MagneSafe OEM USB READER

TECHNICAL REFERENCE MANUAL

PART NUMBER D99875494-52

JULY 2017

MAGTEK®
REGISTERED TO ISO 9001:2008
1710 Apollo Court
Seal Beach, CA 90740
Phone: (562) 546-6400
FAX: (562) 546-6301
Technical Support: (651) 415-6800
www.magtek.com

Copyright© 2001-2017
MagTek®, Inc.
Printed in the United States of America

Information in this document is subject to change without notice. No part of this document may be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose, without the express written permission of MagTek, Inc.

MagTek is a registered trademark of MagTek, Inc.
MagnePrint is a registered trademark of MagTek, Inc.
MagneSafe™ is a trademark of MagTek, Inc.
Magensa™ is a trademark of MagTek, Inc.

USB (Universal Serial Bus) Specification is Copyright© 1998 by Compaq Computer Corporation, Intel Corporation, Microsoft Corporation, NEC Corporation.

REVISIONS

Rev Number	Date	Notes
1.01	23 Feb 2010	Intial release
2.01	17 Mar 2010	Added 21030063; included the part numbers for the mating connectors
3.01	13 Jul 2010	Removed 21030063, added 21073067 & 21073080
4.01	1 May 2014	Update drawing 21030062 to latest revision
50	14 July 2015	Added 21030085 to document.
51	15 Dec 2015	Updates 21030085 image to current revision.
52	25 Jul 2017	Add 21046023 throughout; misc. clarifications and corrections

LIMITED WARRANTY

MagTek warrants that the products sold pursuant to this Agreement will perform in accordance with MagTek's published specifications. This warranty shall be provided only for a period of one year from the date of the shipment of the product from MagTek (the "Warranty Period"). This warranty shall apply only to the "Buyer" (the original purchaser, unless that entity resells the product as authorized by MagTek, in which event this warranty shall apply only to the first repurchaser).

During the Warranty Period, should this product fail to conform to MagTek's specifications, MagTek will, at its option, repair or replace this product at no additional charge except as set forth below. Repair parts and replacement products will be furnished on an exchange basis and will be either reconditioned or new. All replaced parts and products become the property of MagTek. This limited warranty does not include service to repair damage to the product resulting from accident, disaster, unreasonable use, misuse, abuse, negligence, or modification of the product not authorized by MagTek. MagTek reserves the right to examine the alleged defective goods to determine whether the warranty is applicable.

Without limiting the generality of the foregoing, MagTek specifically disclaims any liability or warranty for goods resold in other than MagTek's original packages, and for goods modified, altered, or treated without authorization by MagTek.

Service may be obtained by delivering the product during the warranty period to MagTek (1710 Apollo Court, Seal Beach, CA 90740). If this product is delivered by mail or by an equivalent shipping carrier, the customer agrees to insure the product or assume the risk of loss or damage in transit, to prepay shipping charges to the warranty service location, and to use the original shipping container or equivalent. MagTek will return the product, prepaid, via a three (3) day shipping service. A Return Material Authorization ("RMA") number must accompany all returns. Buyers may obtain an RMA number by contacting Technical Support at (888) 624-8350.

EACH BUYER UNDERSTANDS THAT THIS MAGTEK PRODUCT IS OFFERED AS IS. MAGTEK MAKES NO OTHER WARRANTY, EXPRESS OR IMPLIED, AND MAGTEK DISCLAIMS ANY WARRANTY OF ANY OTHER KIND, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

IF THIS PRODUCT DOES NOT CONFORM TO MAGTEK'S SPECIFICATIONS, THE SOLE REMEDY SHALL BE REPAIR OR REPLACEMENT AS PROVIDED ABOVE. MAGTEK'S LIABILITY, IF ANY, SHALL IN NO EVENT EXCEED THE TOTAL AMOUNT PAID TO MAGTEK UNDER THIS AGREEMENT. IN NO EVENT WILL MAGTEK BE LIABLE TO THE BUYER FOR ANY DAMAGES, INCLUDING ANY LOST PROFITS, LOST SAVINGS, OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OF, OR INABILITY TO USE, SUCH PRODUCT, EVEN IF MAGTEK HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, OR FOR ANY CLAIM BY ANY OTHER PARTY.

LIMITATION ON LIABILITY

EXCEPT AS PROVIDED IN THE SECTIONS RELATING TO MAGTEK'S LIMITED WARRANTY, MAGTEK'S LIABILITY UNDER THIS AGREEMENT IS LIMITED TO THE CONTRACT PRICE OF THIS PRODUCT.

