

FCC CFR47 PART 15 SUBPART C INDUSTRY CANADA RSS-210 ISSUE 7

CERTIFICATION TEST REPORT*

FOR

RUGGEDIZED HANDHELD PDA-TYPE DEVICE WITH DUAL BAND GSM/GPRS/WCDMA/HSDPA, 802.11 b/g & BT

MODEL NUMBER: CN4, CN4e**

FCC ID: EHA-03CN4 IC: 1223A-01CN4

REPORT NUMBER: 09U12493-4, Revision B

ISSUE DATE: JUNE 19, 2009

Prepared for INTERMEC TECHNOLOGIES CORP 550 SECOND STREET SE CEDAR RAPIDS IOWA, 52401, U.S.A

Prepared by COMPLIANCE CERTIFICATION SERVICES 47173 BENICIA STREET FREMONT, CA 94538, U.S.A. TEL: (510) 771-1000 FAX: (510) 661-0888

* This report covers the radiated portion of 11b and 11g modes, and antenna port testing for 11b mode, for antenna port for 11g mode refer to report number ITRM0128.

** Model differences are described within the body of this report

NVLAP LAB CODE 200065-0

Revision History

Rev.	lssue Date	Revisions	Revised By
	05/11/09	Initial Issue	F. Ibrahim
Α	06/11/09	Revised FCC ID	A. Zaffar
В	06/19/09	Revised EUT Description	A. Zaffar

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	INTERMEC TECHNOLOGIES CORP 550 SECOND STREET SE CEDAR RAPIDS, IOWA, 52401, U.S.A			
EUT DESCRIPTION:	RUGGEDIZED HANDHELD PDA-TYPE DEVICE w/ DUAL BAND GSM/GPRS/WCDMA/HSDPA, 802.11 b/g & BT			
MODEL: CN4, CN4e				
SERIAL NUMBER:				
DATE TESTED:	APRIL 27 – MAY 11, 2009			
	APPLICABLE STANDARDS			
ST	ANDARD	TEST RESULTS		
CFR 47 Pa	art 15 Subpart C*	Pass		

 INDUSTRY CANADA RSS-210 Issue 7 Annex 8
 Pass

 INDUSTRY CANADA RSS-GEN Issue 2
 Pass

* This report covers the radiated portion of 11b and 11g modes, and antenna port testing for 11b mode, for antenna port for 11g mode refer to report number ITRM0128

Compliance Certification Services, Inc. (CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by CCS based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by CCS will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:

Tested By:

FRANK IBRAHIM EMC SUPERVISOR COMPLIANCE CERTIFICATION SERVICES

TOM CHEN EMC ENGINEER COMPLIANCE CERTIFICATION SERVICES

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 2, and RSS-210 Issue 7.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <u>http://www.ccsemc.com</u>.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Power Line Conducted Emission	+/- 2.3 dB
Radiated Emission	+/- 3.4 dB

Uncertainty figures are valid to a confidence level of 95%.

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a ruggedized handheld PDA-type device W/ dual band GSM/GPRS/WCDMA/HSDPA, 802.11 B/G & BT.

5.2. DESCRIPTION OF MODEL(S) DIFFERENCES

CN4 is standard and CN4e is extended, both are available with numeric or QWERTY keypads.

CN4e with QWERTY keypad was selected as a representative model for radiated emissions and radiated immunity testing.

5.3. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power in the 11b mode as follows:

Frequency Range	Mode	Output Power	Output Power
(MHz)		(dBm)	(mW)
2412 - 2462	802.11b	18.43	69.66

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PFIA antenna, with a maximum gain of -0.045 dBi.

5.5. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was v.20961.

The test utility software used during testing was FCC Test Utility ver1.01 rev.

5.6. WORST-CASE CONFIGURATION AND MODE

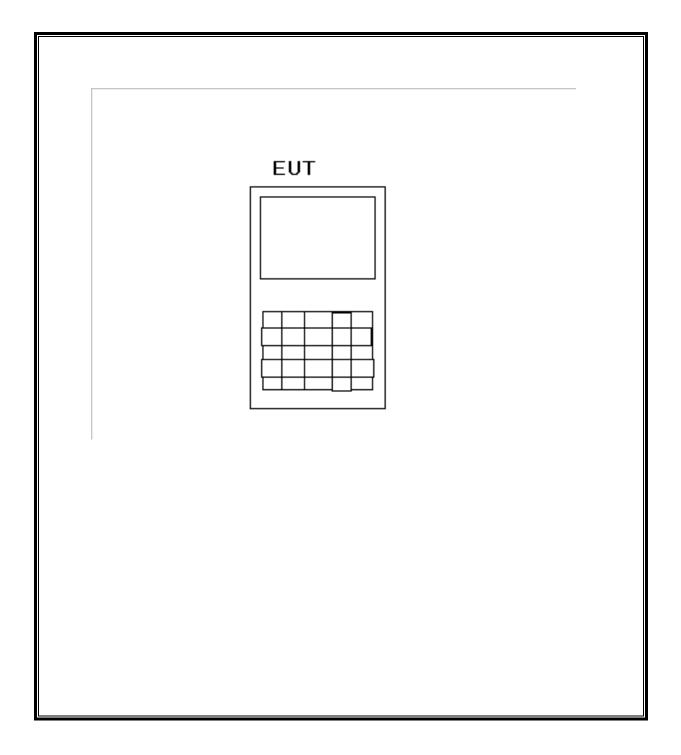
The worst-case channel is determined as the channel with the highest output power.

