

MEASUREMENT AND TECHNICAL REPORT

TRANGO BROADBAND WIRELESS
15070 Avenue of Science
San Diego, CA 92128

DATE: 07 July 2004

This Report Concerns:	Original Grant: X	Class II Change:
Equipment Type:	2.4 GHz Wireless Transceiver M2400S, Models M2400S-AP, M2400S-SU	
Deferred grant requested per 47 CFR 0.457(d)(1)(ii)?	Yes: Defer until:	No: X
Company Name agrees to notify the Commission by: of the intended date of announcement of the product so that the grant can be issued on that date.	N/A	
Transition Rules Request per 15.37?	Yes:	No: X*
(*) Part 15, Paragraph(s) 15.207(a); 15.209(a); 15.247(a)(2); 15.247(b)(3); 15.247(b)(4); 15.247(c); 15.247(d).		
Report Prepared by:	TÜV AMERICA, INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 Fax: 858 546 0364	

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1.0 GENERAL INFORMATION

1.1 Product Description

2.4 GHz Wireless Transceiver M2400S, Models M2400S-AP, M2400S-SU

EUT Specifications and Requirements

Length: 2.8" Width: 7.9" Height: 13.8" Weight: 4 lbs.

Power Requirements

Voltage: 110 Vac; # of Phases: 1; Current (Amps/phase(max.)): 0.8

EUT Power Cable: Removable

EUT Interface Ports and Cables

Interface: 1; Ethernet; digital

Shielding: UTP; RJ45 Termination; RJ45 Connector Type; Length - 6 meters; Removable

EUT System Components

Description	Model #
2.4 GHz Wireless Transceiver	M2400S-AP; M2400S-SU

Oscillator Frequencies

Frequency (MHz)	Derived Frequency (MHz)	Description of Use
25	--	Ethernet
11	66	Digital Clock
22	~1974	LO
	852	2xIF

Power Supply

Manufacturer	Model #
HON-Kwang	D12-10-1000-10

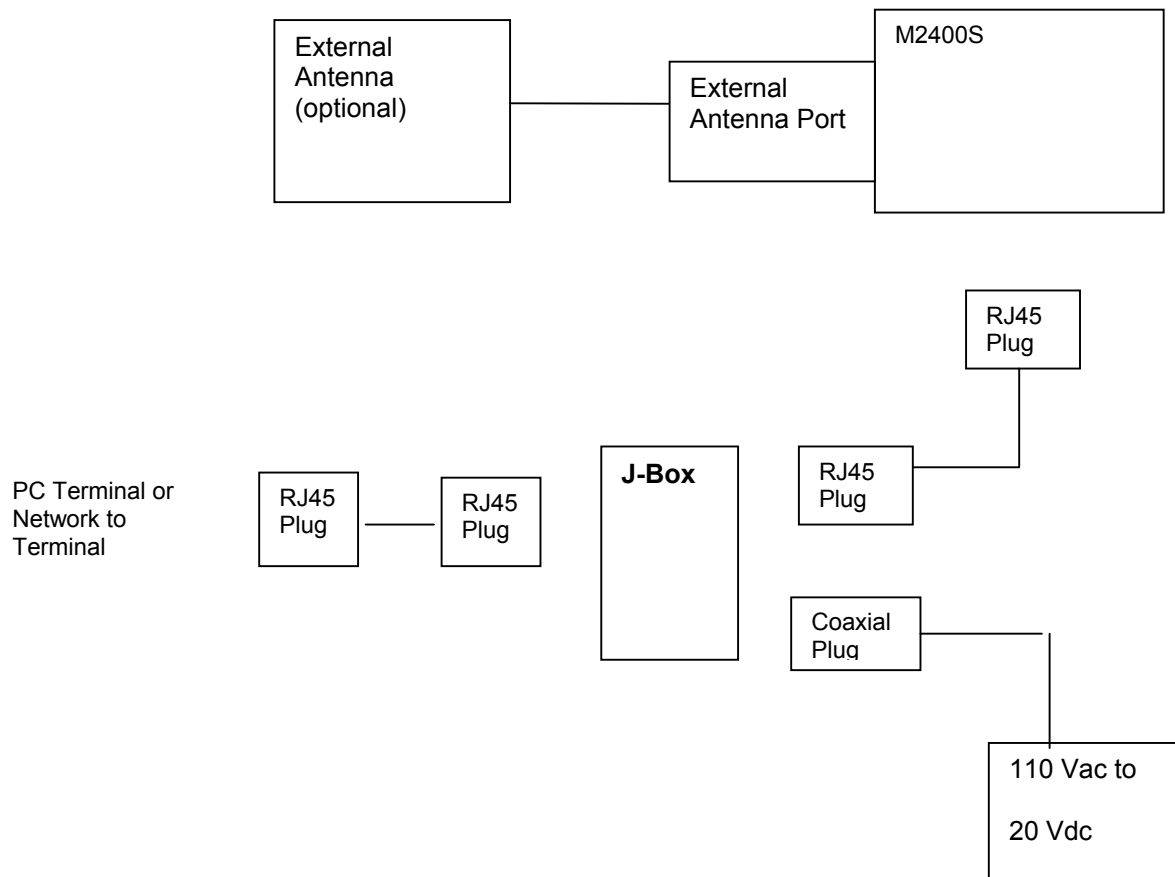
Critical EMI Components (Capacitors, ferrites, etc.)

Description	Manufacturer	Part # or Value	Qty
Fully shielded jack	Kycon	GM-SMT2-S2-88	1
EMI filter	Murata	NFM41PC204F1F3B	2

EMC Critical Detail -- Describe other EMC Design details used to reduce high frequency noise.

Shielded housing, PCB details, bypass capacitors.

M2400S System Configuration Block Diagram



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1.2 Related Submittal Grant

None

1.3 Tested System Details

The FCC ID's for all equipment, plus descriptions of all cables used in the tested system are:

None

1.4 Test Methodology

Purpose of Test: To demonstrate compliance with the following tests.

TEST	FCC CFR 47#	PASS/FAIL
Conducted Emissions	15.207(a)	Pass
Radiated Emissions	15.209(a)	Pass
Bandwidth (Low, Mid, High)	15.247(a)(2)	Pass
RF Output Power (Low, Mid, High)	15.247(b)(3)	Pass
Output Power Summary	15.247(b)(4)	Pass
Conducted Spurious Emissions	15.247(c)	Pass
Radiated Spurious Emissions	15.247(c)	Pass
Peak Power Spectral Density	15.247(d)	Pass

Tests were performed according to the procedures in FCC/ANSI C63.4 and CSA 108.8-M1983.

1.4.1 Environmental Conditions in Lab

	Actual
Temperature	19 to 22°C
Relative Humidity	39 to 67%

1.5 Test Facility

The open area test site and conducted measurement data were tested by:

TÜV AMERICA, INC
10040 Mesa Rim Road
San Diego, CA 92121-2912
Phone: 858 678 1400
Fax: 858 546 0364

The Test Site Data and performance comply with ANSI C63.4 and are registered with the FCC, 7435 Oakland Mills Road, Columbia Maryland 21046. All Measurement Data is acquired according to the content of FCC Measurement Procedure and ANSI C63.4, unless supplemented with additional requirements as noted in the test report.

2.0 SYSTEM TEST CONFIGURATION

2.1 Justification

The EUT was initially tested for FCC emissions in the following configuration:

See Test Setup Photos Exhibit.

2.2 EUT Exercise Software

None

2.3 Special Accessories

None

2.4 Equipment Modifications

None

2.5 Configuration of Test System

See Test Setup Photo Exhibit.

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3.0 CONDUCTED EMISSIONS CFR 47, Part 15, Paragraph 15.207(a)

3.1 EQUIPMENT

The **CONDUCTED EMISSIONS** measurements were performed in the following location at the San Diego Testing Facility:

☐ - Test not applicable

■ - SR3 - Shielded Room

Test Equipment Used:

Model No.	Prop. No.	Description	Manufacturer	Serial No.	Cal Due Date
9252-50-R-24-BNC	458	LISN, 50 μ H /250 μ H/50 Ω / 0.25 μ F	Solar Electronics Co.	941719	02/05
ESHS 20	428	EMI Test Receiver	Rhode & Schwarz	837055/001	01/05
CAT-20	615	20 dB Attenuator	Mini-Circuits	--	Verified

Remarks: One year calibration cycle for all test equipment and sites.

3.2 DATA

TUV America Conducted Emissions

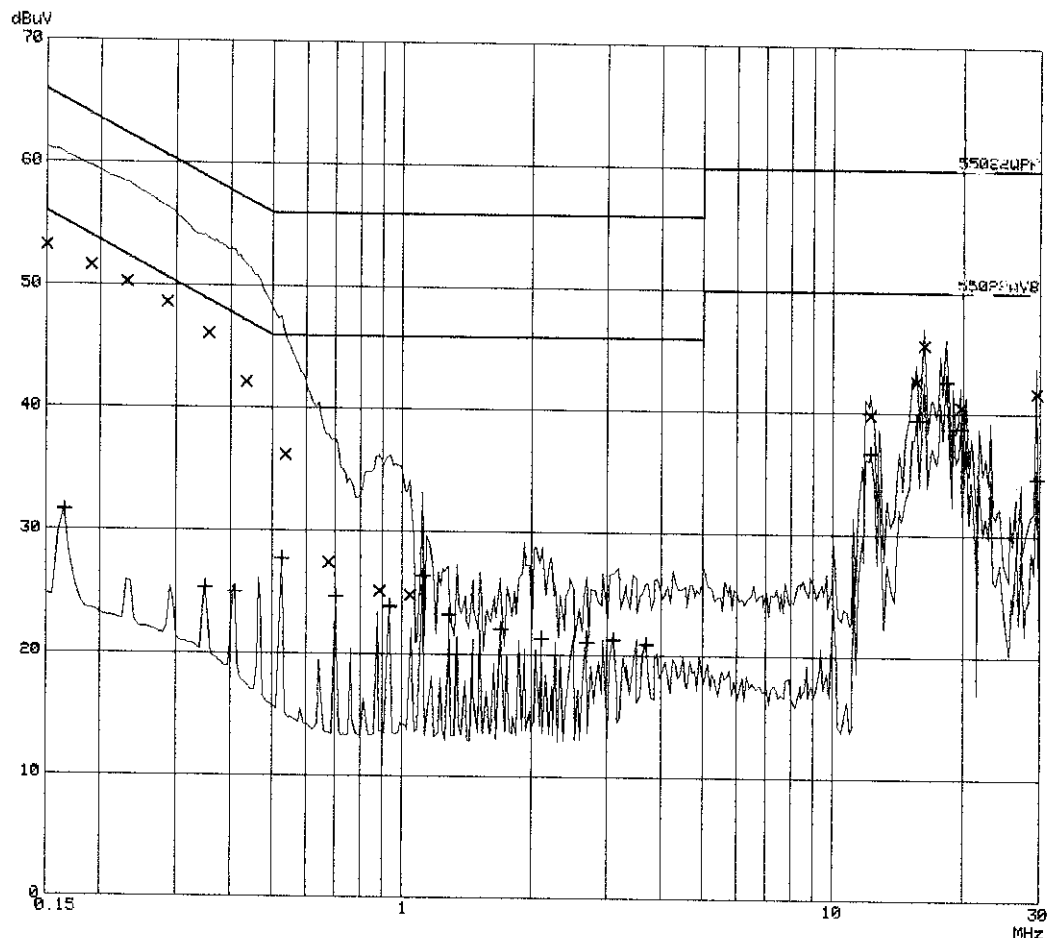
EUT: M2400S-AP ext. ant. Directional
 Manuf: Trango Systems
 Op Cond: Transmit 2441 MHz continuous mod. on
 Operator: A. Laudani
 Test Spec: EN55022 Class B - FCC 15.207(a)
 Comment: 120Vac 60Hz Line 1
 SC402957
 Date: 24. Jun 04 14:14

Scan Settings (2 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150k	1M	5k	10k	PK+AV	100ms	AUTO	LN OFF	60dB
1M	30M	5k	10k	PK+AV	2ms	AUTO	LN OFF	60dB

Transducer No.	Start	Stop	Name
1	100k	30M	20dBLISN

Final Measurement: x QP / + AV
 Meas Time: 10 ms
 Subranges: 25
 Acc Margin: 25dB



TUV America

Conducted Emissions

EUT: M2400S-AP ext. ant. Directional
 Manuf: Trango Systems
 Op Cond: Transmit 2441 MHz continuous mod. on
 Operator: A. Laudani *AL*
 Test Spec: EN55022 Class B - FCC 15.207(a)
 Comment: 120Vac 60Hz Line 1
 SC402957
 Date: 24. Jun 04 14:14

Final Measurement Results:

Frequency MHz	QP Level dBuV	QP Limit dBuV
0.15000	53.2	66.0
0.19000	51.6	64.1
0.23000	50.3	62.4
0.28500	48.6	60.7
0.35500	46.1	58.8
0.43500	42.1	57.2
0.53500	36.2	56.0
0.67500	27.5	56.0
0.88500	25.1	56.0
1.04000	24.8	56.0
12.19500	39.8	60.0
15.61500	42.6	60.0
16.22500	45.6	60.0
19.70500	40.6	60.0
29.57000	41.7	60.0

Frequency MHz	AV Level dBuV	AV Limit dBuV
0.16500	31.6	55.2
0.35000	25.3	49.0
0.41000	25.0	47.7
0.52500	27.7	46.0
0.70000	24.6	46.0
0.93500	23.9	46.0
1.11500	26.4	46.0
1.28500	23.2	46.0
1.69500	22.0	46.0
2.10000	21.3	46.0
2.68500	21.0	46.0
3.09500	21.2	46.0
3.68000	20.9	46.0
12.19500	36.8	50.0
15.61500	39.5	50.0
18.24000	42.6	50.0
19.70500	38.9	50.0
29.58000	34.7	50.0

* limit exceeded

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Conducted Emissions

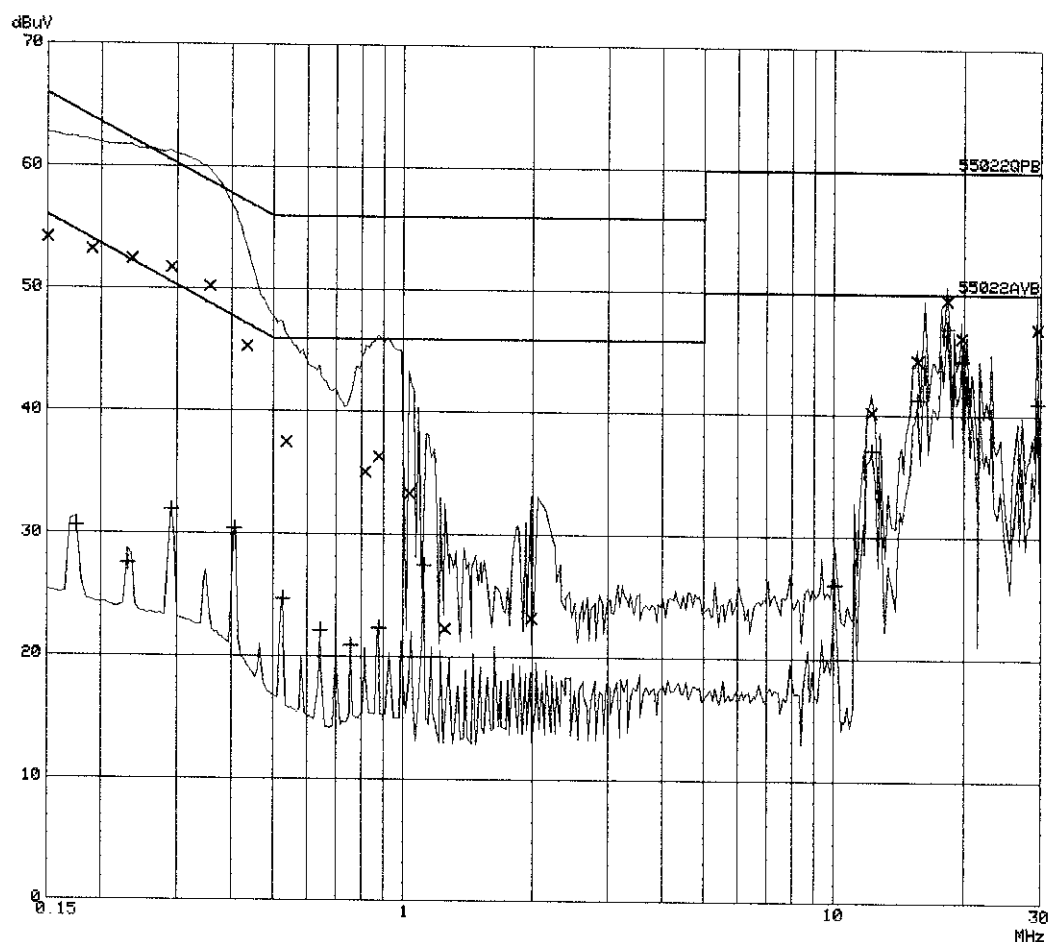
EUT: M2400S-AP ext. ant. Directional
 Manuf: Trango Systems
 Op Cond: Transmit 2441 MHz continuous mod. on
 Operator: A. Laudani
 Test Spec: EN55022 Class B - FCC 15.207(a)
 Comment: 120Vac 60Hz Line 2
 SC402957
 Date: 24. Jun 04 14:04

Scan Settings (2 Ranges)

Frequencies			Receiver Settings						
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge	
150k	1M	5k	10k	PK+AV	100ms	AUTO	LN	OFF 60dB	
1M	30M	5k	10k	PK+AV	2ms	AUTO	LN	OFF 60dB	

Transducer No.	Start	Stop	Name
1	100k	30M	20dBLISN

Final Measurement: x QP / + AV
 Meas Time: 10 ms
 Subranges: 25
 Acc Margin: 25dB



**TUV America
Conducted Emissions**

EUT: M2400S-AP ext. ant. Directional
 Manuf: Trango Systems
 Op Cond: Transmit 2441 MHz continuous mod. on
 Operator: A. Laudani ~~W~~
 Test Spec: EN55022 Class B - FCC 15.207(a)
 Comment: 120Vac 60Hz Line 2
 SC402957
 Date: 24. Jun 04 14:04

Final Measurement Results:

Frequency MHz	QP Level dBuV	QP Limit dBuV
0.15000	54.1	66.0
0.19000	53.2	64.1
0.23500	52.5	62.3
0.29000	51.8	60.6
0.35500	50.2	58.8
0.43500	45.3	57.2
0.53500	37.6	56.0
0.81500	35.1	56.0
0.87500	36.3	56.0
1.03000	33.3	56.0
1.25000	22.3	56.0
1.98500	23.2	56.0
12.19500	40.2	60.0
15.61500	44.5	60.0
18.24000	49.4	60.0
19.70500	46.3	60.0
29.58500	47.2	60.0

Frequency MHz	AV Level dBuV	AV Limit dBuV
0.17500	30.7	54.7
0.23000	27.6	52.4
0.29000	32.0	50.6
0.40500	30.4	47.8
0.52500	24.7	46.0
0.64000	22.2	46.0
0.75500	20.9	46.0
0.87500	22.4	46.0
1.11500	27.5	46.0
10.04000	26.1	50.0
12.19500	37.1	50.0
15.61500	41.3	50.0
18.24000	47.2	50.0
19.71000	44.5	50.0
29.58500	41.0	50.0

* limit exceeded

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Conducted Emissions

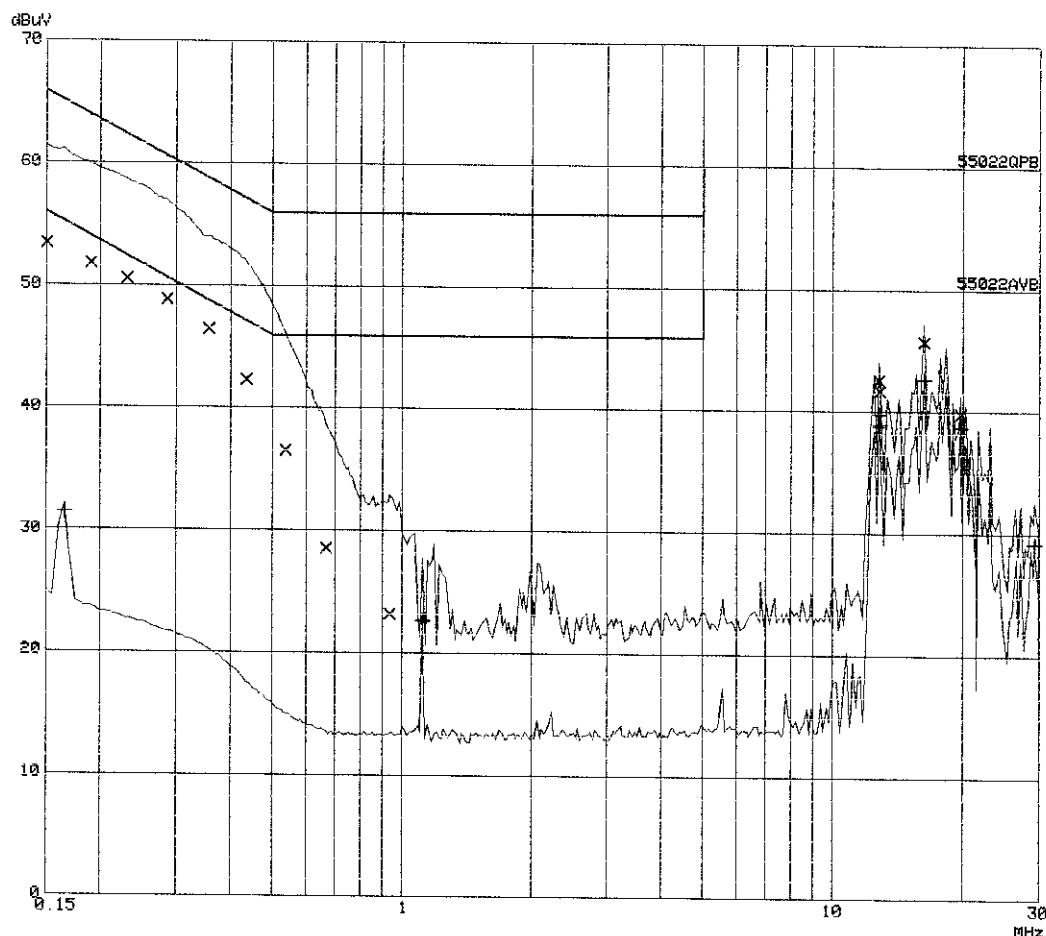
EUT: M2400S-AP ext. ant. OMNI
 Manuf: Trango Systems
 Op Cond: Transmit 2441 MHz continuous mod. on
 Operator: A. Laudani
 Test Spec: EN55022 Class B - FCC 15.207(a)
 Comment: 120Vac 60Hz Line 1
 SC402957
 Date: 24. Jun 04 13:02

Scan Settings (2 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150k	1M	5k	10k	PK+AV	100ms	AUTO	LN OFF	60dB
1M	30M	5k	10k	PK+AV	2ms	AUTO	LN OFF	60dB

Transducer No.	Start	Stop	Name
1	100k	30M	20dBLISN

Final Measurement: x QP / + AV
 Meas Time: 10 ms
 Subranges: 25
 Acc Margin: 25dB



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Conducted Emissions

EUT: M2400S-AP ext. ant. OMNI
 Manuf: Trango Systems
 Op Cond: Transmit 2441 MHz continuous mod. on
 Operator: A. Laudani *AL*
 Test Spec: EN55022 Class B - FCC 15.207(a)
 Comment: 120Vac 60Hz Line 1
 SC402957
 Date: 24. Jun 04 13:02

Final Measurement Results:

Frequency MHz	QP Level dBuV	QP Limit dBuV
0.15000	53.4	66.0
0.19000	51.8	64.1
0.23000	50.5	62.4
0.28500	48.9	60.7
0.35500	46.5	58.8
0.43500	42.3	57.2
0.53500	36.5	56.0
0.66500	28.6	56.0
0.93500	23.2	56.0
12.74500	42.6	60.0
12.80500	41.7	60.0
16.22500	45.8	60.0
19.70500	39.8	60.0

Frequency MHz	AV Level dBuV	AV Limit dBuV
0.16500	31.5	55.2
1.11500	22.6	46.0
12.74500	39.9	50.0
12.80500	38.9	50.0
16.22500	42.7	50.0
19.71000	38.7	50.0
29.23000	29.2	50.0

* limit exceeded

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Conducted Emissions

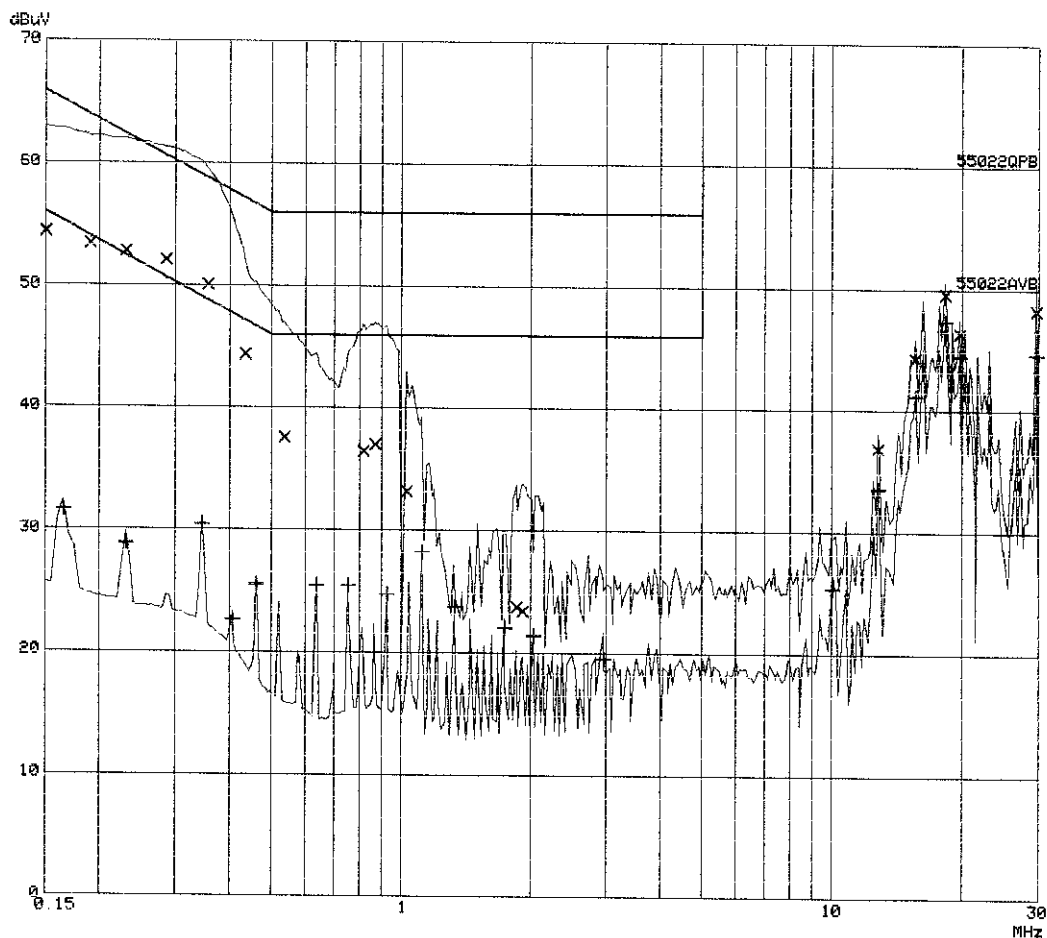
EUT: M2400S-AP ext. ant. OMNI
 Manuf: Trango Systems
 Op Cond: Transmit 2441 MHz continuous mod. on
 Operator: A. Laudani *AL*
 Test Spec: EN55022 Class B - FCC 15.207(a)
 Comment: 120Vac 60Hz Line 2
 SC402957
 Date: 24. Jun 04 13:14

