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## TEST REPORT

**8551-PT-R0237-12**

**Date of issue:** November 9<sup>th</sup>, 2012

Page 1 of 1

**Customer:** Racom s r.o.  
Mírová 1283  
592 31 Nové Město na Moravě  
Czech Republic

**Manufacturer:** Racom s r.o.  
Mírová 1283  
592 31 Nové Město na Moravě  
Czech Republic

**Subject of the test:** Radio parameters

**Kind of equipment:** Radiomodem & Router

**Type:** RipEX-160

**Serial number:** 12486213, 12540214

**Test procedure  
(used standard):** TIA-603-D (June 2010)

The results of the tests have been obtained following the procedures reported in this Report and are related only to the tested item, date, place and conditions of the test. Test Report does not substitute any other document that may be required by national authorities according to relevant regulations. These tests were carried out beyond the accreditation of Czech Metrology Institute - Testing laboratory TESTCOM Praha.

Measurement equipment, date and place of test, ambient and test conditions, results of testing and statements of compliance and other relevant information are written in the Annex 1 of this Test Report.

**Tested by:**

  
Jiří Novotný



**Head of the Department:**

  
Marek Svoboda, Ph.D.

End of test report

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# 1. Technical Summary And Test Results

## 1.1 Technical Summary

Applicant: **Racom s r.o.  
Mírová 1283  
592 31 Nové Město na Moravě**

Manufacturer: **Racom s.r.o.  
Mírová 1283  
592 31 Nové Město na Moravě  
Czech Republic**

Produced By: **Racom s.r.o., Czech Republic**

Kind of Equipment: **Radiomodem & Router**

Type Designation(s): **RipEX-160**

RF Power: **0.1 W to 10 W**

Alignment Range: **135 MHz to 174 MHz**

Switching Range: **19; 20 MHz**

Number of Units: **2**

Date of Receipt of Unit(s): **5.10.2012**

Start of Test: **6.10.2012**

Finish of Test: **9.10.2012**

## 1.2 Test Results of Unit No. 1 Transceiver

Type Designation: **RipEX-160**  
Code: **RipEX-135**  
Serial No.: **12486213**  
Channel Separation: **6.25; 12.5; 25 kHz**

Transmitter Part:

CH 1 **135.0125 MHz**  
CH 2 **145.025 MHz**  
CH 3 **153.9875 MHz**

Power Supply Range: **Vnom = 24 V DC**

Temperature Range: **Tnom = Ambient temperature**

Standard: TIA-603-D (June 2010)

Ambient temperature:  $(22 \pm 1) ^\circ\text{C}$ Relative humidity:  $(32 \pm 10) \%$ 

Transmitter operating unmodulated

The measurement was carried out at maximum power level

Clause 2.2.12: **TRANSMITTER UNWANTED EMISSIONS: RADIATED SPURIOUS**

| SPURIOUS EMISSIONS                                                                       |                    |                |                 |                    |                |                |                    |                |
|------------------------------------------------------------------------------------------|--------------------|----------------|-----------------|--------------------|----------------|----------------|--------------------|----------------|
| CH 1                                                                                     |                    |                | CH 2            |                    |                | CH 3           |                    |                |
| Freq.<br>[MHz]                                                                           | Bandwidth<br>[kHz] | Level<br>[dBm] | Freq.<br>[MHz]  | Bandwidth<br>[kHz] | Level<br>[dBm] | Freq.<br>[MHz] | Bandwidth<br>[kHz] | Level<br>[dBm] |
| For all frequencies the spurious emissions were detected at least 20 dB below the limit. |                    |                |                 |                    |                |                |                    |                |
| Measurement uncertainty                                                                  |                    |                | +4.4 dB/-4.5 dB |                    |                |                |                    |                |

Clause 3.2.12: **LIMIT** (47 CFR 90.210 Emission mask (e))

|                             |                                                                                                                                           |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| FREQUENCY RANGE             | 30 MHz to 4 GHz                                                                                                                           |
| RADIATED SPURIOUS EMISSIONS | $\text{dB}_c = 55 + 10 \log_{10} (P)$<br>where P = RF output power [W]<br>or an equivalent absolute level of -25.0 dBm (3 $\mu\text{W}$ ) |

TEST EQUIPMENT USED: 034, 036, 041, 053, 056, 062, 150, 151, 154, 156, C132

REMARKS: - -

Standard: TIA-603-D (June 2010)

Ambient temperature:  $(22 \pm 1) ^\circ\text{C}$ Relative humidity:  $(32 \pm 10) \%$ 

Transmitter operating unmodulated

The measurement was carried out at minimum power level

Clause 2.2.12: **TRANSMITTER UNWANTED EMISSIONS: RADIATED SPURIOUS**

| SPURIOUS EMISSIONS                                                                       |                    |                |                 |                    |                |                |                    |                |
|------------------------------------------------------------------------------------------|--------------------|----------------|-----------------|--------------------|----------------|----------------|--------------------|----------------|
| CH 1                                                                                     |                    |                | CH 2            |                    |                | CH 3           |                    |                |
| Freq.<br>[MHz]                                                                           | Bandwidth<br>[kHz] | Level<br>[dBm] | Freq.<br>[MHz]  | Bandwidth<br>[kHz] | Level<br>[dBm] | Freq.<br>[MHz] | Bandwidth<br>[kHz] | Level<br>[dBm] |
| For all frequencies the spurious emissions were detected at least 20 dB below the limit. |                    |                |                 |                    |                |                |                    |                |
| Measurement uncertainty                                                                  |                    |                | +4.4 dB/-4.5 dB |                    |                |                |                    |                |

Clause 3.2.12: **LIMIT** (47 CFR 90.210 Emission mask (e))

|                             |                                                                                                                                             |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| FREQUENCY RANGE             | 30 MHz to 4 GHz                                                                                                                             |
| RADIATED SPURIOUS EMISSIONS | $\text{dB}_c = 55 + 10 \log_{10} (P)$<br>where $P$ = RF output power [W]<br>or an equivalent absolute level of -25.0 dBm (3 $\mu\text{W}$ ) |

TEST EQUIPMENT USED: 034, 036, 041, 053, 056, 062, 150, 151, 154, 156, C132

REMARKS: - -

### 1.3 Test Results of Unit No. 2 Transceiver

Type Designation: **RipEX-160**  
Code: **RipEX-154**  
Serial No.: **12540214**  
Channel Separation: **6.25; 12.5; 25 kHz**

Transmitter Part:

CH 1 **154.0125 MHz**  
CH 2 **164.025 MHz**  
CH 3 **173.9875 MHz**

Power Supply Range: **Vnom = 24 V DC**

Temperature Range: **Tnom = Ambient temperature**

Standard: TIA-603-D (June 2010)

Ambient temperature:  $(22 \pm 1) ^\circ\text{C}$ Relative humidity:  $(32 \pm 10) \%$ 

Transmitter operating unmodulated

The measurement was carried out at maximum power level

Clause 2.2.12: **TRANSMITTER UNWANTED EMISSIONS: RADIATED SPURIOUS**

| SPURIOUS EMISSIONS                                                                             |                    |                |                 |                    |                |                |                    |                |
|------------------------------------------------------------------------------------------------|--------------------|----------------|-----------------|--------------------|----------------|----------------|--------------------|----------------|
| CH 1                                                                                           |                    |                | CH 2            |                    |                | CH 3           |                    |                |
| Freq.<br>[MHz]                                                                                 | Bandwidth<br>[kHz] | Level<br>[dBm] | Freq.<br>[MHz]  | Bandwidth<br>[kHz] | Level<br>[dBm] | Freq.<br>[MHz] | Bandwidth<br>[kHz] | Level<br>[dBm] |
| --                                                                                             | --                 | --             | --              | --                 | --             | 695.948        | 100                | -42.2          |
| For all other frequencies the spurious emissions were detected at least 20 dB below the limit. |                    |                |                 |                    |                |                |                    |                |
| Measurement uncertainty                                                                        |                    |                | +4.4 dB/-4.5 dB |                    |                |                |                    |                |

Clause 3.2.12: **LIMIT** (47 CFR 90.210 Emission mask (e))

|                             |                                                                                                                                            |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| FREQUENCY RANGE             | 30 MHz to 4 GHz                                                                                                                            |
| RADIATED SPURIOUS EMISSIONS | $\text{dB}_c = 55 + 10 \log_{10}(P)$<br>where $P$ = RF output power [W]<br>or an equivalent absolute level of -25.0 dBm (3 $\mu\text{W}$ ) |

TEST EQUIPMENT USED: 034, 036, 041, 053, 056, 062, 150, 151, 154, 156, C132

REMARKS: - -



Standard: TIA-603-D (June 2010)

Ambient temperature:  $(22 \pm 1) ^\circ\text{C}$ Relative humidity:  $(32 \pm 10) \%$ 

Transmitter operating unmodulated

The measurement was carried out at minimum power level

Clause 2.2.12: **TRANSMITTER UNWANTED EMISSIONS: RADIATED SPURIOUS**

| SPURIOUS EMISSIONS                                                                       |                    |                |                 |                    |                |                |                    |                |
|------------------------------------------------------------------------------------------|--------------------|----------------|-----------------|--------------------|----------------|----------------|--------------------|----------------|
| CH 1                                                                                     |                    |                | CH 2            |                    |                | CH 3           |                    |                |
| Freq.<br>[MHz]                                                                           | Bandwidth<br>[kHz] | Level<br>[dBm] | Freq.<br>[MHz]  | Bandwidth<br>[kHz] | Level<br>[dBm] | Freq.<br>[MHz] | Bandwidth<br>[kHz] | Level<br>[dBm] |
| For all frequencies the spurious emissions were detected at least 20 dB below the limit. |                    |                |                 |                    |                |                |                    |                |
| Measurement uncertainty                                                                  |                    |                | +4.4 dB/-4.5 dB |                    |                |                |                    |                |

Clause 3.2.12: **LIMIT** (47 CFR 90.210 Emission mask (e))

|                             |                                                                                                                                           |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| FREQUENCY RANGE             | 30 MHz to 4 GHz                                                                                                                           |
| RADIATED SPURIOUS EMISSIONS | $\text{dB}_c = 55 + 10 \log_{10} (P)$<br>where P = RF output power [W]<br>or an equivalent absolute level of -25.0 dBm (3 $\mu\text{W}$ ) |

TEST EQUIPMENT USED: 034, 036, 041, 053, 056, 062, 150, 151, 154, 156, C132

REMARKS: - -

## 1.4 Summary of Test Results

P = Complied with the requirements of the specification for this test (used standard)  
F = Not complied with the requirements of the specification for this test (used standard)  
N/A = Not applicable

### Unit No. 1

| Clause of the standard: Parameter .....                                | Result |
|------------------------------------------------------------------------|--------|
| Clause 2.2.12: TRANSMITTER UNWANTED EMISSIONS: RADIATED SPURIOUS ..... | P      |

### Unit No. 2

| Clause of the standard: Parameter .....                                | Result |
|------------------------------------------------------------------------|--------|
| Clause 2.2.12: TRANSMITTER UNWANTED EMISSIONS: RADIATED SPURIOUS ..... | P      |

