



Nemko Test Report: 26456RUS1

Applicant: Fiber-Span
111 Corporate Blvd.
Plainfield, NJ 07080
USA

Equipment Under Test: FS51C-15
(E.U.T.)

FCC Identifier: Q4VFS51C-15

In Accordance With: **CFR 47 Part 90, Subpart I**
Private Land Mobile Repeater

Tested By: Nemko USA Inc.
802 N. Kealy
Lewisville, TX 75057-3136

TESTED BY:

A handwritten signature in black ink, appearing to read 'David Light'.

David Light, Senior Wireless Engineer

DATE: 22 April 2009

APPROVED BY:

A handwritten signature in black ink, appearing to read 'Tom Tidwell'.

Tom Tidwell, Telecom Direct

DATE: 11 May 2009

Number of Pages: 24

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Section 1. Summary of Test Results

Manufacturer: Fiber-Span

Model No.: FS51C-15

Serial No.: A2334-03-1

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 CFR Part 90, Subpart I.



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".



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Summary Of Test Data

NAME OF TEST	PARA. NO.	SPEC.	RESULT
RF Power Output	90.205	500 watts	Complies
Occupied Bandwidth	90.210	Input/Output	Complies
Spurious Emissions at Antenna Terminals	90.210	Mask B	Complies
Field Strength of Spurious Emissions	90.210	Mask B	Complies
Frequency Stability	90.213	5.0 ppm	NA

Footnotes:

- (1) Since the E.U.T. does not contain modulation circuitry modulation testing was not performed.
- (2) Since the E.U.T. is not a keyed carrier system, Transient Frequency Behavior was not performed.
- (3) The system uses a common oscillator to down-convert incoming rf signals and up-convert out-going rf signals, thus frequency stability is not applicable.

Section 2. General Equipment Specification

Supply Voltage Input: 120 Vac

Frequency Range: 150 to 165 MHz

Type of Modulation and Designator:

CDMA (G7W)	GSM (GXW)	NADC (DXW)	CDPD (F9W)	Analogue (F8W, F1D)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Output Impedance: 50 ohms

RF Output (Rated): Composite: 1 Watt (30 dBm)

Frequency Translation:

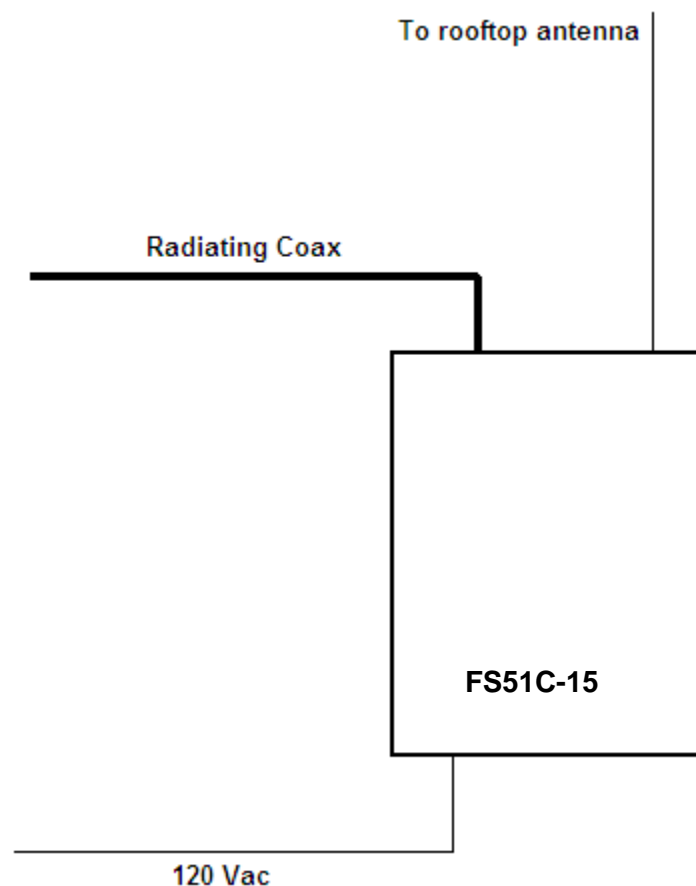
F1-F1	F1-F2	N/A
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Band Selection:

Software	Duplexer Change	Full band Coverage
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Description of EUT

The FS51C-15 is an eight channel, 150 MHz VHF, bidirectional amplifier utilizing 16 channels of synchronized down-up conversions. The multi-channel booster is divided into two independent 8 channel systems for full duplex operation. Downlink signals are received at the roof antenna, 8 selected frequencies are processed and rebroadcast on radiating cable. Conversely, uplink signals induced onto radiating cable are similarly processed and rebroadcast on the roof antenna.

