

Testing method of RB Ethernet ports damaged by over voltage

Over voltage can be caused by following reasons: high voltage surge, lightning, electrostatics etc.
Testing procedures for over voltage damage.

You can check if routerboard was damaged by over voltage or not, by using following testing method.

1. Check Schottky diode measuring with multimeter in diode mode;
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 after that measure resistance of termination resistors.
Resistance value between Rx and Tx line must be 150 Ohm +/-2%.
If resistance value is smaller or higher then Tx/Rx line was damaged by high voltage surge.
Ethernet connector reference number of each routerboard you can find in the table 1.

Table 1

Routerboard type	Schottky diode reference number	Diode array reference number (voltage drop value, V)	Ethernet connector reference number
192	D6, D7	D2-D4; D17-D19; D21-D23 (0,25V-0,32V)	J6-J8; J13-J18
411, 411AH, 411AR, 411U, 411UR, 411UAHR	D801, D803	D601 (0,38V-0,49V)	J601
433, 433AH, 433UAH	D801, D802	D601, D602, D603 (0,38V-0,48V)	J601, J602, J603
450	D801, D802	D601-D605 (0,32V-0,42V)	J601-J605
711-2Hn, 711-2HnD, 711-5HnD	D4	D400 (0,32V-0,4V)	J400
711-5Hn, 711-5Hn-MMCX	D603	D401 (0,32V-0,4V)	J4

711A-5Hn-MMCX	D601, D603	D401 (0,32V-0,4V)	J4
711UA-5HnD	D2, D4	D400 (0,32V-0,4V)	J400
750	D2, D4	-----	J401 (check each Ethernet port)
751-2n	D400, D402	-----	J1
751U-2HnD	D2, D4	-----	J401
1000		D18-D25 (0,34V-0,4V)	J6-J9
Groove-5Hn, Groove-5HPn, Groove A-5Hn	D1702	-----	J1000
SXT-5D	D1903	D3 (0,42V-0,5V)	J1000
SXT-5HnD	D1903	-----	J1000

Additionally to this testing method on RB250G, RB435G, RB450G, RB493G, RB493GAH, RB600, RB711G-5HnD, RB711GA-5HnD, RB750G, RB750GL, RB751G-2HnD, RB800, RB1100, RB1100AH boards you should check diodes bridges and resistor resistance (see Table 2).

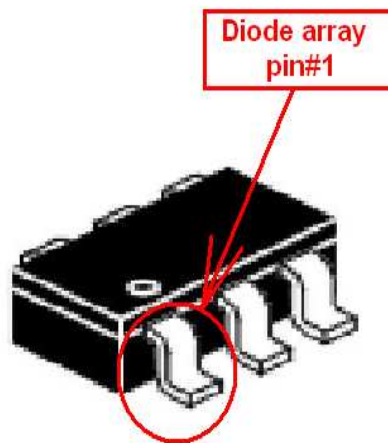
Table 2

Routerboard type	Schottky diode reference number	Diode bridge reference number	Diode array reference number (voltage drop, V)	Etherent connector reference number	Additional components
250GS	D3	D7, D8	-----	Check voltage drop between test points on the resistors and Ground (see picture 3 in the appendix). This voltage drop value should be in the range from 0,21V to 0,28V	Check resistors R10-R13 resistance. It should be 75 Ohm +/-1% (see picture 4 in the appendix)

435G	D109	D107, D108	D501-D504; D507, D508 (0,23V-0,3V)	J501, J502	If voltage drop between D507, D508 pin#1 less than 0,23V then Ethernet connector J504 was damaged by over voltage.
450G	-----	D805, D806	D501-D510 (0,21V-0,3V)	J501-J503; J505	If voltage drop between D507, D508 pin#1 less than 0,21V then Ethernet connector J504 was damaged by over voltage
493G, 493GAH	D1101	D1102, D1105	D601, D603, D605, D607, D609, D611, D614, D615, D618, D620, D801, D803, D805, D807, D809, D811, D815, D820 (0,21V-0,3V)	J601-J603; J605; J801-J803; J805 If voltage drop between D507, D508 pin#1 less than 0,21V then Ethernet connector J604 was damaged by over voltage.	Check resistors R669, R670, R672, R673 resistance (see picture 5 in the appendix). It should be 75Ohm +/-1%
600	-----	D902, D905	D401, D402, D701-DD704 (0,32V-0,4V)	J401, J702; If voltage drop between D701, D702 pin#1 less than 0,32V then Ethernet connector J701 was damaged by over voltage.	Check resistors R703-R706 resistance. It should be 75Ohm +/-1% (see picture 6 in the appendix).
711G-5HnD, 711GA-5HnD	D2	D4, D9	D100, D101 (0,31V-0,38V)	-----	Check resistors R111-R114 resistance. It should be 75Ohm +/-1%
750G	D802	D805, D806	-----	Check voltage drop between test points and Ground (see picture 7 in the appendix). This value should be in the range from 0,22V to 0,28V	Check resistors R563-R566 resistance (see picture 8 in the appendix). It should be 75Ohm +/-1%

