

MEASUREMENT AND TECHNICAL REPORT

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

DATE: 31 December 2003

This Report Concerns:	Original Grant: ☒ X	Class II Change: ☐
Equipment Type:	900 MHz Wireless Transceiver	
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*
(*) FCC Part 15, Paragraph(s) 15.207(a); 15.209(a); 15.247(a)(2); 15.247 (b)(1); 15.247 (b)(3); 15.247 (c)		
Report Prepared by: TÜV AMERICA, INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 Fax: 858 546 0364		

TABLE OF CONTENTS

	Pages
1.0 GENERAL INFORMATION	<u>3</u>
1.1 Product Description	<u>3</u>
1.2 Related Submittal Grant	<u>3</u>
1.3 Tested System Details	<u>3</u>
1.4 Test Methodology	<u>3</u>
1.5 Test Facility	<u>3</u>
2.0 SYSTEM TEST CONFIGURATION	<u>4</u>
2.1 Justification	<u>4</u>
2.2 EUT Exercise Software	<u>4</u>
2.3 Special Accessories	<u>4</u>
2.4 Equipment Modifications	<u>4</u>
2.5 Configuration of Test System	<u>4</u>
3.0 CONDUCTED, 15.207(a)	<u>5</u>
3.1 EQUIPMENT	<u>5</u>
3.2 DATA	<u>6</u>
4.0 RADIATED EMISSIONS, 15.209(a); 15.247(b)(1)	<u>9</u>
3.1 EQUIPMENT	<u>9</u>
3.2 DATA	<u>10</u>
5.0 BANDWIDTH, 15.247(a)(2)	<u>13</u>
4.1 EQUIPMENT	<u>13</u>
4.2 DATA	<u>14</u>
6.0 RF OUTPUT POWER, 15.247(b)(3)	<u>17</u>
6.1 EQUIPMENT	<u>17</u>
6.2 DATA	<u>18</u>
7.0 CONDUCTED SPURIOUS EMISSIONS, 15.247(c)	<u>21</u>
7.1 EQUIPMENT	<u>21</u>
7.2 DATA	<u>22</u>
8.0 ATTESTATION STATEMENT	<u>55</u>

1.0 GENERAL INFORMATION**1.1 Product Description****900 MHz Wireless Transceiver****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	15.207(a)	Pass
Radiated	15.207(a); 15.247(b)(1)	Pass
Channel Bandwidth	15.247(a)(2)	Pass
RF Output Power	15.247(b)(3)	Pass
Conducted Spurious	15.247(c)	Pass

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

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: 858 546 3999
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.

Report No. SC305558-03

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 Photos Exhibit.

Report No. SC305558-03

3. CONDUCTED EMISSION, CFR 47, Part 15, Paragraph 15.207(a)

3.1 EQUIPMENT

Emissions Test Conditions: CONDUCTED EMISSIONS

The *Conducted 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 Date
ESHS 20	428	EMI Test Receiver	Rohde & Schwarz	837055/001	12/04
CAT-20	606	20 dB Attenuator	Mini-Circuits	000606	--
9242-50-R-24-BNC	458	LISN	Solar Electronics	941719	NCR
9242-50-R-24-BNC	457	LISN	Solar Electronics	941720	NCR

Remarks: _____

3.2 DATA

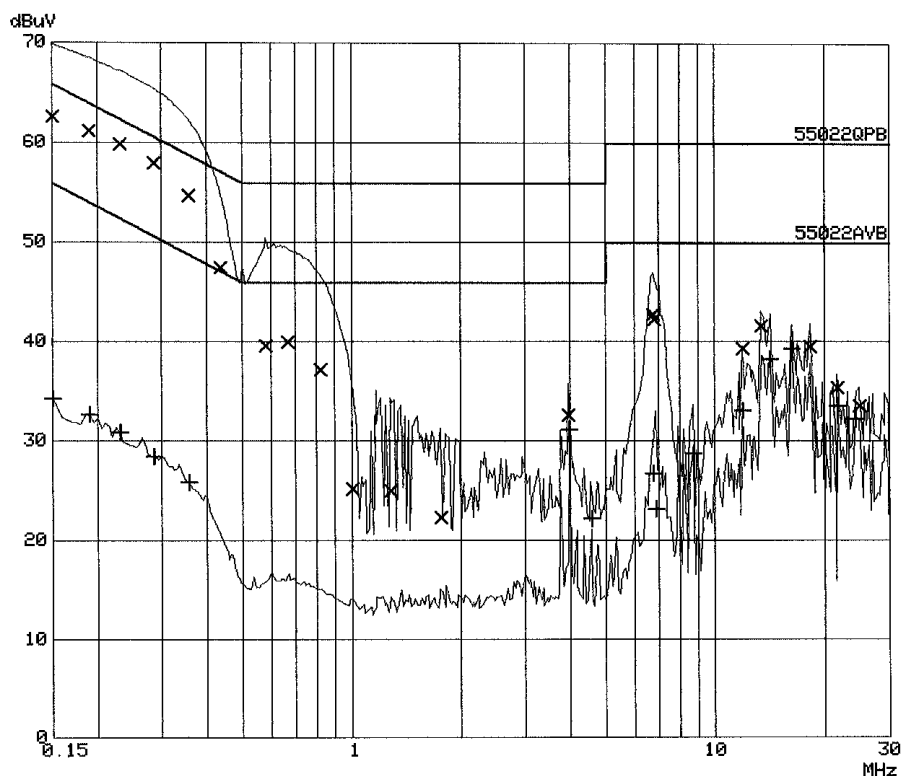
TUV America
 Conducted Emissions
 EUT: 900 MHz. Wireless Transceiver
 Manuf: Trango Systems, Inc.
 Op Cond: XMT/RCV Ping Network
 Operator: M.Lyon
 Test Spec: FCC 15.207(a)
 Comment: 120 Vac Line 1 Connected to 101 WAN
 SC305558
 Date: 18. Dec 03 08:05

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: 1 s
 Subranges: 25
 Acc Margin: 25dB



Report No. SC305558-03

TUV America
 Conducted Emissions
 EUT: 900 MHz. Wireless Transceiver
 Manuf: Trango Systems, Inc.
 Op Cond: XMT/RCV Ping Network
 Operator: M.Lyon
 Test Spec: FCC 15.207(a)
 Comment: 120 Vac Line 1 Connected to 101 WAN
 SC305558
 Date: 18. Dec 03 08:05

Final Measurement Results:

Frequency MHz	QP Level dBuV	QP Limit dBuV
0.15000	62.7	66.0
0.19000	61.2	64.1
0.23000	59.9	62.4
0.28500	57.9	60.7
0.35500	54.7	58.8
0.43500	47.5	57.2
0.58000	39.6	56.0
0.66500	39.9	56.0
0.82000	37.2	56.0
1.00000	25.1	56.0
1.27500	24.9	56.0
1.75500	22.3	56.0
3.96000	32.5	56.0
6.75000	42.8	60.0
6.81000	42.3	60.0
11.89000	39.2	60.0
13.41500	41.6	60.0
18.24000	39.5	60.0
21.66000	35.3	60.0
24.89500	33.5	60.0

Frequency MHz	AV Level dBuV	AV Limit dBuV
0.15000	34.2	56.0
0.19000	32.6	54.1
0.23000	30.8	52.4
0.28500	28.5	50.7
0.35500	25.8	48.8
3.96500	31.1	46.0
4.56000	22.2	46.0
6.74000	26.7	50.0
6.89500	23.1	50.0
8.71500	28.7	50.0
11.89000	33.1	50.0
14.15000	38.3	50.0
16.22500	39.2	50.0
21.66000	33.5	50.0
24.35000	32.1	50.0

* limit exceeded

Report No. SC305558-03

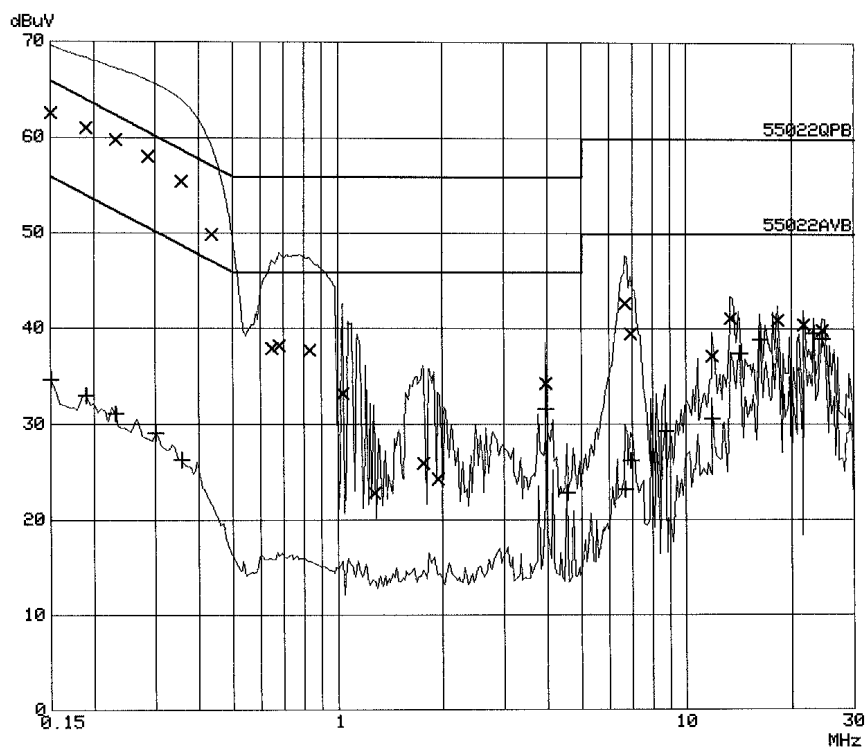
TUV America
 Conducted Emissions
 EUT: 900 MHz. Wireless Transceiver
 Manuf: Trango Systems, Inc.
 Op Cond: XMT/RCV Ping Network
 Operator: M.Lyon
 Test Spec: FCC 15.207(a)
 Comment: 120 Vac Line 2 Connected to 101 WAN
 SC305558
 Date: 18. Dec 03 08:54

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: 1 s
 Subranges: 25
 Acc Margin: 25dB



Report No. SC305558-03

4.0 RADIATED EMISSIONS CFR 47, Part 15, Paragraphs 15.247(b)(1); 15.209(a)

4.1 EQUIPMENT

Test Conditions: RADIATED EMISSIONS

The RADIATED EMISSIONS measurements were performed at the San Diego Testing Facility:

☐ - Test not applicable

■ - Roof (Small Open Area Test Site)

(Date of listing July 27, 2001. Site Verification Valid for 3 years from listing.)

Testing was performed at a test distance of:

■ - 3 meters

Test Equipment Used:

Model No.	Prop. No.	Description	Manufacturer	Serial No.	Cal Due Date
HP8566B	406	Spectrum Analyzer	Hewlett Packard	2618A02913	05/04
3115	251	Horn Antenna	Electro Mechanics Co	2595	12/03
AMF-5D-010180-35-10P	719	PreAmp 40 dB	TUV PS	--	NCR*
FF6548-2	783	High-Pass Filter	Sage	--	Verified
--	6789	30-foot SMA Cable	TUV	--	Verified
3115	453	Horn Antenna	EMCO	9412-4364	01/05

Remarks: One year calibration cycle for all test equipment and sites. (*) No Calibration Required.

[illegible]

Report No. SC305558-03

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

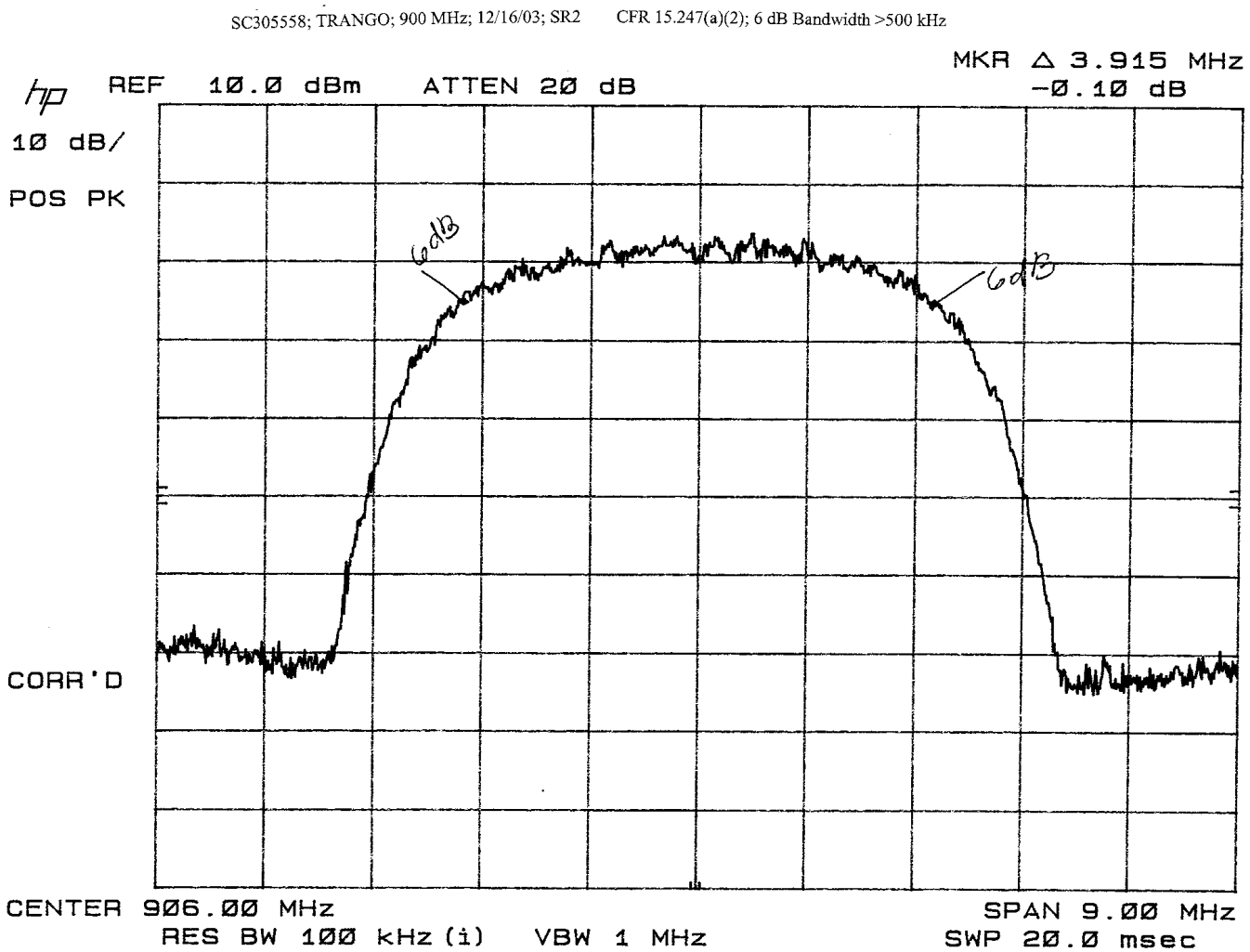
■ - SR3 - Shielded Room

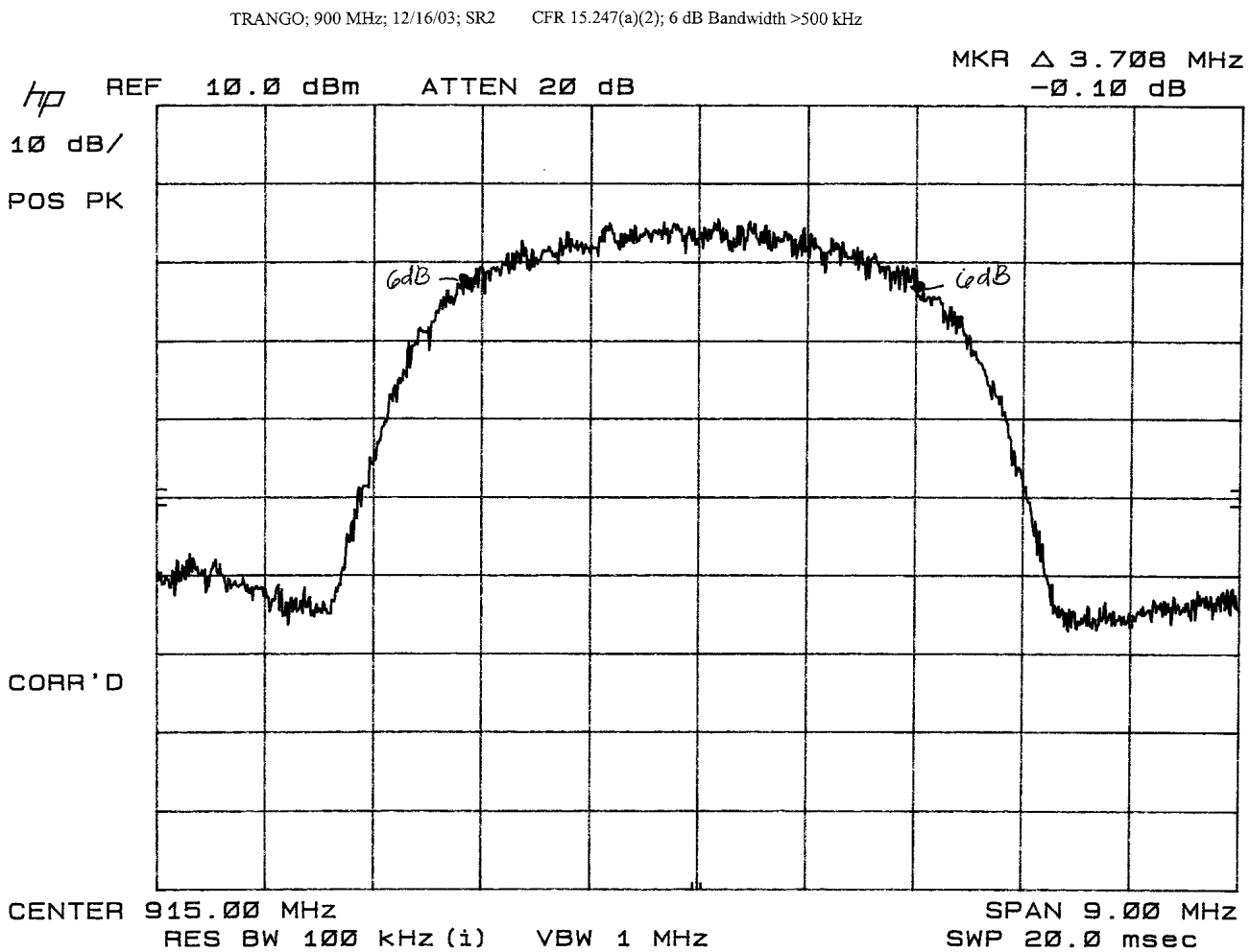
Test Equipment Used:

