

**ANALYSIS OF A  
SYSCOMP CURVE TRACER**

**A CAPABILITY ANALYSIS**

**PREPARED BY**

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## **BACKGROUND**

Syscomp has developed a USB Curve Tracer, the CTR-101. This paper compares this unit to a Tektronix 576 Curve Tracer for use in semiconductor and electronic failure analysis.

## **EXECUTIVE SUMMARY**

*This tester is recommended either as the basic equipment or as a back-up to other higher priced units in the industry. This Syscomp unit will perform 70% to 80% of the normal lab requirements for semiconductor and electronic failure analysis. In addition this unit will provide several measurement capabilities not available on some Tektronix scopes.*

## **BASIC COMPARISONS**

### **ADVANTAGES OF THE SYSCOMP UNIT**

1. The traces are digitized and plotted on the computer. Screen photos are not required.
2. Trace X/Y values can be recorded on the display.
3. The one time scan eliminates most heating effects.
4. MOS gate threshold values can be read from the gain plots (not possible on a 576).
5. Price under \$400.

### **LIMITATIONS**

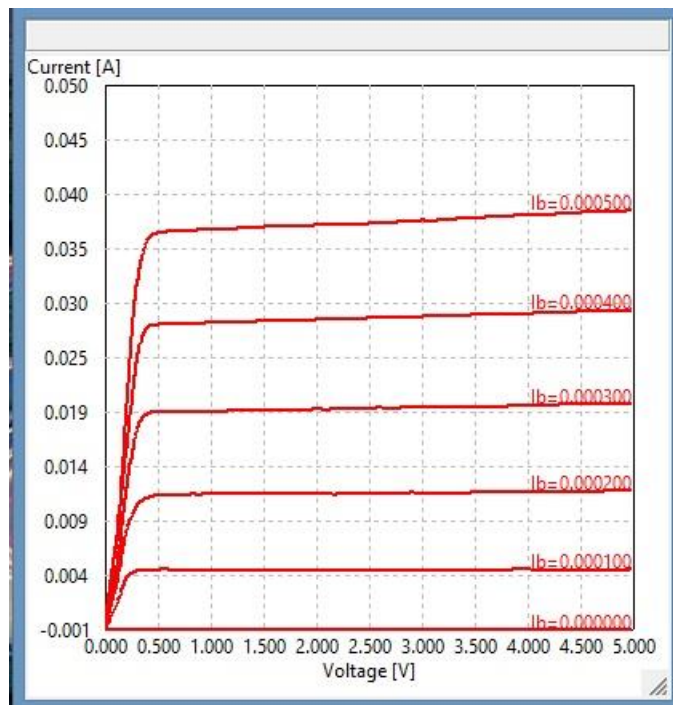
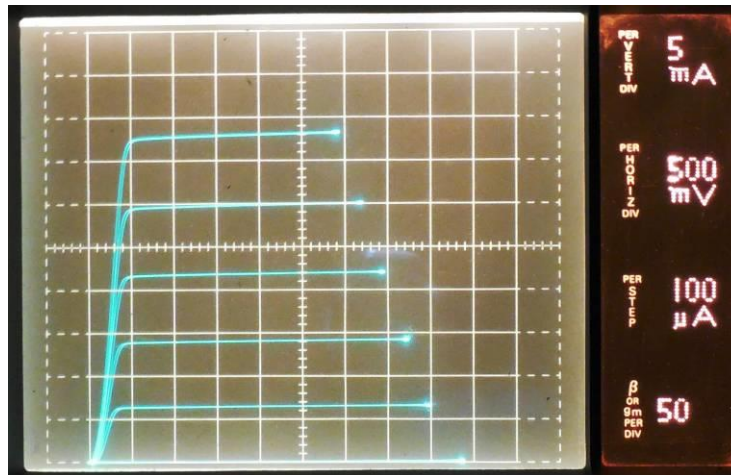
1. 40 volt maximum trace value (cannot measure high voltage breakdown values).
2. Minimum current sensitivity of 20 uA.

