

# TEST RESULT SUMMARY

**FCC Part 15 Subpart C Section 15.207**

**FCC Part 15 Subpart C Section 15.209**

**IC RSS-210 Issue 7**

**IC RSS-Gen Issue 2**

MANUFACTURER'S NAME	Destron Fearing 490 Villaume Avenue South St. Paul MN 55075
PRODUCT NAME	DTR4
MODEL NUMBER(S) TESTED	DTR4
SERIAL NUMBER(S) TESTED	1005-2226
PRODUCT DESCRIPTION	Hand Held 134.2 kHz RFID Reader
TEST REPORT NUMBER	WC1000993.2 Rev A
TEST DATE(S)	17 March 2010

TÜV SÜD America Inc, as an independent testing laboratory, declares that the equipment tested as specified above conforms to the applicable EMC requirements of FCC Part 15 Subpart C Sections 15.207 "Conducted Limits" and 15.209 "Radiated emission limits; general requirements" and IC RSS-210 Issue 7 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment" and IC RSS-Gen "General Requirements and Information for the Certification of Radiocommunication Equipment".

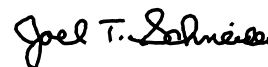
It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics. Any modifications necessary for compliance made during testing on the above mentioned date(s) must be implemented in all production units for compliance to be maintained.

Date: 15 September 2010

Location: Taylors Falls MN  
USA



Greg S Jakubowski  
EMC Test Engineer



Joel T Schneider  
Senior EMC Engineer

Not Transferable



America

# EMC TEST REPORT

Test Report No. WC1000993.2 Rev A Date of issue: 15 September 2010

Product Name DTR4

Model(s) Tested DTR4

Serial No(s) Tested 1005-2226

Product Description Hand Held 134.2 kHz RFID Reader

Manufacturer Destron Fearing  
490 Villaume Avenue  
South St. Paul MN 55075

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

*TÜV SÜD America Inc reports apply only to the specific samples tested under stated test conditions. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. TÜV SÜD America Inc shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV SÜD America 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, NIST, or any agency of the US government.*

*TÜV SÜD America Inc and its professional staff hold government and professional organization certifications and are members of AAMI, ACIL, AEA, ANSI, IEEE, NARTE, and VCCI.*

## REVISION RECORD

REVISION	TOTAL NUMBER OF PAGES	DATE	DESCRIPTION
	25	23 April 2010	Initial Release
A	25	15 September 2010	Revisions Include: <ul style="list-style-type: none"><li>Page 5: Added statement - Testing was performed in accordance with the test procedure of ANSI C63.4 2003, clause 8.2.2.</li></ul>



## D I R E C T O R Y

### Contents

Revision Record	<u>2</u>
Directory	<u>3</u>
Test Regulations	<u>4</u>
Environmental Conditions	<u>4</u>
Power Supply	<u>4</u>
Test Equipment Traceability	<u>4</u>
Test Information	
General Field Strength Limits 0.009 – 30 MHz	FCC 15.209(a) & (c), IC RSS-210 2.6 <u>5</u>
Radiated Emissions 30 - 5000 MHz	15.209(c) & (f) , IC RSS-210 2.6 <u>6</u>
Occupied Bandwidth	RSS-Gen 4.6.1 <u>7 - 8</u>
Conducted limits - AC Power Lines	15.207(a), IC RSS-Gen 7.2.2 <u>9</u>
Test area diagram	<u>10</u>
Test-setup Photos	<u>11 - 12</u>
Equipment Under Test Information	<u>13</u>
General Remarks, Deviations, Summary	<u>14</u>
<b>Appendix A</b>	
EMC Test Plan/CDF/Block Diagram	<u>15 - 23</u>
<b>Appendix B</b>	
Measurement Protocol	<u>24 - 25</u>

#### EMC TEST REGULATIONS:

The tests were performed according to the following regulations:

FCC Part 15 Subpart C Section 15.207 Paragraph (a)

FCC Part 15 Subpart C Section 15.209 Paragraphs (a), (c), (f)

IC RSS-210 Issue 7 Section 2.6

IC RSS-Gen Issue 2 Sections 4.6.1, 7.2.2

#### ENVIRONMENTAL CONDITIONS IN THE LAB

	<u>Actual</u>
Temperature:	: 20°C
Atmospheric pressure	: 100kPa
Relative Humidity	: 34%

#### POWER SUPPLY UTILIZED

Power supply system : 6 VDC

#### TEST EQUIPMENT

All measurement instrumentation is traceable to the National Institute of Standards and Technology and is calibrated according to internal procedure.

