Radio Test Report

Report No.: RJ171207E13-2

Test Model: SN10-23

Received Date: Dec. 07, 2017

Test Date: Dec. 28, 2017

Issued Date: Jan. 31, 2018

Applicant: InnoComm Mobile Technology Corp.

Address: 3F, No. 6, Hsin Ann Rd., Hsinchu Science Park, Hsinchu 30078, Taiwan

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

Lab Address: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.

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Release Control Record

Issue No.	Description	Date Issued
RJ171207E13-2	Original release	Jan. 31, 2018

1 Certificate of Conformity

Product: SigFox module

Brand: InnoComm

Test Model: SN10-23

Sample Status: ENGINEERING SAMPLE

Applicant: InnoComm Mobile Technology Corp.

Test Date: Dec. 28, 2017

Standards: ARIB STD-T108 (Part 2)

Measurement was conducted by the temporary test method which submitted to the Minister for Internal Affairs and Communications based on the Ordinance Concerning Technical Regulations Conformity Certification etc. of Specified Radio Equipment in Annex 1, the Ministry of Internal Affairs and Communication notification in Article 88, Paragraph 2.

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 EMC characteristics under the conditions specified in this report.

Prepared by : _____ , **Date:** Jan. 31, 2018

Claire Kuan / Specialist

Approved by : _____ , **Date:** Jan. 31, 2018

May Chen / Manager

2 Summary of Test Results

The EUT has been tested according to the following specifications:

Notice 88 Reference	ARIB STD-T108 REF. (Part 2)	REPORT REFERENCE	PARAMETER	TEST RESULTS (NOTE)
GENERAL PROVISIONS				
Appendix 22 3rd	3.2.4	4.1	Frequency tolerance	C
Appendix 22 3rd	3.2.6	4.2	Occupied bandwidth	C
Appendix 1	3.2.8	4.3	Spurious emissions	C
TRANSMITTING EQUIPMENT				
Appendix 22 3rd	3.2.1	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				
Appendix 22 3rd	3.3	4.6	Spurious emissions of receiver	C
-	-	3.5	Refer to all articles for transmitting antenna	C
OPERATING FREQUENCY 920MHz-BAND				
-	3.5	3.4	High frequency/modulation section cannot be opened easily	C
-	3.1.1	3.1	Communication method	C
-	3.2.5	3.1	Modulation method	C
-	3.7	4.5	Absolute gain of transmitting antenna	C
Appendix 22 3rd	3.4.1	4.7	Transmission time control equipment	C
Appendix 22 3rd	3.2.7	4.4	Adjacent channel leakage power	C
Appendix 22 3rd	3.4.2	4.8	Carrier Sense Capability	C
Appendix 22 3rd	3.4.3	-	Skipping carrier sense in a response	NA
-	3.4.4	4.9	Interference Prevention Function	C

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

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	1620.33Hz
Spurious emissions	2.52dB
Output power density	1.37dB
Adjacent Channel Leakage Power	0.71 dB
Out of band radiated power	2.52 dB
Frequency Tolerance	1620.33Hz
Transmission Time	2.23ms

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	SigFox module
Brand	InnoComm
Test Model	SN10-23
Status of EUT	ENGINEERING SAMPLE
Nominal Voltage	3.8Vdc from host equipment
Modulation Type	TX: DBPSK , RX: 2GFSK
Operating Frequency	TX: 923.2 MHz , RX: 922.2 MHz
Number of Channel	1
Rated RF Output Power	20 mW
Conducted RF Output Power	19.498 mW
Radiated RF Output Power	38.547 mW
Antenna Type	Refer to section 3.5
Antenna Connector	Refer to section 3.5
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. There are WLAN, Bluetooth (5.0) and SigFox technology used for the EUT.
2. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

1 channel is provided to this EUT:

Channel	Freq. (MHz)
37	923.2

By means of test software (WiFi & Sigbox Command) provided by manufacturer, the power levels during the tests were set according to the following codes:

Channel	Power setting
37	default

3.3 Test Conditions

Test Conditions	Voltage (Vdc)
V_{normal}	3.8
$V_{+10\%}$	4.18
$V_{-10\%}$	3.42

3.4 Assembly

The EUT is constructed as a SigFox module. The RF circuit was covered by metal shielding case, and the metal shielding case was soldered on PCB.

3.5 Antenna Specifications

3.5.1 Antenna Gain

Antenna NO.		Chain No.	Brand	Model	Antenna Net Gain(dBi)	Frequency range	Antenna Type	Connecter Type
1	GPS	Chain 0	InnoComm	SN1023G	-2	1.570~1.580 GHz	PIFA	None
2	Wi-Fi	Chain 0	BJTEK NAVIGATION,INC.	TH-97	3	2.4~2.4835GHz	Dipole	SMA
3	BLE	Chain 0	BJTEK NAVIGATION,INC.	TH-97	3	2.4~2.4835GHz	Dipole	SMA
4	SigFox	Chain 0	Staf	T13-047-1039	2.54	860~928 MHz	Monopole	SMA
5	SigFox	Chain 0	Staf	T13-047-1040	2.54	860~928 MHz	Monopole	SMA
6	SigFox	Chain 0	InnoComm	SN1023	-2	868~930 MHz	Monopole	none
7	SigFox	Chain 0	Staf	T13-047-1041	2.76	860~928 MHz	Monopole	SMA
8	SigFox	Chain 0	BJTEK NAVIGATION,INC.	TH-81E	1.12	850~930 MHz	Monopole	SMA-Male
9	SigFox	Chain 0	BJTEK NAVIGATION,INC.	TH900E	2.62	868~928 MHz	Monopole	SMA-Male
10	SigFox	Chain 0	Gaobotech	GA17-06B0500000-109	2.64	868~930 MHz	Monopole	SMA-Male
11	SigFox	Chain 0	Walsin	RFDPA131000SMRB802	2.96	863~928 MHz	Monopole	SMA-Male
12	SigFox	Chain 0	Jieng Tai	1615Y0318	0.13	868~930 MHz	Monopole	SMA-Male
13	SigFox	Chain 0	TDK	ANT160920ST-1204A1	0.5	902~930 MHz	Chip antenna	N/A
14	SigFox	Chain 0	ACX	AT7020-BR90HAAT/LF	-1.00	902~928 MHz	Chip antenna	N/A
15	SigFox	Chain 0	OneWave	WAN1003F039M03	1.32	910~930 MHz	Chip antenna	N/A
16	SigFox	Chain 0	JC ANTENNA	JCG015	2	880~960 MHz	Monopole	SMA-Male
17	SigFox	Chain 0	JC ANTENNA	JCG059	2	824~960 MHz	Dipole	I-PEX
18	SigFox	Chain 0	JC ANTENNA	JCG104	2	824~960 MHz	Monopole	I-PEX
19	SigFox	Chain 0	JC ANTENNA	JCG401	2	880~960 MHz	Monopole	SMA-Male
20	SigFox	Chain 0	JC ANTENNA	JCG402	2	880~960 MHz	Monopole	SMA-Male
21	SigFox	Chain 0	Staf	T13-023-1043	1.82	815~960 MHz	Dipole	U.FL
22	SigFox	Chain 0	Staf	T13-047-1038	1.86	860~928 MHz	Monopole	SMA-Male
23	SigFox	Chain 0	Staf	T15-030-1042	2.39	860~928 MHz	Monopole	U.FL
24	SigFox	Chain 0	Staf	T16-062-1022	-0.29	814~960 MHz	Dipole	U.FL
25	SigFox	Chain 0	Staf	T16-062-1024	-0.32	814~960 MHz	Dipole	MHF4L
26	SigFox	Chain 0	Staf	T16-062-1025	0.33	814~960 MHz	Dipole	MHF
27	SigFox	Chain 0	Staf	T16-068-1021	1.61	860~928 MHz	Monopole	SMA-Male
28	SigFox	Chain 0	Staf	T16-068-1037	1.75	860~928 MHz	Monopole	SMA-Male
29	SigFox	Chain 0	InnoComm	Collie_Sigfox	-0.06	868~930	IFA	none (like solder)
30	BLE	Chain 0	InnoComm	Collie_BLE	2.0	2.4~2.4835GHz	IFA	none (like solder)
31	WiFi	Chain 0	InnoComm	Collie_WIFI	1.42	2.4~2.4835GHz	IFA	none (like solder)
32	GPS	Chain 0	InnoComm	Collie_GPS	-0.75	1.570~1.580 GHz	IFA	none (like solder)
Note: From the above antennas, Antenna No.: 11 was chosen for final test.								

3.5.2 Antenna Pattern

Please refer to the attached file (Antenna pattern).

