



Testing and certification of, consultancy and
research concerning, electronic and electric
appliances, systems, installations and
telecommunication systems

**TEST REPORT CONCERNING THE COMPLIANCE OF
A MICROWAVE READER FOR HANDSFREE
IDENTIFICATION UP TO 4 METERS,
BRAND nedap,
MODEL TRANSIT ENTRY,
WITH 47 CFR PART 15 (2006-08-14).**

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Test specification(s): 47 CFR Part 15 (2006-08-14)
Description of EUT: Microwave reader for handsfree identification up to 4 m
Manufacturer: N.V. Nederlandsche Apparatenfabriek "Nedap"
Brand mark: nedap
Model: TRANSIT Entry
FCC ID: CGD-TRANSITENTRY

MEASUREMENT/TECHNICAL REPORT

Nedap N.V.

Model : TRANSIT Entry

FCC ID: CGD-TRANSITENTRY

October 4, 2007

This report concerns:	Original grant/certification	Class 2 change	Verification
Equipment type:	Microwave reader for handsfree identification up to 4 m		
Deferred grant requested per 47 CFR 0.457(d)(1)(ii) ?	Yes	No	n.a.
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The data taken for this test and report herein was done in accordance with 47 CFR Part 15 and the measurement procedures of ANSI C63.4-2003. TNO Electronic Products & Services (EPS) B.V. at Niekerk, The Netherlands, certifies that the data is accurate and contains a true representation of the emission profile of the Equipment Under Test (EUT) on the date of the test as noted in the test report. I have reviewed the test report and find it to be an accurate description of the test(s) performed and the EUT so tested.

Date: October 4, 2007

Signature:

H.J. Pieters
Project Manager TNO Electronic Products & Services (EPS) B.V.





Test specification(s): 47 CFR Part 15 (2006-08-14)
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Manufacturer: N.V. Nederlandsche Apparatenfabriek "Nedap"
Brand mark: nedap
Model: TRANSIT Entry
FCC ID: CGD-TRANSITENTRY

Description of test item

Test item : Microwave reader for handfree identification up to 4 meters
Manufacturer : N.V. Nederlandsche Apparatenfabriek "Nedap"
Brand : nedap
Model : TRANSIT Entry
Serial number(s) : Not available
Revision : Not available
Receipt date : September 25, 2007

Applicant information

Applicant's representative : Mr. J.A.M. Hulshof
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Test(s) performed

Location : Niekerk
Test(s) started : September 26, 2007
Test(s) completed : September 29, 2007
Purpose of test(s) : Equipment Authorisation (Certification).
Test specification(s) : 47 CFR Part 15 (2006-08-14)
Test engineers : M. Edwards van Muyen
O.H. Hoekstra
Report written by : O.H. Hoekstra
Report date : October 4, 2007

This report is in conformity with NEN-EN-ISO/IEC 17025: 2005.

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The test results relate only to the item(s) tested.



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1 General information.

1.1 Product description.

1.1.1 Introduction.

The EUT is a microwave reader for handsfree identification upto 4 m of 2.4 GHz tags. It also contains inductive proximity card readers which are intended for the detection of 13.56 MHz and/or 121 kHz inductive cards.

1.2 Related submittal(s) and/or Grant(s).

Not applicable.

1.3 Tested system details.

Details and an overview of the system and all of its components, as it has been tested, may be found below.

EUT	:	Microwave reader for handsfree identification upto 4 m
Manufacturer	:	N.V. Nederlandsche Apparatenfabriek "NEDAP"
Brand	:	nedap
Model	:	TRANSIT Entry
Serial number	:	--
Voltage input rating	:	115 VAC (24 VDC via 115VAC / 24 VDC adaptor)
Current input rating	:	--
Frequency band 1 (section 15.209)	:	120 - 125 kHz (Optional MTR module)
Antenna	:	internal
Frequency band 2 (section 15.225)	:	13.110 - 14.010 MHz (Optional MTR module)
Antenna	:	internal
Frequency band 3 (section 15.245)	:	2435 MHz - 2465 MHz
Antenna	:	internal
Remarks	:	none
Auxiliary equipment 1	:	AC/DC power adapter
Manufacturer	:	DEUTRONIC
Brand	:	DEUTRONIC
Model	:	ESCS30-24
Serial number	:	n.a.
Voltage input rating	:	100-240 VAC, 50-60 Hz
Current input rating	:	800 mA max.
Voltage output rating	:	+24 VDC
Current output rating	:	1.25 A
Remarks	:	-



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1.3.1 Optional interface boards.

Optional interface board 1 : Ethernet (TCP/IP) interface board
 Manufacturer : N.V. Nederlandsche Apparatenfabriek "NEDAP"
 Brand : nedap
 Part number : 7817940

Optional interface board 2 : MTR Module (Multi Technology Reader Module)
 Manufacturer : N.V. Nederlandsche Apparatenfabriek "NEDAP"
 Brand : nedap
 Part number : 7816650

Optional interface board 3 : HIB (HID Interface Board)
 Manufacturer : N.V. Nederlandsche Apparatenfabriek "NEDAP"
 Brand : nedap
 Part number : 7819102

1.3.2 Tested configurations.

Configuration	Ethernet interface board	MTR module	HIB (HID interface board)	Remarks
1	yes	no	no	With Ethernet cable
2	no	yes	no	None
3	no	no	yes	The TX/RX connection of the HIB is not used in this application

1.3.3 Description of input and output ports.

Number	Ports	From	To	Shielding	Remarks
1	AC mains	AC mains	AE1	yes / no	None
2	DC power input port	AE1	EUT	yes / no	None
3	Serial port	EUT	--	yes / no	None
4	Wiegand, Magstripe, Barcode	EUT	AE	yes / no	Maximum cable length 150 meters (500 feet)
5	Ethernet	EUT	AE	yes / no	Connected to Ethernet (TCP/IP) interface board

AE = Auxiliary equipment

1.4 Test methodology.

The test methodology used is based on the requirements of 47 CFR Part 15 (2006-08-14), sections 15.207, 15.209, 15.225 and 15.245.

