DC Motor Control Using PIC18

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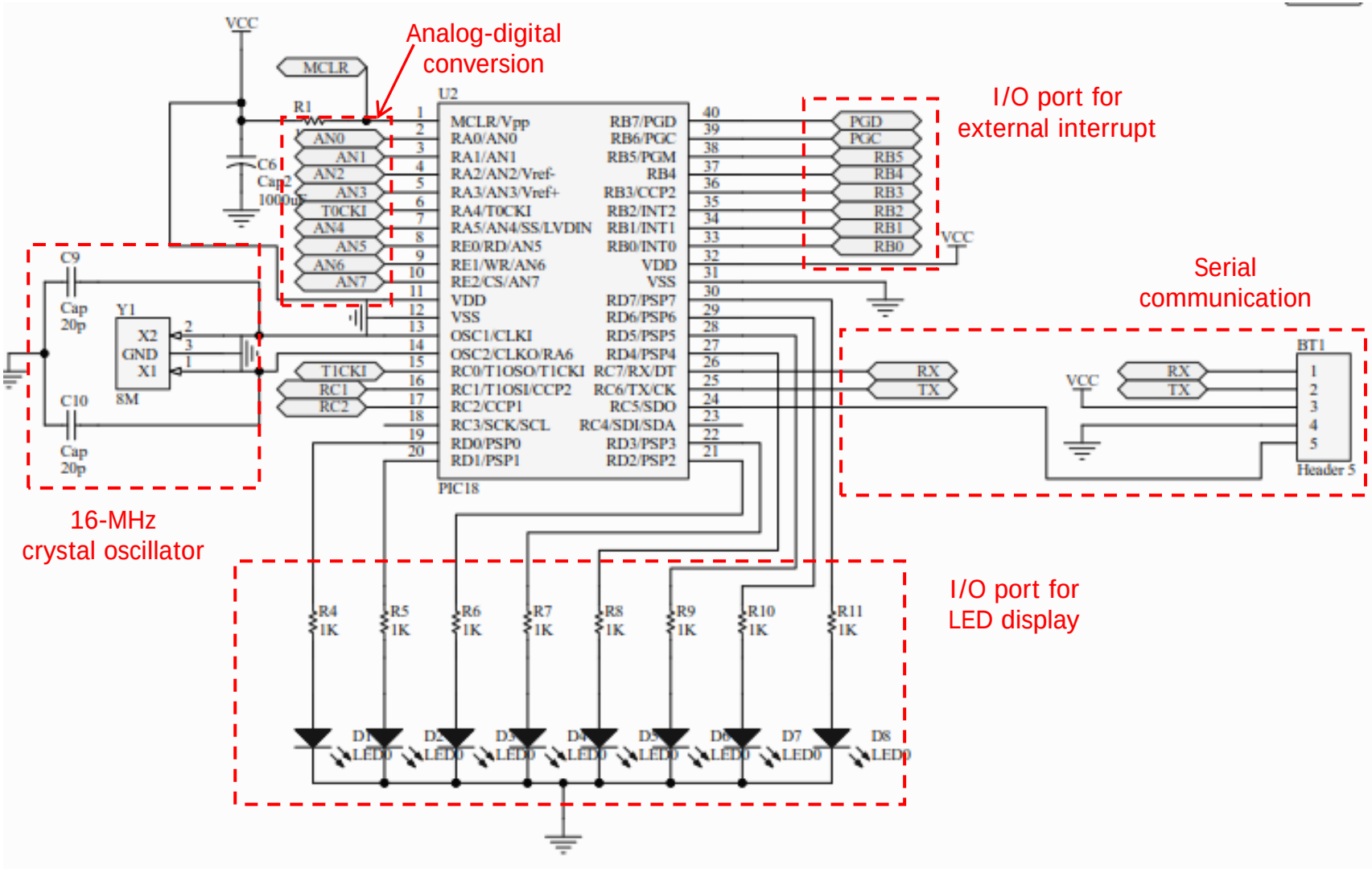
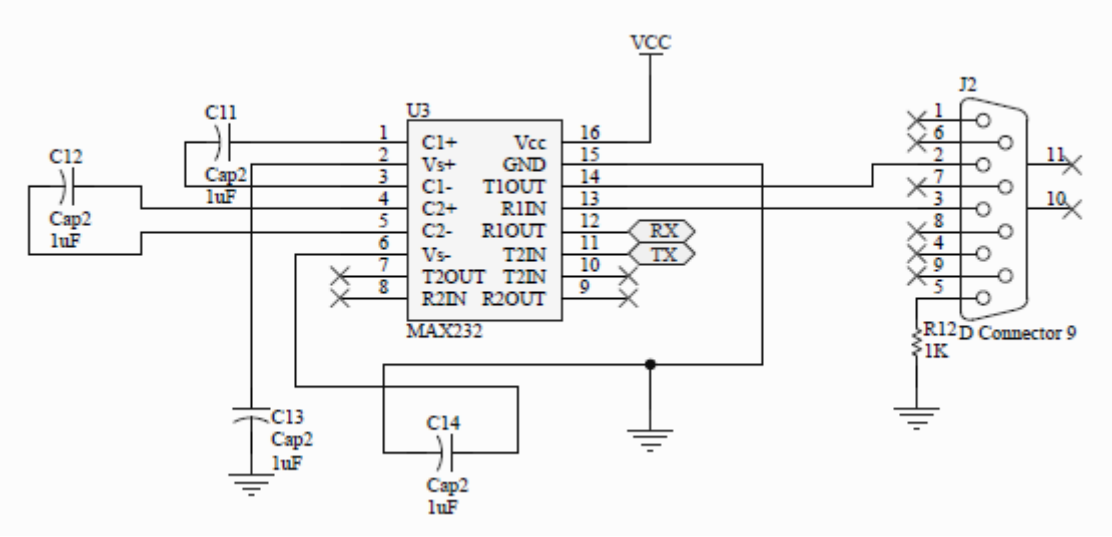
Circuit schematic of PCB