Scan Settings (2 Ranges)

Frequencies			Receiver Settings						
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge	
150k	1M	5k	10k	PK+AV	100ms	AUTO	LN OFF	60dB	
1M	30M	5k	10k	PK+AV	2ms	AUTO	LN OFF	60dB	

Transducer No.	Start	Stop	Name
1	100k	30M	20dBLISN

Final Measurement: x QP / + AV
 Meas Time: 10 ms
 Subranges: 25
 Acc Margin: 25dB



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TUV America Conducted Emissions

EUT: M2400S-AP ext. ant. OMNI
 Manuf: Trango Systems
 Op Cond: Transmit 2441 MHz continuous mod. on
 Operator: A. Laudani *ALB*
 Test Spec: EN55022 Class B - FCC 15.207(a)
 Comment: 120Vac 60Hz Line 2
 SC402957
 Date: 24. Jun 04 13:14

Final Measurement Results:

Frequency MHz	QP Level dBuV	QP Limit dBuV
0.15000	54.4	66.0
0.19000	53.4	64.1
0.23000	52.8	62.4
0.28500	52.1	60.7
0.35500	50.1	58.8
0.43500	44.4	57.2
0.53500	37.6	56.0
0.81500	36.5	56.0
0.87000	37.0	56.0
1.02500	33.2	56.0
1.85500	23.8	56.0
1.91500	23.4	56.0
12.74500	36.9	60.0
15.61500	44.3	60.0
18.24000	49.6	60.0
19.70500	46.3	60.0
29.61500	48.3	60.0

Frequency MHz	AV Level dBuV	AV Limit dBuV	
0.16500	31.6	55.2	
0.23000	28.9	52.4	
0.34500	30.4	49.1	
0.40500	22.6	47.8	
0.46000	25.6	46.7	
0.63500	25.5	46.0	
0.75000	25.5	46.0	
0.92500	24.8	46.0	
1.11500	28.2	46.0	
1.33000	23.8	46.0	
1.73500	22.0	46.0	
2.02500	21.4	46.0	
2.95000	19.5	46.0	
10.06000	25.4	50.0	
12.74500	33.6	50.0	
15.61500	41.2	50.0	
18.24000	47.4	50.0	~ 2.6
19.71000	44.5	50.0	
29.61500	44.6	50.0	25.4

* limit exceeded

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Conducted Emissions

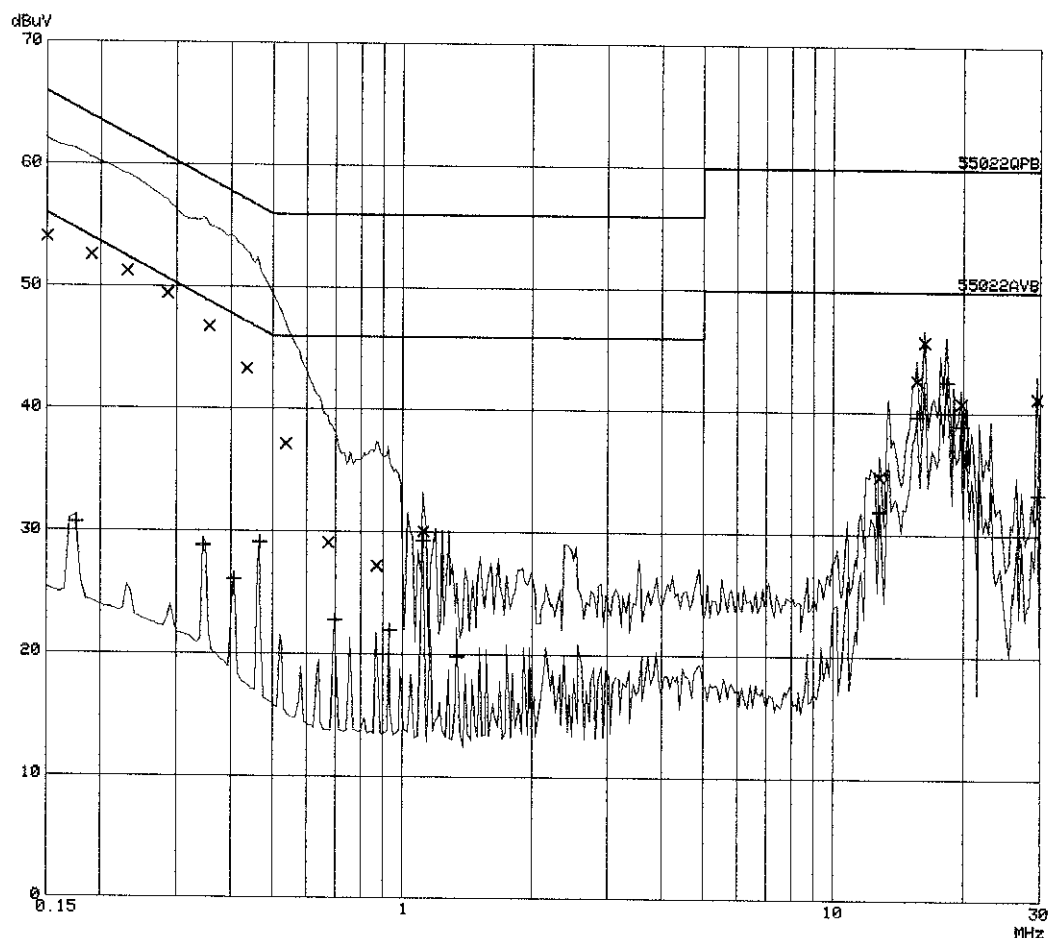
EUT: M2400S-SU internal antenna (AP Firmware)
 Manuf: Trango Systems
 Op Cond: Transmit 2441 MHz contiuous mod. on
 Operator: A. Laudani *ALL*
 Test Spec: EN55022 Class B - FCC 15.207(a)
 Comment: 120Vac 60Hz Line 1
 SC402957
 Date: 24. Jun 04 14:36

Scan Settings (2 Ranges)

Frequencies			Receiver Settings						
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge	
150k	1M	5k	10k	PK+AV	100ms	AUTO	LN OFF	60dB	
1M	30M	5k	10k	PK+AV	2ms	AUTO	LN OFF	60dB	

Transducer No.	Start	Stop	Name
1	100k	30M	20dBLISN

Final Measurement: x QP / + AV
 Meas Time: 10 ms
 Subranges: 25
 Acc Margin: 25dB



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Conducted Emissions

EUT: M2400S-SU internal antenna (AP Firmware)
 Manuf: Trango Systems
 Op Cond: Transmit 2441 MHz contiuous mod. on
 Operator: A. Laudani *AKC*
 Test Spec: EN55022 Class B - FCC 15.207(a)
 Comment: 120Vac 60Hz Line 1
 SC402957
 Date: 24. Jun 04 14:36

Final Measurement Results:

Frequency MHz	QP Level dBuV	QP Limit dBuV
0.15000	54.0	66.0
0.19000	52.5	64.1
0.23000	51.2	62.4
0.28500	49.4	60.7
0.35500	46.7	58.8
0.43500	43.3	57.2
0.53500	37.2	56.0
0.67000	29.1	56.0
0.87000	27.3	56.0
1.11500	30.1	56.0
12.74500	34.8	60.0
15.61500	42.7	60.0
16.22500	45.8	60.0
19.70500	40.8	60.0
29.59000	41.2	60.0

Frequency MHz	AV Level dBuV	AV Limit dBuV
0.17500	30.7	54.7
0.34500	28.9	49.1
0.40500	26.1	47.8
0.46500	29.1	46.6
0.69500	22.8	46.0
0.93000	21.9	46.0
1.11500	29.3	46.0
1.33500	19.8	46.0
12.74500	31.9	50.0
15.61500	39.7	50.0
18.24000	42.5	50.0
19.70500	39.0	50.0
29.61500	33.4	50.0

* limit exceeded

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Conducted Emissions

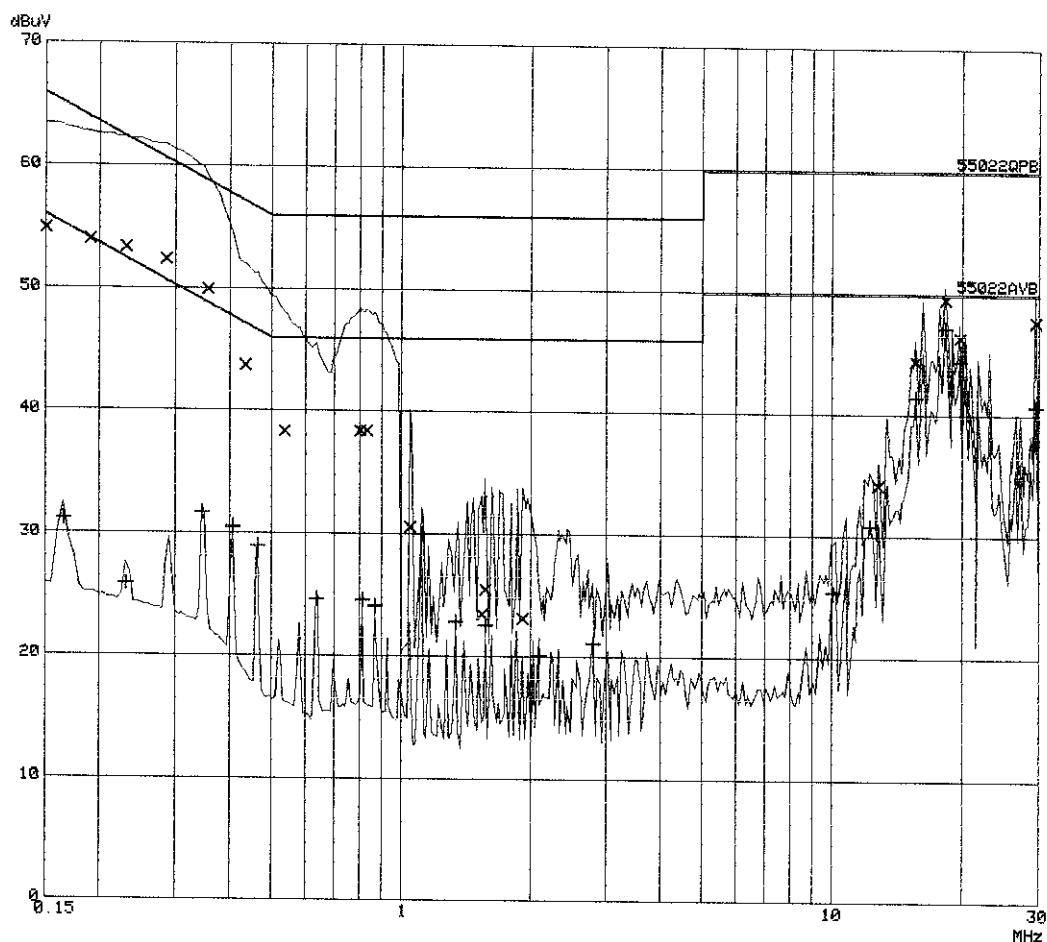
EUT: M2400S-SU internal antenna (AP Firmware)
 Manuf: Trango Systems
 Op Cond: Transmit 2441 MHz continuous mod. on
 Operator: A. Laudani *AL*
 Test Spec: EN55022 Class B - FCC 15.207(a)
 Comment: 120Vac 60Hz Line 2
 SC402957
 Date: 24. Jun 04 14:43

Scan Settings (2 Ranges)

Frequencies			Receiver Settings						
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge	
150k	1M	5k	10k	PK+AV	100ms	AUTO	LN	OFF 60dB	
1M	30M	5k	10k	PK+AV	2ms	AUTO	LN	OFF 60dB	

Transducer No.	Start	Stop	Name
1	100k	30M	20dBLISN

Final Measurement: x QP / + AV
 Meas Time: 10 ms
 Subranges: 25
 Acc Margin: 25dB



TUV America

Conducted Emissions

EUT: M2400S-SU internal antenna (AP Firmware)
 Manuf: Trango Systems
 Op Cond: Transmit 2441 MHz contiuous mod. on
 Operator: A. Laudani *AAE*
 Test Spec: EN55022 Class B - FCC 15.207(a)
 Comment: 120Vac 60Hz Line 2
 SC402957
 Date: 24. Jun 04 14:43

Final Measurement Results:

Frequency MHz	QP Level dBuV	QP Limit dBuV
------------------	------------------	------------------

0.15000	54.9	66.0
0.19000	53.9	64.1
0.23000	53.3	62.4
0.28500	52.3	60.7
0.35500	50.0	58.8
0.43500	43.7	57.2
0.53500	38.4	56.0
0.80000	38.4	56.0
0.83000	38.4	56.0
1.04500	30.6	56.0
1.53500	23.5	56.0
1.56500	25.5	56.0
1.91500	23.1	56.0
12.74500	34.2	60.0
15.61500	44.4	60.0
18.24000	49.5	60.0
19.70500	46.3	60.0
29.56500	47.7	60.0

Frequency MHz	AV Level dBuV	AV Limit dBuV
------------------	------------------	------------------

0.16500	31.2	55.2
0.23000	25.9	52.4
0.34500	31.7	49.1
0.40500	30.6	47.8
0.46500	29.0	46.6
0.63500	24.7	46.0
0.81000	24.6	46.0
0.87000	24.1	46.0
1.11500	30.0	46.0
1.33500	22.8	46.0
1.56500	22.6	46.0
2.09000	20.1	46.0
2.78500	21.1	46.0
10.06000	25.4	50.0
12.19500	30.8	50.0
15.61500	41.4	50.0
18.24000	47.1	50.0
19.71000	44.4	50.0
29.58000	40.7	50.0

47.1 50.0 -2.8

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Conducted Emissions

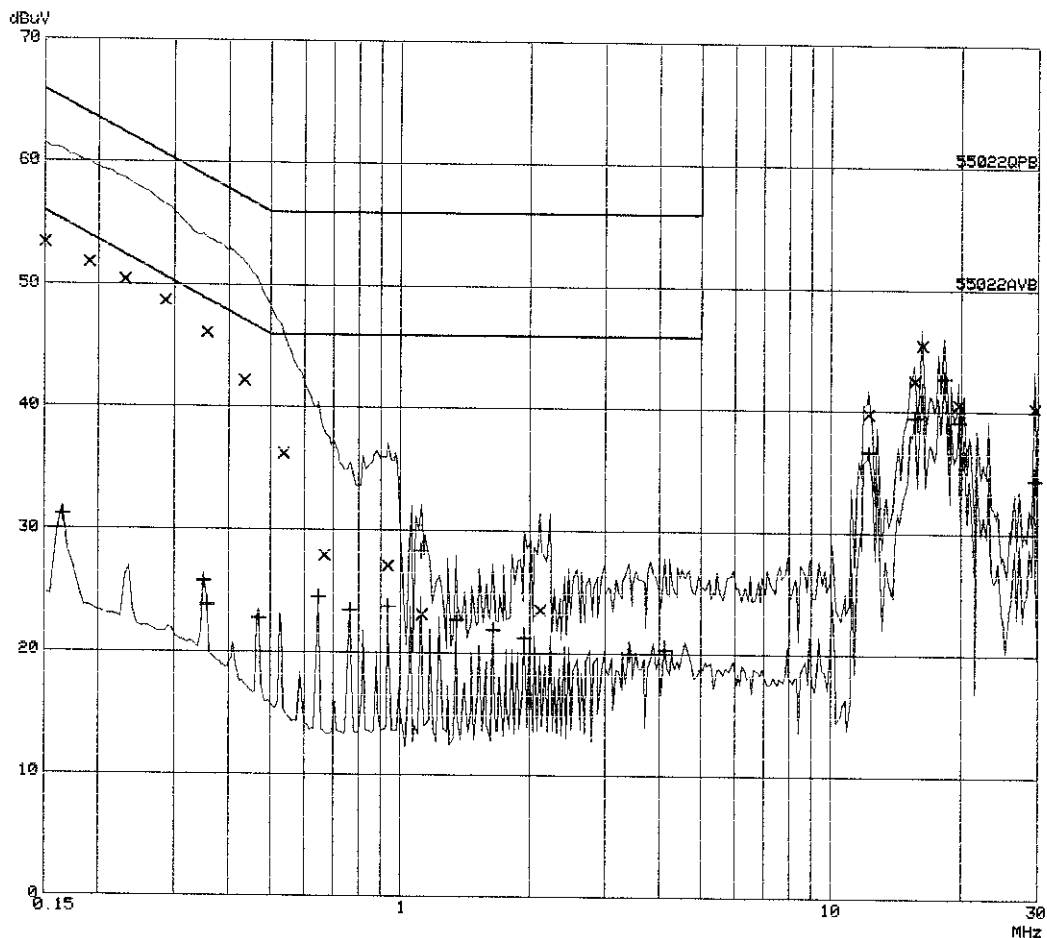
EUT: M2400S-AP ext. ant. SECTOR
 Manuf: Trango Systems
 Op Cond: Transmit 2441 MHz continuous mod. on
 Operator: A. Laudani *AL*
 Test Spec: EN55022 Class B - FCC 15.207(a)
 Comment: 120Vac 60Hz Line 1
 SC402957
 Date: 24. Jun 04 13:40

Scan Settings (2 Ranges)

Frequencies			Receiver Settings						
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge	
150k	1M	5k	10k	PK+AV	100ms	AUTO	LN OFF	60dB	
1M	30M	5k	10k	PK+AV	2ms	AUTO	LN OFF	60dB	

Transducer No.	Start	Stop	Name
1	100k	30M	20dBLISN

Final Measurement: x QP / + AV
 Meas Time: 10 ms
 Subranges: 25
 Acc Margin: 25dB



TUV America

Conducted Emissions

EUT: M2400S-AP ext. ant. SECTOR
 Manuf: Trango Systems
 Op Cond: Transmit 2441 MHz continuous mod. on
 Operator: A. Laudani *AKJ*
 Test Spec: EN55022 Class B - FCC 15.207(a)
 Comment: 120Vac 60Hz Line 1
 SC402957
 Date: 24. Jun 04 13:40

Final Measurement Results:

Frequency MHz	QP Level dBuV	QP Limit dBuV
0.15000	53.4	66.0
0.19000	51.8	64.1
0.23000	50.4	62.4
0.28500	48.7	60.7
0.35500	46.1	58.8
0.43500	42.2	57.2
0.53500	36.2	56.0
0.66500	27.9	56.0
0.93500	27.1	56.0
1.12000	23.1	56.0
2.11000	23.5	56.0
12.19500	39.8	60.0
15.61500	42.6	60.0
16.22500	45.5	60.0
19.70500	40.6	60.0
29.58500	40.3	60.0

Frequency MHz	AV Level dBuV	AV Limit dBuV
0.16500	31.2	55.2
0.35000	25.8	49.0
0.35500	23.9	48.8
0.47000	22.8	46.5
0.64500	24.5	46.0
0.76000	23.5	46.0
0.93500	23.8	46.0
1.11500	28.3	46.0
1.35000	22.7	46.0
1.64000	21.9	46.0
1.93500	21.2	46.0
3.40000	19.9	46.0
4.10500	20.3	46.0
12.19500	36.6	50.0
15.61500	39.5	50.0
18.24000	42.7	50.0
19.71000	39.1	50.0
29.59000	34.4	50.0

* limit exceeded

Report No. SC402957-03

TUV America **Conducted Emissions**

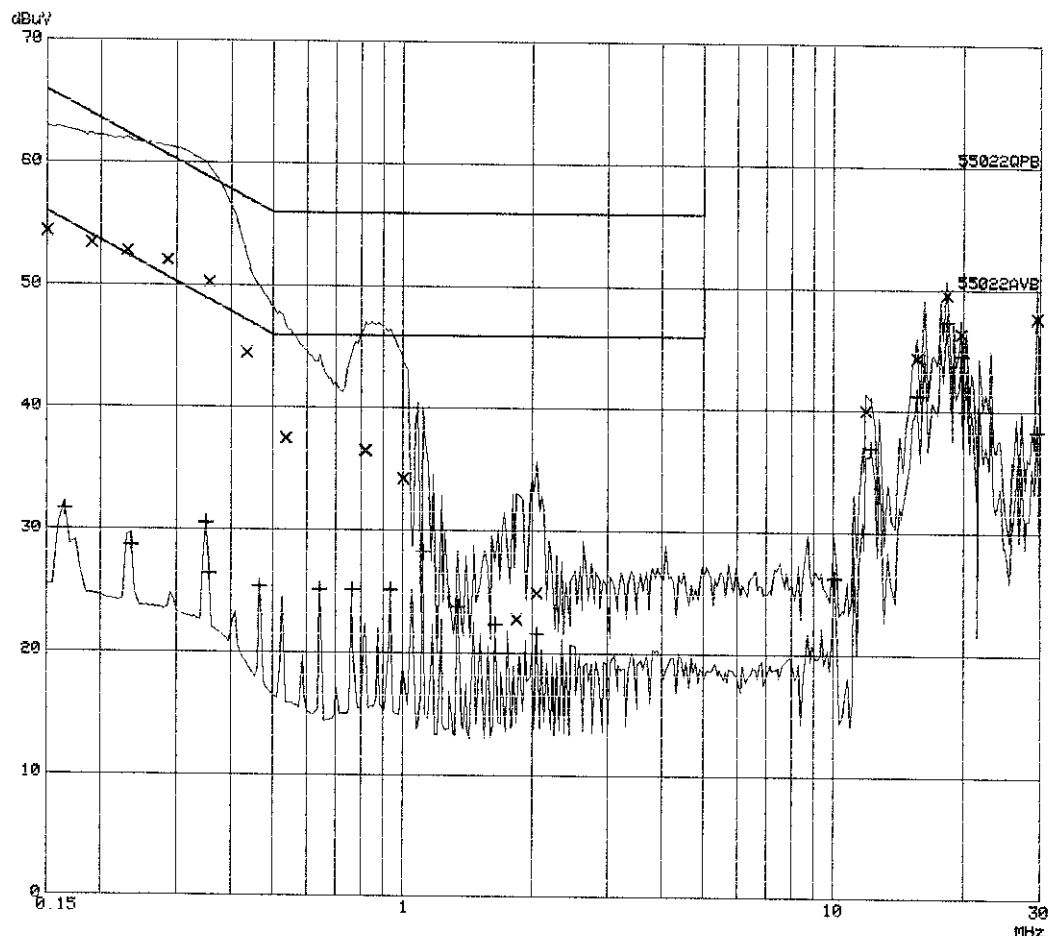
EUT: M2400S-AP ext. ant. SECTOR
 Manuf: Trango Systems
 Op Cond: Transmit 2441 MHz continuous mod. on
 Operator: A. Laudani
 Test Spec: EN55022 Class B - FCC 15.207(a)
 Comment: 120Vac 60Hz Line 2
 SC402957
 Date: 24. Jun 04 13:31

Scan Settings (2 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150k	1M	5k	10k	PK+AV	100ms	AUTO	LN OFF	60dB
1M	30M	5k	10k	PK+AV	2ms	AUTO	LN OFF	60dB

Transducer No.	Start	Stop	Name
1	100k	30M	20dBLISN

Final Measurement: x QP / + AV
 Meas Time: 10 ms
 Subranges: 25
 Acc Margin: 25dB



Report No. SC402957-03

TUV America

Conducted Emissions

EUT: M2400S-AP ext. ant. SECTOR
 Manuf: Trango Systems
 Op Cond: Transmit 2441 MHz continuous mod. on
 Operator: A. Laudani *AW*
 Test Spec: EN55022 Class B - FCC 15.207(a)
 Comment: 120Vac 60Hz Line 2
 SC402957
 Date: 24. Jun 04 13:31

Final Measurement Results:

Frequency MHz	QP Level dBuV	QP Limit dBuV
0.15000	54.4	66.0
0.19000	53.4	64.1
0.23000	52.8	62.4
0.28500	52.0	60.7
0.35500	50.3	58.8
0.43500	44.5	57.2
0.53500	37.5	56.0
0.81500	36.6	56.0
0.82000	36.6	56.0
1.00000	34.3	56.0
1.83500	22.7	56.0
2.04500	24.9	56.0
11.89000	40.0	60.0
15.61500	44.4	60.0
18.24000	49.6	60.0
19.70500	46.4	60.0
29.58000	47.7	60.0

Frequency MHz	AV Level dBuV	AV Limit dBuV
0.16500	31.7	55.2
0.23500	28.7	52.3
0.35000	30.6	49.0
0.35500	26.4	48.8
0.46500	25.3	46.6
0.64000	25.2	46.0
0.76000	25.1	46.0
0.93500	25.1	46.0
1.11500	28.2	46.0
1.34500	23.8	46.0
1.63500	22.4	46.0
2.04500	21.5	46.0
10.03500	26.3	50.0
12.19500	37.0	50.0
15.61500	41.3	50.0
18.24000	47.3	50.0
19.71000	44.5	50.0
29.59000	38.4	50.0

