Nemko Test Report No.:	2L0311RUS1
Applicant:	Decade Transmitters 3232 Richard St. Unit 04 Sherbrooke, QC J1L 1Y2
Equipment Under Test:	FM-800 Mono Transmitter FM-850 Stereo Transmitter
In Accordance With:	**FCC Part 73, Subpart G** FM Broadcast Transmitters
Tested By:	Nemko Dallas Inc. 802 N. Kealy Lewisville, Texas 75057-3136
Authorized By:	Tom Tidwell, RF Group Manager
Date:	6/19/02
Total Number of Pages:	35

Table of Contents

Section 1. Summary of Test Results

Manufacturer: Decade Transmitters

Model No.: FM-800 and FM-850

Serial No.: 647 & S677

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 73, Subpart G.

☒ New Submission ☒ Production Unit

☐ Class II Permissive Change ☐ Pre-Production Unit

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

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE. NONE
See " Summary of Test Data".

Summary Of Test Data

NAME OF TEST	PARA. NO.	SPEC.	RESULT
RF Power Output	73.811	1 watt min.	Complies
Occupied Bandwidth	73.317	Mask	Complies
Spurious Emissions at Antenna Terminals	73.317	-13 dBm	Complies
Field Strength of Spurious Emissions	73.317	-13 dBm	Complies

Footnotes:

Measurement uncertainty is expressed to a confidence level of 95%.

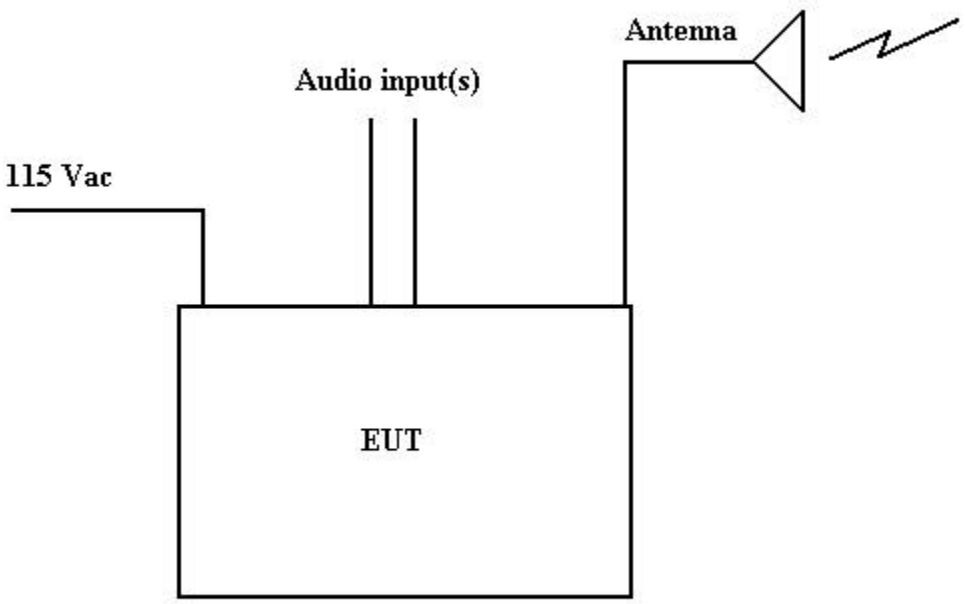
Section 2. General Equipment Specification

Supply Voltage Input:	115 Vac
Operating Frequency:	87.9 to 107.9 MHz
Channel Spacing:	200 kHz
Number of Channels:	100
Type of Modulation and Designator:	180KF3E Frequency Modulation
Output Impedance:	50 ohms
RF Output (Rated):	1.8 Watts at antenna terminals.
Frequency Selection:	**Software** ☐ **Manual** ☒

System Description

The DecadeFM-800 Mono transmitter and the FM-850 Stereo transmitter are transmitters designed to operate in commercial FM broadcast band, LP10 Services.

System Diagram



Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 73.267(b)(2)
TESTED BY: David Light	DATE: 6/6/2002

Test Results: Complies.

Measurement Data:

EUT	Measured Output Power (dBm)	Measured Output Power (W)	Measured/Rated Output Power (dB)
FM-800	32.32	1.706	0.948
FM-850	32.55	1.799	0.999

Equipment Used: 1036-1064-1065-1045

Measurement Uncertainty: +/- 1.6 dB

Test Plots – RF Power Output

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

Nemko Dallas, Inc.

Data Plot **RF Power Output**

Page 1 of 2 Complete X

Job No.: 2L0311 Date: 6/6/2002 Preliminary:

Specification: 73.267(b)(2) Temperature(°C): 24

Tested By: David Light Relative Humidity(%) 40

E.U.T.: Decade transmitters

Configuration: Tx FULL POWER

Sample Number: 1 & 2

Location: Lab 1 RBW: 2 kHz Measurement

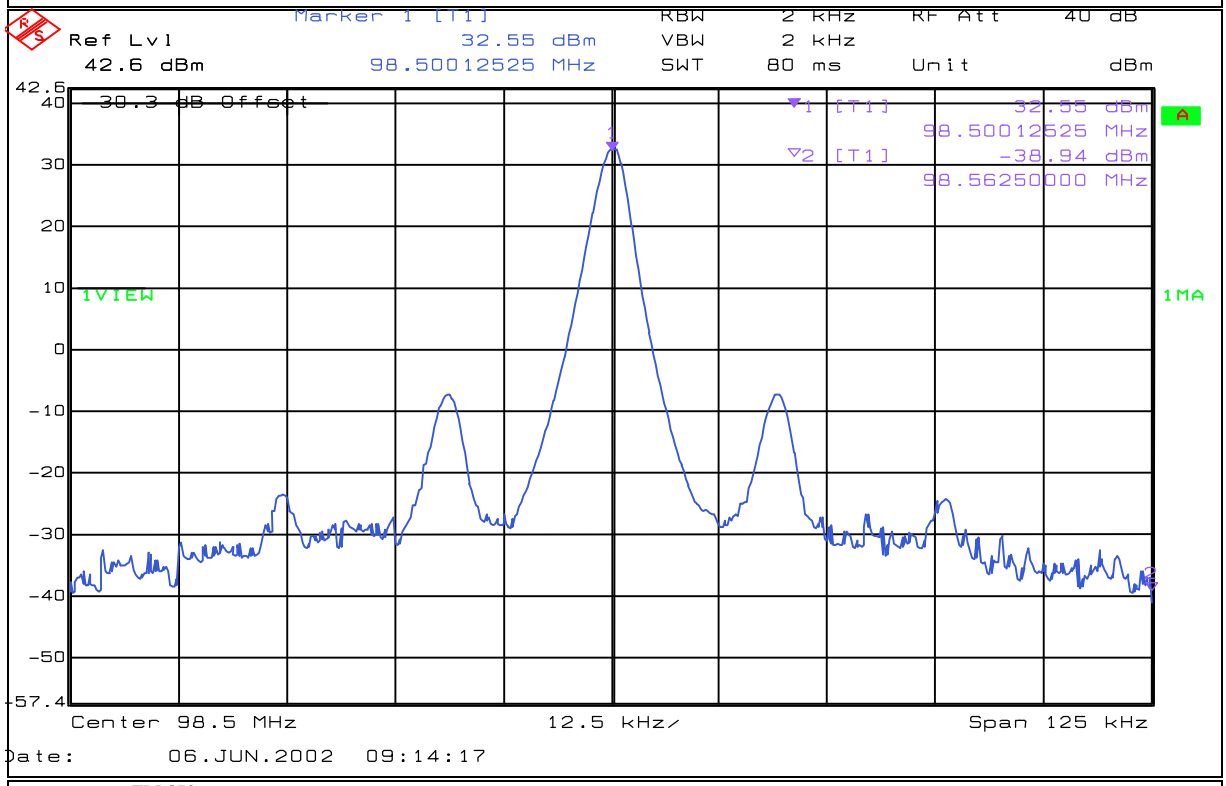
Detector Type: Peak VBW: 2 kHz Distance: NA m

Test Equipment Used

Antenna:		Directional Coupler:	
Pre-Amp:		Cable #1:	1045
Filter:		Cable #2:	
Receiver:	1036	Cable #3:	
Attenuator #1	1064	Cable #4:	
Attenuator #2:	1065	Mixer:	

Additional equipment used:

Measurement Uncertainty: +/-1.7 dB



Notes: **FM-850**

Test Plots – RF Power Output

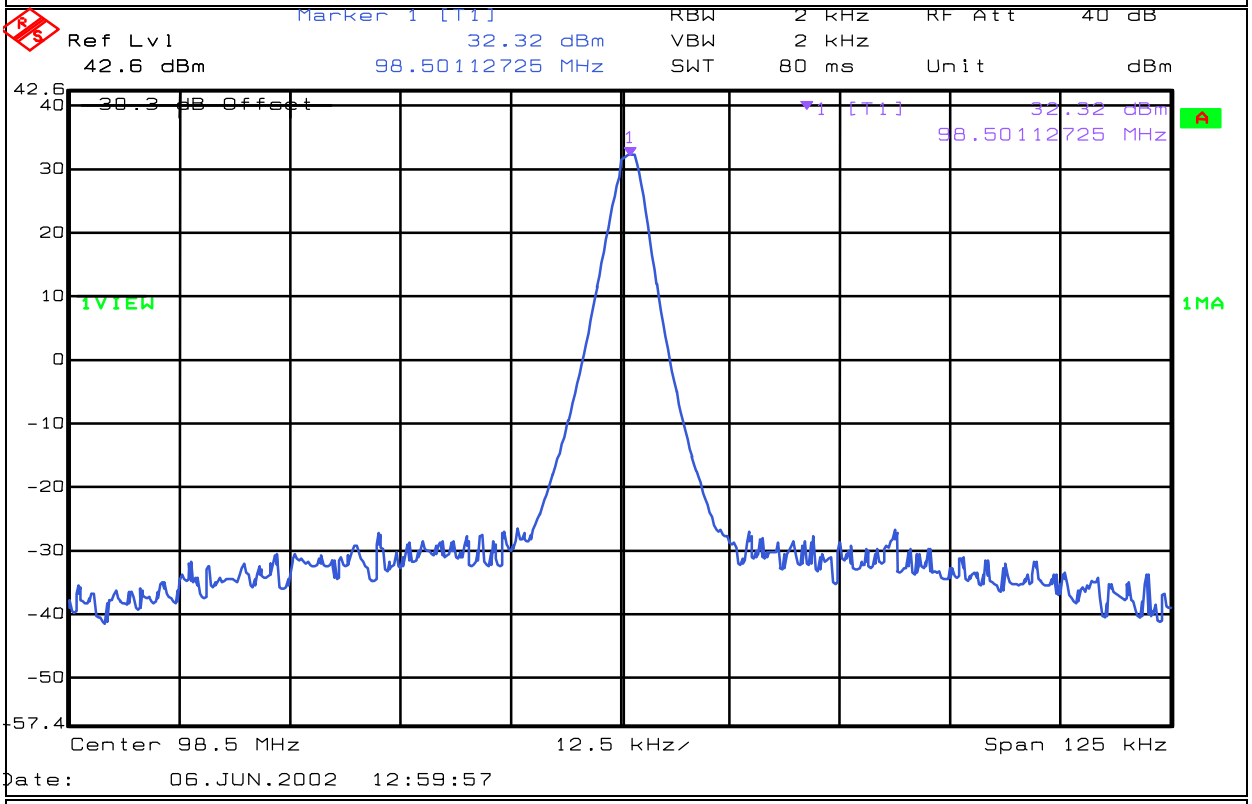
Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.

Data Plot **RF Power Output**

Page 2 of 2

Job No.:	2L0311	Date:	6/6/2002
Specification:	73.267(b)(2)	Temperature(°C):	24
Tested By:	David Light	Relative Humidity(%)	40
E.U.T.:	Decade transmitters		
Configuration:	Tx FULL POWER		



Notes: **FM-800**

Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 73.317
TESTED BY: David Light	DATE: 6/6/2002

Test Results: Complies.

Test Data: See attached plot(s).

All occupied bandwidth measurements were made with the transmitter deviation set to +/- 75 kHz.

Measurement Uncertainty: +/- 1.6 dB

Test Plots –Occupied Bandwidth

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

Nemko Dallas, Inc.

Data Plot **Occupied Bandwidth**

Page 1 of 6 Complete X

Job No.: 2L0311 Date: 6/6/2002 Preliminary:

Specification: 73.317 Temperature(°C): 24

Tested By: David Light Relative Humidity(%) 40

E.U.T.: DECADE FM TRANSMITTERS

Configuration: TX AUDIO SIGNAL FULL POWER

Sample Number: 1 & 2

Location: Lab 1 RBW: 5 kHz Measurement

Detector Type: Peak VBW: 5 kHz Distance: m

Test Equipment Used

Antenna: Directional Coupler:

Pre-Amp: Cable #1: 1045

Filter: Cable #2:

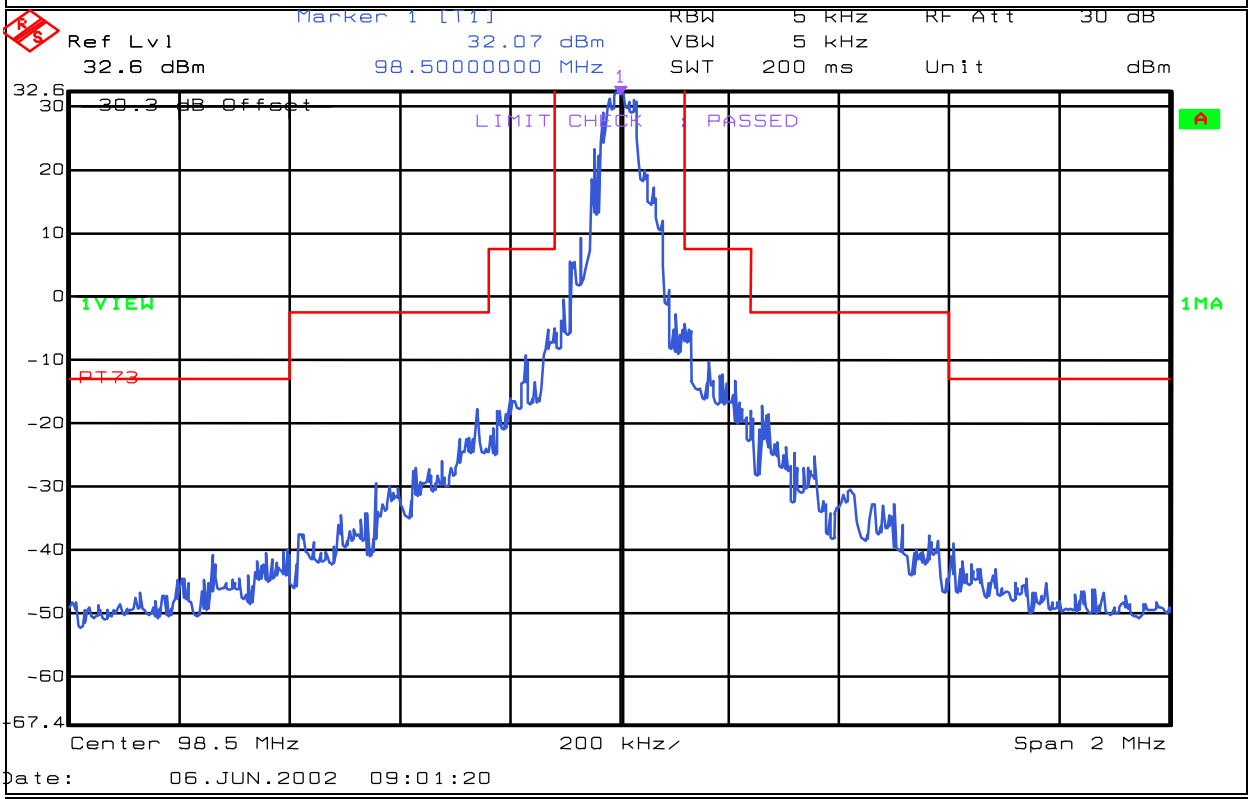
Receiver: 1036 Cable #3:

Attenuator #1 1064 Cable #4:

Attenuator #2: 1065 Mixer:

Additional equipment used:

Measurement Uncertainty: +/-1.7 dB



Notes: **FM-850 STEREO TRANSMITTER**

STEREO OPERATION

Test Plots –Occupied Bandwidth

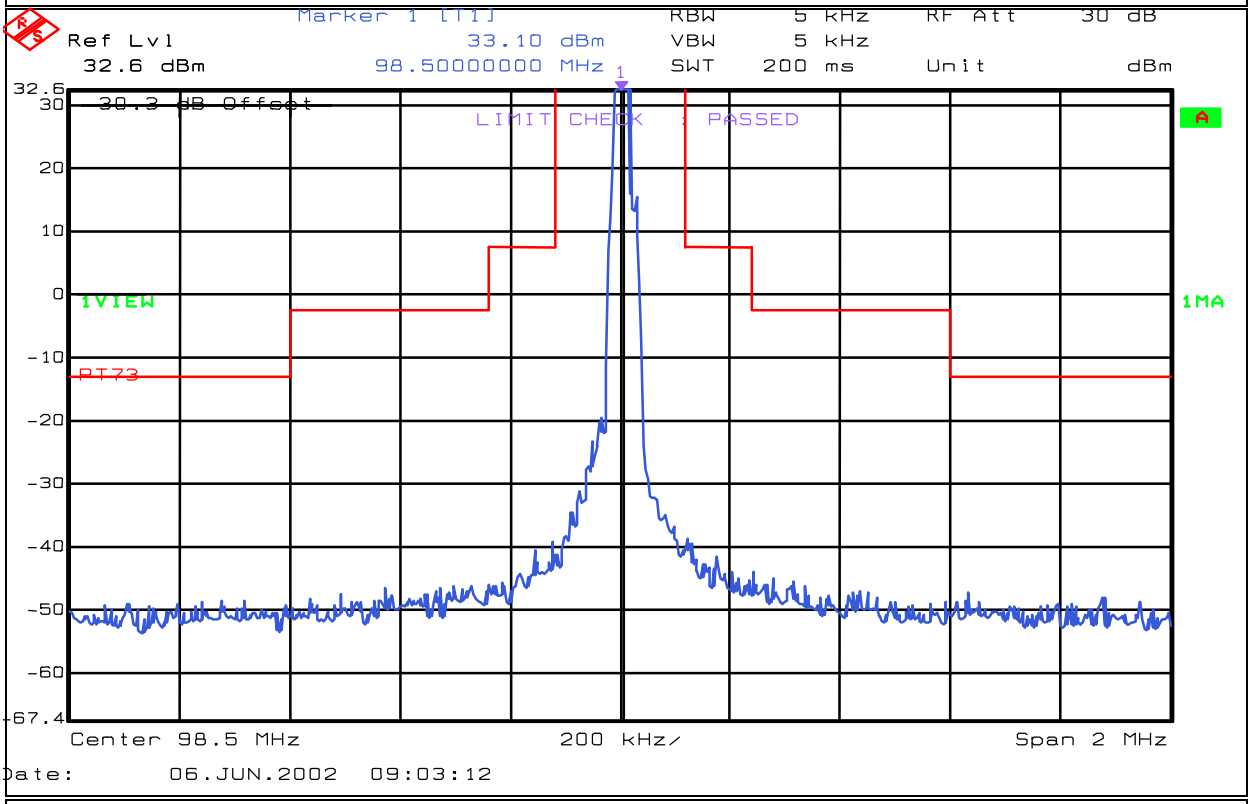
Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.

Data Plot **Occupied Bandwidth**

Page 2 of 6

Job No.: 2L0311 Date: 6/6/2002
Specification: 73.3 Temperature(°C): 24
Tested By: David Light Relative Humidity(%) 40
E.U.T.: DECADE FM TRANSMITTERS
Configuration: TX AUDIO SIGNAL FULL POWER



Notes: **FM-850 STEREO TRANSMITTER**
MONO OPERATION

Test Plots –Occupied Bandwidth

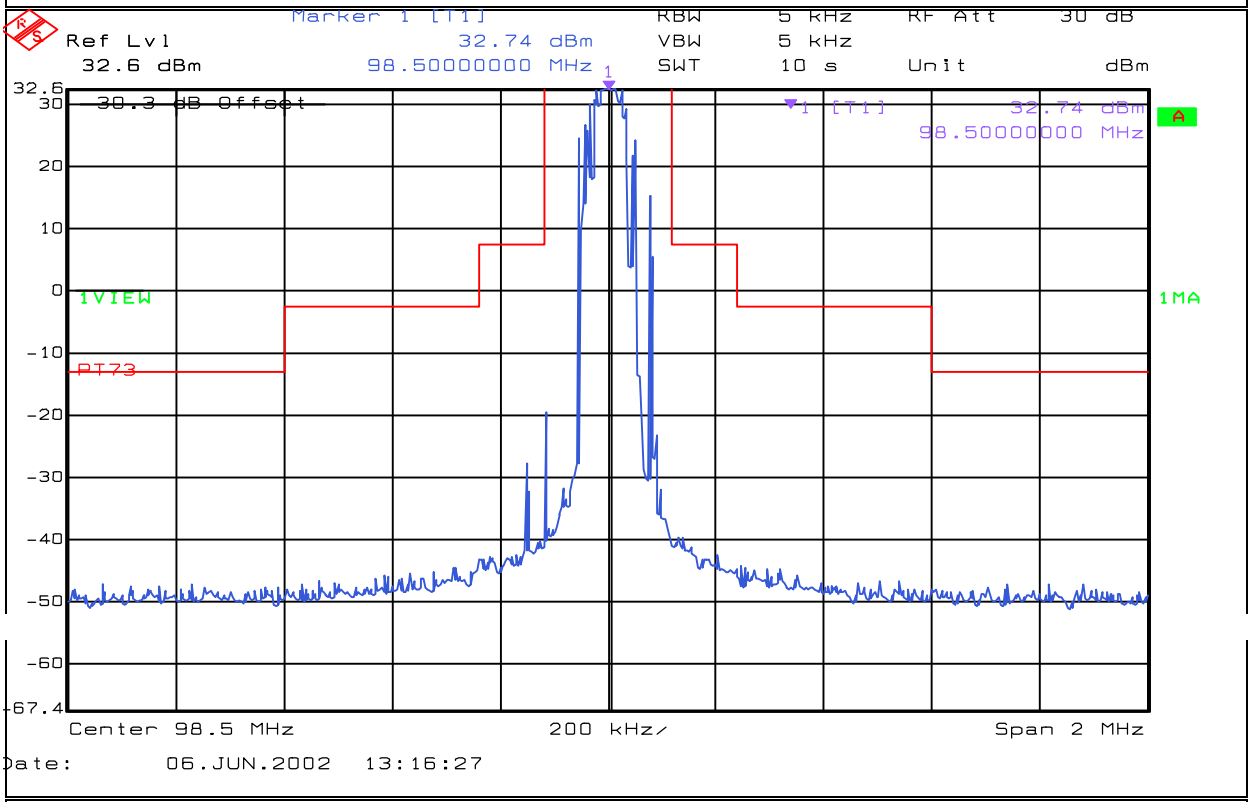
Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.

Test Plot: **Occupied Bandwidth**

Page 5 of 6

Job No.: 2L0311 Date: 6/6/2002
Specification: 73.317 Temperature(°C): 24
Tested By: David Light Relative Humidity(%) 40
E.U.T.: DECADE FM TRANSMITTERS
Configuration: TX AUDIO SIGNAL FULL POWER



Notes: FM-800

Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 73.371
TESTED BY: David Light	DATE: 6/6/2002

Test Results: Complies.

Test Data:

Equipment Used: 1036-1064-1065-1042

Measurement Uncertainty: +/- 1.6 dB

Test Plots – Spurious Emissions at Antenna Terminals

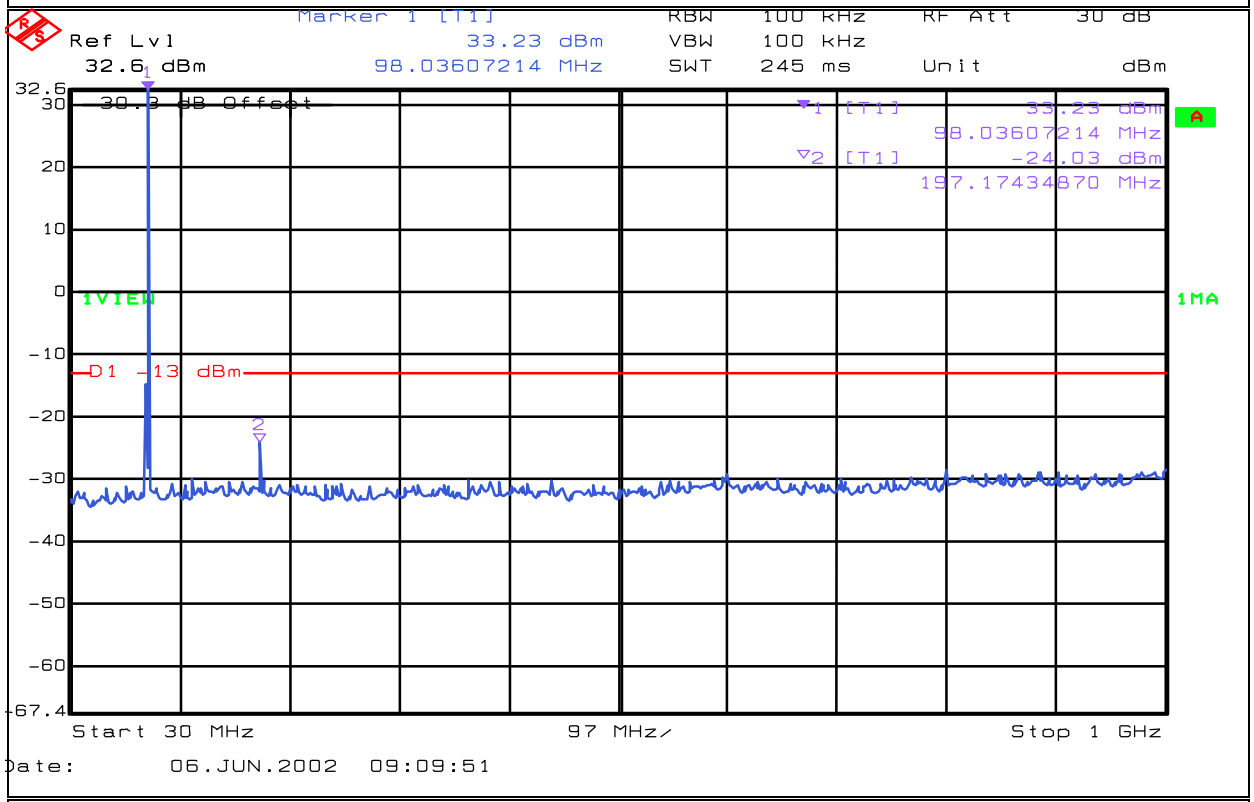
Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.

Data Plot **Occupied Bandwidth**

Page 3 of 6

Job No.:	2L0311	Date:	6/6/2002
Specification:	73.317	Temperature(°C):	24
Tested By:	David Light	Relative Humidity(%)	40
E.U.T.:	DECADE FM TRANSMITTERS		
Configuration:	TX AUDIO SIGNAL FULL POWER		



Notes:	**FM-850 STEREO TRANSMITTER**
	STEREO OPERATION
	MARKER 1 INDICATES CARRIER, MARKER 2 INDICATES HIGHEST EMISSION

Test Plots – Spurious Emissions at Antenna Terminals

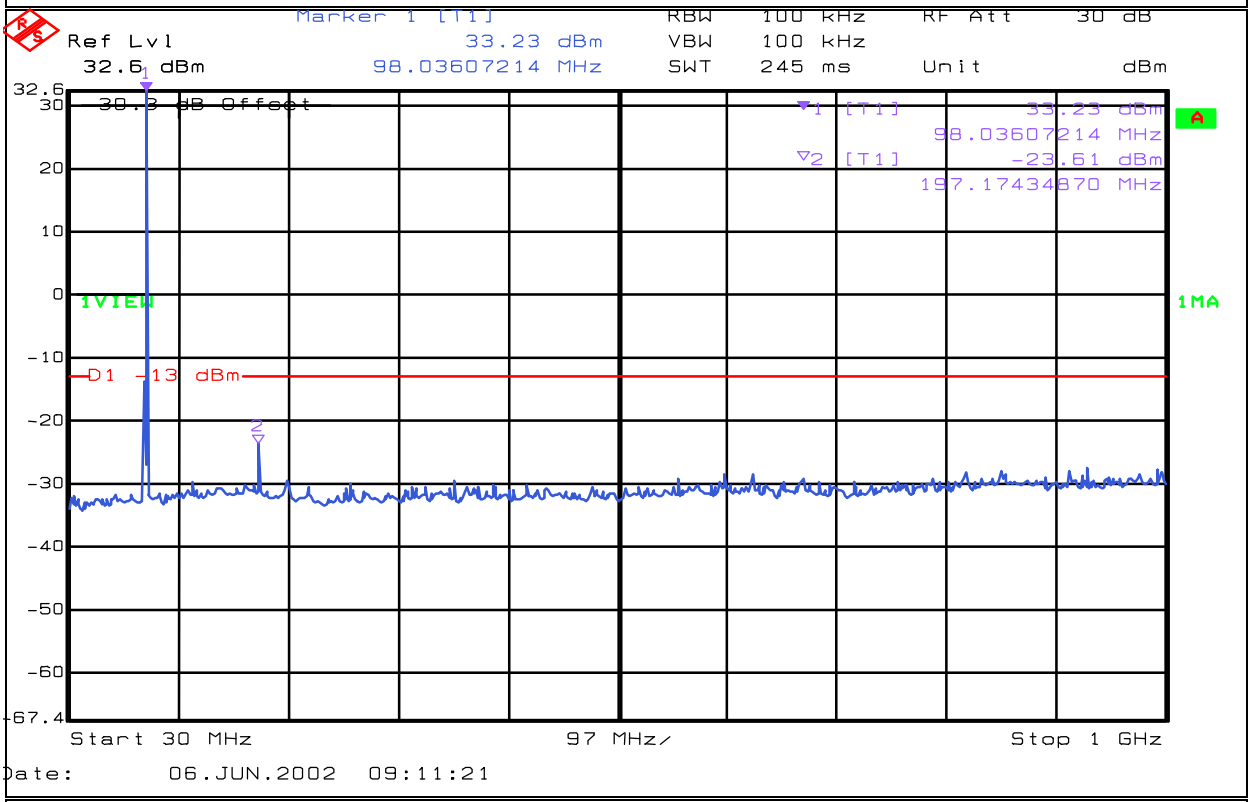
Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.

Test Plot: **Occupied Bandwidth**

Page 4 of 6

Job No.: 2L0311 Date: 6/6/2002
Specification: 73.317 Temperature(°C): 24
Tested By: David Light Relative Humidity(%) 40
E.U.T.: DECADE FM TRANSMITTERS
Configuration: TX AUDIO SIGNAL FULL POWER



Notes:
FM-850 STEREO TRANSMITTER
MONO OPERATION
MARKER 1 INDICATES CARRIER, MARKER 2 INDICATES HIGHEST EMISSION

Test Plots – Spurious Emissions at Antenna Terminals

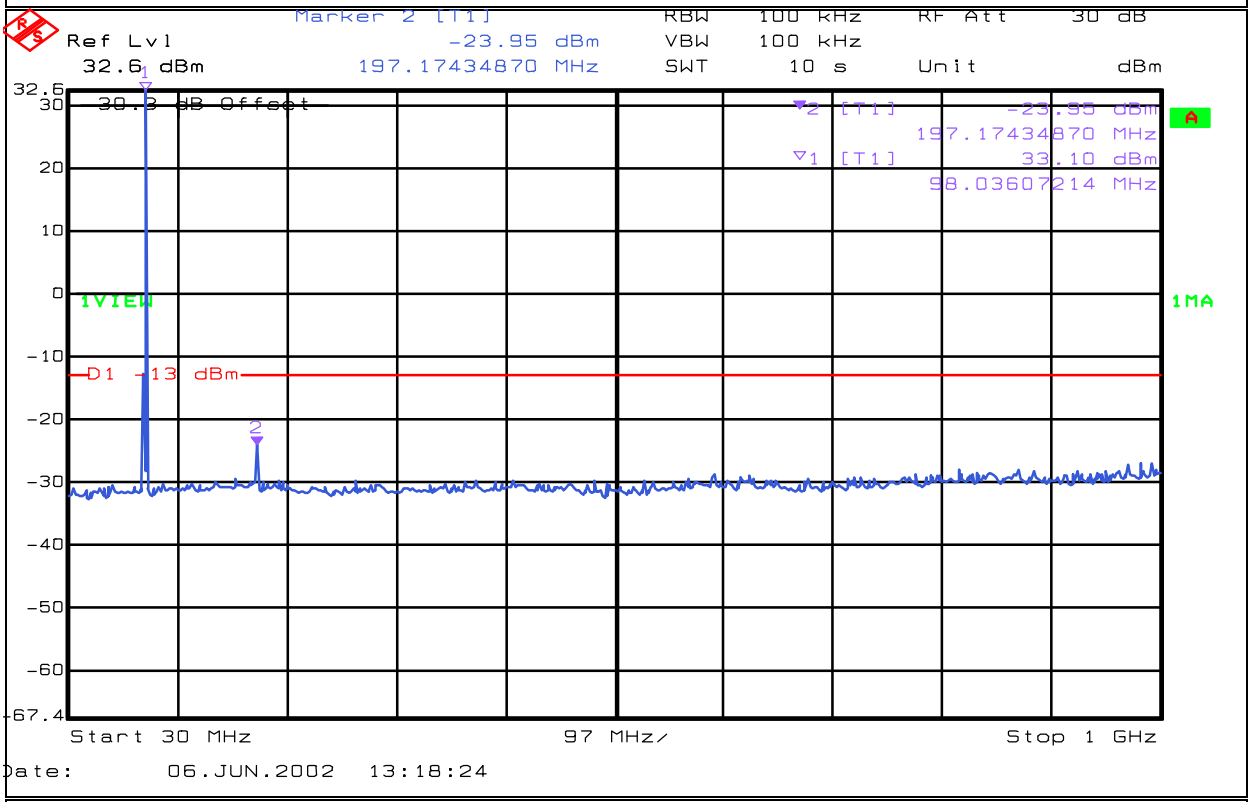
Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.

