



# **FM700B-NFC 2D SCANNER**

## **Integrated Manual**





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## Revision

Version	Description	Date
V1.0	Initial Release	2023-04-20
V1.1	Description Modified	2023-05-20

## Chapter 1 About the Manual

### Introduction

Combined advanced decode algorithm and excellent hardware design, FM700B simply any scanning for 1D or 2D codes.

### Decode Capacities

1D	Codabar、Code 39、Code 32、Interleaved 2 of 5、Industrial 2 of 5、Matrix 2 of 5、Code 93、Code 11、Code 128、GS1-128、ISBT 128、UPC-A、UPC-E、EAN/JAN-8、EAN/JAN-13、GS1 DataBar(RSS14)、Standard 2 of 5、Qlessey、Msiplessey
2D	PDF417、Micro PDF417、QR Code、Micro QR、Data Matrix、Aztec、Hanxi code

### Chapter Introduction

《Chapter 1 Introduction》	Introduce the scanner.
《Chapter 2 Installation》	Describes how to install the engine, including installation information, housing design, optical, grounding, ESD, and environmental considerations.
《Chapter 3 Electrical Specification》	Includes the electrical characteristics for the engine and timing sequences.
《Chapter 4 Interface 》	Includes interface pinout and connector specifications.

# Chapter 1 About FM700B

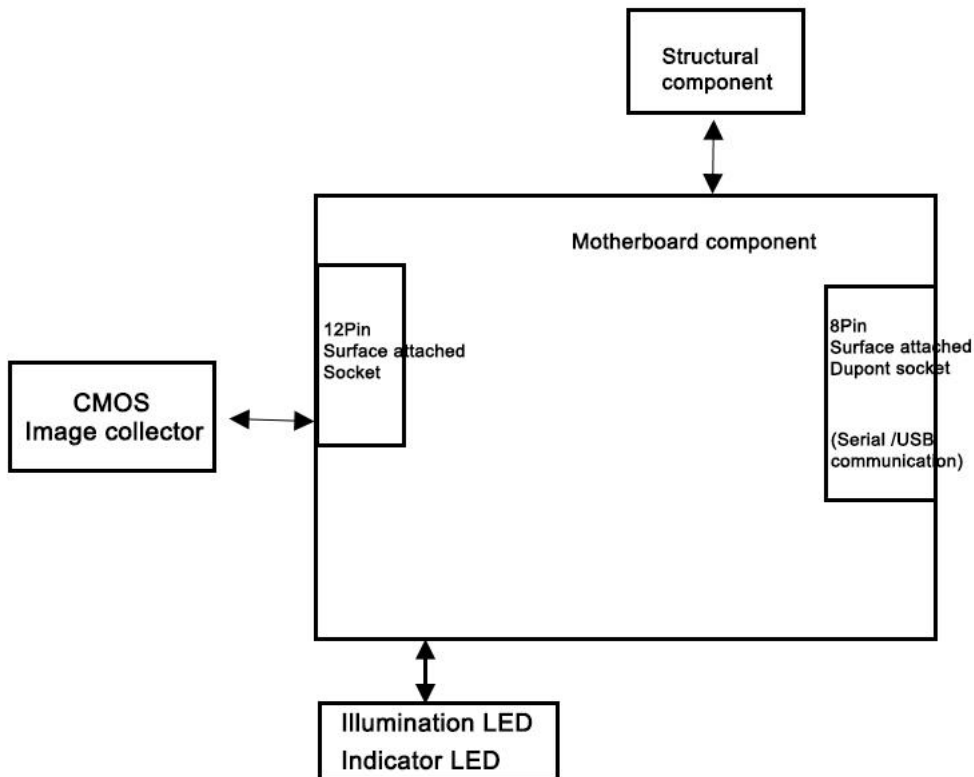
## 1.1 Introduction

The FM700B is an area image scanner for barcode reading. It includes two illumination LEDs, two Good Read LEDs, one 12-pin FPC connector and two 8-pin box connectors (for USB, RS232, TTL, RS485, Wiegand interfaces).

The FM700B contains:

- 1 Cmos sensor
- 2 Illumination LED
- 2 Indicator LED

Figure 1-1 System Block Diagram:



## **1.2 Illumination**

The FM700B has two LEDs for supplementary lighting, making it possible to scan barcodes even in complete darkness. The illumination can be turned On or Off.

## **1.3 Good Read LED**

There are two LEDs for Good Read notification. During scanning, and once the FM700B decodes, the green LED will be on. The Good Read LED can be turn on or turn off though scanning program barcode and the time duration of notification can be programmed though serial command or program code barcode. For more detail, please refer to user manual.



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## Chapter 2 Installation

### 2.1 Introduction

This chapter provides information about installing the FM700B, including physical and electrical information, considerations, and recommended FM700B window properties.

⚠ Warning: Do not touch the imaging lens when installing the scanner and avoid the thumbprint remaining on the lens.

⚠ Warning: Be careful not to touch the lighting LED during handling. Improper handling can damage LED and lenses.

### 2.2 General Requirements

#### ESD

The FM700B has been designed to protect against static electricity, but due to module volume limitations, the static protection of some signals with the client interface cannot be handled in place, such as the use of the scene on the static protection level requirements are higher, the customer needs to consider the static protection design on the relevant interface. The module uses anti-static packaging, but in the process of unsealing and use still need to pay attention to anti-static measures, such as the use of ground wristbands and other measures.

#### Dust-proof and anti-fouling

The FM700B must be sufficiently sealed during storage and use to prevent dust, particles or other contaminants from gathering and sticking to components such as lenses, circuit boards, LEDs, etc. Dust particles or contaminants can degrade engine performance and even affect engine use.

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## Environment

The normal use of the FM700B is subject to the environmental requirements in the table below.

