



Wireless Transceiver Test Report



FCC ID: A94400521 IC: 3232A-400521

Certificate # 1514.1

Report number: EMC.400521.10.134.1

Prepared for: Bose Corporation
DCE - EMC
1 New York Ave, Framingham MA 01701

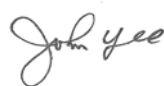
Product Tested: Headset A20/ANR

Standards: FCC part 15, RSS210, RSS-gen and ICES-003

Report prepared by: Chad Bell

Signature:  May 14, 2010

Report reviewed by: John Yee

Signature:  May 14, 2010

Report issue date: May 14, 2010

Changes from previous revision: First revision

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1. Report Summary

1.1 Product Headset A20/ANR

1.2 Client Bose Corporation
The Mountain, Framingham MA 01701

1.3 Applicable Standards **FCC part 15.B and C**
RSS-210 issue 7
RSS-Gen issue 2
ICES-003 issue 4

Test Results: Pass Fail

1.4 Test Laboratory Bose DCE laboratories
1 New York Ave
Framingham, MA 01701.
IC registration : 3232A
FCC site registration under A2LA cert. #1514

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2. Product description

The Headset A20/ANR combines Bose Acoustic Noise Canceling® headset technology, to electronically reduce unwanted aircraft noise, with Bose® TriPort® headset technology.

The Bose® 400521 Aviation Headset has a duty cycle that does not exceed 8% in normal operation. For the purposes of the tests described in this report, where an artificial test mode is indicated or necessary for the purposes of the test, the Headset A20/ANR is operated with a 10% duty cycle which is considered a worst case for the purposes of these tests.

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3. Applicable standards, requirements and tests

FCC part 15	RSS210	RSS-gen	Test references.	Result / Data section
15.15(b)		5.3	There are no user-accessible controls for the adjustment of any transmitter parameters in the device under test.	Complies
15.27			There are no special devices such as shielded cables or special connectors required for compliance to the applicable standards.	Complies
15.203			An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The antenna is not accessible by the user.	Complies
15.205	2.2		The device does not operate in either the US or Canadian restricted bands.	Complies
15.107 15.207		7.2.2	Conducted emissions, 150kHz–30 MHz	Not-applicable see Section 6.1
15.109 15.209			Radiated emissions, 30MHz–1GHz Spurious emissions, 30MHz–1GHz	Section 6.2
15.247 (b)(1)	A8.4 (4)		Transmitter output power:	Section 6.3
15.247 (a)(1)	A8.1 (b)		Hopper Occupied Bandwidth / channel spacing	Section 6.4
15.247(a) (1) iii	A8.3 (1)		Time occupancy of a frequency hopper.	Section 6.5
15.247(d)	7.2.3		Transmitter conducted spurious emissions	Section 6.6
15.247(d)			Transmitter harmonics.	Section 6.7
15.247(d)	2.2(b)		Transmitted radiated spurious emissions	Section 6.8
	6(b)	7.2.3	Receiver Spurious emissions	Section 6.9
OET65	Canada Health and Safety code 6		MPE calculation	6.10

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4 Environmental Conditions

All testing is performed under the following conditions, unless otherwise defined in the detail test report section.

Temperature: 22 ± 4 °C

Humidity: 30 – 60 % RH

5. EUT configuration:

The Headset A20/ANR can be configured to operate on battery power (2 AA alkaline) only or on aircraft power with battery power (2 AA alkaline) as an option.

Headset A20/ANR can not be connected to an AC mains plug, therefore conducted emissions was not performed.

A fresh set of AA alkaline batteries were installed prior to each test.

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6. Detailed Test Results

6.1. Conducted emissions

6.1.1. Requirements

47CFR15.207

Frequency MHz	Limits dB(μV)	
	Quasi-peak	Average
0.15 -0.5	66-56	56-46
0.5 – 1.6	56	46
1.6 – 30	60	50

6.1.2. Test setup details

Test not applicable, see below for details.

6.1.3. Test data

Summary

Conducted emissions measurements are not required. There are two versions of Headset A20/ANR; one version can only be powered by AA batteries. The other version is powered by aircraft power with battery power (2 AA alkaline) as an option.

6.1.4. Test Equipment

Not applicable

6.1.5. Test information

Date of test:	Not required	Test location :	Not required
EUT serial:	Not required	Tested by:	Not required
Test Conclusion:	Not required		

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6.2. Radiated emissions 30 MHz – 1 GHz

6.2.1. Requirements

FCC rules part 15.109 (g), 15.209, RSS210 section 2.6, ICES-003 issue 4 (2004) and CAN/CSA-CEI/IEC CISPR 22:02

Frequency	Limit in dB μ V/m @3m
MHz	Quasi-peak
30 – 230	40
230 - 1000	47
Above 1000	54

6.2.2. Test setup details

The EUT was placed on an 80 cm high table and configured for worst case emissions based on previous testing. EUT was maximized in 3 orthogonal planes for radiated spurious emissions; plots shown represent worst case orientation. Data represents the worst case operating mode with the audio stream based on pink noise. Most of the data is associated with the FCC part 15.B attributes of the product.

Description of cables:

The permanently attached shielded EUT cable that contains stereo audio input as well as the microphone input was not bundled (bundling not required to maintain 40cm height off of the ground plane); total length is 1.5m including the in-line control module. It was situated such that the control module and the headset were separated by >10cm with the cable draped to 40cm off of the ground plane.

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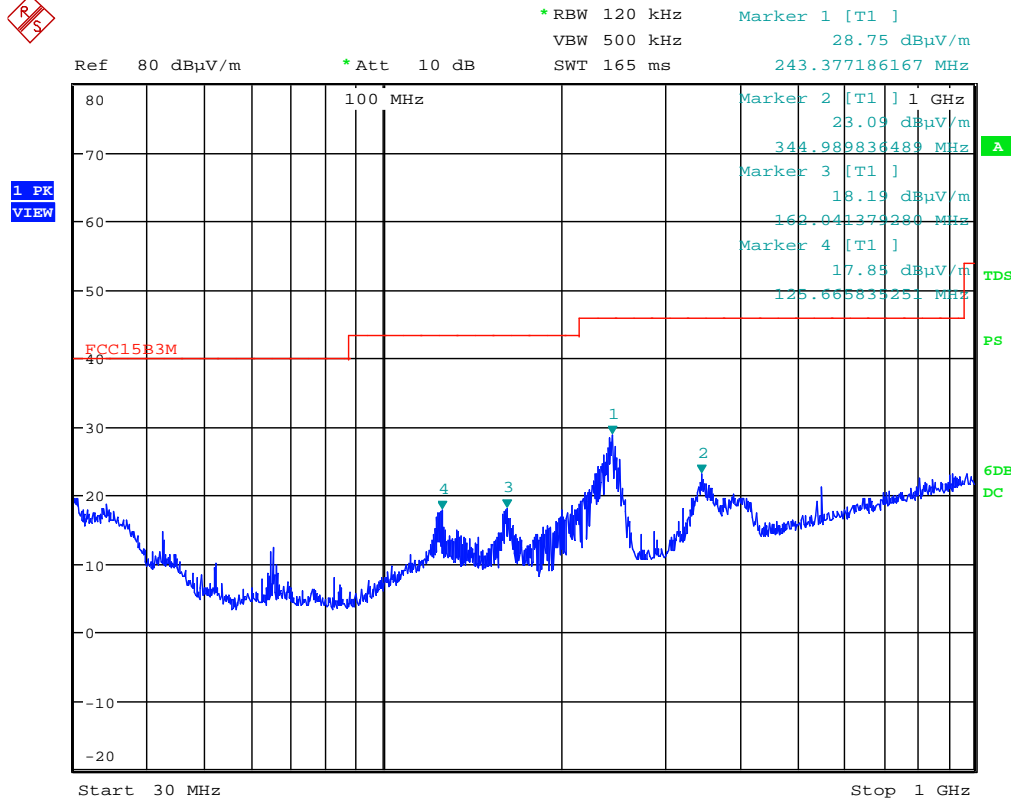
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6.2.3. Test data

Max-Hold Peak Pre-scan, Max Volume Pink noise

EUT is connected in normal hopping mode at full power with a worst case Basic Rate packet type of DH5 with 339 byte packet length.

Streaming Pink Noise via Bluetooth connection using R&S CBT Bluetooth Tester in Hands-free sub mode.



Date: 2.MAR.2010 18:24:06

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Maximized Quasi-Peak Emissions

120 kHz RBW

Emission Frequency (MHz)	Measured Amplitude (dB μ V/m) QP	Limit (dB μ V/m) QP	Margin (dB) QP	Table Azimuth 0° face ant	Receiving Antenna	
					Polarity H/V	Height Meters
243.328	25.7	46.0	20.3	0.0	V	1.00
245.789	25.6	46.0	20.4	0.0	V	1.00
239.669	25.4	46.0	20.6	0.0	V	1.00
124.423	16.7	43.5	26.8	45.0	V	1.00
346.757	21.6	46.0	24.4	90.0	H	1.00
161.362	17.1	43.5	26.4	65.0	V	1.00

Worst case: EUT passes FCC Limit by 20.3dB at 243.328MHz

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6.2.4. Test Equipment

Equipment Type	Manufacturer	Model	Serial or other ID	Service	
				last	due
Antenna	Sunol Sciences	JB5	TN1397	5/29/2009	5/29/2010
Receiver	Rohde & Schwarz	ESU40	TN1663	7/29/2009	7/29/2010
Cable for TS-PR8 Pre-amp	Rohde & Schwarz	HFE160D	TN1692	4/27/2009	4/27/2010
Pre-amp	Rohde & Schwarz	TS-PR8	TN1669	3/5/2009	4/5/2010

6.2.5. Test information

Date of test:	March 2, 2010	Test location :	DCE - Maxwell House
EUT serial:	27	Tested by:	C. Bell
Test Conclusion:	Pass		

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6.3. Output power

6.3.1. Requirements:

FCC 15.247(a)(1) , RSS 210 A8.1(b)

Frequency hopping systems operating in the band 2400-2483.5 MHz may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 0.125 W.

6.3.2. Test setup details:

The transceiver is controlled via a SPI communications link capable of directly setting the test modes of the Bluetooth controller. The EUT antenna is removed and replaced with a 4 inch long piece of semi-rigid cable with an SMA connector at the far end. For all conducted measurements the semi-rigid cable was connected directly to the receiver. The transceiver is operated in an artificial test mode controlled by the SPI link. The EUT is programmed to stop hopping and operated at fixed frequencies at the low end, middle and high end of the authorized frequency band.

The SA resolution bandwidth is set to 2 MHz (higher than the OBW in EDR mode), peak detector and max hold. The maximum output power is recorded for low, mid and high band frequencies. The maximum output power settings are different for basic rate and for Enhanced Data Rate (EDR) settings.