MAGTEK MAKES NO OTHER WARRANTIES WITH RESPECT TO THE PRODUCT, EXPRESSED OR IMPLIED, EXCEPT AS MAY BE STATED IN THIS AGREEMENT, AND MAGTEK DISCLAIMS ANY IMPLIED WARRANTY, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

MAGTEK SHALL NOT BE LIABLE FOR CONTINGENT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES TO PERSONS OR PROPERTY. MAGTEK FURTHER LIMITS ITS LIABILITY OF ANY KIND WITH RESPECT TO THE PRODUCT, INCLUDING ANY NEGLIGENCE ON ITS PART, TO THE CONTRACT PRICE FOR THE GOODS.

MAGTEK'S SOLE LIABILITY AND BUYER'S EXCLUSIVE REMEDIES ARE STATED IN THIS SECTION AND IN THE SECTION RELATING TO MAGTEK'S LIMITED WARRANTY.

FCC WARNING STATEMENT

This equipment has been tested and was found to comply with the limits for a Class B digital device pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. 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 with radio communications. However, there is no guarantee that interference will not occur in a particular installation.

FCC COMPLIANCE STATEMENT

This device complies with Part 15 of the FCC Rules. Operation of this device 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.

CANADIAN DOC STATEMENT

This digital apparatus does not exceed the Class B limits for radio noise from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe B prescrites dans le Réglement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numériqué de la classe B est conformé à la norme NMB-003 du Canada.

CE STANDARDS

Testing for compliance with CE requirements was performed by an independent laboratory. The unit under test was found compliant with standards established for Class B devices.

UL/CSA

This product is recognized per Underwriter Laboratories and Canadian Underwriter Laboratories 1950.

RoHS STATEMENT

When ordered as RoHS compliant, this product meets the Electrical and Electronic Equipment (EEE) Reduction of Hazardous Substances (RoHS) European Directive 2002/95/EC. The marking is clearly recognizable, either as written words like "Pb-free", "lead-free", or as another clear symbol ( ).

TABLE OF CONTENTS

SECTION 1. FEATURES AND SPECIFICATIONS 1
FEATURES 2
HARDWARE CONFIGURATION 2
ACCESSORIES 2
REFERENCE DOCUMENTS 3
SPECIFICATIONS 3
SECTION 2. INSTALLATION 5
USB CONNECTION 5
LED CONNECTION 5
SECTION 3. OPERATION 7
LED INDICATOR 7
CARD READ 7
APPENDIX A. DRAWINGS 9

TABLES AND FIGURES

Table 1-2. Specifications 3
Table 2-1. 5-Pin USB Connector 5
Table 2-2. 3-Pin LED Connector 5
Figure 2-1 Example LED Circuit 5
Figure A-1. MagneSafe 3 Track Module with 0.220” base - USB Flex 9
Figure A-2. MagneSafe 3 Track Reader 90mm Body - USB Flex 10
Figure A-3. MagneSafe 3 Track Reader 90mm Slim Rail - USB Flex 11
Figure A-4. MagneSafe 3 Track Head- USB 12
Figure A-5. MGSFCO MAGNESAFE V5 SLIM PROFILE 60MM READER 3TRACKS USB 13

SECTION 1. FEATURES AND SPECIFICATIONS

The MagneSafe Readers are compact magnetic stripe card readers that conform to ISO standards. In addition to reading multiple tracks of data from a card, the Readers also include MagnePrint technology. The MagnePrint data will be included with the track data on each transaction. In order to maximize card security, the Readers incorporate data encryption within the head to protect the card contents and MagnePrint information from the point of swipe. The Readers are compatible with any device having a host USB interface. A card is read in the swipe readers by sliding it, stripe down, through the slot either forward or backward.

In addition to the USB connector, there is a connector which can be used to control an LED (Light Emitting Diode) indicator. The LED provides the operator with continuous status of the Reader operations.

The readers conform to the USB HID (Human Interface Device) Class specification Version 1.1. This allows host applications designed for most versions of Windows to easily communicate to the readers using standard Windows API calls that communicate to the reader through the HID driver that comes with Windows.

The Readers can be operated in two different modes:

- HID (herein referred to as "***HID*** mode") and
- HID with Keyboard Emulation (herein referred to as "***KB*** mode")

When operating in the HID mode, a reader will not use keyboard emulation. It behaves like a vendor-defined HID device so that a direct communication path can be established between the host application and the reader, without interference from other HID devices.

When configured for the Keyboard Emulation (KB) mode, a Reader emulates a USB HID United States keyboard or, optionally, any international keyboard using ALT ASCII code keypad key combinations or customizable key maps. This allows host applications designed to acquire card data from keyboard input to seamlessly acquire the card data from the USB swipe reader.

