

PIC32CM MC00 100-pin Motor Control Plug-In Module (PIM) Information Sheet

Introduction

The PIC32CM MC00 100-Pin Motor Control Plug-in Module (PIM), EV94F66A, is designed to demonstrate the capabilities of the PIC32CM MC00 48-pin Motor Control device using external op amps with the following hardware:

- The dsPICDEM™ MCLV-2 development board (DM330021-2)
- The dsPICDEM™ MCHV-3 development board (DM330023-3)

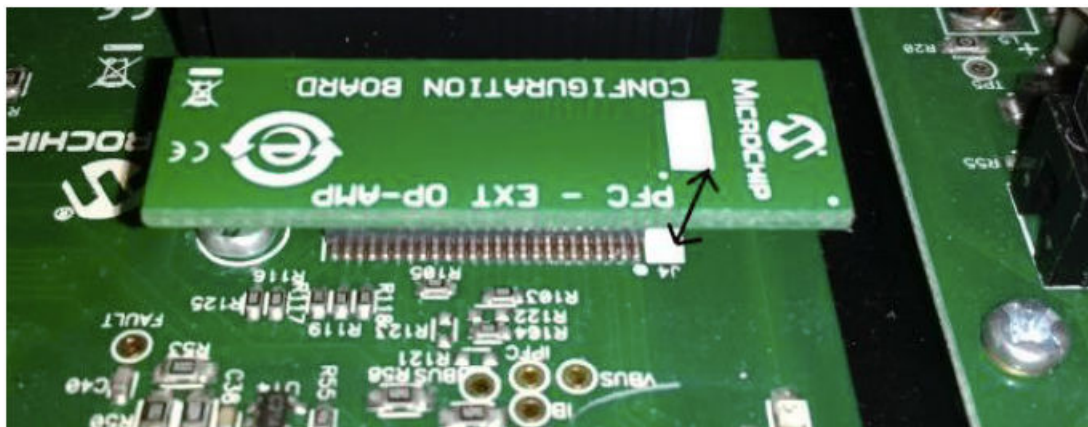
Both development boards support 100-pin PIM interfaces. The PIC32CM MC00 Motor Control PIM is designed to utilize on board external op amps for signal conditioning of analog feedback inputs.

For the dsPICDEM™ MCLV-2 development board, insert external op amp configuration board (included with the development board) at header J14. For the dsPICDEM™ MCHV-3 development board, insert the PFC-EXT-OPAMP configuration board (included with the development board) at header J4, as shown in the figures below.

Figure 1. Op amp Configuration Board for dsPICDEM™ MCLV-2



Figure 2. Op amp Configuration Board for dsPICDEM™ MCHV-3





Do not connect non-isolated oscilloscope probes to probe any traces while using the PIM with the dsPICDEM MCHV-3 development boards. Instead, use a high-voltage differential probe, rated in excess of 600 VRMS (Common mode). Failure to consider this warning could result in hardware damage.

Programming or Debugging:

Use the following methods to program and debug software on the PIC32CM MC00 Motor Control PIM:

1. In-Circuit Debugger: The PIC32CM MC00 Motor Control PIM can be programmed and debugged using the following debugging tools, which are connected to the board using a Arm[®] CoreSight[™] 10 connector:
 - 1.1. MPLAB[®] ICD4 In-Circuit Debugger
 - 1.2. ATMEL ICE
 - 1.3. SAM ICE
2. Isolated EDBG Interface (AC320202): This daughter board provides an isolated programming and debugging interface for the PIC32CM MC00 Motor Control PIM. This daughter board is compatible with dsPICDEM[™] MCHV-2/ MCHV-3 boards. Refer to the Information Sheet of this daughter board for additional information.

1. PIM to MCU Mapping

The following table provides the static mapping between the 100-pin PIM pins and the 48-pin device pins.

