

KTL Test Report: 0R03127

Applicant: Digital Security Controls Ltd.
3301 Langstaff Road
Vaughan, Ontario
L4K 4L2

**Equipment Under Test:
(E.U.T.)** Links 2450, Rev.03X1

FCC ID: F5300LINKS2450

In Accordance With: **FCC Part 90**

Tested By: KTL Ottawa Inc.
3325 River Road, R.R. 5
Ottawa, Ontario K1V 1H2

Authorized By:

G. Westwell, Technologist

Date:

Total Number of Pages: 21

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EQUIPMENT: Links 2450, Rev. 03X1
FCC ID: F5300LINKS2450

Section 1. Summary of Test Results

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.



New Submission



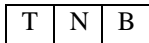
Production Unit



Class II Permissive Change



Pre-Production Unit



Equipment Code

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".



NVLAP LAB CODE: 100351-0

TESTED BY: _____ DATE: _____
R. Grant, Wireless Group Manager

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This report applies only to the items tested.

EQUIPMENT: Links 2450, Rev. 03X1
FCC ID: F5300LINKS2450

Summary Of Test Data

Name Of Test	Para. No.	Result
RF Power Output	2.1046	Complies
Audio Frequency Response	2.1047	Not Applicable
Audio Low-Pass Filter Response	2.1047	Not Applicable
Modulation Limiting	2.1047	Not Applicable
Occupied Bandwidth	2.1049	Complies
Spurious Emissions at Antenna Terminals	2.1051	Complies
Field Strength of Spurious Emissions	2.1053	Complies
Frequency Stability	2.1055	Complies
Transient Frequency Behavior	——	Complies

Footnotes For N/A's:

.

EQUIPMENT: Links 2450, Rev. 03X1
FCC ID: F5300LINKS2450

Section 2. General Equipment Specification

Manufacturer: Digital Security Controls Ltd.

Model No.: Links 2450

Date Received In Laboratory: October 3, 2000

KTL Identification No.: Item # 1 & 2

Frequency: 455 MHz Fixed

RF Power Output: 2W

Data Rate: 19.2 Kbps

Emissions Designator: 20K0F1D

EQUIPMENT: Links 2450, Rev. 03X1
FCC ID: F5300LINKS2450

Section 3. RF Power Output

Para. No.: 2.1046

Test Performed By: Russell Grant	Date of Test: November 2, 2000
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Minimum Standard: 90.205

Test Results: Complies.

The RF power output is 33.5 dBm, 2.2W. This is within ± 1 dB of the manufacturer's rating.

Measurement Data: 33.5 dBm

EQUIPMENT: Links 2450, Rev. 03X1
FCC ID: F5300LINKS2450

Section 4. Occupied Bandwidth

Para. No.: 2.1049

Test Performed By: Russell Grant	Date of Test: November 2, 2000
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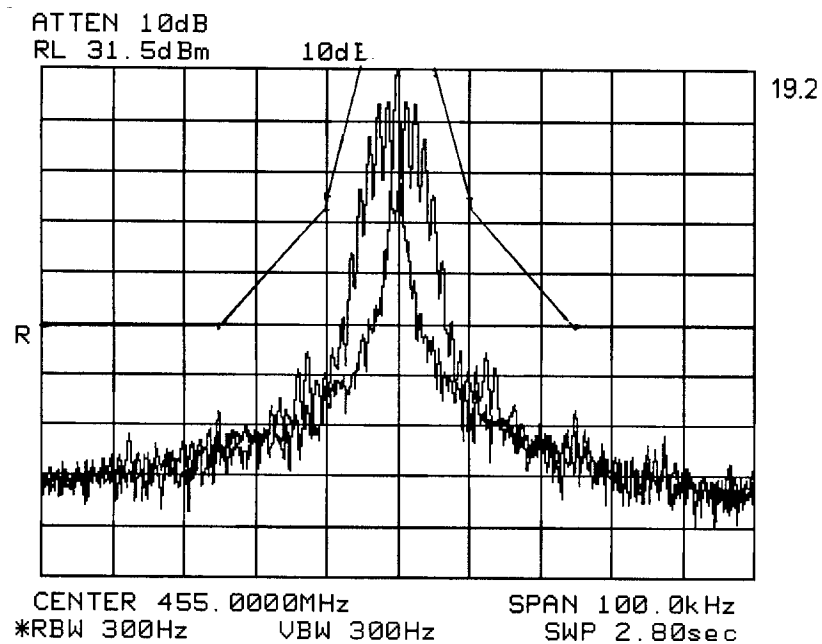
Minimum Standard: 90.210 Mask C

Test Results: Complies.

