CONNECTOR LAYOUT
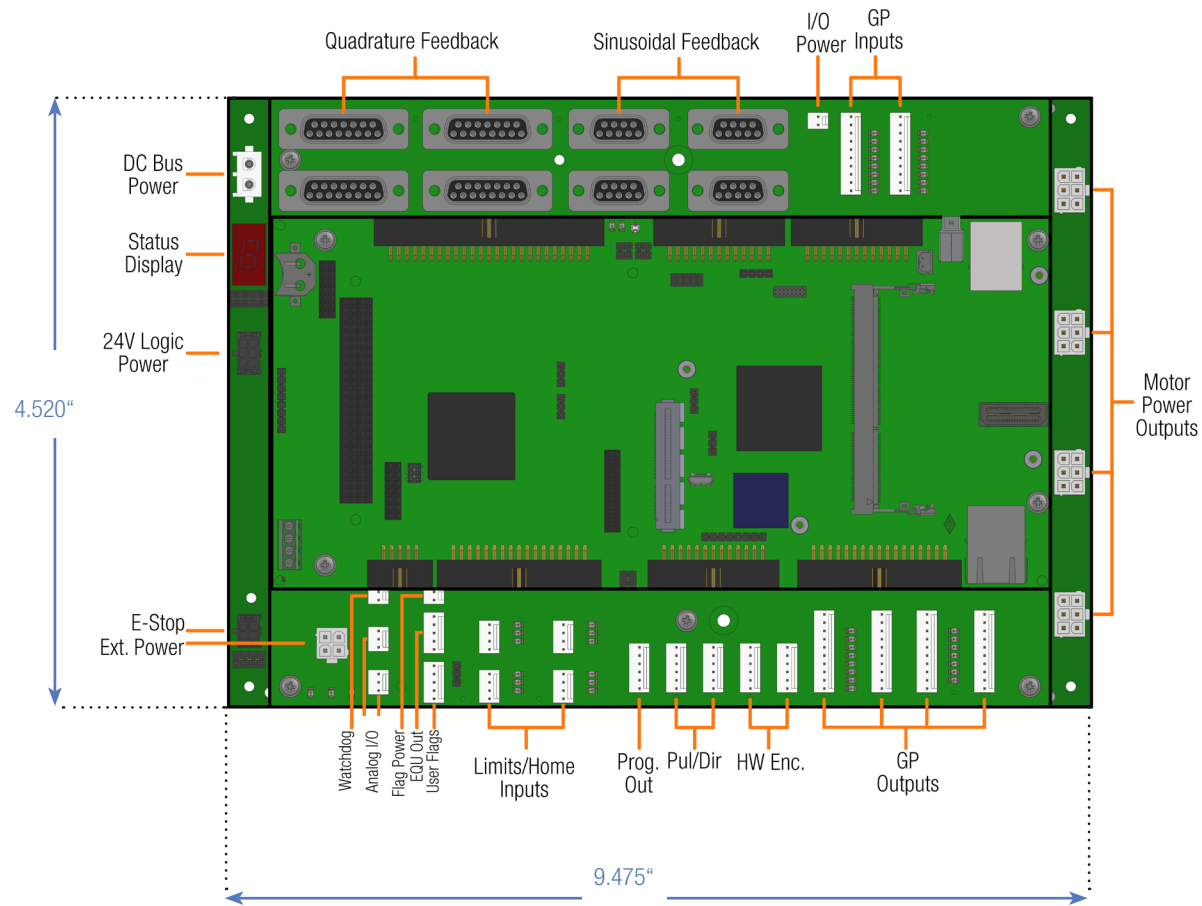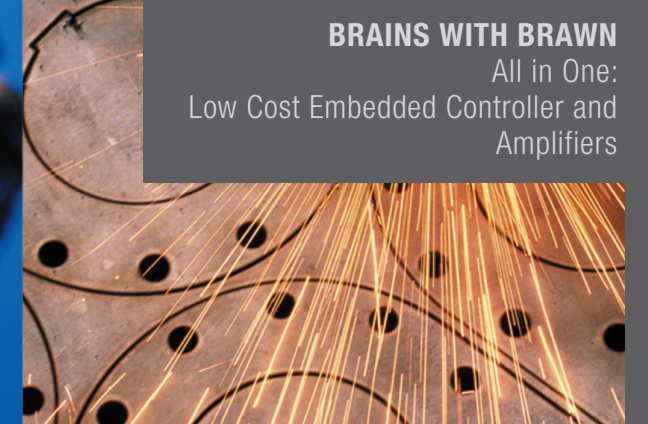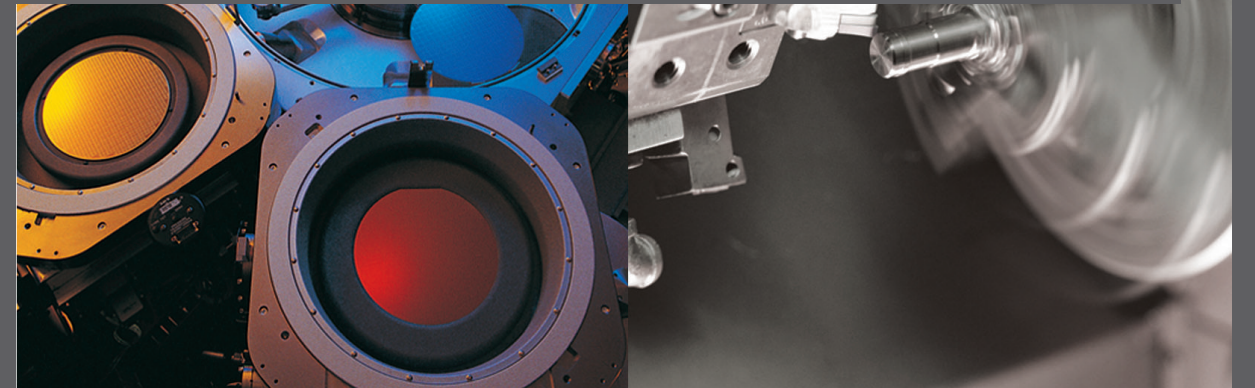4-Axis

