Japan DFS Test Report

Equipment	:	**High-end Tri-band WLAN router**
Model No.	:	**WN-TX4266GR**
Brand Name	:	**I-O DATA DEVICE, INC.**
Applicant	:	**I-O DATA DEVICE, INC.**
Address	:	**3-10, Sakurada machi, Kanazawa shi, Ishikawa Ken**
Standard	:	**Article 2 Paragraph 1 Item 19-3** **Article 2 Paragraph 1 Item 19-3-2**
Received Date	:	**Aug. 27, 2019**
Tested Date	:	**Sep. 03 ~ Sep. 05, 2019**
Operating Mode		**Master**

Measurement was conducted by the following test method:
the test method of Ordinance Concerning Technical Regulations Conformity Certification etc. of Specified Radio Equipment in Annex 1, the Ministry of Internal Affairs and Communication notification in Annex "45" of Article 88, Paragraph 1 or the test method more than equivalent.

We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by:	**Approved by:**
James Fan / Assistant Manager	**Gary Chang / Manager**

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Release Record

Report No.	Version	Description	Issued Date
JZ982704	Rev. 01	Initial issue	Nov. 04, 2019

Summary of Test Results

Description of Test	Result
Channel Availability Check	Pass
In-service Monitoring	Pass
Channel Shutdown and Non-Occupancy Period	Pass

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

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1 General Description

1.1 Information

1.1.1 Specification of the Equipment under Test (EUT)

Power Supply Type	12Vdc from adapter
Type(s) of Modulation / Technology	256QAM,64QAM, 16QAM, QPSK, BPSK / OFDM
Frequency Range (MHz)	5150~5250, 5250~5350, 5470~5725
Operating Mode: **IEEE Std. 802.11 / Data rate (Mbps)**	802.11a 802.11an HT20 (MCS 0~31) 802.11an HT40 (MCS 0~31) 802.11ac VHT 20 (MCS 0~9) 802.11ac VHT 40 (MCS 0~9) 802.11ac VHT 80 (MCS 0~9)
HW Version	80-035-037001ADB
SW Version	0.00.004

1.1.2 Accessories

No.	Equipment	Description
1	Adapter	Brand: UNIFIVE Model: UIA336-1220 I/P: 100-240Vac, 50/60Hz, 0.4A. O/P: 12Vdc, 2A Power line: AC 0.9m non-shielded without core DC 1.8m non-shielded without core
2	Ethernet Cable	1.0m non-shielded without core

1.1.3 Antenna Details

Ant. No.	Model	Type	Connector	Operating Frequencies (MHz) / Antenna Gain (dBi)				
				2400~2483.5	5150~5250	5250~5350	5470~5725	5725~5850
1	C1597-510326-A	PIFA	No	2	3.8	3.9	-	-
2	C1597-510327-A	PIFA	No	2.3	2.2	1.6	-	-
3	C1597-510328-A	PIFA	No	2.3	2	2	-	-
4	C1597-510329-A	PIFA	No	2.5	3	3.1	-	-
5	C1597-510318-A	PIFA	No	-	-	-	2	-
6	C1597-510318-A	PIFA	No	-	-	-	2.5	-
7	C1597-510318-A	PIFA	No	-	-	-	2	-
8	C1597-510318-A	PIFA	No	-	-	-	2.3	-

The lowest gain : 1.6 dBi

1.2 Support Equipment

Support Equipment List				
No.	**Equipment**	**Brand Name**	**Model Name**	**Remark**
1	Notebook	DELL	Latitude E5420	9ZFB4X1
2	Notebook	DELL	Latitude E5420	B6FT9T1
3	Wireless Donlge	Netgear	A6100	--

1.3 Channel Loading/Data Streaming

☒	Test transmission sequence is from the Master to the Slave.
	☒ For W53 band (5250-5350 MHz) Monitoring of operating channel with about 50% loading over maximum signal transmission speed.
	☒ For W56 band (5470-5725 MHz) Monitoring of operating channel with about 17% loading over maximum signal transmission speed.
	☒ No transmissions on channels being checked during a Channel Availability Check and Confirming Available Channels.

