3M Identity Management

3M™ CR100-OEM Reader Module Integration Guide

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1 Introduction

1.1 Warnings, Cautions and Notes

This manual contains important information regarding the installation and operation of the 3M™ CR100-OEM Reader Module. For safe and reliable operation of the readers all users must ensure that they are familiar with and fully understand all instructions contained herein.

DANGER — **Danger** indicates a hazardous situation which, if not avoided, *will* result in death or serious injury.

WARNING — **Warning** indicates a hazardous situation which, if not avoided, *could* result in death or serious injury.

CAUTION — **Caution** indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE — **Notice** indicates a situation which, if not avoided, could result in property damage only. This includes situations which require you to re-install your software or return your equipment to the manufacturer for recalibration.

INFORMATION — **Information** indicates important information that helps get the optimum performance from your scanner and will save you time during evaluation and deployment.

1.2 Proprietary Statement

By using the 3M™ CR100 Document Reader and the 3M™ CR100M OCR/MSR Document Reader products (the "Product"), you (the "User"), agree to be bound by the following terms and conditions.

Because use of the Product varies widely and is beyond the control of 3M Canada Company ("3M"), the user is responsible for determining whether the 3M Product is fit for a particular purpose and suitable for user's application. Warranties, remedies and limitations may vary by product and jurisdiction.

3M Traffic Safety and Security offers a range of security products to protect against article and/or document identity counterfeit, alteration, diversion, duplication, simulation and substitution. However no security products can guarantee absolute protection against attempts to successfully accomplish these illegal activities.

Technical Information: The technical information, recommendations and other statements contained in this document are based upon tests or experience that 3M believes are reliable, but the accuracy or completeness of such information is not guaranteed.

Warranty, Limited Remedy and Limited Liability:

THE FOLLOWING IS MADE IN LIEU OF ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. 3M warrants that its Product will meet 3M's written specifications at the time of shipment. 3M's obligation and your exclusive

remedy shall be, at 3M's option, to replace or repair the 3M Product or refund the purchase price of the 3M Product. IN NO EVENT WILL 3M BE LIABLE FOR ANY INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES INCLUDING, BUT NOT LIMITED TO LOSS OF PROFITS, IN ANY WAY RELATED TO THE PRODUCTS REGARDLESS OF THE LEGAL THEORY ASSERTED

1.3   Notices

3M reserves the right to make changes to its Products at any time and without notice. The information furnished by 3M in this manual is believed to be accurate and reliable. The material contained herein is supplied without any representation or warranty of any kind. 3M therefore assumes no responsibility, consequential or otherwise, of any kind arising from the use of the Product.

1.4   Trademarks & Acknowledgements

3M is a trademark of 3M. Used under license in Canada.

Windows, Vista, Windows 7, Visual C++ and Visual Basic are registered trademarks or trademarks of Microsoft Corporation in the United States and other countries.

CREWS is a trademark of RESA. The SITA name and CUTE® are trademarks or registered trademarks owned by the SITA group of companies around the world. Rockwell Collins' ARINC Multi-User System Environment (MUSE®) is a trademark of Rockwell Collins and/or ARINC Incorporated.

All trademarks are acknowledged.

1.5   Electromagnetic Compatibility (EMC)

These modules are intended to be used as part of a system and it is the system designer's responsibility to ensure compliance with the appropriate standards for the country of use. 3M can help designer's achieve CE and FCC regulatory compliance, ask your local 3M sales office if you require technical assistance on regulatory issues.

NOTICE **All elements of the module are electrostatic sensitive. Components must only be handled by trained engineers in an appropriately setup and maintained anti-static workshop. Failure to observe anti-static precautions can lead to component failure or a significantly reduced operational life.**

1.6   Disposal - European Directive 2002/96/EC

Do not dispose of this equipment in domestic or general waste. These devices can be recycled and should be disposed of in accordance with your local and national regulations.

For more information contact your local 3M Office or visit www.3m.com

1.7   Packing for transportation

When packing this product for repair or shipment carefully disconnect cables and pack in the original packaging cartons.

