

FCC CFR 47 PART 90 SUBPART Y INDUSTRY CANADA RSS-111 ISSUE 2

CERTIFICATION TEST REPORT

FOR

4.9 GHz Radio Module

MODEL: ExtendAir 4.9GHz RF

FCC ID: TTM-104P94N IC: 6254A-104P94N

REPORT NUMBER: 09U12981-1, Revision B

ISSUE DATE: FEBRUARY 3, 2010

Prepared for EXALT COMMUNICATIONS 580 DIVISION STREET CAMPBELL CA, 95008, USA

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

(R)

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
	1/28/2010	Initial Issue	M. Heckrotte
А	1/29/2010	Revised MPE Calculations, Added preliminary test results	M. Heckrotte
В	2/3/2010	Clarified description and model numbers	M. Heckrotte

Page 2 of 76

TABLE OF CONTENTS

1.	ATT	ESTATION OF TEST RESULTS5
2.	TES	T METHODOLOGY6
3.	FAC	ILITIES AND ACCREDITATION6
4.	CAL	IBRATION AND UNCERTAINTY6
4	.1.	MEASURING INSTRUMENT CALIBRATION
4	.2.	SAMPLE CALCULATION
4	.3.	MEASUREMENT UNCERTAINTY
5.	EQU	IPMENT UNDER TEST7
5	.1.	DESCRIPTION OF EUT
5	.2.	MAXIMUM OUTPUT POWER7
5	.3.	DESCRIPTION OF AVAILABLE ANTENNAS
5	.4.	SOFTWARE AND FIRMWARE7
5	.5.	WORST-CASE CONFIGURATION AND MODE
5	6	DESCRIPTION OF TEST SETUP 8
Ũ		
6.	TES	T AND MEASUREMENT EQUIPMENT10
7.	FINA	AL TEST RESULTS
7	.1.	CHANNEL TESTS FOR 10MHz BANDWIDTH11
	7.1.1	. EMISSION BANDWIDTH
	7.1.2	2. OUTPUT POWER
	7.1.3	PEAK POWER SPECTRAL DENSITY 20
	7.1.5	5. PEAK EXCURSION
	7.1.6	EMISSION MASK
	7.1.7	2. CONDUCTED SPURIOUS
	7.1.8	8. RECEIVER SPURIOUS
7	.2.	CHANNEL TESTS FOR 20MHz BANDWIDTH
	7.2.1	2 EMISSION BANDWIDTH
	7.2.3	AVERAGE POWER
	7.2.4	PEAK POWER SPECTRAL DENSITY
	7.2.5	5. PEAK EXCURSION
	7.2.6	6. EMISSION MASK
	7.2.7	CONDUCTED SPURIOUS
_	7.2.0	
7	.3.	FREQUENCY STABILITY
1	.4.	RADIA I ED EMISSIONS
8.	EXC	ERPT OF PRELIMINARY TEST RESULTS69
001		Page 3 of 76
COI 471	VIPLIA 73 RFI	NUE GERTIFICATION SERVICES FORM NO: CCSUP4701C NICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
	This	s report shall not be reproduced except in full, without the written approval of CCS.

9.	MAXIMUM PERMISSIBLE EXPOSURE	70
10.	SETUP PHOTOS	73

Page 4 of 76

1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	EXALT COMMUNICATIONS 580 DIVISION STREET CAMPBELL, CA 95008, USA		
EUT DESCRIPTION:	4.9 GHz Radio Module		
MODEL:	ExtendAir 4.9GHz RF		
SERIAL NUMBER:	EC46090463		
DATE TESTED:	January 11-27, 2010		

APPLICABLE STANDARDS				
STANDARD	TEST RESULTS			
CFR 47 Part 90 Subpart Y	Pass			
INDUSTRY CANADA RSS-111 ISSUE 2	Pass			

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. Measurement Uncertainties were not taken into account and are published for informational purposes only. 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. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For CCS By:

Tested By:

А

M, H

MICHAEL HECKROTTE DIRECTOR OF ENGINEERING COMPLIANCE CERTIFICATION SERVICES

Monin Hanni

MONICA HARRISON SENIOR RF ENGINEER COMPLIANCE CERTIFICATION SERVICES

Page 5 of 76

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with TIA-603-C, FCC CFR 47 Part 2, FCC CFR 47 Part 90, RSS-GEN Issue 2 and RSS-111 Issue 2.

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. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB) 36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a 4.9 GHz radio module. It is intended for Point-to-Point Fixed Link operation. It may operate with a nominal channel bandwidth of 10 MHz or 20 MHz, with QPSK, 16QAM or 64QAM modulation.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range	Mode	Output Power	Output Power
(MHz)		(dBm)	(mW)
4945.5-4984.5	10MHz QPSK	24.06	254.74
4950.5-4979.5	20MHz QPSK	24.11	257.87

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes either an integrated or external antenna, with a maximum gain of 26 dBi.

5.4. SOFTWARE AND FIRMWARE

During testing the EUT was running; Boot Version 1.1.4 Firmware version 1.0.0 RDK Database Version 1.1.0

5.5. WORST-CASE CONFIGURATION AND MODE

Based on preliminary tests over all modulations, QPSK was determined to be the worst-case modulation. For this device the Middle channel with 20MHz Bandwidth and QPSK modulation had the highest conducted power.

