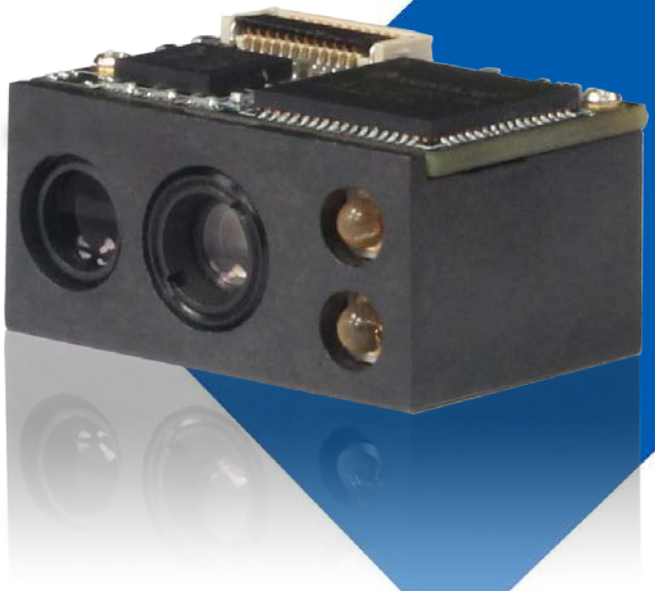
NLS-EM3096

OEM Scan Engine

Integration Guide



Disclaimer

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

Do not disassemble the device or remove the seal label from the device. Otherwise, Fujian Newland Auto-ID Tech. Co., Ltd. does not assume responsibility for the warranty or replacement.

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Revision History

Version	Description	Date
V1.0.0	Initial release.	October 24, 2014

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Chapter 1 Introduction

Overview

The EM3096 OEM scan engines, armed with the Newland patented UIMG®, a computerized image recognition system, bring about a new era of 2D barcode scan engines.

The EM3096's 2D 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 EM3096 supports all mainstream 1D as well as PDF417, QR Code (QR1, QR2, Micro QR), Data Matrix and GS1-DataBar™(RSS) (Limited/ Stacked/ Expanded versions).

Illumination

The EM3096 has two red LEDs for supplementary lighting, making it possible to scan barcodes even in complete darkness. The illumination can be programmed On or Off.

The EM3096 uses red LEDs 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 turn off the engine's illumination and use non-red supplementary lighting (such as green) instead. The user can conduct some tests to determine the proper wavelengths to be used.

Aimer

The EM3096 has a view finder that produces a solid circle-shaped aiming pattern to help the user to easily position the target barcode within the engine's field of view to increase scan efficiency. The aiming pattern can be turned On or Off. It is advisable to turn it on when scanning barcodes.

Chapter 2 Installation

General Requirements

ESD

ESD protection has been taken into account when designing the EM3096 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 EM3096 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 EM3096:

Operating Temperature	-20℃ ~ 60℃
Storage Temperature	-40℃ ~ 80℃
Humidity	5% ~ 95% (non-condensing)

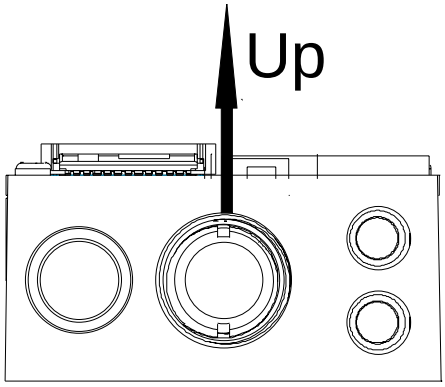
Thermal Considerations

Electronic components in the EM3096 will generate heat during the course of their operation. Operating the EM3096 in continuous mode for an extended period may cause temperatures to rise on CIS 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 EM3096.

- ✧ Reserve sufficient space for good air circulation in the design.
- ✧ Avoid wrapping the EM3096 with thermal insulation materials such as rubber.

Installation Orientation

The following figure illustrates a front view of the EM3096 after correct installation.

