Procedure for checking over-voltage damage.

Published august 21, 2015

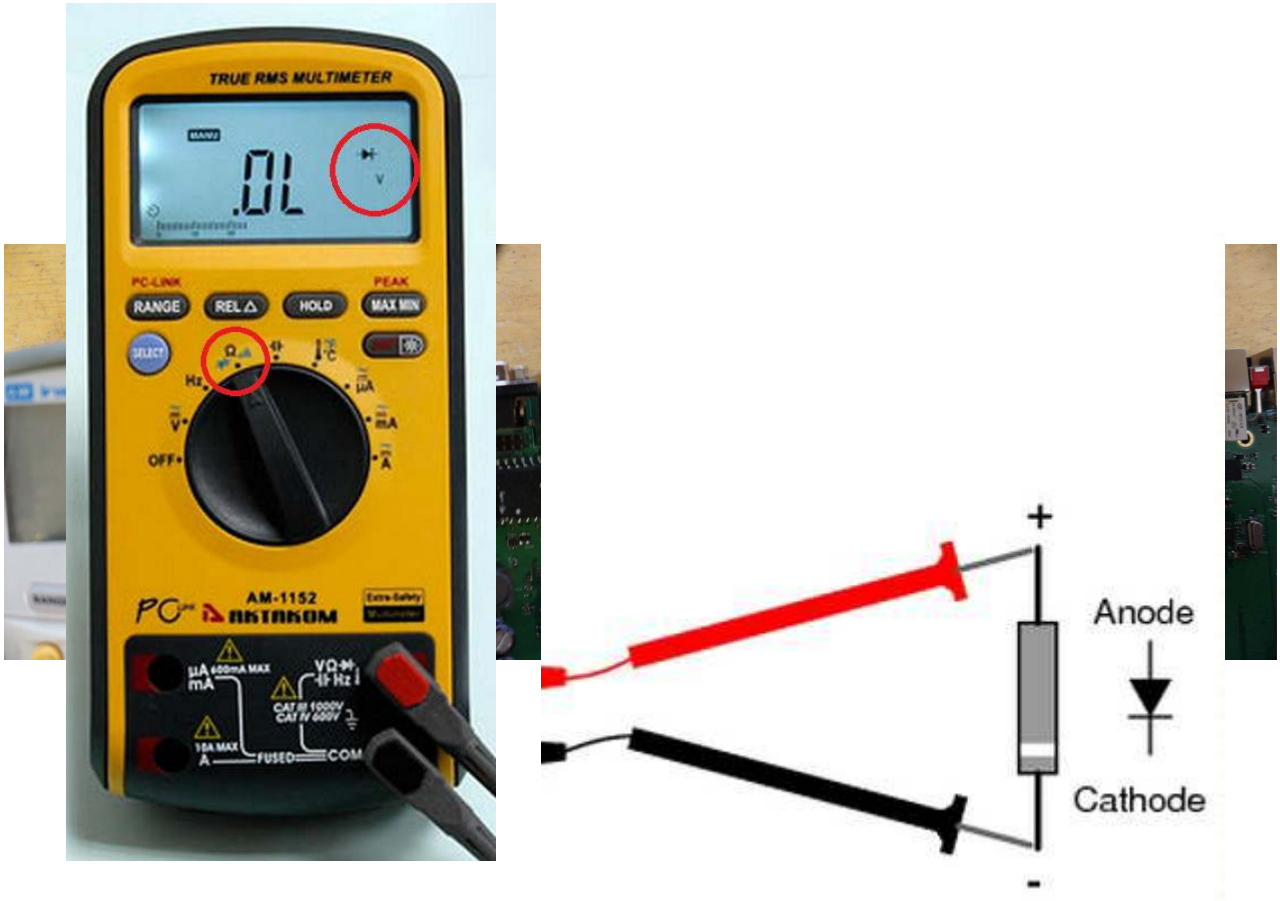
Contents

Checking procedure for over-voltage damage

Over-voltage can be caused by the following reasons: high voltage surge, lightning, electrostatics etc. You can check if routerboard was damaged by over-voltage, by using the following testing method:

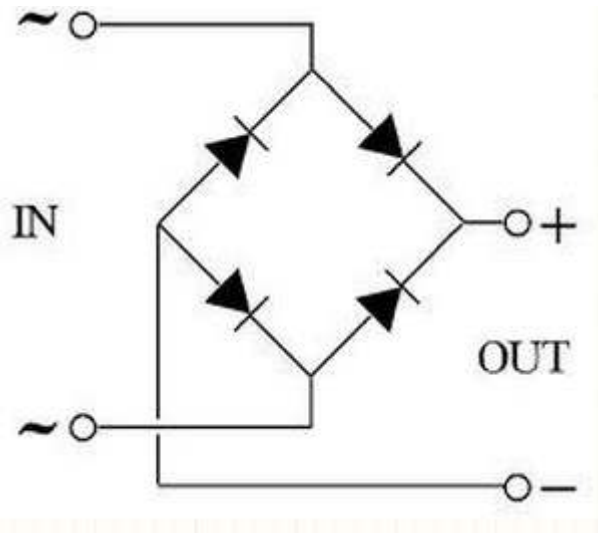
1. Check Schottky diode measurement with multimeter in diode mode;

The multimeter usually has a diode test function:



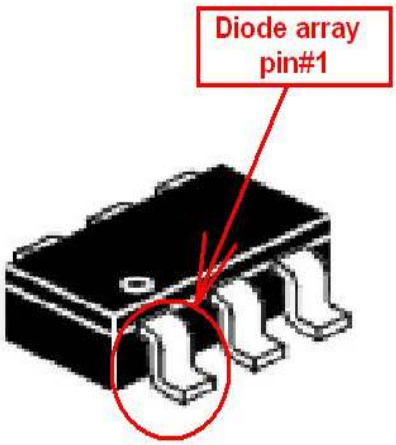
When the test probes are connected as shown the meter gives you the diode voltage drop measurement.

In the same manner we make Diode bridge test, considering schematic of bridge rectifiers



2. Check voltage drop between diode array pin#1 and Ground.

You should measure in diode mode (hold "positive" wire on the Ground and "COM" wire to diode array pin#1). Diode array pin#1 is always marked by dot mark on the diode array case (see picture 1 in the appendix).



Diode array reference number and voltage drop values could be found in the table 1;

3. Check termination resistors resistance in RJ-45 connector.

For this measurement you should take patch cord and plug it into the routerboard (see picture 2 in the appendix), and then measure resistance of termination resistors.

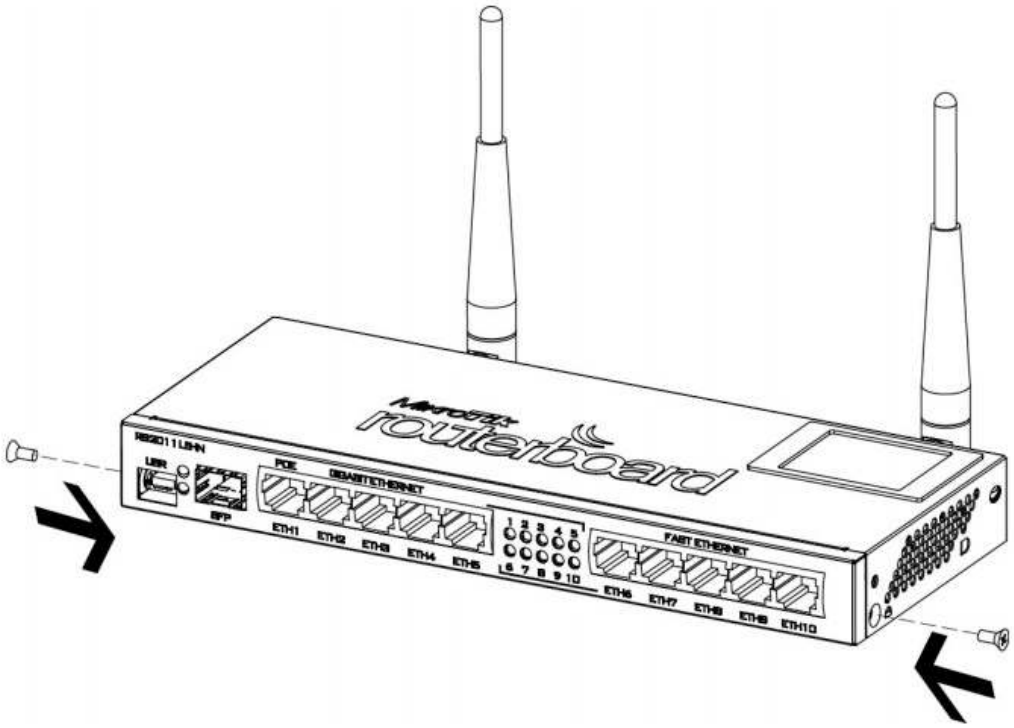
Resistance value between Rx and Tx line must be 150 Ohm +/-4%.

If resistance value is smaller or higher then Tx/Rx line was damaged by high voltage surge.

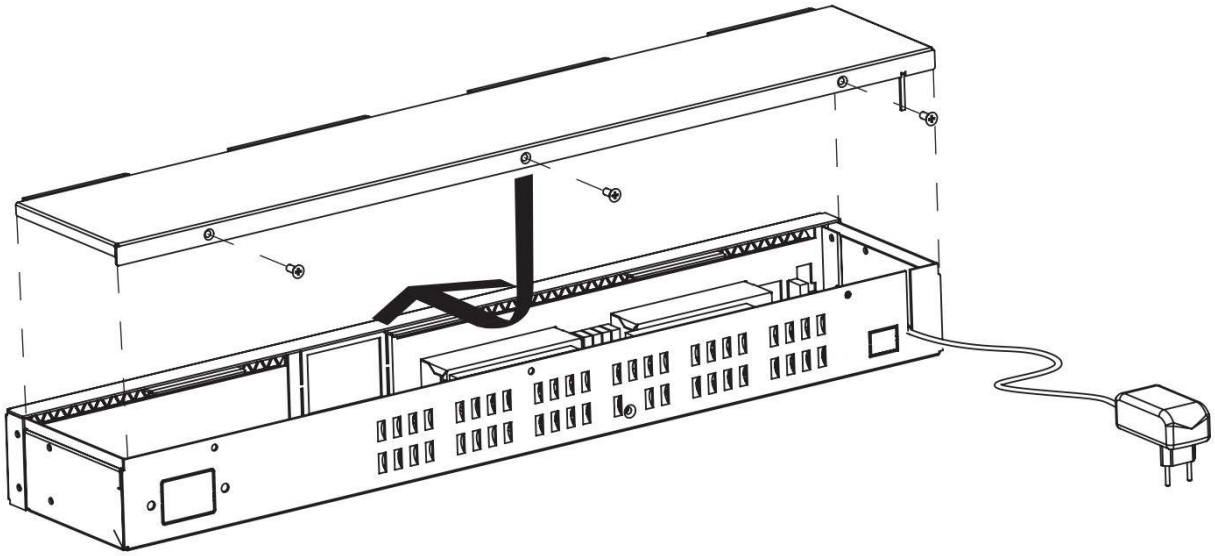
List of RB2011 series RouterBoards:

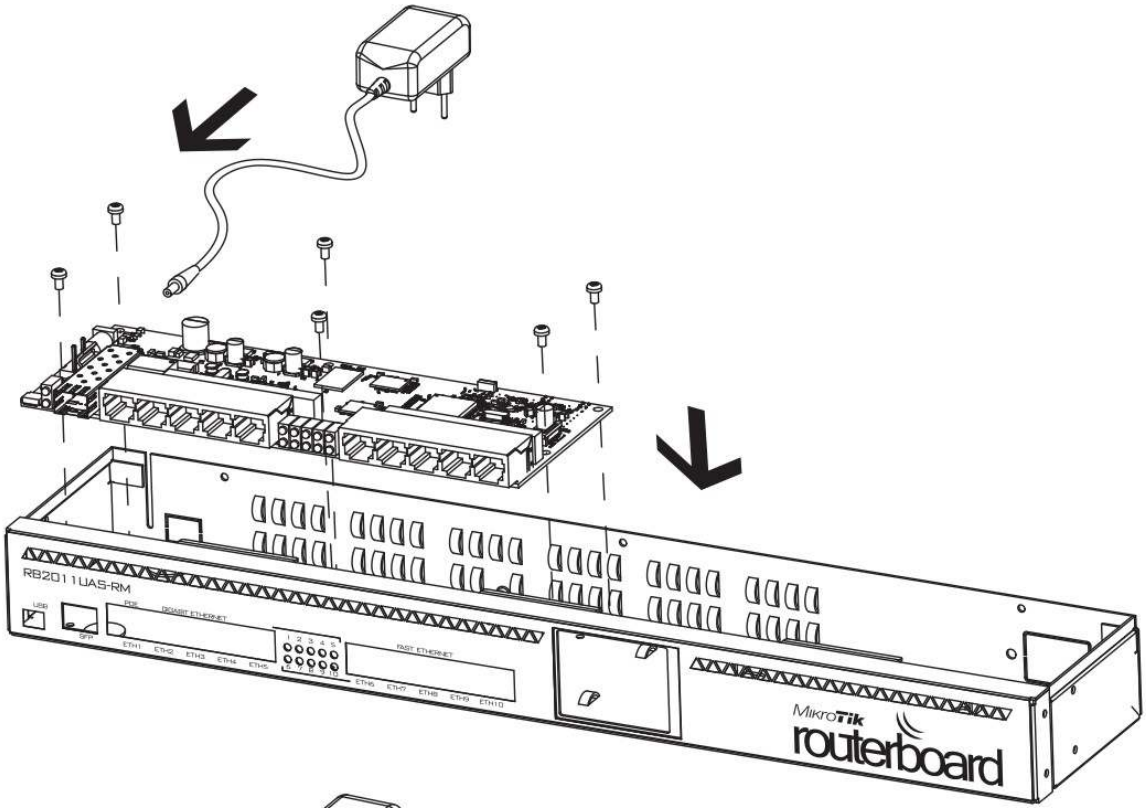
Disassembling information

Indoor 2011 series RouterBoards



Rackmount 2011 series RouterBoard





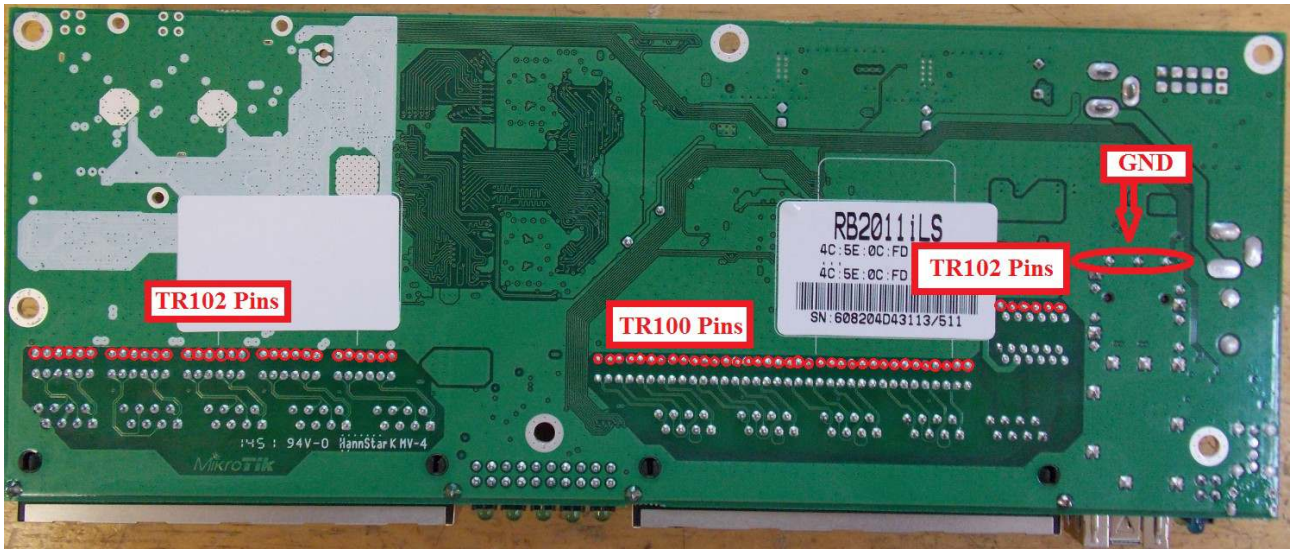
Schottky diode measuring with multimeter in diode mode

Schottky diode reference numbers is D2; Voltage drop value should be about 0,197V
Diode bridges reference numbers are D6, D4. Voltage drop value should be about 0,511V

Voltage drop between diode array pin#1 and Ground.

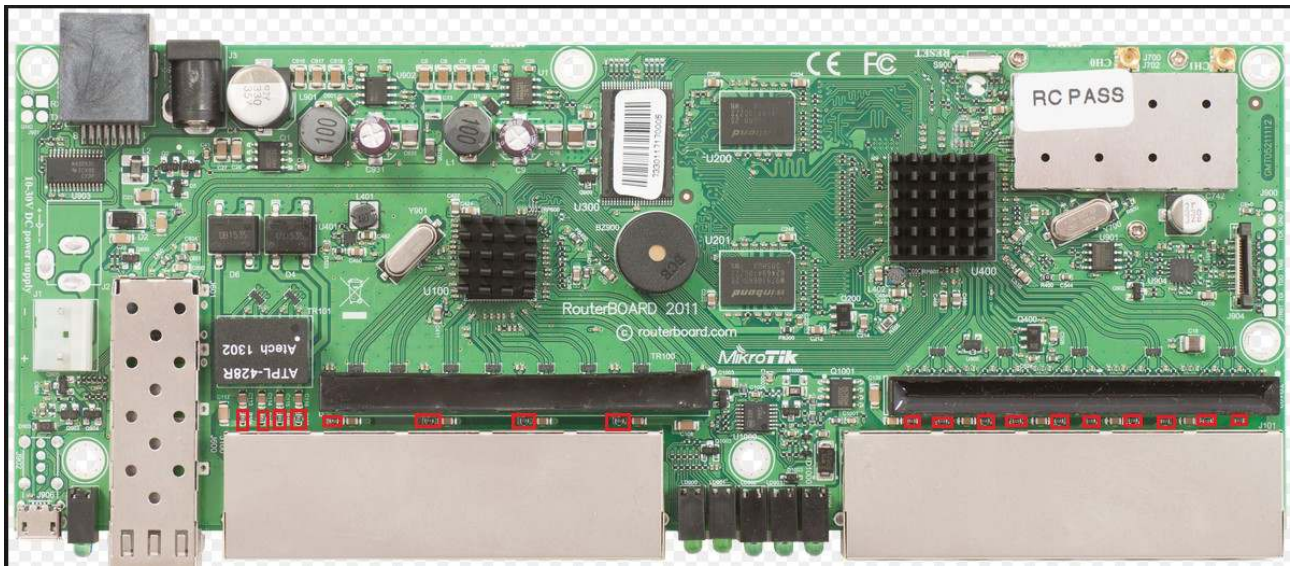
Check voltage drop between Transformer TR100, TR101 and TR102 pins and Ground.

It should be in the range from 0,32V to 0,438V

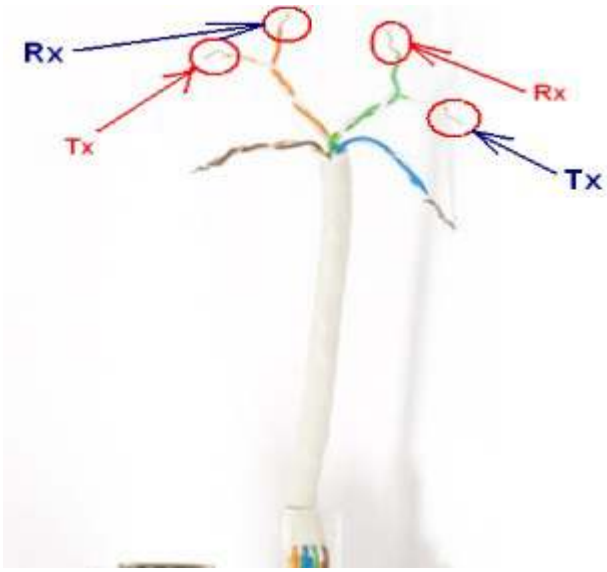


Termination resistors resistance in RJ-45 connector

Red circled resistors resistance should be 75Ohm +/- 1%



On ports Ether2 – Ether10 You can take patch cord and plug it into the routerboard, and then measure resistance of termination resistors.

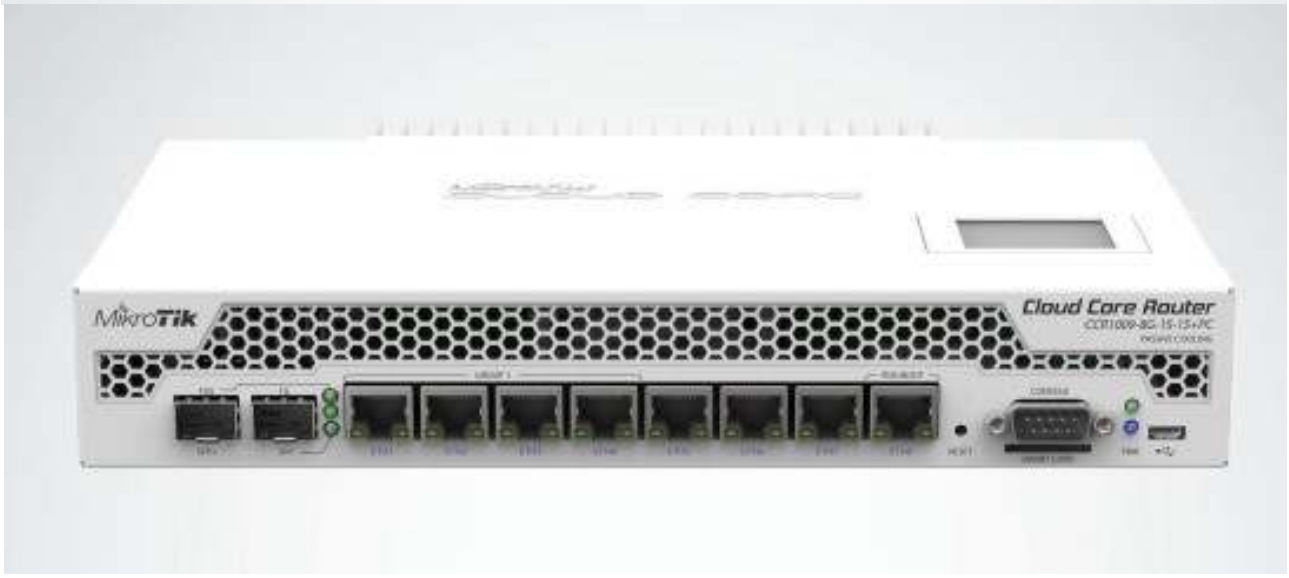


Resistance value between Rx and Tx line must be 150 Ohm +/-4%.

If resistance value is smaller or higher then Tx/Rx line was damaged by high voltage surge.

CCR1009 series RouterBoards

List of CCR1009 series RouterBoards:



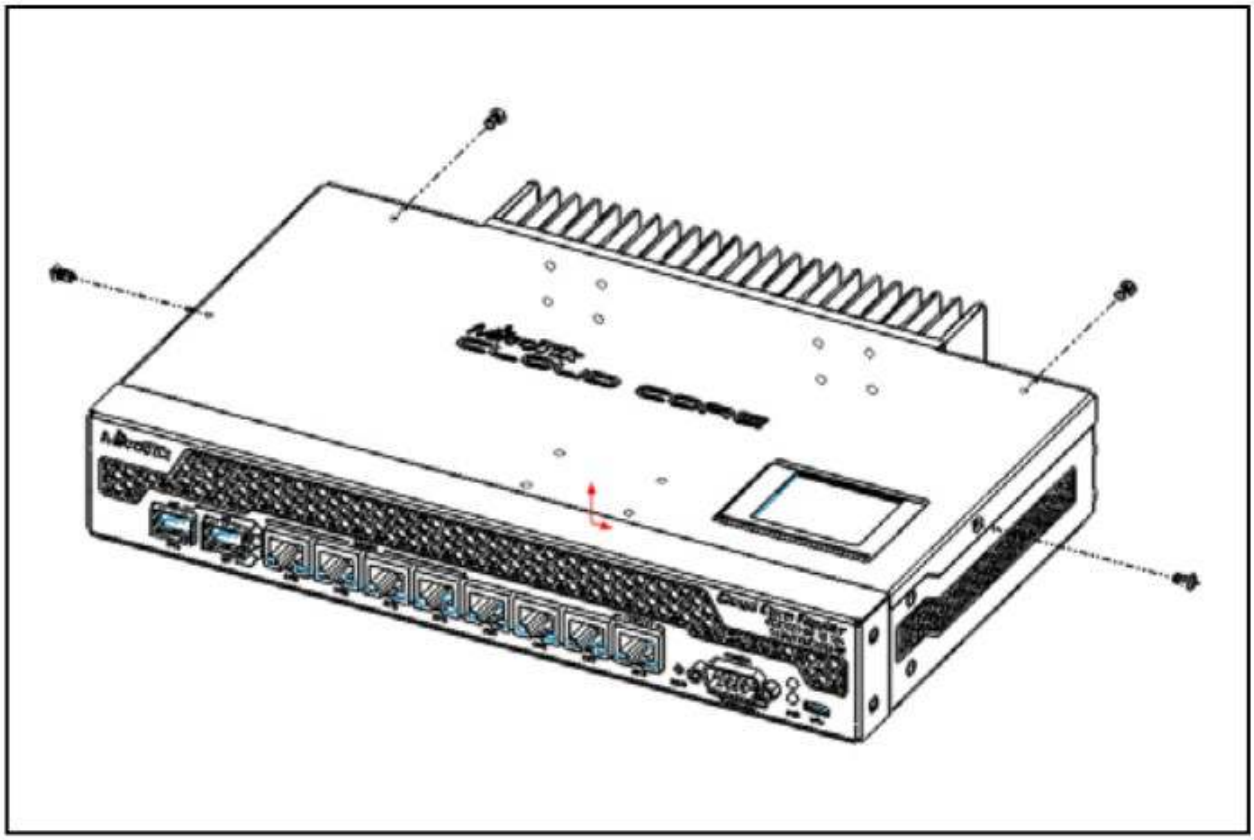
CCR1009-8G-1S-1S+PC

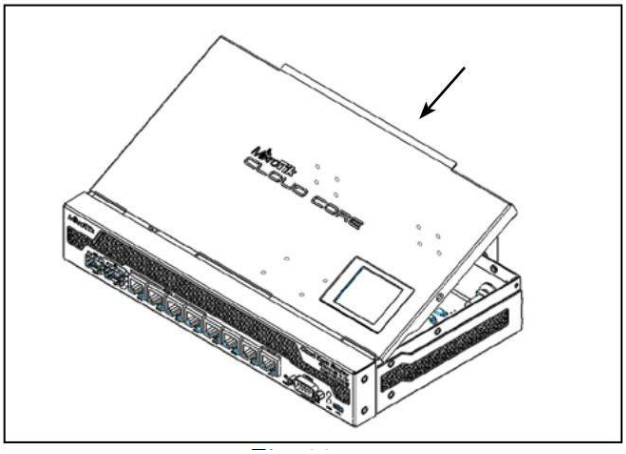
Disassembling information

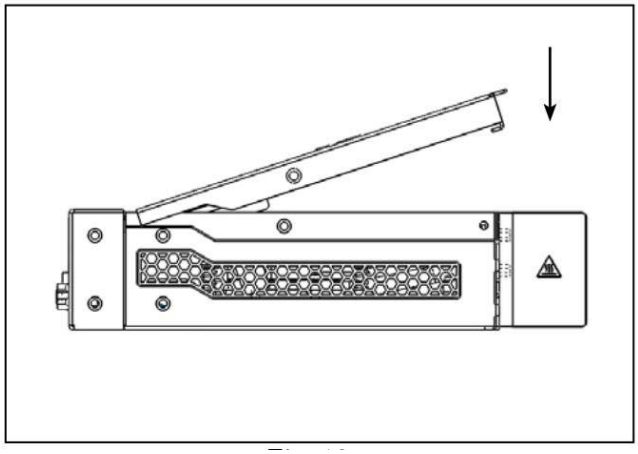
CCR1009-8G-1S-1S+

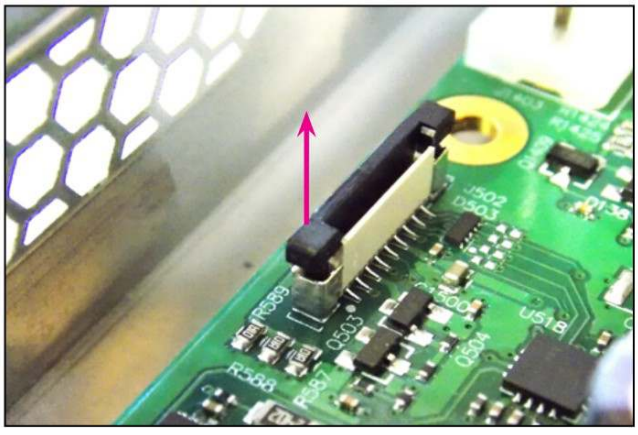
1. Use PH2 screw driver to loose backside screws then side screws, take off cover. Detach DSUB-9 connector fasteners.

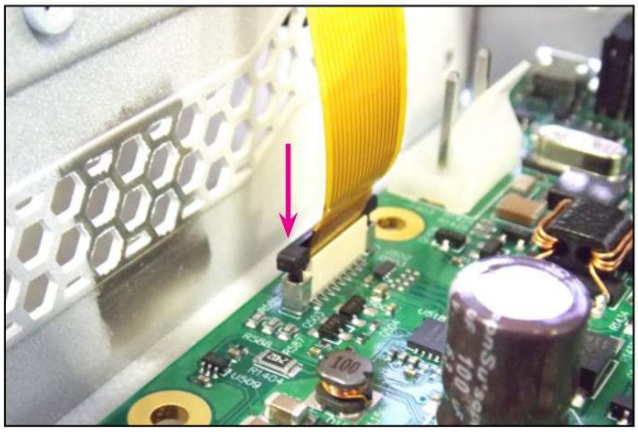
CCR1009-8G-1S-1S+PC

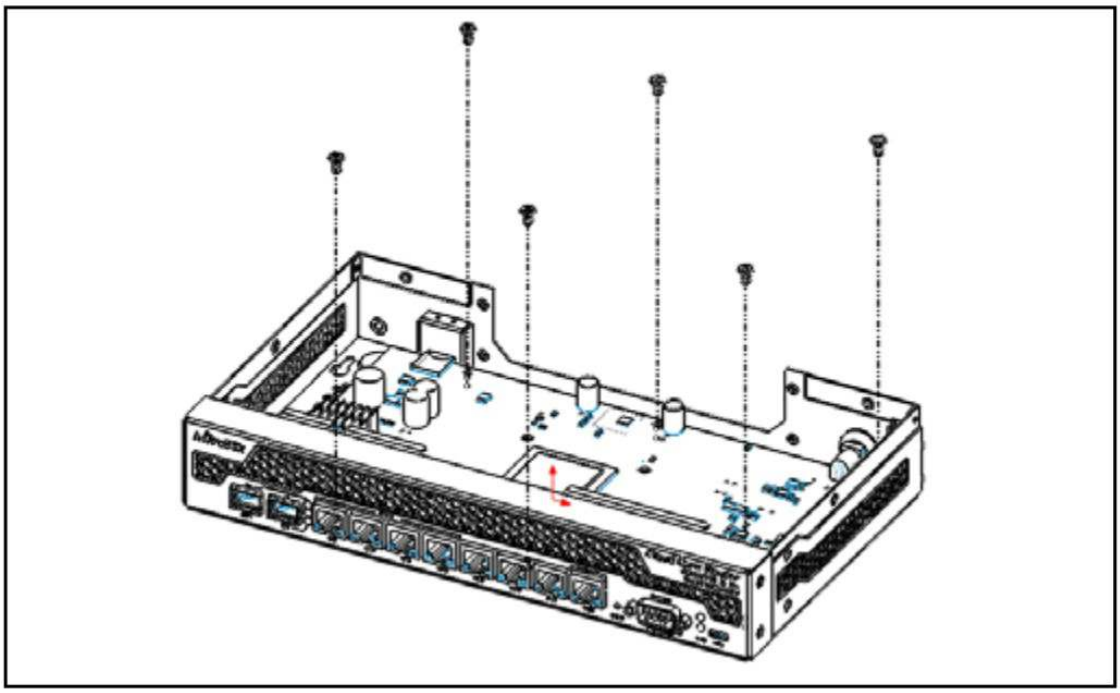


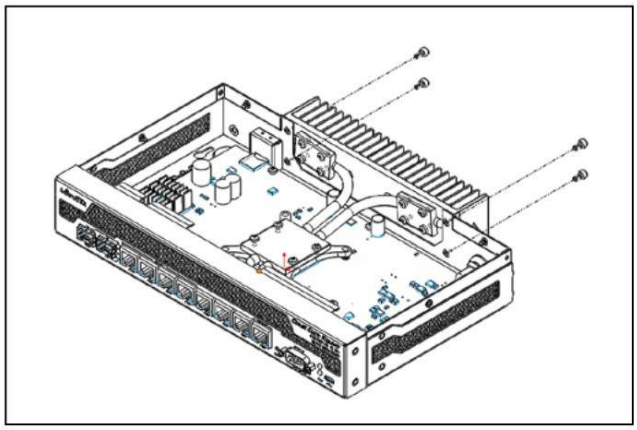


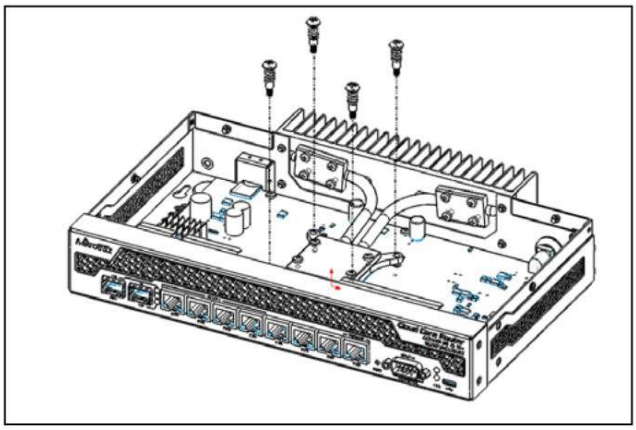


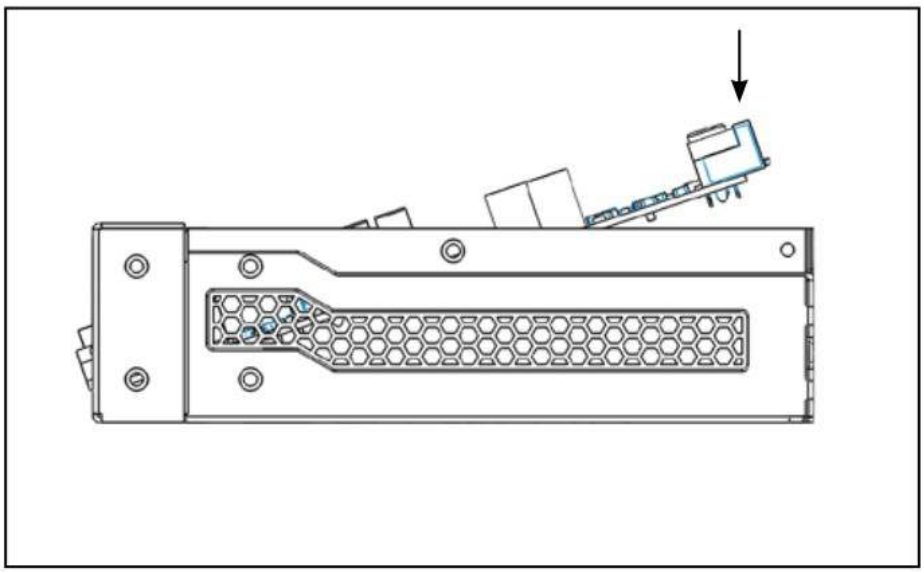






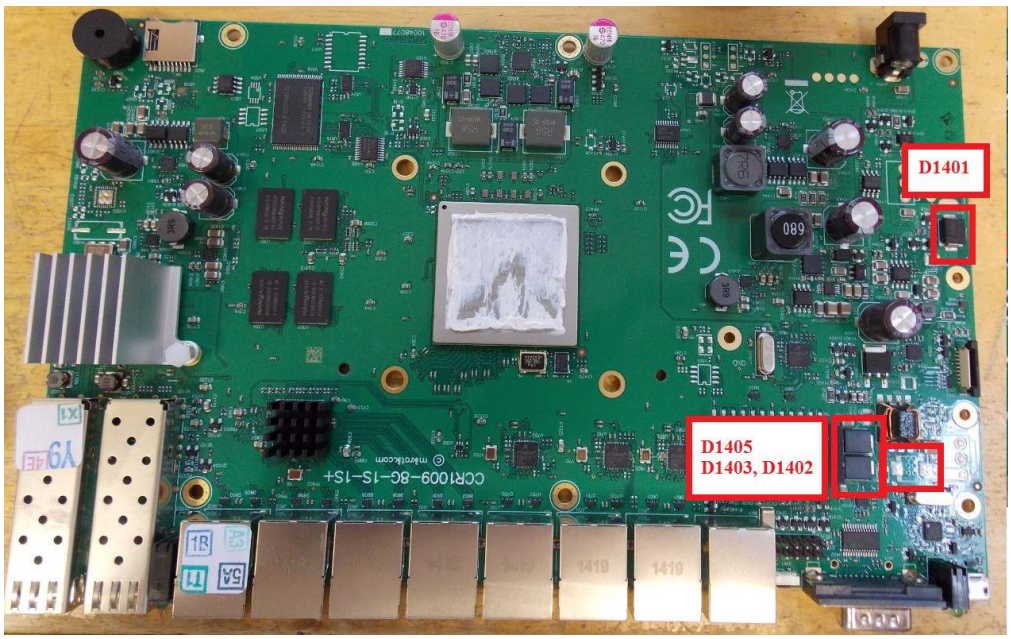






Schottky diode measuring with multimeter in diode mode

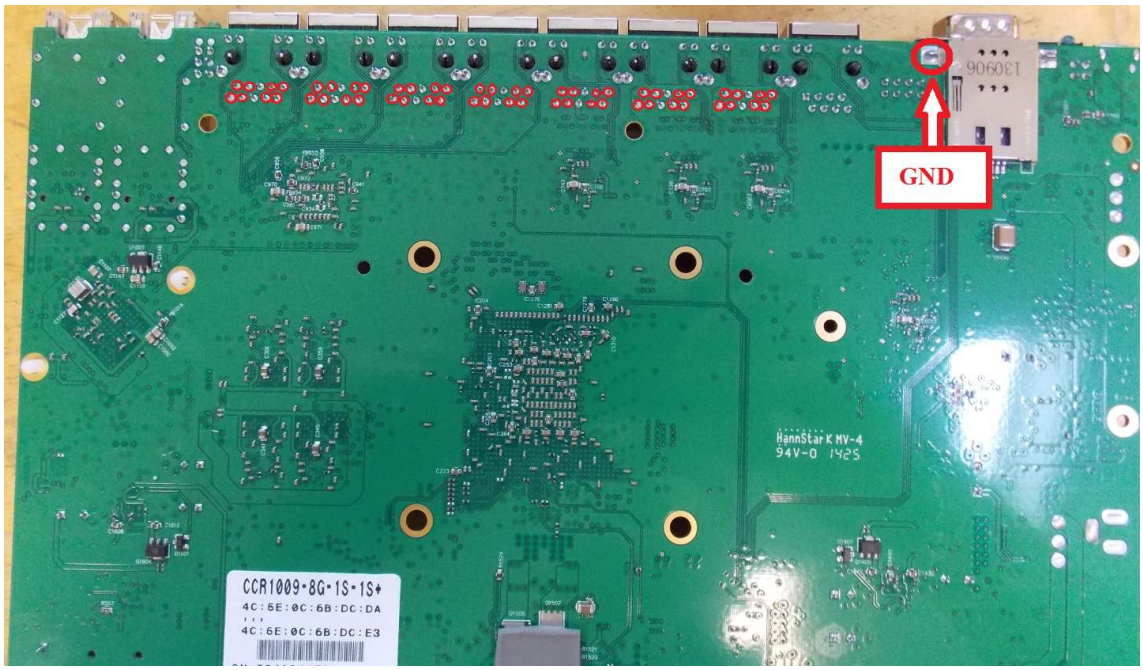
Schottky diode reference numbers is D1401, D1402, D1403, D1405. Voltage drop value should be about 0,264V



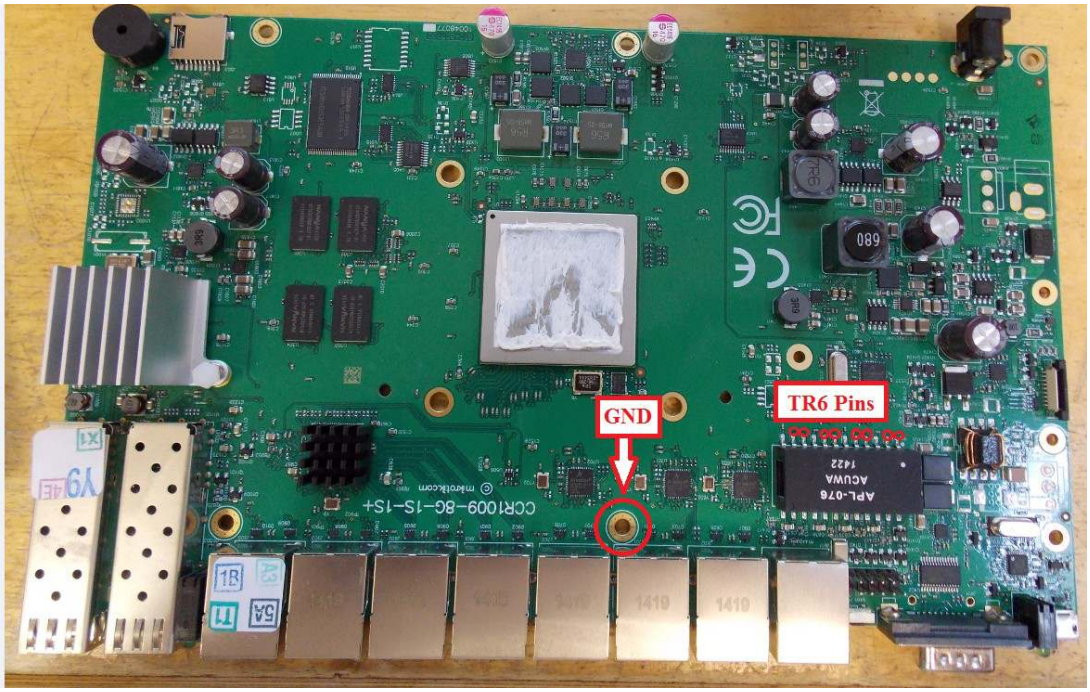
Voltage drop between diode array pin#1 and Ground.