Caution

When in Keyboard Emulation mode, if another keyboard is connected to the same host as the reader and a key is pressed on the other keyboard while the reader is transmitting, then the data transmitted by the reader may get corrupted.

When a card is swiped through the Reader, the track data and MagnePrint information will be TDEA (Triple Data Encryption Algorithm, aka, Triple DES) encrypted using DUKPT (Derived Unique Key Per Transaction) key management. This method of key management uses a base derivation key to encrypt a key serial number that produces a unique initial encryption key which is injected into the Reader prior to deployment. After each transaction, the encryption key is modified per the DUKPT algorithm so that each transaction uses a unique key. Thus, the data will be encrypted with a different encryption key for each transaction.

FEATURES

Major features of the Readers are as follows:

- Hardware Compatible with a PC or any computer or terminal having a USB interface
- Bi-directional card reading
- Reads encoded data that meets ANSI/ISO/AAMVA standards
- Reads up to three tracks of card data
- Provisions for a Red/Green/Amber LED for status
- Compatible with USB specification
- Compatible with HID specification
- Can use standard Windows HID driver for communications; no third party device driver is required
- Programmable USB serial number descriptor
- Programmable USB Interrupt In Endpoint polling interval
- Programmable Keyboard Table to support alternate languages
- Non-volatile memory for property storage
- Supplies 54 byte MagnePrint™ value
- Contains a unique, non-changeable serial number which allows tracking each reader
- Encrypts all track data and the MagnePrint value
- Provides clear text confirmation data including card holder's name, expiration date, and a portion of the PAN as part of the Masked Track Data
- Mutual Authentication Mode for use with Magensa.net®

HARDWARE CONFIGURATION

The hardware configuration is as follows:

Part Number	I/O Type	Connector	Rail Style
21030062	USB HID or USB KB	Flex Cable with Molex 501568-0507	Head Module with .220" base; no rail
21073067	USB HID or USB KB	Flex Cable with Molex 501568-0507	90mm Standard Rail
21073080	USB HID or USB KB	Flex Cable with Molex 501568-0507	90mm Slim Rail
21030085	USB HID or USB KB	Cable with Molex 51021-0500	No rail
21046023	USB HID or USB KB	Cable with Molex 51021-0500	60mm Slim Rail

ACCESSORIES

The optional accessories are as follows:

Part Number	Description
21042806	USB MSR Demo Program with Source Code (CD)
99510026	USB MSR Demo Program with Source Code (WEB)

REFERENCE DOCUMENTS

MagTek Communication Reference Manual for USB MagneSafe V5 Readers (99875475)

Axelson, Jan. *USB Complete, Everything You Need to Develop Custom USB Peripherals*, 1999. Lakeview Research, 2209 Winnebago St., Madison WI 53704, 396pp., *http://www.lvr.com*.

ANS X9.24-2004 Retail Financial Services Symmetric Key Management Part 1: Using Symmetric Techniques

USB Human Interface Device (HID) Class Specification Version 1.1.

Universal Serial Bus (USB): HID Usage Tables Version 1.12 (1/21/2005)

USB (Universal Serial Bus) Specification, Version 1.1, Copyright© 1998 by Compaq Computer Corporation, Intel Corporation, Microsoft Corporation, NEC Corporation.

USB Implementers Forum, Inc., ***www.usb.org***.

SPECIFICATIONS

Table 1-2 lists the specifications for the USB MagneSafe Readers.

Table 1-2. Specifications

Reference Standards	ISO 7810 and ISO 7811/ AAMVA*
Power Input	5V from USB bus
Message Format	ASCII
Card Speed	6 to 60 ips (15.4 to 152.4 cm/s)

ELECTRICAL

Current	
Normal Mode	100mA maximum
Suspend Mode	500uA maximum

MECHANICAL

Dimensions	See related package drawings
Cable length	n/a
Connector	USB: Molex 501568-0507 or 51021-0500 LED: Molex 501568-0307

ENVIRONMENTAL

Temperature	
Operating	-40°C to 85°C (-40°F to 185°F)
Storage	-40°C to 85°C (-40°F to 185°F)
Humidity	
Operating	10% to 90% noncondensing
Storage	10% to 90% noncondensing

* ISO (International Standards Organization) and AAMVA (American Association of Motor Vehicle Administrators).

SECTION 2. INSTALLATION

This section describes the connections for USB and the LED.

USB CONNECTION

Pin numbers and signal descriptions for the USB connector are listed in Table 2-1. The connector on the cable is Molex 501568-0507 or 51021-0500. One possible mating connector is Molex 501330-0500 or 501568-0507.