1.4 DFS and TPC Information

The DFS Related Operating Mode(s) of the Equipment			
☒ Master			
☐ Cilent with radar detection			
☐ Client without radar detection			
Software / Firmware Version		0.00.004	
Power-on Cycle. (Master)(W53)		46.175 sec	
Power-on Cycle. (Master)(W56)		49.375 sec	
Communication Mode		☒IP Based (Load Based)	☐Frame Based
IEEE Std. 802.11	**Frequency Range (MHz)**	**TPC (Transmit Power Control)**	**Active Scan**
a/n/ac (HT20)	☒ 5250-5350	Yes	Yes
n/ac (HT40) ac (HT80)	☒ 5470-5725	Yes	Yes

1.5 DFS Parameters

DFS requirement values	
Parameter	Value
Channel Availability Check Time	60 sec
Channel Move Time	10 sec
Channel Closing Transmission Time	260 ms
Non-occupancy period	Minimum 30 minutes

W53: Parameters DFS radar test signal				
Test Signal (#)	Pulse width [μs]	Pulse repetition frequency PRF [Hz]	Pulses per burst [PPB]	Detection Probability (%)
1	1	700	18	≥60
2	2.5	260	18	≥60

W56: Parameters DFS radar test signal				
Test Signal (#)	Pulse width [μs]	Pulse repetition frequency PRF [Hz]	Pulses per burst [PPB]	Detection Probability (%)
1	0.5	720	18	≥60
2	1	700	18	≥60
3	2	250	18	≥60
4	1~5 (step 1)	4347-6667 (step 1)	23~29	≥60
5	6~10 (step 1)	2000-5000 (step 1)	16~18	≥60
6	11~20 (step 1)	2000-5000 (step 1)	12~16	≥60
Aggregate (Radar Types 1-6)				≥80

W56: Chirp Modulation (5~20MHz) Parameters DFS radar test signal					
Test Signal (#)	Pulse width [μs]	Pulse repetition frequency PRF [Hz]	Number of Pulses per Burst	Number of Bursts	Detection Probability (%)
7	50-100 (step 1)	500-1000 (step 1)	1-3	8-20	≥80

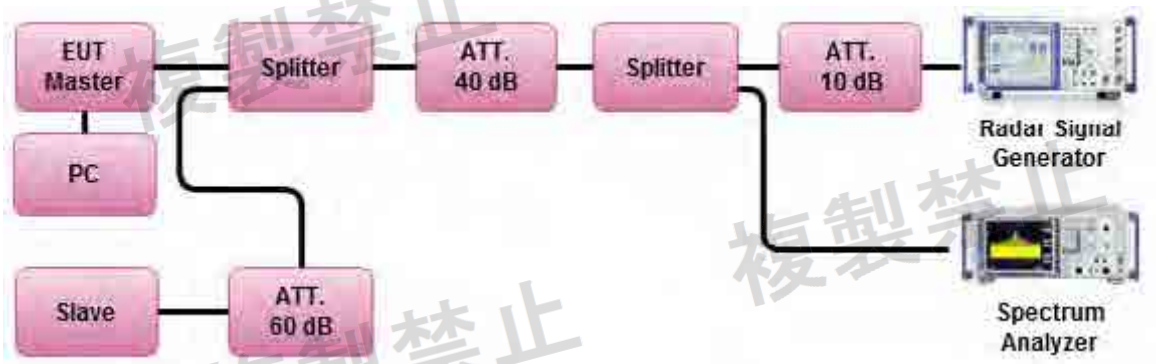
W56: 5250-5724 MHz Frequency Hopping Modulation Parameters DFS radar test signal					
Test Signal (#)	Pulse width [μs]	Pulse repetition frequency PRF [Hz]	Number of Pulses per Burst	Number of Bursts	Detection Probability (%)
8	1	3000	9 (3ms)	300	≥70

