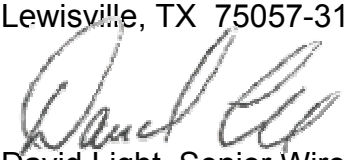
Nemko Test Report:	4L0699RUS1
Applicant:	E. F. Johnson
Equipment Under Test: (E.U.T.)	433x UHF Transceiver
FCC ID:	ATH2424330
In Accordance With:	**FCC Part 90, Subpart I** Private Land Mobile Transmitter
Tested By:	Nemko Dallas Inc. 802 N. Kealy Lewisville, TX 75057-3136
Authorized By:	 David Light, Senior Wireless Engineer
Date:	1/4/05
Total Number of Pages:	54

Table of Contents

Section 1. Summary of Test Results

Manufacturer: E. F. Johnson

Model No.: 433x

Serial No.: 001

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 90, Subpart I. EIA/TIA 603 was used as a test method for these measurements.

☒ 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.
See " Summary of Test Data".

Summary Of Test Data

NAME OF TEST	PARA. NO.	RESULT
RF Power Output	90.205	Complies
Audio Frequency Response	TIA EIA-603.3.2.6	Complies
Audio Low-Pass Filter Response	TIA EIA-603.3.2.6	Complies
Modulation Limiting	TIA EIA-603.3.2.6	Complies
Occupied Bandwidth	90.210	Complies
Spurious Emissions at Antenna Terminals	90.210	Complies
Field Strength of Spurious Emissions	90.210	Complies
Frequency Stability	90.213	Complies
Transient Frequency Behavior	90.214	Complies

Footnotes:

.

Section 2. General Equipment Specification

Transmitter

Supply Voltage Input:	12 Vdc
Frequency Range:	380 – 470 MHz
Tunable Bands:	1
Type(s) of Modulation:	F3E (Voice) ☒ F1D ☒ F2D ☐ D7W (QAM) ☐ Other ☐
Internal/External Data Source:	Internal (Vocoded voice)
Emission Designator:	8K10F1E, 8K10F1D 11K0F3E, 16K0F3E
Output Impedance:	50 ohms
RF Power Output (rated):	15 watts
Duty Cycle:	Mobile
Channel Spacing(s):	12.5 kHz, 25 kHz
Operator Selection of Operating Frequency:	Pre-programmed channel selection
Power Output Adjustment Capability:	Not adjustable

Receiver

Frequency Range:	380 – 470 MHz
Tunable Bands:	1
Operator Selection of Operating Frequency:	Pre-programmed frequency selection

System Description

The 433x is a 15 watt UHF radio for mobile radio services. The radio functions as a normal Push-to-Talk type radio/

Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 2.985
TESTED BY: Tom Tidwell	DATE: 24 Nov. 2004

Measurement Results: Complies.

Measurement Data:

Nemko

Nemko USA

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

RF Power Output (Conducted)

Job No.: 4L0699 Date: 24 Nov. 2004
Specification: CFR 47, Part 2 Temperature(°C): 21
Tested By: Tom Tidwell Humidity(%) 37
E.U.T.: 433X Mobile
Configuration: Transmit
Detector: Average

Test Equipment Used:

Power Meter: 2072 Directional Coupler: 11/19/1902
Power Sensor: 2071 Cable #1: 1629
Load: 1048 Cable #2:
Spectrum Analyzer: Cable #3:
Attenuator #1 1064 Cable #4:
Attenuator #2: Cable #5:
Attenuator #3: Cable #6:
Attenuator #4:

Measurement Uncertainty: +/- .7 dB

		380 MHz	425 MHz	470 MHz	380 MHz	425 MHz	470 MHz
Test Conditions		**Carrier Power(watts)**			**Rel. to Rated**		
		RF Channel Low	**RF Channel Mid**	**RF Channel High**	**RF Channel Low**	**RF Channel Mid**	**RF Channel High**
T_{nom}	V_{nom}	15.3	15.0	13.8	0.09	0.00	-0.36
	V_{min}	15.1	14.8	11.7	0.03	-0.06	-1.08
	V_{max}	16.1	15.8	14.0	0.31	0.23	-0.30
T_{min}	V_{nom}	-	-	-			
	V_{min}	-	-	-			
	V_{max}	-	-	-			
T_{max}	V_{nom}	-	-	-			
	V_{min}	-	-	-			
	V_{max}	-	-	-			

Maximum deviation from rated(normal test conditions)dB: -0.06

Maximum deviation from rated(extreme test conditions)dB: -0.29

Section 4. Modulation Characteristics

NAME OF TEST: Modulation Characteristics	PARA. NO.: 2.987
TESTED BY: Tom Tidwell	DATE: 29 Nov. 2004

Measurement Results: Complies.

Measurement Data: See following pages

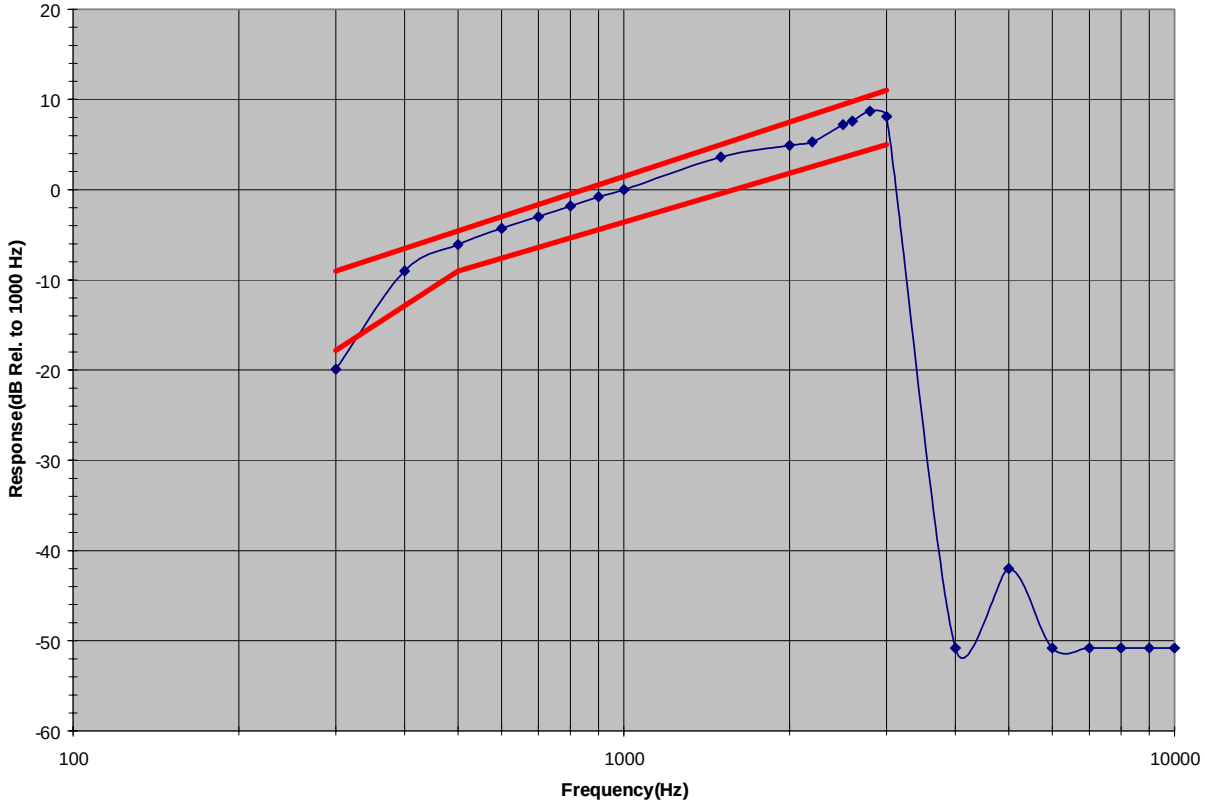
Description of modulation: Modulation input to the radio is voice via a microphone. The radio has three modes of operation:

1) Narrow band voice for 12.5 kHz channels
2) Wideband voice for 25 kHz channels
3) Data modulation. In this mode the voice input signal goes through a Vocoder to translate the audio to data.

Description of baseband filtering: The radio has a low-pass audio filter.

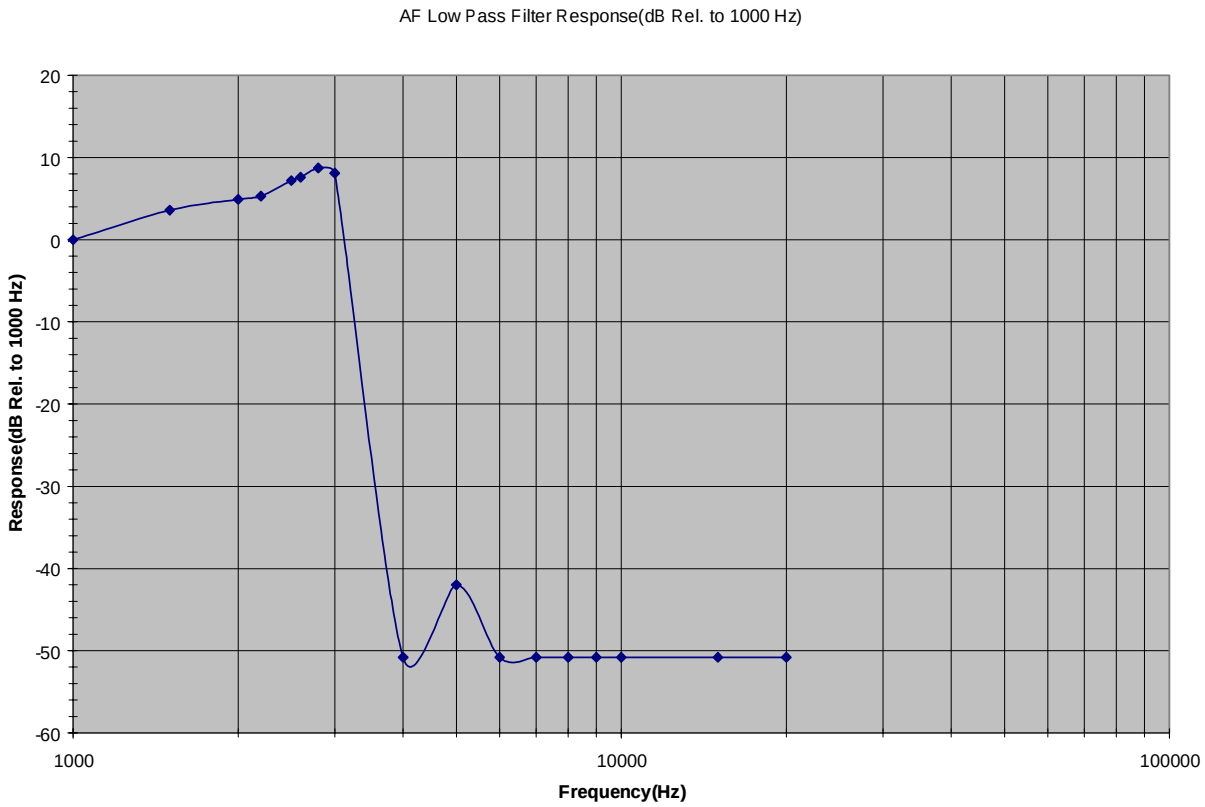
Section 4.1 Audio Frequency Response

NAME OF TEST: Audio Frequency Response	PARA. NO.: 2.987(a)
TESTED BY: Tom Tidwell	DATE: 29 Nov. 2004



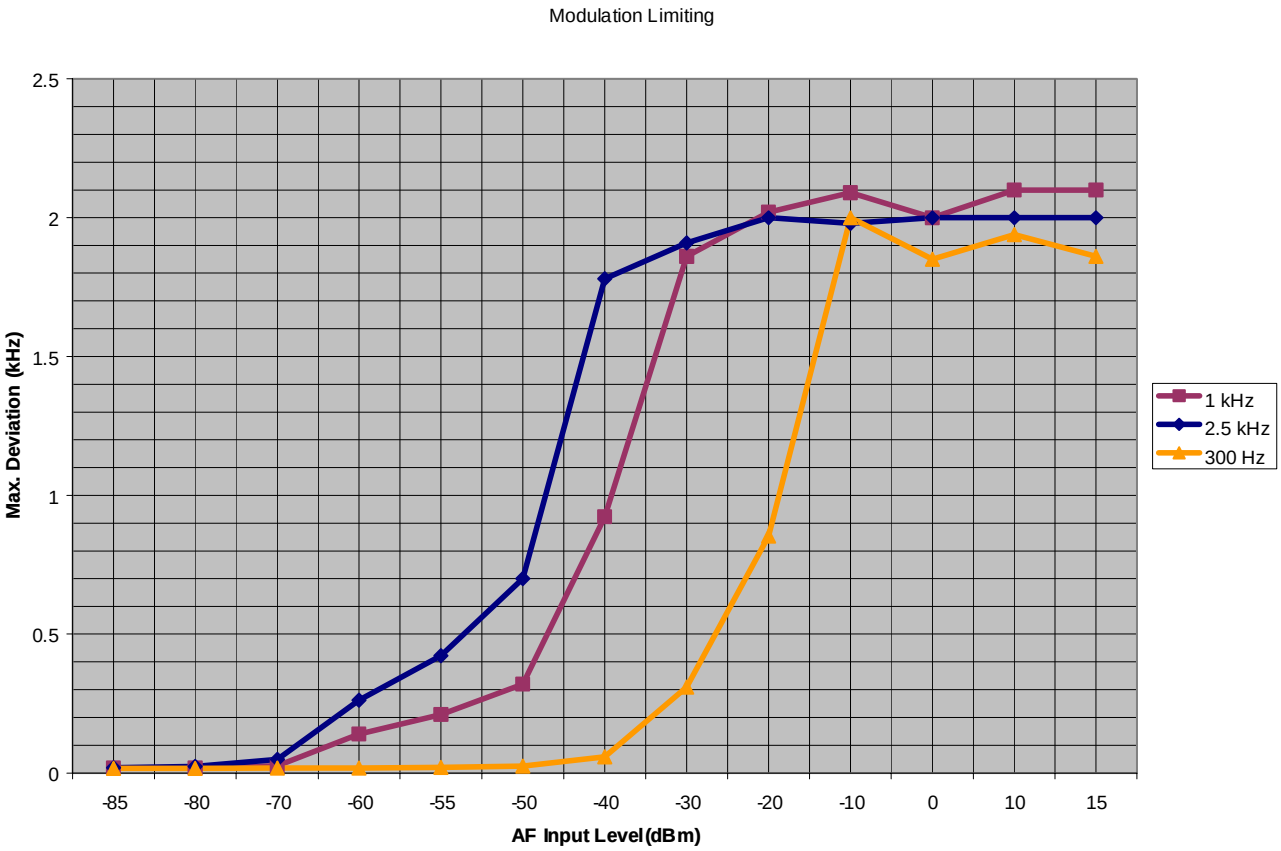
Section 4.2 Audio Low-Pass Filter Response

NAME OF TEST: Audio Low-Pass Filter Response	PARA. NO.: 2.987(a)
TESTED BY: Tom Tidwell	DATE: 29 Nov. 2004



Section 4.3 Modulation Limiting

NAME OF TEST: Modulation Limiting	PARA. NO.: 2.987(b)
TESTED BY: Tom Tidwell	DATE: 29 Nov. 2004



Maximum deviation for non-voice modulation __+/-3__ kHz.

Section 5. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.989
TESTED BY: Tom Tidwell	DATE: 24 Nov. 2004

Measurement Results: Complies.

Measurement Data: See attached data

Nemko Dallas, Inc.