#### SIGN EXPLANATIONS

- not applicable
- applicable

## General field strength limits 0.009 – 30 MHz

FCC 15.209(a), FCC 15.209(c), IC RSS-210 2.6

### Test summary

The requirements are:  - MET  - NOT MET

Testing was performed in accordance with the test procedure of ANSI C63.4 2003, clause 8.2.2

Maximum field strength of the fundamental (average detector) is 15 dB $\mu$ V/m\* (5.6  $\mu$ V/m) at 300 meters at 134.2 kHz

The limit is 25 dB $\mu$ V/m (17.88  $\mu$ V/m)

Spurious emission with least passing margin is 2 dB $\mu$ V/m\* (1.2  $\mu$ V/m) at 30 meters at 536.8 kHz

The limit is 33 dB $\mu$ V/m (44.7  $\mu$ V/m)

No unwanted emissions exceed the level of the fundamental

\*Extrapolated levels using a 40 dB/decade falloff as indicated by the measurements.

### Test location

- Wild River Lab Large Test Site (Open Area Test Site)

- Wild River Lab Small Test Site (Open Area Test Site)

### Test distance

- 3 meters

- 10 meters

- 30 meters

### Test equipment

TUV ID	Model	Manufacturer	Description	Serial	Cal Due
WRLE02517	HFH2-Z2	Polarad	Loop Antenna	879285/036	01-Jul-10
WRLE02534	ESHS-20	Rohde & Schwarz	EMI Receiver	837055/003	29-Mar-11

### Test limit

Frequency (MHz)	Field strength $\mu$ V/m	Measurement distance (m)
0.009-0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30	30	30

### Test Data, dB $\mu$ V/m

Frequency (MHz)	Detector	Distance				Limit 300 m	Delta (dB)
		3 m	10 m	30 m	300 m		
0.1342	Pk/Av	115/115	91/90	57/55	17/15*	45/25	-28/-10
0.2684	Pk/Av	70/68	47/43	nf	-13/-17*	39/19	-52/-36
0.4026	Pk/Av	60/53	nf	nf	-20/-27*	35/15	-55/-42

Frequency (MHz)	Detector	Distance				Limit 30 m	Delta (dB)
		3 m	10 m	30 m	300 m		
0.5368	Qp	42	nf	2*		33	-31
0.671	Qp	40	nf	0*		31	-31
0.8052	Qp	35	nf	-5*		29.4	-34.4

\* Extrapolated value using 40 dB per decade fall off

nf = noise floor

No other signals detected up to 30 MHz.

## Radiated Emissions 30 - 1000 MHz

### FCC 15.209(c), FCC 15.209(f), IC RSS-210 2.6

#### Test summary

The requirements are: ■ - MET □ - NOT MET

Testing was performed in accordance with the test procedure of ANSI C63.4 2003, clause 8.3

Maximum spurious emission is 34 dB $\mu$ V/m at 3 meters at 461 MHz

Minimum margin of compliance is 11.9 dB

#### Test location

□ - Wild River Lab Large Test Site (Open Area Test Site)

■ - Wild River Lab Small Test Site (Open Area Test Site)

#### Test distance

■ - 3 meters

□ - 10 meters

#### Test Equipment

TUV ID	Model	Manufacturer	Description	Serial	Cal Due
WRLE03995	EM-6917B	Electro-Metrics	Biconicalog Periodic	151	24-Apr-10
WRLE02680	85650A	Hewlett-Packard	Quasi-Peak Adapter	2043A00343	02-Jun-10
NBLE03196	8566B	Hewlett-Packard	Spectrum Analyzer	2240A01856	21-Jul-10
NBLE03195	85662A	Hewlett-Packard	Analyzer Display	2648A13518	21-Jul-10
WRLE10617	ZHL-1042J	Mini-Circuits	Preamplifier 30 MHz-5 GHz	QA0746004	Code B 25-Sep-10

Cal Code B = Calibration verification performed internally.

#### Test limits

##### Transmitter

Frequency (MHz)	Field strength ( $\mu$ V/m)	Field strength (dB $\mu$ V/m)	Measurement distance (m)
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

#### Test data

##### Measurement summary for limit2: FCC-B <1GHz 3m (Qp)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m)(DEG)	DELTA2 FCC-B <1GHz 3m
461.084 MHz	45.21 Qp	1.43 / 16.73 / 29.32 / 0.0	34.05	V / 1.00 / 55	-11.95
287.539 MHz	48.15 Qp	1.23 / 12.82 / 29.43 / 0.0	32.77	H / 1.00 / 90	-13.23
280.171 MHz	47.3 Qp	1.22 / 12.51 / 29.45 / 0.0	31.58	H / 1.00 / 270	-14.42
265.423 MHz	46.65 Qp	1.21 / 12.89 / 29.51 / 0.0	31.24	H / 1.00 / 270	-14.76
272.797 MHz	45.3 Qp	1.21 / 12.69 / 29.48 / 0.0	29.73	H / 1.00 / 90	-16.27
375.002 MHz	39.85 Qp	1.33 / 15.6 / 29.36 / 0.0	27.42	V / 1.00 / 0	-18.58
250.669 MHz	43.2 Qp	1.18 / 12.2 / 29.56 / 0.0	27.02	H / 1.00 / 270	-18.98
124.543 MHz	43.05 Qp	0.85 / 9.03 / 29.6 / 0.0	23.33	H / 2.00 / 90	-20.17
500.006 MHz	34.55 Qp	1.48 / 17.86 / 29.38 / 0.0	24.5	V / 1.00 / 0	-21.5
538.214 MHz	33.8 Qp	1.53 / 18.3 / 29.34 / 0.0	24.3	H / 1.00 / 90	-21.7
325.004 MHz	36.85 Qp	1.28 / 14.1 / 29.47 / 0.0	22.76	V / 1.00 / 0	-23.24
479.246 MHz	32.9 Qp	1.45 / 17.26 / 29.35 / 0.0	22.26	V / 1.00 / 0	-23.74
300.002 MHz	34.95 Qp	1.25 / 13.35 / 29.41 / 0.0	20.14	V / 1.00 / 0	-25.86

