symbol®

MiniScan MS XX04 Series

Integration Guide

MiniScan MS XX04 Series Integration Guide

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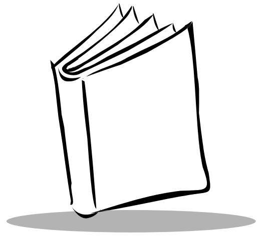

About This Manual

The *MiniScan MS XX04 Series Integration Guide* provides general instructions for mounting, setting up, and programming the following MiniScan models:

- MS 1204FZY
- MS 2204
- MS 2204VHD
- MS 3204
- MS 804FZY
- MS 904HS.

Note: *It is recommended that an opto-mechanical engineer perform an opto-mechanical analysis prior to integration.*

Chapter Descriptions

Topics covered in this guide are as follows:

- ***Chapter 1, Introduction,*** provides an overview of the MiniScan scanners and features, and provides a block diagram of the scanner.
- ***Chapter 2, Installation,*** describes how to mount and install the MiniScan scanner.
- ***Chapter 3, Scanning,*** provides information on scan patterns, scanning, triggering options, and beeper and LED definitions.
- ***Chapter 4, MS 1204FZY Specifications,*** provides the technical and scanning specifications for the ***MS 1204FZY scanner***.
- ***Chapter 5, MS 2204 Specifications,*** provides the technical and scanning specifications for the ***MS 2204 scanner***.

- ***Chapter 6, MS 2204VHD Specifications,*** provides the technical and scanning specifications for the ***MS 2204VHD scanner***.
- ***Chapter 7, MS 3204 Specifications,*** provides the technical and scanning specifications for the ***MS 3204 scanner***.
- ***Chapter 8, MS 804FZY Specifications,*** provides the technical and scanning specifications for the ***MS 804FZY scanner***.
- ***Chapter 9, MS 904HS Specifications,*** provides the technical and scanning specifications for the ***MS 904HS scanner***.
- ***Chapter 10, Maintenance and Troubleshooting,*** provides information on maintaining and troubleshooting the MiniScan scanners.
- ***Chapter 11, Parameter Menus*** describes the programmable parameters, provides bar codes for programming, and hexadecimal equivalents for host download programming.
- ***Chapter 12, Simple Serial Interface (SSI)*** describes scanner-specific updates to the *Simple Serial Interface (SSI) Programmer's Guide*.
- ***Chapter 13, Mounting Templates***, provides mounting templates for the MiniScan scanners.
- ***Appendix A, ASCII Character Sets***, provides prefix and suffix values that can be assigned for ASCII character data transmission.

Notational Conventions

The following conventions are used in this document:

- Bullets indicate:
  - action items
  - lists of alternatives
  - lists of required steps that are not necessarily sequential
- Sequential lists (e.g., those that describe step-by-step procedures) appear as numbered lists.

Related Documents

The following documents provide more information for the MiniScan Series scanners.

- *MiniScan Family of Scanners Quick Reference Guide*, p/n 72-58809-xx
- *Simple Serial Interface (SSI) Programmer's Guide*, p/n 72-40451-xx
- *Simple Serial Interface (SSI) Developer's Guide*, p/n 72-50705-xx

Service Information

If you have a problem with your equipment, contact the *Symbol Support Center*. Before calling, have the model number, serial number, and several of your bar code symbols at hand.

Call the Support Center from a phone near the scanning equipment so that the service person can try to talk you through your problem. If the equipment is found to be working properly and the problem is symbol readability, the Support Center will request samples of your bar codes for analysis at our plant.

If your problem cannot be solved over the phone, you may need to return your equipment for servicing. If that is necessary, you will be given specific directions.

Note: *Symbol Technologies is not responsible for any damages incurred during shipment if the approved shipping container is not used. Shipping the units improperly can possibly void the warranty. If the original shipping container was not kept, contact Symbol to have another sent to you.*

Symbol Support Center

For service information, warranty information or technical assistance contact or call the Symbol Support Center in:

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Symbol Technologies, Inc.
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Holtsville, New York 11742-1300
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For the latest version of this guide go to: http://www.symbol.com/manuals.

