



MT80 2D Mini Scan Engine, Integration Guide, V0.3

MT80 **(2D Mini Scan Engine)**

Integration Guide

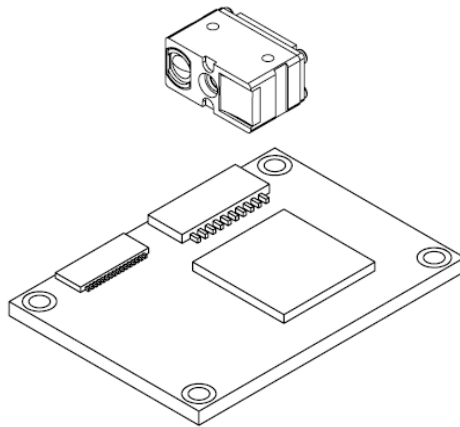




TABLE OF CONTENTS

1. INTRODUCTION	1
1-1. MT80 Block Diagram.....	1
1-2. Electric Interface.....	2
1-2-1. Pin Assignment.....	2
1-2-2. Flex Cable.....	5
2. SPECIFICATIONS	6
2-1. Introduction.....	6
2-2. Technical Specifications.....	6
2-3. Interface.....	9
2-3-1. UART Interface.....	9
2-3-2. USB Interface.....	10
2-4. Operation Method.....	11
2-5. Mechanical Dimension.....	11
2-6. Flex Cable Specification.....	12
2-7. Connector Specification.....	13
3. INSTALLATION	14
3-1. Electrostatic Discharge Cautions.....	14
3-2. Mechanical Dimension.....	14
3-3. Window Materials.....	14
3-4. Window Specifications.....	16
3-5. Window Care.....	17
4. REGULATIONS	17
5. DEVELOPMENT KIT	18
6. VERSION HISTORY	19

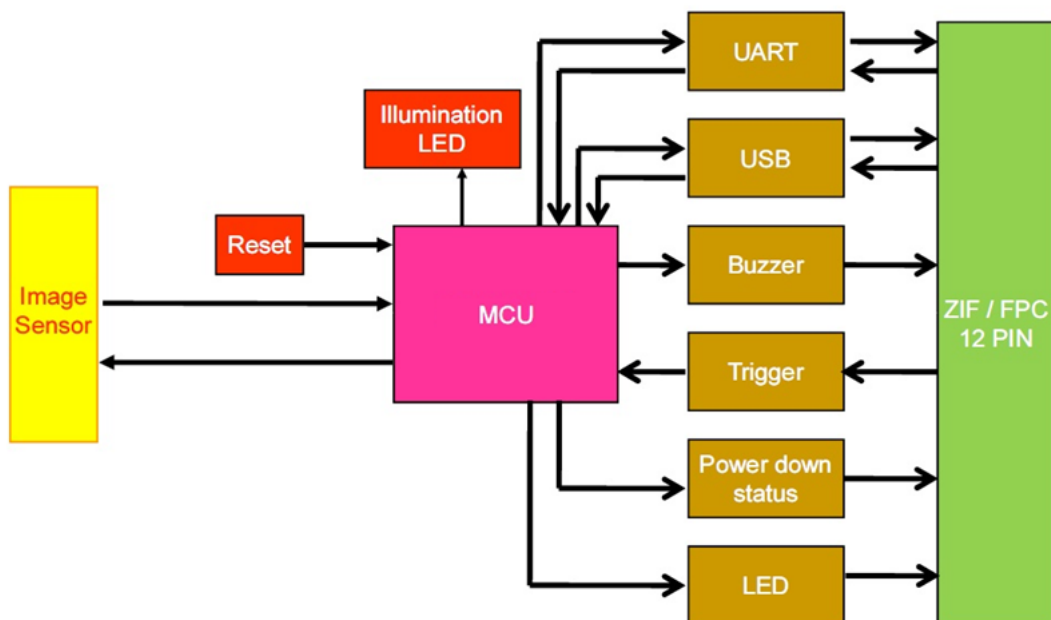
1. INTRODUCTION

The MT80 2D Mini Scan Engine is designed for 1D Barcode and QR Code high performance barcode scanning with easy integration. MT80 is ideal for integration into data terminals and other small mobile devices.