47,4 @ 18.23997 (-2.6)

* limit exceeded

Report No. SC402957-03

TUV America **Conducted Emissions**

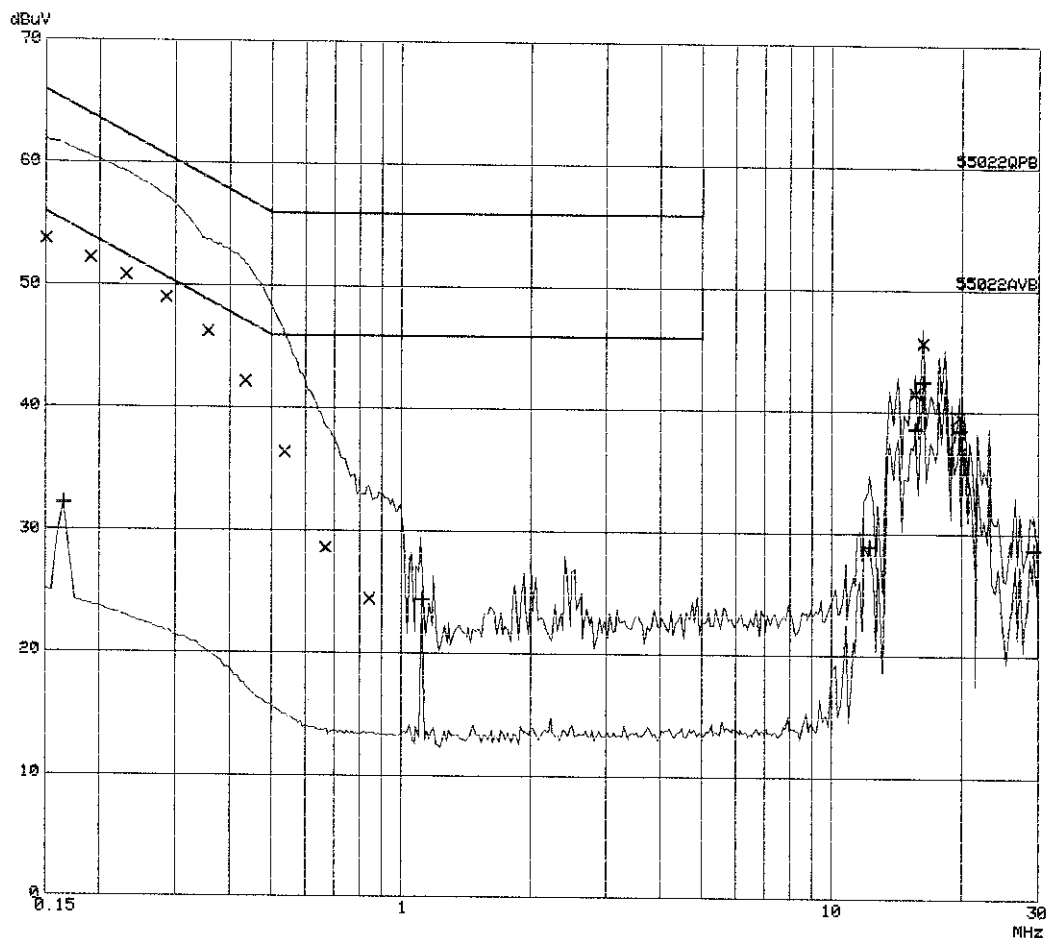
EUT: M2400S-AP
 Manuf: Trango Systems
 Op Cond: Transmit 2441 MHz continuous mod. on
 Operator: A. Laudani *AL*
 Test Spec: EN55022 Class B - FCC 15.207(a)
 Comment: 120Vac 60Hz Line 1
 SC402957
 Date: 24. Jun 04 12:50

Scan Settings (2 Ranges)

Frequencies			Receiver Settings						
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge	
150k	1M	5k	10k	PK+AV	100ms	AUTO	LN OFF	60dB	
1M	30M	5k	10k	PK+AV	2ms	AUTO	LN OFF	60dB	

Transducer No.	Start	Stop	Name
1	100k	30M	20dBLISN

Final Measurement: x QP / + AV
 Meas Time: 10 ms
 Subranges: 25
 Acc Margin: 25dB



**TUV America
Conducted Emissions**

EUT: M2400S-AP
 Manuf: Trango Systems
 Op Cond: Transmit 2441 MHz continuous mod. on
 Operator: A. Laudani *AL*
 Test Spec: EN55022 Class B - FCC 15.207(a)
 Comment: 120Vac 60Hz Line 1
 SC402957
 Date: 24. Jun 04 12:50

Final Measurement Results:

Frequency MHz	QP Level dBuV	QP Limit dBuV
0.15000	53.7	66.0
0.19000	52.2	64.1
0.23000	50.8	62.4
0.28500	49.0	60.7
0.35500	46.2	58.8
0.43500	42.2	57.2
0.53500	36.4	56.0
0.66500	28.6	56.0
0.84000	24.4	56.0
15.61500	41.6	60.0
16.22500	45.7	60.0 <i>-14.3</i>
19.70500	39.6	60.0

Frequency MHz	AV Level dBuV	AV Limit dBuV
0.16500	32.2	55.2
1.11500	24.4	46.0
12.19500	29.0	50.0
15.61500	38.6	50.0
16.22500	42.5	50.0
19.71000	38.5	50.0
29.23000	28.7	50.0

* limit exceeded

Report No. SC402957-03

TUV America **Conducted Emissions**

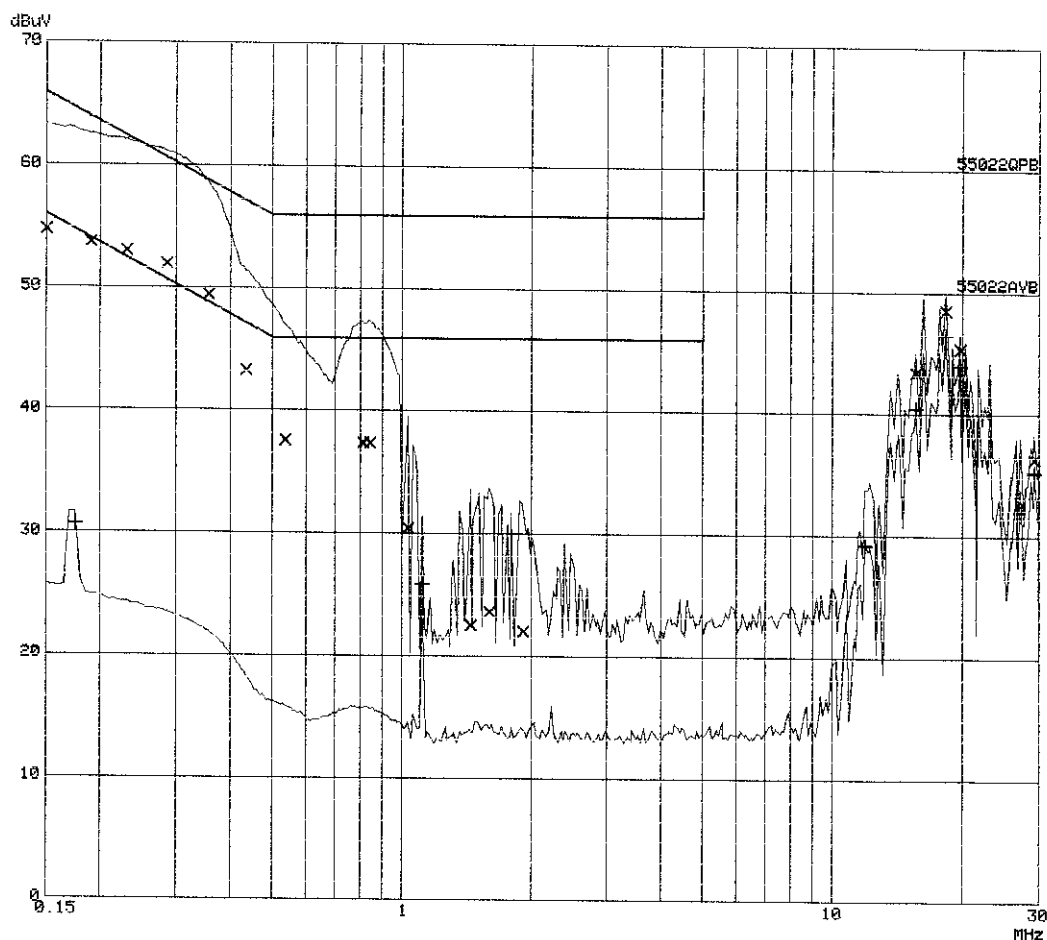
EUT: M2400S-AP
 Manuf: Trango Systems
 Op Cond: Transmit 2441 MHz continuous mod. on
 Operator: A. Laudani
 Test Spec: EN55022 Class B - FCC 15.207(a)
 Comment: 120Vac 60Hz Line 2
 SC402957
 Date: 24. Jun 04 12:43

Scan Settings (2 Ranges)

Frequencies			Receiver Settings						
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge	
150k	1M	5k	10k	PK+AV	100ms	AUTO	LN OFF	60dB	
1M	30M	5k	10k	PK+AV	2ms	AUTO	LN OFF	60dB	

Transducer No.	Start	Stop	Name
1	100k	30M	20dBLISN

Final Measurement: x QP / + AV
 Meas Time: 10 ms
 Subranges: 25
 Acc Margin: 25dB



Report No. SC402957-03

TUV America **Conducted Emissions**

EUT: M2400S-AP
 Manuf: Trango Systems
 Op Cond: Transmit 2441 MHz continuous mod. on
 Operator: A. Laudani *ML*
 Test Spec: EN55022 Class B - FCC 15.207(a)
 Comment: 120Vac 60Hz Line 2
 SC402957
 Date: 24. Jun 04 12:43

Final Measurement Results:

Frequency MHz	QP Level dBuV	QP Limit dBuV
0.15000	54.7	66.0
0.19000	53.7	64.1
0.23000	53.0	62.4
0.28500	51.9	60.7
0.35500	49.5	58.8
0.43500	43.3	57.2
0.53500	37.6	56.0
0.81000	37.4	56.0
0.84000	37.4	56.0
1.03000	30.4	56.0
1.44000	22.5	56.0
1.59500	23.6	56.0
1.91000	22.0	56.0
15.61500	43.4	60.0
18.24000	48.6	60.0
19.70500	45.4	60.0
29.23000	36.3	60.0

Frequency MHz	AV Level dBuV	AV Limit dBuV
0.17500	30.7	54.7
1.11500	25.8	46.0
11.89000	29.3	50.0
15.61500	40.5	50.0
18.24000	46.5	50.0 -3.5
19.71000	44.0	50.0
29.23000	35.3	50.0

* limit exceeded

4.0 RADIATED EMISSIONS CFR 47, Part 15, Paragraph 15.209(a)**4.1 EQUIPMENT**

The **RADIATED EMISSIONS** measurements were performed in the following location at the San Diego Testing Facility:

☐ - Test not applicable

- - Canyon #1 (10- and 30-Meter Open Area Test Site), Carroll Canyon, San Diego
(Date of listing Aug. 29, 2003. Site Verification Valid for 3 years from listing.)

Testing was performed at a test distance of:

- - 10 meters

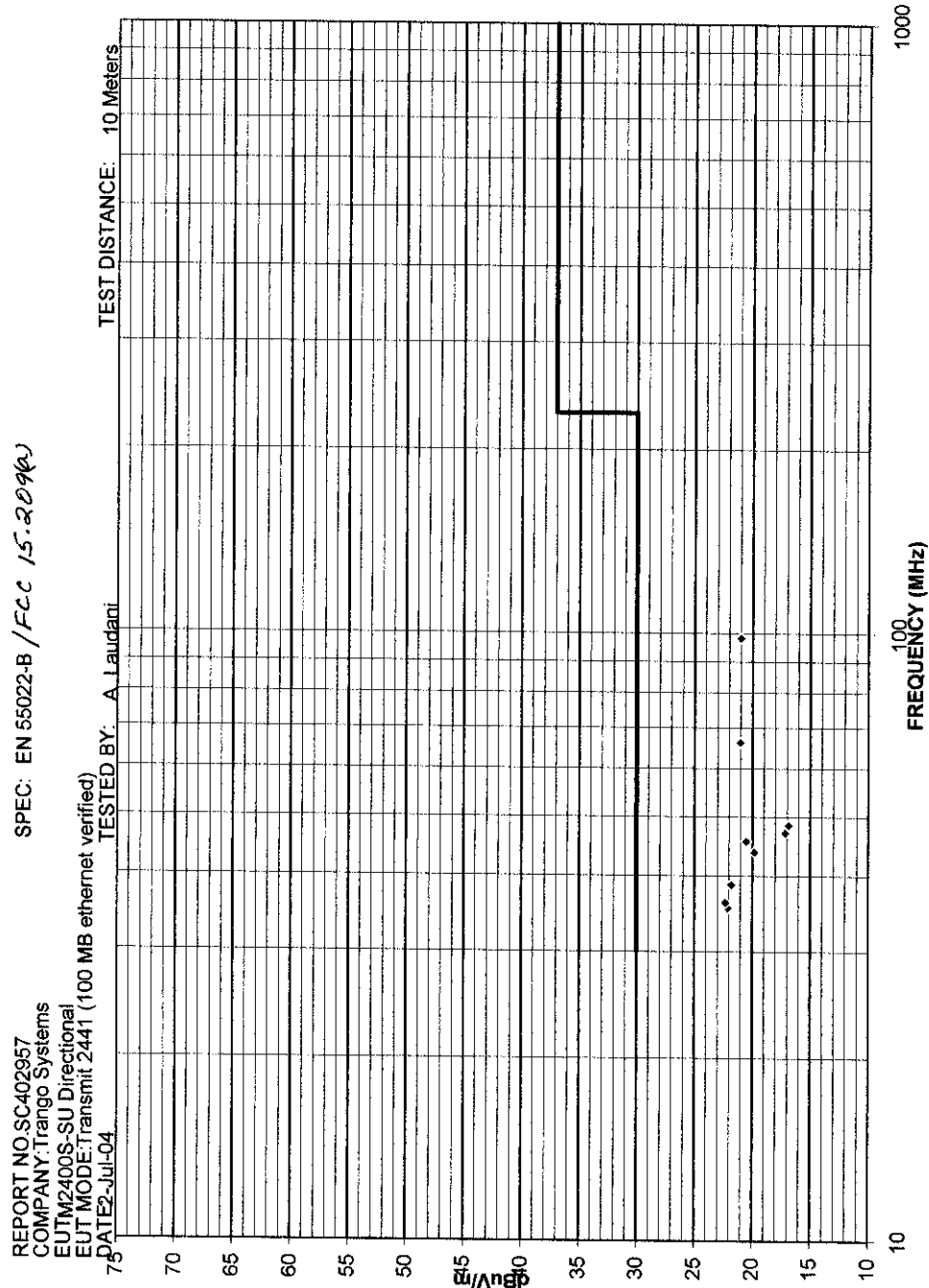
Test Equipment Used:

Model No.	Prop. No.	Description	Manufacturer	Serial No.	Cal Due Date
LPB 2520/A	738	Antenna, Bilog	Antenna Research	1169	09/04
ESVS 30	6723	EMI Test Receiver	Rhode & Schwarz	830350/006	01/05

Remarks: One year calibration cycle for all test equipment and sites.

Report No. SC402957-03

4.2 DATA



REPORT No: SC402957

SPEC: FCC 15.209(a) / EN 55022-8

CUSTOMER: Trango Systems

TEST DIST: 10 Meters

E U T: M2400S-SU Directional

TEST SITE: 1

EUT MODE: Transmit 2441 (100 MB ethernet verified)

BICONICAL: 738

DATE: 2-Jul-04 TESTED BY: A. Laudani

LOG PERIODIC: 738

NOTES: Quasi-Peak with 120 KHz measurement bandwidth.

RCVR: 6723

120 Vac 60 Hz

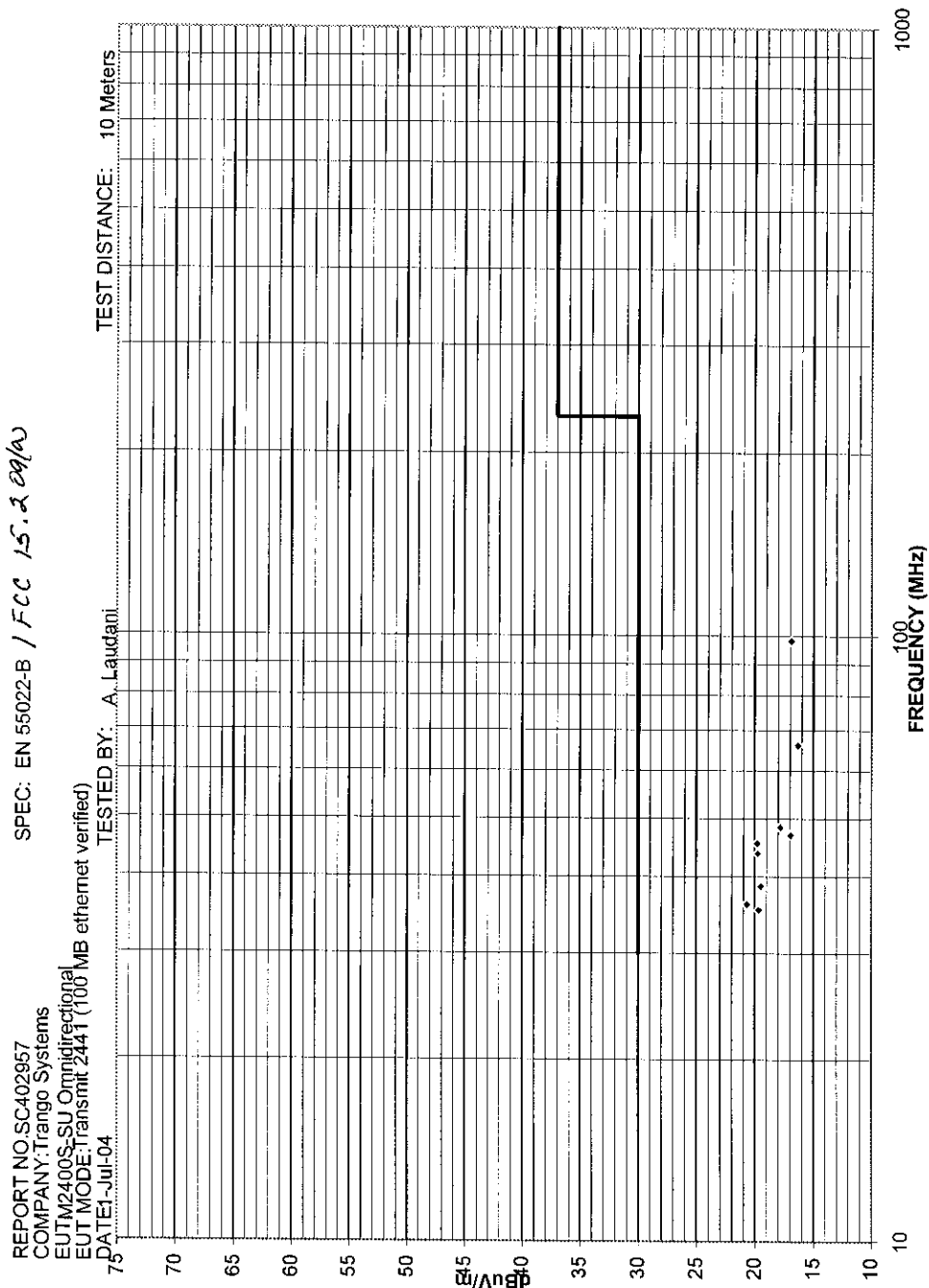
Connected ethernet cable shields in J-box, shielded ethernet cables

Temperature: 21°C Relative Humidity: 40

	Temperature	21 °C
EUT MARGIN	-7.7	dB at 36.13 MHz

ver 1.8

[illegible]



REPORT No: SC402957

SPEC: EN 55022-B / FCC 15.209(a)

CUSTOMER: Trango Systems

TEST DIST: 10 Meters

E U T: M2400S-SU Omnidirectional

TEST SITE: 1

EUT MODE: Transmit 2441 (100 MB ethernet verified)

BICONICAL: 738

DATE: 1-Jul-04 TESTED BY: A. Laudani

LOG PERIODIC: 738

NOTES: Quasi-Peak with 120 KHz measurement bandwidth.

RCVR: 6723

120 Vac 60 Hz

Connected ethernet shields in J-box, shielded ethernet cables

Temperature: 19°C

Relative Humidity: 40%

EUT MARGIN

-9.3

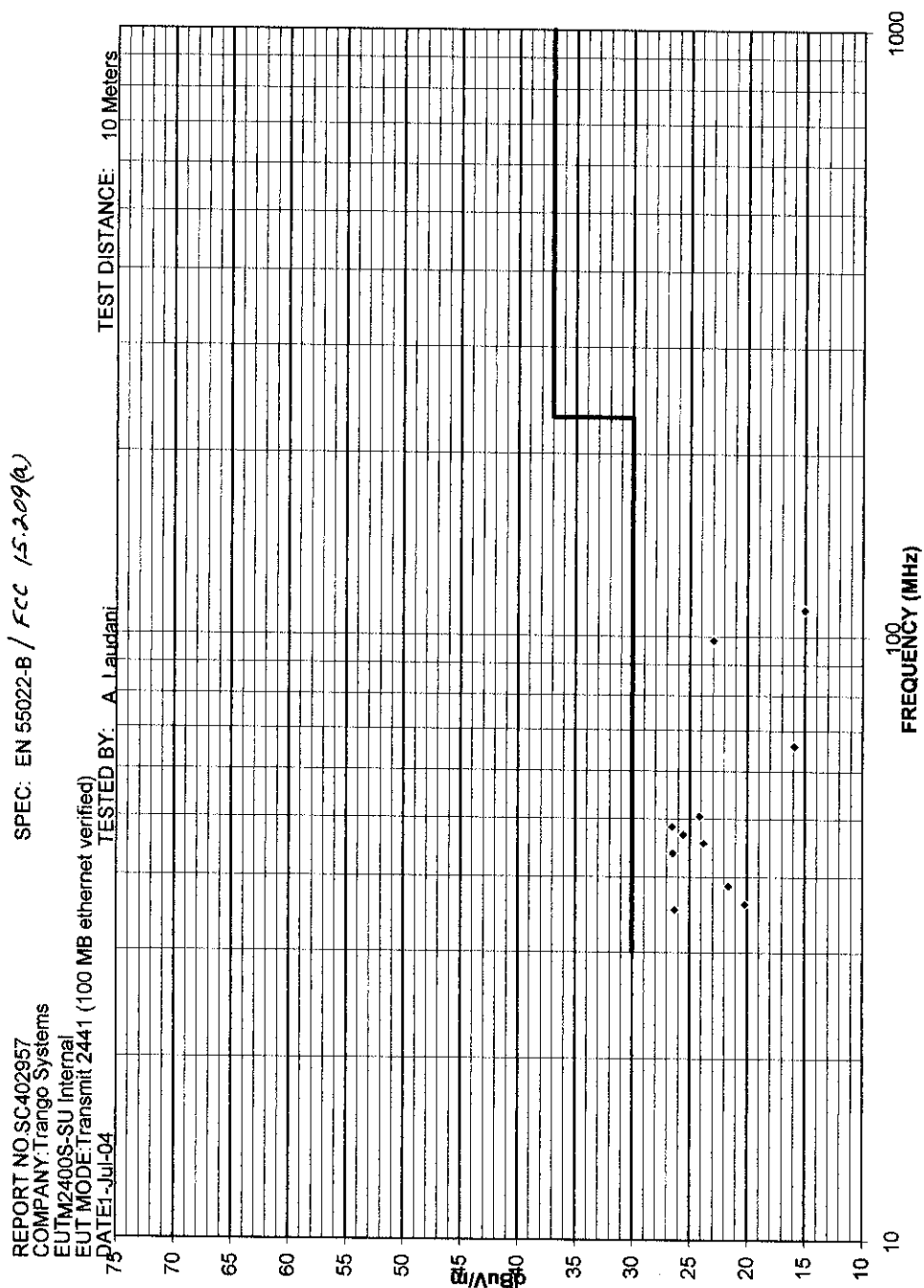
dB at 36.13 MHz

17

4076

ver 1.8

[illegible]



REPORT No: SC402957

SPEC: FCC 15.209(a) / EN55022-8

CUSTOMER: Trango Systems

TEST DIST: 10 Meters

E U T: M2400S-SU Internal

TEST SITE: 1

EUT MODE: Transmit 2441 (100 MB ethernet verified)

BICONICAL: 738

DATE: 1-Jul-04 TESTED BY: A. Laudani

LOG PERIODIC: 738

NOTES: Quasi-Peak with 120 KHz measurement bandwidth.

