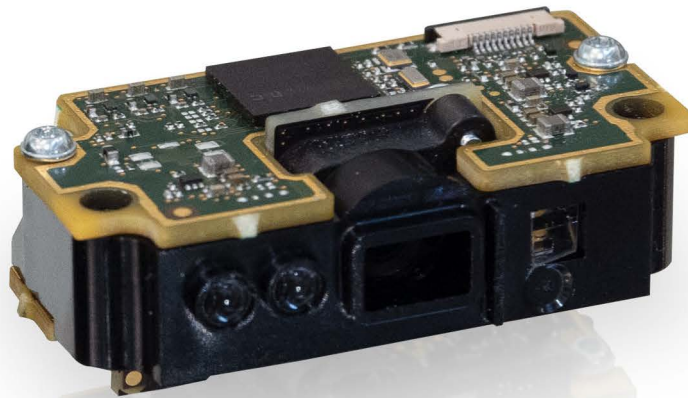


Gryphon™ I GFE4500

INTEGRATION GUIDE



Fixed Mount Area Imager
Bar Code Reader

Datalogic S.r.l.

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NOTES

CHAPTER 1

INTRODUCTION

ABOUT THIS MANUAL

This Integration Guide is provided to give instructions, opto-mechanical details and design considerations for integrating the GRYPHON™ GFE4500 model (designated as "scan engine" or "OEM scan engine" in this manual) specifically into equipment-integrated scanning applications.

Manual Conventions

The following conventions are used in this document:

The symbols listed below are used in this manual to notify the reader of key issues or procedures that must be observed when using the reader:



NOTE: Notes contains information necessary for properly diagnosing, repairing and operating the reader.



CAUTION: Cautions advise about actions that could damage equipment or property.

OUTLINE

[Chapter 1, Introduction](#) presents information about manual conventions, an overview of the engine, information about unpacking, its features and operation.

[Chapter 2, Installation](#) provides information about scan engine connection and setting up the scan engine for optimum performance.

[Chapter 3, Electrical Integration](#) offers information about electrical components.

[Chapter A, Technical Specifications](#) lists physical and performance characteristics, as well as environmental and regulatory specifications.

[Chapter B, Mechanical Specifications](#) details signal characteristics and timing of the camera interface.

ABOUT THE GFE4500

The GFE4500 OEM scan engine is a compact decoding omni-directional imaging scan engine for fixed position OEM integration, such as price verifiers, kiosks, vending machines, point-of-sale (POS) terminals, and other equipment-integrated scanning applications. The new proprietary imaging technology excels at capturing hard-to-read bar codes in omni-direction orientation. A typical system using the scan engine consists of a host system such as a price verifier or kiosk. The host system interfaces with the scan engine and receives decoded bar code data produced by the scan engine.

The illumination LEDs in the scan engine emit visible light when a bar code passes through the scan volume area and light is reflected off the bar code. The scan engine captures an image, processes it into a digital signal and decodes it into data that can be used by the host system. The scan engine has different operational modes which can be selected via special programming bar codes. The OEM scan engine is the same reader as that found in the Gryphon GFS4500 scan module. This document is meant to give instruction, mechanical details, and design considerations to integrate the OEM scan engine model only.

Details on the Configuration Settings and Programming are found in the Product Reference Guide (PRG). The Datalogic Aladdin Configuration Utility (available free from the Datalogic website) can also be used to modify settings.

Unpacking the Scan Engine

The scan engine shipped in custom packaging. Carefully open the package, and inspect for the following:

- Scan engine
- Power supply (if ordered)
- Interface cable (if ordered)

If any parts are damaged or you need additional hardware, please contact Technical Support.

Scan Engine Care

The scan engine contains sensitive components which require special handling. Datalogic may not warrant damage due to improper handling.

- Do not disassemble the scan engine. Doing so will void the warranty.
- Use standard ESD precautions & policies when handling the GFE 4500 scan engine.
- Avoid touching the camera lens. Fingerprints will degrade the scan engine's performance.

TECHNICAL SUPPORT

Support Through the Website

Datalogic provides several services as well as technical support through its website. Log on to (www.datalogic.com).

For quick access, from the home page click on the search icon 🔍, and type in the name of the product you're looking for. This allows you access to download Data Sheets, Manuals, Software & Utilities, and Drawings.

Hover over the Support & Service menu for access to Services and Technical Support.

Reseller Technical Support

An excellent source for technical assistance and information is an authorized Datalogic reseller. A reseller is acquainted with specific types of businesses, application software, and computer systems and can provide individualized assistance.

NOTES

CHAPTER 2

INSTALLATION

This section describes how to design the mounting for optimum scan engine performance.

MOUNTING THE SCAN ENGINE

General Considerations

A typical system uses the scan engine mounted inside a host enclosure, with an opening for the illumination system light to exit and illuminate the label and for reading bar codes. The opening should be the size of the scan engine field of view at a minimum, but only exposing as much of the scan engine as necessary.

Although the scanner has been designed to be rugged, it is important to consider the effect of the environment on the scanner. In particular, mounting should minimize the possibility of foreign objects coming into contact with the electronics. Such contact could damage the device or reduce the scanner's performance.

Dust on the optical parts of the engine can badly affect the performance of the scan engine. Ensure the engine is clear of dust and water when integrating it inside the housing.

Mounting

The primary method of mounting to the host enclosure is to attach the scanner using the mounting holes provided by the frame. "[Mechanical Specifications](#)" on page 22 has mechanical drawings of the scanner, including the position of the mounting features.