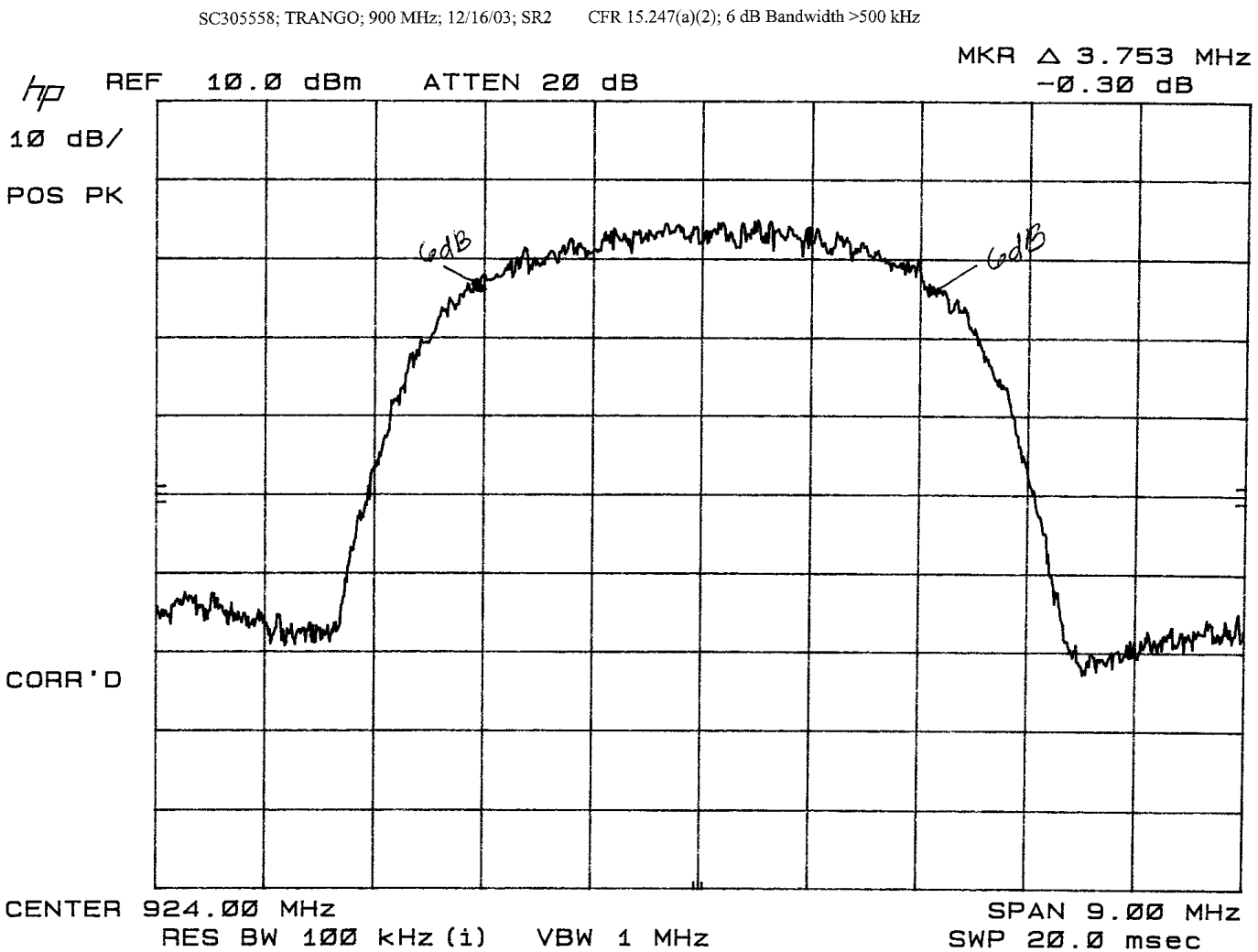
Model No.	Prop. No.	Description	Manufacturer	Serial No.	Cal Due Date
E4440A	--	Spectrum Analyzer	Hewlett Packard	US40241608	09/04

Remarks:

5.2 DATA







Report No. SC305558-03

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.	Date Cal'ed
34440A	7500	Spectrum Analyzer	Agilent	MY3362168	08/04
SML 03	7500	Signal Generator	Rohde & Swartz	100731	10/04

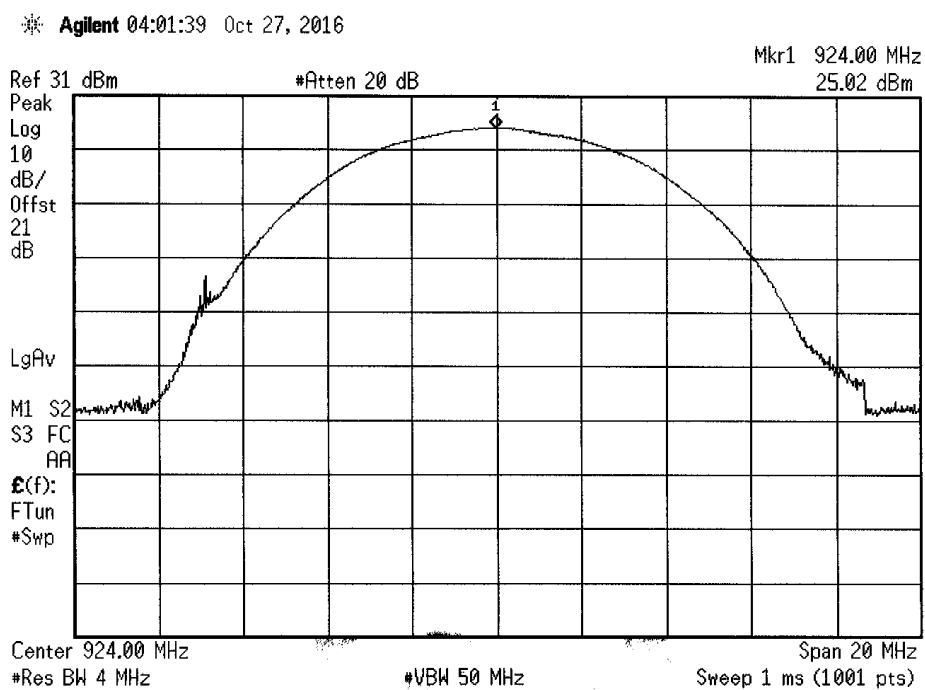
CUSTOMER EQUIPMENT:

Model No.	Prop. No.	Description	Manufacturer	Serial No.	Date Cal'ed
5882568W04	--	Directional Coupler	Cellwave	--	NCR
8251	--	50-Ohm Load	Bird Electric	--	NCR

Remarks: One year calibration cycle for all test equipment and sites. (NCR) No Calibration Required.

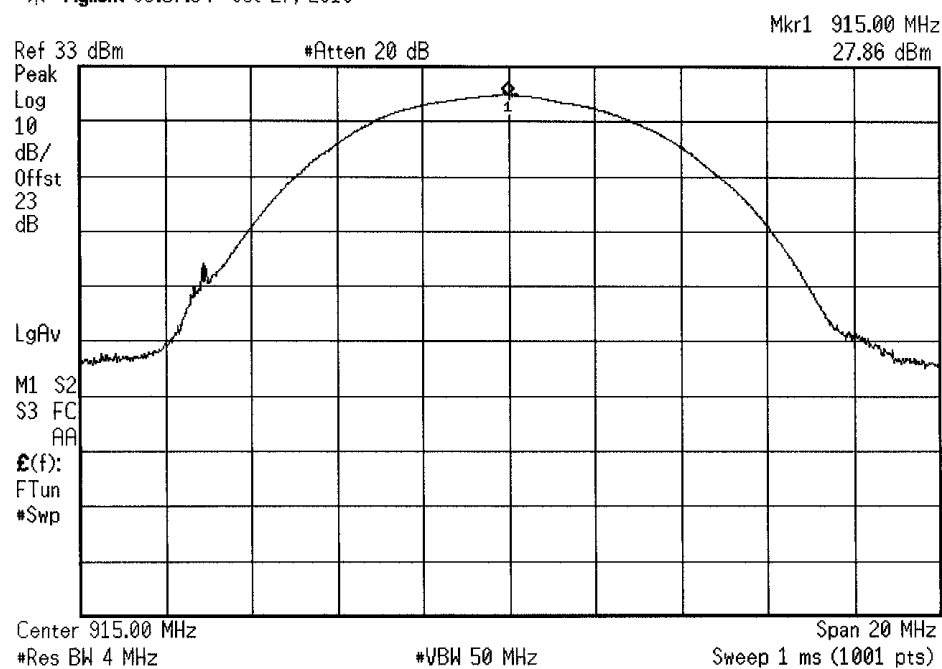
Report No. SC305558-03

6.2 DATA



SC305558; TRANGO; 900 MHz; 12/16/03; SR2 CFR 15.247(b)(3); Peak output power - < 1 Watt

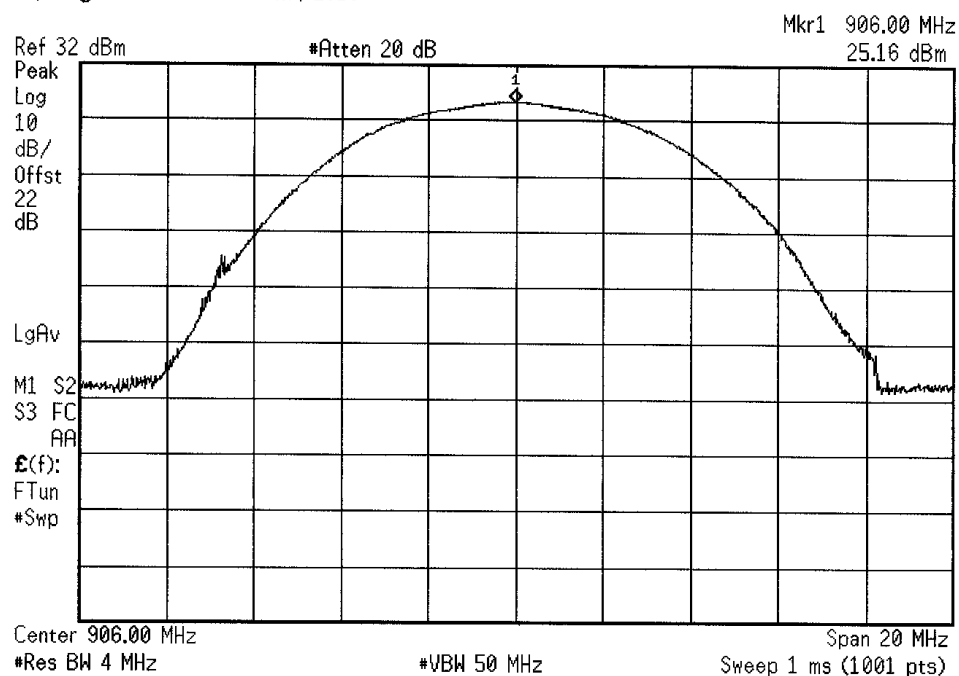
* Agilent 03:57:34 Oct 27, 2016



SC305558; TRANGO; 900 MHz; 12/16/03; SR2 CFR 15.247(b)(3); Peak output power - < 1 Watt

Report No. SC305558-03

✱ Agilent 03:53:07 Oct 27, 2016



SC305558; TRANGO; 900 MHz; 12/16/03; SR2 CFR 15.247(b)(3); Peak output power - < 1 Watt

Report No. SC305558-03

7.0 CONDUCTED SPURIOUS MODULATION, CFR 47, Part 15, Paragraph 15.247(c)

7.1 EQUIPMENT

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

☐ - Test not applicable

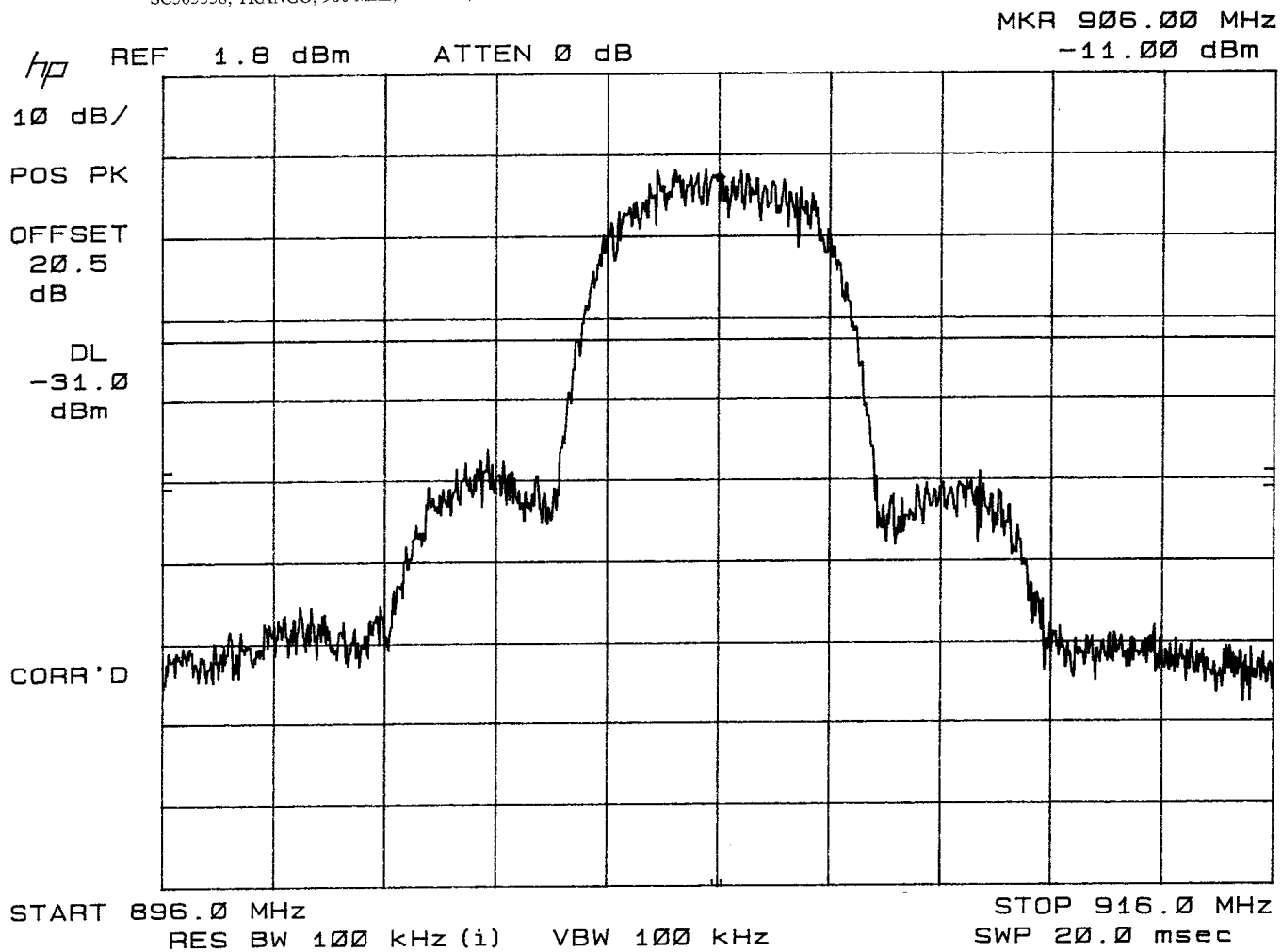
■ - SR-3, Shielded Room, 12' x 20' x 8', Metal Chamber

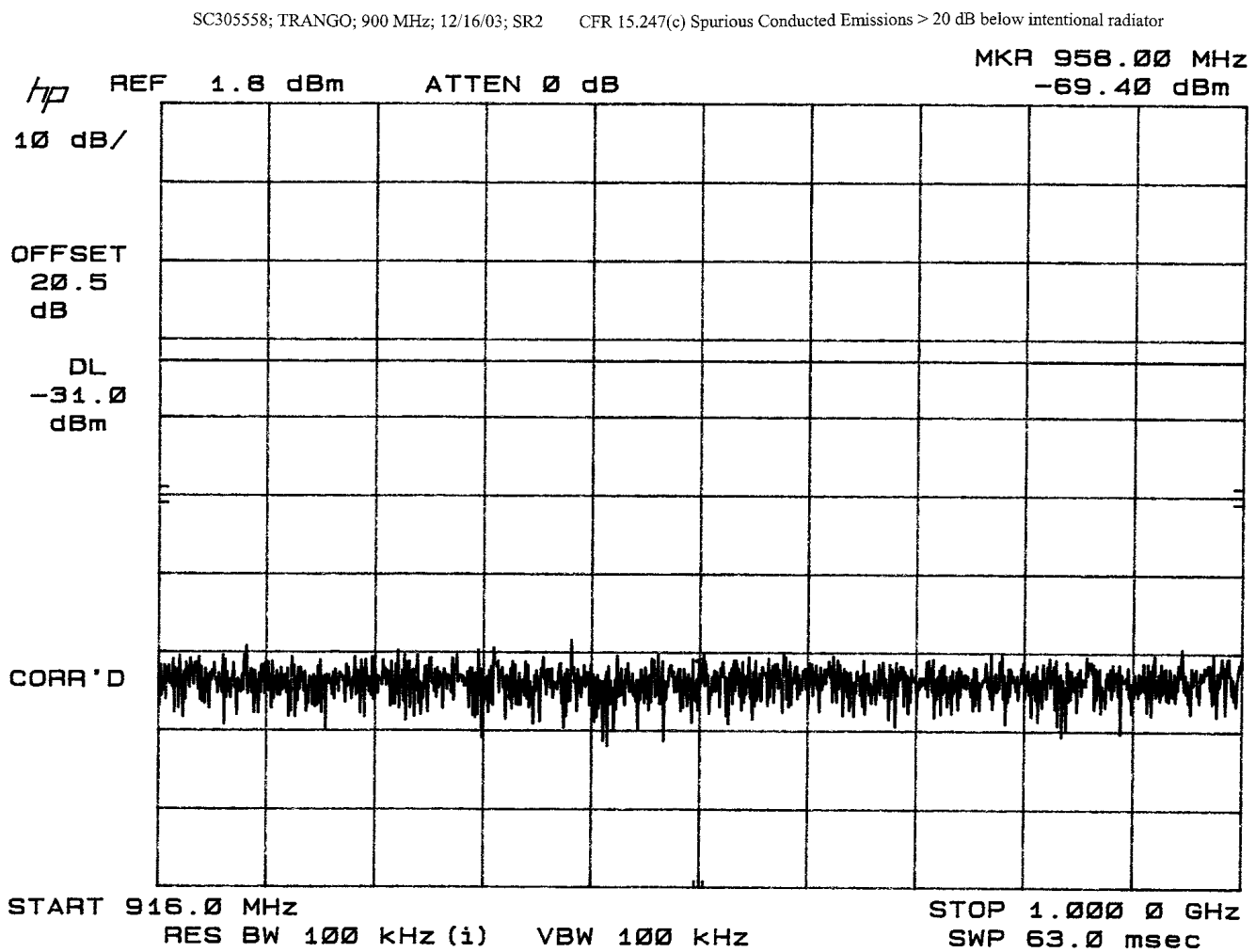
Test Equipment

Model No.	Prop. No.	Description	Manufacturer	Serial No.	Cal Date
TUV	719	Amplifier	TUV	--	Verified
E4440A	7500	Spectrum Analyzer	Agilent	--	08/04
BW-N20W5	--	20 dB Attenuator	Moh	--	NCR

