

IS4910, IS4911

Area Imaging Non-Decode Engine

Integration Guide

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Patents

Please refer to page 32 for a list of patents.



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Introduction

Product Overview

The IS4910 series of non-decode miniature area imaging engines is designed for integration into customer OEM devices. When integrated with a host processor and decoding software from Omniplanar[®], the engine can be used to capture images for decoding 1D and 2D bar codes in addition to OCR fonts.

The compact engine has several models available to accommodate all types of mounting requirements. All model types provide two blind holes for self-tapping screws along with a keying location point. The IS4910-01 model provides two additional through holes located on tabs extended from the sides of the engine's chassis and the IS4910-02 provides threaded inserts instead of through holes on the extended tabs.

The engine's physical design and low power requirements support integration into portable data terminals, hand-held bar code scanners, ID verification devices, kiosks, portable-shopping systems, mass-storage devices, lottery terminals, and medical/diagnostic devices.

A high-density version, IS4911 is also available.

Additional key features include:

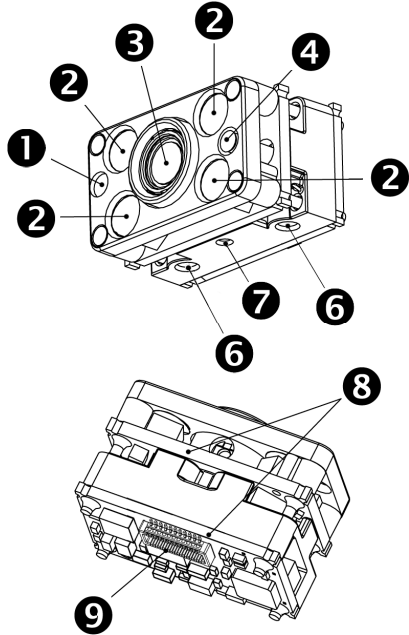
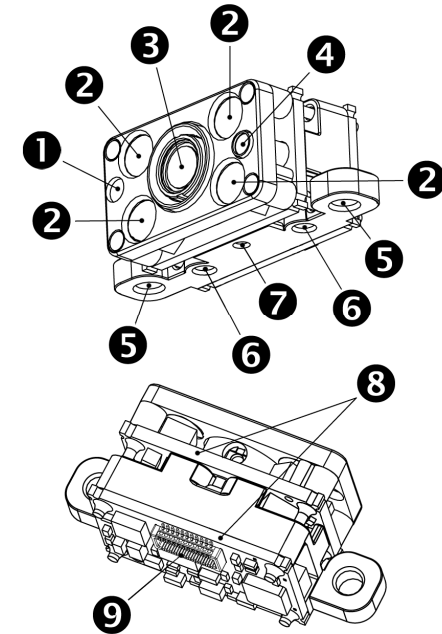
- Designed to scan 1D bar codes as dense as 4 mil (0.102 mm) and 2D bar codes as dense as 10 mil (0.254 mm; Matrix codes)
- High resolution (1280 × 960 pixels)
- The ability to switch between Snapshot and Video modes for different applications
- Capture and transmit high-quality black and white images
- FirstFlash[®] circuitry which automatically adjusts to environmental illumination for excellent light immunity
- Built-in aiming for easy scanning
- Standby mode for power conservation
- Low mass (< 6 g)
- Industrial standard output for seamless integration, Molex[®] 0.50 mm (.020") Pitch SlimStack[™] Plug, P/N 55560-0227
- A choice of mounting options

Models and Accessories

Model		Description
IS4910 or IS4911	-00	Non-Decode Area Imaging Engine Mounting option: <ul style="list-style-type: none"> two blind holes for self-tapping screws
	-01	Non-Decode Engine Mounting options: <ul style="list-style-type: none"> two blind holes for self-tapping hardware two through holes located on tabs that extend from two sides of the engine's chassis
	-02	Non-Decode Engine Mounting options: <ul style="list-style-type: none"> two blind holes for self-tapping hardware threaded inserts located on tabs that extend from two sides of the engine's chassis
77-77104	Flex Cable, 22-Pin, 0.50 mm (.020") Pitch SlimStack™ Receptacle, Molex P/N 54722-0224 See page 26 for additional flex cable information.	
46-00550	Software Development Kit For detailed information on this item, contact a customer service representative	

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Components of the IS4910 / IS4811 Non-Decode Engine

Item No.	Description	Item Location
1	Targeting	 <p data-bbox="954 1014 1380 1045">Figure 1. IS4910-00 / IS4911-00</p>  <p data-bbox="954 1745 1380 1803">Figure 2. IS4910-01 / IS4910-02 IS4911-01 / IS4911-02</p>
2	Area Illumination	
3	Camera Imager	
4	FirstFlash Aperture	
5	Mounting Points (see pages 6 - 7)	
6	Mounting Points Provided for Self-Tapping Screws (see pages 5 - 7)	
7	Keying Location (see pages 5 - 7)	
8	Printed Circuit Boards	
9	22-Pin, 0.50 mm (.020") Pitch SlimStack™ Plug, Molex (P/N 55560-0227)	

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Labels

The engine's serial number/model number label is located on the side of the engine.

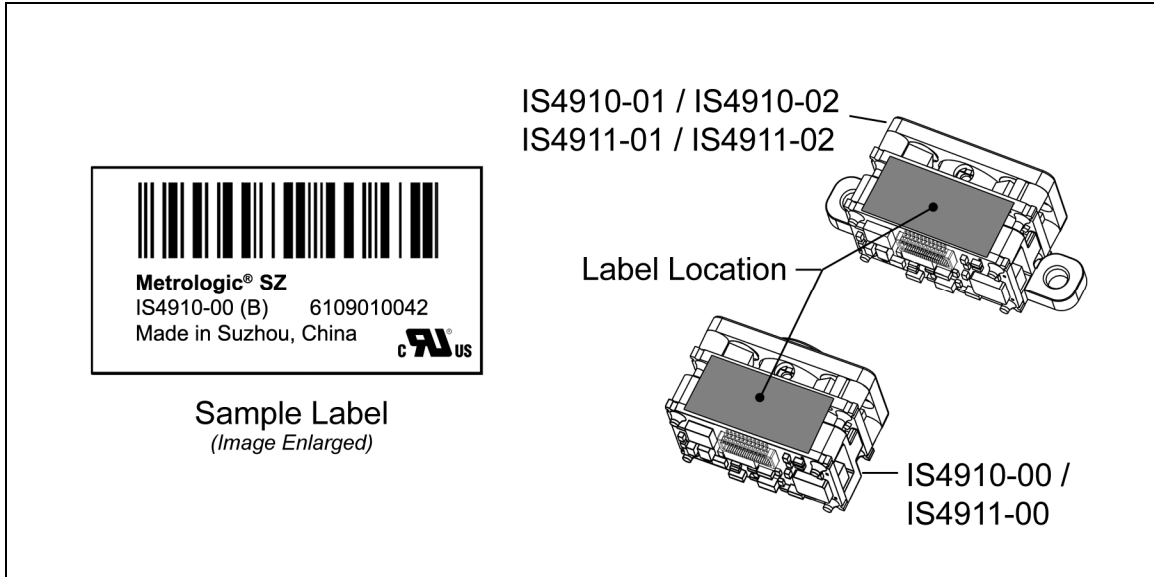


Figure 3. Serial Number Label

IS4910-01 / IS4911-01 Non-Decode Engine Dimensions

The -01 engine model includes two $\text{Ø } .075''$ [1.9 mm] blind holes for mounting the engine with self-tapping screws. Two additional $\text{Ø } .098'' \pm .002$ [2.5 mm $\pm .05$ mm] clearance holes are provided as a secondary mounting option. The clearance holes are located on tabs that extend from the sides of the engine's chassis. A keying location point is provided on the bottom of the engine to assist with alignment.

Warning: The limited warranty (on page 31) is void if the following guidelines are not adhered to when mounting the engine.

When securing the engine with self-tapping screws:

- Use M2.2 x 4.5 Philips pan head, type AB, steel, zinc clear, Trivalent self-tapping screws.
- Do not exceed 1.75 +0.5 in-lb [2.02 +6 cm-kg] of torque during screw installation.
- Use a minimum mount thickness of 0.3 mm.
- Use safe ESD practices when handling and mounting the engine.

