

Nemko Test Report No.:

3L0189RUS2

Applicant:

Communication Components
89 Leuning Street 299 Forest Avenue
Hackensack, NJ 07606

Equipment Under Test:

DAB-1819

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:



Tom Tidwell, Frontline Manager

Date:

5/6/2003

Total Number of Pages:

30

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EQUIPMENT: **DAB-1819****Section 1. Summary of Test Results**

Manufacturer: Communication Components, Inc.

Model No.: DAB-1819

Serial No.: None

General: **All measurements are traceable to national standards.**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 24, Subpart E.

☐

New Submission

☒

Production Unit

☒

Class II Permissive Change

☐

Pre-Production Unit

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.**THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.: NONE**

See " Summary of Test Data".

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EQUIPMENT: **DAB-1819****Summary Of Test Data**

NAME OF TEST	PARA. NO.	SPEC.	RESULT
RF Power Output	24.232	<100W	Complies
Occupied Bandwidth (GSM EDGE))	24.238	Input/Output	Complies
Spurious Emissions at Antenna Terminals	24.238(a)	-13 dBm	Complies

Footnotes:

EQUIPMENT: **DAB-1819****Section 2. General Equipment Specification**

Frequency Bands:	Downlink:	☒ Block A : 1930 – 1945 MHz ☒ Block D : 1945 – 1950 MHz ☒ Block B : 1950 – 1965 MHz ☒ Block E : 1965 – 1970 MHz ☒ Block F : 1970 – 1975 MHz ☒ Block C : 1975 – 1990 MHz
Frequency Bands:	Uplink:	☐ Block A : 1850 – 1865 MHz ☐ Block B : 1865 – 1870 MHz ☐ Block C : 1870 – 1885 MHz ☐ Block D : 1885 – 1890 MHz ☐ Block E : 1890 – 1895 MHz ☐ Block F : 1895 – 1910 MHz
Type of Modulation and Designator:	GSM EDGE (G7W) GSM (GXW) NADC (DXW) ☒ ☒ ☐	
Output Impedance:	50 ohms	
RF Output (Rated):	Uplink	Not tested. The Uplink path is always connected with coaxial connections to a BTS.
RF Output (Rated):	Downlink	Per channel: 100 W Total: 100 W
Frequency Translation:	F1-F1 F1-F2 N/A ☒ ☐ ☐	
Band Selection:	Software Duplexer Fullband ☐ ☐ ☒	

EQUIPMENT: **DAB-1819**

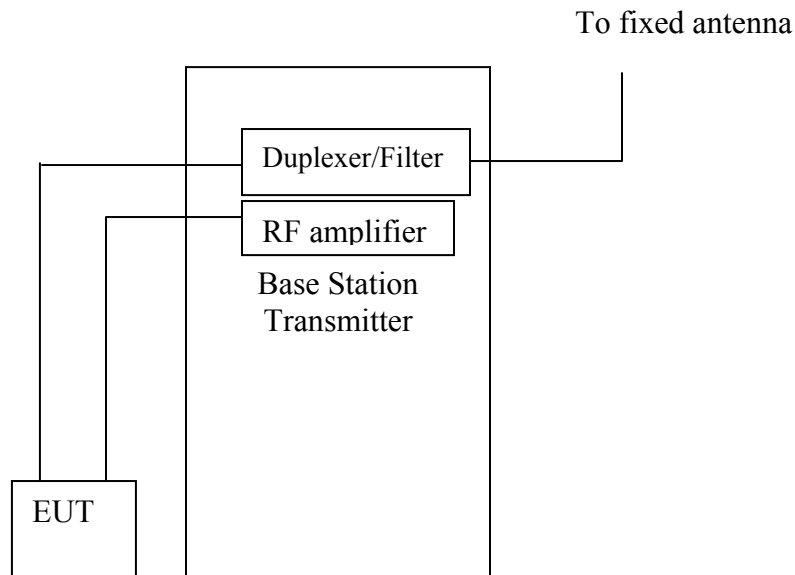
Description of Modifications for Class II Permissive Change

The modulation parameter for GSM EDGE (G7W) is being added. No hardware or software changes have been made.

Description of Operation

The EUT is an RF Single Channel Amplifier to boost a PCS. The amplifier would be operated in an equipment rack and the antenna would be mounted on a pole or tower. The forward direction is wireless but the reverse direction is connected directly to a Base Station Transmitter via coaxial cables.

System Diagram



EQUIPMENT: **DAB-1819****Section 3. RF Power Output**

NAME OF TEST: RF Power Output	PARA. NO.: 2.1046
TESTED BY: D. Light	DATE:3/5/03

Test Results: Complies.**Measurement Data:**

Frequency (MHz)	Modulation Type	Per Channel Output Power (dBm)	Composite Output Power (dBm)
1930.2*	EDGE	31.5	** N/A
1930.3	EDGE	49.0	N/A
1989.7	EDGE	48.5	N/A
1989.8*	EDGE	33.5	N/A
Intermodulation (Lower bandedge)	EDGE	41.0	***43.0
Intermodulation (Upper bandedge)	EDGE	40.6	43.6

*Power must be reduced at the bandedges to meet emission requirements. Refer to plots in Section 5 of this document.

** This is one carrier only.

***This reading was measured with two carriers at each bandedge.

Note-Intermodulation characteristics are being reported but the amplifier is meant for single channel use only.

Equipment Used: 1036-1629-1055-1064**Measurement Uncertainty:** +/- 1.7 dB

EQUIPMENT: **DAB-1819****Section 4. Occupied Bandwidth**

NAME OF TEST: Occupied Bandwidth (GSM EDGE)	PARA. NO.: 2.1049
TESTED BY: David Light	DATE: 5/5/2003

Test Results: Complies.**Test Data:** See attached plot(s).**Measurement Uncertainty:** +/- 1.6 dB

EQUIPMENT: **DAB-1819****Test Data – Occupied Bandwidth**

Nemko Dallas, Inc.