System Diagram

Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 2.985
TESTED BY: David Light	DATE: 21 April 2008

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

	Modulation	Output per Channel (dBm)	Composite Power (dBm)	Composite Power (W)
	Analog	27	30	1.0

Equipment Used: 1663-1082-1472-1469**Measurement Uncertainty:** +/- 1.7 dB**Temperature:** 22 °C**Relative Humidity:** 35 %

Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.989
TESTED BY: David Light	DATE: 21 April 2009

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 1663-1472-1469-1082

Measurement Uncertainty: 1X10⁻⁷ ppm

Temperature: 22 °C

Relative Humidity: 35 %

EQUIPMENT: FS51C-15

Test Data – Occupied Bandwidth

2.5 kHz Tone / 3 kHz deviation



*RBW 300 Hz

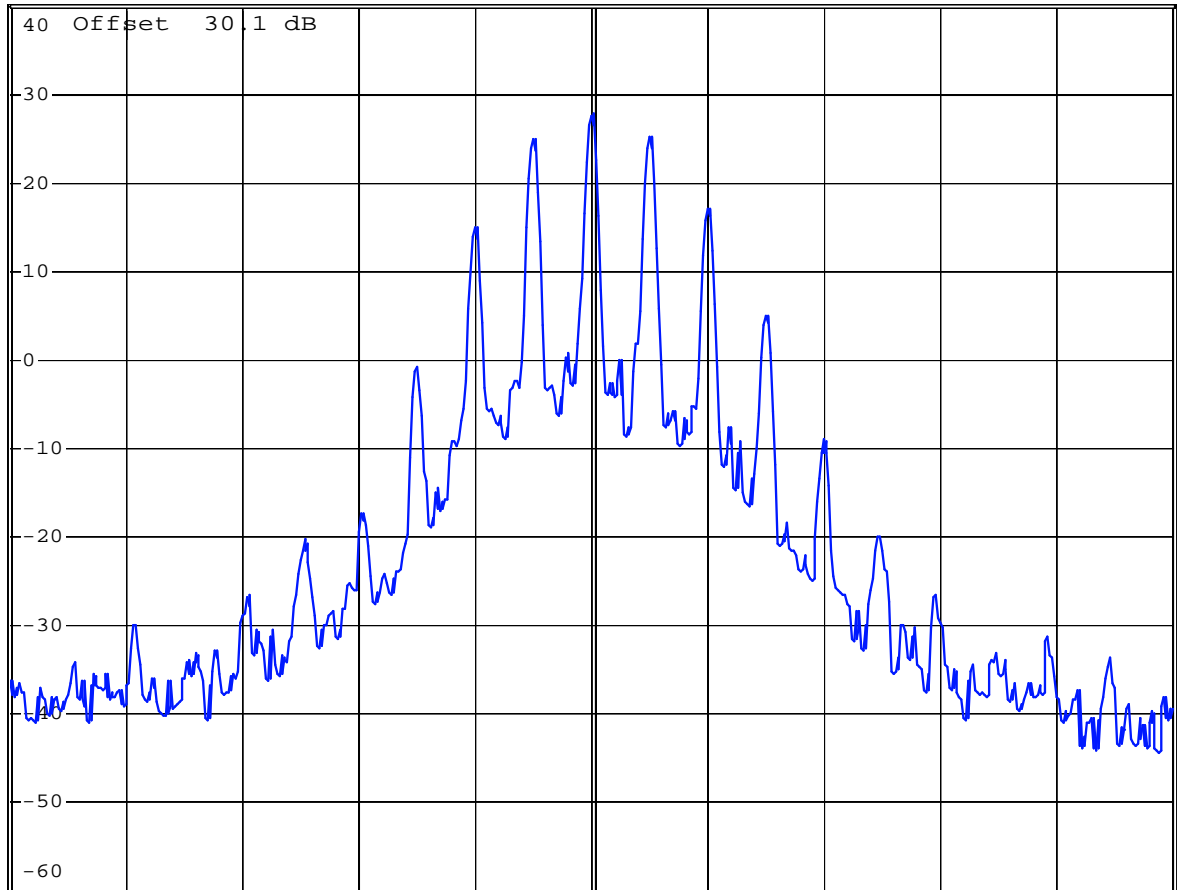
VBW 1 kHz

SWT 560 ms

Ref 40 dBm

Att 40 dB

1 PK
VIEW



Center 164.025 MHz

5 kHz/

Span 50 kHz

Date: 21.APR.2009 13:21:12

EQUIPMENT: FS51C-15

Test Data – Occupied Bandwidth



* RBW 300 Hz

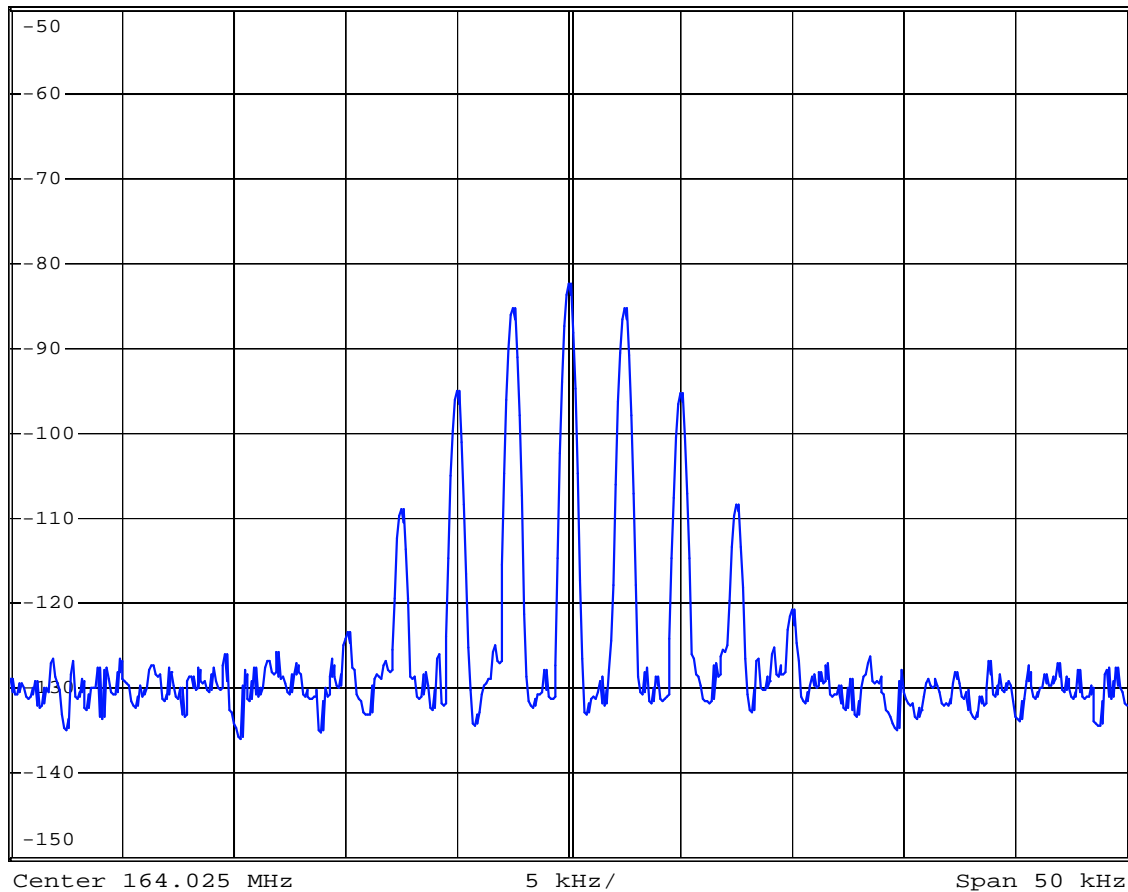
VBW 1 kHz

SWT 560 ms

Ref -50 dBm

* Att 0 dB

1 PK
VIEW



Date: 21.APR.2009 13:22:17

Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.991
TESTED BY: David Light	DATE: 21 April 2009