The MT80 consists of 2 illumination LEDs, a high-quality 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 HID Keyboard device and communicates with the host system over USB.

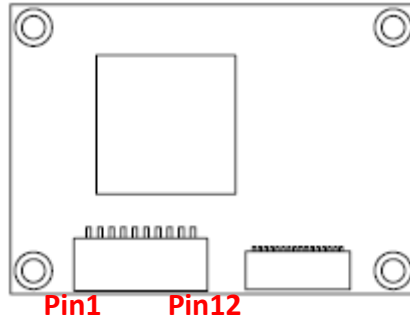
1-1. MT80 Block Diagram

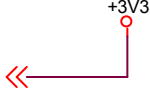
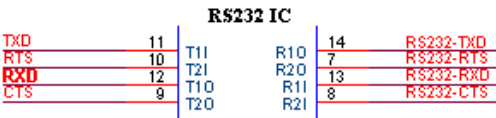
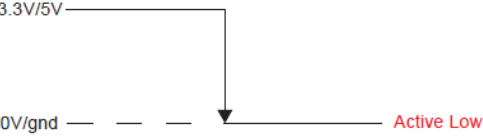


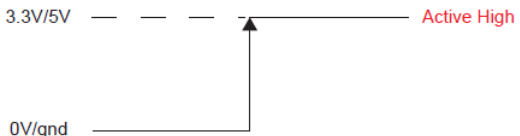
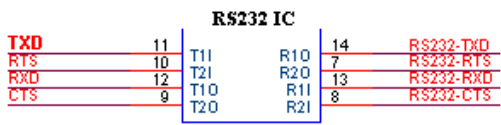
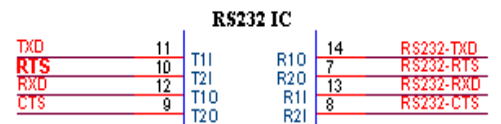

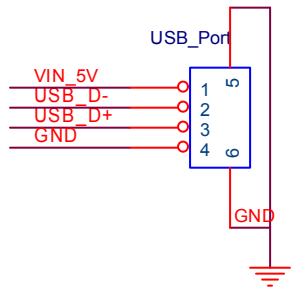
1-2. Electric Interface

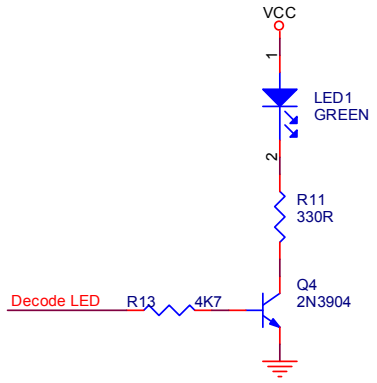
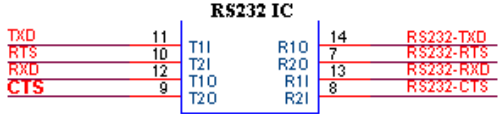
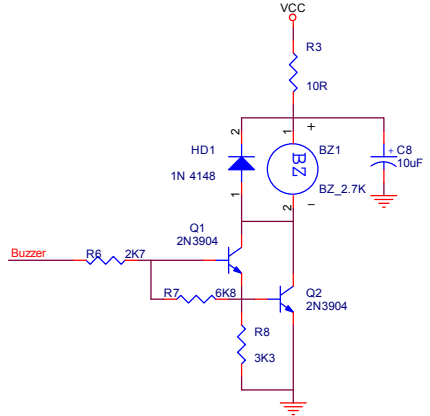
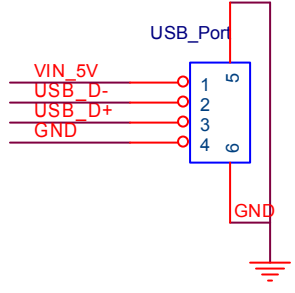
1-2-1. Pin Assignment