1.6 Master DFS Threshold Level

DFS Threshold Level
DFS Threshold level:-62.4 dBm
Note 1: DFS Detection Threshold (dBm) = -64 + G (dBi) The DFS Detection Threshold Level is (-64dBm) + (1.6 dBi)= -62.4 dBm Note 2: maximum EIRP< 200mW (23dBm). DFS Detection Threshold Level is (-62dBm) + G_{ANT} maximum EIRP≥ 200mW (23dBm). DFS Detection Threshold Level is (-64dBm) + G_{ANT}

1.7 Test Setup

Master Conducted Measurement



1.8 The Equipment List

Test Site	(DF01-WS)				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	R&S	FSV7	101607	Dec. 20, 2018	Dec. 19, 2019
RF Cable	HUBER+SUHNER	SUCOFLEX_104	MY15686/4	Oct. 15, 2018	Oct. 14, 2019
RF Cable	HUBER+SUHNER	SUCOFLEX_104	296081/4	Oct. 17, 2018	Oct. 16, 2019
RF Cable	HUBER+SUHNER	SUCOFLEX_104	329023/4	Oct. 17, 2018	Oct. 16, 2019
RF Cable	HUBER+SUHNER	SUCOFLEX_104	329021/4	Oct. 17, 2018	Oct. 16, 2019
Vector signal generator	R&S	SMJ100A	100498	Dec. 26, 2018	Dec. 25, 2019
Splitter (1X2)	WOKEN	2WAYDIV	12101200003	Oct. 17, 2018	Oct. 16, 2019
Splitter (1X4)	WOKEN	4WAYDIV	0120A042011010	Oct. 17, 2018	Oct. 16, 2019
Attenuator	woken	PE7013-10	10-1	Oct. 18, 2018	Oct. 17, 2019
Attenuator	woken	PE7013-10	10-2	Oct. 18, 2018	Oct. 17, 2019
Attenuator	woken	PE7013-20	20-1	Oct. 18, 2018	Oct. 17, 2019
Attenuator	woken	PE7013-20	20-2	Oct. 18, 2018	Oct. 17, 2019
20dB Attenuator	MVE	MVE2462-20	16050401	Oct. 18, 2018	Oct. 17, 2019
30dB Attenuator	MVE	MVE2462-30	16050401	Oct. 18, 2018	Oct. 17, 2019
Direction Coupler	Marvelous Microwave	MVE4514-20	20	Oct. 17, 2018	Oct. 16, 2019
Measurement Software	ICC	DFS	V1.3.30	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

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1.9 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
DFS	DF01-WS	25℃ / 65%	Jack Li

1.10 Test Standards

According to the specification of EUT, the EUT must comply with following standard.

Article 2 Paragraph 1 Item 19-3
Article 2 Paragraph 1 Item 19-3-2

1.11 Deviation from Test Standard and Measurement Procedure

None

1.12 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)

Measurement Uncertainty	
Parameters	**Uncertainty**
Time	±0.1%

2 Test Result

2.1 Channel Availability Check (CAC)

2.1.1 Channel Availability Check Limit

Channel Availability Check Limit
The EUT shall perform a channel availability check to ensure that there is no radar operating on the channel. After power-up sequence, receive at least 1 minute(60 sec) on the intended operating frequency.

