MODEL MT-215 TTL
SINGLE OR DUAL HEAD
INSERTION READER
TECHNICAL REFERENCE MANUAL

Manual Part Number 99875113 Rev 12

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MAGTEK®

REGISTERED TO ISO 9001:2000

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REVISIONS

Rev Number	Date	Notes
1	31 Aug 98	Initial Release
2	9 Dec 98	Section 1, changed specifications, changed Fig 1-1 to reflect current configurations. Section 2, changed Figures 2-1 and 2-2 to reflect current configuration. Changed Figure 2-4 for clarity.
3	2 Feb 99	Added P/N 21065113 with 9-Pin connector.
4	12 Jul 00	Title: Added "Single or"; Sec 1, Specifications, Changed Bezel Thickness from .31' to .31", changed Operating Temperature from -26°F to -22°F
5	14 Sep 00	Section 1: Specifications, changed all cm dimensions to mm. Written to *SI, International System of Units*.
6	01 Jan 01	Front Matter: Changed copyright date; Changed warranty from 90 days to one year; added agencies to Agency Approvals
7	15 Mar 01	Front Matter: Added Address for Warranty RMA. Changed Agency approvals to Class B. Section 2: Fig 2-1, Added to Back View “of Bezel”. Added Appendix A, Bezel Design.
8	01 Aug 01	Front Matter, Agency Page: Editorial Changes to CE and UL/CUL.
9	27 Nov 01	Sec 2, Fig 2-2: Added extended bezel illustration. Appendix A: Added extended bezel mechanical drawing
10	12 Jul 02	Sec 1: Change second paragraph for conforming specifications. Configurations, added 3 more. Added MagTek documents. Spec, added dielectric strength and insulation resistance. Sec 2: Added Fig 2-5, Timing with relevant insertion and withdrawal statement.
11	13 May 03	Front Matter: added ISO line to logo, changed Tech Support phone number, added new warranty statement.
12	5 Jun 06	Updated to reflect new PCB assembly 21063548 which incorporates Delta ASIC

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FCC WARNING STATEMENT

This equipment has been tested and found to comply with the limits for 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 to 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 for 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 las classe B prescrites dans le Réglement sur le brouillage radioélectrique édicté par les ministère des Communications du Canada.

CE STANDARDS

Testing for compliance to CE and FCC requirements was performed by an independent laboratory. The unit under test was found compliant to Class B.

UL/CSA

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

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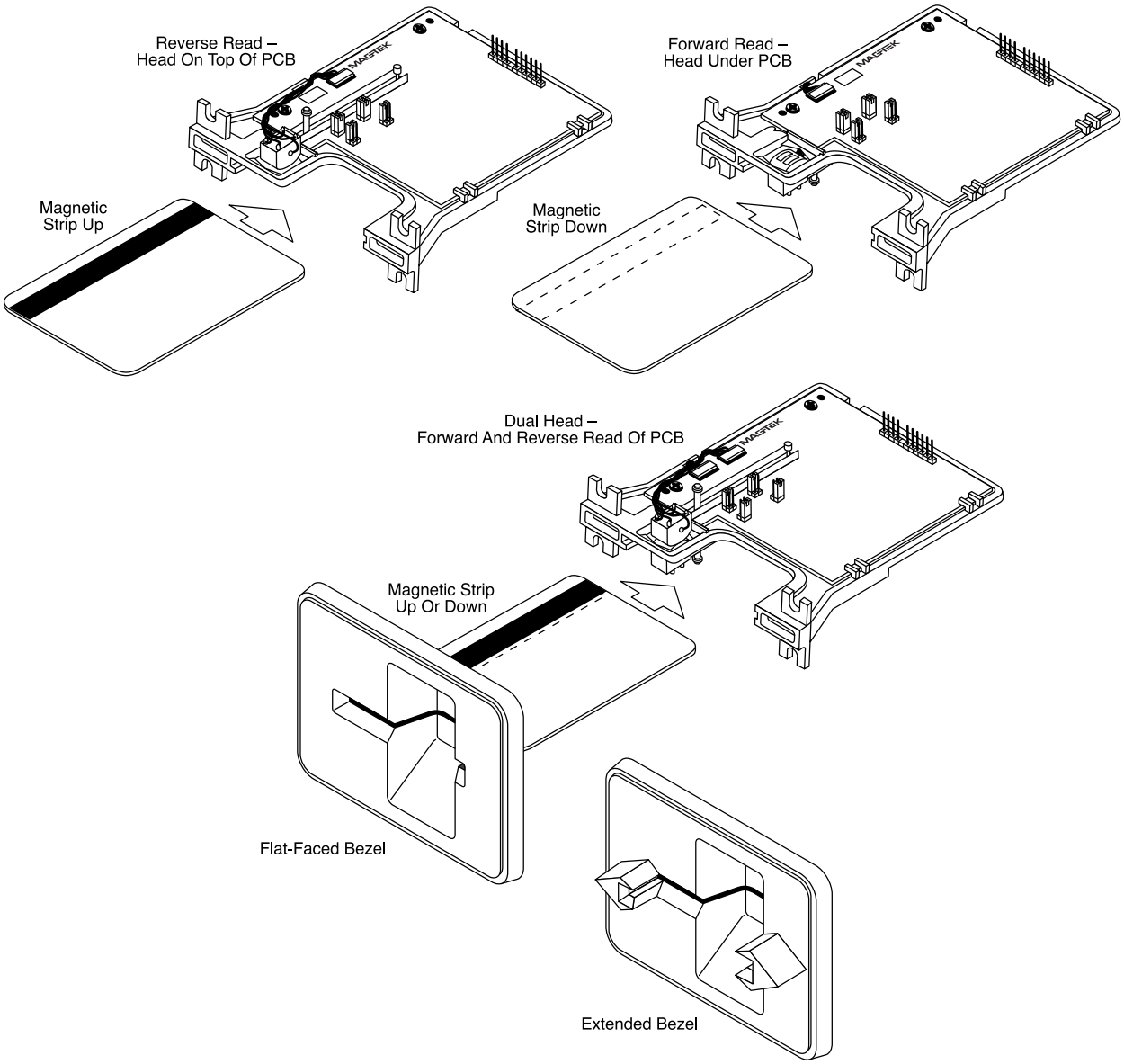


Figure 1-1. MT-215 TTL Insertion Reader Configurations

SECTION 1. FEATURES AND SPECIFICATIONS

The Model MT-215 TTL is a manually operated two-track insertion, or push-in, Reader, which may have one or two read heads. Three configurations of the head(s) and two bezel configurations are shown in Figure 1-1. The Reader can read the magnetic stripe in both the forward and reverse directions.

