

FCC DFS REPORT

FCC Certification

Applicant Name:

LG Electronics MobileComm U.S.A., Inc.

Address:

1000 Sylvan Avenue, Englewood Cliffs NJ 07632

Date of Issue: April 20, 2016 Test Site/Location: HCT CO., LTD., 74,Seoicheon-ro 578beon-gil,Majangmyeo,Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA Report No.: HCT-R-1604-F058 HCT FRN: 0005866421

	e e
FCC ID	: ZNFDM02H
APPLICANT	: LG Electronics MobileComm U.S.A., Inc.
Model(s):	DM-02H

Additional Model(s):

DS1604

EUT Type: Max. RF

Output Power:

Cellular/PCS GSM/WCDMA Phone with WLAN, Bluetooth and NFC

Band	Mode	Frequency Range (MHz)	Power (dBm)	Power (W)
	802.11a	5260 - 5320	12.61	0.0182
	802.11n_HT20	5260 - 5320	8.56	0.0072
UNII2A	802.11n_HT40	5270 - 5310	9.75	0.0094
UNIIZA	802.11ac_VHT20	5260 - 5320	8.46	0.0070
	802.11ac_VHT40	5270 - 5310	9.82	0.0096
	802.11ac_VHT80	5290	9.09	0.0081
	802.11a	5500 - 5700	12.94	0.0197
UNII2C	802.11n_HT20	5500 - 5700	8.95	0.0079
	802.11n_HT40	5510 - 5670	9.57	0.0091
	802.11ac_VHT20	5500 - 5700	8.81	0.0076
	802.11ac_VHT40	5510 - 5670	9.50	0.0089
	802.11ac_VHT80	5530	8.89	0.0077

IC Recognition No.: 5944A-5

Modulation type FCC Classification:

Unlicensed National Information Infrastructure (UNII)

FCC Rule Part(s):

Part 15.407(DFS)

OFDM

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant

to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S. C.853(a))

Report prepared by : Seul Ki Lee **Test Engineer of RF Team**

Approved by : Jong Seok Lee Manager of RF Team

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Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-R-1604-F058	April 20, 2016	- First Approval Report



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1. GENERAL INFORMATION

Applicant:	LG Electronics MobileComm U.S.A., Inc
Address:	1000 Sylvan Avenue, Englewood Cliffs NJ 07632
FCC ID:	ZNFDM02H
EUT Type:	Cellular/PCS GSM/WCDMA Phone with WLAN, Bluetooth and NFC
Model (s):	DM-02H
Additional Model(s):	DS1604
Date(s) of Tests:	April 14, 2016 ~ April 15, 2016
Place of Tests:	HCT Co., Ltd. 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea

2. EUT DESCRIPTION

Model	DM-02H			
Additional Model	DS1604			
EUT Type	Cellular/PCS G	Cellular/PCS GSM/WCDMA Phone with WLAN, Bluetooth and NFC		
Power Supply	DC 3.85 V			
Battery Infomation	Model: BL-T25			
Battery momation	Type: Li-ion Battery			
	TX_20 MHz BW:	5260 MHz - 5320 MHz (UNII 2A)/ 5500 MHz - 5700 MHz (UNII 2C)		
	40 MHz BW: 5270 MHz - 5310 MHz (UNII 2A)/ 5510 MHz - 5670 MHz (UNII 2C)			
Francisco Dance	80 MHz BW: 5290 MHz (UNII 2A)/ 5530 MHz (UNII 2C)			
Frequency Range	RX_20 MHz BW:	5260 MHz - 5320 MHz (UNII 2A)/ 5500 MHz - 5700 MHz (UNII 2C)		
	40 MHz BW:	5270 MHz - 5310 MHz (UNII 2A)/ 5510 MHz - 5670 MHz (UNII 2C)		
	80 MHz BW:	5290 MHz (UNII 2A)/ 5530 MHz (UNII 2C)		
Modulation Type	OFDM(802.11a, 802.11n, 802.11ac)			
Antenna Specification	Manufacturer: LS Mtron Co., Ltd.			
	Antenna type: INT	ERNAL ANTENNA		
	Peak Gain : -2.55	dBi (5260~5320 UNII2A BAND) / -3.05 dBi (5500~5700 UNII2C BAND)		



3. SCOPE

This report has been prepared to demonstrate compliance with the requirements for Dynamic Frequency Selection(DFS) as stated in KDB 905462 D02 v02. Testing was performed in accordance with the measurement procedure described in FCC KDB 905462 D02 v02.

4. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipments, which is traceable to recognized national standards.

Espectially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2006).

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated July 07, 2015 (Registration Number: 90661)

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements. Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."



6. SUMMARY OF TEST RESULTS

Band	Parameter	Limit	Result
	Channel Move Time	10 seconds	PASS
UNII2A	Channel Closing Transmission Time	200 ms + aggregate of 60 ms over remaining 10 second period	PASS
	Non-occupancy Period	30 minutes	PASS
	Channel Move Time	10 seconds	PASS
UNII2C	Channel Closing Transmission Time	200 ms + aggregate of 60 ms over remaining 10 second period	PASS
	Non-occupancy Period	30 minutes	PASS

7. DESCRIPTION OF DYNAMIC FREQUENCY SELECTION TEST 7.1 APPLICABILITY

The following table from KDB905462 D02 v02(04/08/2016) lists the applicable requirements for the DFS testing. The device evaluated in this report is considered a client device without radar detection capability.

	Operation Mode			
Requirement	Master	Client Without Radar	Client With Radar	
		Detection	Detection	
Non-Occupancy Period	Yes	Not required	Yes	
DFS Detection Threshold	Yes	Not required	Yes	
Channel Availability Check Time	Yes	Not required	Not required	
Uniform Spreading	Yes	Not required	Not required	
U-NII Detection Bandwidth	Yes	Not required	Yes	

Table 1-1. DFS Applicability

	Operation Mode			
Requirement	Master	Client Without Radar	Client With Radar	
		Detection	Detection	
DFS Detection Threshold	Yes	Not required	Yes	
Channel Closing Transmission Time	Yes	Yes	Yes	
Channel Move Time	Yes	Yes	Yes	
U-NII Detection Bandwidth	Yes	Not required	Yes	

Table 1-2. DFS Applicability During Normal Operation

7.2 REQUIREMENTS

Per KDB905462 D02 v02(04/08/2016) the following are the requirements for Client Devices:

- a) A Client Device will not transmit before having received appropriate control signals from a Master Device.
- b) A Client Device will stop all its transmissions whenever instructed by a Master Device to which it is associated and will meet the Channel Move Time and Channel Closing Transmission Time requirements.

The Client Device will not resume any transmissions until it has again received control signals from a Master Device.

- c) If a Client Device is performing In-Service Monitoring and detects a Radar Waveform above the DFS Detection Threshold, it will inform the Master Device. This is equivalent to the Master Device detecting the Radar Waveform and d) through f) of section 5.1.1 apply.
- d) Irrespective of Client Device or Master Device detection the Channel Move Time and Channel Closing Transmission Time requirements remain the same.

Channel Move Time and Channel Closing Transmission Time requirements are listed following table.

Value				
Minimum 30 minutes				
60 seconds				
10 seconds				
See Note 1.				
200 milliseconds + an				
Aggregate of 60 milliseconds over				
Remaining 10 second period. See Notes				
1 and 2.				
Minimum 100 % of the U-NII				
99 % transmission				
Power bandwidth. See Note 3.				
ssion Time should be performed with				
e Radar Type 0 burst.				
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 Channell move				
(an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration				
smissions.				
dar type 0 should be used.				
i is 90 percent. Measurements are performed				
With no data traffic.				

Table 1-3: DFS Response requirements

7.3 DFS DETECTION THRESHOLD VALUES

The DFS detection thresholds are defined for Master devices and Client Devices with In-service monitoring. These detection thresholds are listed in the following table.

Value (See Notes 1 and 2)
-64 dBm
-62 dBm
blitude of
nis will
sponse.

Table 1-4: Detection Thresholds for Master Devices and Client Devices with Radar Detection

7.4 PARAMETERS OF DFS TEST SIGNALS

As the EUT is a Client Device with no Radar Detection only one type radar pulse is required for the testing. Radar Pulse type 0 was used in the evaluation of the Client device for the purpose of measuring the Channel Move Time and the Channel Closing Transmission Time. Table 1-5 lists the parameters for the Short Pulse Radar Waveforms. A plot of the Radar pulse Type 0 used for testing is included in Section 7.7 of this report.