750GL	D2	D4, D9	-----	Check voltage drop between transformer TRF100 pins and Ground. (see picture 9 in the appendix). This value should be in the range from 0,32V to 0,38V	Check resistors R104-R107 resistance. It should be 750hm +/-1%
751G-2HnD	D2	D4, D9	-----	Check voltage drop between transformer TRF100 pins and Ground. Measurement method is the same as RB750GL. Voltage drop value should be in the range from 0,35V to 0,4V	Check resistors R104-R107 resistance (see picture 10 in the appendix). It should be 750hm +/-1%
800		D17, D21	D1, D3, D5, D8, D9, D11 (0,28V-0,38V)	J11, J13 If voltage drop between D5, D8 pin#1 and Ground less than 0,28V then Ethernet connector J12 was damaged by over voltage.	Check resistors R152-R155 resistance (see picture 11 in the appendix). It should be 750hm +/-1%.
1100, 1100AH	D1101	D1102, D1105	D501, D503, D601, D603, D605, D607 (0,30V-0,35V) D701, D703, D705, D707, D709, D711, D713, D715, D717, D719, D901, D904, D905, D907, D909, D911, D913, D915, D917, D919 (0,20V-0,28V)	J901-J905; J701-J705 If voltage drop between D501, D503, D601, D603, D605, D607 pin#1 and Ground less than 0,30V then Ethernet PHY U501, U601, U602 was damaged by over voltage.	

