

APLAC T061: The Proficiency Testing Program on Electromagnetic Interference

Office of Proficiency Testing Program, VLAC

EUT (Equipment under Test) as an Artifact

EUT (testing sample) is circulated to the participating laboratories as an artifact for this program. The EUT is an impulsive noise generator (comb generator); Model PTE-2 (Serial No. 004).

It can be operated by AC mains voltage from 100V to 240V. For this proficiency testing program, operating voltage of the EUT is specified to AC 100V \pm 3V.

Also for the measurement of radiated disturbances, a VHF-LISN will be supplied by VLAC to stabilize the impedance between the line and ground of AC mains at the testing site. A VHF-LISN will be circulated together with the EUT.

AC cord of the EUT is equipped with type A plug.

Test items

Items to be measured by program participants using their own measuring facilities and instruments: are as follows.

- Radiated electromagnetic interference field strength at 3m distance
- Mains port conducted interference voltage using AMN

Measuring Frequencies

- Measuring frequencies specified for the Radiated EMI
30MHz ~ 300MHz : 45.4MHz, 60.5MHz, 75.6MHz, 105.9MHz, 151.3MHz and 212.0MHz
300MHz ~ 1GHz : 317.3MHz, 453.4MHz, 740.7MHz and 981.8MHz
Record the readings of maximum field strength at each specified frequency \pm 1%
- Measuring frequencies specified for the Mains port conducted EMI
370kHz, 740kHz, 1.5MHz, 3.7MHz, 7.4MHz and 15.1MHz
Record the reading of maximum voltage at each specified frequency \pm 3%

Testing method

Conditions other than specified hereunder shall be in conformance with those specified in CISPR22.

Measurement of radiated EMI (Electromagnetic field strength at 3m separation distance)

- EUT
Model PTE-2 (Serial No. 004) combined with VHF-LISN
- Measurement procedure
Supply AC100V power to the EUT. Set power voltage to 100V \pm 3V.
Record readings of maximum field strength of horizontal polarization and vertical polarization at each frequency while rotating the EUT 360 degrees and moving the receiving antenna height in the range of 1 – 4m.

Note 1: Turn the power switch ON for the EUT after adjusting power voltage to AC100V \pm 3V

Note 2: Do not start the measurement in 30 minutes or so after the EUT power switch is turned ON

- Orientation of the EUT and testing arrangement
Place the EUT on the EUT stand as indicated in pictures 1 and 2. Then put the loaded stand on the center of EUT table of 80cm in height to be used for the measurement of EMI by the subject laboratory. At the time of horizontal polarization measurement, set the EUT horizontally with the side displayed a model number upward. At the time of vertical polarization measurement, set the EUT vertically with the side displayed the model number on toward the receiver. Make sure the model number is not upside down. The EUT stand shall be placed on the EUT table in such a way that the side of the stand parallels the EUT table and the length of EUT power cable becomes 50cm between the EUT and the edge of the table from which the power cable dangles downward toward ground reference plane as indicated in Figure 1. (If the width of the EUT table is 1m, the EUT is put in the center point). Connect the power plug to VHF-LISN which is connected to 100V power outlet nearby. Excess length of power cable shall be laid on the ground plane. Distance between the EUT and receiving antenna shall be set based on CISPR22 standard.

Note 3: Place VHF-LISN with the bottom plane down on the turntable electrically connected to the ground reference plane. If the surface of the turntable is electrically insulated from the body of the turntable, put VHF-LISN on a metal plane of bigger than 30cm square and secure grounding to the turntable using the metal plane.