Test Plot: **Occupied Bandwidth**

Page 6 of 6

Job No.:	2L0311	Date:	6/6/2002
Specification:	73.317	Temperature(°C):	24
Tested By:	David Light	Relative Humidity(%)	40
E.U.T.:	DECADE FM TRANSMITTERS		
Configuration:	TX AUDIO SIGNAL FULL POWER		



Notes:
FM-800
MARKER 1 INDICATES CARRIER
MARKER 2 INDICATES HIGHEST EMISSION

Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 2.1051
TESTED BY: David Light	DATE: 6/6/2002

Test Results: Complies.

Test Data: See attached table.

Equipment Used: 1464-791-1485-1484-1304-1480

Measurement Uncertainty: +/- 1.6 dB

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 1 Complete X

Job No.: 2l0311 Date: 6/7/2002 Preliminary

Specification: Pt 73 Temperature(°C): 24

Tested By: Tom Tidwell Relative Humidity(%) 40

E.U.T.: FM-800 & FM-850

Configuration: Tx at 98.5 MHz full power into load

Sample No: 1&2

Location: AC 3 RBW: 100 kHz Measurement

Detector Type: Peak VBW: 30 kHz Distance: 3m m

Test Equipment Used

Antenna: 1304 Directional Coupler:

Pre-Amp: 791 Cable #1: 1484

Filter: Cable #2: 1485

Receiver: 1036 Cable #3:

Attenuator #1 Cable #4:

Attenuator #2: Mixer:

Additional equipment used: 1480

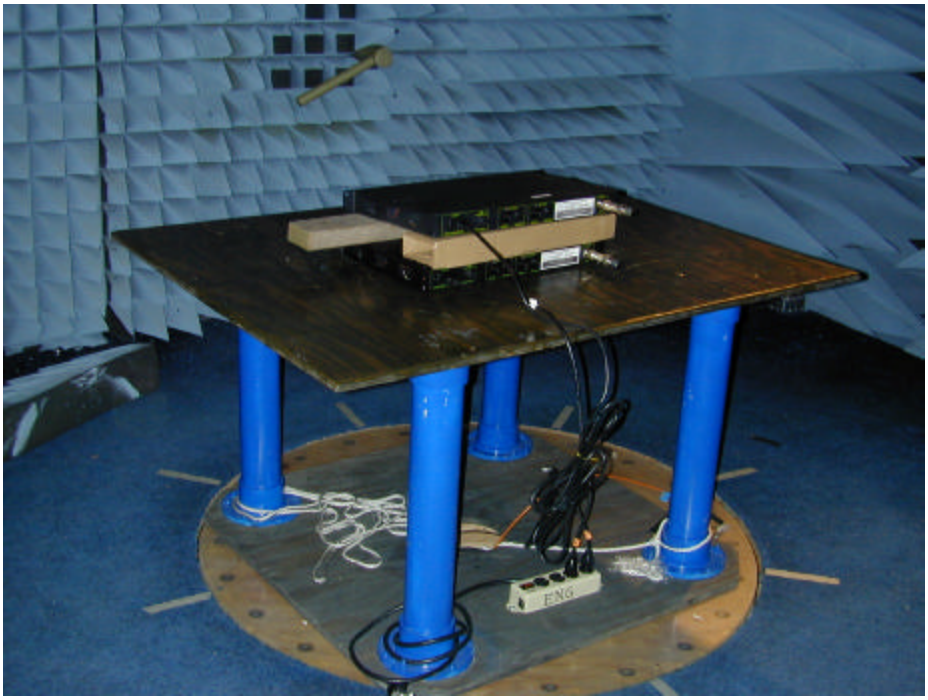
Measurement Uncertainty: +/-3.6 dB

Frequency (MHz)	Meter Reading (dBm)	Correction Factor (dB)		Pre-Amp Gain (dB)	Substitution Antenna Gain (dBd)	Limit (dBm)	ERP (dBm)	ERP (mW)	Polarity	Comments
197	-43.0	-2.5		0	0.0	-13	-45.5	0.0000	V	
295.5	-52.0	3.0		0	0.0	-13	-49.0	0.0000	V	
394	-44.2	4.7		0	0.0	-13	-39.5	0.0001	V	
492.5	-53.7	6.2		0	0.0	-13	-47.5	0.0000	V	
591	-48.0	2.0		0	0.0	-13	-46.0	0.0000	V	
689.5	-53.2	9.7		0	0.0	-13	-43.5	0.0000	V	
788	-47.5	36.0		24.6	-0.7	-13	-36.8	0.0002	V	
886.5	-54.8	32.2		24.8	4.9	-13	-42.6	0.0001	V	
985	-51.0	29.3		24.7	5.0	-13	-41.4	0.0001	V	
197	-48.2	-0.3		0	0.0	-13	-48.5	0.0000	H	
295.5	-56.2	3.2		0	0.0	-13	-53.0	0.0000	H	
394	-53.2	2.7		0	0.0	-13	-50.5	0.0000	H	
492.5	-60.5	3.0		0	0.0	-13	-57.5	0.0000	H	
591	-55.7	8.7		0	0.0	-13	-47.0	0.0000	H	
689.5	-57.8	8.8		0	0.0	-13	-49.0	0.0000	H	
788	-54.8	39.2		24.6	-0.7	-13	-40.9	0.0001	H	
886.5	-57.0	30.3		24.8	4.9	-13	-46.6	0.0000	H	
985	-55.2	31.0		24.7	5.0	-13	-43.9	0.0000	H	

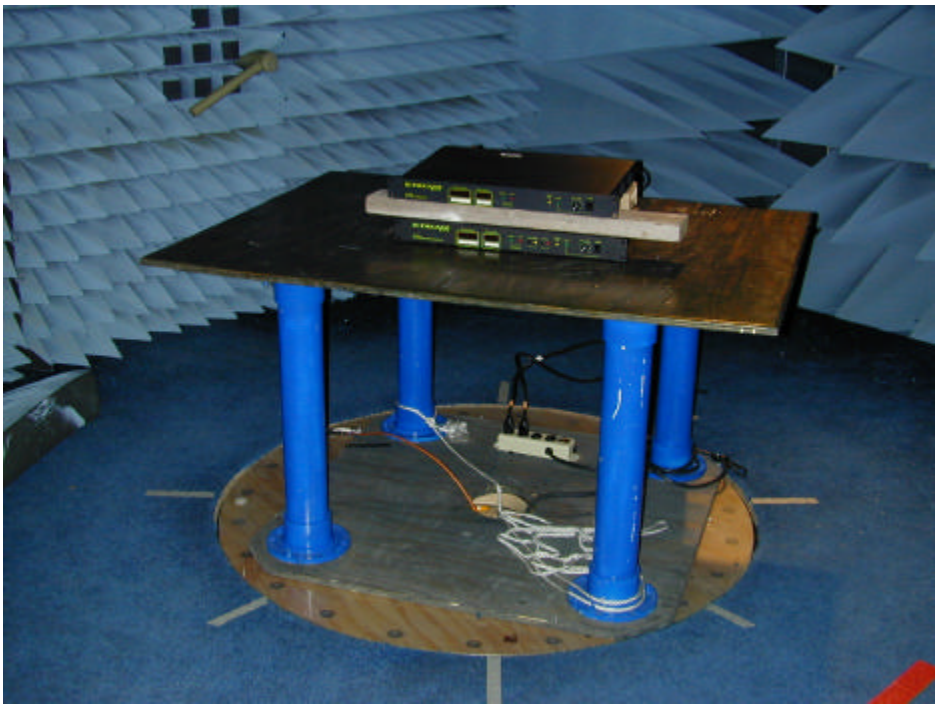
Notes: **Scanned spectrum to the 10th harmonic**

Photographs of Test Setup

FRONT VIEW



REAR VIEW



Section 7. Powerline Conducted Emissions

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.207
TESTED BY: David Light	DATE:6/6/2002

Test Results: Complies

Limit:

Frequency	Limit µV/m	Limit dBµV/m
0.450 to 30 MHz	250	48

Results:

FM-800

The worst case emission was 23.4 dBµV/m on Neutral line. This is 24.6 dB below the quasi-peak limit of 48 dBµV/m.