2.1.2 Test Procedure

Test Method for W53	
Measuring Equipment Conditions	MIC Notice No.88 Appendix No.45, clause 13.2/26.2
Conditions of Equipment under Test	MIC Notice No.88 Appendix No.45, clause 13.3/26.3
Measuring Operation Procedures	MIC Notice No.88 Appendix No.45, clause 13.4/26.4
Presentation of Results	MIC Notice No.88 Appendix No.45, clause 13.5/26.5
Other Conditions	MIC Notice No.88 Appendix No.45, clause 13.6/26.6

Test Method for W56	
Measuring Equipment Conditions	MIC Notice No.88 Appendix No.45, clause 13.2/27.2
Conditions of Equipment under Test	MIC Notice No.88 Appendix No.45, clause 13.3/27.3
Measuring Operation Procedures	MIC Notice No.88 Appendix No.45, clause 13.4/27.4
Presentation of Results	MIC Notice No.88 Appendix No.45, clause 13.5/27.5
Other Conditions	MIC Notice No.88 Appendix No.45, clause 13.6/27.6

2.1.3 Radar Detection Threshold (during the Channel Availability Check) Result

Radar Detection Threshold (during the Channel Availability Check) Result					
Minimum Antenna Gain (dBi)			1.6		
Detection Threshold Level (dBm)			-62.4		
Modulation Mode	**Freq. (MHz)**	**Radar Test Signal (#)**	**Nr of Times Triggered (#out of 4)**	**Detection Probability(%)**	**Detection Probability Limit (%)**
VHT20	5320	1 - Fixed	4	100	100
		2 - Fixed	4	100	100
VHT20	5500	1 - Fixed	4	100	100
		2 - Fixed	4	100	100
		3 - Fixed	4	100	100
		4 - Variable	4	100	100
		5 - Variable	4	100	100
		6 - Variable	4	100	100
		7 - Charp	4	100	100
		8 - Hopping	4	100	100
Result		**Complied**			

Radar Detection Threshold (during the Channel Availability Check) Result					
Minimum Antenna Gain (dBi)			1.6		
Detection Threshold Level (dBm)			-62.4		
Modulation Mode	**Freq. (MHz)**	**Radar Test Signal (#)**	**Nr of Times Triggered (#out of 4)**	**Detection Probability(%)**	**Detection Probability Limit (%)**
VHT40	5310	1 - Fixed	4	100	100
		2 - Fixed	4	100	100
VHT40	5510	1 - Fixed	4	100	100
		2 - Fixed	4	100	100
		3 - Fixed	4	100	100
		4 - Variable	4	100	100
		5 - Variable	4	100	100
		6 - Variable	4	100	100
		7 - Charp	4	100	100
		8 - Hopping	4	100	100
Result		**Complied**			

Radar Detection Threshold (during the Channel Availability Check) Result					
Minimum Antenna Gain (dBi)			1.6		
Detection Threshold Level (dBm)			-62.4		
Modulation Mode	**Freq. (MHz)**	**Radar Test Signal (#)**	**Nr of Times Triggered (#out of 4)**	**Detection Probability(%)**	**Detection Probability Limit (%)**
VHT80	5290	1 - Fixed	4	100	100
		2 - Fixed	4	100	100
VHT80	5530	1 - Fixed	4	100	100
		2 - Fixed	4	100	100
		3 - Fixed	4	100	100
		4 - Variable	4	100	100
		5 - Variable	4	100	100
		6 - Variable	4	100	100
		7 - Charp	4	100	100
		8 - Hopping	4	100	100
Result		**Complied**			

2.2 In-service Monitoring

2.2.1 In-service Monitoring limit

In-service Monitoring Limit
The *In-Service Monitoring* shall be used to monitor an *Operating Channel*. The *In-Service-Monitoring* shall start immediately after the EUT has started transmissions on a channel. During the *In-Service Monitoring*, the EUT shall be capable of detecting any of the radar test signals that fall within the started transmissions ranges and with a level above the *Radar Detection Threshold*. The minimum required detection probability is defined in clause3.1.1 DFS Parameters.