RCVR: 6723

120 Vac 60 Hz

Connected ethernet cable shields in J-box, shielded ethernet cables

Temperature: 19°C

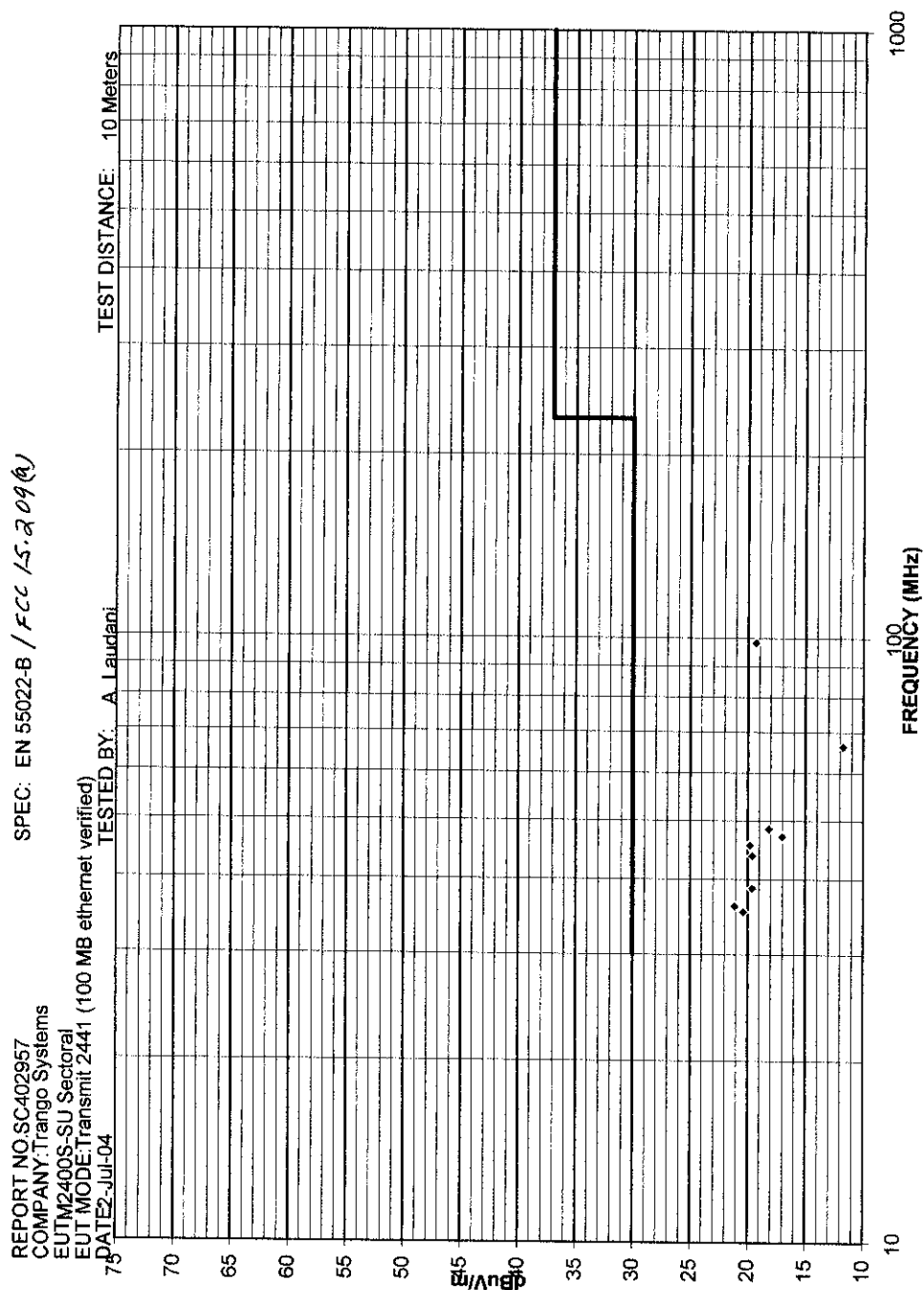
Relative Humidity: 40

EUT MARGIN

-3.5 dB at 48.46 MHz

ver 1.8

[illegible]



REPORT No: SC402957

SPEC: FCC 15.209(a) *FEN 55022-B*

CUSTOMER: Trango Systems

TEST DIST: 10 Meters

E U T: M2400S-SU Sectoral

TEST SITE: 1

EUT MODE: Transmit 2441 (100 MB ethernet verified)

BICONICAL: 738

DATE: 2-Jul-04 TESTED BY: A. Laudani

LOG PERIODIC: 738

NOTES: Quasi-Peak with 120 KHz measurement bandwidth.

RCVR: 6723

120 Vac 60 Hz

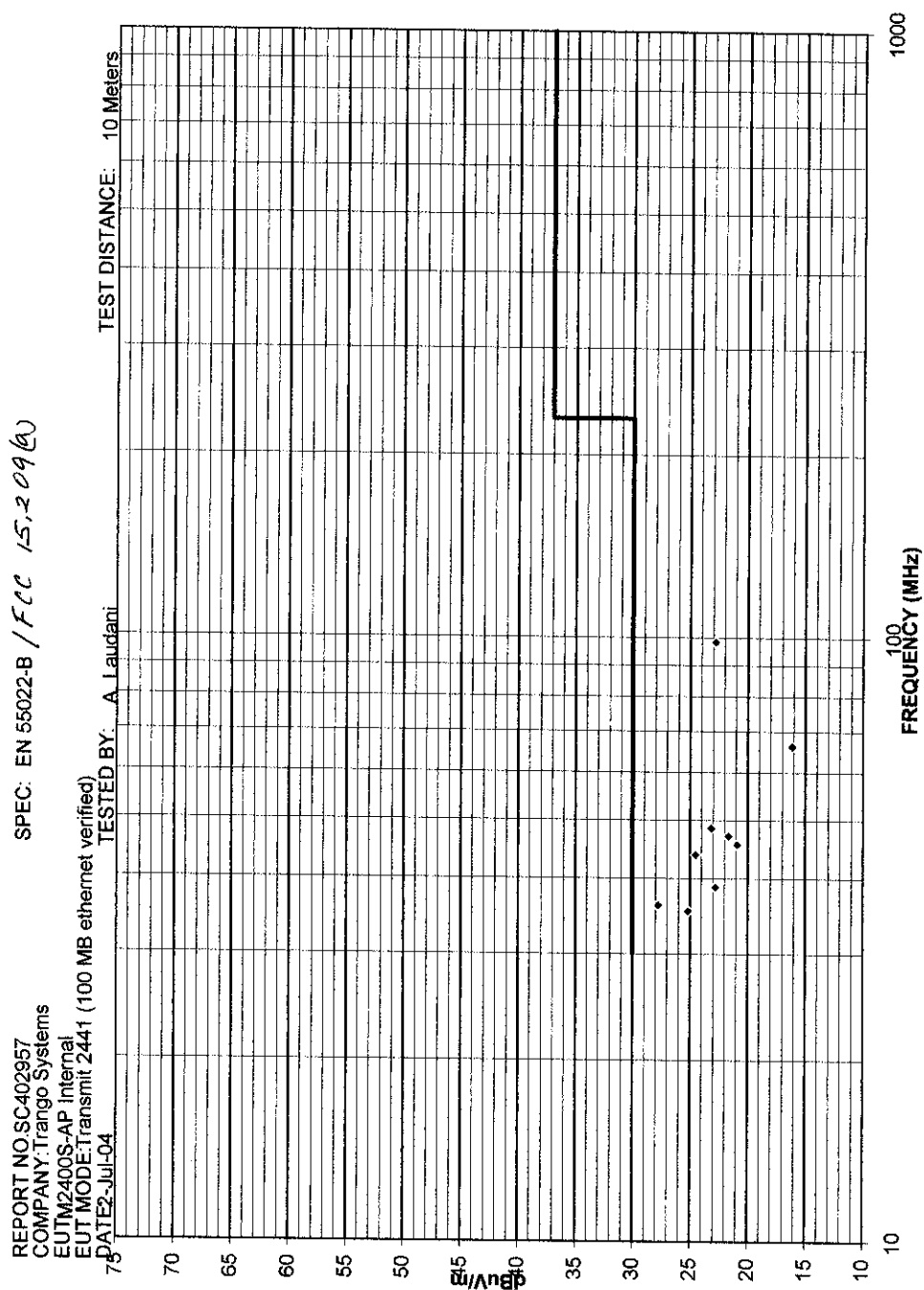
Connected ethernet cable shields in J-box, shielded ethernet cables

Temperature: 21°C Relative Humidity: 40

EUT MARGIN	-8.9	dB at 36.13 MHz
-------------------	------	-----------------

ver 1.8

[illegible]



REPORT No: SC402957

SPEC: FCC 15.209(a) / EN 55022-8

CUSTOMER: Trango Systems

TEST DIST: 10 Meters

E U T: M2400S-AP Internal

TEST SITE: 1

EUT MODE: Transmit 2441 (100 MB ethernet verified)

BICONICAL: 738

DATE: 2-Jul-04 TESTED BY: A. Laudani

LOG PERIODIC: 738

NOTES: Quasi-Peak with 120 KHz measurement bandwidth.

RCVR: 6723

120 Vac 60 Hz

Connected ethernet cable shields in J-box, shielded ethernet cables

Temperature: 21°C

Relative Humidity: 40

EUT MARGIN

-2.2 dB at 36.13 MHz

ver 1.8

[illegible]

Report No. SC402957-03

5.0 BANDWIDTH CFR 47, Part 15, Paragraph 15.247(a)(2)

5.1 EQUIPMENT

The **BANDWIDTH** measurements were performed at the Battelle Facility, Columbus Ohio:

☐ - Test not applicable

■ - SR3 - Shielded Room

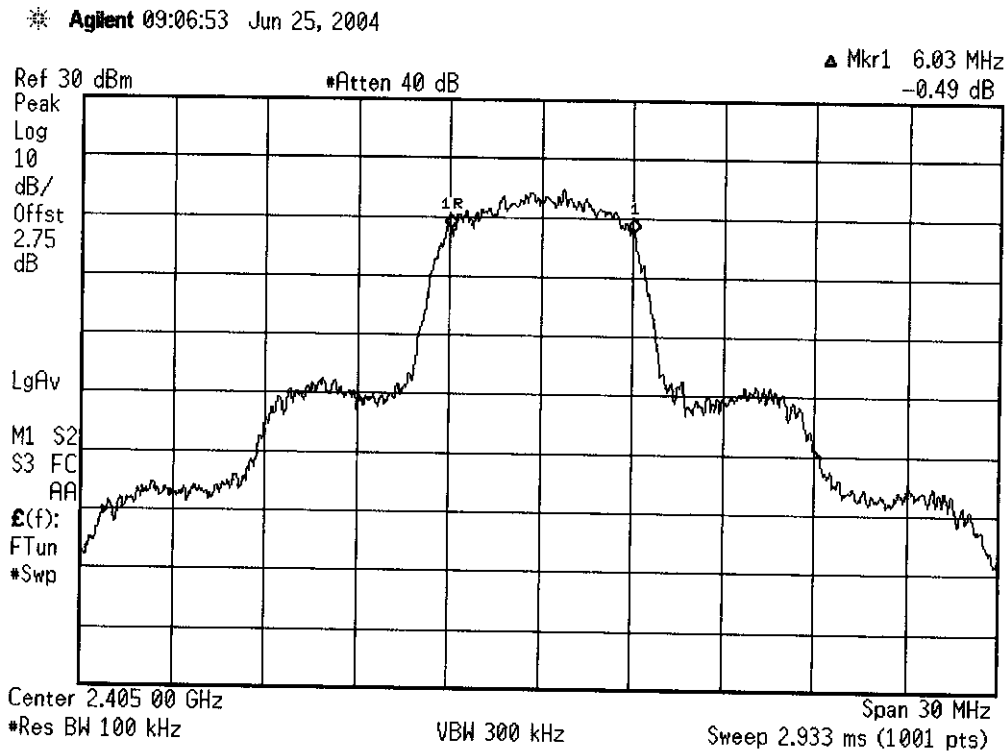
Test Equipment Used:

Model No.	Prop. No.	Description	Manufacturer	Serial No.	Cal Due Date
E4440A	6814	Spectrum Analyzer	Agilent	MY42510441	08/04
CBL6111	6527	Bilog Antenna	Chase	1013	Verified
83640B	6614	Sweep Signal Generator	Hewlett Packard	3044A00726	06/05

Remarks: One year calibration cycle for all test equipment and sites.

Report No. SC402957-03

5.2 DATA



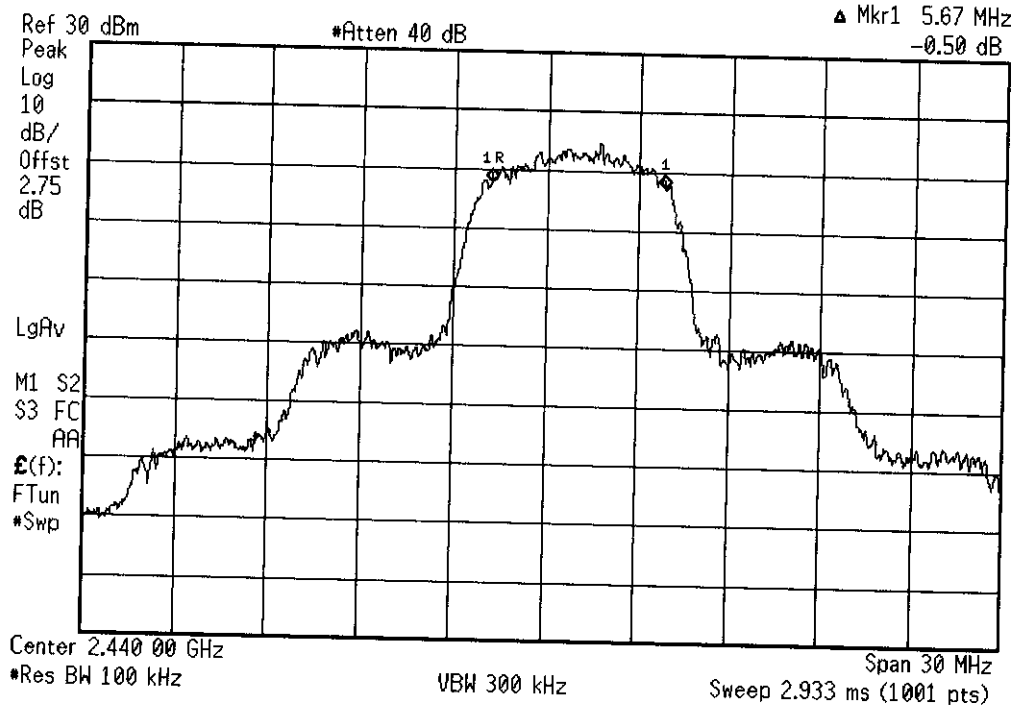
SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (a)(2) 6 dB Bandwidth
Low Band 2405 MHz
BW Limit > 500 kHz

Report No. SC402957-03

* Agilent 20:26:49 Jun 16, 2001



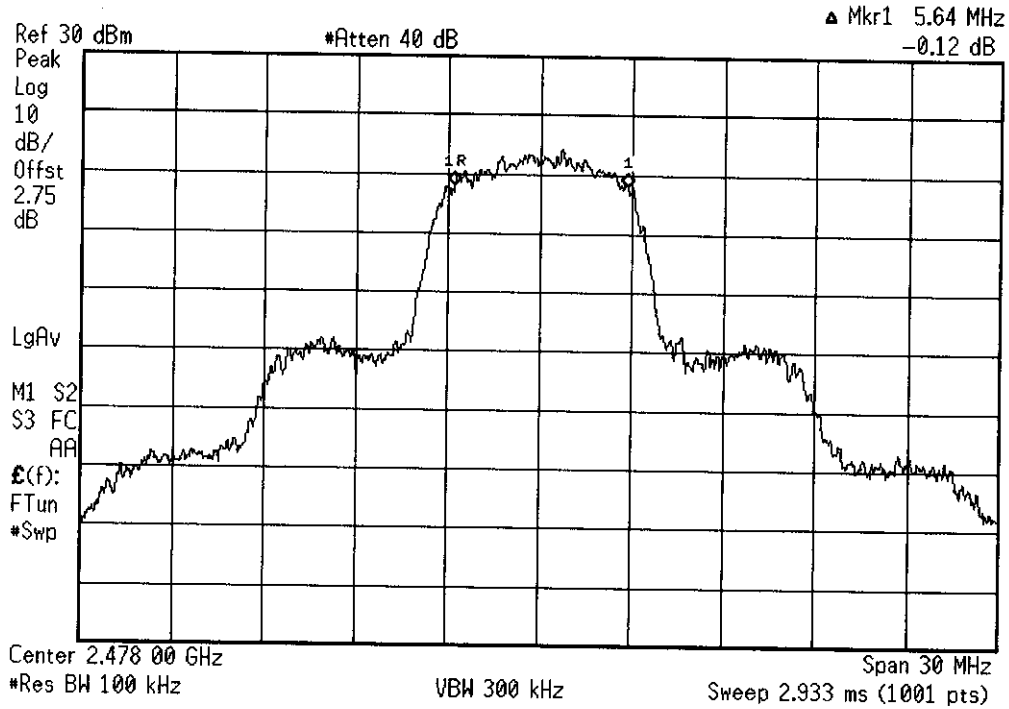
SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (a)(2) 6 dB Bandwidth
Mid Band 2441 MHz
BW Limit > 500 kHz

Report No. SC402957-03

✴ Agilent 09:17:08 Jun 25, 2004



SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (a)(2) 6 dB Bandwidth
High Band 2478 MHz
BW Limit > 500 kHz

Report No. SC402957-03

6.0 RF POWER OUTPUT, CFR 47 Part 15, Paragraph 15.247(b)(3)

6.1 EQUIPMENT

The *RF POWER OUTPUT* measurements were performed at the San Diego Testing Facility:

☐ - Test not applicable

☒ - Roof (Small Open Area Test Site)

Test Equipment Used:

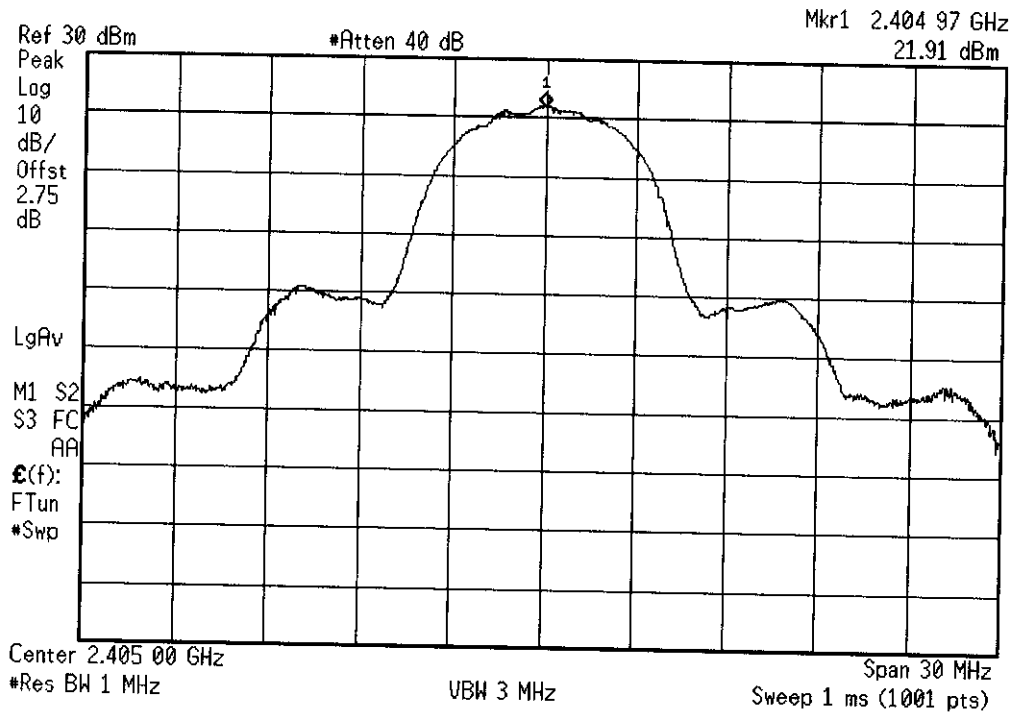
Model No.	Prop. No.	Description	Manufacturer	Serial No.	Cal Due Date
HP8566B	744	Spectrum Analyzer	Hewlett Packard	2618A02913	01/05
AMF-5D-010180-35-10P	719	Pre-Amp, 40 dB	Miteg	--	Verified
3115	453	Horn Antenna	EMCO	7412-4364	02/06
BRM50702	6815	2483.5 High Pass Filter	Microtronics	008	Verified

Remarks: One year calibration cycle for all test equipment and sites.

Report No. SC402957-03

6.2 DATA

* Agilent 09:07:17 Jun 25, 2004



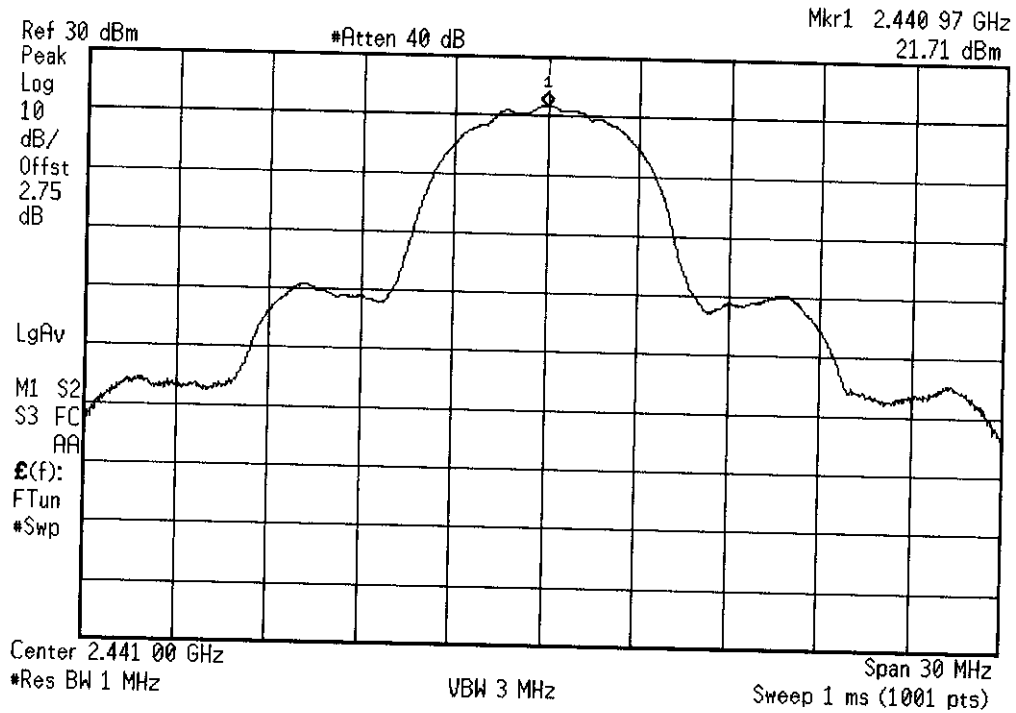
SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (b)(3) Conductive Peak Output Power
Low Band 2405 MHz
Limit = 1 Watt (30 dBm)

Report No. SC402957-03

※ Agilent 19:56:32 Jun 16, 2001



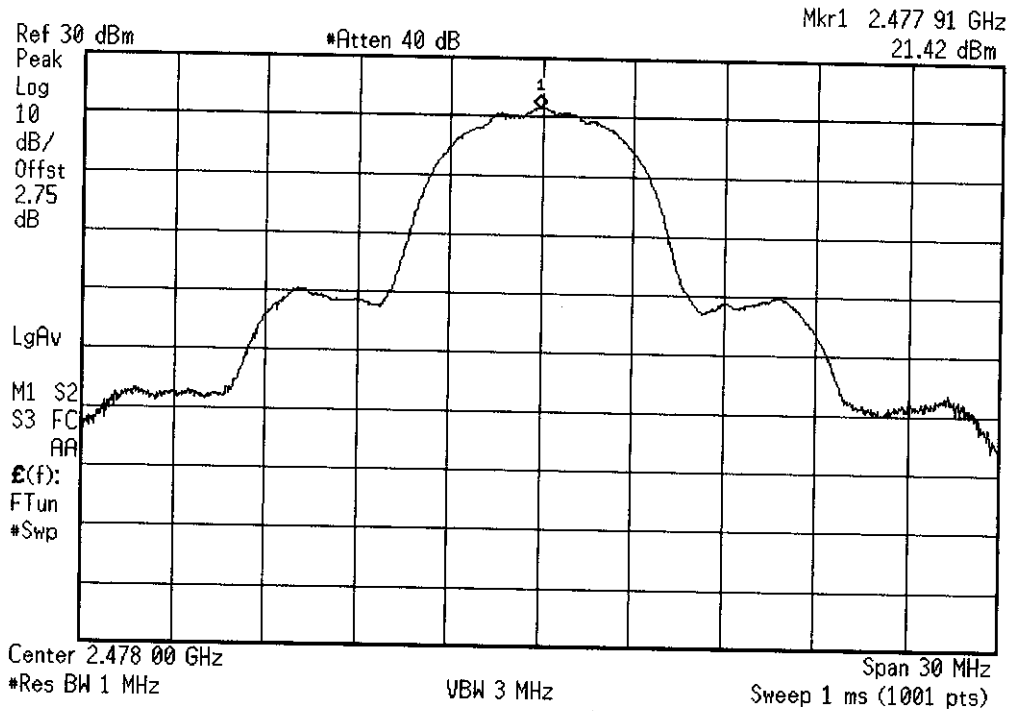
SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (b)(3) Conductive Peak Output Power
Mid Band 2441 MHz
Limit = 1 Watt (30 dBm)

Report No. SC402957-03

✱ Agilent 09:18:00 Jun 25, 2004



SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (b)(3) Conductive Peak Output Power
High Band 2478 MHz
Limit = 1 Watt (30 dBm)

Report No. SC402957-03

7.0 OUTPUT POWER SUMMARY CFR 47, Part 15, Paragraph 15.247(b)(4)

7.1 EQUIPMENT

The *Output Power Summary* measurements were performed at the following test location:

☐ - Test not applicable

☒ - Roof (Small Open Area Test Site)

Test Equipment Used:

Model No.	Prop. No.	Description	Manufacturer	Serial No.	Cal Due Date
HP8566B	744	Spectrum Analyzer	Hewlett Packard	2618A02913	01/05
AMF-5D-010180-35-10P	719	Pre-Amp, 40 dB	Miteg	--	Verified
3115	453	Horn Antenna	EMCO	7412-4364	02/06
BRM50702	6815	2483.5 High Pass Filter	Microtronics	008	Verified

Remarks: One year calibration cycle for all test equipment and sites.