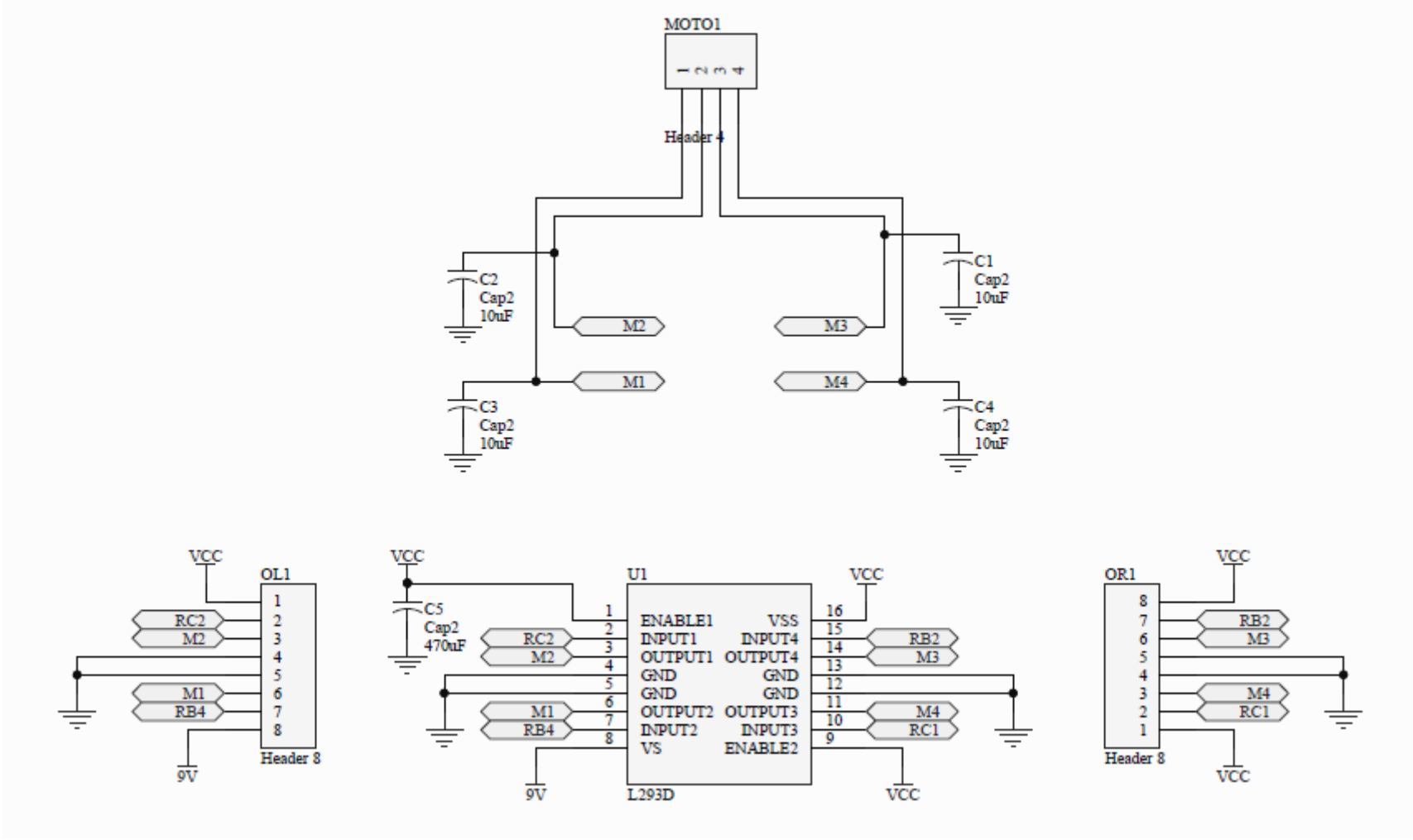


Circuit schematic of PCB (cont.)

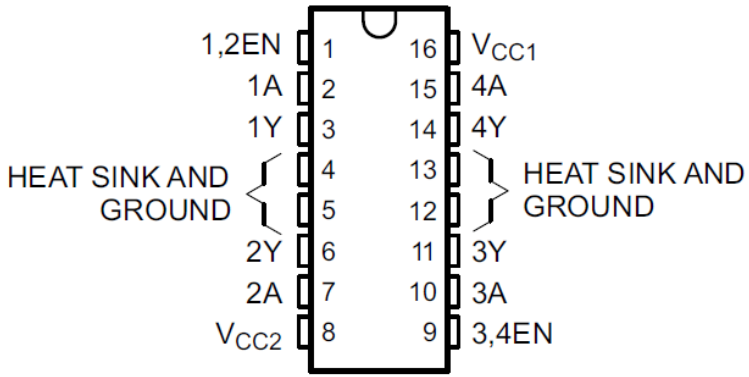
TTL voltage levels ⇄ RS232 voltage levels



