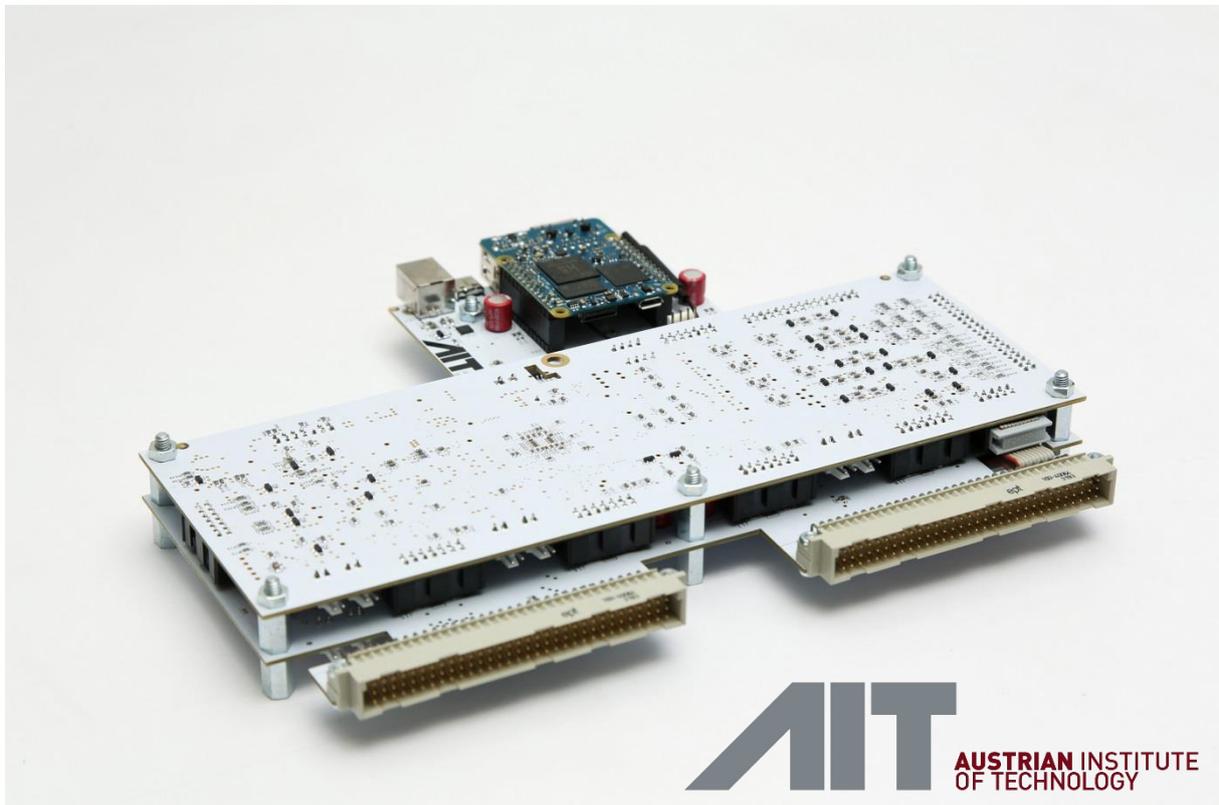# AIT Vindobona General Purpose Inverter Controller (GPIC) Kit

AIT's Vindobona GPIC is a DSP based general purpose inverter control platform designed for rapid controls prototyping and development in power conversion applications. It's employable in both a hardware-in-the-loop (HIL) simulation and a real power converter.