Table 2-1. 5-Pin USB Connector

Pin Number	Signal
1	VBUS
2	- Data
3	+Data
4	Ground
5	Head Ground

LED CONNECTION

Pin numbers and signal descriptions for the LED connector are listed in Table 2-2. The connector on the cable is Molex 501568-0307. One possible mating connector is Molex 501330-0300.

The LED pins will supply about 3.3 VDC at up to about 10 ma. No current limiting is provided, so the external LED circuit must include an appropriate resistor (402 Ω in the example below) to be consistent with the choosen LED. An example circuit is shown in figure 2-1.

Table 2-2. 3-Pin LED Connector

Pin Number	Signal
1	Green
2	Ground
3	Red

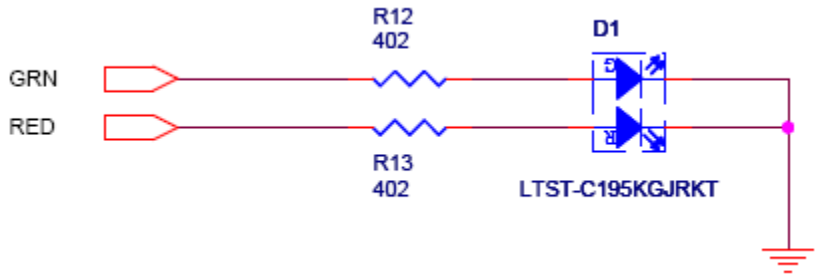

Figure 2-1 Example LED Circuit

SECTION 3. OPERATION

LED INDICATOR

The LED indicator, if equipped, will be either off, red, green, or amber. When the reader is not powered, the LED will be off.

When the reader is first plugged in, the LED will be solid amber. After the reader is plugged in, the host will try to enumerate the reader. Once the reader is enumerated the LED will turn solid green.

Solid green indicates that the reader is either awaiting Authentication (if configured to require Authentication), or armed to read (if configured to NOT require Authentication).

If enabled to operate with authentication (Security Level 4) and when the host completes Authentication successfully, the reader's LED will blink green; the reader is now armed to read a card. If the host fails an Authentication sequence, the LED will turn solid red and stay red until either the host completes Authentication successfully or the reader is powered down.

When a card is being swiped, the LED will turn off temporarily until the swipe is completed. If there are no errors after decoding the card data, then the LED will turn green for approximately two seconds to indicate a successful read. The LED will remain solid green to indicate waiting for the next operation. If there are any errors after decoding the card data, the LED will turn red for approximately two seconds to indicate that an error occurred and then turn solid green to indicate waiting for the next card swipe. The retries can go on indefinitely until a good read.

Anytime the host puts the reader into suspend mode, the LED will turn off. Once the host takes the reader out of suspend mode, the respective LED will return to solid green. Authenticated mode is always ended by a USB suspend.

CARD READ

A card may be swiped through the reader slot when the LED is solid green or flashing green. If there is data encoded on the card, the reader will attempt to read the data, encrypt it, and then send the results to the host via a USB HID input report or, if in Keyboard Emulation mode, as if the data was being typed on a keyboard. After the results are sent to the host, the reader will be ready to read the next card.