Check voltage drop between internal Ethernet Transformers on ports Ether2 – Ether8 pins and Ground.

It should be in the range from 0,32V to 0,438V

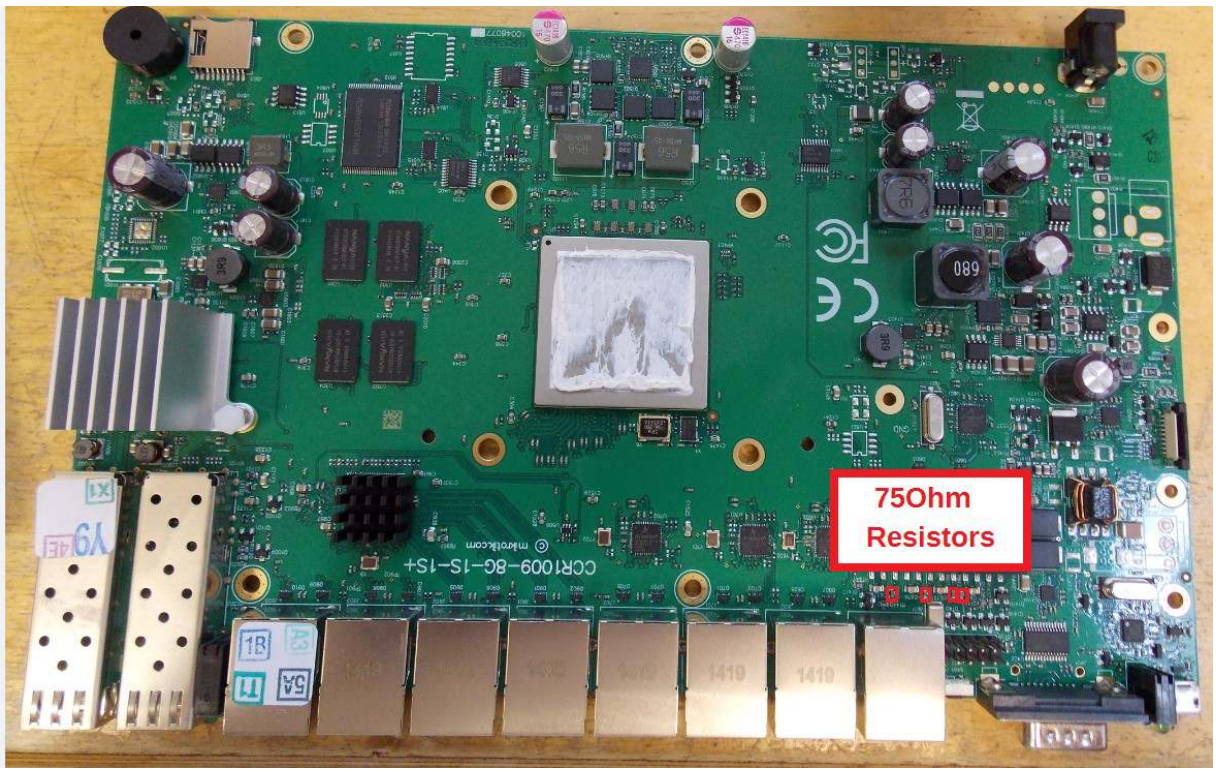


For Ether1 measure voltage drop on TR6 Pins and Ground. It should be in the range from 0,32V to 0,438V

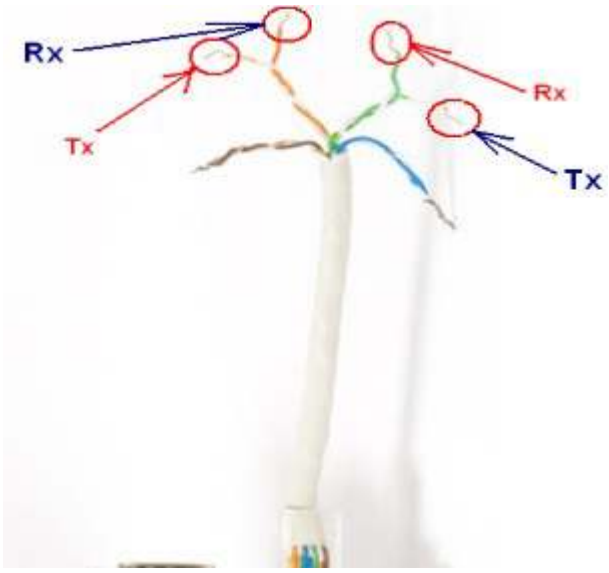


Termination resistors resistance in RJ-45 connector

Red circled resistors resistance should be 75Ohm +/- 1%



On ports Ether2 – Ether8 You can take patch cord and plug it into the routerboard, and then measure resistance of termination resistors.



Resistance value between Rx and Tx lines must be 150 Ohm +/-4%.

If resistance value is smaller or higher then Tx/Rx line was damaged by high voltage surge.

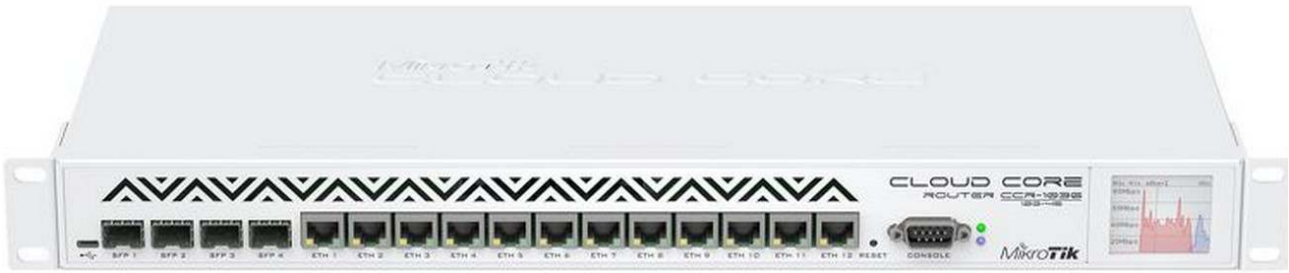
Cloud Core Router CCR1016-12G, CCR1036-12G series

List of Cloud Core Router CCR1016-12G, CCR1036-12G series:

CCR1016-12G

CCR1036-12G-4S

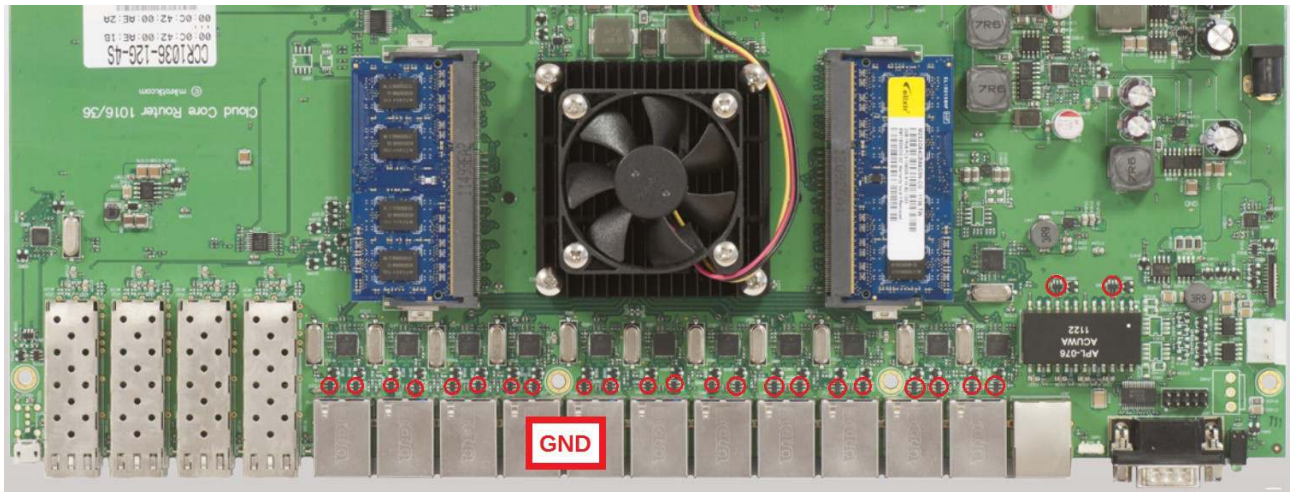
CCR1036-12G-4S-EM



Disassembling information

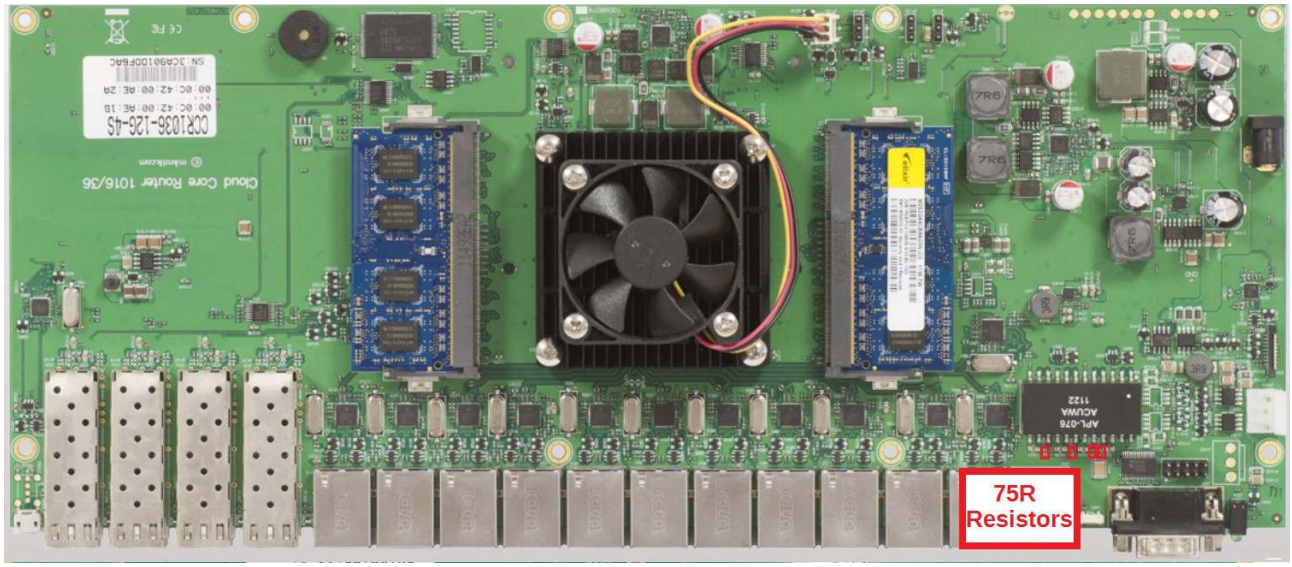
Voltage drop between diode array pin#1 and Ground.

Check voltage drop between diode arrays pin#1 and Ground. Diode arrays are circled red. It should be in the range from 0,32V to 0,438V

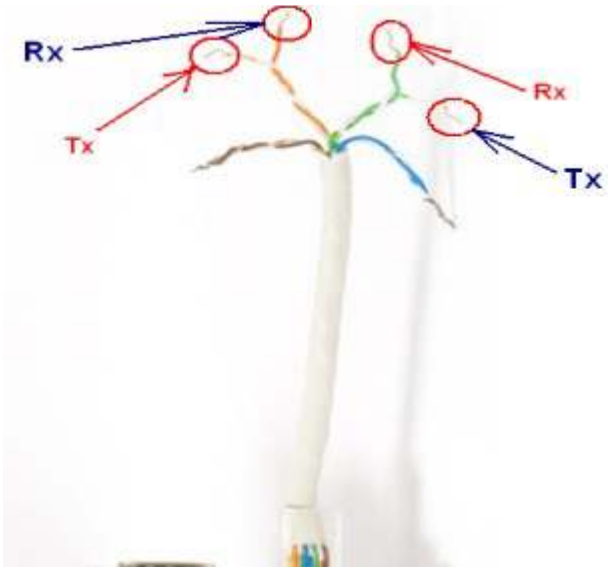


Termination resistors resistance in RJ-45 connector

Red circled resistors resistance should be 75Ohm +/- 1%



On ports Ether2 – Ether11 You can take patch cord and plug it into the routerboard, and then measure resistance of termination resistors.



Resistance value between Rx and Tx lines must be 150 Ohm +/-4%.

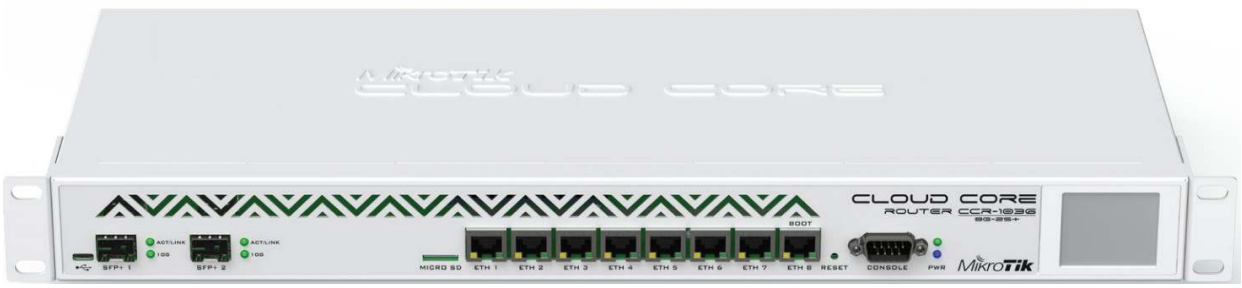
If resistance value is smaller or higher then Tx/Rx line was damaged by high voltage surge.

Cloud Core Router CCR1036-8G-2S+ series

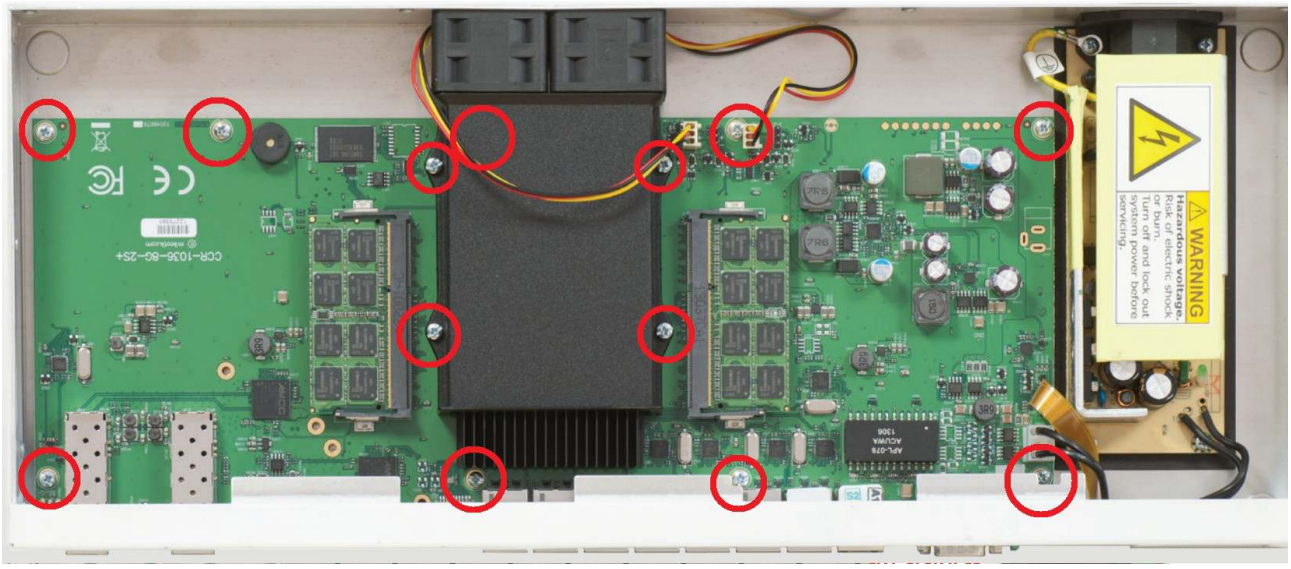
List of Cloud Core Router CCR1036-8G-2S+ series:

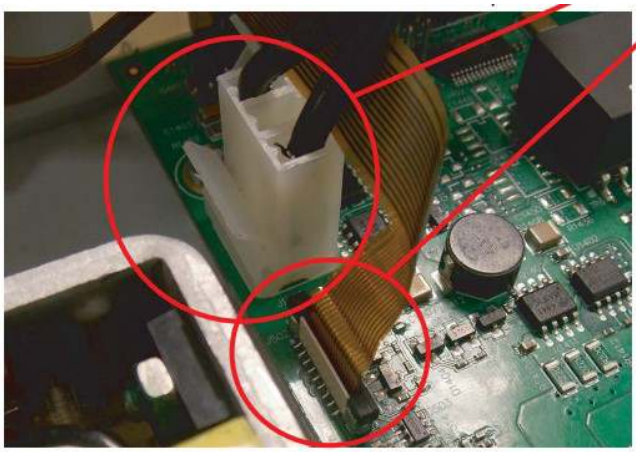
CCR1036-8G-2S+

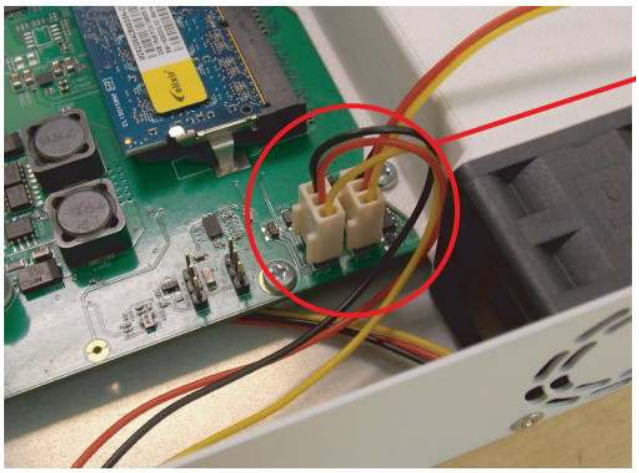
CCR1036-8G-2S+EM



Disassembling information


WARNING
Hazardous voltage.
Risk of electric shock
or burn.
Turn off and lock out
system power before
servicing.





Voltage drop between diode array pin#1 and Ground.

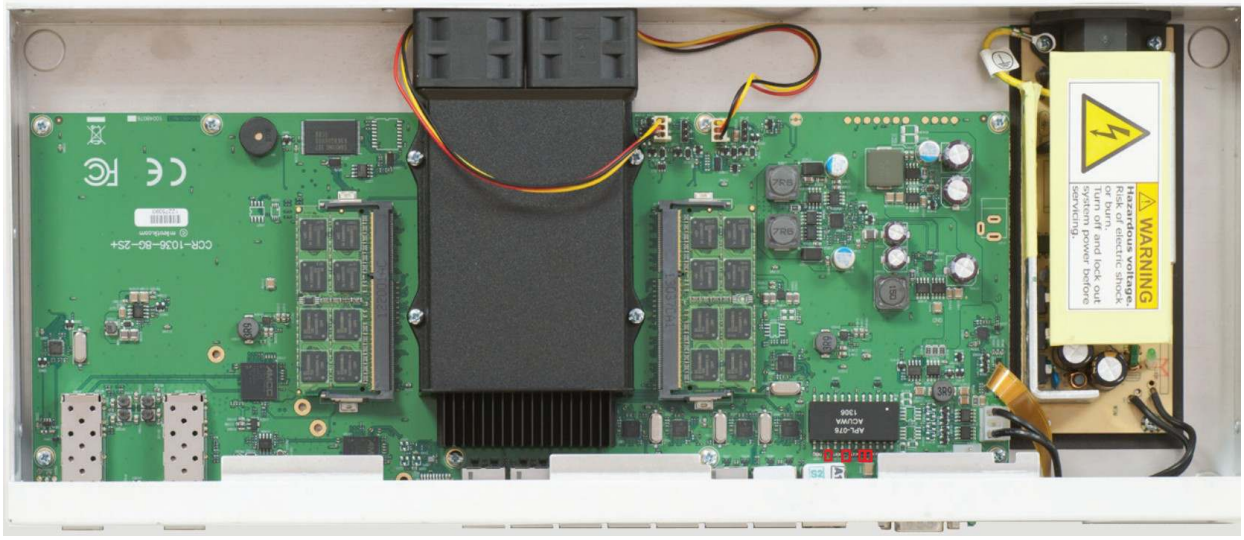
Check voltage drop between internal Ethernet Transformers on ports Ether1 – Ether7 pins and Ground. Ether Pins are circled red.

It should be in the range from 0,32V to 0,438V

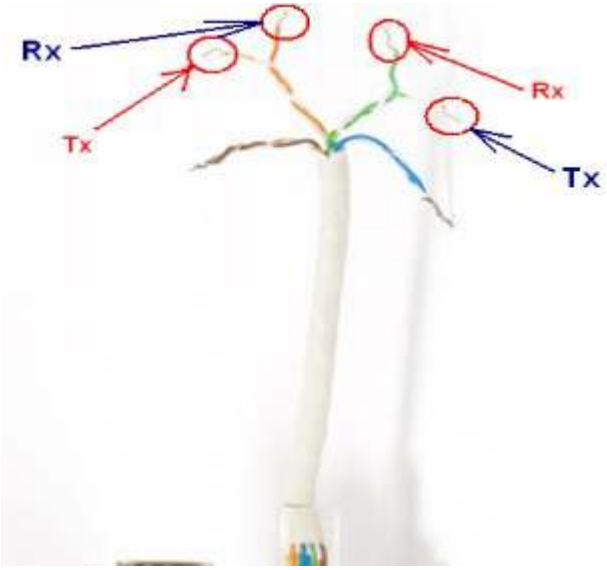

GND

Termination resistors resistance in RJ-45 connector

Red circled resistors resistance should be 75Ohm +/- 1%



On ports Ether1 – Ether7 You can take patch cord and plug it into the routerboard, and then measure resistance of termination resistors.



Resistance value between Rx and Tx lines must be 150 Ohm +/-4%.

If resistance value is smaller or higher then Tx/Rx line was damaged by high voltage surge.

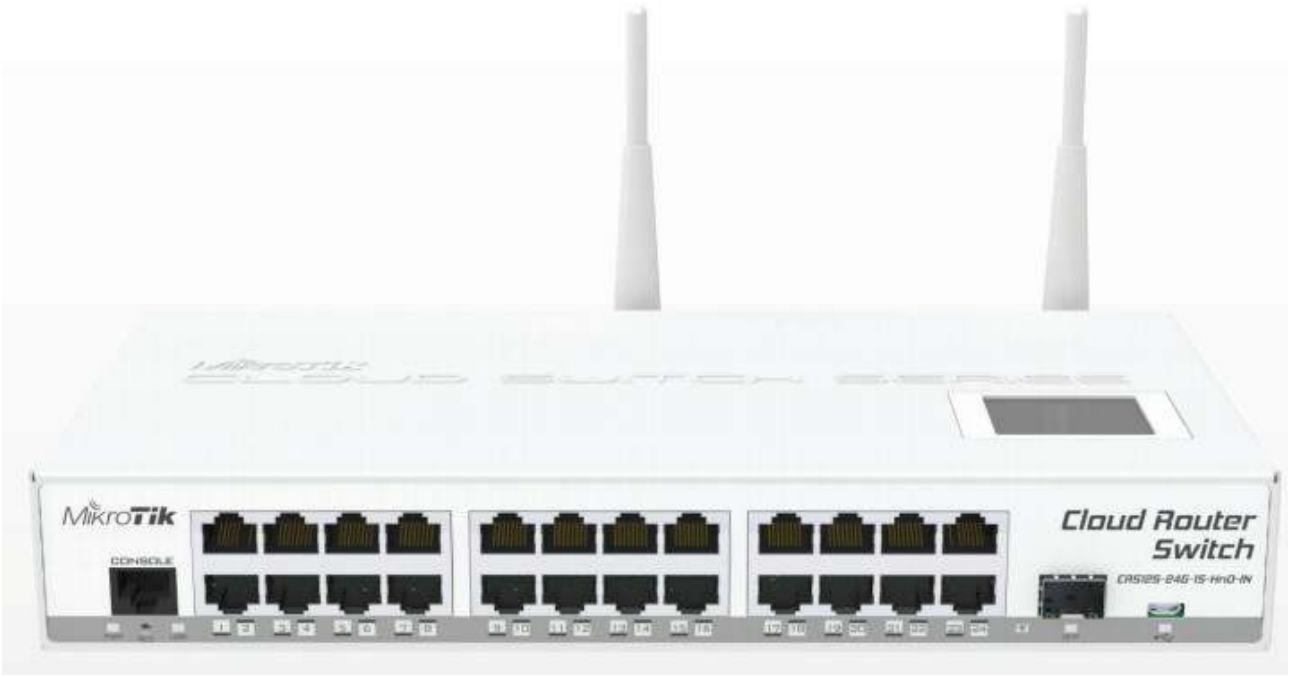
Cloud Router Switch CRS125-24G-1S series

List of Cloud Router Switch CRS125-24G-1S series:

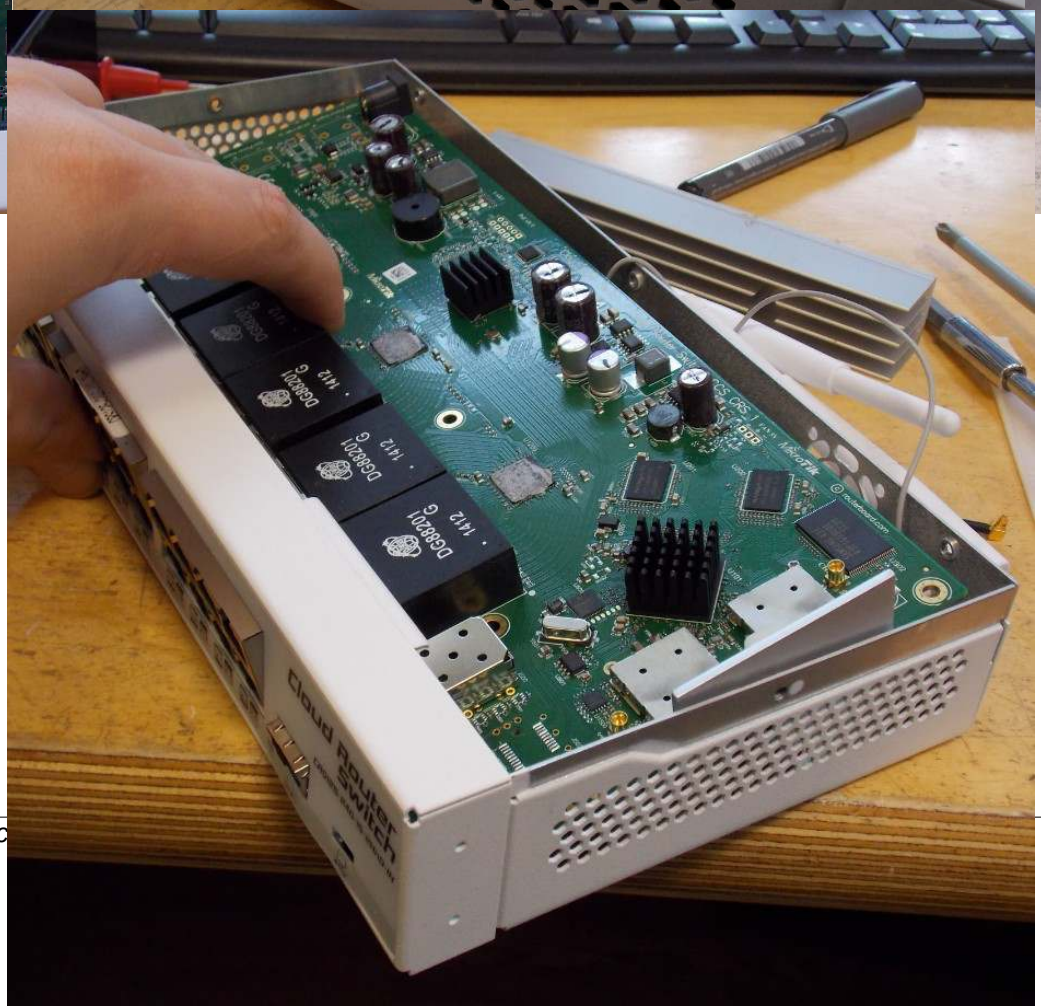
CRS125-24G-1S-IN

CRS125-24G-1S-RM

CRS125-24G-1S-2HnD-IN

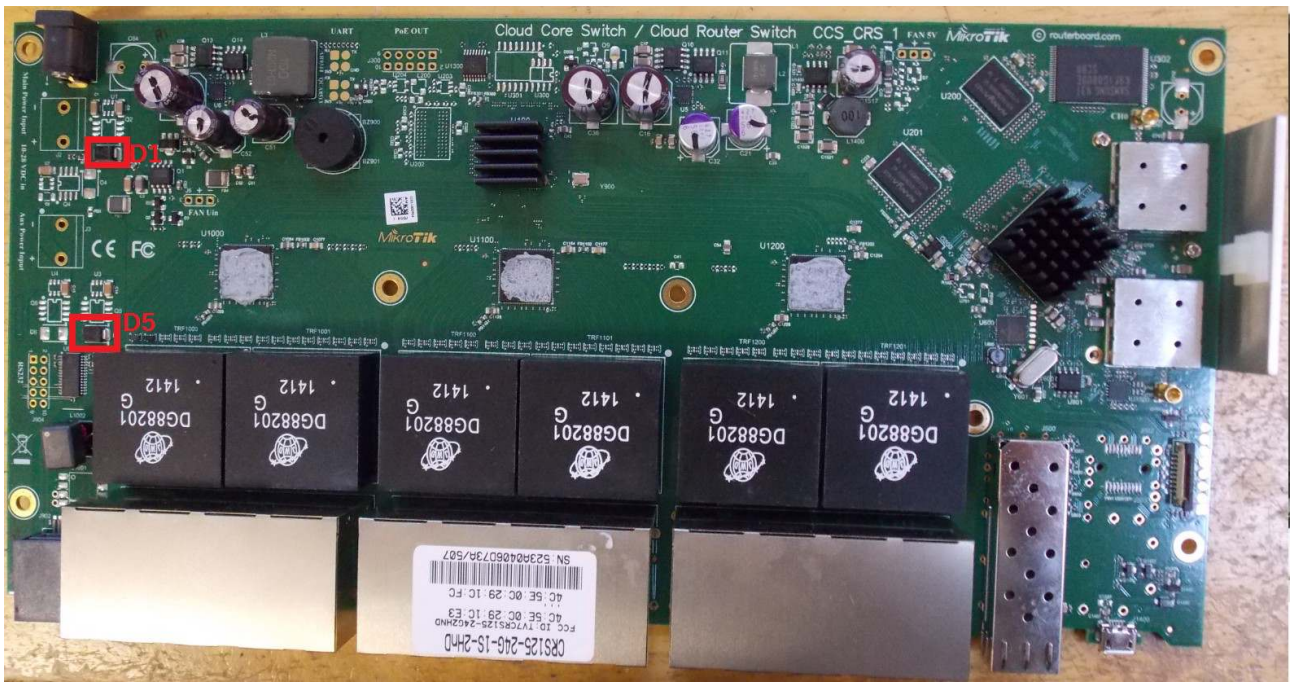

MikroTik
CONSOLE
Cloud Router
Switch
CRS125-24G-1S-RM-IN

Disassembling information



Schottky diode measuring with multimeter in diode mode

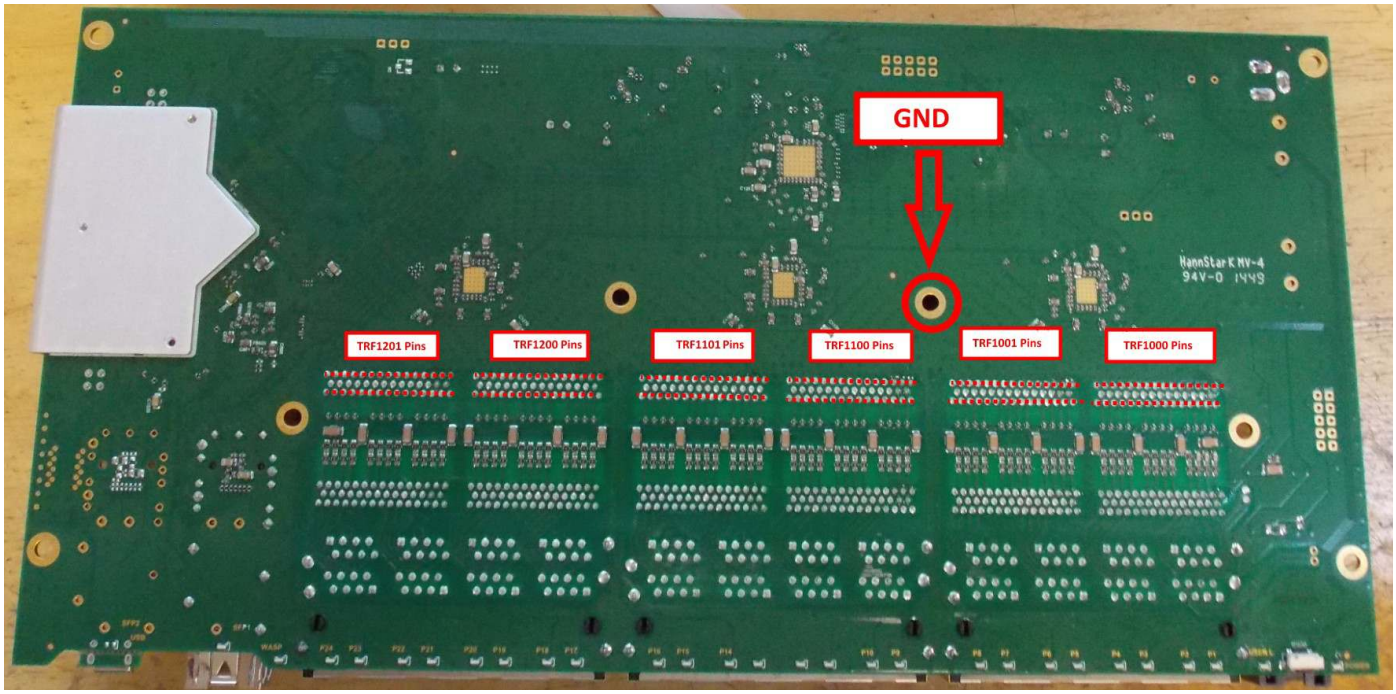
Schottky diode reference numbers is D1 and D5; Voltage drop value should be about 0,208V



Voltage drop between diode array pin#1 and Ground.

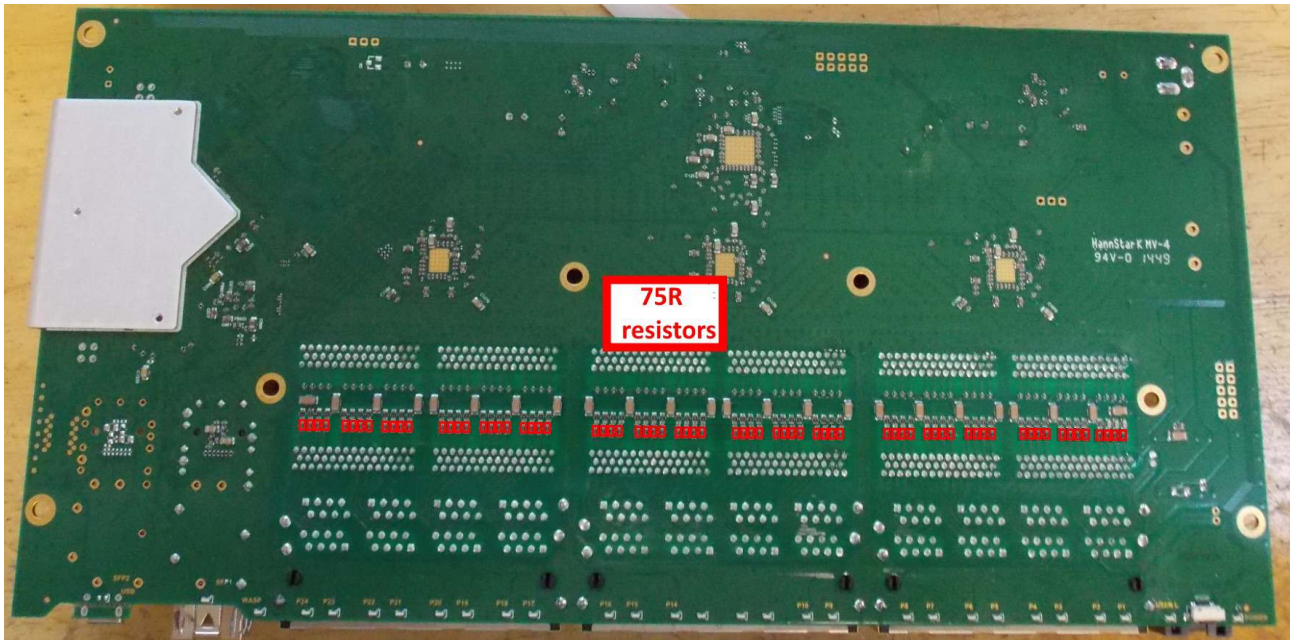
Check voltage drop between Transformer TRF1000, TRF1001, TRF1100, TRF1101, TRF1200 and TR1201 pins and Ground.

It should be in the range from 0,32V to 0,438V

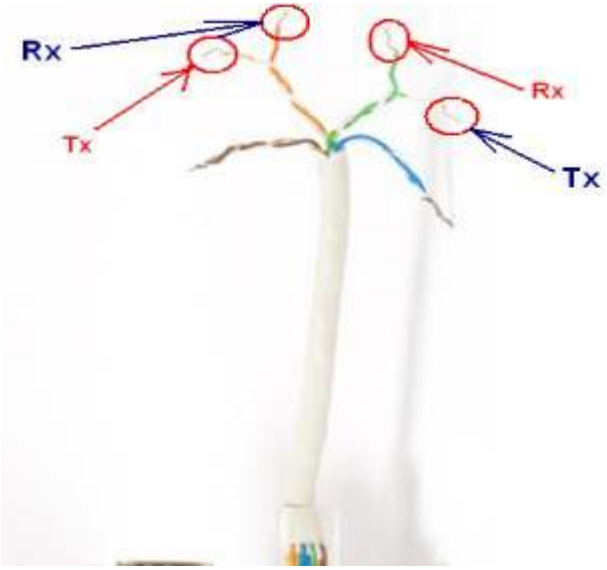


Termination resistors resistance in RJ-45 connector

Red circled resistors resistance should be 75Ohm +/- 1%



On ports Ether2 – Ether24 You can take patch cord and plug it into the routerboard, and then measure resistance of termination resistors.



Resistance value between Rx and Tx line must be 150 Ohm +/-4%.

If resistance value is smaller or higher then Tx/Rx line was damaged by high voltage surge.