Radar Type	Pulse Width (µsec)	PRI (μsec)	Number Of Pulses	Minimum Percentage of Successful Detection	Minimum Number of Trials
0	1	1428	18	See Note 1	See Note 1
1	1	Test A: 15 unique PRI values Randomly selected From the list of 23 PRI values in Table 5a Test B: 15 unique PRI values Randomly selected within the range of 518-3066 μ sec, with a minimum increment of 1 μ sec, excluding PRI values selected in Test A	Roundup $ \left\{ \begin{array}{c} 1 \\ 360 \\ 19 \cdot 10^6 \\ PRI_{\mu seg} \end{array} \right\} $	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
				80%	120

Table 1-5: Parameters for Short Pulse Radar Waveforms

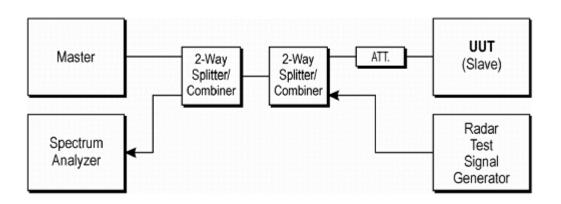
7.5 TEST AND MEASUREMENT SYSTEM

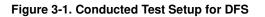
General Test Setup Procedure:

- 1. The EUT was operating 802.11ac_VHT80 mode (MCS0) during the test.
- 2. Connect FCC approved Master AP to a network, via wired Ethernet, that allows connection to an FTP server.
- 3. Associate the EUT with the Master AP.
- 4. Launch the FTP application on the EUT.
- 5. Connect to the FTP server application to the FTP server hosting the file
- 6. Initiate an FTP download of the file from the host.
- 7. Monitor the channel loading during transfer.
- 8. Reduce the maximum allowed data rate for the Master AP, using the AP's GUI interface.
- 9. Repeat steps 5-7 until the channel loading is as close to 20 % as possible.
- 10. Record the data rate setting on the Master AP and the channel loading.
- 11. While the system is performing an FTP transfer using the settings form item 9 above, perform the Channel Closing Transmission Time and Channel Move Time Measurements as required by KDB905462 D02 v02 using a conducted test.

PROCEDURE

The KDB905462 D02 v02 describes a radiated test setup and a conducted test setup. A radiated test setup was used for this testing. Figure 3-1 shows the typical test setup. Each one channel selected between 5260 and 5320 MHz, 5500 and 5720 is chosen for the testing.





- Page 1 4 of 22
- 1. The radar pulse generator is setup to provide a pulse at the frequency that the Master and Client are operating. A Type 0 radar pulse with a 1 µs pulse width and a 1428 µs PRI is used for the testing.
- 2. The vector signal generator is adjusted to provide the radar burst (18 pulses) at a level of approximately -62 dBm at the antenna of the Master device.
- 3. The Client Device (EUT) is set up per the diagram in Figure 3-1 and communications between the Master device and the Client is established.
- 4. The MPEG file specified by the FCC ("6½ Magic Hours") is streamed from the "file computer" through the Master to the Slave Device and played in full motion video using Media Player Classic Ver.6.4.8.6 in order to properly load the network.
- 5. The spectrum analyzer is set to record about 15 sec window to any transmissions occurring up to and after 10 sec.
- 6. The system is again setup and the monitoring time is shortened in order to capture the Channel Closing Transmission Time. This time is measured to insure that the Client ceases transmission within 200 ms and the aggregate of emissions occurring after 200 ms up to 10 sec do not exceed 60 ms.

(Note: the channel may be different since the Master and Client have changed channels due to the detection of the initial radar pulse.)

7. After the initial radar burst the channel is monitored for 30 minutes to insure no transmissions or beacons occur. A second monitoring setup is used to verify that the Master and Client have both moved to different channels.

SYSTEM CALIBRATION

A-50-ohm load is connected in place of the spectrum analyzer, and the spectrum analyzer is connected to a coaxial cable. The signal generator is set to CW mode. The amplitude of the signal generator is adjusted to yield a level of - 62 dBm as measured on the spectrum analyzer.

Without changing any of the instrument settings, the spectrum analyzer is reconnected to the common port of the spectrum analyzer combiner or divider.

The spectrum analyzer displays the level of the signal generator higher than the client TX level. Because we can not search the signal generator in the spectrum analyzer when the signal generator level is - 62 dBm. The spectrum analyzer will still indicate the level higher than the client TX level.