6.3.3. Test data.

Summary: RBW=2 MHz, detector=peak, max power = -6.75 dBm = 0.000211 W

Channel	Frequency MHz	Basic Rate dBm	EDR dBm
0	2402	-8.47	-6.75
39	2441	-8.47	-6.92
78	2480	-8.09	-7.30

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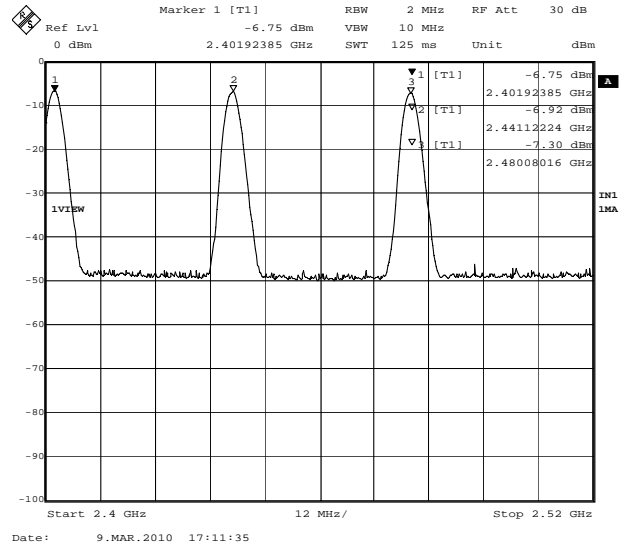
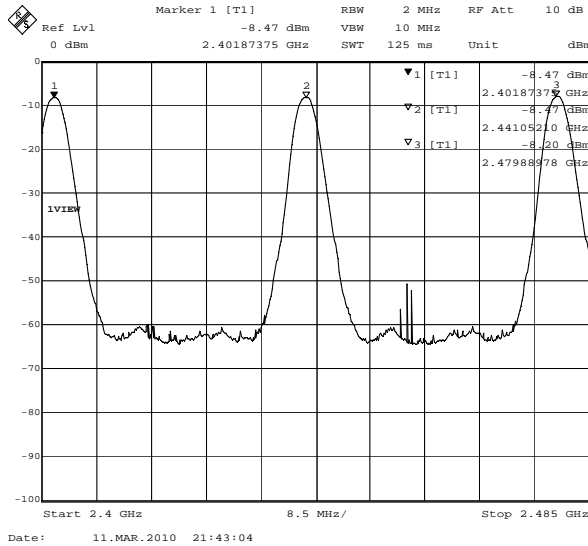
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Test detail: Max power

Basic rate, DH5 packet, 10% PRBS (56 bits)

EDR, 3-DH5 packet, 10% PRBS (168 bits)



6.3.4. Test Equipment

Equipment Type	Manufacturer	Model	Serial or other ID	Service date	
				Last	Due
Spectrum analyzer	Rohde & Schwarz	ESIB 40	TN1560	3/3/2009	4/16/2010

6.3.5. Test information

Date of test:	March 9 and 11, 2010	Test location:	Transmitter Test Bench
EUT serial:	Alpha 36	Tested by:	Chad Bell
Test Conclusion:	Pass		

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6.4. Occupied Bandwidth/Channel Spacing

6.4.1. Requirements

RSS210 section 8.1

The bandwidth of a frequency hopping channel is the 20 dB emission bandwidth, measured with the hopping stopped. The system RF bandwidth is equal to the channel bandwidth multiplied by the number of channels in the hopping frequency set.

FCC part 15.247(a)(1), RSS210 section 8.1(b)

The hopping channel carrier frequencies are separated by at least $2/3^{\text{rd}}$ of the 20dB bandwidth provided the output power is less than 125 mW (20.96 dBm)

6.4.2. Test setup details

The test setup is identical to section 6.3

6.4.3. Test data

Summary: EDR mode packet 3-DH5 (worst case modulation)

BT Channel	Center Frequency (MHz)	20dB OBW (MHz)	99% OBW (MHz)
0	2402	1.382	1.212
39	2441	1.382	1.232
78	2480	1.382	1.212

Conclusion: $2/3^{\text{rd}}$ of the largest OBW = $2/3 \times 1.382 \text{ MHz} = 921.8 \text{ kHz}$, which is less than the carrier channel separation of 1 MHz. In addition, the output power is less than 125 mW. See section 6.3 for the measurement of output power.

The system RF bandwidth as defined in RSS210 A8.1(a) is 79 channels times 1.232 MHz = 97.328 MHz.

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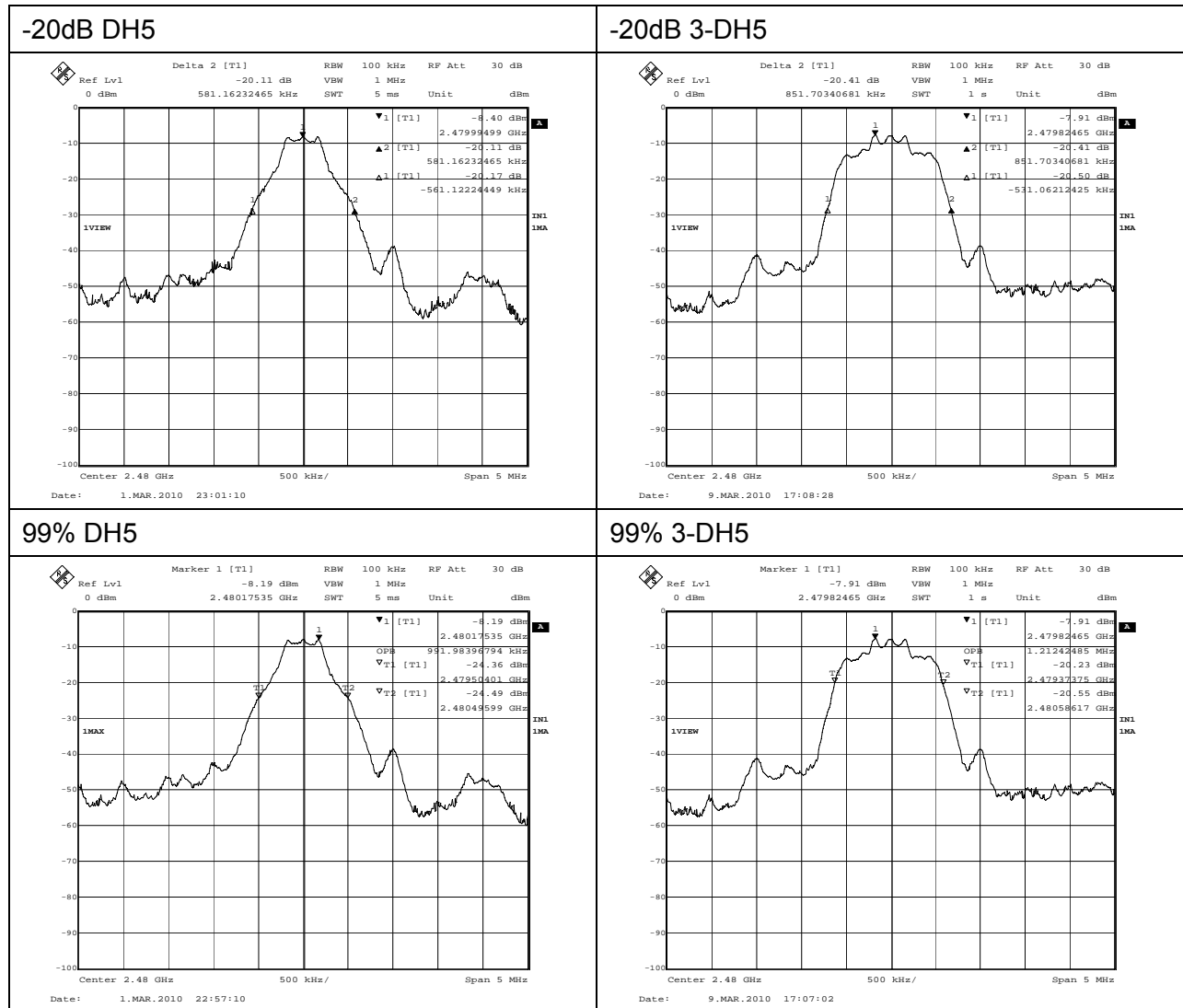
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Detail results:

High Channel, 2480 MHz



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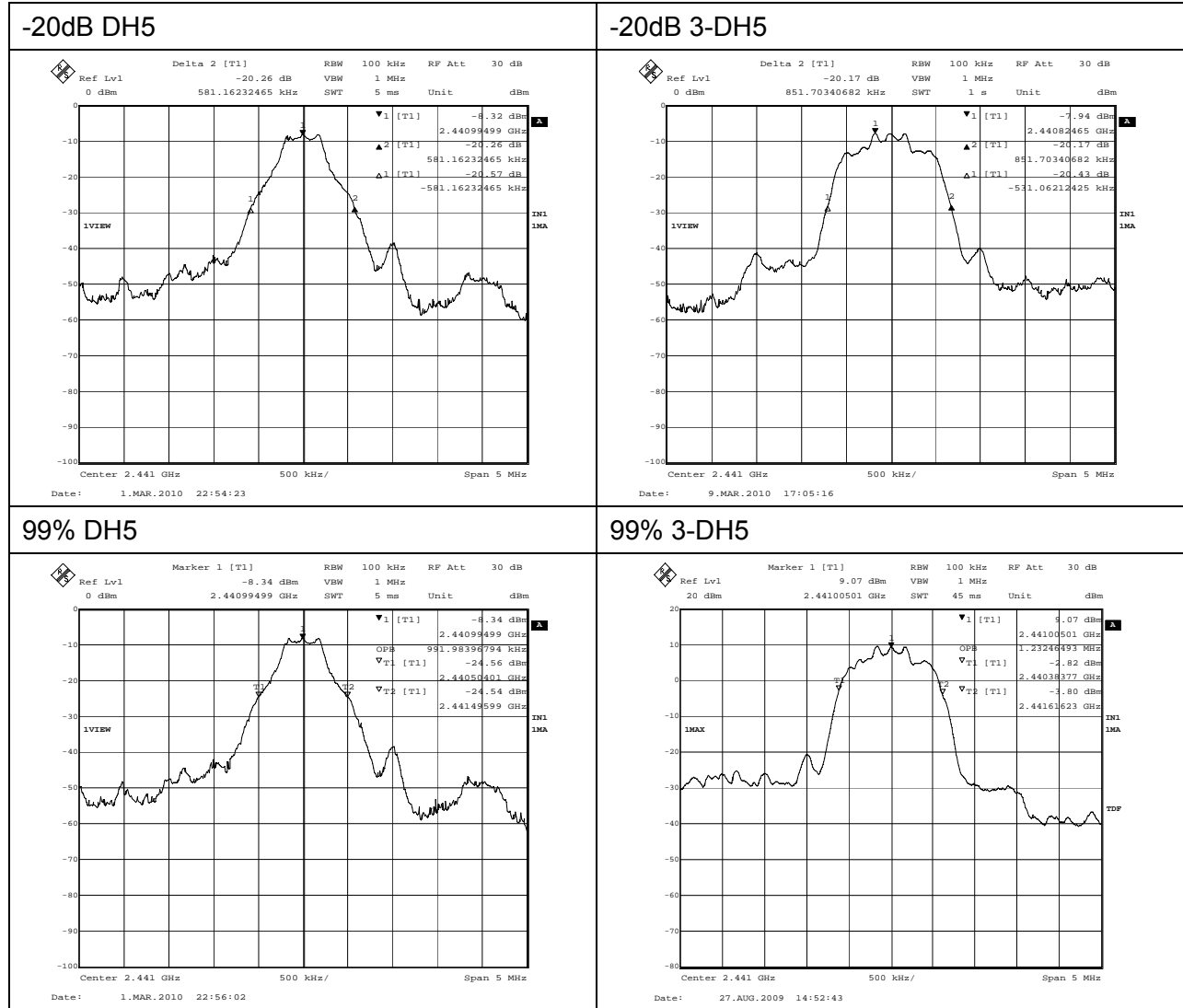


