Nemko Test Report No.:	4L0570RUS2
Applicant:	Andrew Corporation 108 Rand Park Drive Garner, NC 27529
Equipment Under Test:	TFAH 85/19
In Accordance With:	FCC Part 24, Subpart E Broadband PCS Repeaters
Tested By:	Nemko Dallas Inc. 802 N. Kealy Lewisville, Texas 75057-3136
	Jo- Till
Authorized By:	Tom Tidwell, Frontline Group Manager
Date:	1 September, 2004
Total Number of Pages:	43

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FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
Test Report No.: 4L0570RUS2

EQUIPMENT: TFAH 85/19

Section 1. Summary of Test Results

Manufacturer:	Andrew Corporation							
Model No.:	TFAH 85/19							
Serial No.:	043003041							
General: All measurements are traceable to national standards.								
These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 24, Subpart E.								
	New Submission		Production Unit					
	Class II Permissive Change		Pre-Production Unit					

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE. NONE

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FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
Test Report No.: 4L0570RUS2

EQUIPMENT: TFAH 85/19

Summary Of Test Data

	PARA.		
NAME OF TEST	NO.	SPEC.	RESULT
RF Power Output	24.232	100W	Complies
Occupied Bandwidth	24.238	Input/Output	Complies
Spurious Emissions at Antenna Terminals	24.238(a)	-13 dBm	Complies
Field Strength of Spurious Emissions	24.238(a)	-13 dBm E.I.R.P.	Complies
Frequency Stability	24.235		NA

Footnotes:

(1) Modulation characteristics were not tested since the E.U.T. processes but does not produce a modulated waveform.

Measurement uncertainty for each test configuration is expressed to 95% probability.

Section 2. General Equipment Specification

Supply Voltage Input:	115 Vac							
Frequency Bands: Downlink:	Block A:	1930 – 1945 MHz						
	Block D:							
	Block B:							
		1965 – 1970 MHz						
	Block F:							
		Block C: 1975 – 1990 MHz						
Frequency Bands: Uplink:	NA							
	CDMA	GSM NADC	EDGE					
Type of Modulation and Designator:	(F9W)	$(G7W) \qquad (DXW)$	(G7W)					
_			\boxtimes					
-								
Output Impedance:	50 ohms							
	Modulation	1 Carrier	2 Carriers					
RF Output (Rated dBm/carrier): DL	CDMA	31						
	GSM	37	27					
_	EDGE	33.5	25					
-	TDMA	34.5	25.5					
Frequency Translation:	F1-F1	F1-F2	N/A					
requency remounder.								
	Software	Duplexer	Fullband					
Band Selection:	Software	Duplexer	r unbanu					

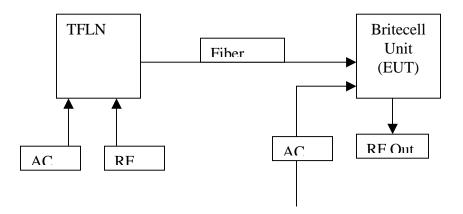
Test Report No.: 4L0570RUS2

EQUIPMENT: TFAH 85/19

Description of Operation

TFAH 85/19 is a fiber based dual band repeater operating in the 800 MHz cellular and the 1900 MHz PCS bands

System Diagram



FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
Test Report No.: 4L0570RUS2

EQUIPMENT: TFAH 85/19

Section 3. RF Power Output

NAME OF TEST: RF Power Output PARA. NO.: 2.1046

TESTED BY: David Light DATE: 8/30/04

Test Results: Complies.

Measurement Data:

Direction	Modulation Type	Per Channel Power Output (dBm)	Composite Power Output (dBm)
Downlink	CDMA	24.5	27.5
Downlink	GSM	27	30
Downlink	NADC	25	28
Downlink	CDPD	25.5	28.8

Equipment Used: 1036-1065-1604-1629

Measurement Uncertainty: +/- 1.7 dB

Temperature: 25 °C

Relative Humidity: 40 %

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS **Test Report No.: 4L0570RUS2**

EQUIPMENT: TFAH 85/19

Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth PARA. NO.: 2.1049

TESTED BY: David Light DATE: 8/30/04

Test Results: Complies.

Test Data: See attached plot(s).

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
Test Report No.: 4L0570RUS2

EQUIPMENT: TFAH 85/19

Test Data – Occupied Bandwidth



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Nemko Dallas, Inc. Occupied Bandwidth Data Plot Page <u>1</u> of <u>2</u> Complete Date: 8/30/2004 Job No.: 4L0570 Preliminary: Specification: PT24 Temperature(°C): 25 Relative Humidity(%) Tested By: David Light E.U.T.: PCS AMPLIFIER TX Configuration: Sample Number: Lab 1 RBW: 30 kHz Location: Measurement Detector Type: VBW: 30 kHz Distance: NA Peak Test Equipment Used Directional Coupler: Cable #1: 1629 Pre-Amp: Filter: Cable #2: 1036 Receiver: Cable #3: Attenuator #1 Cable #4: Attenuator #2: 1604 Mixer: Additional equipment used: Measurement Uncertainty: +/-1.7 dB Ref Lvl -10 dBm -2.92 dBm 30 kHz VBW Mixer 40 dBm 1.96071643 GHz SWT 14 ms Unit 31.1 dB Offset [T1] .92 dBn 643 GHz 30 1.40398 798 MHz 20 Muselle 1VIEW 1MA twin who was a large of the same of the sa -20 -30 THUM -40 -50 -60 Center 1.96 GHz 500 kHz/ Span 5 MHz 30.AUG.2004 08:39:15 Date: CDMA OUTPUT MAX POWER 30.7 dBm