Circuit schematic for DC motor driving



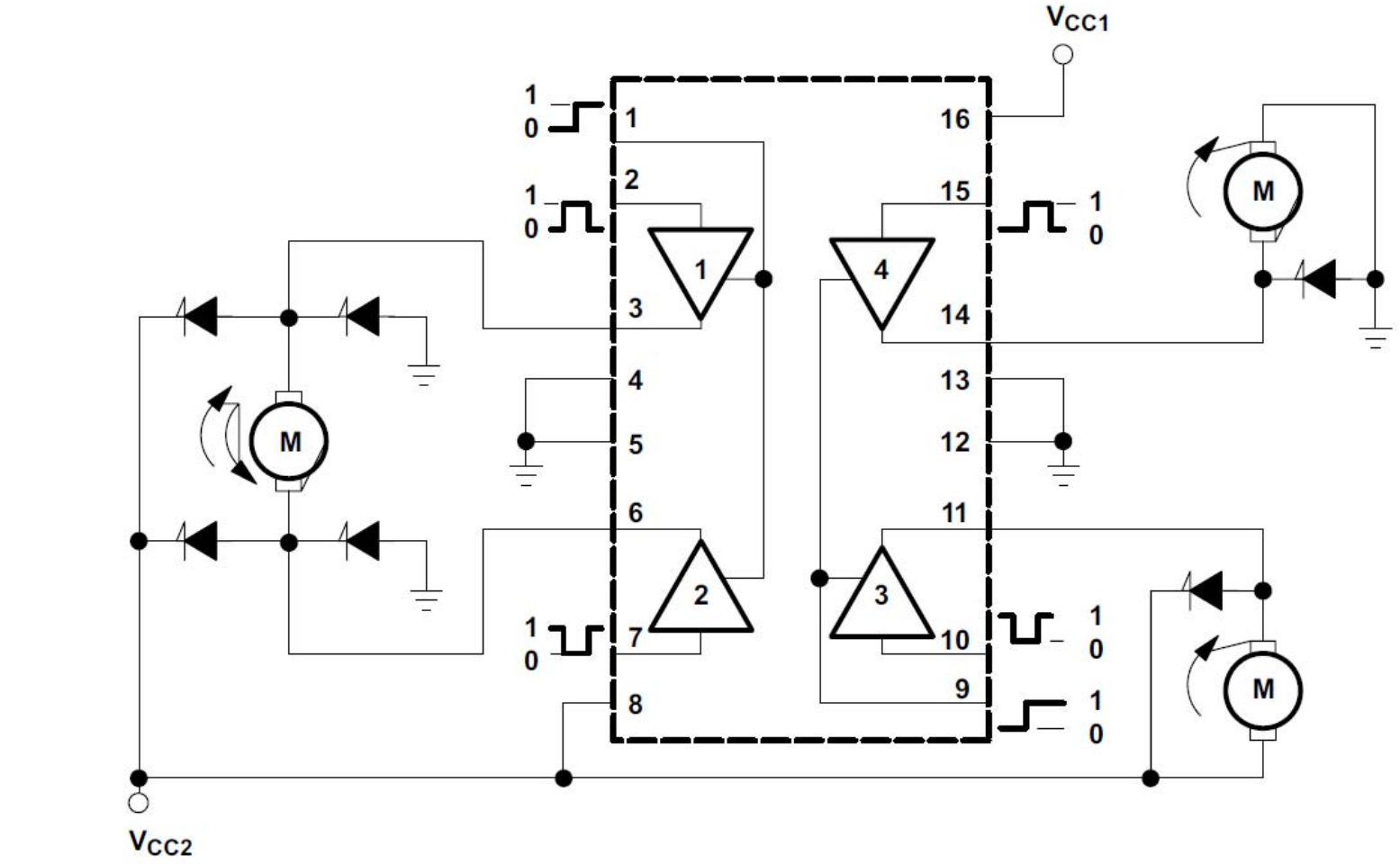
L293x Quadruple Half-H Drivers



Pin Functions

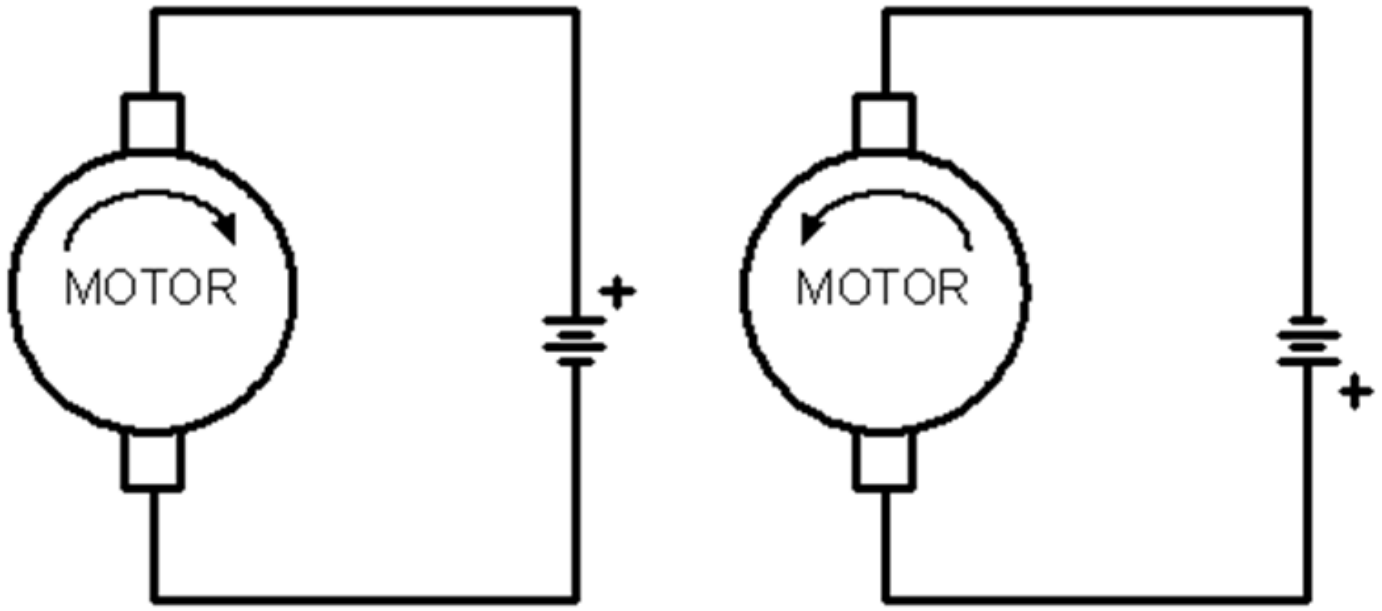
PIN		TYPE	DESCRIPTION
NAME	NO.		
1,2EN	1	I	Enable driver channels 1 and 2 (active high input)
<1:4>A	2, 7, 10, 15	I	Driver inputs, noninverting
<1:4>Y	3, 6, 11, 14	O	Driver outputs
3,4EN	9	I	Enable driver channels 3 and 4 (active high input)
GROUND	4, 5, 12, 13	—	Device ground and heat sink pin. Connect to printed-circuit-board ground plane with multiple solid vias
V_{CC1}	16	—	5-V supply for internal logic translation
V_{CC2}	8	—	Power VCC for drivers 4.5 V to 36 V

