

INDIAN INSTITUTE OF TECHNOLOGY KANPUR
Department of Electrical Engineering

Enquiry No.: EE/YSC/2018/08

Opening Date: 27th November, 2018

Closing Date/time: 10AM on 20th December 2018

Sub.: Purchase of Load Pull System between 2 GHz and 18 GHz

Our organization is an educational institute of the repute and liable to get education discount from manufacturer. Please send sealed quotation, to undersigned, for the same.

There will be two steps in the tender process:

1. Technical specifications with compliance table should be put in one sealed envelope. SPECIFY company name and component number, and attach detailed technical specification for each part/component. Also attach technical brochure from manufacturer.
2. Financial details i.e. budget quotation should be in a separate sealed envelope. This quotation will not be opened if technical details of the product do not match with our specifications.

Specifications:

- Please see technical specifications and compliance table. Mark, whether your system complies or not with the specifications along with details.
- Parent company should be an established company with after sales support in India.
- Vendor must provide 3(THREE)-years warranty for all parts/components and servicing.

Technical Specifications and Compliance table:

Introduction: IIT Kanpur is in the process of upgrading the capabilities of its in-house linear and nonlinear model extraction and refinement capabilities for its GaN HEMT process. While the Pulsed IV, Pulsed S-parameters and compact model extraction capabilities already exist, IIT Kanpur desires to upgrade its capabilities to include fundamental-frequency load pull for model validation and refinement as well as for power amplifier design.

The load pull system must integrate seamlessly with the existing Pulsed IV/S-parameter solution (hardware and software) and enable synchronized pulsed-RF pulsed-bias load pull between 2 GHz and 18 GHz. The solution quoted must be turnkey and all required accessories must be supplied with the quoted system to work with our existing equipment.

Existing equipment:

- Cascade 11000 series 200 mm Manual Probe station
- Keysight N5244A PNA-X Microwave Network Analyzer (10 MHz to 43.5 GHz 2-port S-parameter measurement) (N5244A-200, 080, 086, 219, 224, 087, 008, 021, 022, 025, N1966A Pulse/IO Adapter, U8487A Power Sensor; USB average thermocouple)
- Maury Microwave Pulsed IV/RF System (AM3211 Gate Pulser, AM3221 Drain Pulser, AM3203 Control Unit, IVCAD Software Modules (MT930A MT930B, MT930J, MT930K, and MT930P))

Sr.No	Specifications	Description	Compliance and Comments
1.	Required Capabilities		
		Standalone S parameter measurements (CW and pulsed)	
		Standalone IV measurements (DC and pulsed)	
		Synchronized IV/ S-parameters measurements (CW/DC and pulsed)	

		<p>Single-tone and two-tone passive load pull at the fundamental frequency, including the recording of uncontrolled harmonic impedances and powers, for model validation and refinement between 2 GHz and 18 GHz (CW and pulsed) with the following powers 2-18 GHz: 15 W (CW and pulsed)</p>	
		<p>Single-tone and two-tone passive load pull at the fundamental frequency, including the recording of harmonic impedances and powers, for amplifier matching network design between 2 GHz and 18 GHz (CW and pulsed) 2-18 GHz: 15 W (CW and pulsed)</p>	
		<p>Load pull at the fundamental frequency for amplifier stability and ruggedness testing between 2 GHz and 18 GHz (CW and pulsed) 2-18 GHz: 15 W (CW and pulsed)</p>	

2.	Tuners specifications		
2.1	Load Tuner	Qty 1.	
	Frequency range	0.6 GHz to 18 GHz	
	Tuner type	Passive	
	VSWR	Typical 15:1 across all frequencies, Minimum 10:1	
	Min Power handling (W)	50W CW / 500W peak between 0.8-18 GHz	
	Connector	7mm up to 18 GHz	
	Microcontroller	Built -in	
	Interface	Ethernet	
	Repeatability	-40dB or better	
2.2	Source Impedance Control	Ability to plot power, gain and efficiency contours vs tuned source impedance independently of and simultaneously with load impedance control should be included. Additional hardware (i.e. tuner) and/or software should be included in offer. Source contours should be plotted between 0.8 GHz and 18 GHz with a minimum VSWR of 10:1 Across all frequencies.	
3	Software requirements	<p>Load pull measurements which record a- and b-waves at the input and output of the DUT at the fundamental, harmonic, two-tone carrier and intermodulation product frequencies in order to calculate delivered input power, output power, power gain, efficiency, IMD, AM/PM conversion.</p> <p>Standalone CW and pulsed S-parameters measurements, standalone DC-IV and pulsed-IV measurements, and synchronized DC-IV/S-parameters and Pulsed-IV/S-parameters measurements.</p> <p>All measurements properly de-embedded to the DUT reference plane. Additional ability to de-embed extrinsic parameters and perform load pull at the intrinsic reference plane for high efficiency PA design.</p> <p>During-measurement and post-measurement visualization of measured data to plot load pull parameters on XY graphs and Smith Charts, including maximum power, gain, and efficiency.</p>	