Measurement Data: See attached graphs.

EQUIPMENT: Links 2450, Rev. 03X1
FCC ID: F5300LINKS2450

Tx Data 19.2 Kbps



EQUIPMENT: Links 2450, Rev. 03X1
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Section 5 Spurious Emissions at Antenna Terminals

Para. No.: 2.1051

Test Performed By: Russell Grant	Date of Test: November 2, 2000
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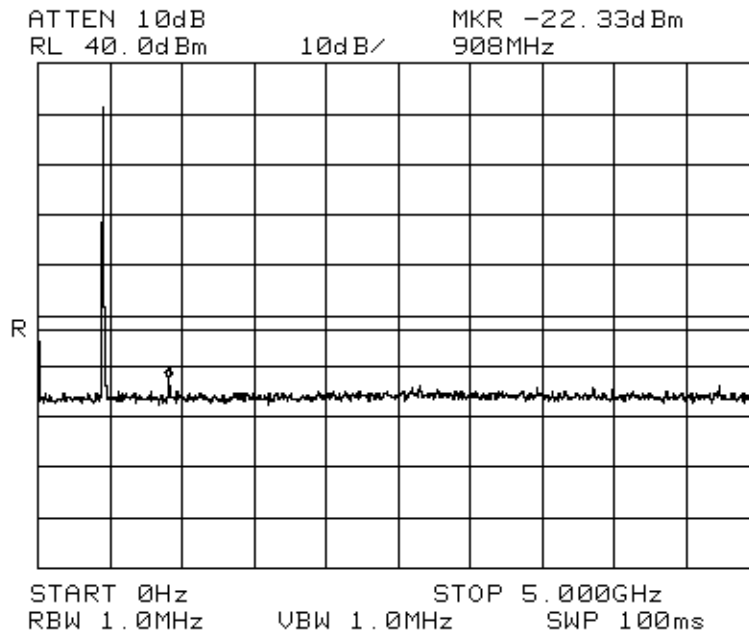
Minimum Standard: 60.2.10 (c), -13 dBm

Test Results: Complies.

The strongest emissions is -22.3 dBm at 910 MHz.
This is 9.3 dB below the specification limit.

Measurement Data: See attached graph.

EQUIPMENT: Links 2450, Rev. 03X1
FCC ID: F5300LINKS2450



EQUIPMENT: Links 2450, Rev. 03X1
FCC ID: F5300LINKS2450

Section 6. Field Strength of Spurious Emissions

Para. No.: 2.1053

Test Performed By: Russell Grant	Date of Test: November 2, 2000
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Minimum Standard: 9210 (c), -13 dBm

Test Results: Complies.

The strongest emission is -14.0 dBm at 2730 MHz. This is 1 dB below the specified limit.

Measurement Data: See attached tabulated data.

