EMISSIONS TEST REPORT FOR A LOW POWER TRANSMITTER

I. GENERAL INFORMATION

Requirement:	Federal Communications Commissions
Test Requirements:	15.205, 15.207, 15.209, 15.247
Applicant:	Afar Communications Inc.

Product ID: FCC ID: Q7N-24027

Antennas used with this product must be professionally installed. The user manual for this product instructs users of this fact, along with providing instructions on allowable power and frequency settings.

II. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)

RF Specifications

RF Frequency Band	2.406 to 2.474 GHz
RF Channels	34 channels programmable in 2 MHz steps
	12 non-overlapping channels
RF Signal Bandwidth	4.6 MHz
Modulation Type	BPSK, QPSK and CCK
Data rate	250, 500, 1375, 2750 Kbps
Transmitter Output Power	23 dBm (average), variable
Antennas	24 dBi grid antenna
	18 dBi flat panel antenna
	9 dBi omni antenna

The product employs the Prism chipset from Intersil used in most of the 802.11b devices used in a non-standard mode. The modification consists of slowing down the clock to 1/4 of the standard rate. All the RF circuitry stayed the same but the occupied RF bandwidth is now 1/4 of the previous design.

III. TEST LOCATION

All tests were performed at:

Compliance Certification Services 571F Monterey Road Morgan Hill, CA 95037

T.N. Cokenias EMC Consultant/Agent for Afar Communications Inc.

16 September 2003

TEST PROCEDURES

Measurement Equipment Used:

TEST EQUIPMENTS LIST									
Name of Equipment	Manufacturer	Model No.							
Line Filter	Lindgren 10k - 10GHz	LMF-3489							
LISN	Fischer 9k - 100MHz	FCC-LISN-50/250-25-2							
EMI Test Receiver	Rohde & Schwarz	ESHS 20							
Spectrum Analyzer	Agilent	E4446A							
Receiver	HP	84320A							
Antenna, Bilog	Schaffner-Chase30M-2GHz	CBL6112B							
Pre-Amplifier	MITEQ1-26GHz	NSP2600-44							
Horn Antenna(1 - 18GHz)	ЕМСО	3115							
Filter 3.2 GHz	FSY Microwave	FM-3200-9SS							

Radiated Emissions

Test Requirement: 15.109, 15.205, 15.209, 15.247

Test Procedures, 1- 26 GHz:

1. The EUT was placed on a wooden table resting on a turntable on the open air test site. The search antenna was placed 3m from the EUT. The EUT antenna was mounted vertically as per normal installation.

2. The turntable was slowly rotated to locate the direction of maximum emission at each emission falling in the restricted bands of 15.205.

3. Radiated emissions were investigated for a LOW channel, a MID channel, and HIGH channel. Emissions were investigated to the 10th harmonic.

4. Once maximum direction was determined, the search antenna was raised and lowered in both vertical and horizontal polarizations. The maximum readings so obtained are recorded in the data listed below.

NOTE: Spurious and harmonic emissions appeared to be independent of modulation type. CCK appeared to be worst case for bandedge and was chosen as the modulation type for radiated emissions. CCK was also chosen for antenna conducted output emissions, as tests indicated no significant difference test data differences among the three modulation types.

Radiated Test Set-up, 1-40 GHz



Figure 2

Testing was performed at 3 different frequencies

Channel Frequency, MHz

Low	2406
Mid	2440
High	2474

Radiated emissions were performed at each frequency for 2 different transmitter antennas.

Antennas tested:

Antenna Type	Gain	Antenna Manufacturer	Model Number
omni	9 dBi	Mobilemark	OD9-2400-24
grid	24 dBi	Andrew	AND26T-2400-1
flat panel	18 dBi	Superpass	SPFPG18

Test Results: Worst case results are presented. Refer to separate Excel spread sheet files.

NOTE: Normal EUT operation is TDD (TX on 50%, RX on 50%). Duty cycle is -6dB and is entered on radiated emissions spread sheets.

Radiated Test Set-up, 30 - 1000 MHz



Test Procedures, 30 -1000 MHz

The EUT was set to RECEIVE/TRANSMIT mode. Radiation emissions from the digital portion of the EUT were measured according to the dictates of ANSI C63.4.

Test Results

Refer to separate attachment.

