



Test Report Number: P2271229.01 FCC

Prübericht Nr.

Test Report Summary

Applicant: Auftraggeber	Dade Behring, Inc. Route 896, Bldg. 500 Newark, DE 19714	Tel: (302) 631-7410 Fax: (302) 631-9716 e-mail: Thomas_E._Kimble@dadebehring.com	Contact: Thomas Kimble
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Type of Equipment: Gegenstand der Prüfung	Programmable Identification Transponder
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Model Number: Bezeichnung:	StreamLab	Trademark: Ursprungszeichen	DADE BEHRING
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Standards: Prüfgrundlage	See Below	Date Of Testing:	19-21JUN02, & 17JUL02
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Standard Number	Description	Limits	Minimum Acceptable Performance Criteria	Summary Result
FCC Part 15 Subpart C	Measurements for intentional radiator as required by §§15.31(e), 15.207, 15. 209,	§§ 15.207(a), 15.209(a)	NA	Complies

NOTE: All data in this report is covered by the NVLAP accreditation.

Place of Test: Prüfort	TUV Rheinland of North America, Inc. 12 Commerce Road Newtown, CT 06470 USA E-mail: info-new@tuv.com Web: http://www.tuv.com Phone: (203) 426-0888 Fax: (203) 429-4009	 NVLAP LAB CODE 200111- 0
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Test Result: Prüfergebnis	Unit presented for testing complied with criteria shown above. Additional Information is contained in the following pages.
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Tested By: Der Sachverständige	Mark Ryan	Checked By: geprüft	Bruce Fagley
30AUG2002, Date, Signature Datum, Unterschrift		30AUG2002, Date, Signature Datum, Unterschrift	

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2. General

2.1 Measuring Equipment Used

Description	Asset or Serial Number	Calibrated	Cal. Period
EMCO 3109 Biconical Antenna	2754	9/01	1 yr.
EMCO 3146 Log Periodic Antenna	2548	9/01	1 yr.
Schwarzbeck VHBB 9124	9124-0205/93	9/01	1 yr.
HP 8593E Spectrum Analyzer	3410A01090	01/02	1 yr
HP 8546A EMC Receiver	3325A00134	01/02	1 yr.
NLSK 8126A LISN	8126278	01/02	1yr.
Schwarzbeck FMZL 1516 Loop Antenna .01 - 30 Mhz	151600/94	12/01	1yr.
Marconi 2031 Signal Generator	Ser. 119571	8/01	1yr.

2.2 Traceability

All measurement equipment calibrations are traceable to NIST or where calibration is performed outside the United States, to equivalent nationally recognized standards organizations

2.3 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.4 Measurement Uncertainty

<input type="checkbox"/>	The estimated combined standard uncertainty for ESD immunity measurements is $\pm 4.1\%$.
<input type="checkbox"/>	The estimated combined standard uncertainty for radiated immunity measurements is $\pm 2.7\text{dB}$.
<input type="checkbox"/>	The estimated combined standard uncertainty for EFT fast transient immunity measurements is $\pm 5.8\%$.
<input type="checkbox"/>	The estimated combined standard uncertainty for surge immunity measurements is $\pm 8.0\%$.
<input type="checkbox"/>	The estimated combined standard uncertainty for conducted immunity measurements is $\pm 1.5\text{dB}$.
<input type="checkbox"/>	The estimated combined standard uncertainty for power frequency magnetic field immunity measurements is $\pm 0.58\%$.
<input type="checkbox"/>	The estimated combined standard uncertainty for voltage variation and interruption measurements is $\pm 4.3\%$.
<input type="checkbox"/>	The estimated combined standard uncertainty for damped oscillatory wave immunity measurements is $\pm 8.7\%$.
<input checked="" type="checkbox"/>	The estimated combined standard uncertainty for radiated emissions measurements is $\pm 1.6\text{ dB}$.
<input checked="" type="checkbox"/>	The estimated combined standard uncertainty for conducted emissions measurements is $\pm 1.2\text{dB}$.

