

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

**CERTIFICATION TEST REPORT** 

FOR

2.4 GHZ TRANSCEIVER

MODEL NUMBER: A2500R24C, A2500R24A

FCC ID: X7J-A10030501 IC: 8975A-A10030501

REPORT NUMBER: 10U13225-1, Revision A

ISSUE DATE: JULY 12, 2010

Prepared for ANAREN, INC. 6635 KIRKVILLE ROAD EAST SYRACUSE, NEW YORK, 13057-9600, 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

NVLAP LAB CODE 200065-0

### **Revision History**

Rev.	lssue Date	Revisions	Revised By
	06/15/10	Initial Issue	T. Chan
A	7/12/10	Correction on MSK 99% BW	C. Pang

Page 2 of 102

# TABLE OF CONTENTS

1.	ATTESTATION OF TEST RESULTS	4
2.	TEST METHODOLOGY	5
3.	FACILITIES AND ACCREDITATION	5
4.	CALIBRATION AND UNCERTAINTY	5
4	4.1. MEASURING INSTRUMENT CALIBRATION	5
4	4.2. SAMPLE CALCULATION	5
4	4.3. MEASUREMENT UNCERTAINTY	5
5.	EQUIPMENT UNDER TEST	6
5	5.1. DESCRIPTION OF EUT	6
5	5.2. MANUFACTURER'S DESCRIPTION OF MODEL DIFFERENCES	6
5	5.3. MAXIMUM OUTPUT POWER	6
5	5.4. DESCRIPTION OF AVAILABLE ANTENNAS	6
5	5.5. SOFTWARE AND FIRMWARE	6
5	5.6. WORST-CASE CONFIGURATION AND MODE	6
5	5.7. DESCRIPTION OF TEST SETUP	7
6.	TEST AND MEASUREMENT EQUIPMENT	9
7.	ANTENNA PORT TEST RESULTS	10
7.	ANTENNA PORT TEST RESULTS	<b>10</b> 10
7.	ANTENNA PORT TEST RESULTS	<b>10</b> 10 15 20
7.	ANTENNA PORT TEST RESULTS   7.1.1. 6 dB BANDWIDTH   7.1.2. 99% BANDWIDTH   7.1.3. OUTPUT POWER   7.1.4. AVERAGE POWER	<b>10</b> 10 15 20 21
7.	ANTENNA PORT TEST RESULTS 7.1.1. 6 dB BANDWIDTH 7.1.2. 99% BANDWIDTH 7.1.3. OUTPUT POWER 7.1.4. AVERAGE POWER 7.1.5. POWER SPECTRAL DENSITY 7.1.6. CONDUCTED SPUCIOUS EMISSIONS	<b>10</b> 15 20 21 22
7.	ANTENNA PORT TEST RESULTS7.1.1.6 dB BANDWIDTH7.1.2.99% BANDWIDTH7.1.3.OUTPUT POWER7.1.4.AVERAGE POWER7.1.5.POWER SPECTRAL DENSITY7.1.6.CONDUCTED SPURIOUS EMISSIONS	<b>10</b> 15 20 21 22 27
<b>7</b> . <b>8</b> .	ANTENNA PORT TEST RESULTS 7.1.1. 6 dB BANDWIDTH 7.1.2. 99% BANDWIDTH 7.1.3. OUTPUT POWER 7.1.4. AVERAGE POWER 7.1.5. POWER SPECTRAL DENSITY 7.1.6. CONDUCTED SPURIOUS EMISSIONS RADIATED TEST RESULTS	<b>10</b> 15 20 21 22 27 <b>34</b>
7. 8.	ANTENNA PORT TEST RESULTS 7.1.1. 6 dB BANDWIDTH 7.1.2. 99% BANDWIDTH 7.1.3. OUTPUT POWER 7.1.4. AVERAGE POWER 7.1.5. POWER SPECTRAL DENSITY 7.1.6. CONDUCTED SPURIOUS EMISSIONS RADIATED TEST RESULTS 3.1. LIMITS AND PROCEDURE	10 15 20 21 22 27 34
7. 8. 8	ANTENNA PORT TEST RESULTS   7.1.1. 6 dB BANDWIDTH   7.1.2. 99% BANDWIDTH   7.1.3. OUTPUT POWER   7.1.4. AVERAGE POWER   7.1.5. POWER SPECTRAL DENSITY   7.1.6. CONDUCTED SPURIOUS EMISSIONS   RADIATED TEST RESULTS   3.1. LIMITS AND PROCEDURE   3.2. TRANSMITTER ABOVE 1 GHz   3.2.1 TDANSMITTER ABOVE 1 GHz	10 15 20 21 27 34 34 35
7. 8. 8	ANTENNA PORT TEST RESULTS   7.1.1. 6 dB BANDWIDTH   7.1.2. 99% BANDWIDTH   7.1.3. OUTPUT POWER   7.1.4. AVERAGE POWER   7.1.5. POWER SPECTRAL DENSITY   7.1.6. CONDUCTED SPURIOUS EMISSIONS   RADIATED TEST RESULTS   8.1. LIMITS AND PROCEDURE   8.2. TRANSMITTER ABOVE 1 GHz   8.2.1. TRANSMITTER ABOVE 1 GHz FOR 2FSK MODE   8.2.2. TRANSMITTER ABOVE 1 GHz FOR MSK MODE	10 15 20 21 22 27 34 35 35 50
7. 8. 8 8	ANTENNA PORT TEST RESULTS   7.1.1. 6 dB BANDWIDTH   7.1.2. 99% BANDWIDTH   7.1.3. OUTPUT POWER   7.1.4. AVERAGE POWER   7.1.5. POWER SPECTRAL DENSITY   7.1.6. CONDUCTED SPURIOUS EMISSIONS   RADIATED TEST RESULTS   3.1. LIMITS AND PROCEDURE   3.2. TRANSMITTER ABOVE 1 GHz   8.2.1. TRANSMITTER ABOVE 1 GHz FOR 2FSK MODE   8.2.2. TRANSMITTER ABOVE 1 GHz FOR MSK MODE   3.3. WORST-CASE BELOW 1 GHz	10 15 20 21 22 27 34 35 35 50 65
7. 8. 8 8 8	ANTENNA PORT TEST RESULTS   7.1.1. 6 dB BANDWIDTH   7.1.2. 99% BANDWIDTH   7.1.3. OUTPUT POWER   7.1.4. AVERAGE POWER   7.1.5. POWER SPECTRAL DENSITY   7.1.6. CONDUCTED SPURIOUS EMISSIONS   RADIATED TEST RESULTS   3.1. LIMITS AND PROCEDURE   3.2. TRANSMITTER ABOVE 1 GHz   8.2.1. TRANSMITTER ABOVE 1 GHz FOR 2FSK MODE   8.2.2. TRANSMITTER ABOVE 1 GHz FOR MSK MODE   3.3. WORST-CASE BELOW 1 GHz   3.4. RECEIVER ABOVE 1 GHz	10 15 20 21 22 27 34 35 35 50 65 83
7. 8. 8 8 8 8 8 8 8 9.	ANTENNA PORT TEST RESULTS   7.1.1. 6 dB BANDWIDTH   7.1.2. 99% BANDWIDTH   7.1.3. OUTPUT POWER   7.1.4. AVERAGE POWER   7.1.5. POWER SPECTRAL DENSITY   7.1.6. CONDUCTED SPURIOUS EMISSIONS   RADIATED TEST RESULTS   3.1. LIMITS AND PROCEDURE   3.2. TRANSMITTER ABOVE 1 GHz   8.2.1. TRANSMITTER ABOVE 1 GHz FOR 2FSK MODE   8.2.2. TRANSMITTER ABOVE 1 GHz FOR MSK MODE   3.3. WORST-CASE BELOW 1 GHz   3.4. RECEIVER ABOVE 1 GHz   AC POWER LINE CONDUCTED EMISSIONS	10 15 20 21 22 27 34 35 35 35 65 65 83 83
7. 8. 8 8 8 9. 10.	ANTENNA PORT TEST RESULTS   7.1.1. 6 dB BANDWIDTH   7.1.2. 99% BANDWIDTH   7.1.3. OUTPUT POWER   7.1.4. AVERAGE POWER   7.1.5. POWER SPECTRAL DENSITY   7.1.6. CONDUCTED SPURIOUS EMISSIONS   RADIATED TEST RESULTS   3.1. LIMITS AND PROCEDURE   3.2. TRANSMITTER ABOVE 1 GHz   8.2.1. TRANSMITTER ABOVE 1 GHz FOR 2FSK MODE   8.2.2. TRANSMITTER ABOVE 1 GHz   8.3. WORST-CASE BELOW 1 GHz   3.4. RECEIVER ABOVE 1 GHz   AC POWER LINE CONDUCTED EMISSIONS   MAXIMUM PERMISSIBLE EXPOSURE	10 15 20 21 22 27 34 35 35 50 65 65 83 89 89
7. 8. 8 8 8 9. 10. 11.	ANTENNA PORT TEST RESULTS   7.1.1. 6 dB BANDWIDTH   7.1.2. 99% BANDWIDTH   7.1.3. OUTPUT POWER   7.1.4. AVERAGE POWER   7.1.5. POWER SPECTRAL DENSITY   7.1.6. CONDUCTED SPURIOUS EMISSIONS   RADIATED TEST RESULTS   3.1. LIMITS AND PROCEDURE   3.2. TRANSMITTER ABOVE 1 GHz   8.2.1. TRANSMITTER ABOVE 1 GHz FOR 2FSK MODE   8.2.2. TRANSMITTER ABOVE 1 GHz   8.3. WORST-CASE BELOW 1 GHz   3.4. RECEIVER ABOVE 1 GHz   AC POWER LINE CONDUCTED EMISSIONS   MAXIMUM PERMISSIBLE EXPOSURE   SETUP PHOTOS	10 15 20 21 22 27 34 35 35 50 65 65 83 83 89 93

# **1. ATTESTATION OF TEST RESULTS**

COMPANY NAME:	ANAREN, INC 6635 KIRKVILLE ROAD EAST SYRACUSE, NY, 13057, U.S.A.			
EUT DESCRIPTION:	2.4 GHZ TRANSCEIVER			
MODEL:	A2500R24C, A2500R24A			
SERIAL NUMBER:	0002581020			
DATE TESTED:	MAY 28-JUNE 08, 2010			

APPLICABLE STANDARDS					
STANDARD	TEST RESULTS				
CFR 47 Part 15 Subpart C	Pass				
INDUSTRY CANADA RSS-210 Issue 7 Annex 8	Pass				
INDUSTRY CANADA RSS-GEN 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:

THU CHAN EMC MANAGER COMPLIANCE CERTIFICATION SERVICES

Chin Pany

CHIN PANG EMC ENGINEER COMPLIANCE CERTIFICATION SERVICES

Page 4 of 102

# 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, 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. 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%.

Page 5 of 102

# 5. EQUIPMENT UNDER TEST

## 5.1. DESCRIPTION OF EUT

The EUT is a 2.4 GHz Transceiver.

## 5.2. MANUFACTURER'S DESCRIPTION OF MODEL DIFFERENCES

A2500R24C and A2500R24A are Identical, except A2500R24C has a U.FL connector, and A2500R24A has an integral printed antenna.

### 5.3. MAXIMUM OUTPUT POWER

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

Frequency Range	Mode	Modulation	Output Power	Output Power
(MHz)			(dBm)	(mW)
2401.3 - 2480.4	DSSS	2FSK	1.32	1.36
2401.8 - 2480.3	DSSS	MSK	1.24	1.33

## 5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes Patch, Monopole and PCB antenna with maximum peak gains of 5dBi on patch antenna, 3dBi gain on Monopole and 2dBi on PCB antennas.

# 5.5. SOFTWARE AND FIRMWARE

The EUT Firmware software installed during testing was v01.00

The test utility software used during testing was AirFCC, V1.0.0.7.

# 5.6. WORST-CASE CONFIGURATION AND MODE

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

The EUT with patch and PCB antenna have been investigated on X, Y and Z position. The worst case was found to be at Y orientation.

Page 6 of 102

# 5.7. DESCRIPTION OF TEST SETUP

#### SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST							
Description	Description Manufacturer Model Serial Number FCC ID						
Laptop	Lenovo	T61	L3-B9034	DoC			
AC Adapter	Lenovo	92P1105	11S92P1105Z1ZBW973VOK	DoC			

#### I/O CABLES

	I/O CABLE LIST						
Cable No.	Port	# of Identic Ports	Connector Type	Cable Type	Cable Length	Remarks	
1	AC	1	US 115V	Un-shielded	2m	One ferrite at Laptop's end.	
2	DC	1	DC	Un-shielded	2m	NA	
3	USB	1	EUT	Un-shielded	2m	NA	

#### TEST SETUP

The EUT is connected to a host laptop computer during the tests. Test software exercised the radio card.

Page 7 of 102

#### **SETUP DIAGRAM FOR TESTS**



COMPLIANCE CERTIFICATION SERVICES FORM NO: CCSUP4701C 47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888 This report shall not be reproduced except in full, without the written approval of CCS.

Page 8 of 102

# 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 Due								
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01016	07/14/10				
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	08/04/10				
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01176	08/24/10				
Antenna, Horn, 18 GHz	EMCO	3115	C00945	07/29/10				
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	11/06/10				
EMI Test Receiver, 30 MHz	R&S	ESHS 20	N02396	05/06/11				
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRC13192	N02683	CNR				
Peak Power Meter	Boonton	4541	C01186	03/01/11				
Peak Power Sensor	Boonton	57318	C01202	02/23/11				

Page 9 of 102

# 7. ANTENNA PORT TEST RESULTS

### 7.1.1. 6 dB BANDWIDTH

### LIMITS

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.

### <u>RESULTS</u>

#### 2FSK MODE

Channel	Frequency	6 dB Bandwidth	Minimum Limit	
	(MHz)	(KHz)	(MHz)	
Low	2401.3	517	0.5	
Middle	2441.0	517	0.5	
High	2480.4	507	0.5	

#### MSK MODE

Channel	Frequency	6 dB Bandwidth	Minimum Limit
	(MHz)	(KHz)	(MHz)
Low	2401.8	583	0.5
Middle	2441.2	580	0.5
High	2480.3	577	0.5

Page 10 of 102

#### 2FSK MODE

#### 6 dB BANDWIDTH





Page 11 of 102



Page 12 of 102

#### MSK MODE

#### 6 dB BANDWIDTH





Page 13 of 102

6 dB BAN	DWIDTH HIGH	H CH			
🔆 Agilent 14	:58:41_May 28, 2010			RT	Marker
Ref 10 dBm #Peak	Atten 20 dB		Δ	Mkr1 577 kHz -0.20 dB	Select Marker 1 2 <u>3</u> 4
Log 10 dB/	18				Normal
Offst 1 dB	- mark		- Andrew - A	~	Delta
-5.9 www. dBm LgAv				477 177	Delta Pair (Tracking Ref) Ref <u>∆</u>
S1 M2 S3 FC AA					Span Pair <sub>Span <u>Center</u></sub>
¤(f): f>50k Swp					Off
Center 2.480 2 #Res BW 100 #	91 GHz KHz #VI	BW 300 kHz	Sweep 1	Span 2 MHz ms (601 pts)	More 1 of 2
Copyright 2000-	2010 Agilent Technolog	ies			

Page 14 of 102

### 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**

#### 2FSK MODE

Channel	Frequency	99% Bandwidth
	(MHz)	(KHz)
Low	2401.3	300.2129
Middle	2441.0	299.8661
High	2480.4	298.8035

#### MSK MODE

Channel	Frequency	99% Bandwidth
	(MHz)	(KHz)
Low	2401.8	881.1228
Middle	2441.2	879.4045
High	2480.3	900.7886

Page 15 of 102

#### 2FSK MODE

#### 99% BANDWIDTH





Page 16 of 102

99% BANDWIDTH HIGH CH	RT	Freq/Channel
Ch Freq 2.48041 GHz Occupied Bandwidth	Trig Free	Center Freq 2.48041100 GHz
		Start Freq 2.47941100 GHz
Ref 10 dBm   Atten 20 dB     #Samp	¢	Stop Freq 2.48141100 GHz
dB/ Offst dB/ dB/	AND STATE AND	CF Step 2.48040000 GHz Auto <u>Mar</u>
Center 2.480 411 GHz #Res BW 10 kHz #VBW 30 kH	Span 2 MHz z Sweep 60.48 ms (601 pts)	Freq Offset 0.00000000 Hz
Occupied Bandwidth 298.8035 kHz	Осс BW % Pwr 99.00 % х dB -26.00 dB	Signal Track On <u>Off</u>
Transmit Freq Error 7.973 kHz x dB Bandwidth 306.523 kHz*		
Copyright 2000-2010 Agilent Technologies		

Page 17 of 102

#### MSK MODE

#### 99% BANDWIDTH





Page 18 of 102



Page 19 of 102

### 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 by the power meter.

#### **RESULTS**

#### 2FSK Mode

Channel	Frequency	Output	Limit	Margin
		Power		
	(MHz)	(dBm)	(dBm)	(dB)
Low	2401.3	1.14	30	-28.86
Middle	2441.0	1.20	30	-28.80
High	2480.4	1.32	30	-28.68

#### MSK Mode

Channel	Frequency	Output	Limit	Margin
		Power		
	(MHz)	(dBm)	(dBm)	(dB)
Low	2401.8	1.10	30	-28.90
Middle	2441.2	1.13	30	-28.87
High	2480.3	1.24	30	-28.76

Page 20 of 102

### 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 1dB was entered as an offset in the power meter to allow for direct reading of power.

#### <u>2FSK</u>

Channel	Frequency	Power
	(MHz)	(dBm)
Low	2401.3	1.12
Middle	2441.0	1.16
High	2480.4	1.29

#### <u>MSK</u>

Channel	Frequency	Power
	(MHz)	(dBm)
Low	2401.8	1.08
Middle	2441.2	1.10
High	2480.3	1.22

Page 21 of 102

### 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.

### <u>RESULTS</u>

#### 2FSK MODE

Channel	Frequency	Frequency PPSD		Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	2401.3	0.70	8	-7.30
Middle	2441.0	0.59	8	-7.41
High	2480.4	0.50	8	-7.50

#### MSK MODE

Channel	Frequency	Frequency PPSD		Margin
	(MHz)	(dBm)	(dBm)	(dB)
Low	2401.8	-5.03	8	-13.03
Middle	2441.2	-5.36	8	-13.36
High	2480.3	-5.48	8	-13.48

Page 22 of 102

#### 2FSK MODE

#### **POWER SPECTRAL DENSITY**





Page 23 of 102

Agilent 16:20	:56 May 28, 2010			RT	Peak Search
ef 10 dBm	Atten 20 dB		Mkr1 2.	480 279 0 GHz 0.50 dBm	Next Peak
g					
ß/ fst		/{			Next Pk Right
3					Next Pk Left
) Bm  Av			The second and a		Min Search
M2 FS					Pk-Pk Search
АА ): 50k					Mkr © C
vp					Mor
enter 2.480 280	0 GHz	WDW 40 LU-	#Curren 1	Span 300 kHz	1 of 2

Page 24 of 102

#### MSK MODE

#### POWER SPECTRAL DENSITY





Page 25 of 102

Agilent 16:5	2:07 May 28	8,2010					F	<u> </u>	Peak Search
ef 10 dBm	Atter	20 dB			м	kr1 2.48	0 918 7 -5.48	GHz dBm	Next Peak
				1 •					Next Pk Right
ffst	m	www	m		or when the	$\sim$	$\sim$	w	
B   0									Next Pk Left
Bm gAv									Min Search
1 M2 3 FC									Pk-Pk Search
АА f): 50k									 Mkr©C
wp									More
enter 2.480 916 2oc BW 3 kHz	7 GHz	#V	RW 10 I	/H-7	#S	oon 100	Span 3   c /601	00 kHz	1 of 2

Page 26 of 102

### 7.1.6. CONDUCTED SPURIOUS EMISSIONS

### LIMITS

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.

Page 27 of 102

#### RESULTS

#### 2FSK MODE

#### SPURIOUS EMISSIONS, LOW CHANNEL





Page 28 of 102

#### SPURIOUS EMISSIONS, MID CHANNEL





Page 29 of 102

#### SPURIOUS EMISSIONS, HIGH CHANNEL





Page 30 of 102

#### MSK MODE

#### SPURIOUS EMISSIONS, LOW CHANNEL





Page 31 of 102

#### SPURIOUS EMISSIONS, MID CHANNEL





Page 32 of 102

#### SPURIOUS EMISSIONS, HIGH CHANNEL





Page 33 of 102

# 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 appplicable 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.

