Using the HCTL-1100 with DC Brush Motors

Application Brief M-024

Introduction

The HCTL-1100 general purpose motion control IC can be used for closed loop position and velocity control of DC Brush motors. A block diagram is shown in Figure 1.

A linear or PWM amplifier, host computer/microcontroller and an incremental optical encoder are the only other components needed to design and implement the closed loop control system.

Figure 1. Closed Loop Position and Velocity Control of DC Brush Motor

Any one of four operating modes (two for position control and two for velocity control) can be used with DC Brush motors. Please refer to the technical data sheets for the HCTL-1100 for detailed information on the different modes of operation.

For more information on interfacing to a host please refer to Application Briefs M-015, M-016, M-021, and M-003. For more information on Agilent optical encoders please refer to Application Briefs M-101 and M-109.

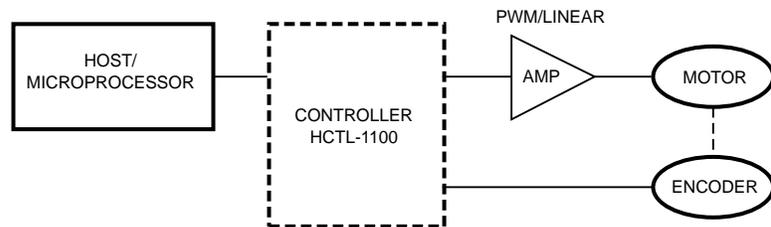Amplifiers compatible with the HCTL-1100s can be built from discrete components, are available as integrated half and full bridges and, from various vendors with special features. A list of some of the manufacturers of amplifiers follows:

Name	Phone Number
Allegro	(508) 853-5000
SGS-Thomson	(602) 867-6100
Unitrode	(603) 424-2410
Harris	(407) 724-3000
TI	(800) 336-5236
Motorola	(708) 490-9500
International Rectifier	(310) 322-3331
Siliconix	(408) 970-5700

In many cases motor manufacturers supply amplifiers for their motors. A good reference for a list of amplifier vendors is the PCIM® *(Power Conversion and Intelligent Motion)* magazine issue dated December 1995.

PWM Interface

Figure 2 shows the glue logic for a PWM amplifier interface to the HCTL-1100 for a DC Brush motor using the L6203 IC made by SGS-Thomson.

