# 6-PAK

SERIES PROGRAMMABLE DC/DC CONVERTER

C&D TECHNOLOGIES
Power Solutions
POWER ELECTRONICS DIVISION

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POWER: 6 Amp
Parrallelable Boost Modules
SIZE: 2.00" x 0.60" x .27"

PRODUCT DATA SHEET

**OBSOLETE PRODUCT**
Contact Factory for Replacement Model

## DESCRIPTION

The 6-PAK™ is a modular system of control and boost SIPs. Each 6A control SIP can also drive up to 8 additional 6A boost SIPs in parallel, for a total of 54A. Each SIP accepts a regulated 5V input (±10%) and provides 2.5V to 3.6Vdc output. The circuit is optimized for high efficiency and fast load transient response needed by telecom, DSP and microprocessor applications.

Advanced thermal design, monolithic power circuitry and synchronous rectification result in outstanding performance and value. With integrated input filter and output capacitors, the 6-PAK system makes a complete power supply which requires no external components over the specified operating range. Pins are staked for wave solderability.

## FEATURES

- **Small SIP Design**
- **Parallelable Boost SIP**
  One stocking part meets a variety of loads
- **Programmable Control SIP**
  Control/Boost Pair extremely configurable
- **Fast Transient Response**
  No need for large external capacitors
  Extremely small footprint
- **Low Component Count**
  Low cost, high reliability
- **Staked Pins**
  Wave solderable
- **Integrated Input Filter**
  Low input ripple

## APPLICATION NOTE

- **DCAN-34 - 6-PAK Demo Board**
  Downloadable from our website - cdpowerelectronics.com

## Ordering Information

Typical examples:

| | | | | |
|---|---|---|---|---|
| 6P | 25 | - CA | 6A Control SIP |
| 6P | 25 | - P | 6A Power Booster SIP |

# Electrical Specifications

Unless otherwise specified, operating conditions are as follows: $V_o$ = 3.3V, $T_A$ = 25°C, $C_{in}$ = 100µF

| Parameter | | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| Input | | | | | | |
| Input Voltage | $V_{in}$ | | 4.5 | 5.0 | 5.5 | $V_{DC}$ |
| Input Current Ripple | | $V_{in}$ = 4.5V to 5.5V, $I_o$ = 6A | | | 400 | $mA_{RMS}$ |
| Required Capacitance | $C_{in}$ | *Note 1* | 0 | 100 | | µF |
| Output | | | | | | |
| Output Voltage | $V_o$ | Nominal | 3.25 | 3.3 | 3.35 | $V_{DC}$ |
| Output Program Range | | *Note 2* | 2.5 | | 3.6 | $V_{DC}$ |
| Output Current | $I_o$ | $T_A$ = 60°C | 0 | | 6 | Amps |
| Output Ripple | | 20Mhz BW | | 50 | 75 | mVp-p |
| Output Rise Time | Tr | $V_{in}$ = 5V, $I_o$ = 6A Resistive, $C_o$ = 0 | | 430 | 500 | µS |
| Output Start-Up Time | Tr | $V_{in}$ = 5v, $I_o$ = 6A Resistive, $C_O$ = 5000µF | | 3.0 | 4.0 | mS |
| Output Capacitance Range | $C_o$ | | 0 | | 5000 | µF |
| Line Regulation | | $I_o$ = 6A | | ±0.2 | ±0.5 | % |
| Load Regulation | | $I_o$ min - $I_o$ max, $V_{in}$ = 4.5-5.5V | | ±0.8 | ±1.2 | % |
| Temperature Coefficient $T_A$ = -40°C to +60°C | | $V_{in}$ = 5V, $I_O$ = 6A | | | ±0.01 | %/°C |
| Combined Variation | | $V_{in}$ min-max &/or $I_o$ min-max $T_A$ = -40°C to +60°C | | | ±2 | % |
| Protection | | *Note 3* | | | | |
| General | | | | | | |
| Switching Frequency | | | | 800 | | kHz |
| Dynamic Response | | | | | | |
| $\Delta I_O/\Delta t$ = 1A/10µsec, $V_i$ = 5.0V, $T_A$ = 25°C | | | | | | |
| Load Change from $I_O$ = 0% to $I_O$ = 100% | | | | | | |
| Peak Deviation | | | | 20 | 30 | mV |
| Settling time ($V_O$<10% Peak Deviation) | | | | 130 | 200 | µsec |
| Load change from $I_O$ = 100% to $I_O$ = 0% | | | | | | |
| Peak Deviation | | | | 20 | 35 | mV |
| Settling time ($V_O$<10% Peak Deviation) | | | | 200 | 300 | µsec |
| Temperature | | | | | | |
| Operating Temperature | | | -40 | | +60 | °C |
| Storage Temperature | | | -40 | | +125 | °C |

