



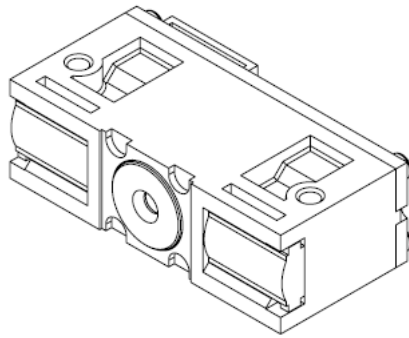
*MT780 Linear Image Barcode Scan Engine, Integration Guide, V2.0*

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## **MT780**

**(3.3V Linear Image Barcode Scan Engine)**

# **Integration Guide**





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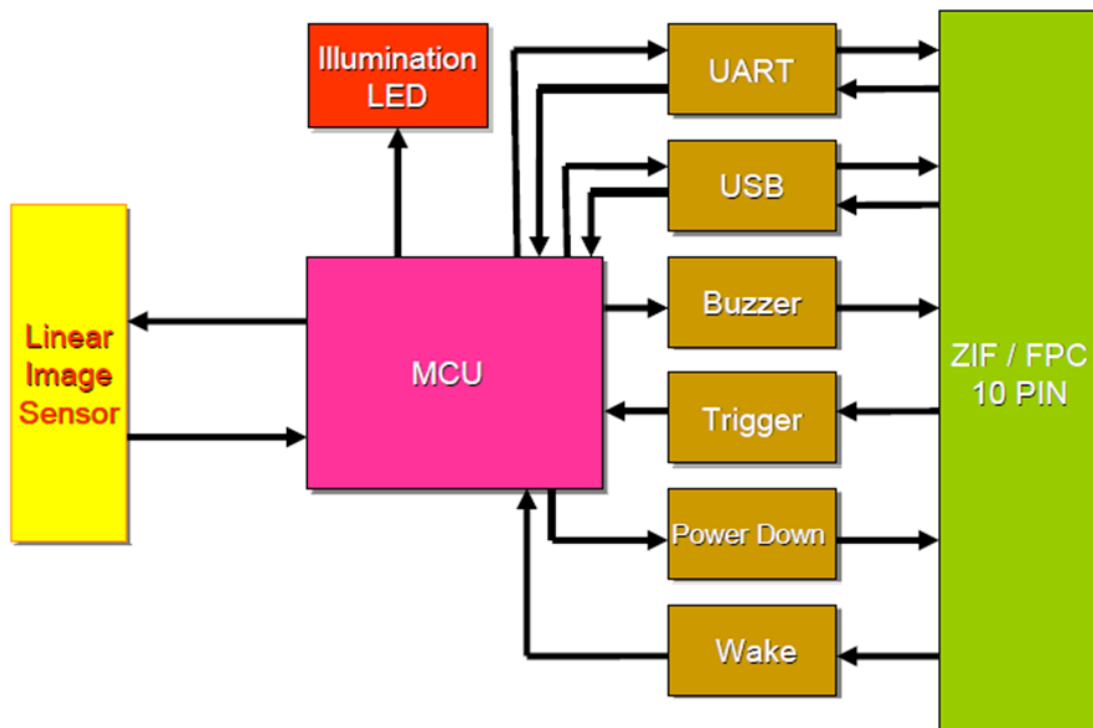
# 1. INTRODUCTION

The MT780 Linear Image Barcode Scan Engine is designed for 1D barcode reading, and high performance barcode scanning with optimal performance and easy integration. MT780 is ideal for integration into data terminals and other small mobile devices.

The MT780 consists of 2 illumination LEDs, a high-quality linear image sensor and 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.

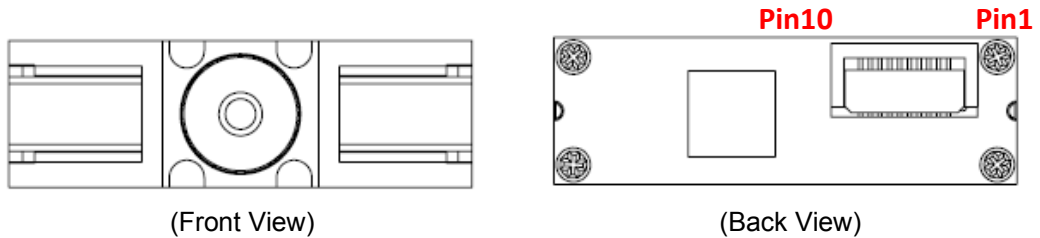
Two interfaces, UART & USB, are available. UART interface communicates with the host system over TTL-level RS232 communication; USB interface emulates a USB Keyboard device and communicates with the host system over USB.


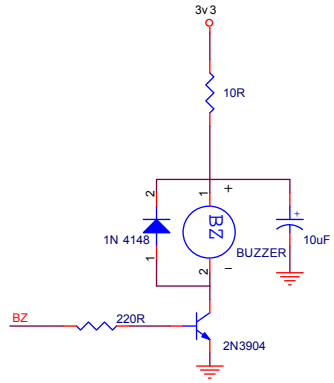
## 1-1. MT780 Block Diagram



## 1-2. Electric Interface

### 1-2-1. Pin Assignment



| Pin# | UART       | USB        | I/O    | Description       | Schematic Example   |
|------|------------|------------|--------|-------------------|---|
| 1    | Power Down | Power Down | Output | Power Down Status | High: Scan engine in idle mode<br>Low: Scan engine in normal operation  |
| 2    | VDD        | VDD        | ---    | Power Supply      | Operating Voltage: 3.3V $\pm$ 5%<br><br><i>*Note: An input voltage with capacitance value of at least 10<math>\mu</math>F.</i>  |
| 3    | GND        | GND        | ---    | Ground            |    |
| 4    | Wake       | Wake       | Input  | Wake Up           | Active Low: Wake up scan engine from idle mode  |
| 5    | Buzzer     | Buzzer     | Output | Beeper output     | Active High: Power-Up or a successful barcode decode. PWM controlled signal can be used to drive an external buzzer<br><br> |



