Introducing the PIC24FJ64GB004 PIM

Overview

The PIC24FJ64GB004 PIM is designed to demonstrate the capabilities of the PIC24FJ64GB004 family using the Explorer 16 Demonstration Board kit and the PICtail™ Plus daughter boards. The PIC24FJ64GB004 is a 44-pin device with USB On-The-Go (OTG), nanoWatt XLP™ Technology and Peripheral Pin Select (PPS) features.. The PPS feature of this PIC24F family allows many of the digital peripherals on the part to be remapped to use any of a number of pins on the device. This allows for significant improvements in ease of design and helps to reduce cost by allowing for the smallest possible size devices to be used.
The following two tables detail the pin mapping of the 44-pin device to the 100-pin PIM header.

- The 44-pin to 100-pin table lists the device pins and shows what functions are mapped to each. This table is most useful for viewing multiplexing conflicts which prevent some functions from being used simultaneously.
- The 100-pin to 44-pin table shows a listing of the Explorer 16 functions and what device pin is mapped to that function.

PIC24FJ64GB004 PIM Features

Due to the flexibility allowed by the PPS feature, the 44-pin device is capable of performing all of the base functions on the 100-pin Explorer 16 board. In addition, the PIM is compatible with most of the PICtail Plus daughter boards for the Explorer 16, including the USB PICtail Plus Daughter Board (AC164131).

PIC24FJ64GB004 PIM Limitations

The result of multiplexing the functions from a 44-pin part to the 100-pin PIM header is that many of the functions cannot be used simultaneously. All of the built-in functionality on the Explorer 16 board can be used simultaneously, with the exception of the LEDs. LEDs are multiplexed on switch and PMP lines, which means they will not always be usable if these functions are in use.
The PICtail Plus daughter boards have similar limitations. All daughter boards will work by themselves, however, most PICtail Plus daughter boards will not work if two are installed simultaneously. Additionally, a PICtail Plus daughter board may not work with all of the default Explorer 16 functionality. If a PICtail Plus daughter board is designed to work with a Microchip stack, the stack will need to be modified to function with the PIM pinout and PPS feature.
Please check the pinouts of the components you are using to ensure compatability before attempting to use multiple peripheral functions or PICtail Plus daughter boards at the same time.

Tips for Using the PIC24FJ64GB004 PIM

- The Explorer 16 LEDs are multiplexed with a number of functions and so may not be useful in some situations. Make sure to check the mapping tables for conflicts.
- The PIC24FJ64GB004 port pins are not mapped to the corresponding port I/O on the Explorer 16. Make sure to use the following pinout tables as a cross reference to ensure you use the correct device pin in your application.
- Many of the peripherals used by the Explorer 16 and PICtail Plus daughter boards are implemented on pins with analog functionality. These peripherals may not conflict with analog features on other PIC24F PIMs. Make sure to add any necessary code to override this analog functionality in your application or in the stack application you are using.
- Some Explorer 16 boards have a 5V LCD. If you are using a function which is multiplexed onto the PMP pins on one of these boards, it may be necessary to manually drive the pins initially. The pin must be driven in order to ensure the bus is driven to either VDD or VSS, instead of floating at 5V.
- Jumper settings: Jumper J1 pins (1-2) select PT+; pins (2-3) select the Explorer 16 potentiometer function. Jumper J2 pins (1-2) select PT+; pins (2-3) select the Explorer 16 analog temperature sensor. Jumper J3 pins (1-2) select the Explorer 16 Serial EEPROM CS; pins (2-3) select PT+. **Note:** PT+ refers to a PICtail Plus connection on the Explorer 16.
- It is not possible to use the Explorer 16 LCD and USB when debugging on this PIM. When debugging and using the LCD on the Explorer 16, select switch S1 = PGX2. When debugging and using USB, select switch S1 = PGX1. **Note:** a pull-down resistor is provided on pin RB14/PMWR to disable the Explorer 16 LCD by default. This prevents the LCD from randomly driving data lines shared with the PGX1 programming pins.
- Many PICtail Plus daughter boards use the EEPROM, SPI and UART2 (which has the RS-232 port functionality). These functions are mapped to ensure that they can be used together to allow support for these boards.