09/15/03	09/15/03 High Frequency Measurement															
Compliance Certification Services, Morgan Hill Open Field Site																
Test Engr Project #: Company EUT Desc EUT M/N Test Targ Mode Ope	Test Engr:William Zhuang Project #:03U2168-1 Company Name:Afar Communication EUT Descrip.:Afar Communication EUT M/N:AR24027 with 9 dBi omni Test Target:FCC15.247 Mode Oper:Transmit															
<u>Test Equipment:</u>																
EMCO Horn 1-18GHz Pre-amplifer 1-26GHz Spectrum Analyzer T60; S/N: 2238 @1m T86 Miteq 924341 Agilent E4446A Analyzer																
b (2 f	t)	es (2 ~ 3 ft)	e (4~6 ft)	b (12 ft)		Peak Measurements: 1 MHz Resolution Bandwidth 1 MHz Video Bandwidth						Average Measurements: 1 MHz Resolution Bandwidth 10Hz Video Bandwidth				
f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	HPF	Peak	Duty	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes
GHz	feet	dBuV	dBuV	dB/m	dB	dB	dB		dBuV/m	Cycle dB	dBuV/m	dBuV/m	dBuV/m	dB	dB	
4.880	9.8	71.0	63.0	33.8	3.9	-45.6	0.0	1.0	63.9	-6.0	50.0	74.0	54.0	-10.1	-4.0	Mid Ch 20, V, PL 21
4.880	9.8	72.5	65.7	33.8	3.9	-45.6	0.0	1.0	65.5	-6.0	52.7	74.0	54.0	-8.5	-1.3	Mid Ch 20, H, PL 21
7.320	9.8	55.3	43.9	37.3	4.9	-46.6	0.0	1.0	51.9	-6.0	34.5	74.0	54.0	-22.1	-19.5	Mid Ch 20, V, PL 21
7.320	9.8	55.7	44.9	37.3	4.9	-46.6	0.0	1.0	52.3	-6.0	35.5	74.0	54.0	-21.7	-18.5	Mid Ch 20, H, PL 21
4.812	9.8	71.8	64.4	33.7	3.8	-45.6	0.0	1.0	64.8	-6.0	51.4	74.0	54.0	-9.2	-2.6	Low Ch 3, V, PL 23
4.812	9.8	69.4	60.7	33.7	3.8	-45.6	0.0	1.0	62.4	-6.0	47.7	74.0	54.0	-11.6	-6.3	Low Ch 3, H, PL 23
7.218	9.8	58.5	48.6	37.2	4.9	-46.6	0.0	1.0	54.9	-6.0	39.0	74.0	54.0	-19.1	-15.0	Low Ch 3, V, PL 23
7.218	9.8	57.2	46.9	37.2	4.9	-46.6	0.0	1.0	53.6	-6.0	37.4	74.0	54.0	-20.4	-16.6	Low Ch 3, H, PL 23
4.948	9.8	67.1	59.1	33.8	3.9	-45.7	0.0	1.0	60.1	-6.0	46.1	74.0	54.0	-13.9	-7.9	High Ch 37, V, PL 23
4.948	9.8	74.1	66.9	35.8	5.9	-45.7	0.0	1.0	67.1	-6.0	53.9	74.0	54.0	-6.9	-0.1	High Ch 37, H, PL 23
7.422	9.8	<u> </u>	51.5	37.4	5.0	-40.5	0.0	1.0	60.0	-0.0	42.3	74.0	54.0	-11.1	-11./	High Ch 37, V, PL 23
1.422	9.8	04.1	50.0	57.4	5.0	-40.5	0.0	1.0	00.9	-0.0	40.8	/4.0	54.0	-13.1	-13.2	підії Сії 57, H, PL 25