NOTICE **Anti-static bags must be used on all components. Failure to observe anti-static precautions can lead to component failure or a significantly reduced operational life.**

1.8   Office Locations

Web: http://www.3M.com/IdentityManagement

United States and Latin America
3M Center
Building 225-4N-14
St. Paul MN55144-1000
USA
telephone: 1-800-581-2631

Europe, Middle East and Africa
3M United Kingdom plc
Cain Road
Bracknell RG12 8HT
United Kingdom
telephone: +44 (0) 8705 360036

Asia, Pacific and Australasia
3M Asia Pacific Pte Ltd
Security Systems Division
1 Yishun Avenue 7
Singapore 768923
telephone: +65 6450 8888
fax: +65 6458 5432

Canada
1545 Carling Avenue
Suite 700
Ottawa, Ontario
CANADA K1Z 8P9

telephone:	+1 613 722 2070
fax:	+1 613 722 2063

1.9   Global Technical Services

The Americas

direct line:	+1 613-722-3629
main number:	+1 613-722-2070
fax:	+1 613-722-2063
email:	3M-AiT-gcs@mmm.com

United Kingdom

direct line:	+44 (0) 1344 858 024
main number:	+44 (0) 1344 858 000
email:	gcs-uk@mmm.com

Asia, Pacific and Australasia

telephone:	+65 6450 8888
fax:	+65 6458 5432

1.10   Summary of Hazards

3M™ CR100-OEM Reader Module is intended to be used by original equipment manufacturers as a module within a larger system. It is the OEM's responsibility to carry out a safety and hazard analysis of the complete product and 3M can assist if required, please contact your local 3M sales office for more information. The hazards here relate to the 3M™ CR100-OEM Reader Module handling, design and manufacture and not the end user application.

NOTICE All elements of the module are electrostatic sensitive. Components must only be handled by trained engineers in an appropriately setup and maintained anti-static workshop. Failure to observe anti-static precautions can lead to component failure or a significantly reduced operational life.

NOTICE Anti-static bags must be used on all components. Failure to observe anti-static precautions can lead to component failure or a significantly reduced operational life.

INFORMATION   Note that you should allow the SDK installation to complete before plugging in the module for the first time.

INFORMATION   The USB drivers are installed as part of the SDK

NOTICE   All TTL serial interface signals operate at a level of 3.3V. Any other signal levels can cause permanent damage to the unit.

INFORMATION   [1]The TXD output signal requires an external pull down 1k5 ohm resistor to prevent spurious data when device is in power off mode.

[2]The 3.3V supply from the device should only be used to power an external buzzer or up to two user LEDs. Other circuits that may connect to the device must have their own power supply.

Data transmission requires 2 stop bits.

For further information on the TTL interface please contact your local 3M Service Centre

NOTICE   Failure to comply with these requirements will mean that your design will not be able to read a wide range of real life documents and will fail to meet ICAO reading standards.

NOTICE   The camera electronics are sensitive to damage from static electricity. It is therefore essential that proper electro-static damage (ESD) control measures be put in place when assembling the head into OEM equipment.

The read heads are supplied in anti-static packaging and should be unpacked as close to the assembly area as possible.

Operators should wear anti-static wrist straps and assembly should take place at a properly grounded anti-static environment.

NOTICE   The cameras WILL be damaged if not handled properly. Additionally, the damage may not be immediately apparent and may appear at a later date once the head has entered service.

INFORMATION Note that a grounded metal plate is not a proper anti-static workstation. There should be around one Megohm impedance between the work surface and ground. This limits the current surge when static is dissipated.

1.11 Revision History

Version	Date	Description
A	June 2015	Original document

1.12 References

Description	3M Part No.
3M™ CR100 Document Reader and CR100M OCR/MSR Document Reader Getting Started Guide	DT-01936
3M™ CR100 Document Reader Protocols Programming Manual	DT-01937

2   The 3M™ CR100-OEM Reader Module

2.1   Overview

The 3M™ CR100-OEM Reader Module is a compact, integrated unit designed to capture data from a variety of travel documents using Optical Character Recognition (OCR) technology.

The demonstration package consists of an optical self contained read head (or camera) mounted on a mechanical guide assembly which provides for insertion and swiping of the travel document. The read head has a USB interface which also supplies the unit's power. A 2 metre USB interface cable is fitted for demonstration use. The head also has an optional 3.3V TTL level serial interface.

For ordering purposes the 3M™ CR100-OEM Reader Module consists of the read head only but 3M can discuss cables, document guides and mounting options where a customer requires this.

All ICAO format machine readable travel documents, including passports, visas and identity cards are supported

Documents are passed through the guide in a single hand-swipe motion and the derived ASCII data transmitted to the host system via a virtual COM port USB interface. Documents can be passed across the read head in either direction making the device suitable for both left and right handed operation.

Reader Status and the quality of the read operation can be indicated to the user by the general purpose status LED.