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
Test Report No.: 4L0570RUS2

EQUIPMENT: TFAH 85/19

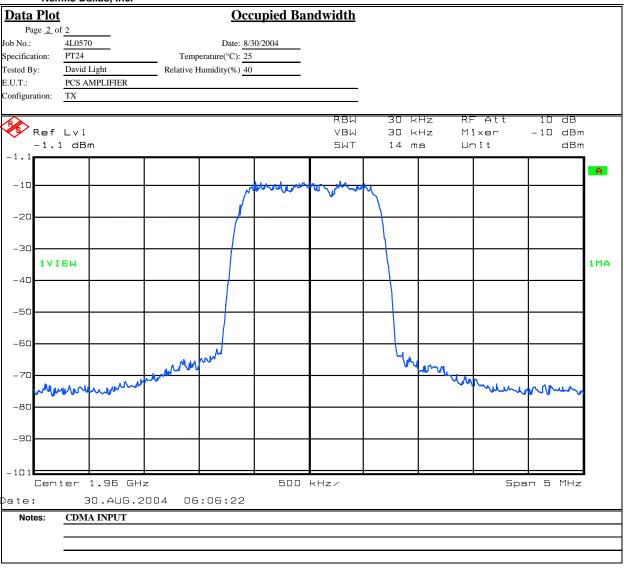
Test Data - Occupied Bandwidth



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Test Report No.: 4L0570RUS2

EQUIPMENT: TFAH 85/19

Test Data - Occupied Bandwidth



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Nemko Dallas, Inc. Data Plot **Occupied Bandwidth** Page 1 of 2 Complete 8/30/2004 Job No.: 4L0570 Date: Preliminary: 25 Specification: PT24 Temperature(°C): Tested By: David Light Relative Humidity(%) PCS AMPLIFIER E.U.T.: Configuration: TXSample Number: Lab 1 RBW: Refer to plots Location: Measurement Detector Type: VBW: Refer to plots Distance: NA Peak Test Equipment Used Directional Coupler: 1629 Pre-Amp: Cable #1: Filter: Cable #2: Receiver: 1036 Cable #3: Cable #4: Attenuator #1 1065 Attenuator #2: Mixer: Additional equipment used: +/-1.7 dB Measurement Uncertainty: 20 dB Ref Lvl -0.07 dB 3 kHz VBW Mixer -10 dBm 40 dBm 282.56513026 kHz SWT 280 ms Unīt dBm 31.1 dB Offset [T1] 40 dBr Α 571 30 2.56513 026 kHz 20 10 1VIEW 1MA - 1 C -20 -30 -4D 4. 14/1/hd 100 kHz/ Span 1 MHz Center 1.96 GHz 30.AUG.2004 07:13:04 Date: GSM OUTPUT Notes: MAX POWER 37 dBm

EQUIPMENT: TFAH 85/19

FCC PART 24, SUBPART E BROADBAND PCS REPEATERS Test Report No.: 4L0570RUS2

Test Data - Occupied Bandwidth



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Nemko Dallas, Inc. Occupied Bandwidth **Data Plot** Page 2 of 2 4L0570 Date: 8/30/2004 Job No.: PT24 Temperature(°C): 25Specification: Tested By: David Light Relative Humidity(%) 40 E.U.T.: PCS AMPLIFIER Configuration: TXRBW 20 dВ Ref Lvl VBW 3 kHz Mixer -10 dBm 8.9 dBm 280 ms SWT dBm Unit 8.9 A -20 1VIEW 1MA -30 -40 -50 -60 91.1 100 kHz/ Center 1.96 GHz Span 1 MHz 30.AUG.2004 Date: 07:14:27 GSM INPUT Notes:

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
Test Report No.: 4L0570RUS2

EQUIPMENT: TFAH 85/19

Test Data - Occupied Bandwidth



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Nemko Dallas, Inc. Data Plot **Occupied Bandwidth** Page 1 of 2 Complete 8/30/2004 Job No.: 4L0570 Date: Preliminary: 25 Specification: PT24 Temperature(°C): Tested By: David Light Relative Humidity(%) PCS AMPLIFIER E.U.T.: Configuration: TX Sample Number: Lab 1 RBW: Refer to plots Location: Measurement Detector Type: VBW: Refer to plots Distance: NA Peak Test Equipment Used Directional Coupler: 1629 Pre-Amp: Cable #1: Filter: Cable #2: Receiver: 1036 Cable #3: Cable #4: Attenuator #1 1065 Attenuator #2: Mixer: Additional equipment used: +/-1.7 dB Measurement Uncertainty: 20 dB Ref Lvl VBW 3 kHz -3.71 dBm Mixer -10 dBm 40 dBm 1.96014128 GHz SWT $280 \, \text{ms}$ Unit dBm 31.1 dB Offset [T1] dBr A 128 GHz 30 629 kHz 20 10 1VIEW 1MA - 1 C -20 -30 -40 -50 1.96 GHz 100 kHz/ Span 1 MHz 30.AUG.2004 07:35:32 EDGE OUTPUT Notes: MAX POWER 33.5 dBm