**Notes**

1. Input source<3" from 6-PAK™, load transient <3A per SIP. 100µF low ESR capacitor for load transients >3A per SIP.
2. Optional programming 2.5V - 3.6V. See Table.
3. The unit is protected against short circuit on the output for durations not exceeding 10 seconds and a repetition rate of less than 5%.

## Programming

The 6-PAK™ is programmed through the Control SIP. All connected Power Boosters follow the Control SIP programming. To program the 6-PAK™ for $V_{out}$<3.3, connect a resistor across the TRIM and $V_o$ pins. For $V_{out}$>3.3, resistor is connected across TRIM and GND.

| $V_{out}$ | Resistor Value | $V_{out}$ | Resistor Value |
|---|---|---|---|
| 2.5 | 196Ω | 3.1 | 1.37k |
| 2.6 | 255Ω | 3.2 | 2.80k |
| 2.7 | 332Ω | 3.3 | Open |
| 2.8 | 442Ω | 3.4 | 2.32k |
| 2.9 | 604Ω | 3.5 | 1.00k |
| 3.0 | 866Ω | 3.6 | 649Ω |

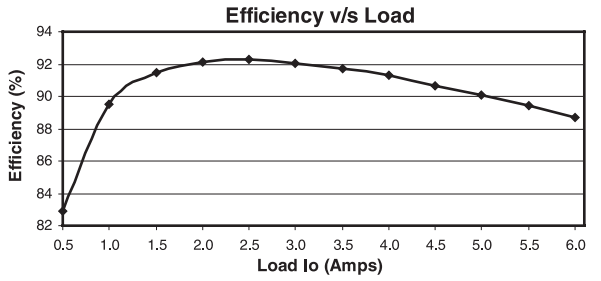
## Transient Response

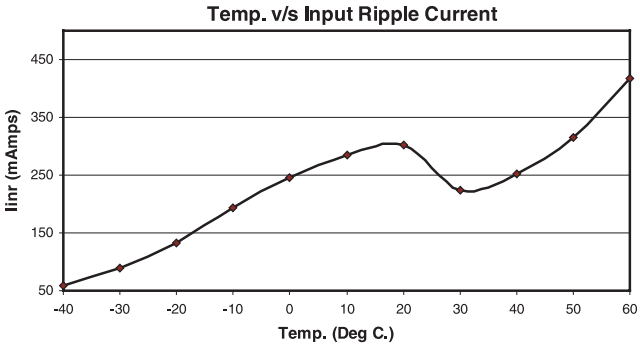
Operating conditions are as follows: $V_{in}$=5V, $V_o$=3.3V, Load change from $I_o$=0% to $I_o$=100%, $T_A$=25°C, $C_{in}$=100µF, $C_o$=0.