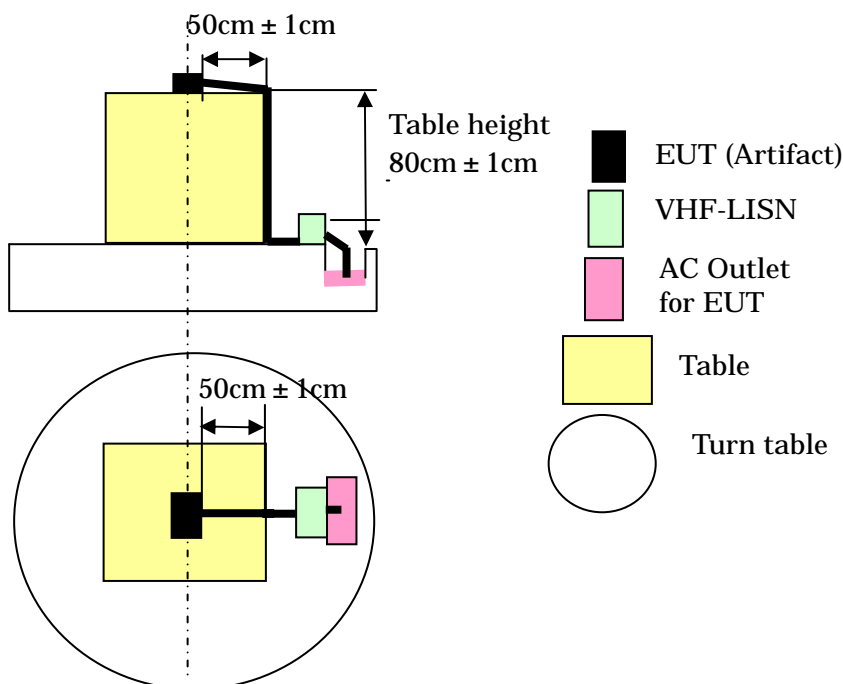
Test arrangement:



Picture 1: Horizontal polarization



Picture 2: Vertical polarization



Measurement of mains port conducted EMI

- EUT
 - Model PTE-2 (Serial No. 004)
- Measurement procedure

Supply AC100V power to the EUT via Artificial Mains Network (AMN) equipped with in the test site. Set power voltage to $100V \pm 3V$. Measure disturbance voltage at the specified frequency points although the frequency will be slightly fluctuated with the voltage change of power supply. **VHF-LISN attached to VPT-R is not used for the conducted disturbance voltage measurement.**

Record the higher value of Line1 and Line2 readings at each frequency point measured with AMN.

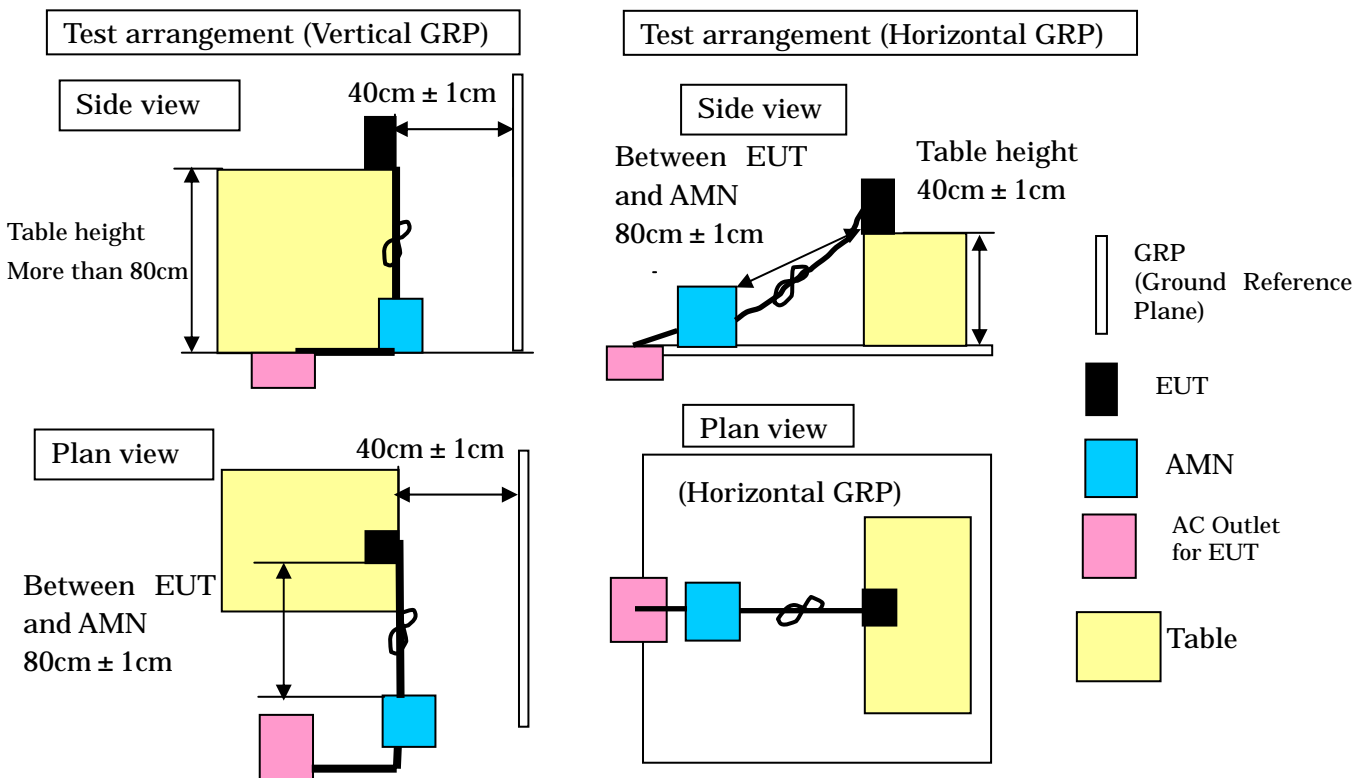
Note 1: Turn the power switch ON for the EUT after adjusting power voltage to $AC100V \pm 3V$

