Applicant:	Andrew Corporation 108 Rand Park Drive Garner, NC 27529
Equipment Under Test: (E.U.T.)	TFAM2332/4
In Accordance With:	FCC Part 22, Subpart H
Tested By:	Nemko Dallas Inc. 802 N. Kealy Lewisville, TX 75057-3136
Authorized By:	Dustin Oaks, Account Manager
Date:	05/28/2004

4L0347RUS1

Nemko Test Report:

EQUIPMENT: TFAM2332/4

Test Report Number: 4L0347RUS1

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Section 1. **Summary of Test Results** Manufacturer: **Andrew Corporation** Model No.: TFAM2332/4 Serial No.: 041501103 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 22, Subpart H. **Production Unit New Submission** 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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Nemko Dallas

EQUIPMENT: TFAM2332/4 Test Report Number: 4L0347RUS1

Summary Of Test Data

NAME OF TEST	PARA. NO.	SPEC.	RESULT
RF Power Output	22.913(a)	500W ERP	Complies
Occupied Bandwidth	22.917(c)	Mask	Complies
Spurious Emissions at Antenna Terminals	22.917	-13 dBm	Complies
Field Strength of Spurious Emissions	22.917	-13 dBm E.I.R.P.	Complies
Frequency Stability	22.355	1.5 ppm	Complies

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

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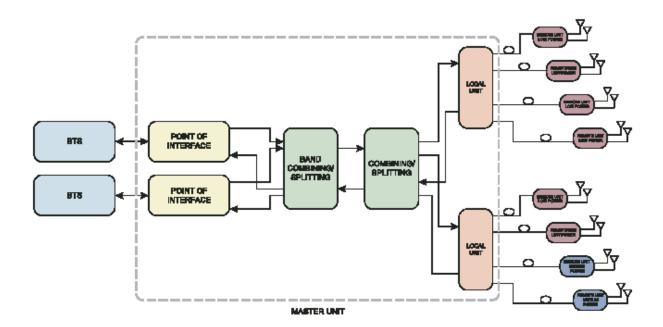
Section 2. General Equipment Specification

Supply Voltage Input:										
Frequency Range: Downlink:	869.04 – 893.7 MHz									
Frequency Range: Uplink:	824 – 849 M	ИНz								
Type of Modulation and Designator:	CDMA (F9W)	GSM (GXW)		EDGE AMPS (G7W) (F8W, F1D)						
Output Impedance:	50 ohms									
RF Output (Rated per carrier):										
Number of Carriers:	1	2	4	8						
CDMA:	21	17	13	9						
GSM:	27	20	17	13						
NADC:	24	18.5	15	11						
EDGE:	23	18	15	11						
Analog:	27	20	17	13						
Frequency Translation:	F1-F1		F1-F2	N/A						
Band Selection:	Software		Duplexer Change	Fullband Coverage						

Description of Operation

Britecell Plus is a radio over fiber system

System Diagram



Nemko Dallas

EQUIPMENT: TFAM2332/4 Test Report Number: 4L0347RUS1

Section 3. RF Power Output

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

TESTED BY: David Light DATE: 5/26/04

Test Results: Complies.

Test Data:

Modulation Type	Single Carrier (dBm)	Per Channel Power Output (dBm)	Composite Power Output (dBm)
Analog	27	20	23
CDMA	21	17	20
GSM	27	20	23
NADC	24	18.5	21.5
CDPD	23	18	21

Equipment Used: 1036-1064-1042

Measurement Uncertainty: +/- 1.7 dB

Temperature: 22 °C

Relative Humidity: 40 %

Nemko Dallas

EQUIPMENT: TFAM2332/4 Test Report Number: 4L0347RUS1

Section 4. Occupied Bandwidth

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

TESTED BY: David Light DATE: 5/26/04

Test Results: Complies.

Test Data: See attached plots

Measurement Uncertainty: +/- 1.6 dB

Test Data - Occupied Bandwidth



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

Nen	nko Dallas, Inc.								
Data Plot			Occ	cupied B	andwidth				
Page 1 of Job No.: Specification: Tested By: E.U.T.:	f <u>5</u> 4L0347 PT 22 David Light 800/1900 MHz AMPL	Relative H	Date:erature(°C): Iumidity(%)	5/26/2004			Complete Preliminary:	X	
Configuration:	Tx FULL POWER								
Sample Number:	1								
Location: Detector Type:	Lab 1 Peak				Refer to plots Refer to plots		Measurement Distance: NA	A m	
Test Equipme	ent Used								
Antenna: Pre-Amp: Filter:			Direction	onal Coupler: Cable #1: Cable #2:	#N/A				
Receiver:	1036			Cable #3:					
Attenuator #1	1064								
Attenuator #2:				Mixer:					
Additional equip									
Measurement Un	ecertainty: +/-1.7 o	iB							
Ref	Lv1 dBm	Marker 879	1 [T1] 4. 1.995065	.27 dBm		300 300 1.4	Hz	Att 30	0 dB dBm
30-				1	3/11				
21	1.4 dB Offs	e t			A	▼1	[T1]	4.27	H
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-20							 		
-30							 		
-40	$A \rightarrow A$				1			$-\!$	
-50			\ _\ \	MAI	*\J	M			
-60						M		MAY 4	
-70	U *	V							
Cen				2.5	kHz/			Span 25	i kHz
Date:	26.MAY 2	2004 11	:01:41						
Notes:	Analog								
	2.5 kHz Tone - 2 kl	1z peak deviat	ion						