APPENDIX A. DRAWINGS

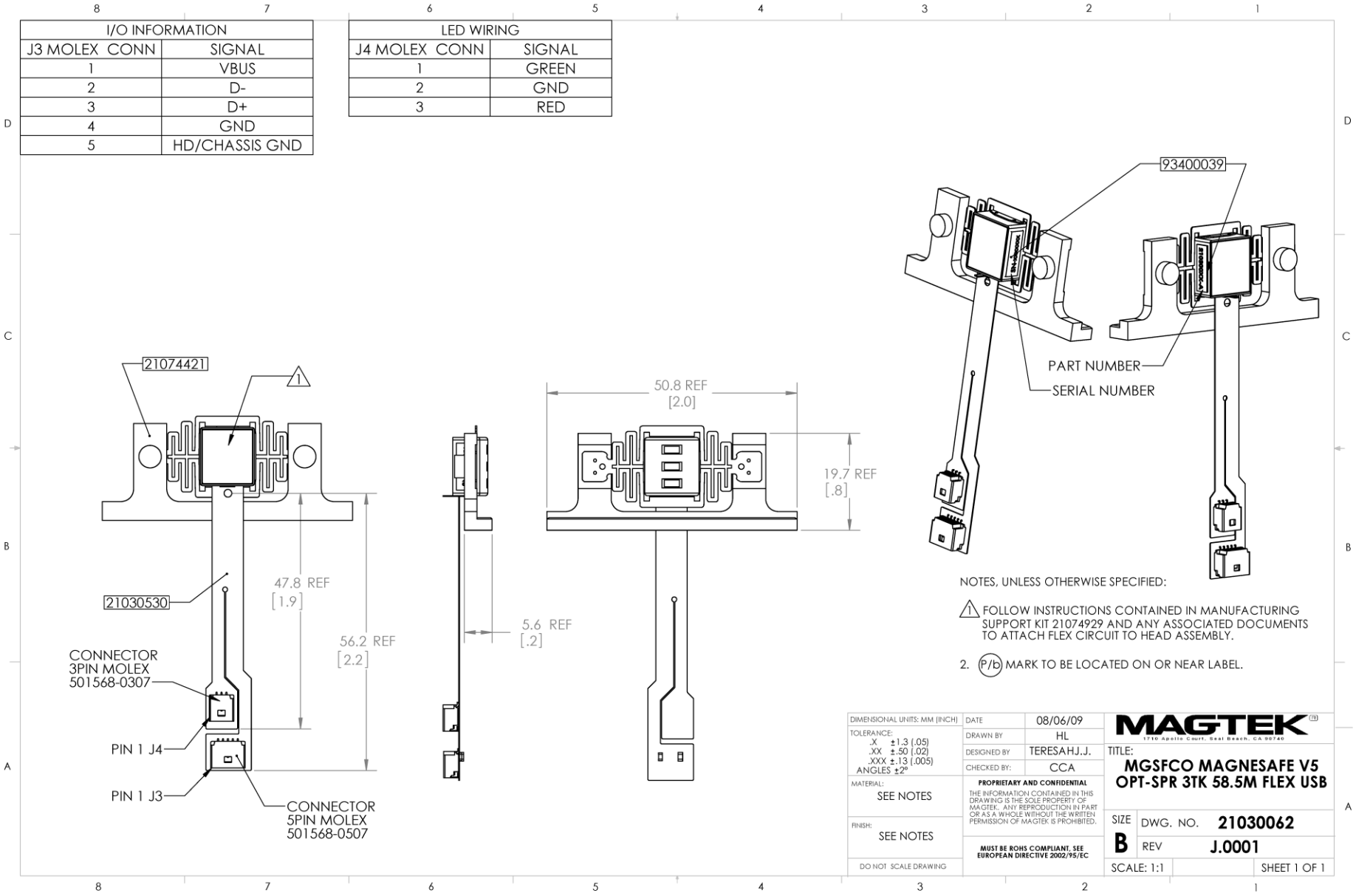

Figure A-1. MagneSafe 3 Track Module with 0.220” base - USB Flex

