

Report No.: ER/2013/80070 **Issue Date: Sep. 26, 2013** 

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## ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

# INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART E REQUIREMENT AND INDUSTRY CANADA RSS 210

OF

**Tablet Computer Product Name:** 

acer **Brand Name:** 

ICONIA W4-820; ICONIA W4-820P **Marketing Name:** 

Different name for market segmentation

EE6 **Model No.:** 

N/A **Model Difference:** 

FCC ID: **HLZEE6** 

IC: 1754F-EE6

ER/2013/80070 **Report No.:** 

Sep. 26, 2013 **Issue Date:** 

**§15.407 FCC Rule Part:** 

**IC Rule Part:** RSS-210 issue 8:2010, Annex 9

**Acer Incorporated** Prepared for:

8F., No. 88, Sec. 1, Xintai 5th Rd., Xizhi, New

Taipei City 22181, Taiwan (R.O.C)

SGS Taiwan Ltd. Prepared by:

**Electronics & Communication Laboratory** 

No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan

24803





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## VERIFICATION OF COMPLIANCE

Acer Incorporated **Applicant:** 

8F., No. 88, Sec. 1, Xintai 5th Rd., Xizhi, New Taipei City 22181, Taiwan

(R.O.C)

**Tablet Computer Product Name:** 

acer **Brand Name:** 

ICONIA W4-820; ICONIA W4-820P

**Marketing Name:** Different name for market segmentation

Model No.: EE<sub>6</sub>

**Model Difference:** N/A

FCC ID: HLZEE6

IC: 1754F-EE6

File Number: ER/2013/80070

Date of test: Aug. 29, 2013 ~ Sep. 18, 2013

**Date of EUT Received:** Aug. 29, 2013

## We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in FCC 06-96 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.407 and RSS-210 issue 8: 2010 Annex 9.

The test results of this report relate only to the tested sample identified in this report.

11 1 1

Test By:	Marcus Iseny	Date:	Sep. 26, 2013
Prepared By:	Marcus Tseng/Engineer Utoletta Tang	Date:	Sep. 26, 2013
Approved By:	Violetta Tang / Clerk  Jim Chang / Supervisor	Date:	Sep. 26, 2013

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## Version

Version No.	Date	Description
00	Sep. 26, 2013	Initial creation of document

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## **GENERAL INFORMATION**

## 1.1. Product Description

#### General:

Product Name:	Tablet Comp	Tablet Computer			
Brand Name:	acer				
Marketing Name:		ICONIA W4-820; ICONIA W4-820P Different name for market segmentation			
Model No.:	EE6				
Model Difference:	N/A				
Hardware Version:	ВЗВ	B3B			
Software Version:	BIOS v012	BIOS v012			
	3.75Vdc Rechargeable Li-polymer battery pack or 5.35Vdc from AC/DC adapter				
	Battery:	1.Model No.: AC13F3L Supplier: Sanyo Electric Co., Ltd.			
		2. Model No.: AC13F8L Supplier: LG CHEMICAL LTD			
Power Supply:		1.Model No.: W12-010N3A, Supplier: Chicony			
	Adapter:	2.Model No.: PSAI10R-050Q Supplier: Phihong Technology Co., Ltd.			
		3.Model No.: DELTA ADP-10HW AA Supplier: DELTA-SINGAPORE			

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#### WLAN 5GHz:

Wi-Fi	Frequency Range	Channels	Rated Power (Avg.) / Average Rated Power(EIRP)	Modulation Technology	Type of Emission
	5150~5250	4	12.60dBm (Avg.) 14.50dBm (EIRP)		16M4D1D
11a	5250~5350	4	12.48dBm (Avg.) 14.38dBm (EIRP)	OFDM	16M4D1D
	5470~5725	11	12.26dBm (Avg.) 13.50dBm (EIRP)		16M3D1D
	HT20 5150~5250	4	Avg. Power: HT 20: 9.61dBm (MIMO Chain 0): 9.13dBm (MIMO Chain 1): 9.72dBm (MIMO Chain 0+1): 12.40dBm EIRP: HT20: 11.51dBm (MIMO Chain 0+1): 14.82dBm		17M5D1D
11n	HT20 5250~5350	4	Avg. Power: HT 20: 9.24dBm (MIMO Chain 0): 8.88dBm (MIMO Chain 1): 9.70dBm (MIMO Chain 0+1): 12.32dBm EIRP: HT20: 11.14dBm (MIMO Chain 0+1): 13.44dBm	OFDM	17M5D1D
	HT20 5470~5725	8	Avg. Power: HT 20: 8.95dBm (MIMO Chain 0): 8.64dBm (MIMO Chain 1): 9.42dBm (MIMO Chain 0+1): 12.06dBm EIRP HT20:10.19dBm (MIMO Chain 0+1): 14.21dBm		17M5D1D

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	HT40 5150-5250 2		Avg. Power: HT 40: 9.36dBm (MIMO Chain 0): 8.66dBm (MIMO Chain 1): 9.20dBm (MIMO Chain 0+1): 11.92dBm EIRP HT40: 8.37dBm (MIMO Chain 0+1): 14.08dBm		36M4D1D		
11n	HT40 5250-5350	2	Avg. Power: HT40: 9.27dBm (MIMO Chain 0): 8.30dBm (MIMO Chain 1): 9.13dBm (MIMO Chain 0+1): 11.75dBm EIRP HT40: 8.31dBm (MIMO Chain 0+1): 14.16dBm	OFDM	36M3D1D		
	HT40 5470-5725	3	Avg. Power: HT40: 9.03dBm (MIMO Chain 0):8.22dBm (MIMO Chain 1): 9.00dBm (MIMO Chain 0+1): 11.64dBm EIRP HT40: 9.65dBm (MIMO Chain 0+1): 13.79dBm		36M4D1D		
Antenna Designation			PIFA Antenna 1. Main: 5GHz Gain: 1.90dBi (5150MHz-5250MHz) 5GHz Gain: 1.90dBi (5250MHz-5350MHz) 5GHz Gain: 1.24dBi (5470MHz-5725MHz) 2. Aux: 5GHz Gain: -0.99dBi (5150MHz-5250MHz) 5GHz Gain: -0.96dBi (5250MHz-5350MHz) 5GHz Gain: 0.62dBi (5470MHz-5725MHz)				
Antenna Part number:			Main: 57.EL 115.OBS Aux: 57.EL 115.OBT				
Modulation type			CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM				
Transitio	on Rate:		802.11 a: 6/9/12/18/24/36/48/54 Mbps 802.11 n_20MHz: 6.5 – 144Mbps 802.11 n_40MHz: 13.5 – 300Mbps				

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## IEEE 802.11n Spec:

MCS					NIC	NCBPS NDBPS			Datarat	e(Mbps)		
Index	Nss	Modulation	R	NBPSC	NC	BPS	ND.	NDBPS 800m		nsGI	400	nsGI
					20MHz	40MHz	20MHz	40MHz	20MHz	40MHz	20MHz	40MHz
0	1	BPSK	1/2	1	52	108	26	54	6.5	13.5	7.200	15
1	1	QPSK	1/2	2	104	216	52	108	13.0	27.0	14.400	30
2	1	QPSK	3/4	2	104	216	78	162	19.5	40.5	21.700	45
3	1	16-QAM	1/2	4	208	432	104	216	26.0	54.0	28.900	60
4	1	16-QAM	3/4	4	208	432	156	324	39.0	81.0	43.300	90
5	1	64-QAM	2/3	6	312	648	208	432	52.0	108.0	57.800	120
6	1	64-QAM	3/4	6	312	648	234	486	58.5	121.5	65.000	135
7	1	64-QAM	5/6	6	312	648	260	540	65.0	135.0	72.200	150

Symbol	Explanation
NSS	Number of spatial streams
R	Code rate
NBPSC	Number of coded bite per single carrier
NCBPS	Number of coded bite per symbol
NDBPS	Number of data bite per symbol
GI	Guard interval