(Top View of MT80 Decoder Board)



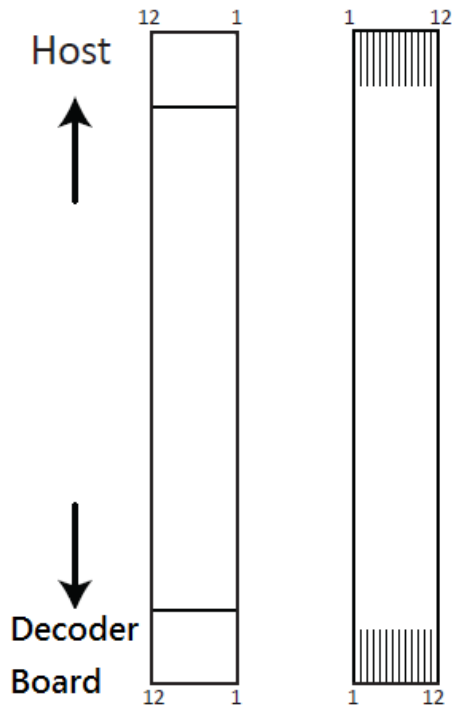
Pin#	UART	USB	I/O	Description	Schematic Example
1	VCC	VCC	-----	Supply voltage input. Must always be connected to 3.3V power supply.	
2	RXD	-----	Input	UART TTL data input.	 <p>Sipex® Vendor P/N: SP232ACT</p>
3	Trigger	Trigger	Input	High: Power-up/Standby Low: Scanning Operation *Warning: 1. Pull low at power-up will prompt the scan engine into firmware update mode.	 <p>Once trigger is pressed (pull low), 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.</p>

Pin#	UART	USB	I/O	Description	Schematic Example
4	Power Off	Power Off	Input	High: Scan Engine Off Low: Scan Engine On *Exception: 1. During data transmission 2. Writing parameters to non-volatile memory.	 <p>When Power Enable pin is pull high, scan engine will be OFF with power consumption of less than 1uA.</p>
5	TXD	-----	Output	UART TTL data output.	 <p>Sipex® Vendor P/N: SP232ACT</p>
6	RTS	-----	Output	When Handshaking is enabled, MT80 requests permission from host to transmit data on TXD line.	 <p>Sipex® Vendor P/N: SP232ACT</p>
7	GND	GND	-----	Power and signal ground.	
8	-----	USB D+	Bidirectional	USB Differential Signal Transmission	

Pin#	UART	USB	I/O	Description	Schematic Example
9	LED	LED	Output	Active High, it indicates the status of Power-Up or a successful barcode decoded (Good Read).	
10	CTS	-----	Input	When Handshaking is enabled, host authorizes MT80 to transmit data on TXD line.	 <p>Sipex® Vendor P/N: SP232ACT</p>
11	Buzzer	Buzzer	Output	Active High: it indicates the status of Power-Up or a successful barcode decoded. PWM controlled signal can be used to drive an external buzzer for a successful barcode decoded (Good Read).	
12	-----	USB D-	Bidirectional	USB Differential Signal Transmission	

1-2-2. Flex Cable

The flex cable is used to connect MT80 to the host side. There are 12 pins on both the decoder board (MT80) side and the host side. Please see Chapter 2-6 for more details of flex cable.



Flex cable (P/N: 67XX-1009X12)	
Pin#	Pin Assignment To Host
1	VCC
2	RXD
3	Trigger
4	Power Enable
5	TXD
6	RTS
7	GND
8	USB D+
9	LED
10	CTS
11	Buzzer
12	USB D-

***Note:** Conforms to MARSON MT30/MT40(W) pin assignment.



2. SPECIFICATIONS

2-1. Introduction

This chapter provides technical specifications of the MT80 scan engine. Operating method, scanning range and scan angle are also presented.