Page 34 of 102

### 8.2. TRANSMITTER ABOVE 1 GHz

### 8.2.1. TRANSMITTER ABOVE 1 GHz FOR 2FSK MODE

#### **5dBi PATCH ANTENNA**

#### RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)





Page 35 of 102

#### **RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**





Page 36 of 102
## **RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**





Page 37 of 102

## RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





Page 38 of 102

## HARMONICS AND SPURIOUS EMISSIONS

Project #:         10113225           Company:         Anaren, Inc.           EUT Description:         2.4 CHz Transceiver           EUT MN:         2.4 S200R24C, 2500R24A           Test Target:         FC List State           Fest Target:         FC List State           Mode Oper:         TX, 2FSK Mode, 5dBi Patch Antenna           f         Messurement Frequency Amp         Preamp Gain         Average Field Strength Limit           Read         Analyzer Reading         Average Field Strength Strength Limit         Margin vs. Average Limit           CL         Cable Loss         HPF         High Pass Filter         Margin vs. Average Limit           f         Messurement Frequency         Map         D Corr         Fitz         Corr         Limit         Margin vs. Average Limit           CL         Cable Loss         HPF         High Pass Filter         Margin vs. Peak Limit           f         Dist         Read         AT         St.         -36.5         0.0         0.0         47.2         74.0         26.8         V         P           class         3.0         5.8         -36.5         0.0         0.0         47.2         74.0         26.8         V         P           dwsth	Test Engr Date:	•	Chin Pa 05/27/10	ng										
Company:       Anaren, Inc.         EUT Description:       2.4 CHZ transactive is an anarch, in the parameter of the	Project #:		10U1322	5										
EUT Description: 2.4 CHE Transceiver         EUT MN: $\Delta 2500R24C, A2500R24A         FCC15.247         Mode Oper:       TX, 2FSK Mode, 5dBi Path Antenna         A measurement Frequency Amp Preamp Gain       Average Field Strength Limit         Dist       Distance to Antenna       D Corn Distance Correct to 3 meters       Peak Field Strength Limit         Read       Antenna Factor       Peak       Calculated Peak Field Strength       Margin vs. Average Limit         f       Margin vs. Peak Eid       Margin vs. Peak Eid       Margin vs. Peak Eid       Notes         f       Read       AF       CL       Amp       D Corn       Fitz       Corn.       Limit       Margin vs. Peak Limit         g       Attenna Factor       Peak       Calculated Peak Field Strength       Margin vs. Peak       Det       Notes         f       Bist       Read       AF       CL       Amp       D Corr       Fitz       Corn.       Limit       Margin vs. Peak Eid       Peak         4303       3.0       44.9       33.0       5.8       -36.5       0.0       0.0       47.2       74.0       -26.8       V       P     <$	Company	:	Anaren,	Inc.										
Build Ch       Associated Carlow and the second secon	EUT Desci	ription:	2.4 GHz	Transce	iver									
Text Target:         FC C15.247           Mode Oper:         TX, 2FSK Mode, 5dBi Patch Antenna           f         Measurement Frequency Amp Dist         Preamp Gain Analyzer Reading Ar         Average Field Strength Qain Margin vs. Average Limit           AF         Antenna Factor Antenna Factor         Peak Peak         Calculated Peak Field Strength @ 3 m Arerage Field Strength @ 3 m Margin vs. Average Limit         Margin vs. Peak Limit           f         Dist         Read Analyzer Reading         Arerage Field Strength @ 3 m Margin vs. Peak Limit         Notes           f         Dist         Read And BuV         AF         CL         Amp Albu M         D Corr         Fitr         Corr.         Limit Margin vs. Peak Limit         Notes           f         Dist         Read Au         AF         CL         Amp Albu M         D Corr         Fitr         Corr.         Limit Margin vs. Peak Limit         Notes           f         Dist         Read Au         AF         CL         Amp AB         D Corr         Fitr         Corr.         Limit Margin vs. Peak Limit         Notes           ds03         3.0         44.0         33.0         5.8         -36.5         0.0         0.0         42.3         7.40         -26.8         V         P           4803         3.0	EUT M/N:		A2500R3	24C, A2	500R3	24A								
Mode Oper:         TX, 2F5K Mode, 5dBi Patch Antenna           f         Measurement Frequency Amp Distance to Antenna Aer         Preamp Gain Areas         Average Field Strength Limit           Read AF         Antenna Factor Cabe Loss         Peak Field Strength @ 3 m Margin vs. Peak Limit           f         Dist         Read Antenna Factor Cabe Loss         CL         Amp ABB W         D Corr BB W         Fitz BB W         Corr. BB W/m         Limit Margin vs. Peak Limit         Notes           f         Dist         Read Antenna Factor Cabe Loss         CL         Amp BB B         D Corr         Fitz BB B         Corr. BB B         Limit BB W/m         Margin vs. Peak Limit         Notes           GHz         (m)         BB V         BB         BB         BB         BB B         BB W/m         Ba W/m         Ba V/H         P/A/QP         Notes           Low ch         -	Test Targe	et:	FCC15.2	47										
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Mode Ope	21:	TX, 2FSF	( Mode,	5dBi	Patch A	ntenna							
Dist         Distance         Correct to 3 meters         Peak Field Strength Limit           Read         Analyzer Reading         Avg         Average Field Strength @ 3 m         Margin vs. Average Limit           AF         Antenna Factor         Peak         Calculated Peak Field Strength         Margin vs. Average Limit           CL         Cable Loss         HPF         High Pass Filter         Margin vs. Peak Limit         Margin vs. Peak Limit           f         Dist         Read         AF         CL         Amp         D Corr         Filt         Corr.         Limit         Margin vs. Peak Limit           f         Dist         Read         AF         CL         Amp         D Corr         Filt         Corr.         Limit         Margin vs. Peak Limit           Low ch		f	Мозатон	nont Fro	nenci	4 mp	Presmp (	Tain			Å 1707350	Field Stren	əth I innit	
Dist         Dist         Dist         Arrage         Field Strength         Margin vs. Average Field Strength         Margin vs. Average Limit           AF         Antenna Factor CL         Peak         Arrage         Field Strength         Margin vs. Average Limit           f         Dist         Read         AF         CL         Amp         D Corr.         First         Margin vs. Peak Limit           f         Dist         Read         AF         CL         Amp         D Corr.         First         Corr.         Limit         Margin vs. Peak Limit           f         Dist         Read         AF         CL         Amp         D Corr.         First         Corr.         Limit         Margin vs. Peak Limit           f         Dist         Read         AF         CL         Amp         D Corr.         First         Corr.         Limit         Margin vs. Peak Limit           f         Dist         Read         AF         CL         Amp         D Corr.         First         Corr.         Limit         Margin vs. Peak Limit           f         Margin vs.         Autor vs.         Autor vs.         Autor vs.         Autor vs.         Autor vs.         Autor vs.           f         Margin vs. <td></td> <td>- Dist</td> <td>Distance</td> <td>to Anter</td> <td>ruency ma</td> <td>D Corr</td> <td>Distance</td> <td>Correc</td> <td>t to 3 me</td> <td>ters</td> <td>Peak Fie</td> <td>ld Strength</td> <td>Limit</td> <td></td>		- Dist	Distance	to Anter	ruency ma	D Corr	Distance	Correc	t to 3 me	ters	Peak Fie	ld Strength	Limit	
AF       Antenan Factor       Peak       Calculated Peak Field Strength       Margin vs. Peak Limit         f       Dist       Read       AF       CL       Amp       D Corr       Fitz       Corr.       Limit       Margin vs. Peak Limit         f       Dist       Read       AF       CL       Amp       D Corr       Fitz       Corr.       Limit       Margin vs. Peak Limit         dHu       MBu V       MB       dB       dB       dB       dB       dB       dB       B       Corr.       Limit       Margin vs. Peak Limit         f       Dist       Read       AF       CL       Amp       D Corr       Fitz       Corr.       Limit       Margin vs. Peak Limit         dtage       J       J       B       B       B       B       B       B       B       B       With       P/A/QP         Low ch       3.0       44.60       33.0       5.8       -36.5       0.0       0.0       42.9       54.0       -11.1       V       A         4303       3.0       41.0       33.0       5.8       -36.5       0.0       0.0       43.3       54.0       -10.7       H       A         4882		Read	Analyzer	Reading		Avz	Average	Field S	trength @	)3m	Marsin	rs. Average	Limit	
CL         Cable Loss         HPF         High Pass Filter           f         Dist         Read         AF         CL         Amp         D Corr         Filte         Corr.         Limit         Margin         Ant. Pol.         Det.         Notes           GHz         (m)         dB/m         dB         dB         dB         dB         W/m         dB         V/H         P/A/QP           Low ch         ///         ///         ///         ///         ///         ///         ///         ///         ///         ///         ///         ///         ///         ///         ///         ///         ///         ///         //         ///         //		AF	Antenna	Factor		Peak	Calculate	d Peak	Field Str	enzth	Marrin	rs. Peak Liv	nit	
f         Dist         Read         AF         CL         Amp         D Corr         Fltr         Corr.         Limit         Margin         Ant. Pol.         Det.         Notes           Low ch		CL	Cable Los	55		HPF	High Pas:	s Filter						
f         Dist         Read         AF         CL         Amp         D Corr         Fitr         Corr.         Limit         Margin         Ant. Pol.         Det.         Notes           GHz         (m)         dBuV         dB/m         dB         dB         dB         dB         dB         dB         dBuV/m         dB         V/H         P/A/QP           Low ch							-							
CHz         (m)         dB/w         dB         dB         dB         dB         dB         dB         dB         V/m         dB         V/H         P/A/QP           Low ch         - <t< th=""><th>f</th><th>Dist</th><th>Read</th><th>AF</th><th>CL</th><th>Amp</th><th>D Corr</th><th>Fltr</th><th>Corr.</th><th>Limit</th><th>Margin</th><th>Ant. Pol.</th><th>Det.</th><th>Notes</th></t<>	f	Dist	Read	AF	CL	Amp	D Corr	Fltr	Corr.	Limit	Margin	Ant. Pol.	Det.	Notes
Low ch         - </td <td>CHz</td> <td>(m)</td> <td>dBuV</td> <td>dB/m</td> <td>dB</td> <td>dB</td> <td>dB</td> <td>dB</td> <td>dBuV/m</td> <td>dBuV/m</td> <td>dB</td> <td>V/H</td> <td>P/A/QP</td> <td></td>	CHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
4.803       3.0       44.9       33.0       5.8       -36.5       0.0       0.0       47.2       74.0       -26.8       V       P         4.803       3.0       46.0       33.0       5.8       -36.5       0.0       0.0       42.9       54.0       -11.1       V       A         4.803       3.0       46.0       33.0       5.8       -36.5       0.0       0.0       43.3       74.0       -25.7       H       P         4.803       3.0       45.3       33.1       5.8       -36.5       0.0       0.0       43.3       54.0       -10.7       H       A         Mid Ch	Low ch												_	
3.0 $40.0$ $33.0$ $5.8$ $-36.5$ $0.0$ $0.0$ $42.9$ $54.0$ $-11.1$ V       A $4.803$ $3.0$ $46.0$ $33.0$ $5.8$ $-36.5$ $0.0$ $0.0$ $43.3$ $74.0$ $-25.7$ H       P $4.803$ $3.0$ $41.0$ $33.0$ $5.8$ $-36.5$ $0.0$ $0.0$ $43.3$ $54.0$ $-10.7$ H       A         Mid Ch	4.803	3.0	44.9	33.0	5.8	-36.5	0.0	0.0	47.2	74.0	-26.8	V	P	
3.0       40.0       3.0       5.8       -30.5       0.0       0.0       48.3       (4.0 $-25.7$ H       P         4803       3.0       41.0       33.0       5.8       -36.5       0.0       0.0       43.3       54.0       -10.7       H       A         Mid Ch	4.8UJ 4.902	3.0	40.6	33.0	5.8	-36.5	0.0	U.U	42.9	54.0	-11.1	۷ ت	A	
Mid Ch	4.803	3.0	41.0	33.0	5.8	-36.5	0.0	0.0	43.3	54.0	-10.7	H	A	
Mid Ch														
4.882 $3.0$ $46.3$ $33.1$ $5.8$ $-36.5$ $0.0$ $0.0$ $47.8$ $74.0$ $-26.2$ V       P $4.882$ $3.0$ $41.1$ $33.1$ $5.8$ $-36.5$ $0.0$ $0.0$ $43.6$ $54.0$ $-10.4$ V       A $7.323$ $3.0$ $42.5$ $35.3$ $7.3$ $-36.2$ $0.0$ $0.0$ $48.8$ $74.0$ $-25.2$ V       P $7.323$ $3.0$ $35.6$ $35.3$ $7.3$ $-36.2$ $0.0$ $0.0$ $41.9$ $54.0$ $-12.1$ V       A $4882$ $3.0$ $46.3$ $33.1$ $5.8$ $-36.5$ $0.0$ $0.0$ $48.8$ $74.0$ $-25.2$ H       P $4.882$ $3.0$ $46.3$ $35.3$ $7.3$ $-36.2$ $0.0$ $0.0$ $44.7$ $74.0$ $-29.3$ H       P $7.323$ $3.0$ $28.0$ $35.3$ $7.3$ $-36.2$ $0.0$ $0.0$ $34.3$ $54.0$ $-19.7$ H	Mid Ch		45.2						4= 0					
4.662 $5.0$ $41.1$ $35.1$ $5.8$ $-30.5$ $0.0$ $0.0$ $43.6$ $94.0$ $-10.4$ V       A $7.323$ $3.0$ $42.5$ $35.3$ $7.3$ $-36.2$ $0.0$ $0.0$ $48.8$ $74.0$ $-25.2$ V       P $7.323$ $3.0$ $35.6$ $35.3$ $7.3$ $-36.2$ $0.0$ $0.0$ $41.9$ $54.0$ $-12.1$ V       A $4882$ $3.0$ $46.3$ $33.1$ $5.8$ $-36.5$ $0.0$ $0.0$ $48.8$ $74.0$ $-25.2$ H       P $4.882$ $3.0$ $42.5$ $33.1$ $5.8$ $-36.5$ $0.0$ $0.0$ $44.7$ $74.0$ $-29.3$ H       P $7.323$ $3.0$ $28.0$ $35.3$ $7.3$ $-36.2$ $0.0$ $0.0$ $34.3$ $54.0$ $-19.7$ H       A $4.961$ $3.0$ $46.0$ $33.2$ $5.9$ $-36.5$ $0.0$ $0.48.7$ $74.0$ $-25.3$ V       P     <	4.882	3.0	45.3	33.1	5.8	-36.5	0.0	0.0	47.8	74.0	-26.2	V V	. Р	
1.35.3       3.0       35.6       35.3       7.3       -36.2       0.0       0.0       48.6       74.0       -25.2       V       P         7.323       3.0       35.6       35.3       7.3       -36.2       0.0       0.0       41.9       54.0       -12.1       V       A         4.882       3.0       46.3       33.1       5.8       -36.5       0.0       0.0       48.8       74.0       -25.2       H       P         4.882       3.0       46.3       33.1       5.8       -36.5       0.0       0.0       48.8       74.0       -25.2       H       P         7.323       3.0       38.3       35.3       7.3       -36.2       0.0       0.0       44.7       74.0       -29.3       H       P         7.323       3.0       28.0       35.3       7.3       -36.2       0.0       0.0       34.3       54.0       -19.7       H       A         High Ch	4.882 7 393	3.0	41.1	35.1	2.8 7 2	-36.5	0.0	0.0	45.0	54.U 74.0	-10.4	V V	A D	
Asso	7.323	3.0	35.6	35.3	7.3	-36.2	0.0	0.0	41.9	54.0	-12.1	v V	A	
4.882       3.0       42.5       33.1       5.8       -36.5       0.0       0.0       45.0       54.0       -9.0       H       A         7.323       3.0       38.3       35.3       7.3       -36.2       0.0       0.0       44.7       74.0       -29.3       H       P         7.323       3.0       28.0       35.3       7.3       -36.2       0.0       0.0       34.3       54.0       -19.7       H       A         High Ch	4.882	3.0	46.3	33.1	5.8	-36.5	0.0	0.0	48.8	74.0	-25.2	Ĥ	P	
7.323       3.0       38.3       35.3       7.3       -36.2       0.0       0.0       44.7       74.0       -29.3       H       P         7.323       3.0       28.0       35.3       7.3       -36.2       0.0       0.0       34.3       54.0       -19.7       H       A         High Ch       -       -       -         4.961       3.0       46.0       33.2       5.9       -36.5       0.0       0.0       48.7       74.0       -25.3       V       P         4.961       3.0       42.9       33.2       5.9       -36.5       0.0       0.0       48.7       74.0       -25.3       V       P         4.961       3.0       42.9       33.2       5.9       -36.5       0.0       0.0       45.5       54.0       -8.5       V       A         7.441       3.0       37.2       35.5       7.3       -36.2       0.0       0.0       43.9       74.0       -30.1       V       P         7.441       3.0       24.7       35.5       7.3       -36.2       0.0       0.0       48.2       74.0       -25.8       H       P	4.882	3.0	42.5	33.1	5.8	-36.5	0.0	0.0	45.0	54.0	-9.0	H	Ā	
7.323       3.0       28.0       35.3       7.3       -36.2       0.0       0.0       34.3       54.0       -19.7       H       A         High Ch	7.323	3.0	38.3	35.3	7.3	-36.2	0.0	0.0	44.7	74.0	-29.3	H	Р	
High Ch	7.323	3.0	28.0	35.3	7.3	-36.2	0.0	0.0	34.3	54.0	-19.7	H	A	
High Ch       - </td <td></td> <td></td> <td>ļ</td> <td></td>			ļ											
3.0 $40.0$ $3.3.2$ $5.7$ $-30.5$ $0.0$ $0.0$ $48.7$ $74.0$ $-42.5$ $V$ $P$ $4.961$ $3.0$ $42.9$ $33.2$ $5.7$ $-30.5$ $0.0$ $0.0$ $45.5$ $54.0$ $-8.5$ $V$ $A$ $7.441$ $3.0$ $37.2$ $35.5$ $7.3$ $-36.2$ $0.0$ $0.0$ $43.9$ $74.0$ $-30.1$ $V$ $P$ $7.441$ $3.0$ $24.7$ $35.5$ $7.3$ $-36.2$ $0.0$ $0.0$ $43.9$ $74.0$ $-30.1$ $V$ $P$ $7.441$ $3.0$ $24.7$ $35.5$ $7.3$ $-36.2$ $0.0$ $0.0$ $48.2$ $74.0$ $-25.8$ $H$ $P$ $4.961$ $3.0$ $42.1$ $33.2$ $5.9$ $-36.5$ $0.0$ $0.0$ $44.7$ $54.0$ $-9.3$ $H$ $A$ $4.961$ $3.0$ $24.8$ $35.5$ $7.3$ <td>High Ch</td> <td>20</td> <td>46.0</td> <td>22.0</td> <td></td> <td>26.8</td> <td></td> <td>0.0</td> <td>40 7</td> <td>740</td> <td></td> <td>TT</td> <td>n</td> <td></td>	High Ch	20	46.0	22.0		26.8		0.0	40 7	740		TT	n	
7.441         3.0         37.2         35.5         7.3         -36.2         0.0         0.0         43.9         74.0         -30.1         V         P           7.441         3.0         37.2         35.5         7.3         -36.2         0.0         0.0         43.9         74.0         -30.1         V         P           7.441         3.0         24.7         35.5         7.3         -36.2         0.0         0.0         31.4         54.0         -22.6         V         A           4.961         3.0         45.6         33.2         5.9         -36.5         0.0         0.0         48.2         74.0         -25.8         H         P           4.961         3.0         42.1         33.2         5.9         -36.5         0.0         0.0         44.7         54.0         -9.3         H         A           7.441         3.0         37.7         35.5         7.3         -36.2         0.0         0.0         44.3         74.0         -29.7         H         P           7.441         3.0         24.8         35.5         7.3         -36.2         0.0         0.0         31.4         54.0         -22.6	4.901 4.961	3.0	40.0	33.2	2.7 E O	-30.5	0.0	0.0	46./	/4LU 5/10	-40.3	V V	A P	
7.441         3.0         24.7         35.5         7.3         -36.2         0.0         0.0         31.4         54.0         -22.6         V         A           4.961         3.0         45.6         33.2         5.9         -36.5         0.0         0.0         48.2         74.0         -25.8         H         P           4.961         3.0         42.1         33.2         5.9         -36.5         0.0         0.0         44.7         54.0         -9.3         H         A           7.441         3.0         37.7         35.5         7.3         -36.2         0.0         0.0         44.3         74.0         -29.7         H         P           7.441         3.0         24.8         35.5         7.3         -36.2         0.0         0.0         31.4         54.0         -29.7         H         P           7.441         3.0         24.8         35.5         7.3         -36.2         0.0         0.0         31.4         54.0         -22.6         H         A	7.441	3.0	37.2	35.5	7.3	-36.2	0.0	0.0	43.9	74.0	-0.2	v V	P	
4.961         3.0         45.6         33.2         5.9         -36.5         0.0         0.0         48.2         74.0         -25.8         H         P           4.961         3.0         42.1         33.2         5.9         -36.5         0.0         0.0         48.2         74.0         -25.8         H         P           4.961         3.0         42.1         33.2         5.9         -36.5         0.0         0.0         44.7         54.0         -9.3         H         A           7.441         3.0         37.7         35.5         7.3         -36.2         0.0         0.0         44.3         74.0         -29.7         H         P           7.441         3.0         24.8         35.5         7.3         -36.2         0.0         0.0         31.4         54.0         -29.7         H         P           7.441         3.0         24.8         35.5         7.3         -36.2         0.0         0.0         31.4         54.0         -22.6         H         A	7.441	3.0	24.7	35.5	7.3	-36.2	0.0	0.0	31.4	54.0	-22.6	v	Â	
4.961         3.0         42.1         33.2         5.9         -36.5         0.0         0.0         44.7         54.0         -9.3         H         A           7.441         3.0         37.7         35.5         7.3         -36.2         0.0         0.0         44.3         74.0         -29.7         H         P           7.441         3.0         24.8         35.5         7.3         -36.2         0.0         0.0         31.4         54.0         -22.6         H         A	4.961	3.0	45.6	33.2	5.9	-36.5	0.0	0.0	48.2	74.0	-25.8	H	P	
7.441         3.0         37.7         35.5         7.3         -36.2         0.0         0.0         44.3         74.0         -29.7         H         P           7.441         3.0         24.8         35.5         7.3         -36.2         0.0         0.0         31.4         54.0         -29.7         H         P	4.961	3.0	42.1	33.2	5.9	-36.5	0.0	0.0	44.7	54.0	-9.3	H	A	
7.441 3.0 24.8 35.5 7.3 -36.2 0.0 0.0 31.4 54.0 -22.6 H A	7.441	3.0	37.7	35.5	7.3	-36.2	0.0	0.0	44.3	74.0	-29.7	H	P	
	7.441	3.0	24.8	35.5	7.3	-36.2	0.0	0.0	31.4	54.0	-22.6	H	A	

