



EMC-100

EMI Training System



* Notebook is excluded

The features of EMC-100 contain two parts: one is the measurement instrument which is equipped with function of measuring electromagnetic interference (EMI), including conductivity of electromagnetic interference and radiated electromagnetic interference. It can provide products electromagnetic interference verification before an inspection. The other part is the training modules which allow students to implement the experiments easily and learn the basic concepts of electromagnetic interference and suppression countermeasure. Beginners are able to learn electromagnetic interference theories, measurement and suppression techniques as being an EMC engineer.

► Features of the hardware and the software

Hardware:

Built in measurement instrument with a line impedance stabilization network, a spectrum analyzer, and a preamplifier provides products electromagnetic interference verification before a preliminary inspection. It's small and portable.

Software:

1. Professional laboratory standard measurement software with powerful analysis software.
2. Measurement software provides one-shot scan frequency axis displayed in LOG/LIN between 9KHz~30MHz.
3. Peak (PK), Quasi-Peak (QP), Average (Ave) measurement conforming to CISPR 16-1 standard.
4. Spectrum analyzer mode. The peak (PK) measurement performs rapid-scanning. It allows users to make a preliminary inspection and analysis on products electromagnetic interference.
5. Inspection value can be defined by users, and the data storage capacity can be unlimitedly achieved under PC based mode.

► Features of suppression components

1. Experimental modules are designed for learning electromagnetic interference and suppression countermeasure. More than 50 pieces of suppression components are offered, and hundreds of suppression experimental modes are introduced in the manual.
2. The suppression components are developed by the experience integration of electromagnetic compatibility engineers. Users can easily learn how to use different suppression components to suppress electromagnetic interference.
3. Plug-in suppression components with error-proofing are expandable, easy maintenance and modification.
4. Comes with transparent case for clear view of suppression components.

EMC-100 contains the measurement instrument (EMC-11001) for providing the electromagnetic interference conductivity, and different experimental modules for supporting the various radiated experimental courses.

► Specifications

► EMI Measurement instrument (EMC-11001)

1. Input / Output

- | | |
|-----------------------------|----------------------------|
| (1) Input voltage | : AC 100V~240V (50Hz/60Hz) |
| (2) Output voltage | : AC 100V~240V (50Hz/60Hz) |
| (3) Communication interface | : USB |

2. Line impedance stabilization network (LISN)

- | | |
|---|---|
| (1) Frequency range | : 9KHz to 30MHz |
| (2) Characteristic impedance | : (50 μ H+5 Ω) // 50 Ω |
| (3) Phase | : Single-phase |
| (4) Rated current | : 2 \times 16A |
| (5) Maximum AC voltage | : 250Vrms |
| (6) Power frequency | : DC-63Hz |
| (7) With function of artificial simulative hand | |

3. Spectrum analyzer

Frequency specifications

- | | |
|--------------------------|------------------------|
| (1) Frequency range | : 9KHz~1GHz |
| (2) Counter accuracy | : 1Hz + timebase error |
| (3) Frequency resolution | : \leq 100KHz |
| (4) Bandwidth resolution | : 10Hz ~1MHz |

Amplitude specifications

- | | |
|---------------------------------|--|
| (1) Measurement range | : +10dBm to Displayed Average Noise Level (DANL) |
| (2) Noise level average display | : -144 dBm/Hz at 1 GHz |
| (3) Maximum DC voltage | : \pm 0.2VDC |

Modulation analysis

- | | |
|-----------------------------------|--|
| (1) Frequency range | : 150KHz ~300MHz |
| (2) Frequency modulation accuracy | : \pm 1% (typical) |
| (3) Amplitude modulation accuracy | : \pm 1% (typical) |
| (4) Operating temperature | : 0 $^{\circ}$ C~ +70 $^{\circ}$ C(standard) |

4. Preamplifier specifications

- | | |
|---------------------|------------------|
| (1) Frequency range | : 500KHz ~ 1 GHz |
| (2) Gain | : 20 dB |



► EMI Experiment module specifications

1. EMC-13001 Conducted Experiment
 - (1) Input voltage : AC 100V~240V (50Hz/60Hz)
 - (2) Producing conduction noise
 - (3) With filter suppression circuit
 - (4) With pluggable suppression components
2. EMC-14001 Radiated Power Supply
 - (1) Input voltage : AC 100V~240V (50Hz/60Hz)
 - (2) Output voltage : DC 12V
 - (3) Output current : 1A
3. EMC-14002 Radiated Case 1
 - (1) Input voltage : DC 12V
 - (2) Producing radiated harmonic noise
 - (3) With π -type filter suppression circuit
 - (4) With pluggable suppression components
 - (5) Circuit board wiring pattern :
Horizontal wiring without laying copper
4. EMC-14003 Radiated Case 2
 - (1) Input voltage : DC 12V
 - (2) Producing radiated harmonic noise
 - (3) With π -type filter suppression circuit
 - (4) With pluggable suppression components
 - (5) Circuit board wiring pattern :
Vertical orthogonal wiring without laying copper
5. EMC-14004 Radiated Case 3
 - (1) Input voltage : DC 12V
 - (2) Producing radiated harmonic noise
 - (3) With π -type filter suppression circuit
 - (4) With pluggable suppression components
 - (5) Circuit board wiring pattern :
Shorted to ground with laying copper
6. EMC-14005 Radiated Case 4
 - (1) Input voltage : DC 12V
 - (2) Producing radiated harmonic noise
 - (3) With π -type filter suppression circuit
 - (4) With pluggable suppression components
 - (5) Circuit board wiring pattern :
Simulate two different substrates