## Occupied bandwidth

### RSS-Gen 4.6.1

#### Test summary

The requirements are:  - MET  - NOT MET

Test was performed in accordance with the article "The Measurement of Occupied Bandwidth" by Industry Canada's certification bureau.

Occupied bandwidth = 47 Hz

#### Test location

- Wild River Lab Large Test Site (Open Area Test Site)

- Wild River Lab Small Test Site (Open Area Test Site)

#### Test equipment

TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
WRLE02517	HFH2-Z2	Polorad	Loop Antenna	879285/036	01-Jul-10
WRLE03371	E4440A	Agilent	Spectrum Analyzer	MY43362222	11-Aug-10

Cal Code B = Calibration verification performed internally. Cal Code Y = Calibration not required when used with other calibrated equipment.

#### Test limit

No limit specified

#### Test data

See following pages



99% Occupied bandwidth

Agilent 15:22:47 Mar 17, 2010

▲ Mkr1 47 Hz  
-0.20 dB

Ref -74.5 dBm

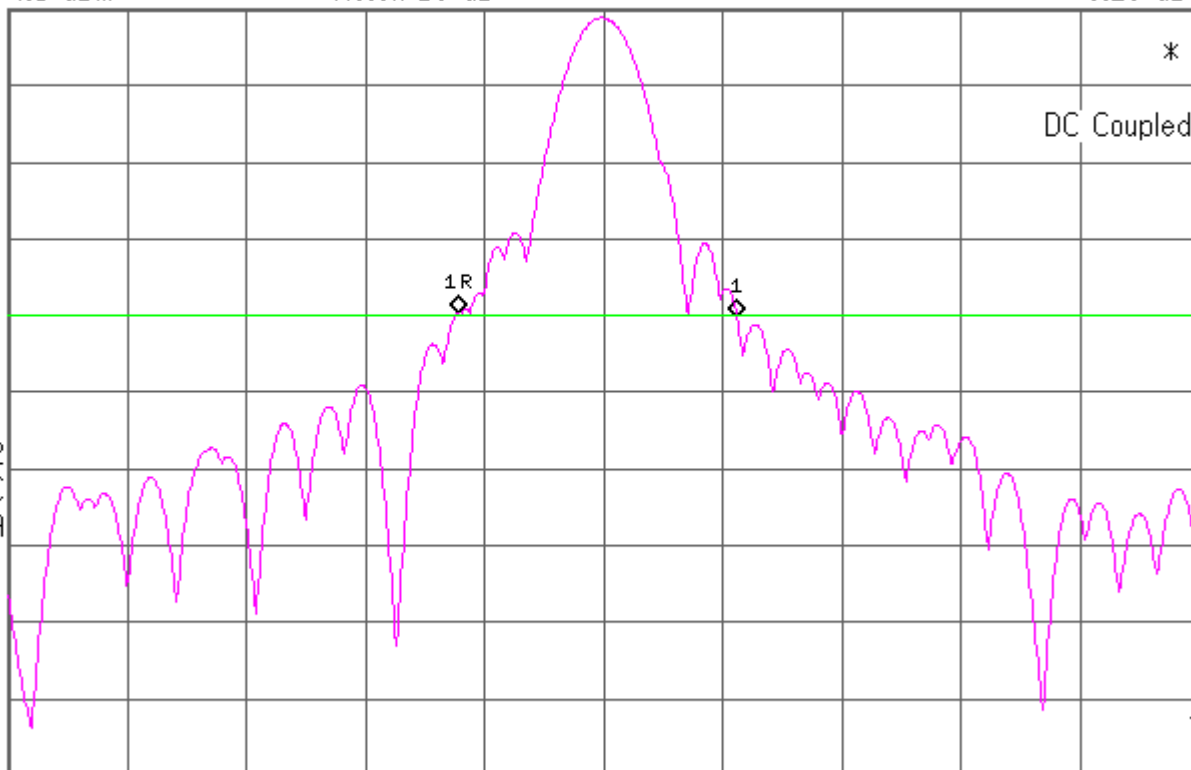
Atten 10 dB

Norm  
Log  
5  
dB/

DI  
-94.5  
dBm  
LgAv

S1 S2  
V3 FC  
AA

£(f):  
f<50k  
#Swp



Center 134.208 kHz

#Res BW 10 Hz

VBW 30 Hz

Span 200 Hz

Sweep 1.911 s (1001 pts)

## Conducted Emissions - AC Power Lines

FCC 15.207(a), IC RSS-Gen 7.2.2

### Test summary

The requirements are:  - NOT APPLICABLE  - NOT MET

Testing was performed in accordance with the test procedure of ANSI C63.4 2003, clause 7.2

The device does not connect to the AC mains.

