



# Electromagnetic Compatibility Test Report

Tests Performed on an RF IDEas, Inc.

Dual Frequency Card Reader

Models RDR-80081AK6, RDR-80081AK9, RDR-80581AK6, & RDR-80581AK9

Radiometrics Document RP-8675A



|                                                                          |                    |                                         |                   |
|--------------------------------------------------------------------------|--------------------|-----------------------------------------|-------------------|
| <i>Product Detail:</i>                                                   |                    |                                         |                   |
| FCC ID: M9MLC80XW6R                                                      |                    |                                         |                   |
| IC: 6571A-LC80XW6R                                                       |                    |                                         |                   |
| Equipment type: Dual Frequency Card Reader                               |                    |                                         |                   |
| <i>Test Standards:</i>                                                   |                    |                                         |                   |
| US CFR Title 47, Chapter I, FCC Part 15 Subpart C                        |                    |                                         |                   |
| FCC Part 15 CFR Title 47: 2017                                           |                    |                                         |                   |
| Canada ISED; RSS-210, Issue 9: 2016 as required for Category I Equipment |                    |                                         |                   |
| FCC Part 15.209 and 15.225                                               |                    |                                         |                   |
| <i>Tests Performed For:</i>                                              |                    | <i>Test Facility:</i>                   |                   |
| <b>RF IDEas, Inc.</b>                                                    |                    | <b>Radiometrics Midwest Corporation</b> |                   |
| 4020 Winnetka Av.                                                        |                    | 12 East Devonwood                       |                   |
| Rolling Meadows, IL 60008                                                |                    | Romeoville, IL 60446                    |                   |
| <i>Test Date(s): (Month-Day-Year)</i>                                    |                    |                                         |                   |
| June 7 thru August 29, 2017                                              |                    |                                         |                   |
| Document RP-7382 Revisions:                                              |                    |                                         |                   |
| Rev.                                                                     | Issue Date         | Affected Sections                       | Revised By        |
| 0                                                                        | August 31, 2017    |                                         |                   |
| 1                                                                        | September 13, 2017 | 2, 11.1, 11.2.2, 11.4                   | Joseph Strzelecki |
|                                                                          |                    |                                         |                   |

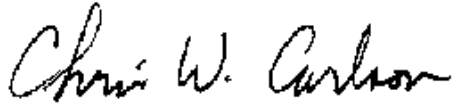
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| RADIOMETRICS MIDWEST CORPORATION - EMC Test Report                        |
|---------------------------------------------------------------------------|
| RF IDEas, Models RDR-80081AK6, RDR-80081AK9, RDR-80581AK6, & RDR-80581AK9 |

## 1 ADMINISTRATIVE DATA

|                                                                                                                                                                                                                                           |                                                                                    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| <i>Equipment Under Test:</i>                                                                                                                                                                                                              |                                                                                    |
| A RF IDEas, Inc., Dual Frequency Card Reader<br>Models: RDR-80081AK6, RDR-80081AK9, RDR-80581AK6, & RDR-80581AK9<br>Serial Numbers: L0I530062, L0IS50051, L05S800160, and L05S50051<br>This will be referred to as the EUT in this Report |                                                                                    |
| <i>Date EUT Received at Radiometrics: (Month-Day-Year)</i>                                                                                                                                                                                | <i>Test Date(s): (Month-Day-Year)</i>                                              |
| June 7, 2017                                                                                                                                                                                                                              | June 7 thru August 29, 2017                                                        |
| <i>Test Report Written By:</i>                                                                                                                                                                                                            | <i>Test Witnessed By:</i>                                                          |
| Joseph Strzelecki<br>Senior EMC Engineer                                                                                                                                                                                                  | The tests were not witnessed by RF IDEas, Inc.                                     |
| <i>Radiometrics' Personnel Responsible for Test:</i>                                                                                                                                                                                      | <i>Test Report Approved By</i>                                                     |
|                                                                                                                                                          |  |
| Joseph Strzelecki<br>Senior EMC Engineer<br>NARTE EMC-000877-NE                                                                                                                                                                           | Chris W. Carlson<br>Director of Engineering<br>NARTE EMC-000921-NE                 |

## 2 TEST SUMMARY AND RESULTS

The EUT (Equipment Under Test) is a Dual Frequency Card Reader, Models RDR-80081AK6, RDR-80081AK9, RDR-80581AK6, and RDR-80581AK9, manufactured by RF IDEas, Inc. The detailed test results are presented in a separate section. The following is a summary of the test results.

### Emissions Tests Results

| Environmental Phenomena       | Frequency Range       | Basic Standard        | Test Result |
|-------------------------------|-----------------------|-----------------------|-------------|
| RF Radiated Emissions         | 30-1000 MHz           | RSS-210 & FCC Part 15 | Pass        |
| Conducted Emissions, AC Mains | 0.15 - 30 MHz         | RSS-210 & FCC Part 15 | Pass        |
| RF Radiated Emissions H-Field | 0.009 – 30 MHz        | RSS-210 & FCC Part 15 | Pass        |
| Occupied Bandwidth            | 125 kHz and 13.56 MHz | RSS-210 & FCC Part 15 |             |
| Frequency Stability           | 13.56 MHz             | RSS-210 & FCC Part 15 |             |

Note: The RSS-210 specification is not currently covered in Radiometrics' Scope of Accreditation. This is technically very similar to FCC, CFR 47 Part 15 which is on Radiometrics scope.

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## 2.1 RF Exposure Compliance Requirements

Since the effective power output is less than 1 mW, the EUT meets the FCC requirement for RF exposure and is exempt from RSS-102. There are no power level adjustments and the antenna is permanently attached. The detailed calculations for RF Exposure are presented in a separate document.

## 3 EQUIPMENT UNDER TEST (EUT) DETAILS

### 3.1 EUT Description

The EUT is a dual frequency card reader, Models RDR-80081AK6, RDR-80081AK9, RDR-80581AK6, and RDR-80581AK9, manufactured by RF IDEas, Inc. The difference between the four model numbers being that the RDR-80081AK6 and RDR-80081AK9 have an SE Logic IC at location U2 that can be used in decoding an HID iCLASS 13.56 MHz credential whereas the models RDR-80581AK6 and RDR-80581AK9 will not have the SE Logic IC. Both products have the same PCB. The EUT was in good working condition during the tests, with no known defects.

#### 3.1.1 Product Family

The following is the product family list of the readers that use the RF sections.

| Model Number | Model Number |
|--------------|--------------|
| RDR-80081AK9 | RDR-80581AK9 |
| RDR-80081AK6 | RDR-80581AK6 |

#### 3.1.2 FCC Section 15.203 & RSS-GEN Antenna Requirements

The antenna is permanently attached to the PCB. The antenna is internal to the EUT and it is not readily available to be modified by the end user.

### 3.2 Related Submittals

RF IDEas, Inc. is not submitting any other products simultaneously for equipment authorization related to the EUT.

## 4 TESTED SYSTEM DETAILS

### 4.1 Tested System Configuration

The system was configured for testing in a typical fashion. The EUT was placed on an 80-cm high, nonconductive test stand. The testing was performed in conditions as close as possible to installed conditions. Wiring was consistent with manufacturer's recommendations. Power was supplied at 115 VAC, 60 Hz single-phase to the host computer. The EUT was powered from either the USB or PS/2 port. The identification for all equipment, plus descriptions of all cables used in the tested system, are:

| RADIOMETRICS MIDWEST CORPORATION - EMC Test Report                        |  |  |  |  |  |
|---------------------------------------------------------------------------|--|--|--|--|--|
| RF IDEas, Models RDR-80081AK6, RDR-80081AK9, RDR-80581AK6, & RDR-80581AK9 |  |  |  |  |  |

### Tested System Configuration List

| Item | Description           | Type* | Manufacturer | Model Number | Serial Number            |
|------|-----------------------|-------|--------------|--------------|--------------------------|
| 1    | Dual Frequency Reader | E     | RF IDEas     | RDR-80081AK6 | L0I530062                |
| 2    | Dual Frequency Reader | E     | RF IDEas     | RDR-80081AK9 | L0IS50051                |
| 3    | Dual Frequency Reader | E     | RF IDEas     | RDR-80581AK6 | L05S800160               |
| 4    | Dual Frequency Reader | E     | RF IDEas     | RDR-80581AK9 | L05S50051                |
| 5    | Desktop PC            | H     | Dell         | DCNE         | 53FMFC1                  |
| 6    | Monitor               | P     | Dell         | E156FPf      | CN-0Y9998-72872-5BN-1KET |
| 7    | Keyboard              | P     | Dell         | L100         | CN-0RH659-73571-14C-0926 |

\* Type: E = EUT, P = Peripheral, S = Support Equipment; H = Host Computer

### List of EUT Cables

| QTY | Length (m) | Cable Description           | Shielded? |
|-----|------------|-----------------------------|-----------|
| 1   | 1.8        | Serial Cable to Card Reader | Yes       |
| 1   | 1.8        | AC Cord to Computer         | No        |
| 1   | 1.5        | VGA cable to Monitor        | Yes       |
| 1   | 1.9        | Power cord to Monitor       | No        |
| 1   | 1.5        | Integral Mouse cable        | Yes       |
| 1   | 1.2        | Integral Keyboard cable     | Yes       |

## 4.2 Special Accessories

No special accessories were used during the tests in order to achieve compliance.

## 4.3 Equipment Modifications

No modifications were made at Radiometrics in order to meet the requirements listed in this report.

## 5 TEST SPECIFICATIONS

| Document           | Date | Title                                                                                                                 |
|--------------------|------|-----------------------------------------------------------------------------------------------------------------------|
| FCC CFR Title 47   | 2017 | Code of Federal Regulations Title 47, Chapter 1, Federal Communications Commission, Part 15 - Radio Frequency Devices |
| IC RSS-210 Issue 9 | 2016 | Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands) Category I Equipment                        |
| IC RSS-Gen Issue 4 | 2014 | General Requirements and Information for the Certification of Radiocommunication Equipment (RSS-Gen)                  |

## 6 TEST PROCEDURE DOCUMENTS

The tests were performed using the procedures from the following specifications:

| Document         | Date | Title                                                                                                                                |
|------------------|------|--------------------------------------------------------------------------------------------------------------------------------------|
| ANSI C63.4-2014  | 2014 | Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz |
| ANSI C63.10-2013 | 2013 | American National Standard for Testing Unlicensed Wireless Devices                                                                   |

## 7 RADIOMETRICS' TEST FACILITIES

The results of these tests were obtained at Radiometrics Midwest Corp. in Romeoville, Illinois, USA. Radiometrics is accredited by A2LA (American Association for Laboratory Accreditation) to conform to ISO/IEC 17025: 2005 "General Requirements for the Competence of Calibration and Testing Laboratories". Radiometrics' Lab Code is 121191 and Certification Number is 1495.01. Radiometrics' scope of accreditation includes all of the test methods listed herein. A copy of the accreditation can be accessed on our web site ([www.radiomet.com](http://www.radiomet.com)). Radiometrics accreditation status can be verified at A2LA's web site ([www.a2la2.org](http://www.a2la2.org)).

The following is a list of shielded enclosures located in Romeoville, Illinois used during the tests:

Chamber E: Is a custom made anechoic chamber that measures 52' L X 30' W X 18' H. The walls and ceiling are fully lined with RF absorber. Pro-shield of Collinsville, Oklahoma manufactured the chamber.

Test Station F: Is an area that measures 10' D X 12' W X 10' H. The floor and back wall are metal shielded. This area is used for conducted emissions measurements.

A separate ten-foot long, brass plated, steel ground rod attached via a 6 inch copper braid grounds each of the above chambers. Each enclosure is also equipped with low-pass power line filters.

The FCC has accepted these sites as test site number US1065. The FCC test site Registration Number is 732175. Details of the site characteristics are on file with the Industry Canada as site number IC8727A-1.

A complete list of the test equipment is provided herein. The calibration due dates are indicated on the equipment list. The equipment is calibrated in accordance to ANSI/NCSL Z540-1 with traceability to the National Institute of Standards and Technology (NIST).

## 8 DEVIATIONS AND EXCLUSIONS FROM THE TEST SPECIFICATIONS

There were no deviations or exclusions from the test specifications.

## 9 CERTIFICATION

Radiometrics Midwest Corporation certifies that the data contained herein was taken under conditions that meet or exceed the requirements of the test specification. The results relate only to the EUT listed herein. Any modifications made to the EUT subsequent to the indicated test date will invalidate the data and void this certification.

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| RF IDEas, Models RDR-80081AK6, RDR-80081AK9, RDR-80581AK6, & RDR-80581AK9 |  |

## 10 TEST EQUIPMENT TABLE

| RMC ID   | Manufacturer   | Description       | Model No.    | Serial No. | Frequency Range | Cal Period | Cal Date |
|----------|----------------|-------------------|--------------|------------|-----------------|------------|----------|
| AMP-22   | Anritsu        | Pre-amplifier     | MH648A       | M23969     | 0.1-1200MHz     | 12 Mo.     | 01/09/17 |
| ANT-03   | Tensor         | Biconical Antenna | 4104         | 2231       | 20-250MHz       | 24 Mo.     | 12/07/15 |
| ANT-04   | Tensor         | Biconical Antenna | 4104         | 2246       | 20-250MHz       | 24 Mo.     | 05/16/16 |
| ANT-06   | EMCO           | Log-Periodic Ant. | 3146         | 1248       | 200-1000MHz     | 24 Mo.     | 11/25/15 |
| ANT-08   | RMC            | Log-Periodic Ant. | LP1000       | 1002       | 200-1000MHz     | 24 Mo.     | 10/06/16 |
| ANT-53   | EMCO           | Loop Antenna      | 6507         | 1453       | 1 kHz-30 MHz    | 24 Mo.     | 12/17/15 |
| CAB-106A | Teledyne       | Coaxial Cable     | N/A          | 1090       | DC-2 GHz        | 24 Mo.     | 04/21/16 |
| CAB-1090 | Teledyne       | Coaxial Cable     | N/A          | 1090       | DC-18 GHz       | 24 Mo.     | 04/19/16 |
| CAB-160B | Teledyne       | Coaxial Cable     | N/A          | 1090       | DC-18 GHz       | 24 Mo.     | 04/21/16 |
| LSN-01   | Electrometrics | 50 uH LISN        | FCC/VDE 50/2 | 1001       | 0.01-30MHz      | 24 Mo.     | 06/30/17 |
| LSN-03   | Farnell        | 50 uH LISN        | 1EXLSN30B    | 000314     | 0.15-30MHz      | 24 Mo.     | 02/08/16 |
| REC-11   | Agilent        | Spectrum Analyzer | E7405A       | US39110103 | 9Hz-26.5GHz     | 24 Mo.     | 03/23/16 |
| REC-21   | Agilent        | Spectrum Analyzer | E7405A       | MY45118341 | 9kHz-26.5 GHz   | 24 Mo.     | 12/22/15 |
| REC-43   | Adventest      | Spectrum Analyzer | U3772        | 150800305  | 9kHz-43GHz      | 24 Mo.     | 04/19/17 |
| THM-03   | Fluke          | Temp/Humid Meter  | 971          | 95850465   | N/A             | 12 Mo.     | 02/20/17 |

Note: All calibrated equipment is subject to periodic checks.

| Software Company | Test Software Name | Version  | Applicable Tests                                   |
|------------------|--------------------|----------|----------------------------------------------------|
| Radiometrics     | EN550XX0           | 06.10.16 | RF Conducted Emissions (FCC Part 15 & EN 55011/22) |
| Radiometrics     | RRECE11D           | 01.05.16 | RF Radiated Emissions (FCC Part 15 & EN 55011/22)  |
| Agilent          | PSA/ESA-E/L/EMC    | 2.4.0.42 | Bandwidth and screen shots                         |

## 11 TEST SECTIONS

### 11.1 AC Conducted Emissions

The tests and limits are in accordance with FCC section 15.207 and RSS Gen section 8.8.

