# TEST REPORT CONCERNING THE COMPLIANCE OF AN INDUCTIVE LOOP VEHICLE DETECTOR, BRAND NORTECH , MODEL PD231 AND PD234 WITH 47 CFR PART 15 (10-1-09 Edition) FCC ID: OW9PD230TD236

**10051001.fcc02**
**August 30, 2010**

FCC listed : 90828
Industry Canada : 2932G-1
VCCI Registered : R-1518, C-1598
R&TTE, LVD, EMC Notified Body : 1856

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# MEASUREMENT/TECHNICAL REPORT

**Model Summary:** This report covers only 2 transmitter models – the applicant states: differences are explained within the Attestation of Similarity found in Appendix 1. All models incorporate the identical circuitry and integral RF Section and PWB embedded antenna housed on the device. From all product geometric differences the worst case units were tested and shown in this report. Refer to Appendix 1 for more information.

**Brand: Nortech**
**Model : PD231 and PD234**
**FCC ID: OW9PD230TD236**

August 30, 2010

| | |
|---|---|
| This report concerns: | Original grant/certification ~~Class 2 Permissive Change~~ ~~Verification~~ |
| Equipment type: | DSC - Part 15 Security/Remote Control Transmitter |


| Report prepared by: | | |
|---|---|---|
| | Name | : Richard van der Meer |
| | Company name | : TÜV Rheinland EPS B.V. |
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The data taken for this test and report herein was done in accordance with 47 CFR Part 15 (10-1-09 Edition), and the measurement procedures of ANSI C63.4-2003. TÜV Rheinland 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: August 30, 2010

Signature:

O. Hoekstra
Senior Engineer Telecom TÜV Rheinland EPS B.V.

## Description of test item

| | | |
|---|---|---|
| Test item (EUT) | : | Inductive Loop Vehicle Detector |
| Manufacturer | : | Nortech International (Pty) Ltd. |
| Brand | : | Nortech |
| Model(s) | : | PD231 and PD234 |
| Serial number(s) | : | 020100122443 (PD231) and 020100122425 (PD234) |
| Receipt date | : | July 12, 2010 |

## Applicant information

| | | |
|---|---|---|
| Applicant's representative | : | Mr. Mike Maggs |
| Company | : | Nortech International (Pty) Ltd. |
| Address | : | 32A Wiganthorpe Road |
| Postal code | : | 3201 |
| City | : | Pietermaritzburg |
| Country | : | South Africa |
| Telephone number | : | +27 33 34553456 |
| Telefax number | : | +27 33 3946449 |
| e-mail address | | m.maggs@nortech.co.za |

## Test(s) performed

| | | |
|---|---|---|
| Location | : | Niekerk |
| Test(s) started | : | July 28, 2010 |
| Test(s) completed | : | August 18, 2010 |
| Purpose of test(s) | : | Equipment Authorization (original certification) |
| Test specification(s) | : | 47 CFR Part 15 (10-1-09 Edition) |

| | | |
|---|---|---|
| Test engineer(s) | : | R. van der Meer |
| Report written by | : | R. van der Meer |
| Report date | : | August 30, 2010 |

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# 1 General information.

## 1.1 Product description.

### 1.1.1 Introduction.

The PD230/TD236 family Enhanced Vehicle Detector is a dual channel microprocessor based detector designed specifically for parking and vehicle access control applications. The primary function of the detector is to detect vehicle presence by means of an inductance change,caused by the vehicle passing over a wire loop buried under the road surface. The PD230/TD236 Enhanced Vehicle dual channel parking detector is designed to be shelf or DIN rail mounted, with the controls and visual indicators at the front, and wiring at the rear of the enclosure.

*In the case of this test report – 2 of 90 different models are covered. The applicant states that the tested model is representative for the other models as noted in the AoS, but it's outside the scope of TÜV Rheinland EPS B.V. to have any judgment on this.*

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

### 1.2.1 General.

This test report supports the original grant/certification in equipment authorization files under registration number.
**FCC ID: OW9PD130TD136** .

## 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 | : | Inductive Loop Vehicle Detector |
| Manufacturer | : | Nortech International (Pty) Ltd |
| Brand | : | Nortech |
| Model | : | PD231 and PD234 |
| Serial number | : | 020100122443 (PD231) and 020100122425 (PD234) |
| Voltage input rating | : | 120V ac ±10% (PD231) and 12-24V ac-dc ±10% (PD234) |
| Voltage output rating | : | n.a. |
| Current input rating | : | 40 mA |
| Antenna | : | External |
| Operating frequency | : | 12 – 80 kHz |
| Remarks | : | n.a. |

| | | |
|---|---|---|
| AUX | : | Testjig |
| Manufacturer | : | Nortech International (Pty) Ltd |
| Brand | : | -- |
| Model | : | -- |
| Serial number | : | -- |
| Voltage input rating | : | -- |
| Voltage output rating | : | -- |
| Current input rating | : | -- |
| Antenna | : | -- |
| Operating frequency | : | -- |
| Remarks | : | To make easy connections possible for testing purposes only. |