RB750r2 series RouterBoards

List of RB750r2 series:

PowerBox

*h*EX lite

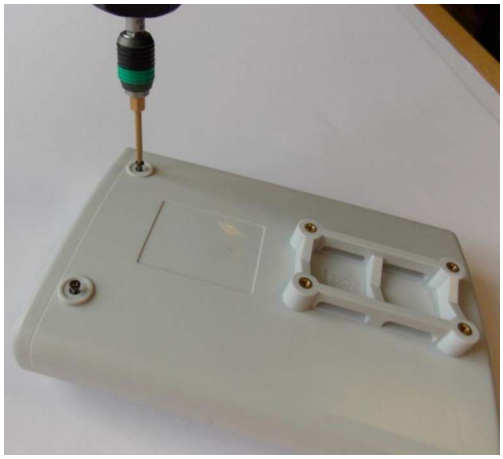
*h*EX PoE lite


Power
hEX PoE lite
RES
PWR
USR
Internet
PoE in
2
3
4
5
LAN PoE out

Disassembling information

PowerBox disassembling

1. step



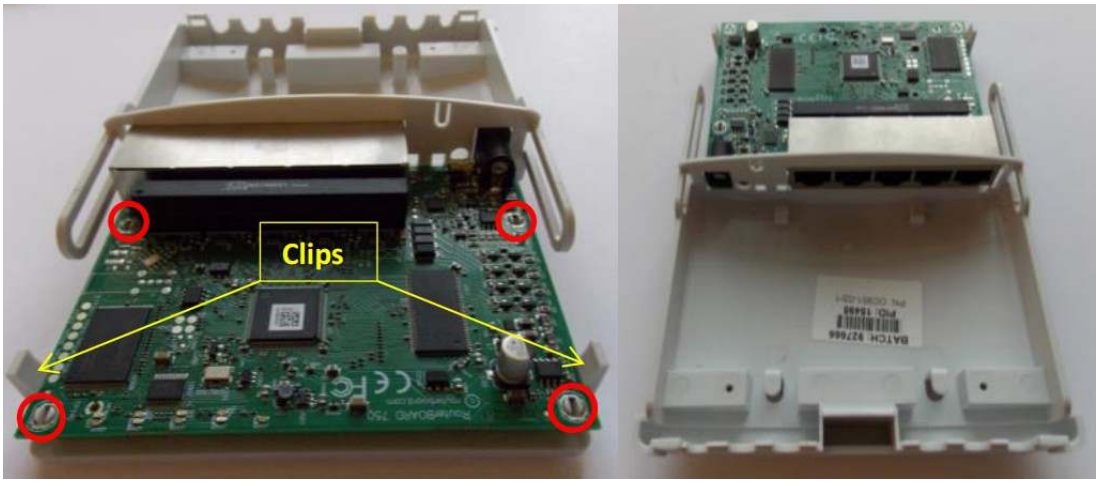
Unscrew with Torx T8

2. step

Remove board from case

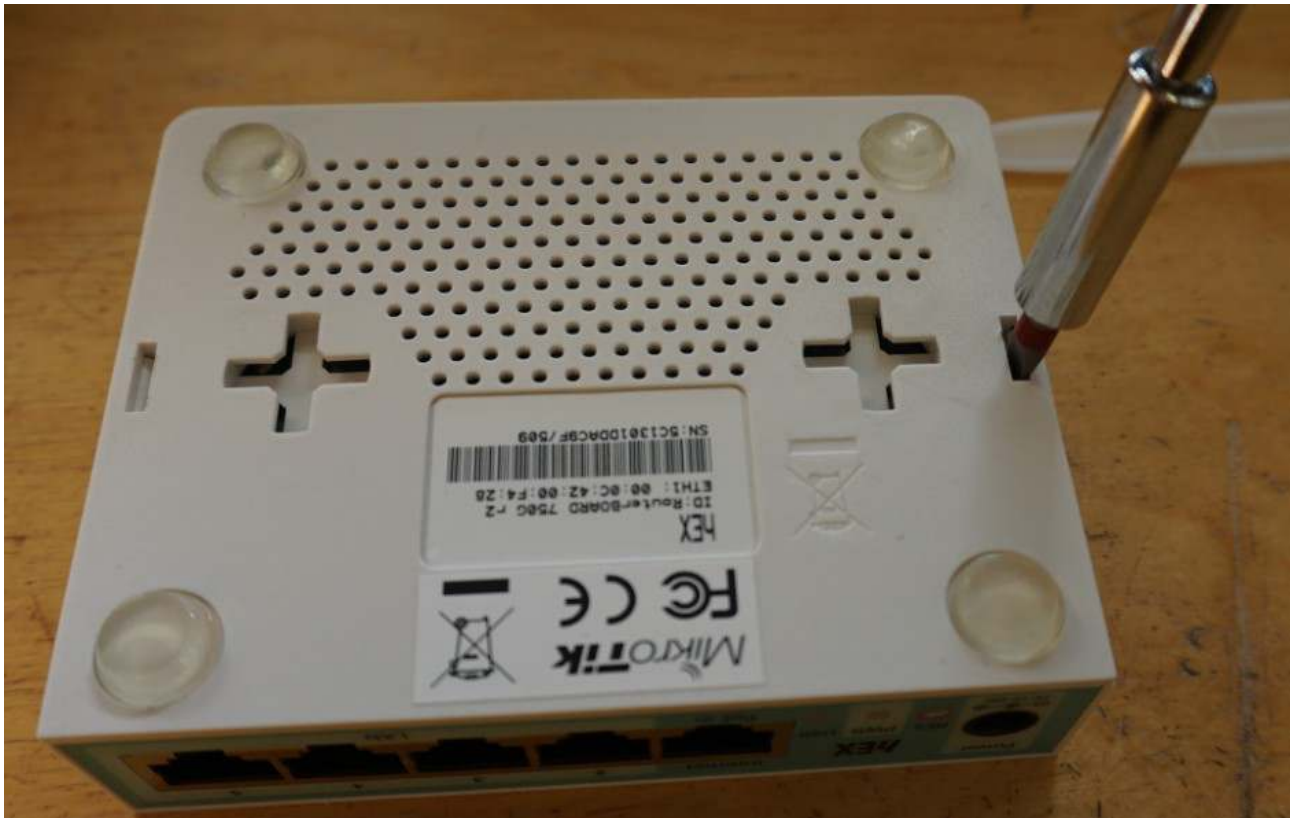
3. Step

Incline fixed plastic clips to sever board from case.



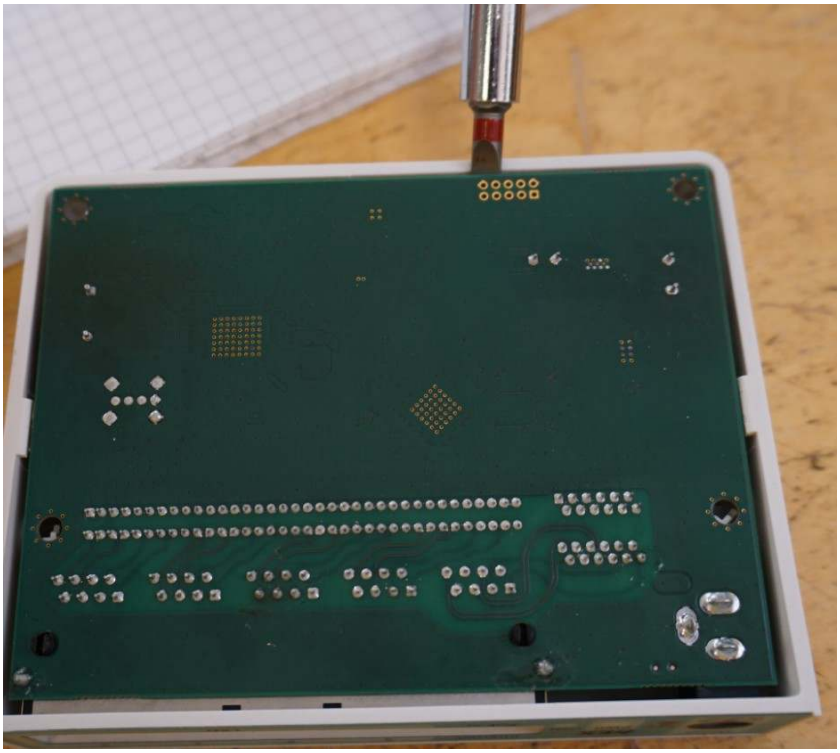
*h*EX lite and *h*EX PoE lite disassembling

Take off the cover with a screwdriver as shown in the picture1



Picture1

Take out the board with a screwdriver as shown in the picture2



Picture1

Schottky diode measuring with multimeter in diode mode

Schottky diode reference numbers is D7, D8, D705, D706, D707, D708; Voltage drop value should be about 0,159V for D7 and D8, and 0,215V for D705, D706, D707, D708

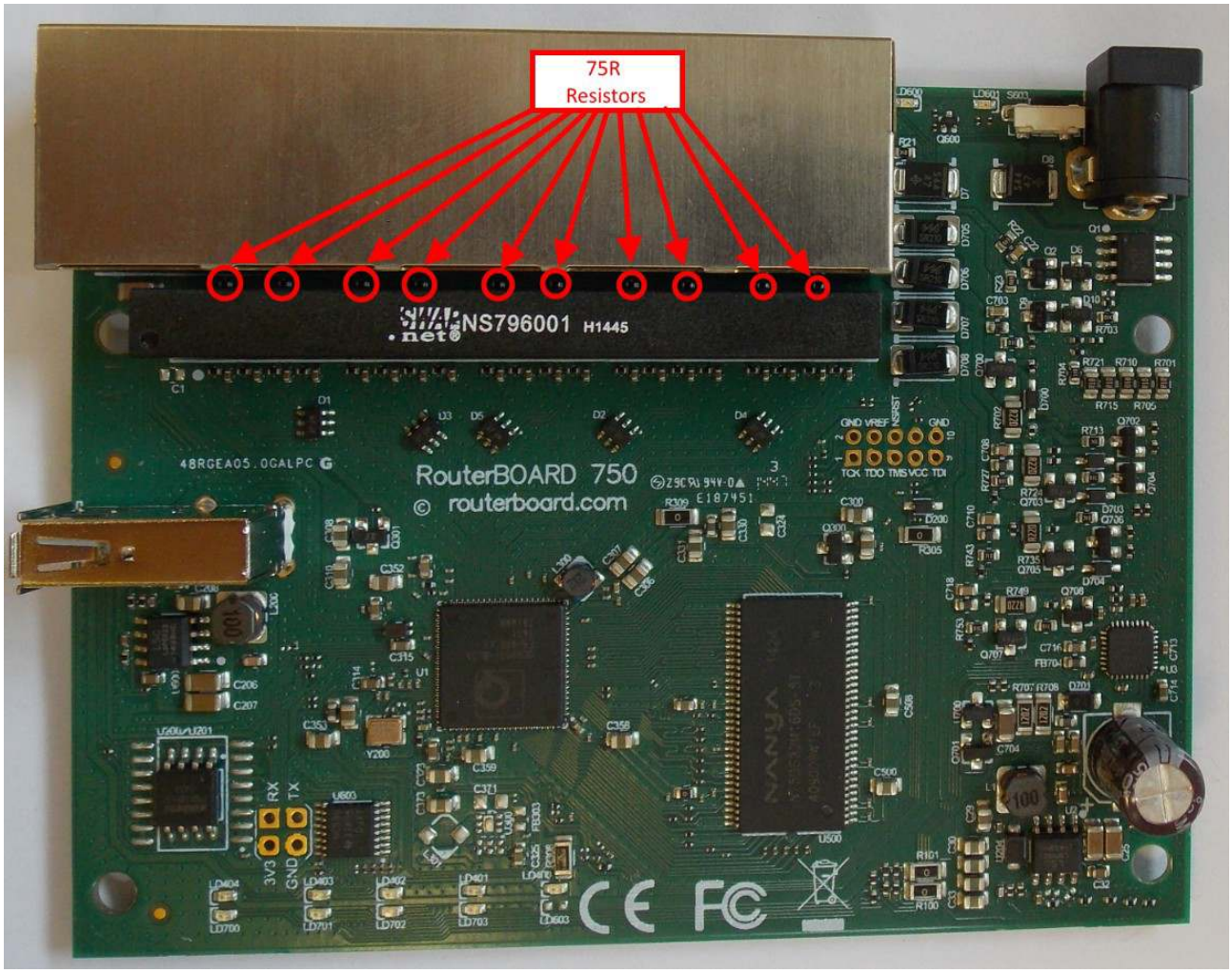
Voltage drop between diode array pin#1 and Ground.

Check voltage drop between TR1 Ethernet Transformers on ports Ether1 – Ether5 pins and Ground. Ether Pins are circled red.

It should be in the range from 0,32V to 0,438V

75R termination resistors resistance

Red circled resistors resistance should be 75Ohm +/- 1%


75R
Resistors
RouterBOARD 750
© routerboard.com

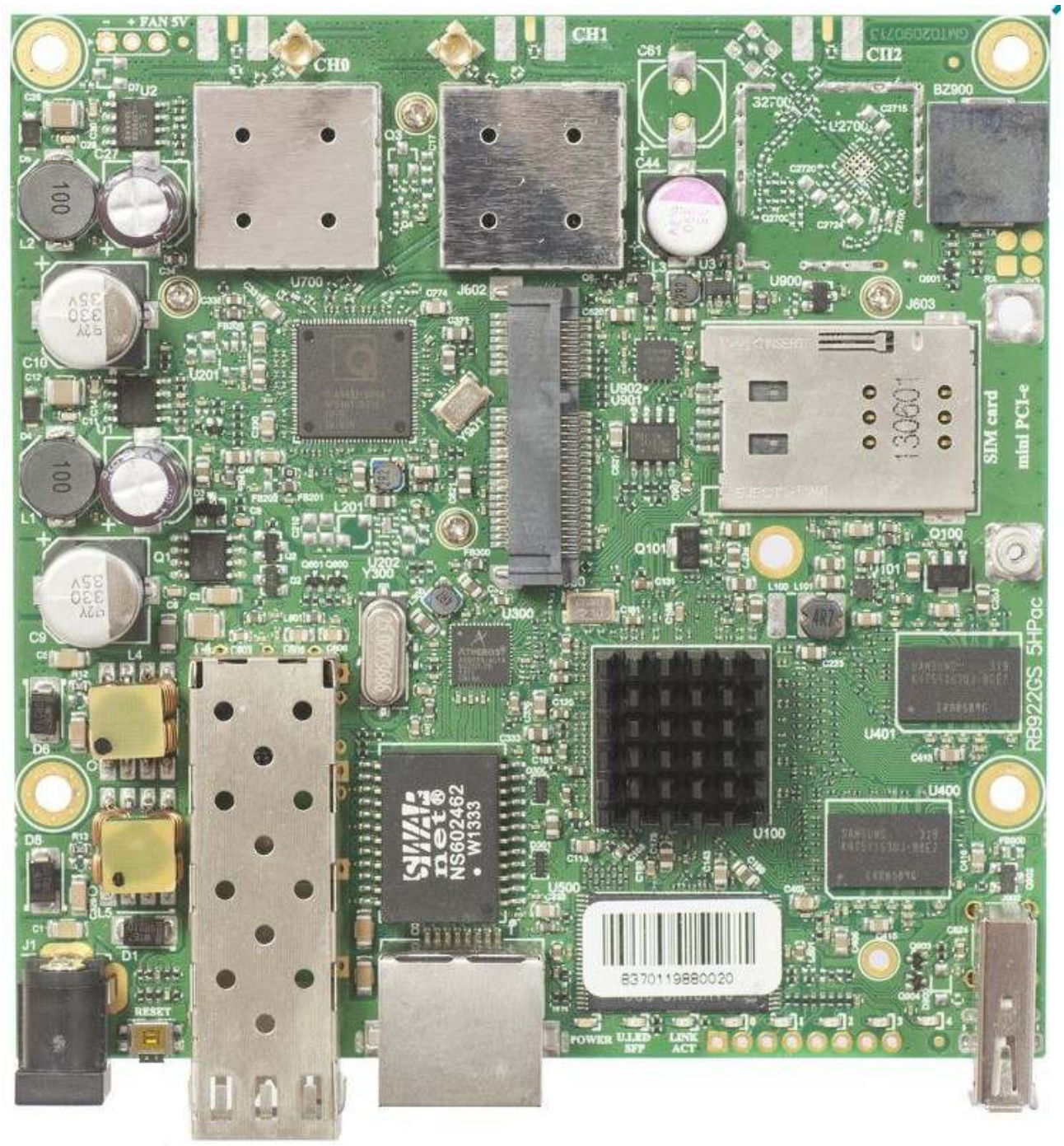
RB922GS-5HPac series RouterBoards

RB922GS-5HPac series:

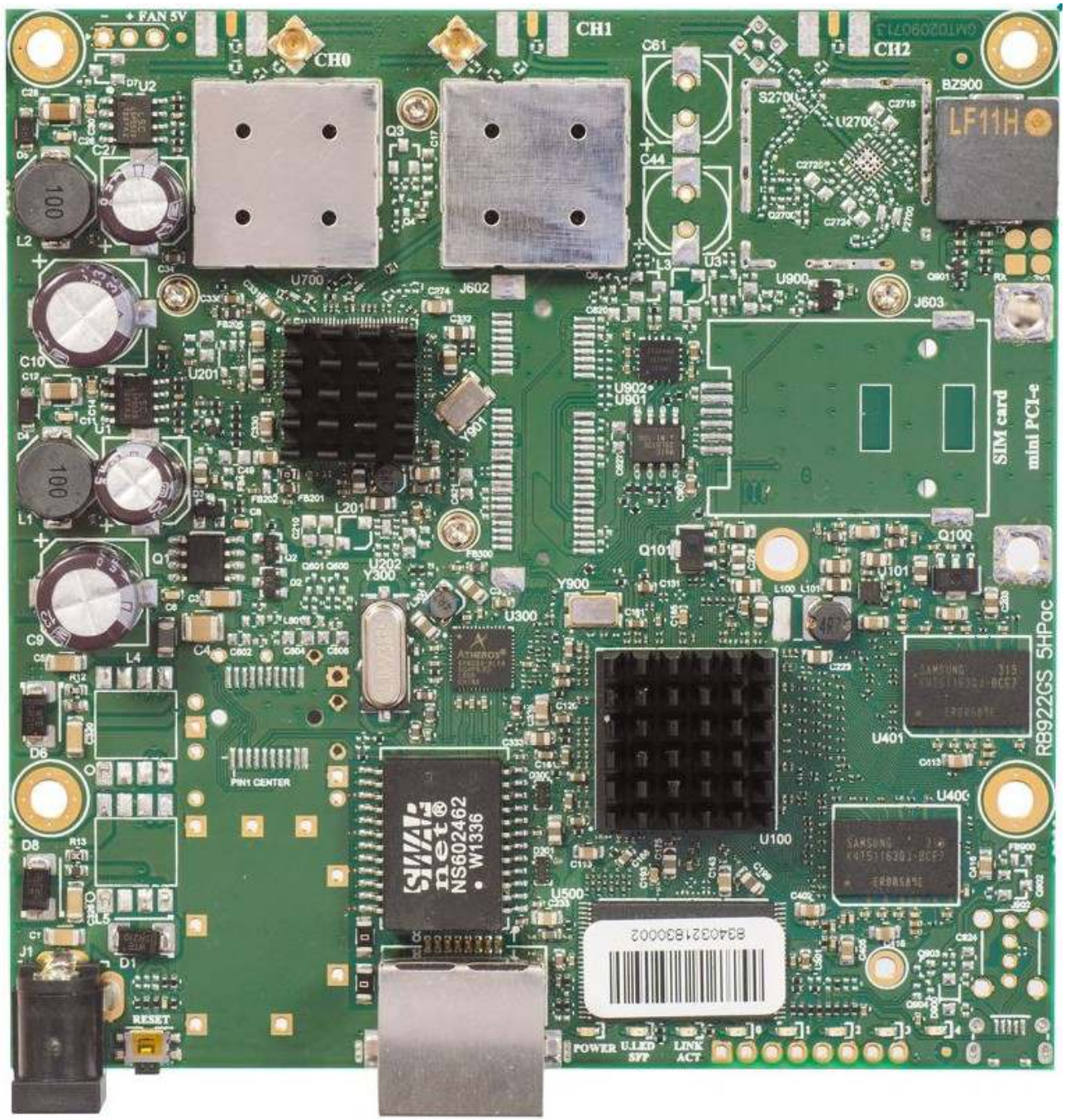
NetMetal 5

QRT 5 ac

RB922UAGS-5HPacD



RB911G-5HPacD

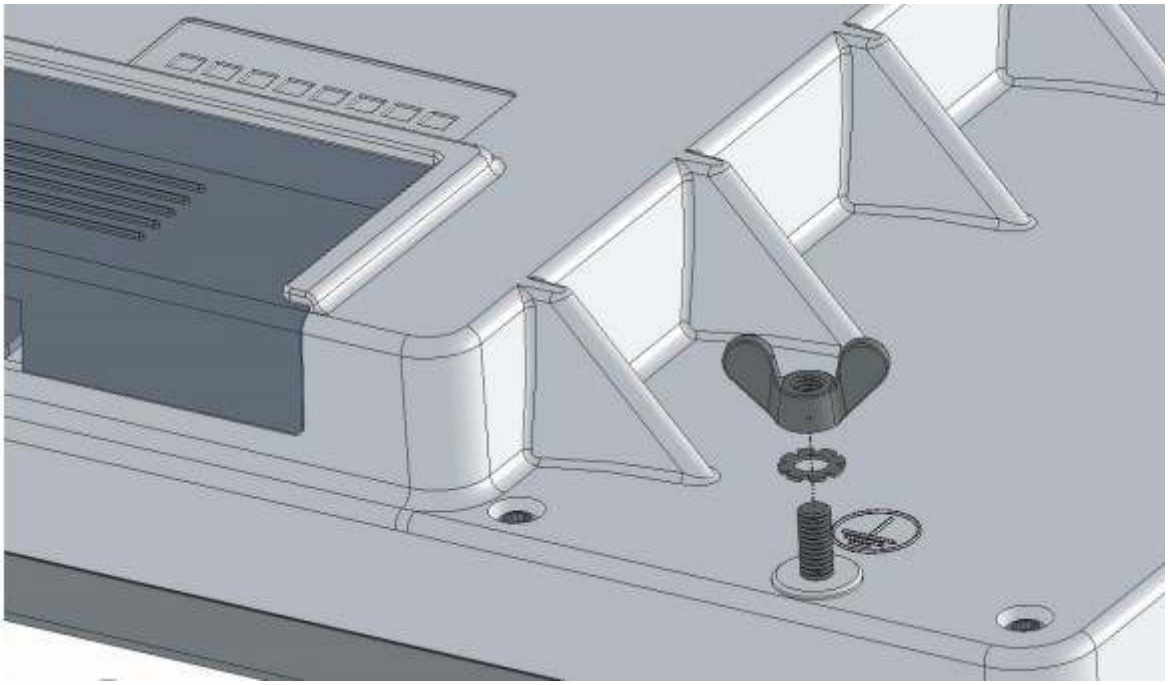


Disassembling information

QRT 5 ac disassembling.

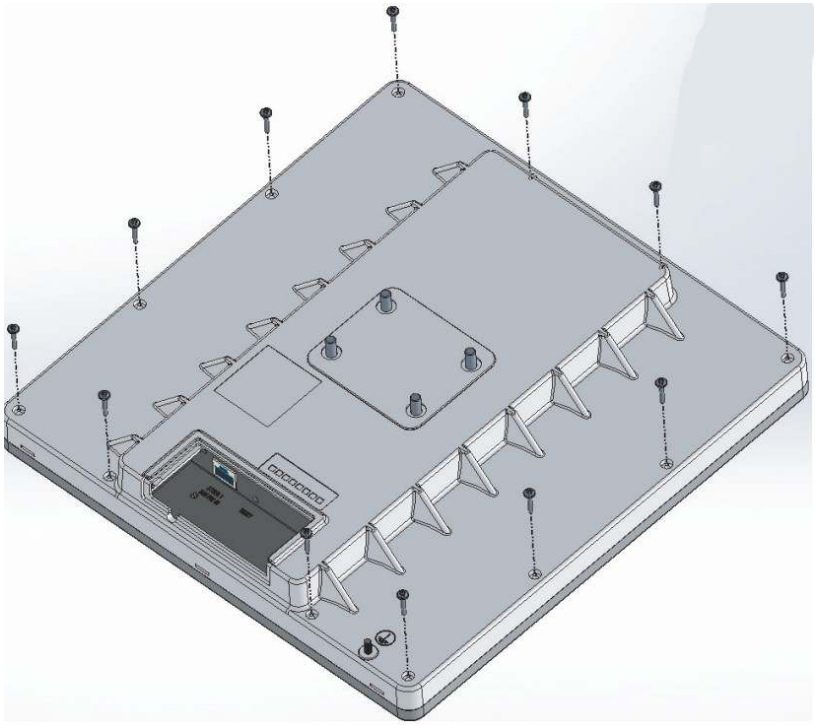
1. step

Remove the wing nut from Ground M4 screw



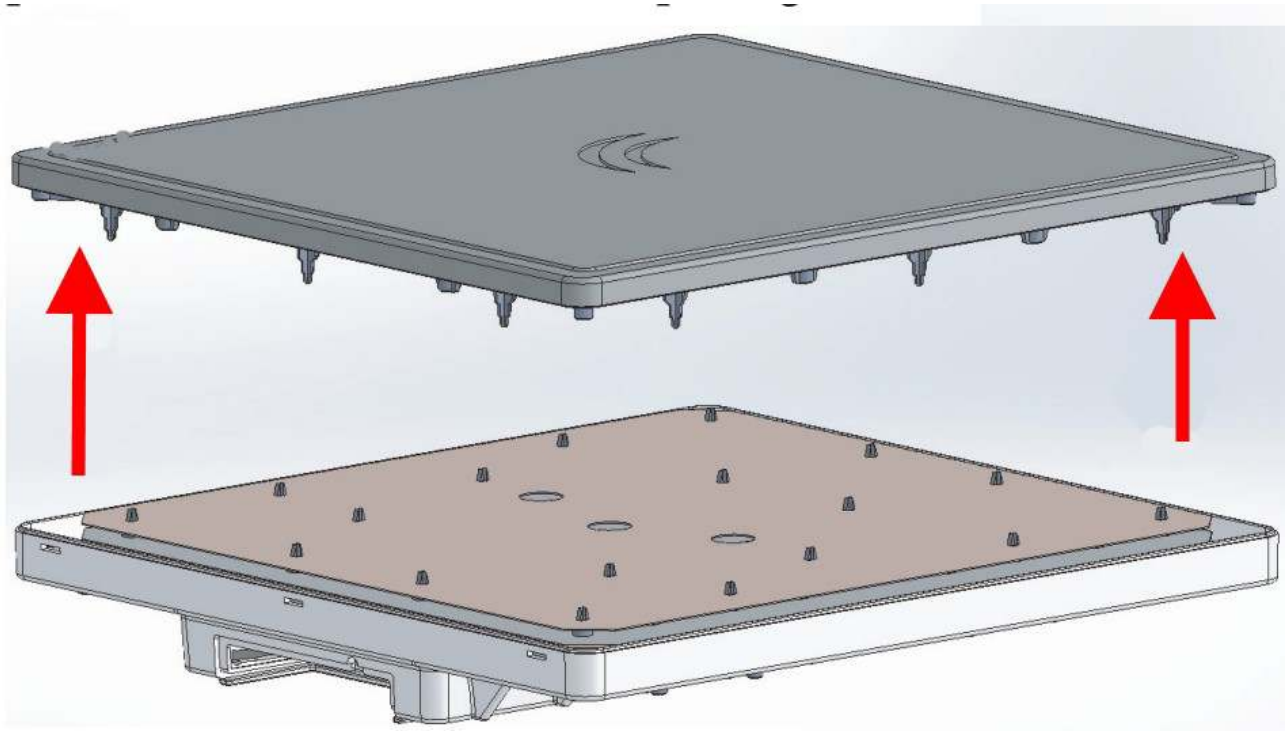
2. step

Remove the 12 pcs screws with torque screwdriverT8



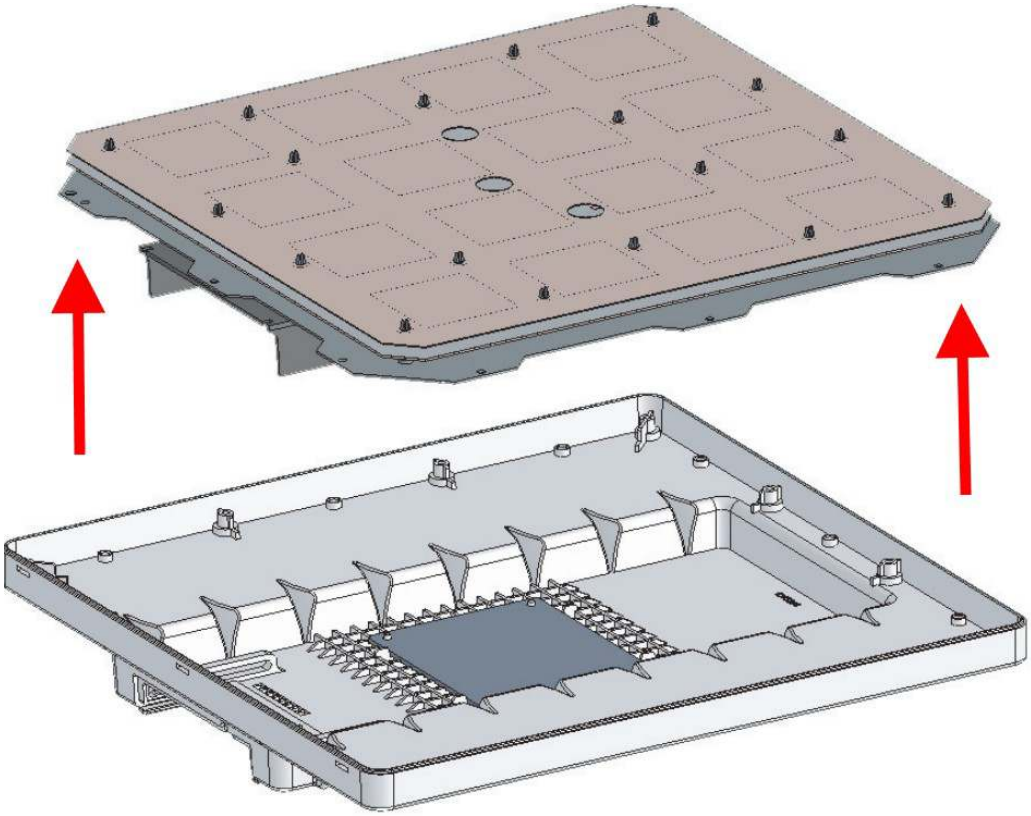
3. step

Remove the cover



4. step

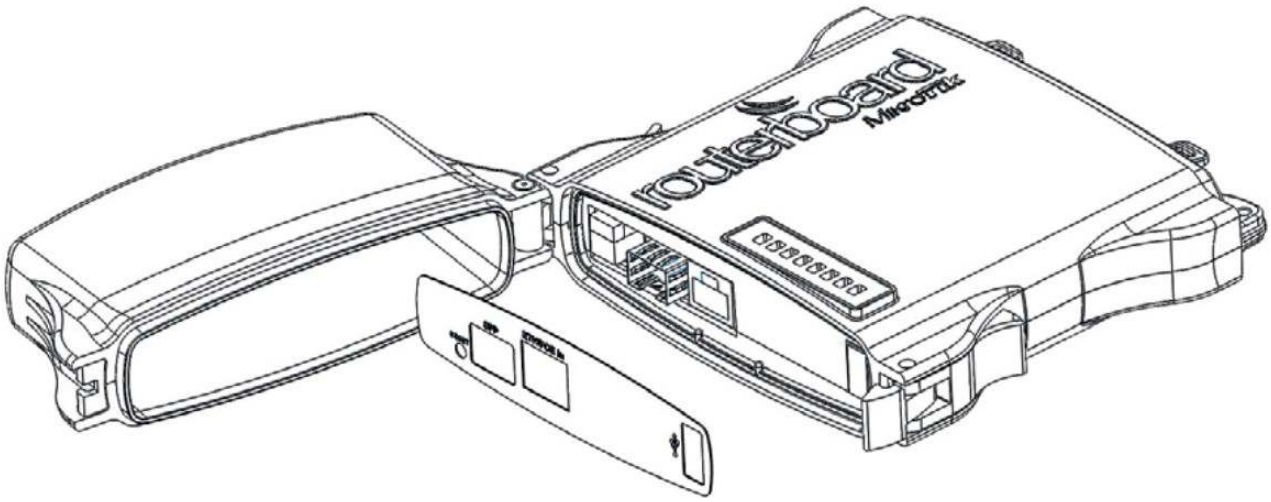
Remove the M4 screw from bottom plate and than separate bottom plate from antenna with board.



NetMetal 5 disassembling

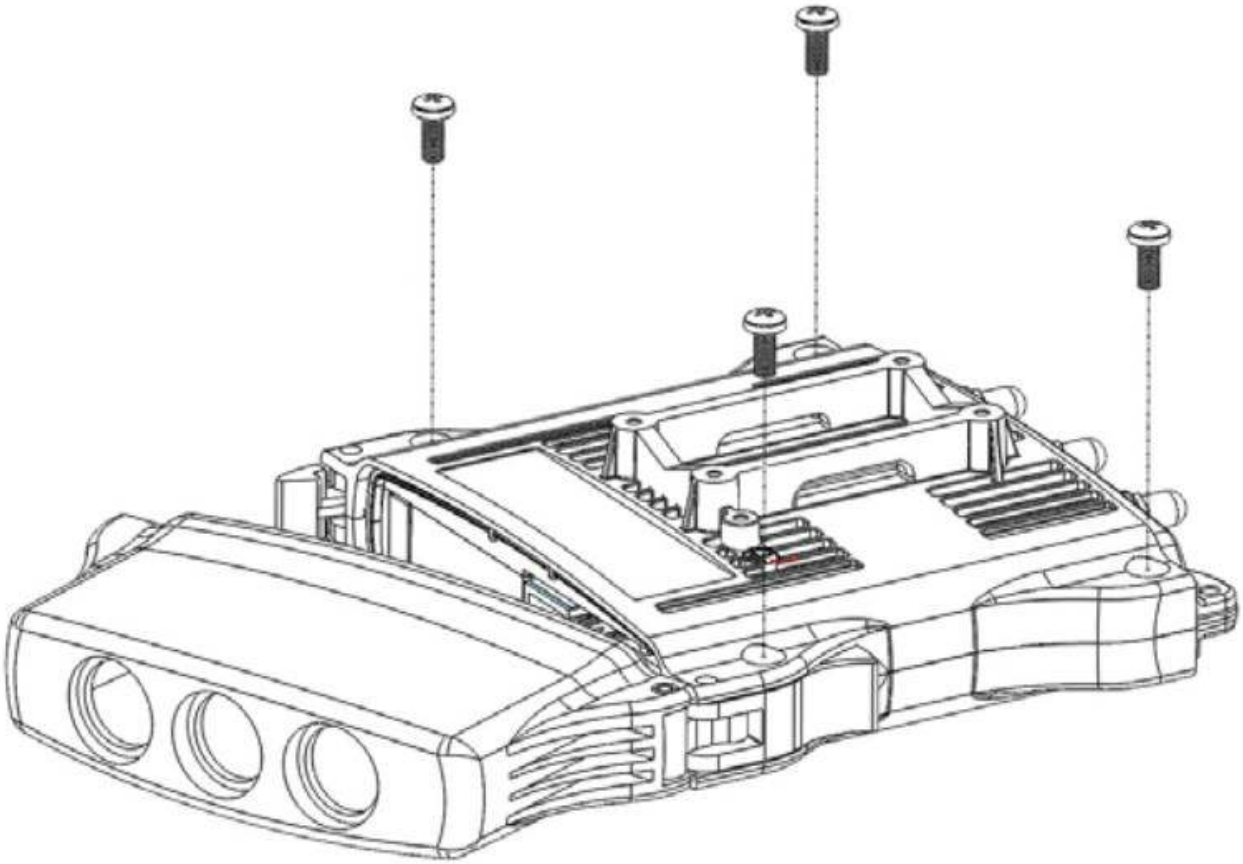
1. step

Open case and remove label from connectors



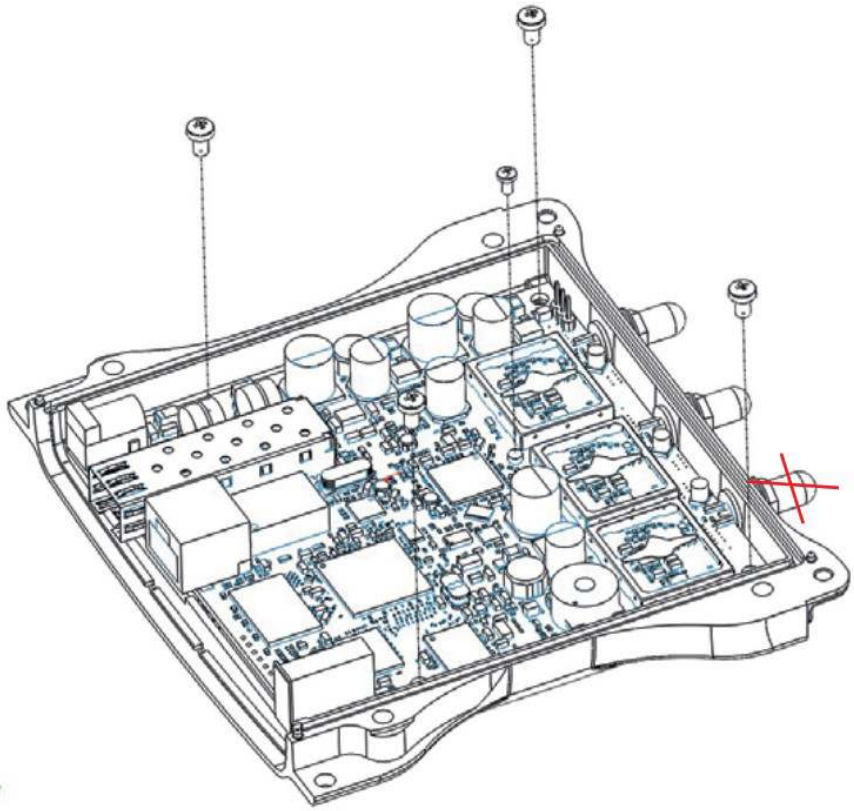
2. step

Remove 4 screws with hexagon key 3 mm screwdriver

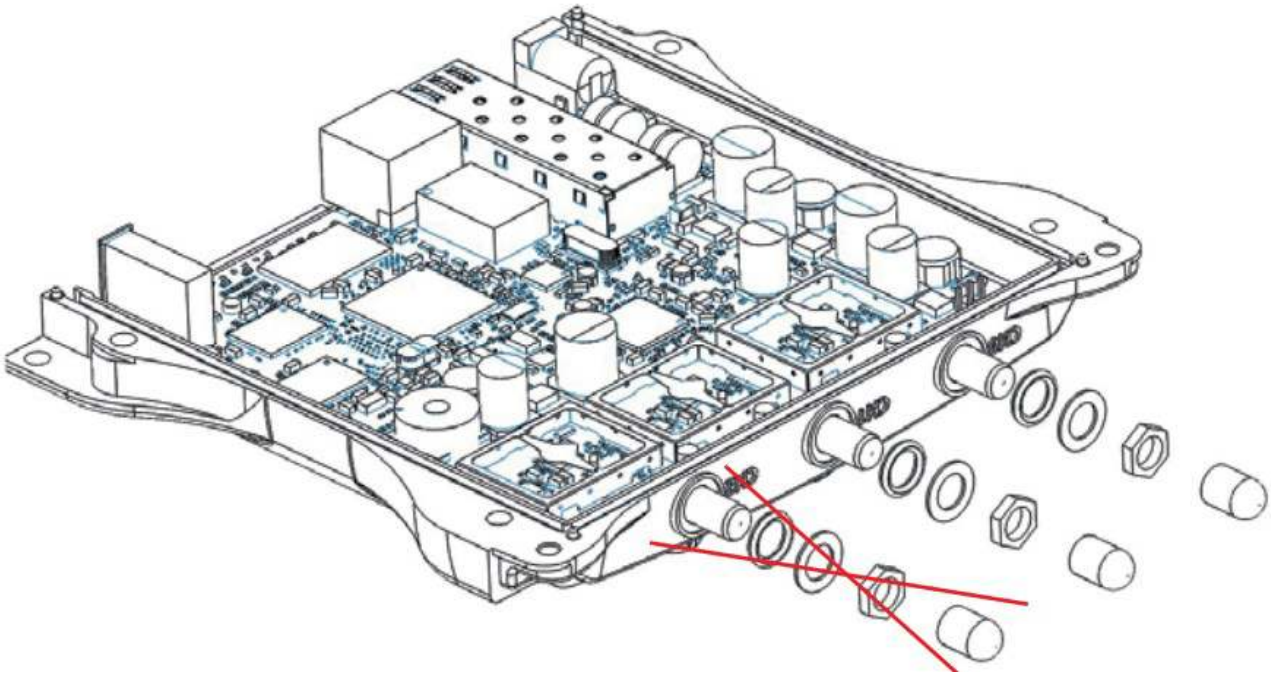


3. Step

Unscrew the PCB from case back with 4 pcs., M3 and 1 pcs., M2 screws

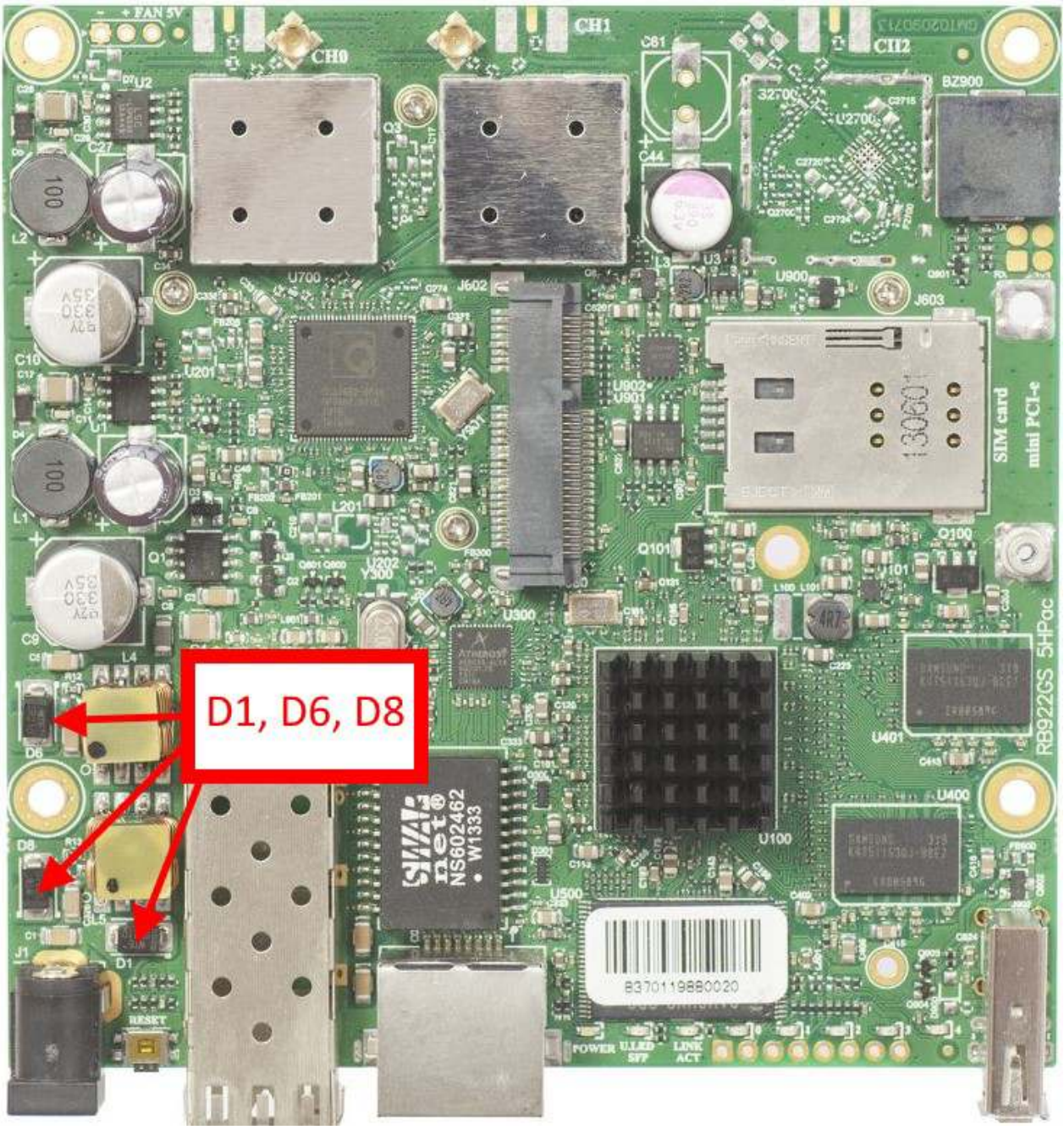


Unscrew the SMA connector nuts with 8 mm wrench.