EQUIPMENT: Links 2450, Rev. 03X1
FCC ID: F5300LINKS2450

Test Data - Field Strength of Spurious Emissions

Test Distance (meters) : 3		Range: A Tower		RBW(kHz): 1000			Detector: Peak		
Freq. (MHz)	Ant. *	Pol. (V/H)	RCVD Signal (dBμV/m)	Corr. Factor (dB)**	Amp. Gain (dB)***	Dist. Corr. (dB)	Field Strength (dBm)	Limit (dBm)	Margin (dB)
910.0	SSV	V	38.7	-69.2			-30.5	-13.0	17.5
910.0	SSH	H	36.1	-71.0			-34.9	-13.0	21.9
1365.0	SSV	V	102.5	-118.9			-16.4	-13.0	3.4
1365.0	SSH	H	100.7	-118.9			-18.2	-13.0	5.2
1820.0	SSV	V	87.2	-116.3			-29.1	-13.0	16.1
1820.0	SSH	H	95.0	-116.5			-21.5	-13.0	8.5
2275.0	SSV	V	92.7	-114.8			-22.1	-13.0	9.1
2275.0	SSH	H	100.7	-116.2			-15.5	-13.0	2.5
2730.0	SSV	V	92.7	-113.3			-20.6	-13.0	7.6
2730.0	SSH	H	101.5	-115.5			-14.0	-13.0	1.0
3185.0	SSV	V	92.3	-110.6			-18.3	-13.0	5.3
3185.0	SSH	H	95.7	-111.7			-16.0	-13.0	3.0
3640.0	SSV	V	80.3	-107.4			-27.1	-13.0	14.1
3640.0	SSH	H	86.3	-108.3			-22.0	-13.0	9.0
4095.0	SSV	V	75.5	-103.1			-27.6	-13.0	14.6
4095.0	SSH	H	82.3	-104.0			-21.7	-13.0	8.7
4550.0	SSV	V	69.8	-104.1			-34.3	-13.0	21.3
4550.0	SSH	H	77.7	-103.4			-25.7	-13.0	12.7
Notes: B/C = Biconical, B/L = Biconilog, L/P = Log-Periodic, H = Horn, D/P = Dipole * Re-measured using dipole antenna. ** Includes cable loss when amplifier is not used. *** Includes cable loss. () Denotes failing emission level. N.D. = Not Detected									

EQUIPMENT: Links 2450, Rev. 03X1
FCC ID: F5300LINKS2450

Section 5. Frequency Stability

Para. No.: 2.1055

Test Performed By: Russell Grant	Date of Test: November 2, 2000
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Minimum Standard: 90.213(a), 2.5 ppm

Test Results: Complies.

The maximum frequency drift is 535 Hz. This is 1.18 ppm.

Standard Test Voltage: 13.8 VDC
Standard Test Voltage: 455.000 MHz

Measurement Data:

Test Condition	Frequency Drift (kHz)
85% STV 20°C	447
STV 20°C	448
115% STV 20°C	480
-30°C	535
-20°C	400
-10°C	86
0°C	127
+10°C	53
+30°C	190
+40°C	478
+50°C	348

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Section 6. Transient Frequency Behaviour

Para. No.: 90.214

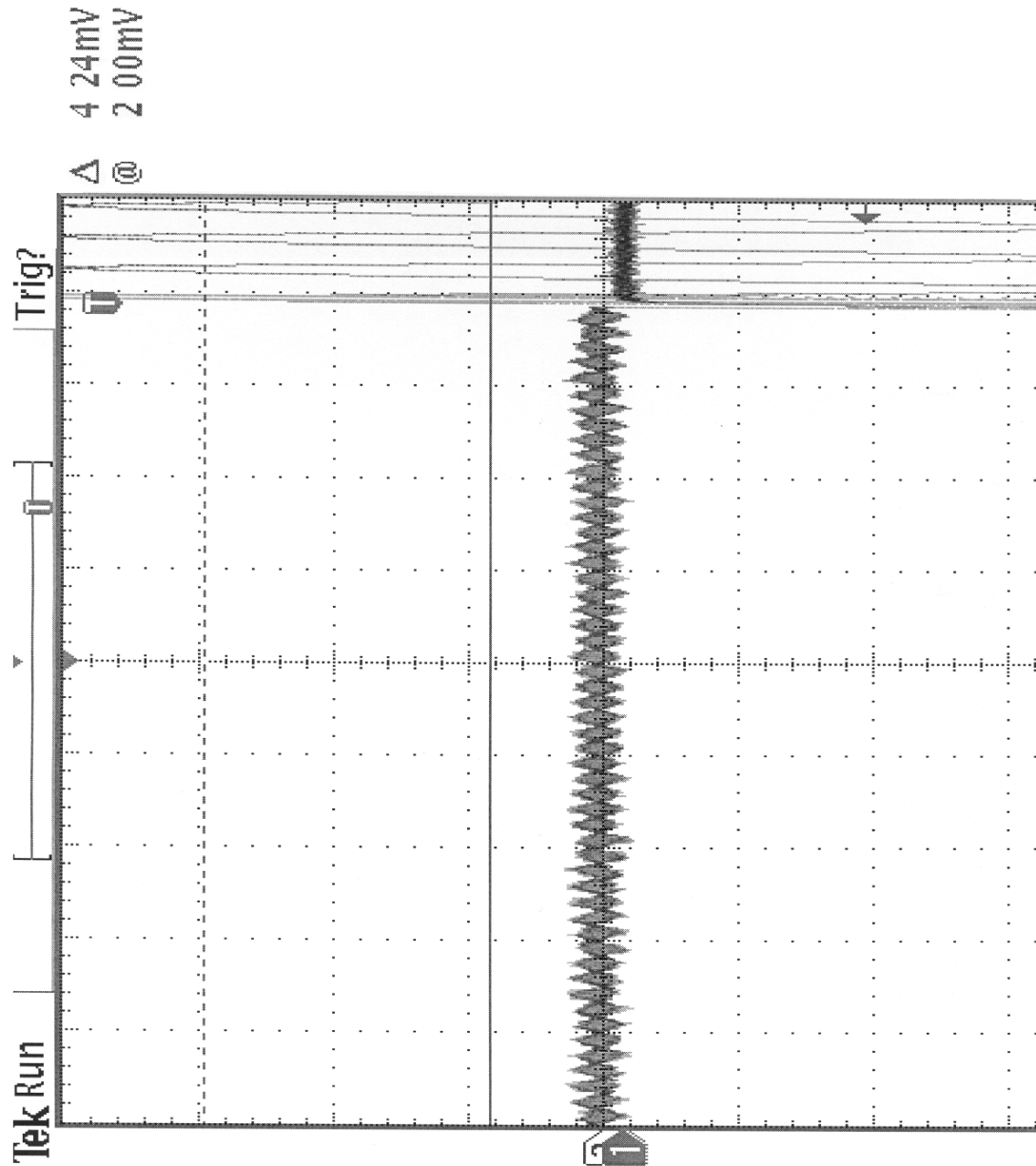
Test Performed By: Russell Grant	Date of Test: November 2, 2000
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Minimum Standard: 90.214

