



Introducing HAILP The Hybrid Active Injection Load Pull System

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What is HAILP?

FOCUS HAILP* solution

- Offered for fundamental and Harmonic source/load pulling
- Existing passive load pull systems can be upgraded to HAILP
- Offered as a turnkey solution - tuners and instruments -

*patent pending

"So far, HAILP is the active system that offers the best combination of performance, accuracy and cost."

HAILP is the solution for getting all the benefits of a passive and an active Load Pull systems in one setup.

Active Load Pull is the only method that allows reaching the low internal impedance of power transistors, especially on-wafer and at very high frequencies.

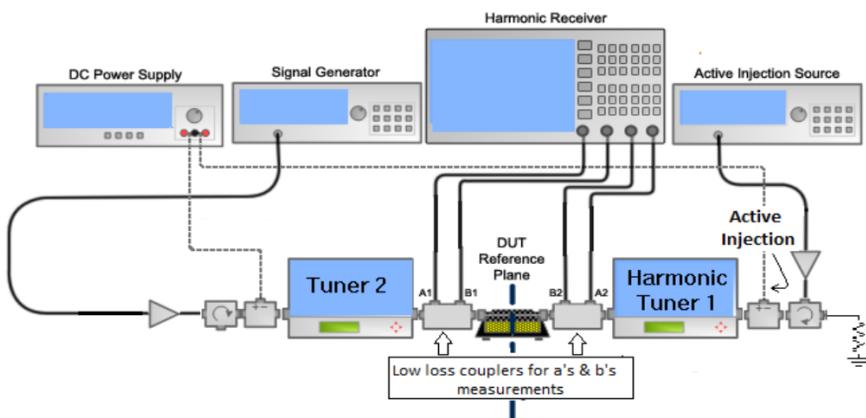
So far, the new Focus Microwaves HAILP system (Hybrid Active Injection Load Pull) is the active system that offers the best combination of performance, accuracy and cost.

The system relies on the basic concept of using pre-match electromechanical tuners for taking the impedance seen by the DUT closer to its conjugate output impedance, then complementing with active injection, the system can tune impedances anywhere in the Smith chart and beyond ($\Gamma \geq 1$).

The measurements themselves are travelling wave-based, performed using one of the following analyzers:

[Agilent's PNA-X](#) or [Rohde and Schwarz's ZVA](#).

With the introduction of pre-match tuners, the amplitude of the feedback injection signal stays within reasonable values. In traditional active systems, the power amplifier has to produce tremendous power for compensating for the strong mismatch between the injected signal and the DUT, taking the cost of the system to the roof and reducing its frequency range.



Focus Microwaves HAILP setup

HAILP, a Groundbreaking Technology

Even though today's electromechanical tuners can synthesize extremely low impedances (less than 0.5Ω), the hardware that is used for connecting the tuner to the DUT introduces loss between the two, resulting in a drastic reduction of the tuning range at the transistor's reference plane. It's physics!

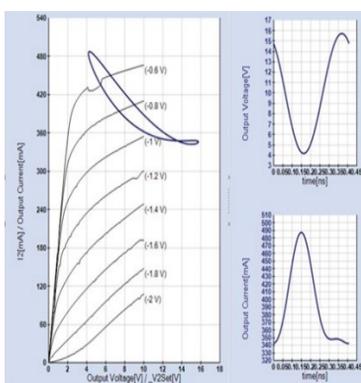
That is why an Active Load Pull system is the logical choice for very low impedance transistors. The idea consists of injecting a coherent signal at the DUT reference plane, and accurately controlling its amplitude and phase; the impedance seen by the DUT can be tuned to virtually any reflection coefficient, including $\Gamma \geq 1$

It all sounds fabulous, but make no mistake, traditional Active Load Pull systems have several major flaws:

- They require tremendous power to overcome the strong mismatch between the amplifier used for the feedback injection and the transistor output impedance.
- Harmonic tuning requires several external sources and associated filters and amplifiers.
- Closed loop active systems are prone to Spurious Oscillations.
- Modulated signal testing creates uncorrectable phase errors

HAILP cures all that:

- $\Gamma \geq 1$ at DUT reference plane (passive + active tuning)
- "Open loop" active injection avoids spurious.
- Electromechanical tuners pre-match the transistor output to the feedback amplifier, thus drastically reducing the required power.
- Harmonic tuners (MPT) perform simultaneous independent harmonic tuning.
- It can be installed as an upgrade to existing load pull setups.
- Is compatible with all harmonic receivers (time domain and frequency domain).



Loadline plot extracted from time domain HAILP

"by accurately controlling the active injection amplitude and phase; the impedance seen by the DUT can be tuned at virtually any reflection coefficient"

The result

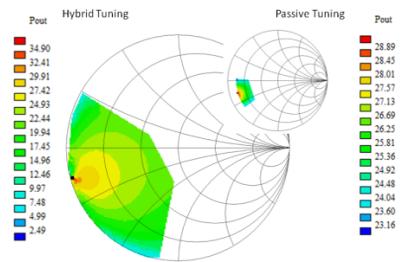
Power transistor characterization is no longer limited by the tuning range of your load pull system at the DUT reference plane.

With Focus HAILP, the Smith chart is yours to prospect, ALL OF IT...

Whatever is the optimum impedance you're seeking, you will reach it!!!

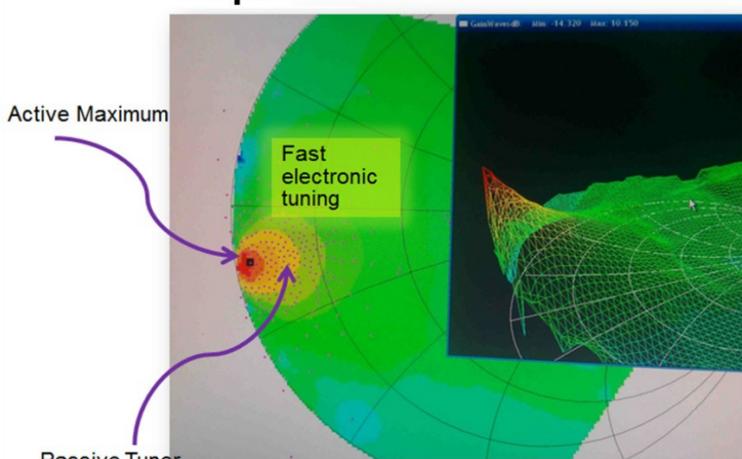
For more information and evaluation.

[CONTACT US TODAY](#)



Passive load pull vs HAILP

Hybrid System Output Power



Optimizing Pout using HAILP



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