Schottky diode measuring with multimeter in diode mode

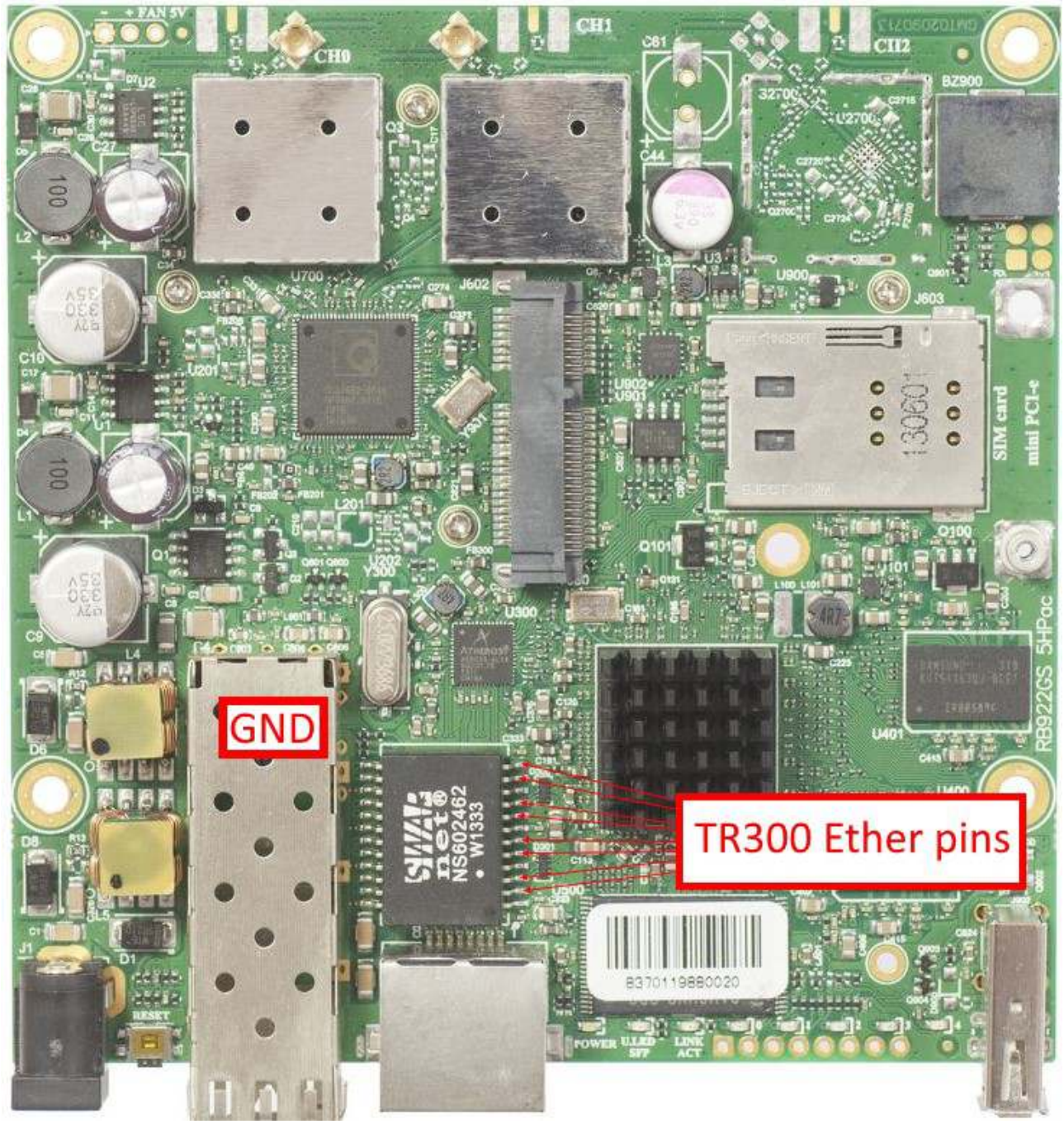
Schottky diode reference numbers are D1, D6, D8. Voltage drop value should be about 0,18V


D1, D6, D8
SIM card
mini PCI-e
RB922GS-5HPoc

Voltage drop between diode array pin#1 and Ground.

Check voltage drop between TR300 Ethernet Transformers on port Ether1 pins and Ground. Ether Pins are marked with red arrows.

It should be in the range from 0,32V to 0,438V


GND
TR300 Ether pins
CH0
CH1
CH2
SIM card
mini PCI-e
RB922GS-5HPac

RB921UAGS-5SHPac series RouterBoards

RB921GS-5HPac series:

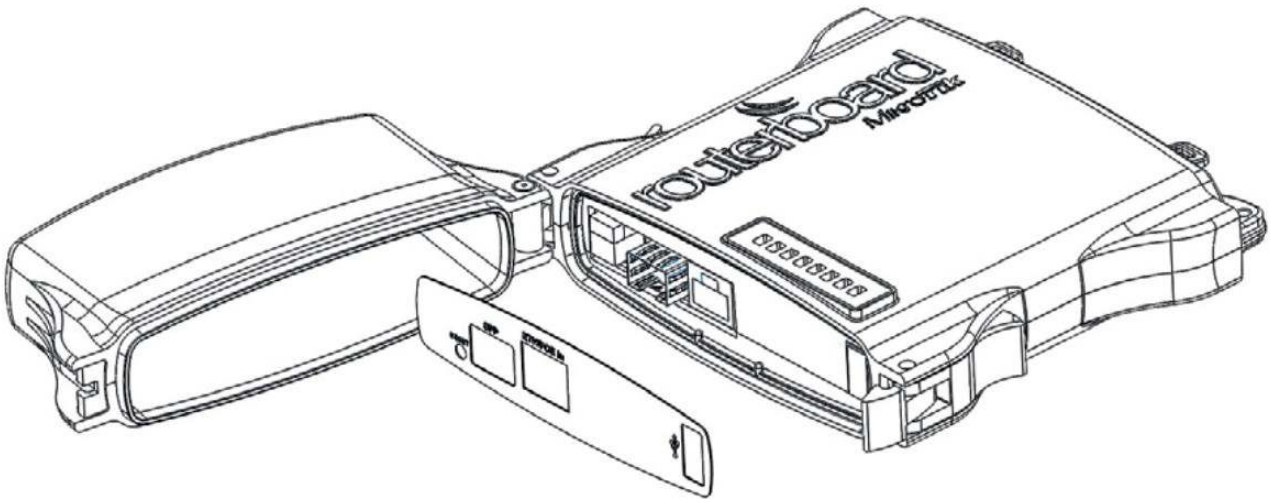
NetMetal 5

Disassembling information

NetMetal 5 disassembling

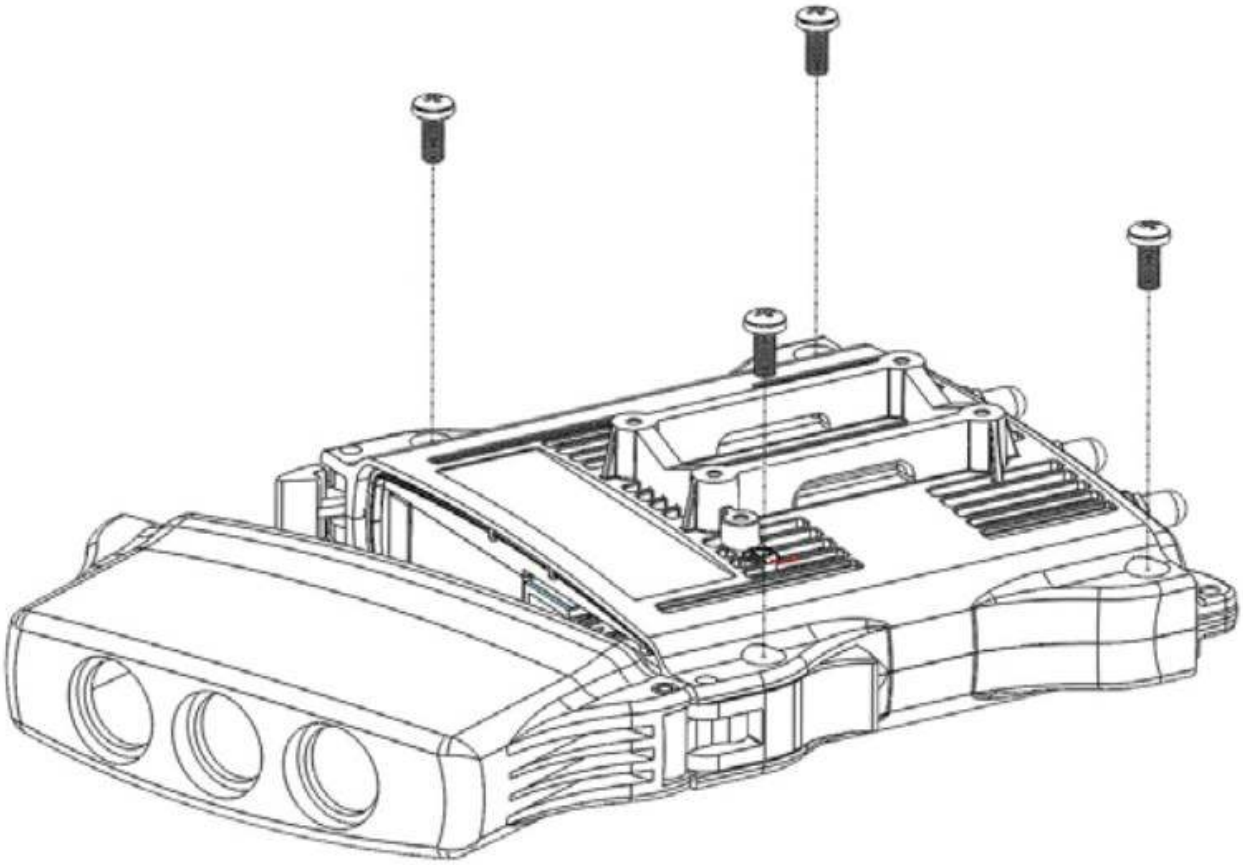
1. step

Open case and remove label from connectors



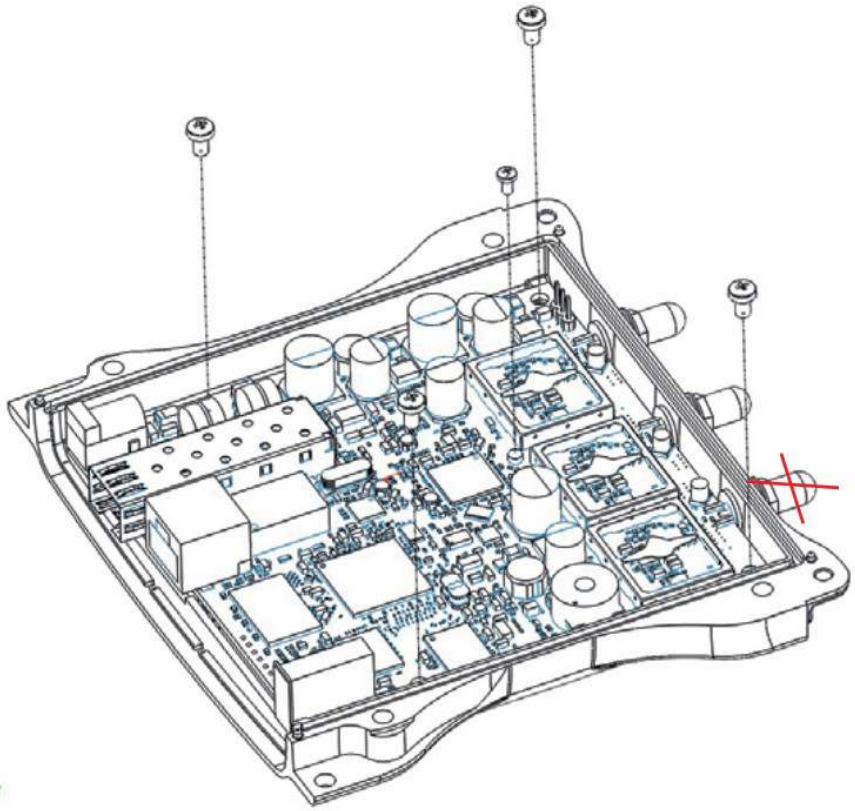
2. step

Remove 4 screws with hexagon key 3 mm screwdriver

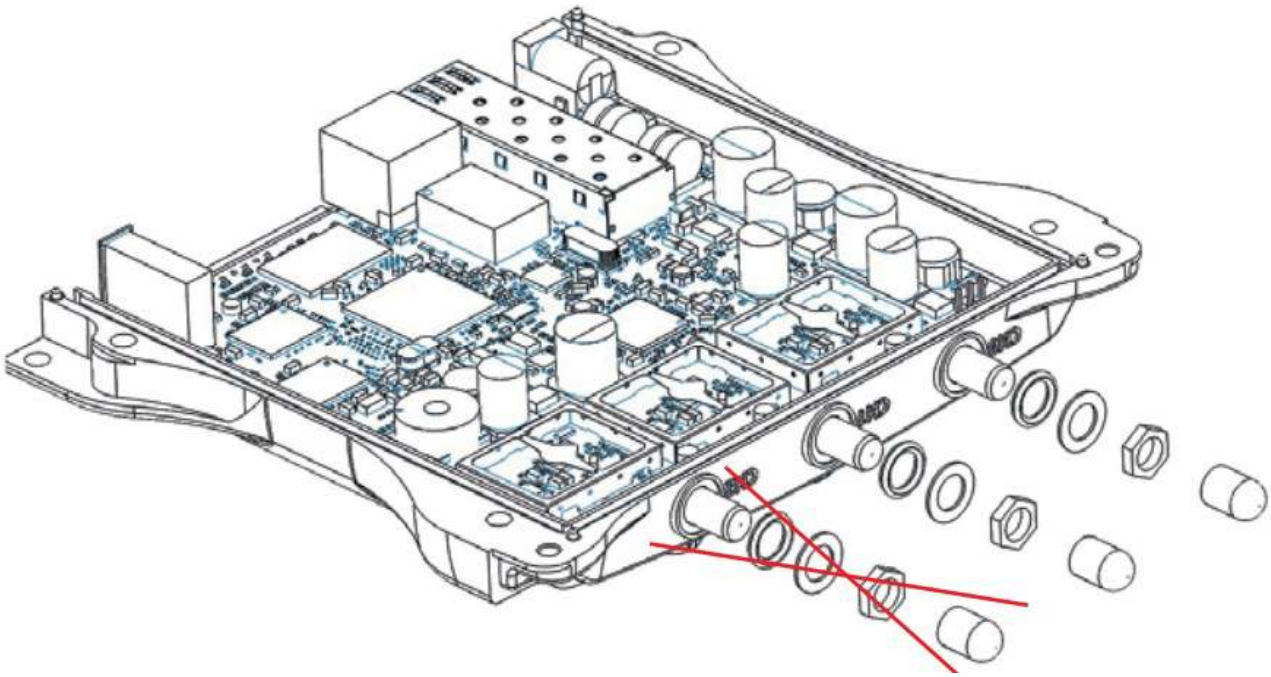


3. Step

Unscrew the PCB from case back with 4 pcs., M3 and 1 pcs., M2 screws

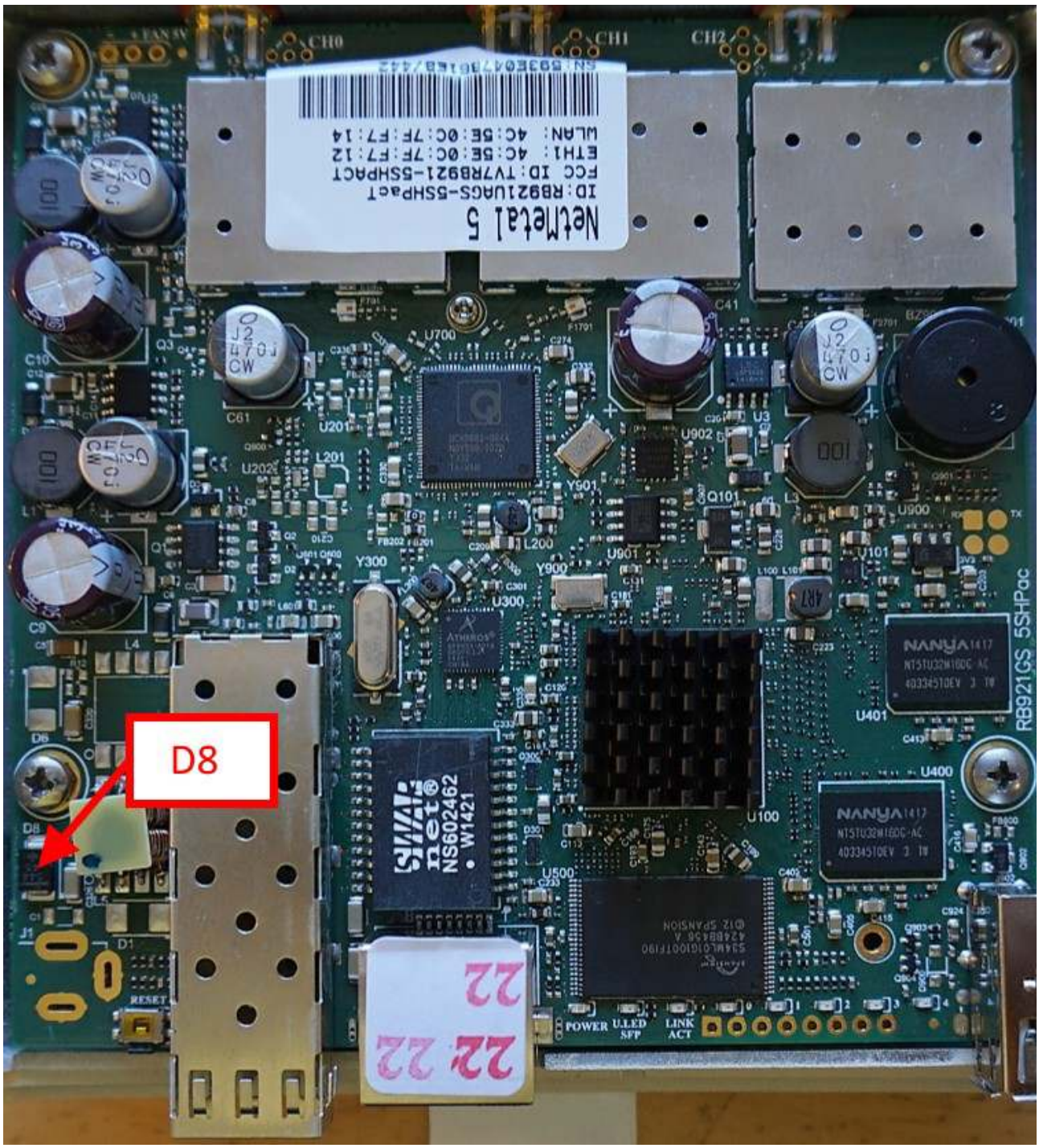


Unscrew the SMA connector nuts with 8 mm wrench.



Schottky diode measuring with multimeter in diode mode

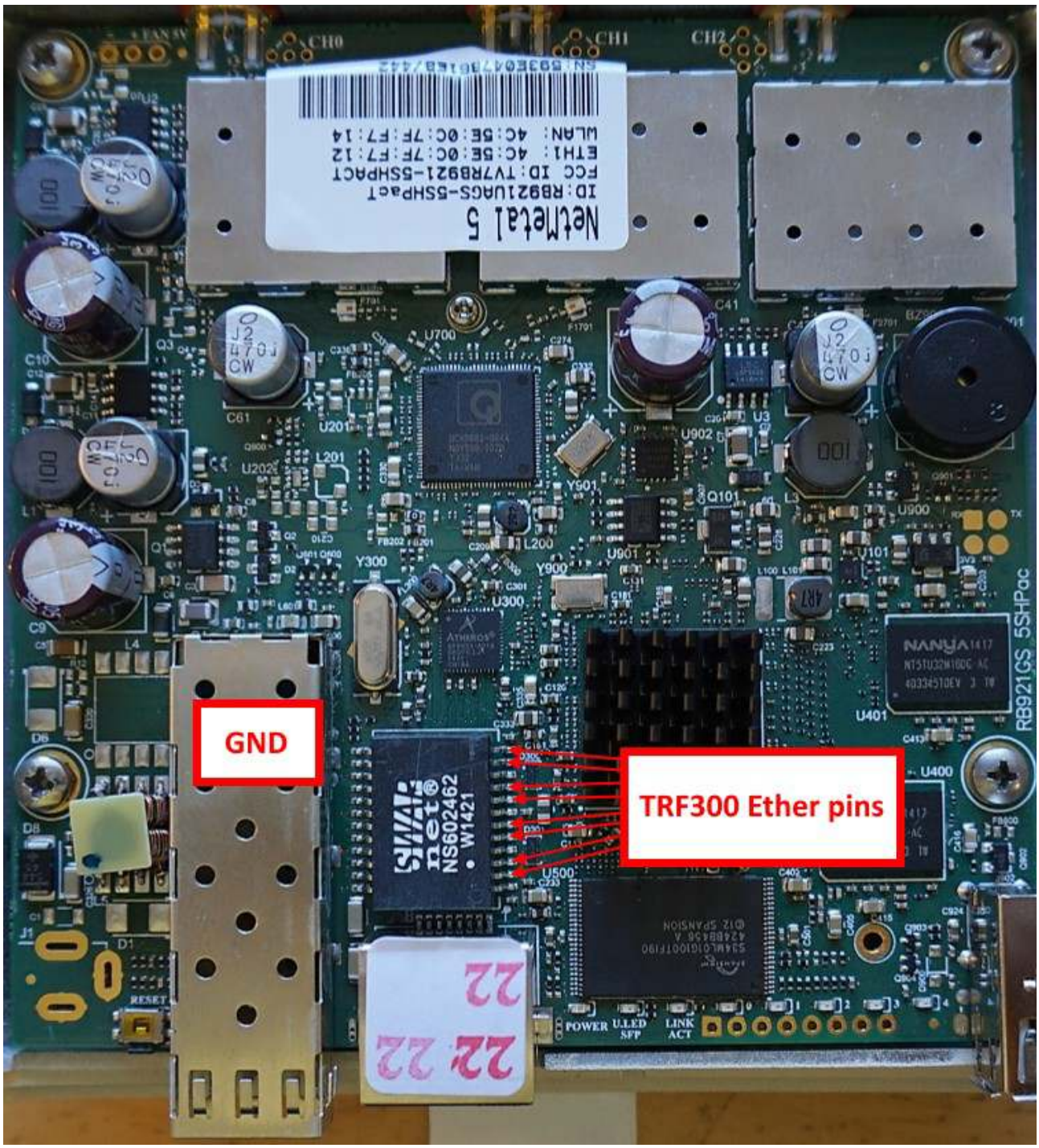
Schottky diode reference numbers are D8. Voltage drop value should be about 0,18V


D8
RB921GS 5HPac

Voltage drop between diode array pin#1 and Ground.

Check voltage drop between TRF300 Ethernet Transformers on port Ether1 pins and Ground. Ether Pins are marked with red arrows.

It should be in the range from 0,32V to 0,438V


GND
TRF300 Ether pins
RB921GS-5HPac

RBmAP series RouterBoards

RBmAP series:

mAP 2n

Disassembling information

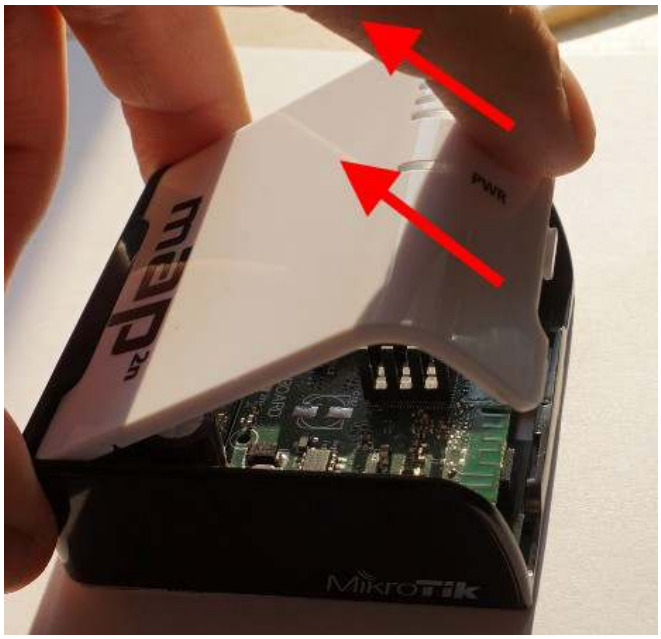
mAP 2n disassembling

1. step

Push the white clip to open the case

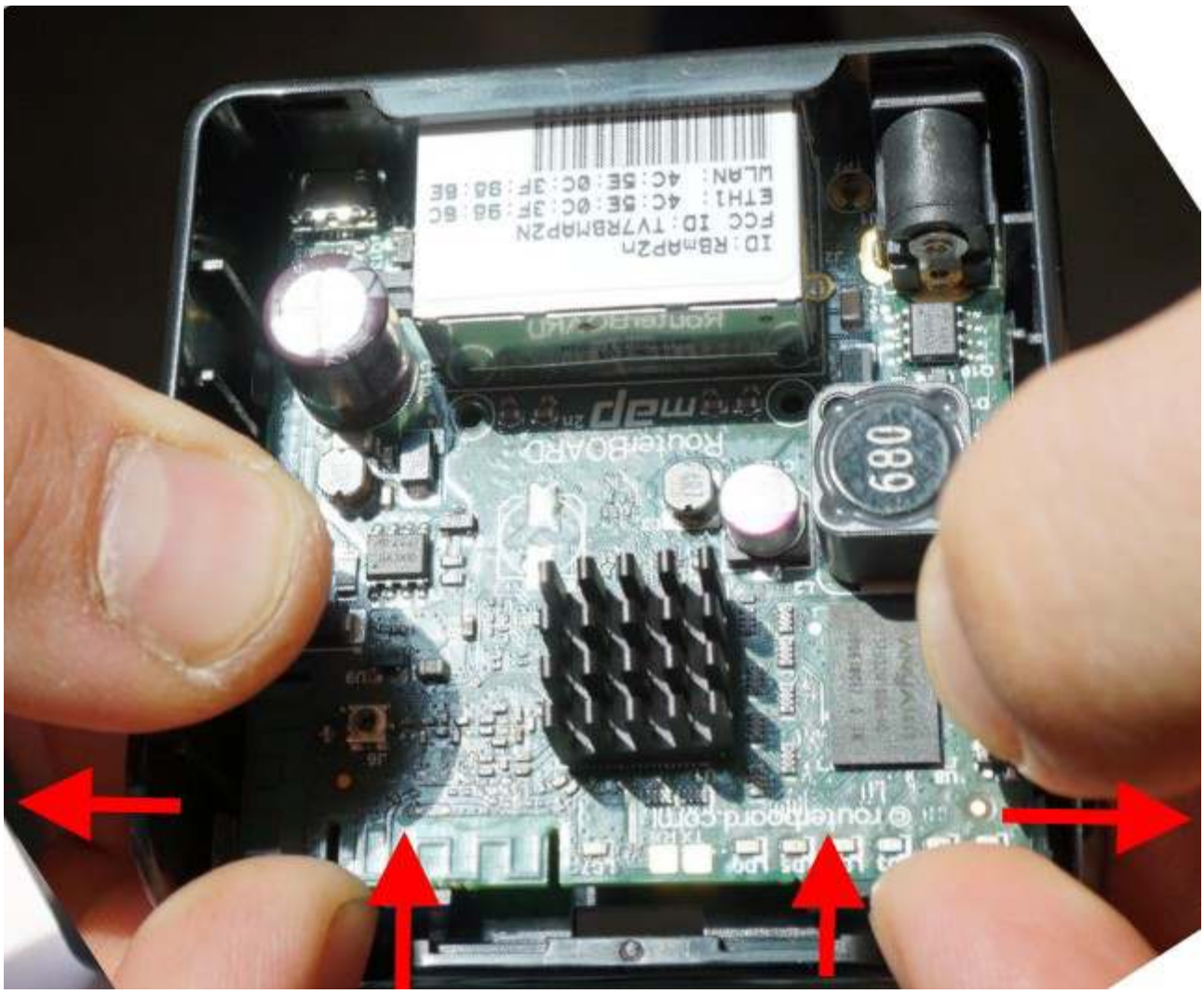
2. step

Remove front case



3. Step

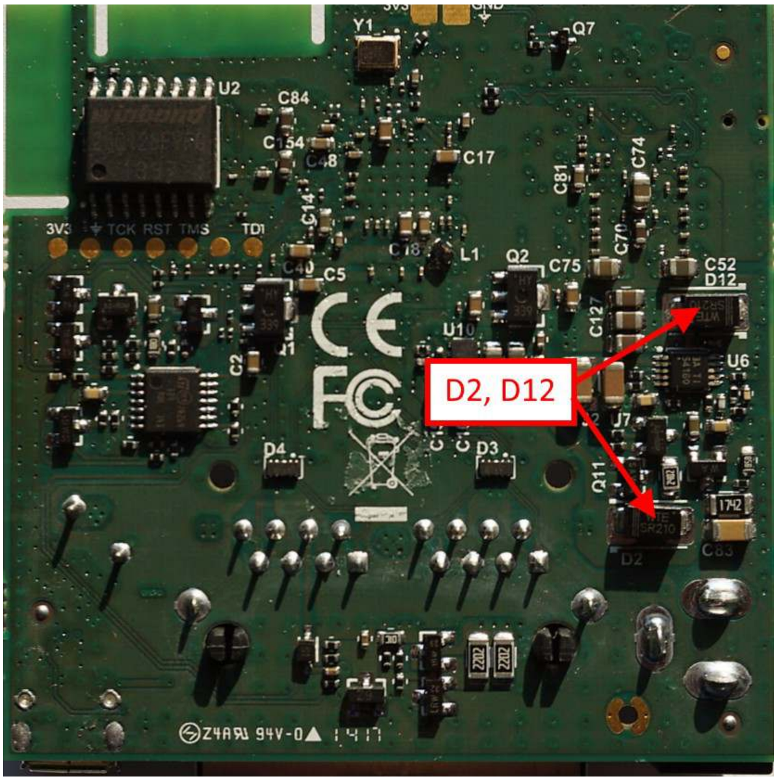
Remove board from case


680

Schottky diode measuring with multimeter in diode mode

Schottky diode reference numbers are D1, D7, D9, D11 on top layer. Voltage drop value should be about 0,35V

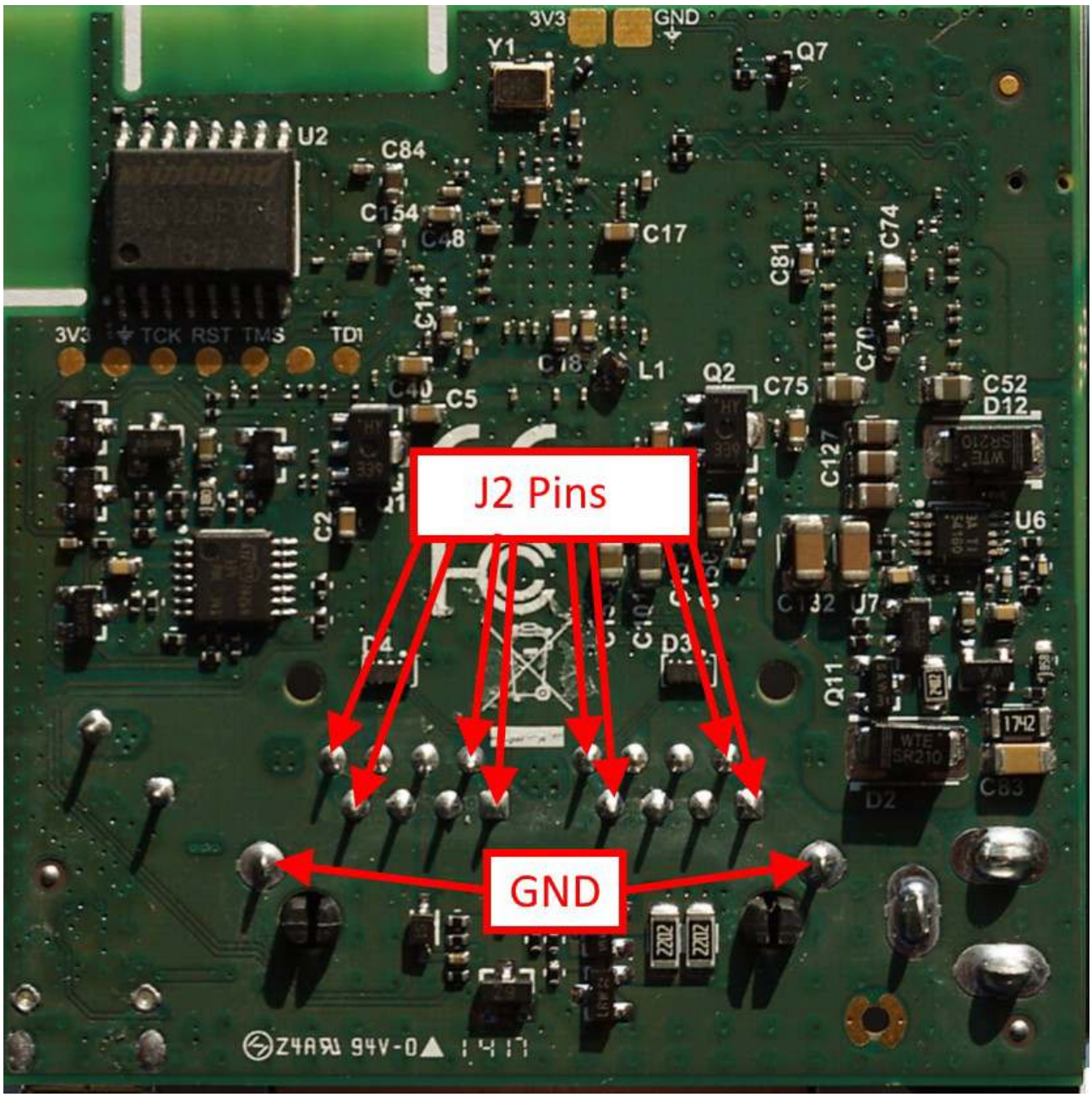
Schottky diode reference numbers are D2, D12 on bottom layer. Voltage drop value should be about 0,35V


D2, D12

Voltage drop between diode array pin#1 and Ground.

Check voltage drop between J2 Ethernet Transformers on port Ether1, Ether2 pins and Ground. Ether Pins are marked with red arrows.

It should be in the range from 0,32V to 0,438V


J2 Pins
GND
3V3
GND
Y1
Q7
U2
C84
C154
C17
C74
C81
3V3
TCK
RST
TMS
TDI
L1
Q2
C75
C52
D12
C5
C127
U6
J7
D4
D3
Q11
D2
C83

RBcAP series RouterBoards

RBcAP series:

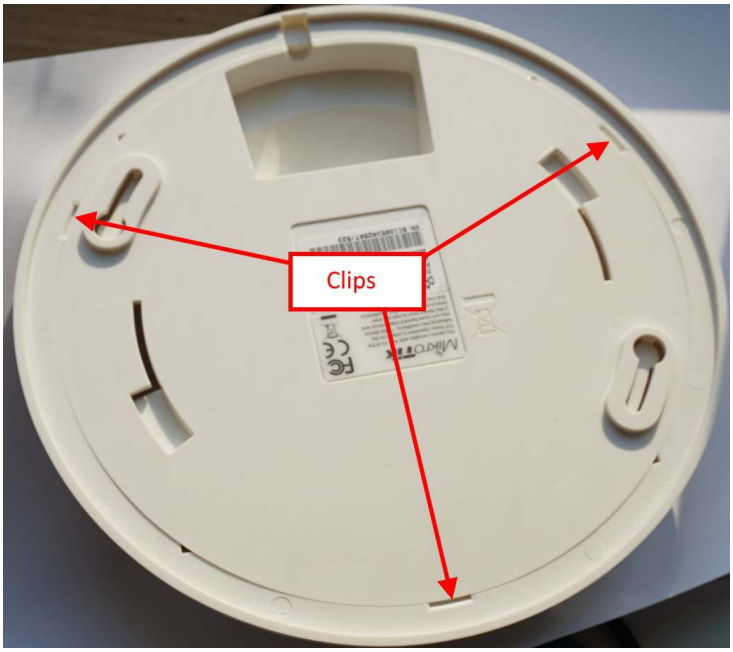
cAP 2n

Disassembling information

cAP 2n disassembling

1. step

Push the outer edge around clips to open the case

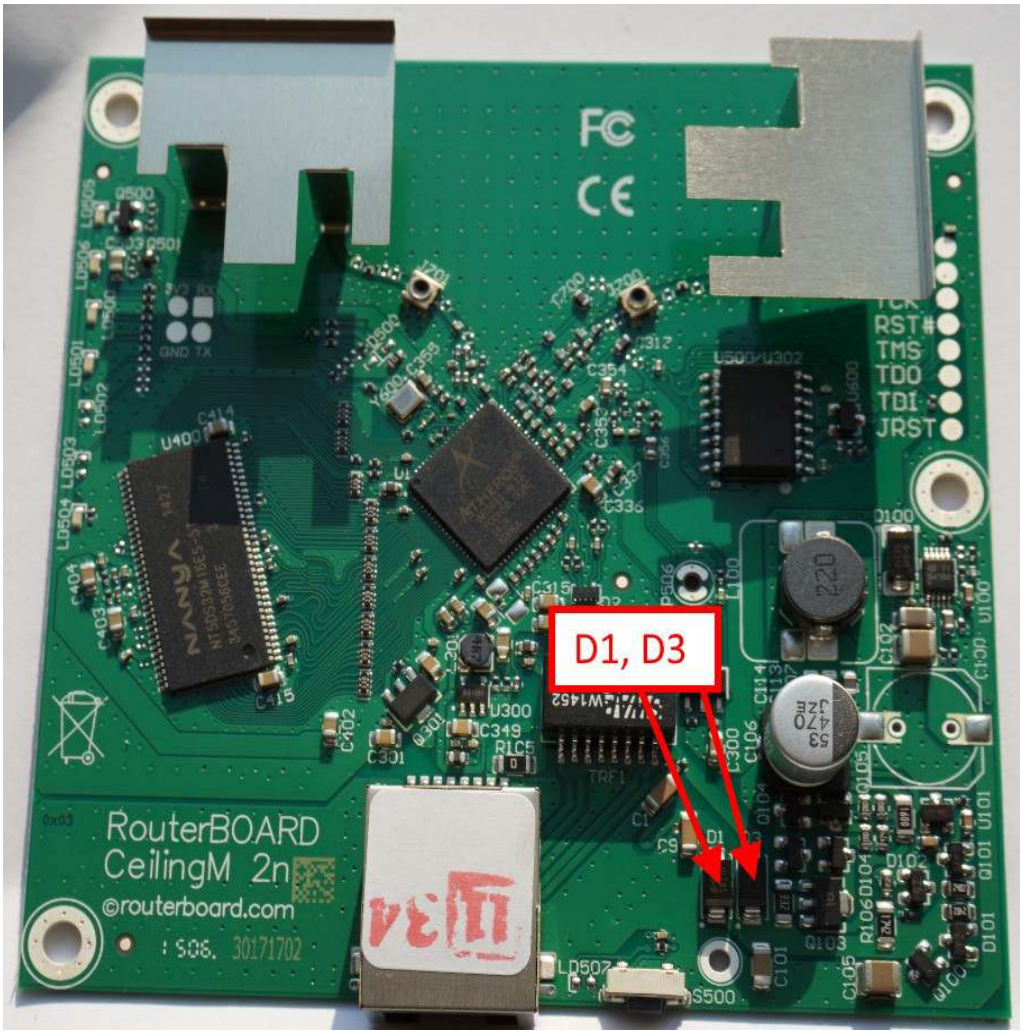


2. step

Remove cover and take out the board from case

Schottky diode measuring with multimeter in diode mode

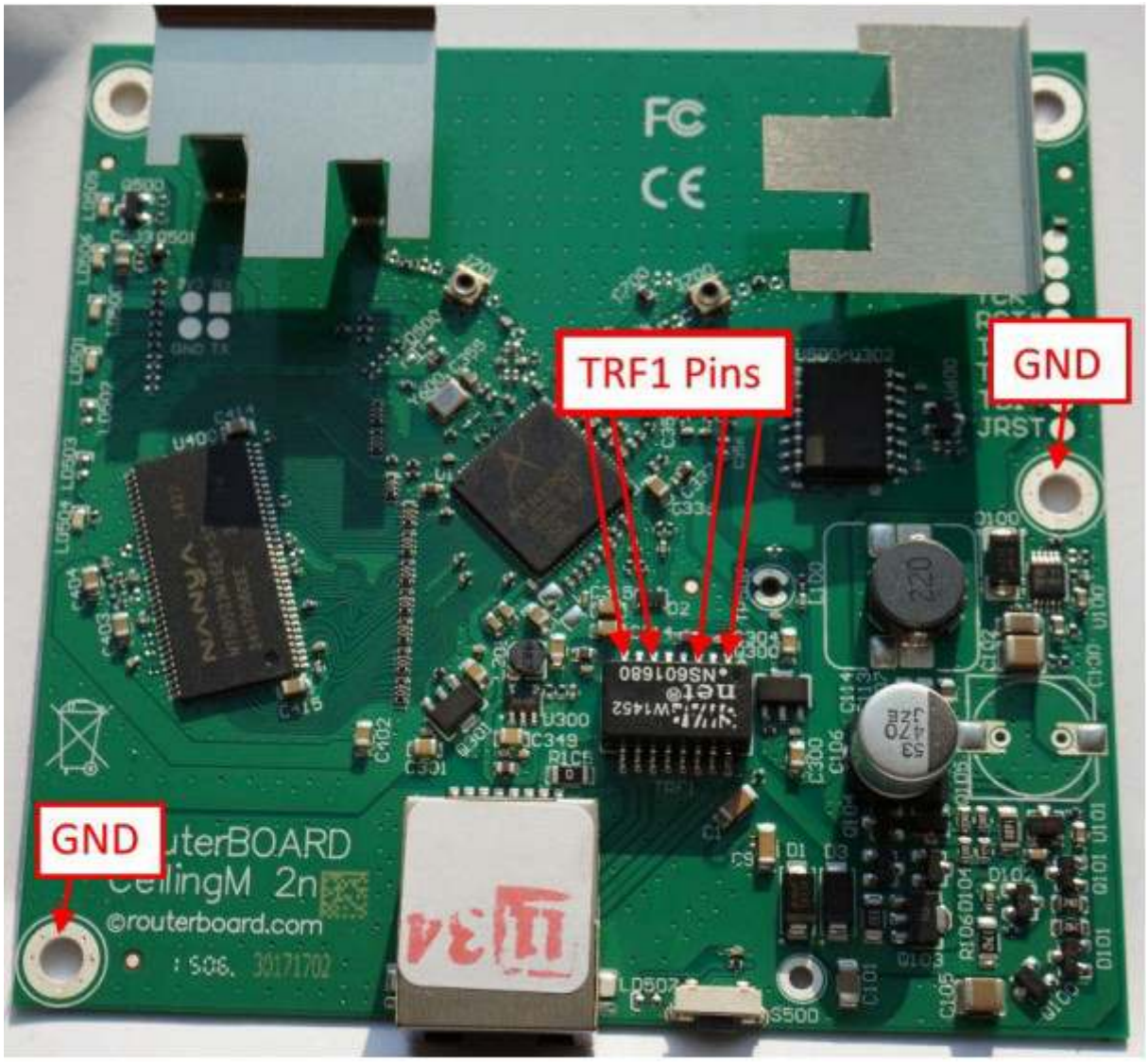
Schottky diode reference numbers are D1, D3 . Voltage drop value should be about 0,35V


D1, D3
RouterBOARD
CeilingM 2n
©routerboard.com

Voltage drop between diode array pin#1 and Ground.