L293x (cont.)



Output diodes are internal in L293D.

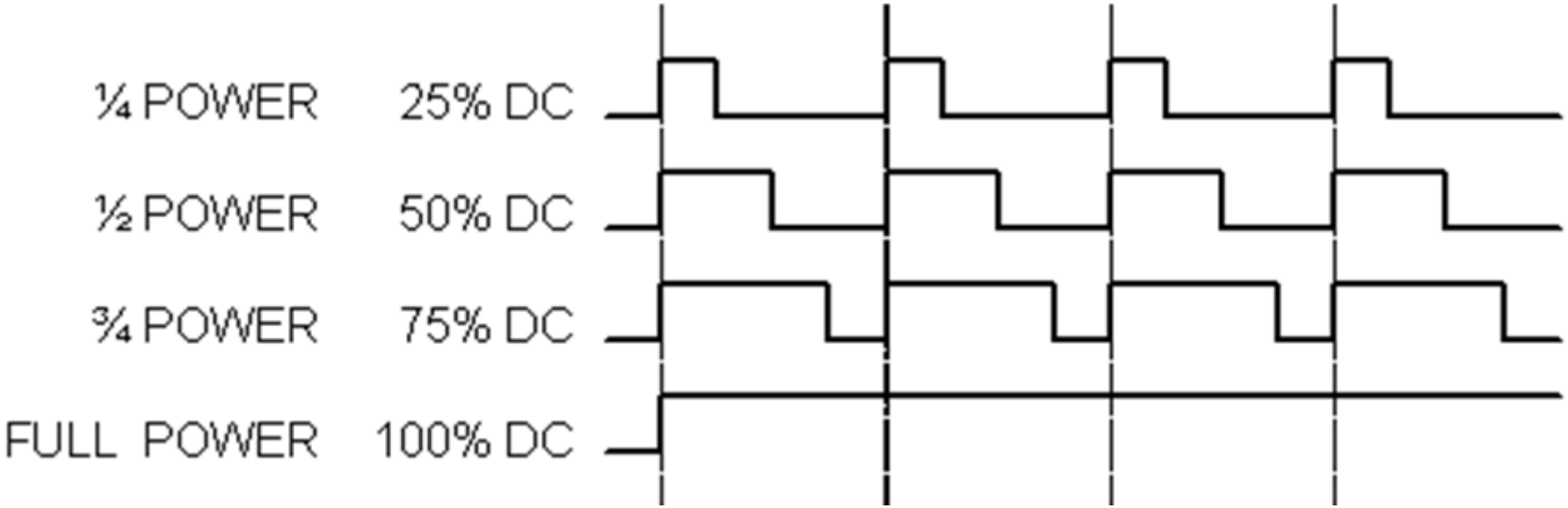
DC motor rotation



