E4990A-09A

Information Only
Internal Only Document
Service Note

Supersedes:
E4990A-09

E4990A – Impedance Analyzer, 20 Hz to 10/20/30/50/120 MHz

Serial Numbers: ALL
Manufacturing ID Number: NA

E4990A A5 TRD module failure – EOS (Electrical Overstress) identification and recommended handling by Service Center

Parts Required:

None

ADMINISTRATIVE INFORMATION

X Calibration Required	PRODUCT LINE: WN
[[]] Calibration NOT Required	AUTHOR: KW

ADDITIONAL INFORMATION:

KEYSIGHT TECHNOLOGIES

Situation:

To prevent failure, do not apply dc voltage or current to the UNKNOWN terminal. Be sure to connect the DUT to the UNKNOWN terminal (or test fixture) only after discharging them sufficiently.
The datasheet, web help, and front panel of the E4990A have caution about that.

However, in case of connecting the charged device (customer's abuse), it's possible that the E4990A is damaged due to excessive input dc voltage or current caused by the charged device.

Solution/Action:

Shown would be the criteria in distinguishing the failure caused by the charged device from other failure modes.

Criteria

1. Cp value of Hpot connector is over 700 pF at frequencies lower than 2 kHz. (If you have an impedance analyzer (E4990A-120/4294A) with 42941A, you can check it easily.)

   Note: Normally, the Cp value of Hpot is about 80 pF. However, the Cp value of Hpot is changed to 700 pF or more when the U45 on the A5 TRD module is burnt due to the charged device (customer's abuse).

2. DC resistance value of U45 (between pin 3 and pin 4) on the A5 TRD module is lower than 1 kΩ. (If you do not have an impedance analyzer (E4990A-120/4294A) with 42941A, you can check it by measuring the resistance value of U45 directly.)

   Note: Normally, the resistance value of the U45 (between pin 3 and pin 4) is about 4 MΩ. However, it is change to 1kΩ or lower when the U45 is burnt due to the charged device (customer's abuse).

1. How to check the Cp value of Hpot

1-1. Set customer's defective E4990A as follows;

[Preset]
[Center] – 2 - 0 - [x1]
[Span] – 0 – [x1]

1-2. Connect an impedance analyzer (E4990A-120/4294A) with 42941A to the Hpot connector of the UNKNOWN terminal of customer's defective E4990A, then measure the Cp value of the Hpot (between the center conductor and outer conductor of Hpot).

In the case of using E4990A-120 + 42941A (if you have E4990A-120 and 42941A);
1-2-1. Connect the 42941A to the E4990A.
1-2-2. Set the E4990A as follows;

[Preset]
[Start] – 2 – [k/m], [Stop] – 2- 0 – [M/u]

[Sweep Setup] – Sweep Type – Log Freq
[Cal] – Adapter – 42941A
[Meas] – Trace 1&2 – Cp-Rp

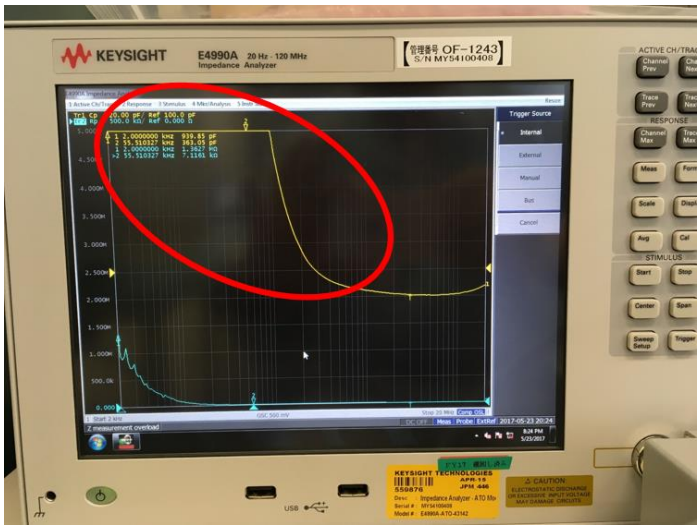
Click Tr1, [Scale] – Scale/Div – 0 - . – 0 – 2 – [G/n]
[Scale] – Reference Y Value – 0 - . – 1 – [G/n]

Click Tr2, [Scale] – Scale/Div – 5 – 0 – 0 - 0 - 0 – 0 – [x1]
[Scale] – Reference Position – 0 – [x1]
[Scale] – Reference Y Value – 0 – [x1]

1-3. Connect SMA(m) -BNC (m) adapter to the 3.5mm port of the 42941A.
1-4. Connect BNC (m) of adapter to the Hpot of UNKNOWN terminal of the defective E4990A.
1-5. Measure the Cp value of the Hpot..

