**ISSUED BY** Shenzhen BALUN Technology Co., Ltd.



FOR

## LTE Digital Mobile Phone

**ISSUED TO** Nubia Technology Co., Ltd.

TESTREPORT

6/F, Tower A, Hans Innovation Mansion, North Ring Rd., No. 9018, Hi-Tech Industrial Park, Nanshan District, Shenzhen, P. R. China



Tested by: Cao Shaodono Approved by: Liao Jianming (Technical Director)

Model NX531J, nubia Z11

Brand Name: nubia Test Standard:

FCC ID: Test conclusion:

Test Date: Date of Issue:

Report No.: BL-SZ1680175-605

**EUT Type:** LTE Digital Mobile Phone

47 CFR Part 15 Subpart E

2AHJO-NX531J

Pass

Sep. 02, 2016 ~ Sep. 09, 2016

Sep. 29, 2016

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### **Revision History**

 Version
 Issue Date

 Rev. 01
 Sep. 22, 2016

 Rev. 01
 Sep. 29, 2016

Revisions
Initial Issue
Add the plots of the radar
waveforms at page 14, etc.

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## 1 ADMINISTRATIVE DATA (GENERAL INFORMATION)

### 1.1 Identification of the Testing Laboratory

Company Name Shenzhen BALUN Technology Co., Ltd.	
A al al a a a a	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road,
Address	Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 6685 0100
Fax Number	+86 755 6182 4271

### 1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co., Ltd.		
	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road,		
Address	Nanshan District, Shenzhen, Guangdong Province, P. R. China		
	The laboratory has been listed by Industry Canada to perform		
	electromagnetic emission measurements. The recognition numbers of		
	test site are 11524A-1.		
Accreditation	The laboratory has been listed by US Federal Communications		
	Commission to perform electromagnetic emission measurements. The		
Certificate	recognition numbers of test site are 832625.		
	The laboratory is a testing organization accredited by China National		
	Accreditation Service for Conformity Assessment (CNAS) according to		
	ISO/IEC 17025. The accreditation certificate number is L6791.		
	All measurement facilities used to collect the measurement data are		
December	located at Block B, FL 1, Baisha Science and Technology Park, Shahe Xi		
Description	Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China		
	518055		

## 1.3 Laboratory Condition

Ambient Temperature	20 to 25°C
Ambient Relative Humidity	45% - 55%
Ambient Pressure	100 kPa - 102 kPa

#### 1.4 Announce

- (1) The test report reference to the report template version v2.2.
- (2) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.
- (3) The test report is invalid if there is any evidence and/or falsification.
- (4) The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.
- (5) This document may not be altered or revised in any way unless done so by BALUN and all revisions are duly noted in the revisions section.
- (6) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.



## **2 PRODUCT INFORMATION**

## 2.1 Applicant Information

Applicant Nubia Technology Co., Ltd.	
Addross	6/F, Tower A, Hans Innovation Mansion, North Ring Rd., No. 9018, Hi-
Address	Tech Industrial Park, Nanshan District, Shenzhen, P. R. China

### 2.2 Manufacturer Information

Manufacturer Nubia Technology Co., Ltd.	
Addross	6/F, Tower A, Hans Innovation Mansion, North Ring Rd., No. 9018, Hi-
Address	Tech Industrial Park, Nanshan District, Shenzhen, P. R. China

## 2.3 Factory Information

Factory	N/A
Address	N/A

## 2.4 General Description for Equipment under Test (EUT)

EUT Type	LTE Digital Mobile Phone
Model Name Under Test	NX531J
Series Model Name	NX531J, nubia Z11
Description of Model name differentiation	The equipment model NX531J and nubia Z11 are LTE Digital Mobile Phone, the electrical parameters and internal structure of circuit are same, only the model name is different.
Hardware Version	NX531J_V2AMB_B
Software Version	NX531J_ENCommon_V1.09
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A
Network and Wireless connectivity	2G Network GSM/GPRS/EDGE 850/1900 MHz 3G Network WCDMA/HSDPA/HSUPA/HSPA + Band 2/4/5 4G Network FDD LTE Band 2/4/5/7/12/17 Bluetooth 3.0, Bluetooth 4.0 Low Energy (BLE), WIFI 802.11a,802.11b, 802.11g and 802.11n (HT20/40), 802.11ac GPS, GLONASS, NFC

