



Nemko Test Report: 131640-4

Applicant: TEKO Telecom S.p.A.
Via Meucci, 24/a
I-40024 Castel S. Pietro Terme (BO)

Equipment Under Test: TRU8A19AWWV/AC-WS
(+ Master Unit composed by:
SUB-TRX+TPSU/AC+TPSU/48+TSPV-R+TTRC4W-S)

In Accordance With: **CFR 47, Part 22, Subpart H (AMPS Band)**
Cellular Band Repeaters

Tested By: Nemko Italy S.p.A..
Via Carroccio, 4
I-20046 Biassono (Italy)

TESTED BY: G. Curioni **DATE:** 18-25 September, 2009

P. Barbieri

APPROVED BY: P. Barbieri **DATE:** 28 September, 2009

Number of Pages: 92

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**CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS**

EQUIPMENT: TRU8A19AWWV/AC-WS

PROJECT NO.: 131640-4

Table of Contents

SECTION 1.	SUMMARY OF TEST RESULTS.....	3
SECTION 2.	GENERAL EQUIPMENT SPECIFICATION.....	5
SECTION 3.	RF POWER OUTPUT.....	8
SECTION 4.	OCCUPIED BANDWIDTH.....	15
SECTION 5.	SPURIOUS EMISSIONS AT ANTENNA TERMINALS	36
SECTION 6.	FIELD STRENGTH OF SPURIOUS.....	72
SECTION 7.	FILTER FREQUENCY RESPONSE.....	724
SECTION 8.	TEST EQUIPMENT LIST	766
SECTION 9.	PHOTOS.....	788
ANNEX A - TEST DETAILS		833
ANNEX B - TEST DIAGRAMS.....		899

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**CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS**

EQUIPMENT: TRU8A19AWWV/AC-WS

PROJECT NO.: 131640-4

Section 1. Summary of Test Results

Manufacturer: TEKO Telecom 

Model No.: TRU8A19AWWV/AC-WS

Serial No.: 090379001

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 47, Part 22, Subpart H.

- | | | | |
|-------------------------------------|----------------------------|-------------------------------------|---------------------|
| <input checked="" type="checkbox"/> | New Submission | <input checked="" type="checkbox"/> | Production Unit |
| <input type="checkbox"/> | Class II Permissive Change | <input type="checkbox"/> | 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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**CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS**

EQUIPMENT: **TRU8A19AWWV/AC-WS**

PROJECT NO.: **131640-4**

Summary Of Test Data

NAME OF TEST	PARA. NO.	SPEC.	RESULT
RF Power Output	22.913(a)	500W ERP	Complies
Occupied Bandwidth	Not defined	Input/Output	Complies
Spurious Emissions at Antenna Terminals	22.917	-13 dBm	Complies
Field Strength of Spurious Emissions	22.917	-13 dBm erp	Complies
Frequency Stability	22.355	1.5 ppm	NA

Footnotes For N/A's:

Frequency Stability testing was not performed since the E.U.T. does not contain modulation circuitry.

Section 2. General Equipment Specification

Supply Voltage Input:	120 Vac				
Frequency Range:	Downlink: 869 to 894 MHz				
Frequency Range:	Uplink: 824 to 849 MHz				
Type of Modulation and Designator:	CDMA (F9W) <input checked="" type="checkbox"/>	GSM (GXW) <input checked="" type="checkbox"/>	TDMA (DXW) <input checked="" type="checkbox"/>	EDGE (G7W) <input checked="" type="checkbox"/>	W-CDMA (F9W) <input checked="" type="checkbox"/>
Output Impedance:	50 ohms				
RF Output (Rated):	Downlink: Uplink:	20 W 43 dBm	0.0025 W 4 dBm		
Gain:	Downlink: Uplink:	48 dB 47 dB			
Frequency Translation:		F1-F1 <input type="checkbox"/>	F1-F2 <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>	
Band Selection:	Software <input type="checkbox"/>	Duplexer Change <input type="checkbox"/>	Fullband Coverage <input checked="" type="checkbox"/>		

Description of EUT

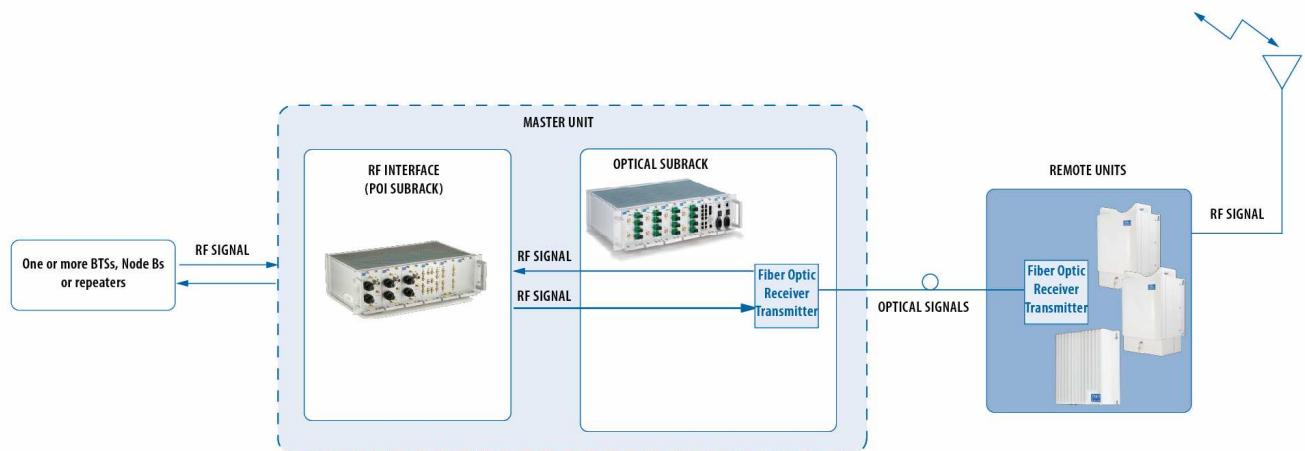
The EUT is a very high power multi-operator optical Remote Unit. It is used in conjunction with a Master Unit in the optical distribution system.

The EUT is a tri-band system; it is able to transport a wide frequency range simultaneously (AMPS, PCS and AWS bands). Single amplifier modules can be combined each other to obtain the following equipment:

<i>Commercial name</i>	<i>Description</i>	
REMOTE UNIT VERY HIGH POWER		
TRUxxxxxcV/zz-kkj-r	TRU	Teko Telecom Remote Unit
	xxxxx =	<p>Operating band:</p> <p>7S: SMR700 (UL: 698-716+776-787MHz) DL: 728-757MHz)</p> <p>7P: Public Safety 700 (DL: 763-775MHz; UL: 793-805MHz)</p> <p>8S: SMR800 (DL: 851-869MHz; UL: 806-824MHz)</p> <p>8A: AMPS (DL: 869-894MHz; UL: 824-849MHz)</p> <p>9S: SMR900 (DL: 935-941MHz; UL: 896-902MHz)</p> <p>19: PCS1900 (DL: 1930-1995MHz; UL: 1850-1915MHz)</p> <p>AW: AWS2100 (DL: 2110-2155MHz; UL: 1710-1755MHz)</p> <p><i>and combination of these</i></p>
	c =	<p>RF Connector:</p> <p>W: wideband D: duplexed B: bi duplexed N: no duplexed S: single connector</p>
	V =	Very high power
	zz =	<p>Power supply:</p> <p>AC: 85-264Vac, 50-60Hz</p>

	kkk =	<p>Laser version:</p> <p>Without option: NO WDM</p> <p>Termocontrolled laser version:</p> <ul style="list-style-type: none"> W21: $\lambda = 1560,61\text{nm}$ W23: $\lambda = 1558,98\text{nm}$ W25: $\lambda = 1557,36\text{nm}$ W27: $\lambda = 1555,75\text{nm}$ W29: $\lambda = 1554,13\text{nm}$ W31: $\lambda = 1552,52\text{nm}$ W: $\lambda = 1550,92\text{nm}$ W35: $\lambda = 1549,32\text{nm}$ W37: $\lambda = 1547,72\text{nm}$ <p>No termocontrolled laser version:</p> <ul style="list-style-type: none"> M11: $\lambda = 1470 \pm 3 \text{ nm}$ M12: $\lambda = 1490 \pm 3 \text{ nm}$ M13: $\lambda = 1510 \pm 3 \text{ nm}$ M14: $\lambda = 1530 \pm 3 \text{ nm}$ W: $\lambda = 1550 \pm 3 \text{ nm}$ M16: $\lambda = 1570 \pm 3 \text{ nm}$ M17: $\lambda = 1590 \pm 3 \text{ nm}$ M18: $\lambda = 1610 \pm 3 \text{ nm}$
	j =	<p>Optical connector:</p> <p>S: SC-APC E: E-2000</p>
	r =	<p>Redundancy:</p> <p>Without option: NO redundancy</p> <p>1: Power Supply 2: HPA 3: Optical Module 4: Power Supply + HPA 5: Power Supply + Optical Module 6: HPA + Optical Module 7: Power Supply + Optical Module + HPA</p>

System Diagram



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**CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS**

EQUIPMENT: **TRU8A19AWWV/AC-WS**

PROJECT NO.: **131640-4**

Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 22.913
TESTED BY: G. Curioni	DATE: 23 September 2009

Test Results: Complies.

Test Data:

Direction	Modulation	Output per Channel (dBm)	Output per Channel Power (W)
Uplink	CDMA	4,27	0.0027
Downlink	CDMA	43,39	21
Uplink	TDMA	4,36	0.0027
Downlink	TDMA	42,99	20
Uplink	EDGE	4,10	0.0025
Downlink	EDGE	43,45	22
Uplink	GSM	4,49	0.0028
Downlink	GSM	43,38	21
Uplink	W-CDMA	4,15	0.0025
Downlink	W-CDMA	43,21	20

Equipment Used: 1-2-3b-4

Measurement Uncertainty: +/- 1.9 dB

Temperature: 24 °C

Relative Humidity: 50 %

QNH: 980 hPa

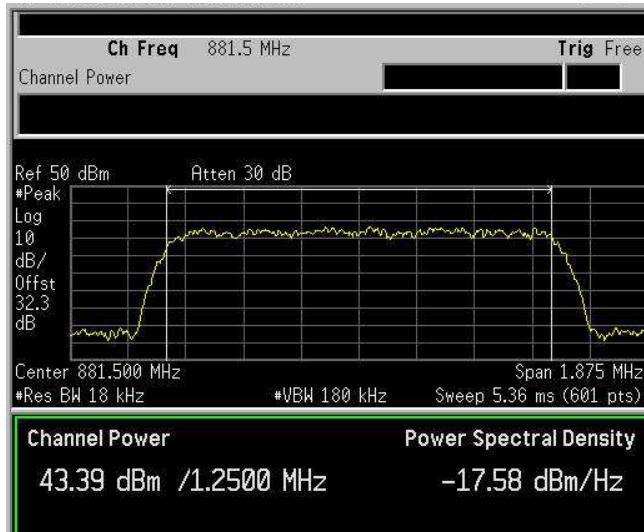
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CELLULAR BAND REPEATERS**

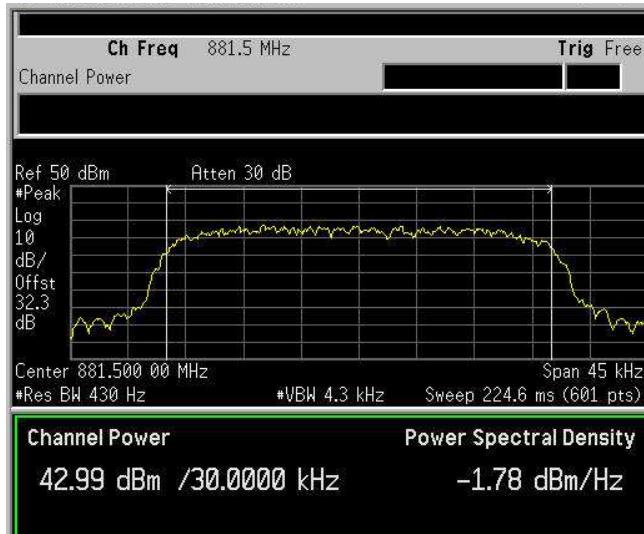
EQUIPMENT: TRU8A19AWWV/AC-WS

PROJECT NO.: 131640-4

RF Power Output D.L. mod. CDMA



RF Power Output D.L. mod. TDMA



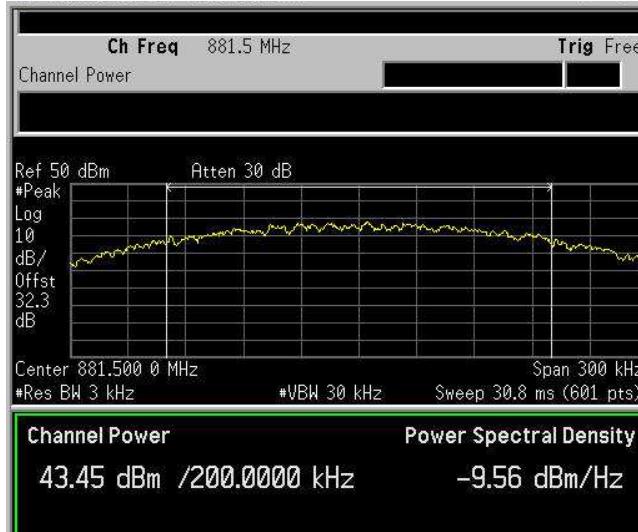
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CELLULAR BAND REPEATERS**

EQUIPMENT: TRU8A19AWWV/AC-WS

PROJECT NO.: 131640-4

RF Power Output D.L. mod. EDGE



RF Power Output D.L. mod. GSM



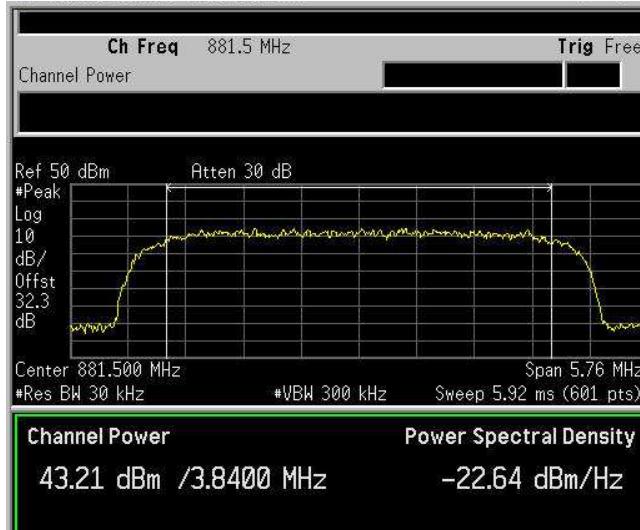
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CELLULAR BAND REPEATERS**

EQUIPMENT: TRU8A19AWWV/AC-WS

PROJECT NO.: 131640-4

RF Power Output D.L. mod. WCDMA



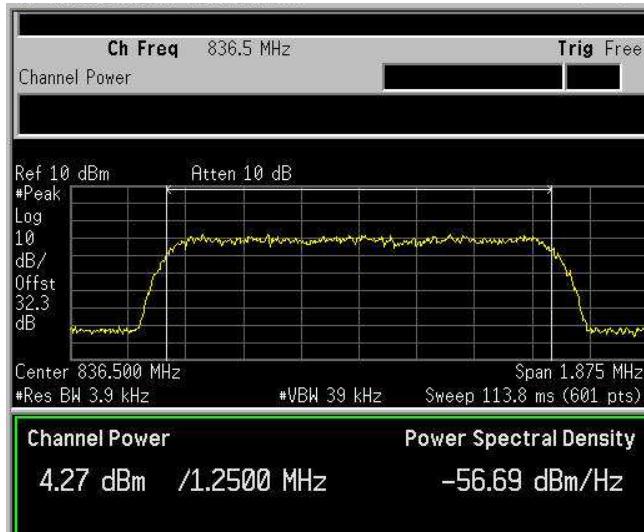
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CELLULAR BAND REPEATERS**

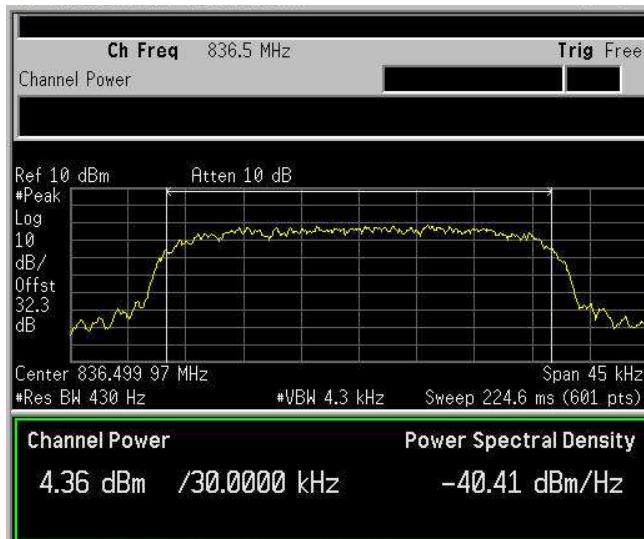
EQUIPMENT: TRU8A19AWWV/AC-WS

PROJECT NO.: 131640-4

RF Power Output U.L. mod. CDMA



RF Power Output U.L. mod. TDMA



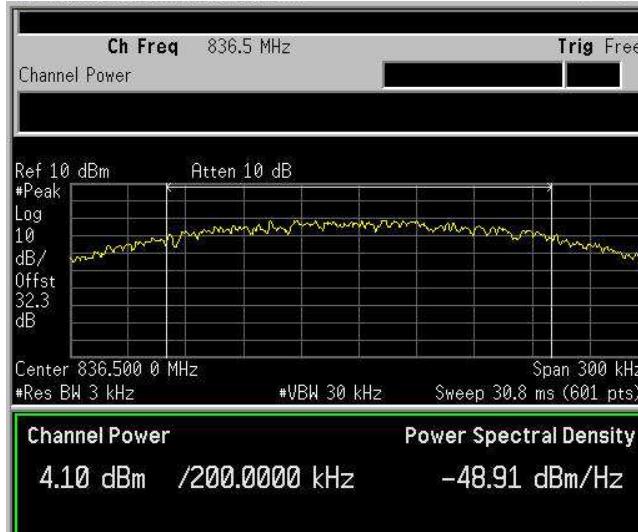
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CELLULAR BAND REPEATERS**

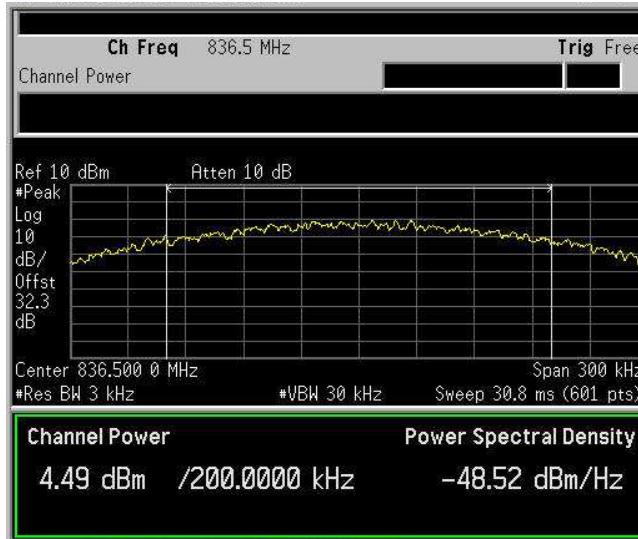
EQUIPMENT: TRU8A19AWWV/AC-WS

PROJECT NO.: 131640-4

RF Power Output U.L. mod. EDGE



RF Power Output U.L. mod. GSM



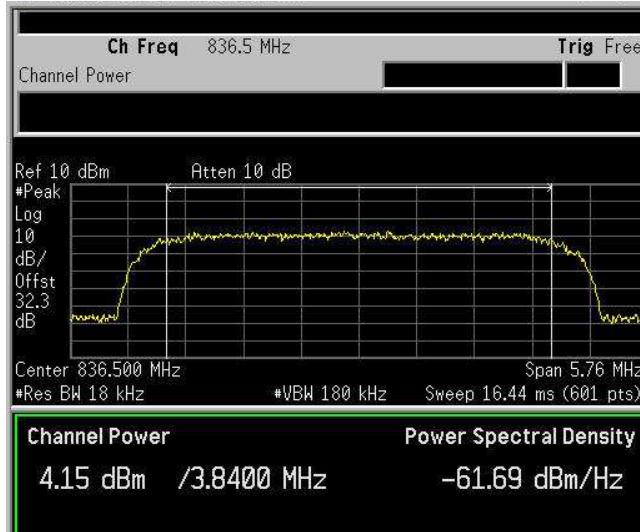
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CELLULAR BAND REPEATERS**

EQUIPMENT: TRU8A19AWWV/AC-WS

PROJECT NO.: 131640-4

RF Power Output U.L. mod. WCDMA



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**CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS**

EQUIPMENT: TRU8A19AWWV/AC-WS

PROJECT NO.: 131640-4

Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.1049
TESTED BY: G. Curioni	DATE: 23 September 2009

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 1-2-3b-4

Measurement Uncertainty: 1X10⁻⁷

Temperature: 24 °C

Relative Humidity: 50 %

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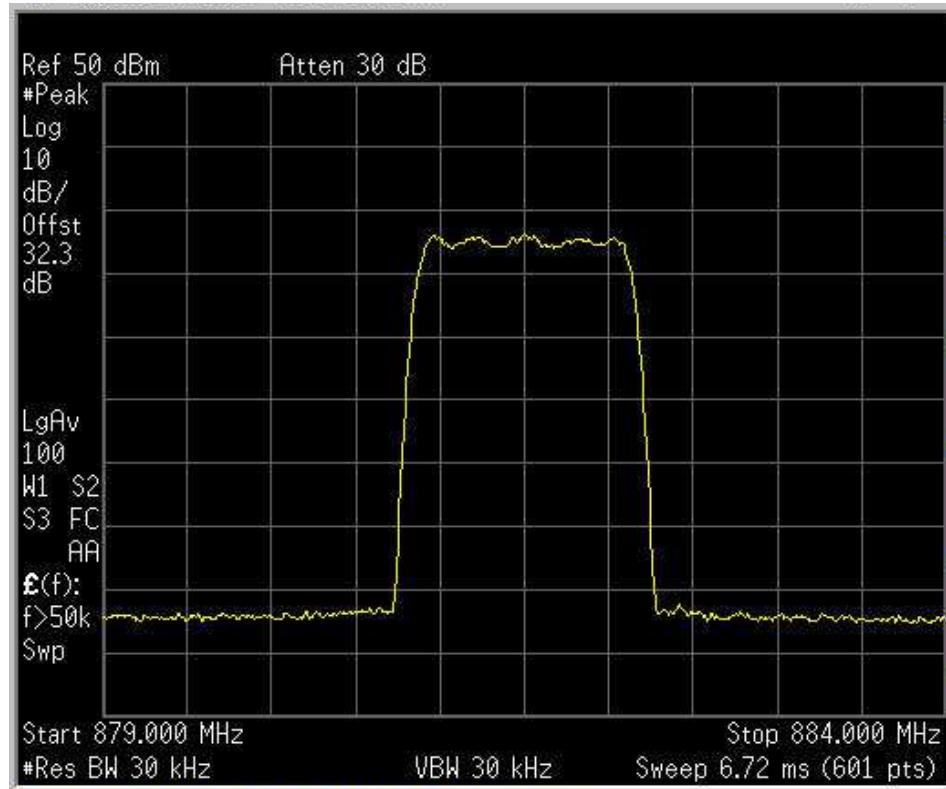
CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