Table 1: 44-Pin to 100-Pin Pinout

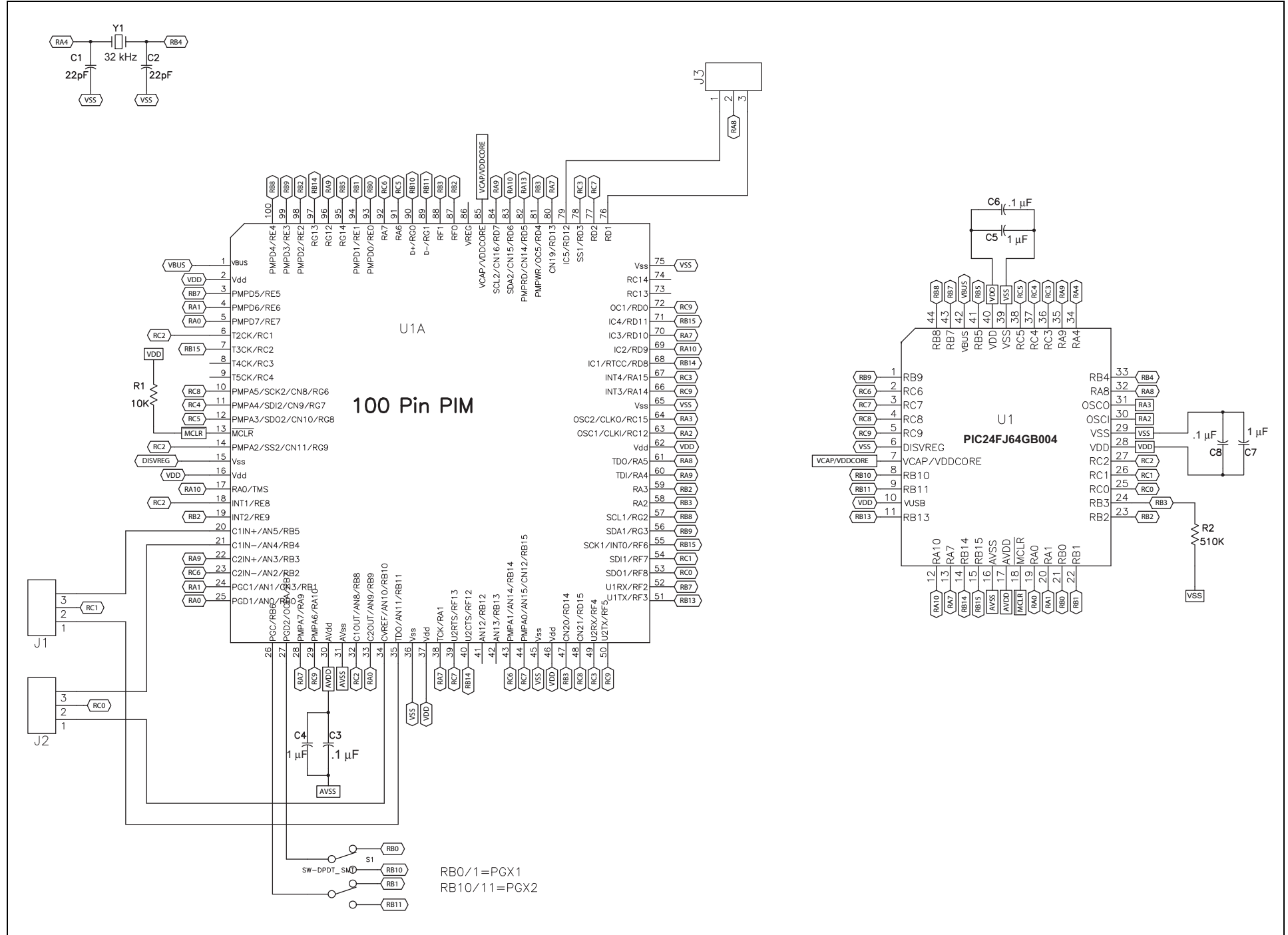| Device Pin #	PIC24FJ64GB004 Pinout	Jumper	PIM Pin #	PIM Func #1	Jumper	PIM Pin #	PIM Func #2	Jumper	PIM Pin #	PIM Func #3	PIM Pin #	PIM Func #4
1	SDA1/RP9/PMPD3/CN21/RB9		56	RG3/SDA1[1]		99	RE3/PMD3					
2	RP22/PMPA1/CN18/RC6		23	RB2/$\overline{SS1}$/AN2[1]		43	RB14/PMA1		92	RA7		
3	RP23/PMPA0/CN17/RC7		44	RB15/PMA0		77	RD2		39	RF13/U2RTS[1]		
4	RP24/PMPA5/CN20/RC8		10	RG6/PMA5/SCK2		48	RD15/U1RTS[1]					
5	RP25/PMPA6/CN19/RC9		29	RA10/PMA6		50	RF5/PMA8/U2TX		66	RA14/INT3[1]	72	RD0[1]
6	DISVREG		65	VSS								
7	VCAP/VDDCORE		85	VDDCORE								
8	PGD2/D+/VPIO/RP10/CN16/RB10	S1-3 (PGX2)	90	RG0/D+[1]	S1-2 (PGD)	27	RB7/AN7/PGD					
9	PGC2/D/VMIO/RP11/CN15/RB11	S1-6 (PGX2)	89	RG1/D-[1]	S1-5 (PGC)	26	RB6/AN6/PGC					
10	VUSB		16	VDD								
11	AN11/C1INC/REFO/RP13/PMPRD/SESSEND/CN13/RB13		82	RD5/PMRD		51	RF3/U1TX					
12	TMS/PMPA10/RA10		17	RA0/TMS		83	RD6		69	RD9		
13	TCK/PMPA7/RA7		28	RA9/PMA7		38	RA1/TCK		80	RD13	70	RD10/PMCS2
14	AN10/C3INB/CVREF/VCPCON/VBUSON/RP14/CN12/RB14		68	RA14/INT3		40	RF12/U2CTS[1]		97	RG13		
15	AN9/C3INA/VBUSCHG/RP15/CN11/VBUSST/RB15		7	RC2[1]		55	RF6/SCK1		71	RD11/PMCS1		
16	AVSS		31	AVSS								
17	AVDD		30	AVDD								
18	MCLR		13	$\overline{MCLR}$								
19	PGD3/AN0/C3INC/VREF+/ASDA1/RP5/PMD7/CN2/CTED1/BUSVLD/VCMPST1/RA0		5	RE7/PMD7		25	RB0/AN0[1]		33	RB9/AN9		
20	PGC3/AN1/C3IND/VREF-/ASCL1/RP6/PMD6/CN3/CTED2/SESSVLD/VCMPST2/RA1		4	RE6/PMD6		24	RB1/AN1[1]					
