Nemko Test Report No.:	4L0571RUS2
Applicant:	Andrew Corporation 108 Rand Park Drive Garner, NC 27529
Equipment Under Test:	TFAH 80/85/19
In Accordance With:	FCC Part 24, Subpart E Broadband PCS Repeaters
Tested By:	Nemko Dallas Inc. 802 N. Kealy Lewisville, Texas 75057-3136
Authorized By:	Journal Tom Tidwell, Frontline Group Manager
	3
Date:	9/1/04
Total Number of Pages:	43

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EQUIPMENT: TFAH 80/85/19

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
Test Report No.: 4L0571RUS2

Section 1. Summary of Test Results

Manufacturer: Model No.: Serial No.:	Andrew Corporation TFAH 80/85/19 043003403								
	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 Class II Permissive Change		Production Unit 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.: 4L0571RUS2

EQUIPMENT: TFAH 80/85/19

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

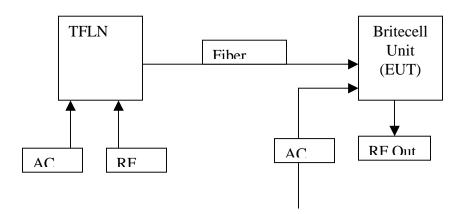
Supply Voltage Input:	115 Vac		
Frequency Bands: Downlink:	Block D: Block B: Block E:	1950 – 1965 MHz 1965 – 1970 MHz 1970 – 1975 MHz	
Frequency Bands: Uplink:	NA		
Type of Modulation and Designator:	CDMA (F9W)	GSM (G7W) (DXW)	EDGE (G7W)
Output Impedance:	50 ohms		
RF Output (Rated dBm/carrier): DL	Modulation CDMA GSM EDGE	1 Carrier 31 37 33.5	2 Carriers 24.5 27 25
Frequency Translation:	TDMA F1-F1	34.5 F1-F2	25.5 N/A
Band Selection:	Software	Duplexer	Fullband

Test Report No.: 4L0571RUS2

Description of Operation

TFAH 80/58/19 is a fiber based tri-band repeater operating in the 800 MHz SMR, the 800 MHz cellular and the 1900 MHz PCS bands

System Diagram



FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
Test Report No.: 4L0571RUS2

EQUIPMENT: TFAH 80/85/19

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.: 4L0571RUS2**

EQUIPMENT: TFAH 80/85/19

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.: 4L0571RUS2**

EQUIPMENT: TFAH 80/85/19

Test Data - Occupied Bandwidth



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Nemko Dallas, Inc.

Data Plot				Occ	cupied Ba	ndwidth					
Page 1 of	of <u>2</u>						Complete X Preliminary:				
Job No.:	4L057	1		Date:	8/30/2004			Preliminar	y:		
Specification:	PT24		Temp	erature(°C):	25						
Tested By:	David 1	Light	Relative H	Iumidity(%)	40						
E.U.T.:	PCS A	MPLIFIER									
Configuration:	TX										
Sample Number:	1										
Location:	Lab	1			RBW: 30) kHz		Measureme	nt		
Detector Type:	Pea	ak			VBW: 30) kHz		Distanc	e: NA	m	
Test Equipme	ent Use	<u>ed</u>									
Antenna:				Directi	ional Coupler:						
Pre-Amp:					Cable #1:	1629					
Filter:					Cable #2:						
Receiver:	103	36			Cable #3:						
Attenuator #1	100	55			Cable #4:						
Attenuator #2:	160)4			Mixer:						
Additional equip	ment use	d:									
Measurement Un	certainty	/: +/-1.7	dB								
r)			Marker	1 [11]		кви	30	KHZ R	F Att	20 dB	
Ref	∟vl			-2.	.92 dBm	VBW	30	kHz M	lixer	-10 dB	m
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							△1	[T1]	-1.40398	2.73 dB 3798 MH:	
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	er	1.96 G⊦	łz		500	kHz/			Spa	an 5 MH:	z
Date:		O.AUG.	2004 08	:39:15							
Notes:		A OUTPUT									
ĺ	MAX	POWER 30	.7 dBm								