Test Data - Occupied Bandwidth



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Ner	nko Dalla	as, Inc.								
Data Plot				Occ	upied Bar	<u>ıdwidth</u>				
Page 1 o					_			Complete X		
Job No.:	4L0347			Date:	6/22/2004			Complete X Preliminary:		
Specification:	PT 22		Temp	erature(°C):	22			· · · · · · · · · · · · · · · · · · ·		
Tested By:	David Lig	ht		Iumidity(%)	40					
E.U.T.:		MHz AMPLI								
Configuration:	Input plots									
Sample Number										
Location:	Lab 1		-		RBW: Re	efer to plots		Measurement		
Detector Type:	Peak	_			_	efer to plots		Distance: NA	m	
J		_			_					
Test Equipm	ent Used									
Antenna:				Direction	onal Coupler:					
Pre-Amp:					Cable #1:	#N/A				
Filter:					Cable #2:					
Receiver:	1036				Cable #3:					
Attenuator #1					Cable #4:					
Attenuator #2:					Mixer:					
Additional equip	ment used:									
Measurement Ui	ncertainty:	+/-1.7 d	В							
			Marker	1 111		RBU	300	Hz RF At	t 20 dB	
∜ Ref	L v 1		riai kei		21 dBm	VBW	300		-10 dBm	
•	5 dBm		879	.994964		SWT	1.4		dBm	
8.5										
					J		▼ 1	[T1]	-18.21 dBm	A
0					/			 	3496 <mark>493 MHz</mark>	
						\ ,	△1	[T1]	0.00 dB	
4.0				/	\ <i>[</i>]	\ /	I\	10.02	2004 <mark>008 kHz</mark>	
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	ter 88				2.5	KHZ/		٤	Span 25 kHz	
ate:	22	.JUN.2	004 14	:55:41						
Notes:	Analog							<u> </u>		
	Input									

Test Data - Occupied Bandwidth



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Nemko Dallas, Inc. **Occupied Bandwidth Data Plot** Page <u>2</u> of 5 4L0347 Date: 5/26/2004 Job No.: Specification: PT 22 Temperature(°C): 22 David Light Relative Humidity(%) 40 Tested By: 800/1900 MHz AMPLIFIER E.U.T.: Configuration: Tx FULL POWER RBU RF Att 30 dB Ref Lvl -0.85 dB VВW 3 kHz 30 dBm 274.54909820 kHz SWT 280 ms Unit 30 21.4 dB Offset 87 Α MHz 346 20 4.54909 820 kHz 10 1VIEW 1MA - 1C EXT -20 -30 -40 100 kHz/ Center 880 MHz Span 1 MHz 11:18:37 26.MAY 2004 ₽ate: Notes: GSM

Test Data - Occupied Bandwidth



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Nemko Dallas, Inc. Occupied Bandwidth Data Plot Page <u>2</u> of 5 Job No.: 4L0347 Date: 6/22/2004 Specification: PT 22 Temperature(°C): 22 Relative Humidity(%) 40 Tested By: David Light E.U.T.: 800/1900 MHz AMPLIFIER Configuration: Input plots Ref Lvl -23.74 dBm 3 kHz -10 dBm VBW Mixer 10 dBm 880.13927856 MHz SWT 280 ms Unit dBm 356 MHz 4.54909 320 kHz - 10 -20 1VIEW 1MA -30 -40 -50 -60 -70 -80 100 kHz/ Center 880 MHz Span 1 MHz 22.JUN.2004 14:59:20 late: GSM Notes: Input



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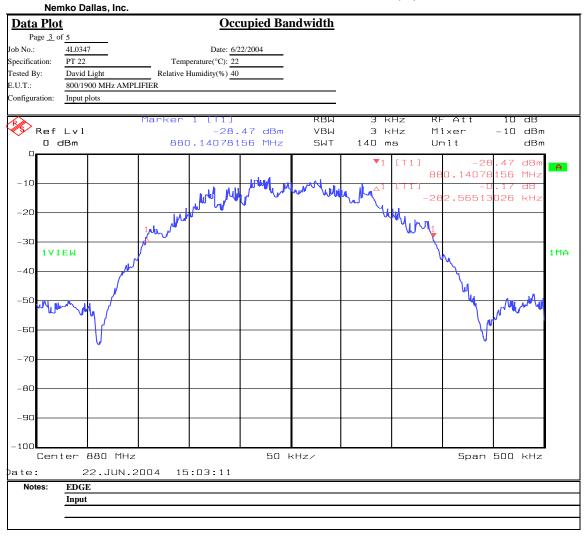
Nemko Dallas, Inc. Data Plot Occupied Bandwidth Page <u>3</u> of 5 4L0347 Job No.: Date: 5/26/2004 Specification: PT 22 Temperature(°C): 22 Tested By: David Light Relative Humidity(%) 40 800/1900 MHz AMPLIFIER E.U.T.: Tx FULL POWER Configuration: RBW Αtt 30 dB 3 kHz Ref Lvl 0.14 dB VBW 3 kHz 30 dBm 280.56112224 kHz SWT 140 ms Unit dBm 21.4 dB Offset dBr A 9.8592 MHz 20 280.56112 224 KHz 10 1VIEW 1MA - 1 C EXT -20 -30 -40 -50 -60 Center 880 MHz 50 kHz/ Span 500 kHz Date: 26.MAY 2004 13:15:35 Notes: EDGE

Test Data - Occupied Bandwidth



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Test Data - Occupied Bandwidth



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Nemko Dallas, Inc. **Test Plot: Occupied Bandwidth** Page <u>4</u> of 5 Job No.: 4L0347 Date: 5/26/2004 Specification: Temperature(°C): 22 Tested By: Relative Humidity(%) 40 David Light E.U.T.: 800/1900 MHz AMPLIFIER Configuration: Tx FULL POWER 30 dB Ref Lvl 0.82 dB VBW 300 Hz 30 dBm 31.06212425 kHz SWT 2.8 s Unit dBm 30 21.4 dB Offset 87 Α 384 MHz 9.9849 20 1.06212 425 10 1VIEW 1MA - 1C EXT -20 -30 -50 -60 Center 880 MHz 5 kHz/ Span 50 kHz 26.MAY 2004 13:25:47 Date: Notes: TDMA