2-2. Technical Specifications

Optic & Performance	
Light Source	White LED
Aiming	Red LED dot aimer
Sensor	Area image sensor
Scan Rate	30 frames/ sec
Resolution	5mil/ 0.125mm
Field of View	Horizontal 45° Vertical 33°
Scan Angle	Pitch Angle 60° Skew Angle 30° Roll Angle 360°
Print Contrast Ratio	30%
Width of Field	70mm (13Mil Code39)
Depth Of Field (Environment: 800 lux)	5 Mil Code39: 25 ~ 60mm (4 digits)
	10 Mil Code39: 30 ~ 110mm (4 digits)
	15 Mil Code39: 40 ~ 160mm (4 digits)
	20 Mil Code39: 55 ~ 200mm (4 digits)
	13 Mil UPC/ EAN: 45 ~ 140mm (13 digits)
	10 Mil QR Code: 10 ~ 50mm (55 digits)
	13 Mil QR Code: 15 ~ 90mm (55 digits)
	15 Mil QR Code: 20 ~ 105mm (55 digits)
40 Mil QR Code: 50 ~ 180mm (55 digits)	
Physical Characteristics	
Dimension	Imager : W10 x L14 x H7 mm Decoder Board : W25 x L35 x H2 mm
Weight	Imager : 1g



MT80 2D Mini Scan Engine, Integration Guide, V0.3

	Decoder Board : 3.3g
Color	Black
Material	ABS
Connector	Imager : 25pin ZIF (pitch=0.3mm) Decoder Board : 12pin ZIF (pitch=0.5mm)
Cable	Imager to Decoder board : 25 pins flex cable (pitch=0.3mm) Decoder board to Host: 12pins flex cable (pitch=0.5mm)
Electrical	
Operation Voltage	3.3VDC ± 5%
Working Current	Typ. 240 mA
Standby Current	Typ. 160 mA
Idle Current	TBD
Surge Current	< 500 mA
Connectivity	
Interface	UART (TTL-level RS232)
	USB (HID Keyboard)
	USB (Virtual COM)
User Environment	
Operating Temperature	0°C ~ 60°C
Storage Temperature	-20°C ~ 60°C
Humidity	0% ~ 95%RH (Non-condensing)
Drop Durability	1.5M
Ambient Light	100,000 Lux (Sunlight)



<p>1D Symbologies</p>	<p>UPC-A/ UPC-E EAN-8/ EAN-13 Matrix 2 of 5 China Postal Code (Toshiba Code) Industrial 2 of 5 Interleaved 2 of 5 Standard 2 of 5 (IATA Code) Codabar Code 11 Code 32 Standard Code 39 Full ASCII Code 39 Code 93 Code 128 EAN/ UCC 128 (GS1-128) MSI/ UK Plessey Code Telepen Code GS1 Databar</p>
<p>2D Symbologies</p>	<p>QR Code</p>
<p>Regulatory</p>	
<p>ESD</p>	<p>Functional after 4KV contact, 8KV air discharge <i>(It requires housing that is designed for ESD protection and stray from electric fields.)</i></p>
<p>EMC</p>	<p>FCC – Part15 Subpart B (Class B) CE – EN55024, EN55032</p>
<p>Safety Approval</p>	<p>IEC 62471 (Exempt Group)</p>
<p>Environmental</p>	<p>WEEE, RoHS 2.0</p>



2-3. 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: [AA5-b-x.xx](#)

(MT80 P/N: [TBD](#))

Characteristics:

- (1) Configurable by scanning configuration barcodes or Ez Utility[®] (a PC-based software utility, available for download at www.marson.com.tw)
- (2) Supports hardware trigger only

Interface Configuration Barcode:

. C002\$



UART

Scanning above barcode will set your MT80 to UART interface.