Table 2-1:

Operating Temperature	0°C to+50°C
Storage Temperature	-20°C to+70°C
Humidity	5% ~95% (Non-Condensing)

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## Heat dissipation

Embedding the FM700B in any product requires heat dissipation design. There are several high-power devices (e.g. CPU, CIS, LEDs, DC/DC, etc.) on the FM700B, reading the scanner that emit a lot of heat when working continuously. The local temperature rise of the FM700B may increase when working continuously at full speed. When the ambient temperature is high, the image noise of the image sensor will be increased, the image quality will be reduced, and the reading performance will be affected.

When integrating applications, the power consumption and heat of the FM700B can be reduced as follows:

- Avoid using LEDs for long periods of time in a continuous mode of operation.
- Designed to reserve space for the FM700B to form natural or forced currents.
- Avoid tightly wrapping the FM700B with insulation such as rubber.

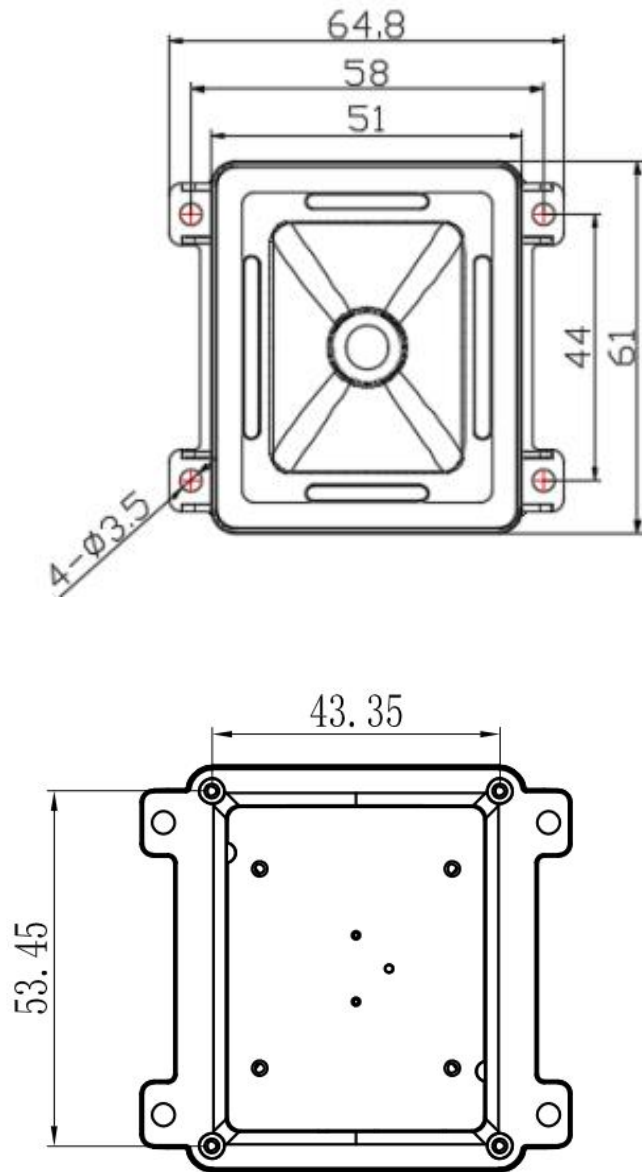
## Optical

Do not expose the external optics of the FM700B to any external forces.

