TÜV PRODUCT SERVICE

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

Test Report File No.	:	**9392-06**	Date of Issue:	11 August 1999
Model / Serial No.	:	**473 / ----**		
Product Type	:	Long Range Transmitter		
Applicant	:	DIRECTED ELECTRONICS, INC.		
Manufacturer	:	DIRECTED ELECTRONICS, INC.		
License holder	:	DIRECTED ELECTRONICS, INC.		
Address	:	2560 Progress Street		
	:	Vista, CA 92083		
Test Result	:	■ **Positive**	☐ **Negative**	
Test Project Number Reference(s)	:	**9392-06**		
Total pages - Test Report	:	9		

NOTE: All test equipment used during testing is calibrated and traceable to NIST.

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TÜV PRODUCT SERVICE

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 55013 / 1990

☐ - EN 55014 / 1987 ☐ - Household appliances and similar
☐ - Portable tools
☐ - Semiconductor devices

☐ - EN 55014 / A2:1990

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

☐ - EN 55015 / 1987
☐ - EN 55015 / A1:1990
☐ - EN 55015 / 1993

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

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

☐ - BS
☐ - 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

■ - 231(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:	: 23 °C
Relative Humidity:	: 50 %
Atmospheric Pressure:	: 100.0 kPa

Power Supply Utilized:

Power supply system : 12 Vdc

Symbol Definitions:

■ - Applicable
☐ - Not Applicable

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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, 20' x 28' x 16', Metal, Anechoic 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.	Cal Due Date
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)	
LISN-3, 50 A	262-263	Power Mains Network (LISN), 50 μH/250 μH/50 Ω/0.25 μF	Fischer Custom Communications, Inc.	3-4	
LISN-2, 25 A	--	Power Mains Network (LISN), 50 μH/250 μH/50 Ω/0.25 μF	Fischer Custom Communications, Inc.	7	
FCC-LISN-50-25-2	553	Power Mains Network (LISN), 50 μH/250 μH/50 Ω/0.25 μF	Fischer Custom Communications, Inc.	112	
FCC-LISN-50-25-2	552	Power Mains Network (LISN), 50 μH/250 μH/50 Ω/0.25 μF	Fischer Custom Communications, Inc.	113	
8012-50-R-12-BNC	266	LISN, 50 μH/50 Ω/0.1 μF	Solar Electronics Co.	--	
9252-50-R-24-BNC	458	LISN, 50 μH /250 μH/50 Ω/ 0.25 μF	Solar Electronics Co.	941719	
9252-50-R-24-BNC	457	LISN, 50 μH /250 μH/50 Ω/ 0.25 μF	Solar Electronics Co.	941720	
CAT-20	598	20 dB Attenuator	Mini-Circuits	--	
CAT-20	615	20 dB Attenuator	Mini-Circuits	--	

Remarks: EUT battery operated.

One year calibration cycle for all test equipment.

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Emissions Test Conditions: RADIATED EMISSIONS (Electric Field)

The *RADIATED EMISSIONS (ELECTRIC FIELD)* measurements were tested in a horizontal and vertical polarization at the following test location :

■ - Test not performed - see remarks

■ - Roof (Small Open Area Test Site) (Calibration Due Date: 28 May 2000)
☐ - Canyon #1 (10- and 30-Meter Open Area Test Site), Carroll Canyon, San Diego (Calibration Due Date: 21 July 1999)
☐ - Canyon #2 (3- and 10-Meter Open Area Test Site), Carroll Canyon, San Diego (Calibration Due Date: 20 May 2000)

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.	Cal Date
3115	453	Antenna, Double Ridge Guide	EMCO	9412-4363	10/99
3146	418	Antenna, Log Periodic Dipole	EMCO	9402-3775	06/99
8566B	720	Spectrum Analyzer	Hewlett Packard	211500842	03/00
8566B	721	Spectrum Analyzer Display	Hewlett Packard	2112A02185	03/00

Remarks: Pre-scan in shielded room detected no measurable emissions from 30 - 1000 MHz except fundamental and harmonics of the fundamental.

