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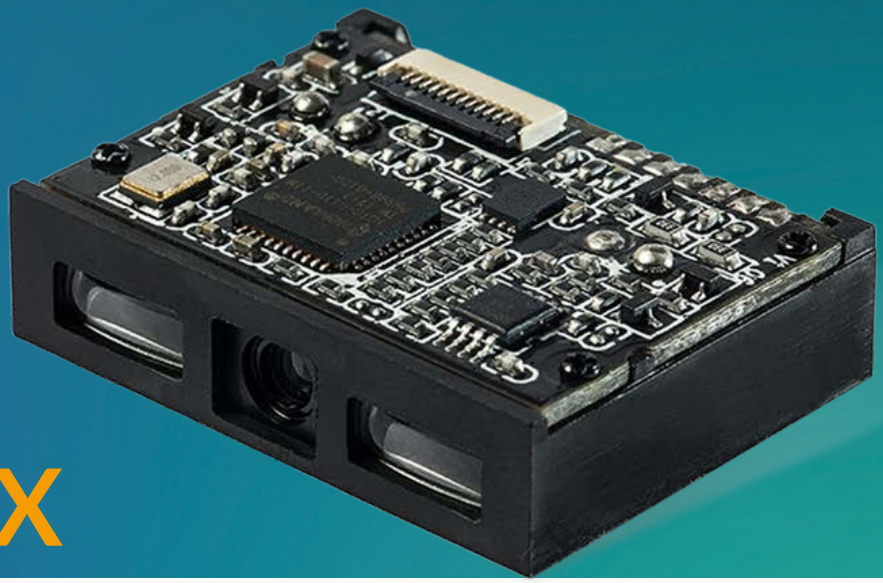

EM1365-EX

OEM Scan Engines

Version: V1.0.0

Integration Guide

Disclaimer

Please read the manual carefully before using the product and operate it according to the manual. It is advised that you keep this manual for future reference.

Do not disassemble the device or remove the seal label from the device; doing so will void the product warranty provided by Newland Europe BV.

All pictures in this manual are for reference only, and the actual product may differ.

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Risk Warning Regarding Unauthorized System Updates:
You should use the Newland-provided tool to update this product's system. Modifying system files by installing a third-party ROM system or using any cracking method may result in product malfunction or data loss and void your warranty.

Newland Europe BV reserves the right to make a final interpretation of the statement above.

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Revision History

Version	Description	Date
V1.0.0	Initial release.	August 7th, 2025

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Preface

Overview

The EM1365-EX OEM scan engine, armed with the Newland patented UIMG®, a computerized image recognition system, brings about a new era of 1D barcode scan engines.

The EM1365-EX's 1D barcode decoder chip ingeniously blends UIMG® technology and advanced chip design & manufacturing, which significantly simplifies application design and delivers superior performance and solid reliability with low power consumption.

The EM1365-EX supports EAN-13, EAN-8, UPC-A, UPC-E, ISSN, ISBN, Codabar, Code 128, Code 93, ITF-6, ITF-14, Interleaved 2 of 5, Industrial 2 of 5, Standard 2 of 5, Matrix 2 of 5, GS1 Databar, Code 39, Code 11, MSI-Plessey, Plessey.

Chapter Description

Chapter 1, Getting Started	Gives a general description of the EM1365-EX.
Chapter 2, Installation	Describes how to install the engine, including installation information, housing design, optical, grounding, ESD, and environmental considerations.
Chapter 3, Electrical Specifications	Includes the electrical characteristics & technical specifications for the engine and timing sequences.
Chapter 4, Interfaces	Describes interface pinout, connector specifications
Chapter 5, Auxiliary Tools	Introduces useful tools you can use to test and evaluate the EM1365-EX as well as conduct secondary development.

Explanation of Symbols

- This symbol indicates lists of required steps.

※ This symbol indicates something important to the readers. Failure to read the notice will not lead to harm to the reader, device or data.

⚠ This symbol indicates caution that, if ignored, may cause data or device damage or even personal injury.

Chapter 1 Getting Started

Introduction

The EM1365-EX is a highly compact area-imaging engine for barcode reading. It captures images and decodes barcodes. It features an LED illumination system that also provides aiming support.