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 1663-1082-1472-1469

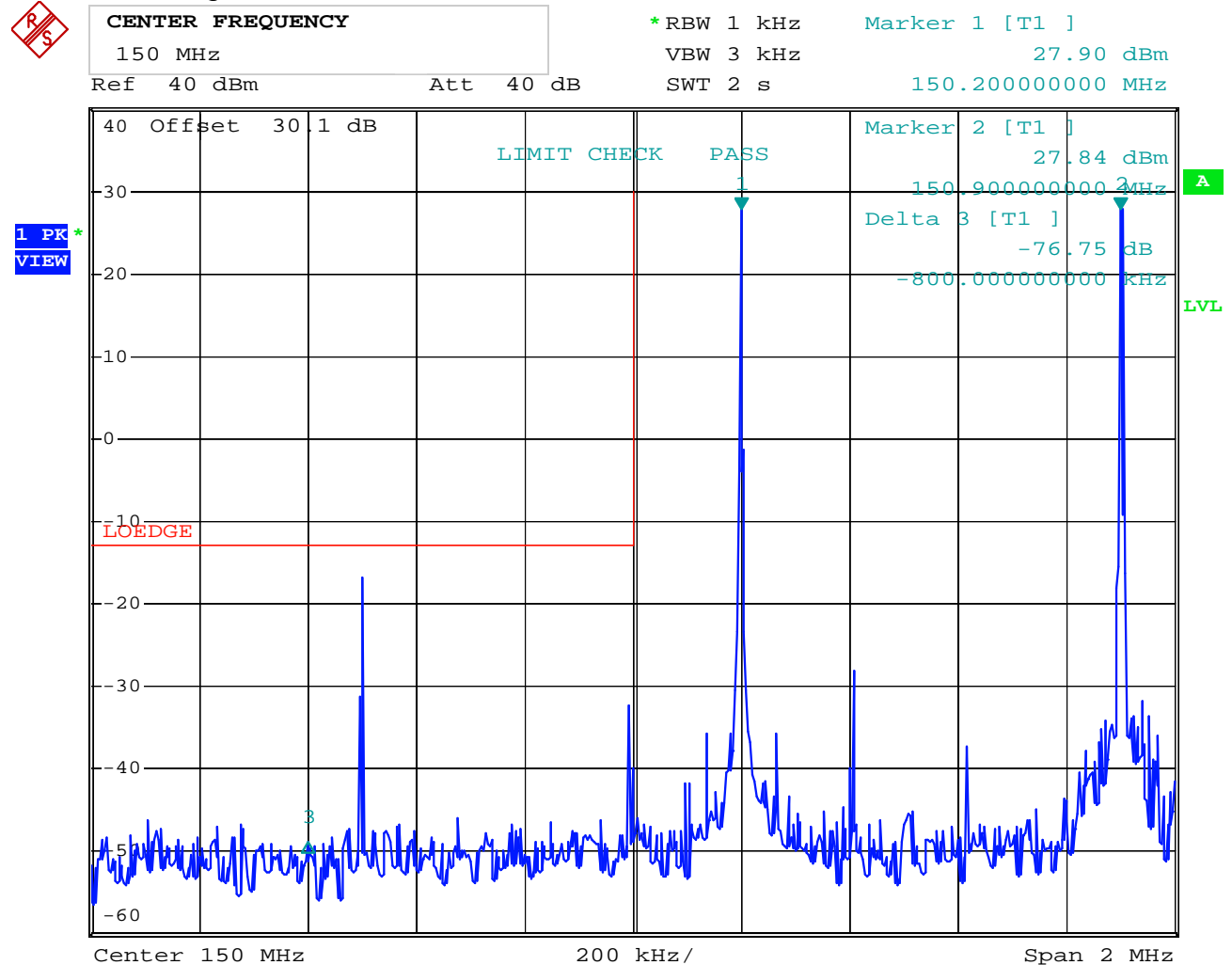
Measurement Uncertainty: +/- 1.7 dB

Temperature: 22 °C

Relative Humidity: 35 %

Test Data – Spurious Emissions at Antenna Terminals

Lower Bandedge Intermodulation

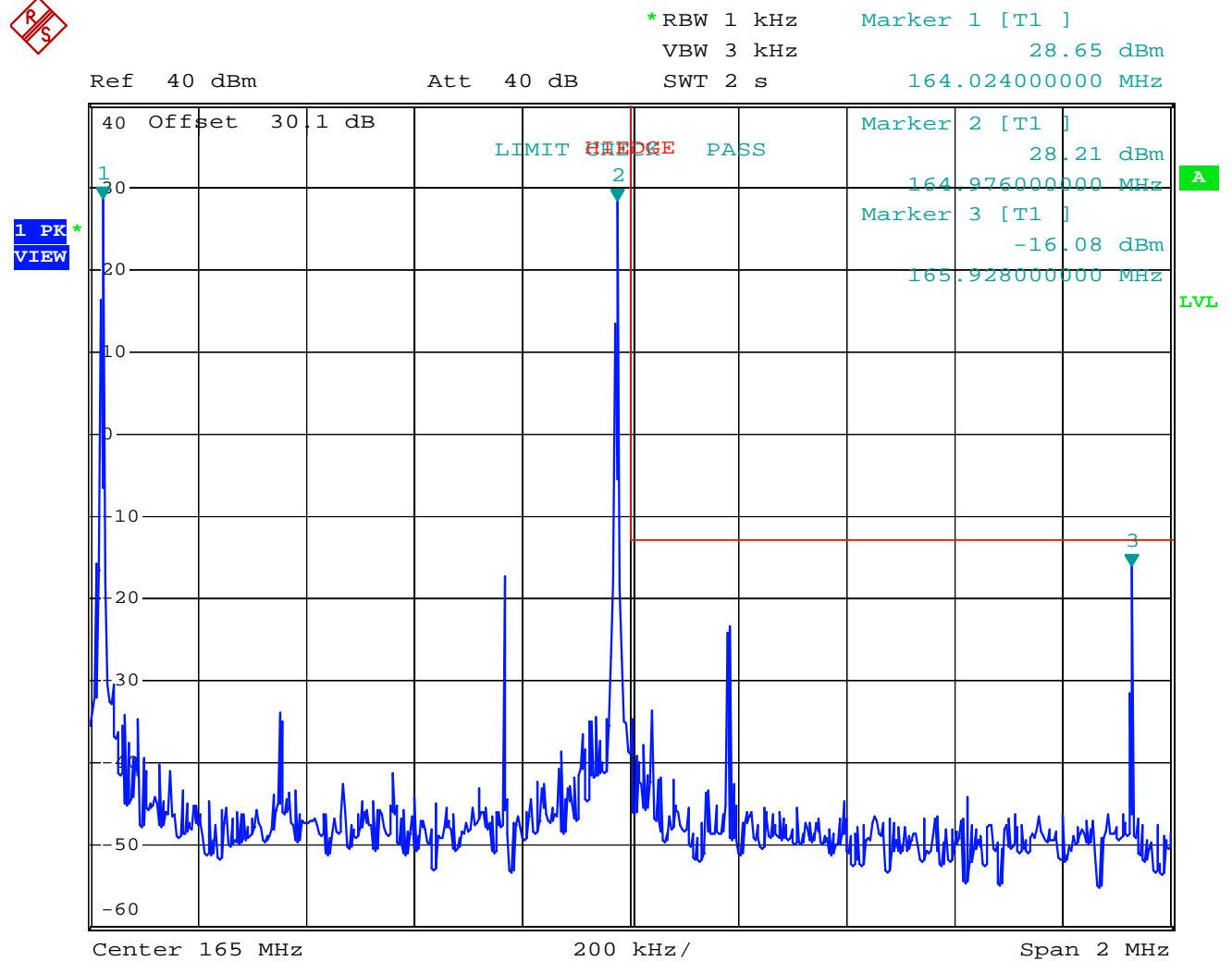


Date: 21.APR.2009 09:51:37

EQUIPMENT: FS51C-15

Test Data – Spurious Emissions at Antenna Terminals

Upper Bandedge Intermodulation

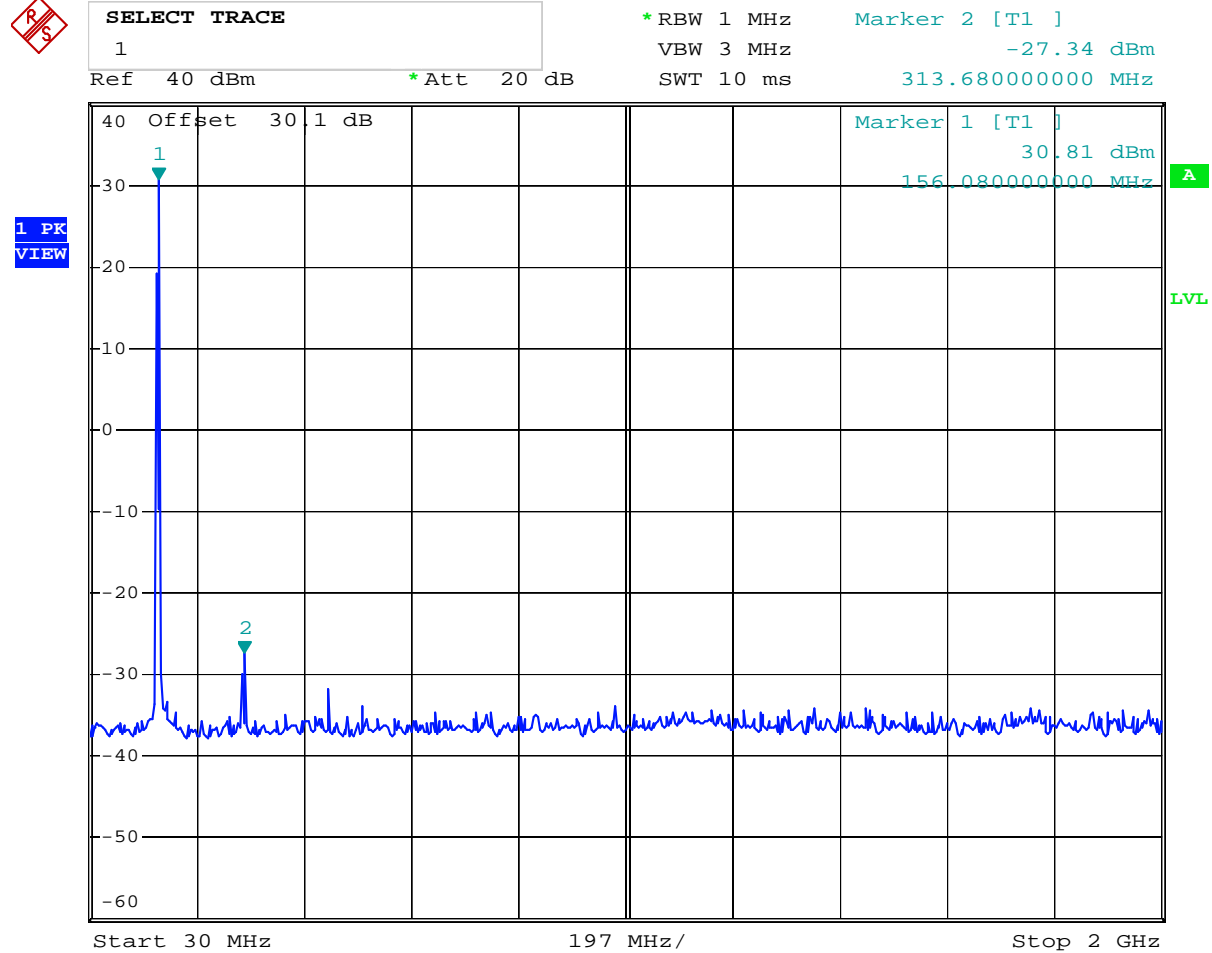


Date: 21.APR.2009 13:19:28

EQUIPMENT: FS51C-15

Test Data – Spurious Emissions at Antenna Terminals

Spurs



Date: 21.APR.2009 10:07:47

Section 6. Field Strength of Spurious Emissions

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 2.993
