RADIO TEST REPORT

For

MODEL NO. 1770
FCC ID: C3K1770
IC ID: 3048A-1770

Test Report No. R-TR209-FCCIC-DFS-2
Issue Date: 06 November 2015

FCC CFR47 Part 15 Subpart E
Industry Canada RSS-247 Issue 1

Prepared by
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ACCREDITED
TESTING CERT #3472.01

1 Record of Revisions

Revision	Date	Section	Page(s)	Summary of Changes	Author/Revised By:
1.0	11/2/2015	All	All	Version 1.0	Daniel Salinas
2.0	11/6/2015	7.2 8	11 12	Updated Test setup block diagram. Included additional details on test setup and Master device.	Daniel Salinas

Microsoft

Table of Contents

Test Report Attestation

Microsoft Corporation
Model: 1770
FCC ID: C3K1770
IC ID: 3048A-1770

Applicable Standards

Specification	Test Result
FCC CFR47 Rule Parts 15.407- DFS	Pass
Industry Canada RSS-247 Issue 1- DFS	Pass

Microsoft EMC Laboratory attests that the product model identified in this report has been tested to and meets the requirements identified in the above standards. The test results in this report solely pertains to the specific sample tested, under the conditions and operating modes as provided by the customer.

This report shall not be used to claim product certification, approval, or endorsement by A2LA or any agency of any Government. Reproduction, duplication or publication of extracts from this test report is prohibited and requires prior written approval of Microsoft EMC Laboratory.

This report replaces the previously issued Report #R-TR209-FCCIC-DFS-1 issued by Microsoft EMC Labs on Nov 2, 2015.

Written By: Daniel Salinas
Radio Test Lead

Reviewed/ Issued By: Sajay Jose
EMC/RF Compliance Lab Manager

2 Deviations from Standards

None.

3 Facilities and Accreditations

3.1 Test Facility

All test facilities used to collect the test data are located at Microsoft EMC Laboratory, located at 17760 NE 67th Ct, Redmond WA, 98052, USA

3.2 Accreditations

The lab is established and follows procedures as outlined in IEC/ISO 17025 and A2LA accreditation requirements.
A2LA Accredited Testing Certificate Number: 3472.01
FCC Registration Number: US1141
IC Site Registration Numbers: 3048A-1, 3048A-2, 3048A-3, 3048A-4

3.3 Test Equipment

The calibrations of the measuring instruments, including any accessories that may affect such calibration, are checked frequently to assure their accuracy. Adjustments are made and correction factors applied in accordance with instructions contained in the user manual for the measuring equipment.

4 Product Description

Company Name:	Microsoft Corporation
Address:	One Microsoft Way
City, State, Zip:	Redmond, WA 98052
Customer Contact:	Pamela Galvan
Functional Description of the EUT:	Wireless Input Device
Model:	1770
FCC ID:	C3K1770
IC ID:	3048A-1770
Radio Description:	IEEE WLAN 802.11a/g/n with 20MHz Signal Bandwidths (SISO only)
Frequency Range of Operation:	2.4- 2.4835 GHz 5170 – 5250MHz, 5250 – 5330MHz, 5490 – 5710MHz, and 5735 – 5835MHz
Modulation:	CCK, BPSK, OFDM, and QAM modulation
Antenna Type:	Internal
EUT Classification:	UNII- Client device without Radar Detection
Equipment Design State:	Production
Equipment Condition:	Good
Test Sample Details:	S/N: 02980005734513

4.1 EUT Operational Description

The EUT is a Client Device without Radar Detection and operates in U-NII DFS frequency bands, 5250-5350 MHz and 5470-5725 MHz. The device has a single antenna with maximum antenna gain of 1.6 dBi in the 5250-5350 MHz sub-band and 0.5 dBi in the 5470-5725 MHz sub-band. The EUT operates in 802.11a/n modes and utilizes 20 MHz bandwidth signal only.