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

Data Plot — Occupied Bandwidth

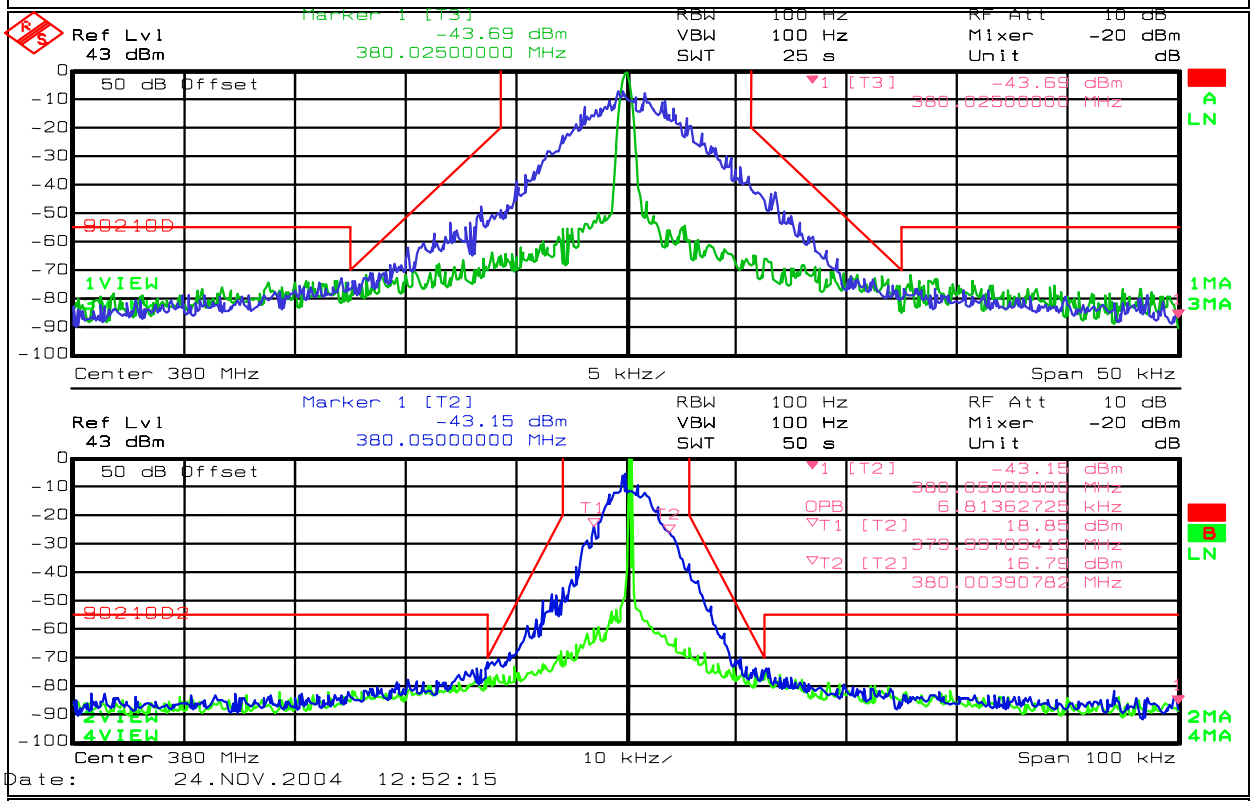
Page 1 of 3

Complete X
Preliminary:

Job No.: 4L0699 Date: 24 Nov. 2004
Specification: Part 90/RSS 119 Temperature(°C): 21
Tested By: Tom Tidwell Relative Humidity(%) 33
E.U.T.: 433X Mobile
Configuration:
Sample Number: 1
Location: Lab 1 RBW: Refer to plots
Detector Type: Peak VBW: Refer to plots

Test Equipment Used

Antenna: Directional Coupler: 1054
Pre-Amp: Cable #1: 1629
Filter: Cable #2:
Receiver: 1036 Cable #3:
Attenuator #1 1064 Cable #4:
Attenuator #2: 1469 Mixer:
Additional equipment used:
Measurement Uncertainty: +/-1.7 dB



Notes: **8K0F1E/8K0F1D - Mask D**
AF Input: -7 dBm

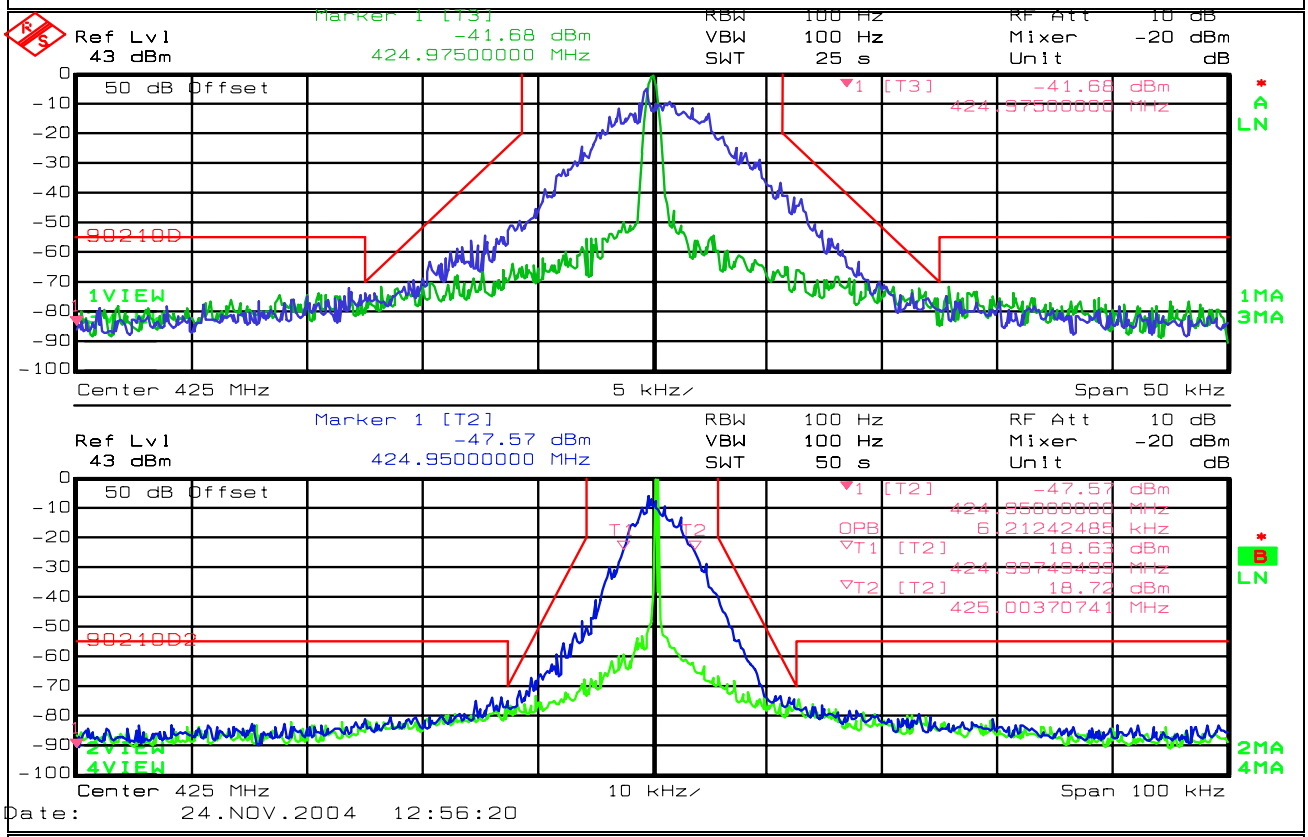
Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.

Data Plot — Occupied Bandwidth

Page 2 of 3

Job No.: 4L0699 Date: 24 Nov. 2004
Specification: Part 90/RSS 119 Temperature(°C): 21
Tested By: Tom Tidwell Relative Humidity(%) 33
E.U.T.: 433X Mobile
Configuration:



Notes: **8K0F1E/8K0F1D - Mask D**
AF Input: -7 dBm

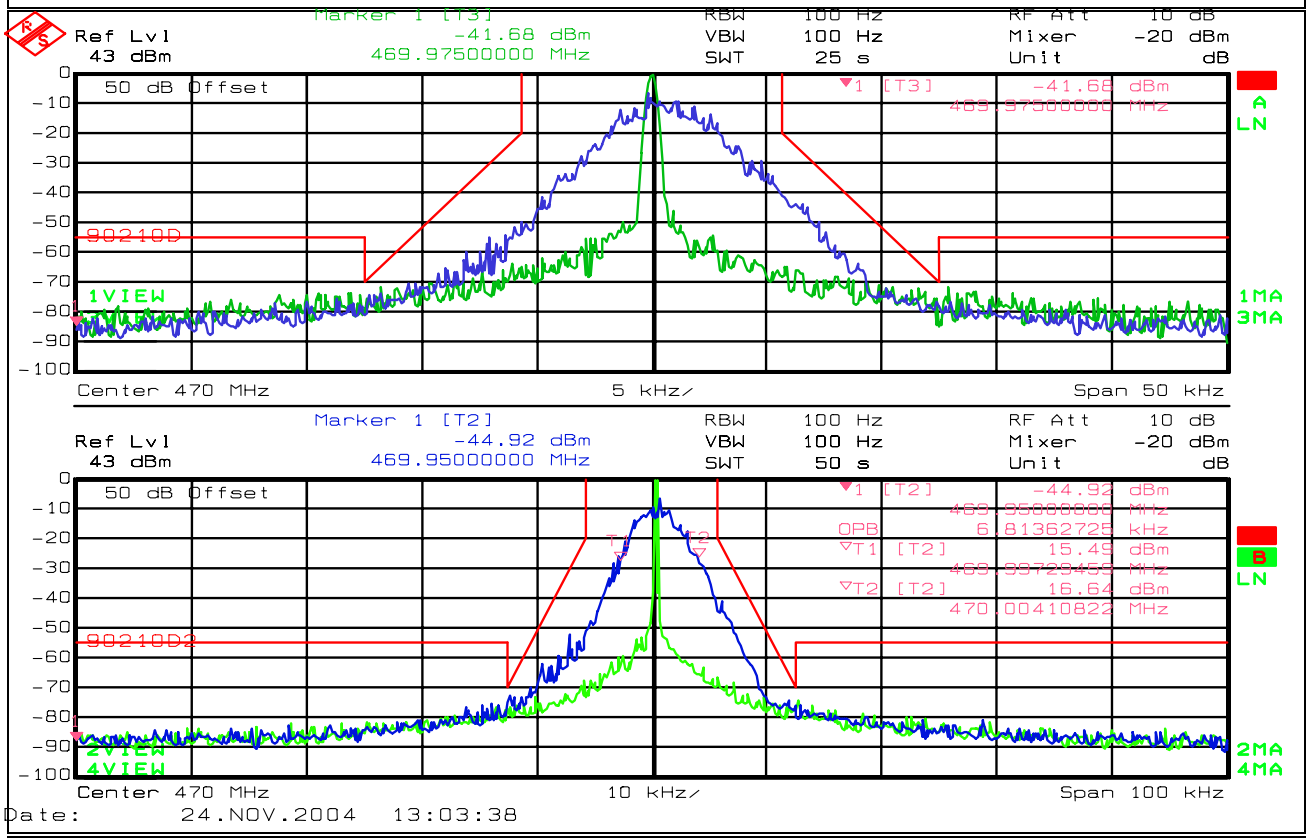
Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.

Data Plot — Occupied Bandwidth

Page 3 of 3

Job No.: 4L0699 Date: 24 Nov. 2004
Specification: Part 90/RSS 119 Temperature(°C): 21
Tested By: Tom Tidwell Relative Humidity(%) 33
E.U.T.: 433X Mobile
Configuration:



Notes: **8K0F1E/8K0F1D - Mask D**
AF Input: -7 dBm

Nemko Dallas, Inc.

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

Data Plot — Occupied Bandwidth

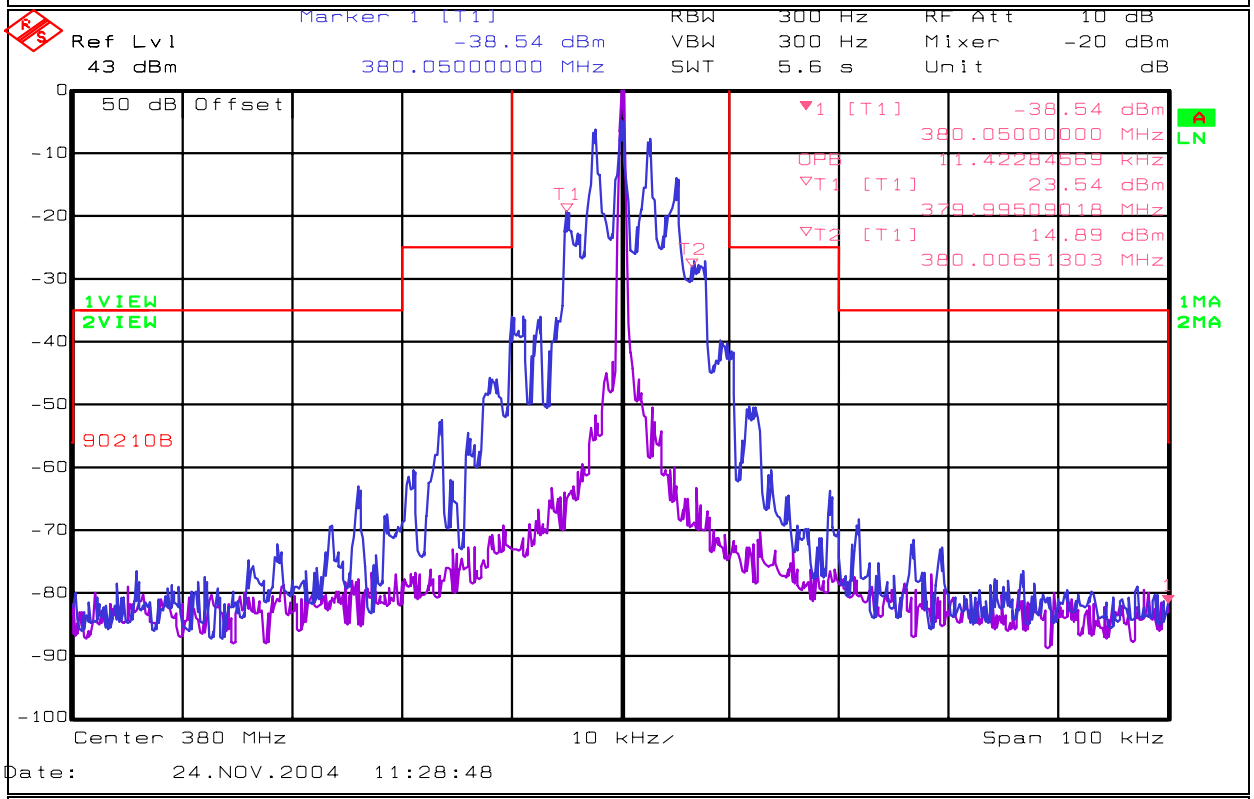
Page 1 of 6

Complete X
Preliminary:

Job No.: 4L0699 Date: 24 Nov. 2004
Specification: Part 90/RSS 119 Temperature(°C): 21
Tested By: Tom Tidwell Relative Humidity(%) 33
E.U.T.: 433X Mobile
Configuration:
Sample Number: 1
Location: Lab 1 RBW: Refer to plots
Detector Type: Peak VBW: Refer to plots

Test Equipment Used

Antenna: Directional Coupler: 1054
Pre-Amp: Cable #1: 1629
Filter: Cable #2:
Receiver: 1036 Cable #3:
Attenuator #1 1064 Cable #4:
Attenuator #2: 1469 Mixer:
Additional equipment used:
Measurement Uncertainty: +/-1.7 dB



Notes:
Wideband - 16K0F3E
AF Input: 2.5 kHz tone at 16db above nominal deviation at 1 kHz
AF level: -7 dBm

