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ASSESSMENT REPORT

Report No.:	44948RRE.004
Approved by (name / position & signature)	Firmado digitalmente por Alejandro Llamas Rodríguez Fecha: 2015.01.21 16:49:21 +01'00'
Issue date	2015-01-21
Identification of item evaluated	INTEL DUAL BAND WIRELESS – AC 3165
Trademark	Not Supplied
Model and/or type reference	3165NGW
Serial number	n/a
Features	802.11 a/b/g/n/ac Wireless LAN + BT 4.0
Other identifications	FCC: PD93165NG (factory install sku) FCC: PD93165NGU (user install allowed) IC: 1000M-3165NG
Description.....	2x2 PCIe M.2 adapter card
Applicant	INTEL MOBILE COMMUNICATIONS
Address	100 Center Point Circle, Suite 200 Columbia, South Carolina 29210 USA
CIF/NIF/Passport.....	Not Supplied
Contact person.....	Steve Hackett
Telephone	803-216-2344
e-mail:	steven.c.hackett@intel.com
Manufacturer	INTEL MOBILE COMMUNICATIONS
Address	100 Center Point Circle, Suite 200 Columbia, South Carolina, 29210 USA
CIF/NIF/Passport.....	Not Supplied
Telephone / Fax.....	803-216-2344

Assessment requested

Evaluation of the possibility of extending the test results of Intel module 7265NGW contained in the test report 41273RRF.004, dated 2014/03/12 to Intel module 3165NGW based on the similarity letter provided by INTEL (See Annex A).

Test Report 41273RRF.004 reference standards are:

USA FCC Part 15.407 (10–1–12 Edition). Unlicensed National Information Infrastructure Devices. General technical requirements.

ANSI C63.10-2009: American National Standard for Testing Unlicensed Wireless Devices.

CANADA RSS-210 Issue 8 (December 2010). Licence-Exempt Radio Apparatus (All Frequency Bands): Category I Equipment. Annex 9.

FCC Order, ET Docket No.03-122 (FCC 06-96): Compliance measurement procedures for unlicensed-national information infrastructure devices operating in the 5.25-5.35 GHz and 5.47-5.725 GHz bands incorporating dynamic frequency selection (DFS).

Report template No .....: FDT70_00

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Documents used

Documents undergoing used for the evaluation has been provided by: **The applicant**.

Title	Description	Reception date
41273RRF.004	Test Report. reference standard USA FCC Part 15.407; CANADA RSS-210, RSS-Gen. Unlicensed National Information Infrastructure Devices. General technical requirements. Licence-Exempt Radio Apparatus (All Frequency Bands): Category I Equipment. General Requirements and Information for the Certification of Radio Apparatus.	2014/12/15
Similarity Declaration letter	Similarity declaration between Intel® Dual Band Wireless-AC 7265, model 7265NGW and Intel® Dual Band Wireless-AC 3165, model 3165NGW	2014/12/15

Summary

Considering the differences between Intel® Dual Band Wireless-AC 7265, model 7265NGW and Intel® Dual Band Wireless-AC 3165, model 3165NGW declared by the client (see Annex A), we conclude that the following test results from 41273RRF.004 test report are fully applicable to model 3165NGW:

Non-Occupancy Period.

Channel Closing Transmission Time.

Channel Move Time.

The results are applicable to only one chain (Chain A or Chain B). The MIMO (Chain A+B) results are not applicable since according to the applicant's declaration MIMO data rates are disabled in model 3165NGW.

See Annex B for test results extracted from 41273RRF.004 test report.

NOTE: The results presented in this Assessment Report apply only to the particular item under evaluation established in page 1 of this document.

ANNEX A: Similarity Declaration letter

Similarity Declaration between:

Intel® Dual Band Wireless-AC 7265, model 7265NGW

And

Intel® Dual Band Wireless-AC 3165, model 3165NGW.