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2.5 Location of original data

The original copies of all test data taken during actual testing were attached at Appendix B of this report and delivered to the applicant. A copy has been retained in the TUV Rheinland file for certification follow-up purposes.

2.6 Status of facility used for testing

The TUV Rheinland of North America EMC test facility located at 12 Commerce Road, Newtown, CT, USA is listed on the US Federal Communications Commission list of facilities approved to perform measurements and has been audited and found acceptable by TUV Rheinland GmbH, Cologne, Germany, a competent body in the European Union.

2.7 References and related documents

Standard	Tests according to FCC Part 15	Test Required	
15.35(b), 15.209(f)	Limit on peak emissions	Y	20 dB above average limit when average detector is used. Use with radiated measurements below.
15.35(c)	Provisions if pulsed operation is employed	N	if used, method of calculation needs to be included in report
15.31(e)	frequency and field strength variation as a function of 85%-115% power supply variation	Y	
15.31(f)	considerations for measurements at distances other than specified	General Info	
15.33	Information regarding frequency range to be investigated.	General Info	Refer to 15.33(a)(1) for measurement of intentional radiator and to 15.33(b) if system contains a digital device
15.205	Restricted bands	General Info	Restricted band from 0.090-0.110 MHz (90-110 kHz). Emissions within restricted band must comply with 15.209.
15.207(a)	Conducted emissions	Y	250 microvolts 0.45-30 MHz; also see 15.207(b)
15.209(a)	Radiated field strength	Y	OATS w/loop antenna < 30 MHz- Extrapolate to limit distance specified; normal antennas > 30 MHz regular limits/distances
15.209(c)	Field strength of unwanted emissions (i.e. harmonics and spurious emissions) may not exceed the field strength of the fundamental	General Info	
15.209(d)	Detector function	General Info	Measurements at 0.110-0.490 MHz with average detector, others with QP
MP-5	Measurement procedure		
OET B62	Information on approval of low power transmitter devices		