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
Test Report No.: 4L0570RUS2

EQUIPMENT: TFAH 85/19

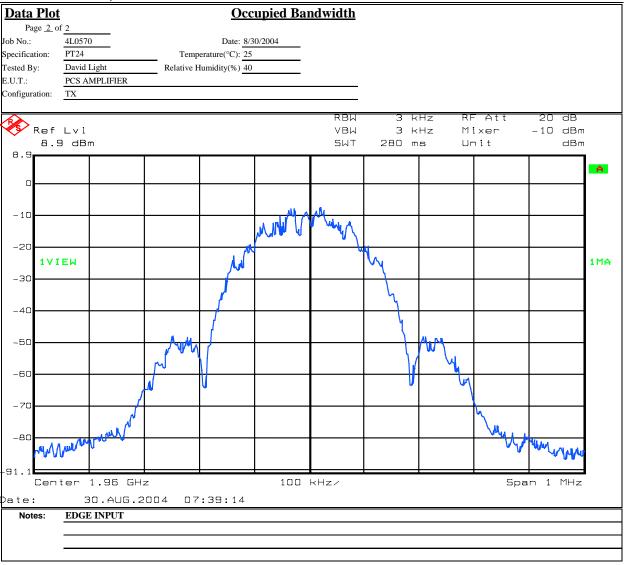
Test Data - Occupied Bandwidth



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Test Report No.: 4L0570RUS2

EQUIPMENT: TFAH 85/19

Test Data – Occupied Bandwidth



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Nemko Dallas, Inc. Occupied Bandwidth Data Plot Page <u>1</u> of <u>2</u> Complete Date: 8/30/2004 Job No.: 4L0570 Preliminary: Specification: PT24 Temperature(°C): 25 Relative Humidity(%) Tested By: David Light E.U.T.: PCS AMPLIFIER TX Configuration: Sample Number: RBW: Refer to plots Lab 1 Location: Measurement Detector Type: VBW: Refer to plots Distance: NA Peak Test Equipment Used Directional Coupler: Cable #1: 1629 Pre-Amp: Filter: Cable #2: 1036 Receiver: Cable #3: Attenuator #1 Cable #4: Attenuator #2: 1604 Mixer Additional equipment used: Measurement Uncertainty: +/-1.7 dB Ref Lvl 0.72 dBm -10 dBm VBW 1 kHz Mixer 40 dBm 1.96001348 GHz SWT 150 ms Unit 31.1 dB Offset [T1] .96001 348 GHz 30 906 kHz 20 1 V I E W 1MA -20 -30 mun $M_{\Lambda_{\epsilon}} M$ -40 -50 -60 Center 1.9599965 GHz 5 kHz/ Span 50 kHz 30.AUG.2004 08:19:34 Date: TDMA OUTPUT MAX POWER 34.5 dBm

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
Test Report No.: 4L0570RUS2

EQUIPMENT: TFAH 85/19

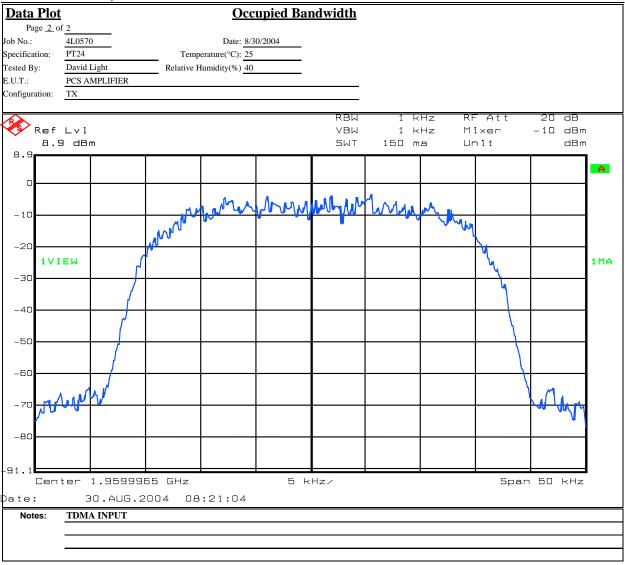
Test Data - Occupied Bandwidth



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EQUIPMENT: TFAH 85/19

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
Test Report No.: 4L0570RUS2

Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals PARA. NO.: 2.1051

TESTED BY: David Light DATE: 8/30/04

Test Results: Complies.

Test Data: See attached plot(s).

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
Test Report No.: 4L0570RUS2

EQUIPMENT: TFAH 85/19

Test Data – Spurious Emissions at Antenna Terminals

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Nemko Dallas, Inc. **Spurious Emissions at Antenna Terminals** Data Plot Page <u>1</u> of <u>3</u> Complete Job No.: 41.0570 Date: 8/30/2004 Preliminary: Temperature(°C): 25 Specification: PT24 Tested By: David Light Relative Humidity(%) E.U.T.: PCS AMPLIFIER Configuration: Sample Number: RBW: Refer to plots Detector Type: VBW: Refer to plots Distance: NA Peak Test Equipment Used Directional Coupler: Pre-Amp: Cable #1: Filter: Cable #2: Cable #3: 1036 Receiver: Cable #4: Attenuator #2: Mixer: Additional equipment used: +/-1.7 dB Measurement Uncertainty: Ref Lvl 11.74 dBm VBW 30 kHz Mixer -10 dBm 1.93125000 GHz 30 dBm SWT 19.5 ms Un i t dBm 31.1 dB Offset 74 dBm A LIMIT CHE 000 GHz 20 1.93290 1Ω 1 V I EW 1MA -10 -20 which was the same of the same -30 -4□ -60 700 kHz/ Center 1.93 GHz Span 7 MHz 30.AUG.2004 Date: 06:26:36 LOWER BAND EDGE Notes: 2 CHANNELS AT 24.5 dBm EACH

