User's Manual

2D Image Scan Engine

Revision History

Changes to the original manual are listed below:

Version	Date	Description of Version
1.0	2024/03/08	Initial release

Important Notice

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For CE-countries

This scanner is in conformity with CE standards. Please note that an approved, CE-marked power supply unit should be used in order to maintain CE conformance.

Guidance for Printing

1. This manual is in A5 size. Please double check your printer setting before printing it out.
2. When printing barcodes for programming, the use of a high-resolution laser printer is strongly suggested for the best scan result.

Table of Contents

Introduction

Expertly designed to surpass expectations, the Z-5212 Plus transcends its role as a mere solution; it's a game-changer, unleashing remarkable scanning speed and cost-effective performance. From decoding intricate Maxicodes to elusive Dotcodes, this state-of-the-art device effortlessly handles various barcodes. Precision-engineered for seamless integration, its carefully configured pins align effortlessly with all major brands, ensuring universal compatibility. With optimal performance and a smooth, intuitive setup process guaranteed, the Z-5212 Plus redefines excellence in barcode scanning, setting a new standard in efficiency and convenience.

- No separate decoder board required
- Flexible interface communications
- Outstanding 1D and 2D scanning performance
- Affordability unleashed
- Simplified integration
- Compact efficiency
- Screen-ready scanning

Overview

Aiming
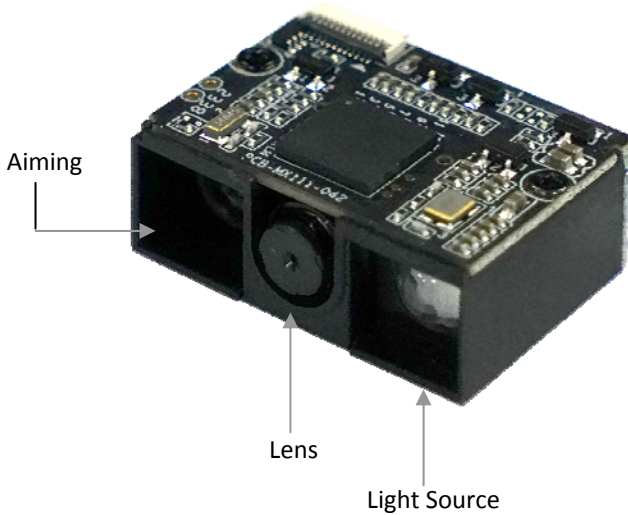
Lens

Light Source

Components

Description	Function
Light Source	Reinforced light brightness
Aiming	Produce easy to see scan line
Lens	Captures image for decoding

Scanner Operation

Precautions

To ensure the scanner reaches its best performance, the following points need to be noticed when mounting the scanner:

a. Do not place the scanner under direct sunlight or any other bright light source illuminating.

b. When placing the barcode label, one must be careful not to over tilt, skew and/or pitch the barcode.

c. Do not place the device at specula reflection position. The LED light of the scanner reflects directly back on the scanner if it is placed at specula reflection position. As to the nature of the sensor, it will not be able to read any barcodes.

d. The barcode label must be placed within the effective depth of field (D.O.F.) since it is the effective reading distance for the barcode from the scanner. For the best placing position, please refer to the Decode Depth of Field drawing.