To meet IC requirements, the device excludes operation in 5600-5650 MHz in that region.

Audio streaming from the Master Device to the EUT, simulating normal operation of the device, was used to achieve a channel loading >17%. The Master Device was using software version 6.2.1981.0. “DFS” application version 1.0.0.0 was used with Firmware Version 2.16.0.0 to configure DFS channels for testing and stream audio to the EUT.

Aeroflex PXI 3001C DFS test system was used to monitor traffic and generate radar pulses.

4.2 Environmental Conditions

Ambient air temperature of the test site was within the range of 10 ºC to 40 ºC (50 ºF to 104 ºF) unless the EUT specified testing over a different temperature range. Humidity levels were in the range of 10% to 90% relative humidity. Testing conditions were within tolerance and any deviations required from the EUT are reported.

4.3 Equipment Modifications

No modifications were made during testing.

4.4 Dates of Testing

Testing was performed from October 29th, 2015.

5 Test Results Summary

Test Description	FCC CFR 47/ IC Rule Part	Limit	Test Result
In-Service Monitoring	15.407(h)(2)(iv) RSS-247 [6.3]	Monitor co-channel radar	N/A*
Channel Availability Check	15.407 (h)(2)(ii) RSS-247 [6.3]	60s detection	N/A*
Channel Move Time	15.407 (h)(2)(iii) RSS-247 [6.3]	10s	Pass
Channel Closing Time	15.407 (h)(2)(iii) RSS-247 [6.3]	200ms	Pass
Non-occupancy Period	15.407 (h)(2)(iv) RSS-247 [6.3]	30 minutes	Pass

*Note: The EUT is a Client Device without Radar Detection.

6 Test Equipment List

Manufacturer	Description	Model #	Asset #	FCC ID	Calibration Due
Aeroflex	PXI Chassis	3001C	RF-132	N/A	3/9/2016
Microsoft	Xbox One Game Console	1540	N/A	C3K1525	N/A
Agilent	Spectrum Analyzer	N9030A	EMC-605	N/A	06/15/2016
Microsoft	Headset	1610	N/A	DoC	N/A
Asus	LCD Monitor	PB287	N/A	N/A	N/A

7 Test Method

7.1 Antenna port conducted measurements

Antenna port conducted measurements were performed on a bench-top setup consisting of a spectrum analyzer, splitters/combiners (as necessary), attenuators, and pre-characterized RF cables. The Aeroflex PXI 3001C DFS test system monitored traffic and generated radar bursts.

The correction factors between the EUT, support equipment, radar test generator and the spectrum analyzer is added internally in the Aeroflex test system.

The Xbox One system acts as the Master device.