Photo 1: EUT

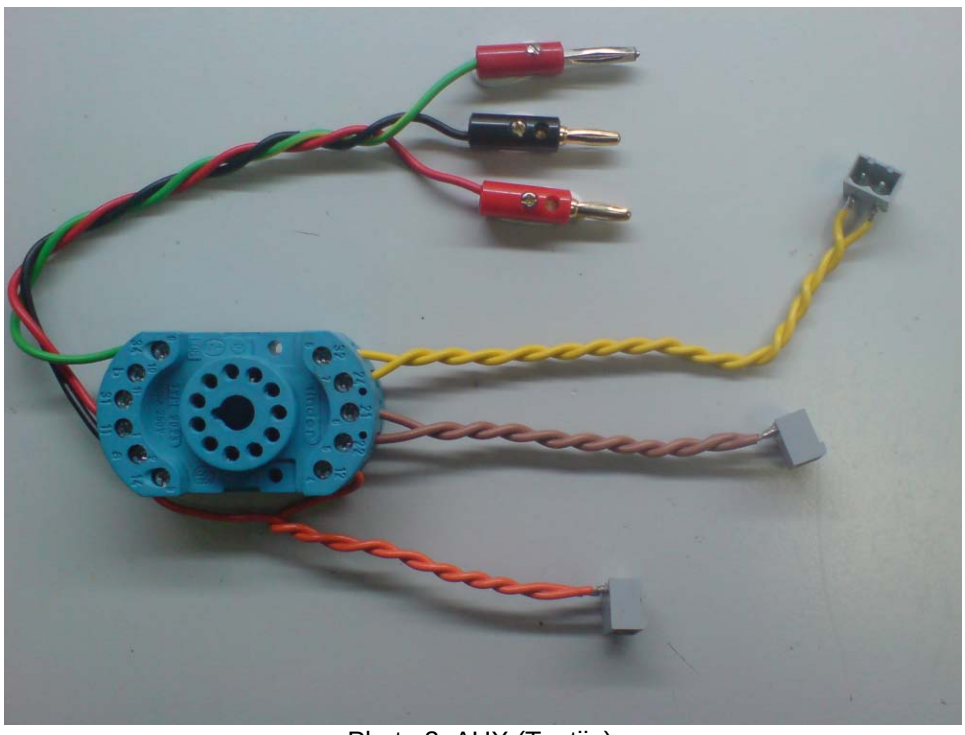


Photo 2. AUX (Testjig)

### 1.3.1 Description of input and output ports.

| Number | Ports | From | To | Shielding | Remarks |
|---|---|---|---|---|---|
| 1-2 | AC mains | AC mains | -- | ~~yes~~ / no | -- |
| 3 | Pulse relay | -- | -- | | -- |
| 4 | Earth | AC mains earth | -- | yes ~~/ no~~ | -- |
| 5-6 | Presence relay | -- | -- | | -- |
| 7-8 | Loop | Loop coil | -- | ~~yes~~ / no | -- |
| 9 | Pulse relay common | -- | -- | | -- |
| 10 | Presence relay N/C | -- | -- | | -- |
| 11 | Pulse relay N/C | -- | -- | | -- |

AE = Auxiliary equipment

### 1.4 Test methodology.

The test methodology used is based on the requirements of 47 CFR Part 15 (10-1-09 Edition), sections 15.31, 15.35, 15.205, 15.207 and 15.209.

The test methods, which have been used, are based on ANSI C63.4: 2009.

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.
To calculate the field strength level from these results to the appropriate distance at which the limit is specified, the appropriate extrapolation factor is used.

The receivers are switching automatically to the right bandwidth in accordance with CISPR 16. This is implemented in the receiver. The antenna factors are programmed in the test receiver. The receiver automatically calculates the appropriate correction factor for the utilized antenna and also the appropriate antenna factor for the cable loss. The total correction is automatically added to the measured value.

### 1.5 Test facility.

The Federal Communications Commission and Industry Canada has reviewed the technical characteristics of the test facilities at TÜV Rheinland 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 15, section 2.948(10-1-06 edition).

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 description of the test facilities has been filed to Industry Canada under registration number 2932G-1. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

### 1.6 Test conditions.

Normal test conditions:

Temperature (*) : +15°C to +35°C
Relative humidity(*) : 20 % to 75 %
Supply voltage : 12 -24 Vdc and Vdc, 120Vac
Air pressure : 950 – 1050 hPa

When is 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.

# 2 System test configuration.

## 2.1 Justification.

The system was configured for testing in a typical fashion (as a customer would normally use it).

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 intentional radiator tests (47 CFR Part 15 sections, 15.207, 15.209 and 15.225) have been performed with a complete functioning EUT and interconnections.

## 2.3 Special accessories.

No special accessories are used and/or needed to achieve compliance.

## 2.4 Equipment modifications.

No modifications have been made to the equipment in order to achieve compliance.

## 2.5 Product Labeling

The product labeling information is available in the technical documentation package.

## 2.6 Block diagram of the EUT.

The block diagram is available in the technical documentation package.

## 2.7 Schematics of the EUT.

The schematics are available in the technical documentation package.

## 2.8 Part list of the EUT.

The part list is available in the technical documentation package.

# 3 Radiated emission data.

## 3.1 Radiated field strength measurements (30 MHz – 1 GHz, E-field) of the PD231

| Frequency (MHz) | Measurement results @3m Vertical (dBuV) | Measurement results @3m Horizontal (dBuV) | Correction factor (dB) | Results after correction Vertical (dBuV/m) | Results after correction Horizontal (dBuV/m) | Limits @3m (dBuV/m) | Pass/Fail |
|---|---|---|---|---|---|---|---|
| 33.44 | 16.0 | 16.8 | 17.9 | 34.4 | 34.7 | 40 | Pass |
| 39.32 | 17.3 | 17.3 | 15.0 | 32.3 | 32.3 | 40 | Pass |
| 40.68 | 16.7 | 19.9 | 14.0 | 30.7 | 33.9 | 40 | Pass |
| 52.44 | 16.4 | 18.6 | 8.9 | 25.3 | 27.5 | 40 | Pass |
| 53.20 | 16.9 | 17.7 | 8.6 | 25.5 | 26.3 | 40 | Pass |
| 63.68 | 16.9 | 18.3 | 7.0 | 23.9 | 25.3 | 40 | Pass |
| 120.32 | 20.5 | 20.0 | 13.7 | 34.2 | 33.7 | 43.5 | Pass |
| 169.72 | 23.3 | 26.7 | 12.1 | 35.3 | 38.8 | 43.5 | Pass |

Table 1a Radiated emissions of the EUT (PD231)

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15 section 15.205, 15.209 are depicted in Table 1a.

