

TEST RESULT SUMMARY

UNITED STATES STANDARD 47 CFR PART 15, SUBPART C

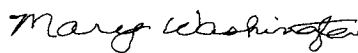
MANUFACTURER NAME DIRECTED ELECTRONICS, INC.
NAME OF EQUIPMENT 476 Transmitter*
MODEL NUMBER 476
MANUFACTURER ADDRESS 2560 Progress Street
Vista, CA 92083
TEST REPORT NUMBER S8472-06
TEST DATE 15 September 1998

According to testing performed at TÜV Product Service, Inc., the above-mentioned unit is in compliance with the electromagnetic compatibility requirements defined in United States Standard 47 CFR Part 15, Subpart C, Paragraphs 15.207(a) and 15.209(a), 15.231(a)(1), (b), (c).

TÜV Product Service reports apply only to the specific sample tested under stated test conditions. It is the manufacturer's responsibility to assure the continued compliance of production units of this model. TÜV Product Service, Inc. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV Product Service, Inc. issued reports.

As the responsible EMC Project/Division Managers, we hereby declare that the equipment tested at TÜV Product Service, Inc. as specified above conforms to the requirements of United States Standard 47 CFR Part 15, Radio Frequency Devices, Subpart C, Intentional Radiators.

Date: 18 September 1998



Location: San Diego, California
USA

Mary Washington
Responsible Engineer

Floyd R. Fleury
EMC Manager, EIC

(*) FCC ID: EZSDEI470

Not Transferable

EMC EMISSION - TEST REPORT

UNITED STATES STANDARD 47 CFR PART 15, SUBPART C

Test Report File No. : **S8472-06** Date of Issue: 18 September 1998

Model / Serial No. : 476 / EZSDEI476

Product Type : 476 Transmitter*

Applicant : DIRECTED ELECTRONICS, INC.

Manufacturer : ----

License holder : DIRECTED ELECTRONICS, INC.

Address : 2560 Progress Street
 : Vista, CA 92083

Test Result : **Positive** **Negative**

Test Project Number Reference(s) : S901847201-06

Total pages - Test Report : 10

(*) FCC ID: EZSDEI476

TÜV Product Service, Inc. is a subcontractor to TÜV Product Service, GmbH according to the principles outlined in ISO/IEC Guide 25 and EN 45001.

TÜV Product Service reports apply only to the specific sample tested under stated test conditions. It is the manufacturer's responsibility to assure the continued compliance of production units of this model. TÜV Product Service, Inc. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV Product Service, Inc. issued reports.

This report is the confidential property of the client. As a mutual protection to our clients, the public and ourselves, extracts from the test report shall not be reproduced except in full without our written approval. This report shall not be used by the client to claim product endorsement by NVLAP or any agency of the US government.

TÜV Product Service, Inc. and its professional staff hold government and professional organization certifications and are members of AAMI, ACIL, AEA, ANSI, IEEE, NVLAP, and VCCI

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EMISSIONS TEST REGULATIONS :

The emissions tests were performed according to the following regulations:

- EN 50081-1 / 1991
- EN 55011 / 1991 - Group 1 - Group 2
- EN 55013 / 1990 - Class A - Class B
- EN 55014 / 1987 - Household appliances and similar
- EN 55014 / 1993 - Portable tools
- EN 55015 / 1987 - Semiconductor devices
- EN 55015 / A1:1990 - Household appliances and similar
- EN 55015 / 1993 - Portable tools
- EN 55022 / 1987 - Class A - Class B
- EN 55022 / 1994 - Class A - Class B
- BS - Class A ITE - Class B ITE
- VCCI - Class A ITE - Class B ITE
- 47 CFR Part 15, Subpart B
 - 107(b)
 - 107(a)
 - 107(e) - Class A - Class B
 - 109(b)
 - 109(a)
 - 109(g) - Class A - Class B
- - 47 CFR Part 15, Subpart C
 - - 207(a)
 - - 209(a)
 - - 231(b)
 - - 231(a)(1)
 - - 231(c)
- AS/NZS 3548: 1995 - Class A - Class B
- CISPR 11 (1990) - Group 1 - Group 2
- CISPR 11 (1990) - Class A - Class B
- CISPR 22 (1993) - Class A - Class B

Environmental Conditions In The Laboratory:

	<u>Actual</u>
Temperature:	: 23 °C
Relative Humidity:	: 50 %
Atmospheric Pressure:	: 100.0 kPa

Power Supply Utilized:

Power supply system : Battery

Symbol Definitions:

- - Applicable
- - Not Applicable

Emissions Test Conditions: CONDUCTED EMISSIONS (Interference Voltage)

The **CONDUCTED EMISSIONS (INTERFERENCE VOLTAGE)** measurements were performed at the following test location:

■ - Test not performed - see remarks

- SR-2, Shielded Room, 12' x 24' x 10', Metal Chamber
- SR-3, Shielded Room, 12' x 20' x 8', Metal Chamber
- SR-4, Shielded Room, 10' x 17' x 8', Copper Screen Chamber
- SR-5, Shielded Room, 16' x 28' x 15', Metal, Semi-Anechoic Chamber
- CSR-1, Shielded Room, 10' x 7' x 7', Metal Chamber

Test Equipment Used :

