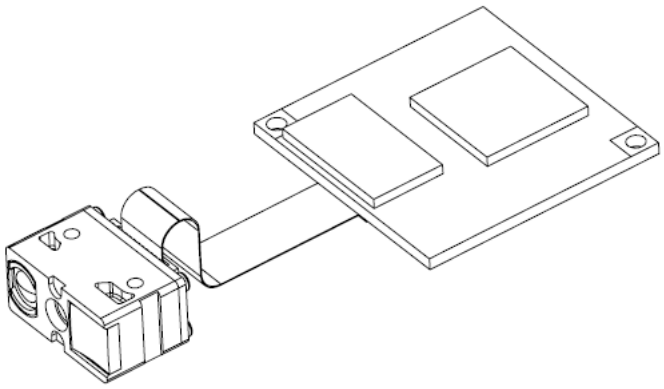
MT80
(2D Mini Imager)

MD200
(Decoder Board)

Integration Guide



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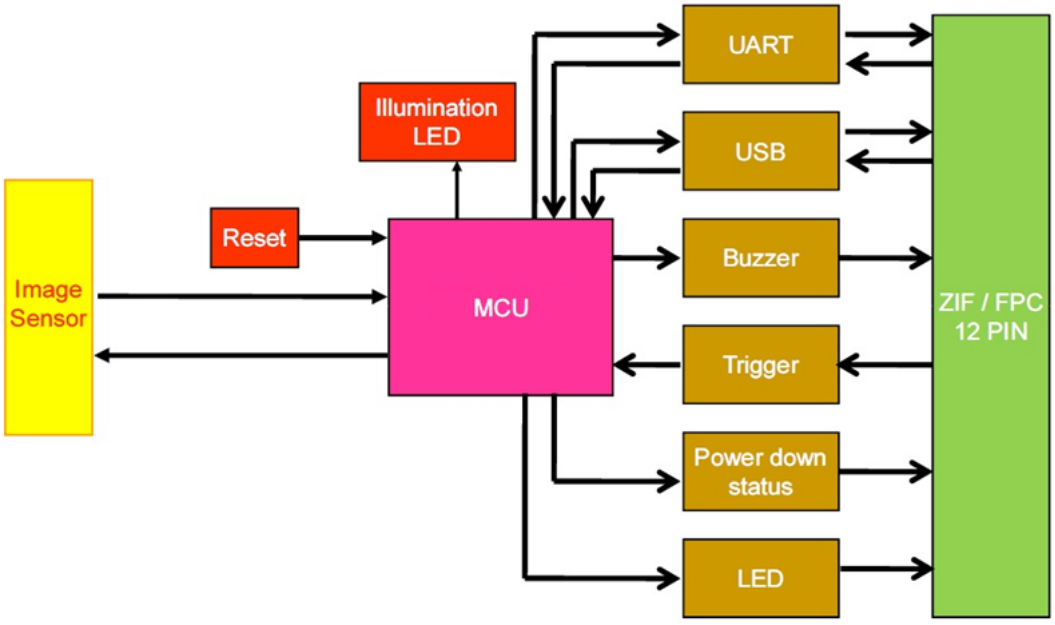
1. INTRODUCTION

The MT80 Mini Imager+MD200 Decoder Board is designed for 1D Barcode and QR Code scanning with easy integration. Due to its small size MT80+MD200 is ideal for integration into data terminals and other small mobile devices.

The MT80 Mini Imager consists of 1 illumination LED, 1 aimer LED and a high-quality image sensor with a microprocessor on MD200 Decoder Board 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.