A computer-controlled analyzer was used to perform the conducted emissions measurements. The frequency range was divided into 500 subranges equally spaced on a logarithmic scale. The computer recorded the peak of each subrange. This data was then plotted on a semi-log graph generated by the computer. Adjusting the positions of the cables and orientation of the test system then maximizes the highest emissions.

Mains Conducted emission measurements were performed using a 50 Ohm/50 uH Line Impedance Stabilization Network (LISN) as the pick-up device. Measurements were repeated on both leads within the power cord. If the EUT power cord exceeded 80 cm in length, the excess length of the power cord was made into a 30 to 40 cm bundle near the center of the cord. The LISN was placed on the floor at the base of the test platform and electrically bonded to the ground plane.

**FCC/IC Limits of Conducted Emissions at the AC Mains Ports**

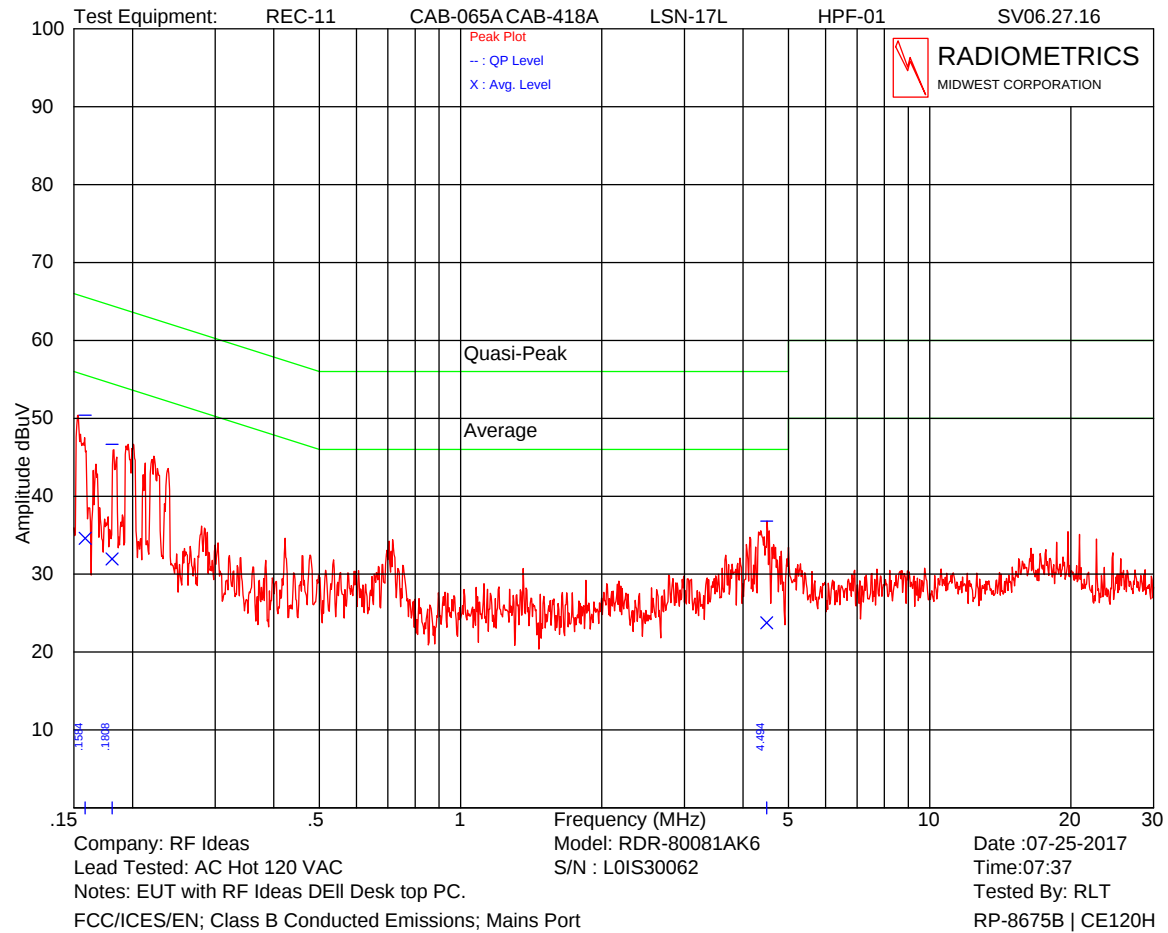
| Frequency Range (MHz)                                                             | Class B Limits (dBuV) |         |
|-----------------------------------------------------------------------------------|-----------------------|---------|
|                                                                                   | Quasi-Peak            | Average |
| 0.150 - 0.50*                                                                     | 66 - 56               | 56 - 46 |
| 0.5 – 5.0                                                                         | 56                    | 46      |
| 5.0 - 30                                                                          | 60                    | 50      |
| * The limit decreases linearly with the logarithm of the frequency in this range. |                       |         |

The initial step in collecting conducted data is a peak detector scan and the plotting of the measurement range. Significant peaks are then marked as shown on the following table, and these signals are then measured with the quasi-peak detector. The following represents the worst case emissions from the host computer (with the EUT connected) power cord, after testing all modes of operation. QP readings are quasi-peak with a 9 kHz bandwidth and no video filter.

Test Date : July 25, 2017

The 125 kHz and the 13.56 MHz transmitters were both on during the following tests. The following shows the results while reading the 125 kHz card during the tests. There was no difference seen with the 13.56 MHz or the 125 card type.

Model: RDR-80081AK6;

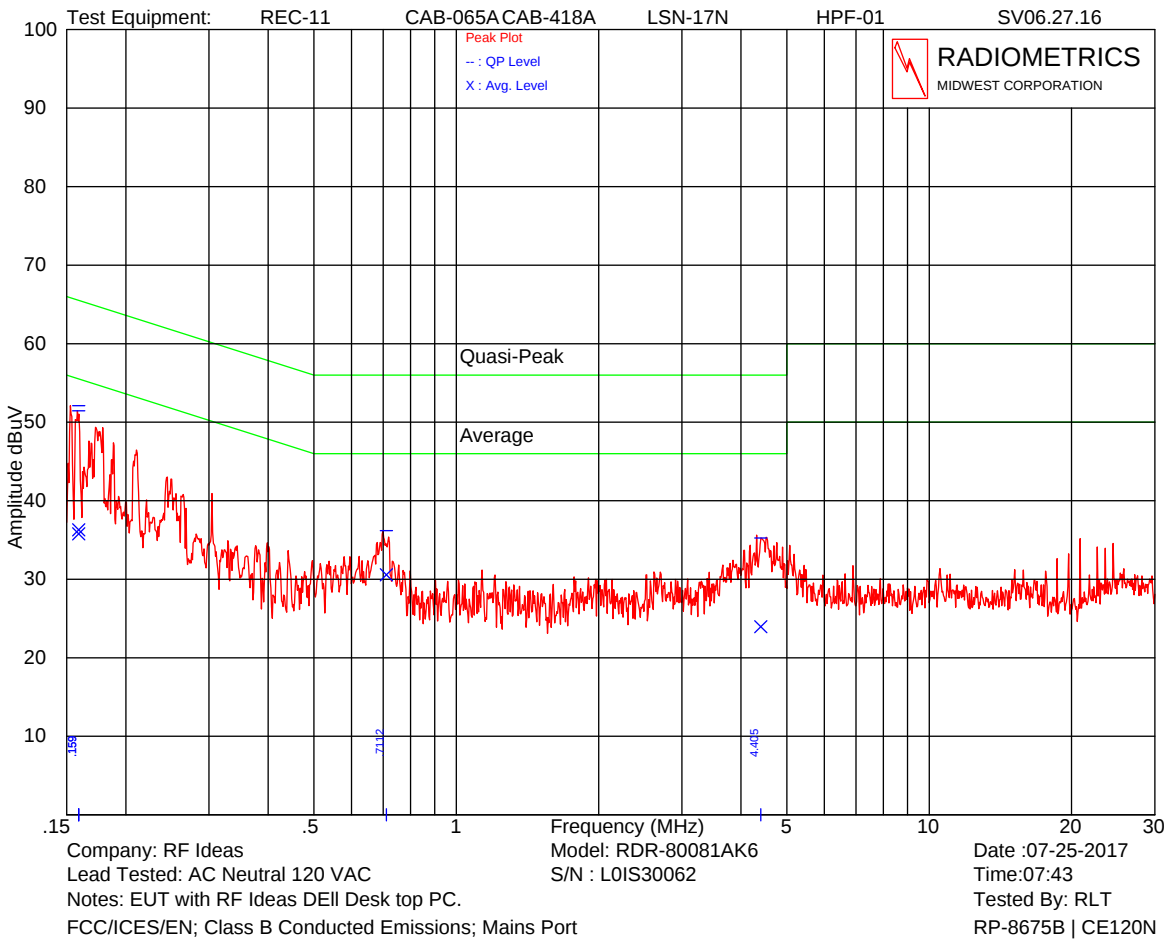


| Frequency (MHz) | QP Amplitude (dBuV) | QP Limit (dBuV) | Average Amplitude (dBuV) | Average Limit (dBuV) | Margin (dB) |
|-----------------|---------------------|-----------------|--------------------------|----------------------|-------------|
| 0.158           | 50.4                | 65.5            | 34.6                     | 55.5                 | 15.1        |
| 0.181           | 46.7                | 64.4            | 31.9                     | 54.4                 | 17.8        |
| 4.495           | 36.8                | 56.0            | 23.7                     | 46.0                 | 19.2        |

The Limit shown above is RSS-GEN Table 3.

|                                                                           |
|---------------------------------------------------------------------------|
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| RF IDEas, Models RDR-80081AK6, RDR-80081AK9, RDR-80581AK6, & RDR-80581AK9 |

Model: RDR-80081AK6

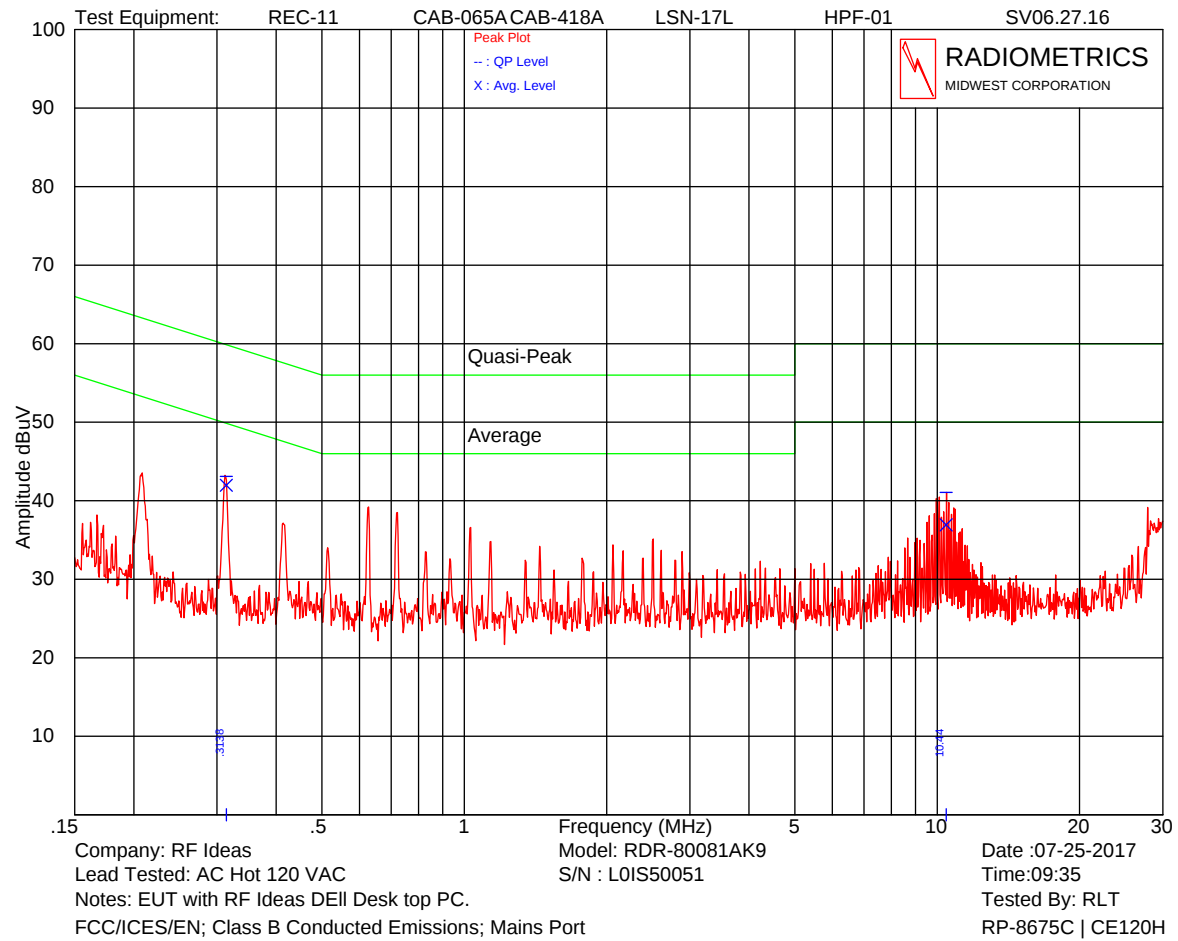


| Frequency (MHz) | QP Amplitude (dBuV) | QP Limit (dBuV) | Average Amplitude (dBuV) | Average Limit (dBuV) | Margin (dB) |
|-----------------|---------------------|-----------------|--------------------------|----------------------|-------------|
| 0.159           | 52.1                | 65.5            | 35.8                     | 55.5                 | 13.4        |
| 0.159           | 51.4                | 65.5            | 36.3                     | 55.5                 | 14.1        |
| 0.711           | 36.2                | 56.0            | 30.6                     | 46.0                 | 15.4        |
| 4.405           | 35.3                | 56.0            | 24.0                     | 46.0                 | 20.7        |

The Limit shown above is RSS-GEN Table 3.

