

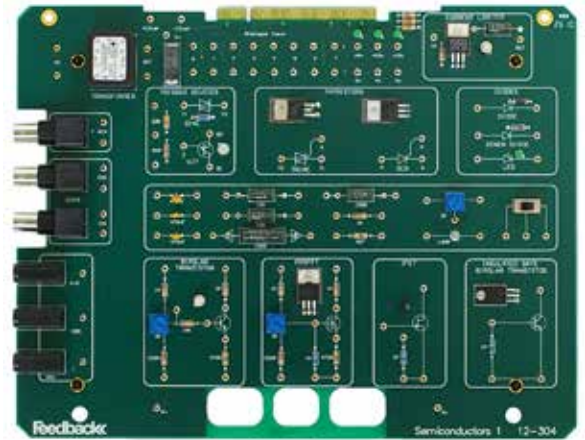
Basic Electronics Series - 12-304 Semiconductors 1



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 12-304 board introduces semiconductor devices and how they function. The student learns the fundamentals of the p-n junction and how its characteristics make the operation of a diode possible. The transistor is able to be tested using the on-screen instrumentation, allowing the student to measure and record the key characteristics of the bipolar junction transistor and the field effect transistor.



The board enables students to learn by hands-on and be connected in different ways to perform a series

using pre-constructed circuit elements that may of assignments.

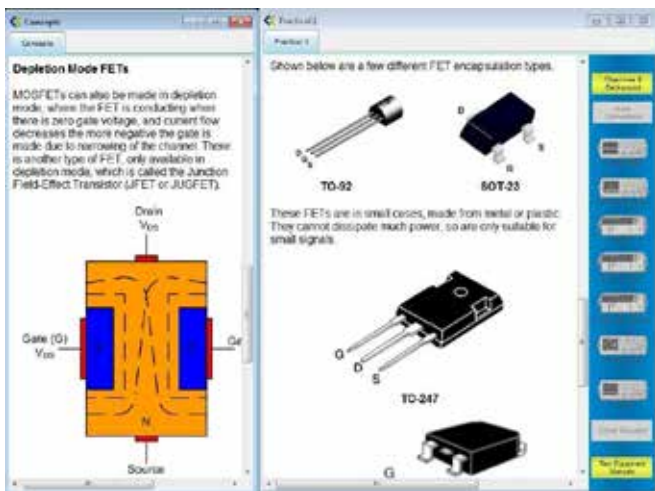
Teaching material and pc based instrumentation are which teaches the student the necessary theory in o screen instructions guide the student through the s instrumentation enables students to observe paramet

delivered by Feedback's own ESPIAL software, order to complete the practical experiments. On- set-up of the boards and the use of the on-screen ers in real time and to record their results.

Semiconductors 1

The principle of operation of the p-n junction is f electronic components and the 12-304 covers the bas

fundamental to the understanding of semiconductor ics through to modern field effect transistors.



Transistor characteristics are studied with the opportunity for the student to measure the input, output and transfer characteristic using the on-screen instrumentation. This leads onto the calculation of the ac current gain, or h_{fe} , of the transistor.

The need for biasing is explained, such that the transistor is able to be used with ac signals and the effect of applying signals to different terminals of the transistor is investigated.

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

Screen showing the Feedback interactive ESPIAL software, enabling the student to learn the principles of the subject and then implement practical experiments using on-screen

ware, instruments.



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The Semiconductor Diode

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

Transistors

- Recognition and identification of types of transistor
- 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

Other Semiconductor Devices

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

NI ELVIS Console

The National Instruments ELVIS II/II+ console provides power and signal acquisition. Contact your Feedback

representative for more information.



Insulated Gate Bipolar Transistors

- Characteristics of IGBTs
- Electrical driving signals for IGBTs

Specifications for 12-304 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)