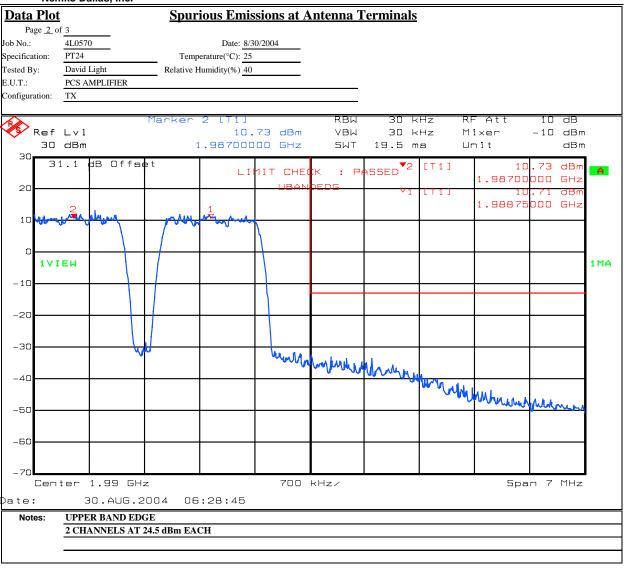
Test Data - Spurious Emissions at Antenna Terminals



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Test Data – Spurious Emissions at Antenna Terminals



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Nemko Dallas, Inc. **Data Plot Spurious Emissions at Antenna Terminals** Page 3 of 3 Date: 8/30/2004 4L0570 Job No.: Specification: PT24 Temperature(°C): 25 Tested By: David Light Relative Humidity(%) 40 E.U.T.: PCS AMPLIFIER Configuration: TX Ref Lvl -27.76 dBm VBW 1 MHz -10 dBm Mixer 30 dBm 3.92002844 GHz SWT 200 ms Umit dBm 31.1 dB Offset . 76 dBm A 3.92002 944 GHz 20 1Г 1 V I EW 1MA - 10 -20 -30 -40 -50 -60 Start 30 MHz 1.997 GHz/ Stop 20 GHz Date: 30.AUG.2004 06:33:08 TX 1960 MHz @ 30.7 dBm The spectrum was searched in detail. This plot is a true indication of the emissions detected.

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
Test Report No.: 4L0570RUS2

EQUIPMENT: TFAH 85/19

Test Data – Spurious Emissions at Antenna Terminals

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Nemko Dallas, Inc. **Spurious Emissions at Antenna Terminals** Data Plot Page <u>1</u> of <u>3</u> Complete 8/30/2004 4L0570 Date: Preliminary: Job No.: Specification: PT24 Temperature(°C): 25 Relative Humidity(%) Tested By: David Light E.U.T.: PCS AMPLIFIER TX Configuration: Sample Number: RBW: Refer to plots Lab 1 Location: Measurement Distance: NA Detector Type: VBW: Refer to plots Peak Test Equipment Used Directional Coupler: Cable #1: 1629 Pre-Amp: Filter: Cable #2: Receiver: 1036 Cable #3: Attenuator #1 Cable #4: Attenuator #2: 1604 Additional equipment used: Measurement Uncertainty: +/-1.7 dB dB Ref Lvl 14.24 dBm 3 kHz VBW Mixer -10 dBm 40 dBm 1.93070000 GHz SWT 560 ms Unit dBm 31.1 dB Offset .24 dBr LIMIT CHE SSED 000 GHz 30 000 GHz 20 1 V I E W 1MA - 1 D -20 -30 -40 -50 -60 200 kHz/ Span 2 MHz 30.AUG.2004 07:19:43 ate: LOWER BAND EDGE GSM 2 CHANNELS AT 27 dBm EACH

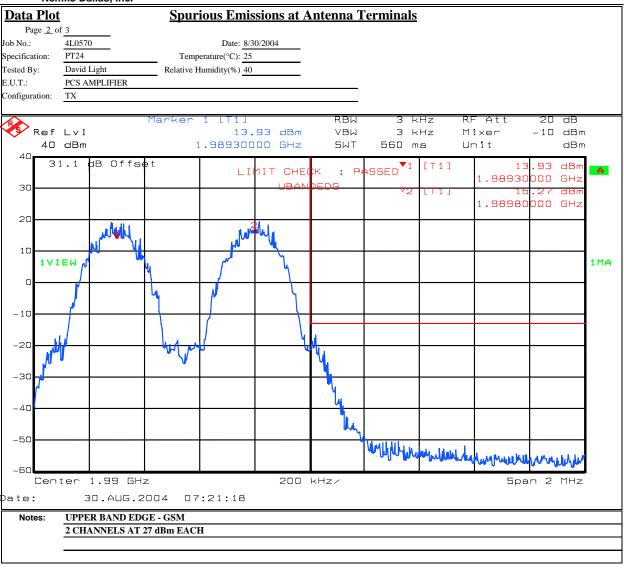
Test Data – Spurious Emissions at Antenna Terminals