## COMPARISON PLOTS

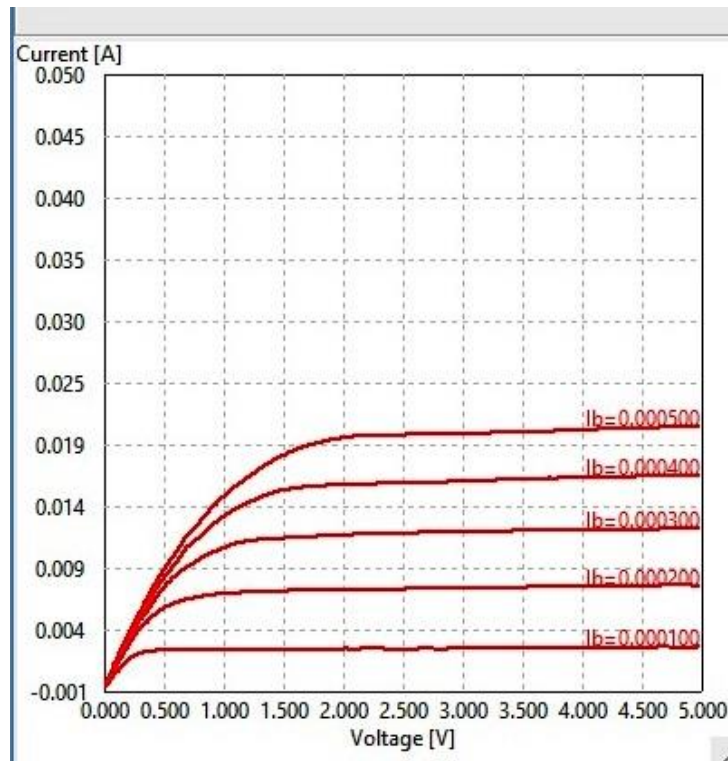
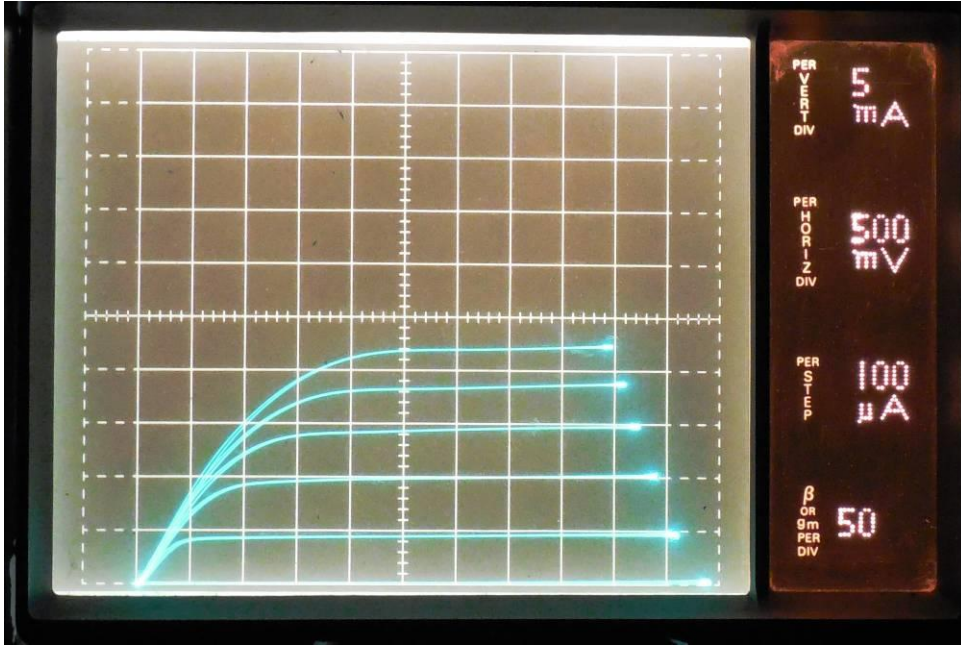
The following shows a series of comparison plots of different devices between the Syscomp unit and the Tektronix scope. The Syscomp was tested with version 1.9 of the software. In all cases the correlation was very close.