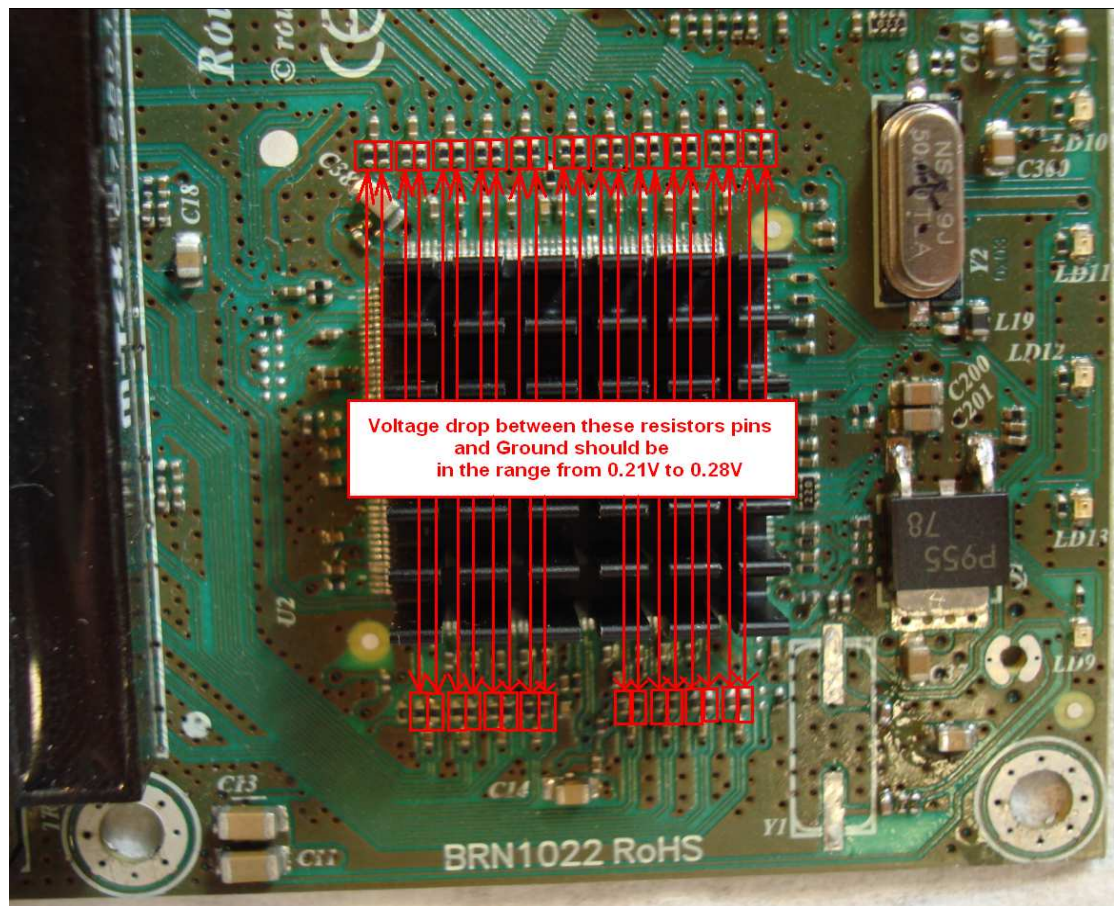
APPENDIX



Picture 1



