

Memory Effect Characterization*

- We seek to characterize the significance of memory effects due to:
 - Bias effects
 - Thermal effects
 - RF Frequency response
- Thus far, we have been using magnitude measurements as we have no wideband phase-measurement capability

*Michael D. McKinley, Hyunchul Ku,
Youngcheol Park and J. Stevenson Kenney

E-mail: mikemck@ieee.org



Two-tone Test Setup

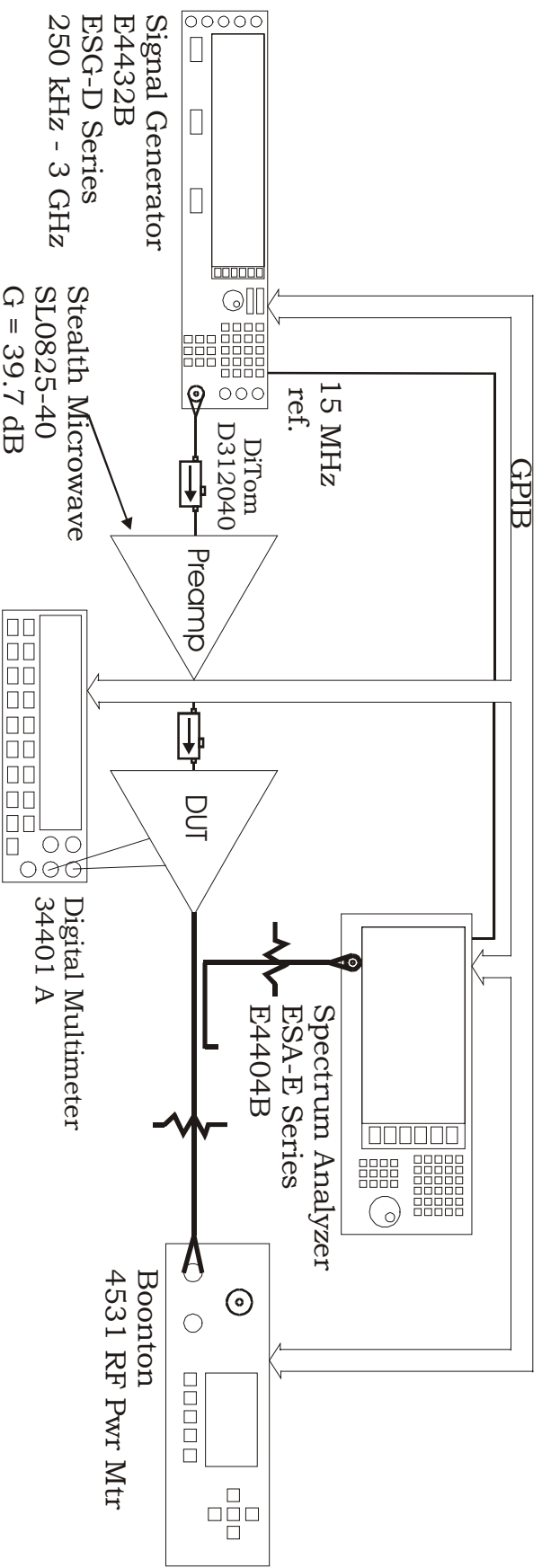


Fig. 1: Setup to measure the magnitudes of the intermodulation distortion of the DUT.



Example

- The following data are potentially* related to a baseband voltage build-up on the bias circuitry.