7.2 DATA

SC402957
Trango Systems
Output Power Summary

15.247(b)(4)(i) Output Power (gain set to 23 dBm by test software)
Low 2405 dBm Mid 2441 dBm High 2478 dBm
Conductive Power (dBm) 21.91 21.71 21.42
Limit 1 Watt (30 dBm) EUT Complies

15.247(b)(4)

Fixed Point-to-Point	Antenna Gain	Gain set EUT	G - 6 dBi	Reduced	Power *Allowed	Power Measured	Power Margin
SU Internal	15	23	9	3	27.0	21.91	-5.1 dBm
Omnidirectional	12	23	6	2	28.0	21.91	-6.1 dBm
Sectoral	17	19	11	3.7	26.3	21.91	-4.4 dBm
Directional	24	12	18	6	24.0	21.91	-2.1 dBm

1 Watt (30 dBm) * reduced by 1 dB for every 3 dB exceeding 6 dBi
To pass Bandedge 15.205(a), Highest channel limited to 2475 MHz.
For Highest Channel 2475 MHz, Gain reduced by 1dB to pass bandedge 15.205(a)

Point-to-Multipoint Limit $\leq$ 36 dBm

Antenna	Antenna Gain	Gain set EUT	EIRP (dBm)	
AP Internal	13	23	36	For Highest Channel 2475 MHz, Gain reduced by 2 dB
Omnidirectional	12	23	35	
Sectoral	17	19	36	
Directional	24	12	36	

Report No. SC402957-03

8.0 CONDUCTED SPURIOUS EMISSIONS, CFR 47, Part 15, Paragraph 15.247(c)

8.1 EQUIPMENT

The *CONDUCTED SPURIOUS EMISSIONS* measurements were performed at the following test location:

☐ - Test not applicable

■ - SR-3, Shielded Room, 12' x 20' x 8', Metal Chamber

Test Equipment Used:

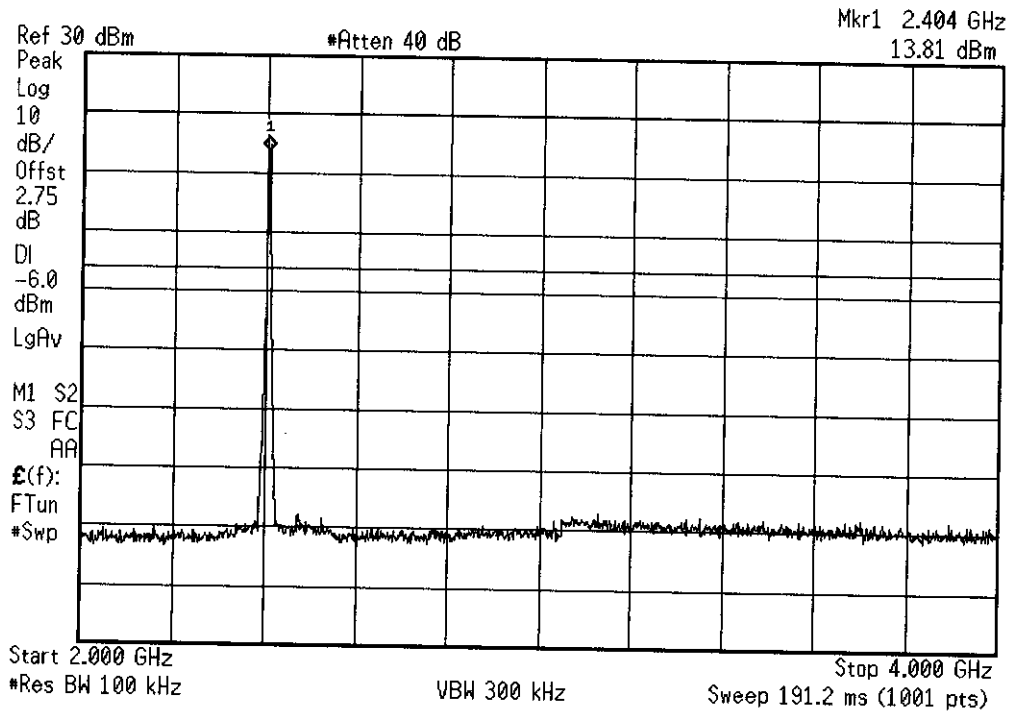
Model No.	Prop. No.	Description	Manufacturer	Serial No.	Cal Due Date
E4440A	6814	Spectrum Analyzer	Agilent	MY42510441	08/04

Remarks: One year calibration cycle for all test equipment and sites.

Report No. SC402957-03

8.2 DATA

* Agilent 09:09:00 Jun 25, 2004

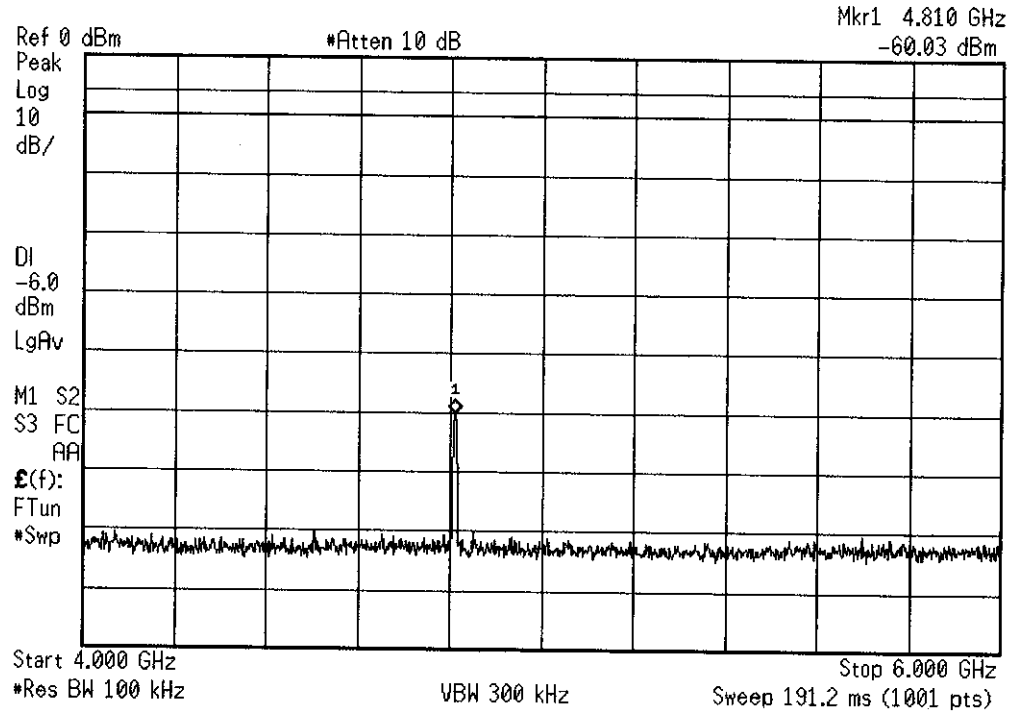


SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (c) Conductive Emissions
Low Band 2405 MHz
Limit = -20dB below output power as measured
BW = 100 kHz, Measured Output Power = 13.81
 $13.81 - 20 = -6.19$; Display Line = -6 dBm

Agilent 09:13:08 Jun 25, 2004



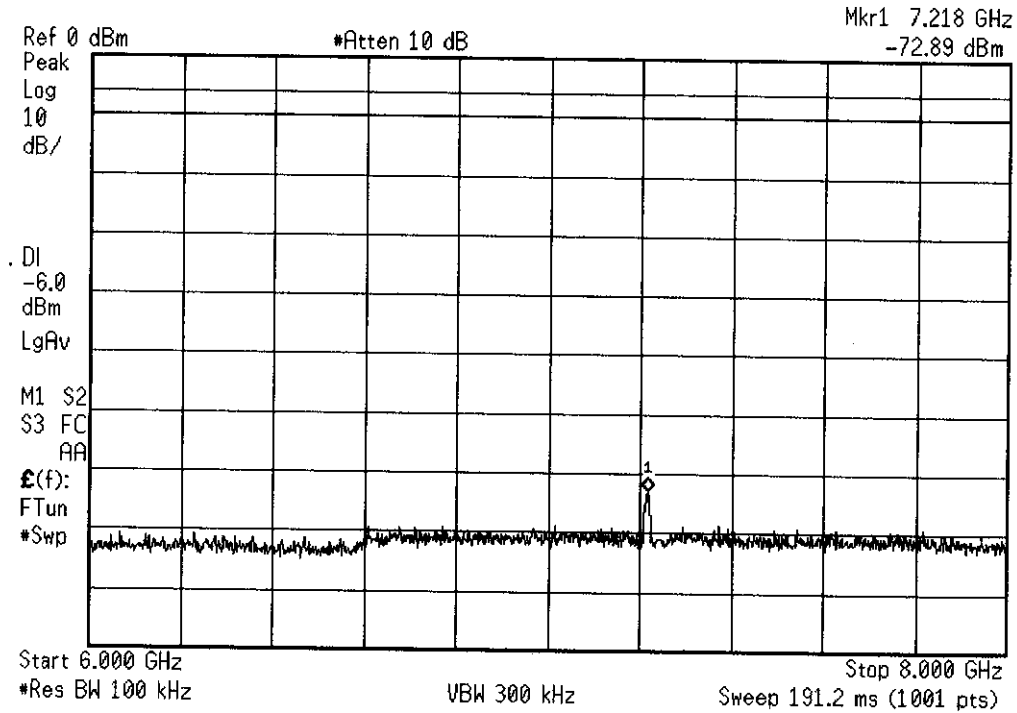
SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (c) Conductive Emissions
Low Band 2405 MHz
Limit = -20dB below output power as measured
BW = 100 kHz, Measured Output Power = 13.81
13.81 - 20 = -6.19; Display Line = -6 dBm

Report No. SC402957-03

※ Agilent 09:13:09 Jun 25, 2004



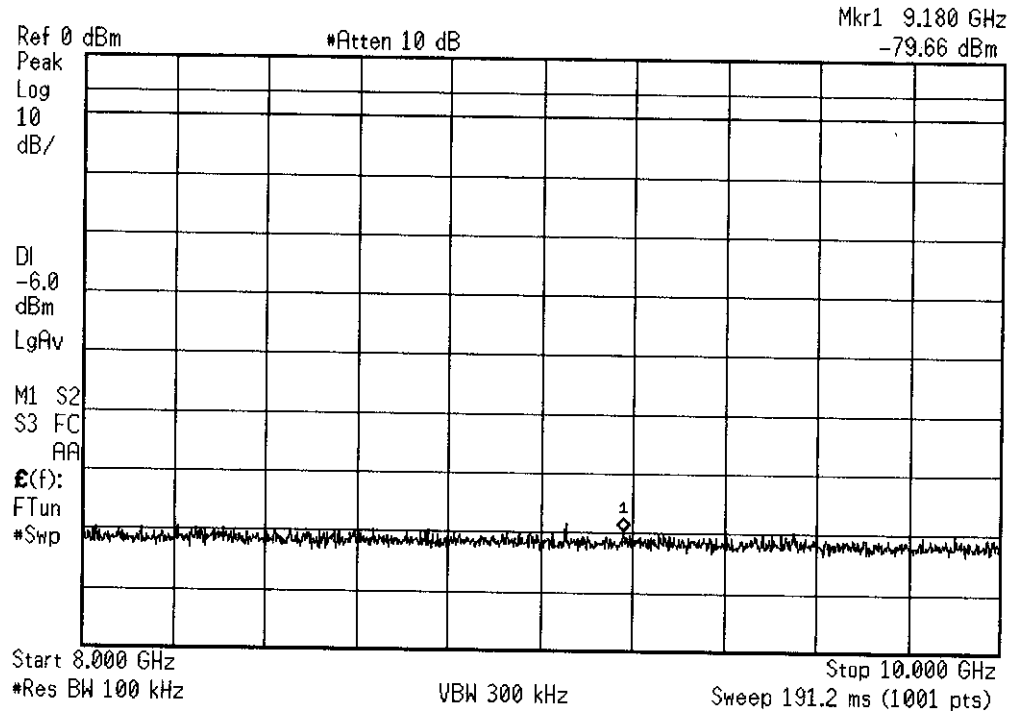
SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (c) Conductive Emissions
Low Band 2405 MHz
Limit = -20dB below output power as measured
BW = 100 kHz, Measured Output Power = 13.81
13.81 - 20 = -6.19; Display Line = -6 dBm

Report No. SC402957-03

✱ Agilent 09:13:29 Jun 25, 2004



SC402957

June 25, 2004

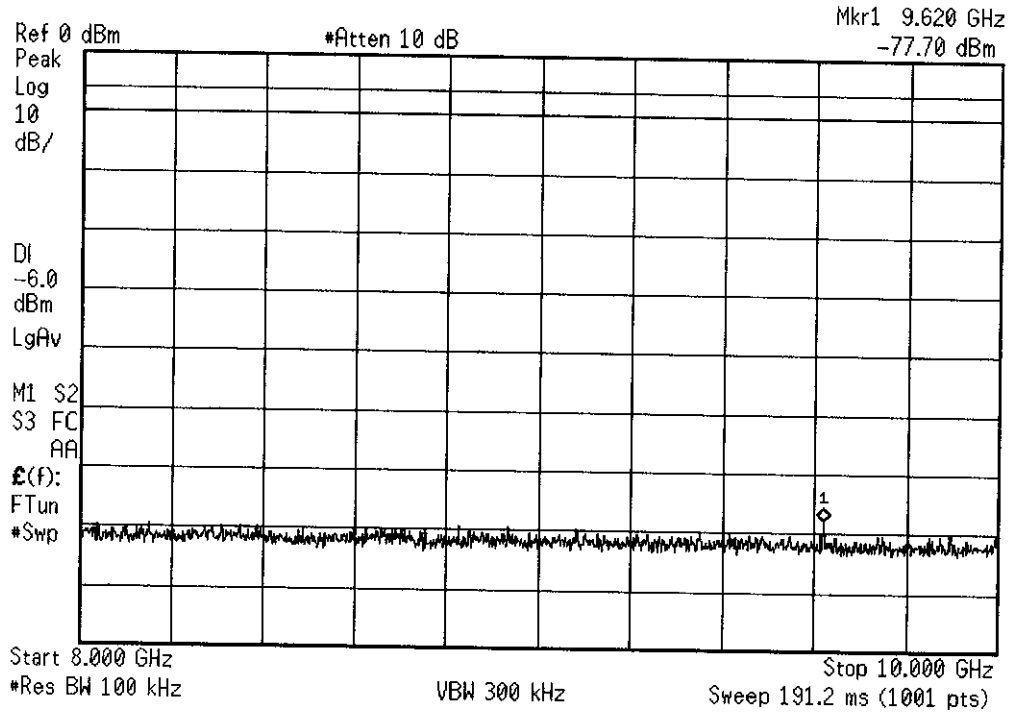
TRANGO SYSTEMS
MODEL M2400S

TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (c) Conductive Emissions
Low Band 2405 MHz
Limit = -20dB below output power as measured
BW = 100 kHz, Measured Output Power = 13.81
13.81 - 20 = -6.19; Display Line = -6 dBm

Report No. SC402957-03

* Agilent 09:13:32 Jun 25, 2004



SC402957

June 25, 2004

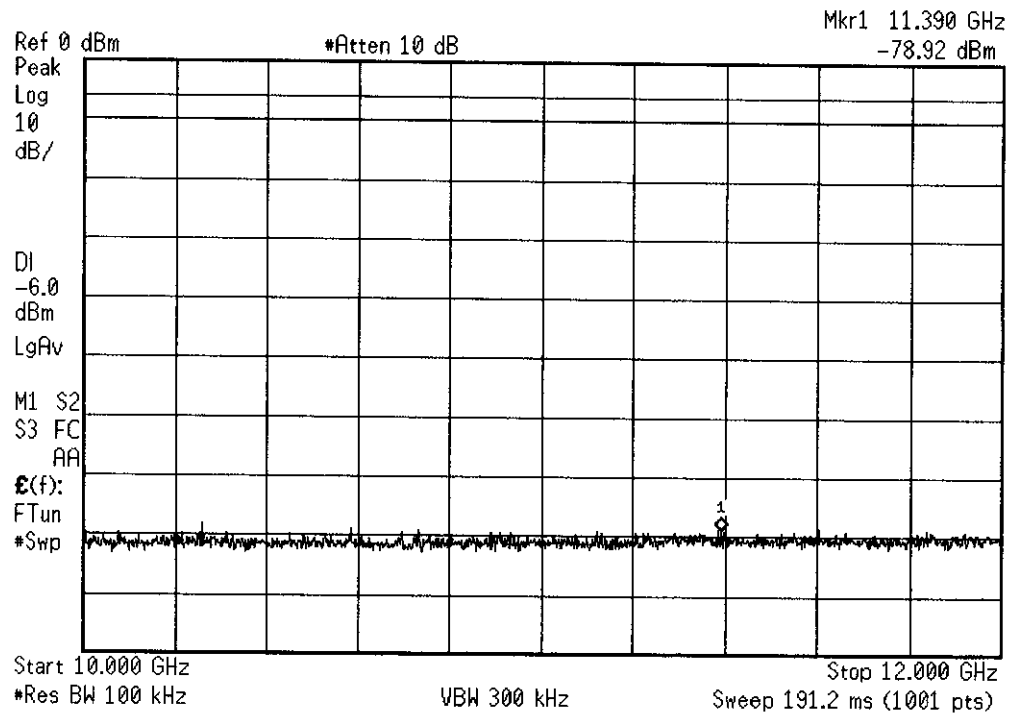
TRANGO SYSTEMS
MODEL M2400S

TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (c) Conductive Emissions
Low Band 2405 MHz
Limit = -20dB below output power as measured
BW = 100 kHz, Measured Output Power = 13.81
13.81 - 20 = -6.19; Display Line = -6 dBm

Report No. SC402957-03

✱ Agilent 09:13:58 Jun 25, 2004



SC402957

June 25, 2004

TRANGO SYSTEMS
MODEL M2400S

TECH/ENGR: AAL
LOCATION: SR3

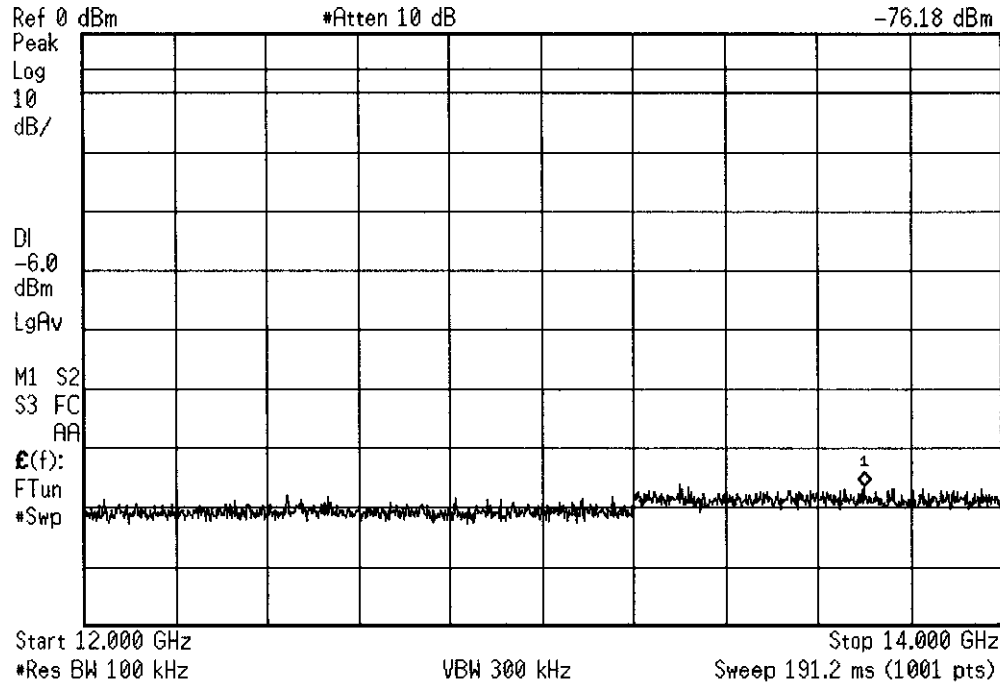
FCC 47 Part 15.247 (c) Conductive Emissions
Low Band 2405 MHz
Limit = -20dB below output power as measured
BW = 100 kHz, Measured Output Power = 13.81
13.81 - 20 = -6.19; Display Line = -6 dBm

Report No. SC402957-03

✱ Agilent 09:14:13 Jun 25, 2004

Mkr1 13.700 GHz

-76.18 dBm



SC402957

June 25, 2004

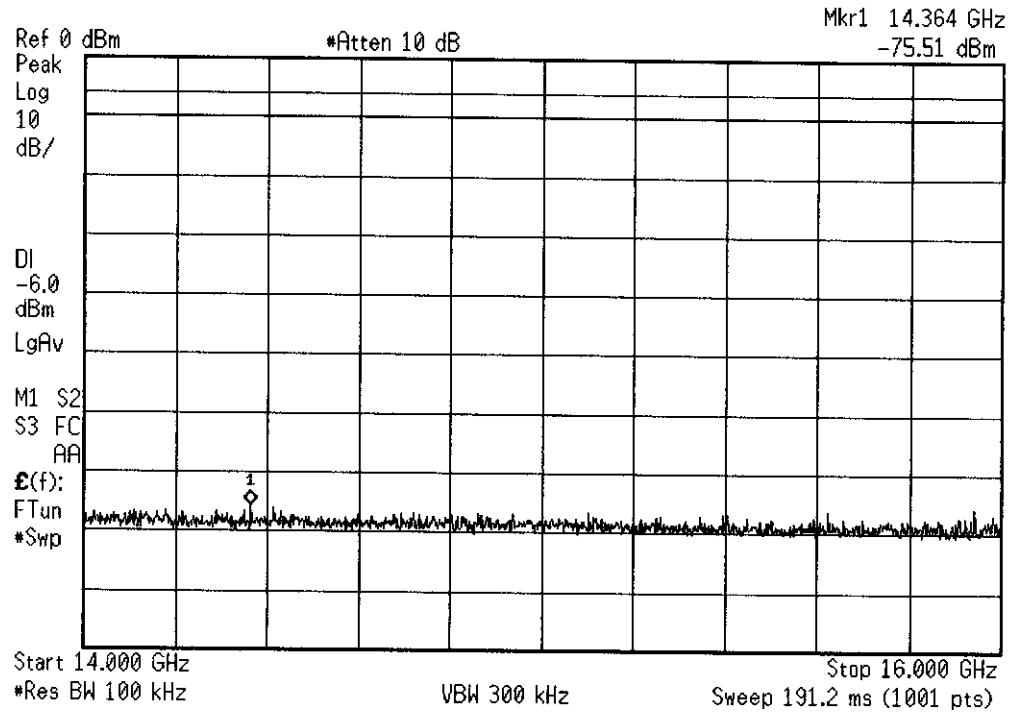
TRANGO SYSTEMS
MODEL M2400S

TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (c) Conductive Emissions
Low Band 2405 MHz
Limit = -20dB below output power as measured
BW = 100 kHz, Measured Output Power = 13.81
13.81 - 20 = -6.19; Display Line = -6 dBm

Report No. SC402957-03

✱ Agilent 09:14:41 Jun 25, 2004



SC402957

June 25, 2004

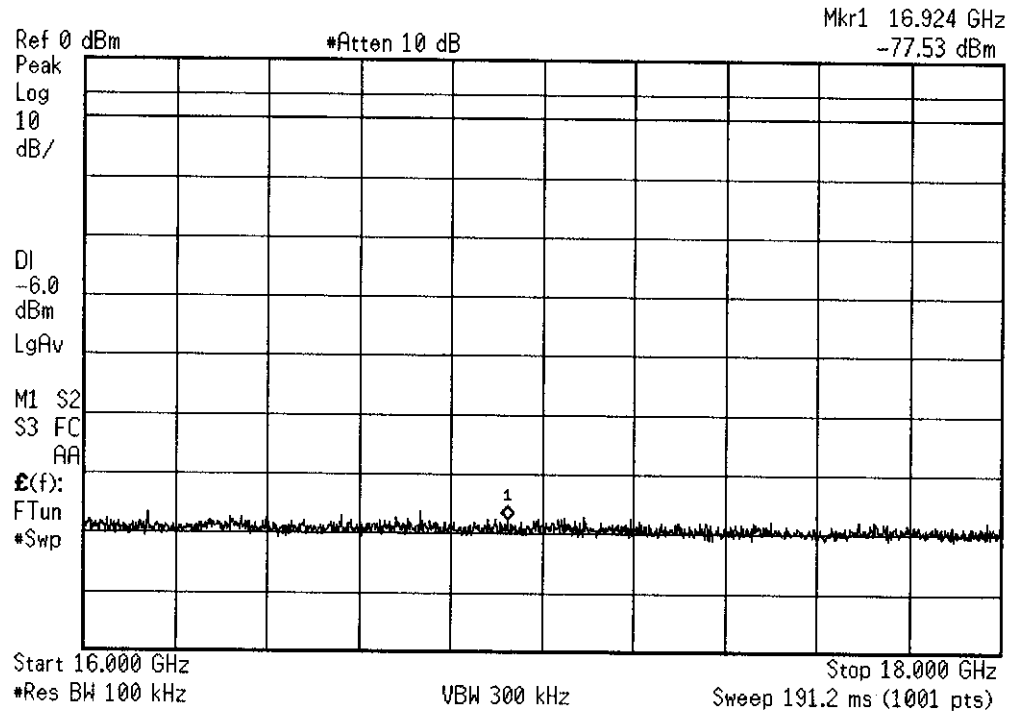
TRANGO SYSTEMS
MODEL M2400S

TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (c) Conductive Emissions
Low Band 2405 MHz
Limit = -20dB below output power as measured
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13.81 - 20 = -6.19; Display Line = -6 dBm

Report No. SC402957-03

* Agilent 09:15:03 Jun 25, 2004



SC402957

June 25, 2004

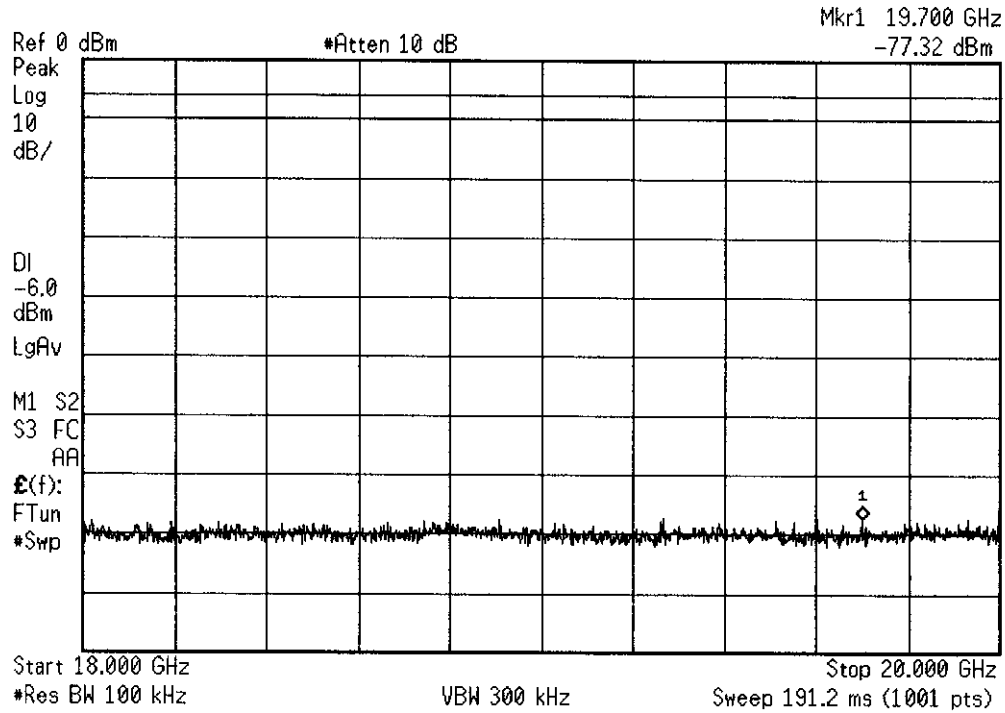
TRANGO SYSTEMS
MODEL M2400S

TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (c) Conductive Emissions
Low Band 2405 MHz
Limit = -20dB below output power as measured
BW = 100 kHz, Measured Output Power = 13.81
13.81 - 20 = -6.19; Display Line = -6 dBm