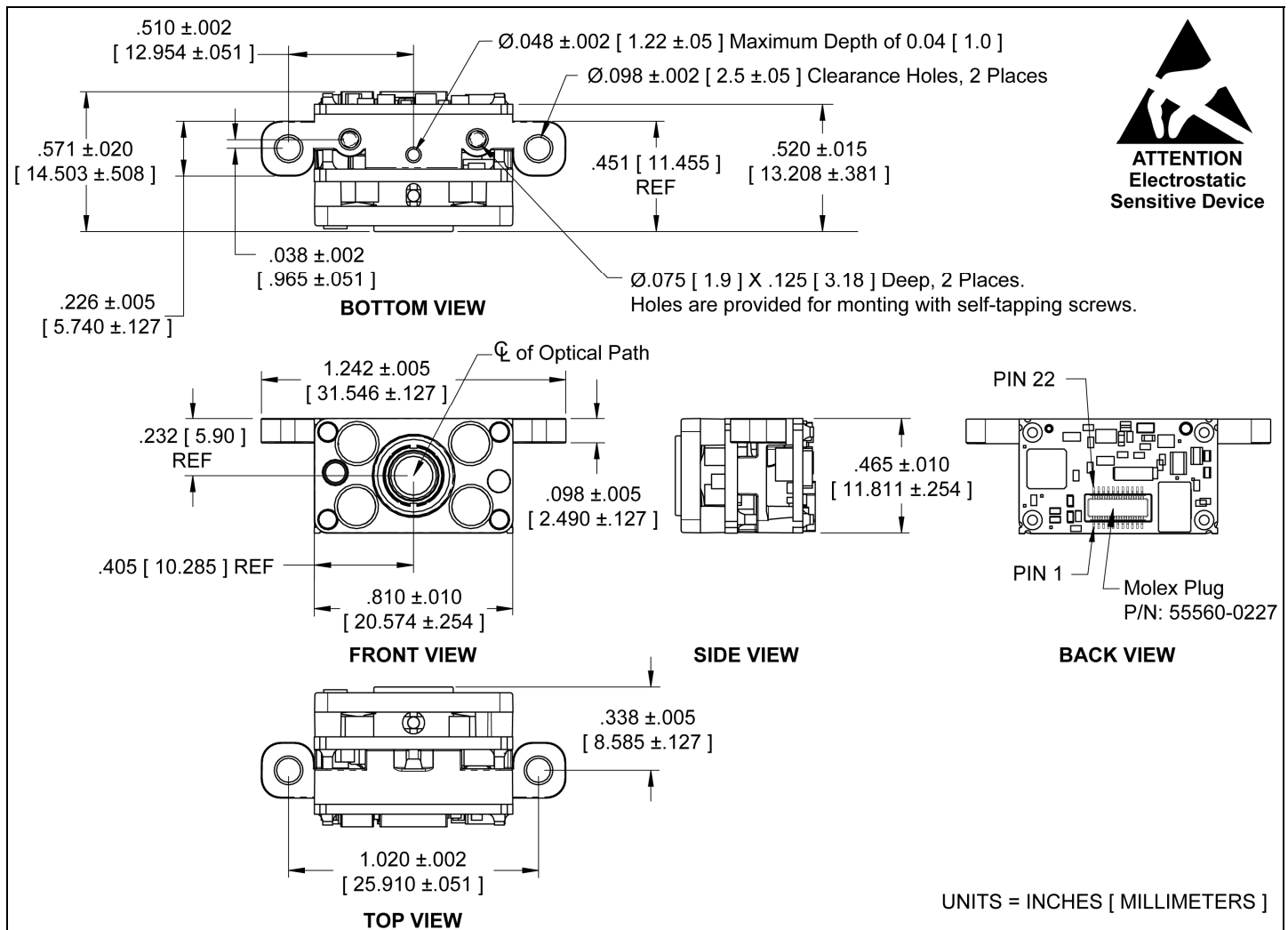


Figure 5. IS4910-01 / IS4911-01 Dimensions

IS4910-02 / IS4911-02 Non-Decode Engine Dimensions

The -02 engine model includes two $\text{Ø} .075$ " [1.9 mm] blind holes for mounting the engine with self-tapping screws. Two additional M2 x .4 threaded inserts are provided as a secondary mounting option. The threaded inserts are located on tabs that extend from the sides of the engine's chassis. A keying location point is provided on the bottom of the engine to assist with alignment.

Warning: The limited warranty (on page 31) is void if the following guidelines are not adhered to when mounting the engine.

When securing the engine by utilizing the two M2 threaded inserts:

- Use M2.2 x 4.5 Philips pan head, type AB, steel, zinc clear or equivalent screws.
- Do not exceeding 2.88 cm-kg [2.5 in-lb] of torque when securing the engine assembly to the host.
- Use a minimum mount thickness of 0.3 mm.
- Use safe ESD practices when handling and mounting the engine.

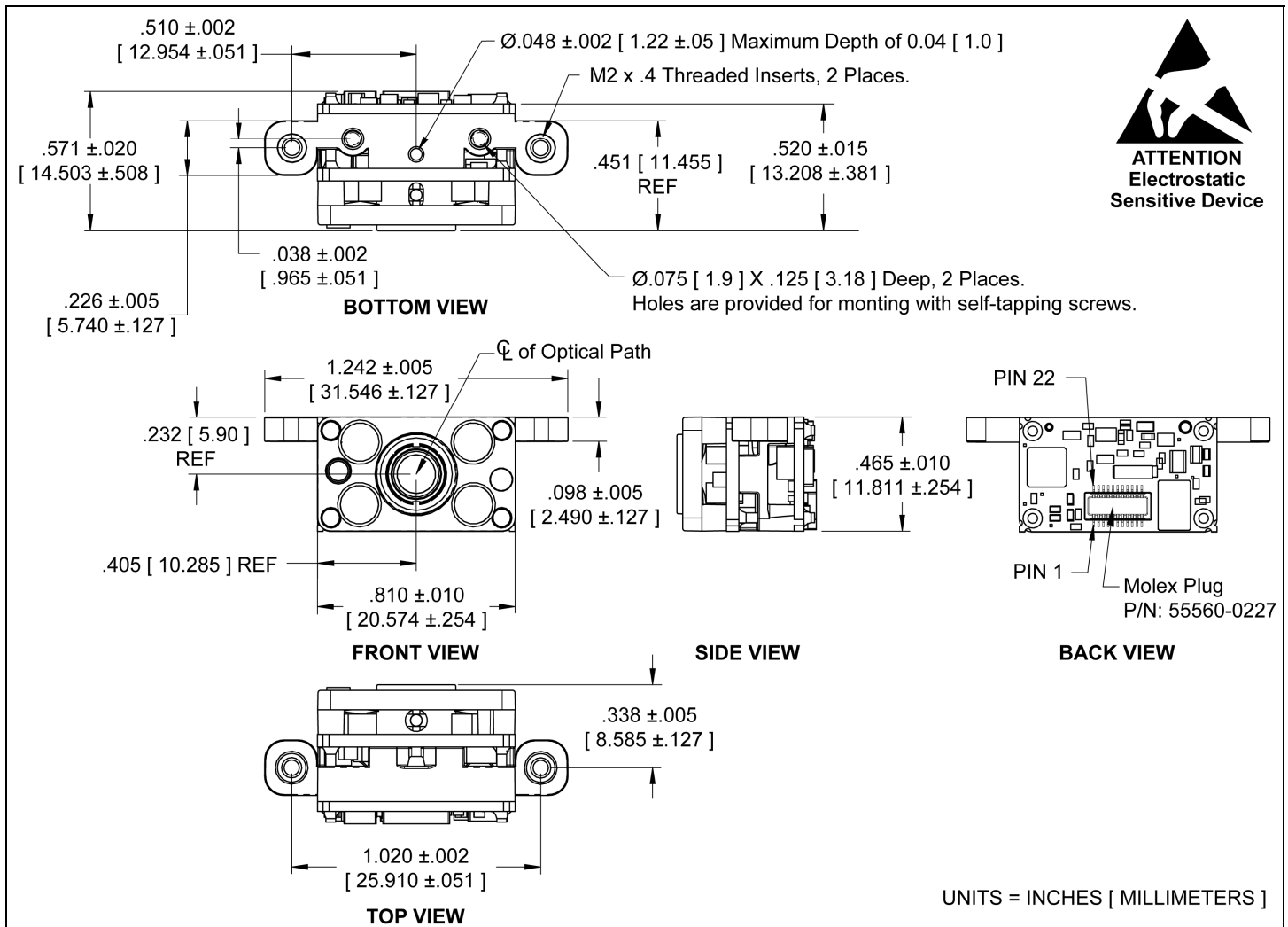


Figure 6. IS4910-02 / IS4911-02 Dimensions

Enclosure Specifications

The imaging engine was specifically designed for integration into custom housings for OEM applications. The imaging engine's performance will be adversely affected or permanently damaged when mounted in an unsuitable enclosure.

Warning: The limited warranty (on page 31) is void if the following considerations are not adhered to when integrating the engine into a system.

Electrostatic Discharge (ESD) Cautions



All imaging engines are shipped in ESD protective packaging due to the sensitive nature of the engine's exposed electrical components.

- ALWAYS use grounding wrist straps and a grounded work area when unpacking and handling the engine.
- Mount the engine in a housing that is designed for ESD protection and stray electric fields.

ESD has the ability to modify the electrical characteristics of a semiconductor device, possibly degrading or even destroying the device. ESD also has the potential to upset the normal operation of an electronic system, causing equipment malfunction or failure.

Airborne Contaminants and Foreign Materials

The imaging engine has very sensitive miniature electrical and optical components that must be protected from airborne contaminants and foreign materials. In order to prevent permanently damaging the imaging engine and voiding the limited warranty (on page 31), the imaging engine enclosure must be:

- Sealed to prevent infiltration by airborne contaminants and foreign materials such as, dust, dirt, smoke, and smog.
- Sealed to protect against water, humidity and be non-condensing.

Refer to page 11 for information on power and thermal considerations.

Output Window Properties

An improperly placed window has the serious potential to reduce the imaging engine's performance. Careful consideration must be made when designing the output window's distance and angle relative to the imaging engine's camera aperture.

Follow these guidelines when designing the output window.