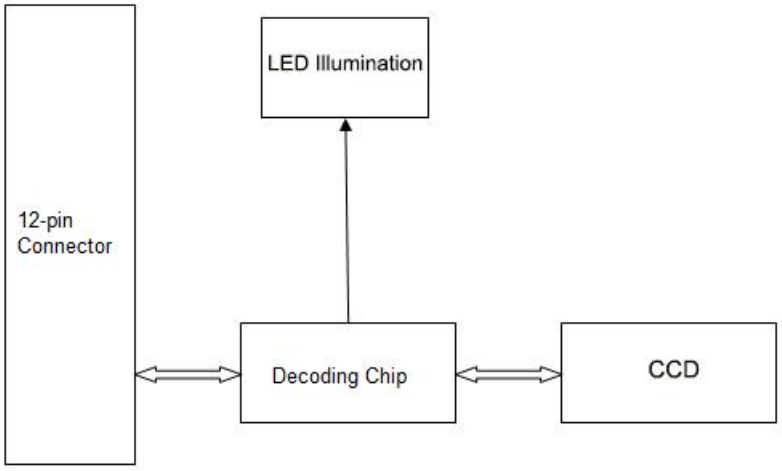
LED Compliance Statement

The EM1365-EX complies with IEC 62471:2006 for LED safety.

The EM1365-EX contains:

- One CCD linear image sensor with integrated lens
- Two illumination LEDs

1-1 System Block Diagram



The 12-pin FPC connector on the engine can be connected to a host device with an FPC cable. For information about this cable, please see the “12-pin FPC Cable” section in Chapter 4.

Illumination

The EM1365-EX uses two red LED (620nm~630nm) for supplementary lighting, making it possible to scan barcodes even in complete darkness. The illumination can be turned On or Off.

The EM1365-EX uses the red LED for illumination, so the engine shows better reading performance on barcodes printed in non-red colors. For applications involving red barcodes, it is advised to use non-red supplementary lighting (such as green). The user can conduct some tests to determine the proper wavelengths to be used.

Chapter 2 Installation

Introduction

This chapter explains how to install the EM1365-EX, including general requirements, housing design, and physical and optical information.

⚠ Caution: Do not touch the imaging lens when installing the engine. Be careful not to leave fingerprints on the lens.

⚠ Caution: Do not touch the illumination LED during handling. Improper handling may damage the LED.

General Requirements

ESD

ESD protection has been taken into account when designing the EM1365-EX and the engine is shipped in ESD safe packaging. Always exercise care when handling the engine outside its package. Be sure grounding wrist straps and properly grounded work areas are used.

Dust and Dirt

The EM1365-EX must be sufficiently enclosed to prevent dust particles from gathering on the imager, lens and circuit board. Dust and other external contaminants will eventually degrade the engine's performance.

Ambient Environment

The following environmental requirements should be met to ensure good performance of the EM1365-EX.

Table 2-1

Operating Temperature	-20℃ to 55℃
Storage Temperature	-40℃ to 70℃
Humidity	5% ~95% (non-condensing)

Thermal Considerations

Electronic components in the EM1365-EX will generate heat during the course of their operation. Operating the EM1365-EX in continuous mode for an extended period may cause temperatures to rise on CCD 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 EM1365-EX.

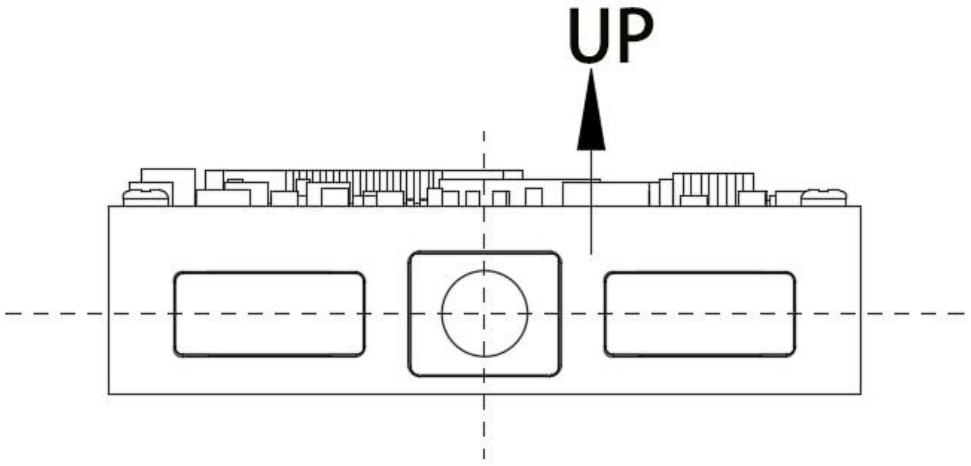
- ✧ Reserve sufficient space for good air circulation in the design.
- ✧ Avoid wrapping the EM1365-EX with thermal insulation materials such as rubber.

External Optical Elements

Do not subject external optical components on the engine to any external force. Do not hold the engine by an external optical component, which may cause the mechanical joints that secure the components to crack or break due to excessive stress.

Installation Orientation

The **Figure 2-1** illustrates a front view of the EM1365-EX after correct installation.



Mounting

The illustrations below show the mechanical mounting dimensions for the EM1365-EX. The structural design should leave some space between components.