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

Page 1 of 2

Job No.: 2L0101R Date: 5/9/2003
 Specification: 24.38 Temperature(°C): 23
 Tested By: Eldon Berry Relative Humidity(%) 50
 E.U.T.: PCS Band GSM Booster
 Configuration: TX
 Sample Number: 1
 Location: Lab 1 RBW: Refer to plots
 Detector Type: Peak VBW: Refer to plots

 Complete x
 Preliminary:

 Measurement
 Distance: m
Test Equipment Used

Antenna: Directional Coupler: 1055
 Pre-Amp: Cable #1: 1627
 Filter: Cable #2:
 Receiver: 1036 Cable #3:
 Attenuator #1: 1064 Cable #4:
 Attenuator #2: 1604 Mixer:

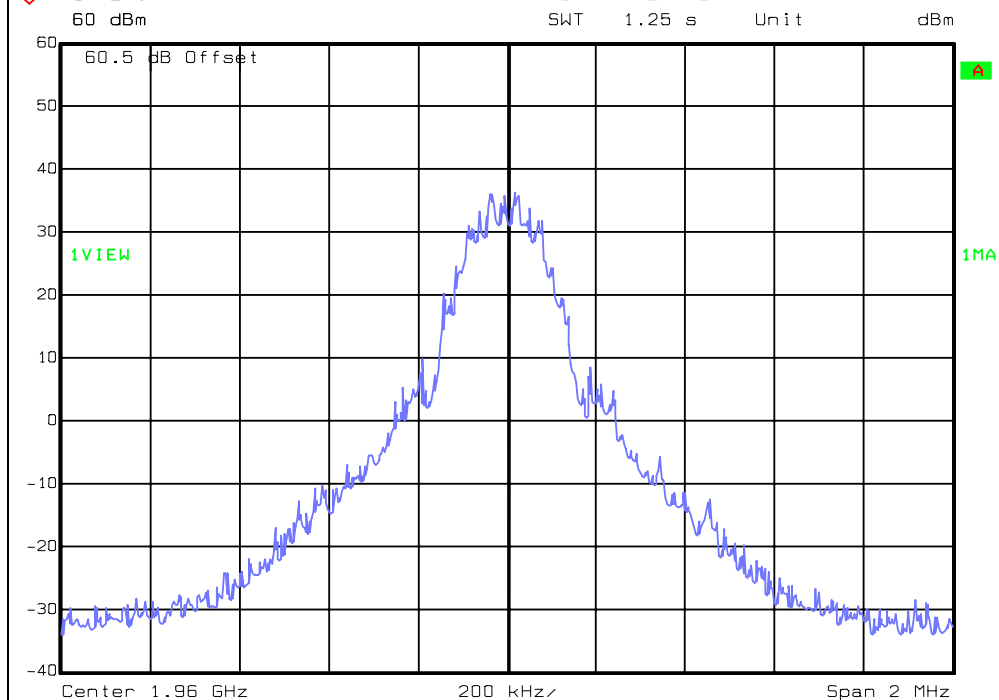
Additional equipment used:

Measurement Uncertainty: +/-1.7 dB

RBW 2 kHz RF Att 20 dB

Ref Lvl

VBW 2 kHz



Date: 09.MAY 2003 15:15:47

Notes: 80 watt amp output plot

EQUIPMENT: DAB-1819

Test Data – Occupied Bandwidth



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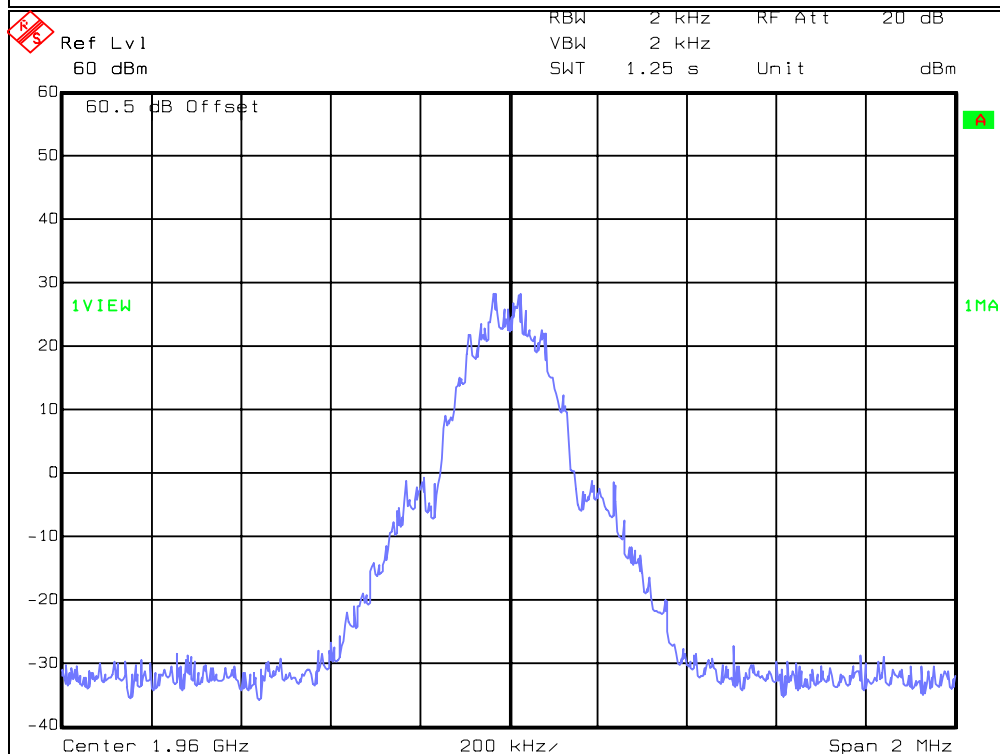
Nemko Dallas, Inc.

Data Plot

Occupied Bandwidth

Page 2 of 2

Job No.: 2L0101R Date: 5/9/2003
Specification: 24.4 Temperature(°C): 23
Tested By: Eldon Berry Relative Humidity(%) 50
E.U.T.: PCS Band GSM Booster
Configuration: TX



Date: 09.MAY 2003 15:18:10

Notes: 80 watt amp input plot

Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.1051
TESTED BY: David Light	DATE:

Test Results: Complies.

Test Data: See attached plot(s).

**Measurement
Uncertainty:** +/- 1.7 dB

Note-Intermodulation characteristics are being reported but the amplifier is meant for single channel use only.