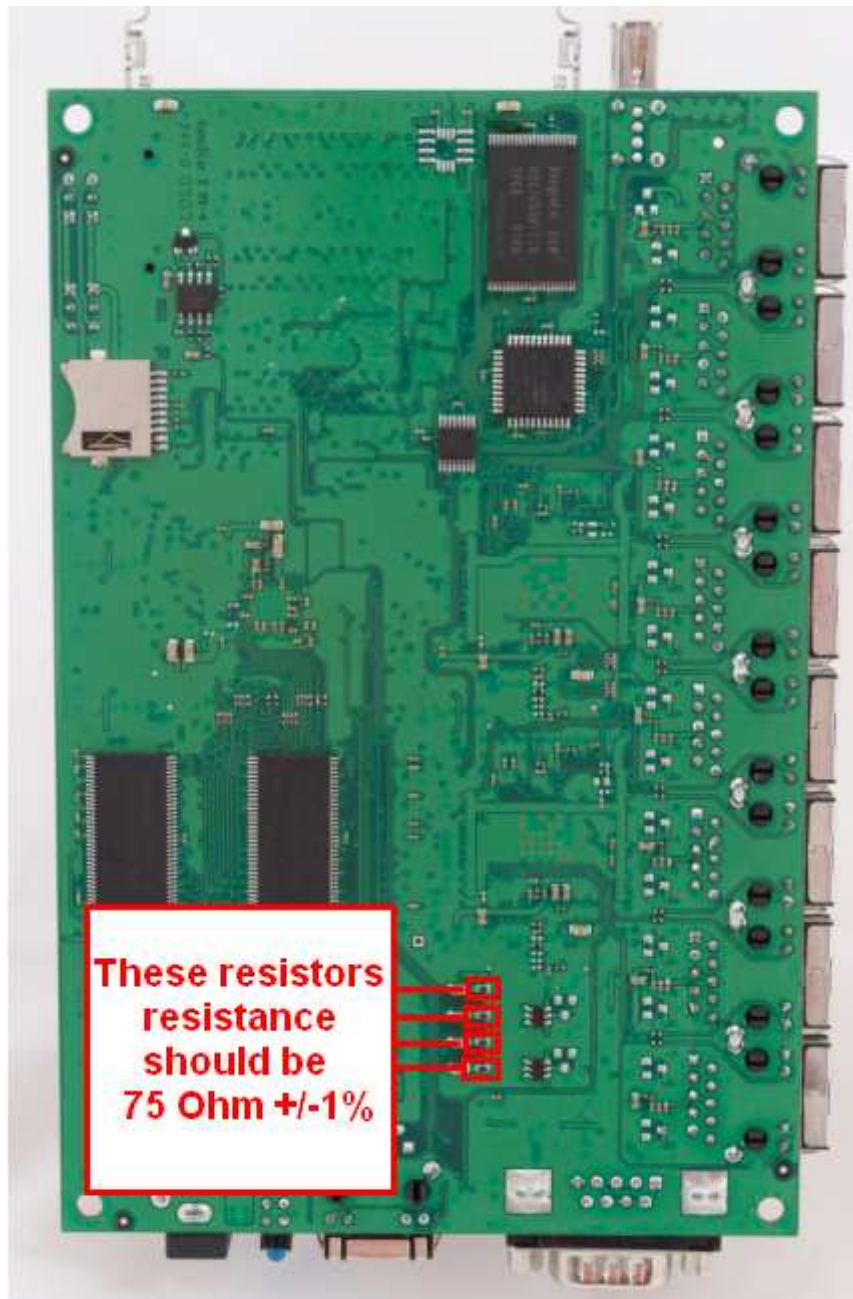
Picture 2



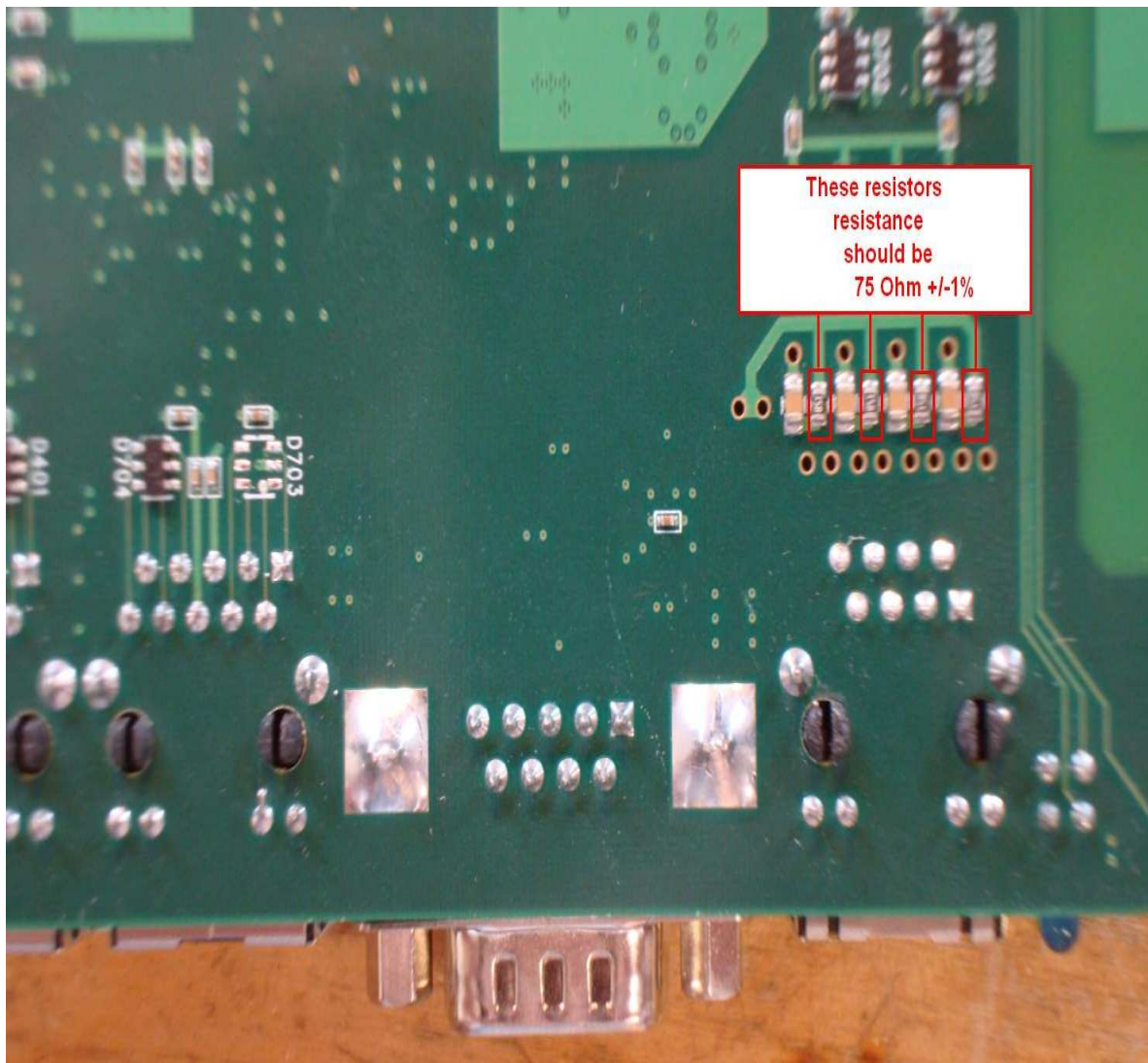