Test Data - Occupied Bandwidth



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Nemko Dallas, Inc. **Test Plot: Occupied Bandwidth** Page <u>4</u> of 5 Job No.: 4L0347 Date: 6/22/2004 Specification: PT 22 Temperature(°C): 22 Tested By: David Light Relative Humidity(%) 40 E.U.T.: 800/1900 MHz AMPLIFIER Configuration: Input plots Ref Lvl 30.17 dBm VBW 300 Hz Mixer -10 dBm 0 dBm 880.01528056 MHz SWT 2.8 s Un i t dBm dBm Multin White 0.01528 156 MHz -10 MUMMY 465 kHz -20 -30 1VIEW 1MA -40 -50 -70 -80 -90 Span 50 kHz Center 880 MHz 5 kHz/ 22.JUN.2004 15:07:23 ate: TDMA Input

Test Data - Occupied Bandwidth



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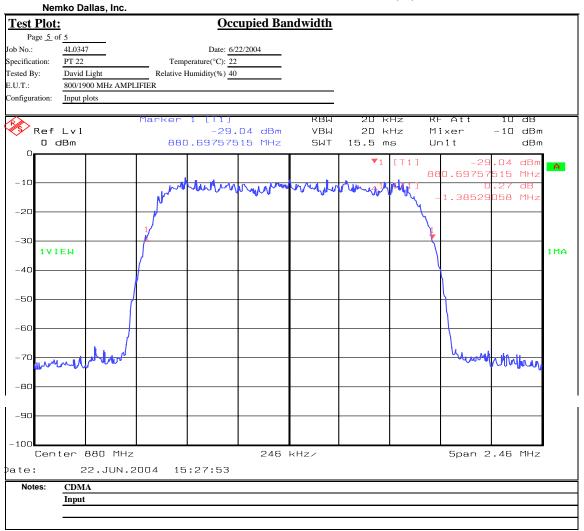
Nemko Dallas, Inc. **Occupied Bandwidth Test Plot:** Page <u>5</u> of <u>5</u> Job No.: Date: 5/26/2004 4L0347 Specification: Temperature(°C): 22 Relative Humidity(%) 40 Tested By: David Light E.U.T.: 800/1900 MHz AMPLIFIER Configuration: Tx FULL POWER Ref Lvl 20 kHz 0.26 dB VBW -10 dBm Mixer 30 dBm 1.39515030 MHz SWT 15.5 ms Un i t 30 21.4 dB Offset dBr Α 9.30738 471 MHz 20 1.39515 330 MHz 10 1VIEW 1MA - 1 O EXT -20 -30 howwhite Manh WHITHALL -50 -60 Center 880 MHz 246 kHz/ Span 2.46 MHz 26.MAY 2004 13:50:55 Date: Notes: CDMA

Test Data - Occupied Bandwidth



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Nemko Dallas

EQUIPMENT: TFAM2332/4 Test Report Number: 4L0347RUS1

Section 5. Spurious Emissions at Antenna Terminals

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

TESTED BY: David Light DATE: 5/26/04

Test Results: Complies.

Note: Spurious emission testing was performed on three channels (high, mid and low). The data presented for mid channel is representative of all measurements as no emissions were detected above the noise floor.

Test Data: See attached plots

Measurement Uncertainty: +/- 1.6 dB

Test Data – Spurious Emissions at Antenna Terminals



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Ne	emko D	allas, Inc.											
Data Plo	t		Spi	urious Emi	ssions at	Ante	enna T	Terminal:	S				
Page 1										plete	X		
Job No.:	4L034	17		Date:	5/26/2004				Prelimir	nplete nary:			
Specification:	PT22									·			
Tested By:	David	Light		ve Humidity(%)	40								
E.U.T.:	800/19	900 MHz AMP			-								
Configuration:	TX FU	JLL POWER											
Sample Numb	er:	1		_									
Location:	La	b 1			RBW: I	Refer to	plots		Measure	ement			
Detector Type	: <u>P</u> 6	eak			VBW: I	Refer to	plots		Dist	ance: NA	r	n	
Test Equip	ment Us	ed											
Antenna:				Directi	onal Coupler:								
Pre-Amp:					_	#1	N/A						
Filter:					Cable #2:								
Receiver:		36			Cable #3:								
Attenuator #1		064			Cable #4:								
Attenuator #2:					Mixer:								
Additional equ	-		ID.										
Measurement	Uncertaint	y: +/-1.7	115										
Ŕ							RBW	300	Hz	RF A	t t	30 dB	
*	f ∟∨1						VBW	300	Hz				
] dBm						SWT	56	s	Unīt		dBm	1
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Date:		26.MAY 2	: 1114	10:47:29									
Notes:	Anal												
		9.04 and 869.		•-									
1	20 dE	3m per carriei	: - 23 dBm (composite									

Test Data – Spurious Emissions at Antenna Terminals



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Nemko Dallas, Inc. **Spurious Emissions at Antenna Terminals Data Plot** Page 2 of 3 4L0347 Date: 5/26/2004 Job No.: Specification: PT22 Temperature(°C): 22 David Light Relative Humidity(%) 40 Tested By: E.U.T.: 800/1900 MHz AMP Configuration: TX FULL POWER RBW RF Att 30 dB Ref Lvl -18.60 dBm VΒW 300 Hz 30 dBm 894.28957916 MHz SWT 56 Unit 30 dB Offset 21.4 : PASSED ▼1 60 Α LIMIT CHE .2895 916 MHz 20 10 1 V I EW 1 MA EXT -20 -30 -40 -50 -60 and the library property from the property of 100 kHz/ Span 1 MHz Center 894 MHz 26.MAY 2004 10:56:36 bate: Notes: Analog Tx 893.97 and 893.65 MHz 20 dBm per carrier - 23 dBm composite

Test Data – Spurious Emissions at Antenna Terminals



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Fax: (972) 436-2667 Nemko Dallas, Inc. **Data Plot Spurious Emissions at Antenna Terminals** Page <u>3</u> of 3 Job No.: 4L0347 Date: 5/26/2004 Specification: Temperature(°C): 22 Relative Humidity(%) 40 Tested By: David Light E.U.T.: 800/1900 MHz AMP Configuration: TX FULL POWER Ref Lvl 27.20 dBm VBW 1 MHz 30 dBm 880.00002505 MHz SWT 90 ms Unit 30 21.4 dB Offset [T1] 20 dBn Α 0.00002 505 MHz 20 10 1VIEW 1MA - 1C dBm-**EXT** -20 -30 -40 -50 -60 897 MHz/ Start 30 MHz Stop 9 GHz 26.MAY 2004 11:02:37 ate: Notes: Analog Single carrier 27 dBm