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Mid channel, 2441 MHz



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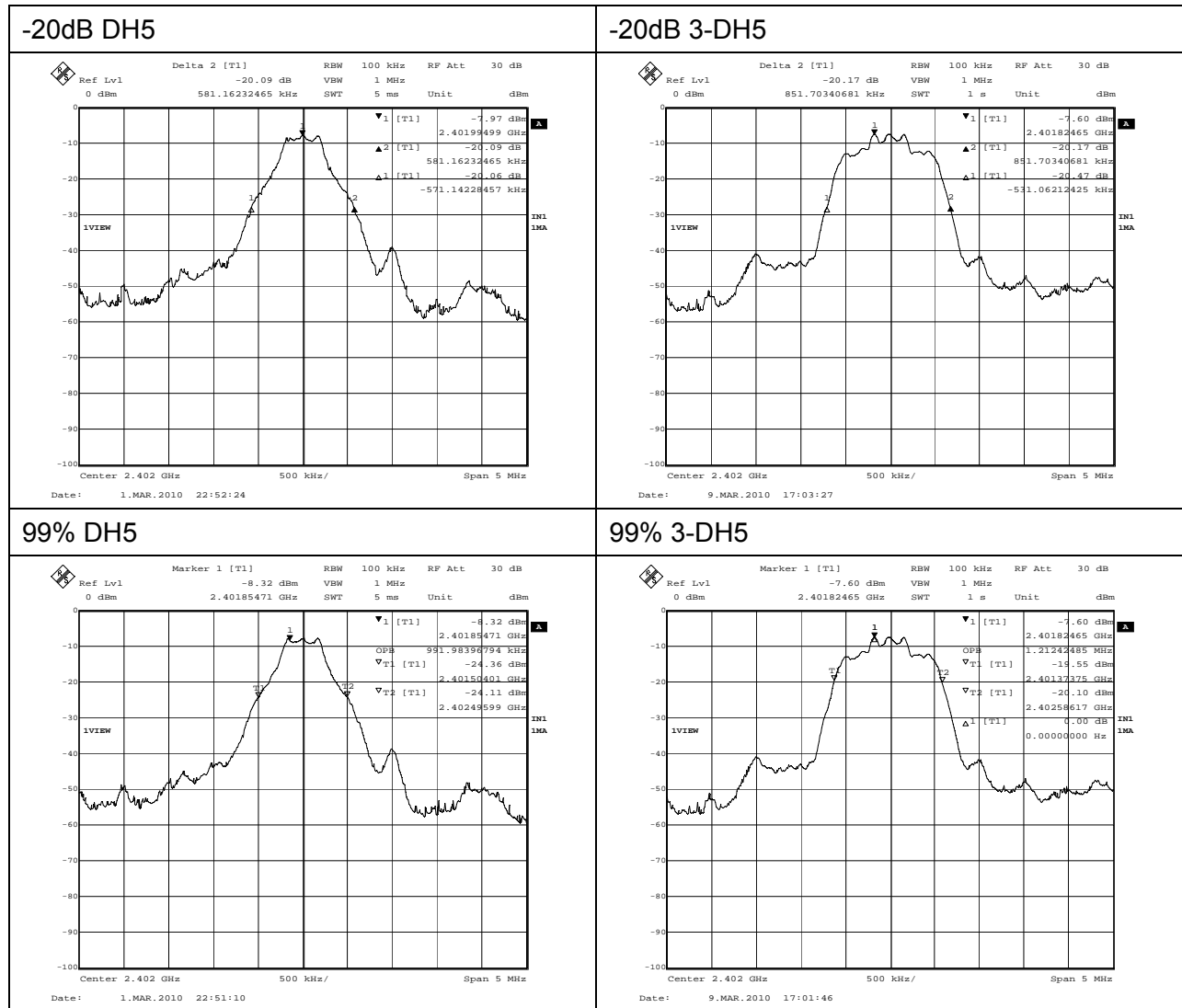


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Low channel, 2402 MHz



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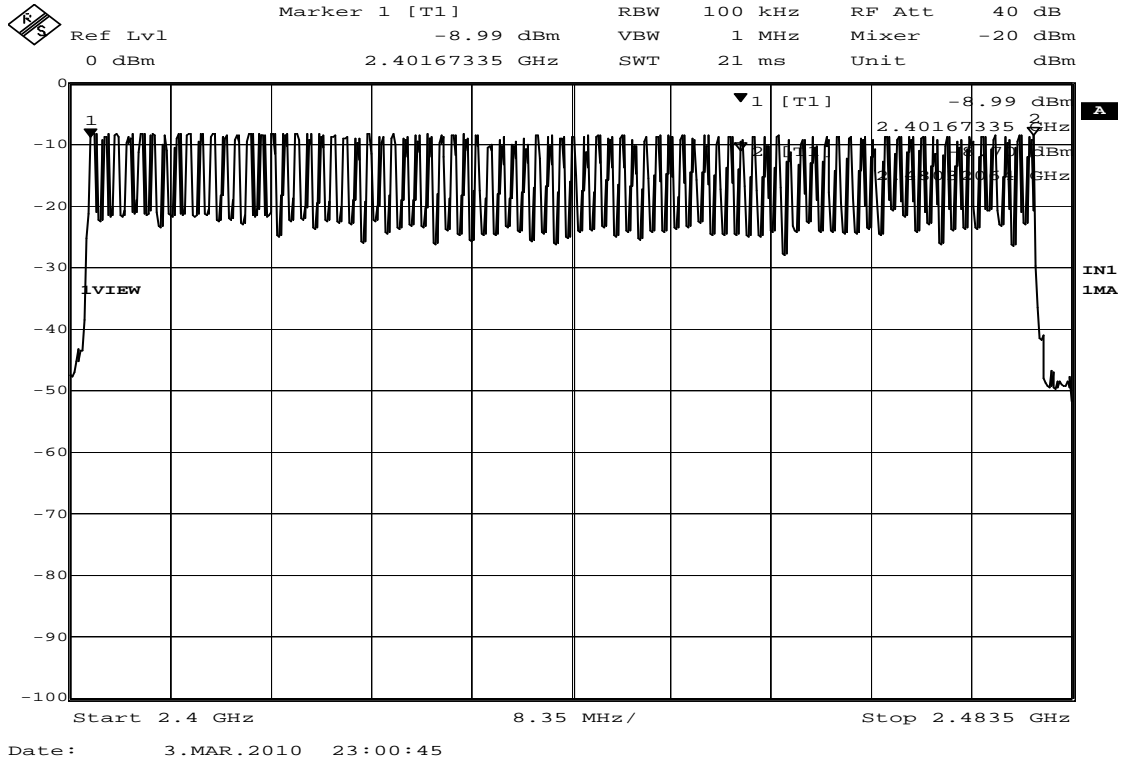
FCC ID: A94400521

IC: 3232A-400521

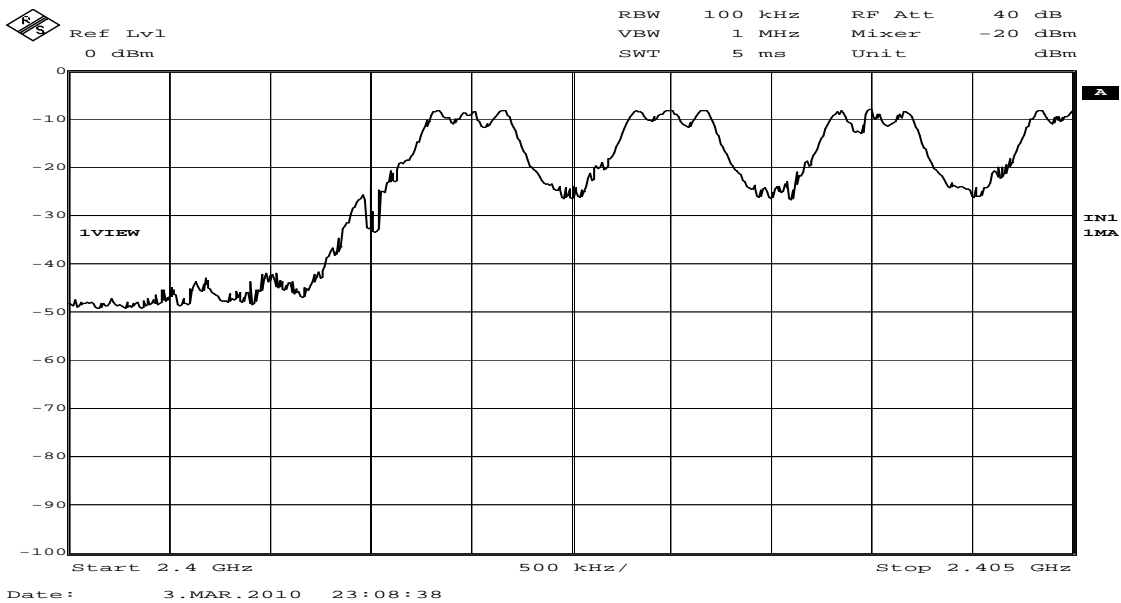
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Channel Spacing

79 channels between 2402 MHz and 2480 MHz = 1 MHz/channel



Low band end spacing detail (2402 MHz)



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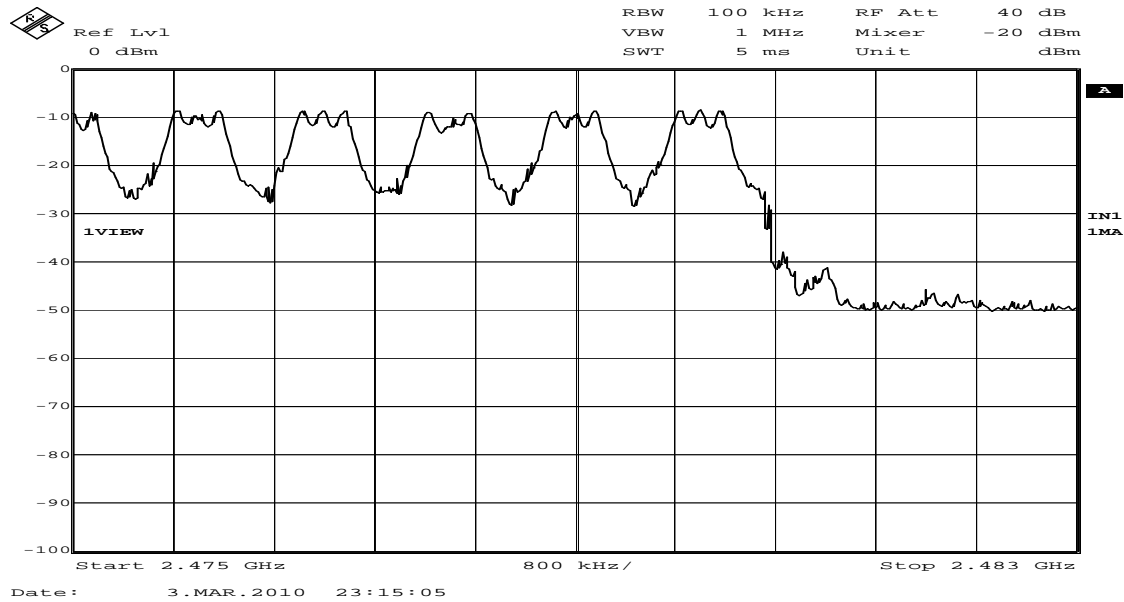