The Power Clipper Drive is a 3-board stack consisting of an amplifier section and the Power Clipper controller connnected by an interface board "sandwiched" in the middle. The interface board provides connections that are common to the Power Clipper controller, but are more conveniently divided into individualized connectors.

Quadrature Feedback · Sinusoidal Feedback · I/O Power · GP Inputs · DC Bus Power · Status Display · 24V Logic Power · 4.520" · E-Stop Ext. Power · Motor Power Outputs · Watchdog · Analog I/O · Flag Power · EQU Out · User Flags · Limits/Home Inputs · Prog. Out · Pul/Dir · HW Enc. · GP Outputs · 9.475"

Worldwide Support

Delta Tau Data Systems, Inc
21314 Lassen Street
Chatsworth CA 91311
tel +1 818 998-2095
fax +1 818 998-7807
sales@deltatau.com
www.deltatau.com

you can also find us on...

Delta Tau Headquarters

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DELTA TAU
NEW IDEAS IN MOTION...

POWER Clipper Drive

BRAINS WITH BRAWN
All in One:
Low Cost Embedded Controller and Amplifiers

DELTA TAU

About the Power Clipper Drive The Power Clipper Drive is an integrated Machine and Motion Controller combining the brain of the cutting edge Power PMAC processor, the unsurpassed custom-designed Digital Signal Processor Gate3 ASIC, and the low voltage brawn of high-performance MOSFET amplifier technology into a compact solution for more cost sensitive and OEM applications.

About the Power PMAC The power and flexibility of the Power PMAC allows the integration of the Power PMAC EtherLite in virtually any kind of industrial motion control application.

Motor Control

The Power Clipper Drive provides servo loop closure (position or torque) ouputs:

- AC/DC Brushless servo (synchronous) linear/rotary motors
- DC Brush (Piezo, Voicecoil) motors
- Stepper motors

Encoder Support

The Power Clipper Drive can interface with one or a combination of the following types of motor feedback devices:

- Quadrature
- Halls (60ºe/120ºe)
- Kawasaki
- Analog +/- 10VDC
- LVDT / MLDT
- EnDat 2.1/2.2

- Mitsubishi
- Panasonic
- Yaskawa
- Nikon-D
- BiSS-B/C

- Mitutoyo
- Tamagawa
- SSI
- HiperFace
- Sinusoidal (with ACC-51S)
- Resolver (with ACC-8D Opt7)

GP Inputs/Outputs

- 32 general-purpose TTL I/O points, direction selectable by byte:
  -16-point mux port, Delta Tau I/O accessory compatible
  -16-point "opto" port, Opto-22 style optically isolated modules compatible
- Supports thousands of I/O points
- "Handwheel" port with 2 each:
  -Quadrature encoder inputs
  -Pulse (PWM or PFM) output pairs
- 4 12-Bit Analog Inputs and 1 Filtered PWM DAC Output (optional)
- PWM laser control option (controllable TTL signals include PWM width, PWM frequency, laser on/off, and first pulse suppression, typically with CO2 and YAG lasers)

Saftey & Other Features

- Hardware/Software E-STOP and Reset
- Watchdog output
- I2T protection
- Encoder count error and encoder loss detection
- Plus/Minus over-travel, home, and user inputs
- Software over-travel limits
- Warning/fatal following error limits
- High speed compare outputs
- Automatic brake control
- High speed capture outputs
- Video Output

Cabled Accessories

- Up to 64 Axes (& I/O) Via EtherCat
- 32 In / 32 Out 12-24V Digital I/O, Optically Isolated (ACC-34AA)
- 32 In / 32 Out Digital I/O for Opto-22 Style Racks (ACC-34B)
- Up to 32 daisy-chained ACC-34 boards for up to 1024 inputs / 1024 Outputs
- ModBus , 24 In / 24 Out 2-24V Digital I/O, Optically Isolated with optional 2x 12-Bit DAC & 2x 12-Bit ADC & 2 Relays (ACC-65ETH)