Test Data – Spurious Emissions at Antenna Terminals



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N	lemko Da	allas, Inc.									
Data Pl	ot		Spur	ious Emis	sions at	Antenna '	Fermina	ls			
Page									ete X		
Job No.:	4L034	7		Date:	5/26/2004			Prelimina	ete X	_	!
Specification	: PT22		Temp	erature(°C):	22					_	
Tested By:	David	Light	Relative I	Iumidity(%)	40						
E.U.T.:	800/19	000 MHz AMP									
Configuration	n: TX FU	JLL POWER									
Sample Num	ber: 1										
Location:	Lat	1				Refer to plots		Measurem	ent ce: NA		
Detector Typ	e: Pe	ak		VBW:							
Test Equip	oment Us	<u>ed</u>									
Antenna:				Direction	onal Coupler:						
Pre-Amp:					Cable #1:	#N/A					
Filter:					Cable #2:						
Receiver:	10:				Cable #3:						
Attenuator #1		54			Cable #4:						
Attenuator #2					Mixer:						
Additional eq			ın.								
Measurement	Uncertaint	y: +/-1.7	ав								
R)			Marker	1 [T1]		RBW	30	kHz I	RF Att	20 dE	}
*	f L∨l				82 dBm	VBW			Mixer	-10 dE	
	0 dBm		869	1.700000	00 MHz	SWT	11.5	ms l	Jn i t	dE	3m
30	21.4	dB Offs	e t				_	1 [T1]		2.82 dB	m
									369.7000		
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-70											
C∈	enter	869 MHz			400	kHz/			5p	ban 4 MH	z
Date:	2	26.MAY 2	2004 13	:40:45							
Notes:	CDM	Ā									
	Tx 86	9.7 and 871.0	7 MHz								
1	15 11		A0 170	• • • • • • • • • • • • • • • • • • • •							

Test Data – Spurious Emissions at Antenna Terminals



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Nemko Dallas, Inc. **Spurious Emissions at Antenna Terminals Data Plot** Page <u>2</u> of 3 4L0347 Date: 5/26/2004 Job No.: Specification: PT22 Temperature(°C): 22 David Light Relative Humidity(%) 40 Tested By: E.U.T.: 800/1900 MHz AMP Configuration: TX FULL POWER RBW Ref Lvl 2.11 dBm VBW 30 kHz Mixer -10 dBm 30 dBm 893.31000000 MHz SWT 11.5 ms Unit dBm 30 dB Offset 21.4 SSED^{▼1} 1 1 dBr LIMIT CHE Α MH: 20 10 **1VIEW** 1MA EXT -20 -30 they when the -40 -50 -60 400 kHz/ Span 4 MHz Center 894 MHz 26.MAY 2004 13:46:18 bate: **CDMA** Tx 893.31 and 891.83 MHz 17 dBm per carrier - 20 dBm composite

Test Data – Spurious Emissions at Antenna Terminals



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Nemko Dallas, Inc. **Data Plot Spurious Emissions at Antenna Terminals** Page <u>3</u> of 3 Job No.: 4L0347 Date: 5/26/2004 Specification: Temperature(°C): 22 Relative Humidity(%) 40 Tested By: David Light E.U.T.: 800/1900 MHz AMP Configuration: TX FULL POWER Ref Lvl 27.45 dBm Mixer VBW 1 MHz -10 dBm 30 dBm 874.86973948 MHz SWT 90 ms Unit dBm 30 dB Offset 21.4 [T1] 45 dBr A 8697 948 MHz 20 10 1 V I E W 1MA -10 dBm--D 1 **EXT** -20 -30 -40 howallender -50 -60 Start 30 MHz 897 MHz/ Stop 9 GHz 26.MAY 2004 13:52:02 Date: Notes: Single channel at 21 dBm output

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. **Spurious Emissions at Antenna Terminals** Data Plot Page <u>1</u> of <u>3</u> Complete X 5/26/2004 Job No.: 4L0347 Date: Preliminary: PT22 Specification: Temperature(°C): 22 Tested By: David Light Relative Humidity(%) 800/1900 MHz AMP E.U.T.: TX FULL POWER Configuration: Sample Number: Location: Lab 1 RBW: Refer to plots Measurement Detector Type: Peak VBW: Refer to plots Distance: NA Test Equipment Used Antenna: Directional Coupler: #N/A Pre-Amp: Cable #1: Filter: Cable #2: 1036 Receiver: Cable #3: Cable #4: Attenuator #2: Mixer: Additional equipment used: +/-1.7 dB Measurement Uncertainty: 30 dB Ref Lvl VBW 3 kHz 30 dBm SWT 560 ms Unit dBm 21.4 dB Offset IIT CHE A 20 1VIEW 1MA **−1**□ EXT -20 -30 -40 -50 -60 Center 869 MHz 200 kHz/ Span 2 MHz 26.MAY 2004 12:57:58 þate: **EDGE** Tx 869.2 and 869.7 MHz 18 dBm per carrier - 21 dBm composite

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Nemko Dallas, Inc. **Data Plot Spurious Emissions at Antenna Terminals** Page 2 of 3 4L0347 Date: 5/26/2004 Job No.: Specification: PT22 Temperature(°C): 22 David Light Relative Humidity(%) 40 Tested By: 800/1900 MHz AMP E.U.T.: Configuration: TX FULL POWER RBW 30 dB Ref Lvl 3 kHz VBW 30 dBm SWT 560 ms Un i t dBm 30 21.4 dB Offset 1IT CHE ASSED A 20 10 MM/M 1VIEW 1MA – 1C **EXT** -20 -30 -40 -50 Mulmy -60 Center 894 MHz 200 kHz/ Span 2 MHz 26.MAY 2004 13:06:09 **EDGE** Tx 893.8 and 893.3 MHz 18 dBm ber carrier - 21 dBm composite