The scanner can be mounted upside down with no loss in scanning performance.

Mounting the Scanner Standalone

The OEM scanner is not intended for use in a standalone application. This model is intended to be integrated inside a host enclosure. GFS4500 models should be used when a standalone application is required.

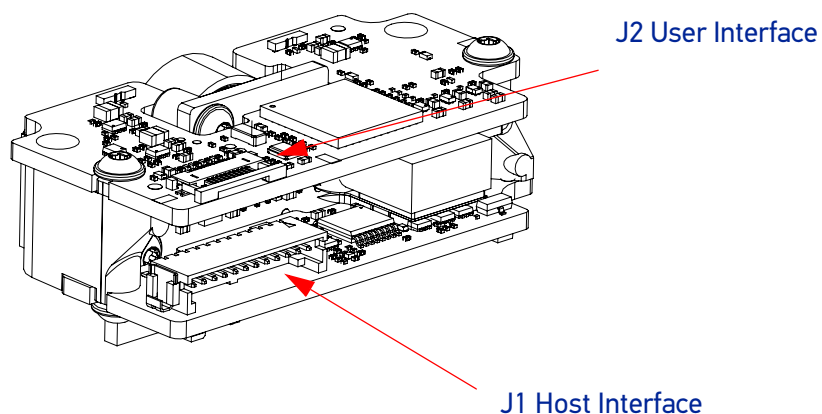
CHAPTER 3

ELECTRICAL INTEGRATION

ELECTRICAL CONNECTIONS

The GFE4500 scan engine has three application ports for device integration, as indicated below, a Host (J1) and User (J2) Interface.

Figure 1. Scan Engine Application Ports



Host Interface

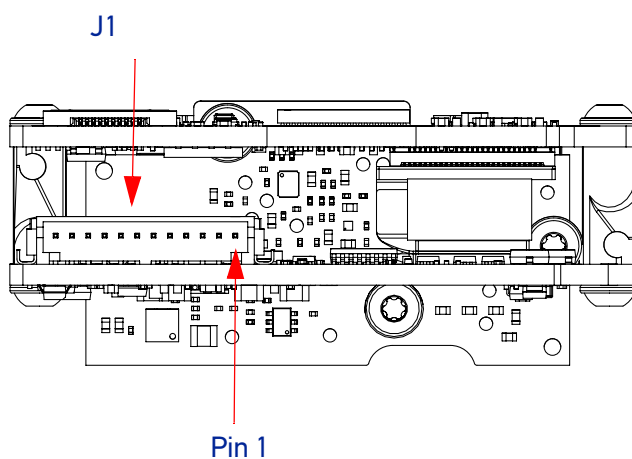
The Host Interface connection (J1) provides all the connection points for either RS-232 or USB host communications. Additionally, this connector is input for power and provides access to the external triggering input and digital signal output functions. The assignment of the connector pins are indicated in Table 1.

Table 1 - Electrical Interface of the Host Connector

| PIN | PIN FUNCTIONALITY |
|-----|----------------------------------------------------------------------------|
| 1 | USB D+ |
| 2 | USB D- |
| 3 | USB Shield |
| 4 | USB Shield |
| 5 | EXT_TRIGGER_IN; (input to the base of a transistor, pull high to activate) |
| 6 | RS232 TXD (output from scanner) |
| 7 | RS232 RTS (output from scanner) |
| 8 | RS232 RXD (input to the scanner) |
| 9 | RS232 CTS (input to scanner) |
| 10 | DIGITAL_OUT (open collector) |
| 11 | +5V (USB Vbus or external power adapter) |
| 12 | GND |

The J1 connection on the GFE4500 scan engine is a Hirose, DF13C-12P-1.25V,12 circuit connector, right angle. For application integration the recommended mating plug is DF13-12S-1.25C housing with DF13-12S-1.25C wire crimp terminals.

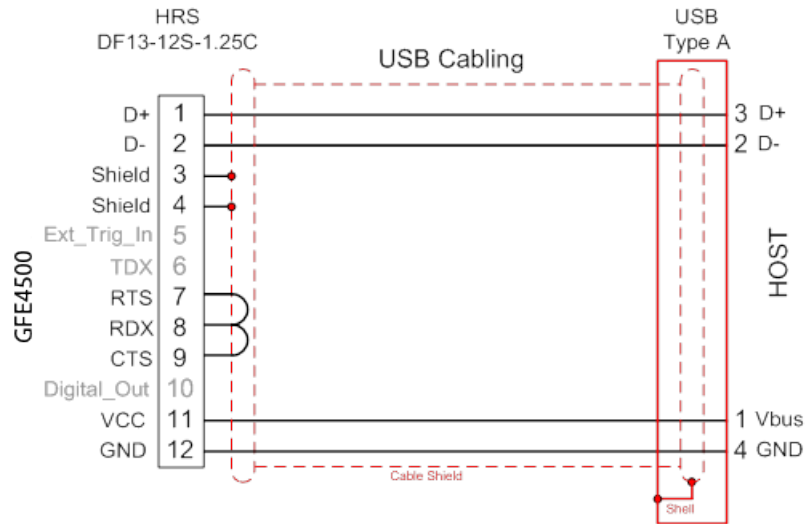
Figure 2. Interface Board (back view)



USB

For USB setup, the recommended wiring is the following.

