TÜV PRODUCT SERVICE

EMC EMISSION - TEST REPORT
UNITED STATES STANDARD 47 CFR PART 15, SUBPART C*

Test Report File No.	: **9547-06**	Date of Issue:	15 November 1999
Model / Serial No.	: **470 / ----**		
Product Type	: 2-Button Mini Transmitter		
Applicant	: DIRECTED ELECTRONICS, INCORPORATED		
Manufacturer	: DIRECTED ELECTRONICS, INCORPORATED		
License holder	: DIRECTED ELECTRONICS, INCORPORATED		
Address	: 2560 Progress Street		
	: Vista, CA 92083		
Test Result	: ■ **Positive**	☐ **Negative**	
Test Project Number Reference(s)	: **9547-06**		
Total pages - Test Report	: 8		

(*) Paragraph 15.231(b) only.
NOTE: All test equipment used during testing is calibrated and traceable to NIST.

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DIRECTORY - EMISSIONS
Test Report

Technical Documentation

Appendices

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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
☐ - Class A ☐ - Class B

☐ - EN 55014 / 1993 ☐ - Household appliances and similar
☐ - Portable tools
☐ - Semiconductor devices

☐ - EN 55022 / 1987 ☐ - Class A ☐ - Class B

☐ - EN 55022 / 1998 ☐ - Class A ☐ - Class B

☐ - VCCI ☐ - Class A ITE ☐ - Class B ITE

■ - 47 CFR Part 15, Subpart B

■ - 15.231(b)
☐ - 107(a)
☐ - 107(e) ☐ - Class A ☐ - Class B

☐ - 109(b)
☐ - 109(a)
☐ - 109(g) ☐ - Class A ☐ - Class B

☐ - AS/NZS 3548: 1995 ☐ - Class A ☐ - Class B

☐ - CISPR 11 (1990) ☐ - Group 1 ☐ - Group 2
☐ - Class A ☐ - Class B

☐ - CISPR 22 (1998) ☐ - Class A ☐ - Class B

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Environmental Conditions In The Laboratory:

	Actual
Temperature:	: 19 °C
Relative Humidity:	: 50 %
Atmospheric Pressure:	: 100.0 kPa

Power Supply Utilized:

Power supply system : Battery

Symbol Definitions:

■ - Applicable
☐ - Not Applicable

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

The *RADIATED EMISSIONS (ELECTRIC FIELD)* measurements were tested at the following test location :

☐ - Test not applicable

■ - Canyon #1 (10- and 30-Meter Open Area Test Site), Carroll Canyon, San Diego (Calibration Due Date: 03 September 2000)

Testing was performed at a test distance of :

■ - 3 meters

Test Equipment Used :

Model No.	Prop. No.	Description	Manufacturer	Serial No.	Cal Date
LPB 2520/A	738	Antenna, Bilog	Antenna Research	1169	04/00
3115	453	Double Ridge Antenna	EMCO	9412-4364	10/00
AA-190-30.00.0	732	High Frequency Cable	United Microwave	--	N/A
AMF-3D-010180-35-10P	752	Amplifier	Miteq	614344	N/A
HP 8566B	743	Spectrum Analyzer	Electo Ren	2349A03116	10/00

Remarks: One year calibration cycle for all test equipment.

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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 at 433.89 MHz

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:

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - unshielded power cable

☐ - unshielded cables

☐ - shielded cables MPS.No.: _____

☐ - customer specific cables

☐ - _____

☐ - _____

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Emissions Test Results:

Radiated Emissions, Part 15, Paragraph 15.231(b)

■ - PASS ☐ - FAIL ☐ - NOT APPLICABLE

Minimum limit margin 12 dB at 867.78 MHz

Maximum limit exceeding _____ dB at _____ MHz

Remarks: _____

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GENERAL REMARKS:

NOTE: All photographs are representative of setup for maximum emissions.

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. The measurement uncertainty is calculated to be ±2 dB for conducted emissions and ±4 dB for radiated emissions.

