Nemko Test Report:	6L0172RUS2
Applicant:	Andrew Corporation 108 Rand Park Drive Garner, NC 27529
Equipment Under Test: (E.U.T.)	TFAM80/92/19E
In Accordance With:	**FCC Part 90, Subpart I** Private Land Mobile Repeater
Tested By:	Nemko USA Inc. 802 N. Kealy Lewisville, TX 75057-3136
Authorized By:	 Abe Cox, Key Account Manager
Date:	July 7, 2006

Table of Contents

Section 1. Summary of Test Results

Manufacturer: Andrew Corporation

Model No.: TFAM80/92/19E

Serial No.: 062200923

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, 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".

Summary Of Test Data

NAME OF TEST	PARA. NO.	RESULT
RF Power Output	90.205	Complies
Audio Frequency Response	TIA EIA-603.3.2.6	N/A
Audio Low-Pass Filter Response	TIA EIA-603.3.2.6	N/A
Modulation Limiting	TIA EIA-603.3.2.6	N/A
Occupied Bandwidth	90.210	Complies
Spurious Emissions at Antenna Terminals	90.210	Complies
Field Strength of Spurious Emissions	90.210	Complies
Frequency Stability	90.213	N/A
Transient Frequency Behavior	90.214	N/A

Footnotes For N/A's:

(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.

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Section 2. General Equipment Specification

Transmitter

Supply Voltage Input: 120 Vac

Frequency Range: 851 to 869 MHz
935 to 940 MHz

Type(s) of Modulation:

F3E (Analog)	F1D (Analog)	GXW (iDEN
☒	☒	☒

Analog 30K0F3E and 30K0F1D
iDEN 30K0GXW

Gain: +13 dB

Output Impedance: 50 ohms

RF Power Output (rated):

	Output power per carrier @ each antenna port (dBm)			
Number of Carriers	1	2	4	8
CW800 and 900	16	13	.10	.7
iDEN800	13	10	.7	.4
Analog800	16	.13	.10	.7
iDEN900	13	.10	.7	.4
Analog900	16	.13	10	.7

Operator Selection of Operating Frequency: None

Power Output Adjustment Capability: None

Frequency Translation:

F1-F1	F1-F2	N/A
☐	☐	☒

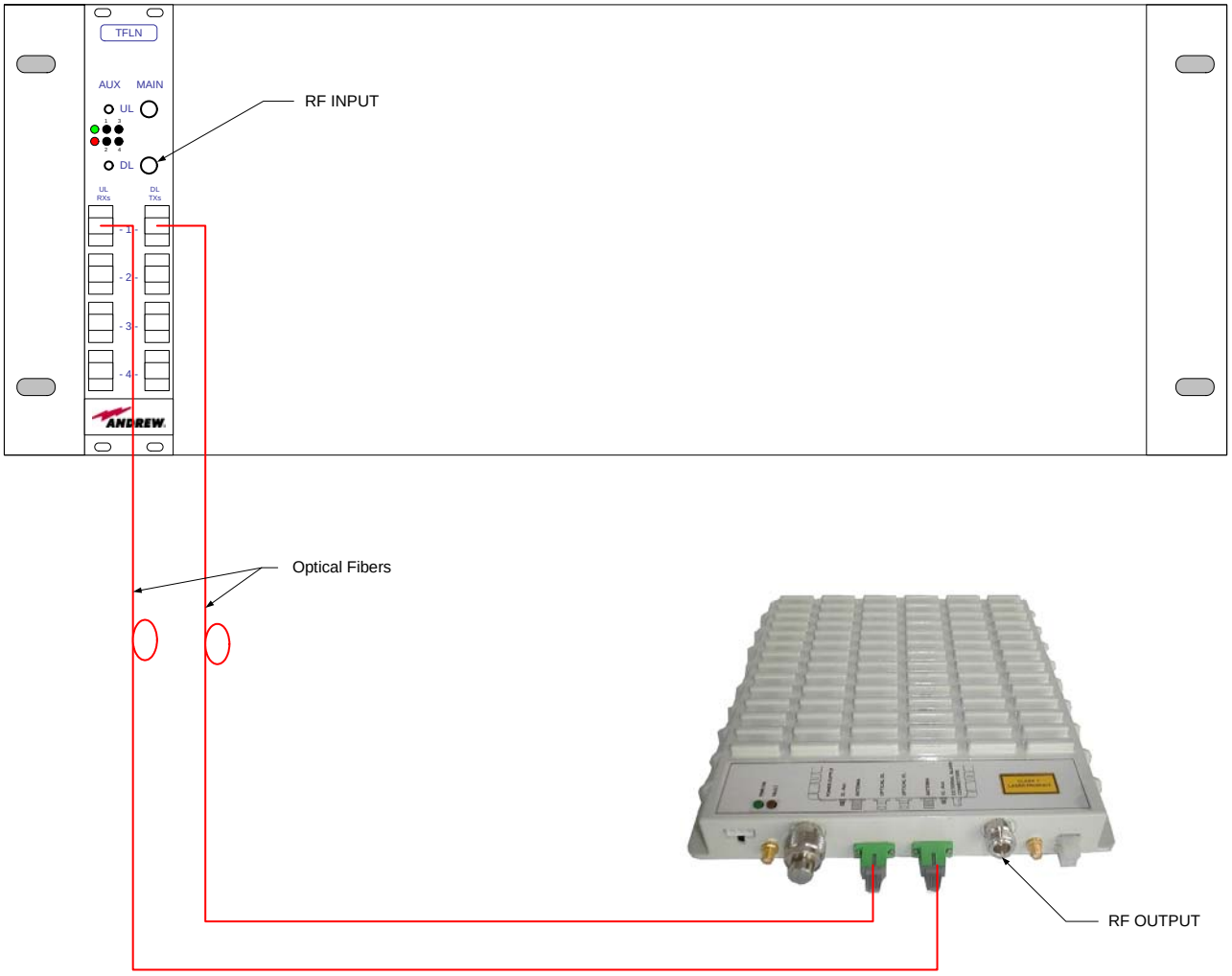
Band Selection:

Software	Duplexer Change	Fullband Coverage
☐	☐	☐

Description of Operation

The TFAM80/92/19E is a triple band remote unit designed to distribute LMR800, LMR900 and PCS1900 extended band signals along the same fiber.

System Diagram



Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 2.985
TESTED BY: David Light	DATE: 28 June 2006

Test Results: Complies.

Measurement Data:

Frequency (MHz)	Modulation	Measured Power (dBm)
851.0125	Analog	16.11
860.0	Analog	16.1
868.987.5	Analog	16.13
851.03	iDEN	13.21
860.0	iDEN	13.07
868.97	iDEN	13.05
935.0125	Analog	16.03
937.5	Analog	16.31
939.9875	Analog	16.21
935.03	iDEN	13.14
937.0	iDEN	13.2
939.97	iDEN	13.04

Section 4. Occupied Bandwidth

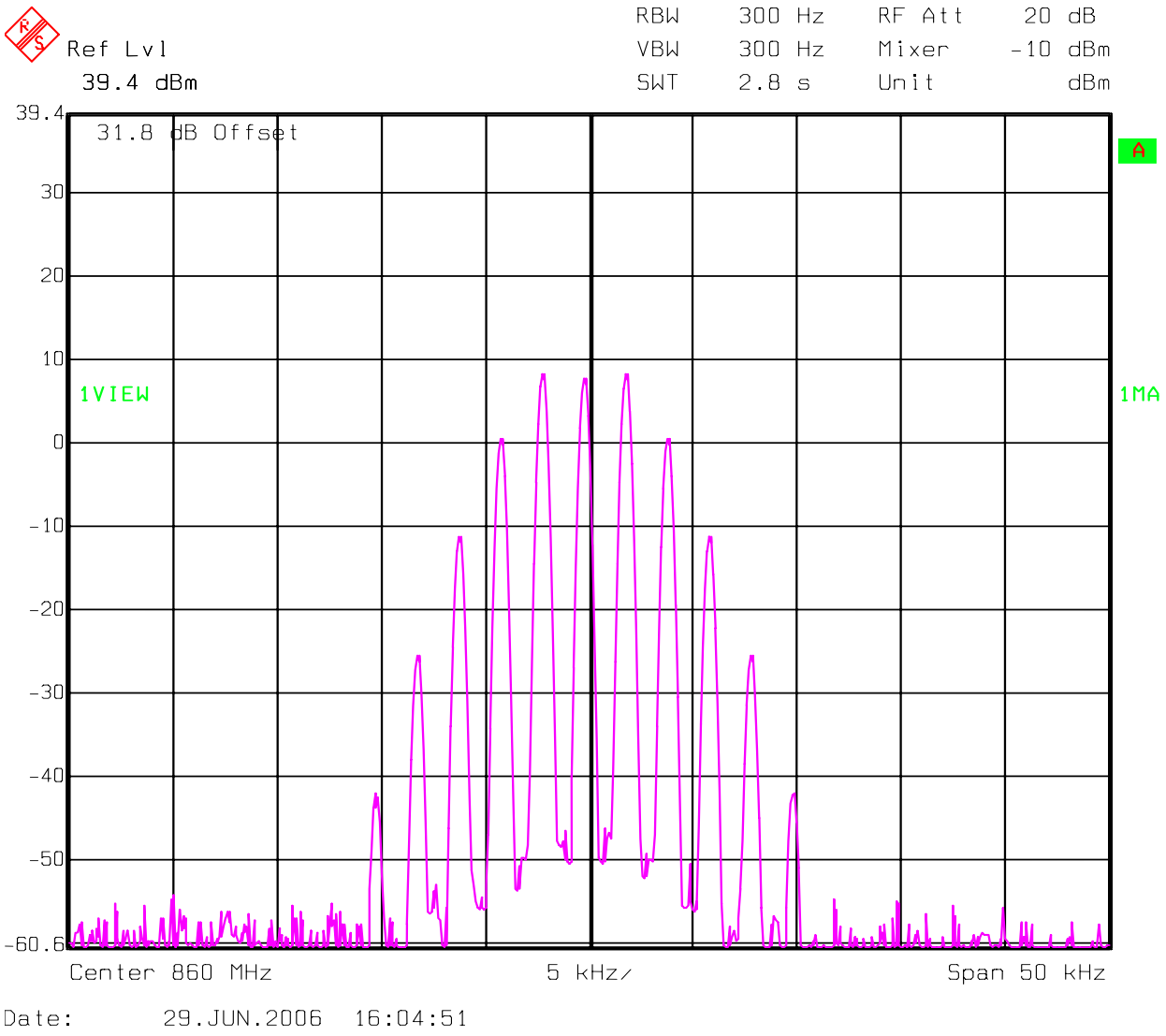
NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.989
TESTED BY: David Light	DATE: 29 June 2006

Test Results: Complies.

Test Data: See attached graph(s).