The test methods, which have been used, are based on ANSI C63.4: 2003.

Radiated emission tests above 30 MHz were performed at a measurement distance of 3 meters. Radiated emission tests below 30 MHz were performed at a measurement distance of 3 meters and if necessary at 10 and 30 meters. To calculate the field strength level from these results to the appropriate distance at which the limit is specified, the computation method in appendix 1 has been applied.



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1.5 Test facility.

The Federal Communications Commission has reviewed the technical characteristics of the test facilities at TNO Electronic Products & Services (EPS) B.V., located in Niekerk, 9822 TL Smidshornerweg 18, The Netherlands, and has found these test facilities to be in compliance with the requirements of 47 CFR Part 2, section 2.948.

The description of the test facilities has been filed at the Office of the Federal Communications Commission under registration number 90828. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

The list of all public test facilities is available on the Internet at <http://www.fcc.gov>.

1.6 Test conditions.

Normal test conditions:

Temperature (*)	: +15°C to +35°C
Relative humidity(*)	: 20 % to 75 %
Supply voltage	: not applicable, the equipment under test is battery operated (see clause 1.3)
Air pressure	: 950 – 1050 hPa

* When it was impracticable to carry out the tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests are stated separately.



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2 System test configuration.

2.1 Justification.

The justification and manipulation of cables and equipment in order to simulate a worst-case behavior of the test setup has been carried out as prescribed in ANSI C63.4: 2003.

2.2 EUT mode of operation.

The EUT has been tested in active mode, i.e. the EUT is ready to detect a card or a tag.

All test set ups have been documented in pictures in the documentation package which will be submitted to the Commission

2.3 Special accessories.

No special accessories are used and/or needed to achieve compliance with the applicable sections of 47 CFR Part 15.

2.4 Equipment modifications.

No modifications have been made to the equipment in order to achieve compliance with the appropriate sections of 47 CFR Part 15.

2.5 Block diagram of the EUT.

The block diagram is available in the technical documentation package, which will be submitted to the Commission.

2.6 Schematics of the EUT.

The schematics are available in the technical documentation package, which will be submitted to the Commission.

2.7 Part list of the EUT.

The part list is available in the technical documentation package, which will be submitted to the Commission.



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3 Radiated emission data.

3.1 Radiated field strength measurements (frequency range of 0.009-30 MHz, H-field).

Frequency	Measurement results dB μ V		Detector	Antenna factor dB	Cable loss dB	Calculated results dB(μ V)/m	Limits Part 15.209 & 15.225 dB(μ V)/m
	3 meters	10 meters					
9.0 – 120.0 kHz	n.i.	n.i.	QP/AV	-	-	-	-
120.0 kHz	41.1	13.0	AV	+20.1	1	-17.8	25.1 (300 m)
240.0 kHz	20.5	n.i.	AV	+20.0	1	-38.5	19.0 (300 m)
360.0 kHz	< 15.0	< 15.0	AV	+20.0	1	< -44.0	16.5 (300 m)
360.0- 1705 kHz	n.i.	n.i.	QP/AV	-	-	-	-
1.705 – 13.56 MHz	n.i.	n.i.	QP	-	-	-	-
13.56 MHz	31.2	13.0	QP	+19.7	1	+11.9	84.0 (30m)
27.12 MHz	< 2.0	n.i.	QP	-	-	-	-
27.12 – 30.0 MHz	n.i.	n.i.	QP	-	-	-	-


Table 1
Radiated emissions of the EUT, Average and Quasi peak values.

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15, sections 15.205, 15.209, 15.225 and 15.245, are depicted in table 1. Measurement results are readings from the measuring device in dB μ V. Using the appropriate antenna factor and cable losses, these readings are expressed directly into dB (μ V)/m and are recalculated at distances as appropriate.

Notes:

1. (AV) average detector
2. (QP) quasi peak detector
3. (PK) peak detector
4. The computation method for calculation of the field strength at different distances can be found in Appendix 1. The extrapolation factor of 40 dB/decade was used (80 dB for 3 to 300 m).
5. n.i. indicates that no field strength values related to the EUT could be measured for the listed frequency or for the listed frequency range.
6. << indicates that field strength values of radiated emissions are more than 20 dB below the applicable limit.
7. The reported field strength values are the worst-case values at the indicated frequency, obtained by rotation of the EUT and orientation of the antenna.

Test engineer

Signature : 

Name : O.H. Hoekstra

Date : October 4, 2007



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Frequency	Measurement results dB μ V		Detector	Antenna factor dB	Cable loss dB	Calculated results dB(μ V)/m	Limits Part 15.209 & 15.225 dB(μ V)/m
	3 meters	10 meters					
9.0 – 90.0 kHz	n.i.	n.i.	PK	-	-	-	-
120.0 kHz	41.1	13.0	PK	+20.1	1	-17.8	45.1 (300 m)
240.0 kHz	20.5	n.i.	PK	+20.0	1	-38.5	39.0 (300 m)
360.0 kHz	< 15.0	< 15.0	PK	+20.0	1	< -44.0	36.5 (300 m)
360.0- 490 kHz	n.i.	n.i.	PK	-	-	-	-


Table 2
Radiated emissions of the EUT, Peak values.