#### 802.11n\_HT20 MCS8 -15

Mod						Data rate (Mb/s)			
MCS Index	Modulation	R	N <sub>BPSCS</sub> (i <sub>SS</sub> )	N <sub>SD</sub>	N <sub>SP</sub>	N <sub>CBPS</sub>	$N_{DBPS}$	800 ns GI	400 ns GI (see NOTE)
8	BPSK	1/2	1	52	4	104	52	13.0	14.4
9	QPSK	1/2	2	52	4	208	104	26.0	28.9
10	QPSK	3/4	2	52	4	208	156	39.0	43.3
11	16-QAM	1/2	4	52	4	416	208	52.0	57.8
12	16-QAM	3/4	4	52	4	416	312	78.0	86.7
13	64-QAM	2/3	6	52	4	624	416	104.0	115.6
14	64-QAM	3/4	6	52	4	624	468	117.0	130.0
15	64-QAM	5/6	6	52	4	624	520	130.0	144.4
NOTE-T	he 400 ns GI rate	values	are rounded to 1	decima	l place.				

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## 802.11n HT40 MCS8 -15

MCS		William B. W. G. V. W. W. W.		N.		Data rate (Mb/s)			
Index	Modulation	R	$N_{BPSCS}(i_{SS})$	N <sub>SD</sub>	$N_{SP}$	$N_{CBPS}$	$N_{DBPS}$	800 ns GI	400 ns GI
8	BPSK	1/2	1	108	6	216	108	27.0	30.0
9	QPSK	1/2	2	108	6	432	216	54.0	60.0
10	QPSK	3/4	2	108	6	432	324	81.0	90.0
11	16-QAM	1/2	4	108	6	864	432	108.0	120.0
12	16-QAM	3/4	4	108	6	864	648	162.0	180.0
13	64-QAM	2/3	6	108	6	1296	864	216.0	240.0
14	64-QAM	3/4	6	108	6	1296	972	243.0	270.0
15	64-QAM	5/6	6	108	6	1296	1080	270.0	300.0

This report applies for client device in order to be compliant DFS regulation.

Note: The pertinent information with regards to the parameters of the detected Radar Waveforms is not available and accessible to the end user.

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## SUMMARY OF TEST RESULT

FCC Rules	<b>Description Of Test</b>	Result
§15.407(h)	TPC and DFS Measurement	Compliant
RSS 210 A9.3		

## **MEASUREMENT UNCERTAINTY**

Test Items	Uncertainty
TPC and DFS Measurement	+/- 123.36 Hz
Temperature	+/- 0.8 °C
Humidity	+/- 4.7 %
DC / AC Power Source	DC= +/- 1%, AC=+/- 0.2%

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

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#### TPC and DFS MEASUREMENT

#### **TPC: Standard Applicable** 4.1.

According to §15.407(h)(1), Transmit power control (TPC). U-NII devices operating in the 5.25-5.35 GHz band and the 5.47-5.725 GHz band shall employ a TPC mechanism. The U-NII device is required to have the capability to operate at least 6 dB below the mean EIRP value of 30 dBm. A TPC mechanism is not required for systems with an e.i.r.p. of less than 500 mW.

According to RSS 210 A9.2(3), The maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever power is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band. The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

**4.1.1. Result**: N/A, The output power is less than 500mW.

#### 4.2. **DFS: Standard Applicable**

According to §15.407(h)(2), Radar Detection Function of Dynamic Frequency Selection (DFS). U-NII devices operating in the 5.25-5.35 GHz and 5.47-5.725 GHz bands shall employ a DFS radar detection. According to RSS 210 A9.3), Note: For the band 5600-5650 MHz, no operation is permitted. Until further notice, devices subject to this annex shall not be capable of transmitting in the band 5600-5650 MHz. This restriction is for the protection of Environment Canada weather radars operating in this band. Devices operating in the bands 5250-5350 MHz, 5470-5600 MHz and 5650-5725 MHz band shall comply with the following:

(a) Devices shall employ a DFS radar detection mechanism to detect the presence of radar systems and to avoid co-channel operation with radar systems (see Note below). The minimum DFS radar signal detection threshold is -62 dBm for devices with a maximum e.i.r.p. less than 200 mW, and -64 dBm for devices with a maximum e.i.r.p. of 200 mW to 1 W. The detection threshold power is the received power, averaged over a 1-microsecond reference to a 0 dBi antenna. The DFS process shall provide a uniform spreading of the loading over all the available channels.