Page 7 of 76

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST							
Description Manufacturer Model Serial Number FCC ID							
Laptop	Dell	Lattitude	28071776413	DoC			
AC Adapter	Dell	LA65NS0-00	CN-0DF263-71615-720-2D21	DoC			

I/O CABLES

TEST SETUP

I/O CABLE LIST							
Cable No.	Port	# of Identica Ports	Connector Type	Cable Type	Cable Length	Remarks	
1	AC	1	AC	unshielded	2.25m		
2	RJ45	1	RJ45	unshielded	1.5m		
3	RJ45	1	RJ45	unshielded	1m		
4	DC	1	DC	unshielded	2m		
5	AC	1	AC	unshielded	1m		

The EUT is a stand alone device, that was controlled using a web based GUI on an external Laptop.

Page 8 of 76

SETUP DIAGRAM FOR TESTS



COMPLIANCE CERTIFICATION SERVICESFORM NO: CCSUP4701C47173 BENICIA STREET, FREMONT, CA 94538, USATEL: (510) 771-1000FAX: (510) 661-0888This report shall not be reproduced except in full, without the written approval of CCS.

Page 9 of 76

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	C01012	6/1/2009	6/1/2010		
Power Meter	Agilent / HP	437B	N02778	11/4/2008	8/4/2010		
Power Sensor, 18 GHz	Agilent / HP	8481A	N02782	10/28/2009	7/28/2011		
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01161	9/9/2009	12/9/2010		
Antenna, Horn, 40 GHz	ARA	MWH-2640/B	C00981	5/21/2009	5/21/2010		
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00589	1/29/2009	1/29/2010		
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	C00990	2/3/2009	2/3/2010		
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00558	1/6/2010	1/6/2011		
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C00749	2/4/2009	2/4/2010		
Temperature Chamber	Thermotron	SE 600-10-10	C00930	4/6/2009	4/6/2010		

Page 10 of 76

7. FINAL TEST RESULTS

7.1. CHANNEL TESTS FOR 10MHz BANDWIDTH

7.1.1. EMISSION BANDWIDTH

LIMITS

The emission bandwdith must be less than or equal to the ominal channel bandwidth.

TEST PROCEDURE

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

RESULTS

Channel	Frequency	99% Bandwidth	EBW Limit
	(MHz)	(MHz)	(MHz)
Low	4945.5	7.6998	10
Middle	4965.5	7.6647	10
High	4984.5	7.6377	10

Page 11 of 76

BANDWIDTH



Page 12 of 76

BANDWIDTH MID CH	Freq/Channel
Ch Freq 4.9655 GHz Trig Fre Occupied Bandwidth	Center Freq 4.96550000 GHz
	Start Freq 4.95550000 GHz
Ref 20 dBm Atten 10 dB #Samp	Stop Freq 4.97550000 GHz
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	CF Step 2.00000000 MHz Auto Man
dB Span 20 Mł Center 4.965 50 GHz Span 20 Mł #Res BW 100 kHz #VBW 300 kHz #Sweep 100 ms (1001 pts)	Freq Offset 0.00000000 Hz
Occupied Bandwidth Occ BW % Pwr 99.00 % 7.6647 MHz x dB -26.00 dB	6 Signal Track On <u>Off</u>
Transmit Freq Error -20.386 kHz x dB Bandwidth 8.506 MHz*	
Copyright 2000-2009 Agrient Technologies	

Page 13 of 76

BANDWIDTH HIGH CH	Freq/Channel				
Ch Freq 4.9845 GHz Trig Free Occupied Bandwidth	Center Freq 4.98450000 GHz				
	Start Freq 4.97450000 GHz				
Ref 20 dBm Atten 10 dB #Samp Log 10 → a	Stop Freq 4.99450000 GHz				
dB/ Offst 20.5	CF Step 2.00000000 MHz <u>Auto Man</u>				
Center 4.984 50 GHz Span 20 MHz #Res BW 100 kHz #VBW 300 kHz #Sweep 100 ms (1001 pts)	Freq Offset 0.00000000 Hz				
Occupied Bandwidth Occ BW % Pwr 99.00 % Signal Track 7.6377 MHz x dB -26.00 dB					
Transmit Freq Error -5.892 kHz x dB Bandwidth 8.576 MHz*					
Copyright 2000-2009 Aglient Technologies					

Page 14 of 76

7.1.2. OUTPUT POWER

PEAK POWER LIMIT

§ 90.1215 The transmitting power of stations operating in the 4940–4990 MHz band must not exceed the maximum limits in this section.

(a)(1) The maximum conducted output power should not exceed:

Channel bandwidth (MHz)	Low power Device Peak transmitter Power (dBm)	High power Device Peak transmitter Power (dBm)
1	7	20
5	14	27
10	17	30
15	18.8	31.8
20	20	33

(2) High power devices are also limited to a peak power spectral density of 21 dBm per one MHz. High power devices using channel bandwidths other than those listed above are permitted; however, they are limited to peak power spectral density of 21 dBm/MHz. If transmitting antennas of directional gain greater than 9 dBi are used, both the maximum conducted output power and the peak power spectral density should be reduced by the amount in decibels that the directional gain of the antenna exceeds 9 dBi. However, high power point-to-point and point-to-multipoint operations (both fixed and temporaryfixed rapid deployment) may employ transmitting antennas with directional gain up to 26 dBi without any corresponding reduction in the maximum conducted output power and peak power spectral density. Corresponding reduction in the maximum conducted output power and peak power spectral density should be the amount in decibels that the directional gain of the antenna exceeds 26 dBi.

TEST PROCEDURE

The maximum conducted output power is measured as a conducted emission over an interval of continuous transmission using instrumentation calibrated in terms of an RMS-equivalent voltage.