Maintaining the Scanner

Handling with care! The scan engines are electrostatic sensitive device; do not handle with bare hands.   Store the engines away from dust and humidity places.
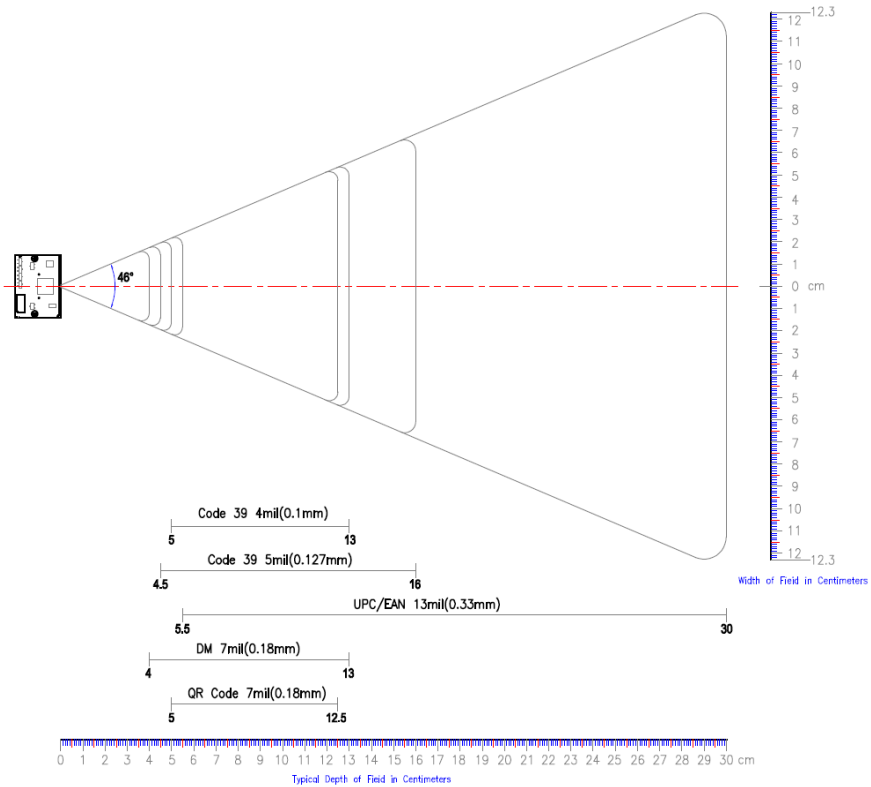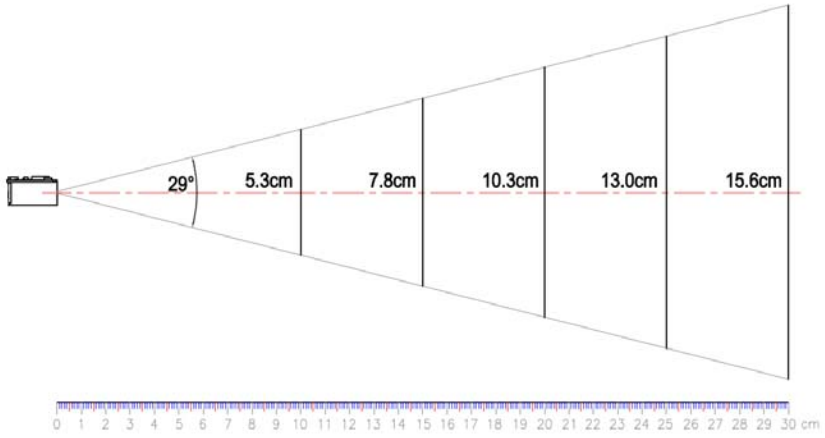

ESD

The scan engines are protected from ESD events that may occur in an ESD-controlled environment. Always exercise care when handling the module. Use grounding wrist straps and handle in a properly grounded work area.

Image Field of View

See the following illustrations for the effective barcode reading angles.

Imager Field of View	46° (H) x 29° (V)
Skew/Pitch/Roll	Skew: ±60° , Pitch: ±60° , Roll: ±360°

29°   5.3cm   7.8cm   10.3cm   13.0cm   15.6cm

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 cm

Scan Zone

The effective reading distance for the scanner is illustrated as below.

Resolution	1D : ≥4 mil ; 2D : ≥7 mil	
DOF (mm)	Code39 (4 mil) : 50 ~ 130 mm	
	Code39 (5 mil) : 45 ~ 160 mm	
	EAN -13 (13 mil) : 55 ~ 300 mm	
	Data Matrix (7 mil) : 40 ~ 130 mm	
	QR Code (7 mil) : 50 ~ 125 mm	
Environment: 350 lux		