- The output window material should have a spectral transmission of at least 85% from 580 nm to 680 nm and should block shorter wavelengths.
- It should have a 60-40 surface quality, be optically flat, clear, and free of scratches, pits, or seeds. If possible, recess the window into the housing for protection or apply a scratch resistance coating (see Output Window Coatings below).
- Apply an anti-reflective coating to the window surfaces to reduce the possibility of reflective light interfering with the engine's performance.
- The clear aperture of the output window should extend beyond the Field of View. Refer to page 10 and pages 20 - 21 for Field of View specifications.
- The window size must accommodate the illumination and targeting areas shown on page 10.
- The window must be parallel to the engine face.
- The distance from the engine face to the inside surface of the window of the enclosure should be minimized and should not exceed 0.5 mm (0.02") due to possible specular reflections from internal area illumination.

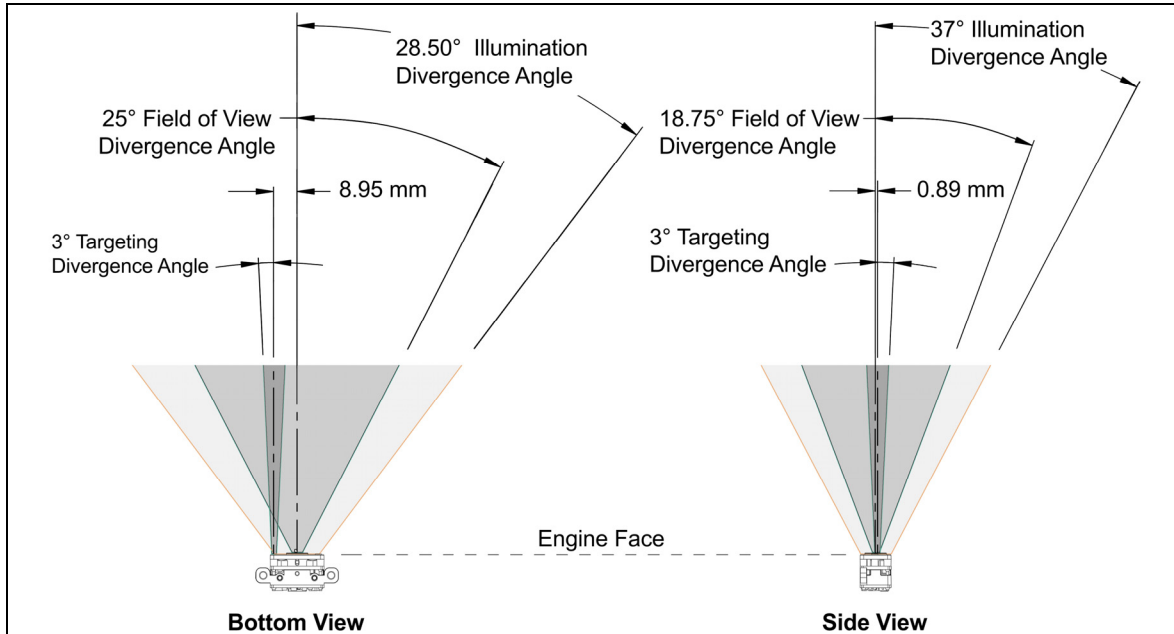
Output Window Coatings

- **Anti-Reflection**
An anti-reflective coating can be applied to the inside and/or outside of the window to reduce the possibility of internal beam reflections interfering with the performance of the engine. If an anti-reflective coating is applied, it is recommended that it be on both sides of the window providing a 0.5% maximum reflectivity on each side from 600 - 700 nanometers at the nominal window tilt angle. The coating must also meet the hardness adherence requirements of MIL-M-13508.
- **Polysiloxane Coating**
Applying a polysiloxane coating to the window surface can help protect the window from surface scratches and abrasions that may interfere with the performance of the engine. Recessing the window into the housing can also provide added protection against surface damage such as scratches and chips. If an anti-reflective coating is used, there is no need to apply a polysiloxane coating.

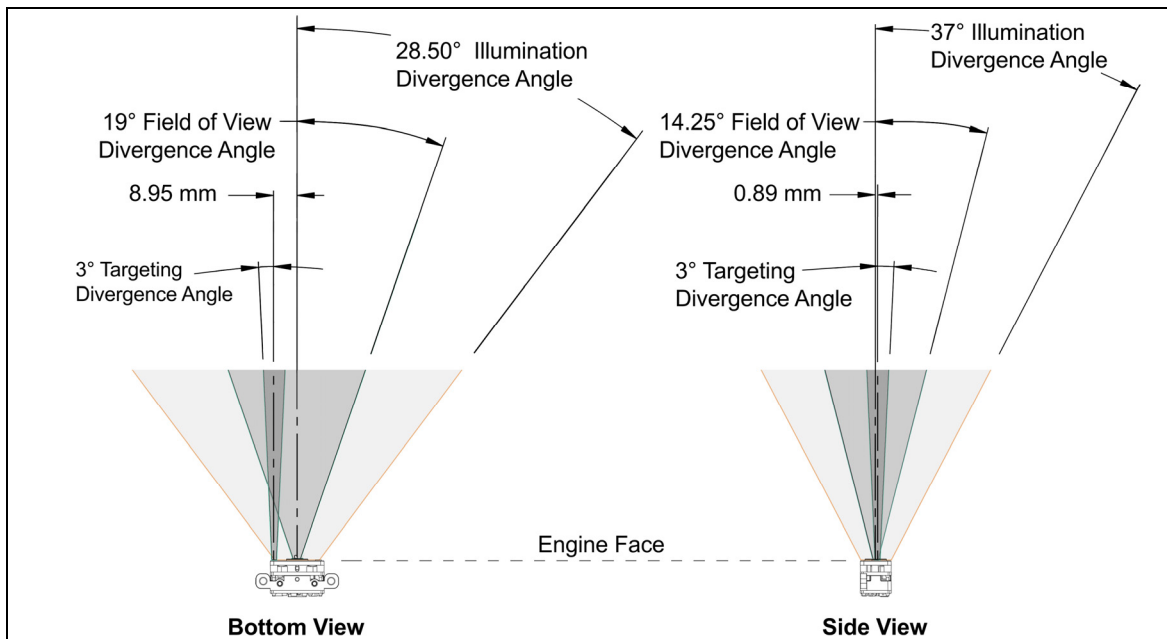
Optical Clearance Specifications

The window size and enclosure design must provide unobstructed clearance for the illumination and targeting areas shown below to avoid optical interference that decreases the engine's performance.

IS4910



IS4911



Specifications are subject to change without notice.

System Considerations

In order to ensure proper operation of the decode engine's electrical system; care must be taken to ensure the following requirements are met.

Power Supply Decoupling*

The engine requires clean filtered power supplies for both the VLED and Vimager power rails. Special care must be taken for the Vimager line as this voltage is used to power the imaging sensor. The power line must be heavily decoupled to prevent noise from coupling into the engine, which can reduce image quality.

Power Sequencing*

All signals to and from the engine (except for VLED) are relative to Vimager. These pins are not over voltage tolerant. As such, care must be taken to ensure that the voltage on these signals never exceed the voltage on the Vimager pin.

Refer to page 11 for additional electrical specifications and page 25 for pinout information.

High-Speed Digital Bus*

Due to the relative high-speed nature of the Camera Data bus (48 MHz max), care must be taken to ensure signal integrity and minimize clock skew. To reduce electromagnetic interference and ringing on the lines, 22-ohm series resistors have been added to each of the pixel data lines as well as the pixel clock and HSYN signals. The capacitive loading and trace length on these lines should be minimal to ensure proper operation.

Thermal Considerations

The engine is qualified at temperatures from 0°C to 40°C (32°F to 104°F). Care must be taken to ensure that ambient temperatures do not exceed this range in order to guarantee operation. The illumination LEDs produce a considerable amount of heat when left on for extended time periods. The on time of these LEDs should be minimized and airflow should be provided whenever possible to minimize internal heating. Excessive heating can damage the LEDs and degrade image quality.

* See page 25 for additional information on electrical specifications.
See pages 25 and 26 for additional information on the engine and flex cable pinouts.

Theory of Operation

Overview

The IS4910 imaging engine series is specifically designed for integration into handheld portable data terminals or other OEM devices used for barcode scanning and/or OCR applications. Since the imaging engine functions like a digital camera, the engine is capable of digital image capture, document lift, and signature capture. With software integration, the non-decode engine will support decoding of all standard 1D & 2D barcodes, reading OCR.

The compact engine has a 1.2M pixel CMOS imaging sensor, high intensity illumination LEDs, and an LED targeting system. The non-decode engine also incorporates FirstFlash® a patented technology that regulates the illumination time during image capture, reducing the need for multiple image acquisition.

The IS4910 series has two types of imaging modes, the Snapshot mode and the Video mode. The Snapshot mode facilitates fast and accurate image acquisition with a minimum amount of power consumption. In this mode, the LEDs are only activated for a very short time while FirstFlash ensures proper illumination. The amount of images required is minimized, ultimately reducing the engine's power consumption. Detailed information on the Snapshot mode can be found on page 14. The second type, the Video mode, enables fine control of the camera exposure time making the mode suitable for high ambient light applications. Detailed information on the Video mode can be found on page 16.