PROJECT NO.: **131640-4**

Test Data – Occupied Bandwidth

CDMA - Output
Downlink



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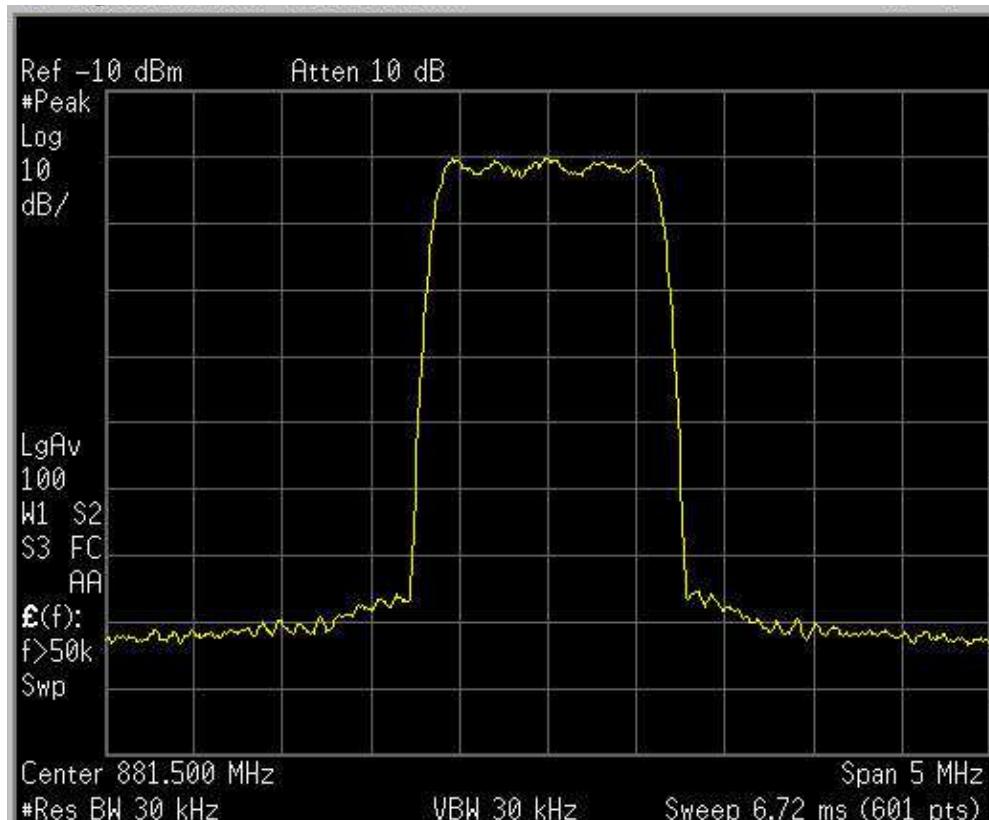
CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

PROJECT NO.: **131640-4**

Test Data – Occupied Bandwidth

CDMA - Input
Downlink



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CELLULAR BAND REPEATERS

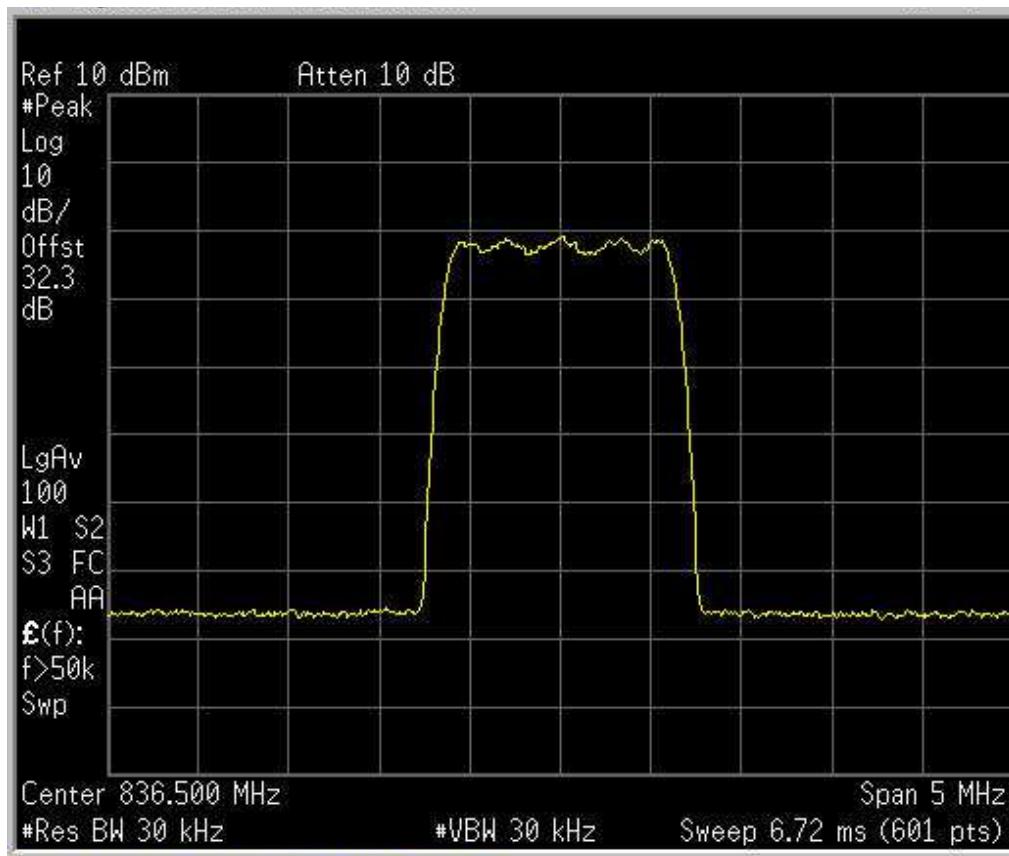
EQUIPMENT: TRU8A19AWWV/AC-WS

PROJECT NO.: 131640-4

Test Data – Occupied Bandwidth

CDMA - Output

Uplink



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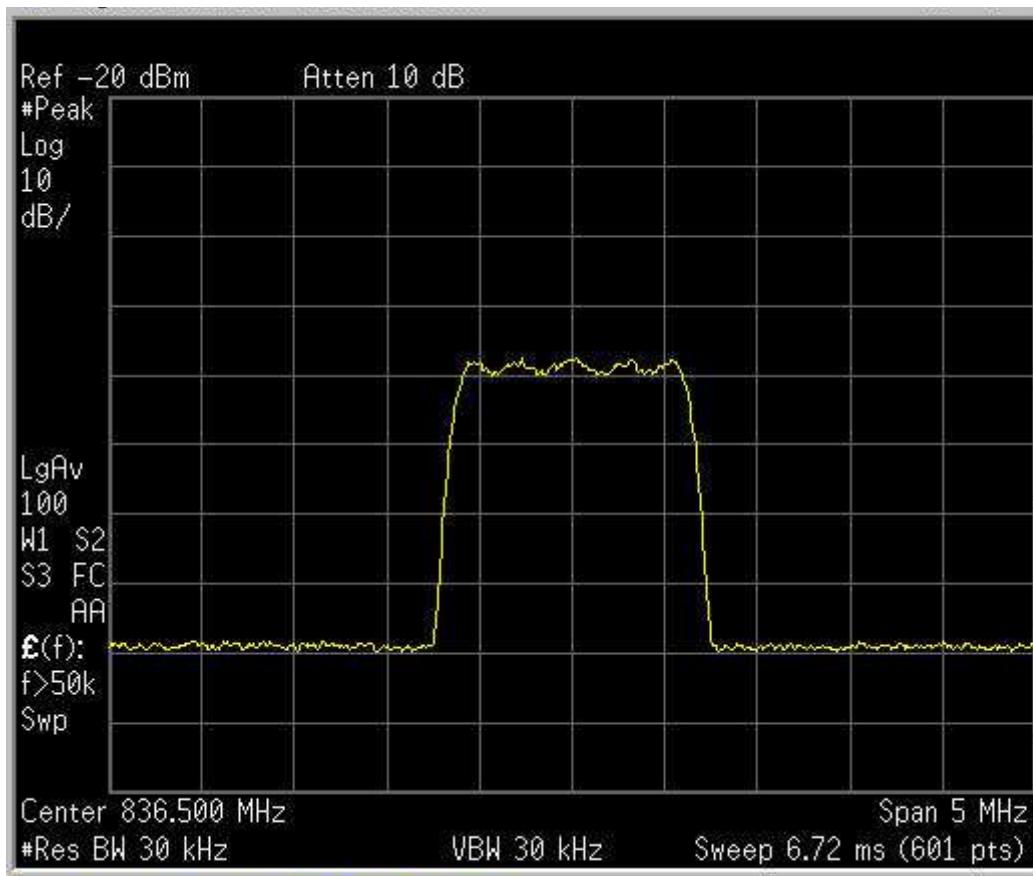
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CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

PROJECT NO.: **131640-4**

Test Data – Occupied Bandwidth

CDMA - Input
Uplink



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CELLULAR BAND REPEATERS

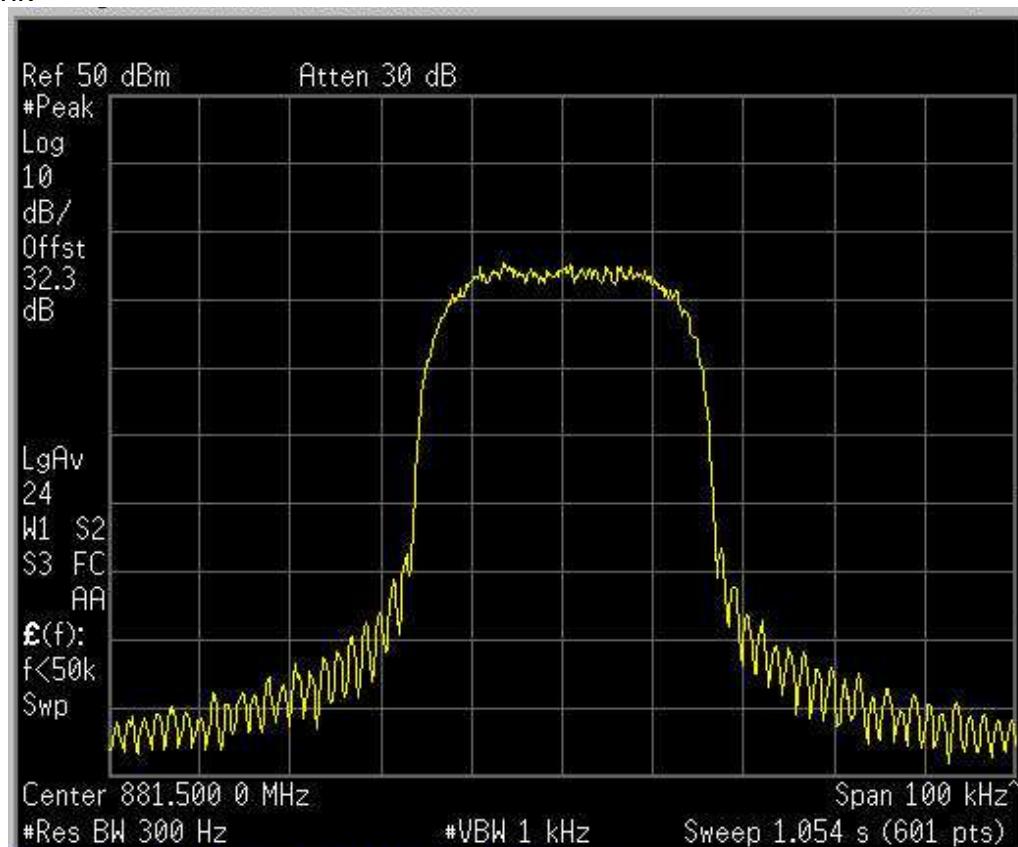
EQUIPMENT: **TRU8A19AWWV/AC-WS**

PROJECT NO.: **131640-4**

Test Data – Occupied Bandwidth

TDMA - Output

Downlink



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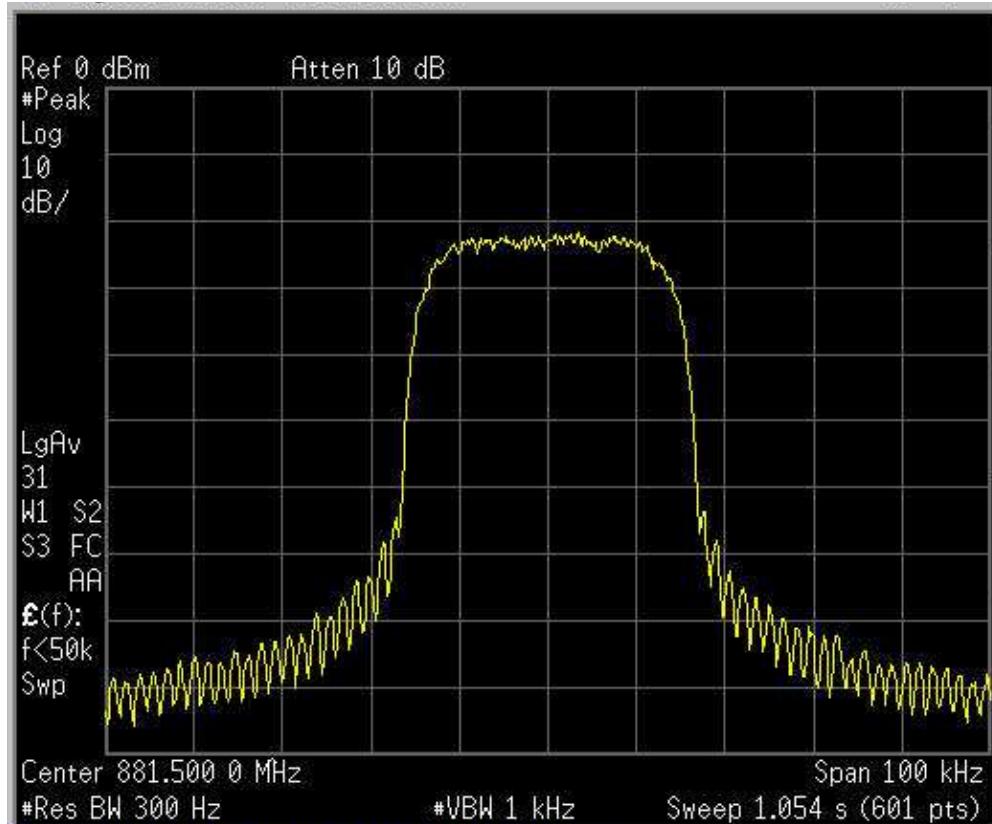
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CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

PROJECT NO.: **131640-4**

Test Data – Occupied Bandwidth

TDMA - Input
Downlink



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CELLULAR BAND REPEATERS

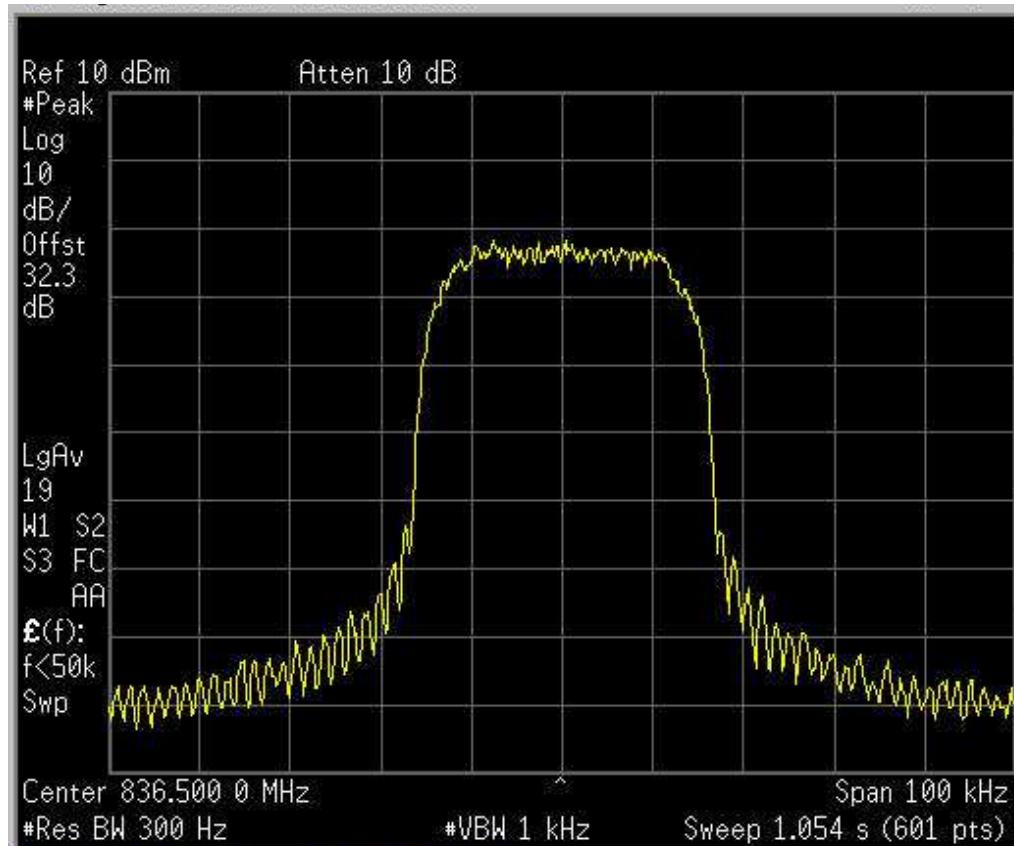
EQUIPMENT: **TRU8A19AWWV/AC-WS**

PROJECT NO.: **131640-4**

Test Data – Occupied Bandwidth

TDMA - Output

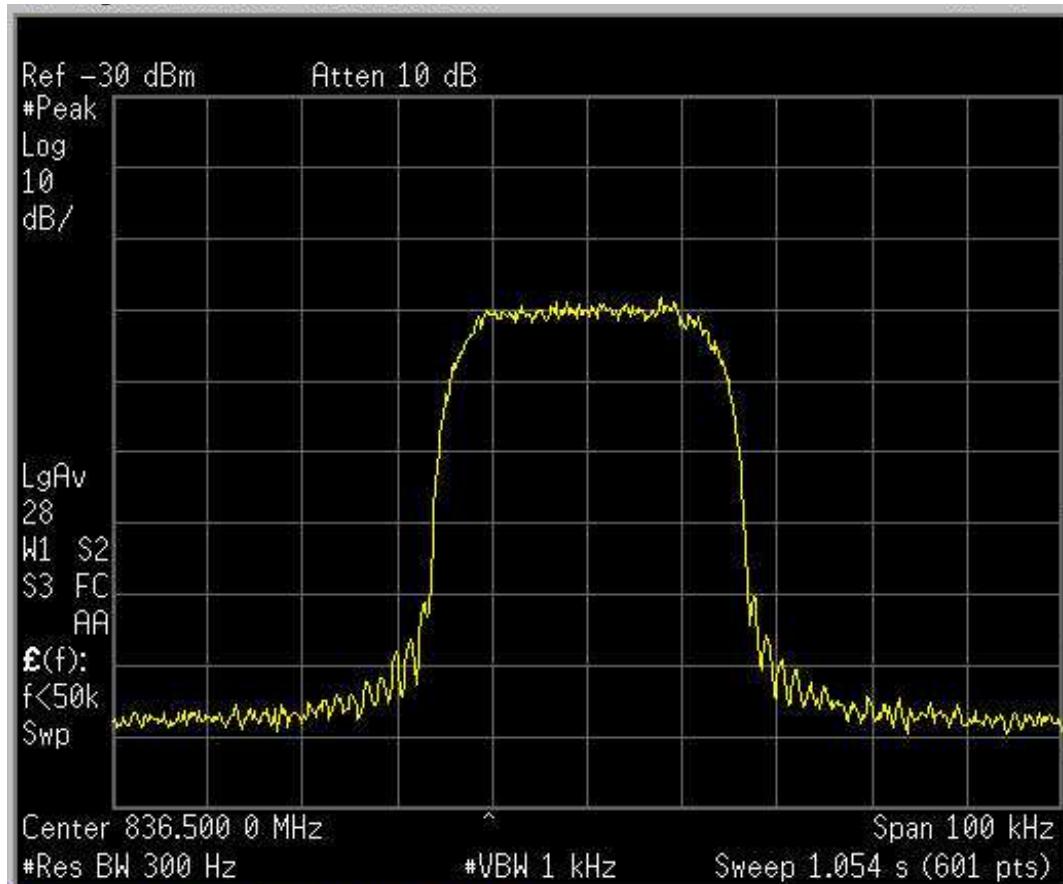
Uplink



Test Data – Occupied Bandwidth

TDMA - Input

Uplink



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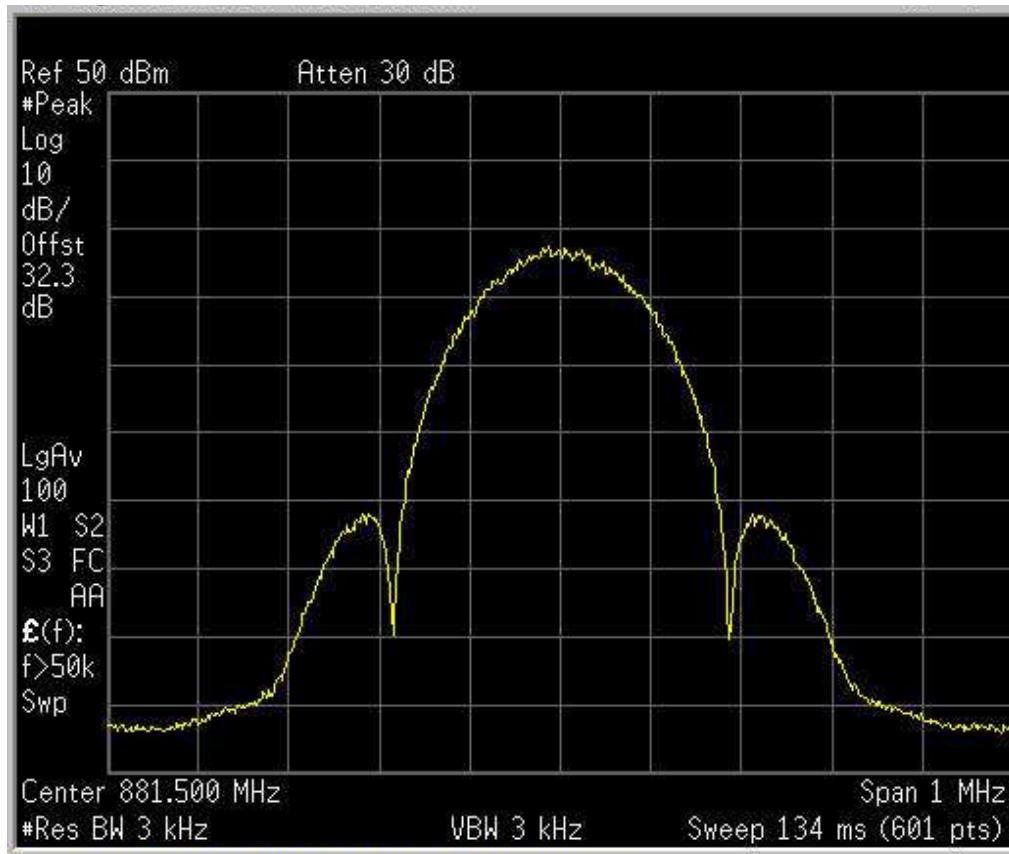
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CELLULAR BAND REPEATERS

EQUIPMENT: TRU8A19AWWV/AC-WS

PROJECT NO.: 131640-4

Test Data – Occupied Bandwidth

EDGE - Output
Downlink



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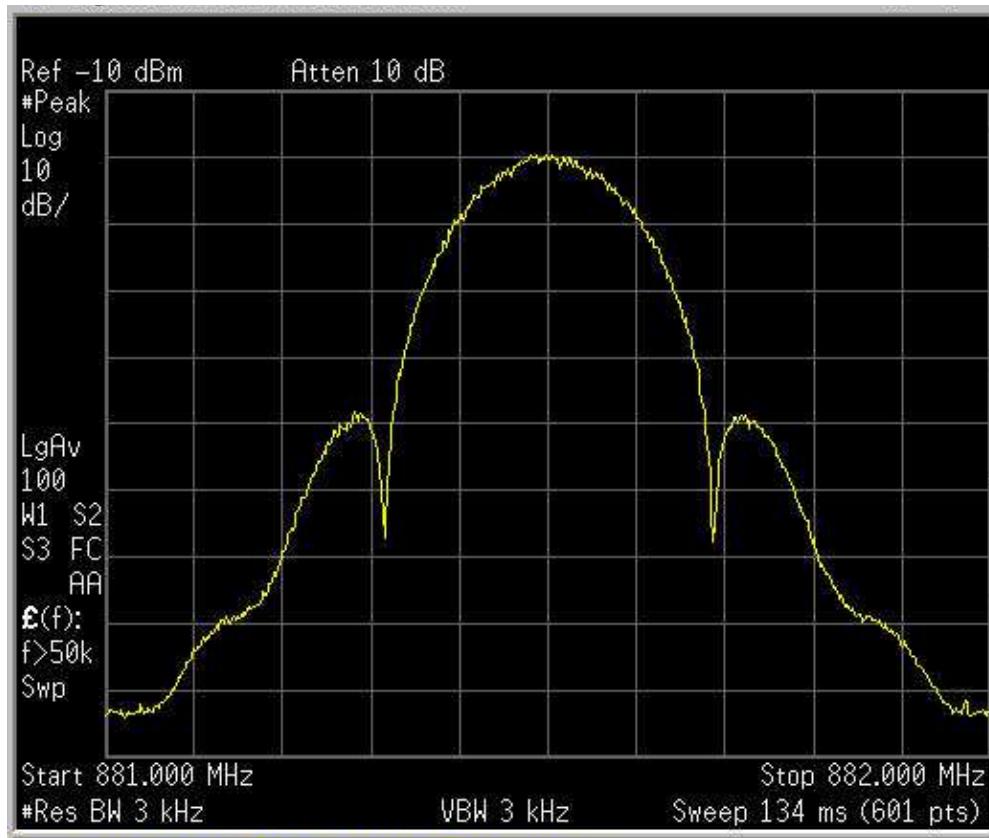
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CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