Page 39 of 102

## **3dBi MONOPOLE ANTENNA**

#### RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)





Page 40 of 102

## **RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**





Page 41 of 102

## **RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**





Page 42 of 102

## RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





Page 43 of 102

## HARMONICS AND SPURIOUS EMISSIONS

Teet From													
iest mer	:	Chin Pa	ng										
Date:		05/27/10											
Project #:	I.	10U1322	.5										
Company The second	·	Anaren,	Inc.										
EUT Desci	ription:	2.4 GHz	Transce	iver									
EUI MDR: Taat Tana	- 4.	AZSUURA RCC14 (	240, 827 247	SUOKS	4A								
1est range Mode One	21: av:	TY 2FSI	.47 4 Mode	34B;	Monone	le Anten	-						
Mode Ob.	21.1	14, 11, 21, 21,	· Houe,	JUDI	Monopo	le much	na.						
	f	Measurer	ment Free	quency	7 Amp	Preamp (	Gain			Average	Field Strer	eth Limit	
	Dist	Distance	to Anter	nna	D Corr	Distance	Corre	ct to 3 me	aters	Peak Fie	ald Strength	. Limit	
	Read	Analyzer	Reading	ś	Avg	Average	Field S	trength Ø	43 m	Margin ,	vs. Average	Limit	
	AF	Antenna	Factor		Peak	Calculate	d Peak	x Field Str	ength	Margin ,	vs. Peak Li	mit	
	CL	Cable Lo:	55		HPF	High Pas	s Filter	r					
f	Diet	Paad	AF	· CT	: A	DCom	: Flitz	Com	Timit		Ant Dal	D-+	Notos
CHz	(m)	reau dBuV	dB/m	dB	dB	dB	dB	dBuV/n	dBuV/m	dB	V/H	P/A/OP	110 162
Low Ch	<u></u>			_ <u></u>		<b></b>				_ <u></u>	1 1/144	- Tringe	
4.803	3.0	40.7	33.0	5.8	-36.5	0.0	0.0	43.0	74.0	-31.0	v	P	
4.803	3.0	33.5	33.0	5.8	-36.5	0.0	0.0	35.8	54.0	-18.2	V	A	
4.803	3.0	38.2	33.0	5.8	-36.5	0.0	0.0	40.6	74.0	-33.4	H	P	
4.803	3.0	26.4	33.0	5.8	-36.5	0.0	0.0	28.8	54.0	-25.2	H	A	
мы съ								4	<u></u>				
4.882	3.0	39.3	33.1	5.8	-36.5	0.0	0.0	41.7	74.0	-32.3	v	Р	
4.882	3.0	29.8	33.1	5.8	-36.5	0.0	0.0	32.2	54.0	-21.8	v	Ā	
7.323	3.0	38.2	35.3	7.3	-36.2	0.0	0.0	44.5	74.0	-29.5	V	Р	,
7.323	3.0	27.6	35.3	7.3	-36.2	0.0	0.0	34.0	54.0	-20.0	V	A	
4.882	3.0	38.1	33.1	5.8	-36.5	0.0	0.0	40.6	74.0	-33.4	H	Р	
4.882	3.0	25.9	33.1	5.8	-36.5	0.0	0.0	28.3	54.0	-25.7	H	A	
7.323	3.0	37.7	35.3	7.3	-36.2	0.0	0.0	44.0	74.0	-30.0	H	P	
7.323	3.0	26.1	35.3	7.3	-36.2	0.0	0.0	32.5	54.0	-21.5	H	A	
High Ch	-		•			-					·		
4.961	3.0	38.5	33.2	5.9	-36.5	0.0	0.0	41.1	74.0	-32.9	V	P	
4.961	3.0	28.9	33.2	5.9	-36.5	0.0	0.0	31.5	54.0	-22.5	V	Α	
7.441	3.0	39.5	35.5	7.3	-36.2	0.0	0.0	46.1	74.0	-27.9	V	Р	
7.441	3.0	30.9	35.5	7.3	-36.2	0.0	0.0	37.5	54.0	-16.5	V ·	A	
4.961	3.0	37.8	33.2	5.9	-36.5	0.0	0.0	40.4	74.0	-33.6	H	P	
4.961	3.0	25.5	33.2	5.9	-36.5	0.0	0.0	28.1	54.0	-25.9	H	<u>A</u>	
7.441	3.0	37.4	35.5	7.3	-36.2	0.0	0.0	44.0	74.0	-30.0	H	P	,
7.441	3.0	25.1	35.5	7.3	-30.2	0.0	0.0	31.7	54.0	-22.3	h	A	
						/					ļ)	·	
Rev. 4.1.2	7	<u>.</u>	·	<u>.                                    </u>	<u>.</u>	<u>.                                    </u>	<u></u>	نـــــــــــــــــــــــــــــــــــــ	<u> </u>	<u> </u>	<u>.                                    </u>	. <u> </u>	

Page 44 of 102

#### 2dBi PCB ANTENNA

#### **RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)**





Page 45 of 102

## **RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**





Page 46 of 102

## **RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**





Page 47 of 102

## RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





Page 48 of 102

## HARMONICS AND SPURIOUS EMISSIONS

Test Engr Date: Project #: Company EUT Desc: EUT M/N: Test Targ Mode Op	: ription: et: er:	05/28/10 10U13225 Anaren iption: 2.4 GHz Transceiver A2500R24C, A2500R24A t: fCC 15.247 r: TX, 2FSK Mode, 2dBi PCB Antenna											
	f Dist	Measuren Distance	nent Fre	quency	Amp	Preamp (	Gain Course			Average	Field Streng	gth Limit Limit	
	DBI DDJ	Annih	D. J.	una	A	Assessment	Correct Figure 6		2	Feak fie	a strengtn	Linut	
	A F	Analyzer	rosaung Faatao		Avg	Colerite.	1 D 1 L IEIG 2.	rength (0	;⊥m 	Margin V	o. Average •• D1. T ≒		
	CL	Antenna Cable Los	ractor 55		HPF	High Pas	u reak s Filter	rield str	engin	wargin v	o, reak Lii		
f	Dist	Read	AF	CL	Атр	D Corr	Fltr	Corr.	Limit	Margin	Ant. Pol.	Det.	Notes
GHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
Low Ch 4 803	3.0	46.2	33.0	5.8	-36.5	0.0	0.0	48.5	74.0	-25.5	v	р	
4.803	3.0	42.9	33.0	5.8	-36.5	0.0	0.0	45.2	54.0	-8.8	v	Â	
4.803	3.0	43.0	33.0	5.8	-36.5	0.0	0.0	45.3	74.0	-28.7	H	P	
4.803	3.0	38.6	33.0	5.8	-36.5	0.0	0.0	40.9	54.0	-13.1	H	A	
Mid Ch													
4.882	3.0	46.9	33.1	5.8	-36.5	0.0	0.0	49.4	74.0	-24.6	v	P	
4.882	3.0	42.8	33.1	5.8	-36.5	0.0	0.0	45.3	54.0	-8.7	v	A	
7.323	3.0	46.5	35.3	7.3	-36.2	0.0	0.0	52.9	74.0	-21.1	V	P	
7.323	3.0	41.3	35.3	7.3	-36.2	0.0	0.0	47.6	54.0	-6.4	v	A	
4.882	3.0	43.7	33.1	5.8	-36.5	0.0	0.0	46.2	74.0	-27.8	H	P	
4.882	3.0	38.7	33.1	5.8	-36.5	0.0	0.0	41.2	54.0	-12.8	H	A	
1.323	3.0	47.2	35.3	7.3	-30.2	0.0	0.0	5J.0 40.0	/4.0	-20.4	н ч	P	
r.Júd	J.U	43.4	J2.J	· ··J	J <b>0.</b> ≰	0.0	v.U	47.0	24LU	6.4	- 11	A	
High Ch													
4.961	3.0	47.5	33.2	5.9	-36.5	0.0	0.0	50.1	74.0	-23.9	V	P	
4.961	3.0	44.6	33.2	5.9	-36.5	0.0	0.0	47.2	54.0	-6.8	V.	A	
/.441	3.0	38.Z	35.5	7.3	-36.2	0.0	0.0	44.8	74.0	-29.2	<u>۷</u>	. Р ,	
4441	3.0	47.7	33.5	/.J 20	-36.4	0.0	0.0	35.2	74.0	-18.8	V H	D D	
4.961	3.0	36.8	33.2	5.9	-36.5	0.0	0.0	39.4	54.0	-14.6	н	A	
7.441	3.0	37.9	35.5	7.3	-36.2	0.0	0.0	44.5	74.0	-29.5	H	P	
7.441	3.0	28.5	35.5	7.3	-36.2	0.0	0.0	35.1	54.0	-18.9	H	A	
	-												
Rev. 4.1.2	.7												
Note: No	other e	missions	were de	tected	l above 1	the system	n nois	se floor.					

Page 49 of 102

# 8.2.2. TRANSMITTER ABOVE 1 GHz FOR MSK MODE

#### **5dBi PATCH ANTENNA**

#### RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)





Page 50 of 102

## **RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**





Page 51 of 102

## **RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**





Page 52 of 102

## RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





Page 53 of 102

#### HARMONICS AND SPURIOUS EMISSIONS

Combria	ice Ceri	nncation	pervice:	s, rre	mont Si	n Unamb	ег						
Fest Engr	:	Chin Pa	ng										
Date: Designt #		10111222	E										
Ртојест #: Сописан		4nomn	.P Inc										
солфацу FITT Docc	rintian.	2 ACH <sub>7</sub>	Transco	inar									
EUT Desc. FIIT M/N:	гфцон.	A2500R3	11aliste 24C. A2	500R:	24A								
Test Targ	et:	FCC 15.	247										
Mode Op	er:	TX, FSK	Mode, 5	dBi P	atch An	tenna							
	f	Measuren	nent Freq	piency	7 Amp	Preamp (	Gain			Average	Field Stren	gth Limit	
	Dist	Distance	to Anter	ma	D Corr	Distance	Correc	et to 3 me	eters	Peak Fie	ld Strength	Limit	
	Read	Analyzer	Reading		Avg	Average	Field S	trength @	)3 m	Margin	rs. Average	Limit	
	AF	Antenna	Factor		Peak	Calculate	d Peak	r Field Str	ength	Margin	rs. Peak Lii	nit	
	CL	Cable Los	55		HPF	High Pas	s Filter	r					
f	Dist	Read	AF	CL	Amp	D Corr	Fltr	Corr.	Limit	Margin	Ant. Pol.	Det.	Notes
GHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
Low Ch									- / -			_	
1.8U4 4 00 4	3.0	44.4	33.0	5.8	-36.5	0.0	0.0	46.8	74.0	-27.2	V T	<u>Р</u>	
1.804 1.90 <i>4</i>	3.0	33.4	33.0	2.0 2.9	-30.7	0.0	0.0	37.8 46 T	54.U 74.0	-10.2	V H	D A	
4.804	3.0	33.0	33.0	5.8	-36.5	0.0	0.0	35.3	54.0	-18.7	H	A	
Mid Ch													
4.882	3.0	44.9	33.1	5.8	-36.5	0.0	0.0	47.4	74.0	- <b>26.6</b>	V	Р	
4.882	3.0	33.4	33.1	5.8	-36.5	0.0	0.0	35.9	54.0	- <b>18.1</b>	V	A	
7.323	3.0	41.4	35.3	7.3	-36.2	0.0	0.0	47.7	74.0	-26.3	V	P	
7.323	3.0	29.9	35.3	7.3	-36.2	0.0	0.0	36.3	54.0	-17.7	V	A	
4.882	3.0	45.4	33.1	5.8	-30.5	0.0	0.0	47.9	/4.0	-20.1	H U	Р ,	
4.004 7 393	3.0	39.5	35.1	73	-30.7	0.0	0.0	30.4	74.U 74.0	-17.0	п	D D	
7.323	3.0	26.2	35.3	7.3	-36.2	0.0	0.0	32.5	54.0	-21.5	н	Å	
High Ch													
4.961	3.0	45.6	33.2	5.9	-36.5	0.0	0.0	48.2	74.0	-25.8	V	P	
4.961	3.0	33.4	33.2	5.9	-36.5	0.0	0.0	36.0	54.0	-18.0	V	A	
	3.0	37.2	35.5	7.3	-36.2	0.0	0.0	43.8	74.0	-30.2	V	P	
7.441	3.0	24.8	35.5	7.3	-36.2	0.0	0.0	31.4	54.0	-22.6	V P	A	
7.441 7.441		37.0	33.2	2.9 2.0	-30.5	0.0	0.0	4/.0	/4.U 5/0	-27.0	л Ч	P A	
7.441 7.441 4.961	3.0		35.5	73	-36.2	0.0	0.0	44.3	74 N	-10.7	н	P	
7.441 7.441 4.961 4.961 7.441	3.0	37.7				÷			F 4 0				
7.441 7.441 4.961 4.961 1.441 1.441	3.0 3.0 3.0 3.0	37.7 24.9	35.5	7.3	-36.2	0.0	0.0	51.5	54.0	-22.5	п	A	