To whom it may concern,

This statement letter is to declare that the two following products are exactly the same board, meaning same HW, same schematic, same layout, same BoM:

- Intel® Dual Band Wireless-AC 7265, model 7265NGW
- Intel® Dual Band Wireless-AC 3165, model 3165NGW

The only difference is disabling by EEprom all MIMO data rate for Intel® Dual Band Wireless-AC 3165, model 3165NGW (Please refer to below table for detailed data rate listing comparison)

Model 7265NGW supports 2 spatial streams and **Model 3165NGW** supports only 1 spatial stream.

IEEE 802.11n/ac Modulation Coding Schemes

HT MCS Index	Modulation and Coding Rate	Spatial Streams	Data Rate (MBPS)						VHT MCS Index
			20 MHz Chan		40 MHz Chan		80 MHz Chan		
			No SGI	SGI	No SGI	SGI	No SGI	SGI	
0	BPSK 1/2	1	6.5	7.2	13.5	15.0	29.3	32.5	0
1	QPSK 1/2	1	13.0	14.4	27.0	30.0	58.5	65.0	1
2	QPSK 3/4	1	19.5	21.7	40.5	45.0	87.8	97.5	2
3	16-QAM 1/2	1	26.0	28.9	54.0	60.0	117.0	130.0	3
4	16-QAM 3/4	1	39.0	43.3	81.0	90.0	175.5	195.0	4
5	64-QAM 2/3	1	52.0	57.8	108.0	120.0	234.0	260.0	5
6	64-QAM 3/4	1	58.5	65.0	121.5	135.0	263.3	292.5	6
7	64-QAM 5/6	1	65.0	72.2	135.0	150.0	292.5	325.0	7
	256-QAM 3/4	1	78.0	86.7	162.0	180.0	351.0	390.0	8
	256-QAM 5/6	1	n/a	n/a	180.0	200.0	390.0	433.3	9
8	BPSK 1/2	2	13.0	14.4	27.0	30.0	58.5	65.0	0
9	QPSK 1/2	2	26.0	28.9	54.0	60.0	117.0	130.0	1
10	QPSK 3/4	2	39.0	43.3	81.0	90.0	175.5	195.0	2
11	16-QAM 1/2	2	52.0	57.8	108.0	120.0	234.0	260.0	3
12	16-QAM 3/4	2	78.0	86.7	162.0	180.0	351.0	390.0	4
13	64-QAM 2/3	2	104.0	115.6	216.0	240.0	468.0	520.0	5
14	64-QAM 3/4	2	117.0	130.0	243.0	270.0	526.5	585.0	6
15	64-QAM 5/6	2	130.0	144.4	270.0	300.0	585.0	650.0	7
	256-QAM 3/4	2	156.0	173.3	324.0	360.0	702.0	780.0	8
	256-QAM 5/6	2	n/a	n/a	360.0	400.0	780.0	866.7	9

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ANNEX B: Test results that apply to model 3165NGW

ANNEX B CONTENT:

TEST CONDITIONS

Power supply (V):

$V_{nominal}$ = 3.3 Vdc

Type of power supply = DC voltage from HMC/NGFC test board.

Type of antenna = External attachable PIFA antenna.
Declared Gain for antenna:

5250 – 5350MHz – 3.73dBi
5470 – 5725MHz – 4.77dBi

The test set-up was made in accordance to the general provisions of Compliance measurement procedures for unlicensed-national information infrastructure devices operating in the 5.25-5.35GHz and 5.47-5.725GHz Bands incorporating Dynamic Frequency Selection (FCC Order, ET Docket No.03-122 (FCC 06-96).

For radio testing purposes the EUT card was installed in a test fixture. The test fixture is connected to a laptop computer and dc power supplied. During the test a streaming video file (MPEG) is sent from the master device (connected to a server via an Ethernet interface) to the laptop computer.

The PC was using the Intel test SW: 17.0.0.

The manufacturer declared values for the EUT operational characteristics that affect DFS are as follows:

- Client Device with no DFS (no In Service Monitoring, no Ad-Hoc mode).
- Maximum declared antenna gain (dBi) for 5.25-5.35 GHz is 3.73 dBi & 5.47-5.725 GHZ is 4.77 dBi.