All international airline standards are supported including SITA CUTE, ARINC MUSE, RESA CREWS, US government TECS compatibility and for cruise ships and hotels the units can be connected to Fidelio systems. These various data transfer protocols can be selected using the supplied Configuration Utility.

The reader firmware can be updated via the USB and/or interface.

A software development kit (SDK) is supplied which includes demonstration programs, example code and documentation.

2.2   Applications

The 3M™ CR100-OEM Reader Module is based on the 3M™ CR100 Document Reader designed for use in areas such as Immigration/ Border Control, Airlines and general MRZ document data capture.

The OEM module is designed for integration into kiosks, keyboards and other items of equipment where document reading is required. However where possible it is recommended to use the complete 3M™ CR100 Document Reader as this has all the mechanical integration for the module and the document read guide completed for you and provides excellent read and document transport performance.

Detailed drawings showing the dimensions of both the OEM Module and the 3M™ CR100 Document Reader are included at the end of this manual.

2.3   Features

- Reads passports, visas and other documents conforming to ICAO Document 9303

- Reads a wide variety of documents that are almost ICAO 9303 compliant

- Bi-directional hand-swipe with wide speed tolerance provides a high first time read rate suitable for untrained use

- Small footprint and volume

- No moving parts hence virtually maintenance free

- Simple USB1.1 connectivity

- Programmable configuration and protocols which may be downloaded from the host

- Designed to be built into self-service terminals and keyboards

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3   Software and Driver Installation

The 3M™ CR100-OEM Reader Module is supported by the 3M™ Swipe Reader Software Development Kit (SDK). This has all the manuals, drivers, test programs and sample code to enable you to integrate and support the module.

3.1   Installing the 3M™ Swipe Reader Software Development Kit

The 3M™ Swipe Reader Installation can be found, unzipped, on the CD which comes with the beta readers. You can download the latest version of the 3M™ Swipe Reader SDK installation from our download site at:

www.3M.com/ReaderSoftware

This takes you to the Customer Portal Home page, in the bottom right hand corner click on "register". Complete the required information, scroll through the agreement and click to accept the conditions and then submit. Please ensure you use the full company name and have a matching email address. The website will show a thank you page after registration.

Once you have been approved you will receive an email stating you are registered and your user name (which is usually the email address you supplied). Please note that 3M verifies all registrations through its local sales representatives and approval can take 3 to 4 days. If you have an urgent need please contact your local sales representative to ask for pre-approval.

For details how to install the SDK please refer to the "3MTM CR100 Document Reader and CR100M OCR/MSR Document Reader Getting Started Guide".

The SDK provides demonstration and management tools and the OEM should determine which to ship with any installation they may provide to the end customer, bearing in mind that some tools may be required for fault diagnosis and/or firmware update. 3M Company's End User Licence Agreement should be referred to and any third party terms passed to the end customer, contact your local 3M sales office for more information.

> **INFORMATION**   **Note that you should allow the SDK installation to complete before plugging in the module for the first time.**

3.2   Installing the USB Drivers

> **INFORMATION**   **The USB drivers are installed as part of the SDK**

The USB interface requires the drivers to be installed, these then present a virtual serial port (COM port). The serial interface does not require any drivers.

4 Getting Started

Refer to the "3M™ CR100 Document Reader and CR100M OCR/MSR Document Reader Getting Started Guide" that can be found in the Documentation Folder of the Swipe Reader SDK installation. This details the demonstration programs that are available to test the module. It also includes information about configuring the module for different data transfer protocols.

4.1 Determining the USB port number

The drivers create a virtual COM port which provides an RS232 serial port emulation (also know as Serial Port Profile SPP) over the USB channel and allows legacy applications using a serial port interface to communicate with the module. You need to look in the device manager to determine the COM port number.

You need to start the device manager (right click **My Computer**, select **Properties.**