Communication with the image sensor is done over two buses, the control bus (I²C) and the data bus. The Control bus is used to send programming commands to the image sensor. The data bus is used to transfer images from the image sensor to the host system. The image data rate is determined by the Pixel Clock (PCLK), which has a maximum frequency of 48 MHz. Note that on some host systems, such as those based on the XScale PXA270 processor, the platform may not be able to support the 48 MHz pixel clock. In these applications, the pixel clock can be configured to 24 MHz or 12 MHz via the (I²C) control bus. See Figure 9 on page 13 for an illustrated depiction of the engine's system architecture.

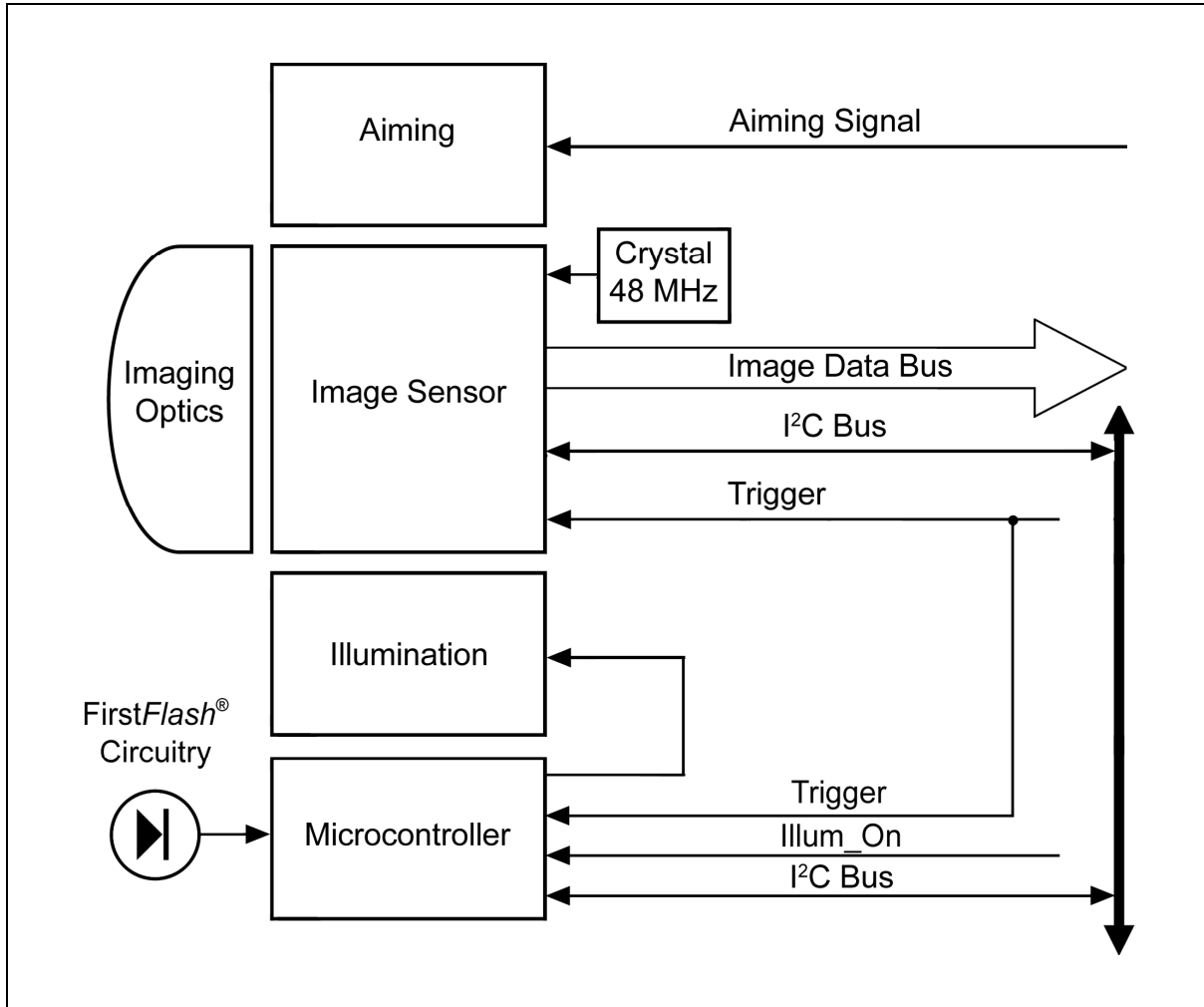


Figure 9. IS4910 / IS4911 System Architecture

Honeywell Scanning and Mobility provides a Software Development Kit (P/N 46-00550) that will ease the functional integration of the IS4910 or IS4911 non-decode engine. The SDK includes all the necessary software components needed to enable an application developer to control and communicate with the engine, acquire images, and decode barcodes. Additional information about the Software Development Kit and its application programming interfaces (APIs) is provided in the IS4910 Series Area Imaging Engine Programmer's Manual (P/N 00-02291). Contact a customer service representative at 1-800-436-3876 for additional information on this item and the Software Development Kit.

Snapshot Mode

In the Snapshot mode of operation, image acquisition begins on the rising edge of the Trigger signal. Image integration continues until the trigger line is brought low at which time the Image Data is output on the Camera bus. In this mode, the area illumination is coincident with the integration time and is activated on the rising edge of the Trigger signal. The illumination will remain on until the FirstFlash circuitry determines that sufficient light has reached the sensor. At that point, the FirstFlash circuitry will then automatically disable illumination. The user can override the FirstFlash circuitry by activating the Illum_On signal along with the Trigger signal. For additional information, refer to Snapshot Illumination Waveforms on page 15.

The minimum Trigger pulse time required to initiate image acquisition in Snapshot mode can be calculated using the following formula:

$$T_{\text{trig_min}} = 84 + (\text{<image-height>} + 19) * 9 / \text{PCLK}$$

Where PCLK is the pixel clock output of the image sensor and can be programmed to 48 MHz, 24 MHz, or 12 MHz.

For example, in systems that cannot support 48 MHz pixel clock rates (such as Xscale PXA270 processor based platforms) the pixel clock can be reduced to 24 MHz or 12 MHz. Thus, for the default image height of 960 rows at 24 MHz pixel clock, the Trigger pulse time should be at least 451 μ s.

As mentioned above, the trigger pulse controls both the image integration time and the maximum duration of the illumination. The maximum time is application specific. Increasing the time will typically result in brighter images but longer exposure time will make the unit susceptible to motion blur.

Software used by the engine device driver and CamLib APIs included in the Software Development Kit provide the ability for precise control of the timings of the Trigger signal, the image sensor, and the image dataflow from the camera to the host system.

The actual time of the illumination flash in Snapshot mode can vary between the minimum illumination time and the maximum illumination time. The maximum illumination time is determined by the duration of the Trigger signal. The minimum illumination time is determined by the duration of the Illum_On signal. The actual time of the illumination flash is determined by the internal Microcontroller based on the measurement of the light intensity performed by the FirstFlash circuitry.

When the light intensity, as measured by the FirstFlash circuitry, exceeds a pre-set factory threshold, the Microcontroller immediately turns illumination off if the time elapsed from the start of illumination is greater than the minimum illumination time (i.e. if the Illum_On signal is de-asserted); otherwise, it waits until the minimum illumination time elapses and then turns the illumination off.

Precise control of the timings of the Illum_On signal is done in software by the engine device driver and CamLib APIs included in the Software Development Kit.

Snapshot Illumination Waveforms

The following waveforms show how the illumination LEDs are controlled relative to the input signals (Trigger and Illum_On) during the snapshot mode. The Trigger signal determines when the illumination and image integrations begin. In addition, the duration of this signal determines the maximum integration and illumination time. The Illum_On signal can be used in conjunction with the Trigger signal to ensure a minimum amount of illumination.

Example 1: Snapshot mode with Illumination duration controlled by FirstFlash circuitry only (see figure below).

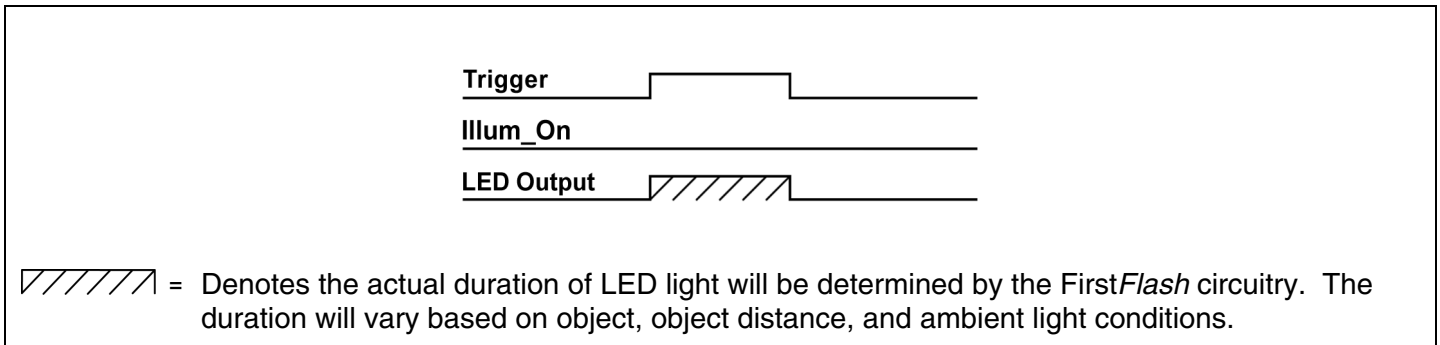


Figure 10. Example 1

Example 2: Snapshot mode with Illumination being forced on for a given duration after which FirstFlash circuitry takes over (see figure below).