7.2 Test Setup Diagrams

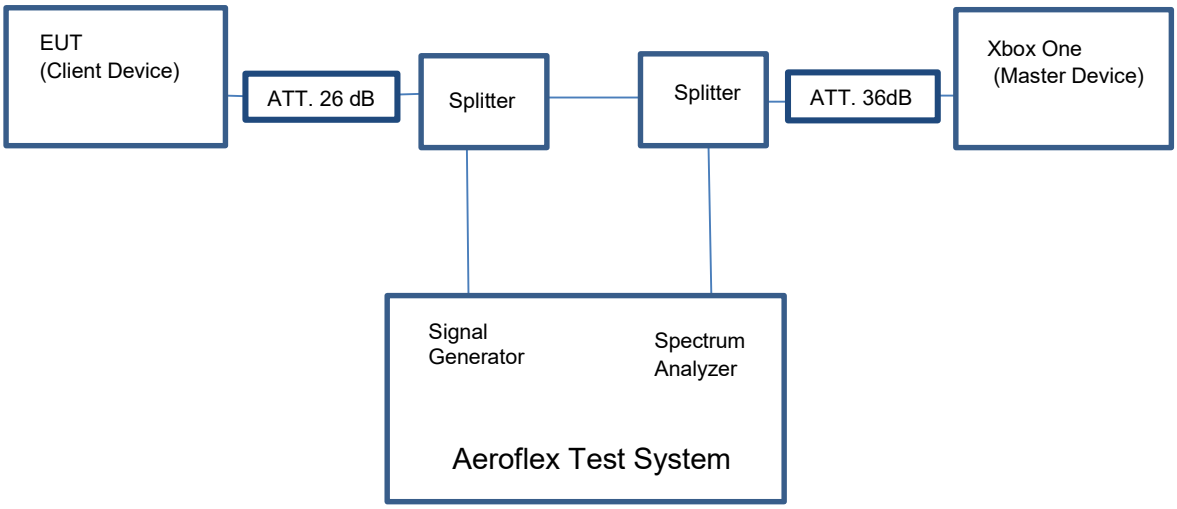

Fig.1. Test Setup for Antenna port conducted measurements

8 Test Data

8.1 Test Setup Parameters

The radar burst level and the channel loading requirements are defined in KDB 905462 D02 UNII DFS Compliance Procedures New Rules v01r02.

8.1.1.1 Radar Burst Level

The Master Device used for testing was a Microsoft XBOX One game console with, FCC ID:C3K1525 and IC ID: 3048A-1525.

The maximum EIRP in both U-NII 2a and U-NII 2c sub-bands are < 23 dBm and the maximum antenna gain is 3.43 dBi. The maximum PSD in both U-NII 2a and U-NII 2c sub-bands are < 10 dBm/MHz. The -62 dBm DFS radar detection threshold applies.

Radar Type 0, an 18 pulse signal with pulse width of 1µs and pulse repetition interval of 1428 µs, was injected into the master device.

The Master Device was replaced with a spectrum analyzer. The level setting was adjusted on the Aeroflex signal generator until the proper level was identified for each frequency.

The DFS radar detection threshold level tested was lower than the required level.

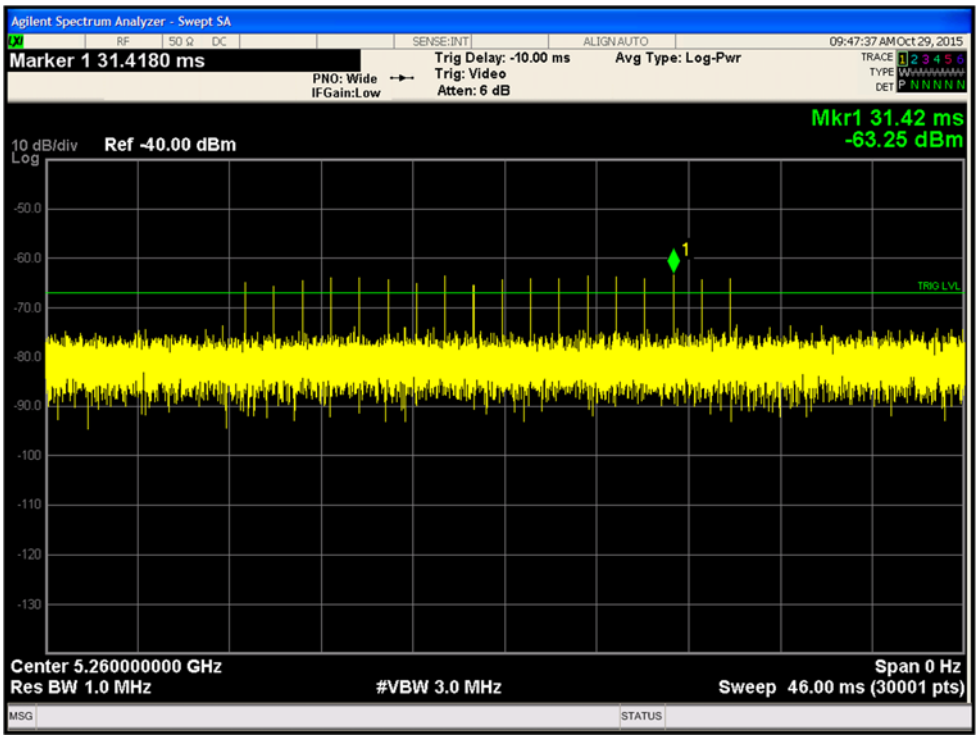

Figure 1. Radar Burst Level at -63dBm: Radar Type 0 - Channel 52 (5260 MHz)