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
Test Report No.: 4L0571RUS2

EQUIPMENT: TFAH 80/85/19

Test Data - Occupied Bandwidth



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Nemko Dallas, Inc. Data Plot Occupied Bandwidth Page <u>2</u> of 2 Date: 8/30/2004 Job No.: 4L0571 PT24 Temperature(°C): 25 Specification: Relative Humidity(%) 40 Tested By: David Light E.U.T.: PCS AMPLIFIER Configuration: TX Ref Lvl VBW 30 kHz Mixer -10 dBm -1.1 dBm SWT 14 ms Unit dBm Α -10-20 -30 1VIEW 1MA -40 -50 -60 any any -70 Marrian maranger -80 -90 500 kHz/ 30.AUG.2004 06:06:22 ate: Notes: CDMA INPUT

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
Test Report No.: 4L0571RUS2

EQUIPMENT: TFAH 80/85/19

Test Data - Occupied Bandwidth



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Fax: (972) 436-2667 Nemko Dallas, Inc. Data Plot Occupied Bandwidth Page <u>1</u> of <u>2</u> Complete X 4L0571 8/30/2004 Preliminary: Job No.: Date: PT24 Specification: $Temperature (^{\circ}C):$ Tested By: David Light Relative Humidity(%) E.U.T.: PCS AMPLIFIER Configuration: Sample Number: Location: Lab 1 RBW: 3 kHz Measurement VBW: 3 kHz Detector Type: Peak Distance: NA Test Equipment Used Directional Coupler: Antenna: Cable #1: Filter: Cable #2: Receiver: 1036 Cable #3: Attenuator #1 1065 Cable #4: Attenuator #2: 1604 Mixer Additional equipment used: Measurement Uncertainty: +/-1.7 dB Ref Lvl -0.07 dB VBW 3 kHz -10 dBm 282.56513026 kHz 40 dBm SWT 280 ms Unit dBm dB Offset dBr GHz 30 dВ 282.56513 026 kHz 20 1 C 1VIEW 1MA -10-20 -30 -4C -50 -60 100 kHz/ Center 1.96 GHz Span 1 MHz 30.AUG.2004 07:13:04 ate: Notes: GSM OUTPUT MAX POWER 37 dBm

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
Test Report No.: 4L0571RUS2

EQUIPMENT: TFAH 80/85/19

Test Data - Occupied Bandwidth



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Nemko Dallas, Inc. Data Plot Occupied Bandwidth Page 2 of 2 Date: 8/30/2004 Job No.: 4L0571 PT24 Temperature(°C): 25 Specification: Relative Humidity(%) 40 Tested By: David Light E.U.T.: PCS AMPLIFIER Configuration: TX Ref Lvl VBW 3 kHz Mixer -10 dBm 8.9 dBm SWT Unit dBm 280 ms Α - 1 C -20 1MA 1VIEW -30 -40 -50 -60 -80 100 kHz/ 30.AUG.2004 07:14:27 ate: Notes: GSM INPUT

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS **Test Report No.: 4L0571RUS2**

EQUIPMENT: TFAH 80/85/19

Test Data - Occupied Bandwidth



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Dallas Headquarters:

Nemko Dallas, Inc.

Data Plot				Occ	upied Bar	ndwidth					
Page 1 of								Complete Preliminary:	<u>X</u>		
Job No.:	4L057	1		Date:	8/30/2004			Preliminary:			
Specification:	PT24			erature(°C):	25						
Tested By:	David	Light	Relative F	Iumidity(%)	40						
E.U.T.:	PCS A	MPLIFIER									
Configuration:	TX										
Sample Number:	1										
Location:	Lal	1			RBW: 3	kHz		Measurement			
Detector Type:	Pe	ak			VBW: 3	kHz		Distance	NA	m	
Test Equipme	nt Us	<u>ed</u>									
Antenna:				Directi	onal Coupler:						
Pre-Amp:					Cable #1:	1629					
Filter:					Cable #2:						
Receiver:	10	36			Cable #3:						
Attenuator #1	10	55			Cable #4:						
Attenuator #2:	16	04			Mixer:						
Additional equips	nent use	ed:									
Measurement Un	certaint	y: +/-1.7 c	iB								
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Notes:	EDGI	E OUTPUT									
		POWER 33.5	dBm								
I											