Page 54 of 102

## **3dBi MONOPOLE ANTENNA**

#### RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)





Page 55 of 102

## **RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**





Page 56 of 102

## **RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**





Page 57 of 102

# RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





Page 58 of 102

## HARMONICS AND SPURIOUS EMISSIONS

hin Pang /27/10 /U13225 naren 4 GHz Transc 2500R24C, A2 20 15.247 C, MSK Mode, easurement Fre stance to Anten nalyzer Reading aterna Factor ble Loss Read AF IBuV dB/m 41.4 33.0 29.8 33.0 38.7 33.0 26.2 33.0	eiver 500R24 3dBi M quency nua CL dB 5.8 5.8 5.8	4A Ionopol D Corr Avg Peak HPF Amp dB -36.5 -36.5	le Antenn Preamp ( Distance Average Calculate High Pas D Corr dB 0.0 0.0	na Gain Correct Gorrect J Peak s Filter dB 0.0 0.0	t to 3 me trength @ Field Stra dBuV/m 43.7 32.1	ters 3 m mgth dBuV/m 74.0	Average Peak Fie Margin v Margin v dB	Field Stren, ld Strength 's. Average 's. Peak Lin <b>Ant. Pol.</b> V/H	gth Limit Limit Limit nit Det. P/A/QP	Notes
27/10 1013225 naren 4 GHz Transco 2500R24C, A2 3C 15.247 4, MSK Mode, easurement Fre stance to Ante- nalyzer Reading ntenna Factor ble Loss Read AF 1BuV dB/m 41.4 33.0 29.8 33.0 38.7 33.0 26.2 33.0	eiver 500R2- 3dBi M quency nna CL dB 5.8 5.8 5.8 5.8	4A Ionopol D Corr Avg Peak HPF Amp dB -36.5 -36.5 -36.5	le Antenn Preamp ( Distance Average Calculate High Pas D Corr dB 0.0 0.0	na Gain Correo Field S d Peak s Filter <b>dB</b> 0.0 0.0	t to 3 me trength @ Field Stre dBuV/m 43.7 32.1	ters 3 m ngth <b>Limit</b> <b>dBuV/m</b> 74.0	Average Peak Fie Margin v Margin v Margin 30 3	Field Stren, ld Strength %. Average %. Peak Lir <b>Ant. Pol.</b> V/H	gth Limit Limit Limit nit Det. P/A/QP	Notes
A CH2 Transco 2500R24C, A2 2500R24C, A2 C 15.247 C 15.247 C MSK Mode, easurement Fre stance to Ante- nalyzer Reading ntenna Factor ble Loss Read AF IBuV dB/m 41.4 33.0 29.8 33.0 38.7 33.0 26.2 33.0	eiver 500R2- 3dBi M quency nna CL dB 5.8 5.8 5.8 5.8	4A Ionopol D Corr Avg Peak HPF Amp dB -36.5 -36.5	le Antenn Preamp ( Distance Average Calculate High Pas D Corr dB 0.0 0.0	a Gain Correc Field S d Peak s Filter dB 0.0 0.0	t to 3 me trength @ Field Stra dBuV/m 43.7 32.1	ters 3 m ngth <b>Limit</b> <b>dBuV/m</b> 74.0	Average Peak Fie Margin v Margin v Margin a B	Field Strem Id Strength 5. Average 5. Peak Lir Ant. Pol. V/H	gth Limit Limit Limit nit Det. P/A/QP	Notes
4 GHz Transco 2500R24C, A2 3C 15.247 4, MSK Mode, easurement Fre stance to Ante- nalyzer Reading ntenna Factor ble Loss Read AF IBuV dB/m 41.4 33.0 29.8 33.0 38.7 33.0	eiver 500R24 3dBi M quency nna CL dB 5.8 5.8 5.8	4A fonopol D Corr Avg Peak HPF Amp dB -36.5 -36.5	le Antenn Preamp ( Distance Average Calculate High Pas D Corr dB 0.0 0.0	a Gain Correc Field S d Peak s Filter <b>Htr</b> <b>dB</b> 0.0 0.0	t to 3 me trength @ Field Stra dBuV/m 43.7 32.1	ters 3 m ngth dBuV/m 74.0	Average Peak Fie Margin v Margin v Margin dB	Field Stren; ld Strength %. Average %. Peak Lin <b>Ant. Pol.</b> V/H	gth Limit Limit Limit nit Det. P/A/QP	Notes
COLD Transec         2500R24C, A2         CC 15.247         X, MSK Mode,         easurement Fre         stance to Antenalyzer Reading         nalyzer Reading         ntenna Factor         ble Loss         Read       AF         IBuV       dB/m         41.4       33.0         29.8       33.0         38.7       33.0         26.2       33.0	CL 508 CL 4B 5.8 5.8 5.8 5.8 5.8	4A fonopol Amp D Corr Avg Peak HPF Amp dB -36.5 -36.5 -36.5	le Antenn Preamp ( Distance Average Calculate High Pas D Corr dB 0.0 0.0	na Gain Correc Field S d Peak s Filter <b>fltr dB</b> 0.0 0.0	t to 3 me trength @ Field Stra dBuV/m 43.7 32.1	ters 3 m ength <b>Limit</b> <b>dBuV/m</b> 74.0	Average Peak Fie Margin v Margin v Margin dB	Field Stren, ld Strength 5. Average 5. Peak Lir <b>Ant. Pol.</b> V/H	gth Limit Limit Limit nit Det. P/A/QP	Notes
C 15.247 C 15.247 C MSK Mode, easurement Fre stance to Ante: nalyzer Reading ntenna Factor ble Loss Read AF IBuV dB/m 41.4 33.0 29.8 33.0 38.7 33.0 26.2 33.0	CL           dB           5.8           5.8           5.8           5.8	Amp D Corr Avg Peak HPF Amp dB -36.5 -36.5	le Antenn Preamp ( Distance Average Calculate High Pas D Corr dB 0.0 0.0	a Gain Correc Field S d Peak s Filter dB 0.0 0.0	t to 3 me trength @ Field Stra dBuV/m 43.7 32.1	ters 3 m ngth <b>Limit</b> <b>dBuV/m</b> 74.0	Average Peak Fie Margin v Margin v Margin dB	Field Stren, ld Strength s. Average s. Peak Lin <b>Ant. Pol.</b> V/H	gth Limit Limit Limit nit Det. P/A/QP	Notes
K, MSK Mode,       easurement Freestance to Antenalyzer Reading       nalyzer Reading       ntenna Factor       ble Loss       Read     AF       IBuV     dB/m       41.4     33.0       29.8     33.0       38.7     33.0       26.2     33.0	3dBi M quency nna CL dB 5.8 5.8 5.8 5.8 5.8	Amp D Corr Avg Peak HPF Amp dB -36.5 -36.5	le Antenn Preamp ( Distance Average Calculate High Pas D Corr dB 0.0 0.0	a Gain Correc Field S d Peak s Filter dB 0.0	t to 3 me trength @ Field Stra dBuV/m 43.7 32.1	ters 3 m ength Limit dBuV/m 74.0	Average Peak Fie Margin v Margin v Margin a B	Field Stren, ld Strength 5. Average 5. Peak Lir Ant. Pol. V/H	gth Limit Limit Limit nit Det. P/A/QP	Notes
easurement Fre stance to Anten nalyzer Reading ntenna Factor ble Loss Read AF BuV dB/m 41.4 33.0 29.8 33.0 38.7 33.0 26.2 33.0	quency nna CL dB 5.8 5.8 5.8 5.8	Amp D Corr Avg Peak HPF Amp dB -36.5 -36.5 -36.5	Preamp ( Distance Average Calculate High Pas D Corr dB 0.0 0.0 0.0	Gain Correc Field S d Peak s Filter <b>Filtr</b> <b>dB</b> 0.0	t to 3 me trength @ Field Stri dBuV/m 43.7 32.1	ters 3 m ength Limit dBuV/m 74.0	Average Peak Fie Margin v Margin v Margin dB	Field Stren, ld Strength rs. Average rs. Peak Lin <b>Ant. Pol.</b> V/H	gth Limit Limit Limit nit Det. P/A/QP	Notes
stance to Ante: alyzer Reading thema Factor ble Loss Read AF BUV dB/m 41.4 33.0 29.8 33.0 38.7 33.0 26.2 33.0	CL dB 5.8 5.8 5.8 5.8 5.8	Amp Avg Peak HPF Amp dB -36.5 -36.5 -36.5	Distance Average Calculate High Pas D Corr dB 0.0	Correc Field S d Peak s Filter dB 0.0 0.0	t to 3 me trength @ Field Stre dBuV/m 43.7 32.1	ters 23 m ength Limit dBuV/m 74.0	Peak Fie Margin v Margin v Margin dB	ld Strength rs. Average rs. Peak Lin Ant. Pol. V/H	Det. P/A/QP	Notes
Allyzer         Reading           ntenna         Factor           ible         Loss           Read         AF           IBuV         dB/m           41.4         33.0           29.8         33.0           38.7         33.0           26.2         33.0	CL dB 5.8 5.8 5.8 5.8 5.8	Avg Peak HPF dB -36.5 -36.5 -36.5	Average Calculate High Pas D Corr dB 0.0 0.0	Field S d Peak s Filter dB 0.0 0.0	Corr. dBuV/m 43.7 32.1	3 m ength dBuV/m 74.0	Margin v Margin v Margin dB	s. Average s. Peak Lir Ant Pol. V/H	Det. P/A/QP	Notes
Attenna Factor ble Loss Read AF IBuV dB/m 41.4 33.0 29.8 33.0 38.7 33.0 26.2 33.0	CL dB 5.8 5.8 5.8 5.8 5.8	Peak HPF dB -36.5 -36.5 -36.5	Calculate High Pas D Corr dB 0.0 0.0	d Peak s Filter dB 0.0 0.0	Corr. dBuV/m 43.7 32.1	ength Limit dBuV/m 74.0	Margin v Margin dB	Ant Pol V/H	Det. P/A/QP	Notes
AF           BuV         dB/m           41.4         33.0           29.8         33.0           38.7         33.0           26.2         33.0	CL dB 5.8 5.8 5.8 5.8 5.8	HPF Amp dB -36.5 -36.5 -36.5	High Pas D Corr dB 0.0 0.0	s Filter Fltr dB 0.0 0.0	Corr. dBuV/m 43.7 32.1	Limit dBuV/m 74.0	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
Read         AF           IBuV         dB/m           41.4         33.0           29.8         33.0           38.7         33.0           26.2         33.0	CL dB 5.8 5.8 5.8 5.8 5.8	Amp dB -36.5 -36.5 -36.5	D Corr dB 0.0 0.0	F1±r dB 0.0 0.0	Corr. dBuV/m 43.7 32.1	Limit dBuV/m 74.0	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
IBuV dB/m 41.4 33.0 29.8 33.0 38.7 33.0 26.2 33.0	dB 5.8 5.8 5.8 5.8	dB -36.5 -36.5 -36.5	dB 0.0 0.0	dB 0.0 0.0	dBuV/m 43.7 32.1	dBuV/m 74.0	dB _30.3	V/H	P/A/QP P	
41.4 33.0 29.8 33.0 38.7 33.0 26.2 33.0	5.8 5.8 5.8 5.8	-36.5 -36.5 -36.5	0.0	0.0 0.0	43.7	74.0	-30.3	v	P	
41.4 33.0 29.8 33.0 38.7 33.0 26.2 33.0	5.8 5.8 5.8 5.8	-36.5 -36.5 -36.5	0.0	0.0 0.0	43.7 32.1	74.0	-30.3	V	P	
29.8         33.0           38.7         33.0           26.2         33.0	5.8 5.8 5.8	-36.5 -36.5	0.0	0.0	32.1			Y		
38.7 33.0 26.2 33.0	5.8 5.8	-36.5	. 00			54.0	-21.9	V	<u>A</u>	
20.2 33.0	5.8	F	0.0	0.0	41.1	74.0	-32.9	H	P	
	11	-30.5	0.0	0.0	28.5	54.0	-25.5	н	A	
	+									
38.5 33.1	5.8	-36.5	0.0	0.0	41.0	74.0	-33.0	v	Р	
26.2 33.1	5.8	-36.5	0.0	0.0	28.6	54.0	-25.4	v	Ā	
40.8 35.3	7.3	-36.2	0.0	0.0	47.1	74.0	-26.9	v	P	
29.2 35.3	7.3	-36.2	0.0	0.0	35.6	54.0	-18.4	V	Α	
38.0 33.1	5.8	-36.5	0.0	0.0	40.4	74.0	-33.6	H	P	
25.6 33.1	5.8	-36.5	0.0	0.0	28.1	54.0	-25.9	H	A	
37.5 35.3	7.3	-36.Z	0.0	0.0	43.8	74.0	-30.2	H	P	
40.0 30.3	/.3	-30.2	0.0	U.U	31.9	<b>24.</b> U	-22.1	n	A	
	†									
39.1 33.2	5.9	-36.5	0.0	0.0	41.7	74.0	-32.3	v	Р	
27.0 33.2	5.9	-36.5	0.0	0.0	29.6	54.0	-24.4	V	A	
37.4 35.5	7.3	-36.2	0.0	0.0	44.1	74.0	-29.9	V	P	
25.2 35.5	7.3	-36.2	0.0	0.0	31.9	54.0	-22.1	V	A	
38.4 33.2	5.9	-36.5	0.0	0.0	41.0	74.0	- <b>33.0</b>	H	Р	
26.5 33.2	5.9	-36.5	0.0	0.0	29.1	54.0	-24.9	Н	<u>A</u>	
37.0 35.5	7.3	-36.2	0.0	0.0	43.6	74.0	-30.4	H	P	
24.6 35.5	7.3	-36.2	U.O	<b>U.</b> O	31.2	54.0	-22.8	Н	A	
	40.8         35.3           19.2         35.3           18.0         33.1           15.6         33.1           17.5         35.3           19.1         33.2           17.4         35.5           15.2         35.5           18.4         33.2           16.5         33.2           17.0         35.5           18.4         33.2           17.0         35.5           14.6         35.5	40.8         35.3         7.3           19.2         35.3         7.3           18.0         33.1         5.8           15.6         33.1         5.8           17.5         35.3         7.3           15.5         35.3         7.3           15.5         35.3         7.3           15.5         35.3         7.3           15.5         35.3         7.3           15.5         35.3         7.3           15.5         35.3         7.3           19.1         33.2         5.9           17.4         35.5         7.3           15.2         35.5         7.3           15.2         35.5         7.3           18.4         33.2         5.9           17.0         35.5         7.3           14.6         35.5         7.3	40.8         35.3         7.3         -36.2           19.2         35.3         7.3         -36.2           19.2         35.3         7.3         -36.2           18.0         33.1         5.8         -36.5           15.6         33.1         5.8         -36.5           17.5         35.3         7.3         -36.2           15.5         35.3         7.3         -36.2           15.5         35.3         7.3         -36.2           15.5         35.3         7.3         -36.2           16.1         33.2         5.9         -36.5           17.4         35.5         7.3         -36.2           17.4         35.5         7.3         -36.2           15.2         35.5         7.3         -36.2           15.2         35.5         7.3         -36.2           15.4         33.2         5.9         -36.5           16.5         33.2         5.9         -36.5           17.0         35.5         7.3         -36.2           14.6         35.5         7.3         -36.2					$            \begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrr$		00.8 $35.3$ $7.3$ $-36.2$ $0.0$ $0.0$ $47.1$ $74.0$ $-26.9$ V       P $9.2$ $35.3$ $7.3$ $-36.2$ $0.0$ $0.0$ $35.6$ $54.0$ $-18.4$ V       A $82.0$ $33.1$ $5.8$ $-36.5$ $0.0$ $0.0$ $40.4$ $74.0$ $-33.6$ H       P $55.6$ $33.1$ $5.8$ $-36.5$ $0.0$ $0.0$ $28.1$ $54.0$ $-25.9$ H       A $75.5$ $35.3$ $7.3$ $-36.2$ $0.0$ $0.0$ $43.8$ $74.0$ $-30.2$ H       P $75.5$ $35.3$ $7.3$ $-36.2$ $0.0$ $0.0$ $43.8$ $74.0$ $-32.3$ V       P $75.5$ $35.3$ $7.3$ $-36.5$ $0.0$ $0.0$ $41.7$ $74.0$ $-32.3$ V       P $77.0$ $33.2$ $5.9$ $-36.5$ $0.0$ $0.0$ $29.6$ $54.0$ $-24.4$ V       A $77.4$

Page 59 of 102

#### 2dBi PCB ANTENNA

#### **RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)**





Page 60 of 102

## **RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**





Page 61 of 102

## **RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**





Page 62 of 102

## RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





Page 63 of 102

## HARMONICS AND SPURIOUS EMISSIONS

	le cer		weivice:	, 11e									
Fest Engr:		Chin Pa	ng										
Date: Designation		10111222	z										
гтојест #: Сописани		1001322 Amonom	P Inc										
Company: FIIT Decer	: Intion:	2 4 CHz	Transco	inar									
EUT Desei EIT M/N:	фион.	A2500R2	4C. A2	500R3	4A								
Test Tarze	t:	FCC15.2	47										
Mode Ope	:	TX, MSK	Mode, 2	2dBi I	PCB An	tenna							
	f	Measuren	aent Freq	piency	Amp	Preamp (	Gain			Average	Field Stren	gth Limit	
	Dist	Distance	to Anter	ma	D Corr	Distance	Correc	t to 3 me	ters	Peak Fie	eld Strength	Limit	
	Read	Analyzer	Reading		Avg	Average	Field S	trength @	)3 m	Margin	vs. Average	Limit	
	AF	Antenna	Factor		Peak	Calculate	d Peak	Field Str	ength	Margin	vs. Peak Lii	nit	
	CL	Cable Los	is		HPF	High Pas	s Filter	:					
f	Dist	Read	AF	CL	Атр	D Corr	Fltr	Согт.	Limit	Margin	Ant. Pol.	Det	Notes
CHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
Low Ch	Ļ		<u></u>										
1.804	3.0	46.1	33.0	5.8	-36.5	0.0	0.0	48.4	74.0	-25.6	V	P	
1.804 1.90 <i>4</i>	3.0	34.2 42.2	33.0	5.8 5 0	-30.5	0.0	0.0	J0.5	54.U 74.0	-17.5	V H	A D	
4.804 4.804	3.0	45.5 32.6	33.0	5.8	-36.5	0.0	0.0	42.0 34.9	54.0	-19.1	H	A	
Mid Ch													
4.882	3.0	47.3	33.1	5.8	-36.5	0.0	0.0	49.7	74.0	-24.3	V	Р	
4.882	3.0	34.6	33.1	5.8	-36.5	0.0	0.0	37.0	54.0	-17.0	V	A	
7.323	3.0	46.0	35.3	7.3	-36.2	0.0	0.0	52.3	74.0	-21.7	V	P	
7.323	3.0	32.9	35.3	7.3	-36.2	0.0	0.0	39.2	54.0	-14.8	V U	A	
4.882	3.0	43.5	33.1	2.8 2.9	-30.5	0.0	0.0	40.0	74.U 54.0	-28.0	 Ц	Р 4	
7.323	3.0	47.4	35.3	7.3	-36.2	0.0	0.0	53.8	74.0	-13.4	H	P	
7.323	3.0	34.2	35.3	7.3	-36.2	0.0	0.0	40.6	54.0	-13.4	H	Ā	
			o										
	ļ												
High Ch	: 20	47.3	33.2	5.9	-36.5	0.0	0.0	50.0	74.0	-24.0	V	P	
High Ch 4.961	3.0		33.2	5.9	-36.5	0.0	0.0	37.7	54.0	-16.3	V V	A	
High Ch 4.961 4.961	3.0	35.1	35.5			; U.U	U.U	45.3	/4.0	-28.7	V V	Р 3	
High Ch 4.961 4.961 7.441	3.0 3.0 3.0	35.1 38.7 26.7	35.5	7.3	36.9	0.0	0.0	22.4					
High Ch 4.961 4.961 7.441 7.441 4.961	3.0 3.0 3.0 3.0 3.0	35.1 38.7 26.7 42.3	35.5 35.5 33.2	7.3 7.3 5.9	-36.2	0.0 0-0	0.0 0.0	33.4	54.U 74.0	-29.1	ч Н	P	
High Ch 4.961 4.961 7.441 7.441 4.961 4.961	3.0 3.0 3.0 3.0 3.0 3.0	35.1 38.7 26.7 42.3 31.4	35.5 35.5 33.2 33.2	7.3 7.3 5.9 5.9	-36.2 -36.5 -36.5	0.0 0.0 0.0	0.0 0.0 0.0	33.4 44.9 34.1	54.0 74.0 54.0	-29.1	н Н Н	P A	
High Ch 4.961 4.961 7.441 7.441 4.961 4.961 7.441	3.0 3.0 3.0 3.0 3.0 3.0 3.0	35.1 38.7 26.7 42.3 31.4 38.8	35.5 35.5 33.2 33.2 35.5	7.3 7.3 5.9 5.9 7.3	-36.2 -36.5 -36.5 -36.2	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	33.4 44.9 34.1 45.4	54.0 74.0 54.0 74.0	-29.1 -19.9 -28.6	H H H	P A P	

Page 64 of 102

# 8.3. WORST-CASE BELOW 1 GHz

# 5dBi PATCH ANTENNA, 2FSK MODE



Page 65 of 102



Page 66 of 102

# VERTICAL AND HORIZONTAL DATA

Test Engr: Date: Project #: Company: EUT Descri EUT M/N: Test Target Mode Ope:	er )0R24/	2FSK m	ode										
	f Dist Read AF CL	Measurem Distance t Analyzer l Antenna F Cable Loss	ent Frequ o Antenn Reading Factor	ency la	Amp D Corr Filter Corr. Limit	Preamp ( Distance Filter Ins Calculate Field Stre	Gain Correct ert Loss d Field S ength Lir	to 3 meters trength nit		Margin	Margin vs.	. Limit	
f	Dist	Read	AF	CL	Amp	D Corr	Filter	Corr.	Limit	Margin	Ant. Pol.	Det	Notes
MHz	(m)	dBuV	dB/m	dB	аВ	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
39.720	3.0	46.1	14.1	0.6	28.4	0.0	0.0	32.4	40.0	- <b>7.6</b>	V	Р	
55.201	3.0	53.9	8.1	0.7	28.4	0.0	0.0	34.3	40.0	-5.7	V	Р	
96.123	3.0	50.9	9.0	0.9	28.3	0.0	0.0	32.5	43.5	-11.0	V	Р	
177.366	3.0	42.0	10.8	1.2	28.2	0.0	0.0	25.7	43.5	- <b>17.8</b>	V	Р	
192.127	3.0	46.6	11.5	1.2	28.2	0.0	0.0	31.0	43.5	-12.5	V	P	
207.967	3.0	40.1	12.0	1.3	28.2	0.0	0.0	25.1	43.5	-18.4	V	P	
96.123	3.0	49.4	9.0	0.9	28.3	0.0	0.0	31.0	43.5	-12.5	H	P	
120.124	3.0	41.5	13.6	1.0	28.3	0.0	0.0	27.9	43.5	-15.6	H	P	
178.326	3.0	40.9	10.9	1.2	28.2	0.0	0.0	24.7	43.5	-18.8	H	P	
192.127	3.0	47.3	11.5	1.2	28.2	0.0	0.0	31.7	43.5	-11.8	H	P	
20/.90/	3.0	41.0	14.0	1.3	28.2	0.0	0.0	20.0	43.5	-10.9	n F	P	
399.933	3.0	J0.J	14.5	1./	28.1	0.0	0.0	24.2	40.0	-21.8	n	P	
		+	÷		+	ł							

Page 67 of 102

## 5dBi PATCH ANTENNA, MSK MODE



Page 68 of 102



Page 69 of 102

# VERTICAL AND HORIZONTAL DATA

f Dist	Мал	Engr:       Chin Pang 05/27/10         ct #:       10U13225         pany:       Anaren         Description:       2.4GHz Transceiver         Ø/N:       A2500R24C, A2500R24A         Varget:       FCC 15B         Oper:       TX, MSK Mode, 5dBi Patch Antenna										
Read AF CL	Dista Anal Ante Cable	urement Fr nce to Ant yzer Readir nna Factor Loss	equency enna E	Amp D Corr Filter Corr. Limit	Preamp ( Distance Filter Ins Calculate Field Stre	Gain Correct ert Loss d Field Si ength Lir	to 3 meters trength nit		Margin	Margin vs.	Limit	
f Dia	t Re	ad Al		Amp	D Corr	Filter	Corr.	Limit	Margin	Ant. Pol.	Det	Notes
MHz (m	) dB	uV dB/	m dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
39.840 3.0	) 39	.4 14.	0 0.6	28.4	0.0	0.0	25.6	40.0	-14.4	H	Р	
5.081 3.0	) 49	.7 8.	0.7	28.4	0.0	0.0	30.1	40.0	-9.9	H	P	
/6.123 3.0	) 53	.8 9.0	0.9	28.3	0.0	0.0	34.4	43.5	-9.1	H	P	
120.004 3.0	J 4	.7 13.	6 1.0	28.3	0.0	0.0	30.1	43.5	-13.4	H	P	
192.127 3.0	4	.2 11.	<u>ə 1.2</u>	28.2	0.0	0.0	32.6	43.5	-10.9	H	N	
207.967 3.0	45	.1 12.	0 1.3 0 0 4	28.2	0.0	0.0	27.1	43.5	-10.4	H V	<u>ч</u>	
57.840 3.0 57.840 3.0		. 14. 0 0	U U.Ó	28.4	0.0	0.0	35.4 35.2	40.0	-0.0	V V	r D	
77.401 J. 06.173 24	, 54 ) E4	. 7 8. 1 0 1	. 0./	10.4	0.0	0.0	37.3	40.0	-4./	V V	P D	
174 126 3.0	, 23 1 A	.1 7.	, 0.9 5 1 7	20.3	0.0	0.0	3467 27.6	43.5	-0.0 _15 0	v	r P	
192.127 31	, <del>,</del>	6 11	5 17	28.7	0.0	0.0	32.1	43.5	-11.4	v V	P	
576.383 31	34	2 12	0 27	27.6	0.0	0.0	26.8	46.0	-19.2	v	P	
								-1010		•	•	
					•	İ				•		