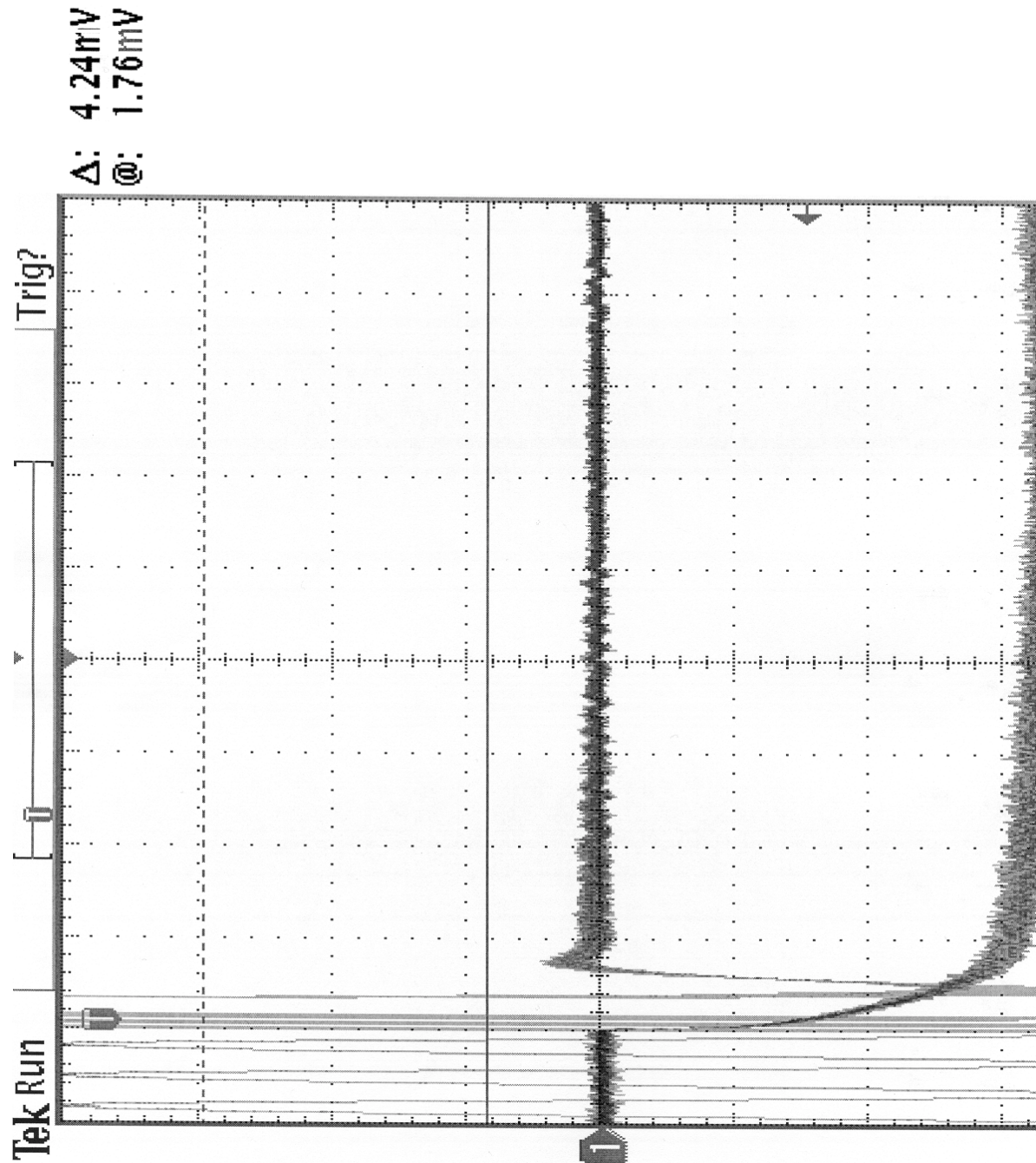
Test Results: Complies.