Figure 3. USB cabling



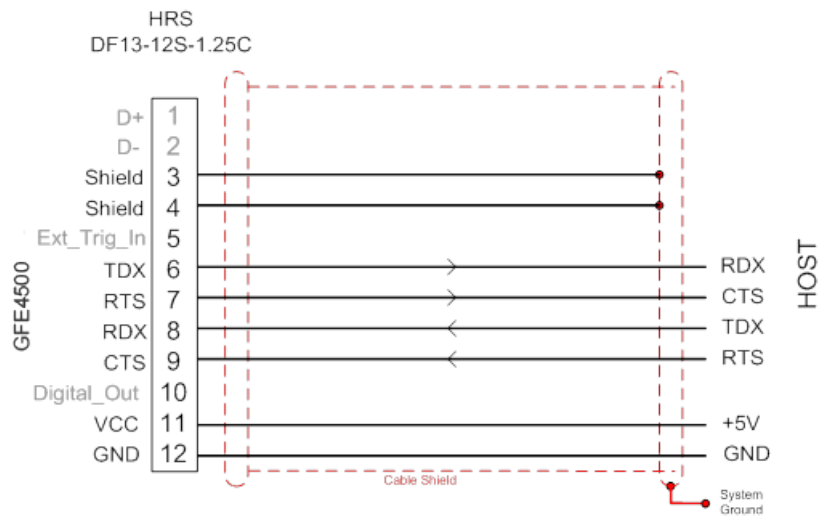
It is important that connections 7/8/9 be wired together for USB Auto Detection.

The reliability of the USB communication has been tested using compatible Datalogic cables. Communication integrity when using different cables is not guaranteed.

RS-232

For RS-232 serial setup, the recommended wiring is the following.

Figure 4. RS-232 cabling



External Trigger and Digital Output

The interface allows the user's adapting interface to trigger the scan engine if not set for Automatic Reading Mode. Also, a programmable digital output signal is available, which indicates a good read/decode. Both the Digital Input and Output connections can be configured separately in PNP or NPN modes. Set the proper configuration using the bar-codes below (or via Aladdin software) before connecting the system. The table below provide interface suggestions.

| ELECTRICAL FEATURES | |
|-------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Digital Input | NPN or PNP protected short circuit |
| Max. Voltage | 14.0 Vdc |
| Max. Input Current | 4.0 mA |
| Digital Output | NPN or PNP protected short circuit |
| V_{OUT high} (I_{LOAD} = 100 mA) Max | 5.0 Vdc (when using 5.0 Vdc power supply) 14.0 Vdc (when using 14.0 Vdc power supply) Up to 14.0 Vdc when using external power supply |
| V_{OUT low} (I_{LOAD} = 100 mA) Max | 0 Vdc |
| I_{LOAD} MAX | 150 mA |

Input levels

There is one input available on the GFE4500's DF13C-12P-1.25V connector on pin 5. GND is on pin 12.

| INPUT | | V _{IN} MIN | V _{IN} MAX | I _{IN} MAX |
|-------|------------------|---------------------|---------------------|---------------------|
| NPN | OFF ^a | 3 V | 14 V | 0 mA |
| | ON | 0 V | 2 V | 0.07 mA |
| PNP | OFF | 0 V | 2 V | 0 mA |
| | ON ^a | 3 V | 14 V | 2.6 mA |

a. The OFF state is guaranteed even if the input is floating



Input connection - Typical layout

Figure 5. NPN configuration



NPN configuration = Set Input Configuration to NPN

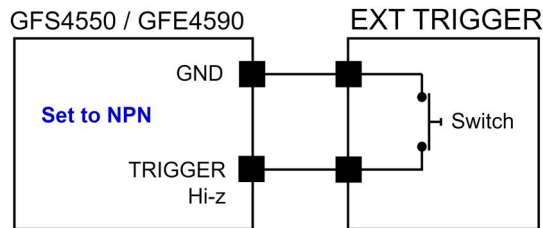
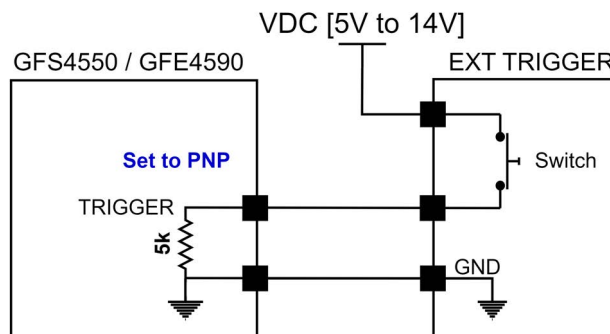
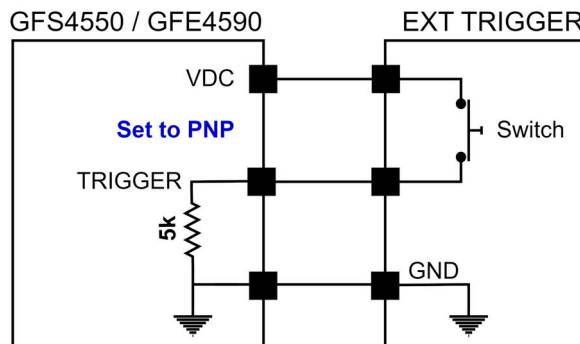


Figure 6. PNP configuration



★ PNP configuration = Set Input Configuration to PNP

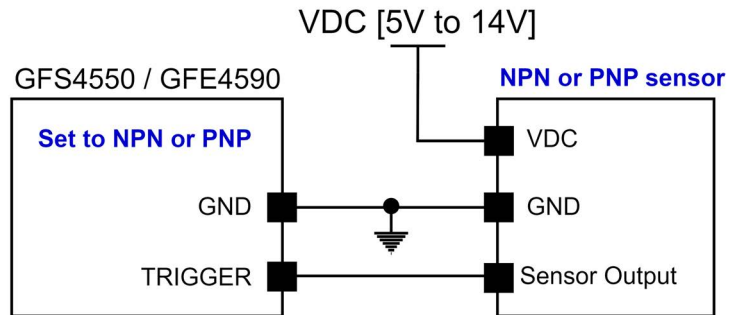


Vext: 5.0 Vdc to 14.0 Vdc, I_IN: 4.0 mA max



Figure 7. NPN or PNP configuration

Ensure both sides are configured the same way.



