

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

CERTIFICATION TEST REPORT*

FOR

RUGGEDIZED HANDHELD PDA-TYPE COMPUTER W/ DUAL-BAND CDMA, 802.11B/G & BT

MODEL NUMBER: CN4-C, CN4e-C**

FCC ID: EHA-04CN4 IC: 1223A-02CN4

REPORT NUMBER: 09U12671-3, Revision B

ISSUE DATE: OCTOBER 09, 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
	07/28/09	Initial Issue	F. Ibrahim
А	07/28/09	Revised model numbers per client's request.	A. Zaffar
В	10/09/09	Added average power for 11g mode in section 7.1.4 Added a justification of testing radiated emissions for 11b mode as worst-case mode in section 5.6	F. Ibrahim

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	INTERMEC TECHNOLOGIES CC 550 SECOND STREET SE CEDAR RAPIDS, IOWA, 52401, U					
EUT DESCRIPTION: RUGGEDIZED HANDHELD PDA-TYPE DEVICE w/ DUA GSM/GPRS/WCDMA/HSDPA, 802.11 b/g & BT						
MODEL: CN4-C, CN4e-C						
SERIAL NUMBER: 03590990181, 03590990054						
DATE TESTED:	APRIL 27 – MAY 11, 2009					
APPLICABLE STANDARDS						
ST	ANDARD	TEST RESULTS				
	Part 15 Subpart C*	Pass				

CFR 47 Part 15 Subpart C*PassINDUSTRY CANADA RSS-210 Issue 7 Annex 8PassINDUSTRY CANADA RSS-GEN Issue 2Pass

* 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, with dual band CDMA, 802.11b/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.

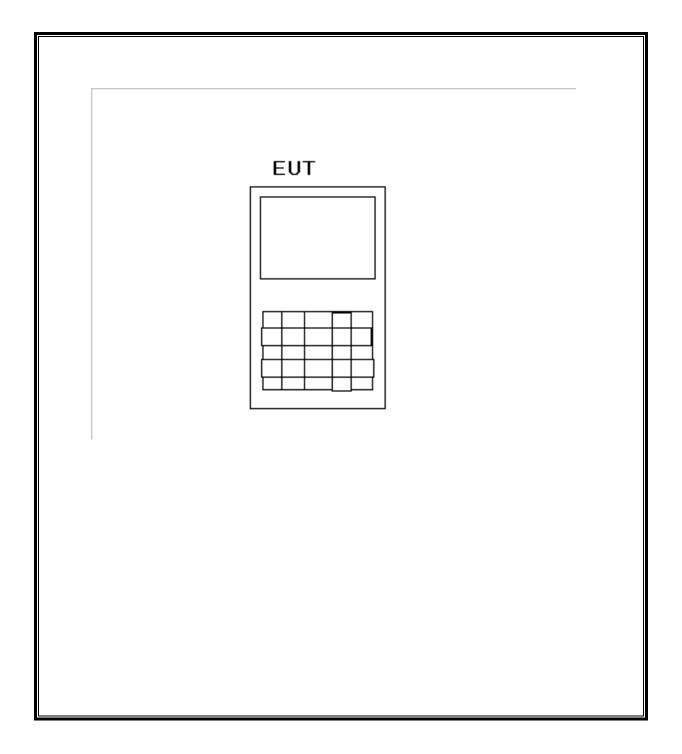
Radiated emissions were performed for 11b because the output power is higher than that of 11g mode.

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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

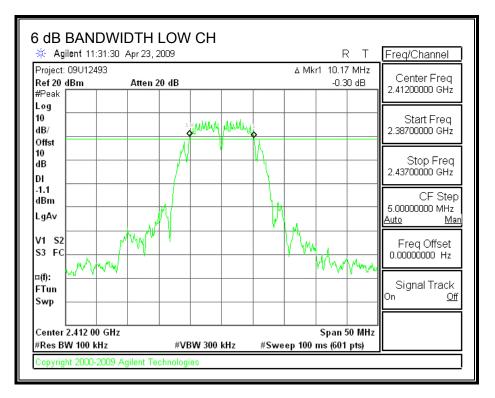
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

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

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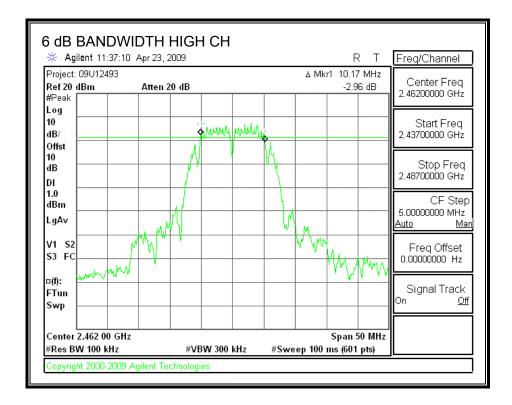
6 dB BANDWIDTH



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🔆 Agilent 11:35:01	Apr 23, 2009			R		Freq/Channel
Project: 09U12493 Ref 20 dBm #Peak	Atten 20 dB		۸ ک 	/lkr1 10.08 1.1	MHz 6 dB	Center Freq 2.43700000 GHz
Log 10 dB/	15	MMM MMM	¢			Start Freq 2.41200000 GHz
Offst 10 dB	M		h.			Stop Freq 2.46200000 GHz
DI 0.8 dBm LgAv						CF Step 5.0000000 MHz Auto Ma
V1 S2 S3 FC	my with		M	du .		<u>Auto Ma</u> Freq Offset 0.00000000 Hz
¤(f): FTun Swp				1 WW	r~w	Signal Track On <u>Of</u> f
Center 2.437 00 GHz #Res BW 100 kHz	#\/P	W 300 kHz	#Sweep 10	Span 5		