Measurement Data: See attached graphs.

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FCC ID: F5300LINKS2450



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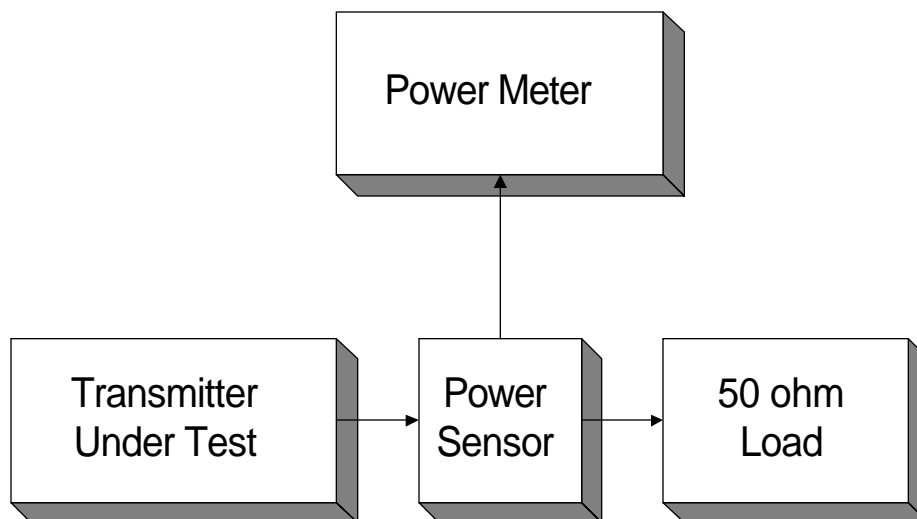
Section 7. Test Equipment List

CAL CYCLE	EQUIPMENT	MANUFACTURER	MODEL	SERIAL	LAST CAL.	NEXT CAL.
1 Year	Spectrum Analyzer	Hewlett Packard	8565E	FA000981	June 16/00	June 16/01
1 Year	Climate Chamber	Thermotron	SM-16C	15649-S	COU	COU
1 Year	Attenuator	Narda	768-10	9709	Oct. 8/99	Oct. 8/00
1 Year	Attenuator	Narda	776B-20	FA001400	Oct. 15/99	Oct. 15/00
1 Year	Horn Antenna	EMCO #2	3115	4336	Nov. 11/99	Nov. 11/00
1 Year	RF AMP	JCA	2-4 GHz	FA001496	May 31/00	May 31/01
1 Year	RF AMP	JCA	1-2 GHz	FA001498	May 31/00	May 31/01
1 Year	RF AMP	JCA	4-8 GHz	FA001497	May 31/00	May 31/01
1 Year	Frequency Counter	Hewlett Packard	HP5350A	2444A00135	May 7/00	Nov. 7/00