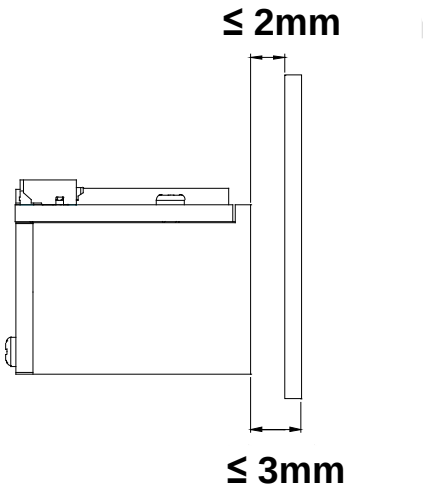


Optics

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).

The window should be mounted close to the front of the engine (parallel). The maximum distance is measured from the front of the engine housing to the farthest surface of the window. In order to reach better reading performance, the distance from the front of the engine housing to the furthest surface of the window should not exceed 3mm and the distance from the front of the engine housing to the nearest surface of the window should not exceed 2mm.



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

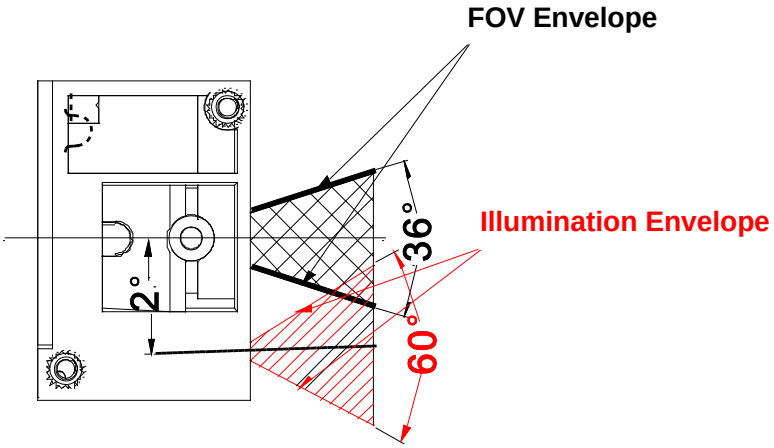
CIS's responsiveness (mainly to wavelengths of red light) should be taken into consideration when choosing window material and color, in order to achieve the possible highest spectral transmission, lowest haze level and homogeneous refractive index. It is suggested to use PMMA or optical glass with spectral transmittance over 90% and haze less than 1%. Whether to use an anti-reflection coating or not depends on the material and application needs.

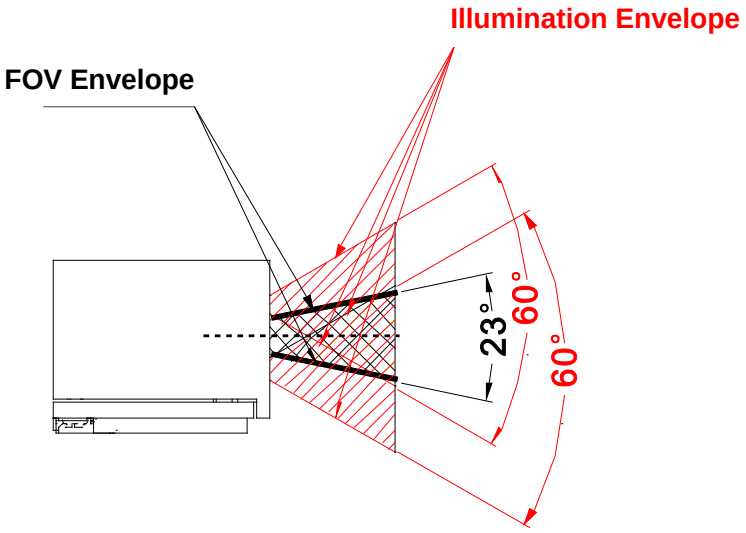
Scratch Resistance and Coating

Scratch on the window can greatly reduce engine performance. It is suggested to use abrasion resistant window material or coating.

Window Size

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





Ambient Light

The EM3096 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.