PROJECT NO.: **131640-4**

Test Data – Occupied Bandwidth

EDGE - Input
Downlink



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CELLULAR BAND REPEATERS

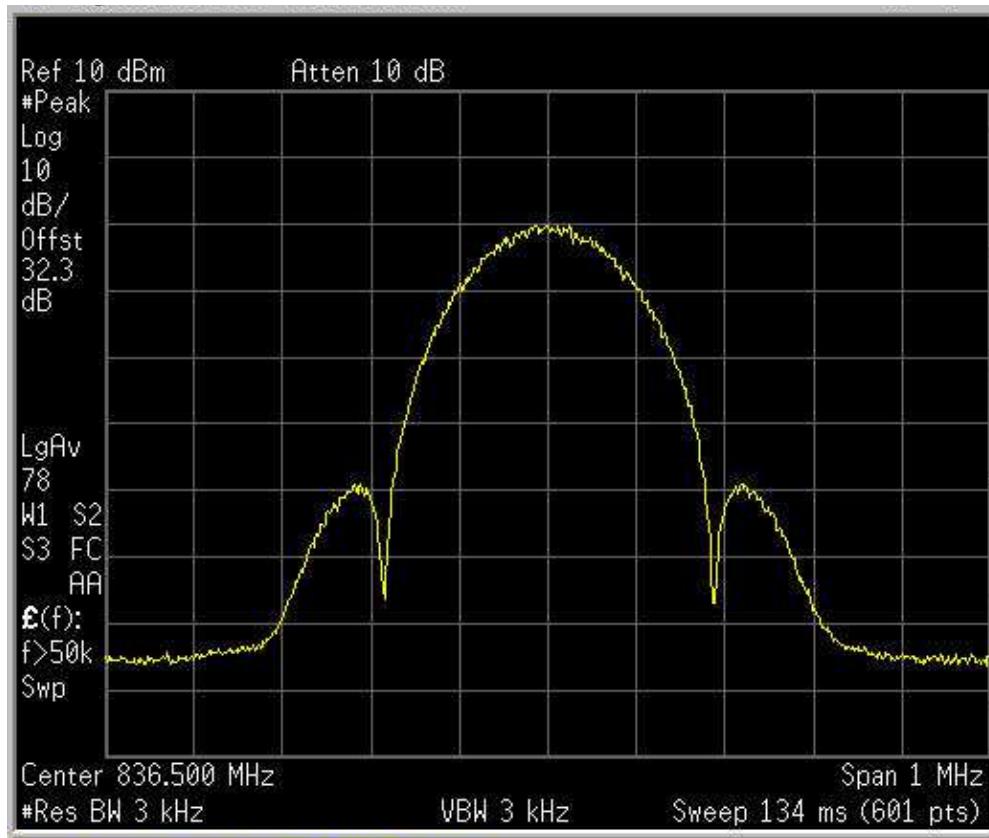
EQUIPMENT: TRU8A19AWWV/AC-WS

PROJECT NO.: 131640-4

Test Data – Occupied Bandwidth

EDGE - Output

Uplink



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CELLULAR BAND REPEATERS

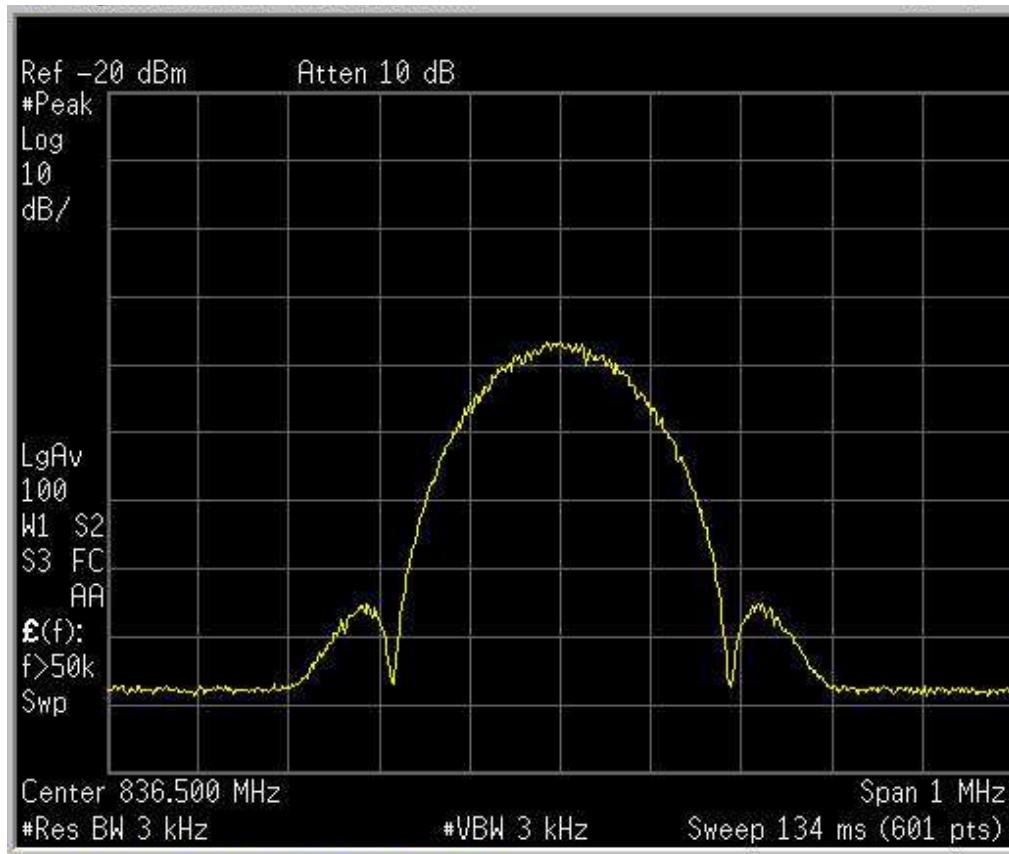
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PROJECT NO.: 131640-4

Test Data – Occupied Bandwidth

EDGE - Input

Uplink



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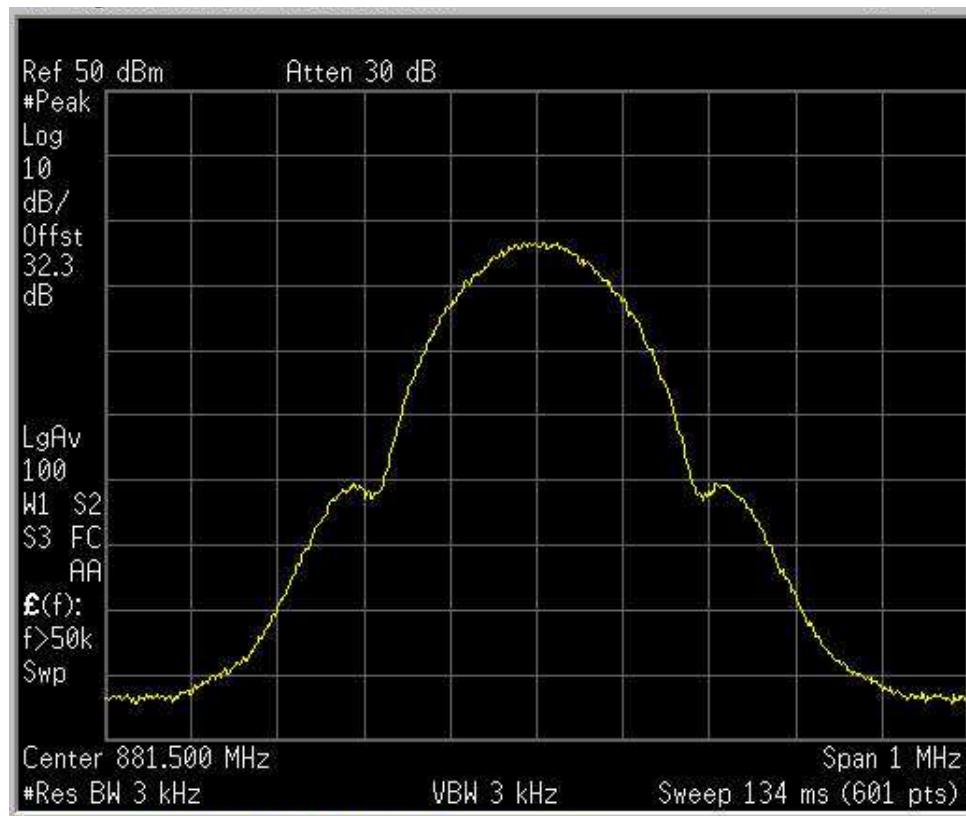
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CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

PROJECT NO.: **131640-4**

Test Data – Occupied Bandwidth

GSM - Output
Downlink



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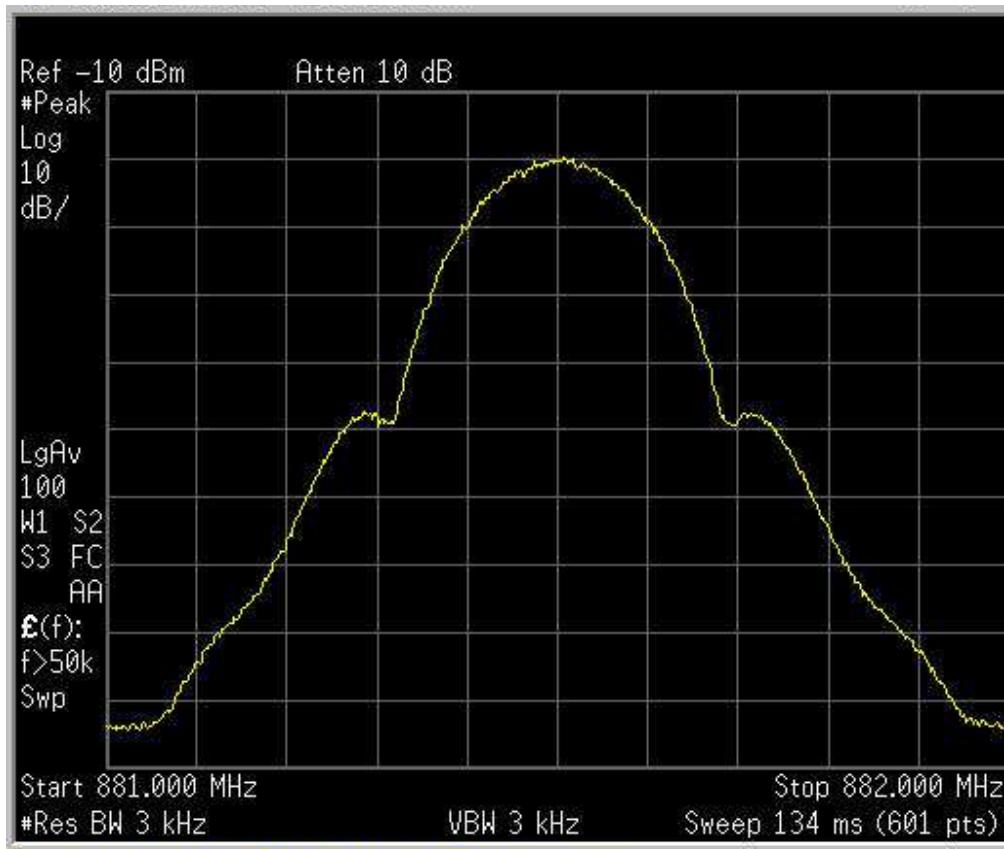
CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

PROJECT NO.: **131640-4**

Test Data – Occupied Bandwidth

GSM - Input
Downlink



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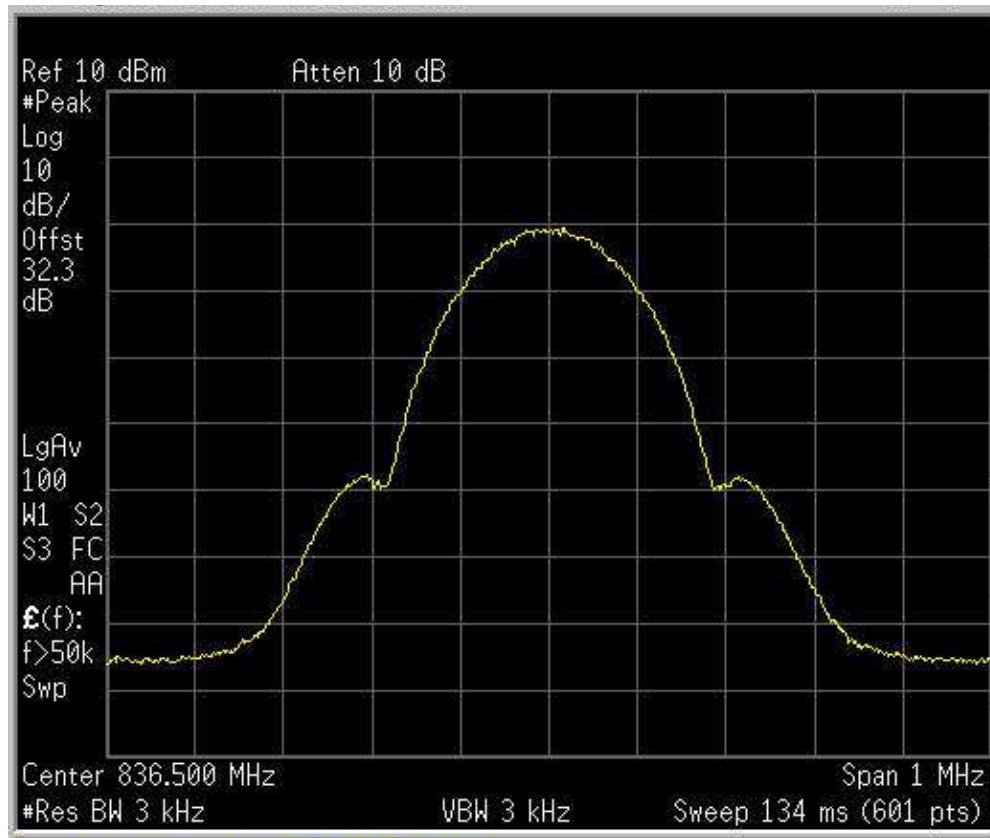
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CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

PROJECT NO.: **131640-4**

Test Data – Occupied Bandwidth

GSM - Output
Uplink



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CELLULAR BAND REPEATERS

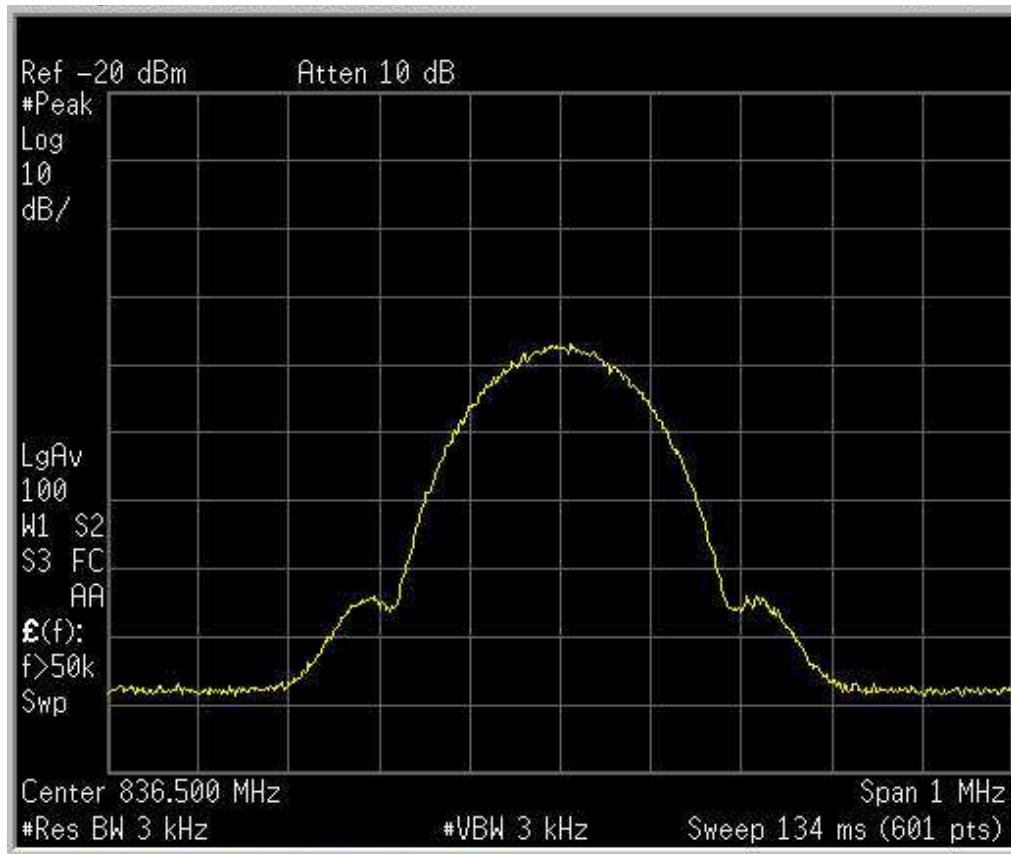
EQUIPMENT: **TRU8A19AWWV/AC-WS**

PROJECT NO.: **131640-4**

Test Data – Occupied Bandwidth

GSM - Input

Uplink



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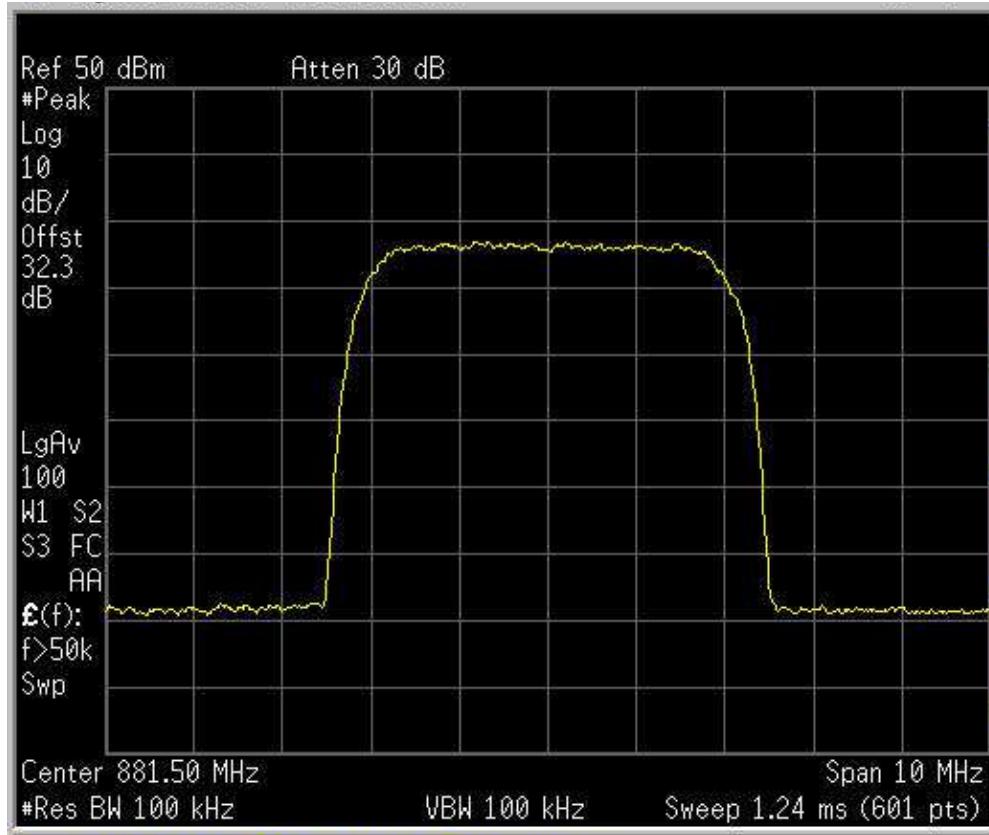
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CELLULAR BAND REPEATERS

EQUIPMENT: TRU8A19AWWV/AC-WS

PROJECT NO.: 131640-4

Test Data – Occupied Bandwidth

WCDMA - Output
Downlink



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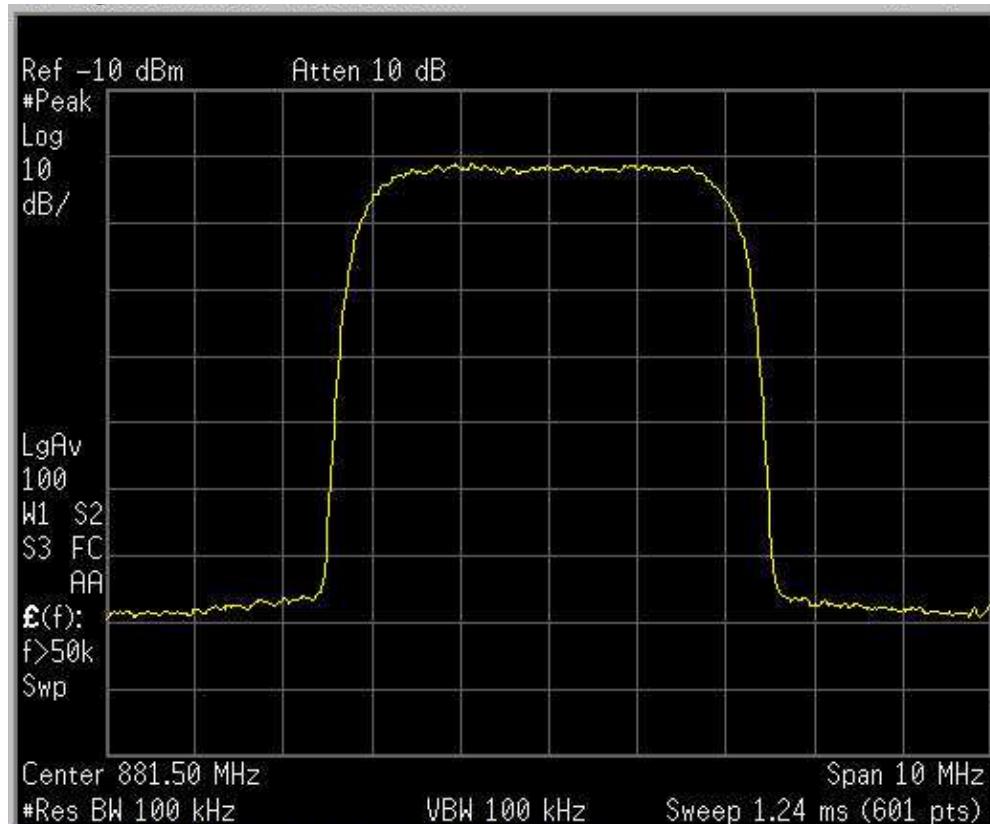
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CELLULAR BAND REPEATERS

