EMI TEST REPORT

Test Report No. : 27JE0288-HO-B-R1

Applicant	:	**CONTEC CO., LTD.**
Type of Equipment	:	**Wireless LAN MiniPCI Card User Unit**
Model No.	:	**FX-DS540-MPCI4W**
Test standard	:	**FCC Part 15 Subpart E:2007** **Section 15.407(DFS test only)**
FCC ID	:	**PQRDS540-MPCI4W**
Test Result	:	**Complied**

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with above regulation.
4. The test results in this report are traceable to the national or international standards.

Date of test : May 31, 2007

Tested by : T. Hatakeda
Takahiro Hatakeda
EMC Services

Approved by : T. Maeno
Tetsuo Maeno
Site manager of
EMC Services

NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.
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http://uljapan.co.jp/emc/nvlap.htm

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SECTION 1: Client information

Company Name	:	CONTEC CO., LTD.
Address	:	33-9-31, Himesato, Nishiyodogawa-ku, Osaka, 555-0025 Japan
Telephone Number	:	+81-6-6477-1363
Facsimile Number	:	+81-6-6477-7221
Contact Person	:	Naoki Ikeda

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment	:	Wireless LAN MiniPCI Card User Unit
Model No.	:	FX-DS540-MPCI4W
Serial No.	:	JZ1641A000005
Rating	:	DC3.3V, 1.6A
Country of Manufacture	:	JAPAN
Receipt Date of Sample	:	May 30, 2007
Condition of EUT	:	Production model
Modification of EUT	:	No modification by the test lab.

2.2 Product Description

Model No: FX-DS540-MPCI4W is the Wireless LAN MiniPCI Card User Unit.
The EUT is a Client Device without Radar detection capability.
Clock frequency : 40MHz
Equipment Type : Transceiver

	IEEE802. 11b/g *1)	IEEE802. 11a *2)
Frequency of operation	2412MHz-2462MHz	5180-5320MHz/5745-5825MHz
Type of Modulation	DSSS, OFDM	
Antenna Type	Chip Antenna	
Antenna Gain	2.0dBi	3.0dBi
Antenna Connector Type	AYU3	
Operating Voltage (inner)	DC3.3V	
Operating Temperature Range	0 to 60 deg.C.	

*1) Refer to 25CE0272-HO-1, FCC Part 15 Subpart C report issued by UL Japan, Inc. (Former UL Apex Co., Ltd.)
*2) For other parts than DFS refer to 25CE0272-HO-2, FCC Part 15 Subpart E (FCC 15.407) report issued by UL Japan, Inc. (Former UL Apex Co., Ltd.)

Remarks :
This Wireless Module consists of 1 chip each of 5GHz band.
This modular transmitter will be equipped only on Wireless LAN Access Point, which is produced by CONTEC CO., LTD. or the manufacturer consigned the production by CONTEC CO., LTD.

FCC 15.31 (e)
This EUT provides stable voltage(DC3.3V) constantly to RF Module regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.407(d) Antenna requirement
This EUT complies with the requirement of 15.407, because a unique coupling (antenna connector, Type: AYU3) is used for this EUT.

SECTION 3: Scope of Report

The EUT has the channels from 5250-5350MHz.
This report only covers DFS requirement subject to 5250-5350MHz bands, as specified by the following referenced procedures.

SECTION 4: Test specification, procedures & results

4.1 Test Specification

Test Specification	:	FCC Part15 Subpart E:2007
Title	:	FCC 47CFR Part15 Radio Frequency Device Subpart E Unlicensed National Information Infrastructure Devices Section 15.407 General technical requirements

Test Specification	:	FCC 06-96 APPENDIX
Title	:	COMPLIANCE MEASUREMENT PROCEDURES FOR UNLICENSED-NATIONAL INFORMATION INFRASTRUCTURE DEVICES OPERATING IN THE 5250-5350 MHz AND 5470-5725MHz BANDS INCORPORATING DYNAMIC FREQUENCY SELECTION