Chapter 1
Introduction

Caution

Use of controls, adjustments or procedures other than those specified here can result in hazardous laser light exposure.

Overview

The MiniScan family of fixed-mount scanners are specifically designed for stand-alone applications, and OEM applications such as kiosks.

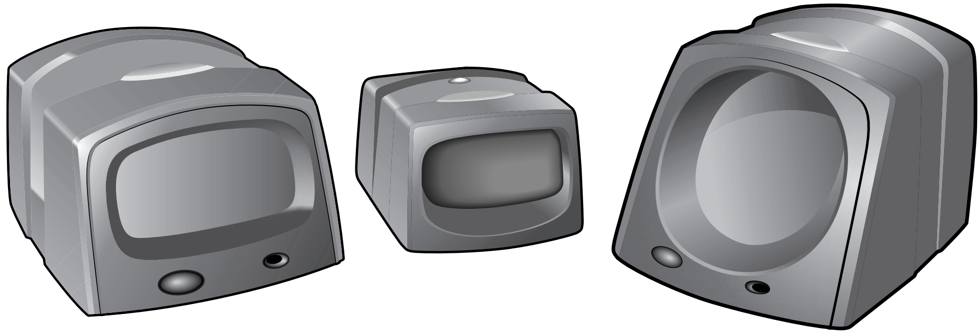


Figure 1-1. MiniScan Family of Scanners

MS XX04 Series scanners provide easy and flexible integration of bar code scanning into a host device, and include the following models:

- The **MS 1204FZY** offers fuzzy logic for premium scanning performance on all types of 1D bar codes including poorly printed and low contrast symbols. The MS 1204FZY features a compact design for superior performance and durability in a form factor that easily integrates into OEM devices for embedded applications such as medical instruments, diagnostic equipment, vending machines, and gaming. As a fixed-mount scanner, the MS 1204FZY is ideal for applications requiring unattended scanning such as manufacturing, warehouse and shipping, conveyor belts, library and document tracking systems.
- The **MS 2204** and **MS 2204VHD** offer a "smart" raster pattern optimized for 2D applications and poorly printed 1D bar codes. The high scan rate ensures fast and reliable data on all 1D symbols, and 2D codes such as PDF417, MicroPDF, RSS and composite codes. These scanners are perfect for automated data entry applications that require high-speed scanning, performance, and small size, such as conveyor belts, manufacturing and warehouse, gas pumps, and security/ID verification.
- The **MS 3204** features a high-speed omnidirectional scan pattern that makes it easy and intuitive for consumers to scan bar codes at the point of activity. The omnidirectional scan pattern reads bar codes quickly and accurately, minimizing the need for precise positioning of linear 1D bar codes. The MS 3204 provides an easy and cost-effective way to enhance existing OEM devices with high-performance 1D and 2D scanning, making it the ideal solution for applications that require fast, accurate scanning such as kiosks, ATMs, listening stations, lottery machines, and vending machines.

- **MS 804FZY** and **MS 904HS** scanners are extremely compact, provide easy and flexible integration of bar code scanning into a host device, and offer high-performance scanning on 1D bar codes. The MS 804FZY is ideal for medical instruments and manufacturing applications, and the MS 904HS is perfect for applications such as clinical diagnostics, conveyer belts or assembly lines.

MS 1204FZY, MS 2204, MS 2204VHD, and MS 3204 Features

- Stand-alone or OEM applications
- Quick and easy integration for OEM devices
- Excellent scanning performance on all types of bar codes (MS 1204FZY supports 1D bar codes only)
- Rugged IP54 sealed housing with integrated beeper
- RS-232
- Easy programming and configuration
- Flexible mounting options
- LEDs and an integrated beeper indicating scanner power status and successful decodes.

MS 804FZY and MS 904HS Features

- Stand-alone or OEM applications
- Quick and easy integration for OEM devices
- Excellent scanning performance on 1D bar codes
- RS-232
- Easy programming and configuration
- Flexible mounting options
- LEDs indicating scanner power status and successful decodes.

