

MT82M (2D Scan Engine)

Integration Guide

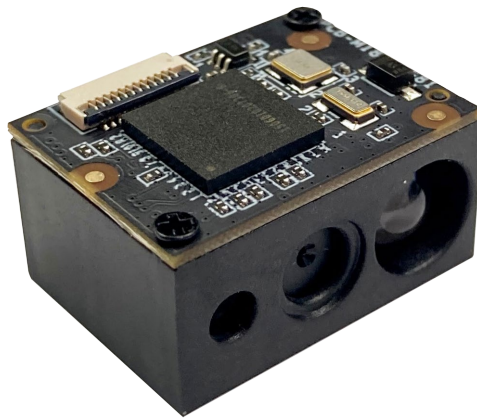


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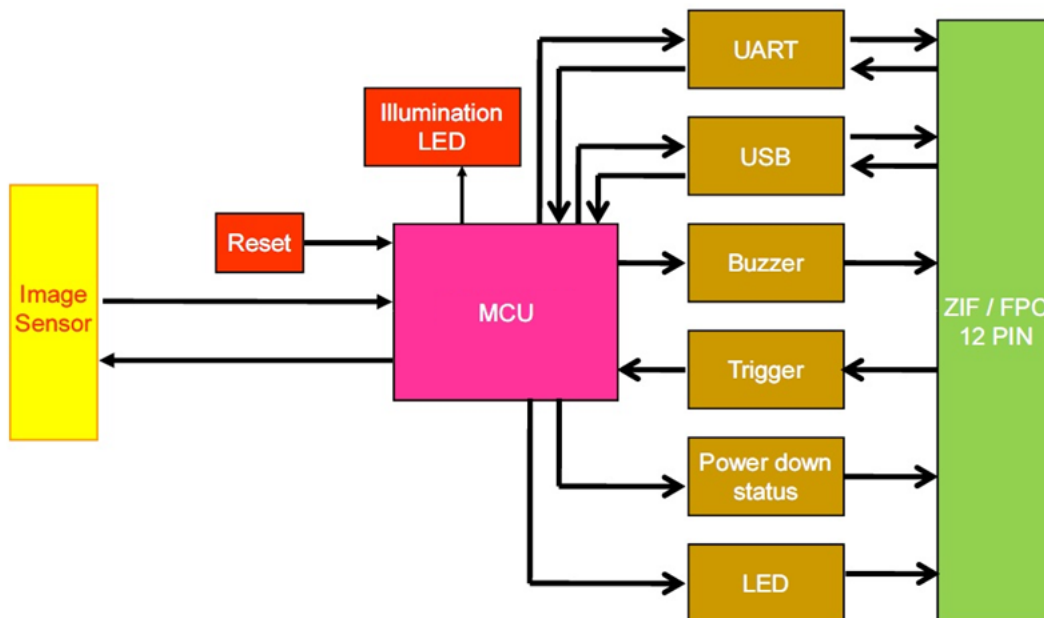
1. INTRODUCTION

MT82M One-piece Compact 2D Scan Engine provides snappy scanning performance at a competitive cost and compact form factor. With its all-in-one design, MT82M 2D scan engine can be easily integrated with specific applications such as access control, lottery kiosk and consumer electronics.

The MT82M 2D Scan Engine consists of 1 illumination LED, 1 aimer LED and a high-quality image sensor with a microprocessor that contains powerful firmware to control all aspects of operations and enable communication with the host system over the standard set of communication interfaces.

Multiple interfaces are available. UART interface communicates with the host system over UART communication; USB interface emulates a USB HID Keyboard or Virtual COM port device and communicates with the host system over USB.