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7.1.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

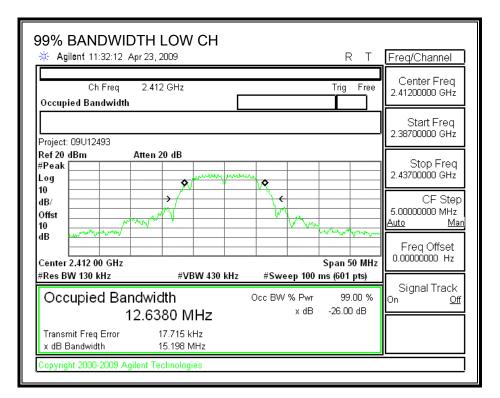
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

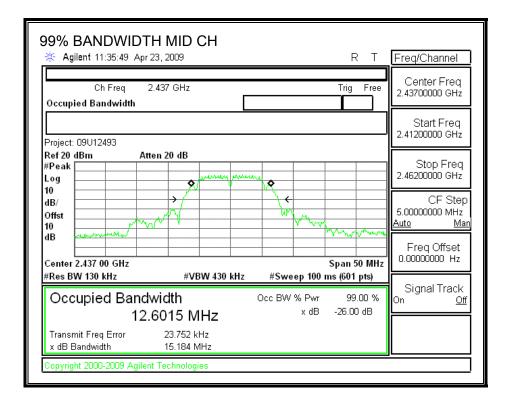
Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
Low	2412	12.6380
Middle	2437	12.6015
High	2462	12.6195

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99% BANDWIDTH



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99% BANDWIDTH HI			RТ	Freq/Channel
Ch Freq 2.462 GH			Trig Free	Center Freq 2.46200000 GHz
Project: 09U12493				Start Freq 2.43700000 GHz
Ref 20 dBm Atten 20 d #Peak	B	M		Stop Freq 2.48700000 GHz CF Step
Offst 10 dB			m	5.00000000 MHz <u>Auto Man</u> Freq Offset 0.00000000 Hz
Center 2.462 00 GHz #Res BW 130 kHz	#VBW 430 kHz	#Sweep 100 i	Span 50 MHz ns (601 pts)	
Occupied Bandwidth 12.6195		Occ BW % Pwr x dB		Signal Track On <u>Off</u>
	D kHz 69 MHz			
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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

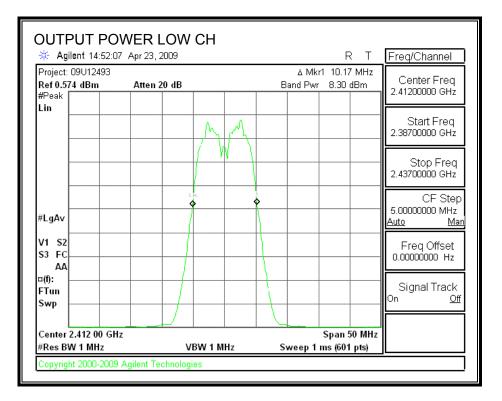
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

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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-	lent 14:54:29 /	Apr 23, 2	:009					R	 Freq/Channel
Ref 0.57		Atten 2	0 dB			В	∆ Mkr and Pwr	1 10.17 8.43 c	 Center Freq 2.43700000 GHz
	Center 2.437000	0000	GHz	Δ.					 Start Freq
				77					 2.41200000 GHz
				['					 Stop Freq 2.46200000 GHz
#LgAv				R.		>			 CF Step 5.00000000 MHz <u>Auto Ma</u> i
V1 S2									 Freq Offset
S3 FC AA ¤(f):									 0.00000000 Hz
FTun Swp						1			 Signal Track On <u>Off</u>
	2.437 00 GHz N 1 MHz			BW 1 M	H7		weep 1	Span 5 ms /601	

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🔆 Agilent 14:56:21	Apr 23, 2009	R T	Freq/Channel
Project: 09U12493 Ref 0.574 dBm #Peak	Atten 20 dB	∆ Mkr1 10.17 MHz Band Pwr 8.15 dBm	Center Freq 2.46200000 GHz
Lin	A A		Start Freq 2.43700000 GHz
			Stop Freq 2.48700000 GHz
#LgAv	1R (>	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>Of</u>
Center 2.462 00 GHz #Res BW 1 MHz	VBW 1 MHz	Span 50 MHz Sweep 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.

11b mode

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

11g mode

Channel	Frequency	Power
	(MHz)	(dBm)
Low	2412	14.10
Middle	2437	14.20
High	2462	14.40

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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

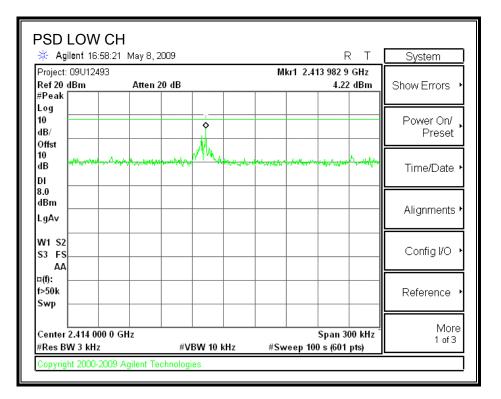
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

