DFS TEST REPORT

REPORT NO.: RF960123A03

MODEL NO.: SG22 series
(Refer to item 2.1 for the more details)

RECEIVED: Jan. 24, 2007

TESTED: Feb. 06 ~ Feb. 12, 2007

ISSUED: Apr. 11, 2007

APPLICANT: TWINHEAD INTERNATIONAL CORP.

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ISSUED BY: Advance Data Technology Corporation

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1. CERTIFICATION

PRODUCT: 12.1" Tablet PC

MODEL: SG22 series (Refer to item 2.1 for the more details)

BRAND: Sahara (Refer to item 2.1 for the more details)

APPLICANT: TWINHEAD INTERNATIONAL CORP.

TEST SAMPLE: ENGINEERING SAMPLE

TESTED: Feb. 06 ~ Feb. 12, 2007

STANDARDS: **FCC Part 15, Subpart E (Section 15.407)**
FCC 06-96

The above equipment (model: SG22 series) has been tested by **Advance Data Technology Corporation,** 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 : _Peggy Chen_ , **DATE:** Apr. 11, 2007
<p align="center">Peggy Chen</p>

**TECHNICAL
ACCEPTANCE** : _Dylan Chiou_ , **DATE:** Apr. 11, 2007
Responsible for RF   Dylan Chiou

APPROVED BY : _Gary Chang_ , **DATE:** Apr. 11, 2007
<p align="center">Gary Chang / Supervisor</p>

2. GENERAL INFORMATION
2.1 GENERAL DESCRIPTION OF EUT

EUT	12.1" Tablet PC
MODEL NO.	SG22 series (Refer to Note for the more details)
FCC ID	FKGTKI400ABGSG22
POWER SUPPLY	20Vdc from AC Adapter
MODULATION TYPE	Wireless LAN: CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM Bluetooth: GFSK,π/4-DQPSK, 8DPSK for FHSS
MODULATION TECHNOLOGY	DSSS, OFDM, FHSS
TRANSFER RATE	Wireless LAN: 802.11b:11/5.5/2/1Mbps 802.11g: 54/48/36/24/18/12/9/6Mbps 802.11a: 54/48/36/24/18/12/9/6Mbps Bluetooth: 1/2/3Mbps
FREQUENCY RANGE	Wireless LAN: 802.11b & 802.11g: 2.412 ~ 2.462GHz 802.11a: 5.150 ~ 5.350GHz , 5.745 ~ 5.825GHz Bluetooth: 2.402 ~ 2.480GHz
NUMBER OF CHANNEL	Wireless LAN: 802.11b & 802.11g: 11 802.11a: 13 Bluetooth: 79
CHANNEL SPACING	Wireless LAN: 802.11b & 802.11g: 5MHz 802.11a: 20MHz Bluetooth: 1MHz
OUTPUT POWER	Wireless LAN: 100.231mW for 802.11b 63.826mW for 802.11g 40.738mW for 5.180 ~ 5.350GHz 50.816mW for 5.745 ~ 5.825GHz Bluetooth: 1.570mW

ANTENNA TYPE	Wireless LAN: PIFA antenna with 0.62dBi gain for 802.11b/g PIFA antenna with 1.83dBi gain for 802.11a (5.15-5.35GHz) PIFA antenna with 2.63dBi gain for 802.11a (5.785-5.85GHz) Bluetooth: PIFA antenna with -1.36dBi gain
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ASSOCIATED DEVICES	Adapter

NOTE:

1. The models as below are identical to each other except for their model designation and brand name due to marketing requirement.

Brand	Model No.
Sahara	SG22 series
Paceblade	SlimBook 200 series
Slate DT	SDT001 series

2. The EUT is a Tablet PC with wireless LAN and bluetooth functions.

3. The EUT was operated with following adapter:

BRAND:	LISHIN
MODEL:	0335A2065
INPUT:	100-240Vac, 50-60Hz, 1.7A
OUTPUT:	20Vdc, 3.25A, 65W
POWER LINE:	AC 1.80m non-shielded cable without core DC 1.80m non-shielded cable with one core

4. The EUT operates in both the 5GHz and 2.4GHz Bands and compatibility with 802.11a and 802.11b, 802.11g technology.

5. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3. TEST RESULTS

3.1 DYNAMIC FREQUENCY SELECTION

The manufacturer shall state whether the UUT is capable of operating as a Master and/or a Client. If the UUT is capable of operating in more than one operating mode then each operating mode shall be tested separately. See tables 1 and 2 for the applicability of DFS requirements for each of the operational modes.