Page 70 of 102

## 3dBi MONOPOLE ANTENNA, 2FSK MODE



Page 71 of 102



Page 72 of 102
#### VERTICAL AND HORIZONTAL DATA

Test Engr: Date: Project #: Company: EUT Descr EUT M/N: Test Targe Mode Ope	: iption: t: r:	Chin Pan 05/27/10 10U13225 Anaren 2.4GHz T A2500R2 FCC 15B TX ,2FSK,	ng 5 Transceiv 4C, A250 , 3dBi M	er 10R24A onopol	i e Anteni	na							
	f Dist Read AF CL	Measurem Distance to Analyzer I Antenna F Cable Loss	ent Frequ o Antenn Reading Factor	ency a	Amp D Corr Filter Corr. Limit	Preamp ( Distance Filter Ins Calculate Field Stre	Gain Correct ert Loss d Field Si ngth Lin	to 3 meters trength nit		Margin	Margin vs.	Limit	
f	Dist	Read	AF	CL	Amp	D Corr	Filter	Corr.	Limit	Marein	Ant. Pol.	Det.	Notes
MHz	(m)	dBuV	dB/m	dВ	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
voriz													
2.002	3.0	43.5	7.9	0.7	28.3	0.0	0.0	23.8	40.0	-16.2	H	P	
68.006	3.0	48.2	11.0	1.2	28.2	0.0	0.0	32.1	43.5	-11.4	H	P	
92.007	3.0	43.5	11.5	1.2	28.2	0.0	0.0	27.9	43.5	-15.6	H	P	
14.808	3.0	39.9	11.9	1.3	28.2	0.0	U.O	24.9	43.5	-18.6	H	Р	
32 004	3.0	41.2	13.0	1.5	28.1	0.0	0.0	27.5	46.0	-18.5	H U	Р	
23.704 0 000	3.0	33.7	16.7	4.3	27.4	0.0	0.0	27.2	40.0	-18.8	n v	r D	
6.161	3.0	40.0 51 4	2967 81	0.0	28.4	0.0	0.0	31.9	40.0	-/.1 .8 1	v V	Р	
2.002	3.0	51.0	7.9	0.7	28.3	0.0	0.0	31.3	40.0	-8.7	v	P	
45.805	3.0	38.7	12.9	1.1	28.3	0.0	0.0	24.4	43.5	-19.1	v	P	
78.926	3.0	45.3	11.0	1.2	28.2	0.0	0.0	29.3	43.5	-14.2	v	P	
288.011	3.0	36.8	13.0	1.5	28.1	0.0	0.0	23.2	46.0	-22.8	v	P	
								•					
			:		1	1					:		

Page 73 of 102

#### 3dBi MONOPOLE ANTENNA, MSK MODE



Page 74 of 102



Page 75 of 102

#### VERTICAL AND HORIZONTAL DATA

Project #: Company: EUT Descrip Configurati Test Target: Mode Oper	otion: ion: :	Chin Pan 06/08/10 10U13225 Anaren, 1 2.4GHz T EUT with FCC 15B TX, MSK :	vg (inc. 'ransceiv 3dBi Mo mode	er onopole	2 Antenr	a							
	f Dist Read AF CL	Measurem Distance to Analyzer H Antenna F Cable Loss	ent Frequ o Antenn Reading 'actor	ency la	Amp D Corr Filter Corr. Limit	Preamp ( Distance Filter Ins Calculate Field Stre	Gain Correct ert Loss d Field S ength Lir	to 3 meters trength nit		Margin	Margin vs.	Limit	
f	Dist	Read	AF	CL	Атр	D Corr	Filter	Corr.	Limit	Margin	Ant. Pol.	Det.	Notes
MHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	4B	V/H	P/A/QP	
												_	
48.001	3.0	56.8	9.2	0.6	29.6	0.0	0.0	37.0	40.0	- <b>3.0</b>	V	Р	
48.001	3.0	53.5	9.2	0.6	29.6	0.0	0.0	33.7	40.0	-6.3	V	QP	
153.005	3.0	48.5	12.1	1.1	29.3	0.0	0.0	32.4	43.5	-11.1	V	Р	
229.568	3.0	44.9	11.9	1.4	28.8	0.0	0.0	29.3	46.0	- <b>16.7</b>	V	Р	
332.772	3.0	43.0	13.9	1.7	29.0	0.0	0.0	29.6	46.0	-16.4	V	P	
664.946	3.0	47.5	18.9	2.5	29.6	0.0	0.0	39.3	46.0	-6.7	<u>V</u>	P	
995.680	3.0	43.0	22.5	3.2	28.4	0.0	0.0	40.4	54.0	-13.6	V	P	
153.365	3.0	50.6	12.0	1.1	29.3	0.0	0.0	34.4	43.5	-9.1	H	P	
229.088	3.0	48.3	11.9	1.4	28.8	0.0	U.U	32.7	46.0	-13.3	H	P	
204.490	3.0	44.5	12.2	1.5	28.8	0.0	0.0	29.4	46.0	-10.0	n u	P D	
551.812	3.0	40.1	13.8	1./	20.9	0.0	0.0	29.0	40.0	-10.4	п	r D	
004.J40 000 400	3.0	47.1	22.6	4.7	29.0	0.0	0.0	41.0	40.0 54.0	-2.0	п	г Р	
22.400		Th (			10.4	0.0	0.0	76.1	24U	-11.3			

Page 76 of 102

#### 2dBi PCB ANTENNA, 2FSK MODE



Page 77 of 102



Page 78 of 102

#### VERTICAL AND HORIZONTAL DATA

Complianc	iz Frequ e Certif	ency Meas ication Se	uremen: rvices, Fr	t xemoni	t 5m Cha	amber							
- Toot En		(' <b>ኬ</b> '።											
nest Engr:		05/27/10	-6										
Desi		107/12000											
rroject #: Com		1001322	7										
company:		Anaren 2 Actua -											
EUI Descrij Filt Blov	hnou:	4.4GHz I	ransceiv	er	,								
EUI MUN:		A2500R2	4C, A25t	JUKZ44	<b>n</b> .								
iest Target		FCC 15B											
Mode Oper		1X, 2FSK	, ZdBi P(	CB An	tenna		<b>.</b> .					<b>.</b> ,	
	ť	Measurem	ent Frequ	ency	Amp	Preamp (	Jain			Margin	Margin vs.	Limit	
	Dist	Distance t	o Antenn	a	D Corr	Distance	Correct	to 3 meters					
	Read	Analyzer l	Reading		Filter	Filter Ins	ert Loss	_					
	AF	Antenna F	actor		Corr.	Calculate	d Field S	trength					
	CL	Cable Los:	5		Limit	Field Stre	ength Lie	nit					
f	Dist	Read	AF	CL	Amp	D Corr	Filter	Corr.	Limit	Margin	Ant. Pol.	Det.	Notes
MHz	<u>(m)</u>	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
vert	ļ			L			ļ			ļ			
39.840	3.0	44.4	14.0	0.6	28.4	0.0	0.0	30.7	40.0	-9.3	<u>V</u>	P	
55.201	3.0	50.8	8.1	0.7	28.4	0.0	0.0	31.3	40.0	-8.7	V	P	
96.123	3.0	49.5	9.0	0.9	28.3	0.0	0.0	31.1	43.5	-12.4	<u>V</u>	P	
210.727	3.0	39.1	12.0	1.3	28.2	0.0	0.0	24.1	43.5	-19.4	V	L P	
403.050 694.965	3.0	36.7	12.2	1.4	28.2	0.0	0.0	22.2	46.U	-23.8	V T	P P	
044.805 996 EF=	3.0	34.Z	18.7	2.3	2/.4	0.0	0.0	27.8	40.0	-18.2	v	n n n	
070.220 06 172	3.0	J8.4	41.8		4/.8 79.2	0.0	0.0	38.3	40.U 43.F	-10./	v H	P P	
20.143 129 244	3.0	391	7.0	11	10.J	0.0	0.0	20.0	43.5	-17.2	H H	p F	
153.004	3.0	38.0	13.0	11	10.J	0.0	0.0	2414 241	43.5	-17.1	H H	p F	```````````````````````````````````````
212.048	3.0	40.5	11.9	1.3	28.7	0.0	0.0	25.5	43.5	-18.0	H	P	
288.371	3.0	34.8	13.0	1.5	28.1	0.0	0.0	21.2	46.0	-24.8	H	P	
384.615	3.0	35.6	14.7	1.8	28.1	0.0	0.0	23.9	46.0	-22.1	H	P	
												·	

Page 79 of 102

#### 2dBi PCB ANTENNA, MSK MODE



Page 80 of 102



Page 81 of 102

#### VERTICAL AND HORIZONTAL DATA

		mode										
	Measureme	ent Frequ	ency	Amp	Preamp (	Gain			Margin	Margin vs.	Limit	
)ist	Distance to	o Antenn	a	D Corr	Distance	Correct	to 3 meters					
lead	Analyzer F	Reading		Filter	Filter Ins	ert Loss						
١F	Antenna F	actor		Corr.	Calculate	d Field St	rength					
Ľ	Cable Loss			Limit	Field Stre	ngth Lin	nit					
Dist	Read	AF	CL	Amp	D Corr	Filter	Согт.	Limit	Margin	Ant. Pol.	Det.	Notes
(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
	40.7	10.1					20 /	40 F	10.0	TT	n	
3.U 2.0	48.7	12.1	1.1	29.3	0.0	0.0	32.6	43.5	-10.9	H T	P	
3.0	47.0	11.9	1.4	10.0	0.0	0.0	31.4 70.7	40.0	-14.0	п ч	P D	
3.0	44.0	13.0	1.1 75	20.7	0.0	0.0	38.4	40.0	-10.0	н	P	
3.0	38.9	21.0	2.8	29.1	0.0	0.0	33.6	46.0	-12.4	H	P	
3.0	37.5	21.1	2.8	29.1	0.0	0.0	32.4	46.0	-13.6	H	P	
3.0	44.3	22.6	3.2	28.4	0.0	0.0	41.6	54.0	-12.4	H	P	
3.0	58.4	8.0	0.6	29.6	0.0	0.0	37.3	40.0	-2.7	V	P	
3.0	55.1	8.0	0.6	29.6	0.0	0.0	34.0	40.0	- <b>6.0</b>	V	QP	
3.0	49.3	12.0	1.1	29.3	0.0	0.0	33.1	43.5	-10.4	v	P	
3.0	46.2	11.9	1.4	28.8	0.0	0.0	30.7	46.0	-15.3	V	P	
3.0	41.9	13.8	1.7	28.9	0.0	0.0	28.5	46.0	-17.5	V	P	
3.0	48.1	18.9	2.5	29.6	0.0	0.0	39.9	46.0	- <b>6.1</b>	V	Р	
3.0	41.6	22.5	3.2	28.4	0.0	0.0	38.9	54.0	-15.1	V	Р	
	ist ead F L 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	ist Distance to ead Analyzer I F Antenna F Cable Loss Dist Read (m) dBuV 3.0 48.7 3.0 47.0 3.0 47.0 3.0 42.6 3.0 38.9 3.0 37.5 3.0 44.3 3.0 58.4 3.0 58.4 3.0 58.4 3.0 58.4 3.0 44.3 3.0 44.3 3.0 44.3 3.0 44.3 3.0 44.3 3.0 44.3	ist Distance to Antenn ead Analyzer Reading F Antenna Factor L Cable Loss Dist Read AF (m) dBuV dB/m 3.0 48.7 12.1 3.0 47.0 11.9 3.0 47.0 11.9 3.0 42.6 13.8 3.0 46.6 18.9 3.0 38.9 21.0 3.0 37.5 21.1 3.0 44.3 22.6 3.0 58.4 8.0 3.0 55.1 8.0 3.0 55.1 8.0 3.0 49.3 12.0 3.0 44.2 11.9 3.0 44.1 18.9 3.0 48.1 18.9	ist Distance to Antenna ead Analyzer Reading F Antenna Factor L Cable Loss Dist Read AF CL (m) dBuV dB/m dB 3.0 48.7 12.1 1.1 3.0 47.0 11.9 1.4 3.0 47.0 11.9 1.4 3.0 42.6 13.8 1.7 3.0 46.6 18.9 2.5 3.0 38.9 21.0 2.8 3.0 37.5 21.1 2.8 3.0 37.5 21.1 2.8 3.0 44.3 22.6 3.2 3.0 58.4 8.0 0.6 3.0 55.1 8.0 0.6 3.0 55.1 8.0 0.6 3.0 49.3 12.0 1.1 3.0 46.2 11.9 1.4 3.0 41.9 13.8 1.7 3.0 48.1 18.9 2.5 3.0 48.1 18.9 2.5	ist         Distance to Antenna         D Corr           ead         Analyzer Reading         Filter           F         Antenna Factor         Corr.           L         Cable Loss         Limit           Dist         Read         AF         CL         Amp           (m)         dBuV         dB/m         dB         dB           3.0         48.7         12.1         1.1         29.3           3.0         47.0         11.9         1.4         28.8           3.0         46.6         18.9         2.5         29.6           3.0         36.5         21.1         2.8         29.1           3.0         37.5         21.1         2.8         29.1           3.0         58.4         8.0         0.6         29.6           3.0         55.1         8.0         0.6         29.6           3.0         46.2         11.9         1.4         28.8           3.0         46.2         11.9         2.4         28.4           3.0         46.2         11.9         2.4         28.4           3.0         46.2         11.9         1.4         28.8 <td< th=""><th>ist         Distance to Antenna         D Corr         Distance           ead         Analyzer Reading         Filter         Filter Ins           F         Antenna Factor         Corr.         Calculate           L         Cable Loss         Limit         Field Stre           Dist         Read         AF         CL         Amp         D Corr           Dist         Read         AF         CL         Amp         D Corr           0         dBuV         dB/m         dB         dB         dB           3.0         48.7         12.1         1.1         29.3         0.0           3.0         47.0         11.9         1.4         28.8         0.0           3.0         46.6         18.9         2.5         29.6         0.0           3.0         46.6         18.9         2.5         29.6         0.0           3.0         444.3         22.6         3.2         28.4         0.0           3.0         55.1         8.0         0.6         29.6         0.0           3.0         46.2         11.9         1.4         28.8         0.0           3.0         46.2         11.9</th><th>ist         Distance to Antenna         D Corr         Distance Correct f           ead         Analyzer Reading         Filter         Filter         Filter Insert Loss           F         Antenna Factor         Corr.         Calculated Field St           L         Cable Loss         Limit         Field Strength Lin           Dist         Read         AF         CL         Amp         D Corr         Filter           Dist         Read         AF         CL         Amp         D Corr         Filter         dB         dB           Dist         Read         AF         CL         Amp         D Corr         Filter         dB         dB           Join         48.7         12.1         1.1         29.3         0.0         0.0         3.0         3.0         46.6         18.9         2.5         29.6         0.0         0.0           3.0         46.6         18.9         2.5         29.6         0.0         0.0         3.0         3.0         44.3         22.6         3.2         28.4         0.0         0.0         3.0         3.0         44.3         22.6         3.2         28.4         0.0         0.0         3.0         3.0         46</th><th>ist         Distance to Antenna         D Corr         Distance Correct to 3 meters           ead         Analyzer Reading         Filter         Corr.         Calculated Field Strength         Limit         Filter         dB         dB         dB         dB         dB         dW/m         dB         dB         dW/m         dB         dB         dW/m         dB         dB         dW/m         dB         dW/m         dB         dW/m         dW/m</th><th>ist         Distance to Antenna         D Corr         Distance Correct to 3 meters           ead         Analyzer Reading         Filter         Filter         Filter Insert Loss           F         Antenna Factor         Corr.         Calculated Field Strength         Limit           Distance Correct to 3 meters         Filter         Filter         Filter         Filter         Filter           Dist         Read         AF         CL         Amp         D Corr         Garage         Limit           Dist         Read         AF         CL         Amp         D Corr         Filter         Corr.         Limit           Dist         Read         AF         CL         Amp         D Corr         Filter         Corr.         Limit           0         dBuV         dBm         dB         dB         dB         dBuV/m         dBuV/m         dBuV/m           3.0         48.7         12.1         1.1         29.3         0.0         0.0         32.6         43.5           3.0         46.6         18.9         2.5         29.6         0.0         0.0         33.6         46.0           3.0         44.3         22.6         32.2         28.4</th><th>ist         Distance to Antenna         D Corr         Distance Correct to 3 meters           ead         Analyzer Reading         Filter         Filter Insert Loss           F         Antenna Factor         Corr.         Calculated Field Strength           L         Cable Loss         Limit         Filter         Filter           Dist         Read         AF         CL         Amp         D Corr         Filter         Read         Margin           0         dBuV         dB/m         dB         dB         dB         dB         dB         dB         dBuV/m         dBuV/m         dB           3.0         48.7         12.1         1.1         29.3         0.0         0.0         32.6         43.5         -10.9           3.0         47.0         11.9         1.4         28.8         0.0         0.0         31.4         46.0         -14.6           3.0         46.6         18.9         2.5         29.6         0.0         0.0         33.6         46.0         -12.4           3.0         346.6         18.9         2.5         29.6         0.0         0.0         33.6         46.0         -12.4           3.0         58.4</th><th>ist         Distance to Antenna         D Corr         Distance Correct to 3 meters           ead         Analyzer Reading         Filter         Filter Insert Loss           F         Anterna Factor         Corr.         Calculated Field Strength           L         Cable Loss         Limit         Filter         Filter           Dist         Read         AF         CL         Amp         D Corr         Filter         Corr.         Limit         Margin         Ant. Pol.           0         dBuV         dB/m         dB         dB         dB         dB         dB         dB         Margin         Ant. Pol.           3.0         48.7         12.1         1.1         29.3         0.0         0.0         32.6         43.5         -10.9         H           3.0         42.6         13.8         1.7         28.9         0.0         0.0         32.6         43.5         -10.9         H           3.0         46.6         18.9         2.5         29.6         0.0         0.0         33.6         46.0         -7.6         H           3.0         346.4         8.0         0.6         29.6         0.0         0.0         37.3         40.0</th><th>ist       Distance to Antenna       D Corr       Distance Correct to 3 meters         ead       Analyzer Reading       Filter       Filter Insert Loss         F       Antenna Factor       Corr.       Calculated Field Strength         L       Cable Loss       Limit       Filter       Filter         Dist       Read       AF       CL       Amp       D Corr       Filter       Corr.       Limit       Margin       Ant. Pol.       Det.       P/A/QP         Dist       Read       AF       CL       Amp       D Corr       Filter       Corr.       Limit       Margin       Ant. Pol.       Det.       P/A/QP         3.0       48.7       12.1       1.1       29.3       0.0       0.0       32.6       43.5       -10.9       H       P         3.0       42.6       13.8       1.7       28.9       0.0       0.0       31.4       46.0       -14.6       H       P         3.0       46.6       18.9       2.5       29.6       0.0       0.0       33.6       46.0       -13.6       H       P         3.0       38.9       21.0       2.8       29.1       0.0       0.0       32.4       46.0</th></td<>	ist         Distance to Antenna         D Corr         Distance           ead         Analyzer Reading         Filter         Filter Ins           F         Antenna Factor         Corr.         Calculate           L         Cable Loss         Limit         Field Stre           Dist         Read         AF         CL         Amp         D Corr           Dist         Read         AF         CL         Amp         D Corr           0         dBuV         dB/m         dB         dB         dB           3.0         48.7         12.1         1.1         29.3         0.0           3.0         47.0         11.9         1.4         28.8         0.0           3.0         46.6         18.9         2.5         29.6         0.0           3.0         46.6         18.9         2.5         29.6         0.0           3.0         444.3         22.6         3.2         28.4         0.0           3.0         55.1         8.0         0.6         29.6         0.0           3.0         46.2         11.9         1.4         28.8         0.0           3.0         46.2         11.9	ist         Distance to Antenna         D Corr         Distance Correct f           ead         Analyzer Reading         Filter         Filter         Filter Insert Loss           F         Antenna Factor         Corr.         Calculated Field St           L         Cable Loss         Limit         Field Strength Lin           Dist         Read         AF         CL         Amp         D Corr         Filter           Dist         Read         AF         CL         Amp         D Corr         Filter         dB         dB           Dist         Read         AF         CL         Amp         D Corr         Filter         dB         dB           Join         48.7         12.1         1.1         29.3         0.0         0.0         3.0         3.0         46.6         18.9         2.5         29.6         0.0         0.0           3.0         46.6         18.9         2.5         29.6         0.0         0.0         3.0         3.0         44.3         22.6         3.2         28.4         0.0         0.0         3.0         3.0         44.3         22.6         3.2         28.4         0.0         0.0         3.0         3.0         46	ist         Distance to Antenna         D Corr         Distance Correct to 3 meters           ead         Analyzer Reading         Filter         Corr.         Calculated Field Strength         Limit         Filter         dB         dB         dB         dB         dB         dW/m         dB         dB         dW/m         dB         dB         dW/m         dB         dB         dW/m         dB         dW/m         dB         dW/m         dW/m	ist         Distance to Antenna         D Corr         Distance Correct to 3 meters           ead         Analyzer Reading         Filter         Filter         Filter Insert Loss           F         Antenna Factor         Corr.         Calculated Field Strength         Limit           Distance Correct to 3 meters         Filter         Filter         Filter         Filter         Filter           Dist         Read         AF         CL         Amp         D Corr         Garage         Limit           Dist         Read         AF         CL         Amp         D Corr         Filter         Corr.         Limit           Dist         Read         AF         CL         Amp         D Corr         Filter         Corr.         Limit           0         dBuV         dBm         dB         dB         dB         dBuV/m         dBuV/m         dBuV/m           3.0         48.7         12.1         1.1         29.3         0.0         0.0         32.6         43.5           3.0         46.6         18.9         2.5         29.6         0.0         0.0         33.6         46.0           3.0         44.3         22.6         32.2         28.4	ist         Distance to Antenna         D Corr         Distance Correct to 3 meters           ead         Analyzer Reading         Filter         Filter Insert Loss           F         Antenna Factor         Corr.         Calculated Field Strength           L         Cable Loss         Limit         Filter         Filter           Dist         Read         AF         CL         Amp         D Corr         Filter         Read         Margin           0         dBuV         dB/m         dB         dB         dB         dB         dB         dB         dBuV/m         dBuV/m         dB           3.0         48.7         12.1         1.1         29.3         0.0         0.0         32.6         43.5         -10.9           3.0         47.0         11.9         1.4         28.8         0.0         0.0         31.4         46.0         -14.6           3.0         46.6         18.9         2.5         29.6         0.0         0.0         33.6         46.0         -12.4           3.0         346.6         18.9         2.5         29.6         0.0         0.0         33.6         46.0         -12.4           3.0         58.4	ist         Distance to Antenna         D Corr         Distance Correct to 3 meters           ead         Analyzer Reading         Filter         Filter Insert Loss           F         Anterna Factor         Corr.         Calculated Field Strength           L         Cable Loss         Limit         Filter         Filter           Dist         Read         AF         CL         Amp         D Corr         Filter         Corr.         Limit         Margin         Ant. Pol.           0         dBuV         dB/m         dB         dB         dB         dB         dB         dB         Margin         Ant. Pol.           3.0         48.7         12.1         1.1         29.3         0.0         0.0         32.6         43.5         -10.9         H           3.0         42.6         13.8         1.7         28.9         0.0         0.0         32.6         43.5         -10.9         H           3.0         46.6         18.9         2.5         29.6         0.0         0.0         33.6         46.0         -7.6         H           3.0         346.4         8.0         0.6         29.6         0.0         0.0         37.3         40.0	ist       Distance to Antenna       D Corr       Distance Correct to 3 meters         ead       Analyzer Reading       Filter       Filter Insert Loss         F       Antenna Factor       Corr.       Calculated Field Strength         L       Cable Loss       Limit       Filter       Filter         Dist       Read       AF       CL       Amp       D Corr       Filter       Corr.       Limit       Margin       Ant. Pol.       Det.       P/A/QP         Dist       Read       AF       CL       Amp       D Corr       Filter       Corr.       Limit       Margin       Ant. Pol.       Det.       P/A/QP         3.0       48.7       12.1       1.1       29.3       0.0       0.0       32.6       43.5       -10.9       H       P         3.0       42.6       13.8       1.7       28.9       0.0       0.0       31.4       46.0       -14.6       H       P         3.0       46.6       18.9       2.5       29.6       0.0       0.0       33.6       46.0       -13.6       H       P         3.0       38.9       21.0       2.8       29.1       0.0       0.0       32.4       46.0