B. Command Mode

Firmware version: [AA5-b-x.xx.CMD](#)

(MT80 P/N: [TBD](#))

Characteristics:

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

Interface Configuration Barcode:

Not supported.

2-3-2. USB Interface

Firmware version: [AA5-b-x.xx](#)

(MT80 P/N: [TBD](#))

Characteristics:

- (1) Configurable by scanning configuration barcodes or Ez Utility® (a PC-based software utility, available for download at www.marson.com.tw)
- (2) Supports hardware trigger only
- (3) Emulates a USB Keyboard device

Interface Configuration Barcode:

. C008\$



USB HID

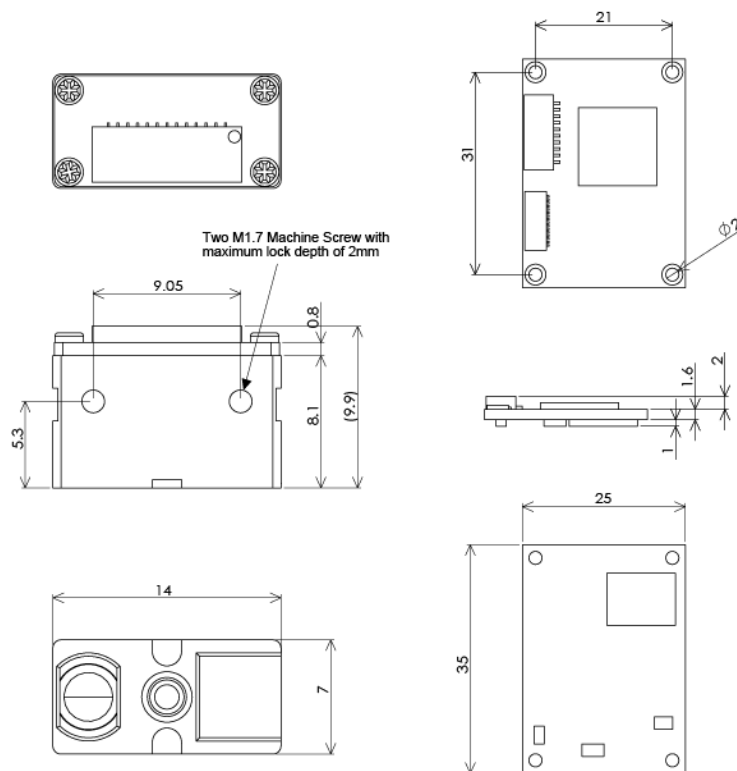
Scanning above barcode will set your MT80 to USB interface.

2-4. Operation Method

1. At power-up, the MT80 sends the Power-Up signals over Buzzer and LED pins as an indication that the MT80 enters **Standby Mode** and is ready for operation.
2. Once the MT80 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 MT80.
4. Upon a successful barcode decoded, the MT80 turns off the illumination LEDs, sends the Good Read signals over Buzzer and LED pins and transmits the decoded data to the host.

2-5. Mechanical Dimension

(Unit = mm)

