John Deere RFID Reader Operator's Manual

Front

Rear

CAUTIONARY NOTE AND WARNING

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 instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense.

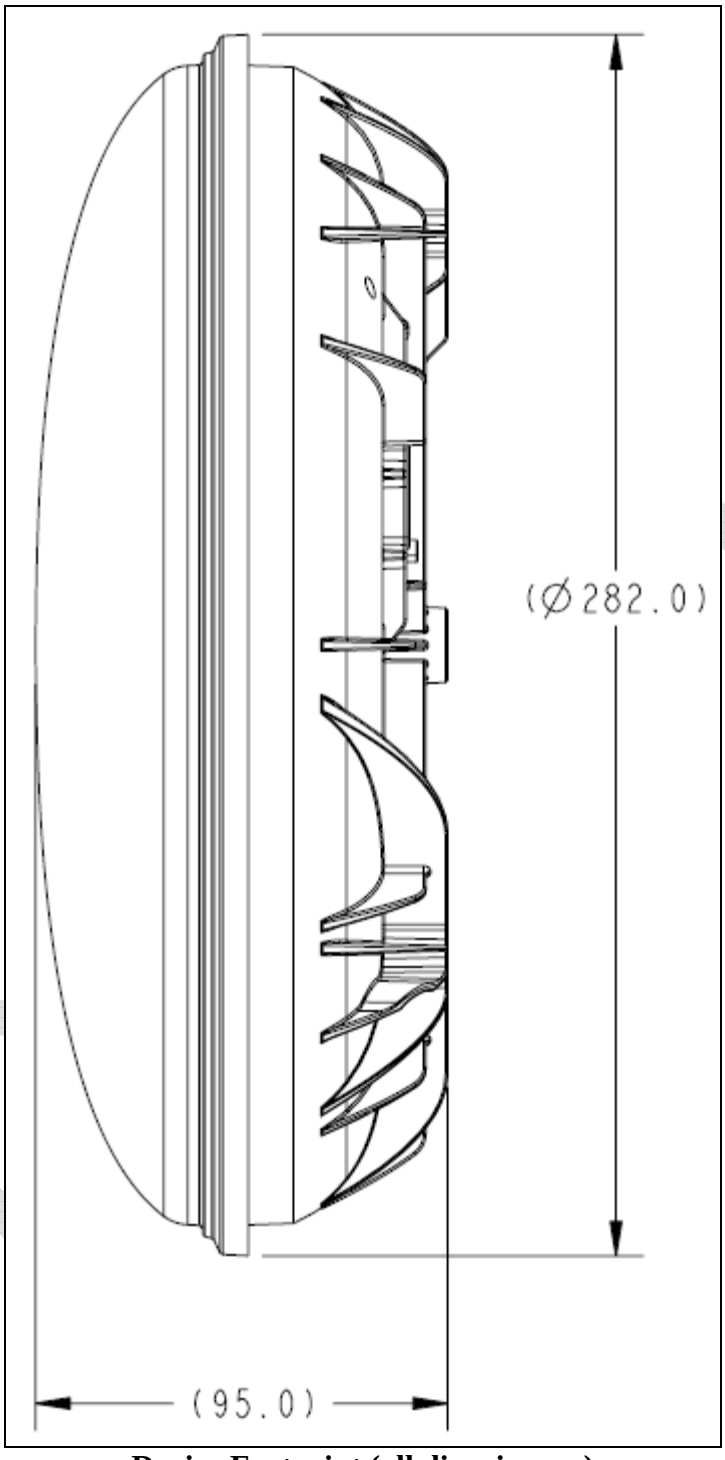
WARNING: Do not use this equipment within 20cm of a person.