4.2 Procedures and results

Table 1: Applicability of DFS Requirements

Requirement	Operating Mode Client without Radar Detection	Test Procedures & Limits	Deviation	Results
U-NII Detection Bandwidth	Not required	FCC 06-96 Appendix 7.8.1	N/A	N/A
Initial Channel Availability Check Time	Not required	FCC15.407 (h) FCC 06-96 Appendix 7.8.2.1	N/A	N/A
Radar Burst at the Beginning of the Channel Availability Check Time	Not required	FCC15.407 (h) FCC 06-96 Appendix 7.8.2.2	N/A	N/A
Radar Burst at the End of the Channel Availability Check Time	Not required	FCC15.407 (h) FCC 06-96 Appendix 7.8.2.3	N/A	N/A
In-Service Monitoring for Channel Move Time, Channel Closing Transmission Time	Yes	FCC15.407 (h) FCC 06-96 Appendix 7.8.3	N/A	Complied
In-Service Monitoring for Non-Occupancy period	Not required	FCC15.407 (h) FCC 06-96 Appendix 7.8.3	N/A	N/A
Statistical Performance Check	Not required	FCC15.407 (h) FCC 06-96 Appendix 7.8.4	N/A	N/A

Table 2: DFS Detection Thresholds for Master Devices and Client Devices With Radar

Maximum Transmit Power	Value (See Notes 1 and 2)
≥ 200 milliwatt	-64 dBm
< 200 milliwatt	-62 dBm
Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna. Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.	

Table 3 DFS Response Requirement Values

Parameter	Value
Non-occupancy period	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds See Note 1
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2
U-NII Detection Bandwidth	Minimum 80% of the U-NII 99% transmission power bandwidth See Note 3

Note 1: The instant that the Channel Move Time and the Channel Closing Transmission Time begins is as follows:

- For the Short Pulse Radar Test Signals this instant is the end of the *Burst*.
- For the Frequency Hopping radar Test Signal, this instant is the end of the last radar *Burst* generated
- For the Long Pulse Radar Test Signal this instant is the end of the 12 second period defining the *Radar Waveform*.

Note 2: The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate a Channel move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signal will not count quiet periods in between transmissions.

Note 3: During the U-NII Detection Bandwidth detection test, radar type 1 is used and for each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.

Table 4 Short Pulse Radar Test Waveform

Radar Type	Pulse Width (µsec)	PRI (µsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Number of Traials
1	1	1428	18	60%	30
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Rader Types 1-4)				80%	120

Table 5 Long Pulse Radar Test Waveform

Radar Type	Pulse Width (µsec)	Chip Width (MHz)	PRI (µsec)	Number of Pulses per *Burst*	Number of *Burst*	Minimum Percentage of Successful Detection	Minimum Number of Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

Table 6 Frequency Hopping Radar Test Waveform

Radar Type	Pulse Width (µsec)	PRI (µsec)	Pulse per Hop (kHz)	Hopping Rate (kHz)	Hopping Sequence Length (msec)	Minimum Percentage of Successful Detection	Minimum Number of Trials
6	1	333	9	0.333	300	70%	30

4.3 Test Location

UL Japan, Inc. Head Office EMC Lab. *NVLAP Lab. code: 200572-0
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone: +81 596 24 8116 Facsimile: +81 596 24 8124

	FCC Registration Number	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	313583	IC4247A	19.2 x 11.2 x 7.7m	7.0 x 6.0m	Preparation room
No.2 semi-anechoic chamber	655103	IC4247A-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	IC4247A-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	
No.3 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	134570	IC4247A-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	-
No.4 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 semi-anechoic chamber	-	-	6.0 x 6.0 x 3.9m	N/A	-
No.6 shielded room	-	-	4.0 x 4.5 x 2.7m	2.0 x 2.0 m	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	4.75 x 5.4 m	-
No.7 shielded room	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.8 measurement room	-	-	3.1 x 5.0 x 2.7m	N/A	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

4.4 Test set up and Test instruments of DFS

Refer to APPENDIX 1 to 2.

SECTION 5: Operation of E.U.T. during testing

5.1 Operating Modes

The EUT, which is a Client Device without Radar detection capability, operates over the 5250-5350MHz band.

The highest power level is 17.08dBm EIRP in the 5250-5350MHz band.
The lowest power level is 12.86dBm EIRP in the 5250-5350MHz band.