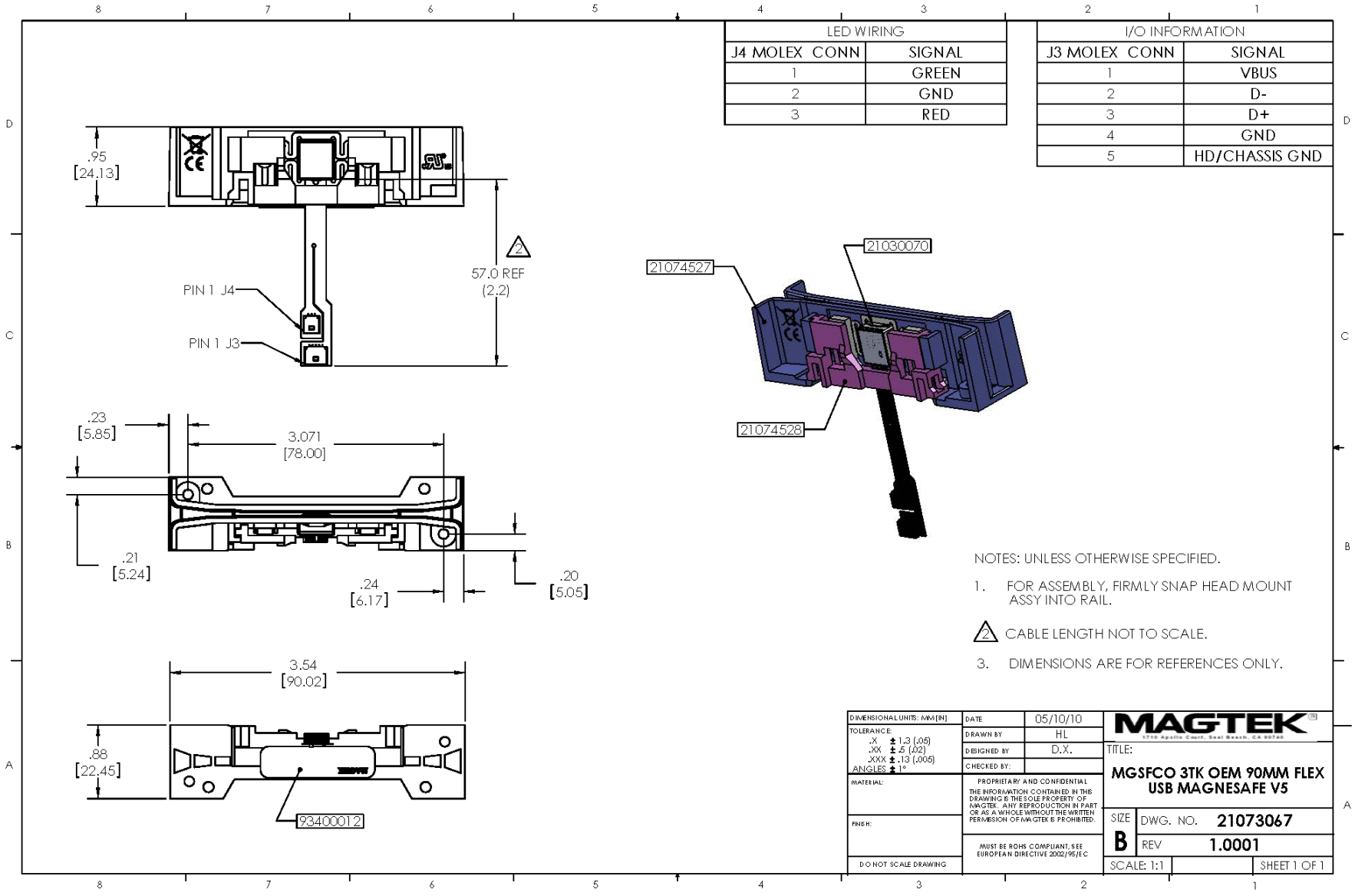

Figure A-2. MagneSafe 3 Track Reader 90mm Body - USB Flex

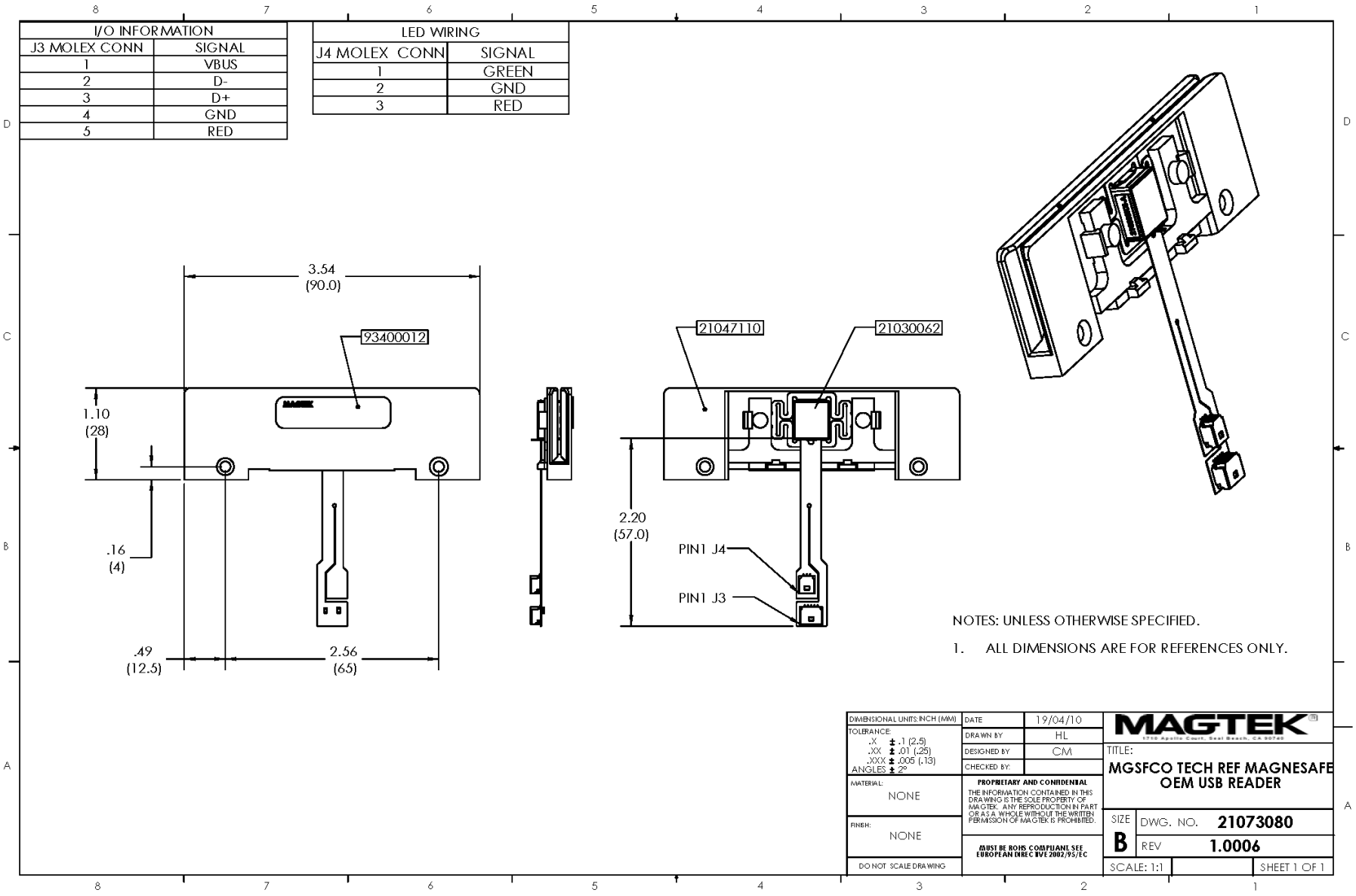