Vext: 5.0 Vdc to 14.0 Vdc, I_{IN}: 4.0 mA max



Output connection - Typical layout

Figure 8. NPN configuration



★ NPN configuration = Set Output Configuration to NPN

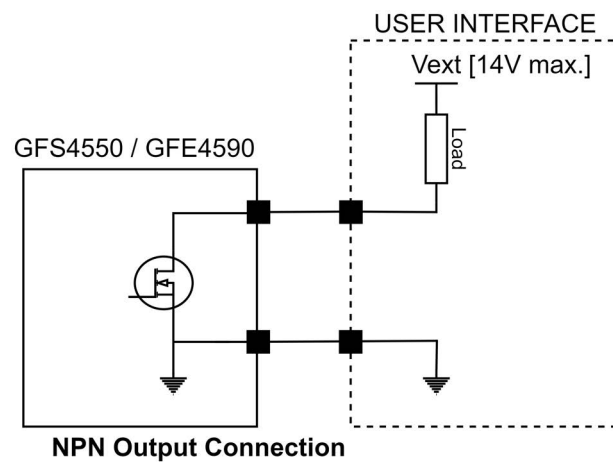
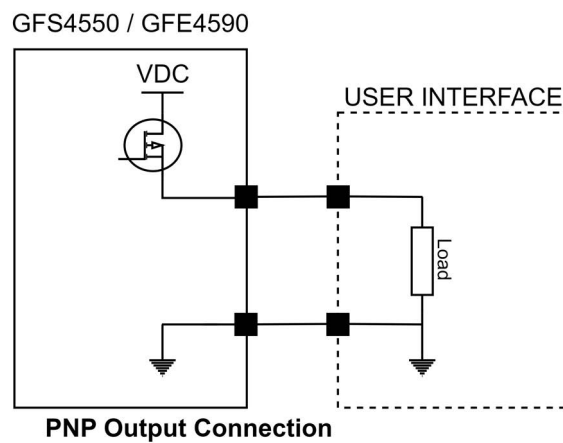


Figure 9. PNP configuration



PNP configuration = Set Output Configuration to PNP



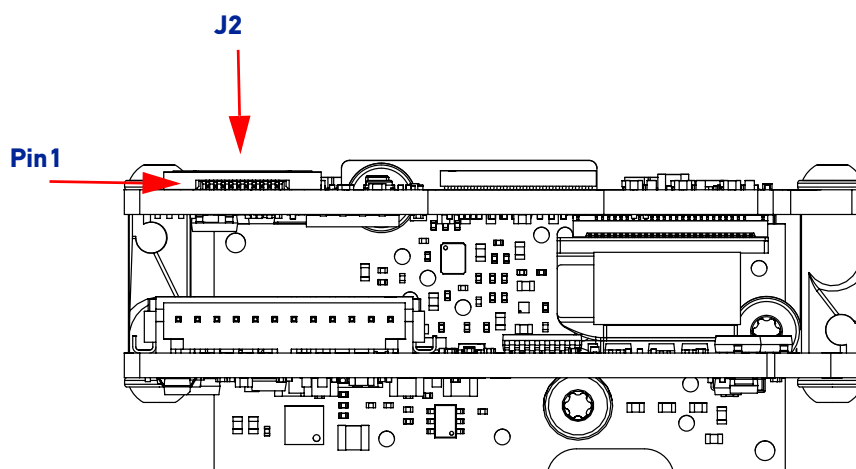
User Interface

The User Interface connection (J2) provides the integrator a means to monitor scan engine status (LEDs), and offers an additional mechanism for manually triggering the device.

The user connection (J2) uses a Molex part-number, 545481072, 0.50mm (.020") Pitch Easy-On FFC/FPC Connector, 1.20mm Height, Right Angle, SMT, Bottom Contact Style, 10 Circuits, Gold Contact Plating. For custom adaptations, the integrator must interface using an FFC (Flat Flexible Cable) that mates properly to scan engine ZIF connector.

An example of compatible FFC is Molex 15166-0100.

Figure 10. Connections



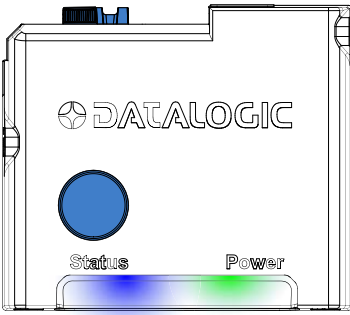
The assignment of the J2 connector pins are indicated in the following table.