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5.7. DESCRIPTION OF TEST SETUP

TEST SETUP

SETUP DIAGRAM FOR TESTS



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6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST							
Description	Manufacturer	Model	Asset	Cal Date	Cal Due		
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01159	39759	02/07/10		
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	39827	01/14/10		
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	39798	12/16/09		
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	39848	02/04/10		
Antenna, Horn, 18 GHz	EMCO	3115	C00945	39560	04/22/10		
EMI Test Receiver, 30 MHz	R&S	ESHS 20	N02396	39484	08/06/09		
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	39750	10/29/09		

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7. ANTENNA PORT TEST RESULTS

7.1. 802.11b MODE IN THE 2.4 GHz BAND

7.1.1.6 dB BANDWIDTH

<u>LIMITS</u>

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

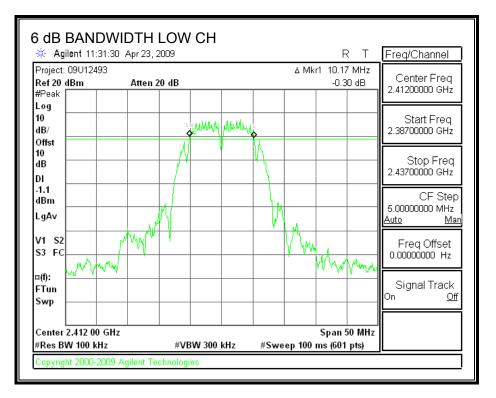
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

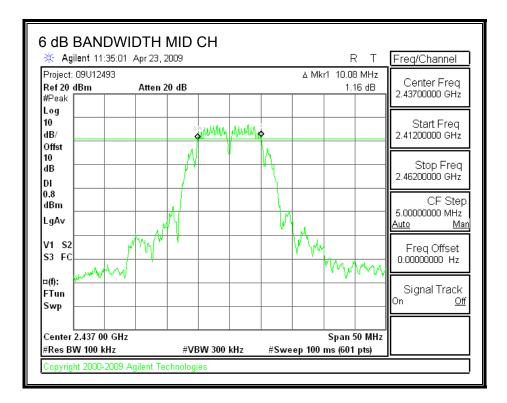
RESULTS

Channel	Frequency	6 dB Bandwidth	Minimum Limit
	(MHz)	(MHz)	(MHz)
Low	2412	10.17	0.5
Middle	2437	10.08	0.5
High	2462	10.17	0.5

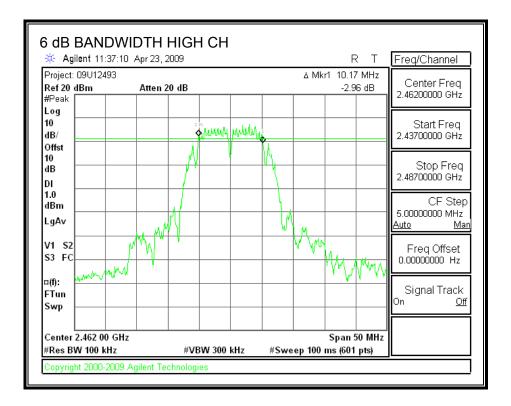
6 dB BANDWIDTH



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7.1.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

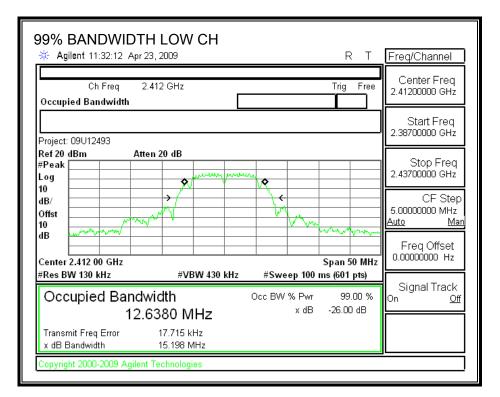
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
Low	2412	12.6380
Middle	2437	12.6015
High	2462	12.6195

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99% BANDWIDTH



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99% BANDWIDTH MID C Agilent 11:35:49 Apr 23, 2009	:Н кт	Freq/Channel
Ch Freq 2.437 GHz Occupied Bandwidth	Trig Free	Center Freq 2.43700000 GHz
Project: 09U12493		Start Freq 2.41200000 GHz
	unan anna	Stop Freq 2.46200000 GHz
10 dB/ Offst 10		CF Step 5.00000000 MHz <u>Auto Man</u>
dB astructure May de la construction de la construc	Span 50 MHz	Freq Offset 0.00000000 Hz
#Res BW 130 kHz #VBV Occupied Bandwidth 12.6015 MH	V 430 kHz #Sweep 100 ms (601 pts) Occ BW % Pwr 99.00 % HZ × dB -26.00 dB	Signal Track On <u>Off</u>
Transmit Freq Error23.752 kHx dB Bandwidth15.184 MH	_	
Copyright 2000-2009 Agilent Technologies	5	

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99% BANDWIDTH HIGH CH [★] Agilent 11:37:43 Apr 23, 2009 R T	Freq/Channel
Ch Freq 2.462 GHz Trig Free Occupied Bandwidth	Center Freq 2.46200000 GHz
Project: 09U12493	Start Freq 2.43700000 GHz
Ref 20 dBm Atten 20 dB #Peak Log	Stop Freq 2.48700000 GHz
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	CF Step 5.0000000 MHz <u>Auto Man</u>
Center 2.462 00 GHz Span 50 MHz	Freq Offset 0.00000000 Hz
#Res BW 130 kHz #VBW 430 kHz #Sweep 100 ms (601 pts) Occupied Bandwidth Occ BW % Pwr 99.00 % 12.6195 MHz × dB -26.00 dB	Signal Track ^{On <u>Off</u>}
Transmit Freq Error 8.090 kHz x dB Bandwidth 15.169 MHz	
Copyright 2000-2009 Agilent Technologies	

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7.1.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

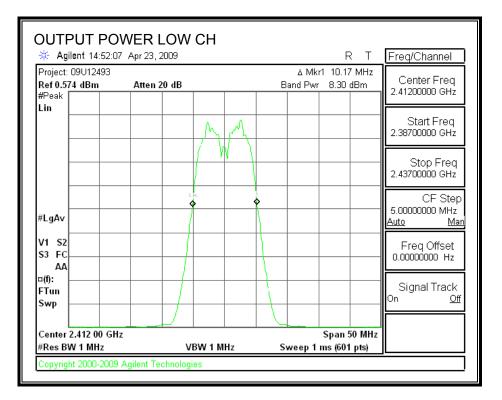
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

RESULTS

Channel	Frequency	Spectrum	Attenuator and	Output	Limit	Margin
		Analyzer Reading	Cable Offset	Power		
	(MHz)	(dBm)	(dB)	(dBm)	(dBm)	(dB)
Low	2412	8.3	10	18.30	30	-11.70
Middle	2437	8.43	10	18.43	30	-11.57
High	2462	8.15	10	18.15	30	-11.85