Typical Applications

MS 1204FZY, MS 2204, MS 2204VHD, and MS 3204 Applications

Fixed Mount Standalone Applications

- Manufacturing / warehouse
- Conveyer belts
- Security / ID verification
- POS.

OEM Applications

- Kiosks / ATMs
- Music listening stations
- Security / ID verification
- Lottery terminals / gaming.

MS 804FZY and MS 904HS Applications

Fixed Mount Standalone Applications

- Clinical diagnostics
- Medical instruments
- Conveyer belts
- Assembly lines.

OEM Applications

- Kiosks / ATMs
- Music listening stations
- Medical instruments
- Clinical diagnostics
- Lottery terminals / gaming.

Block Diagrams

The MiniScan block diagrams illustrate the functional relationship of the MiniScan components. A detailed description of each component in the block diagrams is also provided.

MS 1204FZY, MS 2204, MS 2204VHD, and MS 3204 Block Diagram

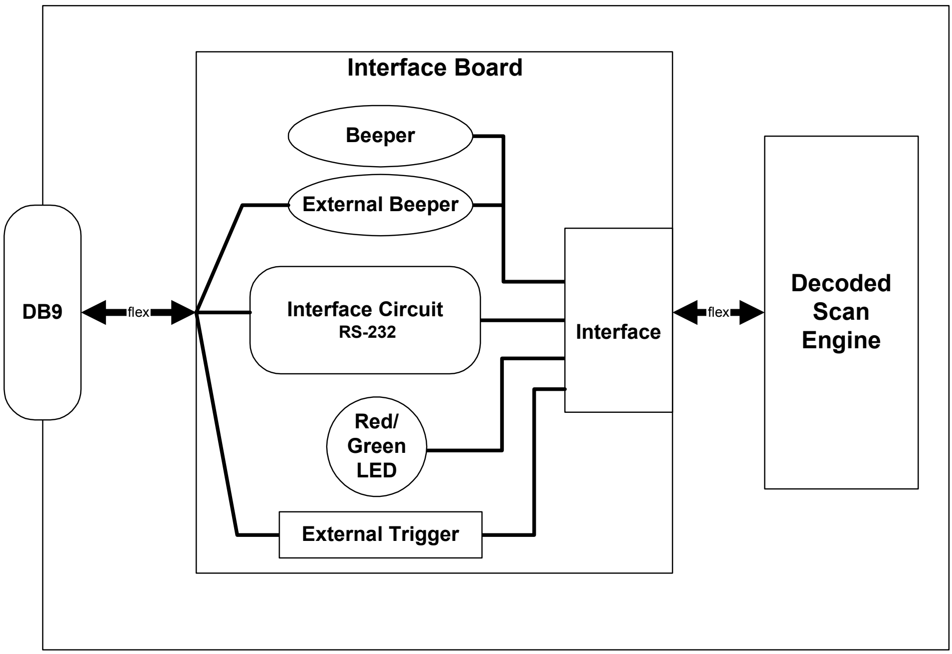


Figure 1-2. MS 1204FZY, MS 2204, MS 2204VHD, and MS 3204 Block Diagram

MS 804FZY and MS 904HS Block Diagram

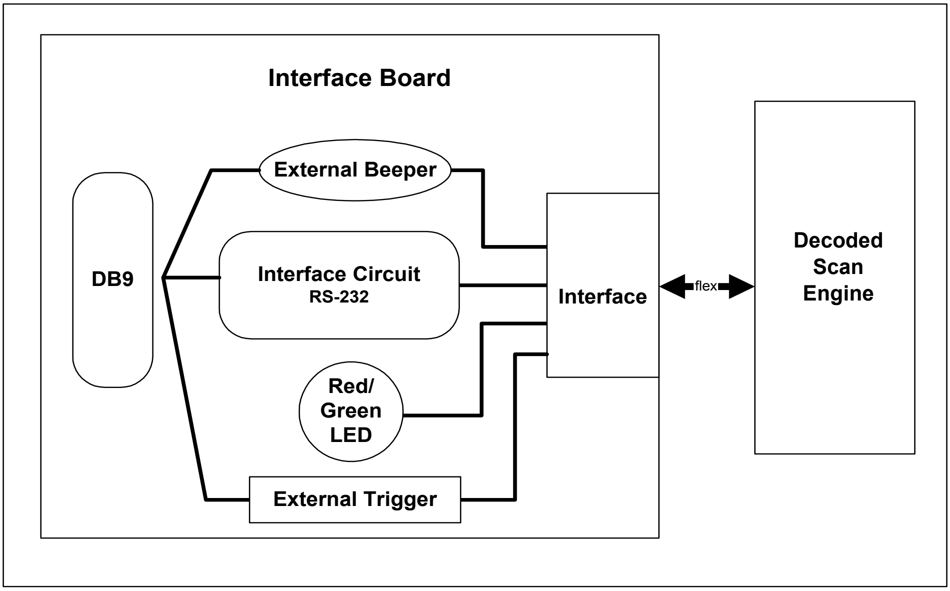


Figure 1-3. MS 804FZY and MS 904HS Block Diagram

Miniscan Block Diagram Descriptions

Decoded Scan Engine - The scan engine emits a beam of laser light that reflects off the bar code to be decoded. Black bars absorb light, white spaces reflect light. The scan engine collects the reflected light and processes the signal through several analog filters. The filtered signal is digitized into a Digitized Barcode Pattern (DBP). Timing information is analyzed by the decoder micro-controller to decode and transmit the data contained in the bar code. Data transmission is carried out using Symbol's proprietary SSI Interface.