Picture 3



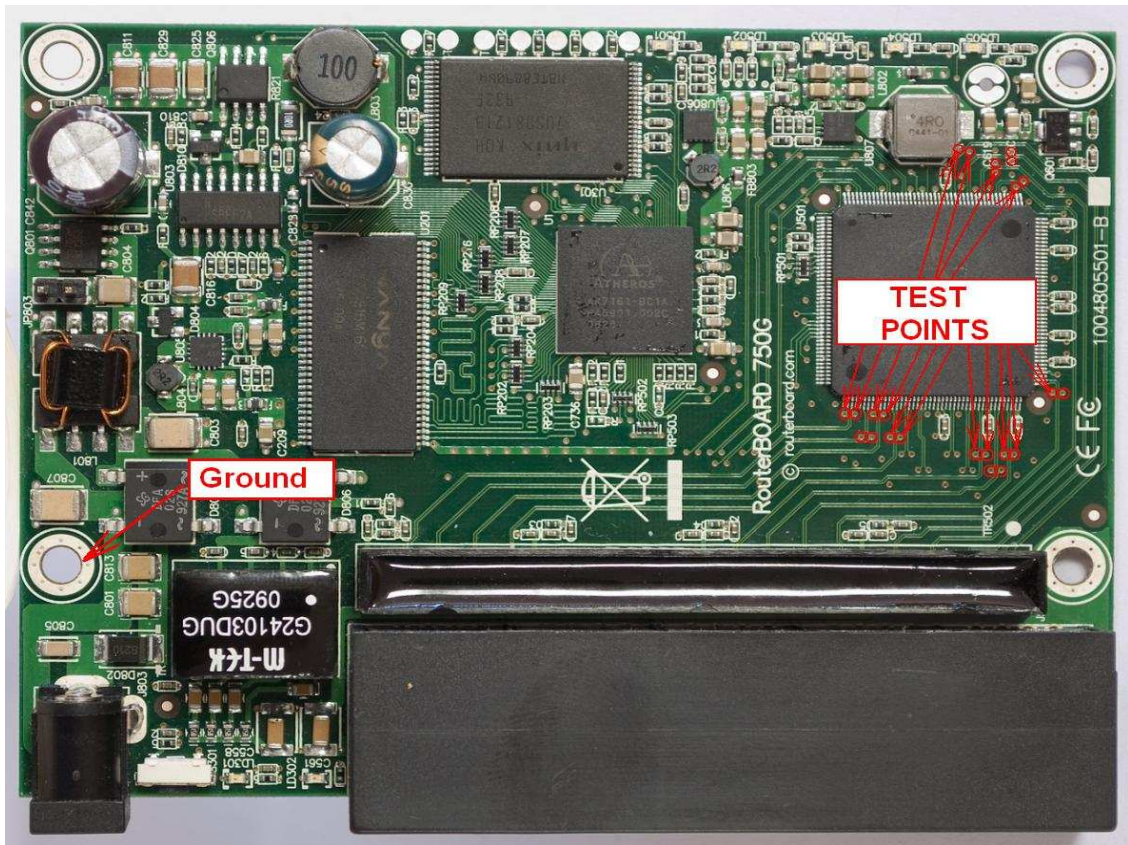
Picture 4