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS **Test Report No.: 4L0571RUS2**

EQUIPMENT: TFAH 80/85/19

Test Data - Occupied Bandwidth



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Data	Plot				Occ	cupied Ba	andwidth					
Pa	ge <u>1</u> o	f <u>2</u>							Complete	<u> X</u>		
Job No.:		4L057	1		Date:	8/30/2004			Preliminary			
Specifica	tion:	PT24		Te	mperature(°C):	25						
Tested By		David	Light		e Humidity(%)	40						
E.U.T.:		PCS A	MPLIFIER		_							
Configura	ation:	TX										
Sample N	Number:	1										
Location:	:	Lat	1			RBW:	3 kHz		Measuremen	t		
Detector '	Type:	Pe	ak			VBW:			Distance	: NA	m	
Test Eq	quipm	ent Us	<u>ed</u>									
Antenna:					Directi	onal Coupler:						
Pre-Amp:	:					Cable #1:	1629					
Filter:						Cable #2:						
Receiver:	:	10	36			Cable #3:						
Attenuato	or #1	10	55			Cable #4:						
Attenuato	or #2:	16)4			Mixer:						
Additiona	al equip	ment use	d:									
Measuren	ment Un	certaint	/: +/-1.7	dB								
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Note	es:	EDGI	OUTPUT									
	-		POWER 33	.5 dBm								
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FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
Test Report No.: 4L0571RUS2

EQUIPMENT: TFAH 80/85/19

Test Data – Occupied Bandwidth

30 AUG 2004 08:19:34

TDMA OUTPUT
MAX POWER 34.5 dBm

Notes:



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Nemko Dallas, Inc. Data Plot Occupied Bandwidth Page <u>1</u> of <u>2</u> Complete X Preliminary: 4L0571 8/30/2004 Job No.: Date: PT24 Specification: $Temperature (^{\circ}C):$ Tested By: David Light Relative Humidity(%) E.U.T.: PCS AMPLIFIER Configuration: Sample Number: Location: Lab 1 RBW: 1 kHz Measurement Detector Type: Peak VBW: 1 kHz Distance: NA Test Equipment Used Directional Coupler: Antenna: Cable #1: Filter: Cable #2: Receiver: 1036 Cable #3: Attenuator #1 1065 Cable #4: Attenuator #2: 1604 Mixer Additional equipment used: Measurement Uncertainty: +/-1.7 dB Ref Lvl 0.72 dBm VBW 1 kHz Mixer -10 dBm 1.96001348 GHz 40 dBm SWT 150 ms Unit dBm 31.1 dB Offset .72 dBm 348 GHz 30 dВ 2.26452 906 kHz 20 10 1VIEW 1MA -10-20 mun -40 -50 -6ol Center 1.9599965 GHz 5 kHz/ Span 50 kHz

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
Test Report No.: 4L0571RUS2

EQUIPMENT: TFAH 80/85/19

Test Data - Occupied Bandwidth



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Nemko Dallas, Inc. Data Plot Occupied Bandwidth Page 2 of 2 Date: 8/30/2004 Job No.: 4L0571 PT24 Temperature(°C): 25 Specification: Relative Humidity(%) 40 Tested By: David Light E.U.T.: PCS AMPLIFIER Configuration: TX Ref Lvl VBW 1 kHz Mixer -10 dBm 8.9 dBm 150 ms Un i t dBm SWT Α and form while the tong with the -10 -20 1MA 1VIEW -30 -40 -50 -60 -80 Center 1.9599965 GHz 5 kHz/ Span 50 kHz 30.AUG.2004 08:21:04 ate: Notes: TDMA INPUT

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
Test Report No.: 4L0571RUS2