Figure A-3. MagneSafe 3 Track Reader 90mm Slim Rail - USB Flex

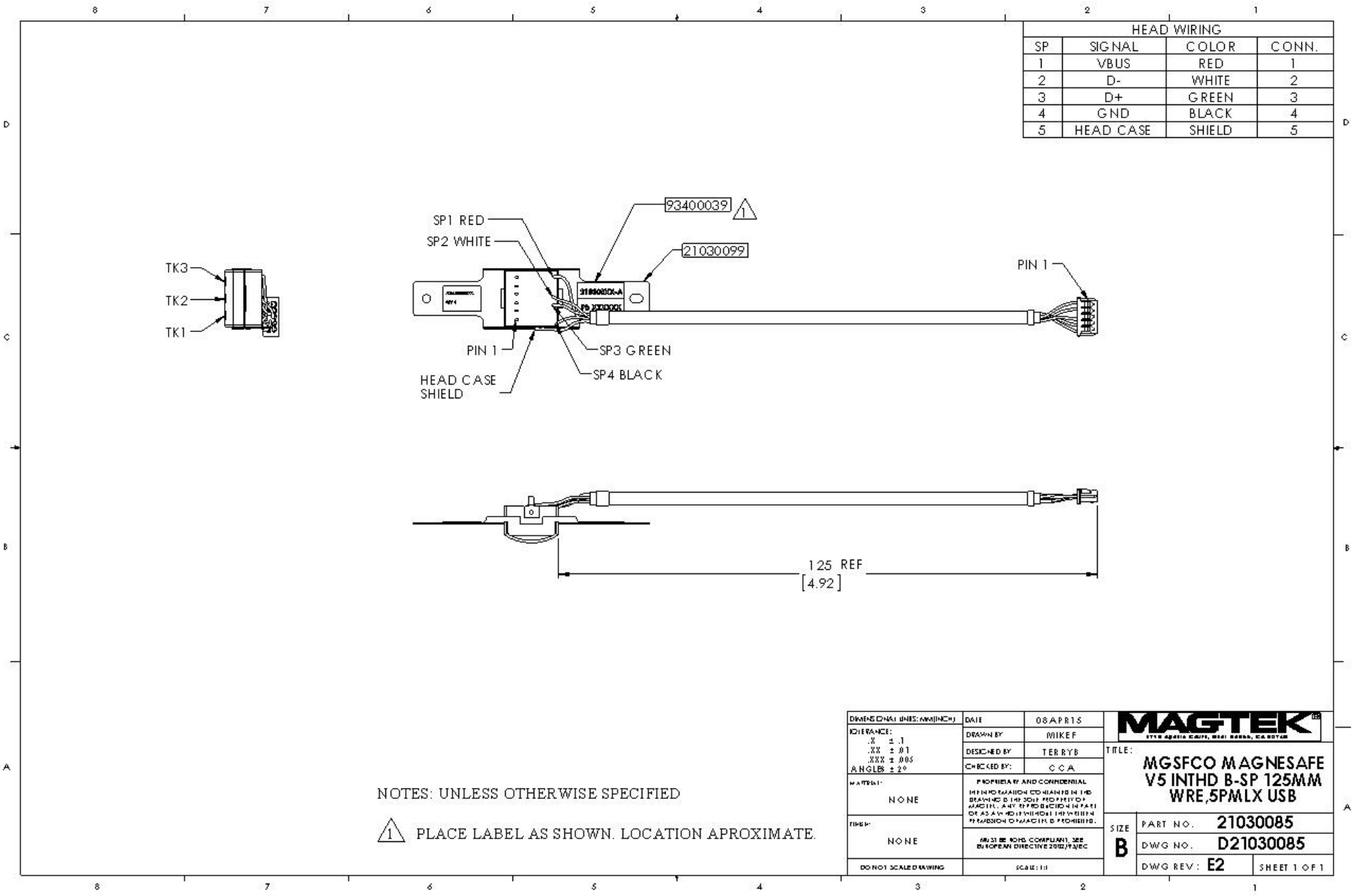