Go to the **Hardware Tab** and click **Device Manager.**

Open the LPT and COM section. This gives you the COM port number (in the example it is 7).
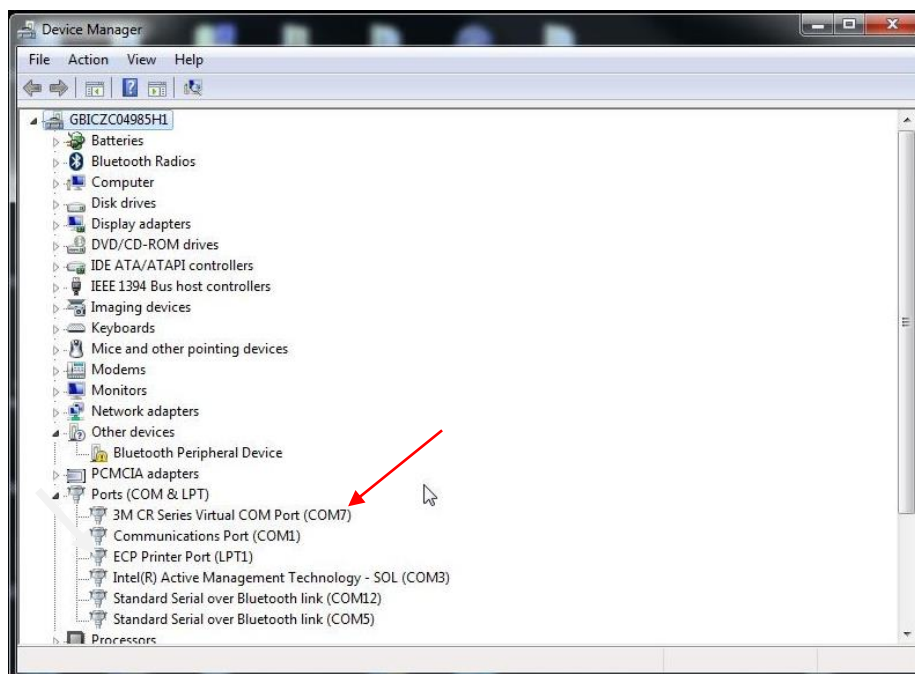
4.2 Protocols and Configuration

Instructions for changing the reader data transfer protocols and com port settings are fully detailed in the 3M™ CR100 Document Reader and 3M™ CR100M OCR/MSR Document Reader Getting Started Guide that can be found in the Documentation Folder of the SDK.

5 Reader Connections and Status LED

The **Status LED** gives visual feedback of the read operation as well as indicating current reader status. It's function is explained in more detail in the CR100 Getting Started Ma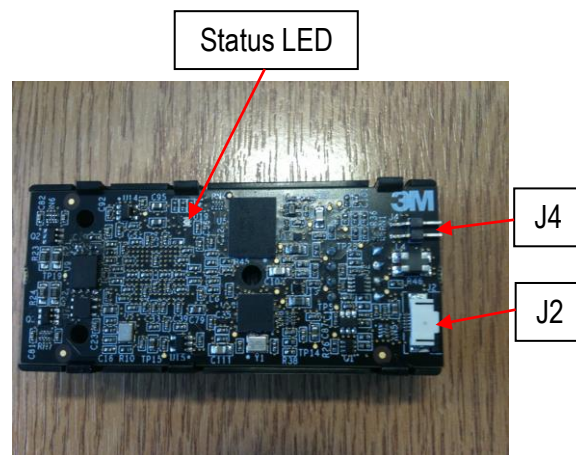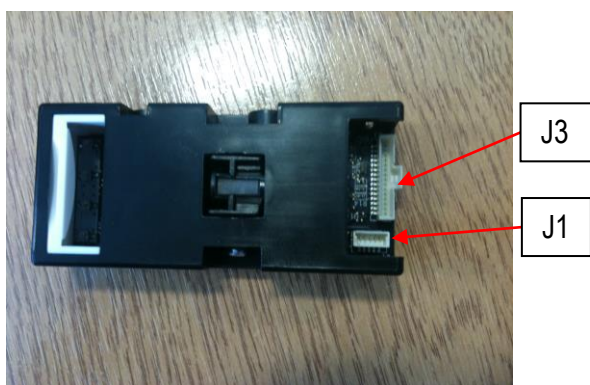nual. The light output from the LED can be channelled to a more visible position by use of a light pipe. The exact position of the LED is shown on the diagram in Appendix A of this manual.

J1   USB port connection (mating connector – Molex 501330-0500 5 way 1mm pitch). This connector supplies power and USB signal data. The pinout is as follows:

Pin	Signal	Colour	USB-A Pin
1	+5V	Red	1
2	USB Data minus	White	2
3	USB data plus	Green	3
4	Ground	Black	4
5	Shield (connected to GND)	Shield	Shield

J2   JTAG Programming Connector – not normally used by OEMs

J3   Optional TTL Serial interface Connector (mating connector – Molex 501330-15 15way 1mm pitch). This supplies power and TTL level (3.3V) serial interface signals.