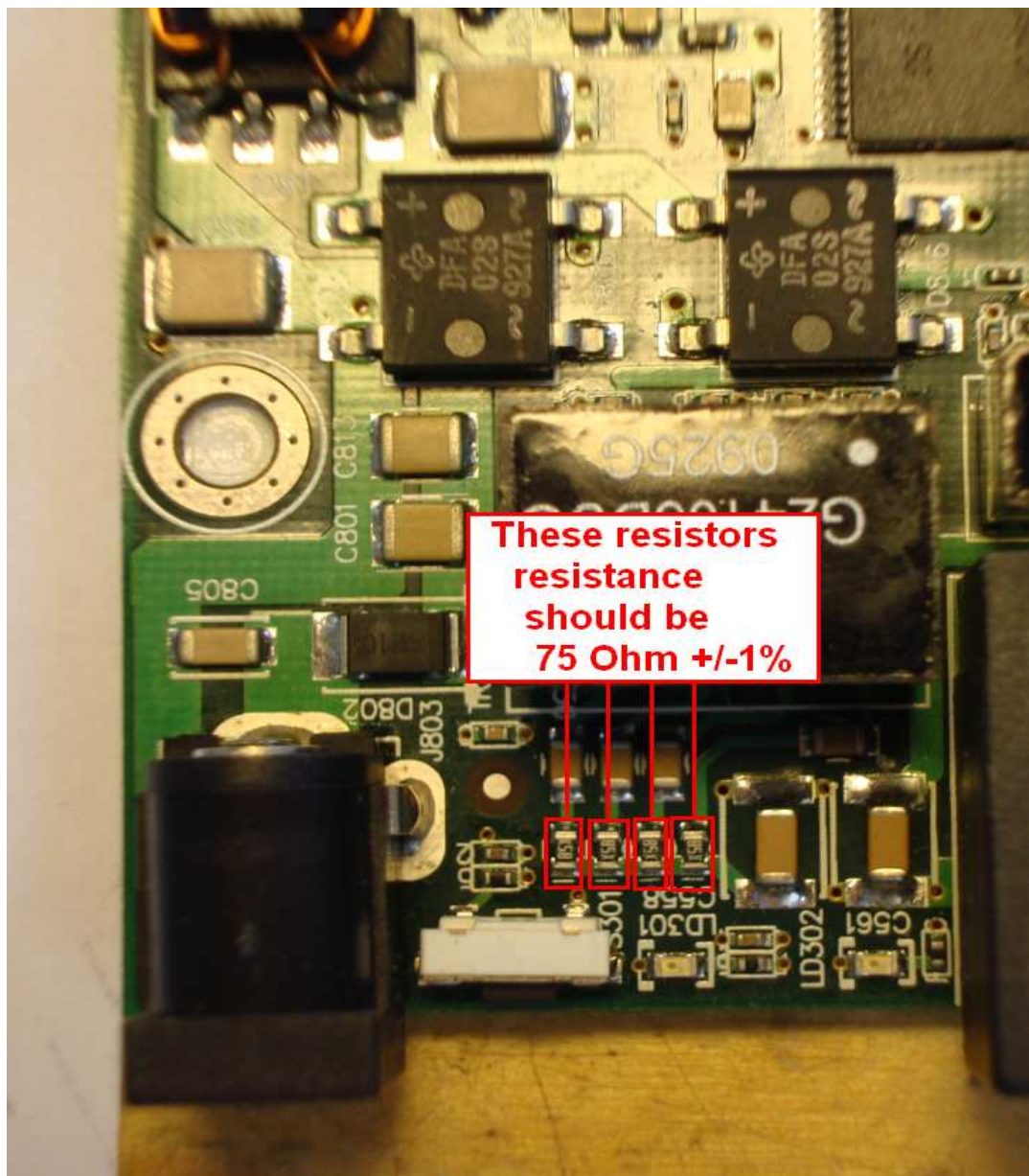
Picture 5



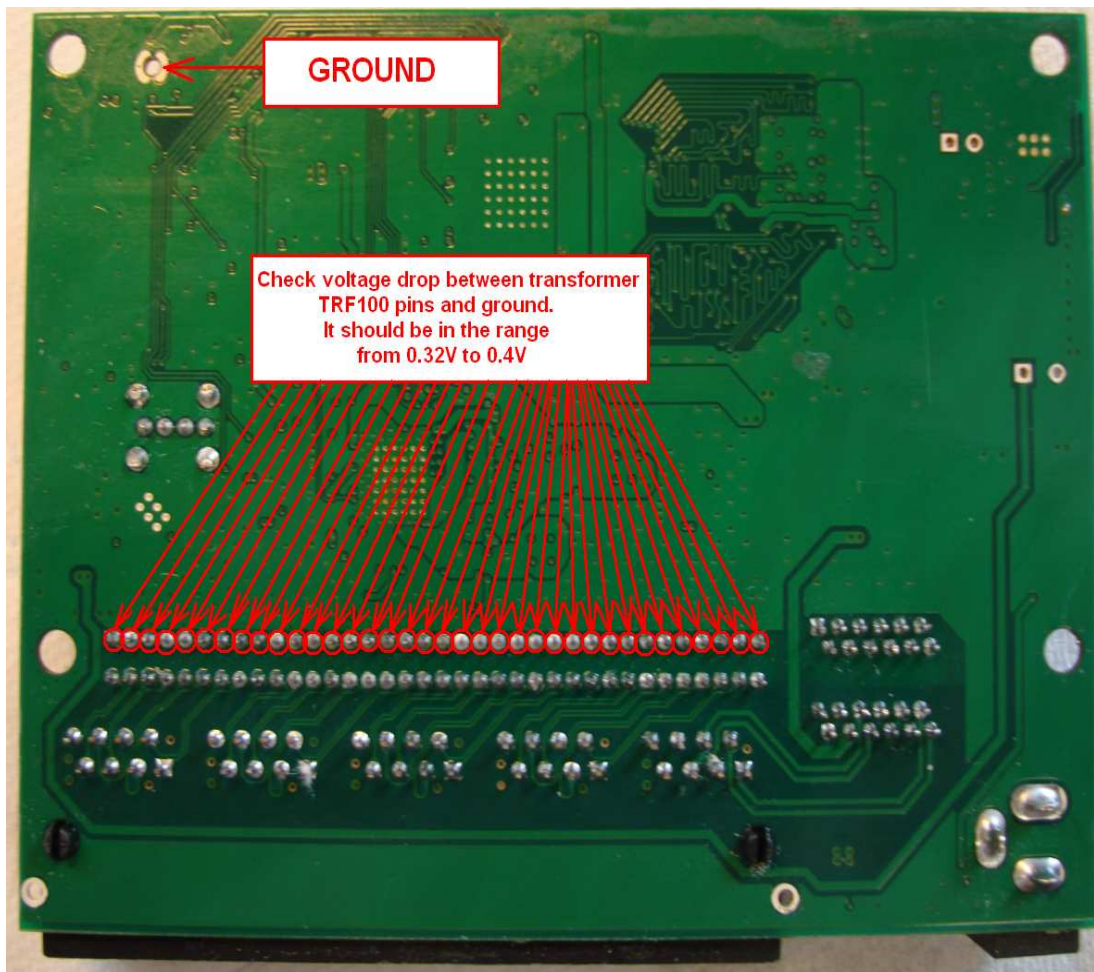