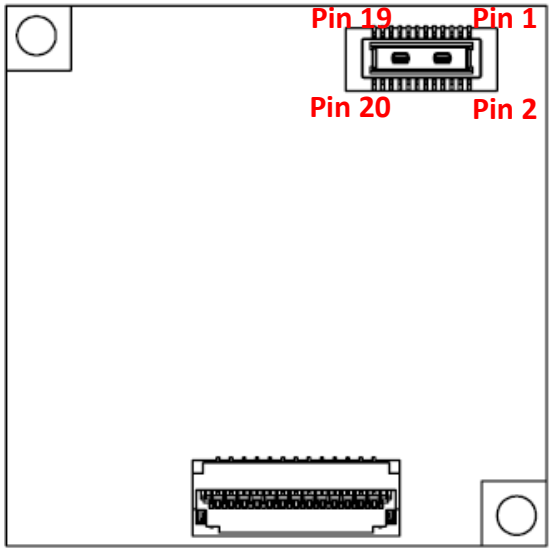
1-1. Block Diagram



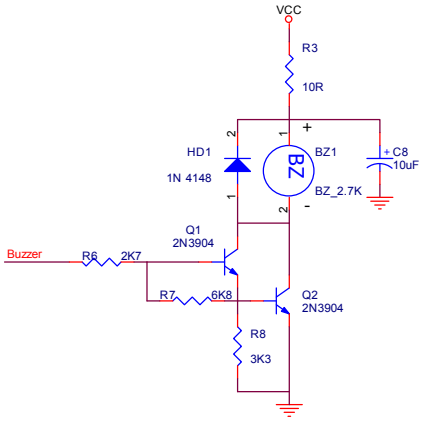
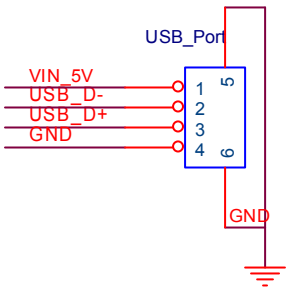
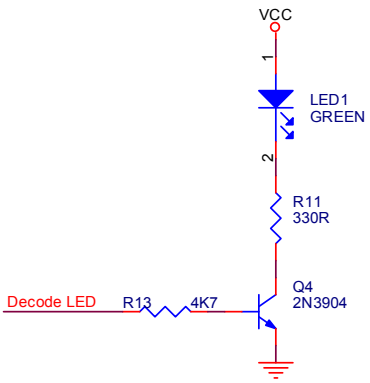
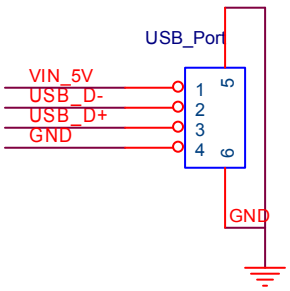
1-2. Electric Interface

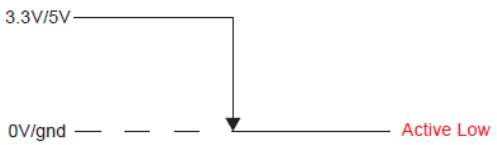
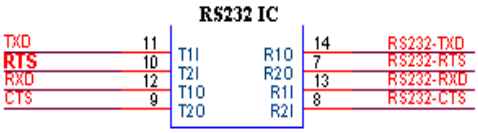
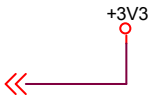
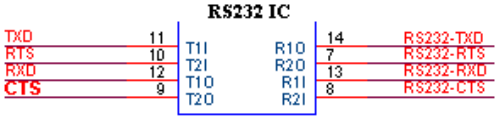
1-2-1. Pin Assignment

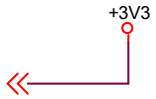
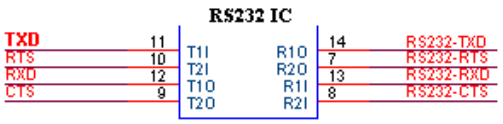
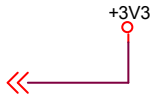
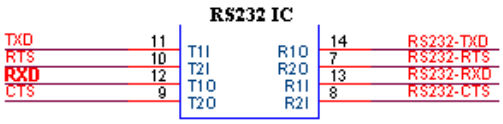
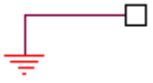
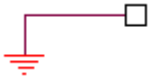
(Top View of MD200 Decoder Board)



Pin#	UART	USB	I/O	Description	Schematic Example
1	nPWRDWN	nPWRDWN	Output	When nPWRDWN is active low, MD200 is in sleep mode.	
2	GND	GND	----------	Power and signal ground.	