Table 1: Applicability of DFS requirements prior to use a channel

Requirement	Operational Mode		
	Master	**Client without radar detection**	**Client with radar detection**
Non-Occupancy Period	✓	Not required	✓
DFS Detection Threshold	✓	Not required	✓
Channel Availability Check Time	✓	Not required	Not required
Uniform Spreading	✓	Not required	Not required
U-NII Detection Bandwidth	✓	Not required	✓

Table 2: Applicability of DFS requirements during normal operation.

Requirement	Operational Mode		
	Master	**Client without radar detection**	**Client with radar detection**
DFS Detection Threshold	✓	Not required	✓
Channel Closing Transmission Time	✓	✓	✓
Channel Move Time	✓	✓	✓
U-NII Detection Bandwidth	✓	Not required	✓

3.1.1 OPERATING FREQUENCY OF U-NII DEVICE

Table 3: Operating frequency range of UUT.

Operational Mode	Operating Frequency Range	
	5250~5350MHz	**5470~5725MHz**
Master	Not Apply	Not Apply
Client without radar detection	✓	Not Apply
Client with radar detection	Not Apply	Not Apply

3.1.2 TEST LIMITS AND RADAR SIGNAL PARAMETERS

DETECTION THRESHOLD VALUES

Table 4: DFS Detection Thresholds for Master Devices and Client Devices With Radar Detection.

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 5: 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 UNII 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 signals 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.

PARAMETERS OF DFS TEST SIGNALS

Step intervals of 0.1 microsecond for Pulse Width, 1 microsecond for PRI, 1 MHz for chirp width and 1 for the number of pulses will be utilized for the random determination of specific test mpeg file.

Table 6: Short Pulse Radar Test Waveforms.

Radar Type	Pulse Width (µsec)	PRI (µsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Number of Trials
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 (Radar Types 1-4)				80%	120

Table 7: Long Pulse Radar Test Waveform

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

Table 8: Frequency Hopping Radar Test Waveform

Radar Type	Pulse Width (µsec)	PRI (µsec)	Pulses per Hop	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

3.1.3 TEST INSTRUMENTS

Table 9: Test instruments list.

DESCRIPTION & MANUFACTURER	MODEL NO.	BRAND	CALIBRATED UNTIL
R&S Spectrum analyzer	FSP40	R&S	Apr. 09, 2007
Signal generator	8645A	Agilent	May 24, 2007
Oscilloscope	TDS 5104	Tektronix	Aug. 28. 2007

3.1.4 DESCRIPTION OF SUPPORT UNITS

Table 10: Support Unit information.

No.	Product	Brand	Model No.	ID
1	802.11a/b/g Access Point	Cisco	AIR-AP1242AG-A-K9	LDK102056

3.1.5 SOFTWARE AND FIRMWARE

Table 11: The software/firmware version for U-NII device.

No.	Product	Model No.	Software/Firmware Version
1	802.11a/b/g Access Point	AIR-AP1242AG-A-K9	C1240-K9W7-TAR.123-11.JA
2	12.1" Tablet PC	SG22 series	Intel(R) PRO/Wireless 3945ABG Network Connection Ver 11.1.0.86

3.1.6 DESCRIPTION OF AVAILABLE ANTENNAS

Table 12: Antenna list.

Antenna	Type	Operation Frequency Range	Max. Gain(dBi)
T12Y	PIFA	5G	1.83

3.1.7 MAXIMUM AND MINIMUM CONDUCTED POWER

Table 13: The measured conducted output power.

Frequency Band(MHZ)	MAX. Power		MIN. Power	
	Output Power(dBm)	Output Power(mW)	Output Power(dBm)	Output Power(mW)
5250~5350MHz	16.06	40.365	10	10

3.1.8 MAXIMUM AND MINIMUM E.I.R.P. POWER

**Table 14: The E.I.R.P output power list.**

Frequency Band(MHZ)	MAX. Power		MIN. Power	
	Output Power(dBm)	Output Power(mW)	Output Power(dBm)	Output Power(mW)
5250~5350MHz	17.89	61.518	11.83	15.240

3.1.9 TEST PROCEDURE

ADT DFS Measurement System:

A complete ADT DFS Measurement System consists of two subsystems: (1) the Radar Signal Generating Subsystem and (2) the Traffic Monitoring Subsystem. The control PC is necessary for generating the Radar waveforms in Table 6, 7 and 8. The traffic monitoring subsystem is specified to the type of unit under test (UUT).