Front View (unit: mm)

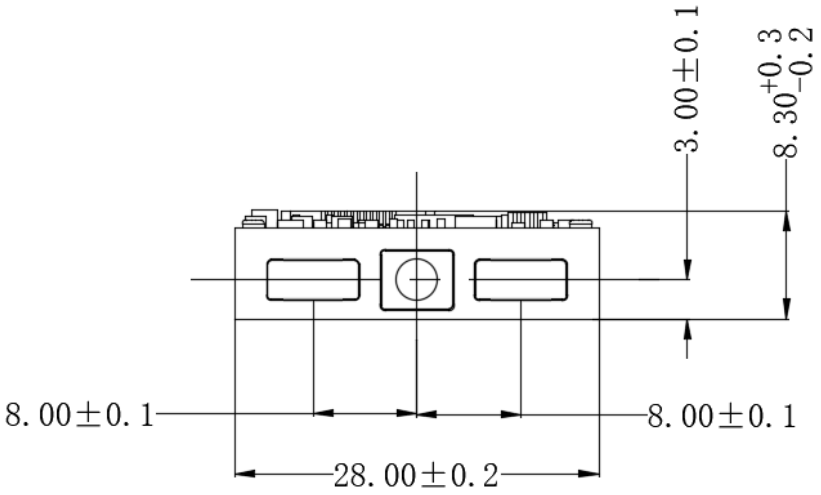


Figure 2-2

Bottom View (unit: mm)

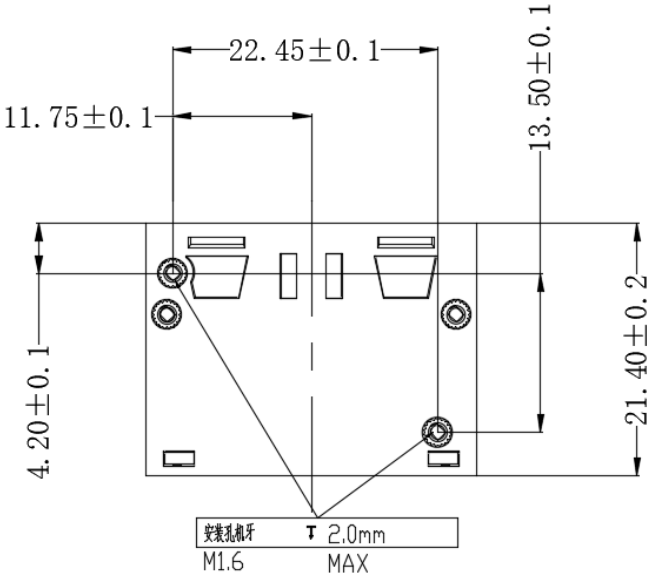


Figure 2-3

Side View (unit: mm)

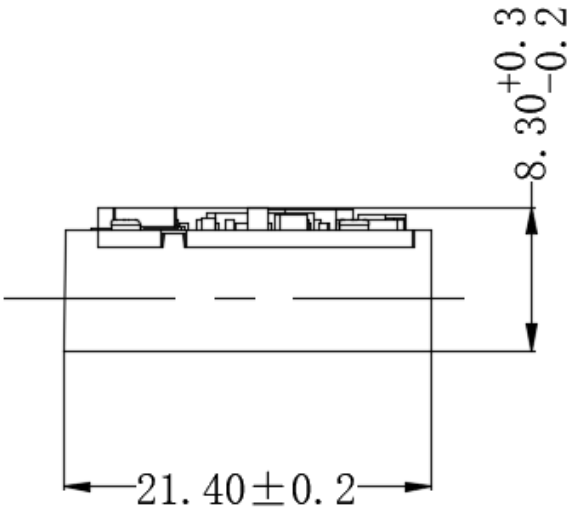


Figure 2-4

Housing Design

※ Note: Conduct an optical analysis for the housing design to ensure optimal scanning and imaging performance. Housing design should make sure that internal reflections from the aiming and illumination system are not directed back to the engine. The reflections from the housing or window can cause problems. For particular window tilt angles, the unwanted reflections can bounce off the top or bottom and reach the engine. Avoid any highly reflective objects around the engine that can cause bright spots to appear in the captured image. It is recommended to use baffles or matte-finished dark internal housing colors.

Optics

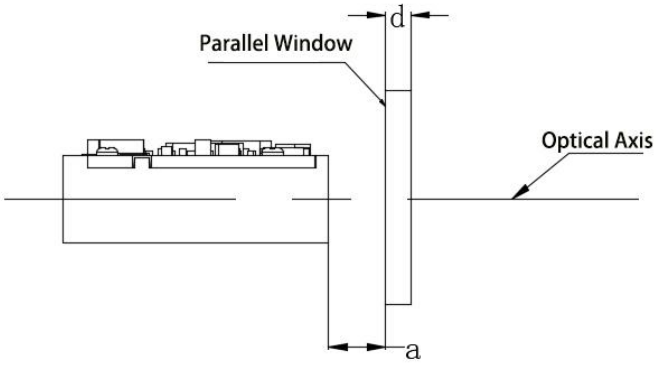
The EM1365-EX uses a sophisticated optical system. An improperly designed internal housing or improper selection of window material can degrade the engine's performance.