### Test location

- Wild River Lab Large Test Site (Open Area Test Site)

- Wild River Lab Small Test Site (Open Area Test Site)

### Test equipment used:

TUV ID	Model	Manufacturer	Description	Serial	Cal Due
WRLE02417	3825/2	Electro-Mechanics (EMCO)	50 Ω LISN	8812-1439	Code B 23-Mar-11
WRLE02534	ESHS-20	Rhode & Schwarz	EMI Receiver	837055/003	29-Mar-11

Cal Code B = Calibration verification performed internally. Cal Code Y = Calibration not required when used with other calibrated equipment.

### Test limits, dB $\mu$ V

Frequency (MHz)	Quasi Peak	Average
0.15 - 0.5	66 - 56*	56 - 46*
0.5 - 5	56	46
5 - 30	60	50

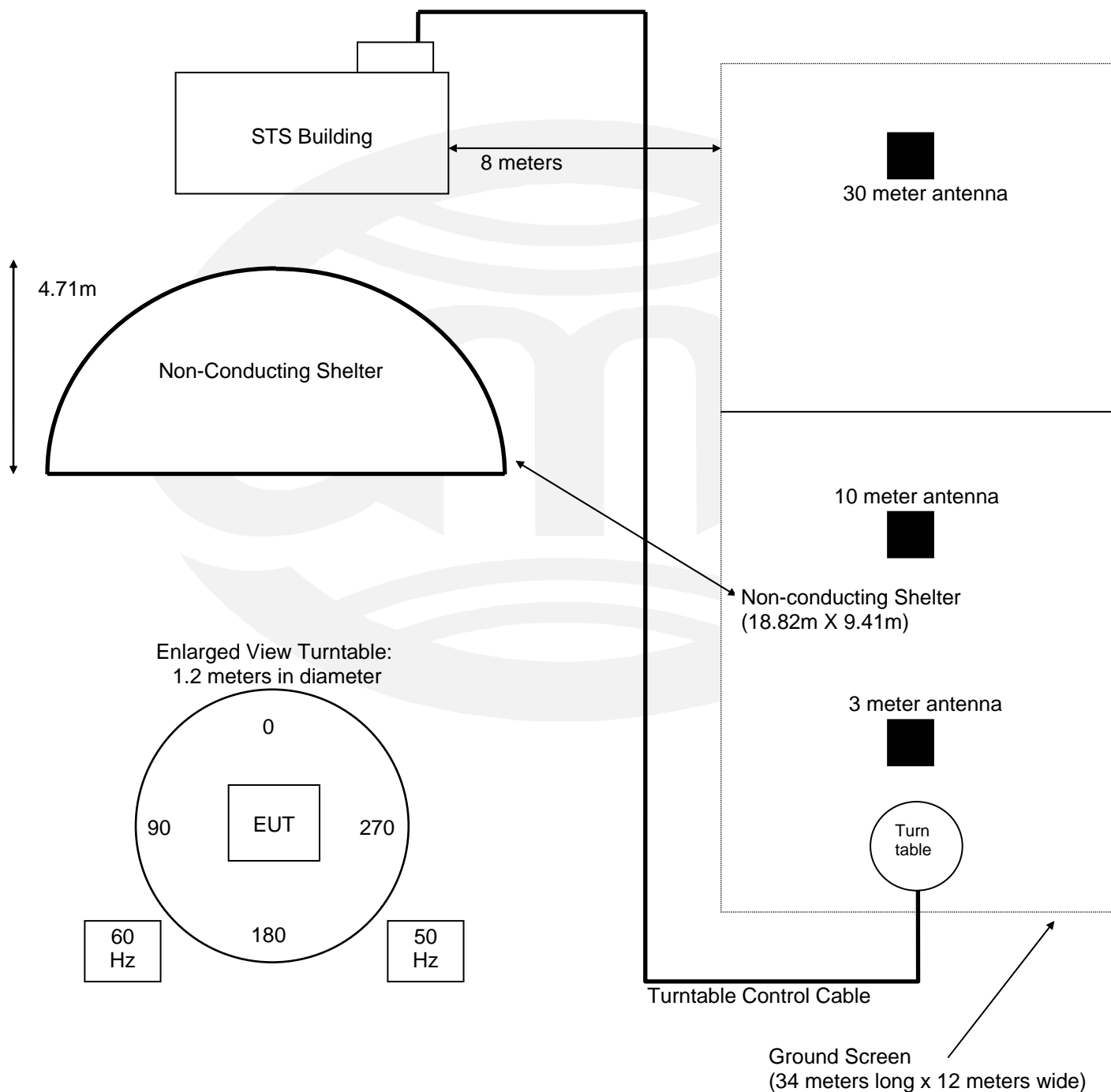
\*Decreases with the logarithm of the frequency