Equipment Received Date: 12 November 1999

Testing Start Date: 12 November 1999

Testing End Date: 12 November 1999

- TÜV PRODUCT SERVICE, INC. -

Responsible Engineer:

Dave Marshall
(EMC Test Engineer)

Responsible Engineer:

Jim Owen
(EMC Lead Engineer)

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Technical Documentation

Test Data Sheets

and

Test Setup Drawing(s)

See photographs for test setup.

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REPORT No: S9547 TESTED BY: J Owen SPEC: FCC Part 15 Para. 15.231(b)

CUSTOMER: Directed Electronics, Inc. TEST DIST: 3

E.U.T: Mini Transmitter Model 470 TEST SITE: 1

EUT MODE: Transmit at 433.89 MHz BICONICAL: N/A

DATE: 12-Nov-99 LOG: 738

NOTES: Duty Cycle = 54% OTHER: 453

RBW & VBW 100 kHz below 1 GHz

RBW & VBW 1 MHz above 1 GHz

v.beta

FREQ (MHz)	VERTICAL (dBuv) pk	VERTICAL (dBuv) av	HORIZONTAL (dBuv) pk	HORIZONTAL (dBuv) av	CORRECTION FACTOR (dB/m)	MAX LEVEL (dBuV/m) pk	MAX LEVEL (dBuV/m) av	SPEC LIMIT (dBuV/m) pk	SPEC LIMIT (dBuV/m) av	MARGIN (dB) pk	MARGIN (dB) av	Rotation EUT	Antenna Height
433.89	44.9	39.6	47.1	41.8	19.8	**66.9**	**61.6**	100.5	80.5	-33.6	-19	46	2.5
867.78	26.5	21.2	21.7	16.4	27.2	**53.7**	**48.4**	80.5	60.5	-26.8	-12	0	1
1301.67	41.9	36.6	34.5	29.2	3.6	**45.5**	**40.2**	74.0	54.0	-28.5	-14	94	1
1735.56	35.7	30.4	34.7	29.4	5.8	**41.5**	**36.2**	80.5	60.5	-39	-24	327	1
2169.48	33.4	28.1	33	27.7	7.8	**41.2**	**35.9**	80.5	60.5	-39.3	-25	64	1
2603.37	32	26.7	38.5	33.2	9.4	**47.9**	**42.6**	80.5	60.5	-32.6	-18	178	1
3037.26	31.4	26.1	29	23.7	10.3	**41.7**	**36.4**	80.5	60.5	-38.8	-24		
3471.16	32.2	26.9	31.9	26.6	11.6	**43.8**	**38.5**	80.5	60.5	-36.7	-22		
3905.04	29.1	23.8	29.1	23.8	14.2	**43.3**	**38.0**	74.0	54.0	-30.7	-16		
4338.93	29.1	23.8	29.1	23.8	14.1	**43.2**	**37.9**	74.0	54.0	-30.8	-16		

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Appendix A

Test Setups
(Photographs)

NOTE: All photographs are representative of setup for maximum emissions.