Plug-In Stack Accessories

- Additional 4 Axes (ACC-24ES3) with optional 4 12-Bit Analog Inputs and 1 Filtered PWM DAC Output (ACC-24ES3)
- 4 Channels Dual 18-Bit True DAC (ACC-8ES)
- 4 Channel Direct PWM Output (ACC-8FS)
- 2 or 4 Channel 16-bit Encoder Interpolator (ACC-51S)
- 2 or 4 Channel Resolver (ACC-8D, OPT 7)
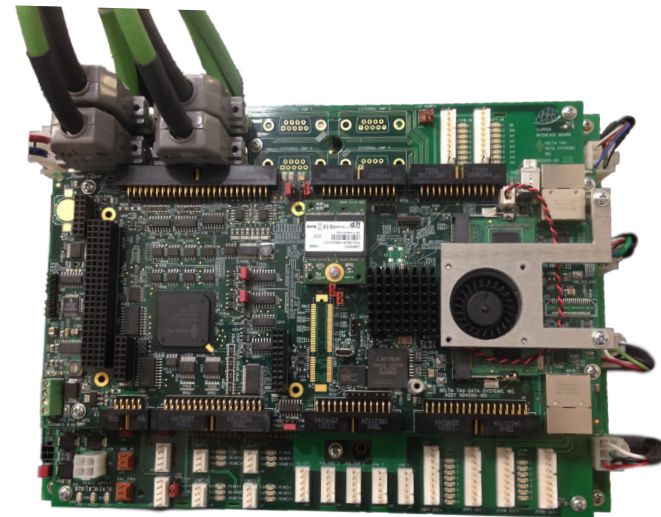
Power Clipper Drive

A powerful and compact integrated controller and drive solution for cost sensitive applications

Motor Servo Control

- Extremely fast update rates (Phase and Servo)
- Standard PID with full feedforward model
- Powerful automatic tuning and analyzer tools
- Analog, Pulse Width Modulated (PWM), Pulse Frequency Modulated (PFM), MACRO or EtherCAT Outputs
- Vibration suppression filters
- Multiple 7th order notch and low pass filters
- Adaptive control for varying loads
- Cascaded loops (force, height, camera auto-focus control)
- Support for custom-written commutation routines
- Support for custom-written servo routines
- Custom routines directly in C or from MATLAB®/Simulink®

Coordinate Systems / Forward and Inverse Kinematics

- Up to 256 axes of coordinated or independent motion
- Up to 128 independent coordinate systems
- Up to 32 independent axes per coordinate system
- Dynamic axes transformations (e.g. offsets, rotations, mirroring)
- Forward/Inverse kinematics for non-linear mechanisms
  -User defined routines convert between tool tip coordinates and actuator positions
  -Permits direct specification of tool tip path

Trajectory Generation - Motion Programs

- Auto-coordination of multiple sets of axes
- Linear, circular, rapid, position-velocity-time (PVT), LIN to PVT (curve fit), Spline move modes
- Seamless blending between linear, circular and PVT modes
- Automatic move until trigger (hardware input)
- True S-Curve accel / decel
- All move modes supported with user kinematics
- Dynamic multi-block lookahead with velocity/acceleration control and jerk limit
- Sub-millisecond segmentation time
- Negative feedrate for true motion reversal in lookahead
- Move block execution rate up to 10,000 blocks/sec
- G-code, M-code, and T-code ready
- Calculations and I/O synchronous to motion
- Tool radius compensation, 2D or 3D

Programmable Logic Control (PLCs)

- Access to all registers
- Trigonometric, transcendental, vector and matrix functions
- 64-bit floating-point architecture optimized math
- Executive functions for standalone operation
- Data gathering of up to 128 hardware/software registers per servo cycle
- Program in PMAC Script
- Program in ANSI C:
  -Real time with preemptive kernel routines
  -General purpose routines
  -MATLAB®/Simulink® Embedded Coder® generated code

Compensation Tables

- Position/torque compensation tables in 1D, 2D, or 3D with rollover and mirroring options
- 1st/3rd order interpolation between points every servo cycle
- Up to 256 compensation tables (64K each)
- Support for superimposed compensation table results
- Backlash compensation, fixed or in tables

Hardware Position Capture and Compare

- Specialized circuitry tying encoder counts to digital I/O
- I/O on exact count (w/sub-count interpolation) at any speed (within 10 nanoseconds)
- For probing, registration, measurement trigger, laser firing

Gantry Control

- Follower motor(s) executes leader's trajectory
- Automatic skew removal on homing
- Automatic gantry cross-coupling servo correction

Electronic Gearing and Cams

- Powerful master/slave techniques
- Position following (gearing) requires no program for motion
- External time base (cam) keeps full trajectory flexibility (non-returning, limited reversal, e.g. moving web application)
- Up to 256 cam tables (16k points each)
  - Position/torque profile(s)
  - Returning, forward/reverse travel
  - Extremely precise synchronized outputs