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2.8 Software and Templates

List of Software and Templates used for EMC Testing

✓	Description	Type *	Version	File Name	Date	Author
<input type="checkbox"/>	95/54/EC Broad Band measurement	ET	19990309	Car-Broad.xls	09-Mar-99	Baldamus
<input type="checkbox"/>	95/54/EC Narrow Band measurement	ET	19990309	Car-Narr.xls	09-Mar-99	Baldamus
<input type="checkbox"/>	FCC 15.107(b) Class A conducted emissions	ET	19981112	CEFCC15A.xls	12-Nov-98	Baldamus
<input type="checkbox"/>	FCC 15.107(a) Class B conducted emissions	ET	19981112	CEFCC15B.xls	12-Nov-98	Baldamus
<input type="checkbox"/>	FCC 15.109(b) Class A radiated emissions	ET	19971023	REFCC15B.xls	23-Oct-97	Baldamus
<input type="checkbox"/>	FCC 15.109(a) Class B radiated emissions	ET	19981112	REFCC15B.xls	12-Nov-98	Baldamus
<input checked="" type="checkbox"/>	FCC 15.207(a) Conducted emissions	ET	19981112	CEFCC15A.xls	12-Nov-98	Baldamus
<input checked="" type="checkbox"/>	FCC 15.209(a) Radiated emissions	ET	19971023	REFCC15B.xls	23-Oct-97	Baldamus
<input type="checkbox"/>	EN55103, Conducted emissions for Signal & Control Ports, DC Power Ports, Environment E4	ET	19971023	CE103IO.xls	23-Oct-97	Baldamus
<input type="checkbox"/>	EN55103, Conducted emissions, as above except for use with Current Clamp	ET	19971023	CE_Clamp103-l.xls	23-Oct-97	Baldamus
<input type="checkbox"/>	EN55022 / FCC 15.107(e) Class A conducted emissions	ET	19981112	CE22_A.xls	12-Nov-98	Baldamus
<input type="checkbox"/>	EN55022 / FCC 15.107(e) Class B conducted emissions	ET	19981112	CE22_B.xls	12-Nov-98	Baldamus
<input type="checkbox"/>	EN55022A Conducted emissions for Telecom Class A	ET	20000531	CE22A_TELCO.xls	21-May-00	Baldamus
<input type="checkbox"/>	EN55022B Conducted emissions for Telecom Class B	ET	20000803	CE22B_TELCO.xls	03-Aug-00	Baldamus
<input type="checkbox"/>	EN55011 Class A conducted emissions Group 1	ET	19971023	CE11_1A.xls	23-Oct-97	Baldamus
<input type="checkbox"/>	EN55011 Class A conducted emissions Group 2	ET	19971112	CE11_2A.xls	12-Nov-97	Baldamus
<input type="checkbox"/>	EN55011 Class B conducted emissions Group1	ET	19971112	CE11_1B.xls	12-Nov-97	Baldamus
<input type="checkbox"/>	EN55011 Class B conducted emissions Group 2	ET	19971112	CE11_2B.xls	12-Nov-97	Baldamus
<input type="checkbox"/>	EN55014 Conducted emissions	ET	19981112	CE14-1.xls	12-Nov-98	Baldamus
<input type="checkbox"/>	EN55103-1 Magnetic Fields Emissions	ET	20000804	MagF55103	04-Aug-00	Baldamus
<input type="checkbox"/>	EN55014 Disturbance Power Measurements for Household and Similar Equipments	ET	19971112	DP14-1.xls	12-Nov-98	Baldamus
<input type="checkbox"/>	CISPR12 Radiated Emissions	ET	19971112	CISPR12.xls	12-Nov-98	Baldamus
<input type="checkbox"/>	EN55022 / FCC 17.109(g) Class A Radiated Emissions	ET	19981112	RE22_1A.xls	12-Nov-98	Baldamus
<input type="checkbox"/>	EN55022 / FCC 17.109(g) Class B Radiated Emissions	ET	19990915	RE22_1B.xls	15-Sep-99	Baldamus
<input type="checkbox"/>	EN55011 Class A Group 1 Radiated Emissions test	ET	19981112	RE11_1A.xls	12-Nov-98	Baldamus
<input type="checkbox"/>	EN55011 Class B Group 1 Radiated Emissions test	ET	19981112	RE11_1B.xls	12-Nov-98	Baldamus
<input type="checkbox"/>	EN55011 Class A Group 2 Radiated Emissions test	ET	19981112	RE11_2A.xls	12-Nov-98	Baldamus
<input type="checkbox"/>	EN55011 Class B Group 2 Radiated Emissions test	ET	19981112	RE11_2B.xls	12-Nov-98	Baldamus
<input type="checkbox"/>	IEC 1000-4-3 Radiated immunity test	V	020322V/H3	RI_PLAY1.vee	22-Mar-02	Gaudette
<input type="checkbox"/>	IEC 1000-4-3 Radiated immunity field setup	V	19990906	RI_CAL1.vee	06-Aug-99	Dwyer
<input type="checkbox"/>	IEC 1000-4-4 Burst (Fast Transient) test	S	Ver 2.02	WIN651.exe	04-Jan-94	Schaffner
<input type="checkbox"/>	IEC 1000-4-5 Surge test	S	Ver 2.02	WIN600.exe	17-Aug-94	Schaffner
<input type="checkbox"/>	IEC 1000-4-6 Conducted immunity test	V	19990915	CI-PLAY1.vee	15-Sep-99	Dwyer
<input type="checkbox"/>	IEC 1000-4-6 Conducted immunity test field setup	V	19980220	CI_CAL.vee	20-Feb-98	Dwyer
<input type="checkbox"/>	IEC 1000-4-11 Voltage dip/short Interruptions	S	Ver 4.00	WIN2050.exe	20-Aug-98	Schaffner
<input type="checkbox"/>	IEC 61000-3-2 Harmonics	Vol	Ver.3.01.03	iec1000-3	29-Mar-01	Voltech
<input type="checkbox"/>	IEC 61000-3-3 Flicker	Vol	Ver.3.01.03	iec1000-3	29-Mar-01	Voltech