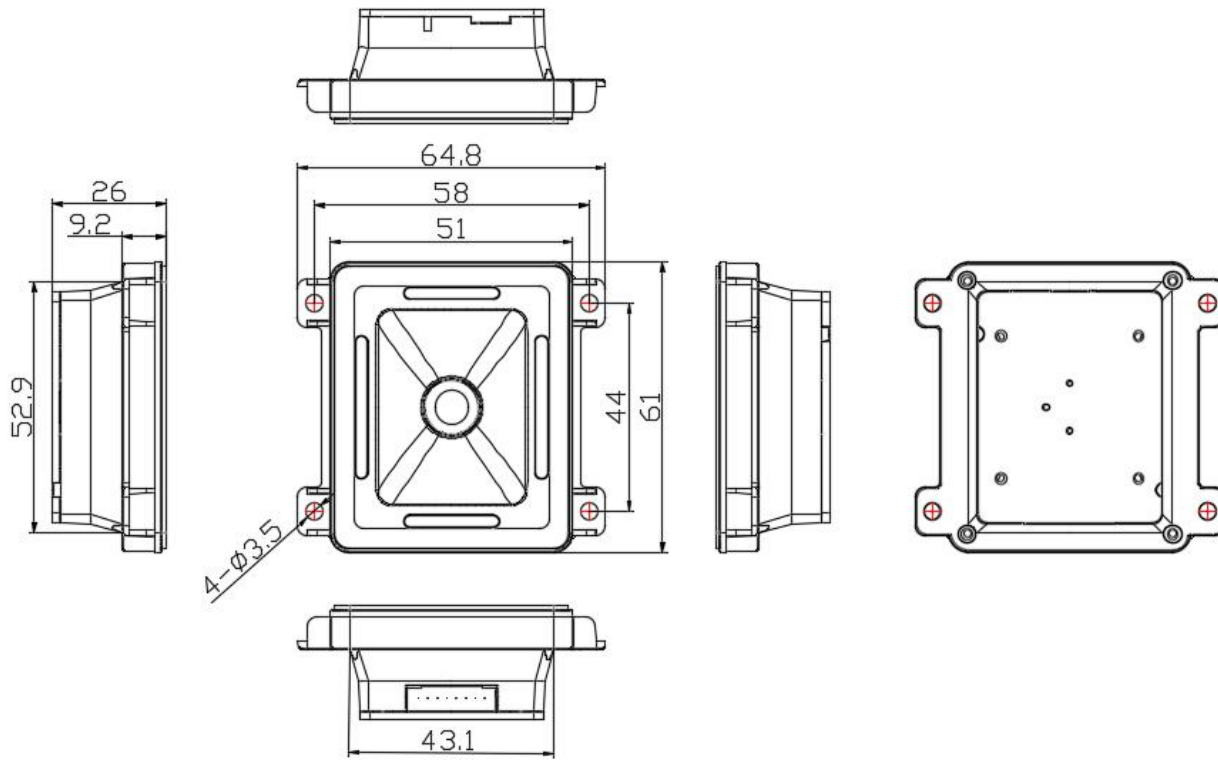
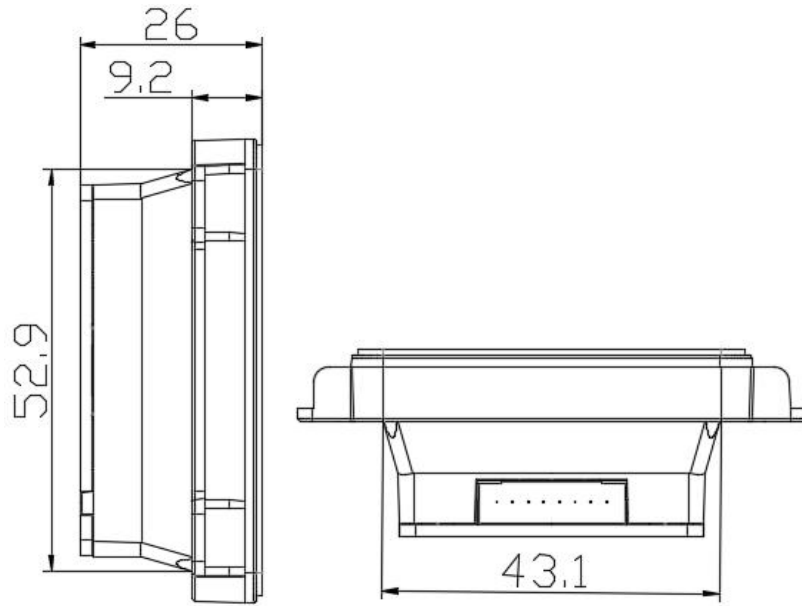
Do not pinch an external optical component of the engine by hand, which may cause too much stress at the mechanical connector, which may cause its fixing components to fail, such as a broken device or a broken cable.

### 2.3 FM700B Dimension (Unit: mm)

#### Front View



**Side View**



## **2.4 External Design**

**Note:** Optical analysis of the housing design ensures optimum scanning or imaging performance.

Design the engine housing so that the aiming and lighting systems do not reflect internally. Reflections from windows or shells can cause problems. For special window tilt angles, these reflections bounce from the top or bottom of the housing and reach the engine. Do not place bright objects around the engine to prevent the tilted window from being reflected into the engine's field of view and appearing in the captured image. Consider using a black matte material inside the bezel or housing.

## 2.5 Optically relevant

### 2.5.1 Window positioning

The window is a transparent medium mounted in front of the FM700B scanner that separates the inside and outside of the product and preserves the light path for the scanner to read the barcode. The window should be placed so that the illumination beam and aim beam are ejected as far as possible and to prevent reflections from entering the engine. If the lighting beam is reflected into the engine, the engine's readability performance is reduced.

The window should be installed as close as possible to the front of the FM700B, and a-0mm.º

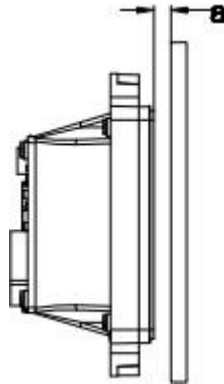


Figure 2-4

### 2.5.2 Window material and color

Window material must be clear. Use only cell-cast plastics or optical glass. PMMA, ADC and chemically tempered glass are recommended. Window material selected for the engine should meet or exceed the specifications specified in Table 2-2.

- PMMA (Cell-cast acrylic): When fabricated by cell-casting, has very good optical quality and low initial cost, but surface must be protected from the environment due to its susceptibility to attack by chemicals, mechanical stresses, and UV light. Reasonably good impact resistance. This material can be laser-cut into odd shapes and ultrasonically welded.

- ADC (CR-39): A thermal-setting plastic produced by the cell-casting process. Excellent chemical and environmental resistance. Quite good surface hardness, and therefore does not have to be hard-coated. Reasonably good impact resistance. This material cannot be ultrasonically welded.
- Chemically tempered glass: Glass is a hard material which provides excellent scratch and abrasion resistance. But unannealed glass is brittle. Increased flexibility strength with minimal optical distortion requires chemical tempering. 9 Glass is hard to be cut into odd shapes and cannot be ultrasonically welded.

Sheet 2-2:

Specification	Description
Thickness	0.8-2.0mm
Wavefront Distortion	PV maximum: $0.2\lambda$ RMS maximum: $0.04\lambda$
Clear Aperture	1.0mm to edges
Surface Quality	60-20 scratch/dig

Pay extra attention to the wavefront distortion when using plastic materials. Colored windows are not recommended if the engine is used to scan barcodes on moving objects.

## 2.6 Coatings and Scratch Resistance

### 2.6.1 Anti-reflection coatings:

Anti-reflection (AR) coatings can be applied to window surfaces to reduce reflected light from the window back into the engine. But they are expensive and have poor abrasion/scratch resistance.

### 2.6.2 Polysiloxane coatings:

Polysiloxane coatings can be applied to plastic surfaces to increase the surfaces' abrasion and scratch resistance.