Picture 6



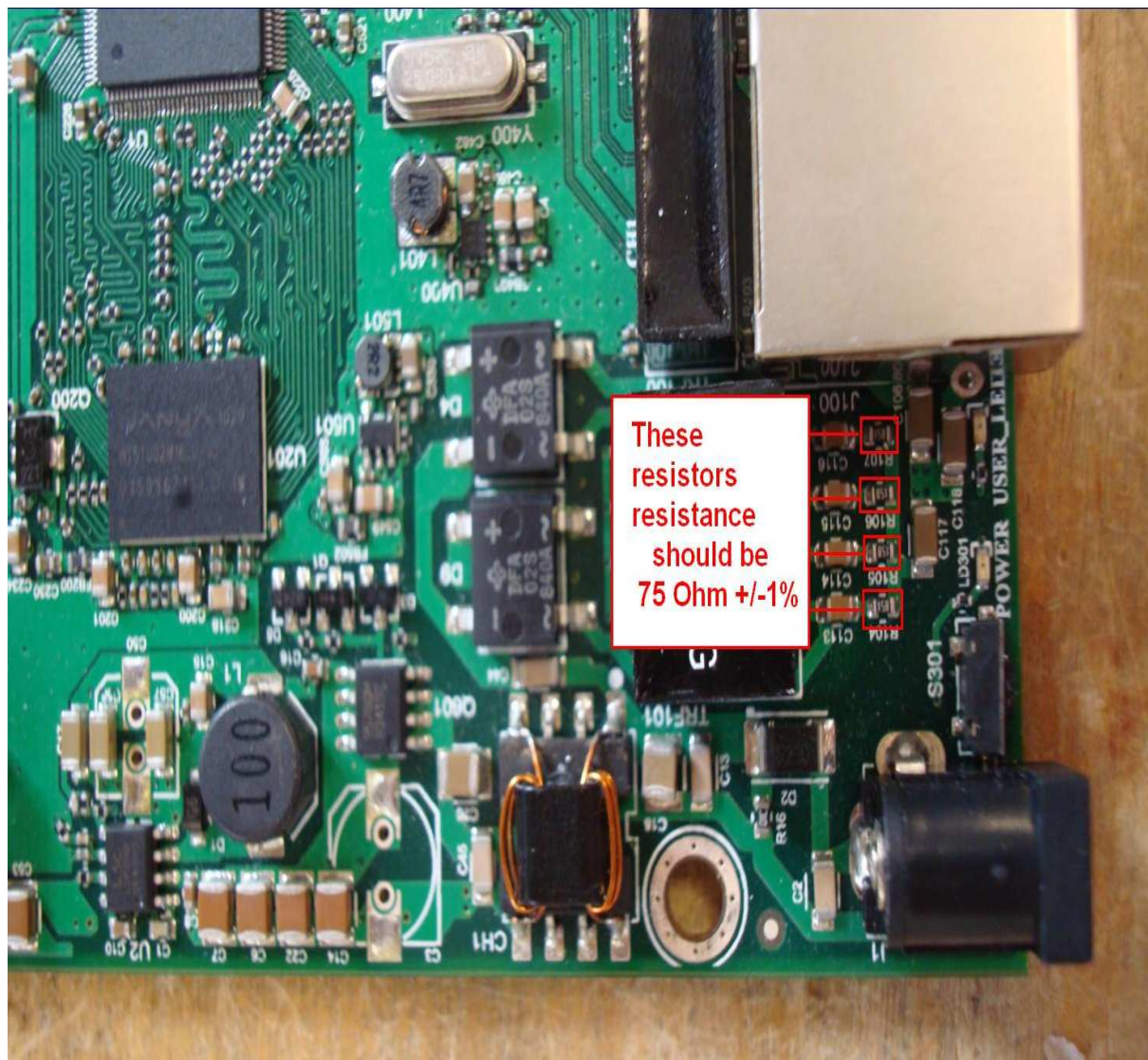
Picture 7