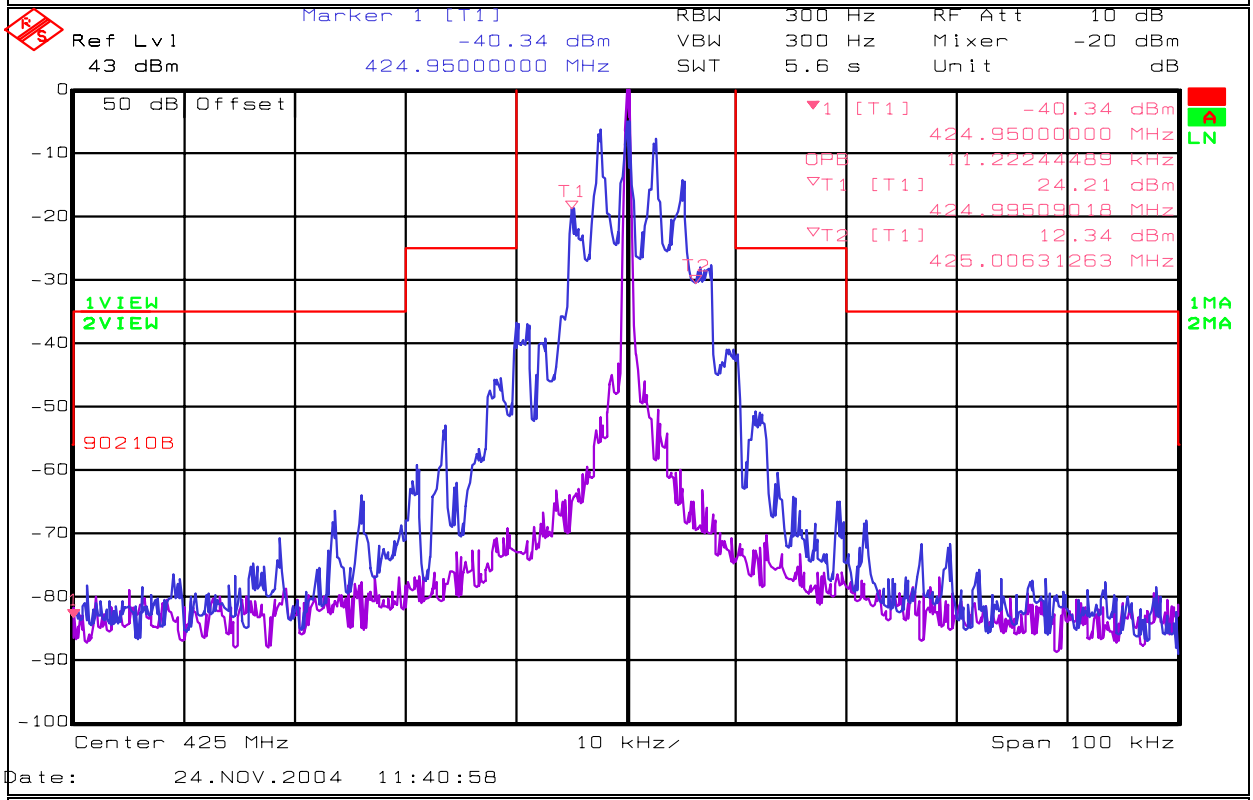
Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.

Data Plot — Occupied Bandwidth

Page 2 of 6

Job No.: 4L0699 Date: 24 Nov. 2004
Specification: Part 90/RSS 119 Temperature(°C): 21
Tested By: Tom Tidwell Relative Humidity(%) 33
E.U.T.: 433X Mobile
Configuration:



Notes:
Wideband - 16K0F3E
AF Input: 2.5 kHz tone at 16db above nominal deviation at 1 kHz
AF level: -7 dBm

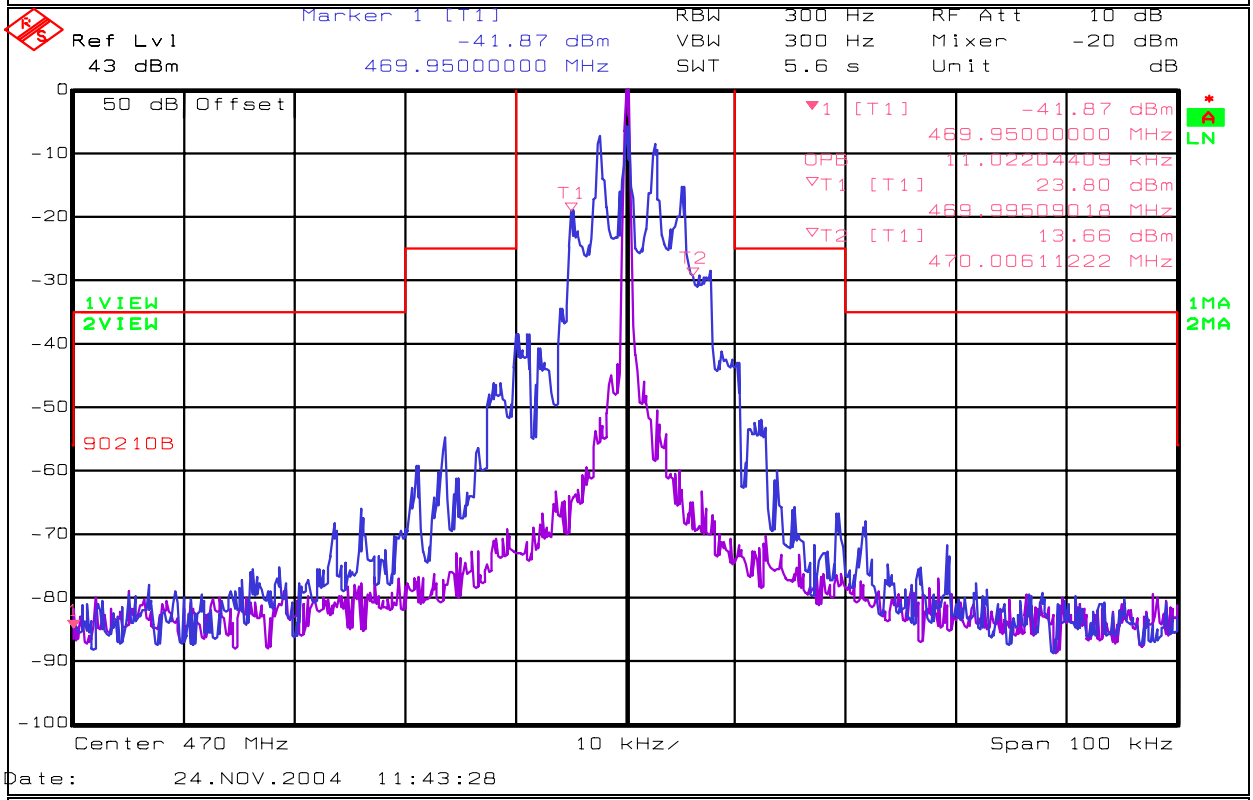
Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.

Data Plot — Occupied Bandwidth

Page 3 of 6

Job No.: 4L0699 Date: 24 Nov. 2004
Specification: Part 90/RSS 119 Temperature(°C): 21
Tested By: Tom Tidwell Relative Humidity(%) 33
E.U.T.: 433X Mobile
Configuration:



Notes:
Wideband - 16K0F3E
AF Input: 2.5 kHz tone at 16db above nominal deviation at 1 kHz
AF level: -7 dBm

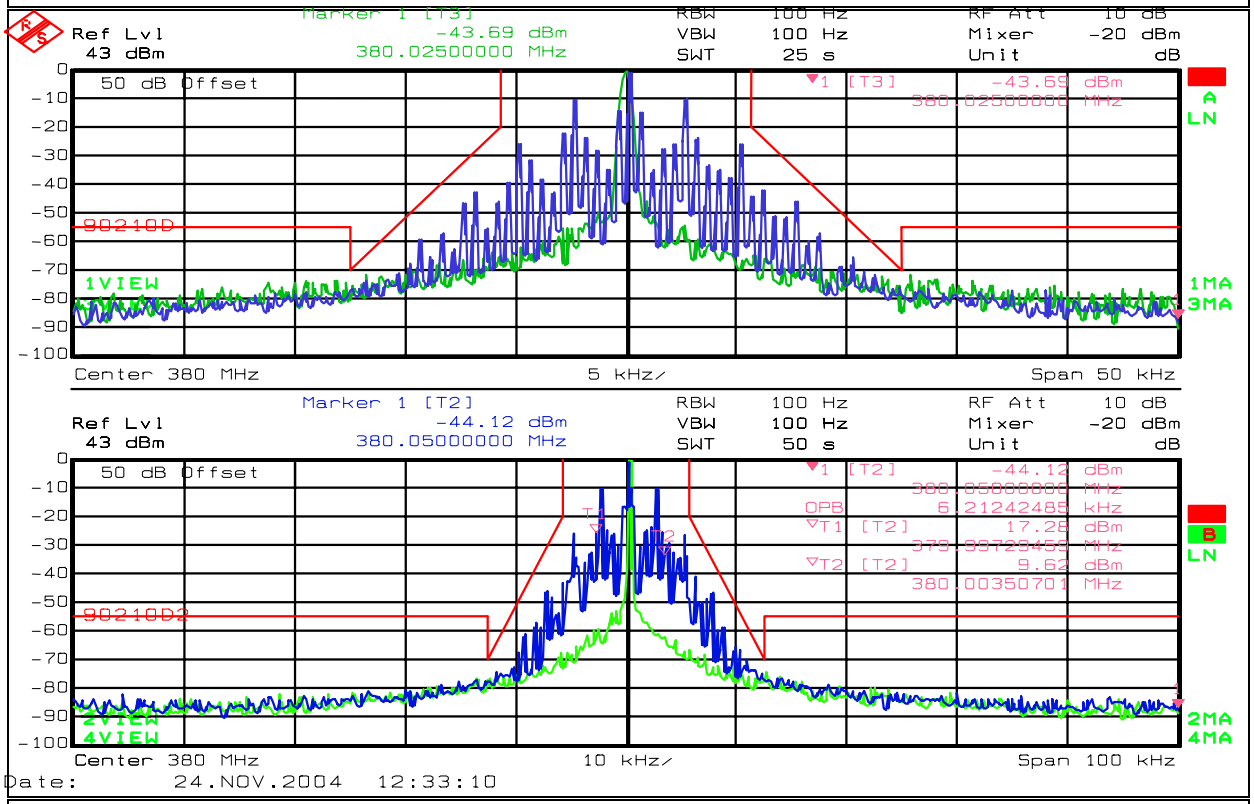
Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.

Data Plot — Occupied Bandwidth

Page 4 of 6

Job No.: 4L0699 Date: 24 Nov. 2004
Specification: Part 90/RSS 119 Temperature(°C): 21
Tested By: Tom Tidwell Relative Humidity(%) 33
E.U.T.: 433X Mobile
Configuration:



Notes:
11K0F3E - Mask D
AF Input: 2.5 kHz tone at 16db above nominal deviation at 1 kHz
AF level: -7 dBm

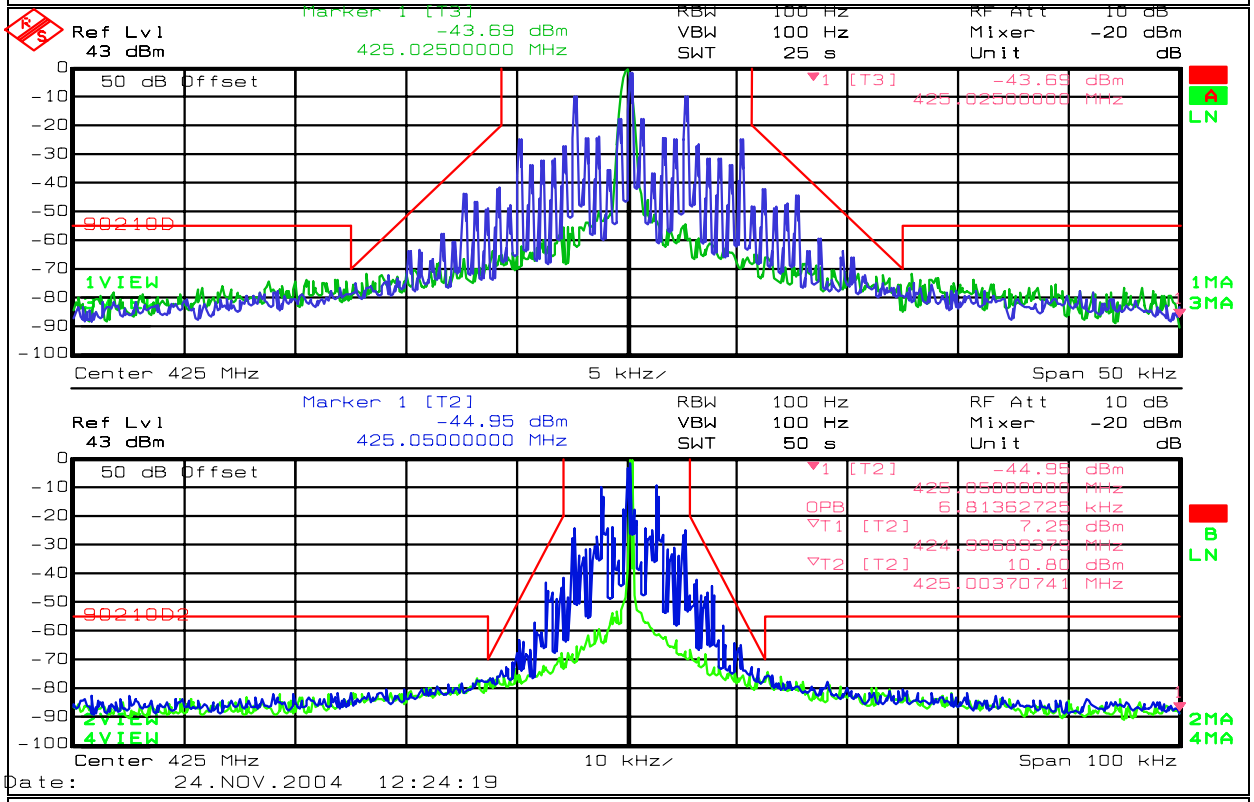
Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.

Data Plot — Occupied Bandwidth

Page 5 of 6

Job No.: 4L0699 Date: 24 Nov. 2004
Specification: Part 90/RSS 119 Temperature(°C): 21
Tested By: Tom Tidwell Relative Humidity(%) 33
E.U.T.: 433X Mobile
Configuration:



Notes:
11K0F3E - Mask D
AF Input: 2.5 kHz tone at 16db above nominal deviation at 1 kHz
AF level: -7 dBm

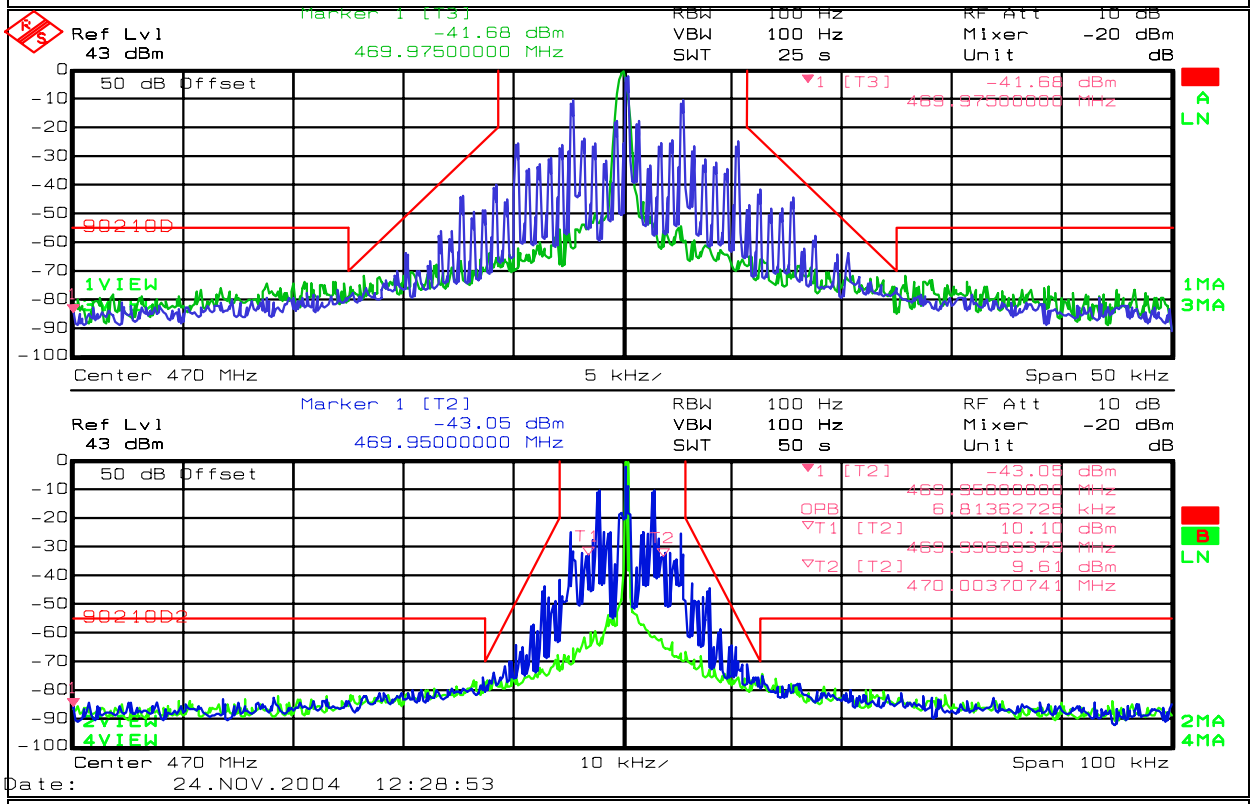
Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.