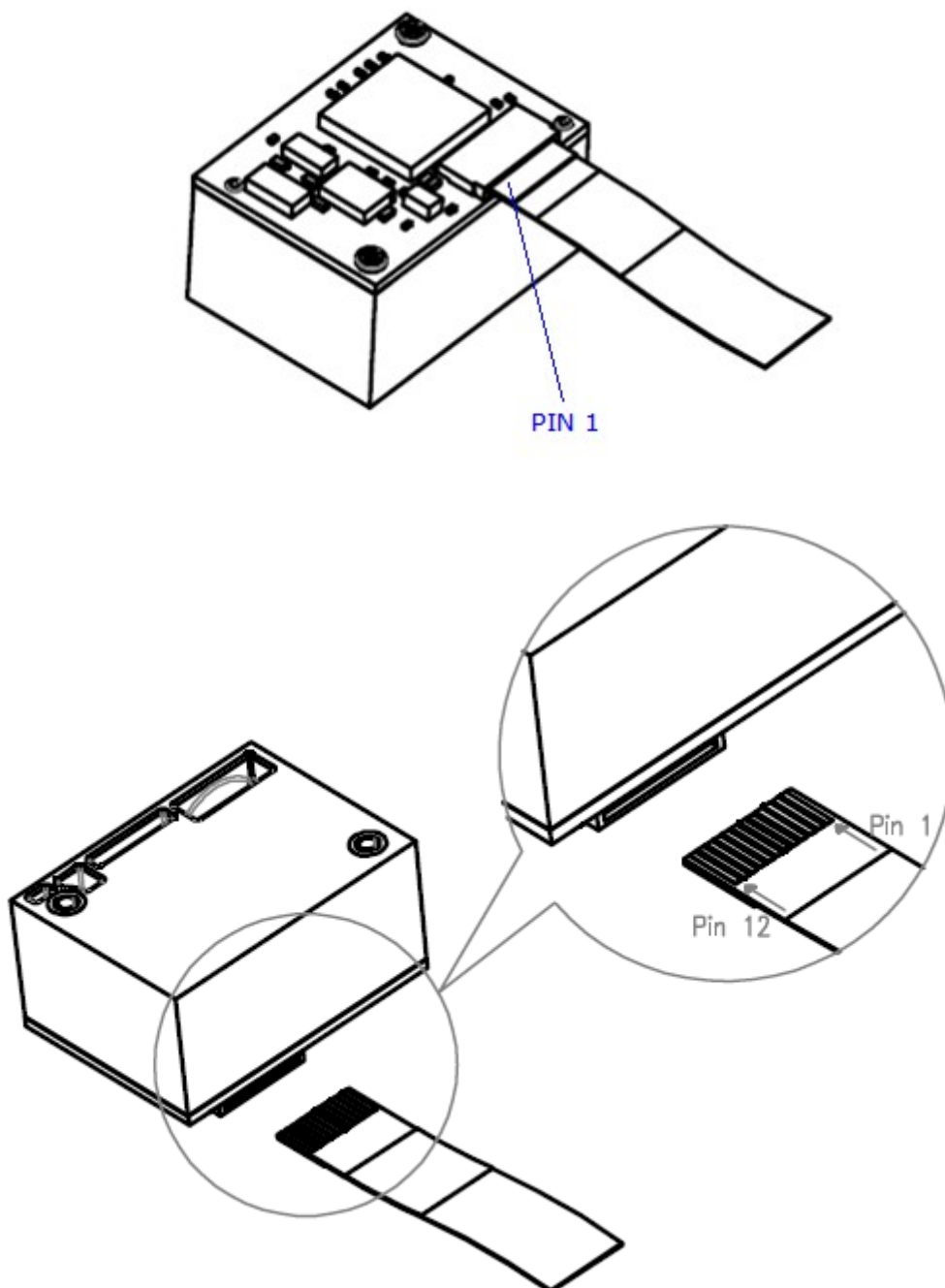
1-1. Block Diagram

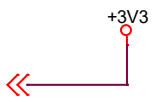

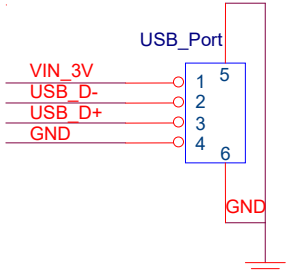
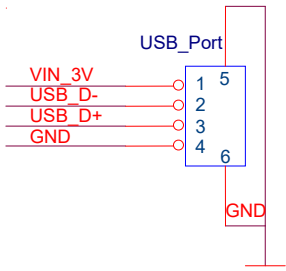


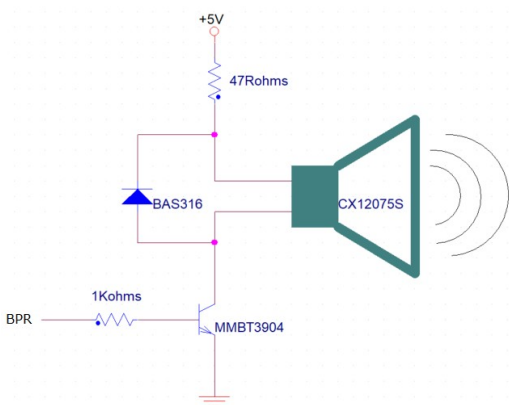
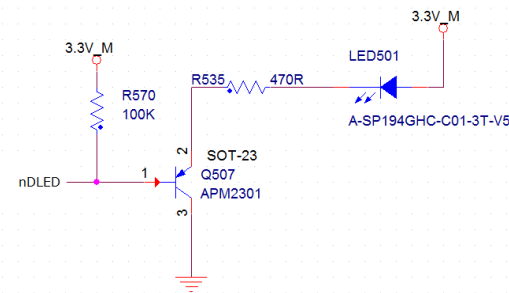
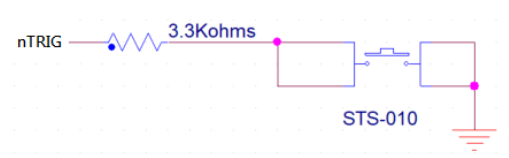
1-2. Electric Interface