|                                                                           |
|---------------------------------------------------------------------------|
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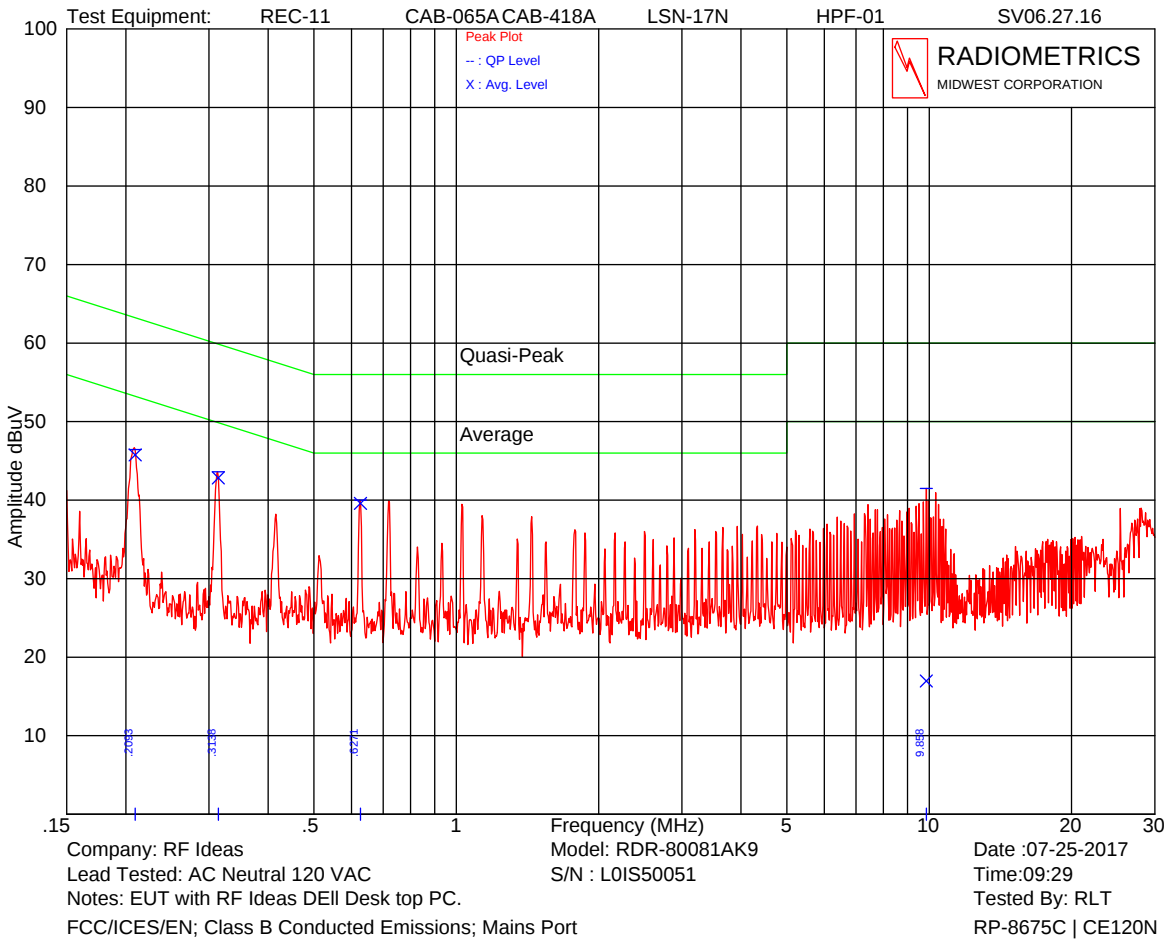
Model: RDR-80081AK9



| Frequency (MHz) | QP Amplitude (dBuV) | QP Limit (dBuV) | Average Amplitude (dBuV) | Average Limit (dBuV) | Margin (dB) |
|-----------------|---------------------|-----------------|--------------------------|----------------------|-------------|
| 0.314           | 43.1                | 59.9            | 42.0                     | 49.9                 | 7.9         |
| 10.448          | 41.1                | 60.0            | 36.9                     | 50.0                 | 13.1        |

|                                                                                      |
|--------------------------------------------------------------------------------------|
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| <b>RF Ideas, Models RDR-80081AK6, RDR-80081AK9, RDR-80581AK6, &amp; RDR-80581AK9</b> |

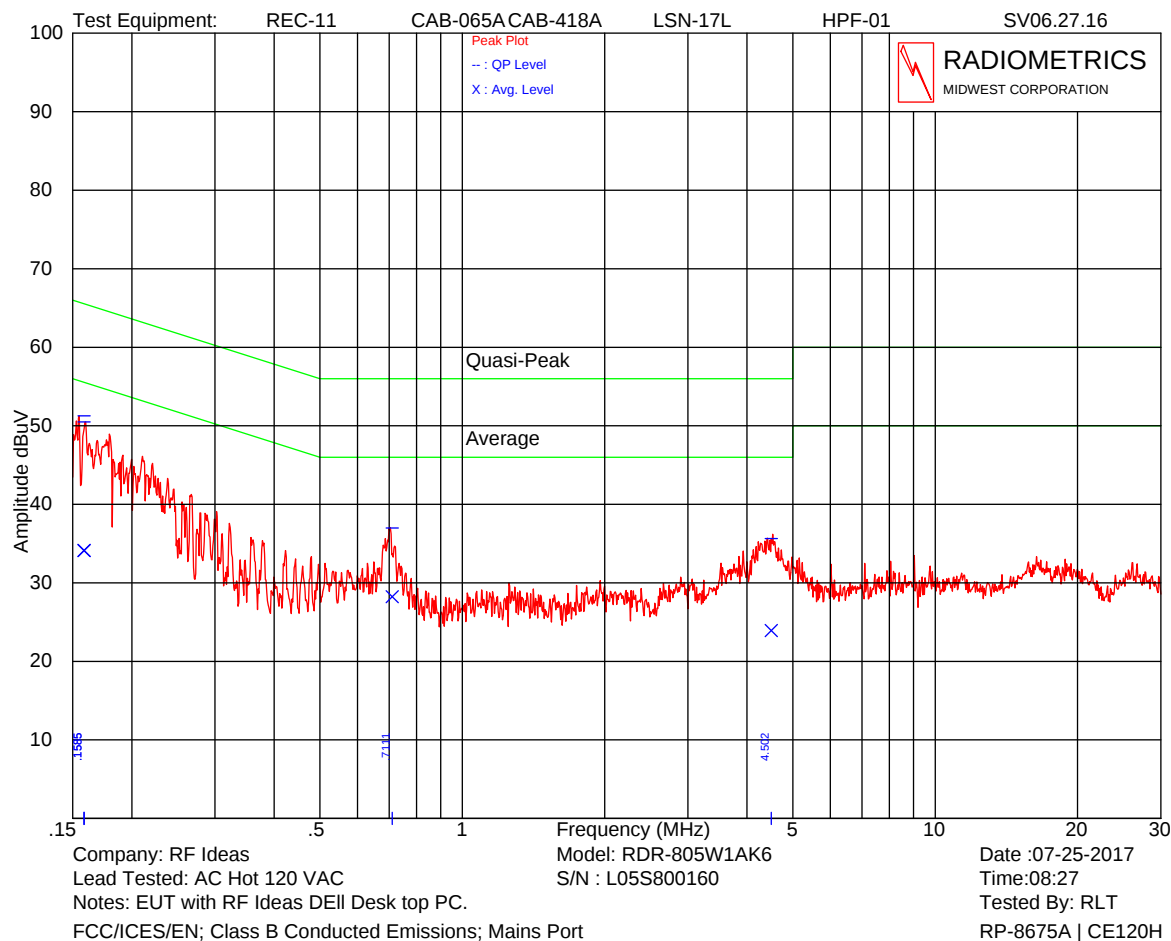
Model: RDR-80081AK9



| Frequency (MHz) | QP Amplitude (dBuV) | QP Limit (dBuV) | Average Amplitude (dBuV) | Average Limit (dBuV) | Margin (dB) |
|-----------------|---------------------|-----------------|--------------------------|----------------------|-------------|
| 0.209           | 46.4                | 63.2            | 45.8                     | 53.2                 | 7.5         |
| 0.314           | 43.6                | 59.9            | 42.8                     | 49.9                 | 7.0         |
| 0.627           | 40.0                | 56.0            | 39.6                     | 46.0                 | 6.4         |
| 9.858           | 41.5                | 60.0            | 17.0                     | 50.0                 | 18.5        |

The Limit shown above is RSS-GEN Table 3.

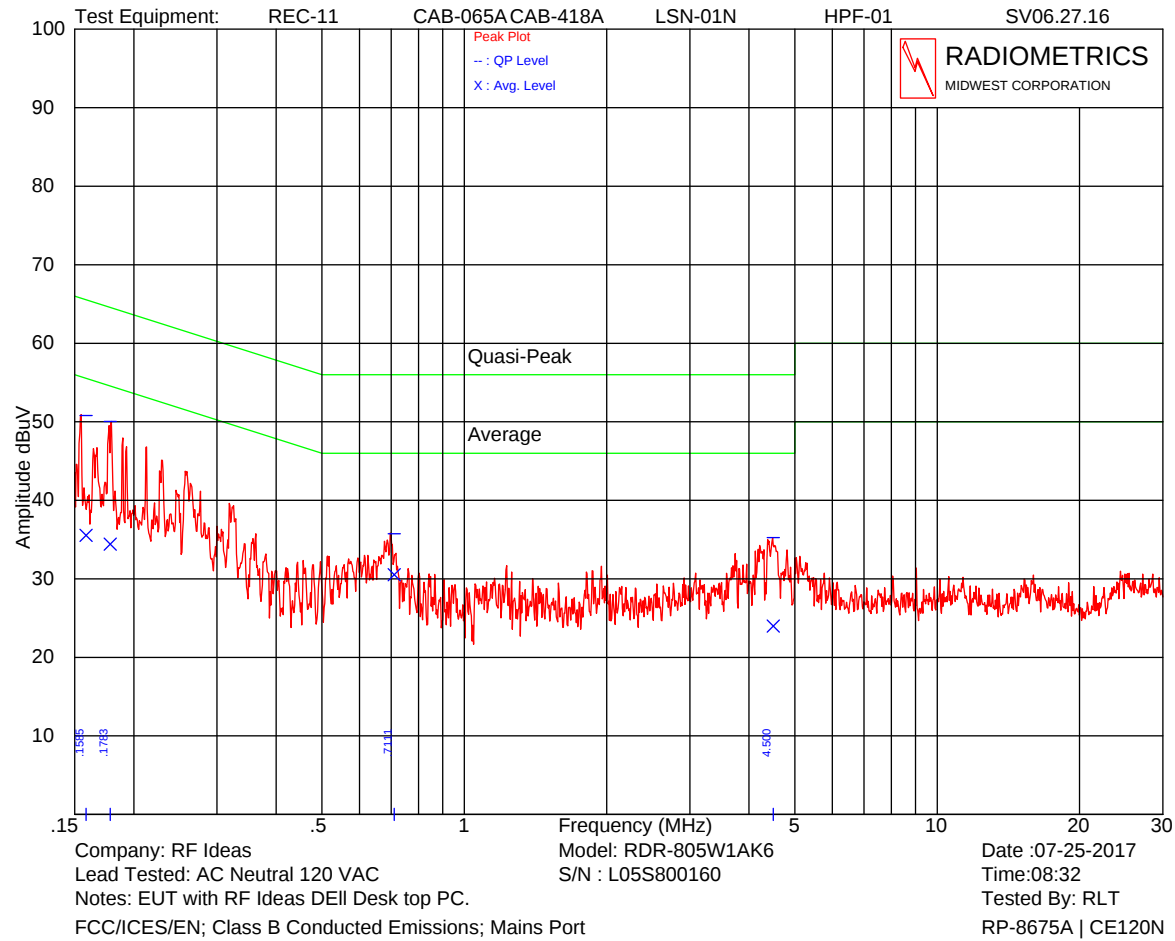
Model: RDR-80581AK6



| Frequency (MHz) | QP Amplitude (dBuV) | QP Limit (dBuV) | Average Amplitude (dBuV) | Average Limit (dBuV) | Margin (dB) |
|-----------------|---------------------|-----------------|--------------------------|----------------------|-------------|
| 0.159           | 51.3                | 65.5            | 34.1                     | 55.5                 | 14.3        |
| 0.159           | 50.5                | 65.5            | 34.1                     | 55.5                 | 15.0        |
| 0.711           | 37.0                | 56.0            | 28.2                     | 46.0                 | 17.8        |
| 4.502           | 35.6                | 56.0            | 23.9                     | 46.0                 | 20.4        |

The Limit shown above is RSS-GEN Table 3.

Model: RDR-80581AK6

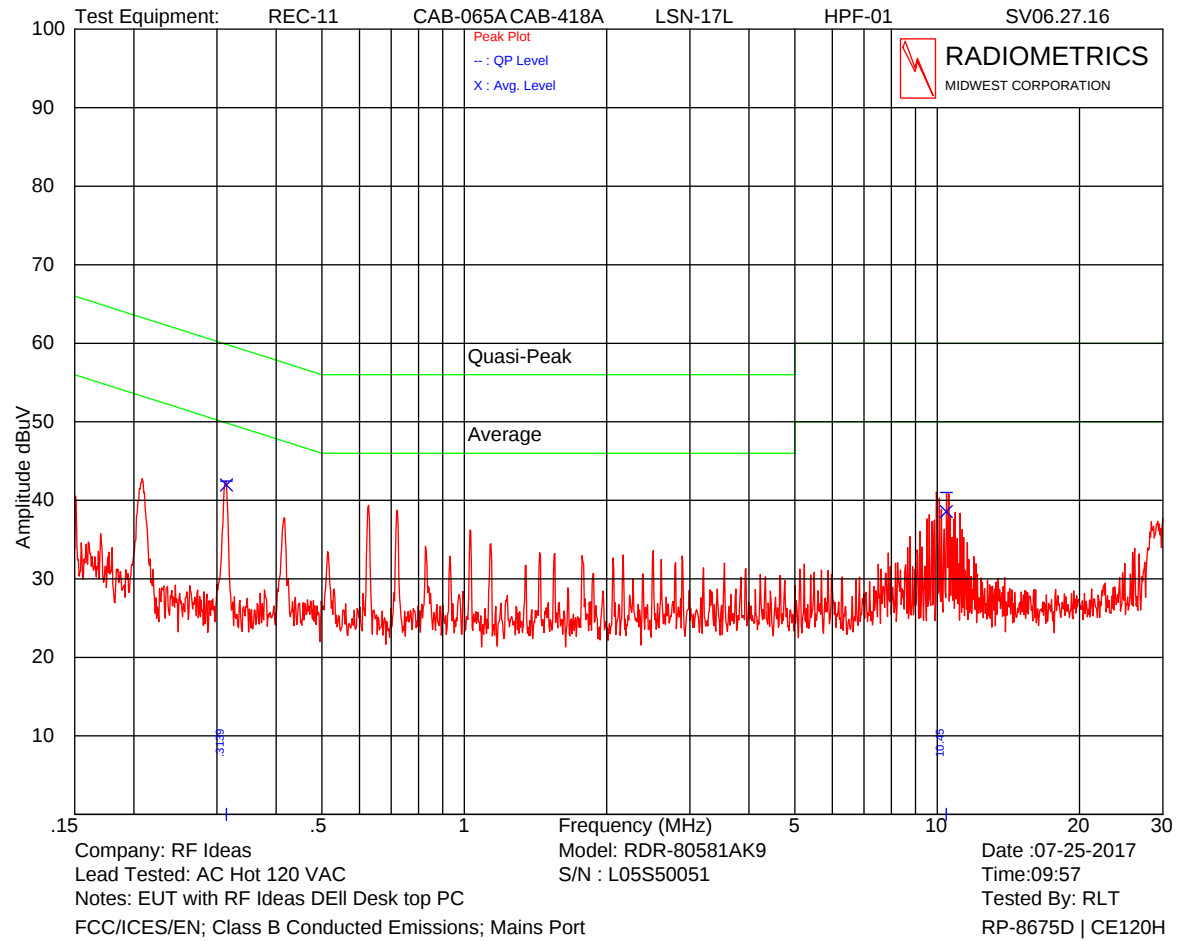


| Frequency (MHz) | QP Amplitude (dBuV) | QP Limit (dBuV) | Average Amplitude (dBuV) | Average Limit (dBuV) | Margin (dB) |
|-----------------|---------------------|-----------------|--------------------------|----------------------|-------------|
| 0.159           | 50.8                | 65.5            | 35.5                     | 55.5                 | 14.7        |
| 0.178           | 50.0                | 64.6            | 34.4                     | 54.6                 | 14.5        |
| 0.711           | 35.7                | 56.0            | 30.5                     | 46.0                 | 15.5        |
| 4.501           | 35.2                | 56.0            | 24.0                     | 46.0                 | 20.8        |

The Limit shown above is RSS-GEN Table 3.