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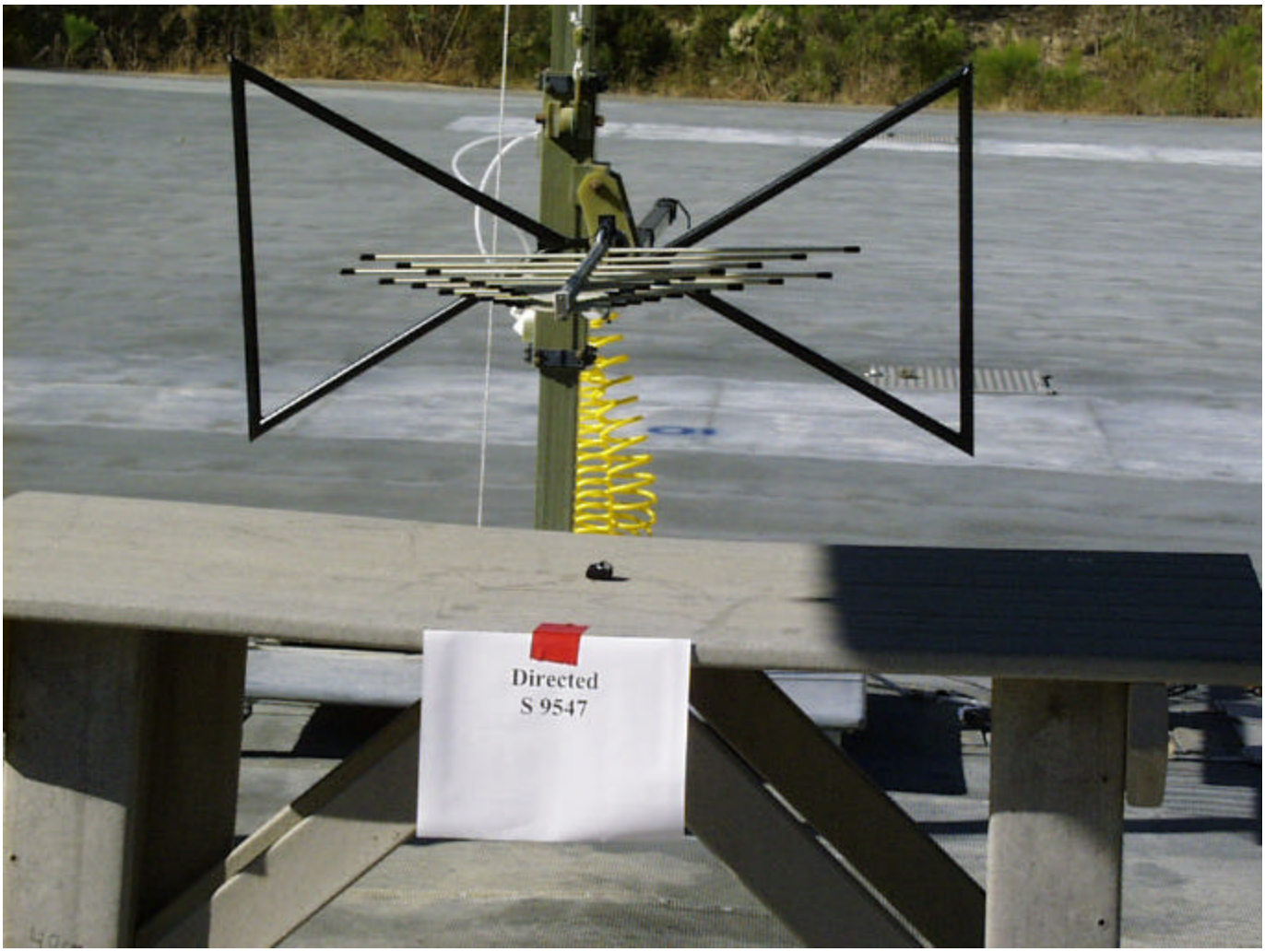
Photograph of Test Setup:
Radiated Emissions 30 MHz - 1000 MHz