Power level(EIRP) of the EUT[dBm]

Antenna Type	Antenna Gain	5250-5350MHz band *1)	
		Output Power (Min)	Output Power(Max)
	[dBi]	10.52	15.47
Chip Antenna	3.00	13.52	18.47

*1) For other parts than DFS refer to 25CE0272-HO-2, FCC Part 15 Subpart E (FCC 15.407) report issued by UL Japan, Inc. (Former UL Apex Co., Ltd.)

The lowest antenna assembly gain of all available antenna assemblies is 3.00dBi.

The EUT uses one transmitter connected to two 50-ohm coaxial antenna ports via a diversity switch. Both antenna ports are connected to the test system via a power divider to perform conducted tests.

WLAN traffic is generated by streaming the MPEG Test file "6 ½ Magic Hours" from the Master to the Client in full motion video mode using the media player with the V2.61 Codec package.

The EUT utilizes the 802.11a architecture, with a nominal channel bandwidth of 20MHz.

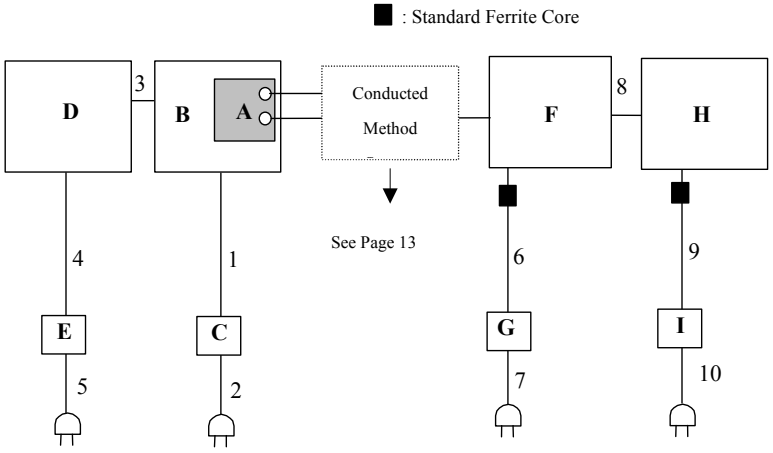
The FCC ID for the Master Device used with EUT for DFS testing is LDK102056.

The rated output power of the Master unit is >200mW(23dBm). Therefore the required interference threshold level is –64 dBm. After correction for antenna gain and procedural adjustments, the required conducted threshold at the antenna port is –64 + 1 + 3.5=-59.5 dBm.

The calibrated conducted DFS detection Threshold level is set to –64dBm. The tested level is lower than the required level hence it provides margin to the limit.

DFS setting is written in EEPROM and users are not able to change EEPROM.

5.2 Configuration and peripherals



Description of EUT and Support equipment

No	Item	Model number	Serial number	Manufacturer	Remarks
A	Wireless LAN MiniPCI Card User Unit	FX-DS540-MPCI4W	JZ1641A000005	CONTEC	EUT
B	Main Board of Wireless LAN Access Point	FX-DS540-APDL-U	3IRBG10000057	CONTEC	-
C	AC Adapter	TAS0093/LA20602T	-	KGCOMP	-
D	Note PC	2366LJ7	9799D4L	IBM	-
E	AC Adapter	02K6750	11S02K6750Z1Z2UP 29A0TJ	IBM	-
F	Access Point	AIR-AP1242AG-A-K9	FTX1045B9L0	Cisco Systems	Master FCC ID : LDK102056
G	AC Adapter	ADP-18PB	PZT0639562214	DLTA ELECTRONICS, INC.	-
H	Note PC	2647-LJ3	97-ALT8N	IBM	-
I	AC Adapter	02K6750	11S02K6750Z1Z2UP 29909J	IBM	-

List of cables used

No.	Name	Length (m)	Shield	
			Cable	Connector
1	DC Cable	1.2	Unshielded	Unshielded
2	AC Cable	1.5	Unshielded	Unshielded
3	LAN Cable	1.5	Unshielded	Unshielded
4	DC Cable	1.8	Unshielded	Unshielded
5	AC Cable	1.0	Unshielded	Unshielded
6	DC Cable	1.8	Unshielded	Unshielded
7	AC Cable	2.0	Unshielded	Unshielded
8	LAN Cable	1.0	Unshielded	Unshielded
9	DC Cable	1.8	Unshielded	Unshielded
10	AC Cable	1.8	Unshielded	Unshielded

5.3 Test and Measurement System

SYSTEM OVERVIEW

The measurement system is based on a conducted test method.