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Nemko Dallas, Inc. **Data Plot Spurious Emissions at Antenna Terminals** Page <u>3</u> of 3 Job No.: 4L0347 Date: 5/26/2004 Specification: Temperature(°C): 22 Relative Humidity(%) 40 Tested By: David Light E.U.T.: 800/1900 MHz AMP Configuration: TX FULL POWER Ref Lv1 23.29 dBm 1 MHz VBW 30 dBm 874.86973948 MHz SWT 90 ms Un i t dBm 30 21.4 dB Offset [T1] A .86973 948 MH: 20 10 1VIEW 1MA - 10 dBm EXT -20 -30 -40 -50 -60 Start 30 MHz 897 MHz/ Stop 9 GHz 26.MAY 2004 13:16:39 Date: Notes: EDGE Tx single carrier at 23 dBm

Test Data – Spurious Emissions at Antenna Terminals



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Nen	nko Da	ıllas, Inc.							(-)		
Data Plot			Spur	ious Emi	ssions at A	Antenna T	Terminals	3			
Page 1 o	f <u>3</u>							Complete	X		
Job No.:	4L0347	1		Date:	5/26/2004			Complete Preliminary:			
Specification:	PT22		Temp	erature(°C):	22						
Tested By:	David l		Relative F	Humidity(%)	40						
E.U.T.:	_	00 MHz AMP									
Configuration:		LL POWER									
Sample Number:											
Location:	Lab				_	efer to plots		Measurement			
Detector Type:	Pea	ık			VBW: R	efer to plots		Distance	NA	m	
Test Equipm	ent Use	<u>ed</u>									
Antenna:				Directi	ional Coupler:						
Pre-Amp:					Cable #1:	#N/A					
Filter:					Cable #2:						
Receiver:	103				Cable #3:						
Attenuator #1	106	64			Cable #4:						
Attenuator #2:					Mixer:						
Additional equip											
Measurement Ur	certainty	+/-1.7 d	<u>B</u>								
Ŕ						RBW	3 k	:Hz RF	Att	30 dB	
Ref						VBW	3 k	:Hz			
	dBm					SWT	560 m	is Ur	nit	dBm	ı
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-70											
Cen	ter 8	369 MHz			200	kHz/			Spa	an 2 MHz	
Date:	2	6.MAY 2	004 11	:13:58							
Notes:	GSM										
	Tx 869	9.2 and 869.7	MHz								
	20 dB	m per carrier	- 23 dBm con	nposite							

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Nemko Dallas, Inc. **Data Plot Spurious Emissions at Antenna Terminals** Page <u>2</u> of 3 4L0347 Date: 5/26/2004 Job No.: Specification: PT22 Temperature(°C): 22 David Light Relative Humidity(%) 40 Tested By: 800/1900 MHz AMP E.U.T.: Configuration: TX FULL POWER RF Att RBW 3 kHz 30 dB Ref Lvl VBW 3 kHz 30 dBm SWT 560 ms Unit dBm 21.4 dB Offset ASSED A 20 10 IVIEW, 1MA - 1 C EXT -20 -30 -50 -60 200 kHz/ Center 894 MHz Span 2 MHz 26.MAY 2004 Date: 11:08:44 Notes: **GSM** Tx 893.8 and 893.3 MHz 20 dBm per carrier - 23 dBm Composite

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Nemko Dallas, Inc. **Data Plot Spurious Emissions at Antenna Terminals** Page <u>3</u> of 3 Job No.: 4L0347 Date: 5/26/2004 Specification: Temperature(°C): 22 Relative Humidity(%) 40 Tested By: David Light E.U.T.: 800/1900 MHz AMP Configuration: TX FULL POWER Ref Lvl 27.52 dBm VBW 1 MHz 30 dBm 879.86472946 MHz SWT 90 ms Unit dBm 30 21.4 dB Offset [T1] 52 dBr Α 9.86472 346 MH: 20 10 1MAX 1MA -10dBm-EXT -20 -30 -40 -50 -60 897 MHz/ Start 30 MHz Stop 9 GHz 26.MAY 2004 11:19:34 ate: Notes: GSM Single 27 dBm carrier

Test Data – Spurious Emissions at Antenna Terminals



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Fax: (972) 436-2667 Nemko Dallas, Inc. **Spurious Emissions at Antenna Terminals** Data Plot Page <u>1</u> of <u>3</u> Complete X 5/26/2004 Job No.: 4L0347 Date: Preliminary: PT22 Specification: Temperature(°C): 22 David Light Tested By: Relative Humidity(%) 800/1900 MHz AMP E.U.T.: TX FULL POWER Configuration: Sample Number: Location: Lab 1 RBW: Refer to plots Measurement Detector Type: Peak VBW: Refer to plots Distance: NA Test Equipment Used Antenna: Directional Coupler: #N/A Pre-Amp: Cable #1: Filter: Cable #2: Receiver: 1036 Cable #3: Attenuator #1 Cable #4: Attenuator #2: Mixer: Additional equipment used: +/-1.7 dB Measurement Uncertainty: 30 dB Αtt Ref Lvl 13.73 dBm VBW 1 kHz 30 dBm 869.03000000 MHz SWT 2.5 s Unit dBm 21.4 dB Offset IT CHE Α 20 **1VIEW** 1MA -10EXT -20 -30 -40 -50 -60 Center 869 MHz 100 kHz/ Span 1 MHz Date: 26.MAY 2004 13:34:34 TDMA Tx 869.03 and 869.30 MHz 18.5 dBm carrier power per channel - 21.5 dBm composite