Data Plot — Occupied Bandwidth

Page 6 of 6

Job No.: 4L0699 Date: 24 Nov. 2004
Specification: Part 90/RSS 119 Temperature(°C): 21
Tested By: Tom Tidwell Relative Humidity(%) 33
E.U.T.: 433X Mobile
Configuration:



Notes:
11K0F3E - Mask D
AF Input: 2.5 kHz tone at 16db above nominal deviation at 1 kHz
AF level: -7 dBm

Section 6. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.991
TESTED BY: Tom Tidwell	DATE: 24 Nov. 2004

Measurement Results: Complies.

Measurement Data: See attached data

Nemko Dallas, Inc.

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

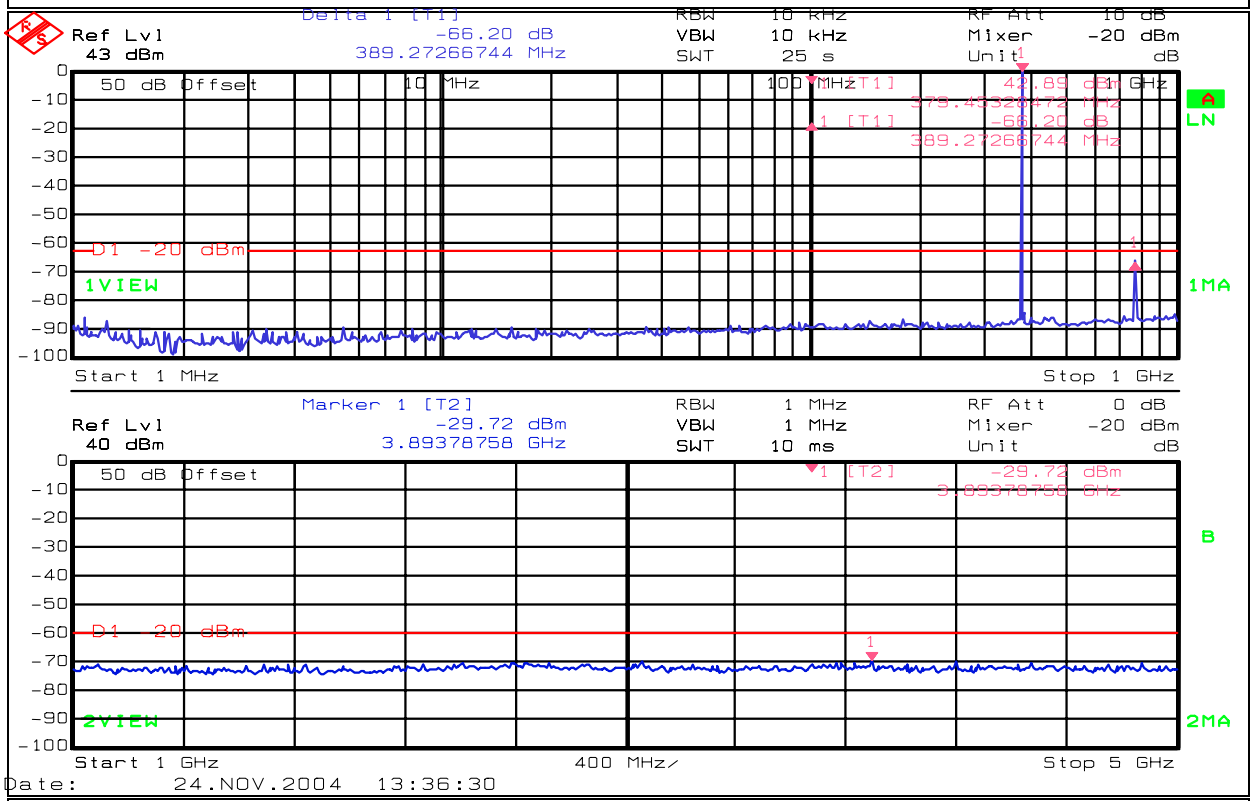
Data Plot — Spurious Emissions at Antenna Terminals

Page 1 of 3 | Complete X | Preliminary:

Job No.: 4L0699 | Date: 24 Nov. 2004
Specification: Part 90/RSS 119 | Temperature(°C): 21
Tested By: Tom Tidwell | Relative Humidity(%) 33
E.U.T.: 433X Mobile
Configuration:
Sample Number: 1
Location: Lab 1 | RBW: Refer to plots
Detector Type: Peak | VBW: Refer to plots

Test Equipment Used

Antenna: | Directional Coupler: 1054
Pre-Amp: | Cable #1: 1629
Filter: | Cable #2:
Receiver: 1036 | Cable #3:
Attenuator #1 1064 | Cable #4:
Attenuator #2: 1469 | Mixer:
Additional equipment used:
Measurement Uncertainty: +/-1.7 dB



Notes: **8K0F1E/8K0F1D - Mask D**
AF Input: -7 dBm

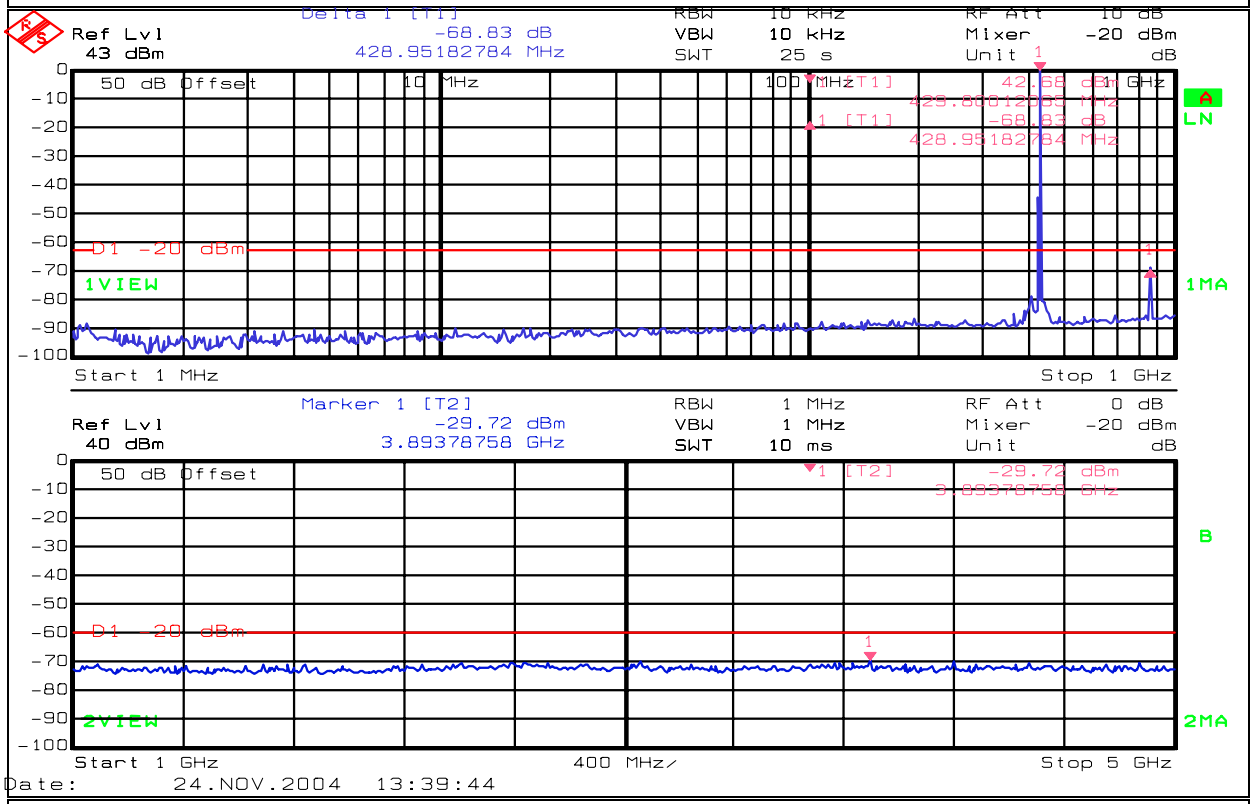
Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.

Data Plot — Spurious Emissions at Antenna Terminals

Page 2 of 3

Job No.: 4L0699 Date: 24 Nov. 2004
Specification: Part 90/RSS 119 Temperature(°C): 21
Tested By: Tom Tidwell Relative Humidity(%) 33
E.U.T.: 433X Mobile
Configuration:



Notes: **8K0F1E/8K0F1D - Mask D**
AF Input: -7 dBm

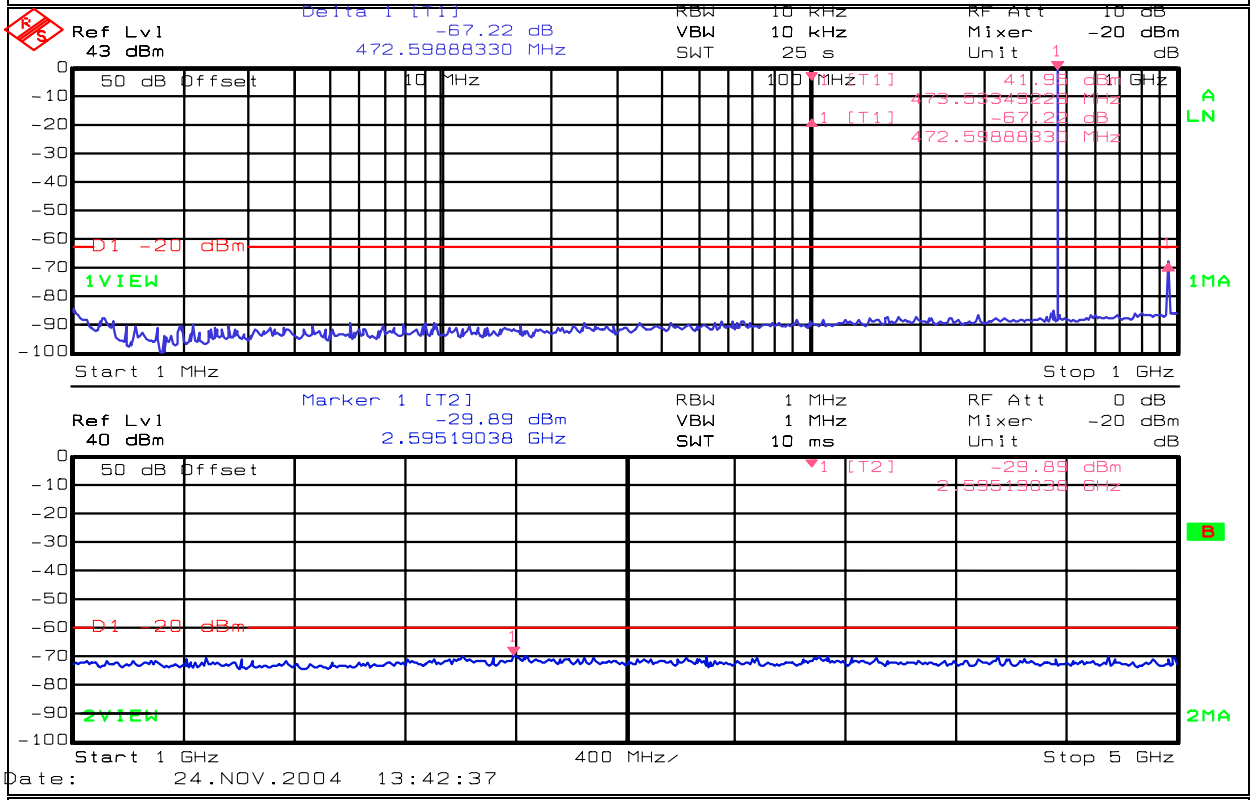
Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.

Data Plot — Spurious Emissions at Antenna Terminals

Page 3 of 3

Job No.: 4L0699 Date: 24 Nov. 2004
Specification: Part 90/RSS 119 Temperature(°C): 21
Tested By: Tom Tidwell Relative Humidity(%) 33
E.U.T.: 433X Mobile
Configuration:



Notes: **8K0F1E/8K0F1D - Mask D**
AF Input: -7 dBm

Nemko Dallas, Inc.