Judgement: Passed by at least 6 dB at all frequencies with standard Loop antenna installed.

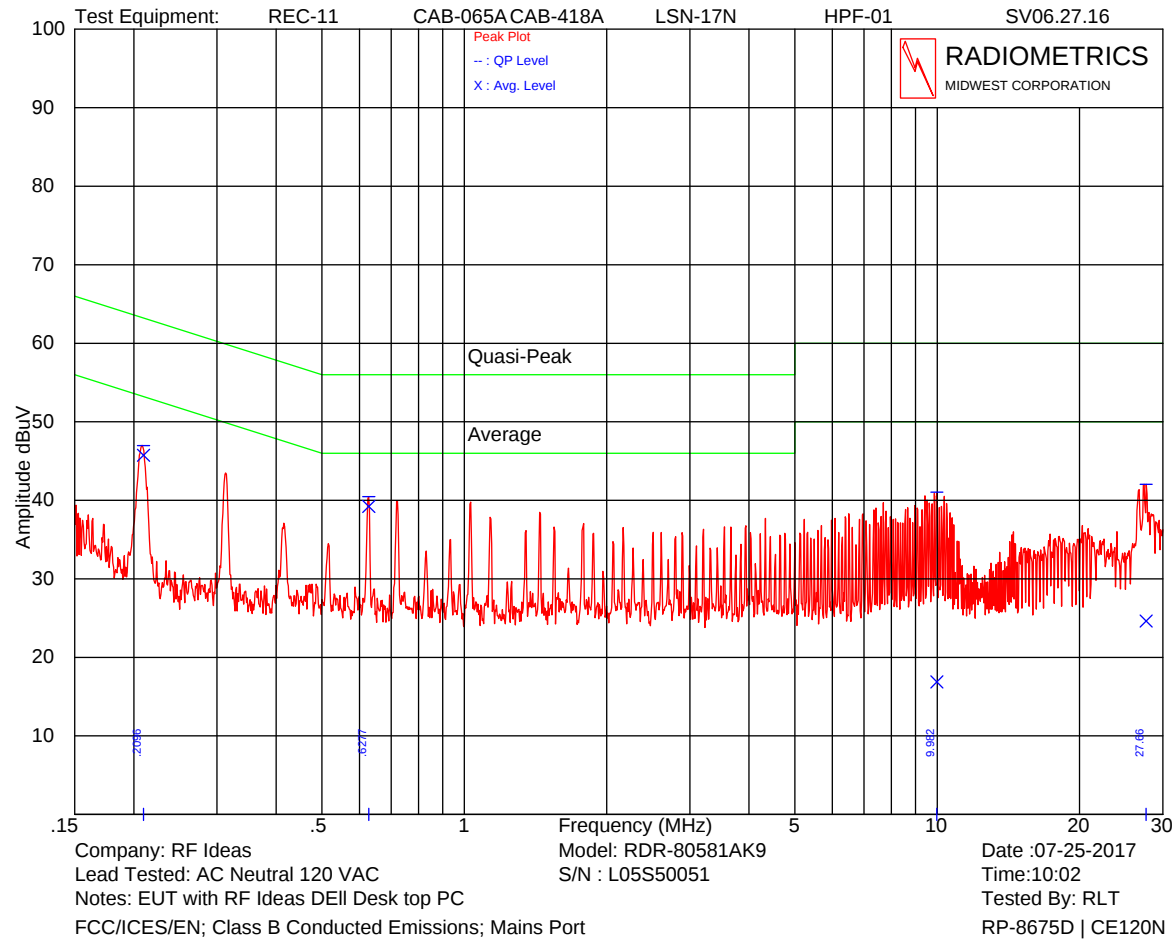
Model: RDR-80581AK9



| Frequency (MHz) | QP Amplitude (dBuV) | QP Limit (dBuV) | Average Amplitude (dBuV) | Average Limit (dBuV) | Margin (dB) |
|-----------------|---------------------|-----------------|--------------------------|----------------------|-------------|
| 0.314           | 42.4                | 59.9            | 42.0                     | 49.9                 | 7.9         |
| 10.454          | 41.0                | 60.0            | 38.6                     | 50.0                 | 11.4        |

The Limit shown above is RSS-GEN Table 3.

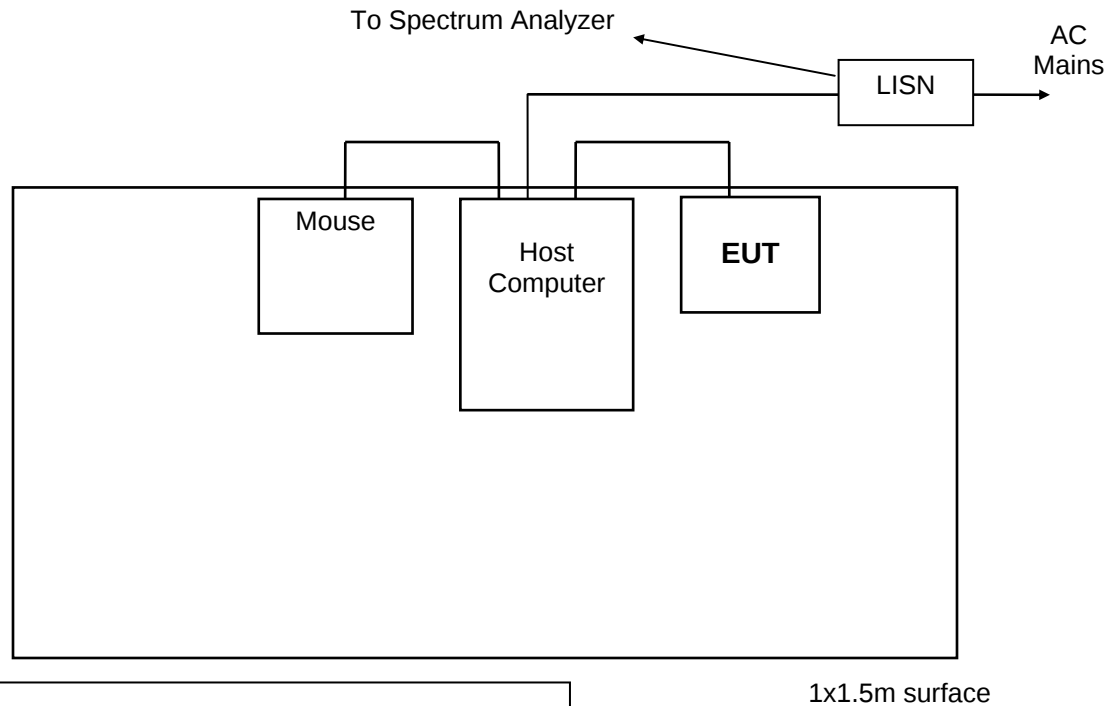
Model: RDR-80581AK9



| Frequency (MHz) | QP Amplitude (dBuV) | QP Limit (dBuV) | Average Amplitude (dBuV) | Average Limit (dBuV) | Margin (dB) |
|-----------------|---------------------|-----------------|--------------------------|----------------------|-------------|
| 0.210           | 47.0                | 63.2            | 45.7                     | 53.2                 | 7.5         |
| 0.628           | 40.5                | 56.0            | 39.2                     | 46.0                 | 6.8         |
| 9.983           | 41.0                | 60.0            | 16.9                     | 50.0                 | 19.0        |
| 27.667          | 42.0                | 60.0            | 24.6                     | 50.0                 | 18.0        |

The Limit shown above is RSS-GEN Table 3.

Passed by at least 8 dB.

**Figure 1. Conducted Emissions Test Setup****Notes:**

- LISN's at least 80 cm from EUT chassis
- Vertical conductive plane 40 cm from rear of table top
- EUT power cord bundled

**11.2 Radiated RF Emissions**

Radiated emission measurements were performed with linearly polarized broadband antennas. The results obtained with these antennas can be correlated with results obtained with a tuned dipole antenna. The radiated emission measurements were performed with a spectrum analyzer. The bandwidth used from 150 kHz to 30 MHz is 9 or 10 kHz and the bandwidth from 30 MHz to 1000 MHz is 100 or 120 kHz. Above 1 GHz, a 1 MHz bandwidth is used. A 10 dB linearity check is performed prior to start of testing in order to determine if an overload condition exists. Figure 4 herein lists the details of the test equipment used during radiated emissions tests.

Final radiated emissions measurements were performed inside of an anechoic chamber at a test distance of 3 meters. The anechoic chamber is designated as Chamber E. This Chamber meets the Site Attenuation requirements of ANSI C63.4 and CISPR 16-1. Chamber E is located at 12 East Devonwood Ave. Romeoville, Illinois EMI test lab.

The entire frequency range from 30 to 1000 MHz was slowly scanned with particular attention paid to those frequency ranges which appeared high. Measurements were performed using two antenna polarizations, (vertical and horizontal). The worst case emissions were recorded. All measurements may be performed using either the peak, average or quasi-peak detector functions. If the peak detector data exceeds or is marginally close to the limits, the measurements are repeated using a quasi-peak detector or average function as required by the specification for final determination of compliance.

| RADIOMETRICS MIDWEST CORPORATION - EMC Test Report                        |
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| RF IDEas, Models RDR-80081AK6, RDR-80081AK9, RDR-80581AK6, & RDR-80581AK9 |

The detected emission levels were maximized by rotating the EUT, adjusting the positions of all cables, and by scanning the measurement antenna from 1 to 4 meters above the ground.

#### Radiated Emissions Field Strength Limits

| Frequency Range (MHz) | Test Distance (meters) | Class B Limits (dBuV/m) |         |      |
|-----------------------|------------------------|-------------------------|---------|------|
|                       |                        | QP                      | Average | Peak |
| 0.009-0.490           | 300                    | 2400/F(kHz)             | N/A     | N/A  |
| 0.490-1.705           | 30                     | 24000/F(kHz)            | N/A     | N/A  |
| 1.705-30.0            | 30                     | 30                      | N/A     | N/A  |
| 30 - 88               | 3                      | 40.0                    | N/A     | N/A  |
| 88 - 216              | 3                      | 43.5                    | N/A     | N/A  |
| 216 - 960             | 3                      | 46.0                    | N/A     | N/A  |
| 960 - 1000            | 3                      | 54                      | N/A     | N/A  |

An Average detector can be used for 9-90 kHz and 110-490 kHz.

#### 11.2.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and by subtracting the Amplifier Gain from the measured reading. The basic equation is as follows:

$$FS = RA + AF + CF - AG$$

Where: FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

AG = Amplifier Gain

#### 11.2.2 Radiated Emissions Test Results

|               |                                                                           |
|---------------|---------------------------------------------------------------------------|
| Test Dates    | 07/07/2017 & 07/16/2017                                                   |
| Test Distance | 3 Meters                                                                  |
| Specification | FCC Part 15 Subpart C & RSS-210                                           |
| Notes         | Corr. Factors = cable loss distance factor.                               |
| Abbreviations | P = peak; Q = QP Pol = Antenna Polarization; V = Vertical; H = Horizontal |

Note: The actual FCC limits are in uV/m. The data in the table below converted the limit to dBuV/m

100 uV/m = 40.0 dBuV/m

150 uV/m = 43.5 dBuV/m

200 uV/m = 46.0 dBuV/m

500 uV/m = 54.0 dBuV/m

The 125 kHz and the 13.56 MHz transmitters were both on during the following tests.

The following shows the highest emissions with the 13.56 MHz or the 125 kHz card during the tests.