Page 82 of 102

# 8.4. RECEIVER ABOVE 1 GHz

#### 2FSK Mode with 5dBi PATCH Antenna

Triat Mitteg 3008A00931         Triat Mitteg 3008A00931         Triat Mitteg 3008A00931         The requency Cables         3' cable 22807700         12' cable 22807600       20' cable 22807500         12' cable 22807600       20' cable 22807500         IPFrequency Cables         Areage Measurement RBW=VBW=IMH         20' cable 22807500         12' cable 22807600       20' cable 22807500         IPFrequency Cables         IPFrequency Cables         Colspan="6">Peak Measurement RBW=VBW=IMH         IPF Peak       Avg       Pk Lim       Peak Measurement RBW=VBW=IMH         Average Measurement RBW=VBW=IMH         Average Measurement RBW=VBW=IMH         Average Measurement RBW=VBW=IMH         Average Measurement RBW=IMH Z: VBW         Pitr Peak Avg       Pk Lim       Peak Measurement RBW=IMH Z: VBW         Average Measurement RBW=10H       Measurement Rad       Average Measurement RBW=10H         Average Measurement RBW=10H       Avg Lim	Hor	m 1-18(	H7	Pre-ar	nplifer	1-260	Hz	Pre-am	olifer	26-40GH	7	Ho	orn > 180	Hz		Limit
Hi Frequency Cables       20' cable 22807500       20' cable 22807500       HPF       Reject Filter       Peak Measuremer RBW=VBW=IMH         3' cable 22807700       12' cable 22807600       20' cable 22807500       0       0       0' cable 22807500       0' ca	T73; S/N	<b>\: 6717 @</b>	3m .	- T144 M	liteq 300	08A009	31 -		pine		-				-	FCC 15.209
Jest No other emissions were detected above the system noise floor.       20 calle 2280/500       20 calle 2280/500<	T73; S/N: 6717 @3m     T144 Miteg 3008A00931       Hi Frequency Cables     12' cable 22807600       3' cable 22807700     12' cable 22807600       3' cable 22807700     12' cable 22807600						00	20' cal	ble 22	807500		HPF	Re	∍ject Filte	r <u>Peak</u> RB	<u>&lt; Measurements</u> W=VBW=1MHz
f         Dist         Read Pk         Read Avg.         AF         CL         Amp         D Corr         Fltr         Peak         Avg         Pk Lim         Avg Lim         Pk Mar         Avg Mar         Notes           GHz         (m)         dBuV         dBuV         dBm         dB         dB         dB         dB         dB         dB         dB         V/m         dBuV/m         dBuV/m         dBuV/m         dB         dB         (V/H)           08         30         508         458         23.9         2.4         -39.5         0.0         0.0         37.6         32.6         74         54         -36.4         -21.4         H           108         3.0         56.0         41.0         33.1         58         -36.5         0.0         0.0         48.5         44.1         74         54         -25.5         9.9         H           108         3.0         56.0         42.0         23.9         2.4         -39.5         0.0         0.0         42.8         28.8         74         54         -31.2         -25.2         V           3.0         47.6         43.0         33.1         58         -36.5         0.0	3. cap	le 2280/7	<sup>30</sup>	12' ca	ble 2280	17600	•	20° cabi	le 2280	-7500 -			-		RBW=	<u>ge Measurements</u> 1MHz ; VBW=10Hz
008         3.0         50.8         45.8         23.9         2.4         39.5         0.0         0.0         37.6         32.6         74         54         .36.4         .21.4         H           870         3.0         46.0         41.6         33.1         58         .36.5         0.0         0.0         48.5         44.1         74         54         .36.4         .21.4         H           088         3.0         56.0         42.0         23.9         2.4         .39.5         0.0         0.0         48.5         44.1         74         54         .25.5         .9.9         H           088         3.0         56.0         42.0         23.9         2.4         .39.5         0.0         0.0         42.8         28.8         74         54         .31.2         .25.2         V           870         3.0         47.6         43.0         33.1         5.8         .36.5         0.0         0.0         50.1         45.5         .74         54         .23.9         .85         V           970         3.0         47.6         43.0         33.1         5.8         .36.5         0.0         0.0         50.1         4	f : 3Hz	Dist R (m)	ad Pk 2 BuV	Read Avg. dBuV	AF dB/m	CL 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)
370       30       46.0       41.6       33.1       5.8       -36.5       0.0       0.0       48.5       44.1       74       54       -25.5       -9.9       H         108       30       56.0       42.0       23.9       2.4       -39.5       0.0       0.0       48.5       44.1       74       54       -31.2       -25.2       V         170       3.0       47.6       43.0       33.1       5.8       -36.5       0.0       0.0       50.1       45.5       74       54       -31.2       -25.2       V         1       1       1       1       1       1       1       1       1       1       1       2.0       8.5       V         1<	08	3.0	50.8	45.8	23.9	2.4	-39.5	0.0	0.0	37.6	32.6	74	54	-36.4	-21.4	Н
f       Measurement Frequency       Amp       Preamp Gain       Avg Lim       Average Field Strength Limit         pist       Distance to Antenna       D Corr       Distance Correct to 3 meters       Pk Lim       Peak Field Strength Limit         Read       Analyzer Reading       Avg       Avg Average Field Strength Q 3 m       Avg Mar       Margin vs. Average Limit         AF       Antenna Factor       Peak       Calculated Peak Field Strength       Pk Mar       Margin vs. Peak Limit	70 08	3.0	46.0	41.6	33.1 23.9	5.8 2.4	-36.5 -39.5	0.0 0.0	0.0 0.0	48.5	44.1 28.8	74	54 54	-25.5 -31.2	-99 -25.2	H V
f     Measurement Frequency     Amp     Preamp Gain     Avg Lim     Average Field Strength Limit       Dist     Distance to Antenna     D Corr     Distance Correct to 3 meters     Pk Lim     Peak Field Strength Limit       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	r. 07.22.09 te: No oth	) Ier emissio	ns were d	etected above 1	ihe syste	m noise	floor.									
AF Antenna Factor Peak Calculated Peak Field Strength Pk Mar Margin vs. Peak Limit	f D B	Me Dist Dis Sead An	asurement tance to .	nt Frequency Antenna anding	r		Amp D Corr Avg	Preamp ( Distance	Bain Correc Field S	ct to 3 mete Strength @	rs 3 m		Avg Lim Pk Lim Avg Mar	Average F Peak Field Margin ys	ield Strength Strength Li Average Li	n Limit imit imit
CL Cable Loss HPF High Pass Filter	A	VF An CL Ca	tenna Fai ble Loss	etor			Avg Peak HPF	Calculate High Pas	d Peak s Filter	t Field Stre	ngth		Pk Mar	Margin vs.	. Peak Limit	IIIt

Page 83 of 102

## MSK Mode with 5dBi PATCH Antenna

est Eq	uipmen	<u>t:</u>		_											1.7
H 173; 9	orn 1- 5/N: 6717	18GHz 7@3m	Pre-ar	nplifer Aiteq 30	1-26G 8A009	31 -	Pre-am	plifer	26-40GH	z	Ho	orn > 18G	Hz	-	FCC 15.209
- Hi Free	quency Cal	bles	12' c	able 2	28076	00	20'ca	ble 22	807500		HPF	Re	ject Filte	r <u>Peal</u>	k Measurements
3' c	able 228	07700	- 12' ca	ible 228	07600	•	20' cab	le 2280	•			-		• <u>Avera</u> RBW=	nge Measurements 1MHz ; VBW=10Hz
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL 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)
008	3.0	52.0	46.3	23.9	2.4	-39.5	0.0	0.0	38.8	33.1	74	54	-35.2	-20.9	Н
870 008 874	3.0 3.0 3.0	453 51.4 44.5	419 45.8 40.5	23.1 23.9 33.1	5.8 2.4 5.8	-30.5 -39.5 -36.5	0.0 0.0 0.0	0.0 0.0 0.0	47.8 38.2 47.0	44.4 32.6 43.0	74 74 74	54 54 54	-20.2 -35.8 -27.0	-9,0 -21,4 -11,0	H V V
.ev. 07.22	2.09														
ote: No	other emi	ssions were	letected above t	the syste:	n noise	floor.									
	f Dist	Measurem Distance to	ent Frequency Antenna	y		Amp D Corr	Preamp Distance	Gain Correi	ct to 3 met	ers		Avg Lim Pk Lim	Average I Peak Field	ield Strengt Strength L	th Limit imit
	Read	Analyzer R	eading			Avg	Average	Field S	Strength @	3 m		Avg Mar	Margin vs	Average L	imit
	AF CL	Antenna Fa Cable Loss	actor			Peak HPF	Calculate High Pas	ed Peal s Filter	c Field Stre -	ength		Pk Mar	Margin vs	. Peak Limit	ŧ
	CL	Cable Loss				HPF	High Pas	s Filter	-			T IC IVIAI	THE BIL 15	. I Car Dini	ч 

Page 84 of 102

## 2FSK Mode with 3dBi Monopole Antenna

omphanee	igh Frequen Certificatio	.cy Measuren n Services, Fi	ient remont :	5m Ch	amber									
omnany: A	naren													
oject#: 1	.0U13225													
nte: 6/8/10	l													
est Engine	er: Chin Par	ig AB: Monon	-1- Ant											
onigurado íode: RX. 1	2FSK mode	130D1 Monop	ole Ano	enna										
est Equipn	<u>aent:</u>													
Horn	1-18GHz	Pre-a	mplifer	1-260	GHz	Pre-am	plifer	26-40GH	z	Ho	orn > 18G	Hz		Limit
T59; S/N: 3	3245 @3m	▼ T145 /	Agilent 3	3008A0(	056 🖵								-	FCC 15.209
Hi Frequency	/ Cables								1					
3' cabl	le 2280770	) 12' d	able 2	28076	00	20' ca	ole 22	807500		HPF	Re	ject Filte	r Peak	<u>K Measurements</u> W=VBW=1MHz
3' cable	22807700	12' ci	able 228	07600		20' cab	le 2280	07500					Avera	ge Measurements
					•								RBW=	1MHz; VBW=10Hz
f Di	ist Read P	k Read Avg.	AF	CL	Amp	D Corr	Fltr	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes
GHz (n	n) dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	(V/H)
0110 (4			-	_		T		T			-		1	
d Ch	- 40.0				25.6			(20					-	**
id Ch 565 3 182 3	0 49.0 n 42.0	33.5 30.0	26.4 32.8	3.1 5.8	-35.6 -34.9	0.0	0.0 0.0	42.9 45.8	27.4 33.8	74 74	54 54	-31.1	-26.6 -20.2	H
id Ch 565 3 182 3 127 3	0 49.0 0 42.0 0 54.0	33.5 30.0 35.6	26.4 32.8 25.1	3.1 5.8 2.7	-35.6 -34.9 -35.9	0.0 0.0 0.0	0.0 0.0 0.0	42.9 45.8 46.0	27.4 33.8 27.6	74 74 74	54 54 54	-31.1 -28.2 -28.0	-26.6 -20.2 -26.4	H H V
id Ch i65 3 i82 3 i27 3 i82 3	0 49.0 0 42.0 0 54.0 0 42.5	33.5 30.0 35.6 32.6	26.4 32.8 25.1 32.8	3.1 5.8 2.7 5.8	-35.6 -34.9 -35.9 -34.9	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	42.9 45.8 46.0 46.3	27.4 33.8 27.6 36.4	74 74 74 74 74	54 54 54 54 54	-31.1 -28.2 -28.0 -27.7	-26.6 -20.2 -26.4 -17.6	H H V V
id Ch 565 3 182 3 127 3 182 3	0 490 0 420 0 540 0 425	33.5 30.0 35.6 32.6	26.4 32.8 25.1 32.8	3.1 5.8 2.7 5.8	-35.6 -34.9 -35.9 -34.9	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	42.9 45.8 46.0 46.3	27.4 33.8 27.6 36.4	74 74 74 74 74	54 54 54 54	-31.1 -28.2 -28.0 -27.7	-26.6 -20.2 -26.4 -17.6	H H V V
a Ch 655 3 82 3 827 3 82 3 82 3	0 490 0 420 0 540 0 425	33.5 30.0 35.6 32.6	26.4 32.8 25.1 32.8	3.1 5.8 2.7 5.8	-35.6 -34.9 -35.9 -34.9	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	42.9 45.8 46.0 46.3	27.4 33.8 27.6 36.4	74 74 74 74 74	54 54 54 54	-31.1 -28.2 -28.0 -27.7	-26.6 -20.2 -26.4 -17.6	H H V V
d Ch i65 3 i82 3 i27 3 i82 3 v. 07.22.09 te: No other	0 49.0 0 42.0 0 54.0 0 42.5 emissions we	33.5 30.0 35.6 32.6 •	26.4 32.8 25.1 32.8 the syste	3.1 5.8 2.7 5.8 m noise	-35.6 -34.9 -35.9 -34.9 -34.9 floor.	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	429 458 460 463	27.4 33.8 27.6 36.4	74 74 74 74	54 54 54 54 54	-31.1 -28.2 -28.0 -27.7	-26.6 -20.2 -26.4 -17.6	H H V V
v. 07.22.09 te: No other	0 49.0 0 42.0 0 54.0 0 42.5 • emissions were	33.5 30.0 35.6 32.6 • detected above	26.4 32.8 25.1 32.8 the syste	3.1 5.8 2.7 5.8 m noise	-35.6 -34.9 -35.9 -34.9 -34.9	0.0 0.0 0.0	0.0	429 458 46.0 46.3	27.4 33.8 27.6 36.4	74 74 74 74	54 54 54 54	-31.1 -28.2 -28.0 -27.7	-26.6 -20.2 -26.4 -17.6	H H V V
d Ch 665 3 822 3 827 3 82 3 82 3 92.09 te: No other f Dis	0 49.0 0 42.0 0 54.0 0 42.5 • emissions wer Measure t Distance	33.5 30.0 35.6 32.6 e detected above ment Frequenc	26.4 32.8 25.1 32.8 the syste	3.1 5.8 2.7 5.8 m noise	-35.6 -34.9 -35.9 -34.9 -34.9 	0.0 0.0 0.0 Preamp (	0.0 0.0 0.0 0.0 Jain	42.9 45.8 46.0 46.3	27.4 33.8 27.6 36.4	74 74 74 74	54 54 54 54 8 8	-31.1 -28.2 -28.0 -27.7 Average I	-26.6 -20.2 -26.4 -17.6 Field Strengt	H H V V
112 (1 167) 1675 3 1882 3 1885 5 1885 5 1895 5		33.5 30.0 35.6 32.6 e detected above ment Frequenc to Antenna Reading	26.4 32.8 25.1 32.8 the syste	3.1 5.8 2.7 5.8 m noise	-35.6 -34.9 -35.9 -34.9 floor. Amp D Corr	0.0 0.0 0.0 0.0 Preamp ( Distance	0.0 0.0 0.0 Jain Correi	42.9 45.8 46.0 46.3	27.4 33.8 27.6 36.4	74 74 74 74	54 54 54 54 54 54 Lim Avg Lim Avg Mar	-31.1 -28.2 -28.0 -27.7 Average I Peak Fiel-	-26.6 -20.2 -26.4 -17.6 Field Strengtl	H H V V
111 (1) 112 (1) 113	0 490 0 420 0 540 0 540 0 425 emissions wer Measure t Distance ad Analyzer Antenna	33.5 30.0 35.6 32.6 • • • • • • • • • • • • • • • • • • •	26.4 32.8 25.1 32.8 the syste	3.1 5.8 2.7 5.8 m noise	-356 -349 -359 -349 -349 -349 D Corr Avg Peak	0.0 0.0 0.0 0.0 Preamp ( Distance Average	0.0 0.0 0.0 Gain Correc Field S d Peal	42.9 45.8 46.0 46.3 ct to 3 mete 3 trength @ c Field Stre	27.4 33.8 27.6 36.4 ers 3 m	74 74 74 74	54 54 54 54 54 54 More Lim Avg Lim Avg Mar Pk Mar	-31.1 -28.2 -28.0 -27.7 Average I Peak Fiel Margin vs Margin vs	-26.6 -20.2 -26.4 -17.6 Field Strengtl d Strength Li s. Average Li s. Peak Limit	H H V V