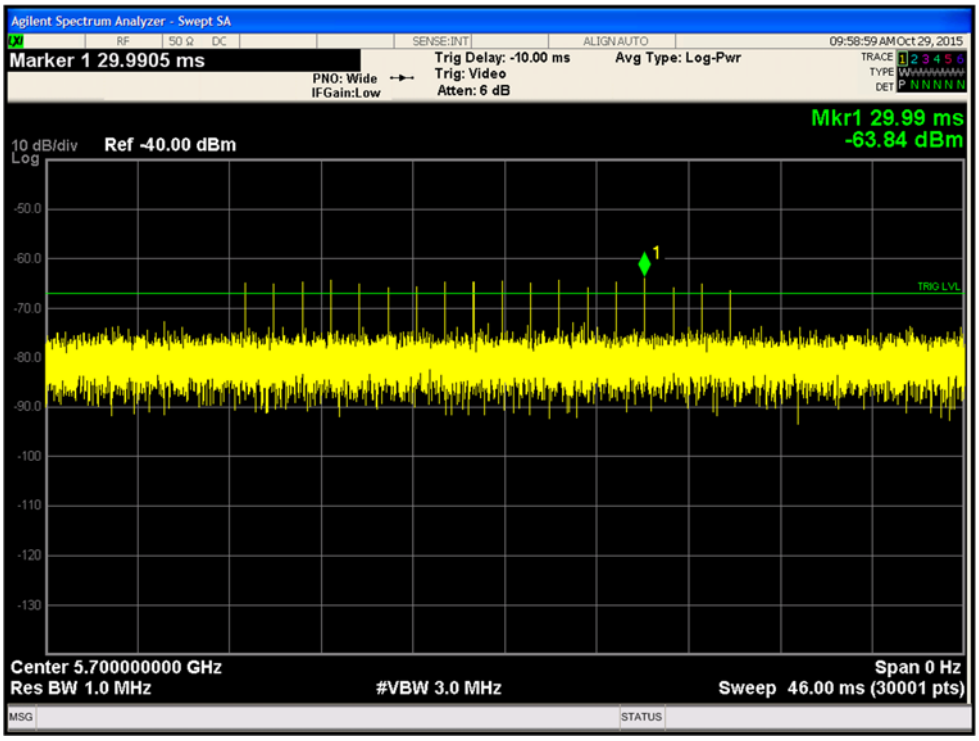

Figure 2. Radar Burst Level at -63dBm: Radar Type 0 - Channel 140 (5700 MHz)

8.1.1.2 Channel Loading

Carrier Frequency (MHz)	ON-Time (ms)	Period (ms)	Channel Loading (%)
5260	2.252	8.025	28
5700	2.252	8.024	28

