

Technical Specifications for Hil Simulator**Bidder Eligibility Criteria-I**

Sl. No	Bidder Eligibility Criteria-I	Complied / Not Complied	Reference Page No.	Remarks, If any
1	The bidder/OEM should have supplied at least 5 similar items to IITs, NITs, IISERs, CSIR Labs or other Govt. organizations in the last 10 years, PO copies or installation certificates along with contact details of end user need to be submitted as the proof of supply. IIT Madras reserves its right to verify the claims submitted by the bidder and the feedback from the previous customers will be part of technical evaluation.			

Technical Specifications II

SPECIFICATIONS			Complied/Not Complied	Reference Pg.No
Processor	Main processor	<ul style="list-style-type: none"> 8-Core FPGA for enabling short compilation time and low latency for small time-step simulation. (ZU9EG Zynq UltraScale+ MPSoC) 		
	Co-processors	3x ARM, for simulation in signal domain		
Channels	Analog inputs (AI)	<ul style="list-style-type: none"> Number: 32 Voltage range: Fully selectable with ± 10 V Input resistance: 30 kΩ Sampling rate: 1 Mega samples per second (All channels simultaneously) Resolution: 16 bit, 1% accuracy ± 24 V tolerant ESD protection 		
	Analog outputs (AO)	<ul style="list-style-type: none"> Number: 64 Voltage range: Fully selectable with ± 10 V Output current: 20 mA (for 5 V) 4.5 mA (for 10 V) Sampling rate: 1 Mega samples per second (All channels simultaneously) Output delay: 340 ns Resolution: 16 bit, 1% accuracy ± 24 V tolerant ESD protection 		
	Digital inputs (DI)	<ul style="list-style-type: none"> Number: 64 Voltage range: 0-2 V Sampling rate: 50 MHz Sampling resolution: 20 ns (on all channels) ± 24 V tolerant ESD protection 		
	Digital outputs (DO)	<ul style="list-style-type: none"> Number: 64 Voltage range: 0-5 V 		

		<ul style="list-style-type: none"> • Sampling rate: upto 280 Mega samples per second • Atleast 12 channels capable of PWM modulation with 7 ns resolution • Output delay: 150 ns • ± 24 V tolerant ESD protection 		
Built-in scope		Yes		
Machine models support		Basic Advanced		
Connectivity	Ports for communication over standard communication protocols	Ethernet, EtherCAT, CAN, FDCAN, RS232, GPIO, HSSL, JTAG, USB 3.0, SFP, QSFP, IRIG-B		
Compatibility		<ul style="list-style-type: none"> • HIL DSP Interface • HIL Breakout board • HIL dS Interfaces • HIL uGrid DSP Interface • HIL Connect 		
Power Supply		<ul style="list-style-type: none"> • 230 V, 50Hz 		
Software	HIL Control Center	<p>Simulator should not be dependent on any third-party simulation software. It must have its own simulation software with below mentioned specifications:</p> <ul style="list-style-type: none"> ✓ Academic premium toolbox package with Graphical User Interface (GUI/SCADA). ✓ Modeling environment for plant as well as Signal Processing with embedded library of components and toolboxes like, i) Converter toolbox, ii) Microgrid toolbox, iii) Power System toolbox, iv) Signal processing toolbox, v) Test Suite and vi) Communication toolbox having IEC61850, UL 1741, CAN Bus protocol, Ethernet, DNP3, MOD Bus protocol etc. ✓ Option for importing code generated for controller from simulation software like MATLAB, Simulink, LabView, PSIM etc. ✓ All the switching components in library should have Internal (for simulation and real-time simulation) or external (HIL simulation) both control option during modeling. ✓ Ability to run Plant simulation without controller if required for feasibility testing of plant. ✓ High resolution built-in real time signal monitoring oscilloscope with 		

		<p>16 channels.</p> <ul style="list-style-type: none"> ✓ Dedicated solvers for switching devices, machines, signal generators, LUTs, etc. are available with simulation software. ✓ Simulation of numerical signals with multiple execution rates ✓ Test environment for testing models and generating Test-Reports. ✓ Scripting Environment based on python. In-built API for automation as well as for communicating with other simulation software. ✓ Option for importing .dll files generated from PSCAD, EMTP, PSSE-DigSilent etc. 		
Capabilities		<ul style="list-style-type: none"> • Minimum simulation step time of 200 ns <ul style="list-style-type: none"> ✓ For RT simulation of maximum 8 switching converter models (3ph, 3 levels) ✓ For RT simulation of 60 averaged converter models (3ph) • Minimum step time of 3 μs -1 s <ul style="list-style-type: none"> ✓ For RT simulation of 150+ (3ph) nodes /buses with complexity • RT simulation of power electronic converters with switching frequency up to 500 kHz. • RT simulation of up to 24 DER models (3ph) • Option for Time synchronization i.e.PPS and IRIG-B inputs. 		
Applications of the Simulator		<ul style="list-style-type: none"> • Grid connected converter applications. • Power System and its applications • Renewable energy applications. • Microgrid and Smart Grid applications. • Parallel and Multilevel converter topologies. • Electrical and industrial drives applications. • Electric Vehicle Application • Pre-certification of smart inverter controllers 		
Warranty		<ul style="list-style-type: none"> • 3 years from the date of installation 		

(Note: It is mandatory for the bidders to provide the compliance statement in tabular column format along with catalogue page number (comply/not comply) for the Above points with document proof as required. Failing which bidders will be technically disqualified)