

6-PAK

SERIES PROGRAMMABLE DC/DC CONVERTER

POWER: 6 Amp

Parallelable Boost Modules

SIZE: 2.00" x 0.60" x .27"

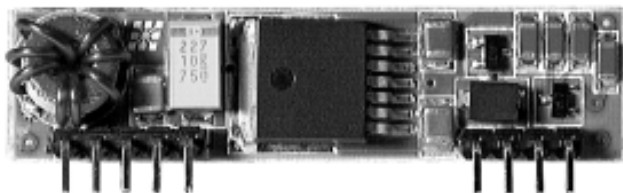
CDTECHNOLOGIES

Power Solutions
POWER ELECTRONICS DIVISION

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PRODUCT DATA SHEET



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

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 ($\pm 10\%$) 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.

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: $V_o = 3.3V$, $T_A = 25^{\circ}C$, $C_{in} = 100\mu F$

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	$T_A = 60^{\circ}C$	0		6	Amps
Output Ripple	20Mhz BW		50	75	mVp-p
Output Rise Time T_r	$V_{in} = 5V$, $I_o = 6A$ Resistive, $C_o = 0$		430	500	μS
Output Start-Up Time T_r	$V_{in} = 5V$, $I_o = 6A$ Resistive, $C_o = 5000\mu F$		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 $T_A = -40^{\circ}C$ to $+60^{\circ}C$	$V_{in} = 5V$, $I_o = 6A$			± 0.01	%/ $^{\circ}C$
Combined Variation	V_{in} min-max &/or I_o min-max $T_A = -40^{\circ}C$ to $+60^{\circ}C$			± 2	%
Protection	Note 3				
General					
Switching Frequency			800		kHz
Dynamic Response					
$\Delta I_o / \Delta t = 1A/10\mu sec$, $V_i = 5.0V$, $T_A = 25^{\circ}C$					
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	$^{\circ}C$
Storage Temperature		-40		+125	$^{\circ}C$

Notes

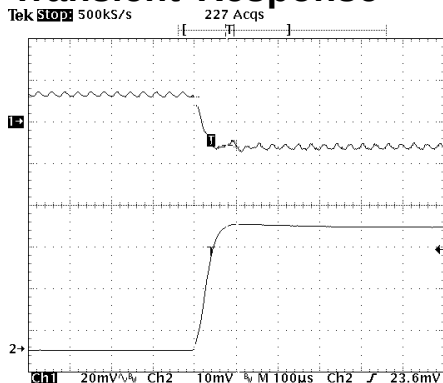
1. Input source <3" from 6-PAK™, load transient <3A per SIP. 100 μF low ESR capacitor for load transients >3A per SIP.
2. Optional programming 2.5V - 3.6V. See Table.
3. The unit is protected against short circuit on the output for durations not exceeding 10 seconds and a repetition rate of less than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

Programming

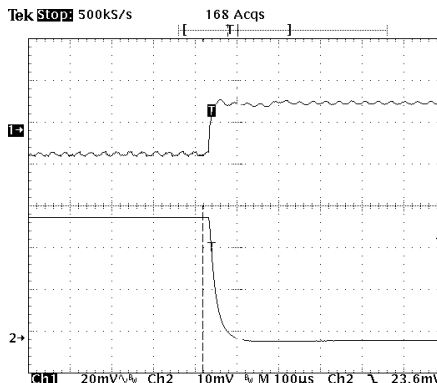
The 6-PAK™ is programmed through the Control SIP. All connected Power Boosters follow the Control SIP programming. To program the 6-PAK™ for $V_{out} < 3.3$, connect a resistor across the TRIM and V_o pins. For $V_{out} > 3.3$, resistor is connected across TRIM and GND.