Page 85 of 102

## MSK Mode with 3dBi Monopole Antenna

omplian	High . nce Cei	Frequency rtification S	Measurem ervices, Fre	ent emont f	5m Ch	amber									
many	v: Anar	eŋ													
oject #:	. 10UJ	3225													
ite: 6/8	3/10														
st Eng	gineer: - Hon: I	Chin Pang	Di Monone	le Anti											
ode: R	X. MS	K mode,	IDI MIOROPO	le Ano	anna										
	,														
est Equi	iipment														
Ho		1000-	Pre-an	oplifer	1-260	-47	Pre-am	nlifer	26-40GH	_	Но	um > 18G	ш <u>-</u>		Limit
nv	//// T-1	0012	Tro-un	ipine.	1-200	9F12	Fre-am	piner	20-40611		110	11 2 100	Π <u>2</u>		5 CC 15 200
T59; S/	/N: 3245	@3m	- T145 A	gilent 3	008A00	)56 -				-				-	FCC 15.209
Hi Frequ	Jency Cab	les —	<u> </u>												
3' 01	able 2	2907700	12' 0	obla 2	29076	00	20' cal	ble 22	807500		UDE	Ba		Peak	Measurements
5.00	able 2	2807700	12 0	able 24	28070	00	20 00.	10 22	807000		HFF	Rej	ject Filter	RBV	W=VBW=1MHz
											· · · · · · · · · · · · · · · · · · ·				
3' cal	ble 228	07700	12' ca	ble 2280	07600	-	20' cab.	le 2280	7500 🚽			-		<ul> <li>Average</li> </ul>	ge Measurements
3' cal	ble 228	07700	12' ca	ble 228	07600	•	20' cab.	le 2280	7500			-		Average     RBW=1	<u>ge Measurements</u> 1MHz ; VBW=10Hz
3' cal	ble 228 Dist	07700 Read Pk	l2' ca Read Avg.	ble 228 AF	07600 CL	• Amp	20' cab	le 2280 Fltr	Peak	Avg	Pk Lim	- Avg Lim	Pk Mar	Avera; RBW=1 Avg Mar	ge Measurements 1MHz ; VBW=10Hz Notes
3' cal f 3Hz	ble 228 Dist (m)	07700 Read Pk dBuV	l 12' ca Read Avg. dBuV	ble 228 AF dB/m	07600 CL dB	• Amp dB	20' cab D Corr dB	le 2280 Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	- Avg Lim dBuV/m	Pk Mar dB	Avera; RBW=1 Avg Mar dB	ge Measurements 1MHz ; VBW=10Hz Notes (V/H)
3' cal f <u>3Hz</u> d Ch	Dist (m)	07700 Read Pk dBuV	l 12' ca Read Avg. dBuV	AF dB/m	07600 CL dB	• Amp dB	20' cab D Corr dB	le 2280 Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	- Avg Lim dBuV/m	Pk Mar dB	Avera; RBW=1 Avg Mar dB	ge Measurements 1MHz ; VBW=10Hz Notes (V/H)
3' cal f GHz d Ch :30 :82	Dist (m) 3.0 3.0	07700 Read Pk dBuV 48.5 40.0	12' ca Read Avg. dBuV 34.5 28.5	AF dB/m 25.2 32.8	07600 CL dB 2.7 5.8	• Amp dB -35.9 -34.9	20' cab D Corr dB 0.0 0.0	le 2280 Fltr dB 0.0 0.0	Peak dBuV/m 40.5 43.8	Avg dBuV/m 26.5 32.3	Pk Lim dBuV/m 74 74	Avg Lim dBuV/m	Pk Mar dB -33.5 -30.2	Avera; RBW=1     Avg Mar dB     -27.5     -21.7	ge Measurements 1MHz ; VBW=10Hz Notes (V/H) H H
3' cal f GHz d Ch 30 82 30	Dist (m) 3.0 3.0 3.0	07700 Read Pk dBuV 48.5 40.0 54.6	. 12' ca Read Avg. dBuV 34.5 28.5 35.4	AF dB/m 25.2 32.8 25.2	07600 CL dB 2.7 5.8 2.7	<ul> <li>Amp dB</li> <li>-35.9</li> <li>-34.9</li> <li>-35.9</li> </ul>	20' cab	le 2280 Fltr dB 0.0 0.0 0.0	Peak dBuV/m 40.5 43.8 46.6	Avg dBuV/m 265 323 274	Pk Lim dBuV/m 74 74 74 74	Avg Lim dBuV/m 54 54 54 54	Pk Mar dB -33.5 -30.2 -27.4	<ul> <li>Avera; RBW=1</li> <li>Avg Mar dB -27.5 -21.7 -26.6         </li> </ul>	ge Measurements 1MHz ; VBW=10Hz Notes (V/H) H H V
3' cal f GHz d Ch 30 82 30 82	Dist (m) 3.0 3.0 3.0 3.0 3.0	07700 Read Pk dBuV 48.5 40.0 54.6 41.4	12' ca Read Avg. dBuV 34.5 28.5 35.4 29.2	AF dB/m 25.2 32.8 25.2 32.8	CL dB 2.7 5.8 2.7 5.8	<ul> <li>Amp dB</li> <li>-35.9</li> <li>-34.9</li> <li>-35.9</li> <li>-34.9</li> </ul>	20' cab D Corr dB 0.0 0.0 0.0 0.0	le 2280	7500 Peak dBuV/m 40.5 43.8 46.6 45.2	Avg dBuV/m 265 323 27.4 33.0	Pk Lim dBuV/m 74 74 74 74 74	Avg Lim dBuV/m 54 54 54 54 54	Pk Mar dB -335 -302 -274 -288	Avera; RBW=1 Avg Mar dB -27.5 -21.7 -26.6 -21.0	<u>ge Measurements</u> IMHz ; VBW=10Hz (V/H) <u>H</u> H V V
3' cal f 3Hz d Ch 30 82 30 82	Dist (m) 3.0 3.0 3.0 3.0	07700 Read Pk dBuV 48.5 40.0 54.6 41.4	Read Avg. dBuV 34.5 28.5 35.4 29.2	AF dB/m 25.2 32.8 25.2 32.8	CL dB 2.7 5.8 2.7 5.8	Amp dB -359 -349 -359 -349	20' cab	Fltr dB 0.0 0.0 0.0 0.0	Peak dBuV/m 40.5 43.8 46.6 45.2	Avg dBuV/m 265 323 274 330	Pk Lim dBuV/m 74 74 74 74 74	Avg Lim dBuV/m 54 54 54 54	Pk Mar dB -33.5 -30.2 -27.4 -28.8	• Avera; RBW=: Avg Mar dB -27.5 -21.7 -26.6 -21.0	ge Measurements IMHz ; VBW=10Hz Notes (V/H) H H V V V
3' cal f GHz d Ch 30 82 30 82	Dist (m) 3.0 3.0 3.0 3.0 3.0 3.0	07700 Read Pk dBuV 48.5 40.0 54.6 41.4	. 12' ca Read Avg. dBuV 34.5 28.5 35.4 29.2	AF dB/m 25.2 32.8 25.2 32.8	CL dB 2.7 5.8 2.7 5.8	Amp dB -359 -349 -359 -349	20' cab	le 2280 Fltr dB 0.0 0.0 0.0	Peak dBuV/m 40.5 43.8 46.6 45.2	Avg dBuV/m 265 323 274 33.0	Pk Lim dBuV/m 74 74 74 74 74	Avg Lim           dBuV/m           54           54           54           54	Pk Mar dB -335 -30.2 -27.4 -28.8	• Avera; RBW=1 Avg Mar dB -27.5 -21.7 -26.6 -21.0	<u>ge Measurements</u> IMHz ; VBW=10Hz Notes (V/H) <u>H</u> H V V V
3' cal f GHz d Ch 30 82 30 82 7. 07.22.0 te: No ot	Dist (m) 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	07700 Read Pk dBuV 48.5 40.0 54.6 41.4 ssions were do	. 12' ca Read Avg. dBuV 34.5 28.5 35.4 29.2 etected above t	AF dB/m 25.2 32.8 25.2 32.8 he system	07600 CL dB 2.7 5.8 2.7 5.8 	Amp dB -359 -349 -359 -349 -349 floor.	20' cab	Fltr dB 0.0 0.0 0.0	Peak dBuV/m 40.5 43.8 46.6 45.2	Avg dBuV/m 265 323 274 330	Pk Lim dBuV/m 74 74 74 74 74	Avg Lim           dBuV/m           54           54           54           54	Pk Mar dB -33.5 -30.2 -27.4 -28.8	• Avera; RBW=1 Avg Mar dB -27.5 -21.7 -26.6 -21.0	ge Measurements IMHz ; VBW=10Hz (V/H) H H V V
3' cal f GHz d Ch 30 82 30 82 82 82 82 82 82 82 82 82 82 82 82 82	Dist (m) 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	07700 Read Pk dBuV 485 40.0 54.6 41.4 ssions were d	Read Avg. dBuV 34.5 28.5 35.4 29.2 etected above t	AF dB/m 25.2 32.8 25.2 32.8 he system	07600 CL dB 2.7 5.8 2.7 5.8 2.7 5.8 m noise	<ul> <li>Amp dB</li> <li>-35.9</li> <li>-34.9</li> <li>-35.9</li> <li>-34.9</li> <li>floor.</li> </ul>	20' cab	le 2280	Peak dBuV/m 40.5 43.8 46.6 45.2	Avg dBuV/m 265 323 274 330	Pk Lim dBuV/m 74 74 74 74 74	Avg Lim dBuV/m 54 54 54 54	Pk Mar dB -33.5 -30.2 -27.4 -28.8	Avera; RBW=1 Avg Mar dB -27.5 -21.7 -26.6 -21.0	ge Measurements IMHz ; VBW=10Hz Notes (V/H) H H V V
3' cal f GHz i Ch 30 82 30 82 v. 07.22.0 te: No ot	Dist (m) 3.0 3.0 3.0 3.0 3.0 4 09 ther emiz	Read Pk.         dBuV           48.5         40.0           54.6         41.4           ssions were de         Measurement	Read Avg. dBuV 34.5 28.5 35.4 29.2 etected above t at Frequency	AF dB/m 25.2 32.8 25.2 32.8 he system	CL dB 2.7 5.8 2.7 5.8 2.7 5.8 m noise	Amp dB -359 -349 -359 -349 -349 -349 floor.	20' cab	le 2280 Fltr dB 0.0 0.0 0.0 0.0	Peak dBuV/m 40.5 43.8 46.6 45.2	Avg dBuV/m 265 323 274 330	Pk Lim dBuV/m 74 74 74 74	Avg Lim dBuV/m 54 54 54	Pk Mar dB -33.5 -30.2 -27.4 -28.8 	Avera; RBW=1 Avg Mar dB -27.5 -21.7 -26.6 -21.0	ge Measurements IMHz ; VBW=10Hz Notes (V/H) H H V V V
3' cal f GHz d Ch 30 82 30 82 v. 07.22.0 te: No ot	Dist (m) 3.0 3.0 3.0 3.0 1 09 ther emir f Dist Dist	Read Pk dBuV 485 400 546 414 ssions were de Measuremen Distance to	I 12' ca Read Avg. dBuV 34.5 28.5 35.4 29.2 etected above f nt Frequency Antenna	AF dB/m 25.2 32.8 25.2 32.8 he system	CL dB 2.7 5.8 2.7 5.8 7.8 5.8 7.7 5.8 7.7 5.8	Amp dB -359 -349 -359 -349 -359 -349 floor. Amp D Corr	20' cab	Fltr dB 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Peak dBuV/m 405 438 466 452	Avg dBuV/m 265 323 274 330	Pk Lim dBuV/m 74 74 74 74	Avg Lim dBuV/m 54 54 54 54 54 54 54 54 54 54 54 54 54	Pk Mar dB -33.5 -30.2 -27.4 -28.8 	Avera; RBW=1 Avg Mar dB -27.5 -21.7 -26.6 -21.0 -2	<u>ge Measurements</u> IMHz ; VBW=10Hz Notes (V/H) H H V V V
3' cal f GHz a Ch 30 82 82 82 82 82 82 82 82 82 82	Dist (m) 3.0 3.0 3.0 3.0 3.0 3.0 3.0 09 ther emiz f Dist Read AF	Read Pk dBuV 485 400 546 414 ssions were d Measuremen Distance to Analyzer to	I2' ca Read Avg. dBuV 34.5 28.5 35.4 29.2 etected above t nt Frequency Antenna ading	AF dB/m 25.2 32.8 25.2 32.8 he system	CL dB 2.7 5.8 2.7 5.8 7.7 5.8 7.7 5.8	Amp dB           -359           -349           -359           -349           D Corr           Amp D Corr           Avg D Pack	20' cab	Fltr dB 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Peak dBuV/m 40.5 43.8 46.6 45.2 :t to 3 mete :trength @ : Field Stee	Avg dBuV/m 265 323 274 330	Pk Lim dBuV/m 74 74 74 74	Avg Lina dBuV/m 54 54 54 54 54 54 54 54 54 54 54 54 54	Pk Mar dB -33.5 -30.2 -27.4 -28.8 -28.8 -28.8 -28.8 -28.8 -28.8 -28.8 -28.8 -28.8 -28.8 -28.8 -28.8 -28.8 -29.2 -2	Avera; RBW=!     Avg Mar dB     -27.5     -21.7     -26.6     -21.0     //	<u>ge Measurements</u> IMHz ; VBW=10Hz Notes (V/H) H H V V V
3' cal f GHz d Ch i30 i82 i30 i82 v. 07.22.0 te: No oth i i i i i i i i i i i i i	Dist (m) 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	Read Pk dBuV 485 400 546 414 ssions were de Measuremen Distance to Analyzer Re Antenna Far	I2' ca Read Avg. dBuV 34.5 28.5 35.4 29.2 etected above f nt Frequency Antenna ading ctor	AF dB/m 25.2 32.8 25.2 32.8 he system	07600 CL dB 2.7 5.8 2.7 5.8 2.7 5.8 m noise	• Amp dB -359 -349 -359 -349 -349 floor. Amp D Corr Avg Peak HDF	20' cab	Fltr dB 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	7500 Peak dBuV/m 40.5 43.8 46.6 45.2 : : : : : : : : : : : : : : : : : : :	Avg dBuV/m 265 323 274 330 rs 3 m ngth	Pk Lim dBuV/m 74 74 74 74	Avg Lina dBuV/m 54 54 54 54 54 54 54 54 54 54 54 54 54	Pk Mar dB -33.5 -30.2 -27.4 -28.8 -28.8 -28.8 -28.8 -28.8 -28.8 -28.8 -28.8 -28.8 -28.8 -28.8 -28.8 -28.8 -29.2 -2	Average Lii     Peak Limit	<u>ge Measurements</u> IMHz ; VBW=10Hz (V/H) H H V V V