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| Pin#     | UART    | USB     | I/O            | Description          | Schematic Example  |          |  |  |  |  |  |     |    |     |     |    |           |     |    |     |     |   |           |     |    |     |     |    |           |     |   |     |     |   |           |
|----------|---------|---------|----------------|----------------------|--|----------|--|--|--|--|--|-----|----|-----|-----|----|-----------|-----|----|-----|-----|---|-----------|-----|----|-----|-----|----|-----------|-----|---|-----|-----|---|-----------|
| 6        | Trigger | Trigger | Input          | Trigger input        | <p>High: Power-up/Standby<br/>Low: Scanning Operation</p> <p><i>*Note:</i></p> <ol style="list-style-type: none"> <li>Scanning operation continues until a barcode is successfully decoded or the trigger is released (pull high). To proceed to the next scanning operation, release (pull high) first and press (pull low) the trigger again.</li> <li>Pull low at power-up will prompt the scan engine into firmware update mode</li> </ol>   |          |  |  |  |  |  |     |    |     |     |    |           |     |    |     |     |   |           |     |    |     |     |    |           |     |   |     |     |   |           |
| 7        | ---     | USB_DP  | Input / Output | USB Signal D+        | Differential Signal Transmission   |          |  |  |  |  |  |     |    |     |     |    |           |     |    |     |     |   |           |     |    |     |     |    |           |     |   |     |     |   |           |
| 8        | ---     | USB_DM  | Input / Output | USB Signal D-        | Differential Signal Transmission   |          |  |  |  |  |  |     |    |     |     |    |           |     |    |     |     |   |           |     |    |     |     |    |           |     |   |     |     |   |           |
| 9        | RXD     | ---     | Input          | UART TTL data input  | <table border="1"> <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>Sipex® Vendor P/N: <a href="#">SP232ACT</a></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 |
| 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  |          |  |  |  |  |  |     |    |     |     |    |           |     |    |     |     |   |           |     |    |     |     |    |           |     |   |     |     |   |           |
| 10       | TXD     | ---     | Output         | UART TTL data output | <table border="1"> <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>Sipex® Vendor P/N: <a href="#">SP232ACT</a></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 |
| 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  |          |  |  |  |  |  |     |    |     |     |    |           |     |    |     |     |   |           |     |    |     |     |    |           |     |   |     |     |   |           |

### 1-2-2. Electric Characteristics

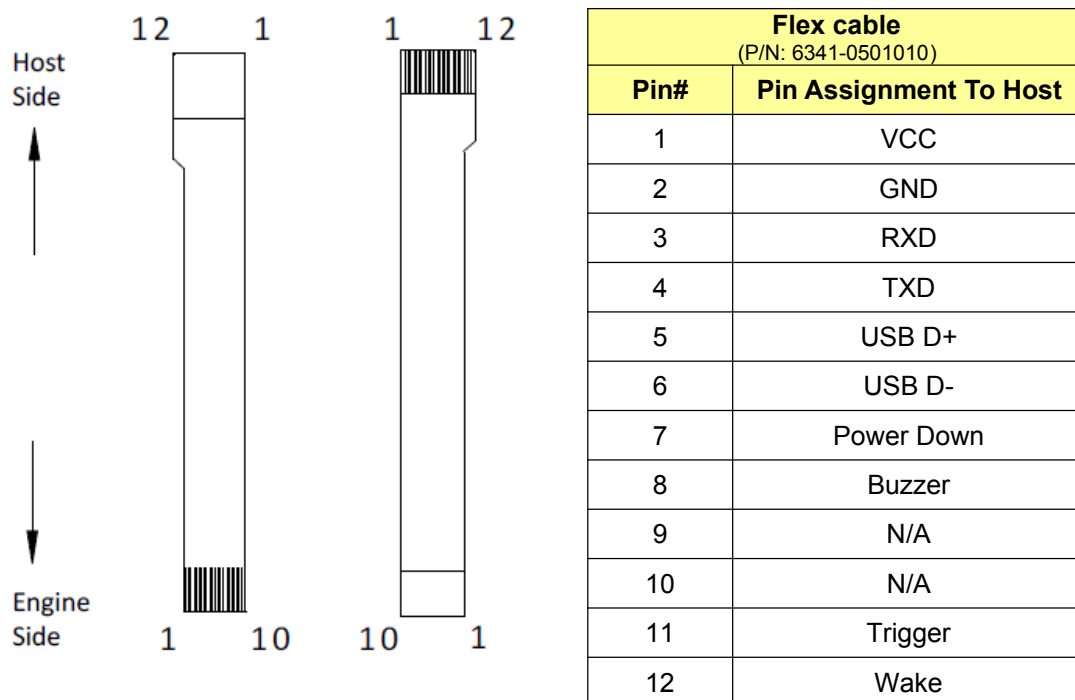
| Symbol             | Ratings  | Min   | Max | Unit |
|--------------------|--|---|-----|------|
| $V_{IH}$           | Input high level                                   | 2.0   | 3.6 | V    |
| $V_{IL}$           | Input low level                                    | 0   | 0.8 | V    |
| $V_{OH}$           | Output high level                                  | 2.9   |     | V    |
| $V_{OL}$           | Output low level                                   |   | 0.4 | V    |
| $V_{ESD(HBM)}$     | Electrostatic discharge voltage (human body model) | ±4kV contact direct discharge, ±8kV indirect discharge. Requires housing that is designed for ESD protection and stray electric fields. |     | kV   |
| $ \Delta V_{DDx} $ | Variations between different $V_{DD}$ power pins   |   | 50  | mV   |

**\*Note:**

1. Power Supply:  $V_{DD}=3.3 \pm 5\%$
2. Exposure to maximum rating conditions for extended periods may affect device reliability.

### 1-2-3. Flex Cable

The flex cable is used to connect MT780 to the host side. There are 10 pins on the MT780 (engine) side and 12 pins on the host side. Please see 2-10 for more details of flex cable.



**\*Note:** Conforms to Marson MT700's pin assignment.



### 1-3. Operational Timing

This chapter describes the timing associated with the various operating modes of the MT780 including Power Up, Sleep Mode, and Decode Timing.

#### 1-3-1. Power Up

When power is initially applied, the MT780 is activated and begins the process of initialization. Once initialization (duration  $\leq 10\text{mS}$ ) is completed, the MT780 emits a power-up beep, enters **Standby Mode** and is ready for barcode scanning.

#### 1-3-2. Sleep (Idle) Mode

The MT780 will enter **Sleep (Idle) Mode** and output a Power Down signal (Active high) after a programmable time period has elapsed without any activity. Please see Chapter 6 for more details about Sleep Mode.

#### 1-3-3. Decode Timing

In **Standby Mode**, the MT780 is activated by the Trigger signal which **MUST** be kept low for at least 20 mS until the successful scan is achieved, as indicated by the Buzzer signal.

The total scan and decode time is approximately equal to the time from the Trigger signal going low to the Buzzer signal going high. This time will vary slightly based on several factors including barcode quality, barcode type and the distance between MT780 and the barcode scanned. The following waveforms show a typical condition.

Upon a successful scan, the MT780 outputs the Buzzer signal and keeps this signal for the duration of the transmission of the data decoded to the host side. The duration is about 80 mS.

Therefore, the total duration of a typical scanning operation (from Trigger turning low to the end of Buzzer PWM signal) is approximately 120mS.



In **Sleep Mode**, the MT780 can be by the Trigger signal which **MUST** be kept low for at least 20 mS until the successful scan is achieved, as indicated by the Buzzer signal. Wake signal can also be used to wake up the MT780, which, **MUST** also be kept low for at least 2 mS, will prompt the scan engine into **Standby Mode**.

The total scan and decode time is approximately equal to the time from the Trigger signal going low to the Buzzer signal going high. This time will vary slightly based on several factors including barcode quality, barcode type and the distance between MT780 and the barcode scanned. The following waveforms show a typical condition.

Upon a successful scan, the MT780 outputs the Buzzer signal and keeps this signal for the duration of the transmission of the data decoded to the host side. The duration is about 80 mS.

Therefore, the total duration of a typical scanning operation (from Trigger turning low to the end of Buzzer PWM signal) is also approximately 120mS.

