dsPIC33CK1024MP710

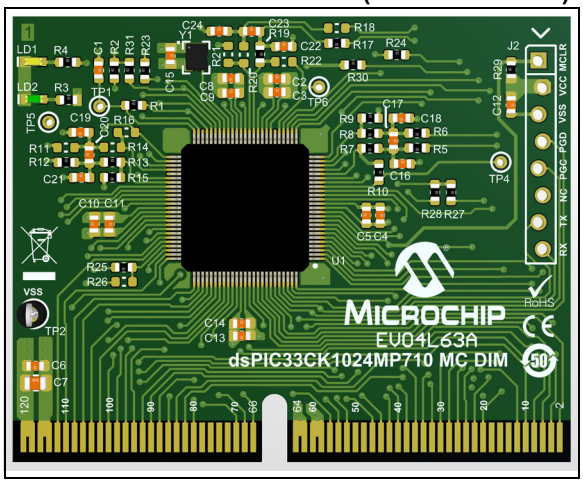
dsPIC33CK1024MP710 Motor Control Dual In-Line Module (DIM) Information Sheet

The dsPIC33CK1024MP710 Motor Control DIM (P/N: EV04L63A) is designed to demonstrate the motor control capabilities of the dsPIC33CK1024MP710 device. This dsPIC® DSC features a 100 MIPS, single-core 16-bit Digital Signal Controller (DSC) with enhanced on-chip peripherals.

This motor control DIM is designed to take advantage of the high-speed PWM module, four dedicated ADC cores, a single shared ADC core, and operational amplifiers in the device to enable various motor control applications. The dedicated ADC cores in the device have a 4:1 input multiplexer. This feature allows switching between internal and external op amp configuration only by setting the input channel selection bits of the dedicated ADCs.

The DIM can be used to demonstrate and develop motor control applications by inserting it in the DIM interface header, provided on the compatible motor control development boards (see Table 1). The DIM is designed to run a single motor with all the compatible development boards. For additional information regarding development boards, refer to the respective user's guide available on the Microchip website (www.microchip.com). Table 1 provides information on the hardware versions of the motor control boards that are compatible with this DIM.

FIGURE 1: dsPIC33CK1024MP710 MOTOR CONTROL DIM (P/N: EV04L63A)



The 8-pin header J2 is provided for interfacing the programmer/debugger. An 8-pin connector is included with the DIM. This connector can be inserted when needed. Alternatively, any 8-pin, single row, 0.100" (2.54 mm) pitch, unshrouded male header can be used (example, P/N: 61300811121).

The LED LD2 indicates the power-on status of the DIM. A general purpose LED LD1 is provided on the board for debug purposes. An RC filter (R1, C1) is provided on the DIM to filter the DC bus current before connecting it to the input of Comparator 4 (CMP4C), which is internal to the dsPIC DSC. If needed, the filter cutoff frequency can be modified by changing the values of the filter components. The clock for the dsPIC DSC is generated by the MEMS Oscillator (Y1 – DSC6011JI2B-008.0000) provided on the DIM.

TABLE 1: HARDWARE COMPATIBILITY(1)

Compatible Development Board	Part Number	Compatible Hardware Revision
MCLV-48V-300W	EV18H47A	All Revisions

Note 1: The DIM is not compatible with earlier motor control development boards (e.g., dsPICDEM™ MCLV-2 Development Board, dsPICDEM MCHV-3 Development Board).

WARNING

Do not connect non-isolated oscilloscope probes to the test points on the DIM when inserted in a High-Voltage Development Board. Failure to heed this warning could result in hardware damage.

Table 2 provides pin mapping from the 100-pin dsPIC33CK1024MP710 device to the DIM interface connector.

TABLE 2: PIN MAPPING – dsPIC33CK1024MP710 TO DIM INTERFACE CONNECTOR (SORTED BY DEVICE PIN NUMBER)