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15, sections 15.205, 15.209, 15.225 and 15.245 are depicted in table 2. Measurement results are readings from the measuring device in dB μ V. Using the appropriate antenna factor and cable losses, these readings are expressed directly into dB (μ V)/m and are recalculated at distances as appropriate.

Notes:

8. (PK) peak detector
9. Only for frequencies where average radiated emission measurements are specified.
10. The computation method for calculation of the field strength at different distances can be found in Appendix 1. The extrapolation factor of 40 dB/decade was used (80 dB for 3 to 300 m).
11. n.i. indicates that no field strength values related to the EUT could be measured for the listed frequency or for the listed frequency range.
12. << indicates that field strength values of radiated emissions are more than 20 dB below the applicable limit.
13. The reported field strength values are the worst-case values at the indicated frequency, obtained by rotation of the EUT and orientation of the antenna.

Test engineer

Signature : 

Name : O.H. Hoekstra

Date : October 4, 2007

3.2 Radiated field strength measurements (30 MHz – 40 GHz, E-field).

3.2.1 Average and Quasi peak values of the emissions

Frequency (MHz)	Measurement results dB(μ V)/m @ 3 metres		Detector	Limits dB(μ V)/m	Margin (dB)		Result
	Vertical	Horizontal			Vertical	Horizontal	
71.1	25.0	< 20.0	QP	40.0	< -20.0	< -15.0	PASS
76.8	26.4	< 20.0	QP	40.0	-13.6	< -20.0	PASS
124.9	26.6	< 20.0	QP	43.5	-16.9	< -23.5	PASS
2438.4	108.9	107.9	AV	114.0	-5.1	-6.1	PASS
4876.8	49.4	50.8	AV	54.0	-4.6	-3.2	PASS
7315.2	46.4	48.1	AV	54.0	-7.6	-5.9	PASS
9753.6	58.5	57.0	AV	64.1	-5.6	-7.1	PASS
12192.0	50.7	50.3	AV	54.0	-3.3	-3.7	PASS
12192-26500	< 34.0	< 34.0	AV	54.0-64.0	< -20.0	< -20.0	PASS

Table 3
Radiated emissions, Average and Quasi peak values of the EUT while operating in transmit mode on channel 50h (2438.4 MHz).

Frequency (MHz)	Measurement results dB(μ V)/m @ 3 metres		Detector	Limits dB(μ V)/m	Margin (dB)		Result
	Vertical	Horizontal			Vertical	Horizontal	
71.1	25.0	< 20.0	QP	40.0	< -20.0	< -15.0	PASS
76.8	26.4	< 20.0	QP	40.0	-13.6	< -20.0	PASS
124.9	26.6	< 20.0	QP	43.5	-16.9	< -23.5	PASS
2448.0	109.3	108.0	AV	114.0	-4.7	-6.0	PASS
4896.0	51.2	49.9	AV	54.0	-2.8	-4.1	PASS
7344.0	47.6	46.4	AV	54.0	-6.4	-7.6	PASS
9792.0	56.6	57.9	AV	64.1	-7.5	-6.2	PASS
12240.0	51.6	52.0	AV	54.0	-2.4	-2.0	PASS
12240-26500	< 34.0	< 34.0	AV	54.0-64.0	< -20.0	< -20.0	PASS

Table 4
Radiated emissions, Average and Quasi peak values of the EUT while operating in transmit mode on channel 60h (2448.0 MHz).



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Frequency (MHz)	Measurement results dB(μ V)/m @ 3 metres		Detector	Limits dB(μ V)/m	Margin (dB)		Result
	Vertical	Horizontal			Vertical	Horizontal	
71.1	25.0	< 20.0	QP	40.0	< -20.0	< -15.0	PASS
76.8	26.4	< 20.0	QP	40.0	-13.6	< -20.0	PASS
124.9	26.6	< 20.0	QP	43.5	-16.9	< -23.5	PASS
2457.0	108.4	107.8	AV	114.0	-5.6	-6.2	PASS
4914.0	51.0	50.8	AV	54.0	-3.0	-3.2	PASS
7371.0	47.9	47.1	AV	54.0	-6.1	-6.9	PASS
9828.0	56.7	58.3	AV	64.1	-7.4	-5.8	PASS
12285.0	51.5	53.5	AV	54.0	-2.5	-0.5	PASS
12285-26500	< 34.0	< 34.0	AV	54.0-64.0	< -20.0	< -20.0	PASS


Table 5
Radiated emissions, Average and Quasi peak values of the EUT
while operating in transmit mode on channel 6Fh (2457.0 MHz).

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15, sections 15.205, 15.209, 15.225 and 15.245, are depicted in table 3 to 5.