### A SMALL SIGNAL NPN TRANSISTOR

Note that the gain calculations and  $V_{cesat}$  values are the same for both traces.

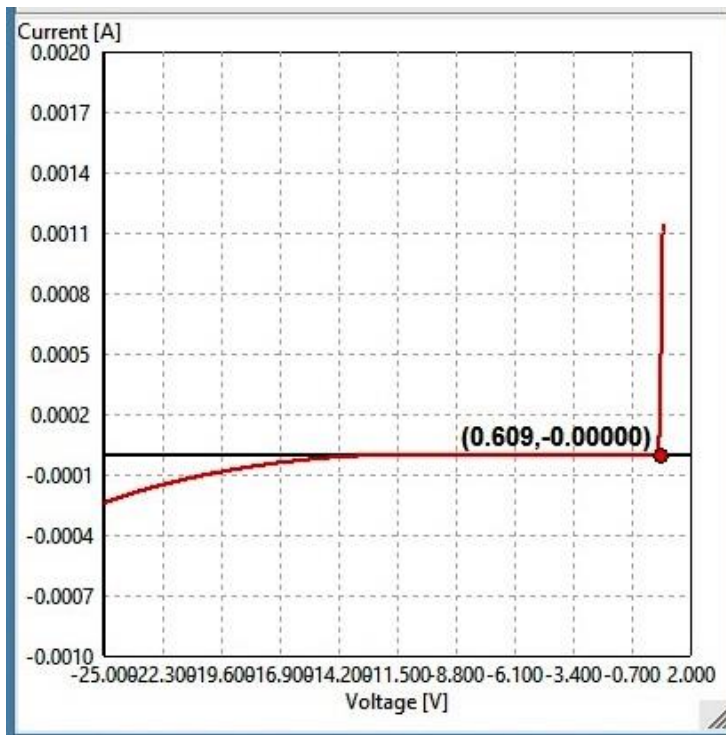
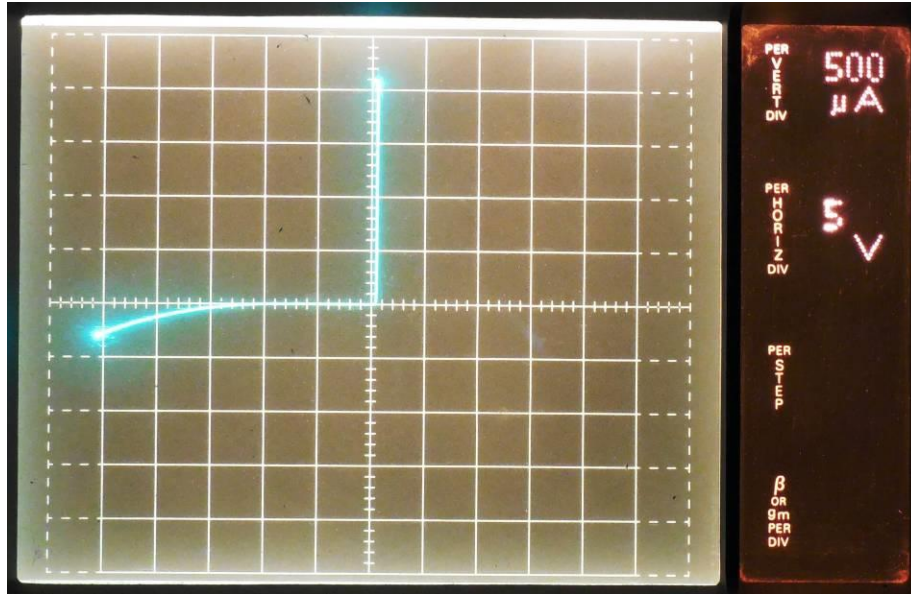