Window Placement

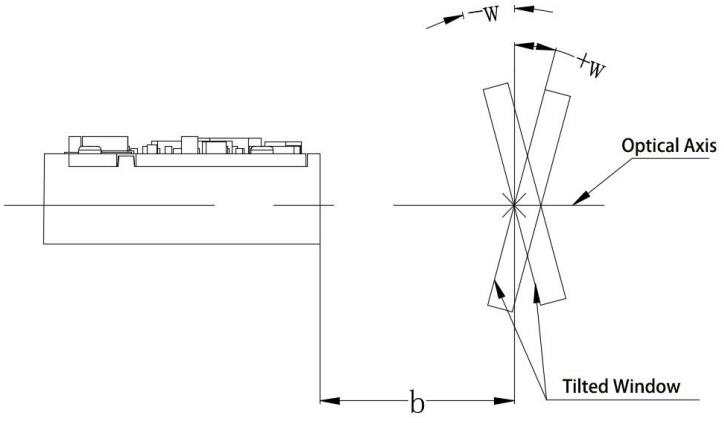
The window should be positioned properly to let the illumination and aiming beams pass through as much as possible and no reflections back into the engine (reflections can degrade the reading performance).

There are two window placement options.

• **Parallel window** – Primary option for imager engines. The following window distance requirements should be satisfied: The maximum distance is measured from the front of the engine housing to the furthest surface of the window. In order to reach better reading performance, the distance from the front of the engine housing to the nearest surface of the window should not exceed a (a=1mm) and the distance from the front of the engine housing to the furthest surface of the window should not exceed a+d (a=1mm, d=2mm), as shown in Figure 2-5.



Tilted window – If the window is required to be in a tilted position, the above distance requirements should be met and tilt angle should ensure no reflections back into the lens.



Window Material and Color

Wavelengths of illumination and aiming beams and CCD's responsiveness (mainly to wavelengths of red light） should be taken into consideration when choosing window material and color, to achieve the possible highest spectral transmission, lowest haze level and homogeneous refractive index. It is

suggested to use PMMA or optical glass with spectral transmittance over 90% and haze less than 1%. Whether to use an anti-reflection coating or not depends on the material and application needs.

Window material must be clear. Use only cell-cast plastics or optical glass. PMMA, ADC and chemically tempered glass are recommended.

• **PMMA (Cell-cast acrylic)**: When fabricated by cell-casting, has very good optical quality and low initial cost, but surface must be protected from the environment due to its susceptibility to attack by chemcials, mechanical stresses, and UV light. Reasonably good impact resistance. This material can be laser-cut into odd shapes and ultrasonically welded.

• **ADC (CR-39)**: A thermal-setting plastic produced by the cell-casting process. Excellent chemical and environmental resistance. Quite good surface hardness, and therefore does not have to be hard-coated. Reasonably good impact resistance. This material cannot be ultrasonically welded.

• **Chemically tempered glass**: Glass is a hard material which provides excellent scratch and abrasion resistance. But unannealed glass is brittle. Increased flexibility strength with minimal optical distortion requires chemical tempering. Glass is hard to be cut into odd shapes and cannot be ultrasonically welded.

Pay extra attention to the wavefront distortion when using plastic materials. Plastic materials are not recommended for tilted windows; colored windows are not recommended if the engine is used to scan barcodes on moving objects.

Coatings and Scratch Resistance

Scratch on the window can greatly reduce the performance of the EM1365-EX. It is suggested to use recessed window or apply abrasion resistant coatings to window surface.

The following introduces two commonly-used types of coatings:

- **Anti-reflection coatings**: Anti-reflection (AR) coatings can be applied to window surfaces to reduce reflected light from the window back into the engine. But they are expensive and have poor abrasion/scratch resistance.
- **Polysiloxane coatings**: Polysiloxane coatings can be applied to plastic surfaces to increase the surfaces' abrasion and scratch resistance.

Both tempered glass and plastic windows can be AR coated. However, it is easier and more cost-effective to put an AR coating on the glass than on the plastic.

The AR coating specifications below should be met when using an AR coated window.

