SPECIFICATIONS

GENERAL. The Model 5110 is a solid state semiconductor analyzer capable of both in-or out-of-circuit GO/NO-GO testing and out-of-circuit Parameter testing.

CLASSIFICATION. The Model 5110 is Type III, Class 5, Style E, and Color R for Navy applications in accordance with MIL-T-28800 with the following exceptions:

a. The relative humidity requirement is limited to 45% during leakage current measurements.

b. The pulse shock testing requirement is not invoked.

c. The EMI requirement is not invoked.

d. The 400 Hz nominal power requirement is not invoked.

OPERATIONAL CHARACTERISTICS

LEVEL 1 AND 2. The Model 5110 is capable of testing semiconductors either out-of-circuit or in-circuit with circuit power removed. A selector switch for HI-LO drive currents is provided with the shunt limits listed below.

a. GO CONDITION (IDENTIFICATION MODE). A good device will be identified as to Good or Bad, type (NPN or PNP) and the Lead orientation indicated with an Alpha-numeric display.

b. NO-GO CONDITION (FAULT MODE). A bad device will be indicated as OPEN or SHORT and the junction involved will be identified with an Alpha-numeric display.

c. DIODE TEST. Indicates short, open or identifies the cathode for a good diode.

All GOOD/BAD, polarity and lead identification is implemented automatically with front panel indicators. No separate charts or manuals are required to interpret front panel indicators.

SHUNT LIMITS. The 5110 is capable of in-circuit testing of signal diodes and bipolar transistors subject to the following limits.

a. DIODES. Diodes in a circuit that shunts the junction with a dynamic impedance of **100** ohms or more.

b. TRANSISTORS. Transistors in a circuit that presents a dynamic impedance of:

(1) Base to Emitter of **100** ohms or more.

(2) Base to Collector of **100** ohms or more.

(3) Collector to Emitter of **25** ohms or more.

LEVEL 3 PARAMETER. The Model 5110 will perform the following out-of-circuit, dynamic parameter measurements:

a. BETA, from 0 to 1,999 using 3 separate base drive currents. Base drive is a 2% duty cycle pulse 300 μS wide.

b. Collector-To-Base Leakage Current, I_{CBO}, from less than 100 nA to 10 mA in 5 ranges with 10 nA resolution on the most sensitive rage. Bias voltage is continuously variable from 5 volts to 50 volts.

c. Base-to-Emitter saturation voltage, $V_{BC\,(SAT)}$, over a range of 0 to 1.999 volts full scale with a resolution of 0.005 volts or less.

d. FET Transconductance (Gm) from 0 to 19.99 m℧ (milli-mhos).

e. SEMICONDUCTOR COMPOSITION. The Model 5110 will identify the semiconductor material composition as either silicon or germanium with a front panel readout of "SI" or "GE".

f. BIAS CURRENT RANGES. In the Beta Mode, peak base currents of 10 μA, 100 μA and 10 mA are provided.

g. ACCURACY. The accuracy of all parameter measurements made by the Model 5110 is ±(3% of reading + 10 digits) for any mode or range.

INDICATORS. The Model 5110 uses LED digital readouts and annunciators for parameter measurements, LED indicators for GO/NO-GO, polarity and fault indicators, and LED digital alpha-numeric identification of device leads in GO/NO-GO testing. A selectable audio indicator with variable volume is provided in GO/NO-GO testing.

EQUIPMENT PROTECTION. The Model 5110 input jacks used for in-circuit GO/NO-GO testing are capable of withstanding up to 600 Vpms without damage to internal circuits. Protection fuses for the 3 leads are mounted in standard front panel accessible fuse holders.

TEST SOCKETS. The 5110 is provided with front panel mounted test sockets for TO-5, TO-66 and TO-3 case configurations in addition to the input banana jacks. Separate sockets are provided for the GO/NO-GO and parameter test sections. The sockets provided are specially designed for test applications to provide a high number of insertions.

POWER. The Model 5110 is powered in accordance with the nominal power requirements of MIL-T-28800 except operation from 400 Hz source power is not provided. The maximum power required for operation shall not exceed 20 watts.

PROTECTIVE CASE. A carrying case is provided to store all components of the test set and to protect them against the normal shock, vibration, and other environmental conditions encountered during use in more than one location. This protection shall be in accordance with the environmental requirements of Class 5 of MIL-T-28800.

ACCESSORIES. The following accessories are provided with each Model 5110.

a. One 3-prong test probe with a 5-foot cable.

b. One set of semiconductor sockets.

c. One spares kit of replacement fuses.

d. Three color coded "mini-grabber" test leads.

e. A complete operator/maintenance manual with description, operating instructions, calibration procedures, schematic, and parts information.

CALIBRATION INTERVAL. After calibration, the Model 5110 will maintain the specified tolerance for a period of at least 1 year.

RELIABILITY. When invoked, reliability verification testing for the Model 5110 will comply with Type III, Class 5 environmental conditions of MIL-T-28800. MTBF is more than 2000 hours.

ELAPSED TIME INDICATOR. The Model 5110 is provided with an internally mounted, replaceable, minaturized, solid-state elapsed time indicator (ETI) capable of measuring and directly indicating the actual time that the equipment is in an operating condition. With the exception of mounting configurations, the ETI shall meet or exceed all requirements invoked by MIL-I-81219 for nonmercuriac indicating cells. The time range full-scale reading shall be 5000 hours.

DIMENSIONS AND WEIGHT. The size and weight of the Model 5110 is consistant with commercial capabilities and does not exceed the maximum dimensions for shipboard applications. Instrument dimensions are 12.5″ wide by 8.5″ high by 6.5″ deep. Weight is less than 7 pounds. The carrying case is 14″ wide by 9.5″ high by 8″ deep. Weight of carrying case and accesories is less than 2 pounds.