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Product Note No 6

Load Pull Characterization and Amplifier Design Service

Focus Microwaves makes its Load/Source Pull Characterization and High Power Amplifier Design capability available to Customers as a Service.

The measurements are focused on high power transistors in the PCN frequency range (0.8 to 4.5 GHz) and provide comprehensive data for designing high power amplifiers. To do these tests Focus Microwaves uses a complete Load Pull setup based on one of the company's MTS systems, calibrated using the latest TRL techniques.

The measured data and contours are available in hard print, ASCII listings and bit map file format. Wideband high power amplifier stage designs, based on the measured nonlinear load pull data of the Customer's transistors and optimized using rf-PADS, are also available.

Measurement Parameters, Amplifier Design

Parameter	Standard Value {Options}
Frequency	750 MHz to 4200 MHz, {option 4500 MHz}
Maximum Input Power	2 Watt, min (33 dBm)
Maximum Output Power	50 Watt, min (47 dBm)
Max DC Bias	20 Volt, min, 1 A, min, {option 30V, 8A}
Max Reflection Factor $\Gamma_{S,L}$	$\Gamma=0.85$ (VSWR=12:1, $Z_{min}=4 \Omega$), {option $\Gamma=0.97$, (VSWR > 50:1, $Z_{min}=0.75\Omega$)}
Type of Measurement	<ul style="list-style-type: none"> - $\Gamma_{opt/S,L}$ for Power, Gain, Efficiency - Saturation plots for Power, Gain, Efficiency, AM/PM - Load and Source Pull including contours for Power, Gain, Efficiency, {options: Intermod, AM/PM}. - Real 1dB compression contours. - {Option Drain (Collector) Current Load/Source Pull}
Transistor Packages	- All standard packages from 0.1" to 1" large
Amplifier Design	Specs/Substrate TBD. Deliverables: Netlist, predicted performance, {option Design Verification data}.

Terms and Conditions

A: Load Pull Tests

Basic Load Pull Test:

- one set of S-parameters (0.5 to 5 GHz, step 50 MHz) and
- contours of output power, gain, efficiency of
- two transistor samples at
- two frequencies
- two input power levels
- one bias condition
- optimum Γ_S and Γ_L , P_{max} and G_{max} for each of the above conditions
- one power transfer plot (Pout, Gain, Efficiency as function of Pin)

all Customer defined within the above listed standard options.

Extra tests: Possible for additional frequencies, input power and bias points and transistor samples.

Extra options {...}: (as listed on page 1):

Prices: On request.

Deliverables: - Hard print contour and power transfer plots

- ASCII listings of all measured data (hard print and file)
- PIC format bit map files of all plots on 1.44 MB diskette (ready to retrieve by word processor)

B: Wideband Power Amplifier Design

includes

- internally carried through load pull test at a single transistor sample at 3 to 5 frequency points at bias and input power conditions to be defined (TBD) by Customer.
- layout and optimization of input and output networks to obtain target performance on TBD microstrip substrate, with TBD min/max dimensions of the elements.

Procedure: after initial tests and pre-optimization, Customer will be notified of obtainable performance and given the possibility to modify the target and/or layout boundaries to better fit its requirements. Then the final design of a single stage amplifier module will be carried through.

Deliverables: Netlist file (.CKT format), predicted Output Power/Gain performance plots.

Customer supplies two samples minimum of each unit to be tested.

Test and Design results delivered by Focus Microwaves: One to two weeks

Price: On request

Warranty: Focus Microwaves guarantees to handle the parts supplied for test carefully, respect to a maximum the precautions advised by the Customer and return them intact, declines however responsibility for damages due to unpredictable events or extreme, Customer defined, test conditions.

Nondisclosure: Focus Microwaves will keep all information supplied by Customer as well as the results of the Amplifier Designs confidential.

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