

## LIQUID CRYSTAL

### Introduction

Liquid crystal is a complementary technology to photoemission microscopy. Liquid crystal will show hot spots, where the temperature of the circuit is higher than the surrounding area. Liquid crystal can be used with great sensitivity to locate defects such as resistive shorts. These defects do not emit light and will not be shown by photoemission tools.

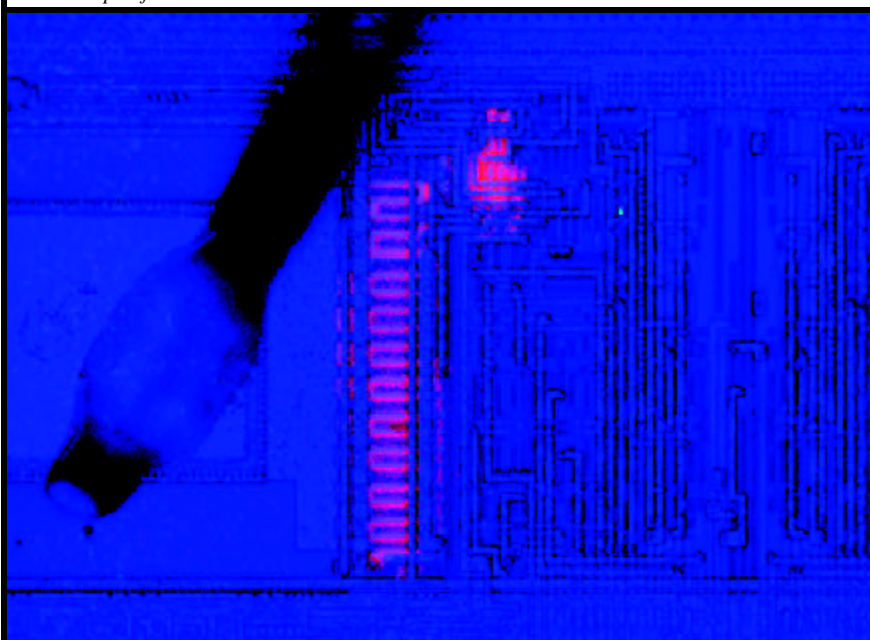
Liquid crystal head detection can be performed with the FA-2000™'s compound microscope equipped with a polarizer/analyzer option. The color/darkness changes typical of liquid crystal detection can be viewed with the eyepieces or with the FA-2000™ camera, which provides real time imaging.

At the same time, defects that emit light can be imaged by the FA-2000™. The combined power of detection of heat (liquid crystal) and detection of light (photoemission) aids in root cause analysis. For one simple example, a resistive short, without emitting light, may be

causing a transistor to saturate. The saturated transistor will produce photoemissions (light), quite likely in a location different from where the short is located. There may be further effects of the short that may also result in photoemission as well.

Many defects do not cause heating and will not be detected by liquid crystal. Typical light emitting defects that the FA-2000™ can detect include latchup, gate oxide tunneling or breakdown, saturated transistors, forward biased pn junctions and spark gaps (intermittent unstable shorts between layers).

*Latchup defects can be detected with the FA-2000*



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