Model No.	Prop. No.	Description	Manufacturer	Serial No.
<input type="checkbox"/> - NM-7A, NM-17/27, NM-37/57, NM-67, CCA-7, & H/P 9836 HP-1B Computer	156, 162-166	Automated RFI Measurement System (ARMS), NO. 1	Eaton/Ailtech	(multiple)
<input type="checkbox"/> - NM-17/27, NM-37/57, CA-7, and H/P 9826 Computer	168, 170, 177, 178	Automated RFI Measurement System (ARMS), NO. 2	Eaton/Ailtech	(multiple)
<input type="checkbox"/> - H/P Spectrum Analyzer, Model 8568B; Display Section RF Analyzer Section; H/P 85650A, Quasi-Peak Adapter H/P Computer System, Model 310 with HP 85869A Software	187, 188	Automated RFI Measurement System (ARMS)	Various	(multiple)
<input type="checkbox"/> - LISN-3, 50 A	262-263	Power Mains Network (LISN), 50 μ H/250 μ H/50 Ω /0.25 μ F	Fischer Custom Communications, Inc.	3-4
<input type="checkbox"/> - LISN-3, 50 A	264, 265	Power Mains Network (LISN), 50 μ H/250 μ H/50 Ω /0.25 μ F	Fischer Custom Communications, Inc.	5-6
<input type="checkbox"/> - LISN-2, 25 A	413	Power Mains Network (LISN), 50 μ H/250 μ H/50 Ω /0.25 μ F	Fischer Custom Communications, Inc.	7
<input type="checkbox"/> - LISN-2, 25 A	--	Power Mains Network (LISN), 50 μ H/250 μ H/50 Ω /0.25 μ F	Fischer Custom Communications, Inc.	7
<input type="checkbox"/> - FCC-LISN-50-25-2	553	Power Mains Network (LISN), 50 μ H/250 μ H/50 Ω /0.25 μ F	Fischer Custom Communications, Inc.	112
<input type="checkbox"/> - FCC-LISN-50-25-2	552	Power Mains Network (LISN), 50 μ H/250 μ H/50 Ω /0.25 μ F	Fischer Custom Communications, Inc.	113
<input type="checkbox"/> - 8012-50-R-12-BNC	266	LISN, 50 μ H/50 Ω /0.1 μ F	Solar Electronics Co.	--
<input type="checkbox"/> - 9252-50-R-24-BNC	458	LISN, 50 μ H /250 μ H/50 Ω /0.25 μ F	Solar Electronics Co.	941719
<input type="checkbox"/> - 9252-50-R-24-BNC	457	LISN, 50 μ H /250 μ H/50 Ω /0.25 μ F	Solar Electronics Co.	941720
<input type="checkbox"/> - MDS-21	277	Absorbing Clamp	Rohde & Schwarz	821023
<input type="checkbox"/> - ESHS 20	428	EMI Test Receiver	Rohde & Schwarz	837055/00 1
<input type="checkbox"/> - ESHS 30	459	EMI Test Receiver	Rohde & Schwarz	832354/00 4
<input type="checkbox"/> - CAT-20	598	20 dB Attenuator	Mini-Circuits	--
<input type="checkbox"/> - CAT-20	615	20 dB Attenuator	Mini-Circuits	--

Remarks: EUT battery operated.

Emissions Test Conditions: RADIATED EMISSIONS (Electric Field)

The *RADIATED EMISSIONS (ELECTRIC FIELD)* measurements, in the frequency range of 30 MHz-1000 MHz, were tested in a horizontal and vertical polarization at the following test location :

■ - Test not performed - see remarks

- Roof (Small Open Area Test Site)
- Canyon #1 (10- and 30-Meter Open Area Test Site), Carroll Canyon, San Diego
- Canyon #2 (3- and 10-Meter Open Area Test Site), Carroll Canyon, San Diego

Testing was performed at a test distance of :

- 3 meters
- 10 meters
- 30 meters

Test Equipment Used :

Model No.	Prop. No.	Description	Manufacturer	Serial No.
<input type="checkbox"/> - NM-37/57A CCA-7	420 373	OATS measurement set (Roof)	Eaton/Ailtech	0561-09261 0773-03117
<input type="checkbox"/> - NM-37/57 CCA-7	171 172	OATS measurement set (Canyon)	Eaton/Ailtech	0709-82078 0187-0322
<input type="checkbox"/> - HFH 2-Z2	208	Antenna, Loop	Rohde & Schwarz	880
<input type="checkbox"/> - 3104	235	Antenna, Biconical	EMCO	3031
<input type="checkbox"/> - 3110	451	Antenna, Biconical	EMCO	1378
<input type="checkbox"/> - 94455-1	231	Antenna, Biconical	Eaton/Ailtech	0811
<input type="checkbox"/> - 3110B	491	Antenna, Biconical	EMCO	9508-2
<input type="checkbox"/> - CBL6111	460	Antenna, Bilog	Chase	1013
<input type="checkbox"/> - CBL6111	461	Antenna, Bilog	Chase	1291
<input type="checkbox"/> - 3146	242	Antenna, Log Periodic Dipole	EMCO	1597
<input type="checkbox"/> - 3146	243	Antenna, Log Periodic Dipole	EMCO	106X
<input type="checkbox"/> - 3146	244	Antenna, Log Periodic Dipole	EMCO	1063
<input type="checkbox"/> - 7405	570	Loop Probes	EMCO	9104-1959
<input type="checkbox"/> - 8566B	404	Spectrum Analyzer	Hewlett Packard	2311A02209
<input type="checkbox"/> - 85662B	406	Spectrum Analyzer Display	Hewlett Packard	2309A04682
<input type="checkbox"/> - ESVS 30	427	EMI Test Receiver	Rohde & Schwarz	830350/006
<input type="checkbox"/> - ESVS 30	466	EMI Test Receiver	Rohde & Schwarz	833825/003

Remarks: Prescan in shielded room detected no measurable emissions from 30 MHz - 1 GHz.

Emissions Test Conditions: RADIATED EMISSIONS (FCC Part 15, 15.231)

The *EQUIVALENT RADIATED EMISSIONS* measurements were performed at the following test location :

- Test not applicable

- - Roof (Small Open Area Test Site)
- Canyon #1 (10- and 30-Meter Open Area Test Site), Carroll Canyon, San Diego
- Canyon #2 (3- and 10-Meter Open Area Test Site), Carroll Canyon, San Diego

Testing was performed at a test distance of:

- 1 meters
- - 3 meters
- 10 meters

Test Equipment Used :

Model No.	Prop. No.	Description	Manufacturer	Serial No.	Cal Date
■ - 8566	407	Spectrum Analyzer	Hewlett Packard	2311A02209	31 Oct 98
■ - 85662B	406	Spectrum Analyzer Display	Hewlett Packard	2309A04682	09 Mar 99
■ - 3115	251	Antenna, Double Ridge Guide	EMCO	2495	01 Oct 98
■ - 3146	243	Antenna, Log Periodic Dipole	EMCO	106Z	26 Sep 98
■ - AFD3-0208-40-ST	367	Pre-amplifier, 2 - 8 GHz	Miteq, Inc.	155382	07 Apr 99
■ - ZJL-3G	469	Pre-amplifier, 1 - 2 GHz	MiniCircuits	--	07 Apr 99