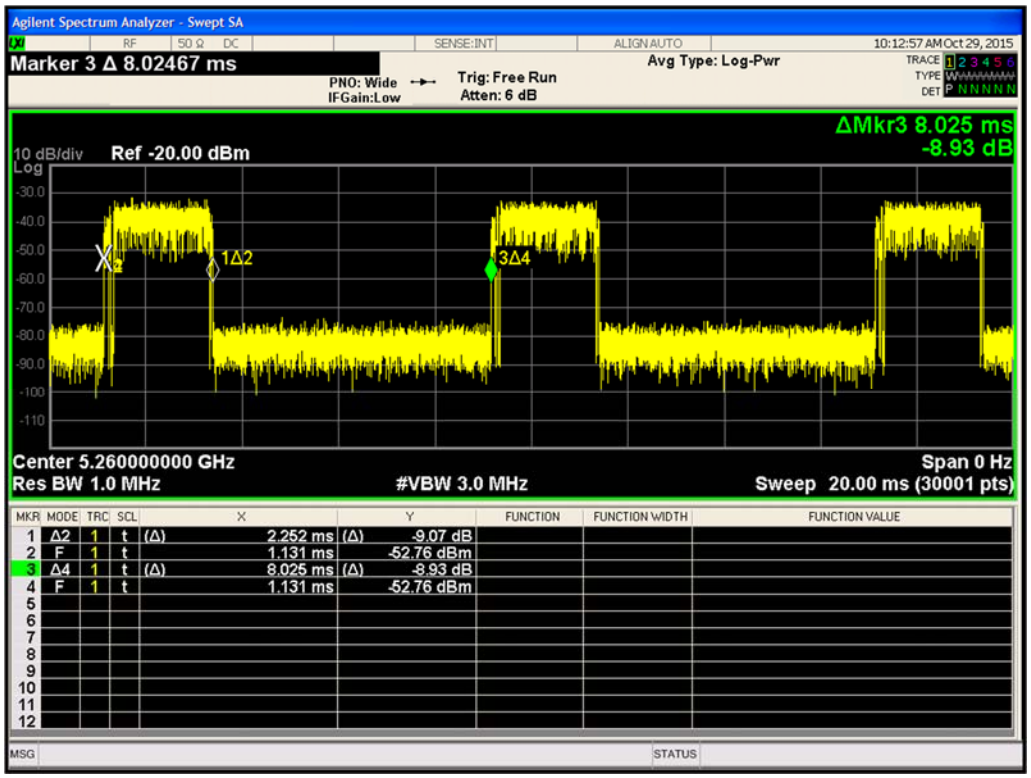

Figure 3. Channel Loading - Ch. 52 (5260 MHz)