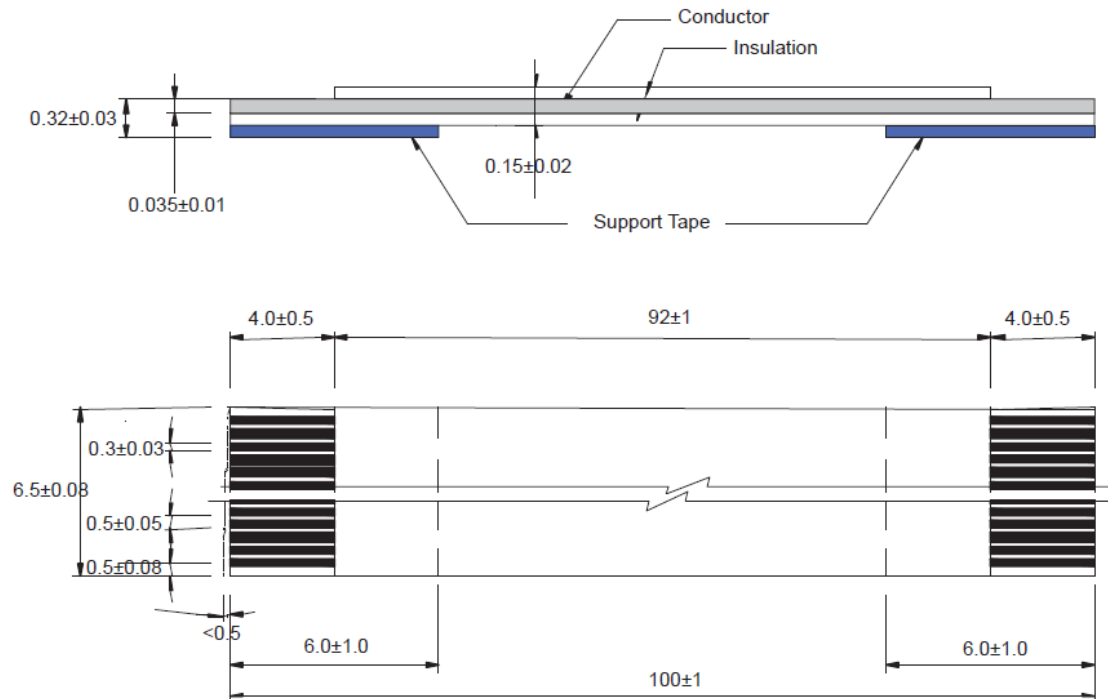


Imager

Decoder Board

2-6. Flex Cable Specification

Below is the drawing of 12 Pins flat cable (P/N: 67XX-1009X12) that comes with MT80.





3. INSTALLATION

The MT80 scan engine is designed specifically for integration into customer's housing for OEM applications. However, the MT80'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 MT80.

3-1. Electrostatic Discharge Cautions

All MT80s 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 MT80.
2. Mount the MT80 in a housing that is designed for ESD protection and stray electric fields.

3-2. Mechanical Dimension

When securing the MT80 by utilizing the machine screws:

1. Leave sufficient space to accommodate the maximum size of the MT80.
2. Do not exceed 1kg-cm (0.86 lb-in) of torque when securing the MT80 to the host.
3. Use safe ESD practices when handling and mounting the MT80.

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)

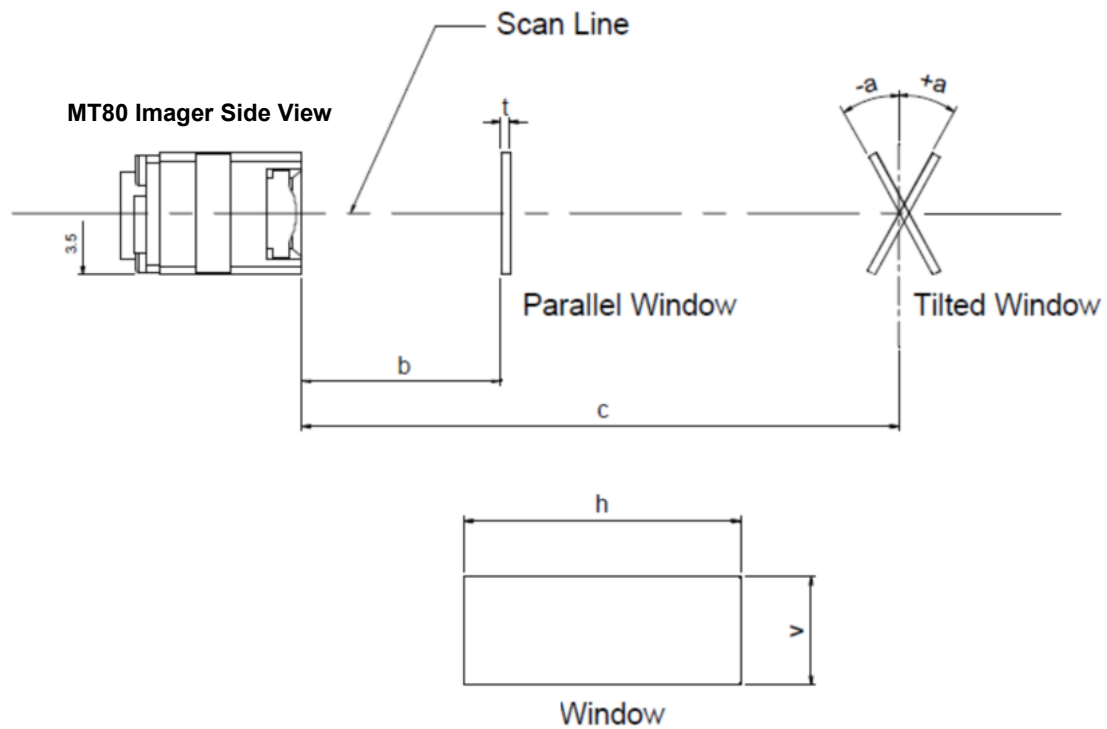
Also known as CR-39™, ADC, a thermal setting plastic widely used for plastic eyeglasses, has excellent chemical and environmental resistance. It also has an inherently moderate surface hardness and therefore does not require hard-coating. This material cannot be ultrasonically welded.