Notes:

1. (AV) average detector
2. (QP) quasi peak detector
3. The reported field strength values are the worst case values at the indicated frequency, obtained by rotation of the EUT and orientation of the antenna.
4. Up to 26500 MHz
5. Maximum emissions from the 3 tested configurations

Test engineer

Signature : 

Name : O.H. Hoekstra

Date : October 4, 2007

3.2.2 Peak values of the emissions

Frequency (MHz)	Measurement results dB(μ V)/m @ 3 metres		Detector	Limits dB(μ V)/m	Margin (dB)		Result
	Vertical	Horizontal			Vertical	Horizontal	
2438.4	108.9	107.9	PK	134.0	-25.1	-26.1	PASS
4876.8	49.4	50.8	PK	74.0	-24.6	-23.2	PASS
7315.2	46.4	48.1	PK	74.0	-27.6	-25.9	PASS
9753.6	58.5	57.0	PK	84.1	-25.6	-27.1	PASS
12192.0	50.7	50.3	PK	74.0	-23.3	-23.7	PASS
12192-26500	< 34.0	< 34.0	PK	74.0-84.0	< -40.0	< -40.0	PASS

Table 6
Radiated emissions, Peak values of the EUT
while operating in transmit mode on channel 50h (2438.4 MHz).

Frequency (MHz)	Measurement results dB(μ V)/m @ 3 metres		Detector	Limits dB(μ V)/m	Margin (dB)		Result
	Vertical	Horizontal			Vertical	Horizontal	
2448.0	109.3	108.0	PK	134.0	-24.7	-26.0	PASS
4896.0	51.2	49.9	PK	74.0	-22.8	-24.1	PASS
7344.0	47.6	46.4	PK	74.0	-26.4	-27.6	PASS
9792.0	56.6	57.9	PK	84.1	-27.5	-26.2	PASS
12240.0	51.6	52.0	PK	74.0	-22.4	-22.0	PASS
12240-26500	< 34.0	< 34.0	PK	74.0-84.0	< -40.0	< -40.0	PASS

Table 7
Radiated emissions, Peak values of the EUT
while operating in transmit mode on channel 60h (2448.0 MHz).

Frequency (MHz)	Measurement results dB(μ V)/m @ 3 metres		Detector	Limits dB(μ V)/m	Margin (dB)		Result
	Vertical	Horizontal			Vertical	Horizontal	
2457.0	108.4	107.8	PK	134.0	-25.6	-26.2	PASS
4914.0	51.0	50.8	PK	74.0	-23.0	-23.2	PASS
7371.0	47.9	47.1	PK	74.0	-26.1	-26.9	PASS
9828.0	56.7	58.3	PK	84.1	-27.4	-25.8	PASS
12285.0	51.5	53.5	PK	74.0	-22.5	-20.5	PASS
12285-26500	< 34.0	< 34.0	PK	74.0-84.0	< -40.0	< -40.0	PASS

Table 8
Radiated emissions, Peak values of the EUT
while operating in transmit mode on channel 6Fh (2457.0 MHz).




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The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15, section 15.35, are depicted in tables 6 to 8.

Notes:

1. (PK) peak detector.
2. Only for frequencies where average radiated emission measurements are specified.
3. The reported field strength values are the worst case values at the indicated frequency, obtained by rotation of the EUT and orientation of the antenna.
4. Up to 26500 MHz.
5. Maximum emissions from the 3 tested configurations.

Test engineer

Signature : 

Name : O.H. Hoekstra

Date : October 4, 2007



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4 Conducted emission data.

Frequency (MHz)	Measurement results dB(μ V) Neutral		Measurement results dB(μ V) Line 1		Limits dB(μ V)		Margin (dB) Neutral		Margin (dB) Line 1		Result
	QP	AV	QP	AV	QP	AV	QP	AV	QP	AV	
0.18	44.1	42.0	43.0	39.2	64.5	54.5	-20.4	-12.5	-21.5	-15.3	PASS
0.24	40.2	38.0	39.2	38.6	62.1	52.1	-21.9	-14.1	-22.9	-13.5	PASS
0.31	38.7	39.5	39.3	40.5	60.0	50.0	-21.3	-10.5	-20.7	-9.5	PASS
0.36	41.7	41.5	40.6	41.1	58.7	48.7	-17.0	-7.2	-18.1	-7.6	PASS
0.43	41.8	41.5	42.0	42.7	57.3	47.3	-15.5	-5.8	-15.3	-4.6	PASS
0.48	37.8	36.0	38.4	40.0	56.3	46.3	-18.5	-10.3	-17.9	-6.3	PASS
0.55	40.9	42.0	41.4	42.3	56.0	46.0	-15.1	-4.0	-14.6	-3.7	PASS
0.79	39.0	40.0	39.7	41.0	56.0	46.0	-17.0	-6.0	-16.3	-5.0	PASS
0.85	39.7	40.3	39.7	41.3	56.0	46.0	-16.3	-5.7	-16.3	-4.7	PASS
0.91	39.5	40.4	39.6	40.4	56.0	46.0	-16.5	-5.6	-16.4	-5.6	PASS
1.16	39.7	40.4	40.0	42.0	56.0	46.0	-16.3	-5.6	-16.0	-4.0	PASS
1.22	40.0	41.1	39.2	40.4	56.0	46.0	-16.0	-4.9	-16.8	-5.6	PASS
1.29	38.7	40.5	38.5	38.6	56.0	46.0	-17.3	-5.5	-17.5	-7.4	PASS
2.55	38.1	40.1	37.7	39.0	56.0	46.0	-17.9	-5.9	-18.3	-7.0	PASS

Table 9
Conducted emissions.

The results of the conducted emission tests, carried out in accordance with 47 CFR Part 15, section 15.207, at the 110 Volts AC mains connection terminals of the AC/DC power supply which was connected to the EUT, are depicted in table 9. The EUT was tested in active mode and while detecting a card or tag. Maximum values of the 3 tested configurations were recorded.