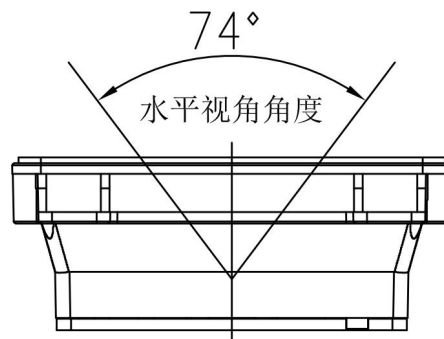


Scratch on the window can greatly reduce the performance of the FM700B. It is suggested to use abrasion resistant window material or coating.

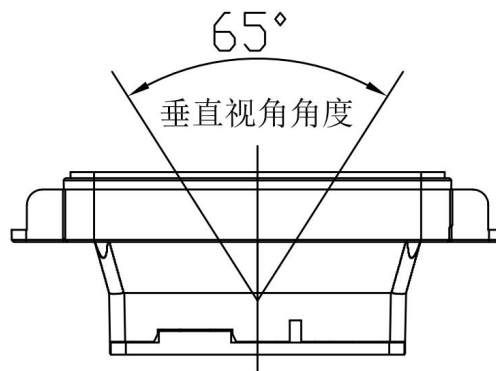
## 2.7 Window Size

The window must not block the field of view and should be sized to accommodate the aiming and illumination envelopes shown below.

### Horizontal:



### Vertical:



## 2.8 Ambient Light

The FM700B shows better performance with ambient light. However, high-frequency pulsed light can result in performance degradation.

## 2.9 Eye Safety

The FM700B has no lasers. It uses LEDs to produce illumination beam. The LEDs are bright, but testing has been done to demonstrate that the engine is safe for its intended application under normal usage conditions. However, the user should avoid looking into the beam.

# Chapter 3 Electrical Specifications

## 3.1 Power Supply

Do not power up the FM700B until it is properly connected. Be sure the power is cut off before connecting a cable to or disconnecting a cable from the host interface connector. Hot-plugging could damage the engine. Make sure that the FFC cable is horizontally inserted into the connector when connecting the engine's 12-pin connector to the host. Improper cable installation or unstable power supply or sharp voltage drops or unreasonably short interval between power-ons may lead to unstable performance of the engine. Do not resupply the power immediately after cutting it off.

## 3.2 Ripple Noise

To ensure the image quality and engine performance, a power supply with low ripple noise is needed.

## 3.3 DC Characteristics

### 3.3.1 Operating Voltage / Current

Sheet 3-1 (T=23°C)

Parameter	Description	Minimum	Typical	Maximum	Unit
Operating Voltage	VIN (12-pin FPC Connector)	4.8	5	20	V
	VIN (4-pin Box Connector)	4.8	5	20	V

Current (@5.0V)	Operating Current	-	210	250	m A
	Idle Current		120		m A

### 3.3.2 I/O Voltage

Sheet 3-2

VDD=3.3V, VSS=0V, T=23°C

Parameter	Minimum	Maximum	Unit
VIL	-0.3	0.7	V
VIH	2.0	3.6	V
VOL	-	0.45	V
VOH	1.35	-	V

### 3.4 Timing Sequence

Power Up and Power Down Timing Sequence

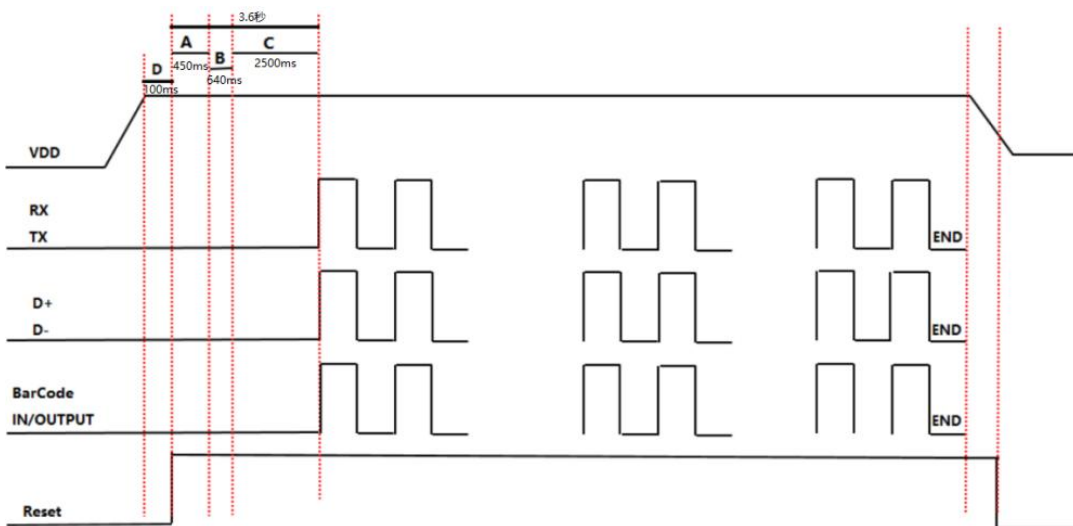


Figure 3-2 Power-on and power-off sequence

1. In the diagram above, it takes A+B+C (about 3600ms) for the engine to power up: A is bootloader execution time (450s), B is kernel boot time (640ms) and C is decoding chip initialization time(2500ms).
2. D is reset time (100ms). If the Reset signal is not operated when powered on, the startup time should be calculated after VCC\_3V3 reaches 3.3V.
3. In end of the above diagram shows the time of all voltage drops of the module, that is, when

the communication stops, the level signals are all low. At the next power-on, in order to ensure that the voltage is completely reduced and the level of each interface is low, the power input can be turned on again after an interval of at least 2s.

## 4. Chapter 4 Interfaces

### 4.1 Interface Pinouts

The physical interface of the FM700B consists of a 12-pin FPC connector and two 8-pin box connectors:.