Pin#	UART	USB	I/O	Description	Schematic Example
3	Buzzer PWN	Buzzer PWN	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).	
4	----------	USB_D+	Bidirectional	USB Differential Signal Transmission (USB D+)	
5	Good Read	Good Read	Output	Active High, it indicates the status of Power-Up or a successful barcode decoded (Good Read).	
6	----------	USB_D-	Bidirectional	USB Differential Signal Transmission (USB D-)	

Pin#	UART	USB	I/O	Description	Schematic Example
7	nWAKE	nWAKE	Input	When MD200 is in sleep mode, active low to wake up.	
8	GND	GND	----------	Power and signal ground.	
9	Trigger Input	Trigger Input	Input	High: Power-up/Standby Low: Scanning Operation ***Warning:*** 1. *Pull low at power-up will prompt the scan engine into firmware update mode.*	 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.
10	RTS	----------	Output	When Handshaking is enabled, MT80 requests permission from host to transmit data on TXD line.	 Sipex® Vendor P/N: SP232ACT
11	VDD_3V3_IN	VDD_3V3_IN	----------	Supply voltage input. Must always be connected to 3.3V power supply.	
12	CTS	----------	Input	When Handshaking is enabled, host authorizes MT80 to transmit data on TXD line.	 Sipex® Vendor P/N: SP232ACT

Pin#	UART	USB	I/O	Description	Schematic Example
13	VDD_3V3_IN	VDD_3V3_IN	----------	Supply voltage input. Must always be connected to 3.3V power supply.	
14	TXD	----------	Output	UART TTL data output.	 Sipex® Vendor P/N: SP232ACT
15	VDD_3V3_IN	VDD_3V3_IN	----------	Supply voltage input. Must always be connected to 3.3V power supply.	
16	RXD	----------	Input	UART TTL data input.	 Sipex® Vendor P/N: SP232ACT
17	IF_SEL	IF_SEL	Input	High: UART Low: USB	
18	GND	GND	----------	Power and signal ground.	
19	GND	GND	----------	Power and signal ground.	
20	GND	GND	----------	Power and signal ground.	

2. SPECIFICATIONS

2-1. Introduction

This chapter provides technical specifications of the MT80+MD200. 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	75mm (13Mil Code39)
Depth Of Field (Environment: 800 lux)	5 Mil Code39: 35 ~ 70mm (4 digits)
	10 Mil Code39: 35 ~ 115mm (4 digits)
	15 Mil Code39: 45 ~ 165mm (4 digits)
	20 Mil Code39: 60 ~ 205mm (4 digits)
	13 Mil UPC/ EAN: 45 ~ 140mm (13 digits)
	10 Mil QR Code: 40 ~ 60mm (55 digits)
	13 Mil QR Code: 30 ~ 90mm (55 digits)
	15 Mil QR Code: 35 ~ 105mm (55 digits)
	40 Mil QR Code: 70 ~ 200mm (55 digits)
Physical Characteristics	
Dimension	MT80 Imager : W14 x L10 x H7 mm MD200 Decoder Board : W25 x L25 x H3.5 mm
Weight	Imager : 1g

	Decoder Board : 3.3g
Color	Black
Material	ABS
Connector	Imager to Decoder board : 25pin ZIF (pitch=0.3mm) Decoder Board to Host : 20pin Board-to-Board Connector (pitch=0.4mm)
Cable	Imager to Decoder board : 25 pins flex cable (pitch=0.3mm)
Electrical	
Operation Voltage	3.3VDC ± 5%
Working Current	Typ. 240 mA
Standby Current	Typ. 160 mA
Idle Current (Sleep Mode)	TBD
Surge Current	< 500 mA
Connectivity	
Interface	UART (TTL-level RS232)
	USB (HID Keyboard)
	USB (Virtual COM)
User Environment	
Operating Temperature	0°C ~ 50°C
Storage Temperature	-20°C ~ 60°C
Humidity	0% ~ 95%RH (Non-condensing)
Drop Durability	1.5M
Ambient Light	100,000 Lux (Sunlight)

1D Symbologies	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
2D Symbologies	QR Code
Regulatory	
ESD	Functional after 4KV contact, 8KV air discharge *(It requires housing that is designed for ESD protection and stray from electric fields.)*
EMC	FCC – Part15 Subpart B (Class B) CE – EN55024, EN55032
Safety Approval	IEC 62471 (Exempt Group)
Environmental	WEEE, RoHS 2.0

2-3. Interface

2-3-1. UART Interface

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:

. C002$

UART

2-3-2. USB HID Interface

Interface Configuration Barcode:

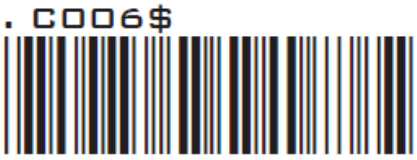
. C008$

USB HID

2-3-3. USB VCP Interface

Interface Configuration Barcode:

. C006$



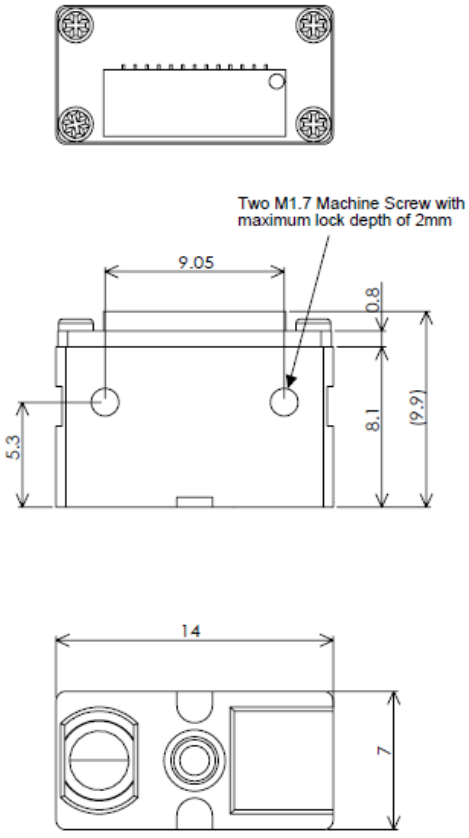
USB VCP

2-4. Operation Method

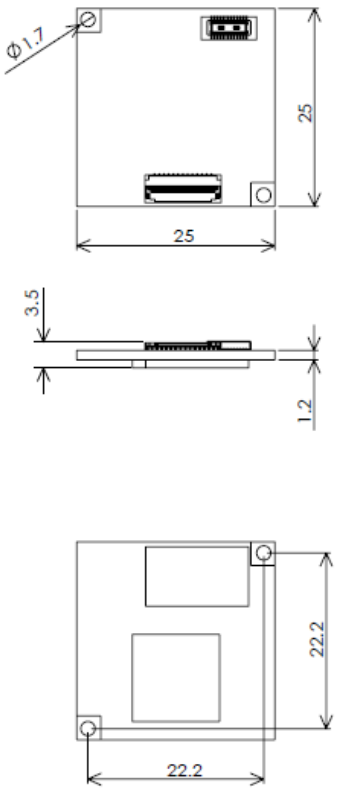
1. At power-up, the MD200 sends the Power-Up signals over Buzzer and LED pins as an indication that the MD200 enters **Standby Mode** and is ready for operation.
2. Once the MD200 triggered by either hardware or software method, MT80 will emit a beam of light which is aligned with the sensor's field 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 MD200.
4. Upon a successful barcode decoded, the MT80 turns off the illumination LEDs, with MD200 sending the Good Read signals over Buzzer and LED pins and transmitting the decoded data to the host.

2-5. Mechanical Dimension

(Unit = mm)