#### **1-3-4. Summary of Operation Timings**

The maximum duration of initialization is 10mS.

The maximum duration of scanning operation in **Standby Mode** is 120mS.

The maximum duration of waking up MT780 from **Sleep Mode** by Trigger/Wake signal is about 2 ms.

The maximum duration of waking up MT780 from **Sleep Mode** by Trigger signal and completing decode is about 120ms.





## 2. SPECIFICATIONS

### 2-1. Introduction

This chapter provides technical specifications of the MT780 scan engine. Operating method, scanning range and scan angle are also presented.

### 2-2. Technical Specifications

| Optic & Performance                             |   |                        |
|---|---|------------------------|
| <b>Light Source</b>                             | 625nm visible red LED                     |                        |
| <b>Sensor</b>                                   | CMOS Linear Sensor                        |                        |
| <b>Scan Rate</b>                                | 620 Scans/ sec (Smart Detection)          |                        |
| <b>Resolution</b>                               | 3mil/ 0.075mm                             |                        |
| <b>Scan Angle</b>                               | 53°                                       |                        |
| <b>Print Contrast Ratio</b>                     | 30%                                       |                        |
| <b>Width of Field</b>                           | 200mm (13Mil Code39)                      |                        |
| <b>Depth Of Field</b><br>(Environment: 800 lux) | <b>3 mil Code39</b>                       | 72 ~ 92mm (13 digits)  |
|   | <b>4 mil Code39</b>                       | 65 ~ 125mm (4 digits)  |
|   | <b>5 mil Code39</b>                       | 65 ~ 165mm (4 digits)  |
|   | <b>10 mil Code39</b>                      | 30 ~ 290mm (4 digits)  |
|   | <b>15 mil Code39</b>                      | 40 ~ 420mm (4 digits)  |
|   | <b>13 mil UPC/ EAN</b>                    | 35 ~ 330mm (13 digits) |
| Physical Characteristics                        |   |                        |
| <b>Dimension</b>                                | (L)23.7 x (W)12.2 x (H)7.5 mm             |                        |
| <b>Weight</b>                                   | 2g  |                        |
| <b>Color</b>                                    | Black                                     |                        |
| <b>Material</b>                                 | PC  |                        |
| <b>Connector</b>                                | 10pin (pitch = 0.5mm) ZIF                 |                        |
| <b>Cable</b>                                    | 10pin to 12pin (pitch = 0.5mm) flex cable |                        |
| Electrical                                      |   |                        |
| <b>Operation Voltage</b>                        | 3.3VDC±5%                                 |                        |
| <b>Working Current</b>                          | < 170 mA                                  |                        |
| <b>Standby Current</b>                          | < 60 mA                                   |                        |
| <b>Idle Current (Sleep Mode)</b>                | < 100 uA                                  |                        |
| <b>Surge Current</b>                            | < 500 mA                                  |                        |



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| <b>Connectivity</b>          |  |
|------------------------------|--|
| <b>Interface</b>             | UART (TTL-level RS232)   |
|                              | USB (HID Keyboard)   |
| <b>User Environment</b>      |  |
| <b>Operating Temperature</b> | -10°C ~ 50°C   |
| <b>Storage Temperature</b>   | -20°C ~ 60°C   |
| <b>Humidity</b>              | 0% ~ 95%RH (Non-condensing)  |
| <b>Drop Durability</b>       | 1.5M   |
| <b>Ambient Light</b>         | 100,000 Lux (Sunlight)   |
| <b>Symbologies</b>           | UPC-A/ UPC-E<br>EAN-8/ EAN-13<br>Matrix 2 of 5<br>China Postal Code (Toshiba Code)<br>Industrial 2 of 5<br>Interleaved 2 of 5<br>Standard 2 of 5 (IATA Code)<br>Codabar<br>Code 11<br>Code 32<br>Standard Code 39<br>Full ASCII Code 39<br>Code 93<br>Code 128<br>EAN/ UCC 128<br>MSI Plessey Code<br>UK Plessey Code<br>Telepen Code<br>GS1 Databar |
| <b>Regulatory</b>            |  |
| <b>ESD</b>                   | Functional after 4KV contact, 8KV air discharge (it requires housing that is designed for ESD protection and stray from electric fields.)  |
| <b>EMC</b>                   | FCC – Part15 Subpart B (Class B)<br>CE – EN55022, EN55024  |
| <b>Safety Approval</b>       | IEC 62471 (Exempt Group)   |
| <b>Environmental</b>         | WEEE, RoHS 2.0   |



## 2-3. Interface

MT780 supports both UART and USB output interface.

### 2-3-1. UART Interface

Below default values of communication parameters apply to both Standard mode and Command mode firmware.

**Baud rate:** 9600

**Data Bits:** 8

**Parity:** None

**Stop Bit:** 1

**Handshaking:** None

**Flow Control Timeout:** None

**ACK/NAK:** OFF

**BCC:** OFF

#### A. Standard Mode

Firmware version: [SM3-e-x.xx](#)

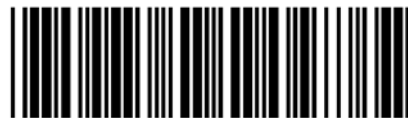
(P/N: [1780-A000000](#))

#### **Characteristics:**

- (1) Configurable by scanning configuration barcodes from [Universal User's Manual](#) or by [Ez Utility](#)<sup>®</sup>, a PC-based software utility.  
*(Both manual & utility are available for download at [www.marson.com.tw](http://www.marson.com.tw))*
- (2) Supports hardware trigger only

#### **Interface Configuration Barcode:**

. C002\$



**UART**

Scanning above barcode will set your MT780 to UART interface.



## **B. Command Mode**

Firmware version: [SM3-e-x.xx.CMD](#)

(P/N: [1780-4000000](#))

### **Characteristics:**

- (1) Configurable by commands sent from host or BEO® (a PC-based software utility, available for download at [www.marson.com.tw](http://www.marson.com.tw))
- (2) Supports both hardware and software triggers

### **Interface Configuration Barcode:**

Not supported.

## **2-3-2. USB Interface**

Firmware version: [SM3-e-x.xx](#)

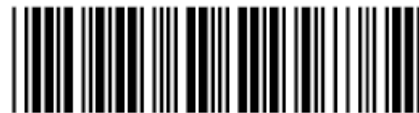
(P/N: [1780-A000000](#))

### **Characteristics:**

- (1) Configurable by scanning configuration barcodes from [Universal User's Manual](#) or by [Ez Utility®](#), a PC-based software utility.  
*(Both manual & utility are available for download at [www.marson.com.tw](http://www.marson.com.tw))*
- (2) Supports hardware trigger only
- (3) Emulates a USB Keyboard device

### **Interface Configuration Barcode:**

. C008\$



### **USB HID**

Scanning above barcode will set your MT780 to USB interface.