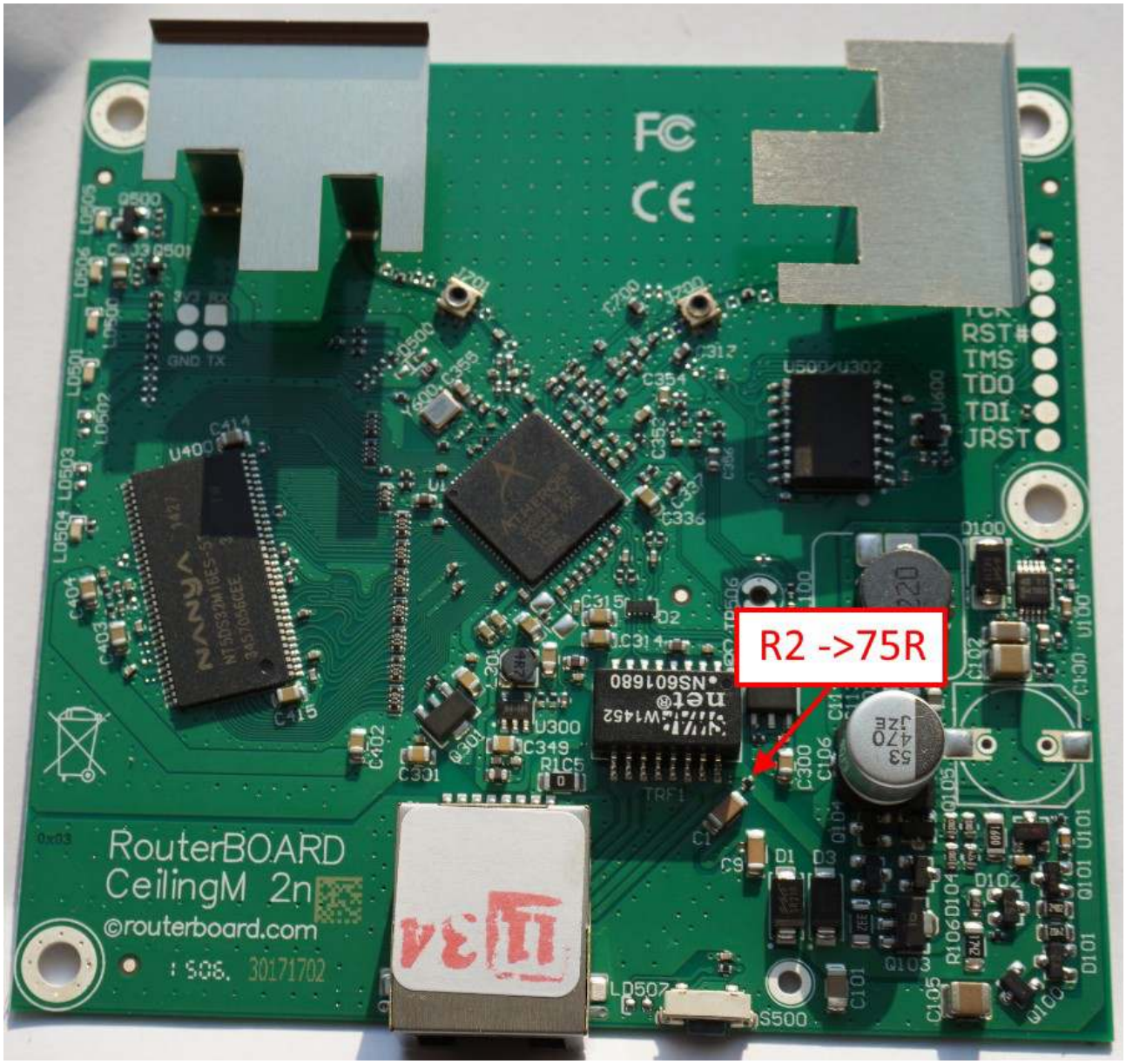
Check voltage drop between TRF1 Ethernet Transformers pins and Ground. Ether Pins are marked with red arrows.

It should be in the range from 0,32V to 0,478V


TRF1 Pins
GND
GND
©routerboard.com

75R Termination resistors resistance.

Resistor resistance, marked with red arrow, should be 75 Ohm +/- 1%



RBDynaDish series RouterBoards

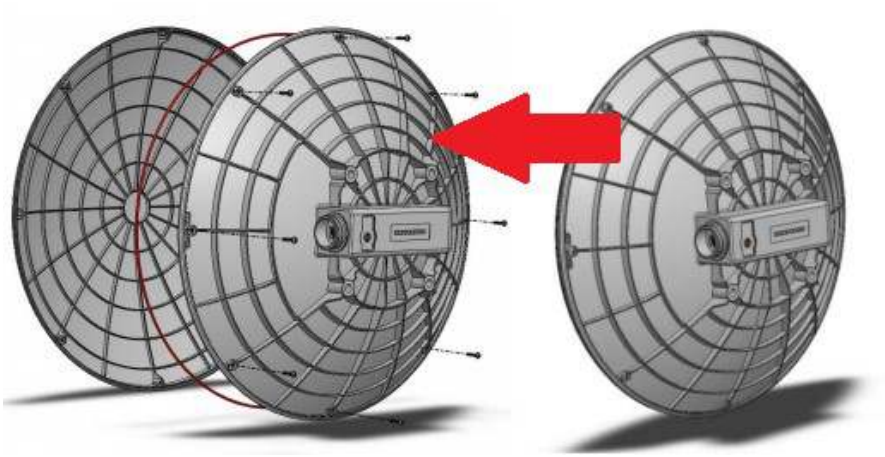
RBDynaDish series:

DynaDish 5

Disassembling information

DynaDish 5 disassembling

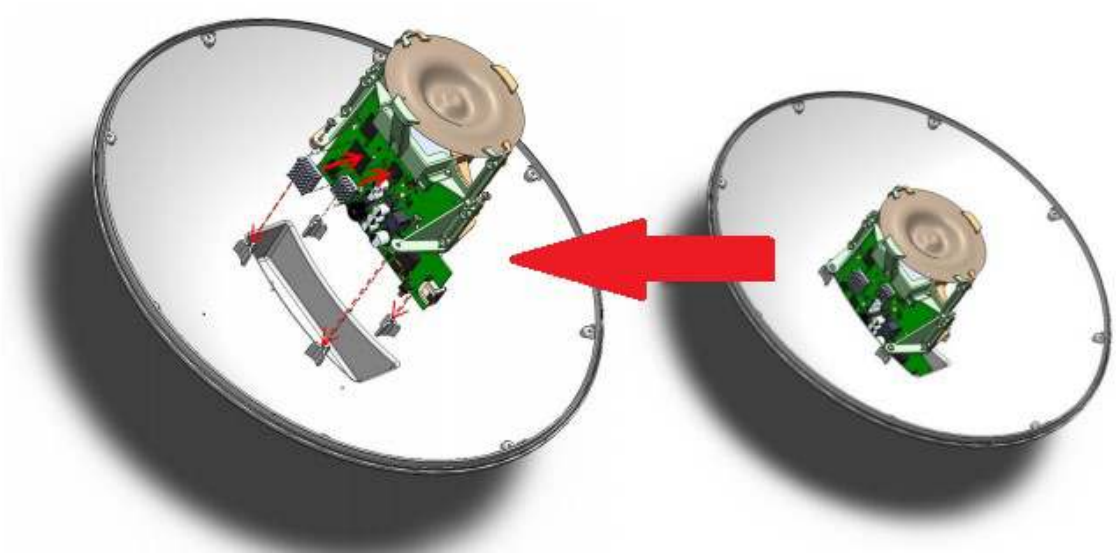
1. step



Unscrew 8 pcs screws with TX10 screwdriver and remove the antenna cover as shown in picture

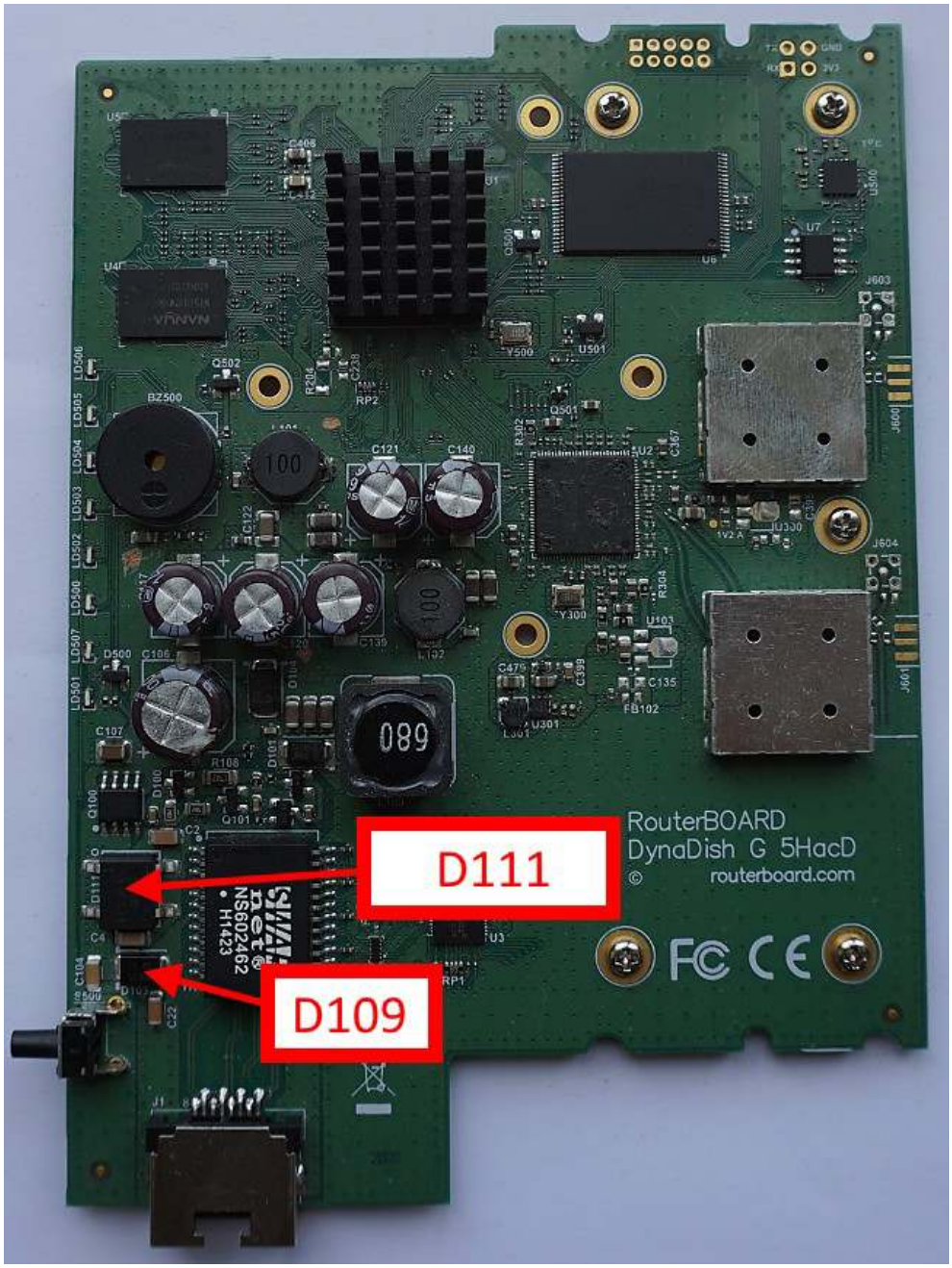
2. step

Unscrew 4 pcs screws with TX10 screwdriver and remove the board from the antenna construction as shown in picture.



Schottky diode measuring with multimeter in diode mode

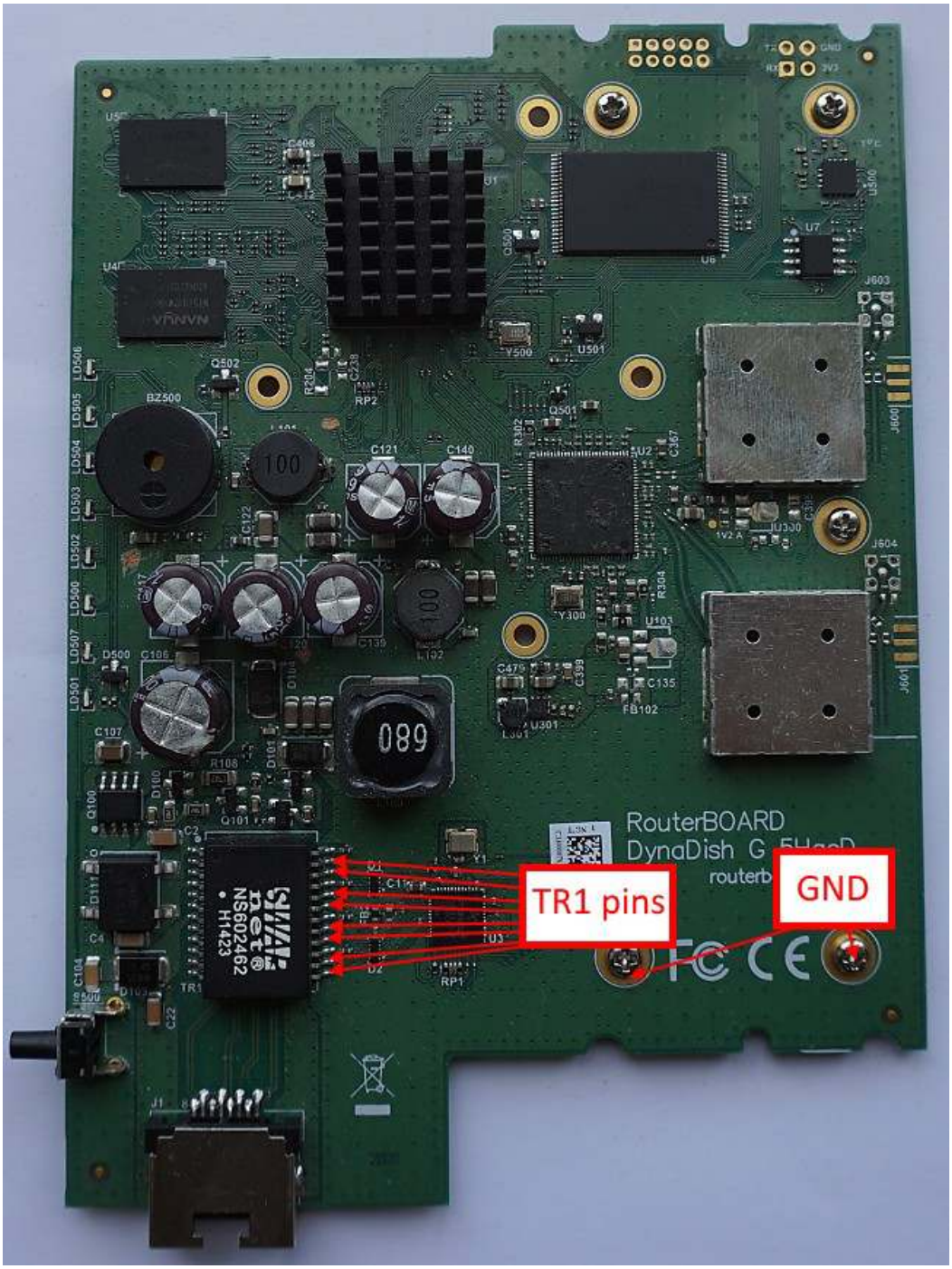
Schottky diode reference number is D109; Voltage drop value should be about 0,197V
Diode bridge reference number is D111. Voltage drop value should be about 0,675V


D111
D109
RouterBOARD
DynaDish G 5HacD
routerboard.com

Voltage drop between diode array pin#1 and Ground.

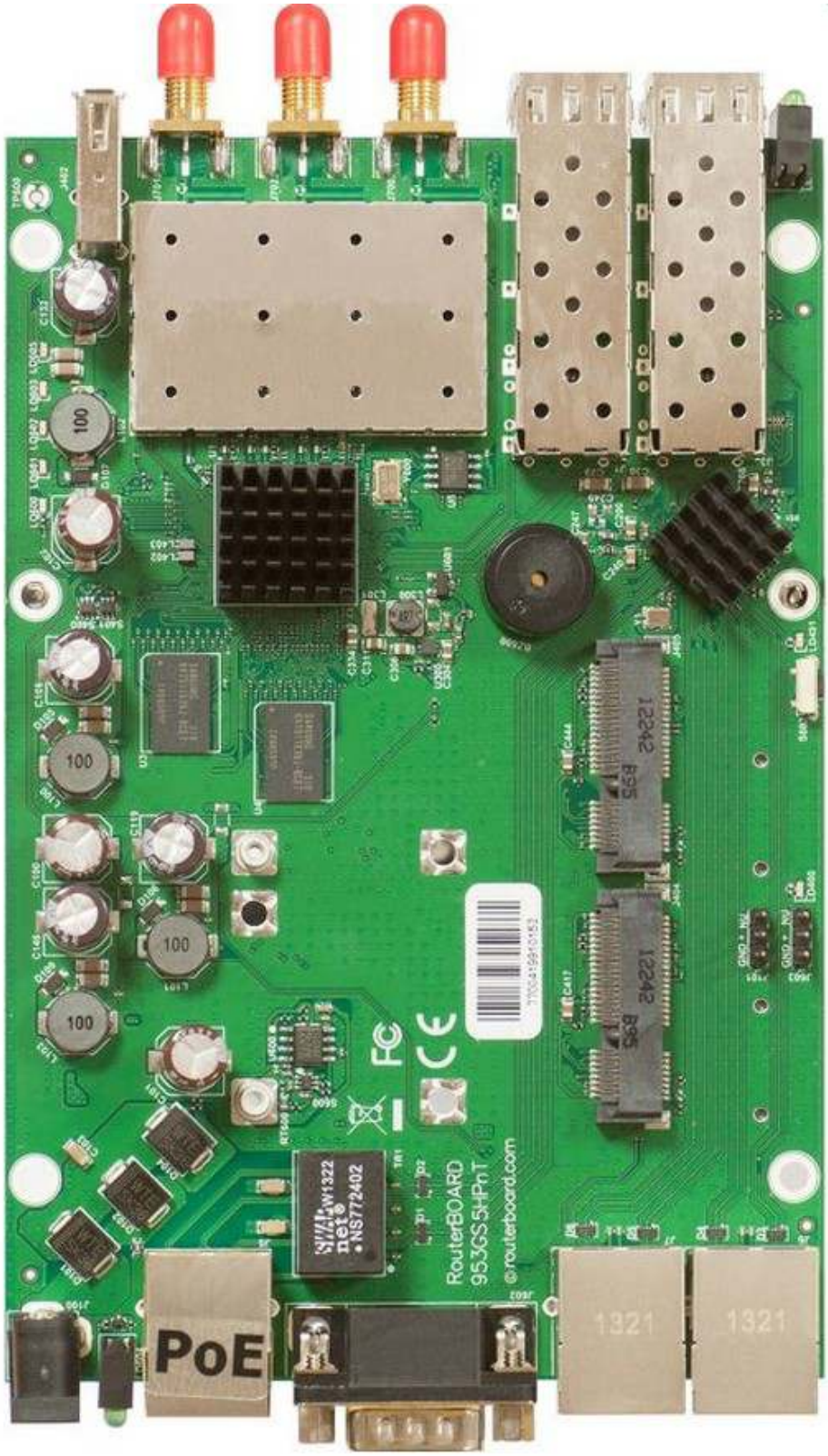
Check voltage drop between TR1 Ethernet Transformers pins and Ground. Ether Pins are marked with red arrows.

It should be in the range from 0,32V to 0,487V



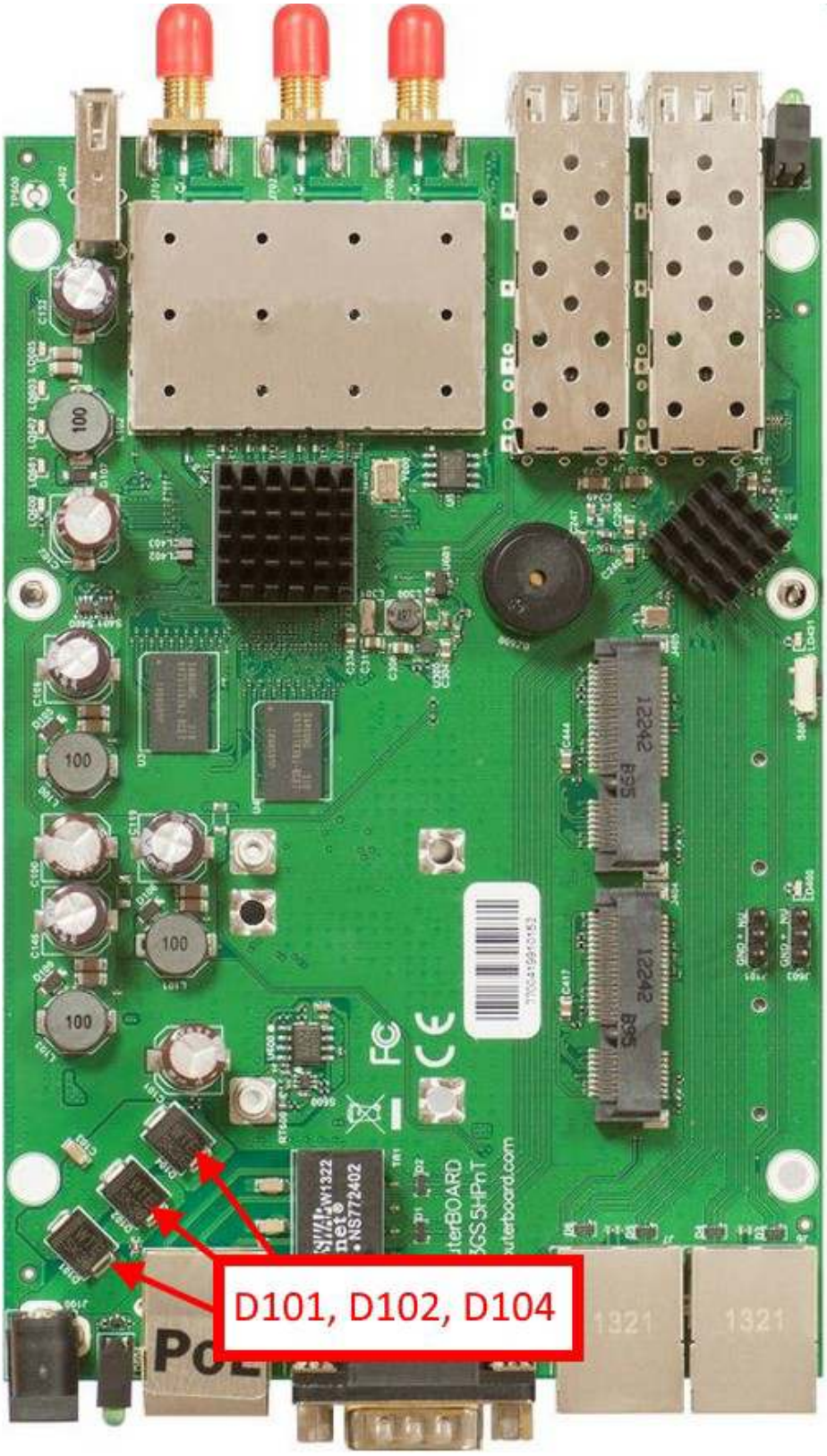
RB953GS-5HnT series RouterBoards

RB953GS-5HnT-RP



Schottky diode measuring with multimeter in diode mode

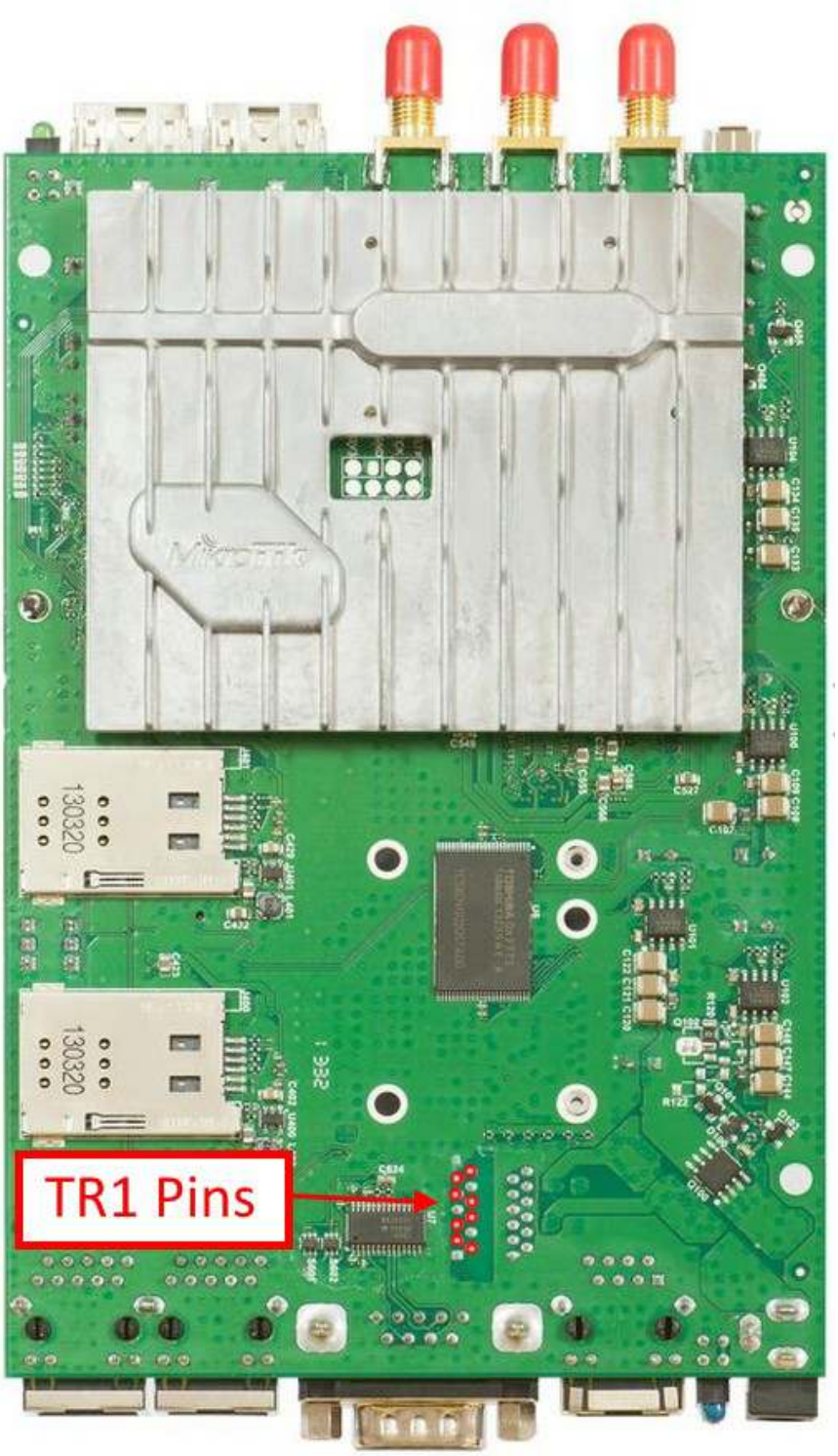
Schottky diode reference numbers are D101, D102, D104; Voltage drop value should be about 0,197V


D101, D102, D104

Voltage drop between diode array pin#1 and Ground.

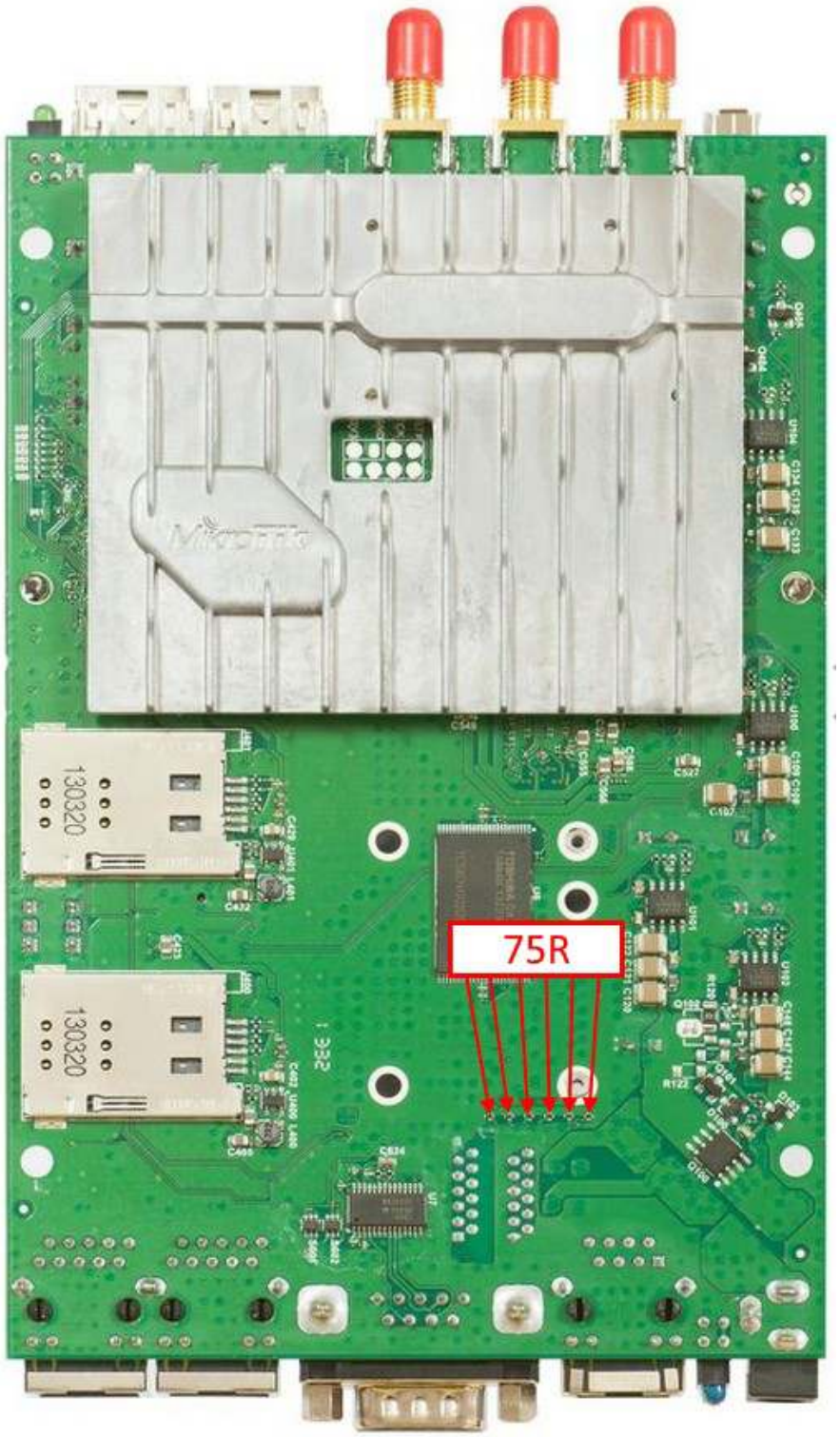
Check voltage drop between TR1 Ethernet Transformers pins and Ground. Ether Pins are marked with red circles.

It should be in the range from 0,32V to 0,589V

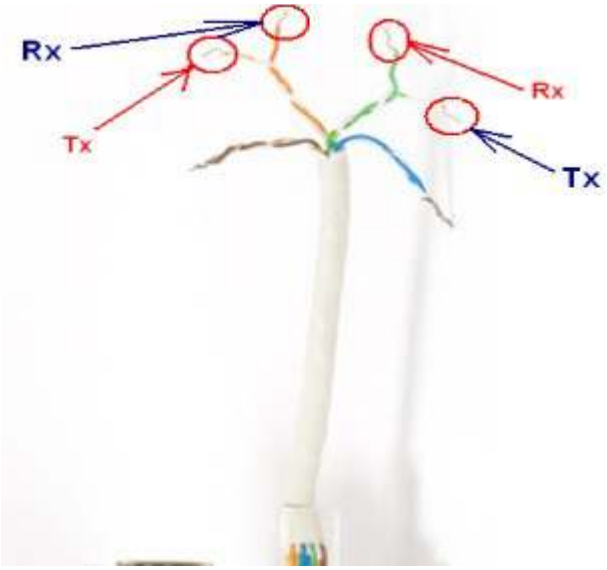


75R Termination resistors resistance.

Resistor resistance, marked with red arrow, should be 75 Ohm +/- 1%



On ports Ether2 – Ether3 You can take patch cord and plug it into the routerboard, and then measure resistance of termination resistors.

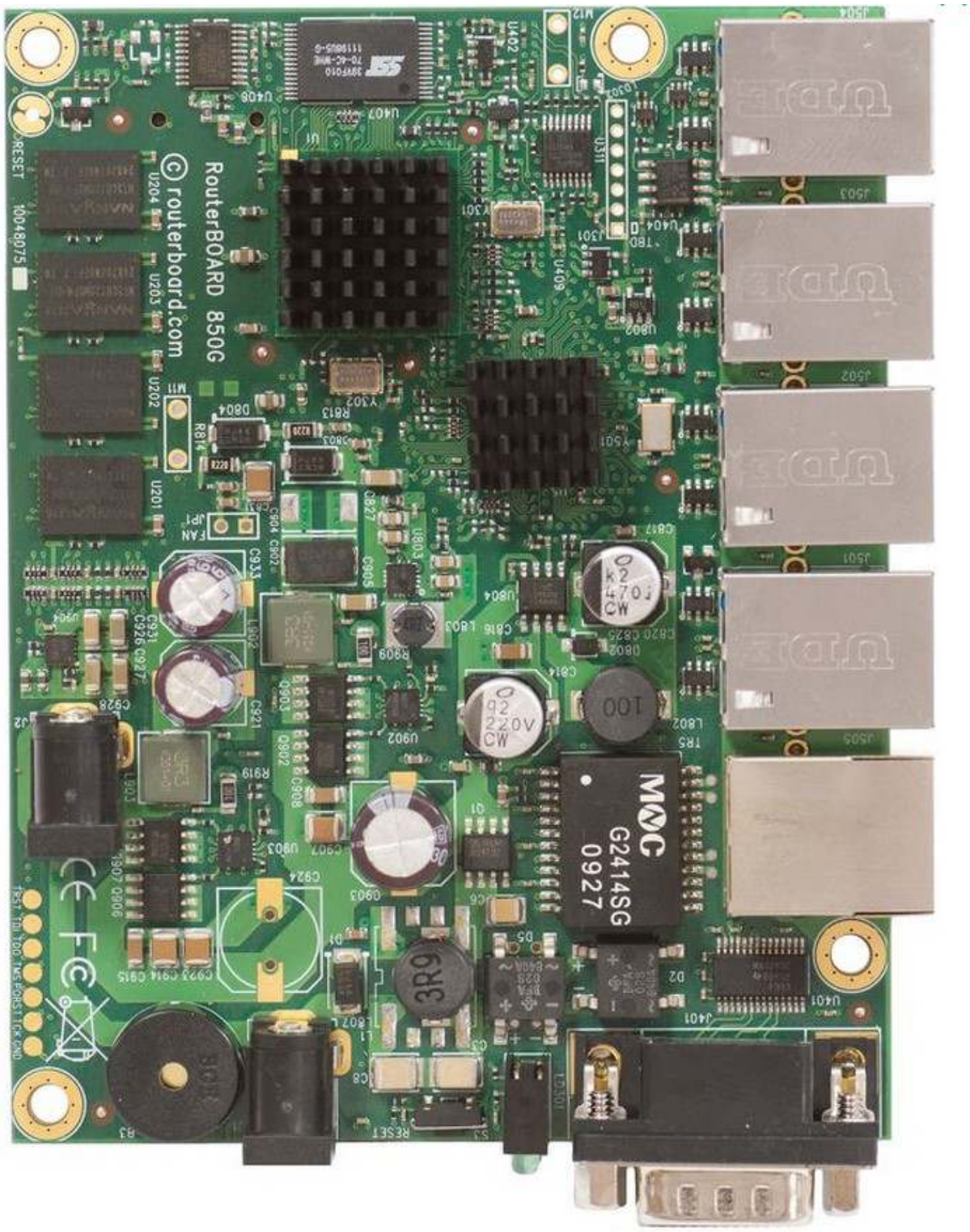


Resistance value between Rx and Tx line must be 150 Ohm +/-4%.

If resistance value is smaller or higher then Tx/Rx line was damaged by high voltage surge.