PIC32 CM MC 00 Motor Control PIM		PIC32CM1216MC0048			dsPICDEM MCLV2		dsPICDEM MCHV3	
PIM Pin Number	PIM Pin Name	MCU Pin Number	MCU Pin Name	Alternate I/O Function	Pin Name	Functionality	Pin Name	Functionality
1	LED2	33	PA24	-	DBG_LED2	Debug LED 2	DBG_LED1	Debug LED 1
2	VDD	17, 36, 44	VDDIN/VDDIO	-	VDD	NC	VDD	NC
3	PWM1H3	15	PA10	TCC0/WO[2]	PWM1H3	PWM Output - 3H	PWM1H3	PWM Output - 3H
4	NC	-	-	-	NC	NC	NC	NC
5	NC	-	-	-	NC	NC	NC	NC
6	NC	-	-	-	NC	NC	NC	NC
7	NC	-	-	-	NC	NC	NC	NC
8	NC	-	-	-	NC	NC	NC	NC
9	NC	-	-	-	NC	NC	NC	NC
10	NC	-	-	-	NC	NC	NC	NC
11	NC	-	-	-	NC	NC	NC	NC
12	NC	-	-	-	NC	NC	NC	NC
13	nRESET	40	nRESET	-	MCLR	Device Master Clear	MCLR	Device Master Clear
14	NC	-	-	-	NC	NC	NC	NC
15	VSS	18, 35, 42	GND	-	VSS	NC	VSS	NC
16	VDD	17, 36, 44	VDDIN/VDDIO	-	VDD	NC	VDD	NC
17	NC	-	-	-	NC	NC	NC	NC
18	FAULT_PWM	41	PA28	EXTINT[8]	FAULT	DC BUS Current Fault (active low logic)	FAULT	DC BUS Current Fault (active low logic)
19	PFC_EN_FLT	19	PB10	EXTINT[10]	TX	UART Transmit	PFC_FLT	IPFC Fault (overvoltage or overcurrent)
20	NC	-	-	-	PIM_V_M3	Voltage feedback signal	PIM_INDX/POT/V_M3	Hall Sensor/Current Sense/ Voltage Feedback Signal
21	NC	-	-	-	PIM_V_M2	Voltage feedback signal	PIM_QEB/IB/V_M2	Hall Sensor/Current Sense/ Voltage Feedback Signal
22	NC	-	-	-	PIM_V_M1	Voltage feedback signal	PIM_QEA/IA/V_M1	Hall Sensor/Current Sense/ Voltage Feedback Signal
23	VDCBUS2	12	PA07	ADC0 - AIN[7]	PIM_IMOTOR_SUM	DC bus current signal	PIM_IBUS/VBUS	DC Bus Voltage (downscaled)
24	NC	-	-	-	PIM_IMOTOR2	Phase current signal	PIM_IB/POT	AC Input Zero Cross/ AC Input Voltage (downscaled)/ Potentiometer
25	NC	-	-	-	PIM_IMOTOR1	Phase current signal	PIM_IA/IPFC	PFC Current (buffered)
26	SWCLK	45	PA30/SWCLK	-	PGC	Device programming clock line	PGC	Device programming clock line
27	SWDIO	46	PA31/SWDIO	-	PGD	Device programming data line	PGD	Device programming data line
28	NC	-	-	-	VREF	Reference voltage (half of AVDD voltage)	AVDD/2	Reference voltage (half of AVDD voltage)
29	NEUTR	3	PA02	ADC0 - AIN[0]	PIM_REC_NEUTR	Reconstructed motor neutral line voltage	PIM_REC_NEUTR	Reconstructed motor neutral line voltage
30	VDDANA	6	VDDANA	-	AVDD	Analog supply	AVDD	Analog supply
31	GNDANA	5	GNDANA	-	AVSS	Analog supply	AVSS	Analog supply
32	PIM_POT	47	PB02	ADC1-AIN[2]	PIM_POT	Potentiometer signal	PIM_POT	Potentiometer signal