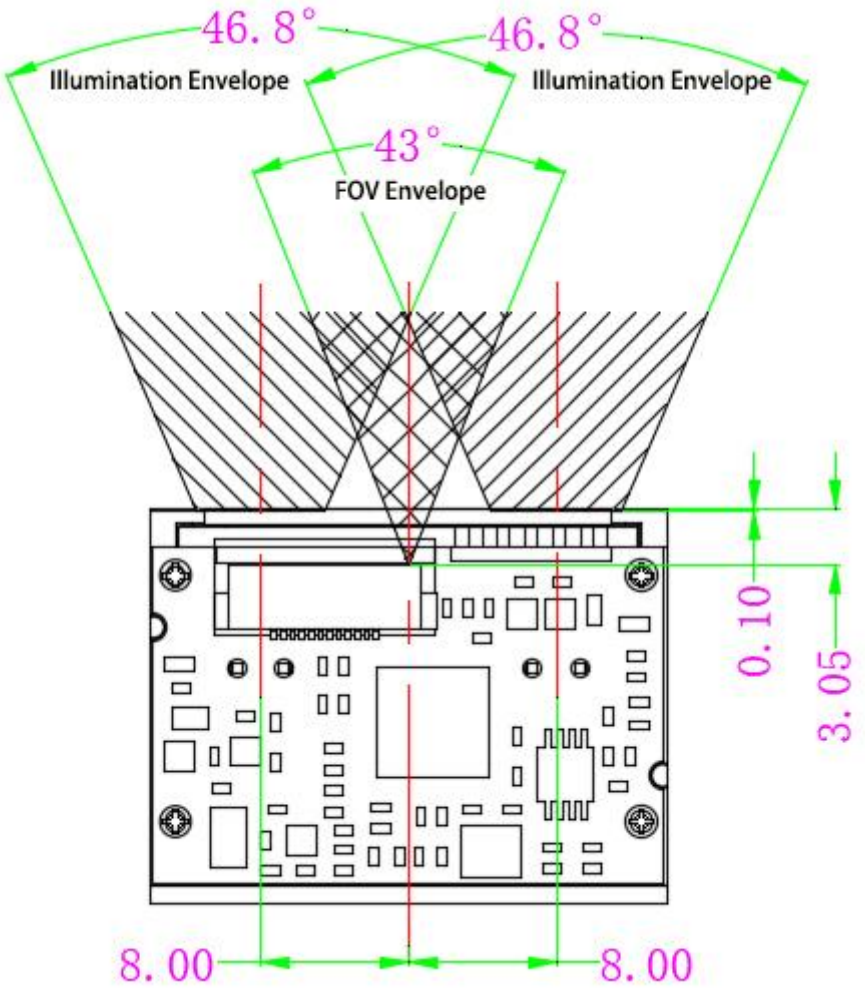
Single side AR coating: 92% minimum transmittance within spectrum range from 420 nm to 730 nm.

Double side AR coating: 97% minimum transmittance within spectrum range from 420 nm to 730 nm.

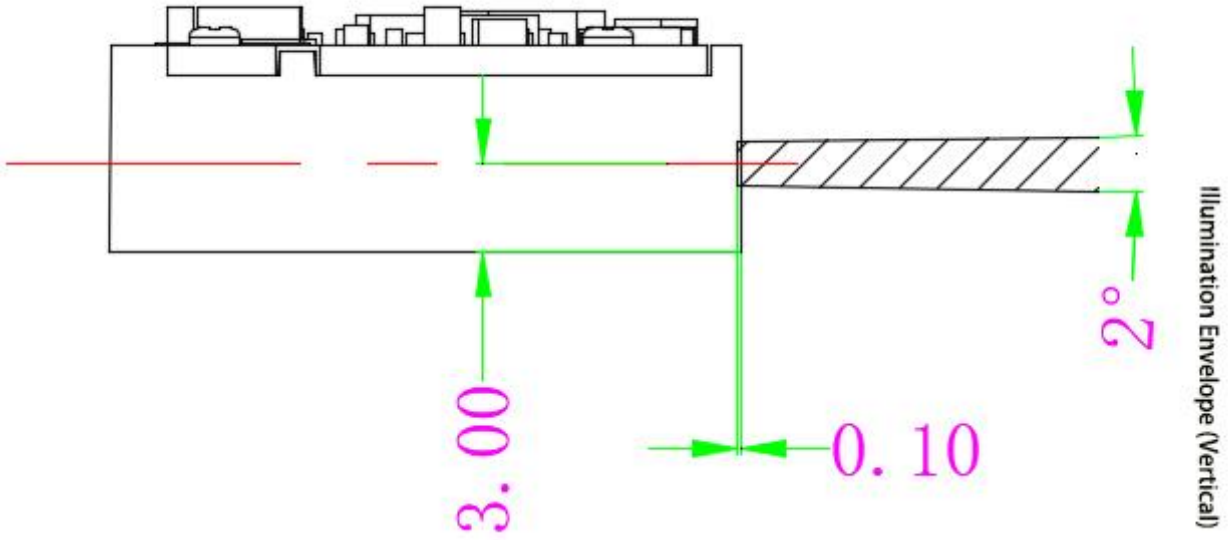
Window Size

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

Horizontal:



Vertical:



Ambient Light

The EM1365-EX shows better performance with ambient light and it is well able to handle the flicker in fluorescent lights using 50-60Hz AC power. However, high-frequency pulsed light can result in performance degradation.

