DIAMOND SYSTEMS CORPORATION

JUPITER-MM

DC/DC Power Supply PC/104 Module

User Manual V1.3

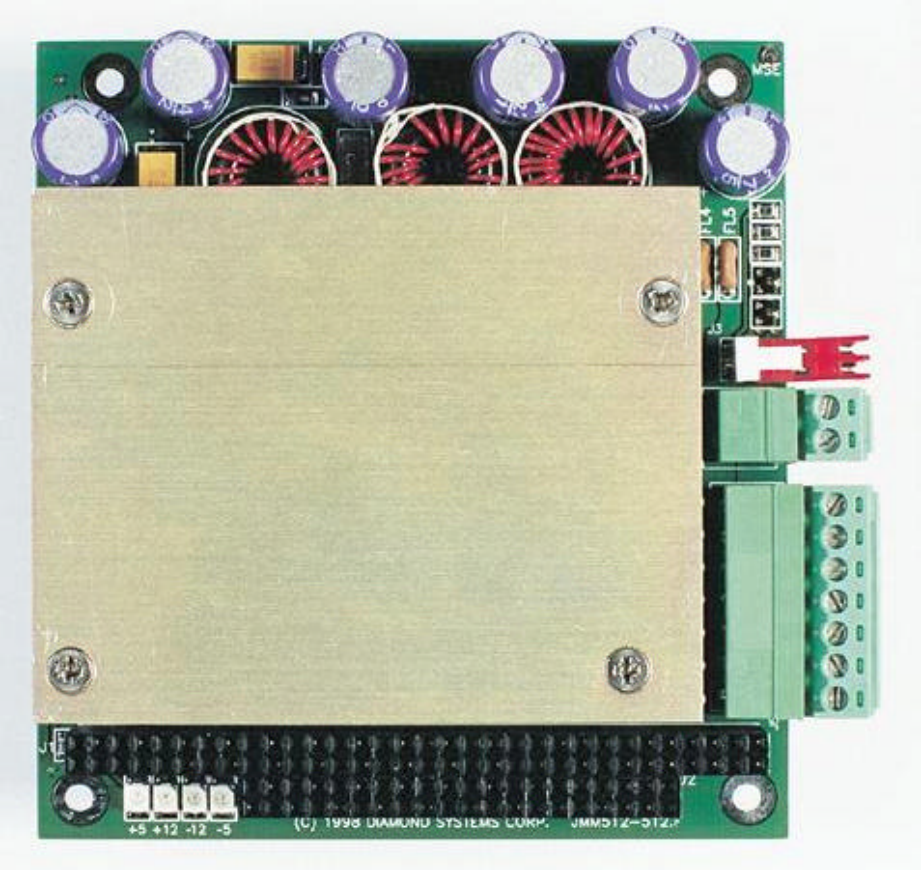

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TABLE OF CONTENTS

1. DESCRIPTION

JUPITER-MM is a PC/104-format power supply module designed for mobile as well as stationary embedded applications. The JUPITER-MM is designed using a high efficiency DC/DC converter circuit to provide the maximum power with minimum losses. Power supply performance and reliability have been optimized through the use of precision surface mount components. The Jupiter-MM series contains significant advances in mobile embedded power supply technology:

- **Surface Mount Components**

  To the maximum extent possible, surface mount components have been used in the design, to lower the profile and improve ruggedness. An additional benefit to SMT technology is the improved ability to use the PCB planes as a heat sink.

- **High Efficiency, High-Frequency Design**

  Efficiency is as high as 92 percent, lowering input power requirements as well as heat generation. The 200KHz switching circuit allows the use of smaller inductors, reducing size and weight and allowing the board to fully fit within the PC/104 height requirements.

- **Advanced Heat Sink Technology**

  A new compressible thermally-conductive material mounted under the aluminum heat sink makes it possible to wick heat away effectively from varying height components. Also, the use of surface mount components and careful PCB design enhance the dissipation of heat through the PCB planes.

- **Remote On/Off Control**

  The supply can be turned on and off with an external contact closure through an auxiliary connector.