Remarks: _____

Emissions Test Conditions: RADIATED EMISSIONS (Electric Field)

The *EQUIVALENT RADIATED EMISSIONS* measurements in the frequency range 1 GHz - 5 GHz were performed in a horizontal and vertical polarization at the following test location :

■ - Test not performed - see remarks

- Roof (Small Open Area Test Site)
- Canyon #1 (10- and 30-Meter Open Area Test Site), Carroll Canyon, San Diego
- Canyon #2 (3- and 10-Meter Open Area Test Site), Carroll Canyon, San Diego

Testing was performed at a test distance of:

- 1 meters
- 3 meters
- 10 meters

Test Equipment Used :

Model No.	Prop. No.	Description	Manufacturer	Serial No.
<input type="checkbox"/> - 8566B	407	Spectrum Analyzer	Hewlett Packard	2311A02209
<input type="checkbox"/> - 85662B	406	Spectrum Analyzer Display	Hewlett Packard	2309A04682
<input type="checkbox"/> - 3115	453	Antenna, Double Ridge Guide	EMCO	9412-4363
<input type="checkbox"/> - 3115	251	Antenna, Double Ridge Guide	EMCO	2495
<input type="checkbox"/> - AFD3-0102-13-ST	366	Pre-Amplifier (38 dB gain), 1 to 2 GHz	Miteq, Inc.	16429
<input type="checkbox"/> - AFD3-0208-40-ST	367	Pre-Amplifier (30 dB gain), 2 to 8 GHz	Miteq, Inc.	155382
<input type="checkbox"/> - AFS4-08001800-70-10P-4	368	Pre-Amplifier (22 dB gain), 8 to 18 GHz	Miteq, Inc.	167
<input type="checkbox"/> - 91888-2	252	Horn Antenna (1 to 2 GHz)	Eaton	101
<input type="checkbox"/> - 91889-2	253	Horn Antenna (2 to 3.6 GHz)	Eaton	101
<input type="checkbox"/> - 91892-1	254	Reflector Antenna (3.6 to 18 GHz)	Eaton	--
<input type="checkbox"/> - 94613-1	255	Horn Antenna (3.6 to 7.6 GHz)	Eaton	--
<input type="checkbox"/> - 91891-2	256	Horn Antenna (7.3 to 12 GHz)	Eaton	--
<input type="checkbox"/> - 94614-1	257	Horn Antenna (12 to 18 GHz)	Eaton	--

Remarks: Pre-scan detected no measurable emissions from 1 to 5 GHz.

Equipment Under Test (EUT) Test Operation Mode - Emissions Tests :

The equipment under test was operated under the following conditions during emissions testing:

- Standby
- Test Program (H - Pattern)
- Test Program (Color Bar)
- Test Program (Customer Specified)
- Practice Operation
- Normal Operating Mode
- Transmit

Configuration of the equipment under test:

- See Constructional Data Form in Appendix B - Page B2
- See Product Information Form(s) in Appendix B - Page B2

The following peripheral devices and interface cables were connected during the testing:

- | | |
|---|----------------|
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - unshielded power cable | |
| <input type="checkbox"/> - unshielded cables | |
| <input type="checkbox"/> - shielded cables | MPS.No.: _____ |
| <input type="checkbox"/> - customer specific cables | |
| <input type="checkbox"/> - _____ | |
| <input type="checkbox"/> - _____ | |

Emissions Test Results:

Conducted Emissions, 10/150/450 kHz - 30 MHz

- PASS - FAIL - NOT APPLICABLE

Minimum limit margin _____ dB at _____ MHz
 Maximum limit exceeding _____ dB at _____ MHz

Remarks: EUT battery operated.

Radiated Emissions (Electric Field), 30 MHz - 5 GHz

- PASS - FAIL - NOT APPLICABLE

Minimum limit margin _____ dB at _____ MHz
 Maximum limit exceeding _____ dB at _____ MHz

Remarks: Pre-scan in shielded room detected no measurable emissions from 30 MHz - 1 GHz.

Equivalent Radiated Emissions 15.231(b)

- PASS - FAIL - NOT APPLICABLE

Minimum limit margin 3.8 dB at 433.9 MHz
 Maximum limit exceeding _____ dB at _____ MHz

Remarks: _____

GENERAL REMARKS:

- (*) Conducted Emissions - EUT battery operated.
Radiated Emissions - Pre-scan in shielded room detected no measurable emissions from 30 MHz - 1 GHz.
Pre-scan detected no measurable emissions from 1 to 5 GHz.
Part 15, Paragraph 15.231(a)(1) - Transmitter deactivated in less than one second.
For Duty Cycle see Appendix D.

SUMMARY:

All tests according to the regulations cited on page 3 were

- Performed
- **Not Performed***

The Equipment Under Test

- **Fulfills** the general approval requirements cited on page 3.
- **Does not** fulfill the general approval requirements cited on page 3.

Statement of Measurement Uncertainty

The data and results referenced in this document are true and accurate. There may be some degree or level of measurement uncertainty. As EN 45001 does not allow recommendations to be included in the test report, the reader is encouraged to request a copy of the TÜV policy concerning pass or fail judgment with respect to possible measurement uncertainties.

Equipment Received Date: 15 September 1998
Testing Start Date: 15 September 1998
Testing End Date: 15 September 1998

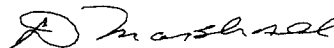
- TÜV PRODUCT SERVICE, INC. -

Responsible Engineer:



Mary Washington
(EMC Engineer)

Responsible Test Engineer:



Dave Marshall
(EMC Test Engineer)