1-2-1. Pin Assignment

The physical interface of MT82M consists of a 0.5-pitch 12-pin FPC connector. Below figure illustrates the position of the connector and pin1.



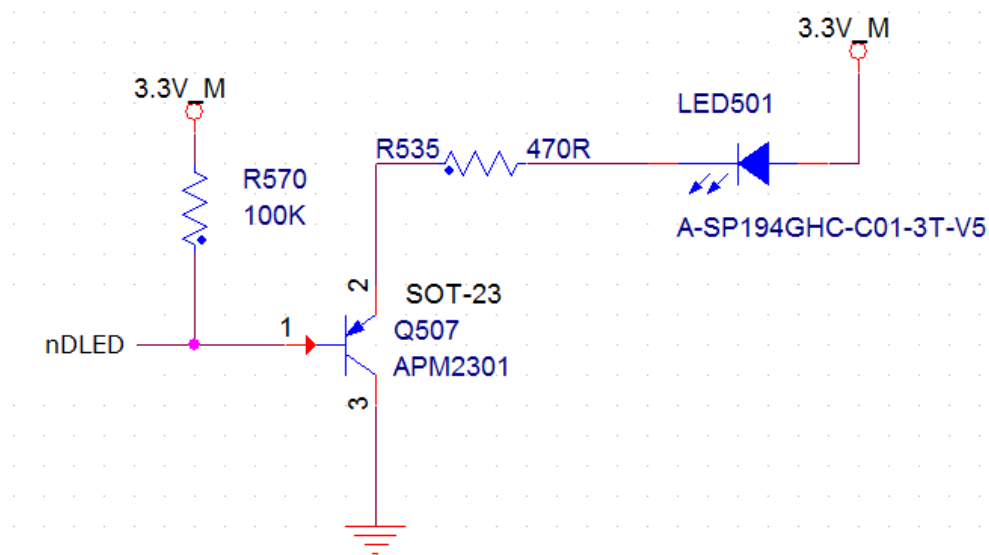
Pin#	Signal	I/O	Description	Schematic Example																														
1	NC	-----	Reserved																															
2	VIN	PWR	Power Supply: 3.3 VDC																															
3	GND	PWR	Power and signal ground.																															
4	RXD	Input	Received Data: Serial input port	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="6">RS232 IC</th> </tr> </thead> <tbody> <tr> <td>TXD</td> <td>11</td> <td>T11</td> <td>R10</td> <td>14</td> <td>RS232-TXD</td> </tr> <tr> <td>RTS</td> <td>10</td> <td>T21</td> <td>R20</td> <td>7</td> <td>RS232-RTS</td> </tr> <tr> <td>RXD</td> <td>12</td> <td>T10</td> <td>R11</td> <td>13</td> <td>RS232-RXD</td> </tr> <tr> <td>CTS</td> <td>9</td> <td>T20</td> <td>R21</td> <td>8</td> <td>RS232-CTS</td> </tr> </tbody> </table> <p style="text-align: center;">Sipex® Vendor P/N: SP232ACT</p>	RS232 IC						TXD	11	T11	R10	14	RS232-TXD	RTS	10	T21	R20	7	RS232-RTS	RXD	12	T10	R11	13	RS232-RXD	CTS	9	T20	R21	8	RS232-CTS
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6	D-	Bidirectional	USB Differential Signal Transmission (USB D-)																															
7	D+	Bidirectional	USB Differential Signal Transmission (USB D+)																															
8	PWRDWN/ WAKE	Input	Power Down: When high, the decoder is in low power mode Wake: When low, the																															

			decoder is in operating mode	
9	BPR	Output	Beeper: Low current beeper output.	
10	nDLED	Output	Decode LED: Low current decode LED output.	
11	NC	-----	Reserved	
12	nTRIG	Input	Trigger: Hardware triggering line. Driving this pin low causes the scanner to start a scan and decode session.	