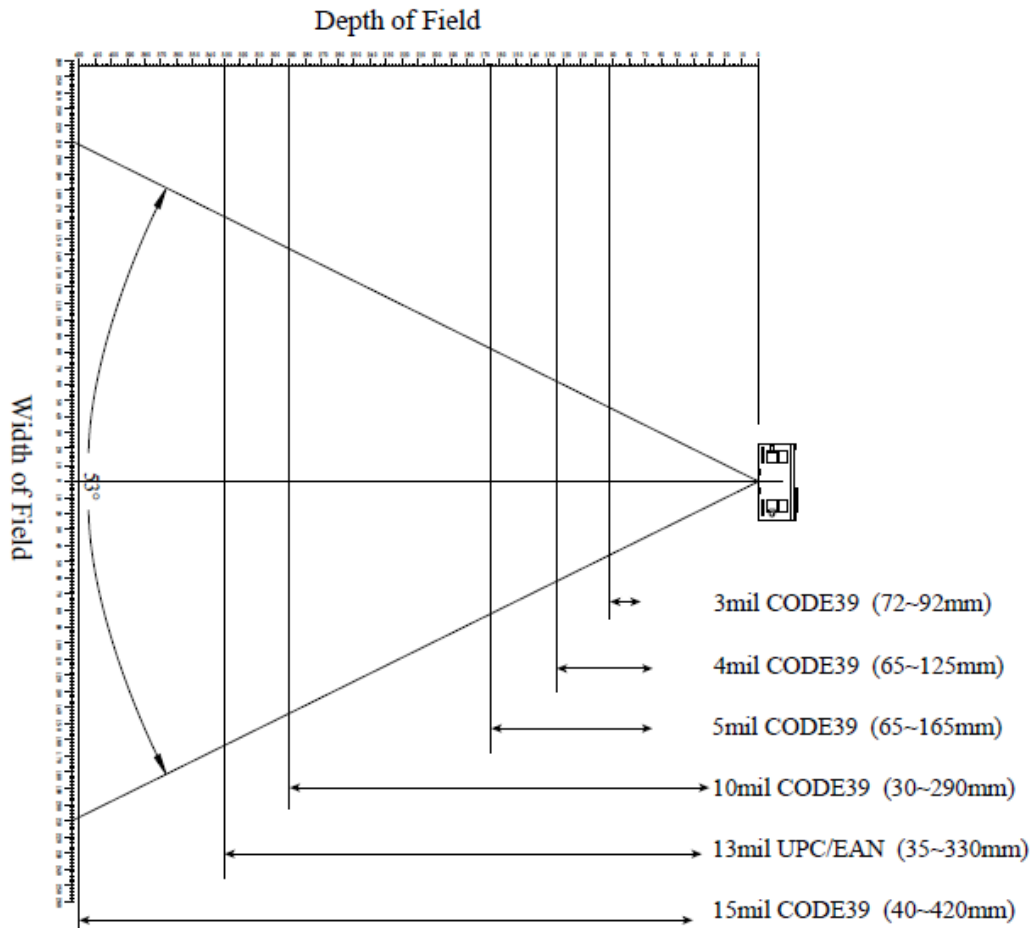


#### **2-4. Operation Method**

1. At power-up, the MT780 sends the Power-Up (PWM) signals over Buzzer pin as an indication that the MT780 enters **Standby Mode** and is ready for operation.
2. Once the MT780 triggered by either hardware or software method, it will emit a narrow, horizontal slab of light which is aligned with the sensor's field of view.
3. The linear image sensor captures the linear image of barcode and produces an analog waveform, which is sampled and analyzed by the decoder firmware running on the MT780.
4. Upon a successful barcode decoded, the MT780 turns off the illumination LEDs, sends the Good Read (PWM) signals over Buzzer pin and transmits the decoded data to the host.
5. The MT780 may enter **Sleep Mode** (Please see Chapter 6 for more details) after a period of inactivity in order to reduce power consumption.

## 2-5. Scanning Range

Barcode Length: Code39 – 4 characters  
 EAN/UPC – 13 characters  
 Bar & Space Ratio: 1 to 2.5  
 Print Contrast Ratio: 0.9  
 Ambient Light: > 800 lux



### Minimum & Maximum Scan Distance

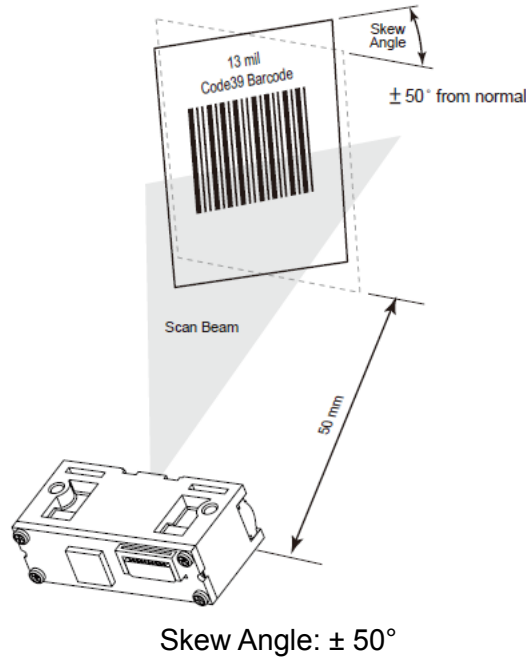
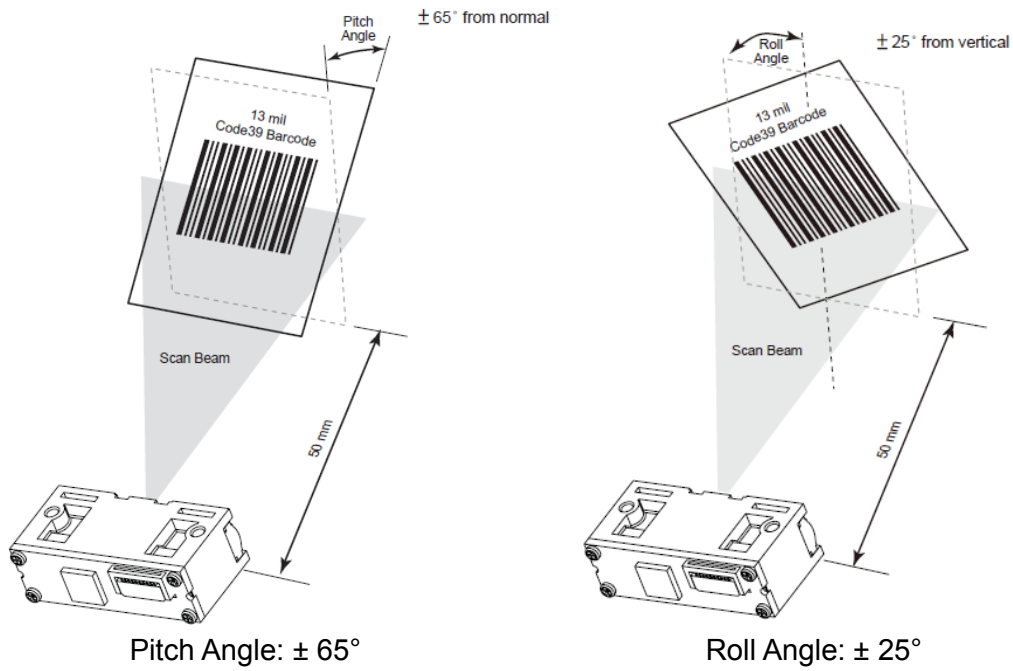
| Symbology                       | Resolution | Distance    | No. of Encoded Characters |
|---------------------------------|------------|-------------|---------------------------|
| Standard Code 39 (w/o checksum) | 3 Mil      | 72 ~ 92 mm  | 4 char.                   |
|                                 | 4 Mil      | 65 ~ 125 mm |                           |
|                                 | 5 Mil      | 65 ~ 165 mm |                           |
|                                 | 10 Mil     | 30 ~ 290 mm |                           |
|                                 | 15 Mil     | 40 ~ 420 mm |                           |
| EAN 13                          | 13 Mil     | 35 ~ 330 mm | 13 char.                  |