Device Pin #	DIM Pin #	dsPIC33CK1024MP710 Pin Function	Remarks
1	DIM:001	RP46/PWM1H/PMD5/RB14	Direct Connection
2	DIM:019	AN20/ANC0/CMP5C/RE0	Direct Connection
3	DIM:003	RP47/PWM1L/PMD6/RB15	Direct Connection
4	DIM:027	AN21/ANC1/CMP6B/RE1	Direct Connection
5	DIM:046	RP80/RF0	Direct Connection
6	DIM:091	RP60/PWM8H/PMD7/RC12	Direct Connection
7	DIM:092	RP61/PWM8L/PMA5/RC13	Direct Connection
8	DIM:089	RP62/PWM6H/PMA4/RC14	Direct Connection
9	DIM:090	RP63/PWM6L/PMA3/RC15	Direct Connection
10	DIM:047 ($\overline{MCLR}$)	$\overline{MCLR}$	Direct Connection; also directly connected to Pin 1 of Header J2
11	DIM:041	RP79/PCI22/PMA2/RD15	Direct Connection
12	DIM:044	RP81/RF1	Direct Connection
13	DIM:061 to DIM:064, DIM117 to DIM:120	VSS	Digital Ground (VSS)
14	DIM:057 to DIM:060, DIM113 to DIM:116	VDD	Digital Power (VCC)
15	DIM:040	RP78/PCI21/RD14	Direct Connection
16	DIM:042	ANN4/CMP5B/RP77/RD13	Direct Connection
17	DIM:022	AN12/ANN0/RP48/RC0	Direct Connection
18	DIM:017	OA1OUT/AN0/CMP1A/IBIAS0/RA0	Output of Op Amp 1 (OA1) when configured and enabled
19	DIM:012	AN22/ANB3/CMP6C/RE2	Connected via 0R (R27) resistor
	DIM:105		Can be connected via 0R (R28) resistor
20	DIM:038	RP82/RF2	Direct Connection
21	DIM:015	OA1IN-/ANA1/RA1	Op Amp 1 Negative Input – connected via amplifier input resistors
22	DIM:082	AN23/ANN3/RE3	Direct Connection
23	DIM:036	RP83/RF3	Direct Connection
24	DIM:013	OA1IN+/AN9/PMA6/RA2	Op Amp 1 Positive Input – connected via amplifier input resistors
25	DIM:034	RP84/RF4	Direct Connection
26	DIM:032	RP85/RF5	Direct Connection
27	DIM:020	DACOUT1/AN3/AN31/CMP1C/RA3	Direct Connection
28	DIM:030	RE4	Direct Connection
29	DIM:084	AN24/RP86/RF6	Direct Connection
30	DIM:033	OA3OUT/AN4/ANB1/ANB2/CMP3B/IBIAS3/RA4	Output of Op Amp 3 (OA3) when configured and enabled
31	—	RE5	—
32	DIM:081	AN25/RP87/RF7	Connected via 0R (R23) resistor
	DIM:026		Can be connected via 0R (R24) resistor
33	DIM:057 to DIM:060, DIM:113 to DIM:116	VDD	Digital Power (VCC)
34	DIM:061 to DIM:064, DIM:117 to DIM:120	VSS	Digital Ground (VSS)

TABLE 2: PIN MAPPING – dsPIC33CK1024MP710 TO DIM INTERFACE CONNECTOR (SORTED BY DEVICE PIN NUMBER) (CONTINUED)

Device Pin #	DIM Pin #	dsPIC33CK1024MP710 Pin Function	Remarks
35	DIM:067	RP76/RD12	Direct Connection
36	DIM:031	OA3IN-/AN13/CMP1B/ISRC0/RP49/PMA7/RC1	Op Amp 3 Negative Input – connected via amplifier input resistors
37	DIM:029	OAIN+/AN14/CMP2B/ISRC1/RP50/PMD13/PMA13/ RC2	Op Amp 3 Positive Input – connected via amplifier input resistors
38	DIM:028	AN17/ANN1/CMP4B/IBIAS1/RP54/PMD12/PMA12/ RC6	Direct Connection
39	DIM:057 to DIM:060, DIM:113 to DIM:116	VDD	Digital Power (VCC)
40	DIM:061 to DIM:064, DIM:117 to DIM:120	VSS	Digital Ground (VSS)
41	DIM:039	AN15/ANN2/CMP2A/IBIAS2/RP51/PMD11/PMA11/ RC3	Direct Connection
42	—	OSCI/CLKI/AN5/RP32/PMD10/PMA10/RB0	CLKI – clock output of MEMS Oscillator (Y1) is connected as input clock of dsPIC® DSC (U1)
43	DIM:071	OSCO/CLKO/AN6/RP33/PMA1/PMALH/PSA1/RB1	Direct Connection
44	DIM:024	AN19/ANB0/CMP2C/RP75/PMA0/PMALL/PSA0/RD11	Connected via 0R (R30) resistor
	DIM:094		Can be connected via 0R (R31) resistor
45	—	RE6	This pin is connected to a general purpose LED (LD1) on the DIM
46	DIM:083	AN26/RP88/RF8	Direct Connection
47	DIM:035	AN18/ANC2/CMP3C/ISRC3/RP74/PMD9/PMA9/RD10	Direct Connection
48	—	RE7	—
49	DIM:111	RP89/RF9	Direct Connection
50	DIM:035	DACOUT2/AN16/CMP4C/ISRC2/RP55/PMD8/PMA8/ RC7	Connected via RC (R1, C1) filter
51	DIM:025	OA2OUT/AN1/AN7/ANA0/ANA2/ANA3/CMP1D/ CMP2D/CMP3D/CMP4D/CMP5D/CMP6D/RP34/ SCL3/INT0/RB2	Output of Op Amp 2 (OA2) when configured and enabled
52	DIM:094	RE8	Connected via 0R (R2) resistor
53	DIM:109	RP90/RF10	Direct Connection
54	DIM:023	PGD2/OA2IN-/AN8/CMP4A/RP35/RB3	Op Amp 2 Negative Input – connected via amplifier input resistors
55	—	RE9	—
56	DIM:107	RP91/RF11	Direct Connection
57	DIM:021	PGC2/OA2IN+/RP36/RB4	Op Amp 2 Positive Input – connected via amplifier input resistors
58	DIM:097	RP56/ASDA1/SCK2/RC8	Direct Connection
59	DIM:099	RP57/ASCL1/SDI2/RC9	Direct Connection
60	DIM:103	RP92/RF12	Direct Connection
61	DIM:101	RP73/PCI20/RD9	Direct Connection
62	DIM:086	RP72/SDO2/PCI19/RD8	Direct Connection
63	DIM:061 to DIM:064, DIM:117 to DIM:120	VSS	Digital Ground (VSS)
64	DIM:057 to DIM:060, DIM:113 to DIM:116	VDD	Digital Power (VCC)
65	DIM:087	RP71PMD15/RD7	Direct Connection
66	DIM:085	RP70/PMD14/RD6	Direct Connection
67	DIM:080	RP69/PMA15/PMCS2/RD5	Direct Connection