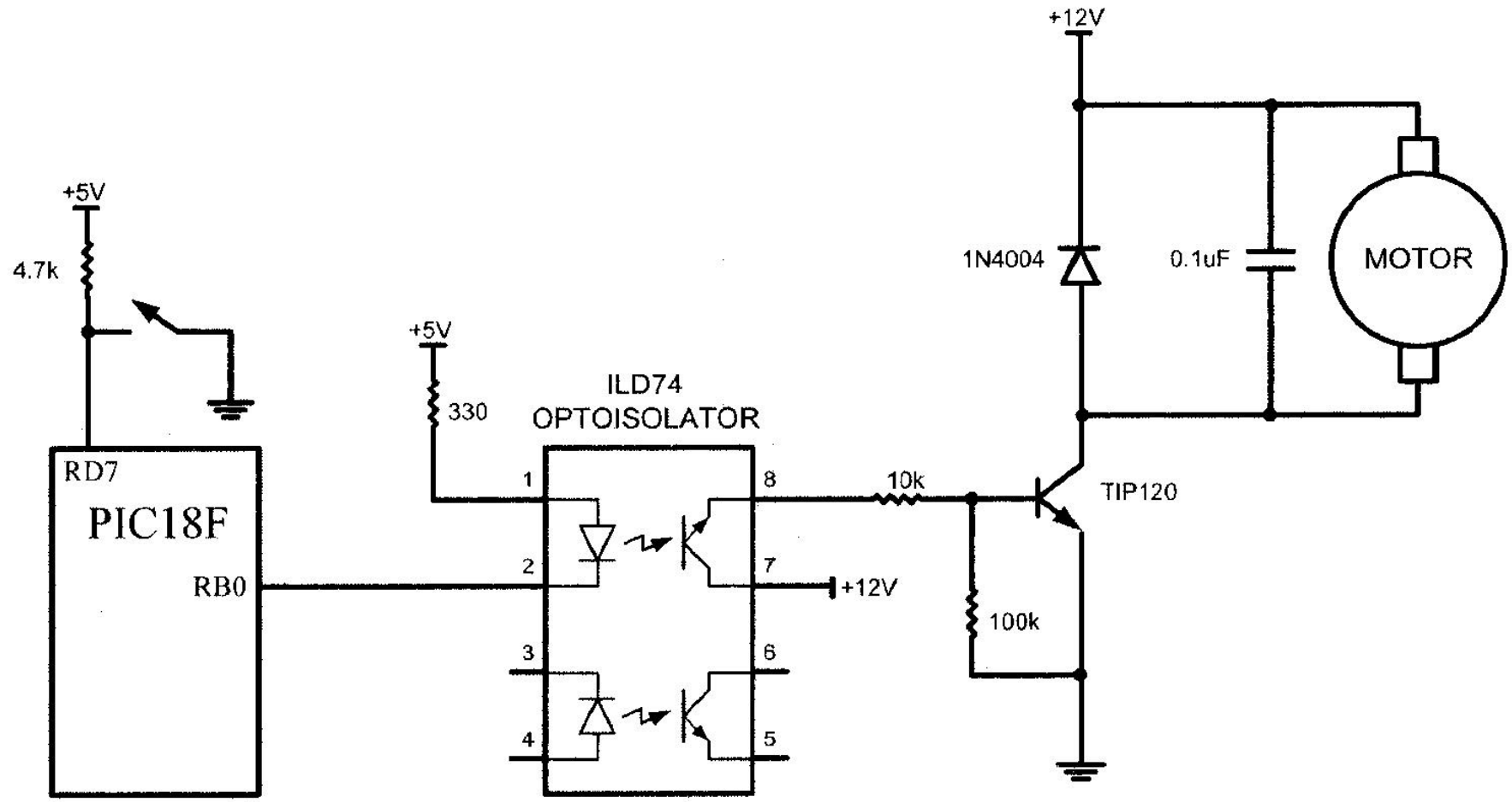
Clockwise Rotation

Counter-Clockwise Rotation

Pulse width modulation (PWM)