1-2-2. External Circuit Design

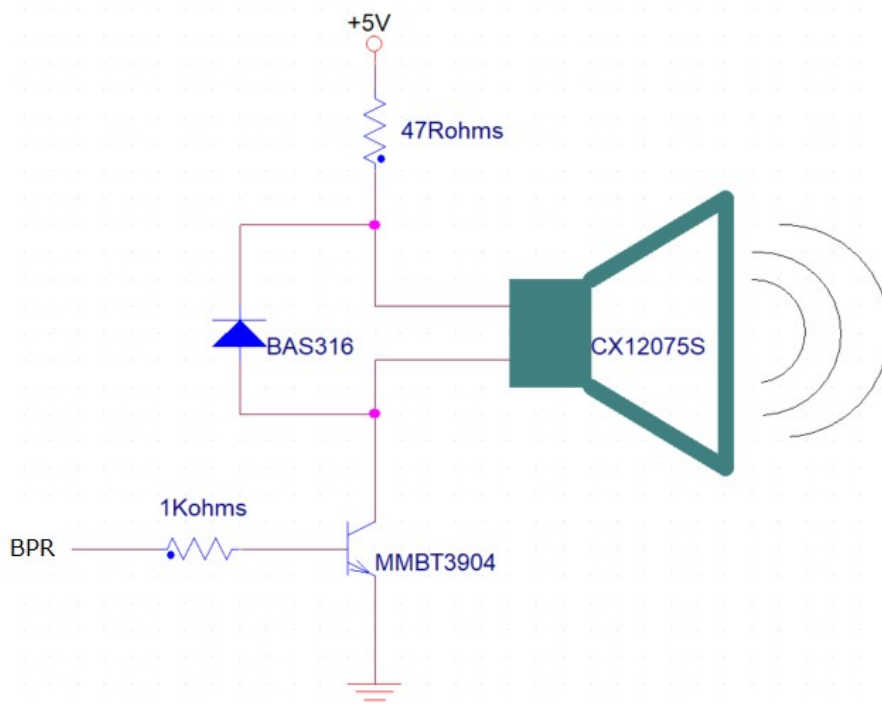
Good Read LED Circuit

The circuit below is used to driver an external LED for good read indication. The nDLED signal is from pin10 of the 12-pin FPC connector.



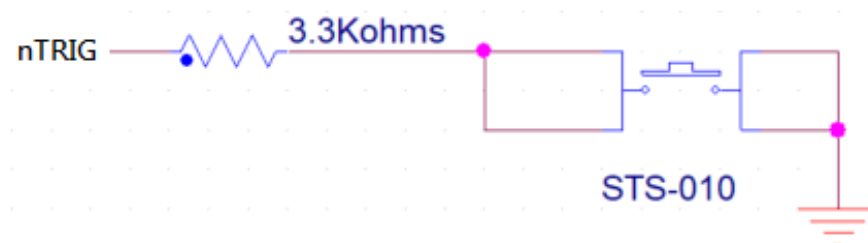
Beeper Circuit

The circuit below is used to driver external beeper. The BPR signal is from pin9 of the 12-pin FPC connector.



Trigger Circuit

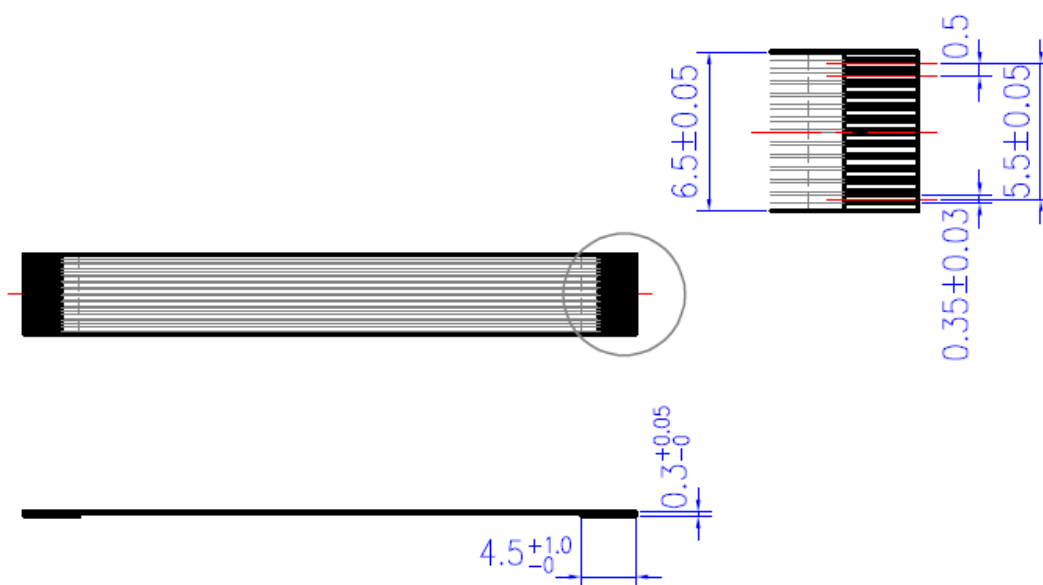
The circuit below is used to provide the scan engine with a signal to trigger a decode session. The nTRIG signal is from pin12 of the 12-pin FPC connector.