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High band end spacing detail (2483.5 MHz)



6.4.4. Test Equipment

Equipment Type	Manufacturer	Model	Serial or other ID	Service date	
				Last	Due
Receiver	Rohde & Schwarz	ESIB 40	TN1560	03/03/2009	4/16/2010

6.4.5. Test information

Date of test:	March 1 – 9, 2010	Test location:	Transmitter Test Bench
EUT serial:	Alpha 36	Test by:	Chad Bell
Test Conclusion:	Pass		

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6.5. Time of occupancy

6.5.1. Requirements

FCC 15.247 (a) (1) iii, RSS210 A8.1 (d)

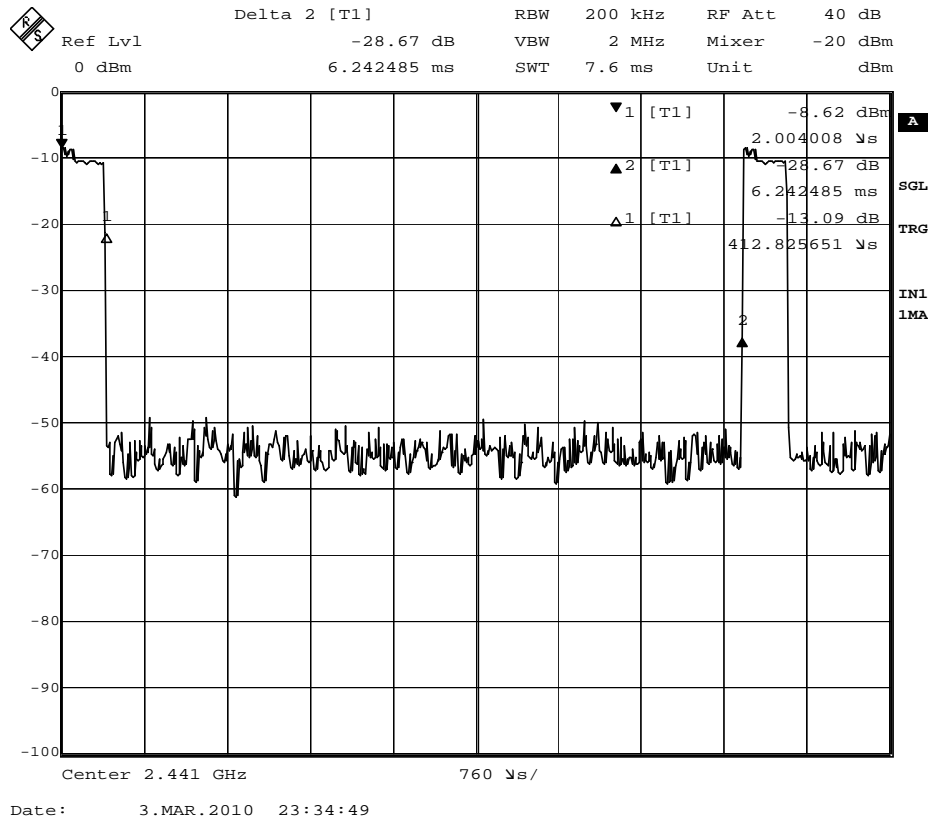
The frequency hopping operation shall have an average time of occupancy on any frequency not to exceed 0.4 seconds within the duration in seconds equal to the number of hopping frequencies employed multiplied by 0.4

6.5.2. Test setup details

The SA is connected to the EUT via a low loss cable. The EUT is operating on its normal hop set. The SA sweep time is set to the number of hopping channels (79) times 0.4 seconds or 31.6 seconds (rounded up to 32 seconds). The SA is tuned to mid-band (2441MHz), set to a 200 kHz bandwidth in order to minimize bleed-over from adjacent channels and set to a single sweep.

6.5.3. Test data

Number of hopping channels is 79 (2402 – 2480 in 1 MHz increments). The longest packet transmission time is 0.413 ms for a DH5 packet type with 10% duty cycle.



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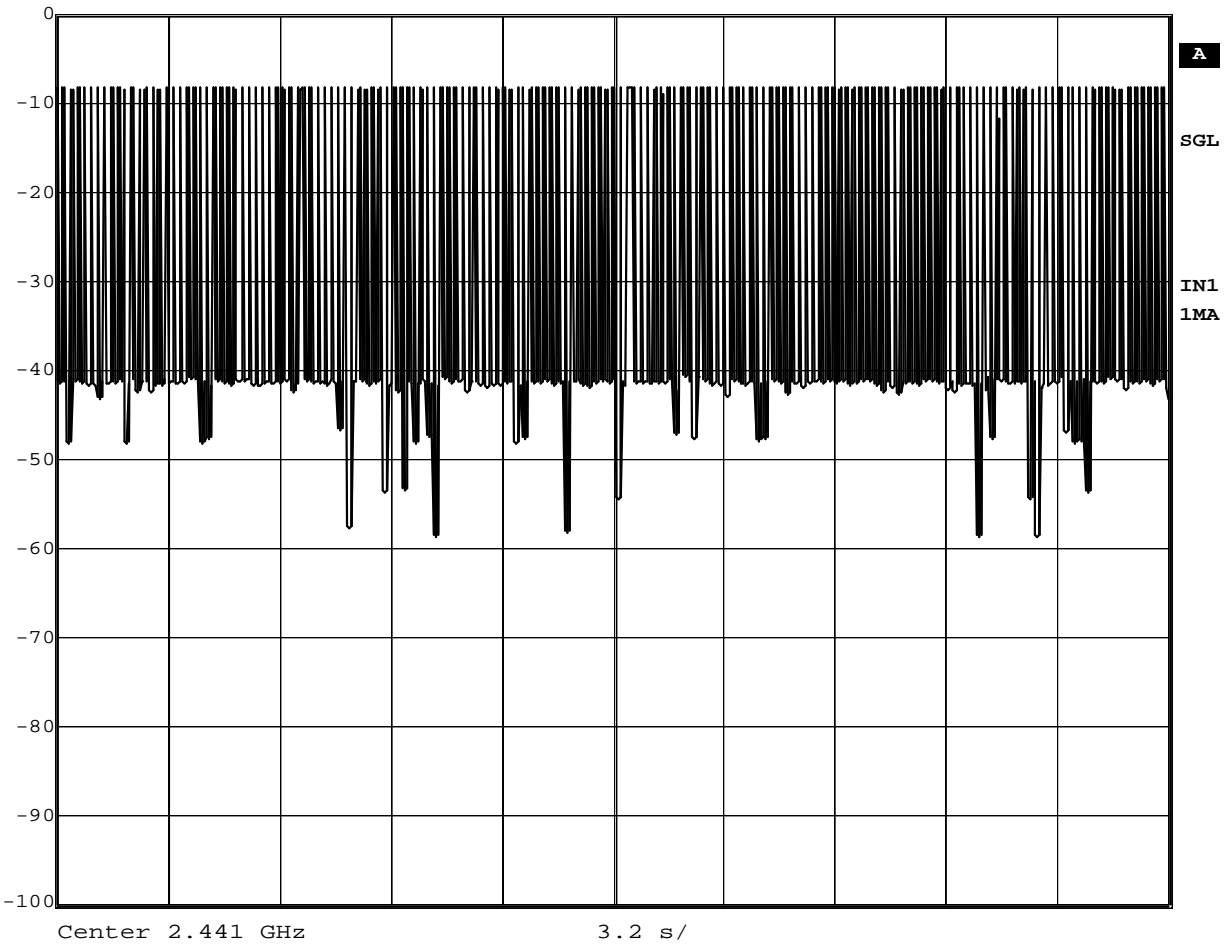
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Set to mid channel (2441 MHz) while operating in Hands-free mode. Hands-free mode is the typical use mode as well as providing the highest pulse rate, which creates the highest average dwell time per channel.



Ref Lvl	RBW	100 kHz	RF Att	30 dB
0 dBm	VBW	2 MHz	Unit	dBm
	SWT	32 s		



Date: 9.MAR.2010 19:14:42

There are 162 pulses in 32 seconds. Therefore the average dwell time per channel is $0.413 \text{ ms} \times 162 = 66.91 \text{ ms}$ this is less than the allowed 400msec.

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6.5.3.1. Test Equipment

Equipment Type	Manufacturer	Model	Serial or other ID	Service date	
				Last	Due
Receiver	Rohde & Schwarz	ESIB40	TN1560	3/3/2009	4/16/2010
CBT controller	Rohde & Schwarz	CBT	TN1758	5/15/2009	5/15/2010

6.5.4. Test information

Date of test:	March 3 and 9, 2010	Test location:	Transmitter Test Bench
Serial number:	Alpha 36	Tested by:	Chad Bell
Test Conclusion:	pass		

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6.6. Spurious emissions - Conducted

6.6.1. Requirements

FCC part 15.247(d), RSS210 A8.5

In any 100 kHz BW, the conducted spurious emissions shall be attenuated at least 20dB below the level of the wanted signal.

6.6.2. Test Setup

The EUT is connectorized and connected to the Spectrum analyzer with a low loss high frequency cable. The cable loss factors are incorporated into the measured values. A current probe is used to couple the CBT control signal into the signal path. The CBT controls the operation of the EUT to enable testing of the spurious output in specific operational modes; however the CBT does not factor into the spurious emission data itself.

Measurements are made with the EUT in normal operation (hopping through all available channels) in basic rate modulation and in EDR mode.

6.6.3. Test data

Conducted spurious:

30 MHz – 25 GHz conducted spurious scan, 100 kHz RBW, peak detector, normal operation basic rate modulation.

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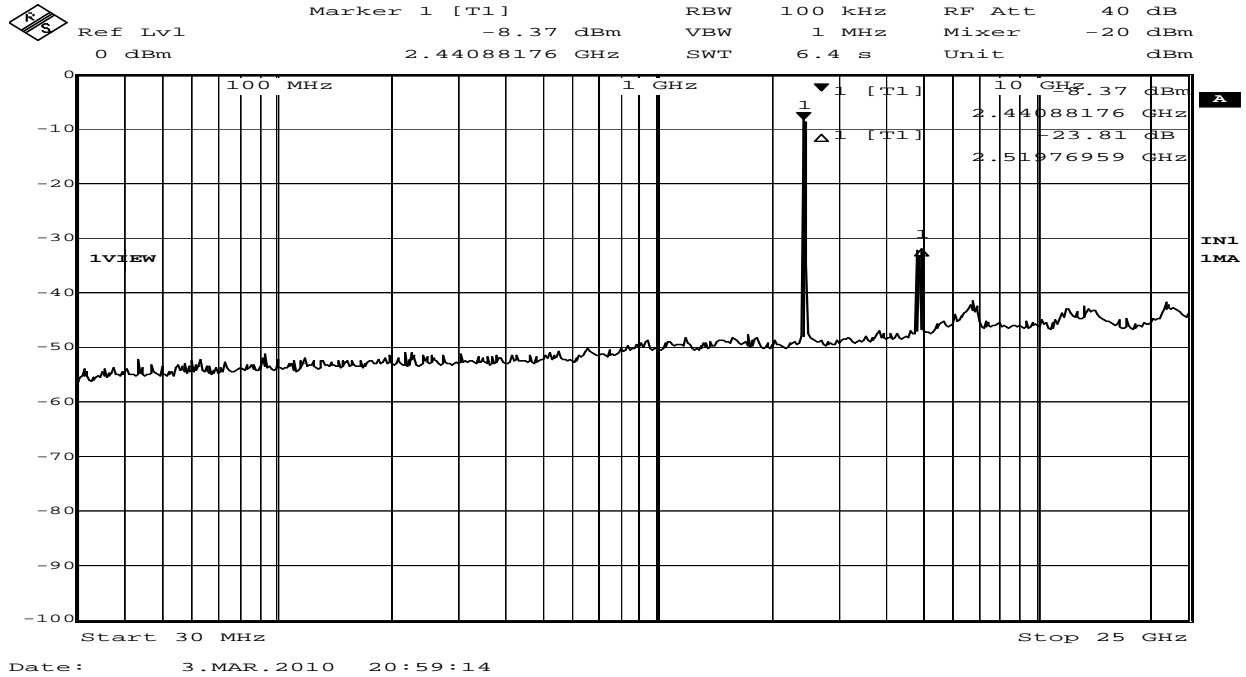


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DH5 basic rate conducted spurious. The level of the wanted signal is -8.37 dBm in 100 kHz RBW. The next highest peak occurs at the 2nd harmonic and is 23.81dB below the wanted. Since it is greater than 20dB below the wanted signal it is a passing result.