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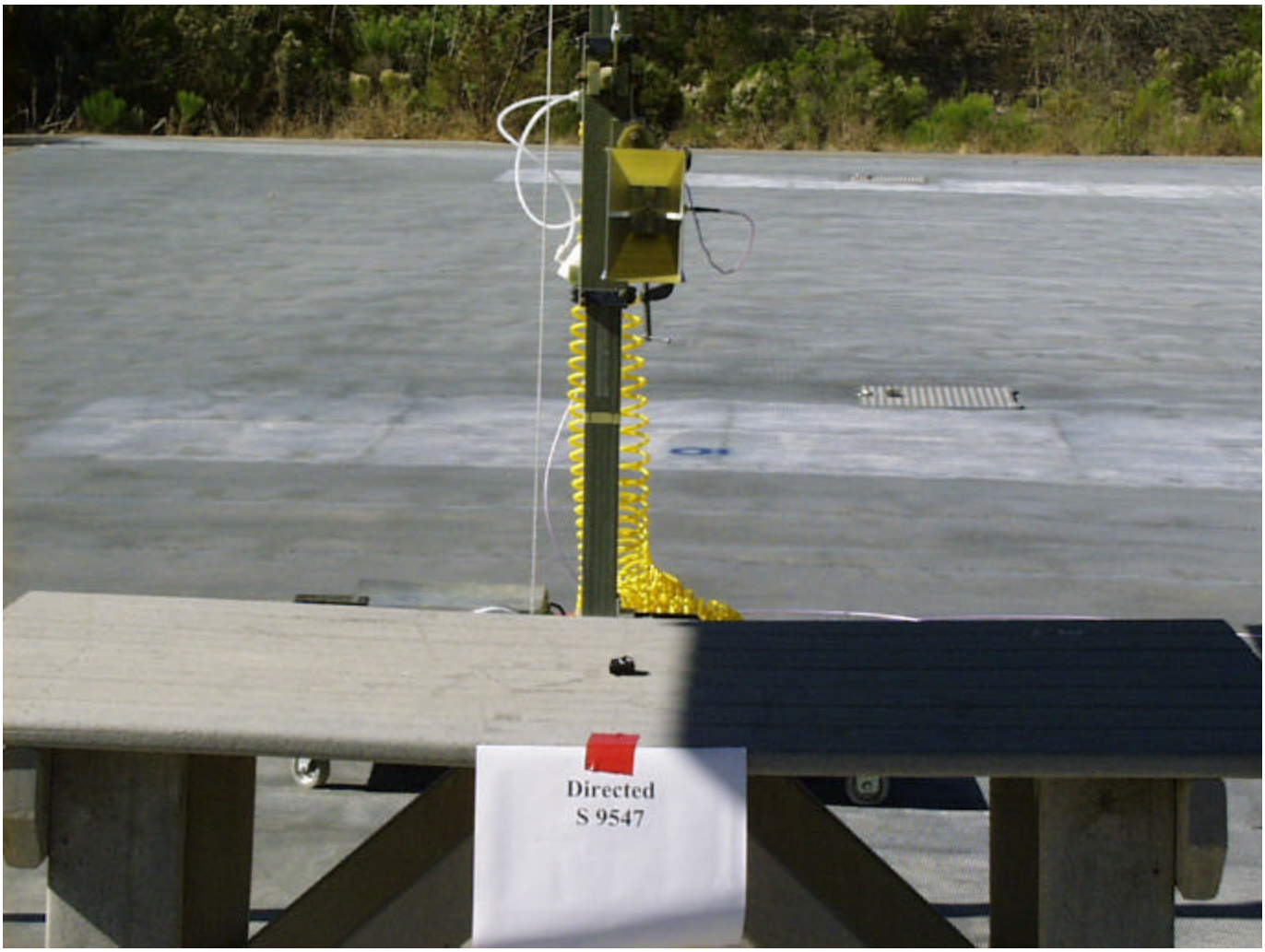
Photograph of Test Setup:
Radiated Emissions 30 MHz - 1000 MHz



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Appendix B

Product Information Form(s)

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Date: 11/8/99

Company: Directed Electronics, Inc. Contact: Tyson Mackjust
Address: 2560 Progress Street Phone: 760-599-1334
City: Vista FAX: 760-599-1380
Zip: 92083 E-mail: tyson@directed.com

EUT Name: 2-Button Mini Transmitter
Model: 470 S/N:n/a

1.0 EUT Documentation

1.1 EUT Description: Mini Security Remote Control Transmitter for use in Automotive Security Systems.

1.1.1 Components of EUT

Description	Model Number	Serial Number	FCC ID Number
Mini Transmitter	470	n/a	EZSDEI470A

1.2 Operating modes:

Manually operated by operator by pressing one of the momentary switches. Transmission deactivates within 5 seconds of being released. Transmission automatically concludes sfter 15 seconds if transmitter button is held on. Transmitter will be configured to transmitt continuously for testing purposes only.