The Reader conforms to the following specifications: ISO (International Standards Organization), ANSI (American National Standards Institute); the Reader conforms to the specifications for Tracks 1 and 2 of the following 3-Track format: AAMVA (American Association of American Motor Vehicle Administrators).

FEATURES

Features of the Reader are as follows:

- **Dual Read Head** - allows for easier card orientation when inserted into the Reader.
- **Open Chassis design** - provides superior debris clearing capability.
- **Half-card Drop out** - allows half-sized credit cards to clear from insert channel.
- **Isolated PCB** - isolates electronics from debris and liquids.
- **AGC (Automatic Gain Control) in MagTek's latest F/2F decoder IC** - enhances read performance with less susceptibility to RF interference.
- **Beam-mounted Read-heads** - improves card tracking capabilities.
- **Ruggedized Chassis and Bezel Material** - improves temperature and impact performance.

CONFIGURATIONS

Table 1-1 lists the part numbers, head mounted position, bezel type, and forward or reverse read.

Table 1-1. Configurations - Tracks 1 and 2

Part Number	Head Mounted Under or on Top of PCB	Bezel	Read Forward or Reverse*
21065101	Under PCB	None	Forward Read
21065102	On Top of PCB	None	Reverse Read
21065103	Under PCB	Flat Faced	Forward Read
21065104	On Top of PCB	Flat Faced	Reverse Read
21065105	Both	None	Both
21065106	Both	Extended	Both
21065109	Both	Flat Faced	Both
21065111	Under PCB	Extended	Forward Read
21065112	On Top of PCB	Extended	Reverse Read
21065113	Both	None	Both

* For forward read the start sentinel is read first on withdrawal; for reverse read the start sentinel is read last on withdrawal.

RELATED DOCUMENTS

The MT-215 will read cards that meet the standards defined by ISO (International Standards Organization):

ISO 7811 Identification Cards - Mag-stripe Cards, Tracks 1-3
ISO 7810 Identification Cards - Physical Specifications (ID-1 Cards)

Available from ANSI: 212-642-4900, www.ansi.org

MAGTEK DOCUMENTS

I/O Interface, For TTL Swipe Readers, Technical Reference Manual, MagTek P/N 99875148

SPECIFICATIONS

The specifications for the Reader are listed in Table 1-2.

Table 1-2. Specifications

OPERATING			
MSR Read-data Format Specifications Supported	ANSI/ISO/AAMVA 75 or 210 BPI on Track 1 (normally 210 BPI) ANSI/ISO/AAMVA 75 or 210 BPI on Track 2 (normally 75 BPI)		
Power Requirements (VCC)	Old Design (PCB Assy 21063528) +5 VDC ±5% at 15mA	New Design (PCBA 21063548) 2.8 – 5.5 VDC at 15ma	
Output Signal Levels	V_{ol} = 0.4 V @ 1.5 mA V_{oh} = Vcc -0.5 V @ 2.0 mA		
Recording Method	Two-frequency coherent phase (F2F)		
Speed	Card Speed: 3 to 50 IPS		
Head Life	1,000,000 passes (500,000 Insertion Cycles) minimum		
I/O Connector	For P/N 21065113, 9-Pin Header, 0.100" centers, single in line For all others, 11-pin Header, 0.100" centers, single in line		
MECHANICAL			
Dimensions	Without bezel	With Flat-faced Bezel	With Extended Bezel
Length	4.4" (111.76 mm)	4.58" (116.33 mm)	5.09" (129.29 mm)
Width	3.51" (89.15 mm)	4.00" (101.60 mm)	4.00" (101.60 mm)
Height	1.24" (31.50 mm)	3.00" (76.2 mm)	3.00" (76.2 mm)
Bezel Thickness	Flat Faced: 0.31" (7.87 mm); Extended: 0.82" (20.83 mm)		
Weight	Without bezel 2.25 oz. (65 gr.)	With Flat-faced Bezel 3.85 oz. (109 gr.)	With Extended Bezel 4.02 oz. (114 gr.)
ENVIRONMENTAL			
Temperature			
Operating	-22 °F to 158 °F (-30 °C to 70 °C)		
Storage	-40 °F to 176 °F (-40 °C to 80 °C)		
Humidity			
Operating	10% to 90% noncondensing		
Storage	10% to 90% noncondensing		
Altitude			
Operating	0-10,000 ft. (0-3,048 m)		
Storage	0-50,000 ft. (0-15,240 m)		

SECTION 2. INSTALLATION

This section describes cabling information, mounting dimensions and timing.

PIN LIST AND CONNECTORS

Table 2-1 lists the connector pins and the required mating Connector.

Table 2-1. J3 Pin List

Pin Number	TK 1, 2
1	Rear Sensor
2	Data TK 2
3	Card Present
4	Strobe TK 2
5	No Connection (Index Pin)
6	VCC
7	GND
8	Strobe TK 1
9	Data TK 1
10	No Connection
11	No Connection

Mating Connector*: Molex 22-01-2091 or 22-01-2111 (recommended for keying purposes)
*Molex Terminals 08-50-0114; Molex Key 15-04-9209

MagTek P/N 21065113 uses a 9-Pin connector with the same signals with pins 10 and 11 removed

MOUNTING

Figure 2-1 shows the dimensions for mounting when using a flat-faced MagTek Bezel. Figure 2-2 shows the dimensions for mounting when using an extended MagTek Bezel. In these configurations, the top view and the side view show the head mounted under the PCB with connector J2 used.

The other head configurations are shown in Figure 1-1.

Note

For users who are interested in designing their own bezel, please refer to the dimensions provided in Appendix A.

Figure 2-3 shows the board layout and indicates the cable connections for all head positions.

