DIAMOND SYSTEMS CORPORATION

GPIO-MM

FPGA-based Digital I/O & Counter/Timer PC/104 Module

Personality Guide Rev B: January 2010

Diamond Systems Corporation
1255 Terra Bella Ave.
Mountain View, CA 94043
Tel (650) 810-2500
Fax (650) 810-2525
www.diamondsystems.com

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1 GENERAL DESCRIPTION

The GPIO-MM contains a Xilinx Spartan-II FPGA and a reprogrammable configuration flash device. Using a JTAG cable, the configuration flash of the GPIO-MM can be reloaded with alternate personalities to change the functionality of the GPIO-MM.

Each official personality from Diamond Systems is given an 8-bit personality ID code. There are currently three personalities available: 0x11, 0x12 and 0x21.

1.1 Personality 0x11: Dual 9513 Counter/Timer Cores with 48 Buffered Digital I/O Lines (ACB)

This is the default personality loaded into the board during production. This personality is designed to be software and hardware compatible with the Quartz-MM and Garnet-MM.

Personality 0x11 emulates the Quartz-MM by providing two 9513 cores, for a total of ten 16-bit counter/timers. Each counter/timer has an input, output and gate pin, allowing for many different modes of operation. The Quartz-MM emulation header also provides 8 unbuffered digital input and 8 unbuffered digital output.

The buffered digital I/O is grouped into six ports of eight bits each. The digital I/O uses two 82C55 interfaces, same as the Garnet-MM. The pinout of the digital I/O is ordered "ACB" to be pinout compatible with the Garnet-MM.

This personality also provides 4 auxiliary bi-directional unbuffered digital I/O lines on J5.

J3: Counter/Timer Header

In 1	1	2	In 2
Gate 1	3	4	Gate 2
Out 1	5	6	Out 2
In 3	7	8	In 4
Gate 3	9	10	Gate 4
Out 3	11	12	Out 4
In 5	13	14	Out 5
Gate 5	15	16	FOUT
In 6	17	18	In 7
Gate 6	19	20	Gate 7
Out 6	21	22	Out 7
In 8	23	24	In 9
Gate 8	25	26	Gate 9
Out 8	27	28	Out 9
In 10	29	30	Out 10
Gate 10	31	32	Interrupt Input
Dout 7	33	34	Din 7
Dout 6	35	36	Din 6
Dout 5	37	38	Din 5
Dout 4	39	40	Din 4
Dout 3	41	42	Din 3
Dout 2	43	44	Din 2
Dout 1	45	46	Din 1
Dout 0	47	48	Din 0
+5V	49	50	Ground

J4: Buffered Digital I/O Header

Port1 7	1	2	Port4 7
Port1 6	3	4	Port4 6
Port1 5	5	6	Port4 5
Port1 4	7	8	Port4 4
Port13	9	10	Port4 3
Port1 2	11	12	Port4 2
Port1 1	13	14	Port4 1
Port1 0	15	16	Port4 0
Port3 7	17	18	Port6 7
Port3 6	19	20	Port6 6
Port3 5	21	22	Port6 5
Port3 4	23	24	Port6 4
Port3 3	25	26	Port6 3
Port3 2	27	28	Port6 2
Port3 1	29	30	Port6 1
Port3 0	31	32	Port6 0
Port2 7	33	34	Port5 7
Port2 6	35	36	Port5 6
Port2 5	37	38	Port5 5
Port2 4	39	40	Port5 4
Port2 3	41	42	Port5 3
Port2 2	43	44	Port5 2
Port2 1	45	46	Port5 1
Port2 0	47	48	Port5 0
+5V	49	50	Ground

1.2 Personality 0x12: Dual 9513 Counter/Timer Cores with 48 Buffered Digital I/O Lines (ABC)

This personality is identical to 0x11 (see above) in every way except for the arrangement of the buffered digital I/O on J4. The digital I/O in this personality is arranged "ABC" to be compatible with the Onyx-MM pinout.

