VME Quad Power Supply Controller
(V474)

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General Description

The V474 is a programmable power supply controller capable of generating four DC analog outputs. The V474 also has digital control capabilities to turn on, turn off, and reset four power supplies. It can also return eight status bits from each of the regulator supplies.

The V474 is a lower-cost alternative to the V473 Quad Ramp controller. It is intended for use where a DC output is required, rather than a ramped output.

Features

The V474 has four, 16-bit DAC outputs, capable of being set from -10V to 10V. The DACs are set directly by the VME front end and are intended to be DC-only (non-ramping).

There are 32 (4x8) optically isolated inputs for power supply status. These inputs can be read eight at a time by the VME front end. There are four additional opto inputs connected directly the V474's FPGA. Their function is undefined at this time.

Four ADC inputs (16 bit, -10V to 10V) allow for analog read-backs. The analog data is available to be read by the VME front end. At this time, the V474 does not itself do anything with the ADC data.

The V474 has eight (4x2) TTL-level digital outputs for power supply enable and reset.

VME Environment

The V474 occupies 64 kbytes (0x10000) of VME A24D16 space. The V474 does not interrupt at this time, but connections are present on the board for interrupt capability, if it were required in the future.

VME Memory Map (Summary)

Addr	Description
0x0000	Channel 0 DAC output
0x0010	Channel 1 DAC output
0x0020	Channel 2 DAC output
0x0030	Channel 3 DAC output
0x0100	Channel 0 ADC input
0x0110	Channel 1 ADC input
0x0120	Channel 2 ADC input
0x0130	Channel 3 ADC input
0x0200	Channel 0 Status
0x0210	Channel 1 Status
0x0220	Channel 2 Status
0x0230	Channel 3 Status
0x0300	Channel 0 Power Supply On/Off
0x0302	Channel 0 Power Supply Reset
0x0310	Channel 1 Power Supply On/Off
0x0312	Channel 1 Power Supply Reset
0x0310	Channel 2 Power Supply On/Off
0x0312	Channel 2 Power Supply Reset
0x0310	Channel 3 Power Supply On/Off
0x0312	Channel 3 Power Supply Reset
0xFF00	Module ID
0xFF02	Logic Version
0xFF10	Diagnostic Reg / LEDs
0xFFFE	Module Reset

DAC Read/Write: 0x00N0

The N in the VME address is the channel number

Writing to this register will set the DAC output to the requested setting. Reading this register will return the most recent value sent to the DAC.

Write to DAC

Bits	Bit Definitions
15:0	DAC setting (-32768 to +32767 = -10V to 10V)

Read ADC: 0x01N0

The N in the VME address is the channel number.

This reading is the voltage seen by the ADC input for Channel N.

ADC Data (Read Only)

Bits	Bit Definitions
15:0	ADC reading (-32768 to +32767 = -10V to 10V)

Power Supply Status: 0x02N0

The N in the VME address is the channel number.

Power Supply Status

Bits	Bit Definitions
15:14	Reserved
13	Power Supply Reset (1 = Reset output active)
12:11	Reserved
10	Power Supply Enabled
9:8	Reserved
7:0	State of power supply status inputs (1 = Input Active)

Turn Power Supply On/Off: 0x03N0

The N in the VME address is the channel number.

The polarity of the power supply enable output is user definable with a jumper on the board.

Power Supply On/Off

Bits	Bit Definitions
15:1	Reserved
0	1 = Turn On 0 = Turn Off

Reset Power Supply: 0x03N2

The N in the VME address is the channel number.

Writing a 1 to this register will reset the power supply. The V474 will automatically send a 1-second long pulse to the power supply's reset input. There is no need to clear the reset bit.

The polarity of the power supply reset output is user definable with a jumper on the board.

Power Supply Reset

Bits	Bit Definitions
15:1	Reserved
0	1 = Reset

Module ID number: 0xFF00

Module ID

Bits	Bit Definitions
15:0	0x01DA (474)

FPGA Version Number: 0xFF02

FPGA Version

Bits	Bit Definitions
15:8	Major Revision
7:0	Minor Revision

Diagnostic Register / LED Bar

This is a dummy register that by itself does nothing. It is there to read and write with whatever data patterns one desires. Bits 6:0 are attached to the front-panel LED bar, allowing for diagnostic displays or scope triggers.

FPGA Version

Bits	Bit Definitions
15:7	Unused
6:0	Front Panel LEDs

Reset Module: 0xFFFE

Any write to address 0xFFFE will reset the V474.

VME Base Address

The V474 occupies 64k (0x1 0000) of VME A24D16 address space. The base address of the card is set with a DIP switch, SW1. Switch positions 1:8 correspond to VME Address bits 23:16, as shown in Figure 1.