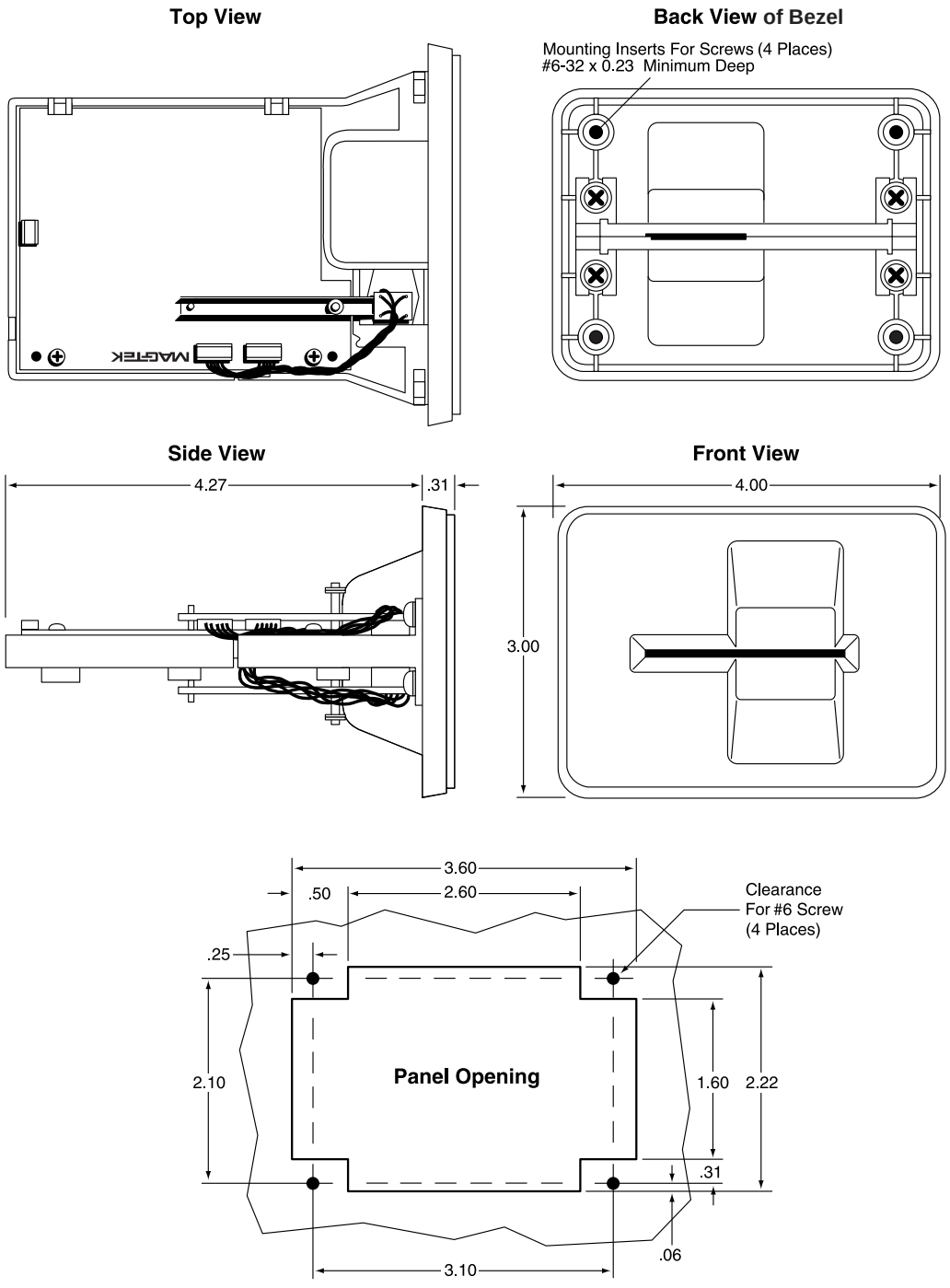


Figure 2-1. MagTek Flat-Faced Bezel Mounting Dimensions

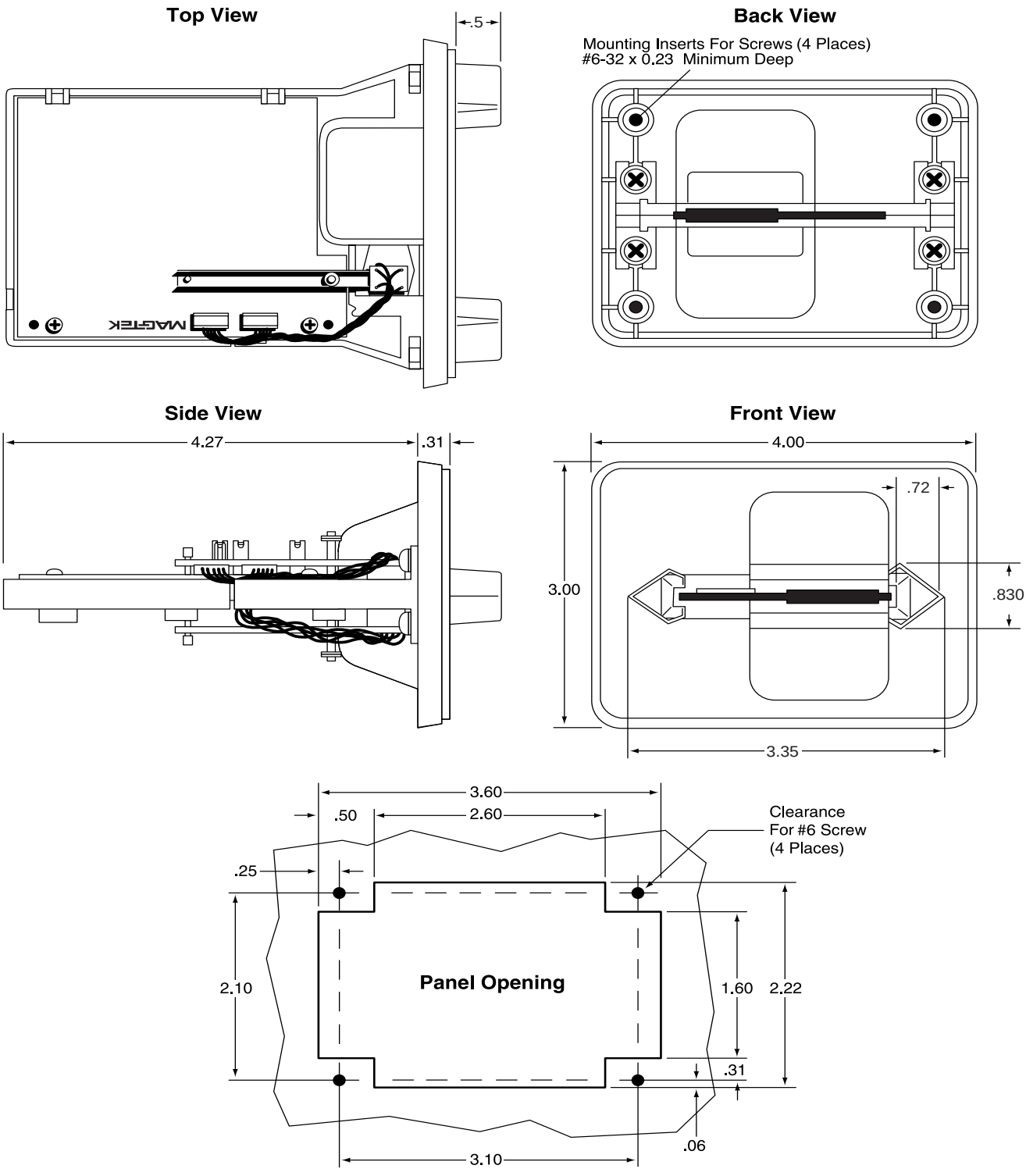


Figure 2-2. MagTek Extended Bezel Mounting Dimensions

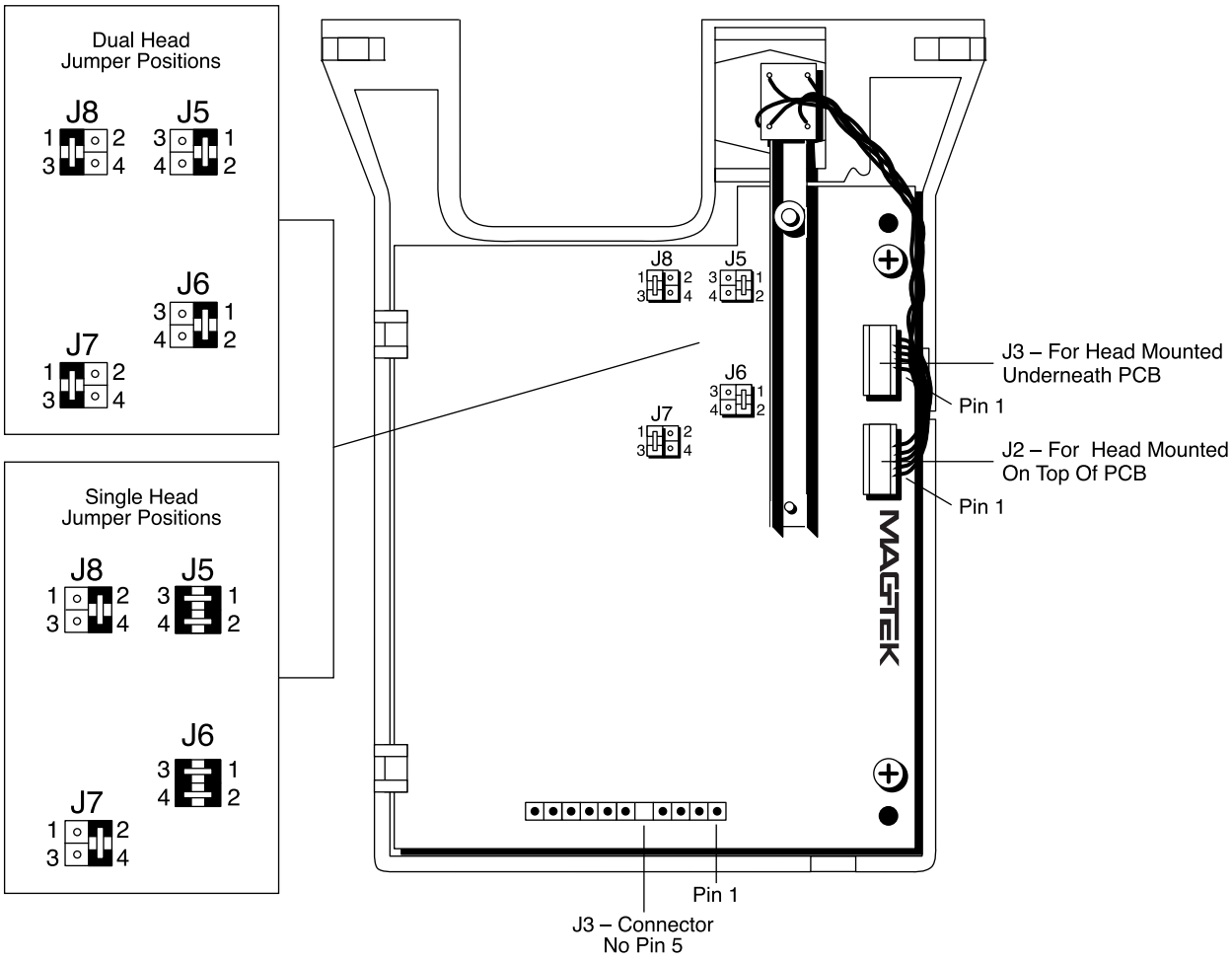


Figure 2-3. Board Layout and Cable Connections

Note

*The jumpers shown in Figure 2-3 are used only on the **old** PCB assembly (21063528); there are no jumpers on the **new** PCB assembly (21063548).*

J3 Connector for P/N 21065113 is a 9-pin connector with pins 10 & 11 removed.

CARD INSERTION AND ORIENTATION

The Reader can be mounted in two positions as shown in Figure 2-4. On the left panel of the illustration, the card is inserted with the magnetic stripe to the left. On the right panel of the illustration, the card is inserted with the magnetic stripe up. These are the mounting positions that permit any foreign object inserted into the slot to drop out of the reader.

On the left panel of the illustration, the magnetic stripe faces up when the head is mounted on top of the PCB, and the magnetic stripe faces down when the head is mounted under the PCB. When the head is mounted on top of the PCB, the data on the card is read in reverse upon card removal. When the head is mounted under the PCB, the data on the card is read forward upon card removal. The same principle applies to the right panel in the illustration, but the Reader is rotated 90 degrees clockwise.