EQUIPMENT: TFAH 80/85/19

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.: 4L0571RUS2**

EQUIPMENT: TFAH 80/85/19

Test Data – Spurious Emissions at Antenna Terminals



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		alias, inc.									
Data Plot			Spur	rious Emi	ssions at	Antenna	Termina	<u>lls</u>			
Page 1 o								Com	plete X		
Job No.:	4L057	1		Date:	8/30/2004			Prelimir		_	
Specification:	PT24		Tem	perature(°C):	25				-	_	
Tested By:	David	Light		Humidity(%)							
E.U.T.:		MPLIFIER				•					
Configuration:	TX	EII IEIC					-				
Sample Number							-				
Location:	Lal				RRW.	Refer to plots		Measure	ment		
Detector Type:	Pe					Refer to plots	-		ance: NA	m	
Detector Type.		ak			VDW.	Refer to plots	-	Disc	ance. 1471	-***	
Test Equipm	ont He	ad									
Antenna:	ent US	<u>eu</u>		Dinanti	anal Caumlan						
				Directi	onal Coupler:		_				
Pre-Amp:					Cable #1:	1629	-				
Filter:	10	26			Cable #2:		-				
Receiver:	10				Cable #3:		_				
Attenuator #1	10				Cable #4:		_				
Attenuator #2:	16				Mixer:		-				
Additional equip							_				
Measurement U	ncertaint	y: +/-1.7	dB								
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Notes:		ER BAND E									
			7 24.5 dBm EA	CH							
	CDM	A									

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 Job No.: 4L0571 Date: 8/30/2004 Specification: PT24 Temperature(°C): 25 Tested By: David Light Relative Humidity(%) 40 PCS AMPLIFIER E.U.T.: Configuration: TX Ref Lv1 10.73 dBm VBW 30 kHz Mixer -10 dBm 1.98700000 GHz 30 dBm SWT 19.5 ms Unit dBm 31.1 dB Offset 73 dBm SSED A MIT CHE 1.98700 nnn GHz 20 dBr 1.98875 000 GHz 10 1 V I E W 1MA – 1 C -20 -30 -40 -50 -60 700 kHz/ Center 1.99 GHz Span 7 MHz 30.AUG.2004 06:28:45 Notes: UPPER BAND EDGE 2 CHANNELS AT 24.5 dBm EACH CDMA

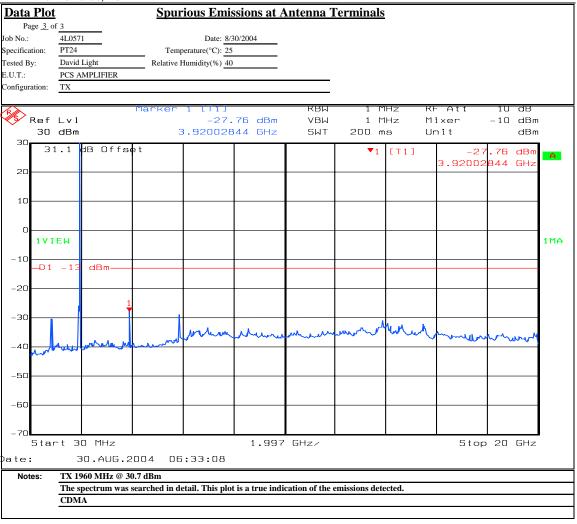
Test Data – Spurious Emissions at Antenna Terminals



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Nemko Dallas, Inc.



FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
Test Report No.: 4L0571RUS2