# 2.5 Ancillary Equipment

	Battery	
	Brand Name	N/A
	Model No.	Li3829T44P6h806435
Ancillary Equipment 1	Serial No.	N/A
	Capacitance	2900 mAh
	Rated Voltage	3.85 V
	Limit Charge Voltage	4.4 V
Ancillary Equipment 2	Charger	
Ancillary Equipment 2	Brand Name	nubia



	Model No.	STC-A5930A-Z	
	Rated Voltage	100-240 V∼ , 0.5 A, 50/60 Hz	
	Limit Charge Voltage	5 V=, 3.0 A or 9 V=, 2.0 A or 12 V=, 1.5 A	
Ancillary Equipment 3	Earphone		
Andiliary Equipment 3	Length (Approx.)	1.0 m	
Ancillant Equipment 1	USB Data Cable		
Ancillary Equipment 4	Length (Approx.)	1.0 m	

### 2.6 Technical Information

The requirement for the following technical information of the EUT was tested in this report:

1			
Frequency Range		5250 MHz to 5350 MHz, 5350 MHz to 5470 MHz	
Marriage	Output Davier	5250 MHz to 5350 MHz: 13.20 dBm	
Maximum	Output Power	5350 MHz to 5470 MHz: 13.60 dBm	
Antenna	Antenna 0 (ANT 0)	PIFA Antenna	
Туре	Antenna 1 (ANT 1)		
	Antenna 0 (ANT 0)	5250 MHz to 5350 MHz: 0.7 dBi	
Antenna		5350 MHz to 5470 MHz: 0.6 dBi	
Gain	Antonno ( (ANT 1)	5250 MHz to 5350 MHz: 0.7 dBi	
	Antenna 1 (ANT 1)	5350 MHz to 5470 MHz: 0.6 dBi	
About the I	Product	The equipment is LTE Digital Mobile Phone, intended for used	
About the i	Floudel	with information technology equipment.	

This device (Client) is without radar detection, then the manufacturer statement confirming that information regarding the parameters of the detected Radar Waveforms is not available to the end user. And the device doesn't have Ad Hoc mode on DFS frequency band.



### 3 SUMMARY OF TEST RESULTS

### 3.1 Test Standards

No.	Identity	Document Title			
1	47 CFR Part 15	Unlicensed National Information Infrastructure Devices			
'	Subpart E				
2	KDB Publication	LINII DES Compliance Procedures New Pules			
	905462 D02v02	UNII DFS Compliance Procedures New Rules			
3	KDB Publication	UNII Clients Without Radar Detection New Rules			
3	905462 D03v01r02	ONIT Clients Without Radal Detection New Rules			
4	KDB Publication	Guidelines for Compliance Testing of Unlicensed National			
4	789033 D02v01r03	Information Infrastructure (U-NII) Devices Part 15, Subpart E			

### 3.2 Verdict

Standard Rule	Description	Result	Remark
15.407	Channel Move Time	Pass	Applicable
15.407	Channel Closing Transmission Time	Pass	Applicable
15.407	Non- Occupancy Period	Pass	Applicable

## 3.3 Test Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Measurement	Value
Conducted emissions (9 KHz-30 MHz)	3.23 dB
Radiated emissions (30 MHz-1 GHz)	3.45 dB
Radiated emissions (1 GHz-18 GHz)	4.55 dB



## **4 GENERAL TEST CONFIGURATIONS**

### 4.1 Test Environments

During the measurement, the normal environmental conditions were within the listed ranges:

Relative Humidity	45% - 55%		
Atmospheric Pressure	100 kPa - 102 kPa		
	NT (Normal Temperature)	+22°C to +25°C	
Temperature	LT (Low Temperature) -20°C		
	HT (High Temperature)	+60°C	
	NV (Normal Voltage)	3.85 V	
Working Voltage of the EUT	LV (Low Voltage)	3.30 V	
	HV (High Voltage)	4.40 V	

