

# EMC - TEST REPORT

## UNITED STATES STANDARD FCC PART 15, Paragraph 15.231

Test Report File No. : **SC401730-06** Date of Issue: 06 May 2004

Model / Serial No. : 487V/P/X / --

Product Type : 2 Way LED

Applicant : DIRECTED ELECTRONICS INCORPORATED

Manufacturer : DIRECTED ELECTRONICS INCORPORATED

License holder : DIRECTED ELECTRONICS INCORPORATED

Address : 1 Viper Way  
 : Vista, CA 92081

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

Test Project Number Reference(s) : SC401730-06

Total pages - Test Report : 25

(\*) See General Remarks.

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

*TÜV America 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 America, Inc. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV America, Inc. issued reports.*

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**DIRECTORY  
Test Report**

	<b>Pages</b>
Test Report	1 - 7
Directory	2
Test Regulations	3
General Remarks and Summary	7
Equipment	
Part 15.231(a) Deactivation	5
Part 15.231(b) Radiated Spurious Emissions	5
Part 15.231(c) Emissions Bandwidth	5

**Technical Documentation**

Test Data Sheets and Test Setup Drawing(s)	TD1
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**Appendices**

<b>Appendix A</b> - Test Setups (Photographs)	A1
<b>Appendix B</b> - Product Information Form(s)	B1
<b>Appendix C</b> - Change History	C1
<b>Appendix D</b> - Supplemental Information	D1

**TEST REGULATIONS:**

The tests were performed according to the following regulations:

- EN 50081-1: 1991
- EN 55011: 1998, Amendment A2: 2002
- EN 55013: 1990
- EN 55014: 1993
- EN 55022: 1987
- EN 55022: 1998, Amendment A2: 2003
- VCCI
- CNS 13438: 1994
- - FCC Part 15
  - - 15.231(a)
  - - 15.231(b)
  - - 15.231(c)
- AS/NZS 3548: 1995
- CISPR 11: 1997
- CISPR 22: 1997
- Group 1
- Class A
- Group 2
- Class B
- Household appliances and similar
- Portable tools
- Semiconductor devices
- Class A
- Class B
- Class A
- Class B
- Class A ITE
- Class B ITE
- Class A
- Class B
- Class A
- Class B
- Class A
- Class B
- Class A
- Class B
- 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 : 1.5 V Battery

**Symbol Definitions:**

- - Applicable
- - Not Applicable

**Test Conditions: Part 15.231(a) Deactivation  
 Part 15.231(b) Radiated Spurious Emissions  
 Part 15.231(c) Emissions Bandwidth**

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

- Test not applicable

- - SR-3, Shielded Room, 12' x 20' x 8', Metal Chamber
- - Roof (Small Open Area Test Site), 3 meters  
 (Date of listing April 20, 2004. Site Verification Valid for 3 years from listing.)

**Test Equipment Used:**

	Model No.	Prop. No.	Description	Manufacturer	Serial No.	Date Cal'ed
Equipment List SR-3						
1	8566B	823	Spectrum Analyzer	Hewlett Packard	2332A02751	09/03
2	CBL6111	460	Bilog Antenna	Chase Electronics	1013	NCR*
Equipment List Roof						
3	3115	453	Double Ridge Antenna	EMCO	9412-4364	02/04
4	8566B	744	Spectrum Analyzer	Hewlett Packard	2618A02913	01/04
5	AMF-5D- 010180-35-10P	719	Preamplifier	Miteq	549460	NCR*
6	FF6549-1	778	High Pass Filter	Sage	005	NCR*

**Remarks:** One year calibration cycle for all test equipment and sites. (\*) No Calibration Required.  
 No emissions detected between 30 MHz to 1 GHz. See Appendix D for prescans.

**Equipment Under Test (EUT) Test Operation Mode:**

The equipment under test was operated under the following conditions during 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
- See Product Information Form(s) in Appendix B

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: _____ |

- Unshielded power cable
- Unshielded cables
- Shielded cables

MPS. No.: \_\_\_\_\_

- Customer specific cables
- \_\_\_\_\_
- \_\_\_\_\_

**GENERAL REMARKS:**

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

(\*) No emissions detected between 30 MHz to 1 GHz. See Appendix D for prescans.

**SUMMARY:**

All tests according to the regulations cited on page 3 were

- Performed

- Performed with the following **exceptions**

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  $\pm 2$  dB for conducted emissions and  $\pm 4$  dB for radiated emissions.