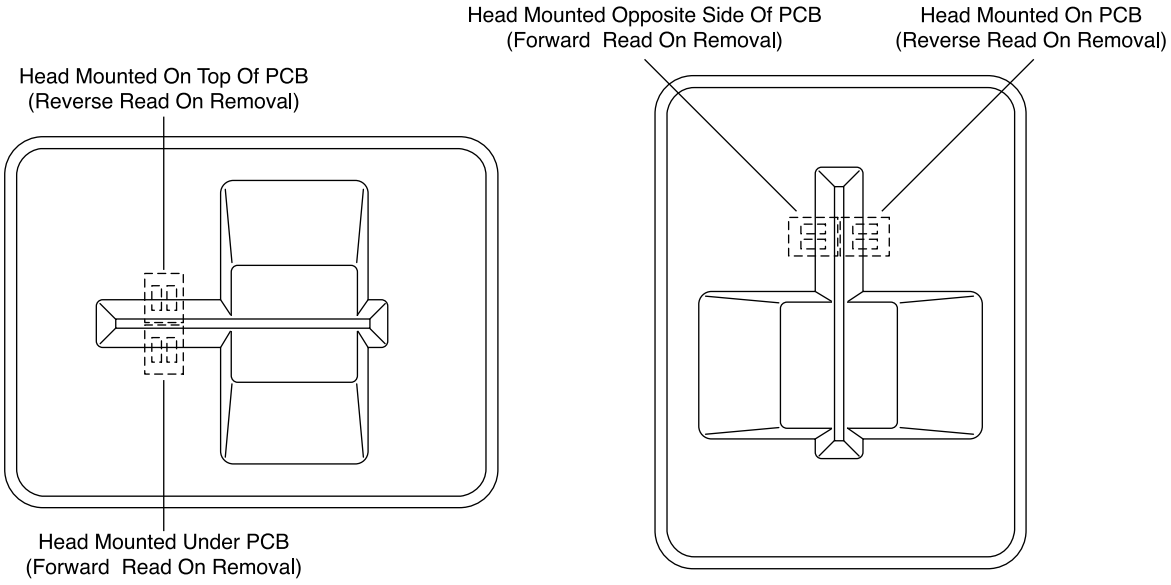
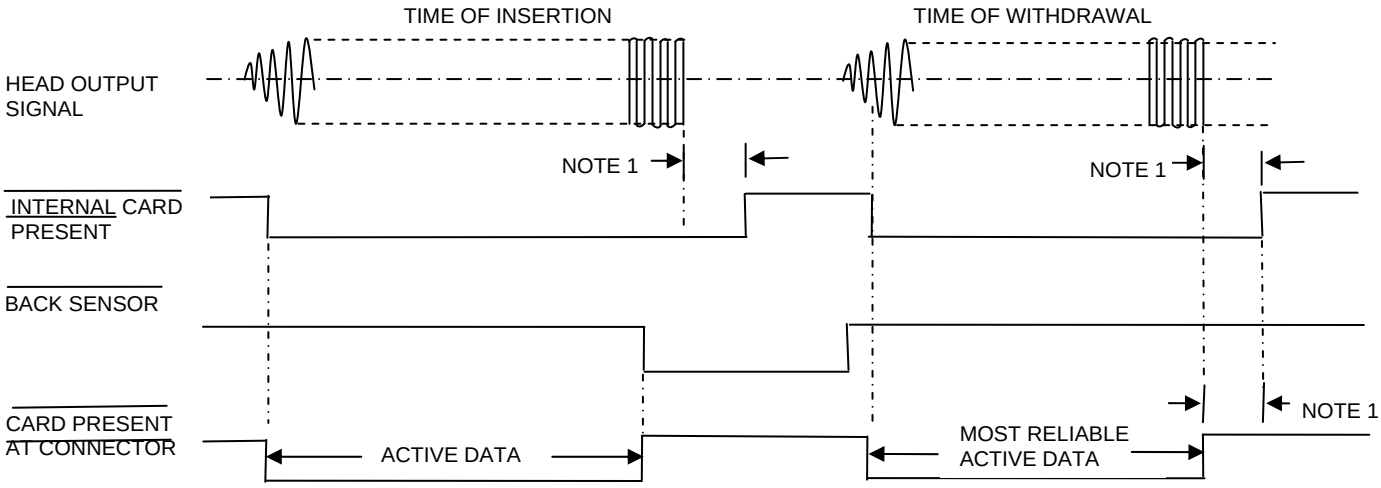


Figure 2-4. Card Insertion and Orientation

TIMING FOR BACK SENSOR AND CARD PRESENT

Figure 2-5 shows the timing for the Back Sensor and the Card Present signals.

The card is read in both directions (on insertion and withdrawal), but the data is active on withdrawal.



NOT TO SCALE

NOTE 1:

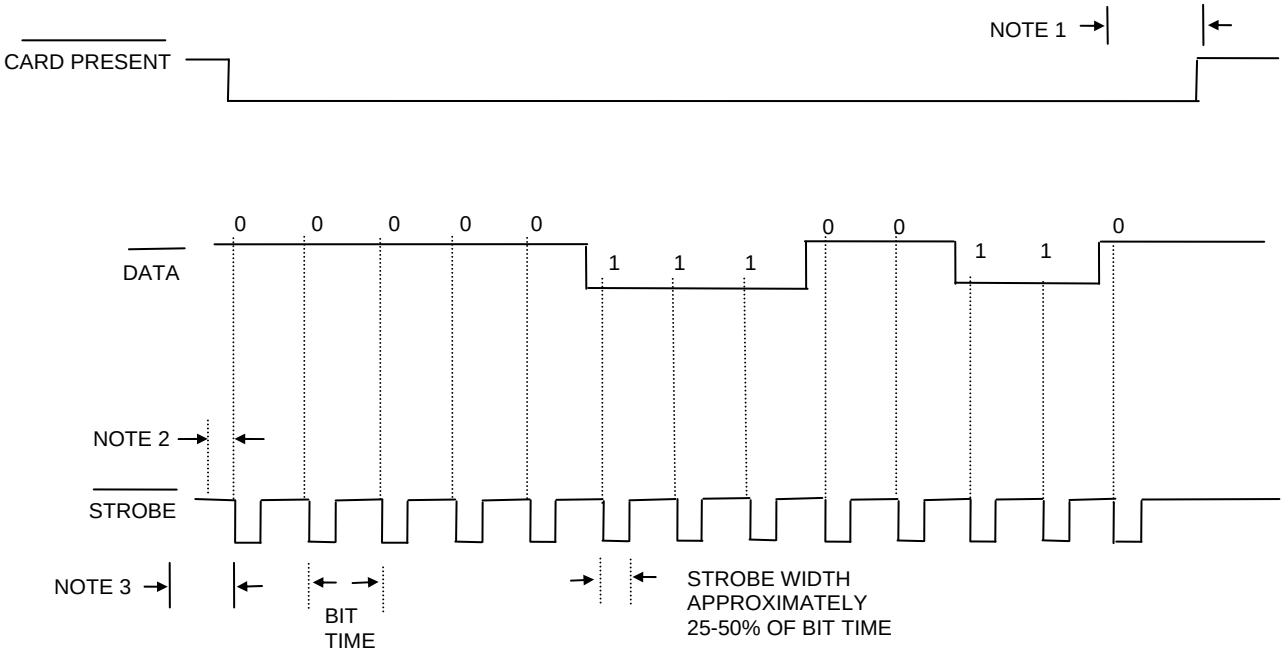
Time out of the internal card present signal occurs within about 150 ms from the last strobe transition. The internal card present signal becomes active when the movement of an encoded magnetic stripe past the read head generates a signal. The back sensor and internal card present are gated together to reduce the dwell time needed before the read-on-withdrawal can be initiated and is output as $\overline{\text{card present}}$ at the connector.