21	PGD1/AN2/C2INB/DPH/RP0/PMD0/CN4/RB0	S1-1 (PGX1)	27	RB7/AN7/PGD	S1-2 (PGD)	93	RE0/PMD0					
22	PGC1/AN3/C2INA/DMH/RP1/PMD1/CN5/RB1	S1-4 (PGX1)	26	RB6/AN6/PGC	S1-5 (PGC)	94	RE1/PMD1					
23	AN4/C1INB/DPLN/SDA2/RP2/PMD2/CN6/RB2		98	RE2/PMD2		59	RA3/SDA2		19	RE9/INT2[1]	87	RF0[1]
24	AN5/C1INA/DMLN/RTCC/SCL2/RP3/PMWR/CN7/RB3		81	RD4/PMWR		58	RA2/SCL2		47	RD14/U1CTS[1]	88	RF1[1]
25	AN6/RP16/CN8/RC0	J2-2	53	RF8/SDO1	J2-3 (Temp)	21	RB4/AN4	J2-1 (PT+)	34	RB10/PMA13		
26	AN7/RP17/CN9/RC1	J1-2	54	RF7/SDI1	J1-3 (Temp)	20	RB5/AN5		35	RB11/PMA12		
27	AN8/RP18/PMPA2/CN10/RC2		14	RB14/PMA1		18	RE8/INT1[1]	J1-1 (PT+)	32	RB8/AN8[1]	6	RC1[1]
28	VDD		46	VDD								
29	VSS		45	VSS								
30	OSCI/CLKI/C1IND/PMCS1/CN30/RA2		63	OSC1								
31	OSCO/CLKO/CN29/RA3		64	OSC2								
32	TDO/PMPA8/RA8		61	RA5/TDO		79	RD12		76	RD1		
33	SOSCI/SCLKI/C2IND/RP4/CN1/RB4		NC	RC14/SOSCI								
34	SOSCO/T1CK/C2INC/CN0/RA4		NC	RC13/SOSCO								
35	TDI/PMPA9/RA9		60	RA4/TDI		84	RD7		96	RG12	22	RB3/AN3[1]
36	AN12/RP19/PMPBE/CN28/RC3		78	RD3/PMBE		49	RF4/PMA9/U2RX		67	RA15/INT4[1]		
37	RP20/PMPA4/CN25/RC4		11	PMA4/SDI2								
38	RP21/PMPA3/CN26/RC5		12	PMA3/SDO2		91	RA6					
39	VSS		75	Vss								
40	VDD		62	VDD								
41	CN27/USBID/RB5		95	RG14/USBID								
42	VBUS		1	RG15/VBUS								
43	RP7/PMPD5/INT0/CN23/RB7		3	RE5/PMD5		52	RF2/U1RX					
44	USBOEN/SCL1/RP8/PMPD4/CN22/RB8		57	RG2/SCL1[1]		100	PMD4					