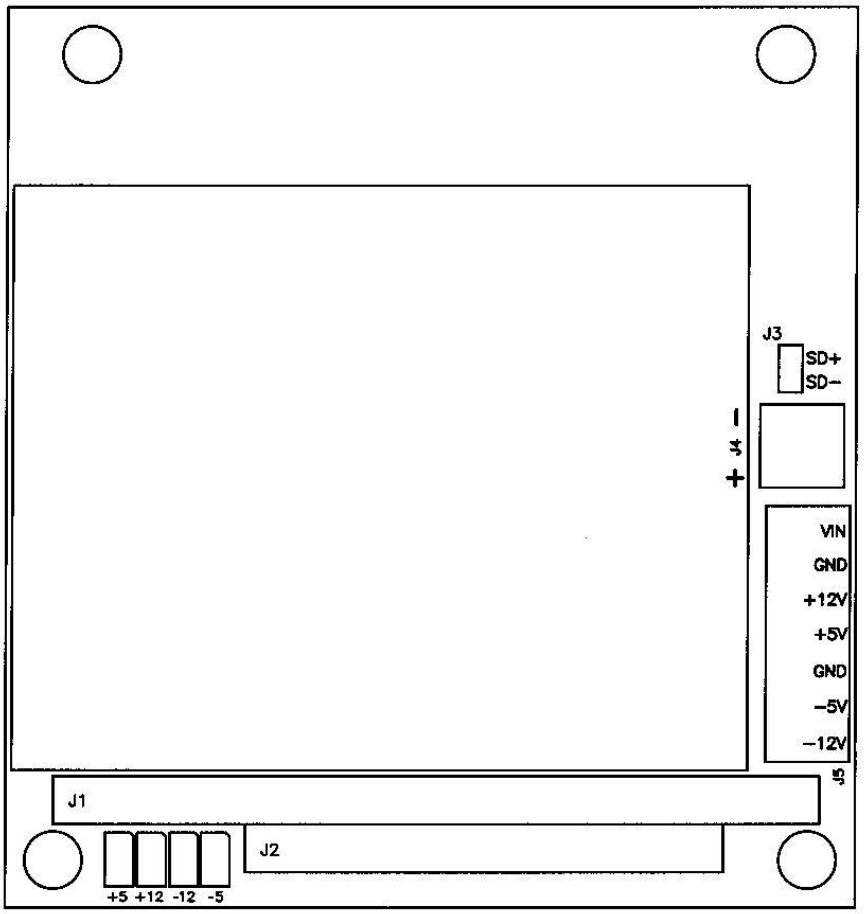
- **Extended Temperature Operation**

  Extended temperature (-40 to +85^{o}C) operation is standard, enabling the supplies to be used in vehicle applications and other harsh environments.

Jupiter-MM is available in two standard configurations of output power and output voltages:

JMM-512	50W, +5/+12V outputs
JMM-512-V512	50W, +5/+12/-5/-12V outputs

2. BOARD DRAWING



J1 PC/104 8-bit bus header

J2 PC/104 16-bit bus header

J3 Shutdown control input

J4 Main power input

J5 Power input/output connector

3. I/O HEADER PINOUTS

Jupiter-MM provides connections for input, input/output, remote on/off control, and PC/104 bus. All I/O connectors except the PC/104 bus connectors are located along the right side of the board.

PC/104 Bus Connectors

For simplicity, signal names are only shown for pins with connections on board. All remaining pins are not used on Jupiter-MM.

J1: PC/104 8-bit bus connector

(Left edge of board)

Ground	D0	C0	Ground
	D1	C1	
	D2	C2	
	D3	C3	
	D4	C4	
	D5	C5	
	D6	C6	
	D7	C7	
	D8	C8	
	D9	C9	
	D10	C10	
	D11	C11	
	D12	C12	
	D13	C13	
	D14	C14	
	D15	C15	
+5V	D16	C16	
	D17	C17	
Ground	D18	C18	
Ground	D19	C19	

(Right edge of board)

J2: PC/104 16-bit bus connector

(Left edge of board)

	A1	B1	Ground
	A2	B2	
	A3	B3	+5V
	A4	B4	
	A5	B5	-5V
	A6	B6	
	A7	B7	-12V
	A8	B8	
	A9	B9	+12V
	A10	B10	
	A11	B11	
	A12	B12	
	A13	B13	
	A14	B14	
	A15	B15	
	A16	B16	
	A17	B17	
	A18	B18	
	A19	B19	
	A20	B20	
	A21	B21	
	A22	B22	
	A23	B23	
	A24	B24	
	A25	B25	
	A26	B26	
	A27	B27	
	A28	B28	
	A29	B29	+5V
	A30	B30	
	A31	B31	Ground
Ground	A32	B32	Ground

(Right edge of board)

Main Input Power – J4

J4 consists of a detachable 2-pin screw terminal block. The screw terminals will accept wire sizes from 18-28 gauge. The input polarity is shown in markings on the board adjacent to the board-mounted connector.

1	Positive Input
2	Input Return

Auxiliary Input/Output Power – J5

J5 consists of a 7-pin Molex friction lock header with .156" pin spacing, part no. 26-48-1076. The mating connector with insulation displacement contacts is included with the board. Both IDC and crimp terminal housings may be used to mate with J5. They are stock items at Digi-Key (Tel 800-344-4539 in the US, or www.digikey.com). The part nos. for several compatible mating connectors are shown below, along with the crimp terminal part no. Each contact is rated for 7A using 18AWG wire.