Figure 2-5. Timing for Card Present and Back Sensor Signals

While it is possible for the Card Reader to read data on either the insertion or withdrawal stroke, it should be noted that card reading is most reliable during the card withdrawal stroke. For this reason MagTek recommends that customer's software should be designed to emphasize data capture during the card withdrawal stroke. For the most reliable operation: Read the card upon insertion, when the card present goes high, check for errors, if no errors, output the data, start sentinel first, after the card is withdrawn. If an error is detected, clear the stored data and read the card on withdrawal, if no errors, output the data, start sentinel first, otherwise output an error indication or a try again message.

TIMING FOR DATA AND STROBE

Figure 2-6 shows the timing for Data and Strobe. The timing shown is for active data (see Figure 2-5).



NOTES

1. TIME OUT OF THE CARD PRESENT SIGNAL OCCURS WITHIN APPROXIMATELY 150 MS FROM THE LAST STROBE TRANSITION.
2. DATA IS VALID 1.0 μS (MINIMUM) BEFORE THE NEGATIVE EDGE OF STROBE.
3. UP TO 6 OR 7 HEAD FLUX REVERSALS ARE IGNORED FOR LOW DENSITY CONFIGURATION AND 14 OR 15 FOR HIGH DENSITY CONFIGURATION.

Figure 2-6. Data and Strobe Timing

Card Present at Connector

The Card Present signal is low when a recorded card is being moved across the read head. The Card Present signal is "ANDed" with the rear sensor to ensure that Card Present will go high when the card is fully inserted into the Reader.

Data

The Data signal is valid while the Strobe is low. If the Data signal is high, the bit is a zero.

Strobe

The Strobe signal indicates when Data is valid. It is recommended that Data be loaded by the user with the leading edge (negative) of the Strobe.

APPENDIX A. BEZEL DESIGN

The engineering drawing in this section is for customers interested in designing their own bezel. The example shown is a typical design from MagTek.

Please note that the bezel is an active part of the Reader; therefore the bezel design is important for card alignment and the performance of the Reader.