2.2.2 Test Procedure

Test Method for W53	
Measuring Equipment Conditions	MIC Notice No.88 Appendix No.45, clause 13.2/26.2
Conditions of Equipment under Test	MIC Notice No.88 Appendix No.45, clause 13.3/26.3
Measuring Operation Procedures	MIC Notice No.88 Appendix No.45, clause 13.4/26.4
Presentation of Results	MIC Notice No.88 Appendix No.45, clause 13.5/26.5
Other Conditions	MIC Notice No.88 Appendix No.45, clause 13.6/26.6

Test Method for W56	
Measuring Equipment Conditions	MIC Notice No.88 Appendix No.45, clause 13.2/27.2
Conditions of Equipment under Test	MIC Notice No.88 Appendix No.45, clause 13.3/27.3
Measuring Operation Procedures	MIC Notice No.88 Appendix No.45, clause 13.4/27.4
Presentation of Results	MIC Notice No.88 Appendix No.45, clause 13.5/27.5
Other Conditions	MIC Notice No.88 Appendix No.45, clause 13.6/27.6

Note:
W53: Type 1-2 limit 20 times – 75% [15] or 40 times – 60% [24]
W56: Type 1-7 limit 20 times –90% [18] or 40 times – 80% [32]
W56: Type 8 limit 20 times –80% [16] or 40 times –70% [28]

2.2.3 Test Result of In-service Monitoring

In-service Monitoring Result					
Minimum Antenna Gain (dBi)			1.6		
Detection Threshold Level (dBm)			-62.4		
Modulation Mode	**Freq. (MHz)**	**Radar Test Signal (#)**	**Nr of Times Triggered (#out of 20)**	**Detection Probability(%)**	**Detection Probability Limit (%)**
VHT20	5320	1 - Fixed	18	90	75
		2 - Fixed	20	100	75
VHT20	5500	1 - Fixed	20	100	90
		2 - Fixed	20	100	90
		3 - Fixed	20	100	90
		4 - Variable	18	90	90
		5 - Variable	19	95	90
		6 - Variable	18	90	90
		7 - Charp	20	100	90
		8 - Hopping	20	100	80
Result		Complied			

In-service Monitoring Result					
Minimum Antenna Gain (dBi)			1.6		
Detection Threshold Level (dBm)			-62.4		
Modulation Mode	**Freq. (MHz)**	**Radar Test Signal (#)**	**Nr of Times Triggered (#out of 20)**	**Detection Probability(%)**	**Detection Probability Limit (%)**
VHT40	5310	1 - Fixed	20	100	75
		2 - Fixed	20	100	75
VHT40	5510	1 - Fixed	20	100	90
		2 - Fixed	20	100	90
		3 - Fixed	20	100	90
		4 - Variable	18	90	90
		5 - Variable	19	95	90
		6 - Variable	18	90	90
		7 - Charp	20	100	90
		8 - Hopping	20	100	80
Result		Complied			

In-service Monitoring Result					
Minimum Antenna Gain (dBi)			1.6		
Detection Threshold Level (dBm)			-62.4		
Modulation Mode	**Freq. (MHz)**	**Radar Test Signal (#)**	**Nr of Times Triggered (#out of 20)**	**Detection Probability(%)**	**Detection Probability Limit (%)**
VHT80	5290	1 - Fixed	19	95	75
		2 - Fixed	20	100	75
VHT80	5530	1 - Fixed	20	100	90
		2 - Fixed	20	100	90
		3 - Fixed	20	100	90
		4 - Variable	19	95	90
		5 - Variable	19	95	90
		6 - Variable	19	95	90
		7 - Charp	20	100	90
		8 - Hopping	20	100	80
Result		**Complied**			

2.3 Channel Shutdown and Non-Occupancy Period

2.3.1 Channel Shutdown and Non-Occupancy Period Limit

Channel Shutdown and Non-Occupancy Period Limit	
Channel Move Time	10 sec
Channel Closing Transmission Time	260 ms in Channel Move Time 10 sec period.
Non-occupancy period	Minimum 30 minutes

