Manuals+ — User Manuals Simplified.

MARSON MT1 2D Scan Engine User Guide

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MARSON MT1 2D Scan Engine
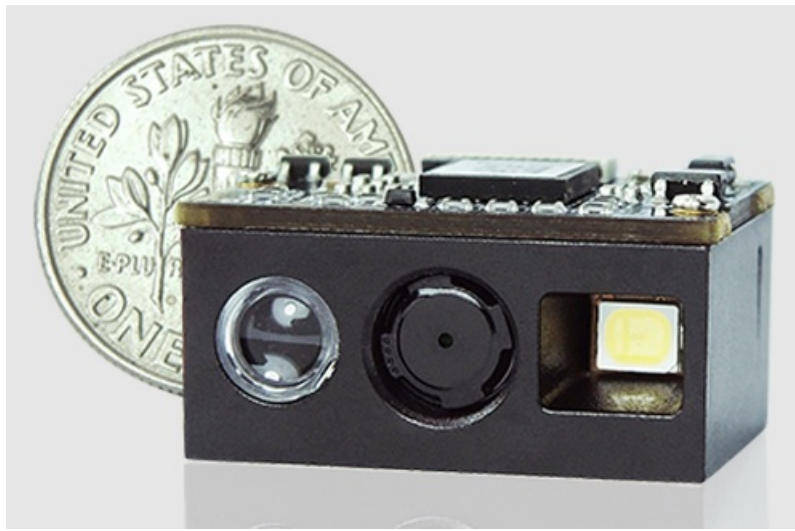
INTRODUCTION

MT1 One-piece Compact 2D Scan Engine provides snappy scanning performance at a competitive cost and compact form factor. With its all-in-one design, MT1 2D scan engine can be easily integrated with specific applications such as access control, lottery kiosk and consumer electronics.

The MT1 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.

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 or Virtual COM port device and communicates with the host system over USB.
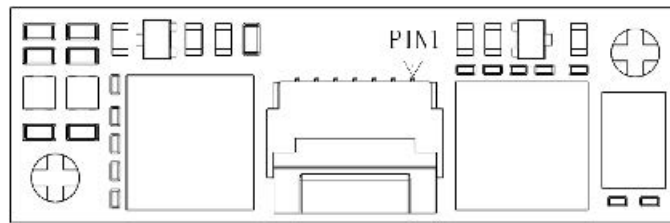
Block Diagram
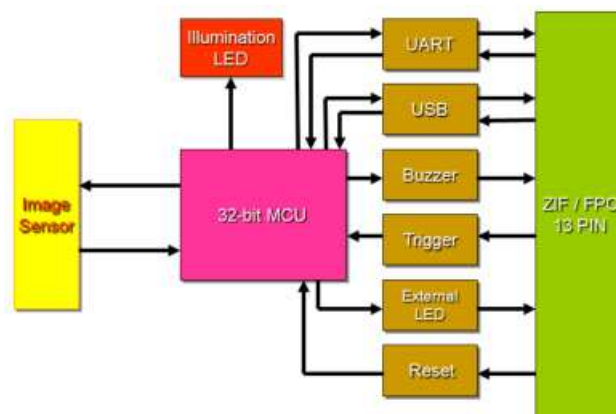
Electric Interface
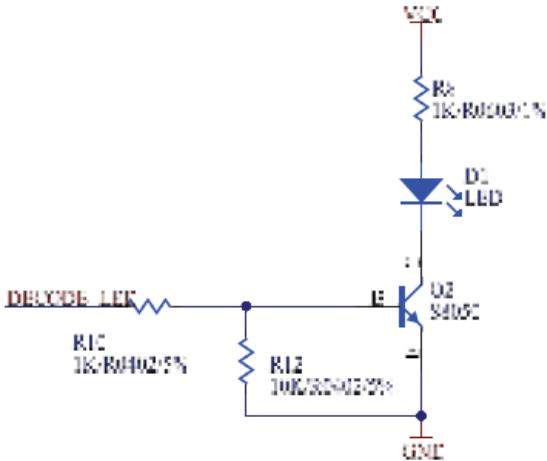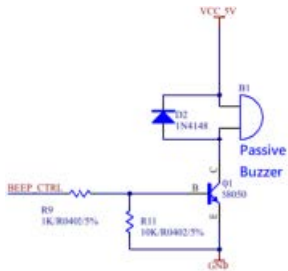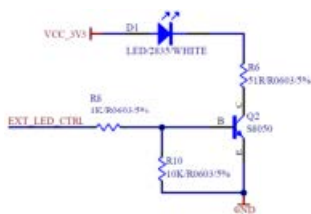
Pin Assignment
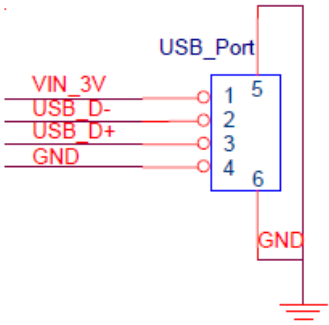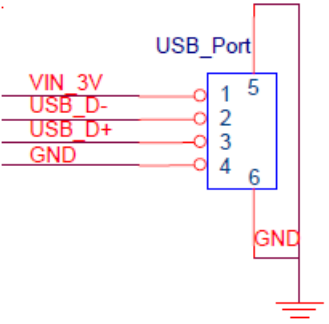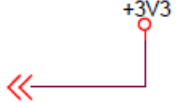
(Back View of MT1)
Contact points of connector are on the inside