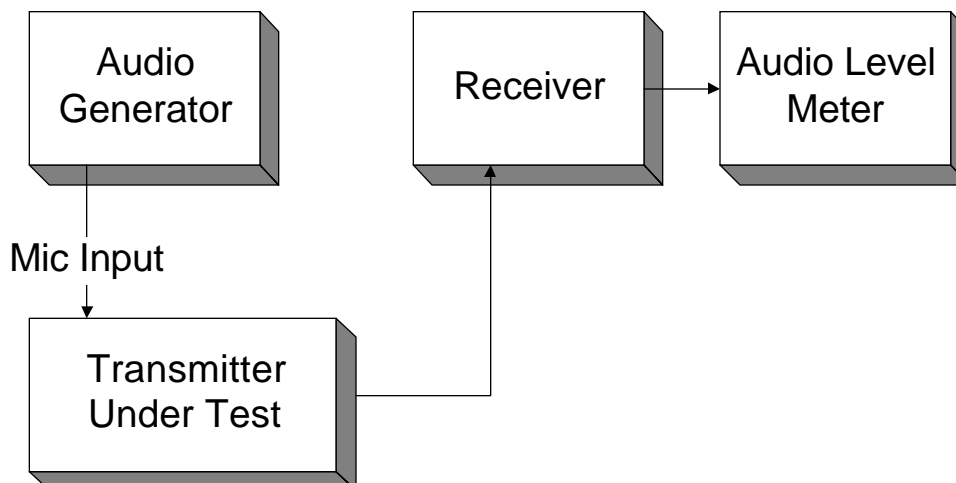
NA: Not Applicable
NCR: No Cal Required
COU: CAL On Use