Eye Safety

The EM1365-EX has no lasers. It uses a red LED to form a bright, intuitive aiming aid. Testing has been done to demonstrate that the engine is safe for its intended application under normal conditions. However, the user should avoid looking into the beam.

Chapter 3 Electrical Specifications

Power Supply

Do not power up the EM1365-EX until it is properly connected. Be sure the power is cut off before connecting a flexible cable to or disconnecting a flexible cable from the host interface connector. Hot-plugging could damage the engine.

Unstable power supply or sharp voltage drops or unreasonably short interval between power-ons may lead to unstable performance of the engine. Do not resupply the power immediately after cutting it off. The minimum interval must exceed 500ms.

The EM1365-EX itself does not provide a power switch. Users can switch the engine off by cutting off the power.

The EM1365-EX's start-up time is less than 200ms.

Ripple Noise

Image sensor and decoder chip are directly fed by the input power of EM1365-EX. To ensure the image quality, a power supply with low ripple noise is needed.

Acceptable ripple range (peak-to-peak): ≤100mV (≤50mV recommended).

DC Characteristics

Operating Voltage

Table 3-1
Ta=23℃

Parameter	Description	Minimum	Typical	Maximum	Unit
V_{DD}	Interface Power Supply Voltage	3.0	3.3	3.6	V
V_{IH}	High Level Input Voltage	0.7*V_{DD}	-	-	V
V_{IL}	Low Level Input Voltage	-	-	0.2*V_{DD}	V
V_{OH}	High Level Output Voltage	0.9*V_{DD}	-	-	V
V_{OL}	Low Level Output Voltage	-	-	0.1*V_{DD}	V

Operating Current

Table 3-2
Ta=23℃, VDD=3.3V

Operating Current	Standby Current	Unit
88	10	mA

I/O Voltage

Table 3-3
VDD=3.3 V, VSS=0 V, T=23°C

Parameter	Minimum	Maximum	Unit
VIL	-0.3	0.6	V
VIH	2.1	3.6	V
VOL	VSS	0.4	V
VOH	2.7	VDD	V

Technical Specifications

Please search the Newland website or contact the sales for technical specifications. The test methods for pitch, skew, and tilt are shown below (see Figure 3-1).

※ **Note:** Measurements should be taken at a minimum distance of 5 inches.

The angle of deviation along the **X-axis** is defined as the **skew** angle.
The angle of deviation along the **Y-axis** is defined as the **pitch** angle.
The angle of deviation along the **Z-axis** is defined as the **tilt** angle.