EQUIPMENT: TFAH 80/85/19

Test Data – Spurious Emissions at Antenna Terminals



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Nemko Dallas, Inc. Data Plot **Spurious Emissions at Antenna Terminals** Page $\underline{1}$ of $\underline{3}$ Complete 8/30/2004 Preliminary: Job No.: 4L0571 Date: PT24 Specification: Temperature(°C): Tested By: David Light Relative Humidity(%) E.U.T.: PCS AMPLIFIER Configuration: Sample Number: Location: Lab 1 RBW: Refer to plots Measurement Distance: NA Detector Type: Peak VBW: Refer to plots Test Equipment Used Antenna: Directional Coupler: Cable #1: Filter: Cable #2: Receiver: 1036 Cable #3: Attenuator #1 1065 Cable #4: Attenuator #2: 1604 Mixer: Additional equipment used: Measurement Uncertainty: +/-1.7 dB Ref Lvl 14.24 dBm VBW 3 kHz Mixer -10 dBm 1.93070000 GHz 40 dBm SWT 560 ms Unit dBm 31.1 dB Offset SSED^{▼2} 24 dBm LIMIT CHE 1.93070 000 GHz 30 . 86 dBr 1.93020 000 GHz 20 10 1VIEW 1MA -1CLOBNDE -20 -30 -40-50 200 kHz/ Span 2 MHz ate: 30.AUG.2004 Notes: LOWER BAND EDGE GSM 2 CHANNELS AT 27 dBm EACH

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 2 of 3 Job No.: 4L0571 Date: 8/30/2004 Specification: PT24 Temperature(°C): 25 Tested By: David Light Relative Humidity(%) 40 E.U.T.: PCS AMPLIFIER Configuration: TX Ref Lvl 13.93 dBm VBW 3 kHz Mixer -10 dBm 40 dBm 1.98930000 GHz SWT 560 ms Un i t dBm 31.1 dB Offset .93 dBn MIT CHE SSED A 1.98930 000 GHz 30 1.98980<mark>000 GHz</mark> 20 10 1 V I E W 1MA – 1 D -20 -30 -40-50 arther to be a facilitated by 200 kHz/ Center 1.99 GHz Span 2 MHz 30.AUG.2004 07:21:18 ate: Notes: UPPER BAND EDGE - GSM 2 CHANNELS AT 27 dBm EACH

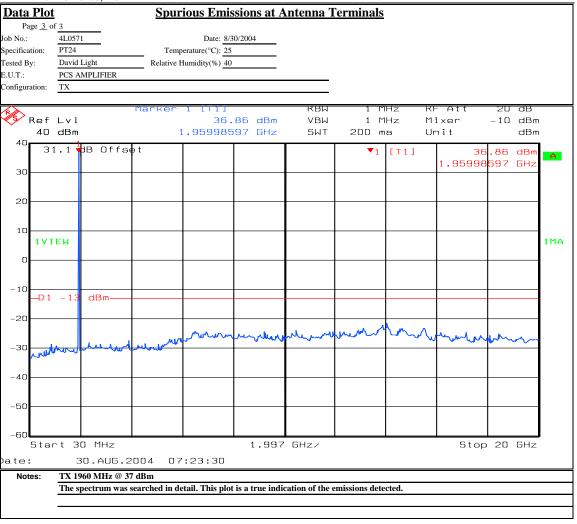
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Nemko Dallas, Inc.



FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
Test Report No.: 4L0571RUS2

EQUIPMENT: TFAH 80/85/19

Test Data – Spurious Emissions at Antenna Terminals



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Nemko Dallas, Inc. Data Plot **Spurious Emissions at Antenna Terminals** Page $\underline{1}$ of $\underline{3}$ Complete 8/30/2004 Preliminary: Job No.: 4L0571 Date: PT24 Specification: Temperature(°C): Tested By: David Light Relative Humidity(%) E.U.T.: PCS AMPLIFIER Configuration: Sample Number: Location: Lab 1 RBW: Refer to plots Measurement Distance: NA Detector Type: Peak VBW: Refer to plots Test Equipment Used Antenna: Directional Coupler: Cable #1: Filter: Cable #2: Receiver: 1036 Cable #3: Attenuator #1 1065 Cable #4: Attenuator #2: 1604 Mixer: Additional equipment used: Measurement Uncertainty: +/-1.7 dB Ref Lvl 12.66 dBm VBW 3 kHz Mixer -10 dBm 1.93070000 GHz 40 dBm SWT 560 ms Un i t dBm 31.1 dB Offset .66 dBm LIMIT CHE 000 GHz 30 dBm 28 1.93020 000 GHz 20 10 1 V I E W 1MA -10OBNDE -20 -30 -4C -50 200 kHz/ Span 2 MHz 30.AUG.2004 07:30:34 Notes: LOWER BAND EDGE EDGE 2 CHANNELS AT 25 dBm EACH EDGE