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PIM to MCU Mapping

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PIC32 CM MC 00 Motor Control PIM		PIC32CM1216MC00048			dsPICDEM MCLV2		dsPICDEM MCHV3	
PIM Pin Number	PIM Pin Name	MCU Pin Number	MCU Pin Name	Alternate I/O Function	Pin Name	Functionality	Pin Name	Functionality
33	NC	-	-	-	NC	NC	PIM_POT	Potentiometer signal
34	NC	-	-	-	PIM_GEN2	General I/O	PIM_GEN2	General I/O
35	VDCBUS1	14	PA09	ADC0-AIN[9]	PIM_VBUS	DC bus voltage (downscaled)	PIM_VBUS	DC bus voltage (downscaled)
36	VSS	18, 35, 42	GND	-	VSS	NC	VSS	NC
37	VDD	17, 36, 44	VDDIN/VDDIO	-	VDD	NC	VDD	NC
38	NC	-	-	-	NC	NC	PIM_VAC_VOL2	AC Input Voltage (unbuffered)
39	NC	-	-	-	NC	NC		PFC Shunt Signal
40	NC	-	-	-	NC	NC	PIM_PFC_L	PFC Shunt Signal
41	PIM_MONITOR_1	7	PB08	ADC0-AIN[2]	PIM_MONITOR_1	Hall sensor/Current sense/ Voltage feedback signal	PIM_V_M1/POT	Hall Sensor/Current Sense/ Voltage Feedback Signal
42	PIM_MONITOR_2	8	PB09	ADC1-AIN[3]	PIM_MONITOR_2	Hall sensor/Current sense/ Voltage feedback signal	PIM_V_M2	Hall Sensor/Current Sense/ Voltage Feedback Signal
43	PIM_MONITOR_3	13	PA08	ADC0-AIN[8]/ ADC1-AIN[10]	PIM_MONITOR_3	Hall sensor/Current sense/ Voltage feedback signal	PIM_V_M3/IBUS	Hall Sensor/Current Sense/ Voltage Feedback Signal
44	NC	-	-	-	NC	NC	NC	NC
45	VSS	18, 35, 42	GND	-	VSS	NC	VSS	NC
46	VDD	17, 36, 44	VDDIN/VDDIO	-	VDD	NC	VDD	NC
47	HALLB_QEB	26	PA17	PDEC/QD[1]	HALLB	Hall sensor/QEI input	HB/QEB	Hall sensor/QEI input
48	HALLC_QINDX	27	PA18	PDEC/QD[2]	HALLC	Hall sensor/QEI input	HC/INDX	Hall sensor/QEI input
49	URXD0	32	PA23	SERC0M3/PAD[1]	RX	UART Receive	RX	UART Receive
50	UTXD0	31	PA22	SERC0M3/PAD[0]	TX	UART Transmit	TX	UART Transmit
51	NC	-	-	-	USB_TX	UART Transmit (connected directly to U7)	NC	NC
52	NC	-	-	-	USB_RX	UART Receive (connected directly to U7)	NC	NC
53	NC	-	-	-	NC	NC	NC	NC
54	NC	-	-	-	NC	NC	NC	NC
55	NC	-	-	-	NC	NC	NC	NC
56	NC	-	-	-	NC	NC	NC	NC
57	NC	-	-	-	NC	NC	NC	NC
58	PFC_VACZC	11	PA06	ADC0-AIN[6]	PIM_FLT_OUT2	General I/O	PIM_FLT_OUT2 (VACZC)	General I/O
59	PFC_I	48	PB03	ADC1-AIN[3]	PIM_FLT_OUT1	General I/O	PIM_FLT_OUT1 (IPFC)	General I/O
60	LED1	34	PA25	-	DBG_LED1	Debug LED 1	DBG_LED2	Debug LED 2
61	NC	-	-	-	HOME	Home signal for QEI	HOME	Home signal for QEI
62	VDD	17, 36, 44	VDDIN/VDDIO	-	VDD	NC	VDD	NC
63	NC	-	-	-	OSC1/CLKO	Crystal oscillator in	OSCI	Crystal oscillator in
64	NC	-	-	-	OSC2/CLKI	Crystal oscillator out	OSCO	Crystal oscillator out
65	VSS	18, 35, 42	GND	-	VSS	NC	VSS	NC
66	NC	-	-	-	PIM_IBUS+	BUS current shunt signal	PIM_IBUS+	BUS current shunt signal
67	NC	-	-	-	PIM_IBUS-	BUS current shunt signal	PIM_IBUS-	BUS current shunt signal
68	BTN	16	PA11	-	LIN_CS	LIN Chip Select signal	BTN	Push Button
69	NC	-	-	-	LIN_FAULT	LIN Fault signal	NC	NC
70	NC	-	-	-	RX	UART Receive	RX	UART Receive
71	NC	-	-	-	NC	NC	PIM_PFC_PWM	PFC PWM Output

