

ENCRYPTING SPI MAGNESAFE INTELLIHEAD TECHNICAL REFERENCE MANUAL

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REVISIONS

Rev Number	Date	Notes
1.01	7 Jan 08	Preliminary Release
2.01	19 May 08	Added drawings of 21030046 and 21030047. Added commands MP Mode Property and Check MP Noise Property.
3.01	1 Aug 08	Changed the current from 4.5 to 26 mA. Changed the indeterminate time after reset for SDO and DAV from 1 second to 10 ms.
4.01	12 Sept 08	Added 21030050; updated company address; Corrected and added KCV examples.
5.01	12 Dec 08	Added 21030053, corrected Appendix B byte information.
6.01	30 Aug 09	Updated warranty and agency information. Added 21074007, 08 and deleted 21030053.
7.01	15 Dec 09	Removed obsolete readers and added 21030055, 21030058, 21073056, 21073061, and 21073076;.moved communication sections to 99875459
8.01	14 Jul 10	Removed 21030058 and 21073061; added 21030060 & 21030066; updated high temperature range to 85°C
9.01	20 Dec 11	Added 21074020 and 21074021
10.01	16 July 12	Added SPI Interface signals to Table 1-2
11.01	5 June 13	Under Features Changed From "Maximum SPI bus transfer rate of 100 Kbits/Second" to 600
12.01	30 Oct 13	Added 21073156

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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 Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

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

Cet appareil numérique de la classe B est conforme 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 ().

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SECTION 1. FEATURES AND SPECIFICATIONS

The Encrypting SPI MagneSafe IntelliHead™ provides secure three-track magstripe reading capabilities and MagnePrint data for use in POS terminals and other applications where system requirements dictate the need for improved security to meet PCI (Payment Card Industry) requirements. The readers incorporate the MagTek *MagnePrint ASIC*. The serial output from the MagnePrint ASIC is encrypted before it leaves the encapsulated head to ensure the same level of security applied to other types of financial transactions.

This family of Encrypting MagneSafe IntelliHead Readers utilizes TDEA (a.k.a. Triple-DES) encryption with a unique key per device to encrypt the magnetic track information. The Encrypting IntelliHeads are available in a variety of spring and beam arrangements for both swipe and insert reader configurations. The three-track heads conform to ISO and AAMVA standards.

The SPI (Serial Peripheral Interface) is a synchronous full-duplex serial bus used for communication between the Reader and the target system.

FEATURES

Major features of the Encrypting IntelliHead include:

- 3-Track head
- Bi-directional card reading
- Reads up to three tracks of card data that meets ANSI/ISO/AAMVA/JIS standards
- Reads MagnePrint data
- All electronics are potted inside the head to prevent tampering
- Includes Key Serial Number
- All card data from the MagnePrint ASIC is encrypted using TDEA prior to transmission (the data is not decoded or formatted prior to encryption)
- Uses a unique double-length DES key per device
- SPI bus compatible 2 to 5 wire serial interface
- Maximum SPI bus transfer rate of 600 Kbits/Second

CONFIGURATIONS

The reader configurations are as follows:

Part Number	Description	Cable Length and Connector Type	For use with
21030055	MagneSafe Swipe Assembly	150mm, 8-pin Molex 51021*	MagneSafe Swipe Reader Rail (full base)
21030060	MagneSafe Swipe Assembly	57mm, 8-pin Molex 51021	MagneSafe Swipe Reader Rail (narrow base)
21030066	MagneSafe Swipe Assembly	45mm, 10-pin Molex 51021	MagneSafe Swipe Reader Rail (narrow base)
21073056	70mm MagneSafe Rail	150mm, 8-pin Molex 51021	Swipe Readers
21073076	70mm MagneSafe Rail	57mm, 8-pin Molex 51021	Swipe Readers
21073156	70mm MagneSafe Rail	150mm, 8-pin Molex 51021	Swipe Readers
21074020	110mm MagneSafe Rail	110mm Flex Cable	Encrypting Head
21074021	60mm MagneSafe Rail	60mm Flex Cable	Encrypting Head

* The connector family is Molex 51021-0800 which mates with a number of housings in the Molex product line (e.g., 51047, 53047, 53048, 53261, and 53398); 21030066 uses 51021-1000.

REFERENCE DOCUMENTS

Communication Reference Manual for Encrypting MagneSafe IntelliHead, P/N 99875459
MagnePrint Card Reader Design Kit Technical Specification, P/N 99821003

SPECIFICATIONS

Table 1-2 lists the specifications for the Encrypting SPI MagneSafe IntelliHead products.