Report No. SC402957-03

* Agilent 09:15:18 Jun 25, 2004



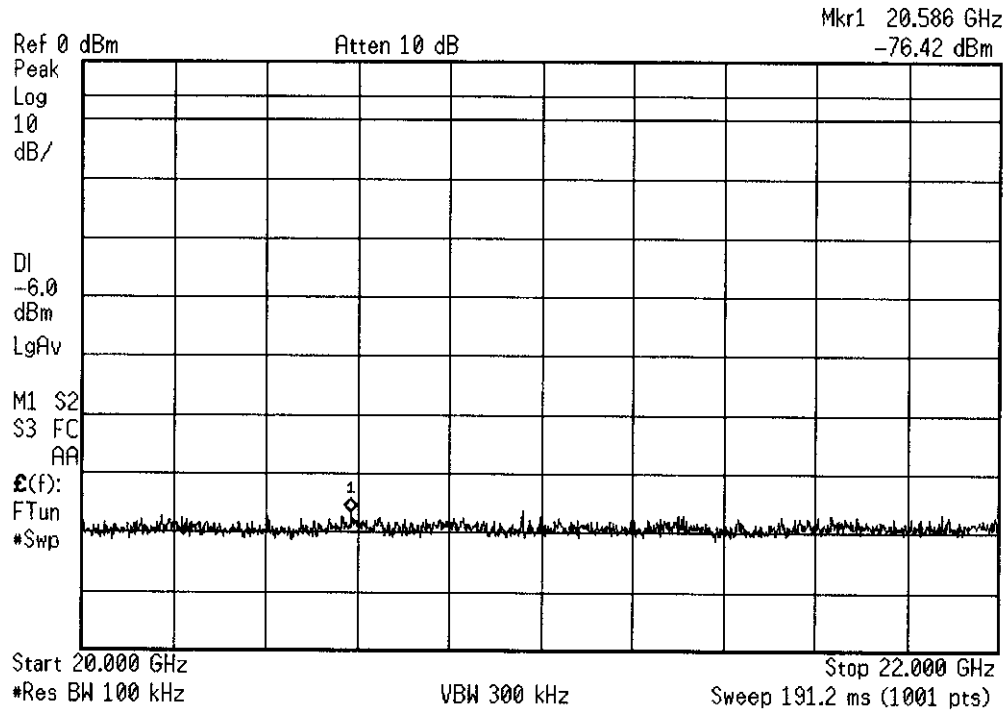
SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (c) Conductive Emissions
Low Band 2405 MHz
Limit = -20dB below output power as measured
BW = 100 kHz, Measured Output Power = 13.81
13.81 - 20 = -6.19; Display Line = -6 dBm

Report No. SC402957-03

✱ Agilent 09:15:31 Jun 25, 2004

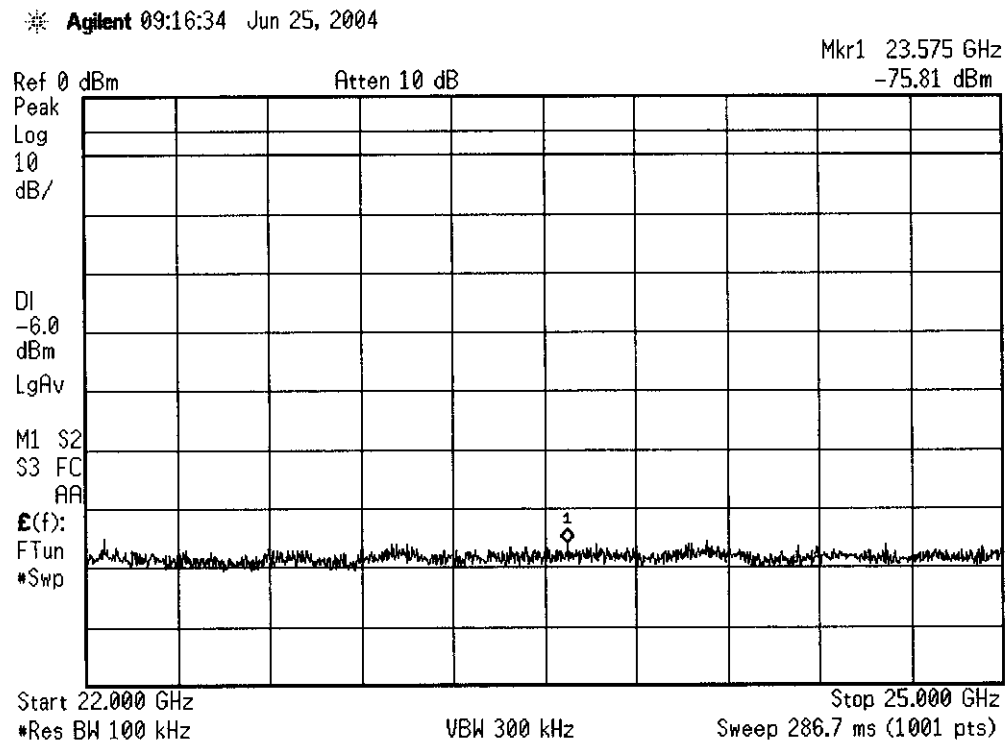


SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (c) Conductive Emissions
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Limit = -20dB below output power as measured
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Report No. SC402957-03

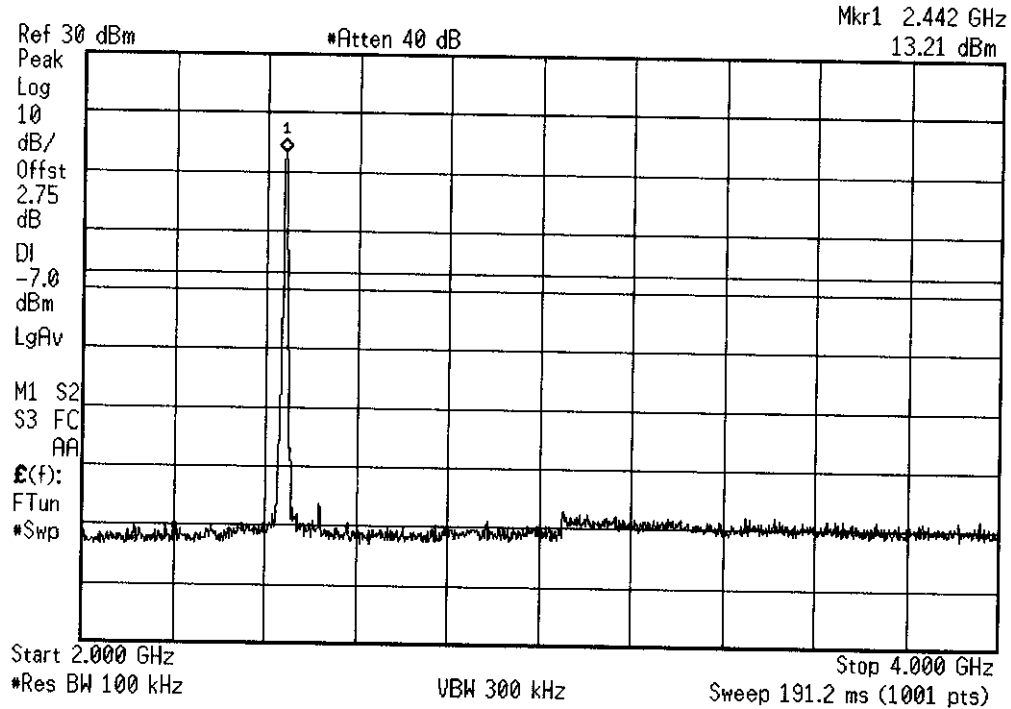


SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (c) Conductive Emissions
Low Band 2405 MHz
Limit = -20dB below output power as measured
BW = 100 kHz, Measured Output Power = 13.81
13.81 - 20 = -6.19; Display Line = -6 dBm

* Agilent 20:08:24 Jun 16, 2001



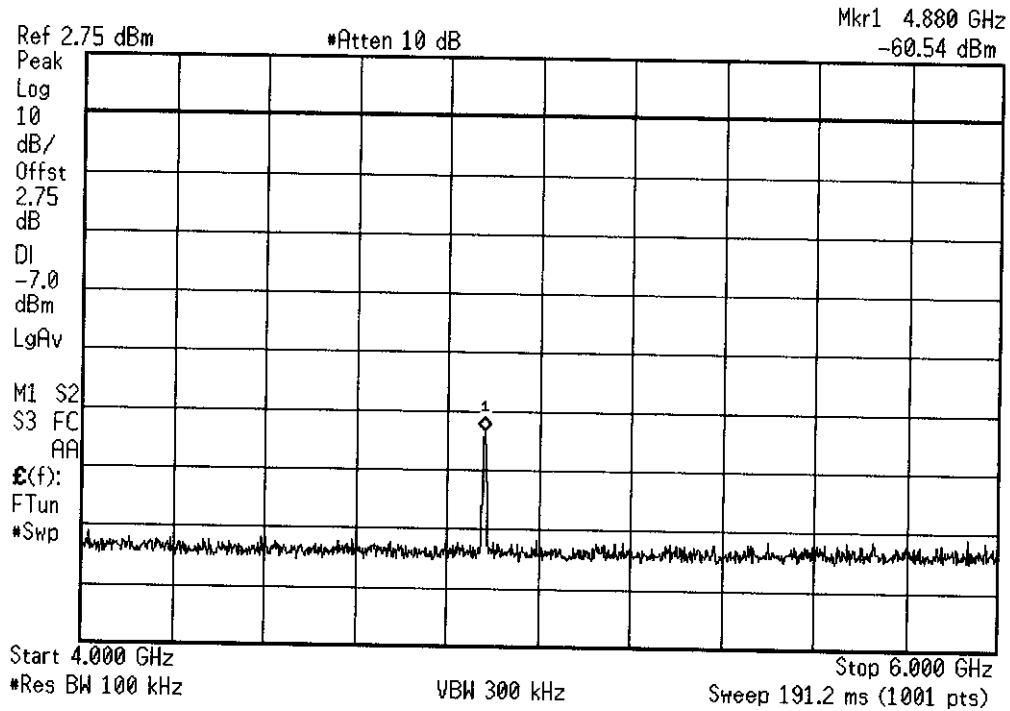
SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (c) Conductive Emissions
Mid Band 2441 MHz
Limit = -20dB below output power as measured
BW = 100 kHz, Measured Output Power = 13.21
13.21 - 20 = -6.79; Display Line = -7 dBm

Report No. SC402957-03

✱ Agilent 20:20:40 Jun 16, 2001

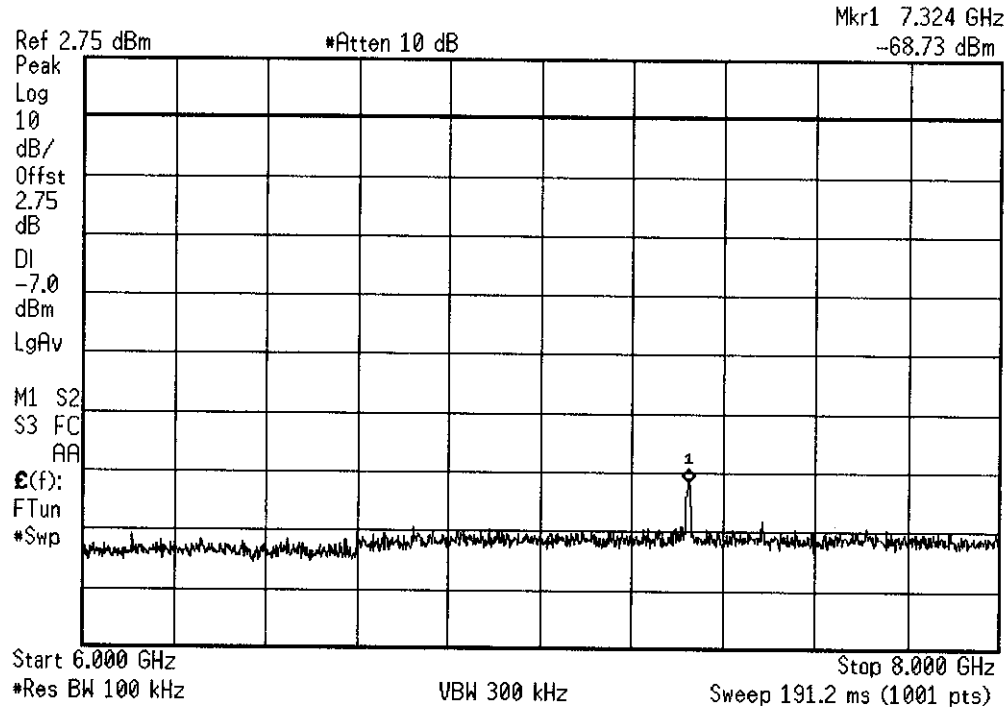


SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (c) Conductive Emissions
Mid Band 2441 MHz
Limit = -20dB below output power as measured
BW = 100 kHz, Measured Output Power = 13.21
13.21 - 20 = -6.79; Display Line = -7 dBm

* Agilent 20:21:21 Jun 16, 2001



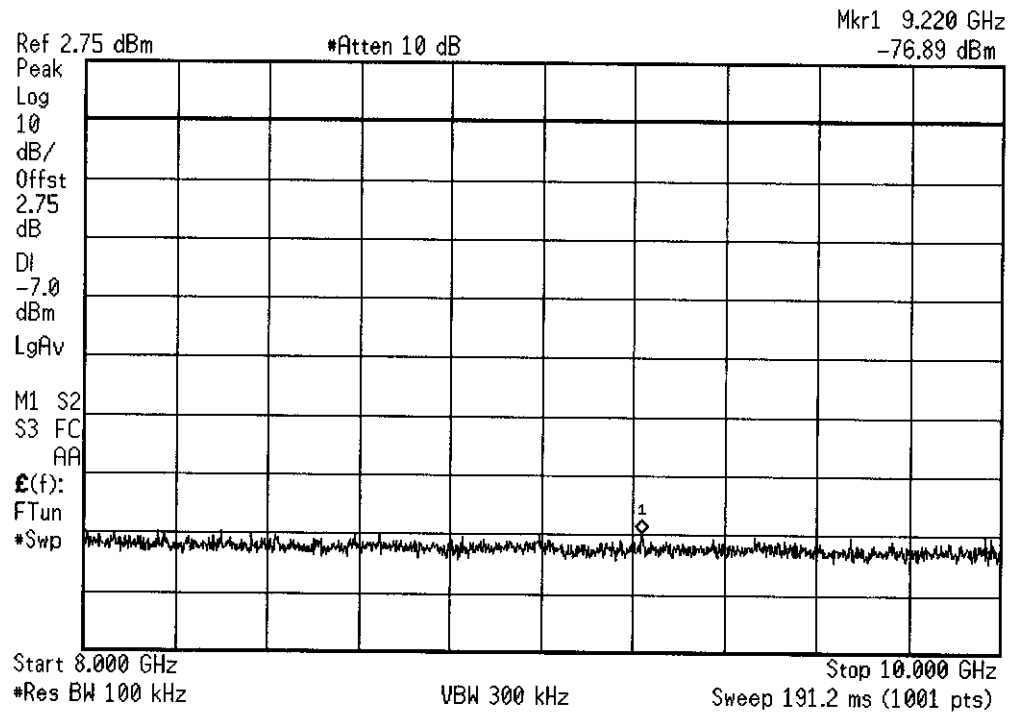
SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (c) Conductive Emissions
Mid Band 2441 MHz
Limit = -20dB below output power as measured
BW = 100 kHz, Measured Output Power = 13.21
 $13.21 - 20 = -6.79$; Display Line = -7 dBm

Report No. SC402957-03

※ Agilent 20:21:45 Jun 16, 2001



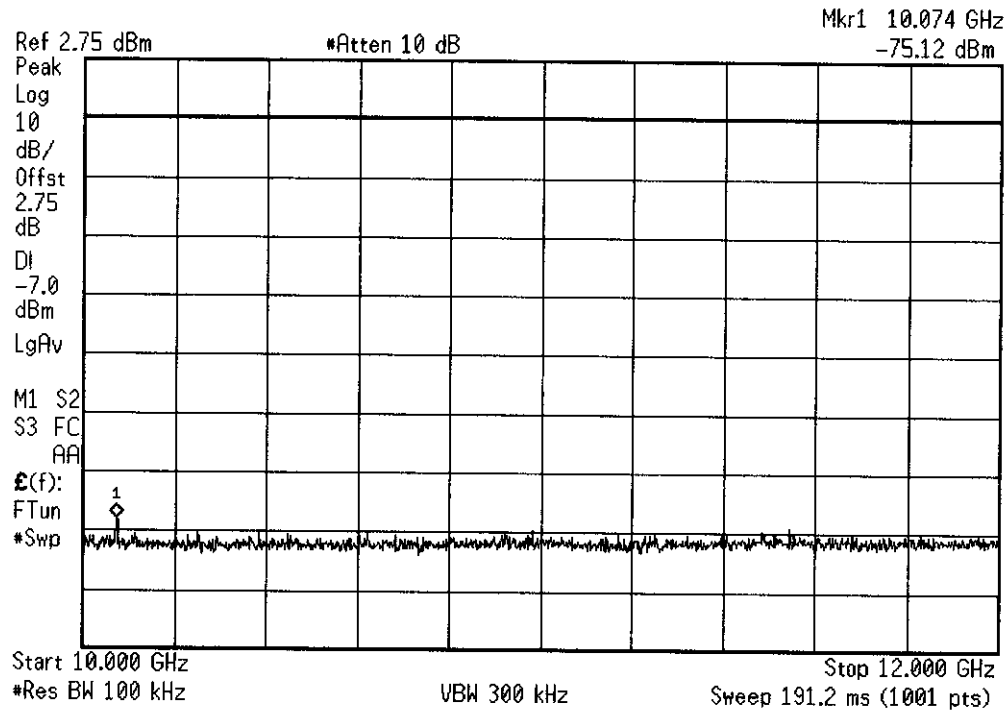
SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (c) Conductive Emissions
Mid Band 2441 MHz
Limit = -20dB below output power as measured
BW = 100 kHz, Measured Output Power = 13.21
 $13.21 - 20 = -6.79$; Display Line = -7 dBm

Report No. SC402957-03

✱ Agilent 20:22:16 Jun 16, 2001



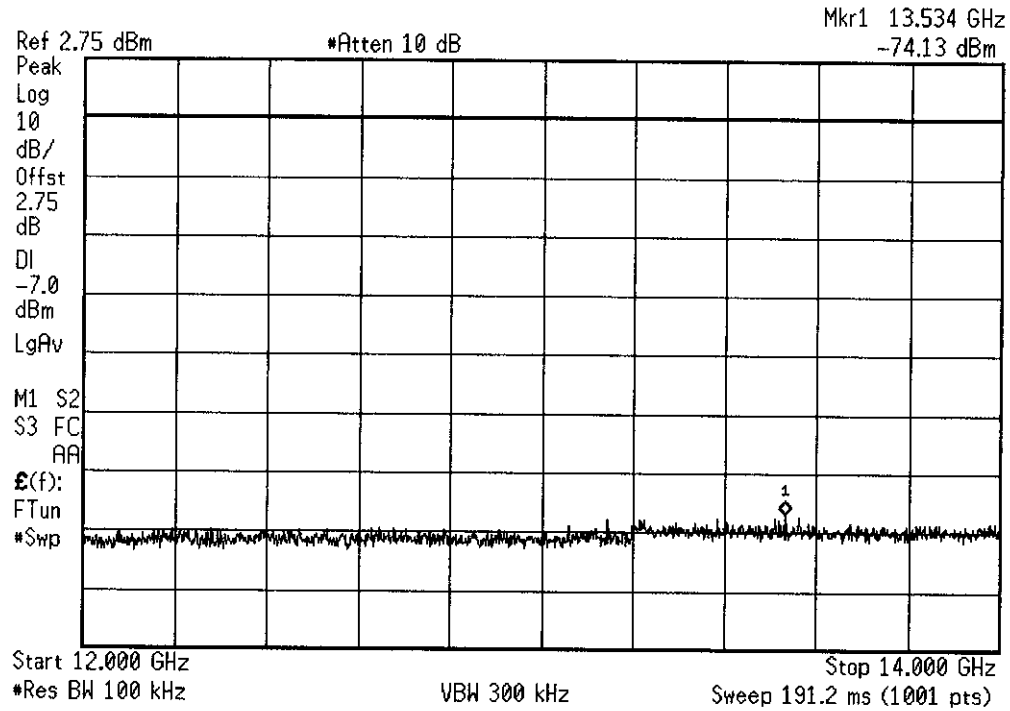
SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (c) Conductive Emissions
Mid Band 2441 MHz
Limit = -20dB below output power as measured
BW = 100 kHz, Measured Output Power = 13.21
 $13.21 - 20 = -6.79$; Display Line = -7 dBm

Report No. SC402957-03

✱ Agilent 20:22:33 Jun 16, 2001



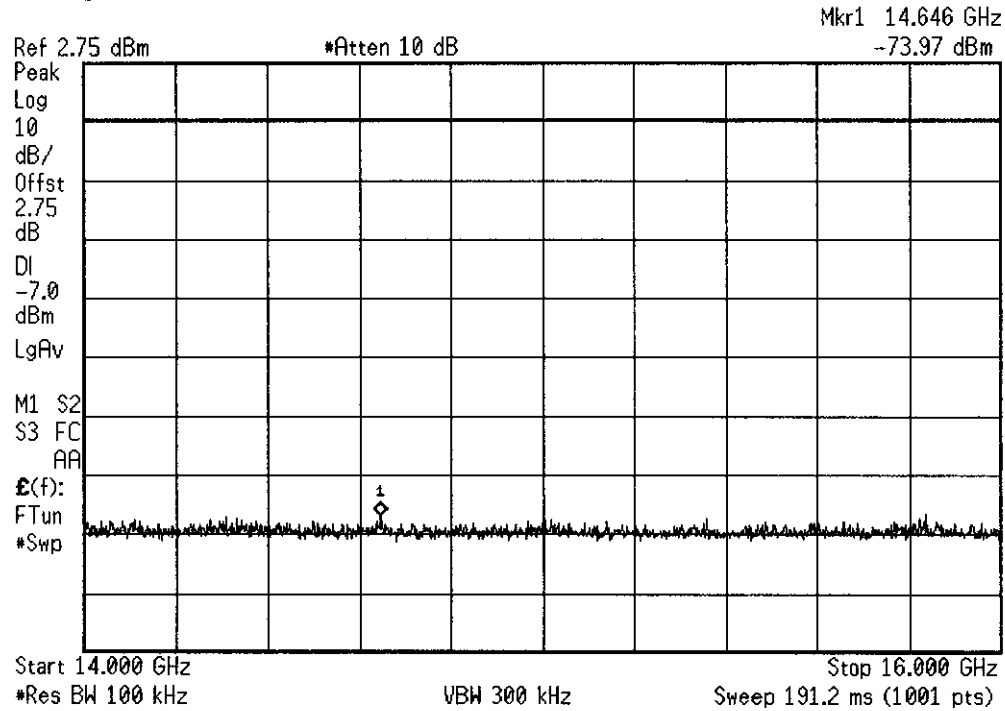
SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (c) Conductive Emissions
Mid Band 2441 MHz
Limit = -20dB below output power as measured
BW = 100 kHz, Measured Output Power = 13.21
 $13.21 - 20 = -6.79$; Display Line = -7 dBm

Report No. SC402957-03

* Agilent 20:22:55 Jun 16, 2001

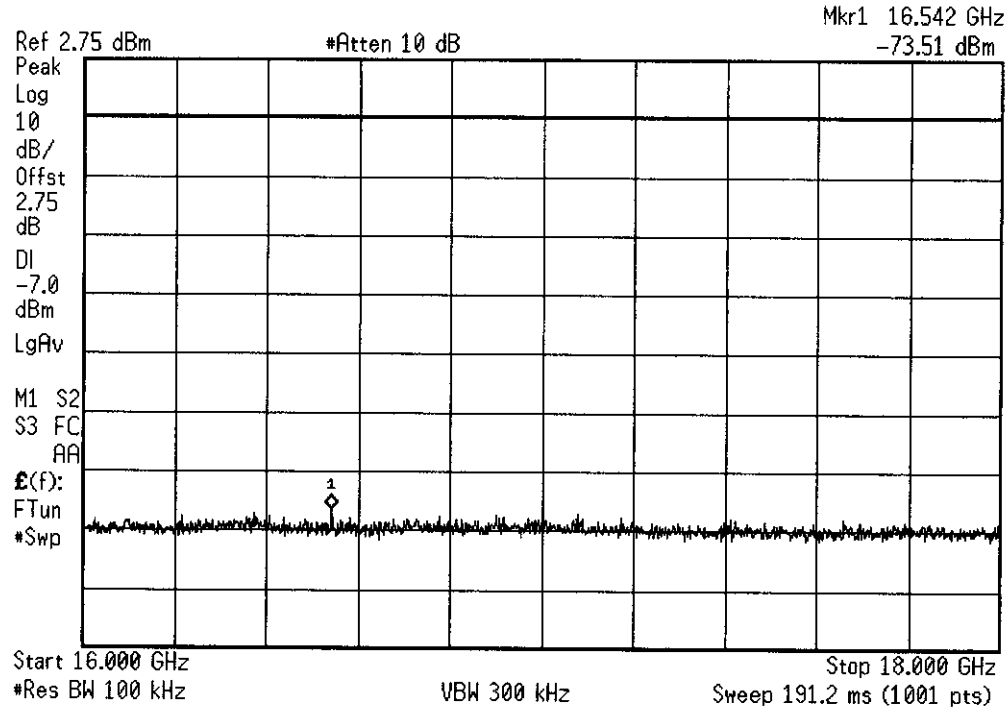


SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (c) Conductive Emissions
Mid Band 2441 MHz
Limit = -20dB below output power as measured
BW = 100 kHz, Measured Output Power = 13.21
13.21 - 20 = -6.79; Display Line = -7 dBm