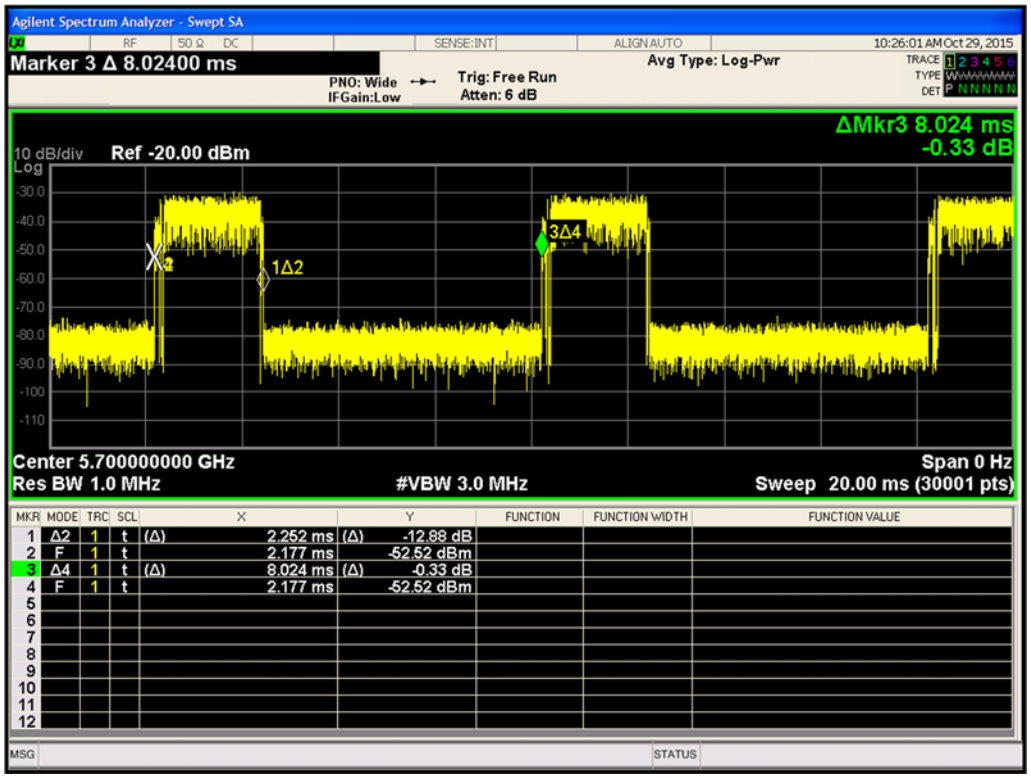

Figure 4. Channel Loading - Ch. 140 (5700 MHz)

8.2 Channel Move Time

8.2.1 Test Requirement:

FCC CFR 47 Rule Part 15.407 (h)(2)(iv)

Industry Canada RSS-247 [6.3]

8.2.2 Test Method:

Measurements were performed according to the procedures defined in KDB 905462 D02 UNII DFS Compliance Procedures New Rules v01r02

8.2.3 Limits:

After a radar signal is detected, the device shall cease all transmissions on the operating channel within 10 seconds.

8.2.4 Test Results:

Pass.

The EUT ceased transmission on the channel within 10s.

8.2.5 Test Data

8.2.5.1 Channel Move Time 20 MHz Bandwidth

Figure 5. Channel Move Time 10s – Ch. 52 (5260 MHz)

Figure 6. Channel Move Time 10s – Ch. 140 (5700 MHz)

8.3 Channel Closing Transmission Time

8.3.1 Test Requirement:

FCC CFR 47 Rule Part 15.407 (h)(2)(iii)

Industry Canada RSS-247 [6.3]

8.3.2 Test Method:

Measurements were performed according to the procedures defined in KDB 905462 D02 UNII DFS Compliance Procedures New Rules v01r02

8.3.3 Limits:

After the radar burst has been applied, the EUT shall cease normal transmission on the channel within 200 ms starting at the beginning of the channel move time. Control signaling required to facilitate a channel move (an aggregate of 60 ms) over the remaining 10-second period of the channel move time is permissible.

8.3.4 Test Results:

Pass.

The EUT ceased transmission on the channel within the allotted time.

8.3.5 Test Data

Channel Closing Transmission Time = Channel Move Time (s) – End Waveform Time (s)

Channel (MHz)	Channel Closing Transmission Time (ms)	Aggregate Control Signaling Time (ms)	Channel Closing Transmission Time Limit (ms)	Aggregate Control Signaling Time Limit (ms)	Result
5260	185.866	0	200	60	Pass
5700	184.383	0	200	60	Pass

Figure 7. Channel Closing Time - Ch. 52 (5260 MHz)