# RADIOMETRICS MIDWEST CORPORATION - EMC Test Report

RF IDEas, Models RDR-80081AK6, RDR-80081AK9, RDR-80581AK6, & RDR-80581AK9

EUT : RDR-80081AK6; SN: L0IS30062

| Freq. MHz | Meter Reading dBuV | Dect. Type | Antenna  |           | Corr. Factors dB | Field Strength dBuV/m |       | Margin Under Limit dB |
|-----------|--------------------|------------|----------|-----------|------------------|-----------------------|-------|-----------------------|
|           |                    |            | Polarity | Factor dB |                  | EUT                   | Limit |                       |
| 33.3      | 17.3               | P          | H        | 11.4      | 0.5              | 29.2                  | 40.0  | 10.8                  |
| 34.4      | 17.1               | P          | H        | 11.5      | 0.5              | 29.1                  | 40.0  | 10.9                  |
| 61.3      | 17.9               | P          | H        | 8.7       | 0.6              | 27.2                  | 40.0  | 12.8                  |
| 67.4      | 23.5               | P          | H        | 7.3       | 0.7              | 31.5                  | 40.0  | 8.5                   |
| 92.7      | 18.0               | P          | H        | 10.4      | 0.8              | 29.2                  | 43.5  | 14.3                  |
| 109.2     | 16.5               | P          | H        | 12.4      | 0.8              | 29.7                  | 43.5  | 13.8                  |
| 120.2     | 15.0               | P          | H        | 12.4      | 0.9              | 28.3                  | 43.5  | 15.2                  |
| 138.4     | 19.4               | P          | H        | 11.7      | 1.0              | 32.1                  | 43.5  | 11.4                  |
| 150.4     | 20.3               | P          | H        | 13.3      | 1.0              | 34.6                  | 43.5  | 8.9                   |
| 174.6     | 13.8               | P          | H        | 16.6      | 1.1              | 31.5                  | 43.5  | 12.0                  |
| 181.3     | 12.9               | P          | H        | 17.0      | 1.1              | 31.0                  | 43.5  | 12.5                  |
| 209.9     | 17.1               | P          | H        | 15.3      | 1.2              | 33.6                  | 43.5  | 9.9                   |
| 257.4     | 26.1               | P          | H        | 11.6      | 1.3              | 39.0                  | 46.0  | 7.0                   |
| 271.0     | 24.3               | P          | H        | 12.7      | 1.4              | 38.4                  | 46.0  | 7.6                   |
| 284.6     | 24.9               | P          | H        | 13.6      | 1.4              | 39.9                  | 46.0  | 6.1                   |
| 302.2     | 17.5               | P          | H        | 14.6      | 1.5              | 33.6                  | 46.0  | 12.4                  |
| 325.6     | 19.8               | P          | H        | 13.6      | 1.5              | 34.9                  | 46.0  | 11.1                  |
| 336.0     | 17.2               | P          | H        | 13.8      | 1.6              | 32.6                  | 46.0  | 13.4                  |
| 362.6     | 18.9               | P          | H        | 14.3      | 1.6              | 34.8                  | 46.0  | 11.2                  |
| 434.1     | 18.5               | P          | H        | 15.6      | 1.8              | 35.9                  | 46.0  | 10.1                  |
| 460.8     | 15.5               | P          | H        | 16.2      | 1.9              | 33.6                  | 46.0  | 12.4                  |
| 487.5     | 15.5               | P          | H        | 17.5      | 1.9              | 34.9                  | 46.0  | 11.1                  |
| 499.8     | 20.2               | P          | H        | 17.8      | 2.0              | 40.0                  | 46.0  | 6.0                   |
| 512.5     | 19.1               | P          | H        | 18.0      | 2.0              | 39.1                  | 46.0  | 6.9                   |
| 516.3     | 16.9               | P          | H        | 17.8      | 2.0              | 36.7                  | 46.0  | 9.3                   |
| 525.0     | 17.4               | P          | H        | 16.9      | 2.0              | 36.3                  | 46.0  | 9.7                   |
| 543.8     | 15.5               | P          | H        | 18.0      | 2.1              | 35.6                  | 46.0  | 10.4                  |
| 605.0     | 16.0               | P          | H        | 18.2      | 2.2              | 36.4                  | 46.0  | 9.6                   |
| 625.0     | 20.4               | P          | H        | 18.8      | 2.2              | 41.4                  | 46.0  | 4.6                   |
| 665.0     | 15.5               | P          | H        | 19.6      | 2.3              | 37.4                  | 46.0  | 8.6                   |
| 678.8     | 13.1               | P          | H        | 21.2      | 2.3              | 36.6                  | 46.0  | 9.4                   |
| 721.3     | 12.8               | P          | H        | 20.9      | 2.4              | 36.1                  | 46.0  | 9.9                   |
| 785.0     | 14.0               | P          | H        | 20.9      | 2.5              | 37.4                  | 46.0  | 8.6                   |
| 786.3     | 15.6               | P          | H        | 20.8      | 2.5              | 38.9                  | 46.0  | 7.1                   |
| 846.3     | 14.5               | P          | H        | 21.8      | 2.6              | 38.9                  | 46.0  | 7.1                   |
| 906.3     | 12.6               | P          | H        | 22.1      | 2.7              | 37.4                  | 46.0  | 8.6                   |
| 36.0      | 21.6               | P          | V        | 11.6      | 0.5              | 33.7                  | 40.0  | 6.3                   |
| 40.5      | 20.2               | P          | V        | 12.0      | 0.5              | 32.7                  | 40.0  | 7.3                   |
| 42.1      | 20.3               | P          | V        | 12.0      | 0.5              | 32.8                  | 40.0  | 7.2                   |
| 43.2      | 19.8               | P          | V        | 12.0      | 0.5              | 32.3                  | 40.0  | 7.7                   |
| 68.5      | 22.3               | P          | V        | 7.0       | 0.7              | 30.0                  | 40.0  | 10.0                  |
| 72.3      | 22.7               | P          | V        | 6.5       | 0.7              | 29.9                  | 40.0  | 10.1                  |
| 92.7      | 22.9               | P          | V        | 10.4      | 0.8              | 34.1                  | 43.5  | 9.4                   |
| 99.3      | 21.8               | P          | V        | 11.6      | 0.8              | 34.2                  | 43.5  | 9.3                   |
| 114.2     | 21.1               | Q          | V        | 12.5      | 0.9              | 34.5                  | 43.5  | 9.0                   |
| 120.2     | 21.0               | Q          | V        | 12.4      | 0.9              | 34.3                  | 43.5  | 9.2                   |
| 126.3     | 21.9               | Q          | V        | 12.0      | 0.9              | 34.8                  | 43.5  | 8.7                   |
| 128.4     | 18.4               | Q          | V        | 11.9      | 0.9              | 31.2                  | 43.5  | 12.3                  |
| 129.0     | 23.0               | P          | V        | 11.9      | 0.9              | 35.8                  | 43.5  | 7.7                   |
| 138.4     | 22.6               | Q          | V        | 11.7      | 1.0              | 35.3                  | 43.5  | 8.2                   |

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|---------------------------------------------------------------------------|--|--|--|--|--|--|--|--|
| RF IDEas, Models RDR-80081AK6, RDR-80081AK9, RDR-80581AK6, & RDR-80581AK9 |  |  |  |  |  |  |  |  |

| EUT : RDR-80081AK6; SN: L0IS30062 |                    |            |          |           |                  |                       |       |                       |
|-----------------------------------|--------------------|------------|----------|-----------|------------------|-----------------------|-------|-----------------------|
| Freq. MHz                         | Meter Reading dBuV | Dect. Type | Antenna  |           | Corr. Factors dB | Field Strength dBuV/m |       | Margin Under Limit dB |
|                                   |                    |            | Polarity | Factor dB |                  | EUT                   | Limit |                       |
| 150.4                             | 22.0               | Q          | V        | 13.3      | 1.0              | 36.3                  | 43.5  | 7.2                   |
| 162.6                             | 17.8               | Q          | V        | 15.3      | 1.1              | 34.2                  | 43.5  | 9.3                   |
| 174.6                             | 17.1               | P          | V        | 16.6      | 1.1              | 34.8                  | 43.5  | 8.7                   |
| 200.5                             | 15.7               | P          | V        | 16.3      | 1.2              | 33.2                  | 43.5  | 10.3                  |
| 209.9                             | 16.5               | P          | V        | 15.3      | 1.2              | 33.0                  | 43.5  | 10.5                  |
| 224.7                             | 14.0               | P          | V        | 14.4      | 1.2              | 29.6                  | 46.0  | 16.4                  |
| 225.8                             | 15.2               | P          | V        | 14.4      | 1.2              | 30.8                  | 46.0  | 15.2                  |
| 240.1                             | 14.7               | P          | V        | 15.7      | 1.3              | 31.7                  | 46.0  | 14.3                  |
| 257.4                             | 28.9               | P          | V        | 11.6      | 1.3              | 41.8                  | 46.0  | 4.2                   |
| 266.5                             | 17.2               | P          | V        | 12.3      | 1.4              | 30.9                  | 46.0  | 15.1                  |
| 271.0                             | 22.1               | P          | V        | 12.7      | 1.4              | 36.2                  | 46.0  | 9.8                   |
| 284.6                             | 18.1               | P          | V        | 13.6      | 1.4              | 33.1                  | 46.0  | 12.9                  |
| 299.0                             | 13.9               | P          | V        | 14.3      | 1.5              | 29.7                  | 46.0  | 16.3                  |
| 349.6                             | 18.8               | P          | V        | 14.0      | 1.6              | 34.4                  | 46.0  | 11.6                  |
| 352.9                             | 19.0               | P          | V        | 14.1      | 1.6              | 34.7                  | 46.0  | 11.3                  |
| 362.6                             | 17.9               | P          | V        | 14.3      | 1.6              | 33.8                  | 46.0  | 12.2                  |
| 406.9                             | 16.7               | P          | V        | 14.9      | 1.7              | 33.3                  | 46.0  | 12.7                  |
| 432.2                             | 19.5               | P          | V        | 15.7      | 1.8              | 37.0                  | 46.0  | 9.0                   |
| 466.0                             | 14.1               | P          | V        | 16.7      | 1.9              | 32.7                  | 46.0  | 13.3                  |
| 487.5                             | 14.6               | P          | V        | 17.5      | 1.9              | 34.0                  | 46.0  | 12.0                  |
| 488.1                             | 16.9               | P          | V        | 17.4      | 1.9              | 36.2                  | 46.0  | 9.8                   |
| 499.8                             | 16.5               | P          | V        | 17.8      | 2.0              | 36.3                  | 46.0  | 9.7                   |
| 516.3                             | 14.7               | P          | V        | 17.8      | 2.0              | 34.5                  | 46.0  | 11.5                  |
| 543.8                             | 15.3               | P          | V        | 18.0      | 2.1              | 35.4                  | 46.0  | 10.6                  |
| 625.0                             | 17.7               | P          | V        | 18.8      | 2.2              | 38.7                  | 46.0  | 7.3                   |
| 665.0                             | 11.6               | P          | V        | 19.6      | 2.3              | 33.5                  | 46.0  | 12.5                  |
| 833.8                             | 14.9               | P          | V        | 22.0      | 2.6              | 39.5                  | 46.0  | 6.5                   |
| 846.3                             | 12.8               | P          | V        | 21.8      | 2.6              | 37.2                  | 46.0  | 8.8                   |
| 966.3                             | 13.3               | P          | V        | 22.4      | 2.8              | 38.5                  | 54.0  | 15.5                  |

| Model Number : RDR-80581AK9; SN: L05S50051 |                    |            |          |           |                  |                       |       |                       |
|--------------------------------------------|--------------------|------------|----------|-----------|------------------|-----------------------|-------|-----------------------|
| Freq. MHz                                  | Meter Reading dBuV | Dect. Type | Antenna  |           | Corr. Factors dB | Field Strength dBuV/m |       | Margin Under Limit dB |
|                                            |                    |            | Polarity | Factor dB |                  | EUT                   | Limit |                       |
| 34.4                                       | 16.9               | P          | H        | 11.5      | 0.5              | 28.9                  | 40.0  | 11.1                  |
| 61.9                                       | 17.9               | P          | H        | 8.6       | 0.6              | 27.1                  | 40.0  | 12.9                  |
| 72.9                                       | 16.5               | P          | H        | 6.4       | 0.7              | 23.6                  | 40.0  | 16.4                  |
| 100.4                                      | 14.3               | P          | H        | 11.7      | 0.8              | 26.8                  | 43.5  | 16.7                  |
| 138.4                                      | 21.9               | P          | H        | 11.7      | 1.0              | 34.6                  | 43.5  | 8.9                   |
| 209.9                                      | 15.1               | P          | H        | 15.3      | 1.2              | 31.6                  | 43.5  | 11.9                  |
| 241.8                                      | 15.1               | P          | H        | 15.9      | 1.3              | 32.3                  | 46.0  | 13.7                  |
| 257.4                                      | 26.2               | P          | H        | 11.6      | 1.3              | 39.1                  | 46.0  | 6.9                   |
| 271.0                                      | 16.4               | P          | H        | 12.7      | 1.4              | 30.5                  | 46.0  | 15.5                  |
| 302.2                                      | 18.0               | P          | H        | 14.6      | 1.5              | 34.1                  | 46.0  | 11.9                  |
| 325.6                                      | 17.2               | P          | H        | 13.6      | 1.5              | 32.3                  | 46.0  | 13.7                  |
| 348.4                                      | 18.8               | P          | H        | 14.0      | 1.6              | 34.4                  | 46.0  | 11.6                  |
| 362.0                                      | 18.8               | P          | H        | 14.4      | 1.6              | 34.8                  | 46.0  | 11.2                  |
| 432.2                                      | 19.1               | P          | H        | 15.7      | 1.8              | 36.6                  | 46.0  | 9.4                   |

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| RF IDEas, Models RDR-80081AK6, RDR-80081AK9, RDR-80581AK6, & RDR-80581AK9 |

| Model Number |                    | RDR-80581AK9; SN: L05S50051 |          |           |                  |                       |       |                       |
|--------------|--------------------|-----------------------------|----------|-----------|------------------|-----------------------|-------|-----------------------|
| Freq. MHz    | Meter Reading dBuV | Dect. Type                  | Antenna  |           | Corr. Factors dB | Field Strength dBuV/m |       | Margin Under Limit dB |
|              |                    |                             | Polarity | Factor dB |                  | EUT                   | Limit |                       |
| 499.8        | 17.0               | P                           | H        | 17.8      | 2.0              | 36.8                  | 46.0  | 9.2                   |
| 528.8        | 15.5               | P                           | H        | 16.8      | 2.0              | 34.3                  | 46.0  | 11.7                  |
| 548.8        | 15.8               | P                           | H        | 18.6      | 2.1              | 36.5                  | 46.0  | 9.5                   |
| 605.0        | 15.6               | P                           | H        | 18.2      | 2.2              | 36.0                  | 46.0  | 10.0                  |
| 625.0        | 17.3               | P                           | H        | 18.8      | 2.2              | 38.3                  | 46.0  | 7.7                   |
| 665.0        | 15.5               | P                           | H        | 19.6      | 2.3              | 37.4                  | 46.0  | 8.6                   |
| 786.3        | 13.2               | P                           | H        | 20.8      | 2.5              | 36.5                  | 46.0  | 9.5                   |
| 846.3        | 14.4               | P                           | H        | 21.8      | 2.6              | 38.8                  | 46.0  | 7.2                   |
| 963.8        | 10.4               | P                           | H        | 22.4      | 2.8              | 35.6                  | 54.0  | 18.4                  |
| 35.0         | 20.0               | P                           | V        | 11.5      | 0.5              | 32.0                  | 40.0  | 8.0                   |
| 39.9         | 18.8               | P                           | V        | 12.0      | 0.5              | 31.3                  | 40.0  | 8.7                   |
| 60.8         | 18.5               | P                           | V        | 8.9       | 0.6              | 28.0                  | 40.0  | 12.0                  |
| 72.3         | 19.8               | P                           | V        | 6.5       | 0.7              | 27.0                  | 40.0  | 13.0                  |
| 92.7         | 22.9               | P                           | V        | 10.4      | 0.8              | 34.1                  | 43.5  | 9.4                   |
| 114.7        | 21.4               | P                           | V        | 12.5      | 0.9              | 34.8                  | 43.5  | 8.7                   |
| 138.4        | 21.6               | Q                           | V        | 11.7      | 1.0              | 34.3                  | 43.5  | 9.2                   |
| 150.4        | 16.4               | P                           | V        | 13.3      | 1.0              | 30.7                  | 43.5  | 12.8                  |
| 209.9        | 18.1               | P                           | V        | 15.3      | 1.2              | 34.6                  | 43.5  | 8.9                   |
| 257.4        | 22.1               | P                           | V        | 11.6      | 1.3              | 35.0                  | 46.0  | 11.0                  |
| 266.5        | 15.9               | P                           | V        | 12.3      | 1.4              | 29.6                  | 46.0  | 16.4                  |
| 349.6        | 18.6               | P                           | V        | 14.0      | 1.6              | 34.2                  | 46.0  | 11.8                  |
| 362.0        | 17.8               | P                           | V        | 14.4      | 1.6              | 33.8                  | 46.0  | 12.2                  |
| 434.1        | 18.3               | P                           | V        | 15.6      | 1.8              | 35.7                  | 46.0  | 10.3                  |
| 490.0        | 15.3               | P                           | V        | 17.3      | 1.9              | 34.5                  | 46.0  | 11.5                  |
| 499.8        | 14.7               | P                           | V        | 17.8      | 2.0              | 34.5                  | 46.0  | 11.5                  |
| 548.8        | 15.0               | P                           | V        | 18.6      | 2.1              | 35.7                  | 46.0  | 10.3                  |
| 625.0        | 16.9               | P                           | V        | 18.8      | 2.2              | 37.9                  | 46.0  | 8.1                   |
| 706.3        | 11.8               | P                           | V        | 20.2      | 2.4              | 34.4                  | 46.0  | 11.6                  |
| 833.8        | 13.9               | P                           | V        | 22.0      | 2.6              | 38.5                  | 46.0  | 7.5                   |
| 966.3        | 11.5               | P                           | V        | 22.4      | 2.8              | 36.7                  | 54.0  | 17.3                  |