Page 15 of 76

RESULTS

Channel	Frequency	icy Power		Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	4945.5	23.87	30.00	-6.13
Mid	4965.5	24.05	30.00	-5.95
High	4984.5	24.06	30.00	-5.94

OUTPUT POWER



Page 16 of 76



Page 17 of 76

OUTPUT POV	VER HIGH	СН		RТ	Freq/Channel
Ref 30 dBm #Samp	Atten 20 dB		∆ Mk Band Pwr	r1 10.00 MHz 24.061 dBm	Center Freq 4.98450000 GHz
Log 10 dB/ Offst			and the second sec		Start Freq 4.97450000 GHz
20.5 dB					Stop Freq 4.99450000 GHz
#PAvg				maple in the state	CF Step 2.00000000 MHz <u>Auto Mar</u>
W1 S2 S3 FS AA					Freq Offset 0.00000000 Hz
¤(f): FTun Swp					Signal Track On <u>Off</u>
Center 4.984 50 GHz #Res BW 1 MHz		BW 3 MHz	Sweep 1 n	Span 20 MHz ns (1001 pts)	
Copyright 2000-2009 /	Agilent Technologie	es			-

Page 18 of 76

7.1.3. 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 21.2 dB (including 20 dB pad and 1.2 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Power
	(MHz)	(dBm)
Low	4945.5	23.91
Middle	4965.5	23.99
High	4984.5	23.95

Page 19 of 76

7.1.4. PEAK POWER SPECTRAL DENSITY

LIMITS

§ 90.1215 (a) High power devices are also limited to a peak power spectral density of 21 dBm per one MHz. High power devices using channel bandwidths other than those listed above are permitted; however, they are limited to a peak power spectral density of 21 dBm/MHz. If transmitting antennas of directional gain greater than 9 dBi are used, both the peak transmit power and the peak power spectral density should be reduced by the amount in decibels that the directional gain of the antenna exceeds 9 dBi. However, high power point-to-point or point-to-multipoint operation (both fixed and temporary-fixed rapid deployment) may employ transmitting antennas with directional gain up to 26 dBi without any corresponding reduction in the transmitt power or spectral density. Corresponding reduction in the peak transmit power and peak power spectral density should be the amount in decibels that the directional gain of the antenna exceeds 26 dBi.

(d) The peak power spectral density is measured as conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements are made over a bandwidth of one MHz or the 26 dB emission bandwidth of the device, whichever is less. A resolution bandwidth less than the measurement bandwidth can be used, provided that the measured power is integrated to show total power over the measurement bandwidth. If the resolution bandwidth is approximately equal to the measurement bandwidth, and much less than the emission bandwidth of the equipment under test, the measured results shall be corrected to account for any difference between the resolution bandwidth of the test instrument and its actual noise bandwidth.

TEST PROCEDURE

The peak value measured in a 1 MHz measurement bandwidth is corrected for the difference between the measurement bandwidth and the noise bandwidth.

Channel	Frequency	PPSD	Noise BW Factor	Corrected PPSD	Limit	Margin
	(MHz)	(dBm)	(dB)	(dBm/MHz)	(dBm/MHz)	(dB)
Low	4945.5	16.75	-0.21	16.54	21	-4.46
Middle	4965.5	16.81	-0.21	16.60	21	-4.40
High	4984.5	16.58	-0.21	16.37	21	-4.63

RESULTS

POWER SPECTRAL DENSITY



Page 21 of 76



Page 22 of 76

PSD HIGH CH	- .lan 11_2010			ВТ	Freq/Channel
Ref 30 dBm	Atten 20 dB		Mkr1	4.986 06 GHz 16.578 dBm	Center Freq 4.98450000 GHz
Log 10 dB/		1.	ware ware		Start Freq 4.97450000 GHz
Offst 20.5 dB	+		-		Stop Freq 4.99450000 GHz
#PAvg				Margalin what when many been	CF Step 2.00000000 MHz Auto Man
100 V1 S2 S3 FS AA					Freq Offset 0.00000000 Hz
r(f): FTun Swp					Signal Track ^{On <u>Off</u>}
Center 4.984 50 GHz #Res BW 1 MHz	#V	/BW 3 MHz	Sweep 1 n	Span 20 MHz ns (1001 pts)	
Copyright 2000-2009 /	Copyright 2000-2009 Agilent Technologies				

Page 23 of 76

7.1.5. PEAK EXCURSION

LIMITS

§ 90.1215 (e) The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

TEST PROCEDURE

The modulation envelope using peak hold is compared to the conducted output power.

RESULTS

Channel	Frequency	Peak Excursion	Limit	Margin
	(MHz)	(dB)	(dB)	(dB)
Low	4945.5	8.22	13	-4.78
Middle	4965.5	8.82	13	-4.18
High	4984.5	8.31	13	-4.69

Page 24 of 76

PEAK EXCURSION



Page 25 of 76



Page 26 of 76



Page 27 of 76

7.1.6. EMISSION MASK

§ 90.210 (m) *Emission Mask M.* For high power transmitters (greater that 20 dBm) operating in the 4940–4990 MHz frequency band, the power spectral density of the emissions must be attenuated below the output power of the transmitter as follows:

(1) On any frequency removed from the assigned frequency between 0–45% of the authorized bandwidth (BW): 0 dB.

(2) On any frequency removed from the assigned frequency between 45–50% of the authorized bandwidth: 568 log (% of (BW)/45) dB.

(3) On any frequency removed from the assigned frequency between 50–55% of the authorized bandwidth: 26 + 145 log (% of BW/50) dB.

(4) On any frequency removed from the assigned frequency between 55-100% of the authorized bandwidth: $32 + 31 \log (\% \text{ of } (BW)/55) \text{ dB}$.