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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🔆 Agile			Vlay 8, 2	2009					R		Freq/Channel
Project: 09 Ref 20 dB #Peak		93	Atten 2	20 dB			м	kr1 2.43	5 392 2 -9.03		Center Freq 2.43545000 GHz
Log 10 dB/ Offst											Start Freq 2.43530000 GHz
10 dB DI	Mray	YIYin yu	Mplwy	¢ Miliji (Miliji)	Muruy	Nut Market	(driftingher)	1/2.14MM	n/hyw/h	hrmling	Stop Freq 2.43560000 GHz
8.0 dBm LgAv											CF Step 30.0000000 kHz <u>Auto Ma</u> i
V1 S2 S3 FS AA											Freq Offset 0.00000000 Hz
¤(f): — f>50k Swp —											Signal Track On <u>Off</u>
Center 2. #Res BW		0 0 GH	z	#V	BW 10 I	KH7	#Sw	eep 100	Span 30 s <i>(</i> 601		

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🔆 Agilent	17:21:18	May 8, 2009					R	Т	Freq/Channel
Project: 09U Ref 20 dBm #Peak		Atten 20 d	B		м	kr1 2.46	3 970 4 (-8.23 (Center Freq 2.46390000 GHz
Log 10 dB/ Offst									Start Freq 2.46375000 GHz
10	www.	1/1/1/1-1/4/1/1	www.ww	NV VITWIN	nyv.hhimy		hy hyrithryphil	1. M	Stop Freq 2.46405000 GHz
8.0 dBm LgAv									CF Step 30.0000000 kHz <u>Auto Mar</u>
W1 S2 S3 FS									Freq Offset 0.00000000 Hz
¤(f): f>50k Swp									Signal Track On <u>Off</u>
Center 2.46 #Res BW 3		lz	#VBW 10	kHz	#Sw		Span 30() s (601 p		

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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

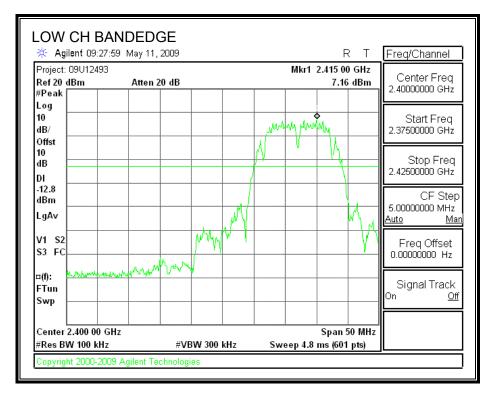
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

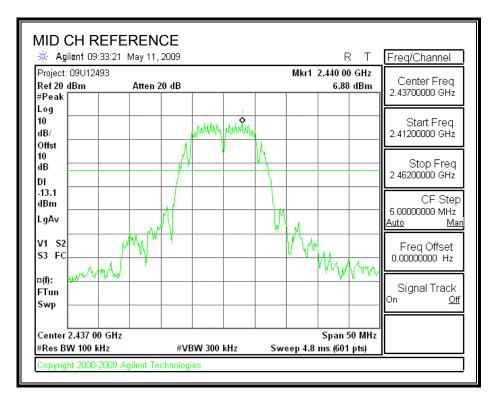


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Project: 09U					Mk	ar3 7.250		Freq/Cha Center	
Ref 20 dBm #Peak		Atten 20	dB			-50.74 d	IBm	13.0150000	
Log 10 dB/ Offst								Start 30.0000000	
dB	1	3						Stop 26.000000	
-12.8 dBm			real of the second s	Marile and the second second	har war	manun		CF 2.59700000	- Step) GHz
LgAv								<u>Auto</u>	Ma
Center 13.0 #Res BW 10			#VBW 300 I	kHz Sw	Sp eep 2.482	an 25.97 s (1001 pi		Freq O	
Marker	Trace	Туре		Axis	•	Amplitud		0.000000	JHZ
	(1) (1)	Freq Freq Freq	4.8	14 GHz 34 GHz 50 GHz		-50.26 dBm -54.46 dBm -50.74 dBm		Signal ⁻ On	Frack Off
1 2 3	ů	rieg	7.2						

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SPURIOUS EMISSIONS, MID CHANNEL

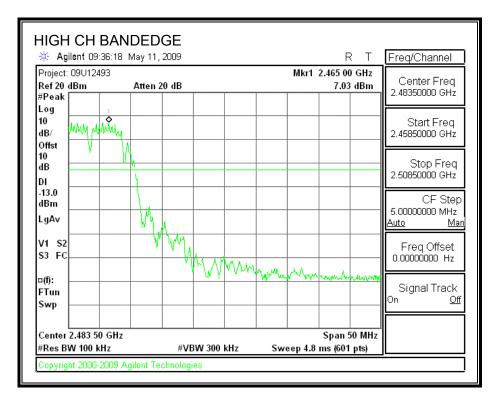


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Project: 090 Ref 20 dBn		Atten 20	dB			Mk	ur3 7.30 -51.06		Center 13.015000	
#Peak Log									13.013000	
10									Start 30.000000	
Offst									30.000000	O IVITIE
10 dB										Freq
DI	1	2 3							26.000000	0 GHz
-13.1	A MARK			a prove lanar	ميد مدين معامير المعالية	Latting and set		age and the spectrum		F Step
LgAv									2.5970000 <u>Auto</u>	UGHz <u>Ma</u>
Center 13.0	015 GHz					Sp	an 25.9	7 GHz		
#Res BW 1	00 kHz		#VBW 300	kHz	Swee	p 2.482 s	s (1001	pts)	Freq C	
Marker 1	Trace (1)	Type Freg		X Axis 614 GHz			Amplitu -51.38 dB			
2	(1)	Freq		886 GHz			-54.56 dB		Signal	Track
3	(1)	Freq	7.	302 GHz			-51.06 dB	m	On	Off

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SPURIOUS EMISSIONS, HIGH CHANNEL