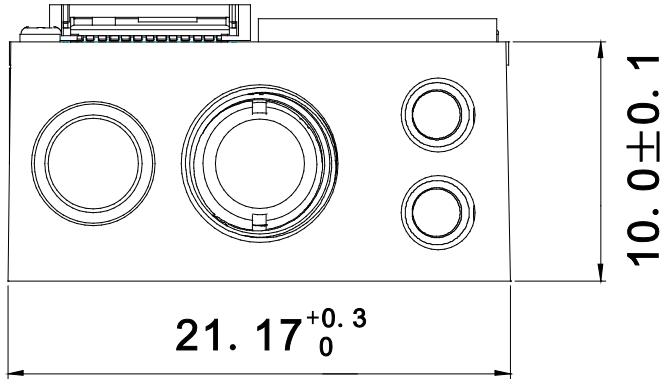
Eye Safety

The EM3096 has no lasers. It uses red LEDs to create aiming and illumination beams. The LEDs are bright, but testing has been done to demonstrate that the engine is safe for its intended application under normal usage conditions. However, the user should avoid looking into the beam.

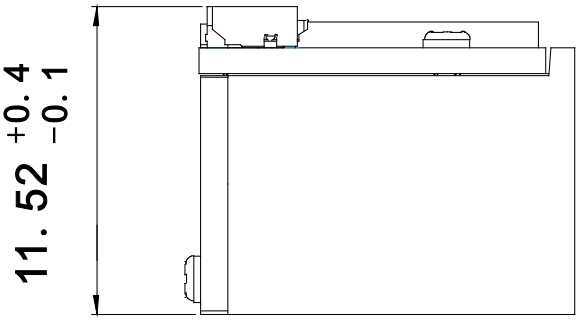
Mounting

The illustrations below show the mechanical mounting dimensions for the EM3096. The structural design should leave some space between components.

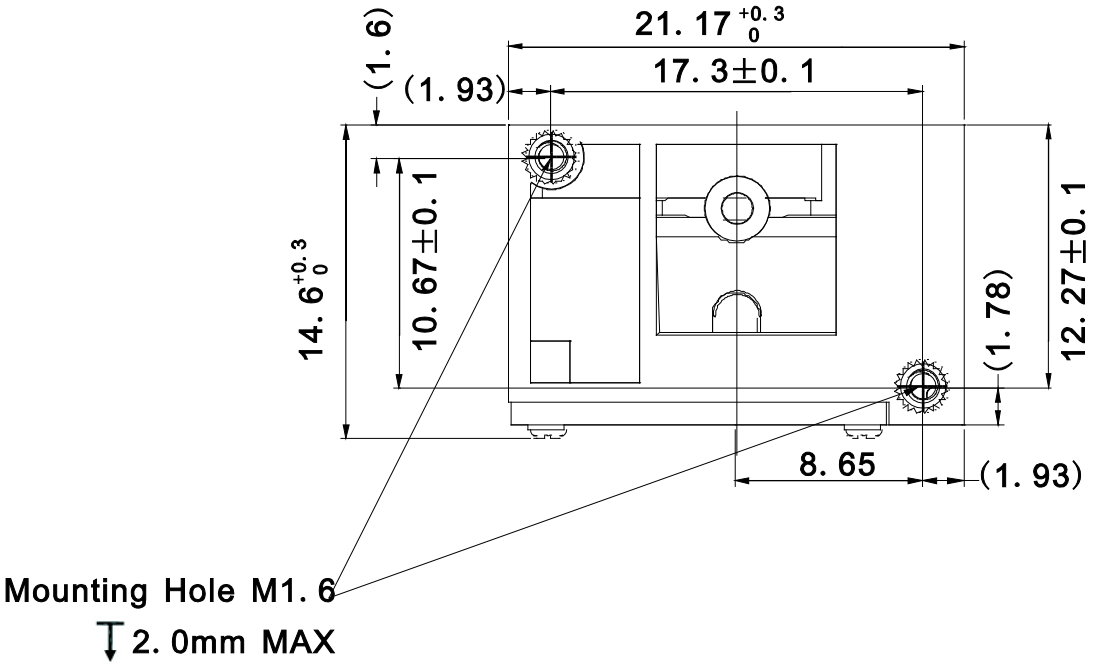
Front View (unit: mm)



Side View (unit: mm)



Top View (unit: mm)



Chapter 3 Electrical Specifications

Power Supply

Do not power up the EM3096 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 2 seconds.

Ripple Noise

Image sensor and decoder chip are directly fed by the input power of EM3096. To ensure the image quality, a power supply with low ripple noise is needed.