Conducted setup configuration of ADT DFS Measurement System
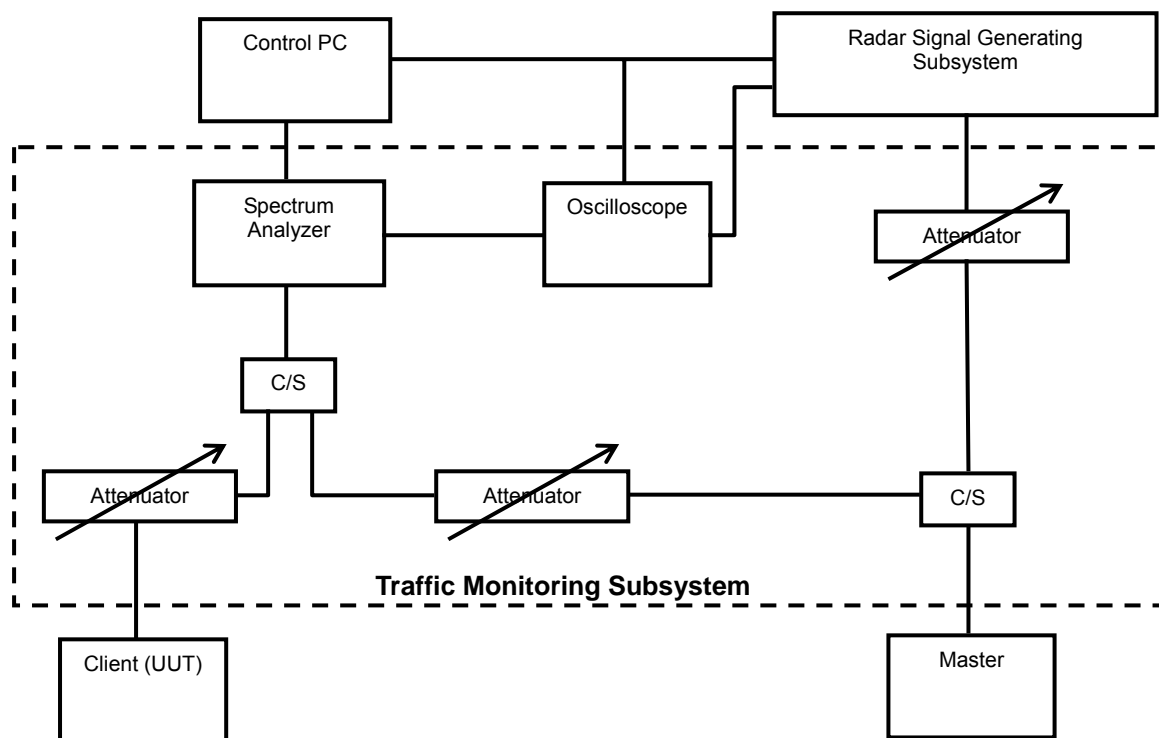

The test transmission will always be from the Master Device to the Client Device. While the Client device is set up to associate with the Master device and play the MPEG file (6 $\frac{1}{2}$ Magic Hours) from Master device, the designated MPEG test file and instructions are located at: http://ntiacsd.ntia.doc.gov/dfs/.

Calibration of DFS Detection Threshold Level:

The measured channel is 5320MHz. The radar signal was the same as transmitted channels, and injected into the antenna port of AP (master), measured the channel closing transmission time and channel move time. The Required detection threshold is -58dBm (= -62 +1+3)dBm. The calibrated conducted detection threshold level is set to -59dBm. The tested level is lower than required level hence it provides margin to the limit.
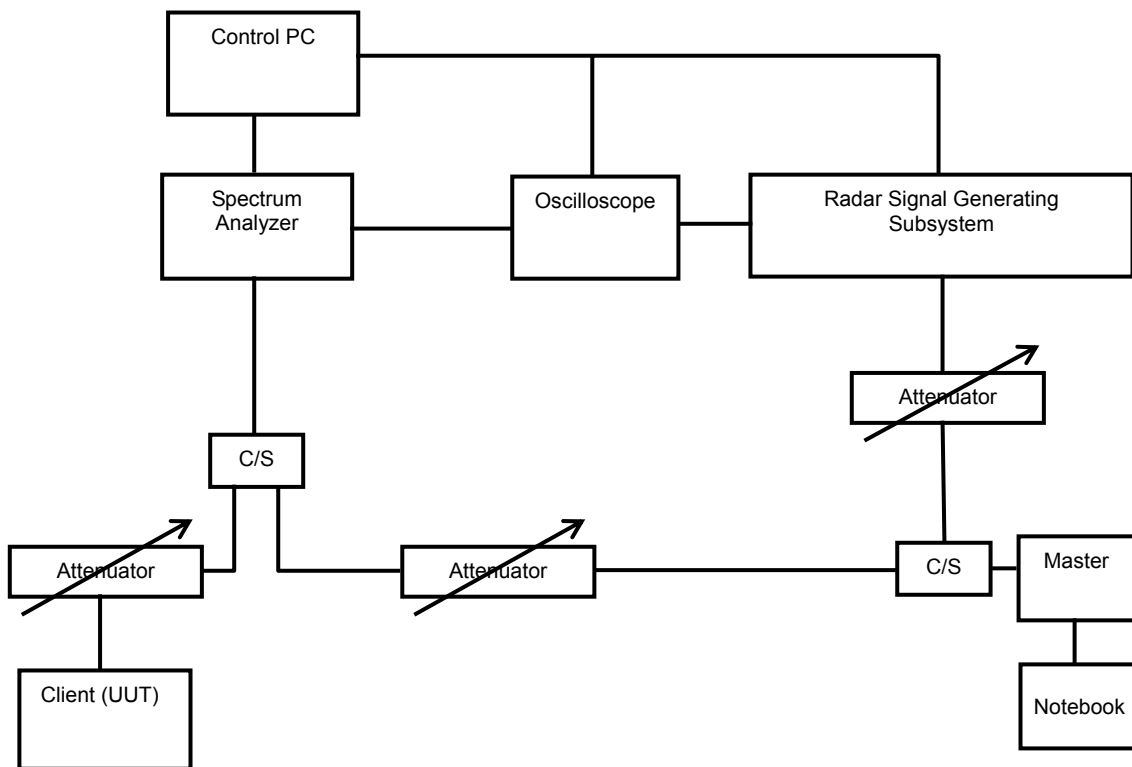
Conducted setup configuration of Calibration of DFS Detection Threshold Level
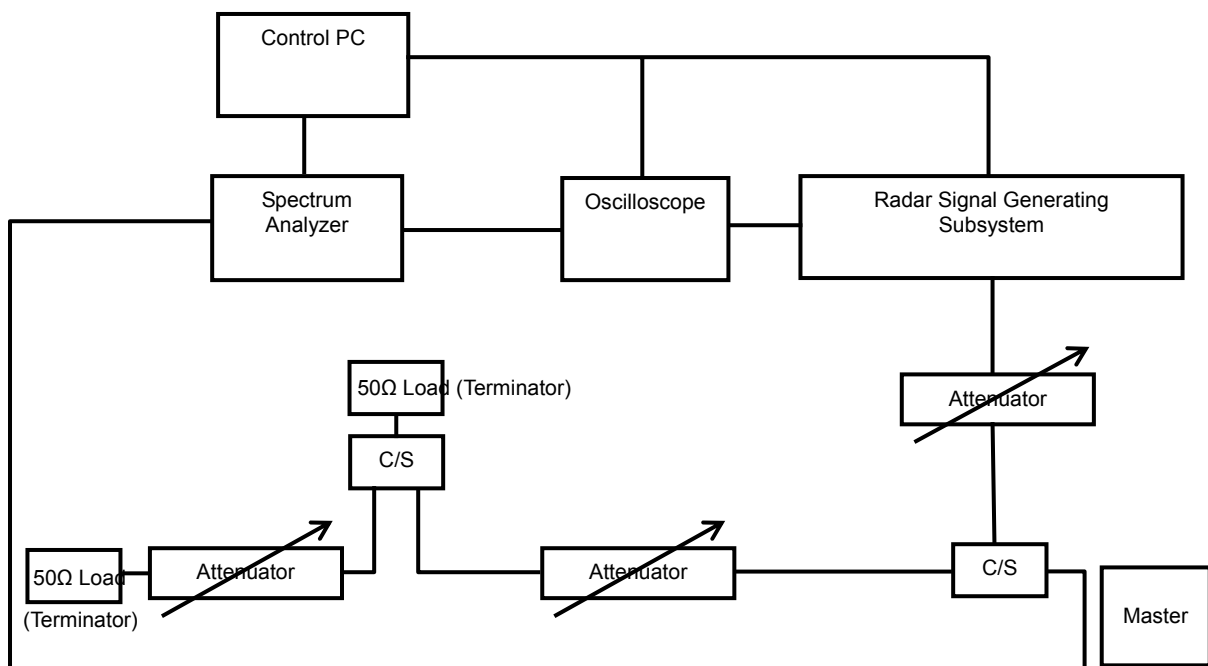
3.1.10   DEVIATION FROM TEST STANDARD