Nemko Dallas

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
PROJECT NO.: **3L0189RUS2**

EQUIPMENT: **DAB-1819**

EQUIPMENT: **DAB-1819**

Test Data – Spurious Emissions at Antenna Terminals



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Data Plot

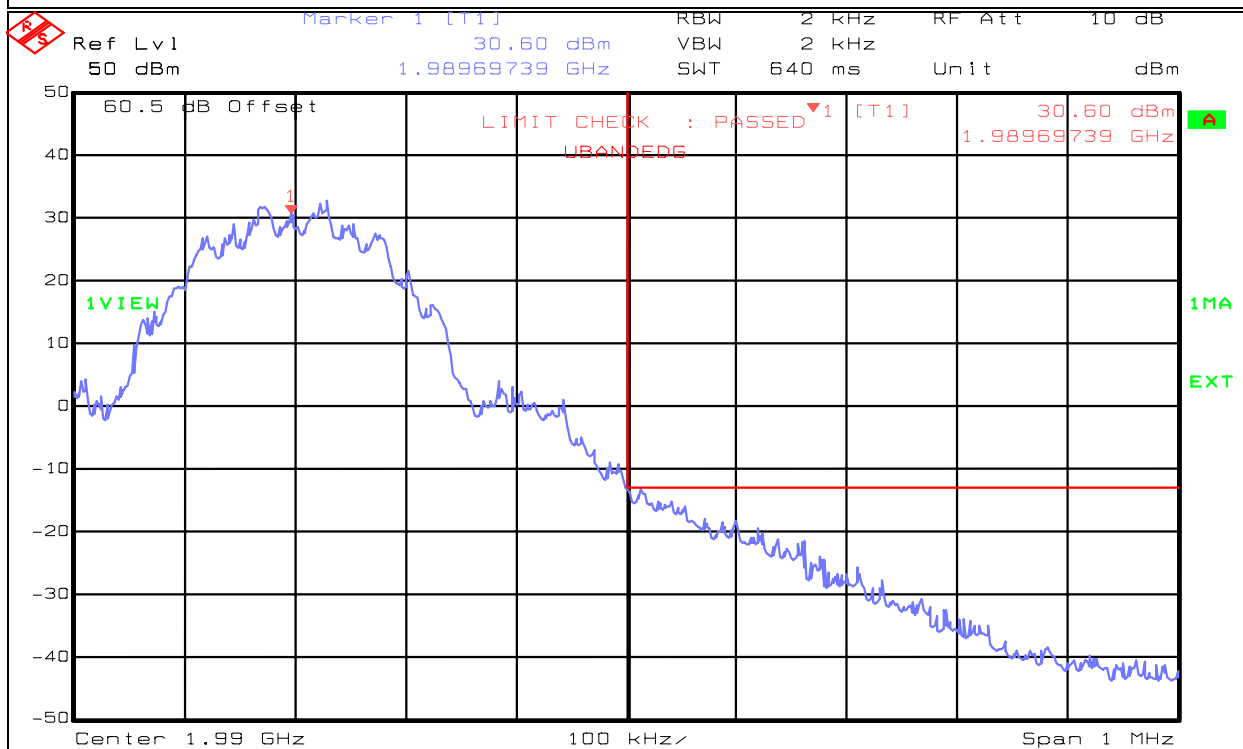
Spurious Emissions at Antenna Terminals

Page 1 of 7

Job No.: 3L0189R Date: 5/6/2003 Complete X
Specification: PART 24 Temperature(°C): 22 Preliminary: _____
Tested By: David Light Relative Humidity(%): 40
E.U.T.: PCS Band Booster
Configuration: TX
Sample Number: 1
Location: Lab 1 RBW: Refer to plots Measurement
Detector Type: Peak VBW: Refer to plots Distance: N/A m

Test Equipment Used

Antenna: _____ Directional Coupler: 1055
Pre-Amp: _____ Cable #1: 1627
Filter: _____ Cable #2: _____
Receiver: 1036 Cable #3: _____
Attenuator #1: 1064 Cable #4: _____
Attenuator #2: _____ Mixer: _____
Additional equipment used: _____
Measurement Uncertainty: +/-1.7 dB



Date: 06.MAY 2003 13:02:46

Notes: UpperBandedge
1989.7 MHz CF @ 80 Watts output (Rated power)

EQUIPMENT: DAB-1819

Test Data – Spurious Emissions at Antenna Terminals



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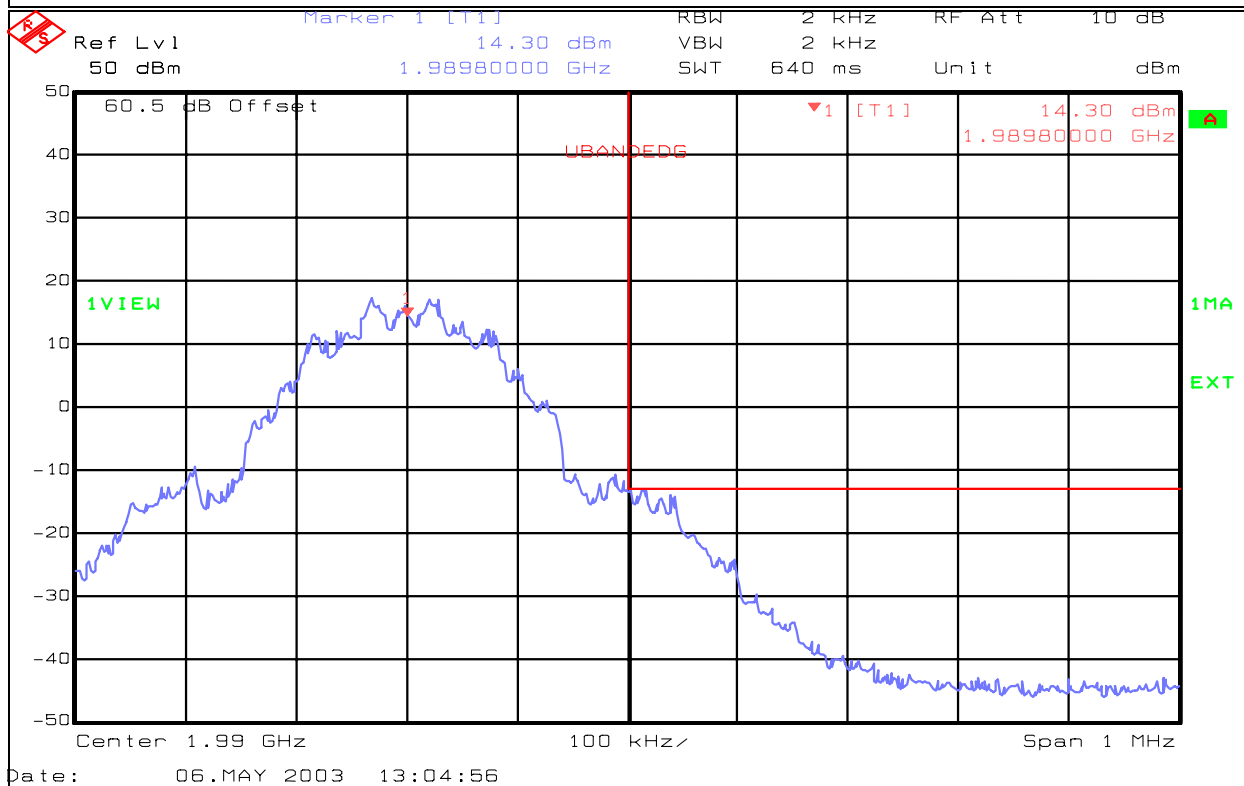
Nemko Dallas, Inc.