TESTED BY: David Light	DATE: 21 April 2009

Test Results: Complies.

Test Data: The spectrum was searched from 30 MHz to the tenth harmonic of the carrier. There were no emissions detected above the noise floor which was at least 20 dB below the specification limit.

RBW=VBW=100 kHz below 1000 MHz
RBW=VBW=1 MHz above 1000 MHz
Peak detector

Equipment Used: 1763-1484-1485-1016-791-1767-993

Measurement Uncertainty: +/-1.7 dB

Temperature: 21 °C

Relative Humidity: 30 %

Note: See page A5 for applicable limit.

Section 7. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
1082	CABLE 2m	Astrolab 32027-2-29094-72TC	N/A	CBU	N/A
1472	20db Attenuator DC 18 Ghz	Omni Spectra 20600-20db	NONE	CBU	N/A
1469	10 db Attenuator DC 18 Ghz	MCL Inc. BW-S10W2 10db-2WDC	NONE	CBU	N/A
1663	Spectrum Analyzer	Rhode & Schwarz FSP3	100073	06/03/08	06/03/09
1767	EMI Test Receiver 20Hz - 26.5 GHz - 150 - +30 dBm LCD	ROHDE & SCHWARZ ESIB26	837491/0002	09/20/07	09/20/09
1763	Bilog Antenna	Schaffner CBL 6111D	22926	11/04/08	11/04/09
1484	Cable	Storm PR90-010-072	N/A	05/07/08	05/07/09
1485	Cable	Storm PR90-010-216	N/A	05/07/08	05/07/09
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	05/07/08	05/07/09
791	PREAMP, 25dB	Nemko USA, Inc. LNA25	398	05/07/08	05/07/09
1767	EMI Test Receiver 20Hz - 26.5 GHz	ROHDE & SCHWARZ ESIB26	837491/0002	09/20/07	09/20/09
993	Horn antenna	A.H. Systems SAS-200/571	XXX	08/31/07	08/31/09

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.