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

Transient Response

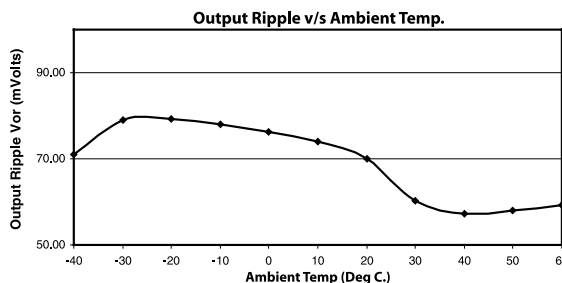
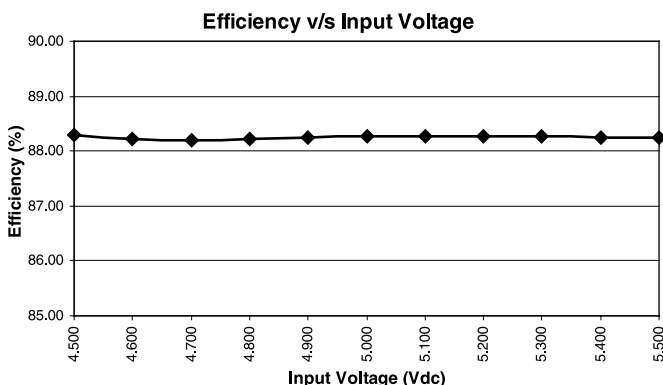
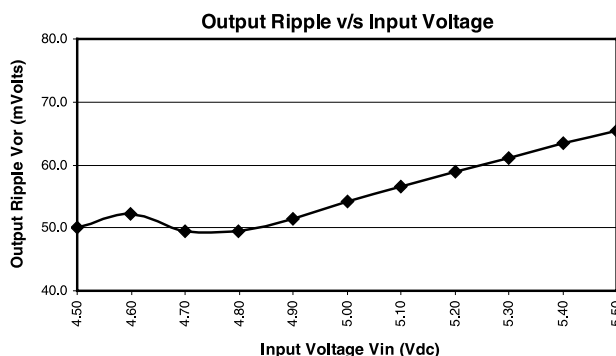
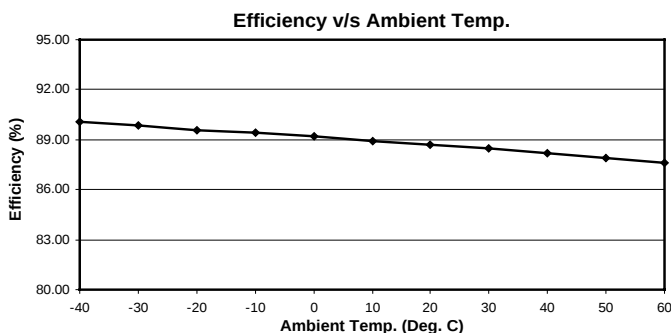
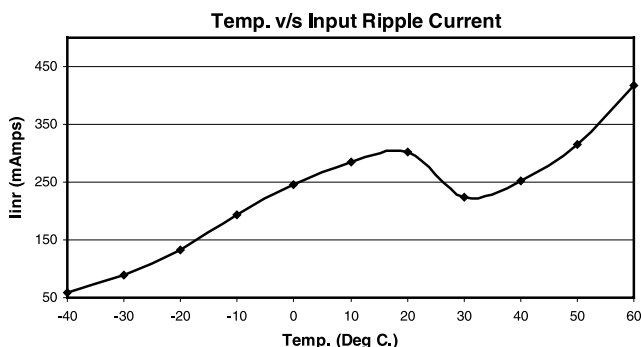
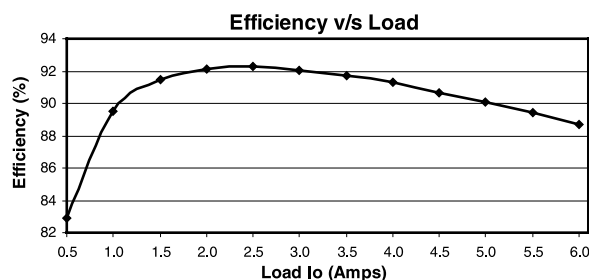


Operating conditions are as follows: $V_{in}=5V$, $V_o=3.3V$, Load change from $I_o=0\%$ to $I_o=100\%$, $T_A=25^\circ C$, $C_{in}=100\mu F$, $C_o=0$.