Equipment Received Date: 22 April 2004  
Testing Start Date: 22 April 2004  
Testing End Date: 22 April 2004

- TÜV AMERICA, INC. -

Reviewing Engineer:



Jim Owen  
(EMC Chief Engineer)

Test Engineer:



Alan Laudani  
(EMC Engineer)

**Technical Documentation**

**Test Data Sheets  
and  
Test Setup Drawing(s)**

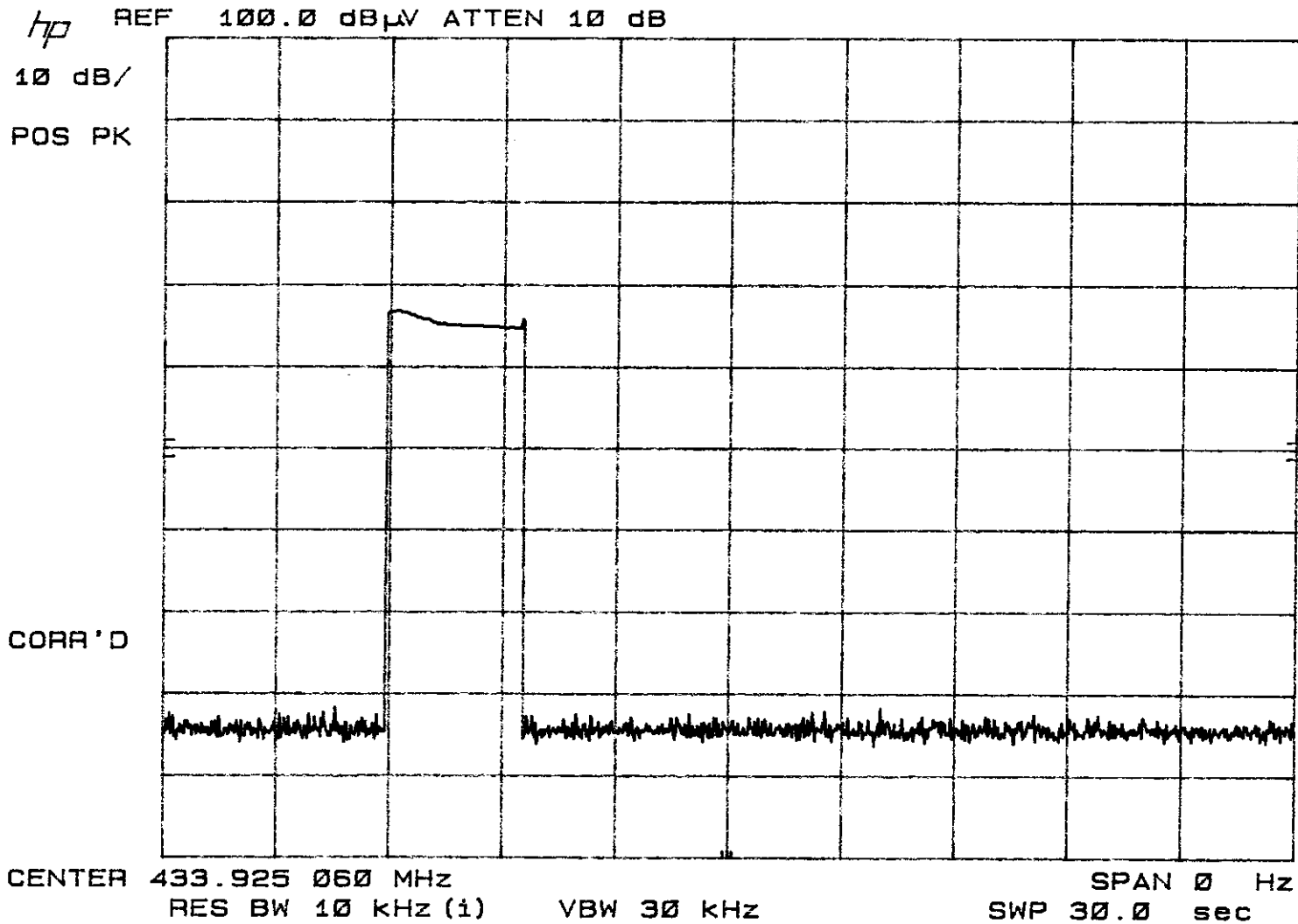


April 22, 2004  
TECH/ENGR: AAL  
LOCATION: SR3

Hand Held Unit 487V/P/X

SC401730  
Directed Electronics  
CFR 47 Part 15.231(a) (2) Deactivation

Deactivation occurs as one releases the transmit button.