DC motor driven by a Darlington transistor



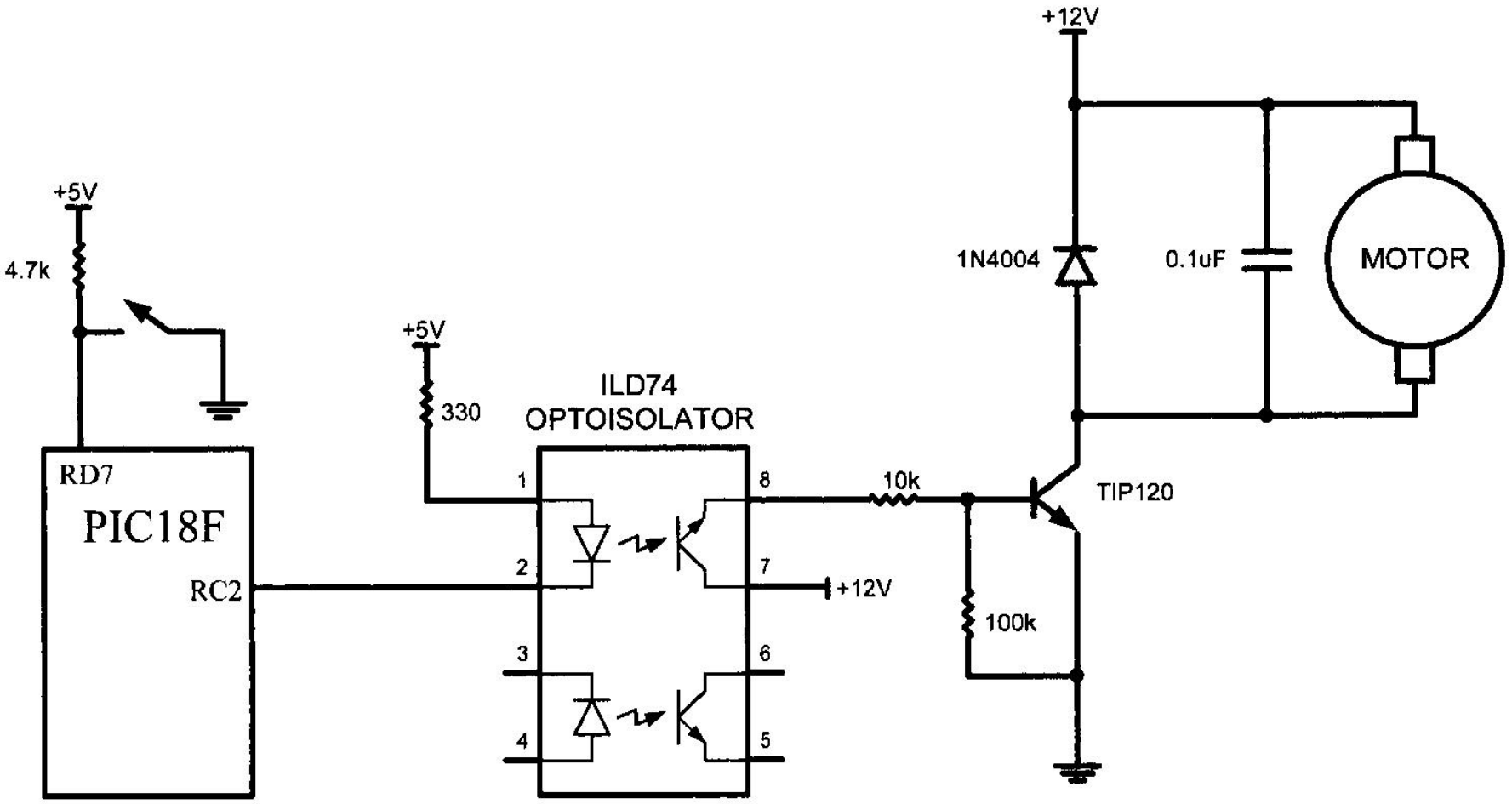
If RD7=1, DC motor with 25% duty cycle; if 0, 50%

```
        BCF     TRISB, RB0
        BSF     TRISD, RD7
        BCF     PORTB, RB0      ; turn off motor

CHK     BTFSS   PORTD, RD7
        BRA     PWM50

        BSF     PORTB, RB0
        CALL    DELAY
        BCF     PORTB, RB0
        CALL    DELAY
        CALL    DELAY
        CALL    DELAY
        BRA     CHK
```

DC motor example (cont.)

```
PWM50   BSF     PORTB, RB0
        CALL    DELAY
        CALL    DELAY
        BCF     PORTB, RB0
        CALL    DELAY
        CALL    DELAY
        BRA     CHK
```