Key features:

- Provisions for any power converter topologies
  - AC/DC, DC/AC, 1,3ph,4ph 2-level and multi-level
  - DC/DC – Hard, Soft, Resonant switched
  - Cascaded DC/DC+DC/AC
  - Line Commutated Rectifiers
- C-code or Model based control development with optimised code-generation
- Rugged design proven in harsh industrial environment subjected to wide range of temperature swings and highly polluted EMC environment
- Normalized Inputs/Outputs (IOs) for simplified integration with a power converter via pre-conditioning modules (optional)
- Gate drive hats (optional) for support of various logic and voltage levels, current driven and fiber optic gates signals for driving power trains from few Watts to several Mega Watts
- Ready-made hardware-in-the-loop (HIL) interface accessory kit (optional)
- AIT firmware stack and built-in bootloader allowing for secure remote field upgrade
- Built in hardware protections and application specific and user settable firmware faults
- Includes a widgets based user-interface suitable for a custom-made applications
- Includes powerful AIT diagnostics featuring Data logger and Scope/Phasors/Locus tool
- Reference designs and examples
- Technical documentation and support
- Design support (Limited)
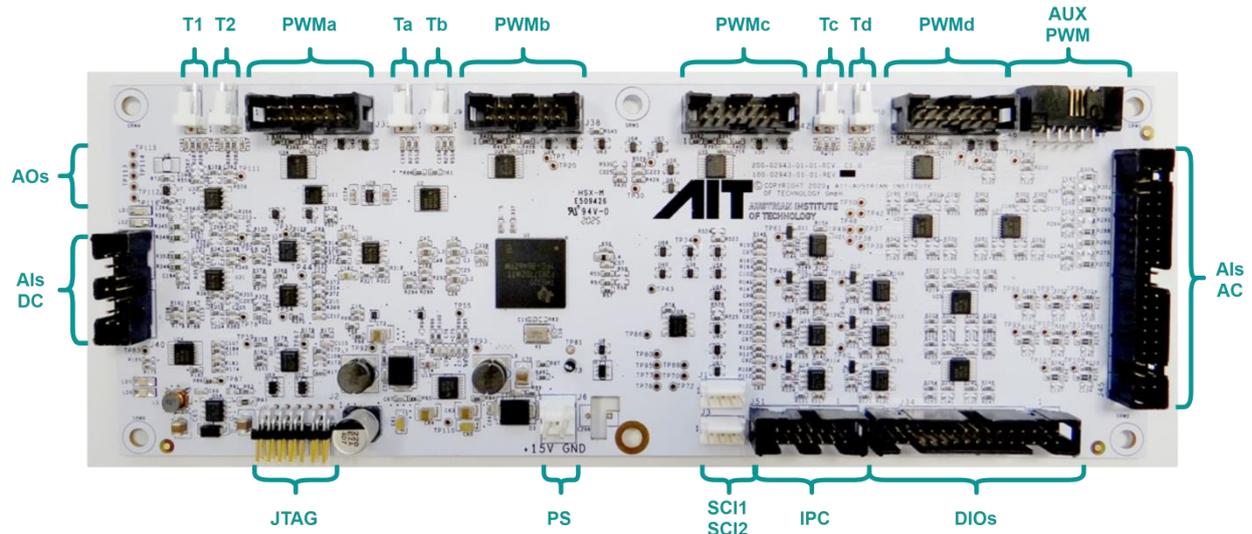
Item	Description	Notes / Ranges
PWMa, PWMb, PWMc, PWMn, AUX PWM	Logic level PWMs & HW signals & temperature measurement	20 PWMs / 0..3.3V 1 DO HW ENA / 0..3.3V 1 DI HW FAULT / 0..5.0V Ta...Td/0..10mA / 0..3.0V
AIs DC	Analog Inputs DC side	3 VDC AIs /0..5.0V 1 VDC AI /0..5.0V or IDC AI 1 IDC AI / -45..45mA* 1 DI & 1 DO / 0..3.3V +3.3V
AIs AC	Analog Inputs AC side	9 VAC AIs / -5..+5V 8 IAC AIs / -60..60mA* 2 GP AIs / 0..+3.0V +1.5V Ref, +3.0V Ref +3.3V
AOs	Analog Outputs (optional)	4 AOs / 0..3.0V
DIOs	Digital Inputs and Outputs	25 DIOs / 0..3.3V
Ta, Tb, Tc, Td, T1, T2	Temperature measurements	Ta...Td / 0..10mA/0..3.0V T1,T2 / 0..3.0V
SCI1, SCI2	Serial Interfaces	GUI/CLI/Diagnostic Tool
IPC	Inter-processor communication port	Not used
PS	Power Supply	4.5..15V / 1A
JTAG	DSP JTAG	Not used