## 2. Test Equipment

| Lab Id. No. | Test equipment           | Type         | Manufacturer    | Serial No.  |
|-------------|--------------------------|--------------|-----------------|-------------|
| 002         | Spectrum Analyzer        | 8595A        | Hewlett-Packard | 3132 A      |
| 006         | Signal Generator         | 8657B        | Hewlett-Packard | 3133 U      |
| 007         | Signal Generator         | 8657B        | Hewlett-Packard | 3133 U      |
| 011         | RF Millivoltmeter        | URV 4        | Rohde-Schwarz   | 871889/047  |
| 014         | Attenuator 20 dB/30 W    | RBU-30       | Rohde-Schwarz   | 825 723/009 |
| 017         | Attenuator 40 dB/1 kW    | RBS 1000     | Rohde-Schwarz   | 835922/007  |
| 022         | 4-Port Junction Box      | DVU 4        | Rohde-Schwarz   | 832731/004  |
| 024         | Regulating Transformer   | TST 280/6    | RFT             | 740 889     |
| 026         | Heating Chamber          | 3524/11      | Feutron         | 142/88      |
| 027         | Freezing Chamber         | NZ 350-40    | Frigeria        | 35/88       |
| 028         | Shielded Chamber         | -            | Siemens         | -           |
| 029         | Digital Multimeter       | M-3850       | Metex           | EB 127 259  |
| 030         | 4-Port Junction Pad      | MA1612A      | Anritsu         | M54131      |
| 031         | Digital Oscilloscope     | 9310AM       | Le Croy         | 9310 3310   |
| 034         | Spectrum Analyzer        | 8563E        | Hewlett-Packard | 3436A02701  |
| 035         | Tracking Source          | 85644A       | Hewlett-Packard | 3407A00177  |
| 036         | Preamplifier             | 87405A       | Hewlett-Packard | 3207A00368  |
| 037         | Step Attenuator          | 8494A        | Hewlett-Packard | 3308A23005  |
| 038         | Step Attenuator          | 8495A        | Hewlett-Packard | 3308A15336  |
| 039         | Attenuator 10 dB/100 W   | RBU 100      | Rohde-Schwarz   | 836121/007  |
| 041         | Anechoic Chamber         | -            | Frankonia       | -           |
| 042         | Environmental Chamber    | KWP 450/70   | Weiss           | 221/18068   |
| 043         | Directional Bridge       | 8721A        | Hewlett-Packard | -           |
| 048         | Signal Generator         | 8664A        | Hewlett-Packard | 3546A01039  |
| 050         | Power Splitter           | 11667A       | Hewlett-Packard | 0000A21292  |
| 051         | Dual Directional Coupler | 778D         | Hewlett-Packard | 16738       |
| 052         | Simulated Man            | -            | Testcom         | -           |
| 053         | Spectrum Analyzer        | 8595E        | Hewlett-Packard | 3726U00949  |
| 055         | Termination 50 Ohm/1 W   | 378NF        | Narda           | -           |
| 056         | Termination 50 Ohm/1 W   | 378NM        | Narda           | -           |
| 057         | Termination 50 Ohm/1 W   | 378NM        | Narda           | -           |
| 058         | Attenuator 3 dB/20 W     | 768-3        | Narda           | -           |
| 059         | Attenuator 6 dB/20 W     | 768-6        | Narda           | -           |
| 060         | Attenuator 10 dB/20 W    | 768-10       | Narda           | -           |
| 061         | Attenuator 10 dB/20 W    | 768-10       | Narda           | -           |
| 062         | Attenuator 20 dB/50 W    | 776B-20      | Narda           | -           |
| 063         | Attenuator 15 dB/50 W    | 776B-30      | Narda           | -           |
| 064         | Attenuator 30 dB/150 W   | 769-30       | Narda           | 06472       |
| 065         | Step Attenuator          | 745          | Narda           | 02698       |
| 066         | Dual Directional Coupler | -            | Tesla           | -           |
| 067         | Attenuator 8 dB/1 kW     | RFA1000NFF8Z | RES-NET         | 9851        |
| 068         | Dual directional Coupler | -            | Tesla           | 185         |
| 069         | Signal Generator         | 83732A       | Hewlett-Packard | 3520A00697  |
| 072         | Attenuator 30 dB/50 W    | 776B-30      | Narda           | -           |
| 073         | Signal Generator         | SMIQ03B      | Rohde-Schwarz   | 100522      |
| 074         | Thermometer - Hygrometer | C3120A       | Comet System    | -           |
| 075         | Thermometer - Hygrometer | C3120A       | Comet System    | -           |
| 076         | Isolating Transformer    | LTS 006      | RFT             | 310329      |
| 077         | Digital Oscilloscope     | 9310AM       | Le Croy         | 5935        |
| 078         | Signal Generator         | 8657A        | Hewlett-Packard | 2849U01178  |

Standard: TIA-603-D (June 2010)

| Lab Id. No. | Test equipment                          | Type                | Manufacturer      | Serial No.  |
|-------------|-----------------------------------------|---------------------|-------------------|-------------|
| 080         | Interval Counter                        | SR620               | Stanford Research | 3352        |
| 081         | Time and Frequency Precise Generator    | GPG24               | Dicom s.r.o.      | 0108251     |
| 082         | Power Meter                             | 437B                | Hewlett-Packard   | 3125U05716  |
| 083         | Step Attenuator                         | DPSP                | Rohde-Schwarz     | 880607/044  |
| 084         | Power Splitter                          | 11636A              | Hewlett-Packard   | 04464       |
| 085         | Power Splitter                          | 11667A              | Hewlett-Packard   | 19894       |
| 087         | Termination 50 Ohm/1 W                  | 378NF               | Narda             | -           |
| 108         | Notch Filter                            | -                   | Kathrein          | -           |
| 111         | RF Test Fixture                         | -                   | Testcom           | -           |
| 112         | AF Test Fixture                         | -                   | Testcom           | -           |
| 123         | Power Supply                            | YE 2 T              | Mesit             | PC 001      |
| 127         | Power Supply                            | TSZ 75              | ZPA               | 547 1255    |
| 134         | Notch Filter 15 - 90 MHz                | SF 1                | Schomandl         | 10046       |
| 135         | Notch Filter 85 - 260 MHz               | SF 2                | Schomandl         | 10004       |
| 136         | Notch Filter 210 - 500 MHz              | SF 3                | Schomandl         | 10010       |
| 137         | Notch Filter 500 - 1000 MHz             | SF 4                | Schomandl         | 10016       |
| 142         | Radiocommunication Tester               | CMTA 54             | Rohde-Schwarz     | 838262/005  |
| 143         | AF Transformer                          | CM - Z39            | Rohde-Schwarz     | 835844/0002 |
| 144         | Power Amplifier 9 kHz - 220 MHz         | BSA 0122-20         | Bonn Elektronik   | 943954A     |
| 145         | Power Amplifier 200 - 1000 MHz          | BLWA 2010-20        | Bonn Elektronik   | 943954B     |
| 146         | Precision Dipole 30 - 300 MHz           | VHAP                | Schwarzbeck       | 705         |
| 147         | Precision Dipole 30 - 300 MHz           | VHAP                | Schwarzbeck       | 706         |
| 148         | Precision Dipole 300 - 1000 MHz         | UHAP                | Schwarzbeck       | 728         |
| 149         | Precision Dipole 300 - 1000 MHz         | UHAP                | Schwarzbeck       | 729         |
| 150         | Biconical Broadband Antenna to 300 MHz  | VHBB 9124 + BA 9106 | Schwarzbeck       | 0204/93     |
| 151         | Biconical Broadband Antenna 0.3 - 1 GHz | UBA 9116            | Schwarzbeck       | 313/93      |
| 152         | Short Dipole 25 - 80 MHz                | VHAA 9110           | Schwarzbeck       | 140         |
| 154         | Broadband Horn Antenna 0.8 - 4.5 GHz    | BBHA 9120-A         | Schwarzbeck       | 215         |
| 155         | Broadband Horn Antenna 0.8 - 4.5 GHz    | BBHA 9120-A         | Schwarzbeck       | 216         |
| 156         | Broadband Horn Antenna 2 - 14 GHz       | BBHA 9120-C         | Schwarzbeck       | 309         |
| 157         | Broadband Horn Antenna 2 - 14 GHz       | BBHA 9120-C         | Schwarzbeck       | 310         |
| 160         | ACP Filter                              | ACPX 107-125-A      | COMNET Sys        | 736001      |
| 161         | ACP Filter                              | ACPX 107-200-A      | COMNET Sys        | 736002      |
| 162         | ACP Filter                              | ACPX 107-250-A      | COMNET Sys        | 736003      |
| 163         | Noise Generator                         | RG 1                | Wandel-Goltermann | 467250 G    |
| 164         | Colour Noise Filter                     | -                   | Testcom           | -           |
| 165         | Transmission Measuring Set              | PMD-1               | Wandel-Goltermann | 454632 B    |
| 166         | Power Supply                            | 6653A               | Hewlett-Packard   | US36400106  |
| 167         | Power Supply                            | 6653A               | Hewlett-Packard   | US36400120  |
| 169         | Notch filter 1.4 – 2.0 GHz              | -                   | Testcom           | -           |
| 170         | Level Amplifier                         | PSV-39              | Wandel-Goltermann | B-0011      |
| 171         | Bit Error Rate Meter                    | BER Meter           | Radom             | -           |
| 174         | Ferrite Circulator                      | CKU 355H            | Tesla             | 2900024/001 |
| 175         | Ferrite Circulator                      | CKU 356             | Tesla             | 2900056/001 |
| 176         | Power Supply                            | 6634A               | Hewlett-Packard   | 3004A-02063 |
| 177         | Power Supply                            | 6634A               | Hewlett-Packard   | 3326A-03226 |
| 178         | Amplifier 10 – 1000 MHz                 | ZFL-1000VH          | Mini-Circuits     | -           |
| 179         | Amplifier 1 – 500 MHz                   | ZHL-5W-1            | Mini-Circuits     | -           |
| 202         | Video-Millivoltmeter                    | VMV 21              | Tesla             | 86 114      |
| 306         | Tuneable Filter 60 – 180 MHz            | -                   | Tesla             | -           |
| C132        | Preamplifier                            | PE1524              | Pasternak         | 0104        |