09/04/03 Compliar	09/04/03 High Frequency Measurement Compliance Certification Services, Morgan Hill Open Field Site															
Test Engr Project #: Company EUT Desc EUT M/N Test Targ Mode Ope	Test Engr:William Zhuang Project #:03U2168-1 Company Name:Afar Communication EUT Descrip.:Afar Communication EUT M/N:AR24027 with 18 dBi panel antenna Test Target:FCC15.247 Mode Oper:Transmit															
<u>Test Equipment:</u>																
EMCO T73; S/N	EMCO Horn 1-18GHz Pre-amplifer 1-26GHz Spectrum Analyzer Horn > 18GHz T73; S/N: 6717 @1m T87 Miteq 924342 Agilent E4446A Analyzer Image: Compare the second sec															
Hi Frequency Cables b (2 ft) e (2 ~ 3 ft) e (4 ~ 6 ft) b (12 ft)								<u>Peak M</u> 1 MHz I 1MHz V	Ieasuremen Resolution Ba /ideo Bandwi	<u>ts:</u> ndwidth dth		Average M 1 MHz Resol 10Hz Video I	easurements ution Bandwic Bandwidth	<u>:</u> lth		
f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	HPF	Peak	Duty	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes
GHz	feet	dBuV	dBuV	dB/m	dB	dB	dB		dBuV/m	Cycle dB	dBuV/m	dBuV/m	dBuV/m	dB	dB	
4.880	9.8	67.9	61.2	34.0	3.9	-44.7	0.0	1.0	61.9	-6.0	49.2	74.0	54.0	-12.1	-4.8	Mid Ch 20, V, PL 23
4.880	9.8	68.0	61.4	34.0	3.9	-44.7	0.0	1.0	62.1	-6.0	49.4	74.0	54.0	-11.9	-4.6	Mid Ch 20, H, PL 23
7.320	9.8	65.8	52.2	36.8	4.9	-44.5	0.0	1.0	64.0	-6.0	44.4	74.0	54.0	-10.0	-9.6	Mid Ch 20, V, PL 23
7.320	9.8	66.3	54./	30.8	4.9	-44.5	0.0	1.0	64.9	-6.0	46.9	74.0	54.0	-9.1	-/.1	Mid Ch 20, H, PL 23
4 812	9.0	67.9	61.2	33.9	3.8	-44.7	0.0	1.0	61.9	-0.0	49.0	74.0	54.0	-13.7	-3.0	Low Ch 3 H PL 23
7.218	9.8	55.5	42.8	36.7	4.9	-44.6	0.0	1.0	53.5	-6.0	34.7	74.0	54.0	-20.5	-19.3	Low Ch 3, 11, 11, 23
7.218	9.8	58.4	43.2	36.7	4.9	49 - 446 = 0.0 = 1.0 = 56.3 = -6.0 = 35.2 = 74.0 = 54.0 = -17.7 = 18.8 = Low Ch 3.4, 1.1.2 = 20.0 = 10.0									Low Ch 3, H, PL 23	
4.948	9.8	68.9	61.9	34.0	3.9	-44.8	0.0	1.0	63.0	-6.0	50.0	74.0	54.0	-11.0	-4.0	High Ch 37, V, PL 23
4.948	9.8	68.4	60.7	34.0	3.9	-44.8	0.0	1.0	62.5	-6.0	48.8	74.0	54.0	-11.5	-5.2	High Ch 37, H, PL 23
7.422	9.8	65.2	53.3	37.0	5.0	-44.4	0.0	1.0	63.7	-6.0	45.8	74.0	54.0	-10.3	-8.2	High Ch 37, V, PL 23
7.422	9.8	65.8	53.1	37.0	5.0	-44.4	0.0	1.0	64.3	-6.0	45.6	74.0	54.0	-9.7	-8.4	High Ch 37, H, PL 23

09/15/03 Complia	09/15/03 High Frequency Measurement Compliance Certification Services, Morgan Hill Open Field Site															
Test Engr Project #: Company EUT Deso EUT M/N Test Targ Mode Op	Test Engr:William Zhuang Project #:03U2168-1 Company Name:Afar Communication EUT Descrip.:Afar Communication EUT M/N:AR24027 with 24 dBi grid antenna Test Target:FCC15.247 Mode Oper:Transmit															
<u>Test Equipment:</u>																
EMCO T60; S/N	EMCO Horn 1-18GHz Pre-amplifer 1-26GHz Spectrum Analyzer Horn > 18GHz T60; S/N: 2238 @1m T86 Miteq 924341 Agilent E4446A Analyzer Image: Comparison of the second seco															
Hi Freq	Hi Frequency Cables Peak Measurements: Average Measurements: 1 MUz Bosolution Dondwidth 1 MUz Bosolution Dondwidth															
6 (2 1	n) (€ (2~3 π)	€ (4~6π)	θ (12 π)				1 MHz V	/ideo Bandwi	dth		10Hz Video I	Bandwidth	1111		
f	Dist	Read Pk	Read Avg	AF	CL	Amn	D Corr	HPF	Peak	Duty	Ava	Pk I im	Avg I im	Pk Mar	Avg Mar	Notes
GHz	feet	dBuV	dBuV	dB/m	dB	dB	dB		dBuV/m	Cycle dB	dBuV/m	dBuV/m	dBuV/m	dB	dB	TUTES
4.880	9.8	71.0	63.0	33.8	3.9	-45.6	0.0	1.0	63.9	-6.0	50.0	74.0	54.0	-10.1	-4.0	Mid Ch 20, V, PL 21
4.880	9.8	72.5	65.7	33.8	3.9	-45.6	0.0	1.0	65.5	-6.0	52.7	74.0	54.0	-8.5	-1.3	Mid Ch 20, H, PL 21
7.320	9.8	55.3	43.9	37.3	4.9	-46.6	0.0	1.0	51.9	-6.0	34.5	74.0	54.0	-22.1	-19.5	Mid Ch 20, V, PL 21
7.320	9.8	55.7	44.9	37.3	4.9	-46.6	0.0	1.0	52.3	-6.0	35.5	74.0	54.0	-21.7	-18.5	Mid Ch 20, H, PL 21
4.812	9.8	71.8	64.4	33.7	3.8	-45.6	0.0	1.0	64.8	-6.0	51.4	74.0	54.0	-9.2	-2.6	Low Ch 3, V, PL 23
4.812	9.8	69.4	60.7	33.7	3.8	-45.6	0.0	1.0	62.4	-6.0	47.7	74.0	54.0	-11.6	-6.3	Low Ch 3, H, PL 23
7.218	9.8	58.5	48.6	37.2	4.9	-46.6	0.0	1.0	54.9	-6.0	39.0	74.0	54.0	-19.1	-15.0	Low Ch 3, V, PL 23
/.218	9.8	57.2	40.9	3/.2	4.9	-40.0	0.0	1.0	53.0	-0.0	3/.4	74.0	54.0	-20.4	-10.0	LOW Ch 3, H, PL 23
4.940	9.0	74.1	66.9	33.8	3.9	-45.7	0.0	1.0	67.1	-0.0	40.1 53.0	74.0	54.0	-13.9	-7.9	High Ch 37 H PL 23
7.422	9.8	66.1	51.5	37.4	5.0	-46.5	0.0	1.0	62.9	-6.0	42.3	74.0	54.0	-11.1	-11.7	High Ch 37, V. PL 23
7.422	9.8	64.1	50.0	37.4	5.0	-46.5	0.0	1.0	60.9	-6.0	40.8	74.0	54.0	-13.1	-13.2	High Ch 37, H, PL 23