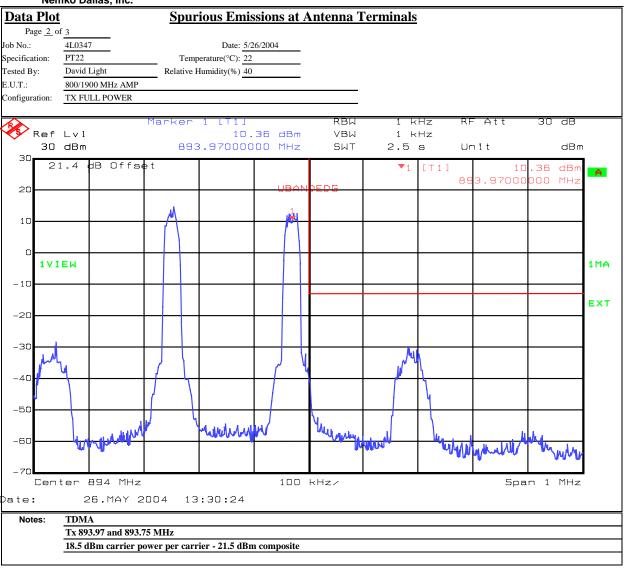
Test Data – Spurious Emissions at Antenna Terminals



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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 <u>3</u> of 3 Job No.: 4L0347 Date: 5/26/2004 Specification: Temperature(°C): 22 Relative Humidity(%) 40 Tested By: David Light E.U.T.: 800/1900 MHz AMP Configuration: TX FULL POWER Ref Lv1 1 MHz 25.23 dBm VBW 30 dBm 874.86973948 MHz SWT 90 ms Un i t dBm 30 21.4<u>1</u>dB Offset [T1]23 A .8697 48 MH 20 10 **1VIEW** 1MA dBm-EXT -20 -30 -40 -50 -60 Start 30 MHz 897 MHz/ Stop 9 GHz Date: 26.MAY 2004 13:21:08 Notes: TDMA Tx single carrier at 24 dBm channel power

Nemko Dallas

EQUIPMENT: TFAM2332/4 Test Report Number: 4L0347RUS1

Section 6. Field Strength of Spurious

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

TESTED BY: David Light DATE:5/27/04

Test Results: Complies.

Test Data: There were no emissions detected above the noise floor, which was more than 20

dB below the specification limit of -13 dBm.

The device was tested at 3 frequencies, Low, Mid and High

Equipment Used: 1464-1304-1016-1484-1485

Measurement Uncertainty: +/- 1.7 dB

Temperature: 25 °C

Relative Humidity: 50 %

Test Setup – Field Strength of Spurious Emissions





EQUIPMENT: TFAM2332/4 Test Report Number: 4L0347RUS1

Section 7. Frequency Stability

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

TESTED BY: David Light DATE:5/27/04

Test Results: Complies.

Test Data: See attached table.

Standard Test Frequency: 880 MHz Standard Test Voltage: -48 Vdc

Measurement Uncertainty: +/- 1 x 10⁻¹⁷ ppm

Test Data - Frequency Stability



Nemko Dallas, Inc.

Dallas Headquarters:

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		<u>Frequency Stabili</u>	<u>ty</u>	
Page <u>1</u> o	f <u>1</u>			
Job No.:	4L0347	Date: 5/27/2004		
Specification:	PT22	Temperature(°C): 20		
Tested By:	David Light	Relative Humidity(%) 45		
E.U.T.:		800/1900 MHz AMP		
Configuration:		TX CENTER BAND		
Sample Number:	:1			
		Test Equipment Used		
Antenna:		Directional Coupler:		
Pre-Amp:		Cable #1:	1042	
Filter:		Cable #2:		
Receiver:	1026			
Attenuator #1	1064			
Attenuator #2:				
Measurement	17			
Uncertainty:	$1 \times 10^{-17} \text{ppm}$	Standard Test Frequency	880.000000	MHz

Tomas	(°C)	Measured	Rho	Test	Frequuncy	Limit	Error	
Temp (Frequency (MHz)		Voltage	Error (Hz)	(+/-Hz)	(ppm)	Comment
20		880.000000		-48	0	1320.0	0.0	
20		880.000000		-56.2	0	1320.0	0.0	
20		880.000000		-40.8	0	1320.0	0.0	
50		880.000000		-48	0	1320.0	0.0	
40		880.000000		-48	0	1320.0	0.0	
30		880.000000		-48	0	1320.0	0.0	
10		880.000000		-48	0	1320.0	0.0	
0		880.000000		-48	0	1320.0	0.0	
-10		880.000000		-48	0	1320.0	0.0	
-20		880.000000		-48	0	1320.0	0.0	
-30		880.000000		-48	0	1320.0	0.0	
No	tes:				-			-

EQUIPMENT: TFAM2332/4 Test Report Number: 4L0347RUS1

Section 8. Test Equipment List

Nemko 1D.	Description	Manufacturer Modet Number	Şerial Number	Calibration Date	Calibration Due
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	03/26/04	03/26/05
1042	CABLE, 4M	STORM PR90-010-144	N/A	09/02/03	09/01/04
1064	ATTENUATOR	NARDA 776B-20	NONE	CBU	N/A
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	02/11/03	02/11/05
1484	Cable 2.0-18.0 Ghz	Storm PR90-010-072	N/A	07/24/03	07/23/04
1485	Cable 2.0-18.0 Ghz	Storm PR90-010-216	N/A	07/24/03	07/23/04
1304	HORN ANTENNA	ELECTRO METRICS RGA-60	6151	09/22/03	09/22/05
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	10/27/03	10/26/04
283	Environmental Chamber with controller # 1189006	ENVIROTRONICS SH27 & 2030-22844	129010083	05/06/04	05/06/05

ANNEX A - TEST DETAILS

Page 40 of 55

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

Minimum Standard: Para. No. 22.913(a). The maximum effective radiated power (ERP)

of base transmitters and cellular repeaters must not exceed 500

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

EQUIPMENT: TFAM2332/4 Test Report Number: 4L0347RUS1

NAME OF TEST: Occupied Bandwidth (Voice & SAT) PARA. NO.: 2.1049

Minimum Standard: 22.917(c) The mean power of any emission removed from the

carrier frequency by a displacement frequency (f_d in kHz) must be attenuated below the mean power of the unmodulated carrier (P) as

follows:

(i) On any frequency removed from the carrier frequency by more than 12 kHz but not more than 20 kHz:

at least 117 log $(f_d/12)$

(ii) On any frequency removed from the carrier frequency by more than 20 kHz, up to the first multiple of the carrier frequency:

at least $100 \log (f_d/11) dB$ or $43 + 10 \log (P) dB$, whichever is the lesser attenuation.