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OUTPUT POWER



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· •	ilent 14:54:29 09U12493	, ibi 201 20					∆ Mkr	1 10.17	₹T 7 MHz	Freq/Channel
Ref 0.57 #Peak		Atten 20)dB			В	and Pwr	8.43	dBm	Center Freq 2.43700000 GHz
Lin	Center 2.437000		ЭНz	A	A					Start Freq 2.41200000 GHz
				(Stop Freq
			11	a.		>				2.46200000 GHz CF Step 5.0000000 MHz
#LgA∨										<u>Auto Ma</u>
V1 S2 S3 FC AA			-			$\left\{ - \right\}$				Freq Offset 0.00000000 Hz
¤(f): FTun Swp										Signal Track On <u>Off</u>
						Ĺ				
	2.437 00 GHz W 1 MHz		VE	3W 1 M	Hz	S	weep 1	•	50 MHz pts)	

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Agilent 14:56:2 Project: 09U12493	21 Api 23, 2003		R T	Freq/Channel
Ref 0.574 dBm #Peak	Atten 20 dB		Pwr 8.15 dBm	Center Freq 2.46200000 GHz
Lin				Start Freq 2.43700000 GHz
		\mathbb{W}		Stop Freq 2.48700000 GHz
#LgAv				CF Step 5.0000000 MHz <u>Auto Ma</u>
V1 S2 S3 FC AA				Freq Offset 0.00000000 Hz
¤(f): FTun Swp				Signal Track On <u>Off</u>
Center 2.462 00 GH #Res BW 1 MHz	lz VBW 1	MHz Swe	Span 50 MHz ep 1 ms (601 pts)	

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7.1.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 10 dB (including 10 dB pad) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Power
	(MHz)	(dBm)
Low	2412	15.67
Middle	2437	15.45
High	2462	15.54

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7.1.5. POWER SPECTRAL DENSITY

<u>LIMITS</u>

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

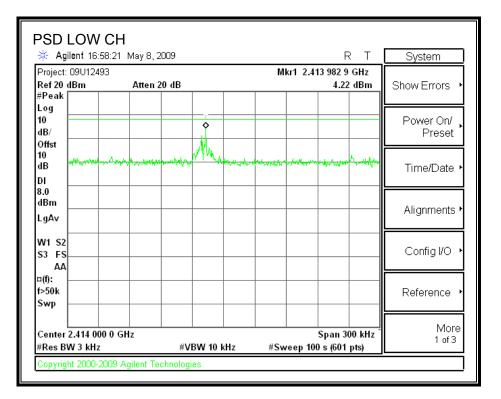
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

Channel	Frequency	PPSD	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	2412	4.22	8	-3.78
Middle	2437	-9.03	8	-17.03
High	2462	-8.23	8	-16.23

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POWER SPECTRAL DENSITY



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🔆 Agil			viay 0, 2	.003						<u>}</u>	Freq/Channel
Project: I Ref 20 d #Peak [93	Atten 2	20 dB			M	kr1 2.43	5 392 2 -9.03		Center Freq 2.43545000 GHz
Log 10 dB/											Start Freq 2.43530000 GHz
Offst 10 dB DI	whipitum	Withdu	Martina	è Mulipatina	Maring	WHW HAN	(drifeny)body	ntra han	hyllwyw?W	hrmling	Stop Freq 2.43560000 GHz
8.0 dBm LgAv											CF Step 30.0000000 kHz <u>Auto Ma</u>
V1 S2 S3 FS AA											Freq Offset 0.00000000 Hz
¤(f): f>50k Swp											Signal Track On <u>Off</u>
Center 2 #Res BV			z	#1	BW 10 I	LH7	#5w	eep 100	Span 3() e /601		

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🔆 Agi			viay 0, 2	.000						2 T	Freq/Channel
Project: Ref 20 (#Peak		.93	Atten 2	20 dB			M	kr1 2.46		dBm	Center Freq 2.46390000 GHz
Log 10 dB/ Offst											Start Freq 2.46375000 GHz
10	NHVAN	white	NANAM	4/1/hurry	V~~W	NI/ YM	ww.hhhwy		h/hillingh	14/14/14	Stop Freq 2.46405000 GHz
8.0 dBm LgA∨											CF Step 30.0000000 kHz <u>Auto Ma</u>
W1 S2 S3 FS											Freq Offset 0.00000000 Hz
¤(f): f>50k Swp											Signal Track On <u>Off</u>
Center #Poc Bl	2.463 9 W 3 kH;		Z	#V	BW 10 I	417	#Su	reep 100	Span 3() e /601		

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7.1.6. CONDUCTED SPURIOUS EMISSIONS

<u>LIMITS</u>

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

TEST PROCEDURE

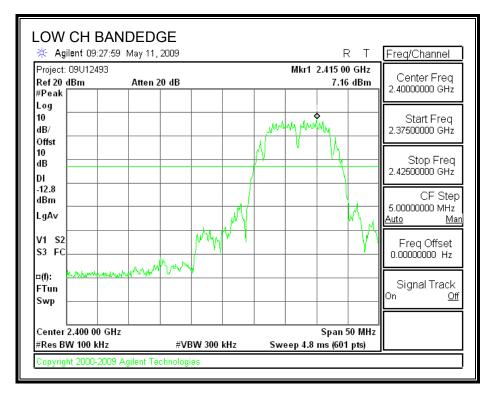
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

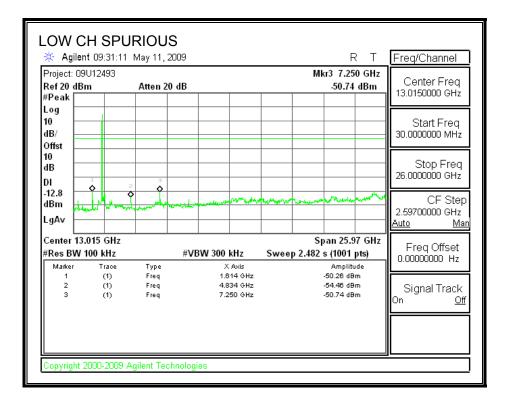
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RESULTS