Note 1: This pin is a common or required signal for PICtail™ Plus daughter boards.

Table 2: 100-Pin to 44-Pin Pinout

Exp 16 Pin #	PIM Function	Jumper	Device Pin #	PIC24FJ64GB004 Pinout
1	RG15/V$_{BUS}$		42	V$_{BUS}$
2	V$_{DD}$			
3	RE5/PMD5		43	RP7/PMPD5/INT0/CN23/RB7
4	RE6/PMD6		20	PGC3/AN1/C3IND/V$_{REF}$-/ASCL1/RP6/PMD6/CN3/CTED2/SESSVLD/VCMPST2/RA1
5	RE7/PMD7		19	PGD3/AN0/C3INC/V$_{REF}$+/ASDA1/RP5/PMD7/CN2/CTED1/VBUSVLD/VCMPST1/RA0
6	RC1[1]		27	AN8/RP18/PMPA2/CN10/RC2
7	RC2[1]		15	AN9/C3INA/VBUSCHG/RP15/CN11/VBUSST/RB15
8	RC3			
9	RC4			
10	RG6/PMA5/SCK2		4	RP24/PMPA5/CN20/RC8
11	PMA4/SDI2		37	RP20/PMPA4/CN25/RC4
12	PMA3/SDO2		38	RP21/PMPA3/CN26/RC5
13	MCLR		18	MCLR
14	RB14/PMA1		27	AN8/RP18/PMPA2/CN10/RC2
15	V$_{SS}$		6	DISVREG
16	V$_{DD}$			
17	RA0/TMS		12	TMS/PMPA10/RA10
18	RE8/INT1[1]		27	AN8/RP18/PMPA2/CN10/RC2
19	RE9/INT2[1]		23	AN4/C1INB/DPLN/SDA2/RP2/PMD2/CN6/RB2
20	RB5/AN5	J1-3 (POT)		
21	RB4/AN4	J2-3 (TEMP)		
22	RB3/AN3[1]		35	TDI/PMPA9/RA9
23	RB2/SS1/AN2[1]		2	RP22/PMPA1/CN18/RC6
24	RB1/AN1[1]		20	PGC3/AN1/C3IND/V$_{REF}$-/ASCL1/RP6/PMD6/CN3/CTED2/SESSVLD/VCMPST2/RA1
25	RB0/AN0[1]		19	PGD3/AN0/C3INC/V$_{REF}$+/ASDA1/RP5/PMD7/CN2/CTED1/VBUSVLD/VCMPST1/RA0
26	RB6/AN6/PGC	S1-5 (PGC)		
27	RB7/AN7/PGD	S1-2 (PGD)		
28	RA9/PMA7		13	TCK/PMPA7/RA7
29	RA10/PMA6		5	RP25/PMPA6/CN19/RC9
30	AV$_{DD}$		17	AV$_{DD}$
31	AV$_{SS}$		16	AV$_{SS}$
32	RB8/AN8[1]		27	AN8/RP18/PMPA2/CN10/RC2
33	RB9/AN9[1]		19	PGD3/AN0/C3INC/V$_{REF}$+/ASDA1/RP5/PMD7/CN2/CTED1/VBUSVLD/VCMPST1/RA0
34	RB10/PMA13	J2-1 (PT+)		
35	RB11/PMA12	J1-1 (PT+)		
36	V$_{SS}$			
37	V$_{DD}$			
38	RA1/TCK		13	TCK/PMPA7/RA7
39	RF13/U2RTS[1]		3	RP23/PMPA0/CN17/RC7
40	RF12/U2CTS		14	AN10/C3INB/CV$_{REF}$/VCPCON/VBUSON/RP14/CN12/RB14
41	RB12/PMA11			
42	RB13/PMA10			
43	RB14/PMA1		2	RP22/PMPA1/CN18/RC6
44	RB15/PMA0		3	RP23/PMPA0/CN17/RC7
45	V$_{SS}$		29	V$_{SS}$
46	V$_{DD}$		28	V$_{DD}$
47	RD14/U1CTS[1]		24	AN5/C1INA/DMLN/RTCC/SCL2/RP3/PMWR/CN7/RB3
48	RD15/U1RTS[1]		4	RP24/PMPA5/CN20/RC8
49	RF4/PMA9/U2RX		36	AN12/RP19/PMPBE/CN28/RC3
50	RF5/PMA8/U2TX		5	RP25/PMPA6/CN19/RC9

Note 1: This pin is a common or required signal for PICtail™ Plus daughter boards.