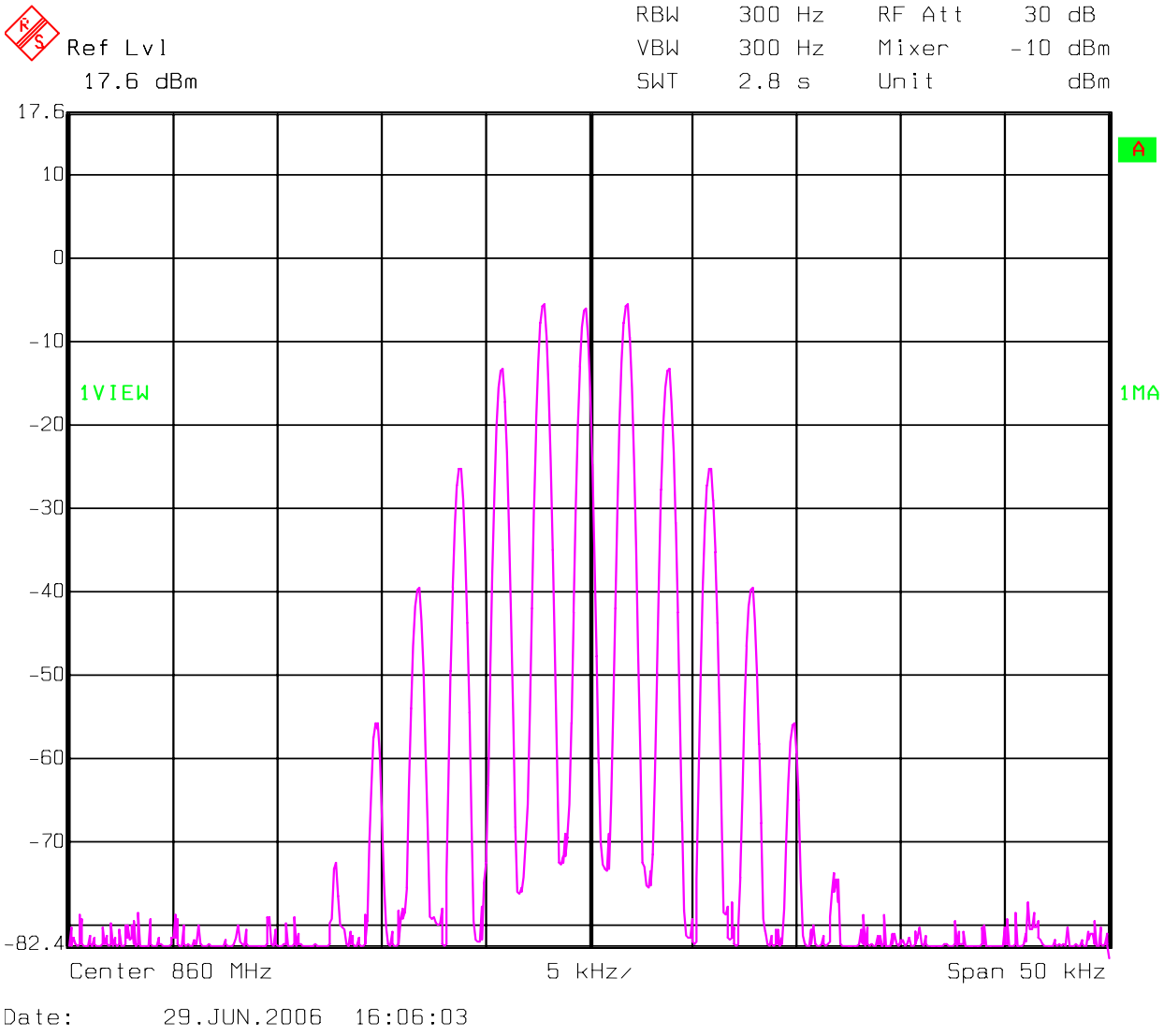
Test Data Occupied Bandwidth

Analog Output
2 kHz tone/ 3 kHz Deviation
800 Band



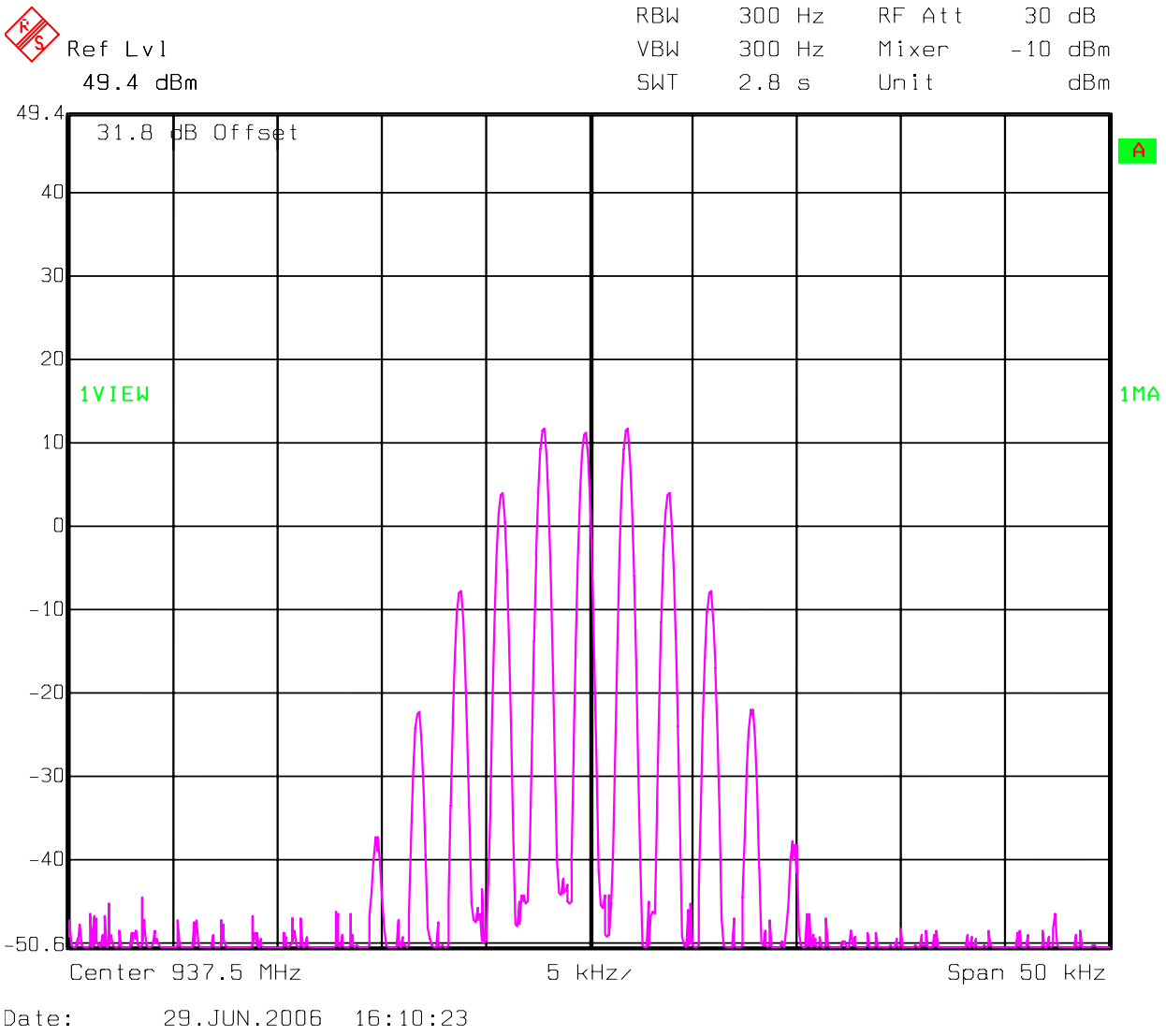
Test Data Occupied Bandwidth

Analog Input
800 Band



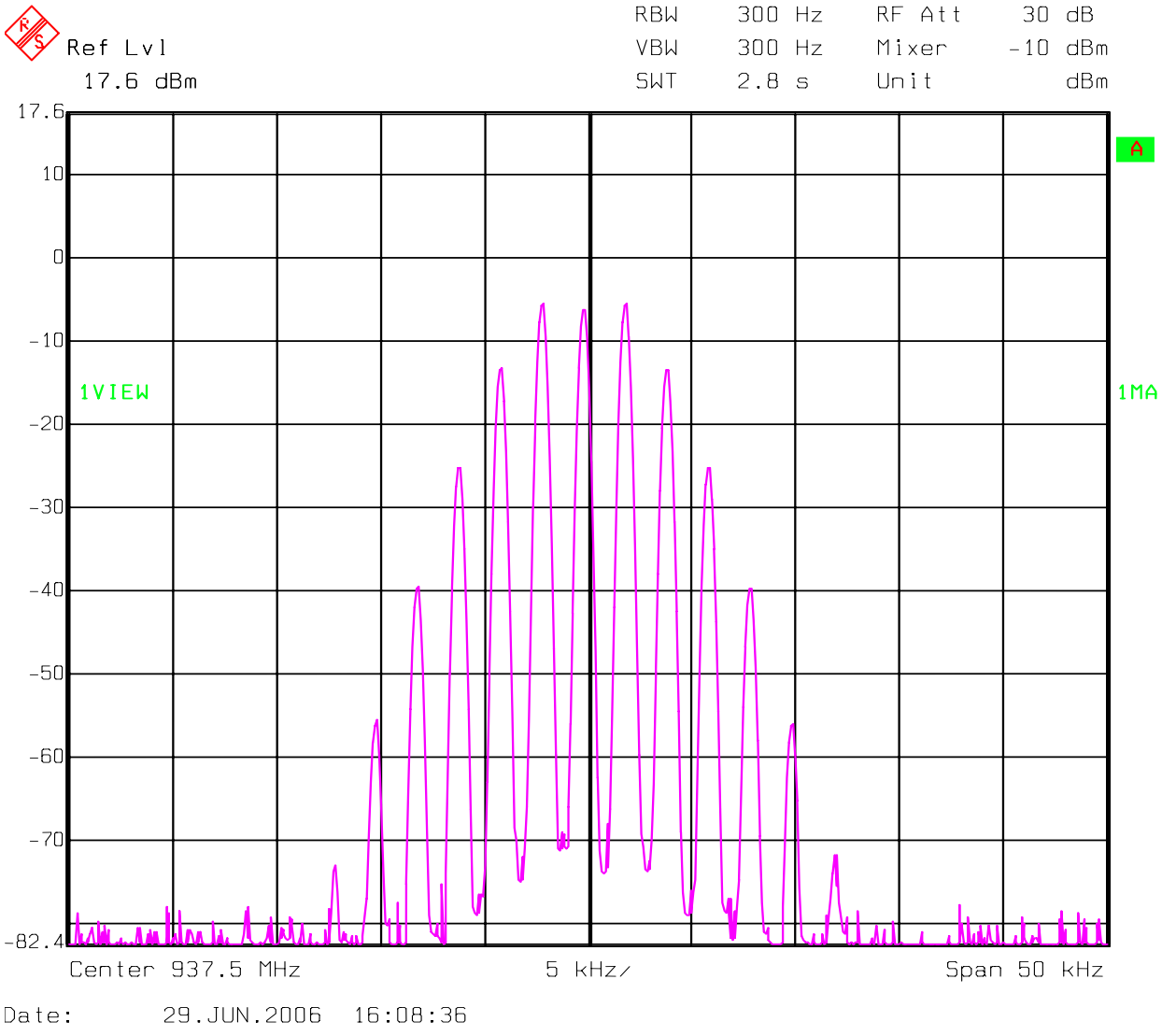
Test Data Occupied Bandwidth

Analog Output
2 kHz Tone / 3 kHz Deviation
900 Band



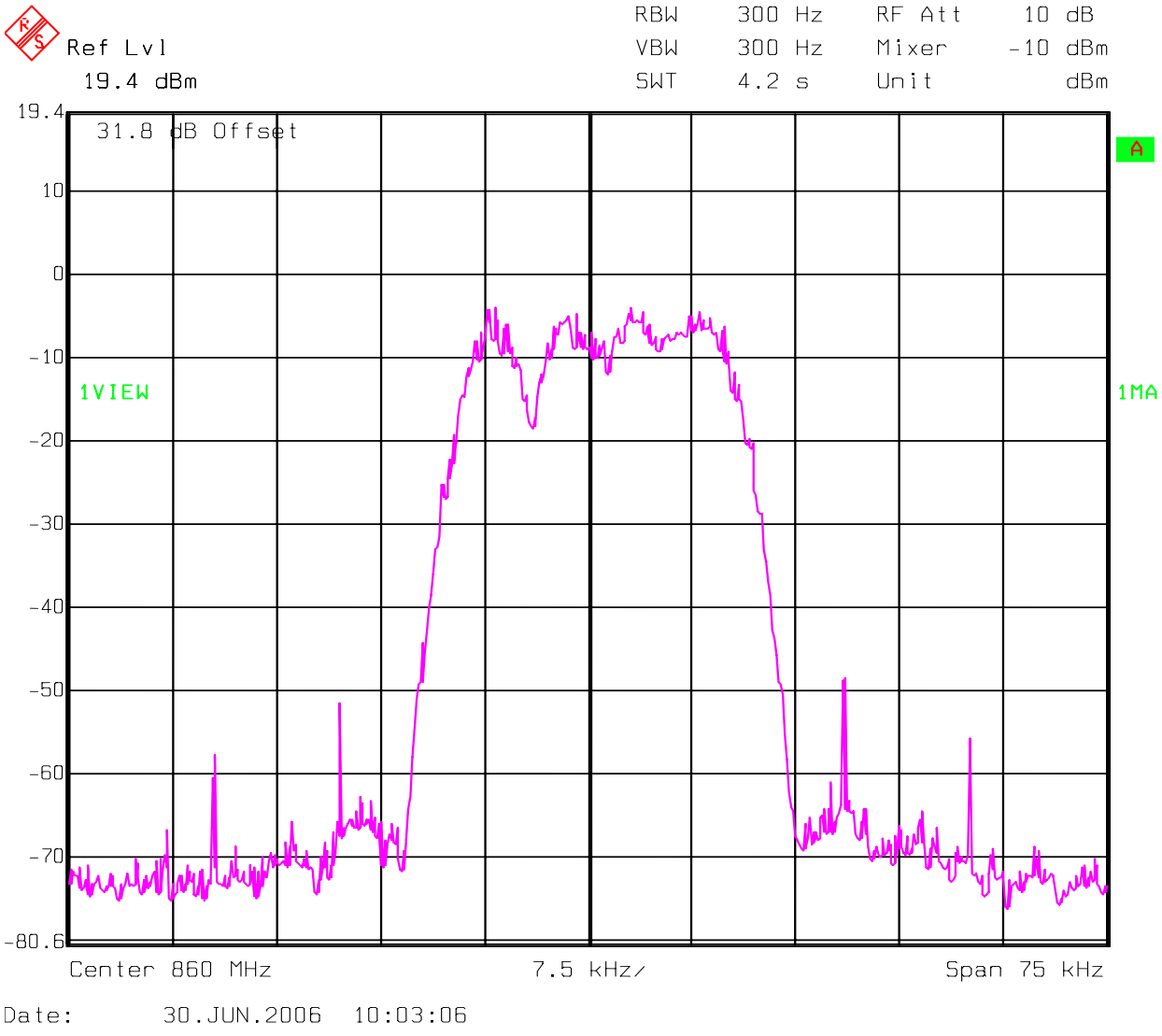
Test Data Occupied Bandwidth

Analog Input
900 Band



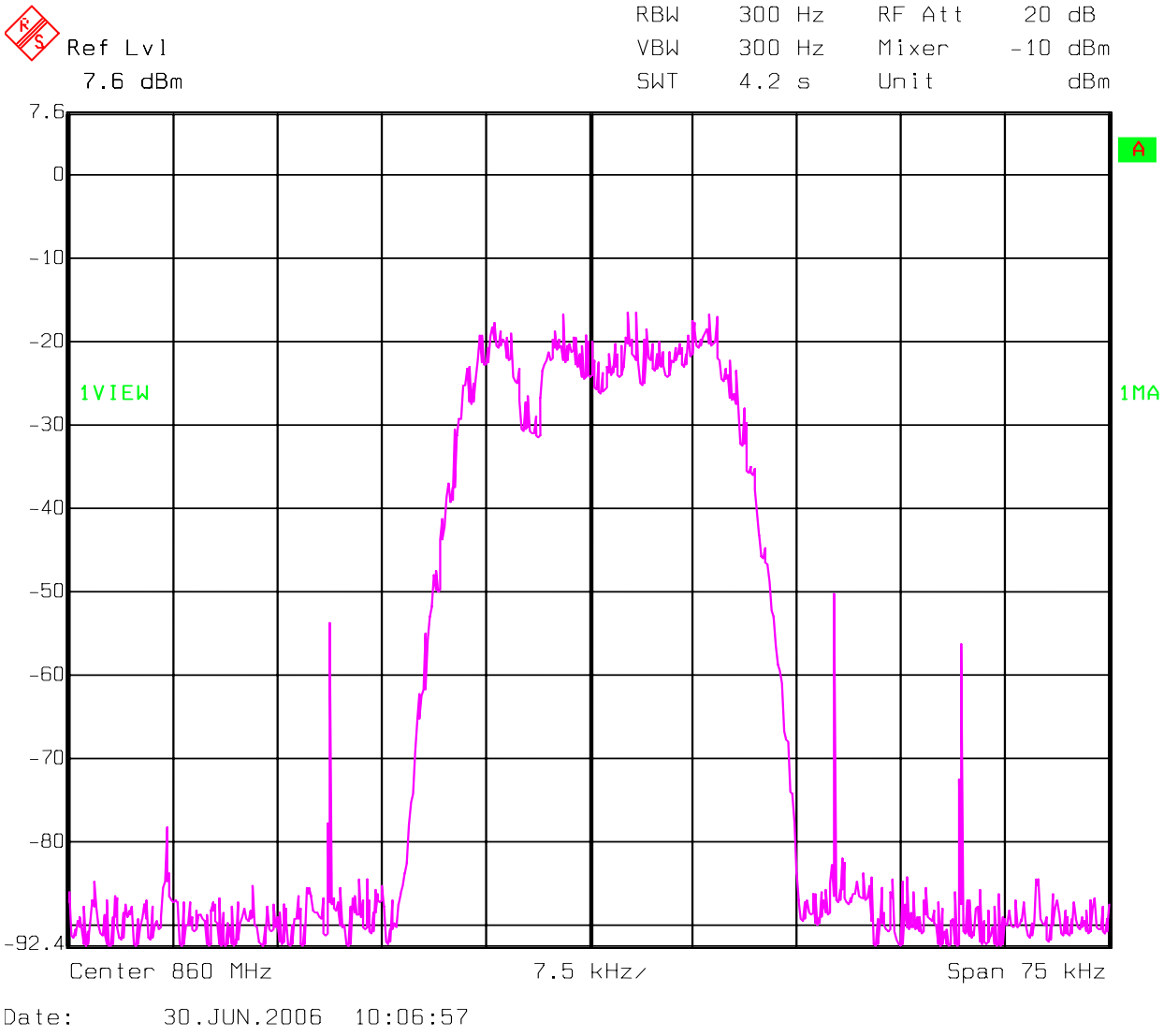
Test Data Occupied Bandwidth