* ET = Excel Template, V = Agilent (HP) Vee Program, S= Schaffner program, Vol = Voltech, H= Haefely Trench

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2.9 EMC Procedure References

TUV RHEINLAND EMC PROCEDURE REFERENCES

Document reference	Description	Rev.	Date
QAMANUAL.doc	Quality Assurance Manual, TUV Rheinland of North America, Inc.	K	Dec 15, 1998
QP110901	Use of NVLAP Logo	1	Feb 2000
QP110902	Measurement Uncertainty	1	Feb 2000
QP110903	Assurance of Integrity and Security of Computers, Software, and Data	1	Feb 2000
QP110945	Measuring equipment warm-up and setup	1	June 2000
QP110946.doc	In house checks of measuring equipment	1	June 2000
QF110946.a01	Record of Equipment Calibration, Check, or Maintenance Activity	1	June 2000
QF110946.a02	Report of In-House Equipment Calibration	1	June 2000
Electro-Static Discharge.doc	Electro-Static Discharge EN61000-4-2	1	02/14/2000
Radiated Immunity.doc	Radiated Immunity EN61000-4-3	1	02/14/2000
Fast Transient.doc	Fast Transient EN61000-4-4	1	02/14/2000
Surge .doc	Surge EN61000-4-5	1	02/14/2000
Conducted Immunity.doc	Conducted Immunity EN61000-4-6	1	02/14/2000
Power Frequency Magnetic field.doc	Power Frequency Magnetic Field EN61000-4-8	1	04/01/2001
Voltage Dips and Interruptions.doc	Voltage Dips and Variations EN61000-4-11	1	02/14/2000
ANSI C63.4: 1992	Emissions Measurement Procedure for FCC Tests	1992	1992
Emissions.doc	Conducted and radiated emissions	1	04/02/1997
Flicker.doc	Flicker EN61000-3-3	1	04/014/2000
Harmonic Current.doc	Harmonic Current EN61000-3-2	1	04/01/2001

3. Test Plan

Refer to the test plan at appendix A

4. Description of Equipment Tested

4.1 General Description of Equipment

The StreamLab Programmable Identification Transponder is used to identify laboratory samples using a small identification device placed in the sample container.

5. Equipment Specifications

5.1 Technical Data

Type:	Programmable Identification Transponder
Models:	StreamLab
Serial No. of Unit Tested:	Test sample not serialized
Supply Voltage:	DC 24 V to transponder supplied by battery for test.
Protection Class:	SELV
Test Sample Received:	Jun 19, 2002
Condition Received in:	Operational

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5.2 Physical Data

Dimensions of equipment : PCB -11cm (l) x 6.7 cm (w) x 2 cm (h)
Coils - 5.5 cm (l) x 3 cm (w) x 1.5 cm (h)
Cable Lengths: Refer to configuration diagram in section 9.2 of this document
Weight: 0.1 kg (without enclosure)

6. Configuration and Mode of Operation

6.1 Configuration

The EUT was tested in two physical configurations;
Test configuration #1; The EUT is in a standalone arrangement.
Test configuration #2; The EUT is placed in a portion of the actual machine in which it will be used.

The electrical configuration is shown in the diagram at Appendix A.

6.2 Mode of Operation

The EUT was powered with two DC 12 V batteries during the tests and operated continuously.

7. Pass/Fail Criteria

7.1 Pass Criteria

The EUT is considered to pass a test or standard if the measured level is less than or equal to the applicable limit.

7.2 Fail Criteria

The EUT is considered to fail a test or standard if the measured level is greater than the applicable limit.

The details of the performance criteria used for immunity assessment are contained in the test plan at Appendix A

8. Measurements

8.1 General

The data in this report represents the worst-case emissions. The cables and equipment configuration were arranged and/or manipulated to achieve maximum measurements consistent with the requirements of the standards.