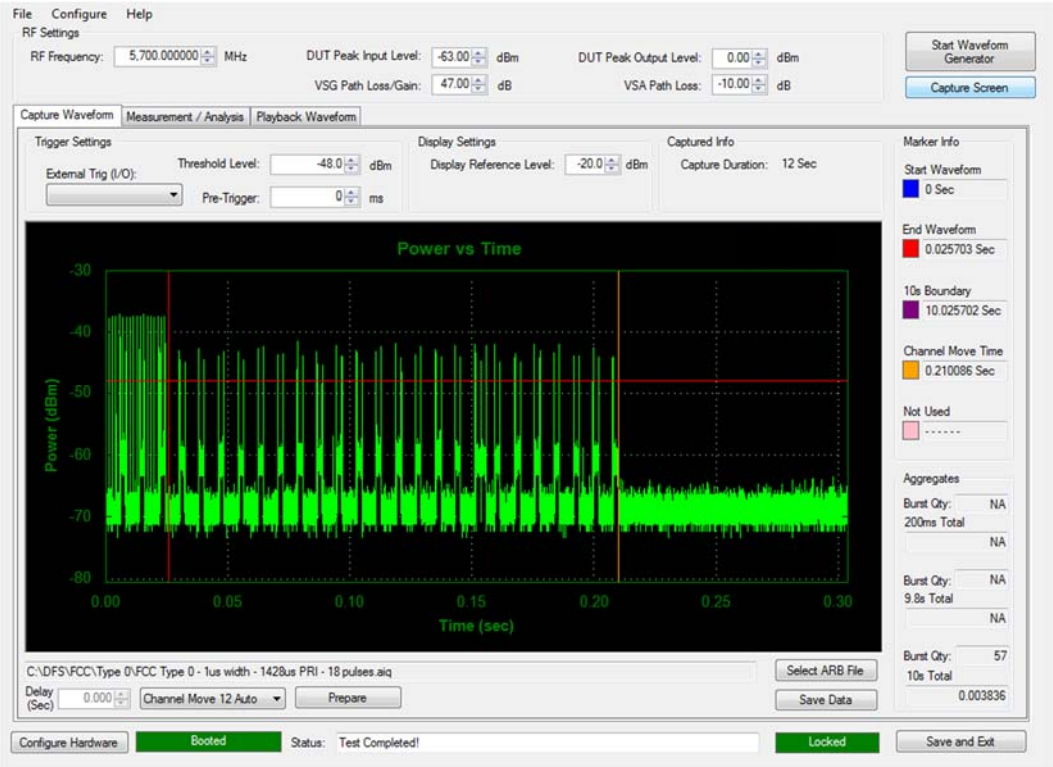

Figure 8. Channel Closing Time - Ch. 140 (5700 MHz)

8.4 Non-Occupancy Period

8.4.1 Test Requirement:

FCC CFR 47 Rule Part 15.407 (h)(2)(iv)

Industry Canada RSS-247 [6.3]

8.4.2 Test Method:

Measurements were performed according to the procedures defined in KDB 905462 D02 UNII DFS Compliance Procedures New Rules v01r02

8.4.3 Limits:

A channel that has been flagged as containing a radar system, either by a channel availability check or in-service monitoring, is subject to a non-occupancy period of at least 30 minutes. The non-occupancy period starts at the time when the radar system is detected.

8.4.4 Test Results:

Pass.

The EUT ceased transmission on the channel within 10s.

8.4.5 Test Data:

Plot shown for 2000 seconds sweep time.