Test engineer

Signature : 

Name : O.H. Hoekstra

Date : October 4, 2007



Test specification(s): 47 CFR Part 15 (2006-08-14)
 Description of EUT: Microwave reader for handsfree identification up to 4 m
 Manufacturer: N.V. Nederlandsche Apparatenfabriek "Nedap"
 Brand mark: nedap
 Model: TRANSIT Entry
 FCC ID: CGD-TRANSITENTRY

5 Bandwidth of the emission.

5.1.1 Bandwidth of the emission at 120 kHz in accordance with 47 CFR Part 15, section 15.215 (e).

Limit: 20 dB of the bandwidth of the emission shall be within the specified frequency band.
 Bandwidth of the emission is determined at the points 20 dB down from the modulated carrier.
 Specified frequency band: None

Temperature (°C)	Minimum frequency (kHz)	Maximum frequency (kHz)
+21.0	119.998	120.026
-20.0	119.998	120.026
+50.0	119.998	120.026
Bandwidth	119.998	120.026

Table 10
Bandwidth of the emission at 120 kHz.

5.1.2 Bandwidth of the emission on 13.56 MHz in accordance with 47 CFR Part 15, section 15.225 (e).

Limit: 20 dB of the bandwidth of the emission shall be within the specified frequency band.
 Bandwidth of the emission is determined at the points 20 dB down from the modulated carrier.
 Specified frequency band: 13553 kHz - 13567 kHz.

Temperature (°C)	Minimum frequency (kHz)	Maximum frequency (kHz)
+21.0	13560.68	13563.26
-20.0	13560.54	13563.12
+50.0	13560.75	13563.31
Bandwidth	13560.54	13563.31

Table 11
Bandwidth of the emission at 13561kHz.

5.1.3 Bandwidth of the emission on 2.45 GHz in accordance with 47 CFR Part 15, section 15.245 (e).

Limit: 20 dB of the bandwidth of the emission shall be within the specified frequency band.
 Bandwidth of the emission is determined at the points 20 dB down from the modulated carrier.
 Specified frequency band: 2435 MHz - 2465 MHz.

Temperature (°C)	Minimum frequency (MHz)	Maximum frequency (MHz)
+21.0	2438.3928	2457.0020
-20.0	2438.3919	2457.0011
+50.0	2438.3948	2457.0040
Bandwidth	2438.3919	2457.0040

Table 12
Bandwidth of the emission at 2.45 GHz.

Notes:

- The minimum frequency was measured while the transmitter was operating on the lowest working channel (2438.4 MHz).
- The maximum frequency was measured while the transmitter was operating on the highest working channel (2457.0 MHz).



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6 Carrier stability under special conditions.

6.1 Carrier stability with respect to the operating frequency of 2.4 GHz.

6.1.1 Frequency stability on 2.45 GHz in accordance with 47 CFR Part 15.

No particular requirements other than in section 3 of this report.

From measurements performed as indicated below, the frequency stability will not cause non-compliant situations with respect to exclusion bands or emissions outside permissible bands (band edges)

Stability under special conditions Temperature (°C)	Measured frequency (MHz)	Frequency deviation (kHz)
21.0	2449.7986 (reference)	N.A.
-20.0	2449.7977	-0.9
50.0	2449.8006	+2.0

Table 13
Frequency stability of the EUT due to temperature variations.

Stability under special conditions Supply Voltage (V)	Measured frequency (MHz)	Frequency deviation (kHz)
115 (100%)	2449.7986 (reference)	N.A.
97 (-15%)	2449.7986	0
132 (+15%)	2449.7986	0

Table 14
Frequency stability of the EUT due to voltage variations.

Test engineer

Signature

Name : O.H. Hoekstra

Date : October 4, 2007



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FCC ID: CGD-TRANSITENTRY

6.1.2 Amplitude stability on 2.45 GHz in accordance with 47 CFR Part 15, section 15.31 (e).

No particular requirements other than in section 3 of this report.

From measurements performed as indicated below, the amplitude stability will not cause non-compliant situations with respect to exclusion bands or emissions outside permissible bands (band edges)

Stability under special conditions	Amplitude deviation (dB)
Supply Voltage (V)	
115 (100%)	N.A.
97 (-15%)	0.0
132 (+15%)	0.0

Table 15
Amplitude stability of the EUT due to voltage variations.

Test engineer

Signature

:

Name

: O.H. Hoekstra

Date

: October 4, 2007



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6.2 Carrier stability with respect to the operating frequency of 13.56 MHz.

6.2.1 Frequency stability on 13.56 MHz in accordance with 47 CFR Part 15, section 15.225 (e).

- 1) The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage.

Stability under special conditions Temperature (°C)	Measured frequency (kHz)	Frequency deviation (%)	PASS/FAIL
+21.0	13561.704 (reference)	N.A.	N.A.
-20.0	13561.584	-0.0009	PASS
+50.0	13561.772	+0.0005	PASS


Table 16
Frequency stability of the EUT due to temperature variations.

- 2) The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over an input voltage variation of +/- 15% of the normal supply voltage at 20 degrees C .

Stability under special conditions Supply Voltage (V)	Measured frequency (kHz)	Frequency deviation (%)	PASS/FAIL
115 (100%)	13561.704 (reference)	N.A.	N.A.
97 (-15%)	13561.704	0.0	PASS
132 (+15%)	13561.704	0.0	PASS

Table 17
Frequency stability of the EUT due to voltage variations.

Test engineer

Signature : 

Name : O.H. Hoekstra

Date : October 4, 2007



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6.2.2 Amplitude stability on 13.56 MHz in accordance with 47 CFR Part 15, section 15.31 (e).

No particular requirements other than in section 3 of this report.