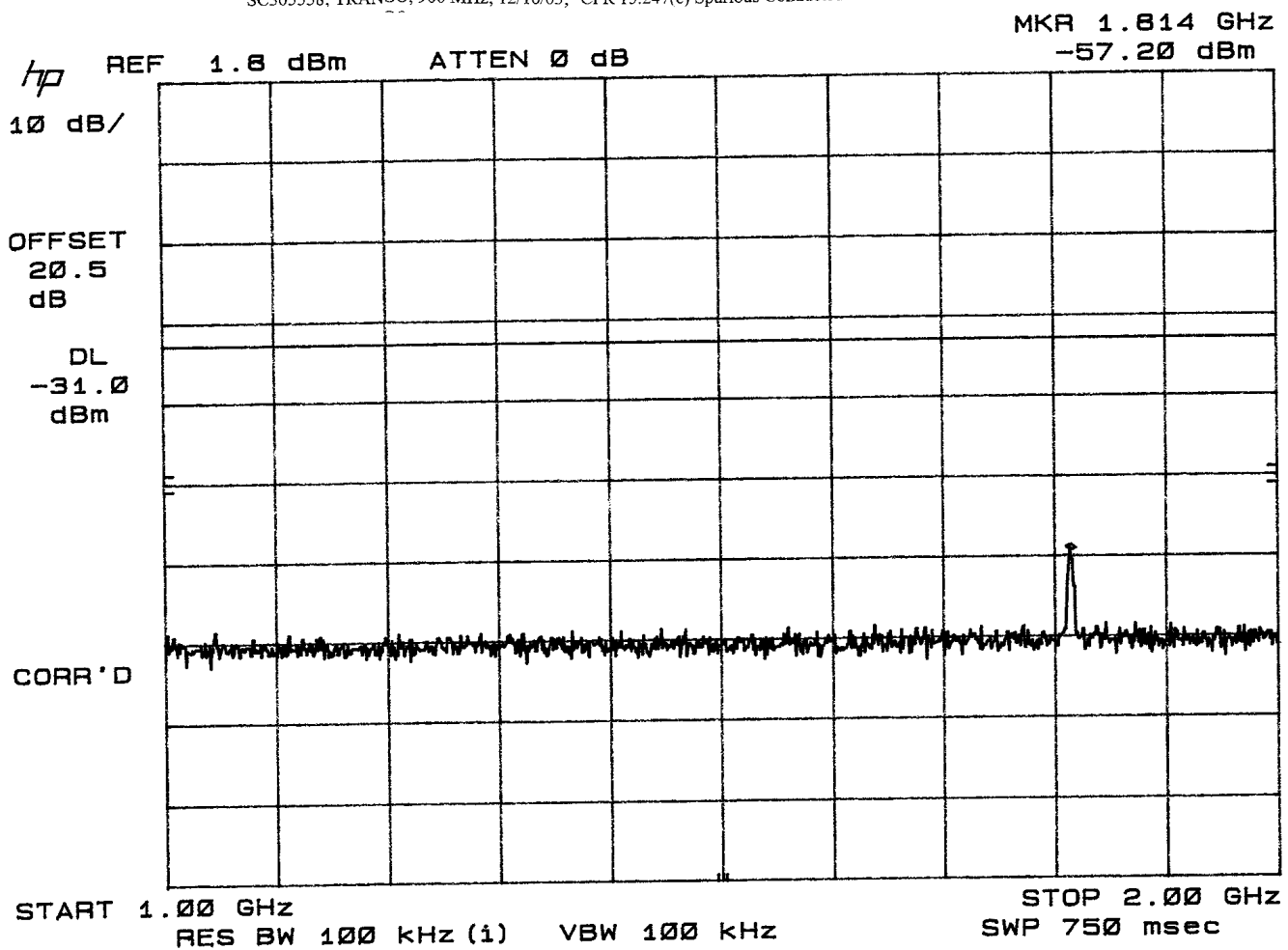
Remarks: _____

SC305558; TRANGO; 900 MHz; 12/16/03; SR2 CFR 15.247(c) Spurious Conducted Emissions > 20 dB below intentional radiator

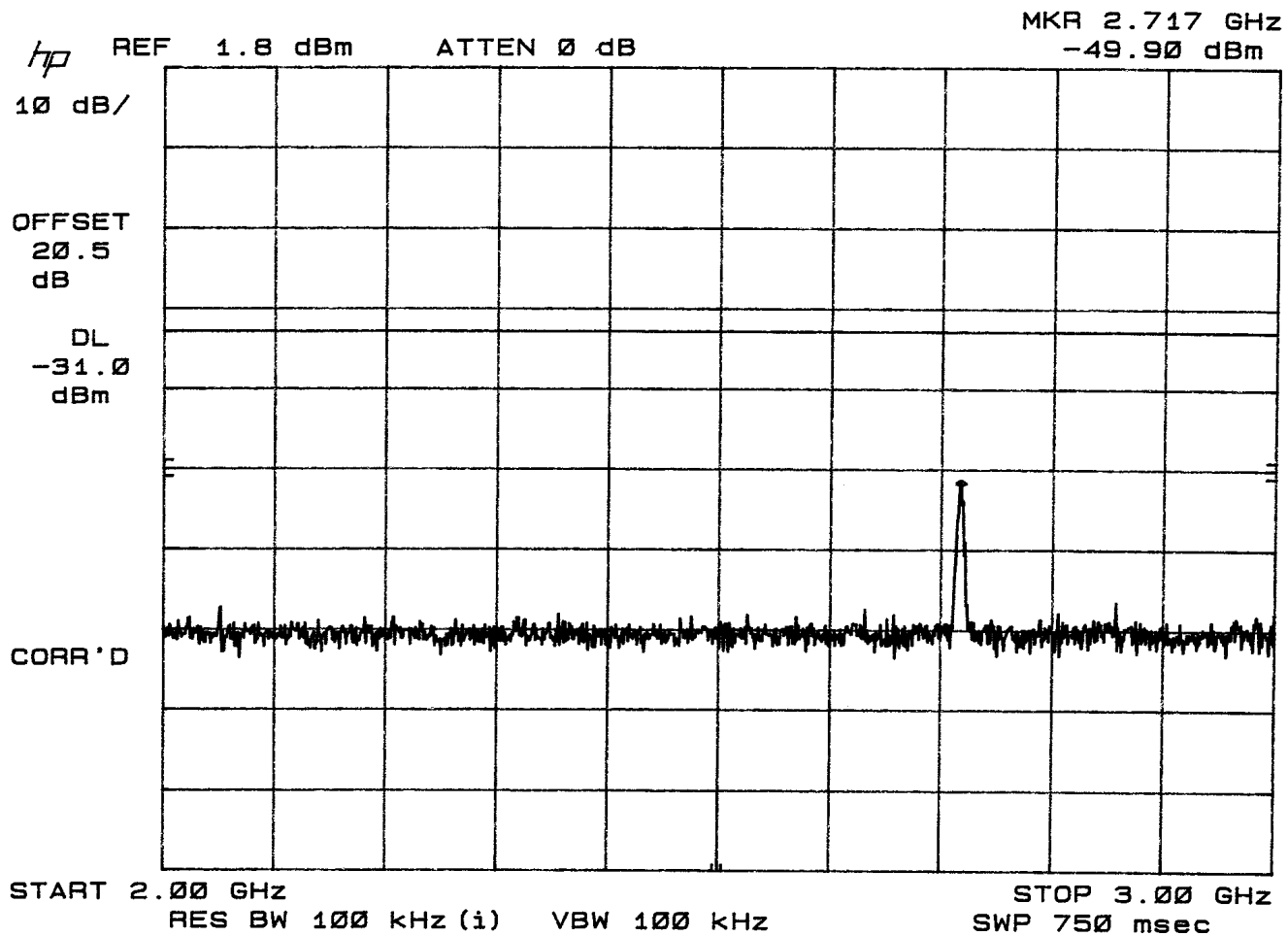




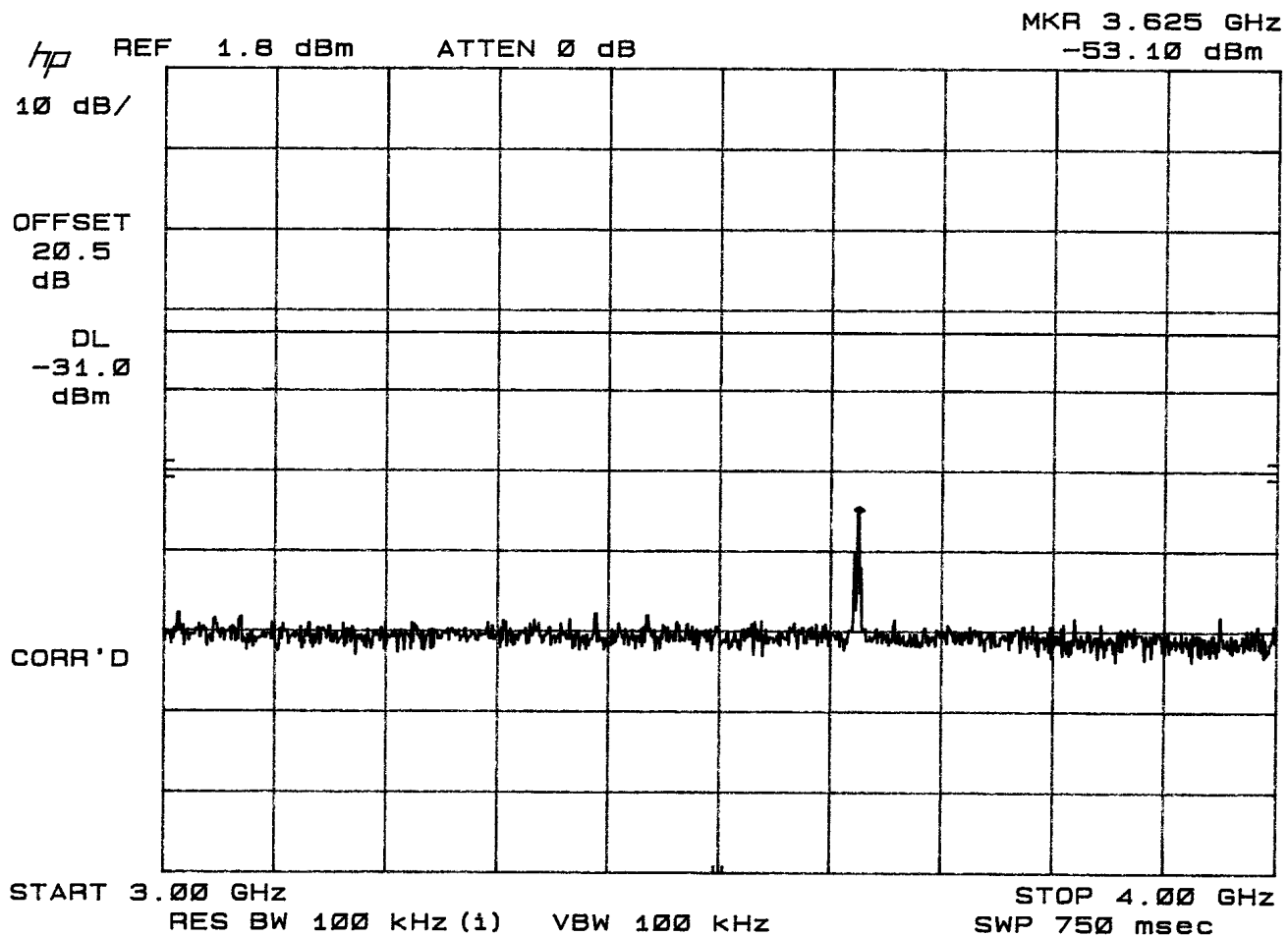
SC305558; TRANGO; 900 MHz; 12/16/03; CFR 15.247(c) Spurious Conducted Emissions > 20 dB below intentional radiator



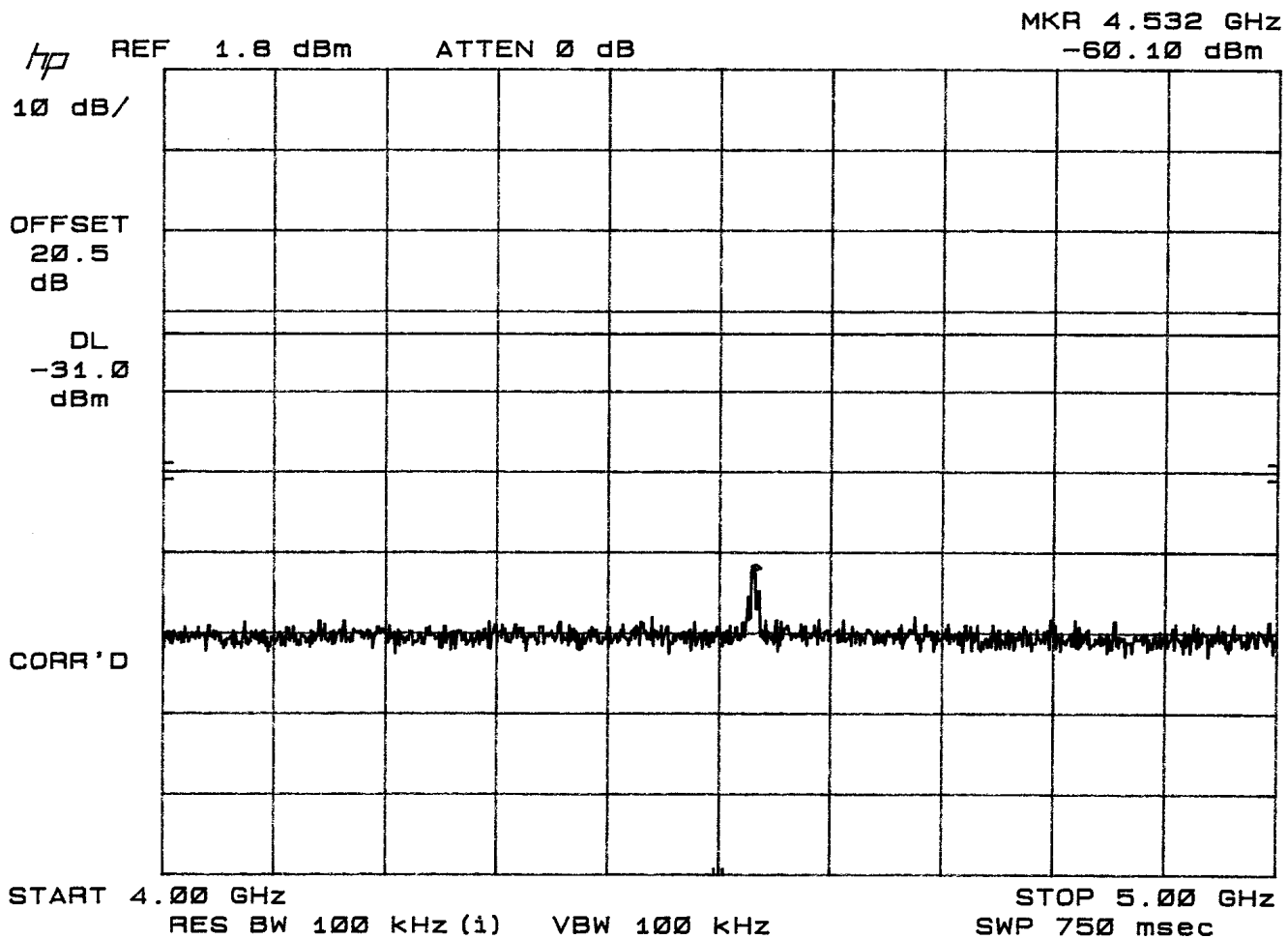
SC305558; TRANGO; 900 MHz; 12/16/03; SR2 CFR 15.247(c) Spurious Conducted Emissions > 20 dB below intentional radiator



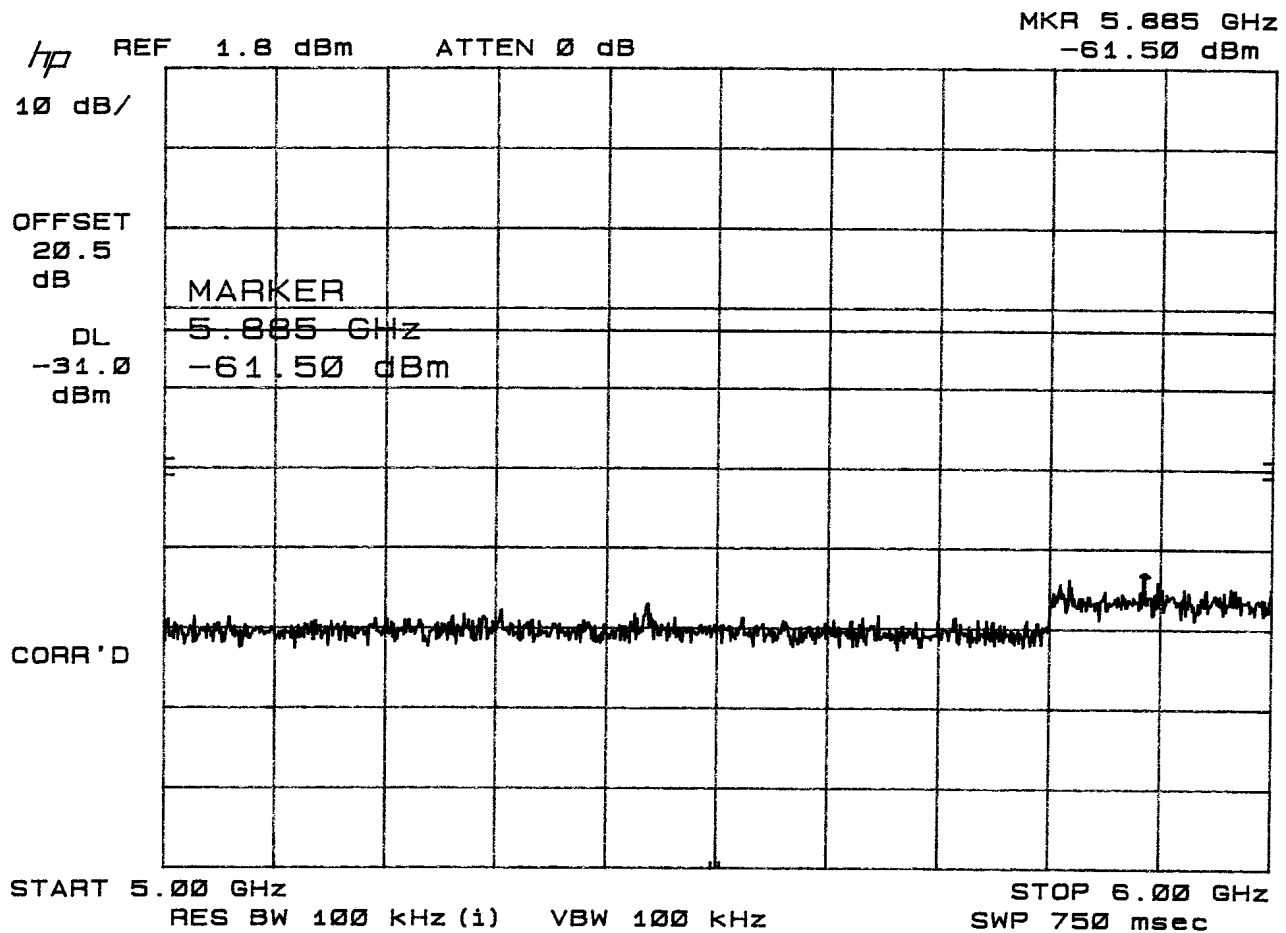
SC305558; TRANGO; 900 MHz; 12/16/03; SR2 CFR 15.247(c) Spurious Conducted Emissions > 20 dB below intentional radiator