### Test data

Not applicable

### TEST SETUP FOR EMISSIONS TESTING

WILD RIVER LAB  
Small Test Site (STS)



Test-setup photo(s):  
General Field Strength Limits 0.009 – 30 MHz



Test-setup photo(s):  
Radiated Emissions 30 - 8000 MHz



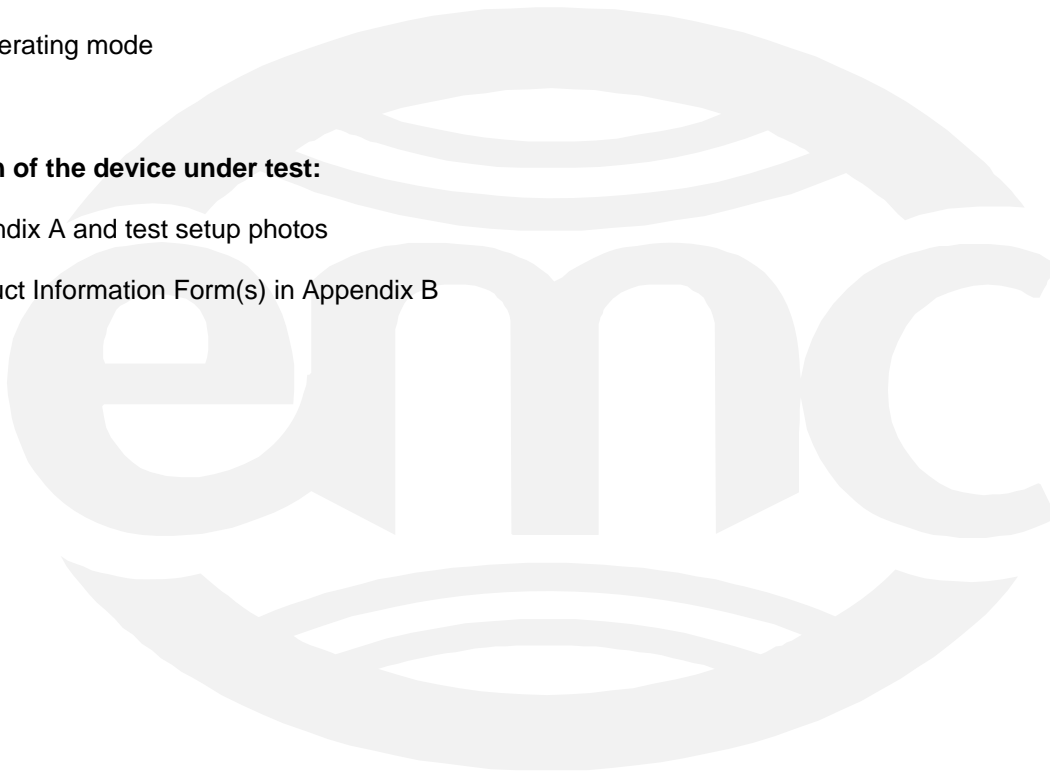
**Equipment Under Test (EUT) Test Operation Mode:**

The device under test was operated under the following conditions during immunity testing :

- Standby
- Test program (H - Pattern)
- Test program (color bar)
- Test program (customer specific)
- Practice operation
- Normal operating mode

**Configuration of the device under test:**

- See Appendix A and test setup photos
- See Product Information Form(s) in Appendix B



**DEVIATIONS FROM STANDARD:**

None.

**GENERAL REMARKS:**

None

Modifications required to pass:

- None
- As indicated on the data sheet(s)

Test Specification Deviations: Additions to or Exclusions from:

- None
- As indicated in the Test Plan

**SUMMARY:**

The requirements according to the technical regulations are

- met and the device under test does fulfill the general approval requirements.
- **not** met and the device under test does **not** fulfill the general approval requirements..

EUT Received Date: 17 March 2010

Condition of EUT: Normal

Testing Start Date: 17 March 2010

Testing End Date: 17 March 2010

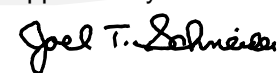
**TÜV SÜD AMERICA INC**

Tested by:



Greg S Jakubowski  
EMC Test Engineer

Approved by:



Joel T Schneider  
Senior EMC Engineer

## Appendix A

### Constructional Data Form







## EMC Test Plan and Constructional Data Form

PLEASE COMPLETE THIS DOCUMENT IN FULL, ENTERING N/A IF THE FIELD IS NOT APPLICABLE. IF TESTING RESULTS IN MODIFICATIONS TO THE EQUIPMENT, PLEASE SUBMIT A REVISED TP/CDF INDICATING THOSE MODIFICATIONS.  
**NOTE: This information will be input into your test report as shown below. Press the F1 key at any time to get HELP for the current field selected.**

