SPECIFICATION FOR
Multi channel Isolated Digitized Transient Data Recorder, Acquisition cum Analyzer

1. **Code No: CU9095004645**
2. **Location: BHEL-EDN, COE for Power Electronics**
3. **List of Items with required Quantity**

	Description	Qty
a.	Tower Mainframe	2 Nos
b.	Receiver Card	4Nos
c.	Transmitter	8 Nos
d.	Heavy Duty Fibre Optic Cable Pairs	8Nos
e.	1000X medium voltage probe	2 Nos
f.	1000X HV Probe	2Nos
g.	Standard Software	2 Nos

Detailed Specification as per Sl No 4

4. Detailed Specification

4.1 Main Frame

4.1.1 Minimum number of slots	i. Should accommodate a min of 6 I/P modules. ii. Desktop model.
4.1.2 PC interface	High speed Ethernet interface of 1 GB/s
4.1.3 Triggers	Multiple trigger domains-level, pulse, gradient, window, TTL
4.1.3.1 Trigger Synchronization	On all Channels
4.1.4 Local display/control	By connecting an external monitor or External Computer connected through Ethernet
4.1.5 Operating Temperature	5 to 35deg C
4.1.6 Power	100-260Vac,50 Hz,450WMax
4.1.7 High speed Ethernet	
4.1.7.1 Transfer Rate	Typical: 12 Mega Sample per second,(24 MByte/s) through 1 Gbit Ethernet Maximum: 15 Mega Sample per second (30 MByte/s) through 1 Gbit Ethernet
4.1.7.2 High Speed option	High speed Ethernet option for additional transfer speed for streaming mode acquisitions through the Ethernet connection to PC. In typical situations transfer will be twice as fast compared to the standard transfer rate
4.1.8 Acquisition modes	
4.1.8.1 Recorder	for continuous acquisition
4.1.8.2 Scope	for repetitive phenomena
4.1.8.3 Transient	for intermittent events
4.1.9 Data storage	
4.1.9.1 Recorder	i. Spooled directly to hard disk of control PC ii. Unlimited file size or duration which is limited by only hard disk size.
4.1.9.2 Scope	store in transient memory
4.1.9.3 Transient	store in transient memory
4.1.10 No. of Receivers	Should accept minimum 8 isolated fibre optic inputs and upgradable to 24

4.2 Receiver Card

4.2.1 Input type	single-ended to isolated common (unbalanced differential) Optical Receiver
4.2.2 Number of Channels	4 (optical Isolated)
4.2.3 Sampling Rate	100MS/s @14 bit (Maximum sample rate of 25MS/s when all the four channels are used simultaneously)
4.2.4 Coupling	AC / DC
4.2.3 Ranges	+/-1V to +/- 100V
4.2.4 Offset	Automatic/programmable
4.2.5 Impedance	1 M Ohm (± 2 %) // 20pF-38 pF (± 5 %)
4.2.6 Bandwidth	100MS/s, 25 MHz @ –3 dB
4.2.7 Rise time	14 ns at 100MS/s
4.2.8 CMRR	60-70dB,Typical
4.2.9 Offset error	0.1 % Full Scale
4.2.10 Noise (RMS)	0.1 % Full Scale
4.2.11 Overload	180 V peak protected for greater or equal to ± 2 V 125 V peak protected for less than ± 2 V
4.2.12 Recovery time	10 ns to 10 % accuracy 30 ns to 1 % accuracy 40 ns to 0.1 % accuracy after 200 % overload
4.2.13 Non-Linearity	0.05%Max
4.2.14 Acquisition	
4.2.14.1 Sample rate	100 MHz @ 14 bit
4.2.14.2 Sampling	i. single ADC per channel, ii. synchronous between channels
4.2.14.3 ADC	14-bit
4.2.14.4 Anti Aliasing Filter	Bessel low pass
4.2.15 Transient memory (receiver side)	Standard 400 Mega Sample memory per card, shared by enabled channels
4.2.16 Triggering	
4.2.16.1 Pre/post	0 to full memory length
4.2.16.2 Rate	every 100 ms, up to 10 triggers per second
4.2.16.3 Resolution	10ns at 14 bit

4.3 High voltage fibre optic isolated Transmitter

4.3.1 Bandwidth	100 MS/s @14 bit
4.3.2 Shielding	Proper shielding to provide maximum isolation in High Voltage/High Current environment
4.3.3 Power supply	Internal removable batteries
4.3.4 Operating temperature	0 – 40 deg
4.3.5 Battery	Maintenance free, rechargeable battery with external charger.
4.3.6 Isolation	Fully floating
4.3.7 Battery operation time	Continuous operation up to 8 hrs
4.3.8 Battery life time in 'sleep'	80 hours
4.3.9 Power switch	Power on /off
4.3.10 Battery status indicator	To be provided either in hardware or software.

