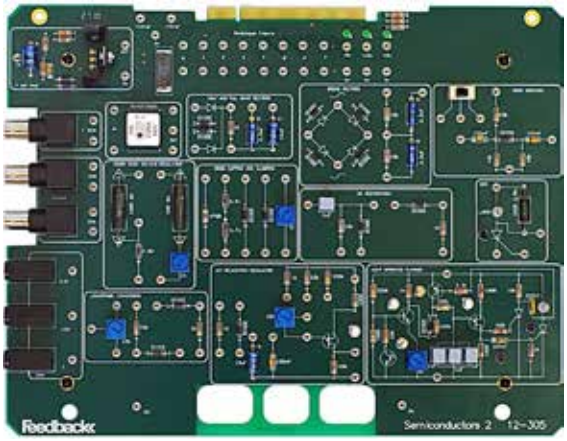
Basic Electronics Series - 12-305 Semiconductors 2

Introduction



With over 50 years of experience in the design, manufacture and supply of high quality educational products, Feedback's 12-300 series of innovative workboards and ESPIAL software set new standards in the teaching of basic electronics.

The 12-305 board builds on the semiconductors fundamentals covered on the 12-304 board to demonstrate key applications of semiconductor devices. In particular it covers how the diode may be used to rectify an ac signal and its importance as a device for clipping an a.c. signal.

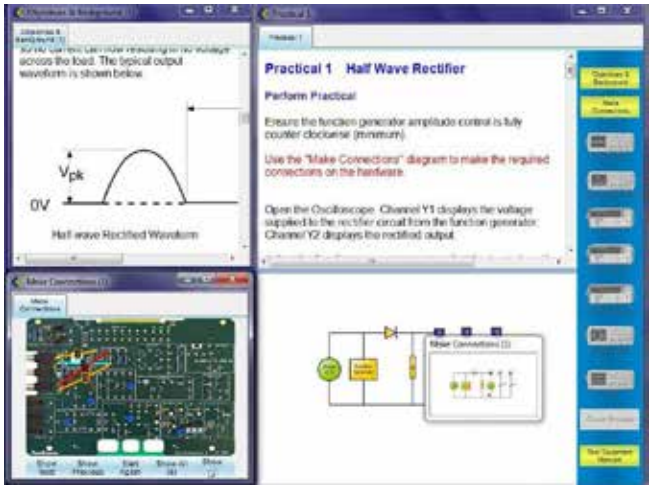
Amongst the many other components studied the Zener diode and its use as a voltage regulator in a power supply is investigated.

The board enables students to learn by hands-on and using pre-constructed circuit elements that may be connected in different ways to perform a ser ies of assignments.

Teaching material and pc based instrumentation are delivered by Feedback's own ESPIAL software, which teaches the student the necessary theory in o rder to complete the practical experiments. On-screen instructions guide the student through the s et-up of the boards and the use of the on-screen instrumentation enables students to observe paramet ers in real time and to record their results.

Semiconductors 2

The 12-305 semiconductors board features a wide ran ge of semiconductor applications that can be investigated by the student.



The principle of rectification of A.C. to D.C. is covered in detail allowing the student to study half-wave and full-wave rectification using the on-screen oscilloscope. Smoothing of rectified signals is investigated by measuring the effect of applying a capacitor across the load.

The student can construct a light dimming circuit using a uni-junction transistor and utilise silicon controlled rectifiers (SCRs) for power control applications.

The student is able to refer to the "Concepts" section of the ESPIAL software to reinforce their understanding of the fundamentals of the subject be fore conducting the practical experiments.

Screen showing the Feedback interactive ESPIAL soft ware, enabling the student to learn the principles of the subject and then implement practical experiments using on-scree n instruments.

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The Semiconductor Diode

- Recognition of diode types and diode polarity
- Electrical Characteristics of a diode
- Zener diodes
- Light Emitting Diodes (LEDs)

Transistors

- Recognition and identification of types of transist or
- Input and output characteristics
- Common emitter, common collector and common base circuits
- Transistor ac current gain (h_{fe}) The emitter follower circuit

Field Effect Transistors

- Field Effect Transistor familiarisation
- FETs, MOSFETs & JFETs
- Input and output characteristics
- Gate capacitance

Insulated Gate Bipolar Transistors

- Characteristics of IGBTs
- Electrical driving signals for IGBTs

Other Semiconductor Devices

- Triggering of Silicon Controlled Rectifiers (SCRs)
- DIACs and uni-junction transistors

Use and implementation of TRIACs

NI ELVIS Console

The National Instruments ELVIS II/II+ console provi de the platform for the 12-300 series, also supplyi ng power and signal acquisition. Contact your Feedback representative for more information.

Specifications for 12 - 305 board

Supply voltage: From NI ELVIS II/II+ console

Dimensions: 280 mm (w) x 20 mm (h) x 215 mm (d)

Specifications for NI ELVIS II/II+ Console

Supply voltage: 110 – 230 V a.c.

Dimensions: 343 mm (w) x 76 mm (h) x 280 mm (d)