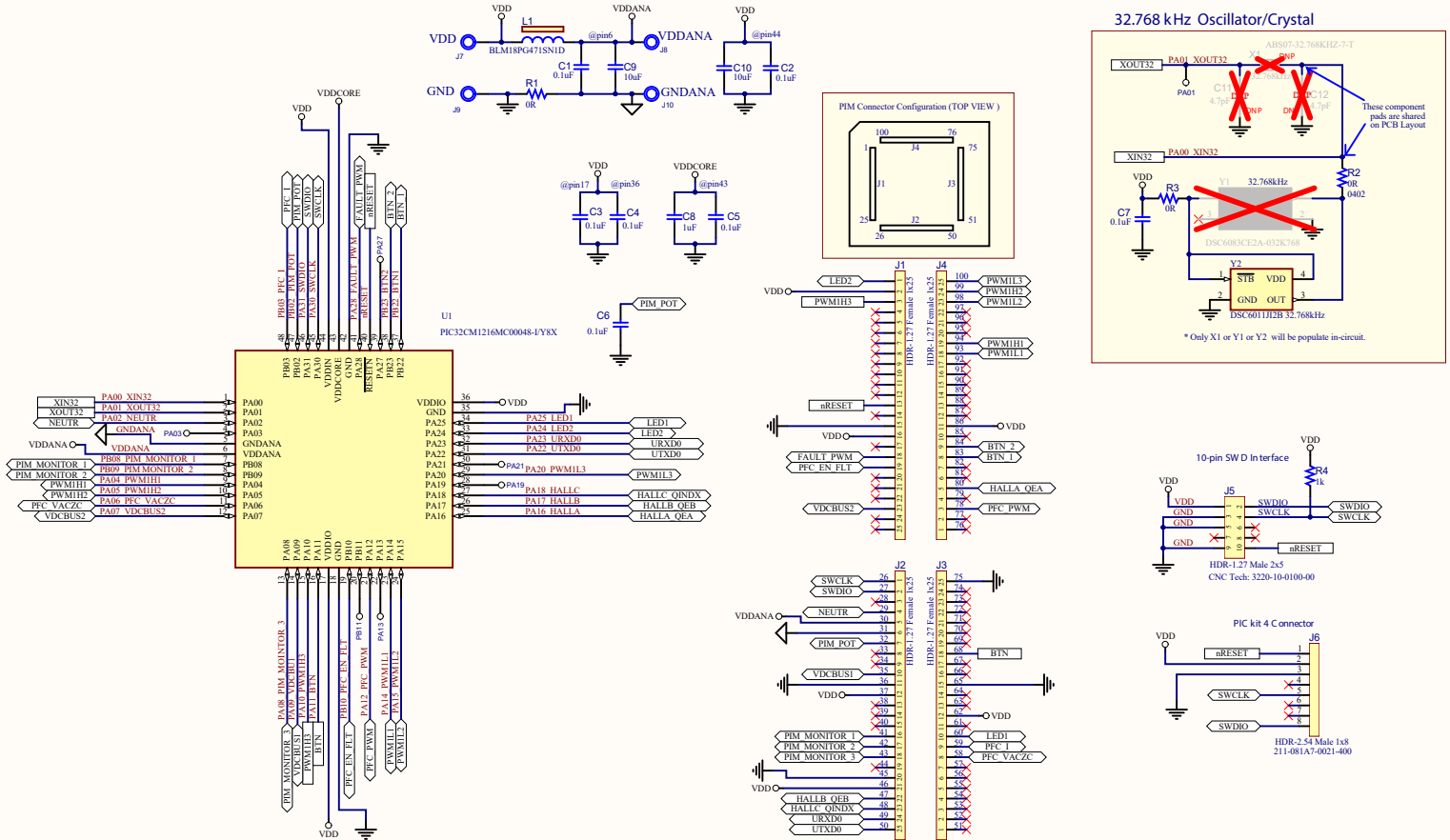
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PIM to MCU Mapping