Acceptable ripple range (peak-to-peak) : ⩽50mV (⩽30mV recommended).

DC Characteristics

Operating Voltage

Ta=25℃

Parameter	Description	Minimum	Typical	Maximum	Unit
V_{DD}	Voltage Drain Drain	3.0	3.3	3.6	V
V_{IH}	High Level Input Voltage	V_{CC}-0.5	-	-	V
V_{IL}	Low Level Input Voltage	-	-	0.5	V
V_{OH}	High Level Output Voltage	V_{CC}-0.3	-	-	V
V_{OL}	Low Level Output Voltage	-	-	0.3	V

Operating Current

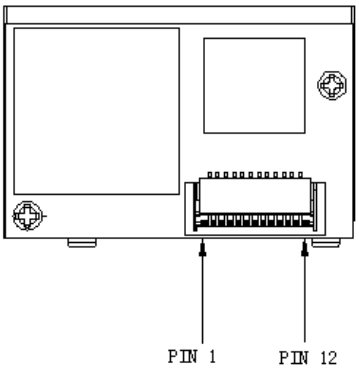
Ta=25℃，V_{DD}=3.3V

Operating Current	Standby Current	Sleep Current
230mA	4mA (USB communication not supported) 7mA (USB communication supported)	<5uA

Chapter 4 Interfaces

Host Interface Connector

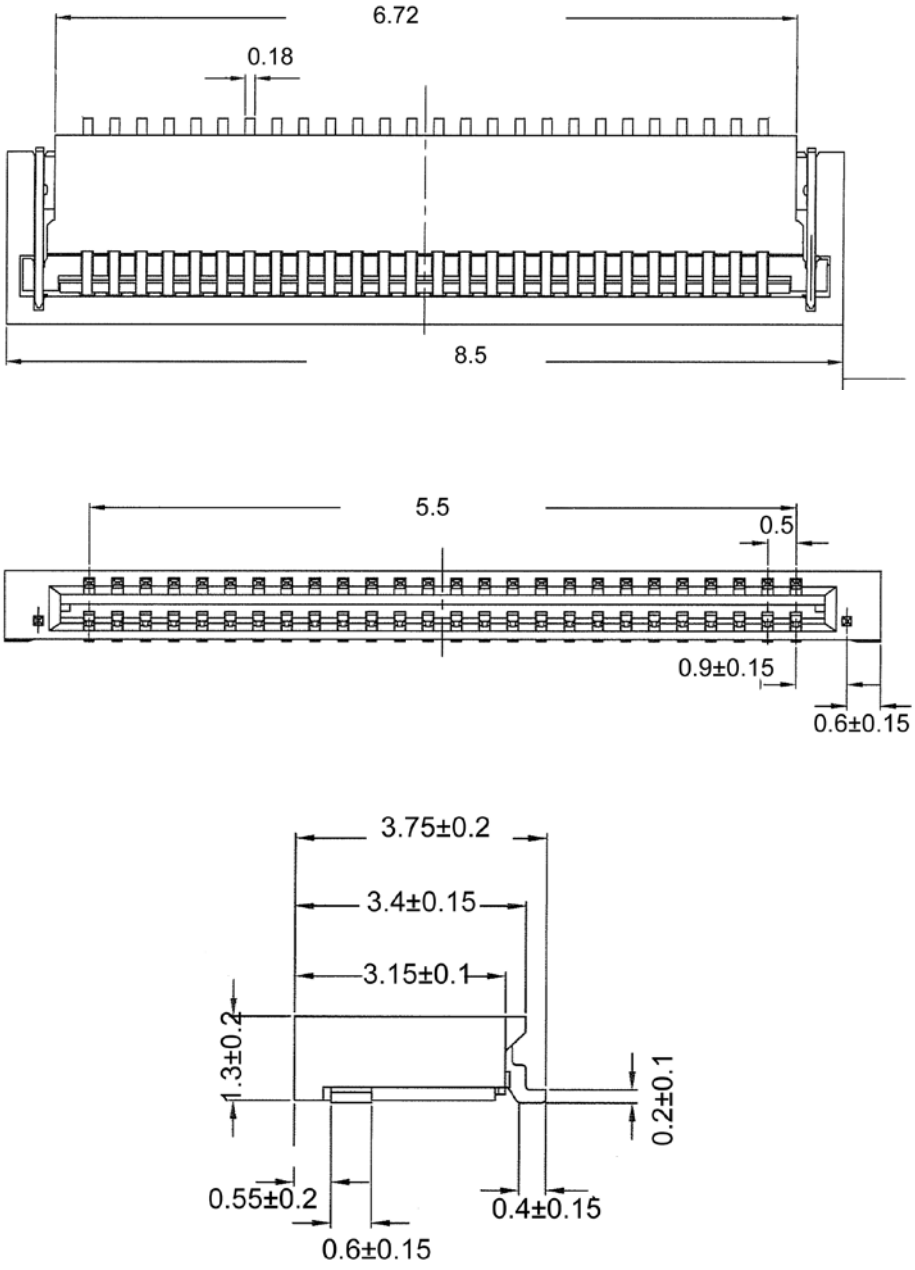
The following table lists the pin functions of the 12-pin host interface connector on the EM3096.