1.3 EUT I/O Ports and Cables:

1.3.1 I/O Cables

CONNECTION:	**n/a**
SHIELD:	**n/a**
CONNECTORS:	**n/a**
TERMINATION TYPE:	**n/a**
LENGTH:	**n/a**
REMOVABLE:	**n/a**

1.3.2 Power Cords

UNIT:	**n/a**
MANUFACTURER:	**n/a**
SHIELDED:	**n/a**
LENGTH:	**n/a**

1.3.3 Power requirements:

Battery: 3 VDC Expected life: 15 Hours

1.4 Oscillator Frequencies

Frequency	EUT Location	Description of use
n/a	n/a	n/a

1.5 Power Supply

Description	Manufacturer	Model #	Serial #	Switching frequency or linear
n/a	n/a	n/a	n/a	n/a

1.6 Power Line Filters

Manufacturer	Model #	Qty	LOCATION ON EUT
n/a	n/a	n/a	n/a

1.7 Critical EMI Components (Capacitors, ferrites, etc.)

Description	Manufacturer	Part # or value	Qty	LOCATION ON EUT
n/a	n/a	n/a	n/a	n/a

1.8 Description of Enclosure: (including Gasketing, Coatings, Bonding, etc.)

n/a

1.9 Interfacing and/or Simulators Peripheral Equipment

DESCRIPTION:	**n/a**
MANUFACTURER:	**n/a**
MODEL NUMBER:	**n/a**
SERIAL NUMBER:	**n/a**
FCC ID:	**n/a**

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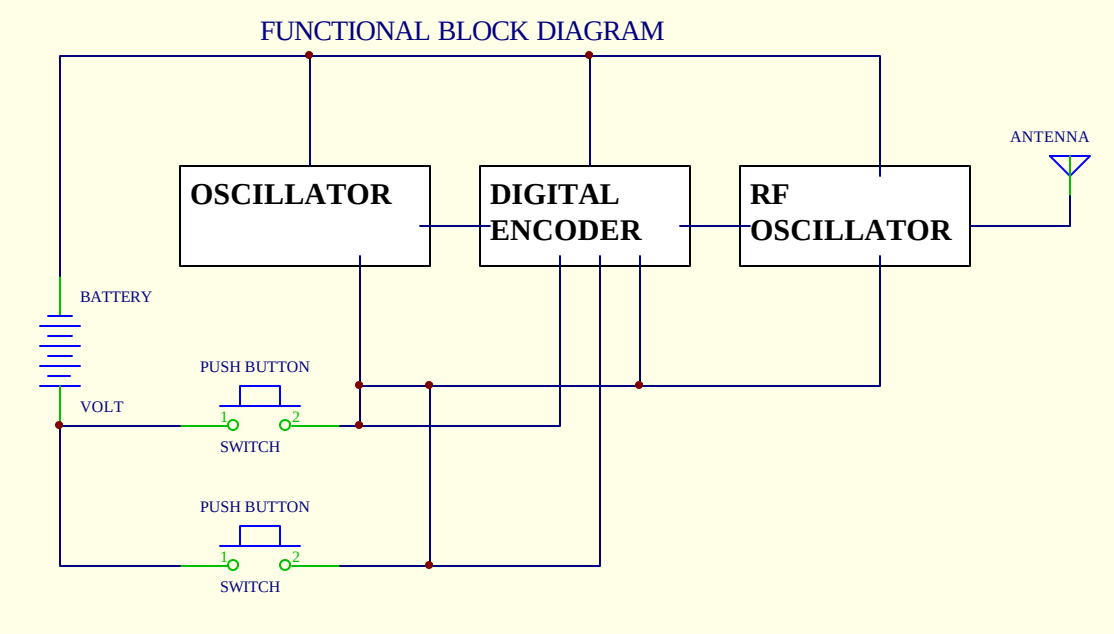
1.10 System Configuration Block Diagram