| Model Number |                    | RDR-80081AK9, Serial Number L0IS50051 |          |           |                  |                       |       |                       |
|--------------|--------------------|---------------------------------------|----------|-----------|------------------|-----------------------|-------|-----------------------|
| Freq. MHz    | Meter Reading dBuV | Dect. Type                            | Antenna  |           | Corr. Factors dB | Field Strength dBuV/m |       | Margin Under Limit dB |
|              |                    |                                       | Polarity | Factor dB |                  | EUT                   | Limit |                       |
| 33.8         | 17.2               | P                                     | H        | 11.4      | 0.5              | 29.1                  | 40.0  | 10.9                  |
| 59.7         | 13.3               | P                                     | H        | 9.2       | 0.6              | 23.1                  | 40.0  | 16.9                  |
| 63.5         | 13.4               | P                                     | H        | 8.2       | 0.6              | 22.2                  | 40.0  | 17.8                  |
| 92.2         | 13.0               | P                                     | H        | 10.3      | 0.8              | 24.1                  | 43.5  | 19.4                  |
| 121.8        | 13.9               | P                                     | H        | 12.3      | 0.9              | 27.1                  | 43.5  | 16.4                  |
| 138.9        | 19.7               | P                                     | H        | 11.7      | 1.0              | 32.4                  | 43.5  | 11.1                  |
| 209.3        | 15.1               | P                                     | H        | 15.4      | 1.2              | 31.7                  | 43.5  | 11.8                  |
| 223.1        | 12.1               | P                                     | H        | 14.4      | 1.2              | 27.7                  | 46.0  | 18.3                  |
| 230.8        | 13.2               | P                                     | H        | 14.7      | 1.3              | 29.2                  | 46.0  | 16.8                  |
| 241.8        | 15.8               | P                                     | H        | 15.9      | 1.3              | 33.0                  | 46.0  | 13.0                  |
| 259.3        | 12.6               | P                                     | H        | 11.8      | 1.4              | 25.8                  | 46.0  | 20.2                  |
| 271.0        | 16.2               | P                                     | H        | 12.7      | 1.4              | 30.3                  | 46.0  | 15.7                  |
| 284.6        | 16.8               | P                                     | H        | 13.6      | 1.4              | 31.8                  | 46.0  | 14.2                  |

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RF IDEas, Models RDR-80081AK6, RDR-80081AK9, RDR-80581AK6, & RDR-80581AK9

| Model Number : RDR-80081AK9, Serial Number L0IS50051 |                    |            |          |           |                  |                       |       |                       |
|------------------------------------------------------|--------------------|------------|----------|-----------|------------------|-----------------------|-------|-----------------------|
| Freq. MHz                                            | Meter Reading dBuV | Dect. Type | Antenna  |           | Corr. Factors dB | Field Strength dBuV/m |       | Margin Under Limit dB |
|                                                      |                    |            | Polarity | Factor dB |                  | EUT                   | Limit |                       |
| 302.2                                                | 16.6               | P          | H        | 14.6      | 1.5              | 32.7                  | 46.0  | 13.3                  |
| 319.1                                                | 11.7               | P          | H        | 13.8      | 1.5              | 27.0                  | 46.0  | 19.0                  |
| 325.6                                                | 13.6               | P          | H        | 13.6      | 1.5              | 28.7                  | 46.0  | 17.3                  |
| 348.4                                                | 18.3               | P          | H        | 14.0      | 1.6              | 33.9                  | 46.0  | 12.1                  |
| 362.6                                                | 16.2               | P          | H        | 14.3      | 1.6              | 32.1                  | 46.0  | 13.9                  |
| 379.5                                                | 13.0               | P          | H        | 15.0      | 1.7              | 29.7                  | 46.0  | 16.3                  |
| 406.9                                                | 14.6               | P          | H        | 14.9      | 1.7              | 31.2                  | 46.0  | 14.8                  |
| 422.5                                                | 14.5               | P          | H        | 15.7      | 1.8              | 32.0                  | 46.0  | 14.0                  |
| 432.2                                                | 14.6               | P          | H        | 15.7      | 1.8              | 32.1                  | 46.0  | 13.9                  |
| 460.8                                                | 15.0               | P          | H        | 16.2      | 1.9              | 33.1                  | 46.0  | 12.9                  |
| 488.1                                                | 14.3               | P          | H        | 17.4      | 1.9              | 33.6                  | 46.0  | 12.4                  |
| 500.5                                                | 14.7               | P          | H        | 17.8      | 2.0              | 34.5                  | 46.0  | 11.5                  |
| 512.5                                                | 14.5               | P          | H        | 18.0      | 2.0              | 34.5                  | 46.0  | 11.5                  |
| 525.0                                                | 14.4               | P          | H        | 16.9      | 2.0              | 33.3                  | 46.0  | 12.7                  |
| 566.3                                                | 14.3               | P          | H        | 18.3      | 2.1              | 34.7                  | 46.0  | 11.3                  |
| 573.8                                                | 13.4               | P          | H        | 18.4      | 2.1              | 33.9                  | 46.0  | 12.1                  |
| 602.5                                                | 16.2               | P          | H        | 18.2      | 2.2              | 36.6                  | 46.0  | 9.4                   |
| 631.3                                                | 14.8               | P          | H        | 19.0      | 2.2              | 36.0                  | 46.0  | 10.0                  |
| 658.8                                                | 13.1               | P          | H        | 20.1      | 2.3              | 35.5                  | 46.0  | 10.5                  |
| 698.8                                                | 11.5               | P          | H        | 20.7      | 2.4              | 34.6                  | 46.0  | 11.4                  |
| 786.3                                                | 12.7               | P          | H        | 20.8      | 2.5              | 36.0                  | 46.0  | 10.0                  |
| 833.8                                                | 11.5               | P          | H        | 22.0      | 2.6              | 36.1                  | 46.0  | 9.9                   |
| 846.3                                                | 12.1               | P          | H        | 21.8      | 2.6              | 36.5                  | 46.0  | 9.5                   |
| 966.3                                                | 13.4               | P          | H        | 22.4      | 2.8              | 38.6                  | 54.0  | 15.4                  |
| 35.5                                                 | 18.1               | P          | V        | 11.6      | 0.5              | 30.2                  | 40.0  | 9.8                   |
| 39.9                                                 | 19.3               | P          | V        | 12.0      | 0.5              | 31.8                  | 40.0  | 8.2                   |
| 61.9                                                 | 18.3               | P          | V        | 8.6       | 0.6              | 27.5                  | 40.0  | 12.5                  |
| 92.7                                                 | 19.1               | P          | V        | 10.4      | 0.8              | 30.3                  | 43.5  | 13.2                  |
| 102.6                                                | 18.4               | P          | V        | 12.0      | 0.8              | 31.2                  | 43.5  | 12.3                  |
| 107.0                                                | 18.9               | P          | V        | 12.3      | 0.8              | 32.0                  | 43.5  | 11.5                  |
| 138.9                                                | 19.3               | P          | V        | 11.7      | 1.0              | 32.0                  | 43.5  | 11.5                  |
| 150.4                                                | 16.7               | P          | V        | 13.3      | 1.0              | 31.0                  | 43.5  | 12.5                  |
| 200.5                                                | 14.2               | P          | V        | 16.3      | 1.2              | 31.7                  | 43.5  | 11.8                  |
| 208.8                                                | 15.7               | P          | V        | 15.4      | 1.2              | 32.3                  | 43.5  | 11.2                  |
| 241.8                                                | 12.7               | P          | V        | 15.9      | 1.3              | 29.9                  | 46.0  | 16.1                  |
| 250.9                                                | 11.7               | P          | V        | 11.2      | 1.3              | 24.2                  | 46.0  | 21.8                  |
| 284.6                                                | 12.8               | P          | V        | 13.6      | 1.4              | 27.8                  | 46.0  | 18.2                  |
| 302.2                                                | 14.3               | P          | V        | 14.6      | 1.5              | 30.4                  | 46.0  | 15.6                  |
| 349.6                                                | 16.9               | P          | V        | 14.0      | 1.6              | 32.5                  | 46.0  | 13.5                  |
| 362.6                                                | 11.9               | P          | V        | 14.3      | 1.6              | 27.8                  | 46.0  | 18.2                  |
| 379.5                                                | 13.3               | P          | V        | 15.0      | 1.7              | 30.0                  | 46.0  | 16.0                  |
| 434.1                                                | 14.8               | P          | V        | 15.6      | 1.8              | 32.2                  | 46.0  | 13.8                  |
| 464.7                                                | 17.9               | P          | V        | 16.6      | 1.9              | 36.4                  | 46.0  | 9.6                   |
| 499.8                                                | 15.4               | P          | V        | 17.8      | 2.0              | 35.2                  | 46.0  | 10.8                  |
| 525.0                                                | 15.7               | P          | V        | 16.9      | 2.0              | 34.6                  | 46.0  | 11.4                  |
| 565.0                                                | 12.7               | P          | V        | 18.3      | 2.1              | 33.1                  | 46.0  | 12.9                  |
| 608.8                                                | 15.2               | P          | V        | 18.4      | 2.2              | 35.8                  | 46.0  | 10.2                  |
| 625.0                                                | 16.7               | P          | V        | 18.8      | 2.2              | 37.7                  | 46.0  | 8.3                   |
| 651.3                                                | 14.3               | P          | V        | 20.4      | 2.3              | 37.0                  | 46.0  | 9.0                   |
| 665.0                                                | 12.7               | P          | V        | 19.6      | 2.3              | 34.6                  | 46.0  | 11.4                  |

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| RF IDEas, Models RDR-80081AK6, RDR-80081AK9, RDR-80581AK6, & RDR-80581AK9 |

| Model Number : RDR-80081AK9, Serial Number L0IS50051 |                    |            |          |           |                  |                       |       |                       |
|------------------------------------------------------|--------------------|------------|----------|-----------|------------------|-----------------------|-------|-----------------------|
| Freq. MHz                                            | Meter Reading dBuV | Dect. Type | Antenna  |           | Corr. Factors dB | Field Strength dBuV/m |       | Margin Under Limit dB |
|                                                      |                    |            | Polarity | Factor dB |                  | EUT                   | Limit |                       |
| 698.8                                                | 11.3               | P          | V        | 20.7      | 2.4              | 34.4                  | 46.0  | 11.6                  |
| 797.5                                                | 11.1               | P          | V        | 20.3      | 2.5              | 33.9                  | 46.0  | 12.1                  |
| 846.3                                                | 11.5               | P          | V        | 21.8      | 2.6              | 35.9                  | 46.0  | 10.1                  |
| 906.3                                                | 11.8               | P          | V        | 22.1      | 2.7              | 36.6                  | 46.0  | 9.4                   |
| 966.3                                                | 11.6               | P          | V        | 22.4      | 2.8              | 36.8                  | 54.0  | 17.2                  |