SPURIOUS EMISSIONS, LOW CHANNEL

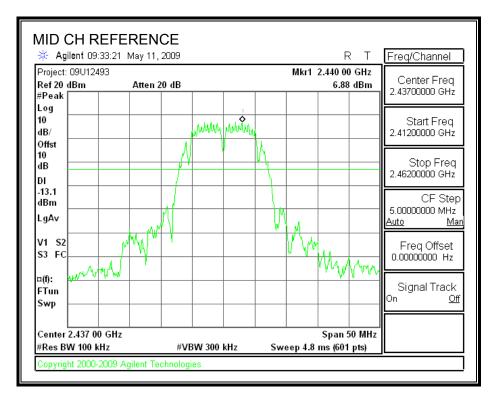


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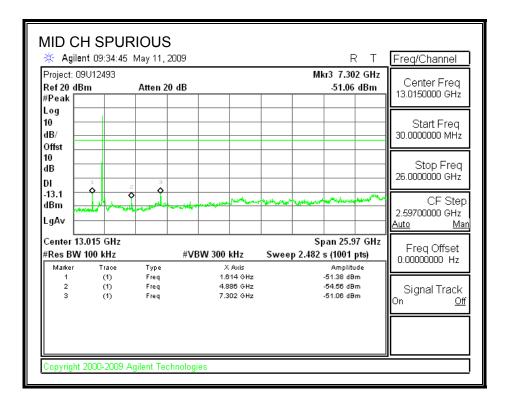


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SPURIOUS EMISSIONS, MID CHANNEL

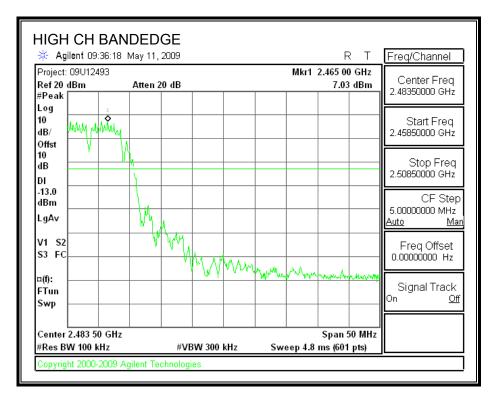


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SPURIOUS EMISSIONS, HIGH CHANNEL



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Project: 09		May 11, 20			м	kr3 7.38	0 GHz	Freq/Cha	
Ref20dBr #Peak	n	Atten 20	dB			49.37	dBm	Center 13.0150000	
Log 10 dB/ Offst								Start 30.0000000	
10 dB	1	3						Stop 26.000000	Freq) GHz
-13.0 dBm			www.cherewalter	at the second second	WHAT LARD	er fer for	anon a	2.59700000	
LgAv								<u>Auto</u>	<u>Mar</u>
Center 13. #Res BW 1			#VBW 300	kHz Sv	Sj veep 2.482	pan 25.9 s (1001		Freq 0 0.0000000	
Manker 1	Trace (1)	Type Freg		(Axis 340 GHz		Amplitu -47.17 dB			
2 3	(1) (1) (1)	Freq Freq Freq	4.9	912 GHz 380 GHz		-52.98 dBi -49.37 dBi	m	Signal ⁻ On	Frack <u>Off</u>

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8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

<u>LIMITS</u>

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

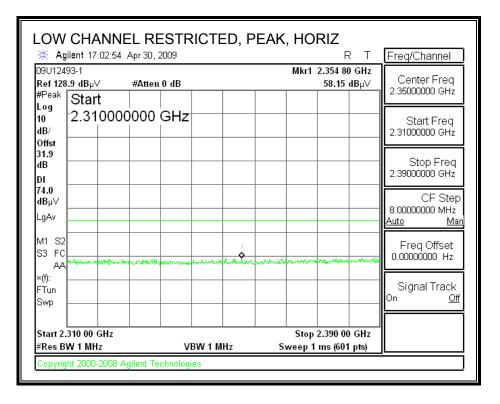
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

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8.2. TRANSMITTER ABOVE 1 GHz

8.2.1. TX ABOVE 1 GHz FOR 802.11b MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

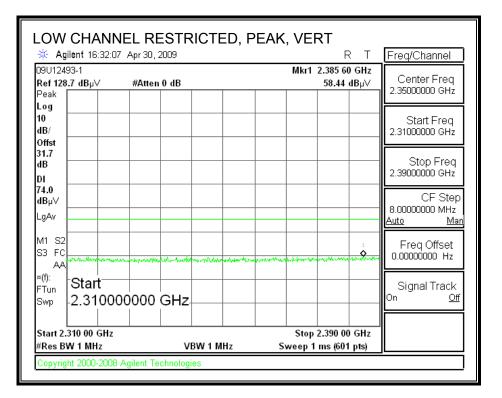


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🔆 Agilent 17:03	:48 Apr 30, 2009	R T	Freq/Channel
09U12493-1 Ref 128.9 dB µ∨ #Peak 	#Atten 0 dB	Mkr1 2.390 00 GHz 45.80 dBµ∨	Center Freq 2.3500000 GHz
Log 10 dB/ Offst			Start Freq 2.31000000 GHz
dB			- Stop Freq 2.3900000 GHz
54.0 dBµ∨ LgAv			CF Step 8.0000000 MHz
V1 S2 S3 FC			Auto Mai Freq Offset 0.00000000 Hz
≈(f): FTun Swp			Signal Track
Start 2.310 00 GH #Res BW 1 MHz	z #VBW 10 H	Stop 2.390 00 GHz Iz Sweep 6.238 s (601 pts)	Ť

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RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

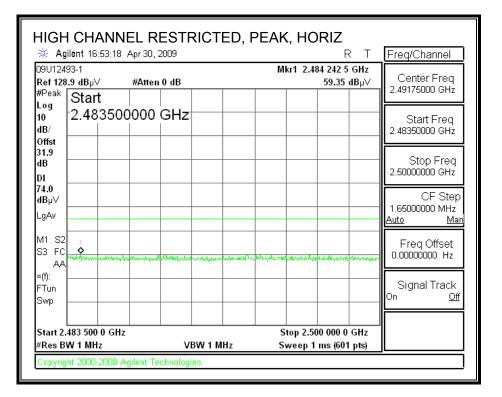


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Agilent 16:33:30	EL RESTRICTEI Apr 30, 2009	R T	Freq/Channel
09∪12493-1 Ref 128.7 dB µ∨ Peak	#Atten 0 dB	Mkr1 2.390 00 GHz 45.98 dBμ∀	Center Freq 2.35000000 GHz
Log 10 dB/ Offst			Start Freq 2.31000000 GHz
dB			Stop Freq 2.39000000 GHz
54.0 dBµ∨ LgAv			CF Step 8.0000000 MHz <u>Auto Mar</u>
M1 S2 S3 FC			Freq Offset 0.00000000 Hz
×(f): FTun Swp			Signal Track
Start 2.310 00 GHz #Res BW 1 MHz	#VBW 10 H	Stop 2.390 00 GHz z Sweep 6.238 s (601 pts)	