IDEN Output
800 Band



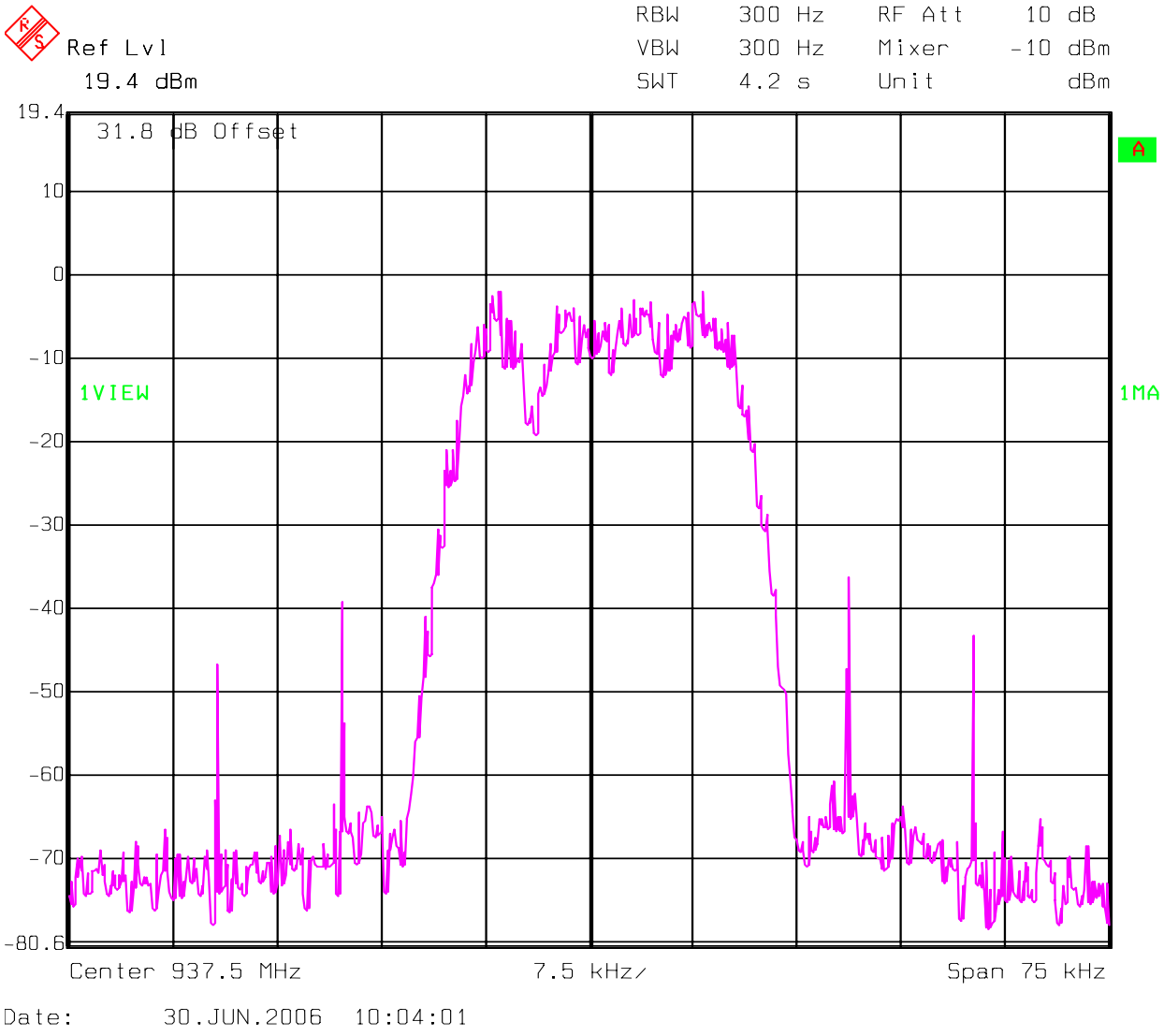
Test Data Occupied Bandwidth

iDEN Input
800 Band



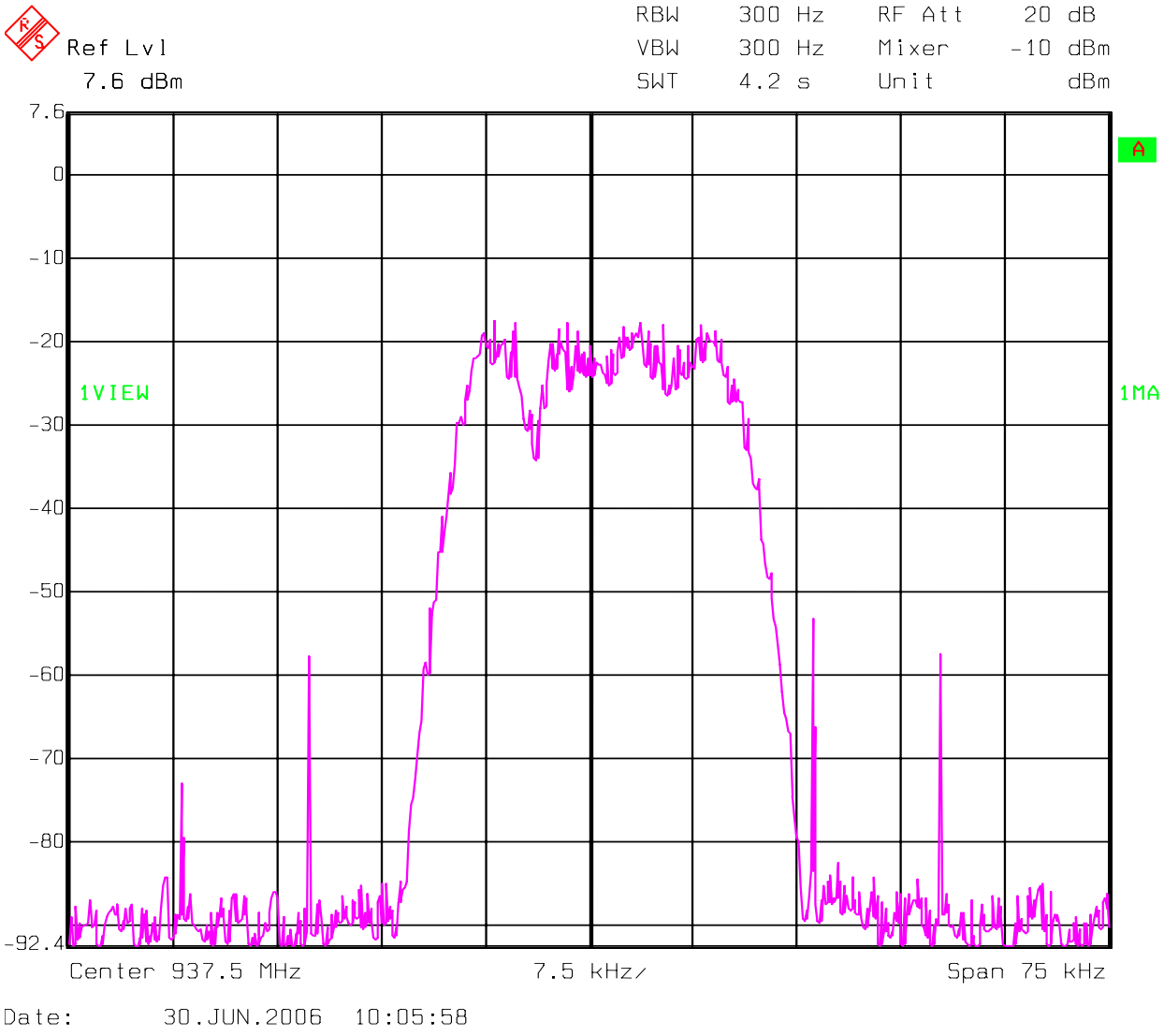
Test Data Occupied Bandwidth

IDEN Output
900 Band



Test Data Occupied Bandwidth

IDEN Input
900 Band



Section 5. Spurious Emissions at Antenna Terminals

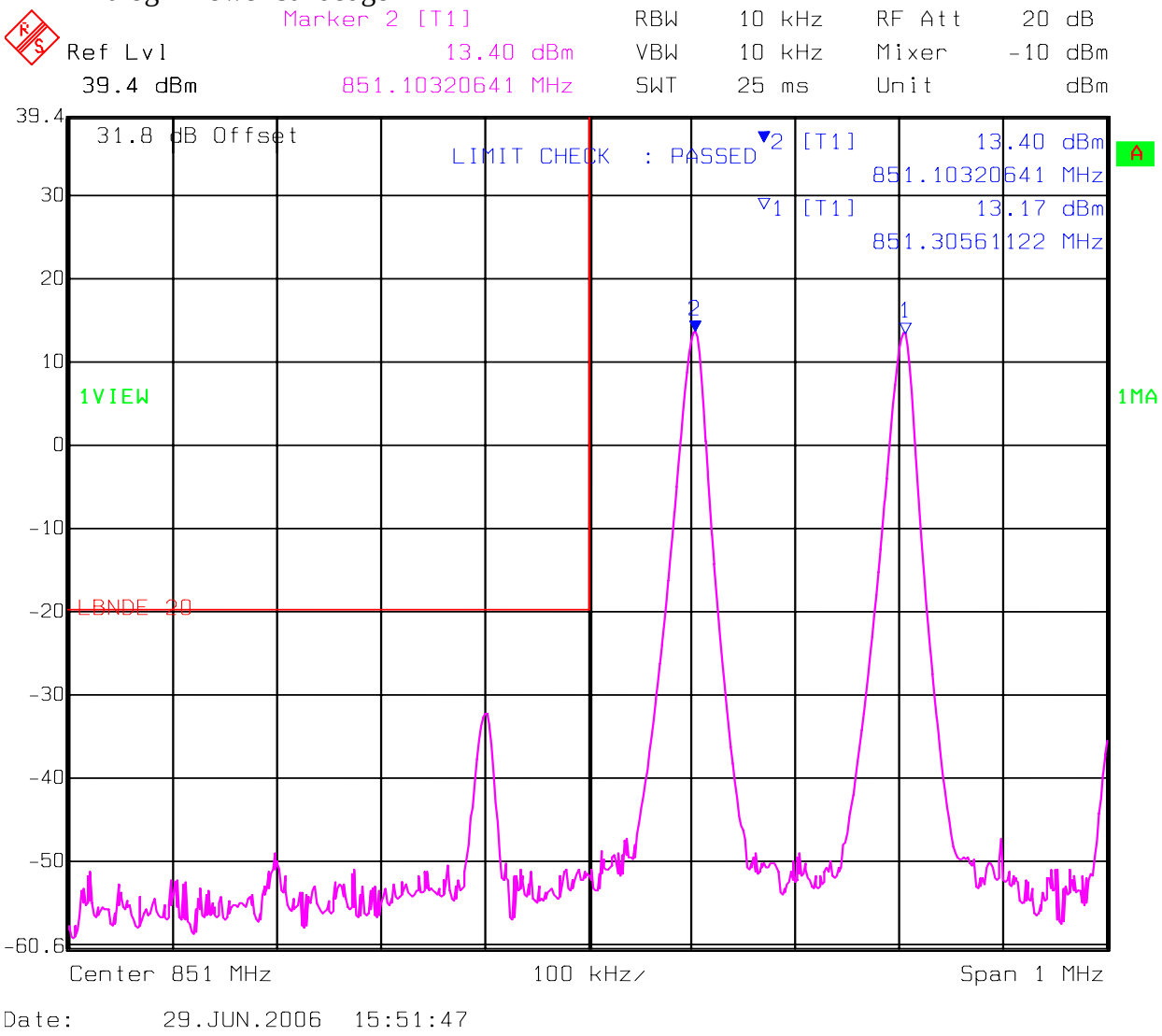
NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.991
TESTED BY: David Light	DATE: 30 June 2006

Test Results: Complies.