| Model Number : P/N 80081AK6; S/N L0IS30062 |                    |            |          |           |                  |                       |       |                       |
|--------------------------------------------|--------------------|------------|----------|-----------|------------------|-----------------------|-------|-----------------------|
| Freq. MHz                                  | Meter Reading dBuV | Dect. Type | Antenna  |           | Corr. Factors dB | Field Strength dBuV/m |       | Margin Under Limit dB |
|                                            |                    |            | Polarity | Factor dB |                  | EUT                   | Limit |                       |
| 35.0                                       | 14.1               | P          | H        | 11.5      | 0.5              | 26.1                  | 40.0  | 13.9                  |
| 54.2                                       | 15.5               | P          | H        | 10.6      | 0.6              | 26.7                  | 40.0  | 13.3                  |
| 62.5                                       | 15.3               | P          | H        | 8.5       | 0.6              | 24.4                  | 40.0  | 15.6                  |
| 72.3                                       | 16.9               | P          | H        | 6.5       | 0.7              | 24.1                  | 40.0  | 15.9                  |
| 99.3                                       | 18.1               | P          | H        | 11.6      | 0.8              | 30.5                  | 43.5  | 13.0                  |
| 115.3                                      | 16.9               | P          | H        | 12.5      | 0.9              | 30.3                  | 43.5  | 13.2                  |
| 148.3                                      | 19.0               | P          | H        | 12.9      | 1.0              | 32.9                  | 43.5  | 10.6                  |
| 150.4                                      | 19.5               | P          | H        | 13.3      | 1.0              | 33.8                  | 43.5  | 9.7                   |
| 158.1                                      | 15.0               | P          | H        | 14.7      | 1.0              | 30.7                  | 43.5  | 12.8                  |
| 209.3                                      | 17.5               | P          | H        | 15.4      | 1.2              | 34.1                  | 43.5  | 9.4                   |
| 241.8                                      | 13.8               | P          | H        | 15.9      | 1.3              | 31.0                  | 46.0  | 15.0                  |
| 257.4                                      | 26.6               | Q          | H        | 11.7      | 1.3              | 39.6                  | 46.0  | 6.4                   |
| 302.2                                      | 15.8               | P          | H        | 14.6      | 1.5              | 31.9                  | 46.0  | 14.1                  |
| 325.6                                      | 15.3               | P          | H        | 13.6      | 1.5              | 30.4                  | 46.0  | 15.6                  |
| 362.6                                      | 17.2               | P          | H        | 14.3      | 1.6              | 33.1                  | 46.0  | 12.9                  |
| 422.5                                      | 12.8               | P          | H        | 15.7      | 1.8              | 30.3                  | 46.0  | 15.7                  |
| 460.8                                      | 17.0               | P          | H        | 16.2      | 1.9              | 35.1                  | 46.0  | 10.9                  |
| 487.5                                      | 16.5               | P          | H        | 17.5      | 1.9              | 35.9                  | 46.0  | 10.1                  |
| 499.8                                      | 15.2               | P          | H        | 17.8      | 2.0              | 35.0                  | 46.0  | 11.0                  |
| 512.5                                      | 13.6               | P          | H        | 18.0      | 2.0              | 33.6                  | 46.0  | 12.4                  |
| 525.0                                      | 13.1               | P          | H        | 16.9      | 2.0              | 32.0                  | 46.0  | 14.0                  |
| 605.0                                      | 12.0               | P          | H        | 18.2      | 2.2              | 32.4                  | 46.0  | 13.6                  |
| 625.0                                      | 14.5               | P          | H        | 18.8      | 2.2              | 35.5                  | 46.0  | 10.5                  |
| 846.3                                      | 12.8               | P          | H        | 21.8      | 2.6              | 37.2                  | 46.0  | 8.8                   |
| 906.3                                      | 13.3               | P          | H        | 22.1      | 2.7              | 38.1                  | 46.0  | 7.9                   |
| 966.3                                      | 12.1               | P          | H        | 22.4      | 2.8              | 37.3                  | 54.0  | 16.7                  |
| 37.7                                       | 18.4               | P          | V        | 11.8      | 0.5              | 30.7                  | 40.0  | 9.3                   |
| 54.2                                       | 23.1               | P          | V        | 10.6      | 0.6              | 34.3                  | 40.0  | 5.7                   |
| 61.3                                       | 18.6               | P          | V        | 8.7       | 0.6              | 27.9                  | 40.0  | 12.1                  |
| 71.8                                       | 20.3               | P          | V        | 6.5       | 0.7              | 27.5                  | 40.0  | 12.5                  |
| 93.3                                       | 21.8               | Q          | V        | 10.5      | 0.8              | 33.1                  | 43.5  | 10.4                  |
| 113.6                                      | 25.5               | P          | V        | 12.5      | 0.9              | 38.9                  | 43.5  | 4.6                   |
| 114.2                                      | 22.3               | Q          | V        | 12.5      | 0.9              | 35.7                  | 43.5  | 7.8                   |
| 128.4                                      | 21.7               | Q          | V        | 11.8      | 0.9              | 34.4                  | 43.5  | 9.1                   |
| 129.6                                      | 25.4               | P          | V        | 11.8      | 0.9              | 38.1                  | 43.5  | 5.4                   |
| 150.4                                      | 20.7               | Q          | V        | 13.3      | 1.0              | 35.0                  | 43.5  | 8.5                   |
| 177.9                                      | 14.6               | P          | V        | 16.8      | 1.1              | 32.5                  | 43.5  | 11.0                  |
| 202.1                                      | 4.0                | Q          | V        | 16.1      | 1.2              | 21.3                  | 43.5  | 22.2                  |

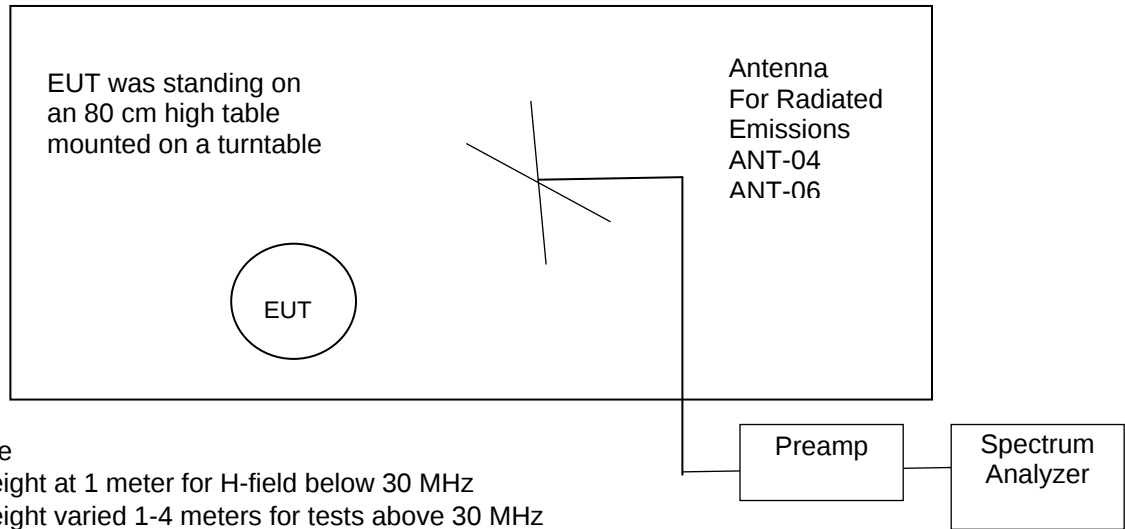
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|---------------------------------------------------------------------------|--|--|--|--|--|--|--|--|
| RF IDEas, Models RDR-80081AK6, RDR-80081AK9, RDR-80581AK6, & RDR-80581AK9 |  |  |  |  |  |  |  |  |

| Model Number |                    | P/N 80081AK6; S/N L0IS30062 |          |           |                  |                       |       |                       |
|--------------|--------------------|-----------------------------|----------|-----------|------------------|-----------------------|-------|-----------------------|
| Freq. MHz    | Meter Reading dBuV | Dect. Type                  | Antenna  |           | Corr. Factors dB | Field Strength dBuV/m |       | Margin Under Limit dB |
|              |                    |                             | Polarity | Factor dB |                  | EUT                   | Limit |                       |
| 218.6        | 15.6               | P                           | V        | 14.4      | 1.2              | 31.2                  | 46.0  | 14.8                  |
| 257.4        | 25.1               | P                           | V        | 11.6      | 1.3              | 38.0                  | 46.0  | 8.0                   |
| 271.0        | 17.7               | P                           | V        | 12.7      | 1.4              | 31.8                  | 46.0  | 14.2                  |
| 284.6        | 15.5               | P                           | V        | 13.6      | 1.4              | 30.5                  | 46.0  | 15.5                  |
| 302.2        | 11.2               | P                           | V        | 14.6      | 1.5              | 27.3                  | 46.0  | 18.7                  |
| 325.6        | 14.3               | P                           | V        | 13.6      | 1.5              | 29.4                  | 46.0  | 16.6                  |
| 352.9        | 14.9               | P                           | V        | 14.1      | 1.6              | 30.6                  | 46.0  | 15.4                  |
| 362.0        | 12.3               | P                           | V        | 14.4      | 1.6              | 28.3                  | 46.0  | 17.7                  |
| 434.1        | 12.8               | P                           | V        | 15.6      | 1.8              | 30.2                  | 46.0  | 15.8                  |
| 468.0        | 15.1               | P                           | V        | 17.0      | 1.9              | 34.0                  | 46.0  | 12.0                  |
| 487.5        | 15.9               | P                           | V        | 17.5      | 1.9              | 35.3                  | 46.0  | 10.7                  |
| 499.8        | 14.8               | P                           | V        | 17.8      | 2.0              | 34.6                  | 46.0  | 11.4                  |
| 512.5        | 13.2               | P                           | V        | 18.0      | 2.0              | 33.2                  | 46.0  | 12.8                  |
| 605.0        | 13.4               | P                           | V        | 18.2      | 2.2              | 33.8                  | 46.0  | 12.2                  |
| 665.0        | 13.7               | P                           | V        | 19.6      | 2.3              | 35.6                  | 46.0  | 10.4                  |
| 786.3        | 12.2               | P                           | V        | 20.8      | 2.5              | 35.5                  | 46.0  | 10.5                  |
| 837.5        | 12.0               | P                           | V        | 21.9      | 2.6              | 36.5                  | 46.0  | 9.5                   |
| 966.3        | 11.5               | P                           | V        | 22.4      | 2.8              | 36.7                  | 54.0  | 17.3                  |

Judgment: Passed by 4.2 dB

**Figure 2. Drawing of Radiated Emissions Test Setup**

Chamber E, anechoic



**Notes:**

- Not to Scale
- Antenna height at 1 meter for H-field below 30 MHz
- Antenna height varied 1-4 meters for tests above 30 MHz
- Distance from antenna to tested system is 3 meters
- AC cords not shown. They are connected to an AC outlet with low-pass filter on turntable

| Frequency Range | Receive Antenna | Pre-Amplifier | Spectrum Analyzer |
|-----------------|-----------------|---------------|-------------------|
| 0.01 to 30 MHz  | ANT-53          | None          | REC-21            |
| 30 to 200 MHz   | ANT-03          | AMP-22        | REC-21            |
| 200 to 1000 MHz | ANT-06          | AMP-22        | REC-21            |

### 11.3 Magnetic Field Measurements and Decay Factor Calculations

Radiated emission measurements are performed with an EMCO shielded loop antenna. The antenna was rotated in order to find the maximize readings.

The distance correction factor is calculated as follows:

The distance factor in (dB) =  $DE \cdot 20 \cdot \log(TD/SD)$

Where: DE = Decay Exponent (2.0 is used for this)

TD = Test distance in meters. This is 3 meters

SD = Specifcation Distance in meters

From 9 kHz to 490 kHz, the Specifcation Distance is 300m therefore the distance factor is  $2 \cdot 20 \cdot \log(300/3) = 80$  dB.

From 490 kHz to 30 MHz, the Specifcation Distance is 30m therefore the distance factor is  $2 \cdot 20 \cdot \log(30/3) = 40$  dB.

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|---------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|
| RF IDEas, Models RDR-80081AK6, RDR-80081AK9, RDR-80581AK6, & RDR-80581AK9 |  |  |  |  |  |  |  |  |  |  |

### 11.3.1 Magnetic Field Radiated Emissions Results (0.009 to 30 MHz)

|               |                                                 |
|---------------|-------------------------------------------------|
| Test Date     | 07/07/2017                                      |
| Test Distance | 3 Meters                                        |
| Specification | FCC 15 & RSS-GEN                                |
| Notes         | A shielded Loop Antenna was used for this test. |

#### 125 kHz Frequencies

| Freq (kHz) | meter reading dBuV | Loop Ant Factor | Dist (m) | Decay exp | Cable Loss dB | FCC Distance factor dB | Field Strength dBuV/m | RSS-GEN Limit dBuV/m | Margin under limit | Model    |
|------------|--------------------|-----------------|----------|-----------|---------------|------------------------|-----------------------|----------------------|--------------------|----------|
| 125.0      | 62.1               | 19.1            | 3.0      | 2.0       | 0.0           | -80.0                  | 1.2                   | 25.7                 | 24.5               | 80081AK6 |
| 250.0      | 39.5               | 18.9            | 3.0      | 2.0       | 0.0           | -80.0                  | -21.6                 | 19.6                 | 41.2               | 80081AK6 |
| 375.0      | 45.7               | 18.9            | 3.0      | 2.0       | 0.0           | -80.0                  | -15.4                 | 16.1                 | 31.5               | 80081AK6 |
| 125.0      | 63.8               | 19.1            | 3.0      | 2.0       | 0.0           | -80.0                  | 2.9                   | 25.7                 | 22.8               | 80081AK9 |
| 250.0      | 48.7               | 18.9            | 3.0      | 2.0       | 0.0           | -80.0                  | -12.4                 | 19.6                 | 32.1               | 80081AK9 |
| 375.0      | 45.3               | 18.9            | 3.0      | 2.0       | 0.0           | -80.0                  | -15.9                 | 16.1                 | 32.0               | 80081AK9 |
| 125.0      | 62.3               | 19.1            | 3.0      | 2.0       | 0.0           | -80.0                  | 1.4                   | 25.7                 | 24.3               | 80581AK6 |
| 250.0      | 48.8               | 18.9            | 3.0      | 2.0       | 0.0           | -80.0                  | -12.3                 | 19.6                 | 31.9               | 80581AK6 |
| 375.0      | 45.4               | 18.9            | 3.0      | 2.0       | 0.0           | -80.0                  | -15.7                 | 16.1                 | 31.8               | 80581AK6 |
| 125.0      | 63.1               | 19.1            | 3.0      | 2.0       | 0.0           | -80.0                  | 2.2                   | 25.7                 | 23.5               | 80581AK9 |
| 250.0      | 39.8               | 18.9            | 3.0      | 2.0       | 0.0           | -80.0                  | -21.3                 | 19.6                 | 41.0               | 80581AK9 |
| 375.0      | 37.5               | 18.9            | 3.0      | 2.0       | 0.0           | -80.0                  | -23.6                 | 16.1                 | 39.8               | 80581AK9 |
| 500.0      | 34.7               | 18.8            | 3.0      | 2.0       | 0.0           | -40.0                  | 13.5                  | 33.6                 | 20.2               | 80581AK9 |

#### 13.56 MHz Frequencies

| Freq (kHz) | meter reading dBuV | Loop Ant Factor | Dist (m) | Decay exp | Cable Loss dB | FCC Distance factor dB | Field Strength dBuV/m | RSS-GEN Limit dBuV/m | Margin under limit | Model    |
|------------|--------------------|-----------------|----------|-----------|---------------|------------------------|-----------------------|----------------------|--------------------|----------|
| 13560      | 54.2               | 16.8            | 3.0      | 2.0       | 0.4           | -40.0                  | 31.4                  | 40.5                 | 9.1                | 80081AK6 |
| 27120      | 29.5               | 16.0            | 3.0      | 2.0       | 0.5           | -40.0                  | 6.0                   | 29.5                 | 23.5               | 80081AK6 |
| 13560      | 52.6               | 16.8            | 3.0      | 2.0       | 0.4           | -40.0                  | 29.8                  | 40.5                 | 10.7               | 80081AK9 |
| 27120      | 27.1               | 16.0            | 3.0      | 2.0       | 0.5           | -40.0                  | 3.6                   | 29.5                 | 25.9               | 80081AK9 |
| 13560      | 53.8               | 16.8            | 3.0      | 2.0       | 0.4           | -40.0                  | 31.0                  | 40.5                 | 9.5                | 80581AK6 |
| 27120      | 30.4               | 16.0            | 3.0      | 2.0       | 0.5           | -40.0                  | 6.9                   | 29.5                 | 22.6               | 80581AK6 |
| 13560      | 52.7               | 16.8            | 3.0      | 2.0       | 0.4           | -40.0                  | 29.9                  | 40.5                 | 10.6               | 80581AK9 |
| 27120      | 30.8               | 16.0            | 3.0      | 2.0       | 0.5           | -40.0                  | 7.3                   | 29.5                 | 22.2               | 80581AK9 |

The limit shown at 13.56 MHz in the above table is the lowest limit from 15.225 sections (a), (b) and (c).