Company: Destron Fearing  
 Address: 490 Villaume Ave  
South St. Paul  
55075  
 Contact: Daniel Johnson Position: Product Engineer  
 Phone: 651-552-6586 Fax: 651-455-0413  
 E-mail Address: DJOHNSON@DESTRONFEARI  
NG.COM

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

EUT Description Hand Held RFID Reader  
 EUT Name DTR4  
 Model No.: DTR4 Serial No.: 1005-2226  
 Product Options: none  
 Configurations to be tested: HandHeld stand alone

**Equipment Modification (If applicable, indicate modifications since EUT was last tested. If modifications are made during this testing, submit revised TP/CDF after testing is complete.)**

Modifications since last test: None  
 Modifications made during test: None

**Test Objective(s): Please indicate the tests to be performed, entering the applicable standard(s) where noted.**

- |   |  |
|---|--|
| <input type="checkbox"/> EMC Directive 2004/108/EC (EMC)<br>Std: _____  | <input checked="" type="checkbox"/> FCC: Class <input type="checkbox"/> A <input checked="" type="checkbox"/> B Part <u>15</u> |
| <input type="checkbox"/> Machinery Directive 89/392/EEC (EMC)<br>Std: _____   | <input type="checkbox"/> VCCI: Class <input type="checkbox"/> A <input type="checkbox"/> B                                     |
| <input type="checkbox"/> Medical Device Directive 93/42/EEC (EMC)<br>Std: _____   | <input type="checkbox"/> BSMI: Class <input type="checkbox"/> A <input type="checkbox"/> B (Separate Report)                   |
| <input type="checkbox"/> Vehicle Directive: <input type="checkbox"/> 2001/3/EC (EMC) <input type="checkbox"/> 2004/104/EC (EMC) | <input checked="" type="checkbox"/> Canada: Class <input type="checkbox"/> A <input checked="" type="checkbox"/> B             |
| <input type="checkbox"/> Other Vehicle Std: _____   | <input type="checkbox"/> Australia: Class <input type="checkbox"/> A <input type="checkbox"/> B                                |
| <input type="checkbox"/> FDA Reviewers Guidance for Premarket Notification Submissions (EMC)                                    | <input checked="" type="checkbox"/> Other: <u>EN</u>   |

**Third Party Certification, if applicable (\*Signature on Page 6 Required)**

- |   |   |
|---|---|
| <input type="checkbox"/> Attestation of Conformity (AoC)*   | <input type="checkbox"/> EMC Certification (used with Octagon Mark)*                                  |
| <input type="checkbox"/> Statement of Compliance (previously CoC)*<br>Protection Class (N/A for vehicles) | <input type="checkbox"/> Compliance Document*   |
| (Press F1 when field is selected to show additional information on Protection Class.)                     | <input type="checkbox"/> Class I <input type="checkbox"/> Class II <input type="checkbox"/> Class III |
| <input checked="" type="checkbox"/> FCC / TCB Certification   | <input checked="" type="checkbox"/> Industry Canada / FCB Certification                               |
| <input type="checkbox"/> E-Mark Certification   | <input type="checkbox"/> Taiwan Certification   |



## EMC Test Plan and Constructional Data Form

### Attendance

Test will be:  Attended by the customer  Unattended by the customer

### Failure - Complete this section if testing will not be attended by the customer.

If a failure occurs, TÜV SÜD America should:

- Call contact listed above, if not available then stop testing. (After hrs phone): \_\_\_\_\_
- Continue testing to complete test series.
- Continue testing to define corrective action.
- Stop testing.

### EUT Specifications and Requirements

Length: 19.5 in Width: 3.0 in 7.75 Height: 2.875 in Weight: 1.6 lbs

### 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: 6 VDC (If battery powered, make sure battery life is sufficient to complete testing.)

# of Phases: \_\_\_\_\_

Current (Amps/phase(max)): \_\_\_\_\_ Current (Amps/phase(nominal)): \_\_\_\_\_

Other \_\_\_\_\_

### Other Special Requirements

### Typical Installation and/or Operating Environment

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

### EUT Power Cable

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



## EMC Test Plan and Constructional Data Form

EUT Interface Ports and Cables														
Type	Analog	Digital	During Test		Qty	Shielding		Termination	Connector Type	Port Termination	Length tested (in meters)	Removable	Permanent	
			Active	Passive		Yes	No							Type
<b>EXAMPLE:</b> RS232	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input 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"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>



## EMC Test Plan and Constructional Data Form

**EUT Software.**

Revision Level: Rev 01

Description: Read and Stores RFID tag IDs

**Equipment Under Test (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. Stand alone Battery operated
- 2.
- 3.

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

Description	Model #	Serial #	FCC ID #



## EMC Test Plan and Constructional Data Form

**Support Equipment** -- List and describe all support equipment which is not part of the EUT. (i.e. peripherals, simulators, etc)  
This information is required for FCC & Taiwan testing.