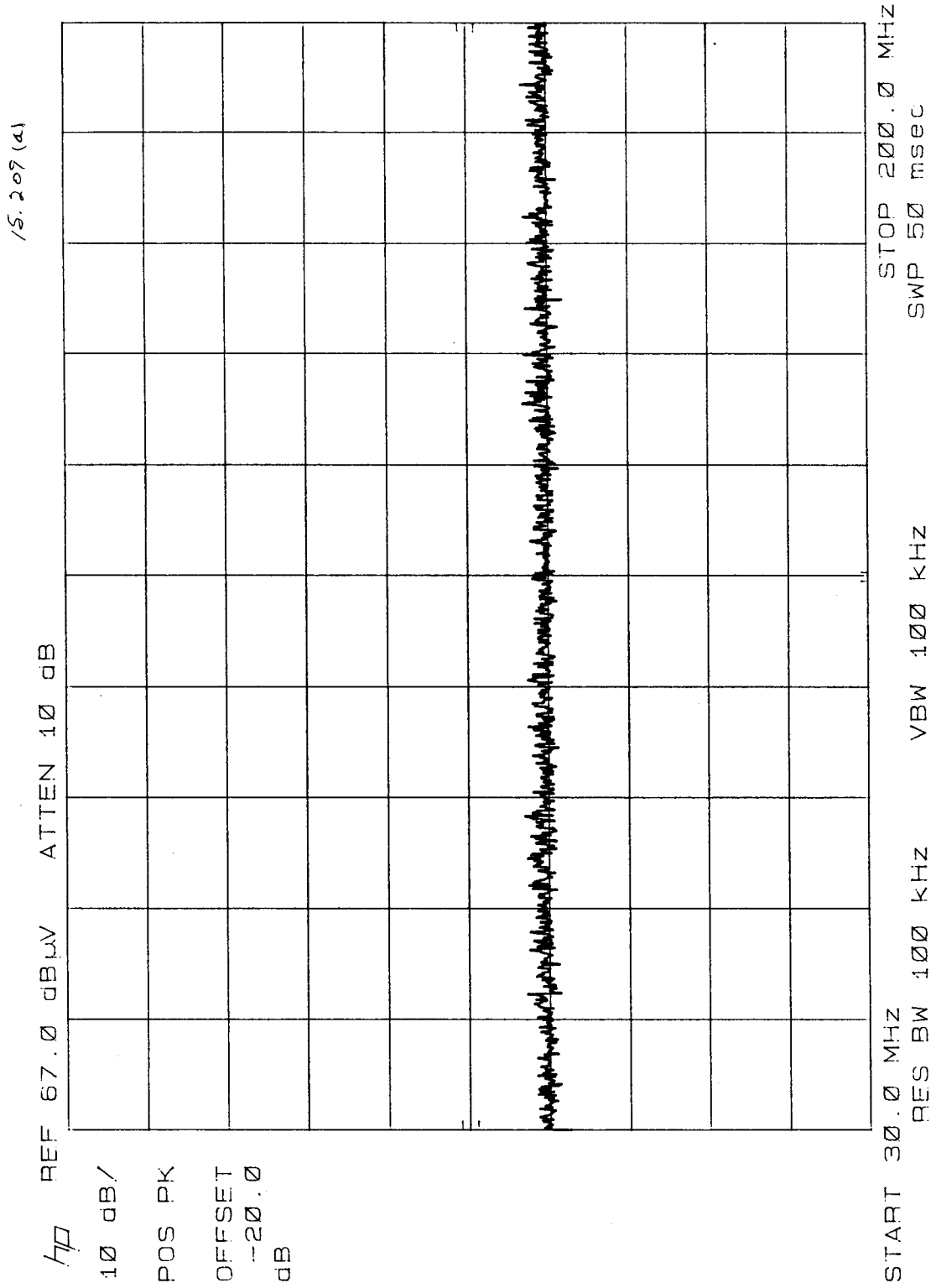
Technical Documentation

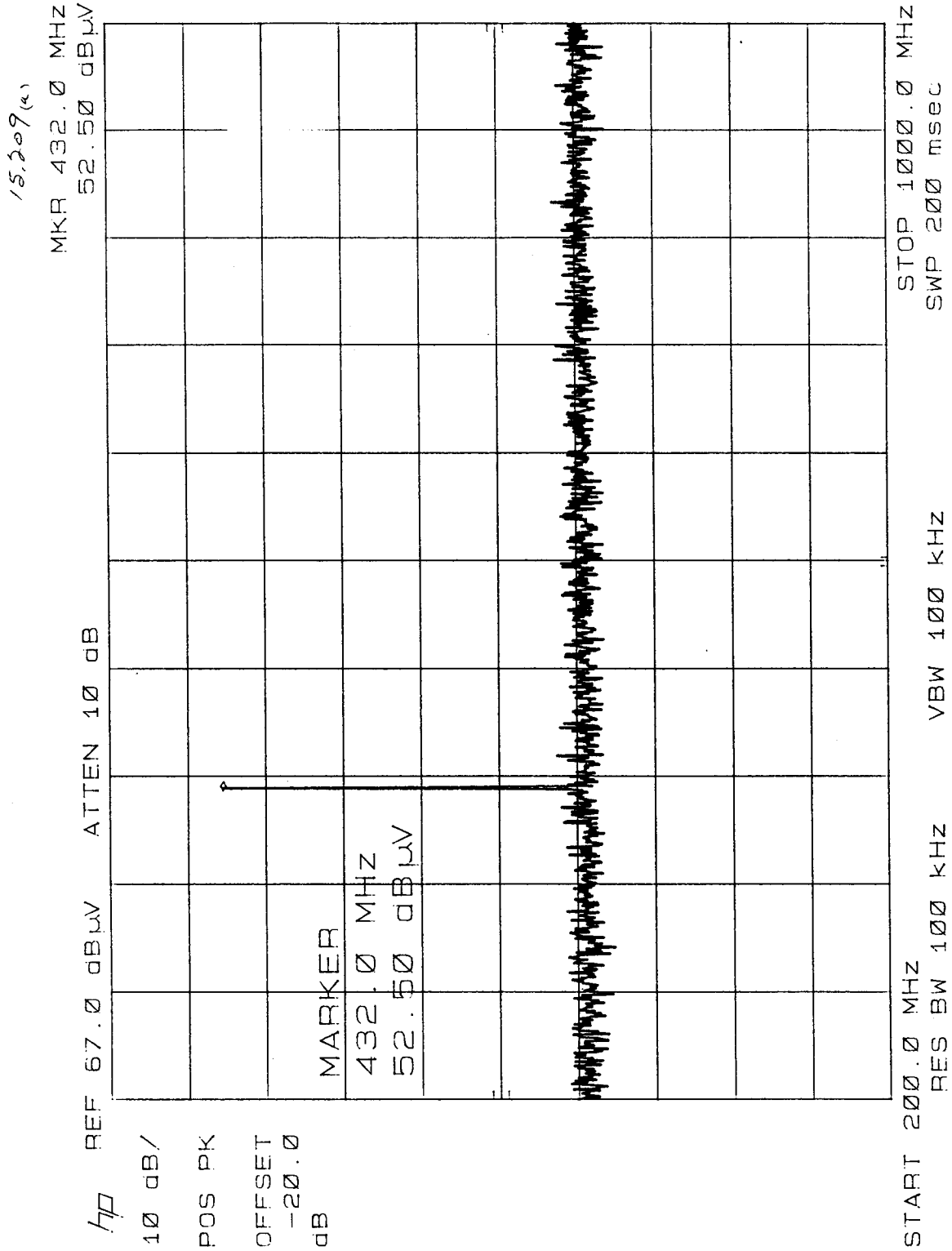
Test Data Sheets