Data Plot

Spurious Emissions at Antenna Terminals

Page 2 of 7

Job No.: 3L0189R Date: 5/6/2003
Specification: PART 24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 40
E.U.T.: PCS Band Booster
Configuration: TX



Notes: UPPER BAND EDGE
1989.8 MHz @ 2.2 Watts (33.5 dBm)

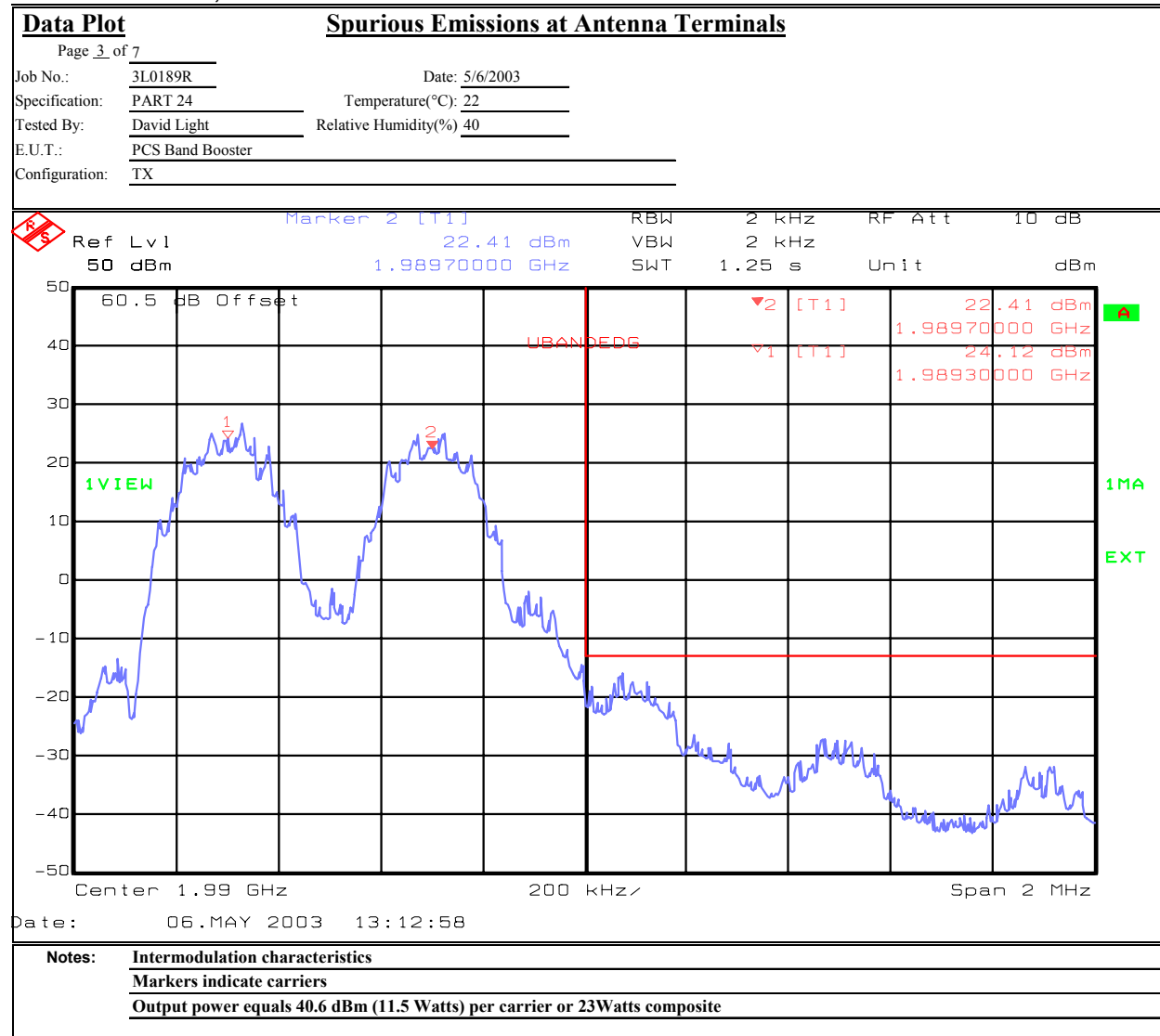
EQUIPMENT: DAB-1819