Pin	Signal
1	TXD (from Head)[1]
2	RTS
3	DTR
4	RXD
5	CTS
6	DSR
7	DCD
8	VCC 3.3V (supplied from head)[2]
9	Reserved for future use
10	Reserved for future use
11	Reserved for future use
12	Power On/Off (input to head)
13	VCC 5.0V (power in to head)
14	Ground
15	Ground

NOTICE   **All TTL serial interface signals operate at a level of 3.3V. Any other signal levels can cause permanent damage to the unit.**

INFORMATION   **[1]The TXD output signal requires an external pull down 1k5 ohm resistor to prevent spurious data when device is in power off mode.**

[2]The 3.3V supply from the device should only be used to power an external buzzer or up to two user LEDs. Other circuits that may connect to the device must have their own power supply.

Data transmission requires 2 stop bits.

For further information on the TTL interface please contact your local 3M Service Centre

J4   Jumper to keep device in bootstrap mode. Not normally used by OEMs

6   OEM Integration

In order to integrate the 3M™ CR100-OEM Reader Module into your equipment you need to consider a number of design issues and ensure that your manufacturing process is appropriate. This section helps you through some of these questions.

Having tested the Module in a standalone configuration and ensured its suitability you may decide to design your own document guide if this is the case then see the next section for more detail. This will include the mounting of the read head to the guide and the retaining of the glass window.

Refer to **Appendix B – Read Head Dimensions and Mounting Points** for read head fixing points.

Design a USB to host cable to suit your requirements noting that this may need a ferrite(s) to reduce radiated/conducted EMC emissions.

The product then needs testing to your required standards.

Ensure that your manufacturing process is aware of the ESD precautions

6.1   Guide Arrangement

When designing a guide, there are some technical conditions that you must stick to:-

> **NOTICE**   **Failure to comply with these requirements will mean that your design will not be able to read a wide range of real life documents and will fail to meet ICAO reading standards.**

1.   The slot past the read head should be no wider than 2 mm.

2.   There should be adequate provision for the entry to the guide (either top drop or side swipe) and generally a wider entry will make it easier for the user to enter the document into the guide.

3.   Consider whether you require bi-directional swiping.

4.   Generally a vertical guide is best as this lets gravity help pull the document to the bottom of the guide. Angling the guide at roughly 30 degrees front to back (back higher) with a back to front swipe is ergonomically best.

5.   The back of the slot opposite the read head should be non-reflective in the near infra red band. This must be checked using an IR detector, do not assume that black finished are absorbent in the infra-red region.

6.   The glass must be 5mm thick. The window must be full length of the read head.

7. The glass must be made from an optically pure good quality product with approximately 90% transmission across 5 mm at 900nm. 3M uses Pilkington's Optiwhite (code FG2) although there are similar products from other manufacturers. 3M can provide the detailed specification for this glass if required. Transmissive glass surfaces must be smooth and free of inclusions, scratches or blemishes. 3M recommends that the other surfaces have a diffuse ground finish.

8. The read head must be tight against the glass.

9. The document must be able to pass smoothly in the required direction(s) past the read head without catching on the guide.

6.2 Read Head Installation

The read head is a compact electro-optical assembly.

> **NOTICE** **The camera electronics are sensitive to damage from static electricity. It is therefore essential that proper electro-static damage (ESD) control measures be put in place when assembling the head into OEM equipment.**
>
> **The read heads are supplied in anti-static packaging and should be unpacked as close to the assembly area as possible.**
>
> **Operators should wear anti-static wrist straps and assembly should take place at a properly grounded anti-static environment.**

> **NOTICE** **The cameras WILL be damaged if not handled properly. Additionally, the damage may not be immediately apparent and may appear at a later date once the head has entered service.**

Static damaged read heads may read documents but performance will be degraded for poorly printed or damaged documents.

> **INFORMATION** **Note that a grounded metal plate is not a proper anti-static workstation. There should be around one Megohm impedance between the work surface and ground. This limits the current surge when static is dissipated.**