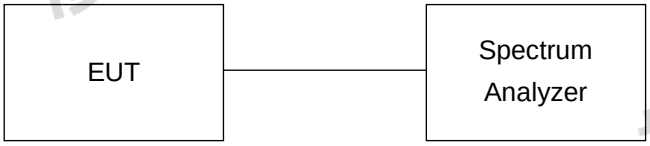
4 Test Results

4.1 Frequency Tolerance Measurement

4.1.1 Limits of Frequency Tolerance Measurement

It shall be within 20 X 10^{-6}

4.1.2 Test Setup



4.1.3 Test Results

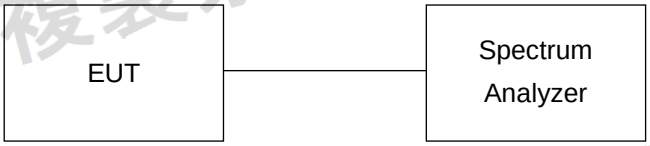
Environmental Conditions		25 deg.C, 60% RH					
Channel	Frequency (MHz)	Voltage normal		Voltage +10%		Voltage -10%	
		Carrier frequency (MHz)	Frequency tolerance (ppm)	Carrier frequency (MHz)	Frequency tolerance (ppm)	Carrier frequency (MHz)	Frequency tolerance (ppm)
37	923.2	923.19962	-0.41	923.19956	-0.48	923.19962	-0.41

4.2 Occupied Bandwidth Measurement (99% power bandwidth)

4.2.1 Limits of Occupied Bandwidth Measurement

It shall be (200 x n) kHz or less. (n is a number of unit radio channels constituting the radio channel and is an integer from 1 to 5.)

4.2.2 Test Setup

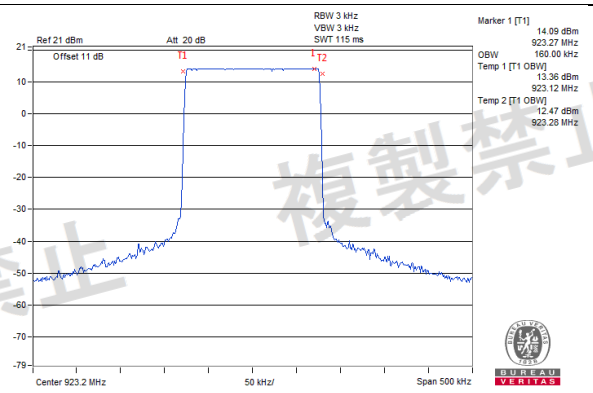


4.2.3 Test Results

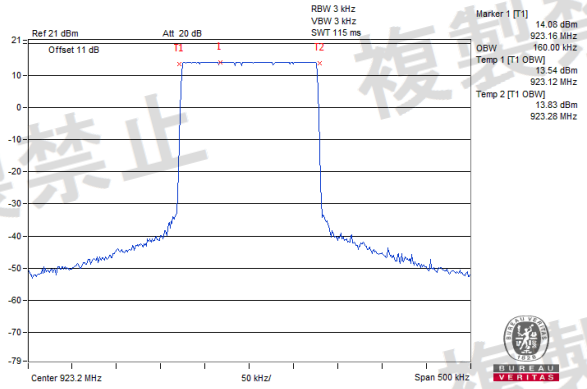
Environmental Conditions		25 deg.C, 60% RH		
Channel	Frequency (MHz)	V_{normal}	$V_{+10\%}$	$V_{-10\%}$
		Occupied Bandwidth (kHz)	Occupied Bandwidth (kHz)	Occupied Bandwidth (kHz)
37	923.2	160	160	160

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

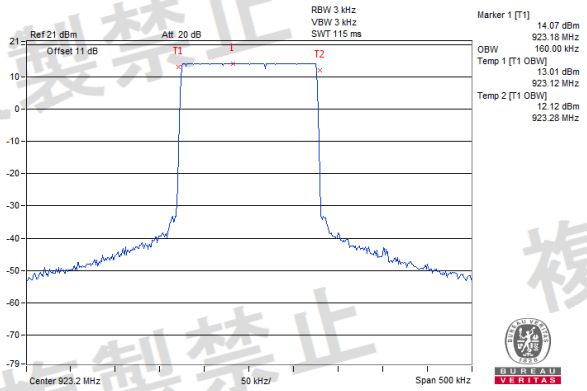
Vnormal



$V_{+10\%}$



$V_{-10\%}$

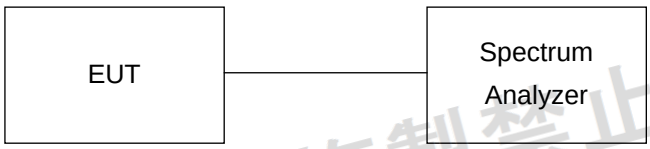


4.3 Spurious Emissions for Transmitter Measurement

4.3.1 Limits of Spurious Emissions

Frequencies (MHz)	Limit (dBm)	RBW
f <= 710 MHz	-36	100kHz
710 MHz < f <= 900 MHz	-55	1MHz
900 MHz < f <= 915 MHz	-55	100kHz
915 MHz < f <= 930 MHz* (Except for |f-fc| <= (200+100×n) kHz if bandwidth of unit radio channel is 200 kHz, except for |f-fc| <= (100+50×n) kHz if bandwidth of unit radio channel is 100 kHz. Except for |f-fc| <= (100+100×n)kHz If frequency band is 915.9MHz <= f <= 916.9MHz and 920.5MHz <= 922.3MHz. Where n is a number of unit radio channels constituting the radio channel and is an integer from 1 to 5)	-36	100kHz
930 MHz < f <= 1000 MHz	-55	100kHz
1000MHz < f <= 1,215 MHz	-45	1MHz
1,215 MHz < f	-30	1MHz