# A GROWN JUNCTION TRANSISTOR



## A LEAKY REVERSE JUNCTION

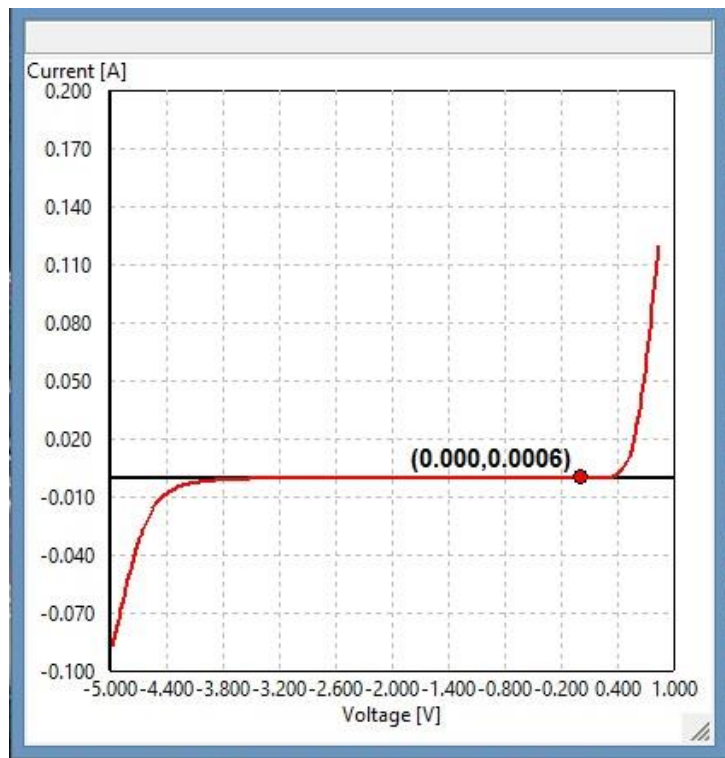
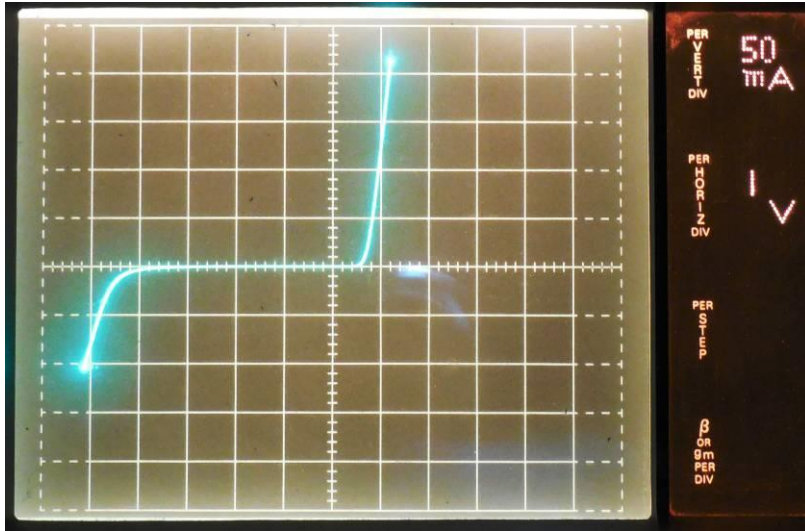
Note that on the Syscomp unit the +/- voltages do not have to be equal. Also note that the X/Y trace values can be displayed at any point. In this case the X value is the forward voltage of the junction.