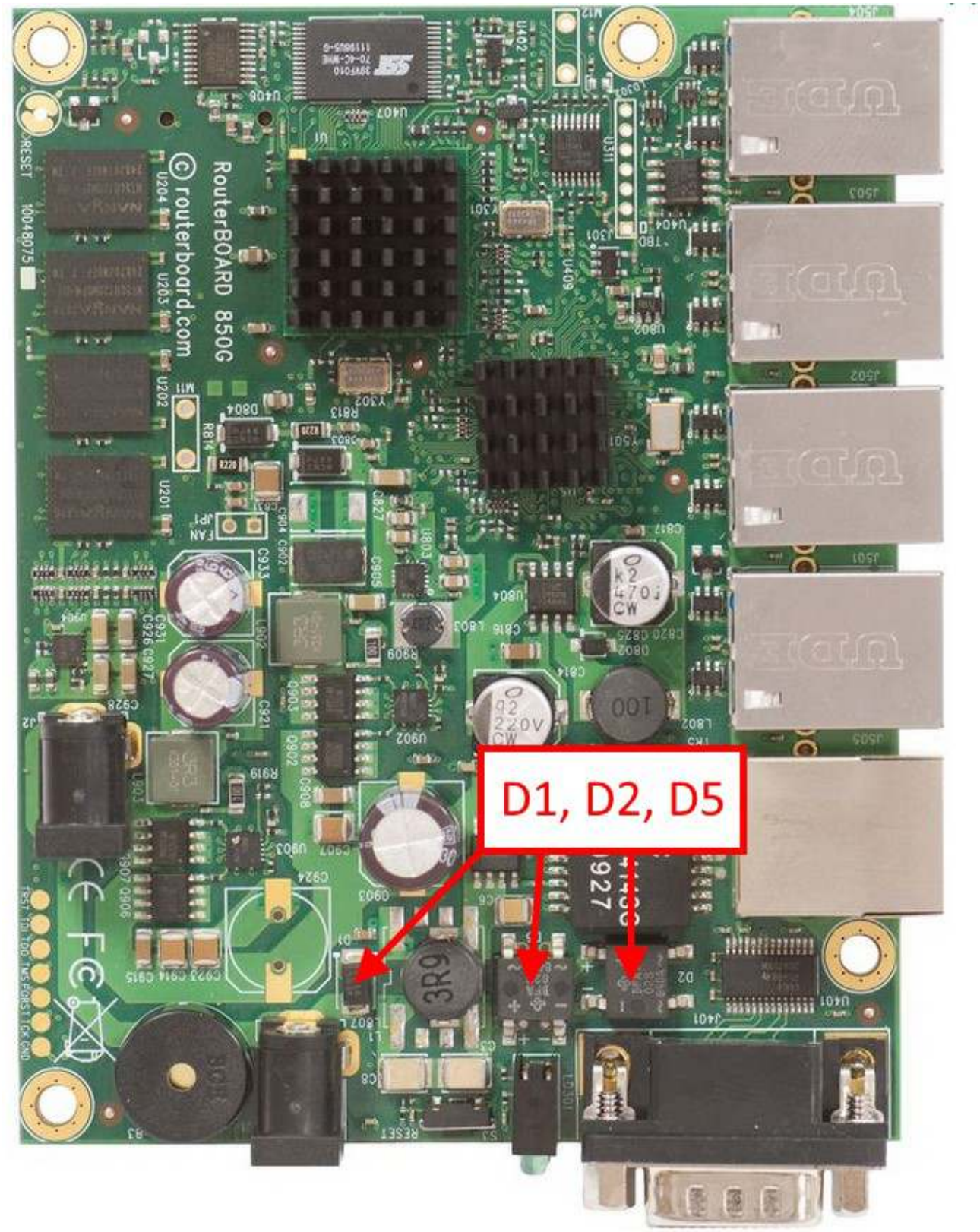
RB850Gx2 series RouterBoards

RB850Gx2



Schottky diode measuring with multimeter in diode mode

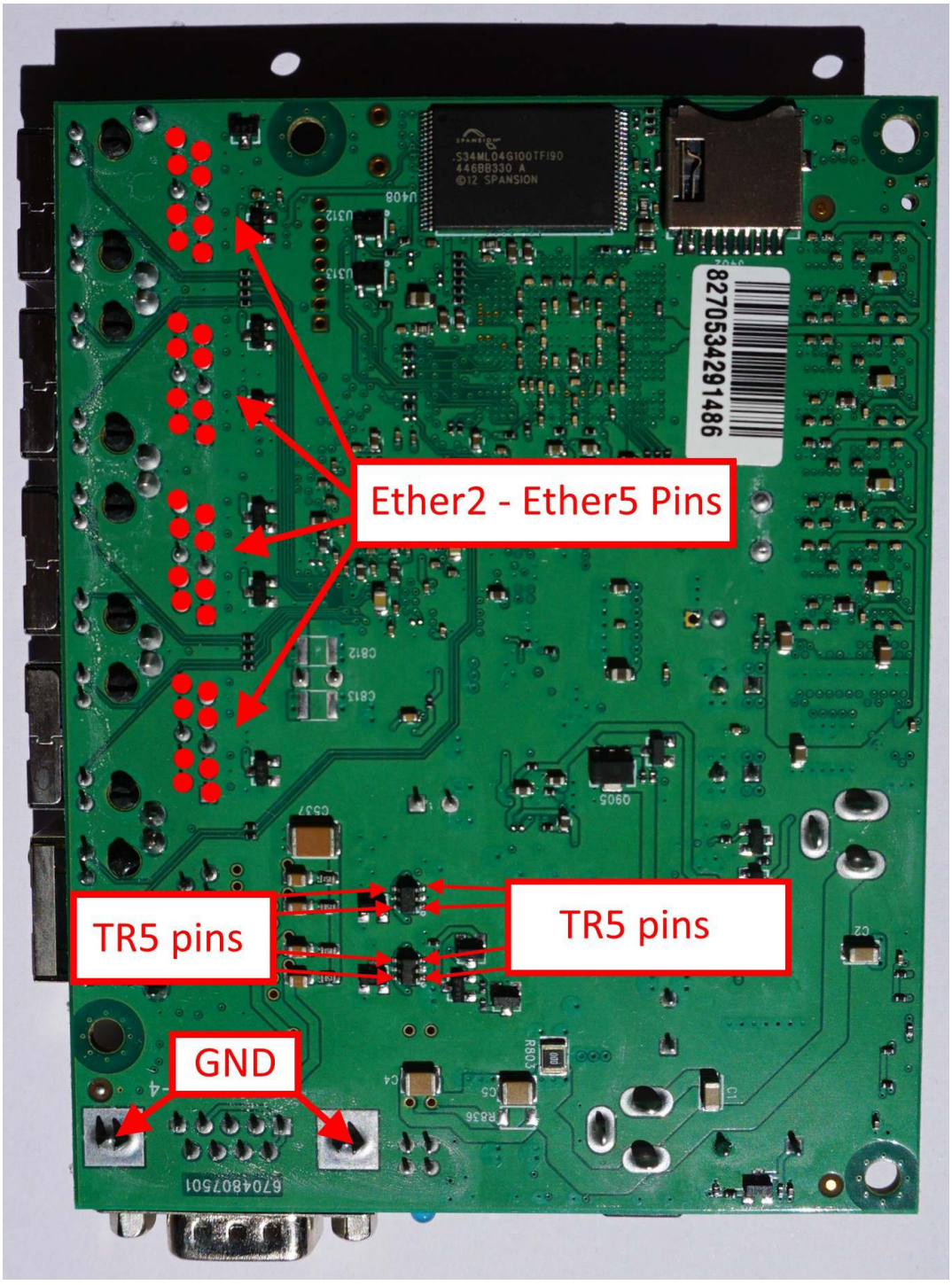
Schottky diode reference number is D1; Voltage drop value should be about 0,225V
Diode bridge reference numbers are D2 and D5. Voltage drop value should be about 0,675V



Voltage drop between diode array pin#1 and Ground.

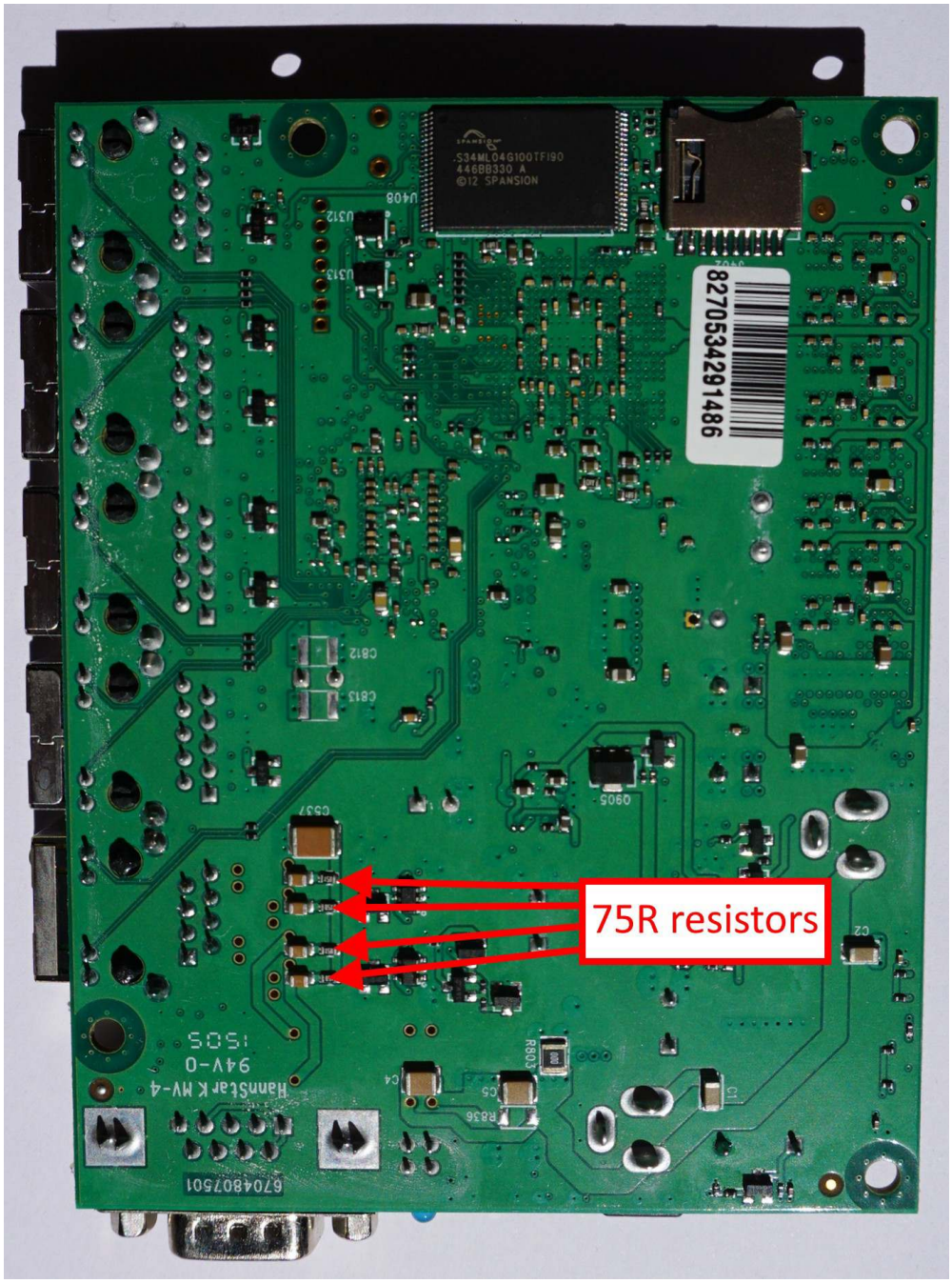
Check voltage drop between TR5, ether2- ether5 Transformers pins and Ground. Ether Pins are marked with red arrows and circles.

It should be in the range from 0,32V to 0,589V

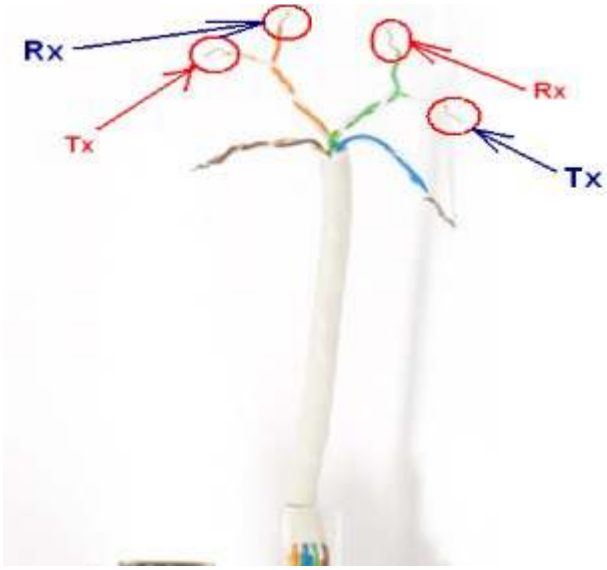


75R Termination resistors resistance.

Resistor resistance, marked with red arrow, should be 75 Ohm +/- 1%



On ports Ether2 – Ether5 You can take patch cord and plug it into the routerboard, and then measure resistance of termination resistors.

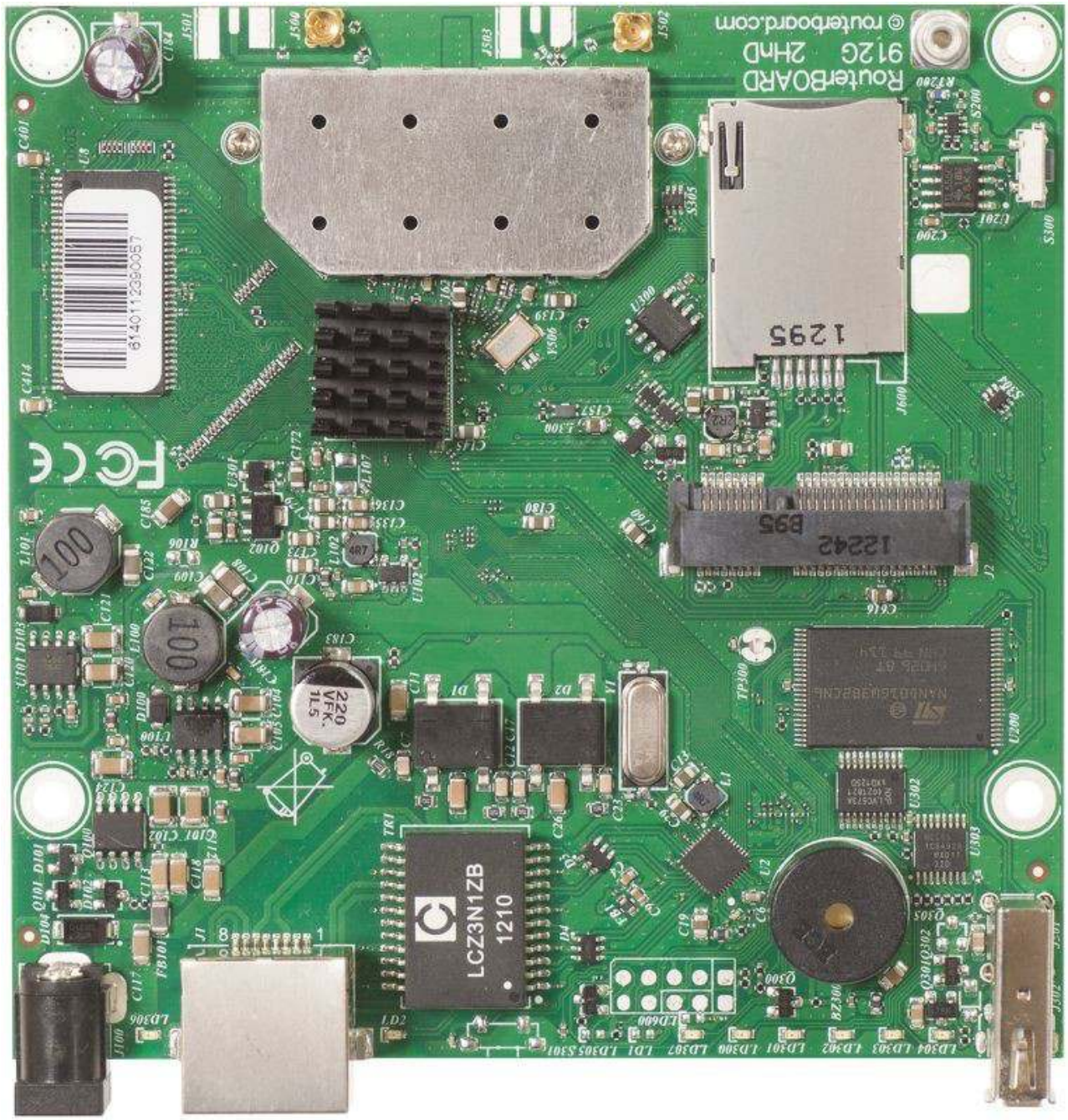


Resistance value between Rx and Tx line must be 150 Ohm +/-4%.

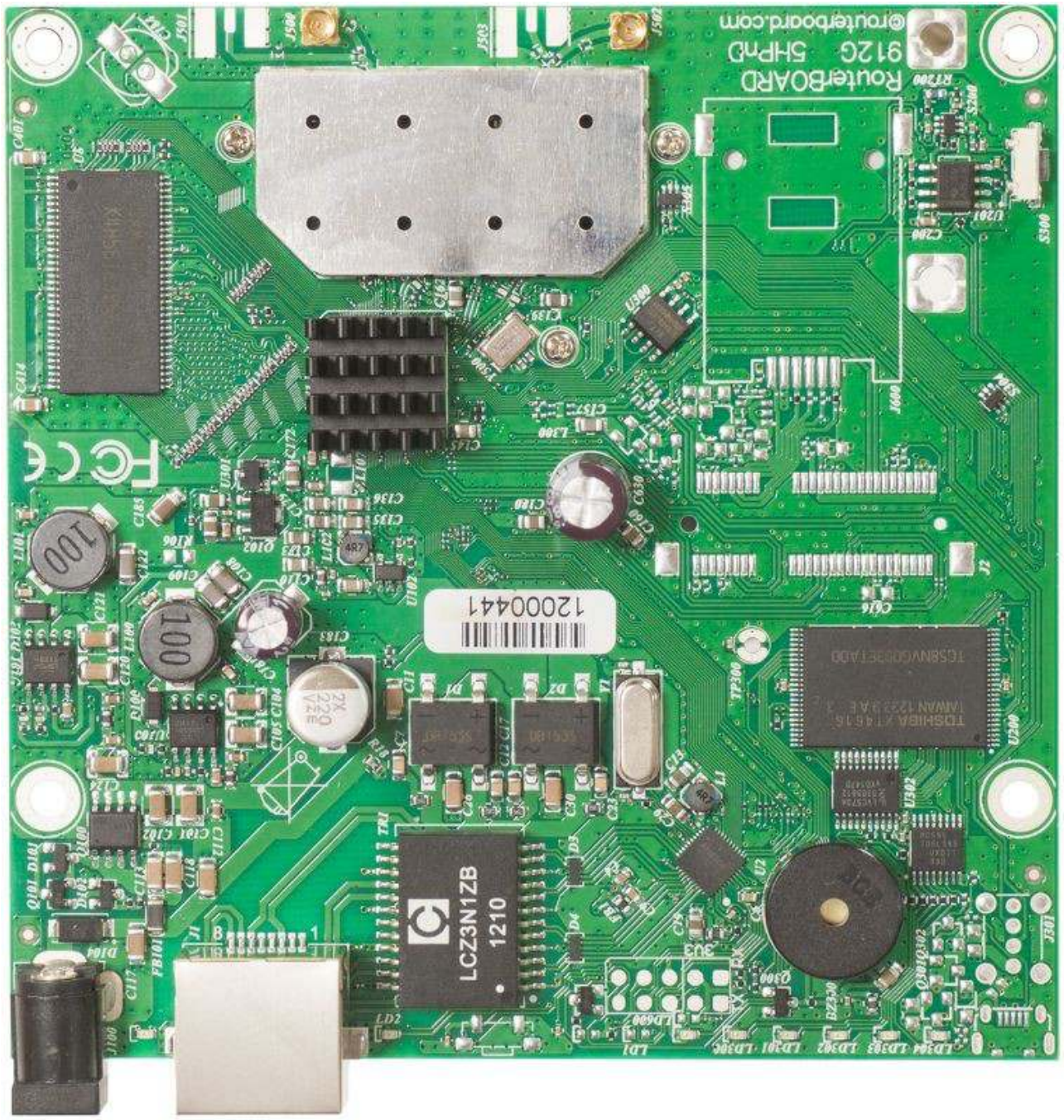
If resistance value is smaller or higher then Tx/Rx line was damaged by high voltage surge.

RB912G - 2HnD series RouterBoards

RB912UAG-2HPnD



RB911G-2HPnD



BaseBox 2

BaseBox 2 disassembling information

1. step

Remove the sticker from connectors

2. step

Remove the screw stickers

3. step

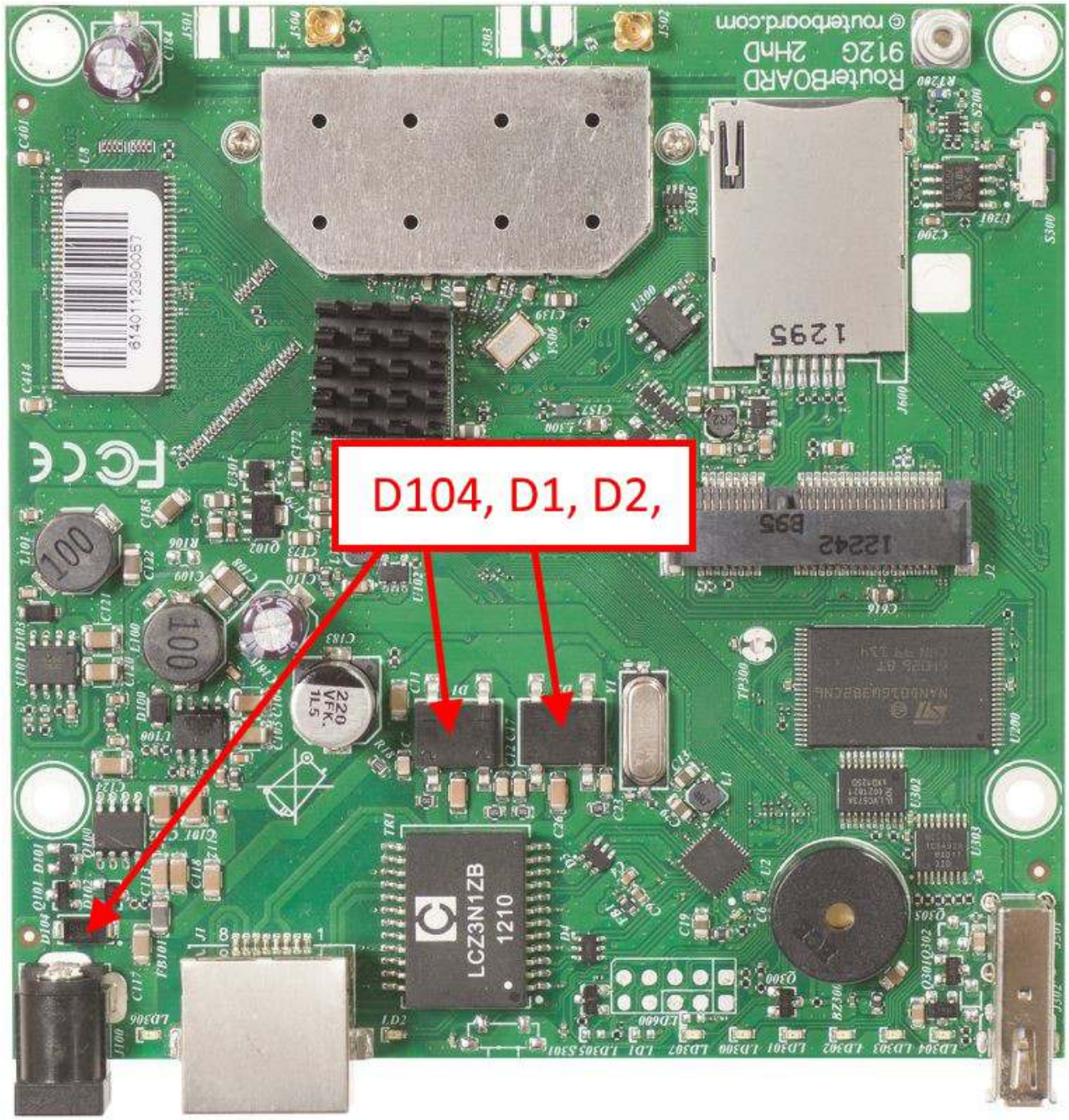
Unscrew the case base from the   board holder with torque screwdriver T8

4. step

Remove the case base from the board holder

Schottky diode measuring with multimeter in diode mode

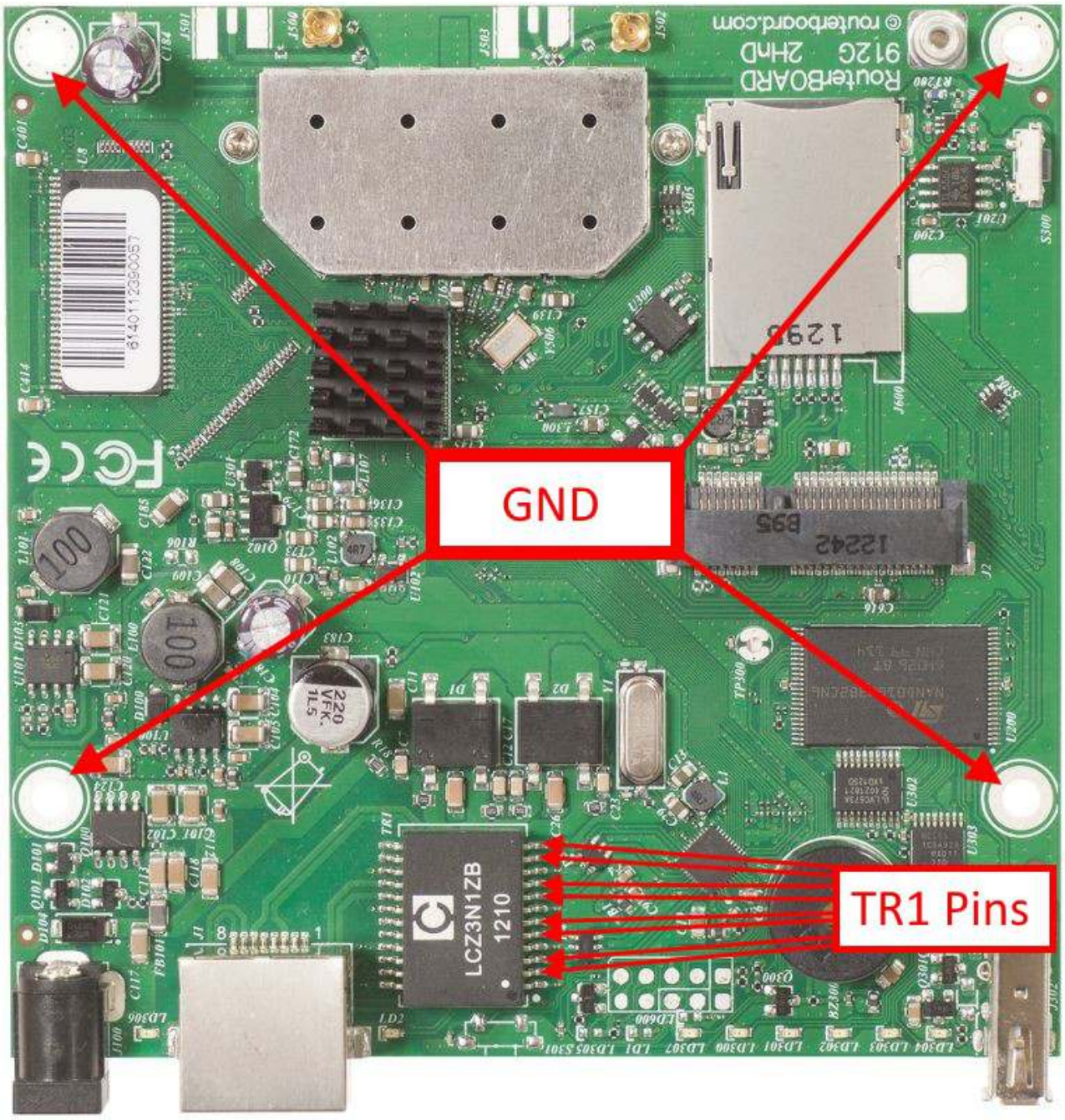
Schottky diode reference number is D104; Voltage drop value should be about 0,350V
Diode bridge reference numbers are D1 and D2. Voltage drop value should be about 0,563V



Voltage drop between diode array pin#1 and Ground.

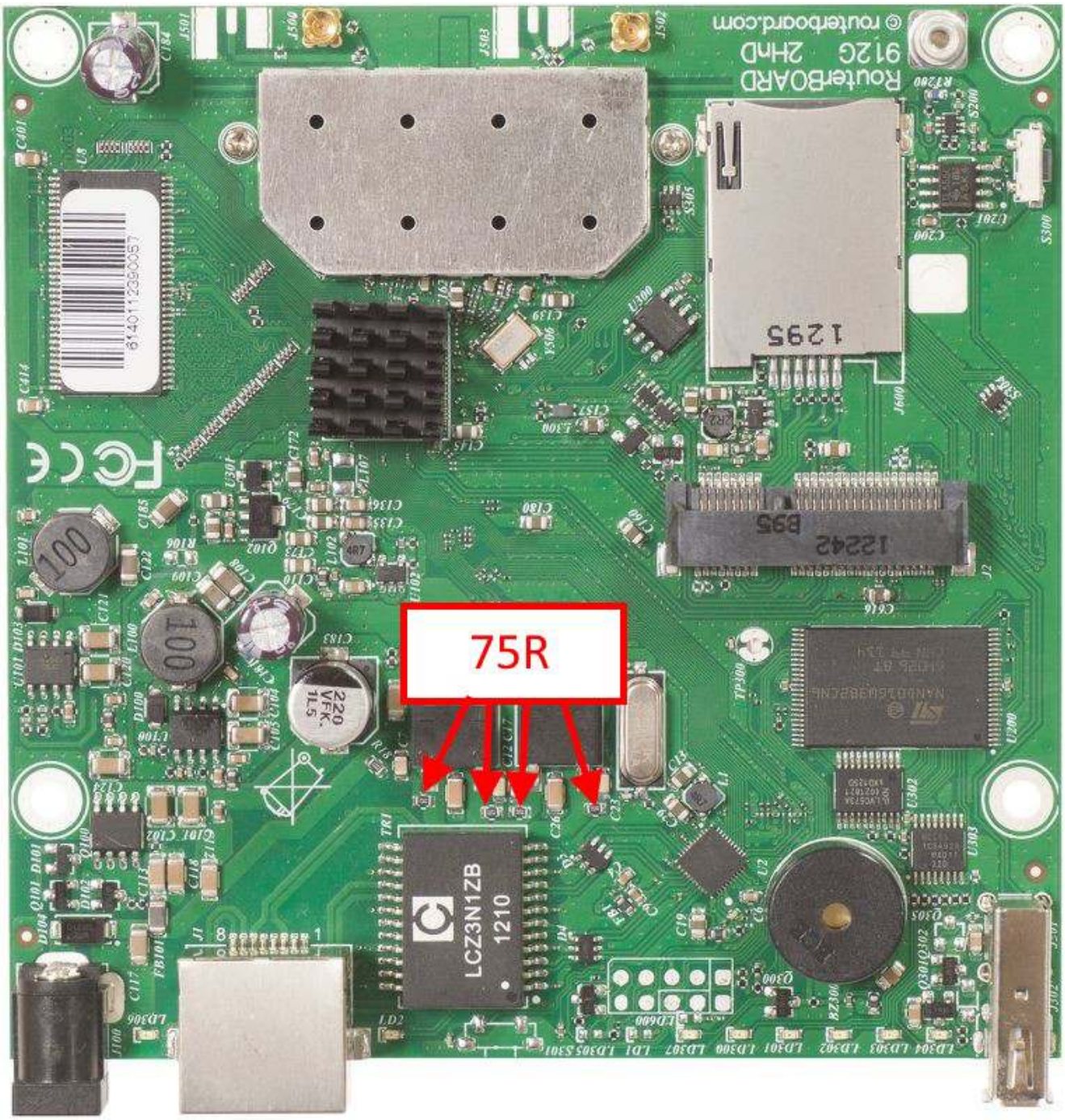
Check voltage drop between TR1, Transformers pins and Ground. Ether Pins are marked with red arrows.

It should be in the range from 0,32V to 0,589V



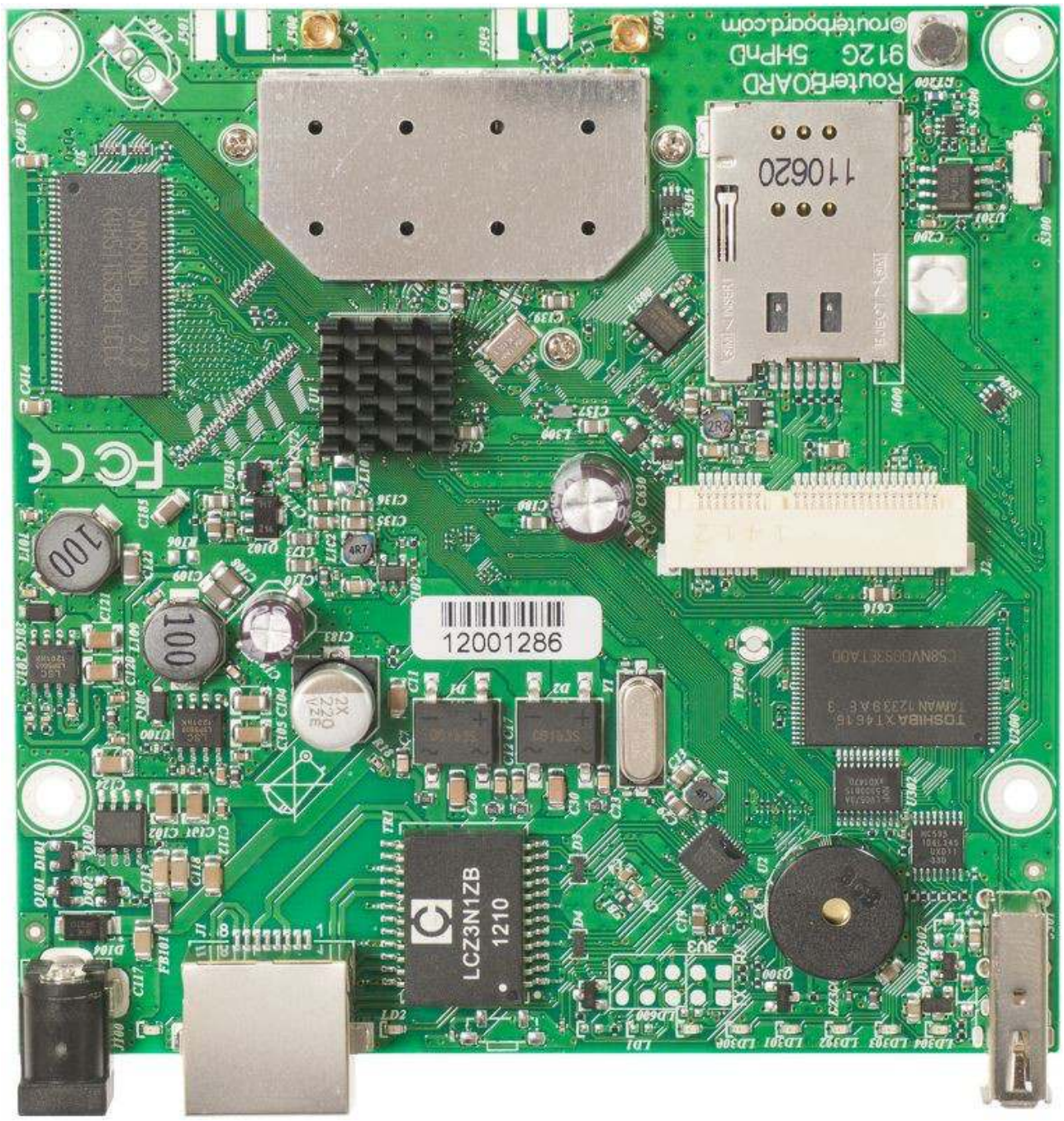
75R Termination resistors resistance.

Resistor resistance, marked with red arrow, should be 75 Ohm +/- 1%



RB912G - 5HPnD series RouterBoards

RB912UAG-5HPnD



SEXTANT G 5HPnD

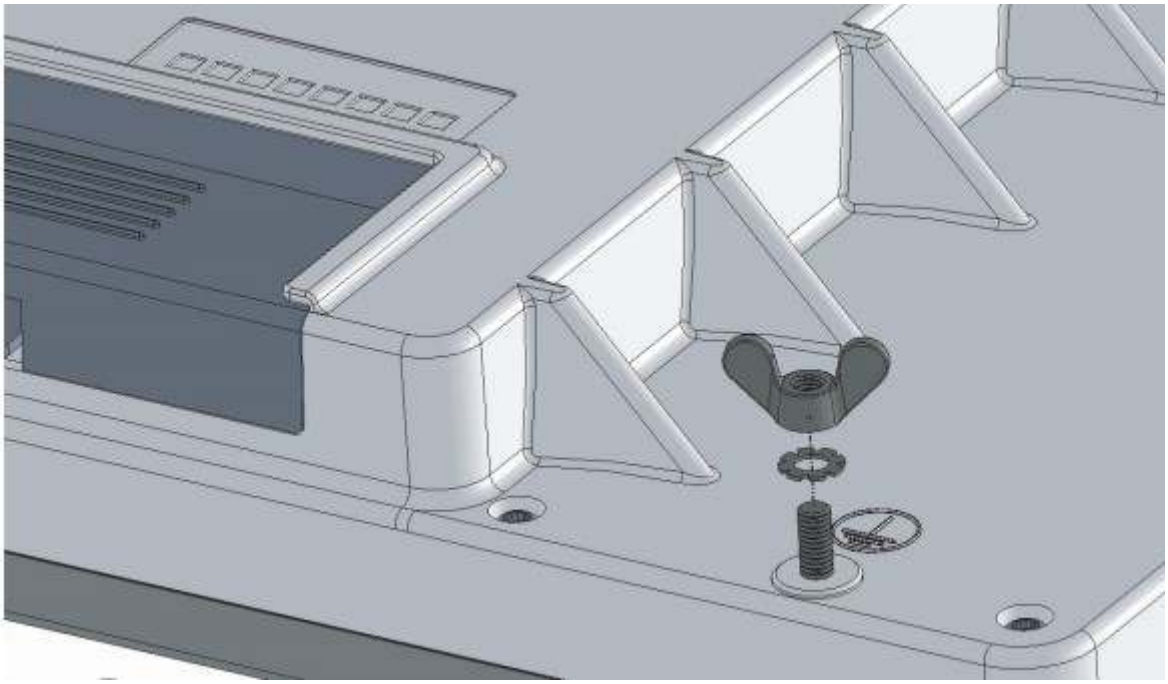
BaseBox 5

QRT 5

QRT 5 disassembling information

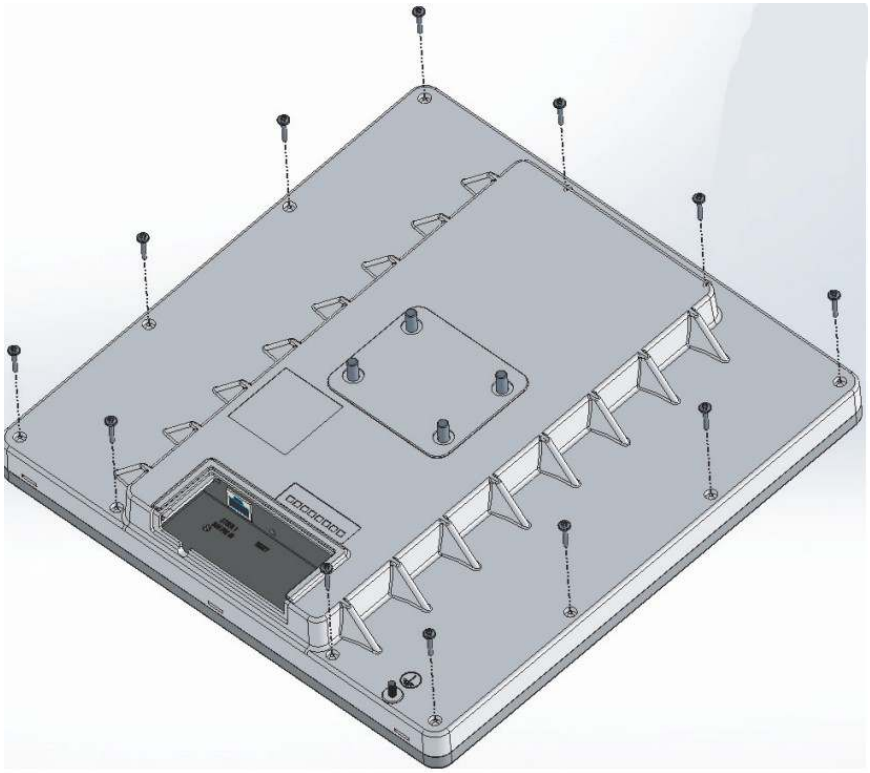
1. step

Remove the wing nut from Ground M4 screw



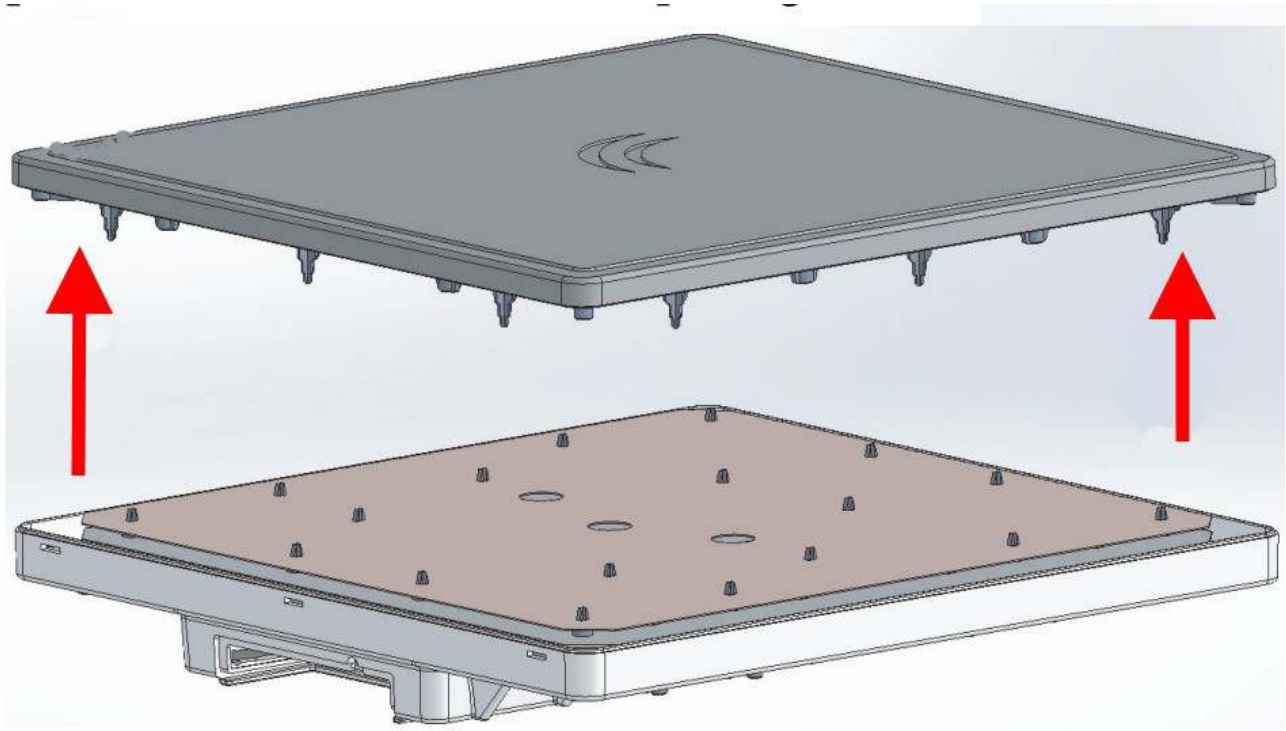
2. step

Remove the 12 pcs screws with torque screwdriverT8



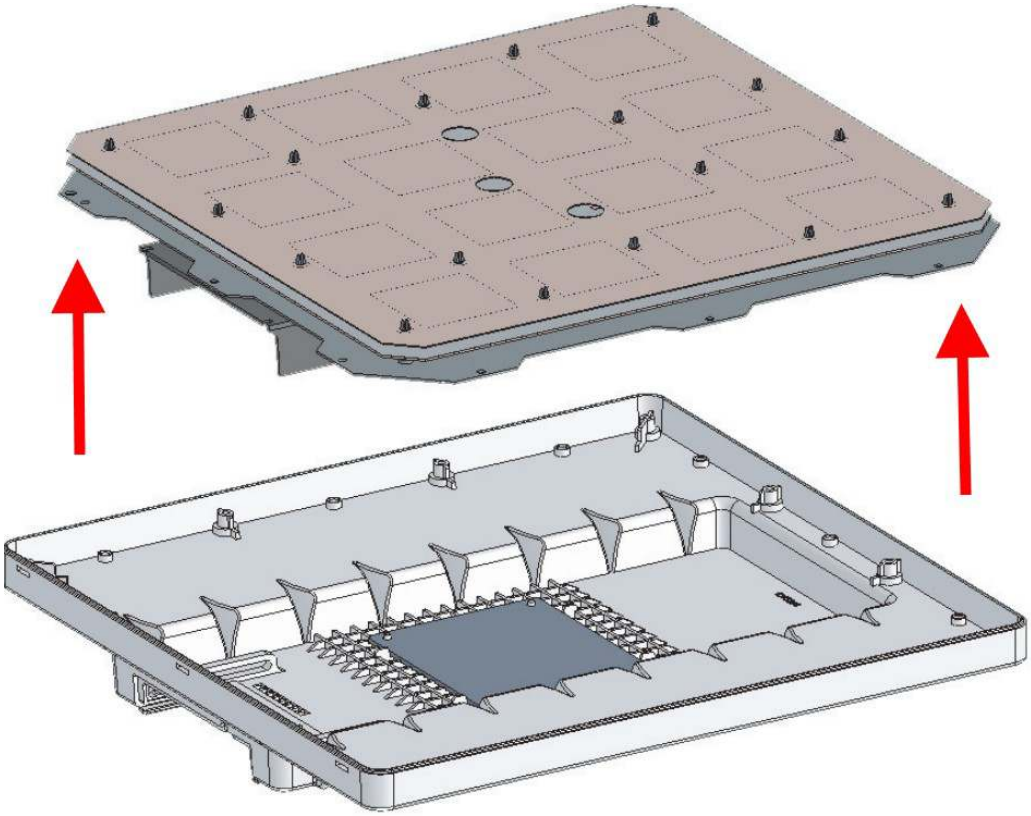
3. step

Remove the cover



4. step

Remove the M4 screw from bottom plate and than separate bottom plate from antenna with board.



