

# VBA Curve Tracer Specifications

## DUT Voltages and Currents

There are three main voltage ranges that can be selected.

- 0-35V @ 0-2A
- 0-70V @ 0-1A
- 0-200V @ 0-100mA

The voltages and the currents of any of these ranges can be adjusted from 0-100% of the maximum values with full load. The voltage output can be selected between a triangle-based waveform, which is the default, and DC for leakage measurements. Selecting the DC mode will automatically change the maximum current in the X1 Current range setting to 50% to reduce the thermals.

The frequency of the triangle-based waveform is set at about 160Hz but can be tuned by changing a trimmer inside the unit. It can range from about 140Hz to 650Hz and can be used to tune the rate of flicker on the display of the oscilloscope.

An indicator will warn the user when voltages higher than approx. 40V are present on the DUT output terminals.

There are 6 current ranges to set the maximum currents for the DUT in the three voltage modes:

- x 1 (changes to x0.5 in the DC mode)
- x 0.5
- x 0.2
- x 0.1
- x 0.05
- x 0.02

This means that in the 35V @ 2A range, the maximum current can be set to 2A, 1A, 400mA, 200mA, 100mA and 40mA. A Current adjustment can be used to further set the maximum current from 0-100% in any of the selected Current Ranges.

An LED will signal the current limiting (CL) mode, i.e. when the current to the DUT meets or is exceeding the set current by the Current Range and the Current setting.

## Step Generator

The Step Generator feeds the Base or Gate of the DUT and can be set to output a current for BJT devices or a voltage for FET devices.

The Step Generator output can be set to generate 0-7 steps.

A Step Delay can be selected to delay the time between complete step cycles to reduce the thermals developing in the DUT and prevent it from over-heating. When activated, the delay is approx. 40mSec between step cycles and can be increased to more than 250mS. The step cycle delay can be set with step cycles of 1 to 7 steps.

The output of the Step Generator can be selected in a 1-2-5 sequence.

The selections are:

- 5V\*) or 5mA
- 2V or 2mA
- 1V or 1mA
- 500mV or 500uA
- 200mV or 200uA
- 100mV or 100uA
- 50mV or 50uA
- 20mV or 20uA
- 10mV or 10uA
- 5mV or 5uA
- 2mV or 1uA
- 1mV or 1uA
- 500uV or 500nA
- 200uV or 200nA
- 100uV or 100nA
- 50uV or 50nA

\*) Note that in the 5V range, you will have to reduce the number of steps to avoid clipping against the supply rail of the step amplifier (approx. +/-14V). This can also happen with 1V and 2V step sizes in combination with the offset feature. The current settings do not clip.

An offset can be selected with either a positive (aid) or negative (oppose) offset to the Step output. The offset range has a maximum range of +/- 7V for BJT's at 100mA/Step and +/- 2V for FET's regardless of the V/Step setting. The maximum offset range for BJT's lowers with lower mA/Step settings so the user will need to readjust the offset level (Bias) when you change the Base current. In the FET mode, the offset (VGS) and the range stay constant with different V/Step settings. By changing three resistor values, the maximum offset for FET's can be set to +/-3, 4, 5 and 7.5V.

Both the current and the voltage outputs are corrected for DUT junction voltage drops and other current/voltage drops so composite devices (Darlington) can be tested without influencing the Base or Gate step settings.

The Step Gen output is protected against damages by high voltages in case of a shorted/damaged C-B or D-G junction or an accidental shorting of the Base or Gate to the DUT supply, that can be

as high as 200V. A Fault LED will warn the user of this condition as long as it is present and the voltage at the Collector/Drain output will be removed for the duration of the fault condition.

A switch determines the polarity of the DUT for PNP/P-channel or NPN/N-channel type devices in such a way that the origin of the I/V curves on the DSO will always start in the lower left-hand corner of the oscilloscope.

## **Device Under Test (DUT)**

A large variation of DUT's can be connected to the Curve Tracer by means of test sockets or 2mm Banana sockets. Two DUT's can be compared by means of a DUT selector switch that can be off or power the left or the right DUT socket to make comparisons and matching of devices possible.

Many different 2 or 3-pin DUT's can be measured or characterized with the instrument.

## **Display Device**

An analog (CRT) or digital oscilloscope (DSO) is used in the X-Y display mode to show the I/V curves of the DUT. There are two BNC sockets available on the back panel of the instrument to connect the X and Y outputs to the input channels of the scope. An optional Z or blanking signal can be made available through a BNC connector on the back panel for analog oscilloscopes.

A multiplier for the measured DUT current can be used to select between x1 and x10 to amplify small DUT currents on the scope and raise the signal above noise levels.

## **Enclosure, Electrical & Mechanical Information**

A mains switch is available on the back of the unit. An indicator on the Face Plate will show that the instrument is powered on.

The overall current consumption of the instrument in the idle mode is 0,25A and 12.5W with a 230V main supply. With the maximum DUT load of 35V @ 2A, the consumption is 340mA and 53W.

The instrument can be used with 115V @ 60Hz or 220-240V @ 50Hz mains voltages by means of a selector switch inside the unit. The mains connection is through an IEC C-7 type connector (also known as a figure 8) with EMI filter, has a fuse and a main power switch on the back panel. The instrument circuits itself are floating from earth ground but will be earth grounded through the BNC connections to the earth grounded oscilloscope.

The plastic enclosure measures 25cm x 18cm x 8cm. The Front and Back panels are shielded printed circuit boards with a black background and white lettering.

The overall weight is 2.5Kg.