TABLE 2: PIN MAPPING – dsPIC33CK1024MP710 TO DIM INTERFACE CONNECTOR (SORTED BY DEVICE PIN NUMBER) (CONTINUED)

Device Pin #	DIM Pin #	dsPIC33CK1024MP710 Pin Function	Remarks
68	DIM:049 (PGD)	PGD3/RP37/SDA2/PMA14/PMCS1/PSCS/RB5	Direct Connection; also directly connected to Pin 4 of Header J2
69	DIM:051 (PGC)	PGC3/RP38/SCL2/RB6	Direct Connection; also directly connected to Pin 5 of Header J2
70	DIM:093	RE10	Direct Connection
71	DIM:112	RP93/APWM4H/RF13	Direct Connection
72	DIM:010	TDO/AN2/AN30/CMP3A/RP39/SDA3/RB7	Connected via 0R (R25) resistor
	DIM:095		Can be connected via 0R (R26) resistor
73	DIM:065	APWM4L/RE11	Direct Connection
74	DIM:110	RP94/APWM3H/RF14	Direct Connection
75	DIM:009	PGD1/AN10/CMP6A/RP40/SCL1/RB8	Direct Connection
76	DIM:108	RP95/APWM3L/RF15	Direct Connection
77	DIM:011	PGC1/AN11/CMP5A/RP41/SDA1/RB9	Direct Connection
78	DIM:106	APWM2H/RE12	Direct Connection
79	DIM:096	RP96/APWM2L/RA5	Direct Connection
80	DIM:098	RP52/PWM5H/ASDA2/RC4	Direct Connection
81	DIM:088	RE13	Direct Connection
82	DIM:100	RP53/PWM5L/ASCL2/$\overline{\text{PMWR}}$/PMENB/PSWR/RC5	Direct Connection
83	DIM:102	RP58/PWM7H/PMRD/PMWR/PSRD/RC10	Direct Connection
84	DIM:104	RP59/PWM7L/RC11	Direct Connection
85	DIM:070	RP68/ASDA3/RD4	Direct Connection
86	DIM:068	RP67/ASCL3/RD3	Direct Connection
87	DIM:061 to DIM:064, DIM:117 to DIM:120	VSS	Digital Ground (VSS)
88	DIM:057 to DIM:060, DIM:113 to DIM:116	VDD	Digital Power (VCC)
89	DIM:066	RP66/RD2	Direct Connection
90	DIM:006	RP65/PWM4H/RD1	Direct Connection
91	DIM:008	RP64/PWM4L/PMD0/RD0	Direct Connection
92	DIM:002	TMS/RP42/PWM3H/PMD1/RB10	Direct Connection
93	DIM:004	TCK/RP43/PWM3L/PMD2/RB11	Direct Connection
94	DIM:056	RE14	Direct Connection
95	DIM:054	RP97/APWM1H/RA6	Direct Connection; also directly connected to Pin 8 of Header J2
96	DIM:052	RP98/APWM1L/RA7	Direct Connection; also directly connected to Pin 7 of Header J2
97	DIM:005	TDI/RP44/PWM2H/PMD3/RB12	Direct Connection
98	DIM:045	RE15	Direct Connection
99	DIM:043	RP99/RA8	Direct Connection
100	DIM:007	RP45/PWM2L/PMD4/RB13	Direct Connection

Table 3 provides pin mapping from the DIM interface connector to the 100-pin dsPIC33CK1024MP710 device.

TABLE 3: PIN MAPPING – DIM INTERFACE CONNECTOR TO dsPIC33CK1024MP710 (SORTED BY DIM PIN NUMBER)