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RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

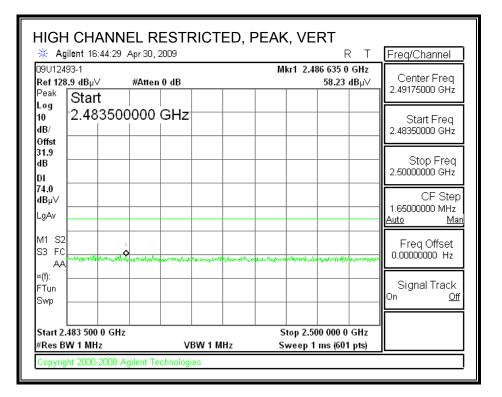


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🔆 Agilent 16:54:1	5 Apr 30, 2009			RT	Freq/Channel
09∪12493-1 Ref 128.9 dB µ∨ #Peak	#Atten 0 dB		Mkr1 2.4	83 610 0 GHz 46.57 dBµ∀	Center Freq 2.49175000 GHz
Log 10 dB/					Start Freq 2.48350000 GHz
Offst 31.9 dB					Stop Freq 2.5000000 GHz
DI 54.0 dBµ∨ LgAv					CF Step 1.65000000 MHz
M1 S2 S3 FC					Freq Offset 0.00000000 Hz
AA *(f): b FTun Swp					Signal Track On <u>Off</u>
Start 2.483 500 0 GI #Res BW 1 MHz		BW 10 Hz	\$top 2.50 Sweep 1.28	00 000 0 GHz 7 s (601 pts)	

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RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



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🔆 Agilent 16:45:	17 Apr 30, 2009			RT	Freq/Channel
09∪12493-1 Ref 128.9 dB µ∨ Peak	#Atten 0 dB		Mkr1 2.483 50 45.	0 0 GHz 72 dBµ∨	Center Freq 2.49175000 GHz
Log 10 dB/					Start Freq 2.48350000 GHz
Offst 31.9 dB DI					Stop Freq 2.5000000 GHz
54.0 dBµ∨					CF Step 1.6500000 MHz
LgAv M1 S2 S3 FC					Auto Mar Freq Offset
×(f):					0.00000000 Hz Signal Track
FTun T					On <u>Off</u>
Start 2.483 500 0 (#Res BW 1 MHz		V 10 Hz	Stop 2.500 00 Sweep 1.287 s (6		

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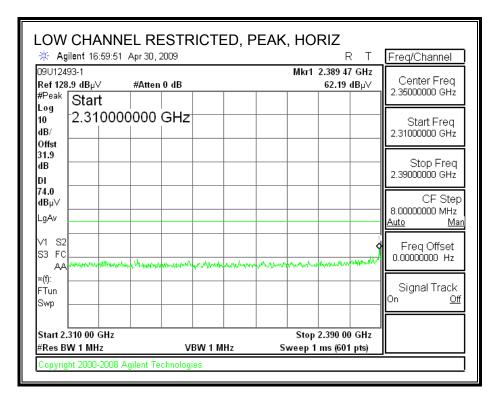
HARMONICS AND SPURIOUS EMISSIONS

Complia	-		[,] Measurem Services, Fr		5m Ch	amber									
- Compan		Intermec													
Project a		09U12493													
Date:		4/30/2009													
		Tom Chen													
Configui Mode:	ration:	EUT only TX, b mode,	L/M/H												
est Eq	uinmen														
		18GHz	Pre-ar	nplifer	1-260	Hz	Pre-am	plifer	26-40GH	7	н	orn > 180	SH7		Limit
	5/N: 324		_	Agilent 3			l lo all	pinor	20 40 011	-					FCC 15.209
 r= Hi Freq	juency Ca	bles													
		22807700	12' c	able 2	28076	00	20' ca	ble 22	807500		HPF	Re	ject Filte		<u>k Measurements</u> W=VBW=1MHz
3' ca	able 22	807700	- 12' ca	ıble 228	07600	-	20' cab	le 2280)7500 <mark>-</mark>			- R_	001	Avera	age Measurements =1MHz ; VBW=10Hz
	1	-													
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	dB dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
b mode		abuv	ubu v	uD/III		<u></u>			and the second s	and the second second	ubu v/m	abuv/m			(1/11)
ow CH 2															H
.824 .236	3.0 3.0	41.5 41.9	34.5 34.3	32.8 35.1	5.8 7.2	-34.8 -34.7	0.0 0.0	0.0 0.0	45.2 49.5	38.2 41.9	74 74	54 54	-28.8 -24.5	-15.8 -12.1	H H
.824	3.0	41.3	33.8	32.8	5.8	-34.8	0.0	0.0	45.0	37.5	74	54 54	-24.5	-16.5	V
.236	3.0	41.3	33.8	35.1	7.2	-34.7	0.0	QO	48.9	41.4	74	54	-25.1	-12.6	v
/lid CH 2	437 MH														V H
.874	3.0	41.1	33.6	32.8	5.8	-34.9	0.0	0.0	44.9	37 <i>A</i>	74	54	- 29.1	-16.6	H
311	3.0	43.5	37.9	35.2	73	-34.7	0.0	0.0	51.3	45.7	74	54	-22.7	-8.3	H
.874 .311	3.0 3.0	41.7 43.1	33.6 37.3	32.8 35.2	5.8 7.3	-34.9 -34.7	۵0 ۵0	0.0 0.0	45.5 50.9	37.4 45.1	74 74	54 54	-28.5 -23.1	-16.6 -8.9	V v
	1														v
li CH 240 924	62 MHz 3.0	43.4	37.5	32.8	59	-34.9	0.0	0.0	47.3	41.4	74	54	-26.7	-12.6	H
386	3.0	43.4	3/5 40.3	35.3	39 73	-34.9	0.0	0.0	47.3 54.3	41.4	74 74	- 24 54	-20./ -19.7	-12.0	H
924	3.0	43.7	37.2	32.8	59	-34.9	0.0	0.0	47.6	41.1	74	54	- 26.4	-12.9	v
386	3.0	44.3	39.7	35.3	73	-34.6	0.0	0.0	52.3	47.7	74	54	-21.7	-6.3	V н
															H
Rev. 11.10).08									A					
	f	Maagurama	ent Frequency			Amp	Preamp (Toin				Arra Tim	Average I	Field Strengt	h T imit
	Dist	Distance to		,					ct to 3 mete	ers				d Strength L	
		Analyzer R				Avg			Strength @					. Average L	
	AF	Antenna Fa	<u> </u>			Peak			k Field Stre					. Peak Limit	
	CL	Cable Loss				HPF	High Pas	s Filter	-						