Table 2 - J2 Connector Pins

| PIN NUMBER | PIN FUNCTIONALITY |
|------------|----------------------------------------------------|
| 1 | Ground |
| 2 | Trigger Switch- (Ground) |
| 3 | Trigger Switch+ |
| 4 | Good Read Beep Signal (open collector, active low) |
| 5 | Ground |
| 6 | Power LED (open collector, active low) |
| 7 | Status LED - Red (open collector, active low) |
| 8 | Status LED - Blue (open collector, active low) |
| 9 | Status LED - Green (open collector, active low) |
| 10 | VCC (5V for LED Supply) |

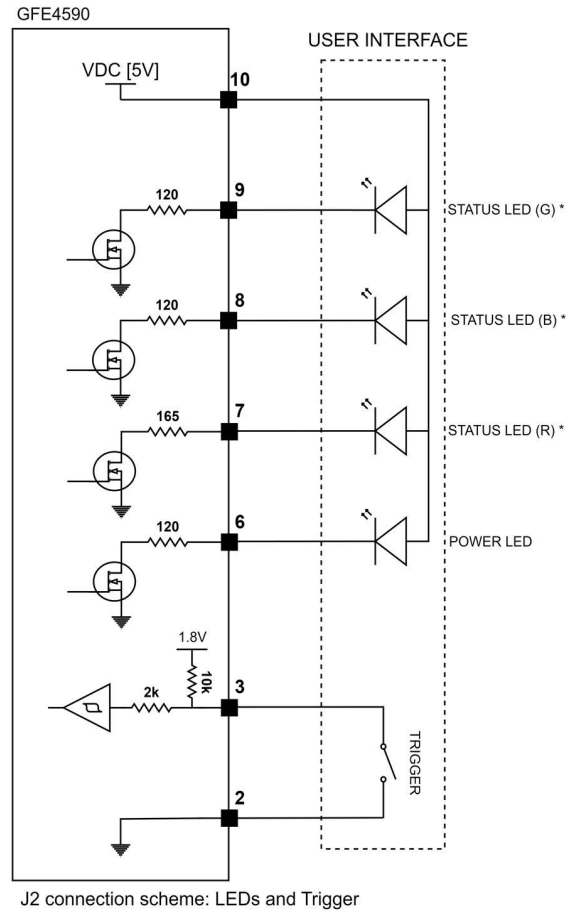
The following table outlines scan engine status assigned to each LED (with recommended colors).

Table 3. Scan Engine Status

| | | |
|-----------------------------------------------------------------------------------|----------------------------|-------------------------------------------------------------------------------------------------------------|
|  | POWER LED (green) | ON = Power ON |
| | | Blinking =USB enumeration (USB version only) or FW Upgrade |
| | | OFF = Power OFF or Limited Scanning Mode or Standby (USB version only) |
| | STATUS LED (multicolor) | Green = Good Read, USB enumeration (USB version only) or FW Upgrade |
| | | Blue = External trigger, or button pressed or phase active or Image Capture mode. |
| | | Red = Used to indicate Wrong Code or No Read, depending on the configuration (see Product Reference Guide). |

The following is an example of a possible connection scheme for the User Interface:

Figure 11. J2 connection example - LEDs and Trigger



*= G (Green), B (Blue) and R (Red) are the three separated color components for the Status LED indicator.

Figure 12. J2 connection example - Buzzer using external power

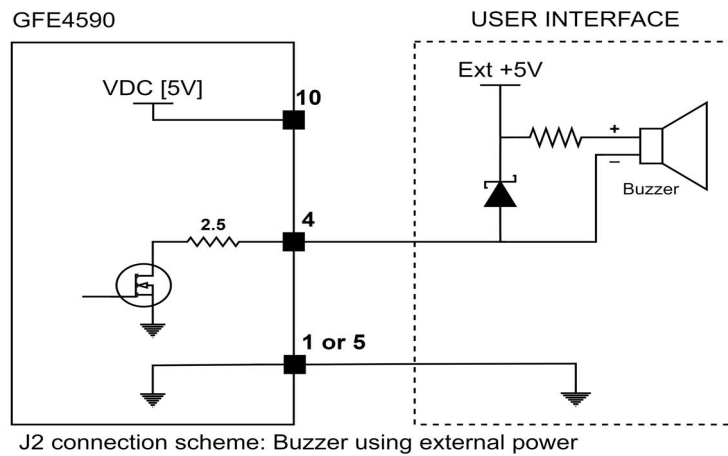
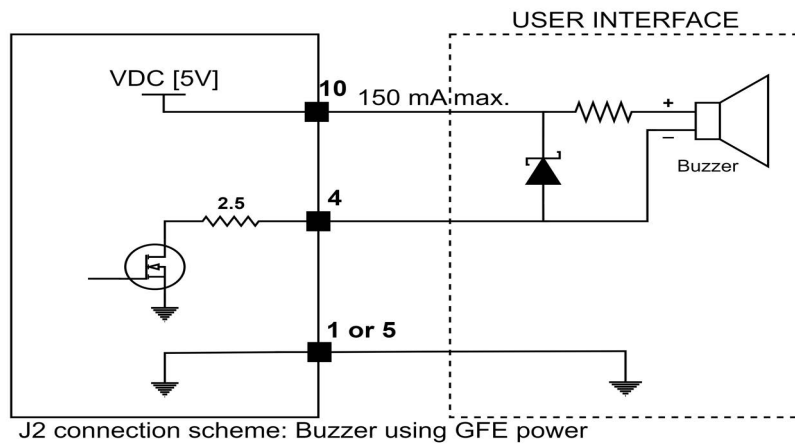


Figure 13. J2 connection example - Buzzer using GFE power



Scanner Ventilation

When mounting the scanner inside an enclosure, it is important to have proper ventilation to ensure that the scanner temperature does not exceed the maximum range as listed in "GFE4500 Technical Specifications" on page 20. The reliability of the scanner may be compromised if the temperature range is not maintained.