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Project: 09U12	9:37:28 May 11	, 2005	Mbr2	R T 7.380 GHz	Freq/Channel
Ref 20 dBm #Peak	Atten	20 dB		9.37 dBm	Center Freq 13.0150000 GHz
Log 10 dB/ Offst					Start Freq 30.0000000 MHz
10 dB DI \diamond					Stop Freq 26.000000 GHz
-13.0 dBm	And and a		munica	and and a second and a second and a second and a second a	CF Step 2.59700000 GHz
LgAv					<u>Auto Mar</u>
Center 13.015 #Res BW 100		#VBW 300 kHz	Span Sweep 2.482 s (10	25.97 GHz 001 pts)	Freq Offset 0.00000000 Hz
	Trace Type	X Axis		nplitude	0.00000000 Hz
2	(1) Freq (1) Freq (1) Freq	1.640 GHz 4.912 GHz 7.380 GHz	-52.9	7 dBm 18 dBm 17 dBm	Signal Track On <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.

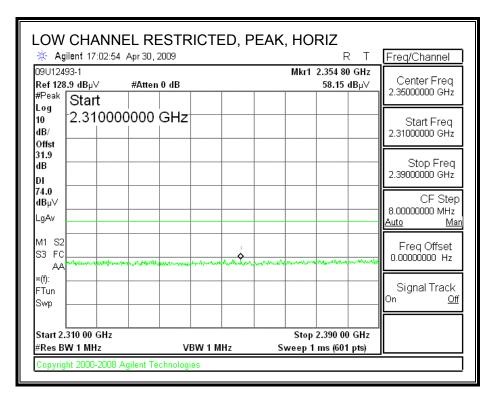
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

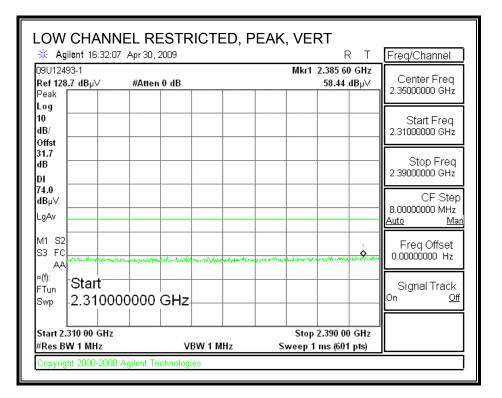


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_OW CHANN Agilent 17:03:4	NEL RESTRICTE	D, AVG, HORIZ	Freq/Channel
09∪12493-1 Ref 128.9 dBµ∨ #Peak	#Atten 0 dB	Mkr1 2.390 00 GHz 45.80 dBµ∀	Center Freq 2.35000000 GHz
Log 10 dB/ Offst			Start Freq 2.31000000 GHz
31.9 dB			Stop Freq 2.39000000 GHz
54.0 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
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 (LOW CHANNEL, VERTICAL)

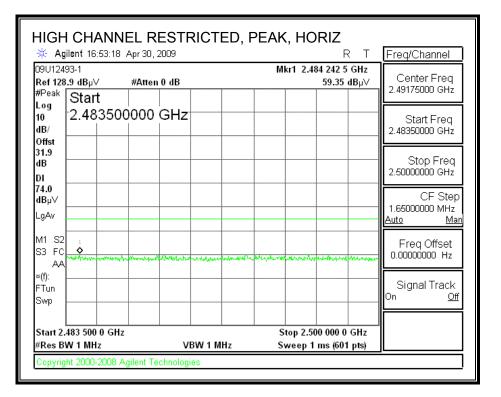


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_OW CHANN	NEL RESTRICTEI	D, AVG, VERT	Freq/Channel
09U12493-1 Ref 128.7 dBµ∨ Peak	#Atten 0 dB	Mkr1 2.390 00 GHz 45.98 dBµ∀	Center Freq 2.3500000 GHz
Log 10 dB/ Offst			Start Freq 2.31000000 GHz
31.7 dB			Stop Freq 2.39000000 GHz
54.0 dBµ∨ LgAv			CF Step 8.00000000 MHz Auto Man
M1 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 H;	Stop 2.390 00 GHz z Sweep 6.238 s (601 pts)	

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RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

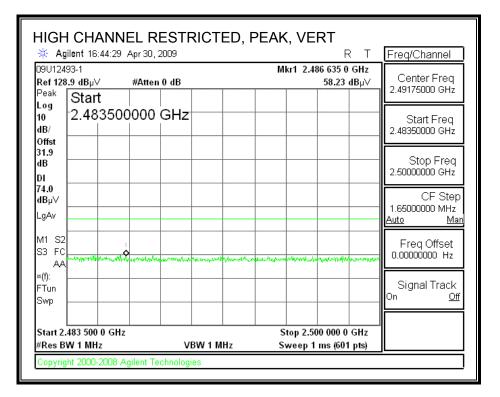


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🔆 Agilent 16:54:1	5 Apr 30, 2009			RT	Freq/Channel
D9∪12493-1 Ref 128.9 dB µ∨ #Peak	#Atten 0 dB		Mkr1 2.	483 610 0 GHz 46.57 dBµ∨	Center Freq 2.49175000 GHz
Log 10 dB/					Start Freq 2.48350000 GHz
Offst 31.9 dB					Stop Freq 2.50000000 GHz
54.0 dBµ∨					CF Step 1.6500000 MHz
LgAv					Auto Mar Freq Offset
S3 FC AA					0.00000000 Hz
FTun Swp					Signal Track On <u>Off</u>
Start 2.483 500 0 G #Res BW 1 MHz	Hz #VBW	10 Hz	•	500 000 0 GHz 87 s (601 pts)	1