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8.2.2. TX ABOVE 1 GHz FOR 802.11g MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

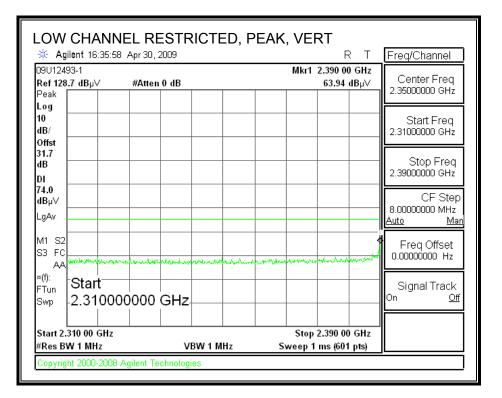


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Agilent 17:00:5	NEL RESTRIC	TED, A	VG, HOR	R T	Freq/Channel
09∪12493-1 Ref 128.9 dBµ∨ #Peak	#Atten 0 dB		Mkr1	2.390 00 GHz 46.60 dBµ∨	Center Freq 2.3500000 GHz
Log 10 dB/ Offst					Start Freq 2.3100000 GHz
31.9 dB					Stop Freq 2.3900000 GHz
54.0 dBµ∨ LgAv					CF Step 8.0000000 MHz <u>Auto Man</u>
V1 S2 S3 FC					Freq Offset 0.00000000 Hz
×(f): FTun Swp					Signal Track On <u>Off</u>
Start 2.310 00 GHz #Res BW 1 MHz	#VBW ⁻	10 Hz	Stop Sweep 6.23	2.390 00 GHz 8 s (601 pts)	
Copyright 2000-2008	3 Agilent Technologies				

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RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

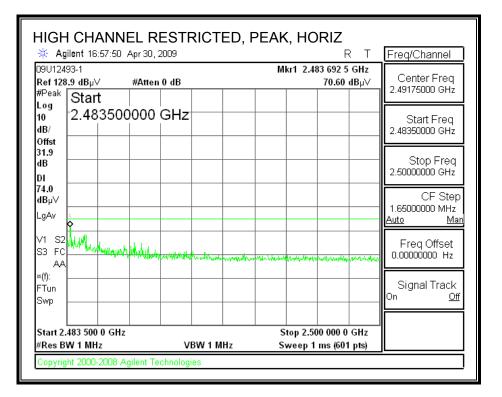


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LOW CHANN	NEL RESTRICT	ED, AVG,	VERT	
- 🔆 Agilent 16:37:4	1 Apr 30, 2009		RT	Freq/Channel
09∪12493-1 Ref 128.7 dBµ∨ Peak	#Atten 0 dB		Mkr1 2.389 60 GH: 45.91 dBµ∨	- II. ⊂onstor ⊑rog I.
Log 10 dB/ Offst				Start Freq 2.31000000 GHz
31.7 dB				Stop Freq 2.39000000 GHz
54.0 dBµ∨ LgAv				CF Step 8.0000000 MHz <u>Auto Man</u>
M1 S2 S3 FC				Freq Offset 0.00000000 Hz
×(f): FTun Swp				Signal Track
Start 2.310 00 GHz #Res BW 1 MHz		0 Hz Swe	Stop 2.390 00 GHz eep 6.238 s (601 pts)	
Copyright 2000-2008	Agilent Technologies			

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RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

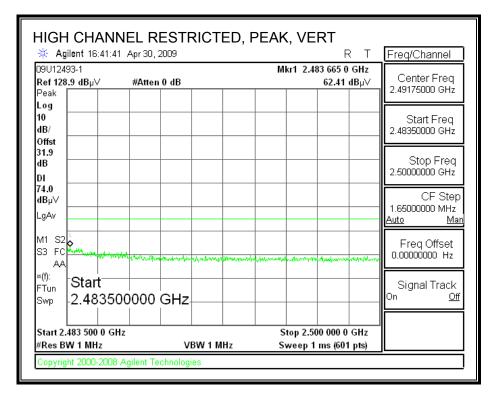


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🔆 Agilent 16:56:51	Apr 30, 2009	R T	Freq/Channel
09U12493-1 Ref 128.9 dB µ∨ #Peak	#Atten 0 dB	Mkr1 2.483 610 0 GHz 48.61 dBµ∀	Center Freq 2.49175000 GHz
Log 10 dB/			Start Freq 2.48350000 GHz
Offst 31.9 dB			Stop Freq 2.5000000 GHz
DI 54.0 dBµ∨ LqAv			CF Step 1.6500000 MHz
M1 S2 S3 FC			Auto Mai Freq Offset 0.00000000 Hz
AA ×(f): b FTun Swp			Signal Track
Start 2.483 500 0 GHz #Res BW 1 MHz	#VBW 10 Hz	Stop 2.500 000 0 GHz z Sweep 1.287 s (601 pts)	ļ

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RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



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🔆 Agilent 16:42:40		TED, AVG, VERT	r t Fr	eq/Channel
09U12493-1 Ref 128.9 dB µ∨ Peak	#Atten 0 dB	Mkr1 2.483	7 14 dBuV	Center Freq 49175000 GHz
Log 10 dB/ Offst			2.	Start Freq 48350000 GHz
dB			2.	Stop Freq 50000000 GHz
54.0 dBµ∨ LgAv				CF Step 6500000 MHz to Man
M1 S2 S3 FC				Freq Offset 00000000 Hz
×(f): FTun Swp	· · · · · · · · · · · · · · · · · · ·		On	Signal Track <u>Off</u>
Start 2.483 500 0 GH #Res BW 1 MHz	lz #VBW 1	Stop 2.500 (0 Hz Sweep 1.287 s		