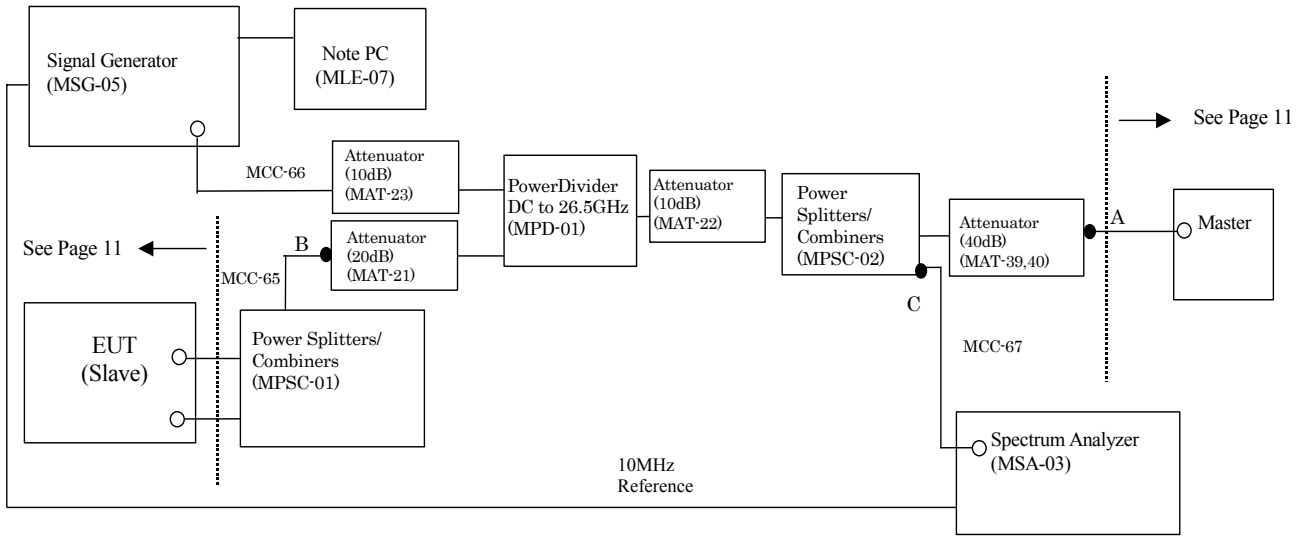
The software selects waveform parameters from within the bounds of the signal type on a random basis using uniform distribution. The short pulse types 2, 3, and 4, the long pulse type 5, and the frequency hopping type 6 parameters are randomized at run-time.

The signal monitoring equipment consists of a spectrum analyzer with the capacity to display 8192 bins on the horizontal axis. A time-domain resolution of 2 msec/bin is achievable with a 16 second sweep time, meeting the 10 seconds short pulse reporting criteria. The aggregate ON time is calculated by multiplying the number of bins above a threshold during a particular observation period by the dwell time per bin, with the analyzer set to peak detection. A time-domain resolution of 3 msec/bin is achievable with a 24 second sweep time, meeting the 22 second long pulse reporting criteria and allowing a minimum of 10 seconds after the end of the long pulse waveform.

FREQUENCY HOPPING RADAR WAVEFORM GENERATING SUBSYSTEM

The first 100 frequencies are selected out of the hopping sequence of the randomized 475 hop frequencies.
Only a *Burst* that has the frequency falling within the receiver bandwidth of the tested U-NII device is selected among those frequencies. (Frequency-domain simulation). The radar waveform generated at the start time of the selected *Burst* (Time-domain simulation) is download to the Signal Generator.
If all of the randomly selected 100 frequencies do not fall within the receiver bandwidth of the U-NII device, the radar waveform is not used for the test.

CONDUCTED METHODS SYSTEM BLOCK DIAGRM



MEASUREMENT SYSTEM FREQUENCY REFERENCE

Lock the signal generator and the spectrum analyzer to the same reference sources as follows: Connect the 10MHz OUT on the signal generator to the 10MHz IN on the spectrum analyzer and set the spectrum analyzer 10MHz In to On.