FM-850

The worst case emission was 22.23 dBµV/m on Neutral line. This is 25.77 dB below the quasi-peak limit of 48 dBµV/m.

Test Plots – Powerline Conducted Emissions

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

Nemko Dallas, Inc.

Data Plot **Powerline Conducted Emissions**

Page 1 of 4 Complete ____

Job No.: 2L0311 Date: 6/8/2002 Preliminary: ____

Specification: PT15 Temperature(°C): 25

Tested By: David Light Relative Humidity(%) 40

E.U.T.: FM-800 & FM-850 TRANSMITTERS

Configuration: TX FULL POWER

Sample Number: 1 & 2

Location: Lab 4 RBW: 10 kHz Measurement

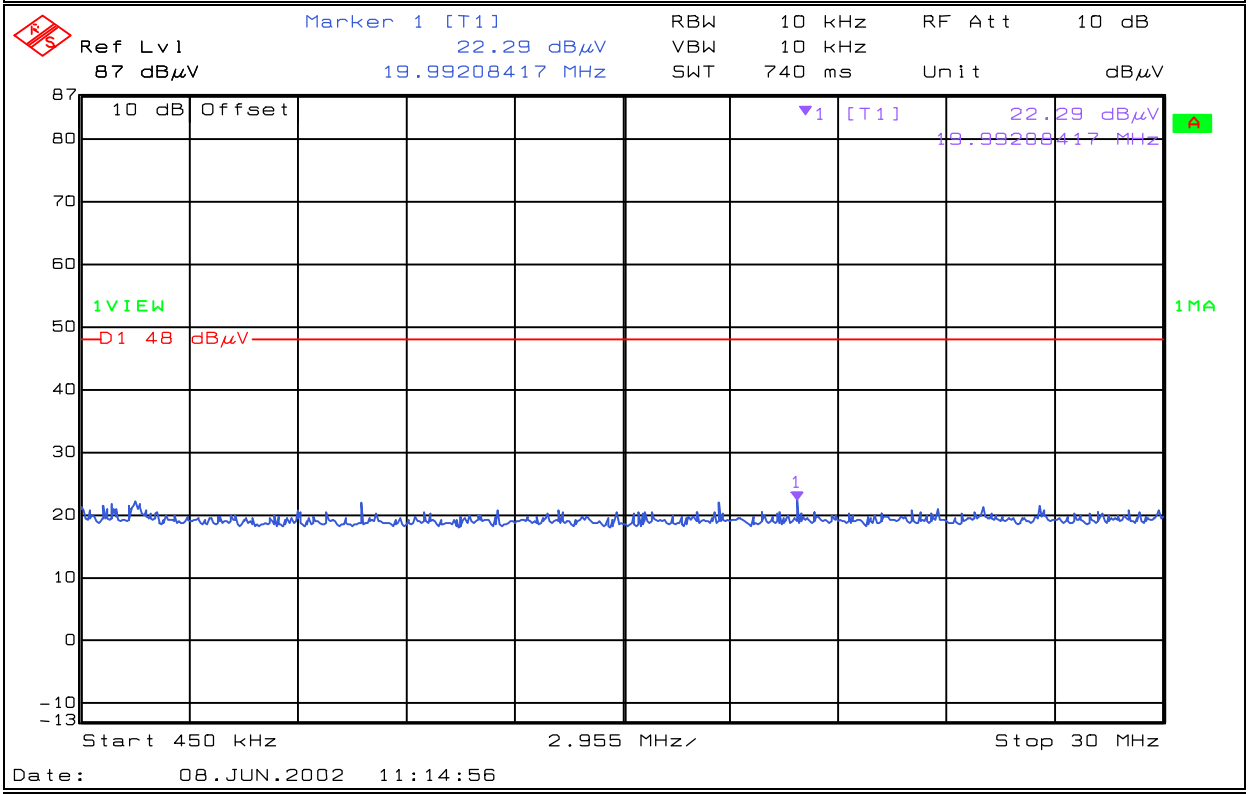
Detector Type: Peak VBW: 10 kHz Distance: ____ m

Test Equipment Used

Antenna:		L.I.S.N.	1258
Limiter	674	Cable #1:	1526
Filter:	1555	Cable #2:	1114
Receiver:	1036	Cable #3:	
Attenuator #1		Cable #4:	
Attenuator #2:		Mixer:	

Additional equipment used:

Measurement Uncertainty: +/-1.7 dB



Notes: **L1**

FM-800 TRANSMITTER

Test Plots – Powerline Conducted Emissions

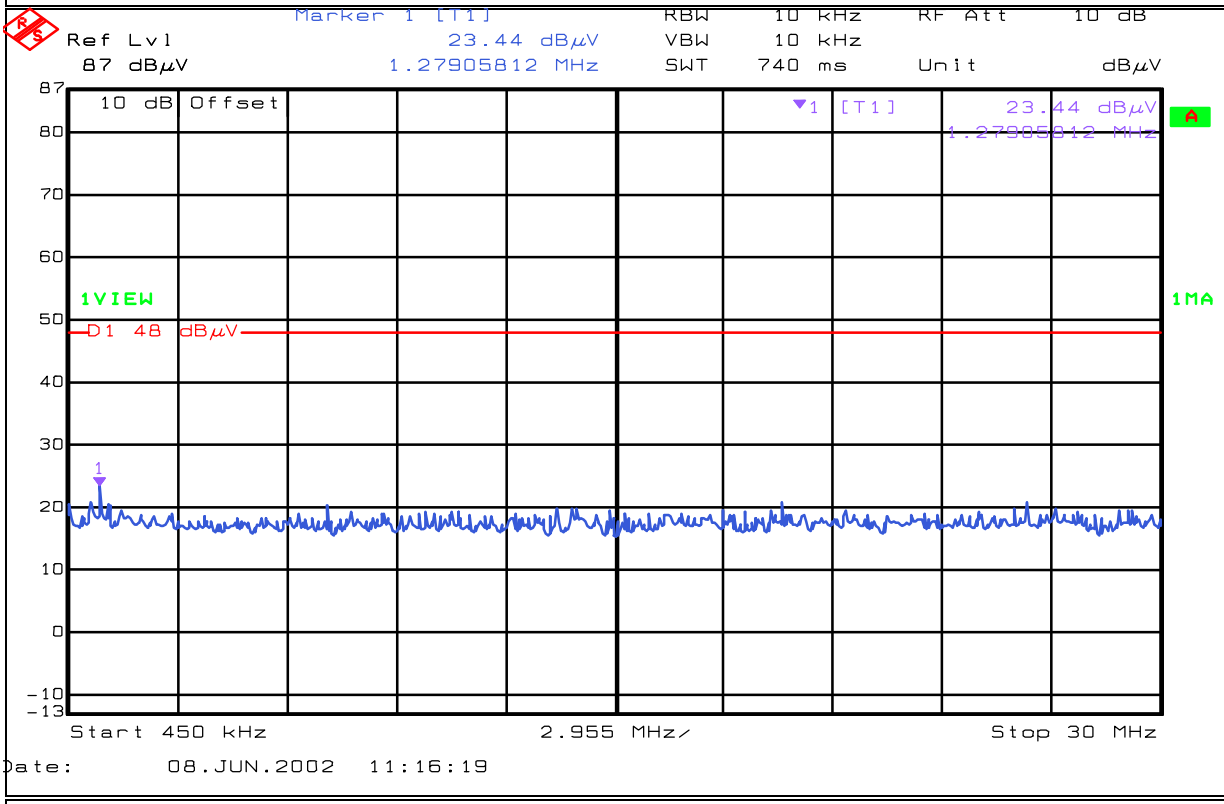
Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.