Table 1-2. Specifications

Reference Standards	ISO 7810 and ISO 7811; AAMVA ¹
Message Format	Bit serial
Card Speed	5 to 60 ips (10.1 to 152.4 cm/s)
Flammability	Meets UL94V-0
ELECTRICAL	
Voltage	3.0-3.6 VDC
Current	26 mA nominal when idle ² 45 mA maximum when active
SCL, SDI & /CS Input Signals	Input High Voltage: 2.0 V min Input Low Voltage: 0.8 V max
SDO & DAV Output Signals	Output High Voltage: Vin – 0.7 V min at I _{OH} = -3 mA Vin – 0.1 V min at I _{OH} = -10 uA Vin – 0.8 V typ at I _{OH} = -10 mA Output Low Voltage: 0.6 V max at I _{OL} = 8.5 mA 0.1 V max at I _{OL} = 10 uA 1.0 V typ at I _{OL} = 25 mA
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

- 1 ISO (International Standards Organization) and AAMVA (American Association of Motor Vehicle Administrators)
- 2 The device is idle when no card is being swiped and no SPI commands are being processed, otherwise it is active. The device is idle most of the time.

APPENDIX A. GLOSSARY OF TERMS

Term	Description
AAMVA	American Association for Motor Vehicle Administration
ANS	American National Standards
ASIC	Application Specific Integrated Circuit
DES	Data Encryption Standard
ips	Inches per second
ISO	International Standards Organization
JIS	Japanese Industry Standard
mA	Milliampere
SPI	Serial Peripheral Interface
TDEA	Triple Data Encryption Algorithm
VDC	Volts Direct Current

APPENDIX B. DRAWINGS

This section contains the drawings showing the mechanical dimensions and wiring connections of the Encrypting SPI IntelliHead models.

The following drawings are included:

- 21030055 Drawing and Wiring Connections for the MagneSafe Assembly with 150mm cable and 8-pin Molex connector on full rail
- 21030060 Drawing and Wiring Connections for the MagneSafe Assembly with 57mm cable and 8-pin Molex connector on narrow rail
- 21030066 Drawing and Wiring Connections for the MagneSafe Assembly with 45mm cable and 10-pin Molex connector on narrow rail
- 21073056 Drawing and Wiring Connections for the 70mm Rail with 150mm cable & 8-pin connector
- 21073076 Drawing and Wiring Connections for the 70mm Rail with 57mm cable & 8-pin connector
- 21073156 Drawing and Wiring Connections for the 70mm Rail with 150mm cable & 8-pin connector, Noise Filtering
- 21074020 Drawing and Wiring Connections for the 110mm Rail with Flex cable
- 21074021 Drawing and Wiring Connections for the 60mm Rail with Flex cable