DIM Pin #	Device Pin #	dsPIC33CK1024MP710 Pin Function	Remarks
DIM:001	1	RP46/PWM1H/PMD5/RB14	Direct Connection
DIM:002	92	TMS/RP42/PWM3H/PMD1/RB10	Direct Connection
DIM:003	3	RP47/PWM1L/PMD6/RB15	Direct Connection
DIM:004	93	TCK/RP43/PWM3L/PMD2/RB11	Direct Connection
DIM:005	97	TDI/RP44/PWM2H/PMD3/RB12	Direct Connection
DIM:006	90	RP65/PWM4H/RD1	Direct Connection
DIM:007	100	RP45/PWM2L/PMD4/RB13	Direct Connection
DIM:008	91	RP64/PWM4L/PMD0/RD0	Direct Connection
DIM:009	75	PGD1/AN10/CMP6A/RP40/SCL1/RB8	Direct Connection
DIM:010	72	TDO/AN2/AN30/CMP3A/RP39/SDA3/RB7	Connected via 0R (R25) resistor
DIM:011	77	PGC1/AN11/CMP5A/RP41/SDA1/RB9	Direct Connection
DIM:012	19	AN22/ANB3/CMP6C/RE2	Connected via 0R (R27) resistor
DIM:013	24	OA1IN+/AN9/PMA6/RA2	Op Amp 1 Positive Input – connected via amplifier input resistors
DIM:014	—	—	No Connection
DIM:015	21	OA1IN-/ANA1/RA1	Op Amp 1 Negative Input – connected via amplifier input resistors
DIM:016	—	—	No Connection
DIM:017	18	OA1OUT/AN0/CMP1A/IBIAS0/RA0	The output of Op Amp 1 (OA1) when configured and enabled
DIM:018	—	—	No Connection
DIM:019	2	AN20/ANC0/CMP5C/RE0	Direct Connection
DIM:020	27	DACOUT1/AN3/AN31/CMP1C/RA3	Direct Connection
DIM:021	57	PGC2/OA2IN+/RP36/RB4	Op Amp 2 Positive Input – connected via amplifier input resistors
DIM:022	17	AN12/ANN0/RP48/RC0	Direct Connection
DIM:023	54	PGD2/OA2IN-/AN8/CMP4A/RP35/RB3	Op Amp 2 Negative Input – connected via amplifier input resistors
DIM:024	44	AN19/ANB0/CMP2C/RP75/PMA0/PMALL/PSA0/RD11	Connected via 0R (R30) resistor
DIM:025	51	OA2OUT/AN1/AN7/ANA0/ANA2/ANA3/CMP1D/CMP2D/CMP3D/CMP4D/CMP5D/CMP6D/RP34/SCL3/INT0/RB2	The output of Op Amp 2 (OA2) when configured and enabled
DIM:026	32	AN25/RP87/RF7	Can be connected via 0R (R24) resistor
DIM:027	4	AN21/ANC1/CMP6B/RE1	Direct Connection
DIM:028	38	AN17/ANN1/CMP4B/IBIAS1/RP54/PMD12/PMA12/RC6	Direct Connection
DIM:029	37	OA3IN+/AN14/CMP2B/ISRC1/RP50/PMD13/PMA13/RC2	Op Amp 3 Positive Input – connected via amplifier input resistors
DIM:030	28	RE4	No Connection
DIM:031	36	OA3IN-/AN13/CMP1B/ISRC0/RP49/PMA7/RC1	Op Amp 3 Negative Input – connected via amplifier input resistors
DIM:032	26	RP85/RF5	Direct Connection
DIM:033	30	OA3OUT/AN4/ANB1/ANB2/CMP3B/IBIAS3/RA4	The output of Op Amp 3 (OA3) when configured and enabled
DIM:034	25	RP84/RF4	Direct Connection

TABLE 3: PIN MAPPING – DIM INTERFACE CONNECTOR TO dsPIC33CK1024MP710 (SORTED BY DIM PIN NUMBER) (CONTINUED)

DIM Pin #	Device Pin #	dsPIC33CK1024MP710 Pin Function	Remarks
DIM:035	47	AN18/ANC2/CMP3C/ISRC3/RP74/PMD9/PMA9/RD10	Direct Connection
	50	DACOUT2/AN16/CMP4C/ISRC2/RP55/PMD8/PMA8/RC7	Connected via RC (R1, C1) filter
DIM:036	23	RP83/RF3	Direct Connection
DIM:037 (V_{REF})	24, 37, 57	Connected to the positive input of amplifiers OA1, OA2 and OA3 through gain resistor	V_{REF} (+1.65V) Input from Motor Control Board
DIM:038	20	RP82/RF2	Direct Connection
DIM:039	41	AN15/ANN2/CMP2A/IBIAS2/RP51/PMD11/PMA11/RC3	Direct Connection
DIM:040	15	RP78/PCI21/RD14	Direct Connection
DIM:041	11	RP79/PCI22/PMA2/RD15	Direct Connection
DIM:042	16	ANN4/CMP5B/RP77/RD13	Direct Connection
DIM:043	99	RP99/RA8	Direct Connection
DIM:044	12	RP81/RF1	Direct Connection
DIM:045	98	RE15	Direct Connection
DIM:046	5	RP80/RF0	Direct Connection
DIM:047 ($\overline{MCLR}$)	10	$\overline{MCLR}$	Direct Connection; also directly connected to Pin 1 of Header J2
DIM:048	—	—	No Connection
DIM:049 (PGD)	68	PGD3/RP37/SDA2/PMA14/PMCS1/PSCS/RB5	Direct Connection; also directly connected to Pin 4 of Header J2
DIM:050	—	—	No Connection
DIM:051 (PGC)	69	PGC3/RP38/SCL2/RB6	Direct Connection; also directly connected to Pin 5 of Header J2
DIM:052	96	RP98/APWM1L/RA7	Direct Connection; also directly connected to Pin 7 of Header J2
DIM:053	—	—	No Connection
DIM:054	95	RP97/APWM1H/RA6	Direct Connection; also directly connected to Pin 8 of Header J2
DIM:055 (VCC_SELECT)	—	—	No Connection
DIM:056	94	RE14	Direct Connection
DIM:057	14, 33, 39, 64, 88	V_{DD}	Digital Power (V_{CC})
DIM:058			
DIM:059			
DIM:060			
DIM:061	13, 34, 40, 63, 87	V_{SS}	Digital Ground (V_{SS})
DIM:062			
DIM:063			
DIM:064			
DIM:065	73	APWM4L/RE11	Direct Connection
DIM:066	89	RP66/RD2	Direct Connection
DIM:067	35	RP76/RD12	Direct Connection
DIM:068	86	RP67/ASCL3/RD3	Direct Connection
DIM:069	—	—	No Connection
DIM:070	85	RP68/ASDA3/RD4	Direct Connection
DIM:071	43	OSCO/CLKO/AN6/RP33/PMA1/PMALH/PSA1/RB1	Direct Connection
DIM:072	—	—	No Connection