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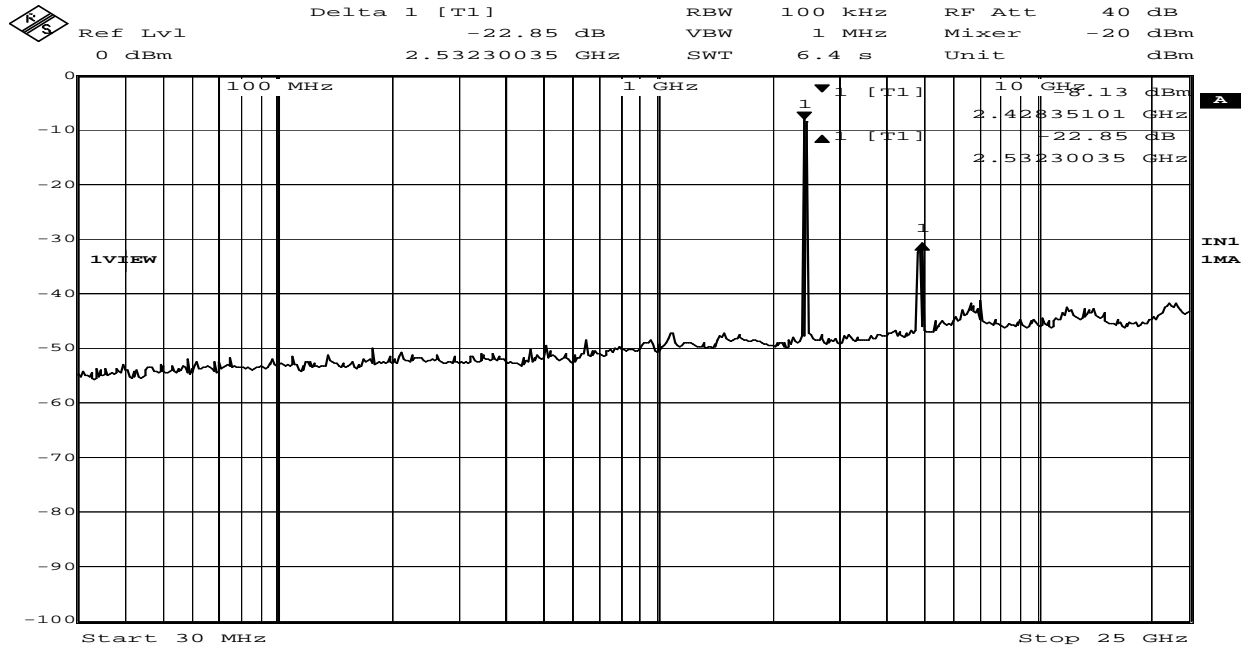


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3-DH5 conducted spurious, 30 MHz – 25 GHz, 100 kHz RBW, peak detector, normal operation EDR rate modulation. The level of the wanted signal is -8.13 dBm in. The next highest peak occurs at the 2nd harmonic and is 22.85dB below the wanted. Since it is greater than 20dB below the wanted signal it is a passing result.



Date: 3.MAR.2010 21:07:02

Conclusion:

Spurious emissions in any 100 kHz bandwidth are more than 20 dB below the peak values in the desired transmission band.

6.6.4. Test Equipment

Equipment Type	Manufacturer	Model	Serial or other ID	Service date	
				Last	Due
Receiver	Rohde & Schwarz	ESIB40	TN1560	3/3/2009	4/16/2010
40 GHz cable	-	-	TN1277	Verify before use	
BT tester	Rohde & Schwarz	CBT	145	NA	NA

6.6.5. Test information

Date of test:	March 3, 2009	Test Location:	Transmitter Test Bench
EUT serial:	Alpha 36	Tested by:	Chad Bell
Test Conclusion:	Pass		

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6.7. Harmonics

6.7.1. Requirements

FCC part 15.247(d)

In any of the restricted bands defined in FCC part 15.209(a), the field strength at a distance of 3 meters shall not exceed 54dBµV/m (average) or 74dBµV/m (peak)

6.7.2. Test Setup

The EUT is placed in a standard ANSI C63.4 test setup. The carrier output is measured for reference purposes. Standard gain horns with suitable pre-amps mounted directly on the horn antennas are used for the measurement of the harmonics. The EUT hopping is stopped and measurements are made in the low, mid and high end of the frequency range at the defined limit distance of 3 meters. Above 18GHz the measurement distance may be reduced to make sure the instrumentation noise floor is well below the limit.

The EUT is rotated around the vertical axis, the antenna polarization changed from H to V and the antenna height is varied from 1 to 4 meters in order to find the maximum value of the harmonic emission. Account is taken of the beam width of the horn antennas to make sure the EUT remains in the main lobe of the antenna.

6.7.3. Test data

2nd Harmonic

Frequency (MHz) Packet Type = DH5	Measured Values		Limits		
	Peak detector dBµV/m @ 3m	Average detector dBµV/m @ 3m	Peak dBµV/m	Average dBµV/m	Margin dB
4804, DH5	68.3	47.5	74	54	5.7
4804, 3DH5	64.2	38.9	74	54	9.8
4882, DH5	68.6	47.8	74	54	5.4
4882, 3DH5	64.6	39.0	74	54	9.4
4960, DH5	66.2	45.6	74	54	7.8
4960, 3DH5	61.9	37.1	74	54	12.1

3rd Harmonic

Frequency (MHz) Packet Type = DH5	Measured Values		Limits		
	Peak detector dBµV/m @ 3m	Average detector dBµV/m @ 3m	Peak dBµV/m	Average dBµV/m	Margin dB
7206, DH5	50.6	33.7	74	54	20.3
7206, 3DH5	45.8	31.6	74	54	22.4
7323, DH5	52.4	34.6	74	54	19.4
7323, 3DH5	47	31.5	74	54	22.5
7440, DH5	52.1	33.9	74	54	20.1
7440, 3DH5	47.4	31.3	74	54	22.7

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At the 4th through the 10th Harmonic no signal was observed above the instrumentation noise floor. In all cases the noise floor was in excess of 10dB below the limit value.

4th – 10th harmonic instrumentation noise floor

Frequency [GHz]	Measured values		Limits		Margin dB
	Peak detector	Average Detector	Peak	Average	
	dB μ V/m @ 3m	dB μ V/m @ 3m	dB μ V/m	dB μ V/m	
9.9 (4th Har)	39.2	27.1	not in restricted band		
12.4 (5th Har)	39.9	27.1	74	54	26.90
14.8 (6th Har)	43.9	31.0	74	54	23.00
17.3 (7th Har)	46.0	31.6	not in restricted band		
19.5 (8th Har)	51.5	37.5	74	54	16.50
22.1 (9th Har)	53.0	39.9	74	54	14.10
24.5 (10th Har)	52.1	41.0	not in restricted band		

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Wireless Transceiver Test Report



FCC ID: A94400521

IC: 3232A-400521

Certificate # 1514.1

6.7.4. Test Equipment

Equipment Type	Manufacturer	Model	Tracking Number	Service date	
				Last	Due
Receiver	Rohde & Schwarz	ESU40	TN1663	7/29/2009	7/29/2010
Antenna 30M – 5G	Sunol	JB5	TN1541	5/29/2009	5/29/2010
Antenna 4 – 8G	AR	AT4003	TN727	11/24/2008	11/24/2011
Antenna 8 – 18G	AR	AT4004	TN728	11/24/2008	11/24/2011
Antenna 18 – 26.5G	ETS	3160-09	TN1307	2/18/2008	2/18/2010
20 GHz Pre-amp	MITEQ	AFS4-00102000-30-10P-4	TN1672	4/27/2009	4/27/2010
40 GHz pre-amp	MITEQ	JS4018004000-30-8P-A1	TN1757	Verify before use	
Antenna cable 18GHz	Rohde & Schwarz	HFE160D	TN1692	4/27/2009	4/27/2010
BT tester	Rohde & Schwarz	CBT	TN1758	5/15/2009	5/15/2010

6.7.5. Test information

Date of test:	March 8, 2010	Test Location:	Maxwell House
EUT serial:	Alpha – 27	Tested by:	C. Bell
Test Conclusion:	Pass		

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Wireless Transceiver Test Report



FCC ID: A94400521

IC: 3232A-400521

Certificate # 1514.1

6.8. Spurious emissions 1-25 GHz

6.8.1. Requirements

FCC part 15.247(d), RSS210 section 2.2(b)

In any of the restricted bands defined in FCC part 15.209(a), the field strength at a distance of 3 meters shall not exceed 54dB μ V/m (average) or 74dB μ V/m (peak)

6.8.2. Test Setup

The EUT is placed in a standard ANSI C63.4 test setup. From 1 to 4 GHz a linearly polarized hybrid bi-conical / log-periodic antenna is used. Above 4 GHz, standard gain horns with suitable pre-amps mounted directly on the horn antennas are used for the measurement of the emissions.

The EUT is operating normally (hopping), and measurements are made at the defined limit distance of 3 meters. Above 18GHz the measurement distance may be reduced to make sure the instrumentation noise floor is well below the limit. Measurements are made with a 1 MHz resolution bandwidth and an average detector. There is an implied peak limit 20dB above the average limit.

The EUT is rotated around the vertical axis, the antenna polarization changed from H to V and the antenna height is varied from 1 to 4 meters in order to find the maximum value of the emissions. EUT was maximized in 3 orthogonal planes for radiated spurious emissions; plots shown represent worst case orientation. Account is taken of the beam width of the horn antennas to make sure the EUT remains in the main lobe of the antenna.