Appendix A – Sample Guide Track Dimensions
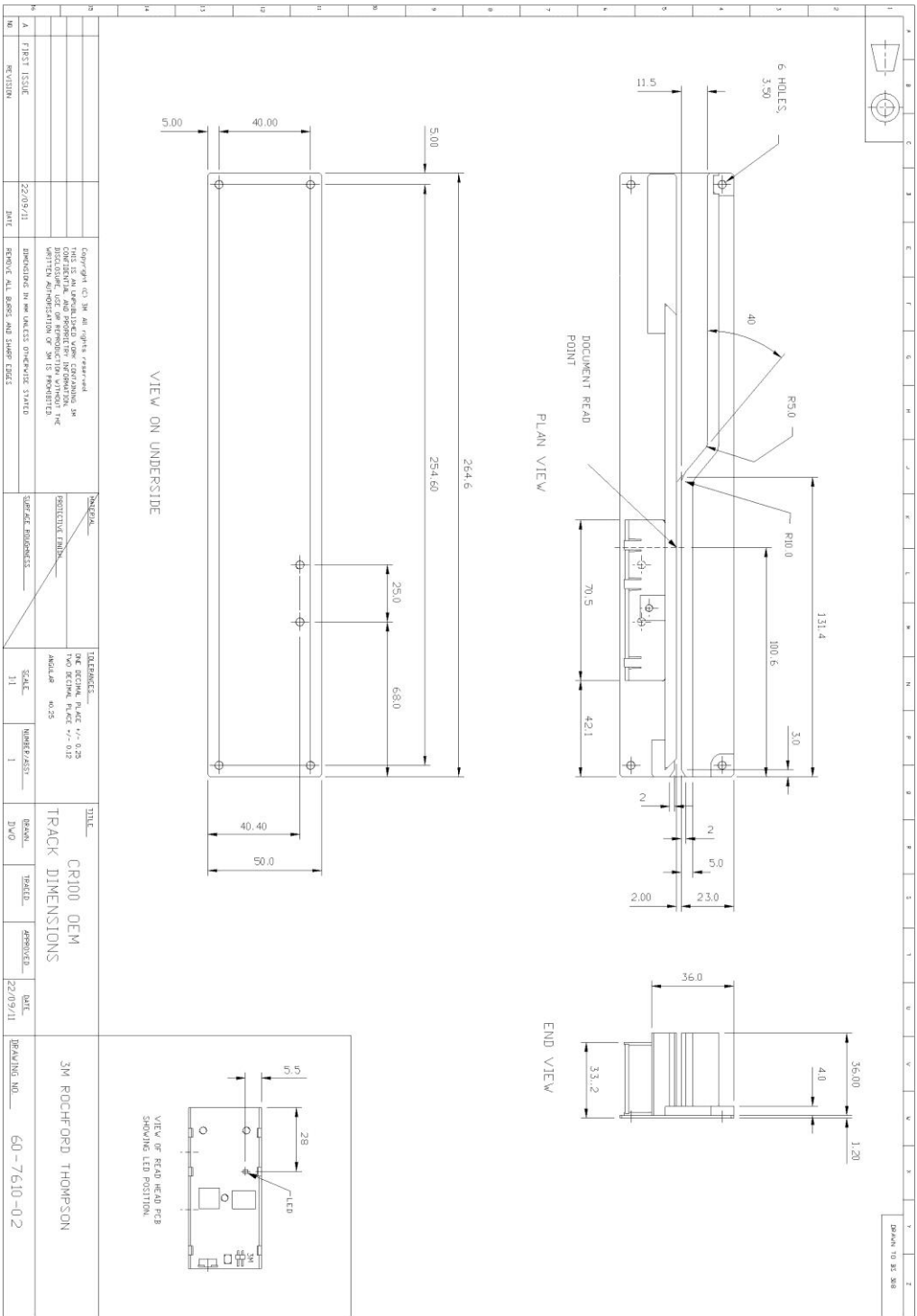
Appendix B – Read Head Dimensions and Mounting Points

Appendix C – CR100 Swipe Reader Dimensions

Appendix D – Sample USB Interface Cable

Appendix E – Sample Serial Interface Cable

NOTES:
1. CONNECT PIN TO PIN 1, PIN 2 TO PIN 2 ETC.
2. ITEMS 1,2 AND 4 TO BE UL APPROVED.