TABLE 3: PIN MAPPING – DIM INTERFACE CONNECTOR TO dsPIC33CK1024MP710 (SORTED BY DIM PIN NUMBER) (CONTINUED)

DIM Pin #	Device Pin #	dsPIC33CK1024MP710 Pin Function	Remarks
DIM:073	—	—	No Connection
DIM:074	—	—	No Connection
DIM:075	—	—	No Connection
DIM:076	—	—	No Connection
DIM:077	—	—	No Connection
DIM:078	—	—	No Connection
DIM:079	—	—	No Connection
DIM:080	67	RP69/PMA15/PMCS2/RD5	Direct Connection
DIM:081	32	AN25/RP87/RF7	Connected via 0R (R23) resistor
DIM:082	22	AN23/ANN3/RE3	Direct Connection
DIM:083	46	AN26/RP88/RF8	Direct Connection
DIM:084	29	AN24/RP86/RF6	Direct Connection
DIM:085	66	RP70/PMD14/RD6	Direct Connection
DIM:086	62	RP72/SDO2/PCI19/RD8	Direct Connection
DIM:087	65	RP71/PMD15/RD7	Direct Connection
DIM:088	81	RE13	Direct Connection
DIM:089	8	RP62/PWM6H/PMA4/RC14	Direct Connection
DIM:090	9	RP63/PWM6L/PMA3/RC15	Direct Connection
DIM:091	6	RP60/PWM8H/PMD7/RC12	Direct Connection
DIM:092	7	RP61/PWM8L/PMA5/RC13	Direct Connection
DIM:093	70	RE10	Direct Connection
DIM:094	52	RE8	Connected via 0R (R2) resistor
	44	AN19/ANB0/CMP2C/RP75/PMA0/PMALL/PSA0/RD11	Can be connected via 0R (R31) resistor
DIM:095	72	TDO/AN2/AN30/CMP3A/RP39/SDA3/RB7	Can be connected via 0R (R26) resistor
DIM:096	79	RP96/APWM2L/RA5	Direct Connection
DIM:097	58	RP56/ASDA1/SCK2/RC8	Direct Connection
DIM:098	80	RP52/PWM5H/ASDA2/RC4	Direct Connection
DIM:099	59	RP57/ASCL1/SDI2/RC9	Direct Connection
DIM:100	82	RP53/PWM5L/ASCL2/$\overline{\text{PMWR}}$/PMENB/PSWR/RC5	Direct Connection
DIM:101	61	RP73/PCI20/RD9	Direct Connection
DIM:102	83	RP58/PWM7H/PMRD/PMWR/PSRD/RC10	Direct Connection
DIM:103	60	RP92/RF12	Direct Connection
DIM:104	84	RP59/PWM7L/RC11	Direct Connection
DIM:105	19	AN22/ANB3/CMP6C/RE2	Can be connected via 0R (R28) resistor
DIM:106	78	APWM2H/RE12	Direct Connection
DIM:107	56	RP91/RF11	Direct Connection
DIM:108	76	RP95/APWM3L/RF15	Direct Connection
DIM:109	53	RP90/RF10	Direct Connection
DIM:110	74	RP94/APWM3H/RF14	Direct Connection
DIM:111	49	RP89/RF9	Direct Connection
DIM:112	71	RP93/APWM4H/RF13	Direct Connection
DIM:113	14, 33, 39, 64, 88	V_{DD}	Digital Power (V_{CC})
DIM:114			
DIM:115			
DIM:116			

TABLE 3: PIN MAPPING – DIM INTERFACE CONNECTOR TO dsPIC33CK1024MP710 (SORTED BY DIM PIN NUMBER) (CONTINUED)

DIM Pin #	Device Pin #	dsPIC33CK1024MP710 Pin Function	Remarks
DIM:117	13, 34, 40, 63, 87	VSS	Digital Ground (VSS)
DIM:118			
DIM:119			
DIM:120			

INTERNAL AMPLIFIER

Operational amplifiers internal to the dsPIC33CK1024MP710 can be configured and enabled for amplifying motor currents. The amplifier circuits are shown in Figure 2. The detailed schematics of the block, “Filter, Feedback and Bias Circuit” used in Figure 2, are shown in Figure 3.