4	Accessories		
4.1	Low-Loss Directional couplers (qty 2)	600 MHz to 18 GHz	
		Insertion loss : <0.25 dB up to 8 GHz <0.35 dB 8-18GHz	
		Directivity : > 15 dB up to 8 GHz > 10 dB up to 8-18 GHz	
		Coupling: 30dB +/- 3dB	
		Power handling: Max 500 W CW/ 2KW Peak	
4.2	Bias tees (qty 2)	350 MHz to 18 GHz	
		Max voltage :100V up to 18 GHz	
		Max current : 1A up to 18GHz	
		RF power handling: Max 10W CW / 40W peak	
		Insertion loss : Typ 0.28dB/ Max 0.6dB	
4.3	Power amplifier for input drive signal	<p>Frequency: 2-18 GHz</p> <p>Psat: 16W typical</p> <p>Gain: 41dB typical with manual variable gain control</p> <p>VSWR Max (input) 2:1</p> <p>Max spurious signals better than -65dBc</p> <p>IM3 at 13dB backoff: typical -38dBc</p> <p>Fault protection: overcurrent, temperature</p> <p>Connectors: SMA female</p> <p>Integrated power supplies and cooling</p> <p>LCD display to show status and faults</p>	

4.4	Circulators with terminations	<p>Circulator set as follows:</p> <p>2-4 GHz, 18dB isolation, 0.5dB IL</p> <p>4-8 GHz, 20dB isolation, 0.4dB IL</p> <p>8-18 GHz, 16dB isolation, 0.8dB IL</p> <p>VSWR\leq 1.5:1 for all models</p> <p>Suitable termination for Port 3 of circulator</p>	
4.5	Coaxial calibration kit	<p>(i) SOLT calibration Kit up to 40 GHz with 2.92 mm connector type for on-wafer devices.</p> <p>(ii) TRL calibration Kit up to 40 GHz with 2.92 mm connector type for packaged devices. Standard test fixture must be included.</p>	
4.6	Adapters	<p>As required to connect vendor-supplied and existing equipment and ensure proper operation of the complete solution.</p> <p>All adapters should be precision-grade or higher.</p>	
4.7	Attenuators	<p>Qty: As required</p> <p>Connectors: SMA male-female</p>	
4.8	Phase-stable cable assemblies	<p>As required to connect vendor-supplied and existing equipment and ensure proper operation of the complete solution</p> <p>2.92mm male-to-male</p> <p>Phase stable</p>	

4.9	On-wafer Integration	As required to mount supplied components onto customer-supplied Summit 1100 probe station, using customer supplied RF probes and calibration substrate. At the minimum, vendor must supply RF probe positioners, mounting plates and integration cables (qty 2 each). DC probe positioners will not be used as part of the on-wafer load pull setup.	
5	Power Meter	Peak/pulsed USB Power sensor up to 50MHz to 40 GHz	
6	Integration with existing Pulsed-IV and Pulsed S- parameters System	System must be able to control existing hardware as follows: Keysight N5244A (with options 200, 080, 086, 219, 224, 008, 021, 022, 025) Keysight N1966A System must be able to use existing hardware for pulsed load pull measurements.	
7	Installation and Training	5 days of onsite installation and training of the above equipment	
8	Warranty	1 year for the entire system after successful Completion. Additional 2-year warranty should be quoted as optional.	

Note:

1. Your quotation shall contain Authorization Letter from manufacturer specifically for this tender.
2. Quotation must be valid for 90 days.
3. Delivery period should not be more than **10 weeks**.
4. Send complete detail of the product(s) including brochure from manufacturer.
5. Price must include all taxes and charges.

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