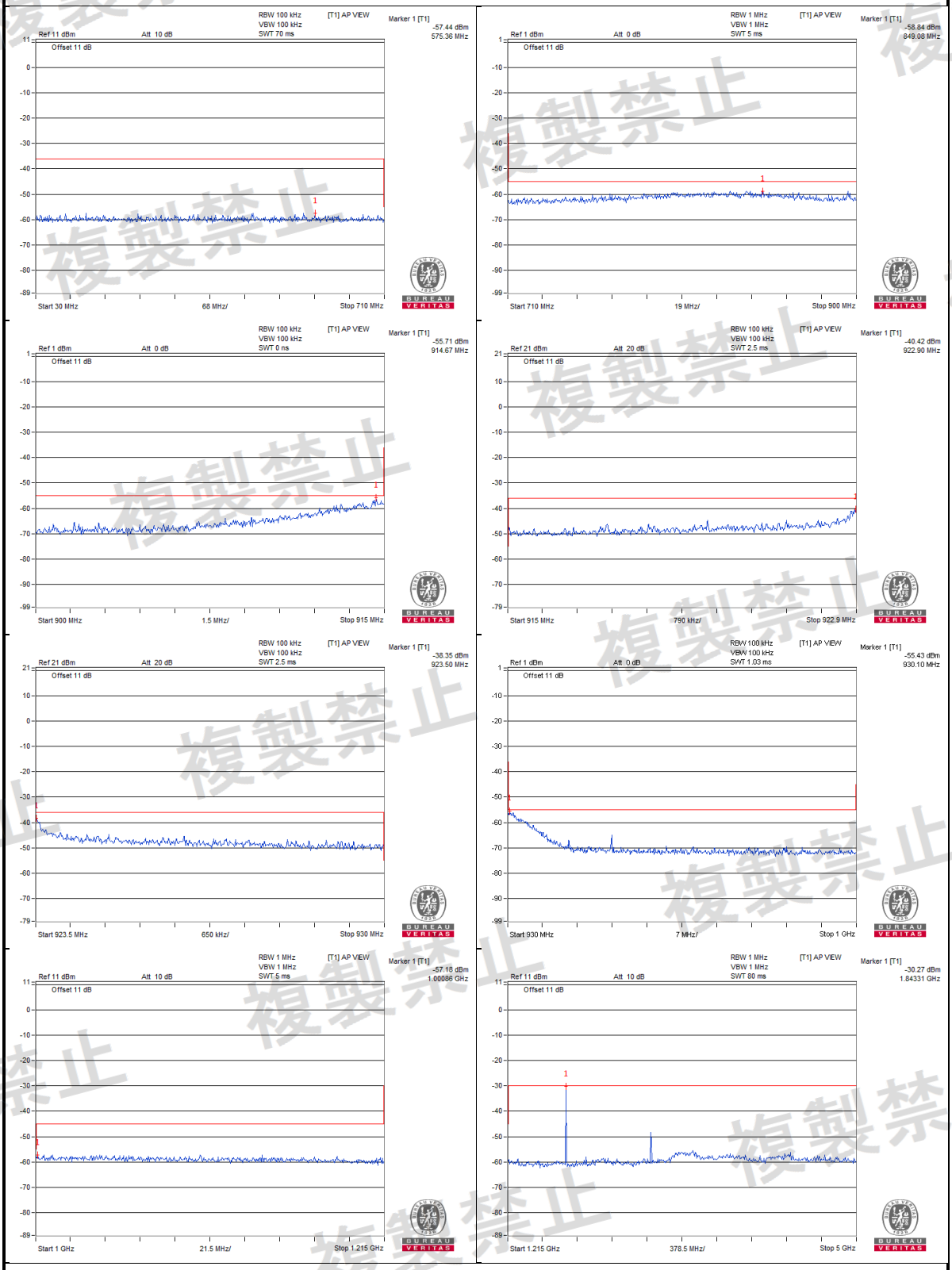
4.3.2 Test Setup



4.3.3 Test Results

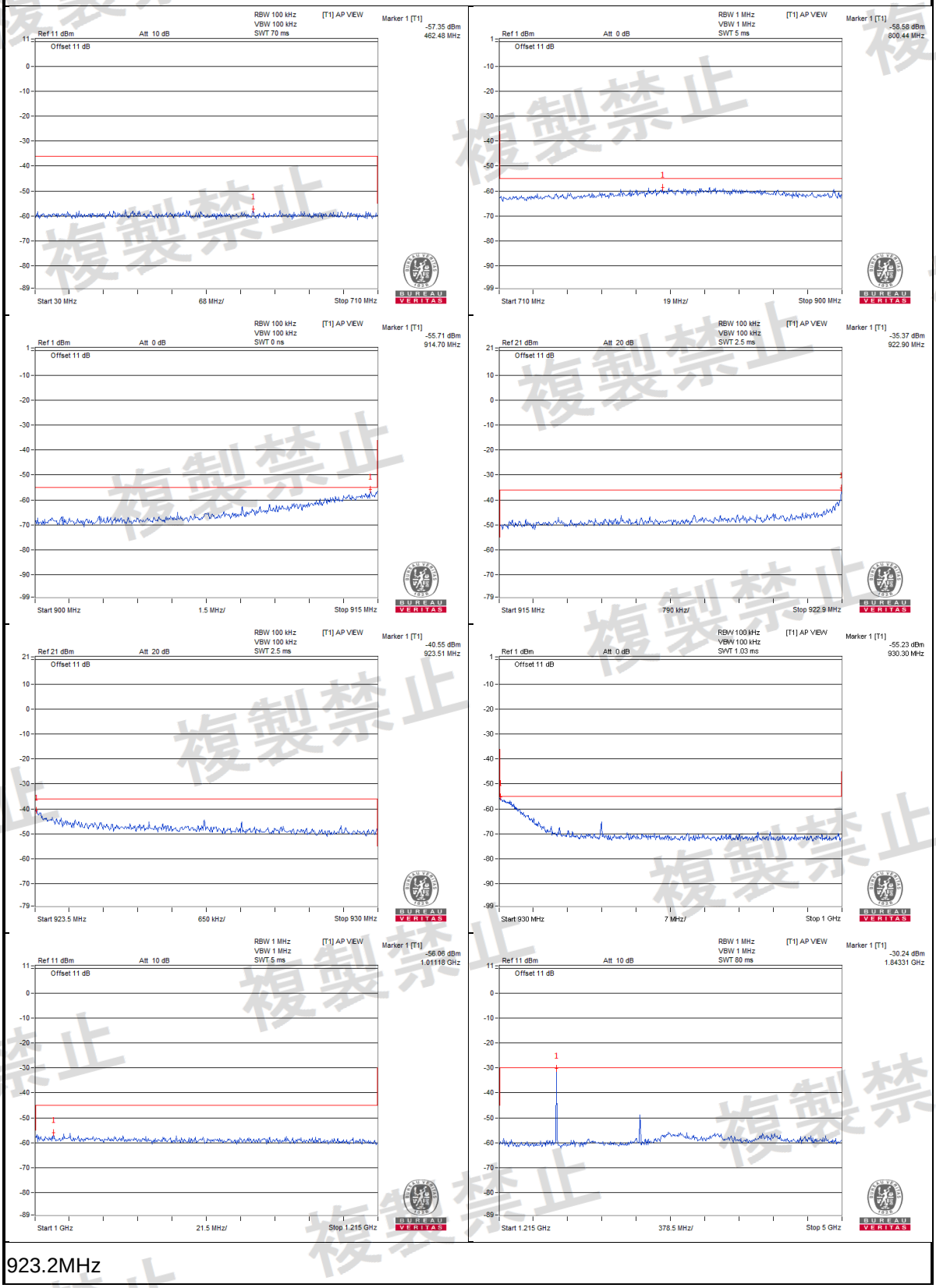
TEST CHANNEL		923.2MHz		LIMIT	RESULT
TEST CONDITION	FREQUENCY RANGE	FREQUENCY (MHz)	MEASURE. VALUE		
Vnormal	30MHz to 710MHz	575.36	-57.44	-36	PASS
	710MHz to 900MHz	849.08	-58.84	-55	PASS
	900MHz to 915MHz	914.67	-55.71	-55	PASS
	915MHz to CF-300kHz	922.9	-40.42	-36	PASS
	CF+300kHz to 930MHz	923.5	-38.35	-36	PASS
	930MHz to 1000MHz	930.14	-55.43	-55	PASS
	1000MHz to 1215MHz	1000.86	-57.18	-45	PASS
	1215MHz to 5000MHz	1843.31	-30.27	-30	PASS
V+10%	30MHz to 710MHz	462.48	-57.35	-36	PASS
	710MHz to 900MHz	800.44	-58.58	-55	PASS
	900MHz to 915MHz	914.7	-55.71	-55	PASS
	915MHz to CF-300kHz	922.9	-35.37	-36	PASS
	CF+300kHz to 930MHz	923.51	-40.55	-36	PASS
	930MHz to 1000MHz	930.3	-55.23	-55	PASS
	1000MHz to 1215MHz	1011.18	-56.06	-45	PASS
	1215MHz to 5000MHz	1843.31	-30.24	-30	PASS
V-10%	30MHz to 710MHz	333.28	-57.17	-36	PASS
	710MHz to 900MHz	840.72	-58.26	-55	PASS
	900MHz to 915MHz	915	-56.71	-55	PASS
	915MHz to CF-300kHz	922.88	-39.97	-36	PASS
	CF+300kHz to 930MHz	923.52	-40.72	-36	PASS
	930MHz to 1000MHz	930.2	-56.25	-55	PASS
	1000MHz to 1215MHz	1124.7	-56.69	-45	PASS
	1215MHz to 5000MHz	1843.31	-30.27	-30	PASS