SYSTEM CALIBRATION

Step 1: Set the system as shown in Figure 3 of FCC 06-96 7.2.1.

Step 2: Adjust each attenuator to fulfill the following three conditions:
- WLAN can be communicated, and
- Rader detection threshold level is bigger than Client Device traffic level on the spectrum analyzer, and
- Master Device traffic level is not displayed on the spectrum analyzer.

Step 3: Terminate 50 ohm at B and C points, and connect the spectrum analyzer to the point A. (See the figure on page 13) At the point A, adjust the signal generator and spectrum analyzer to the center frequency of the channel to be measured. Download the applicable radar waveforms to the signal generator. Select the radar waveform, trigger a burst manually and measure the amplitude on the spectrum analyzer. Readjust the amplitude of the signal generator as required so that the peak level of the waveform is at a displayed level equal to the required or desired interference detection threshold. Separate signal generator amplitude settings are determined as required for each radar type.

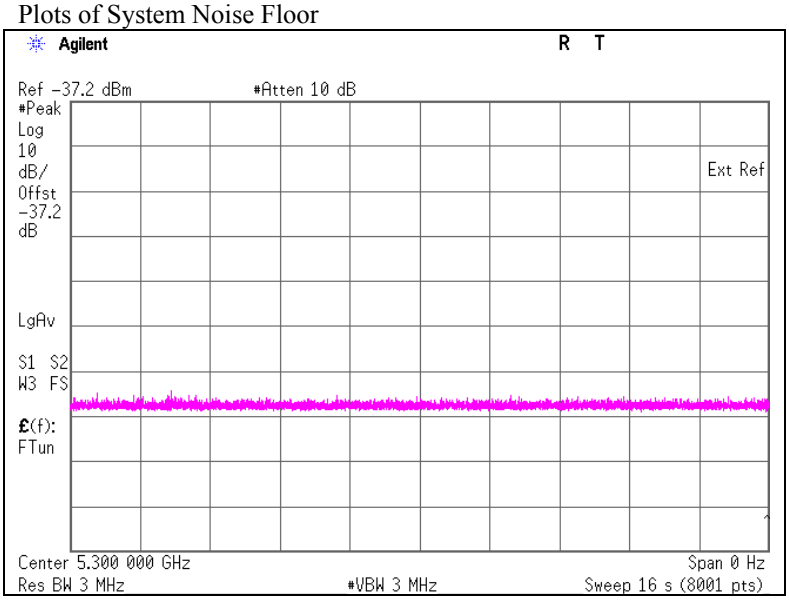
Step 4: Without changing any of the instrument settings, restore the system setting to Step 2 and adjust the Reference Level Offset of the spectrum analyzer to the level at Step 3.

By taking the above steps 1 to 4, the spectrum analyzer displays the level of the signal generator as received at the antenna ports of the Master Device.

See Clause 5.4 for Plots of Noise, Rader Waveforms, and WLAN signals.