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HARMONICS AND SPURIOUS EMISSIONS

vlode: Test Equ		TX, gmode,	L/IVI/H												
		t:													
Ho	orn 1-	18GHz	Pre-ar	nplifer	1-260	Hz	Pre-am	plifer	26-40GH	z	н	orn > 180	SHz		Limit
T59; S	/N: 324	5@3m		Agilent 3				-		-				-	FCC 15.209 🗸
 Hi Frequ	iency Cat	oles —													·
		2807700	12' c	able 2	28076	00	20' ca	ble 22	807500		HPF	Re	ject Filte		<u>k Measurements</u> W=VBW=1MHz
3' ca	ble 228	07700	- 12' ca	ıble 228	07600	-	20' cab	le 2280	7500			• R_	001	• Avera	ge Measurements 1MHz; VBW=10Hz
f	Dist	Road Pla	Read Avg.	AF	CL	Amp	D Corr	Fltr	Peak	Avg	Pk Lim	Aug Tim	Pl: Mar	Avg Mar	Notes
GHz	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	· · ·	dBuV/m	dBuV/m	dB	dB	(V/H)
Low CH 24															Н
4.824 7.236	3.0 3.0	41.4	28.4 28.7	32.8 35.1	5.8 7.2	-34.8 -34.7	0.0 0.0	0.0 0.0	45.1 49.1	32.1 36.3	74	54 54	-28.9	-21.9	H H
1.824	3.0	41.5 40.7	28.7	35.1	7.2 5.8	-34.7	0.0	0.0	49.1	36.3	74 74	54 54	-24.9 -29.6	-17.7 -22.7	<u>н</u> V
7.236	3.0	39.7	27.3	35.1	7.2	34.7	0.0	0.0	47.3	34.9	74	54	-26.7	-19.1	v
															v
Mid CH 24															H
4.874 7.311	3.0 3.0	40.9 40.7	28.4 27.9	32.8 35.2	5.8 7.3	-34.9 -34.7	0.0 0.0	0.0 0.0	44.7 48.5	32.2 35.7	74 74	54 54	-29.3 -25.5	-21.8 -18.3	H H
4.874	3.0	40.7	27.9	32.8	5.8	-34.)	0.0	0.0	46.5	35./ 31.9	74	54 54	-25.5	-18.5	v v
7.311	3.0	40.6	28.3	35.2	73	-34.7	0.0	0.0	48.4	36.1	74	54	-25.6	-17.9	v
								ļ							v
Hi CH 246		41.8	28.5	32.8	59	-34.9	0.0	0.0	45.7	32.4	74	54	-28.3	-21.6	H
4.924 7.386	3.0 3.0	41.8	28.5	32.8	59 73	-34.9	0.0 0.0	0.0	45.7 51.4	32.4 36.8	74 74	54 54	-28.3	-21.0	H H
1924	3.0	43.4	28.3	32.8	59	-34.9	0.0	0.0	45.6	30.5	74	54 54	-22.0	-21.8	V
7.386	3.0	41.5	28.3	35.3	73	-34.6	0.0	0.0	49.5	36.3	74	54	-24.5	-17.7	v
															Н
Rev. 11.10.	08														H
	f	Measureme	ent Frequency	у		Amp	Preamp	Gain				Avg Lim	Average H	Field Strengt	h Limit
		Distance to				-			ct to 3 met	ers				d Strength L	
						Avg			Strength @					. Average L	
		Analyzer R	eacing			-			c Field Stre			Pk Mar			
	Read	Analyzer R Antenna Fa				Peak	Calculate	eu rea	C LIEIO PIL	ingun		T LC TATOR	TATMENT AR	. Peak Limit	

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8.3. RECEIVER ABOVE 1 GHz

Tid5 Agilent 3008A0056 RX RS Bit Frequency Cables 3' cable 22807700 20' cable 22807500 12' cable 22807600 20' cable 22807500 12' cable 22807600 20' cable 22807500 12' cable 22807600 20' cable 22807500 20' cable 22807500 12' cable 22807600 20' cable 22807500 12' cable 22807600 20' cable 22807500 12' cable 22807600 Peak Measure RBW=VBW: Average Mease RBW=1MHz; V Average Mease RBW=1MHz; V Straight Read Avg. AF CL Amp D Corr Fltr Peak Marge Mease RBW=1MHz; V Straight Read Avg. AF CL Amp D Corr Fltr Peak Marge Marge Mease RBW=1MHz; V Straight Read Avg. AF CL Amp D Corr Fltr Peak Marge Marge Mease RBW=1MHz; V Straight Read Avg. AF CL Average Mease RBW=1MHz; V <th></th> <th>uipmen</th> <th></th> <th>Pre-ar</th> <th>nplifer</th> <th>1-26G</th> <th>Hz</th> <th>Pre-am</th> <th>nlifer</th> <th>26-40GH:</th> <th>7</th> <th>н</th> <th>orn > 180</th> <th>SH7</th> <th></th> <th>Limit</th>		uipmen		Pre-ar	nplifer	1-26G	Hz	Pre-am	nlifer	26-40GH:	7	н	orn > 180	SH7		Limit
Image: Control of Cable 22807700 Interpretation of Cable 22807600 Interpretation of Cable 22807600 <th< th=""><th></th><th></th><th></th><th></th><th>· ·</th><th></th><th></th><th></th><th>pinor</th><th></th><th>-</th><th></th><th></th><th>2112</th><th>-</th><th>RX RSS 210</th></th<>					· ·				pinor		-			2112	-	RX RSS 210
f Dist Read Pk Gad Avg. AF CL Amp D Cor Flt Peak Avg Pk Lin Avg Lin Pk Mar Avg Mar Arg Mar <th></th> <th></th> <th></th> <th>12' c</th> <th>able 22</th> <th>280760</th> <th>00</th> <th>20' cat</th> <th>ole 22</th> <th>807500</th> <th></th> <th>HPF</th> <th>Re</th> <th>ject Filte</th> <th></th> <th><u>k Measurements</u> W=VBW=1MHz</th>				12' c	able 22	280760	00	20' cat	ole 22	807500		HPF	Re	ject Filte		<u>k Measurements</u> W=VBW=1MHz
GHz (m) dBuV dBuV dBn dB	3' c	able 220	07700	- 12' ca	ble 2280	7600	•	20' cab	ie 2280	7500 🗸			-			a <u>ge Measurements</u> =1MHz ; VBW=10Hz
840 3.0 43.8 31.7 27.0 3.3 -35.5 0.0 0.0 38.6 26.5 74 54 -35.4 -27.5 460 3.0 41.6 29.3 31.0 4.7 -35.0 0.0 0.0 42.3 30.0 74 54 -35.4 -27.5 134 3.0 45.2 32.7 24.4 25 -36.0 0.0 0.0 36.1 23.6 74 54 -37.7 -24.0 930 3.0 43.6 31.1 27.4 3.4 -35.4 0.0 0.0 38.9 26.4 74 54 -37.7 -30.4 930 3.0 43.5 31.4 31.0 4.7 -35.0 0.0 0.0 38.9 26.4 74 54 -35.1 -27.6 475 3.0 43.5 31.4 31.0 4.7 -35.0 0.0 0.0 44.3 32.2 74 54 -29.7 -21.8 ev.11.1008				-	1 1					1	-		-		-	Notes (V/H)
460 3.0 41.6 29.3 31.0 4.7 -35.0 0.0 0.0 42.3 30.0 74 54 -31.7 -24.0 134 3.0 45.2 32.7 24.4 2.5 -36.0 0.0 0.0 36.1 23.6 74 54 -37.9 -30.4 930 3.0 43.6 31.1 27.4 3.4 -35.4 0.0 0.0 38.9 26.4 74 54 -35.1 -27.6 475 3.0 43.5 31.4 31.0 4.7 -35.0 0.0 0.0 44.3 32.2 74 54 -35.1 -27.6 475 3.0 43.5 31.4 31.0 4.7 -35.0 0.0 0.0 44.3 32.2 74 54 -29.7 -21.8 ev. 11.10.08																H
930 3.0 43.6 31.1 27.4 3.4 -35.4 0.0 0.0 38.9 26.4 7.4 5.4 -35.1 -27.6 475 3.0 43.5 31.4 31.0 4.7 -35.0 0.0 0.0 44.3 32.2 7.4 5.4 -29.7 -21.8 ev. 11.10.08																H
475 3.0 43.5 31.4 31.0 4.7 -35.0 0.0 0.0 44.3 32.2 74 54 -29.7 -21.8 ev. 11.10.08																v
																v v
	ev. 11.1(D.08					<u>I</u>		L	11		1				
		f			9			-					-	-	-	
Read Analyzer Reading Avg Average Field Strength @ 3 m Avg Mar Margin vs. Average Limit AF Antenna Factor Peak Calculated Peak Field Strength Pk Mar Margin vs. Peak Limit			-	~												
CL Cable Loss HPF High Pass Filter											igui		F K. Iviai	Iviai gui va	. FCaR LAIII	L