Vnormal



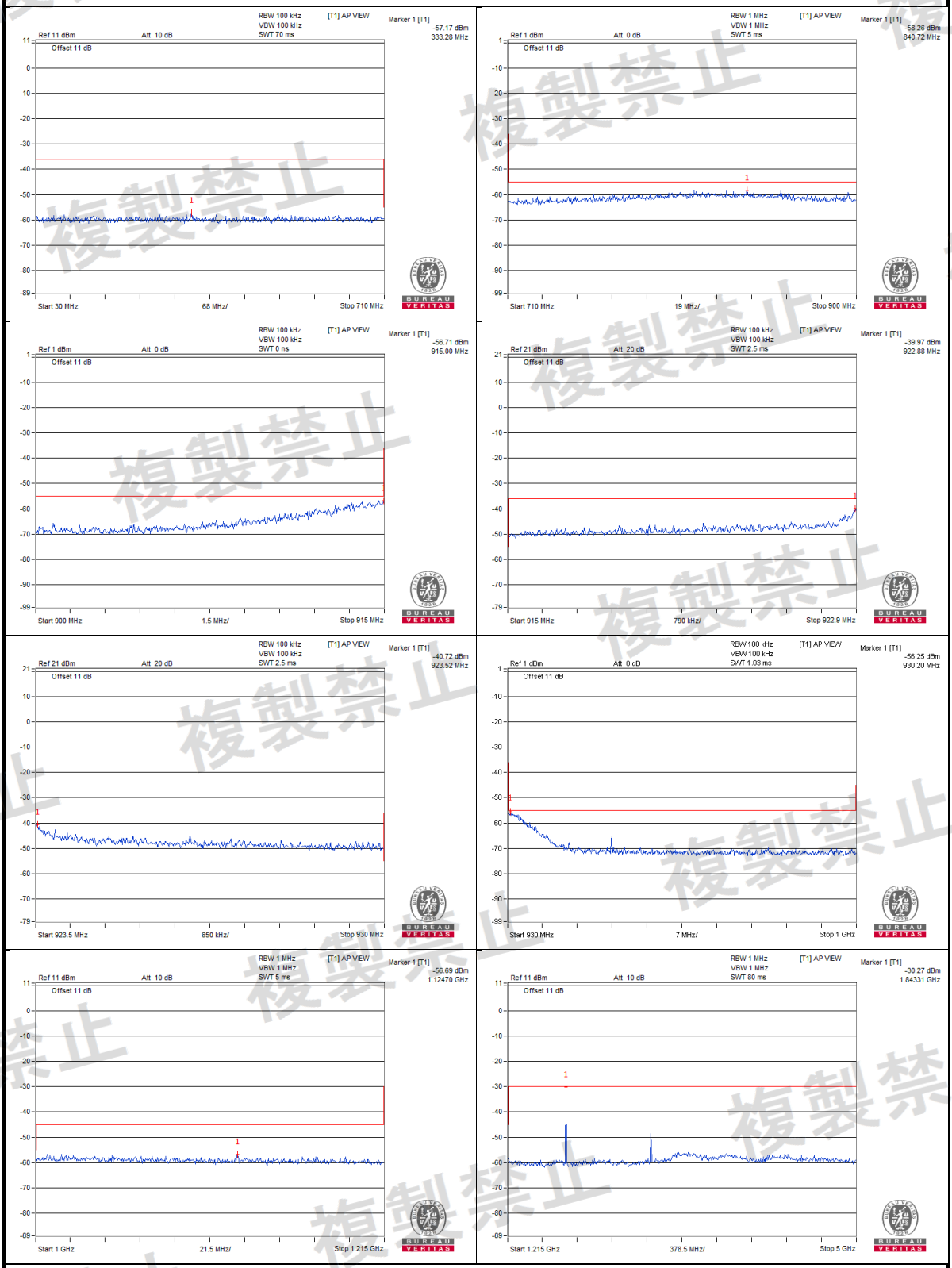
923.2MHz

$V_{+10\%}$


RBW 100 kHz
VBW 100 kHz
SWT 70 ms
[T1] AP VIEW
Marker 1 [T1]
-57.35 dBm
462.48 MHz
Ref 11 dBm
Att 10 dB
Offset 11 dB
Start 30 MHz
68 MHz/
Stop 710 MHz
RBW 1 MHz
VBW 1 MHz
SWT 5 ms
[T1] AP VIEW
Marker 1 [T1]
-58.58 dBm
800.44 MHz
Ref 1 dBm
Att 0 dB
Offset 11 dB
Start 710 MHz
19 MHz/
Stop 900 MHz
RBW 100 kHz
VBW 100 kHz
SWT 0 ms
[T1] AP VIEW
Marker 1 [T1]
-55.71 dBm
914.70 MHz
Ref 1 dBm
Att 0 dB
Offset 11 dB
Start 900 MHz
1.5 MHz/
Stop 915 MHz
RBW 100 kHz
VBW 100 kHz
SWT 2.5 ms
[T1] AP VIEW
Marker 1 [T1]
-35.37 dBm
922.90 MHz
Ref 21 dBm
Att 20 dB
Offset 11 dB
Start 915 MHz
790 kHz/
Stop 922.9 MHz
RBW 100 kHz
VBW 100 kHz
SWT 2.5 ms
[T1] AP VIEW
Marker 1 [T1]
-40.55 dBm
923.51 MHz
Ref 21 dBm
Att 20 dB
Offset 11 dB
Start 923.5 MHz
650 kHz/
Stop 930 MHz
RBW 100 kHz
VBW 100 kHz
SWT 1.03 ms
[T1] AP VIEW
Marker 1 [T1]
-55.23 dBm
930.30 MHz
Ref 1 dBm
Att 0 dB
Offset 11 dB
Start 930 MHz
7 MHz/
Stop 1 GHz
RBW 1 MHz
VBW 1 MHz
SWT 5 ms
[T1] AP VIEW
Marker 1 [T1]
-56.06 dBm
1.01118 GHz
Ref 11 dBm
Att 10 dB
Offset 11 dB
Start 1 GHz
21.5 MHz/
Stop 1.215 GHz
RBW 1 MHz
VBW 1 MHz
SWT 80 ms
[T1] AP VIEW
Marker 1 [T1]
-30.24 dBm
1.84331 GHz
Ref 11 dBm
Att 10 dB
Offset 11 dB
Start 1.215 GHz
378.5 MHz/
Stop 5 GHz

923.2MHz

V-10%


RBW 100 kHz
VBW 100 kHz
SWT 70 ms
[T1] AP VIEW
Marker 1 [T1]
-57.17 dBm
333.28 MHz
Ref 11 dBm
Att 10 dB
Offset 11 dB
Start 30 MHz
68 MHz/
Stop 710 MHz
RBW 1 MHz
VBW 1 MHz
SWT 5 ms
[T1] AP VIEW
Marker 1 [T1]
-58.26 dBm
840.72 MHz
Ref 1 dBm
Att 0 dB
Offset 11 dB
Start 710 MHz
19 MHz/
Stop 900 MHz
RBW 100 kHz
VBW 100 kHz
SWT 0 ns
[T1] AP VIEW
Marker 1 [T1]
-56.71 dBm
915.00 MHz
Ref 1 dBm
Att 0 dB
Offset 11 dB
Start 900 MHz
1.5 MHz/
Stop 915 MHz
RBW 100 kHz
VBW 100 kHz
SWT 2.5 ms
[T1] AP VIEW
Marker 1 [T1]
-39.97 dBm
922.88 MHz
Ref 21 dBm
Att 20 dB
Offset 11 dB
Start 915 MHz
790 kHz/
Stop 922.9 MHz
RBW 100 kHz
VBW 100 kHz
SWT 2.5 ms
[T1] AP VIEW
Marker 1 [T1]
-40.72 dBm
923.52 MHz
Ref 21 dBm
Att 20 dB
Offset 11 dB
Start 923.5 MHz
650 kHz/
Stop 930 MHz
RBW 100 kHz
VBW 100 kHz
SWT 1.03 ms
[T1] AP VIEW
Marker 1 [T1]
-56.25 dBm
930.20 MHz
Ref 1 dBm
Att 0 dB
Offset 11 dB
Start 930 MHz
7 MHz/
Stop 1 GHz
RBW 1 MHz
VBW 1 MHz
SWT 5 ms
[T1] AP VIEW
Marker 1 [T1]
-56.69 dBm
1.12470 GHz
Ref 11 dBm
Att 10 dB
Offset 11 dB
Start 1 GHz
21.5 MHz/
Stop 1.215 GHz
RBW 1 MHz
VBW 1 MHz
SWT 80 ms
[T1] AP VIEW
Marker 1 [T1]
-30.27 dBm
1.84331 GHz
Ref 11 dBm
Att 10 dB
Offset 11 dB
Start 1.215 GHz
378.5 MHz/
Stop 5 GHz

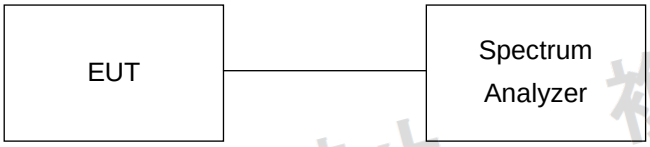
923.2MHz

4.4 Adjacent Channel Leakage Power

4.4.1 Limits of Adjacent Channel Leakage Power

FREQUENCIES (MHz) 922.3MHz TO 928.1MHz (Antenna power is more than 1mW and 20mW or less.)	LIMIT
ADJACENT UNIT CHANNEL	-15dBm or less

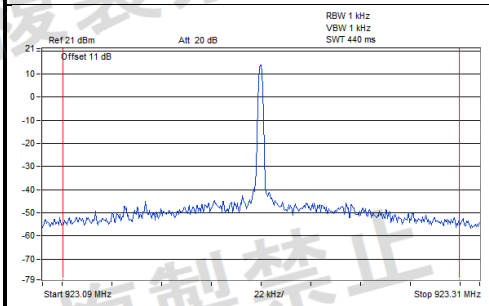
4.4.2 Test Setup



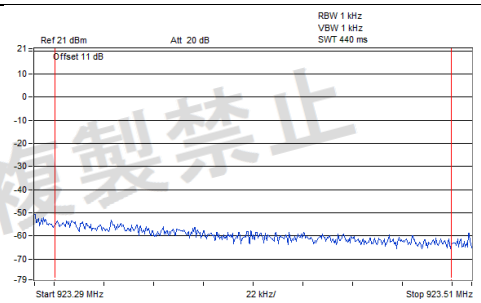
4.4.3 Test Results

ENVIRONMENTAL CONDITIONS	25 deg.C, 60% RH		
VOLTAGE	FREQUENCY (MHz)	923.2MHz	MAX. LIMIT (dBm)
V_{nom}	Mean Power of carrier (dBm)	16.57	-
	Mean Power +0.2 MHz distance of carrier (dBm)	-35.29	-15
	Mean Power -0.2 MHz distance of carrier (dBm)	-35.13	-15
$V_{+10\%}$	Mean Power of carrier (dBm)	16.57	-
	Mean Power +0.2 MHz distance of carrier (dBm)	-35.07	-15
	Mean Power -0.2 MHz distance of carrier (dBm)	-35.21	-15
$V_{-10\%}$	Mean Power of carrier (dBm)	16.57	-
	Mean Power +0.2 MHz distance of carrier (dBm)	-35.16	-15
	Mean Power -0.2 MHz distance of carrier (dBm)	-34.91	-15

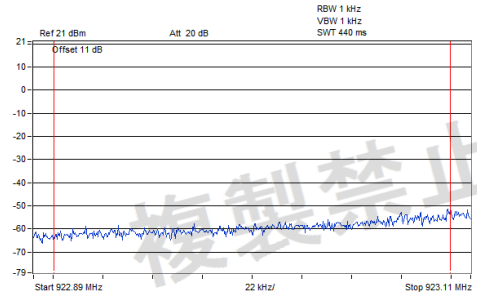
Vnormal



TX Channel Bandwidth 200 kHz Power 16.57 dBm



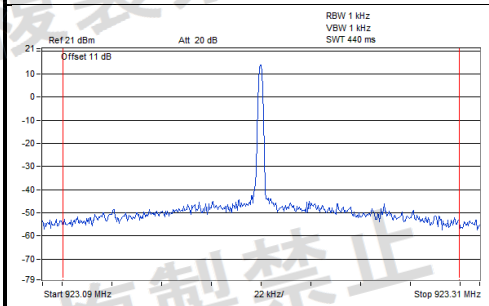
TX Channel Bandwidth 200 kHz Power -35.29 dBm