Different quality and density of a barcode could effect its decode depth of field. Usually when a barcode has poor printing quality or high density, the depth of field would be shorter. It is highly suggested **not** place the barcode label at the extremes of depth of field as it is often easy to move out from the reading range.
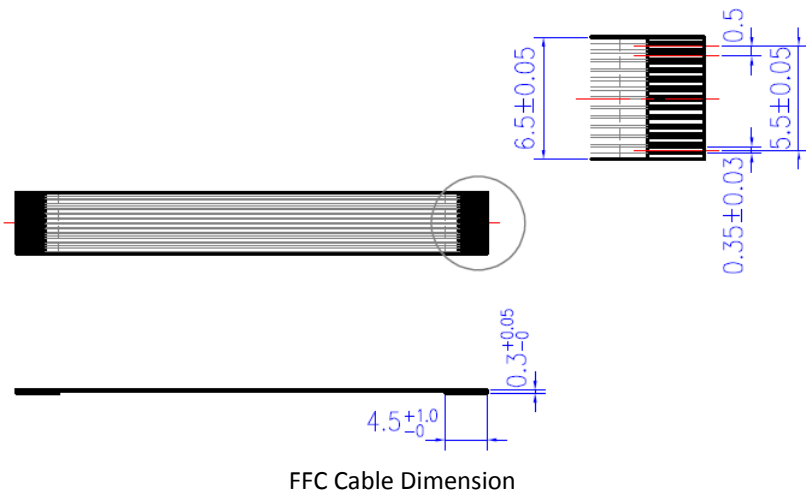
Code 39 4mil(0.1mm)
Code 39 5mil(0.127mm)
UPC/EAN 13mil(0.33mm)
DM 7mil(0.18mm)
QR Code 7mil(0.18mm)

