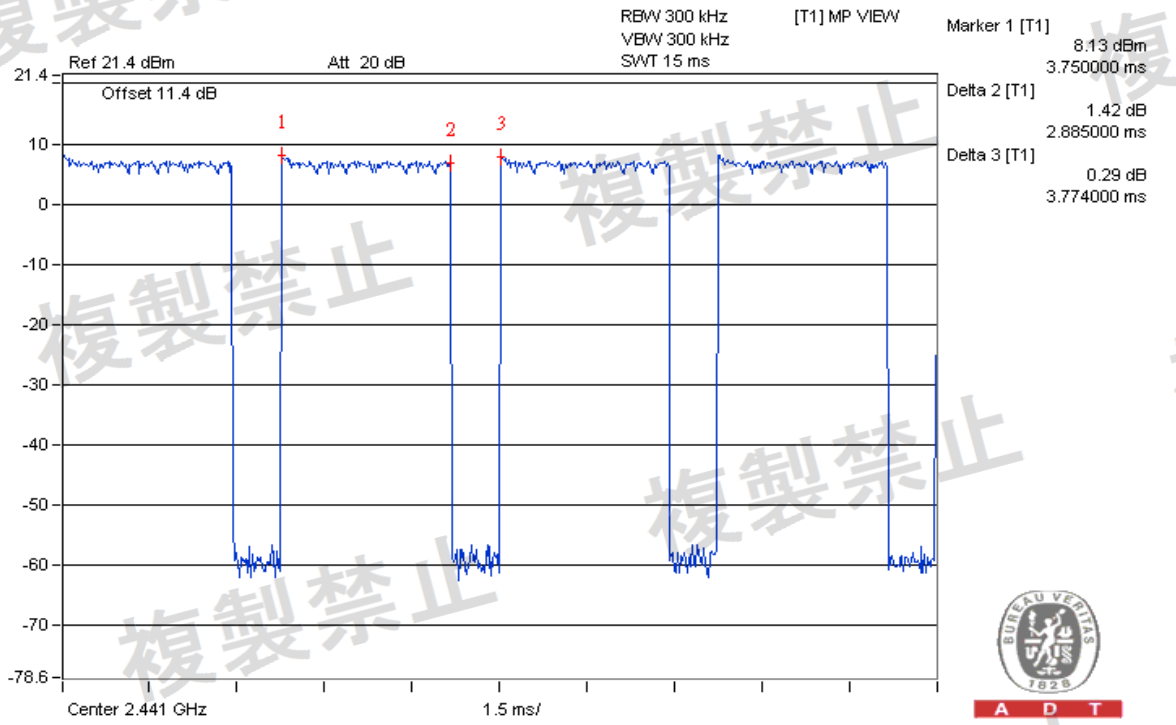


DH1

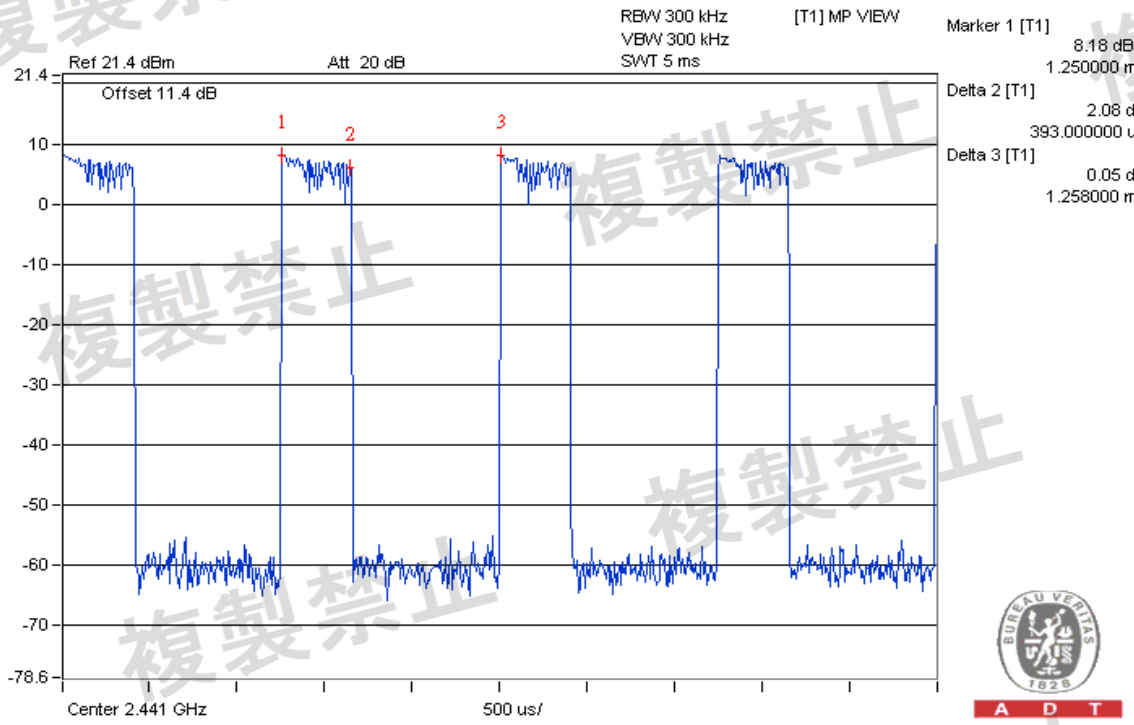


DH3

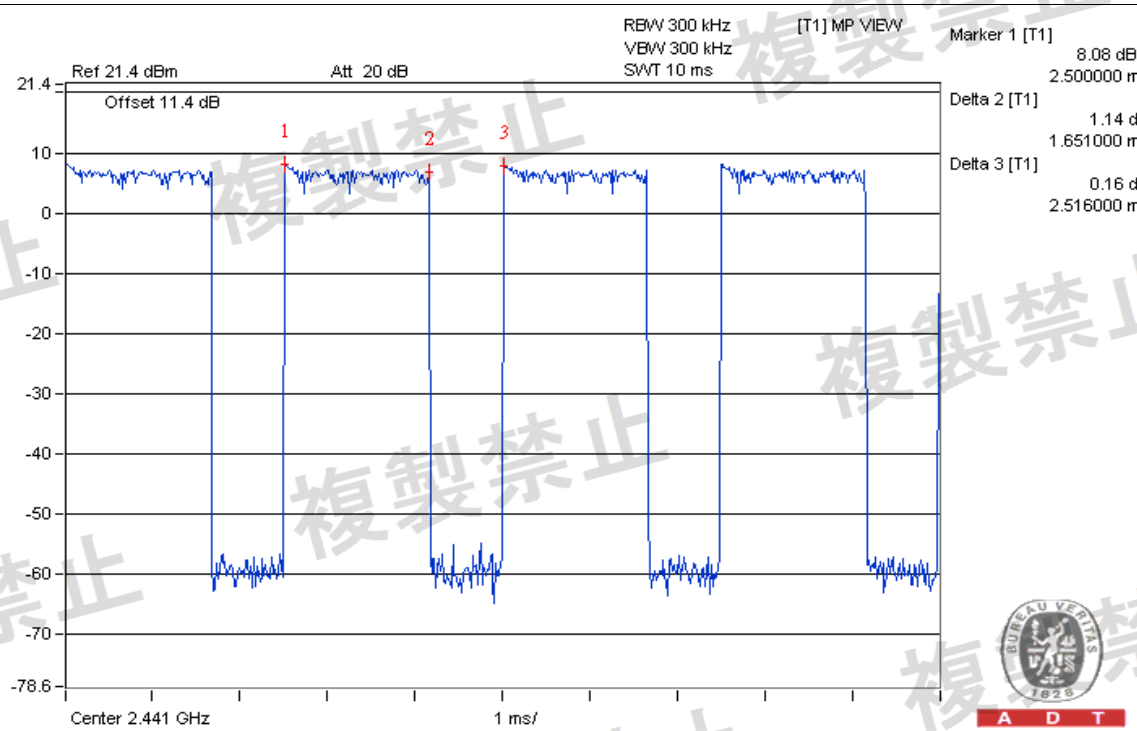
Measurement uncertainty: ± 3.93dB

$V_{+10\%}$ 
DH5