EQUIPMENT: TRU8A19AWWV/AC-WS

PROJECT NO.: 131640-4

Test Data – Occupied Bandwidth

WCDMA - Input
Downlink



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CELLULAR BAND REPEATERS

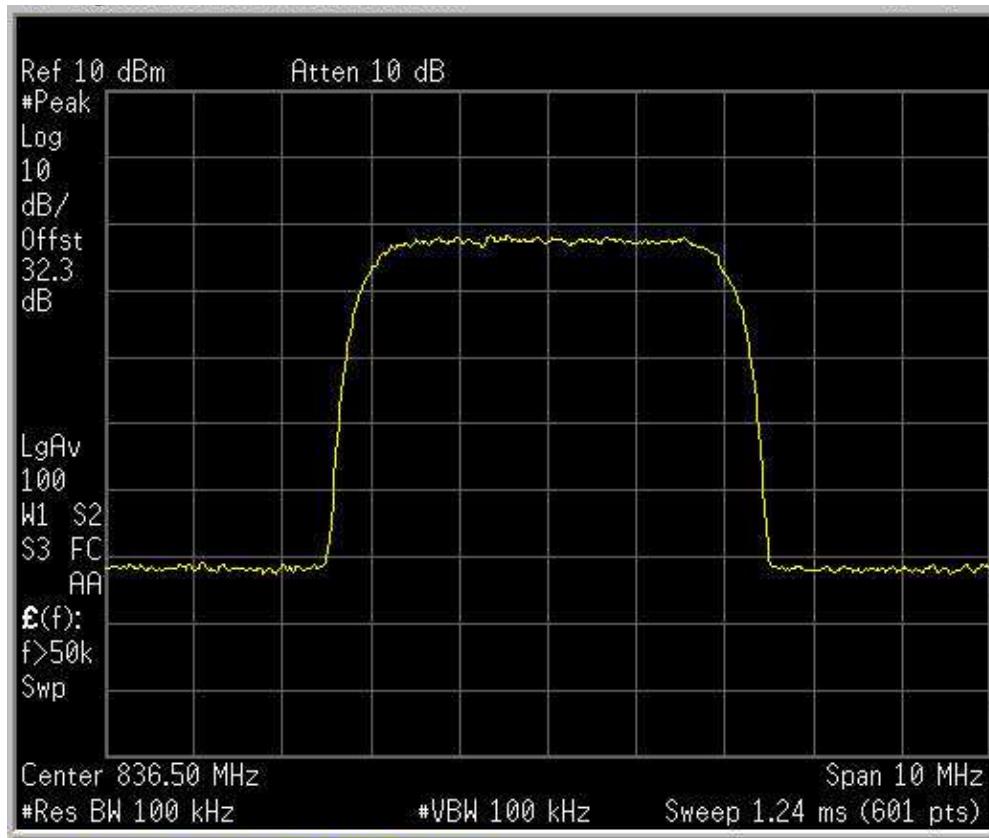
EQUIPMENT: **TRU8A19AWWV/AC-WS**

PROJECT NO.: **131640-4**

Test Data – Occupied Bandwidth

WCDMA - Output

Uplink



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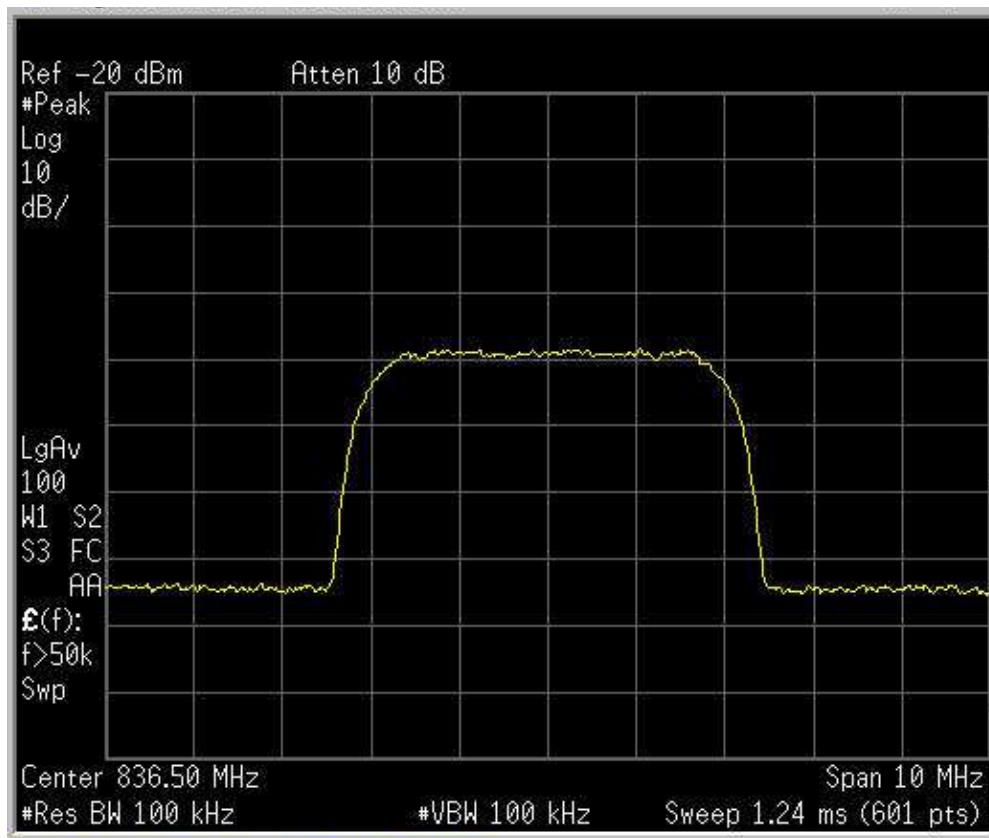
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CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

PROJECT NO.: **131640-4**

Test Data – Occupied Bandwidth

WCDMA - Input
Uplink



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**CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS**

EQUIPMENT: **TRU8A19AWWV/AC-WS**

PROJECT NO.: **131640-4**

Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals PARA. NO.: 22.917

TESTED BY: G. Curioni

DATE: 23 September 09

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 1-2-3b-4

Measurement Uncertainty: +/- 1.9 dB

Temperature: 24 °C

Relative Humidity: 50 %

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CELLULAR BAND REPEATERS

EQUIPMENT: TRU8A19AWWV/AC-WS

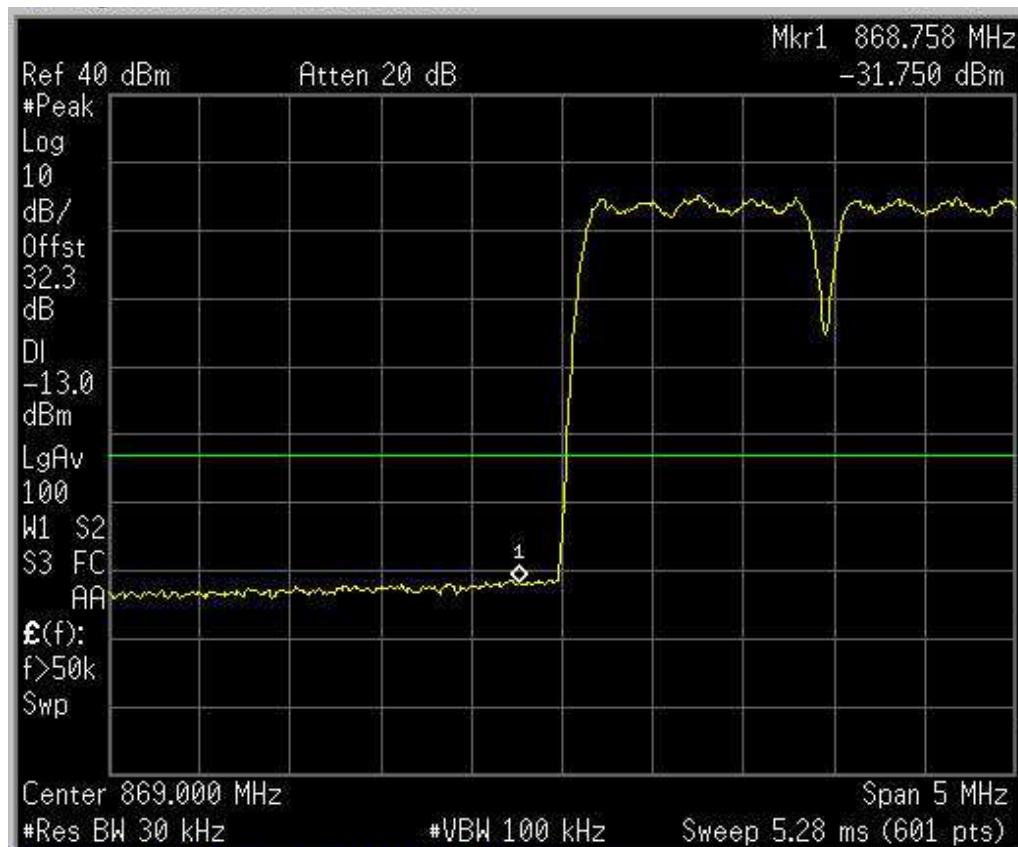
PROJECT NO.: 131640-4

Test Data – Spurious Emissions at Antenna Terminals

Lower Band edge Intermodulation

CDMA

Downlink



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CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

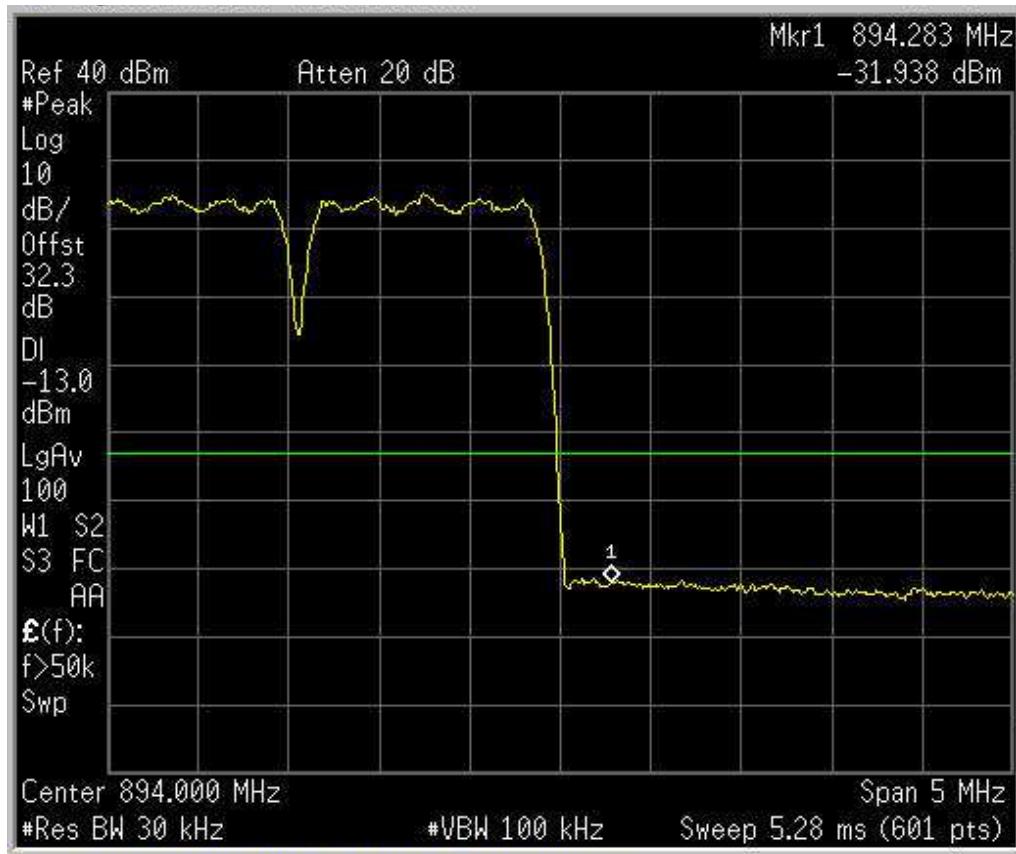
PROJECT NO.: **131640-4**

Test Data – Spurious Emissions at Antenna Terminals

Upper Band edge Intermodulation

CDMA

Downlink



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CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

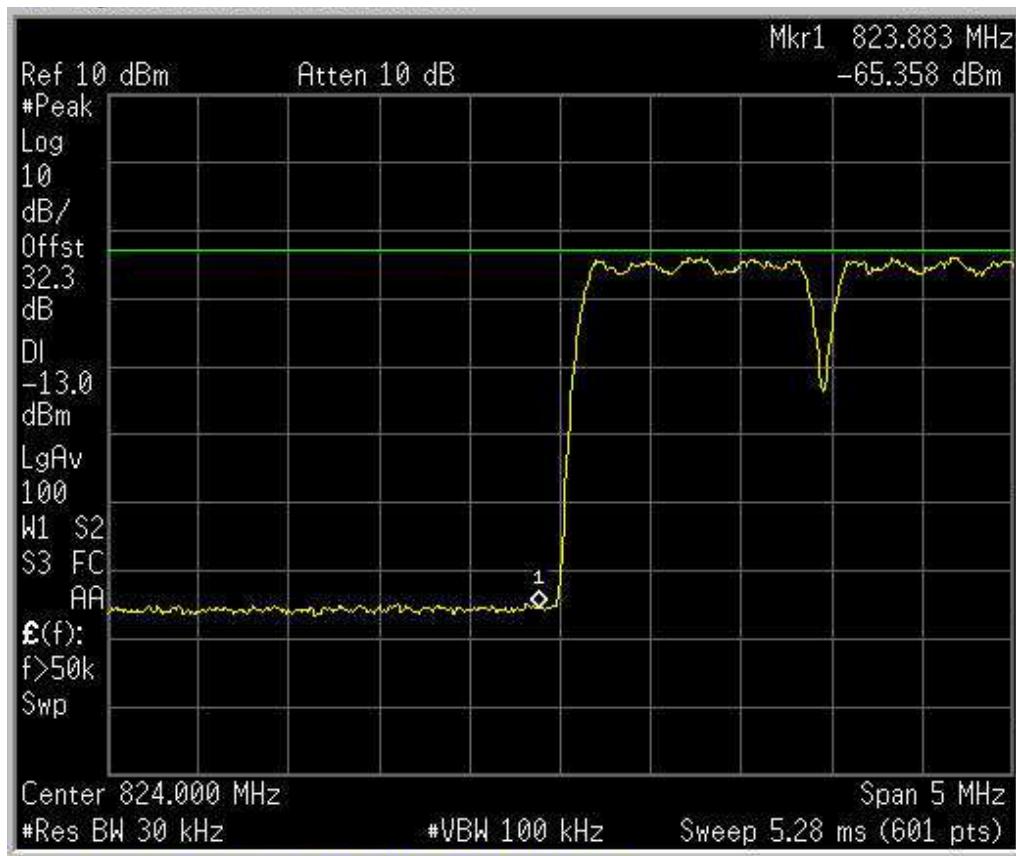
PROJECT NO.: **131640-4**

Test Data – Spurious Emissions at Antenna Terminals

Lower Band edge Intermodulation

CDMA

Uplink



Nemko Italy S.p.A.

CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

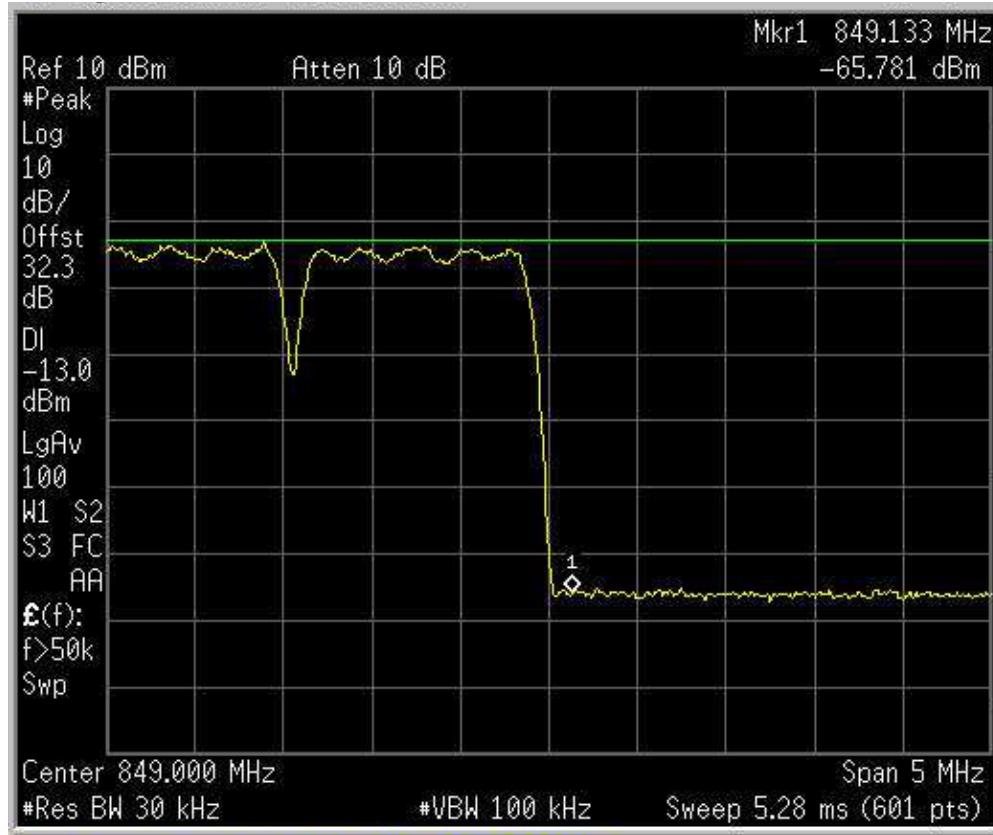
PROJECT NO.: **131640-4**

Test Data – Spurious Emissions at Antenna Terminals

Upper Band edge Intermodulation

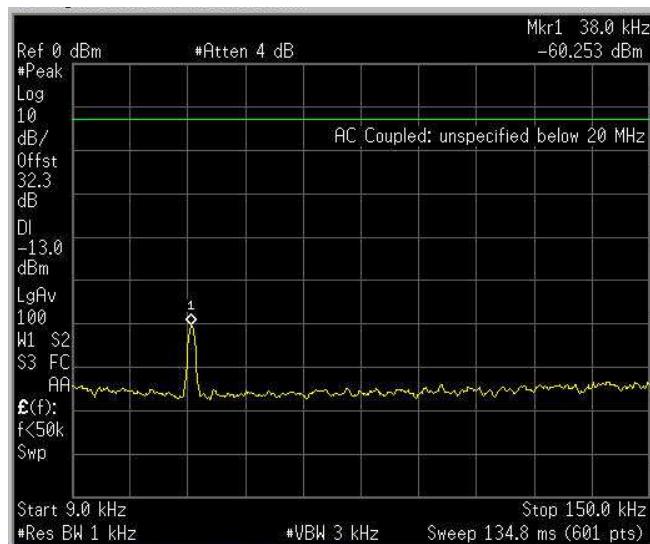
CDMA

Uplink

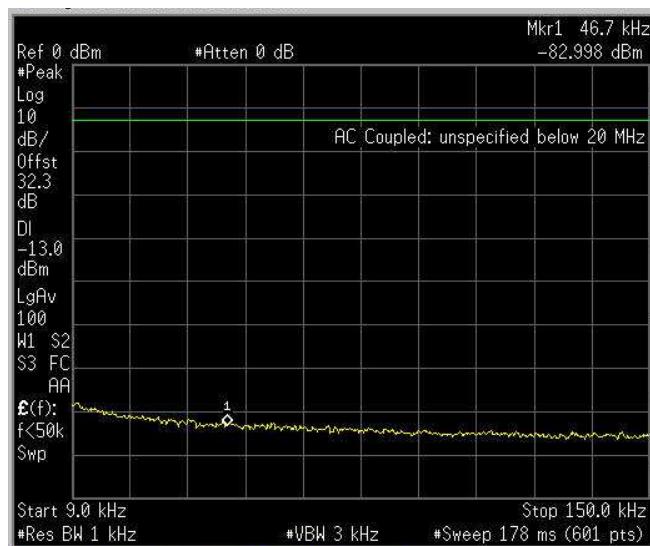


Test Data – Spurious Emissions at Antenna Terminals

Spurs – CDMA – Downlink 9 -150 kHz



Spurs – CDMA – Uplink 9 -150 kHz



Nemko Italy S.p.A.

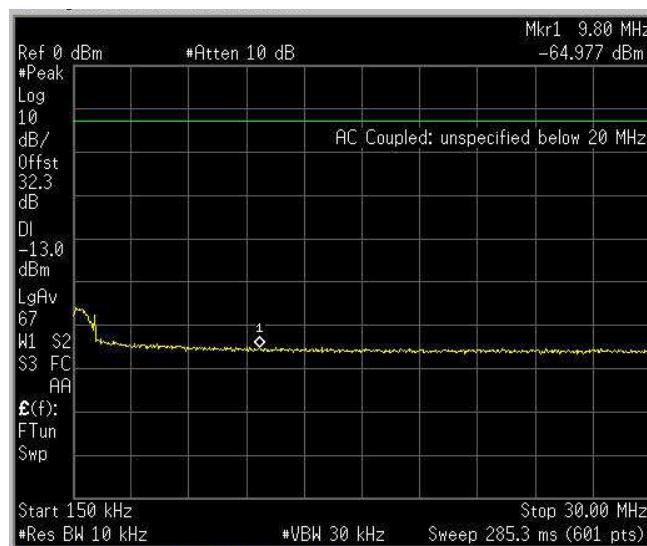
CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

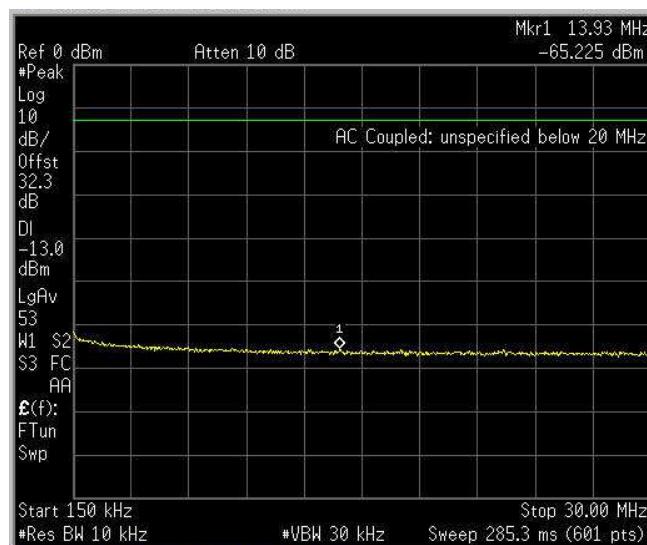
PROJECT NO.: **131640-4**

Test Data – Spurious Emissions at Antenna Terminals

Spurs – CDMA – Downlink 150 kHz – 30 MHz

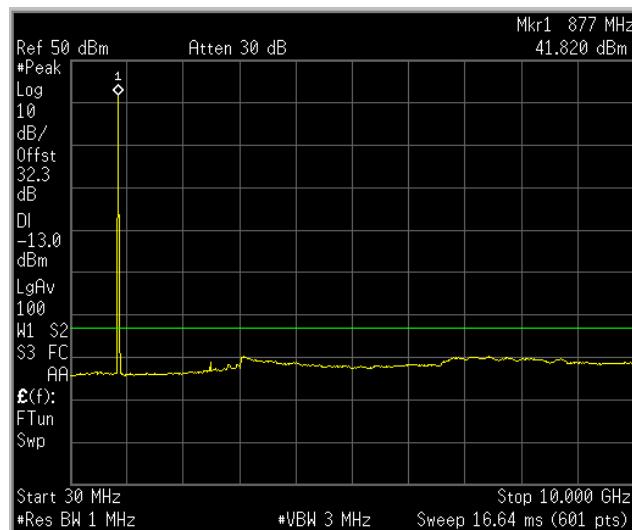


Spurs – CDMA – Uplink 150 kHz – 30 MHz

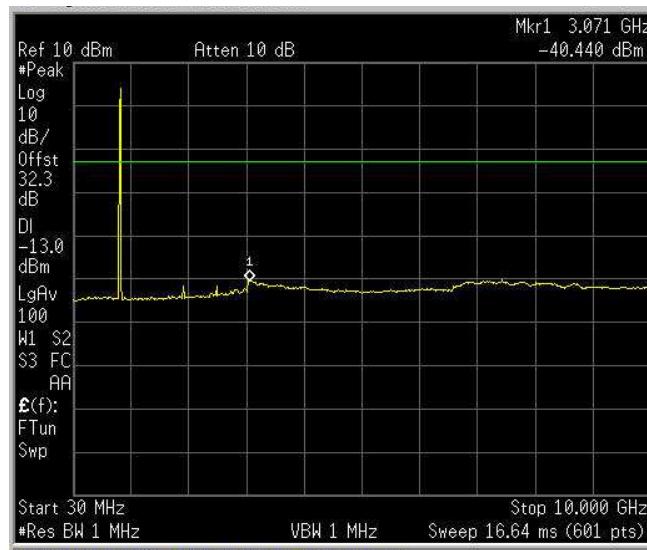


Test Data – Spurious Emissions at Antenna Terminals

Spurs – CDMA – Downlink 30 MHz – 10 GHz



Spurs – CDMA – Uplink 30 MHz – 10 GHz



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CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