Integral Antenna:

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

NAME OF TEST: Spurious Emissions at Antenna
Terminals

PARA. NO.: 2.991

Minimum Standard:

90.210, Table 1

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

MASK	Spurious Limit
A,B,C,G,H,I	-13dBm
D,J	-20dBm
E,F,K	-25dBm

Test Method:

RBW: 1% of emission bandwidth in the 0 - 1 GHz range.
1 MHz at frequencies above 1 GHz.

VBW: ⇒ RBW

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

NAME OF TEST: Occupied Bandwidth

PARA. NO.: 2.989

Minimum Standard: Not defined. Input/Output

Method Of Measurement:

Analog

Spectrum analyzer settings:

RBW=VBW=300 Hz

Span: 100 kHz

Sweep: Auto

iDEN

RBW=VBW= 300 Hz

Span: 100 kHz

Sweep: Auto

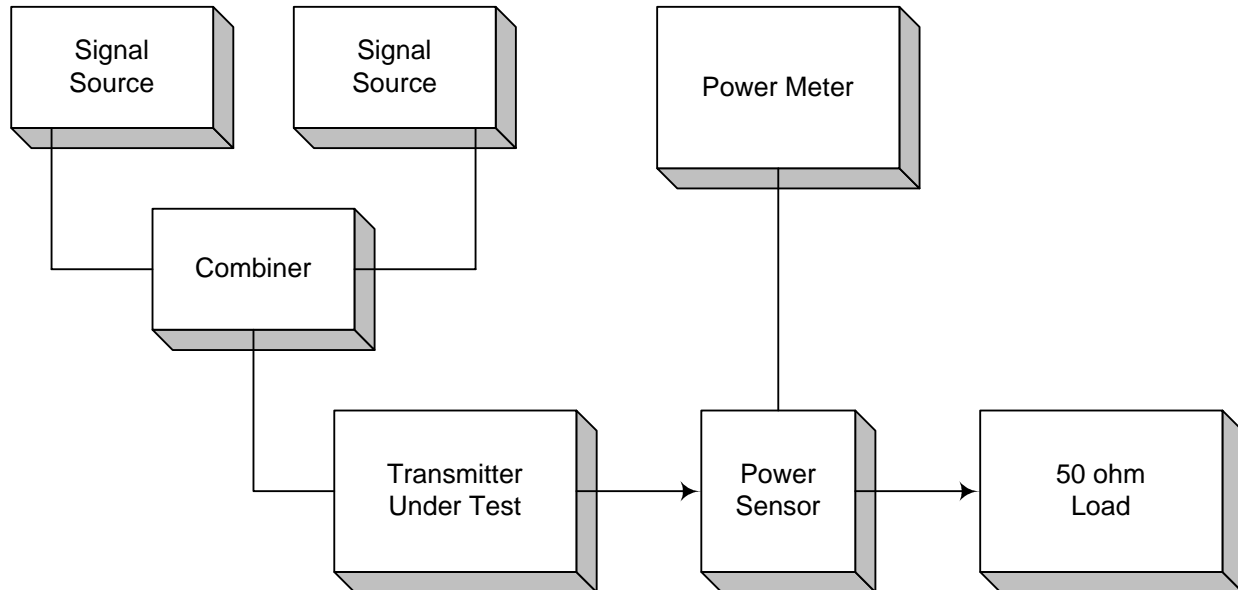
NAME OF TEST: Field Strength of Spurious**PARA. NO.: 2.993****Minimum Standard:** Para. No. 90.210, see table 1 for applicable mask.**Method Of Measurement:** TIA/EIA-603-1992