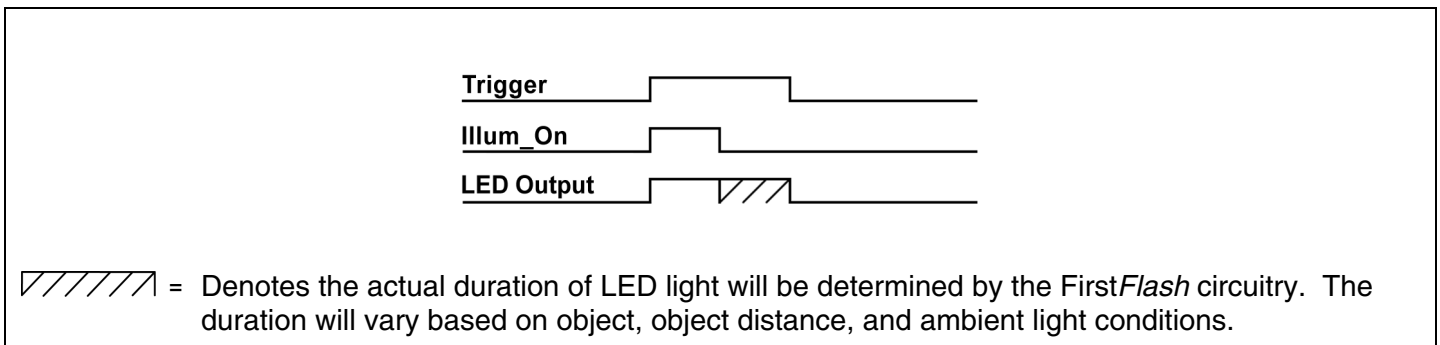


Figure 11. Example 2

Video Mode

The Video Mode allows for streaming video from the CMOS imager. The main advantage in the mode is that the user has fine control over the exposure time. Fine control over the exposure time makes this mode well suitable for high ambient light applications. The Video Mode is initiated through commands via the I²C bus. During this mode of operation, the Trigger signal must be held low. If lighting is required, the Illumination LEDs can be controlled via the Illum_On control signal.

Control of all signals and image dataflow in Video Mode is done in software by the engine device driver and CamLib APIs included in the Software Development Kit. See SDK documentation for more details.

When not in Video Mode, the image sensor is always ready for Snapshot image acquisition.

Targeting

The engine uses a targeting LED to indicate the center of the imaging field. This LED can be activated at any time by asserting the Aimer signal. The targeting LED is independent of the mode of operation and illumination. **However, it is strongly recommended that the targeting LED not be activated during image acquisition as the light from the targeting LED will be visible in the image and may result in “hot spots”.** Control of the aiming mechanism is done in software by the IS4910 device driver and CamLib APIs included in the SDK.

I²C Interface

The IS4910 series engines use an I²C compliant interface to communicate with the host system. The bus allows the host to communicate directly with the image sensor and illumination microcontroller. Both of these devices function as auxiliary* devices on the bus. The illumination Microcontroller is capable of running at speeds up to 100 kHz whereas the image sensor can support frequencies up to 400 kHz. The standard configuration of the IS4900 series of imaging engines does not incorporate pull up resistors on the SDA and SCL lines in order to allow flexibility for the end user when choosing the resistor values. These resistors must be provided by the host system and sized to meet the I²C timing requirements. Timing provided by the I²C bus specification must be observed in order to guarantee proper operation of the engine.

The two I²C devices used in the IS4910 Engine use the following addresses:

- CMOS Image: 0x10
- Illumination Micro: 0x61 and 0x70

For details regarding programming of the image sensor, please refer to documentation provided with the Software Development Kit. For details regarding the I²C protocol, see the Phillips I²C specification.

* In the Phillips I²C specification, auxiliary is defined as slave.

Camera Bus Timings

The non-decode engine outputs pixel data via an 8-bit parallel data bus. The rate at which data is output is determined by the pixel clock, which can be set for 48, 24, or 12 MHz. When the horizontal and vertical synch signals are high, valid pixel data is latched on the rising edge of the PCLK. New pixel data is then driven on to the bus on the falling edge. The VSYNC, HSYNC, and Pixel Data timings are relative to the PCLK and are related as shown in the following timing diagram.

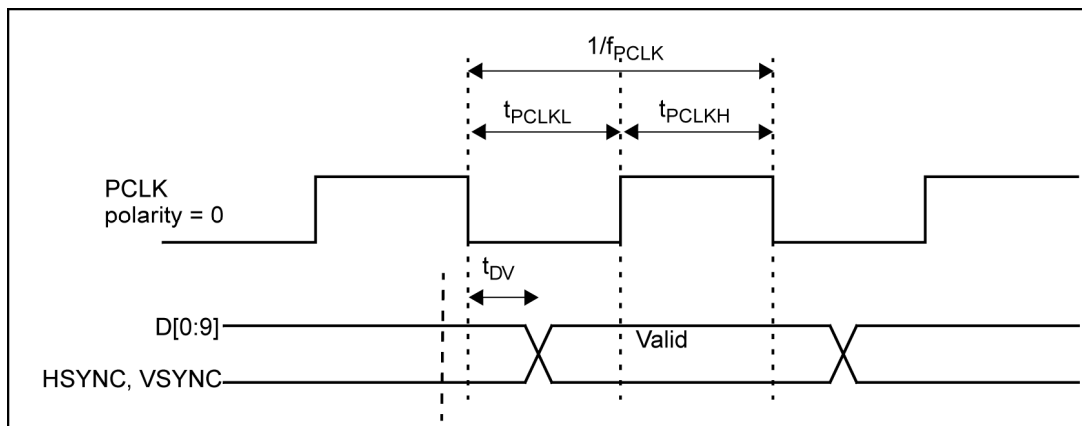


Figure 12. Parallel Data Output Video Timing*

Parallel Data Interface Timings*				
Symbol	Description	Min.	Max.	Unit
f_{PCLK}	PCLK frequency		48	MHz
t_{PCLKL}	PCLK low width	$[1/2 * 1/f_{PCLK}] - 0.5$	$[1/2 * 1/f_{PCLK}] + 0.5$	ns
t_{PCLKH}	PCLK high width	$[1/2 * 1/f_{PCLK}] - 0.5$	$[1/2 * 1/f_{PCLK}] + 0.5$	ns
t_{DV}	PCLK to output valid	-0.1	+2.5	ns

Table 1. Parallel Data Interface Timings*

* © of STMicroelectronics – All rights reserved.

Wake Up Timing

When exiting sleep mode the engine will require a minimum wake up time before an image can be acquired. Wake up is initiated by pulsing the Illum_On pin for a minimum of 250 μ S. The pulsing wakes up the on board microcontroller and oscillator. After this pulse is brought low, an additional 10 mS delay is required to ensure that the oscillator has stabilized. After the additional 10 mS delay, the oscillator is stabilized and the imager is ready to receive its configuration via the I²C control bus.

During sleep, the imager loses all configuration settings therefore all applicable settings will need to be updated. The total time for the device to wake up will be dependant on how many registers need to be reconfigured, the running speed of the I²C bus, and the manner in which the data is transmitted on the bus (i.e. repeated stop vs. no repeat stop transmission).

Wake up time calculation:

$$\begin{aligned} T_{\text{wake up}} &= \text{Oscillator Stabilization Time} + \text{Illum_On pulse width} + \text{Configuration Time} \\ &= 10 \text{ mS} + 250 \mu\text{S} + \text{Configuration Time} \\ &= 10.25 \text{ mS} + \text{Configuration Time} \end{aligned}$$

Example: The following waveform illustrates the wake up time measured from the rising edge of the Illum_On signal to the last byte of configuration data sent on the I²C bus (labeled as SCL). The example below is for a host system running the I²C at 100kHz and transmitting data using no repeat stop. In this example, 27 registers are configured. The total wake up time under the example conditions is approximately 31.5 mS.

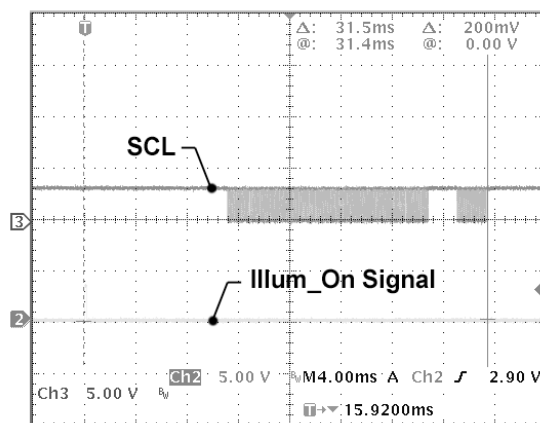


Figure 13. Example of wake up timing with I²C running at 100 kHz

Electrical Specifications

Signal Levels				
Signal	Description	Min.	Typical	Max.
Vimager	Power to Imager and Supporting Circuitry	3.1V	3.3V	3.5V
VLED	Power to Illumination and Targeting LEDs	3V	-	5.5V
VIL1	Input Low (Aimer, Illum_On, Trigger)			.6V
VIH1	Input High (Aimer, Illum_On, Trigger)	2.1V		Vimager
VOH2	Output High Voltage (Data, PCLK, VSYNC, HSYNC)	2.71		
VOL2	Output Low Voltage (Data, PCLK, VSYNC, HSYNC)			.3V1

¹ Sink / Source current = 2mA

² Voltages listed are at the engine. A voltage drop should be expected when using a flex cable.