Introduction

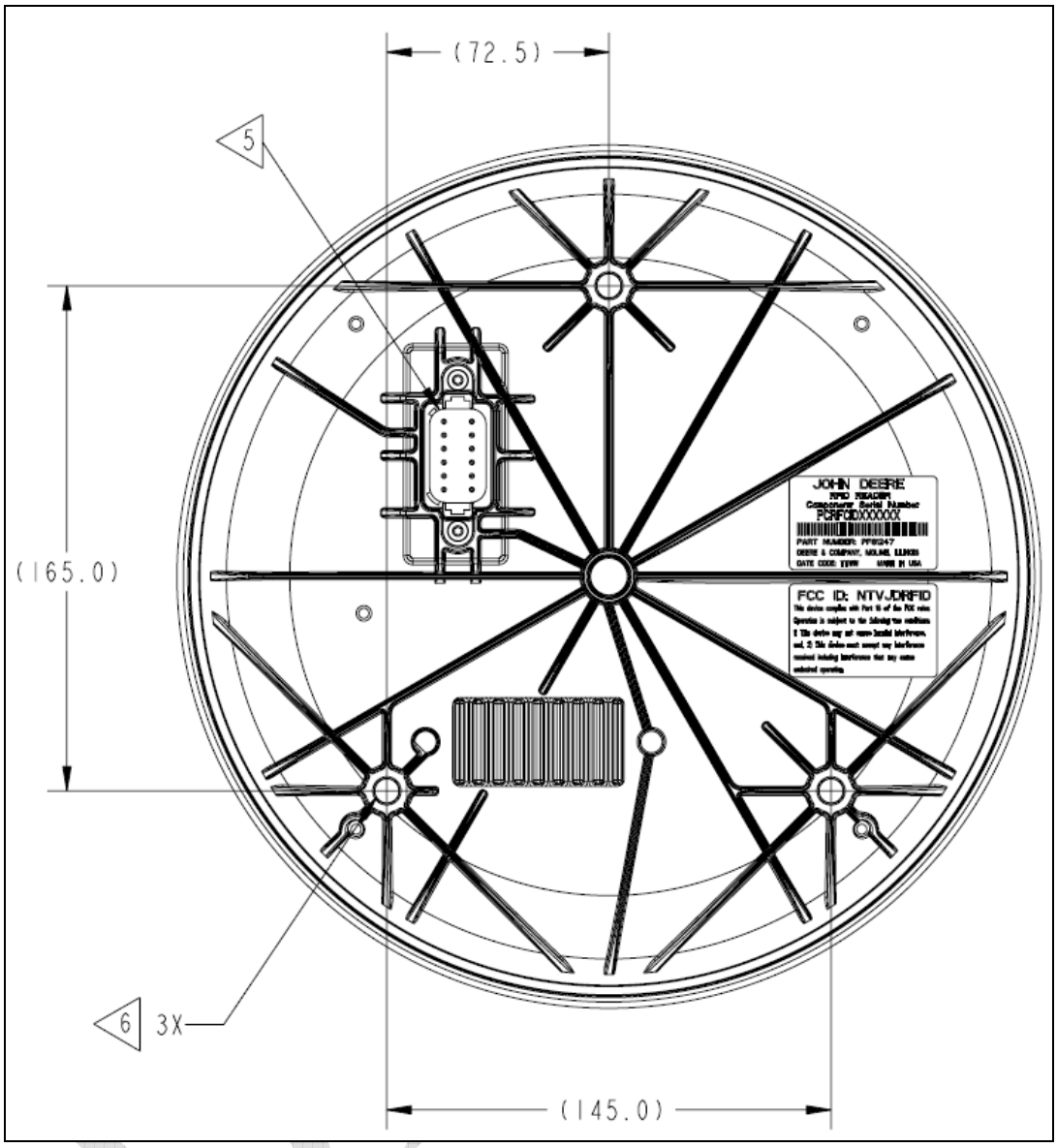
The John Deere RFID Reader was designed for use in a Pinnacle Cotton Harvesting environment. It may either be mounted in the bale chamber of the harvester, or on ginning equipment within a cotton gin. In both situations, the functionality of the reader is the same. When triggered to do so, the reader emits an RF signal in order to read an RFID tag identifier. Once the ID is obtained, the reader sends the ID back to the source, depending on how it was triggered.