From measurements performed as indicated below, the amplitude stability will not cause non-compliant situations with respect to exclusion bands or emissions outside permissible bands (band edges)

Stability under special conditions	Amplitude deviation (dB)
Supply Voltage (V)	
115 (100%)	N.A.
97 (-15%)	0.0
132 (+15%)	0.0

Table18
Amplitude stability of the EUT due to voltage variations.

Test engineer

Signature

Name

: O.H. Hoekstra

Date

: October 4, 2007



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6.3 Carrier stability with respect to the operating frequency of 120 kHz.

6.3.1 Frequency stability on 120 kHz in accordance with 47 CFR Part 15.

No particular requirements other than in section 3 of this report.

From measurements performed as indicated below, the frequency stability will not cause non-compliant situations with respect to exclusion bands or emissions outside permissible bands (band edges)

Stability under special conditions Temperature (°C)	Measured frequency (kHz)	Frequency deviation (Hz)
21.0	120.014 (reference)	N.A.
-20.0	120.014	0
50.0	120.014	0

Table 19
Frequency stability of the EUT due to temperature variations.

Stability under special conditions Supply Voltage (V)	Measured frequency (kHz)	Frequency deviation (Hz)
115 (100%)	120.014 (reference)	N.A.
97 (-15%)	120.014	0
132 (+15%)	120.014	0

Table 20
Frequency stability of the EUT due to voltage variations.

Test engineer

Signature

Name

: O.H. Hoekstra

Date

: October 4, 2007



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6.3.2 Amplitude stability on 120 kHz in accordance with 47 CFR Part 15, section 15.31 (e).

No particular requirements other than in section 3 of this report.

From measurements performed as indicated below, the amplitude stability will not cause non-compliant situations with respect to exclusion bands or emissions outside permissible bands (band edges)

Stability under special conditions Supply Voltage (V)	Amplitude deviation (dB)
115 (100%)	N.A.
97 (-15%)	0.0
132 (+15%)	0.0

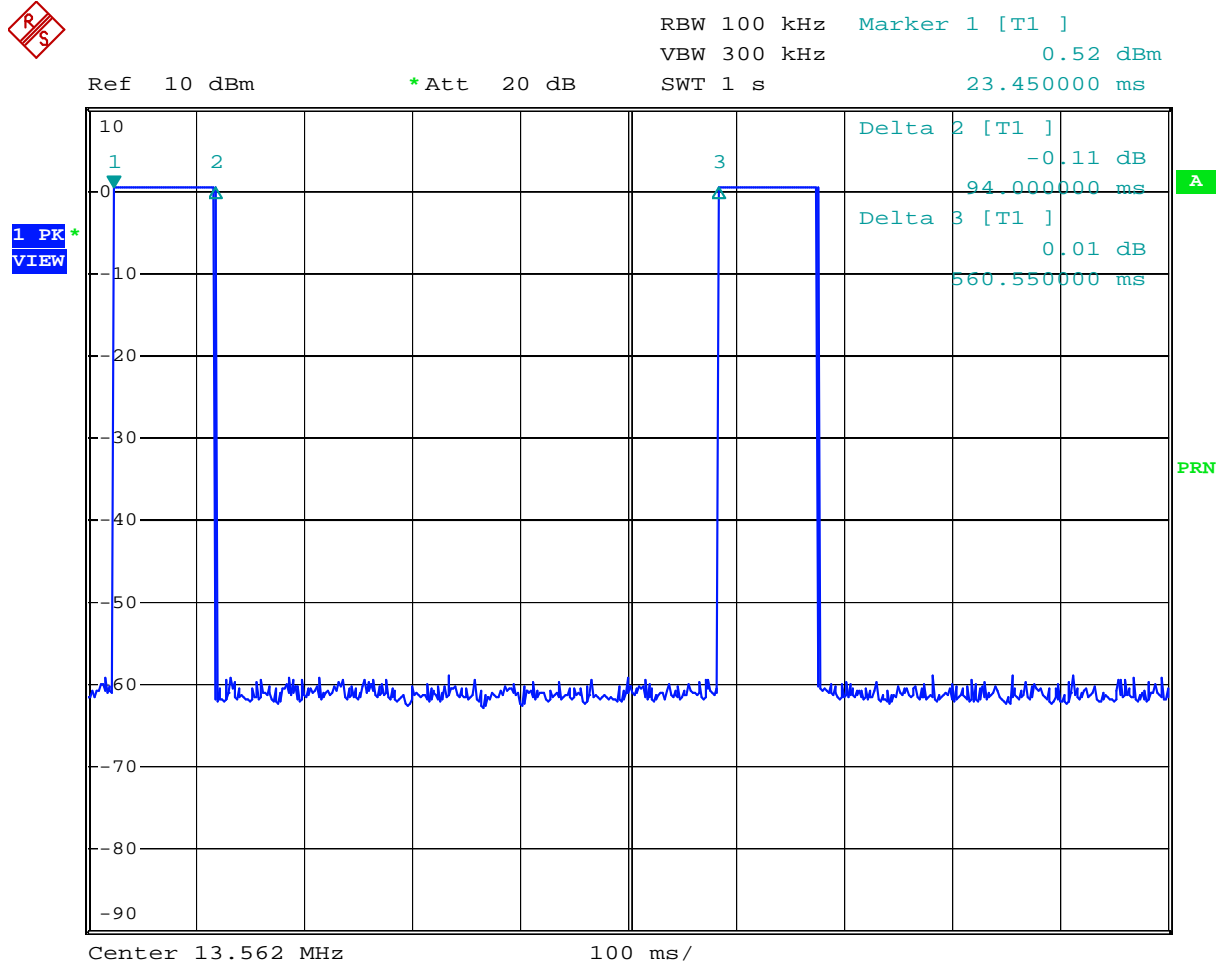
Table 21
Amplitude stability of the EUT due to voltage variations.