PIN#	Signal Name	I/O	Function
1	NC	-	Not connected.
2	VDD	-	3.3V power supply.
3	GND	-	Power-supply ground.
4	RX	I	TTL level 232 receive data.
5	TX	O	TTL level 232 transmit data.
6	USB_D-	I/O	USB_D- differential data signal. (Optional)
7	USB_D+	I/O	USB_D+ differential data signal. (Optional)
8	NC	-	Not connected.
9	Buzz	O	Beeper output. For the information of beeper driver circuit, see the **Beeper** section in this chapter.
10	LED	O	Good Read LED output. For the information of LED driver circuit, see the **Good Read LED** section.
11	Reset	I	Reset signal input: Driving this pin low for 100us-500us resets the engine.
12	nTrig	I	Trigger signal input: Driving this pin low for at least 10ms causes the EM3096 to start a scan and decode session.

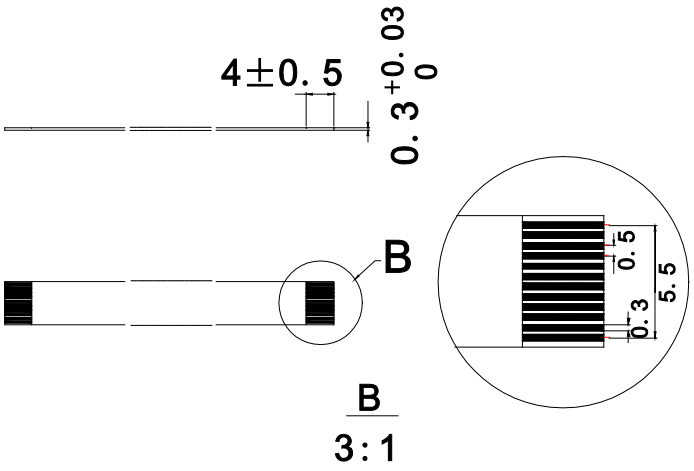
Dimensions of the Host Interface Connector (unit: mm)

The EM3096 uses a 12-pin FPC ZIF socket (bottom contact, model: 10051922-1210EHLF) manufactured by FCI. The socket can be connected to a host device with a flat flexible cable.



Flat Flexible Cable (unit: mm)

A 12-pin flat flexible cable can be used to connect the EM3096 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.



Communication Interface

The EM3096 can communicate with the host device via its TTL-232 port. This interface is applicable to most system architectures. For those requiring RS-232, a TTL-232 to RS-232 conversion circuit is needed.

The EM3096's TTL-232 port supports baud rates from 1200bps to 115200bps; it does not support hardware flow control. Its default settings are 9600bps, 8 data bits, no parity check and1 stop bit.

Besides, the EM3096 can also communicate with the host device via its USB port (optional).

1. USB HID-KBW: Based on USB connection, the engine's transmission is simulated as USB keyboard input. It works on a Plug and Play basis and no driver is required.
2. USB COM Port Emulation: The USB port on the host device is emulated as a serial port with the same data transmission and configuration as a real serial port. A driver is required.

Control Interface

Reset

Driving the Reset pin (PIN 11) on the host interface connector low for 100us-500us can reset the EM3096. However, do not reset the engine at unreasonably short intervals. The minimum interval between resets must exceed 2 seconds.