(5) On any frequency removed from the assigned frequency between 100–150% of the authorized bandwidth: $40 + 57 \log (\% \text{ of (BW)}/100) \text{ dB}.$

(6) On any frequency removed from the assigned frequency between above 150% of the authorized bandwidth: 50 dB or $55 + 10 \log (P) dB$, whichever is the lesser attenuation.

(7) The zero dB reference is measured relative to the highest average power of the fundamental emission measured across the designated channel bandwidth using a resolution bandwidth of at least one percent of the occupied bandwidth of the fundamental emission and a video bandwidth of 30 kHz. The power spectral density is the power measured within the resolution bandwidth of the measurement device divided by the resolution bandwidth of the measurement device. Emission levels are also based on the use of measurement instrumentation employing a resolution bandwidth of at least one percent of the occupied bandwidth.

TEST PROCEDURE

The EUT is connected to the spectrum analyzer, the peak amplitude is used as the 0 dB reference value for the mask, and the trace is compared to the mask.

RESULTS

Page 28 of 76

EMISSION MASK



Page 29 of 76



Page 30 of 76



Page 31 of 76

7.1.7. CONDUCTED SPURIOUS

§ 90.210 (m) *Emission Mask M.* For high power transmitters (greater that 20 dBm) operating in the 4940–4990 MHz frequency band, the power spectral density of the emissions must be attenuated below the output power of the transmitter as follows:

(6) On any frequency removed from the assigned frequency between above 150% of the authorized bandwidth: 50 dB or $55 + 10 \log (P) dB$, whichever is the lesser attenuation.

(7) The zero dB reference is measured relative to the highest average power of the fundamental emission measured across the designated channel bandwidth using a resolution bandwidth of at least one percent of the occupied bandwidth of the fundamental emission and a video bandwidth of 30 kHz. The power spectral density is the power measured within the resolution bandwidth of the measurement device divided by the resolution bandwidth of the measurement device. Emission levels are also based on the use of measurement instrumentation employing a resolution bandwidth of at least one percent of the occupied bandwidth.

TEST PROCEDURE

The EUT is connected to the spectrum analyzer. $55 + 10 \log (P) dB$ provides the lesser attenuation therefore the limit is -25 dBm.

RESULTS

Page 32 of 76

SPURIOUS EMISSIONS



Page 33 of 76



Page 34 of 76

						 	ML	-1 24 0	1 CH-	1
Ref20 o #Peak [lBm		#Atten	10 dB				-51.90	dBm	Center Freq 20.0150000 GHz
Log 10 dB/ Offst										Start Freq 30.000000 MHz
20.5 dB										Stop Freq 40.000000 GHz
⊿ -25.0 dBm #PA∨g										CF Step 3.99700000 GHz <u>Auto Ma</u>
V1 S2 S3 FC AA		<u> </u>		altree.		 - Suny		s.	Maria	Freq Offset 0.00000000 Hz
¤(f): FTun Swp	ternether	pl say			*******					Signal Track On <u>Ot</u>
Start 30	MHz						St	op 40.0	0 GHz	

Page 35 of 76

7.1.8. RECEIVER SPURIOUS

IC RSS-GEN Clause 6 The following receiver spurious emission limits shall be complied with:

(a) If a radiated measurement is made, all spurious emissions shall comply with the limits of Table 1.

Table 1 - Spurious Er	nission Limits	for Receivers
-----------------------	----------------	---------------

Spurious Frequency (MHz)	Field Strength (microvolt/m at 3 metres)
30-88	100
88-216	150
216-960	200
Above 960	500

(b) If a conducted measurement is made, no spurious output signals appearing at the antenna terminals shall exceed 2 nanowatts per any 4 kHz spurious frequency in the band 30-1000 MHz, or 5 nanowatts above 1 GHz.

TEST PROCEDURE

The EUT is connected to the spectrum analyzer. Below 1 GHz, 2 nW / 4 kHz is equivalent to -57 dBm / 4 kHz. Above 1 GHz, 5 nW / 4 kHz is equivalent to -53 dBm / 4 kHz. Measurements are made from 30 MHz to 18 GHz.

<u>RESULTS</u>

Page 36 of 76
RECEIVER SPURIOUS



Page 37 of 76



Note: the transmitter and receiver operate simultaneously; the emission over the limit is the fundamental of the transmitter.

Page 38 of 76

7.2. CHANNEL TESTS FOR 20MHz BANDWIDTH

7.2.1. EMISSION BANDWIDTH

LIMITS

The emission bandwdith must be less than or equal to the ominal channel bandwidth.

TEST PROCEDURE

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

RESULTS

Channel	Frequency	99% Bandwidth	EBW Limit
	(MHz)	(MHz)	(MHz)
Low	4950.5	15.5704	20
Middle	4965.5	15.3203	20
High	4979.5	15.5169	20

26 dB and 99% BANDWIDTH



Page 40 of 76

BANDWIDTH MID Agilent 13:49:29 Jan 11	CH , 2010		RТ	Freq/Channel	
Ch Freq 4.9 Occupied Bandwidth	655 GHz	Tri	g Free	Center Freq 4.96550000 GHz	
	_			Start Freq 4.95050000 GHz	
Ref 20 dBm Atte #Samp Log	10 dB			Stop Freq 4.98050000 GHz	
dB/ Offst 20.5				CF Step 3.0000000 MHz <u>Auto Man</u>	
dB		Spar	n 30 MHz	Freq Offset 0.00000000 Hz	
#Res BW 300 kHz	#Res BW 300 kHz #VBW 1 MHz #Sweep 100 ms (1001 pts)				
15.3203 MHz × dB -26.00 dB					
Transmit Freq Error -12.913 kHz x dB Bandwidth 17.152 MHz*					
Copyright 2000-2009 Agilent	Copyright 2000-2009 Agilent Technologies				