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Note: Test procedures for demonstrating compliance with the DFS radar detection requirements set out in this section are being evaluated by Industry Canada. As an interim measure, the Department will, until further notice, accept utilization of the DFS test procedures published by the U.S. Federal Communications Commission (FCC)3 to demonstrate compliance with the requirements of this section.

- (b) Operational requirements: the requirement for channel availability check time applies in the master operational mode. The requirement for channel move time applies in both the master and slave operational modes.
- (i) In-service monitoring: an LE-LAN device should be able to monitor the operating channel to check that a co-channel radar has not moved or started operation within range of the LE-LAN device. During in-service monitoring, the LE-LAN radar detection function continuously searches for radar signals between normal LE-LAN transmissions.
- (ii) Channel availability check time: the device shall check if there is a radar system already operating on the channel before it initiates a transmission on a channel and when it moves to a channel. The device may start using the channel if no radar signal with a power level greater than the interference threshold value specified in A9.3 (a) above is detected within 60 seconds.
- (iii) Channel move time: after a radar's signal is detected, the device shall cease all transmissions on the operating channel within 10 seconds. Transmission during this period shall consist of normal traffic for a maximum of 200 ms after detection of the radar signal. Intermittent management and control signals may also be sent during the remaining time to facilitate vacating the operating channel.
- (iv)Channel closing time: the maximum channel closing time is 260 ms. (v) Non-occupancy period: a channel that has been flagged as containing a radar signal, either by a channel availability check or in-service monitoring, is subject to a 30-minute non-occupancy period where the channel cannot be used by the LE-LAN device. The non-occupancy period starts from the time that the radar signal is detected.

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#### 4.2.1. Limit

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

, , , , , , , , , , , , , , , , , , , ,	Operational Mode				
Requirement	Master	Client(without radar detection)	Client(with radar detection)		
Non-occupancy Period	Yes	Yes	Yes		
DFS Detection Thresh- old	Yes	Not required	Yes		
Channel Availability Check Time	Yes	Not required	Not required		
Uniform Spreading	Yes	Not required	Not required		

Table 2: Applicability of DFS requirements during normal operation

	Operational Mode					
Requirement	Master	Client(without radar detection)	Client(with radar detection)			
Cannel Closing Transmission time	Yes	Yes	Yes			
Channel Move time	Yes	Yes	Yes			

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Table 3: Interference Threshold values, Master or Client incorporating In-Service Monitoring

Maximum Transmit Power	Value (see note)
≥ 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 4: 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 99%		
	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 transmission.

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 Channel changes (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%. Measurements are performed with no data traffic.

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**Table 5: Radar Test Waveforms** 

## **Short Pulse Radar**

Radar	Pulse Width	PRI	Number	Minimum	Minimum
Туре	(µsec)	(µsec)	of Pulses	Percentage of	Trials
				Successful	
				Detection	
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
Aggreg	ate (Radar Types 1	80%	120		

## Long Pulse Radar

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

## **Frequency Hopping Radar**

	dar /pe	Pulse Width (µsec)	PRI (µsec)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (msec)	Minimum Percentage of Successful Detection	Minimum Trials
(	6	1	333	9	.333	300	70%	30

The applicant of this given application confirms that information regarding the parameters of the detected Radar Waveforms is not available to the end user.