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

Data Plot — Spurious Emissions at Antenna Terminals

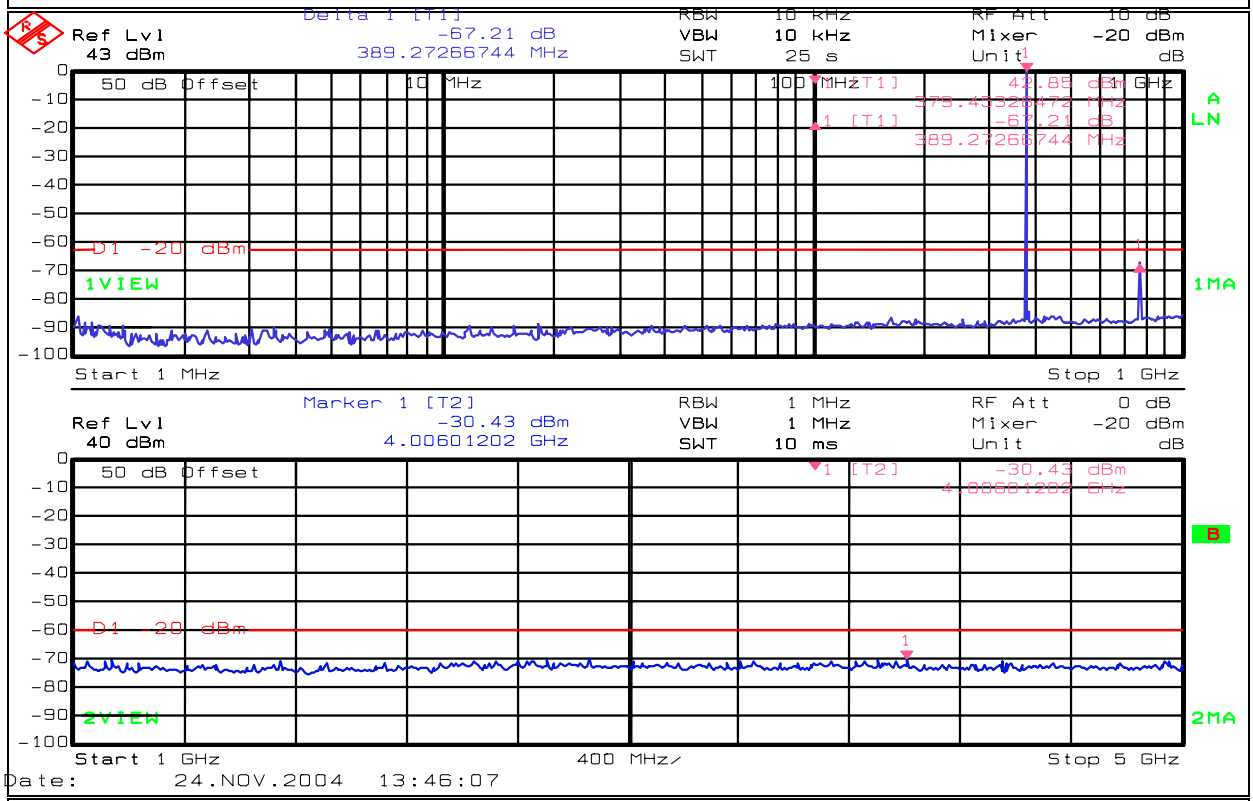
Page 1 of 6

Complete X
Preliminary:

Job No.: 4L0699 Date: 24 Nov. 2004
Specification: Part 90/RSS 119 Temperature(°C): 21
Tested By: Tom Tidwell Relative Humidity(%) 33
E.U.T.: 433X Mobile
Configuration:
Sample Number: 1
Location: Lab 1 RBW: Refer to plots
Detector Type: Peak VBW: Refer to plots

Test Equipment Used

Antenna: Directional Coupler: 1054
Pre-Amp: Cable #1: 1629
Filter: Cable #2:
Receiver: 1036 Cable #3:
Attenuator #1 1064 Cable #4:
Attenuator #2: 1469 Mixer:
Additional equipment used:
Measurement Uncertainty: +/-1.7 dB



Notes:
Wideband - 16K0F3E
AF Input: 2.5 kHz tone at 16db above nominal deviation at 1 kHz
AF level: -7 dBm

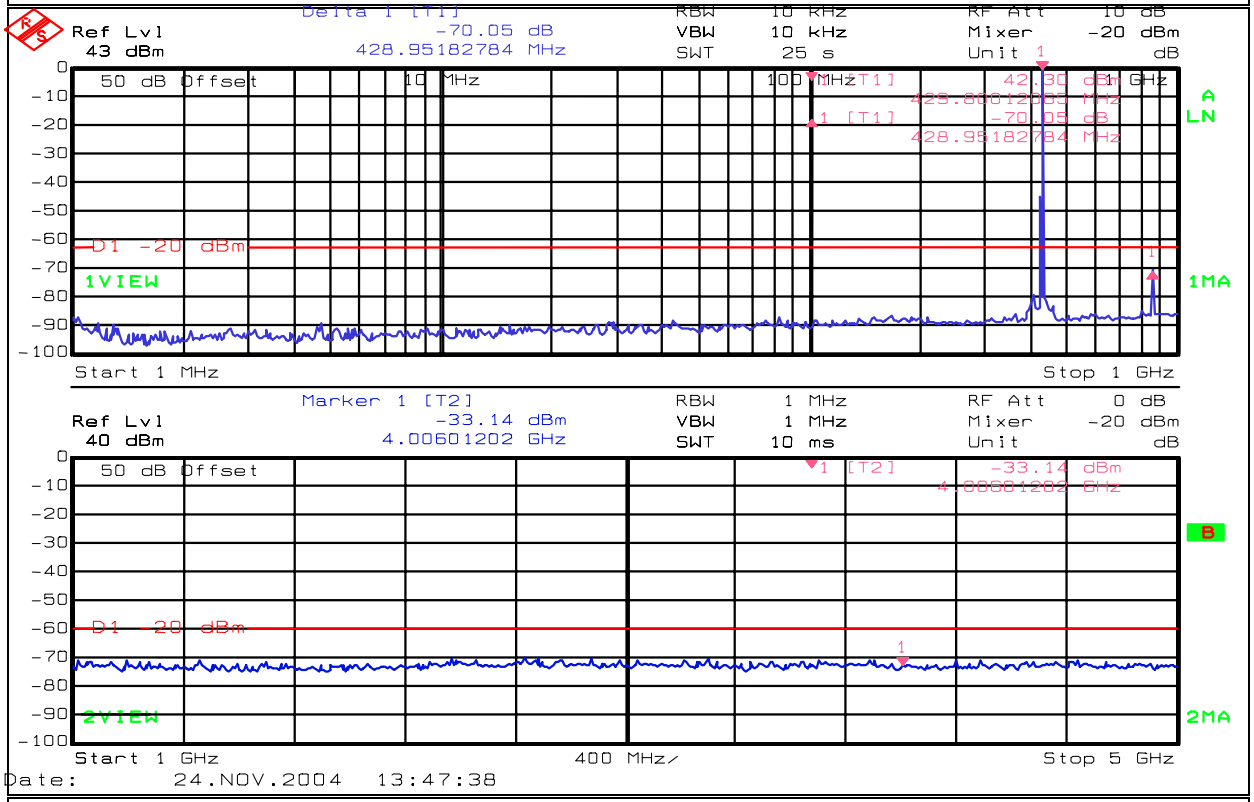
Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.

Data Plot — Spurious Emissions at Antenna Terminals

Page 2 of 6

Job No.: 4L0699 Date: 24 Nov. 2004
Specification: Part 90/RSS 119 Temperature(°C): 21
Tested By: Tom Tidwell Relative Humidity(%) 33
E.U.T.: 433X Mobile
Configuration:



Notes:
Wideband - 16K0F3E
AF Input: 2.5 kHz tone at 16db above nominal deviation at 1 kHz
AF level: -7 dBm

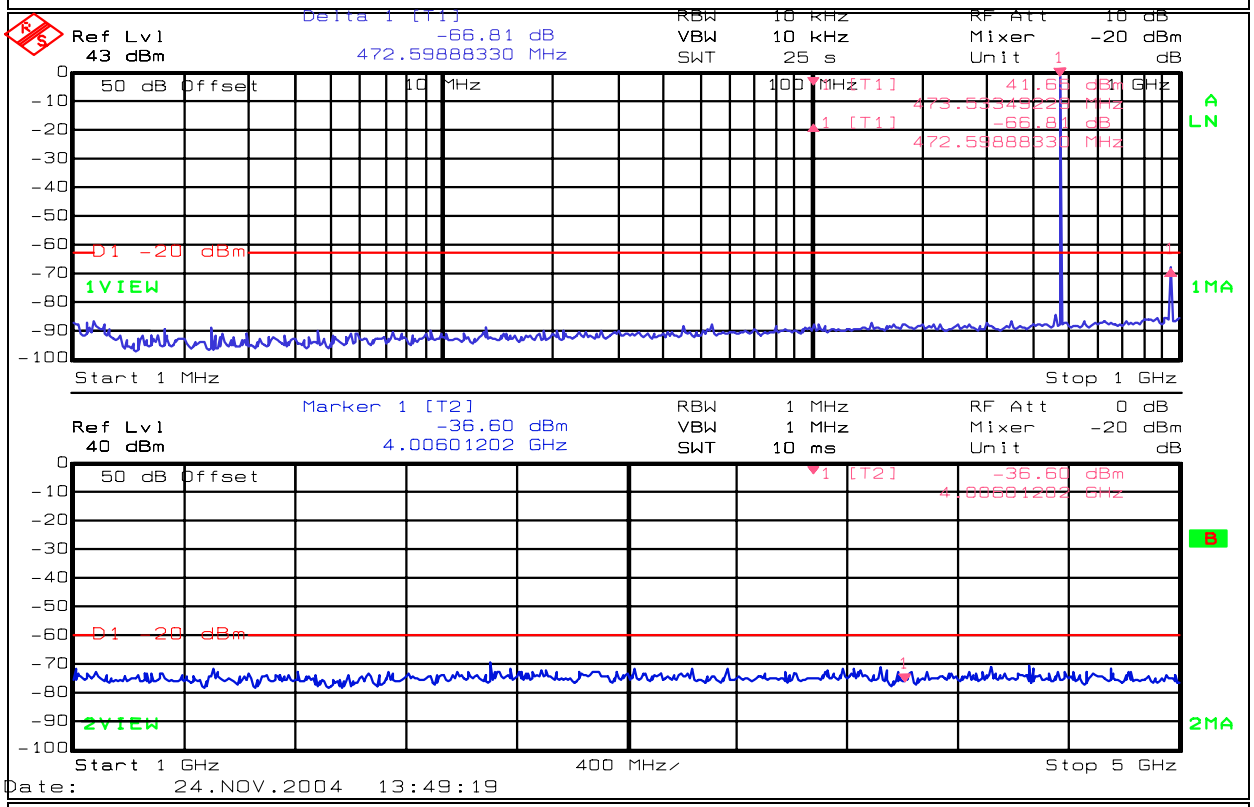
Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.

Data Plot — Spurious Emissions at Antenna Terminals

Page 3 of 6

Job No.: 4L0699 Date: 24 Nov. 2004
Specification: Part 90/RSS 119 Temperature(°C): 21
Tested By: Tom Tidwell Relative Humidity(%) 33
E.U.T.: 433X Mobile
Configuration:



Notes:
Wideband - 16K0F3E
AF Input: 2.5 kHz tone at 16db above nominal deviation at 1 kHz
AF level: -7 dBm

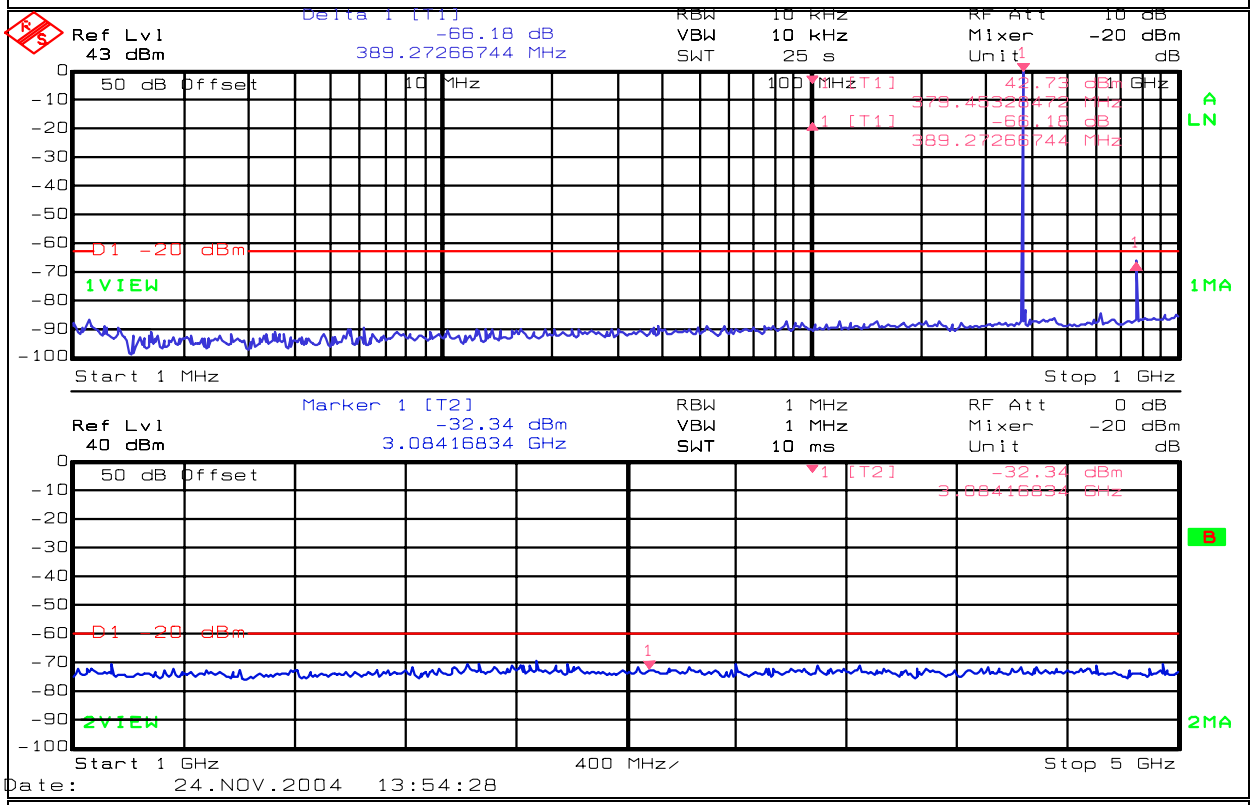
Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.

Data Plot — Spurious Emissions at Antenna Terminals

Page 4 of 6

Job No.: 4L0699 Date: 24 Nov. 2004
Specification: Part 90/RSS 119 Temperature(°C): 21
Tested By: Tom Tidwell Relative Humidity(%) 33
E.U.T.: 433X Mobile
Configuration:



Notes:
11K0F3E - Mask D
AF Input: 2.5 kHz tone at 16db above nominal deviation at 1 kHz
AF level: -7 dBm

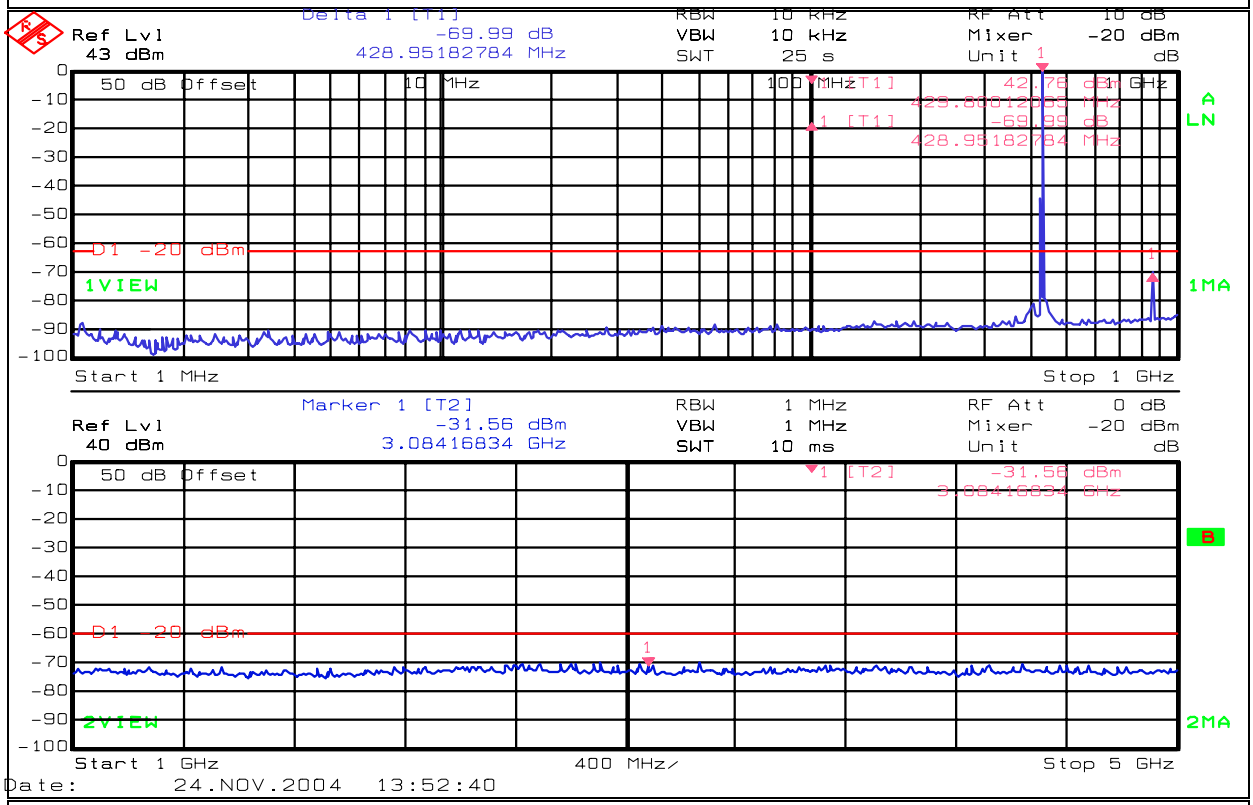
Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.