Page 41 of 76

Ch Freq 4.9795 GHz Trig Free Occupied Bandwidth Start Freq Ref 20 dBm Atten 10 dB #Samp Start Freq Log Stop Freq 10 J dB/ J offst Stop Freq 20.5 J dB J Offst Span 30 MHz #Res BW 300 kHz #VBW 1 MHz #Sweep 100 ms (1001 pts) Occupied Bandwidth Occ BW % Pwr 99.00 % 15.5169 MHz x dB Signal Track on Offst Transmit Freq Error 55.527 kHz x dB x dB Bandwidth 17.160 MHz*	BANDWIDTH HIGH CH	R T Freq/Channel
Start Freq 4.96450000 GHz Ref 20 dBm Atten 10 dB #Samp Stop Freq 4.99450000 GHz Log 10 CF Step 3.00000000 MHz Offst 20.5 dB Span 30 MHz Center 4.979 50 GHz Span 30 MHz #Res BW 300 kHz #VBW 1 MHz #Sweep 100 ms (1001 pts) Occupied Bandwidth Occ BW % Pwr 99.00 % 15.5169 MHz Signal Track on Transmit Freq Error 55.527 kHz x dB Bandwidth x dB -26.00 dB	Ch Freq 4.9795 GHz Occupied Bandwidth	Trig Free 4.97950000 GHz
Ref 20 dBm Atten 10 dB #Samp Stop Freq Log CF Step 10 CF Step 0ffst CF Step 20.5 Center 4.979 50 GHz #Res BW 300 kHz #VBW 1 MHz #Sweep 100 ms (1001 pts) Occupied Bandwidth Occ BW % Pwr Transmit Freq Error 55.527 kHz x dB Bandwidth 17.160 MHz*		Start Freq 4.96450000 GHz
dB/ Offst data the plant d	Ref 20 dBm Atten 10 dB #Samp Log 10	Stop Freq 4.99450000 GHz
Center 4.979 50 GHz Span 30 MHz #Res BW 300 kHz #VBW 1 MHz #Sweep 100 ms (1001 pts) Occupied Bandwidth Occ BW % Pwr 99.00 % 15.5169 MHz x dB -26.00 dB Transmit Freq Error 55.527 kHz x dB x dB Bandwidth 17.160 MHz* Freq Offset	dB/ Offst 20.5 dB	CF Step 3.0000000 MHz <u>Auto Man</u>
Occupied Bandwidth Occ BW % Pwr 99.00 % Signal Frack On Off 15.5169 MHz x dB -26.00 dB	Center 4.979 50 GHz #Res BW 300 kHz #VBW 1 MHz	Span 30 MHz Freq Offset #Sweep 100 ms (1001 pts) Original Table
Transmit Freq Error 55.527 kHz x dB Bandwidth 17.160 MHz*	Occupied Bandwidth 0 15.5169 MHz	Cc BW % Pwr 99.00 % x dB -26.00 dB
Convright 2000-2009 Agilent Technologies		

Page 42 of 76

7.2.2. OUTPUT POWER

PEAK POWER LIMIT

§ 90.1215 The transmitting power of stations operating in the 4940–4990 MHz band must not exceed the maximum limits in this section.

(a)(1) The maximum conducted output power should not exceed:

Channel bandwidth (MHz)	Low power Device Peak transmitter Power (dBm)	High power Device Peak transmitter Power (dBm)
1	7	20
5	14	27
10	17	30
15	18.8	31.8
20	20	33

(2) High power devices are also limited to a peak power spectral density of 21 dBm per one MHz. High power devices using channel bandwidths other than those listed above are permitted; however, they are limited to peak power spectral density of 21 dBm/MHz. If transmitting antennas of directional gain greater than 9 dBi are used, both the maximum conducted output power and the peak power spectral density should be reduced by the amount in decibels that the directional gain of the antenna exceeds 9 dBi. However, high power point-to-point and point-to-multipoint operations (both fixed and temporaryfixed rapid deployment) may employ transmitting antennas with directional gain up to 26 dBi without any corresponding reduction in the maximum conducted output power and peak power spectral density. Corresponding reduction in the maximum conducted output power and peak power spectral density should be the amount in decibels that the directional gain of the antenna exceeds 26 dBi.

TEST PROCEDURE

The maximum conducted output power is measured as a conducted emission over an interval of continuous transmission using instrumentation calibrated in terms of an RMS-equivalent voltage.

Page 43 of 76

RESULTS

Channel	Frequency	Power	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	4950.5	23.86	33.00	-9.14
Mid	4965.5	24.11	33.00	-8.89
High	4979.5	23.98	33.00	-9.02

OUTPUT POWER



Page 44 of 76



Page 45 of 76



Page 46 of 76

7.2.3. 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 21.2 dB (including 20dB pad and 1.2dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Power
	(MHz)	(dBm)
Low	4950.5	23.95
Middle	4965.5	23.99
High	4979.5	24.00

Page 47 of 76

7.2.4. PEAK POWER SPECTRAL DENSITY

<u>LIMITS</u>

§ 90.1215 (2) High power devices are also limited to a peak power spectral density of 21 dBm per one MHz. High power devices using channel bandwidths other than those listed above are permitted; however, they are limited to peak power spectral density of 21 dBm/MHz. If transmitting antennas of directional gain greater than 9 dBi are used, both the maximum conducted output power and the peak power spectral density should be reduced by the amount in decibels that the directional gain of the antenna exceeds 9 dBi. However, high power point-to-point and point-to-multipoint operations (both fixed and temporaryfixed rapid deployment) may employ transmitting antennas with directional gain up to 26 dBi without any corresponding reduction in the maximum conducted output power and peak power spectral density. Corresponding reduction in the maximum conducted output power and peak power spectral density should be the amount in decibels that the directional gain of the antenna exceeds 26 dBi.