Method Of Measurement:

Spectrum Analyzer Settings:

RBW: 300 Hz VBW: ≥ RBW Span: 100 kHz Sweep: Auto

Input Signal Characteristics (F3E/F3D):

RF level: Maximum recommended by manufacturer

AF1 frequency: 6 kHz

AF1 level: sufficient to produce 2 kHz deviation

AF2 frequency: 2.5 kHz

AF2 level: sufficient to produce 12 kHz deviation.

EQUIPMENT: TFAM2332/4 Test Report Number: 4L0347RUS1

NAME OF TEST: Occupied Bandwidth (WB Data) PARA. NO.: 2.1049

Minimum Standard: 22.917(c) The mean power of any emission removed from the

carrier frequency by a displacement frequency (f_d in kHz) must be attenuated below the mean power of the unmodulated carrier (P) as

follows:

(1) On any frequency removed from the carrier frequency by more than 20 kHz but not more than 45 kHz:

at least 26 dB

(2) On any frequency removed from the carrier frequency by more than 45 kHz but not more than 90 kHz:

at least 45 dB

(3) On any frequency removed from the carrier frequency by more than 90 kHz, up to the first multiple of the carrier frequency:

at least 60 dB or 43 + 10 log (P) dB, whichever is the lesser attenuation.

Method Of Measurement:

Spectrum Analyzer Settings:

RBW: 300 Hz VBW: ≥RBW Span: 200 kHz Sweep: Auto

Input Signal Characteristics:

RF level: Maximum recommended by manufacturer

AF1 frequency: 10 kHz, random bit sequence AF1 level: sufficient to produce 8 kHz deviation

EQUIPMENT: TFAM2332/4 Test Report Number: 4L0347RUS1

NAME OF TEST: Occupied Bandwidth (ST)

PARA. NO.: 2.1049

Minimum Standard: 22.917(c) The mean power of any emission removed from the

carrier frequency by a displacement frequency (f_d in kHz) must be attenuated below the mean power of the unmodulated carrier (P) as

follows:

(1) On any frequency removed from the carrier frequency by more than 20 kHz but not more than 45 kHz:

at least 26 dB

(2) On any frequency removed from the carrier frequency by more than 45 kHz but not more than 90 kHz:

at least 45 dB

(3) On any frequency removed from the carrier frequency by more than 90 kHz, up to the first multiple of the carrier frequency:

at least 60 dB or 43 + 10 log (P) dB, whichever is the lesser attenuation.

Method Of Measurement:

Spectrum Analyzer Settings:

RBW: 300 Hz VBW: ≥ RBW Span: 200 kHz Sweep: Auto

Input Signal Characteristics:

RF level: Maximum recommended by manufacturer

AF1 frequency: 10 kHz tone

AF1 level: sufficient to produce 8 kHz deviation

EQUIPMENT: TFAM2332/4 Test Report Number: 4L0347RUS1

NAME OF TEST: Occupied Bandwidth (Digital Modulation) PARA. NO.: 2.1049

Minimum Standard: Not defined by FCC. Input vs. Output.

Method Of Measurement:

Spectrum Analyzer Settings:

RBW: CDMA (30 kHz), GSM (30 kHz), NADC (1 kHz) and CDPD (1 kHz)

VBW: ≥ RBW Span: As required Sweep: Auto

Input Signal Characteristics:

RF level: Maximum recommended by manufacturer

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EQUIPMENT: TFAM2332/4 Test Report Number: 4L0347RUS1

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

Minimum Standard: Para. No. 22.917(e). The mean power of emissions must be

attenuated below the mean power of the unmodulated carrier on any frequency twice or more than twice the fundamental emission by at least 43 + 10 log P. This is equivalent to -13 dBm absolute

power.

Method Of Measurement:

Spectrum Analyzer Settings:

RBW: 30 kHz (AMPS). As required for digital modulations.

VBW: ≥RBW

Start Frequency: 0 MHz Stop Frequency: 10 GHz

Sweep: Auto

EQUIPMENT: TFAM2332/4 Test Report Number: 4L0347RUS1

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

Minimum Standard: Para. No. 22.917(e). The mean power of emissions must be

attenuated below the mean power of the unmodulated carrier on any frequency twice or more than twice the fundamental emission by at least 43 + 10 log P. This is equivalent to -13 dBm absolute

power.

Test Method: TIA/EIA-603-1992, Section 2.2.12

The antenna substitution method was used to determine the equivalent radiated power at spurious frequencies. The spurious emissions were measured at a distance of 3 meters. The EUT was then replaced with a reference substitution antenna with a known gain referenced to a dipole. This antenna was fed with a signal at the spurious frequency. The level of the signal was adjusted to repeat the previously measured level. The resulting erp is the signal level fed to the reference antenna corrected for gain referenced to a dipole.

EQUIPMENT: TFAM2332/4 Test Report Number: 4L0347RUS1

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

Minimum Standard: Para. No. 22.355. The transmitter carrier frequency shall remain

within the tolerances given in Table C-1.

Table C-1

Freq. Range (MHz)	Base, fixed	Mobile > 3 W	Mobile ≤ 3 W
821 to 896	1.5	2.5	2.5

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.

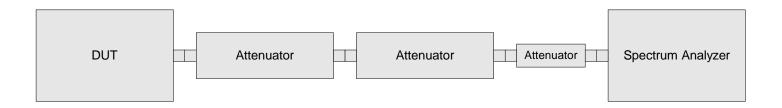
Frequency Stability With Temperature Variation:

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.