Measurement uncertainty: ± 3.93dB

$V_{-10\%}$



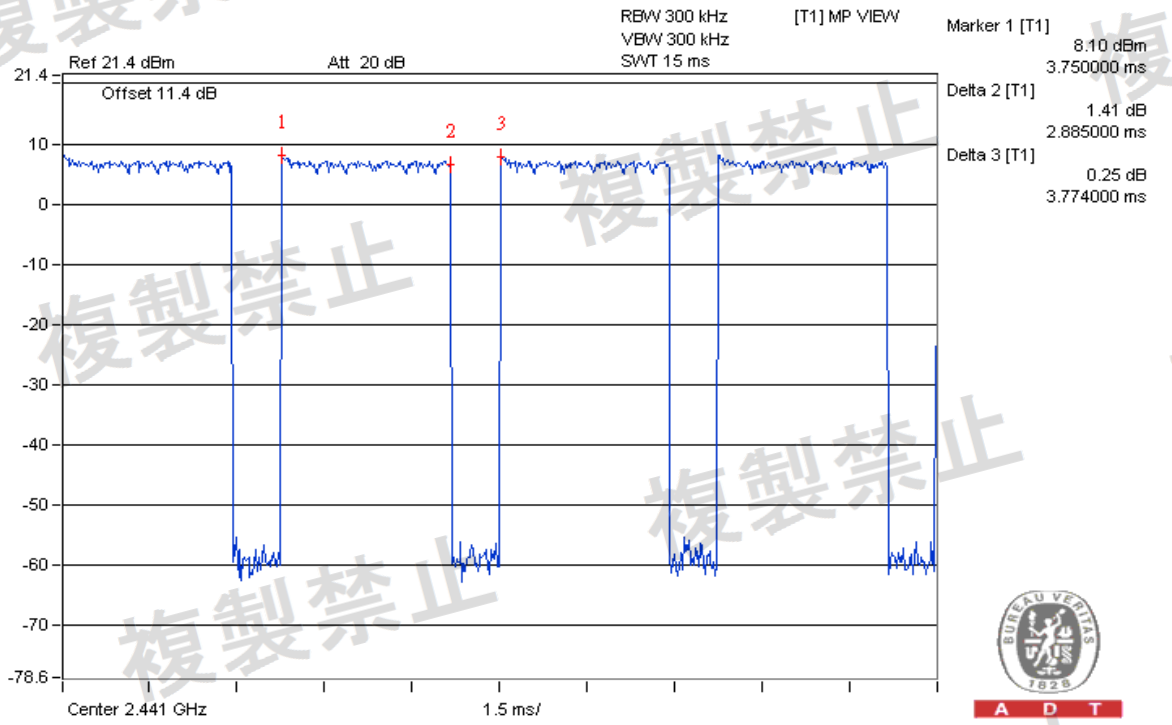
DH1



DH3

Measurement uncertainty: ± 3.93dB

V-10%



DH5

Measurement uncertainty: ± 3.93dB

Modulation: 8DPSK

Normal Mode:

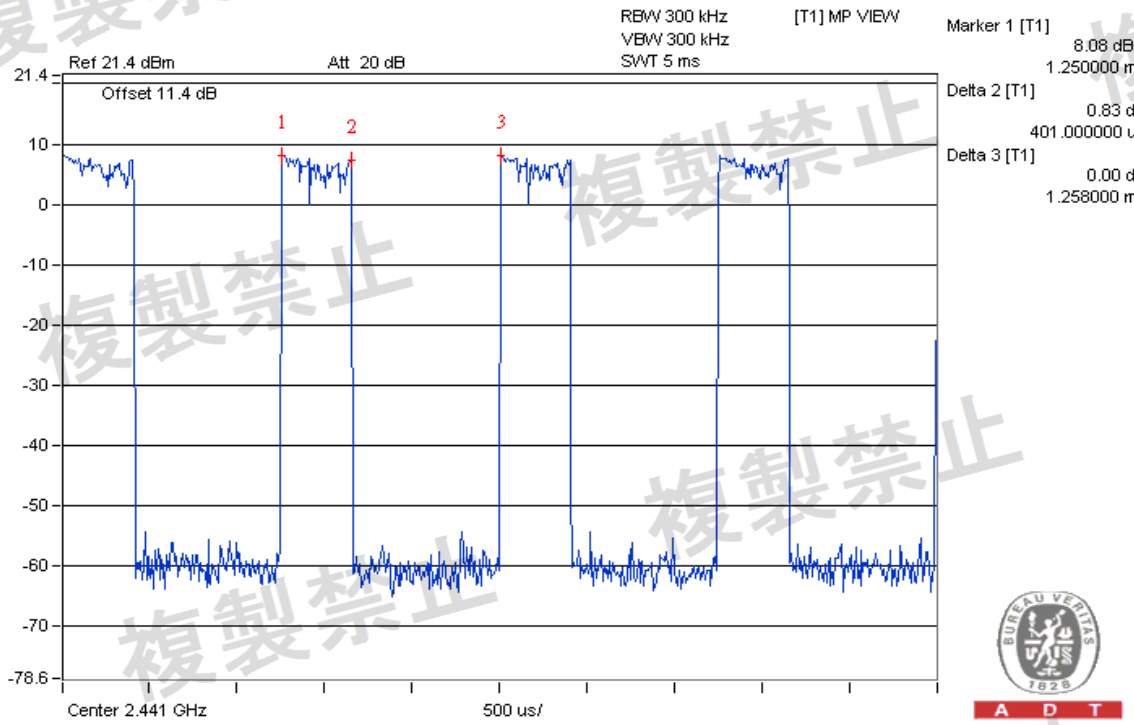
Test Condition	Mode	Spreading Rate	[Spreading Rate/79]*0.4	Duty Cycle	Result (msec)	Limit (msec)
V_{normal}	DH1	71.79	0.363	0.319	115.797	400
	DH3	71.79	0.363	0.656	238.128	400
	DH5	71.79	0.363	0.771	279.873	400
$V_{+10\%}$	DH1	71.79	0.363	0.319	115.797	400
	DH3	71.79	0.363	0.656	238.128	400
	DH5	71.79	0.363	0.771	279.873	400
$V_{-10\%}$	DH1	71.79	0.363	0.306	111.078	400
	DH3	71.79	0.363	0.656	238.128	400
	DH5	71.79	0.363	0.771	279.873	400

AFH Mode:

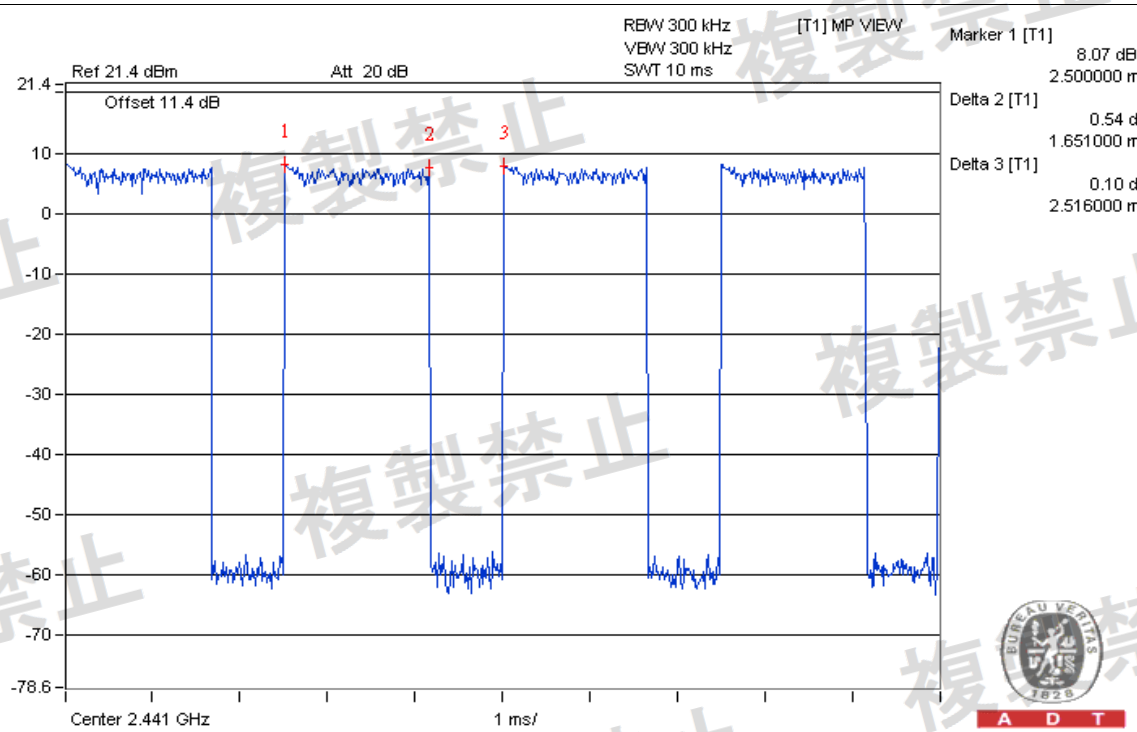
Test Condition	Mode	Spreading Rate	[Spreading Rate/20]*0.4	Duty Cycle	Result (msec)	Limit (msec)
V_{normal}	DH1	17.38	0.348	0.319	111.012	400
	DH3	17.38	0.348	0.656	228.288	400
	DH5	17.38	0.348	0.771	268.308	400
$V_{+10\%}$	DH1	17.38	0.348	0.319	111.012	400
	DH3	17.38	0.348	0.656	228.288	400
	DH5	17.38	0.348	0.771	268.308	400
$V_{-10\%}$	DH1	17.30	0.346	0.306	105.876	400
	DH3	17.30	0.346	0.656	226.976	400
	DH5	17.30	0.346	0.771	266.766	400

NOTE: Test plots of the transmitting time slot are shown on following pages.