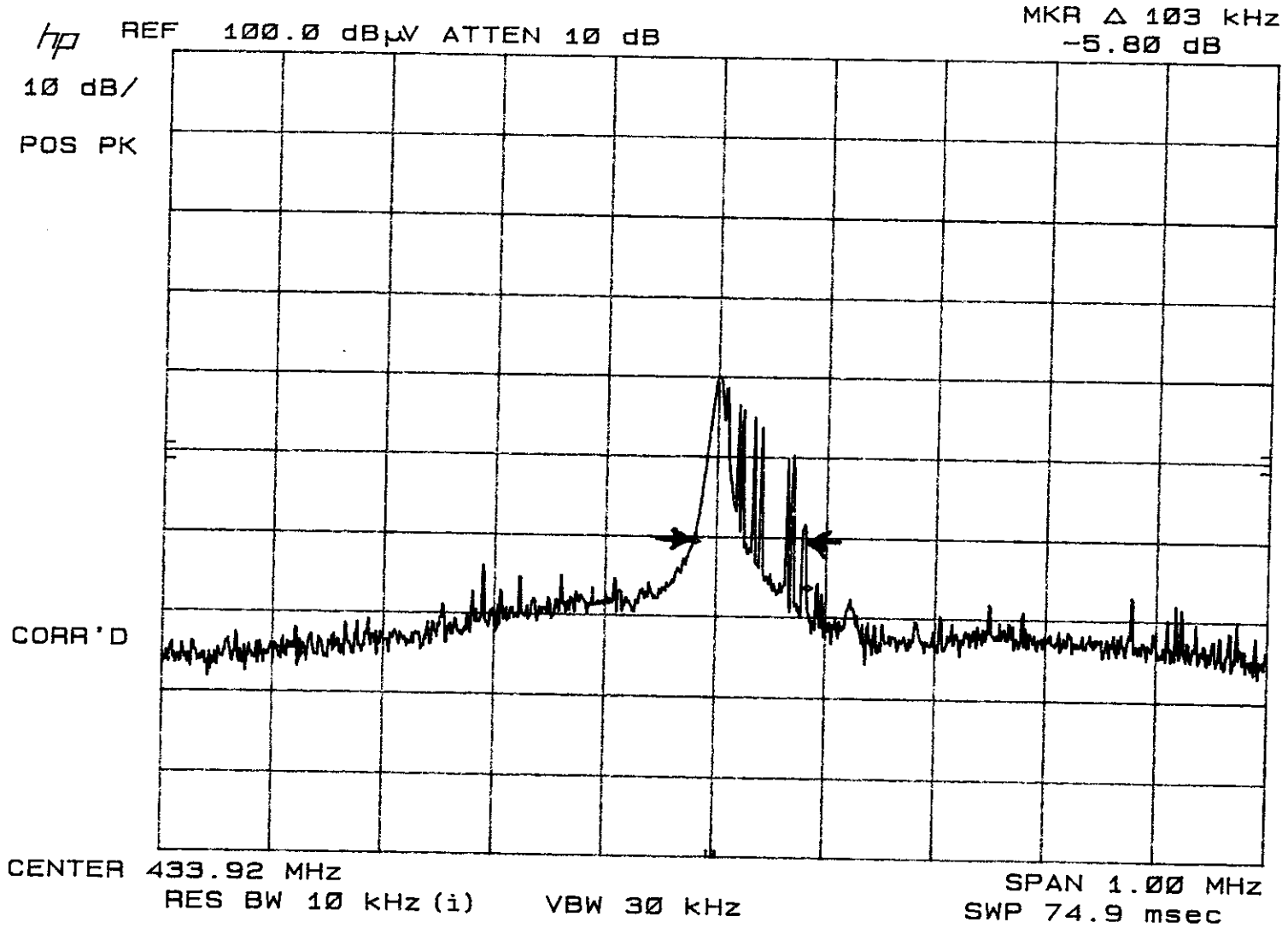
REPORT No: SC401730    TESTER: Alan Laudani *AL*    SPEC: FCC Part 15 para 15.231(b)  
 CUSTOMER: Directed Electronics    TEST DIST: 3 Meters  
 E U T: 487 V/P/X    TEST SITE: Roof  
 EUT MODE: Transmit    BICONICAL: N/A  
 DATE: April 22, 2004    LOG: 244  
 NOTES: Duty Cycle= 55.5%    OTHER: 453  
 above 1GHz: RBW & VBW 1 MHz for Pk; AVG = PK - 20LOG(Duty Cycle)  
 below 1GHz: RBW & VBW 100 kHz for Pk; AVG = PK - 20LOG(Duty Cycle)  
 CF = Antenna Factor + Cable Loss - Preamplifier Gain