Section 8. Test Diagrams

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

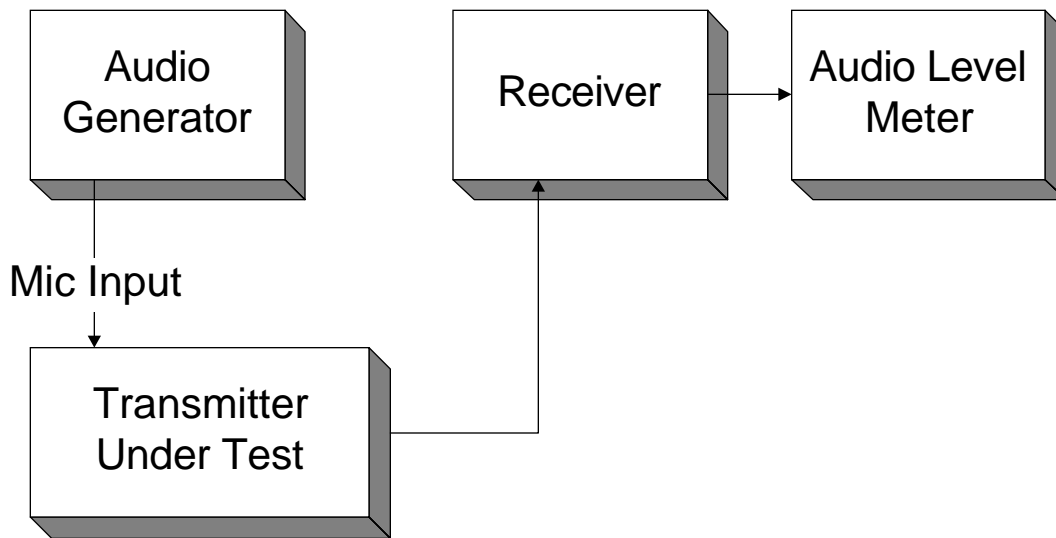


Para. No. 2.2.1047 - Audio Frequency Response

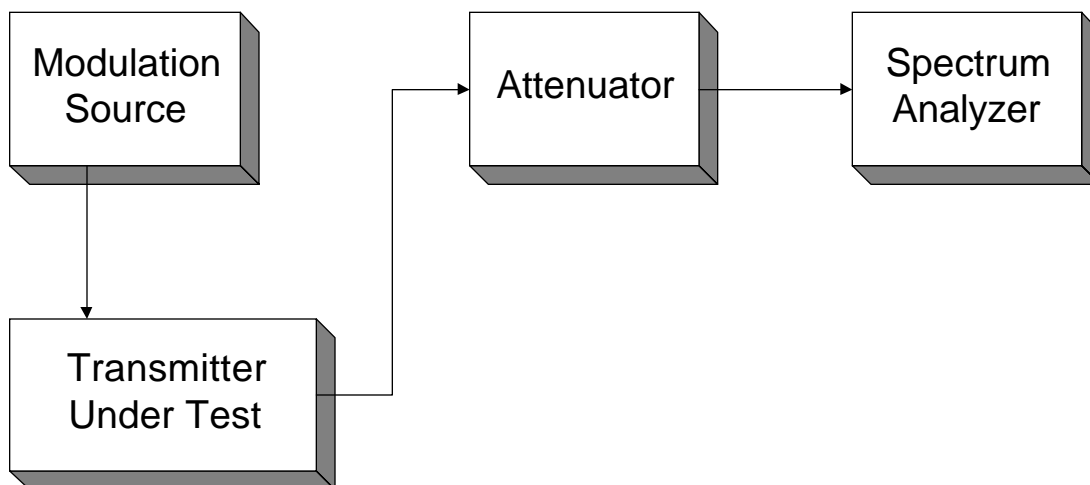


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Para. No. 2.1047 - Modulation Limiting

