WHAT IS CLAIMED IS:

1. A method for state mapping of active devices within a device under test (DUT), comprising:

illuminating a selected area of the DUT while the DUT is receiving test signals causing certain of the active devices to modulate, the selected area having at least two of the active devices situated therein;

collecting reflected light from the selected area;

converting the reflected light into an electrical signal;

extracting phase information from the electrical signal;

generating a two-dimensional image from the phase information, wherein the two-dimensional image spatially correlates to the selected area.

2. The method of claim 1, wherein extracting phase information comprises mixing the electrical signal with an interference signal.

3. The method of claim 2, wherein mixing comprises applying the electrical signal to a lock-in amplifier.

4. The method of claim 3, wherein generating a two-dimensional image comprises applying output signal of the lock-in amplifier to a data acquisition module.

5. The method of claim 4, wherein applying output signal comprises applying one of X or Y outputs of the lock-in amplifier.

6. The method of claim 4, wherein applying output signal comprises applying R-Θ output of the lock-in amplifier.

7. The method of claim 6, further comprising:

setting a threshold for values of R;

for each pixel examining detected amplitude of R and:

if the detected amplitude of R is higher than the threshold, utilizing the value of Θ for this pixel; conversely if the detected amplitude of R is lower than the threshold value, disallowing use of Θ for this pixel.

8. The method of claim 2, wherein mixing comprises applying the electrical signal and an interference signal to a spectrum analyzer.

9. The method of claim 8, further comprising collecting electromagnetic radiation emitted by at least one of the DUT, a tester, a test board, a DUT board, and cables to generate the interference signal.

10. The method of claim 9, further comprising conditioning the interference signal prior to the mixing.

11. The method of claim 10, wherein conditioning comprises at least one of: amplifying, attenuating, and phase shifting.

12. The method of claim 8, wherein mixing comprises combining the electrical signal and the interference signal in one of a summing amplifier and a voltage adder.

13. The method of claim 12, further comprising RF amplifying the electrical signal prior to combining.

14. The method of claim 8, wherein mixing comprises radiating the interference signal onto electrical path of the electrical signal.

15. The method of claim 8, wherein mixing comprises applying the electrical signal and the interference signal to a T-connector.

16. The method of claim 8, wherein generating a two-dimensional image comprises applying output of the spectrum analyzer to a data acquisition module.

17. A system for testing an IC device under test (DUT), comprising:

a laser source generating a laser beam;

optical elements for conditioning and scanning the optical beam onto a selected area of the DUT;

optical elements for collecting reflected beam from the DUT;

a sensor for converting the reflected beam into an electrical signal;

electrical components for mixing an interference signal with the electrical signal and extracting phase information of the reflected beam;

a data acquisition module for generating a two-dimensional image from the phase information to thereby provide a phase map of the selected area of the DUT.

18. The system of claim 17, wherein the electrical components comprise a lock-in amplifier.

19. The system of claim 17, wherein the electrical components comprise:

an interference signal generator;

a combiner combining the electrical signal and the interference signal to generate a combined signal; and,

a spectrum analyzer receiving the combined signal.

20. The system of claim 19, wherein the combiner comprises one of: a summing amplifier, a voltage adder, a radiating antenna, or a T-connector.

CLAIMS

1. A method for state mapping of active devices within a device under test (DUT), comprising:

illuminating a selected area of the DUT while the DUT is receiving test signals causing certain of the active devices to modulate, the selected area having at least two of the active devices situated therein and the two active devices modulating at opposing logic states;

collecting reflected light from the selected area;

converting the reflected light into an electrical signal;

extracting relative phase information of the two active devices from the electrical signal to thereby extract the logic states of active devices within the DUT;

generating a two-dimensional image from the phase information, wherein the two-dimensional image spatially correlates to the selected area.

2. The method of claim 1, wherein extracting phase information comprises mixing the electrical signal with an interference signal.

3. The method of claim 2, wherein mixing comprises applying the electrical signal and an interference signal to a spectrum analyzer.

4. The method of claim 3, further comprising collecting electromagnetic radiation emitted by at least one of the DUT, a tester, a test board, a DUT board, and cables to generate the interference signal.

5. The method of claim 4, further comprising conditioning the interference signal prior to the mixing.

6. The method of claim 5, wherein conditioning comprises at least one of: amplifying, attenuating, and phase shifting.

7. The method of claim 3, wherein mixing comprises combining the electrical signal and the interference signal in one of a summing amplifier and a voltage adder.

8. The method of claim 7, further comprising RF amplifying the electrical signal prior to combining.

9. The method of claim 3, wherein mixing comprises applying the electrical signal and the interference signal to a T-connector.

10. The method of claim 3, wherein generating a two-dimensional image comprises applying output of the spectrum analyzer to a data acquisition module.

11. The method of claim 2, wherein mixing the electrical signal with an interference signal comprises mixing the electrical signal with an RF interference signal.