Interface Board - The interface board adapts the scan engine's interface into usable signals and data for the intended host. It also contains a beeper (MS 1204FZY/2204/2204VHD/3204 models only) and red/green LED for audio/visual feedback, and provides for an external trigger and external beeper.

The MiniScan interface board converts TTL level SSI signals to proper RS-232 levels for connection to any RS-232 compliant host.

DB9 - The DB9 connector provides an outlet for the various interface signals used between a MiniScan scanner and the host. It also maintains pin compatibility with the previous generation LS 1220 MiniScan host cables.

Chapter 2
Installation

Overview

This chapter provides information on unpacking, mounting, and installing the MiniScan scanner.

Unpacking

Remove the MiniScan from its packing and inspect for damage. If the scanner is damaged, call the *Symbol Support Center* at the telephone number listed on page xiii.

KEEP THE PACKING. It is the approved shipping container and should be used if the equipment needs to be returned for servicing.

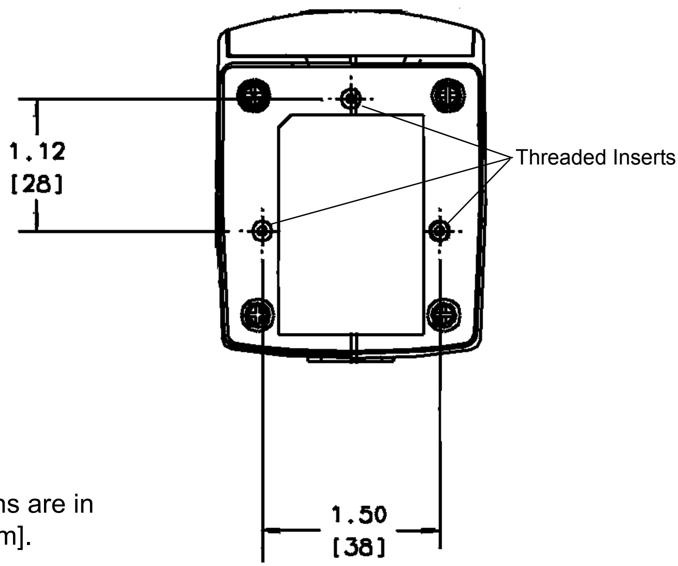
Mounting

There are three mounting holes (threaded inserts) on the bottom of the MS 1204FZY/2204/2204VHD/3204 chassis; two mounting holes on the MS 804FZY/904HS.

The following figures provide mounting dimensions for the MiniScan scanner housings. For a mounting template, see Chapter 13, *Mounting Templates*.