Test Data – Spurious Emissions at Antenna Terminals



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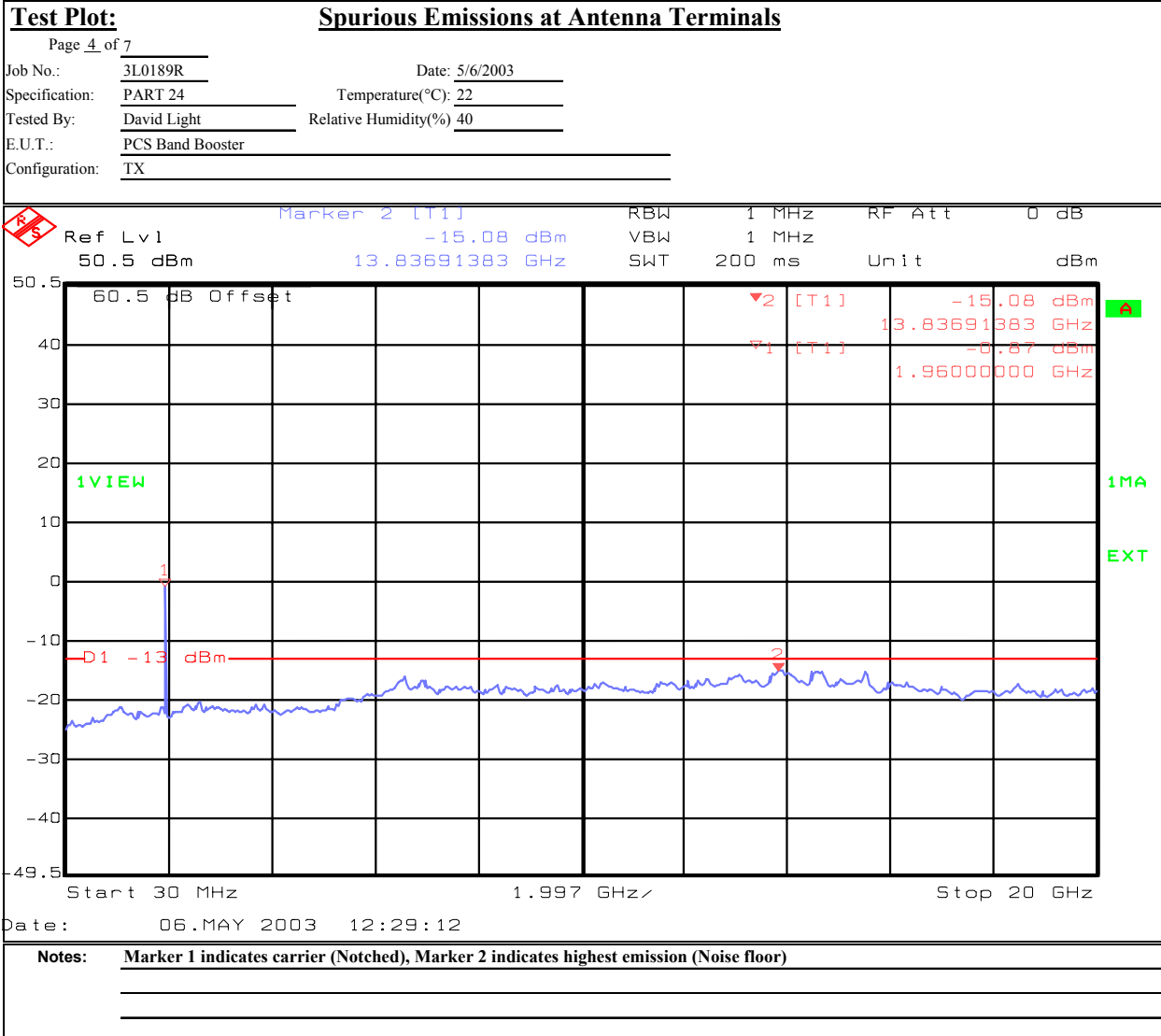
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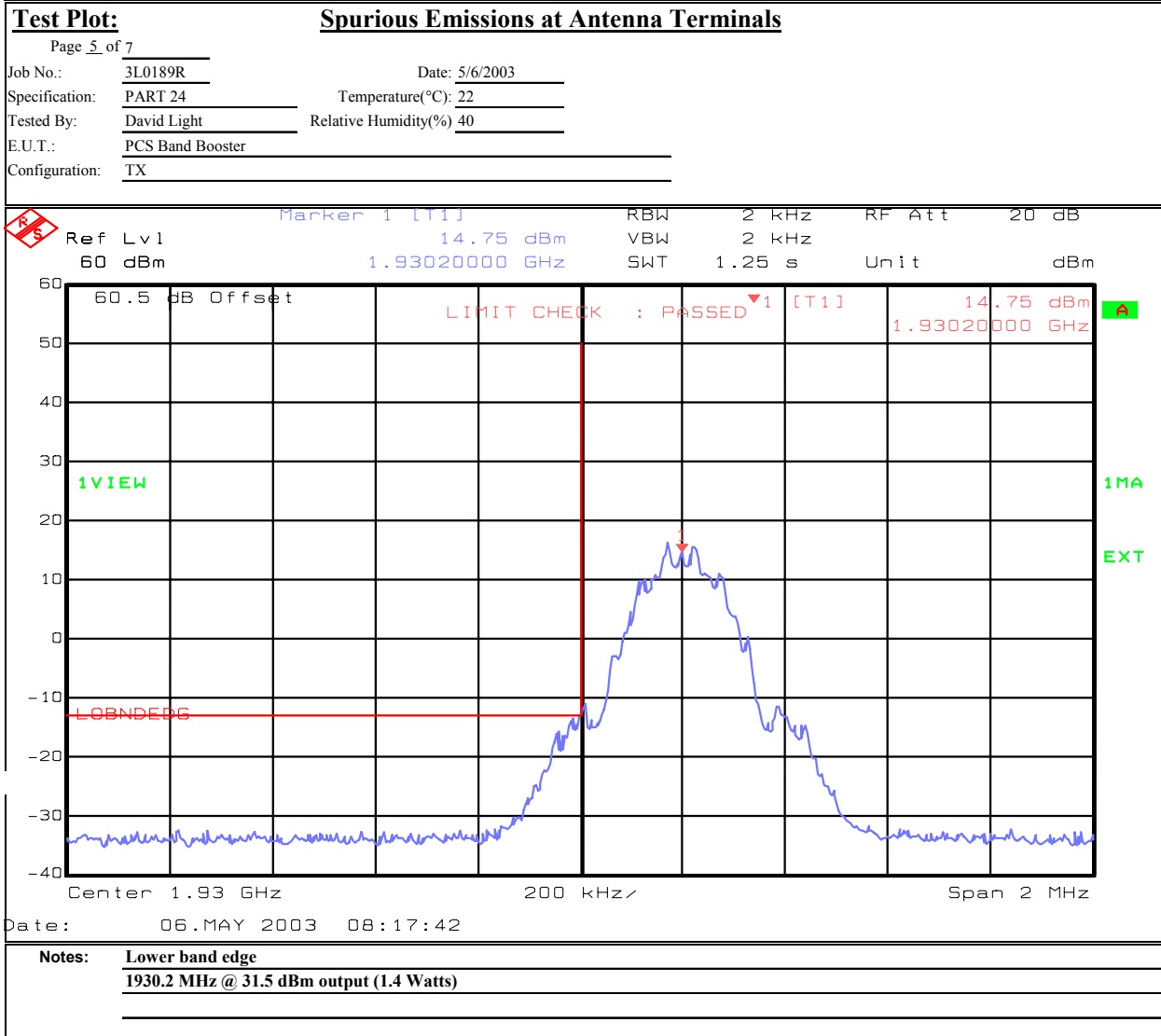
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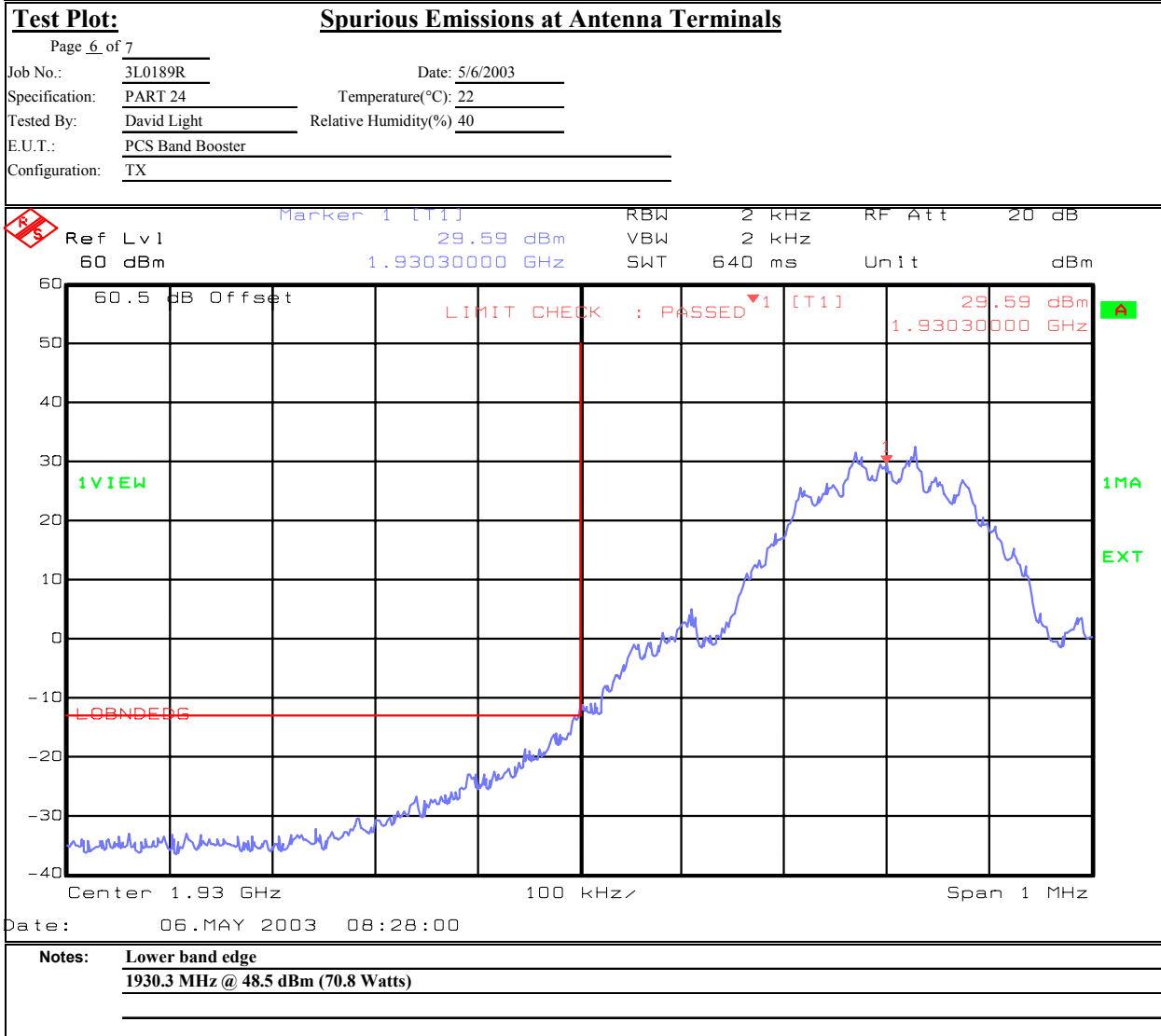
EQUIPMENT: **DAB-1819**