**Notes:**

1. Field strength values of radiated emissions at frequencies not listed in the table above are more than 20 dB below the applicable limit.
2. Measurement uncertainty is ±5.0dB.
3. The EUT was varied in three positions, the loop antenna was varied in horizontal and vertical orientations and also around it's axis. The reported value is the worst case found at the reported frequency
4. The EUT was tested in both normal mode (i.e. without a label in its proximity) and in activated mode (i.e. with a label in its proximity).
5. A Quasi-peak detector was used with a bandwidth of 1 MHz.

Test engineer

Signature : 

Name : Richard van der Meer
Date : August 18, 2010

## 3.2 Radiated field strength measurements (30 MHz – 1 GHz, E-field) of the PD234

| Frequency (MHz) | Measurement results @3m Vertical (dBuV) | Measurement results @3m Horizontal (dBuV) | Correction factor (dB) | Results after correction Vertical (dBuV/m) | Results after correction Horizontal (dBuV/m) | Limits @3m (dBuV/m) | Pass/Fail |
|---|---|---|---|---|---|---|---|
| 33.44 | 17.1 | 17.5 | 17.9 | 35.0 | 35.4 | 40 | Pass |
| 39.32 | 17.5 | 17.8 | 15.0 | 32.5 | 32.8 | 40 | Pass |
| 40.68 | 15.6 | 20.0 | 14.0 | 29.6 | 34.0 | 40 | Pass |
| 52.44 | 16.9 | 18.5 | 8.9 | 25.8 | 27.4 | 40 | Pass |
| 53.20 | 17.3 | 17.4 | 8.6 | 25.9 | 26.0 | 40 | Pass |
| 63.68 | 17.1 | 19.2 | 7.0 | 24.1 | 26.2 | 40 | Pass |
| 120.32 | 22.1 | 21.9 | 13.7 | 35.8 | 35.6 | 43.5 | Pass |
| 169.72 | 23.5 | 27.2 | 12.1 | 35.6 | 39.3 | 43.5 | Pass |

Table 2b Radiated emissions of the EUT (PD234)

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15 section 15.205, 15.209 are depicted in Table 1b.

**Notes:**

1. Field strength values of radiated emissions at frequencies not listed in the table above are more than 20 dB below the applicable limit.
2. Measurement uncertainty is ±5.0dB.
3. The EUT was varied in three positions, the loop antenna was varied in horizontal and vertical orientations and also around it's axis. The reported value is the worst case found at the reported frequency
4. The EUT was tested in both normal mode (i.e. without a label in its proximity) and in activated mode (i.e. with a label in its proximity).
5. A Quasi-peak detector was used with a bandwidth of 1 MHz.

Test engineer

Signature : 

Name : Richard van der Meer
Date : August 18, 2010

## 3.3 Radiated field strength measurements (frequency range of 0.009-30 MHz, H-field) for the PD231.

| Frequency (MHz) | (a) Measurement results (dBµV) | Detector | (b) Antenna factor | (c) Cable loss | (d) Distance Extrapolation factor | Measurement results (calculated a+b+c-d) | Limits |
|---|---|---|---|---|---|---|---|
| | 3 meters | | dB | dB | dB | dB(µV)/m @300m | dB(µV)/m @300m |
| 0.043 (fundamental) | 71.3 | Av | 20.9 | 1 | 80 | 13.2 | 34.9 |
| 0.086 | 45.5 | Av | 20.9 | 1 | 80 | -12.6 | 28.9 |
| 0.129 | 42.1 | Av | 20.9 | 1 | 80 | -16.0 | 25.4 |
| 0.172 | 28.6 | Av | 20.9 | 1 | 80 | -29.5 | 22.9 |
| 0.215 | 19.3 | Av | 20.9 | 1 | 80 | -38.8 | 20.9 |
| 0.258 | 13.0 | Av | 20.9 | 1 | 80 | -45.1 | 19.4 |
| 1.270 | 28.3 | Qp | 19.7 | 1 | 40 | 9.0 | 25.5 |
| 1.394 | 33.6 | Qp | 19.5 | 1 | 40 | 14.1 | 24.7 |
| 1.602 | 33.0 | Qp | 19.7 | 1 | 40 | 13.7 | 23.5 |
| 6.086 | 24.3 | Qp | 19.5 | 1 | 40 | 4.8 | 29.5 |

Table 2a Radiated emissions of the PD231, in the frequency range 0.009 – 30 MHz

The results of the radiated emission tests in the frequency range 0.009 – 30 MHz, carried out in accordance with 47 CFR Part 15 section 15.209 are depicted in Table 2a.