Test Data: See attached graph(s).

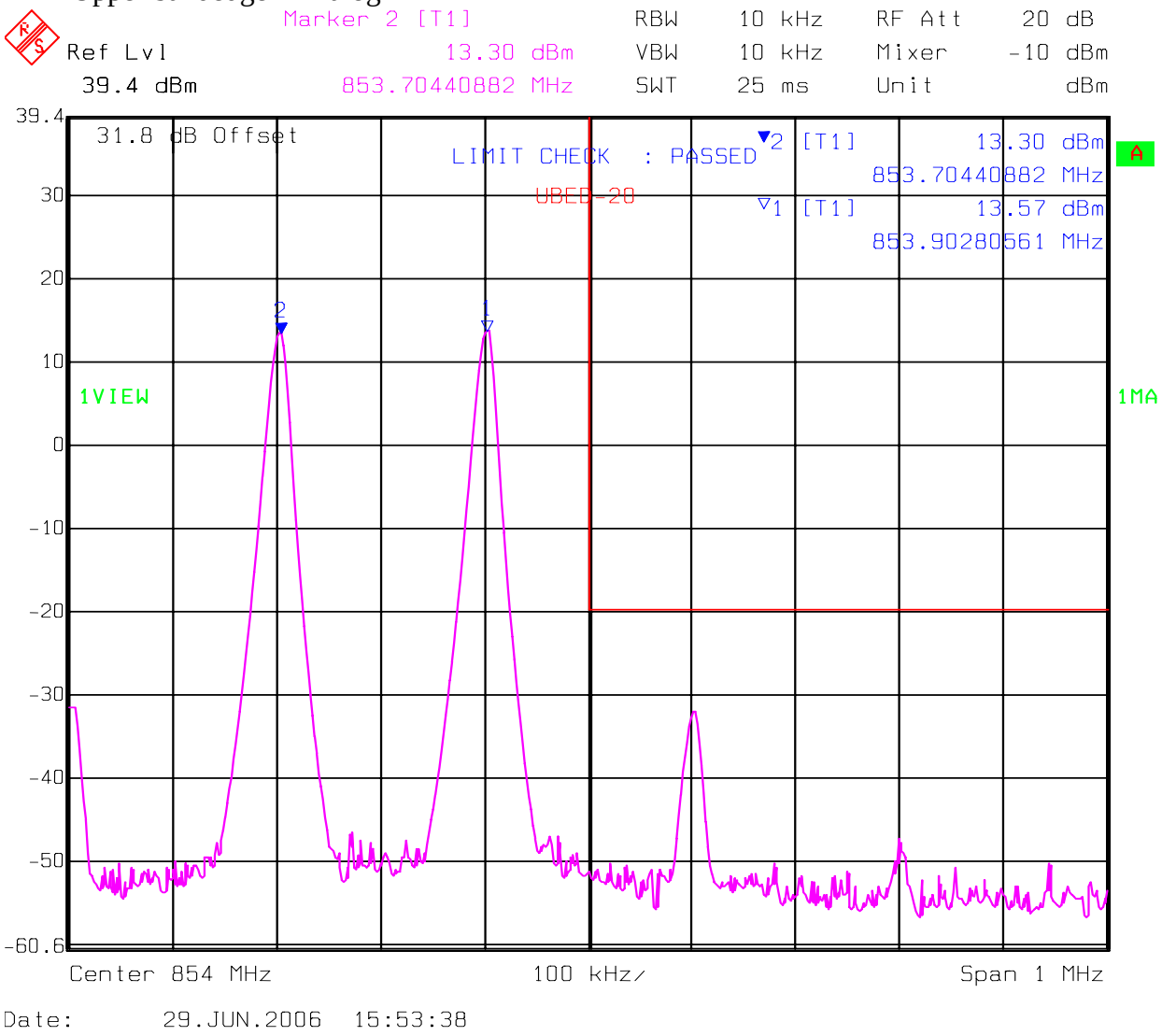
Test Data – Spurious Emissions

IM – Analog – Lower bandedge



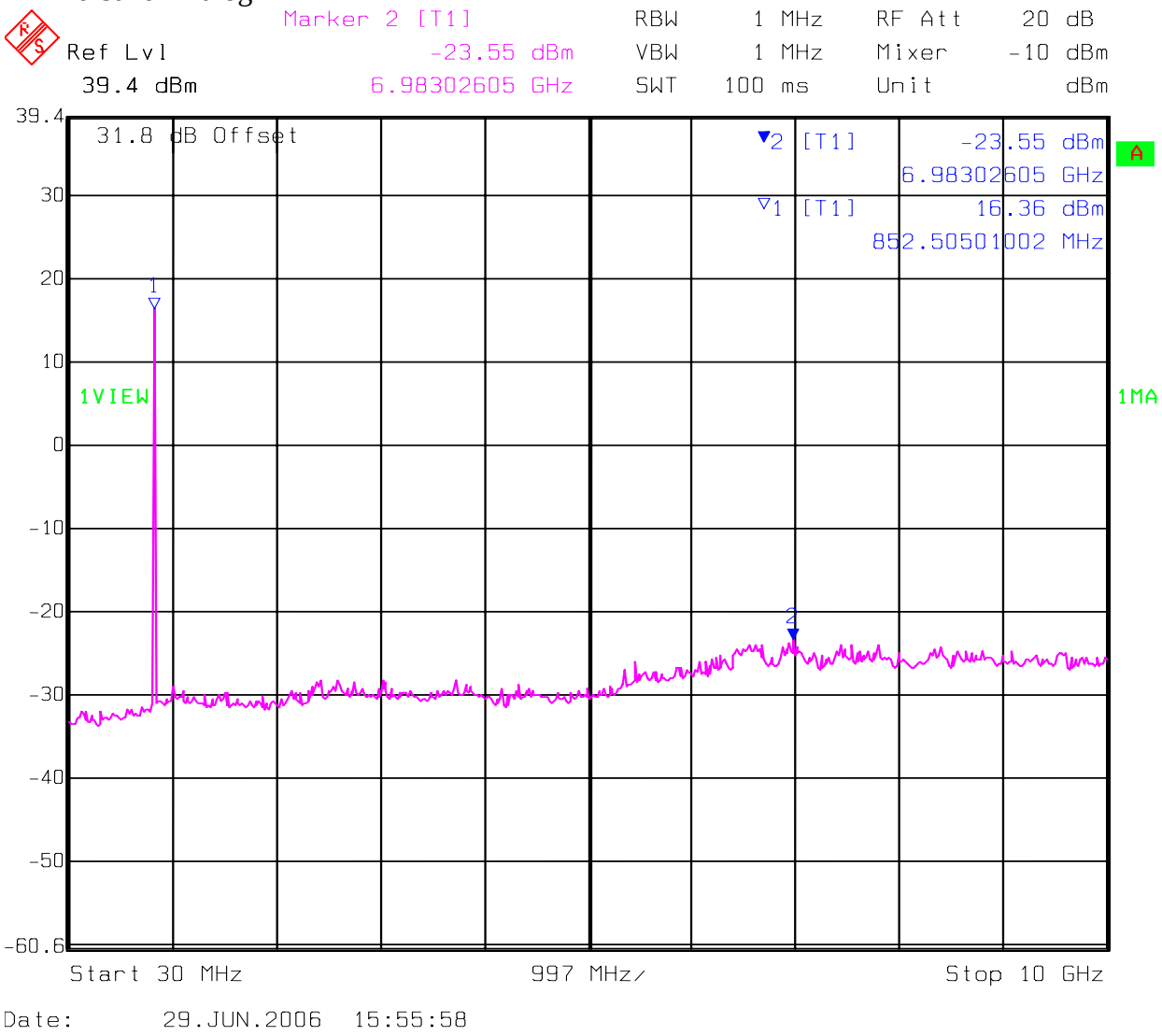
Test Data – Spurious Emissions

IM – Upper bandedge - Analog



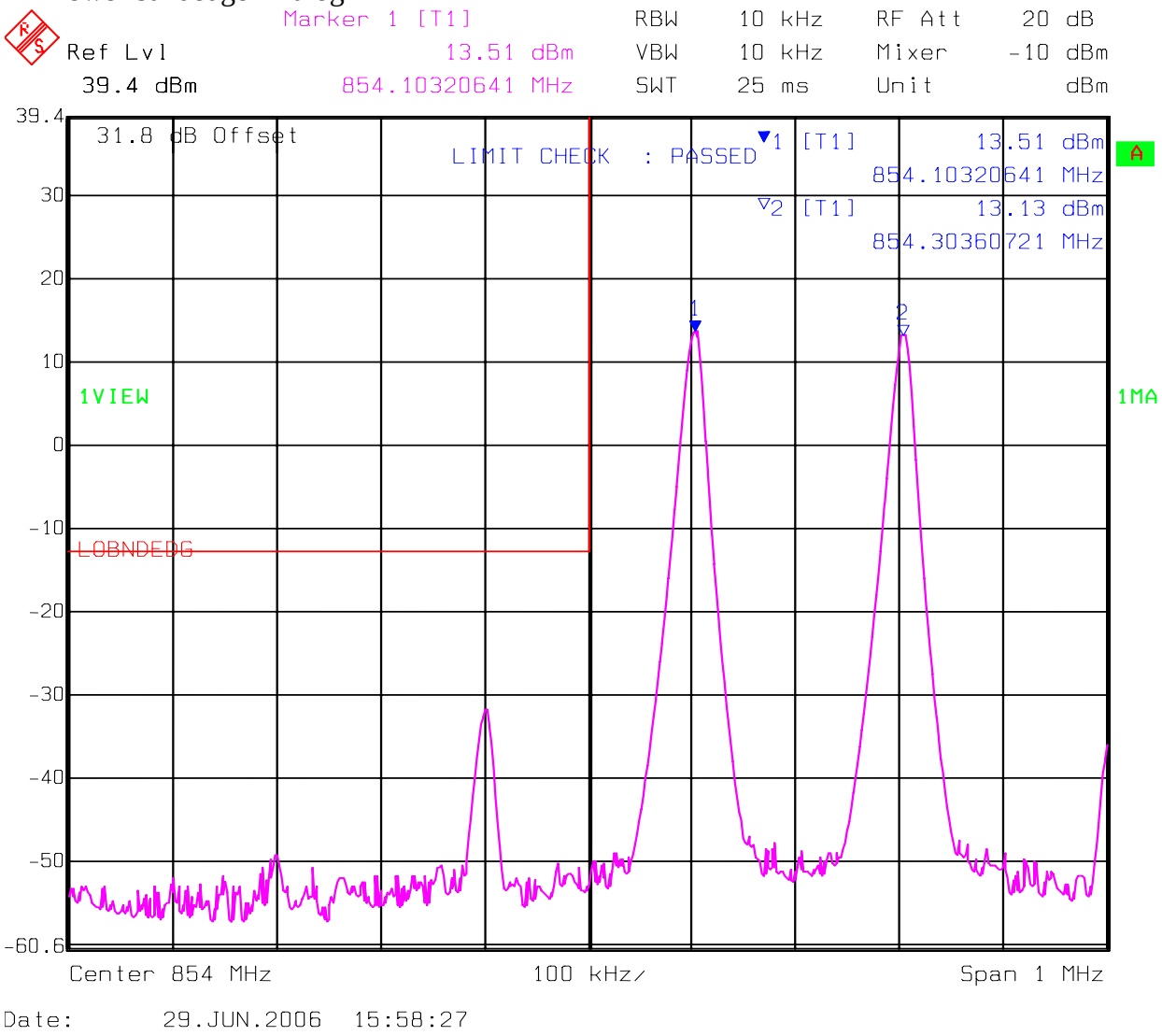
Test Data – Spurious Emissions

Tx mid band Analog



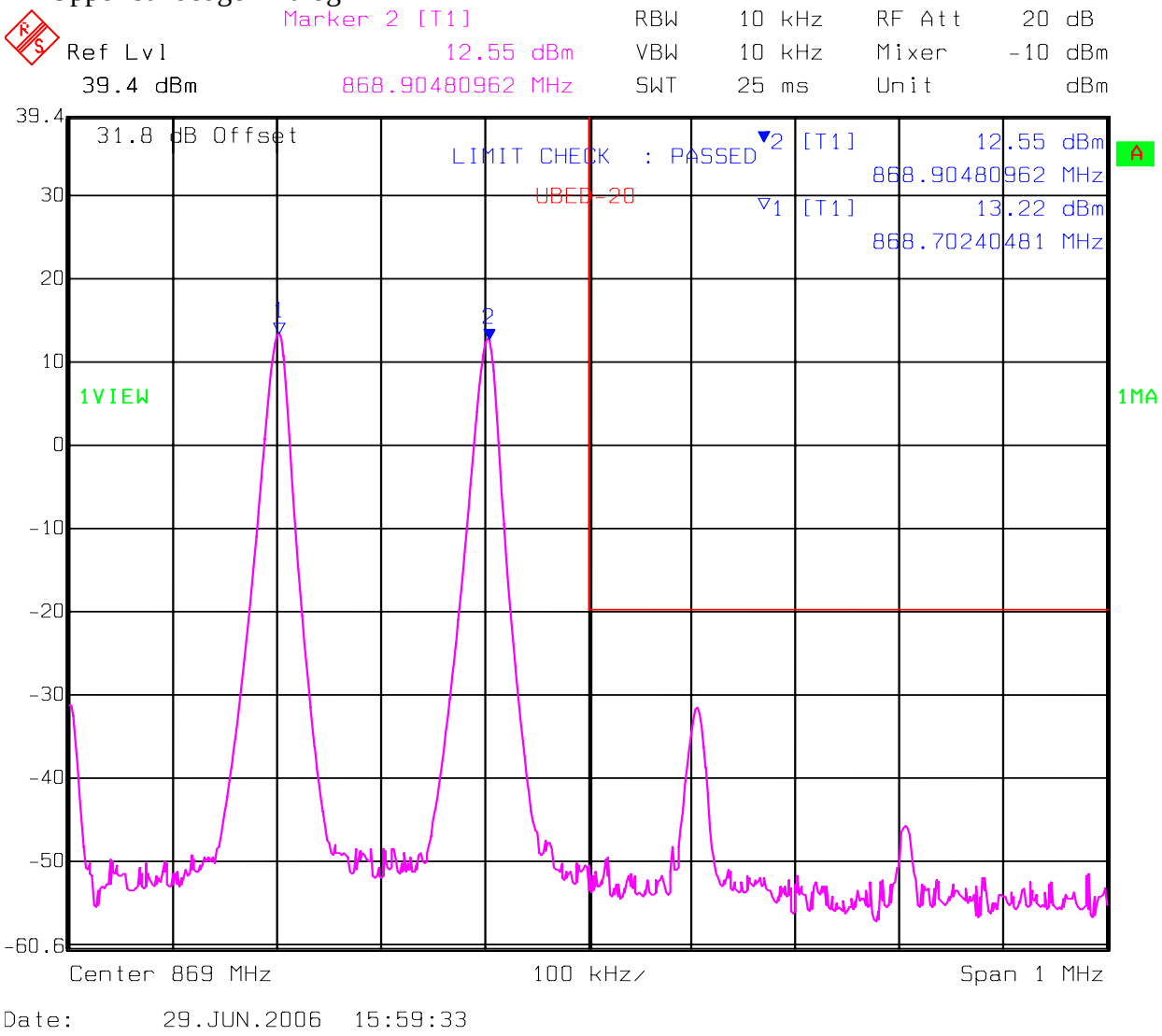
Test Data – Spurious Emissions

IM Lower bandedge Analog