V_Imager Current (Vimager = 3.3V)	
Description	Typical
Stand By Current (V_imager = 3.3V)	450 μ A
Idle Current (V_camera = 3.3V)	55 mA
Operating Current (V_camera = 3.3V)	90 mA

VLED Current	
Description	Typical
idle (VLED = 5V or 3.3V)	50 μ A
Peak Current (VLED = 5V or 3.3V) Note: Peak duration of less than 20 μ S	350 mA
LED enabled (VLED = 5V)	90 mA
LED enabled (VLED = 3.3V)	155 mA
Targeting LED	24 mA

See page 11 for information on system considerations.

Depth of Field vs. Bar Code Element

IS4910

Bar Code Element Width			Depth of Field* in the Field of View		
			Start (From Engine Face)	End (From Engine Face)	Total
1D	.127 mm	5 mil	50 mm (2.0")	145 mm (5.7")	95 mm (3.7")
	.254 mm	10 mil	30 mm (1.2")	210 mm (8.3")	180 mm (7.1")
	.330 mm	13 mil	25 mm (1.0")	310 mm (12.2")	285 mm (11.2")
PDF	.127 mm	5 mil	45 mm (1.8")	160 mm (6.3")	115 mm (4.5")
	.254 mm	10 mil	25 mm (1.0")	270 mm (10.6")	245 mm (9.6")
Data Matrix	.254 mm	10 mil	50 mm (2.0")	95 mm (3.7")	45 mm (1.8")
	.381 mm	15 mil	35 mm (1.4")	160 mm (6.3")	125 mm (4.9")
	.508 mm	20 mil	40 mm (1.6")	260 mm (10.2")	220 mm (8.7")

* Depth of field information is for reference only. Depths of field distances were measured with decoding software from Omniplaner®, a division of Honeywell Scanning and Mobility. Actual values may vary depending on environmental conditions, host hardware, and decoding software.

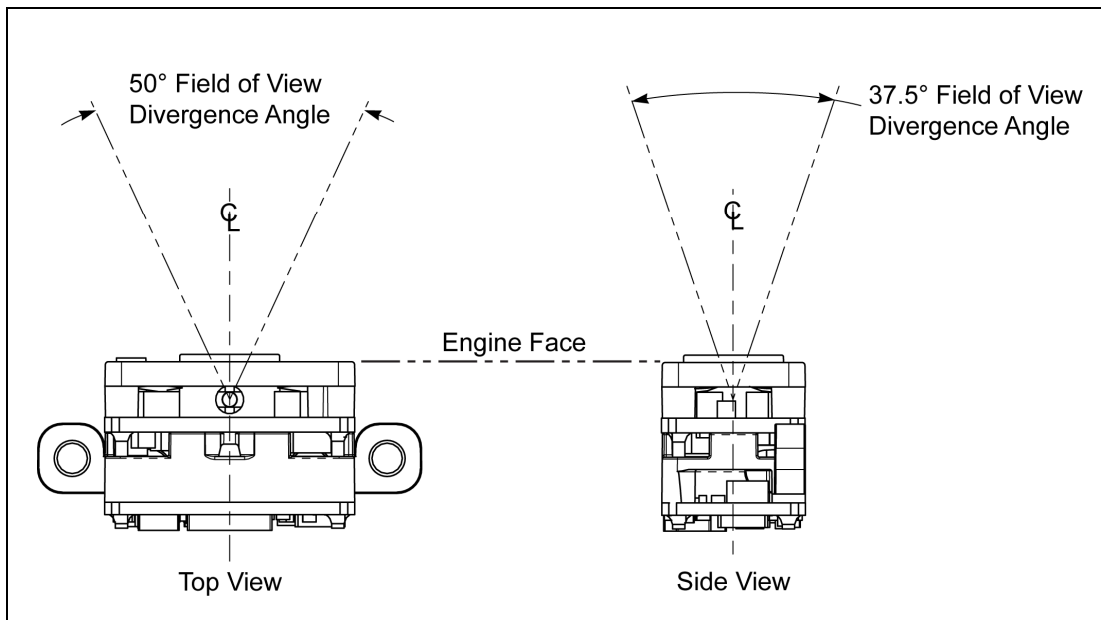


Figure 14. IS4910 Field of View, Divergence Angle (model -01 shown)

IS4911

Bar Code Element Width			Depth of Field* in the Field of View		
			Start (From Engine Face)	End (From Engine Face)	Total
1D	.076 mm	3 mil	68 mm (2.7")	105 mm (4.1")	37 mm (1.4")
	.127 mm	5 mil	50 mm (2.0")	120 mm (4.7")	70 mm (2.75")
	.330 mm	13 mil	50 mm (2.0")	170 mm (6.7")	120 mm (4.7")
PDF	.127 mm	5 mil	45 mm (1.8")	130 mm (5.0")	85 mm (3.2")
Data Matrix and QR	.127 mm	5 mil	75 mm (3.0")	115 mm (4.5")	40 mm (1.5")

* Depth of field information is for reference only. Depths of field distances were measured with decoding software from Omniplaner, a division of Honeywell Scanning and Mobility. Actual values may vary depending on environmental conditions, host hardware, and decoding software.

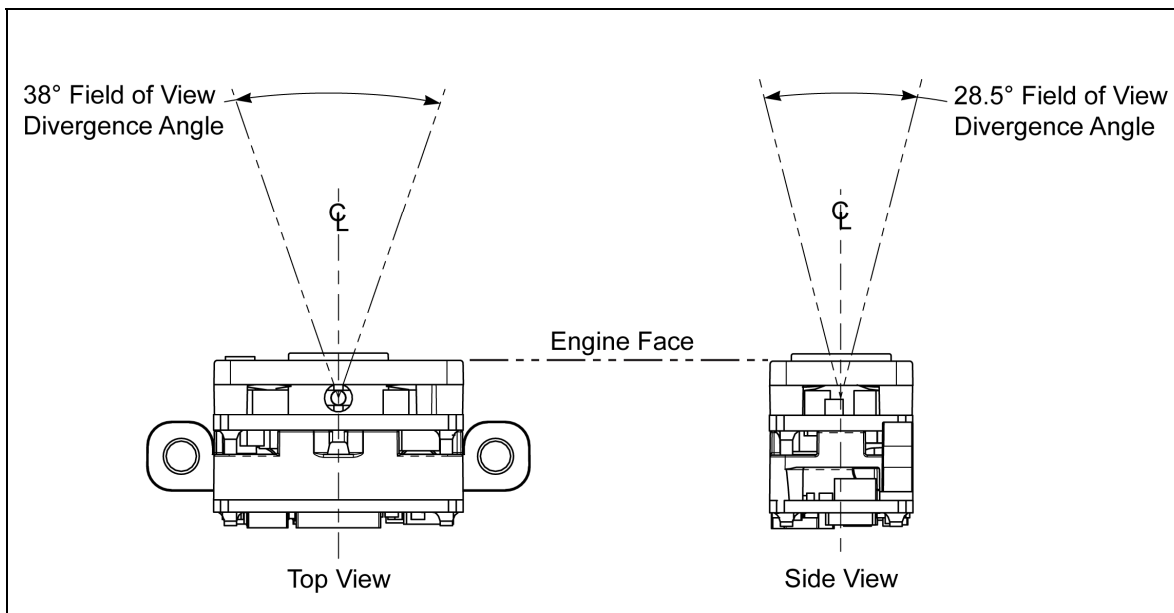


Figure 15. IS4911 Field of View, Divergence Angle (model -01 shown)

Design Specifications

Operational

Light Source:	Four, 650 nm Red Light Emitting Diode LED	
Depth of Field*:	IS4910	25 mm – 310 mm (1.0" to 12.2") for 0.330 mm (13 mil) 1D Bar Codes See page 20 for additional information on engine depth of field.
	IS4911	50 mm – 170 mm (2.0" to 6.7") for 0.330 mm (13 mil) 1D Bar Codes See page 21 for additional information on engine depth of field.
Field of View:	IS4910	50° Horizontal
		37.5° Vertical
	IS4911	38° Horizontal
		28.5° Vertical
Scan Area:	IS4910	118.4 mm x 86.2 mm (4.7" x 3.4") at 127 mm (5.0") from the Face of the Engine
		236.8 mm x 172.4 mm (9.3" x 6.8") at 254 mm (10.0") from Face of the Engine
	IS4911	37 mm x 28 mm (1.45" x 1.08") at 80 mm (3.15") from the Face of the Engine
		78 mm x 58 mm (3.09" x 2.3") at 170 mm (6.69") from the Face of the Engine
Rotation Sensitivity:	360° Around the Optical Axis	
Minimum Element Width:	IS4910	.10 mm (4.0 mil) 1D, PDF
		.254 mm (10 mil) 2D
	IS4911	.063 mm (2.5 mil) 1D, PDF
		.10 mm (4.0 mil) 2D
Resolution:	1.2 mega pixels (1280 x 960)	
Symbologies Supported:	Software Dependent*	
Print Contrast:	20% Minimum	

* *Depth of field information is for reference only. Depth of field distances were measured with decoding software from Omniplaner, a division of Honeywell Scanning and Mobility. Actual values may vary depending on environmental conditions, host hardware, and decoding software.*

** *Contact a customer service representative at 1-800-436-3876 for information on available decoding software.*

Mechanical

Dimensions:	See pages 5 - 7 for detailed specifications.
Weight:	< 6 g (.21 oz.)
Engine Termination:	22-Pin, 0.50 mm (.020") Pitch SlimStack™ Plug, Molex P/N 55560-0227 See page 25 for engine pinouts. See page 26 for flex cable specifications.
Mounting:	See pages 5 - 7 for detailed specifications.
Key Location:	See pages 5 - 7 for detailed specifications.