**Notes**:

1. Values in Table 2a are of the PD131.
2. Calculated measurement results are obtained by using the 80dB/decade factor (antenna factor and cable loss is included). i.e at 0.043 MHz: 73.1dBuv + 20.9dB + 1dB - 80dB= 13.2dBuV/m.
3. A resolution bandwidth of 200Hz and 9 kHz was used during testing
4. Field strength values of radiated emissions at frequencies not listed in Table 2a are more than 20 dB below the applicable limit
5. The loop antenna was varied in horizontal and vertical orientations and also around it's axis. The reported value is the worst case found at the reported frequency.
6. The EUT was tested in horizontal orientation being the normal use orientation.
7. Measurement uncertainty is ±5.0dB

Test engineer

Signature : 

Name : R. van der Meer
Date : July 28, 2010

## 3.4 Radiated field strength measurements (frequency range of 0.009-30 MHz, H-field) for the PD231, Peak values.

| Frequency (MHz) | (a) Measurement results (dBµV) | Detector | (b) Antenna factor | (c) Cable loss | (d) Distance Extrapolation factor | Measurement results (calculated a+b+c-d) | Limits |
|---|---|---|---|---|---|---|---|
| | 3 meters | | dB | dB | dB | dB(µV)/m @300m | dB(µV)/m @300m |
| 0.043 (fundamental) | 77.1 | Pk | 20.4 | 1 | 80 | 19.0 | 56.94 |
| 0.086 | 51.4 | Pk | 20.4 | 1 | 80 | -6.7 | 50.92 |
| 0.129 | 47.5 | Pk | 20.1 | 1 | 80 | -10.6 | 47.40 |
| 0.172 | 34.9 | Pk | 20.1 | 1 | 80 | -23.2 | 44.90 |
| 0.215 | 30.1 | Pk | 20.1 | 1 | 80 | -28.0 | 42.96 |
| 0.258 | 22.0 | Pk | 20.1 | 1 | 80 | -36.1 | 41.38 |

Table 2b Radiated emissions of the PD231, in the frequency range 0.009 – 30 MHz

The results of the radiated emission tests in the frequency range 0.009 – 30 MHz, carried out in accordance with 47 CFR Part 15 section 15.209 for Peal levels are depicted in Table 2b.

**Notes:**

1. Values in Table 2b are Peak detector levels of the PD231.
2. Calculated measurement results are obtained by using the 80dB/decade factor (antenna factor and cable loss is included). i.e at 0.043 MHz: 77.1dBuv + 20.4dB + 1dB - 80dB= 19.0dBuV/m.
3. A resolution bandwidth of 200Hz and 9 kHz was used during testing
4. Field strength values of radiated emissions at frequencies not listed in Table 2b are more than 20 dB below the applicable limit
5. The loop antenna was varied in horizontal and vertical orientations and also around it's axis. The reported value is the worst case found at the reported frequency.
6. The EUT was tested in horizontal orientation being the normal use orientation.
7. Measurement uncertainty is ±5.0dB

Test engineer

Signature : 

Name : R. van der Meer
Date : July 28, 2010

## 3.5 Radiated field strength measurements (frequency range of 0.009-30 MHz, H-field) for the PD234.

| Frequency (MHz) | (a) Measurement results (dBµV) | Detector | (b) Antenna factor | (c) Cable loss | (d) Distance Extrapolation factor | Measurement results (calculated a+b+c-d) | Limits |
|---|---|---|---|---|---|---|---|
| | 3 meters | | dB | dB | dB | dB(µV)/m @300m | dB(µV)/m @300m |
| 0.04267 (fundamental) | 71.5 | Av | 20.9 | 1 | 80 | 13.4 | 34.9 |
| 0.086 | 22.6 | Av | 20.9 | 1 | 80 | -35.5 | 28.9 |
| 0.129 | 36.4 | Av | 20.9 | 1 | 80 | -21.7 | 25.4 |
| 0.172 | 15.0 | Av | 20.9 | 1 | 80 | -43.1 | 22.9 |
| 0.215 | 12.0 | Av | 20.9 | 1 | 80 | -46.1 | 20.9 |
| 0.258 | 1.0 | Av | 20.9 | 1 | 80 | -57.1 | 19.4 |
| 1.270 | 28.9 | Qp | 19.7 | 1 | 40 | 9.6 | 29.5 |
| 1.390 | 33.0 | Qp | 19.7 | 1 | 40 | 13.7 | 29.5 |
| 1.600 | 33.0 | Qp | 19.7 | 1 | 40 | 13.7 | 29.5 |
| 6.070 | 24.9 | Qp | 19.5 | 1 | 40 | 5.4 | 29.5 |

Table 2c Radiated emissions of the PD234, in the frequency range 0.009 – 30 MHz

The results of the radiated emission tests in the frequency range 0.009 – 30 MHz, carried out in accordance with 47 CFR Part 15 section 15.209 are depicted in Table 2c.

**Notes**:

1. Values in Table 2c are of the PD234.
2. Calculated measurement results are obtained by using the 80dB/decade factor (antenna factor and cable loss is included). i.e at 0.04267 MHz: 71.5dBuv + 20.9dB + 1dB - 80dB= 13.4 dBuV/m.
3. A resolution bandwidth of 200Hz and 9 kHz was used during testing
4. Field strength values of radiated emissions at frequencies not listed in Table 2c are more than 20 dB below the applicable limit
5. The loop antenna was varied in horizontal and vertical orientations and also around it's axis. The reported value is the worst case found at the reported frequency.
6. The EUT was tested in horizontal orientation being the normal use orientation.
7. Measurement uncertainty is ±5.0dB

Test engineer

Signature : 