DFS Measurement instrumentation

A Pulse function generator HP8116A and an Agilent E4438C Vector signal generator are used as the radar-generating source. The waveform of pulses and burst configuration are programmed using the Pulse function generator and the Vector signal generator is used for up-converting the signal to the 5 GHz band.

The output of the Vector signal generator is connected to a calibrated horn antenna.

Channel monitoring is implemented by using a spectrum analyzer and digital storage oscilloscope. The analyzer is configured in a zero-span mode, center frequency set to the radar waveform´s frequency or the center frequency of the EUT´s operating channel.
The IF output of the spectrum analyzer is connected to one input of the oscilloscope. The output of the Pulse function generator is used to send the modulating signal. This output is also connected to a second input on the oscilloscope and the oscilloscope display both the RF channel traffic and the radar pulses on its display.

The master and slave (EUT) devices are placed inside an anechoic chamber. The simulated radar waveform is transmitted using a directional calibrated horn antenna toward the unit performing the radar detection (master).

The radar signal level at the master device is verified by measuring the continuous signal level from the Vector signal generator using a reference measuring antenna placed at the master's location and connected to a spectrum analyzer. The signal level is calculated from the measured level at the reference antenna and taking into account the cable loss and reference antenna gain.

Applied level (dBm) = M (dBm) – Gref (dBi)+ L (dB)

Where:

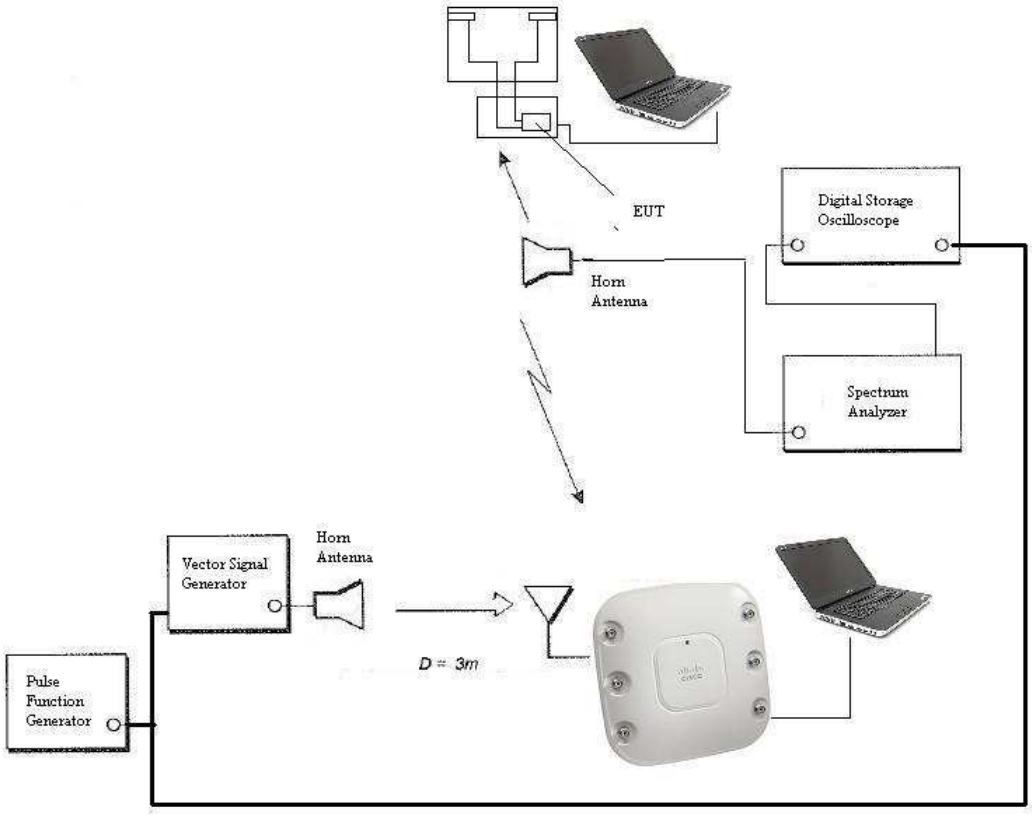
M (dBm): Measured level in the spectrum analyzer

Gref (dBi): Reference antenna gain

L (dB): Loss of connecting cable between antenna and spectrum analyzer.