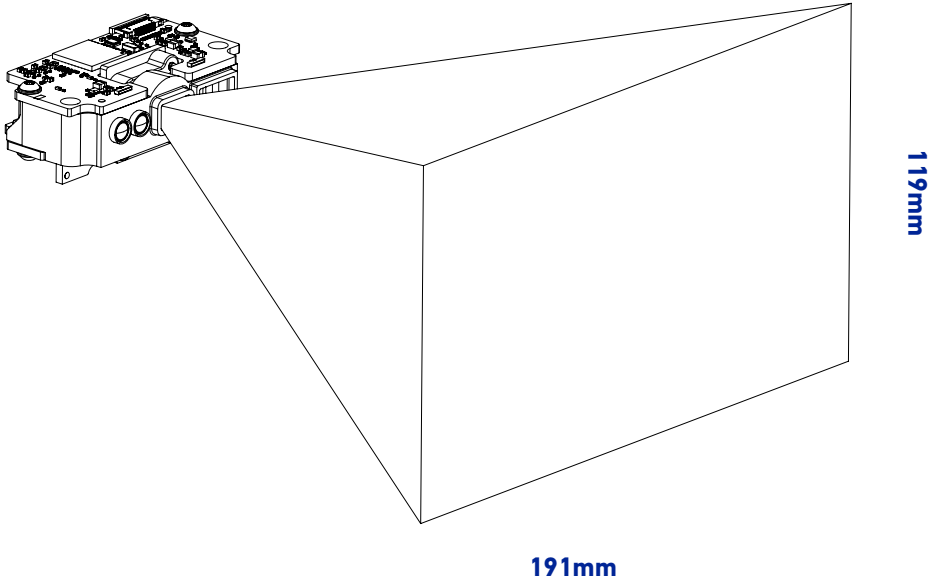
Particular care must be taken to properly dissipate the heat generated by an intensive operative condition, like using Always On mode with aiming and LED at full power continuously for an extended period of time.

Integrating the Scanner to Read at the Proper Distance

When deciding how to mount the OEM scanner, there are many criteria that must be considered. First, there are minimum and maximum distances that the bar code can be from the front of the scanner to be properly read, depending on the size of the bar code. These distances, or depth of field, are specified in "GFE4500 Technical Specifications" on page 20

The scanner must be positioned so that the scan volume and illumination light will cover the entire bar code. The scan volume is shown in Figure 9. The combination of the Scan Volume and the illumination light is called the Field of View. Designing around the scanner Field of View is explained more in the following section.

Figure 14. Scanning Volume



Scan Volume@200mm

Design of the Scanner Opening

The design and placement of the scanner opening within a host enclosure are critical for optimum system performance. A typical system uses the scanner mounted inside a host enclosure, with an opening to allow the scanner Field of View to exit the scanner window and read bar codes.

Use the following guidelines to design the host enclosure and scanner opening, along with the dimensions shown in "[Mechanical Specifications](#)" on page 22.

- The opening must not block any of the outgoing illumination light, described by dimensions of the scanner Field of View.
- Ensure that there are no reflective surfaces around the area of the scanner opening.
- The minimum opening size must increase as the distance between the scanner and the host enclosure window increases. This is necessary to accommodate the width and height of the scan volume.
- The opening or other parts of the host enclosure must not enter the Field of View in order to allow the bar code image to be captured by the scanner.
- If the scanner is flush against the opening, the opening must be the size of the scanner at a minimum, but only exposing as much of the front surface of the scanner as necessary.

Integrating the Scanner Behind a Window



CAUTION: The addition of a host enclosure window could degrade scanner performance. This is due to the optical reflective surfaces that will cause interference with the imaging technology.

It is recommended to conduct scan performance testing with any window to determine if the performance level is acceptable for the application.

- Window material should be transparent with ³92% transmission to wavelength 625nm and 850nm.
- Only a flat window must be used.
- The window should be as thin as possible (thickness less than 2mm).
- The window should be as close to the illumination LEDs as possible to avoid LED ghost images or light reflections. Tilting the window and/or anti-reflective coating can help mitigate illumination reflections.

Performance degradation may include:

- The scan module will not read very low contrast labels.
- The scan module will not be able to wake up, especially in low ambient light (typically <100Lux). In this case, the scan module may need its wakeup sensitivity setting increased.

ESD

The engine is protected from ESD up to $\pm 2.5\text{Kv}$ @ connector. The host enclosure design must provide adequate ESD protection for the scanner. Ideally, static discharge should not be allowed contact with the scanner. The preferred method to prevent static discharge is to provide a long discharge path to all circuits. The scanner is intended to be mounted inside a host enclosure. Only the front surface should be exposed in order to read bar codes. This is to protect the rear interface connector area, which can be susceptible to static discharge. Interface cables should also not have power applied when inserted into the scanner. Any metal mounting surfaces for the scanner must be electrically grounded with proper insulation to the scan engine mounting.

Static discharge (ESD) testing is recommended for the entire system integration to ensure proper ESD protection.



ESD: Proper ESD protection should be used at the time of installation and servicing of the scanner or the host equipment.

APPENDIX A

TECHNICAL SPECIFICATIONS

This section lists the technical specification of the scan engine, including reading performance.