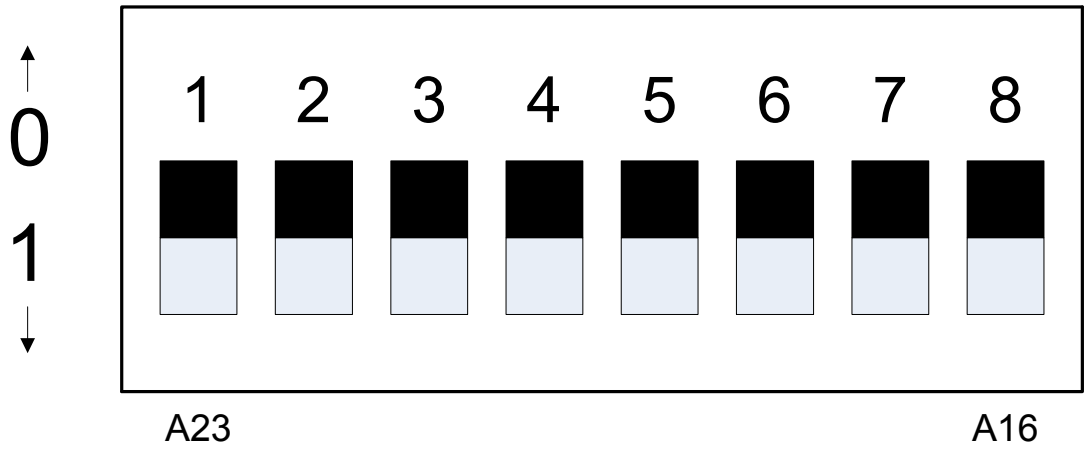

Figure 1: Base Address DIP Switch

VME IRQ Select

The V474 can drive any one of the seven VME IRQ's (IRQ1 – IRQ7). The IRQ is selected by placing a jumper on the one of the jumper headers labeled IR1 – IR7.

Additionally, jumpers must be placed on IS0 – IS2 to select which Interrupt Acknowledge cycle to respond to. IS[2:0] represent a 3-bit field intended to correspond with the IRQ selected. A jumper placed on ISx is a zero. An open ISx is a 1. For example, Figure 2 shows IR[7:1] and IS[2:0] set up for IRQ1.

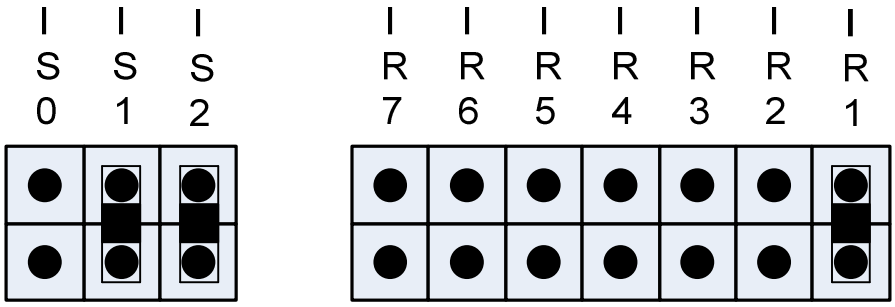

Figure 2: IRQ Selection (IRQ1 Shown)

I/O Connections (P2)

Terminal	Function
A1	Opto Anode Supply - 5 Volts provided by Supply 0
A2	Status Input 0-1 - (pull low for active state)
A3	Status Input 0-2
A4	Status Input 0-3
A5	Status Input 0-4
A6	Status Input 0-5
A7	Status Input 0-6
A8	Status Input 0-7
A9	Status Input 0-8
A10	Opto Anode Supply - 5 Volts provided by Supply 1
A11	Status Input 1-1 - (pull low for active state)
A12	Status Input 1-2
A13	Status Input 1-3
A14	Status Input 1-4
A15	Status Input 1-5
A16	Status Input 1-6
A17	Status Input 1-7
A18	Status Input 1-8
A19	Interlock Input 3 (Ignored)
A20	Interlock Input 1 (Ignored)
A21	TTL Output - Reset Supply 3
A22	TTL Output - Reset Supply 2
A23	TTL Output - Reset Supply 1
A24	TTL Output - Reset Supply 0
A25	Analog Current Readback 3
A26	Analog Current Readback 2
A27	Analog Current Readback 1
A28	Analog Current Readback 0
A29	Analog Reference Ground 3
A30	Analog Reference Ground 2
A31	Analog Reference Ground 1
A32	Analog Reference Ground 0
B2	Digital Gnd
B12	Digital Gnd
B22	Digital Gnd
B31	Digital Gnd
C1	Opto Anode Supply - 5 Volts provided by Supply 2
C2	Status Input 2-1 - (pull low for active state)
C3	Status Input 2-2
C4	Status Input 2-3
C5	Status Input 2-4
C6	Status Input 2-5
C7	Status Input 2-6
C8	Status Input 2-7
C9	Status Input 2-8
C10	Opto Anode Supply - 5 Volts provided by Supply 3
C11	Status Input 3-1 - (pull low for active state)
C12	Status Input 3-2

C13	Status Input 3-3
C14	Status Input 3-4
C15	Status Input 3-5
C16	Status Input 3-6
C17	Status Input 3-7
C18	Status Input 3-8
C19	Interlock Input 2 (Ignored)
C20	Interlock Input 0 (Ignored)
C21	TTL Output - Enable Supply 3
C22	TTL Output - Enable Supply 2
C23	TTL Output - Enable Supply 1
C24	TTL Output - Enable Supply 0
C25	Unused
C26	Unused
C27	Unused
C28	Unused
C29	Analog Reference Output 3
C30	Analog Reference Output 2
C31	Analog Reference Output 1
C32	Analog Reference Output 0