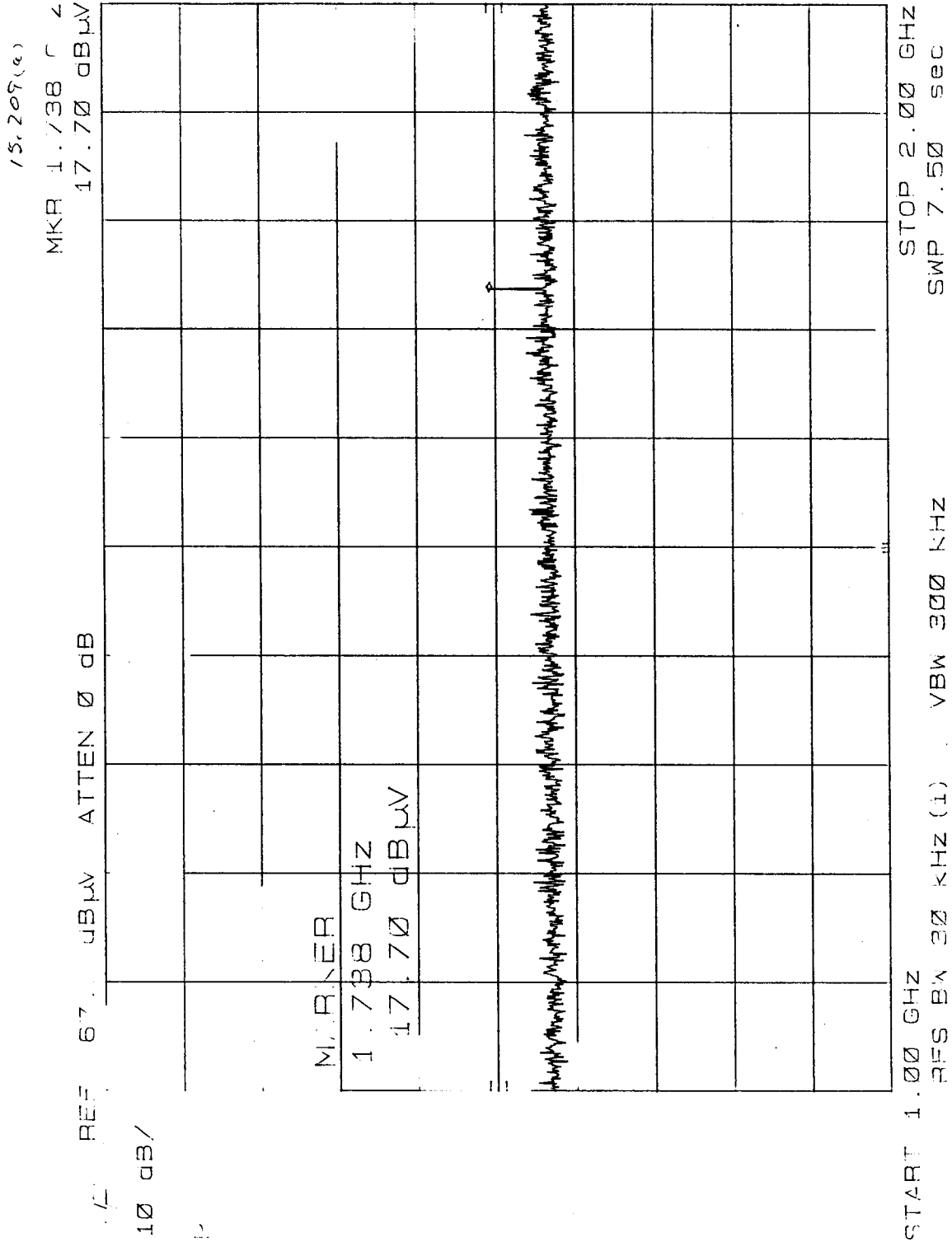
and

Test Setup Drawing(s)

(See photographs for test setups.)