Data Plot **Powerline Conducted Emissions**

Page 2 of 4

Job No.: 2L0311 Date: 6/8/2002
Specification: PT15 Temperature(°C): 25
Tested By: David Light Relative Humidity(%) 40
E.U.T.: FM-800 & FM-850 TRANSMITTERS
Configuration: TX FULL POWER



Notes: **L2**
FM-800 TRANSMITTER

Test Plots – Powerline Conducted Emissions

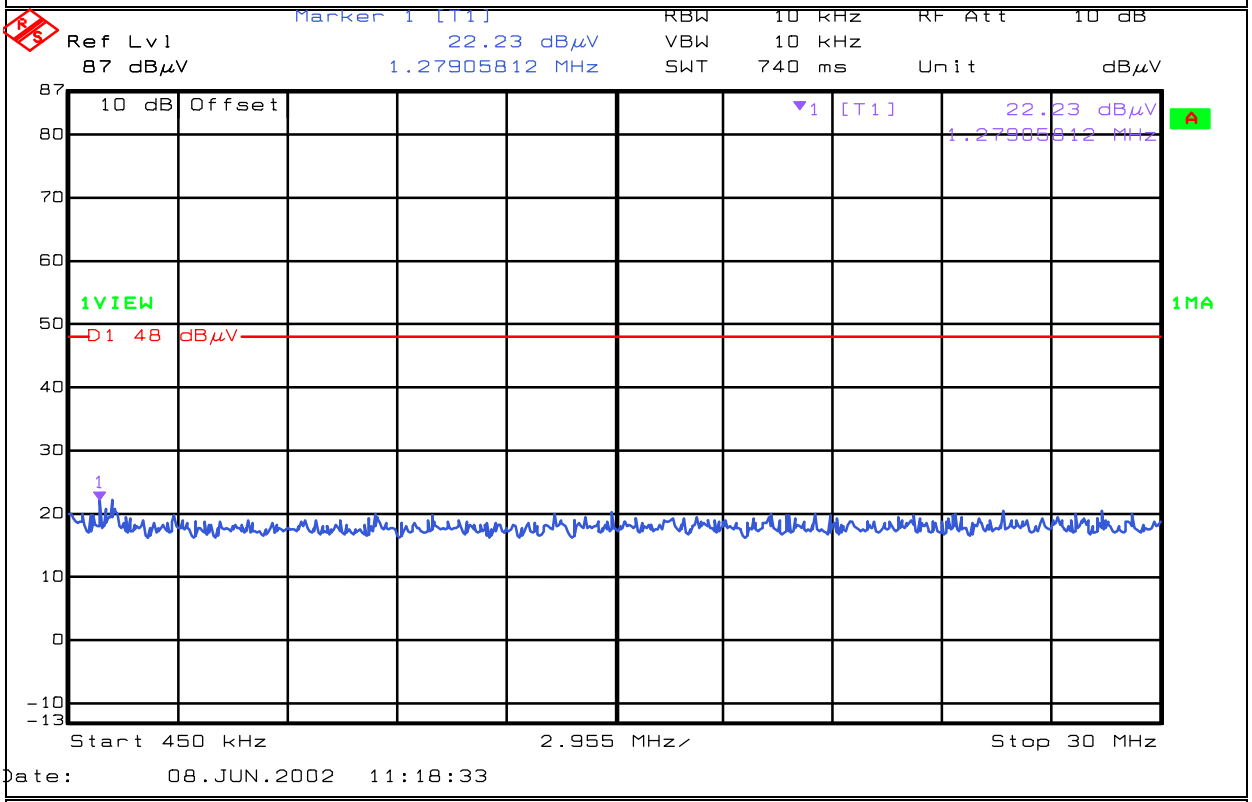
Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.

Data Plot — **Powerline Conducted Emissions**

Page 3 of 4

Job No.: 2L0311 Date: 6/8/2002
Specification: PT15 Temperature(°C): 25
Tested By: David Light Relative Humidity(%) 40
E.U.T.: FM-800 & FM-850 TRANSMITTERS
Configuration: TX FULL POWER



Notes: **L1**
FM-850 TRANSMITTER

Test Plots – Powerline Conducted Emissions

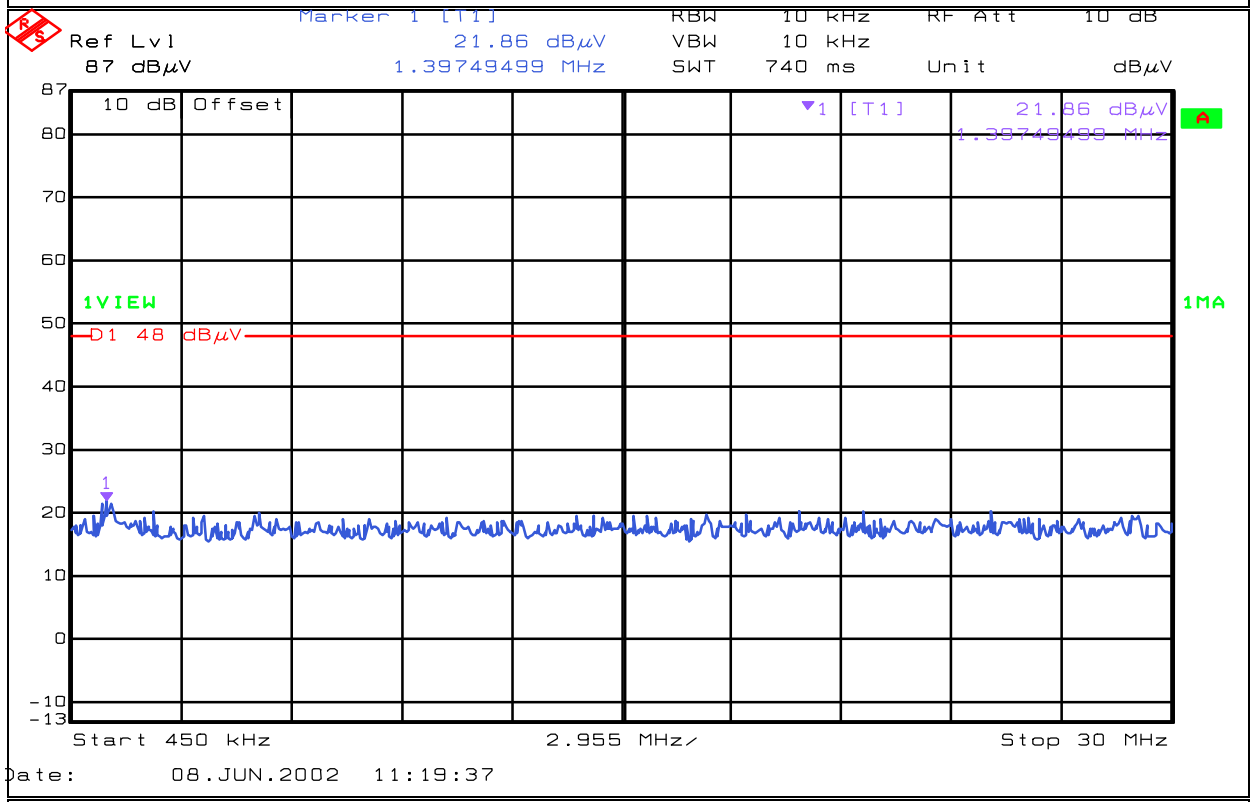
Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.

Test Plot: **Powerline Conducted Emissions**

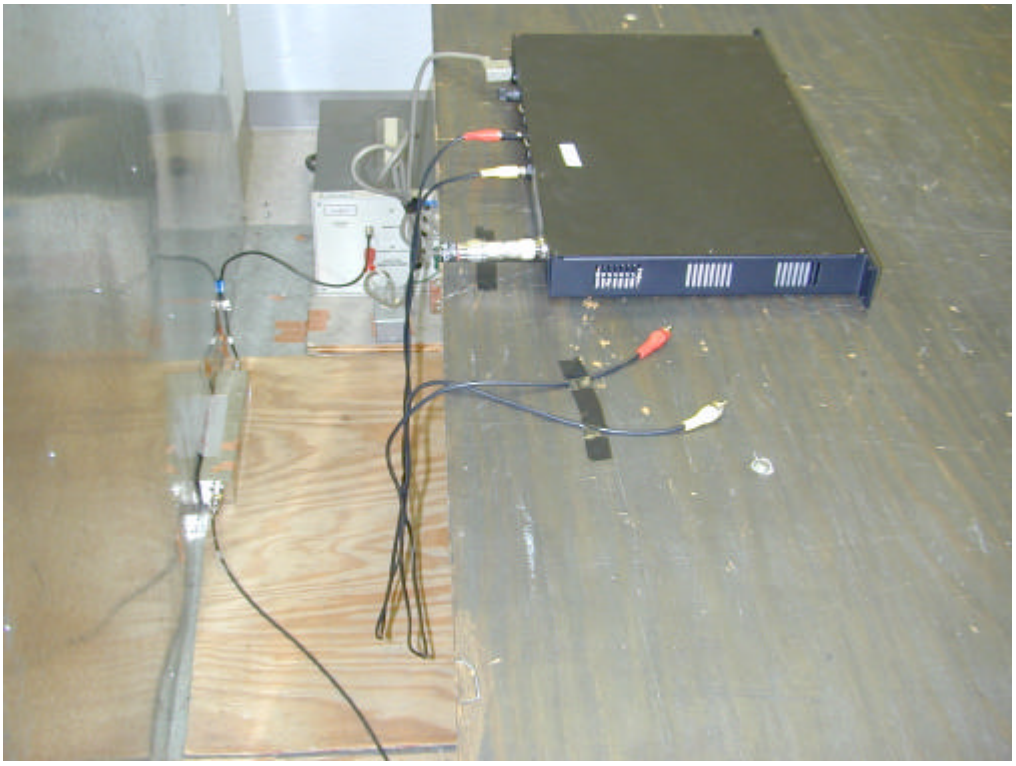
Page 4 of 4

Job No.:	2L0311	Date:	6/8/2002
Specification:	PT15	Temperature(°C):	25
Tested By:	David Light	Relative Humidity(%)	40
E.U.T.:	FM-800 & FM-850 TRANSMITTERS		
Configuration:	TX FULL POWER		



