



INDIAN INSTITUTE OF TECHNOLOGY MADRAS

Chennai – 600 036, India

Department of Electrical Engineering

Telephone: +91 (44) 2257 4400 Fax: +91 (44) 2257 4402

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Date: 19-02-2015

Dear Sir,

1. Quotation are invited in duplicate for the items as a group specified below/overleaf/enclosed.
2. The quotations duly sealed and superscribed on the envelope with the Reference No. and due date, should be addressed to the undersigned so as to reach him/her on or before the due date stipulated above.
3. The quotations should be valid for sixty days from the due date and the period of delivery required should also be clearly indicated.
4. If the item is under DGS &D RATE CONTRACT, RC No.and the price must be mentioned. It may be also please be indicated whether the supply can be made direct to us at the Rate Contract price. If so, please send copy of the RC (Please note that we are not Direct Demanding Officers)
5. Relevant literature pertaining to the items quoted with full specifications (and drawing, if any) should be sent along with the Quotations, wherever applicable. Samples if called for, should be submitted free of charges, and collected back at the supplier's expenses.
6. Local Firms : Quotations should be for free delivery to this Institute. If Quotations are for Ex-godown . delivery charges should be indicated separately.
7. Firms outside Chennai: Quotations should be for F.O.R. Chennai. If F.O.R. consignor station, freight charges by passenger train/lorry transport must be indicated. If Ex-godown, packing, forwarding and freight charges must be indicated.
8. The rate of Sales/General Taxes and the percentage of such other taxes legally leviable and intended to be claimed should be distinctly shown along with the price quoted. Where this is not done, no claim for Sales/General taxes will be admitted at any stage and on any ground whatsoever . The taxes leviable should take into consideration that we are entitled to have concessional Sales Tax applicable to non-Government Educational Institutions run with no profit motive for which a concession. Sales tax Certificate will be issued at the time of final settlement of the bill.
9. Goods should be supplied carriage paid and insured.
10. Goods shall not be supplied without an official supply order.
11. Payment: Every attempt will be made to make payment within 30 days from the date of receipt of bill/acceptance of goods, whichever is later.

Specification Enclosed

Yours Sincerely
S. Aniruddhan
Assistant Professor,
Department of Electrical Engineering,
IIT-Madras, Chennai 600036.

We require the RF equipment with the following key specifications (All Products should be quoted together):

A) Specification for Phase Noise Test System

1. Frequency Range : 10 MHz to 7 GHz
2. Minimum Input Level : -20 dBm
3. Offset Frequency : 1 Hz to 100 MHz
4. Measurement Parameters: SSB phase noise [dBc/Hz], Spurious noise [dBc], Integrated rms phase deviation [deg, rad] or time jitter [s], Residual FM [Hz rms]
5. Frequency transient capture range: up to 80 MHz in narrow band, up to 4.8 GHz in wide band
6. AM noise measurement and phase noise measurement without changing RF connection
7. Spectrum monitoring up to 15 MHz span in a real-time mode
8. Simultaneous transient measurements for frequency, phase and power over time
9. Clock jitter measurement with femto-second resolution
10. Frequency resolution: 10Hz, 1 KHz, 64KHz
11. Sweep Measurement Time: 10us to 10 S
12. Phase Noise Sensitivity @ 1 GHz
 - a. @ 100 Hz Offset : -116 dBc/Hz
 - b. @ 1kHz Offset : -135dBc/HZ
13. Should support Two External Frequency Ref for Cross-Correlation
14. Frequency Transient Bandwidth (Narrow Band) : 80 MHz max
15. Should be able measure the following at the same time : Frequency (Narrow Band, Wideband), Power (Narrow Band) and Phase (Narrow Band)
16. Capability to upgrade the frequency range to 26.5GHz

B) Specifications for Signal Analyzer

1. Frequency Range : 3 Hz to 26.5 GHz
2. Maximum Input Level : +30 dBm
3. Analysis Bandwidth of 10MHz and Upgradable upto 160MHz
4. Built in Preamp upto 26.5GHz
5. Input Attenuator Range : 0 to 70 dB in 2 dB steps
6. Frequency Response : ± 0.46 dB @ 10 MHz
7. Preamplifier : Upto 26.5 GHz
8. DANL : -172 dBm @ 5.95 GHz
9. Phase Noise accuracy upto : ± 0.20 dB
10. Frequency Span: Zero Span, 10 Hz to 26.5GHz
11. Min Sweep time: 1us at zero span and 1 ms at non zero span
12. Built in Noise Floor enhancement
13. Trace Detectors: Normal, peak, sample, negative peak, average (log-power, RMS, voltage)
14. Built in persistence spectrum and spectrogram
15. Should have Phase Noise Measurement application with one button measurement for analyzing phase noise in frequency domain (log plot) and time domain (spot frequency)
16. Modulation Analysis: AM,FM, BPSK, QPSK, 16QAM, 64QAM, GSM, Bluetooth,
17. Capability to upgrade for Baseband inputs and for Real time spectrum analysis
18. 15 Licenses of Vector Signal Analysis software required (should support as many signal standards and modulation types as possible)
20. The Demodulation software should support the below modulation techniques
 - Cellular communications: LTE- Advanced, LTE, W-CDMA HSPA+, GSM/EDGE

- Evolution, cdma2000®, TD-SCDMA
- Wireless connectivity: 802.11a/b/g/ac,, 802.11n, 802.16 ,OFDMA, WiMAX™, Bluetooth®, Zigbee, UWB, RFID
- Aerospace, defense and satellite applications: custom APSK, FSK, BPSK, QPSK, QAM, StarQAM, APSK, VSB
- Custom OFDM:
- MIMO and multi- channel test

The Software should have the below capabilities

- 20 traces, each with unlimited markers
- Create and run multiple independent measurements, simultaneously
- analysis of multiple component carriers simultaneously

Software should have the standard tools for constellations, IQ parameters and overall EVM

The software should be able to installed in a PC/PC based instruments and should support multiple instrument platform.

C) 20 GHz Local Oscillator

1. Frequency Range : 9kHz to 20 GHz
2. Resolution : 0.01 dB
3. Max standard output power :+18 dBm
4. SSB Phase Noise : -129dBc/Hz @ 250 MHz
5. Operating Temperature Range : 0 to 55 C
6. Calibration Cycle : 36 Months