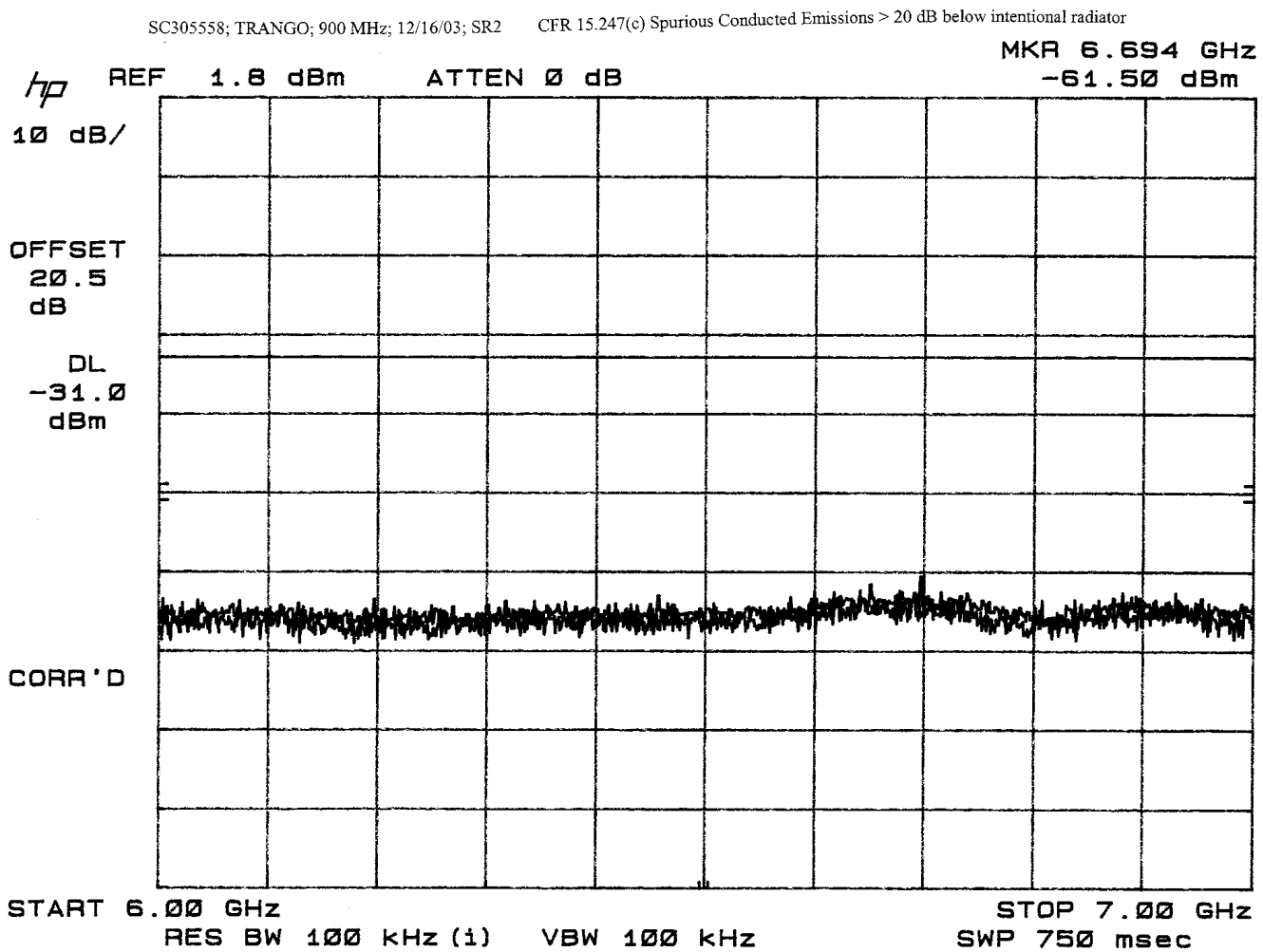


SC305558; TRANGO; 900 MHz; 12/16/03; SR2 CFR 15.247(c) Spurious Conducted Emissions > 20 dB below intentional radiator

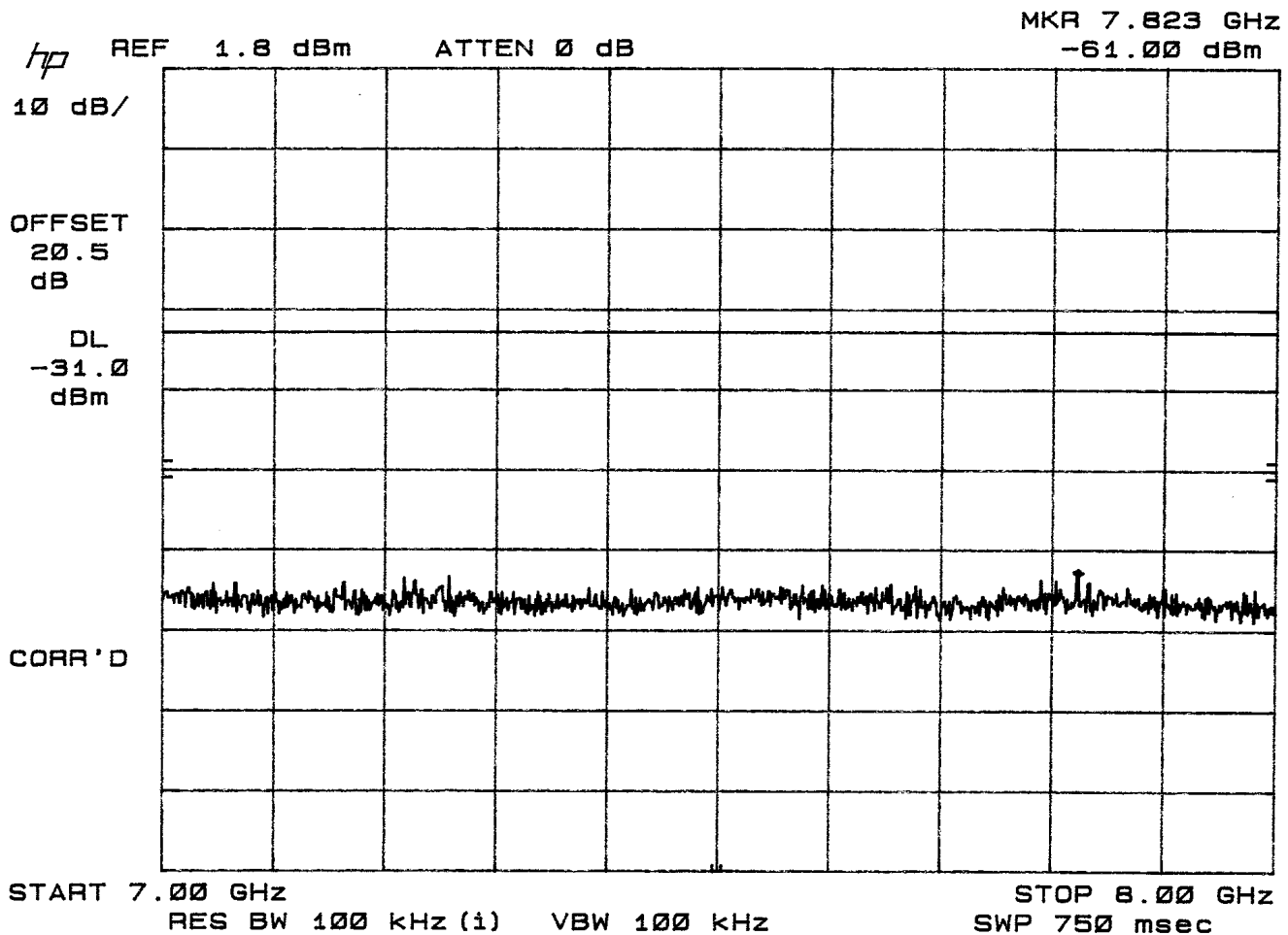


SC305558; TRANGO; 900 MHz; 12/16/03; SR2 CFR 15.247(c) Spurious Conducted Emissions > 20 dB below intentional radiator

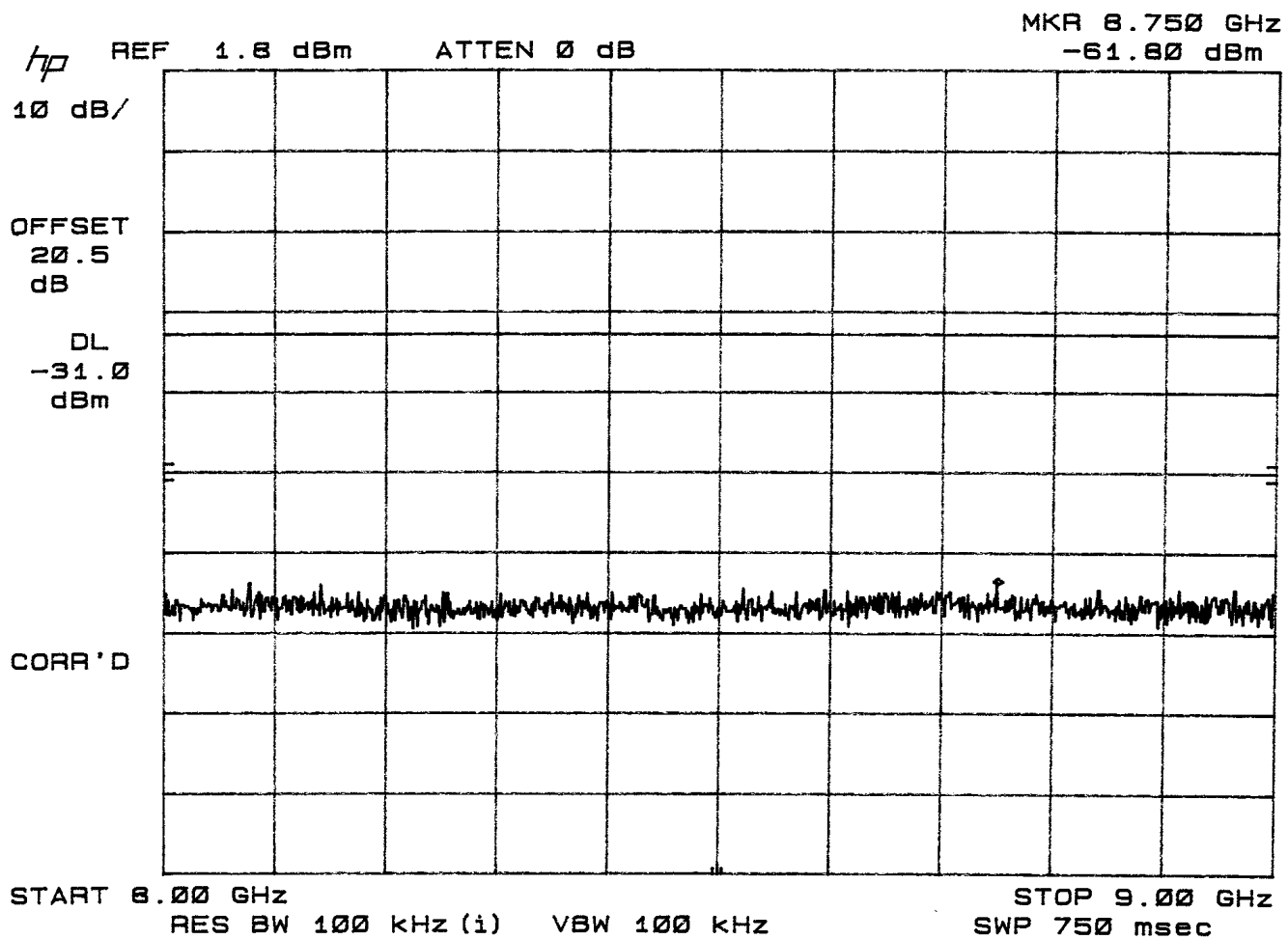




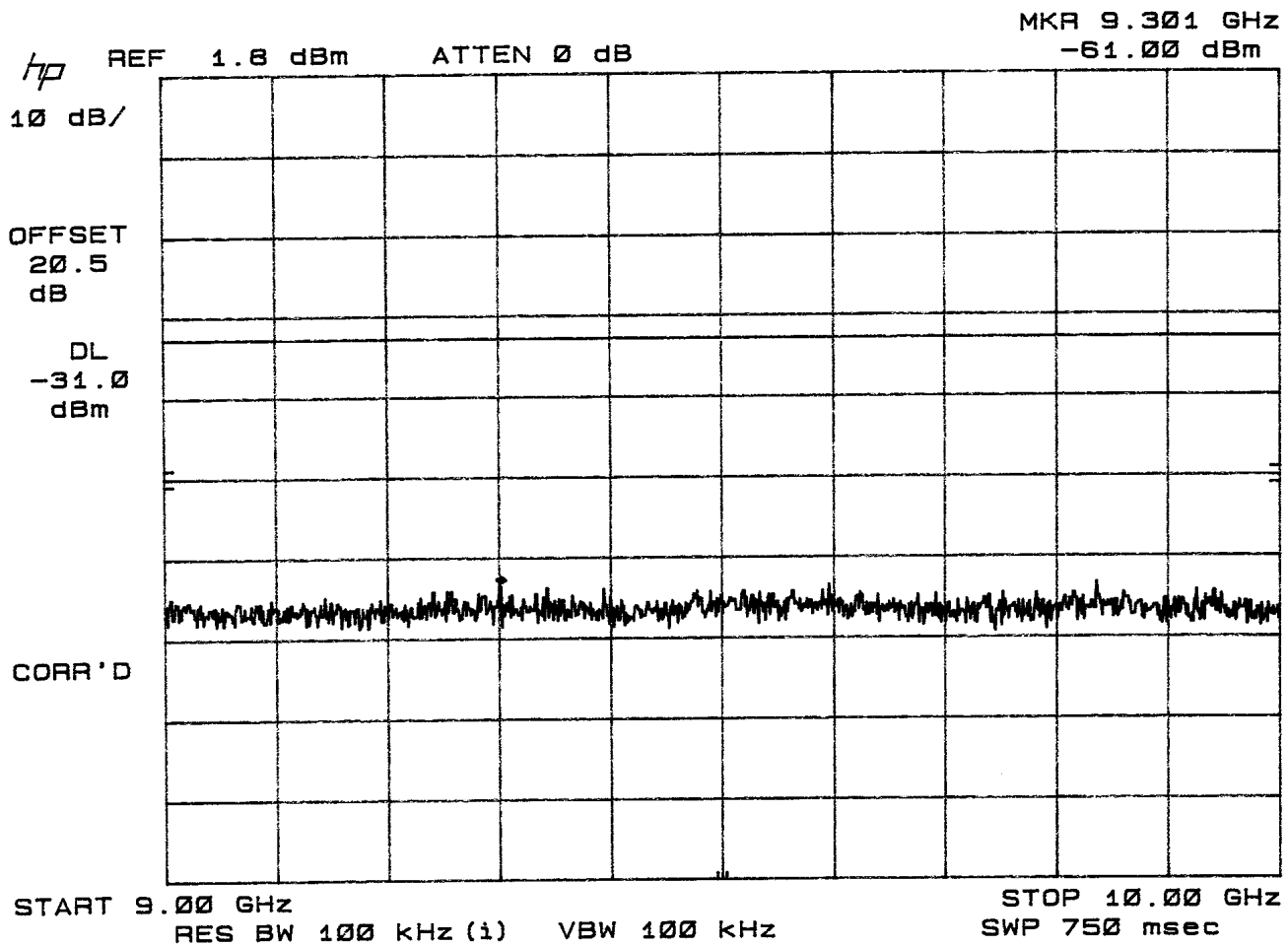
SC305558; TRANGO; 900 MHz; 12/16/03; SR2 CFR 15.247(c) Spurious Conducted Emissions > 20 dB below intentional radiator



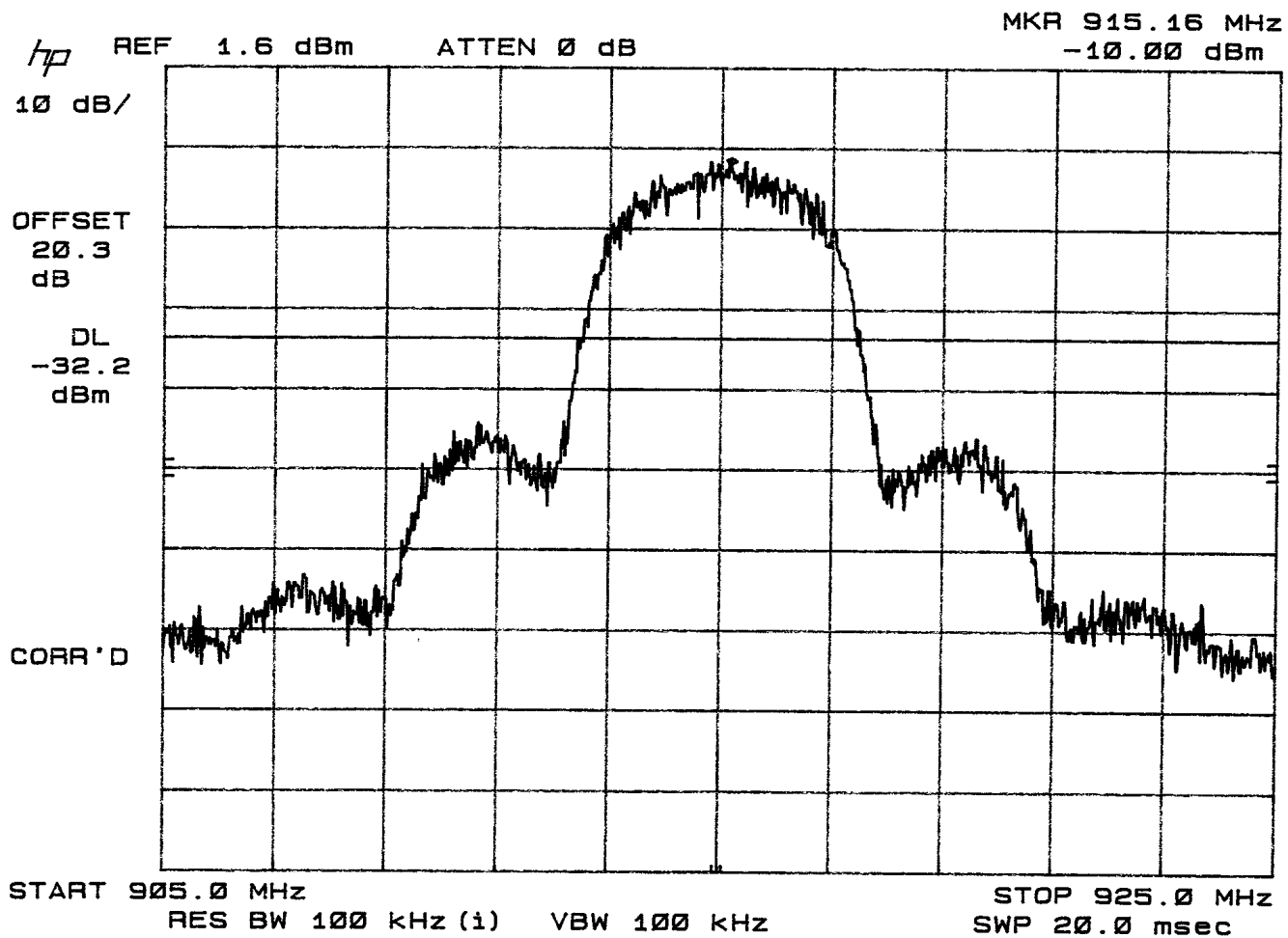
SC305558; TRANGO; 900 MHz; 12/16/03; SR2 CFR 15.247(c) Spurious Conducted Emissions > 20 dB below intentional radiator



