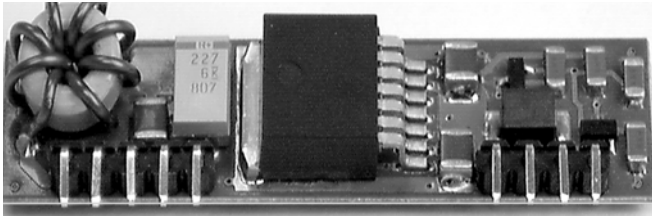


5V TO 3.3V, AND PROGRAMMABLE DC/DC CONVERTER WITH PARALLELABLE BOOST MODULES

6-PAK



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 1.8V 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

More product information and application notes are available
on our website at www.cdpowerelectronics.com

Electrical Specifications

Unless otherwise specified, operating conditions are as follows: $V_{in}=5V$, $V_o=3.3V$, $I_o=6A$, $T_A=25^{\circ}C$, $C_{in}=100\mu F$, $C_o=\mu F$.

Parameter	Conditions	Min	Typ	Max	Units
Input					
Input Voltage V_{in}		4.5	5.0	5.5	V_{DC}
Input Current Ripple			200		mA_{RMS}
Required Capacitance C_{in}	<i>Note 1</i>	0	100		μF
Output					
Output Voltage V_o	Nominal	3.25	3.3	3.35	V_{DC}
Output Program Range	<i>Note 2</i>	1.8		3.6	V_{DC}
Output Current I_o	$T_A=25^{\circ}C$	0		6	Amps
Output Ripple	20Mhz BW			50	mVp-p
Output Rise Time T_r			12		μS
Output Capacitance Range C_o		0		5000	μF
Line Regulation			± 0.5		%
Load Regulation	I_o min - I_o max		± 0.5		%
Temperature Coefficient T_c			0.01		%/ $^{\circ}C$
Combined Variation	V_{in} min-max &/or I_o min-max $T_A=25^{\circ}C$ - $85^{\circ}C$	-2		+2	%
Protection	<i>Note 3</i>				
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			60		mV
Settling time ($V_o < 10\%$ Peak Deviation)			150		μsec
Load change from $I_o = 100\%$ to $I_o = 0\%$					
Peak Deviation			90		mV
Settling time ($V_o < 10\%$ Peak Deviation)			100		μsec
Temperature					
Operating Temperature		<i>Note 4</i>		+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 1.8 - 3.6 or $\pm 10\%$ available. See Table.
3. Short circuit and thermal protection.
4. 100 lfm air, $V_o=3.3V$, $I_o=6A$. See Thermal Design Guide for other conditions.

Programming

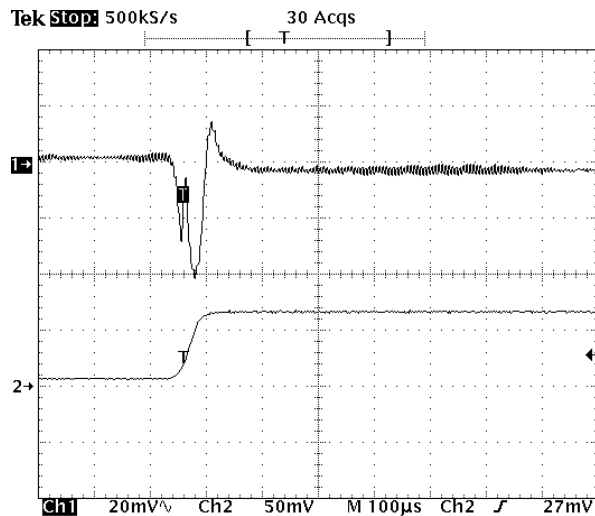
The 6-PAK™ is programmed through the Control SIP. All connected Power Boosters follow the Control SIP programming. To program the 6-PAK™ for $V_{out} < 3.3$, connect a resistor across the TRIM and V_o pins. For $V_{out} > 3.3$, resistor is connected across TRIM and GND.

Table 2

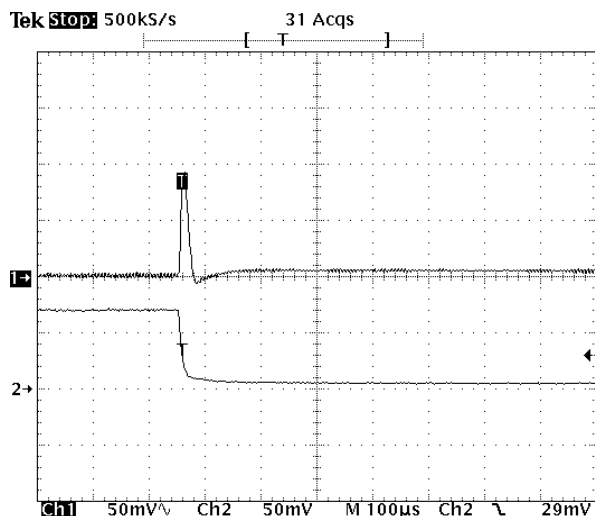
V_{out}	Resistor Value	V_{out}	Resistor Value
1.8	0Ω	2.8	442Ω
1.9	15.6Ω	2.9	604Ω
2.0	34Ω	3.0	866Ω
2.1	55.6Ω	3.1	1.37k
2.2	80.6Ω	3.2	2.80k
2.3	110Ω	3.3	Open
2.4	147Ω	3.4	2.32k
2.5	196Ω	3.5	1.00k
2.6	255Ω	3.6	649Ω
2.7	332Ω		