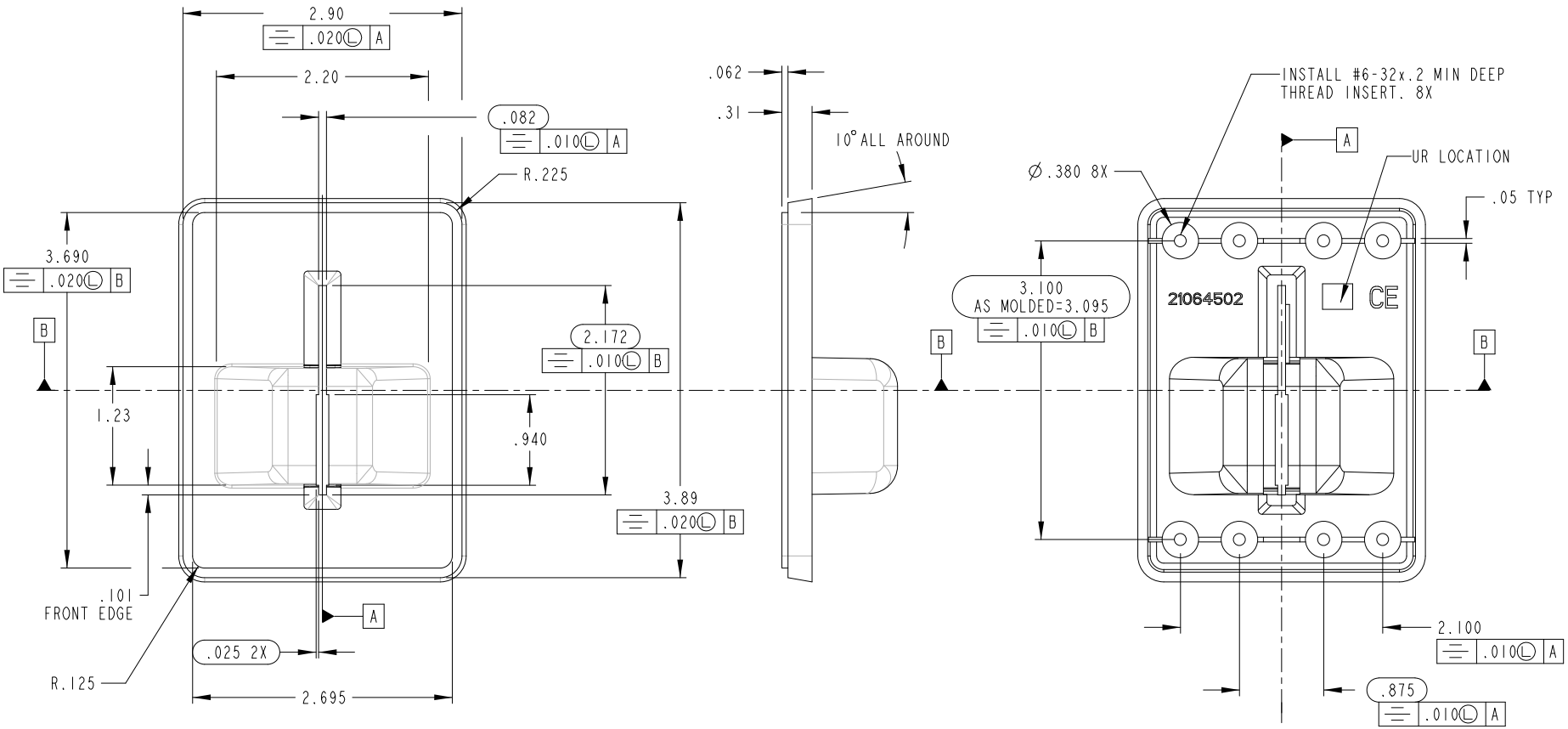


Figure A-1. Dimensions for Flat-Faced Bezel Design Sheet 1

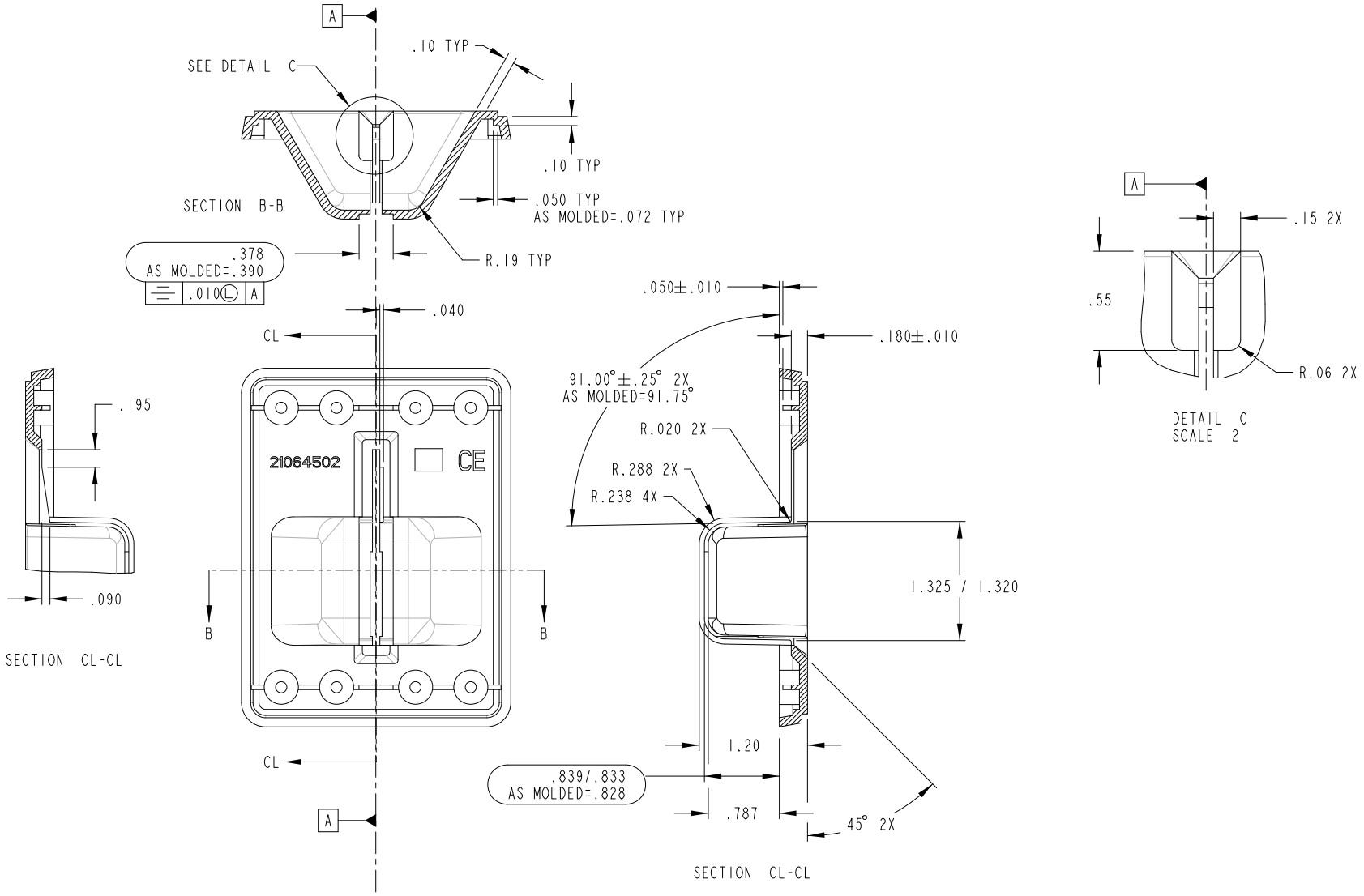


Figure A-2. Dimensions for Flat-Faced Bezel Design Sheet 2