## 4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	ROHDE&SCHWARZ	FSV-30	103118	2016.07.13	2017.07.12
Vector Signal Generator	ROHDE&SCHWARZ	SMBV100A	177746	2016.07.13	2017.07.12
Signal Generator	ROHDE&SCHWARZ	SMB100A	260592	2016.07.13	2017.07.12
Switch Unit with OSP- B157	ROHDE&SCHWARZ	OSP120	101270	2016.07.13	2017.07.12
Spectrum Analyzer	AGILENT	E4440A	MY45304434	2015.10.15	2016.10.14
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2016.07.05	2017.07.04
LISN	SCHWARZBECK	NSLK 8127	8127-687	2016.07.05	2017.07.04
Bluetooth Tester	ROHDE&SCHWARZ	CBT	101005	2016.07.13	2017.07.12
Power Splitter	KMW	DCPD-LDC	1305003215		
Power Sensor	ROHDE&SCHWARZ	NRP-Z21	103971	2016.07.13	2017.07.12
Attenuator (20 dB)	KMW	ZA-S1-201	110617091		
Attenuator (6 dB)	KMW	ZA-S1-61	1305003189		
DC Power Supply	ROHDE&SCHWARZ	HMP2020	018141664	2016.07.13	2017.07.12
Temperature Chamber	ANGELANTIONI SCIENCE	NTH64-40A	1310	2016.07.13	2017.07.12
Test Antenna- Loop(9 kHz-30 MHz)	SCHWARZBECK	FMZB 1519	1519-037	2015.07.22	2017.07.21
Test Antenna- Bi-Log(30 MHz-3 GHz)	SCHWARZBECK	VULB 9163	9163-624	2015.07.22	2017.07.21
Test Antenna- Horn(1-18 GHz)	SCHWARZBECK	BBHA 9120D	9120D-1148	2015.07.22	2017.07.21
Test Antenna- Horn(15-26.5 GHz)	SCHWARZBECK	BBHA 9170	9170-305	2015.07.22	2017.07.21
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	2015.02.28	2017.02.27
Shielded Enclosure	ChangNing	CN-130701	130703		

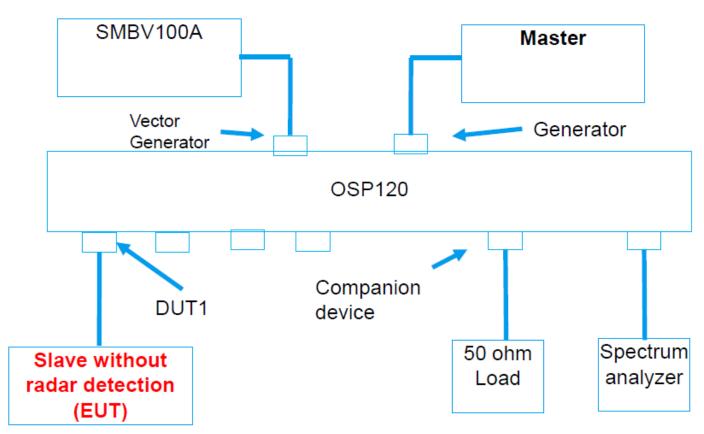


	Access Point		
	Brand Name	Aerohive	
	Model No.	AP230	
Master	Serial No.	AH-AP-230-AC-W	
	FCC ID	WBV-AP230	
	CDEC	The maximum EIRP is18.5dBm, Antenna Gain is	
	SPEC.	6.57dBi	

## 4.3 Description of Test Setup

### 4.3.1 Conducted Test Setup Configuration

Client without Radar Detection Mode



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

(Diagram 1)



## 5 Test Type and Test Results

#### 5.1 **DFS**

### 5.1.1 U-NII DFS Rule Requirements

#### 5.1.1.1 Working Mode and Required Test Items

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.