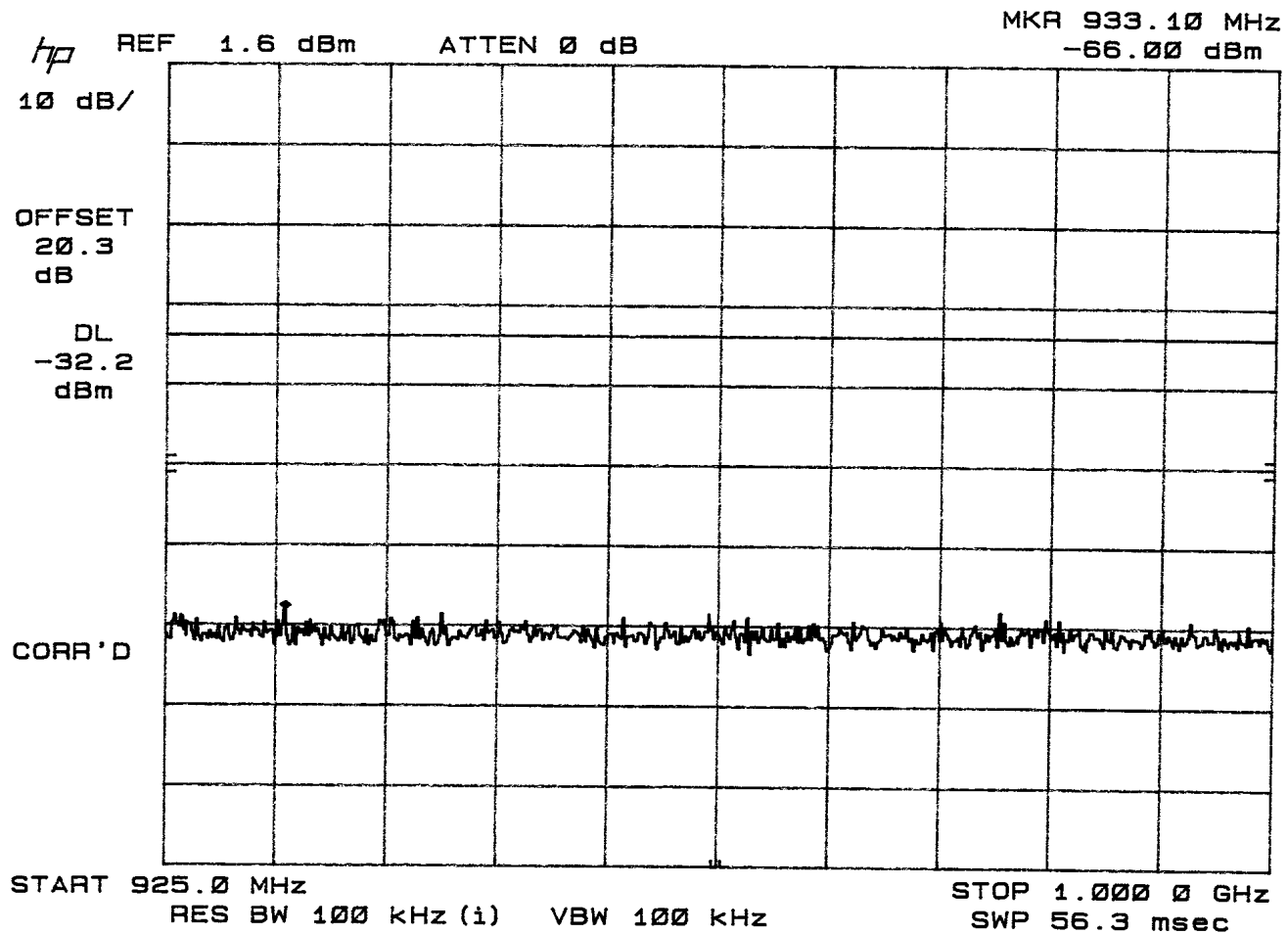
SC305558; TRANGO; 900 MHz; 12/16/03; SR2 CFR 15.247(c) Spurious Conducted Emissions > 20 dB below intentional radiator



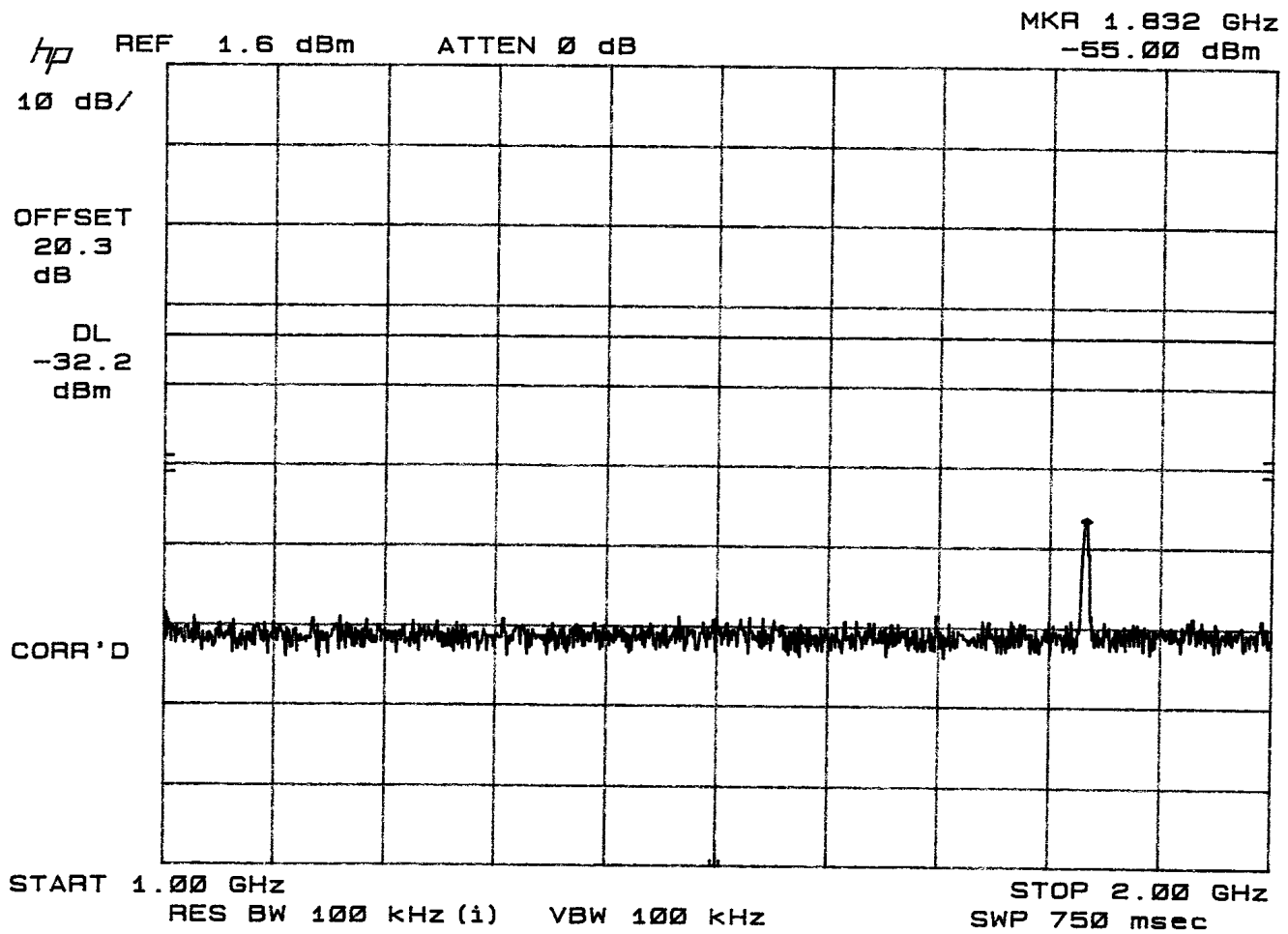
SC305558; TRANGO; 900 MHz; 12/16/03; SR2 CFR 15.247(c) Spurious Conducted Emissions > 20 dB below intentional radiator

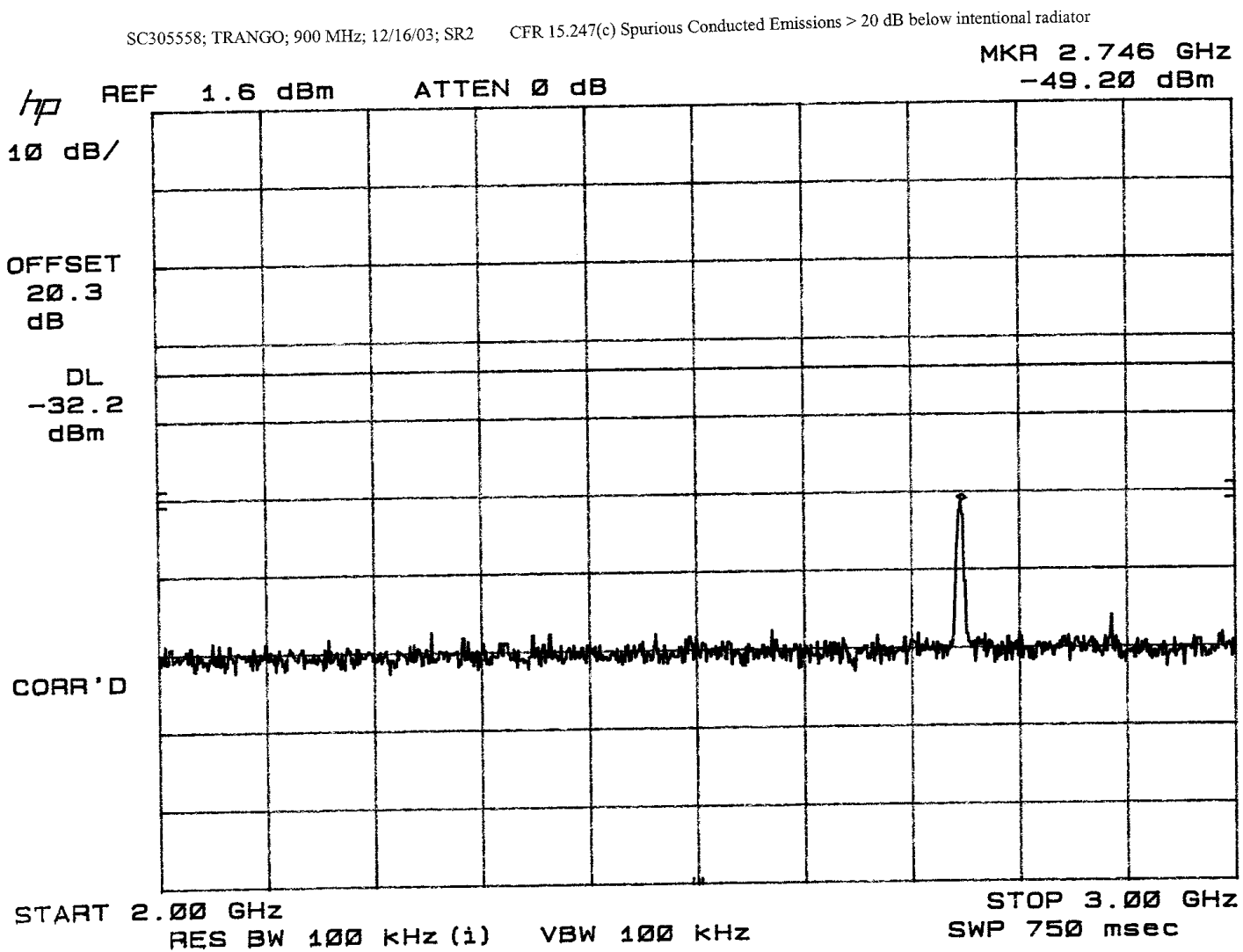


SC305558; TRANGO; 900 MHz; 12/16/03; SR2 CFR 15.247(c) Spurious Conducted Emissions > 20 dB below intentional radiator

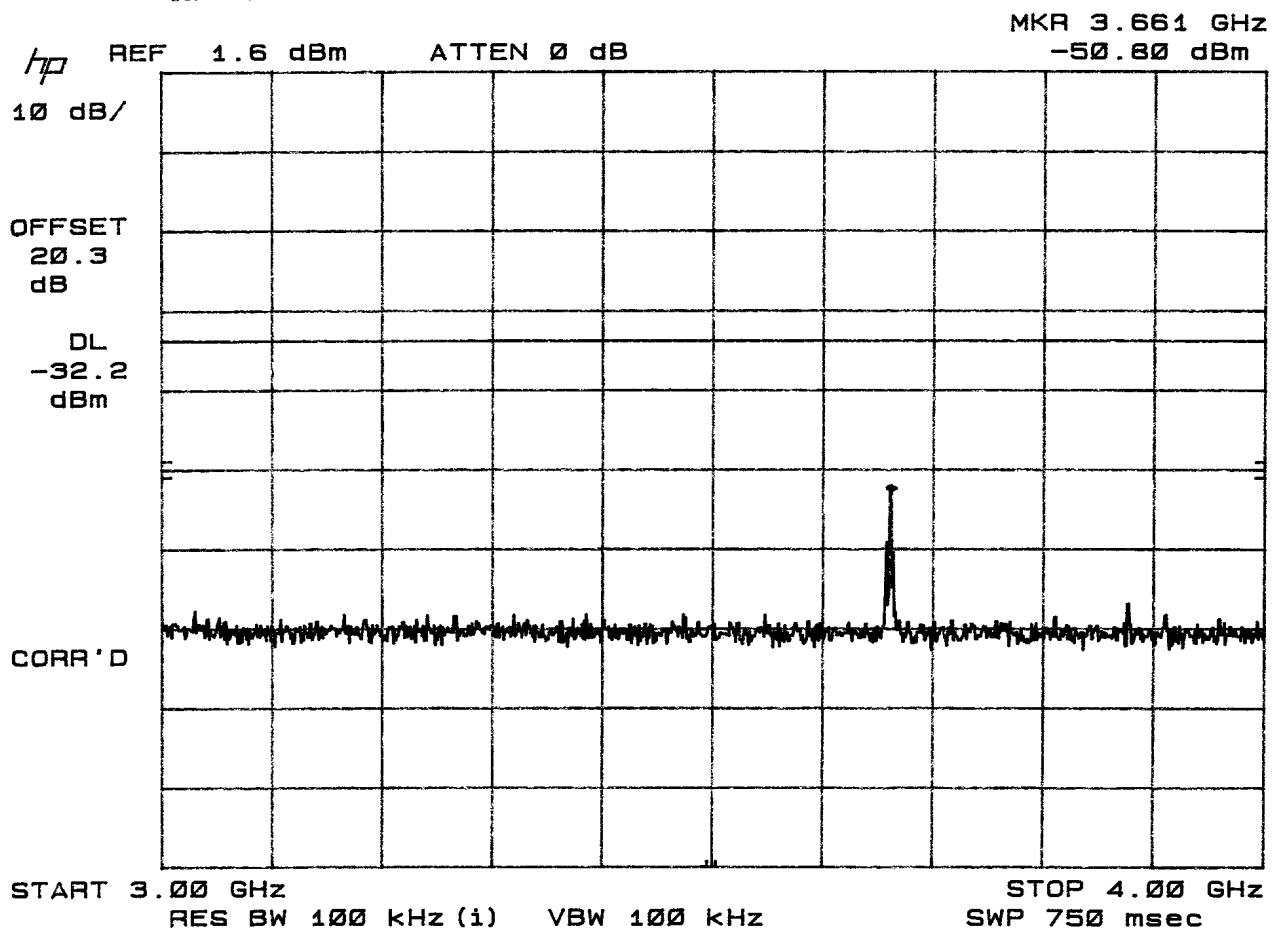


SC305558; TRANGO; 900 MHz; 12/16/03; SR2 CFR 15.247(c) Spurious Conducted Emissions > 20 dB below intentional radiator

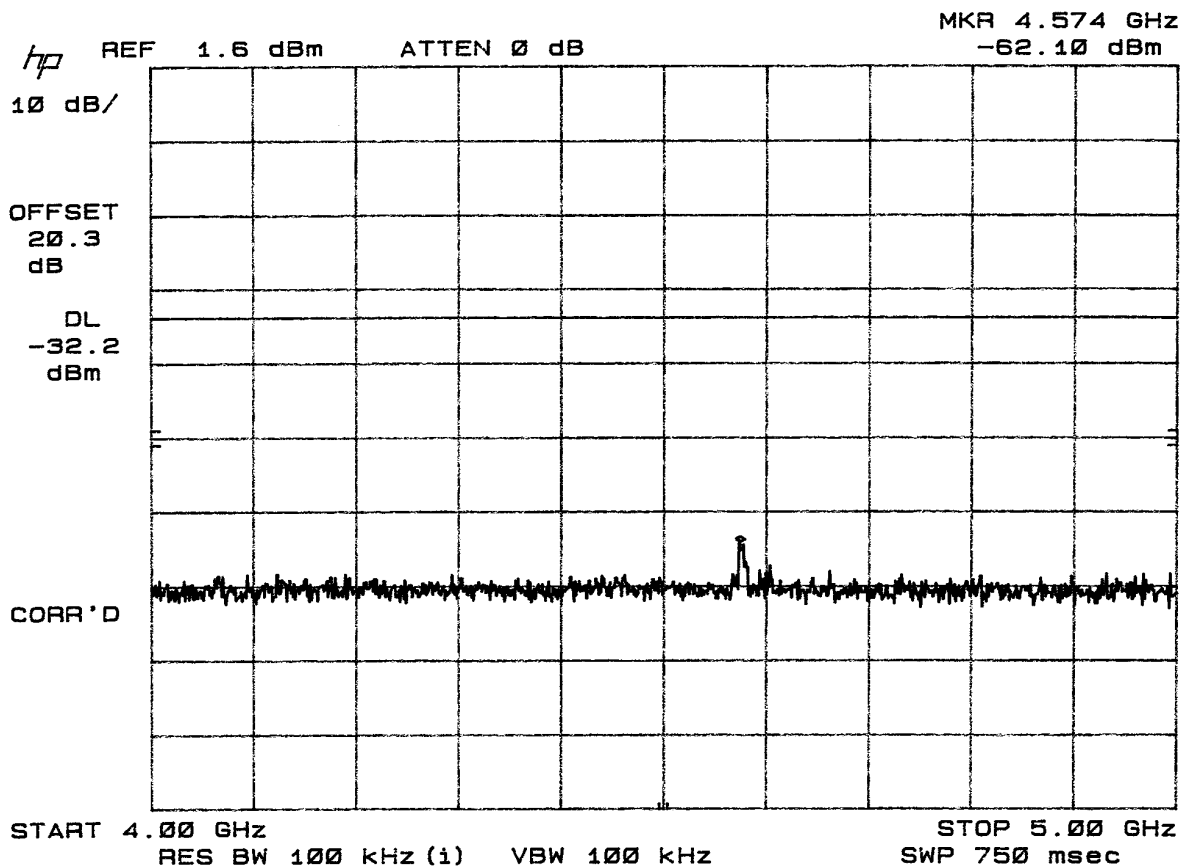




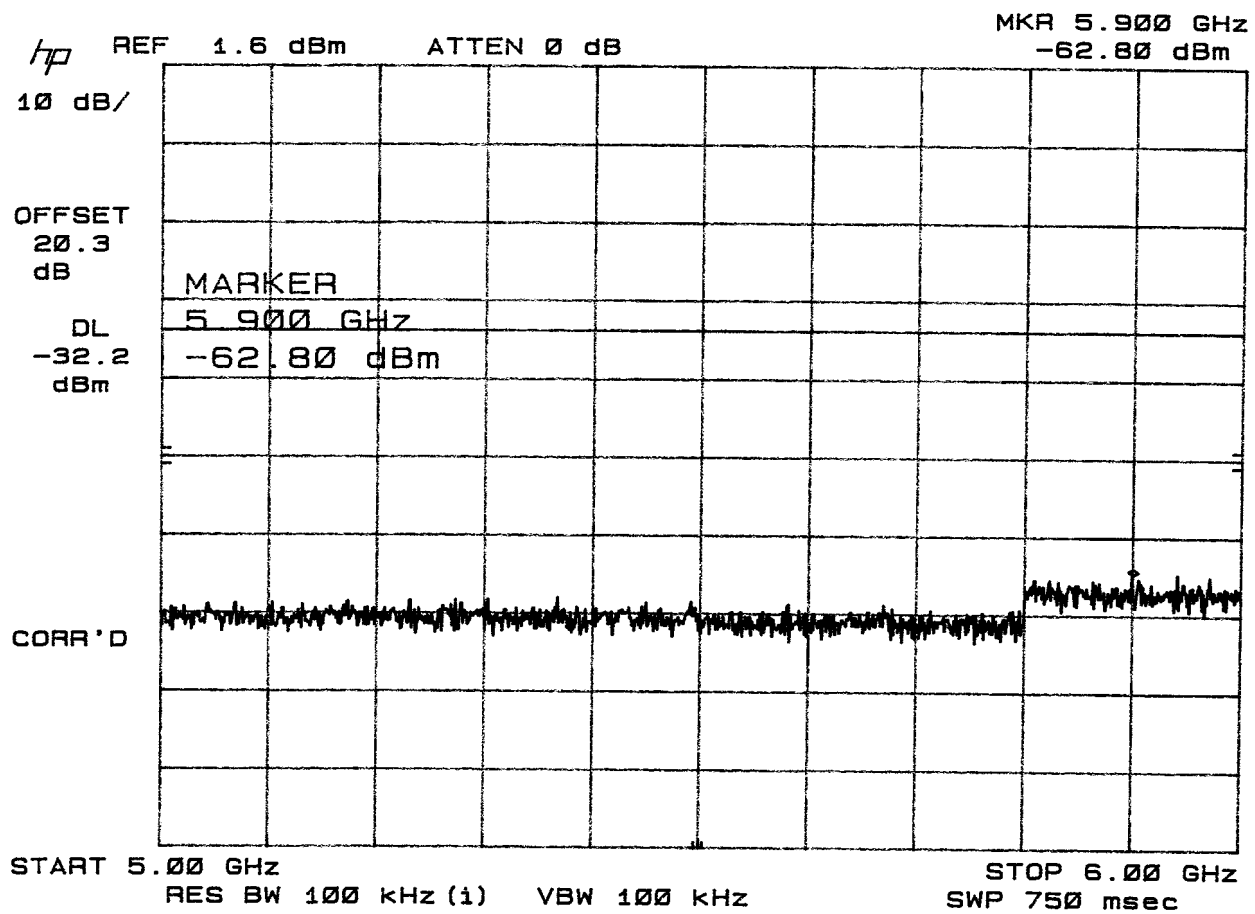
SC305558; TRANGO; 900 MHz; 12/16/03; SR2 CFR 15.247(c) Spurious Conducted Emissions > 20 dB below intentional radiator