1-2-3. Cable Drawing

FFC Cable (unit:mm)

A 12-pin FFC cable can be used to connect the MT82M to host device. The cable design must be consistent with the specifications shown below. Use reinforcement material for the connectors on the cable and reduce cable impedance for reliable connection and stable performance



2. SPECIFICATIONS

2-1. Introduction

This chapter provides technical specifications of the MT82M. Operating method, scanning range and scan angle are also presented.

2-2. Technical Specifications

Optic & Performance	
Light Source	White LED
Aiming	Visible red LED
Sensor	1280 x 800 (Megapixel)
Resolution	3mil/ 0.075mm (1D) 7mil/ 0.175mm (2D)
Field of View	Horizontal 46° Vertical 29°
Scan Angle	Pitch Angle $\pm 60^\circ$ Skew Angle $\pm 60^\circ$ Roll Angle 360°
Print Contrast Ratio	20%
Typical Depth Of Field (Environment: 800 lux)	5 Mil Code39: 40 ~ 222mm
	13 Mil UPC/EAN: 42 ~ 442mm
	15 Mil Code128: 41 ~ 464mm
	15 Mil QR Code: 40 ~ 323mm
	6.67 Mil PDF417: 38 ~ 232mm
	10 Mil Data Matrix: 40 ~ 250mm
Physical Characteristics	
Dimension	W21.6 x L16.1 x H11.9 mm
Weight	3.7g
Color	Black
Material	Plastic
Connector	12pin ZIF (pitch=0.5mm)
Cable	12pin flex cable (pitch=0.5mm)
Electrical	

Operation Voltage	3.3VDC \pm 5%
Working Current	< 400mA
Standby Current	< 70mA
Low Power Current	10 mA \pm 5%
Connectivity	
Interface	UART
	USB (HID Keyboard)
	USB (Virtual COM)
User Environment	
Operating Temperature	-10°C ~ 50°C
Storage Temperature	-40°C ~ 70°C
Humidity	5% ~ 95%RH (Non-condensing)
Drop Durability	1.5M
Ambient Light	100,000 Lux (Sunlight)
1D Symbologies	UPC-A / UPC-E EAN-8 / EAN-13 Code 128 Code 39 Code 93 Code 32 Code 11 Codabar Plessey MSI Interleaved 2 of 5 IATA 2 of 5 Matrix 2 of 5 Straight 2 of 5 Pharmacode GS1 Databar GS1 Databar Expanded GS1 Databar Limited Composite Code-A/B/C
	2D Symbologies

	PDF417 MicroPDF417 Aztec MaxiCode DotCode
Regulatory	
ESD	Functional after 4KV contact, 8KV air discharge <i>(It requires housing that is designed for ESD protection and stray from electric fields.)</i>
EMC	TBA
Safety Approval	TBA
Environmental	WEEE, RoHS 2.0

2-3. Interface

2-3-1. UART Interface

When the scan engine is connected to the UART port of a host device, the scan engine will automatically enable UART communication.

Below are default communication protocols:

Baud rate: 9600

Data Bits: 8

Parity: None

Stop Bit: 1

Handshaking: None

Flow Control Timeout: None

ACK/NAK: OFF

BCC: OFF

Interface Configuration Barcode:

Step1:



Enter Setup

Step2:



UART

Step3:



Exit Setup

2-3-2. USB HID Interface

The transmission will be simulated as USB keyboard input. The Host receives keystrokes on the virtual keyboard. It works on a Plug and Play basis and no driver is required.