FIGURE 2: dsPIC® DSC INTERNAL AMPLIFIERS

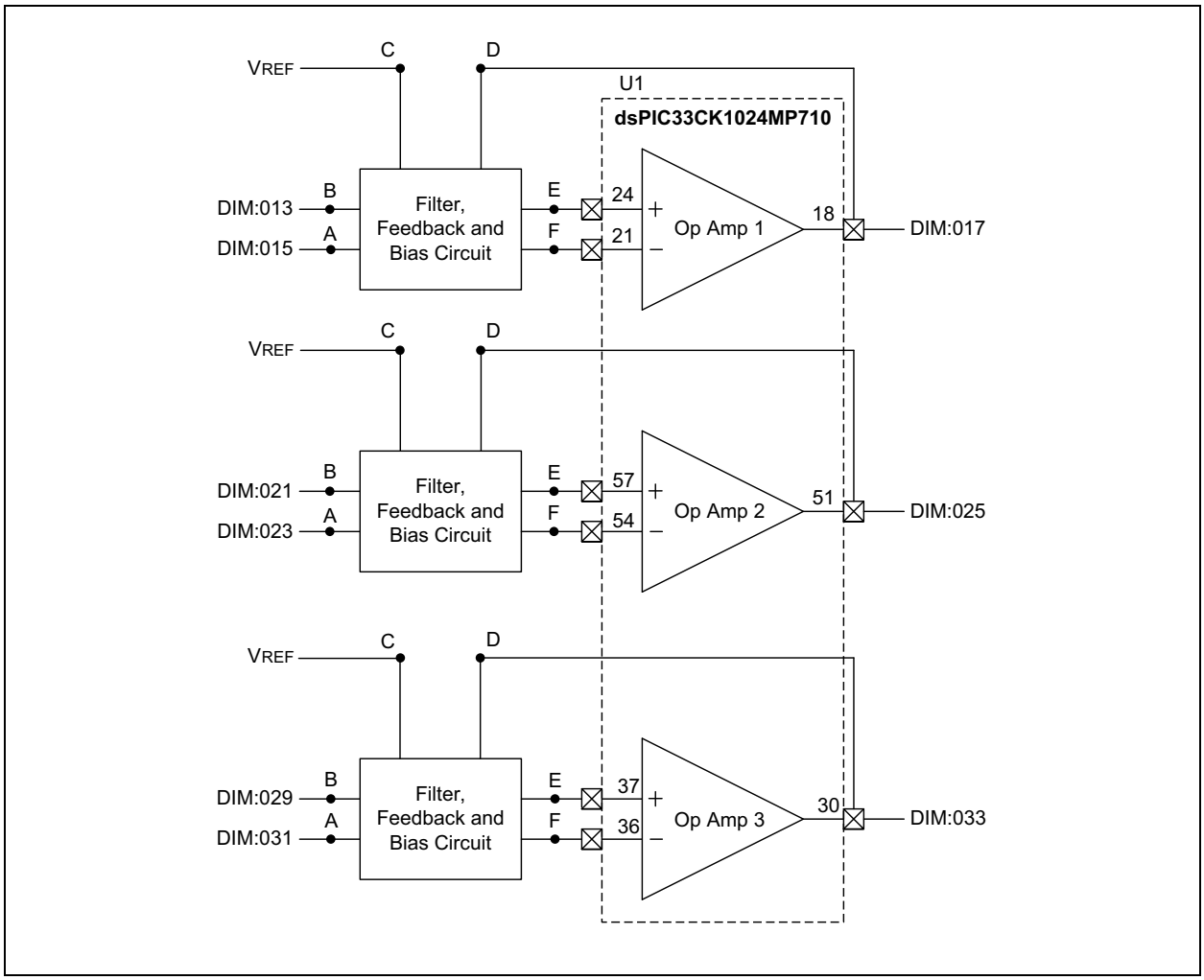
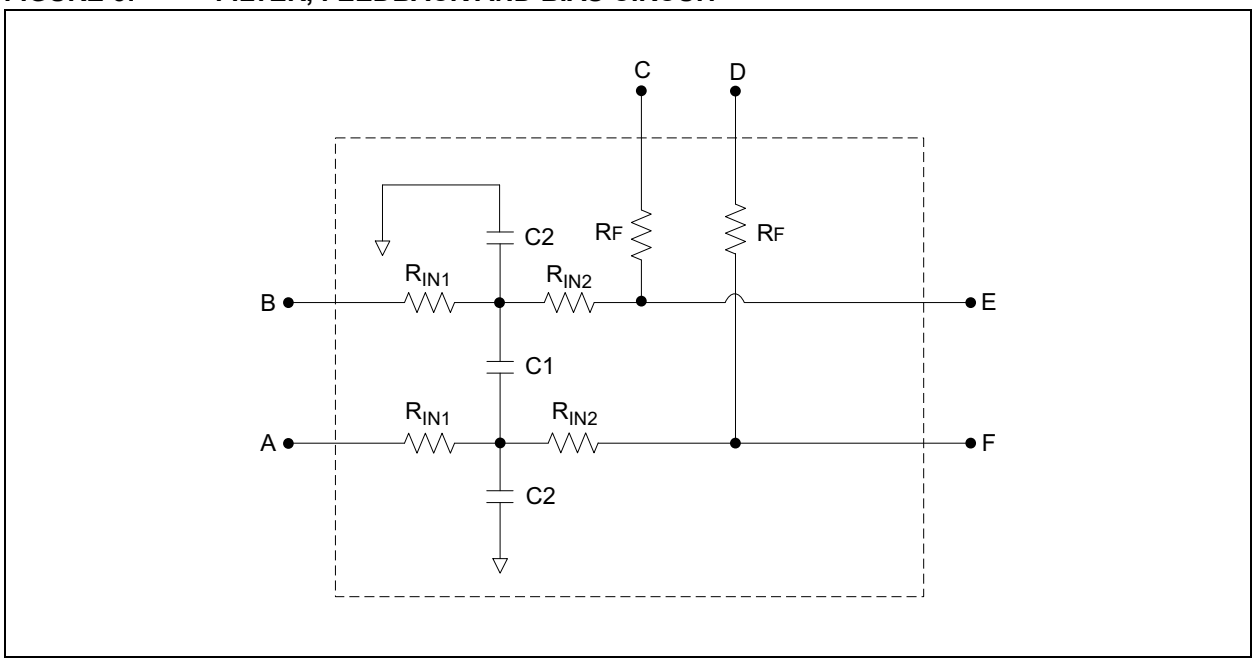