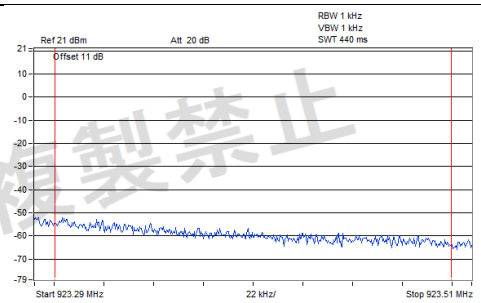
TX Channel Bandwidth 200 kHz Power -35.13 dBm

923.2MHz

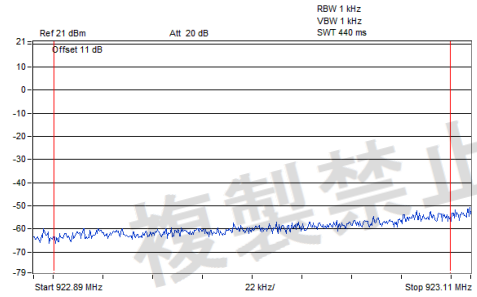
$V_{+10\%}$



TX Channel Bandwidth 200 kHz Power 16.57 dBm



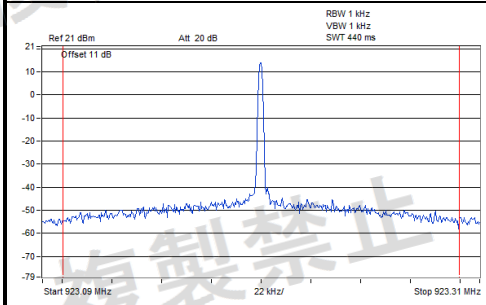
TX Channel Bandwidth 200 kHz Power -35.07 dBm



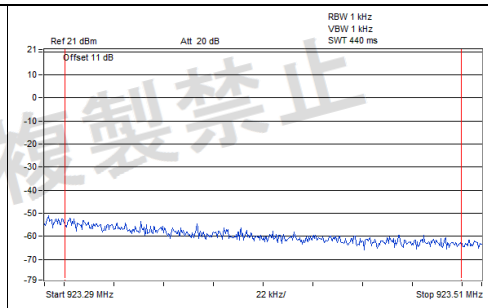
TX Channel Bandwidth 200 kHz Power -35.21 dBm

923.2MHz

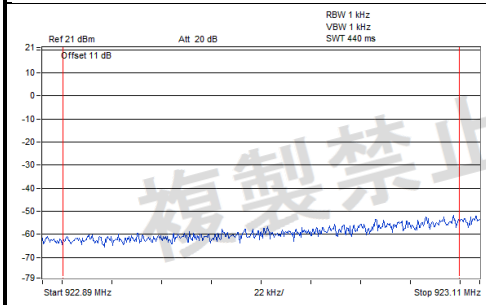
V-10%



TX Channel Bandwidth 200 kHz Power 16.57 dBm



TX Channel Bandwidth 200 kHz Power -35.16 dBm



TX Channel Bandwidth 200 kHz Power -34.91 dBm

923.2MHz

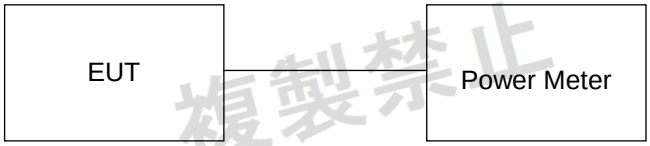
4.5 Antenna Power Measurement

4.5.1 Limits of Antenna Power

Application	Antenna Power	Applied CH number	Unit CH bandwidth	CH used in a bundle
	1mW or less	1-5	200kHz	1~5 ch
		62-77	100kHz	1~5 ch
V	20mW or less	24-38	200kHz	1~5 ch
		33-61	200kHz	1ch
				2ch
				3~5ch

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

4.5.2 Test Setup



4.5.3 Test Results

Environmental Conditions		25 deg.C, 60% RH		
Channel Number	Frequency (MHz)	Conducted RF Output Power (mW)		
		V_{normal}	V_{max}	V_{min}
37	923.2	19.498	19.187	19.011
Max. Limit (mW)		20		
Rated Power		20		
Tolerance of Antenna Power		4 ~ 24		

Monopole antenna with antenna gain: 2.96 dBi

Environmental Conditions		25 deg.C, 60% RH		
Channel Number	Frequency (MHz)	Radiated RF Output Power (mW)		
		V_{normal}	V_{max}	V_{min}
37	923.2	38.547	37.932	37.584
EIRP Max. Limit (mW)		39.902		

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

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

4.6 Spurious Emissions for Receiver

4.6.1 Limits of Spurious Emissions for Receiver

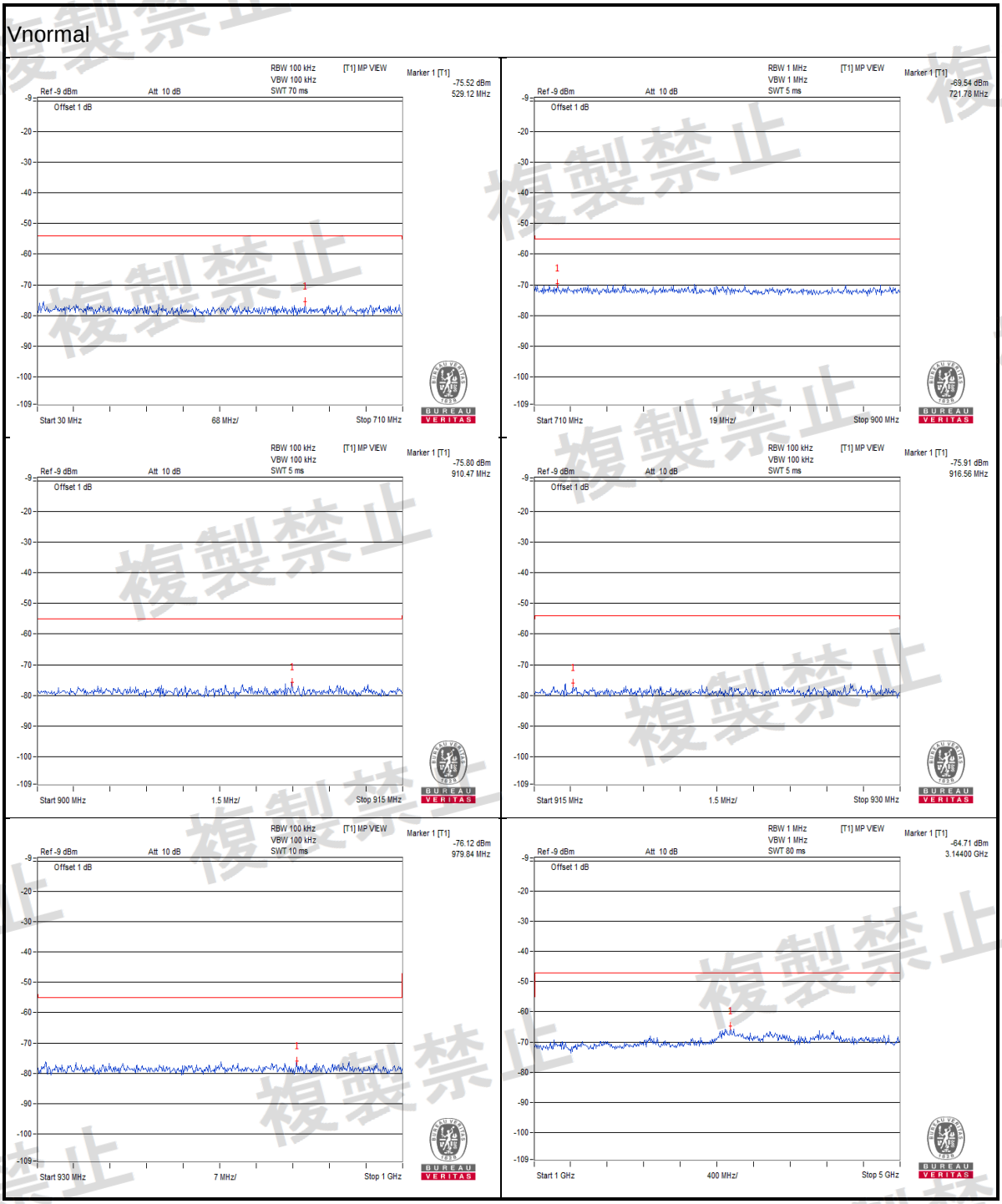
Frequency Band	Limit on Secondary Radiated Emissions, etc. (Antenna input)	Reference bandwidth
f <= 710 MHz	-54 dBm	100kHz
710 MHz < f <= 900 MHz	-55 dBm	1MHz
900 MHz < f <= 915 MHz	-55 dBm	100kHz
915 MHz < f <= 930 MHz	-54 dBm	100kHz
930 MHz < f <= 1000 MHz	-55 dBm	100kHz
1000 MHz < f	-47 dBm	1MHz