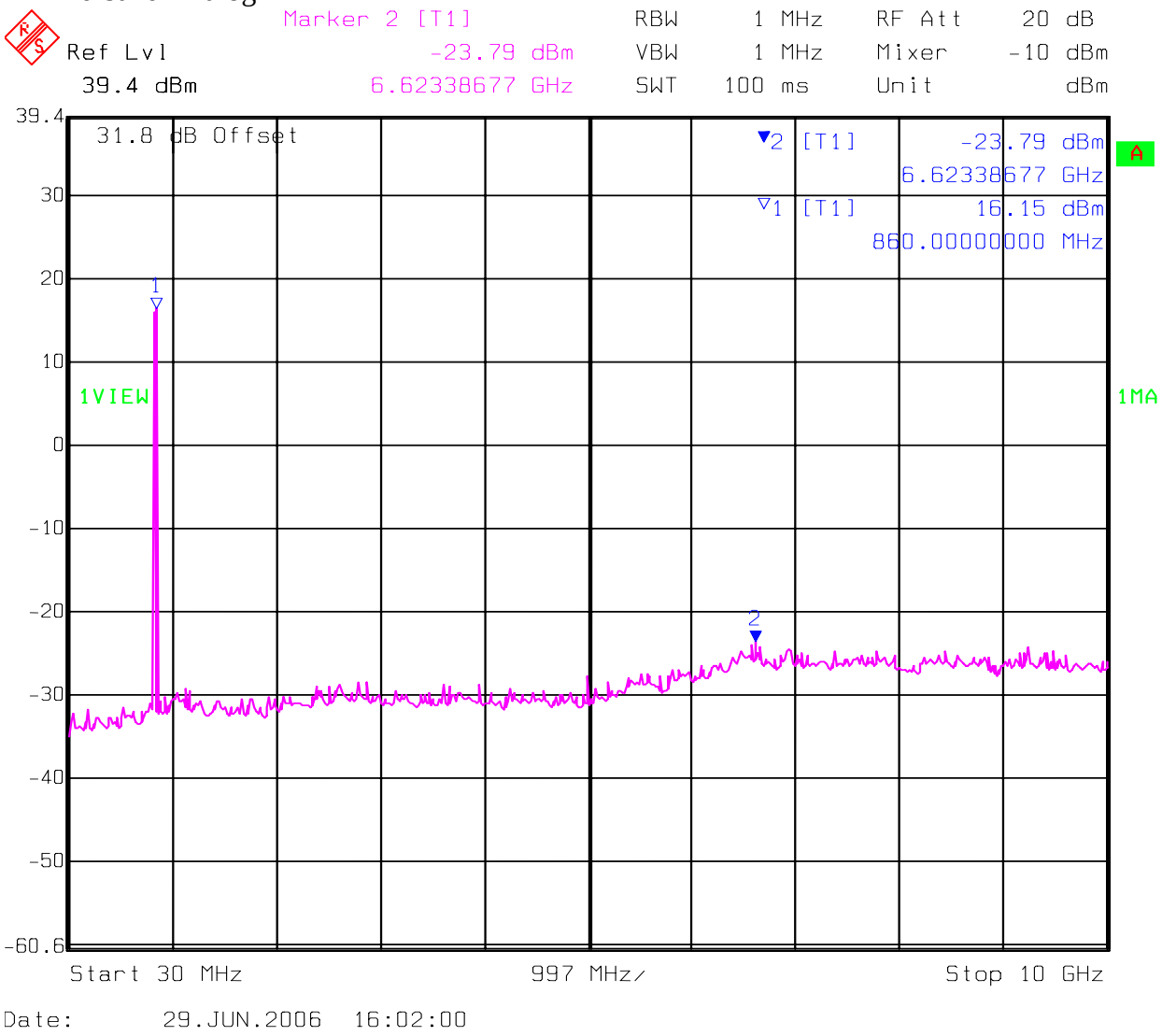
Test Data – Spurious Emissions

IM Upper bandedge Analog



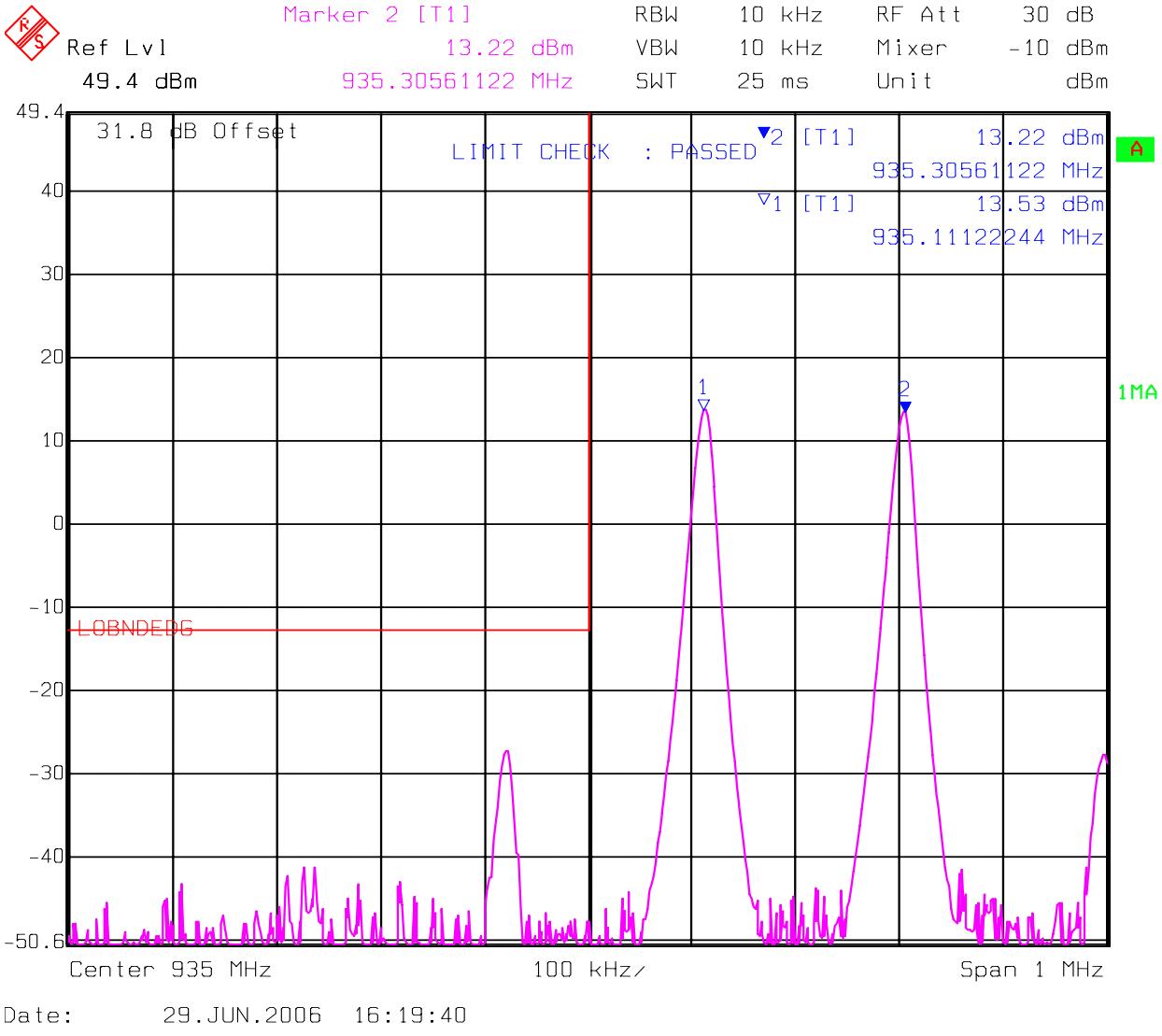
Test Data – Spurious Emissions

Tx Mid band Analog



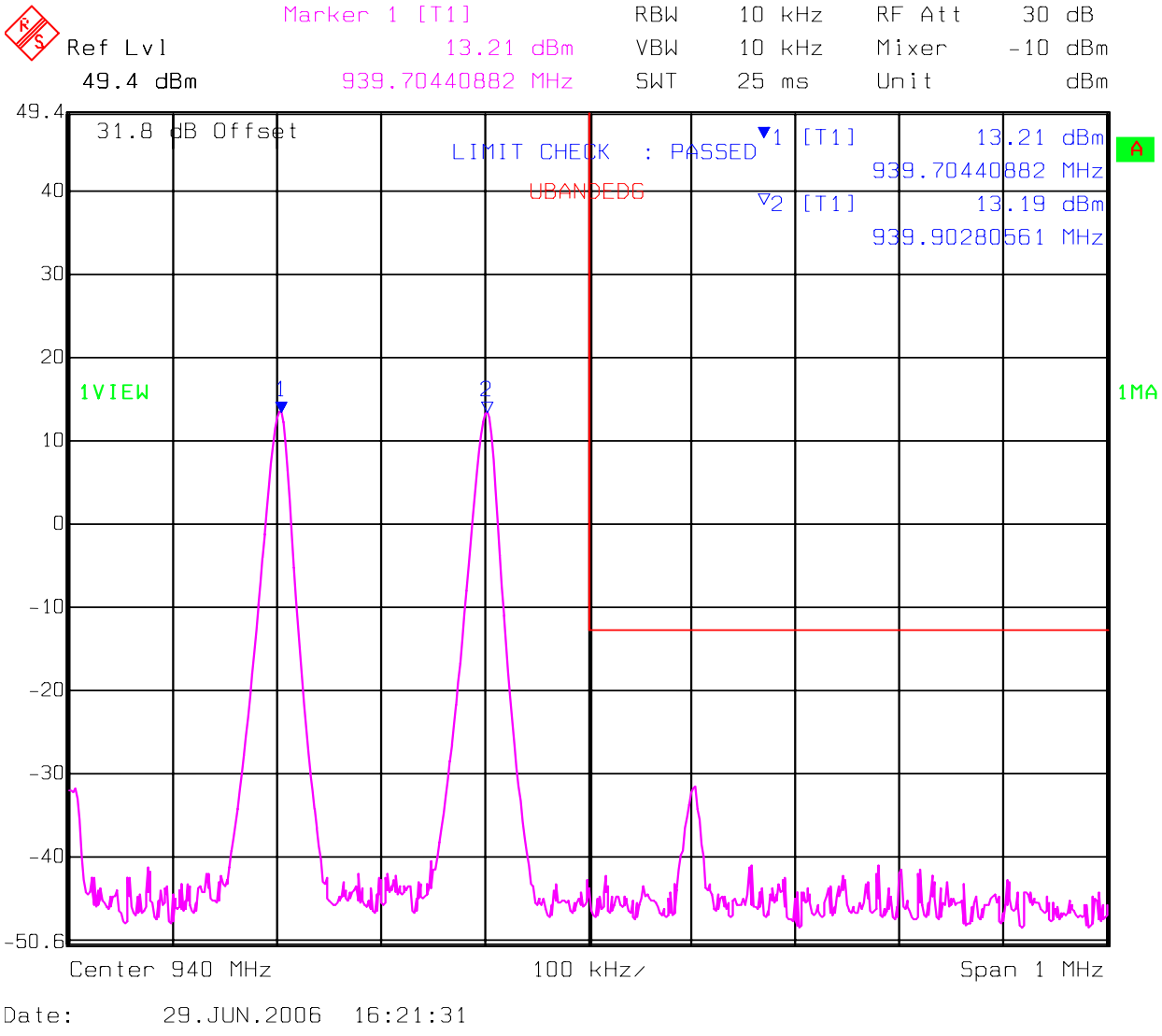
Test Data – Spurious Emissions

IM Lower bandedge Analog
900 Band



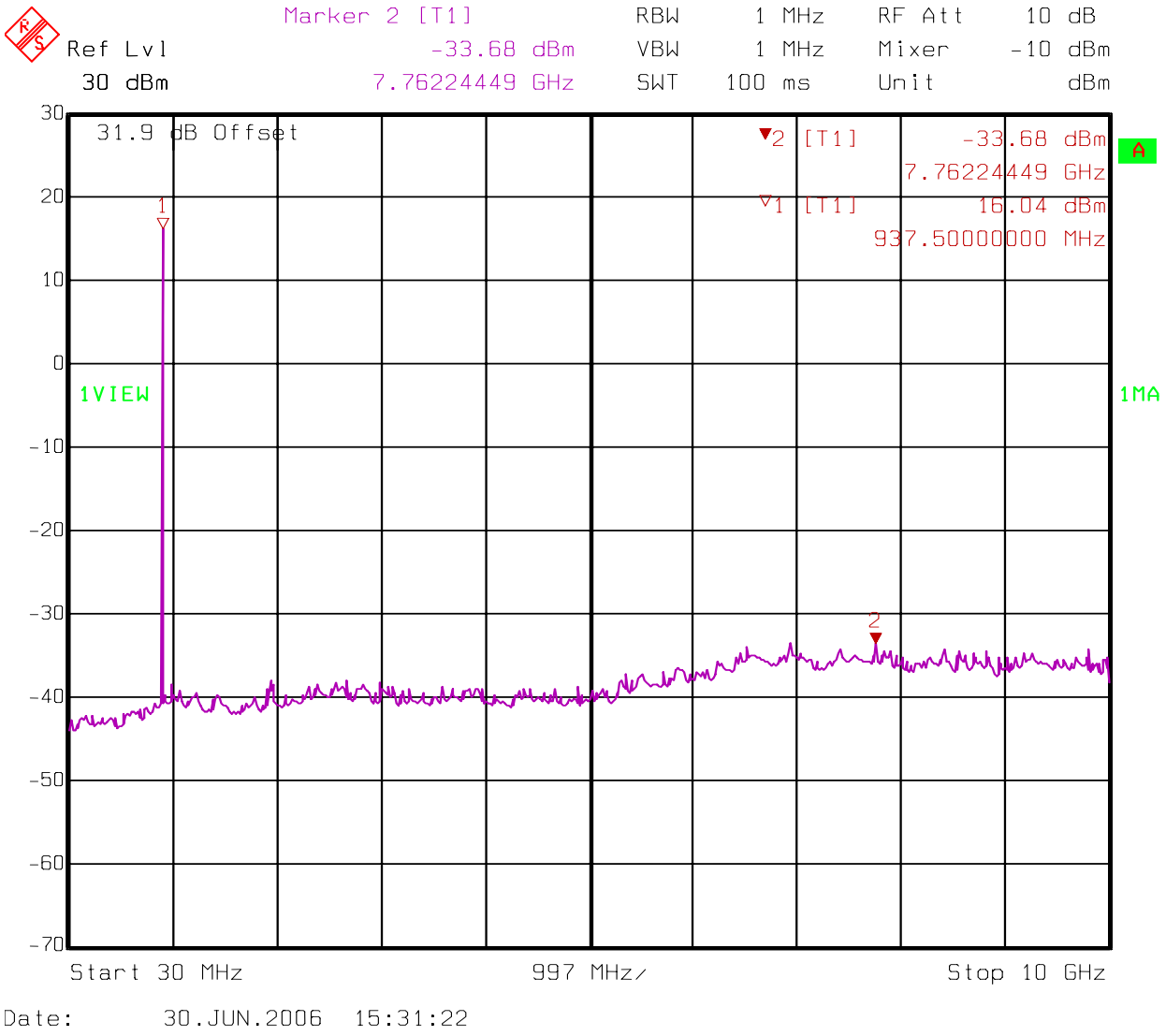
Test Data – Spurious Emissions

IM Upper bandedge Analog
900 Band