<i>Description</i>	<i>Model #</i>	<i>Serial #</i>	<i>FCC ID #</i>

### Oscillator Frequencies

<i>Manufacturer</i>	<i>Frequency</i>	<i>Derived Frequency</i>	<i>Component # / Location</i>	<i>Description of Use</i>
	54.295 MHz		X1	U1 DECODER BD
	4.294 MHz	134.2KHz	X2	DRIVE CIRCUIT

### Power Supply

<i>Manufacturer</i>	<i>Model #</i>	<i>Serial #</i>	<i>Type</i>
AVT	C3H205210N AU	NA	<input checked="" type="checkbox"/> Switched-mode: (Frequency) _____ <input type="checkbox"/> Linear <input type="checkbox"/> Other: _____
			<input type="checkbox"/> Switched-mode: (Frequency) _____ <input type="checkbox"/> Linear <input type="checkbox"/> Other: _____

### Power Line Filters

<i>Manufacturer</i>	<i>Model #</i>	<i>Location in EUT</i>



## EMC Test Plan and Constructional Data Form

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

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

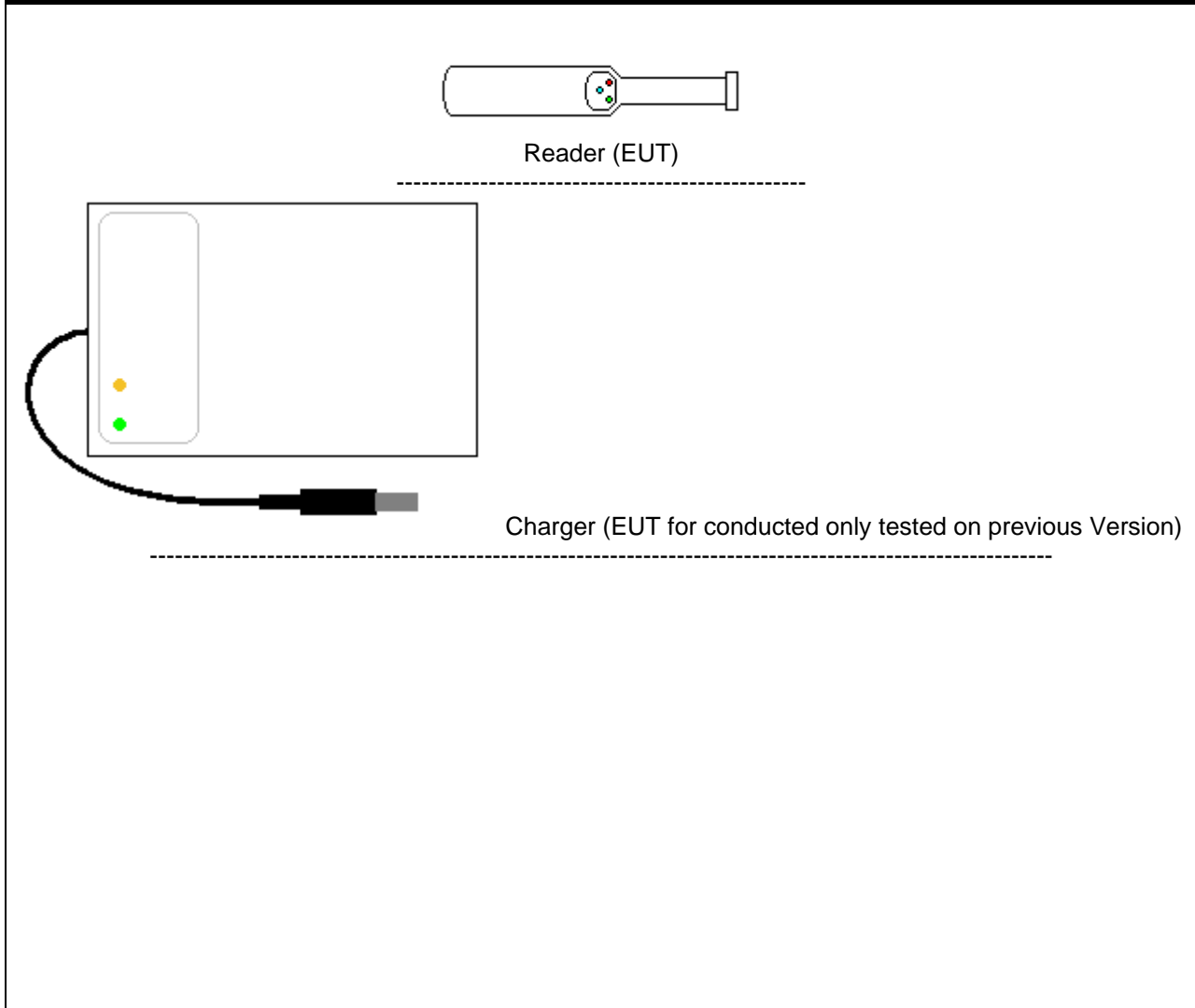
PLEASE ENTER NAMES BELOW (INSERT ELECTRONIC SIGNATURE IF POSSIBLE)

**Authorization (Signature Required if a Third Party Certification is checked on pg 1)**

Daniel Johnson	03-15-10
_____	_____
Customer authorization to perform tests according to this test plan.	Date
Daniel Johnson	03-15-10
_____	_____
Test Plan/CDF Prepared By (please print)	Date

# EMC Block Diagram Form

**System Configuration Block Diagram** -- Provide a line drawing identifying the EUT, simulators, support equipment, I/O cables, power cables, and any other pertinent components to be used during testing. Use a dashed line to separate the equipment in the testing field versus equipment outside testing field.