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RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



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🔆 Agilent 16:45:	17 Apr 30, 2009	R T	Freq/Channel
D9U12493-1 Ref 128.9 dBµ∨ ⊃eak	#Atten 0 dB	Mkr1 2.483 500 0 GHz 45.72 dBµ∀	Center Freq 2.49175000 GHz
Log 10 dB/			Start Freq 2.48350000 GHz
Offst 31.9 dB			Stop Freq 2.5000000 GHz
54.0 dBµ∨ _qAv			CF Step 1.6500000 MHz Auto Ma
V1 S2 S3 FC			<u>Auto Ma</u> Freq Offset 0.00000000 Hz
AA «(f): =Tun Swp			Signal Track On <u>Off</u>
Start 2.483 500 0 0 #Res BW 1 MHz	Hz #VBW 10 H	Ŝtop 2.500 000 0 GHz z Sweep 1.287 s (601 pts)	

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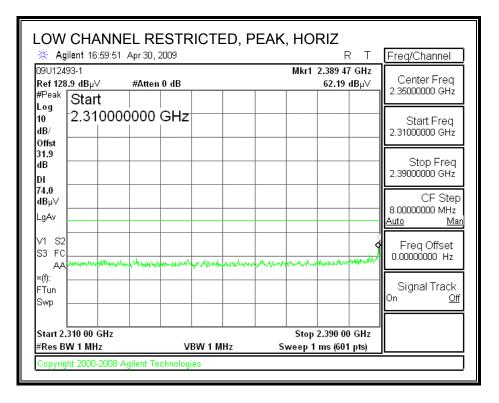
HARMONICS AND SPURIOUS EMISSIONS

Complia	~	- ·	[,] Measurem Services, Fr		5m Ch	amber									
•															
Compan Project #		Intermec 09U12493													
roject # late:	4 :	4/30/2009													
	gineer:	Tom Chen													
		EUT only													
fode:		TX, b mode,	L/M/H												
est Eq	uipmen	<u>it:</u>													
н	orn 1-	18GHz	Pre-ar	nplifer	1-260	SHz	Pre-am	plifer	26-40GH	z	н	orn > 18(GHz		Limit
T59; S	5/N: 324	5 @3m	- T145 A	Agilent 3	008800	056 🖵				-				-	FCC 15.209 -
— Hi Freq	uency Ca	bles	1												
		22807700	12' c	able 2	28076	00			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			• R_	001		a <u>ge Measurements</u> =1MHz ; VBW=10Hz
f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Сон	Fltr	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes
GHz	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	(V/H)
o mode															
ow CH 2- .824	412 MH 3.0	z 41.5	34.5	32.8	5.8	-34.8	0.0	0.0	45.2	38.2	74	54	-28.8	-15.8	H H
.824 .236	3.0	41.5	34.5	35.1	7.2	-34.6	0.0	0.0	45.2	38.2 41.9	74 74	54 54	-26.6 -24.5	-12.1	H
824	3.0	41.3	33.8	32.8	5.8	-34.8	0.0	0.0	45.0	37.5	74	54	-29.0	-16.5	v
.236	3.0	41.3	33.8	35.1	7.2	-34.7	0.0	0.0	48.9	41.4	74	54	- 25.1	-12.6	v
															V
lid CH 24 1874	437 MH 3.0	41.1	33.6	32.8	5.8	-34.9	0.0	0.0	44.9	37.4	74	54	-29.1	-16.6	H 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	Н
.874	3.0	41.7	33.6	32.8	5.8	-34.9	0.0	0.0	45.5	37.4	74	54	-28.5	-16.6	v
311	3.0	43.1	37 <i>.</i> 3	35.2	73	-34.7	0.0	0.0	50.9	45.1	74	54	- 23.1	-8.9	v
i CH 240	52 MHz														V H
924	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	46.3	40.3	35.3	73	-34.6	0.0	0.0	54.3	48.3	74	54	-19.7	-5.7	Н
924	3.0	43.7	37.2	32.8	59	-34.9	0.0	0.0	47.6	41.1	74	54	-26.4	-129	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
															H H
lev. 11.10	.08						A						A		
	f	Maggirero	ent Frequenc			Amp	Preamp (Tain				Aura Tim	Auerage	Field Strengt	th T insit
	Dist	Distance to		,		-	-		et to 3 mete	er c		Pk Lim	-	d Strength L	
		Analyzer R				Avg			Strength @					: Average L	
	AF	Antenna Fa				Peak	-		c Field Stre					: Peak Limit	
	CL	Cable Loss				HPF	High Pas					T 1C 14100	21200 2011 1/3		*
							0 us								

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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)

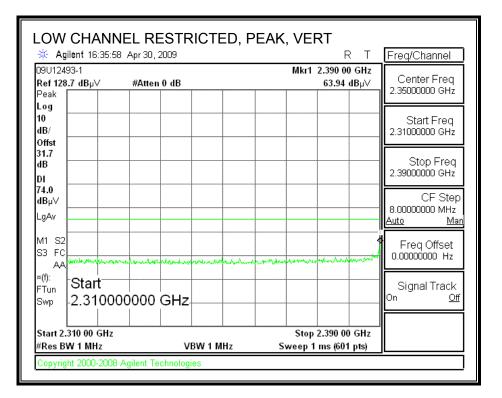


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OW CHAN	NEL RESTRICTE	D, AVG, HORIZ	Freq/Channel
09U12493-1 Ref 128.9 dBµ∀ #Peak	#Atten 0 dB	Mkr1 2.390 00 GHz 46.60 dBµ∀	Center Freq 2.35000000 GHz
Log 10 dB/			Start Freq 2.31000000 GHz
Offst 31.9 dB DI			- Stop Freq 2.39000000 GHz
54.0 dBµ∨ LgAv			CF Step 8.00000000 MHz <u>Auto Man</u>
V1 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 (LOW CHANNEL, VERTICAL)