The antenna connected to the channel monitoring system is positioned to allow both master and slave (EUT) transmissions to be observed, with the level of the EUT's transmissions between at least 10 dB higher than those from the master device.

The setup is shown in the next figure.



DFS Channel Closing Transmission Time and Channel Move Time measurement method

These times are measured by applying a burst of radar signal and observing the transmissions in the operating channel. The time between the end of the applied radar burst and the end of transmissions on the channel is the Channel Move Time.

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.

DFS Channel Non Occupancy Period measurement method

The channel is monitored for 30 minutes to check that there are no transmissions on the channel over the required non-occupancy period. This is achieved by allowing the analyzer to perform a sweep over a 30 minutes period to capture any transmissions on the channel after the detection of the radar waveform.

Section 15.407 Subclause (h) (2). RSS-210 A.9.3. Channel Closing Time, Channel Move Time and Non-occupancy period measurement

The steps below define the procedure to determine the above mentioned parameters when a radar Burst with a level equal to the DFS Detection Threshold + 1dB is generated on the Operating Channel of the
U-NII device.

Operating Frequency: 5.66 GHz. Channel 132 BW=20MHz.

Radar type: Radar type 1

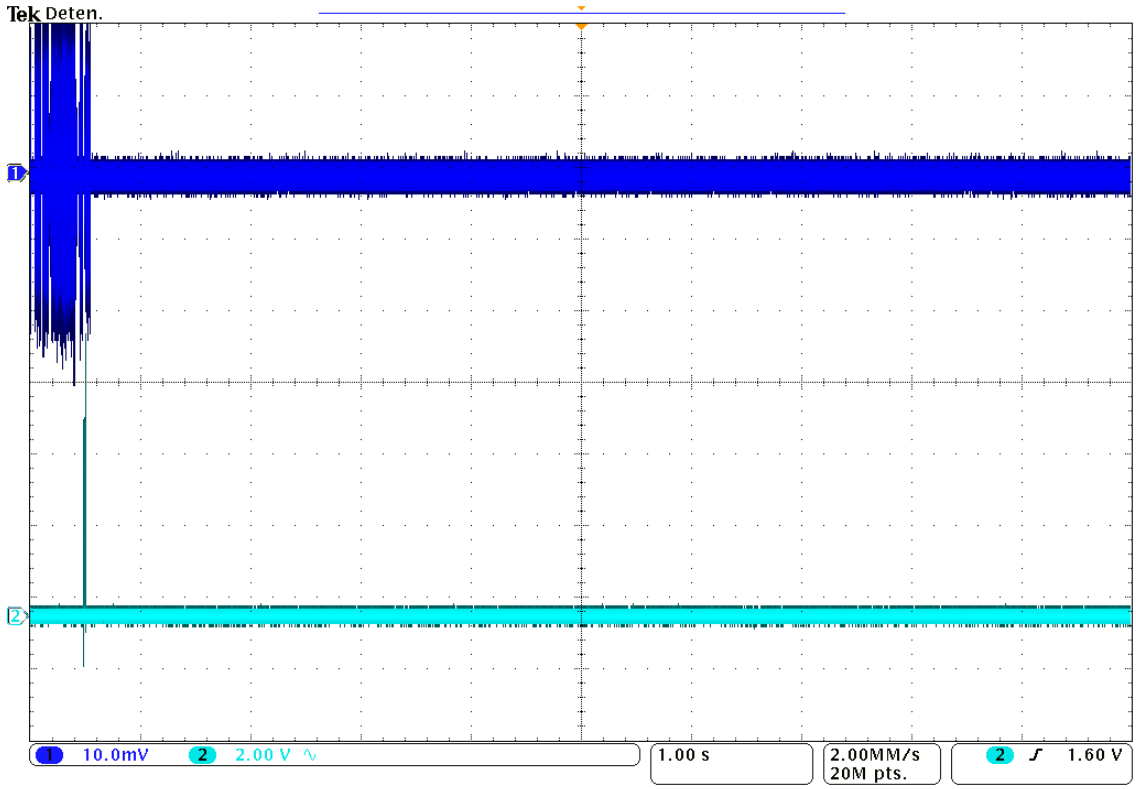
Table 1 FCC Short Pulse Radar Test Waveforms					
Radar Type	Pulse Width (µsec)	PRI (µsec)	Pulses / burst	Minimum Detection Percentage	Minimum Number of Trials
1	1	1428	18	60%	30
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120