PWM motor control with CCP



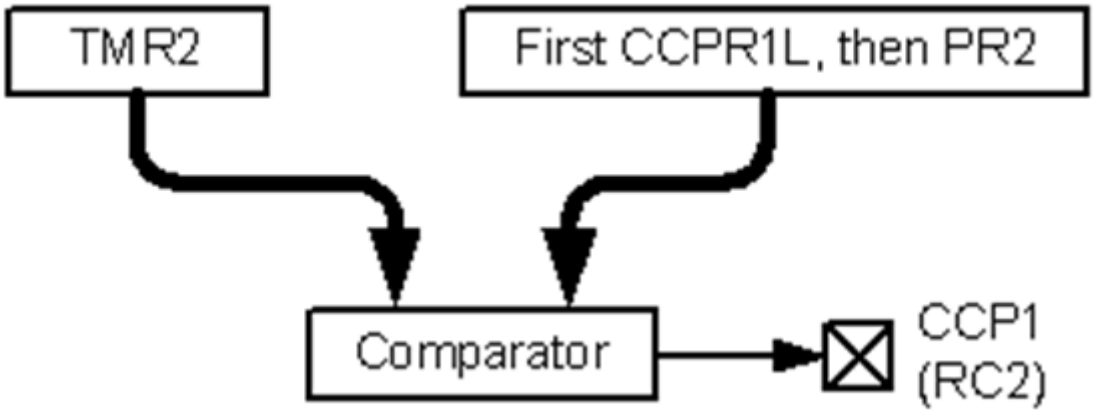
PWM motor control with CCP (cont.)

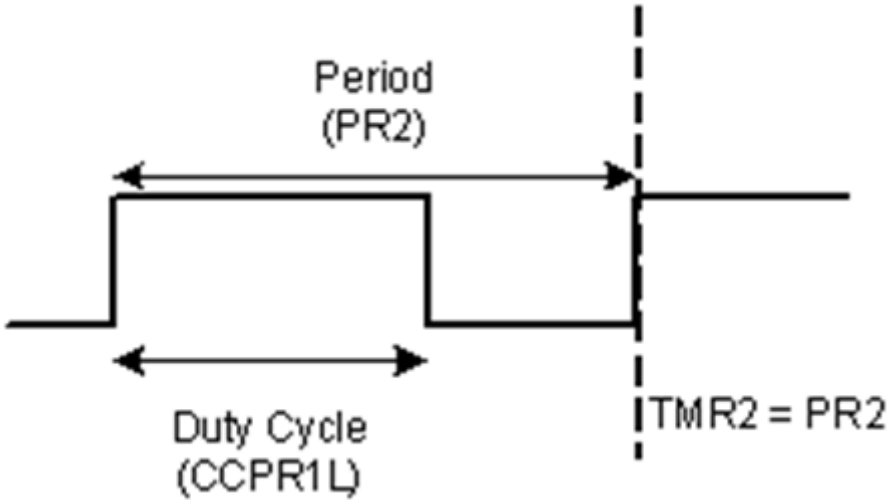
```
        BCF     TRISC, CCP1
        BSF     TRISD, RD7
        MOVLW   0x3C            ; PWM mode, 11 for DC1B1:B0
        MOVWF   CCP1CON
        MOVLW   D'100'          ;  set period to 100 * Fosc/4
        MOVWF   PR2
        MOVLW   0x01            ; Timer2, 4 prescale, no postscaler
        MOVWF   T2CON

AGIAN   BTFSS   PORTD, RD7
        BRA     T2DUTY
        MOVLW   D'25'           ; 25% duty cycle
        BRA     LOAD
T2DUTY  MOVLW   D'50'           ; 50% duty cycle
        BRA     LOAD
```

PWM motor control with CCP (cont.)

```
LOAD    MOVWF   CCPR1L              ; load duty cycle
        CLRF    TMR2
        BSF     T2CON, TMR2ON       ; turn on Timer2
        BCF     PIR1, TMR2IF        ; clear Timer2 flag
OVER    BTFSS   PIR1, TMR2IF        ; wait for end for period
        BRA     OVER
        GOTO    AGAIN
```

PWM mode operation





Reference

- M.A. Mazidi, R.D. Mckinlay, D Causey, PIC Microcontroller and Embedded Systems Using Assembly and C for PIC18, Pearson Education Inc., 2008.