4.6.2 Test Setup

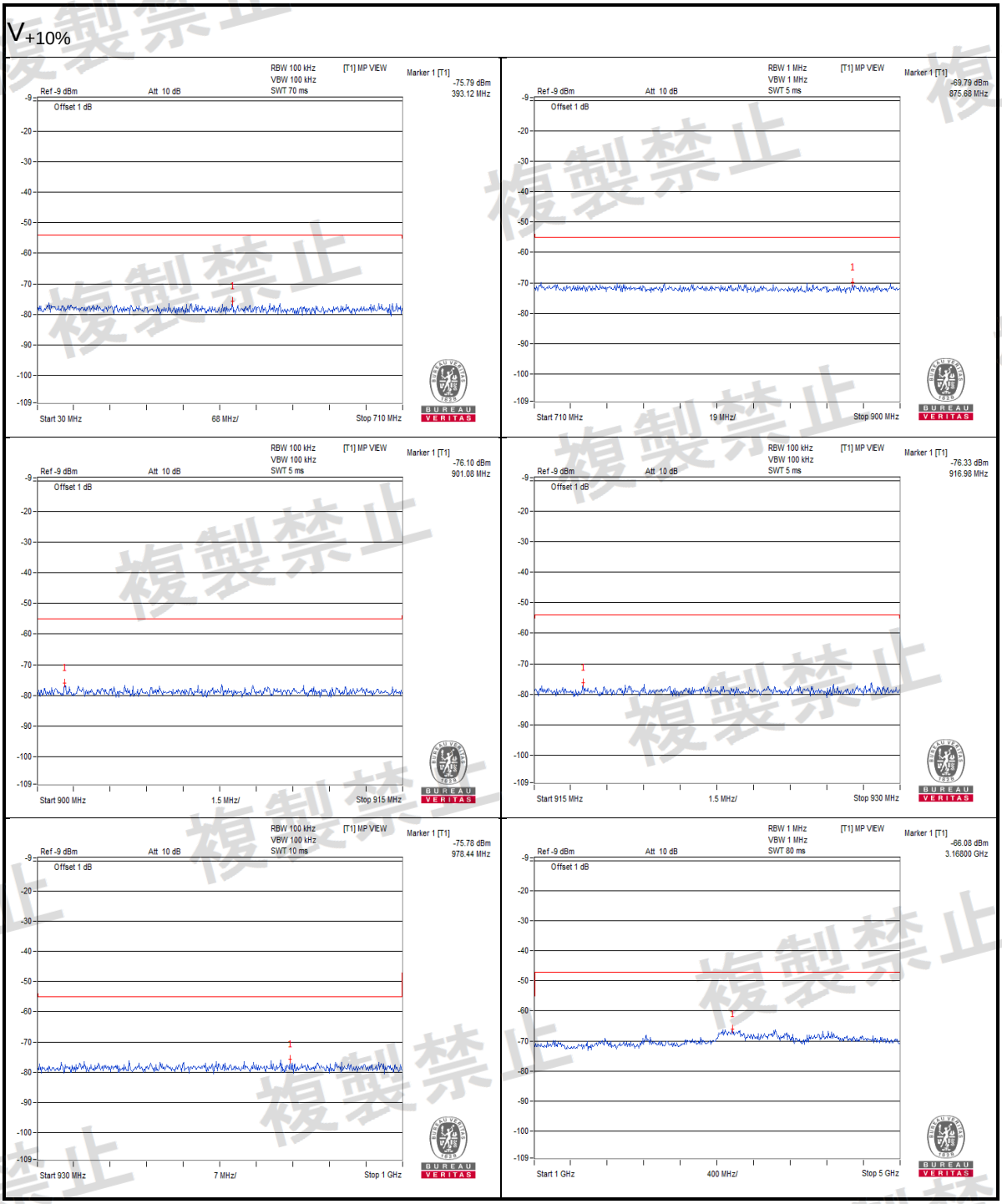
4.6.3 Test Result

TEST CHANNEL		CH37 (923.2MHz)		LIMIT	RESULT
TEST CONDITION	FREQUENCY RANGE	FREQ. (MHz)	MEASURE. VALUE		
Vnormal	30MHz Peak 710MHz	529.12	-75.52	-54	PASS
	710MHz Peak 900MHz	721.78	-69.54	-55	PASS
	900MHz Peak 915MHz	910.47	-75.8	-55	PASS
	915MHz Peak 930MHz	916.56	-75.91	-54	PASS
	930MHz Peak 1000MHz	979.84	-76.12	-55	PASS
	1000MHz Peak 5000MHz	3144	-64.71	-47	PASS
V+10%	30MHz Peak 710MHz	393.12	-75.79	-54	PASS
	710MHz Peak 900MHz	875.68	-69.79	-55	PASS
	900MHz Peak 915MHz	901.08	-76.1	-55	PASS
	915MHz Peak 930MHz	916.98	-76.33	-54	PASS
	930MHz Peak 1000MHz	978.44	-75.78	-55	PASS
	1000MHz Peak 5000MHz	3168	-66.08	-47	PASS
V-10%	30MHz Peak 710MHz	91.2	-75.46	-54	PASS
	710MHz Peak 900MHz	746.86	-69.35	-55	PASS
	900MHz Peak 915MHz	914.67	-76.47	-55	PASS
	915MHz Peak 930MHz	929.46	-75.79	-54	PASS
	930MHz Peak 1000MHz	956.6	-75.94	-55	PASS
	1000MHz Peak 5000MHz	3048	-65.85	-47	PASS