7.6 DESCRIPTION OF EUT

The EUT operates over the 5260 MHz - 5320 MHz and 5500 MHz - 5700 MHz ranges.

The EUT is a slave device without radar detection.

The EUT antenna has a gain of -2.55 dBi in 5260 MHz - 5320 MHz band and -3.05 dBi in 5500 MHz- 5700 MHz band.

The highest power level within these bands in 10.06 dBm EIRP in the 5260 MHz - 5320 MHz band and 9.89 dBm EIRP in the 5500 MHz - 5700 MHz band.

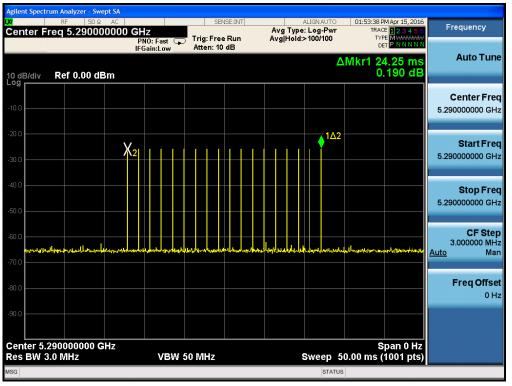
The EUT one transmitter/receiver chain connected to a coaxial cable to perform conducted tests.

TPC is not required since the maximum EIRP is less than 500 mW.

The EUT utilizes the 802.11a/n/ac architecture. The nominal channel bandwidth is implemented: 20 MHz, 40 MHz, 80 MHz

7.7 UNII2A TEST RESULT

RESULT PLOTS(UNII2A Band)



Type0 Radar Pulse Number

Marker Descriptions:

Number of Pulse Form M1R to M1 : 18

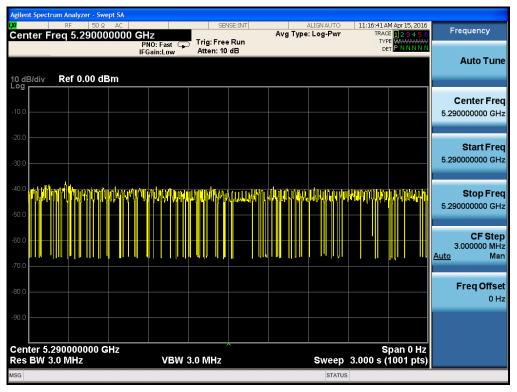
Type0 PRI

gilent Specti	rum Analyzer - S							_		
enter F	RF 50	Ω AC	GHz		NSE:INT		ALIGNAUTO : Log-Pwr	TRAC	M Apr 15, 2016 E <mark>1 2 3 4 5 6</mark>	Frequency
			PNO: Fast IFGain:Low	→→ Trig: Fre Atten: 10			_			
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0.0										5.290000000 GH
0.0							1∆2			Start Fre
0.0				X ₂						5.290000000 GH
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G							STATUS			

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).0										Freq Offse 0 ⊢
enter 5.	290000000	GĤz						Sp	an 0 Hz	
es BW 3			VBW 3	.0 MHz			Sweep	1.000 s (1	001 pts)	

Time Display, Non WLAN Channel Traffic

Time Display, WLAN Channel Traffic (Streaming Video)





Model: DM-02H

semngs Frequency: 5.	290,000000 🌩 MHz	DUT Peak I	nput Leve	l:35,00 ⊉ dBm	DUT Peak Output L	evel: 0,00 🜲	dBm	Start Waveform Generator
		VSG Path	Loss/Ga	in: 18,00 🖨 dB	VSA Path	Loss: 0,00 🌩	dB	Capture Screen
ture Waveform Meas	surement / Analysis Play	back Waveform						
rigger Settings			11	Display Settings	(Captured Info		Marker Info
External Trig (I/O):	Threshold Level:	-50,0 🜲	dBm	Display Reference Leve	l: 0,0 🜩 dBm	Capture Duration:	12 Sec	Start Waveform
T0 (out)	▼ Pre-Trigger:	1000	ms					0 Sec
				Power vs Time		FCC	: 905462 D02 v01 : Type 0	End Waveform 0,025702 Sec
								200ms Boundarv
								0,225702 Sec
-20				'Test Status : P	ass'			10s Boundary 10,025702 Sec
(mgp) -40 -50				Trigger Thi	reshold			Channel Move Time 0,305046 Sec
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								Burst Qty:
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	02 v01₩Type 0₩FCC Type	0 - 1us width -	1428us P	RI - 18 pulses,aiq		1	Select ARB File	Burst Oty: 10s Total
ay 0.000 🕁 🖸	hannel Move 12 Auto 👻	Prepar	•				Save Data	0,00019