Pin#	Definition	I/O	Description	Schematic Example
1	GND	———	Power and signal ground.	
2	nTRIG	Input	High: Stop Scanning Low: Start Scanning	 Once nTRIG pin is pull low for more than 5ms, the scanning operation starts until a barcode is successfully decoded or the nTRIG pin is pull high. To proceed to the next scanning operation, pull high first and pull low again. A minimum of 50ms interval is recommended between two trigger signals.

3	nRST	Input	Keep level low for at least 100us to reset the scan engine.	If the pin is not in use, leave it unconnected.
4	LED	Output	When scanning is successful (Good Read), it outputs a high-level pulse, whose load capacity is limited and not enough to driver LED directly. A supporting LED drive circuit is required.	
5	Buzzer	Output	Active High: it indicates the status of Power-Up or a successful barcode decode. PWM controlled signal can be used to drive an external buzzer for a successful barcode decode (Good Read).	
6	EXT LED CTRL	Output	External LED illumination control signal.	If the pin is not in use, leave it unconnected.

7	USB_D+	Bidirectional	USB Differential Signal Tr ansmission (USB D+)	USB_Port VIN_3V 1 5 USB_D- 2 USB_D+ 3 GND 46 GND
8	USB_D-	Bidirectional	USB Differential Signal Tr ansmission (USB D-)	USB_Port VIN_3V 1 5 USB_D- 2 USB_D+ 3 GND 4 6 GND

9	UART_TX	Output	UART TTL data output.	Sipex® Vendor P/N: SP232ACT
10	UART_RX	Input	UART TTL data input.	Sipex® Vendor P/N: SP232ACT
11	GND	———	Power and signal ground.	
12	VCC	———	Supply voltage input. Must always be connected to 3.3V power supply.	+3V3
13	VCC	———	Supply voltage input. Must always be connected to 3.3V power supply.	+3V3

Electric Characteristics

- Operating Voltage Ta=25°C

Symbol	Ratings	Min	Typical	Max	Unit
VDD	Power supply	—	3.3	—	
VIL	Input low level	—	—	0.8	
VIH	Input high level	2	—	—	
VOL	Output low level	—	—	0.4	V
VOH	Output high level	2.5	—	—	

Operating Current

Ta=25°C, **VDD**=3.3V

Ratings	Max	Unit
Standby Current	15	
Working Current	200	mA

SPECIFICATIONS

Technical specifications

Optic & Performance	
Light Source	White LED
Aiming	Visible red LED
Sensor	640 x 480 pixels
Resolution	3mil/ 0.075mm (Code 39)
Field of View	Horizontal 43° Vertical 33°
Scan Angle	Pitch Angle ±55° Skew Angle ±55° Roll Angle 360°
Print Contrast Ratio	10%
Width of Field	176mm (13Mil Code39)
	5 Mil Code39: 42 ~ 204mm

Typical	13 Mil UPC/EAN: 45 ~ 350mm
Depth Of Field (Environment: 800 lux)	15 Mil QR Code: 28 ~ 246mm
	6.67 Mil PDF417: 46 ~ 152mm
	10 Mil Data Matrix: 37 ~ 150mm

Physical Characteristics	
Dimension	W21.5 x L9 x H6.7 mm
Weight	1.25g
Color	Black
Material	Plastic
Connector	13pin ZIF (pitch=0.3mm)
Cable	13pin to 12pin flex cable (pitch=0.5mm)