### Maximum Scan Width

| Symbology                       | Resolution | Barcode Length | No. of Encoded Characters |
|---------------------------------|------------|----------------|---------------------------|
| Standard Code 39 (w/o checksum) | 13 Mil     | 200 mm         | 37 char.                  |

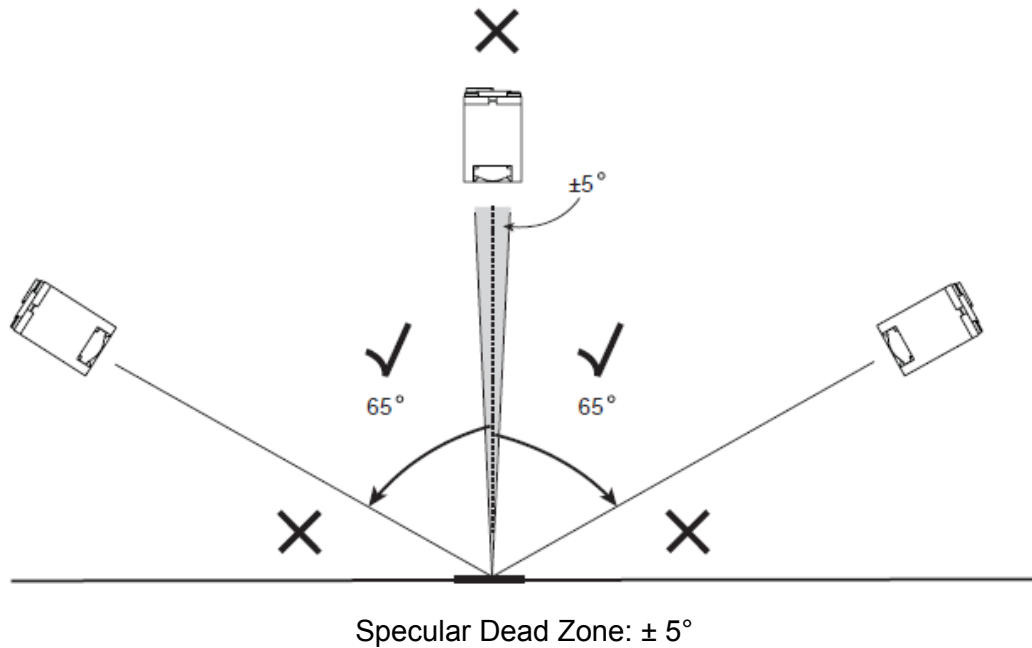
## 2-6. Pitch Angle, Roll Angle and Skew Angle

Be aware of the tolerance for the pitch, roll and skew angle of barcode you are trying to scan.



### 2-7. Specular Dead Zone

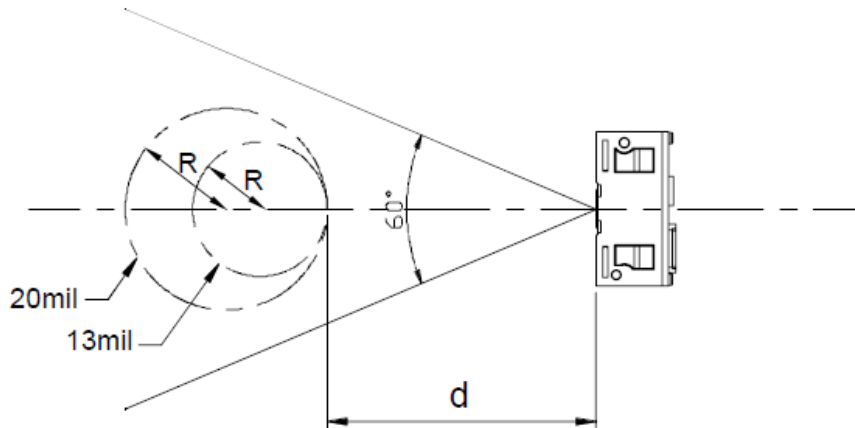
Do not place the MT780 directly over the barcode. The light reflecting directly back into the MT780 from the barcode is known as specular reflection, which can make decoding difficult. The specular dead zone of MT780 is up to 5° depending on target distance and substrate glossiness.





## 2-8. Curvature Degree

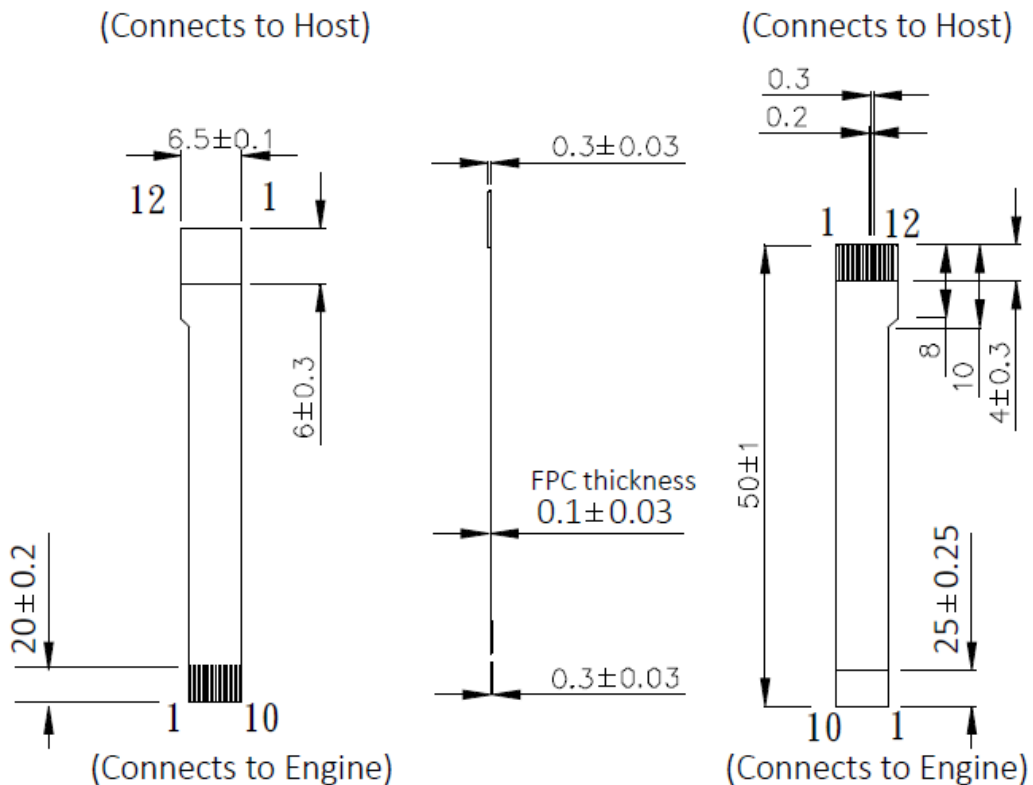
The curvature degree of a scanned barcode is specified as below:



|                   |                                     |                        |
|-------------------|-------------------------------------|------------------------|
| <b>Barcode</b>    | Code 39 (L=32 mm)                   | Code 39 (L=43 mm)      |
| <b>Resolution</b> | 13 mil (0.33 mm)                    | 20 mil (0.51 mm)       |
| <b>R</b>          | $R \geq 15 \text{ mm}$              | $R \geq 20 \text{ mm}$ |
| <b>d</b>          | 40 mm                               |                        |
| <b>PCS</b>        | 0.9 (printed on photographic paper) |                        |

