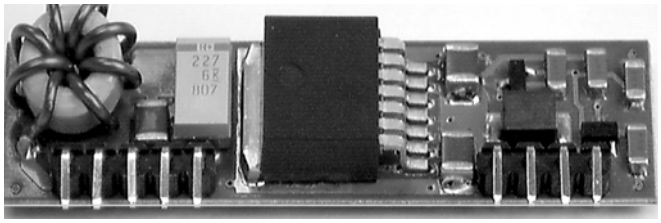
C&D TECHNOLOGIES

Product Data Sheet

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 (±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

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Electrical Specifications

Unless otherwise specified, operating conditions are as follows: V_{in}=5V, V_o=3.3V, I_o=6A, T_A=25°C, C_{in}=100µF, C_o=µF.

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}	*Note 1*	0	100		µF
Output						
Output Voltage	V_o	Nominal	3.25	3.3	3.35	V_{DC}
Output Program Range		*Note 2*	1.8		3.6	V_{DC}
Output Current	I_o	T_A=25°C	0		6	Amps
Output Ripple		20Mhz BW			50	mVp-p
Output Rise Time	Tr			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		%/°C
Combined Variation		V_{in} min-max &/or I_o min-max				
		T_A=25°C- 85°C	-2		+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				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			*Note 4*		+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 1.8 - 3.6 or ±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

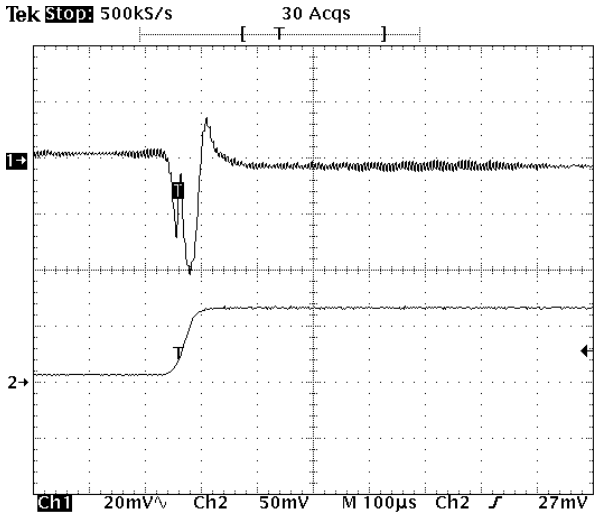
The 6-PAK™ is programmed through the Control SIP. All connected Power Boosters follow the Control SIP programming. To program the 6-PAK™ for V_{out}<3.3, connect a resistor across the TRIM and V_o pins. For V_{out}>3.3, resistor is connected across TRIM and GND.

Table 2

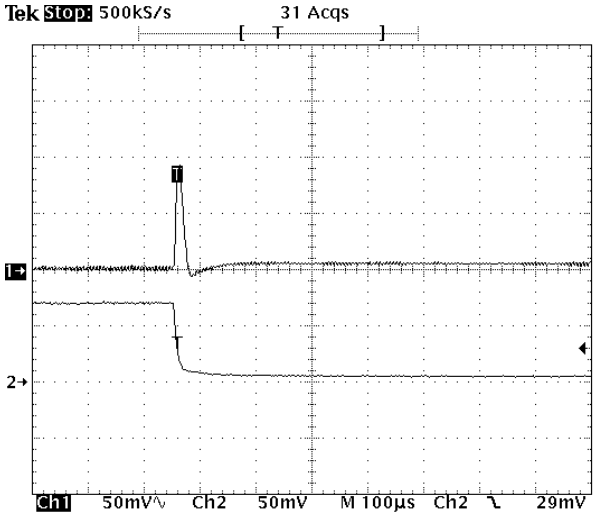
V_{out}	Resistor Value	V_{out}	Resistor Value
1.8	0Ω	2.8	442Ω
1.9	15.6Ω	2.9	604Ω
2.0	34Ω	3.0	866Ω
2.1	55.6Ω	3.1	1.37k
2.2	80.6Ω	3.2	2.80k
2.3	110Ω	3.3	Open
2.4	147Ω	3.4	2.32k
2.5	196Ω	3.5	1.00k
2.6	255Ω	3.6	649Ω
2.7	332Ω		