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8.2 Radiated H-field

8.2.1 Test Basis

FCC Part 15, Paragraph 15.209(a)

8.2.2 Test Specifications

15.209(a) - 19.2 μ V/m (25.7dB μ V) at 125 kHz

8.2.3 Deviations from Standard Test Procedures

None.

8.2.4 Test Procedure

Procedures specified in ANSI C63.4 were followed. For 100 kHz- 30 MHz radiated emissions testing was first performed at a distance of 3 meters in the semi-anechoic chamber. Emissions identified in the semi-anechoic chamber were re-measured on the Open Area Test Site (OATS) at 3, 6, 9 and 12 meters. Resulting measurements were used to extrapolate the results to 300-meter limits.

The measurements from 100 kHz to 30 MHz were performed with a Loop antenna.

8.2.5 Calculation

The operating frequency of 125kHz was measured at 3m, 6m, 9m, and 12m using the formula: Measured Level (dB μ V) + Cable Loss (dB) + Antenna Factor dB = Field Strength (dB μ V/m).

These four points were plotted using logarithmic graph, and determined the slope of the line to be:

$y=83.465e^{0.0558X}$. Where X is distance in meters, and e is the base of natural logs (approx. = 2.71828)
Using this formula, the radiated emission can be extrapolated to 300m as 25.7 dB μ V/m.

8.2.6 Test Results

All final radiated emissions measurements were below (in compliance) with the limits. Complete results of the radiated emissions measurements are shown in the tables and plots at Appendix B

8.2.7 Maximum Emission

The maximum radiated emission from the StreamLab (extrapolated to 300m) was 1 μ V/m AVG at the frequency of 125 kHz. The equation for field strength limit is; $2400/F(\text{kHz})$

The limit at 300m is calculated to be; $2400/125 = 19.2\mu\text{V}/\text{m}$ (25.7dB μ V/m), per FCC 15.209(a)

The margin with reference to the limit was 18.2 μ V.

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8.2.8 Radiated Emissions

8.2.9 Test Basis

FCC Part 15 Per Section 15.209(a)

8.2.10 Test Specifications

FCC 15.209(a) for frequencies from 30MHz to above 960MHz

8.2.11 Deviations from Standard Test Procedures

None.

8.2.12 Test Procedure

Procedures specified in ANSI C63.4 were followed. For 30 MHz-5 GHz radiated emissions testing was first performed at a distance of 3 meters in the semi-anechoic chamber. Emissions identified in the semi-anechoic chamber were re-measured on the Open Area Test Site (OATS) at 3 meters.

The measurements from 30 MHz to 300 MHz were performed with a biconical antenna. From 300 MHz to 1 GHz measurements were performed with a log periodic antenna.

8.2.13 Calculation

Measured Level (dB μ V) + Cable Loss (dB) + Antenna Factor dB = Field Strength (dB μ V/m)

8.2.14 Test Results

All final radiated emissions measurements were below (in compliance) with the limits. Complete results of the radiated emissions measurements are shown in the tables and plots at Appendix B

8.2.15 Maximum Emission

The maximum radiated emission observed from the StreamLab was 33.4 dB μ V/m QP at 48.0MHz. The margin with reference to the limit was 6.6 dB.

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8.3 Conducted Emissions

8.3.1 Test Basis

FCC Part 15 Per Section 15.207(a)

8.3.2 Test Specifications

15.207(a) 250 μ V (48dB μ V) 0.45-30 MHz

8.3.3 Deviations from Standard Test Procedures

Since a simulator was used for the testing due to the large size of the complete StreamLab system, power was provided to the transponder from two 12 V batteries. In the complete system power will be provided by an internal power subsystem, which is supplied power from the AC mains. In this case, since the investigation is for the transponder, conducted emissions were measured on the DC power leads between the batteries and transponder.

8.3.4 Test Procedure

Procedures specified in ANSI C63.4 were followed. Conducted emissions measurements were performed in the shielded room. Measurements were made on each conductor.

8.3.5 Calculation

Measured Level (dB μ V) + Cable Loss (dB) = Volts (dB μ V)

8.3.6 Test Results

Conducted emissions were below (in compliance) with the limit. Complete results of the conducted emissions measurements are shown in the tables and plots at Appendix B.