Note: *Use only non-magnetic M3x.5 screws with a maximum length of 3.6M to mount the MiniScan scanner chassis.*

MS 1204FZY/MS 2204/MS 2204VHD Mounting Dimensions

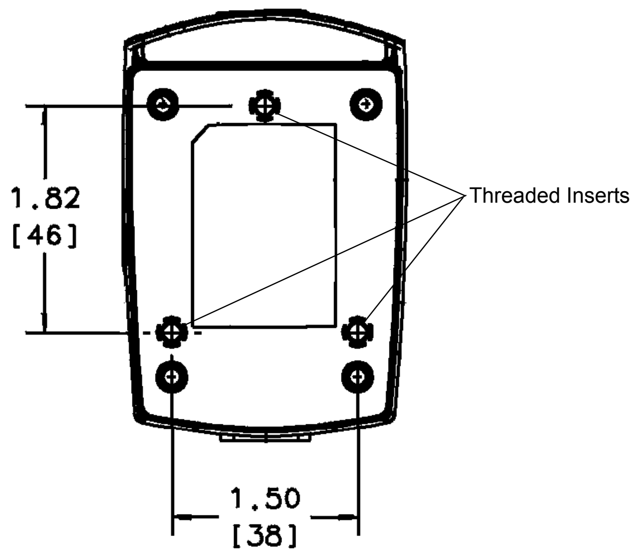


Note:

Dimensions are in inches [mm].

Figure 2-1. MS 1204FZY/MS 2204/MS 2204VHD Mounting Dimensions

MS 3204 Mounting Dimensions

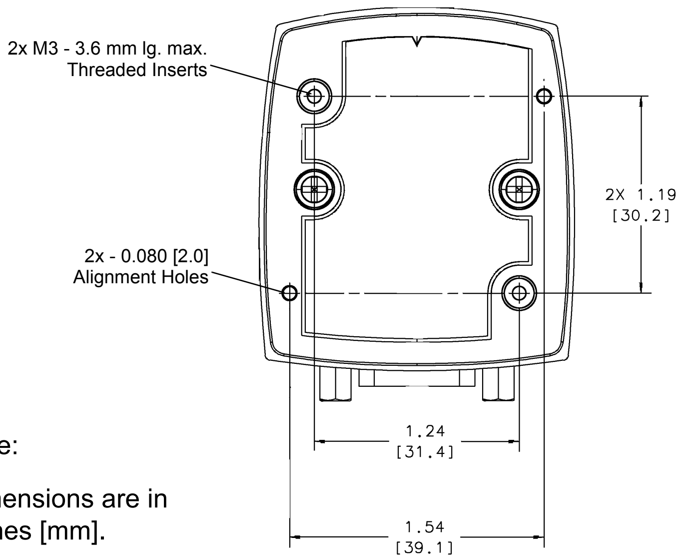


Note:

Dimensions are in inches [mm].

Figure 2-2. MS 3204 Mounting Dimensions

MS 804FZY/MS 904HS Mounting Dimensions



Note:

Dimensions are in inches [mm].

Figure 2-3. MS 804FZY/MS 904HS Mounting Dimensions

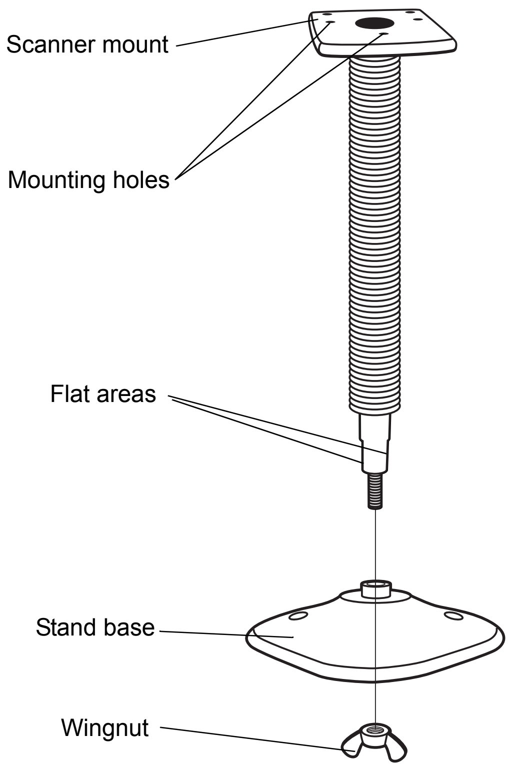
Mounting the Scanner on the Stand

Note: *The stand is optional for the MS 1204FZY, MS 2204, MS 2204VHD, and MS 3204 only.*