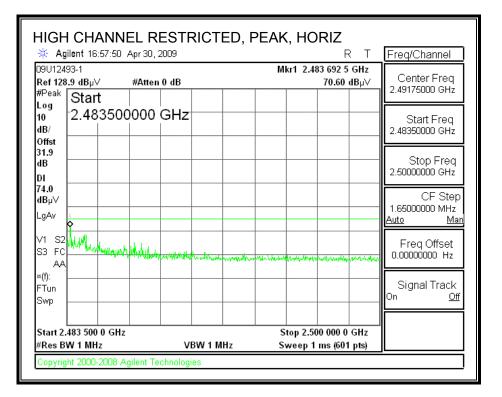


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🔆 Agilent 16:37	:41 Apr 30, 2009	RT	Freq/Channel
09∪12493-1 Ref 128.7 dB µ∨ Peak	#Atten 0 dB	Mkr1 2.389 60 GHz 45.91 dBμ∀	Center Freq 2.35000000 GHz
Log 10 dB/ Offst			Start Freq 2.31000000 GHz
dfist 31.7 dB DI			- Stop Freq 2.39000000 GHz
54.0 dBµ∨ LgAv			CF Step 8.00000000 MHz Auto Mar
M1 S2			Freq Offset 0.00000000 Hz
»(f): FTun Swp			Signal Track On <u>Off</u>
Start 2.310 00 GH #Res BW 1 MHz	z #VBW 10 H	Stop 2.390 00 GHz z Sweep 6.238 s (601 pts)	

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RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

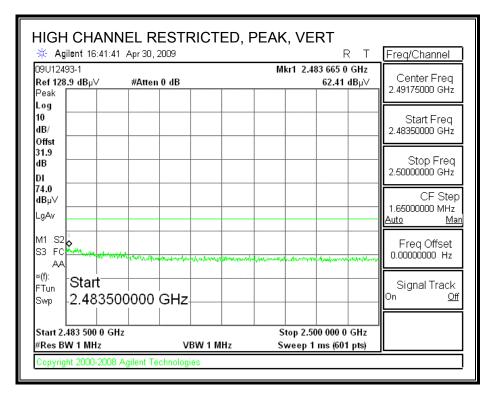


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		ED, AVG, HORIZ		
🔆 Agilent 16:56:51	I Apr 30, 2009		RT	Freq/Channel
09∪12493-1 Ref 128.9 dBµ∨ #Peak	#Atten 0 dB	Mkr1 2.483 (4	610 0 GHz 8.61 dBµ∀	Center Freq 2.49175000 GHz
Log 10 dB/				Start Freq 2.48350000 GHz
Offst 31.9 dB				Stop Freq 2.5000000 GHz
DI 54.0 dBµ∨				CF Step 1.6500000 MHz
LgAv M1 S2				<u>Auto Man</u>
S3 FC				Freq Offset 0.00000000 Hz
×(f): FTun Swp				Signal Track On <u>Off</u>
Start 2.483 500 0 GF #Res BW 1 MHz	lz #VBW 10	Stop 2.500 (Hz Sweep 1.287 s		
	Agilent Technologies		(001 (70)	

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RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



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🔆 Agilent 16:42:4	10 Apr 30, 2009	R	T Freq/Channel
D9U12493-1 Ref 128.9 dB µ∨ Peak	#Atten 0 dB	Mkr1 2.483 527 5 GH 47.14 dBµ	- II. Contor Eron
Log 10 dB/			Start Freq 2.48350000 GHz
Offst 31.9 dB			Stop Freq
DI			CF Step
LgAv M1 S2			<u>Auto Ma</u>
53 FC			Freq Offset 0.00000000 Hz
«(f): Tun Swp			Signal Track
Start 2.483 500 0 G #Res BW 1 MHz	Hz #VBW 10	Stop 2.500 Ô00 0 GH Hz Sweep 1.287 s (601 pts)	

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HARMONICS AND SPURIOUS EMISSIONS