### 3. Additional Information

There was carried out only measurement of the following parameter on the request of applicant:

Clause 2.2.12: Transmitter Unwanted Emissions: Radiated Spurious.

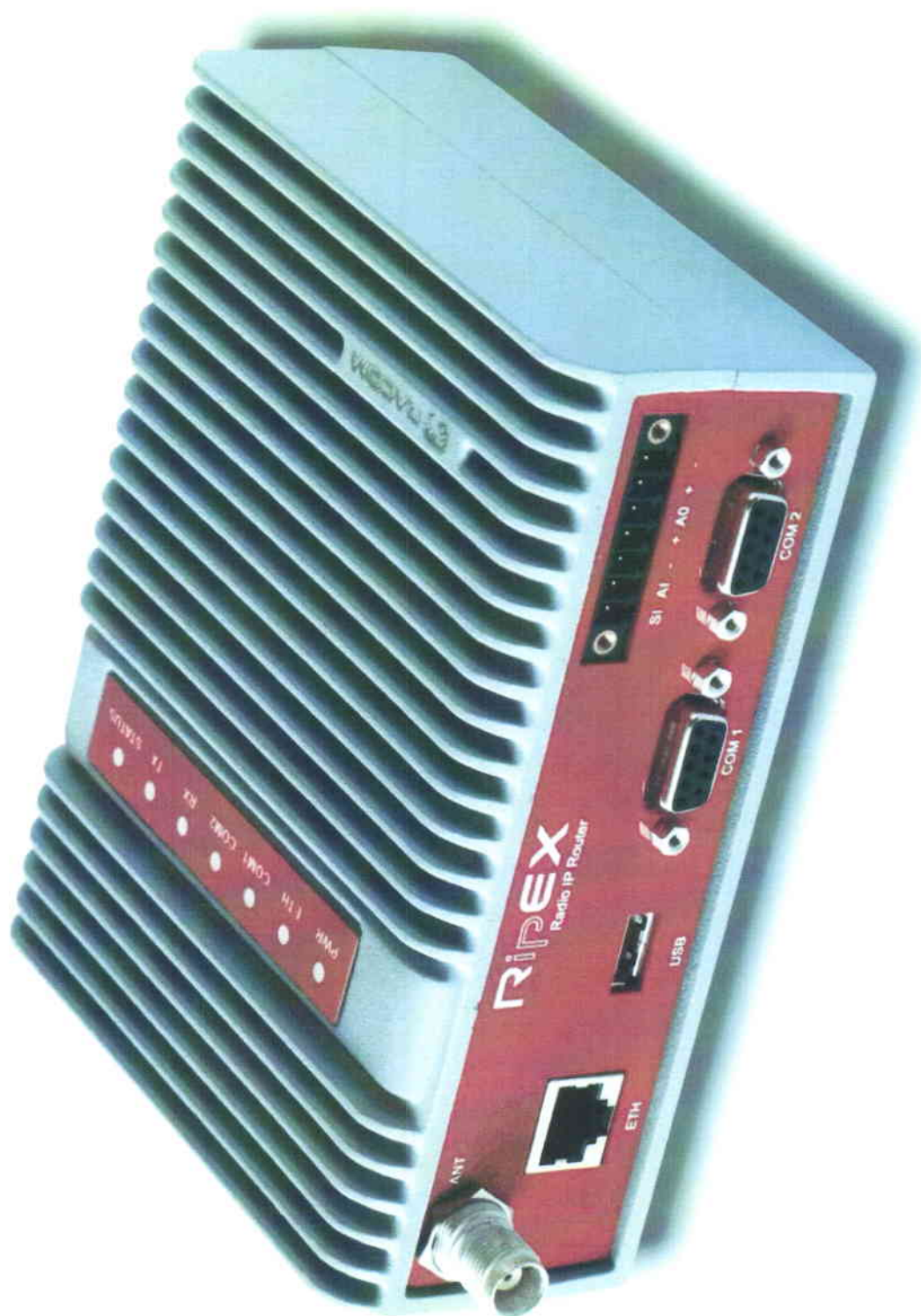
## 4. Photographs Of Equipment

List of photographs:

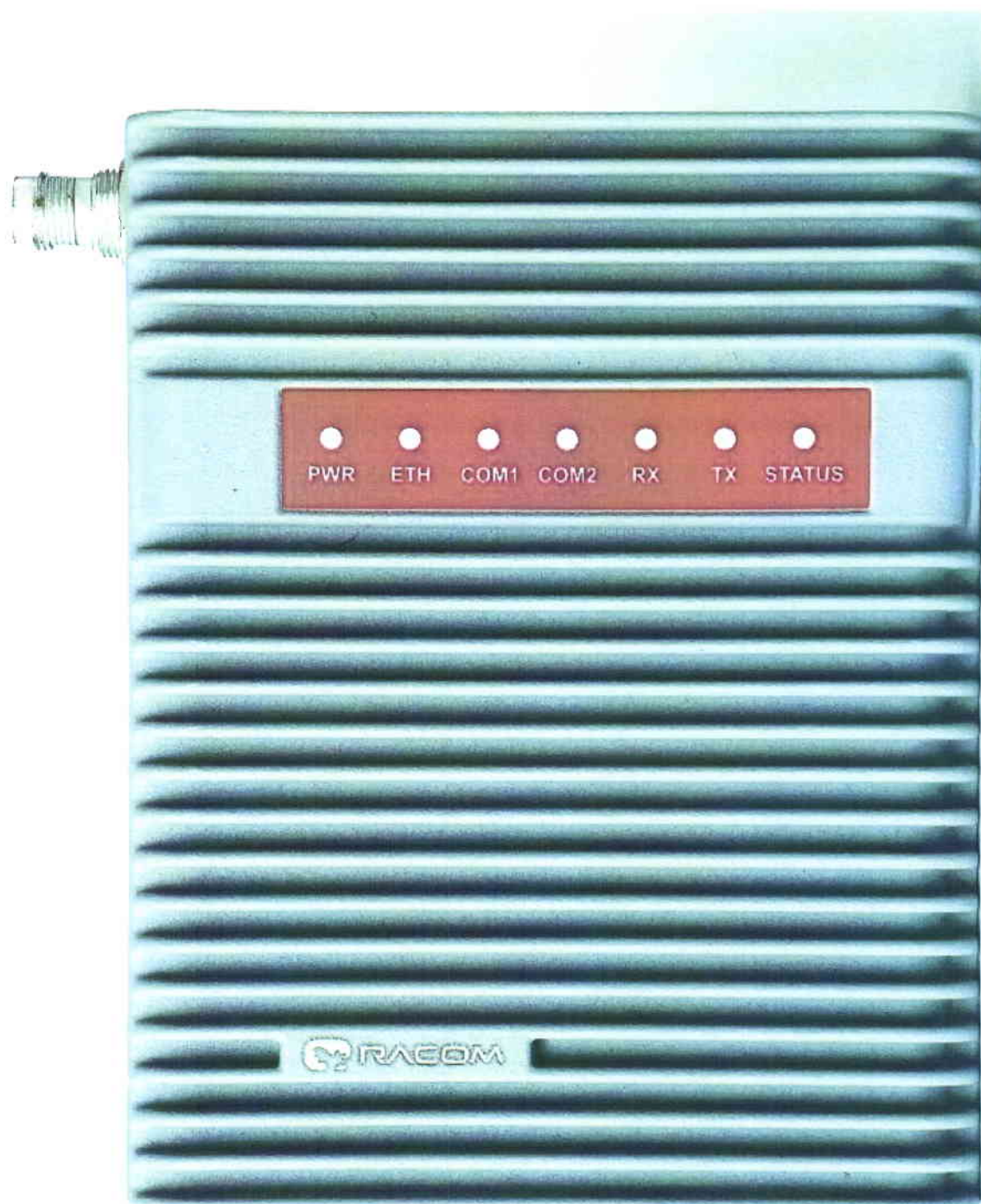
|                                                                         |    |
|-------------------------------------------------------------------------|----|
| PHOTOGRAPH 1: Unit No. 1, 2, overall external view .....                | 14 |
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| PHOTOGRAPH 8: Unit No. 1, 2, modem circuit board – one side .....       | 21 |
| PHOTOGRAPH 9: Unit No. 1, 2, modem circuit board – the other side ..... | 22 |