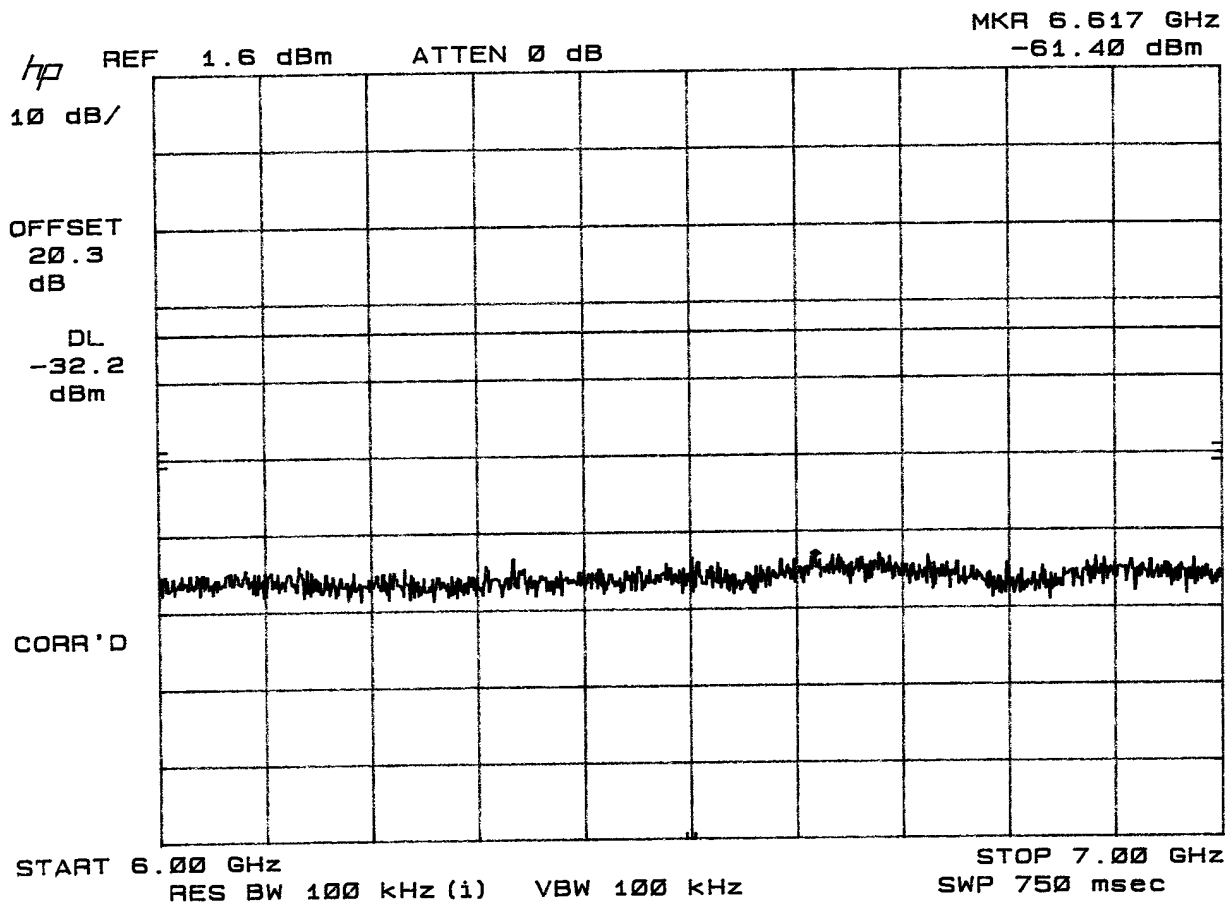
SC305558; TRANGO; 900 MHz; 12/16/03; SR2 CFR 15.247(c) Spurious Conducted Emissions > 20 dB below intentional radiator



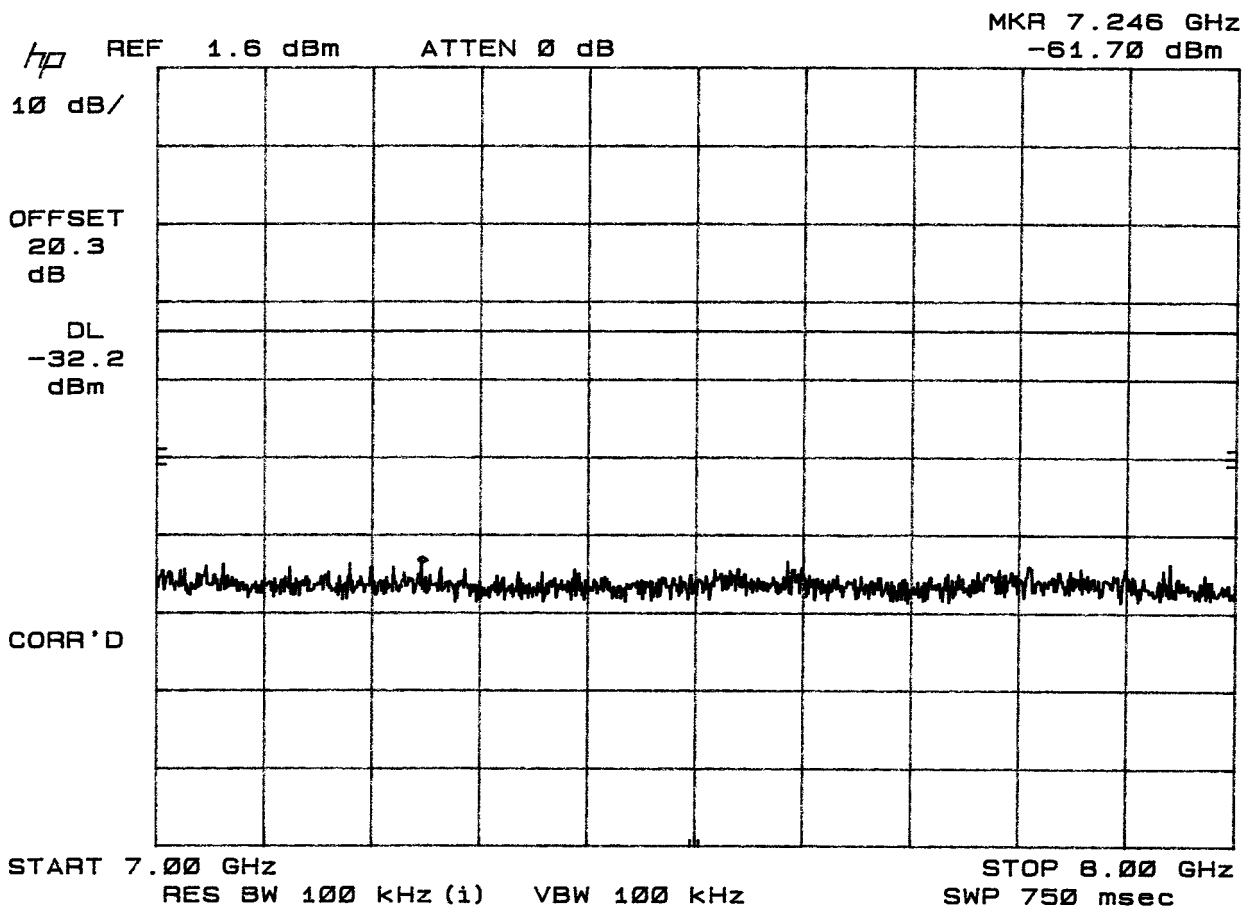
SC305558; TRANGO; 900 MHz; 12/16/03; SR2 CFR 15.247(c) Spurious Conducted Emissions > 20 dB below intentional radiator



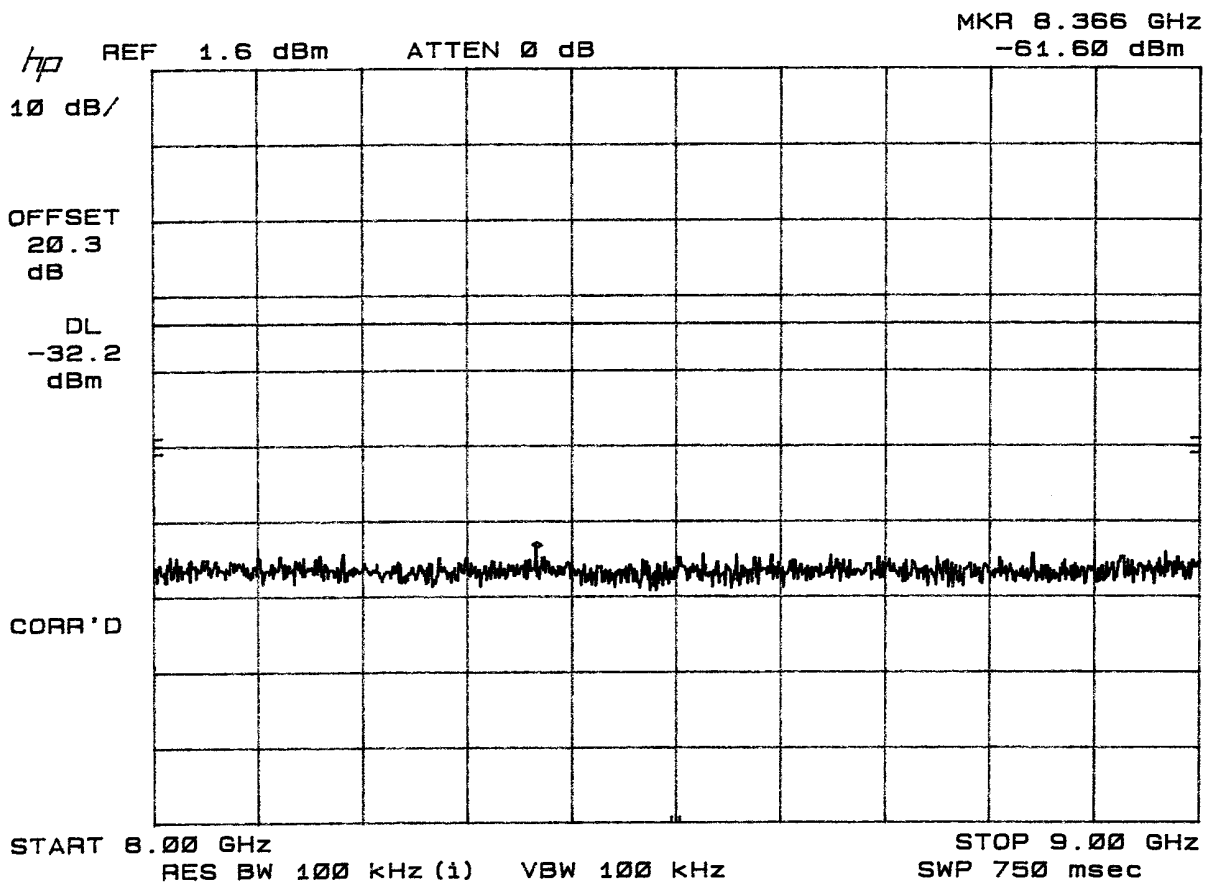
SC305558; TRANGO; 900 MHz; 12/16/03; SR2 CFR 15.247(c) Spurious Conducted Emissions > 20 dB below intentional radiator



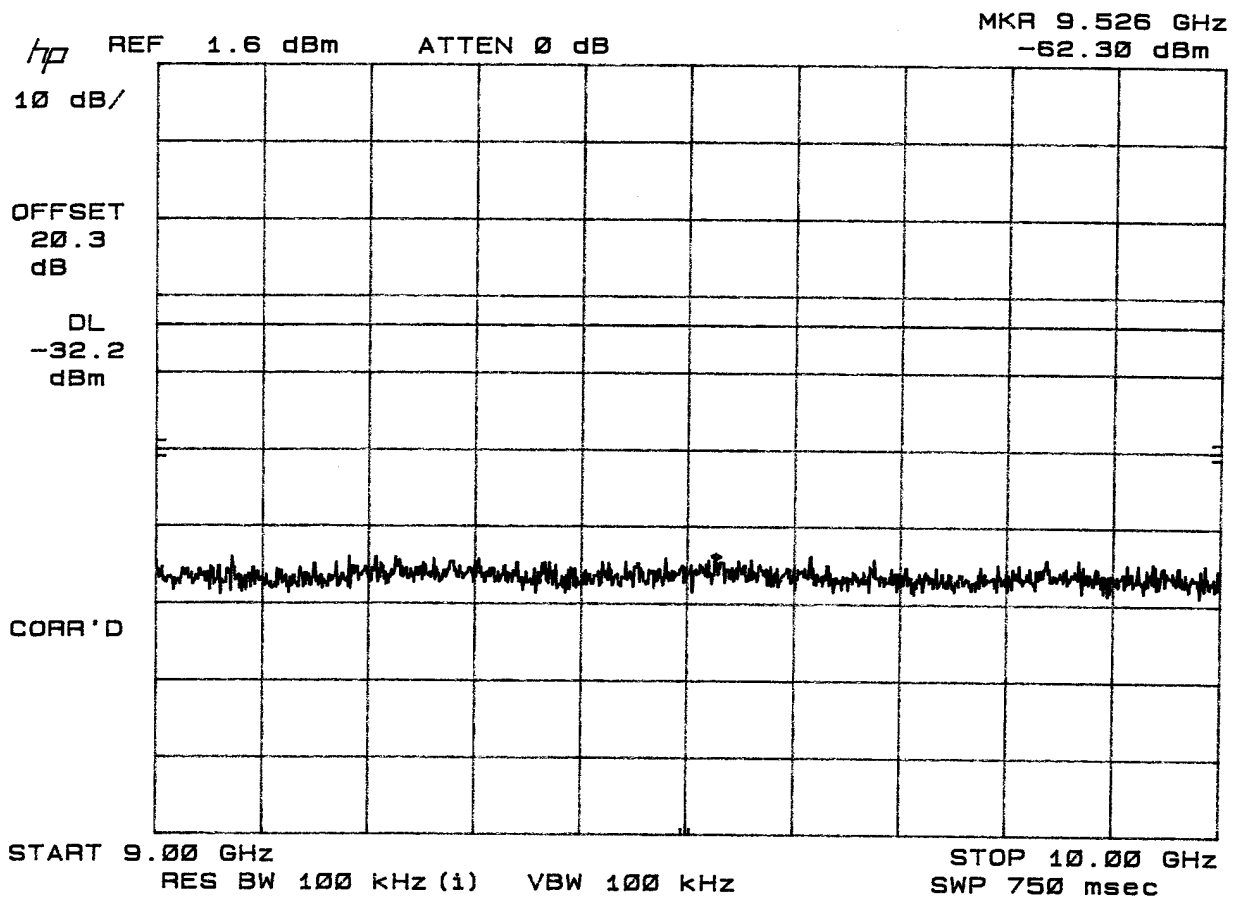
SC305558; TRANGO; 900 MHz; 12/16/03; SR2 CFR 15.247(c) Spurious Conducted Emissions > 20 dB below intentional radiator



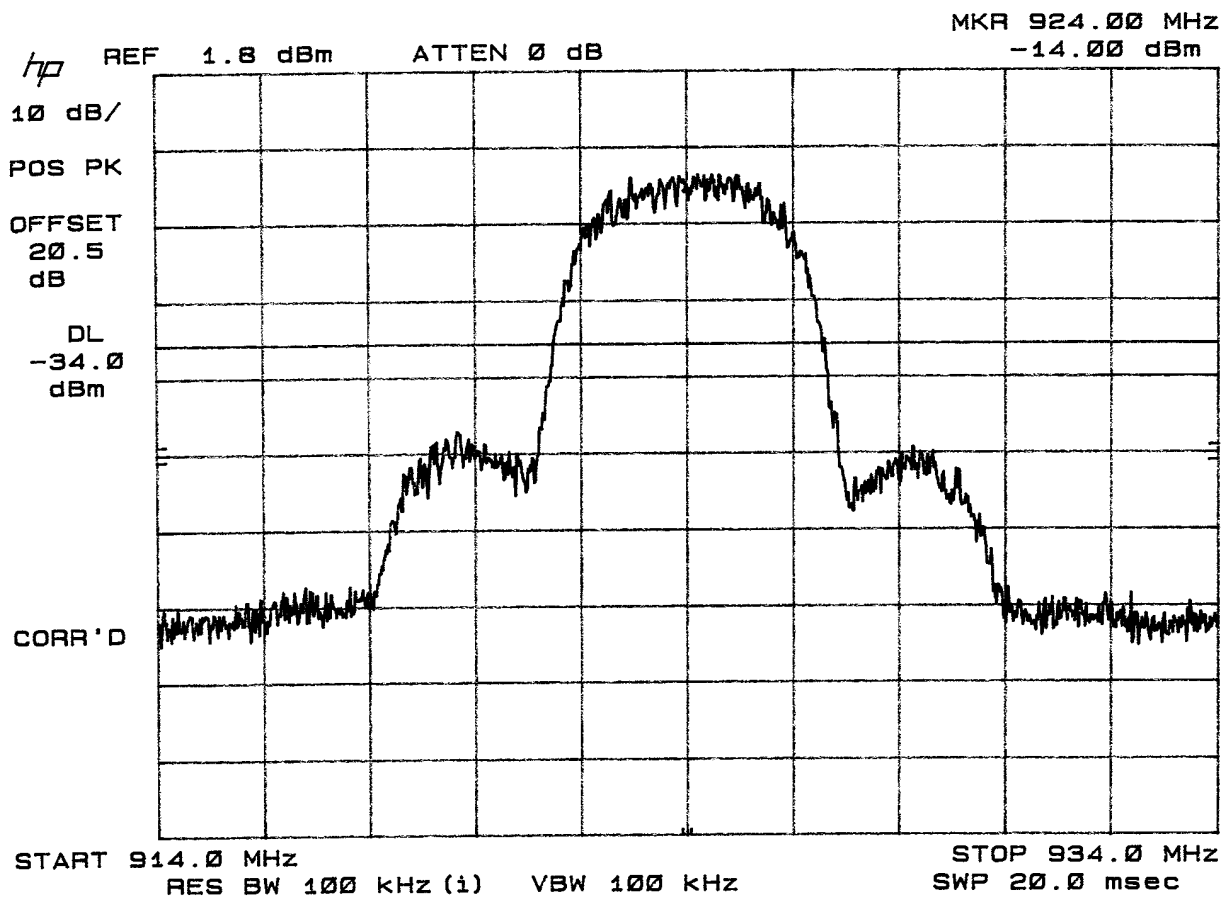
SC305558; TRANGO; 900 MHz; 12/16/03; SR2 CFR 15.247(c) Spurious Conducted Emissions > 20 dB below intentional radiator