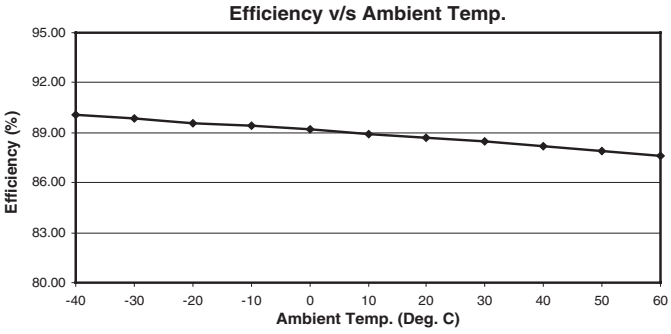
Operating conditions are as follows: Vin=5V, Vo=3.3V, Load change from Io=100% to Io=0%, $T_A$=25°C, Cin=100µF, Co=0.

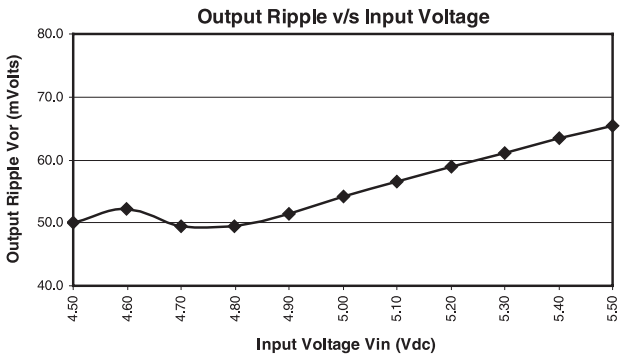
## Typical Performance Curves

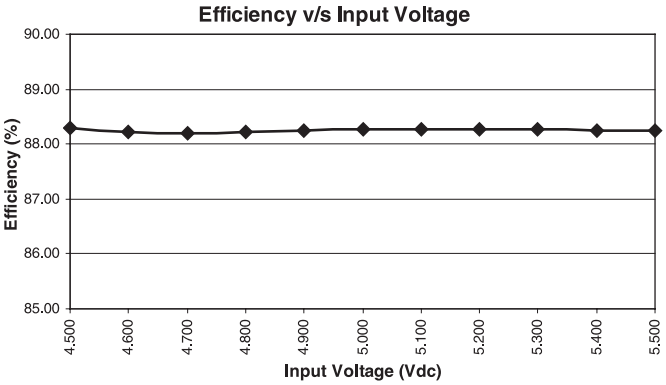
(Unless otherwise specified, operating conditions are as follows: $V_{in}$ = 5.0V, $V_o$ = 3.3V, $I_o$ = 6A, $T_A$ = +25°C, $C_{in}$ = 100µF, $C_{out}$ = 0.)