**PHOTOGRAPH 1: Unit No. 1, 2, overall external view**

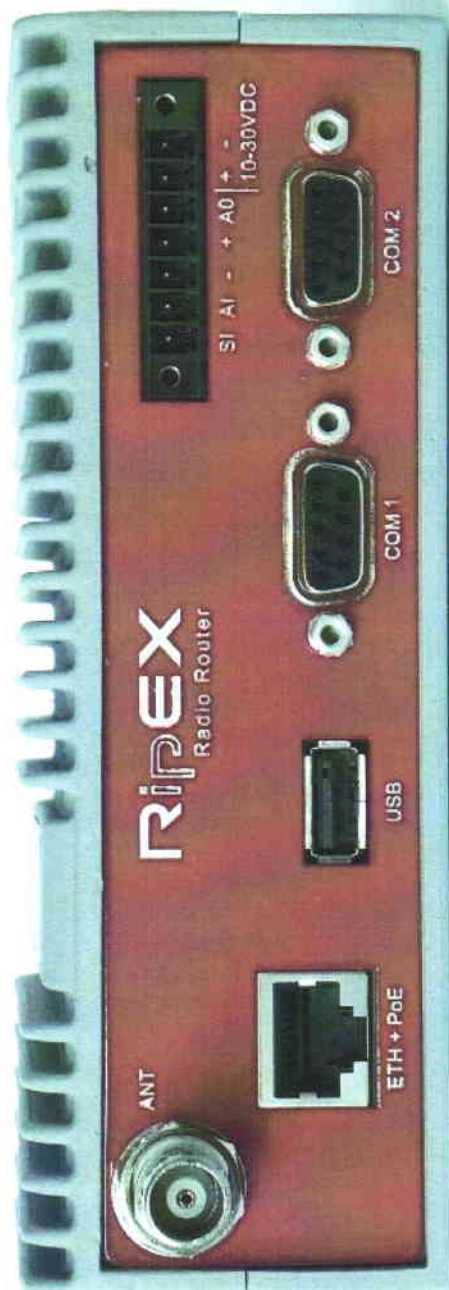


**PHOTOGRAPH 2: Unit No. 1, 2, top external view**

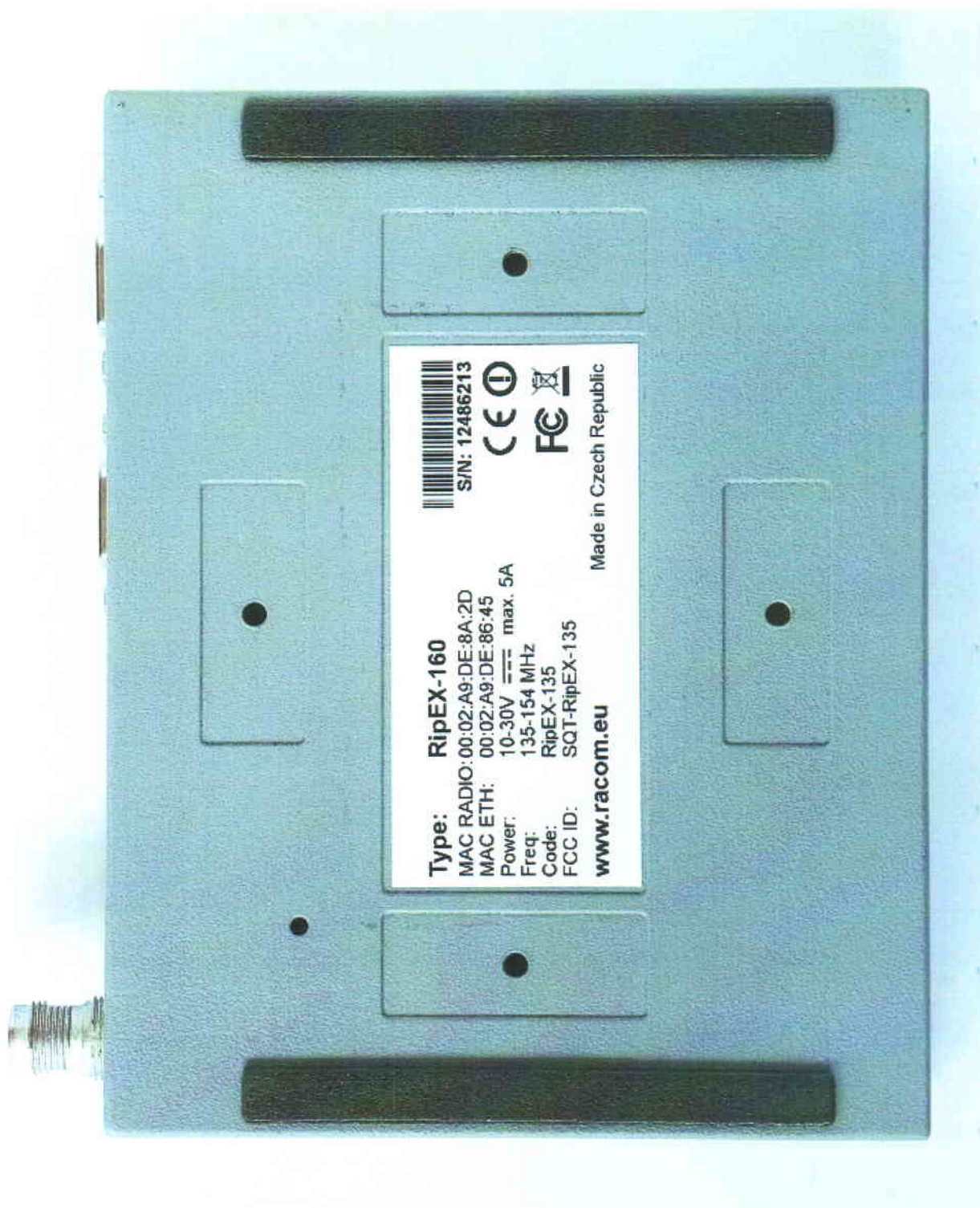




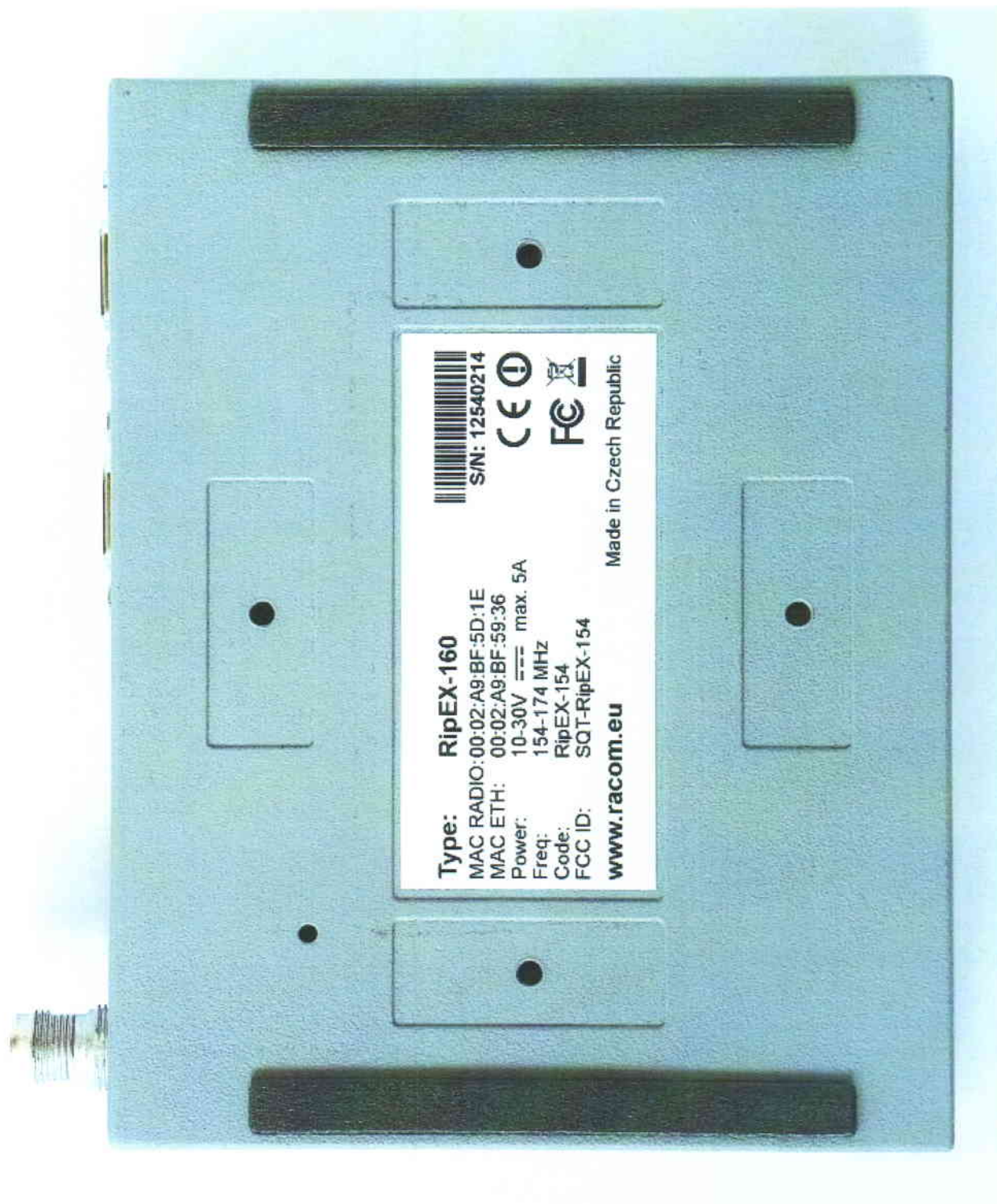
**PHOTOGRAPH 3: Unit No. 1, 2, front external view**