Notes: **L2**
FM-850 TRANSMITTER

Test Setup – Powerline Conducted Emissions



Section 8. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	12/18/01
1042	CABLE, 4M	STORM PR90-010-144	N/A	06/14/02
674	LIMITER	HP 11947A	3107A02200	11/04/00
1555	Filter high pass 5KHz	Solar Electronics 7930-5.0	933125	06/06/02
1258	LISN .15mhz-30mhz	EMCO 0	1305	04/04/01
1526	Cable, .6m	KTL RG223	NA	08/06/01
1114	CABLE, 7m	KTL RG223	N/A	06/06/02
1304	HORN ANTENNA	ELECTRO METRICS RGA-60	6151	07/30/01
791	PREAMP, 25dB	ICC LNA25	398	08/16/01
1484	Cable 2.0-18.0 Ghz	Storm PR90-010-072	N/A	06/01/01
1485	Cable 2.0-18.0 Ghz	Storm PR90-010-216	N/A	06/01/01
1064	ATTENUATOR	NARDA 776B-20	NONE	09/13/01
1065	ATTENUATOR	NARDA 776B-10	NONE	09/13/01

ANNEX A - TEST DETAILS

NAME OF TEST: RF Power Output **PARA. NO.: 73.267**

Determining operating power.

(a) The operating power of each FM station is to be determined by either the direct or indirect method.

(b) Direct method. The direct method of power determination for an FM station uses the indications of a calibrated transmission line meter (responsive to relative voltage, current, or power) located at the RF output terminals of the transmitter. This meter must be calibrated whenever there is any indication that the calibration is inaccurate or whenever any component of the metering circuit is repaired or replaced. The calibration must cover, as a minimum, the range from 90% to 105% of authorized power. The meter calibration may be checked by measuring the power at the transmitter terminals while either:

(1) operating the transmitter into the transmitting antenna, and determining actual operating power by the indirect method described in §73.267(c); or

(2) operating the transmitter into a load (of substantially zero reactance and a resistance equal to the transmission line characteristic impedance) and using an electrical device (within ±5% accuracy) or temperature and coolant flow indicator (within ±4% accuracy) to determine the power.

(c) Indirect method. The operating power is determined by the indirect method by applying an appropriate factor to the input power to the last radio-frequency power amplifier stage of the transmitter, using the following formula:

Transmitter output power = Ep x Ip x F

Where:

Ep = DC input voltage of final radio stage.
Ip = Total DC input current of final radio stage.
F = Efficiency factor.

(1) If the above formula is not appropriate for the design of the transmitter final amplifier, use a formula specified by the transmitter manufacturer with other appropriate operating parameters.

(2) The value of the efficiency factor, F, established for the authorized transmitter output power is to be used for maintaining the operating power, even though there may be some variation in F over the power operating range of the transmitter.

(3) The value of F is to be determined and a record kept thereof by one of the following procedures listed in order of preference:

(i) Using the most recent measurement data for calibration of the transmission line meter according to the procedures described in paragraph (b) of this section or the most recent measurements made by the licensee establishing the value of F. In the case of composite transmitters or those in which the final amplifier stages have been modified pursuant to FCC approval, the licensee must furnish the FCC and also retain with the station records the measurement data used as a basis for determining the value of F.

(ii) Using measurement data shown on the transmitter manufacturer's test data supplied to the licensee; provided that measurements were made at the authorized frequency and transmitter output power.

(iii) Using the transmitter manufacturer's measurement data submitted to the FCC for type acceptance and as shown in the instruction book supplied to the licensee.

NAME OF TEST: Occupied Bandwidth	**PARA. NO.: 73.317**

FM transmission system requirements.

(a) FM broadcast stations employing transmitters authorized after January 1, 1960, must maintain the bandwidth occupied by their emissions in accordance with the specification detailed below. FM broadcast stations employing transmitters installed or type accepted before January 1, 1960, must achieve the highest degree of compliance with these specifications practicable with their existing equipment. In either case, should harmful interference to other authorized stations occur, the licensee shall correct the problem promptly or cease operation.

(b) Any emission appearing on a frequency removed from the carrier by between 120 kHz and 240 kHz inclusive must be attenuated at least 25 dB below the level of the unmodulated carrier. Compliance with this requirement will be deemed to show the occupied bandwidth to be 240 kHz or less.

(c) Any emission appearing on a frequency removed from the carrier by more than 240 kHz and up to and including 600 kHz must be attenuated at least 35 dB below the level of the unmodulated carrier.

(d) Any emission appearing on a frequency removed from the carrier by more than 600 kHz must be attenuated at least 43 + 10 Log10 (Power, in watts) dB below the level of the unmodulated carrier, or 80 dB, whichever is the lesser attenuation.

(e) Preemphasis shall not be greater than the impedance-frequency characteristics of a series inductance resistance network having a time constant of 75 microseconds. (See upper curve of Figure 2 of §73.333.)

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

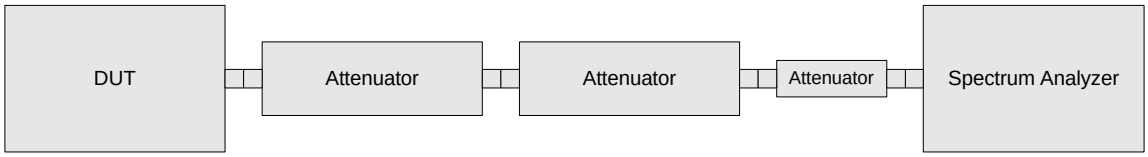
Minimum Standard: Para. No.73.317(d). Any emission appearing on a frequency removed from the carrier by more than 600 kHz must be attenuated at least 43 + 10 Log10 (Power, in watts) dB below the level of the unmodulated carrier, or 80 dB, whichever is the lesser attenuation.

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

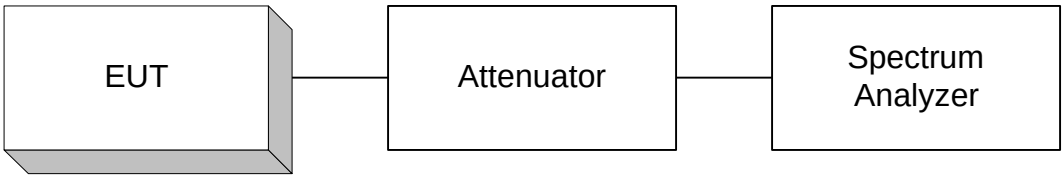
The antenna substitution method was used to determine the equivalent radiated power at spurious frequencies. The spurious emissions were measured at a distance of 3 meters. The EUT was then replaced with a reference substitution antenna with a known gain referenced to a dipole. This antenna was fed with 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.

ANNEX B - TEST DIAGRAMS

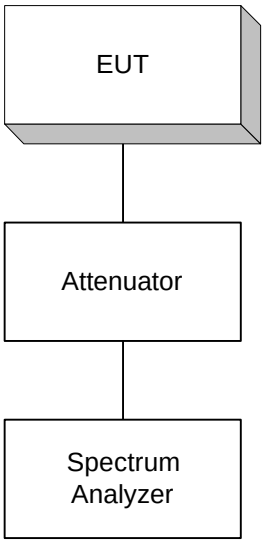
Para. No. 2.985 - R.F. Power Output



Para. No. 2.989 - Occupied Bandwidth



Para. No. 2.991 Spurious Emissions at Antenna Terminals



Para. No. 2.993 - Field Strength of Spurious Radiation