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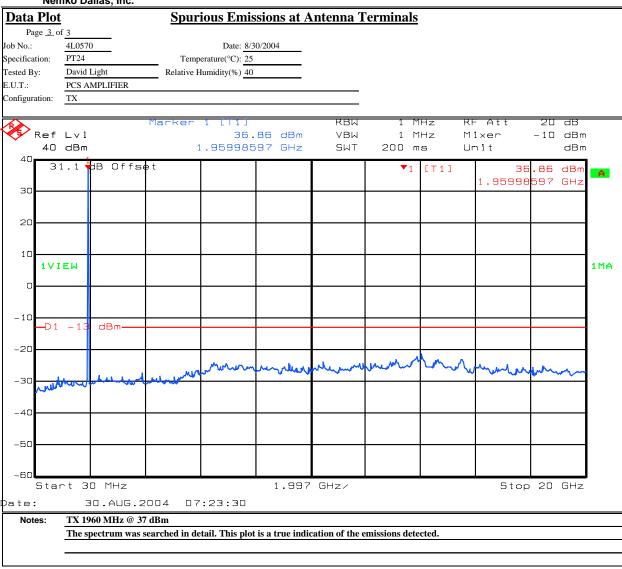
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FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS **Test Report No.: 4L0570RUS2**

EQUIPMENT: TFAH 85/19

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Test Data – Spurious Emissions at Antenna Terminals

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Data Plot			<u>Spur</u>	ious Emis	ssions at A	Antenna T	Terminals				
Page 1 of	f <u>3</u>							Complete			
Job No.:	4L0570)		Date:	8/30/2004			Preliminary:			
Specification:	PT24		Temp	erature(°C):	25						
Tested By:	David I	ight	Relative F	Iumidity(%)	40						
E.U.T.:	PCS Al	MPLIFIER	_		,						
Configuration:	TX										
Sample Number:	1										
Location:	Lab	1			RBW: F	tefer to plots		Measurement			
Detector Type:	Pea				_	tefer to plots			NA r	n	
Test Equipm	ent Use	d									
Antenna:	care est	<u></u>		Directi	onal Coupler:						
Pre-Amp:	-			Bireeu	Cable #1:	1629					
Filter:					Cable #2:	102)					
Receiver:	103	6			Cable #3:						
Attenuator #1	106				Cable #4:						
Attenuator #2:	160										
					Mixer:						
Additional equip			D								
Measurement Un	icertainty	: +/-1.7 d	В								
6			Marker	2 [T1]		RBW	3 k	:Hz RF	Att	20 dB	
Ref	$L \vee 1$			12.	66 dBm	VBW	3 K	Hz M	lxer	-10 dBm	1
	dBm		1	.930700	000 GHz	SWT	560 m	ns Ur	nīt	dBm	1
40											
31	1.1	dB Offse	e t	1.7	MIT CHE		ASSED ^{▼2}	[T1]	12	.66 dBm	A
					1	T			1.93070	000 GHz	
30							√1	[T1]	14	.28 dBm	1
									1.93020	000 GHz	
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Cen	ter	1.93 GHz			200	kHz/			Spa	n 2 MHz	
		ח אוור פ		. 20 . 24							
Date:	3	O.AUG.2	uu4 U7	:30:34							
Notes:		ER BAND ED					-		-		
ĺ	2 CHA	NNELS AT 2	25 dBm EACl	H							
1											

Test Data – Spurious Emissions at Antenna Terminals



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Nemko Dallas, Inc. **Data Plot Spurious Emissions at Antenna Terminals** Page 2 of 3 4L0570 Date: 8/30/2004 Job No.: Specification: PT24 Temperature(°C): 25 David Light Relative Humidity(%) 40 Tested By: E.U.T.: PCS AMPLIFIER Configuration: TXRBW 20 dВ Ref Lvl 10.94 dBm VBW 3 kHz Mixer -10 dBm 1.98930000 GHz 40 dBm SWT $560 \, \text{ms}$ Unit dBm 31.1 dB Offset 94 dBm LIMIT CHE A 1.98930000 GHz 30 000 GHz 1.98980 20 1VIEW 1MA - 1C -20 -30 -40 -50 Money -60 200 kHz/ Center 1.99 GHz Span 2 MHz 30.AUG.2004 07:32:20 Date: Notes: UPPER BAND EDGE - EDGE 2 CHANNELS AT 25 dBm EACH

Test Data – Spurious Emissions at Antenna Terminals



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Nemko Dallas, Inc. **Data Plot Spurious Emissions at Antenna Terminals** Page 3 of 3 Date: 8/30/2004 4L0570 Job No.: Specification: PT24 Temperature(°C): 25 Tested By: David Light Relative Humidity(%) 40 E.U.T.: PCS AMPLIFIER Configuration: Ref Lvl 1 MHz -10 dBm 33.11 dBm VBW Mixer 40 dBm 1.96003707 GHz SWT 200 ms Unit dBm 31.1 dB Offset dBr . 11 Α .96003 707 GH2 30 20 **1VIEW** 1MA - 10 dBm -D 1 -20 -30 -40 -50 -60 1.997 GHz/ Start 30 MHz Stop 20 GHz 30.AUG.2004 07:27:41 Date: TX 1960 MHz @ 33.5 dBm Notes: The spectrum was searched in detail. This plot is a true indication of the emissions detected.