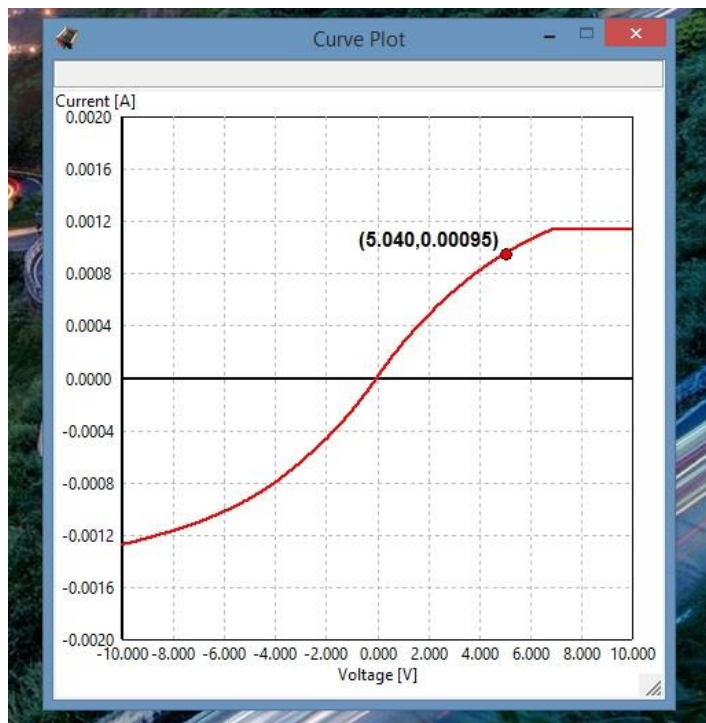
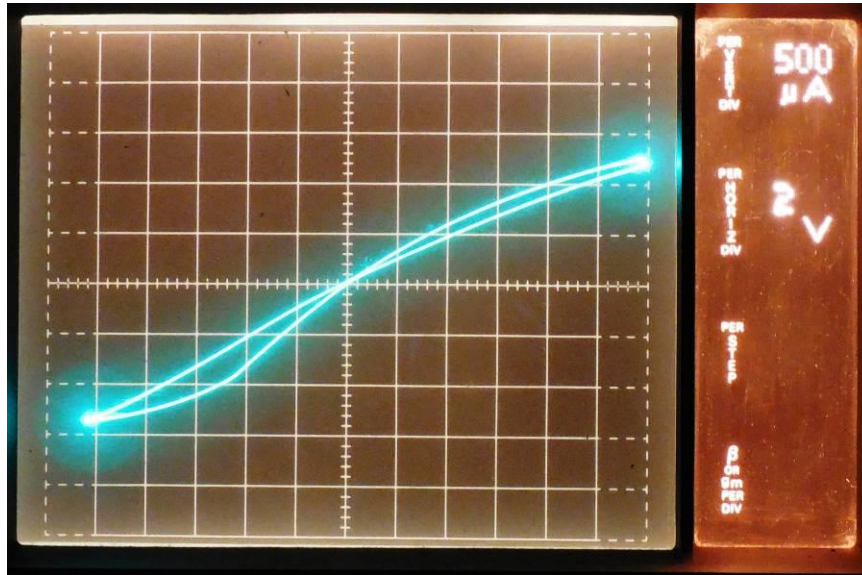
## A BASE - EMITTER JUNCTION

Note that the forward and reverse breakdown slopes are very similar. Again the X/Y value point shows the zero value point.



## DAMAGED PN JUNCTION

Note that the Syscomp unit has one clear trace and not the "looping" that shows on the Tektronix traces.