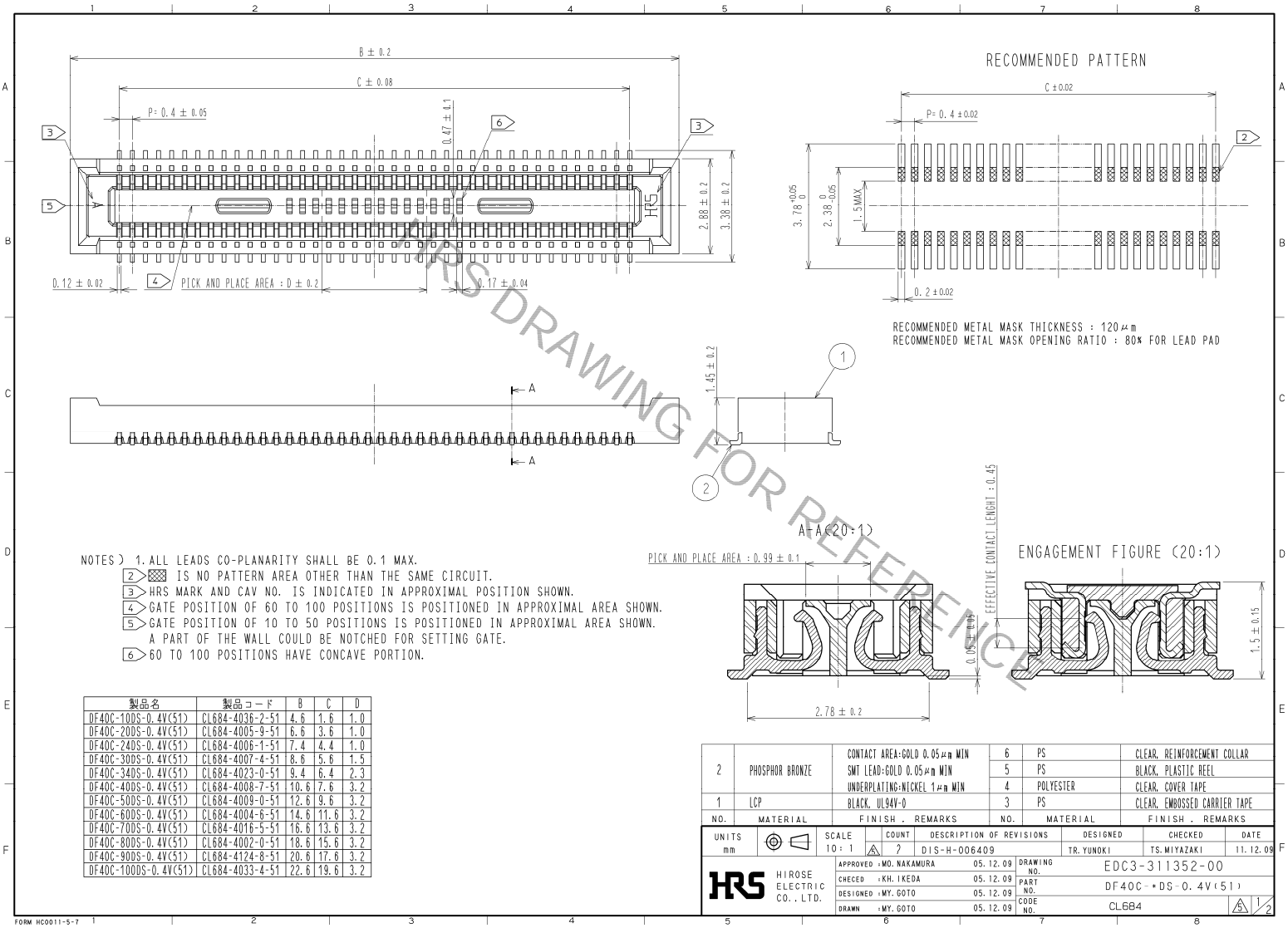
Imager



Decoder Board

2-6. Connector Specification

Below is the recommended 20-pin 0.4-pitch board-to-board connector on the host side.



NOTES) 1. ALL LEADS CO-PLANARITY SHALL BE 0.1 MAX.
2 ▨ IS NO PATTERN AREA OTHER THAN THE SAME CIRCUIT.
3 HRS MARK AND CAV NO. IS INDICATED IN APPROXIMAL POSITION SHOWN.
4 GATE POSITION OF 60 TO 100 POSITIONS IS POSITIONED IN APPROXIMAL AREA SHOWN.
5 GATE POSITION OF 10 TO 50 POSITIONS IS POSITIONED IN APPROXIMAL AREA SHOWN.
A PART OF THE WALL COULD BE NOTCHED FOR SETTING GATE.
6 60 TO 100 POSITIONS HAVE CONCAVE PORTION.