4.4 Fiber Optic Link between Receiver and Transmitter

4.4.1 Transfer rate	2 Gigabits/s
4.4.2 Connections	4 Channel per receiver board
4.4.3 Wavelength	850 nm
4.4.4 Cable length	50 meters

4.5 Medium Voltage Probes

4.5.1 Input voltage	Voltages up to 6.0 kV Peak Pulse, up to 4.0 kV DC incl. pk AC and up to 2.8 kV AC rms CAT.II
4.5.2 System bandwidth	Up to 400MHz
4.5.3 System rise time	0.9 ns
4.5.4 Input R	50 M Ohm
4.5.5 Input C	< 6.5pF
4.5.6 Attenuation	1000/1
4.5.7 HF adjustment	To be provided
4.5.8 DC fine adjustment	+/- 3%
4.5.9 Design standard	IEC 61010-0-031
4.5.10 Cable length	2 meters

4.6 High Voltage Probes

4.6.1 Input voltage	Voltages up to 40 kV Pulse Peak, 20 kV DC incl. peak AC, 14 kV AC rms CAT.II
4.6.2 System bandwidth	Up to 100MHz
4.6.3 System rise time	3.5 ns
4.6.4 Input R	100 M Ohm
4.6.5 Input C	< 2.5pF
4.6.6 Attenuation	1000/1
4.6.7 HF adjustment	To be provided
4.6.8 DC fine adjustment	+/- 3%
4.6.9 Cable length	3 meters

4.7 Data Acquisition & Analysis Software

4.7.1 Control & Analysis software	Control & Viewing software for set up, control and display
4.7.2 Features	i. Real time display, control and analysis ii. Play back and analysis iii. Multiple Exports to different data formats iv. Multi monitor, workbook control v. Analysis based on formula data base vi. Generating Reports, Info Sheets vii. Ultra fast display technology for review of Giga bytes of data in seconds.
4.7.3 Generic	
4.7.3.1 Signal Start, Signal End	Finding the start or end of a signal (e.g. start or stop of current), even if the recorded trace contains spikes.
4.7.3.2 Next Zero Crossing, Previous Zero Crossing	Finding the next or previous zero crossing from a given position.
4.7.3.3 Next Slope At Zero Crossing, Previous Slope At-Zero Crossing	Calculating the slope (e.g. di/dt) at the next or previous zero crossing.
4.7.3.4 Next Crest Value, Previous Crest Value	Calculating the next or previous crest from a given position, even if the signal contains noise and/or spikes.
4.7.3.5 Next Crest Time, Previous Crest Time	Finding the correct time of the next or previous crest found by Next Crest Value or Previous Crest Value.

4.7.3.6 First Maximum Crest Value, First Maximum Crest Time	Finding the value and the position of the first maximal crest in asymmetric signals (may be first or second crest)
4.7.3.7 Value	Calculating the value of a waveform at a given position, even if the signal contains noise.
4.7.3.8 Next 3Crest RMS, Previous 3Crest RMS	Calculating the equivalent RMS value of a pure sinusoidal waveform at a given position with the 3-crest method.
4.7.3.9 Next True RMS, Previous True RMS	Calculates the RMS value at a given position of a distorted waveform between zero crossings with the true RMS method.
4.7.4 Transient Recovery Voltage (TRV)	
4.7.4.1 '2ParamTRV_Uc, _t3, _td'	Calculates the 2-parameter TRV values Uc, t3 and td of a voltage.
4.7.4.2 '4ParamTRV_U1, _Uc, _t1, _t2, _t3'	Calculates the 4-parameter TRV values U1, Uc, t1, t2 and t3 of a voltage.
4.7.4.3 Over Voltage Value, Over Voltage Time	Calculates the value and the position of the maximum, even if the signal contains noise or a spike.
4.7.5 Short Time Current (STC)	
4.7.5.1 STC Value, STC Duration	Calculates the RMS value and duration of a STC current signal with the 3-crest method.
4.7.5.2 Shorter STC Value, Shorter STC Duration	Calculates the RMS value and duration of a shorter-STC current signal with the 3-crest method, but taking less crests into account than the standard STC function.
4.7.5.3 '3CrestDC'	Calculates the asymmetry of a signal at a given position and returns the percentage value of the DC component, using the 3 crest method.
4.7.5.4 Exp Crest DC, Exp Delay Crest DC, Exp Factor- Crest DC, Exp Offset Crest DC	Calculates the 4 parameters (tau, t0, alpha and C) of the DC component of an asymmetric current (STC). The 4 parameters allow reproducing the exponential DC component as a waveform.