GFE4500 TECHNICAL SPECIFICATIONS

Table 4 - GFE4500 Technical Specifications

| PHYSICAL CHARACTERISTICS | |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Dimensions | GFE4500: 2.0 x 2.7 x 4.8 cm / 0.8 x 1.1 x 1.9 in. |
| Weight | GFE4500: 17 g / 0.6 oz (12 pin connector) |
| ELECTRICAL CHARACTERISTICS | |
| Current | Operating (Typical): < 225 mA Standby/Idle (Typical): - Automatic Object Sense Mode: 115 mA - Online & Serial Online Modes: 55 mA |
| Input Voltage | GFE4500: 5 - 14.0 VDC |
| ENVIRONMENTAL CHARACTERISTICS | |
| Operating Temperature | GFE4500: -20 to 60 °C / -4 to 140 °F |
| Storage/Transport Temperature | -40 to 70 °C / -40 to 158 °F |
| Ambient Light Immunity | 0-120,000 Lux |
| Vibration Resistance | Tolerates random vibration, 5 G, from 22 Hz to 300 Hz, 2 hrs / 3 axes |
| READING PERFORMANCE | |
| Image Capture | Graphic Formats: BMP, JPEG, TIFF; Greyscale: 256, 16, 2 |
| Image Sensor | 1 Megapixel: 1280 x 800 pixels |
| Field of View | 51°H, 32°V |
| Print Contrast Ratio (Min.) | 15% |
| Motion Tolerance | 70 IPS (EAN/UPC) |
| Frame Rate | 60 full-frame/s |
| Reading Angle | Pitch: +/- 60°; Roll (Tilt): +/- 180°; Skew (Yaw): +/- 60° |

| | |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Reading Indicators | Beeper (Adjustable Tone and volume); Datalogic 'Green Spot' Good Read Feedback; Top-Front Good Read LED with Adjustable brightness |
| Resolution (Maximum) | 1D Linear: 0.076 mm / 3 mils Data Matrix: 0.13 mm / 5 mils PDF417: 0.13 mm / 5 mils |
| INTERFACES | |
| INTERFACES | GFE4500: USB / RS232 (12 pin connector) |
| Digital I/O | GFE4500: One SW Programmable digital input + one SW programmable digital output |
| DEPTH OF FIELD^A | |
| | Resolution [mils] |
| Code 39 | 5 mil: 4 to 30.0 cm / 0.16 to 11.8 in 10 mil: 1.7 to 53.5 cm / 0.6 to 21.0 in |
| Data Matrix | 10 mil: 3.5 to 23.5 cm / 1.3 to 9.6 in 15 mil: 3.0 to 35.0 cm / 1.2 to 13.7 in |
| EAN/UPC | 13 mil: 4.0 to 82.0 cm / 1.6 to 32.3 in |
| PDF417 | 10 mil: 1.5 to 35.0 cm / 5.9 to 13.7 in |
| QR Code | 10 mil: 3.5 to 22.0 cm / 1.4 to 8.7 in |

- a. Minimum distance determined by symbol length and scan angle. Printing resolution, contrast, and ambient light dependent.

| | |
|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DECODING CAPABILITY | |
| 1D / Linear Codes | Auto discriminates all standard 1D codes including GS1 DataBar™ linear codes. |
| 2D Codes | Aztec Code; China Han Xin Code; Data Matrix; MaxiCode; Micro QR Code; QR Code; Dot Code; Dot Matrix |
| Postal Codes | Australian Post; British Post; China Post; IMB; Japanese Post; KIX Post; Planet Code; Postnet; Royal Mail Code (RM4SCC) |
| Stacked Codes | EAN/JAN Composites; GS1 DataBar Composites; GS1 DataBar Expanded Stacked; GS1 DataBar Stacked; GS1 DataBar Stacked Omnidirectional; MacroPDF; MicroPDF417; PDF417; UPC A/E Composites |
| Digital Watermarking | Digimarc Barcodes |
| REGULATORY | |
| See Regulatory Addendum included with your product | |

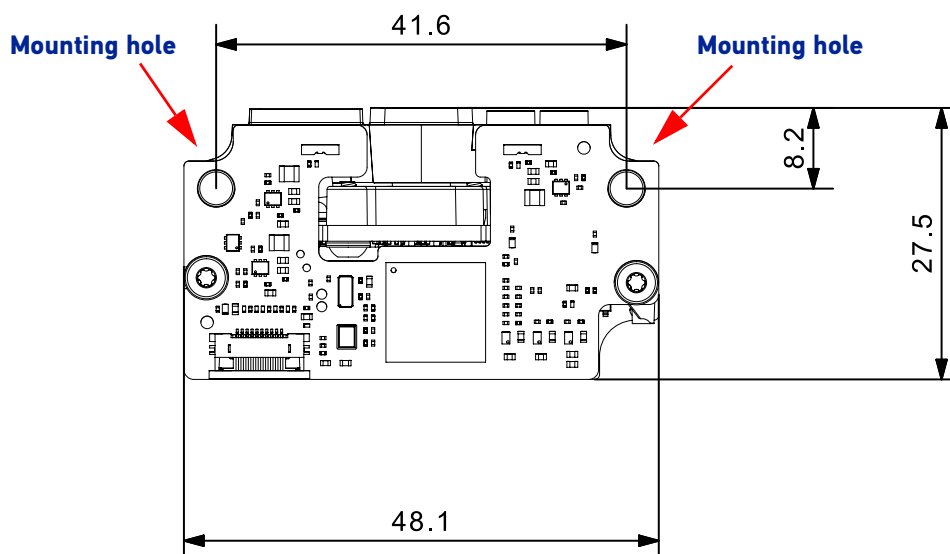
APPENDIX B

MECHANICAL SPECIFICATIONS

PHYSICAL PROPERTIES

| PARAMETER | SPECIFICATION |
|-----------|-----------------------------------------------------|
| Dimension | 27.5mm x 48.0mm x 20.2mm (1.08" x 1.88" x 0.80") |
| Weight | 16.8 g (0.59 oz) |