· Channel Move Time : 0.305046 s (Limit : 10 s)

· Channel Closing Transmission Time, Aggregate Time After 200 ms : 0.000144 s (Limit : 60 ms)

Swept SA alyzer 01:10:26 PM Apr 15, 2016 TRACE 12 3 4 5 6 TYPE WWWW DET P N N N N N Center Freq 5.290000000 GHz PNO: Fast +++ IFGain:Low Atten: 10 dB Frequency Avg Type: Log-Pwr Auto Tune ΔMkr1 1.800 ks -45.85 dB 10 dB/div Log Ref 0.00 dBm **Center Freq** 5.290000000 GHz -20.0 X-2 Start Freq 5.290000000 GHz **Stop Freq** 5.290000000 GHz CF Step 3.000000 MHz Man <u>1Δ2</u> Auto Freq Offset 0 Hz Center 5.290000000 GHz Res BW 3.0 MHz Span 0 Hz Sweep 2.000 ks (1001 pts) VBW 3.0 MHz STATUS

Non-occupancy Period – Monitoring live time spectrum analyzer – Elapse time 30 minutes

7.8 UNII2C TEST RESULT RESULT PLOTS_(UNII2C Band)

gilent Spectrum Analyzer - Swept SA 01:54:32 PM Apr 15, 2016 Avg Type: Log-Pwr Avg|Hold:>100/100 Frequency TRACE 123 TYPE MWW DET PNN Center Freq 5.530000000 GHz Trig: Free Run Atten: 10 dB PNO: Fast 😱 IFGain:Low Auto Tune ΔMkr1 24.30 ms 0.168 dB Ref 0.00 dBm 10 dB/div **Center Freq** 5.530000000 GHz Start Freq X_2 5.530000000 GHz Stop Freq 5.53000000 GHz CF Step 3.000000 MHz Man MAR. <u>Auto</u> **Freq Offset** 0 Hz Center 5.530000000 GHz Res BW 3.0 MHz Span 0 Hz Sweep 50.00 ms (1001 pts) VBW 50 MHz STATUS

Type0 Radar Pulse Number

Marker Descriptions:

Number of Pulse Form M1R to M1 : 18

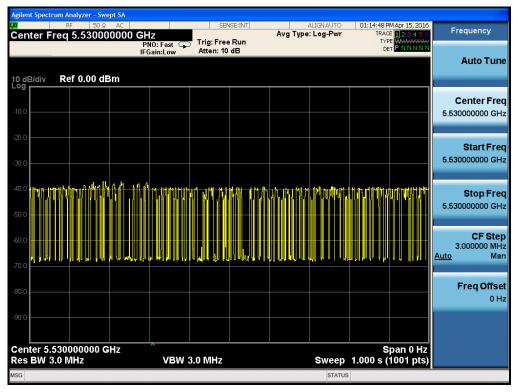
Type0 PRI

	<mark>rum Analyzer - Swep</mark> RF 50 Ω	AC		SEN	JSE:INT		ALIGN AUTO		M Apr 15, 2016	Entertaint
enter F	req 5.530000	PN	Z O: Fast ↔ ain:Low	Trig: Free Atten: 10		Avg Type	: Log-Pwr	TYP	E 123456 E WWWWWW T P N N N N N	Frequency
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D.O										Freq Offs 0 ⊦
	.530000000 C 3.0 MHz	Hz	VBW	3.0 MHz			Sween	S 1.000 s.(pan 0 Hz 1001 pts)	
G				······································			STATUS			

Time Display, Non WLAN Channel Traffic

Time Display, WLAN Channel Traffic (Streaming Video)