Encrypting SPI IntelliHead

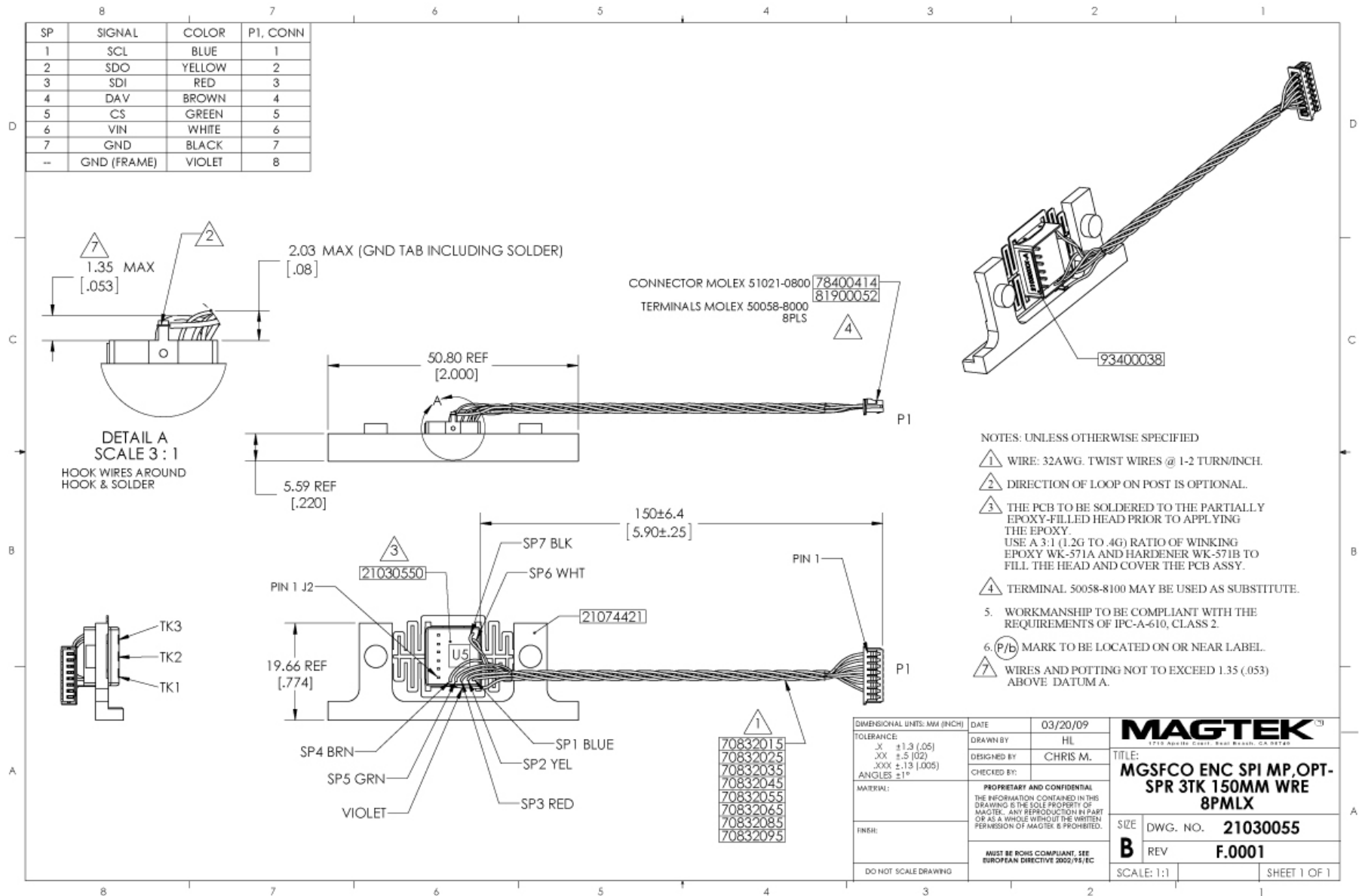


Figure B-1. Encrypting SPI MagnePrint module with 150mm cable & 8-pin connector

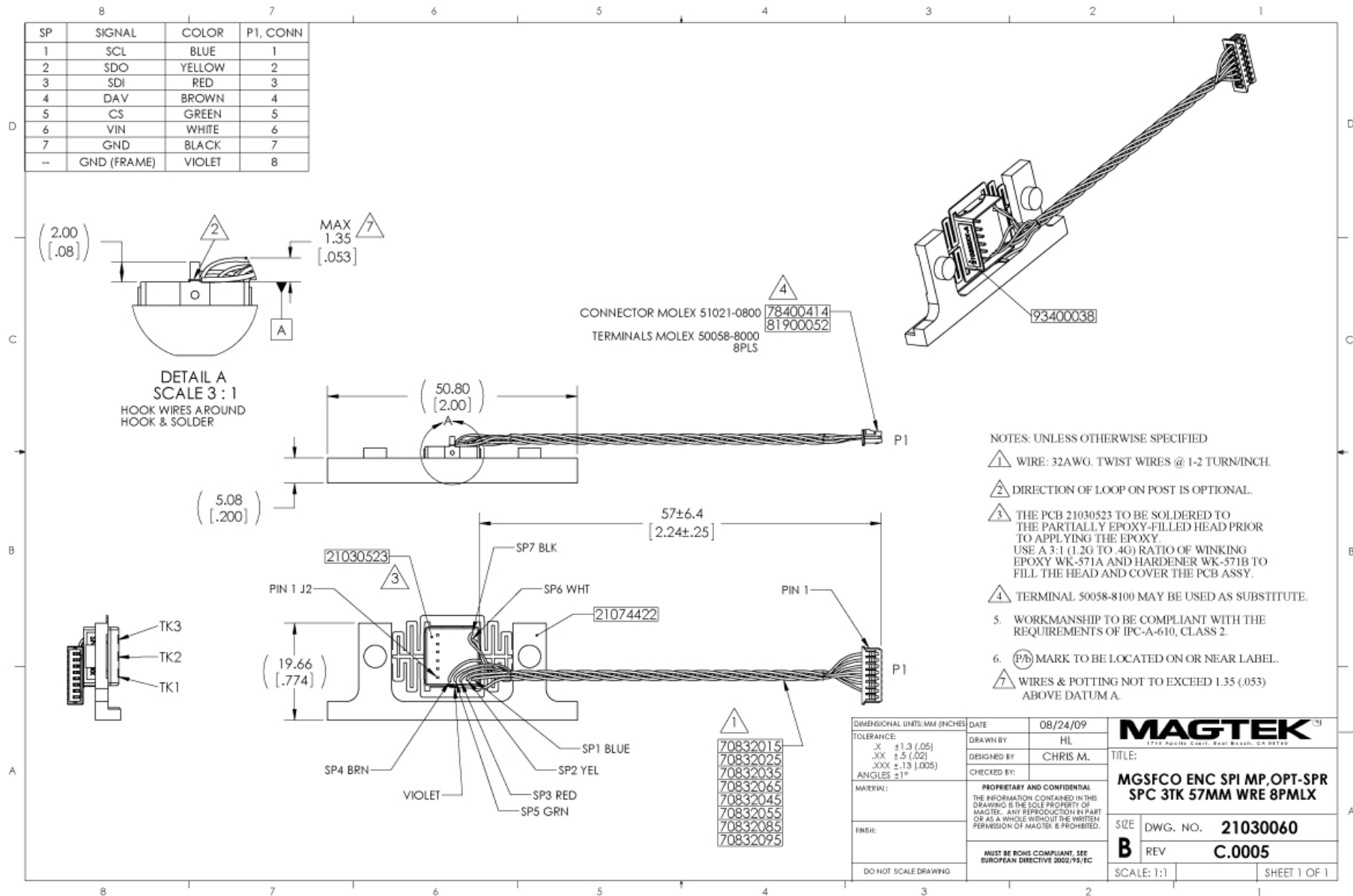