FIGURE 3: FILTER, FEEDBACK AND BIAS CIRCUIT



Equation 1 provides the amplifier gain calculations. Equation 2 and Equation 3 provide the equations to calculate cutoff frequencies of the Differential-mode and Common-mode filters.

EQUATION 1: AMPLIFIER GAIN

$$Differential\ Amplifier\ Gain = \frac{Rf}{(R_{IN1} + R_{IN2})}$$

EQUATION 2: CUTOFF FREQUENCY DIFFERENTIAL-MODE FILTER

$$Differential\text{-}mode\ f_{-3\ dB} \cong \frac{1}{2\pi(R_{IN1} + R_{IN2})\left(\frac{C2}{2} + C1\right)}$$

EQUATION 3: CUTOFF FREQUENCY COMMON-MODE FILTER

$$Common\text{-}mode\ f_{-3\ dB} \cong \frac{1}{2\pi(R_{IN1})(C2)}$$

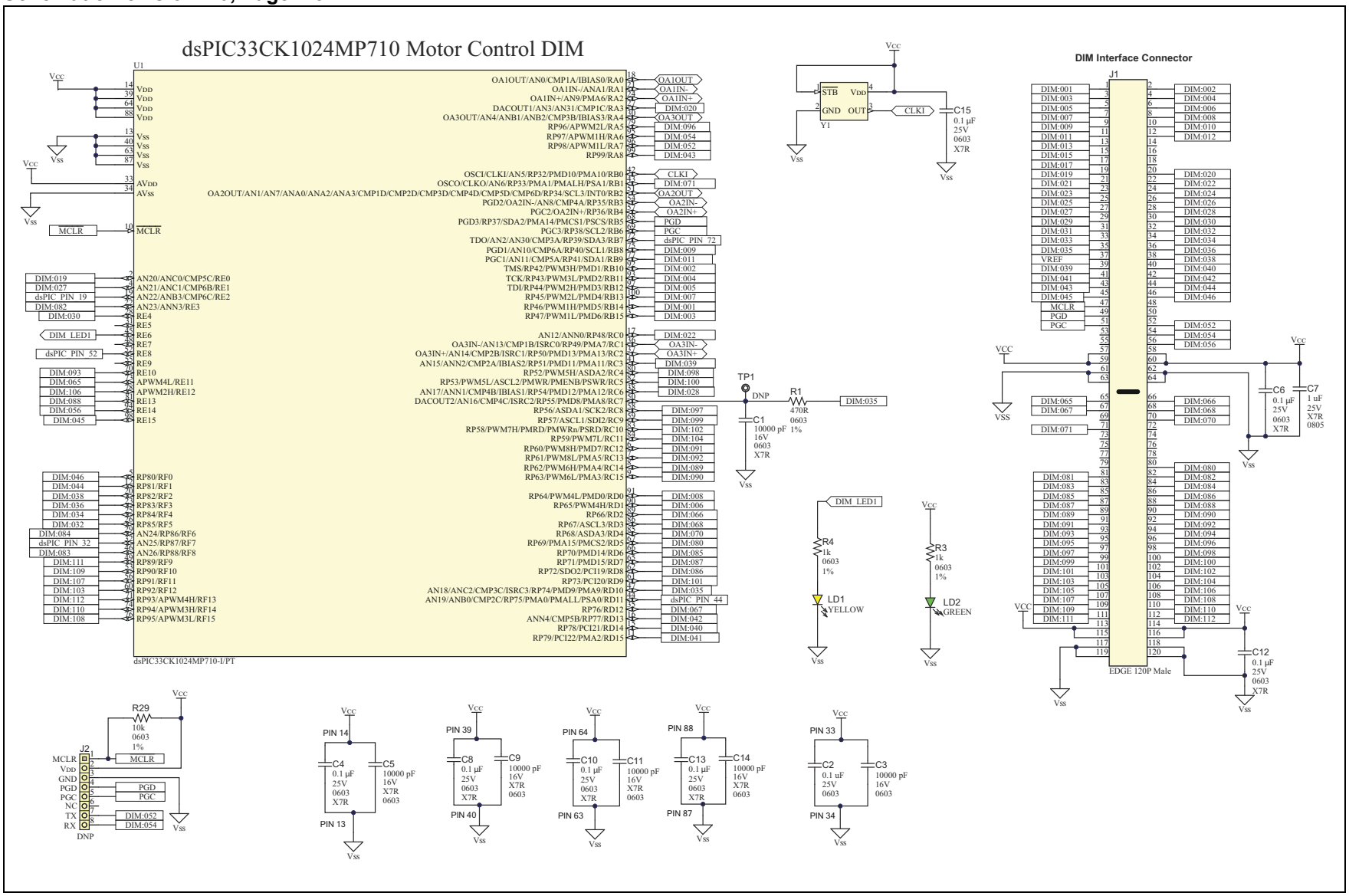
Table 4 summarizes the amplifier gain and filter cutoff frequencies for the amplifier circuit used on the DIM. The customer can select different values, based on the application requirements, ensuring peak current is within the operating range of the Motor Control Board in which the DIM is inserted.