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Nemko Dallas, Inc. Data Plot **Spurious Emissions at Antenna Terminals** Page 2 of 3 Job No.: 4L0571 Date: 8/30/2004 Specification: PT24 Temperature(°C): 25 Tested By: David Light Relative Humidity(%) 40 E.U.T.: PCS AMPLIFIER Configuration: TX Ref Lvl 10.94 dBm VBW 3 kHz Mixer -10 dBm 1.98930000 GHz 40 dBm SWT 560 ms Unit dBm 31.1 dB Offset .94 dBm 1IT CHE A 1.98930 000 GHz 30 1.98980 000 GHz 20 10 1 V I E W 1MA - 10 -20 W -30 -40 M/L -50 -60 Center 1.99 GHz 200 kHz/ Span 2 MHz 30.AUG.2004 ate: 07:32:20 Notes: UPPER BAND EDGE - EDGE 2 CHANNELS AT 25 dBm EACH EDGE

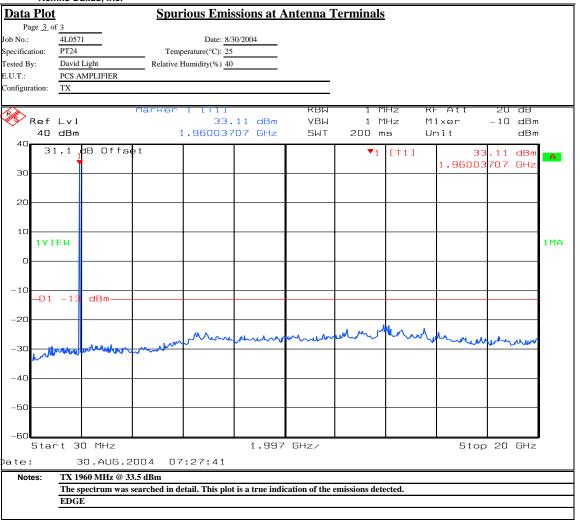
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BROADBAND PCS REPEATERS
Test Report No.: 4L0571RUS2

EQUIPMENT: TFAH 80/85/19

Test Data – Spurious Emissions at Antenna Terminals



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Nemko Dallas, Inc. Data Plot **Spurious Emissions at Antenna Terminals** Page $\underline{1}$ of $\underline{3}$ Complete 8/30/2004 Preliminary: Job No.: 4L0571 Date: PT24 Specification: Temperature(°C): Tested By: David Light Relative Humidity(%) E.U.T.: PCS AMPLIFIER Configuration: Sample Number: Location: Lab 1 RBW: Refer to plots Measurement Distance: NA Detector Type: Peak VBW: Refer to plots Test Equipment Used Antenna: Directional Coupler: Cable #1: Filter: Cable #2: Receiver: 1036 Cable #3: Attenuator #1 1065 Cable #4: Attenuator #2: 1604 Mixer: Additional equipment used: Measurement Uncertainty: +/-1.7 dB Ref Lvl 18.40 dBm VΒW 3 kHz Mixer -10 dBm 1.93050000 GHz 40 dBm SWT 560 ms Unit dBm dB Offset : PASSED ₹2 .40 dBm LIMIT CHE 1.93050<mark>000 GHz</mark> 30 dBr 20.36 1.93003<mark>000 GHz</mark> 20 10 1VIEW 1MA -10LOBNDE -20 -30 -40-50 1/4/how 200 kHz/ Span 2 MHz ate: 30.AUG.2004 Notes: LOWER BAND EDGE GSM 2 CHANNELS AT 25.5 dBm EACH TDMA

Test Data – Spurious Emissions at Antenna Terminals



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Lewisville, TX 75057 Tel: (972) 436-9600 Fax: (972) 436-2667