**PHOTOGRAPH 4: Unit No. 1, bottom external view**

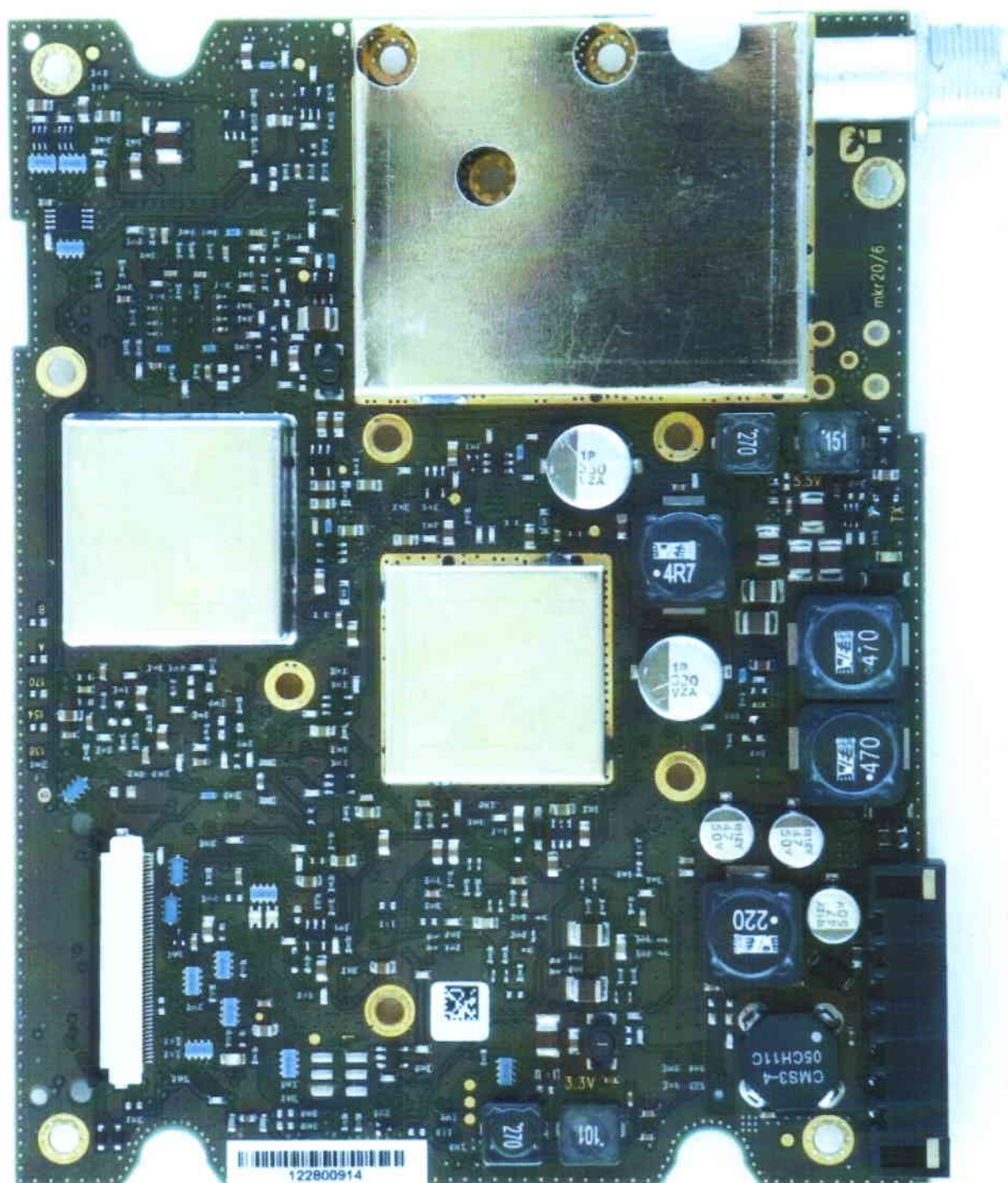


**PHOTOGRAPH 5: Unit No. 2, bottom external view**

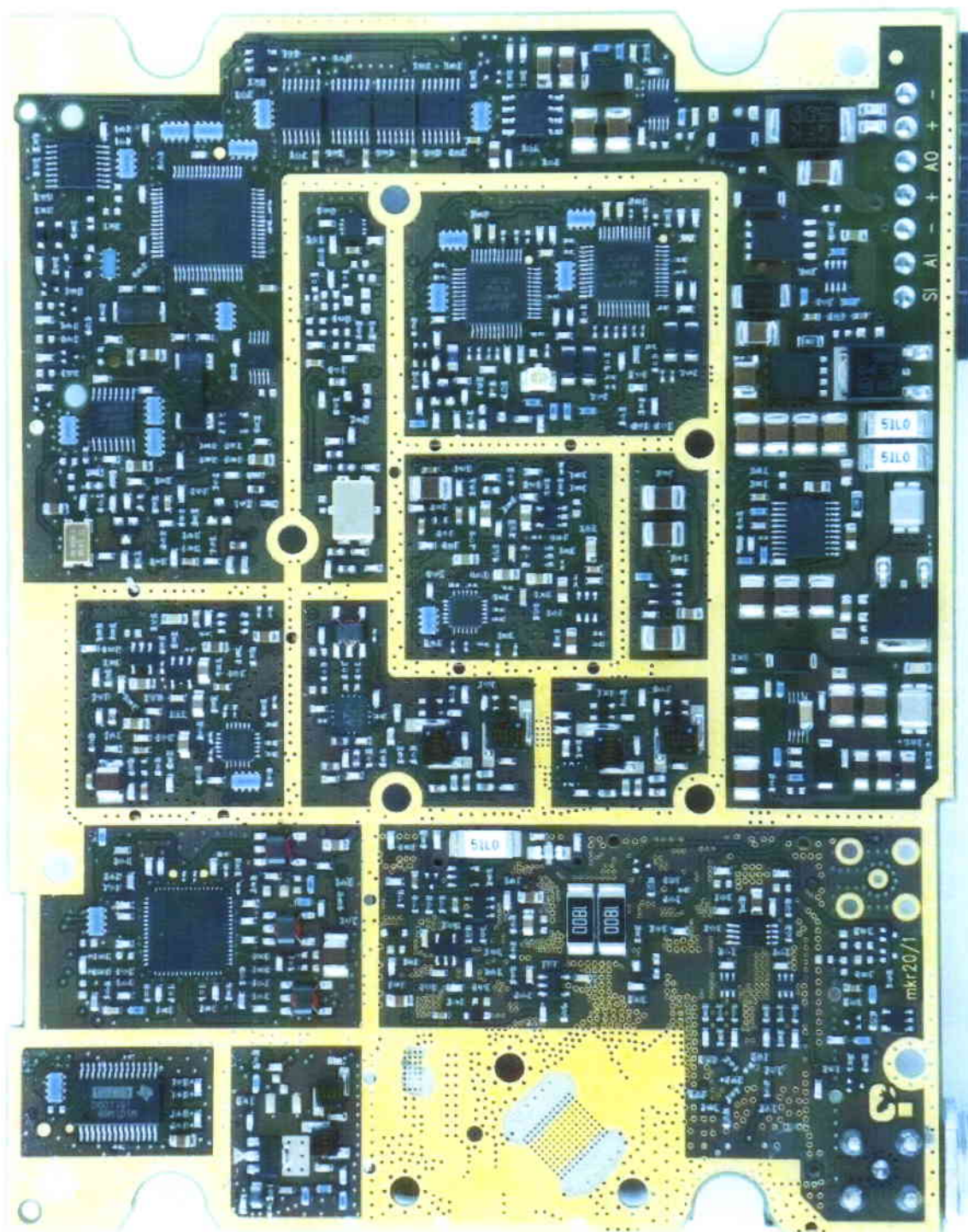




**PHOTOGRAPH 6: Unit No. 1, 2, RF circuit board – one side**