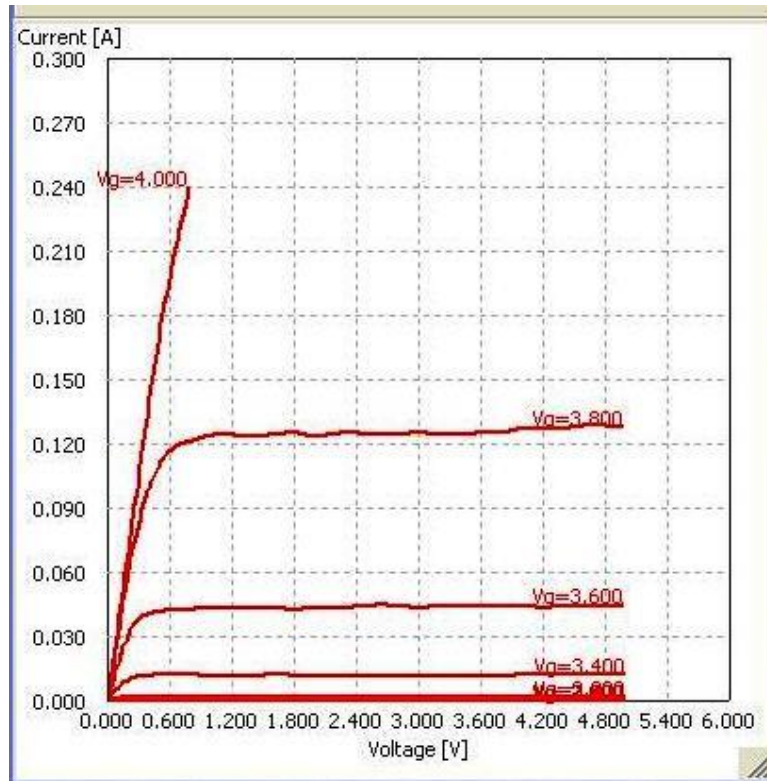






## MOS TRANSISTOR CHARACTERISTICS

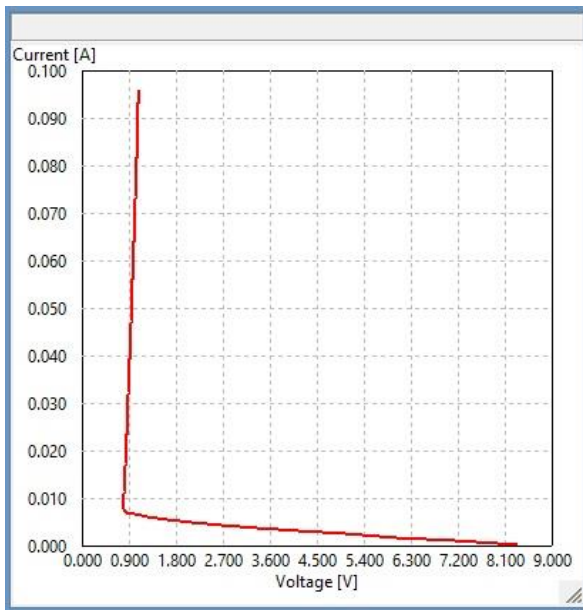
Note that the Syscomp trace shows the actual threshold voltage because the value of each voltage step can be controlled. The Tektronix voltage steps are too coarse to show when conduction starts. In this example the threshold voltage is approximately 3.2 volts.



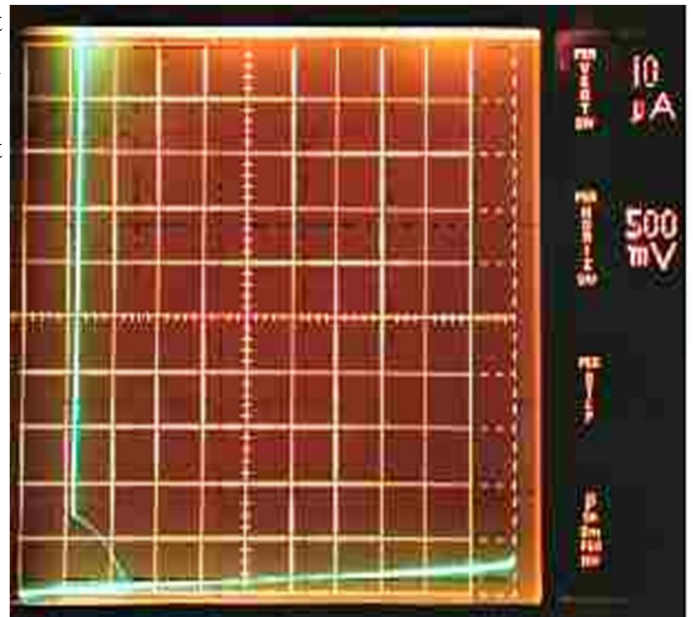
## LATCHUP

Latchup is major failure mechanism for CMOS integrated circuits.

As shown in the screen shot, the CTR-101 generates a sharp trace showing the exact breakover and



sustaining voltage.



Syscomp CTR-101

Tek 576

## DISCUSSION

Every electronic and semiconductor failure analysis must start with curve trace information. This Syscomp unit provides an excellent low cost approach to provide the majority of this requirement.