Figure B-2. Encrypting SPI MagnePrint rail with 57mm cable & 8-pin connector

Encrypting SPI IntelliHead

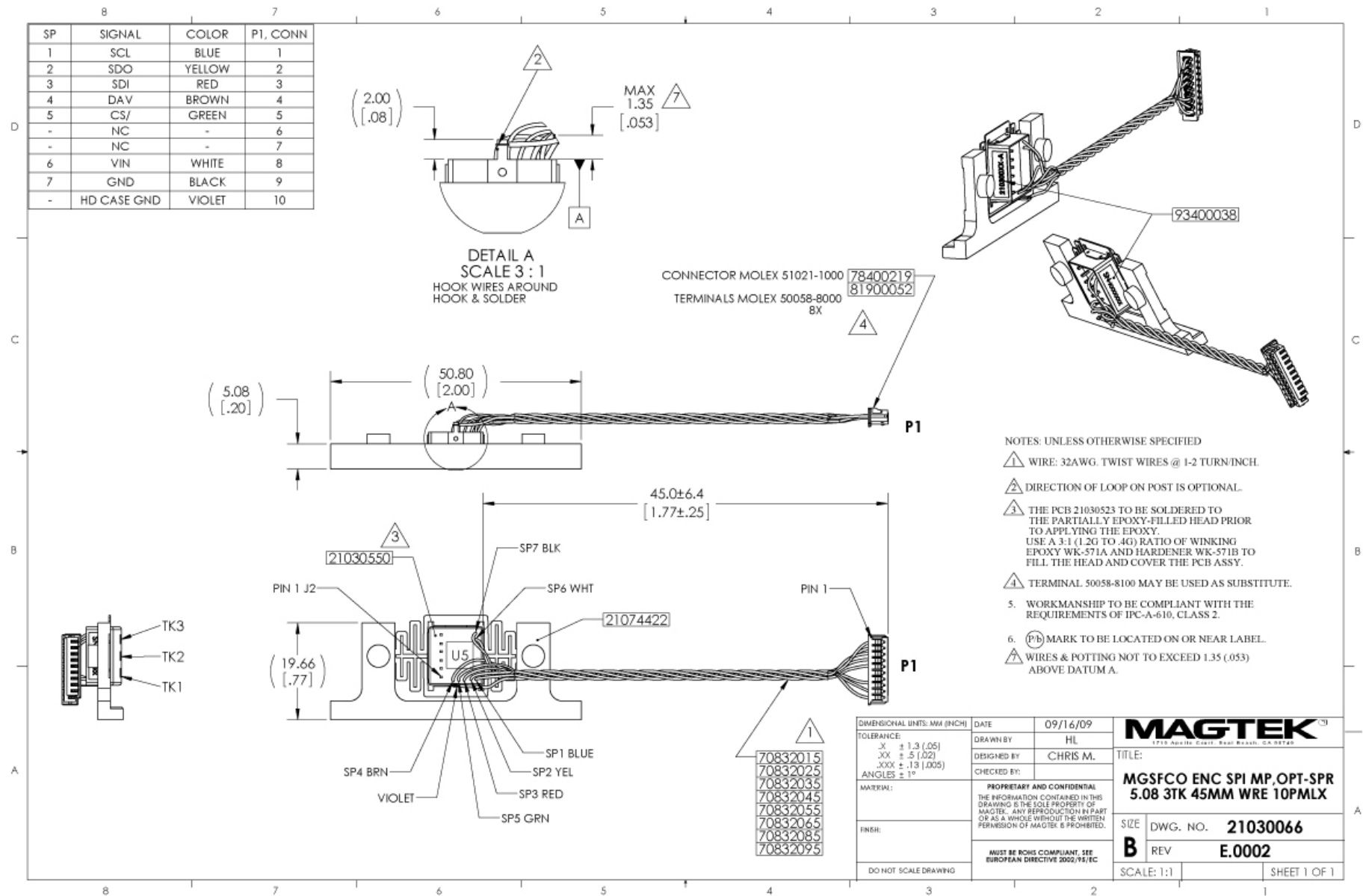


Figure B-3. Encrypting SPI 70mm MagnePrint rail with 150mm cable & 8-pin connector