TABLE 4: AMPLIFIER GAIN AND CUTOFF FREQUENCIES

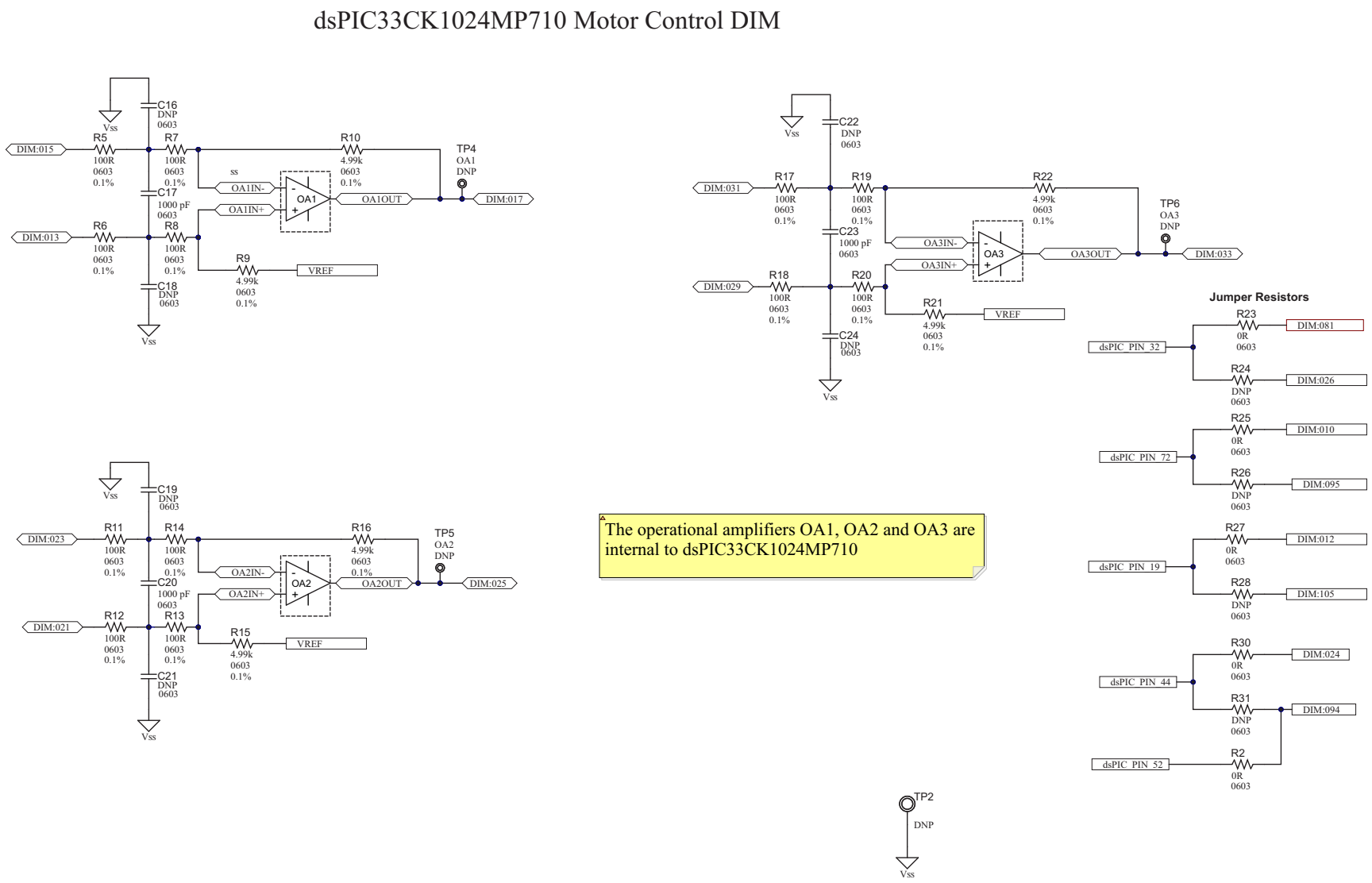
Component Values					Amplifier Gain	Differential-Mode Filter Cutoff Frequency	Common-Mode Filter Cutoff Frequency
R_{IN1}	R_{IN2}	R_F	C1	C2			
100Ω	100Ω	4.99 kΩ	1000 pF	Not Populated	24.95	796 kHz	—

dsPIC33CK1024MP710 Motor Control Dual In-Line Module (DIM)

Schematic Revision 1.0, Page 1 of 2



Schematic Revision 1.0, Page 2 of 2



NOTES:

Note the following details of the code protection feature on Microchip products:

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- Microchip believes that its family of products is secure when used in the intended manner, within operating specifications, and under normal conditions.
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