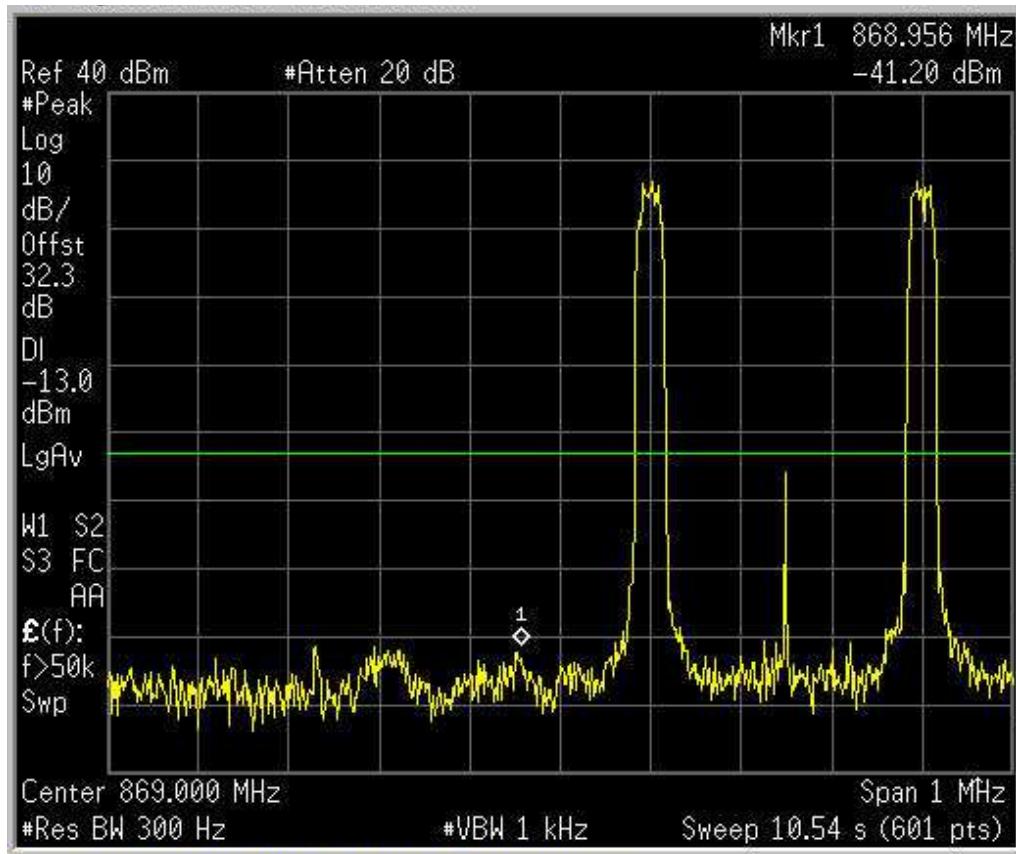
PROJECT NO.: **131640-4**

Test Data – Spurious Emissions at Antenna Terminals

Lower Bandedge Intermodulation

TDMA

Downlink



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CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

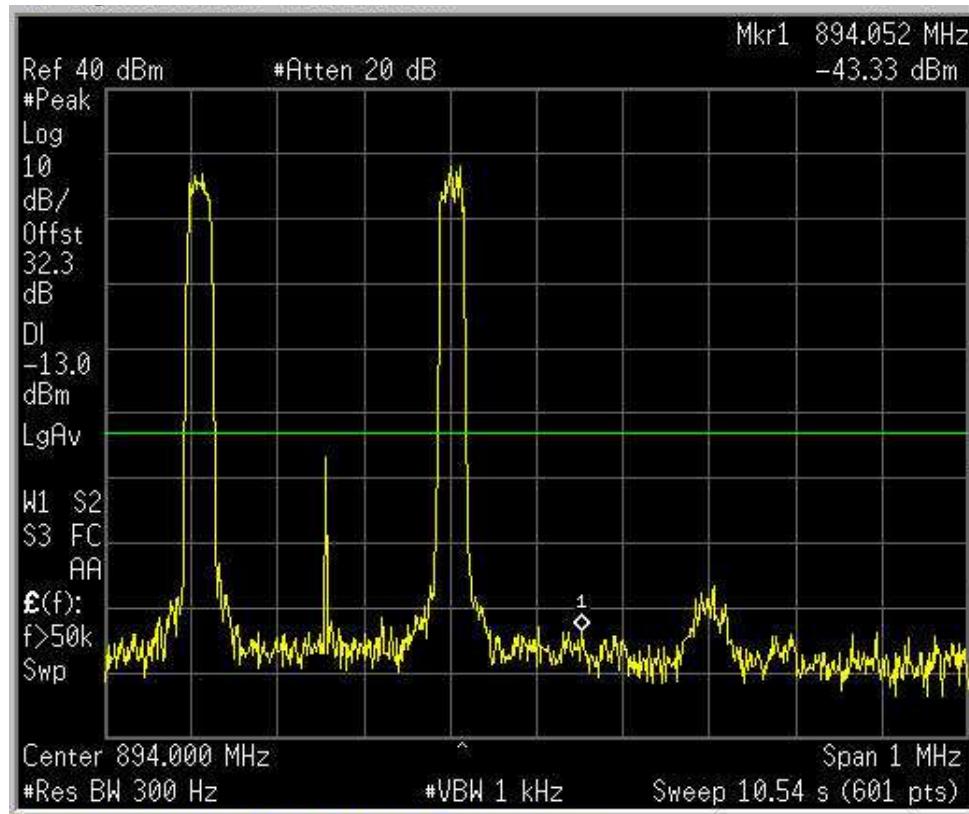
PROJECT NO.: **131640-4**

Test Data – Spurious Emissions at Antenna Terminals

Upper Bandedge Intermodulation

TDMA

Downlink

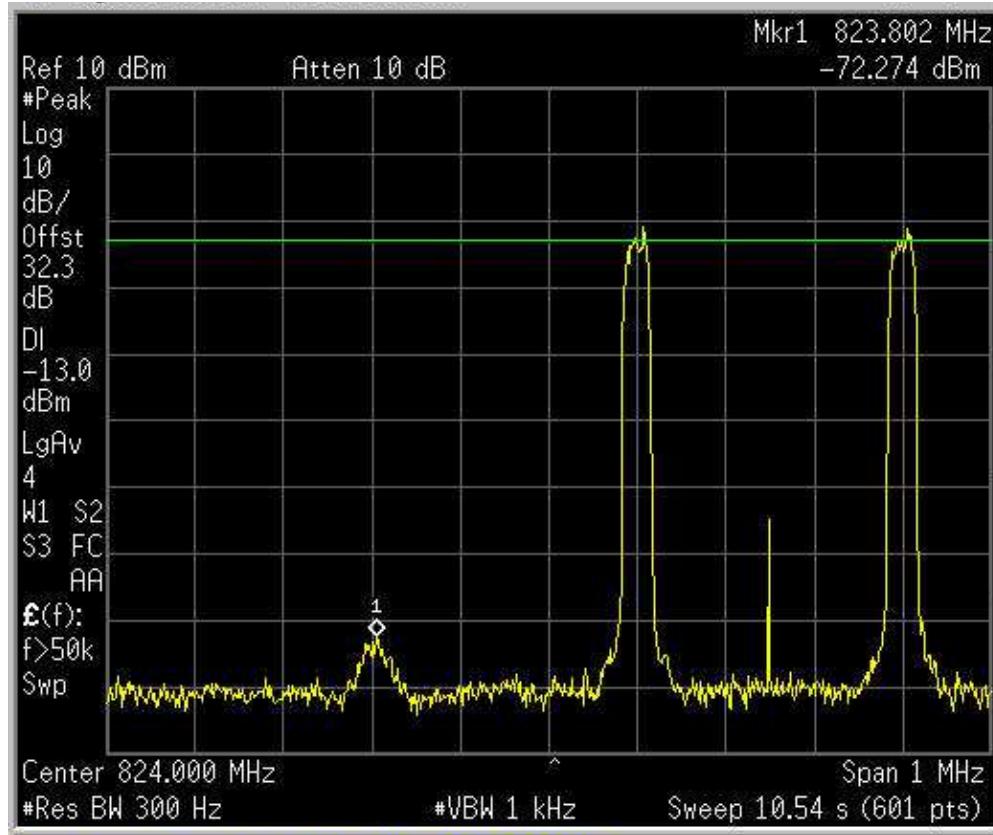


Test Data – Spurious Emissions at Antenna Terminals

Lower Bandedge Intermodulation

TDMA

Uplink



Nemko Italy S.p.A.

CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

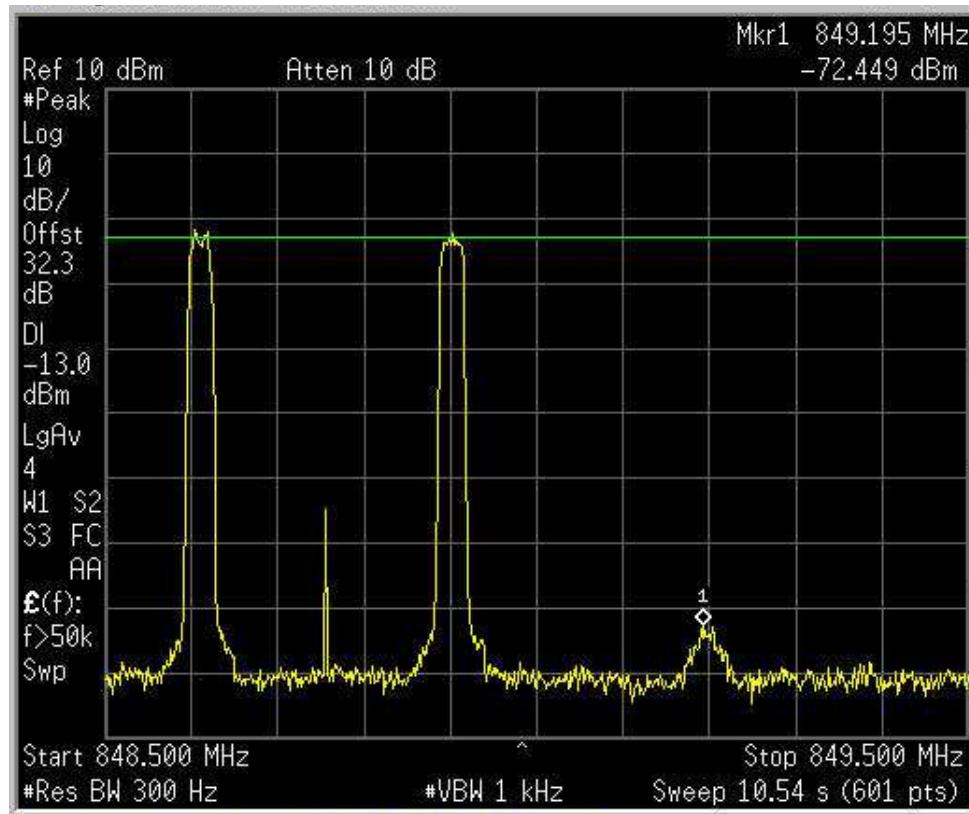
PROJECT NO.: **131640-4**

Test Data – Spurious Emissions at Antenna Terminals

Upper Bandedge Intermodulation

TDMA

Uplink



Nemko Italy S.p.A.

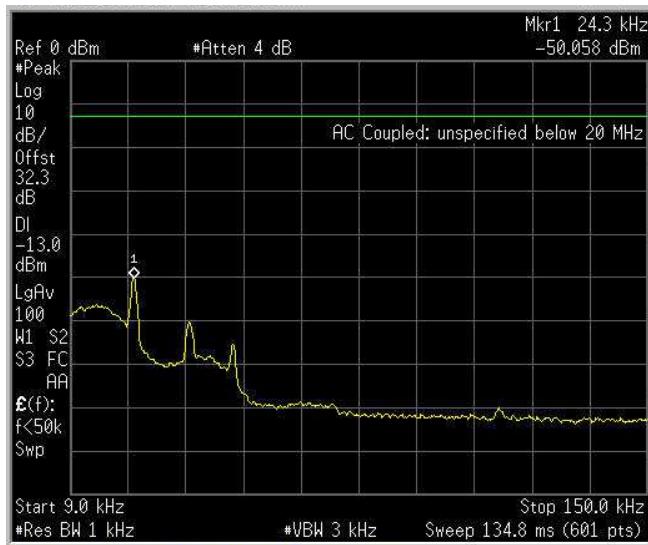
CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: TRU8A19AWWV/AC-WS

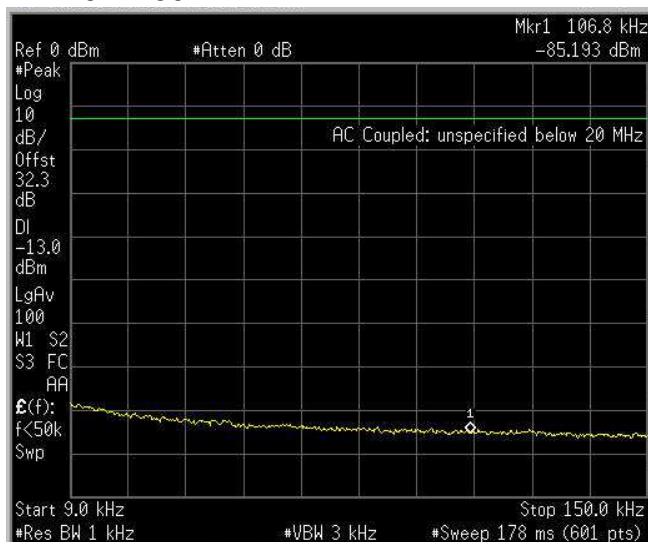
PROJECT NO.: 131640-4

Test Data – Spurious Emissions at Antenna Terminals

Spurs – TDMA – Downlink 9 – 150 kHz



Spurs – TDMA – Uplink 9 – 150 kHz



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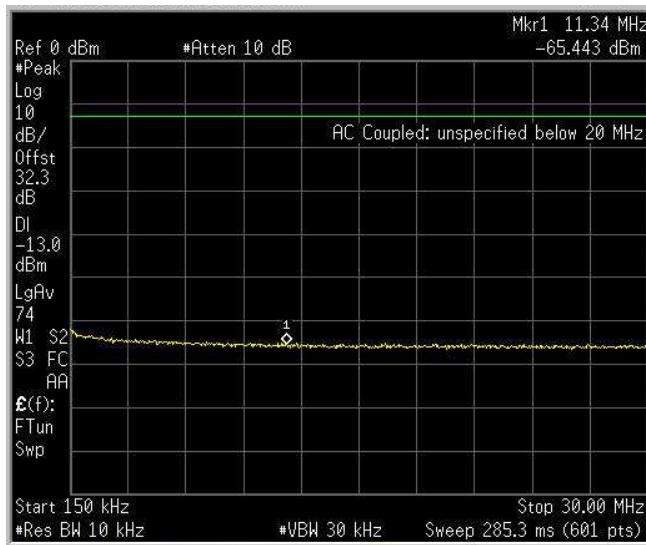
CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

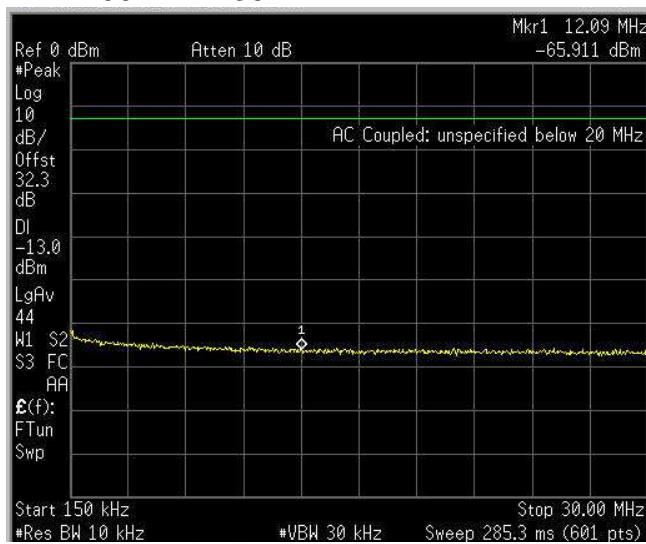
PROJECT NO.: **131640-4**

Test Data – Spurious Emissions at Antenna Terminals

Spurs – TDMA – Downlink 150 kHz – 30 MHz



Spurs – TDMA – Uplink 150 kHz – 30 MHz



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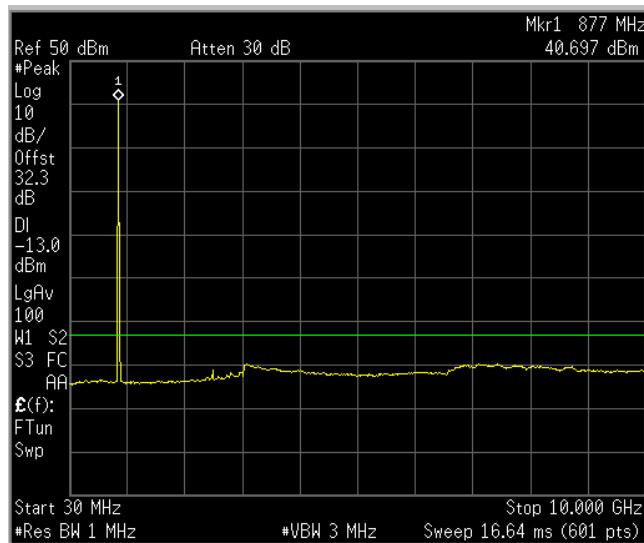
CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

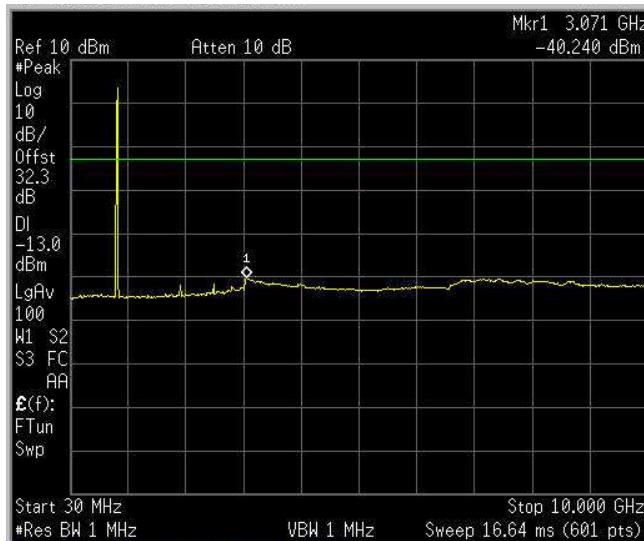
PROJECT NO.: **131640-4**

Test Data – Spurious Emissions at Antenna Terminals

Spurs – TDMA – Downlink 30 MHz – 10 GHz



Spurs – TDMA – Uplink 30 MHz – 10 GHz



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CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

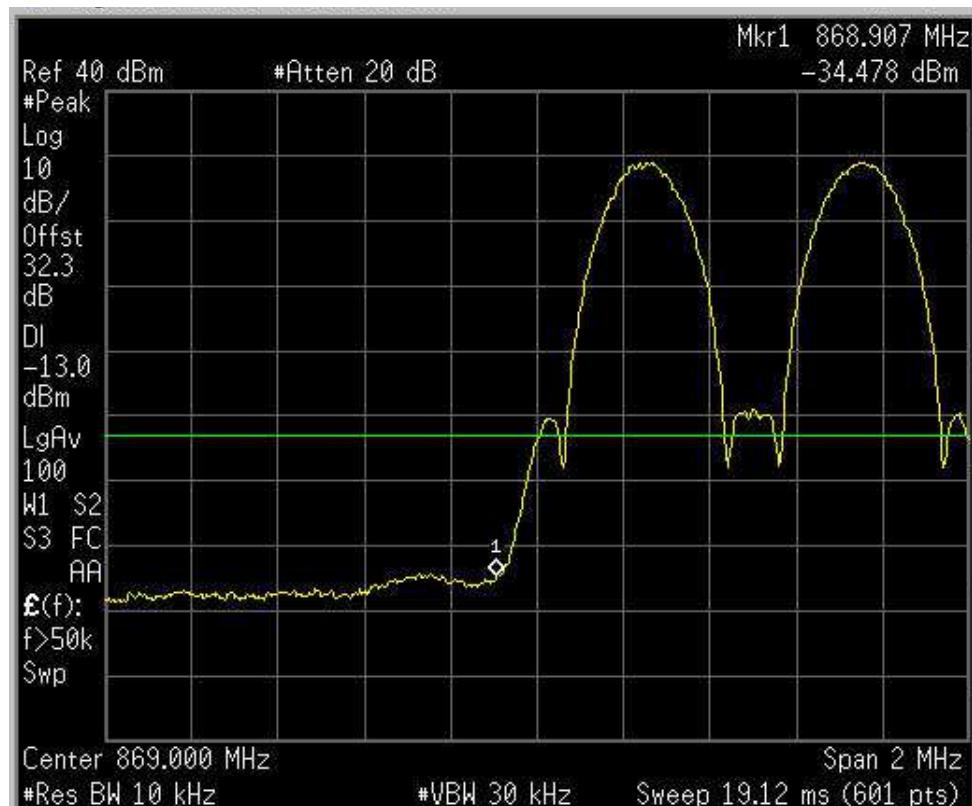
PROJECT NO.: **131640-4**

Test Data – Spurious Emissions at Antenna Terminals

Lower Bandedge Intermodulation

EDGE

Downlink



Nemko Italy S.p.A.

CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

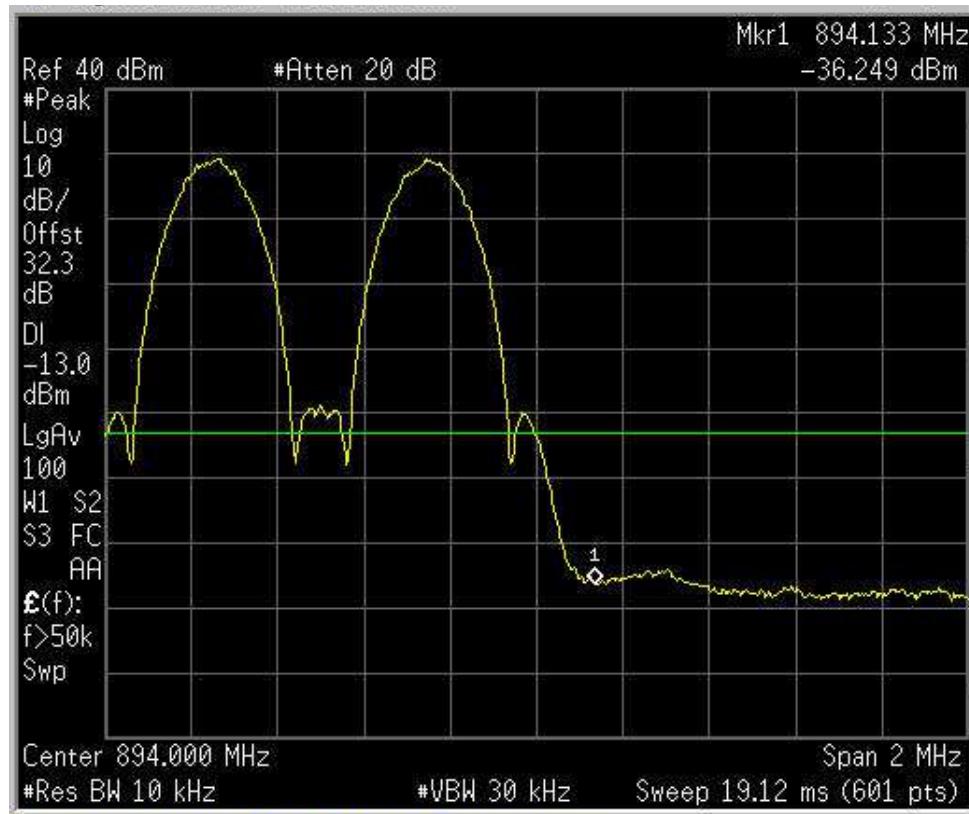
PROJECT NO.: **131640-4**

Test Data – Spurious Emissions at Antenna Terminals

Upper Bandedge Intermodulation

EDGE

Downlink



Nemko Italy S.p.A.

CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

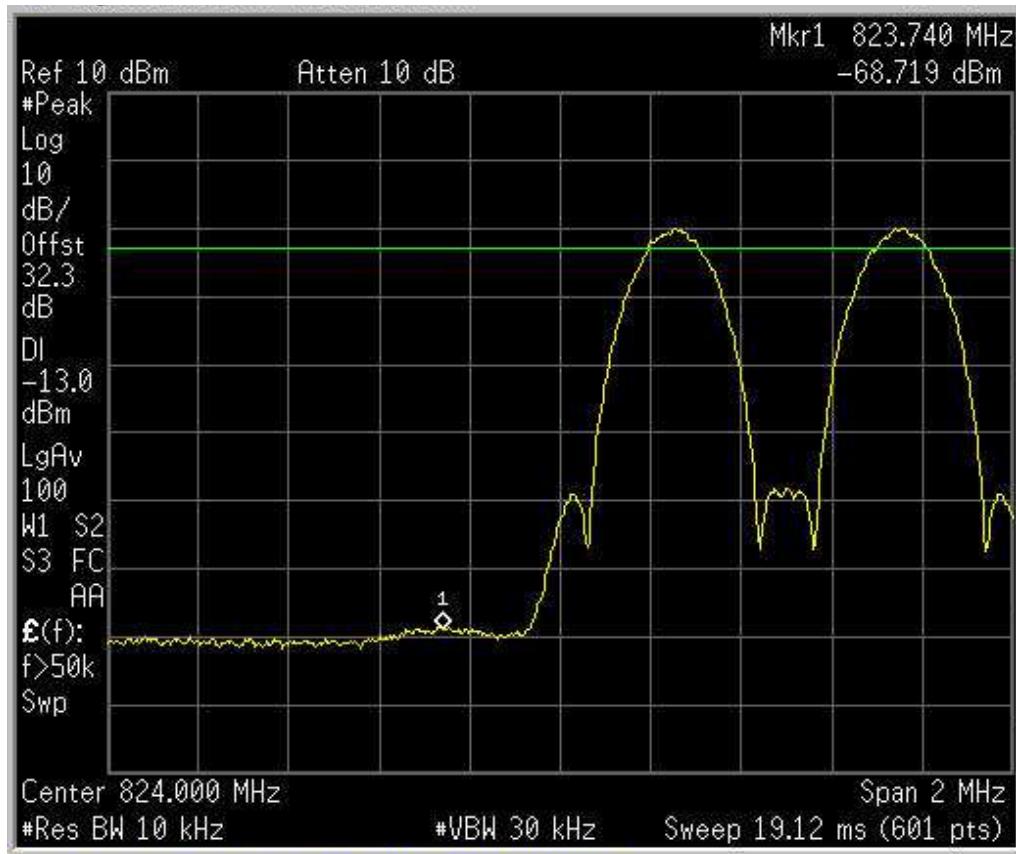
PROJECT NO.: **131640-4**

Test Data – Spurious Emissions at Antenna Terminals

Lower Bandedge Intermodulation

EDGE

Uplink



Nemko Italy S.p.A.

CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

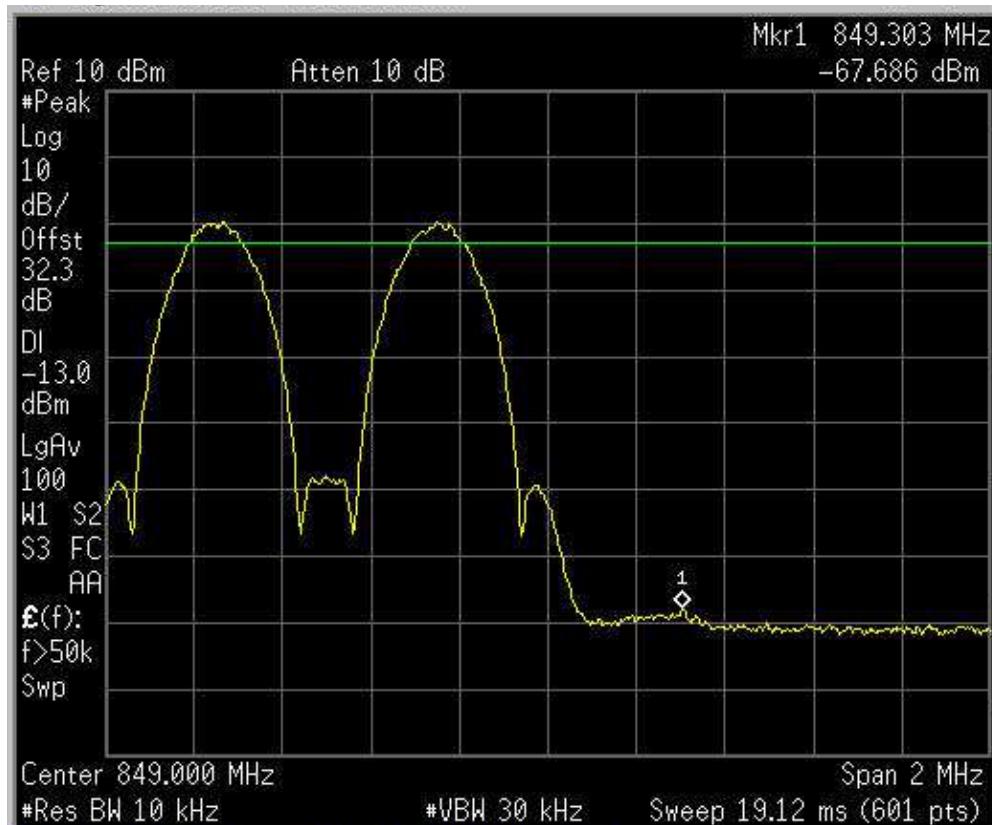
PROJECT NO.: **131640-4**

Test Data – Spurious Emissions at Antenna Terminals

Upper Bandedge Intermodulation

EDGE

Uplink



Nemko Italy S.p.A.

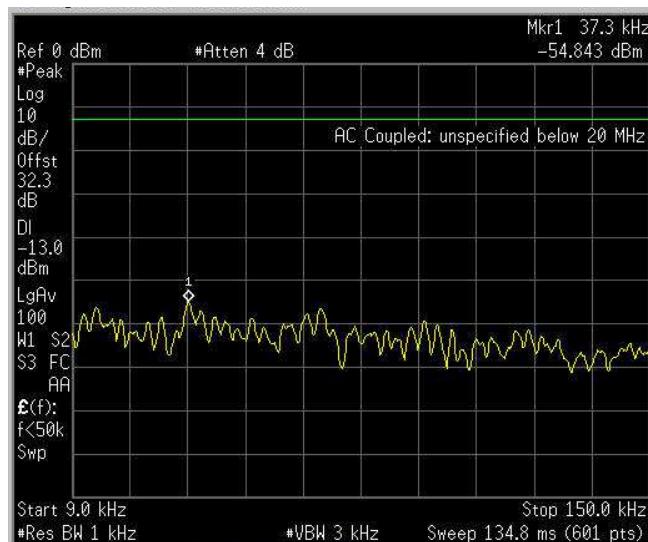
CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

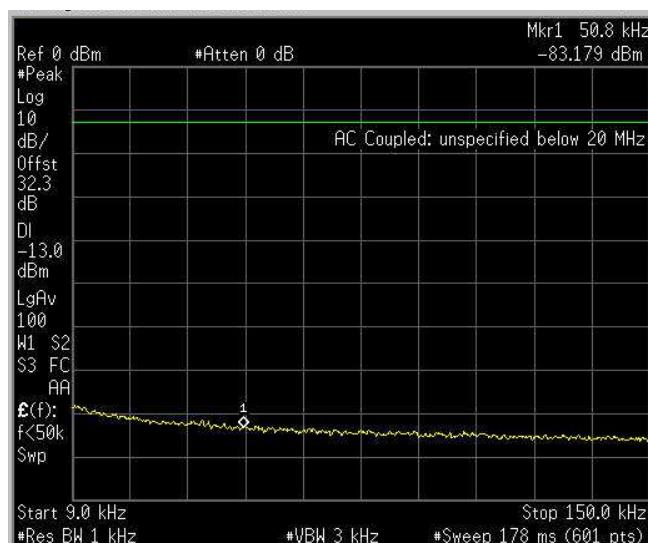
PROJECT NO.: **131640-4**

Test Data – Spurious Emissions at Antenna Terminals

Spurs – EDGE – Downlink 9 – 150 kHz



Spurs – EDGE – Uplink 9 – 150 kHz



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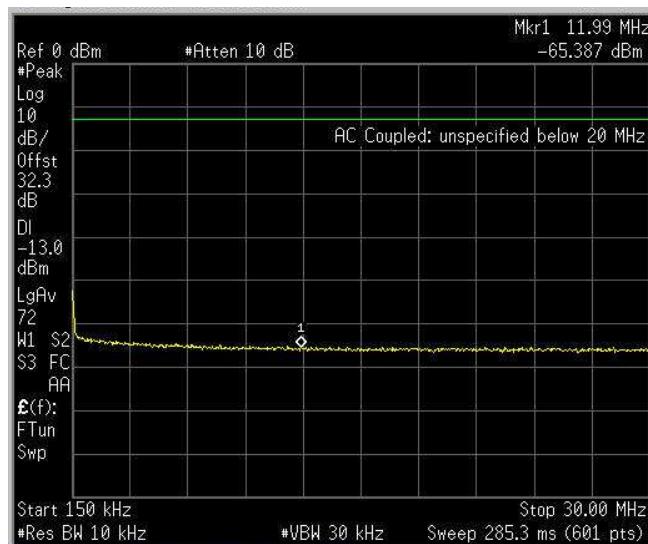
CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

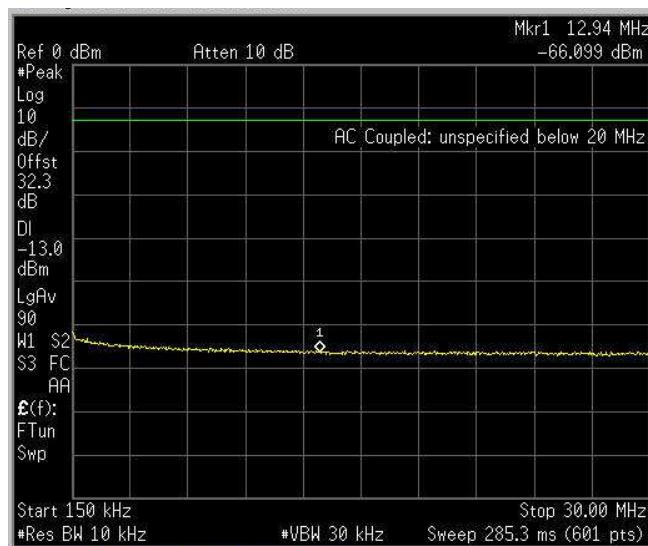
PROJECT NO.: **131640-4**

Test Data – Spurious Emissions at Antenna Terminals

Spurs – EDGE – Downlink 150 kHz – 30 MHz

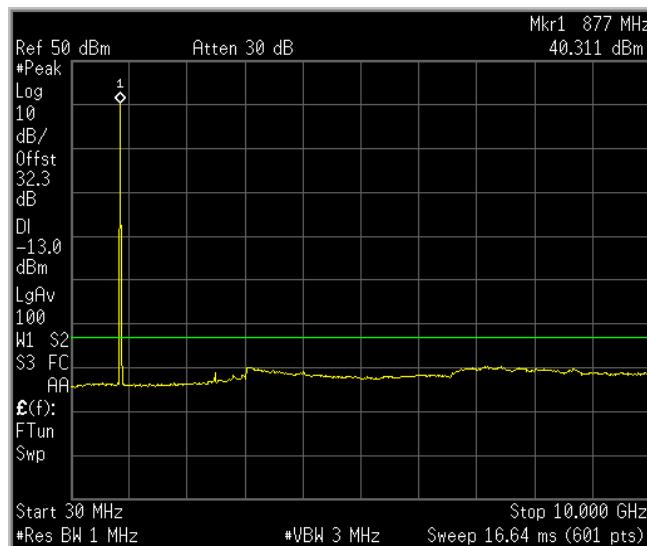


Spurs – EDGE – Uplink 150 kHz – 30 MHz

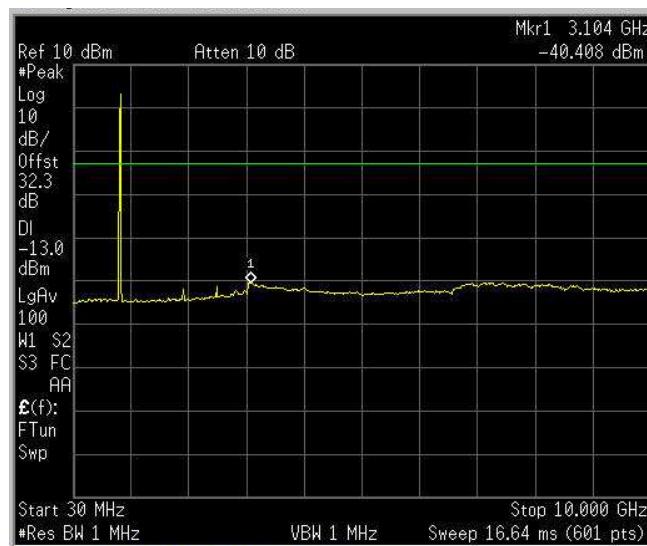


Test Data – Spurious Emissions at Antenna Terminals

Spurs – EDGE – Downlink 30 MHz – 10 GHz



Spurs – EDGE – Uplink 30 MHz – 10 GHz



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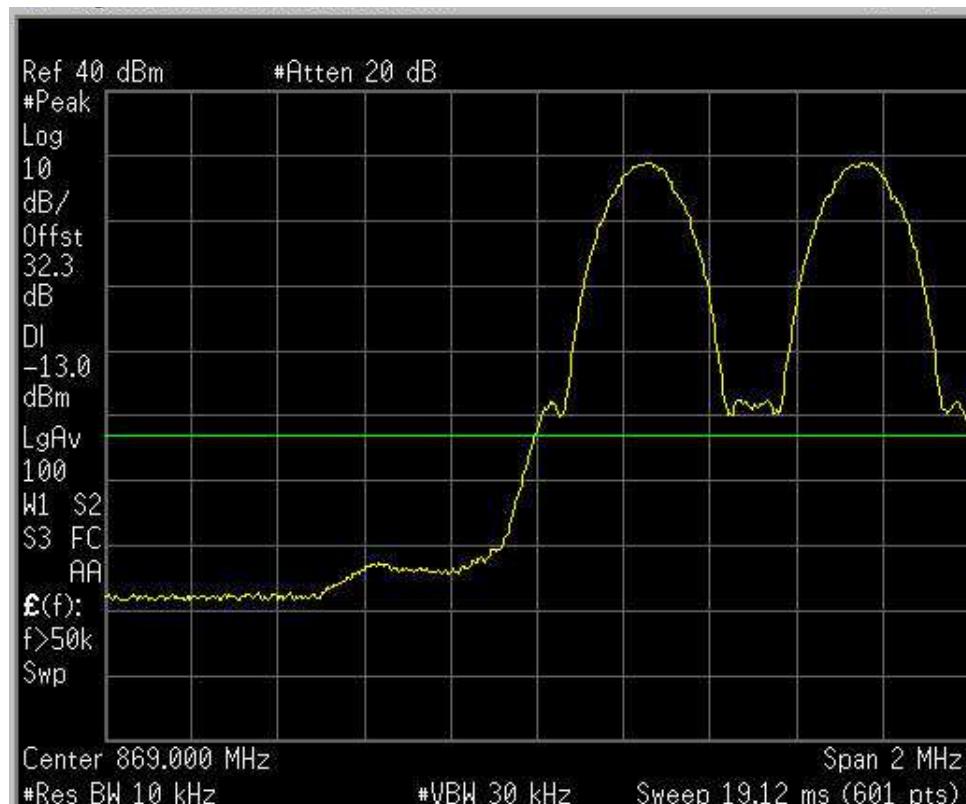
CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

PROJECT NO.: **131640-4**

Test Data – Spurious Emissions at Antenna Terminals

Lower Bandedge Intermodulation
GSM
Downlink



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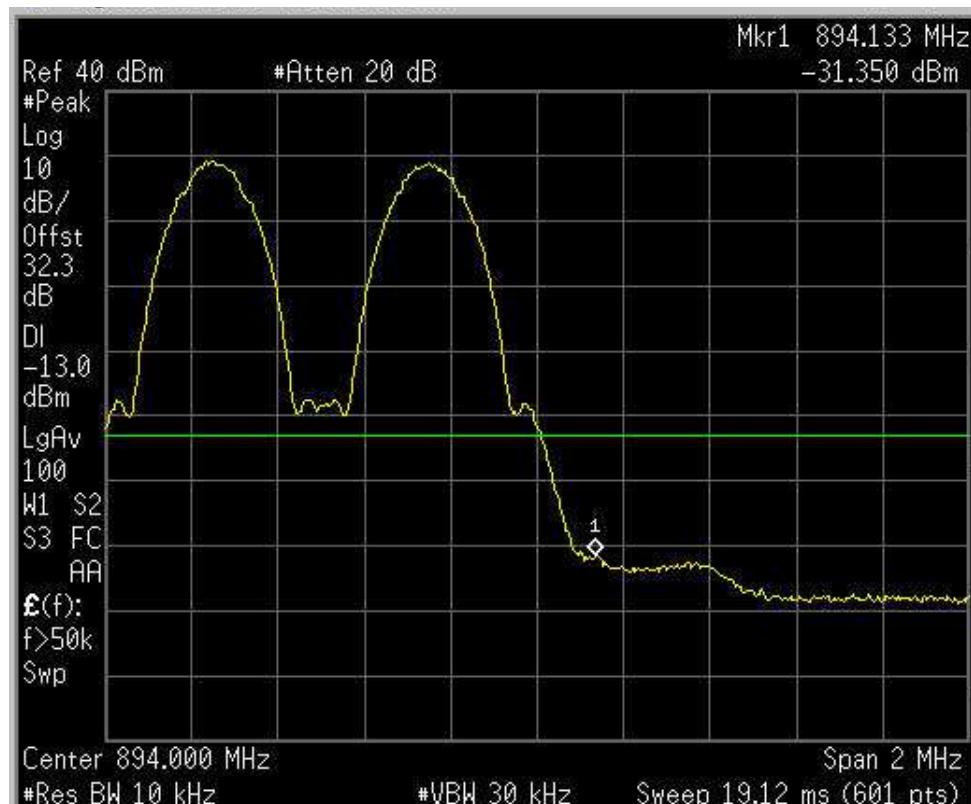
CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

PROJECT NO.: **131640-4**

Test Data – Spurious Emissions at Antenna Terminals

Upper Bandedge Intermodulation
GSM
Downlink



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CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

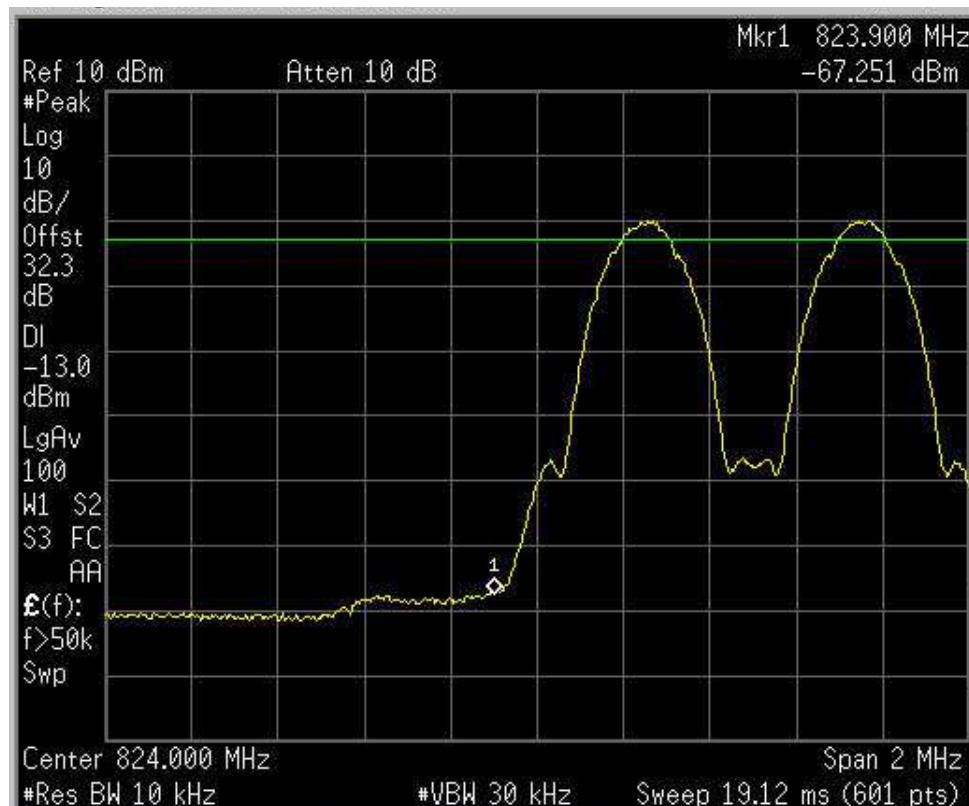
PROJECT NO.: **131640-4**

Test Data – Spurious Emissions at Antenna Terminals

Lower Bandedge Intermodulation

GSM

Uplink



Nemko Italy S.p.A.

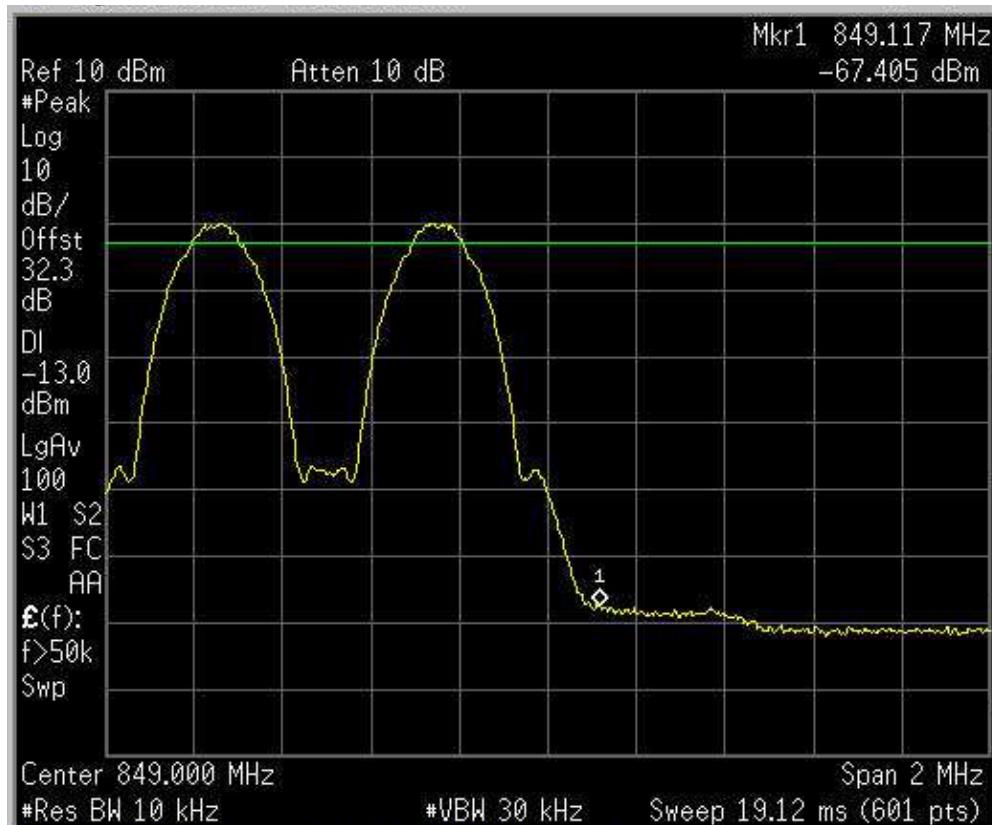
CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

PROJECT NO.: **131640-4**

Test Data – Spurious Emissions at Antenna Terminals

Upper Bandedge Intermodulation
GSM
Uplink



Nemko Italy S.p.A.