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS **Test Report No.: 4L0570RUS2**

EQUIPMENT: TFAH 85/19

Test Data – Spurious Emissions at Antenna Terminals

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Nen	nko Da	allas, Inc.									, ,			
Data Plot			Spur	ious Emi	ssions at	Ant	enna T	Fermina	ls					
Page <u>1</u> o	f <u>3</u>									Complet				
Job No.:	4L057	D		Date:	8/30/2004				Preli	minary	:			
Specification:	PT24		Temp	erature(°C):	25									
Tested By:	David	Light	Relative I	Humidity(%)	40									
E.U.T.:	PCS A	MPLIFIER												
Configuration:	TX													
Sample Number:	1													
Location:	Lat	1			RBW:	Refer t	to plots		Mea	suremen	t			
Detector Type:	Pea	ak			VBW:	Refer t	o plots			Distance	: NA	m		
Test Equipm	ent Use	<u>ed</u>												
Antenna:				Directi	onal Coupler:									
Pre-Amp:					Cable #1:	1	629							
Filter:					Cable #2:									
Receiver:	103	36			Cable #3:									
Attenuator #1	100	55			Cable #4:									
Attenuator #2:	160	04			Mixer:									
Additional equip	ment use	ed:			-									
Measurement Un			IB											
			Marker	2 [T1]			RBW	3	kHz	RI			dB 	
Ref					40 dBm		VBW		KHZ		ixer	-10		
	dBm		1	.930500	100 GHz		SWT	560	ms	Ur	ηīt	C	dBm	
40 3	1.1	dB Offse	e t					▼ 2	2 [T1	1	1.6	3.40 c	dBm	
				LI	MIT CHE	CCK	: Pr	SSED '	-	-	1.93050		SHZ	Α
30						_		▼-	1 [1	1	21		dBm	
									.	-	1.93003			
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-20														
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-30												 	-	
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	TDM													

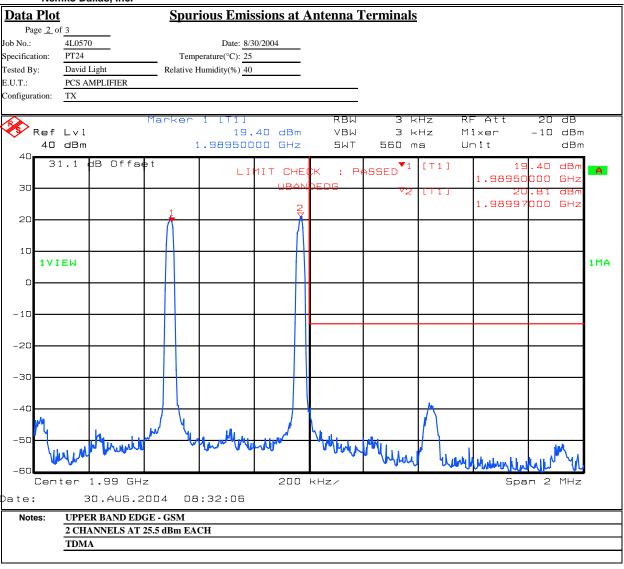
Test Data – Spurious Emissions at Antenna Terminals



Dallas Headquarters:

802 N. Kealy Lewisville, TX 75057 Tel: (972) 436-9600 Fax: (972) 436-2667

Nemko Dallas, Inc.



FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
Test Report No.: 4L0570RUS2

EQUIPMENT: TFAH 85/19

Test Data – Spurious Emissions at Antenna Terminals



Dallas Headquarters:

802 N. Kealy Lewisville, TX 75057 Tel: (972) 436-9600 Fax: (972) 436-2667

Nemko Dallas, Inc. **Data Plot Spurious Emissions at Antenna Terminals** Page <u>3</u> of 3 Date: 8/30/2004 4L0570 Job No.: Specification: PT24 Temperature(°C): 25 Tested By: David Light Relative Humidity(%) 40 PCS AMPLIFIER E.U.T.: Configuration: Ref Lvl 1 MHz -10 dBm VBW Mixer 40 dBm SWT 200 ms Unit dBm 31.1 dB Offset A 30 20 **1VIEW** 1MA - 10 dBm -20 -30 -40 -50 -60 Start 30 MHz 1.997 GHz/ Stop 20 GHz 30.AUG.2004 08:24:00 Date: TX 1960 MHz @ 34.5 dBm The spectrum was searched in detail. This plot is a true indication of the emissions detected. TDMA

EQUIPMENT: TFAH 85/19

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
Test Report No.: 4L0570RUS2

Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious Emissions PARA. NO.: 2.1051

TESTED BY: Brian Boyea DATE: 8/31/04

Test Results: Complies.

Test Data: See attached table.

Page 30 of 43

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
Test Report No.: 4L0570RUS2

EQUIPMENT: TFAH 85/19

Test Data - Radiated Emissions



Nemko Dallas, Inc.