J3: Counter/Timer Header

In 1	1	2	In 2
Gate 1	3	4	Gate 2
Out 1	5	6	Out 2
In 3	7	8	In 4
Gate 3	9	10	Gate 4
Out 3	11	12	Out 4
In 5	13	14	Out 5
Gate 5	15	16	FOUT
In 6	17	18	In 7
Gate 6	19	20	Gate 7
Out 6	21	22	Out 7
In 8	23	24	In 9
Gate 8	25	26	Gate 9
Out 8	27	28	Out 9
In 10	29	30	Out 10
Gate 10	31	32	Interrupt Input
Dout 7	33	34	Din 7
Dout 6	35	36	Din 6
Dout 5	37	38	Din 5
Dout 4	39	40	Din 4
Dout 3	41	42	Din 3
Dout 2	43	44	Din 2
Dout 1	45	46	Din 1
Dout 0	47	48	Din 0
+5V	49	50	Ground

J4: Buffered Digital I/O Header

Port1 7	1	2	Port4 7
Port1 6	3	4	Port4 6
Port1 5	5	6	Port4 5
Port1 4	7	8	Port4 4
Port13	9	10	Port4 3
Port1 2	11	12	Port4 2
Port1 1	13	14	Port4 1
Port1 0	15	16	Port4 0
Port2 7	17	18	Port5 7
Port2 6	19	20	Port5 6
Port2 5	21	22	Port5 5
Port2 4	23	24	Port5 4
Port2 3	25	26	Port5 3
Port2 2	27	28	Port5 2
Port2 1	29	30	Port5 1
Port2 0	31	32	Port5 0
Port3 7	33	34	Port6 7
Port3 6	35	36	Port6 6
Port3 5	37	38	Port6 5
Port3 4	39	40	Port6 4
Port3 3	41	42	Port6 3
Port3 2	43	44	Port6 2
Port3 1	45	46	Port6 1
Port3 0	47	48	Port6 0
+5V	49	50	Ground

1.3 Personality 0x21: 96 Digital I/O Lines (48 Buffered, 48 Unbuffered)

This personality provides a total of 96 digital I/O in the “ABC” arrangement compatible with the Onyx-MM family.

The digital I/O is accessed through four 82C55 interfaces. The first two 82C55 circuits provide 48 unbuffered digital I/O through J3. The second two 82C55 circuits provide 48 buffered digital I/O through J4.

J3: Unbuffered Digital I/O Header

Port7 7	1	2	Port10 7
Port7 6	3	4	Port10 6
Port7 5	5	6	Port10 5
Port7 4	7	8	Port10 4
Port7 3	9	10	Port10 3
Port7 2	11	12	Port10 2
Port7 1	13	14	Port10 1
Port7 0	15	16	Port10 0
Port8 7	17	18	Port11 7
Port8 6	19	20	Port11 6
Port8 5	21	22	Port11 5
Port8 4	23	24	Port11 4
Port8 3	25	26	Port11 3
Port8 2	27	28	Port11 2
Port8 1	29	30	Port11 1
Port8 0	31	32	Port11 0
Port9 7	33	34	Port12 7
Port9 6	35	36	Port12 6
Port9 5	37	38	Port12 5
Port9 4	39	40	Port12 4
Port9 3	41	42	Port12 3
Port9 2	43	44	Port12 2
Port9 1	45	46	Port12 1
Port9 0	47	48	Port12 0
+5V	49	50	Ground

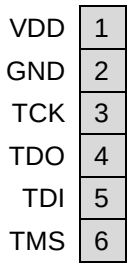
J4: Buffered Digital I/O Header

Port1 7	1	2	Port4 7
Port1 6	3	4	Port4 6
Port1 5	5	6	Port4 5
Port1 4	7	8	Port4 4
Port13	9	10	Port4 3
Port1 2	11	12	Port4 2
Port1 1	13	14	Port4 1
Port1 0	15	16	Port4 0
Port2 7	17	18	Port5 7
Port2 6	19	20	Port5 6
Port2 5	21	22	Port5 5
Port2 4	23	24	Port5 4
Port2 3	25	26	Port5 3
Port2 2	27	28	Port5 2
Port2 1	29	30	Port5 1
Port2 0	31	32	Port5 0
Port3 7	33	34	Port6 7
Port3 6	35	36	Port6 6
Port3 5	37	38	Port6 5
Port3 4	39	40	Port6 4
Port3 3	41	42	Port6 3
Port3 2	43	44	Port6 2
Port3 1	45	46	Port6 1
Port3 0	47	48	Port6 0
+5V	49	50	Ground

2 REPROGRAMMING THE CONFIGURATION FLASH

Diamond Systems recommends the iMPACT JTAG tool, available free in the Xilinx ISE Webpack. The Webpack is currently available at this URL: http://www.xilinx.com/ise/logic_design_prod/webpack.htm

The end user will also require a suitable JTAG programming cable. This cable must connect to the target device using a 6-pin connector compatible with 3.3V logic:



One suitable cable can be found here: http://www.nuhorizons.com/products/digilent/jtag-cable.html

Personalities provided by Diamond Systems will be available as .mcs files. These files can be used in the iMPACT software tool to directly reprogram the configuration flash.