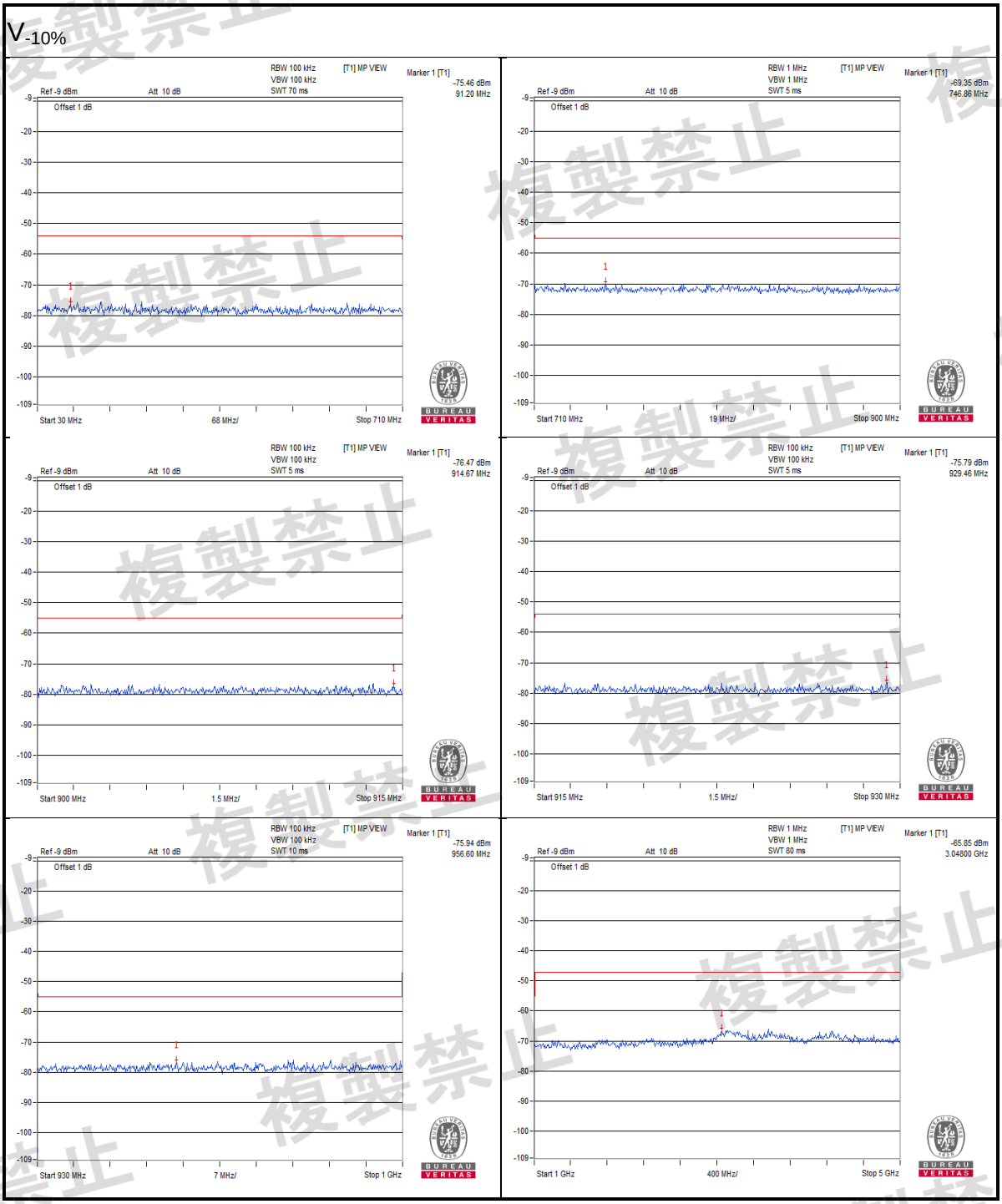
Vnormal


RBW 100 kHz
VBW 100 kHz
SWT 70 ms
[T1] MP VIEW
Marker 1 [T1]
-75.52 dBm
529.12 MHz
Ref -9 dBm
Att 10 dB
Offset 1 dB
Start 30 MHz
68 MHz/
Stop 710 MHz
RBW 1 MHz
VBW 1 MHz
SWT 5 ms
[T1] MP VIEW
Marker 1 [T1]
-69.54 dBm
721.78 MHz
Ref -9 dBm
Att 10 dB
Offset 1 dB
Start 710 MHz
19 MHz/
Stop 900 MHz
RBW 100 kHz
VBW 100 kHz
SWT 5 ms
[T1] MP VIEW
Marker 1 [T1]
-75.80 dBm
910.47 MHz
Ref -9 dBm
Att 10 dB
Offset 1 dB
Start 900 MHz
1.5 MHz/
Stop 915 MHz
RBW 100 kHz
VBW 100 kHz
SWT 5 ms
[T1] MP VIEW
Marker 1 [T1]
-75.91 dBm
916.56 MHz
Ref -9 dBm
Att 10 dB
Offset 1 dB
Start 915 MHz
1.5 MHz/
Stop 930 MHz
RBW 100 kHz
VBW 100 kHz
SWT 10 ms
[T1] MP VIEW
Marker 1 [T1]
-76.12 dBm
979.84 MHz
Ref -9 dBm
Att 10 dB
Offset 1 dB
Start 930 MHz
7 MHz/
Stop 1 GHz
RBW 1 MHz
VBW 1 MHz
SWT 80 ms
[T1] MP VIEW
Marker 1 [T1]
-64.71 dBm
3.14400 GHz
Ref -9 dBm
Att 10 dB
Offset 1 dB
Start 1 GHz
400 MHz/
Stop 5 GHz

V+10%


RBW 100 kHz
VBW 100 kHz
SWT 70 ms
[T1] MP VIEW
Marker 1 [T1]
-75.79 dBm
393.12 MHz
Ref -9 dBm
Att 10 dB
Offset 1 dB
Start 30 MHz
68 MHz/
Stop 710 MHz
RBW 1 MHz
VBW 1 MHz
SWT 5 ms
[T1] MP VIEW
Marker 1 [T1]
-69.79 dBm
875.68 MHz
Ref -9 dBm
Att 10 dB
Offset 1 dB
Start 710 MHz
19 MHz/
Stop 900 MHz
RBW 100 kHz
VBW 100 kHz
SWT 5 ms
[T1] MP VIEW
Marker 1 [T1]
-76.10 dBm
901.08 MHz
Ref -9 dBm
Att 10 dB
Offset 1 dB
Start 900 MHz
1.5 MHz/
Stop 915 MHz
RBW 100 kHz
VBW 100 kHz
SWT 5 ms
[T1] MP VIEW
Marker 1 [T1]
-76.33 dBm
916.98 MHz
Ref -9 dBm
Att 10 dB
Offset 1 dB
Start 915 MHz
1.5 MHz/
Stop 930 MHz
RBW 100 kHz
VBW 100 kHz
SWT 10 ms
[T1] MP VIEW
Marker 1 [T1]
-75.78 dBm
978.44 MHz
Ref -9 dBm
Att 10 dB
Offset 1 dB
Start 930 MHz
7 MHz/
Stop 1 GHz
RBW 1 MHz
VBW 1 MHz
SWT 80 ms
[T1] MP VIEW
Marker 1 [T1]
-66.08 dBm
3.16800 GHz
Ref -9 dBm
Att 10 dB
Offset 1 dB
Start 1 GHz
400 MHz/
Stop 5 GHz

V-10%

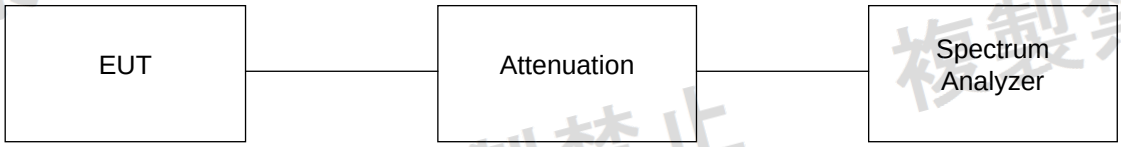

RBW 100 kHz
VBW 100 kHz
SWT 70 ms
[T1] MP VIEW
Marker 1 [T1]
-75.46 dBm
91.20 MHz
Ref -9 dBm
Att 10 dB
Offset 1 dB
Start 30 MHz
68 MHz/
Stop 710 MHz
RBW 1 MHz
VBW 1 MHz
SWT 5 ms
[T1] MP VIEW
Marker 1 [T1]
-69.35 dBm
746.86 MHz
Ref -9 dBm
Att 10 dB
Offset 1 dB
Start 710 MHz
19 MHz/
Stop 900 MHz
RBW 100 kHz
VBW 100 kHz
SWT 5 ms
[T1] MP VIEW
Marker 1 [T1]
-76.47 dBm
914.67 MHz
Ref -9 dBm
Att 10 dB
Offset 1 dB
Start 900 MHz
1.5 MHz/
Stop 915 MHz
RBW 100 kHz
VBW 100 kHz
SWT 5 ms
[T1] MP VIEW
Marker 1 [T1]
-75.79 dBm
929.46 MHz
Ref -9 dBm
Att 10 dB
Offset 1 dB
Start 915 MHz
1.5 MHz/
Stop 930 MHz
RBW 100 kHz
VBW 100 kHz
SWT 10 ms
[T1] MP VIEW
Marker 1 [T1]
-75.94 dBm
956.60 MHz
Ref -9 dBm
Att 10 dB
Offset 1 dB
Start 930 MHz
7 MHz/
Stop 1 GHz
RBW 1 MHz
VBW 1 MHz
SWT 80 ms
[T1] MP VIEW
Marker 1 [T1]
-65.85 dBm
3.04800 GHz
Ref -9 dBm
Att 10 dB
Offset 1 dB
Start 1 GHz
400 MHz/
Stop 5 GHz

4.7 Transmission Time Control

4.7.1 Limits of Transmission Time Control

Application	Antenna Power	Applied CH number	Unit CH bandwidth	CH used in a bundle	Sending duration	Pause duration	The sum of emission time per arbitrary one hour
	1mW or less	1-5	200kHz	1~5 ch	100ms or less	100ms	3.6sec
		62-77	100kHz	1~5 ch	50ms or less	50ms	None
V	20mW or less	24-38	200kHz	1~5 ch	4s	50ms	None
		33-61	200kHz	1ch	More than 200ms, and 400ms or less	Ten times or more of the former sending time	360sec or less
					More than 6ms, and 200ms or less	2ms	
					6ms or less	None	
				2ch	More than 3ms, and 200ms or less	2ms	
					3ms or less	None	
				3~5ch	More than 2ms, and 100ms or less	2ms	
					2ms or less	None	