Table 2: 100-Pin to 44-Pin Pinout (Continued)

Exp 16 Pin #	PIM Function	Jumper	Device Pin #	PIC24FJ64GB004 Pinout
51	RF3/U1TX		11	AN11/C1INC/REFO/RP13/PMPRD/SESSEND/CN13/RB13
52	RF2/U1RX		43	RP7/PMPD5/INT0/CN23/RB7
53	RF8/SDO1	J2-2	25	AN6/RP16/CN8/RC0
54	RF7/SDI1	J1-2	26	AN7/RP17/CN9/RC1
55	RF6/SCK1		15	AN9/C3INA/VBUSCHG/RP15/CN11/VBUSST/RB15
56	RG3/SDA1[1]		1	SDA1/RP9/PMPD3/CN21/RB9
57	RG2/SCL1[1]		44	USBOEN/SCL1/RP8/PMPD4/CN22/RB8
58	RA2/SCL2		24	AN5/C1INA/DMLN/RTCC/SCL2/RP3/PMWR/CN7/RB3
59	RA3/SDA2		23	AN4/C1INB/DPLN/SDA2/RP2/PMD2/CN6/RB2
60	RA4/TDI		35	TDI/PMPA9/RA9
61	RA5/TDO		32	TDO/PMPA8/RA8
62	V$_{DD}$		40	V$_{DD}$
63	OSC1		30	OSCI/CLKI/C1IND/PMCS1/CN30/RA2
64	OSC2		31	OSCO/CLKO/CN29/RA3
65	V$_{SS}$			
66	RA14/INT3[1]		5	RP25/PMPA6/CN19/RC9
67	RA15/INT4[1]		36	AN12/RP19/PMPBE/CN28/RC3
68	RA14/INT3		14	AN10/C3INB/CV$_{REF}$/VCPCON/VBUSON/RP14/CN12/RB14
69	RD9		12	TMS/PMPA10/RA10
70	RD10/PMCS2		13	TCK/PMPA7/RA7
71	RD11/PMCS1		15	AN9/C3INA/VBUSCHG/RP15/CN11/VBUSST/RB15
72	RD0[1]		5	RP25/PMPA6/CN19/RC9
73	RC14/SOSCI			
74	RC13/SOSCO			
75	V$_{SS}$		39	V$_{SS}$
76	RD1		32	TDO/PMPA8/RA8
77	RD2		3	RP23/PMPA0/CN17/RC7
78	RD3/PMBE		36	AN12/RP19/PMPBE/CN28/RC3
79	RD12		32	TDO/PMPA8/RA8
80	RD13		13	TCK/PMPA7/RA7
81	RD4/PMWR		24	AN5/C1INA/DMLN/RTCC/SCL2/RP3/PMWR/CN7/RB3
82	RD4/PMRD		11	AN11/C1INC/REFO/RP13/PMPRD/SESSEND/CN13/RB13
83	RD6		12	TMS/PMPA10/RA10
84	RD7		35	TDI/PMPA9/RA9
85	V$_{DDCORE}$		7	V$_{CAP}$/V$_{DDCORE}$
86	ENVREG			
87	RF0[1]		23	AN4/C1INB/DPLN/SDA2/RP2/PMD2/CN6/RB2
88	RF1[1]		24	AN5/C1INA/DMLN/RTCC/SCL2/RP3/PMWR/CN7/RB3
89	RG1/D-[1]	S1-6 (PGX2)	9	PGC2/D-/VMIO/RP11/CN15/RB11
90	RG0/D+[1]	S1-3 (PGX2)	8	PGD2/D+/VPIO/RP10/CN16/RB10
91	RA6		38	RP21/PMPA3/CN26/RC5
92	RA7		2	RP22/PMPA1/CN18/RC6
93	RE0/PMD0	S1-1 (PGX1)	21	PGD1/AN2/C2INB/DPH/RP0/PMD0/CN4/RB0
94	RE1/PMD1	S1-4 (PGX1)	22	PGC2/AN3/C2INA/DMH/RP1/PMD1/CN5/RB1
95	RG14/USBID		41	CN27/USBID/RB5
96	RG12		35	TDI/PMPA9/RA9
97	RG13		14	AN10/C3INB/CV$_{REF}$/VCPCON/VBUSON/RP14/CN12/RB14
98	RE2/PMD2		23	AN4/C1INB/DPLN/SDA2/RP2/PMD2/CN6/RB2
99	RE3/PMD3		1	SDA1/RP9/PMPD3/CN21/RB9
100	PMD4/LED4		44	USBOEN/SCL1/RP8/PMPD4/CN22/RB8

Note 1: This pin is a common or required signal for PICtail™ Plus daughter boards.

Figure 1: 100-Pin Header and 44-Pin Device Schematic

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