Nemko Dallas, Inc. Data Plot **Spurious Emissions at Antenna Terminals** Page 2 of 3 Job No.: 4L0571 Date: 8/30/2004 Specification: PT24 Temperature(°C): 25 Tested By: David Light Relative Humidity(%) 40 E.U.T.: PCS AMPLIFIER Configuration: TX Ref Lvl 19.40 dBm VBW 3 kHz Mixer -10 dBm 1.98950000 GHz SWT 40 dBm 560 ms Unit dBm 31.1 dB Offset 40 dBm 1IT CHE SSED Α 1.98950 JOO GHZ 30 81 1.98997 000 GHz 20 10 1VIEW 1MA – 1 C -20 -30 -4C -50 Center 1.99 GHz 200 kHz/ 30.AUG.2004 08:32:06 ate: Notes: UPPER BAND EDGE - GSM 2 CHANNELS AT 25.5 dBm EACH TDMA

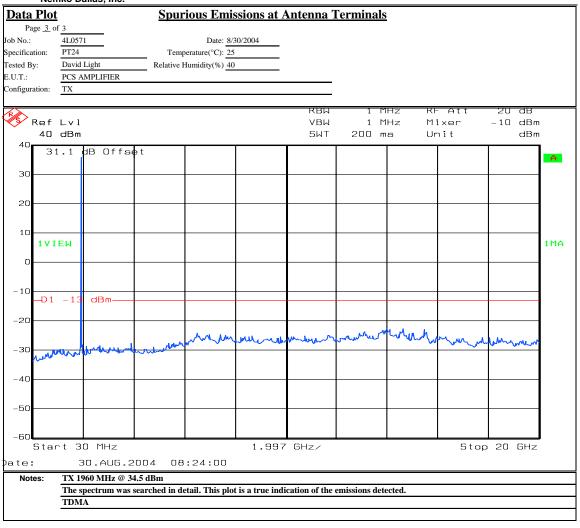
Test Data – Spurious Emissions at Antenna Terminals



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FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
Test Report No.: 4L0571RUS2

EQUIPMENT: TFAH 80/85/19

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.

FCC PART 24, SUBPART E BROADBAND PCS REPEATERS Test Report No.: 4L0571RUS2

EQUIPMENT: TFAH 80/85/19

Test Data - Radiated Emissions



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57 Fax: (972) 436-2667

			<u>F</u>	EIRP Substit	<u>ution Me</u>	thod				
Page <u>1</u> of Job No.: Specification: Tested By:	4L0571R		Temperature(°C)				Complete Preliminary	X	- -	
E.U.T.: Configuration:	Brian Boyea	1	Relative Humidity(%) 33							
Sample No: Location: Detector Type:	AC 3 Peak	·	RBW: 1 MHz VBW: 1 MHz			Measurement Distance: 3 m				
Test Equipm										
Antenna:	1304	•	1	Directional Coupler:	1.10.1	_				
Pre-Amp: Filter:	1016	•		Cable #1:		_				
Receiver:	1464	•		Cable #2:		_				
Attenuator #1	1464			Cable #4:		_				
Attenuator #2:		•		Mixer:		_				
Additional equip	ment used:			WIIXEI.		_				
Measurement U		+/-3.6 dB				_				
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)			
2222	15.5	12.2	20	10.7	10	24.5	0.000445	**		
3920 5880	-45.7	43.3	33 32.1	10.7 11.4	13 13	-24.7 -18.2	0.003415	V		
7840	-37.3 -50.3	39.8 41.8	32.1	11.4	13	-30.1	0.015252 0.000985	V		
7040	-30.3	41.8	32.9	11.5	13	-30.1	0.000965	· ·		
3920	-46.8	35.5	33	10.7	13	-33.6	0.000437	Н		
5880	-38.2	37.8	32.1	11.4	13	-21.1	0.000437	Н		
7840	-47.2	41.5	32.9	11.3	13	-27.3	0.001862	Н		
									1960 MHz Channel	
Notes			e 10th harmonic. dB of the spec limit o	f -13 dRm were re	enorted				-	
	011113310	20 (c. ale opec milit o		p					

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	ELECTRO METRICS RGA-60	6151	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 80/85/19

FCC PART 24, SUBPART E BROADBAND PCS REPEATERS

Test Report No.: 4L0571RUS2

ANNEX A - TEST DETAILS

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
Test Report No.: 4L0571RUS2

EQUIPMENT: TFAH 80/85/19

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.: 4L0571RUS2

EQUIPMENT: TFAH 80/85/19

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.: 4L0571RUS2

EQUIPMENT: TFAH 80/85/19

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.: 4L0571RUS2

EQUIPMENT: TFAH 80/85/19

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 ½ wave dipole.

