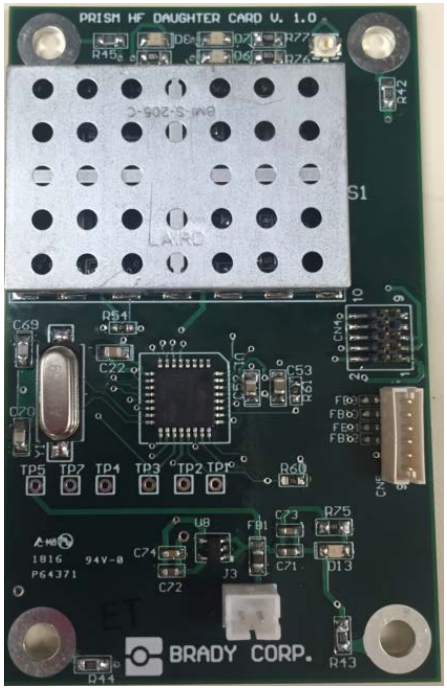
Brady BDC2000 RFID Assembly



BDC2000 RFID PCB

ANT2000 Antenna PCB

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Agency Compliance and Approvals

For Users in the United States

FCC Notice-US Only
This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

(1) this device may not cause harmful interference,
(2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

—Reorient or relocate the receiving antenna.
—Increase the separation between the equipment and receiver.
—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
—Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Canada

ICES-003 Class A Notice, Class A
Industry Canada ICES-003: CAN ICES-3 (A)/NMB-3(A)

This device complies with Industry Canada license-exempt RSSs. Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :
(1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Europe

Warning – This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

Waste Electrical and Electronic Equipment Directive

In accordance with the European WEEE Directive, this device must be recycled in the European Union country in which it was purchased.

RoHS Directive 2011/65/EU

This product is CE marked and complies with the European Union's Directive 2011/65/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 8 June 2011
on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

Radio Equipment Directive (RED) 2014/53/EC

(a) Frequency band(s) in which the radio equipment operates; 13.56MHz

(b) Maximum radio-frequency power transmitted in the frequency band(s) in which the radio equipment operate; < +23dBm (200mW)

Important: Proper labeling for end-products using Brady BDC2000 RFID Assembly:

1) When incorporating BRADY BDC2000 PCB into a host device and the FCC & IC identification numbers are not visible, the outside of host device must display a label referring to the enclosed certified BDC2000 PCB. Specifically this should display wording such as “Contains FCC ID: NUC-BDC2000”
“Contains IC: 3287A-BDC2000”

2) The following statement must be placed in the end-device manual:

"This device complies with Part 15 of the FCC Rules and with Industry Canada licence-exempt RSSs”. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation."

Important: For Canadian guidance for the user manual, all compliance information needs to be provided in BOTH French and English language.

3) FYI -The label on end-device shall be permanently affixed and shall be readily visible to the purchaser at the time of purchase. "Permanently affixed" means that the label is etched, engraved, stamped, indelibly printed, or otherwise permanently marked on a permanently attached part of the equipment enclosure or on a nameplate of metal, plastic, or other material fastened to the equipment by welding, riveting, or a permanent adhesive. The label must be designed to last the expected lifetime of the equipment in the environment in which the equipment may be operated and must not be readily detachable.

BRADY Warranty

Our products are sold with the understanding that the buyer will test them in actual use and determine for him or herself their adaptability to his/her intended uses. BRADY warrants to the buyer that its products are free from defects in material and workmanship, but limits its obligation under this warranty to replacement of the product shown to BRADY's satisfaction to have been defective at the time BRADY sold it. This warranty does not extend to any persons obtaining the product from the buyer.

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YOU SHOULD CAREFULLY READ THE FOLLOWING TERMS & CONDITIONS OF THIS LICENSE AGREEMENT. IF YOU DO NOT AGREE WITH THESE TERMS & CONDITIONS, PLEASE PROMPTLY RETURN THIS PACKAGE FOR A FULL REFUND.

Technical Support

Technical Support Numbers/On-line Help

For repair or technical assistance, find your regional Brady Tech Support office by going to:

In the Americas: www.bradyid.com
In Europe: www.bradyeurope.com
In Asia: www.bradycorp.com

Repair and Replacement Parts
Brady Corporation offers repair and replacement services. Contact Brady Technical Support for repair and replacement information.

1. Introduction

1.1 Description

The Brady BDC2000 RFID Assembly consists of a Brady Daughter Card (BDC2000), a PCB Antenna Board (ANT2000) and a U.FL cable connecting BDC2000 to the ANT2000 PCB. The diagram below shows the Brady BDC2000 RFID Assembly and its connection to a host such as a printer's main control board.