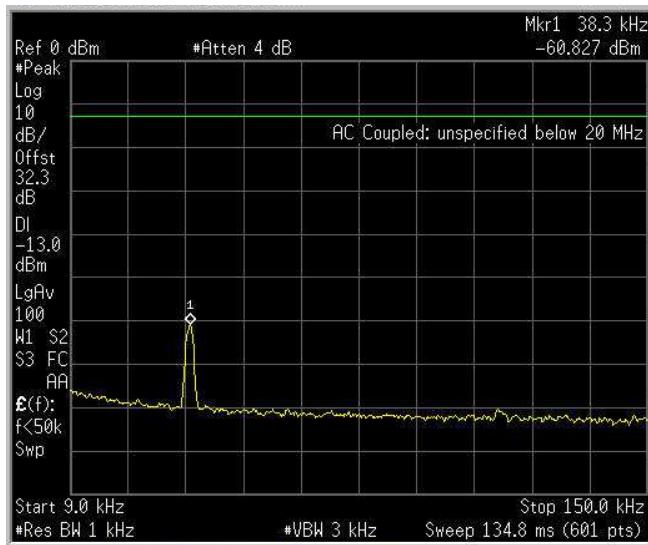
CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

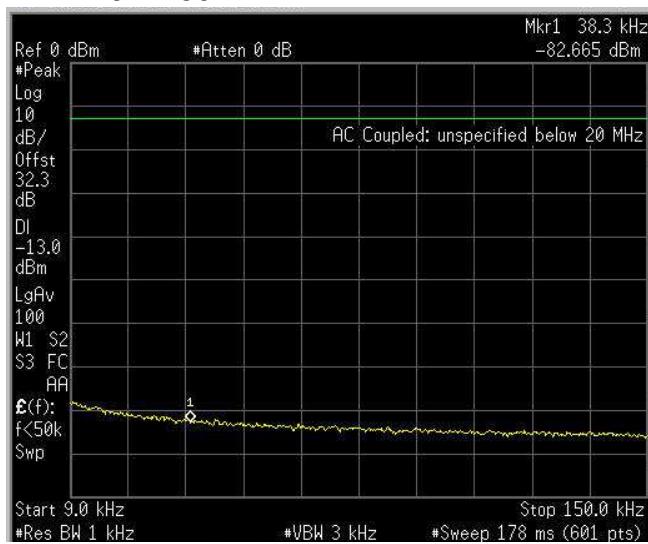
PROJECT NO.: **131640-4**

Test Data – Spurious Emissions at Antenna Terminals

Spurs – GSM – Downlink 9 – 150 kHz

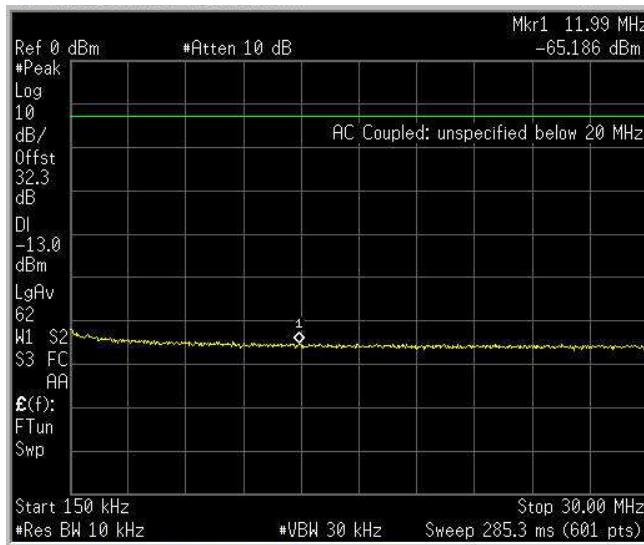


Spurs – GSM – Uplink 9 – 150 kHz

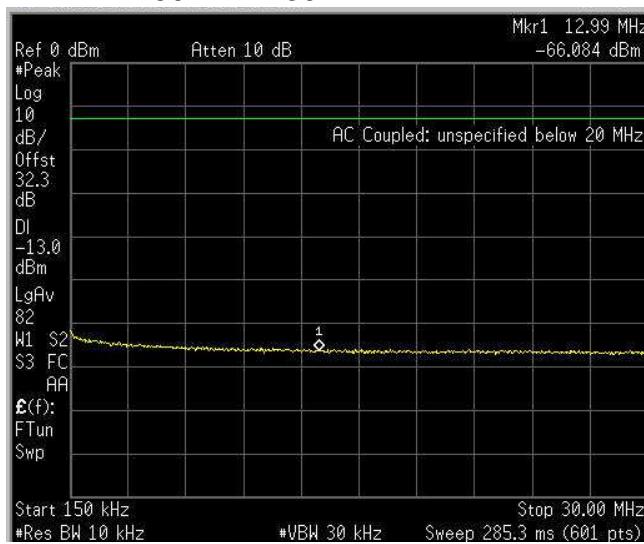


Test Data – Spurious Emissions at Antenna Terminals

Spurs – GSM – Downlink 150 kHz – 30 MHz



Spurs – GSM – Uplink 150 kHz – 30 MHz



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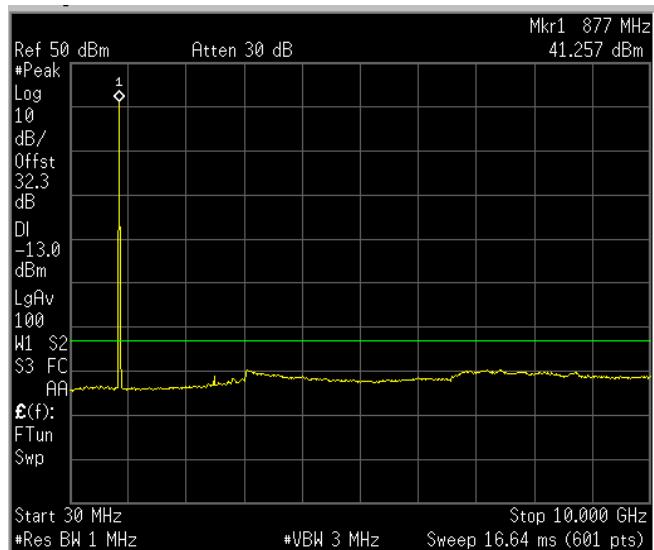
CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

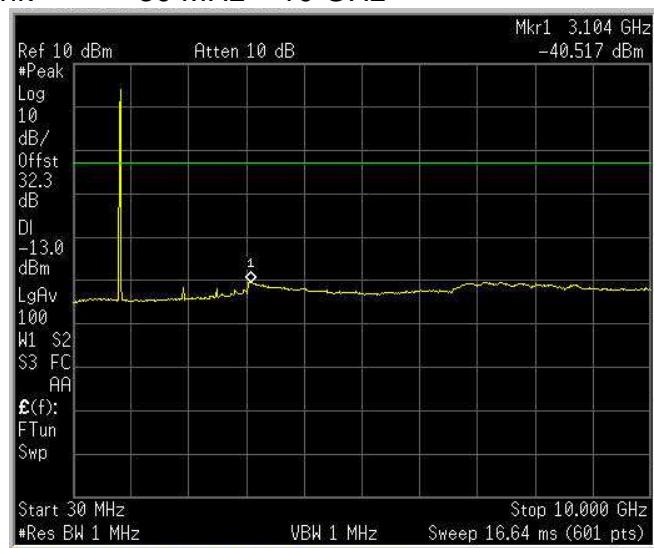
PROJECT NO.: **131640-4**

Test Data – Spurious Emissions at Antenna Terminals

Spurs – GSM – Downlink 30 MHz – 10 GHz



Spurs – GSM – Uplink 30 MHz – 10 GHz



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CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

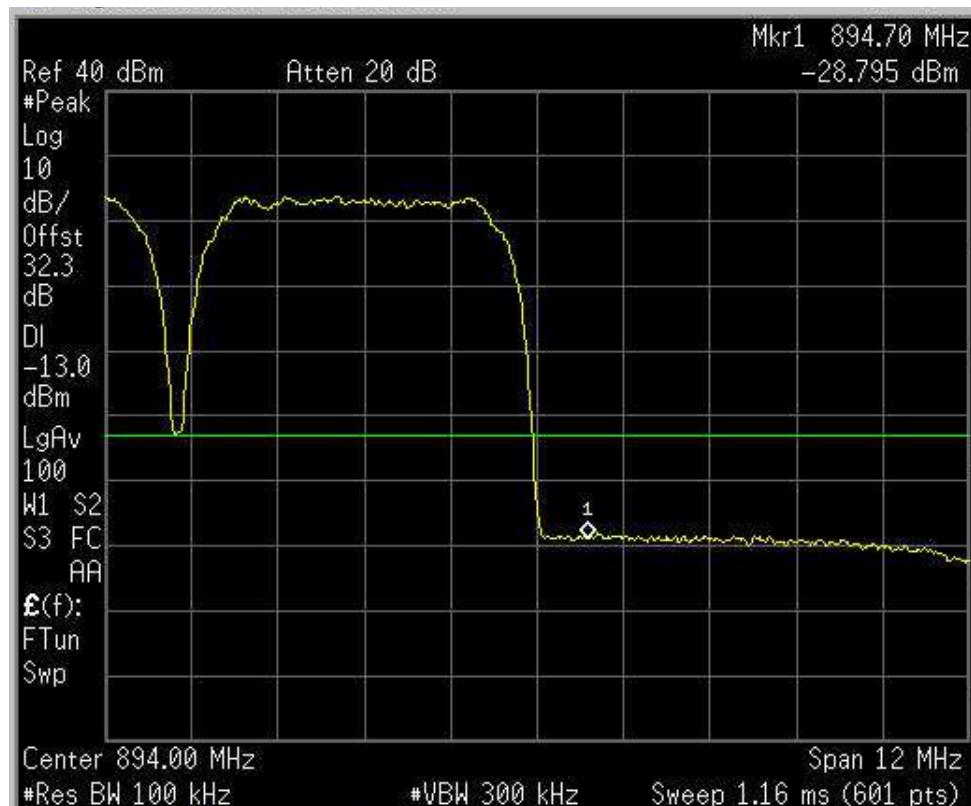
PROJECT NO.: **131640-4**

Test Data – Spurious Emissions at Antenna Terminals

Lower Bandedge Intermodulation

W-CDMA

Downlink



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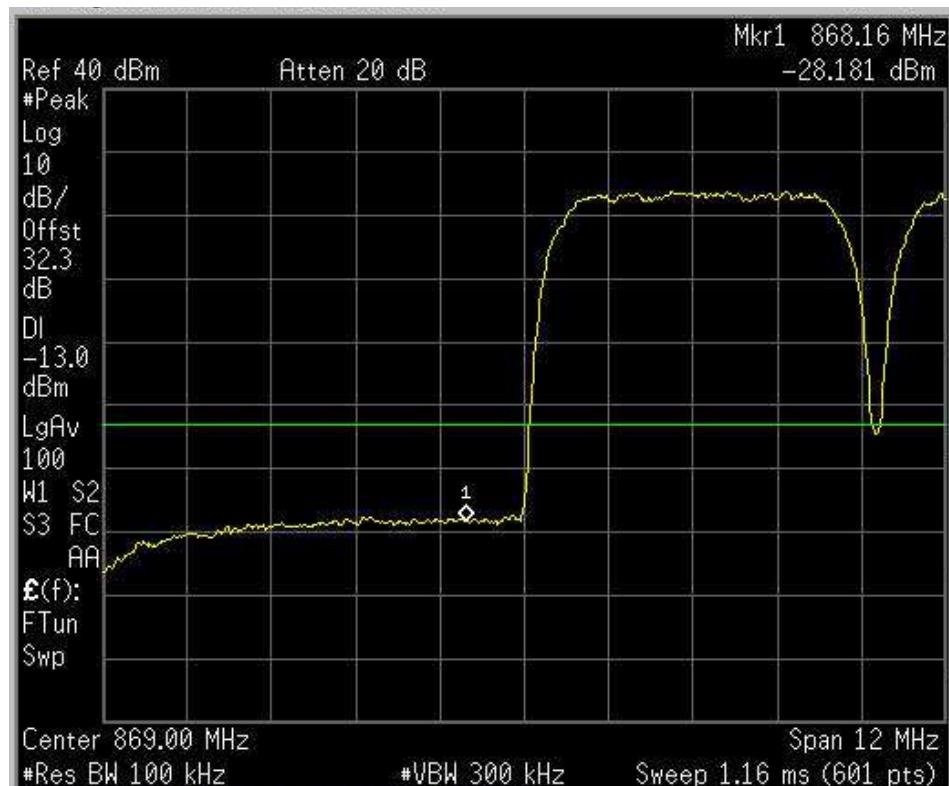
CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

PROJECT NO.: **131640-4**

Test Data – Spurious Emissions at Antenna Terminals

Upper Bandedge Intermodulation
W-CDMA
Downlink



Nemko Italy S.p.A.

CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

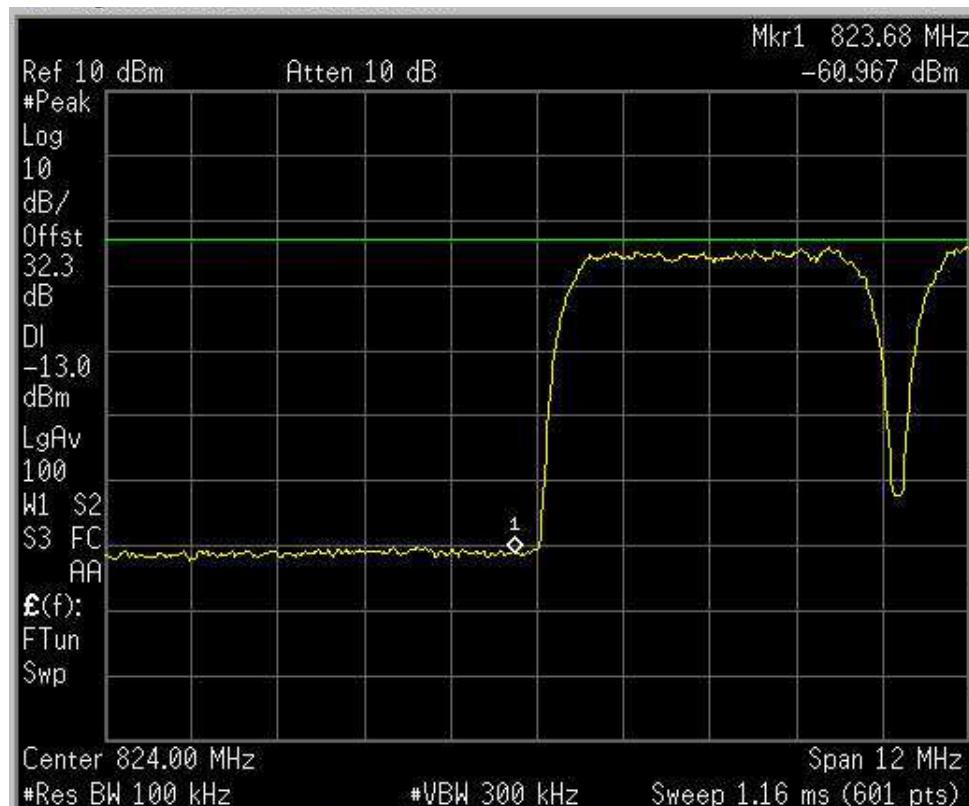
PROJECT NO.: **131640-4**

Test Data – Spurious Emissions at Antenna Terminals

Lower Bandedge Intermodulation

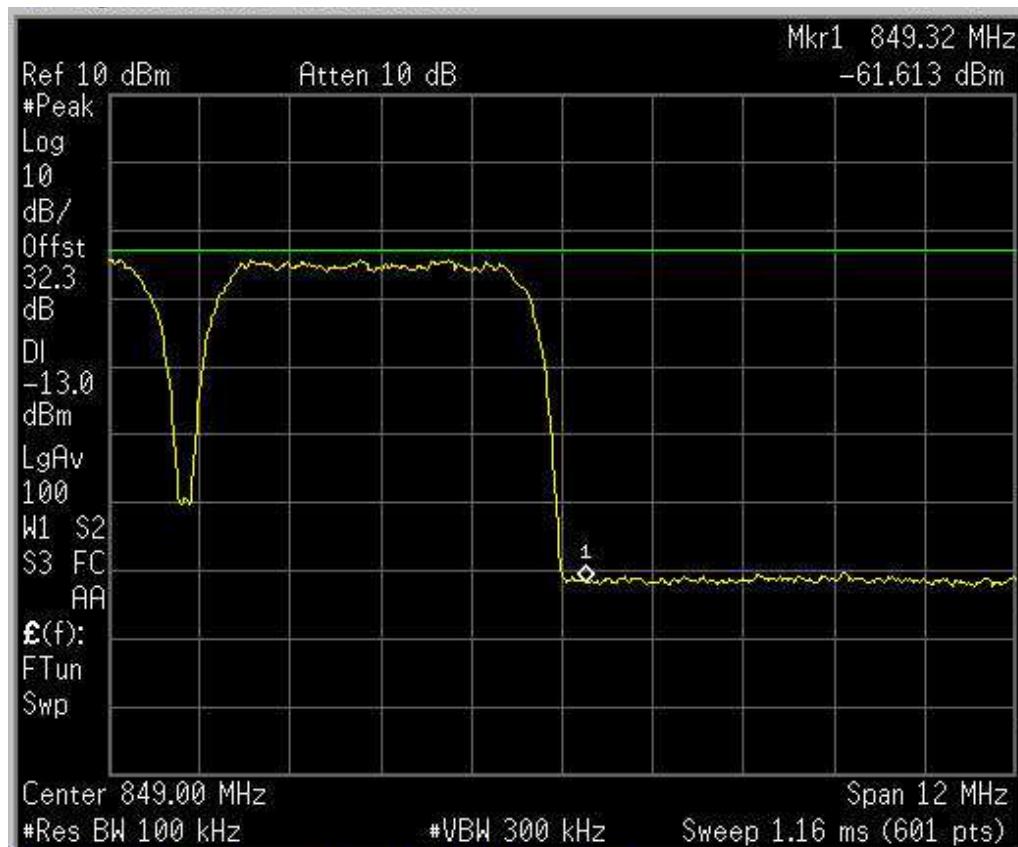
W-CDMA

Uplink



Test Data – Spurious Emissions at Antenna Terminals

Upper Bandedge Intermodulation
W-CDMA
Uplink



Nemko Italy S.p.A.

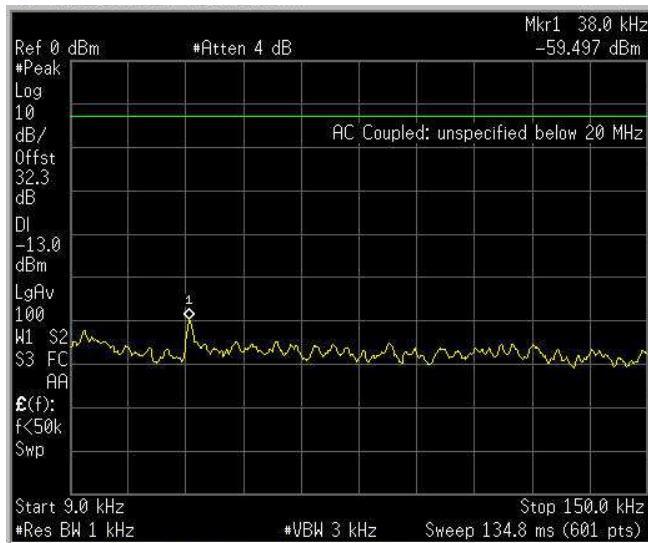
CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

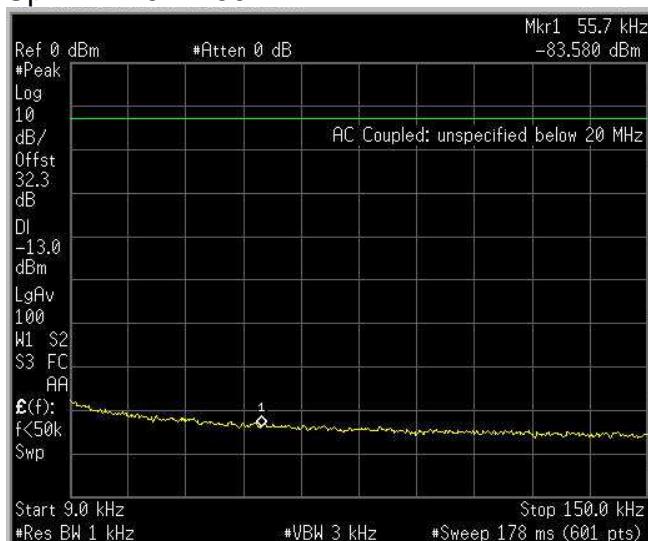
PROJECT NO.: **131640-4**

Test Data – Spurious Emissions at Antenna Terminals

Spurs – W-CDMA – Downlink 9 – 150 kHz

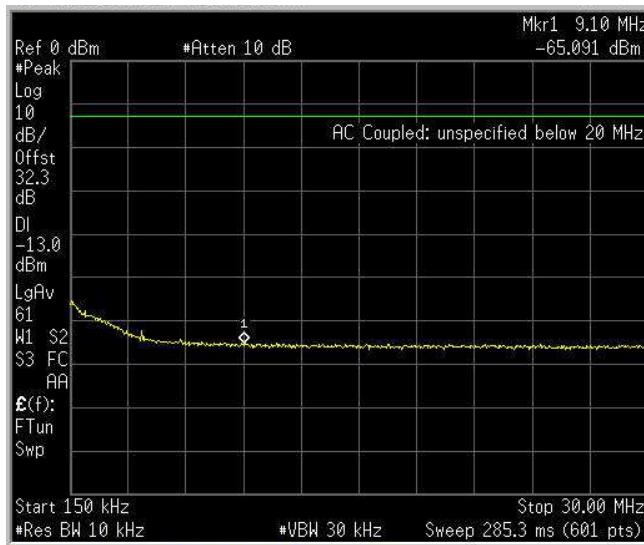


Spurs – W-CDMA – Uplink 9 – 150 kHz

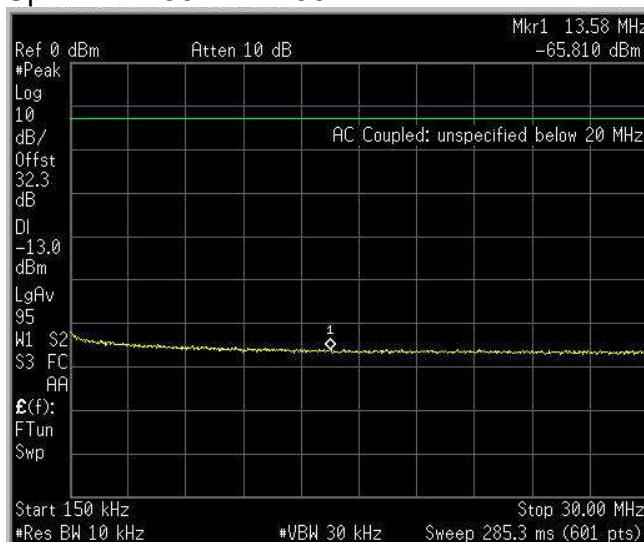


Test Data – Spurious Emissions at Antenna Terminals

Spurs – W-CDMA – Downlink 150 kHz – 30 MHz



Spurs – W-CDMA – Uplink 150 kHz – 30 MHz



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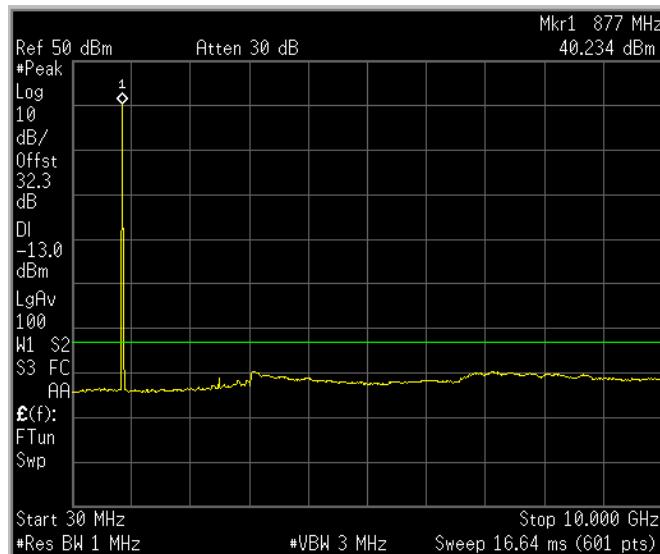
CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

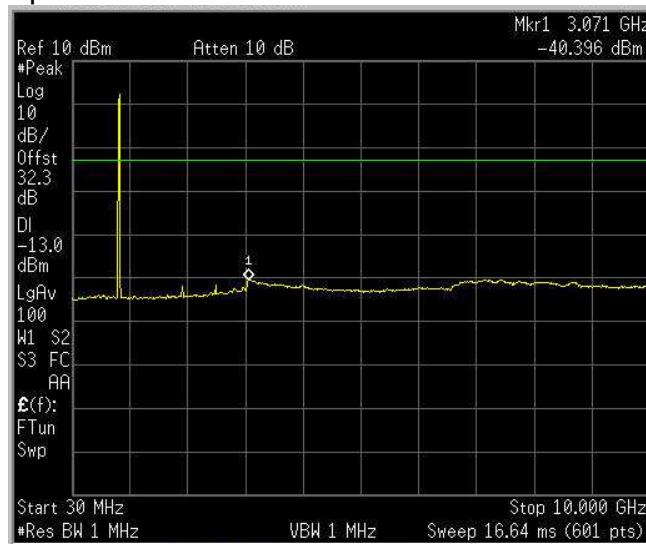
PROJECT NO.: **131640-4**

Test Data – Spurious Emissions at Antenna Terminals

Spurs – W-CDMA – Downlink 30 MHz – 10 GHz



Spurs – W-CDMA – Uplink 30 MHz – 10 GHz



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**CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS**

EQUIPMENT: **TRU8A19AWWV/AC-WS**

PROJECT NO.: **131640-4**

Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious	PARA. NO.: 22.917
TESTED BY: G. Curioni	DATE: 23 September 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 of -13 dBm.