Note 2: Do not start the measurement in 30 minutes or so after the EUT power switch is turned ON
- Orientation of the EUT and testing arrangement

In the case of measurement based on vertical reference plane, place the EUT vertically on the EUT stand as indicated in Picture 2. Put the loaded stand on the edge of EUT table of 80cm in height and move the EUT table so the side of EUT is 40cm away from the vertical reference plane as indicated in the left schematic of Figure 2.

In the case of measurement based on horizontal reference plane, place the EUT vertically on the EUT stand as indicated in Picture 2. Put the loaded stand on the EUT table of 40cm in height as indicated in the right schematic of Figure 2. Describe the arrangement in the attached data sheet.

Connect the power cable of the EUT to the AMN placed 80cm away from the EUT. Power cable shall be bundled in the middle so the total length becomes 1m.



Reporting on test results

(1) Measurement of radiated EMI (3 m)

Fill out cells of the data sheet (3 – 1 of Annex 3) with vertical and horizontal polarization readings at each frequency of 45.4MHz, 60.5MHz, 75.6MHz, 105.9MHz, 151.3MHz, 212.0MHz, 317.3MHz, 453.4MHz, 740.7MHz and 981.8MHz.

If the laboratory has uncertainty of measuring facilities and instruments calculated, please write the value of extended uncertainty in the report.

(2) Measurement of mains port conducted EMI

Fill out cells of the data sheet (3 – 2 of Annex 3) with readings at each frequency of 370kHz, 740kHz, 1.5MHz, 3.7MHz, 7.4MHz and 15.1MHz.

If the laboratory has uncertainty of measuring facilities and instruments calculated, please write the value of extended uncertainty in the report.

Statistical treatment of test results

We will statistically process test results based on ISO 15328 Robust Method. Our evaluation will be on z score in principle and additionally we will extend the evaluation of deviation from median value or the center value of a data group.

VLAC will provide participating laboratories with measurement Data Sheets (Appendix 3) for result collection. All participating laboratories are required to return the completed data sheets to their parent Accreditation Body who will then forward the collected data sheets to VLAC within two weeks after the completion of the test in the group. Late return of result sheets without justifiable reasons may be rejected and the corresponding data will not be included in the analysis.

Once all results are received, VLAC will check the data and create an interim report with them tabulated in a well-formatted table. Then VLAC will send out the report to all participating Accreditation Bodies who are then kindly requested to forward the same to the participating laboratories. Test participants are supposed to send confirmation or any clarification or correction of results to VLAC via the accreditation body within 2 weeks after receipt of the interim report.

Upon confirmations of data received from all participants, VLAC will prepare a draft report by applying z-score approach using robust median to the test data followed by statistical analysis carried out to the deviation from the center value or median value of data group. VLAC will then send the draft report to APLAC Proficiency Testing Committee for their review and comment before its general publication and distribution to participating laboratories via their parent accreditation bodies.