## 2-9. Flex Cable Specification

Below is the drawing of the flat cable(P/N: 6341-0501010) that comes with MT780.





## **2-10. Connector Specification**

Marson recommends that a 12-pin 0.5-pitch Molex® FPC Connector (Molex® P/N: [54548-1229](#)), to be installed on Host side.

### 3. INSTALLATION

The MT780 scan engine is designed specifically for integration into customer's housing for OEM applications. However, the MT780'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 MT780.

#### 3-1. Electrostatic Discharge Cautions

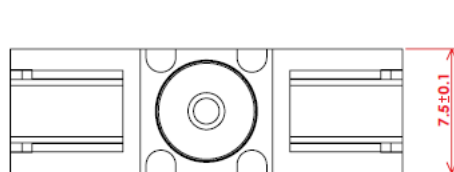
All MT780s are shipped in ESD protective packaging due to the sensitive nature of the exposed electrical components.

1. ALWAYS use grounding wrist straps and a grounded work area when unpacking and handling the MT780.
2. Mount the MT780 in a housing that is designed for ESD protection and stray electric fields.

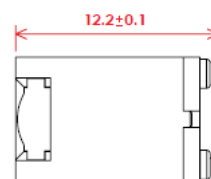
#### 3-2. Mechanical Dimension

When securing the MT780 by utilizing the self-forming screws:

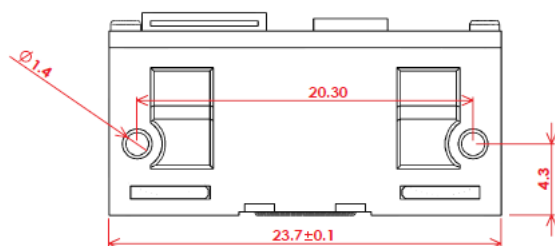
1. Leave sufficient space to accommodate the maximum size of the MT780.
2. Do not exceed 1kg-cm (0.86 lb-in) of torque when securing the MT780 to the host.
3. Use safe ESD practices when handling and mounting the MT780.



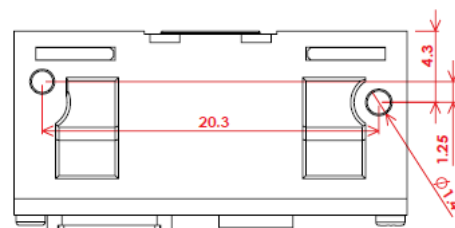
Front View



Side View



Top View



Bottom View



### 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.

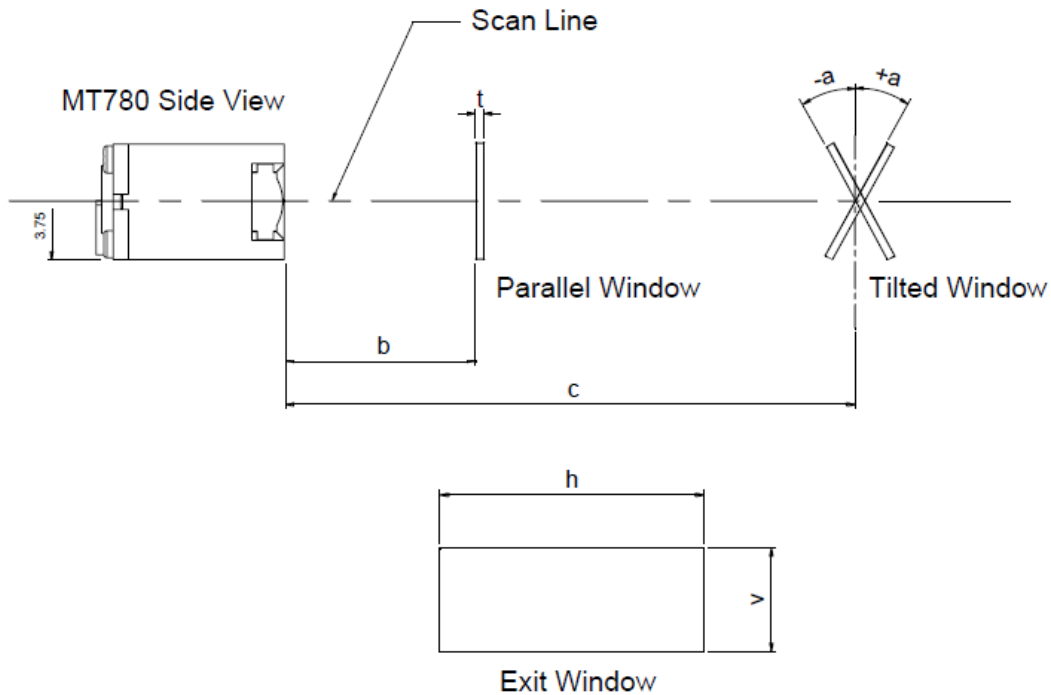
#### Chemically Tempered Float Glass

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 610 to 680 nanometers   |
| Thickness             | < 1 mm   |
| Coating               | Both sides to be anti-reflection coated to provide 1% maximum reflectivity from 610 to 680 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. |