AMPS band - Master/remote 120/120 Vac			
Frequency range	D.L. & U.L.	Result [dBm] Max. field strength pol. V/H	Limit
30 – 1000 MHz	78.6 MHz	-68.5 dBm H	-13 dBm
1 – 10 GHz		negligible	-13dBm

AMPS band - Master/remote 48 Vdc/120 Vac			
Frequency range	D.L. & U.L.	Result [dBm] Max. field strength pol. V/H	Limit
30 – 1000 MHz	33.9 MHz 35.8 MHz 70.8 MHz 88.3 MHz 103.9 MHz 154.4 MHz	-62.9 dBm V -53.4 dBm H -59.6 dBm H -59.1 dBm V -59.7 dBm H -56.6 dBm V	Limit: -13 dbm
1 – 10 GHz		negligible	Limit: -13 dBm

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CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

PROJECT NO.: **131640-4**

Equipment Used: 5 – 6 – 7 – 8 – 9 – 10 – 11 – 12 - 13

Measurement Uncertainty: +/-5 dB

Temperature: 24 °C

Relative Humidity: 55 %

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**CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS**

EQUIPMENT: **TRU8A19AWWV/AC-WS**

PROJECT NO.: **131640-4**

Section 7. Filter Frequency Response

NAME OF TEST: Filter Frequency Response	PARA. NO.: 2-11-04/EAB/RF
TESTED BY: G. Curioni	DATE: 23 January 2010

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 3a

Measurement Uncertainty: +/-1,9 dB

Temperature: 24 °C

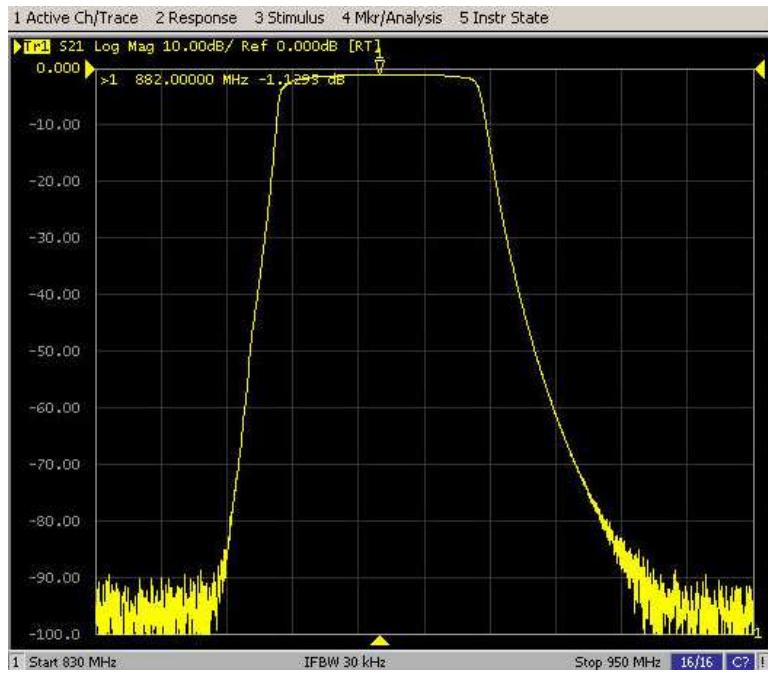
Relative Humidity: 55 %

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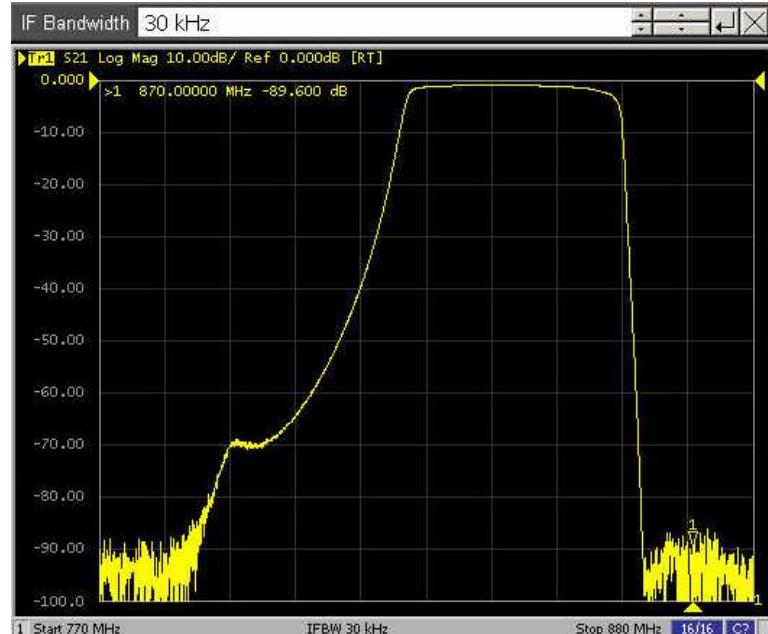
**CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS**

EQUIPMENT: TRU8A19AWWV/AC-WS

PROJECT NO.: 131640-4



Down-link



Up-link

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**CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS**

EQUIPMENT: **TRU8A19AWWV/AC-WS**

PROJECT NO.: **131640-4**

Section 8. Test Equipment List

<i>Identification number</i>	<i>Description</i>	<i>Manufacturer model</i>	<i>s/n</i>	<i>Cal. Due</i>
1	Vector Signal Generator	Agilent H.P. E4438C	MY45094485	July 2010
2	Spectrum Analyzer	Agilent H.P. E4440A	US40420470	December 2009
3a	Network Analyzer	Agilent H.P E5062A	MY44101829	November 2012
3b	Network Analyzer	Hewlett Packard 8753D	3410A04850	March 2010
4	2xcables+directional coupler+dummyload			

Client's property

Coupling Factor 2xcables+directional coupler+dummyload	AMPS	UL 836.5 DL 881.5	32.3 dB 32.3 dB	
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**CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS**

EQUIPMENT: TRU8A19AWWV/AC-WS

PROJECT NO.: 131640-4

<i>Identification number</i>	<i>Equipment</i>	<i>Manufacturer</i>	<i>Model</i>	<i>Serial N°</i>	<i>Cal. due</i>
5	Trilog Broadband Antenna	Schwarzbeck	VULB 9163	VULB 9163-286	04/2010
6	Bilog antenna	Schwarzbeck	STLP 9148-123	123	09/2011
7	Broadband preamplifier	Schwarzbeck	BBV 9718	9718-137	05/2011
8	Spectrum Analyzer 9kHz-40GHz	R&S	FSEK	848255/005	09/2010
9	Controller	EMCO	2090	9511-1099	NSC
10	Antenna Tower	EMCO	2071-2	9601-1940	NSC
11	Turning table Controller	EMCO	1061-1.521	9012-1508	NSC
12	Semi-anechoic chamber	Nemko	3m semi-anechoic chamber	70	04/2010
13	Trilog Broadband Antenna	Siemens	3m control room	3	NSC

Property of Nemko Italy

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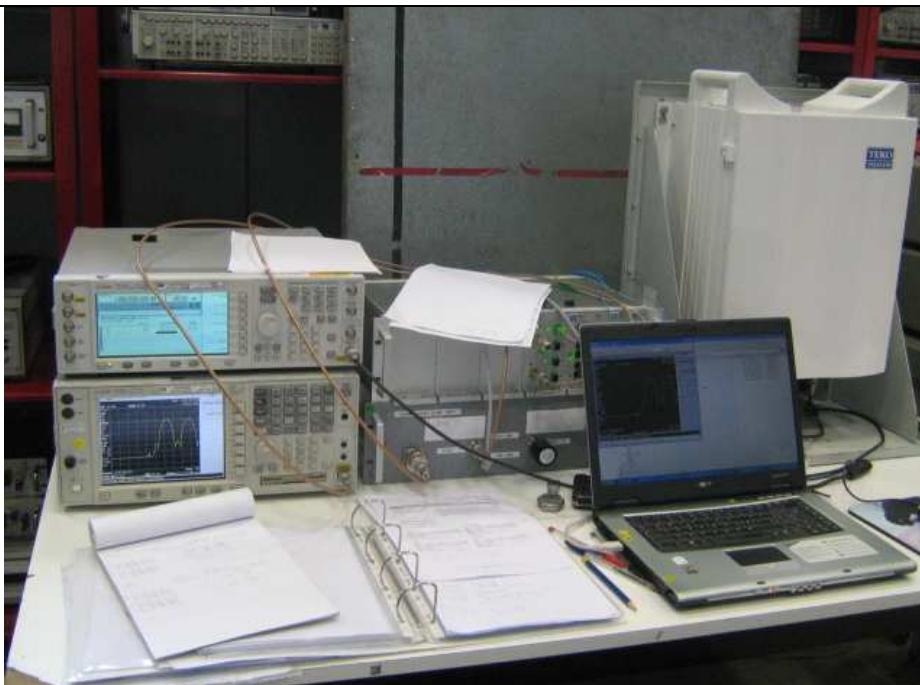
CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

PROJECT NO.: **131640-4**

Section 9. PHOTOS

SETUP

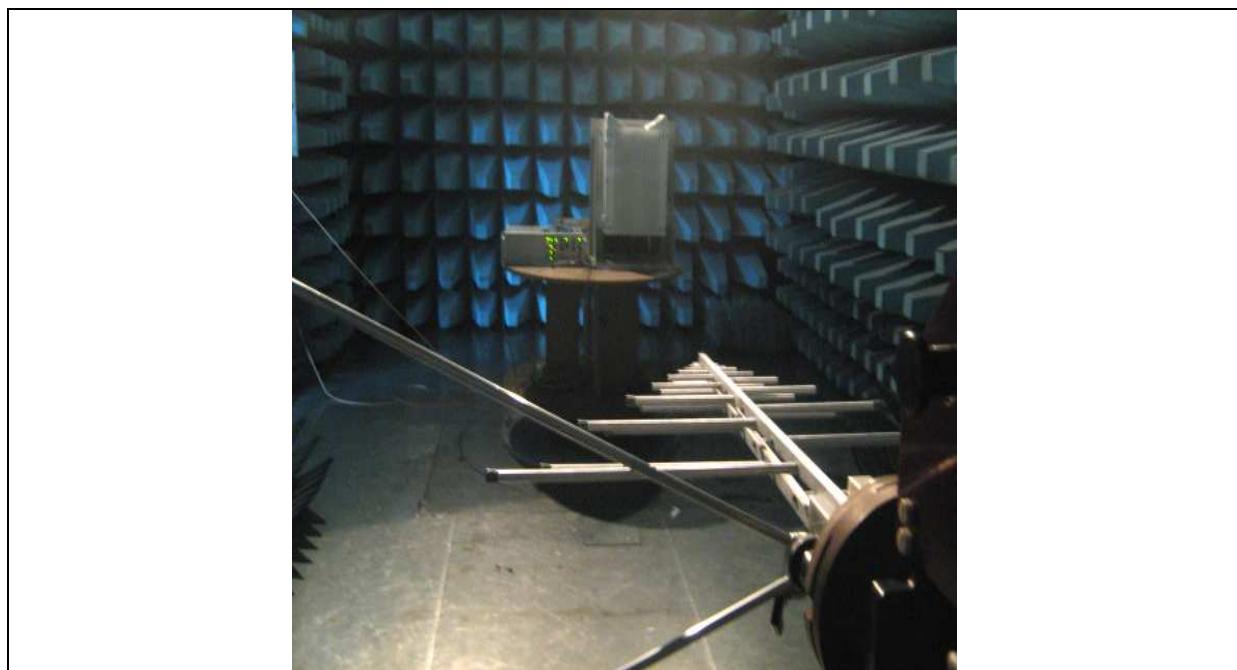


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CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

PROJECT NO.: **131640-4**



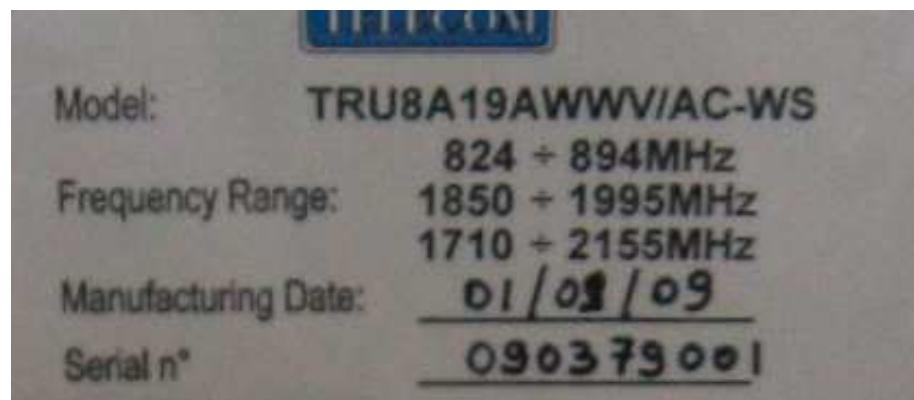
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**CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS**

EQUIPMENT: **TRU8A19AWWV/AC-WS**

PROJECT NO.: **131640-4**

REMOTE



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**CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS**

EQUIPMENT: TRU8A19AWWV/AC-WS

PROJECT NO.: 131640-4

MASTER



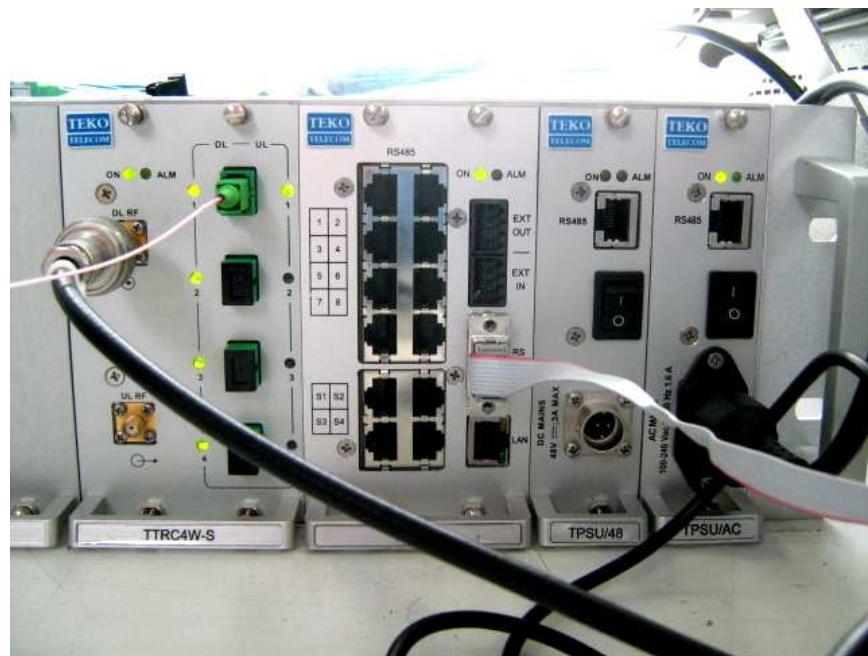
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**CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS**

EQUIPMENT: TRU8A19AWWV/AC-WS

PROJECT NO.:

131640-4



Nemko Italy S.p.A.

CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

PROJECT NO.: **131640-4**

ANNEX A - TEST DETAILS

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**CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS**

EQUIPMENT: TRU8A19AWWV/AC-WS

PROJECT NO.: 131640-4

NAME OF TEST: RF Power Output

PARA. NO.: 2.1046

Minimum Standard: Para. No. 22.913(a). The maximum effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 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:

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 a dipole. 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 erp is the signal level fed to the reference antenna corrected for gain referenced to a dipole.

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**CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS**

EQUIPMENT: **TRU8A19AWWV/AC-WS**

PROJECT NO.: **131640-4**

NAME OF TEST: **Occupied Bandwidth**

PARA. NO.: **2.1049**

Minimum Standard: Not defined (Input/Output)

Method Of Measurement:

CDMA

Spectrum analyzer settings:

RBW=VBW=30 kHz

Span: 5 MHz

Sweep: Auto

GSM / EDGE

RBW=VBW= 3 kHz

Span: 1 MHz

Sweep: Auto

TDMA

RBW=VBW= 1 kHz

Span: 1 MHz

Sweep: Auto

W-CDMA

RBW=VBW= 100 kHz

Span: 10 MHz

Sweep: Auto

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**CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS**

EQUIPMENT: **TRU8A19AWWV/AC-WS**

PROJECT NO.: **131640-4**

NAME OF TEST: Spurious Emission at Antenna Terminals	PARA. NO.: 2.1051
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Minimum Standard: Para. No. 22.917(e). The mean power of emissions must be attenuated below the mean power of the unmodulated carrier on any frequency twice or more than twice the fundamental emission by at least $43 + 10 \log P$. This is equivalent to -13 dBm absolute power.

Method Of Measurement:

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 / EDGE

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

TDMA

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

W-CDMA

RBW: 1 MHz (> 1 MHz from Band Edge)
RBW: 100 kHz (< 1MHz from Band Edge)
VBW: \geq RBW
Sweep: Auto
Video Avg: 6 Sweeps

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**CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS**

EQUIPMENT: TRU8A19AWWV/AC-WS

PROJECT NO.: 131640-4

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

Minimum Standard:

Para. No. 22.917(e). The mean power of emissions must be attenuated below the mean power of the unmodulated carrier on any frequency twice or more than twice the fundamental emission by at least $43 + 10 \log P$. This is equivalent to -13 dBm absolute power.

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 a dipole. 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 erp is the signal level fed to the reference antenna corrected for gain referenced to a dipole.

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**CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS**

EQUIPMENT: **TRU8A19AWWV/AC-WS**

PROJECT NO.: **131640-4**

NAME OF TEST: Frequency Stability

PARA. NO.: 2.1055

Minimum Standard:

Para. No. 22.355. The transmitter carrier frequency shall remain within the tolerances given in Table C-1.

Table C-1

Freq. Range (MHz)	Base, fixed	Mobile > 3 W	Mobile ≤ 3 W
821 to 896	1.5	2.5	2.5

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.

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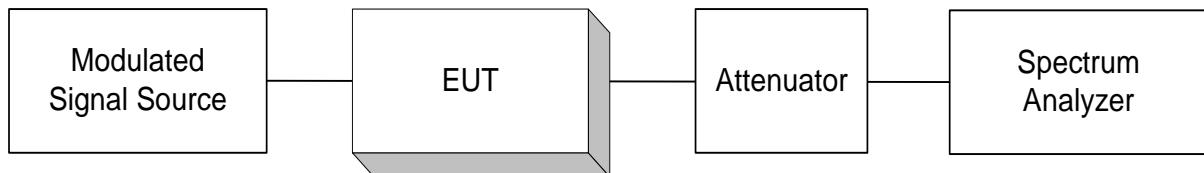
CFR 47, PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: **TRU8A19AWWV/AC-WS**

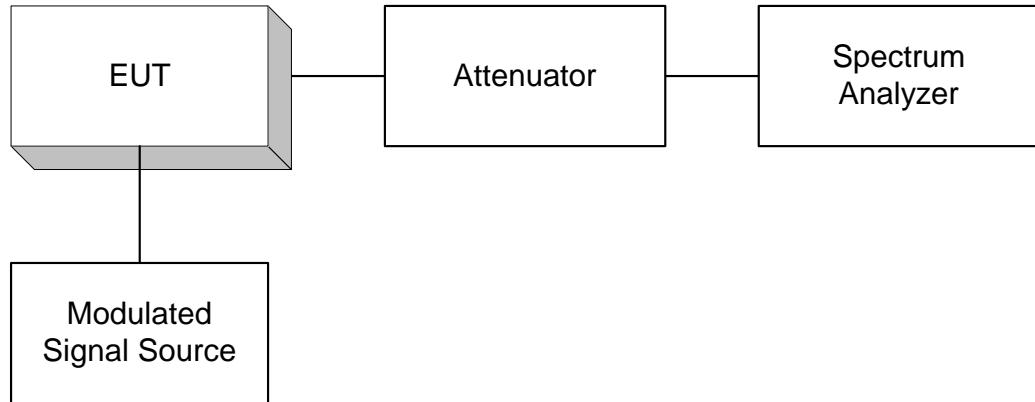
PROJECT NO.: **131640-4**

ANNEX B - TEST DIAGRAMS

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



Para. No. 2.989 - Occupied Bandwidth



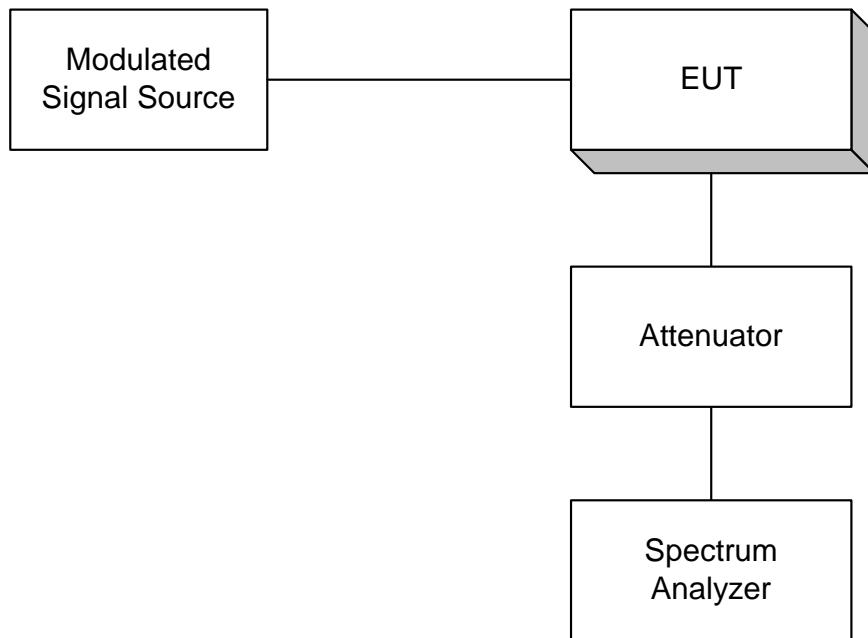
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CELLULAR BAND REPEATERS

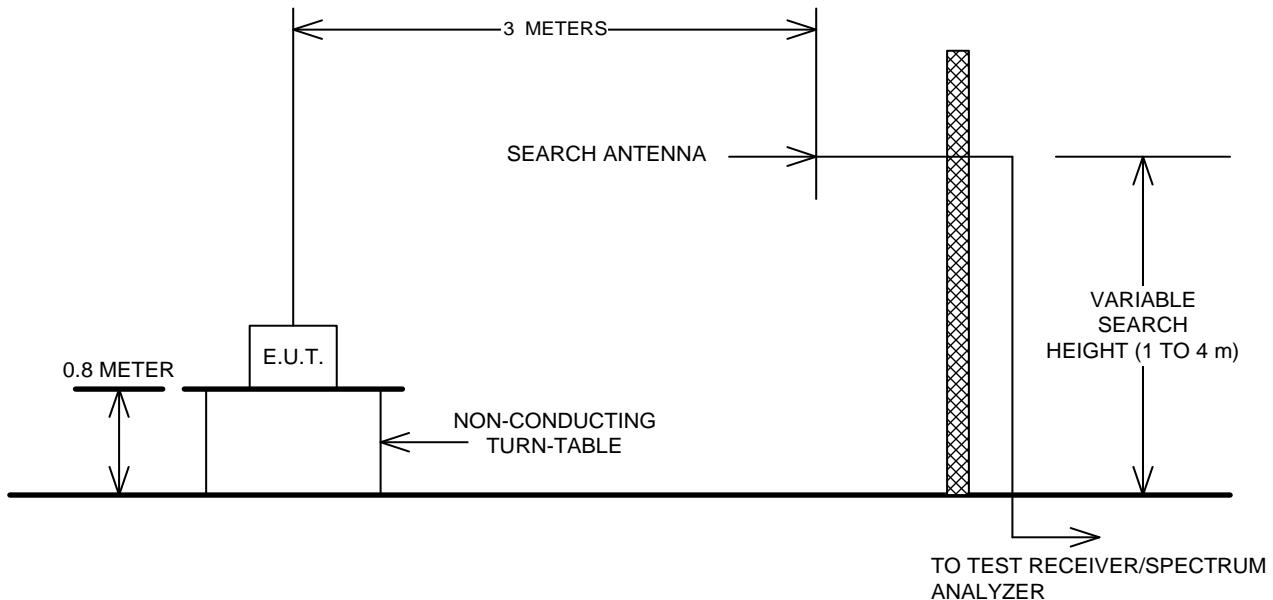
EQUIPMENT: **TRU8A19AWWV/AC-WS**

PROJECT NO.: **131640-4**

Para. No. 2.991 Spurious Emissions at Antenna Terminals



Para. No. 2.993 - Field Strength of Spurious Radiation



Para. No. 2.995 - Frequency Stability