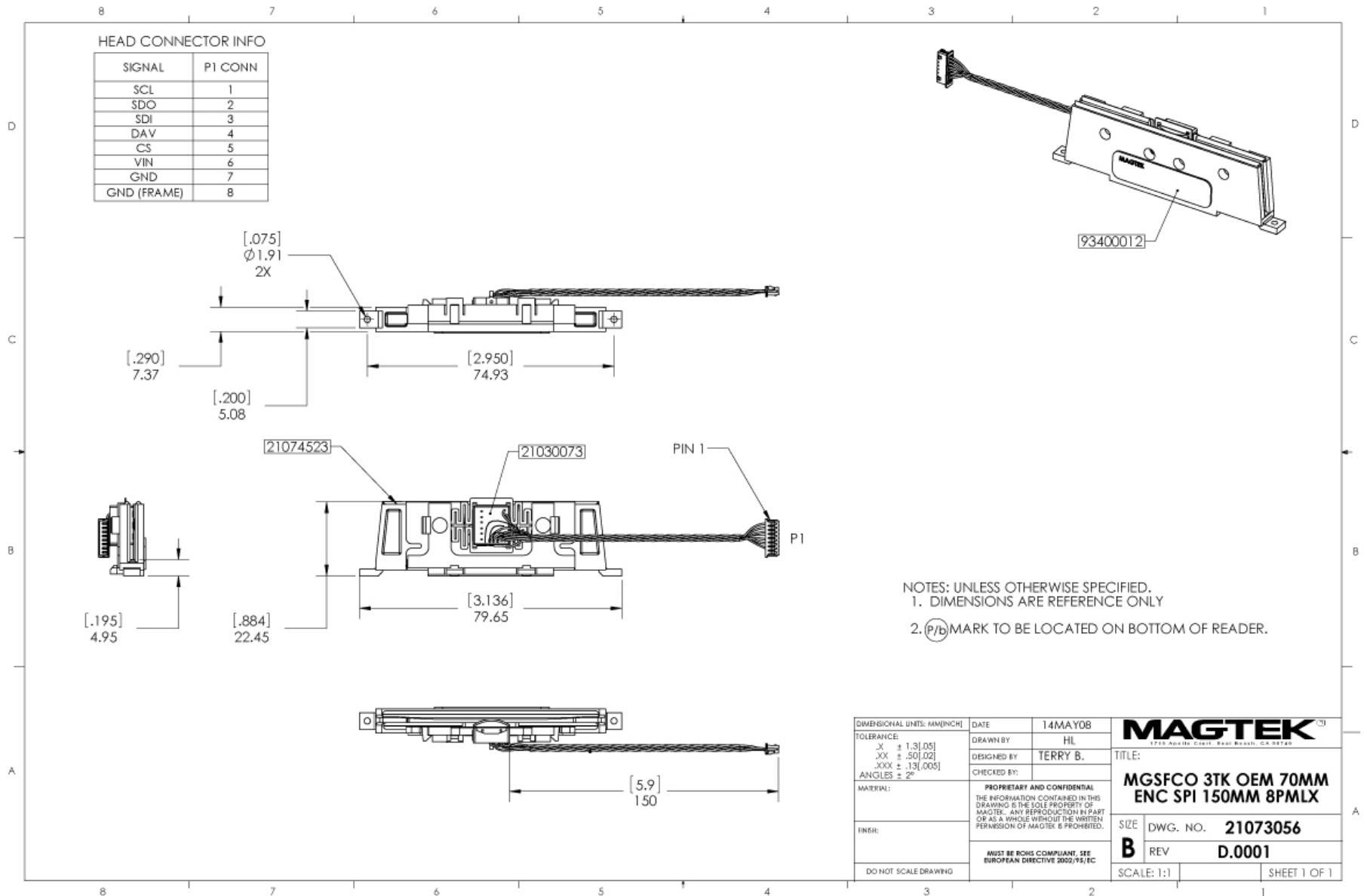


Figure B-4. Encrypting SPI MagnePrint Rail with 45mm cable & 10-pin connector