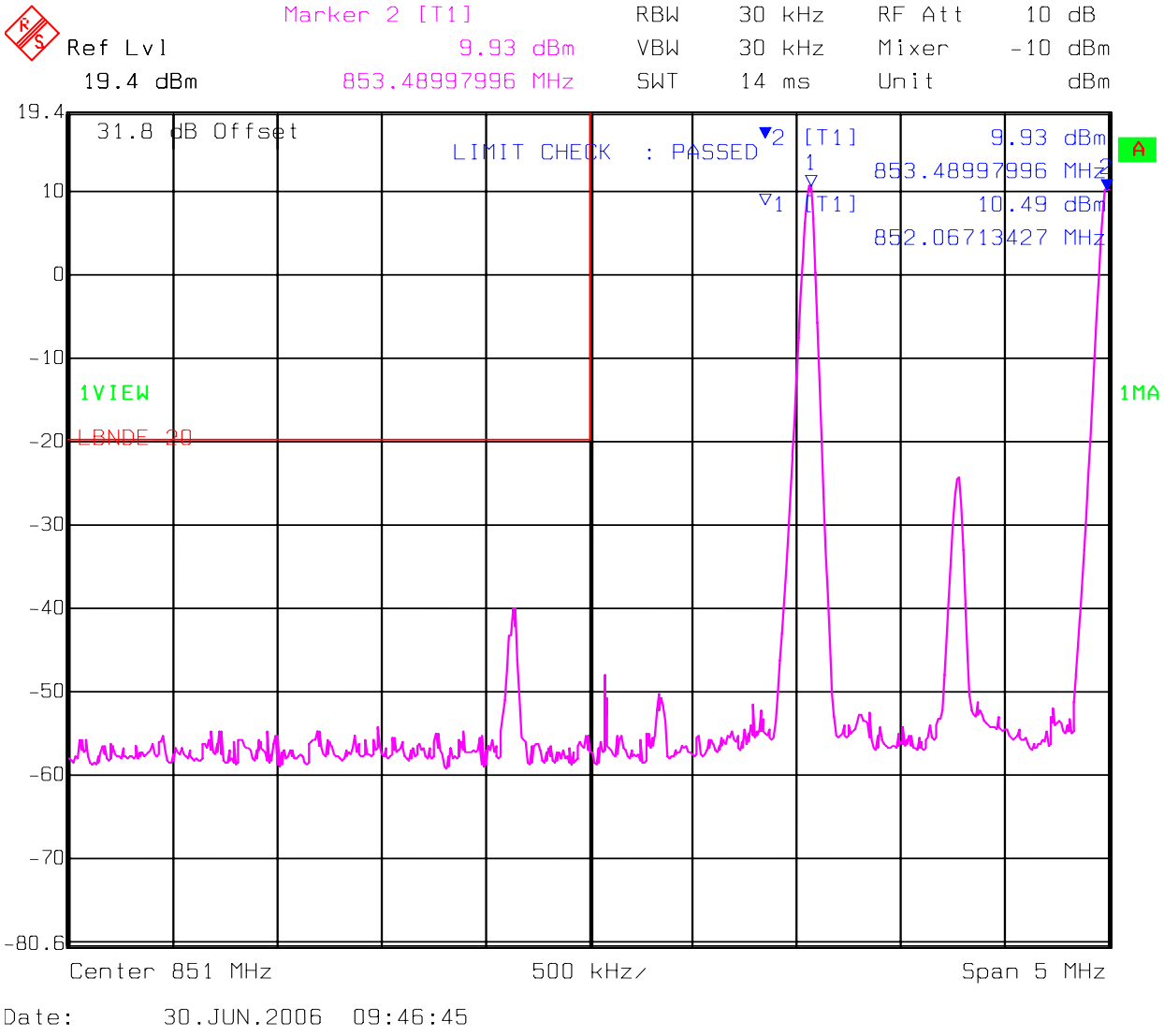
Test Data – Spurious Emissions

Tx mid band Analog
900 Band



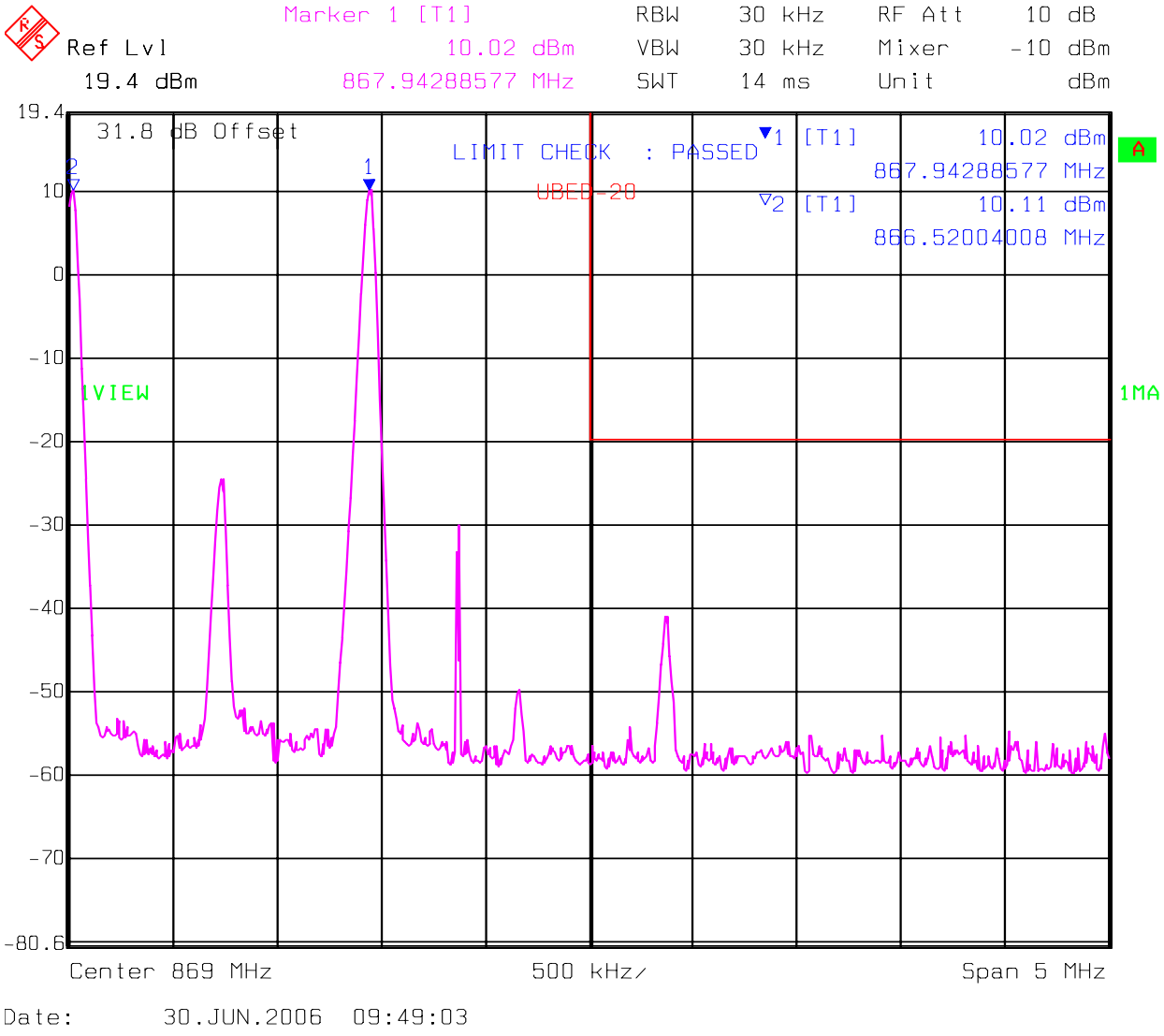
Test Data – Spurious Emissions

IM Lower bandedge iDEN
800 Band



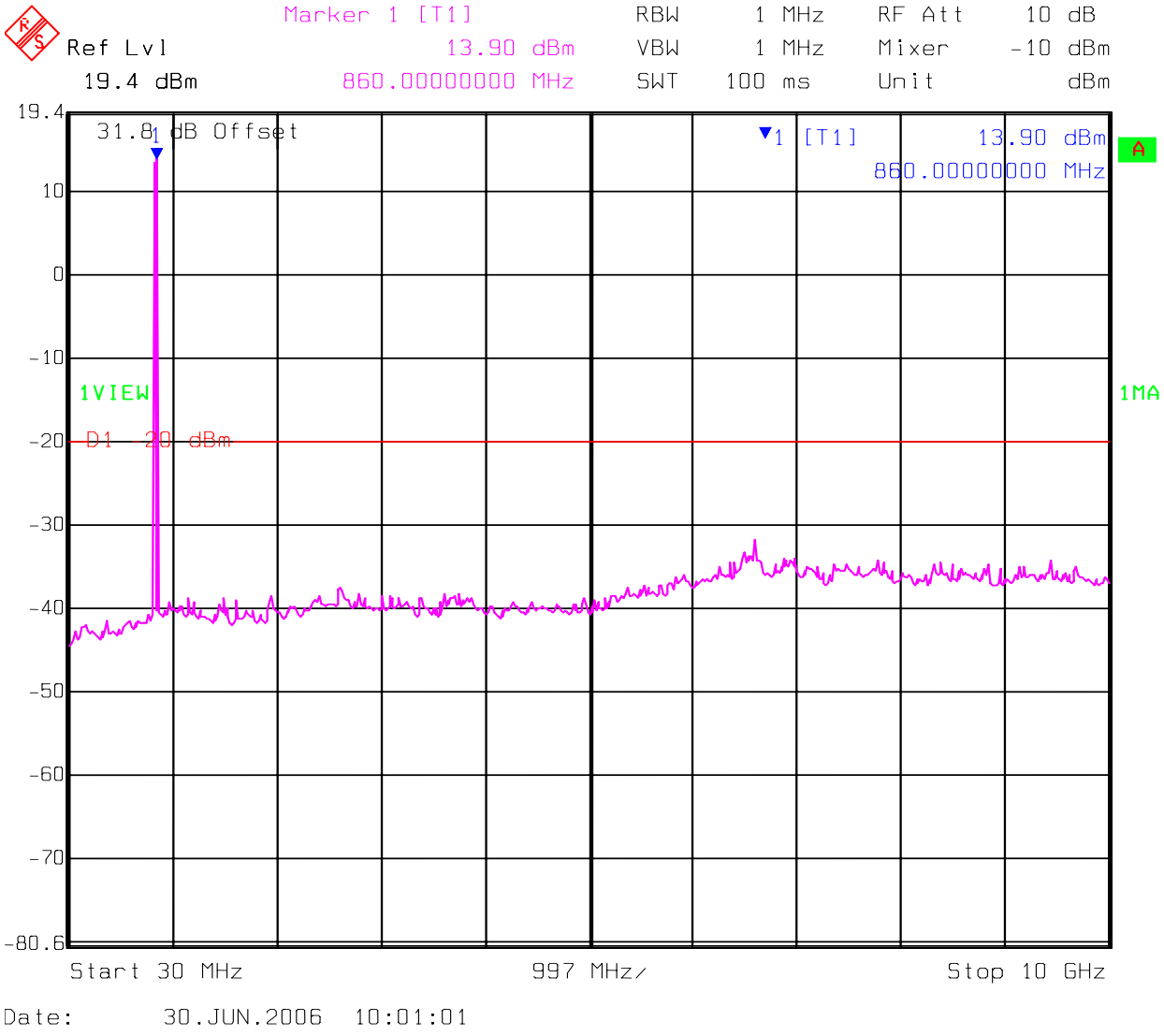
Test Data – Spurious Emissions

IM Upper bandedge iDEN
800 band



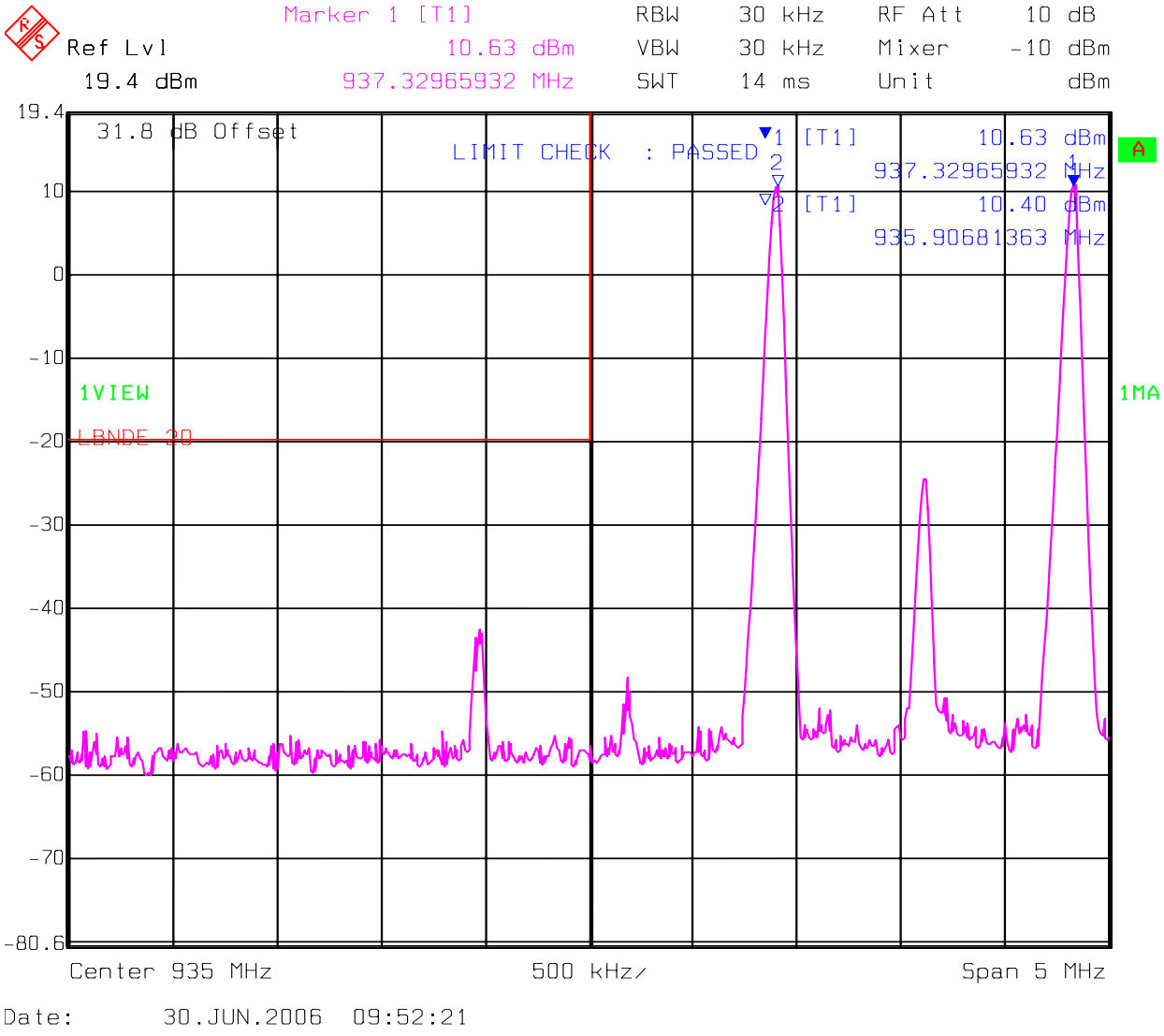
Test Data – Spurious Emissions

Tx mid band iDEN
800 band



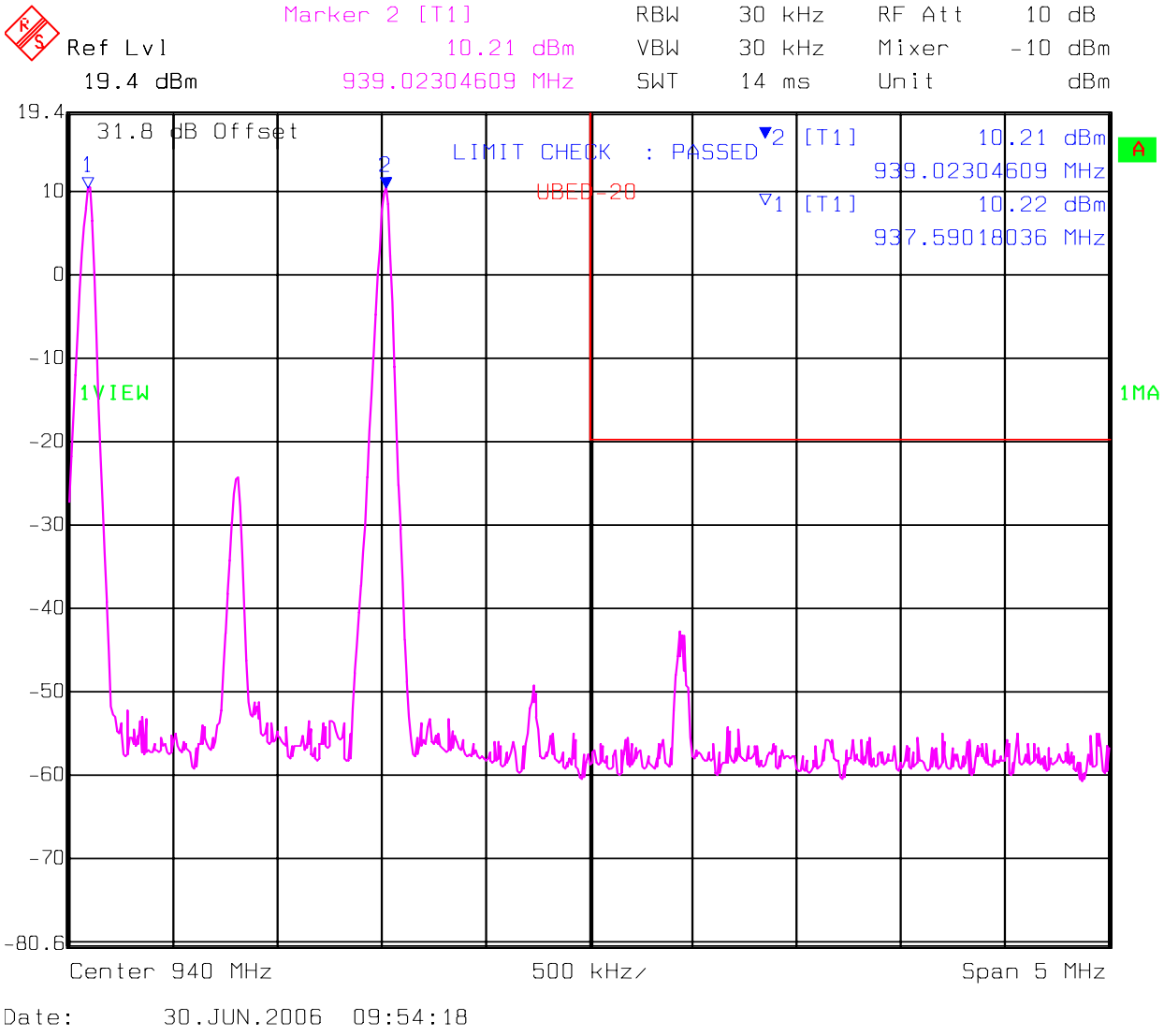