Data Plot — Spurious Emissions at Antenna Terminals

Page 5 of 6

Job No.: 4L0699 Date: 24 Nov. 2004
Specification: Part 90/RSS 119 Temperature(°C): 21
Tested By: Tom Tidwell Relative Humidity(%) 33
E.U.T.: 433X Mobile
Configuration:



Notes:
11K0F3E - Mask D
AF Input: 2.5 kHz tone at 16db above nominal deviation at 1 kHz
AF level: -7 dBm

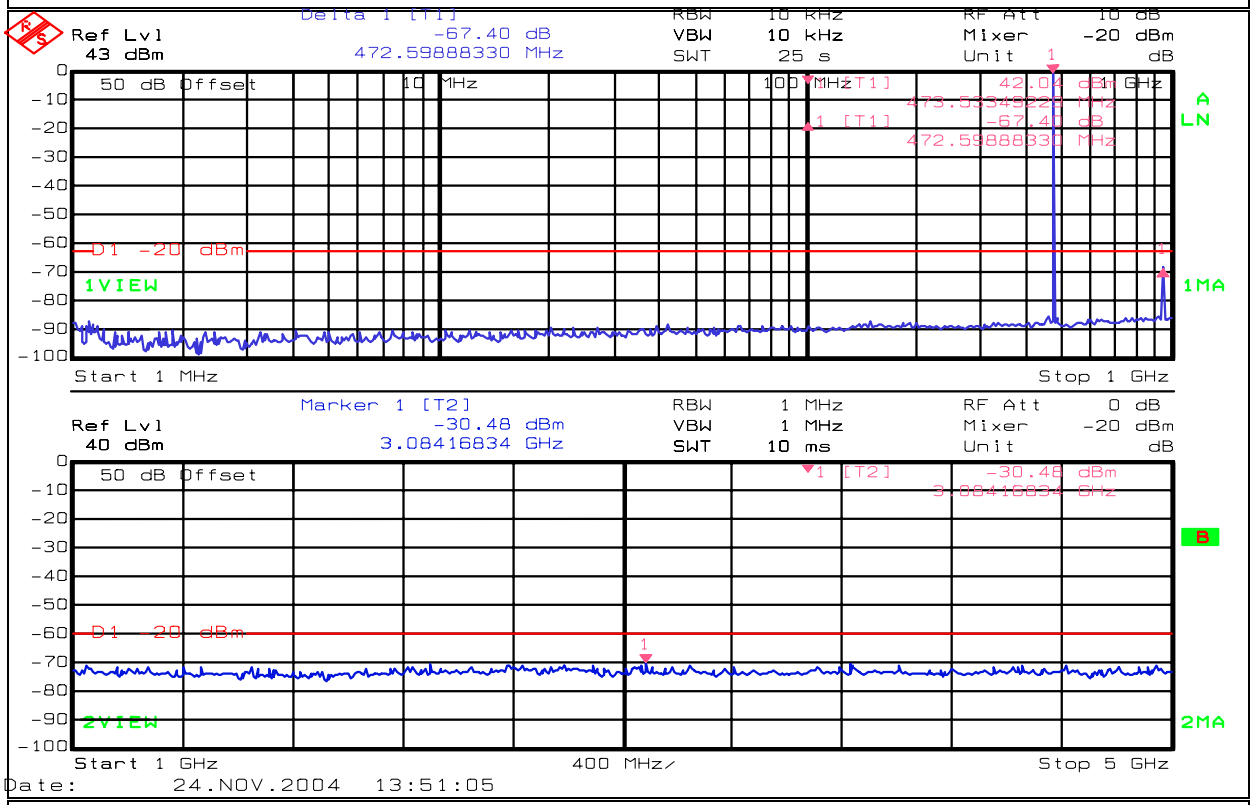
Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.

Data Plot — Spurious Emissions at Antenna Terminals

Page 6 of 6

Job No.: 4L0699 Date: 24 Nov. 2004
Specification: Part 90/RSS 119 Temperature(°C): 21
Tested By: Tom Tidwell Relative Humidity(%) 33
E.U.T.: 433X Mobile
Configuration:



Notes: **11K0F3E - Mask D**
AF Input: 2.5 kHz tone at 16db above nominal deviation at 1 kHz
AF level: -7 dBm

Section 7. Field Strength of Spurious Emissions

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 2.993
TESTED BY: Tom Tidwell	DATE: 29 Nov. 2004

Measurement Results: Complies.

Measurement Data: See attached data

Note: The frequency spectrum was searched from 10 MHz up to 10 GHz. All emissions within 20 dB of the specification limit are reported.

Test Data - Radiated Emissions

Nemko Dallas, Inc.

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

ERP Substitution Method

Page 1 of

Complete X
Preliminary

Job No.: 4L0699 Date: 29 Nov. 2004
Specification: Part 90 Temperature(°C): 19
Tested By: Tom Tidwell Relative Humidity(%) 51
E.U.T.: 433x UHF transceiver
Configuration: TX at 15 watts rf out into a 50 ohm load
Sample No: 1
Location: AC 1 RBW: 1 MHz Measurement
Detector Type: Peak VBW: 1 MHz Distance: 3 m

Test Equipment Used

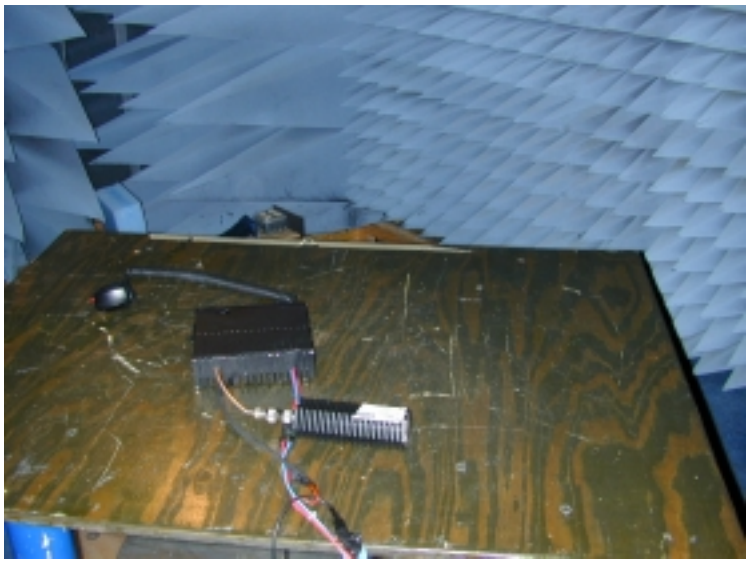
Antenna: 1304 Directional Coupler:
Pre-Amp: Cable #1: 1483
Filter: Cable #2: 1484
Receiver: 1464 Cable #3:
Attenuator #1 Cable #4:
Attenuator #2: Mixer:
Additional equipment used:
Measurement Uncertainty: +/-3.6 dB

Frequency (MHz)	Meter Reading (dBm)	Substitution Level (dBm)		Pre-Amp Gain (dB)	Substitution Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarity	Comments
851	-53.6	-21.4			4.9	-21.4	-20.0	-1.4333	V	
851	-52.6	-22.3			4.9	-22.3	-20.0	-2.2667	H	
1275	-59.6	-28.1			4.9	-28.1	-20.0	-8.1000	V	
1275	-61.0	-30.3			4.9	-30.3	-20.0	-10.3333	H	
1700	-67.0	-36.0			7.3	-36.0	-20.0	-16.0000	V	
1700	-68.0	-35.0			7.3	-35.0	-20.0	-15.0000	H	
2125	-67.0	-32.8			6.8	-32.8	-20.0	-12.8333	V	
2125	-68.0	-31.0			6.8	-31.0	-20.0	-11.0000	H	
2550	-68.0	-32.5			8.0	-32.5	-20.0	-12.5000	V	
2550	-68.0	-32.5			8.0	-32.5	-20.0	-12.5000	H	
2975	-68.0	-32.5			8.0	-32.5	-20.0	-12.5000	V	
2975	-68.0	-32.5			8.0	-32.5	-20.0	-12.5000	H	
3400	-68.0	-28.2			8.0	-28.2	-20.0	-8.1667	V	
3400	-68.0	-31.7			8.0	-31.7	-20.0	-11.6667	H	
3825	-68.0	-24.7			8.6	-24.7	-20.0	-4.6667	V	
3825	-68.0	-32.5			8.6	-32.5	-20.0	-12.5000	H	
4250	-68.0	-22.7			8.2	-22.7	-20.0	-2.6667	V	
4250	-68.0	-33.2			8.2	-33.2	-20.0	-13.1667	H	
4675	-68.0	-24.0			8.7	-24.0	-20.0	-4.0000	V	
4675	-68.0	-32.5			8.7	-32.5	-20.0	-12.5000	H	

Photographs of Test Setup

FRONT VIEW

REAR VIEW



Section 8. Frequency Stability

NAME OF TEST: Frequency Stability	PARA. NO.: 2.995
TESTED BY: Tom Tidwell	DATE: 29 Nov. 2004

Measurement Results: Complies.

Measurement Data: See attached data

Nemko Dallas, Inc.

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

Frequency Stability

Page 1 of 1

Job No.: 4L0699 Date: 29 Nov. 2004
Specification: Part 90/Rss 119 Temperature(°C): See data
Tested By: Tom Tidwell Relative Humidity(%) See data
E.U.T.: 433x transceiver
Configuration: Full TX power, CW
Sample Number: 1

Test Equipment Used

Antenna: Directional Coupler:
Pre-Amp: Cable #1:
Counter: 1026 Cable #2:
Receiver:
Attenuator #1 1064
Attenuator #2: 1604

Measurement Uncertainty: $1x10^{-17}$ppm **Standard Test Frequency 425.000000 MHz**

Temp (°C)	Measured Frequency (MHz)	Rho	Test Voltage	Freqeuncy Error (Hz)	Limit (+/-Hz)	Error (ppm)	Comment
20	425.000169	-	10.2	169	637.5	0.4	
20	425.000157	-	12.0	157	637.5	0.4	
20	425.000170	-	13.6	170	637.5	0.4	
		-					
50	425.000240	-	12	240	637.5	0.6	
40	425.000235	-	12	235	637.5	0.6	
30	425.000212	-	12	212	637.5	0.5	
		-					
10	425.000174	-	12	174	637.5	0.4	
0	425.000055	-	12	55	637.5	0.1	
-10	425.000056	-	12	56	637.5	0.1	
-20	425.000053	-	12	53	637.5	0.1	
-30	425.000048	-	12	48	637.5	0.1	

Notes:

Section 9. Transient Frequency Behaviour

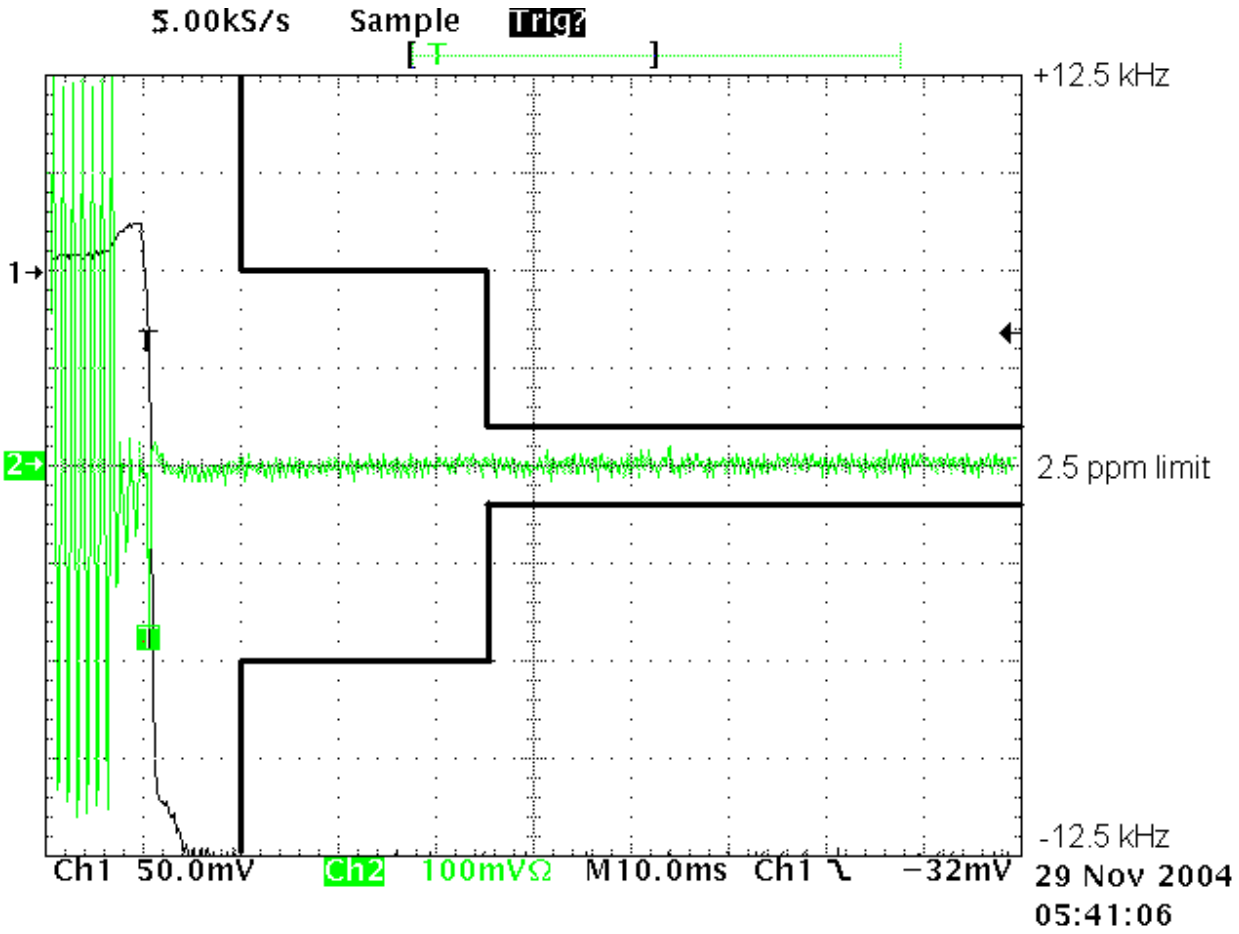
NAME OF TEST: Transient Frequency Behaviour	PARA. NO.: 90.214
TESTED BY: Tom Tidwell	DATE: 29 Nov. 2004

Measurement Results: Complies.