#### APPLICABILITY OF DFS REQUIREMENTS PRIOR TO USE A CHANNEL

	Operational Mode			
Requirement	Master	Client without radar detection	Client with radar detection	
Non-Occupancy Period	✓	✓	✓	
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	<b>√</b>	

#### APPLICABILITY OF DFS REQUIREMENTS DURING NORMAL OPERATION

	Operational Mode			
Requirement	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	✓	

#### 5.1.2 Test Limits and Radar Signal Parameters

#### **Detection Thereshold Values**

DFS DETECTION THRESHOLDS FOR MASTER DEVICES AND CLIENT DEVICES WITH RADAR DETECTION

Maximum Transmit Power	Value (See Note 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.



#### 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	100% of the UNII 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 waveforms.

#### SHORT PULSE RADAR TEST WAVEFORMS

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 µsec, with a minimum increment of 1 µsec, excluding PRI values selected in Test A	Roundup $\left\{ \left( \frac{1}{360} \right) \right\}$	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



Note 1: Short Pulse Radar Type 0 should be used for the detection bandwidth test, channel move time, and channel closing time tests.

#### LONG PULSE RADAR TEST WAVEFORM

Radar Type	Pulse Width (µsec)	Chirp Width (MHz) PRI		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

#### 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

#### 5.1.2.1 Test Setup

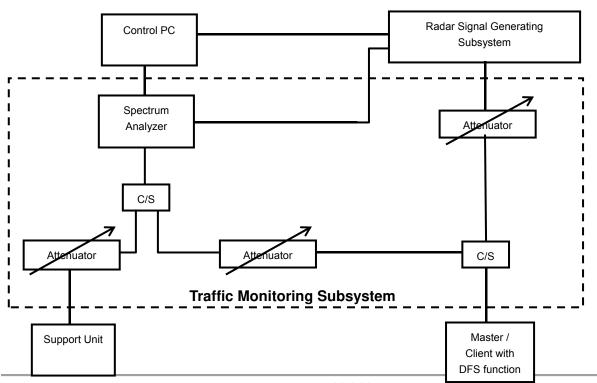
See 4.3 for test setup description for the radiated test. The photo of test setup please refer to ANNEX B.

#### 5.1.2.2 Test Procedure

#### **DFS MEASUREMENT SYSTEM:**

A complete 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



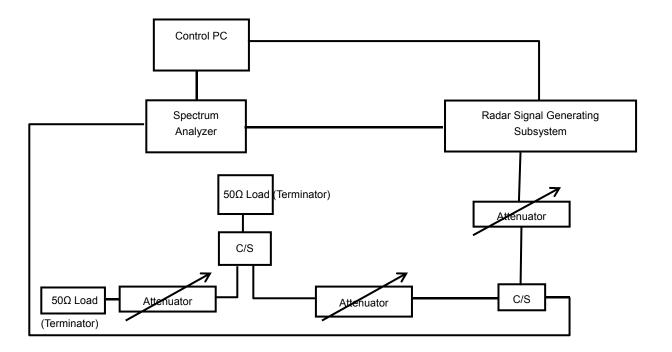


The test transmission will always be from the Master Device to the Client Device. While the Client device is set up to associate with the Master device and play the MPEG file (6  $\frac{1}{2}$  Magic Hours) from Master device, the designated MPEG test file and instructions are located at: <a href="http://ntiacsd.ntia.doc.gov/dfs/">http://ntiacsd.ntia.doc.gov/dfs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

#### **CALIBRATION OF DFS DETECTION THRESHOLD LEVEL:**

The measured channel is 5500 MHz in 20MHz Bandwidth and 5530MHz in 80MHz Bandwidth. The radar signal was the same as transmitted channels, and injected into the antenna port of AP (master) or Client Device with Radar Detection, measured the channel closing transmission time and channel move time. The Master antenna gain is 6.57dBi and required detection threshold is-54.43dBm (= -62 +1 +6.57)dBm. The calibrated conducted detection threshold level is set to -54.43 dBm.