Test Data – Spurious Emissions

IM Lower bandedge iDEN
900 band



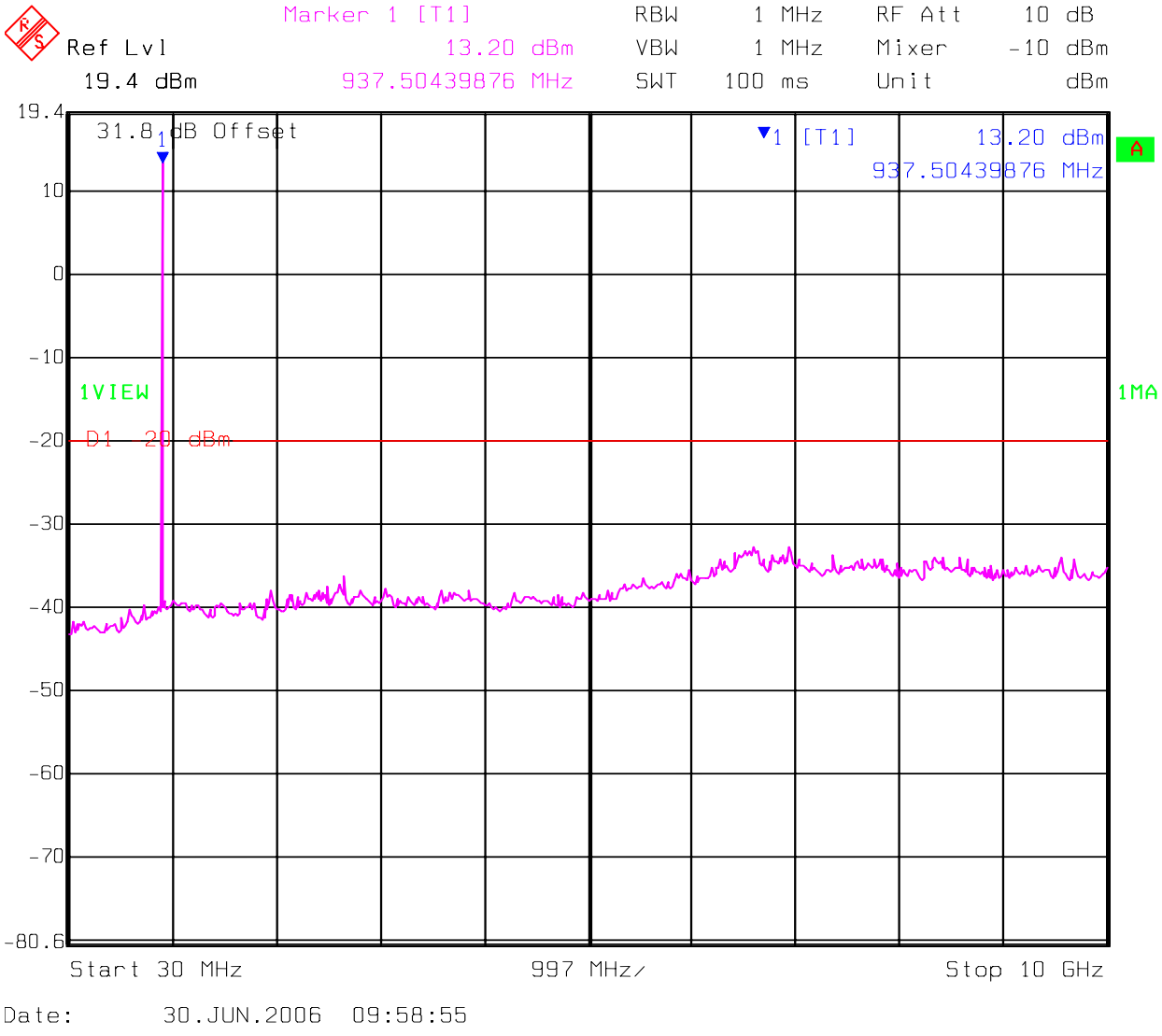
Test Data – Spurious Emissions

IM Upper bandedge iDEN
900 band



Test Data – Spurious Emissions

Tx mid band iDEN
900 band



Section 6. Field Strength of Spurious Emissions

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 2.993
TESTED BY: David Light	DATE: 30 June 2006

Test Results: Complies.