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PIC32 CM MC 00 Motor Control PIM		PIC32CM1216MC0048			dsPICDEM MCLV2		dsPICDEM MCHV3	
PIM Pin Number	PIM Pin Name	MCU Pin Number	MCU Pin Name	Alternate I/O Function	Pin Name	Functionality	Pin Name	Functionality
72	NC	-	-	-	USB_RX	UART Receive (connected directly to U7)	HA/QEA	Hall Sensor/QEI Input
73	NC	-	-	-	PIM_IB+	IMOTOR1 shunt signal	PIM_IB+	IB Shunt Signal
74	NC	-	-	-	PIM_IA+	IMOTOR2 shunt signal	PIM_IA+	IA Shunt Signal
75	VSS	18, 35, 42	GND	-	VSS	NC	VSS	NC
76	NC	-	-	-	USB_TX	UART Transmit (connected directly to U7)	HB/QEB	Hall Sensor/QEI Input
77	NC	-	-	-	CAN_TX	CAN Transmit	PIM_HALLC/INDX/ STP_PWM	Hall Sensor/QEI Input
78	PFC_PWM	21	PA12	TCC2/WO[0]	CAN_RX	CAN Receive	PIM_PFC_PWM	PFC PWM Output
79	NC	-	-	-	NC	NC	VACZX	AC Input Zero Cross
80	HALLA_QEA	25	PA16	PDEC/QD[0]	HALLA	Hall sensor/QEI input	HA/QEA	Hall Sensor/QEI Input
81	NC	-	-	-	NC	NC	NC	NC
82	NC	-	-	-	PIM_GEN1	General I/O	PIM_GEN1	General I/O
83	BTN_1	37	PB22	-	BTN_1	Push-button S2 input	NC	NC
84	BTN_2	38	PB23	-	BTN_2	Push-button S3 input	TX	UART Transmit
85	NC	-	-	-	NC	NC	NC	NC
86	VDD	17, 36, 44	VDDIN/VDDIO	-	VDD	NC	VDD	NC
87	NC	-	-	-	CAN_RX	CAN Receive	NC	NC
88	NC	-	-	-	CAN_TX	CAN Transmit	NC	NC
89	NC	-	-	-	NC	NC	NC	NC
90	NC	-	-	-	NC	NC	NC	NC
91	NC	-	-	-	NC	NC	NC	NC
92	NC	-	-	-	NC	NC	NC	NC
93	PWM1L1	23	PA14	TCC0/WO[4]	PWM1L1	PWM Output - 1L	PWM1L1	PWM Output - 1L
94	PWM1H1	9	PA04	TCC0/WO[0]	PWM1H1	PWM Output - 1H	PWM1H1	PWM Output - 1H
95	NC	-	-	-	NC	NC	NC	NC
96	NC	-	-	-	NC	NC	NC	NC
97	NC	-	-	-	NC	NC	NC	NC
98	PWM1L2	24	PA15	TCC0/WO[5]	PWM1L2	PWM Output - 2L	PWM1L2	PWM Output - 2L
99	PWM1H2	10	PA05	TCC0/WO[1]	PWM1H2	PWM Output - 2H	PWM1H2	PWM Output - 2H
100	PWM1L3	29	PA20	TCC0/WO[6]	PWM1L3	PWM Output - 3L	PWM1L3	PWM Output - 3L

Figure 1-1. PIC32CM MC00 Motor Control PIM Schematic



2. Revision History

Revision B - 01/2021

Updated the MCU Pin Name for Pin 80 in [PIM to MCU Mapping](#).

Revision A - 07/2020

Initial release of this document.

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