46°

12.3
12
11
10
9
8
7
6
5
4
3
2
1
0 cm
1
2
3
4
5
6
7
8
9
10
11
12
12.3

Width of Field in Centimeters

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 cm
Typical Depth of Field in Centimeters
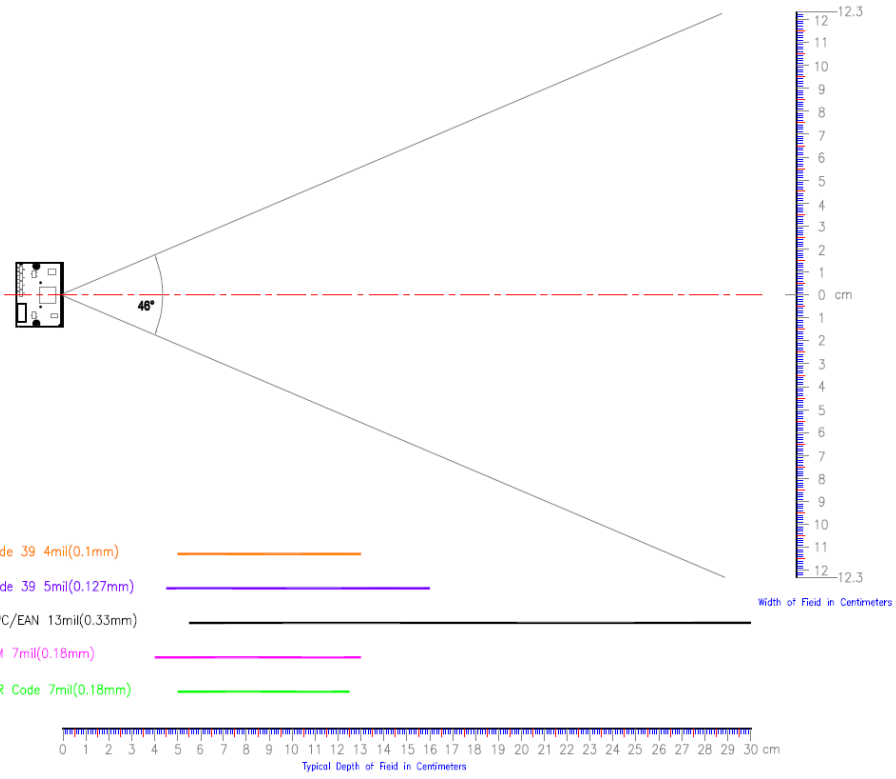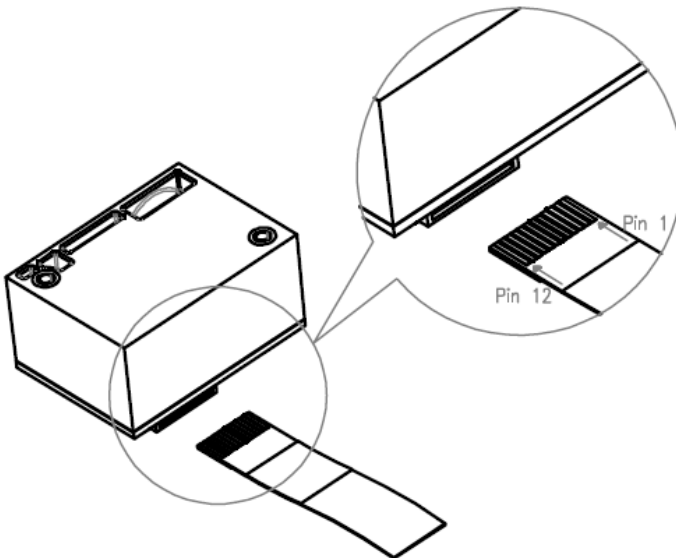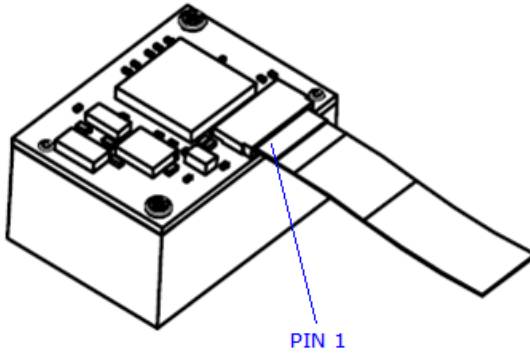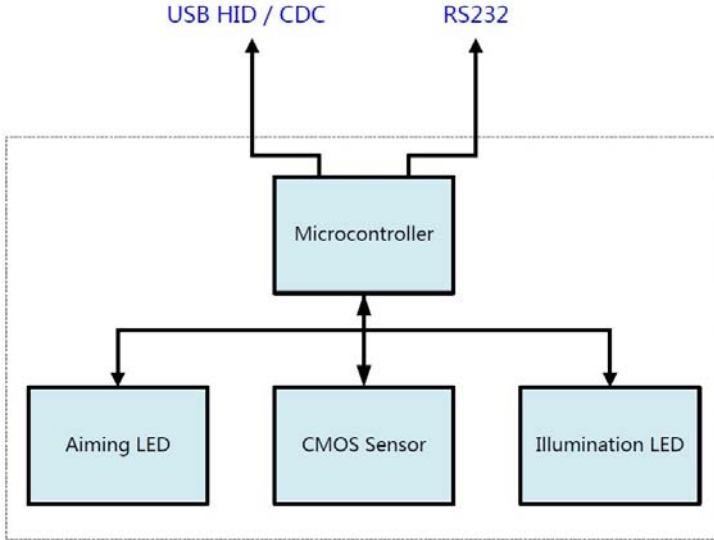
Installation

FFC Cable

A 12Pin ZIF Pin configured FFC cable is needed to connect the scan engine to your host terminal.

The following figure shows the FFC cable dimension and its pin-out configuration.

FFC Cable Dimension

Pin Definition

PIN 1

Pin 1

Pin 12

USB HID / CDC   RS232

Microcontroller

Aiming LED   CMOS Sensor   Illumination LED

PIN#	Signal Name	I/O	Function
1	NC	-	
2	VIN	-	Power: supply voltage input
3	GND	-	Ground: power and signal ground
4	RXD	I	Input: TTL level 232 receive data
5	TXD	O	Output: TTL level 232 transmit data
6	D-	I/O	USB D- differential data signal
7	D+	I/O	USB D+ differential data signal
8	NC	-	
9	BEEPER	O	Low current beeper output.
10	nDLED	O	Low current decode LED output.
11	NC	-	
12	nTrig	I	Input: Active low, signal used as trigger input to activate the engine to start a scan and decode session

Mounting

At the back of scan engine, there are two screw holes reserved for mounting, the scan engine can be fixed in any position and any angle without any degradation in performance. And to ensure the scanner reaches its best performance, the following points need to be noticed when mounting the scanner:

● Avoid direct sunlight or any other bright light source illuminating.