(Audix ATC)

Trace: 3

Ref Trace:

Condition: FCC CLA	AS	S-B
Company	:	Aar Communication
EUT Description	:	Wireless Ethernet Bridge
Model Number	:	AR24027
Test Configurtion	:	EUT/Power Inserter Unit/Antenna
Tester	:	William Zhuang
Test Target	:	FCC CLASS B
Mode of Operation	:	Transmit Mode
Project No	:	03U2168-1
:	:	Vertical

								Pa	age: 1
		Read	Probe	Cable	Preamp		Limit	Over	
	Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV/m	dBuV/m	dB	
1	30.000	7.97	16.99	0.55	0.00	25.51	40.00	-14.49	Peak
2	65.890	15.25	9.38	0.77	0.00	25.40	40.00	-14.60	Peak
3	72.680	21.57	7.47	0.79	0.00	29.83	40.00	-10.17	Peak
4	85.290	14.40	7.30	0.86	0.00	22.56	40.00	-17.44	Peak
5	114.390	15.72	10.15	1.03	0.00	26.90	43.50	-16.61	Peak
6	121.180	20.27	10.50	1.03	0.00	31.80	43.50	-11.70	Peak
7	138.640	15.92	9.06	1.11	0.00	26.09	43.50	-17.41	Peak
8	140.580	16.13	8.83	1.13	0.00	26.09	43.50	-17.41	Peak
9	164.830	16.57	8.71	1.26	0.00	26.54	43.50	-16.96	Peak
10	198.780	18.12	9.04	1.38	0.00	28.54	43.50	-14.96	Peak



(Audix ATC)

Trace: 1

Ref Trace:

Condition: FCC CLA	SS-B						
Company :	Aar Communication						
EUT Description :	Wireless Ethernet Bridge						
Model Number :	AR24027						
Test Configurtion:	EUT/Power Inserter Unit/Antenna						
Tester :	William Zhuang						
Test Target :	FCC CLASS B						
Mode of Operation:	Transmit Mode						
Project No :	03U2168-1						
:	Horizontal						

								Pa	age: 1
		Read	Probe	Cable	Preamp		Limit	Over	
	Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV/m	dBuV/m	dB	
1	72.680	13.70	7.47	0.79	0.00	21.96	40.00	-18.04	Peak
2	121.180	24.88	10.50	1.03	0.00	36.41	43.50	-7.09	Peak
3	138.640	16.39	9.06	1.11	0.00	26.56	43.50	-16.94	Peak
4	184.230	14.76	8.92	1.34	0.00	25.02	43.50	-18.48	Peak
5	198.780	16.68	9.04	1.38	0.00	27.10	43.50	-16.40	Peak
6	444.190	8.55	15.44	2.15	0.00	26.14	46.00	-19.86	Peak
7	465.530	8.55	15.87	2.25	0.00	26.67	46.00	-19.33	Peak
8	499.480	7.62	16.53	2.29	0.00	26.44	46.00	-19.56	Peak
9	848.680	3.61	20.20	3.15	0.00	26.96	46.00	-19.04	Peak
10	866.140	3.93	20.33	3.13	0.00	27.39	46.00	-18.61	Peak

Radiated Emissions, Band Edge

Investigations were performed in the 2310 - 2390 MHz and 2483.5 - 2500 MHz restricted bands at the edges of the operating band.