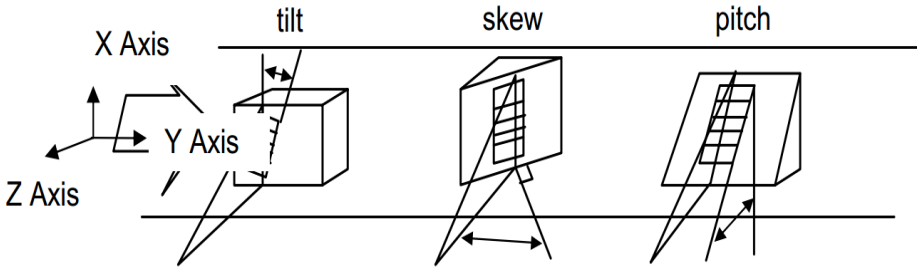


Figure 3-1

Timing Sequence

Power Up and Power Down Timing Sequence

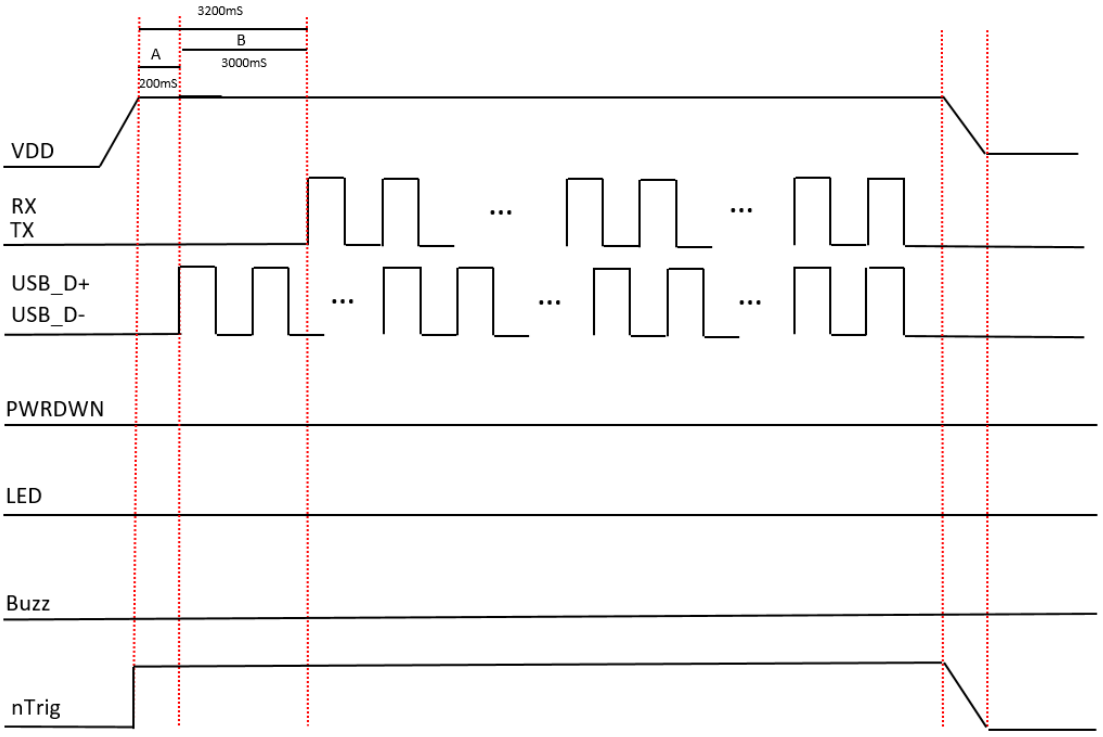


Figure 3-2

A indicates boot time. B indicates the self-adaptation state which exists when there is serial communication. You may enable the engine to skip the self-adaptation state by driving the nTrig pin on the host interface connector low or adjust baud rate self-adaptation state through the simple procedure below.

1. After powered on, the EM1365-EX enters the self-adaptation state which lasts 3 seconds at most. Send “0x0d” from the host device to the engine during the period.
2. When the internal self-adaptation logic of the engine receives “0x0d”, it returns “0x3e” (“>”) to the host device to indicate the self-adaptation is completed. If the host device does not receive “>”, you may send “0x0d” to the engine repeatedly at an interval of over 200ms.
3. Keep level low before VDD is powered on.

Chapter 4 Interfaces

Host Interface Connector

The following table lists the pin functions of the 12-pin host interface connector on the EM1365-EX.

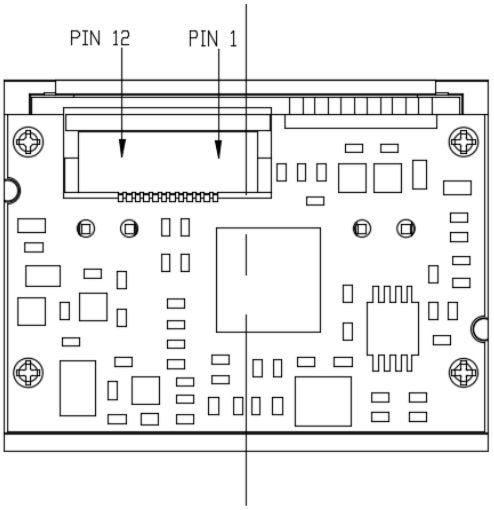
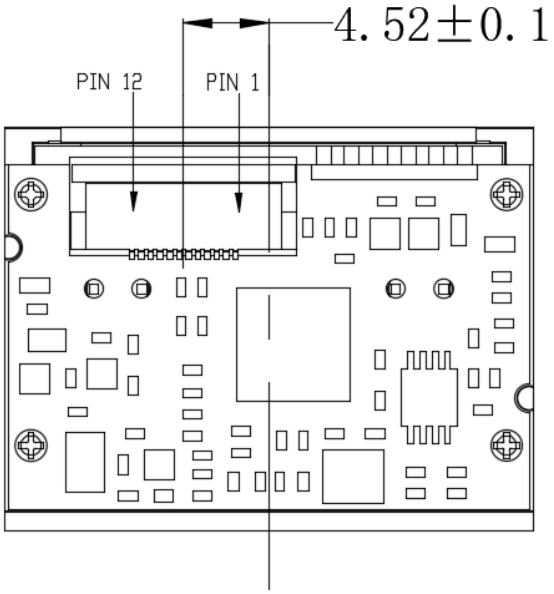


Figure 4-1

PIN#	Signal Name	I/O	Function
1	NC	-	Not connected.
2	VCC	-	3.3V power supply.
3	GND	-	Power-supply ground.
4	RXD	I	TTL level 232 receive data.
5	TXD	O	TTL level 232 transmit data.
6	USB_D-	I/O	USB_D- differential data signal.
7	USB_D+	I/O	USB_D+ differential data signal.
8	PWRDWN	O	Low Power State signal output: Active high indicates that the engine is in low power state.
9	BEEP	O	Beeper output. The output current is insufficient to drive the buzzer directly; an external driver circuit is required.
10	DLED	O	Good Read LED output. The output current is insufficient to drive the LED directly; an external LED driver circuit is required.
11	Wake	I	Same as the Trig pin (PIN 12).
12	Trig	I	Trigger signal input: Driving this pin low for at least 10ms causes the engine to start a scan and decode session.