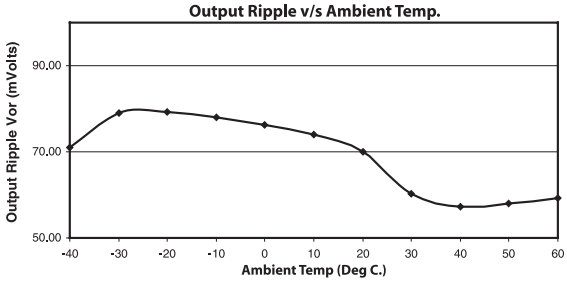


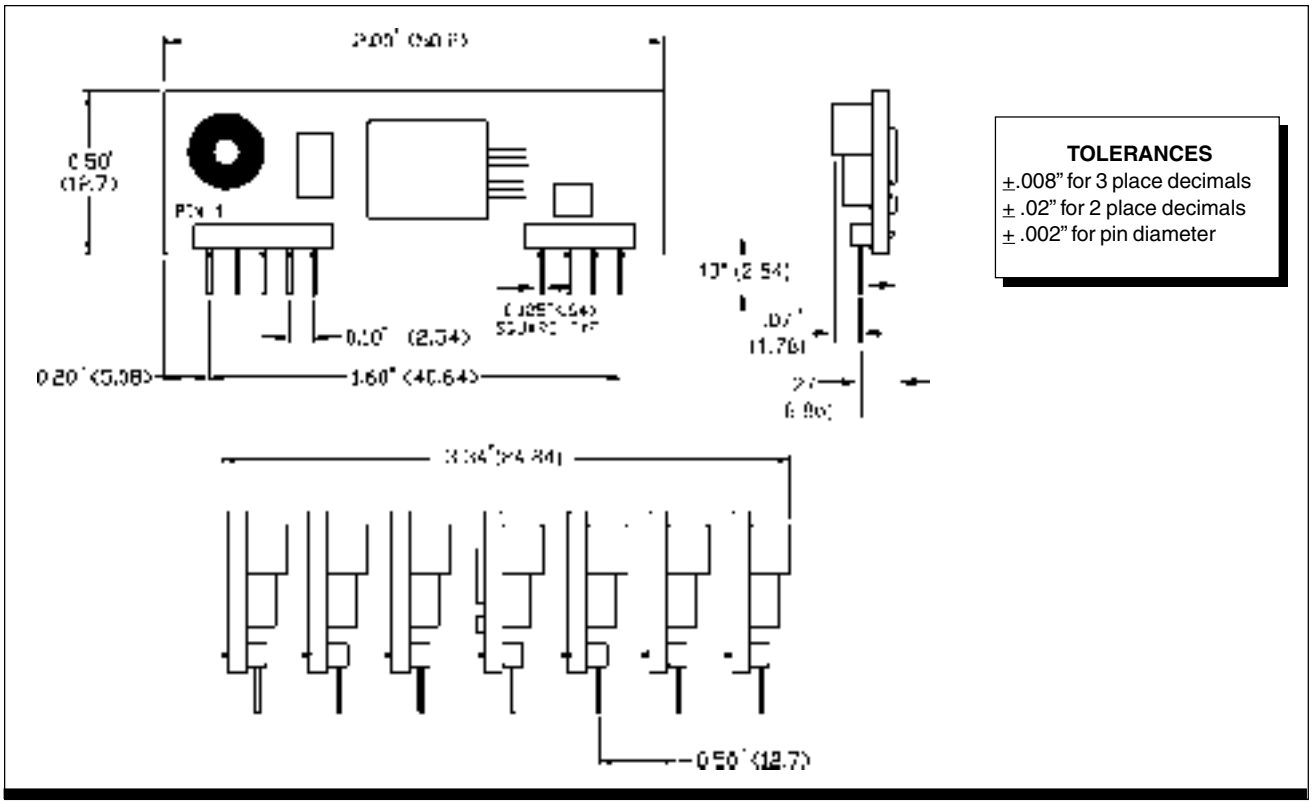




NOTE: The ambient temperature is as measured at approx. 1/4" away on the back side of the unit, with the probe end at approx. center (vertical & horizontal). For thermal performance, the unit was mounted on a 4"x4" PCB (with ground plane) & enclosed in a box so that it operates in a controlled environment.

## Mechanical Outline




**TOLERANCES**
±.008" for 3 place decimals
± .02" for 2 place decimals
± .002" for pin diameter

## Pin Out

| Pin | Function | Description |
|---|---|---|
| 1 | $V_o$ | Output Voltage |
| 2 | $V_o$ | Output Voltage |
| 3 | TRIM | Output Adjust* |
| 4 | GND | Ground |
| 5 | INTI | InterModule 1 |
| 6 | Gnd | Ground |
| 7 | INT2 | InterModule 2 |
| 8 | $V_i$ | 5V Input Voltage |
| 9 | $V_i$ | 5V Input Voltage |

* not connected on Boosters

## System Interconnection Guidelines

1. Each SIP must have input, ground and output pins sunk into common input ground and output planes in the host PC board.
2. Two additional common signal traces are required to interconnect INT1 and INT2 pins. These traces must be a least 0.06" wide and make a straight connection among the modules.
3. Power Booster SIP must be adjacent to the Control SIP located in the center of the layout, as shown in the Typical Example figure. Recommended distance between SIP pin centers is 0.5".
4. A 300 LFM air flow is required in direction from Pin 9 to Pin 1, to draw rated power from booster configuration. Each application using boosters should be evaluated for thermal performance.

Standard Options are shown, consult factory for other available options.

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