Test Data – Spurious Emissions at Antenna Terminals



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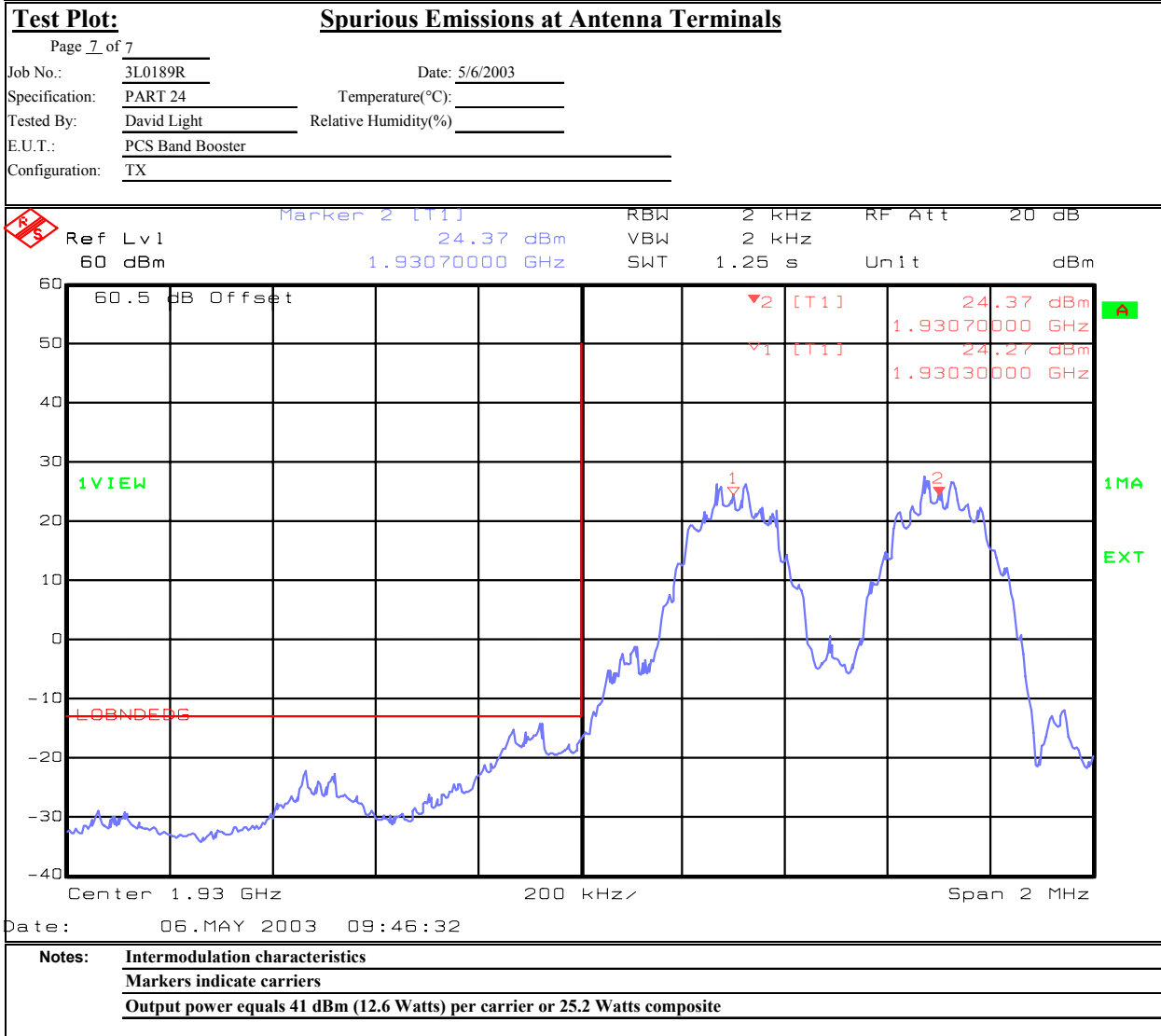
EQUIPMENT: DAB-1819