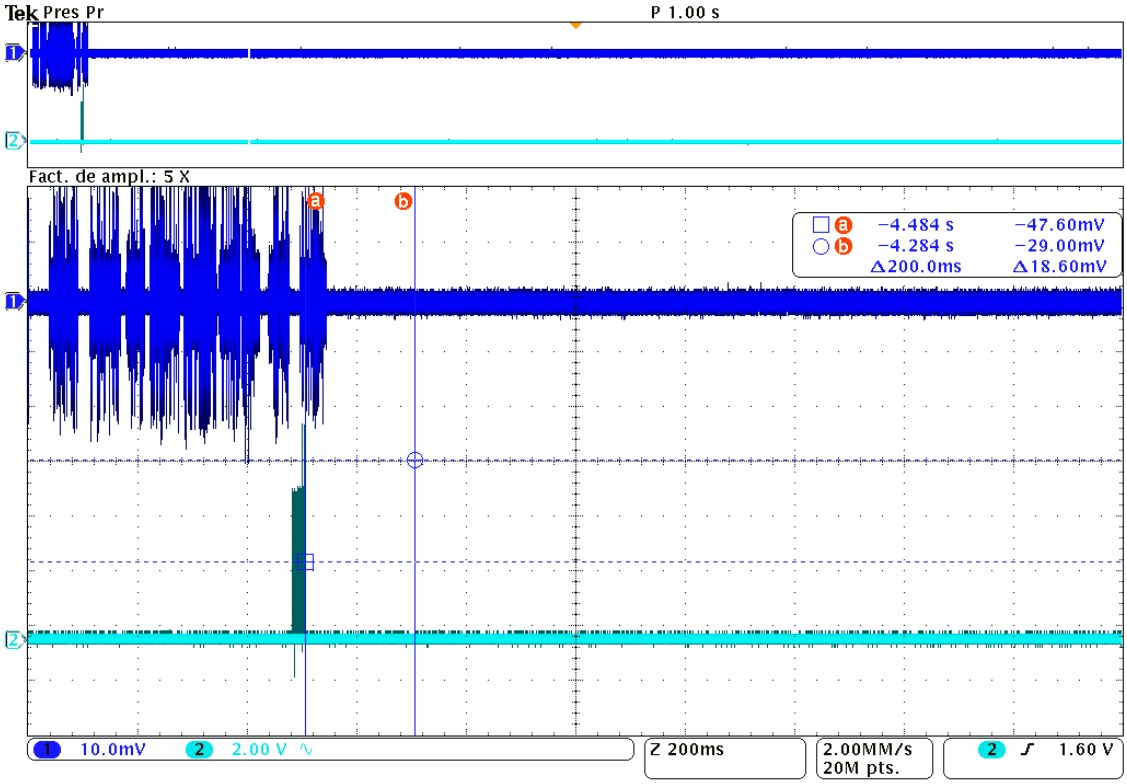
RESULTS: (See next plots)

FCC part 15.407 (h)(2) Tests Result Summary					
Description	Radar Type	Radar Frequency (MHz)	Measured Value	Requirement	Result
Channel Closing transmission time	1	5660	24.3 ms	200 ms + an aggregate of 60 ms.	PASS
Channel move time	1	5660	38.8 ms	10 seconds	PASS
Non-occupancy period	1	5660	>33 minutes	>30 minutes	PASS