製品名	製品コード	B	C	D
DF40C-10DS-0.4V(51)	CL684-4036-2-51	4.6	1.6	1.0
DF40C-20DS-0.4V(51)	CL684-4005-9-51	6.6	3.6	1.0
DF40C-24DS-0.4V(51)	CL684-4006-1-51	7.4	4.4	1.0
DF40C-30DS-0.4V(51)	CL684-4007-4-51	8.6	5.6	1.5
DF40C-34DS-0.4V(51)	CL684-4023-0-51	9.4	6.4	2.3
DF40C-40DS-0.4V(51)	CL684-4008-7-51	10.6	7.6	3.2
DF40C-50DS-0.4V(51)	CL684-4009-0-51	12.6	9.6	3.2
DF40C-60DS-0.4V(51)	CL684-4004-6-51	14.6	11.6	3.2
DF40C-70DS-0.4V(51)	CL684-4016-5-51	16.6	13.6	3.2
DF40C-80DS-0.4V(51)	CL684-4002-0-51	18.6	15.6	3.2
DF40C-90DS-0.4V(51)	CL684-4124-8-51	20.6	17.6	3.2
DF40C-100DS-0.4V(51)	CL684-4033-4-51	22.6	19.6	3.2

NO.	MATERIAL	FINISH . REMARKS	NO.	MATERIAL	FINISH . REMARKS
2	PHOSPHOR BRONZE	CONTACT AREA:GOLD 0.05μm MIN SMT LEAD:GOLD 0.05μm MIN UNDERPLATING:NICKEL 1μm MIN	6	PS	CLEAR, REINFORCEMENT COLLAR
			5	PS	BLACK, PLASTIC REEL
			4	POLYESTER	CLEAR, COVER TAPE
1	LCP	BLACK, UL94V-0	3	PS	CLEAR, EMBOSSED CARRIER TAPE

UNITS	SCALE	COUNT	DESCRIPTION OF REVISIONS	DESIGNED	CHECKED	DATE
mm	10:1	2	DIS-H-006409	TR. YUNOKI	TS. MIYAZAKI	11.12.09

HRS HIROSE ELECTRIC CO., LTD.

APPROVED	MO. NAKAMURA	05.12.09	DRAWING NO.	EDC3-311352-00
CHECED	KH. IKEDA	05.12.09	PART NO.	DF40C-*DS-0.4V(51)
DESIGNED	MY. GOTO	05.12.09	CODE NO.	CL684
DRAWN	MY. GOTO	05.12.09		1/2

FORM HC0011-5-7

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)

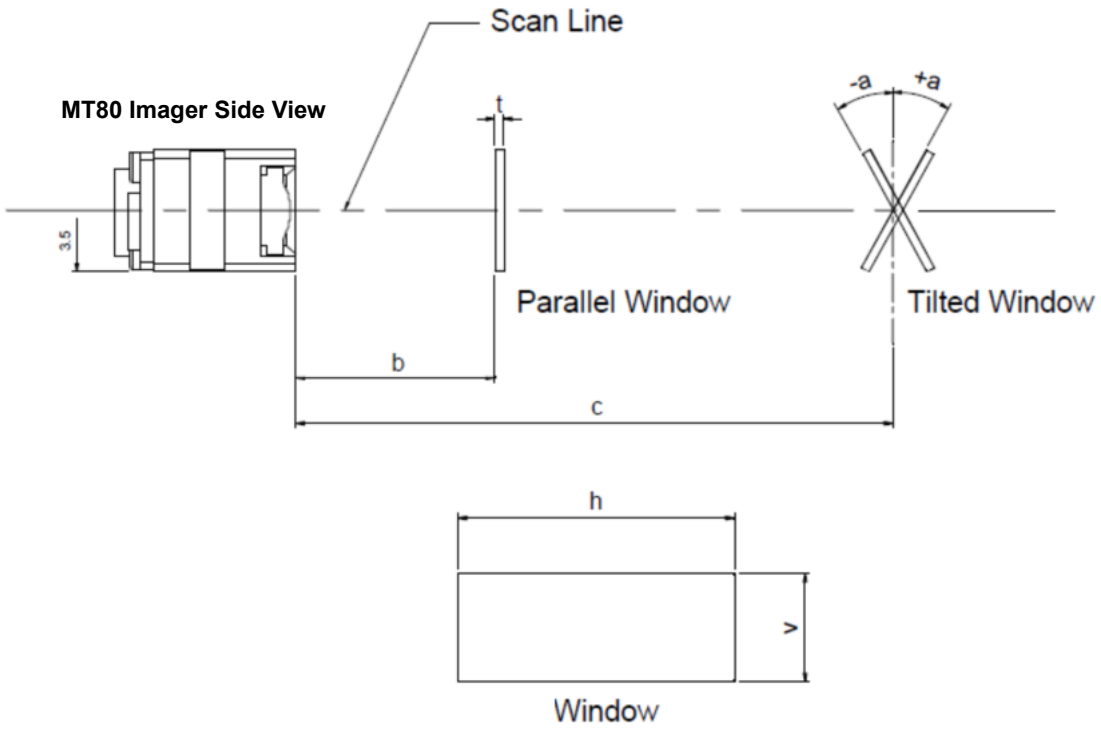
Also known as CR-39™, ADC, a thermal setting plastic widely used for plastic eyeglasses, has excellent chemical and environmental resistance. It also has an inherently moderate surface hardness and therefore does not require hard-coating. This material cannot be ultrasonically welded.