Electrical	
Operation Voltage	3.3VDC ± 5%
Working Current	< 200 mA
Standby Current	< 15 mA
Idle Current (Sleep Mode)	Typ. 2.7mA

Connectivity	
Interface	UART (TTL-level RS232)
	USB (HID Keyboard)
	USB (Virtual COM)

User Environment	
Operating Temperature	-20°C ~ 60°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 ISBN / ISSN Codabar Code 11 Code 39 Code 32 Code 93 Code 128 Interleaved 2 of 5 Matrix 2 of 5 Industrial 2 of 5 Standard 2 of 5 Plessey MSI Plessey Febraban Composite GS1 Databar
2D Symbologies	QR Code Micro QR Code PDF417 MicroPDF417 Data Matrix Aztec MaxiCode HanXin DotCode
Regulatory	
ESD	Functional after 4KV contact, 8KV air discharge
	(It requires housing that is designed for ESD protection and stray from electric fields.)
EMC	TBA
Safety Approval	TBA
Environmental	RoHS 2.0

Interface

UART Interface

- Below are default communication protocols: Baud rate: 9600
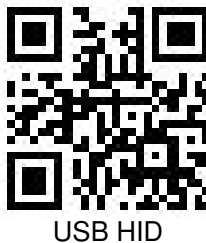- Data Bits: 8
- Parity: None
- Stop Bit: 1

- Handshaking: None
- Flow Control Timeout: None
- ACK/NAK: OFF
- BCC: OFF

Interface Configuration Barcode:

UART

USB HIID Interface
Interface Configuration Barcode:

USB HID

USB VCP Interface
Interface Configuration Barcode:

USB VCP

Operation Method

1. At power-up, the MT1 sends the Power-Up signals over Buzzer and LED pins as an indication that the MT1 enters Standby Mode and is ready for operation.
2. Once the MT1 triggered by either hardware or software method, MT1 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 MT1.
4. Upon a successful barcode decoded, the MT1 turns off the illumination LEDs, sending the Good Read signals over Buzzer and LED pins and transmitting the decoded data to the host.

Mechanical Dimension

(Unit = mm, Tolerance = ±0.2mm)

Front view   Side view   Bottom view
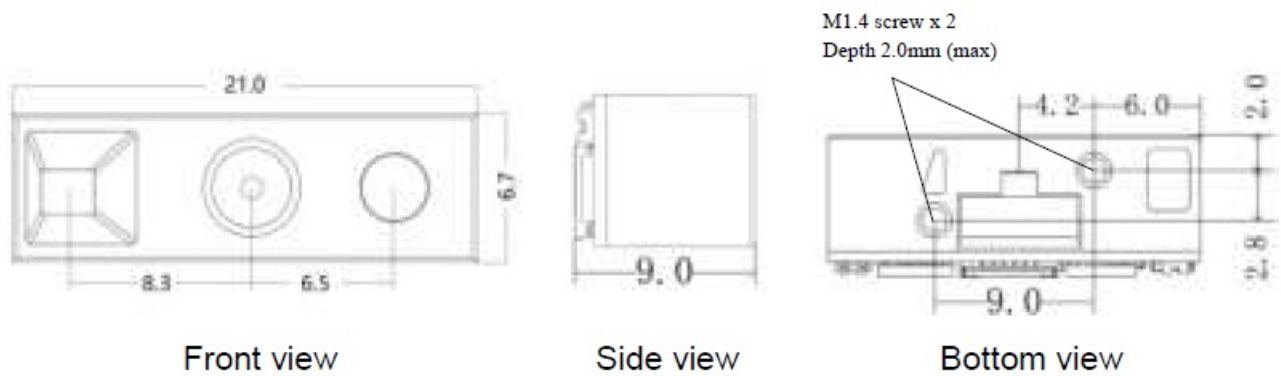
Connector Specification

MT1 is built with a 13-pin pitch 0.3mm FPC connector. The recommended Model No. of 13-pin connector is FH35C-13S-0.3SHW(50)

When the 13-pin to 12-pin FPC cable (shipped with MT1 by default) is used, the recommended Model No. of 12-pin pitch 0.5mm FPC connector on the host side is FH34SRJ-12S-0.5SH(50), with pin assignment below:

Pin#	Definition	I/O	Description
1	NC	———	Floating
2	VCC	———	3.3V power supply.
3	GND	———	Power and signal ground.
4	UART_TX	Output	UART TTL data output.
5	UART_RX	Input	UART TTL data input.
6	USB_D-	Bidirectional	USB D- signal
7	USB_D+	Bidirectional	USB D+ signal
8	NC	———	Floating
9	Buzzer	Input	Buzzer input
10	LED	Input	Good read LED input
11	nRST	Output	Reset signal output
12	nTRIG	Output	Trigger signal output

INSTALTION

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.