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EQUIPMENT: **DAB-1819****Section 7. Test Equipment List**

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	12/18/01	12/19/03
1055	DUAL DIRECTIONAL COUPLER	NARDA 3022	73393	Cal Not Req	N/A
1064	ATTENUATOR	NARDA 776B-20	NONE	CBU	N/A
1604	ATTENUATOR	NARDA 776B-20	NONE	N/A	N/A
1627	CABLE, 5 ft	MEGAPHASE 10312 1GVT4	N/A	CBU	N/A

ANNEX A - TEST DETAILS

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

EQUIPMENT: **DAB-1819****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: $\geq$ RBW

Span: 5 MHz

Sweep: Auto

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

GSM

RBW: 3 kHz

VBW: $\geq$ RBW

Span: 2 MHz

Sweep: Auto

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

NADC

RBW: 1 kHz

VBW: $\geq$ RBW

Span: 1 MHz

Sweep: Auto

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

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

CDMA

RBW: 1 MHz (> 1 MHz from Band Edge)
RBW: 30 kHz (< 1MHz from Band Edge)
VBW: $\geq$ RBW
Sweep: Auto
Video Avg: 6 Sweeps

GSM

RBW: 1 MHz (> 1 MHz from Band Edge)
RBW: 3 kHz (< 1 MHz from Band Edge)
VBW: $\geq$ RBW
Sweep: Auto
Video Avg: Disabled

NADC

RBW: 1 MHz (> 1 MHz from Band Edge)
RBW: 3 kHz (< 1 MHz from Band Edge)
VBW: $\geq$ 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.

EQUIPMENT: **DAB-1819**

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: 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: **DAB-1819****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.

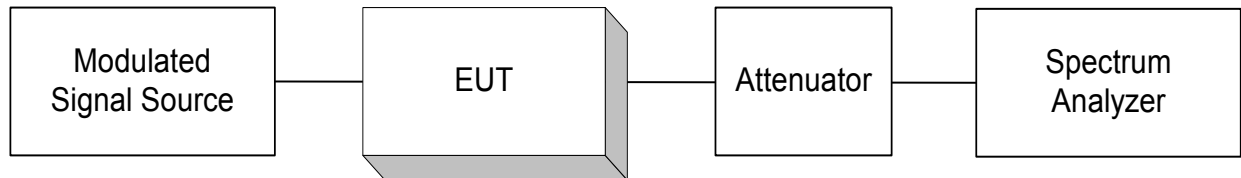
Frequency Stability With Temperature Variation

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.