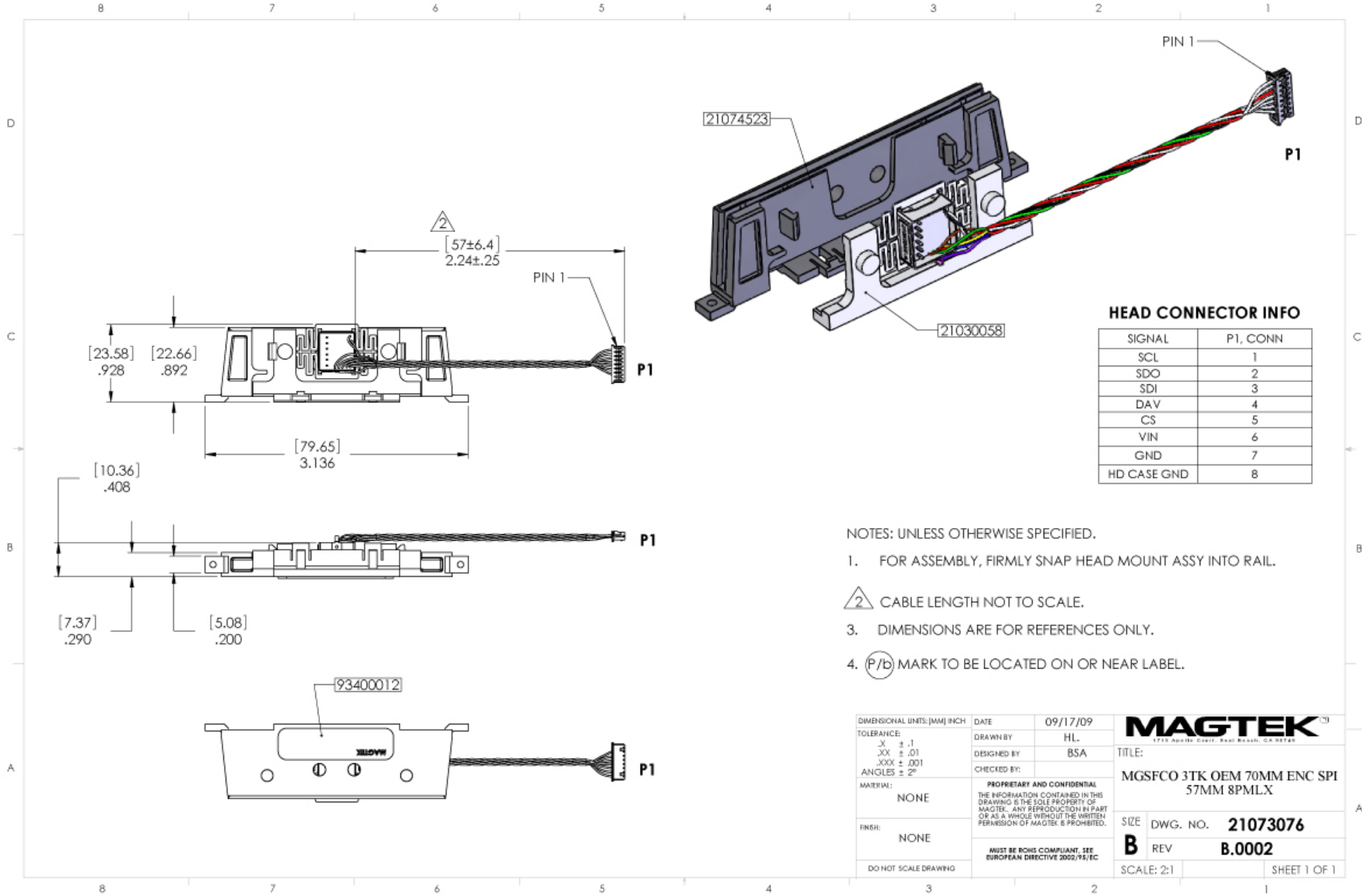


Figure B-5. Encrypting SPI 70mm MagnePrint rail with 57mm cable & 8-pin connector