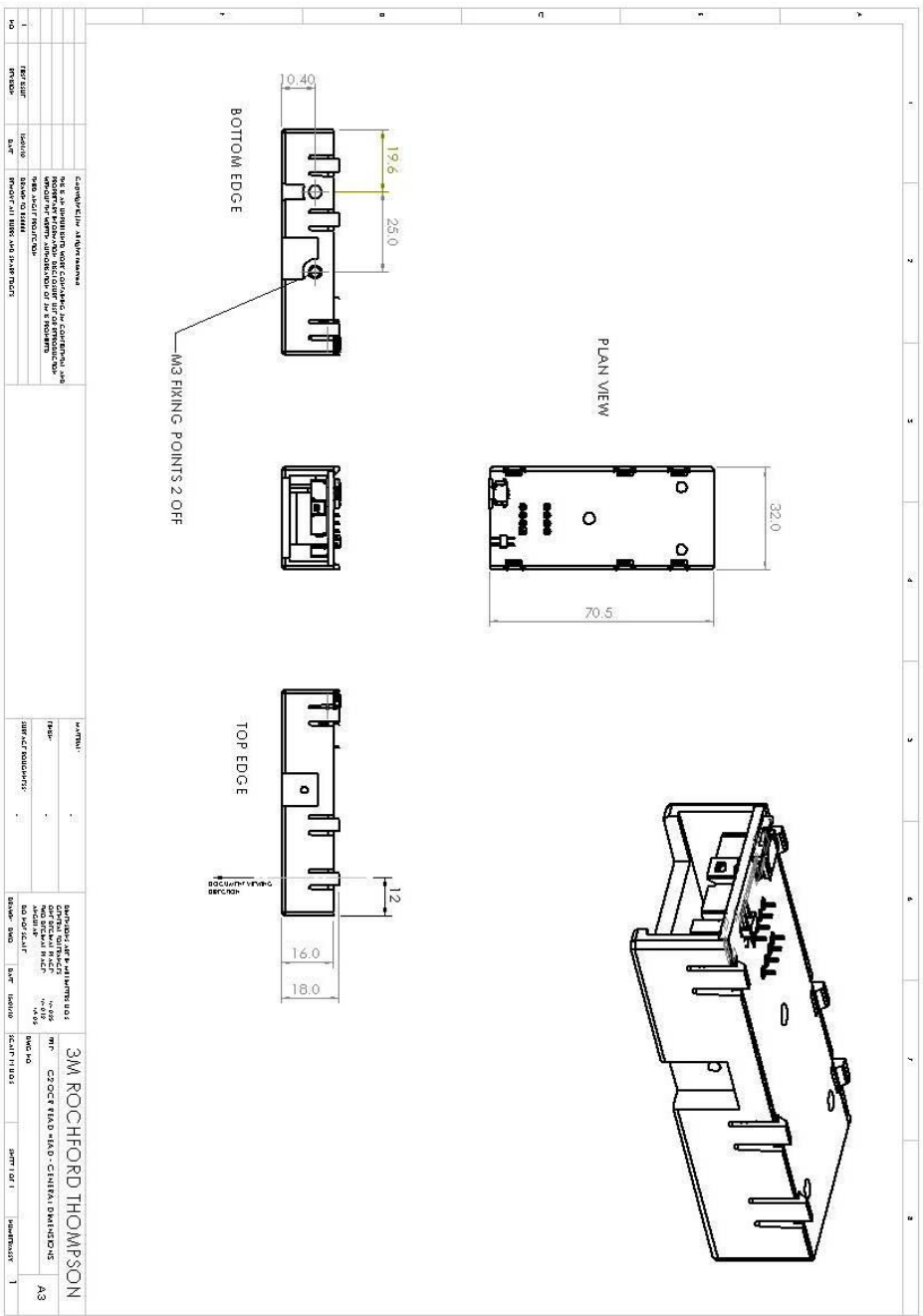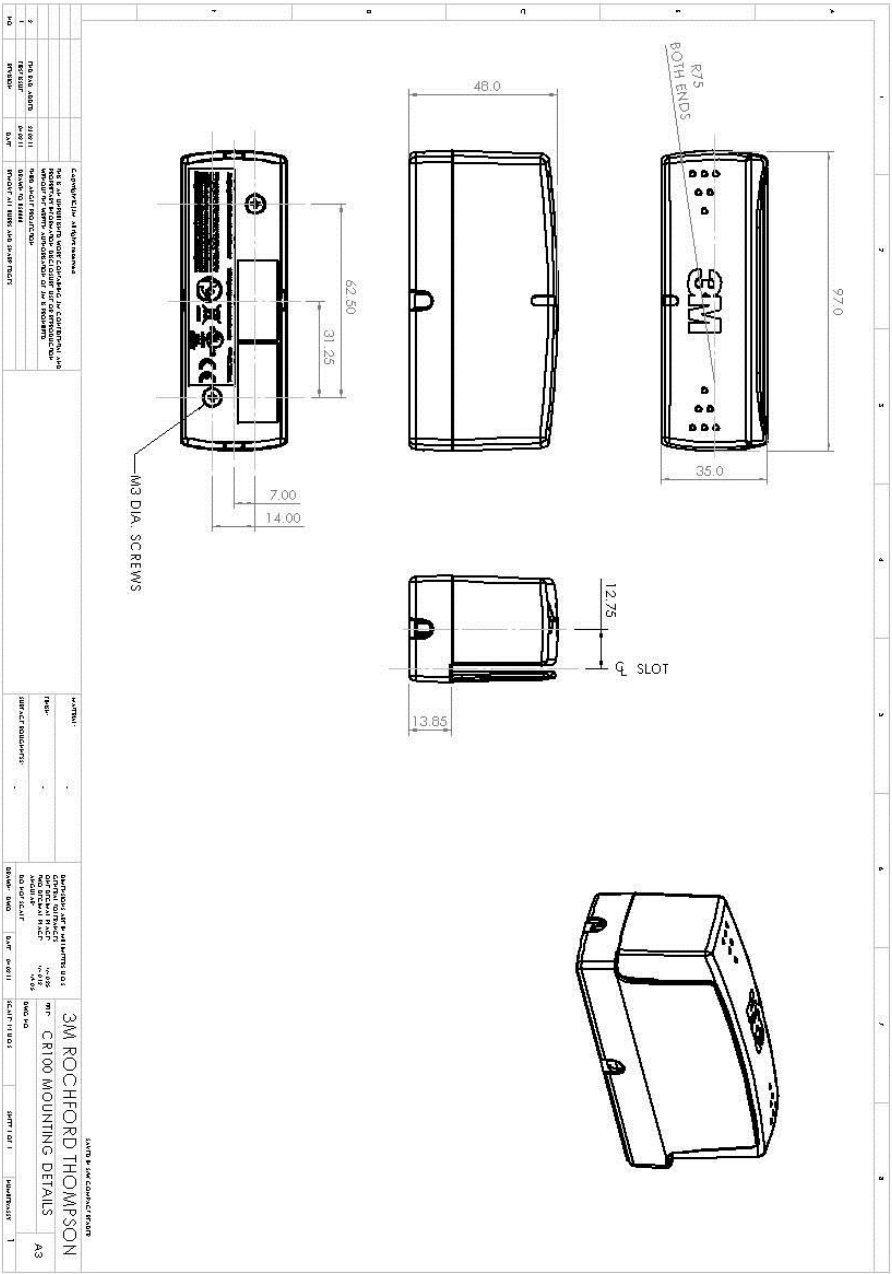| ITEM	PART NO.	DESCRIPTION	QTY.	REMARKS
1		15-WAY RECEPTACLE	1	MOLEX 50130-15 (DIGI-KEY WM7928-ND)
2		CRIMP (TO SUIT ITEM 1)	8	MOLEX 501334 (DIGI-KEY 7933-ND)
3		WIRE 28-32 AWG	A/R	BLACK 28-32 AWG
4		HE14 HOUSING 12-WAY 0.1"	1	
5		HE14 CRIMP (TO SUIT ITEM 4)	8	
6		CABLE IDENT. TAG	1	ALTERNATIVE SYSTEM MAY BE USED
7				