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

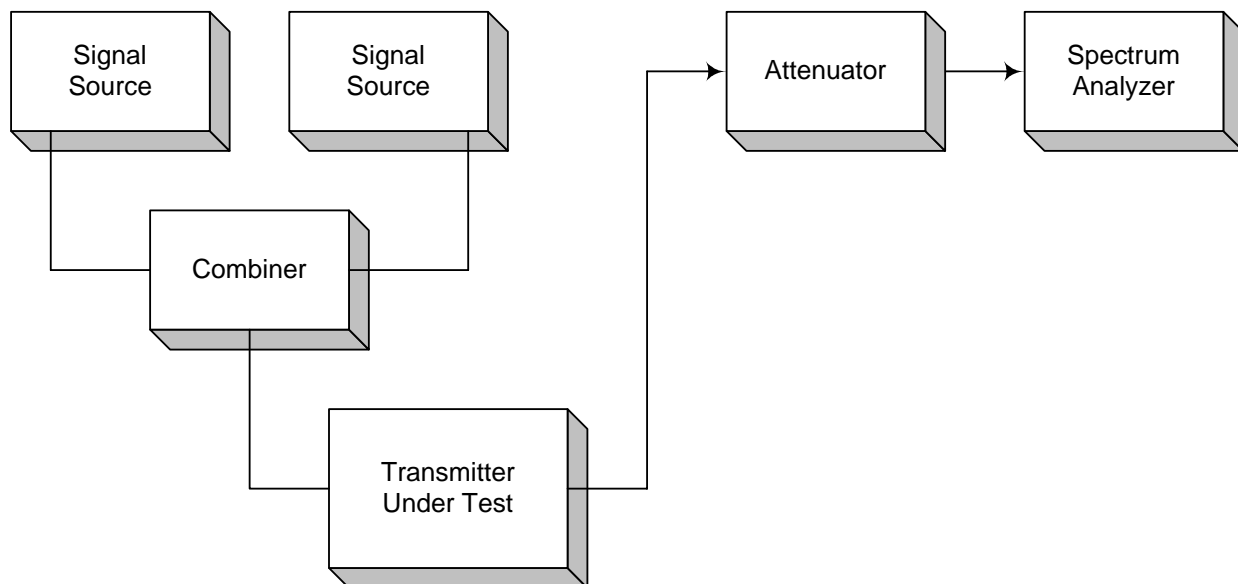
MASK	Spurious Limit
A,B,C,G,H,I	-13dBm
D,J	-20dBm
E,F,K	-25dBm

ANNEX B - TEST DIAGRAMS

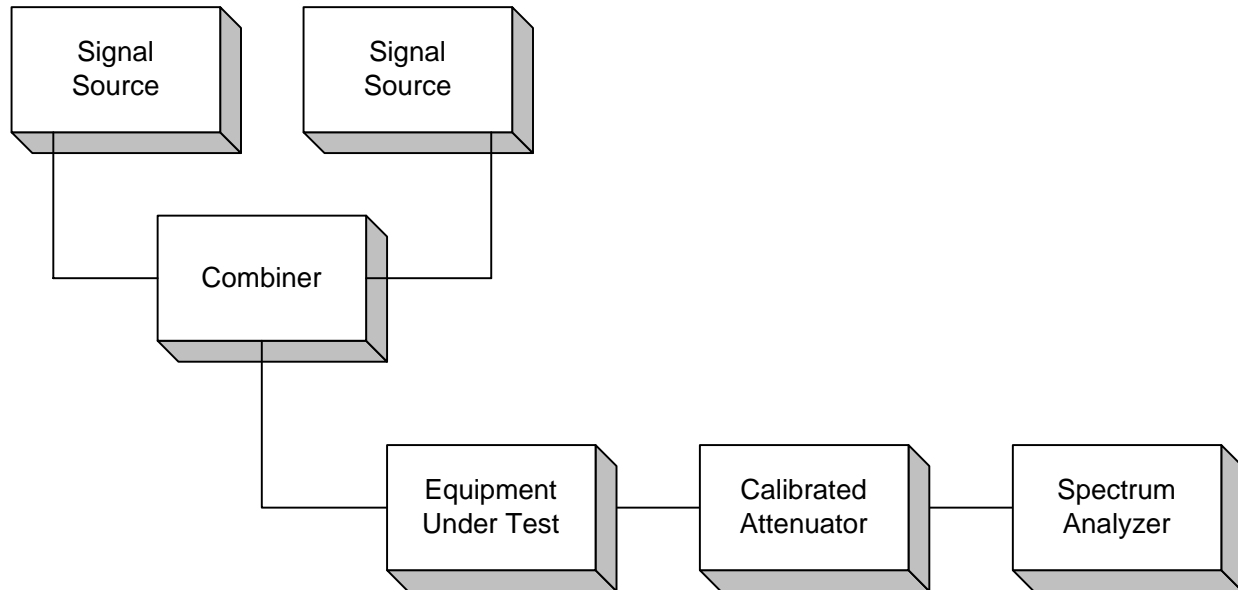
Para. No. 2.985 - R.F. Power Output



Para. No. 2.989 - Occupied Bandwidth



Para. No. 2.991 - Spurious Emissions at Antenna Terminals



Para. No. 2.993 - Field Strength of Spurious Radiation