5.4 Plots of Noise, Rader Waveforms, and WLAN signals

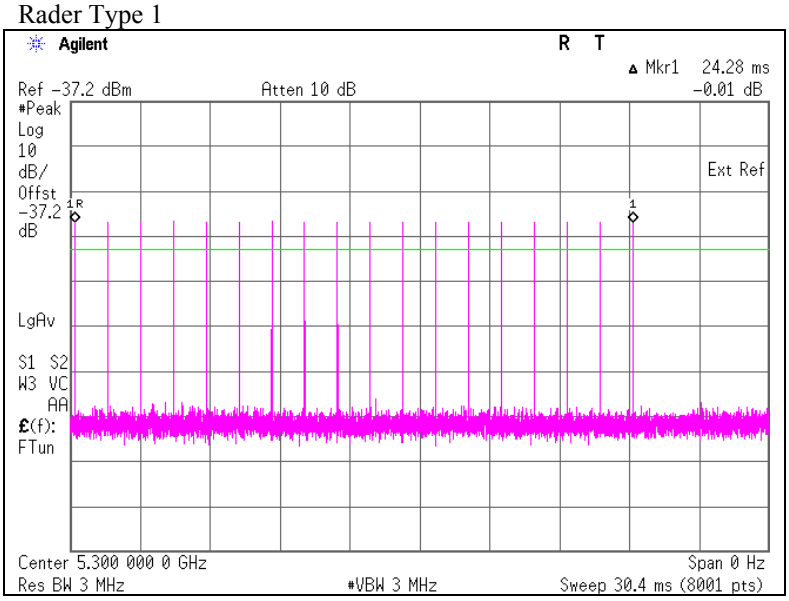
Plots of System Noise Floor



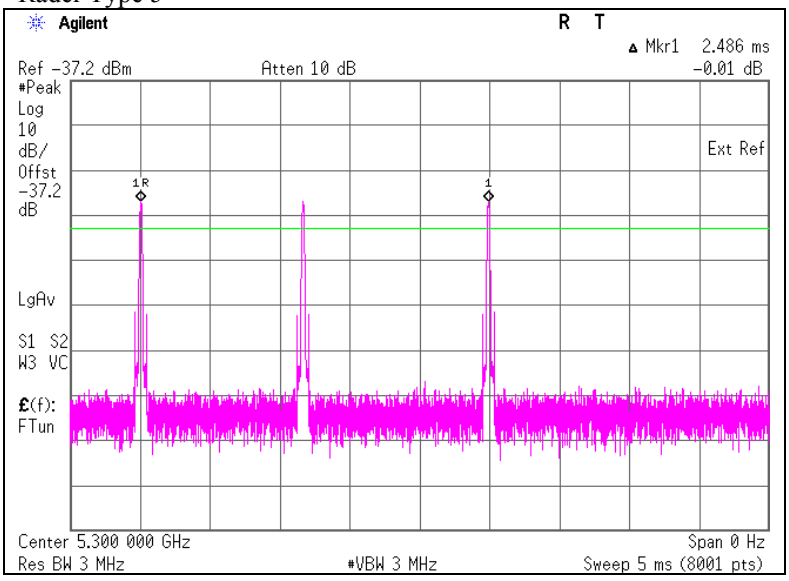
It was confirmed that the EUT did not transmit before having received appropriate control signals from a Master Device.

Plots of Radar Waveforms

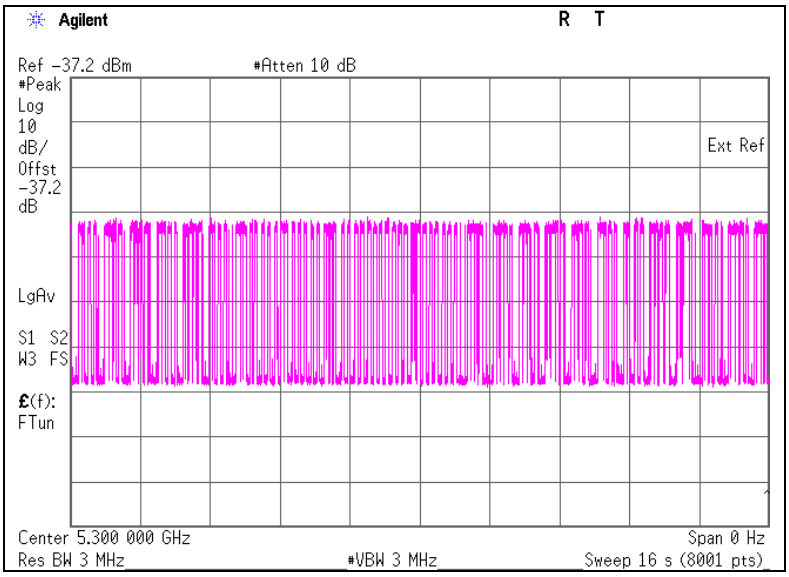
Rader Type 1



Rader Type 5



Plots of WLAN Traffic



SECTION 6: In-Service Monitoring for Channel Move Time, Channel Closing Transmission Time

6.1 Operating environment

Test place : No.6 measurement room
Temperature : 23deg.C.
Humidity : 45%

6.2 Test Procedure

Stream the MPEG test file from the Master Device to the Client Device on the test Channel for the entire period of the test.
the Radar Waveform generator sends a Burst of pulses for one of the Short Pulse Radar Types 1-4 at levels defined ,
on the Operating Channel. An additional 1 dB is added to the radar test signal to ensure it is at or above the DFS Detection Threshold, accounting for equipment variations/errors.
Observe the transmissions of the EUT at the end of the radar Burst on the Operating Channel for duration greater than 10 seconds.