No deviation.

3.1.11   CONDUCTED TEST SETUP CONFIGURATION

The UUT is a U-NII Device operating in Client mode without Radar Detection function. The radar test signals are injected into the Master Device.

3.1.12 LIST OF MEASUREMENTS

The UUT (SG22 series) is capable of operating as a Client (without radar detection).

Clause	Test Parameter	Remarks	Pass/Fail
15.407	Channel Availability Check Time	Not Required	NA
15.407	In-Service Monitoring	Not Required	NA
15.407	Channel Move Time	Applicable	Pass
15.407	Channel Closing Transmission Time	Applicable	Pass
15.407	Non- Occupancy Period	Not Required	NA
15.407	Uniform Spreading	Not Required	NA

3.1.13 TEST RESULTS

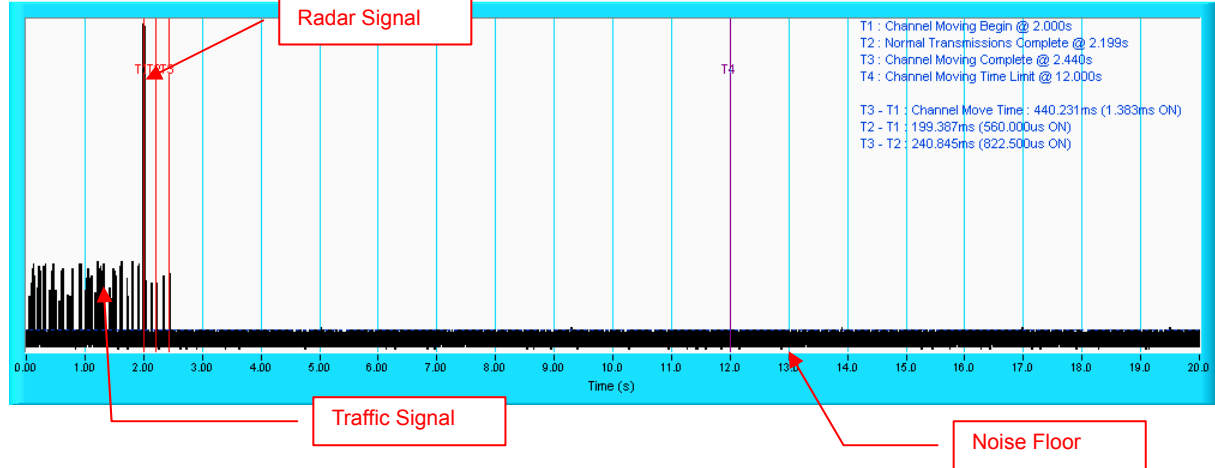**DETECTION THRESHOLD VALUES INJECTED INTO AP**

The Required detection threshold is -62dBm and the AP antenna gain is 3dBi. The

Radar Burst signal level to the AP connector is -59dBm. The tested level is lower