Dallas Headquarters: 802 N. Kealy Lewisville, TX 75057 Tel: (972) 436-9600

Fax: (972) 436-2667

EIRP Substitution Method Complete Page 1 of 1 Job No.: 4L0570R Date: 8/31/04 Preliminary Temperature(°C): $\underline{23}$ Specification: Tested By: Brian Boyea Relative Humidity(%) 33 E.U.T.: Configuration: Sample No: Location: AC 3 RBW. 100 kHz Measurement VBW: 100 kHz Distance: 3 m Detector Type: Peak Test Equipment Used Directional Coupler: Pre-Amp: 1016 Cable #1: 1484 1485 Filter: Cable #2: Receiver: 1464 Cable #3: Attenuator #1 Cable #4: Attenuator #2: Mixer: Additional equipment used: +/-1.7 dB Measurement Uncertainty:

Frequency	Meter Reading	Correction Factor	Pre-Amp Gain	Substitution Antenna Gain	Spec Limit	EIRP	EIRP	Polarity	Comments
(MHz)	(dBm)	(dB)	(dB)	(dBi)	13 dBm	(dBm)	(mW)		
									Tx @ 1960
5880	-48.7	37.8	31.9	11.4	13	-31.4	0.00	Н	
5880	-46.3	39.8	31.9	11.4	13	-27.0	0.002011	V	

Notes: Searched spectrum to 10th harmonic of the carrier.

All emissions within 20 dB of the spec limit were reported

Photographs of Test Setup





Section 7. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	10/27/03	10/26/04
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	07/30/04	07/31/06
1484	Cable 2.0-18.0 Ghz	Storm PR90-010-072	N/A	08/26/04	08/26/05
1485	Cable 2.0-18.0 Ghz	Storm PR90-010-216	N/A	08/02/04	08/02/05
1304	HORN ANTENNA	HORN ANTENNA ELECTRO METRICS RGA-60		09/22/03	09/22/05
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	03/22/04	03/23/06
1065	ATTENUATOR	NARDA 776B-10	NONE	CBU	N/A
1604	ATTENUATOR	NARDA 776B-20	NONE	N/A	N/A
1629	CABLE, 6 ft	MEGAPHASE 10311 1GVT4	N/A	CBU	N/A

EQUIPMENT: TFAH 85/19

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS **Test Report No.: 4L0570RUS2**

ANNEX A - TEST DETAILS

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
Test Report No.: 4L0570RUS2

EQUIPMENT: TFAH 85/19

NAME OF TEST: RF Power Output PARA. NO.: 2.1046

Minimum Standard: Para. No.24.232. Base stations are limited to 1640 watts peak

E.I.R.P. with an antenna height up to 300 meters HAAT. In no case may the peak output power of a base station transmitter exceed 100

watts.

Method Of Measurement:

Detachable Antenna:

The peak power at antenna terminals is measured using an in-line peak power meter. Power output is measured with the maximum rated input level.

Integral Antenna:

If the antenna is not detachable from the circuit then the Peak Power Output is derived from the peak radiated field strength of the fundamental emission by using the plane wave relation $GP/4\pi$ $R^2 = E^2/120\pi$ and proceeding as follows:

$$P = \frac{E^2 R^2}{30G} = \frac{E^2 3^2}{30G}$$

where,

P = the equivalent isotropic radiated power in watts

E =the maximum measured field strength in V/m

R =the measurement range (3 meters)

G = the numeric gain of the transmit antenna in relation to an isotropic radiator

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
Test Report No.: 4L0570RUS2

EQUIPMENT: TFAH 85/19

NAME OF TEST: Occupied Bandwidth PARA. NO.: 2.1047

Minimum Standard: Para. No. 24.238(b). The emission bandwidth is defined as the

width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of

which all emissions are attenuated at least 26 dB.

Method Of Measurement:

CDMA

Spectrum analyzer settings:

RBW: 30 kHz VBW: ≥ RBW Span: 5 MHz Sweep: Auto

Mask: Set markers to -26 dB from peak of CW.

GSM

RBW: 3 kHz VBW: ≥ RBW Span: 2 MHz Sweep: Auto

Mask: Set markers to -26 dB from peak of CW.

NADC

RBW: 1 kHz VBW: ≥ RBW Span: 1 MHz Sweep: Auto

Mask: Set markers to -26 dB from peak of CW.

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
Test Report No.: 4L0570RUS2

EQUIPMENT: TFAH 85/19

NAME OF TEST: Spurious Emission at Antenna Terminals PARA. NO.: 2.1051

Minimum Standard: Para. No.24.238(a). On any frequency outside a licensee's

frequency block, the power of any emission shall be attenuated below the transmitter power by at least $43 + 10 \log (P) dB$.

Method Of Measurement:

Spectrum analyzer settings:

<u>CDMA</u> <u>GSM</u>

RBW: 1 MHz (> 1 MHz from Band Edge)
RBW: 1 MHz (> 1 MHz from Band Edge)
RBW: 3 kHz (< 1 MHz from Band Edge)
RBW: 3 kHz (< 1 MHz from Band Edge)

 $VBW: \ge RBW$ $VBW: \ge RBW$ Sweep: Auto Sweep: Auto

Video Avg: 6 Sweeps Video Avg: Disabled

NADC

RBW: 1 MHz (> 1 MHz from Band Edge) RBW: 3 kHz (< 1 MHz from Band Edge)

VBW: ≥RBW Sweep: Auto

Video Avg: Disabled

To demonstrate compliance at band edges the frequency of the input signal is set to the lowest and highest assigned channel and the center frequency of the spectrum analyzer is set to the upper and lower edges of the appropriate frequency block.