Name : R. van der Meer
Date : August 18, 2010

## 3.6 Radiated field strength measurements (frequency range of 0.009-30 MHz, H-field) for the PD234, Peak values.

| Frequency (MHz) | (a) Measurement results (dBµV) | Detector | (b) Antenna factor | (c) Cable loss | (d) Distance Extrapolation factor | Measurement results (calculated a+b+c-d) | Limits |
|---|---|---|---|---|---|---|---|
| | 3 meters | | dB | dB | dB | dB(µV)/m @300m | dB(µV)/m @300m |
| 0.04267 (fundamental) | 77.7 | Pk | 20.9 | 1 | 80 | 19.6 | 54.9 |
| 0.086 | 30.3 | Pk | 20.9 | 1 | 80 | 28.9 | 48.9 |
| 0.129 | 38.4 | Pk | 20.9 | 1 | 80 | 25.4 | 45.4 |
| 0.172 | 22.0 | Pk | 20.9 | 1 | 80 | 22.9 | 42.9 |
| 0.215 | 27.0 | Pk | 20.9 | 1 | 80 | 20.9 | 40.9 |
| 0.258 | 12.0 | Pk | 20.9 | 1 | 80 | 19.4 | 39.4 |

Table 2d Radiated emissions of the PD234, in the frequency range 0.009 – 30 MHz

The results of the radiated emission tests in the frequency range 0.009 – 30 MHz, carried out in accordance with 47 CFR Part 15 section 15.209 are depicted in Table 2d.

**Notes:**

1. Values in Table 2d are of the PD234.
2. Calculated measurement results are obtained by using the 80dB/decade factor (antenna factor and cable loss is included). i.e at 0.04267 MHz:77.7dBuv + 20.9dB + 1dB - 80dB=19.6dBuV/m.
3. A resolution bandwidth of 200Hz and 9 kHz was used during testing
4. Field strength values of radiated emissions at frequencies not listed in Table 2d are more than 20 dB below the applicable limit
5. The loop antenna was varied in horizontal and vertical orientations and also around it's axis. The reported value is the worst case found at the reported frequency.
6. The EUT was tested in horizontal orientation being the normal use orientation.
7. Measurement uncertainty is ±5.0dB.

Test engineer

Signature : 

Name : R. van der Meer
Date : August 18, 2010

# 4 Conducted emission data.

## 4.1 Conducted emission data of the EUT (PD231).

| Frequency (MHz) | Measurement results dB(µV) Neutral | | Measurement results dB(µV) Line 1 | | Limits dB(µV) | | Result |
|---|---|---|---|---|---|---|---|
| | QP | AV | QP | AV | QP | AV | |
| 0.150 | <20 | - | 26 | - | 66 | 56 | PASS |
| 0.225 | 29.2 | - | <20 | - | 56 | 46 | PASS |
| 1.050 | 13.5 | - | <20 | - | 56 | 46 | PASS |
| 3.175 | 15.0 | - | 16.1 | - | 60 | 50 | PASS |
| 13.700 | 24.6 | - | 19.6 | - | 60 | 50 | PASS |
| 14.975 | 26.6 | - | 25.6 | - | 60 | 50 | PASS |
| 15.400 | 27.2 | - | 13.6 | - | 60 | 50 | PASS |
| 15.825 | 25.6 | - | 13.5 | - | 60 | 50 | PASS |
| 16.675 | 26.0 | - | 25.6 | - | 60 | 50 | PASS |
| 17.100 | 19.6 | - | 19.8 | - | 60 | 50 | PASS |
| 18.800 | 22.3 | - | 21.9 | - | 60 | 50 | PASS |
| 20.000 | 27.3 | - | 28.2 | - | 60 | 50 | PASS |
| 20.075 | 20.5 | - | 21.8 | - | 60 | 50 | PASS |
| 21.775 | 16.4 | - | 15.0 | - | 60 | 50 | PASS |
| 22.200 | 13.8 | - | 14.3 | - | 60 | 50 | PASS |
| 29.500 | 21.0 | - | 20.4 | - | 60 | 50 | PASS |

Table 3a Conducted emission measurements of the PD231

The results of the conducted emission tests, carried out in accordance with 47 CFR Part 15 section 15.207 at the 120 Volts AC mains connection terminals of the PD231, are depicted in table 3a. Maximum values recorded.

**Notes:**

1. Field strength values of radiated emissions at frequencies not listed in Table 3a are more than 20 dB below the applicable limit.
2. Values obtained with Quasi Peak detector were already within Average limits, therefor average values not measured.
3. The test data shown above is of the worst case EUT.
4. The resolution bandwidth used was 9 kHz.
5. Measurement uncertainty is ±3.5dB

Test engineer

Signature : 