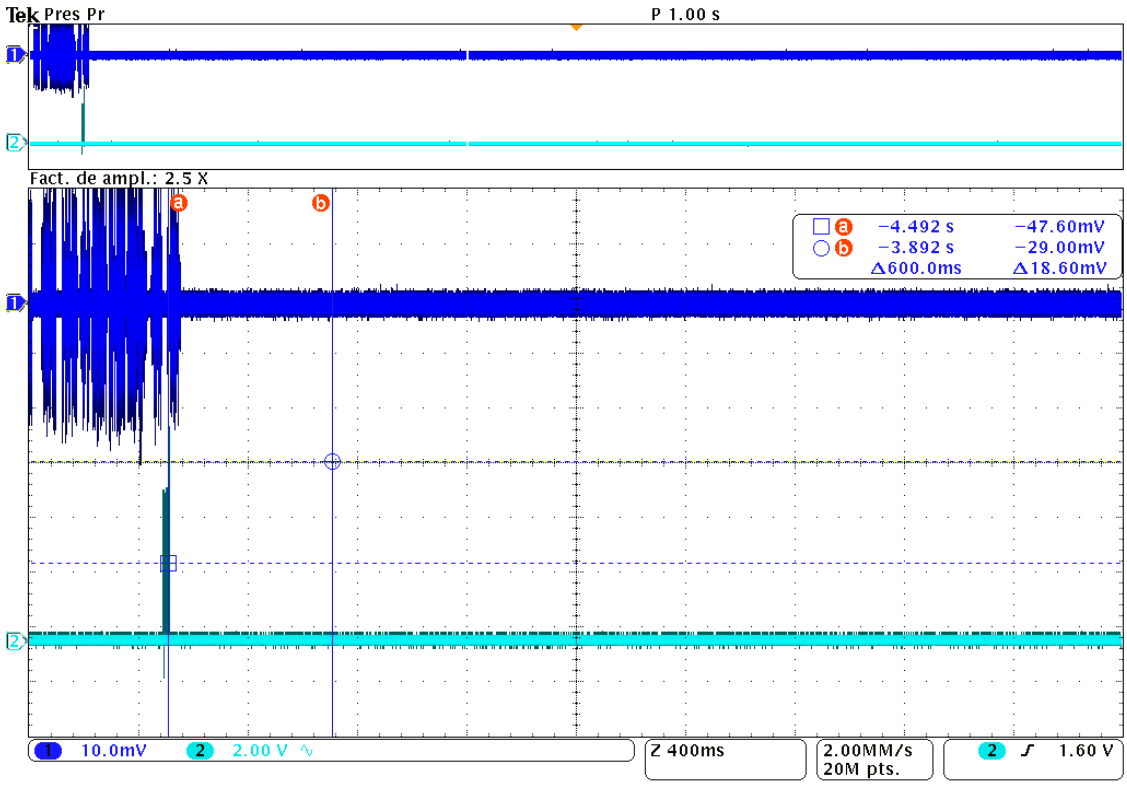
	Measurement uncertainty
Timing	± 0.057 ms
DFS Detection Threshold Level	± 3.79 dB

The upper trace in the above plot has 10 seconds of EUT final transmission data and the lower trace shows the simulated radar signal.