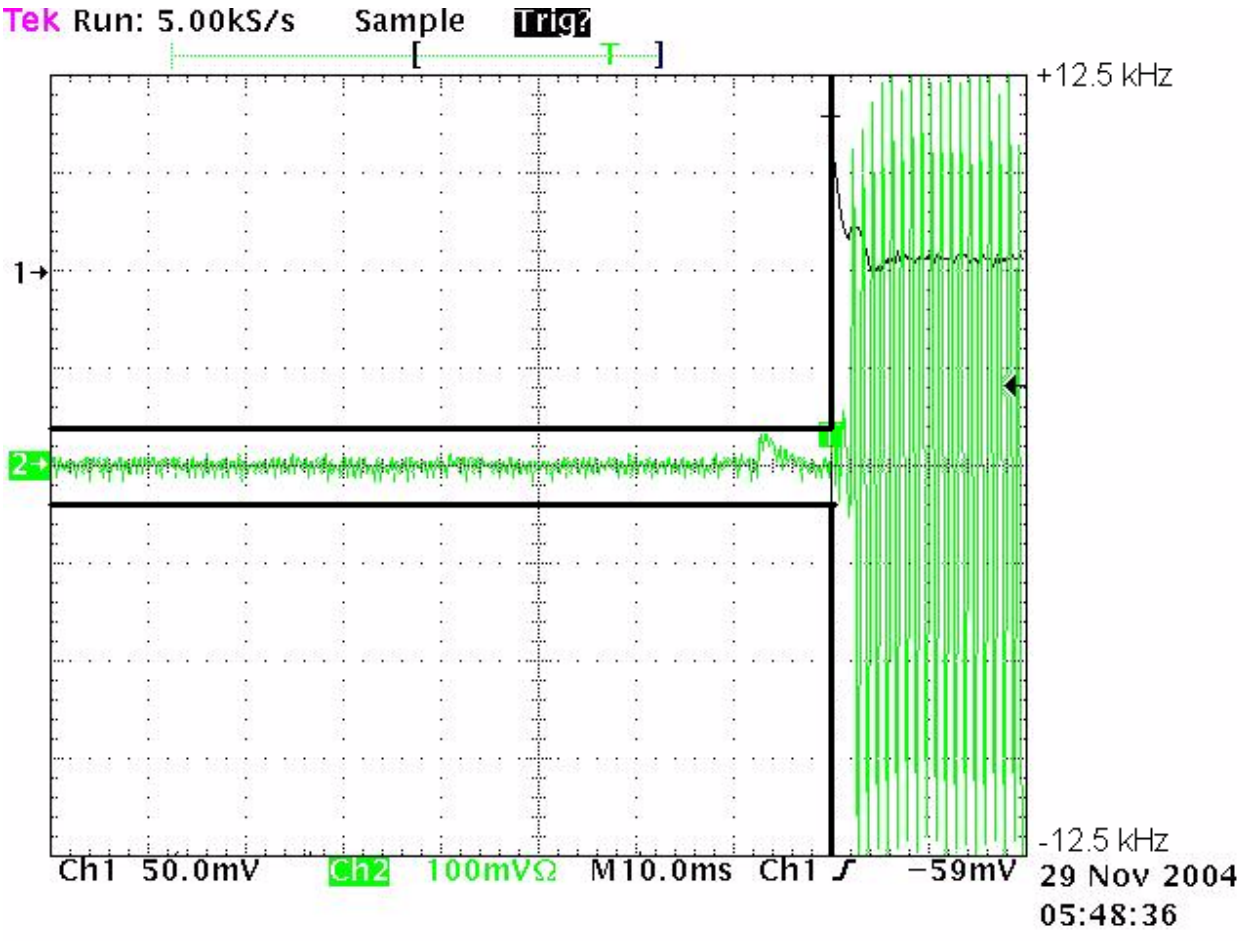
Measurement Data: See attached data

Measurement Conditions:

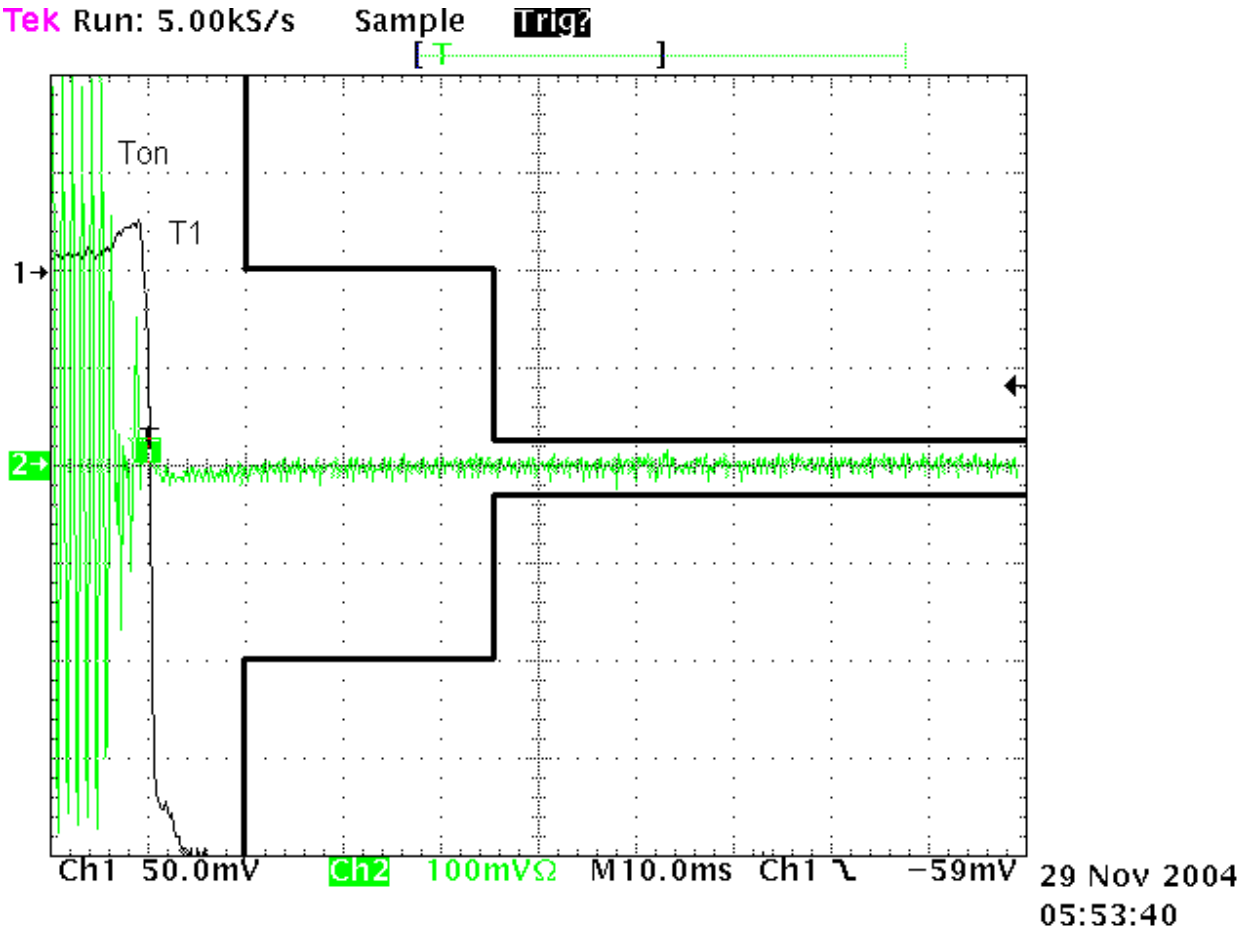
Temperature:	21	°C
Humidity:	53	%



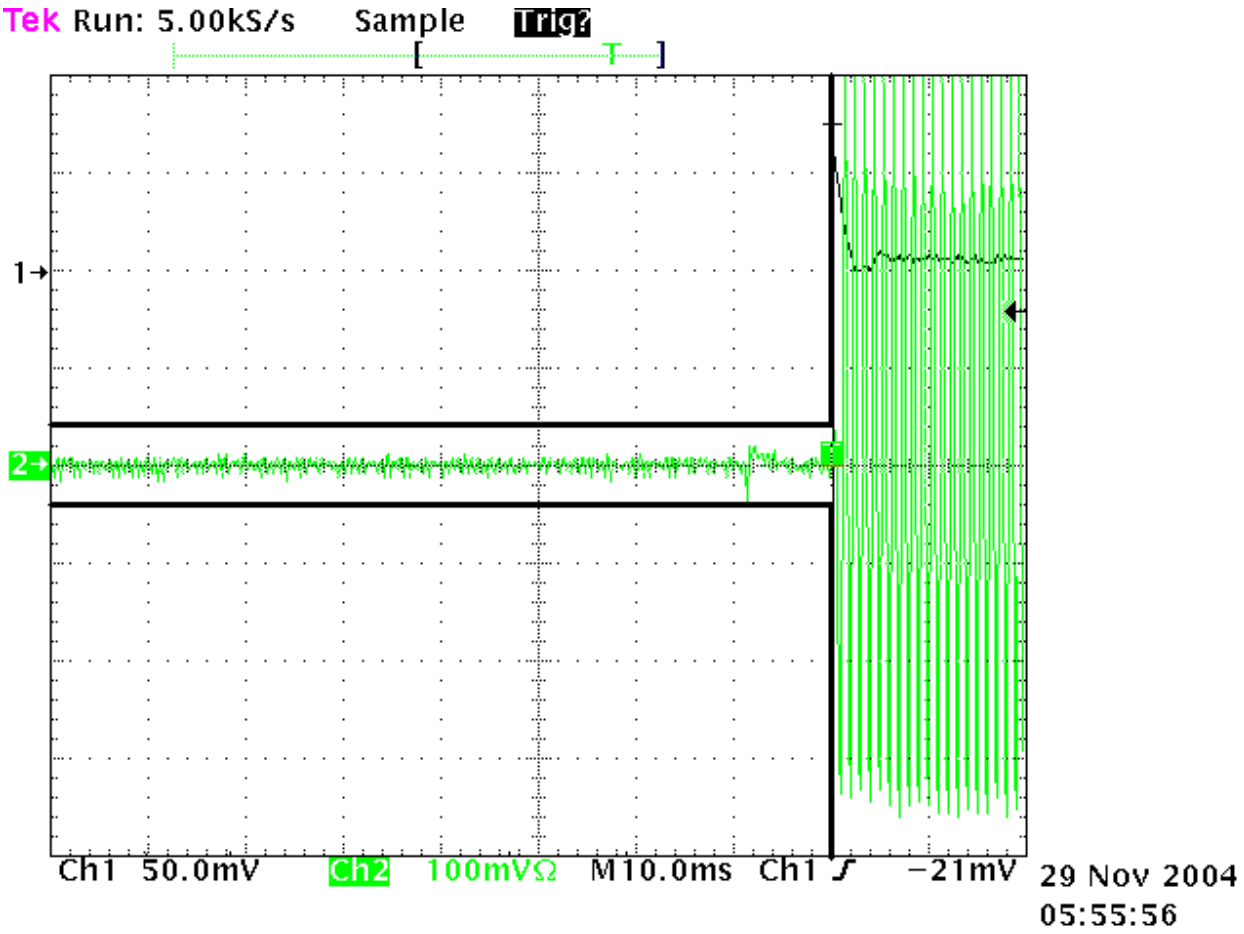
Switch on Condition – 12.5 kHz Channel Spacing



Switch off Condition – 12.5 kHz Channel Spacing



Switch On Condition – 25 kHz Channel Spacing



Switch Off Condition – 25 kHz Channel Spacing

Section 10. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
2072	Power Meter	HP E4418B	GB39401848	03/12/04	03/12/05
2071	Power Sensor	Agilent E9304A	MY41495174	n/a	n/a
1048	50 OHM LOAD	NARDA 27470	254	Cal B4 Use	N/A
1064	ATTENUATOR	NARDA 776B-20	NONE	CBU	N/A
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	03/22/04	03/23/06
1469	10 db Attenuator DC 18 GHz	MCL Inc. BW-S10W2 10db	NONE	CBU	N/A
1054	DUAL DIRECTIONAL COUPLER	NARDA 3020A	34366	Cal Not Req	N/A
1629	CABLE, 6 ft	MEGAPHASE 10311 1GVT4	N/A	CBU	N/A
1304	HORN ANTENNA	ELECTRO METRICS RGA-60	6151	09/22/03	09/22/05
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	07/30/04	07/31/06
1483	Cable 4m	Storm PR90-010-144	N/A	04/14/04	04/13/05
1484	Cable 2.0-18.0 Ghz	Storm PR90-010-072	N/A	08/26/04	08/26/05
1026	FREQUENCY COUNTER	HEWLETT PACKARD 5350B	8232A01493	01/23/04	01/22/05
1051	Radio Communication Analyzer	Rhode & Schwarz CMTA-54	835875/002	03/12/04	03/12/05
1053	SIGNAL GENERATOR	ROHDE & SCHWARZ SMIQ 03	DE22081	06/10/04	06/09/05
765	RECEIVER (20-1000 MHz)	ROHDE & SCHWARZ ESVS 30	843710/0001	09/12/04	09/11/05
616	Oscilloscope digital storage	Tektronix 468	B033169	10/11/04	10/11/05
981	Antenna, Loop	Rohde&Schwarz HFH2-Z2	871336/20	Cal Not Req	N/A

ANNEX A - TEST METHODOLOGIES

NAME OF TEST: RF Power Output	**PARA. NO.: 2.985**

Minimum Standard: Para. No. 90.205(a). The maximum allowable station ERP is dependent upon the stations HAAT and required service area and will be authorized in accordance with Table 1 of 90.205(d).

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.

NAME OF TEST: Audio Frequency Response	**PARA. NO.: 2.987(a)**

Test Method: TIA/EIA-603

Minimum Standard: TIA/EIA-603, Para. 3.2.6 from 300 Hz to 3000 Hz. The transmitter audio frequency response shall have a nominal 6 dB per octave pre-emphasis characteristic.

NAME OF TEST: Audio Low-Pass Filter Frequency Response	**PARA. NO.: 2.987(a)**

Test Method: TIA/EIA-603

Minimum Standard: TIA/EIA-603

NAME OF TEST: Modulation Limiting	**PARA. NO.: 2.987(a)**

Test Method: TIA/EIA-603

Minimum Standard: TIA/EIA-603

NAME OF TEST: Occupied Bandwidth **PARA. NO.: 2.989**

Minimum Standard: Para. No. 90.210, see table 1 below for applicable mask.

Table 1

Frequency Band (MHz)	Mask for equipment with Low Pass Filter	Mask for equipment without Low Pass Filter
Below 25	A or B	A or C
25 - 50	B	C
72 - 76	B	C
150 - 174	B, D or E	C, D or E
150 Paging only	B	C
220 - 222	F	F
421 - 512	B, D or E	C, D or E
450 paging only	B	H
806 - 821/ 851 - 866	B	G
821 - 824/ 866 - 869	B	H
896 - 901/ 935 - 940	I	J
902 - 928	K	K
929 - 930	B	G
Above 940	B	C
All other bands	B	C

Test Method:

RBW: 1% of emission bandwidth in 0 - 1 GHz range. 1 MHz at frequencies above 1 GHz.
VBW: $\Rightarrow$ RBW

The spectrum is search up to 10 times the fundamental frequency.

NAME OF TEST: Field Strength of Spurious **PARA. NO.: 2.993**

Minimum Standard: Para. No. 90.210, see table 1 for applicable mask.

Test Method: The substitution antenna method was used to measure erp of spurious emissions. This method is described in EIA/TIA 603. The field strength of the emission is measured and recorded. The EUT is then replaced with a substitution antenna of known gain against a dipole. The substitution antenna is fed with a calibrated signal which is adjusted until the previously recorded value is repeated. The erp of the spurious signal is the level required to repeat the previously measured level. If the substitution antenna gain is calibrated and expressed as dBi (referenced to an isotropic radiator instead of a dipole), the result is adjusted by 2.15 dB so that the result is erp not eirp.

NAME OF TEST: Frequency Stability PARA. NO.: 2.995

Minimum Standard: Para. No. 990.213. The transmitter carrier frequency shall remain within the assigned frequency below in ppm.