- 12-pin FPC connector can be used as TTL-232 interface or USB interface.

One 8-pin box connector can be used as standard USB interface and the other as RS-232 interface

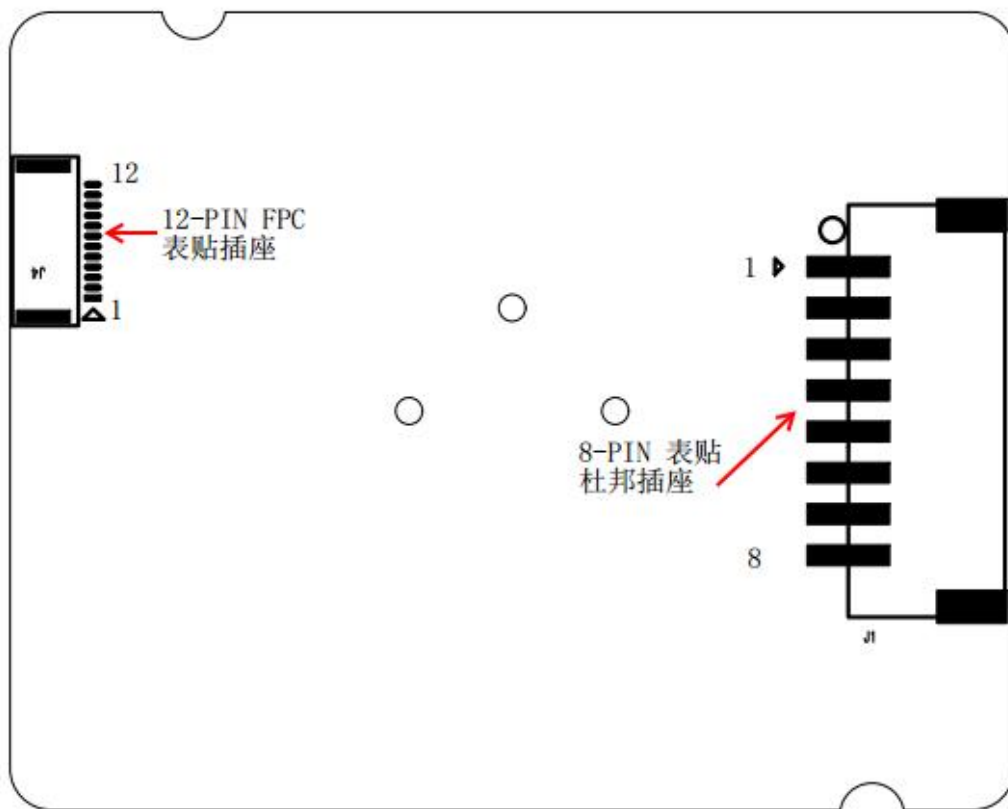


Figure 4-1

## 4.2 FM700B Interfaces Pinouts

### 4.2.1 12-pin FPC Connector

PIN#	Signal Name	I/O	Function	Remark
1	nTRIG	I	Trigger	
2	nRESET	I	Reset	
3	LED	O	LED	
4	Buz	O	Beeper Output	
5	PIN 8	-	NULL	
6	USB_DP	I/O	USB D+ Signal	
7	USB_DN	I/O	USB D- Signal	
8	TXD	O	TTL Send	
9	RXD	I	TTL Receive	
10	GND	-	Ground	
11	VIN	-	5V Power Supply	
12	NC	-		

## 4.2.2 8-PIN Box Connector

PIN#	Signal	I/O	Function
1	POW_IN	-	5V Power Supply Input
2	GND	-	Power Supply Ground
3	RS232_RX/RS485_B/ WG_DATA1	I/O	RS232-RXD/TTL-232- RXD/RS485B-
4	RS232_TX/RS485_A/ WG_DATA0	I/O	RS232-TXD/TTL-232- TXD/RS485A-
5	USB_DP	I/O	USB_D+ Signal
6	USB_DN	I/O	USB_D- Signal
7	LED	O	LED
8	nTRIG	I	Trigger

**Notice:** FM700B serial is RS232 electric level.

## Connector/Cable Specifications (Unit: mm)

12-pin FPC connector and two 8-pin box connectors.