The RF antenna and RF generator within the sealed reader have been calibrated and designed for operation on a cotton picker or within a cotton gin. There is no access to modify any of the settings. The only method of user control is by triggering the device. There are 3 separate methods for triggering the device, CAN, Serial, or pin strapping. Since CAN is a language only used by the pinnacle cotton harvester, it will not be detailed. The remainder of this document will explain the serial and pin strapping trigger methods as well as give instructions for mounting, orientation, and interfacing with the reader.

Mechanical Interface



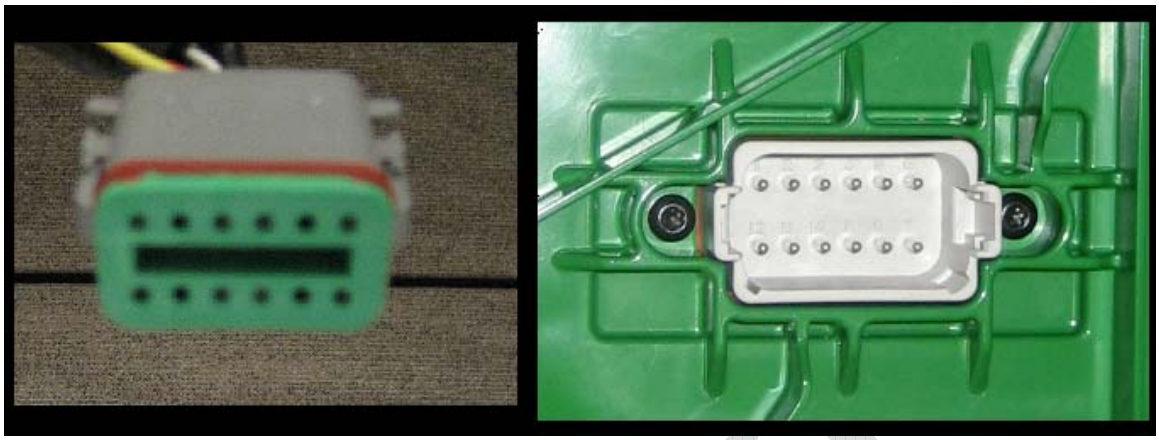
Device Footprint (all dims in mm)



Mount Design (all dims in mm)

As seen above, there are 3 threaded mounting holes on the device. The hardware necessary to mount the device are 3 xx bolts. The thread depth into the device is x mm. The bolt pattern measurements can be taken from the above drawing, or the device directly.

Electrical Interface



Male and Female Electrical Connector

Pin	Function	Pin	Function
12	Continuous Power	**1**	Input (5 - 24v) Read Trigger
11	Configuration	**2**	Input (5 - 24v) Relay Driver
10	Rx- Serial	**3**	Tx - Serial
▮	~~CANL~~	▮	~~CANH~~
▮	~~Bootstrap~~	**5**	Output (5 - 24v) Relay Driver
7	GROUND	**6**	Switched Power

Pin Function Table

12 Pin Deutsch Connector - part # = DT15-12PA-P010

Note: The blacked out pins should not be connected or grounded in a non-pinnacle mounted configuration, leave them in an open circuit configuration.

Pins 12, 6, and 7 provide the power circuit for the device. Pin 6 and 12 take the same +12 V DC (acceptable range 10-14 V). Pin 6 allows for the on/off toggling of the device while Pin 12 supplies constant power. Pin 6 should be disconnected 30 seconds prior to disconnecting pin 12 to allow the device to properly shutdown.

Serial-Read Interface

The external RS-232 bus shall operate at a baud rate between 4800 and 614400 Bps, inclusive. Several proprietary messages shall be used. Each proprietary message shall be of the format:

":RFID " (data) "?" (checksum) "\r\n" (note the mandatory space after :RFID)

The total length of each message is restricted to 80 bytes. The checksum shall be in the form of two uppercase ASCII hex characters. This value is calculated by adding up each of the data bytes (restricting the sum to 8 bits). The checksum covers the underlined area below:

Example: ":RFID ReadTimeout=050 Trigger=03 ?E9\r\n"

Each message may contain one or more segments, which are separated by spaces. Segments will be processed from left to right. These segments are defined in detail below.