Interface Configuration Barcode:

Step1:



Enter Setup

Step2:



USB HID

Step3:



Exit Setup

2-3-3. USB VCP Interface

If scanner is connected to the USB port on a host device, the USB VCP feature allows the host device to receive data in the way as a serial port does. A driver is needed when using this feature.

Interface Configuration Barcode:

Step1:



Enter Setup

Step2:



USB VCP

Step3:



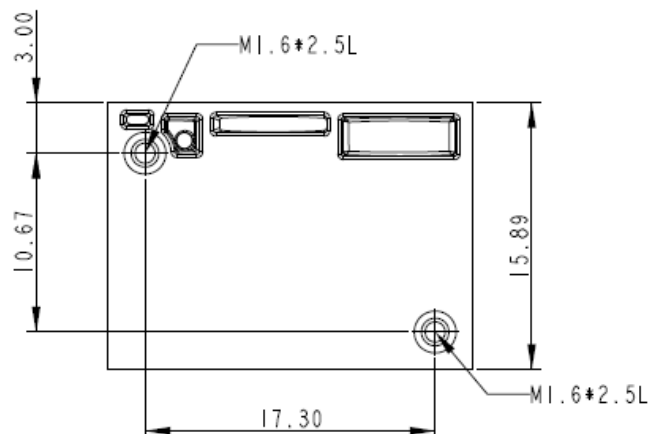
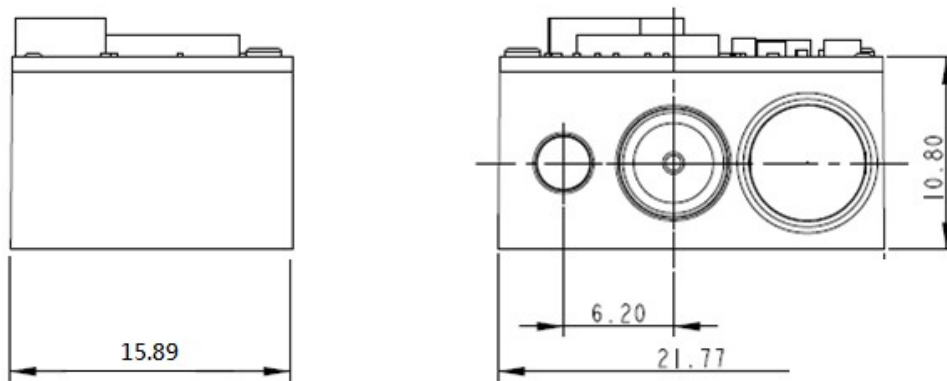
Exit Setup

2-4. Operation Method

1. At power-up, the MT82M sends the Power-Up signals over Buzzer and LED pins as an indication that the MT82M enters **Standby Mode** and is ready for operation.
2. Once the MT82M triggered by either hardware or software method, MT82M will emit a beam of light which is aligned with the sensor's field of view.
3. The area image sensor captures the image of barcode and produces an analog waveform, which is sampled and analyzed by the decoder firmware running on the MT82M.
4. Upon a successful barcode decoded, the MT82M turns off the illumination LEDs, sending the Good Read signals over Buzzer and LED pins and transmitting the decoded data to the host.

2-5. Mechanical Dimension

(Unit = mm)



3. INSTALLATION

The scan engine is designed specifically for integration into customer's housing for OEM applications. However, the scan engine's performance will be adversely affected or permanently damaged when mounted into an unsuitable enclosure.

Warning: The limited warranty is void if the following recommendations are not adhered to when mounting the scan engine.

3-1. Electrostatic Discharge Cautions

All scan engines are shipped in ESD protective packaging due to the sensitive nature of the exposed electrical components.

1. ALWAYS use grounding wrist straps and a grounded work area when unpacking and handling the scan engine.
2. Mount the scan engine in a housing that is designed for ESD protection and stray electric fields.

3-2. Mechanical Dimension

When securing the scan engine by utilizing the machine screws:

1. Leave sufficient space to accommodate the maximum size of the scan engine.
2. Do not exceed 1kg-cm (0.86 lb-in) of torque when securing the scan engine to the host.
3. Use safe ESD practices when handling and mounting the scan engine.

3-3. Window Materials

Following are descriptions of three popular window materials:

1. Poly-methyl Methacrylic (PMMA)
2. Allyl Diglycol Carbonate (ADC)
3. Chemically tempered float glass

Cell Cast Acrylic (ASTM: PMMA)

Cell cast Acrylic, or Poly-methyl Methacrylic is fabricated by casting acrylic between two precision sheet of glass. This material has very good optical quality, but is relatively soft and susceptible to attack by chemicals, mechanical stress and UV light. It is strongly recommended to have acrylic hard-coated with Polysiloxane to provide abrasion resistance and protection from environmental factors. Acrylic can be laser-cut into odd shapes and ultrasonically welded.