Test engineer

Signature : 

Name : O.H. Hoekstra

Date : October 4, 2007



Date: 5.OCT.2007 12:04:55

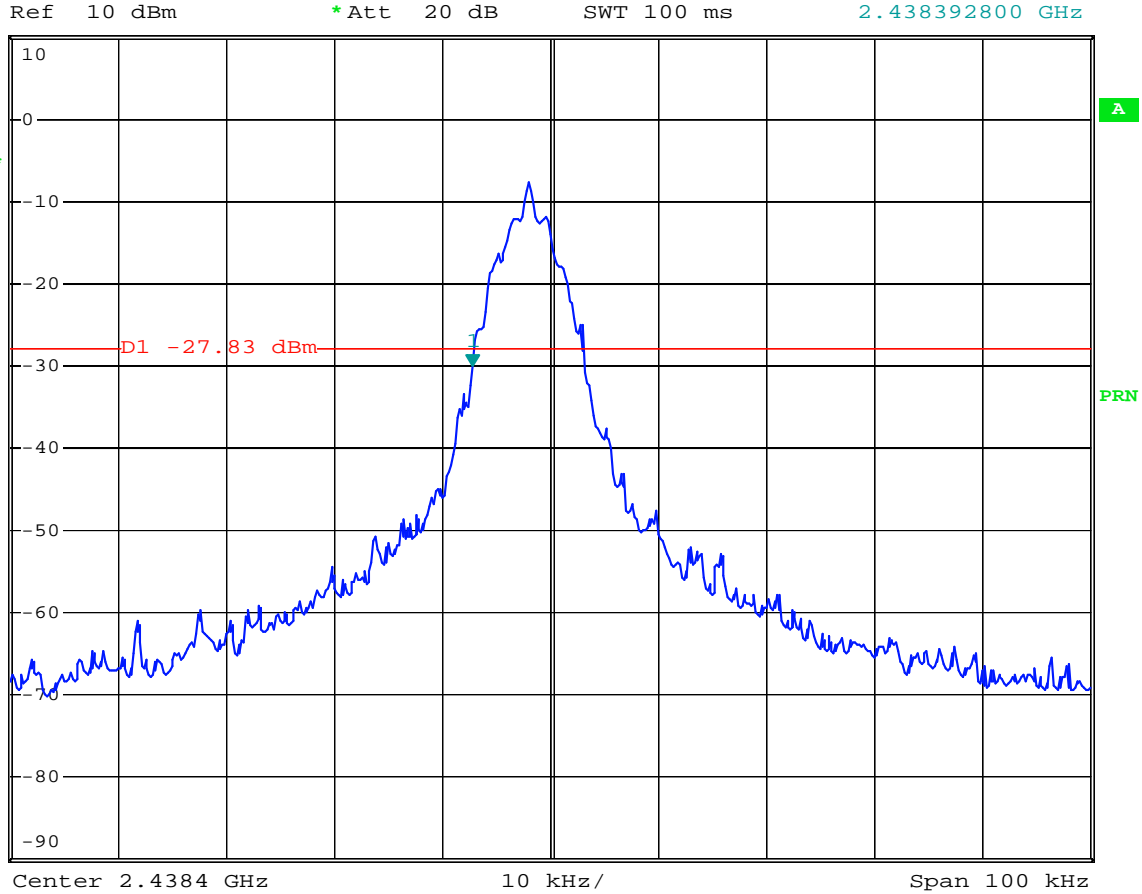
Plot 3 – Duty cycle of the emission at 13561 kHz

Note:

The transmit signal at 13561 kHz is an unmodulated carrier with a duty cycle of 16.8%

