

# Improved Contactless Micro-Wave Alternative for Hall Measurement for Compound Semiconductors

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Lehigh Electronics has previously published the results of non-contact mobility measurements [1,2]. This enhancement over the destructive Hall measurement system had reduced process times, saved money, and thus increased productivity for defining the electrical properties of III-V samples.

The latest development we report here has shown the ability to reduce the measurement area by 40% of the current microwave-based technique operating at 10 GHz. This will provide an increase to the measurement resolution, sensitivity, and expand the lower limit of sheet resistance measuring. The results have shown good correlation to the current non-destructive measurement capabilities and to the destructive van der Pauw Hall test data (Figure 1).

In addition, the reduced measurement area has improved sensitivity to separate the 2DEG data for thick cap or multi-layered structures. As a result, this technique provides a more efficient and cost-effective alternative metrology method to measure and monitor the important electrical properties in the III-V materials. It also provides a more detailed map of these electrical properties for improvements in the process control and characterization (figure 2).

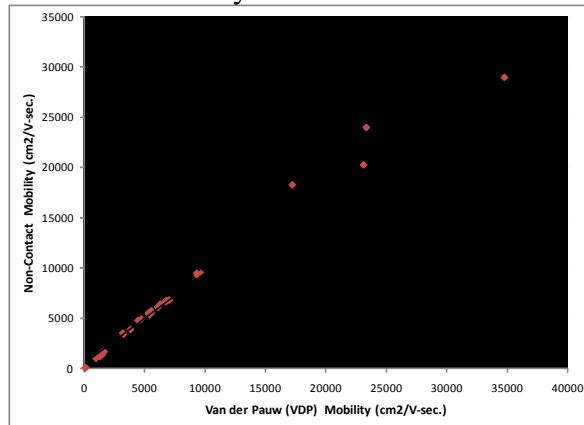
In the full paper, we will discuss further the merits and some limitations of the reduced measurement area.

## References

- [1] D. Nguyen A, K. Hogan, A. Blew, M. Cordes, Improved process control, lowered costs and reduced risks through the use of non-destructive mobility and sheet carrier density measurements on GaAs and GaN wafers, 12th International Conference on Metal Organic Vapor Phase Epitaxy, June 2004
- [2] Information on <http://www.lehigh.com/mobility/index.html>

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**Fig.1:** Correlation of the non-contact mobility to that of the destructive van der Pauw.



**Fig. 2.** Mobility map of a 3 inch (75 mm) sample.