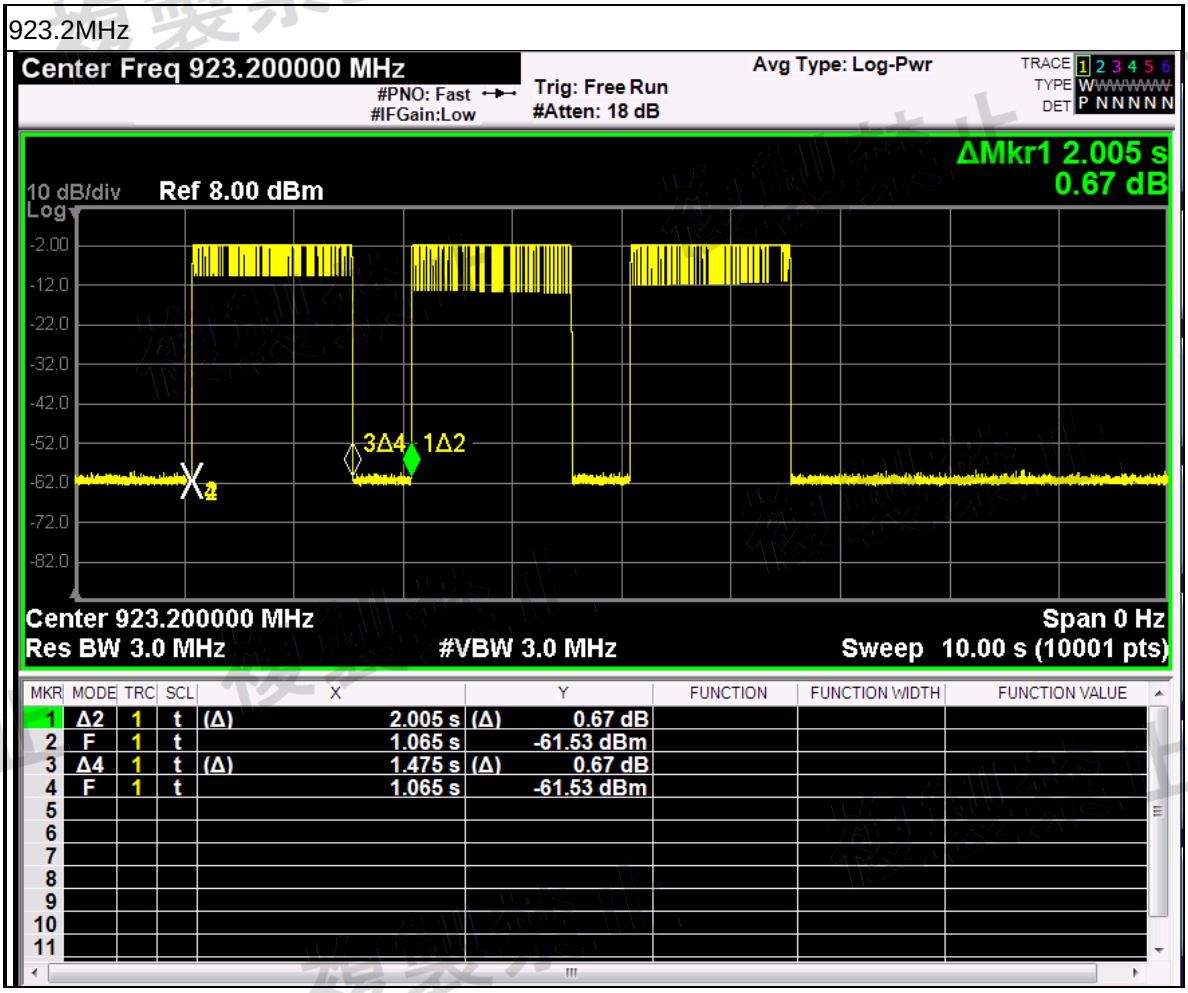
4.7.2 Test Setup



4.7.3 Test Results

Transmission Time Control				
Frequency (MHz)	Sending Duration		Pause Duration	
	Test Result (ms)	Limit	Test Result (ms)	Min. Limit
923.2	1475	4s	530	50ms

923.2MHz

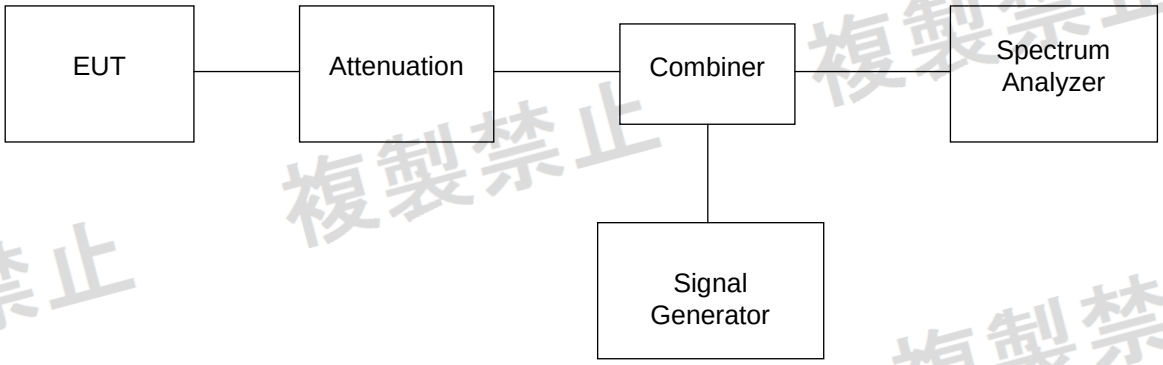


4.8 Carrier Sense

4.8.1 Limits of Carrier Sense

Application	Antenna Power	Applied CH number	Unit CH bandwidth	CH used in a bundle	Carrier sense time
	1mW or less	1-5	200kHz	1~5 ch	None
		62-77	100kHz	1~5 ch	
V		24-38	200kHz	1~5 ch	5ms or more
	20mW or less	33-61	200kHz	1ch	128us or more
				2ch	
				3~5ch	

4.8.2 Test Setup



4.8.3 Test Results

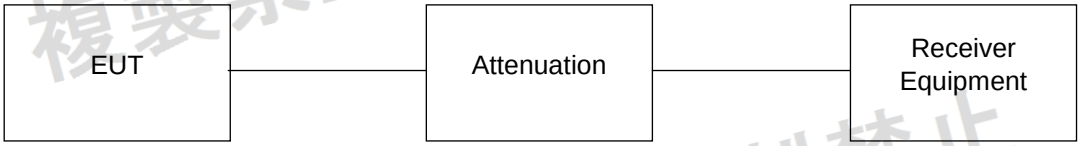
Carrier Sense		
Frequency (MHz)	Can transmit condition	Can not transmit condition
	EUT can transmit after 5ms that pulse signal in the off time	EUT cannot transmit anyway
923.2	PASS	PASS

4.9 Interference Prevention Function

4.9.1 Limits of Interference Prevention Function

The radio equipment shall automatically transmit/receive identification codes.

4.9.2 Test Setup



4.9.3 Test Results

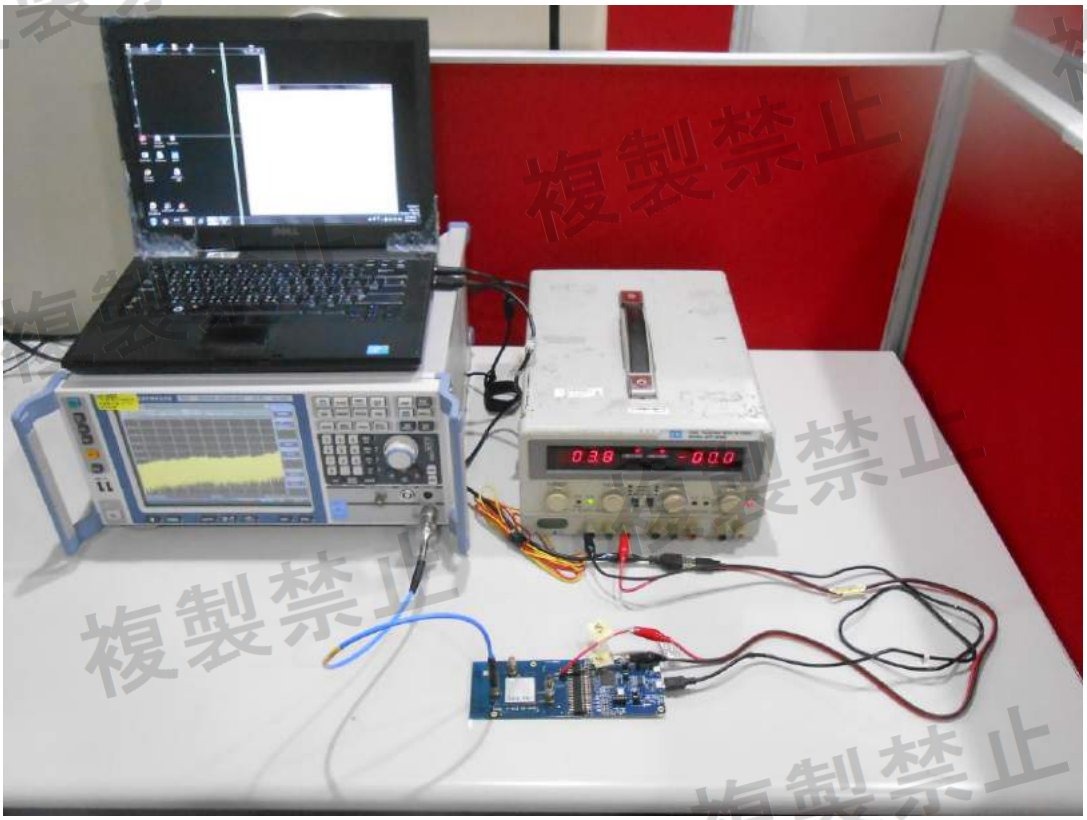
Environmental Conditions	25 deg.C, 60% RH
Link Mode	**Test Result**
Normal	Pass

5 Test Instruments

Description & Manufacturer	Model no.	Serial No.	Calibrated Date	Calibrated Until	Calibration Authority
Spectrum Analyzer R&S	FSV40	100964	July 01, 2017	June 30, 2018	ETC
ESG Vector signal generator Agilent	E4438C	MY47271330 506 602 UNJ	Oct, 11, 2017	Oct. 10, 2018	ETC
Detector Narda	4503A	0306	NA	NA	NA
Power Meter Anritsu	ML2495A	1014008	May 11, 2017	May 10, 2018	ETC
Power Sensor Anritsu	MA2411B	0917122	May 11, 2017	May 10, 2018	ETC
Digital Oscilloscope R&S	RTO1012	300053	June 28, 2017	June 27, 2018	ETC
DC Power Supply Topward	6603D	795558	NA	NA	NA
AC Power Source Extech Electronics	6205	1440452	NA	NA	NA
True RMS Clamp Meter FLUKE	325	31130711WS	May 29, 2017	May 28, 2018	ETC

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. Tested Date: Dec. 28, 2017

6 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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Tel: 886-2-26052180
Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab
Tel: 886-3-6668565
Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab
Tel: 886-3-3183232
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Web Site: www.bureauveritas-adt.com

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

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