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 Specifications



Window Specifications for MT80 Integration					
Distance	Tilt Angle (a)		Minimum Window Size		
			Horizontal (h)	Vertical (v)	Thickness (t)
< 0.5 mm (b)	0	0	18 mm	7 mm	< 1 mm
10 mm (c)	+20°~	-20°~	25 mm	15 mm	
20 mm (c)	+17°~	-17°~	35 mm	25 mm	
30 mm (c)	+15°~	-15°~	50 mm	40 mm	



3-5. Window Care

In the aspect of window, the performance of MT80 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 MT80 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 MT80 on the MicroSoft 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 MT80 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 MT80

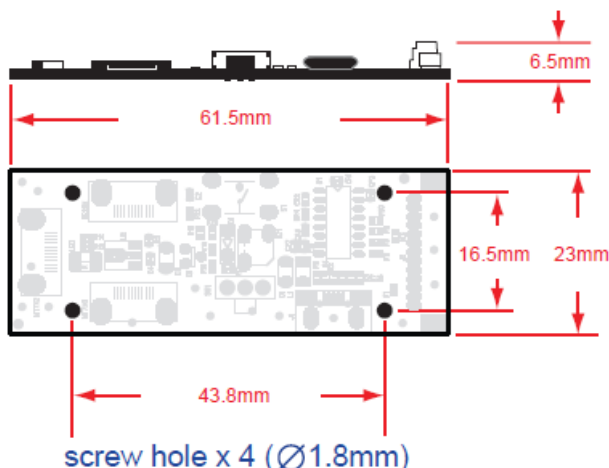


MB100 Demo Kit Accessories

O: Supported X: Not Supported

Cable	Interface	RS232	USB HID	USB VCP
	External Y-cable (P/N: 7090-1583A00)		o	o
Internal Y-cable (P/N: 5300-1315X00)		o	o	o
Micro USB Cable (P/N: 7005-9892A50)		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 MT80 to the host device.





6. VERSION HISTORY

Rev.	Date	Description	Issued	Checked
0.1	2017.11.24	Preliminary Draft Release	Shaw	Kenji & Hus
0.2	2018.01.10	Updated Chapter 5	Shaw	Kenji
0.3	2018.03.14	Updated VCC in Chapter 1-2-1	Shaw	Kenji

Marson Technology Co., Ltd.

9F., 108-3, Mincyuan Rd., Sindian Dist., New Taipei City, Taiwan

TEL: 886-2-2218-1633

FAX: 886-2-2218-6638

E-mail: info@marson.com.tw

Web: www.marsontech.com