6.8.2.1. Test data

Frequency range 30MHz – 1 GHz. Passes, see section 6.2 of this report

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Wireless Transceiver Test Report

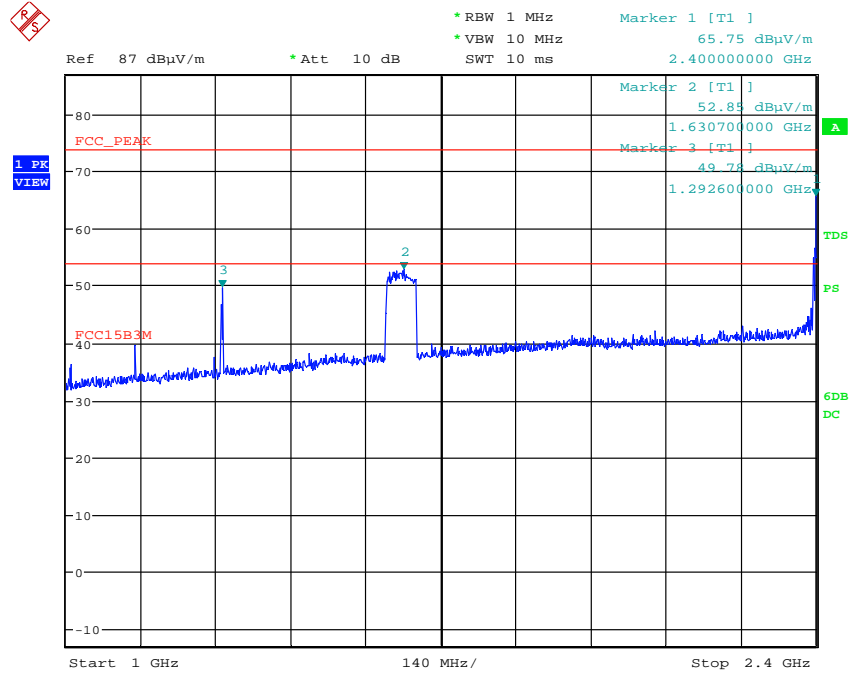


FCC ID: A94400521

IC: 3232A-400521

Certificate # 1514.1

Frequency range 1 – 2.38 GHz



Date: 2.MAR.2010 19:00:21

Max-Hold Peak Pre-scan, MAX volume pink noise via Bluetooth 1GHz-2.4GHz

PEAK & AVERAGE readings made in receiver mode:

Emission Frequency (MHz)	Measured Amplitude (dBuV/m) QP/Avg	Measured Amplitude (dBuV/m) Peak	FCC 15B				Table Azimuth 0° face ant	Receiving Antenna	
			Limit (dBuV/m) QP/Avg*	Limit (dBuV/m) Peak	Margin (dB) QP/Avg	Margin (dB) Peak		Pol H/V	Height Meters
1292.600	24.1	52.9	54.0	74.0	29.9	21.1	80.0	V	1.00
1630.663	29.4	53.4	54.0	74.0	24.6	20.6	0.0	V	1.00
2400.000	31.1	70.2	54.0	74.0	22.9	3.8	60.0	V	1.00

Worst case: EUT passes FCC Peak Limit by 3.8dB at 2400.0MHz

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Wireless Transceiver Test Report

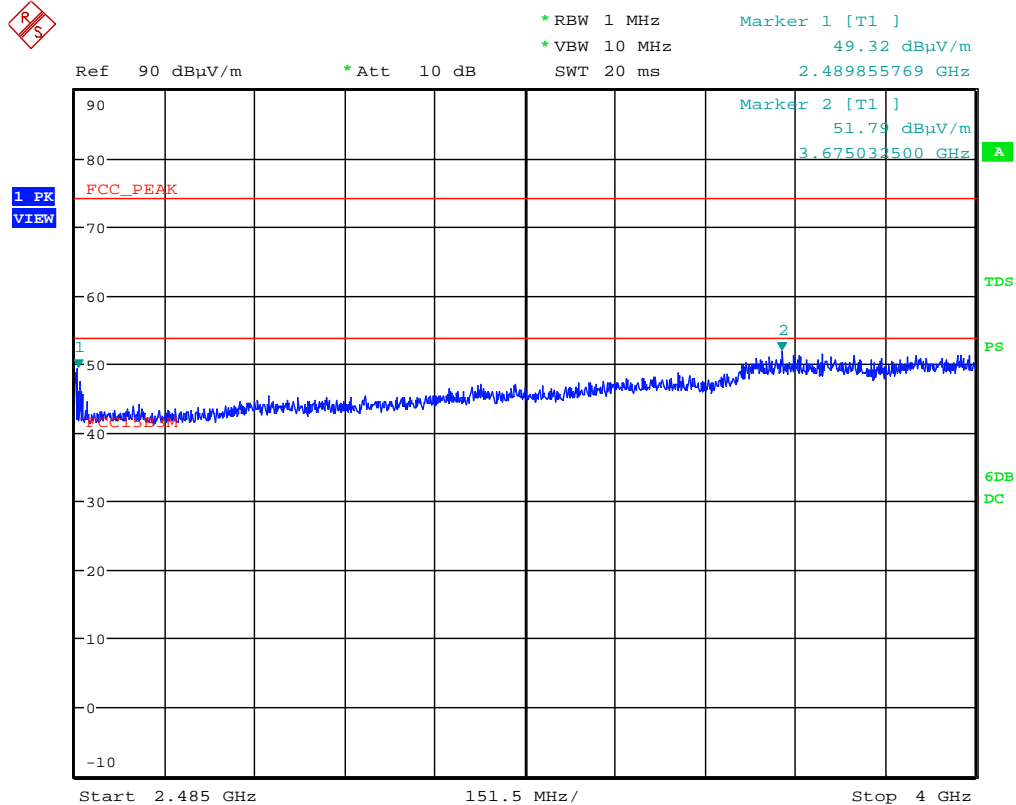


FCC ID: A94400521

IC: 3232A-400521

Certificate # 1514.1

Frequency range 2.4835 – 4.0 GHz



Date: 2.MAR.2010 20:07:49

Max-Hold Peak Pre-scan, MAX volume pink noise via Bluetooth 2.485GHz-4GHz
PEAK & AVERAGE readings made in receiver mode:

Emission Frequency (MHz)	Measured Amplitude (dBuV/m) QP/Avg	Measured Amplitude (dBuV/m) Peak	FCC 15B				Table Azimuth 0° face ant	Receiving Antenna	
			Limit (dBuV/m) QP/Avg*	Limit (dBuV/m) Peak	Margin (dB) QP/Avg	Margin (dB) Peak		Pol H/V	Height Meters
2485.143	31.4	59.3	54.0	74.0	22.6	14.7	180.0	V	1.00

Worst case: EUT passes FCC Peak Limit by 14.7dB at 2485.143MHz

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Wireless Transceiver Test Report

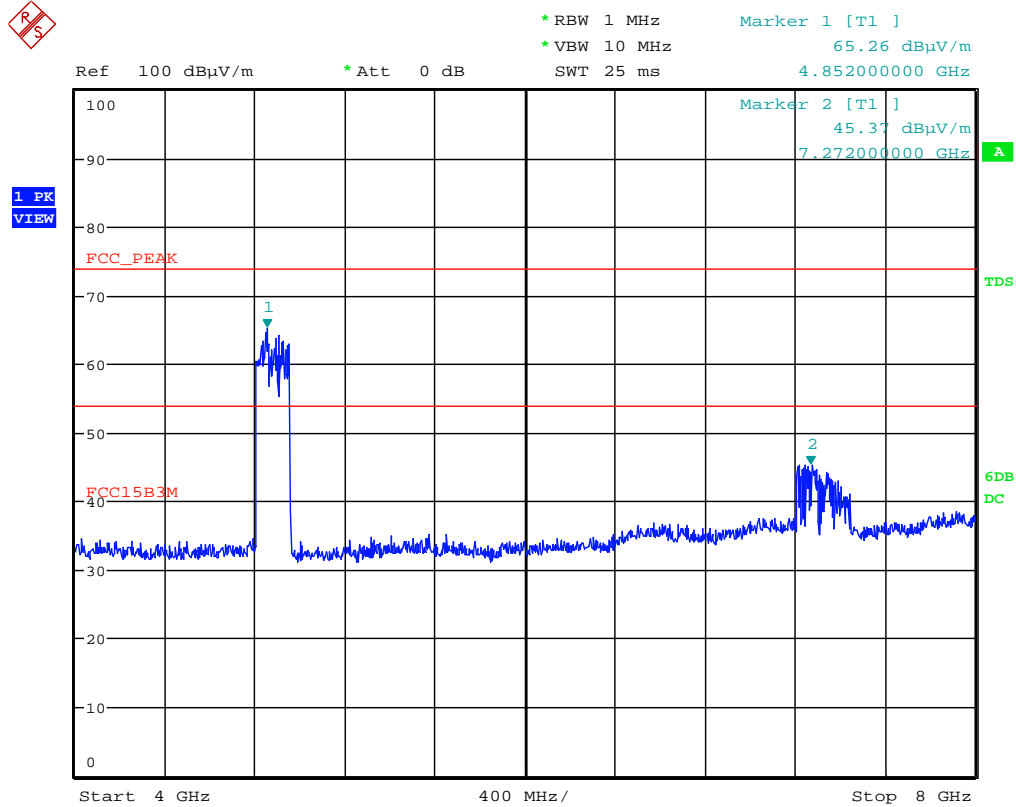


FCC ID: A94400521

IC: 3232A-400521

Certificate # 1514.1

Frequency range 4.0 -8.0 GHz



Date: 2.MAR.2010 20:31:06

Max-Hold Peak Pre-scan, MAX volume pink noise via Bluetooth 4GHz-8GHz

The only emissions within 15dB of the limit were TX Harmonics which are covered in section 6.7 Harmonics of this report.

*Above 8 GHz, no spurious emissions in peak detection were observed and the noise floor was at least 10 dB below the Average limit.

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Wireless Transceiver Test Report



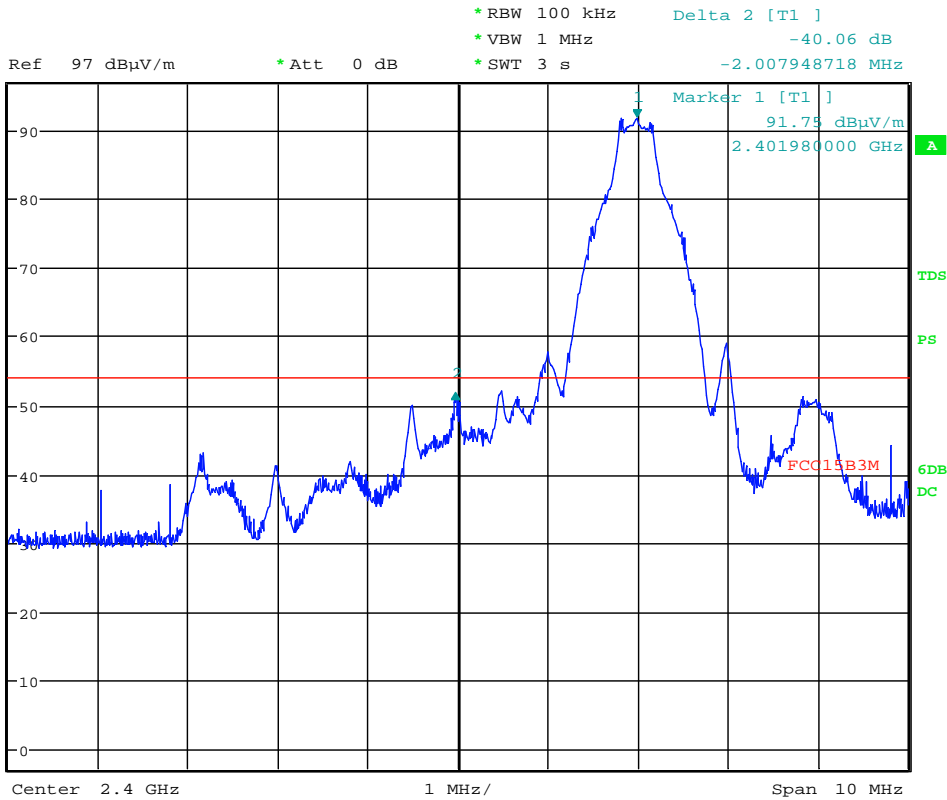
FCC ID: A94400521

IC: 3232A-400521

Certificate # 1514.1

Band edge measurements:

Basic rate (DH5), Center frequency lower band edge, 100 kHz RBW, Peak detection



Date: 8.MAR.2010 23:29:45

The delta between the in-band and maximum value in the lower adjacent restricted band is 40.06 dB.