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Appendix C

Change History

Not Applicable

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Appendix D

Supplemental Information

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Pre-Word On Time	10.5 ms	Measured
Word On Time	80.5 ms	Measured
Max Bit Period	1.22 ms	Measured
Max Bit On Time	730 ms	Measured

Duty Cycle = $[(80.5_{ms} + 10.5_{ms}) \div 100_{ms}] (.730_{ms} \div 1.22_{ms})$

= $(91.0_{ms} \div 100_{ms}) (.730_{ms} \div 1.22_{ms})$

= (0.91) (0.598)

= 0.544

dB Corrections = -5.28

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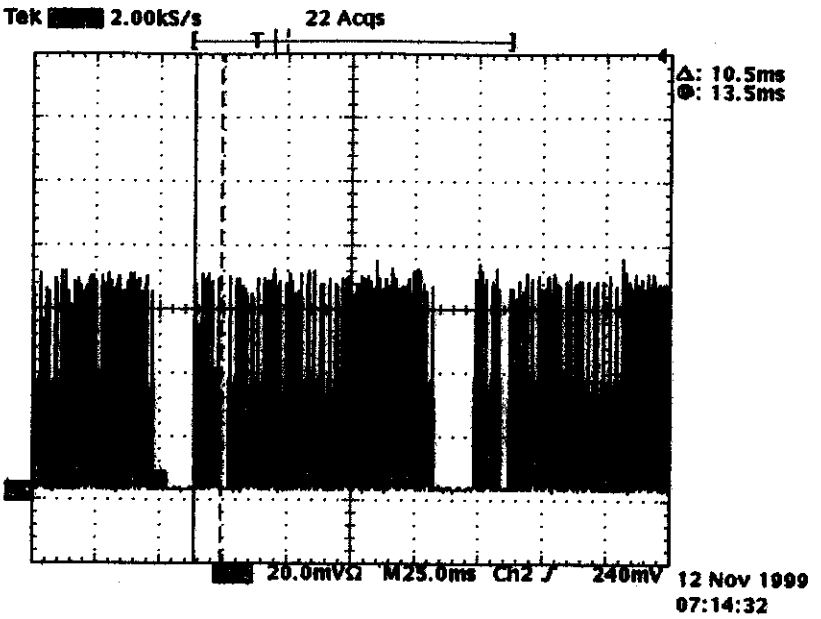

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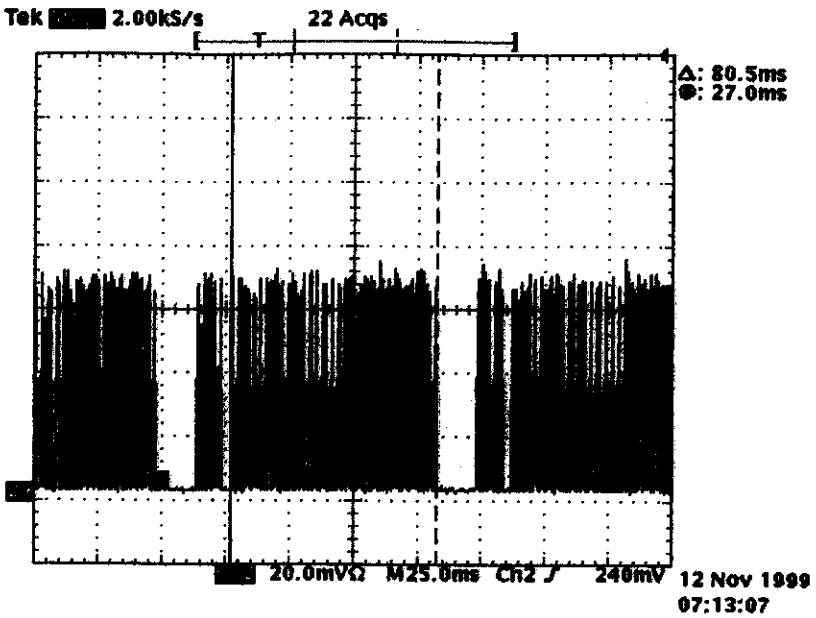