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

■ - Continuous 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:

☐ - _____ 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:

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)

■ - PASS ☐ - FAIL ☐ - NOT APPLICABLE

Minimum limit margin 0.6 dB at 433.92 MHz

Maximum limit exceeding _____ dB at _____ MHz

Remarks: Pre-scan in shielded room detected no measurable emissions from 30 - 1000 MHz.

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GENERAL REMARKS:

NOTE: All photographs are representative of setup for maximum emissions.
(*) Conducted Emissions - EUT battery operated.
Radiated Emissions - Pre-scan in shielded room detected no measurable emissions from 30 - 1000 MHz except fundamental and harmonics of the fundamental.

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.

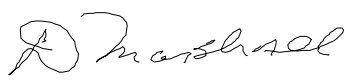
Equipment Received Date: 10 August 1999

Testing Start Date: 10 August 1999

Testing End Date: 10 August 1999

- TÜV PRODUCT SERVICE, INC. -

Responsible Engineer:



Dave Marshall
(EMC Test Engineer)

Responsible Engineer:

Mary Washington
(EMC Engineer)

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Technical Documentation

Test Data Sheets

and

Test Setup Drawing(s)

(See photograph for test setup.)

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TÜV PRODUCT SERVICE

REPORT No: S9392 TESTED BY: mw SPEC: FCC Part 15, Para. 15.231(b)

CUSTOMER: Directed Electronics, Inc. TEST DIST: 3 Meters

E U T: Long Range Transmitter, Model 473 TEST SITE: 3

EUT MODE: Continuous Transmit BICONICAL: N/A

DATE: 10-Aug-99 LOG: 418

NOTES: Duty Cycle= 10% OTHER: 453

RBW and VBW = 100 kHz below 1 GHz and 1 MHz above 1 GHz.

EUT flat on table. No emissions detectable at 3 meters except as noted below,

EUT's antenna fully extended and vertical to ground plane.

v.beta

FREQ (MHz)	VERTICAL (dBuv)		HORIZONTAL (dBuv)		CORRECTION FACTOR (dB/m)	MAX LEVEL (dBuV/m)		SPEC LIMIT (dBuV/m)		MARGIN (dB)		EUT Rotation	Antenna Height
	pk	av	pk	av		pk	av	pk	av	pk	av		
433.92	69.3	49.3	81	61	19.2	**100.2**	**80.2**	100.8	80.8	-0.6	-0.6	65	1
867.84	27.9	7.9	39.5	19.5	27.4	**66.9**	**46.9**	80.8	60.8	-13.9	-14	283	1.1
1301.76	29.8	9.8	32.4	12.4	28.7	**61.1**	**41.1**	74	54	-12.9	-13	51	1
1735.68	30.9	10.9	29.2	9.2	31.5	**62.4**	**42.4**	80.8	60.8	-18.4	-18	301	1
2169.6	32	12	30.8	10.8	33.5	**65.5**	**45.5**	80.8	60.8	-15.3	-15	49	1

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Appendix A

Test Setups
(Photographs)