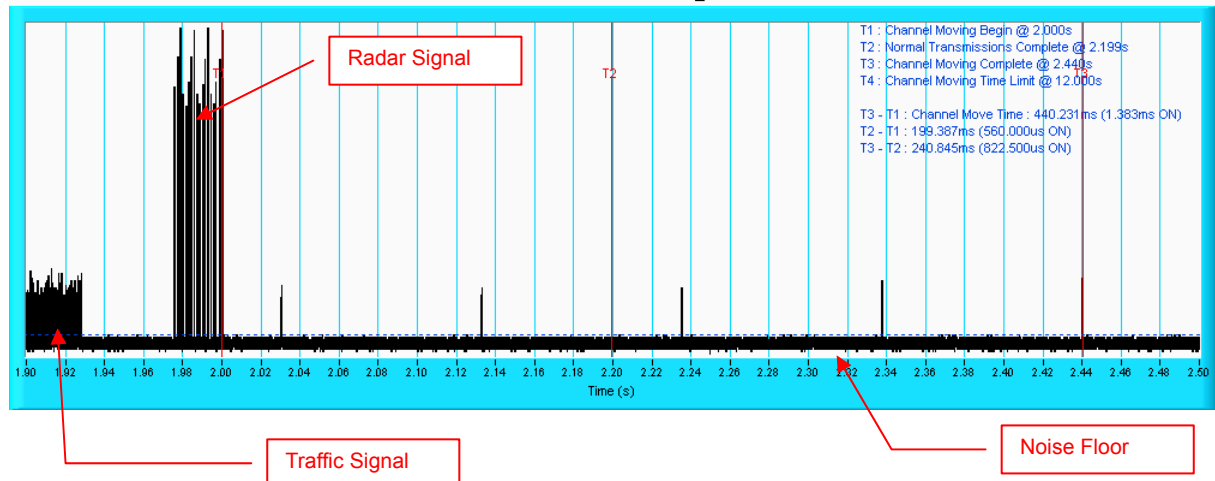than required level hence it provides margin to the limit.
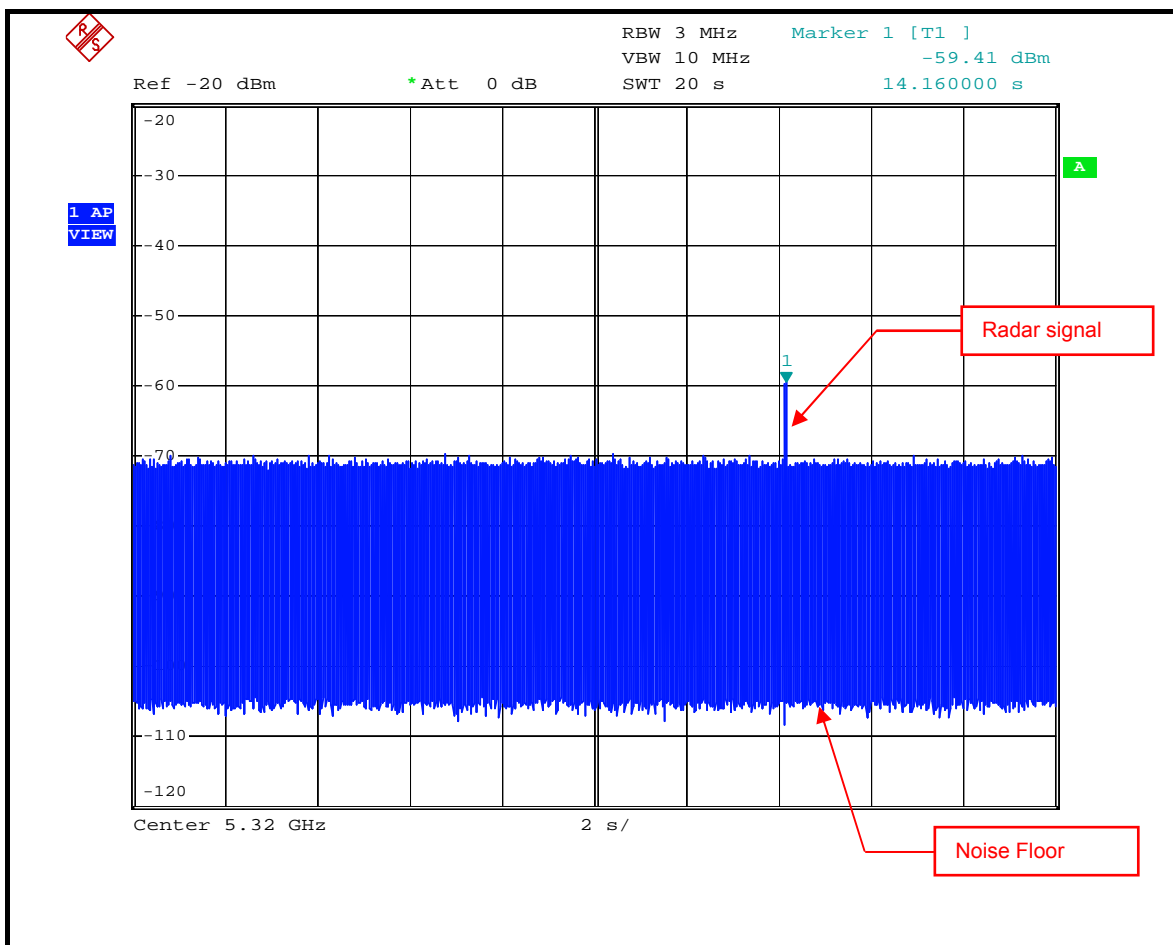
Radar Signal 1