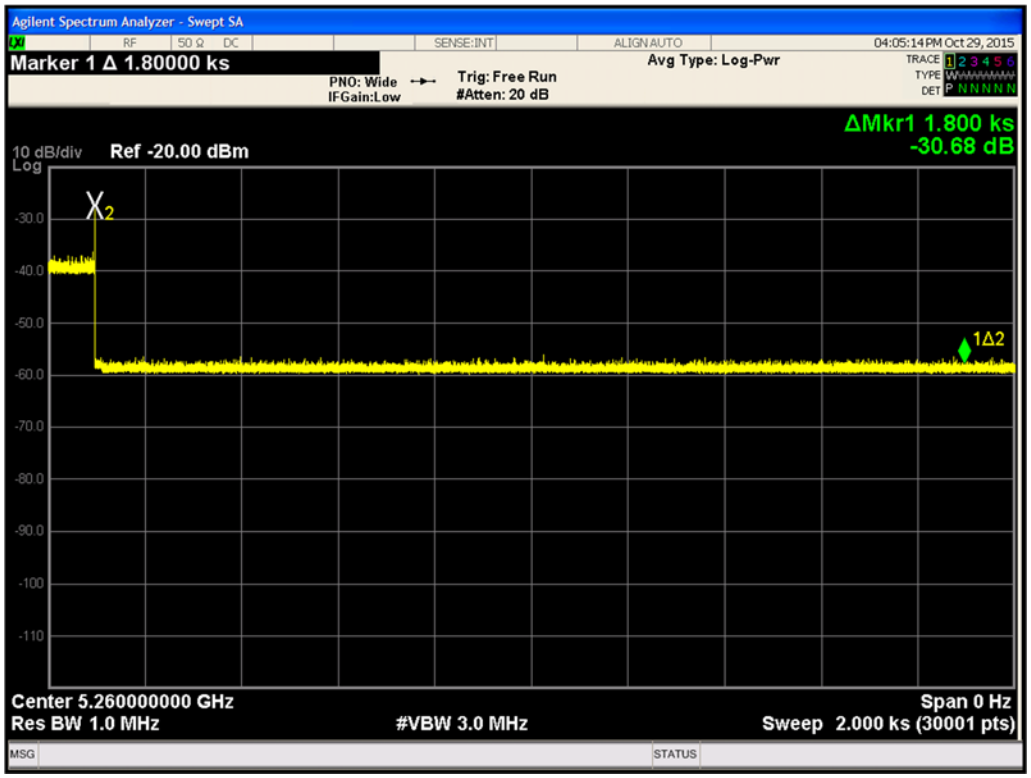

Figure 9. Non-Occupancy Period - Ch. 52 (5260 MHz)

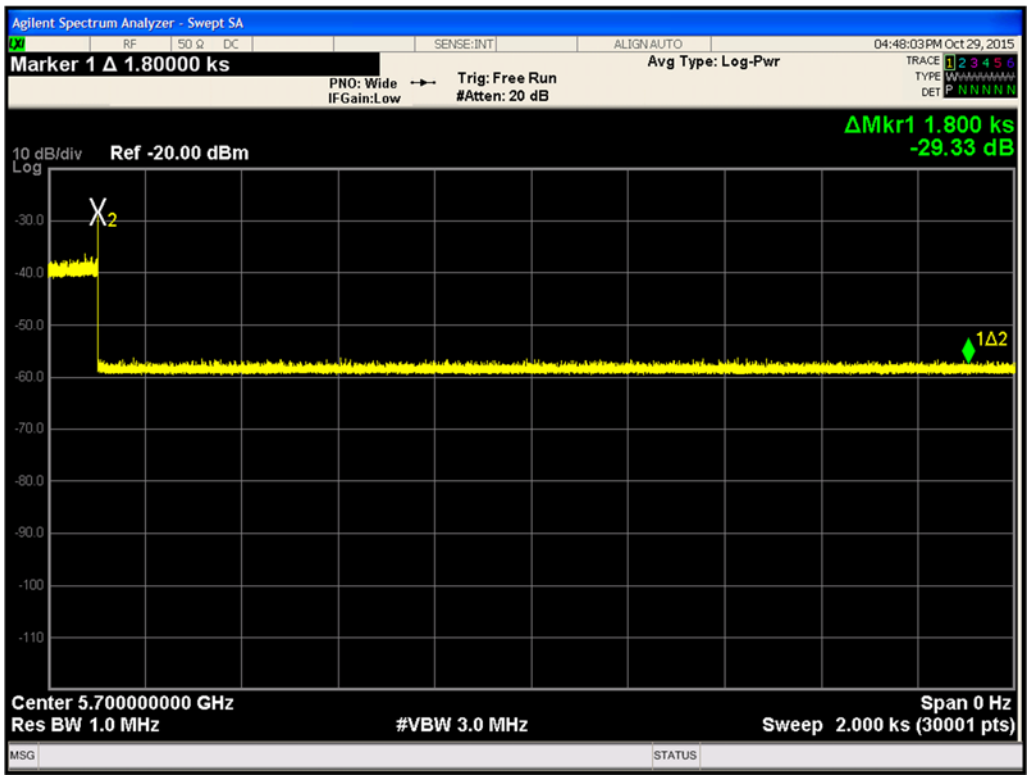

Figure 10. Non-Occupancy Period - Ch. 140 (5700 MHz)

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End of Report