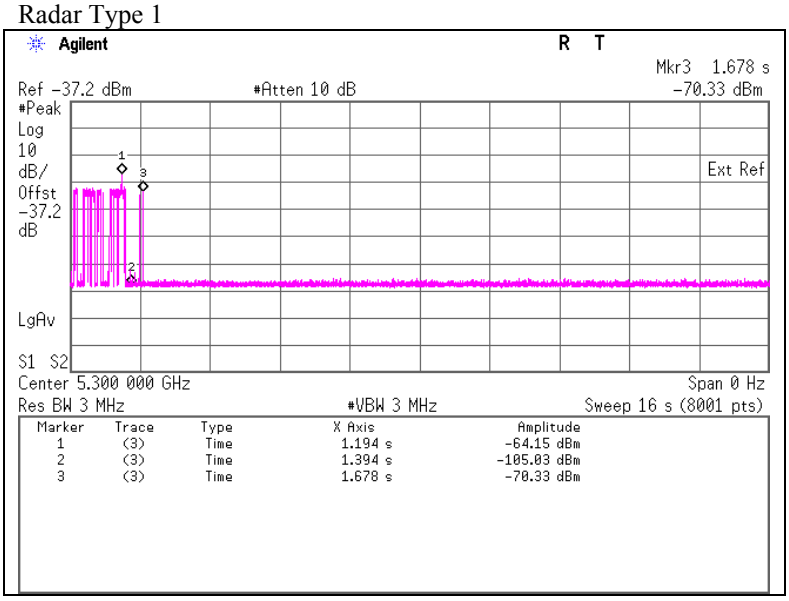
6.3 Test data

Test Item	Unit	Measurement Time	Limit	Results
Channel Move Time *1)	[sec]	0.484	10.000	Pass
Channel Closing Transmission Time *2)	[msec]	4	60	Pass

*1) Channel Move Time is calculated as follows:
(Channel Move Time) = (End of Transmission) - (End of Burst) = 1.678-1.194

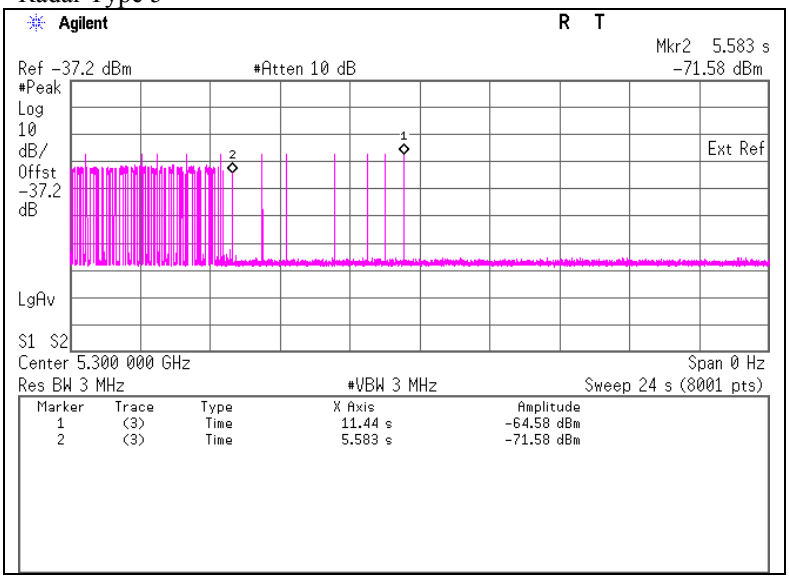
*2). Channel Closing Transmission Time is calculated from (End of Burst + 200msec) to (End of Burst + 10sec)
(Channel Closing Transmission Time) = (Number of analyzer bins showing transmission) * (dwell time per bin)
= 2 * 2[msec]

Radar Type 1



Marker 1 : End of Burst : 1194 ms
Marker 2 : End of Burst + 200 msec : 1394 ms
Marker 3 : End of Transmission : 1678 ms

Radar Type 5



Marker 1 : End of Burst : 11440 ms
Marker 2 : End of Transmission : 5583 ms

6.4 Test result

Test result: Pass
Date : 05 /31 / 2007 Test engineer : Takahiro Hatakeda