Name : R. van der Meer

Date : August 03, 2010

## 4.2 Conducted emission data of the EUT (PD234).

| Supply Voltage (V) | Frequency (MHz) | Measurement results dB(µV) Neutral | | Measurement results dB(µV) Line 1 | | Limits dB(µV) | | Result |
|---|---|---|---|---|---|---|---|---|
| | | QP | AV | QP | AV | QP | AV | |
| 12 | 0.150 | 40.2 | - | 38.0 | - | 66 | 56 | PASS |
| | 0.750 | <20 | - | 41.3 | - | 56 | 46 | PASS |
| | 0.825 | 40.1 | - | <20 | - | 56 | 46 | PASS |
| | 3.175 | 11.3 | - | 17.2 | - | 56 | 46 | PASS |
| | 10.925 | <15 | - | 20.3 | - | 60 | 50 | PASS |
| | 11.200 | 21.2 | - | <20 | - | 60 | 50 | PASS |
| | 16.675 | 17.2 | - | 17.8 | - | 60 | 50 | PASS |
| | 20.000 | 24.2 | - | 23.1 | - | 60 | 50 | PASS |
| | 20.075 | 18 | - | 17.6 | - | 60 | 50 | PASS |
| 18 | 0.150 | 38.7 | - | 38.2 | - | 60 | 50 | PASS |
| | 0.800 | <20 | - | 39.1 | - | 56 | 46 | PASS |
| | 0.825 | 39.1 | - | <20 | - | 56 | 46 | PASS |
| | 3.100 | 11.5 | - | 17.2 | - | 56 | 46 | PASS |
| | 11.300 | 22.3 | - | 22.8 | - | 60 | 50 | PASS |
| | 17.525 | 18.4 | - | 18.3 | - | 60 | 50 | PASS |
| | 20.000 | 23.5 | - | 22.3 | - | 60 | 50 | PASS |
| | 20.075 | 17.7 | - | 16.9 | - | 60 | 50 | PASS |
| 24 | 0.150 | 36.8 | - | 37.2 | | 60 | 50 | PASS |
| | 0.750 | 38.8 | - | 37.8 | - | 56 | 46 | PASS |
| | 3.275 | 16.6 | - | 10.3 | - | 56 | 46 | PASS |
| | 14.975 | 27.6 | - | 13.6 | - | 60 | 50 | PASS |
| | 15.400 | 25.5 | - | 12.9 | - | 60 | 50 | PASS |
| | 15.825 | 21.8 | - | 7.7 | - | 60 | 50 | PASS |
| | 16.675 | 18.8 | - | 16.4 | - | 60 | 50 | PASS |
| | 20.000 | 20.5 | - | 23.5 | - | 60 | 50 | PASS |

Table 3b Conducted emission measurements

The results of the conducted emission tests, carried out in accordance with 47 CFR Part 15 section 15.207 at the 120 Volts AC mains connection terminals of the AC/DC power supply which was connected to the PD234, are depicted in table 3b. Maximum values recorded.

**Notes:**

1. Field strength values of radiated emissions at frequencies not listed in Table 3b are more than 20 dB below the applicable limit.
2. Values obtained with Quasi Peak detector were already within Average limits, therefor average values not measured.
3. The test data shown above is of the worst case EUT.
4. Measurement uncertainty is ±3.5dB

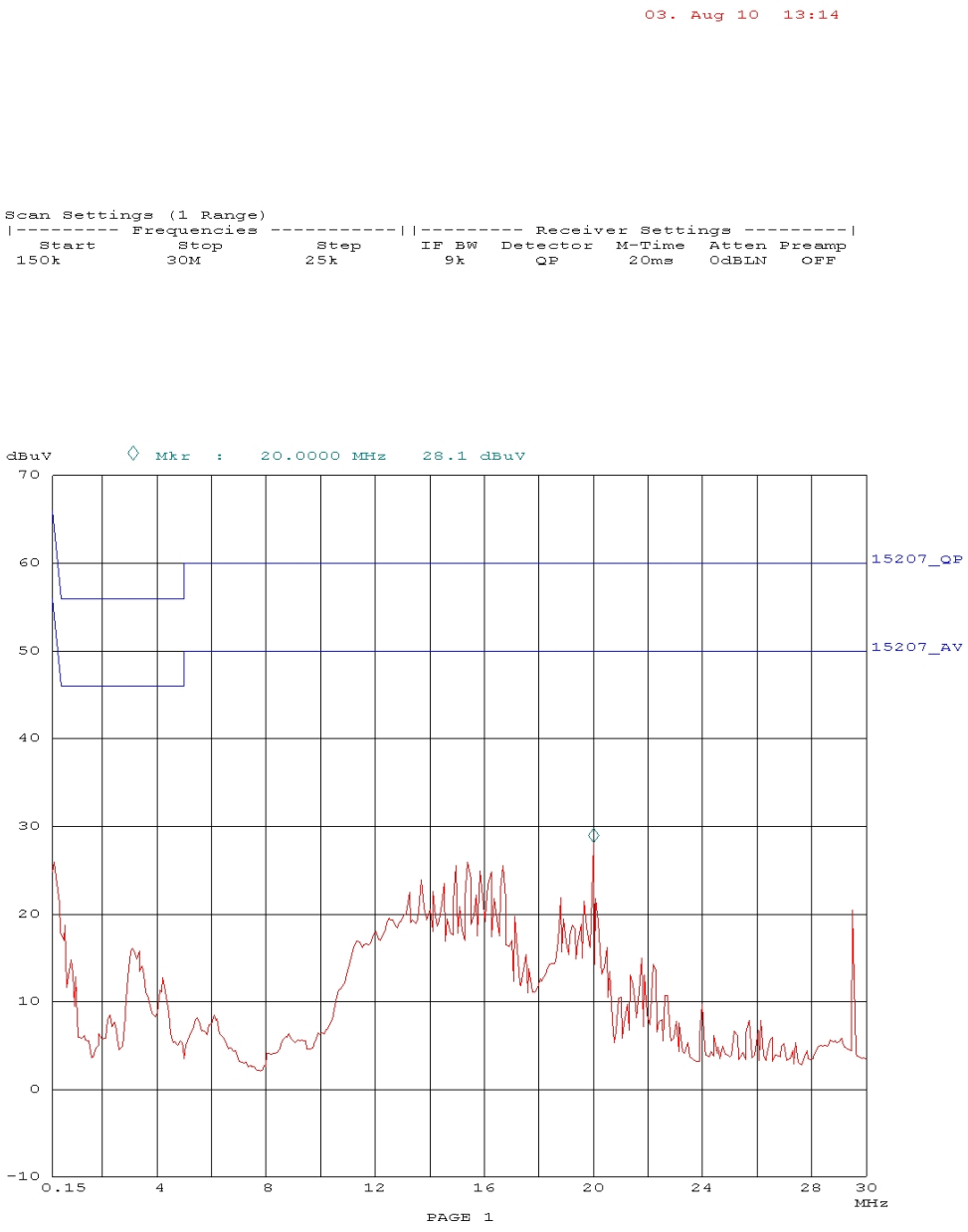
Test engineer

Signature :