### 4.2.3 12-PIN FPC Connector

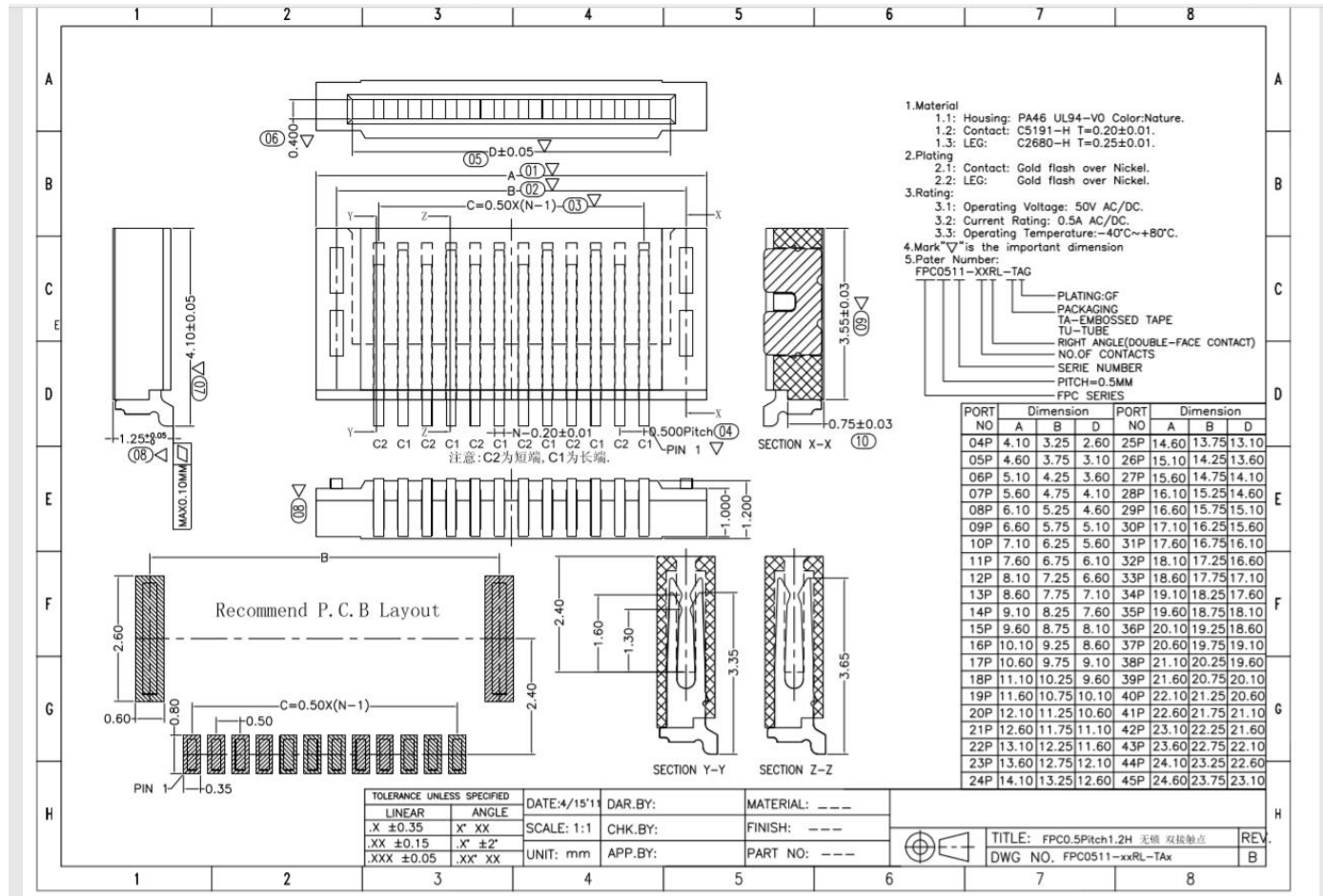


Figure 4-2



### 4.2.4 8-PIN RS232 Box Connector

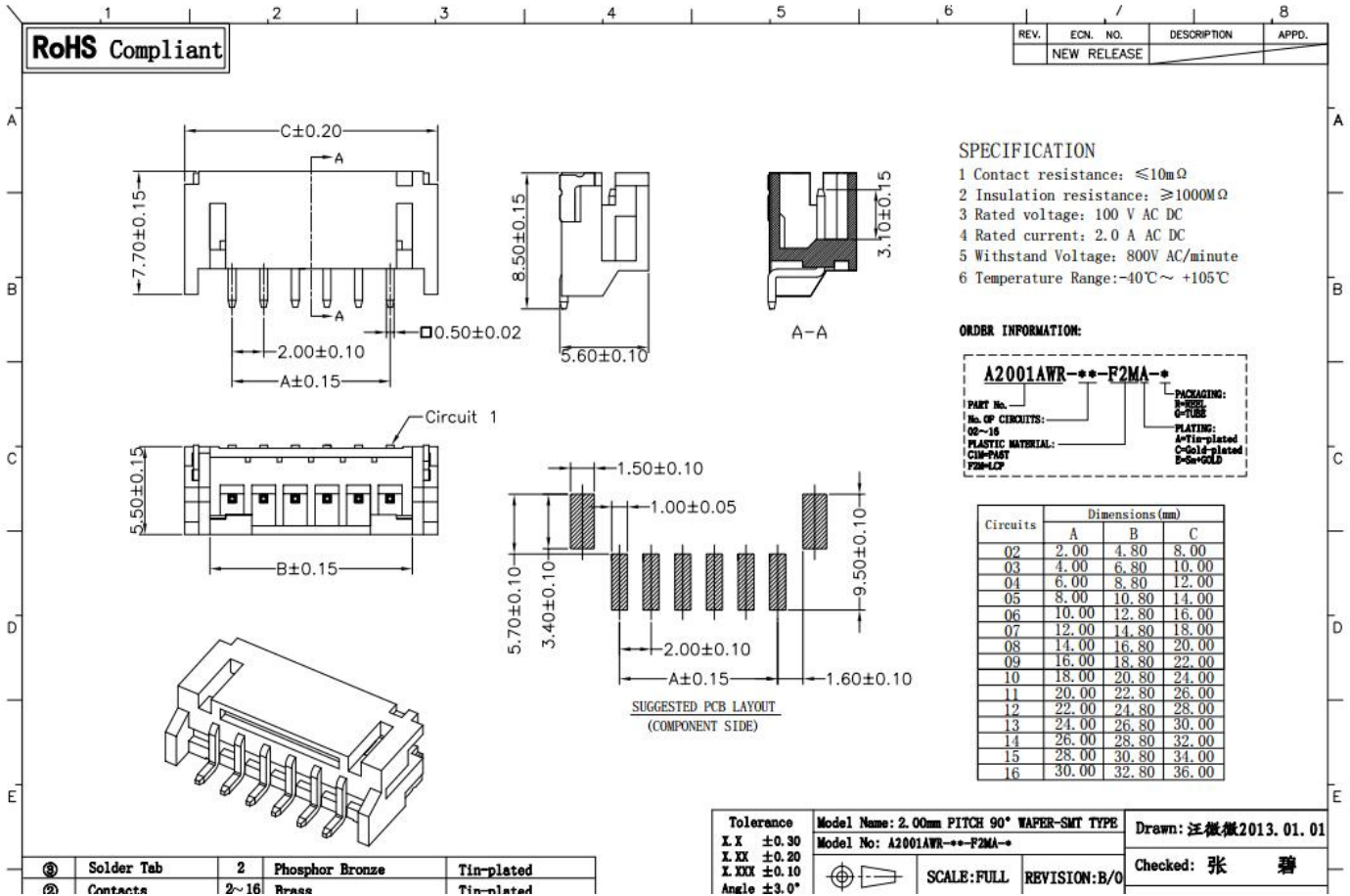


Figure 4-3

## 4.2.4 12-PIN FPC

A 12-pin cable can be used to connect the engine's 12-pin FPC connector to a host device.