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

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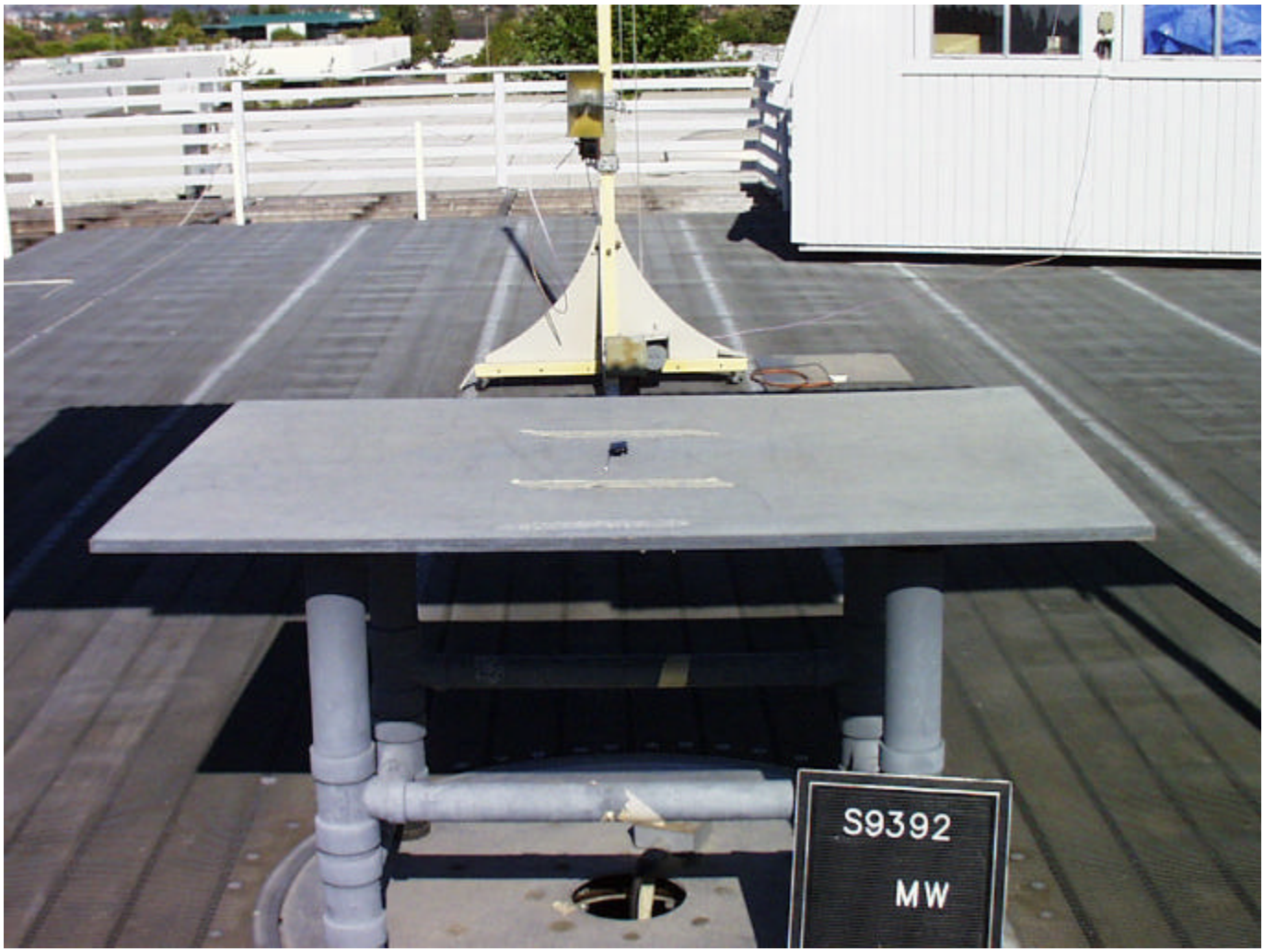
Photograph of Test Setup:
Radiated Emissions



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Photograph of Test Setup:
Radiated Emissions

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Appendix B

Product Information Form(s)

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Electromagnetic Compatibility (EMC) Test Plan

Date: 8/2/99

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: Long Range Transmitter**
****Model: 473 S/N:n/a**

Test Objective:
EMC Directive 89/336/EEC (EMC Requirements)
Machinery Directive 89/362/EEC (EMC Requirements)
Medical Device Directive 93/42/EEC (EMC Requirements)
xxxxFCC Part 15.231 (list)
Other (please specify)

Test will be,
Attended by the customer.
xxxxx Unattended by the customer.

If a failure occurs, TÜV Product Service should,
xxxxx Call contact list above, if not available then stop testing.
Continue testing to complete test series.
Continue testing to define corrective action.
Stop testing.