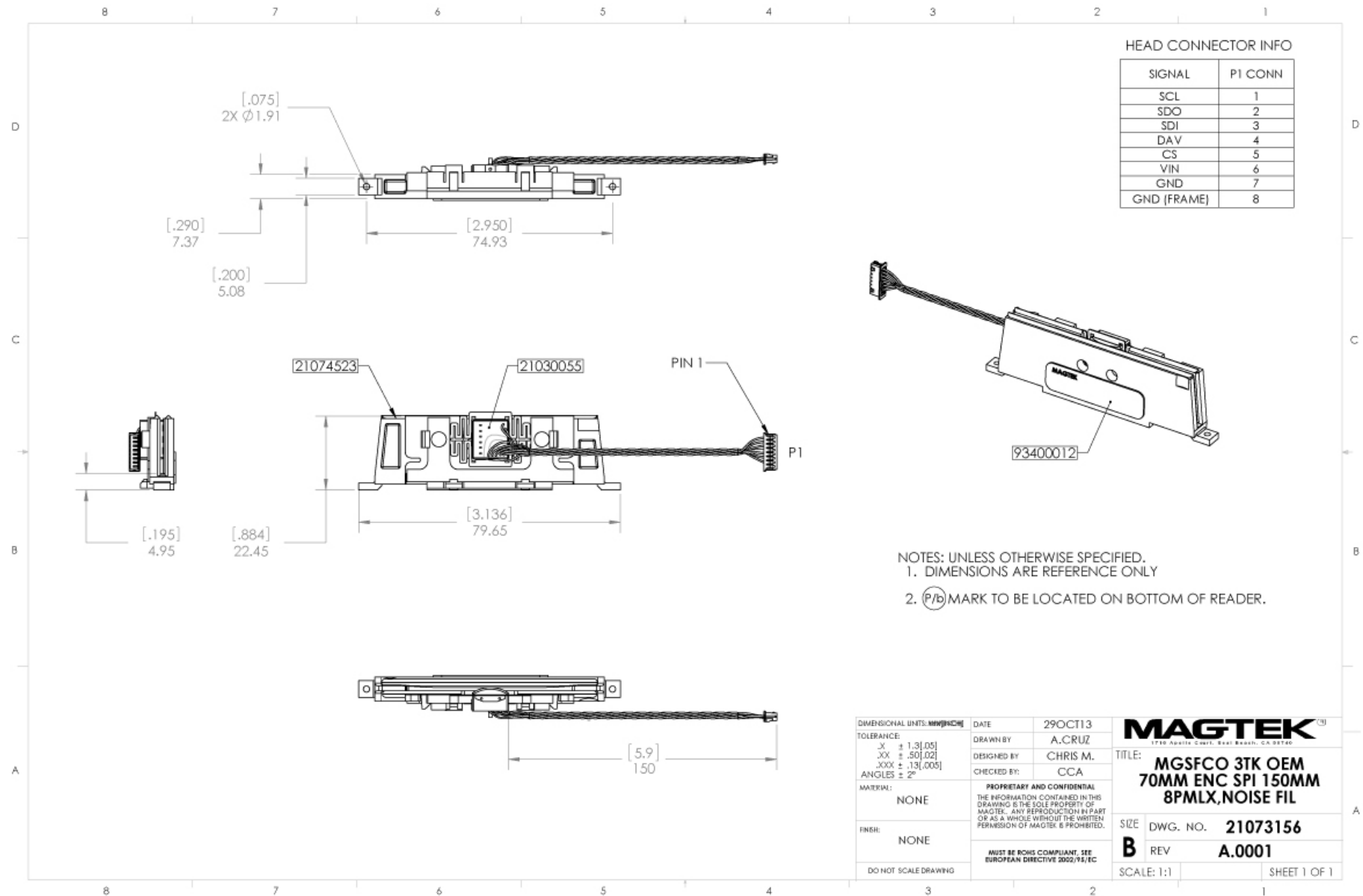


Figure B-6. Encrypting SPI MagnePrint Rail with 45mm cable & 10-pin connector & noise filtering