BaseBox 5 disassembling information

1. step

Remove the sticker from connectors

2. step

Remove the screw stickers

3. step

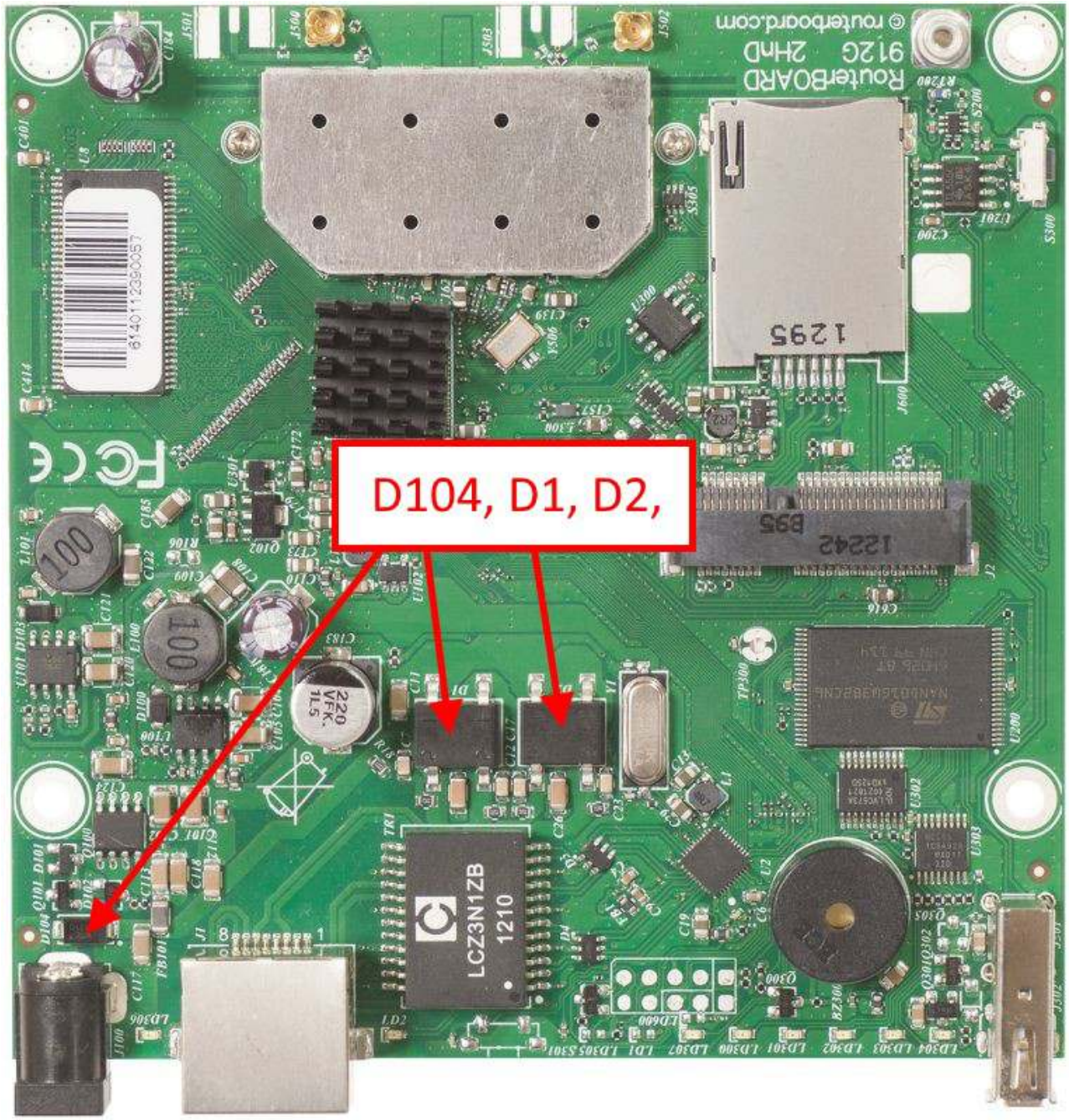
Unscrew the case base from the   board holder with torque screwdriver T8

4. step

Remove the case base from the board holder

Schottky diode measuring with multimeter in diode mode

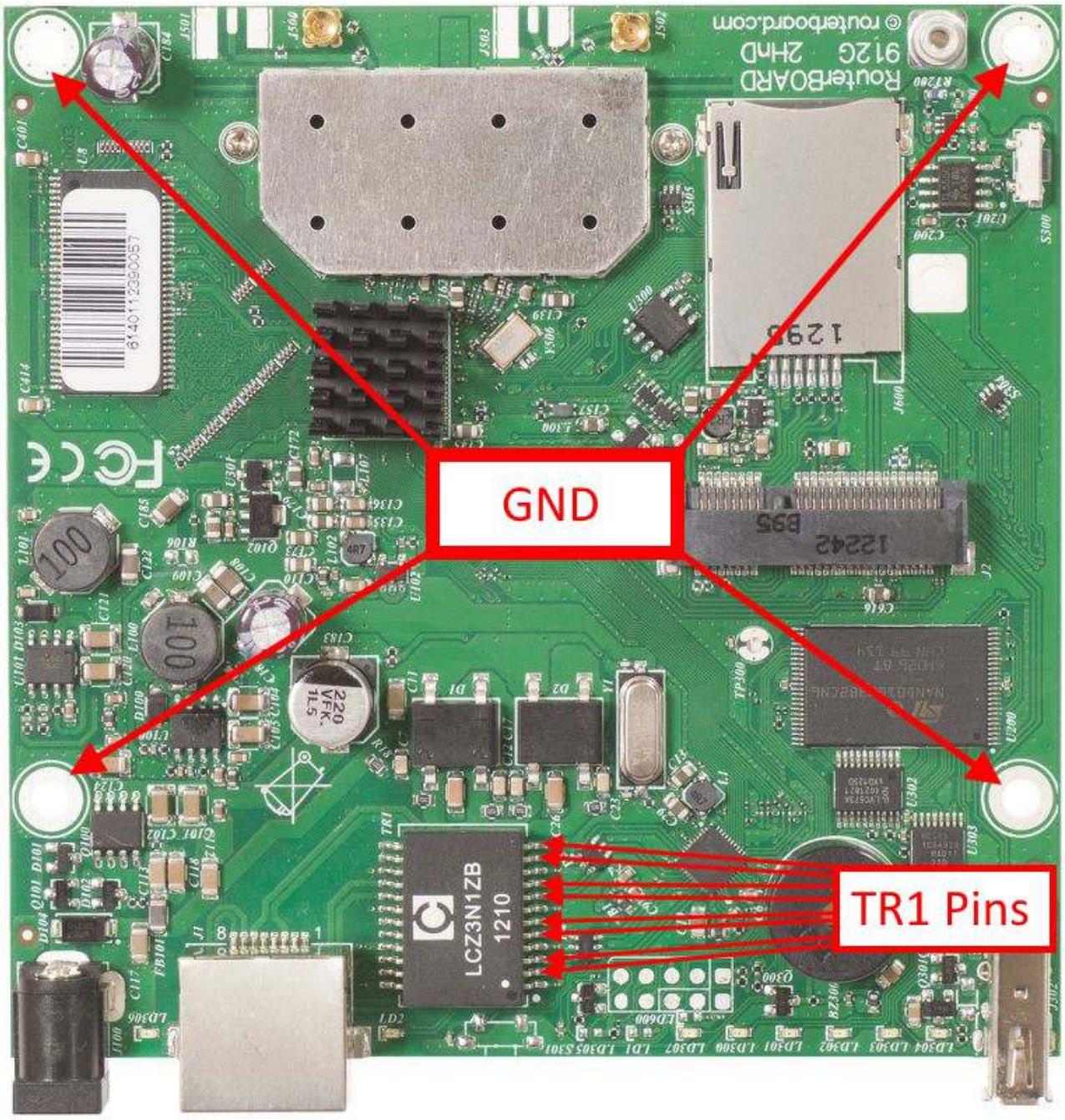
Schottky diode reference number is D104; Voltage drop value should be about 0,350V
Diode bridge reference numbers are D1 and D2. Voltage drop value should be about 0,563V



Voltage drop between diode array pin#1 and Ground.

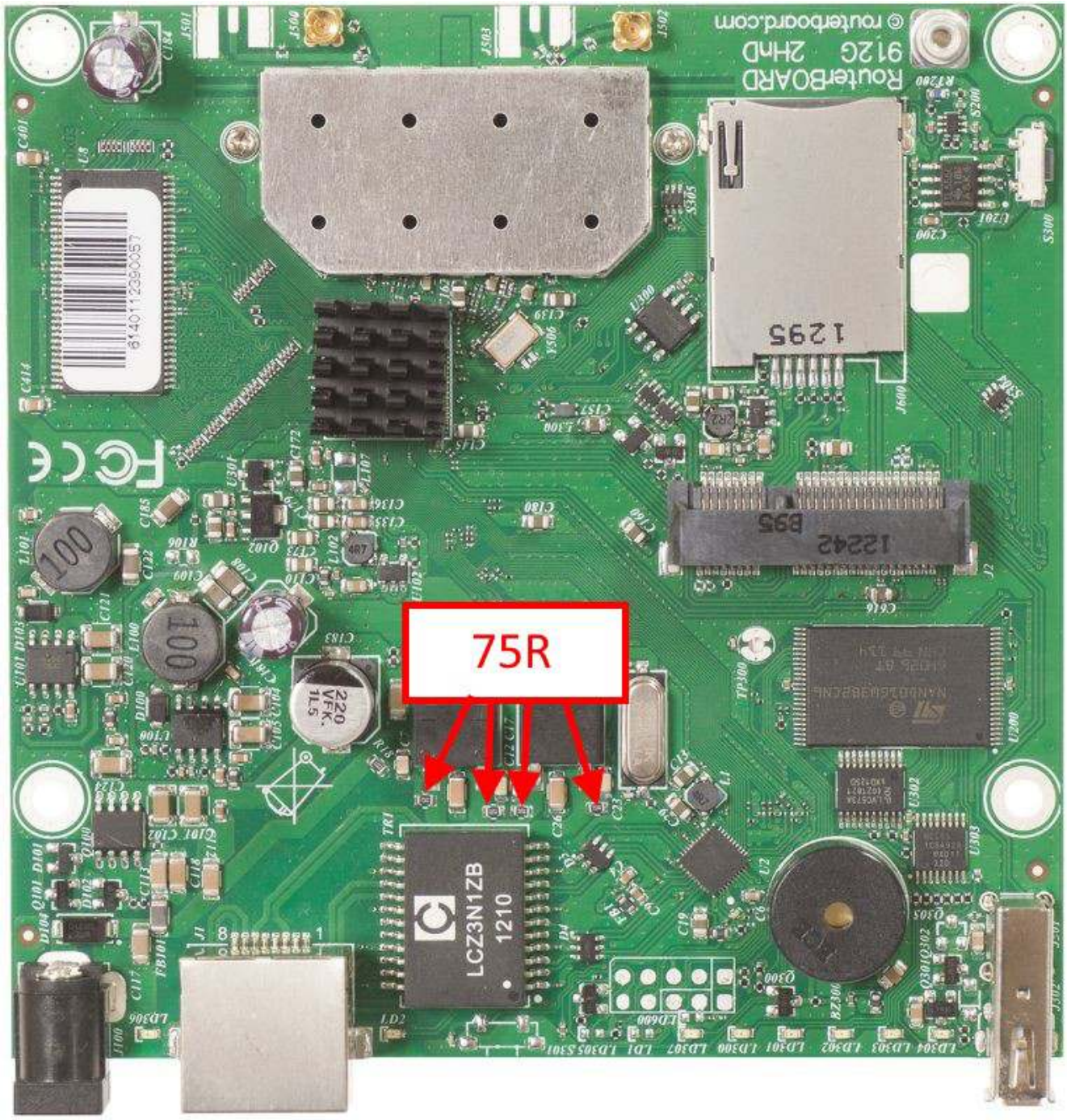
Check voltage drop between TR1, Transformers pins and Ground. Ether Pins are marked with red arrows.

It should be in the range from 0,32V to 0,589V



75R Termination resistors resistance.

Resistor resistance, marked with red arrow, should be 75 Ohm +/- 1%



RBSXTG-5HPacD series RouterBoards

RBSXTG-5HPacD series:

SXT 5 ac

SXT SA5 ac

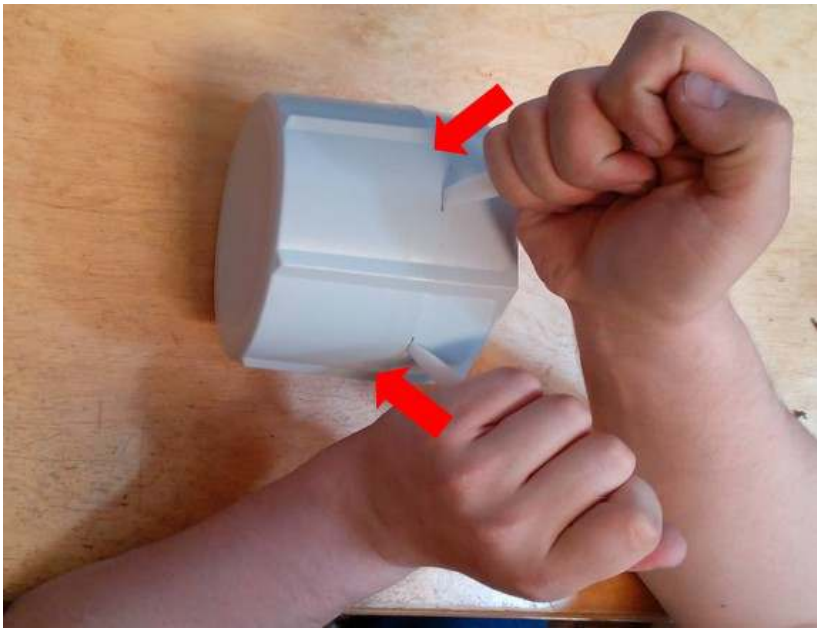
SXT HG5 ac

Disassembling information

SXT series disassembling

1. step

Use two “-” screwdrivers. Push screwdrivers in case cavities.

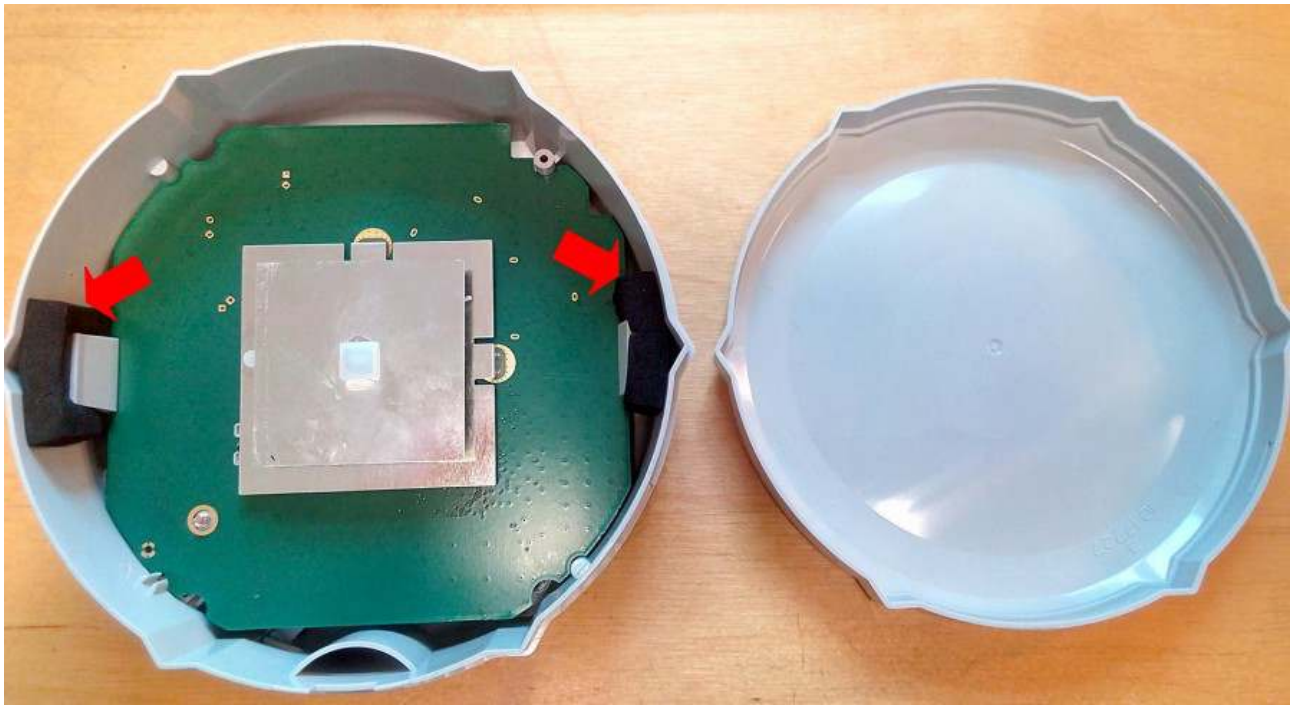


2. step

Rotate screwdriver and pull both case parts.

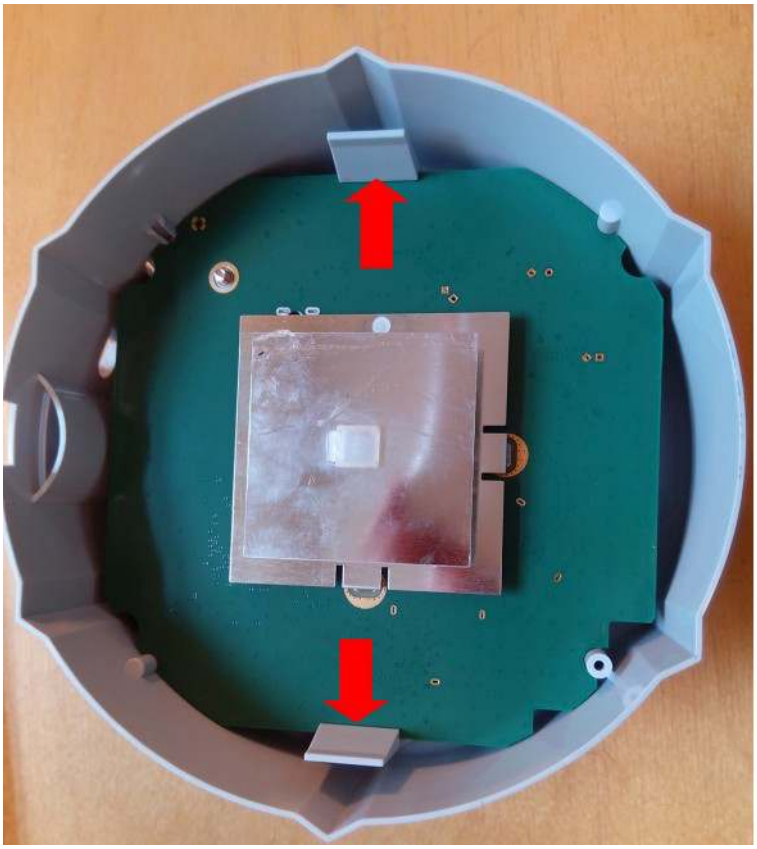
3. step

Remove rubber bushing



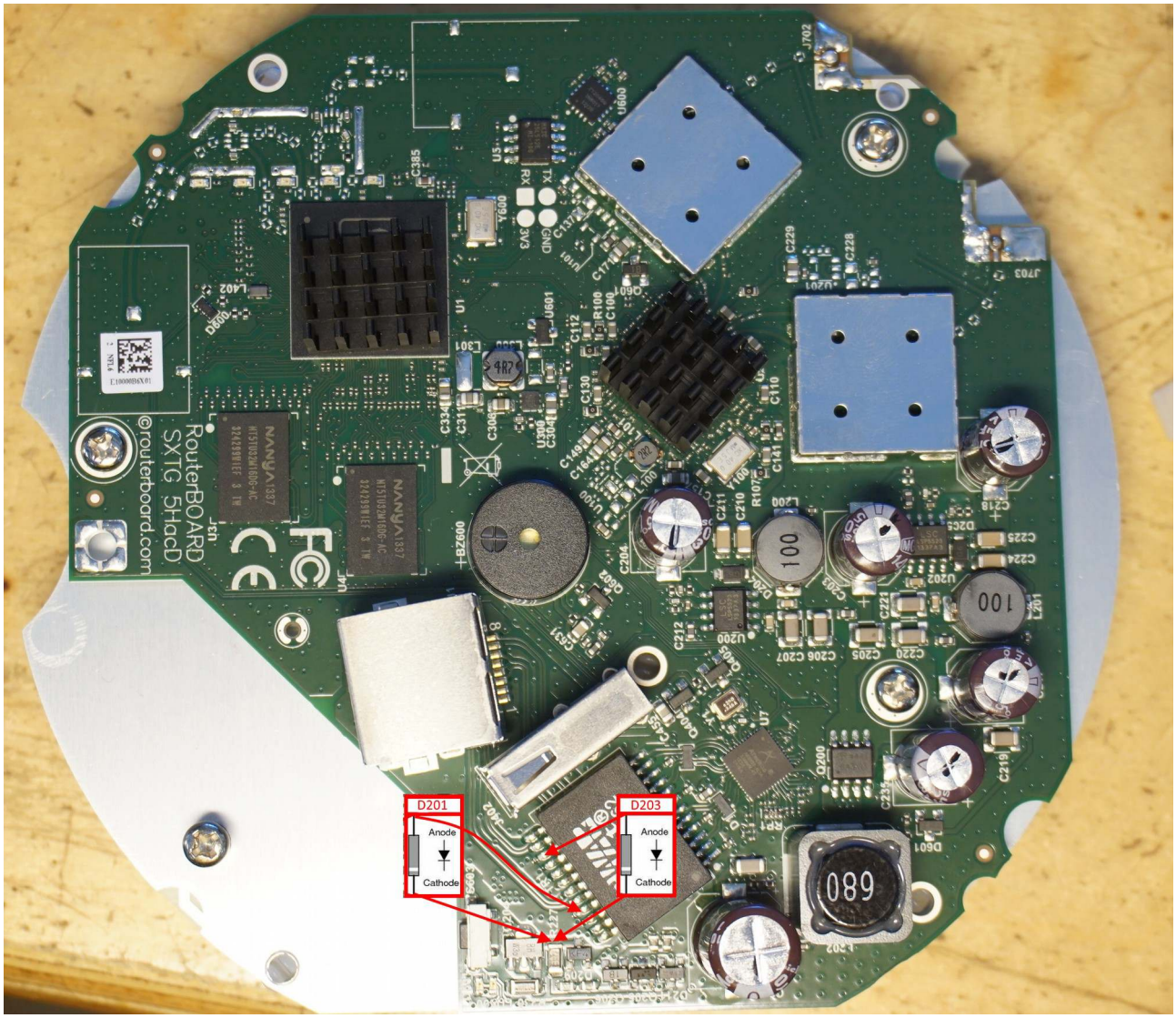
4. step

Push back Plastic PCB holders and take out the board.



Schottky diode measuring with multimeter in diode mode

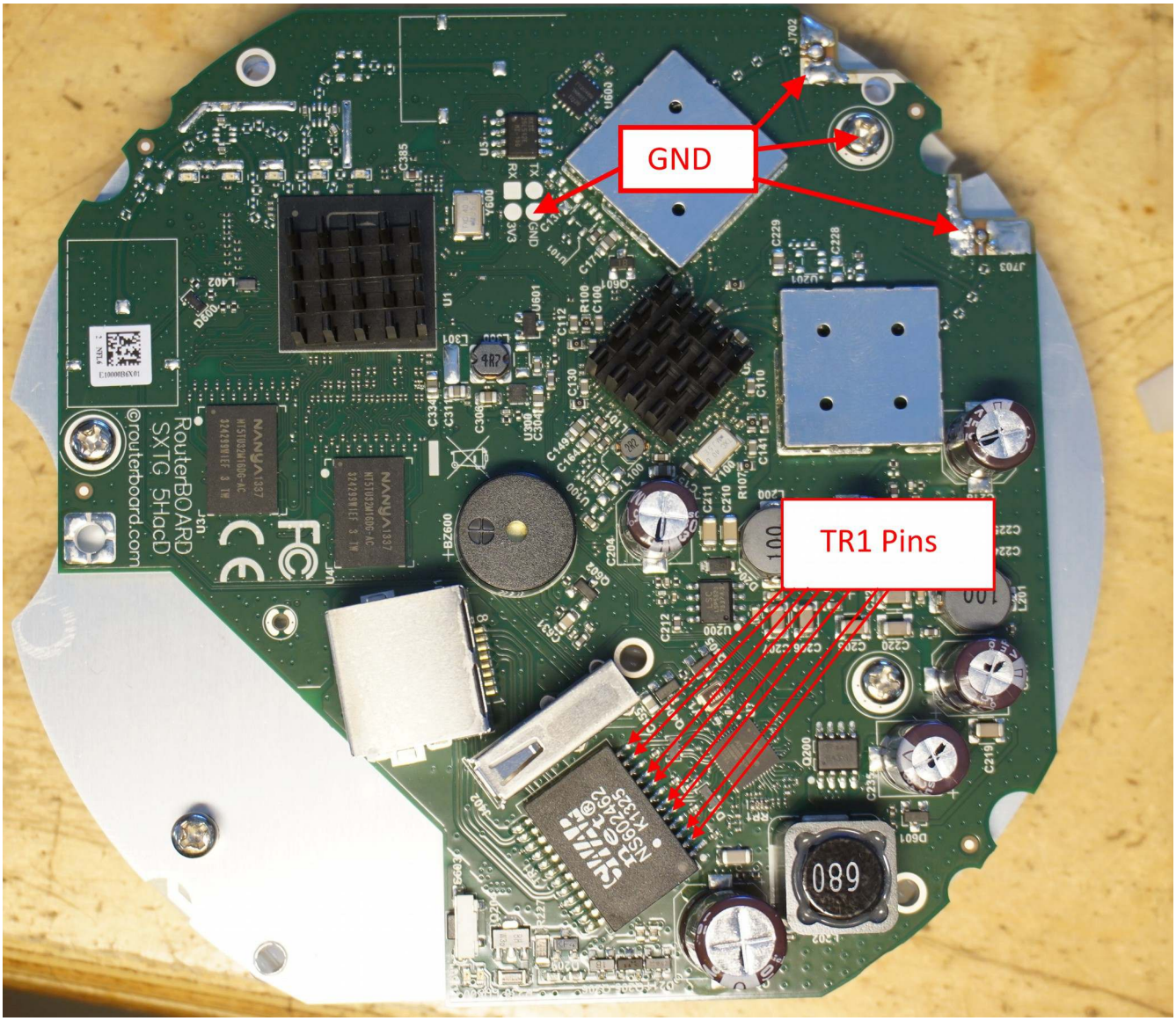
Schottky diode reference numbers are D201, D203 . Voltage drop value should be about 0,170V



Voltage drop between diode array pin#1 and Ground.

Check voltage drop between TRF1 Ethernet Transformers pins and Ground. Ether Pins are marked with red arrows.

It should be in the range from 0,32V to 0,48V



RBSXTLite2 series RouterBoards

RBSXTLite2 series:

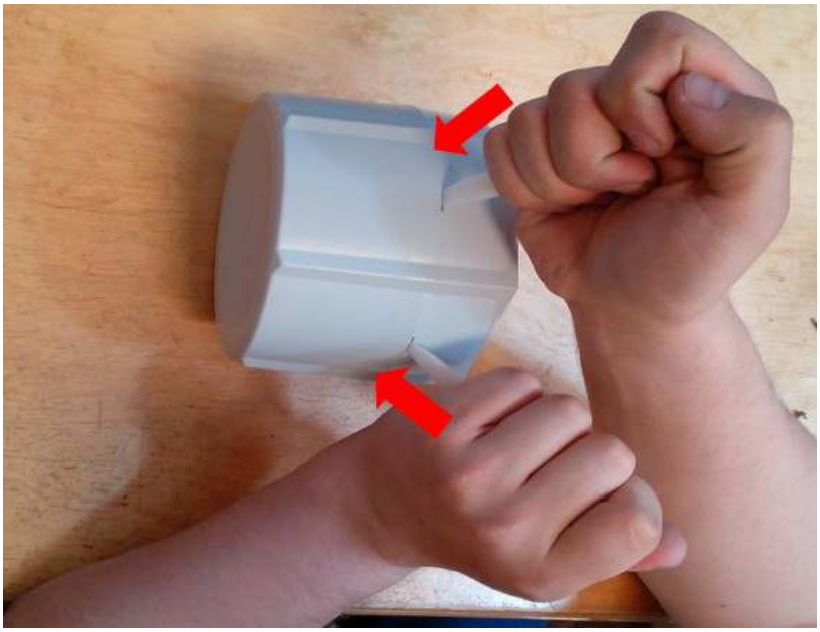
SXT Lite2

Disassembling information

SXT series disassembling

1. step

Use two “-” screwdrivers. Push screwdrivers in case cavities.

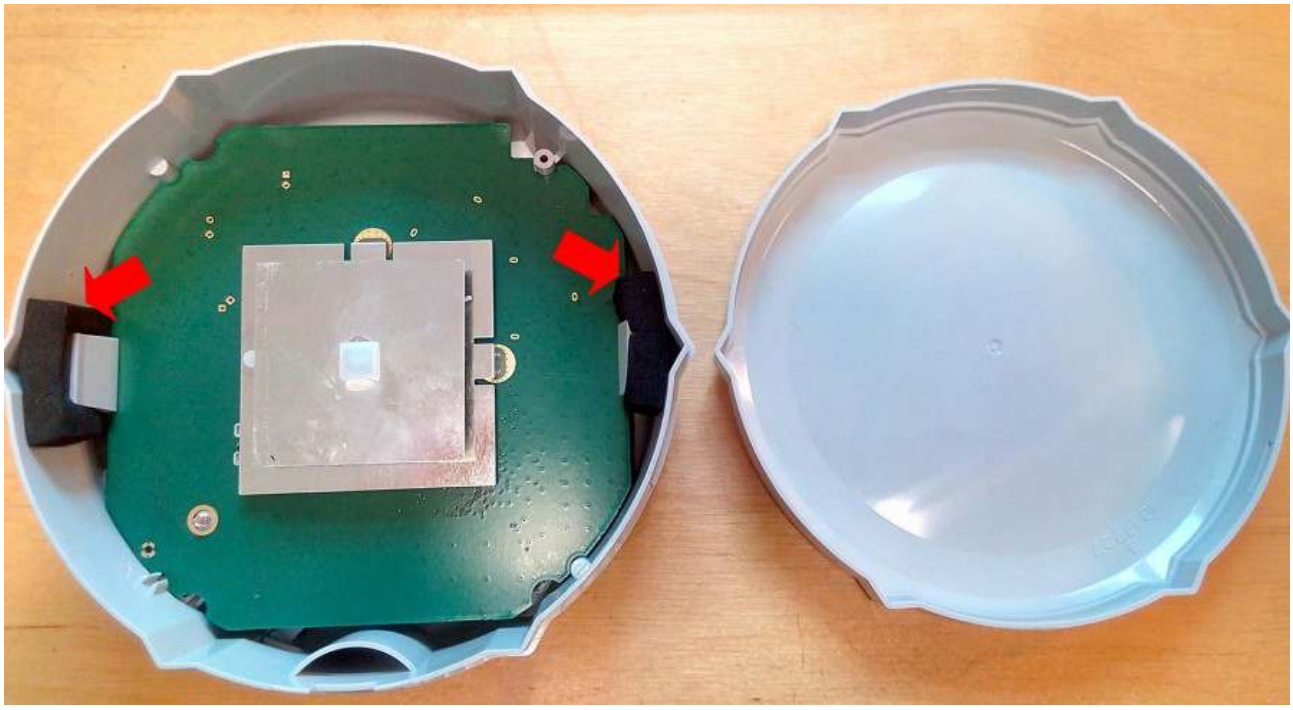


2. step

Rotate screwdriver and pull both case parts.

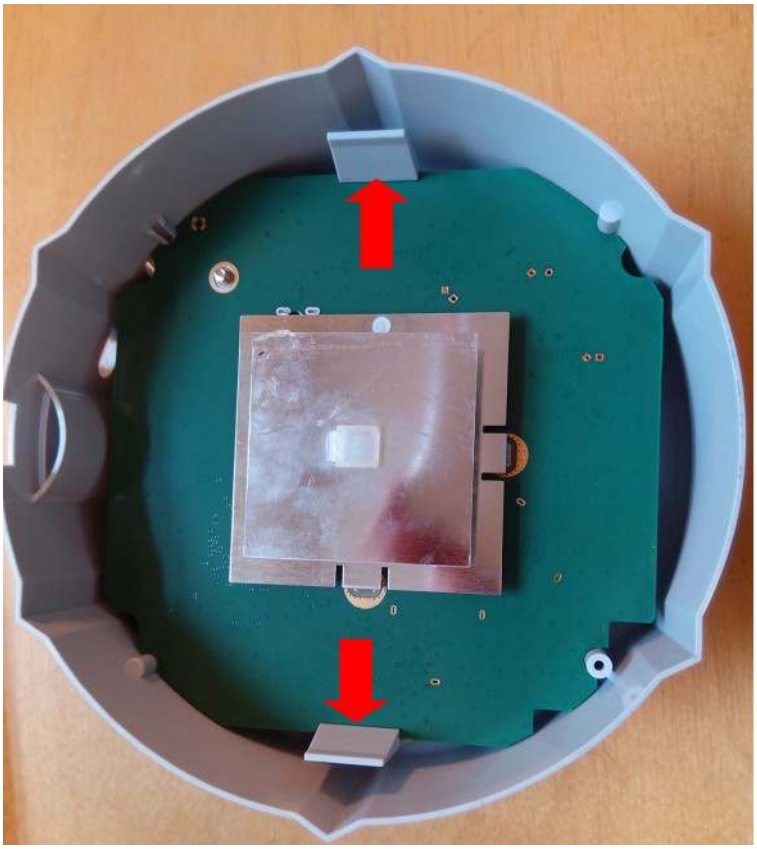
3. step

Remove rubber bushing



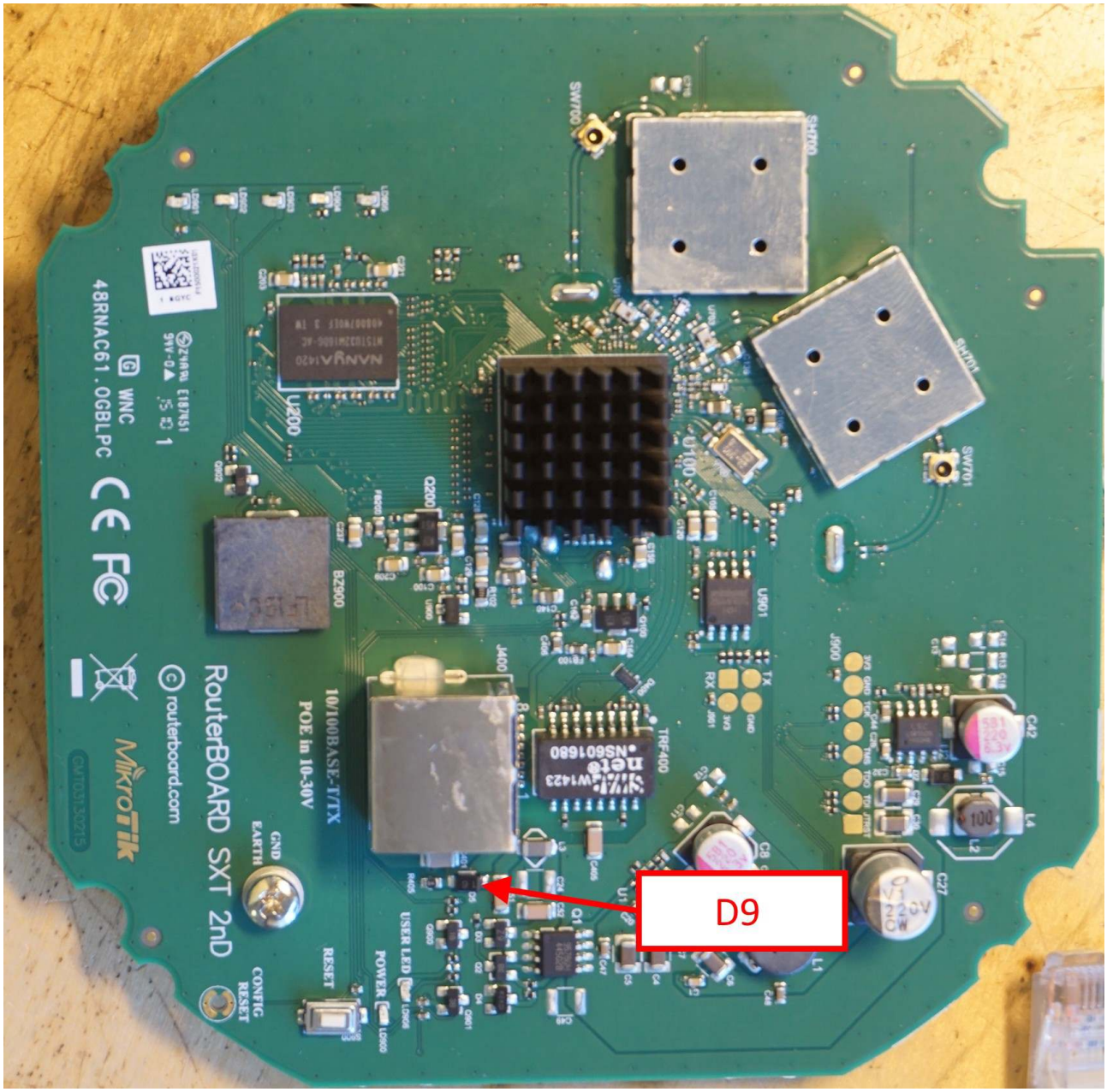
4. step

Push back Plastic PCB holders and take out the board.