The EUT was set up with transmit antenna as shown in Figure 2 above, except that the high pass filter and pre-amplifier were not used. The search antenna was raised and lowered, and the turntable was rotated, to maximize received emissions, which were compared against the limits for radiated emissions in the restricted bands.

Transmitter was set to 2406 MHz for 2310-2390 MHz investigation. Transmitter was set to 2475 MHz for 2483.5 – 2500 MHz investigation. To meet restricted band emissions levels at the high band edge, the power to theomni, panel antenna and the grid antenna were reduced according to the following schedule:

9 dBi omni

Channel	Pout max dbm
37	22
all others	23

Low Bandedge: Channel 3, 23 dBm 18 dBi Panel Antenna

Channel	Pout max dbm
37	19
36	21
35	22
34	23
all others	23

Low Bandedge: Channel 3, 23 dBm

24 dBi Grid Antenna

Channel	Pout max
	dbm
37	10
36	20
35	21
34	22
33	23
all others	23

Low Bandedge: Channel 3, 23 dBm

Worst case band edge spectrum analyzer plots shown below. The user manual will include a table showing maximum output power for each channel.

Afar Communications Inc. FCC ID: Q7N-24027

NOTE: Normal transmission is TDD (-6 dB duty cycle). Correction included in display line level for average readings.

Omni ANTENNA, 2483.5-2500 MHz, Peak and Average Field Strength



Omni ANTENNA, 2310-2390 MHz, Peak and Average Field Strength





FLAT PANEL ANTENNA, 2483.5-2500 MHz, Peak and Average Field Strength

Channel 34



FLAT PANEL ANTENNA, 2310 - 2390 MHz, Peak and Average Field Strength

Channel 3					
🔆 Agilent 15:42:33	Sep 4, 2003			L	Peak Search
Ref 129.5 dB µ∨ #Peak	#Atten 6 dB		Mkr1 2.39 70	0 00 GHz .05 dBµ∨	Next Peak
Log 10 dB/					Next Pk Right
32.5 dB DI					Next Pk Left
74.0 dBμ√ LgAv					Min Search
V1 S2 S3 FC	und soll have polynol metriden	undertradiente de la constante	ishihasayahahatwaanoolahaha	VYNYN	Pk-Pk Search
×(f): FTun Swp					Mkr © CF
Start 2.310 00 GHz #Res BW 1 MHz	VB	W 1 MHz	Stop 2.39 Sween 1 ms	0 00 GHz (601 pts)	More 1 of 2
			ences i me	(001)/(0)	
Convright 2000-2002	Agilant Technologia	e			
Copyright 2000-2002	Agilent Technologie	s		1	Dool/ Soorah
Copyright 2000-2002	Agilent Technologie Sep 4, 2003	S	ML-4 -2 -20		Peak Search
Copyright 2000-2002 / ∰ Agilent 15:43:27 Ref 129.5 dBµ∨ #Peak	Agilent Technologie Sep 4, 2003 #Atten 6 dB	8	Mkr1 2.38 58	L 5 73 GHz 45 dBµ∀	Peak Search Next Peak
Copyright 2000-2002 / Image: Agilent 15:43:27 Ref 129.5 dBµ∨ #Peak Log 10 dB/ Offect	Agilent Technologie Sep 4, 2003 #Atten 6 dB	8	Mkr1 2.38 58	L 5 73 GHz 45 dBµ∨	Peak Search Next Peak Next Pk Right
Copyright 2000-2002 /	Agilent Technologie Sep 4, 2003 #Atten 6 dB	8	Mkr1 2.38 58	L 5 73 GHz 45 dBµ∨	Peak Search Next Peak Next Pk Right Next Pk Left
Copyright 2000-2002 / Image: Agilent 15:43:27 Ref 129.5 dBµ∨ #Peak Log 10 dB/ Offst 32.5 dB DI 60.0 dBµ∨ LgAv	Agilent Technologie Sep 4, 2003 #Atten 6 dB	8	Mkr1 2.38 58	L 5 73 GHz .45 dBµ∨	Peak Search Next Peak Next Pk Right Next Pk Left Min Search
Copyright 2000-2002 /	Agilent Technologie Sep 4, 2003 #Atten 6 dB	8	Mkr1 2.38 58	L 5 73 GHz 45 dBµ∨	Peak Search Next Peak Next Pk Right Next Pk Left Min Search Pk-Pk Search
Copyright 2000-2002 / Ref 129.5 dBµ∨ #Peak Log 10 dB/ Offst 32.5 dB DI 60.0 dBµ∨ LgAv V1 S2 S3 FC AA ×(f): FTun Swp	Agilent Technologie Sep 4, 2003 #Atten 6 dB		Mkr1 2.38 58	L 5 73 GHz .45 dBµ∨ 	Peak Search Next Peak Next Pk Right Next Pk Left Min Search Pk-Pk Search Mkr © CF
Copyright 2000-2002 / Ref 129.5 dBµ∨ #Peak Log	Agilent Technologie Sep 4, 2003 #Atten 6 dB	S S S S S S S S S S S S S S S S S S S	Mkr1 2.38 58	5 73 GHz .45 dBµ∨ .45 dBµ∨ 	Peak Search Next Peak Next Pk Right Next Pk Left Min Search Pk-Pk Search Mkr © CF More