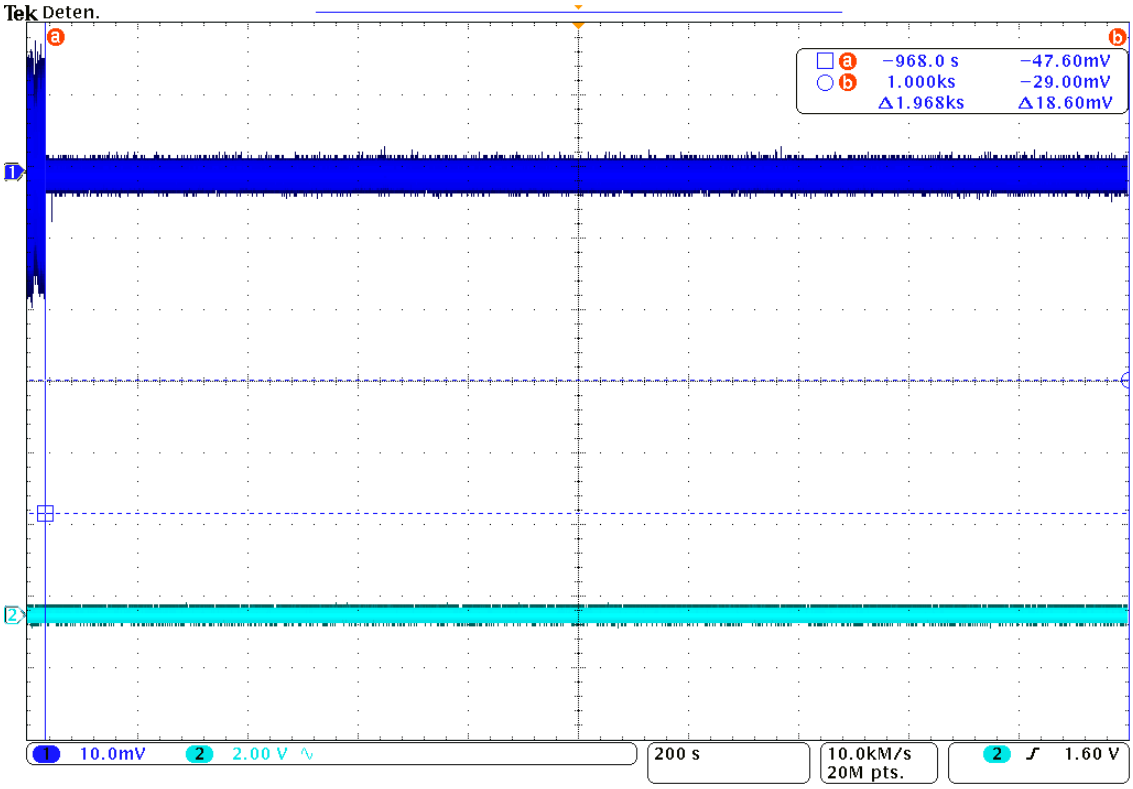


This plot provides a zoom-in to show the 200 ms time interval after the radar burst.



This plot provides a zoom-in to show the 600 ms time interval after the radar burst. This shows that there were not any transmissions after 200 ms following the radar burst.

The non-occupancy period plot was made over a 2000-seconds (33.3 minutes) time period that included the channel move period plus a minimum of 30 minutes thereafter. No transmissions were observed in the 30 minutes following the channel move time.



Summary

Considering the results of the performed test according to standard USA FCC Parts 15.407 / RSS-210, the item under test is **IN COMPLIANCE** with the requested specifications specified in the standard.

NOTE: The results presented in this Test Report apply only to the particular item under test established in page 1 of this document, as presented for test on the date(s) shown in section, "USAGE OF SAMPLES, TESTING PERIOD AND ENVIRONMENTAL CONDITIONS".

Remarks and comments

1: The EUT is a client device without radar detection.

List of equipment used during the test

		Last Cal. date	Cal. due date
1.	Semianechoic Absorber Lined Chamber IR 11. BS	N.A.	N.A.
2.	Control Chamber IR 12.BC	N.A.	N.A.
3.	Double-ridge Guide Horn antenna 1-18 GHz HP 11966E	2011/05	2014/05
4.	Spectrum analyser Rohde & Schwarz FSW50	2013/10	2015/10
5.	Pulse function generator HP8116A	2013/06	2015/06
6.	Vector signal generator Agilent E4438C	2012/11	2014/11
7.	Oscilloscope Tektronix DPO4104B	2013/06	2014/06
8.	Double-ridge Guide Horn antenna 1-18 GHz HP 11966E	2012/04	2015/04