Customer authorization to perform tests according to this test plan.
XTyson Mackjust Date: 8/2/99

Test plan prepared by:
xTyson Mackjust Date: 8/2/99
(Please Print)
Test plan reviewed by:
xMartin Gonzalez Date: 8/2/99

(**) PLEASE NOTE: Information in this box will be the information in your test reports.

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TÜV PRODUCT SERVICE

Electromagnetic Compatibility (EMC) Test Plan

1.0 EUT Documentation

This section provides the necessary documentation for detailing the Equipment Under Test (EUT). Descriptions of the equipment including software and documentation on installation and operations should be provided.

Additional documentation necessary for test plan completion should be attached to the back of the test plan. For additional instruction on how to complete your test plan contact your TÜV Product Service representative.

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

1.1.1 Components of EUT

(List each one separately. Add attachment if necessary. NOT TO INCLUDE PERIPHERALS.)

Description	Model Number	Serial Number	FCC ID Number
Long Range Transmiter	473	n/a	EZSDEI473
n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a

1.2 Operating modes: (list and describe)

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

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Electromagnetic Compatibility (EMC) Test Plan

1.3 EUT I/O Ports and Cables:

1.3.1 I/O Cables (Add attachment if necessary.)

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

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

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

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

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Electromagnetic Compatibility (EMC) Test Plan

1.3.2 Power Cords (Add attachment if necessary.)

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

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

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

1.3.3 Power requirements:

***Note: European power is typically 230 VAC 50Hz or 400 VAC 50Hz, single and three phase, respectively. FCC requires testing to be performed at typical US power ratings at 60Hz.**

230 VAC 50Hz – single phase Amps

400 VAC 50Hz – three phase Amps per phase

120 VAC 60Hz – single phase Amps

VDC Amps

Battery: 12 VDC Expected life: 15 Hours

Other: (describe)

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Electromagnetic Compatibility (EMC) Test Plan

1.4 Oscillator Frequencies

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

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

n/a

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Electromagnetic Compatibility (EMC) Test Plan

1.9 Interfacing and/or Simulators Peripheral Equipment
(Please provide a complete description of all peripherals to be used during testing, please note that all I/O ports must be appropriately loaded)

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

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

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

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

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

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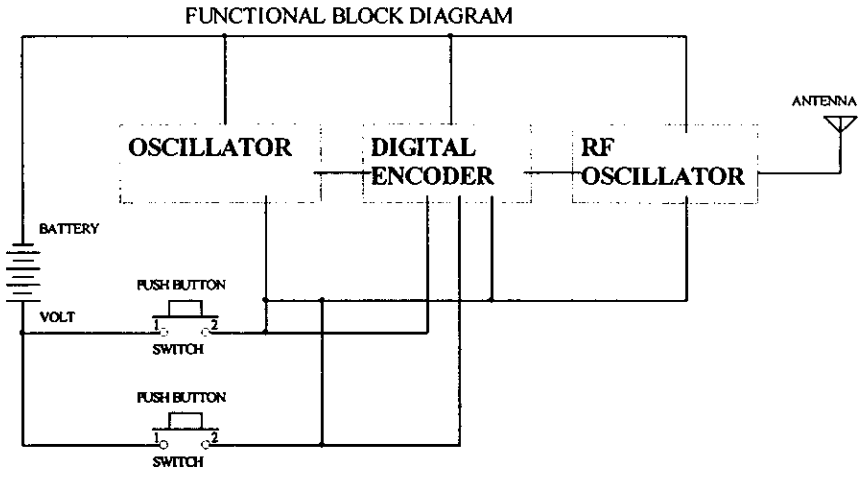
Electromagnetic Compatibility (EMC) Test Plan

1.10 System Configuration Block Diagram
Use Word Draw or another draw program to draw the block diagram.



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Appendix C

Change History

Not Applicable

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Appendix D

Supplemental Information

Not Applicable

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