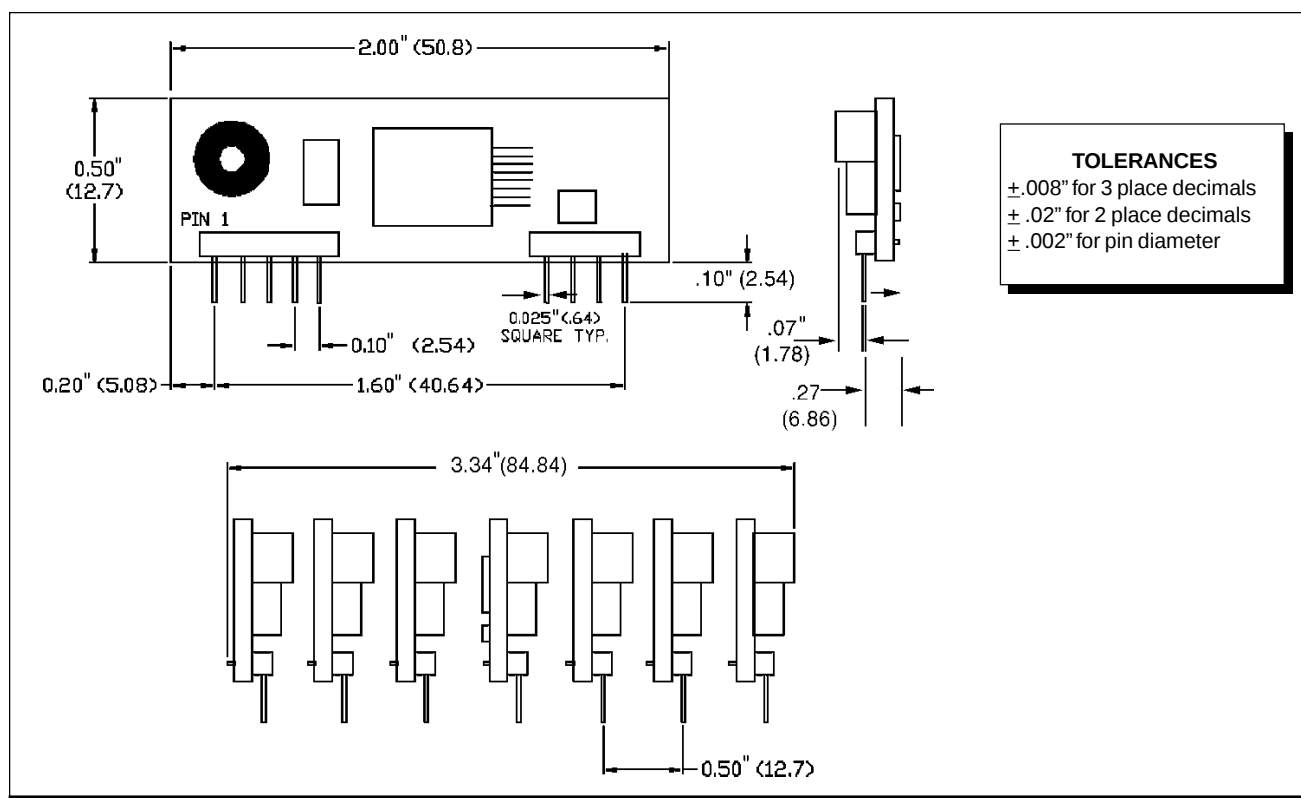
Operating conditions are as follows: $V_{in}=5V$, $V_o=3.3V$, Load change from $I_o=100\%$ to $I_o=0\%$, $T_A=25^\circ C$, $C_{in}=100\mu F$, $C_o=0$.

Typical Performance Curves (Unless otherwise specified, operating conditions are as follows: $V_{in} = 5.0V$, $V_o = 3.3V$, $I_o = 6A$, $T_A = +25^\circ C$, $C_{in} = 100\mu F$, $C_{out} = 0$.)



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



Pin Out

Pin	Function	Description
1	V _o	Output Voltage
2	V _o	Output Voltage
3	TRIM	Output Adjust*
4	GND	Ground
5	INT1	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 at least 0.06 inches 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 inches.
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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