Transient Response

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



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

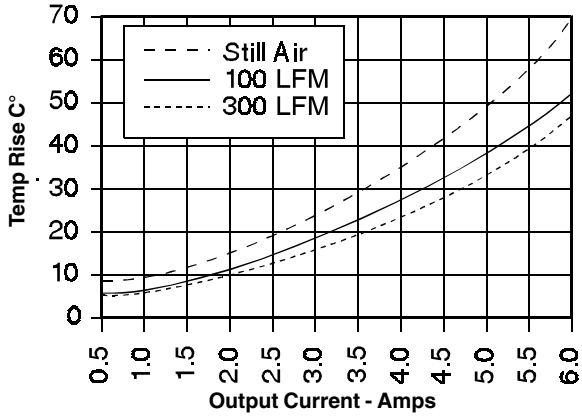


Thermal Design Guide

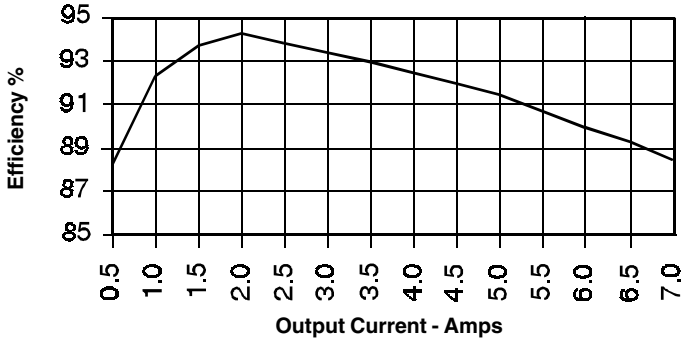
Locate your operating current, read the junction temp rise from the graph and add to your maximum ambient. 135°C is the maximum allowable operating junction temperature. Test conditions: Device soldered into 4" X 4: PCB, 2-sided with power and ground planes for heat conduction. Due to the difficulty 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

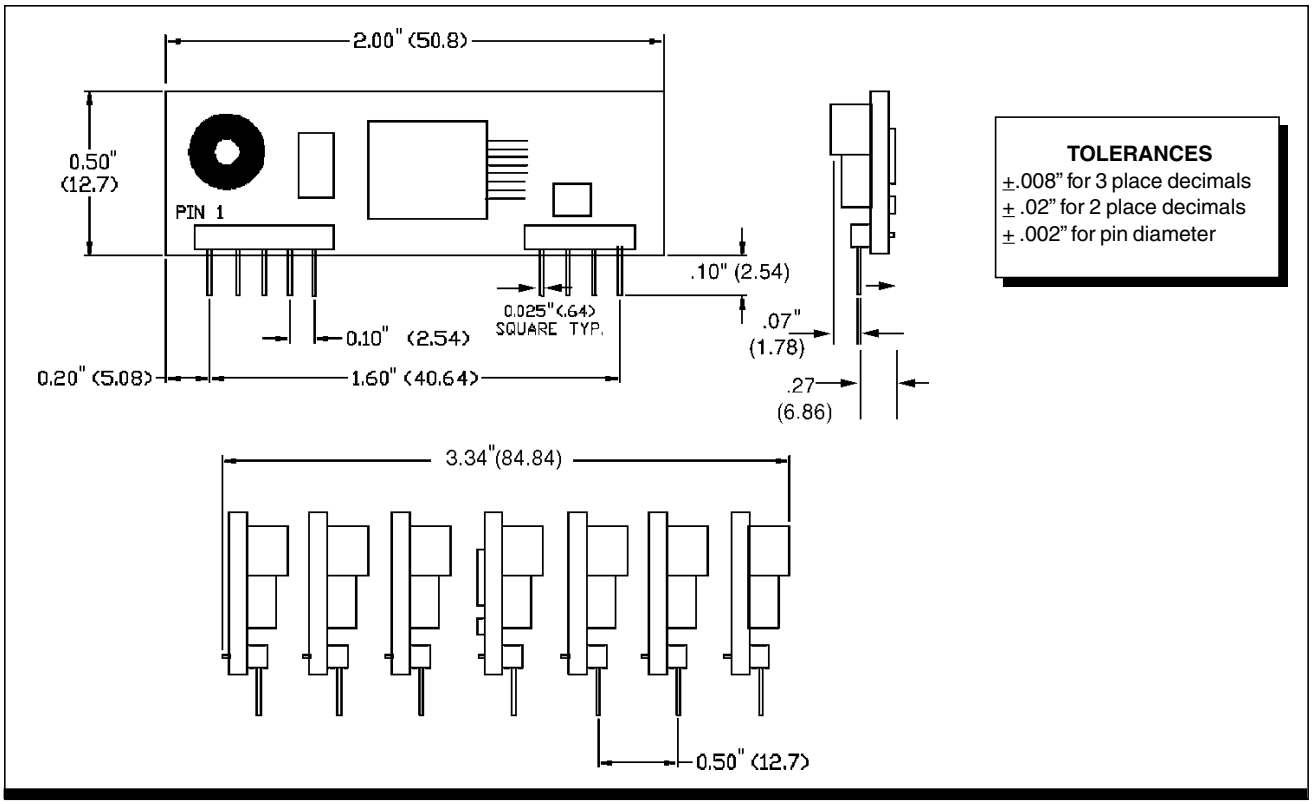


Ordering Information

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	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".

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