DISH ANTENNA, 2310-2390 MHz, Peak and Average Field Strength



🄆 Ag	ilent 05:26:10	Sep 16, 2003			L	Peak Search
Ref 107 #Peak	′dBµ∨	#Atten 0 dB		Mkr1 3	2.389 60 GHz 70.03 dBµ∨	Next Peak
Log 10 dB/ Offst						Next Pk Right
32.5 dB DI						Next Pk Left
74.0 dBµ∨ LgAv	getter and get detter and	muhlphadaanakall	yanan Martha	New Martin and a second second	hunder and the second	Min Search
V1 S2 S3 FC						Pk-Pk Search
×(f): FTun Swp						Mkr © CF
Center #Res B	2.350 00 GHz W 1 MHz		BW 1 MHz	Sweep 1	Span 80 MHz ms (601 pts)	More 1 of 2
Convrig		allows Technolog				
poopring	ni 2000-2002 A	glient Technolog	es			
🔆 Ag	ilent 05:25:26	glient Technolog Sep 16, 2003	es		L	Peak Search
* Ag	ilent 05:25:26 ∕ dBµ∨	Sep 16, 2003 #Atten 0 dB	les	Mkr1 :	L 2.385 73 GHz 57.55 dBµ∀	Peak Search Next Peak
Ref 107 #Peak Log 10 dB/ Offst	ilent 05:25:26 ∕ dBµ∨	#Atten 0 dB		Mkr1 :	2.385 73 GHz 57.55 dBµ∨	Peak Search Next Peak Next Pk Right
Ref 107 #Peak Log 10 dB/ Offst 32.5 dB DI	ilent 05:25:26 7 dBµ√	#Atten 0 dB		Mkr1 :	L 2.385 73 GHz 57.55 dBµ∨	Peak Search Next Peak Next Pk Right Next Pk Left
Ref 107 # Ag Ref 107 #Peak Log 10 dB/ Offst 32.5 dB DI 60.0 dBµ∨ LgAv	ilent 05:25:26 7 dBµ√	#Atten 0 dB		Mkr1 :	L 2.385 73 GHz 57.55 dBµ∨ 	Peak Search Next Peak Next Pk Right Next Pk Left Min Search
Ref 107 # Ag Ref 107 #Peak Log 10 dB/ Offst 32.5 dB DI 60.0 dBµ∨ LgAv W1 S2 S3 FC AA	ilent 05:25:26 7 dBµ√	Ment Technolog Sep 16, 2003 #Atten 0 dB		Mkr1 :	2.385 73 GHz 57.55 dBµ∨	Peak Search Next Peak Next Pk Right Next Pk Left Min Search Pk-Pk Search
Ref 107 # Ag Ref 107 #Peak Log 10 dB/ Offst 32.5 dB DI 60.0 dBµ∨ LgAv W1 S2 S3 FC AA *(f): FTun Swp	ilent 05:25:26 dBμ√	Sep 16, 2003 #Atten 0 dB		Mkr1 : Mkr1 :	L 2.385 73 GHz 57.55 dBµ∨ 	Peak Search Next Peak Next Pk Right Next Pk Left Min Search Pk-Pk Search Mkr © CF
Image: width	ilenf 05:25:26 7 dBµ√ 2 dBµ/ 2 dBµ/	<pre>gellent recentiolog Sep 16, 2003 #Atten 0 dB #Atten 0 dB #Atten 0 dB #Atten 0 dB #Atten 0 dB #Atten 0 dB ##Atten 0 dB ####################################</pre>	/BW 10 Hz	Mkr1 :	L 2.385 73 GHz 57.55 dBµ∨ 	Peak Search Next Peak Next Pk Right Next Pk Left Min Search Pk-Pk Search Mkr © CF More 1 of 2