Cell Cast ADC, Allyl Diglycol Carbonate (ASTM: ADC)

Also known as CR-39™, ADC, a thermal setting plastic widely used for plastic eyeglasses, has excellent chemical and environmental resistance. It also has an inherently moderate surface hardness and therefore does not require hard-coating. This material cannot be ultrasonically welded.

Chemically Tempered Float Glass

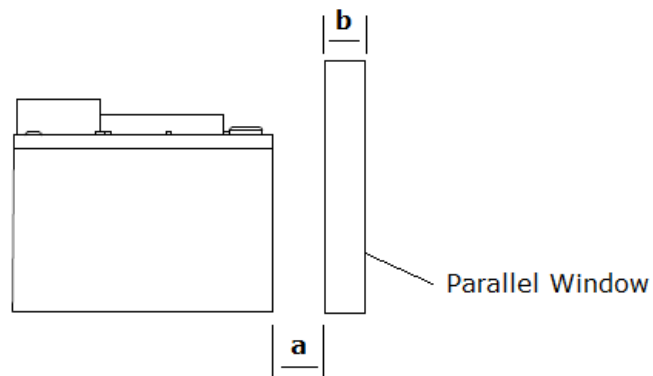
Glass is a hard material which provides excellent scratch and abrasion resistance. However, un-annealed glass is brittle. Increased flexibility strength with minimal optical distortion requires chemical tempering. Glass cannot be ultrasonically welded and is difficult to cut into odd shapes.

Property	Description
Spectral Transmission	85% minimum from 635 to 690 nanometers
Thickness	< 1 mm
Coating	Both sides to be anti-reflection coated to provide 1% maximum reflectivity from 635 to 690 nanometers at nominal window tilt angle. An anti-reflection coating can reduce the light that is reflected back to the host case. Coatings will comply with the hardness adherence requirements of MIL-M-13508.

3-4. Window Placement

The window should be positioned properly to let the illumination and aiming beams pass through as much as possible and no reflections back into the engine. An improperly designed internal housing or improper selection of window material can degrade the engine's performance.

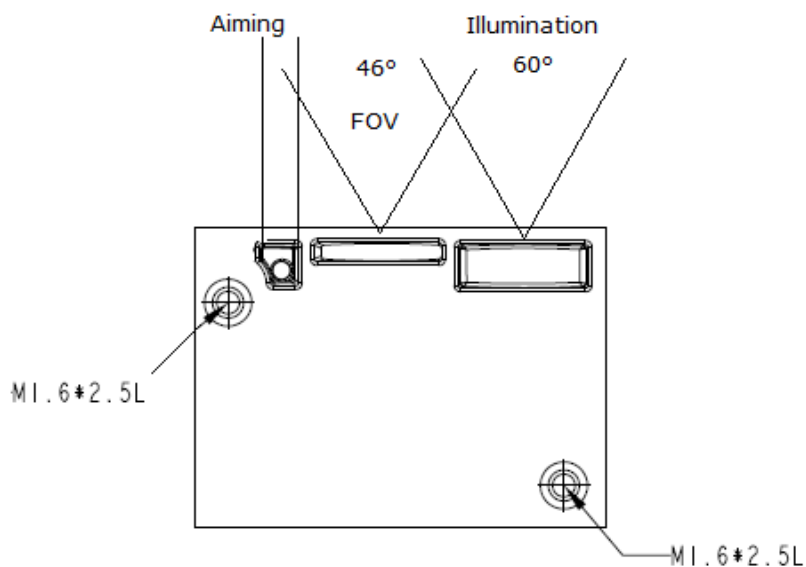
MT82M Side View



The front of the engine housing to the furthest surface of the window should not exceed $a+b$ ($a \leq 0.1\text{mm}$, $b \leq 2\text{mm}$).

3-5. Window Size

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



3-6. Window Care

In the aspect of window, the performance of MT82M will be reduced due to any kind of scratch. Thus, reducing the damage of window, there are few things have to be noticed.

1. Avoid touching the window as much as possible.
2. When cleaning the window surface, please use non-abrasive cleaning cloth, and then gently wipe the host window with the cloth that is already sprayed with glass cleaner.