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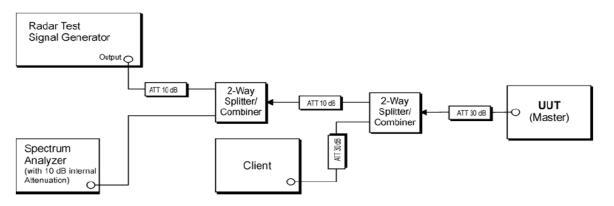


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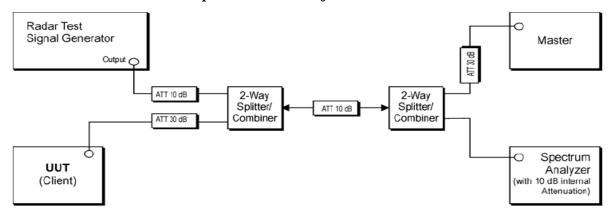
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## 4.2.2. Test Setup

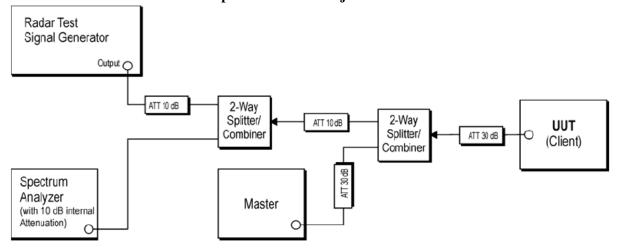
#### Setup for Master with injection at the Master



#### Setup for Client with injection at the Master



#### Setup for Client with injection at the Client



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## 4.2.3. Test Equipment Used:

DFS Test Site									
EQUIPMENT TYPE	MFR MODEL NUMBER		SERIAL NUMBER	LAST CAL.	CAL DUE.				
Signal Generator	Agilent	E4438C	MY45093613	07/30/2013	07/29/2014				
Spectrum Analyzer	Agilent	E4446A	MY51100003	05/30/2013	05/29/2014				
DC Block	Mini-Circuits	BLK-18-S+	1	02/28/2013	02/27/2014				
Attenuator	Mini-Circuit	BW-S10W2+	002	02/28/2013	02/27/2014				
Power Splitter	Mini-Circuits	ZN2PD-9G-S+	N/A	02/28/2013	02/27/2014				
Power Splitter	Mini-Circuits	ZN2PD-9G-S+	N/A	02/28/2013	02/27/2014				
Attenuator	Agilent	8495B	3308A22470	02/28/2013	02/27/2014				
Attenuator	HP	8494B	2812A170605	02/28/2013	02/27/2014				

### **4.2.4. Description of EUT:**

EUT operates over the 5250-5350MHz and 5470-5725MHz ranges and EUT is a slave device (client equipment) w/o radar detection and DFS capability. EUT has a gain of 1.90dBi in the 5GHz Band.

EUT has no TPC mechanism implemented with no adjustment of lowest, and highest power, but the level of power emission stays at fixed level.

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

WLAN traffic is generated by streaming the mpeg file from the master to slave in full monitor video mode using the media player by configuring test lab owned laptop as IP server.

MPEG test file is located at: http://ntiacsd.ntia.doc.gov/dfs/.

The rated output power of the master unit is >23dBm(EIRP).therefore the required interference threshold level is -62dBm.after correction for antenna gain and procedural adjustments, the required conducted threshold at the antenna port is -62dBm, and the master device as employed for the applicable DFS test is CISCO router whose FCC ID= LDK102061

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While calibrate the path on antenna port of DFS test equipment (master), measurements equipments (spectrum) is ensured to be 50 Ohms, and therefore verification on antenna gain measurement can be ignored.

Conducted test was performed with appropriate adjustment, and calibration to ensure power from DFS simulator injects to antenna port of DFS test equipment (DFS) is -62dBm

## Message or files that is used for communication between Master and Client:

## IP based system:

For the required channel loading, the full motion, 30 frames per second MPEG video file from http://ntiacsd.ntia.doc.gov/dfs/ was streamed from a network on a test bench (server of the storage to download the mandatory format of Video file), via the DFS Master device, to the UE (mobile phone).