Page 86 of 102

#### 2FSK Mode with 2dBi PCB Antenna

	ince Ce	rtification	Services, Fr	emont 5	5m Ch	ıamber									
əmpan	ıy: Anar	en													
oject≠	#: 10U	13225													
ate: 6/8	8/10	Chin Bong													
est En; onfigu	gineer. ration: l	EUT with 2	dBi PCB Ar	itenna											
lode: F	RX, 2FS	K mode,													
est Eq	uipmen	<u>t:</u>													
H	orn 1-	18GHz	Pre-ar	nplifer	1-26	GHz	Pre-am	plifer	26-40GH	z	Но	orn > 18G	Hz		Limit
T59; S	5/N: 3245	5@3m	▼ T145 A	igilent 3	008A0	05( 🗸				•				-	FCC 15.209
- Hi Freq	juency Cab	oles	_							— Б					
3' 0	cable 2	2807700	12' c	able 22	28076	500	20' cal	ble 22	2807500		HPF	Re	ect Filte	r Peal	k Measurements
	1.1. 220	07700					201	. 220/	27500				Joer 1 112	RB	W=VBW=1MHz
3. ca	able 228	07700	▼ 12' ca	ble 2280	)7600	•	20° cab	le 2280	)7500			•		RBW=	ge Measurements 1MHz ; VBW=10Hz
	equency Cables ' cable 22807700 cable 22807700 12' cable 2280760 12' cable 22807600						D Corr	Fltr	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes
f	Dist	Read Pk	Read Avg.	AF	ID	ID	ID	i i D	175 577	<b>T T T T T T T T T T</b>	<b>'D 37</b> /	10 X7/	100	100	(37/37)
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	(V/H)
f GHz id Ch 565	Dist (m) 3.0	Read Pk dBuV 47.6	Read Avg. dBuV 32.0	AF dB/m 26.4	dB 3.1	dB -35.6	dB 0.0	dB 0.0	dBuV/m 41 <i>5</i>	dBuV/m 25.9	<u>dBuV/m</u>	dBuV/m 54	dB -32.5	dB -28.1	(V/H) H
f GHz id Ch 565 182	Dist (m) 3.0 3.0	Read Pk dBuV 47.6 41.5	Read Avg. dBuV 32.0 32.5	AF dB/m 26.4 32.8	dB 3.1 5.8	dB -35.6 -34.9	dB 0.0 0.0	dB 0.0 0.0	dBuV/m 41.5 45.3	dBuV/m 25.9 36.3	dBuV/m 74 74	dBuV/m 54 54	dB -32.5 -28.7	dB -28.1 -17.7	(V/H) H H
f GHz id Ch 565 882 330 292	Dist (m) 3.0 3.0 3.0 3.0 3.0	Read Pk dBuV 47.6 41.5 53.6 43.2	Read Avg. dBuV 32.0 32.5 34.0 24.0	AF dB/m 26.4 32.8 25.2 32.8	dB 3.1 5.8 2.7 5.8	dB -35.6 -34.9 -35.9 -34.9	dB 0.0 0.0 0.0	dB 0.0 0.0 0.0	dBuV/m 415 453 456 470	dBuV/m 25.9 36.3 26.0 37.8	dBuV/m 74 74 74 74 74	dBuV/m 54 54 54 54	dB -32.5 -28.7 -28.4 -27.0	dB -28.1 -17.7 -28.0 -15.2	(V/H) H H V V
f GHz id Ch 565 882 330 382	Dist (m) 3.0 3.0 3.0 3.0 3.0	Read Pk dBuV 47.6 41.5 53.6 43.2	Read Avg. dBuV 32.0 32.5 34.0 34.0	AF dB/m 26.4 32.8 25.2 32.8	dB 3.1 5.8 2.7 5.8	dB -35.6 -34.9 -35.9 -34.9	dB 0.0 0.0 0.0 0.0	dB 0.0 0.0 0.0 0.0	dBuV/m 41.5 45.3 45.6 47.0	dBuV/m 25.9 36.3 26.0 37.8	<u>dBuV/m</u> 74 74 74 74	dBuV/m 54 54 54 54	dB -32.5 -28.7 -28.4 -27.0	dB -28.1 -17.7 -28.0 -16.2	(V/H) H H V V V
f GHz id Ch 565 882 330 882	Dist (m) 3.0 3.0 3.0 3.0	Read Pk dBuV 47.6 41.5 53.6 43.2	Read Avg. dBuV 32.0 32.5 34.0 34.0	AF dB/m 26.4 32.8 25.2 32.8	dB 3.1 5.8 2.7 5.8	dB -35.6 -34.9 -35.9 -34.9	dB 0.0 0.0 0.0 0.0	dB 0.0 0.0 0.0 0.0	dBuV/m 41.5 45.3 45.6 47.0	dBuV/m 25.9 36.3 26.0 37.8	dBuV/m 74 74 74 74 74	dBuV/m 54 54 54 54	dB -32.5 -28.7 -28.4 -27.0	dB -28.1 -17.7 -28.0 -16.2	(V/H) H H V V
f GHz id Ch 565 882 330 882 	Dist (m) 3.0 3.0 3.0 3.0 3.0	Read Pk dBuV 47.6 41.5 53.6 43.2	Read Avg. dBuV 32.0 32.5 34.0 34.0	AF dB/m 264 328 25.2 32.8	dB 3.1 5.8 2.7 5.8	dB -35.6 -34.9 -35.9 -34.9	dB 0.0 0.0 0.0 0.0	dB 0.0 0.0 0.0	dBuV/m 41.5 45.3 45.6 47.0	dBuV/m 259 363 260 378	dBuV/m 74 74 74 74 74	dBuV/m 54 54 54 54	dB -32.5 -28.7 -28.4 -27.0	dB -28.1 -17.7 -28.0 -16.2	(V/H) H H V V
f GHz id Ch 565 882 330 382 v. 07.22 te: No o	Dist (m) 3.0 3.0 3.0 3.0 3.0 0 0 0 0 0 0 0 0 0 0	Read Pk dBuV 47.6 41.5 53.6 43.2 ssions were of	Read Avg. dBuV 32.0 32.5 34.0 34.0 letected above t	Af dB/m 26.4 32.8 25.2 32.8 he system	dB 3.1 5.8 2.7 5.8 m noise	dB -35.6 -34.9 -35.9 -34.9 -34.9	dB 0.0 0.0 0.0	dB 0.0 0.0 0.0	dBuV/m 41.5 45.3 45.6 47.0	dBuV/m 259 363 260 378	dBuV/m 74 74 74 74 74	dBuV/m 54 54 54 54	dB -32.5 -28.7 -28.4 -27.0	dB -28.1 -17.7 -28.0 -16.2	(V/H) H H V V V
f GHz id Ch 565 882 330 882 sv. 07.22 ote: No o	Dist (m) 3.0 3.0 3.0 3.0 3.0 (09) vther emi	Read Pk dBuV 47.6 41.5 53.6 43.2 ssions were of Measurement	Read Avg. dBuV 32.0 32.5 34.0 34.0 34.0 ietected above t	Af dB/m 26.4 32.8 25.2 32.8 the system 7	dB 3.1 5.8 2.7 5.8 m noise	dB -35.6 -34.9 -35.9 -34.9 -34.9 -34.9 -34.9 -34.9 -34.9	dB 0.0 0.0 0.0 0.0 Preamp (	dB 0.0 0.0 0.0	dBuV/m 41.5 45.3 45.6 47.0	dBuV/m 259 363 260 378	dBuV/m 74 74 74 74	dBuV/m 54 54 54 54 54 54	dB -32.5 -28.7 -28.4 -27.0 Average F	dB -28.1 -17.7 -28.0 -16.2 Field Strengt	(V/H) H H V V
f GHz id Ch 565 882 330 882 882	Dist (m) 3.0 3.0 3.0 3.0 3.0 (.09) <b>Mer emi</b> f Dist	Read Pk dBuV 47.6 41.5 53.6 43.2 ssions were of Distance to	Read Avg. dBuV 32.0 32.5 34.0 34.0 detected above 1 ent Frequency Antenna	Af dB/m 26.4 32.8 25.2 32.8 the system 7	dB 3.1 5.8 2.7 5.8 m noise	dB -35.6 -34.9 -35.9 -34.9 -34.9 -34.9 -34.9 -34.9 -34.9 -34.9 -34.9 -34.9 -34.9 -34.9 -34.9 -34.9 -35.0 -34.9 -35.0 -34.9 -35.0 -34.9 -35.0 -34.9 -35.0 -34.9 -35.0 -34.9 -35.0 -34.9 -35.0 -34.9 -35.0 -34.9 -35.0 -34.9 -35.9 -35.9 -35	dB 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	dB 0.0 0.0 0.0 0.0 3ain Correc	dBuV/m 41.5 45.3 45.6 47.0	dBuV/m 259 36.3 26.0 37.8 15	dBuV/m 74 74 74 74	dBuV/m           54           54           54           54           54           54           bulk           Avg Lim           Pk Lim	dB -32.5 -28.7 -28.4 -27.0 Average F Peak Field	dB -28.1 -17.7 -28.0 -16.2 	(V/H) H H V V
f GHz id Ch 665 882 330 882 ***. 07.22 ste: No o	Dist (m) 3.0 3.0 3.0 3.0 3.0 5.09 5.09 5.09 5.09 5.09 5.09 5.09 5.	Read Pk dBuV 47.6 41.5 53.6 43.2 ssions were of Measuremen Distance to Analyzer R	Read Avg. dBuV 32.0 32.5 34.0 34.0 34.0 etected above to ant Frequency Antenna eading	AF dB/m 26.4 32.8 25.2 32.8 the system 7	dB 3.1 5.8 2.7 5.8 m noise	dB -35.6 -34.9 -35.9 -34.9 -34.9 -34.9 -34.9 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2	dB 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	dB 0.0 0.0 0.0 Jain Correct	dBuV/m 41.5 45.3 45.6 47.0 2 2 2 2 2 3 mete 3 2 3 mete 3 2 3 mete 3 2 3 2 3 2 3 2 3 3 2 3 3 3 3 3 3 4 5 6 4 5 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	dBuV/m 259 363 26J 378 78 8 3 m	<u>dBuV/m</u> 74 74 74 74 74	dBuV/m 54 54 54 54 54 54 54 Lim Avg Lim Pk Lim Avg Mar	dB -32.5 -28.7 -28.4 -27.0 -28.4 -27.0 -27.0 -28.4 -27.0 -27.0 -28.4 -27.0 -29.4 -29.5 -29.7 -29	dB -28.1 -17.7 -28.0 -16.2 Field Strengt d Strength L . Average L	(V/H) H H V V
f GHz id Ch 665 882 330 882 ×v. 07.22 >te: No o	Dist (m) 3.0 3.0 3.0 3.0 3.0 3.0 3.0 5.09 5.09 5.09 5.09 5.09 5.09 5.09 5.	Read Pk dBuV 47.6 41.5 53.6 43.2 ssions were of Measurem Distance to Analyzer R Antenna Fa	Read Avg. dBuV 32.0 32.5 34.0 34.0 34.0 	Af dB/m 264 328 25.2 32.8 the system 7	dB 3.1 5.8 2.7 5.8 m noise	dB -35.6 -34.9 -35.9 -34.9 -34.9 -34.9 -34.9 - -34.9 - 	dB 0.0 0.0 0.0 0.0 Preamp ( Distance Average Calculate	dB 0.0 0.0 0.0 Gain Correct Field S d Peal	dBuV/m           41.5           45.3           45.6           47.0	dBuV/m 259 363 260 378 778 778 778 3 m ngth	dBuV/m 74 74 74 74 74 74	dBuV/m 54 54 54 54 54 54 54 54 54 54 54 54 54	dB -32.5 -28.7 -28.4 -27.0 Average F Peak Field Margin vs. Margin vs.	dB -28.1 -17.7 -28.0 -16.2 	(V/H) H H V V

Page 87 of 102

#### MSK Mode with 2dBi PCB Antenna

Complia	ance Ce	rtification	Services, Fr	emont 5	m Ch	amber									
ompai	ny: Anai	en													
roject	#: 10U	13225													
ate: o/ est En	/8/10 )gineer:	Chin Pang	,												
onfigu	ration:	EUT with 2	dBi PCB Ar	itenna											
fode: l	RX, MS	K mode,													
est Eq	luipmen	<u>t:</u>													
н	orn 1.	19647	Pre-ar	nnlifer	1.260	247	Pre-am	nlifer	26-40GH	7	H	vm > 186	247		Limit
TEO	011 1-	100112	T145.A	Il and 20	1.200	2112	T TO-am	piner	20-40011		115		112		ECC 15 209
159; :	5/N: 324;	) @3m	▼ 1145 A	gilent su	108A01	<sup>050</sup>				-				-	FCC 13.203
- Hi Fred	quency Cal	oles	1											-1	
3'	cable 2	2807700	12' c	able 22	8076	00	20' ca	ble 22	807500		HPF	Re	ject Filte	r <u>Peak</u>	<u>a Measurements</u>
3' c	able 228	07700	12' ca	hle 2280	7600		20' cab	le 228	07500					Avera	w=vbw=nnnz ge Measurements
				DIC LLOO	1000	•			•			•		RBW=	1MHz ; VBW=10Hz
f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	Fltr	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL 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)
f GHz iid Ch 330	Dist (m)	Read Pk dBuV	Read Avg. dBuV 33.5	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m 42.0	Avg dBuV/m	Pk Lim dBuV/m 74	Avg Lim dBuV/m	Pk Mar dB -32.0	Avg Mar dB -28.5	Notes (V/H)
f GHz id Ch 330 882	Dist (m) 3.0 3.0	Read Pk dBuV 50.0 41.0	Read Avg. dBuV 33.5 31.7	AF dB/m 25.2 32.8	CL dB 2.7 5.8	Amp dB -35.9 -34.9	D Corr dB 0.0 0.0	Fltr dB 0.0 0.0	Peak dBuV/m 42.0 44.8	Avg dBuV/m 25.5 35.5	Pk Lim dBuV/m 74 74	Avg Lim dBuV/m 54 54	Pk Mar dB -32.0 -29.2	Avg Mar dB -28.5 -18.5	Notes (V/H) H H
f GHz iid Ch 330 882 330	Dist (m) 3.0 3.0 3.0 3.0 2.0	Read Pk dBuV 50.0 41.0 53.0	Read Avg. dBuV 335 31.7 34.6 22.8	AF dB/m 252 328 252 252	CL dB 2.7 5.8 2.7 5.8	Amp dB -35.9 -34.9 -35.9 24.0	D Corr dB 0.0 0.0 0.0	Fltr dB 0.0 0.0 0.0	Peak dBuV/m 42.0 44.8 45.0 47.3	Avg dBuV/m 255 355 266 276	Pk Lim dBuV/m 74 74 74 74	Avg Lim dBuV/m 54 54 54	Pk Mar dB -32.0 -29.2 -29.0 26.7	Avg Mar dB -285 -185 -27,4	Notes (V/H) H H V
f GHz id Ch 330 882 330 882	Dist (m) 3.0 3.0 3.0 3.0	Read Pk dBuV 50.0 41.0 53.0 43.5	Read Avg. dBuV 33.5 31.7 34.6 33.8	AF dB/m 252 328 252 328	CL dB 2.7 5.8 2.7 5.8	Amp dB -35.9 -34.9 -35.9 -34.9	D Corr dB 0.0 0.0 0.0 0.0	Fltr dB 0.0 0.0 0.0 0.0	Peak dBuV/m 42.0 44.8 45.0 47.3	Avg dBuV/m 255 355 266 37.6	Pk Lim dBuV/m 74 74 74 74 74	Avg Lim dBuV/m 54 54 54 54	Pk Mar dB -32.0 -29.2 -29.0 -26.7	Avg Mar dB -28.5 -18.5 -27.4 -16.4	Notes (V/H) H H V V
f GHz id Ch 330 882 330 882	Dist (m) 3.0 3.0 3.0 3.0	Read Pk dBuV 50.0 41.0 53.0 43.5	Read Avg. dBuV 33.5 31.7 34.6 33.8	AF dB/m 252 328 252 328	CL dB 2.7 5.8 2.7 5.8	Amp dB -359 -349 -359 -349	D Coir dB 0.0 0.0 0.0 0.0	Fltr dB 0.0 0.0 0.0	Peak dBuV/m 42.0 44.8 45.0 47.3	Avg dBuV/m 255 355 266 376	Pk Lim dBuV/m 74 74 74 74 74	Avg Lim dBuV/m 54 54 54 54 54	Pk Mar dB -32.0 -29.2 -29.0 -26.7	Avg Mar dB -28.5 -18.5 -27.4 -16.4	Notes (V/H) H H V V y
f GHz id Ch 330 882 330 882 *v. 07.22	Dist (m) 3.0 3.0 3.0 3.0 2.09	Read Pk dBuV 50.0 41.0 53.0 43.5	Read Avg. dBuV 335 31.7 34.6 33.8	AF dB/m 25.2 32.8 25.2 32.8	CL dB 2.7 58 2.7 58	Amp dB -359 -349 -359 -349	D Corr dB 0.0 0.0 0.0	Fltr dB 0.0 0.0 0.0	Peak dBuV/m 42.0 44.8 45.0 47.3	Avg dBuV/m 255 355 266 376	Pk Lim dBuV/m 74 74 74 74 74	Avg Lim dBuV/m 54 54 54 54	Pk Mar dB -32.0 -29.2 -29.0 -26.7	Avg Mar dB -28.5 -18.5 -27.4 -16.4	Notes (V/H) H H V V
f GHz id Ch 330 882 330 882 ev. 07.22 ote: No	Dist (m) 3.0 3.0 3.0 3.0 2.09 other emi	Read Pk dBuV 50.0 41.0 53.0 43.5 ssions were	Read Avg. dBuV 335 31.7 346 33.8 detected above t	AF dB/m 252 328 252 328 252 328	CL dB 2.7 5.8 2.7 5.8	Amp dB -35.9 -34.9 -35.9 -34.9 -34.9 floor.	D Conr dB 0.0 0.0 0.0	Fltr dB 0.0 0.0 0.0	Peak dBuV/m 42.0 44.8 45.0 47.3	Avg dBuV/m 255 355 266 376	Pk Lim dBuV/m 74 74 74 74	Avg Lim dBuV/m 54 54 54 54	Pk Mar dB -32.0 -29.2 -29.0 -26.7	Avg Mar dB -285 -185 -274 -164	Notes (V/H) H H V V V
f GHz 330 882 330 882 ev. 07.22 ote: No	Dist (m) 3.0 3.0 3.0 3.0 2.09 other emi	Read Pk dBuV 50.0 41.0 53.0 43.5 ssions were Measurem	Read Avg. dBuV 33.5 31.7 34.6 33.8 detected above t	AF dB/m 25.2 32.8 25.2 32.8 25.2 32.8 	CL dB 2.7 5.8 2.7 5.8	Amp dB -359 -349 -359 -349 -359 -349 -360 -349	D Corr dB 0.0 0.0 0.0 0.0 Preamp (	Fltr dB 0.0 0.0 0.0 0.0 3 Jain	Peak dBuV/m 42.0 44.8 45.0 47.3	Avg dBuV/m 255 355 266 376	Pk Lim dBuV/m 74 74 74 74 74	Avg Lim dBuV/m 54 54 54 54	Pk Mar dB -32.0 -29.2 -29.0 -26.7 Average F	Avg Mar dB -28.5 -18.5 -27.4 -16.4	Notes (V/H) H V V
f GHz iid Ch 330 882 330 882 ev. 07.22 ote: No	Dist (m) 3.0 3.0 3.0 3.0 2.09 other emi f Dist Read	Read Pk dBuV 50.0 41.0 53.0 43.5 ssions were Measurem Distance to Applyze R	Read Avg. dBuV 33.5 31.7 34.6 33.8 detected above t ent Frequency . Antenna seading	AF dB/m 25.2 32.8 25.2 32.8 the system	CL dB 2.7 5.8 2.7 5.8	Amp dB -359 -349 -359 -349 -349 -349 -349 -349 -20 -20 -20 -20 -20 -20 -20 -20 -20 -20	D Corr dB 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Fltr dB 0.0 0.0 0.0 0.0 3ain Correct	Peak dBuV/m 42.0 44.8 45.0 47.3 	Avg dBuV/m 255 355 266 376	Pk Lim <u>dBuV/m</u> 74 74 74 74 74 	Avg Lim dBuV/m 54 54 54 54 54 Avg Lim Pk Lim Avg Mar	Pk Mar dB -32.0 -29.2 -29.0 -26.7 -26.7 -26.7 -26.7 -26.7 -26.7 -26.7 -26.7 -26.7 -26.7 -26.7 -26.7 -26.8 -26.2 -27.0 -2	Avg Mar dB -28.5 -18.5 -27.4 -16.4 -16.4 Strength Li d Strength Li	Notes (V/H) H V V
f GHz Hid Ch 330 882 330 882 ev. 07.2 ote: No	Dist (m) 3.0 3.0 3.0 3.0 3.0 5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Read Pk dBuV 50.0 41.0 53.0 43.5 ssions were bistance to Analyzer R Antenna F.	Read Avg. dBuV 33.5 31.7 34.6 33.8 detected above 1 ent Frequency . Antenna eading actor	AF dB/m 25.2 32.8 25.2 32.8 the system	CL dB 2.7 5.8 2.7 5.8	Amp dB -359 -349 -359 -349 -359 -349 -349 -349 - Boor. Amp D Corr Avg Peak	D Corr dB 0.0 0.0 0.0 0.0 0.0 0.0 Distance Average Calculate	Fltr dB 0.0 0.0 0.0 0.0 3ain Correc Field S :d Peal	Peak dBuV/m 42.0 44.8 45.0 47.3 47.3 2 2 2 2 3 2 47.3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Avg dBuV/m 255 355 266 376 376	Pk Lim dBuV/m 74 74 74 74 74 74	Avg Lim dBuV/m 54 54 54 54 54 54 54 54 54 54 54 54 54	Pk Mar dB 32.0 .29.2 .29.0 .26.7 Average F Peak Field Margin vs. Margin vs.	Avg Mar dB -28.5 -18.5 -27.4 -16.4 -16.4 -16.4 -16.4 -16.4 -16.4 -16.4 -16.4 -16.4 -16.4 -16.4 -16.4 -16.4 -16.4 -16.4 -16.4 -16.4 -16.5 -	Notes (V/H) H V V

Page 88 of 102

# 9. AC POWER LINE CONDUCTED EMISSIONS

#### LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

Frequency of Emission (MHz)	Conducted L	.imit (dBuV)
	Quasi-peak	Average
0.15-0.5	66 to 56 "	56 to 46 *
0.5-5	56	46
5-30	60	50

\* Decreases with the logarithm of the frequency.

#### TEST PROCEDURE

#### ANSI C63.4

#### RESULTS

Page 89 of 102

#### 6 WORST EMISSIONS (WORST CASE)

		CONDUC	CTED EMISS	IONS D	ATA (115	VAC 60H	(z)		
Freq.		Reading		Closs	Limit	EN_B	Marg	gin	Remark
(MHz)	PK(dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.20	46.11		26.38	0.00	63.61	53.61	-17.50	-27.23	L1
0.41	37.91		20.10	0.00	57.65	47.65	-19.74	-27.55	L1
24.01	40.48		31.17	0.00	60.00	50.00	-19.52	-18.83	L1
0.20	46.61		27.40	0.00	63.61	53.61	-17.00	-26.21	L2
0.34	38.59		23.10	0.00	59.23	49.23	-20.64	-26.13	L2
24.01	37.99		28.68	0.00	60.00	50.00	-22.01	-21.32	L2
6 Worst	Data								

Page 90 of 102

#### LINE 1 RESULTS



Page 91 of 102

#### LINE 2 RESULTS



Page 92 of 102

#### 10. 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	/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 6
(B) Limits	for General Populati	on/Uncontrolled Exp	posure	
0.3–1.34	614 824 <i>1</i> f	1.63 2.19/f	*(100) *(180/f <sup>2</sup> )	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	27.5	0.073	0.2	30
300–1500 1500–100,000			f/1500 1.0	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.

Page 93 of 102

## 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 <sup>2</sup> )	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> <sup>0.5</sup>	0.0042f <sup>0.5</sup>	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 <sup>1.2</sup>
150 000-300 000	0.158 <i>f</i> <sup>0.5</sup>	4.21 x 10 <sup>-4</sup> f <sup>0.5</sup>	6.67 x 10 <sup>-5</sup> f	616 000 /f <sup>1.2</sup>

\* 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<sup>2</sup> is equivalent to  $1 \text{ mW/cm}^2$ .
- A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (μT) or 12.57 milligauss (mG).

Page 94 of 102

#### EQUATIONS

Power density is given by:

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

where

S = Power density in W/m<sup>2</sup> EIRP = Equivalent Isotropic Radiated Power in W D = Separation distance in m

Power density in units of W/m<sup>2</sup> is converted to units of mWc/m<sup>2</sup> 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<sup>2</sup>

For multiple colocated transmitters operating simultaneously in frequency bands where the limit is identical, the total power density is calculated using the total EIRP obtained by summing the Power \* Gain product (in linear units) of each transmitter.

Total EIRP = (P1 \* G1) + (P2 \* G2) + ... + (Pn \* Pn)

where

Px = Power of transmitter xGx = Numeric gain of antenna x

In the table(s) 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/cm<sup>2</sup>

From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m<sup>2</sup>

Page 95 of 102

#### **RESULTS**

Band	Mode	Separation	Output	Antenna	IC Power	FCC Power
		Distance	Power	Gain	Density	Density
		(m)	(dBm)	(dBi)	(W/m^2)	(mW/cm^2)
2.4 GHz	DSSS	0.20	1.32	5.00	0.01	0.001

Page 96 of 102