V_{normal}



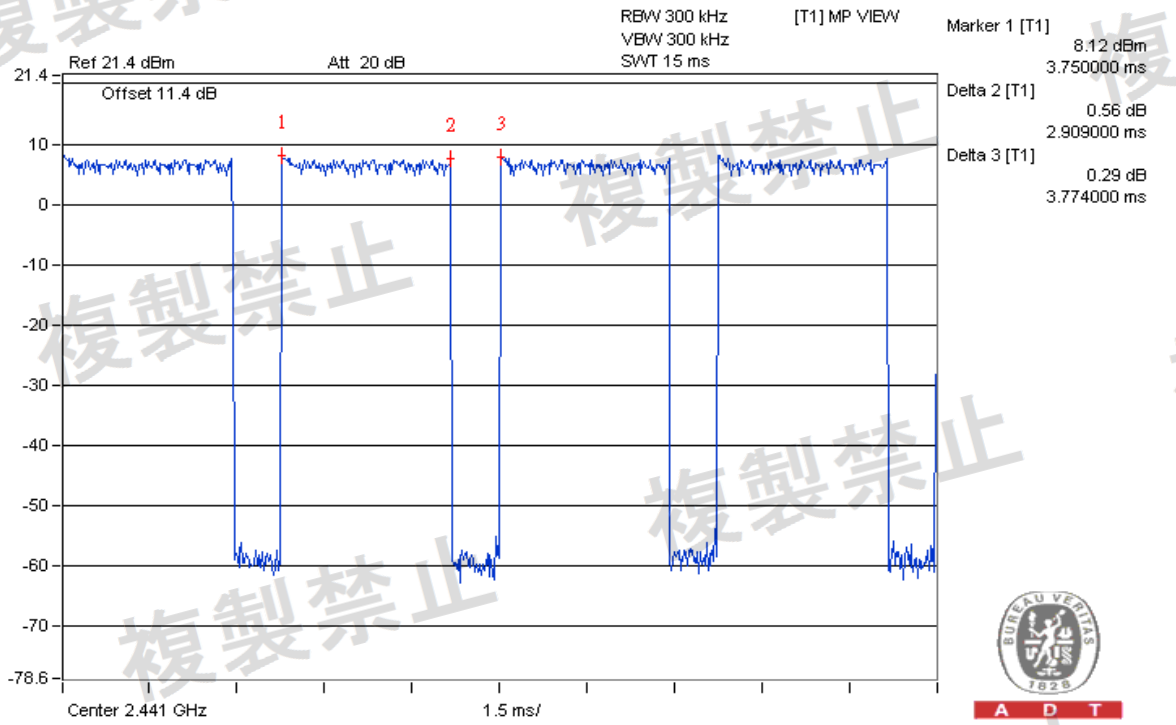
DH1



DH3

Measurement uncertainty: ± 3.93dB

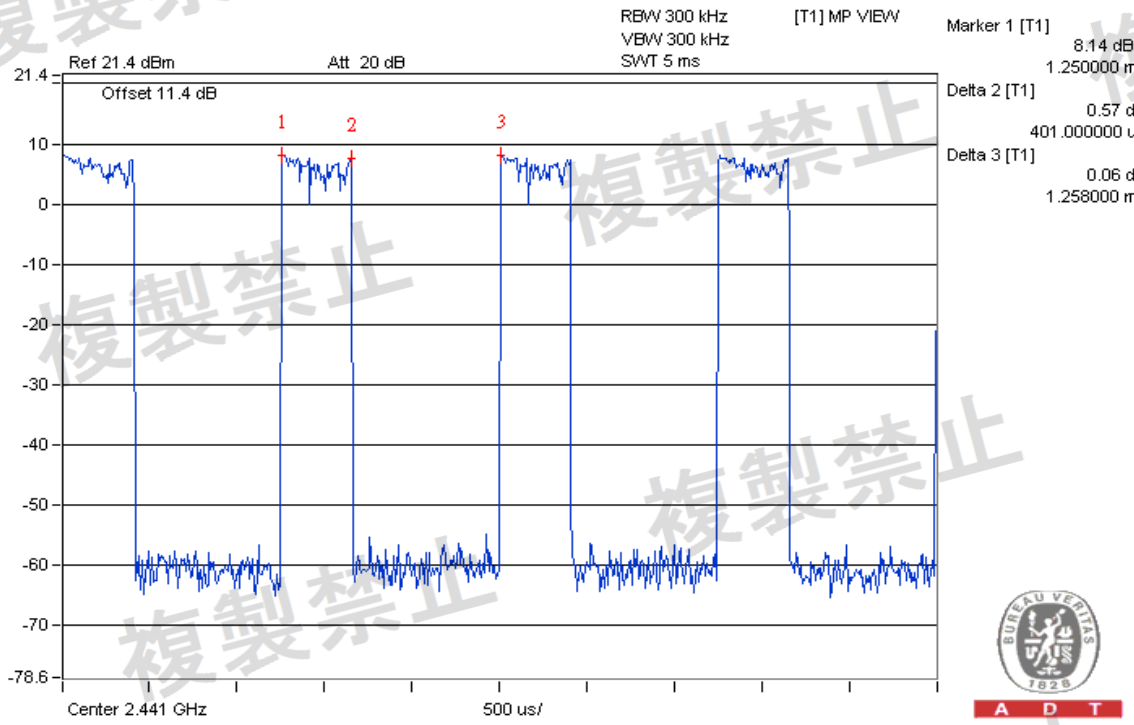
V_{normal}



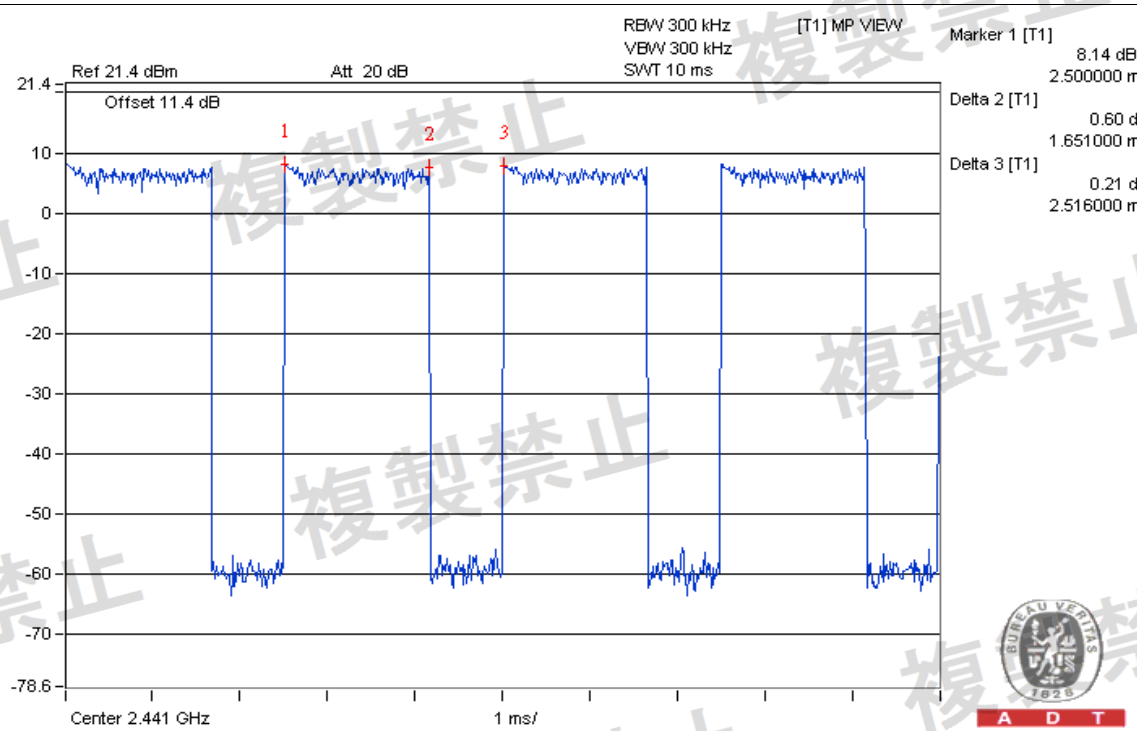
DH5

Measurement uncertainty: ± 3.93dB

$V_{+10\%}$

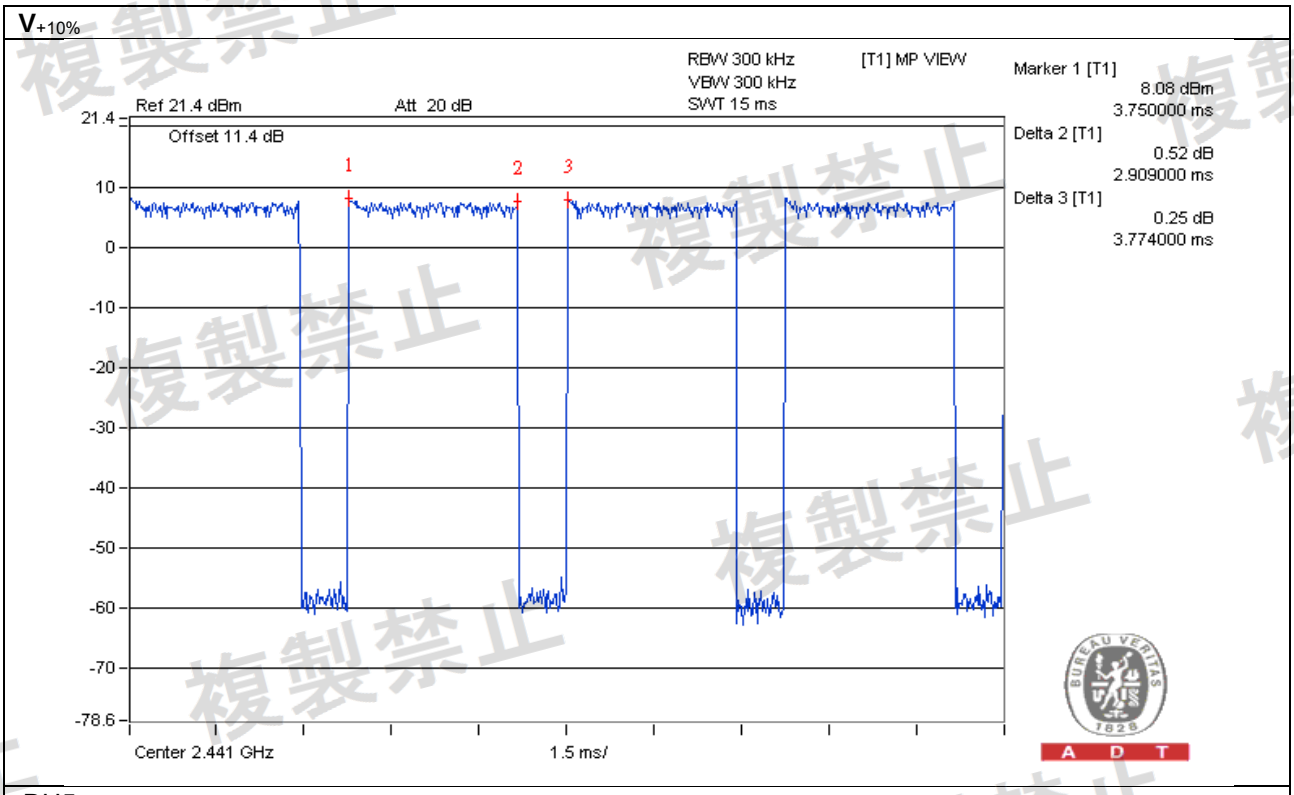


DH1



DH3

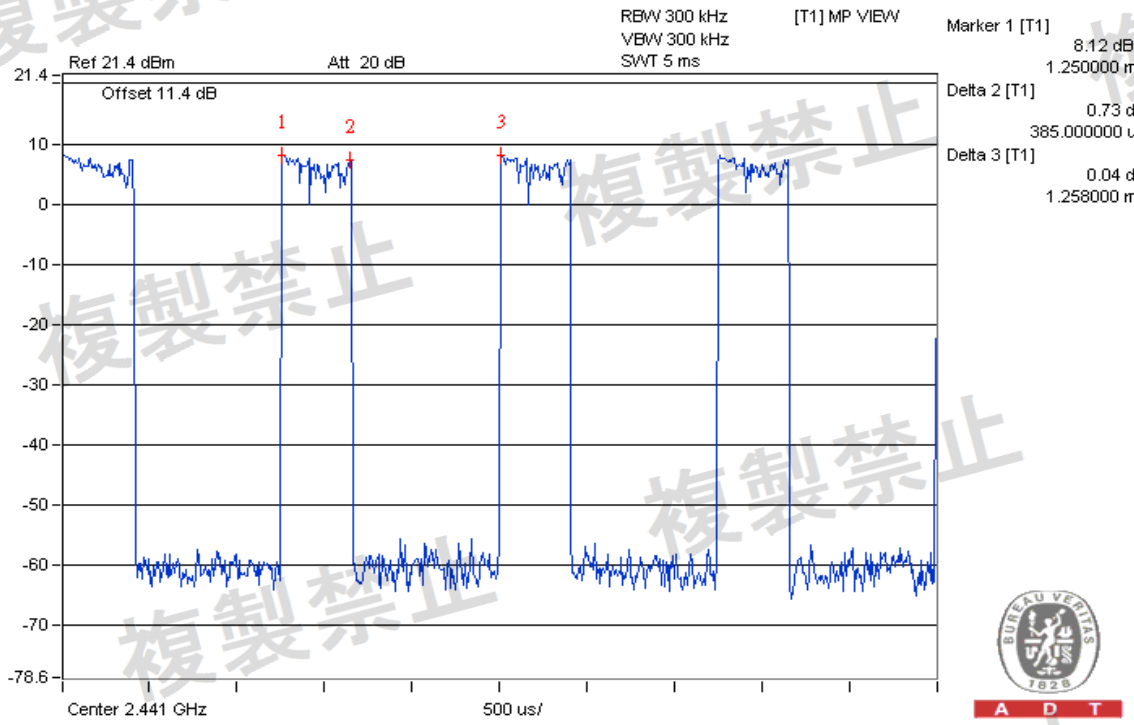
Measurement uncertainty: ± 3.93dB



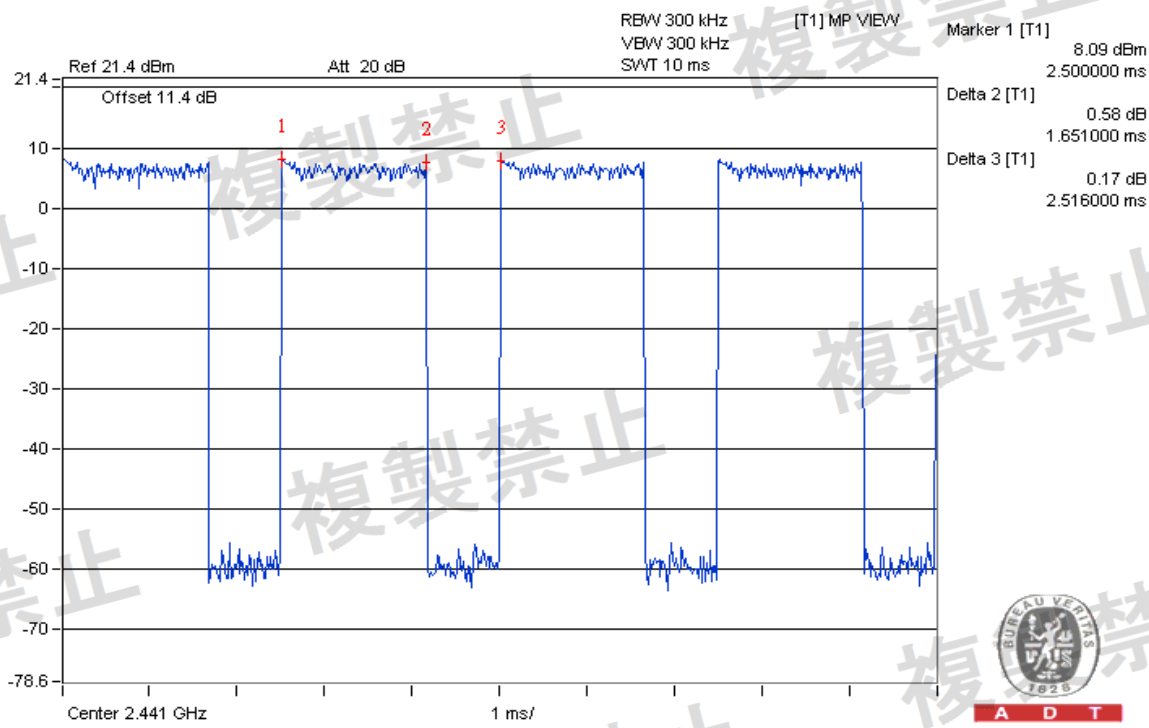
DH5

Measurement uncertainty: ± 3.93dB

$V_{-10\%}$

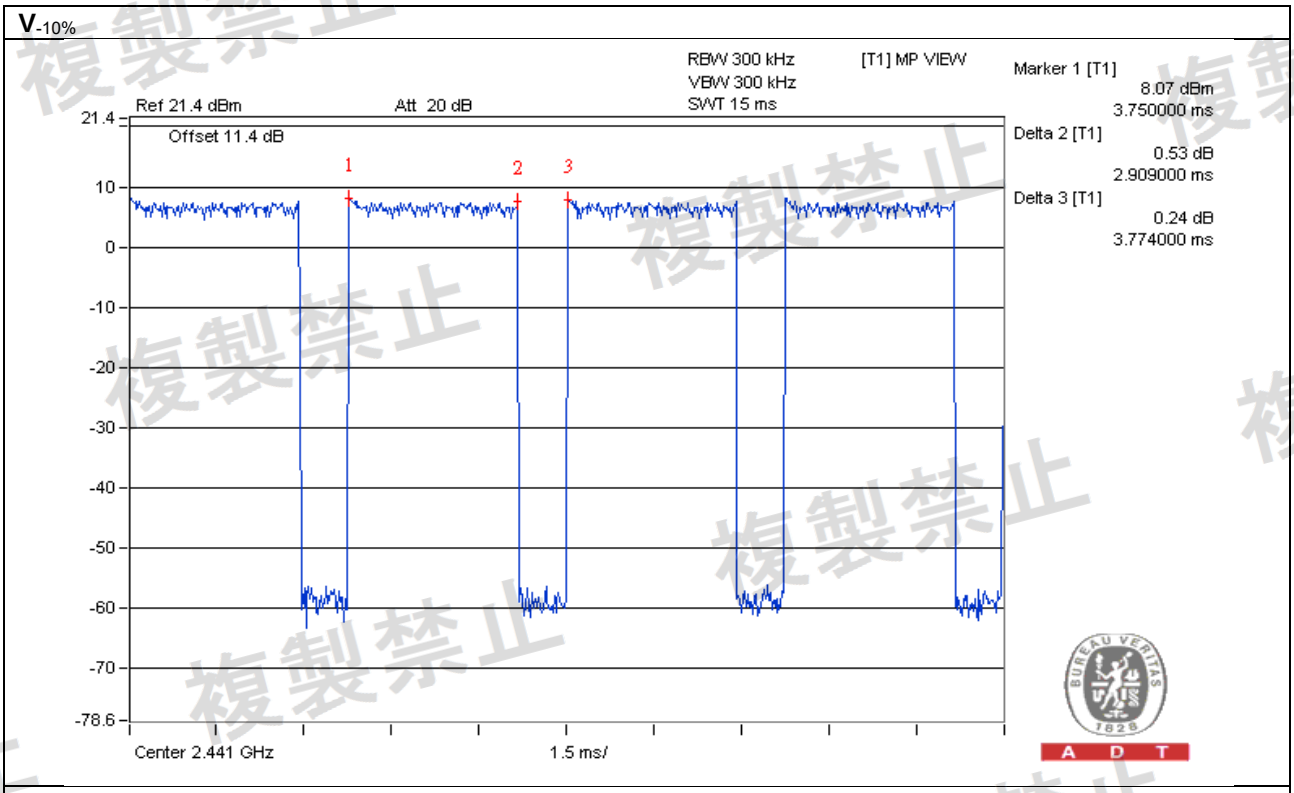


DH1



DH3

Measurement uncertainty: ± 3.93dB



DH5

Measurement uncertainty: ± 3.93dB