8.3.7 Maximum Emission

The maximum conducted emission observed from the StreamLab was 47.89 dB μ V QP at 486kHz. The margin with reference to the limit was 0.11 dB.

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APPENDIX A: TEST PLAN

*Medical Telemetry System
Dade Behring, Inc.
Model: StreamLab*

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9. TEST PLAN SUMMARY

Product Description: Medical Telemetry System

Models: StreamLab

Applicant: Dade Behring, Inc.
Route 896, Bldg. 500
Newark, DE 19714
Tel: (302) 631-7410 Thomas Kimble
Fax: (302) 631-9716

9.1 EMISSION (FCC)

Test to:	Limit Value		Test Procedure
FCC Part 15	Radiated Emissions	Sections 15.109(a)	Part 15 and ANSI C63.4: 1992
FCC Part 15	Conducted Emissions	Sections 15.107(a)	Part 15 and ANSI C63.4: 1992
FCC Part 15	Antenna power conduction	Section 15.111(a)	Part 15 and ANSI C63.4: 1992

9.2 General:

Equipment type description: Programmable Identification Transponder

Models: StreamLab

EUT Dimensions: 8 cm (h) x 18.7 cm (w) x 229.5 cm (d)

(d) EUT Weight: 2.1 kg

Voltage and frequency
of supply during test: DC 24 V

Operating conditions and hardware configuration of EUT during test:

Powered and operating.

The EUT was tested in two physical configurations;

Test configuration #1; The EUT is in a standalone arrangement.

Test configuration #2; The EUT is placed in a portion of the actual machine in which it will be used.

The electrical configuration is shown in the diagram at Appendix A.

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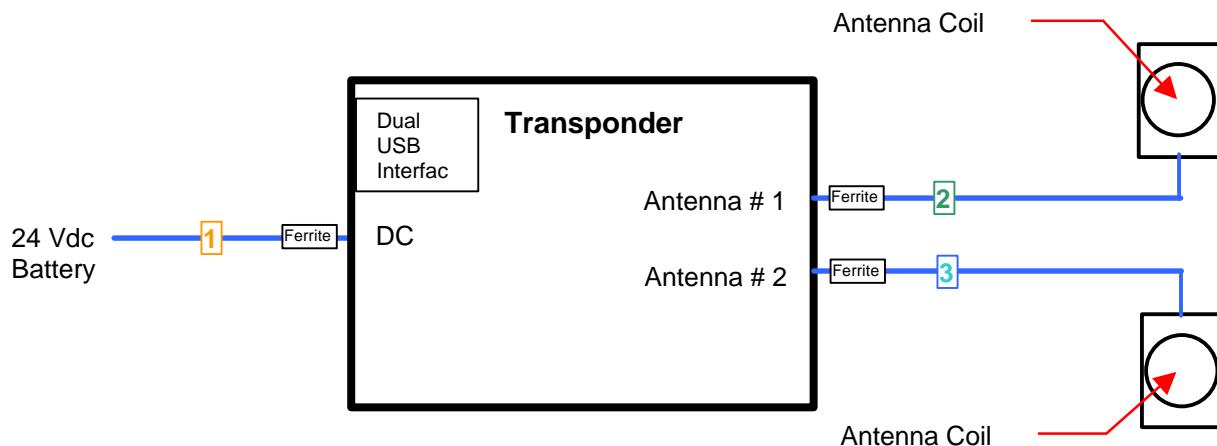
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DIAGRAM OF EQUIPMENT CONFIGURATION FOR TESTING

Configuration:

Shown in the following configuration diagram.

Photographs of each setup shall be made and documented at appendix C.
Emission tests setup shall show the worst-case configuration.



Cable Number	Description	Length	Shielded
1	DC 24 V power cable	100 cm	Yes
2	Antenna Cable	75 cm	Yes
3	Antenna Cable	75 cm	Yes

Note: the manufacturer provided all cables.

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