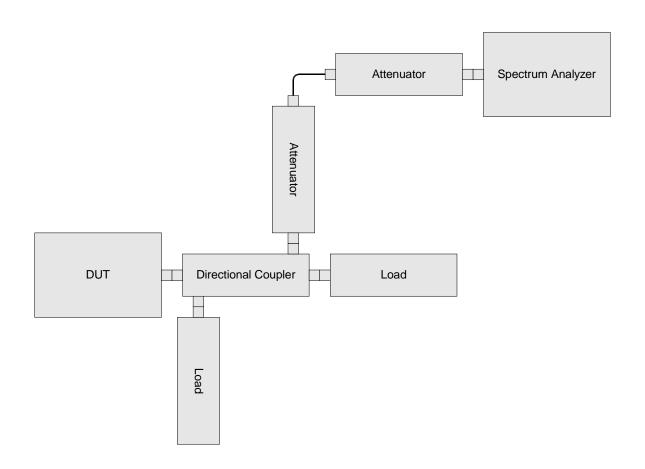
ANNEX B - TEST DIAGRAMS

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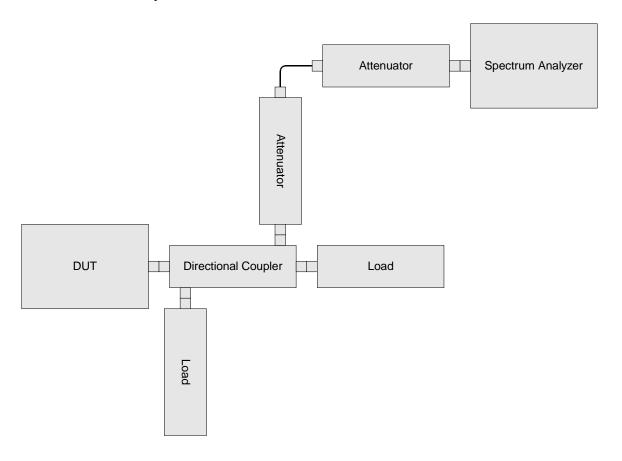
Para. No. 2.1046 - R.F. Power Output

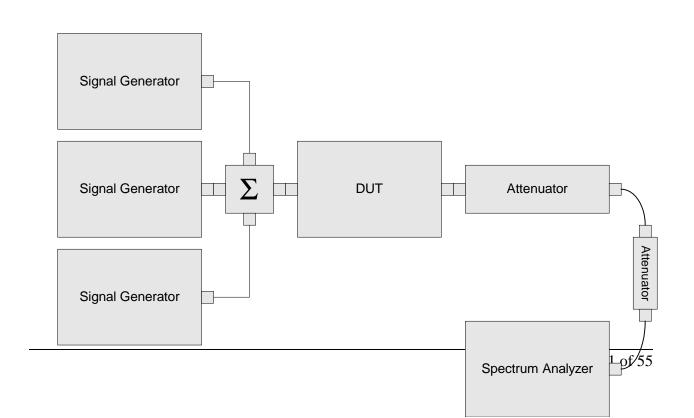


Para. No. 2.1049 - Occupied Bandwidth

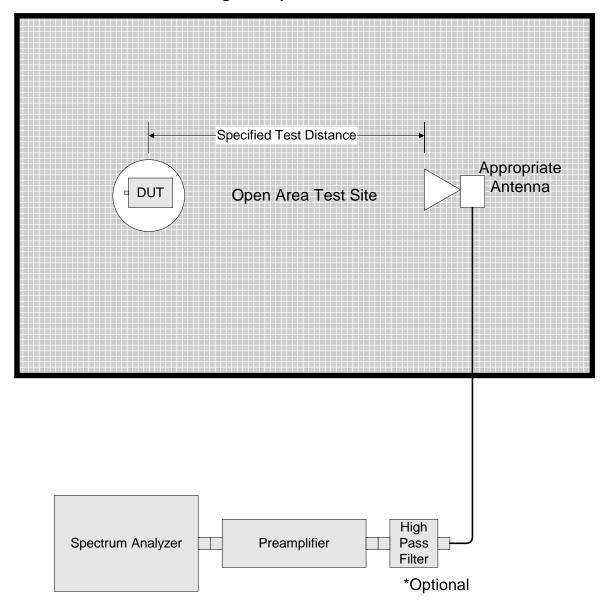


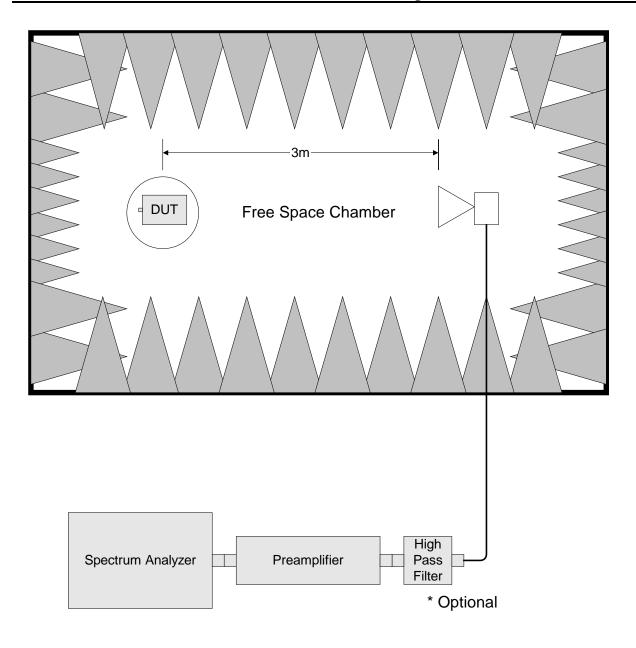
Para. No. 2.1051 Spurious Emissions at Antenna Terminals





Para. No. 2.1053 - Field Strength of Spurious Radiation





Para. No. 2.1055 - Frequency Stability