## Authorization Signatures

Daniel Johnson

03-15-10

Customer authorization to perform tests according to this test plan.

Date

Daniel Johnson

03-15-10

Test Plan/CDF Prepared By (please print)

Date

## Appendix B

### Measurement Protocol





# MEASUREMENT PROTOCOL

## GENERAL INFORMATION

### Test Methodology

Emissions testing is performed according to the procedures in ANSI C63.4-2003 & the article “The Measurement of Occupied Bandwidth” by Industry Canada’s certification bureau

### Measurement Uncertainty

The test system for conducted emissions is defined as the LISN, tuned receiver or spectrum analyzer, and coaxial cable. The test system has a measurement uncertainty of  $\pm 1.8$  dB. The test system for radiated emissions is defined as the antenna, the pre-amplifier, the spectrum analyzer and the coaxial cable. The test system has a measurement uncertainty of  $\pm 4.8$  dB. The equipment comprising the test systems is calibrated on an annual basis.

### Justification

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral into its characteristic impedance or left unterminated. When appropriate, the cables are manually manipulated with respect to each other to obtain maximum emissions from the unit.

### Conducted Emissions

The final level, in  $\text{dB}\mu\text{V}$ , equals the EMI receiver level plus the cable loss and LISN factor.

### Radiated Emissions

The final level, in  $\text{dB}\mu\text{V}/\text{m}$ , equals the reading from the spectrum analyzer (Level  $\text{dB}\mu\text{V}$ ), adding the antenna correction factor and cable loss factor (Factor dB) to it, and subtracting the preamp gain (and duty cycle correction factor, if applicable). This result then has the limit subtracted from it to provide the Delta, which gives the tabular data as shown in the data sheets in Attachment A.

Example:

FREQ (MHz)	LEVEL ( $\text{dB}\mu\text{V}$ )	CABLE/ANT/PREAMP (dB)	FINAL ( $\text{dB}\mu\text{V}/\text{m}$ )	POL/HGT/AZ (m) (deg)	DELTA1
60.80	42.5Qp +	1.2 + 10.9 - 25.5 =	29.1	V 1.0 0.0	-10.9

### Test Equipment

All measurement instrumentation is traceable to the National Institute of Standards and Technology and is calibrated according to internal procedure.

## DETAILS OF TEST PROCEDURES

### Conducted Emissions

Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EUT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection, and a Line Impedance Stabilization Network (LISN), with 50  $\Omega$ /50  $\mu$ H (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimeters above the floor and is positioned 40 centimeters from the vertical ground plane (wall) of the screen room. In some cases, a pre-scan using a spectrum analyzer is initially performed on the units comprising the system under test to locate the highest emissions.

### Radiated Emissions

Radiated emissions in the frequency range of 10 kHz to 30 MHz, including the fundamental transmit signal, are measured using a receiver capable of quasi-peak, peak and average measurements and a magnetic loop antenna. Peak and average measurements below 150 kHz are made with 200 Hz rbw. Peak and average measurements from 150 kHz to 30 MHz are made with 9 kHz rbw. Quasi-peak measurements above 150 kHz are made with 9 kHz/6 dB bandwidth, quasi-peak measurements below 150 kHz are made with 200 Hz/6 dB bandwidth. The transmitter is rotated through 3 orthogonal axes in order to determine the maximum emission levels. If the signal cannot be measured at the specified limit distance, measurements are recorded at multiple distances nearer to the device and the final level mathematically extrapolated. Radiated emissions from the EUT are measured in the frequency range of 30 to 1000 MHz using a spectrum analyzer and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection and measurements above 1000 MHz are made with a 1 MHz/6 dB bandwidth and peak detection. Floor standing equipment is placed directly on the turntable/ground plane. Interface cables that are closer than 40 centimeters to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimeters from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. The antenna is positioned 3, 10 or 30 meters horizontally from the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarizations and the EUT are rotated 360 degrees.

In the frequency range of 9 kHz to 30 MHz, magnetic field measurements may be performed. This method is applicable for radiated radio noise from all units, cables, power cords, and interconnect cabling or wiring. A calibrated loop antenna as specified in 4.1.5.1 shall be positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. For certain applications, the loop antenna may also need to be positioned horizontally at the specified distance from the EUT. The center of the loop shall be 1 m above the ground.