► Experiment modules

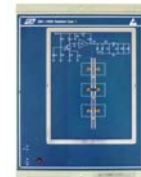
- EMC-13001 Conducted experiment
- EMC-14001 Radiated power supply
- EMC-14002 Radiated Case 1
- EMC-14003 Radiated Case 2
- EMC-14004 Radiated Case 3
- EMC-14005 Radiated Case 4



EMC-13001



EMC-14001



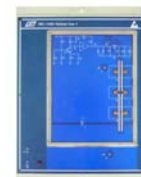
EMC-14002



EMC-14003

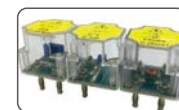


EMC-14004



EMC-14005

► Suppression Components



► List of Experiments

1. **The source of waveform for conducted electromagnetic interference**
 - 2-1 No Load conduction interference source.....EMC-13001
 - 2-2 Load conduction interference sourceEMC-13001
2. **Power supply filtering experiment of conducted electromagnetic interference**
 - 3-1 LC Filter circuit.....EMC-13001
 - 3-2 First order filter circuitEMC-13001
 - 3-3 Second order filter circuitEMC-13001
3. **Ground experiment of conducted electromagnetic interference**
 - A. Filter components without connecting to power grounding experiment
 - 4-1 N-phase conduction measurement.....EMC-13001
 - 4-2 L-phase conduction measurementEMC-13001
 - 4-3 First order filter circuitEMC-13001
 - 4-4 Second order filter circuit.....EMC-13001
 - B. Secondary side and power grounding experiment
 - 4-5 N-phase conduction measurement of secondary side grounding experiment.....EMC-13001
 - 4-6 L-phase conduction measurement of secondary side grounding experimentEMC-13001
 - 4-7 First order filter circuit of secondary side grounding experiment.....EMC-13001
 - 4-8 Second order filter circuit of secondary side grounding experimentEMC-13001



4. Optimization experiment of conducted electromagnetic interference

- 5-1 Filter components choice and filter circuit combinationEMC-13001
- 5-2 First order filter circuitEMC-13001
- 5-3 Typical first order filter circuitEMC-13001
- 5-4 Second order filter circuit.....EMC-13001

5. The source of waveform for radiated electromagnetic interference

- 6-1 Interference source experiment of searching for environment and measurement instrument
- 6-2 Searching for radiated interference source using without laying copper and horizontal wiring circuit moduleEMC-14002
- 6-3 Searching for radiated interference source using without laying copper and vertical wiring circuit moduleEMC-14003
- 6-4 Searching for radiated interference source using with laying copper circuit moduleEMC-14004
- 6-5 Searching for radiated interference source using circuit module of two different substrates simulation...EMC-14005

6. Suppression components experiment of radiated electromagnetic interference

- 7-1 Radiated interference source measurement...EMC-14002
- 7-2 Single component suppressionEMC-14002
- 7-3 Combination components suppressionEMC-14002
- 7-4 π -type circuit suppression.....EMC-14002
- 7-5 Material selection experiment of suppression componentsEMC-14002
- 7-6 Ferrite ring and decoupling capacitors experimentEMC-14002

7. Radiated electromagnetic interference grounded experiment

- 8-1 Circuit to be measured without laying copper (EMC-14003) and ungrounded with laying copper (EMC-14004) of radiated interference source measurement
 - A. Ungrounded experiment with laying copper
- 8-2 Single component suppression.....EMC-14004
- 8-3 Combination components suppressionEMC-14004
- 8-4 π -type circuit suppressionEMC-14004
- B. Grounded experiments of filter suppression components
- 8-5 Ungrounded with laying copper and grounded with laying copperEMC-14004
- 8-6 Grounded with laying copper and single component suppressionEMC-14004
- 8-7 Combination components suppression.....EMC-14004
- 8-8 Grounded with laying copper and π -type circuit suppressionEMC-14004

8. Shielding experiment of radiated electromagnetic interference

- A. Shielding experiment
 - 9-1 Shielding experiment without laying copper.....EMC-14003
 - 9-2 Shielding experiment with laying copperEMC-14004
- B. Shielding grounded experiment
 - 9-3 Shielding grounded experiment (including component suppression)EMC-14004

9. Optimization experiment of radiated electromagnetic interference

- 10-1 Single component suppressionEMC-14005
- 10-2 Combination components suppressionEMC-14005
- 10-3 π -type circuit suppressionEMC-14005
- 10-4 Grounded experimentEMC-14005
- 10-5 Shielding experimentEMC-14005

► System Requirements

- PC : CPU P4 2GHz or better
- RAM 1GB or better
- Two USB 2.0 version or better
- Hard disk more than 10GB
- DVD-ROM drive
- OS : Win 7 with 32 bit or better



► Accessories (EMC-19001)

1. Flat braided ground cable x 1
2. Suppression components x 1 set
3. Storage cabinet x 1
4. Metallic board

► Consumable materials

1. Conductive foam
2. Aluminum Foil tape