* by default, scalable to accept wider current transducer signals or bipolar voltage signals 0..3.0V referenced to +1.5V Ref

Note: Exact pinout available at request

Size (L x W x H): 24 x 8.68 x 1.27 cm or 9.460 x 3.420 x 0.500"

Mounting orientation: Horizontal or Vertical (along longer side)

Connectors: Standard 0.1" vertical, horizontal female sockets and flat cables

Pre-conditioning: Modules available for preconditioning of the AC and DC voltage and current ranges from 0...3.3kV and 2...+2kVA respectively

Gate drive hats: Digital logic and voltage levels, current driven and fiber optic gates signals for driving power trains from few Watts to several Mega Watts

AIT's Vindobona GPIC Packages

	Vindobona GPIC Kit B2B	Vindobona GPIC Kit Free*
HIL interface Accessory Kit	Optional	Optional
Reference Power Converter Applications	✗	✗
Diagnostics & FW/SW update	✓	✓
HW Protections and FW Faults	HW Protections only	HW Protections only
Connectivity	✗	✗
AIT firmware stack	✓	✓
Documentation	✓	✓
RCP Reference Design & Examples	✓	✓
Design support	✓	✗
Technical support	✓	✓

- Reference Power Converter Applications:
  - 3-Phase PV/BESS/AFE/DC Source/Battery Simulator/EV Charging Station
  - Grid support functions (P(U)-Volt/Watt, Q(U)-Volt/Var, P(f)-Freq/Watt, Anti-Islanding, Fault Ride Thru (FRT), Grid Faults & Trips according to Grid codes
  - Grid forming (Droop, Virtual Synchronous Machine) – available by Q4, 2020
  - Nominal rating as per user request (default 35KVA), support for Grids world wide
- Diagnostics
  - Widgets based GUI - ease to tailor to fit custom application
  - AIT CLI (Command Line Interface) - access to user and custom settable parameters
  - AIT Data Logger – log target application and power converter data in CSV file
  - AIT Scope/Phasor/Locus tool – powerful diagnostic tool able to scope out controls waveforms, state space vectors, statuses and display it as scope snapshot, phasor and locus diagrams
- Firmware/Software upgrade
  - Remote field FW upgrade via secure built in bootloader and BootFlasher application (no JTAG required)
  - SW upgrade (applicable only for AIT HIL Controller)
- Hardware Protections and FW Faults

- - Built in hardware protections designed to ensure protection of a power converter hardware
  - Application specific and user settable firmware faults
- Connectivity
  - ModBus, SunSpec, IEC61850, other protocol stacks available upon request
- AIT Firmware Stack
  - Real Time Multi-tasking kernel
  - Low level peripheral drivers
  - State Machine
  - Controls & Signal processing tool box
  - Command Line Interface – to Widgets based GUI
  - Bootloader and Debug Interface – to BootFlasher
  - Inter Processor Communication (with networking processor AIT HIL Controller only)
  - IOs handler
  - Interface with Typhoon HIL C code Auto Gen tool
- Documentation:
  - Typhoon HIL simulation models
  - App notes & video tutorials
  - FW and SW updates
- RCP Reference Design and Example
  - Reference design of the Control of 3PH Solar/Battery Storage inverter
- Design support
  - Up to 50 Hrs of hands on consulting including an on-site or a digital workshop
- Technical support via emails - 1 year

  * Exclusive offer for qualified Academic partners & Key customers signed up to Vindobona community volunteer squad and/or willing to produce reference design & examples according to mutually agreed application example within 6 months from acquiring the kit. The offer is also valid for all funded research and customer design services projects.

List of Abbreviations:

HW – Hardware

FW – Firmware

RCP – Rapid Control Prototyping (Development and Deployment)

GPIC – General purpose inverter controller

Vindobona – trade name for AIT RCP Kit

PV – Solar

BESS – Battery Energy Storage System

AFE – Active Front End

B2B – Business to Business