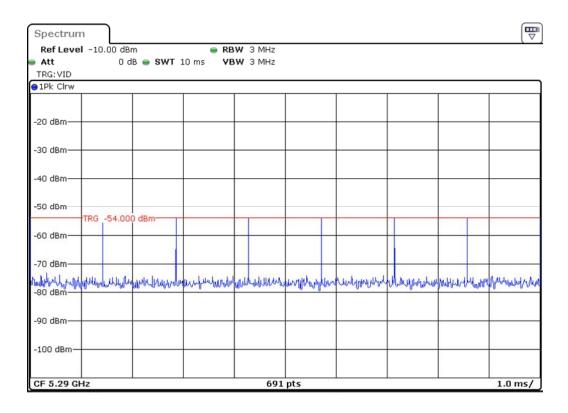
Conducted setup configuration of Calibration of DFS Detection Threshold Level



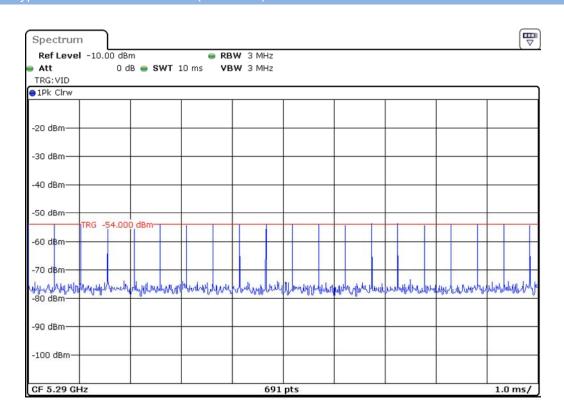


#### **Radar Waveform Calibration Result**

#### Radar Type 0 Calibration Plot (5290MHz)

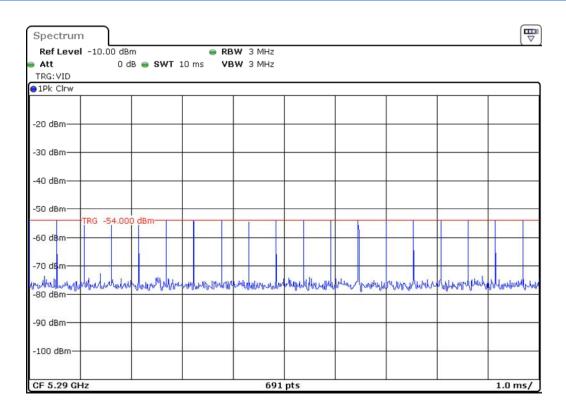


#### Radar Type 1 test A Calibration Plot (5290MHz

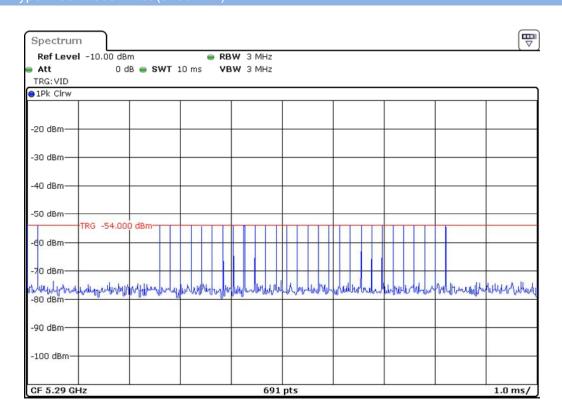




#### Radar Type 1 test B Calibration Plot (5290MHz)

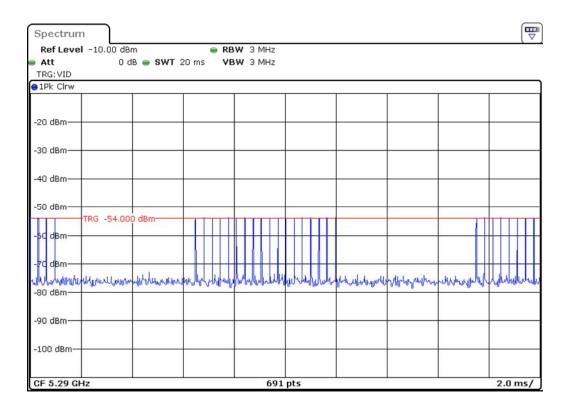


#### Radar Type 2 Calibration Plot (5290MHz

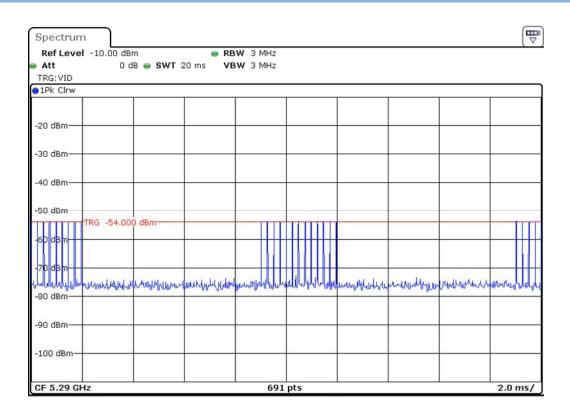