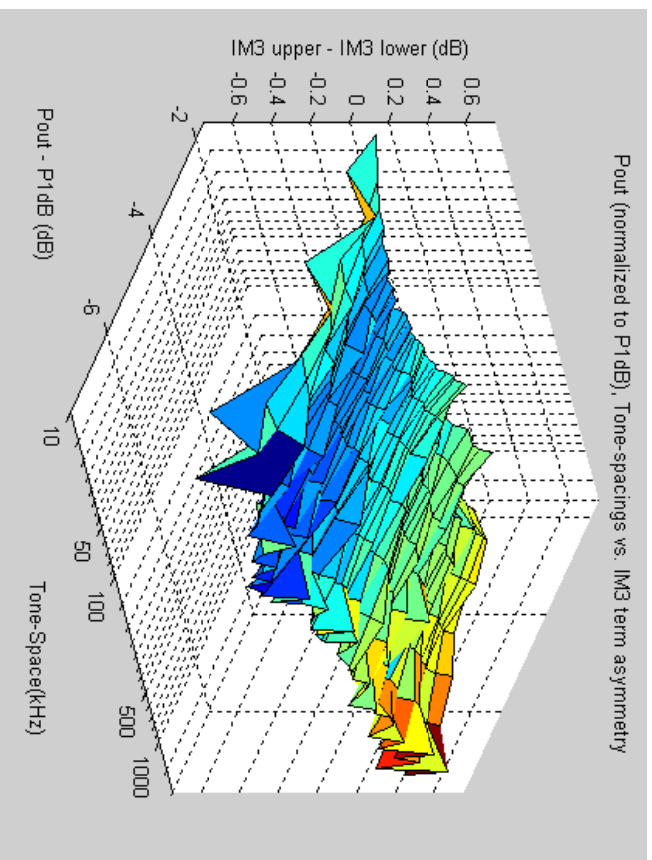


Fig. 2: IMD3 asymmetry for a 10 W SiC PA (prototype sample from Cree)**

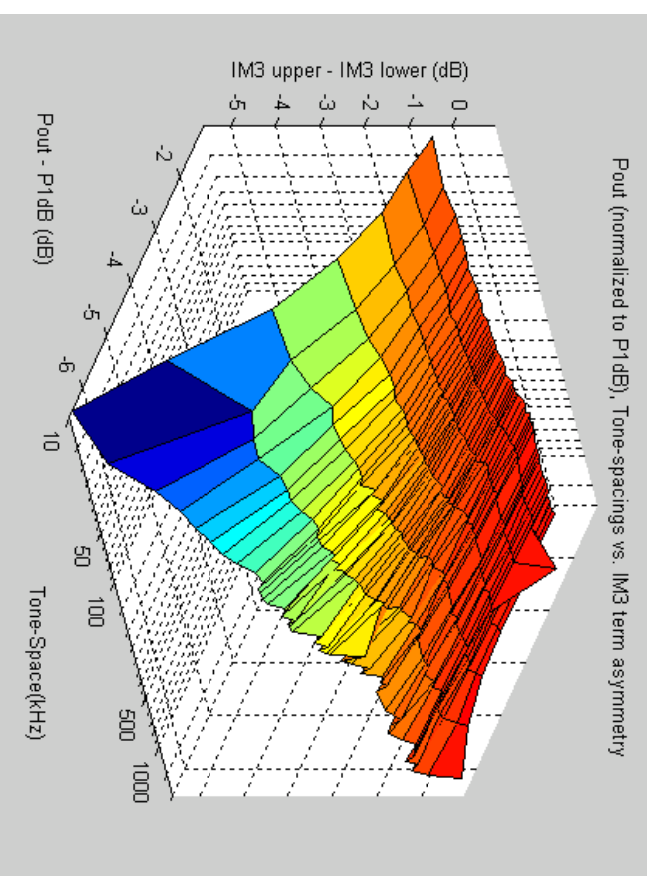


Fig. 3: IMD3 asymmetry for a 10 W LDMOS PA (prototype sample from Cree)**

**Potentially, since it has not been verified for this device, but it has been verified in other devices.
**Work is ongoing.*



Extraction and Predistortion

- Behavioral models extracted from two-tone data
- Memory ratio, which tells the amount of improvement that can be achieved through memoryless predistortion, also calculated
- Predistortion performed on devices to verify the memory ratio
 - Predistortion results appear to have verified the memory ratio calculation, but further steps need to be taken before securing this claim



Separating Memory Effects

- My work thus far has mainly concentrated on bias-related memory effects
 - ESR appears to be main component allowing a build-up of the baseband voltage, which is a cause of IMD3 asymmetry, and hence, memory effects
- Thermal effects
 - Current work has been limited and solely related to extracting conclusions from the two-tone measurements
 - Potential future work on this would involve being able to measure the transient temperature rise of the junction
- RF frequency response effects
 - Currently evaluating the level of gain and phase flatness that a PA must have to be pre-distortable