4. REGULATIONS

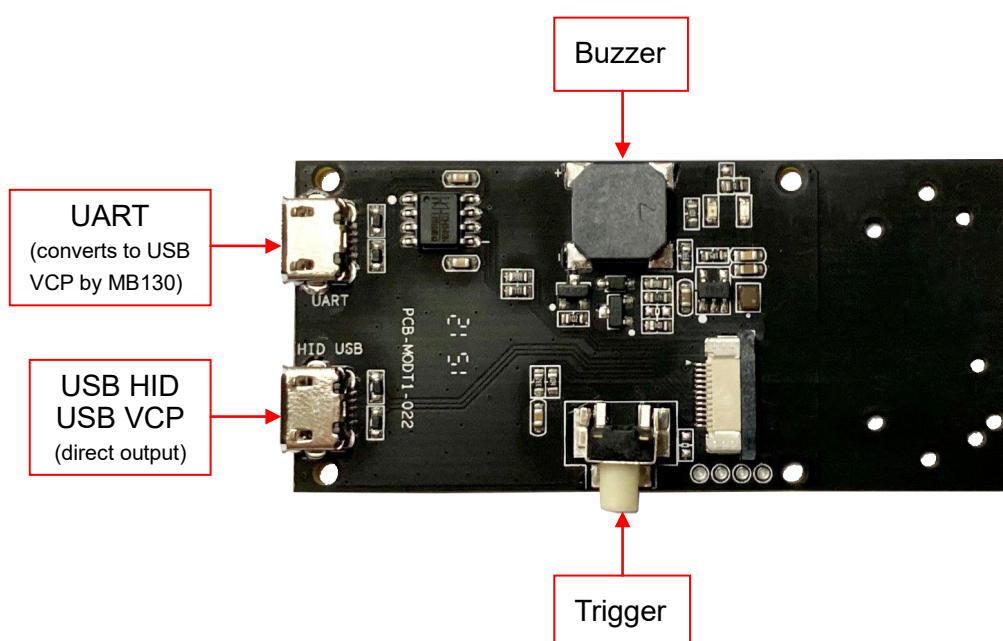
The MT82M scan engine conforms to the following regulations:

1. Electromagnetic Compliance – [TBA](#)
2. Electromagnetic Interference – [TBA](#)
3. Photobiological Safety – [TBA](#)
4. Environmental Regulations – RoHS 2.0, WEEE

5. DEVELOPMENT KIT

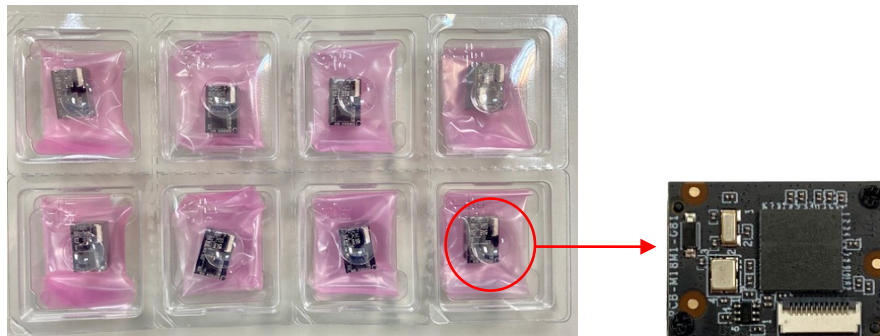
MB130 Demo Kit (P/N: [11D0-A020000](#)) includes an MB130 Multi I/O Board (P/N: [9014-3100000](#)) and a micro USB cable. MB130 Multi I/O Board serves as an interface board for MT82M and accelerates the testing and integration with the host system. Please contact your sales representative for ordering information.

MB130 Multi I/O Board (P/N: [9014-3100000](#))



6. PACKAGING

1. **Tray** (size: 24.7 x 13.7 x 2.7cm): Each tray contains 8pcs of [MT82M](#).



2. **Box** (size: 25 x 14 x 3.3cm): Each Box contains 1pc of tray, or 8pcs of [MT82M](#).



3. **Carton** (size: 30 x 27 x 28cm): Each Carton contains 16pcs of boxes, or 128pcs of [MT82M](#).



7. VERSION HISTORY

Rev.	Date	Description	Issued
0.1	2022.02.11	Preliminary Draft Release	Shaw
0.2	2022.07.26	Updated Schematic Example, Scan Rate, Operating Temp.	Shaw
0.3	2023.09.01	Updated Development Kit	Shaw
0.4	2023.10.03	Revised RS232 to UART Removed Scan Rate Updated Typical D.O.F, Dimension, Weight, Working Current, Standby Current	Shaw

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