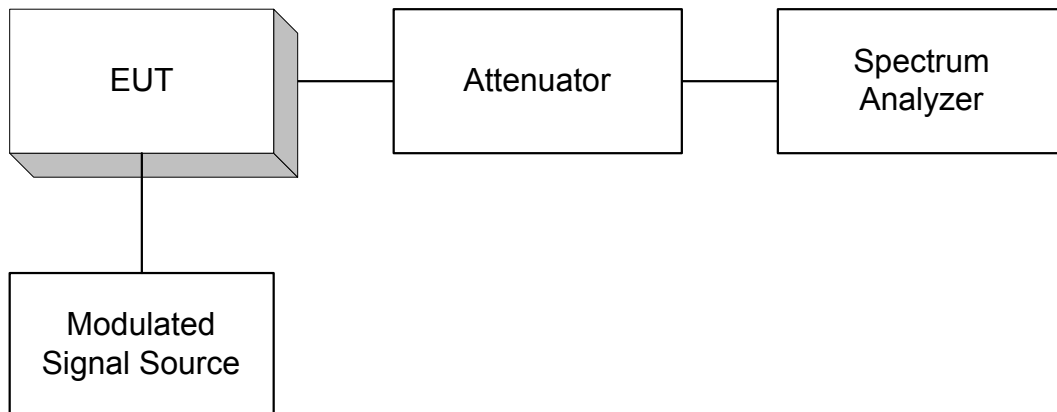
ANNEX B - TEST DIAGRAMS

EQUIPMENT: **DAB-1819**

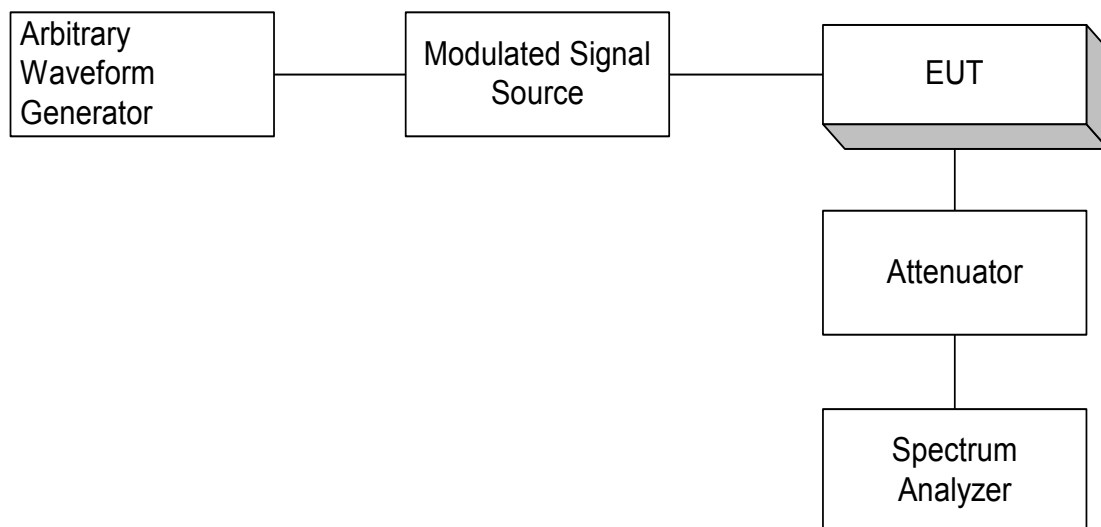
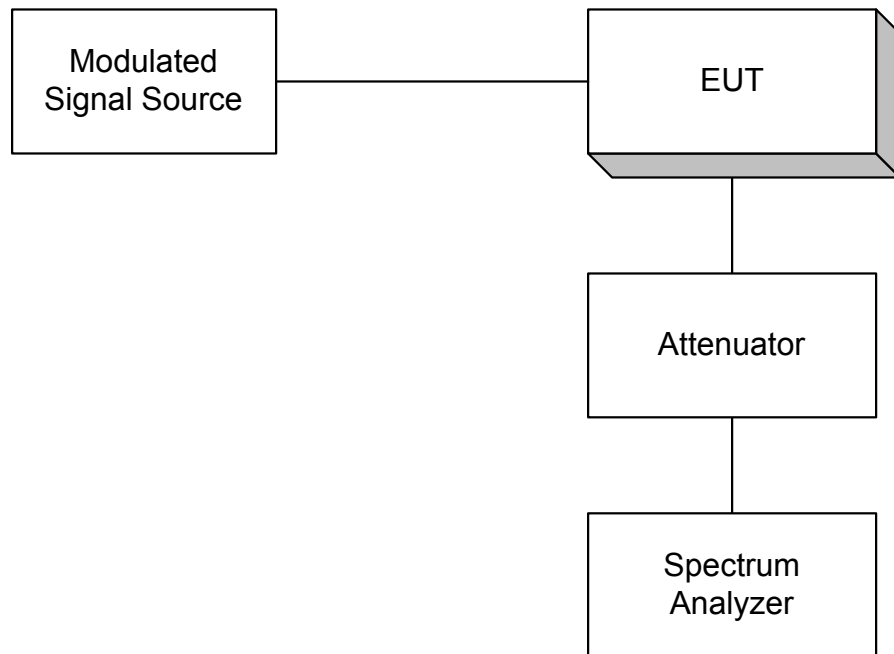
Para. No. 2.985 - R.F. Power Output



Para. No. 2.989 - Occupied Bandwidth

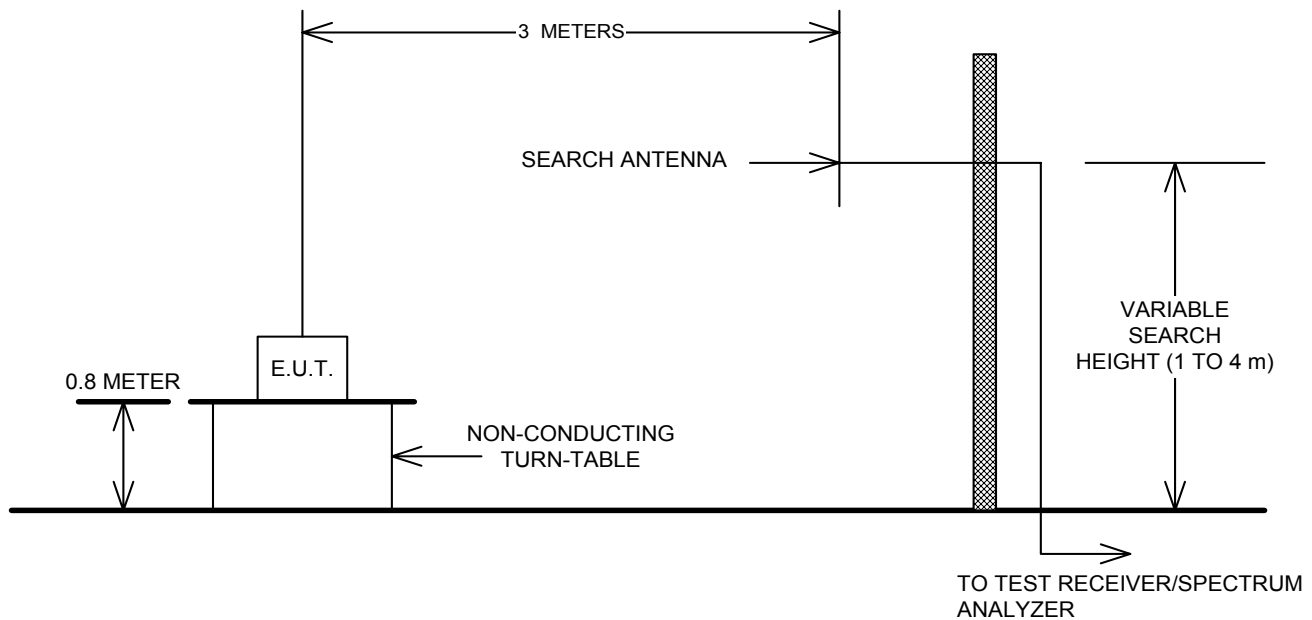


Para. No. 2.991 Spurious Emissions at Antenna Terminals



EQUIPMENT: **DAB-1819**

Para. No. 2.993 - Field Strength of Spurious Radiation



Para. No. 2.995 - Frequency Stability