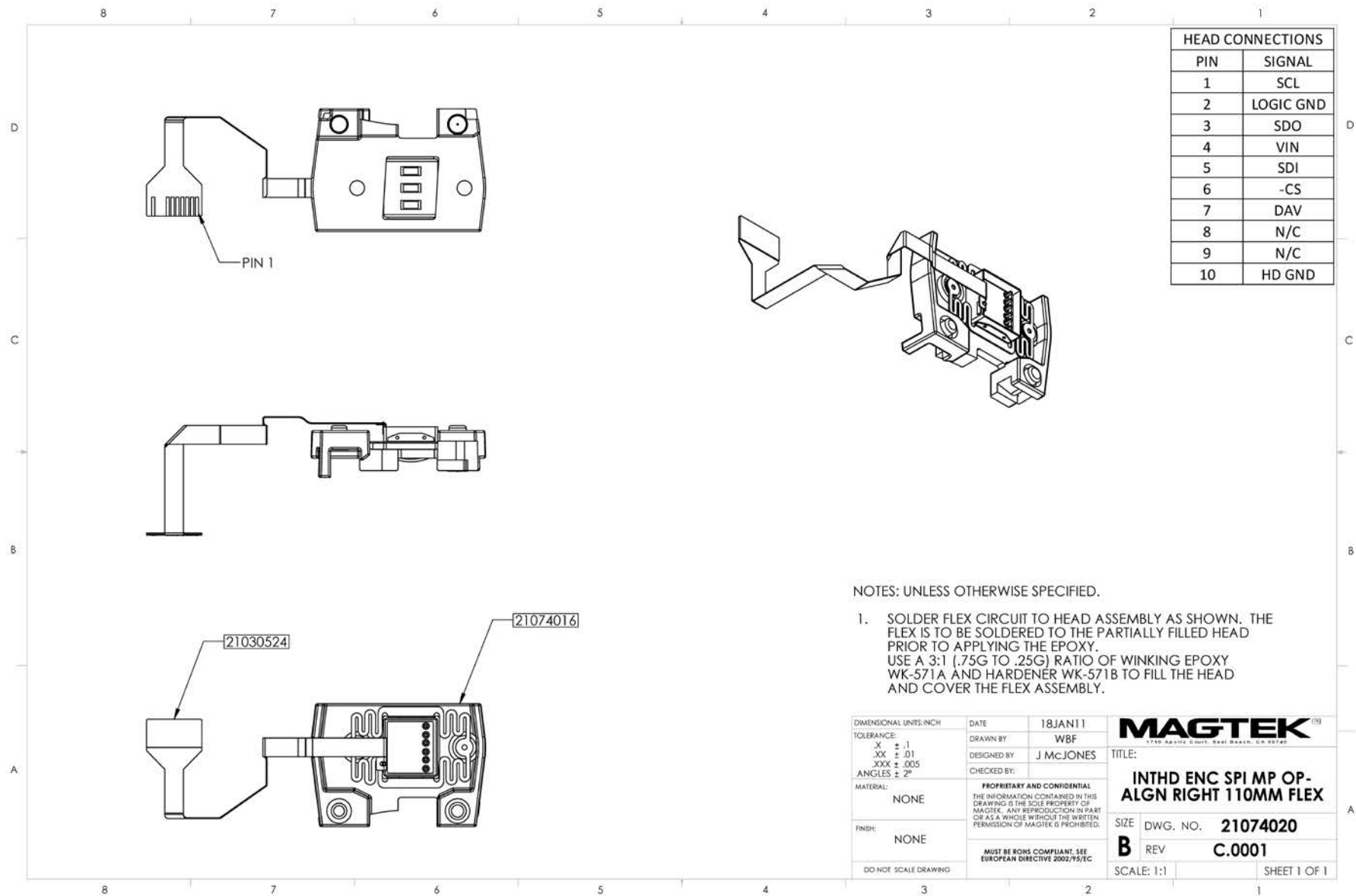


Figure B-7. Encrypting SPI 110mm MagnePrint rail with Flex cable

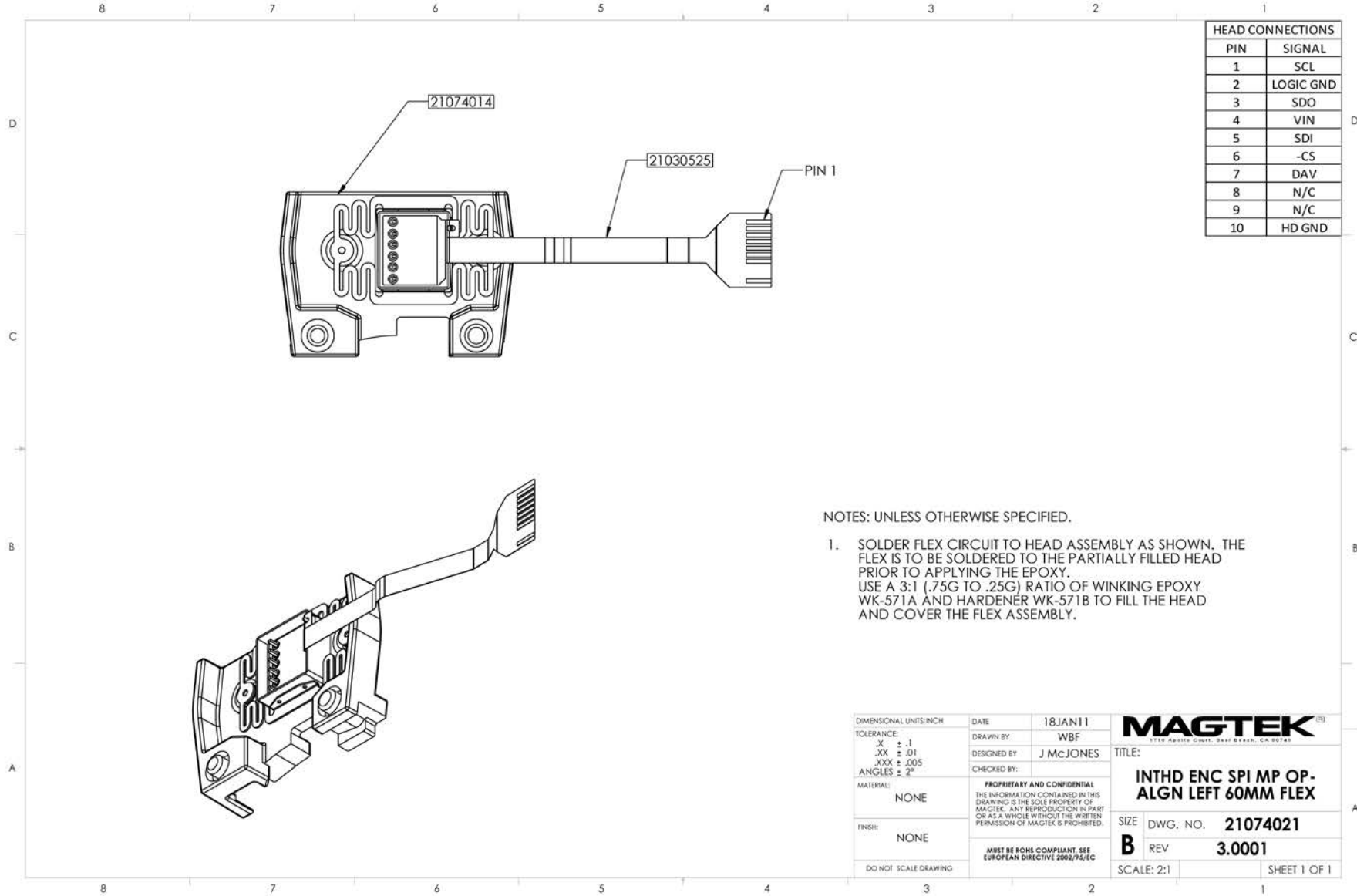


Figure B-8. Encrypting SPI 60mm MagnePrint rail with Flex cable