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Wireless Transceiver Test Report

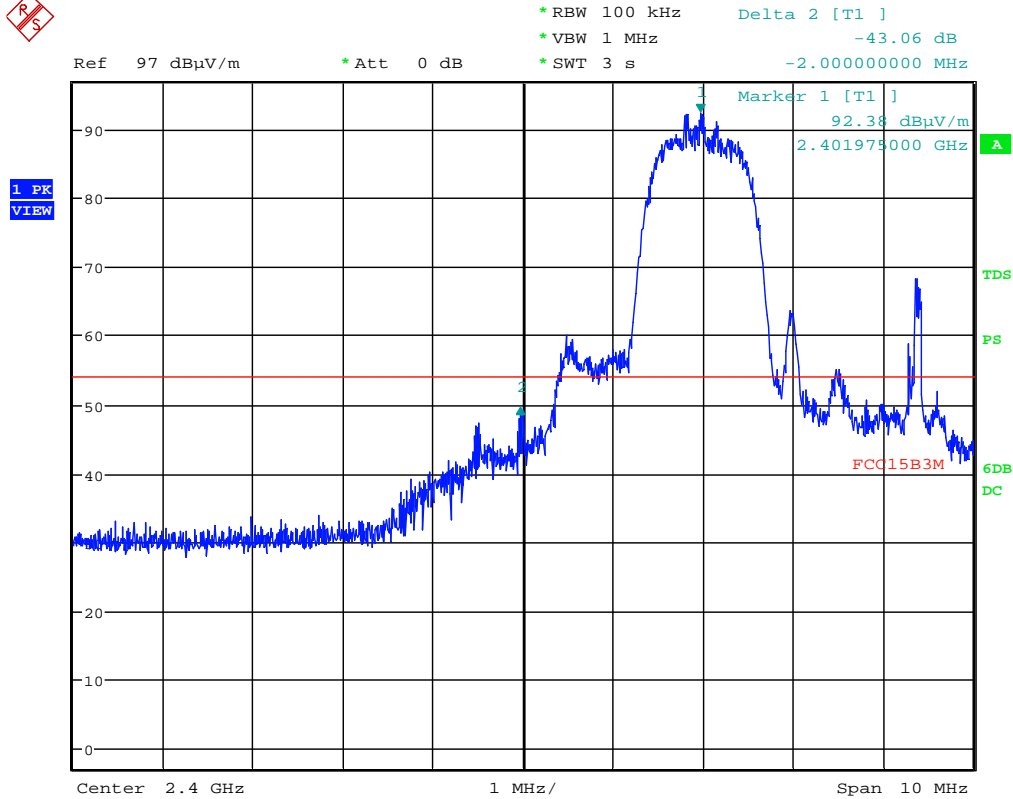


FCC ID: A94400521

IC: 3232A-400521

Certificate # 1514.1

Enhanced Data Rate (3-DH5), Center frequency lower band edge, 100 kHz RBW, Peak detection



Date: 8.MAR.2010 23:33:52

The delta between the in-band and maximum value in the lower adjacent restricted band is 43.06 dB.

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Wireless Transceiver Test Report

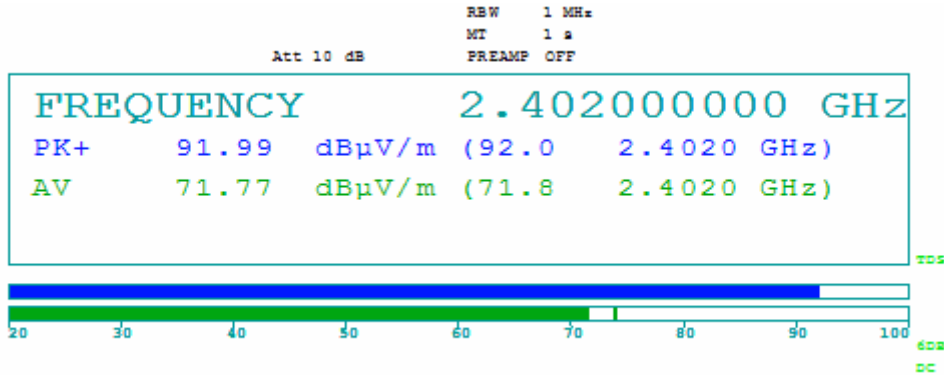


FCC ID: A94400521

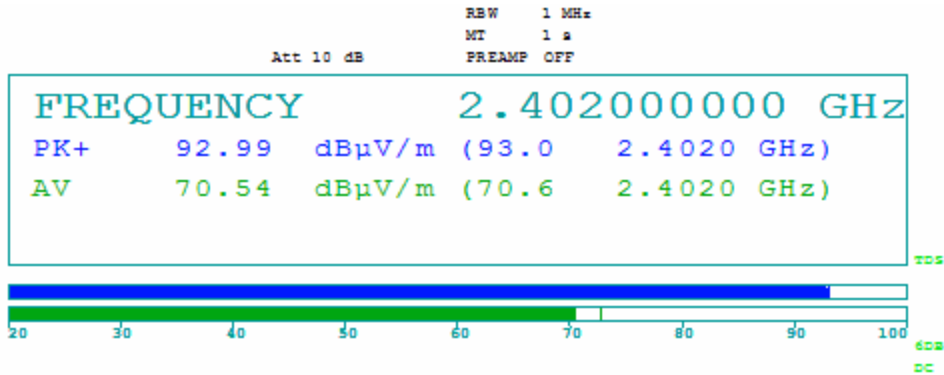
IC: 3232A-400521

Certificate # 1514.1

Measured peak and average in-band amplitude with 1 MHz RBW and Basic Rate modulation:



Measured peak and average in-band amplitude with 1 MHz RBW and Enhanced Data Rate modulation:



Maximum values for spurious emissions from 2380-2400 MHz is

(a) More than 20 dB

(b) The maximum value in the restricted band is

Basic Rate: 71.8-40.06 = 31.74 dBμV/m average

92.0-40.06 = 51.94 dBμV/m peak

EDR: 70.6-43.06 = 27.54 dBμV/m average

93.0-43.06 = 49.94 dBμV/m peak

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Wireless Transceiver Test Report

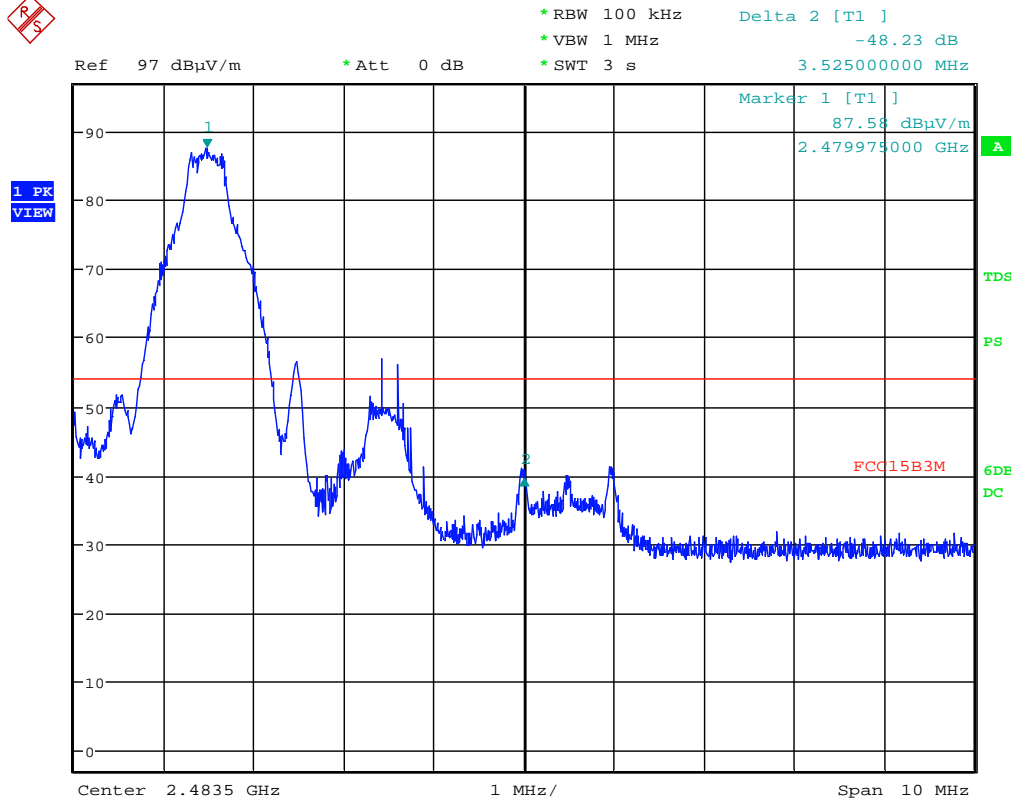


FCC ID: A94400521

IC: 3232A-400521

Certificate # 1514.1

Basic rate (DH5), Center frequency upper band edge, 100 kHz RBW, Peak detection



Date: 8.MAR.2010 23:40:17

The delta between the in-band and maximum value in the lower adjacent restricted band is 48.23 dB.