2.3.2 Test Procedure

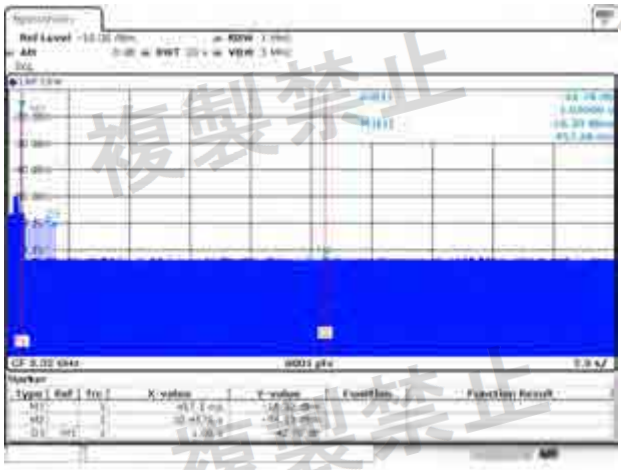
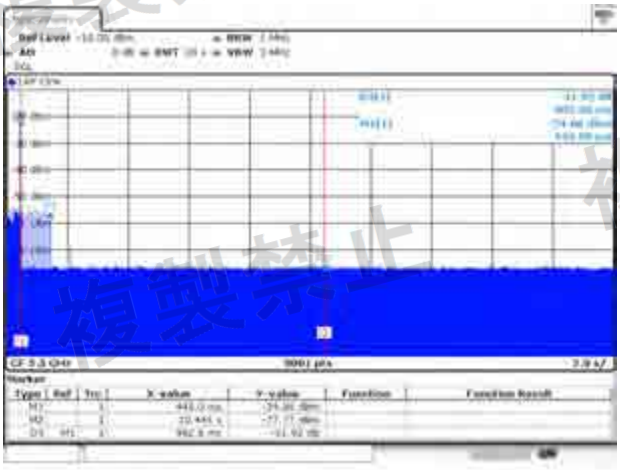
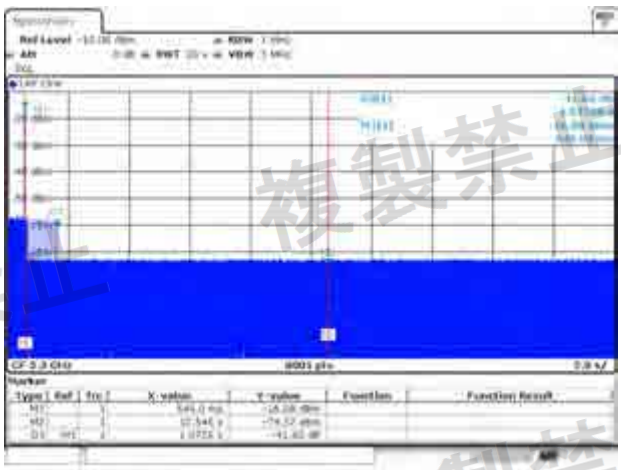
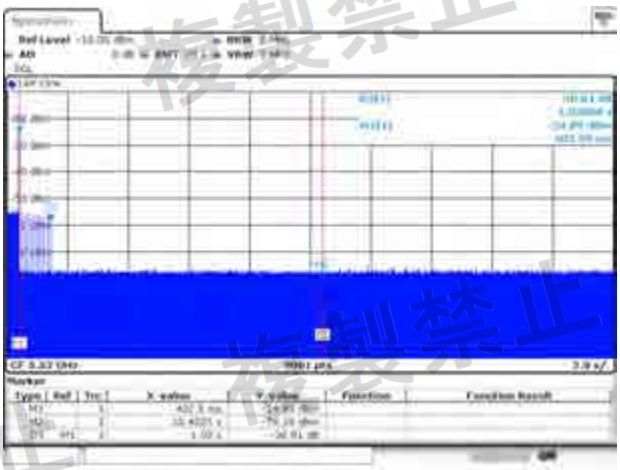
Test Method for W53	
Measuring Equipment Conditions	MIC Notice No.88 Appendix No.45, clause 13.2/26.2
Conditions of Equipment under Test	MIC Notice No.88 Appendix No.45, clause 13.3/26.3
Measuring Operation Procedures	MIC Notice No.88 Appendix No.45, clause 13.4/26.4
Presentation of Results	MIC Notice No.88 Appendix No.45, clause 13.5/26.5
Other Conditions	MIC Notice No.88 Appendix No.45, clause 13.6/26.6