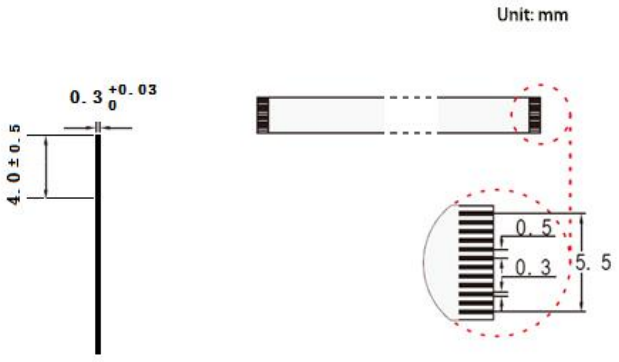
Dimensions of the Host Interface Connector (unit: mm)

The scan engine uses a 12-pin ZIF socket (bottom contact). The socket can be connected to a host device with an FPC cable.



FPC Cable (unit: mm)

A 12-pin FPC cable can be used to connect the EM1365-EX to a host device. The cable design must be consistent with the specifications shown below. Use reinforcement material for the connectors on the cable and reduce cable impedance for reliable connection and stable performance.



External Circuit Design

Good Read LED Circuit

The circuit below can be used to drive an external LED for indicating good read. The LED signal is from PIN 10 of the12-pin FPC connector.

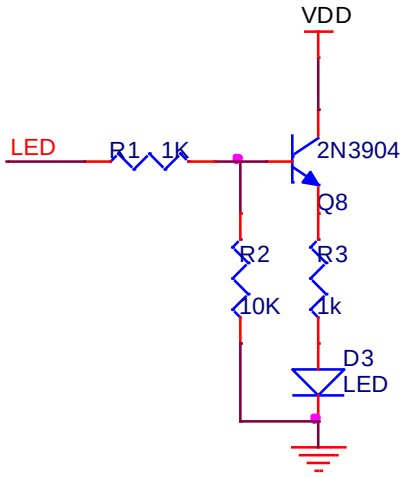


Figure 4-4

Beeper Circuit

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

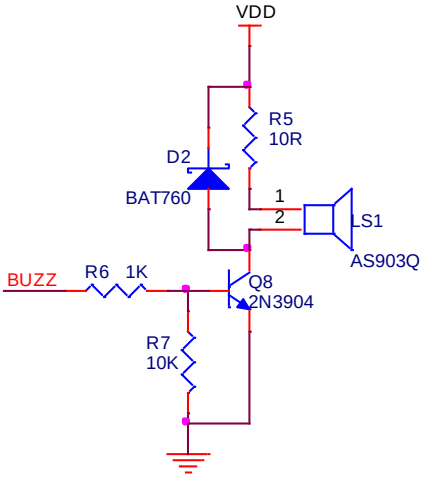
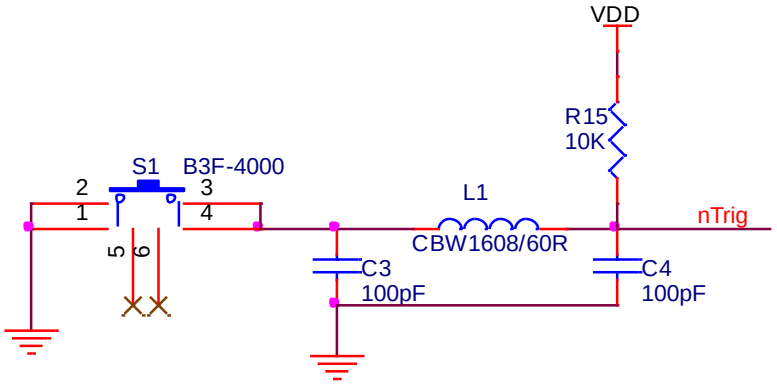


Figure 4-5

Trigger Circuit

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



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Chapter 4 Auxiliary Tools

The EM1365-EX provides the following tool to assist users with engine performance evaluation, application development, and engine configuration.

EVK

The EVK is provided to help users to test and evaluate the EM1365-EX, which contains beeper & beeper driver circuit, LED & LED driver circuit, trigger & reset buttons, TTL-232 to RS-232 converter & TTL-232 to USB converter, RS-232 & USB interfaces, etc. The EM1365-EX can be connected to the EVK via a 12-pin FPC cable type 1 (contacts on the same side). Either USB or RS-232 connection can be used when connecting the EVK to a host device.

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