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Wireless Transceiver Test Report

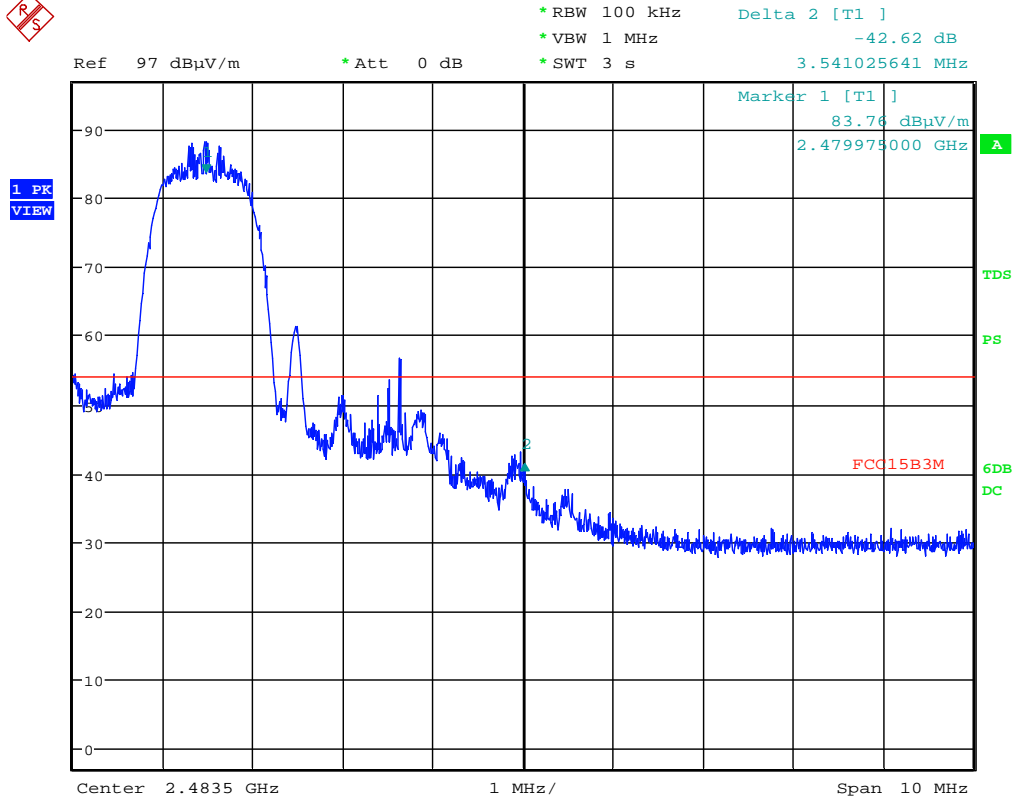


FCC ID: A94400521

IC: 3232A-400521

Certificate # 1514.1

Enhanced Data Rate (3-DH5), Center frequency lower band edge, 100 kHz RBW, Peak detection



Date: 8.MAR.2010 23:41:38

The delta between the in-band and maximum value in the lower adjacent restricted band is 42.62 dB.

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Wireless Transceiver Test Report

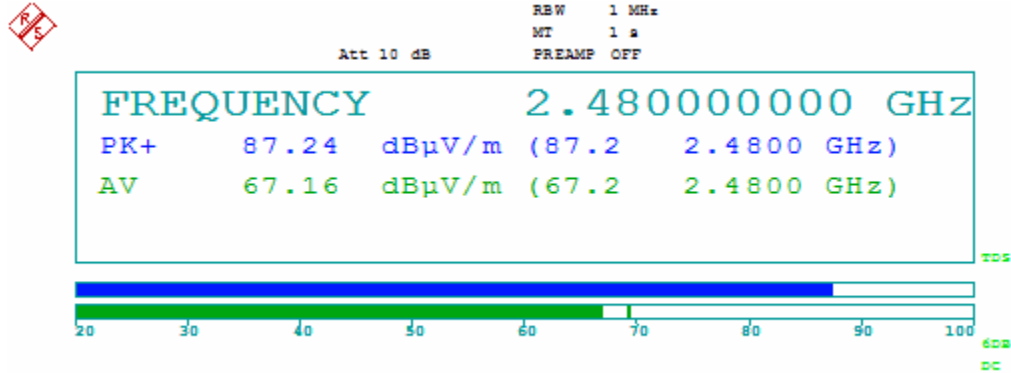


FCC ID: A94400521

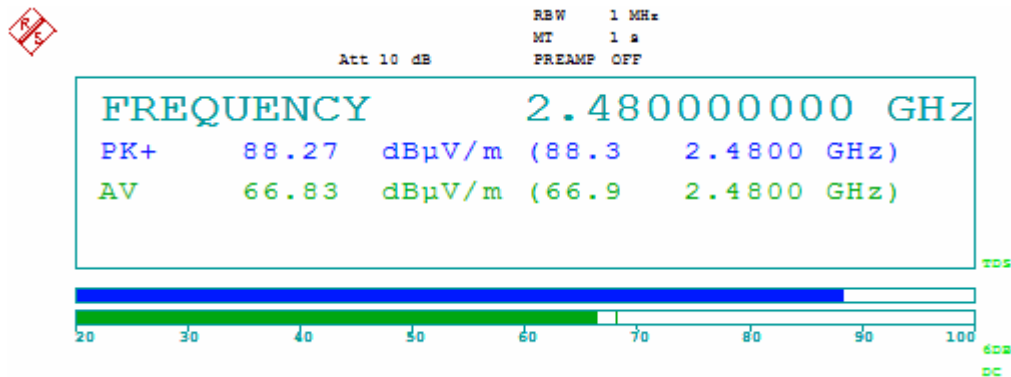
IC: 3232A-400521

Certificate # 1514.1

Measured peak and average in-band amplitude with 1 MHz RBW and Basic Rate modulation:



Measured peak and average in-band amplitude with 1 MHz RBW and Enhanced Data Rate modulation:



The maximum value in the restricted band with 1 MHz RBW is

- (a) More than 20 dB
- (b) The maximum value in the restricted band is
 - Basic Rate: 67.16-48.23 = 18.93 dBµV/m average
 - 87.24-48.23 = 39.01 dBµV/m peak
 - EDR: 66.3-42.66 = 23.64 dBµV/m average
 - 88.27-42.66 = 45.61 dBµV/m peak

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Wireless Transceiver Test Report



FCC ID: A94400521

IC: 3232A-400521

Certificate # 1514.1

6.8.2.2. Test Equipment

Equipment Type	Manufacturer	Model	Tracking Number	Service date	
				Last	Due
Receiver	Rohde & Schwarz	ESU40	TN1663	7/29/2009	7/29/2010
Antenna 30M – 5G	Sunol	JB5	TN1541	5/29/2009	5/29/2010
Antenna cable 18GHz	Rohde & Schwarz	HFE160D	TN1692	4/27/2009	4/27/2010
BT tester	Rohde & Schwarz	CBT	TN1758	5/15/2009	5/15/2010

6.8.3. Test information

Date of test:	March 8, 2010	Test Location:	Maxwell House
EUT serial:	Alpha – 27	Tested by:	C. Bell
Test Conclusion:	Pass		

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Wireless Transceiver Test Report



FCC ID: A94400521

IC: 3232A-400521

Certificate # 1514.1

6.9. Receiver spurious emissions

6.9.1. Requirements

RSS-Gen section 4.10

- if the antenna is detachable, a conducted measurement may be performed.

RSS-GEN section 6(b)

No spurious output signals appearing at the antenna terminals shall exceed 2 nW (-57dBm) per any 4 kHz spurious frequency in the band 30-1000 MHz, or 5 nW (-53dBm) above 1 GHz.

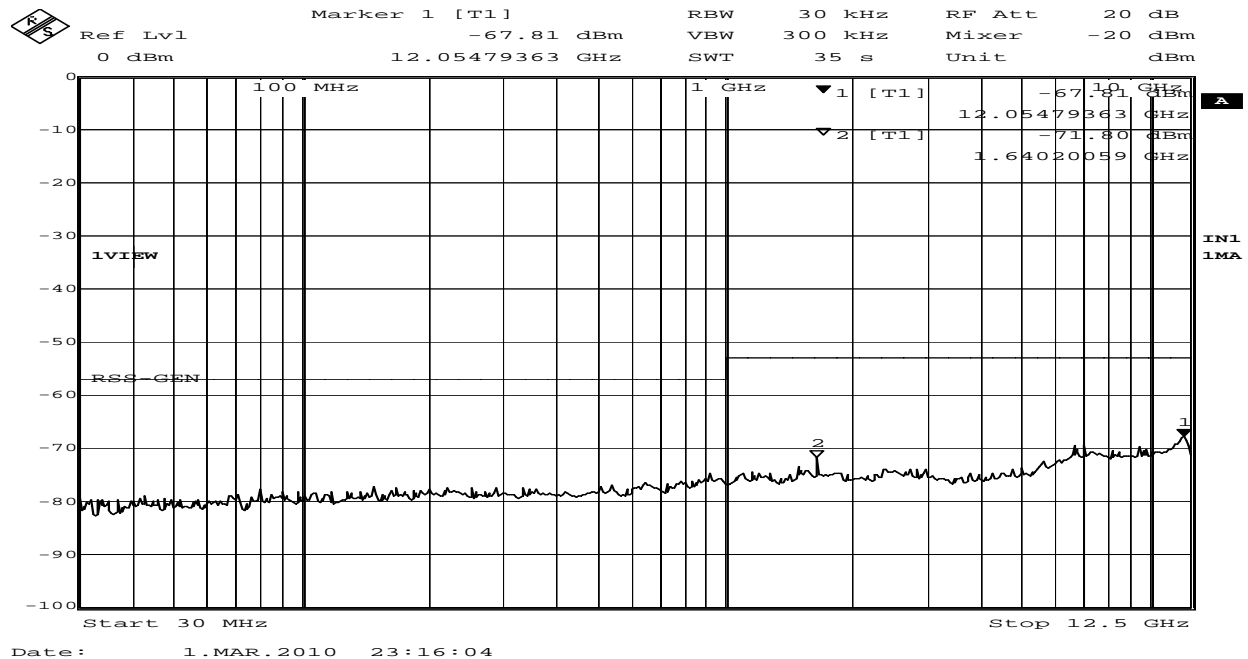
6.9.2. Test Setup

The EUT is tuned to the middle of the band and placed in receive mode. (TX idle).

Conducted:

The EUT is connected with a low loss cable to the spectrum analyzer and placed in receive mode, tuned to the middle of the band (channel 39, 2441 MHz). Cable losses are incorporated in the measured results by the measurement software. A spectrum scan is made from 30 MHz to 12.5 GHz (covering the required 30MHz – 7.5 GHz range) with a 30 kHz RBW (more than the required 4 kHz).

6.9.3. Test data



Measurements from 30MHz - 12.5 GHz, RX mode, and receiver tuned to mid-band.

Max level @ 2.444 GHz -67.81 dBm or 0.166 nW

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Wireless Transceiver Test Report



FCC ID: A94400521

IC: 3232A-400521

Certificate # 1514.1

6.9.4. Test Equipment

Equipment Type	Manufacturer	Model	Serial or other ID	Service date	
				last	due
Bluetooth Tester	Rohde & Schwartz	CBT32	TN1758	5/15/2009	5/15/2010
40GHz cable	-	-	TN1277	Verify before use	
Spectrum Analyzer	Rohde & Schwartz	ESIB40	TN1560	3/3/2009	4/16/2010

6.9.5. Test information

Date of test:	March 1, 2010	Test location:	Transmitter Test Bench
EUT serial:	Alpha – 36	Tested by:	C. Bell
Test Conclusion:	Pass		

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Wireless Transceiver Test Report



FCC ID: A94400521

IC: 3232A-400521

Certificate # 1514.1

6.10. SAR calculation

Frequency Range: 2402-2480MHz

Low threshold = $60/f(\text{GHz}) \text{ mW} = 60 / 2.480 = 24.19\text{mW}$

Conducted Output Power Measured (dBm) = -6.75dBm

Antenna Gain (dBi) = 0.4dBi

EIRP = 0.229 mW

Conducted Output Power (mW) = 0.211 mW

Since both Conducted Output Power and EIRP are below the low threshold, device complies with FCC and Industry Canada RF radiation exposure limits for general population/uncontrolled exposure as a portable device without SAR evaluation.

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