Model: DM-02H

F Frequency: 5,5	530, 000000 🐳 MHz	DUT Peak Inp		DUT Peak Output		Start Waveform Generator
		VSG Path Lo	ss/Gain: 18,00≩ dB	VSA Pati	n Loss: 0.00 🛊 dB	Capture Scree
heredy and here	urement / Analysis Playb	ack Waveform				
rigger Settings	T I I I I I I I I	50.0	Display Settings		Captured Info	Marker Info
External Trig (I/O):	Threshold Level:		3m Display Reference I	Level: 0,0 🖨 dBm	Capture Duration: 12 Sec	Start Waveform
TO (out)	Pre-Trigger:	1000 🌩 🛛 m	s			0 Sec
			Power vs Time		FCC 905462 D02 FCC Type 0	V01 End Waveform 0.025702 Sec
	1					200ms Boundary
						0,225702 Sec
	un ann an a		'Test Status	· Dace'	ana ana amin' amin' amin'	10s Boundary
	an a		Test otatus			10,025702 Sec
(m8b) newood						Channel Move Tim
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-70					internet service data in the	Burst Qty: 10 200ms Total
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						9,8s Total
						0,00000
		5 4	28us DBL - 18 pulses aid		Select A	Burst Qty: 10
₩DFS₩FCC 905462 DC lay 0.000 € C	I2 v01₩Type 0₩FCC Type I	J - TUS WIDTN - 14	coust in to puises, and			10s Total

· Channel Move Time : 0.13681 s (Limit : 10 s)

• Channel Closing Transmission Time, Aggregate Time After 200 ms : 0.005919 s (Limit : 60 ms)

	Spectru	ım Analyz										
<mark>IXI</mark> Centr	or Er	RF	50 Ω 3000	AC 0000 G	Line and the second sec	SEN	JSE:INT		ALIGNAUTO : Log-Pwr		M Apr 15, 2016	Frequency
Gent		eq 5.5	5000		PNO: Fast 🔸 IFGain:Low	. Trig: Free Atten: 10			Ū	TYP De	E WWWWWWW T P N N N N N	Auto Turro
10 dB/ Log 🗖	div	Ref 0.	00 dE	m					L	1 ۵Mkr1 -3	.800 ks 8.97 dB	Auto Tune
-10.0												Center Freq 5.530000000 GHz
-20.0 -30.0	<2											Start Freq 5.530000000 GHz
-40.0 -50.0												Stop Freq 5.530000000 GHz
-60.0		-forman of	Inclass	mililaum	ากสระบรระบาทสามสี่งงารใ	mhummerthe-theor	mannalado	tantaning den ar 160	hardlan marina		1 <u>0</u> 2 —	CF Step 3.000000 MHz <u>Auto</u> Man
-80.0 -												Freq Offset 0 Hz
		300000)00 G	Hz						S	pan 0 Hz	
	3W 3.	0 MHz			VBW	3.0 MHz				1	1001 pts)	
MSG									STATUS			

Non-occupancy Period – Monitoring live spectrum analyzer – Elapse time 30 minutes



8. LIST OF TEST EQUIPMENT

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
SAMSUNG ELECTRONICS	WEA453e / Wireless AP (Master Device)	N/A	N/A	S2LF812265 FCC ID: A3LWEA453E
ADLINK	PXI/DFS Measurement System(S/G)	03/28/2016	Annual	302581/735
ADLINK	PXI/DFS Measurement System(S/A)	03/28/2016	Annual	303582/113
Agilent	N9020A / SIGNAL ANALYZER	06/30/2015	Annual	MY51110085
Agilent	N9030A / SIGNAL ANALYZER	11/24/2015	Annual	MY49431210
Agilent	N1911A/Power Meter	07/09/2015	Annual	MY45100523
Agilent	N1921A /Power Sensor	03/11/2016	Annual	MY52260025
Hewlett Packard	11636B/Power Divider	01/26/2016	Annual	0531
Agilent	87300B/Directional Coupler	11/30/2015	Annual	3116A03621
Hewlett Packard	11667B / Power Splitter	06/15/2015	Annual	5001
Hewlett Packard	E3632A / DC POWER SUPPLY	03/09/2016	Annual	KR75303962
Agilent	8493C / Attenuator(10 dB)	07/23/2015	Annual	07560
WEINSCHEL	2-3 / Attenuator(3 dB)	10/26/2015	Annual	BR0617
Weinschel	AF9003-69-31 / Step Attenuator	10/14/2015	Annual	5701
Narda	922695 / 4 Way Divider	09/22/2015	Annual	15298