4.7.6 Offline analysis	i. View and post analysis data without instrument based on formulae data base ii. Basic math + - * / ( ) iii. Advanced Math Invert, Abs iv. Statistical Area, Energy, Max, Max Pos, Mean, Min, Min Pos, RMS, Std Dev v. Goniometric Cosine, Sine vi. Search Next Level Crossing, Previous Level Crossing vii. Miscellaneous Cut, X Shift viii. Information Sweep, Trigger Time, Value, X Delta, X Delta High, X Delta Low, X First,, X Last, Length ix Generation Square Wave, Ramp, Sine Wave.
4.7.7 Automation and batch processing	For unattended recording

4.8 PC requirements	Minimum configuration of PC required for the operation of the system to be specified
4.9 Software requirements	Details of software required for the PC and any other software required for the optimum use of the system to be furnished.
4.10 Analysis Software	Analysis Software**.** For display, analysis and reporting. Includes extensive time and frequency-domain analysis such as spectrum and signal filtering. Place 2-D and 3-D plots and tables in a report, word processor or web site.
4.11 Software License	Details to be provided

5. Optionally quote for the following items

a. PC - 1 Nos
b. HV Probes - 3 Nos
c. MV Probes - 3 Nos
d. Additional License for 4 PCs
e. 2 years recommended Maintenance spares
f. Annual Maintenance contract details
g. Calibrating the equipment on yearly basis

6. Deviations

Deviations if any taken by the supplier to be clearly mentioned under the heading 'Deviations' in the technical offer.

7. Qualification Criteria

a. Supplier should have supplied similar equipment and it should be in working for the past 3 years. Supplier to give details of such installations.
b. The vendor shall be an Original Equipment Manufacturer (OEM). Only the OEM or their authorized dealers in India along with an authorization letter can submit offers. An authorized Representative/Dealer in India, cannot quote for the same equipment from more than one OEM.
c. The offer shall be only for Standard Catalog Items from the manufacturer and not custom-made one. All the specifications should be supported by Standard Catalogs and Data Sheets of the manufacturer.
d. Offer shall be for new equipment and not for any refurbished / used equipment. All the parts used in the machine shall also be new and not used / refurbished ones. A declaration to the above effect to be furnished.
e. Foreign OEM shall have Authorized Indian dealer(s) / representative(s) for after-sales service and support. The authorization letter for the dealer/ representative shall be provided.
f. The vendor or their authorized service representatives shall have trained engineers in India for commissioning & service for the offered equipment and shall be in a position to provide prompt after sales service and spares support for our installations.
g. The vendor shall be in a position to undertake AMC or provide service support for the equipment supplied, after the expiry of the warranty/ guarantee period either directly or through a service representative.
h. The vendor shall furnish a comprehensive warranty for at least 12 months from the date of commissioning.

8. Installation/Commissioning

The equipment should be installed in BHEL's premises in Bangalore as and when required by BHEL. The equipment should be successfully Installed / commissioned and demonstrated by the successful bidder.

9. Spares

Mandatory spares required for the reliable and optimum use of the equipment to be supplied.

10. Manuals

Successful bidder should provide user manual for the equipment which should include user instructions for the hardware and software, details of the hardware and its parts and the maintenance instruction of the system. The manuals are to be provided in hard copy (2 copies) and in soft format.

11. Calibration certificate

Successful bidder should provide calibration certificate for the system and the details of the calibration procedures.

12. Post warranty calibration and repair

Supplier should mention how & where the post warranty calibration and repair of the system will be done.

13. Experience list

Bidder to furnish documents corroborating their experience in manufacturing /supplying equipments and systems of this kind, list of clients and other references along with dates of supply and commissioning.

14. The successful bidder will be responsible for the entire system as a whole irrespective of the individual components being sourced from different suppliers/ manufacturers.

15. Training

The successful bidder shall provide training for two BHEL personnel at the premises of the manufacturer in the field of operation and maintenance of the equipment for a cumulative period of 10 man days free of cost. Travel and living expenses shall be borne by BHEL.

16. Warranty

Complete system with controls shall be warranted for satisfactory and trouble free operation for a period of at least 12 months from the date of commissioning.

17. The Bidder has to submit the clause wise confirmation/comments in the following format.

Clause No	Confirmation (yes/no/others)	Details/Comments
1 to 16		