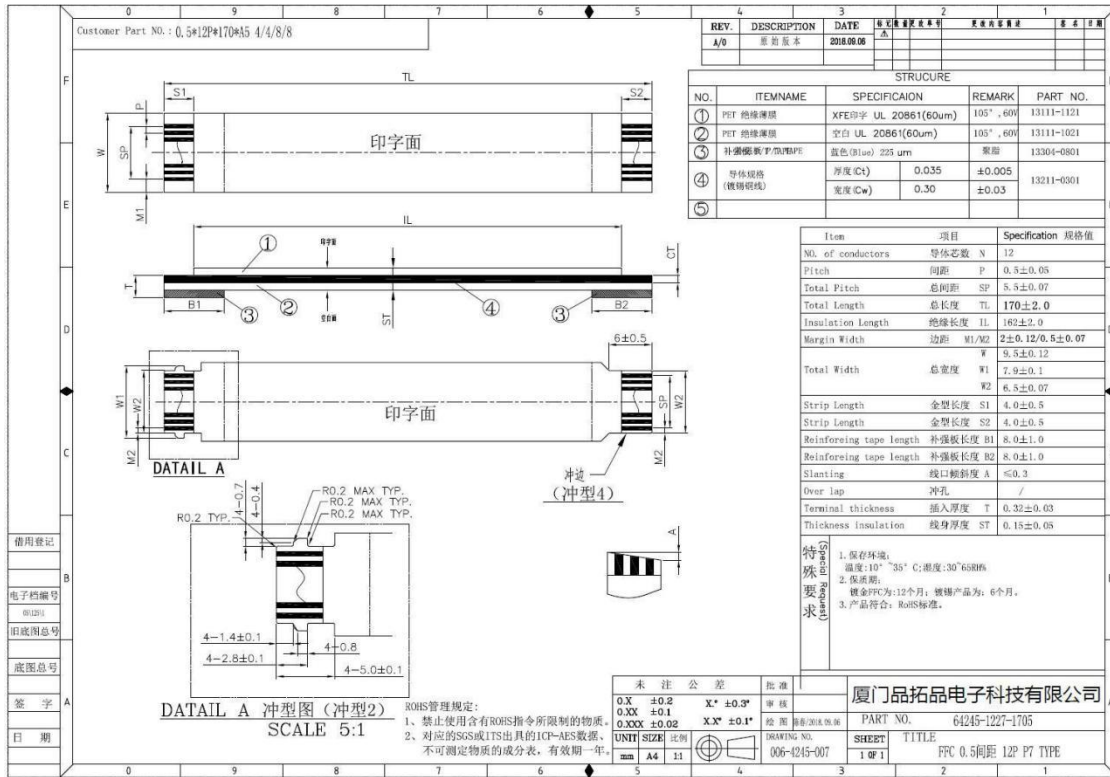


Figure 4-4

### 4.2.5 8-PIN USB Box Cable

A 8-pin female cable can be used to connect the engine's 8-pin box connector (male) to a host device