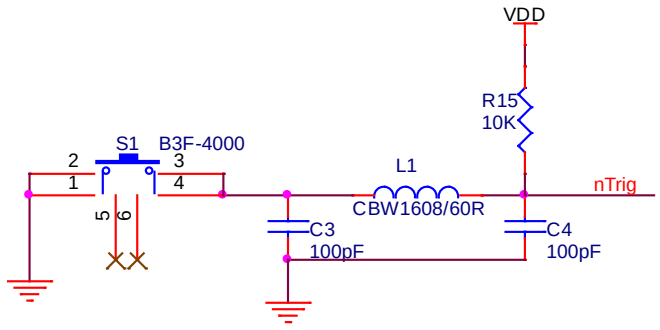
Trigger

Driving the nTrig pin (PIN 12) on the host interface connector low for over 10ms causes the EM3096 to start a scan and decode session. If barcode is decoded, the EM3096 waits for the voltage at the nTrig pin to turn high (or the trigger to be released) after sending the data to the Host. If the trigger is released during a scan attempt, the EM3096 immediately stops decoding.

Next decode session does not happen until the EM3096 receives active trigger signal (driving the nTrig pin low) again.

As a decode session involves image capture, barcode decoding and other steps, it is suggested that the minimum interval between triggers should exceed 50ms.

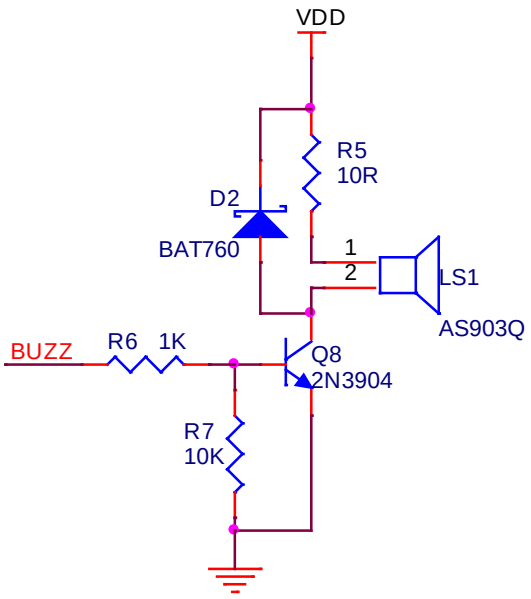
The following trigger circuit is provided for reference.



Beeper

The EM3096 provides a pin (Buzz, PIN 9) on the host interface connector that provides a PWM output to an external driver circuit for generating audible feedback to the user to indicate statuses like power up or good decode. The PWM output is not strong enough to drive a beeper, thus a beeper driver circuit is needed.

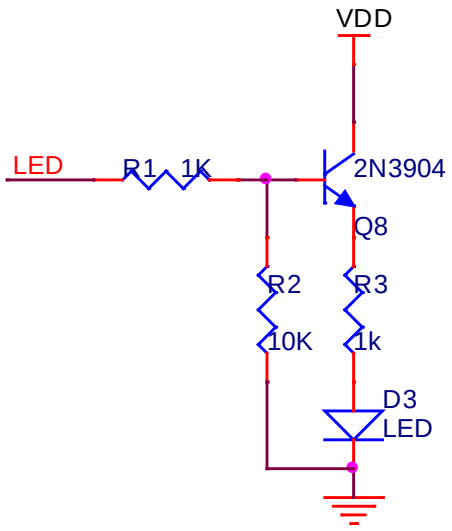
The following beeper driver circuit is provided for reference.



Good Read LED

The EM3096 provides a pin (LED, PIN 10) on the host interface connector that can be used by an external driver circuit to drive an LED to indicate a Good Read status. When a good read occurs, the LED pin produces a high level output for about 300ms, and then the signal is back to a low level. This Good Read LED output is not strong enough to drive an LED, so an LED driver circuit is needed.

The following Good Read LED driver circuit is provided for reference.



Chapter 5 Development Tools

EVK

The EVK is provided to help users to test and evaluate the EM3096, 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 EM3096 can be connected to the EVK via a 12-pin flat flexible cable. Either USB connection or RS-232 connection can be used when connecting the EVK to a host device.

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