amplia	-		' Measurem Services, Fr		Sm Ch	amhar									
.ompiia	nce Ce	rtification	Services, Fr	emont	sm Ch	amber									
Company		Intermec													
Project #		09U12493													
Date:		4/30/2009 Tom Chen													
	-	EUT only													
Vlode:		TX, gmode,	L/M/H												
Fest Equ	inmeni														
		18GHz	Bre or	nplifer	1 260	24-	Dre om	nlifer	26-40GH	-	u	orn > 18	004-		Limit
				· ·			Fie-an	piner	20-4001	<u> </u>			5012		
T59; S	/N: 3245	6@3m	- T145 A	Agilent 3	008A0	056 -				-				-	FCC 15.209
- Hi Frequ	uency Cab	les													
3' c	able 2	2807700	12' c	able 2	28076	000	20' ca	ble 22	2807500		HPF	R	eject Filte		<u>k Measurements</u> W=VBW=1MHz
3' ca	ble 228	07700	- 12' ca	ıble 228	07600	•	20' cab	le 2280	07500 🗸			- F	t_001	Avera	n <u>ge Measurements</u> =1MHz ; VBW=10Hz
											1				
f	Dist		Read Avg.	AF	CL	Amp	D Corr	1	Peak	Avg	Pk Lim	-	1	Avg Mar	
GHz Low CH 24	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/n	<u>dB</u>	dB	(V/H) H
1.824	3.0	41.4	28.4	32.8	5.8	-34.8	0.0	0.0	45.1	32.1	74	54	-28.9	-21.9	H
7.236	3.0	41.5	28.7	35.1	7.2	-34.7	0.0	0.0	49.1	36.3	74	54	-24.9	-17.7	Н
824	3.0	40.7	27.6	32.8	5.8	-34.8	0.0	0.0	44.4	31.3	74	54	-29.6	-22.7	V
.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
Mid CH 24	37 MHz													1	Ĥ
1.874	3.0	40.9	28.4	32.8	5.8	-34.9	0.0	0.0	44.7	32.2	74	54	-29.3	-21.8	Н
311 874	3.0 3.0	40.7	27.9 28.1	35.2 32.8	7.3 5.8	-34.7 -34.9	0.0 0.0	0.0 0.0	48.5 44.3	35.7 31.9	74 74	54 54	-25.5	-18.3 -22.1	H V
311	3.0	40.5	28.3	35.2	5.6 7.3	-34.9	0.0	0.0	44.5	36.1	74	54 54	-29.7	-17.9	v
															v
Hi CH 246															H
924 7 3 86	3.0 3.0	41.8 43.4	28.5 28.8	32.8 35.3	59 73	-34.9 -34.6	0.0 0.0	0.0 0.0	45.7 51.4	32.4 36.8	74 74	54 54	-28.3 -22.6	-21.6 -17.2	H H
.380 1.924	3.0 3.0	43.4	28.3	32.8	59	-34.0	0.0	0.0	45.6	30.8	74 74	54 54	-22.0	-17.2	л 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
						l			1		L				H
Rev. 11.10.	f Dist Read AF	Distance to Analyzer R Antenna Fa	eading actor	у		Avg Peak	Average Calculate	Corre Field : ed Peal	ct to 3 mete Strength @ k Field Stre	3 m		Pk Lim Avg Mar	Peak Fiel Margin ve	Field Strengt d Strength L s. Average L s. Peak Limi	.imit .imit
	CL	Cable Loss	:			HPF	High Pas	s Filter	r						

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8.3. RECEIVER ABOVE 1 GHz

ter Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz; VBW=10Hz		18GHz	orn > 180	Но	z	26-40GH	u lifer						<u>.t:</u>	uipmen	est E
RX RSS 210 RX RSS 210 REWEVEWEIMHz Average Measurements		18GHz	orn > 18(Но	z	26-40GH	-								
ter Peak Measurements RBW=VBW=1MHz Average Measurements							piirer	Pre-am	Hz	1-26G	mplifer	Pre-ar	18GHz	orn 1-	H
RBW=VBW=1MHz	Filter I				-)56 🖵	3008A00	Agilent 3	- T145 A	5 @3m	S/N: 324	T59;
		Reject Filt	Re	HPF		807500	ble 22	20' cal	00	28076	cable 22	12' c	bles	quency Ca cable 2	
			-			7500 -	le 2280	20' cab	•	07600	able 2280	. 12' ca	307700	able 22	3,
r Avg Mar Notes dB (V/H)	-	1	-		Avg dBuV/m	Peak dBuV/m	Fltr dB	D Corr dB	Amp dB	CL dB	. AF dB/m	Read Avg. dBuV	Read Pk dBuV	Dist (m)	f ;Hz
-30.8 H -27.5 H			54 54	74 74	23.2 26.5	35.1 38.6	0.0 0.0	0.0 0.0	-36.1 -35.5	2.4 3.3	24.0 27.0	32.9 31.7	44.8 43.8	3.0 3.0	31 40
-24.0 H	.7 -24.0	-31.7	54	74	30.0	42.3	0.0	0.0	-35.0	4.7	31.0	29.3	41.6	3.0	50
-30.4 V -27.6 V			54 54	74 74	23.6 26.4	36.1 38.9	0.0 0.0	0.0 0.0	-36.0 -35.4	2.5 3.4	24.A 27.A	32.7 31.1	45.2 43.6	3.0 3.0	34 30
-21.8 V			54	74	32.2	44.3	0.0	0.0	-35.0	4.7	31.0	31.4	43.5	3.0	75
			4	i		i	i			L).08	7. 11.1
Field Strength Limit	age Field Str	m Average	Avg Lim					Preamp (Amp		y	nt Frequency	Measureme	f	
eld Strength Limit	-												Distance to	Dist	
9			<u> </u>			~ ~		<u> </u>	~			0	-		
5. I Care Dani	µi (s. i carci	i iviaighi (I R. IVIAI		ngun			High Pas:	HPF				Cable Loss	CL	
-	Field Streng in vs. Averag	n Peak Fie Iar Margin v	Pk Lim Avg Mar		3 m	ot to 3 mete (trength @ 1 Field Stre	Correc Field S ed Peak	Distance Average Calculate	D Corr Avg Peak		у	Antenna eading ctor	Distance to Analyzer Re Antenna Fa	Dist Read AF	