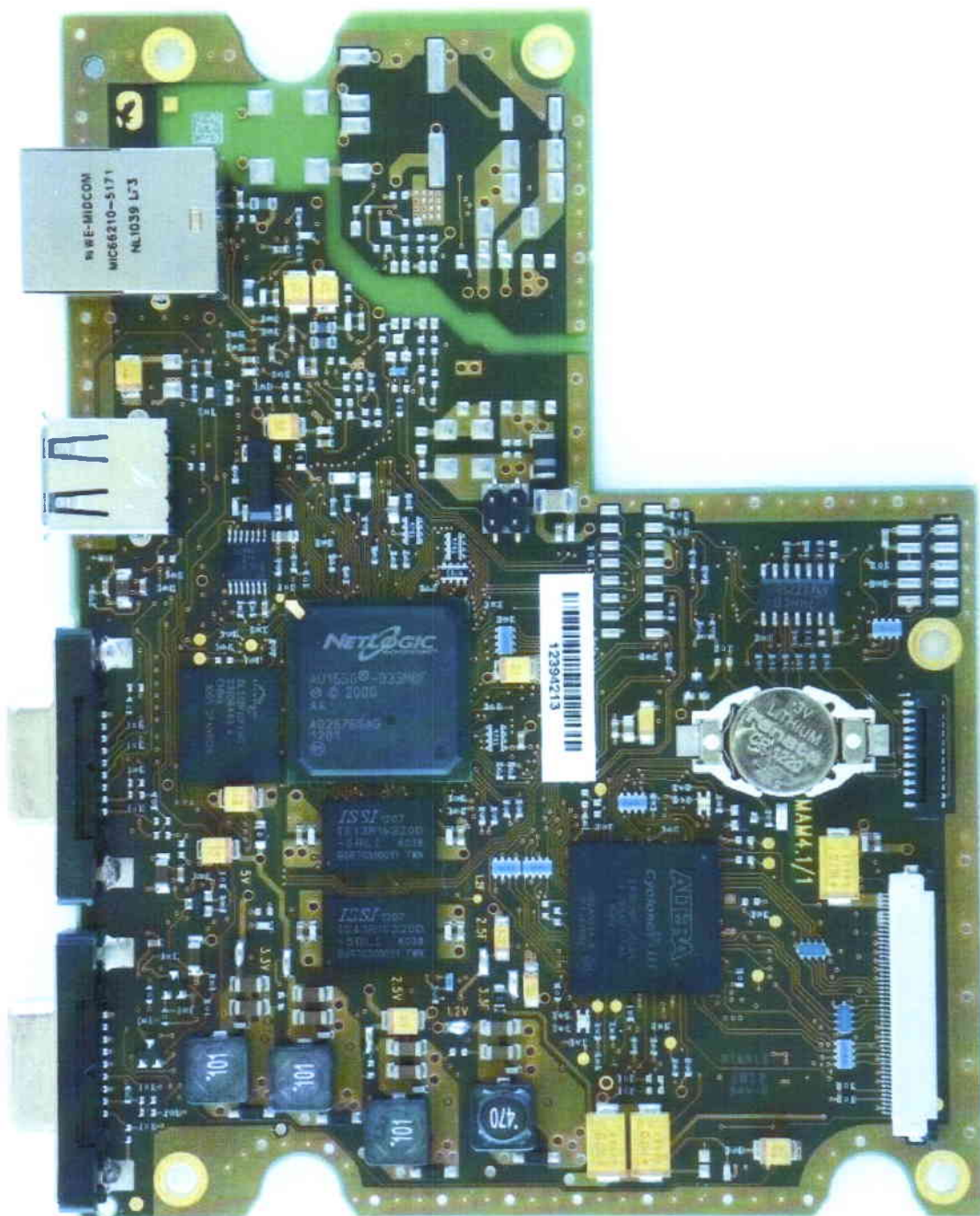


**PHOTOGRAPH 7: Unit No. 1, 2, RF circuit board – the other side**





**PHOTOGRAPH 8: Unit No. 1, 2, modem circuit board – one side**



**PHOTOGRAPH 9: Unit No. 1, 2, modem circuit board – the other side**