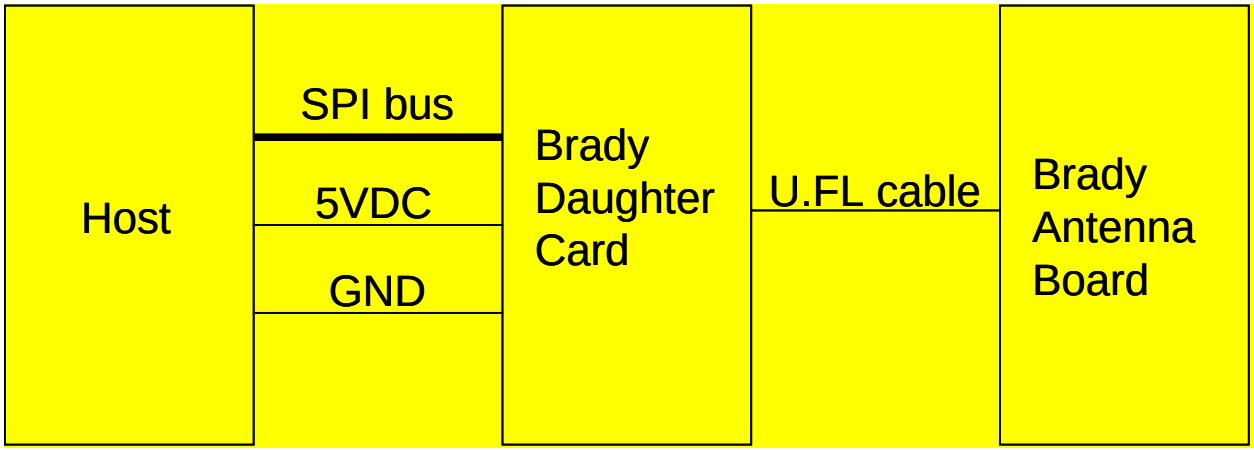

Figure 1. Block Diagram of Brady BDC2000 RFID Assembly and its Connection to a Host

The Brady BDC2000 RFID PCB has a radio module and MCU for control. The radio module communicates to an HF RFID tag that is located in proximity to the ANT2000 antenna board. The information from the RFID tag can be acquired by the host through the SPI bus. The host also provides 5VDC and ground to the BDC2000 RFID PCB.

1.2 Specification

The Brady BDC2000 RFID Assembly specification is provided in Table 1.

Table 1. Specification of Brady BDC2000 RFID Assembly

BDC2000 RFID PCB	
Radio Fundamental Frequency	13.56 MHz
ISO Standard	ISO 15693
Type of Modulation	Amplitude
Antenna Type	PCB Loop Antenna 50 OHM
Antenna Impedance	50 OHM
Number of Channels	One
Operation Range (M)	0.05
Power Output	RF power output < 200 mW
MCU	ATSAMD21E17A
MCU XTAL	12 MHz
DC Voltage	5VDC +/- 10%
DC Current Consumption	< 100mA
Communication Interface with Host	SPI Bus
Operating Temperature Range	40 – 110 degF
Operating Humidity Range	20 to 80 % RH non-condensing
Size (mm x mm)	50 x 80
Weight (g)	18.5
ANT2000 PCB	
Size (mm x mm)	40 x 60
Length of U.FL Cable (mm)	Up to 203.2
Weight (g)	7
Gain (uH)	2.5 @ 13.56 MHz

2. Installation

A photo of the Brady BDC2000 RFID Assembly is shown in Figure 2.