(d) The peak power spectral density is measured as conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements are made over a bandwidth of one MHz or the 26 dB emission bandwidth of the device, whichever is less. A resolution bandwidth less than the measurement bandwidth can be used, provided that the measured power is integrated to show total power over the measurement bandwidth. If the resolution bandwidth is approximately equal to the measurement bandwidth, and much less than the emission bandwidth of the equipment under test, the measured results shall be corrected to account for any difference between the resolution bandwidth of the test instrument and its actual noise bandwidth.

TEST PROCEDURE

The peak value measured in a 1 MHz measurement bandwidth is corrected for the difference between the measurement bandwidth and the noise bandwidth.

Channel	Frequency	PPSD	Noise BW Factor	Corrected PPSD	Limit	Margin
	(MHz)	(dBm)	(dB)	(dBm/MHz)	(dBm/MHz)	(dB)
Low	4950.5	14.11	-0.21	13.90	21	-7.10
Middle	4965.5	14.12	-0.21	13.91	21	-7.09
High	4979.5	13.74	-0.21	13.53	21	-7.47

RESULTS

POWER SPECTRAL DENSITY



Page 49 of 76



Page 50 of 76

PSD HIGH	CH I:40 Jan 11, 2010				RТ	Freq/Channel
Ref 30 dBm #Samp	Atten 20 dB		M	Mkr1 4.9 1	84 03 GHz 3.738 dBm	Center Freq 4.97950000 GHz
Log 10 dB/		4014178-10-200				Start Freq 4.96450000 GHz
Offst 20.5 dB				+		Stop Freq 4.99450000 GHz
#PAvg					the start of the s	CF Step 3.0000000 MHz <u>Auto Man</u>
100 W1 S2 S3 FS AA						Freq Offset 0.00000000 Hz
¤(f): FTun Swp						Signal Track On <u>Off</u>
Center 4.979 50 (#Res BW 1 MHz	GHz #V	/BW 3 MHz	Swee	S ep 1 ms	pan 30 MHz (1001 pts)	
Copyright 2000-20	09 Agilent Technologi	es				

Page 51 of 76

7.2.5. PEAK EXCURSION

LIMITS

§ 90.1215 (e) The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

TEST PROCEDURE

The modulation envelope using peak hold is compared to the conducted output power.

RESULTS

Channel	Frequency	Peak Excursion	Limit	Margin
	(MHz)	(dB)	(dB)	(dB)
Low	4950.5	9.84	13	-3.16
Middle	4965.5	11.01	13	-1.99
High	4979.5	9.67	13	-3.33

Page 52 of 76

PEAK EXCURSION



Page 53 of 76



Page 54 of 76



Page 55 of 76

7.2.6. EMISSION MASK

§ 90.210 (m) *Emission Mask M.* For high power transmitters (greater that 20 dBm) operating in the 4940–4990 MHz frequency band, the power spectral density of the emissions must be attenuated below the output power of the transmitter as follows:

(1) On any frequency removed from the assigned frequency between 0–45% of the authorized bandwidth (BW): 0 dB.

(2) On any frequency removed from the assigned frequency between 45–50% of the authorized bandwidth: 568 log (% of (BW)/45) dB.

(3) On any frequency removed from the assigned frequency between 50–55% of the authorized bandwidth: 26 + 145 log (% of BW/50) dB.

(4) On any frequency removed from the assigned frequency between 55-100% of the authorized bandwidth: $32 + 31 \log (\% \text{ of } (BW)/55) \text{ dB}$.

(5) On any frequency removed from the assigned frequency between 100–150% of the authorized bandwidth: $40 + 57 \log (\% \text{ of (BW)}/100) \text{ dB}.$

(6) On any frequency removed from the assigned frequency between above 150% of the authorized bandwidth: 50 dB or $55 + 10 \log (P) dB$, whichever is the lesser attenuation.

(7) The zero dB reference is measured relative to the highest average power of the fundamental emission measured across the designated channel bandwidth using a resolution bandwidth of at least one percent of the occupied bandwidth of the fundamental emission and a video bandwidth of 30 kHz. The power spectral density is the power measured within the resolution bandwidth of the measurement device divided by the resolution bandwidth of the measurement device. Emission levels are also based on the use of measurement instrumentation employing a resolution bandwidth of at least one percent of the occupied bandwidth.

TEST PROCEDURE

The EUT is connected to the spectrum analyzer, the peak amplitude is used as the 0 dB reference value for the mask, and the trace is compared to the mask.

RESULTS

Page 56 of 76

EMISSION MASK



Page 57 of 76



Page 58 of 76



Page 59 of 76

7.2.7. CONDUCTED SPURIOUS

§ 90.210 (m) *Emission Mask M.* For high power transmitters (greater that 20 dBm) operating in the 4940–4990 MHz frequency band, the power spectral density of the emissions must be attenuated below the output power of the transmitter as follows:

(6) On any frequency removed from the assigned frequency between above 150% of the authorized bandwidth: 50 dB or $55 + 10 \log (P) dB$, whichever is the lesser attenuation.