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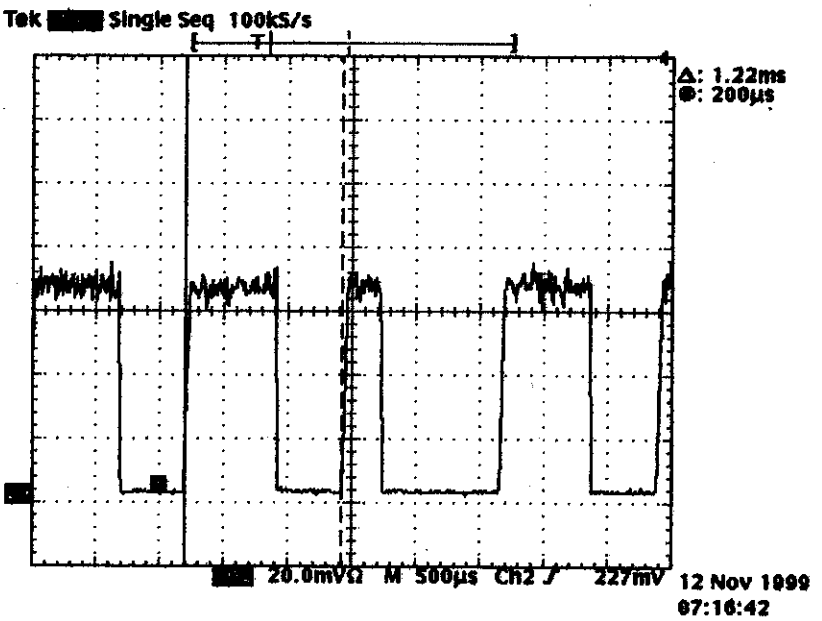

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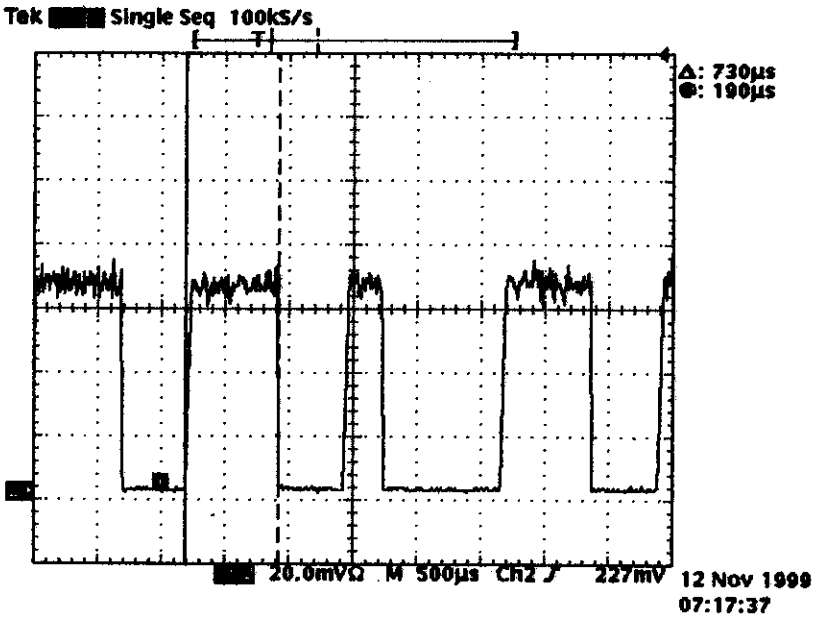

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