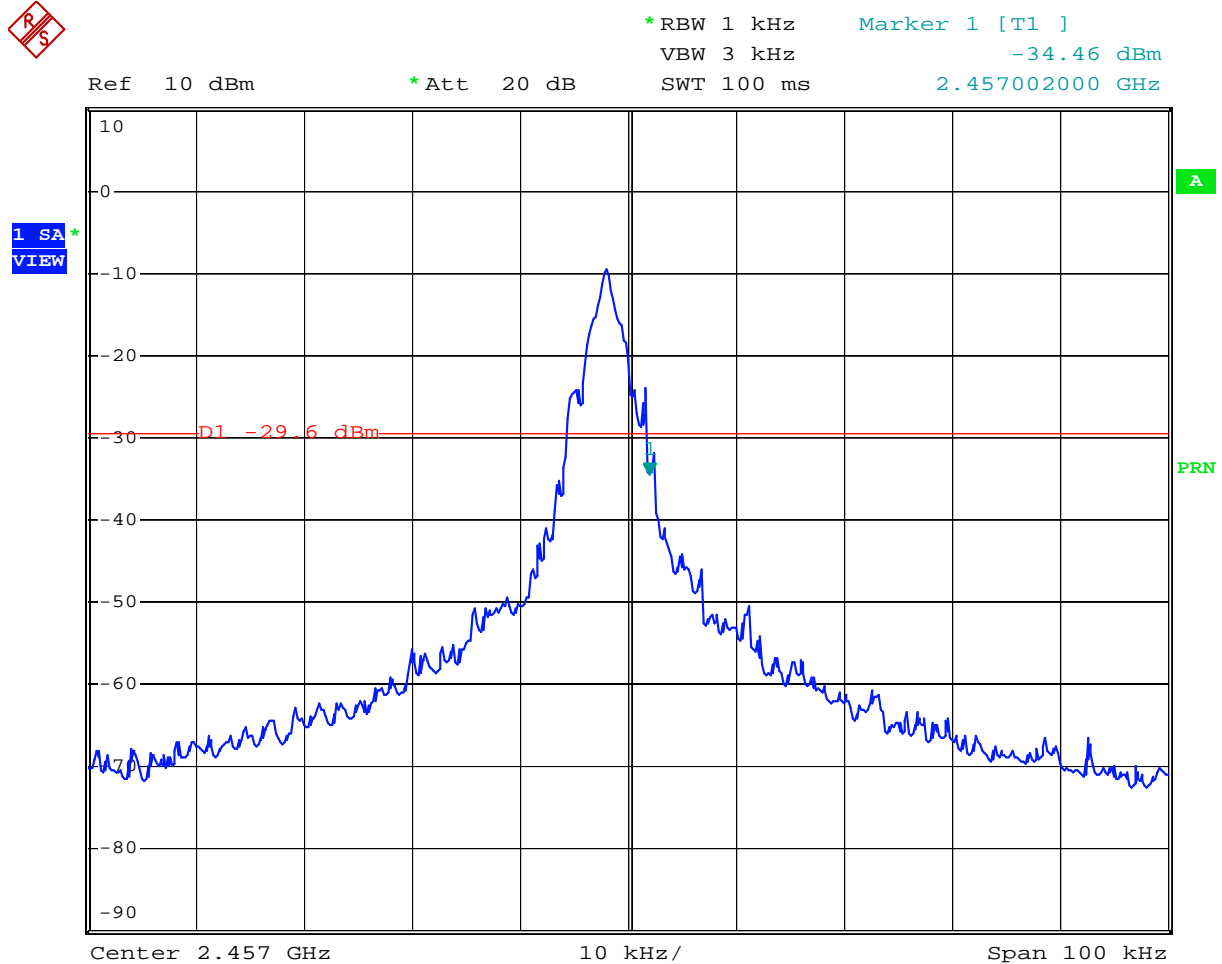


*RBW 1 kHz Marker 1 [T1]
 VBW 3 kHz -29.90 dBm
 SWT 100 ms 2.438392800 GHz



Date: 5.OCT.2007 12:23:12

Plot 4 – Bandwidth of the emission at 2.45 GHz while transmitting at the lowest frequency



Date: 5.OCT.2007 12:25:04

Plot 5 – Bandwidth of the emission at 2.45 GHz while transmitting at the highest frequency

Note:

The transmit signal at 2.45 GHz is an unmodulated carrier with a duty cycle of 100%



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8 List of utilized test equipment.

Inventory number	Description	Brand	Model	Last cal.	Next cal.
12476	Antenna mast	EMCO	TR3	-	-
12477	Antenna mast 1-4 mtr	Poelstra	--	-	-
12482	Loop antenna	EMCO	6507	04/2007	04/2008
12483	Guidehorn 1-18 GHz	EMCO	3115	03/2007	03/2008
12484	Guidehorn 1-18 GHz	EMCO	3115	03/2007	03/2008
12486	Guidehorn 18-40 GHz	EMCO	3116	03/2007	03/2008
12533	Signalgenerator	MARCONI	2032	03/2007	03/2008
12605	Calibrated dipole 28MHz-1GHz	EMCO	3121c	09/2002	09/2007
12640	Temperature chamber	Heraeus	VEM03/500	01/2007	01/2008
13664	Spectrum analyzer	HP	HP8593E	08/2007	08/2008
13886	Open Area testsite	Comtest	--	09/2006	09/2008
14051	Anechoic room	Comtest	--	-	-
15633	Biconilog Testantenna	Chase	CBL 6111B	02/2007	02/2008
15667	Measuring receiver	R&S	ESCS 30	04/2007	04/2008
99596	Preamplifier 0.5 GHz - 18 GHz	Miteq	AMF-5D-005180-28-13p	07/2007	07/2008
99597	Bandpass filter 3 - 12 GHz	BSC	SN3463-F1	07/2007	07/2008
99598	Bandpass filter 6 - 18 GHz	BSC	SH3877	07/2007	07/2008
99599	Preamplifier 18 - 40 GHz	Miteq	AMF-6F-18004000-50	07/2007	07/2008



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Appendix 1

Calculated measurements results radiated field strength, H-Field

The rules of Part 15 section 15.31 allow scaling of the measured values or limits when measurements are made at distances other than those specified. The extrapolation factor for frequencies below 30 MHz are 40 dB/decade which means that for a distance change of 10 to 1 (a decade), the limit, or measured value, may be recalculated by adding (moving closer) or subtracting (moving away) 40 dB, respectively.

It is also possible to make radiated-emission measurements at two different distances and extrapolate to a third distance. The calculation method described below, should then be followed.

General Formula:

d_1 = short distance

d_2 = long distance

So: $(d_1/d_2)^n = H_{d2}/H_{d1}$

$n \times \log(d_1/d_2) = \log(H_{d2}/H_{d1})$

Calculation of n:

$n = \log(H_{d2}/H_{d1}) / \log(d_1/d_2)$

Calculation of field strength at other distance ($d_1 \rightarrow d_2$):

$H_{d2} = H_{d1} (d_1/d_2)^n$