v.beta231

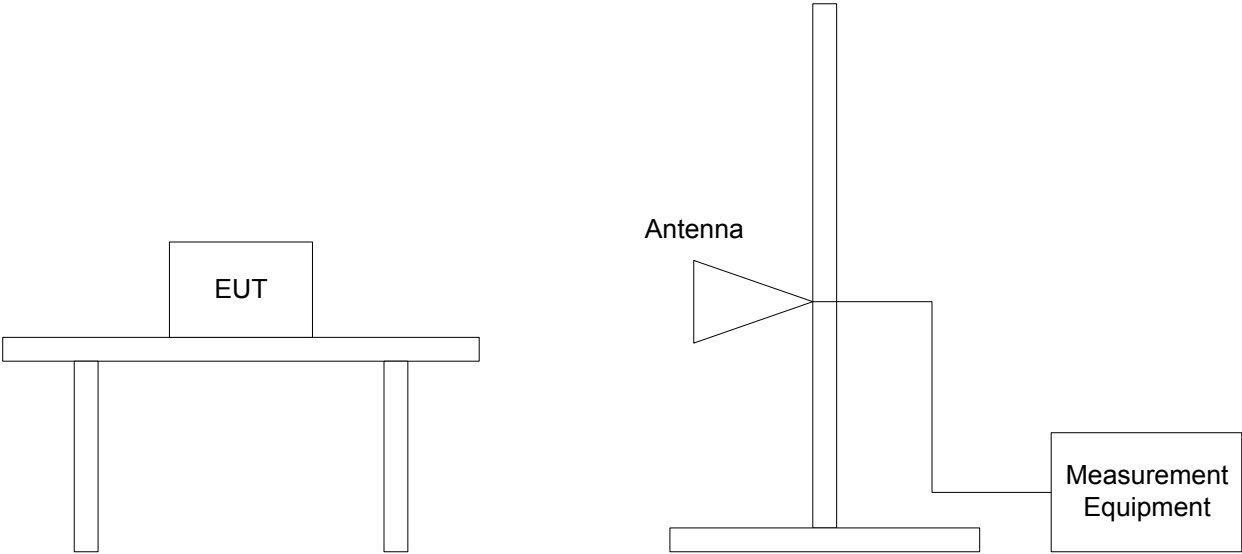
FREQ (MHz)	VERT. (dBuv)		HORIZ (dBuv)		CF (dB/m)	MAX LEVEL (dBuV/m)		SPEC LIMIT (dBuV/m)		MARGIN (dB)		EUT Rotation	Antenna Height	Notes
	pk	DCav	pk	DCav		pk	av	pk	av	pk	av			
433.920	56.7	51.6	67.2	62.1	16.4	83.6	78.5	100.8	80.8	-17.2	-2.4	250	1	
867.840	25.7	20.6	26.7	21.6	22.7	49.4	44.3	80.8	60.8	-31.4	-16.5		1	
1301.760	68.7	63.6	64.6	59.5	-12.5	56.2	51.1	74.0	54.0	-17.8	-2.9	230	1	
1735.680	61.4	56.3	65.3	60.2	-9.1	56.2	51.1	80.8	60.8	-24.6	-9.7		1	
2169.600	57.3	52.2	56.7	51.6	-6.8	50.5	45.4	80.8	60.8	-30.3	-15.5	300	1	
2603.520	64.3	59.2	60.9	55.8	-5.1	59.2	54.1	80.8	60.8	-21.6	-6.7	260	1.2	
3037.440	62.2	57.1	62.2	57.1	-2.5	59.7	54.6	80.8	60.8	-21.1	-6.2	300	1.5	
3471.360	60.0	54.9	62.4	57.3	-0.9	61.5	56.4	80.8	60.8	-19.3	-4.4	300	1.5	
3905.280	50.7	45.6	48.7	43.6	-0.2	50.5	45.4	74.0	54.0	-23.5	-8.6	320	1.2	
4339.200	56.9	51.8	56.2	51.1	-1.3	55.6	50.5	74.0	54.0	-18.4	-3.5	340	1.4	

SC401730  
Directed Electronics  
CFR 47 Part 15.231(c) Bandwidth  
-20 dB Bandwidth is less than 0.25% of the Operating Frequency (1.085 MHz); EUT complies.