(7) The zero dB reference is measured relative to the highest average power of the fundamental emission measured across the designated channel bandwidth using a resolution bandwidth of at least one percent of the occupied bandwidth of the fundamental emission and a video bandwidth of 30 kHz. The power spectral density is the power measured within the resolution bandwidth of the measurement device divided by the resolution bandwidth of the measurement device. Emission levels are also based on the use of measurement instrumentation employing a resolution bandwidth of at least one percent of the occupied bandwidth.

TEST PROCEDURE

The EUT is connected to the spectrum analyzer. $55 + 10 \log (P) dB$ provides the lesser attenuation therefore the limit is -25 dBm.

RESULTS

Page 60 of 76

SPURIOUS EMISSIONS



Page 61 of 76



Page 62 of 76

SPURIOUS (Hi	gh Channel)	рт	
Ref 20 dBm #	Atten 10 dB	Mkr1 24.97 GHz -48.67 dBm	Center Freq
#Peak Log 10 dB/			Start Freq 30.0000000 MHz
Offst 20.5 dB DI			Stop Freq 40.0000000 GHz
-25.0 dBm #PAvg			CF Step 3.99700000 GHz <u>Auto Man</u>
V1 S2 S3 FC AA	And Marine and and	www.www.www.www.www.	Freq Offset 0.00000000 Hz
FTun Swp			Signal Track On <u>Off</u>
Start 30 MHz #Res BW 300 kHz	#VBW 30 kHz	Stop 40.00 GHz Sweep 3.487 s (1001 pts)	J.
Copyright 2000-2009 Ag	ilent Technologies		

Page 63 of 76

7.2.8. RECEIVER SPURIOUS

IC RSS-GEN Clause 6 The following receiver spurious emission limits shall be complied with:

(a) If a radiated measurement is made, all spurious emissions shall comply with the limits of Table 1.

Spurious Frequency (MHz)	Field Strength (microvolt/m at 3 metres)
30-88	100
88-216	150
216-960	200
Above 960	500

(b) If a conducted measurement is made, no spurious output signals appearing at the antenna terminals shall exceed 2 nanowatts per any 4 kHz spurious frequency in the band 30-1000 MHz, or 5 nanowatts above 1 GHz.

TEST PROCEDURE

The EUT is connected to the spectrum analyzer. Below 1 GHz, 2 nW / 4 kHz is equivalent to -57 dBm / 4 kHz. Above 1 GHz, 5 nW / 4 kHz is equivalent to -53 dBm / 4 kHz. Measurements are made from 30 MHz to 18 GHz.

RESULTS

Page 64 of 76

RECEIVER SPURIOUS



Page 65 of 76



Note: the transmitter and receiver operate simultaneously; the emission over the limit is the fundamental of the transmitter.

Page 66 of 76

7.3. FREQUENCY STABILITY

<u>LIMIT</u>

Regarding Equipment Authorization, for reporting purposes.

§90.213 Frequency stability.

(a) Unless noted elsewhere, transmitters used in the services governed by this part must have a minimum frequency stability as specified in the following table.

Above 2450¹⁰

¹⁰Except for DSRCS equipment in the 5850 –5925 MHz band, frequency stability is to be specified in the station authorization.

TEST PROCEDURE

ANSI / TIA / EIA 603 Clause 2.3.1 and 2.3.2

RESULTS

Power Supply	Temperature	Frequency	Deviation
(Vac)	(3 °)	(MHz)	(ppm)
115.00	65	4965.494210	-0.659
115.00	60	4965.495380	-0.423
115.00	50	4965.497290	-0.038
115.00	40	4965.498070	0.119
115.00	30	4965.497960	0.097
115.00	20	4965.497480	REF
115.00	10	4965.496390	-0.220
115.00	0	4965.495240	-0.451
115.00	-10	4965.494280	-0.644
115.00	-20	4965.491830	-1.138
115.00	-30	4965.491560	-1.192
115.00	-40	4965.493310	-0.840
97.15	20	4965.498040	0.113
132.25	20	4965.498040	0.113

7.4. RADIATED EMISSIONS

LIMITS

55 + 10 log (P) dB provides the lesser attenuation therefore the limit is -25 dBm ERP/EIRP.

TEST PROCEDURE

ANSI / TIA / EIA 603 Clause 3.2.12

WORST-CASE RADIATED EMISSIONS 30 TO 1000 MHz

			Compli 30 - 1000M	ance Certifi IHz Substit	cation Serv ution Meas	vices urement				
mpany	: Exalt									
oject #	09U12981									
ite:	1/13/10									
st⊵ng	II Monica Harriso NDOE in isolatia	n 								
onnigura odo:	20MH- ODSI/	n box TV								
Jue.	2011112 GF 3K	17								
	Chambo	-	Р	re-amplifer			Filter			Limit
	chambe							_		
Зn	n Chamber	-	T 15 8	44/D	-			*		-
f	SA reading	Ant. Pol.	Distance	Path Loss	Preamp	Filter	ERP	Limit	Delta	Notes
MHz	(dBm)	(H/V)	(m)	(dB)	(dB)	(dB)	(dBm)	(dBm)	(dB)	
950.50		<u> </u>								
36.10	-61.4	Н	3.0	56.8	28.4		-33.0	-25.0	-8.0	
47.81	-47.3	Н	3.0	41.2	28.4		-34.4	-25.0	-9.4	
359.80	-34.0	H	3.0	25.3	27.8		-36.5	-25.0	-11.5	
36.09	-56.0	<u>v</u>	3.0	49.9	28.4		-34.5	-25.0	-9.5	
47.80	-30.0	V	3.0	38.0	28.4		-21.0	-20.0	-2.0	
559.00	-34.3	<u>v</u>	3.0	24.0	21.0		-30.3	-23.0	-13.3	
965 50	+									
36.12	-60.7	Н	3.0	56.8	28.4		-32.3	-25.0	-7.3	
47.80	47.9	Н	3.0	41.2	28.4		-35.0	-25.0	-10.0	
359.80	-34.0	Н	3.0	25.3	27.8		-36.5	-25.0	-11.5	
36.10	-54.5	v	3.0	49.9	28.4		-33.0	-25.0	-8.0	
47.82	-37.3	٧	3.0	38.0	28.4		-27.7	-26.0	-1.7	
359.80	-34.7	V	3.0	24.0	27.8		-38.5	-25.0	-13.5	
				ļ			ļ	ļļ		
979.50	67.0		2.0	50.0	20.4		25.4	25.0	40.4	
33.80	-57.3	V	3.0	20.2	28.4		-35.4	-23.0	-10.4	
47.00	-57.5	v	3.0	30.U 24.0	20.4		-21.0	-23.0	-2.0	
36 13	63.1	H	3.0	56.7	28.4		-30.5	-25.0	.97	
and the second se	-48.0	Н	3.0	38.6	20.4		-37.7	-25.0	-12.7	
49.40		н	3.0	25.3	27.8		-36.6	-25.0	-11.6	
49.40 359.80	-34.1									