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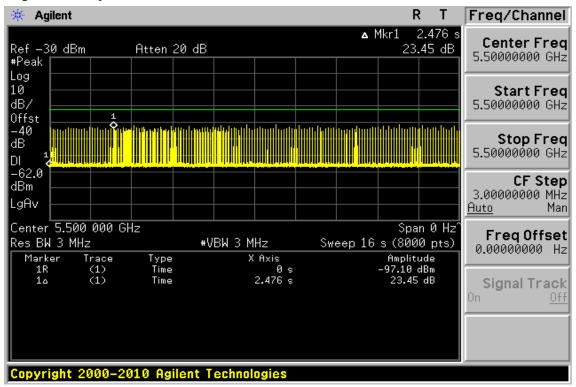


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#### 4.2.5. Test results

The time of power-on cycle (2.476s):



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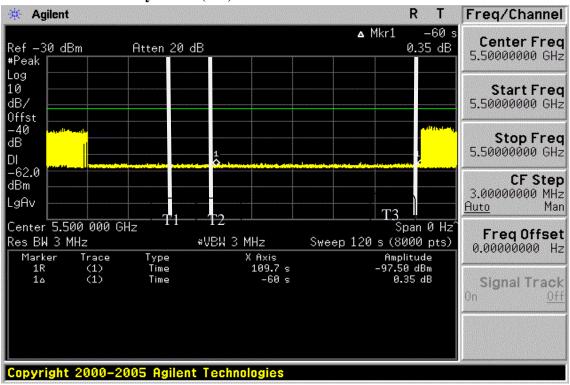
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#### The time of channel availability check (60s)



Where T1~T2 indicates the time to power up, where T2~T3 represents the channel availability time.

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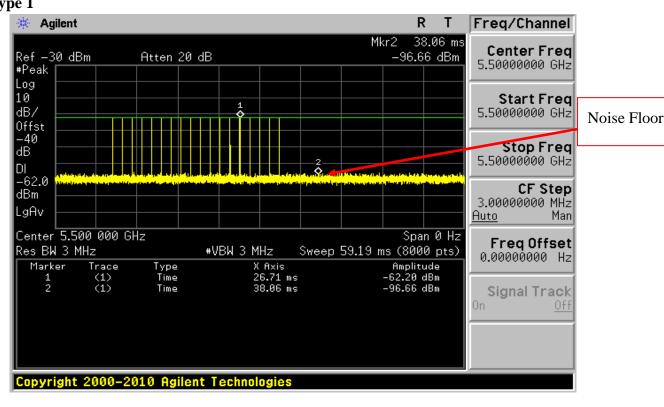
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# Calibration plots for each of the required radar waveforms Radar type 1



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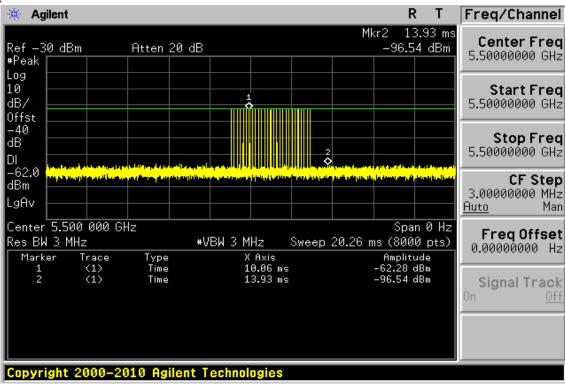
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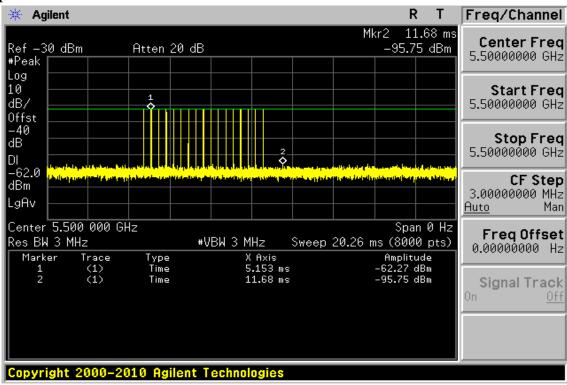
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## Radar type 2