Name : R. van der Meer
Date : August 03, 2010

# 5 Plots of measurement data

## 5.1 Conducted emissions

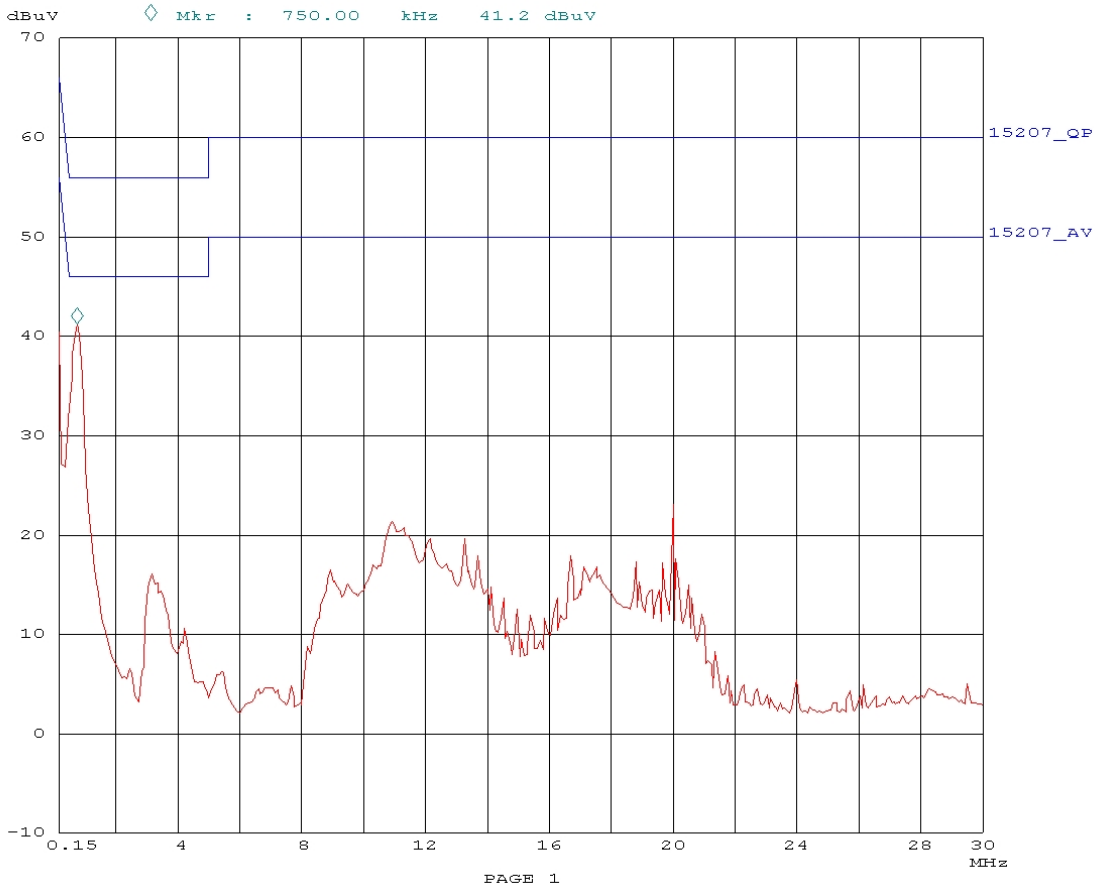



Plot 1: Conducted emissions of the PD231 (L1 shown)

02. Aug 10 14:20

Scan Settings (1 Range)

| Frequencies | | | Receiver Settings | | | | |
|---|---|---|---|---|---|---|---|
| Start | Stop | Step | IF BW | Detector | M-Time | Atten | Preamp |
| 150k | 30M | 25k | 9k | QP | 20ms | 0dBLN | OFF |




Plot 2: Conducted emissions of the PD234 (L1 at 12V shown)

# 6 List of utilized test equipment.

| Inventory number | Description | Brand | Model | Last cal. | Next cal. |
|---|---|---|---|---|---|
| 12476 | Antenna mast | EMCO | TR3 | NA | NA |
| 12477 | Antenna mast 1-4 mtr | Poelstra | NA | NA | NA |
| 12513 | LISN | EMCO | 3625/2 | 01/2010 | 01/2012 |
| 15453 | Active loopant. 60 cm | Chase | HLA6120 | 05/2010 | 05/2011 |
| 15633 | Biconilog Testantenna | Chase | CBL 6111B | 02/2010 | 02/2011 |
| 12640 | Temperature chamber | Heraeus | VEM03/500 | 01/2010 | 01/2011 |
| 99045 | Power supply | Delta | E030-3 | 04/2010 | 04/2011 |
| 99069 | Coax 5m RG213 OATS | NMi Certin B.V. | CABLE 5M OATS | 11/2009 | 11/2010 |
| 99070 | Coax 15m RG213 OATS | NMi Certin B.V. | CABLE 15M OATS | 11/2009 | 11/2010 |
| 99071 | Coax OATS ground | NMi Certin B.V. | CABLE OATS | 11/2009 | 11/2010 |
| 99161 | Variac 120Vac | RFT | LTS001 | NA | NA |
| 99107 | Controller OATS | Heinrich Deisel | 4630-100 | NA | NA |
| 99547 | Temperature-Humiditymeter | Europe supplies | WS-7082 | 10/2009 | 10/2010 |
| 99580 | OATS | Comtest | FCC listed: 90828 | 08/2008 | 08/2011 |
| 99608 | Controller (OATS) | EMCS | DOC202 | NA | NA |
| 99609 | Antenna mast | EMCS | AP-4702C | NA | NA |
| 99699 | Measuring receiver | R&S | ESCI | 12/2009 | 12/2010 |