4.8 Interference Prevention Function

4.8.1 Limits of Interference Prevention Function

Radio equipment used mainly on the same premises and automatically transmits or receives identification code.

4.8.2 Test Setup

4.8.3 Test Results

Environmental Conditions	25 deg.C, 68 % RH
Link Mode	**Test Result**
Bluetooth EDR	Pass

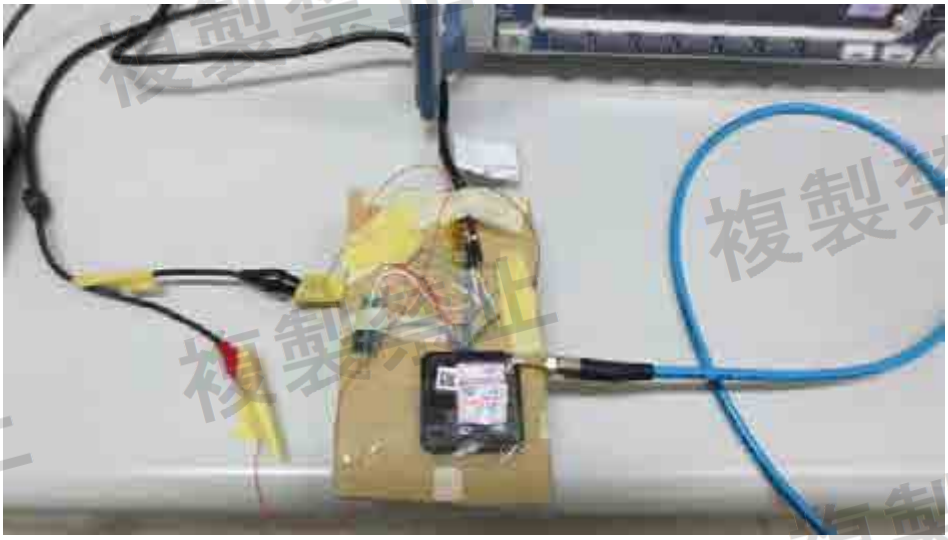
5 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration	Calibration Authority	Cal. Method
SPECTRUM ANALYZER / ROHDE & SCHWARZ	FSU43	101261	Dec. 10, 2014	Dec. 09, 2015	R&S	c)
SIGNAL GENERATOR / AGILENT	N5182B	MY53050430	Oct. 30, 2015	Oct. 29, 2016	Agilent	c)
POWER METER / ANRITSU	ML2495A	1012010	Aug. 21, 2015	Aug. 20, 2016	Agilent	c)
POWER SENSOR / ANRITSU	MA2411B	1315050	Aug. 21, 2015	Aug. 20, 2016	Agilent	c)

NOTE:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Calibration Method
   a)：Calibration conducted by the National Institute of Information and Communications Technology～ NICT～ or a designated calibration agency under Article 102-18 paragraph (1)～ TELEC EngeneeringCenter, Intertek Japan K.K., Keysight Technologies, Inc～.
   b)：Correction conducted pursuant to the provisions of Article 135 or Article 144 of the MeasurementLaw (Law No. 51 of 1992)～Japan Calibration Service Syste～
   c)：Calibration conducted in foreign countries, which shall be equivalent to the calibration conducted bythe NICT or a designated calibration agency under Article 102-18 paragraph (1)～ TELEC EngeneeringCenter, Intertek Japan K.K., Keysight Technologies, Inc～.
   d)：Calibration conducted by using other equipment that listed above from a) to c)

6 Photographs of the Test Configuration



Appendix - Information of 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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