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 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

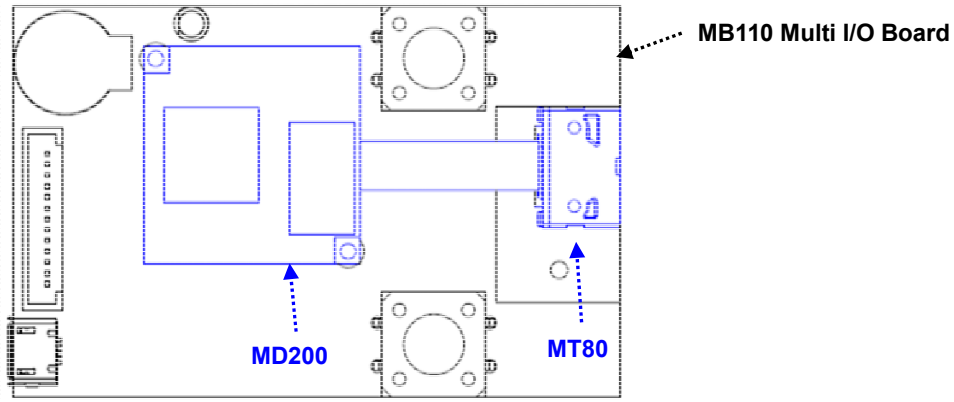
The MT80 scan engine conforms to the following regulations:

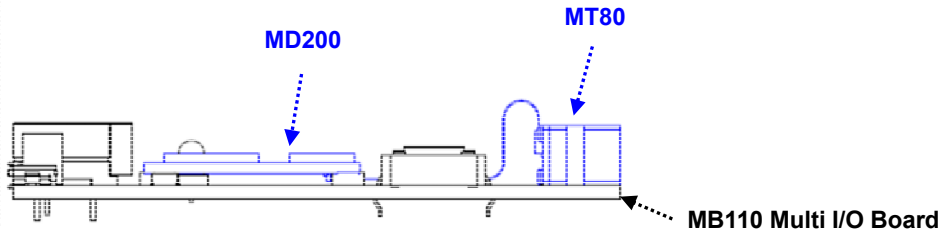
1. Electromagnetic Compliance – CE EN55022, EN55024
2. Electromagnetic Interference – FCC Part15 Subpart B (Class B)
3. Photobiological Safety – IEC 62471 (Exempt Group)
4. Environmental Regulations – RoHS 2.0, WEEE

5. DEVELOPMENT KIT

MARSON MB110 Demo Kit (P/N: TBD) enables the development of products and systems using the MT80+MD200 on the MS Windows OS platform. Besides the Multi I/O board (P/N: TBD), the MB110 Demo Kit also provides the software and hardware tools required for testing the MT80+MD200 applications before integrating it into the host device. Please contact your sales representative for ordering information.

MB110 Multi I/O Board (P/N: TBD)





MB110 Demo Kit Accessories

O: Supported X : Not Supported

Interface / Cable	RS232 (UART)	USB HID	USB VCP
External Y-cable (P/N: 7090-1583A00)	o	o	o
Internal Y-cable (P/N: 5300-1315X00)	o	o	o
Micro USB Cable (P/N: 7005-9892A50)	x	o	o

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
0.4	2018.06.27	Defined MT80 as 2D Mini Imager Defined MD200 as Decoder Board Updated Chapter 1-2-1 Updated Chapter 5	Shaw	Kenji
0.5	2018.07.04	Updated Chapter 2-5 Revised MD200 DIM to 25x25x3.5mm Updated Chapter 5, adding MB110	Shaw	Hus

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