1	Positive Input
2	Input Return
3	+12V Output
4	+5V Output
5	Ground
6	-5V Output
7	-12V Output

Item	Mfr. Part No.	Digi-Key Part No.	Description
IDC contact housings	640426-7 (Amp)	A19582	IDC contacts for 18 AWG wire
	640427-7 (Amp)	A19595	IDC contacts for 20 AWG wire
Crimp terminal	09-50-3071 (Molex)	WM2105	With locking ramp
housings	09-50-8073 (Molex)	WM2116	With locking ramp and polarizing ribs
	09-50-8071 (Molex)	WM2127	With locking ramp, 94V-0 polyester
Crimp terminals	08-50-0106 (Molex)	WM2300	Brass, tin plated, 18-24AWG
	08-52-0072 (Molex)	WM2302	Bronze, tin plated, 18-24AWG
	08-56-0106 (Molex)	WM2305	Brass, gold plated, 18-24AWG
	08-58-0122 (Molex)	WM2304	Bronze, gold plated, 18-24AWG

Shutdown Control – J3

Shutdown may be implemented by shorting the two pins on J3 together. J3 consists of a .1" spacing friction lock header, Amp part no. 640457-2. The mating connector with integrated IDC contacts is included with the board. It is also a stock item at Digi-Key (Tel 800-344-4539 in the US, or www.digikey.com). The part nos. for several compatible mating connectors are shown below. Each contact is rated for 4A using 22AWG wire.

1	Shutdown input
2	Ground

Item	Amp Part No.	Digi-Key Part No.	Description
Mating Connectors	640442-2	A19030	26 AWG, Blue
	640441-2	A1901	24 AWG, White
	640440-2	A1906	22 AWG, Red

4. INSTALLATION

All JUPITER-MM power supplies are load tested prior to shipping. The supplies ship with all the external connectors required to start using your supply immediately.

No user configuration is required for any version of Jupiter-MM. Simply plug in the input power and the supply is operational. To power up your supply:

1. For protection, if you are unfamiliar with the use of this product, do not plug any other boards onto it when powering it up for the first time.
2. Connect a DC source to Main power J4, or to the Auxiliary connector J5. The supply will operate with input voltages from 7 to 30VDC.

   CAUTION: Voltages above 31V will be shunted to ground through a transient voltage supressor (TVS) on the board. The TVS is rated for 1,500 watt surges. However it could be damaged by sustained voltages above 31V.

   CAUTION: The supply is not protected against reverse polarity inputs. To add this protection would dissipate excessive heat and power, reducing the efficiency. Check your wiring for correct polarity before powering up the supply.

3. Once the input voltage is in the valid range, verify that the power output indicator LEDs in the lower left corner are illuminated. This verifies your input power connections and the supply are fully functional. Note that only indicators corresponding to the voltages available on the supply will be lit. On the dual output version, the –5V and –12V LEDs may be present on the board but will not be lit.
4. Power down the supply. Plug the supply into your PC/104 stack. Your system is ready to use.

5. OUTPUT VOLTAGES AND CURRENTS

Jupiter-MM provides either 2 or 4 output voltges. The outputs appear on the PC/104 bus headers J1 / J2 as well as on the auxiliary I/O connector J5. The table below lists the maximum ratings for each output voltage.

Output	JMM-512	JMM-512-V512	JMM-512-LP	Notes
+5V	10A	10A	5A	Maximum rating achieved when only +5V output is used. Power drawn from additional outputs will reduce the available power on this line.
+12V	2A	2A	2A	
-5V	-	0.2A	-	
-12V	-	0.75A	-	

6. OUTPUT PROTECTION

All outputs on the Jupiter-MM power supply are protected against overload on the outputs. The protection for each output circuit is slightly different:

+5V	Current limited to 10A. Above 10A the output voltage will drop to maintain maximum output of 50W. A short circuit will shut down the entire supply.
+12V	Current limited to 2A. Above 2A the voltage will drop to 5V and output current can increase to 10A (the 5V supply limit).Above 10A the output voltage will continue to drop. A short circuit will shut down the entire supply.
-5V	Current limited to 0.2 – 0.3A. A short circuit will shut down the output due to thermal protection on the output regulator.
-12V	Current limited to 1 – 2A. Above that level the output voltage will drop to zero.

7. SPECIFICATIONS

Input

Input voltage	7-30VDC		
Input ripple	<100mV RMS		
Transient protection	1500W transient voltage suppressor		
Transient cutoff	31V		

Output

Output voltage/current	+5V	10A	All models
	+12V	2A	All models
	-5V	0.2A	JMM-512-V512 only
	-12V	0.75A	JMM-512-V512 only
Total output power	50 Watts	JMM-512, JMM-512-V512	
	25 Watts	JMM-512-LP	
Output protection	+5V	Current limited to 10A; short circuit shuts down supply	
	+12V	Current limited to 2A; short circuit shuts down supply	
	-5V	Current limited to 0.2A; thermally protected against short circuit	
	-12V	Current limited to 1A	
Output ripple	<50mV RMS (+5V output, 50% load)		
Load regulation	+/-3%		
Efficiency	80% to 92%, based on load and input voltage		

Mechanical

Size	3.55” x 3.775”
PC/104 bus	J1 (64 pins) and J2 (40 pins) stackthrough connectors installed

Environmental

Operating temperature	-40 to +85^{o}C
Operating humidity	5 to 95% non-condensing