DISH ANTENNA, 2483.5-2500 MHz, Peak and Average Field Strength Ch 33 at 23 dBm



AC Line Conducted Emissions Test Requirement: 15.107, 15.207

Measurement Equipment Used:

Rohde & Schwarz EMI Receiver ESHS-20 Fischer Custom Communication LISN, FCC-LISN-50/250-25-2

Test Procedure

1. The EUT was placed on a wooden table 40 cm from a vertical ground plane and approximately 80 cm above the horizontal ground plane on the floor. The EUT was set to transmit in normally.

2. Line conducted data was recorded for both NEUTRAL and HOT lines.

Test Results

PASS. Refer to separate data sheets.

















Minimum 6 dB Bandwidth Test Requirement: 15.247(a)2

Measurement Equipment Used:

Agilent E4446A spectrum analyzer 10 dB attenuator 2ft length coaxial cable (.3 dB loss)

Test Procedures

The EUT was configured on a test bench. The EUT was set for continuous operation . Frequency was set to LOW channel. While the transmitter broadcast a steady stream of digital data, the analyzer MAX HOLD function was used to capture the envelope of the transmission occupied bandwidth.

The test was repeated at MID channel and at HIGH channel.

Test Results: Refer to attached spectrum analyzer charts. Data taken with RES BW of 100 kHz shows minimum 6 dB BW of 3.2 MHz. Minimum requirement: no less than 500 kHz

Channel	Frequency,	MHz
3 Low	2406	
37 High	2440 2474	

15.247(a)2: Minimum 6 dB Bandwidth

LOW Channel



Minimum 6 dB BW

MID Channel



Minimum 6 dB BW

HIGH Channel



LOW channel 99% bandwidth (Industry Canada Only) RSS-210



MID channel 99% bandwidth (Industry Canada Only) RSS-210



HIGH channel 99% bandwidth (Industry Canada Only) RSS-210



RF Power Output Test Requirement: 15.247(b)

Measurement Equipment Used:

Agilent E4446A spectrum analyzer 10 dB attenuator 12ft length coaxial cable (2.4 dB loss)

Test Procedures

- 1. The EUT was configured on a test bench and set to the LOW channel
- 2. The analyzer CHANNEL POWER function was activated with PEAK detector and power read directly from the screen.
- 3. The process in (1) and (2) was repeated for MID channel and HIGH channel.

Test Results

Peak power level readings are shown below. Refer also to spectrum analyzer graphs. Reference level offset corrects for external attenuation and cable loss.

Channel	Frequency, MHz	Output Power, dBm
3 LOW	2406	23.79
20 MID	2440	24.28
37 HIGH	2474	24.67

The EUT power setting was at 23 dBm for all three measurements. The power settings correspond to readings that would be obtained by an average power meter. Peak to average ratio for CCK is approximately 2 dB, theoretical maximum 2.5 dB.

LOW channel 3 peak output power



MID channel 20 peak output power



HIGH channel 37 peak output power



Spurious Emissions, Conducted Test Requirement: 15.247(c)

Measurement Equipment Used:

Agilent E4446A Spectrum Analyzer 10 dB attenuator 12ft length coaxial cable (2.4 dB loss)

Test Procedure

1. The EUT was configured on a test bench. The cable was connected between the EUT antenna port and the spectrum analyzer input port.

Spectrum analyzer RES BW was set to 100 kHz. While the transmitter broadcast a steady stream of digital data, the analyzer MAX HOLD function was used to capture the envelope of the transmission.

Readings were taken out to 10fo.

2. The process in (1) was repeated for MID channel and HIGH channel.

Test Results

Refer to attached data sheets. Data shows out of band emissions are suppressed well below the -20 dBc minimum required by the Rules.