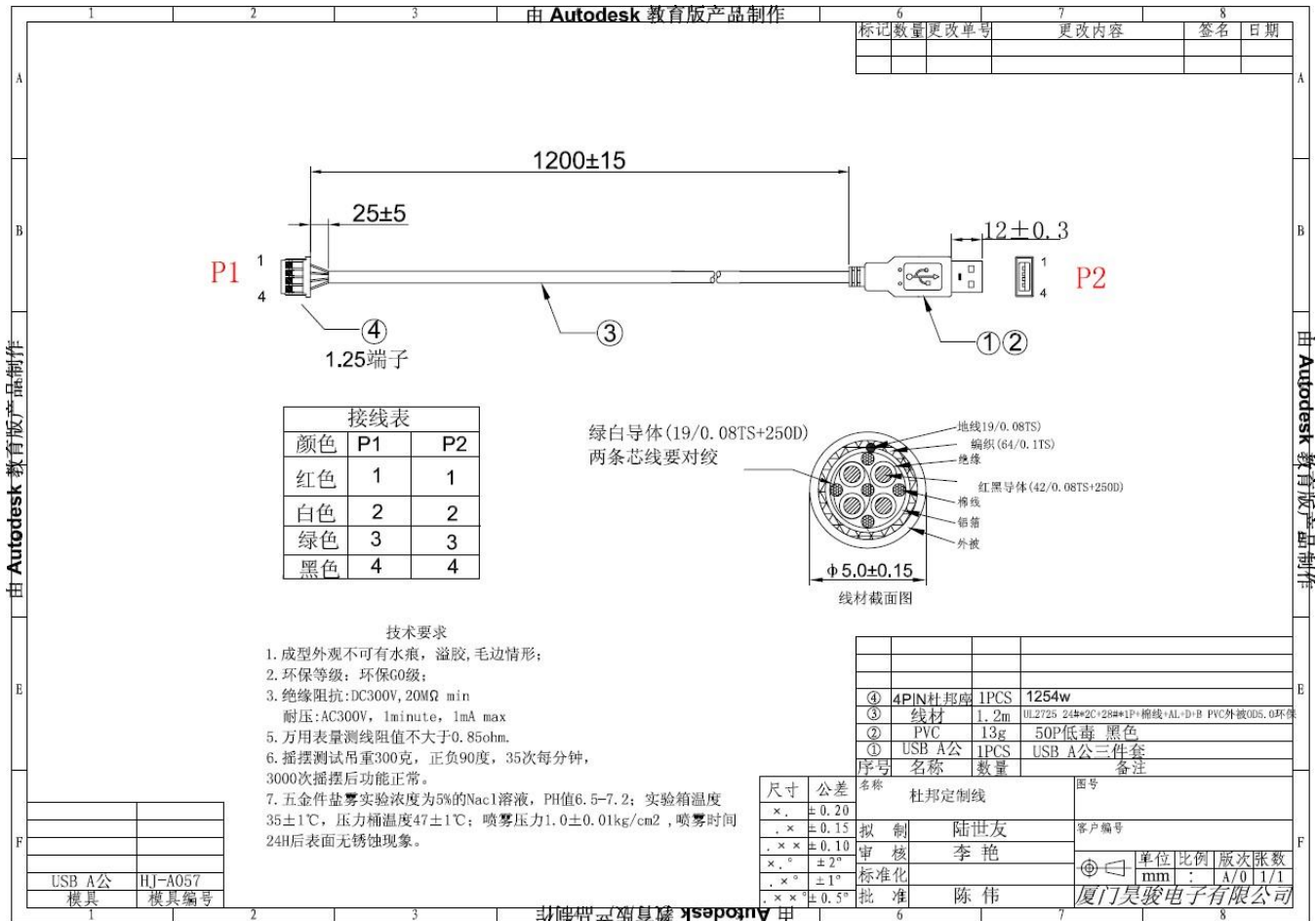


Figure 4-5

### 4.2.6 8-PIN RS-232 Box Cable

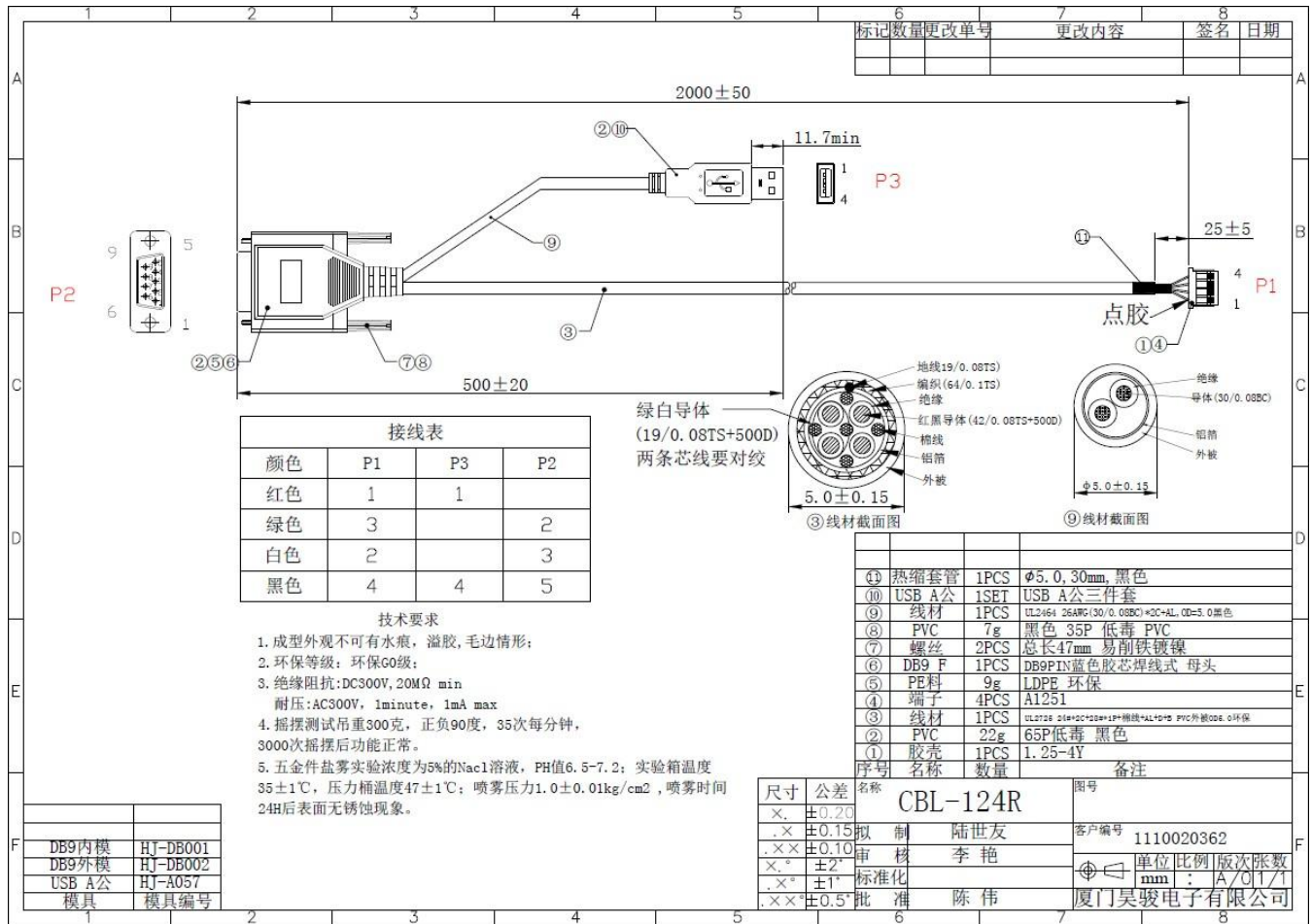


Figure 4-6