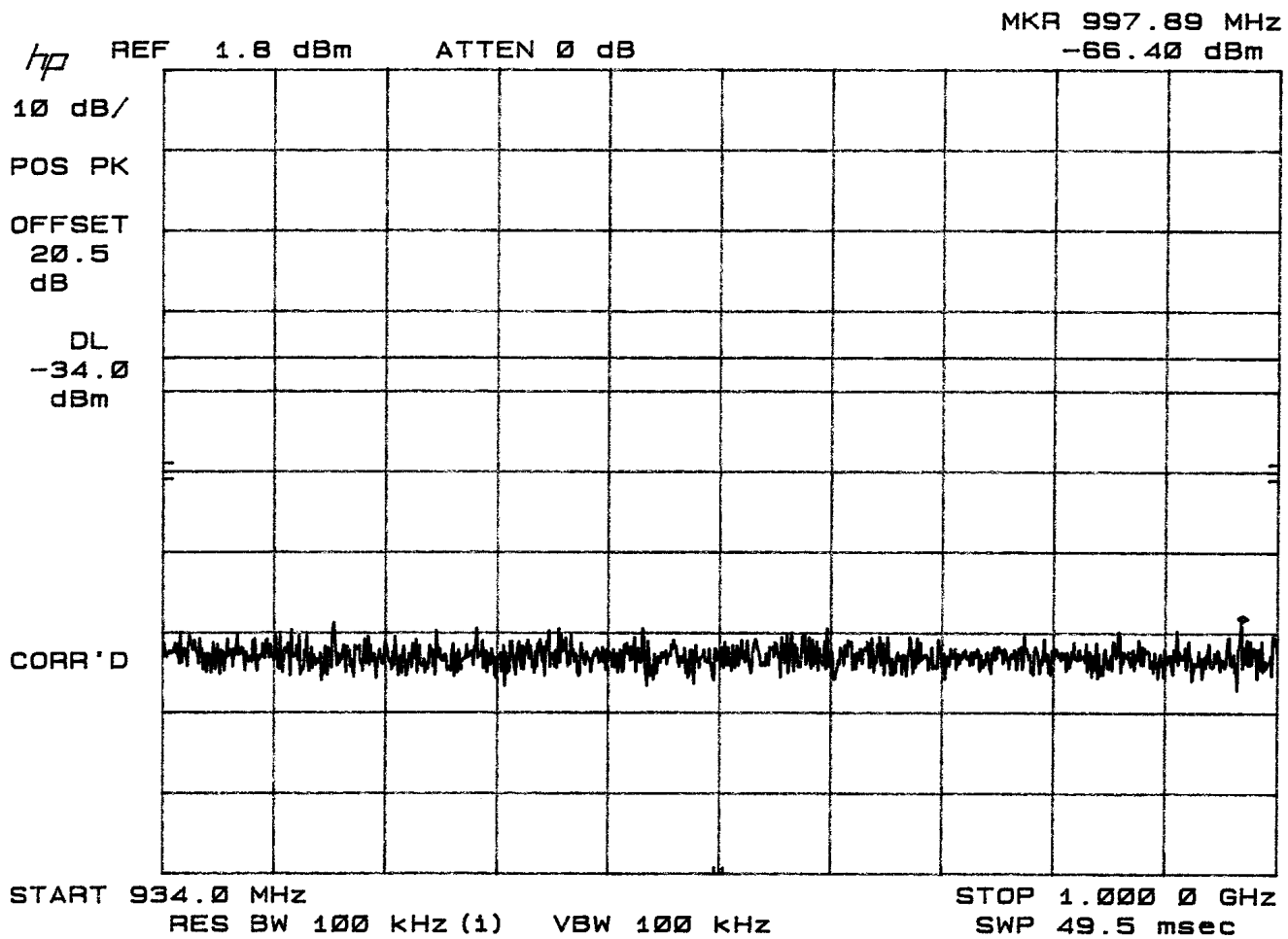
SC305558; TRANGO; 900 MHz; 12/16/03; SR2 CFR 15.247(c) Spurious Conducted Emissions > 20 dB below intentional radiator



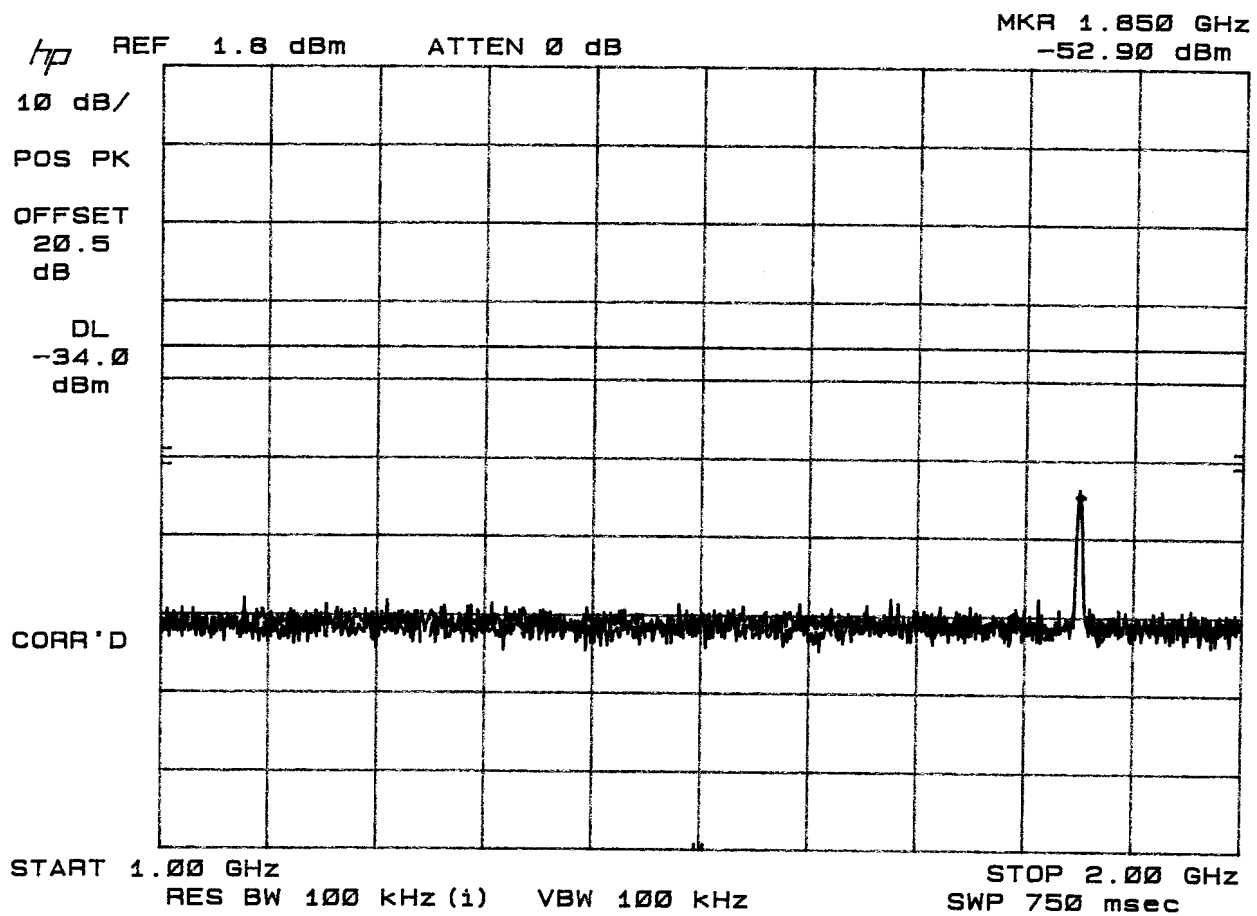
SC305558; TRANGO: 900 MHz; 12/16/03; SR2 CFR 15.247(c) Spurious Conducted Emissions > 20 dB below intentional radiator



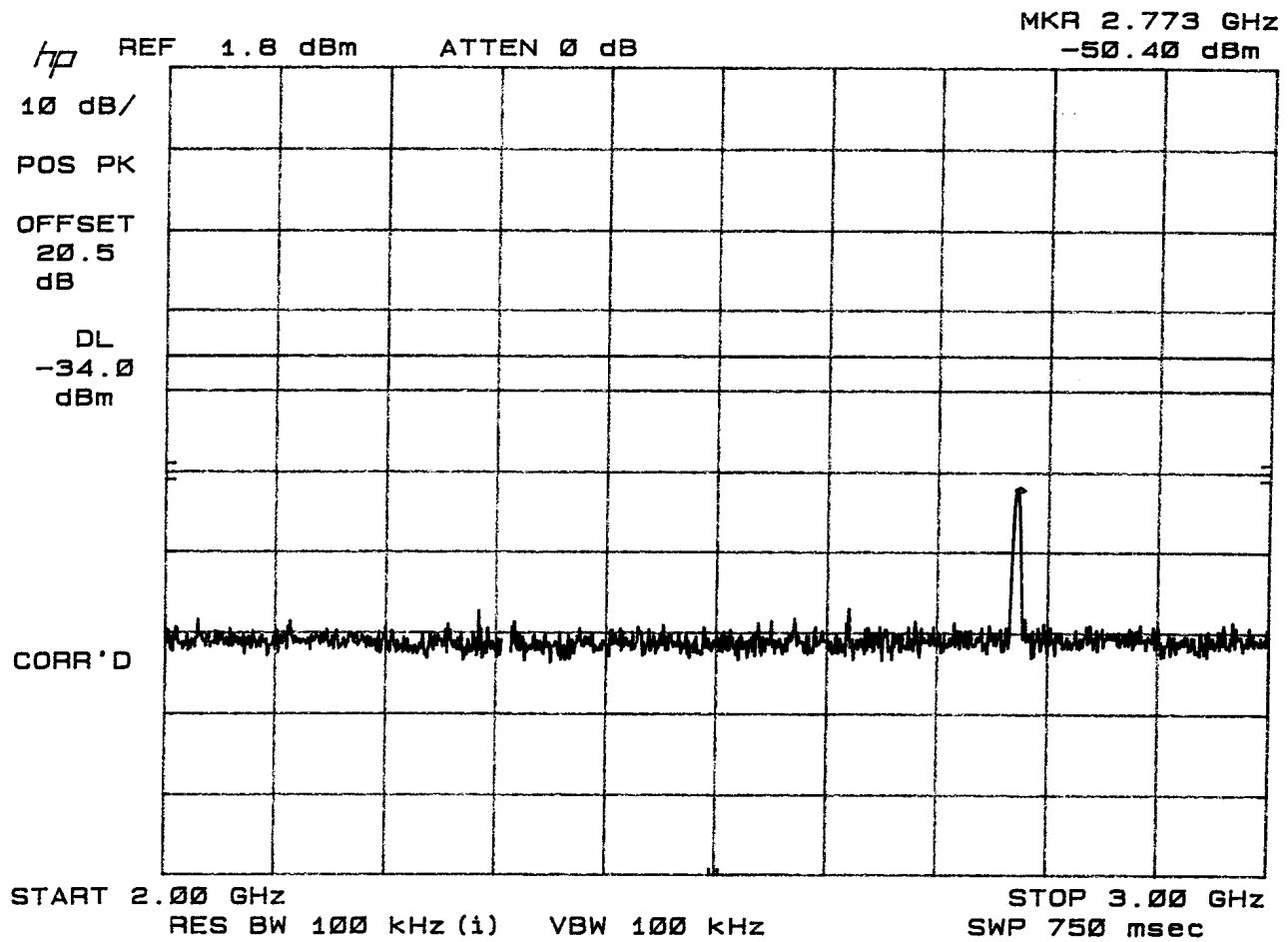
SC305558; TRANGO; 900 MHz; 12/16/03; SR2 CFR 15.247(c) Spurious Conducted Emissions > 20 dB below intentional radiator



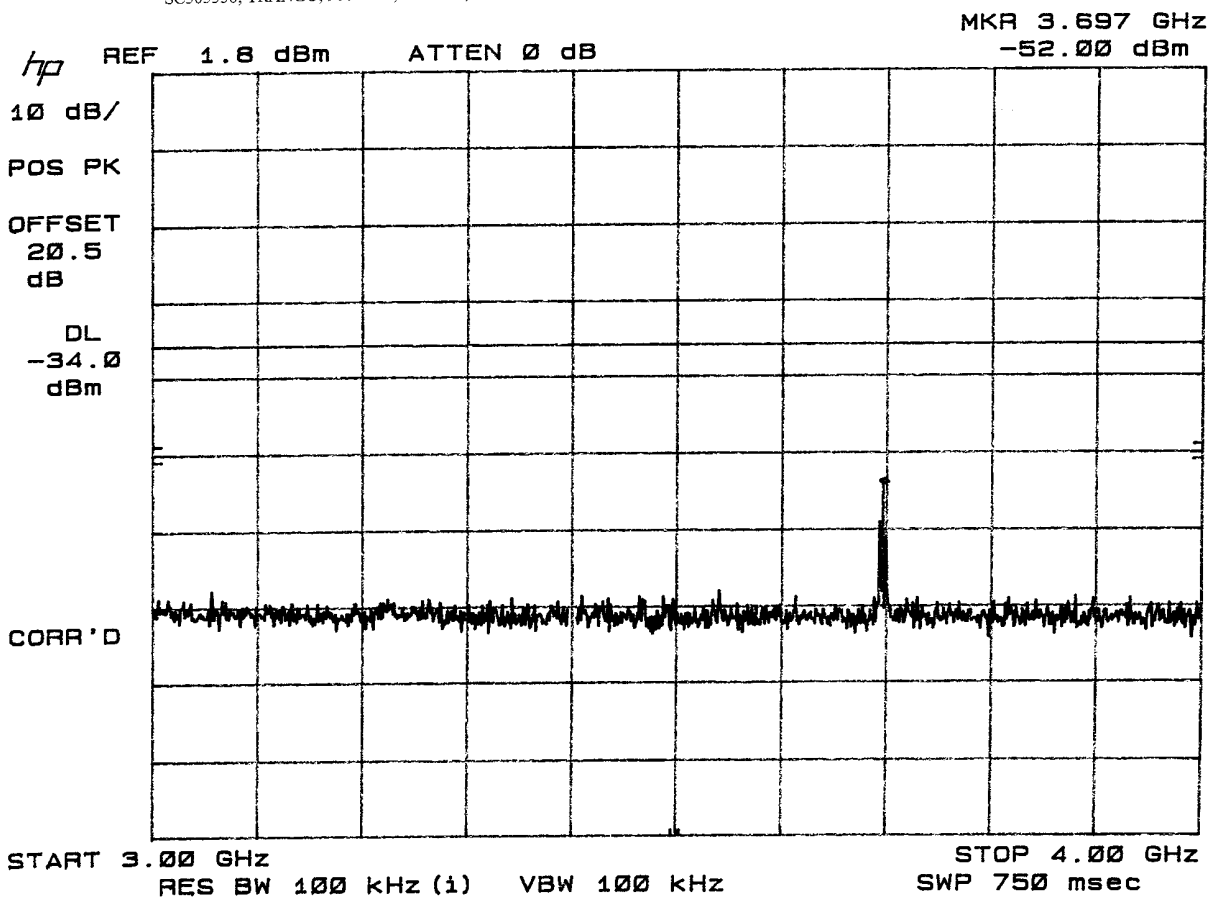
SC305558; TRANGO; 900 MHz; 12/16/03; SR2 CFR 15.247(c) Spurious Conducted Emissions > 20 dB below intentional radiator



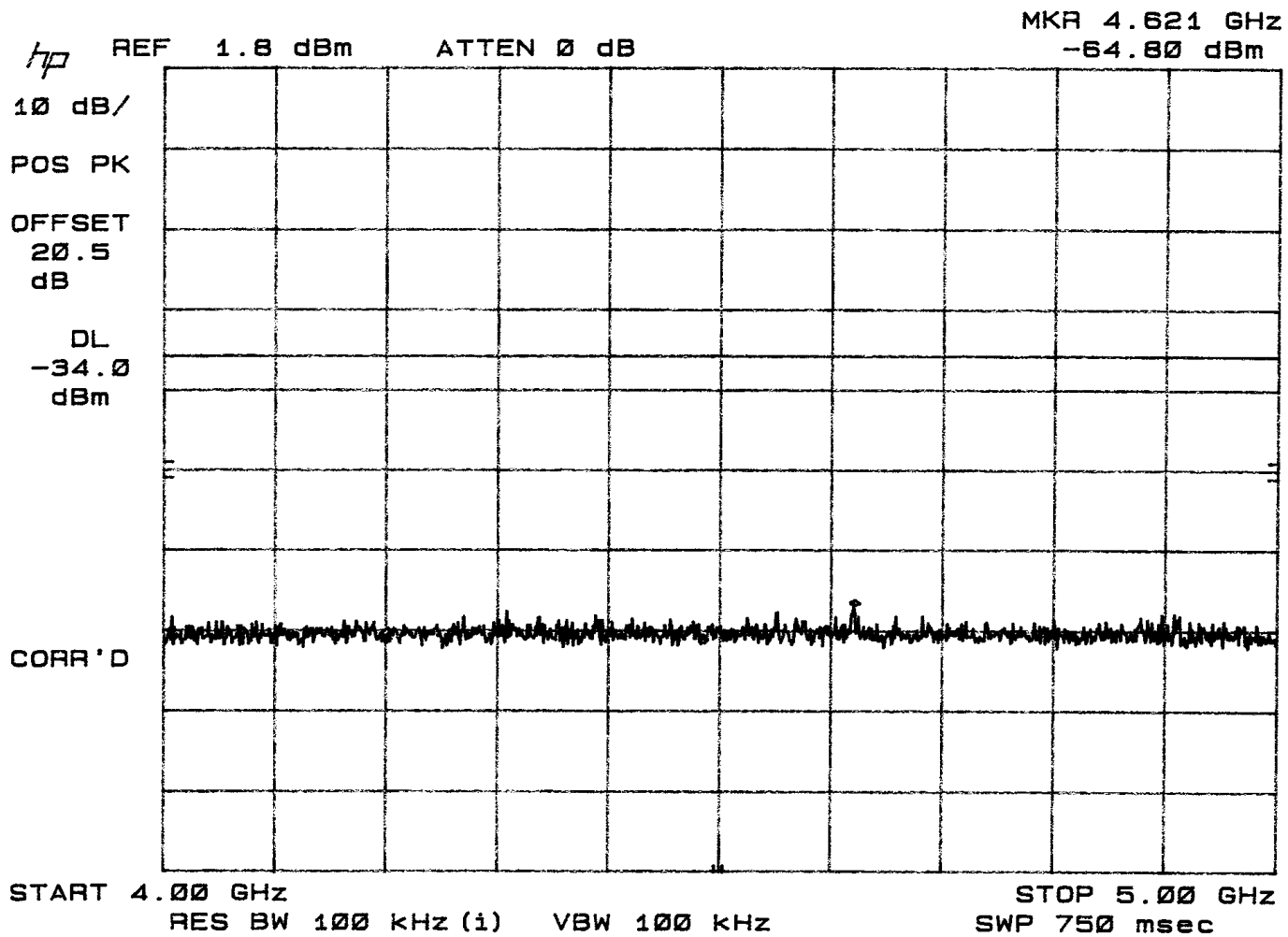
SC305558; TRANGO; 900 MHz; 12/16/03; SR2 CFR 15.247(c) Spurious Conducted Emissions > 20 dB below intentional radiator