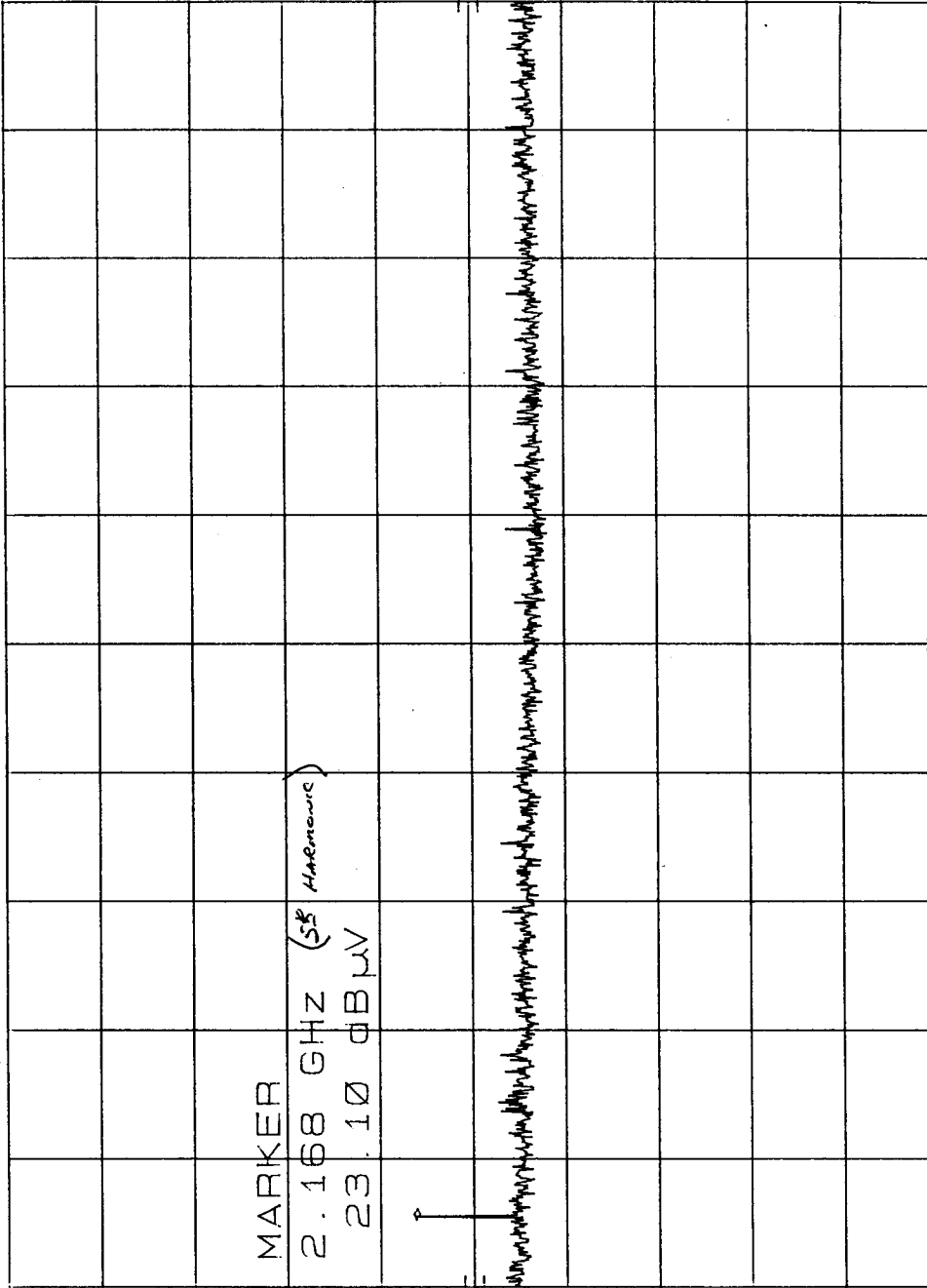


15.209 (a)