Scanner Dimensions

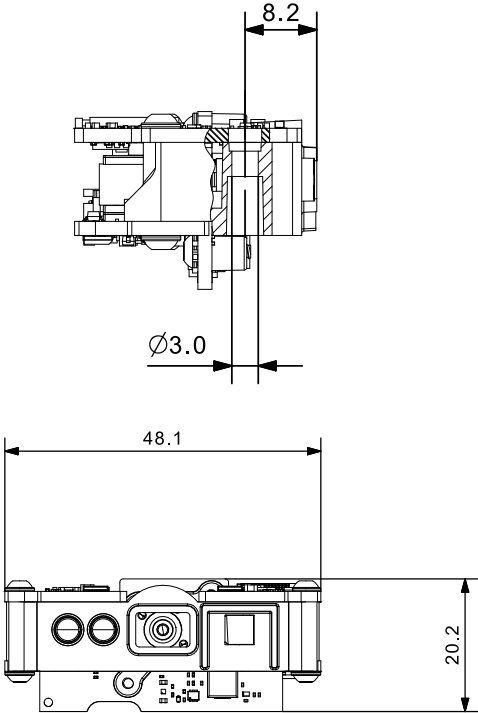


NOTE: Use M3 screws to mount the device through the indicated mounting holes.

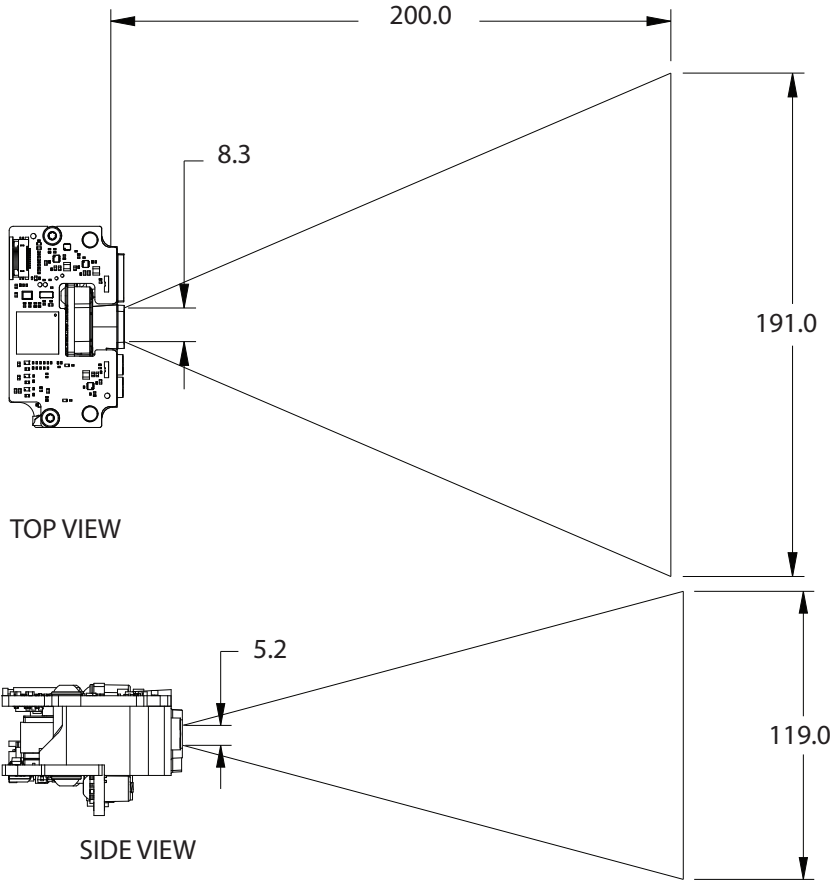


NOTE: Each mounting hole is surrounded by a ground ring. Either use isolating screw washers, or ensure the surface where device is mounted is connected to the ground.

Scanner Dimensions (continued)



Clearance Required for Integration





China RoHS

| PART | 部件名称 | Lead (Pb) | Mercury (Hg) | Cadmium (Cd) | Hexavalent Chromium (Cr(VI)) | Polybrominated biphenyls (PBB) | Polybrominated diphenyl ethers (PBDE) |
|--------------------------------|-------|-----------|--------------|--------------|------------------------------|--------------------------------|---------------------------------------|
| | | 有毒有害物质或元素 | | | | | |
| | | 铅 | 汞 | 镉 | 六价铬 | 多溴联苯 | 多溴二苯醚 |
| Printed Circuit Board Assembly | 电路板组件 | X | O | O | O | O | O |
| Assy, Optics Block | 光学组件 | X | O | O | O | O | O |
| Assy, Module | 光学组件 | X | O | O | O | O | O |

O: 代表此种部件的所有均质材料中所含的该种有毒有害物质均低于中华人民共和国信息产业部所颁布的《电子信息产品中有毒有害物质的限量要求》(SJ/T 11363-2006) 规定的限量。

X: 代表此种部件所用的均质材料中, 至少有一类材料其所含的有毒有害物质高于中华人民共和国信息产业部所颁布的《电子信息产品中有毒有害物质的限量要求》(SJ/T 11363-2006) 规定的限量

NOTES

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