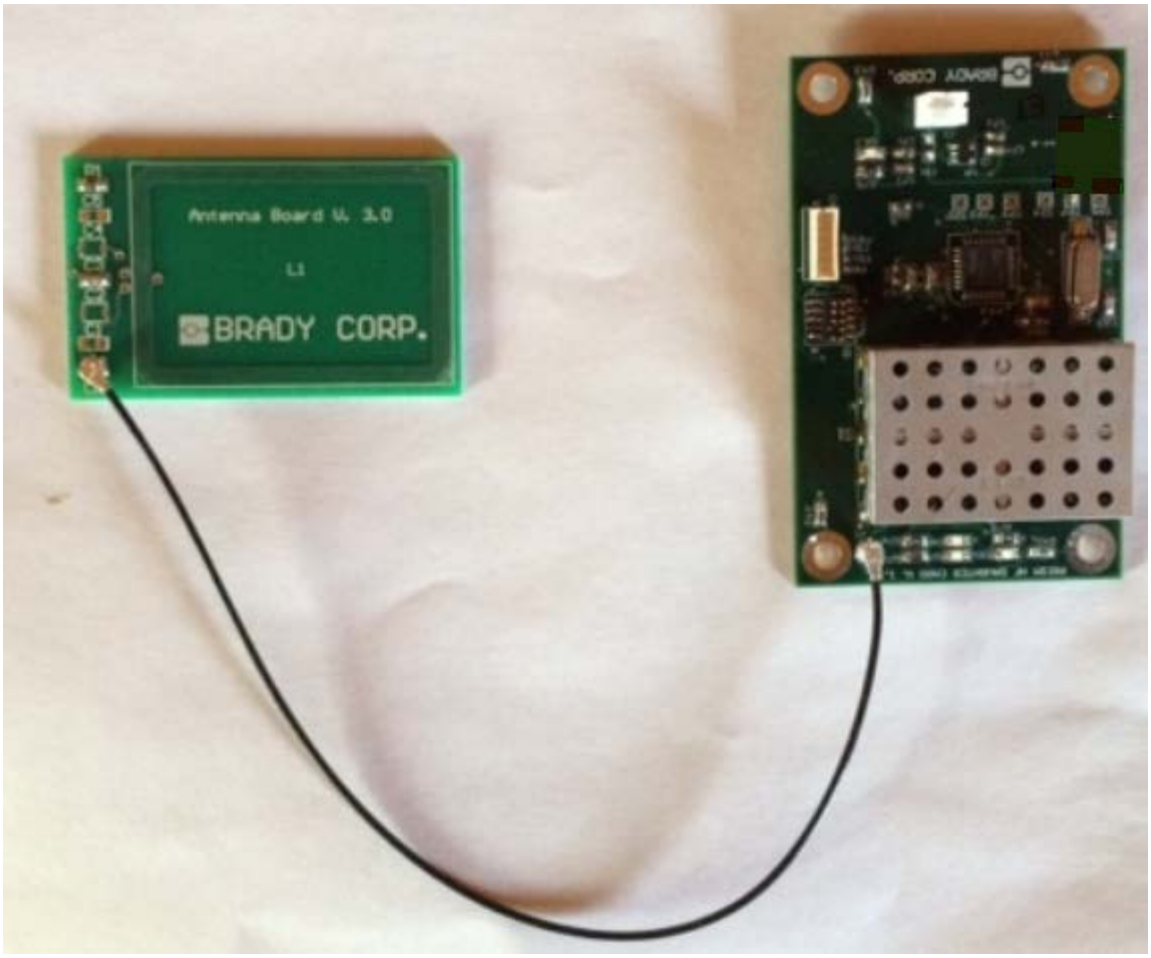

Figure 2. photo of the Brady BDC2000 RFID Assembly

As is shown in the picture, the Brady BDC2000 RFID PCB has four mounting holes at the corners of the PCB. The holes' center-to-center distances are 40mm and 70mm respectively. The holes' size is 4mm in diameter. These four holes can be used for mounting the BDC2000 RFID PCB.

The Brady ANT2000 antenna PCB can be mounted with a custom plastic piece. A cautionary note: The presence of metal in close proximity to the antenna loop will affect the normal operation of the radio and should be avoided.

2.1 Connections

There are four connectors on the BDC.

- The U.FL connector for connecting a U.FL cable to the antenna board.
- The 6-pin JST B6B-PH-K-S connector for SPI, GND, and 5VDC.
- A separate 2-pin JST B2B-PH-K-S connector for 5VDC and GND.
- A dual row 10-position header (Samtec FTSH-105-01-L-DV) for debugging and downloading firmware to the BDC2000 RFID PCB.

Note: The usage of the 2-pin connector is optional. If the 5VDC and GND are in the 6-pin connector, then the 2-pin connector can be left unused.

The signal designations of the connectors are listed in Tables 2 to 4.

Table 2. JST B6B-PH-K-S

Pin Number	Signal
1	MOSI
2	SS
3	MISO
4	SCK
5	GND
6	5VDC

Table 3. JST B2B-PH-K-S

Pin Number	Signal
1	5VDC
2	GND

Table 4. Samtec 10-Position Dual Row

Pin Number	Signal
1	VTref (3V3)
2	SWDIO
3	GND
4	SWCLK
5	GND
6	SWO (NC)
7	NC
8	TDI (NC)
9	NC
10	nRESET

3.0 Operation

The Brady BDC2000 RFID PCB SPI configuration is shown in Table 5.

Table 5. BDC2000 SPI Configuration

Parameter	Setting
Clock Speed	100 KHz
Master/Slave	Slave
Number of Bits for Transmitting a Byte	8
Duplex	Full
Bit Direction	LSB (Little Endian)
SPI Transmission Mode	0 (Data latched at Rising Edge of the Clock)

The Brady BDC2000 RFID PCB acts as an SPI slave. It reads ISO15693 compliant tags and converts and transmits the data to the SPI master upon request from the SPI master.

Firmware read out from the BDC2000 RFID PCB is inhibited. Attempting to read out firmware will result in automatic erasure of flash program memory.

RFID configuration uses hard coded constants. Settings are locked down and are not configurable.