Schottky diode measuring with multimeter in diode mode

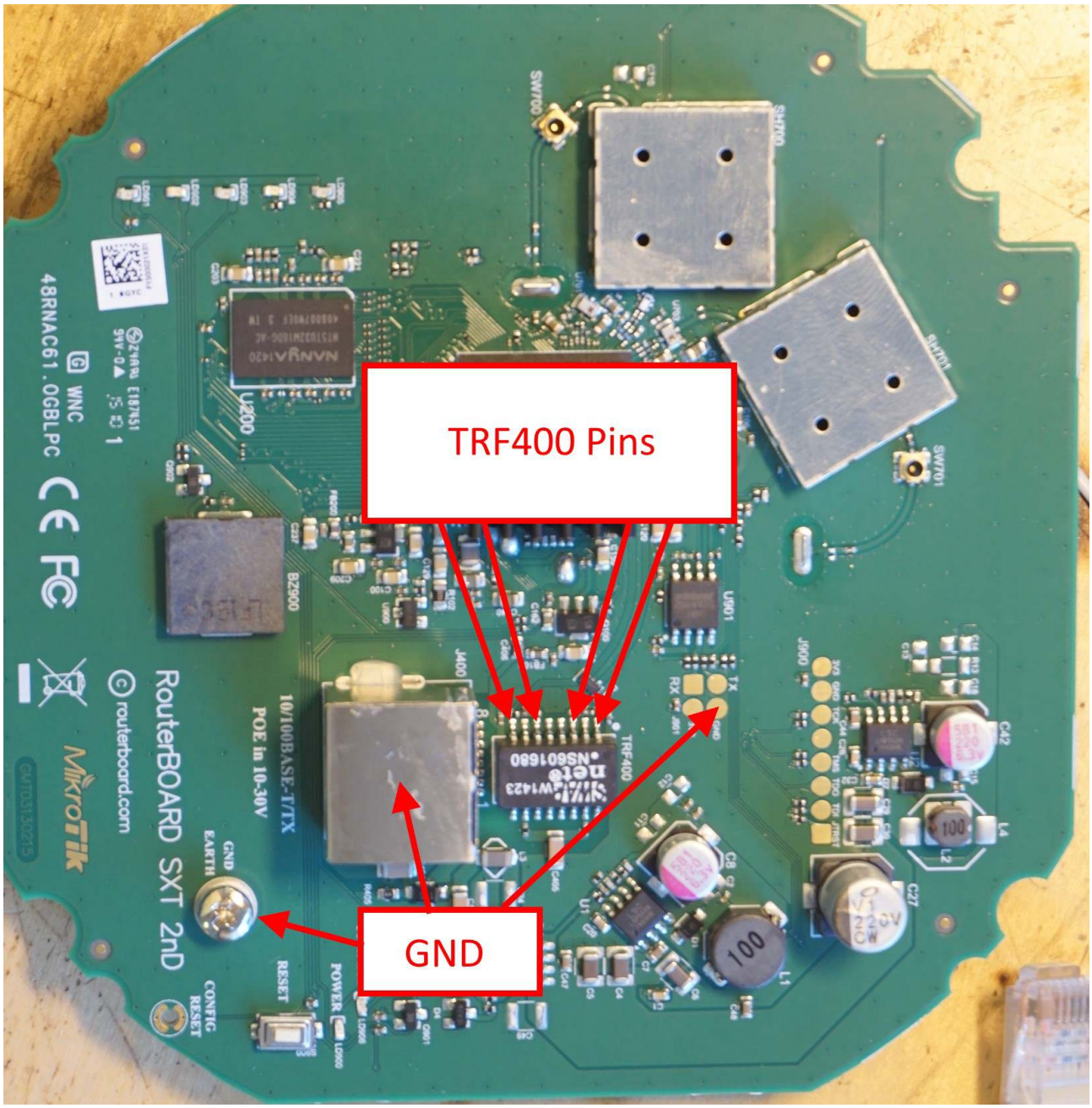
Schottky diode reference numbers are D5 . Voltage drop value should be about 0,190V



Voltage drop between diode array pin#1 and Ground.

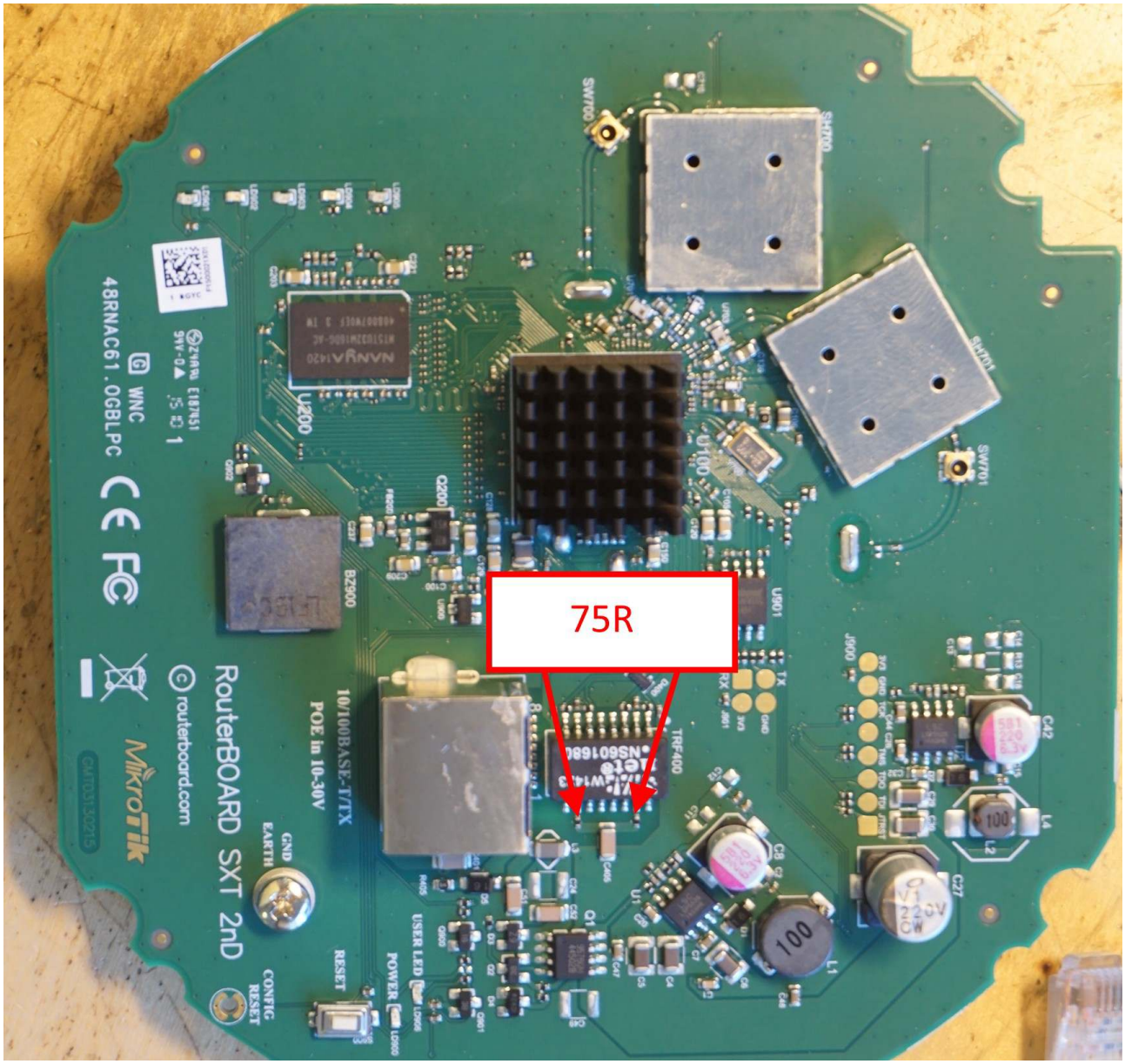
Check voltage drop between TRF400 Ethernet Transformers pins and Ground. Ether Pins are marked with red arrows.

It should be in the range from 0,32V to 0,48V



75R Termination resistors resistance.

Resistor resistance, marked with red arrow, should be 75 Ohm +/- 1%



RBSXTLite5 series RouterBoards

RBSXTLite5 series:

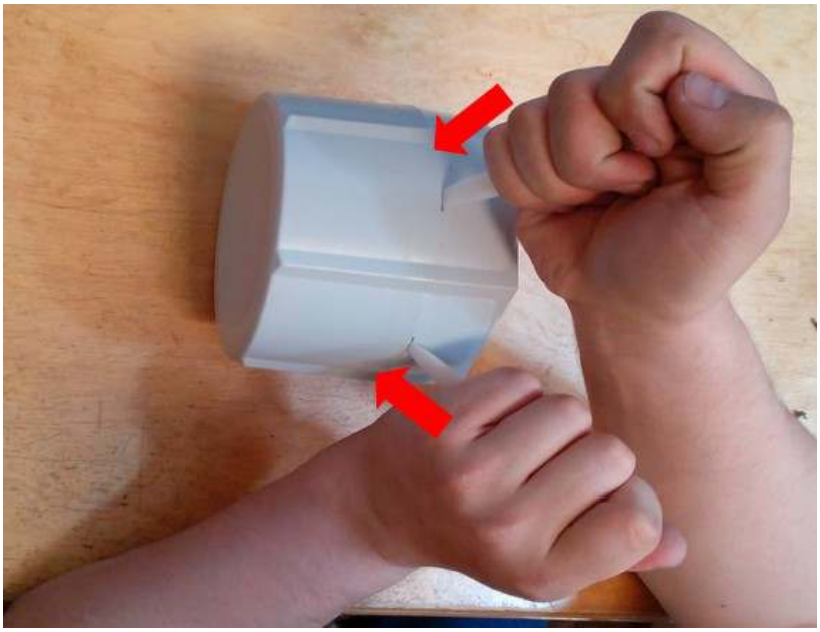
SXT Lite5

Disassembling information

SXT series disassembling

1. step

Use two “-” screwdrivers. Push screwdrivers in case cavities.

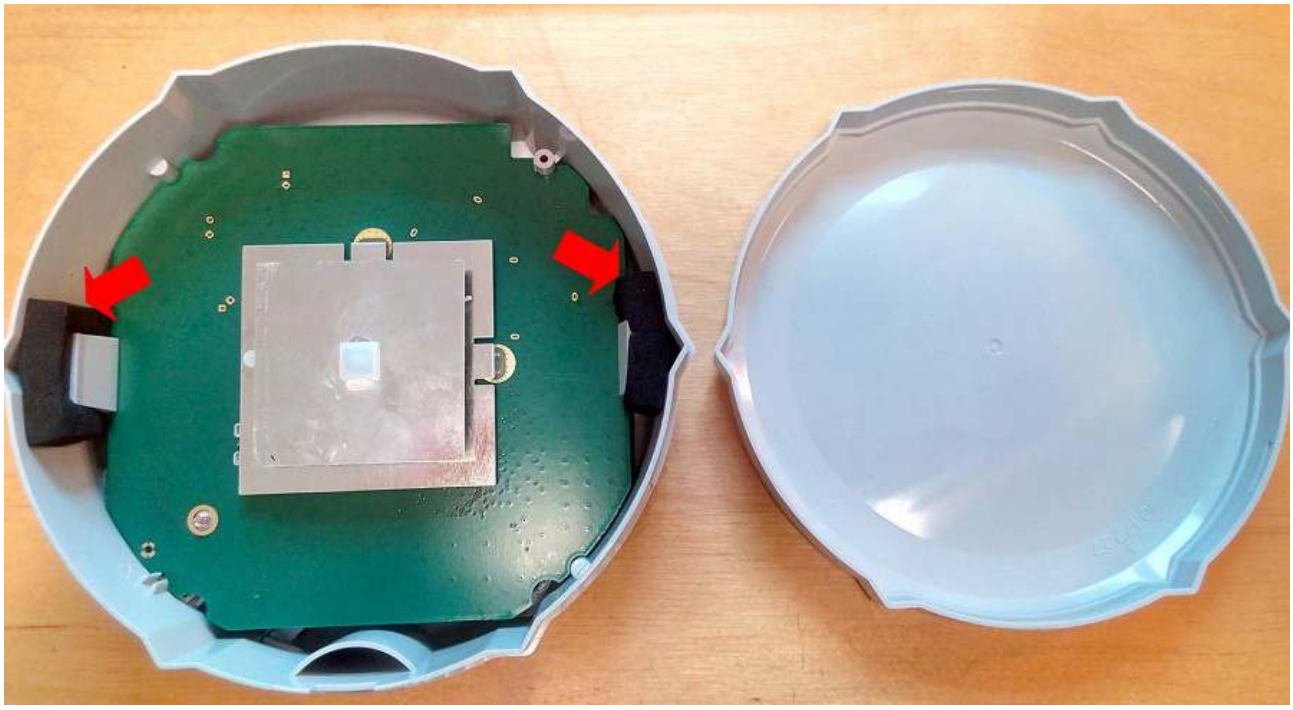


2. step

Rotate screwdriver and pull both case parts.

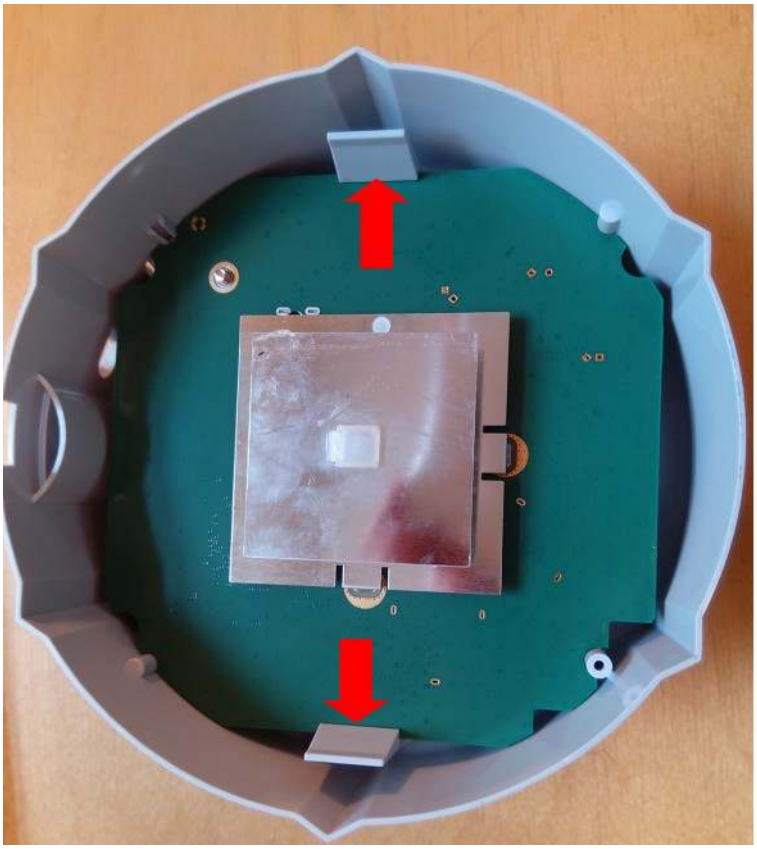
3. step

Remove rubber bushing



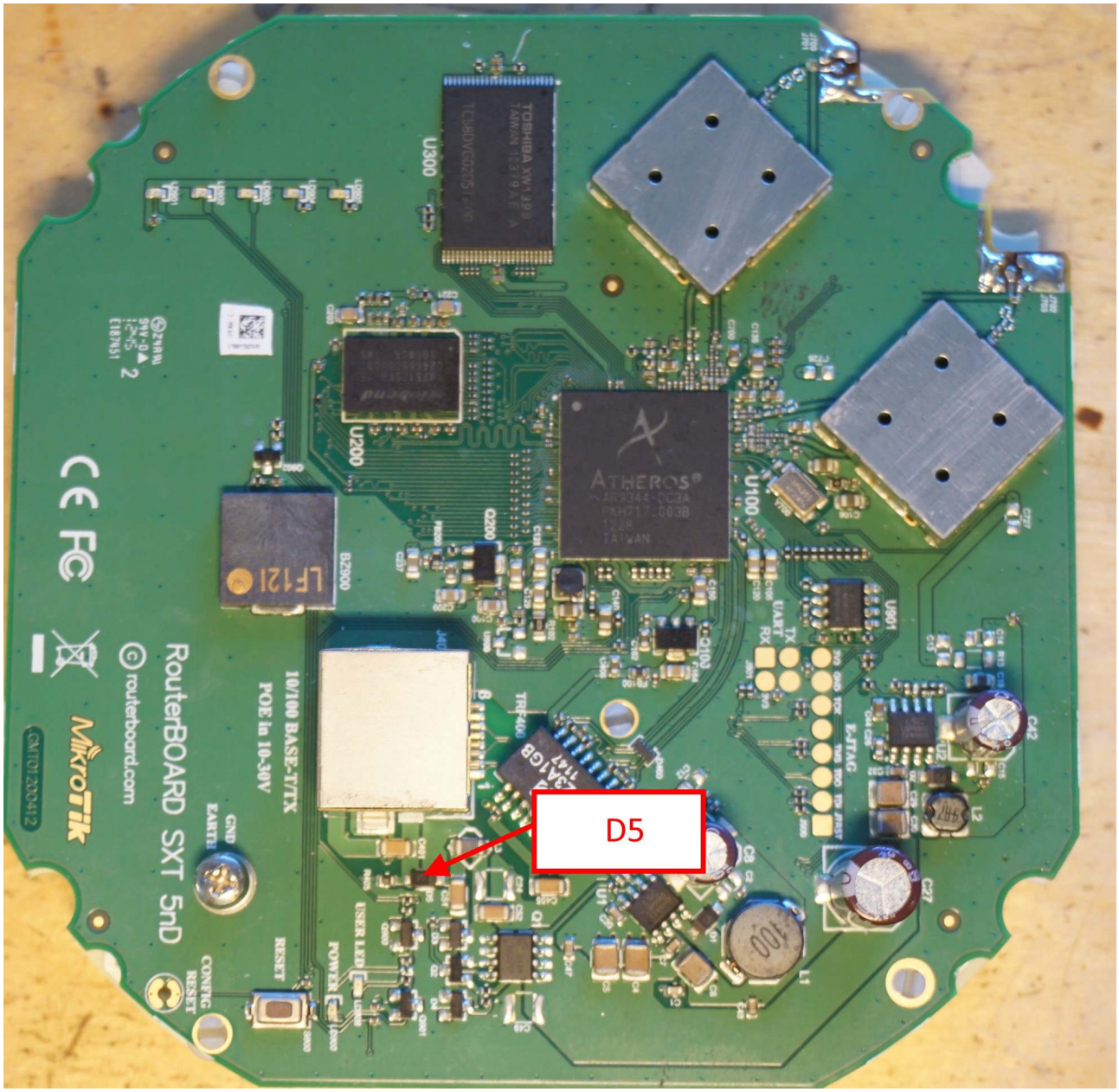
4. step

Push back Plastic PCB holders and take out the board.



Schottky diode measuring with multimeter in diode mode

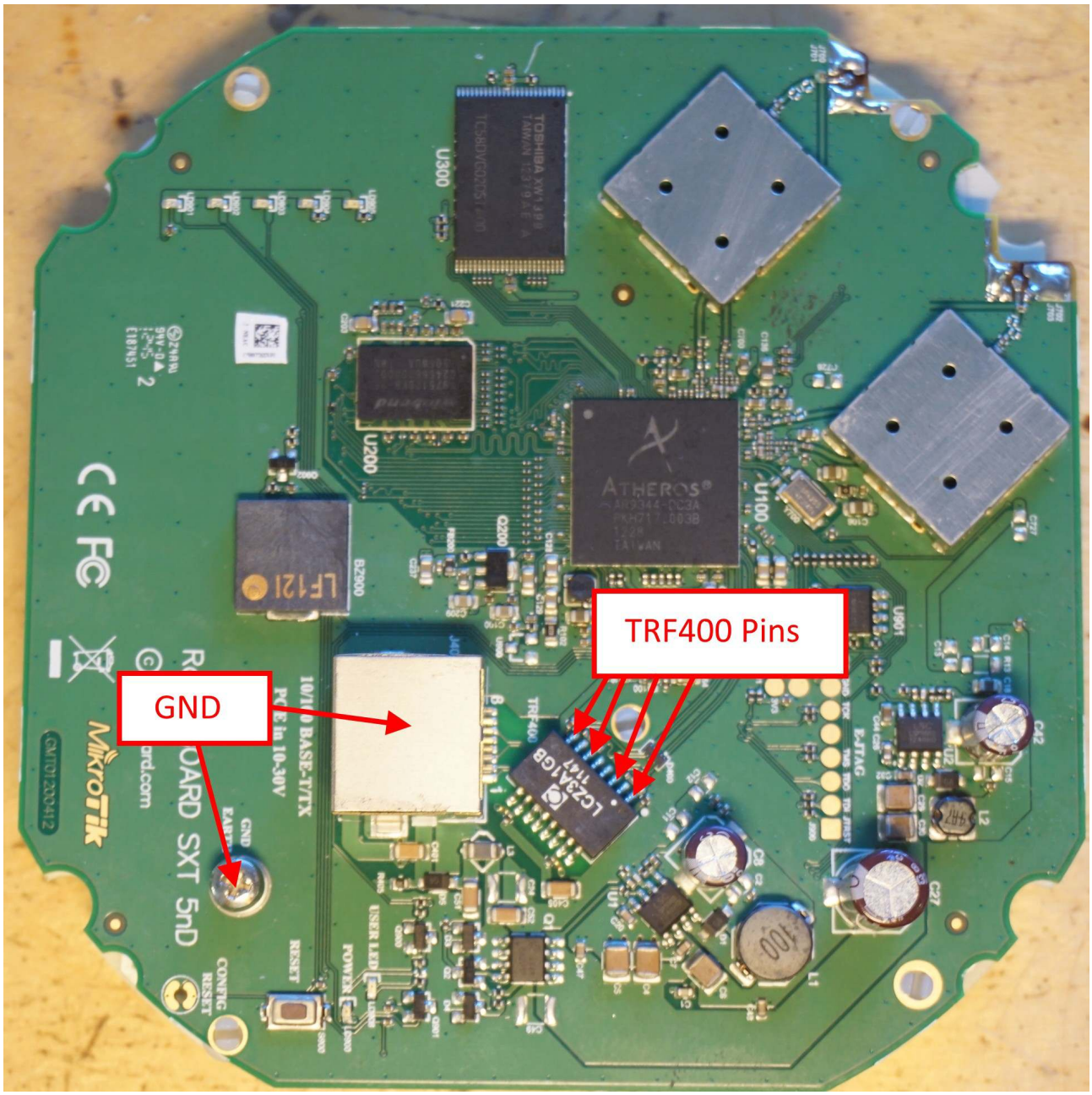
Schottky diode reference numbers are D5 . Voltage drop value should be about 0,190V



Voltage drop between diode array pin#1 and Ground.

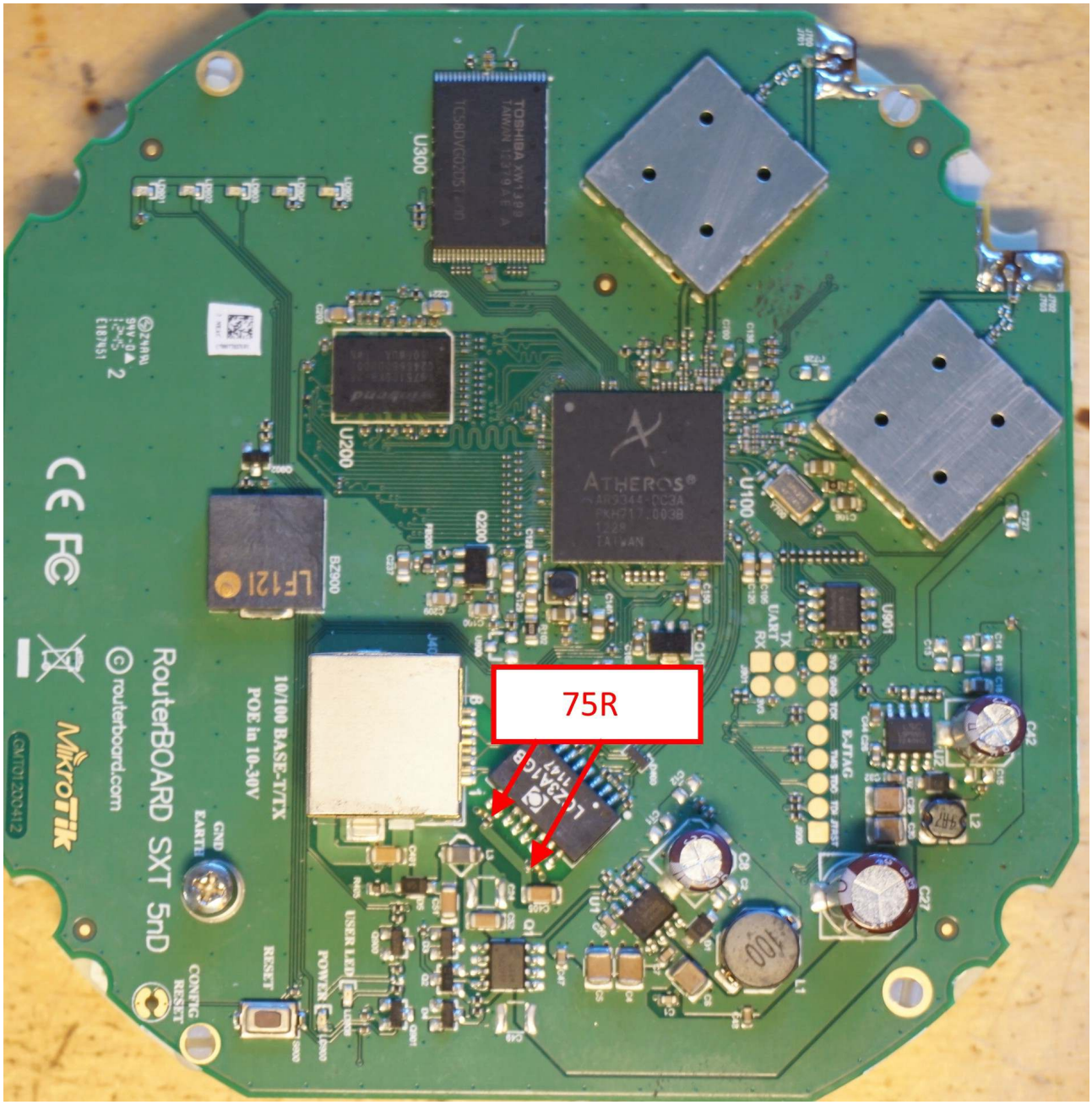
Check voltage drop between TRF400 Ethernet Transformers pins and Ground. Ether Pins are marked with red arrows.

It should be in the range from 0,32V to 0,48V



75R Termination resistors resistance.

Resistor resistance, marked with red arrow, should be 75 Ohm +/- 1%



RBSXTG-5HPnD series RouterBoards

RBSXTG-5HPnD series:

SXT HG5

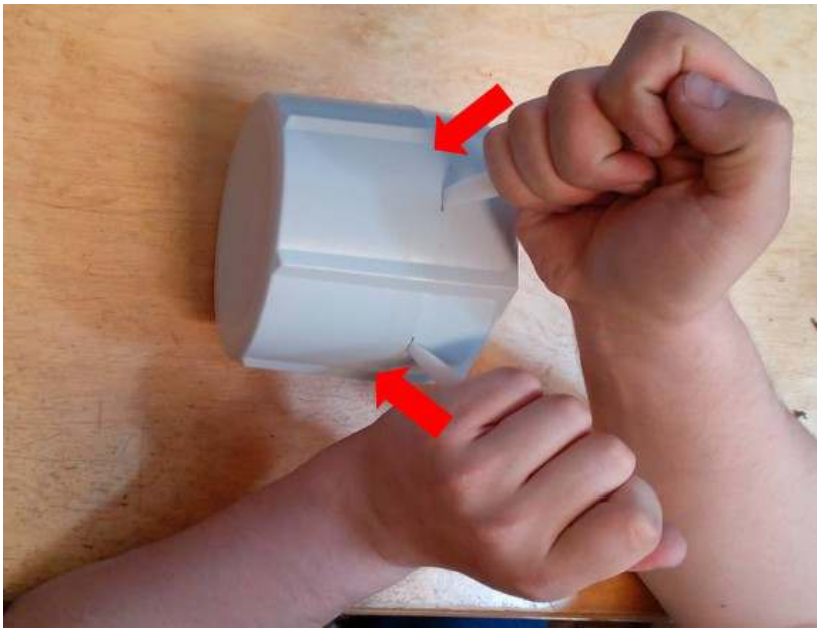
SXT SA5

Disassembling information

SXT series disassembling

1. step

Use two “-” screwdrivers. Push screwdrivers in case cavities.

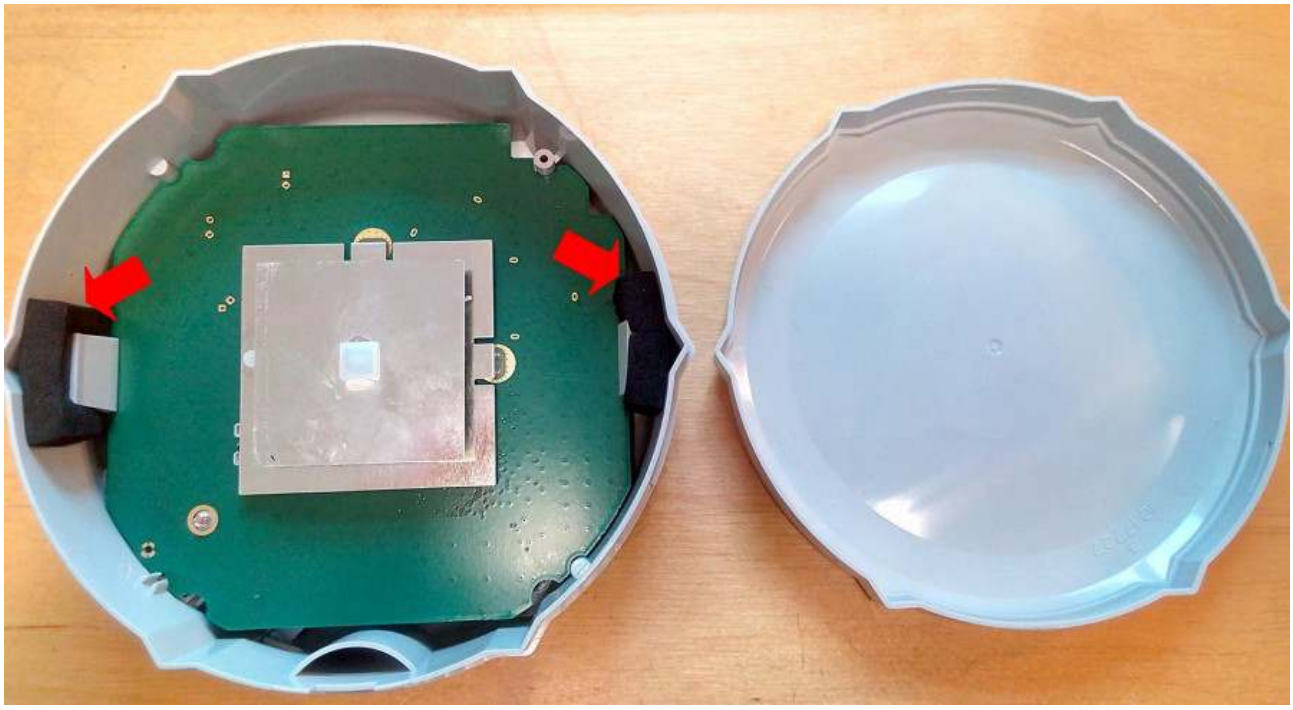


2. step

Rotate screwdriver and pull both case parts.

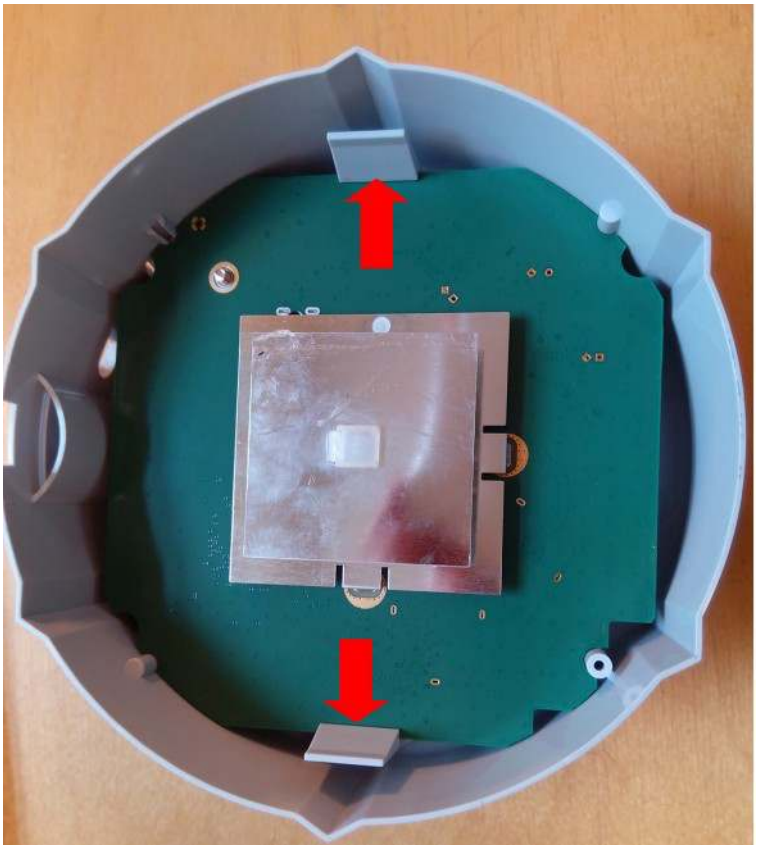
3. step

Remove rubber bushing



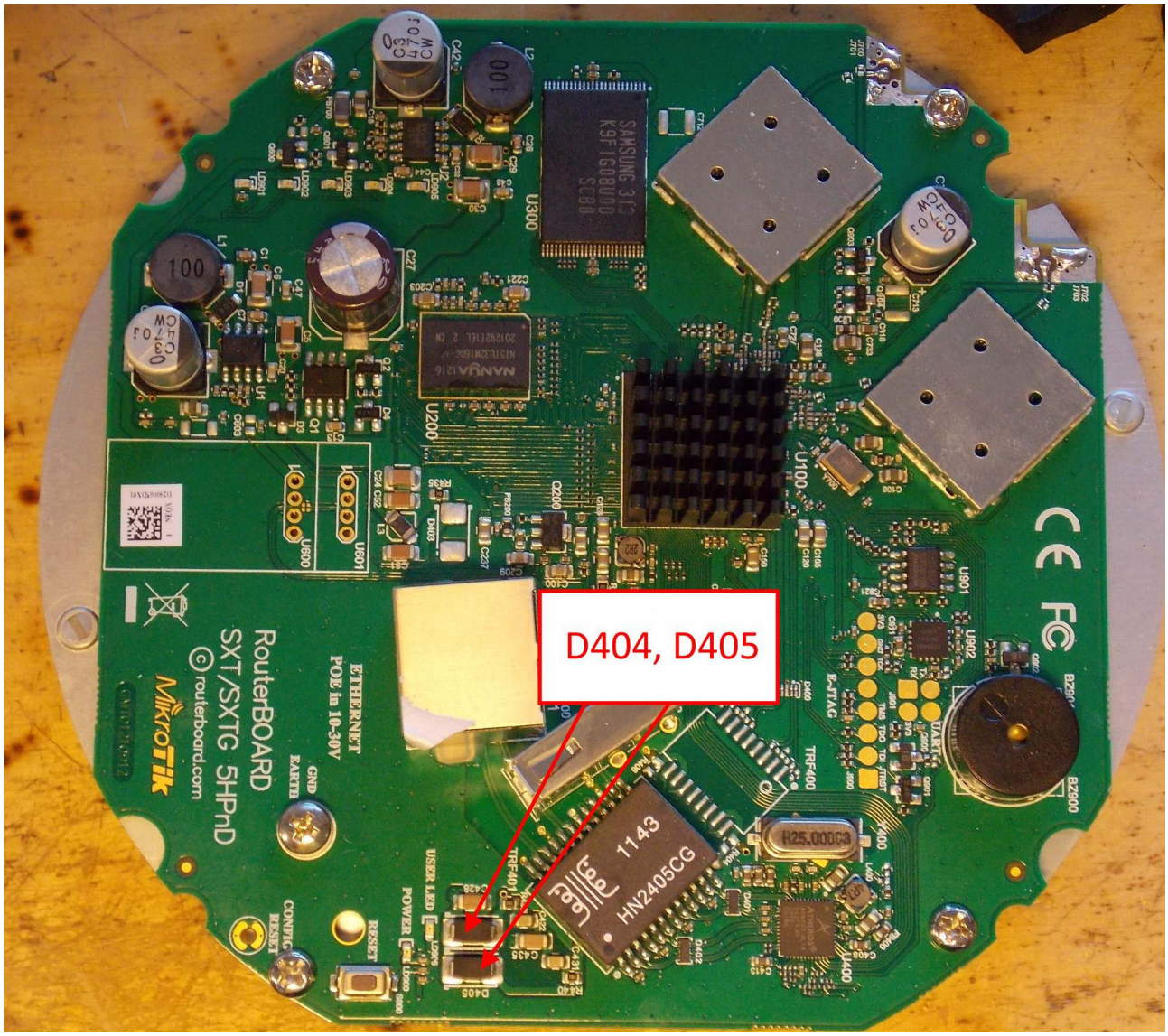
4. step

Push back Plastic PCB holders and take out the board.



Schottky diode measuring with multimeter in diode mode

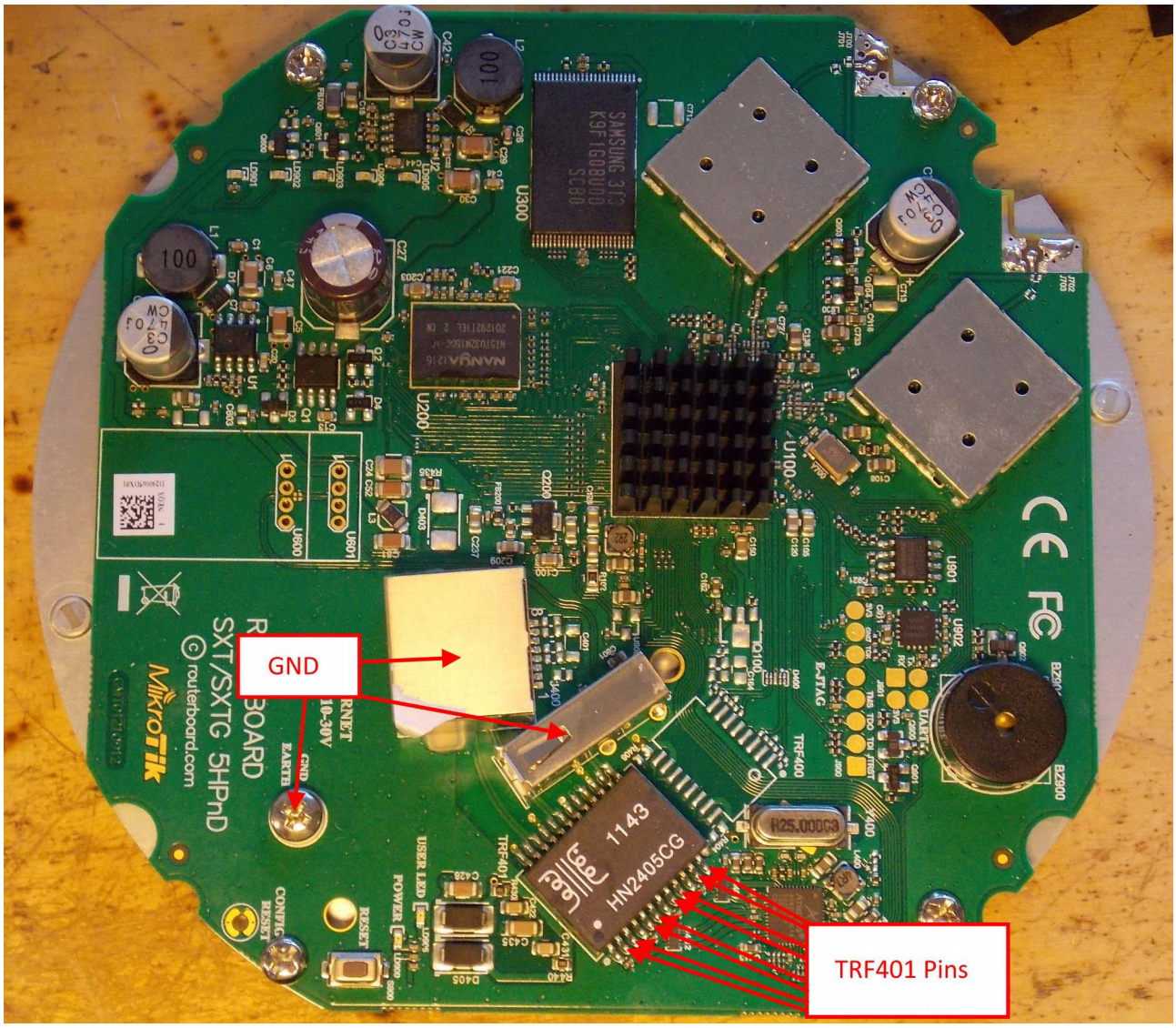
Schottky diode reference numbers are D404, D405 . Voltage drop value should be about 0,247V



Voltage drop between diode array pin#1 and Ground.

Check voltage drop between TRF401 Ethernet Transformers pins and Ground. Ether Pins are marked with red arrows.

It should be in the range from 0,32V to 0,48V



75R Termination resistors resistance.

Resistor resistance, marked with red arrow, should be 75 Ohm +/- 1%