### Radar type 3



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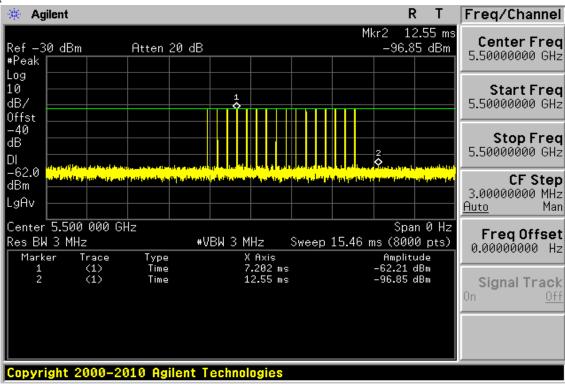
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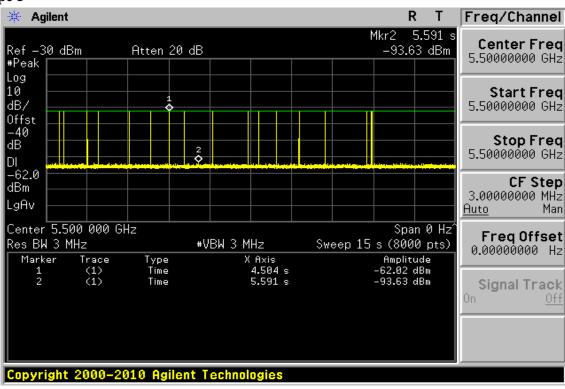
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## Radar type 4



### Radar type 5



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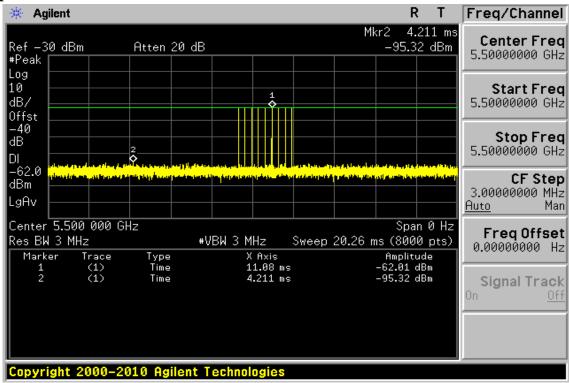
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## Radar type 6



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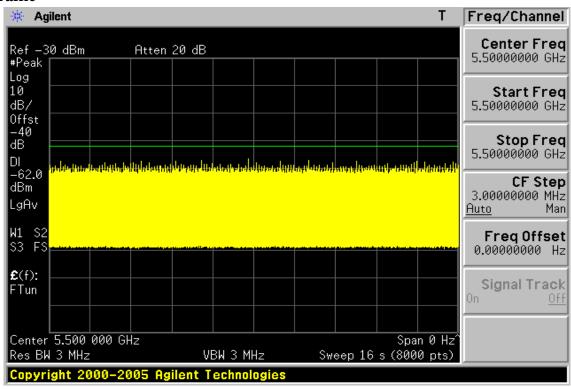
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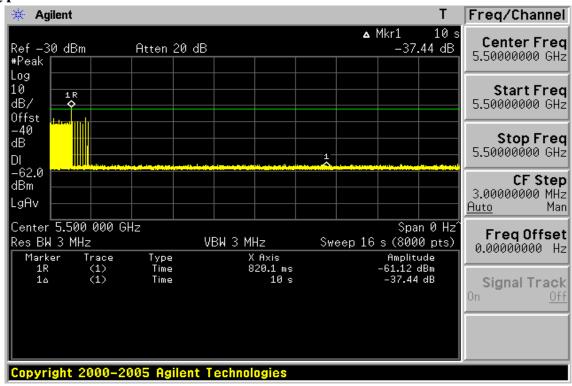
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#### **WLAN** traffic