Linear Amplifier Interface

Figure 3 shows an example of a linear amplifier interface to the HCTL-1100 for a DC Brush motor using the L165 made by SGS-Thomson. The circuit makes use of a digital to analog converter DAC-08.
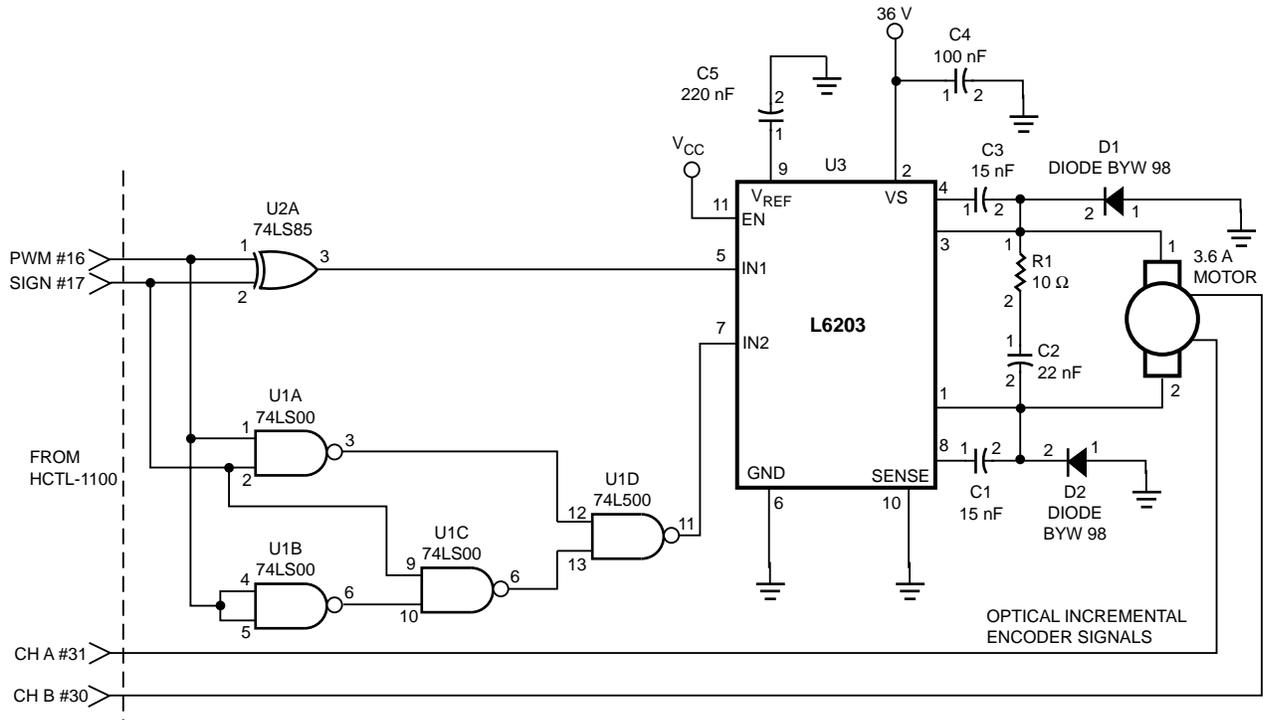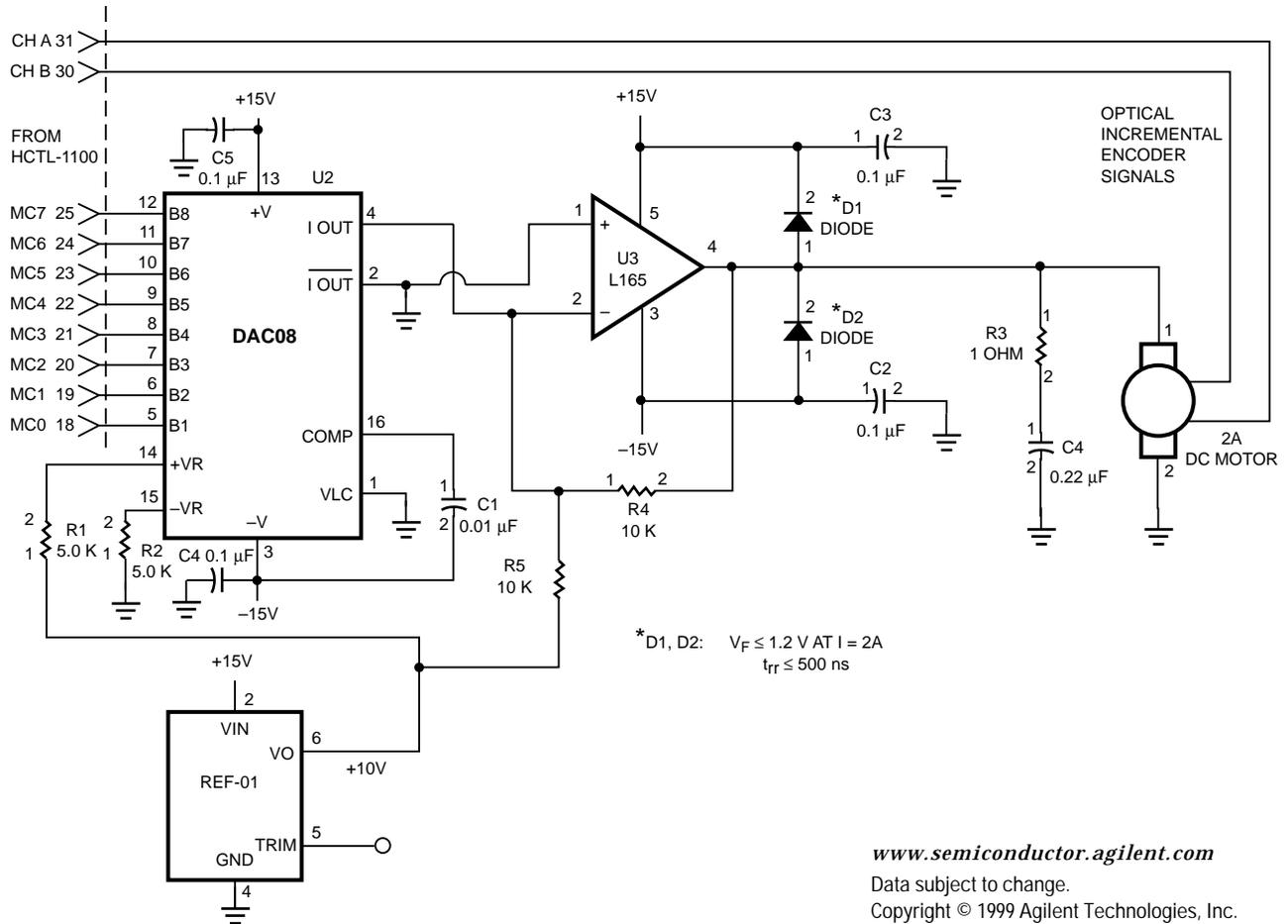
Figure 2.

36 V

C5 220 nF

C4 100 nF

C3 15 nF

D1 DIODE BYW 98

U2A 74LS85

PWM #16

SIGN #17

V_CC

9 U3 2

11 V_REF VS 4

EN

5 IN1 3

R1 10 Ω

3.6 A MOTOR

L6203

7 IN2

1 C2 22 nF

U1A 74LS00

1

2 3

FROM HCTL-1100

U1D 74L500

12

13 11

GND SENSE

6 10

8 C1 15 nF

D2 DIODE BYW 98

U1B 74LS00

U1C 74LS00

4

5 6

9

10 6

CH A #31

CH B #30

OPTICAL INCREMENTAL ENCODER SIGNALS

Figure 3.

CH A 31

CH B 30

+15V

C5 0.1 μF

+15V

C3 0.1 μF

OPTICAL INCREMENTAL ENCODER SIGNALS

FROM HCTL-1100

MC7 25

MC6 24

MC5 23

MC4 22

MC3 21

MC2 20

MC1 19

MC0 18

12 B8

11 B7

10 B6

9 B5

8 B4

7 B3

6 B2

5 B1

+V 13

U2

I OUT 4

Ī OUT 2

DAC08

COMP 16

VLC

14 +VR

15 −VR

−V 3

U3 L165

1 +

2 −

5

4

3

*D1 DIODE

*D2 DIODE

C2 0.1 μF

R3 1 OHM

2A DC MOTOR

R4 10 K

C4 0.22 μF

R1 5.0 K

R2 5.0 K

C4 0.1 μF

−15V

C1 0.01 μF

R5 10 K

−15V

+15V

*D1, D2: $V_F \le 1.2$ V AT I = 2A
$t_{rr} \le 500$ ns

VIN 2

VO 6 +10V

REF-01

GND TRIM 5

4