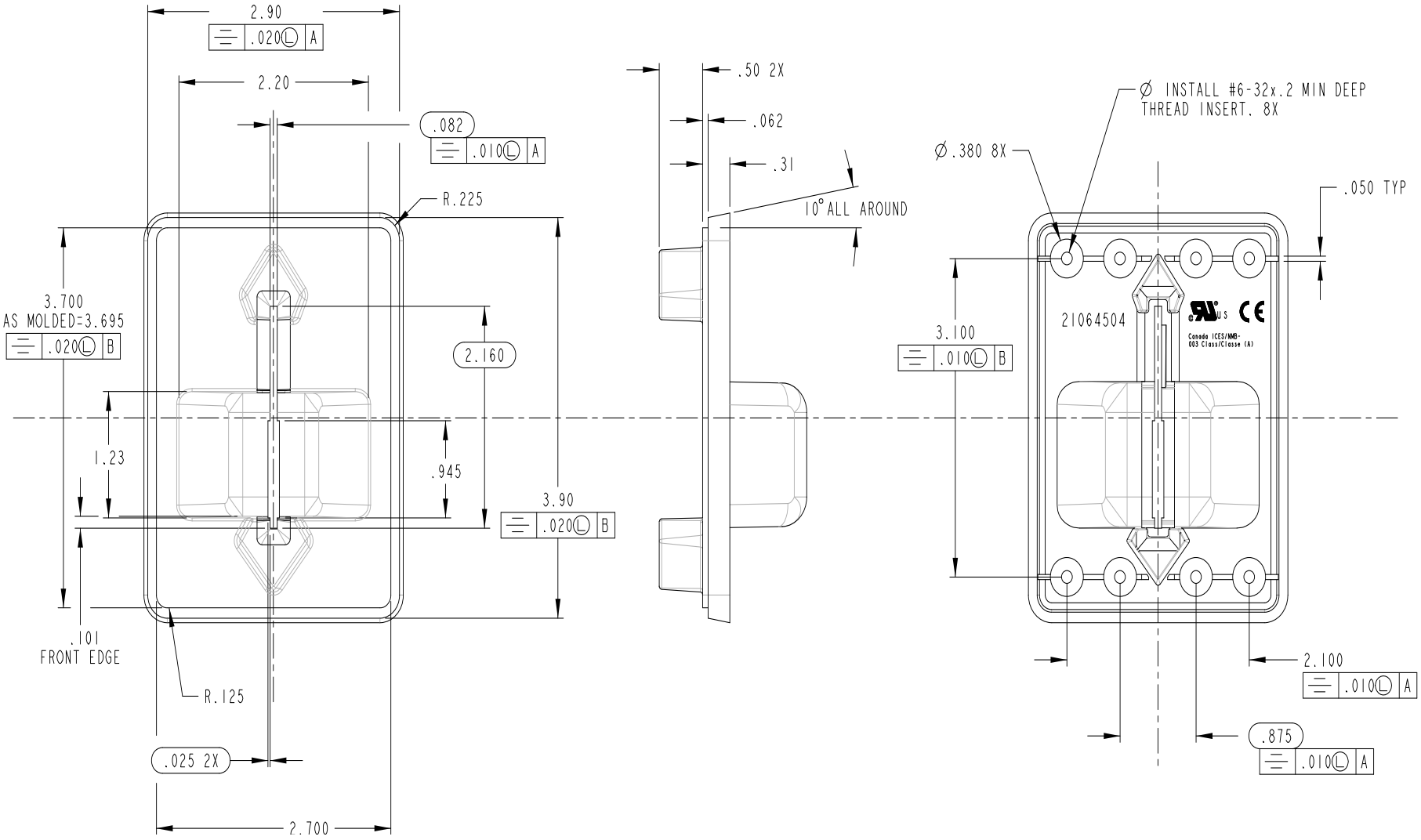


Figure A-3. Dimensions for Extended Bezel Design Sheet 1

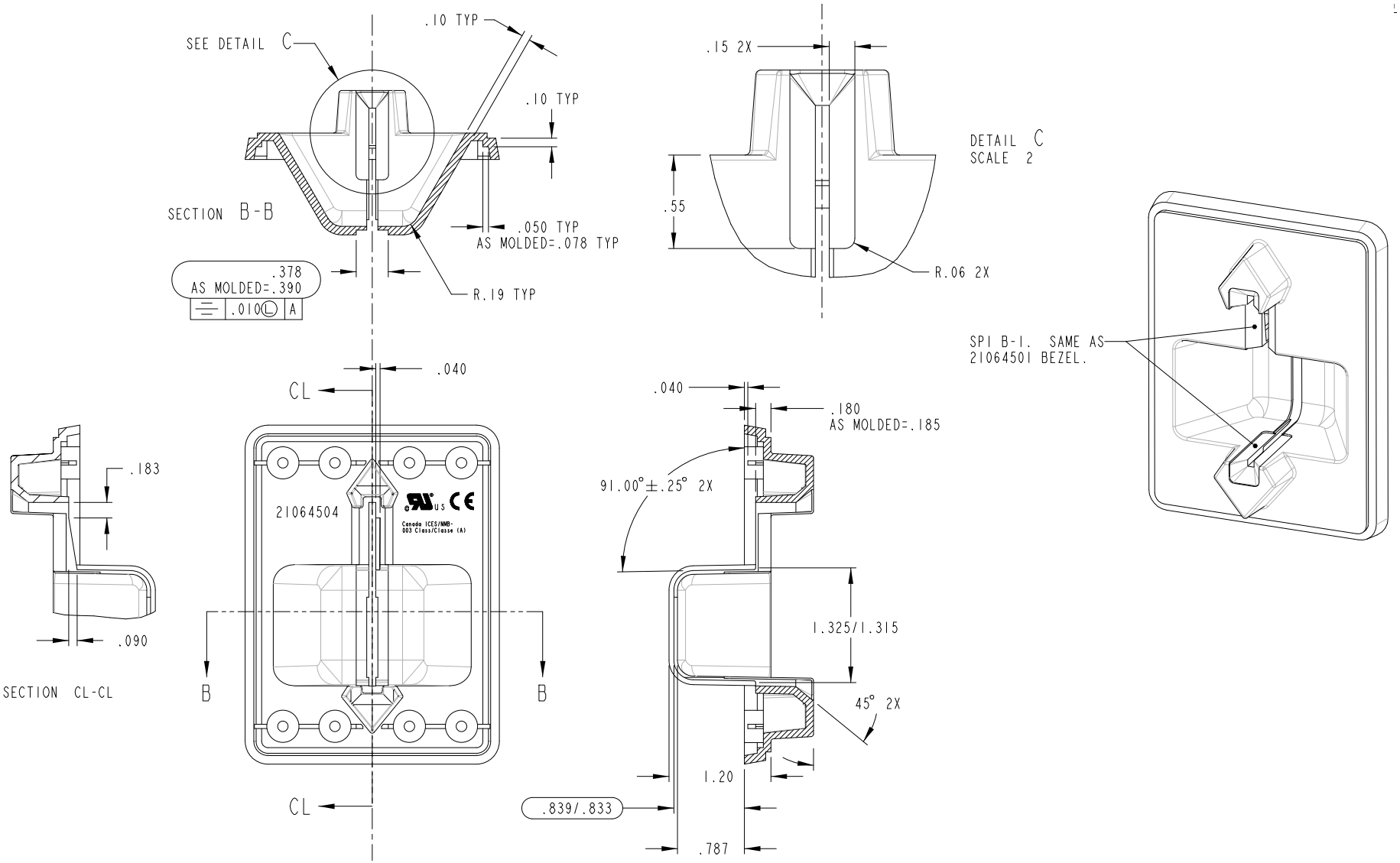


Figure A-4. Dimensions for Extended Bezel Design Sheet 2