CON. 'A'

CON. 'B'

CONNECT TO 60-7975-01
TTL – RS232 CONVERTOR PCB

WIRING SCHEDULE

CON A		CON B	
PIN	SIGNAL	PIN	SIGNAL
1	TXD	6	RXD
2	RTS	7	CTS
3	DTR	8	DSR
4	RXD	3	TXD
5	CTS	4	RTS
6	DSR	5	DTR
7	N/C	N/C	N/C
8	N/C	N/C	N/C
9	N/C	N/C	N/C
10	N/C	N/C	N/C
11	N/C	N/C	N/C
12	N/C	N/C	N/C
13	+5v	1	+5v
14	N/C	N/C	N/C
15	GND	10	GND

FIRST ISSUE

DIMENSIONS IN MM UNLESS OTHERWISE STATED
REMOVE ALL BURRS AND SHARP EDGES

MATERIAL: SEE NOTES
PROTECTIVE FINISH
SURFACE ROUGHNESS

TOLERANCES
ONE DECIMAL PLACE ± 0.25
TWO DECIMAL PLACE ± 0.12
ANGULAR

SCALE: NTS
NUMBER/ASSY

TITLE: COMPACT READER SERIAL CABLE ASSY

DRAWN: DWD
TRACED
APPROVED
DATE: 16/06/10

3M Rochford Thompson

DRAWING NO. 61-7914-01

DRAWN TO BS 8888