SlimStack is a trademark of Molex, Inc., all rights reserved.

Electrical

Engine Input Voltage:	3.3VDC ± 0.2	
Camera Current:	90 mA, typical	
Illumination Current:	150 mA, typical	
	350 mA, peak for less than 20 µs	
Aiming Current:	24 mA	
Peak Operating Current:	< 450 mA	
Typical Operating Current:	Snapshot Mode	85 mA
	Video Mode	250 mA
Power Save Mode Current:	0.5 mA Typical	
See page 19 for additional electrical specifications.		
See page 29 for regulatory compliance information.		

Environmental

Operating Temperature:	0°C to 40°C (32°F to 104°F)
Storage Temperature:	-20°C to 70°C (-4°F to 158°F)
See page 11 for additional information on thermal considerations.	
Humidity:	5% to 95% relative humidity, non-condensing
Light Levels:	0 - 110,00 Lux Note: Immunity against high levels of ambient light is achieved in Video Mode. See page 16 for additional information on the Video Mode and the Software Development Kit.
Shock:	5 ft. (1.5 m)
Vibration Protection:	7G, 10 – 500 Hz
Contaminants:	See page 8.

Imaging Engine Terminations

IS4910 / IS4911 Pinout Connections

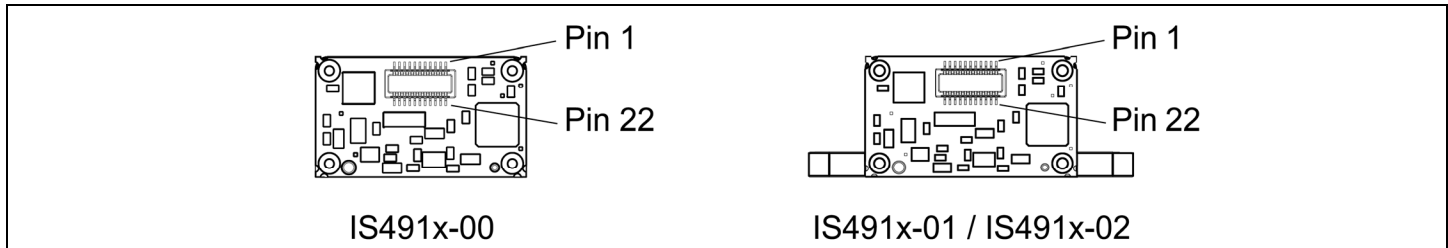


Figure 16. Non-Decode Engine Termination

Pin	Signal Name	Function
1	Aimer	High enables Targeting LED (Input)
2	Illum_On	High forces on Illumination LEDs (Input), Wake up Scanner
3	Trigger	Controls Integration and Illumination in Snapshot mode (Input)
4	SDA	I ² C data (Bi-Directional) – Devices Functions as Auxiliary Devices
5	SCL	I ² C clock (Bi-Directional) – Devices Function as Auxiliary Devices
6	VLED	Voltage Supply for Targeting and Area LEDs (3V - 5.5V)
7	D0	Pixel Data0 (LSB) (Output)
8	Vimager	Camera Voltage (3.1V - 3.5V)
9	D1	Pixel Data1 (Output)
10	D2	Pixel Data2 (Output)
11	D3	Pixel Data3 (Output)
12	PCLK	Pixel Clock (Output)
13	D7	Pixel Data7 (Output)
14	D6	Pixel Data6 (Output)
15	D5	Pixel Data5 (Output)
16	D4	Pixel Data4 (Output)
17	VSYNC	Vertical Sync (Output)
18	HSYNC	Horizontal Sync (Output)
19	GND	Power and Signal ground
20	Reserved	Terminate with Resistor, Pulled Low, or Leave Unconnected
21	GND	Power and Signal Ground
22	NC	No Connection

* In the Phillips I²C specification auxiliary is defined as slave.

Flex Cable Specifications

Pinout, Host End

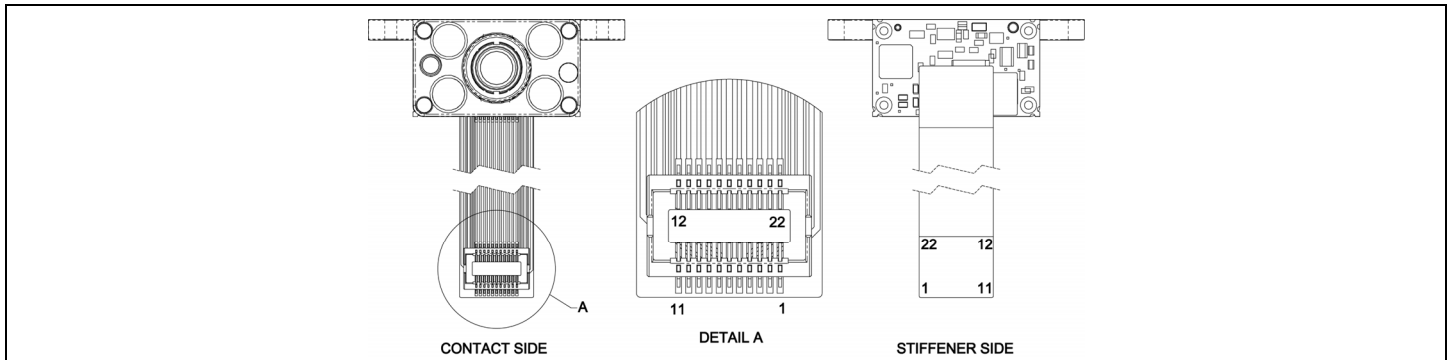


Figure 17. Flex Cable Pin Arrangement

Pin	Signal Name	Function
1	GND	Power and Signal Ground
2	Reserved	Terminate with resistor, Pulled low, or Leave Unconnected
3	GND	Power and Signal Ground
4	HSYNC	Horizontal Sync (Output)
5	VSYNC	Vertical Sync (Output)
6	D4	Pixel Data4 (Output)
7	D5	Pixel Data5 (Output)
8	D6	Pixel Data6 (Output)
9	D7	Pixel Data7 (Output)
10	PCLK	Pixel Clock (Output)
11	NC	No Connection
12	D3	Pixel Data3 (Output)
13	D2	Pixel Data2 (Output)
14	D1	Pixel Data1 (Output)
15	Vimager	Camera Voltage (3.1V - 3.5V)
16	D0	Pixel Data0 (LSB) (Output)
17	VLED	Voltage supply for Targeting and Area LEDs (3V - 5.5V)
18	SCL	I ² C clock (Bi-Directional) – Devices Function as Auxiliary Devices
19	SDA	I ² C Data (Bi-Directional) – Devices Function as Auxiliary Devices
20	Trigger	Controls Integration and Illumination in Snapshot Mode (Input)
21	Illum_On	High Forces on Illumination LEDs (Input)
22	Aimer	High Enables Targeting LED (Input)