The limit from 13.553-13.567 MHz at 30 meters is 15,848 uV/m which = 84 dBuV/m in accordance with FCC 15.225 (c) and RSS-210 section A2.6 (c).

The limit drops to 334uV/m from 13.410-13.553 MHz and 13.567-13.710 MHz, and 106uV/m = 40.5 dBuV/m from the bands 13.110-13.410 MHz and 13.710-14.010 MHz.

All other limits are general limits of FCC 15.209 or the RSS-Gen.

The emissions were scanned from 10 kHz to 30 MHz, including 13.11 and 14.01 MHz.

No other emissions were detected from 10 kHz to 30 MHz within 10 dB of the 15.209 or the RSS-GEN limits.

Judgement: Passed by 9.1 dB.



Model: RDR-80081AK9

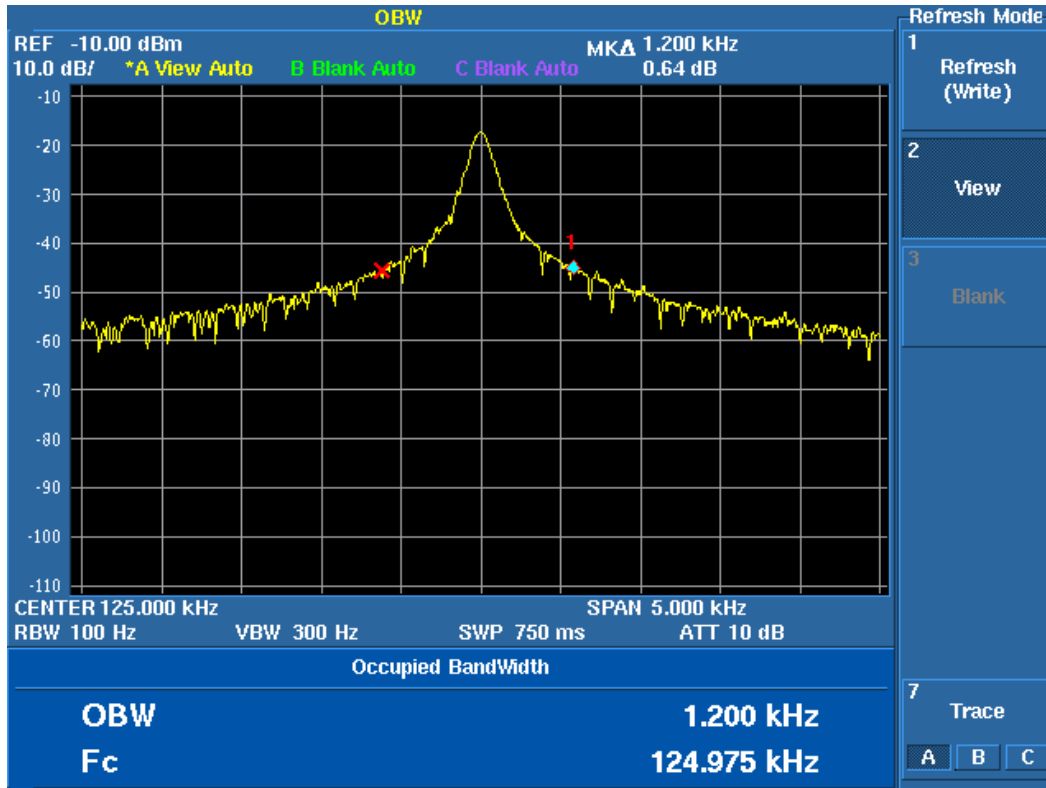
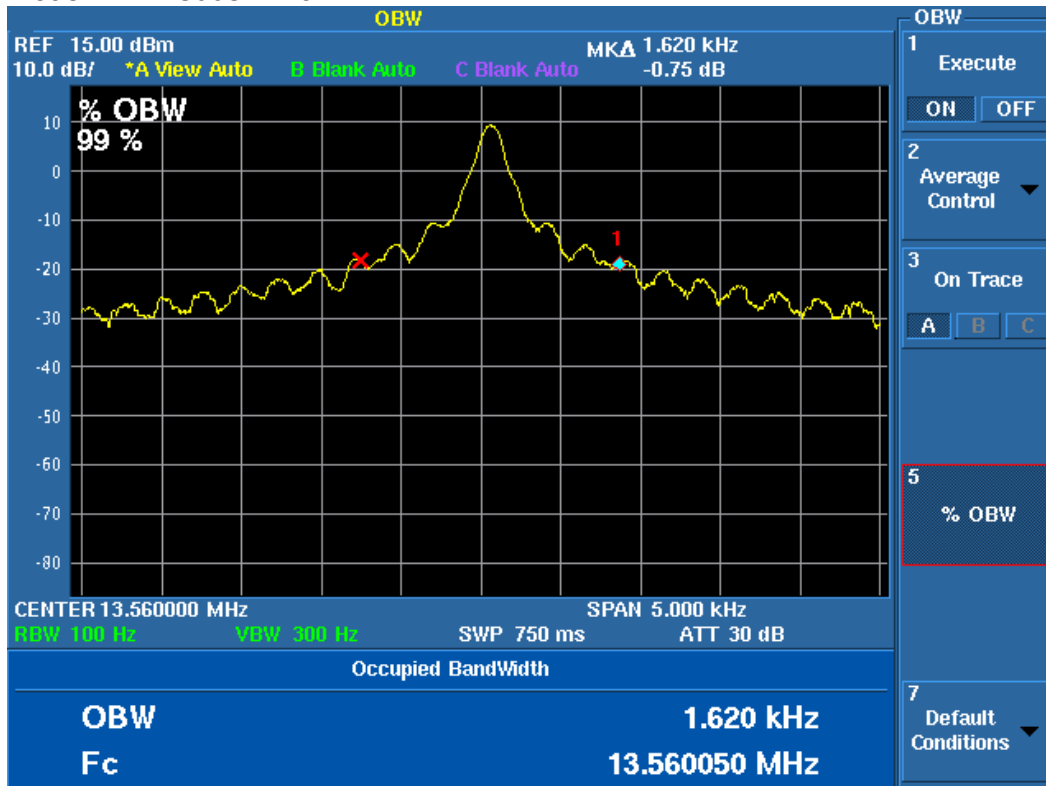


Figure 4. Occupied Bandwidth Plots 13.56 MHz

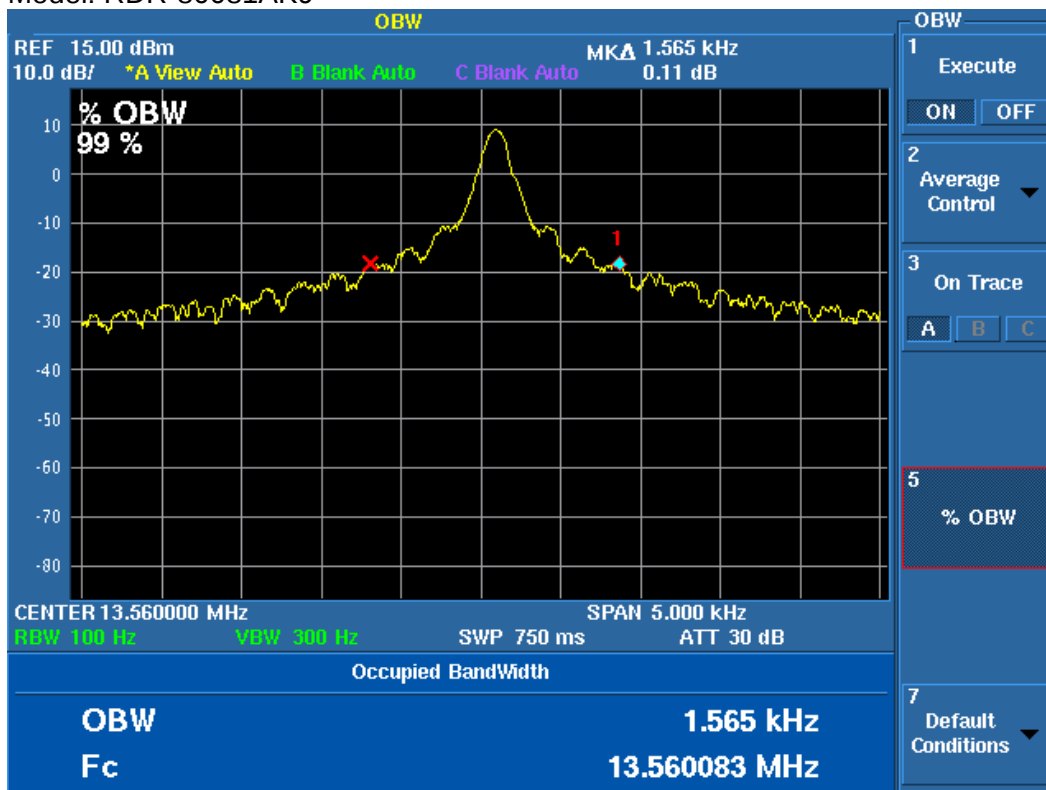
Model: RDR-80081AK6



# RADIOMETRICS MIDWEST CORPORATION - EMC Test Report

RF IDEas, Models RDR-80081AK6, RDR-80081AK9, RDR-80581AK6, & RDR-80581AK9

Model: RDR-80081AK9



## 11.5 Frequency Stability

The tests were in accordance to FCC 15.225 and RSS-210 Section A2.6. Since the product is USB powered, a Desktop PC was used to power the device. The input power to the desktop PC was varied by 15%, using a variable AC supply.

### 11.5.1 Test Results for Frequency Stability

|                |                                                                                |                   |                   |
|----------------|--------------------------------------------------------------------------------|-------------------|-------------------|
| Specification  | FCC Part 15.225<br>RSS-210 Section A2.6                                        | Test Personnel    | Richard Tichelaar |
| Test Date      | 08/29/2017                                                                     | Nominal Frequency | 13.560 MHz        |
| Test Equipment | Spectrum Analyzer (REC-21); Temperature Chamber TC-01<br>Power Supply (PSA-02) |                   |                   |
| Notes          | 10 minutes at each Temperature; 1 min at each voltage                          |                   |                   |

#### RDR-80081AK6

| Temp. | Start | Freq@ start | Freq @2min | Freq @5min | Freq @10min | Max error |
|-------|-------|-------------|------------|------------|-------------|-----------|
| Deg C | Time  | MHz         | (MHz)      | (MHz)      | (MHz)       | %         |
| 50    | 8:46  | 13.560046   | 13.560015  | 13.560014  | 13.560009   | 0.00034   |
| 40    | 9:04  | 13.560017   | 13.560019  | 13.560016  | 13.560017   | 0.00014   |
| 30    | 9:20  | 13.560044   | 13.560048  | 13.560050  | 13.560042   | 0.00037   |
| 20    | 9:36  | 13.560087   | 13.560088  | 13.560088  | 13.560084   | 0.00065   |
| 10    | 9:54  | 13.560126   | 13.560133  | 13.560131  | 13.560140   | 0.00103   |
| 0     | 10:15 | 13.560173   | 13.560151  | 13.560167  | 13.560142   | 0.00128   |

| RADIOMETRICS MIDWEST CORPORATION - EMC Test Report                        |  |  |  |  |  |  |
|---------------------------------------------------------------------------|--|--|--|--|--|--|
| RF IDEas, Models RDR-80081AK6, RDR-80081AK9, RDR-80581AK6, & RDR-80581AK9 |  |  |  |  |  |  |

| Temp.               | Start | Freq@ start | Freq @2min | Freq @5min | Freq @10min | Max error |
|---------------------|-------|-------------|------------|------------|-------------|-----------|
| Deg C               | Time  | MHz         | (MHz)      | (MHz)      | (MHz)       | %         |
| -10                 | 10:35 | 13.560174   | 13.560173  | 13.560179  | 13.560169   | 0.00132   |
| -20                 | 10:52 | 13.560160   | 13.560166  | 13.560159  | 13.560156   | 0.00122   |
| 20                  | 11:10 | 13.560161   | 13.560159  | 13.560106  | 13.560087   | 0.00119   |
| <b>RDR-80081AK9</b> |       |             |            |            |             |           |
| 50                  | 8:46  | 13.560083   | 13.560078  | 13.560064  | 13.560058   | 0.00061   |
| 40                  | 9:04  | 13.560068   | 13.560053  | 13.560069  | 13.560064   | 0.00051   |
| 30                  | 9:20  | 13.560064   | 13.560066  | 13.560066  | 13.560066   | 0.00049   |
| 20                  | 9:36  | 13.560091   | 13.560089  | 13.560091  | 13.560094   | 0.00069   |
| 10                  | 9:54  | 13.560122   | 13.560126  | 13.560126  | 13.560119   | 0.00093   |
| 0                   | 10:15 | 13.560131   | 13.560132  | 13.560128  | 13.560131   | 0.00097   |
| -10                 | 10:35 | 13.560119   | 13.560122  | 13.560119  | 13.560119   | 0.00090   |
| -20                 | 10:52 | 13.560106   | 13.560101  | 13.560088  | 13.560092   | 0.00078   |
| 20                  | 11:10 | 13.560121   | 13.560124  | 13.560098  | 13.560092   | 0.00091   |

| Volts | Freq.     | Change from Nominal |              |
|-------|-----------|---------------------|--------------|
| DC    | (MHz)     | %                   | EUT          |
| 7.7   | 13.560061 | 0.00045             | RDR-80081AK6 |
| 9.0   | 13.560060 | 0.00044             | RDR-80081AK6 |
| 10.4  | 13.560059 | 0.00043             | RDR-80081AK6 |
|       |           |                     |              |
| 4.3   | 13.560092 | 0.00068             | RDR-80081AK9 |
| 5.0   | 13.560079 | 0.00058             | RDR-80081AK9 |
| 5.8   | 13.560080 | 0.00059             | RDR-80081AK9 |

Test Requirements: Limit is 100 ppm or 0.01% deviation.  
Judgement: Pass

## 12 MEASUREMENT INSTRUMENTATION UNCERTAINTY

The uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2 in accordance with CISPR 16-4-2.

| Measurement                                            | Uncertainty          |
|--------------------------------------------------------|----------------------|
| Conducted Emissions, LISN method, 150 kHz to 30 MHz    | 2.7 dB               |
| Radiated Emissions, H-field, 3 meters, 9 kHz to 30 MHz | 2.7 dB               |
| Radiated Emissions, E-field, 3 meters, 30 to 200 MHz   | 3.3 dB               |
| Radiated Emissions, E-field, 3 meters, 200 to 1000 MHz | 4.9 dB               |
| Frequency counter at 13.56 MHz; REC-21                 | 136 Hz               |
| 99% Occupied Bandwidth using REC-43                    | 1% of frequency span |
| Temperature THM-03                                     | 0.6 Deg C            |