Electrosstatic 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.

Installation Recommended

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.
4. Do not enclose the scan engine with thermal insulation material. Failure of heat dissipation may deteriorate the scan engine's performance.

Installation Orientation
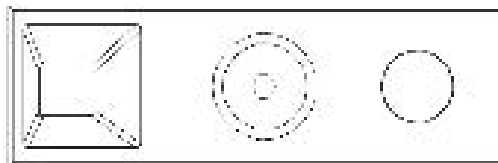
Two M1.4 screw holes (max depth 2mm) are available at the bottom of MT1. When the screw holes are facing downwards, MT1's appearance should be identical to above picture.

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-39TM, 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.

Window Placement

MT1 Side View
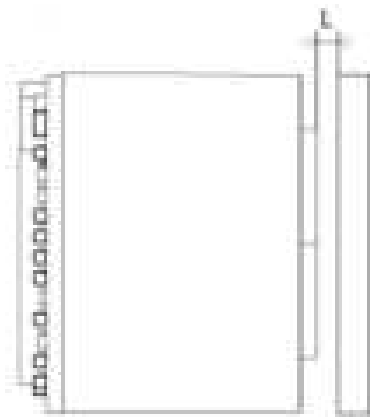
The distance between window and front of MT1 should not exceed L=0.5mm The thickness of the window should not exceed 1mm

Window Size
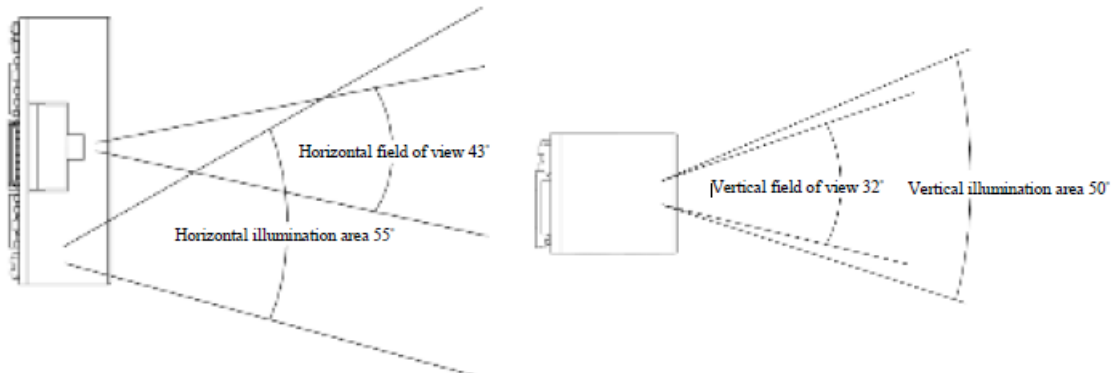
The window size should ensure that field of view is not blocked, and the illumination area should not be blocked as well. For the size of window, please refer to above diagram of each optical area.

Window Care

In the aspect of window, the performance of MT1 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.