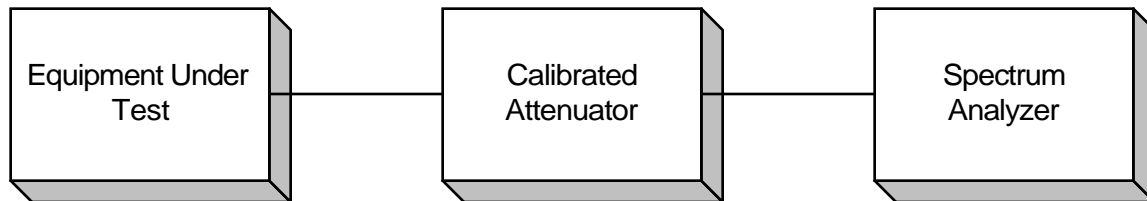


Para. No. 2.1049 - Occupied Bandwidth

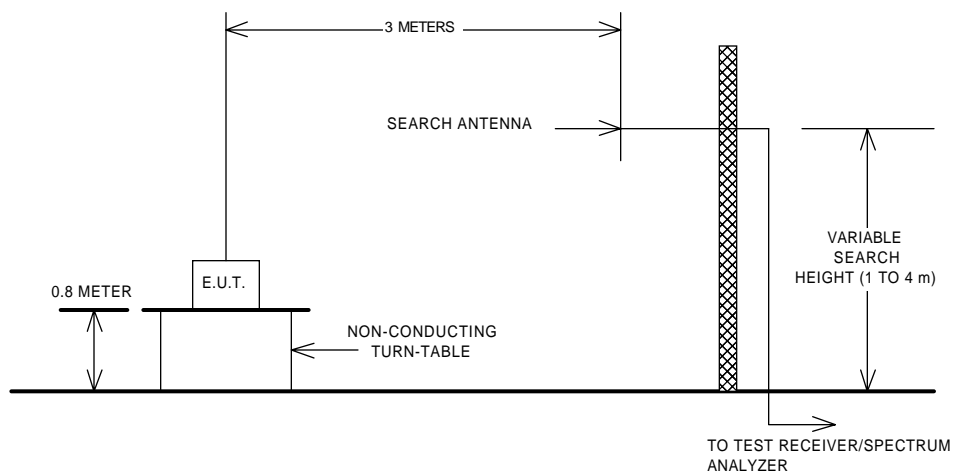


EQUIPMENT: Links 2450, Rev. 03X1
FCC ID: F5300LINKS2450

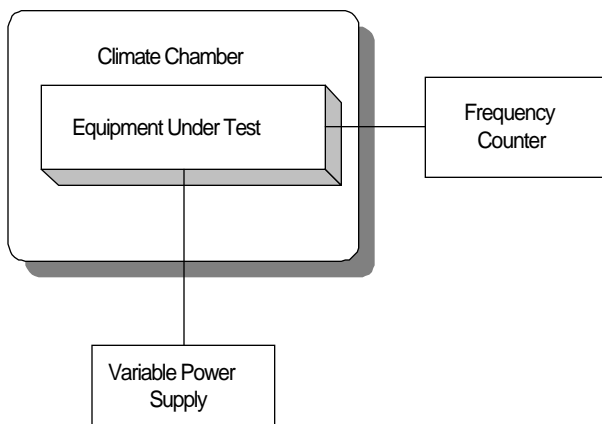
Para. No. 2.1051 - Spurious Emissions at Antenna Terminals



Para. No. 2.1053 - Field Strength of Spurious Radiation

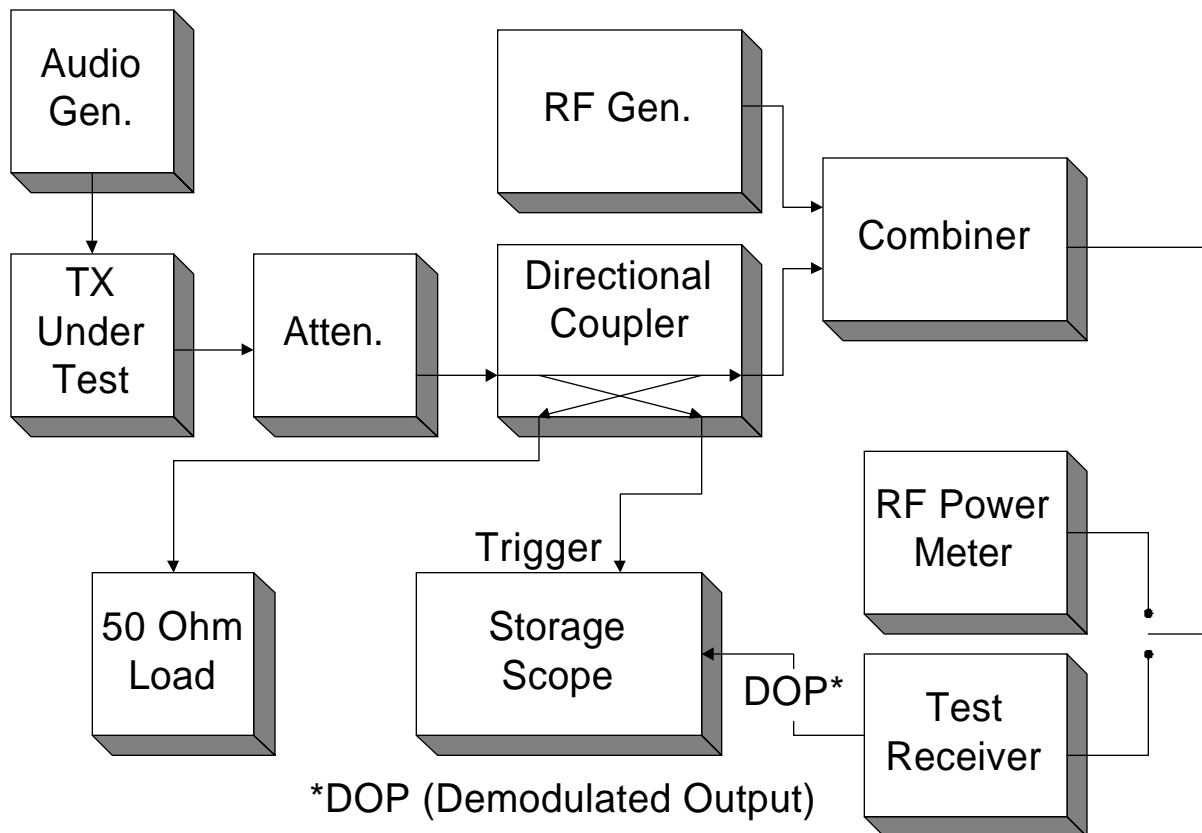


Para. No. 2.1055 - Frequency Stability



EQUIPMENT: Links 2450, Rev. 03X1
FCC ID: F5300LINKS2450

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).