Table 2

Frequency Band (MHz)	Fixed And Base Stations	Mobile Stations	
		> 2 Watts o/p pwr	< 2 Watts o/p pwr
Below 25	100	100	200
25 - 50	20	20	50
72 - 76	5	-	50
150 - 174	5	5	5
220 - 222	0.1	1.5	1.5
421 - 512	2.5	5	5
806 - 821	1.5	2.5	2.5
821 - 824	1.0	1.5	15
851 - 866	1.5	2.5	2.5
866 - 869	1.0	1.5	1.5
869 - 901	0.1	1.5	1.5
902 - 928	2.5	2.5	2.5
929 - 930	1.5	-	-
935 - 940	0.1	1.5	1.5
1427 - 1435	300	300	300
Above 2450	-	-	-

NAME OF TEST: Transient Frequency Behaviour PARA. NO.: 2.214

Minimum Standard:

Transient Frequency Behaviour for Equipment Designed to Operate on 25 kHz Channels

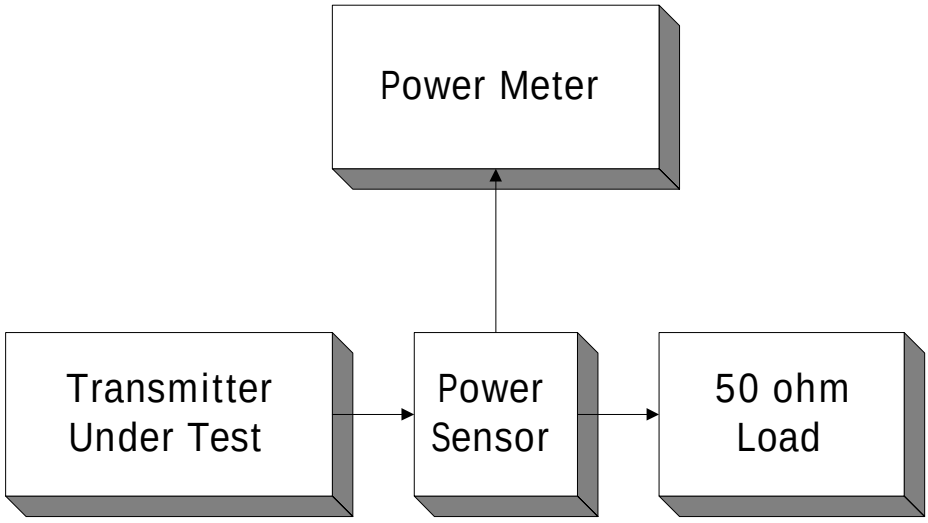
		Frequency ranges (MHz) All equipment					
	Maximum	Base station and portable radios			Mobile Radios		
Time intervals [1,2]	Frequency difference[3] (kHz)	150 - 174 (ms)	450 - 500 (ms)	500 - 512 (ms)	150 - 174 (ms)	450 - 500 (ms)	500 - 512 (ms)
t_1[4]	± 25	5.0	10.0	20.0	5.0	10.0	5.0
t_2	± 12	20.0	25.0	50.0	20.0	25.0	20.0
t_3[4]	± 25	5.0	10.0	10.0	5.0	10.0	5.0

Transient Frequency Behaviour for Equipment Designed to Operate on 12.5 kHz & 6.25 kHz Channels

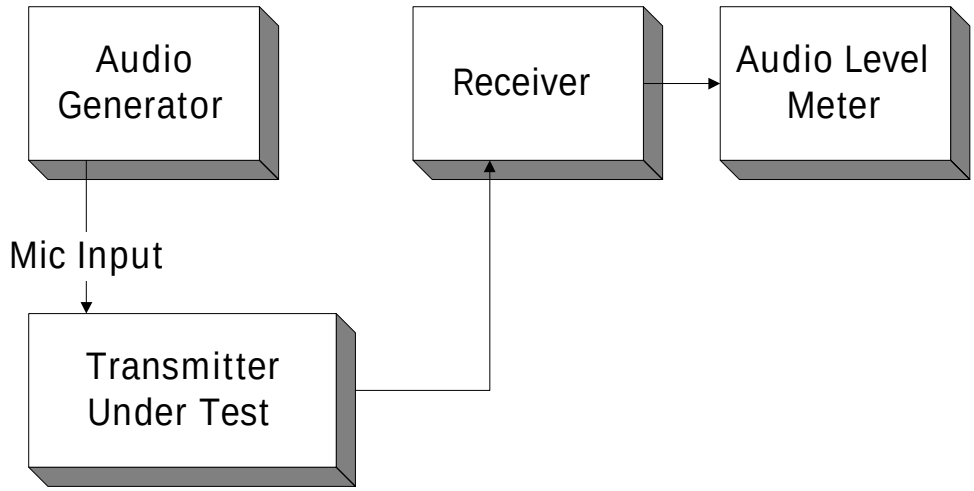
	Maximum	Frequency ranges (MHz) All equipment		
Time intervals [1,2]	Frequency difference[3] (kHz)	150 - 174 (ms)	450 - 500 (ms)	500 - 512 (ms)
t_1[4]	± 12.5 / ± 6.25	5.0	10.0	20.0
t_2	± 6.25 / ± 3.125	20.0	25.0	50.0
t_3[4]	± 12.5 / ± 6.25	5.0	10.0	10.0

ANNEX B - TEST DIAGRAMS

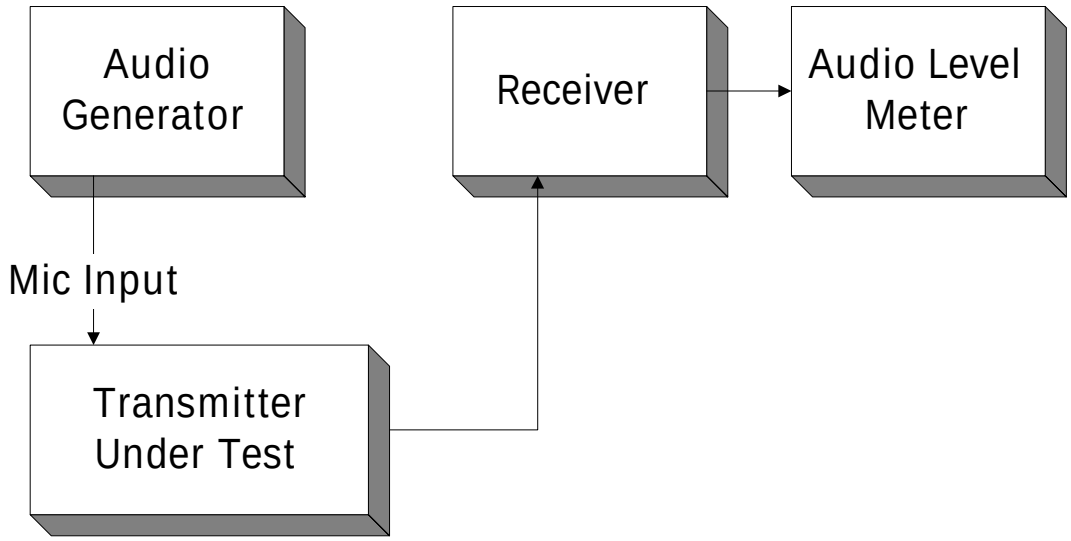
Para. No. 2.985 - R.F. Power Output



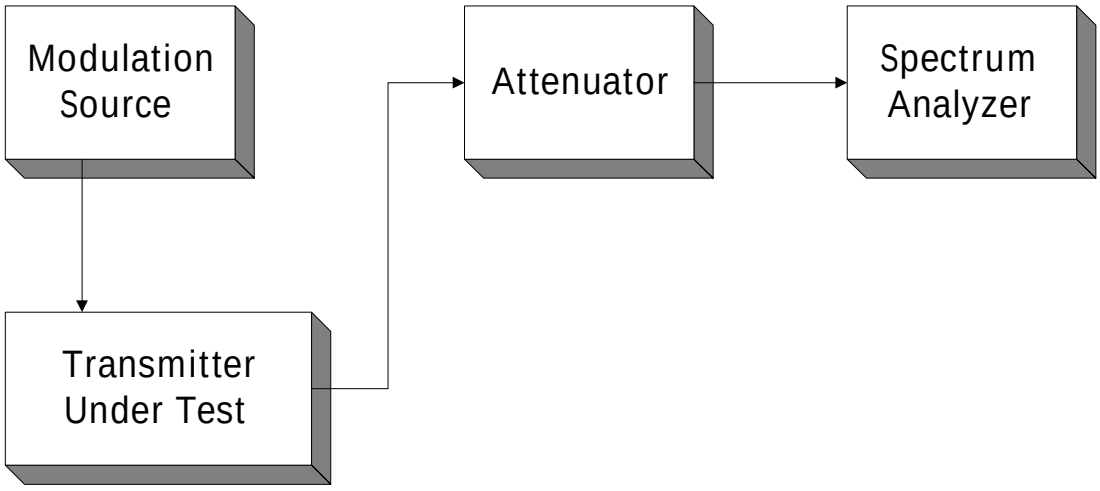
Para. No. 2.987(a) - Audio Frequency Response



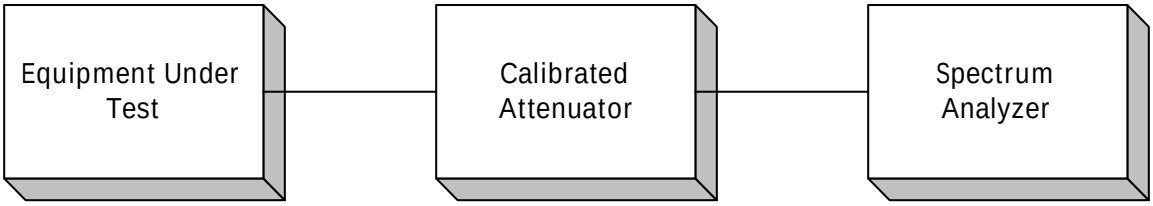
Para. No. 2.987(b) - Modulation Limiting



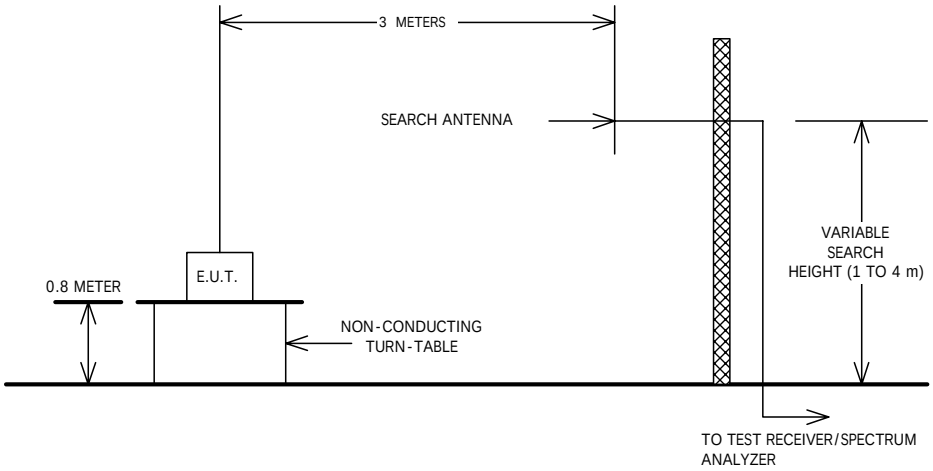
Para. No. 2.989 - Occupied Bandwidth



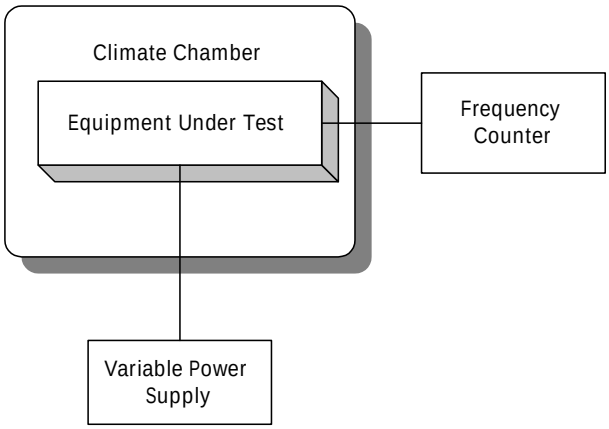
Para. No. 2.991 - Spurious Emissions at Antenna Terminals



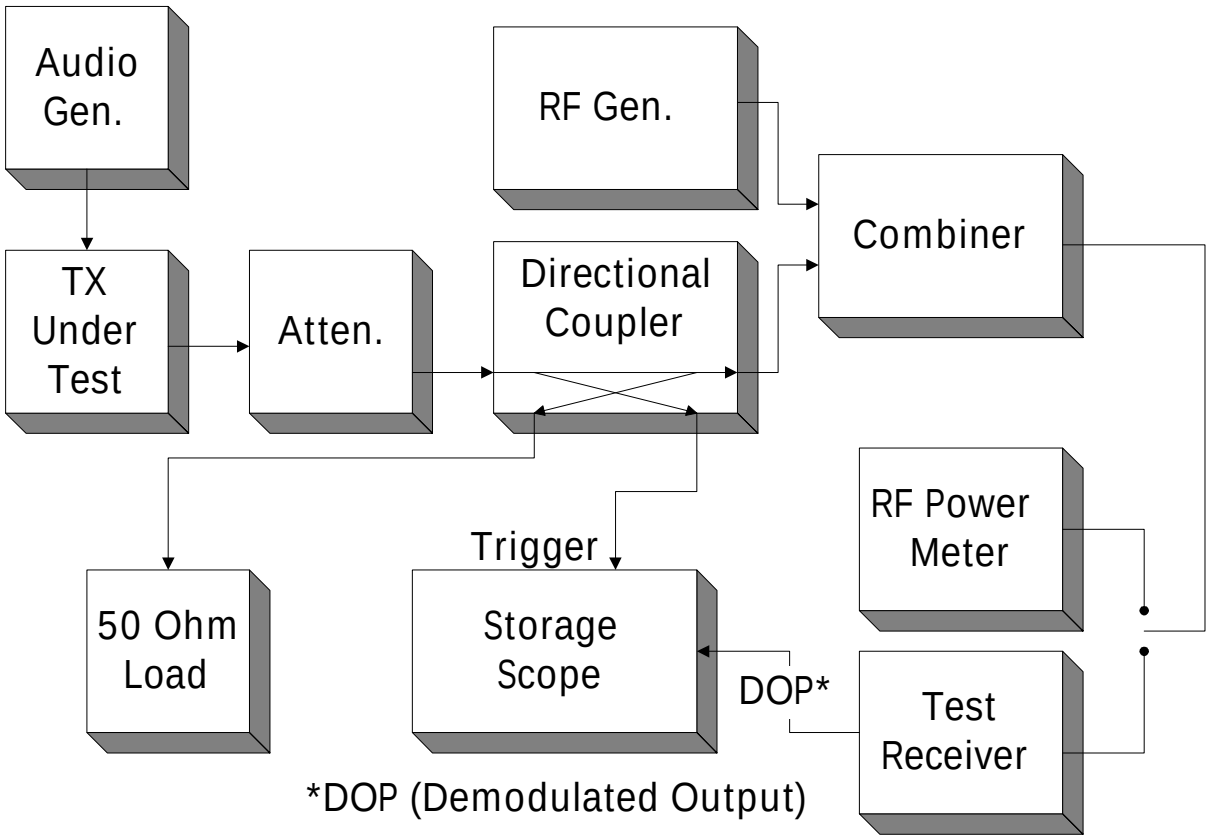
Para. No. 2.993 - Field Strength of Spurious Radiation



Para. No. 2.995 - Frequency Stability



Para. No. 90.214 - Transient Frequency Behaviour



Voice

This measurement was made using measurement procedure TIA/EIA Land Mobile FM or PM Communications Equipment Measurement and Performance Standards TIA/EIA-603 February 1993 Telecommunications Industry Association (American National Standard ANSI/TIA/EIA-603-1992 Approved: October 27, 1992) Para. no. 2.2 Methods of Measurement for Transmitters Para. no. 2.2.19 Transient Frequency Behaviour (page no. 83).

Data

This measurement was made using measurement procedure TIA/EIA Digital C4FM/CQPSK Transceiver Measurement Methods TSB102.CAAA Para. no. 2.2.17 Transient Frequency Behaviour (page no. 74).