Commands

The following segments are sent to the RFID reader:

Segment	Description
Trigger=cc	Sets the read trigger specified by cc. The available triggers are: 00 – Stop read 01 – Start read until stop is seen 02 – Start read until tag is seen 03 – Start read for the duration specified by the Timeout
OutputTimeout=ddd	Sets the output timeout of pin 5 to ddd in 100's of milliseconds (example: OutputTimeout=020 sets the timeout to 2 seconds) Values may be from 1 – 999
ReadTimeout=ddd	Sets the Trigger 03 timeout to ddd in 100's of milliseconds (example: ReadTimeout=080 sets the timeout to 8.0 seconds) Values may be from 1 – 999
SerialBaudRate=ddddddd	Sets the serial port baud rate to ddddddd (in Bps)
TagFilterTimeout=ddd	Sets the tag filter timeout to ddd in 100's of milliseconds (example: TagFilterTimeout=080 sets the timeout to 8.0 seconds) Values may be from 1 – 999. This filter is to limit the number of repeat ID's the device sends out. Once an ID is identified, the device will not be able to retransmit the same ID until this filter has elapsed. The default value is 2 seconds.
TagNotSeenTimeout=dddd	Sets the Trigger 01 timeout to dddd in seconds (example: TagNotSeenTimeout=0100 sets the timeout to 100 seconds) Values may be from 1 – 9999. This filter is to protect the device from lengthy unused operation. The reader will stop attempting to read if it has not seen a tag after the duration specified by this filter. The default value is 60 seconds.

Responses

The following segments are sent from the RFID reader:

Segment	Description
BadChecksum(cc)	Message sent out in response to a message with a bad checksum (the correct checksum is included in parenthesis)
BadSegment	Message sent out in response to a message with a bad segment
CommEstablished	Message sent out when communication with the IM4 is established
Heartbeat	Heartbeat message sent once every ten seconds. Used to debug power or communication issues.
MessageOK	Message sent out in response to a valid request
NoSegment	Message sent out in response to a message with no segments
Reprogramming	Message sent out just before the IM4 reprogramming begins
SpecialGinSolutionModeDisabled	Message sent out if the low cost gin solution mode is disabled This message is only sent out of the mode was previously enabled
SpecialGinSolutionModeEnabled	Message sent out if the low cost gin solution mode is enabled
Tag=cccc…cccc (24 c's)	This tag id was detected (tag id is in the form of 24 ASCII characters, which represent a 12-byte value)

Hardware-Read Interface

Standard Operation

It is also possible to communicate to the device without using a standard communication protocol. By enabling a hardware command, you can determine if a tag has been seen by the device or not. A formal protocol is still necessary to determine the ID of the tag seen. Activating a hardware command will still result in the ID being sent over the RS232 connection.

To trigger a hardware command, simply apply an appropriate amount of voltage (5-24V) to pins 1 and 2 and when a tag passes in front of the reader, pin 5 will respond by outputting the reference voltage seen on pin 2 for a specified duration of time. The timer cycle defaults to 2 seconds, but may be altered using the RS232 comm detailed above. Removing the reference voltage before the timer cycle ends will also terminate the output voltage. It should be noted that the voltages on pins 1 and 2 need not be the same. The device will read continuously as long as pin 1 is high.

Low Cost Gin Solution

Low Cost Gin mode was designed to be used on Gin equipment that will not have the capability to use a formal communication protocol or intelligent controllers. For that reason, the device was designed to filter for a specific identifier (one that denotes placement on a cotton module) within a tag ID and only output the hardware output when that tag has been seen. To enable this mode, wire pin 11 to ground. Then the hardware trigger will operate the same as in the description above, except that it will only high the output when it sees a tag that marks the tail position of the cotton wrap.