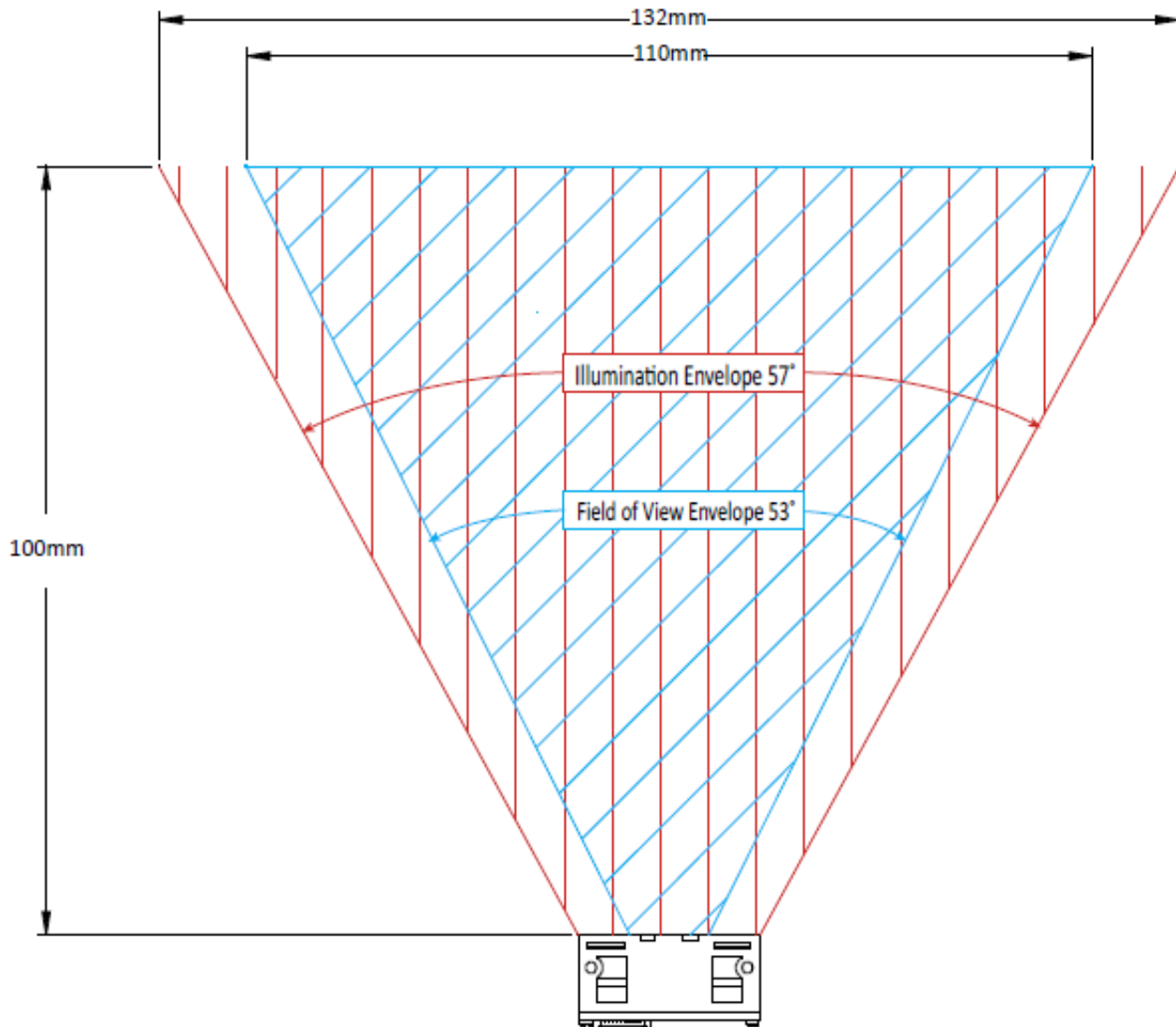
### 3-4. Window Specifications

The external transparent window is recommended to be AR coated which provides 1% maximum reflectivity from 610 to 680 nanometers for MT780 Integration. There are two types of window placement can be implemented while a parallel window must be close to MT780 within a distance under 0.5 mm.



| Window Specifications for MT780 Integration |                |       |                     |              |               |
|---|----------------|-------|---------------------|--------------|---------------|
| Distance                                    | Tilt Angle (a) |       | Minimum Window Size |              |               |
|   |                |       | Horizontal (h)      | Vertical (v) | Thickness (t) |
| < 0.5mm (b)                                 | 0              | 0     | 25 mm               | 5.5 mm       | < 1 mm        |
| 10 mm (c)                                   | +20°~          | -20°~ | 35 mm               | 6 mm         |               |
| 20 mm (c)                                   | +17°~          | -17°~ | 48 mm               | 6.5 mm       |               |
| 30 mm (c)                                   | +15°~          | -15°~ | 64 mm               | 7 mm         |               |

The window size must increase as it is moved away from MT780 and should be sized to accommodate the field of view and illumination envelopes shown below:



### 3-5. Window Care

In the aspect of window, the performance of MT780 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**

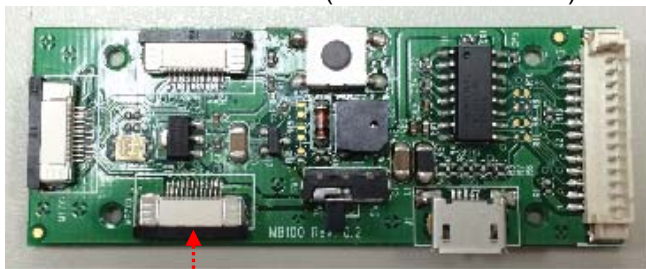
The MT780 scan engine conforms to the following regulations:

1. Electromagnetic Compliance – CE EN55022, EN55024
2. Electromagnetic Interference – FCC Part15 Subpart B (Class B)
3. Photobiological Safety – IEC 62471 (Exempt Group)
4. Environmental Regulations – RoHS 2.0, WEEE

## 5. DEVELOPMENT KIT

MARSON MB100 Demo Kit (P/N: [11A0-9801A20](#)) enables the development of products and systems using the MT780 on the MS Windows OS platform. Besides the Multi I/O board (P/N: [2006-1007X00](#)), the MB100 Demo Kit provides the software and hardware tools required for testing the MT780 applications before integrating it into the host device. Please contact your sales representative for ordering information.

### MB100 Multi I/O Board (P/N: [2006-1007X00](#))



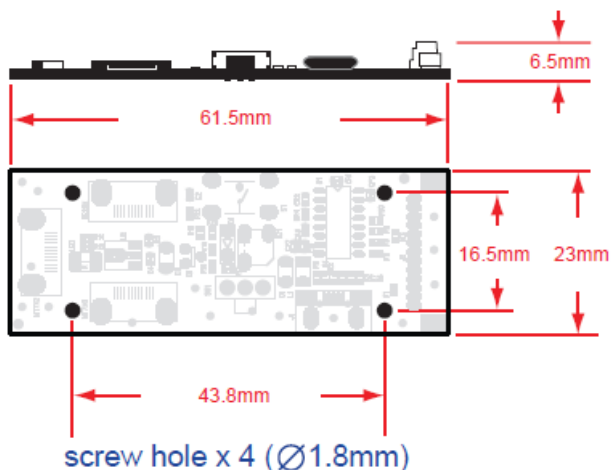
Connects to MT780

### MB100 Demo Kit Accessories

O: Supported X: Not Supported

| Interface  | RS232 | USB HID | USB VCP |
|--|-------|---------|---------|
| <b>Cable</b>   |       |         |         |
| External Y-cable<br>(P/N: <a href="#">7090-1583A00</a> ) | o     | o       | o       |
| Internal Y-cable<br>(P/N: <a href="#">5300-1315X00</a> ) | o     | o       | o       |
| Micro USB Cable<br>(P/N: <a href="#">7005-9892A50</a> )  | x     | o       | o       |

Due to the advantage of its small size, MB100 Multi I/O board is also suitable for being installed inside the host system, as an interface board connecting MT780 to the host device.