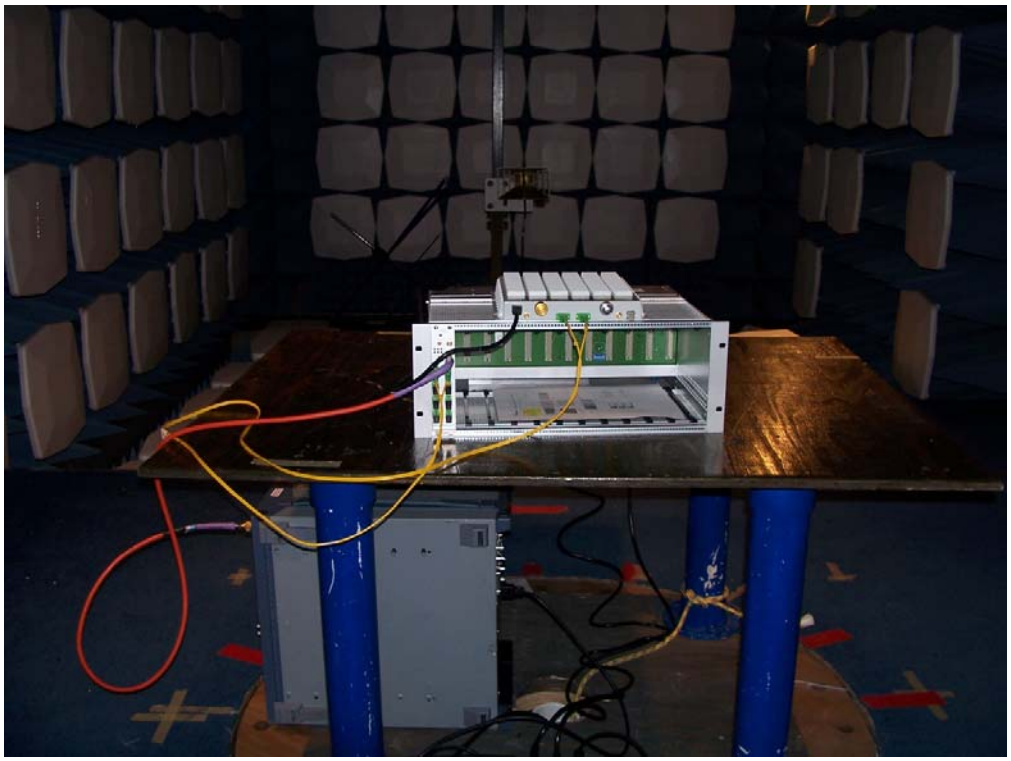
Test Data: No emissions were detected above the noise floor which was at least 20 dB below the specification limit. No emissions are reported per 2.1057(c).

Note: The spectrum was searched from 30 MHz to the tenth harmonic of the highest frequency generated.

RBW=VBW=1 MHz

Note: See page A5 for applicable limit.

Photographs of Test Setup



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	05/26/06	05/26/08
1042	CABLE, 4M	STORM PR90-010-144	N/A	06/15/06	06/15/07
1472	20db Attenuator	Omni Spectra 20600-20db	NONE	CBU	N/A
1469	10 db Attenuator	MCL Inc. BW-S10W2 10db-2WDC	NONE	CBU	N/A
759	ANTENNA, LOG PERIODIC	A.H. SYSTEMS SAS-200/510	556	02/13/06	02/13/07
760	Antenna biconical	Electro Metrics MFC-25	477	08/04/05	08/04/06
791	PREAMP, 25dB	Nemko USA, Inc. LNA25	398	04/20/06	04/20/07
1484	Cable	Storm PR90-010-072	N/A	08/26/05	08/26/06
1485	Cable	Storm PR90-010-216	N/A	08/26/05	08/26/06
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	01/14/05	01/15/07
993	Horn antenna	A.H. Systems SAS-200/571	XXX	08/01/05	08/02/07
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	04/20/06	04/20/07

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:
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

NAME OF TEST: Spurious Emissions at Antenna Terminals PARA. NO.: 2.991

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

VBW: $\Rightarrow$ RBW

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

NAME OF TEST: Occupied Bandwidth **PARA. NO.: 2.989**

Minimum Standard: Para. No. 90.210

Analog

Spectrum analyzer settings:
RBW: 300 Hz
VBW: ≥ RBW
Span: 50 kHz
Sweep: Auto
Compare input signal to output signal

iDEN

RBW: 300 Hz
VBW: ≥ RBW
Span: 1 MHz
Sweep: Auto
Compare input signal to output signal

NAME OF TEST: Field Strength of Spurious **PARA. NO.: 2.993**

Minimum Standard: Para. No. 90.210, see table 1 for applicable mask.

Calculation of Field Strength Limit

An example of attenuation requirement of 50 + 10 Log P is equivalent to -20 dBm (1×10^{-5} Watts) at the antenna terminal. We determine the field strength limit by using the plane wave relation.

$GP/4\pi R^2 = E^2/120\pi$

For emissions ≤ 1 GHz:

G = 1.64 (Dipole Gain)
P = 10^{-5} Watts (Maximum spurious output power)
R = 3m (Measurement Distance)

$$E = \frac{\sqrt{30GP}}{R} = \text{E} = \frac{\sqrt{30 \text{ x } 1.64 \text{ x } 10^{-5}}}{3} = 0.00739 \text{ V / m} = 77.4 \text{ dB}\mu\text{V / m}$$

For emissions > 1 GHz:

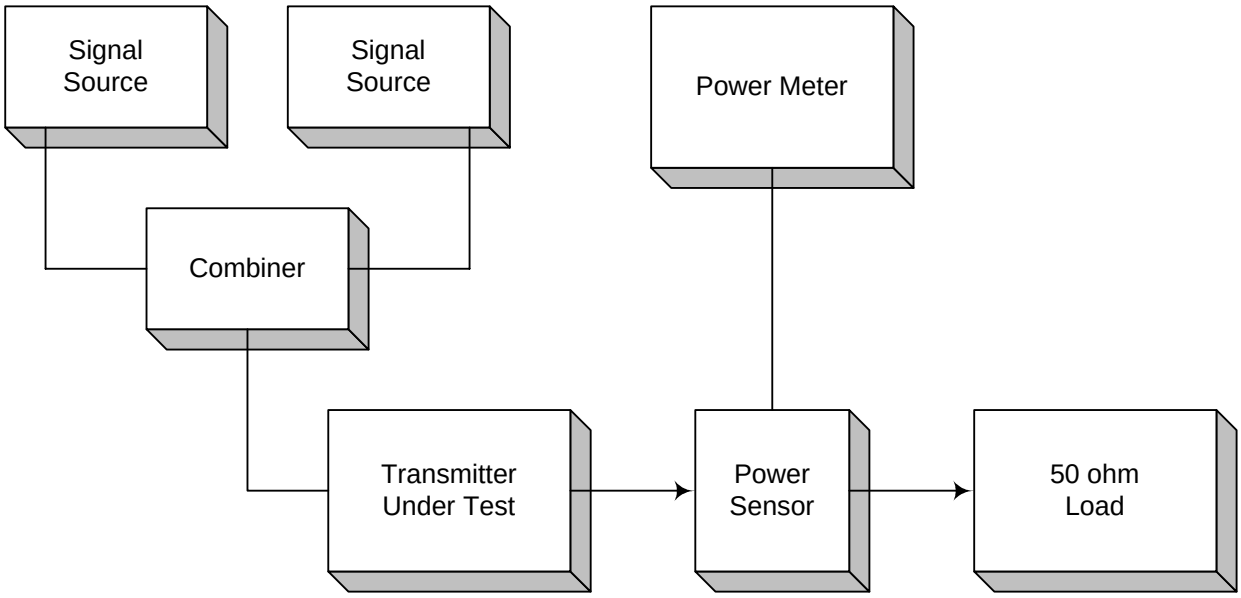
G = 1 (Isotropic Gain)
P = 1×10^{-5} Watts (Maximum spurious output power)
R = 3m (Measurement Distance)

$$E = 77.4 - 20Log\sqrt{1.64} = 75.2 dB\mu V \text{ / } m@3m$$

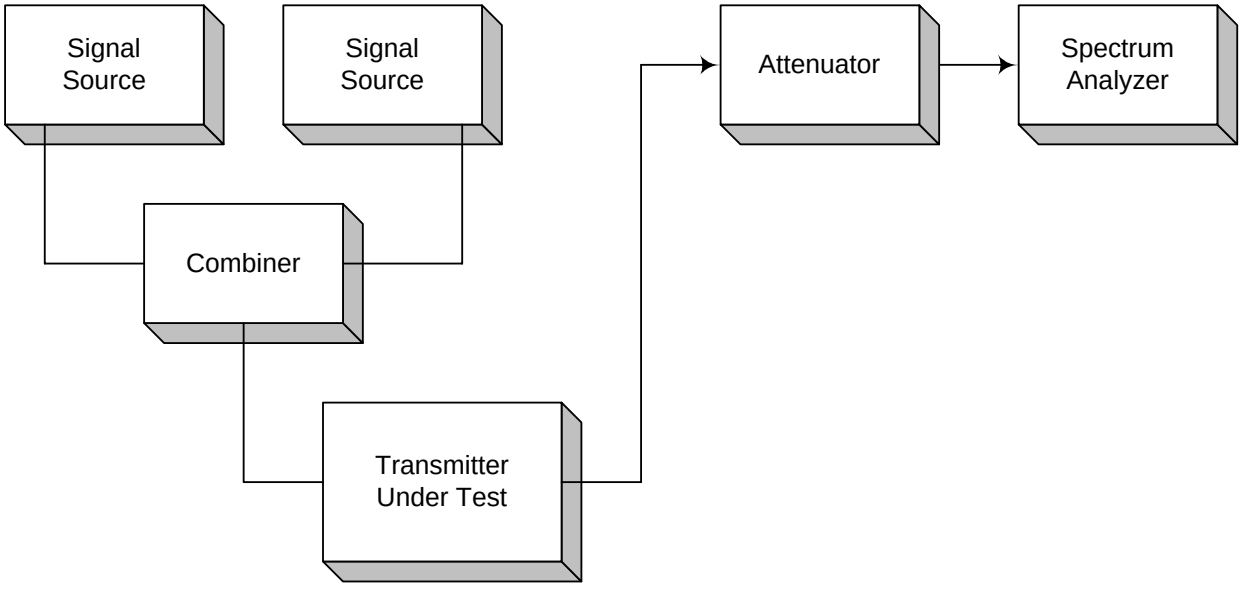
MASK	Spurious Limit	FS Limit Below 1 GHz	FS Limit Above 1 GHz
A,B,C,G,H,I	-13dBm	84.4 dBμV/m@3m	82.2 dBμV/m@3m
D,J	-20dBm	77.4 dBμV/m@3m	75.2 dBμV/m@3m
E,F,K	-25dBm	72.4 dBμV/m@3m	70.2 dBμV/m@3m

ANNEX B - TEST DIAGRAMS

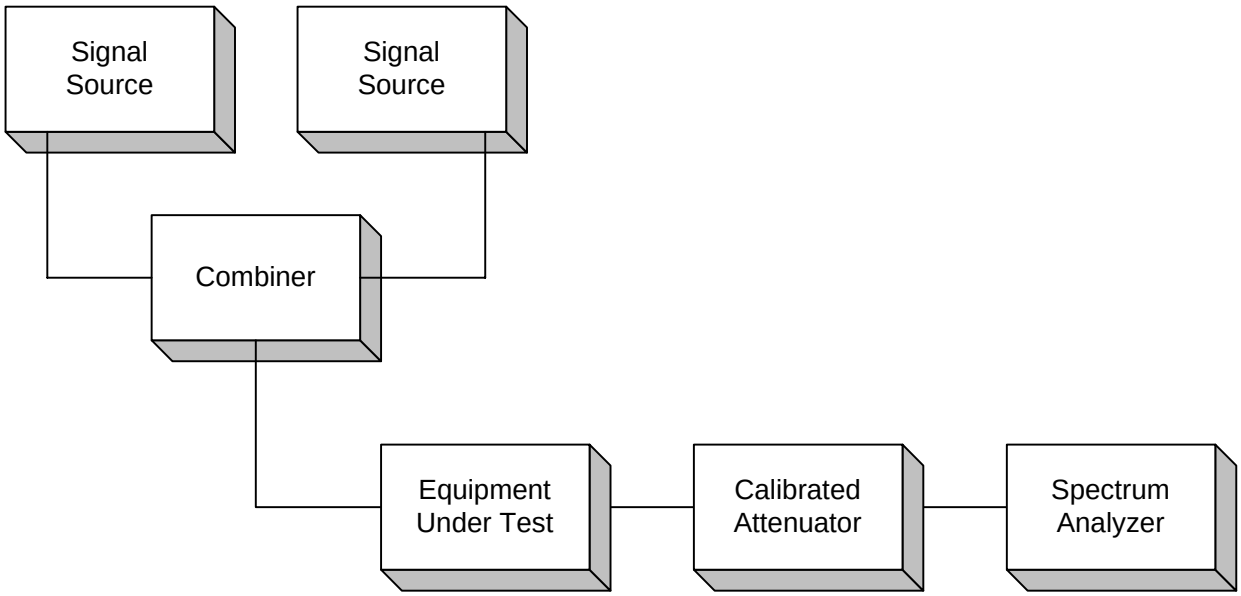
Para. No. 2.985 - R.F. Power Output



Para. No. 2.989 - Occupied Bandwidth



Para. No. 2.991 - Spurious Emissions at Antenna Terminals



Para. No. 2.993 - Field Strength of Spurious Radiation