REGULATIONS

The MT1 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

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 MT1 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)
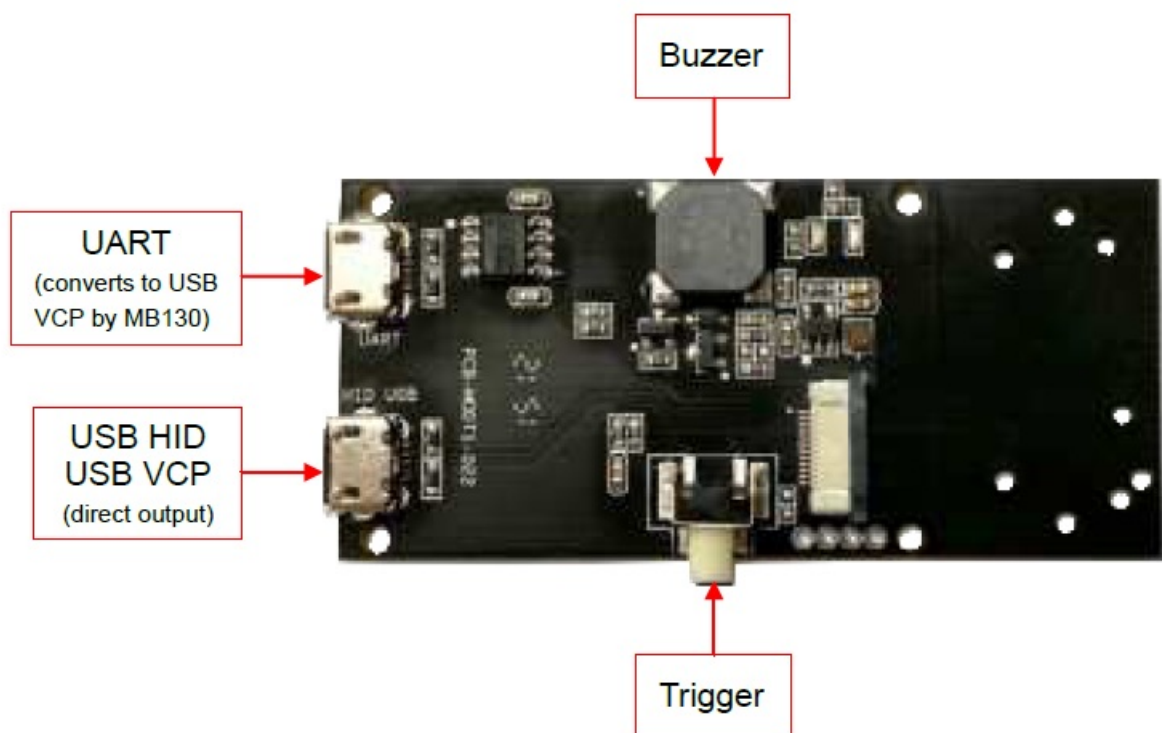
PACKAGING

1. Tray (size: 24.7 x 13.7 x 2.7cm): Each tray contains 8pcs of MT1.
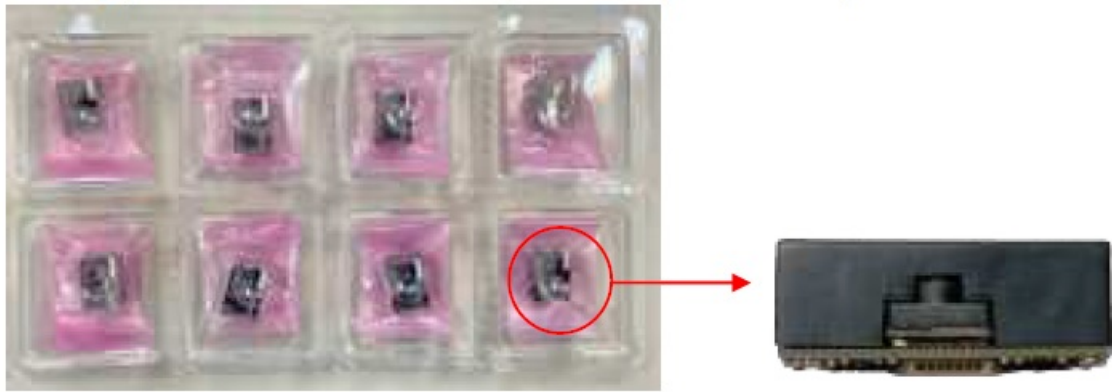
2. Box (size: 25 x 14 x 3.3cm): Each Box contains 1pc of tray, or 8pcs of MT1.

3. Carton (size: 30 x 27 x 28cm): Each Carton contains 16pcs of boxes, or 128pcs of MT1.

VERSION HISTORY

Rev.	Date	Description	Issued	Checked
0.1	2022.09.12	Initial Release	Shaw	Ming
0.2	2022.09.22	Updated Pin Assignment	Shaw	Ming

Marson Technology Co., Ltd.
9F., 108-3, Minquan Rd., Xindian Dist., New Taipei City, Taiwan

TEL: 886-2-2218-1633
FAX: 886-2-2218-6638
E-mail: info@marson.com.tw
Web: www.marson.com.tw

Documents / Resources

MARSON MT1 2D Scan Engine [pdf] User Guide
MT1, 2D Scan Engine, MT1 2D Scan Engine

References

- 🌐 **Barcode Scanner | Scan Engines | RFID Reader | Custom Manufacturer AIDC solution - Marson**