## 6. SLEEP (IDLE) MODE

The **Sleep (Idle) Mode** is disabled by default. To enable **Sleep (Idle) Mode**, simply follow below instruction to configure the “Pre-Idle Time”, or the period of inactivity before MT780 enters Sleep (Idle) Mode, as appropriate.

### A. Standard Mode

Firmware version: [SM3-e-x.xx](#)

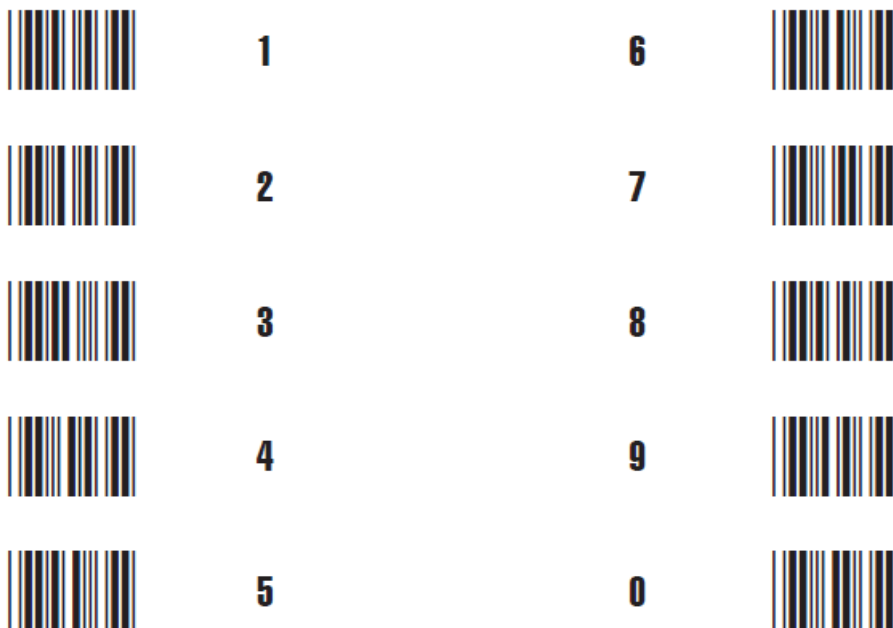
(P/N: [1780-A000000](#))

#### Steps:

1. Scan SET MINUTE [.B030\$] (or SET SECOND [.B029\$])
2. Scan two digit from the numeric barcode table below.
3. Scan SET MINUTE [.B030\$] (or SET SECOND [.B029\$])

#### Notes:

Pre-Idle Time - Min: 10 sec, Max: 60 min & 60 sec





## B. Command Mode

Firmware version: SM3-e-x.xx.CMD

(P/N: 1780-4000000)

| Property                       | Option   | Remark   |
|--------------------------------|--|--|
| Sleep (Idle) Mode<br>{MC11WT1} | 0 Off<br>1 On  | Default : <b>Off</b><br>When enabled, scanner will automatically enter into <b>Sleep Mode</b> after a period of inactivity(Sleep Mode timeout).          |
| Pre-Idle Time<br>{MC11WT,1,0}  | A number from<br>0~60 (Minute)<br>A number from<br>0~60 (Second) | Default : <b>1 minute</b><br><b>Sleep Mode</b> timeout(10 sec ~ 60 min & 60 sec), the period of inactivity before the scanner enters <b>Sleep Mode</b> . |

### Steps:

1. Send {MC11WT1} & {MC11WT,1,0} to the MT780 if you want to enable **Sleep (Idle) Mode** and set Pre-Idle Time as 1 minute.
2. The MT780 will return {MC11,OK} and {MC11,1,1,0} respectively as confirmation.
3. If you want above settings to be saved permanently in Flash ROM, send {MCMDWT1} to the MT780. Otherwise MT780 will be reset to default after wake up from sleep.

### Notes:

Curly braces “{ }” must be included at both ends of each command.

## 7. PARAMETER SETUP

You can set up your MT780 using the following method:

### 1. Standard Mode (F/W ver.: SM3-e-x.xx):

Scan configuration barcodes from the Universal User’s Manual, or use Ez Utility®, both of which are available for download at [www.marson.com.tw](http://www.marson.com.tw)

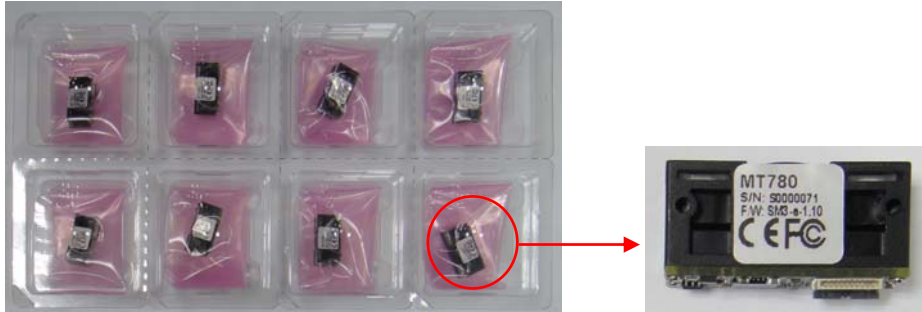
### 2. Command Mode (F/W ver.: SM3-e-x.xx.CMD):

Full list of software commands can either be found in the Help File of BEO® program, or Serial Commands Manual available for download at [www.marson.com.tw](http://www.marson.com.tw).



## 8. PACKAGING

1. **Tray** (size: 24.7 x 13.7 x 2.7cm): Each tray contains 8pcs of [MT780](#).



2. **Box** (size: 25 x 14 x 3.3cm): Each Box contains 1pc of tray, or 8pcs of [MT780](#).



3. **Carton** (size: 30 x 27 x 28cm): Each Carton contains 16pcs of boxes, or 128pcs of [MT780](#).





## 9. VERSION HISTORY

| Rev. | Date       | Description  | Issued | Checked     |
|------|------------|--|--------|-------------|
| 1.0  | 2016.02.15 | Initial Release  | Shaw   | Kenji       |
| 1.1  | 2016.03.01 | Updated D.O.F  | Shaw   | Kenji       |
| 1.2  | 2016.03.09 | Updated Scan Rate  | Shaw   | Kenji       |
| 1.3  | 2016.05.17 | Updated Operating Temp.  | Shaw   | Kenji       |
| 1.4  | 2016.06.24 | Added MT780HD  | Shaw   | Kenji       |
| 1.5  | 2016.10.31 | Revised Sleep Mode command in Chapter 6  | Shaw   | Kenji       |
| 1.6  | 2017.03.24 | Revised Skew & Roll Angle<br>Added Packaging Chapter                                   | Shaw   | Hus         |
| 1.7  | 2017.06.21 | Deleted Red Cell-Cast<br>Acrylic Description   | Shaw   | Hus         |
| 1.8  | 2017.12.11 | Deleted MT780HD<br>Updated D.O.F & Resolution  | Shaw   | Hus         |
| 1.9  | 2018.01.31 | Revised Skew & Roll Angle  | Shaw   | Hus         |
| 2.0  | 2018.03.15 | Updated Chapter 1 and 1-1<br>on MCU.<br>Updated Chapter 6 on<br>Command Mode settings. | Shaw   | Kenji & Hus |

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