✱ Agilent 20:23:14 Jun 16, 2001



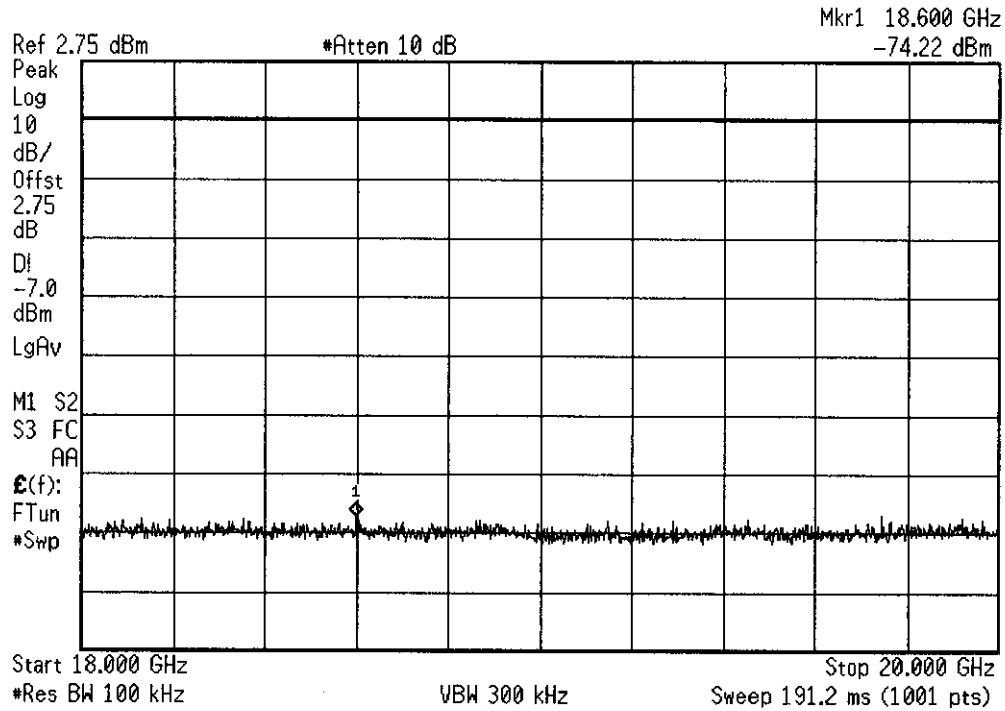
SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (c) Conductive Emissions
Mid Band 2441 MHz
Limit = -20dB below output power as measured
BW = 100 kHz, Measured Output Power = 13.21
13.21 - 20 = -6.79; Display Line = -7 dBm

Report No. SC402957-03

* Agilent 20:23:42 Jun 16, 2001



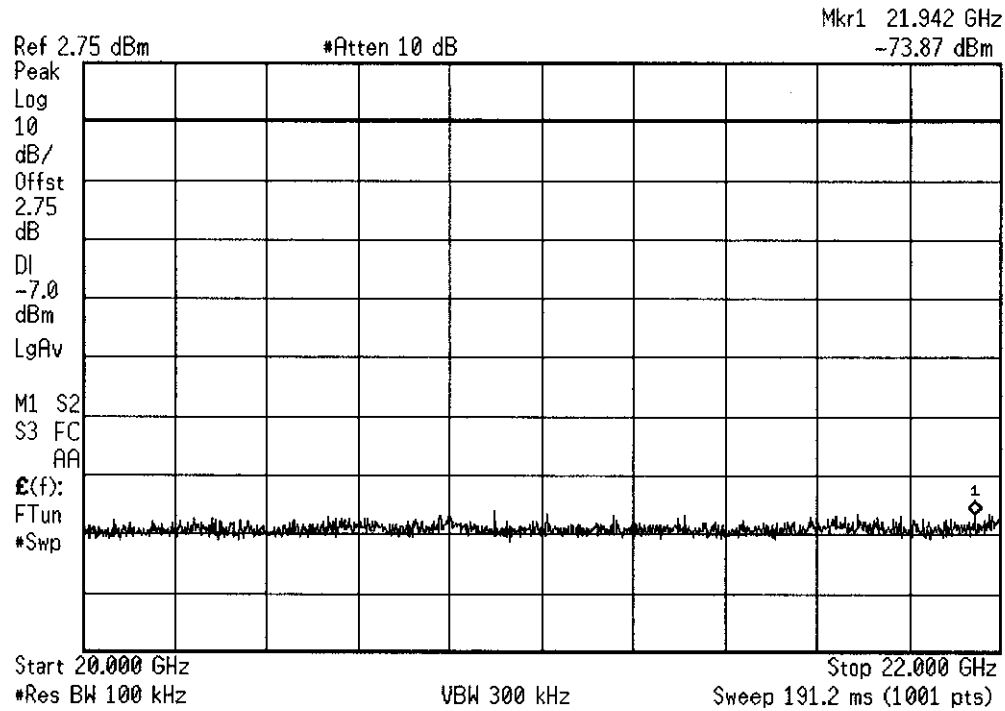
SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (c) Conductive Emissions
Mid Band 2441 MHz
Limit = -20dB below output power as measured
BW = 100 kHz, Measured Output Power = 13.21
13.21 - 20 = -6.79; Display Line = -7 dBm

Report No. SC402957-03

* Agilent 20:24:06 Jun 16, 2001



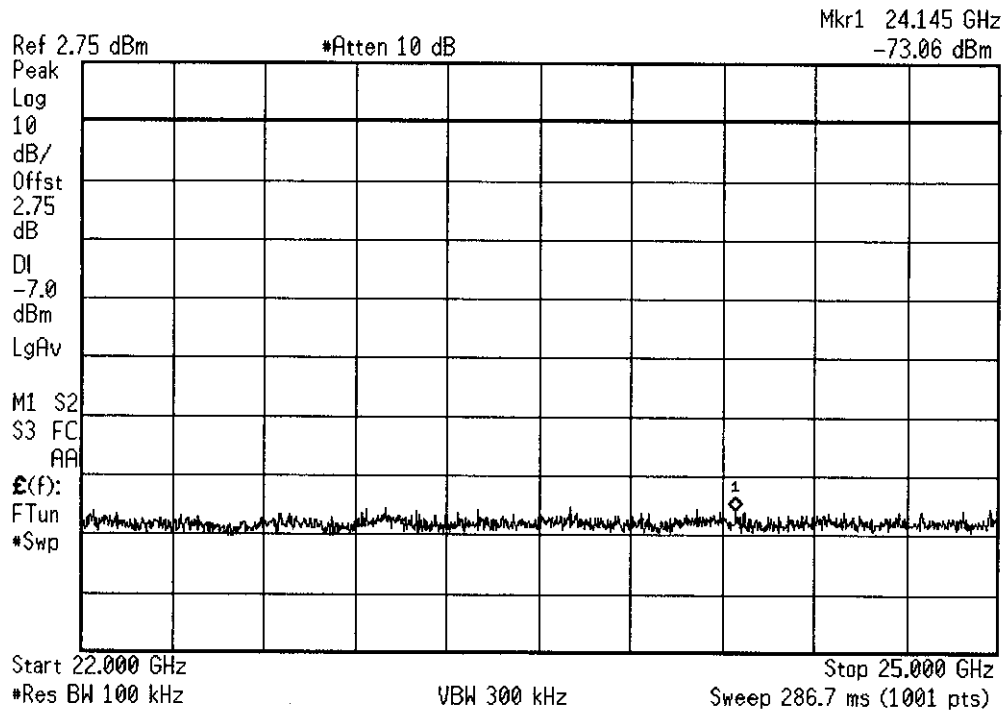
SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (c) Conductive Emissions
Mid Band 2441 MHz
Limit = -20dB below output power as measured
BW = 100 kHz, Measured Output Power = 13.21
13.21 - 20 = -6.79; Display Line = -7 dBm

Report No. SC402957-03

✱ Agilent 20:24:25 Jun 16, 2001



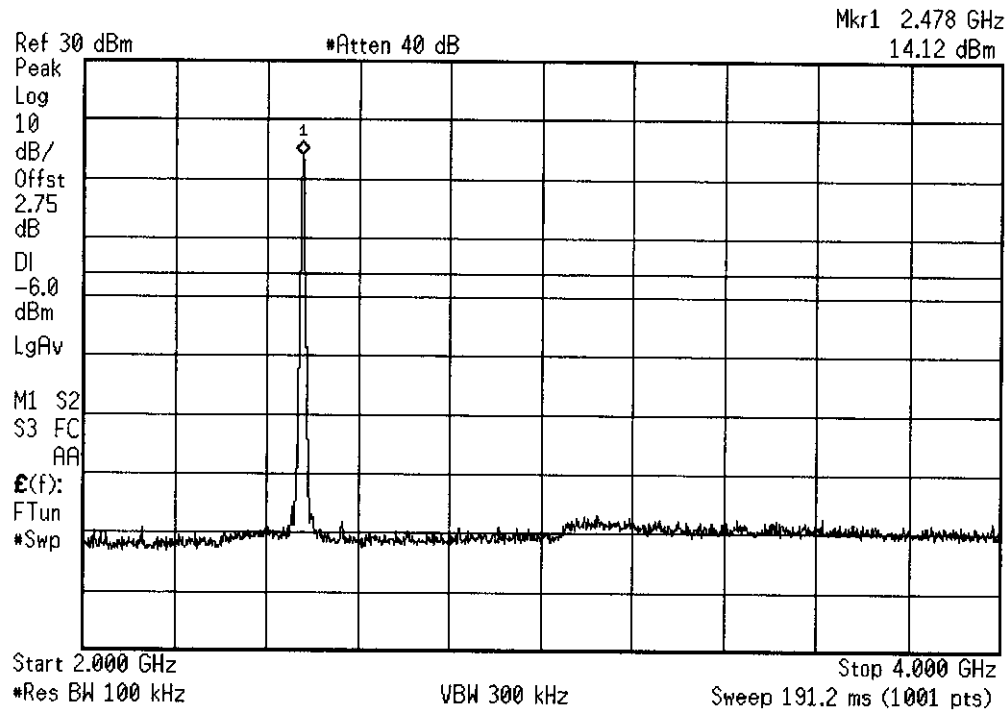
SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (c) Conductive Emissions
Mid Band 2441 MHz
Limit = -20dB below output power as measured
BW = 100 kHz, Measured Output Power = 13.21
13.21 - 20 = -6.79; Display Line = -7 dBm

Report No. SC402957-03

* Agilent 09:18:43 Jun 25, 2004

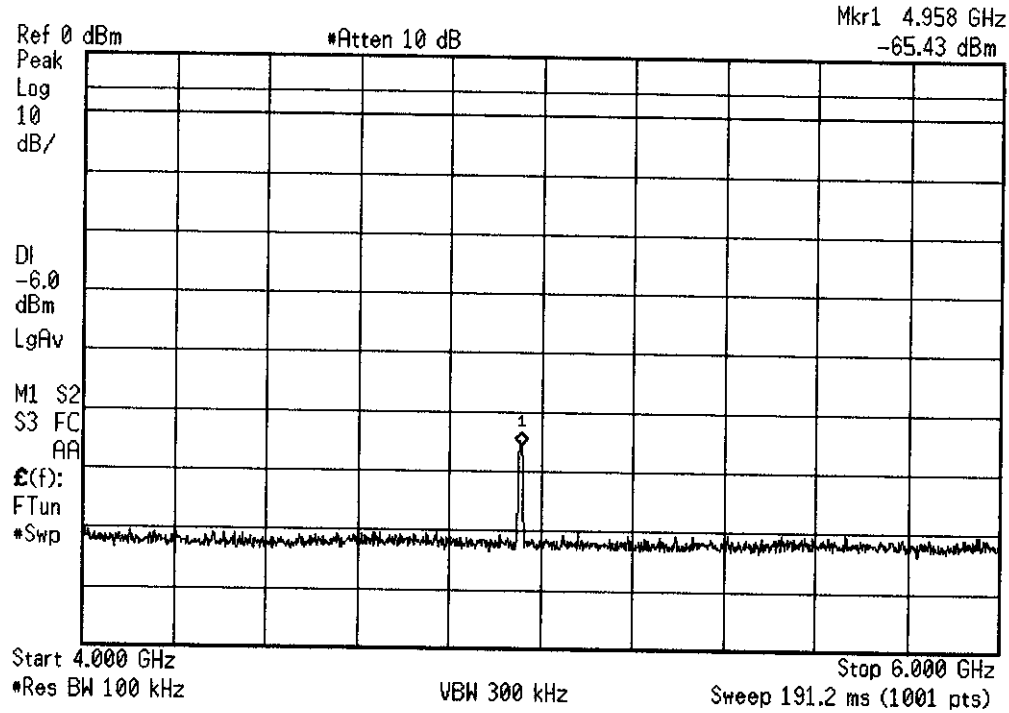


SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (c) Conductive Emissions
High Band 2478 MHz
Limit = -20dB below output power as measured
BW = 100 kHz, Measured Output Power = 14.12
14.12 - 20 = -5.88; Display Line = -6 dBm

※ Agilent 09:22:31 Jun 25, 2004

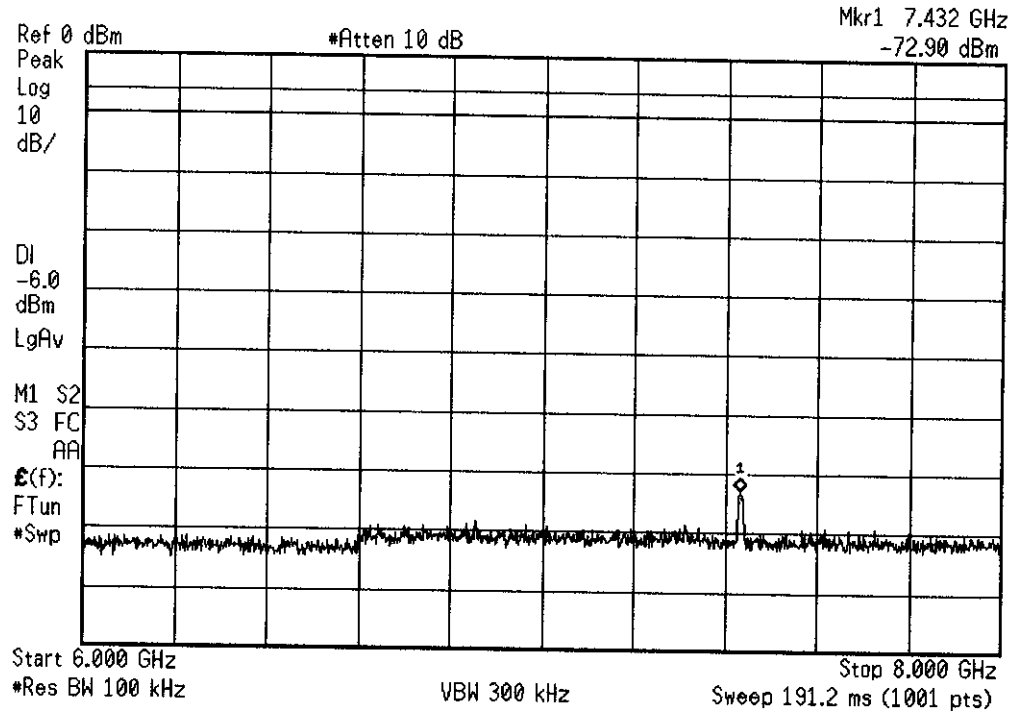


SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (c) Conductive Emissions
High Band 2478 MHz
Limit = -20dB below output power as measured
BW = 100 kHz, Measured Output Power = 14.12
14.12 - 20 = -5.88; Display Line = -6 dBm

* Agilent 09:22:59 Jun 25, 2004

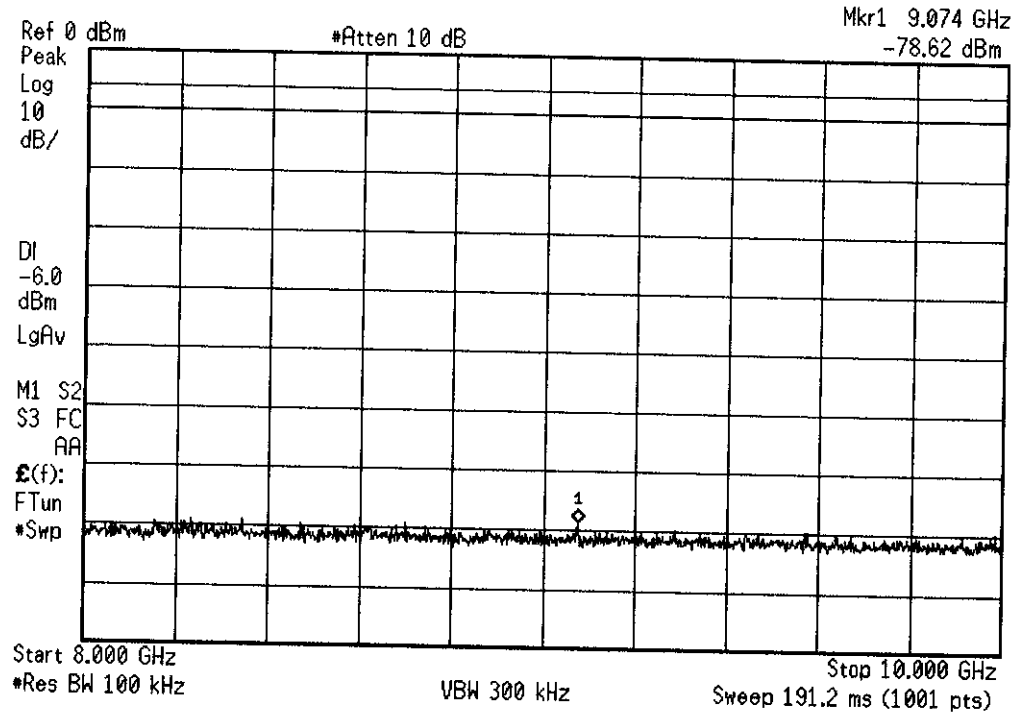


SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (c) Conductive Emissions
High Band 2478 MHz
Limit = -20dB below output power as measured
BW = 100 kHz, Measured Output Power = 14.12
14.12 - 20 = -5.88; Display Line = -6 dBm

* Agilent 09:23:43 Jun 25, 2004

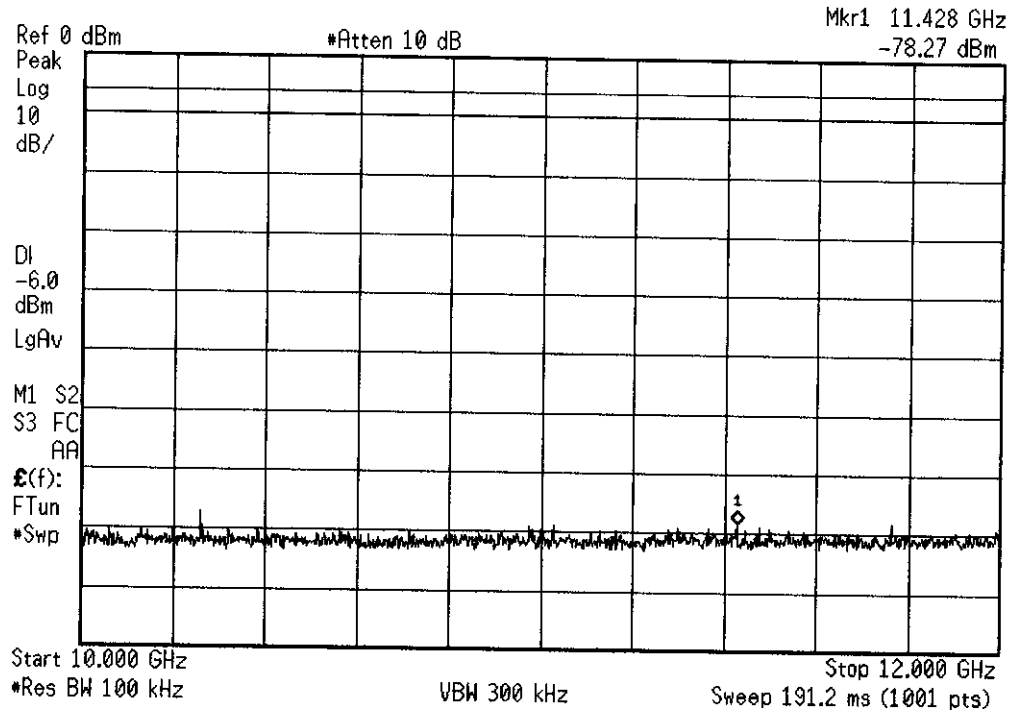


SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (c) Conductive Emissions
High Band 2478 MHz
Limit = -20dB below output power as measured
BW = 100 kHz, Measured Output Power = 14.12
14.12 - 20 = -5.88; Display Line = -6 dBm

✱ Agilent 09:24:01 Jun 25, 2004



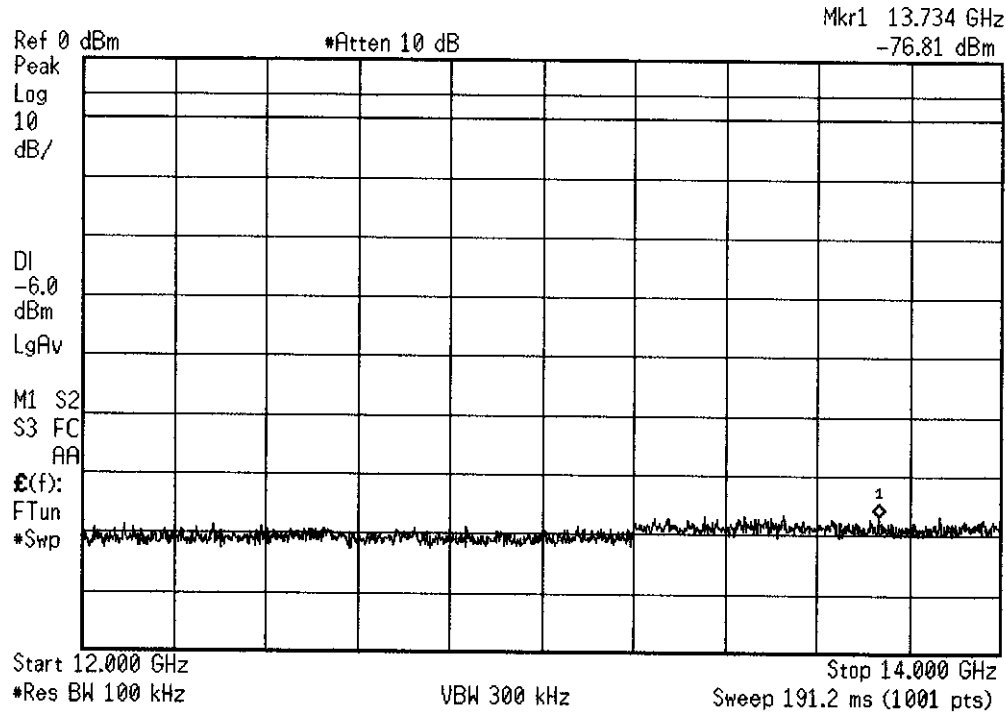
SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (c) Conductive Emissions
High Band 2478 MHz
Limit = -20dB below output power as measured
BW = 100 kHz, Measured Output Power = 14.12
14.12 - 20 = -5.88; Display Line = -6 dBm

Report No. SC402957-03

✱ Agilent 09:24:30 Jun 25, 2004

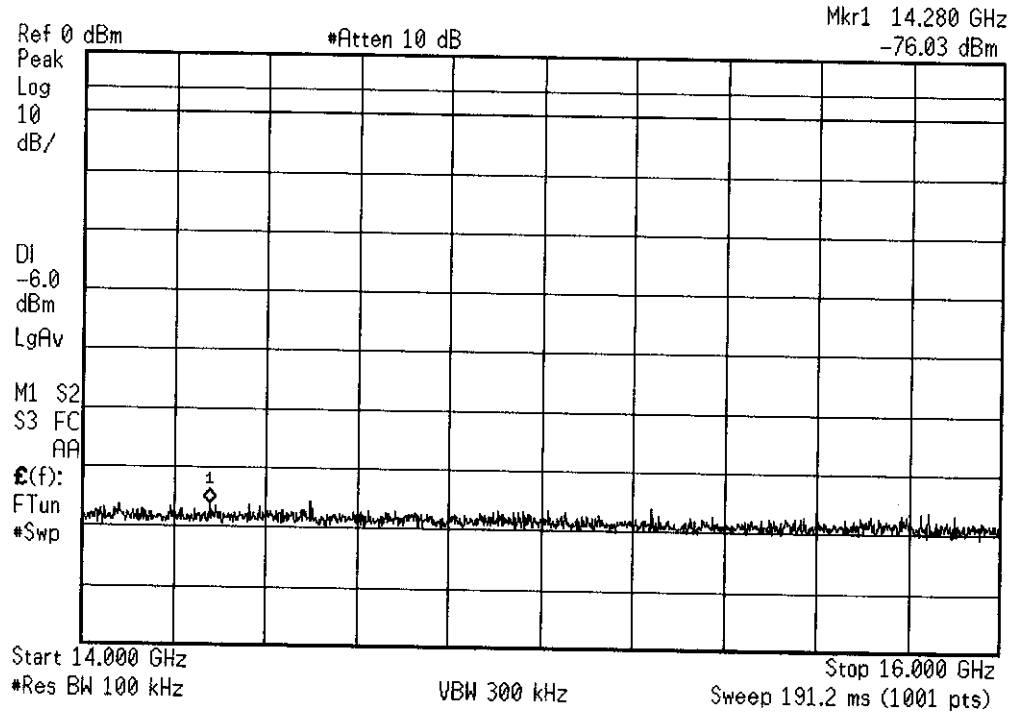


SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (c) Conductive Emissions
High Band 2478 MHz
Limit = -20dB below output power as measured
BW = 100 kHz, Measured Output Power = 14.12
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✱ Agilent 09:25:00 Jun 25, 2004