#### Radar Type 3 Calibration Plot (5290MHz)

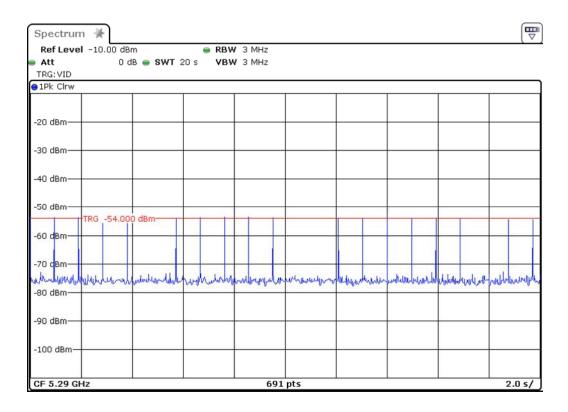


#### Radar Type 4 Calibration Plot (5290MHz

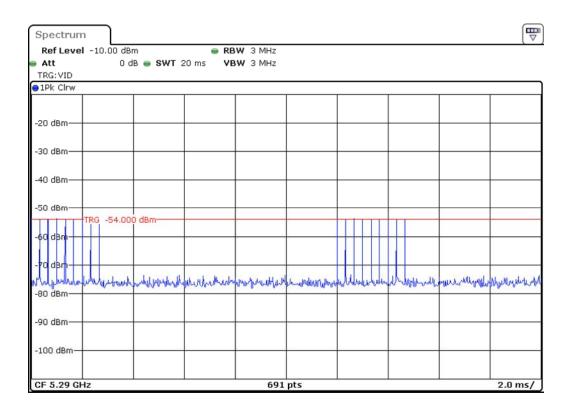




#### Radar Type 5 Calibration Plot (5290MHz)



#### Radar Type 6 Calibration Plot (5290MHz)



#### 5.1.2.3 Test Result

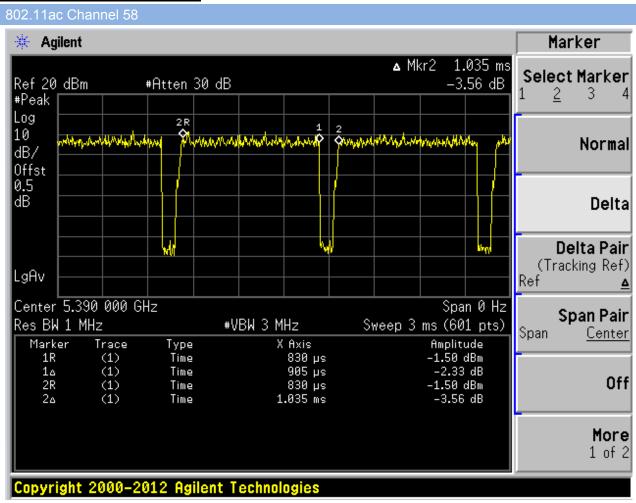
Please refer to ANNEX A



## ANNEX A TEST RESULT

#### A.1 CHANNEL CLOSING TRANSMISSION AND CHANNEL MOVE TIME

The timing plot of the channel loading



The channel loading Specification of Ton/ (Ton +Toff) as the file streaming between master to client is 87.4%.