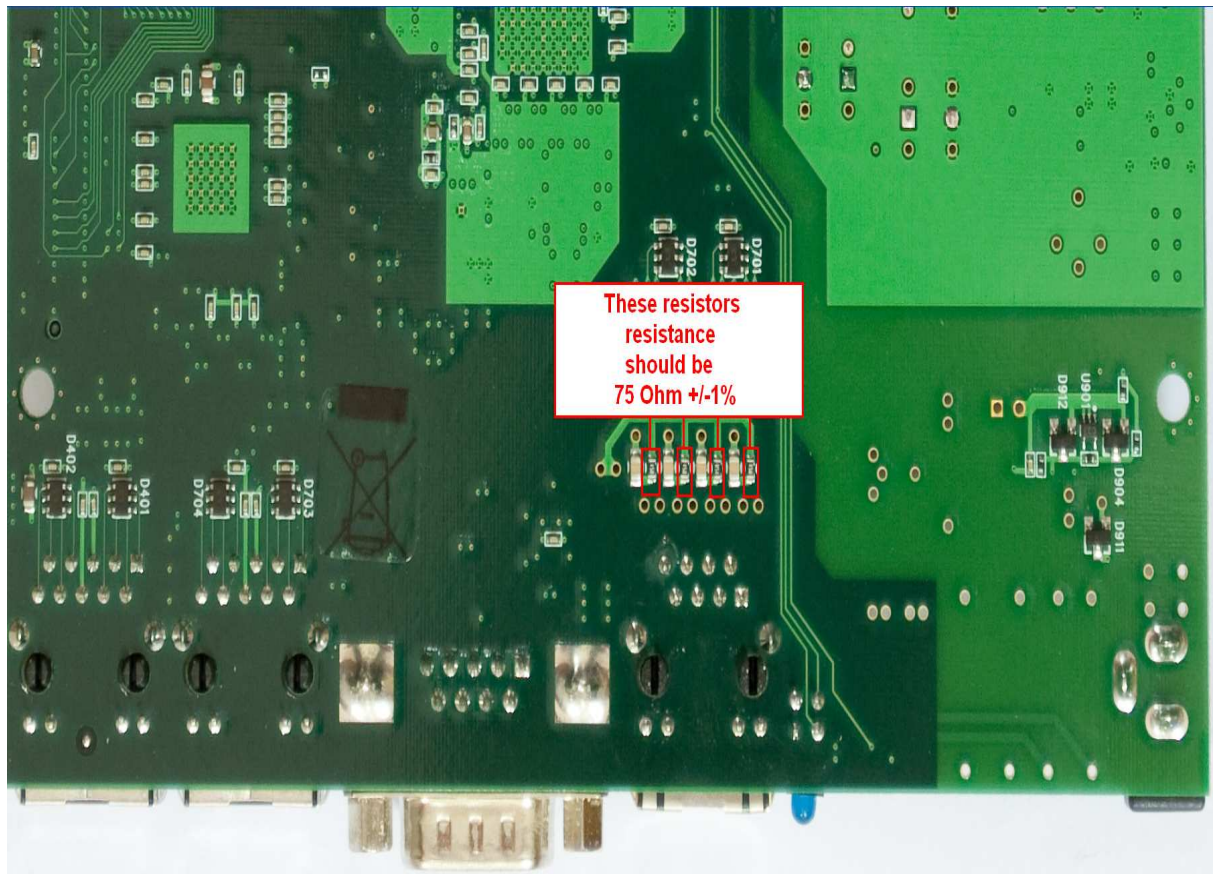
Picture 8



Picture 9



Picture 10



Picture 11