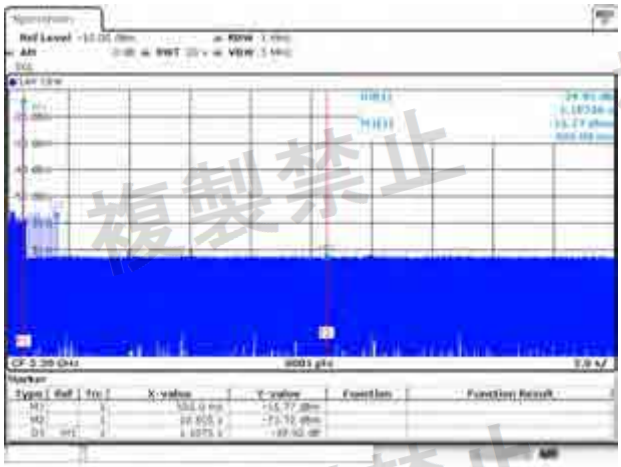
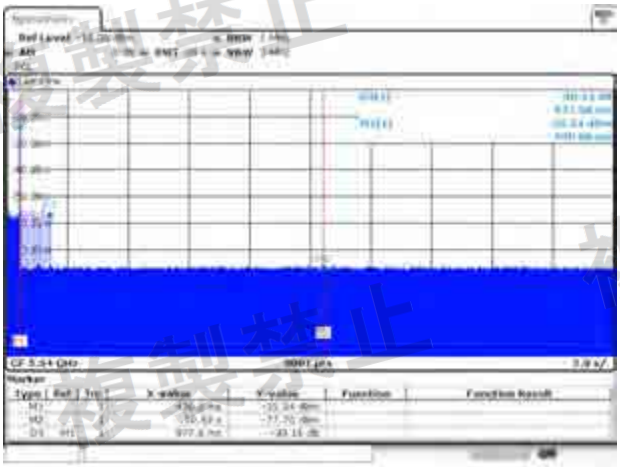
Test Method for W56	
Measuring Equipment Conditions	MIC Notice No.88 Appendix No.45, clause 13.2/27.2
Conditions of Equipment under Test	MIC Notice No.88 Appendix No.45, clause 13.3/27.3
Measuring Operation Procedures	MIC Notice No.88 Appendix No.45, clause 13.4/27.4
Presentation of Results	MIC Notice No.88 Appendix No.45, clause 13.5/27.5
Other Conditions	MIC Notice No.88 Appendix No.45, clause 13.6/27.6

2.3.3 Test Result of Channel Shutdown

Channel Shutdown and Non-Occupancy Period Result				
Minimum Antenna Gain (dBi)			1.6	
Detection Threshold Level (dBm)			-62.4	
Modulation Mode	**Freq. (MHz)**	**Radar Test Signal**	**Channel Closing Transmission Time(ms)**	**Channel Move Time(s)**
VHT20	5320	1 - Fixed	72.5	1.05
VHT20	5500	1 - Fixed	32.5	0.9825
VHT40	5310	1 - Fixed	115	1.0725
VHT40	5510	1 - Fixed	32.5	1.03
VHT80	5290	1 - Fixed	115	1.1075
VHT80	5530	1 - Fixed	25	0.9775
Limit			260ms	10 sec
Result			**Complied**	