MKR 2.168 GHz
23.10 dBμV

hp REF 67.0 dBμV ATTEN 0 dB

10 dB/
POS PK

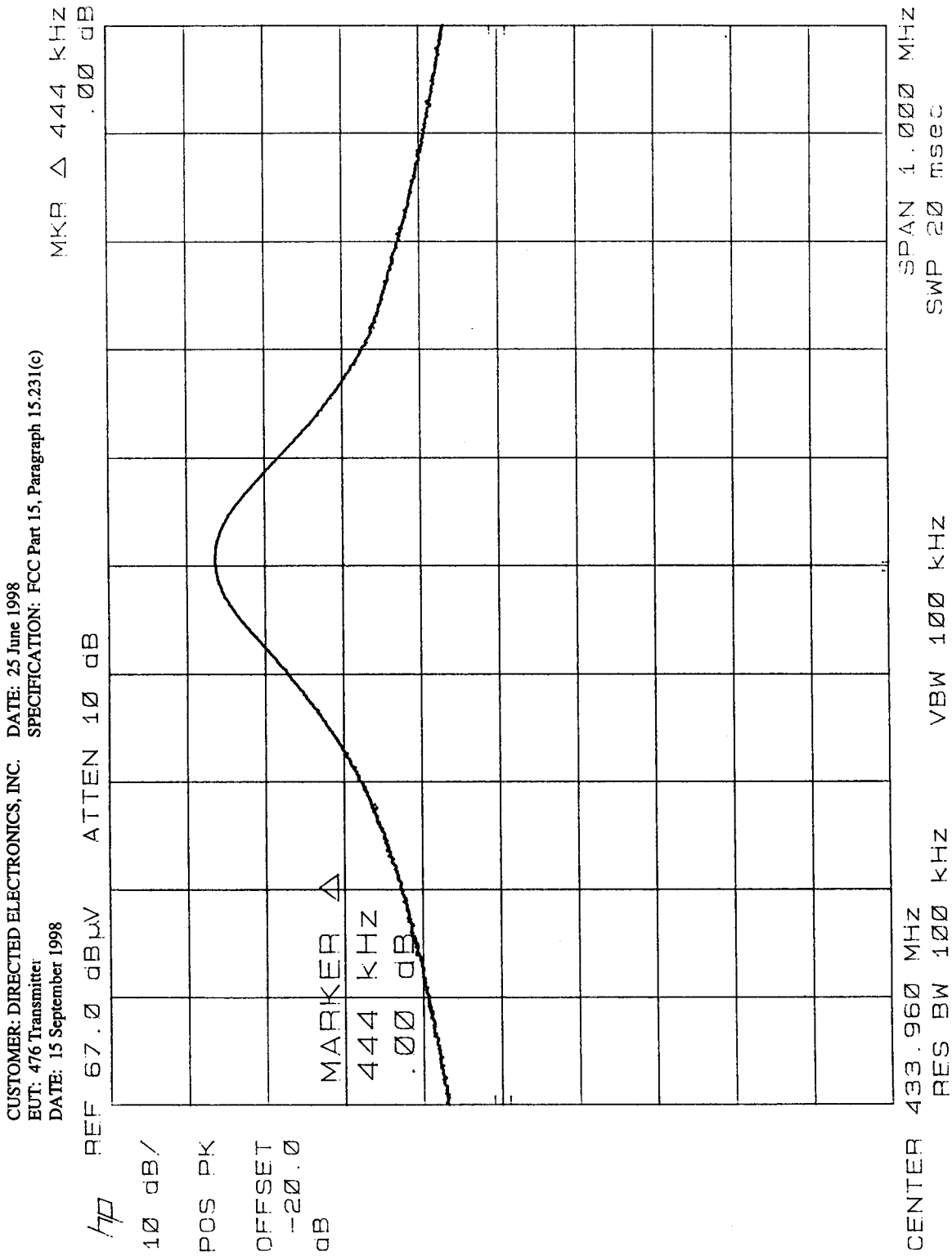


START 2.00 GHz RES BW 30 KHZ (i) VBW 300 KHZ SWP 22.5 sec STOP 5.00 GHz



REPORT No: S-8472 TESTED BY: *[Signature]* SPEC: FCC Part 15 para 15.231(b)
 CUSTOMER: Directed Electronics Inc. TEST DIST: 3 Meters
 E U T: Model 476 Transmitter TEST SITE: 3
 EUT MODE: on continous BICONICAL: N/A
 DATE: 15-Sep-98 LOG PERIODIC: 418
 NOTES: Duty Cycle= 55% OTHER: 453
 RBW & VBW 100kHz below 1 GHz
 RBW & VBW 1 MHz above 1 GHz
 no measurable emisssons @ 3meters above 8th harmonic

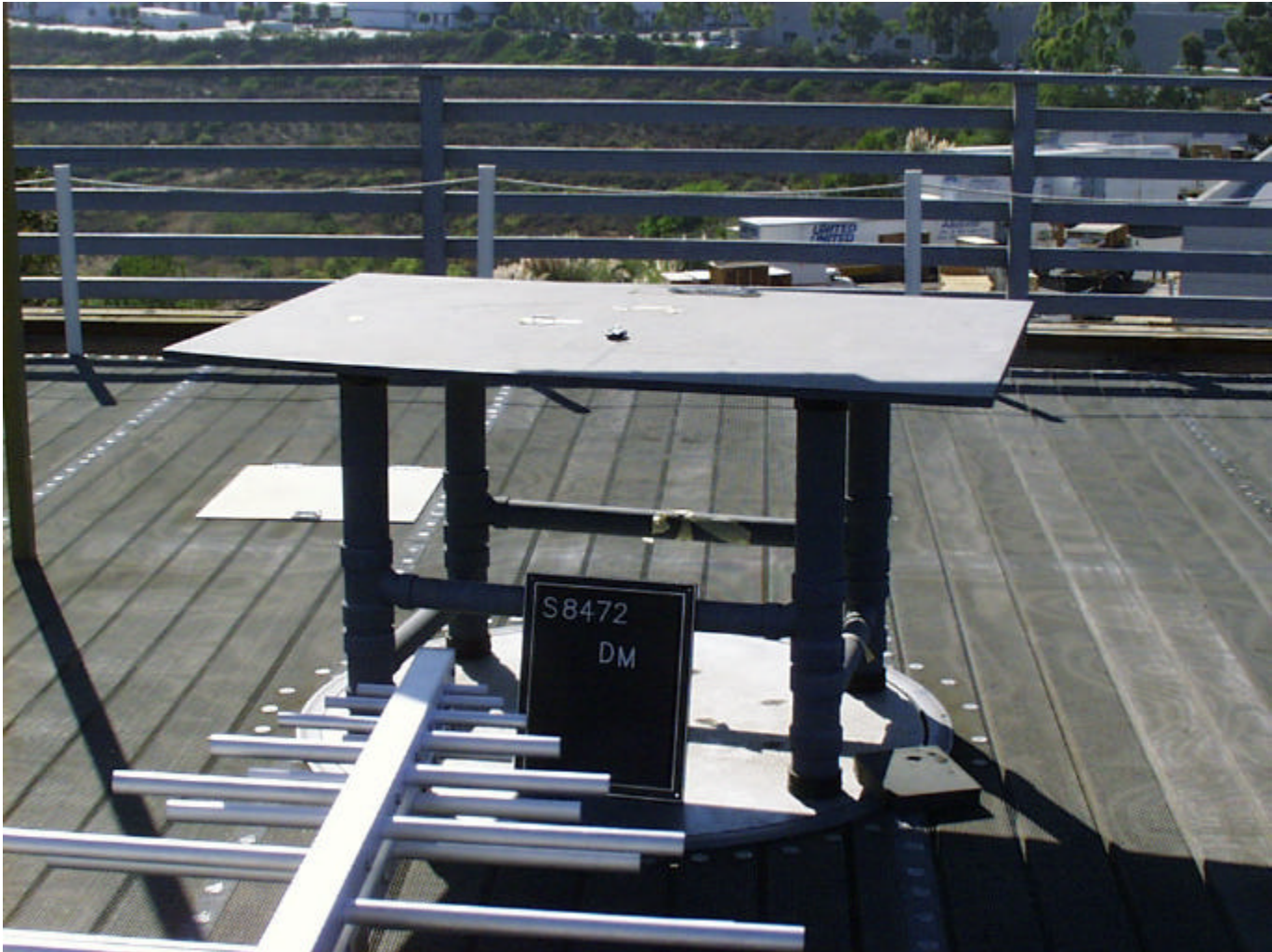
FREQ (MHz)	VERTICAL (dBuv)		HORIZONTAL (dBuv)		CORRECTION FACTOR (dB/m)	MAX LEVEL (dBuV/m)		SPEC LIMIT (dBuV/m)		MARGIN (dB)		EUT Rotatio	Antenna Height
	pk	av	pk	av		pk	av	pk	av	pk	av		
433.9	52.8	47.6	63	57.8	19.2	82.2	77.0	100.8	80.8	-18.6	-3.8	0	2
867.8	31.6	26.4	32.4	27.2	27.4	59.8	54.6	80.8	60.8	-21	-6.2	0	2
1301.7	23.7	18.5	27	21.8	27.9	54.9	49.7	74	54	-19.1	-4.3	0	2
1735.6	20.8	15.6	22.5	17.3	31.5	54.0	48.8	80.8	60.8	-26.8	-12	0	2
2169.5	12.8	7.61	11.4	6.21	33.5	46.3	41.1	80.8	60.8	-34.5	-20	0	2
2603.4	9.7	4.51	8.7	3.51	35.2	44.9	39.7	80.8	60.8	-35.9	-21	0	2
3037.3	6	0.81	5.4	0.21	37.4	43.4	38.2	80.8	60.8	-37.4	-23	0	2
3471.2	-1.9	-7.09	-2.8	-7.99	38.6	36.7	31.5	80.8	60.8	-44.1	-29	0	2