NA= Not Applicable

NORTECH

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# Appendix-1

# PD230 / TD236 Family –Description

There are more than:-

90 members of the PD230 / TD236 Family

b) All the members of the PD230 / TD236 Family use the same PCB - PCB No. 302AW0005 Rev 02

c) Different languages on the labels

d) Different connector pin assignment

e) Re-Badged for major OEMs (Labels with OEM's Logo and Model No.)

f) There are three supply voltage versions:- 120 Vac, 230Vac and Low voltage version 12 to 24V ac or dc

| Model No. | Supply Voltage |
|---|---|
| | |
| PD231 | 120 Vac |
| PD232 | 230Vac |
| PD234 | 12 to 24V ac or dc |
| TD234 | 12 to 24V ac or dc |
| TD236 | 230Vac |

**Power Supplies**

Refer to the Block diagrams below

PD231 Models

Block A is populated (120 V transformer used)

Block B is not populated

PD232 and TD236 Models

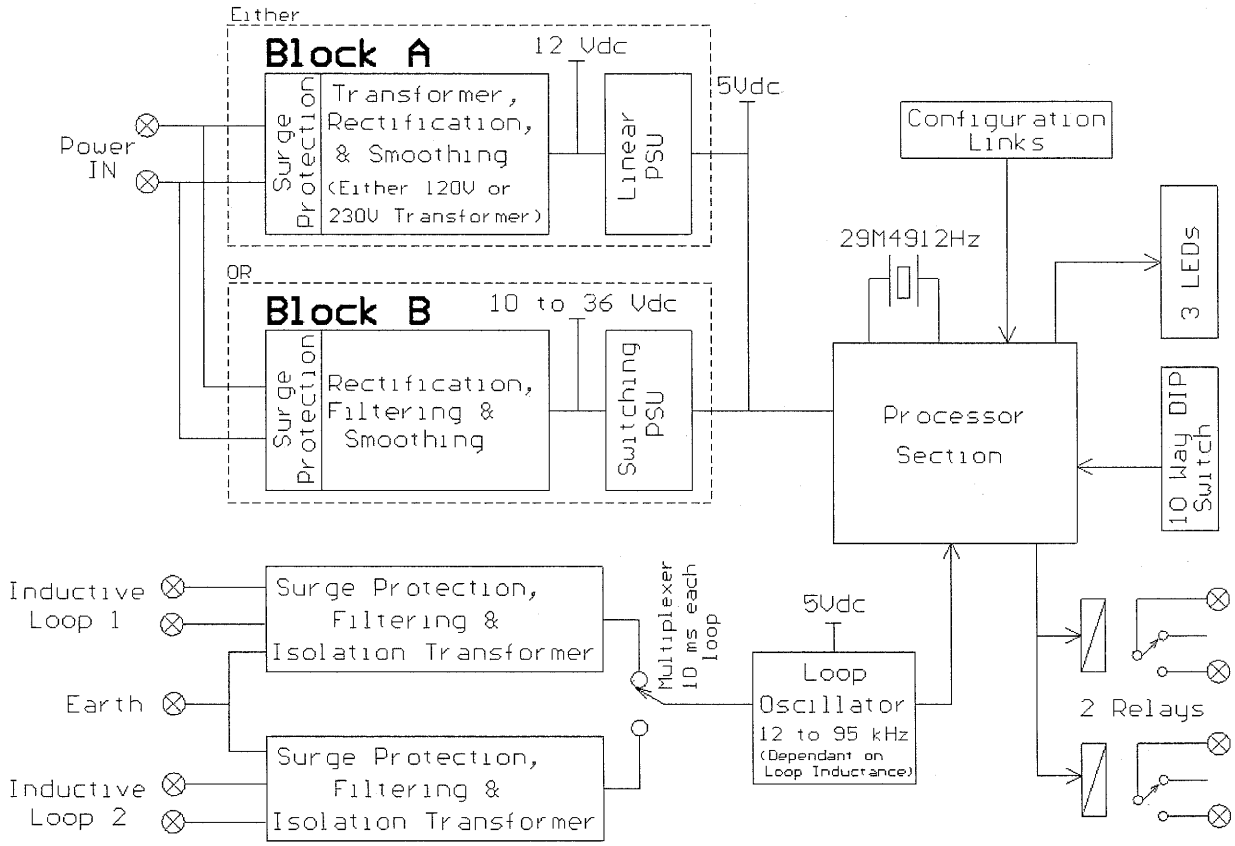
Block A is populated (230 V transformer used)

Block B is not populated

PD234 and TD234 Models

Block A is not populated

Block B is populated




# PD230/TD236 Family Block Diagram

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Signed by:

Full name: Barry Kemp

Function: Managing Director
Components Division
Nortech International (Pty) Ltd.