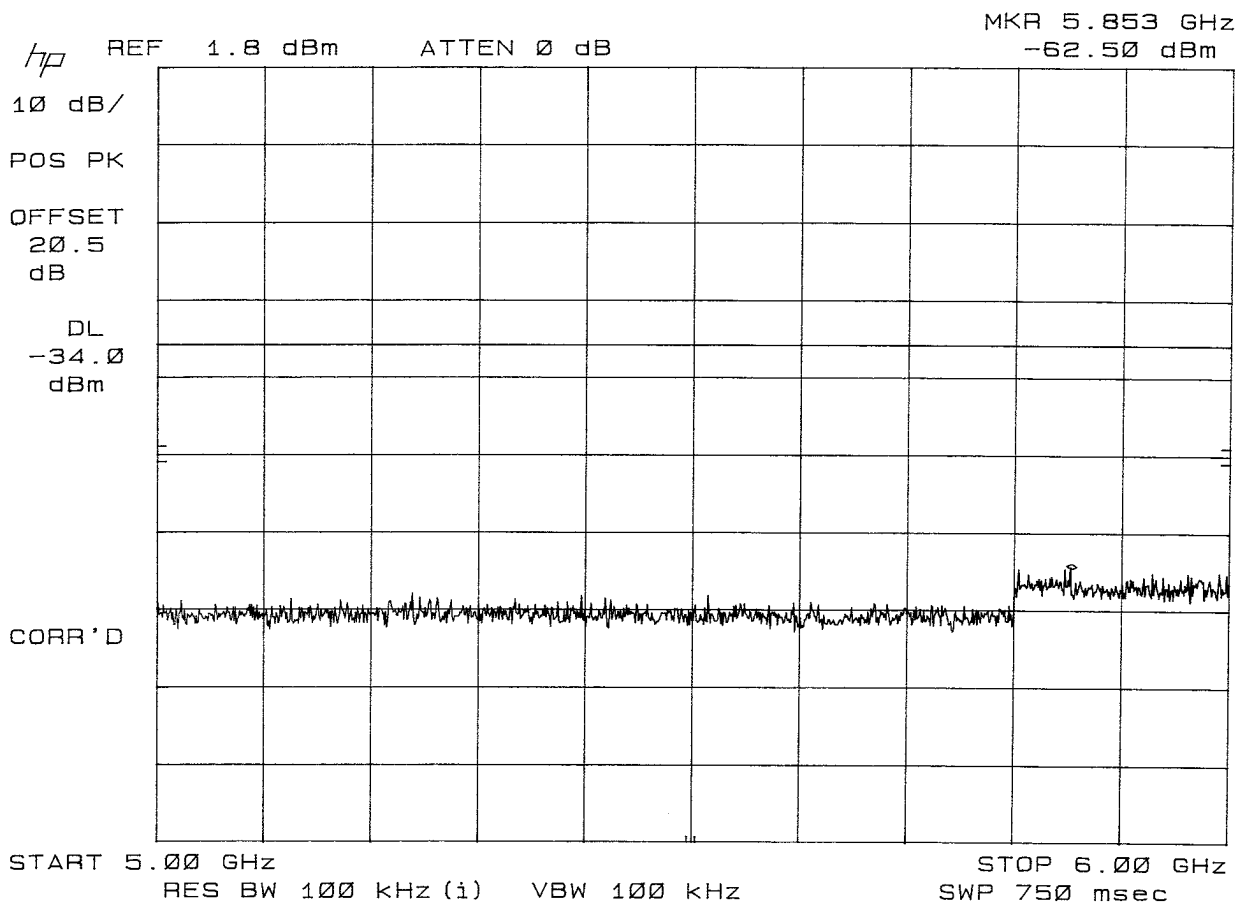
SC305558; TRANGO; 900 MHz; 12/16/03; SR2 CFR 15.247(c) Spurious Conducted Emissions > 20 dB below intentional radiat



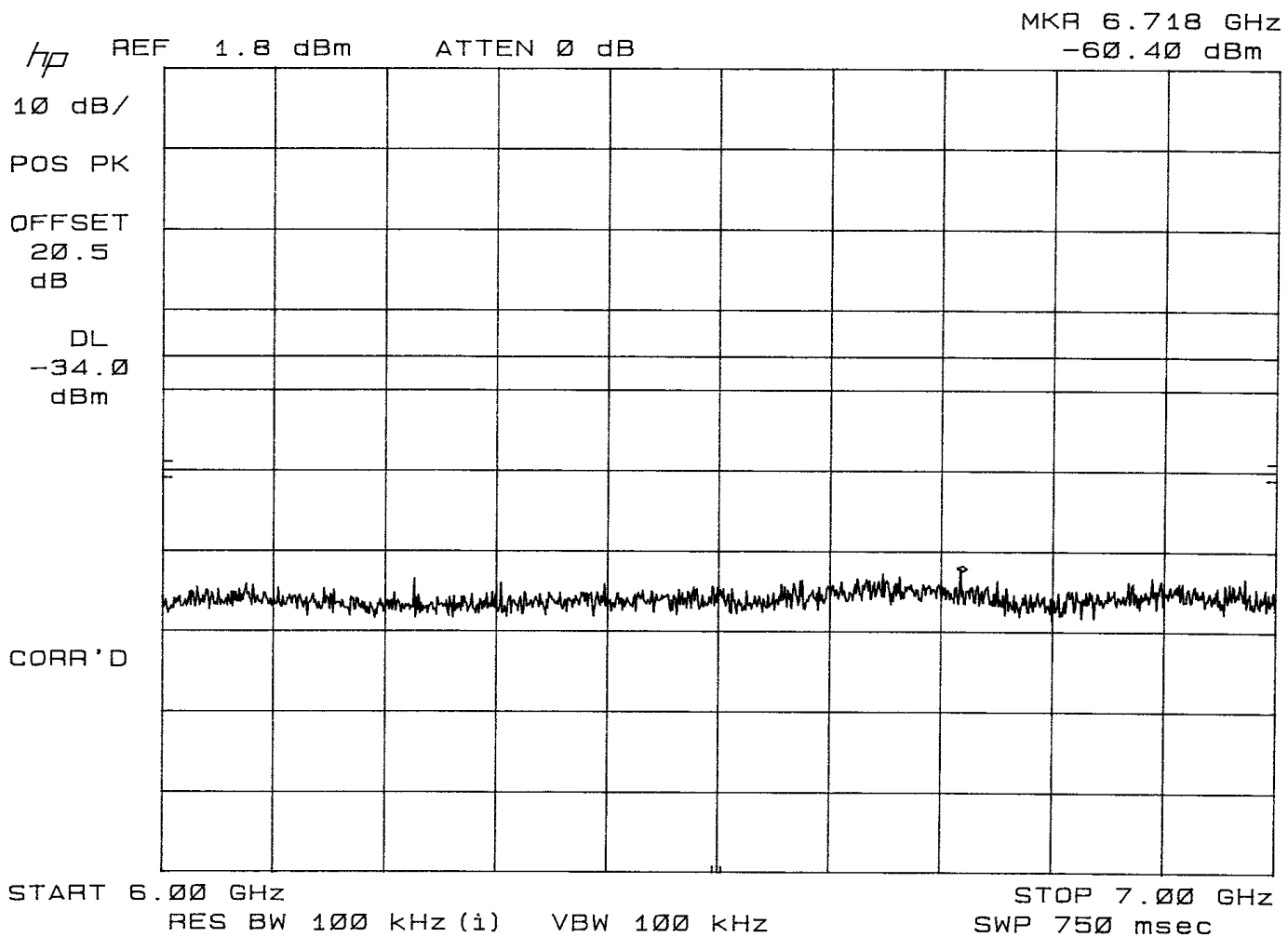
SC305558; TRANGO; 900 MHz; 12/16/03; SR2 CFR 15.247(c) Spurious Conducted Emissions > 20 dB below intentional radiator



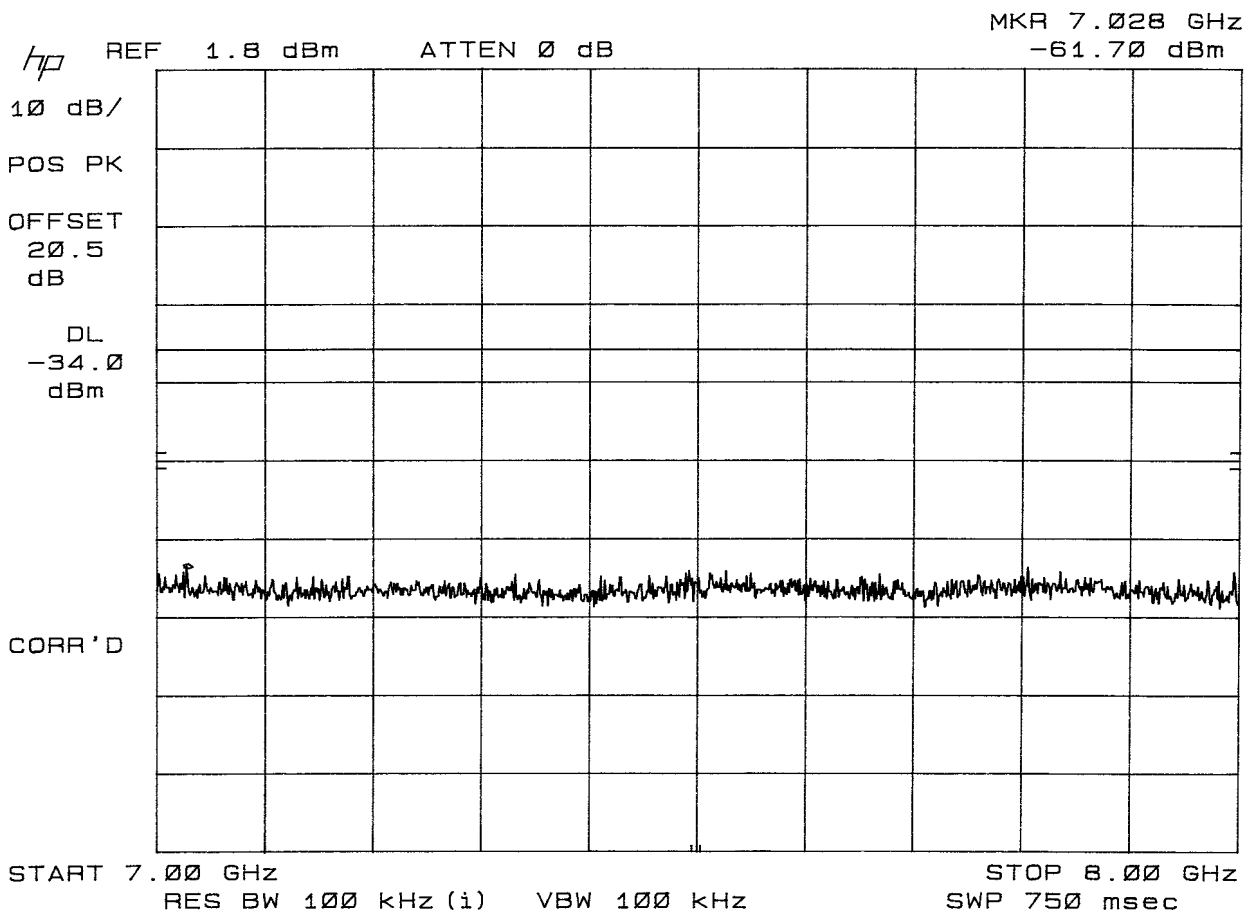
SC305558; TRANGO; 900 MHz; 12/16/03; SR2 CFR 15.247(c) Spurious Conducted Emissions > 20 dB below intentional radiator



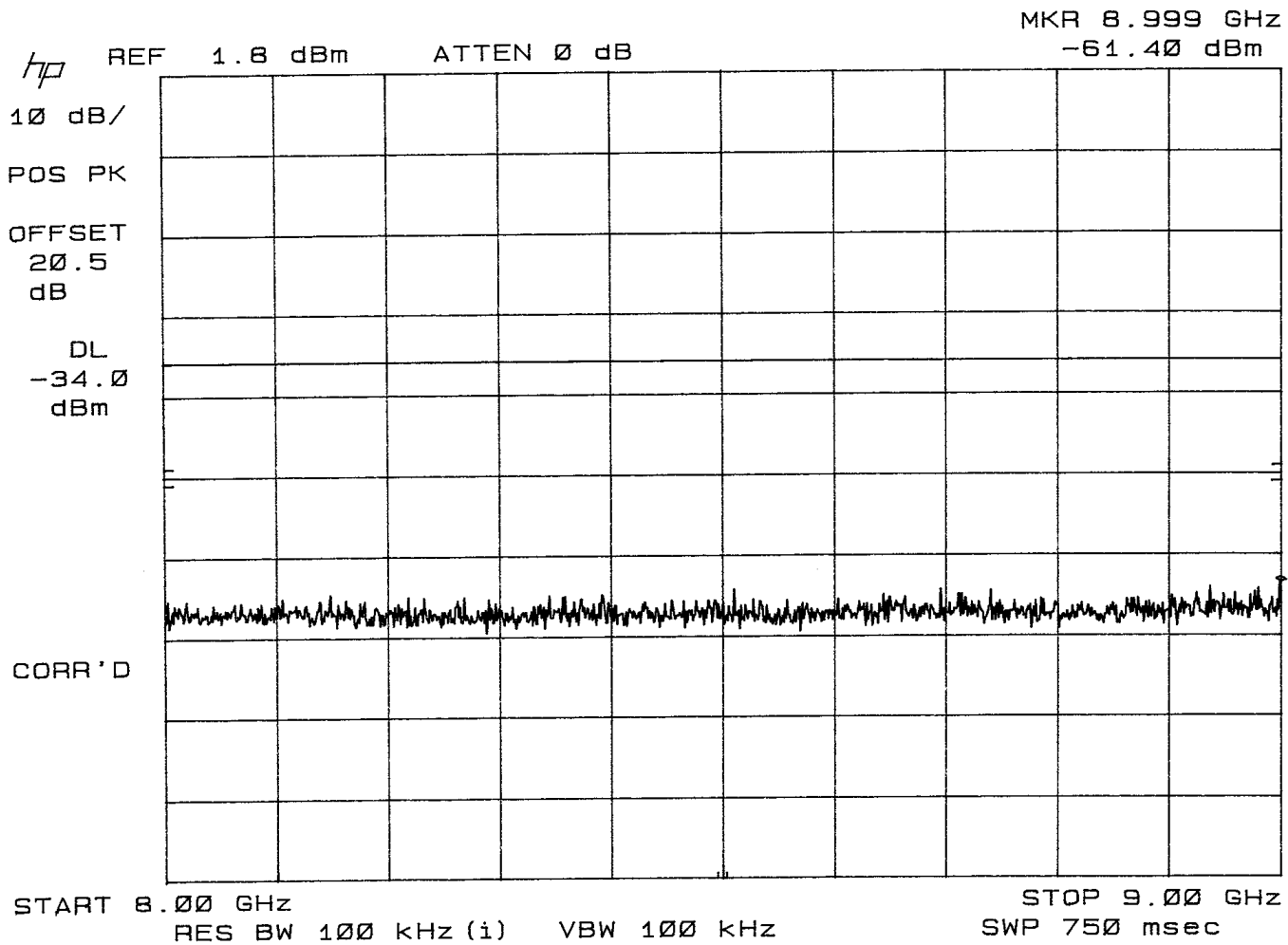
SC305558; TRANGO; 900 MHz; 12/16/03; SR2 CFR 15.247(c) Spurious Conducted Emissions > 20 dB below intentional radiator

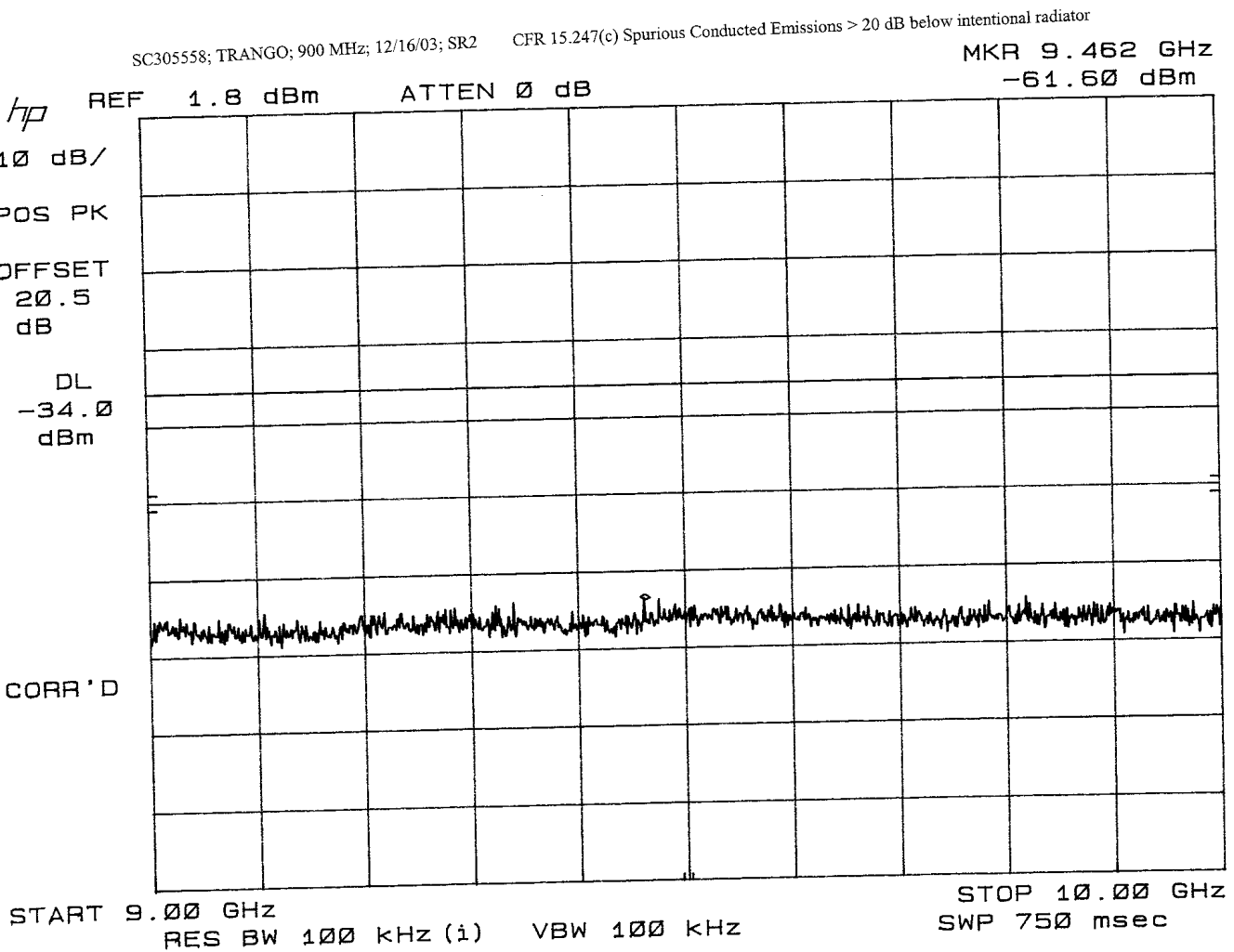


SC305558; TRANGO; 900 MHz; 12/16/03; SR2 CFR 15.247(c) Spurious Conducted Emissions > 20 dB below intentional radiator



SC305558; TRANGO; 900 MHz; 12/16/03; SR2 CFR 15.247(c) Spurious Conducted Emissions > 20 dB below intentional radiator





Report No. SC305558-03

8.0 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)(1); 15.247(b)(3); 15.247(c).**

■ - 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)(1); 15.247(b)(3); 15.247(c).**

Testing Start Date: 16 December 2003

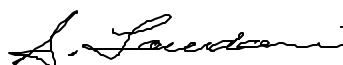
Testing End Date: 18 December 2003

- TÜV AMERICA, INC. -

Responsible Engineer:



EMC Engineer



EMC Engineer