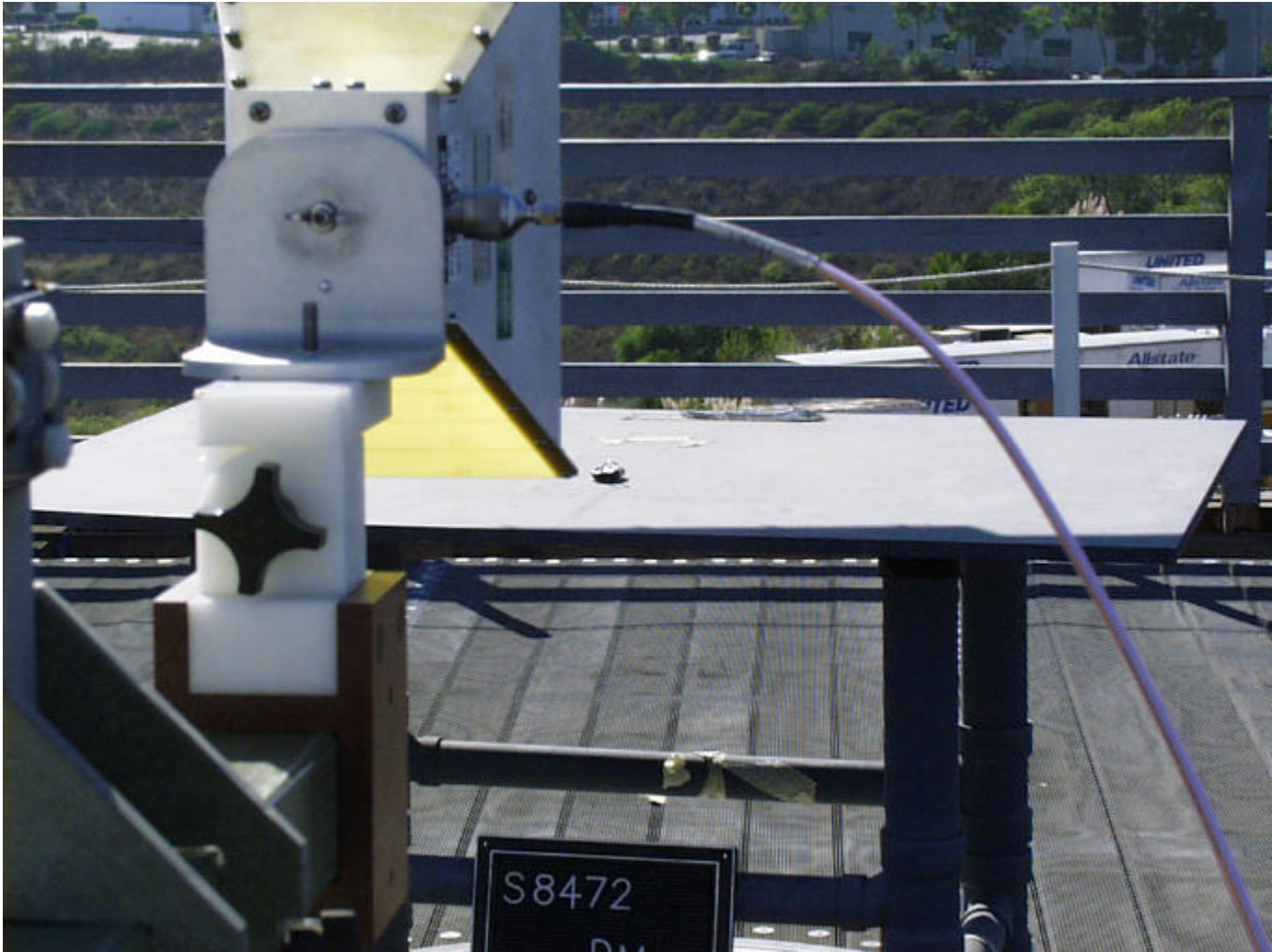
Appendix A

Test Setups
(Photographs)

Photograph of Test Setup:



Photograph of Test Setup:



Photograph of Test Setup:



Appendix B

Product Information Form(s)

CUSTOMER INFORMATION				
COMPANY NAME:		DIRECTED ELECTRONICS, INC.		
COMPANY ADDRESS:		2560 Progress Street		
		Vista, CA 92083		
PHONE NUMBER:		760 599 1366		
FAX NUMBER/E-MAIL ADDRESS:		760 599 1380; marting@directed.com		
CUSTOMER CONTACT:		Martin Gonzales		
PRODUCT DESCRIPTION				
NAME, MODEL, SERIAL # OF EUT:		476 Transmitter, Model 476 (FCC ID: EZSDEI476)		
DESCRIPTION OF EUT:		433.92 MHz, saw-stabilized transmitter		
Components of EUT				
Description	Model Number	Serial Number	FCC ID Number	
N/A				
OPERATING MODE(S):		On continuously transmitting.		
I/O CABLES		N/A		
POWER CORDS		N/A		
POWER INTERFACE				
FREQUENCY/AC/DC VOLTAGE:		Battery 6 Vdc		
PHASES/CURRENT:		-- / --		
OSCILLATOR FREQUENCIES				
FREQUENCY	EUT LOCATION	DESCRIPTION OF USE		
433.92 MHz	--	--		
POWER SUPPLY				
DESCRIPTION	MANUFACTURER	MODEL #	SERIAL #	SWITCHING/LINEAR FREQ.
2-3 V battery	Any	CR2016	--	--
POWER LINE FILTERS				
MANUFACTURER	MODEL NO.	QTY.	LOCATION ON EUT	
--				
CRITICAL EMI COMPONENTS				
DESCRIPTION	MANUFACTURER	PART # OR VALUE	QTY.	LOCATION ON EUT
--				
DESCRIPTION OF ENCLOSURE:		ABS plastic		
INTERFACING AND/OR SIMULATORS PERIPHERAL EQUIPMENT:				
DESCRIPTION	MANUFACTURER	MODEL #	SERIAL #	FCC ID
N/A				
BLOCK DIAGRAM:		--		

Appendix C

Change History

Not Applicable

Appendix D

Supplemental Information

*Duty Cycle Calculation
(See Appendix)*

Duty Cycle: 25%