● When placing the barcode label, one must be careful not to over tilt, skew and/or pitch the barcode.

● Avoid putting the scanner in specula reflection position, the sensor will not sense the reading of any barcodes if the LED light reflects straight back.

The barcode must be placed within the effective depth of field (D.O.F.) area, the effective reading distance for the barcode from the scanner. Its theory is like a camera, if the object is placed within the focal range, and the image appears clearly. But if the object is outside the focal range, the image then is blurred. And different quality and density of barcodes could affect its D.O.F.; usually a lower piece or high density of barcode, its depth of field is shorter. It is suggested to avoid using depth of field extremes range, barcode is easily moved away from the reading range.

For best placing position, please refer to the Decode Depth of Field drawing.

Thermal Considerations
Electronic components in the Z-5212 Plus will generate heat during the course of their operation. Operating the Z-5212 Plus in continuous mode for an extended period may cause temperatures to rise on APU and decoder chip. Overheating can degrade image quality and affect scanning performance. Given that, the following precautions should be taken into consideration when integrating the Z-5212 Plus.

● Reserve sufficient space for good air circulation in the design.
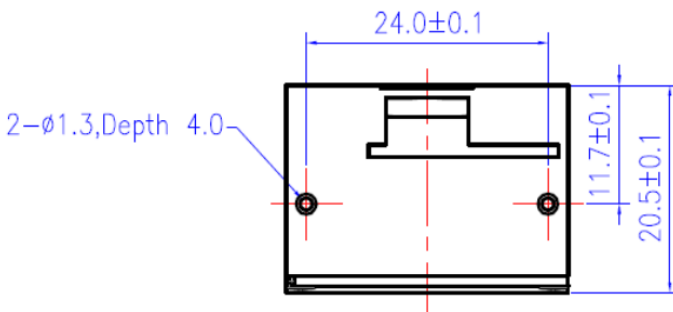● Avoid wrapping the Z-5212 Plus with thermal insulation materials such as rubber.

Dimensions
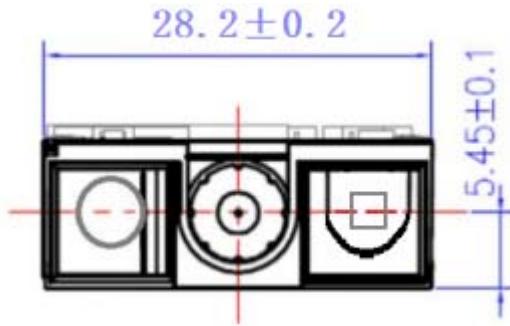
Outline Drawing
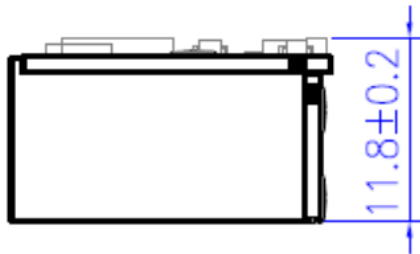
Left View

Bottom View

2D Image Scan Engine

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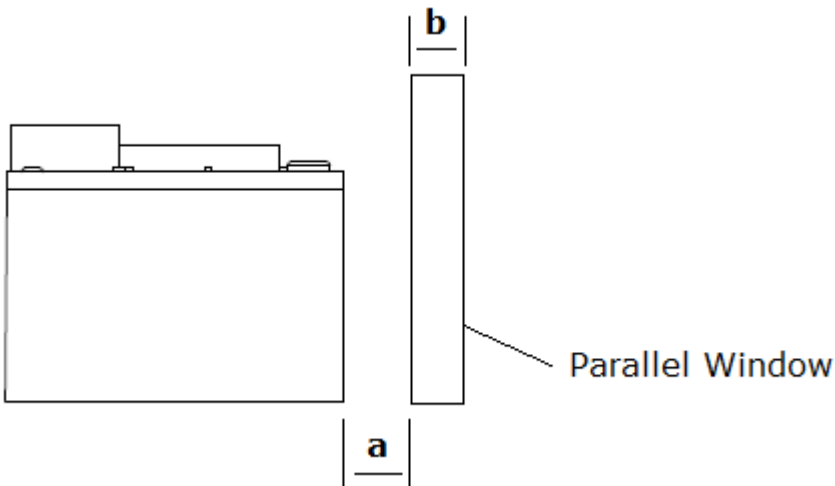
The front of the engine housing to the furthest surface of the window should not exceed a+b (a $\leq$ 0.1mm, b $\leq$ 2mm).