2.3.4 Channel Shutdown Plots

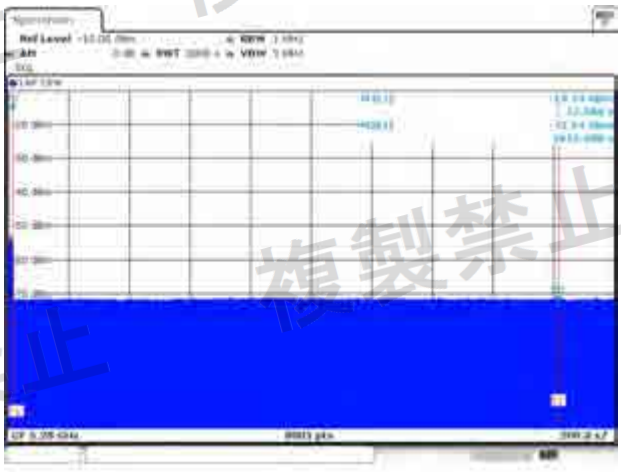
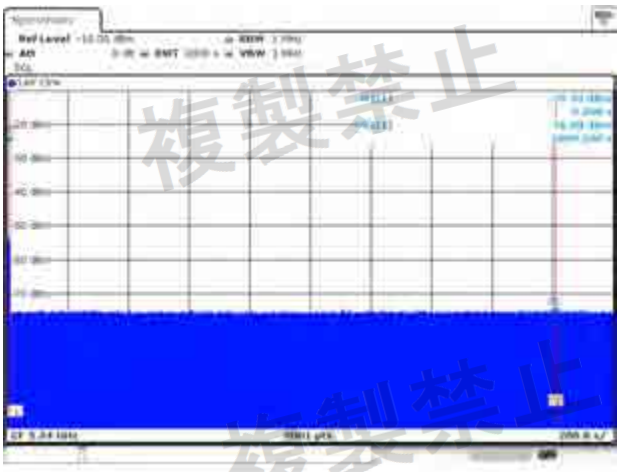
VHT20-5320MHz - 20 sec Timing Plot (total 8001 bin, transmit data 29 bin)	VHT20-5500MHz - 20 sec Timing Plot (total 8001 bin, transmit data 13 bin)
	
VHT40-5310MHz - 20 sec Timing Plot (total 8001 bin, transmit data 46 bin)	**VHT40-5510MHz - 20 sec Timing Plot (total 8001 bin, transmit data 13 bin)**
	

VHT80-5290MHz - 20 sec Timing Plot (total 8001 bin, transmit data 46 bin)	VHT80-5530MHz - 20 sec Timing Plot (total 8001 bin, transmit data 10 bin)
	

2.3.5 Test Result of Non-Occupancy Period

Non-Occupancy Period Result			
Minimum Antenna Gain (dBi)			1.6
Detection Threshold Level (dBm)			-62.4
Modulation Mode	**Freq. (MHz)**	**Radar Test Signal**	**Non-Occupancy Period(min)**
VHT80	5290	1 - Fixed	>30
VHT80	5530	1 - Fixed	>30
Limit			30 min
Result			**Complied**

2.3.6 Non-Occupancy Period Plots

5290MHz - 2000 sec Timing Plot	***5530MHz - 2000 sec Timing Plot***
	

3 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corp, it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan District. Location map can be found on our website http://www.icertifi.com.tw.

Linkou	**Kwei Shan**	**Kwei Shan Site II**
Tel: 886-2-2601-1640	Tel: 886-3-271-8666	Tel: 886-3-271-8640
No. 30-2, Ding Fwu Tsuen, Lin Kou District, New Taipei City, Taiwan, R.O.C.	No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C.	No. 14-1, Lane 19, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C.

If you have any suggestion, please feel free to contact us as below information

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