WORST-CASE RADIATED EMISSIONS 1 TO 40 GHz

No emissions measured within 20 dB of the limit.

8. EXCERPT OF PRELIMINARY TEST RESULTS

CONDUCTED OUTPUT POWER AS A FUNCTION OF BANDWIDTH AND MODULATION

The maximum conducted output power is measured as a conducted emission over an interval of continuous transmission using instrumentation calibrated in terms of an RMS-equivalent voltage.

Nominal	Mode	Output
Bandwidth		Power
(MHz)		(dBm)
10.0	QPSK	24.061
10.0	16QAM	23.428
10.0	64QAM	23.141
20.0	QPSK	24.114
20.0	16QAM	23.495
20.0	64QAM	23.165

Page 69 of 76

9. MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm²)	Averaging time (minutes)
(A) Lin	nits for Occupational	I/Controlled Exposu	res	
0.3–3.0 3.0–30 30–300 300–1500 1500–100,000	614 1842/f 61.4	1.63 4.89/f 0.163	*(100) *(900/f²) 1.0 f/300 5	6 6 6 8
(B) Limits	for General Populati	ion/Uncontrolled Exp	posure	
0.3–1.34	614 824 <i>1</i> f	1.63 2.19/f	*(100) *(180/f ²)	30 30

TABLE 1-LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

TABLE 1-LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)-Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm²)	Averaging time (minutes)
30–300 300–1500 1500–100 000	27.5	0.073	0.2 f/1500 1.0	30 30 30

f = frequency in MHz

* = Plane-wave equivalent power density NOTE 1 To TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occu-tions where a the exposure of the potential for exposure and the potential for exposure.

pational/controlled limits apply provided he or she is made aware of the potential for exposure. NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be ex-posed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

IC RULES

IC Safety Code 6, Section 2.2.1 (a) A person other than an RF and microwave exposed worker shall not be exposed to electromagnetic radiation in a frequency band listed in Column 1 of Table 5, if the field strength exceeds the value given in Column 2 or 3 of Table 5, when averaged spatially and over time, or if the power density exceeds the value given in Column 4 of Table 5, when averaged spatially and over time.

Table 5

Exposure Limits for Persons Not Classed As RF and Microwave Ex-
posed Workers (Including the General Public)

1 Frequency (MHz)	2 Electric Field Strength; rms (V/m)	3 Magnetic Field Strength; rms (A/m)	4 Power Density (W/m ²)	5 Averaging Time (min)
0.003–1	280	2.19		6
1–10	280/f	2.19/ <i>f</i>		6
10–30	28	2.19/ <i>f</i>		6
30–300	28	0.073	2*	6
300–1 500	1.585 <i>f</i> ^{0.5}	0.0042f ^{0.5}	f/150	6
1 500–15 000	61.4	0.163	10	6
15 000-150 000	61.4	0.163	10	616 000 /f ^{1.2}
150 000-300 000	0.158 <i>f</i> ^{0.5}	4.21 x 10 ⁻⁴ f ^{0.5}	6.67 x 10 ⁻⁵ f	616 000 /f ^{1.2}

* Power density limit is applicable at frequencies greater than 100 MHz.

Notes: 1. Frequency, f, is in MHz.

- 2. A power density of 10 W/m^2 is equivalent to 1 mW/cm^2 .
- A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (μT) or 12.57 milligauss (mG).

Page 71 of 76

EQUATIONS

Power density is given by:

S = EIRP / (4 * Pi * D^2)

where

S = Power density in W/m² EIRP = Equivalent Isotropic Radiated Power in W D = Separation distance in m

Power density in units of W/m² is converted to units of mWc/m² by dividing by 10.

Distance is given by:

D = SQRT (EIRP / (4 * Pi * S)) where D = Separation distance in m EIRP = Equivalent Isotropic Radiated Power in W S = Power density in W/m^2

In the table below, Power and Gain are entered in units of dBm and dBi respectively and conversions to linear forms are used for the calculations.

<u>LIMITS</u>

From FCC §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm²

From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m²

<u>RESULTS</u>

Separation distance with maximum declared antenna gain:

Band	Mode	IC	FCC	Output	Antenna	Separation
		Limit	Limit	Power	Gain	Distance
		(W/m^2)	(mW/cm^2)	(dBm)	(dBi)	(m)
4.9 GHz	QPSK	10.00	1.000	24.11	26.00	0.90

Page 72 of 76