Window Size

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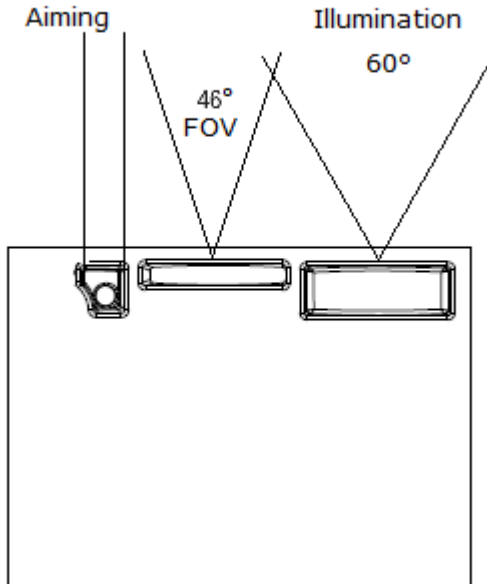

Scan Window Material

Scan window material must be clear. Many materials contain stresses and distortions which affect the optics module and reduce engine performance .PMMA, ADC and chemically tempered glass are recommended.

- PMMA (Cell-cast acrylic)
- ADC (CR-39): Also known as CR-39
- Chemically tempered glass
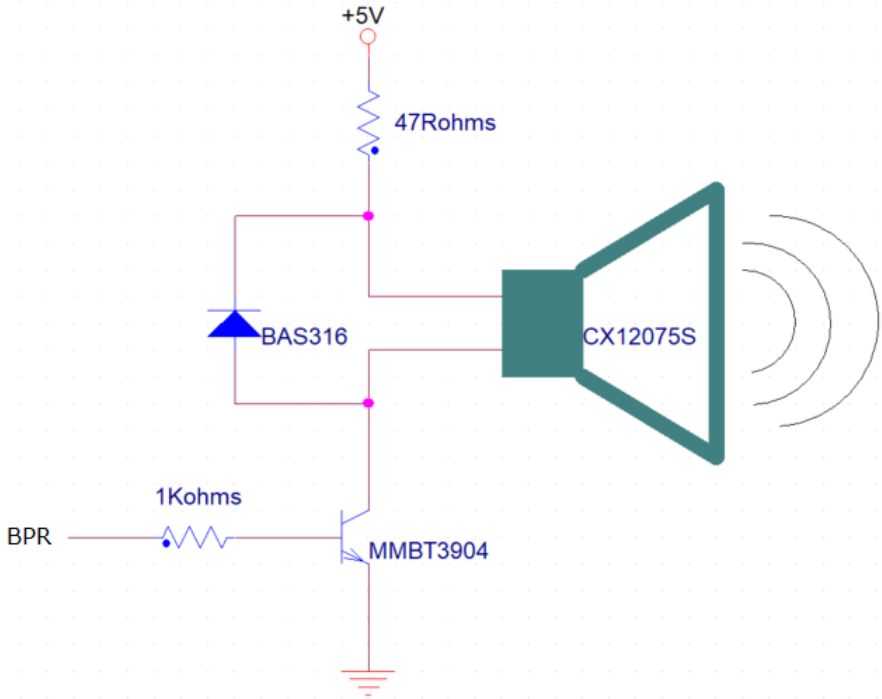
External Circuit Design