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
Test Report No.: 4L0570RUS2

EQUIPMENT: TFAH 85/19

NAME OF TEST: Field Strength of Spurious Radiation PARA. NO.: 2.1053

Minimum Standard: Para. No.24.238(a). On any frequency outside a licensee's

frequency block, the power of any emission shall be attenuated below the transmitter power by at least $43 + 10 \log (P) dB$.

Test Method:

The maximum field strength of the spurious emission is measured at a distance of 3 meters. The device under test is then replaced with a substitution antenna of known gain with respect to a ½ wave dipole antenna. A calibrated signal source is used to feed the substitution antenna. The rf level to the substitution antenna is adjusted to repeat the previously measured field strength. The rf input level to the substitution antenna is the effective radiated power of the spurious emission after any correction for substitution antenna gain against a ¼ wave dipole.

The spectrum was searched up to 20 GHz.

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
Test Report No.: 4L0570RUS2

EQUIPMENT: TFAH 85/19

NAME OF TEST: Frequency Stability PARA. NO.: 2.1055

Minimum Standard: Para. No. 24.235. The frequency stability shall be sufficient to

ensure that the fundamental emission stays within the authorized

frequency block.

Method Of Measurement:

Frequency Stability With Voltage Variation

The E.U.T. is placed in an environmental chamber and allowed to stabilize at +20 degrees Celsius for at least 15 minutes. The frequency counter and signal generator are phase locked with the same 10 MHz reference frequency by connecting the 10 MHz ref. out of the counter to the 10 MHz ref, in of the signal generator. With the voltage input to the E.U.T. set to 85% S.T.V., the frequency is measured in 30 second intervals for a period of 5 minutes. This procedure is repeated at 100% S.T.V. and 115% S.T.V.

Frequency Stability With Temperature Variation

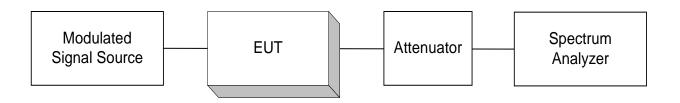
The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30 second intervals for a period of 5 minutes.

EQUIPMENT: TFAH 85/19

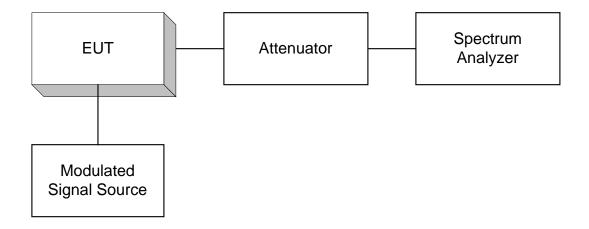
FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS **Test Report No.: 4L0570RUS2**

ANNEX B - TEST DIAGRAMS

Para. No. 2.985 - R.F. Power Output



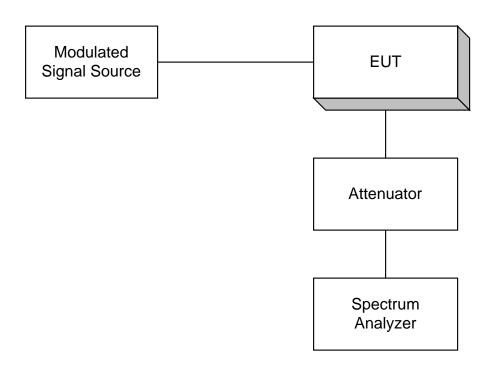
Para. No. 2.989 - Occupied Bandwidth

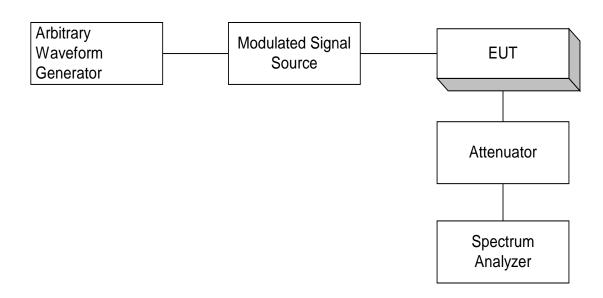


Test Report No.: 4L0570RUS2

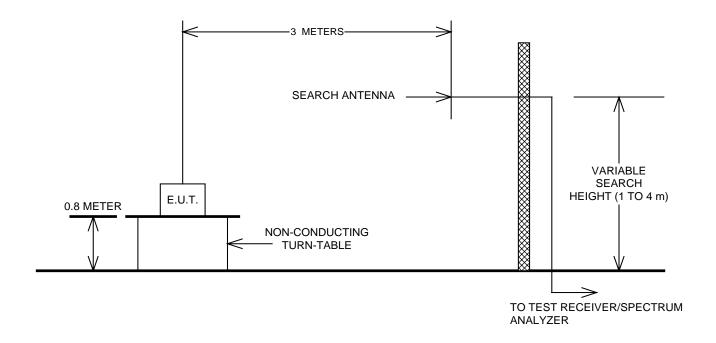
EQUIPMENT: TFAH 85/19

Para. No. 2.991 Spurious Emissions at Antenna Terminals





Para. No. 2.993 - Field Strength of Spurious Radiation



Para. No. 2.995 - Frequency Stability