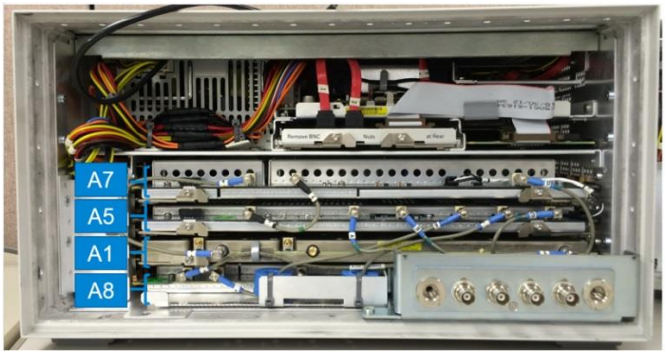
Good (no abuse)
Cp values are about 80 pF (within 50 pF – 120 pF) at all frequencies

NG (Damaged by the charged device (customer's abuse))
Cp values are over 700 pF at frequencies lower than 2 kHz



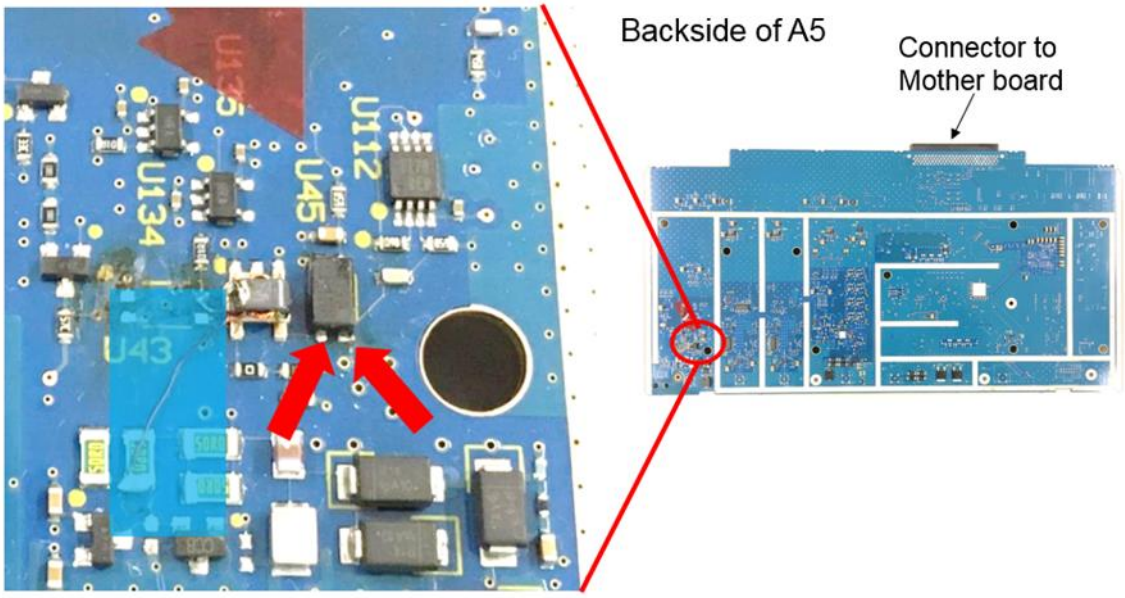
2. How to check the DC resistance value of U45

2-1. Remove the A5 TRD module from the defective E4990A. The location of A5 is shown in the figure below.



2-2. Remove the shield of A5.

2-3. Measure the DC resistance value of U45 (between Pin 3 and Pin 4) using a digital multimeter. The location of the U45 and Pin3-4 are shown in the figure below.



Good (no abuse)
DC resistance value is about 4 MΩ

NG (Damaged by the charged device (customer's abuse))
DC resistance value is lower than 1 kΩ

Action required:
If Criteria 1 is NG [the Cp values of Hpot connector are over 700 pF at frequencies lower than 2 kHz] or Criteria 2 is NG [DC resistance value of U45 (between pin 3 and pin 4) on the A5 TRD module is lower than 1 kΩ] , this would be clear evidence that the failure is due to excessive input dc voltage or current caused by the charged device (customer's abuse). Charge the service center repair cost to customer.

Revision History:

Date	Service Note Revision	Author	Reason for Change
28 Jun 2017	E4990A-09	KW	As Published
7 Aug 2017	E4990A-09A	KW	Add criteria about the resistance value of U45 and how to check it.