Dimensions

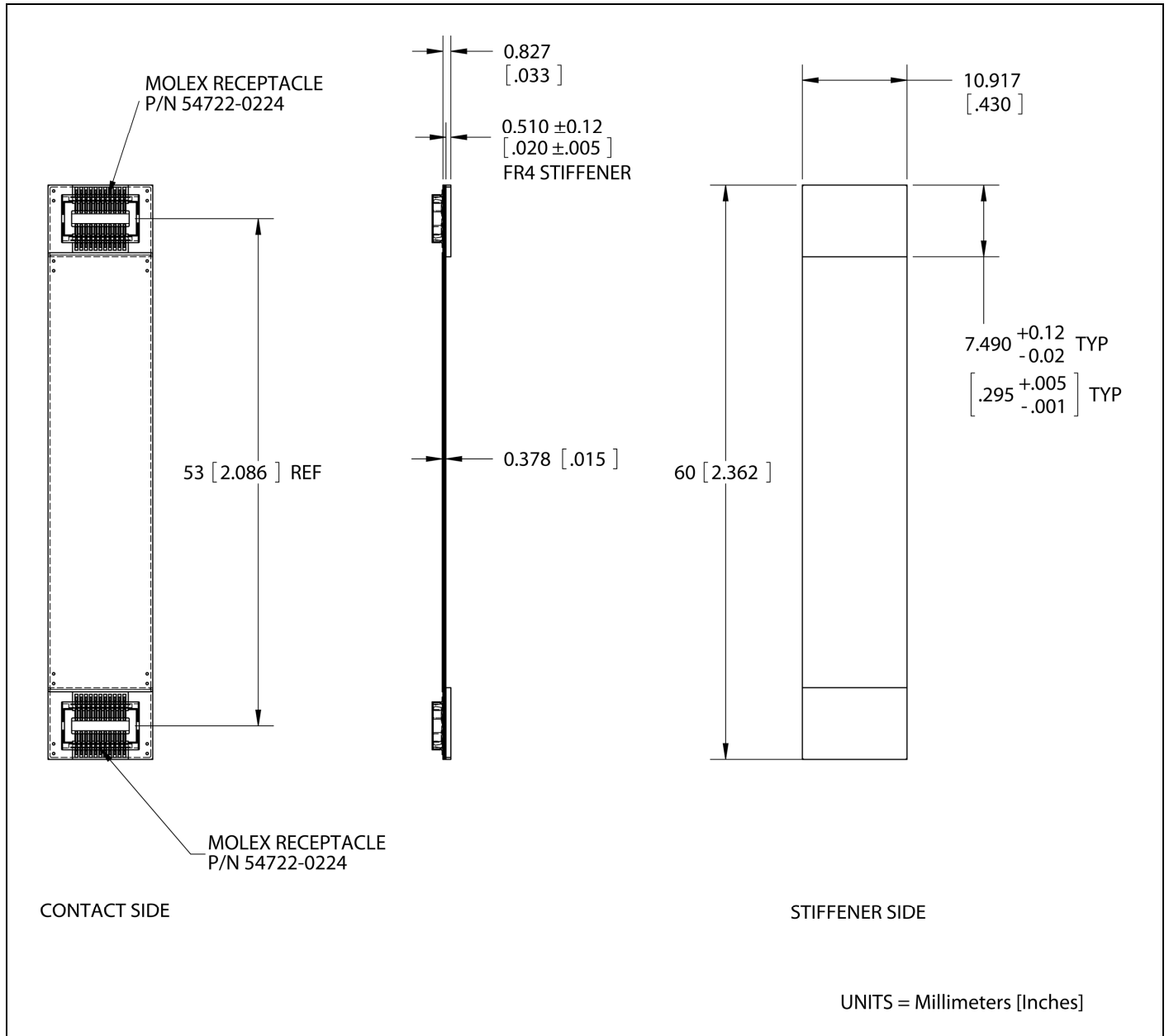



Figure 18. Flex Cable Dimensions, P/N 77-77104

 See installation warning on page 28.

Installation Notes

Note 1. **Warning!**

The flex cable must be installed in the orientation shown below in Figure 19. If the cable is incorrectly installed, the engine can be damaged, and the warranty voided, see page 31.

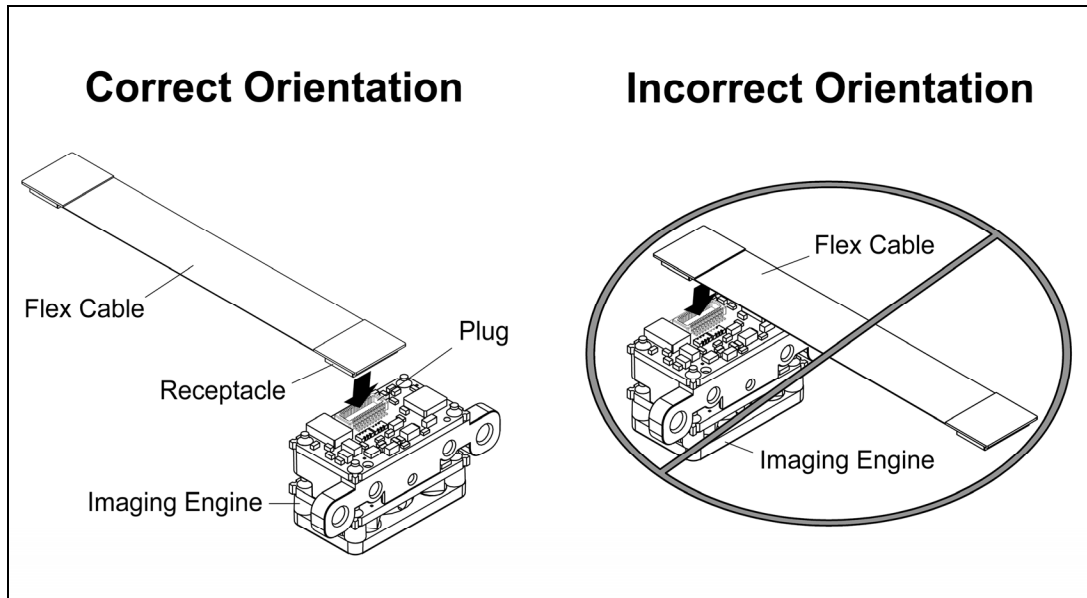


Figure 19. Flex Cable Orientation

- Note 2. Proper installation of the flex cable is essential for engine performance. When installing the flex cable, verify that the flex cable receptacle is fully seated in the engine plug. To achieve a full connection, ensure that the alignment of the mating parts is not angled during installation. Flex cable P/N 77-77104 is designed with universal ends.
- Note 3. Once installed, it is recommended that the flex cable be secured properly in the enclosure to prevent loss of connection due to vibration or physical drop.

Regulatory Compliance

Safety

The IS4910 series area imaging engines are designed to meet the requirements of IEC Class 1 in accordance with IEC 60825-1:1993+A1+A2. IEC Class 1 is defined as follows:

The specifications required for agency approval are not obtainable until the IS4910 / IS4911 area imaging engine is used in its final configuration. Honeywell International Inc. is unable to fulfill these requirements because the imaging engine will operate differently depending upon where the engine is used as a component.

If the product containing the IS4910 series engine is to be used in another country, **the manufacturer who incorporates the imaging engine into their product is responsible for fulfilling any regulatory compliance requirements for that country.** Refer to one of the following sections for further explanation.

Europe

The CE Mark is required on products that incorporate the IS4910 series engine if the products are to be imported into European Economic Area (EEA) countries. Use of the CE Mark requires compliance with directives and standards dependent upon the type of product. Information may be found at <http://europa.eu.int/comm/enterprise/newapproach/>.

LED Safety

IEC 60825-1:1993+A1+A2,
EN 60825-1:1994+A1+A2
“Safety of LED products”

Compliance with either of the standards listed above is required for the product to bear the CE mark.

Note: Non EEA countries may impose additional testing/certification requirements.

EMC

All combinations of IS4910 area imaging engines and associated electronics will require certification of compliance with the European EMC Directive. EMC compliance of finished products in Europe can be accomplished by the following method:

The manufacturer may certify to the EC's Electromagnetic Compatibility Directive 89/336/EEC. Compliance is required for the product to bear the CE Mark.

Note: Non EEA countries may impose additional testing/certification requirements.

The IS4910 series area imaging engine is designed to meet EN55022 Radiated Class B emission limits. The engine was installed in a representative system and tested for compliance.

Electrical Safety

The IS4910 engines are built to conform to the European Low Voltage Directive 73/23/ EEC.

United States

EMC

All combinations of imaging engines and associated electronics will require testing to insure compliance with the following Federal Communications Commission regulation: 47 CFR Part 15

Note: When using the imaging engine with RF equipment, modems, etc. may require examination(s) to the standard(s) for the specific equipment combination. It is the manufacturers' responsibility to comply with the applicable federal regulation(s).

The IS4910 series area imaging engine is designed to meet EN55022 Radiated Class B emission limits. The engine was installed in a representative system and tested for compliance.

Canada

EMC

Products meeting FCC 47 CFR Part 15 will meet Industry Canada interference-causing equipment standard for digital apparatus, ICES-003. Additional testing is not required.

A written notice indicating compliance must accompany the apparatus to the end user. The notice shall be in the form of a label that is affixed to the apparatus. The notice may be in the form of a statement included in the user's manual if, because of insufficient space or other restrictions, it is not feasible to affix a label to the apparatus.

Limited Warranty

Honeywell International Inc. ("HII") warrants its products and optional accessories to be free from defects in materials and workmanship and to conform to HII's published specifications applicable to the products purchased at the time of shipment. This warranty does not cover any HII product which is (i) improperly installed or used; (ii) damaged by accident or negligence, including failure to follow the proper maintenance, service, and cleaning schedule; or (iii) damaged as a result of (A) modification or alteration by the purchaser or other party, (B) excessive voltage or current supplied to or drawn from the interface connections, (C) static electricity or electro-static discharge, (D) operation under conditions beyond the specified operating parameters, or (E) repair or service of the product by anyone other than HII or its authorized representatives.

This warranty shall extend from the time of shipment for the duration published by HII for the product at the time of purchase ("Warranty Period"). Any defective product must be returned (at purchaser's expense) during the Warranty Period to HII factory or authorized service center for inspection. No product will be accepted by HII without a Return Materials Authorization, which may be obtained by contacting HII. In the event that the product is returned to HII or its authorized service center within the Warranty Period and HII determines to its satisfaction that the product is defective due to defects in materials or workmanship, HII, at its sole option, will either repair or replace the product without charge, except for return shipping to HII.

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The duration of the limited warranty for the IS4910 and IS4911 is two year(s). The accessories have a 90 day limited warranty from the date of manufacture.



Patents

This Honeywell product may be covered by, but not limited to, one or more of the following U.S. Patents:

U.S. Patent No.;

7,086,595; 7,128,266

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Other worldwide patents pending.

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