April 22, 2004  
TECH/ENGR: AAL  
LOCATION: SR3



**Test Setup for Part 15.231(a) Deactivation, Part 15.231(b) Radiated Spurious Emissions,  
and Part 15.231 (c) Emissions Bandwidth**



## **Appendix A**

### **Test Setups (Photographs)**

See Test Setup Exhibit.

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

**Appendix B**

**Product Information Form(s)**

**General Equipment Description -- NOTE: This information will be input into your test report as shown below.**

EUT Description: Hand held keyfob transceiver for car alarm and convenience systems.  
 EUT Name: 2 Way LED  
 Model No.: 487V/P/X Serial No.: --  
 Product Options: --  
 Configurations to be tested: 1

**Power Requirements**

**Regulations require testing to be performed at typical power ratings in the countries of intended use. (i.e., European power is typically 230 VAC 50 Hz or 400 VAC 50 Hz, single and three phase, respectively)**

Voltage: 1.5 V (AAA Battery) (If battery powered, make sure battery life is sufficient to complete testing.)  
 # of Phases: --  
 Current (Amps/phase(max)): 100 mA Current (Amps/phase(nominal)): --  
 Other: --

**Other Special Requirements**

--

**Typical Installation and/or Operating Environment**

(ie. Hospital, Small Business, Industrial/Factory, etc.)

Automotive

**EUT Power Cable**

Permanent OR  Removable Length (in meters): --  
 Shielded OR  Unshielded  
 Not Applicable

**EUT Interface Ports and Cables**

Interface			Shielding				Type	Termination	Connector Type	Port Termination	Length (in meters)	Removable / Permanent	
Analog	Digital	Qty	Yes	No									
<b>EXAMPLE:</b> RS232	<input type="checkbox"/>	<input checked="" type="checkbox"/>	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Foil over braid	Coaxial	Metallized 9-pin D-Sub	Characteristic Impedance	6	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
--	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>	

**EUT Software.**

Revision Level: --  
 Description: --

**EUT Operating Modes to be Tested** -- list the operating modes to be used during test. It is recommended the equipment be tested while operating in a typical operation mode. FCC testing of personal computers and/or peripherals requires that a simple program generate a complete line of upper case H's. Provide a general description of all software, firmware, and PLD algorithms used in the equipment. List all code modules as described above, with the revision level used during testing. Consult with your TÜV Product Service Representative if additional assistance is required.

1. Continuous modulated transmission
2. Receiver LO re-radiation

**EUT System Components** -- List and describe all components which are part of the EUT. For FCC testing a minimum configuration is required. (ie. Mouse, Printer, Monitor, External Disk Drive, Motherboard, etc.)

Description	Model #	Serial #	FCC #
Keyfob	487V, 487P, 487X	--	EZSDEI487

**Support Equipment** -- List and describe all support equipment which is not part of the EUT. (i.e. peripherals, simulators, etc)

Description	Model #	Serial #	FCC #
--			



Oscillator Frequencies			
Frequency	Derived Frequency	Component # / Location	Description of Use
13.56 MHz	433.92 MHz	--	Transmitter RF carrier
13.2256 MHz	423.22 MHz	--	Receiver LO
32.76 kHz	--	--	Microcontroller

Power Supply				
Manufacturer	Model #	Serial #	Type	
--			<input type="checkbox"/> Switched-mode	(Frequency)
			<input type="checkbox"/> Linear	<input type="checkbox"/> Other

Power Line Filters		
Manufacturer	Model #	Location in EUT
--		

Critical EMI Components (Capacitors, ferrites, etc.)				
Description	Manufacturer	Part # or Value	Qty	Component # / Location
--				

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

--

**Appendix C**

**Change History**

**Not Applicable**

## Appendix D

### Supplemental Information