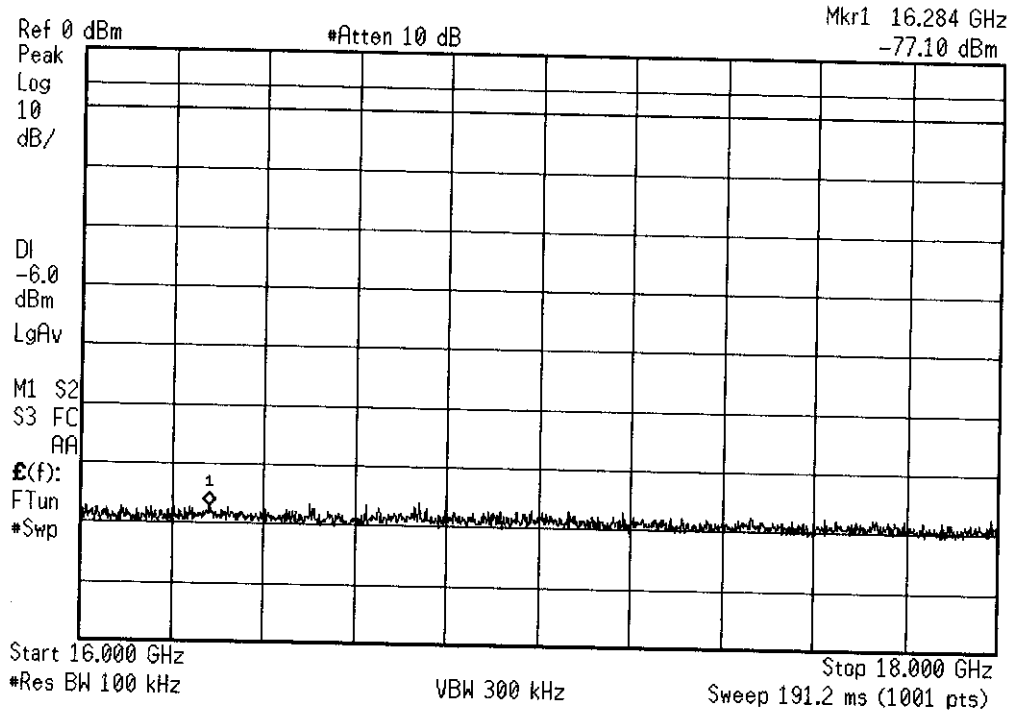


SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (c) Conductive Emissions
High Band 2478 MHz
Limit = -20dB below output power as measured
BW = 100 kHz, Measured Output Power = 14.12
14.12 - 20 = -5.88; Display Line = -6 dBm

* Agilent 09:26:57 Jun 25, 2004

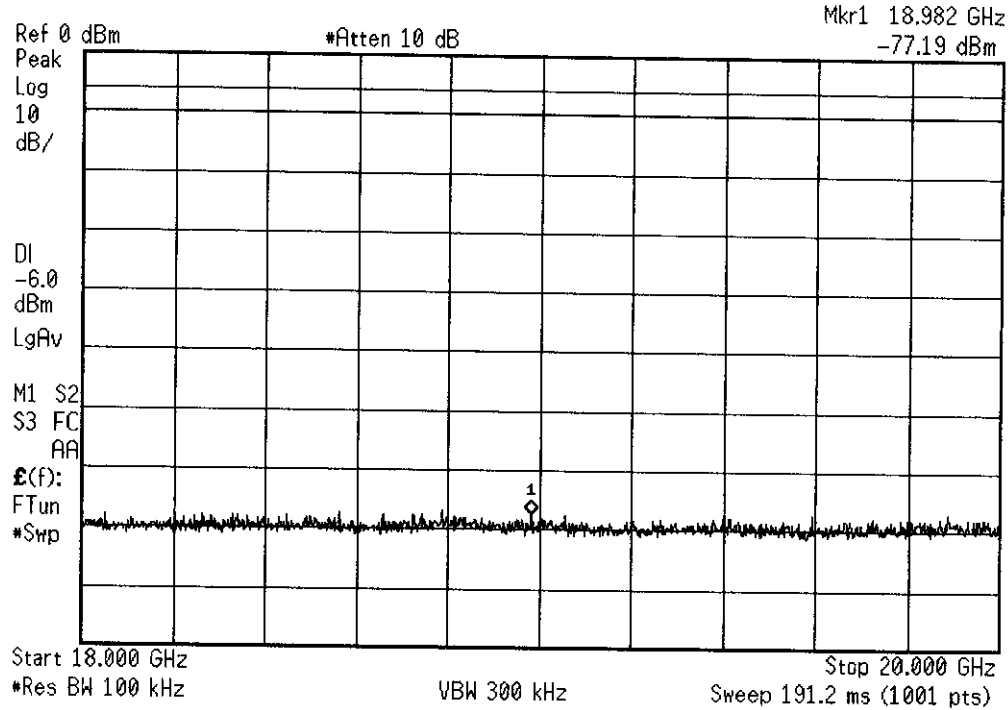


SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (c) Conductive Emissions
High Band 2478 MHz
Limit = -20dB below output power as measured
BW = 100 kHz, Measured Output Power = 14.12
14.12 - 20 = -5.88; Display Line = -6 dBm

* Agilent 09:28:08 Jun 25, 2004



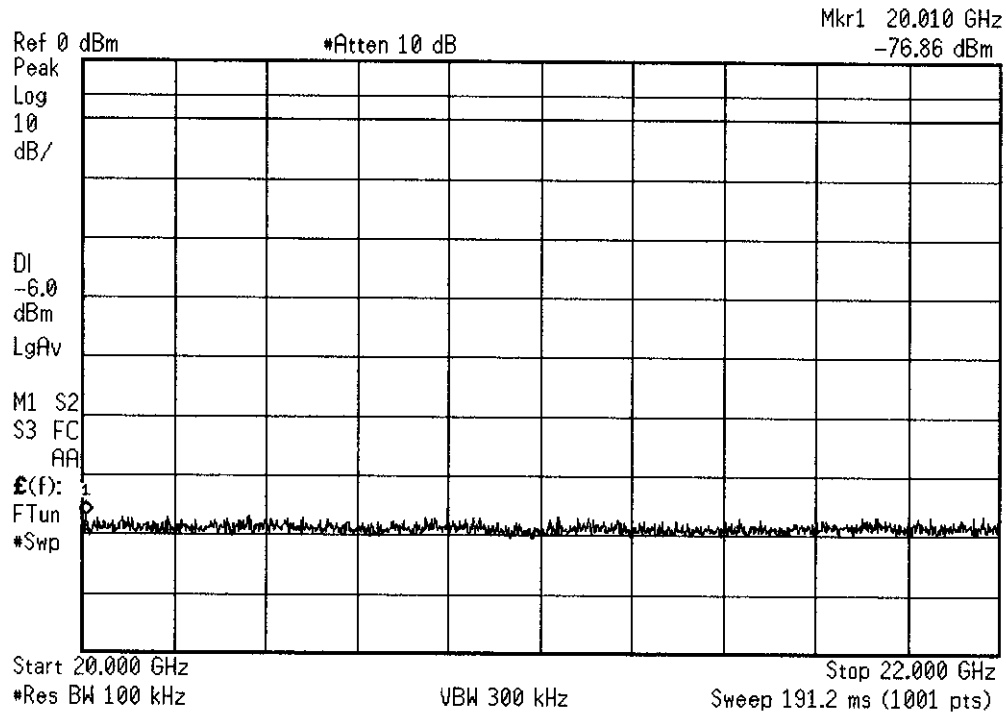
SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (c) Conductive Emissions
High Band 2478 MHz
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Report No. SC402957-03

* Agilent 09:28:37 Jun 25, 2004



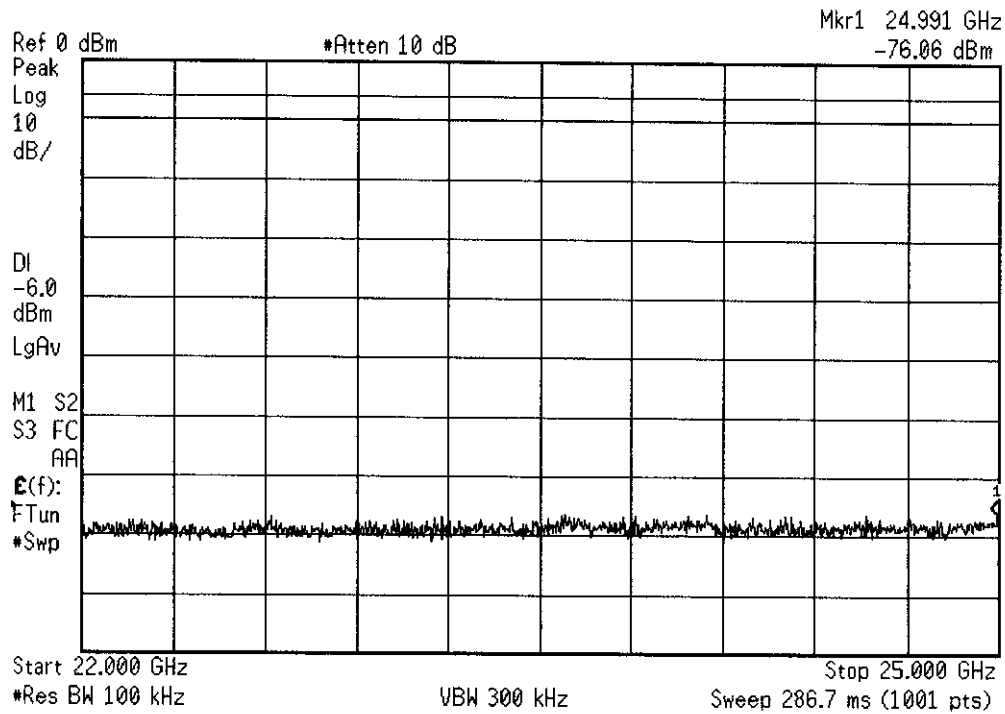
SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

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High Band 2478 MHz
Limit = -20dB below output power as measured
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Report No. SC402957-03

Agilent 09:33:42 Jun 25, 2004



SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (c) Conductive Emissions
High Band 2478 MHz
Limit = -20dB below output power as measured
BW = 100 kHz, Measured Output Power = 14.12
14.12 - 20 = -5.88; Display Line = -6 dBm

Report No. SC402957-03

9.0 RADIATED SPURIOUS EMISSIONS, CFR 47, Part 15, Paragraph 15.247(c); 15.209(a); 15.205(a)

9.1 EQUIPMENT

The *Radiated Spurious Emissions* measurements were performed at the following test location:

☐ - Test not applicable

☒ - Roof (Small Open Area Test Site)

Test Equipment Used:

Model No.	Prop. No.	Description	Manufacturer	Serial No.	Cal Due Date
HP8566B	744	Spectrum Analyzer	Hewlett Packard	2618A02913	01/05
AMF-5D-010180-35-10P	719	Pre-Amp, 40 dB	Miteg	--	Verified
3115	453	Horn Antenna	EMCO	7412-4364	02/06
BRM50702	6815	2483.5 High Pass Filter	Microtronics	008	Verified

Remarks: One year calibration cycle for all test equipment and sites.

9.1 DATA

Bandedge Measurements

FCC 15.205(a) requires emissions to pass the limits of 15.209(a) for emissions in the restricted bands. The highest frequency used by the M2400S spills over into across the bandedge of 2400-2483.5 MHz and spurious emissions may capture some in-band signal by the resolution bandwidth of the spectrum analyzer. The marker-delta method was used to compensate for this problem. The fundamental emission was measured in the restricted band, peaked for polarity, antenna height and EUT rotation in relation to the receiving antenna. The resolution bandwidth used was 100 kHz per 15.247(c). Then the bandwidth was reduced to 30 kHz and the fundamental emission and the spurious emission were then measured. The difference measured was noted as the delta and this delta was used to increase the measured spurious emissions. These compensated spurious emission values were corrected for antenna gain and cable loss and then compared to the limits of 15.209(a). The result (corrected values) is shown by the datasheets. The EUT complies using this method.

Typical Measurements:

	Frequency (MHz)	Amplitude (dBuV/m)		
		100 kHz	30 kHz	difference
Fundamental Measured	2474.8	51.0	46.4	4.6
Average Measurement	2483.5		13.2	
Bandedge Measured			4.6	
Bandedge Corrected for Bandwidth			17.8	
Bandedge Corrected for antenna and cable loss			33.8	
Bandedge Reported			51.6	dBuV/m
Average Limit			54.0	
Margin			-2.4	dB

The preamplifier was not used during bandedge measurements.

REPORT No. SC402957 TESTER: Alan Laudani SPEC: CFR 15.205 (a) CFR 15.209 (a) / 15.247(c)

REPORT No: SC402957 TESTER: Alan Laudani

ends

CFR 15.205 (a) CFR 15.209 (a)

15.247(c)

CUSTOMER: Trango Systems

TEST DIST: 3 Meters

EUT: M2400S Directional Antenna -- SU
50 % duty cycle

TEST SITE: Roof

TEST SITE: Roof

EUT MODE: Transmit Continuous +22 dBm

BICONICAL: N/A

DATE: July 6, 2004

LOG: N/A

NOTES:	Temp. 18°C RH 75%	OTHER:	453
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OTHER: 453

above 1GHz: RBW & VBW 1 MHz for Pk; RBW 1MHz and VBW 10Hz for AVG
Frequencies scanned from 30 MHz to 24835 MHz

and VBW 10Hz for AVG

EIRP limit = 36 dBm = 131.3 dBuV/m @ 3 m

EIRP limit = 36 dBm = 131.3 dBuV/m @ 3 m

CF = Antenna Factor + Cable Loss - Preamplifier Gain

CF = Antenna Factor + Cable Loss - Preamplifier Gain

[illegible]

REPORT No: SC402957 TESTER: Alan Laudani SPEC: CFR 15.205 (a) CFR 15.209 (a) / 15.247(c)

REPORT No: SC402957 TESTER: Alan Laudani

SPEC: CFR 15.205 (a)

CFR 15.205 (a) CFR 15.209 (a)

115,247(c)

CUSTOMER: Trango Systems

TEST DIST: 3 Meters

3 Meters

EUT:	M2400S Sectoral Antenna -- AP	TEST SITE:	Roof
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TEST SITE: Roof

Roof

EUT MODE:	Transmit Continuous +19 dBm	BICONICAL:	N/A
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BICONICAL: N/A

N/A

DATE:	July 6, 2004	LOG:	N/A
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LOG: N/A

N/A

NOTES:	Temp. 20°C RH 67%	OTHER:	453
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OTHER: 453

453

above 1GHz: RBW & VBW 1 MHz for Pk; RBW 1MHz and VBW 10Hz for AVG

MHz and VBW 10Hz for AVG

W 10Hz for AVG

Frequencies scanned from 30 MHz to 24835 MHz
 F1RP limit = 36 dBm = 131.3 dBV/m @ 3 m

2

CF = Antenna Factor + Cable Loss - Preamplifier Gain

Gain

[illegible]

REPORT No: SC402957 . TESTER: Alan Laurence SPEC: CFR 15.205 (a) CFR 15.209 (a) / 15.247(c)

REPORT No: SC402957 TESTER: Alan Lawrence

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CFR 15.205 (a); CFR 15.209 (a)

15.247(c)

CUSTOMER: Trango Systems

TEST DIST: 3 Meters

EUT:	M2400S Internal Antenna -- AP	TEST SITE:	Roof
	50 % duty cycle		

TEST SITE: Roof

EUT MODE: Transmit Continuous +21 dBm	BICONICAL:	N/A
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BICONICAL: N/A

DATE: July 6, 2004 LOG: N/A

LOG: N/A

NOTES:	Temp. 20°C RH 67%	OTHER:	453
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OTHER: 453

above 1GHz; RBW 1 MHz for PK; RBW 1MHz and VBW 10Hz for AVG
Frequencies scanned from 30 MHz to 24835 MHz

Frequencies scanned from 30 MHz to 24835 MHz

EIRP limit = 36 dBm = 131.3 dBuV/m @ 3 m

CF = Antenna Factor + Cable Loss - Preamplifier Gain

Figure 1. The effect of the concentration of the *Agrobacterium* strain on the transformation efficiency of *Agrobacterium* strain 101. The concentration of the *Agrobacterium* strain 101 was varied from 10⁶ to 10⁹ cells/ml. The transformation efficiency was determined by the number of transformants per 10⁶ cells of the *Agrobacterium* strain 101. The data are the mean ± SD of three independent experiments. The transformation efficiency was significantly higher at 10⁸ cells/ml than at 10⁶ and 10⁷ cells/ml ($P < 0.05$).

[illegible]

Report No. SC402957-03

10.0 PEAK POWER SPECTRAL DENSITY, CFR 47, Part 15, Paragraph 15.247(d)

10.1 EQUIPMENT

The *Peak Power Spectral Density* measurements were performed at the following test location:

☐ - Test not applicable

■ - SR-3, Shielded Room, 12' x 20' x 8', Metal Chamber

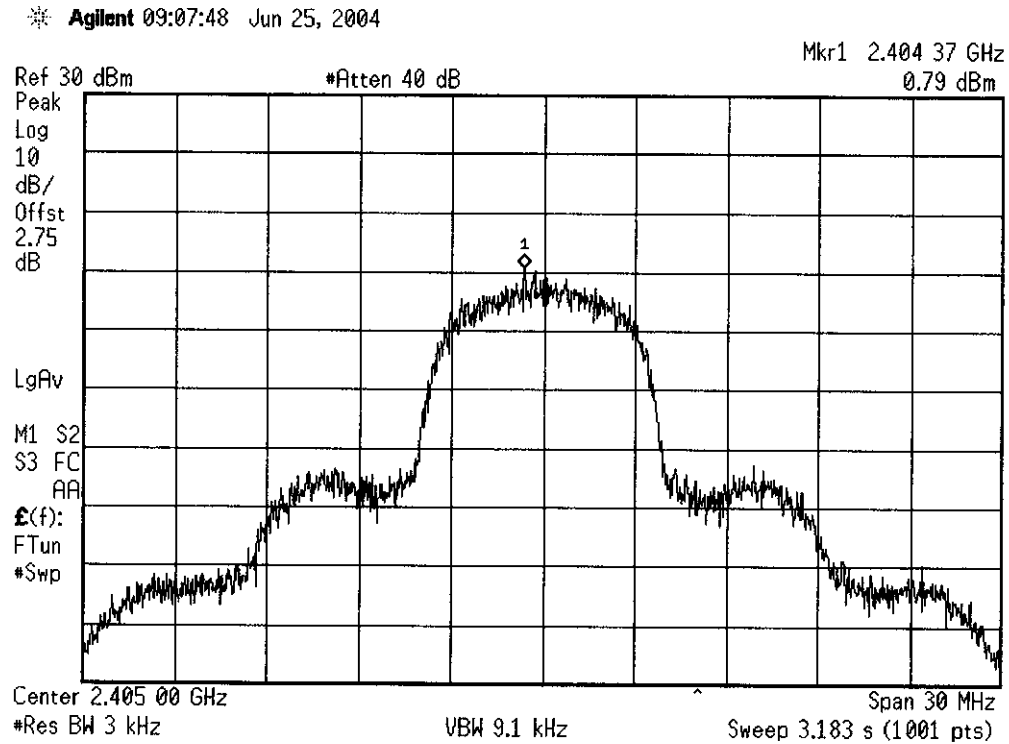
Test Equipment Used:

Model No.	Prop. No.	Description	Manufacturer	Serial No.	Cal Due Date
E4440A	6814	Spectrum Analyzer	Agilent	MY42510441	08/04
CBL6111	6527	Bilog Antenna	Chase	1013	Verified
83640B	6614	Sweep Signal Generator	Hewlett Packard	3044A00726	06/05

Remarks: One year calibration cycle for all test equipment and sites.

Report No. SC402957-03

10.2 DATA



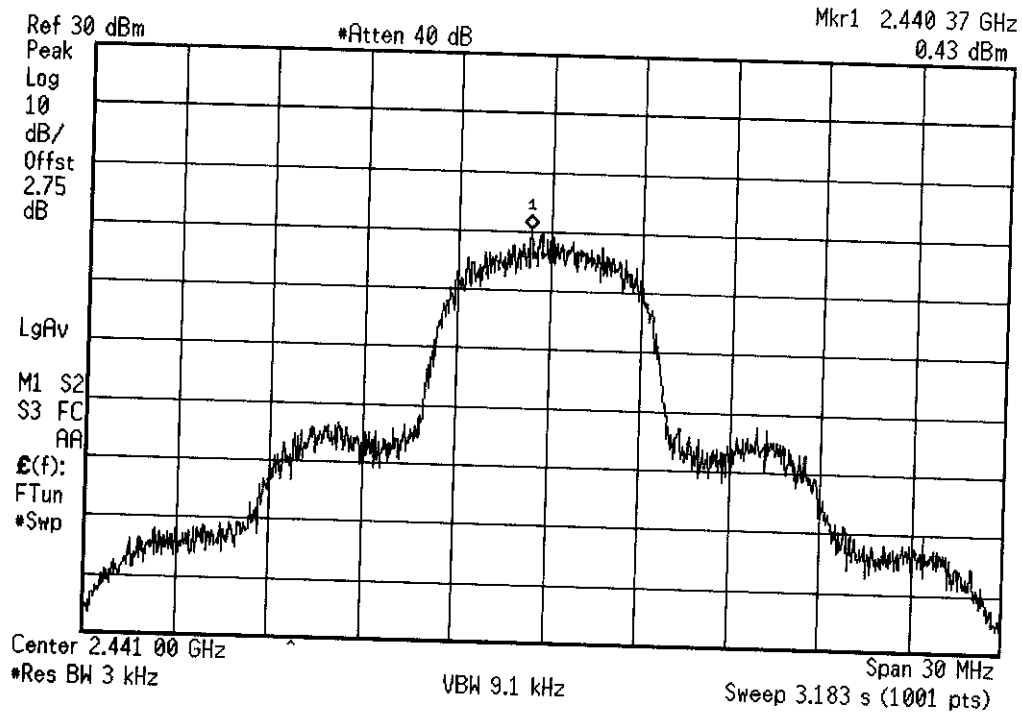
SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (d) Peak Power Spectral Density
Low Band 2405 MHz
RBW = 3 KHz
Limit < 8 dBm

Report No. SC402957-03

* Agilent 19:58:28 Jun 16, 2001



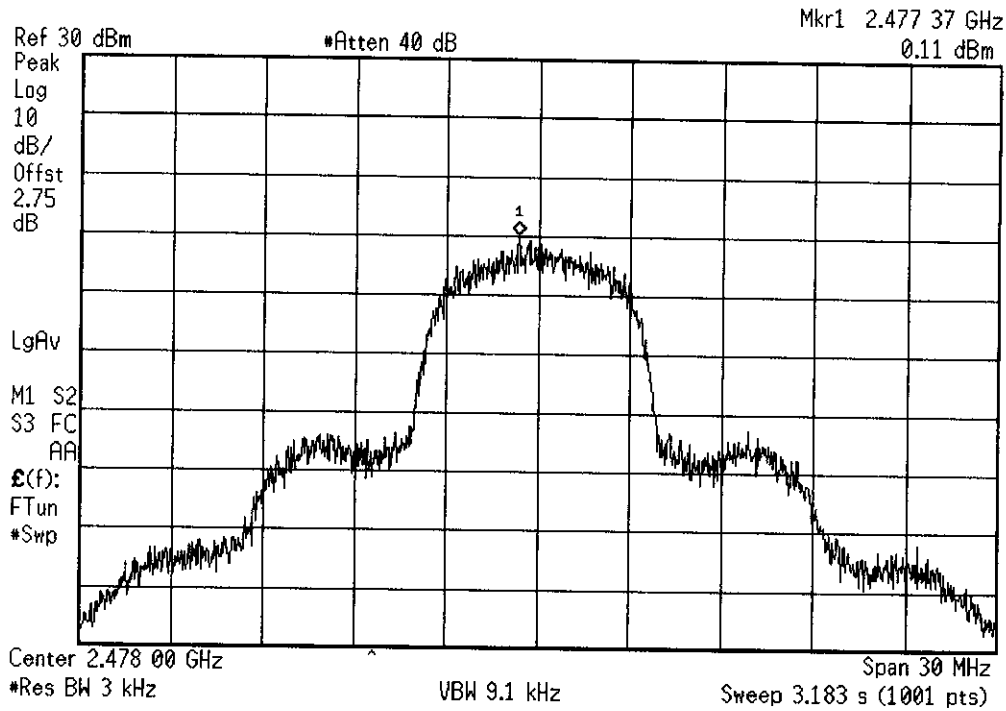
SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (d) Peak Power Spectral Density
Mid Band 2441 MHz
RBW = 3 KHz
Limit < 8 dBm

Report No. SC402957-03

✱ Agilent 09:17:33 Jun 25, 2004



SC402957
TRANGO SYSTEMS
MODEL M2400S

June 25, 2004
TECH/ENGR: AAL
LOCATION: SR3

FCC 47 Part 15.247 (d) Peak Power Spectral Density
High Band 2478 MHz
RBW = 3 KHz
Limit < 8 dBm

Report No. SC402957-03

11.0 ATTESTATION STATEMENT**GENERAL REMARKS:****SUMMARY:**

All tests were performed per CFR 47, **Part 15, Paragraph(s) 15.207(a); 15.209(a); 15.247(a)(2); 15.247(b)(3); 15.247(b)(4); 15.247(c); 15.247(d).**

■ - Performed

The Equipment Under Test

■ - **Fulfills** the requirements of CFR 47, **Part 15, Paragraph(s) 15.207(a); 15.209(a); 15.247(a)(2); 15.247(b)(3); 15.247(b)(4); 15.247(c); 15.247(d).**

Testing Start Date: 25 June 2004

Testing End Date: 6 July 2004

- TÜV AMERICA, INC. -

Reviewing Engineer:



EMC Chief Engineer

Test Engineer



EMC Engineer