EMC-100
EMI Training System


* Notebook is excluded

EMC-100 contains two parts. One part is a measurement instrument designed to measure electromagnetic interference (EMI), including conductivity of electromagnetic interference and radiated electromagnetic interference. It provides electromagnetic interference verification on products before inspection. Another part is training modules which allow students to easily implement the experiments and learn the basic concepts of electromagnetic interference and suppression countermeasure. Beginners are able to learn electromagnetic interference theories, measurement and suppression techniques to prepare themselves 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 electromagnetic interference verification on products before a preliminary inspection. It's a smart and portable device.

Software:

1. Professional laboratory standard measurement with powerful analysis function.
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 of electromagnetic interference on products.
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. Moreover, hundreds of suppression experimental modes are introduced in the manual.
2. The suppression components are developed by experienced engineers who are specialized in integration of electromagnetic compatibility. Users can easily learn how to use different suppression components to suppress electromagnetic interference.
3. Plug-in suppression components with error-proofing are expandable and can be easily maintained and modified.
4. A transparent case for clear view of suppression components.

EMC-100 contains the measurement instrument (EMC-11001) providing the electromagnetic interference conductivity, and different experimental modules to support 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~ 30MHz
   - (2) Characteristic impedance: (50μH+5Ω) // 50Ω
   - (3) Phase : single-phase
   - (4) Rated current : 2 ×16A
   - (5) Max. 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 : ⩽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) Max. DC voltage : ±0.2VDC

   Modulation Analysis
   - (1) Frequency range : 150KHz~300MHz
   - (2) Frequency modulation accuracy : ±1% (typical)
   - (3) Amplitude modulation accuracy : ±1% (typical)
   - (4) Operating temperature : 0°C~ +70°C (standard)
4. Preamplifier Specifications
   - (1) Frequency range : 500KHz~1 GHz
   - (2) Gain : 20dB

●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

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


EMC-13001


EMC-14001


EMC-14002


EMC-14003


EMC-14004


EMC-14005

Suppression Components

● List of Experiments

1. Source of waveform for conducted electromagnetic interference
   2-1 No Load conduction interference source.....EMC-13001
   2-2 Load conduction interference source EMC-13001

2. Power supply filtering experiment of conducted electromagnetic interference
   3-1 LC Filter circuit.....EMC-13001
   3-2 First order filter circuit EMC-13001
   3-3 Second order filter circuit EMC-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 measurement.....EMC-13001
   4-3 First order filter circuit EMC-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 experiment EMC-13001
   4-7 First order filter circuit of secondary side grounding experiment.....EMC-13001
   4-8 Second order filter circuit of secondary side grounding experiment EMC-13001

4. Optimization experiment of conducted electromagnetic interference
   - 5-1 Filter components choice and filter circuit combination EMC-13001
   - 5-2 First order filter circuit EMC-13001
   - 5-3 Typical first order filter circuit EMC-13001
   - 5-4 Second order filter circuit EMC-13001

5. 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 module EMC-14002
   - 6-3 Searching for radiated interference source using without laying copper and vertical wiring circuit module EMC-14003
   - 6-4 Searching for radiated interference source using with laying copper circuit module EMC-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 suppression EMC-14002
   - 7-3 Combination components suppression EMC-14002
   - 7-4 π-type circuit suppression EMC-14002
   - 7-5 Material selection experiment of suppression components EMC-14002
   - 7-6 Ferrite ring and decoupling capacitors experiment EMC-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 suppression EMC-14004
   - 8-4 π -type circuit suppression EMC-14004

   B. Grounded experiments of filter suppression components
   - 8-5 Ungrounded with laying copper and grounded with laying copper EMC-14004
   - 8-6 Grounded with laying copper and single component suppression EMC-14004
   - 8-7 Combination components suppression EMC-14004
   - 8-8 Grounded with laying copper and π -type circuit suppression EMC-14004

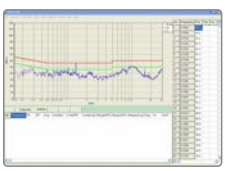
8. Shielding experiment of radiated electromagnetic interference

   A. Shielding experiment
   - 9-1 Shielding experiment without laying copper EMC-14003
   - 9-2 Shielding experiment with laying copper EMC-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 suppression EMC-14005
   - 10-2 Combination components suppression EMC-14005
   - 10-3 π -type circuit suppression EMC-14005
   - 10-4 Grounded experiment EMC-14005
   - 10-5 Shielding experiment EMC-14005

System Requirements



PC : CPU i5 2GHz or better
RAM 4GB or better
Two USB 2.0 version or better
Hard disk more than 10GB
DVD-ROM drive
OS : Win 7/10, 32/64 bit

Accessories (EMC-19001)

1. Flat Braided Ground Cable x 1 pce
2. Suppression Components x 1 set
3. Storage Cabinet x 1 pce
4. Metallic Board x 1 pce

Consumable Materials

1. Conductive Foam
2. Aluminum Foil Tape