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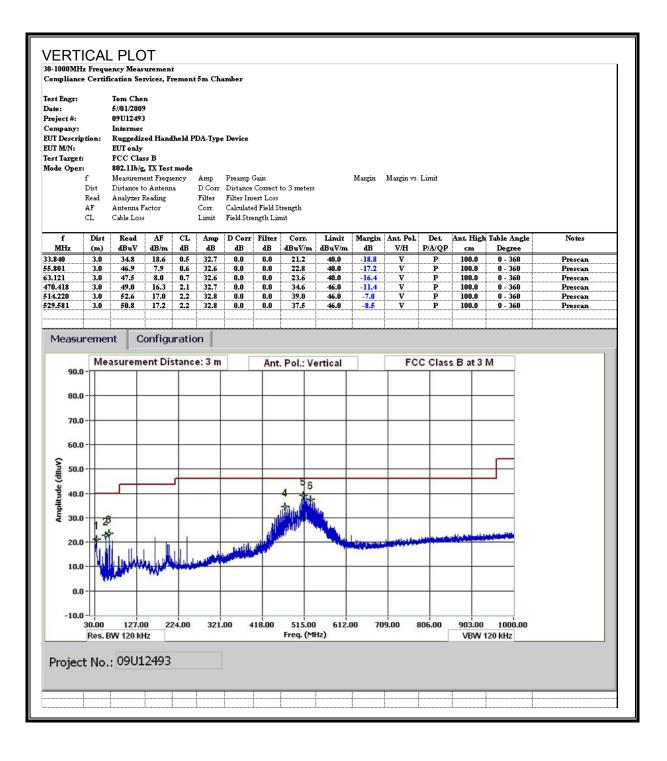
8.4. WORST-CASE BELOW 1 GHz

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

est Engr:		ication Se Tom Che													
ate:		05/01/09													
oject #: ompany:		09U1249 Intermed													
JT Descri	ption:	Ruggedia		lheld P	DA-Type	• Device									
JT M/N:	-	EUT only													
est Targe ode Oper		FCC Cla 802.11b/§		mada											
oue ope	f	Measurer			Amp	Preamp	Gain			Margin	Margin vs.	Limit			
	Dist	Distance t		a				to 3 meters							
	Read AF	Analyzer Antenna l	-		Filter Corr.	Filter Ins Calculate									
	CL	Cable Los			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. High cm	Table Angle Degree	Notes
14.603	3.0	38.0	12.7	1.0	32.6	0.0	0.0	19.1	43.5	-24.4	Н	Р	100.0	0 - 360	Prescan
13.165 57.445	3.0 3.0	44.5 41.3	13.0 11.3	1.1 1.1	32.6 32.6	0.0 0.0	0.0 0.0	26.0 21.1	43.5 43.5	-17.5 -22.4	H H	P P	100.0 100.0	0 - 360 0 - 360	Prescan Prescan
13.489	3.0	43.3	11.5	1.4	32.6	0.0	0.0	23.9	46.0	-22.1	H	P	100.0	0 - 360	Prescan
10.620 19.461	3.0 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
.7.401	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 - JÖU	Prescan
70. 60. 50. 40. 30. 20. 20.	0 0		2 43	<u>م</u>				56						5	
duy 20.					International	h shi ka						lete school of			
0.															
-10. -20.	0 - 30.00	127.0		24.00	321	.00 4	18.00	515.00		00 70	9.00 8	806.00	903.00	1000.00	
		BW 120 ki				in and a second s		Freq. (MI	Hz)				VBW 1	120 kHz	

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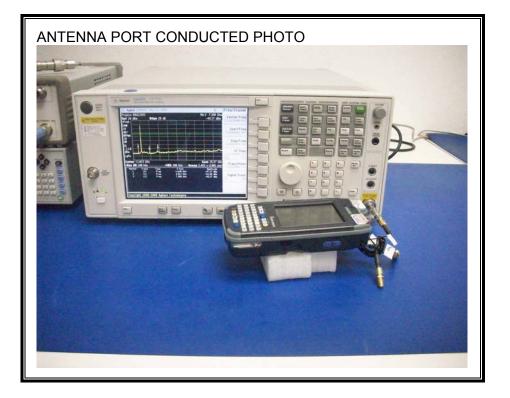
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)



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9. SETUP PHOTOS

ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP



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RADIATED RF MEASUREMENT SETUP FOR PORTABLE CONFIGURATION



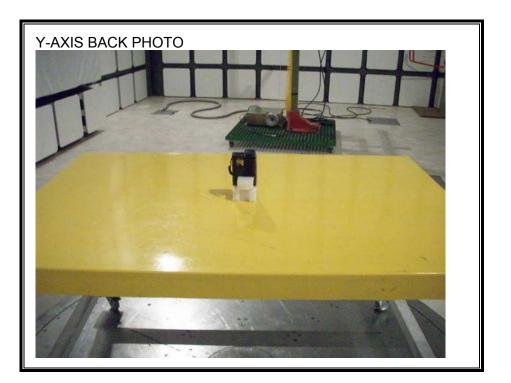
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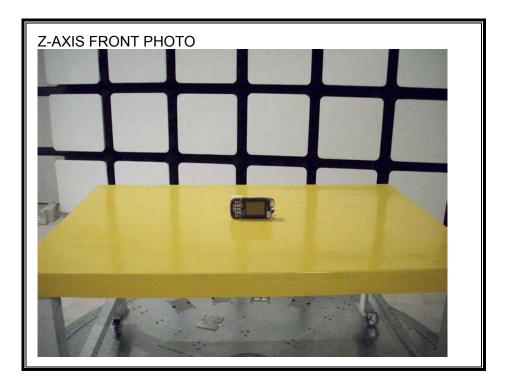
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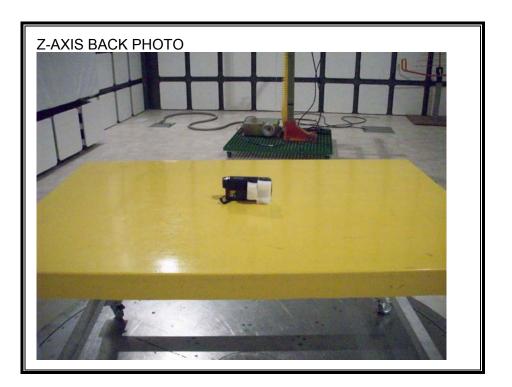
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END OF REPORT

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