Channel Closing Transmission and Channel Move Time

Channel Closing Transmission Time & Channel Move Time @ CH064 - 5320MHz

T1 : Channel Moving Begin @ 2.000s
T2 : Normal Transmissions Complete @ 2.199s
T3 : Channel Moving Complete @ 2.440s
T4 : Channel Moving Time Limit @ 12.000s

T3 - T1 : Channel Move Time : 440.231ms (1.383ms ON)
T2 - T1 : 199.387ms (560.000us ON)
T3 - T2 : 240.845ms (822.500us ON)

Radar Signal
Traffic Signal
Noise Floor

Channel Closing Transmission Time & Channel Move Time @ CH064 - 5320MHz

T1 : Channel Moving Begin @ 2.000s
T2 : Normal Transmissions Complete @ 2.199s
T3 : Channel Moving Complete @ 2.440s
T4 : Channel Moving Time Limit @ 12.000s

T3 - T1 : Channel Move Time : 440.231ms (1.383ms ON)
T2 - T1 : 199.387ms (560.000us ON)
T3 - T2 : 240.845ms (822.500us ON)

Radar Signal
Traffic Signal
Noise Floor

Radar signal 1

NOTE: T1 denotes the start of Channel Move Time upon the end of the last Radar burst. T2 denotes the data transmission time of 200ms from T1. T3 denotes the last traffic signal and show the period from T1 to observe the aggregate duration of transmissions.

Type 1 Radar Statistical Performances				
Trial #	Pulses per Burst	Pulse Width (s)	PRI (s)	Detection
1	18	1.0u	1.428m	Yes
2	18	1.0u	1.428m	Yes
3	18	1.0u	1.428m	Yes
4	18	1.0u	1.428m	No
5	18	1.0u	1.428m	Yes
6	18	1.0u	1.428m	Yes
7	18	1.0u	1.428m	Yes
8	18	1.0u	1.428m	Yes
9	18	1.0u	1.428m	Yes
10	18	1.0u	1.428m	No
11	18	1.0u	1.428m	Yes
12	18	1.0u	1.428m	Yes
13	18	1.0u	1.428m	Yes
14	18	1.0u	1.428m	Yes
15	18	1.0u	1.428m	Yes
16	18	1.0u	1.428m	Yes
17	18	1.0u	1.428m	Yes
18	18	1.0u	1.428m	Yes
19	18	1.0u	1.428m	Yes
20	18	1.0u	1.428m	Yes
21	18	1.0u	1.428m	Yes
22	18	1.0u	1.428m	Yes
23	18	1.0u	1.428m	Yes
24	18	1.0u	1.428m	Yes
25	18	1.0u	1.428m	Yes
26	18	1.0u	1.428m	No
27	18	1.0u	1.428m	Yes
28	18	1.0u	1.428m	No
29	18	1.0u	1.428m	Yes
30	18	1.0u	1.428m	Yes
				Detection Rate: 86.7 %

4. INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

USA	FCC, UL, A2LA
Germany	TUV Rheinland
Japan	VCCI
Norway	NEMKO
Canada	INDUSTRY CANADA , CSA
R.O.C.	CNLA, BSMI, NCC
Netherlands	Telefication
Singapore	PSB , GOST-ASIA(MOU)
Russia	CERTIS(MOU)

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site:
www.adt.com.tw/index.5/phtml. 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.