The spectrum was searched up to 20 GHz.

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
Test Report No.: 4L0571RUS2

EQUIPMENT: TFAH 80/85/19

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

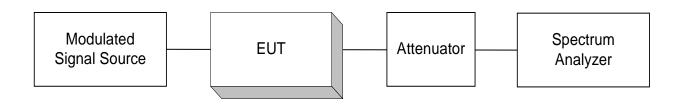
The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30 second intervals for a period of 5 minutes.

EQUIPMENT: TFAH 80/85/19

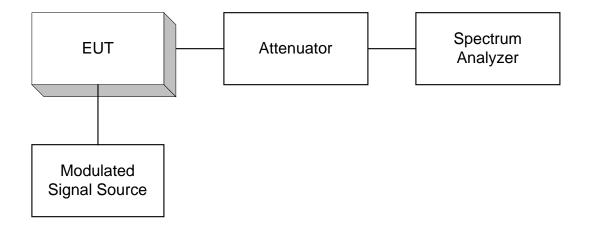
FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS **Test Report No.: 4L0571RUS2**

ANNEX B - TEST DIAGRAMS

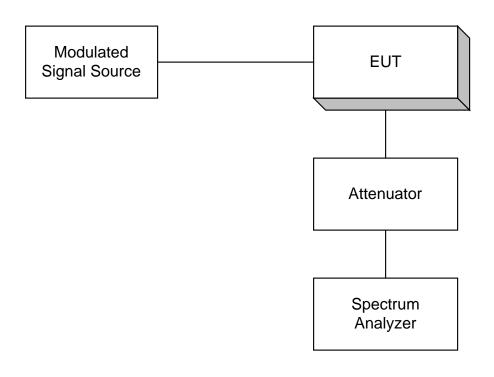
Para. No. 2.985 - R.F. Power Output

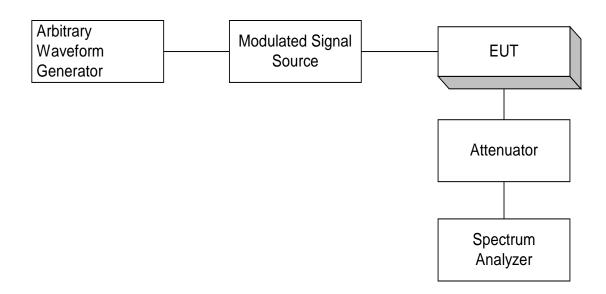


Para. No. 2.989 - Occupied Bandwidth

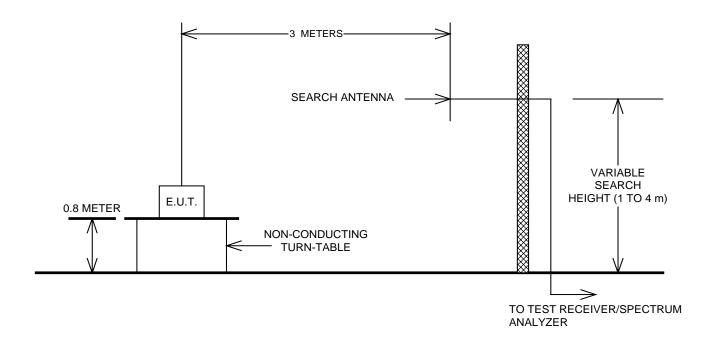


Para. No. 2.991 Spurious Emissions at Antenna Terminals





Para. No. 2.993 - Field Strength of Spurious Radiation



Para. No. 2.995 - Frequency Stability