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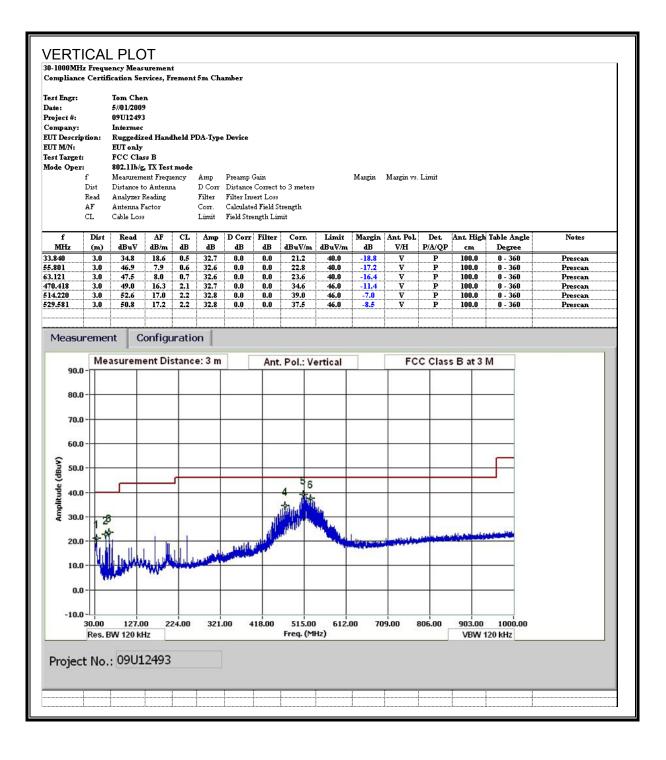
8.4. WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

-	e Certif	ication Se		remoni	5m Ch	amber									
t Engr: te:		Tom Che 05/01/09	n												
ject #:		09U1249													
mpany: I Descri	ption:	Intermed Ruggedia		held P	DA-Type	Device									
I M/N	_	EUT only													
t Targe de Opei		FCC Cla 802.11b/§		mada											
ue Ope.	f	Measuren			Amp	Preamp (Gain			Margin	Margin vs	. Limit			
	Dist	Distance t		a	D Corr Filter			to 3 meters							
	Read AF	Analyzer Antenna l			Corr.	Filter Ins Calculate		rength							
	CL	Cable Los	5		Limit	Field Stre									
f MHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filter dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant. Higl cm	n Table Angle Dogmoo	Notes
.603	(m) 3.0	38.0	ab/m 12.7	ав 1.0	ab 32.6	0.0	مە 0.0	abuv/m 19.1	43.5	-24.4	H	PADQP	cm 100.0	Degree 0 - 360	Prescan
.165	3.0	44.5	13.0	1.1	32.6	0.0	0.0	26.0	43.5	-17.5	H	P	100.0	0 - 360	Prescan
.445 .489	3.0 3.0	41.3 43.3	11.3 11.8	1.1 1.4	32.6 32.6	0.0 0.0	0.0 0.0	21.1 23.9	43.5 46.0	-22.4 -22.1	H H	P P	100.0 100.0	0 - 360 0 - 360	Prescan Prescan
.620	3.0	42.0	17.0	2.2	32.8	0.0	0.0	28.3	46.0	-17.7	H	P	100.0	0 - 360 0 - 360	Prescan Prescan
.461	3.0	41.8	17.2	2.2	32.8	0.0	0.0	28.4	46.0	-17.6	H	Р	100.0	U - 36U	rrescan
40. 50. 40. 30. 20.	0		2	4				56	.b1					5	
duy 20.		Number			Juliya							iste shudei	alara i denda	gungtal na velite	
0. -10.															
-20.	30.00 Res. I	127.0 3W 120 ki	Hz	24.00	321	.00 4	18.00	515.00 Freq. (Mi		00 70	9.00 i	806.00	903.00 VBW	1000.00 120 kHz	
herior	t No.	: 09U1	.2493												

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SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)



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