Figure A-4. MagneSafe 3 Track Head- USB

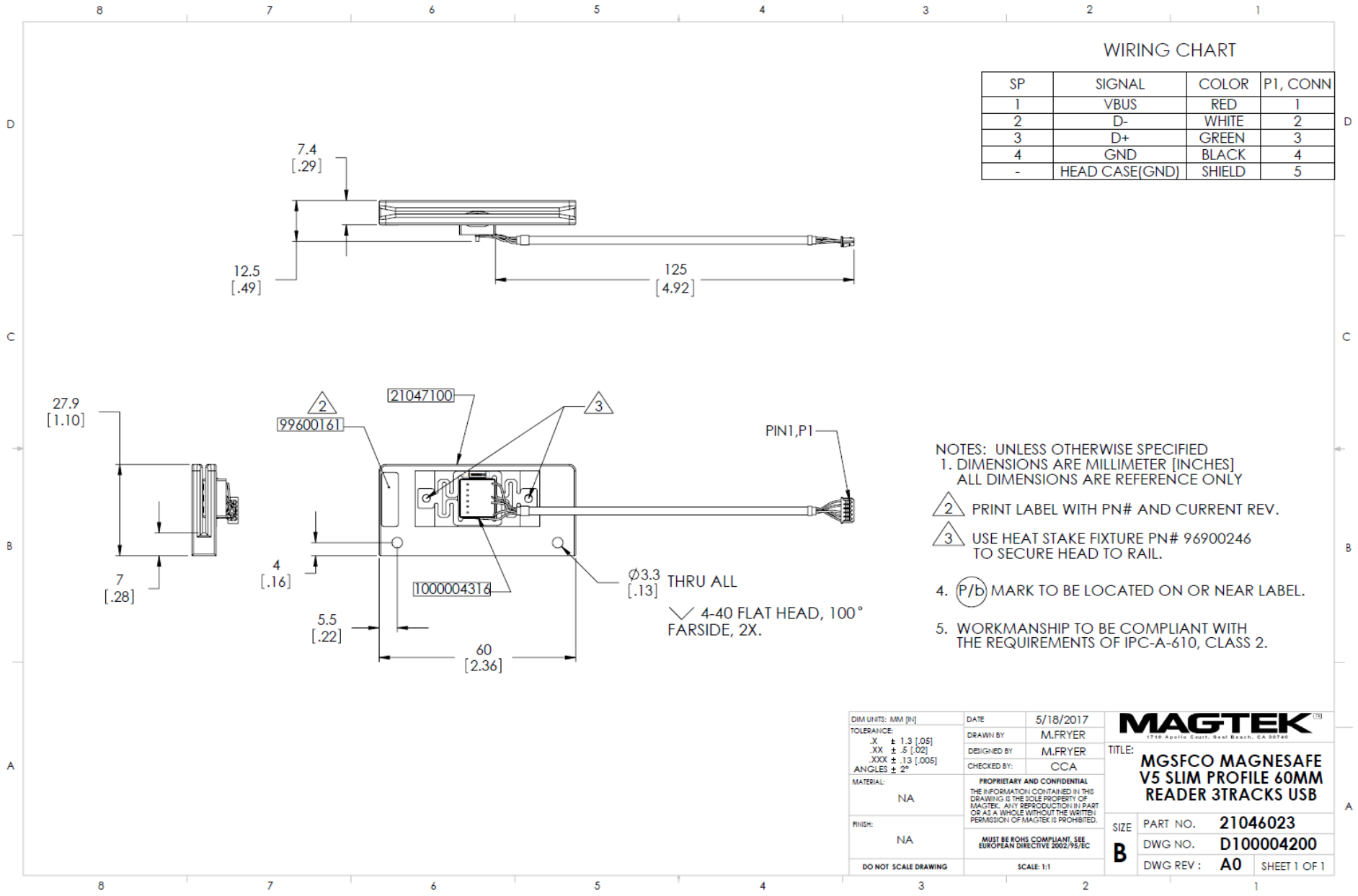

Figure A-5. MGSFCO MAGNESAFE V5 SLIM PROFILE 60MM READER 3TRACKS USB