Channel Frequency, MHz

3 Low	2406
20 Mid	2440
37 High	2474

15.247(c): Spurious Emissions, Conducted, -20 dBc



LOW Channel 3, 23 dBm power output setting

15.247(c): Spurious Emissions, Conducted, -20 dBc



MID Channel 20, 23 dBm power output setting

15.247(c): Spurious Emissions, Conducted, -20 dBc

High Channel 37, 23 dBm power output setting



Power Spectral Density Test Requirement: 15.247(d)

Measurement Equipment Used:

Agilent E4446A spectrum analyzer 10 dB attenuator 12ft length coaxial cable (2.4 dB loss)

Test Procedure

For the LOW channel, the emission peak was set to the center of the display. The SPAN was set to 300 kHz, the RES BW and VID BW were set to 3 kHz, and SWEEP TIME was set to 100 seconds. The maximum trace was recorded and compared to the 8 dBm limit.

The test was repeated for MID and HIGH channel.

Test Results

Maximum measured PSD was approximately 2 dBm. Maximum allowed psd is 8 dBm. Refer to attached spectrum analyzer charts.

Channel Frequency, MHz

3 Low	2406
20 Mid	2440
37 High	2474

15.247(d): Power Spectral Density

🔆 Agil	ent 01:	:57:14	Sep 16, 1	2003						L	Peak Search
Ref 22.4 #Peak	dBm		Atten 2	20 dB			M	kr1 2.4(06 074 1 1.43	GHz dBm	Next Peak
Log 10 dB/							11111111111			4111241124112	Next Pk Right
dls.4 dB DI		9-404- 4- 9094	rwwyrywny.	1909-9-9-9 1	an a	-9-9- <i>-9-</i> 94	Jefe-Joersterla	~1~~	ala da kara da sa kara	ikan kaluraka	Next Pk Left
8.0 dBm LgAv											Min Search
V1 S2 S3 FC											Pk-Pk Search
¤(f): f>50k Swp -											Mkr © CF
Center 2 #Res BV	2.406 0 V 3 kHz	00 0 GH	Z	v	BW 3 ki	Hz	#Sw	7eep 100	Span 3) s (601	DO kHz pts)	More 1 of 2
Copyrigh	t 2000-	2002 Ac	ilent Te	chnologi	es						

LOW Channel 3, 23 dBm power output setting

15.247(d): Power Spectral Density

MID Channel 20, 23 dBm power output setting

🔆 Agi	ilent 01:	:53:01	Sep 16, 1	2003						L	Peak Search
Ref 22.4 #Peak	4 dBm		Atten 2	20 dB			M	kr1 2.44	10 025 6 1.83	GHz dBm	Next Peak
Log 10 dB/ Offet							11.1141/11.114	wawawa	N.M.N.M.M.M.M.M.M.M.M.M.M.M.M.M.M.M.M.M	W saint, styles,	Next Pk Right
12.4 dB DI			*****	Anne and a second							Next Pk Left
8.0 dBm LgAv											Min Search
V1 S2 S3 FC AA											Pk-Pk Search
¤(f): f>50k Swp											Mkr © CF
Center #Res B	2.440 0 W 3 kHz	00 0 GH 2	z	v	BW 3 kl	Hz	#Sw	reep 100	Span 3() s (601)0 kHz î pts)	More 1 of 2
Copyrig	ht 2000-	2002 Ag	gilent Te	chnologi	es						

15.247(d): Power Spectral Density

🔆 Agilent 01:48:25 Sep 16, 2003 L Peak Search Mkr1 2.474 025 1 GHz Ref 22.4 dBm Atten 20 dB 1.98 dBm Next Peak #Peak Log 10 Next Pk Right dB/ Offst LAND VIN MARY AND Law war ward shall for any off **yw**n 12.4 dB Next Pk Left DI 8.0 dBm Min Search LgAv V1 S2 Pk-Pk Search S3 FC AA ¤(f): f>50k Mkr © CF Swp More Center 2.474 100 0 GHz Span 300 kHz 1 of 2 #Res BW 3 kHz VBW 3 kHz #Sweep 100 s (601 pts) Copyright 2000-2002 Agilent Technologies

HIGH Channel 37, 23 dBm power output setting

MPE Calculations

Afar Communications Inc. FCC ID:

RF Hazard Distance Calculation

mW/cm2 from Table1: 1.00

Max RF Power	TX Antenna	MPE
P, dBm	G, dBi	Safe Distance, cm

24.0	9.0	12.6
24.0	18.0	35.5
24.0	24.0	70.9

Basis of Calculations:

E^2/3770 = S, mW/cm2 E, V/m = (Pwatts*Ggain*30)^.5/d, meters d = ((Pwatts*G*30)/3770*S))^0.5 Pwatts*Ggain = 10^(PdBm-30+GdBi)/10)

NOTE: For fixed location transmitters, minimum separation distance is 2m, even if calculations indicate MPE distance is less