Good Read LED Circuit

The circuit below is used to drive an external LED for indicating good read. The nDLED signal is from PIN 10 of the 12-pin FPC connector.
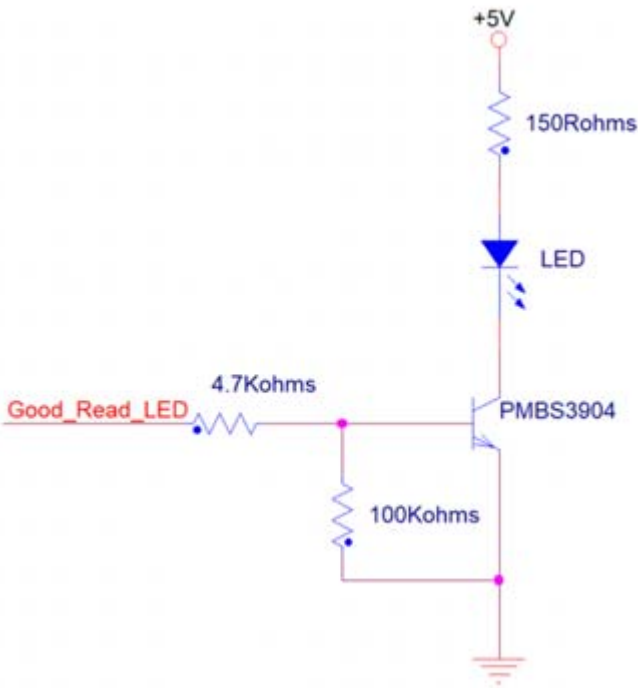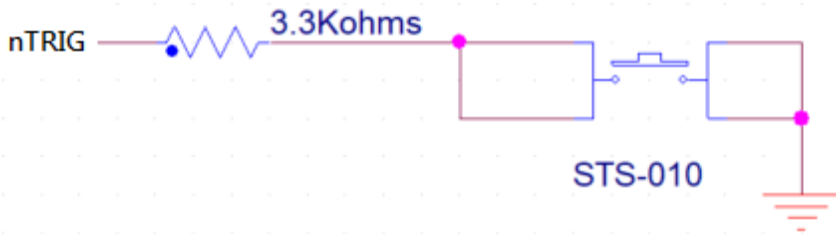
Beeper Circuit

The circuit below is used to drive an external beeper. The
BPR signal is from PIN 9 of the 12-pin FPC connector.

Trigger Circuit

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

Technical Specification

Operational	
Resolution	1280 pixels(H)x 800 pixels(V)
Light source	Aiming: 617nm; illumination: 5600K White LED
Depth of field	55 mm - 300 mm 0.33mm(13mil)@EAN -13, 100 %, PCS= 90%
Field of view	46° (H) x 29° (V)
Minimum resolution	0.1mm (4mil)@Code 39, PCS=90%
Printing contrast	30%(UPC/EAN 100% , PCS 90%)
System interface	+3.3V TTL serial port, 12pin ZIF connector
Physical	
Dimension	28.2mm x 20.5mmx 11.8 mm
Weight	5g
Power	
Input voltage	3.3VDC±10%
Operating current	100mA±5%, peak 195mA±5%
Safety	
EMC	CE EN55022 B, FCC Part 15 Class B, VCCI, BSMI
Environmental	
Operating temperature	-20℃~55℃
Humidity	5%~95% non condensation
Storage temperature	-40℃~+70℃
Light level	0~8,600Lux（fluorescence）0~100,000Luxdirect sunlight）
Decoding capability	
	1-D: UPC/EAN/JAN, UPC-A & UPC-E, EAN-8 & EAN-13, JAN-8 & JAN-13, ISBN/ISSN, Code 39 (with full ASCII), Codabar (NW7), Code 128 & EAN 128, Code 32, Code 11, Codabar, MSI Plessey, Interleaved 2 of 5, Matrix 2 of 5, Straight 2 of 5, IATA 2 of 5, Pharmacode, GS1 DataBar (Omnidirectional(RSS-14), Stacked, Limited, Expanded, Expanded Stacked), Interleaved 2 of 5, Stacked bar code: PDF417, MicroPDF417 2-D: Data Matrix, QR Code, Micro QR Code, Aztec code, Maxicode