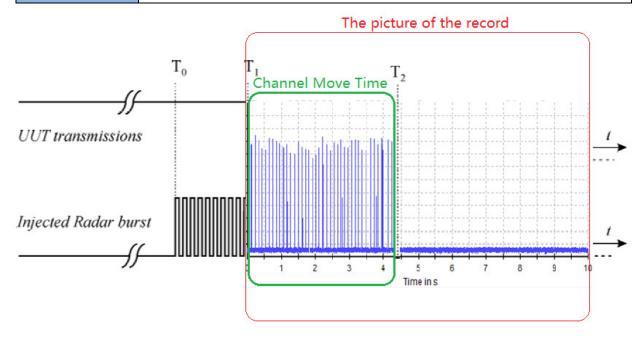


### Result of DFS Channel Shutdown

Note: The radar test signals are injected into the Master Device.

This test was investigated for different bandwidth (the lowest and the highest bandwidth). The following plots was done on 80MHz as a representative

Description	Operation	Operation	Value	Limit		
	Mode	Channel	(s)			
Channel Move	802.11ac(80	58	4.3	10 s		
Time	MHz)			10.5		
Channel Closing Transmission Time	802.11ac(80 MHz)	58	0.068	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period.		
Channel Move Time			4.3	10 s		
Channel Closing Transmission Time	802.11ac(80 MHz) 106		0.061	200 milliseconds + an aggregate of milliseconds over remaining 10 second period.		
Test Verdict	Pass					



T0 denotes DFS test signal start generated on the channel.

T1 denotes the end of the radar burst.

T2 denotes the instant when the UUT has ceased all transmissions on the channel.

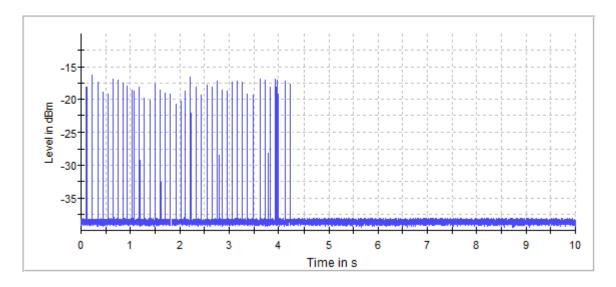
The time difference between T1 and T2 shall be measured. This value (Channel Move Time) shall be noted and compared with the limit.

The aggregate duration (*Channel Closing Transmission Time*) of all transmissions from the UUT on Ch<sub>r</sub> during the *Channel Move Time* shall be compared to the limit.

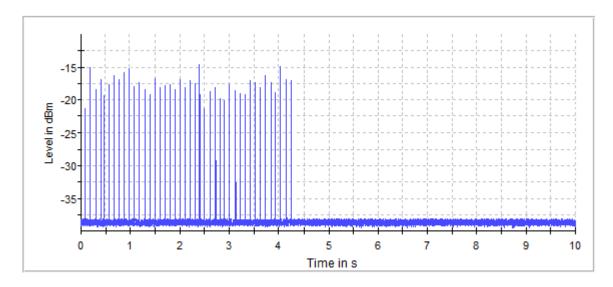
DFS Test schematic graphic



### 802.11ac Channel 58



### 802.11ac 80 Channel 106



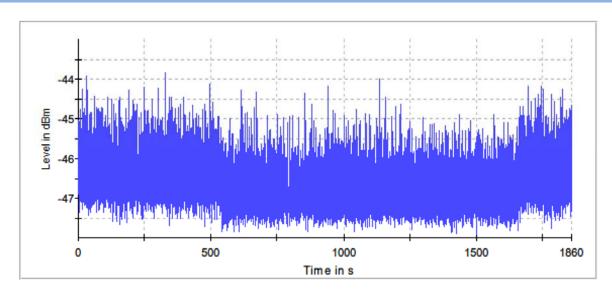


### A.2 NON-OCCUPANCY PERIOD

Master was off.

During the 30 minutes observation time, The UUT did not make any transmissions in the DFS band after UUT power up.

#### 802.11ac (80 MHz) CH58





### ANNEX B TEST SETUP PHOTOS

Please refer the document "BL-SZ1680175-DFS.PDF".

### ANNEX C EUT EXTERNAL PHOTOS

Please refer the document "BL-SZ1680175-AW.PDF".

### ANNEX D EUT INTERNAL PHOTOS

Please refer the document "BL-SZ1680175-AI.PDF".

--END OF REPORT--