Transient Response

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



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

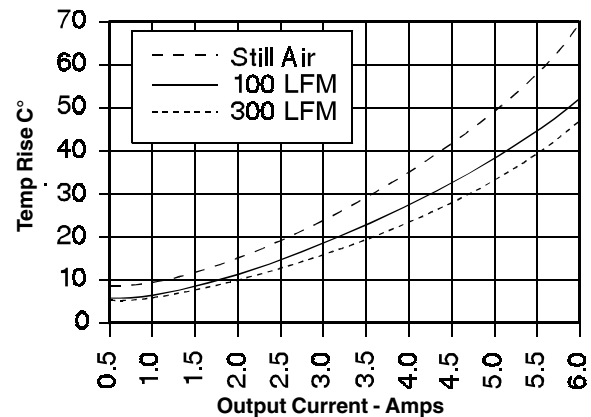


Thermal Design Guide

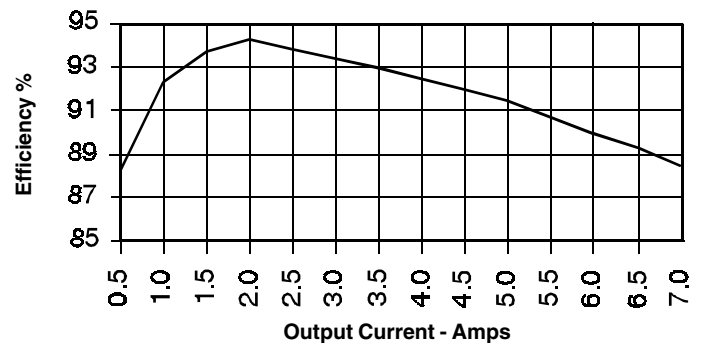
Locate your operating current, read the junction temp rise from the graph and add to your maximum ambient. $135^\circ C$ is the maximum allowable operating junction temperature. Test conditions: Device soldered into 4" X 4: PCB, 2-sided with power and ground planes for heat conduction. Due to the difficulty in predicting the thermal effects of airflow velocity and direction, and thermal conduction through ground planes, it is important that the 6-PAK™ be evaluated thermally in each application. For high ambient temperature/high current application, please request our Application Note, "Accurate Measurements of 6-PAK™ Junction Temperature."

T_j Rise vs. I_o

(Junction Temp Rise vs. Output Current)



Efficiency

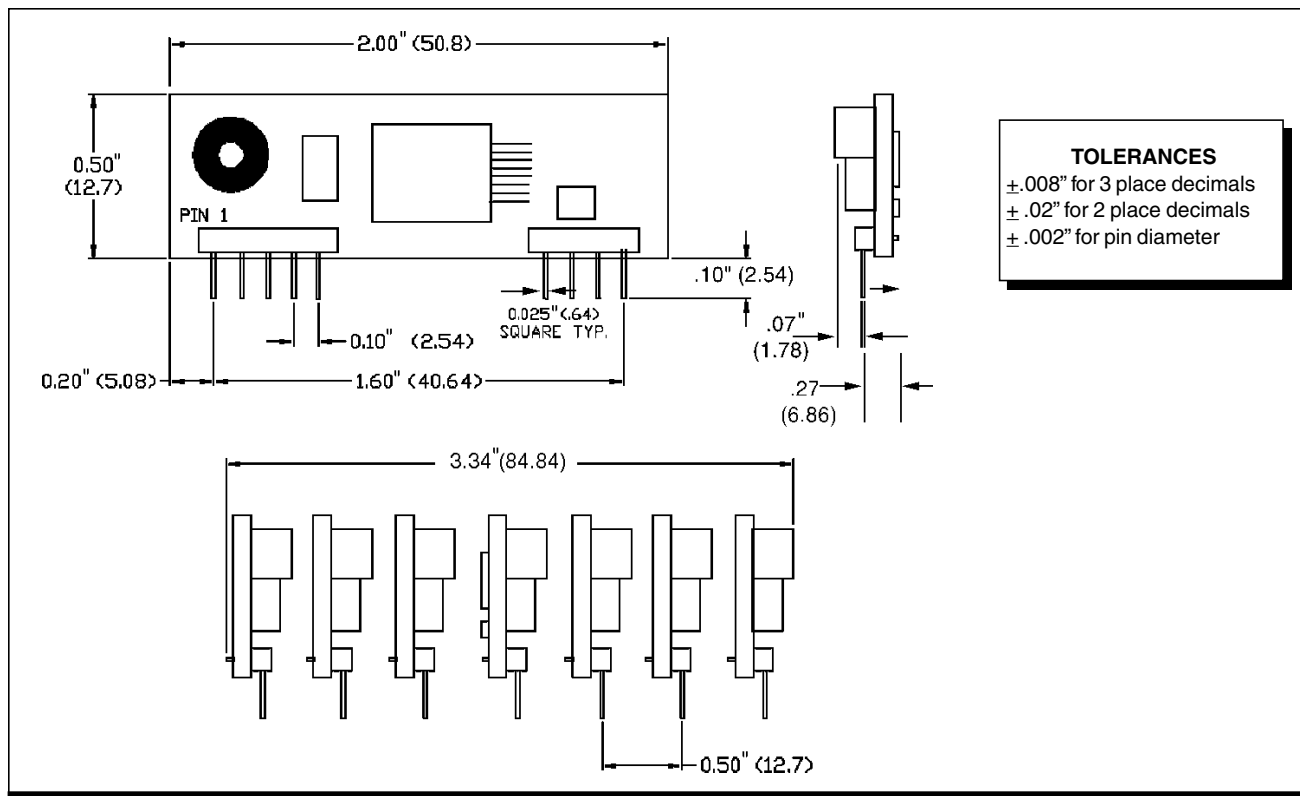


Ordering Information

Typical examples:

- 6P 25 - C 6A Control SIP
- 6P 25 - P 6A Power Booster SIP

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 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".

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

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