#### **Radar Type 1 Channel Move Time**



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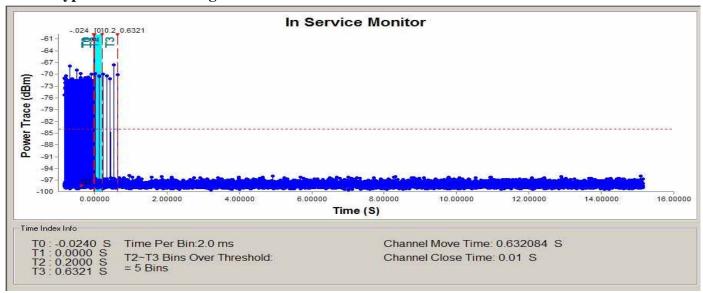
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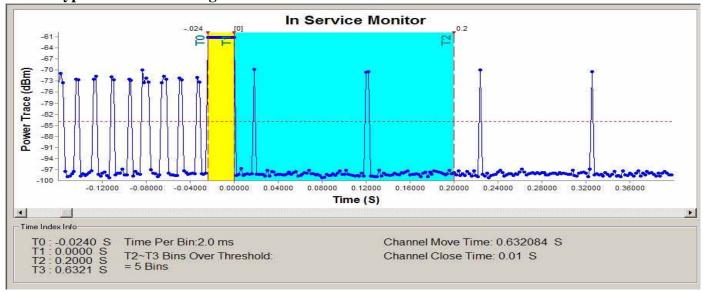
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#### Radar Type 1 Channel Closing Transmission Time - 1



## Radar Type 1 Channel Closing Transmission Time - 2



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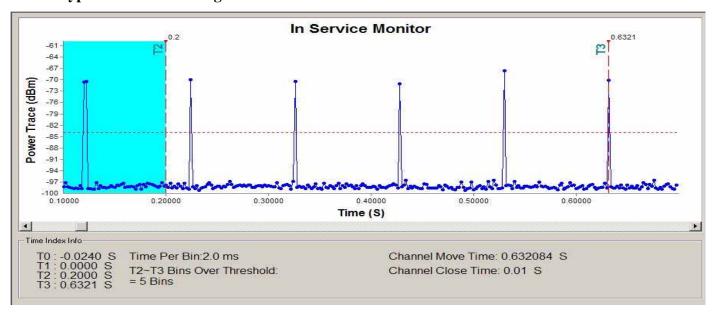
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#### Radar Type 1 Channel Closing Transmission Time - 3



#### **Verdict:**

Time per bin: 2.0ms, Total Bins after 200ms: 6Bins, Total time intermittent control remains: 12.0ms. 12.0ms < 60ms in the period of 10s.

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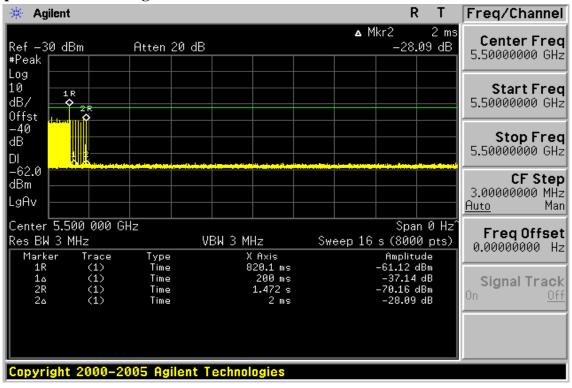
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## Radar Type 1 Channel Closing Transmission Time - 4



#### **Verdict:**

Note: narrowing the sweep time as the good engineering process for the verification of transmission closing in 200ms

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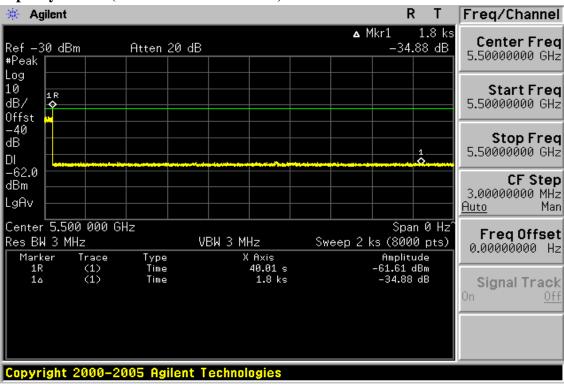
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## **Non-occupancy Period (without radar detection)**



### **Verdict:**

To verify whether channel is unavailable to be operated in 30 minutes.

1.8ks = 1800s = 1800s/min/60 = 30minute

~ End of Report ~

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