



Typhoon HIL506

Integration. Scalability. Versatility.

Perfect for power electronics systems, motor drives, and grid modernization applications, the HIL506 is derived from our flagship hardware, tailored specifically for mid-range applications.



HIL506 Highlights

The HIL506 is engineered to offer a versatile and affordable solution without sacrificing performance, seamlessly bridging the gap between our entry - level and high - end devices. Perfect for both industrial and academic settings, it sets the industry standard for ultra-low - latency, high - fidelity, real - time emulation with powerful, user - friendly, Python - based software. Whether you're testing a single power electronics converter control or managing a complex multi - converter system, the HIL506 delivers an integrated, scalable solution that grows with your needs.

Our HIL506 device enables:

- Unleash the 6-core processor HIL for real-time emulation of complex multi converter topologies.
- Emulate your power stage with down to 200ns simulation time step (typically under 500ns).
- Replicate your fast switching DC - DC converter with 25 nanoseconds simulation time step.
- Interface your controller via 32 analog outputs, 16 analog inputs, 32 digital inputs, and 32 digital outputs.
- Digital inputs sampling every 3.5ns for great simulation accuracy.
- Dive deeply into your system behavior with 32 - channel 64 mega sample capture function running at full simulation rate.
- Build converter models using our extensive library of power electronics components and prepackaged examples.
- Automate testing with the power of Python for the most comprehensive control software validation.
- Connect up to 16 units in parallel for extended simulation and IO capacity.
- Connect to host PC via Ethernet or USB 3.0.
- Cross-device paralleling with HIL606.

Device Configuration Table

HIL Device

HIL506

Param name \ Configuration	1	2	3
Standard Processing Cores	4	6	2
SPC peak processing power [GMAcs]	1.12	1.12	1.12
SPC matrix memory [KWords]	16.0	16.0	64.0
Max converter weight (ideal switches)	3	3	4
Contactors (ideal switches)	6	6	6
Non-ideal switches	32	32	32
Time varying elements	16	16	16
Global GDS oversampling	yes	yes	yes
Switch-level GDS oversampling	no	no	yes
GDS switching delay	yes	yes	yes
Converter power loss calculation	yes	yes	yes
Converter forward voltage drop	yes	yes	yes
Machine solvers	1	0	0
Nonlinear machine support	yes	no	no
Nonlinear machine LUT size [KWords]	32	0	0
Absolute encoder protocol support	yes	no	no
DC-DC converter solvers	0	0	2
Signal generators	12	12	12
Look Up Tables	8	8	8
PWM modulators	12	12	12
PWM analyzers	4	0	0
Parallel DTV detectors	3	3	3
Interfaces			

HIL506 Technical Details

Processor	Up to 6 core
Channels	16 x Analog inputs (AI); 32 x Analog outputs (AO); 32 x Digital inputs (DI); 32 x Digital outputs (DO)
GDS Oversampling Resolution	3.5ns
Resolution	16 bit
Analog IO Voltage Range	± 10 V
Built-in Scope	Yes
Connectivity	1 x USB 4 x Ethernet 2 x CAN Bus 2 x CAN FD 1 x RS232 1 x Time synchronization (IRIG-B) 2 x EtherCAT 2 x SFP 2 x QSFP 1 x GPIO 1 x JTAG
Compatibility	HIL DSP Interface; HIL Breakout board; HIL dSpace Interface; HIL uGrid DSP Interface
Software	Typhoon HIL Control Center (THCC)
Power	110 - 240 V, 250 W, 50/60 Hz
Housing	483 x 353 x 88 [mm], 5.5 kg

Software Key Features:

Environment:	Typhoon HIL Proprietary modeling environment for high – fidelity real time simulation of power electronics and highly dynamic power systems.
HIL Software Tools:	Schematic Editor HIL SCADA Python Based TyphoonTest IDE Waveform Generator Signal Analyzer
License:	Permanent (lifelong) software tool-chain license, quarterly updates / upgrades.
Toolboxes:	Signal Processing toolbox, Power Systems toolbox, Microgrid library toolbox, Communication toolbox, API support (MATLAB, LabView and other software). PHIL Toolbox, Converter toolbox, Machine Toolbox, PSIM & JMAG Compatibility.
Simulation Capabilities:	Embedded library of power electronics, power systems and microgrid components. Real time simulation of power electronics converters with high switching frequency. Open/closed loop HIL testing and RCP Simulation of detailed IEEE distributions systems Simulation of detailed models of PV and WIND (DFIG and PMSG based) plants Control algorithm development and validation for laboratory scale converters used in renewable energy, power quality applications etc. Simulation and testing of industrial controls for drives such as Direct Torque Control, V/f etc. Control algorithm development and validation for drives applications, and SMPS and UPS Development of custom logic & algorithms used in advance control schemes (C function and Advanced C function) dedicated solvers for Drives and Power electronics.
Others:	Test automation (scripting) using python Development support for project specific components. Ability to edit parameters of the system during real time execution. Internal PWM generator Offline simulation supported communication protocols: 1 x USB, 4 x Ethernet, 2 x CAN Bus, 2 x CAN FD, 1 x RS232, 1 x Time synchronization (IRIG-B), 2 x EtherCAT, 2 x SFP, 2 x QSFP, 1 x GPIO, 1 x JTAG

Area of Application

Power Electronics	Electric Drives	Power Quality	Power Plant Engineering
Marine	Traction	Energy Storage	Signal Processing
Pre-certification	Rapid Control Prototyping	Adaptive Control	Real Time Simulation
Renewable Energy Solar Power, Wind Power	Power System Analysis and Studies	Different Loads (Variable, resistance, inductance)	Electric Vehicle & Plugged – in – Hybrid Electric Vehicle
Controller Hardware-in-Loop Studies (C-HIL)	HVAC, HVDC, FACTS Devices	Micro Grid	Smart & Microgrid Testing, commissioning & communication
MMC Studies	PHIL (Power Hardware in Loop Studies)	Biomedical Application	Power Quality Studies, Aerospace

Seamless Integration for Diverse Applications.

Experience the simplicity of compiling models, interacting with real-time simulations, and automating tests —even if you’re new to HIL. Multi-unit HIL506 testbeds can simulate extensive systems with over a hundred power electronics converters, showcasing unparalleled performance.





HIL Accessories



HIL101



HIL404



HIL606



e-Mobility TestBed



Microgrid TestBed



Smart Charging TestBed



HIL101

The HIL101 is an FPGA-based simulator designed for educational settings, offering high precision and advanced features at an affordable price. It supports real-time control prototyping and general simulations, allowing seamless integration of power stage models with Typhoon HIL's software. The HIL101 includes a built-in mixed-signal oscilloscope and is compatible with various popular third-party tools, making it an ideal choice for validating controller performance in academic research in power electronics.

HIL404

Our HIL404 delivers the unprecedented model fidelity needed for the most advanced motor drives and automotive power electronics applications. By leveraging the ultra-high fidelity and ease-of-use of the existing Typhoon HIL solutions, and by bringing the extra speed to the table, the HIL404 makes the HIL testing methodology truly applicable for the emerging high frequency power conversion applications.

HIL606

Our HIL606 is our top-of-the-line product which encompasses the best features from our entry level devices together with our mid-tier devices providing the perfect balance of speed, power, and flexibility to integrate and scale seamlessly. With these unique connectivity options, your controller won't know the difference between your test models and the devices in the field, no matter your use case.

Microgrid Testbed

A Microgrid Testbed is a collection of HIL devices with integrated protection relays, microgrid controllers and controllers of solar inverters, battery inverters, diesel gensets, fuel cells, etc. The main purpose of the Microgrid Testbed is to comprehensively test and validate primary and secondary control, communications and protection under all operating conditions including faults in both the islanded and grid-connected mode. Moreover, Microgrid Testbed can perform all its tests and generate its test reports in the fully automatic mode, thus boosting the productivity and improving test coverage even further.

Typhoon HIL's Accessories

HIL interfaces play a critical role in HIL testing setups by enabling the seamless integration of real hardware into the simulation environment, facilitating accurate and efficient testing and validation of control systems in a controlled and safe manner. Typhoon HIL offers a wide variety of essential interfaces to create seamless integration and interaction to assess data communication, signal conditioning, real-time processing, I/O connectivity, communication protocols, safety features, and more.



HIL Connect



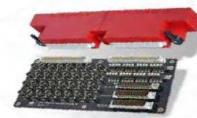
HIL Breakout Board



HIL TI Launchpad Interface



HIL Calibration Card



HIL DS Interface



HIL BMS Interface

Original Equipment Manufacturer

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