To mount the scanner on the optional stand:

1. Place the bottom of the scanner on the stand's scanner mount, aligning the scanner's center threaded insert (beneath the scan window) with the center mounting hole on the front of the stand. The two rear threaded inserts on the bottom of the scanner will align with the proper mounting holes on the stand.
2. Secure the scanner to the stand using the three screws provided with the stand.

Assembling the Stand



1. Unscrew the wingnut from the bottom of the one-piece scanner mount.
2. Fit the bottom of the neck piece into the opening on the top of the stand base.
3. Tighten the wingnut underneath the base to secure the cup and neck piece (see the note below).
4. Bend the neck to the desired position for scanning.

Figure 2-4. Assembling the Stand

Note: *Before tightening the wingnut under the base, ensure that the flat areas on the flexible neck fit securely in the grooves in the base.*

Mounting the Stand (optional)

You can attach the base of the scanner's stand to a flat surface using two screws or double-sided tape (not provided).

Screw Mount

1. Position the assembled base on a flat surface.
2. Screw one #10 wood screw into each screw-mount hole until the base of the stand is secure.

Tape Mount

1. Peel the paper liner off one side of each piece of tape and place the sticky surface over each of the three rectangular tape areas.
2. Peel the paper liner off the exposed sides of each piece of tape and press the stand on a flat surface until it is secure.

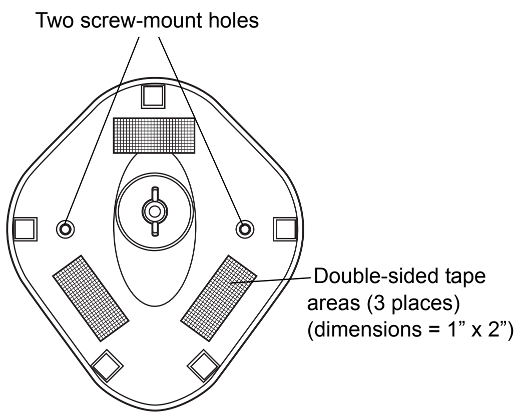


Figure 2-5. Mounting the Stand

Mounting the Scanner on the Mounting Bracket

Note: *The mounting bracket is optional for the MS 1204FZY, MS 2204, MS 2204VHD, and MS 3204 only.*

The optional mounting bracket kit consists of a scanner bracket, a mounting bracket, and the hardware required to mount the scanner. The bracket kit accommodates adjustable angles for optimal positioning of the scanner.

To mount the MiniScan scanner on the bracket, first secure the scanner to the scanner bracket, then attach the mounting bracket to the wall (see Figure 2-6 on page 2-8):

1. Tilt the scanner bracket forward to access the center scanner mounting hole on the bracket.
2. Place the bottom of the scanner on the scanner bracket, aligning the scanner's center threaded insert (beneath the scan window) with the center mounting hole on the scanner bracket.
3. Insert one of the screws provided through the mounting hole and into the scanner's center threaded insert.

   For the MS 1204FZY, MS 2204, and MS 2204VHD, use a #0 Phillips screwdriver; for the MS 3204, use a #1 Phillips screwdriver.
4. Tilt the scanner bracket in the opposite direction to access the rear scanner mounting holes (which are aligned with the rear inserts on the bottom of the scanner), then insert the remaining two screws provided through the two rear mounting holes and into the scanner's threaded inserts.
5. Secure the mounting bracket to a flat surface by inserting 1/8" or smaller fasteners through the surface and into the bracket's mounting holes. There are four mounting holes on the bottom of the mounting bracket for horizontal mounting, and six holes on the side for vertical mounting.

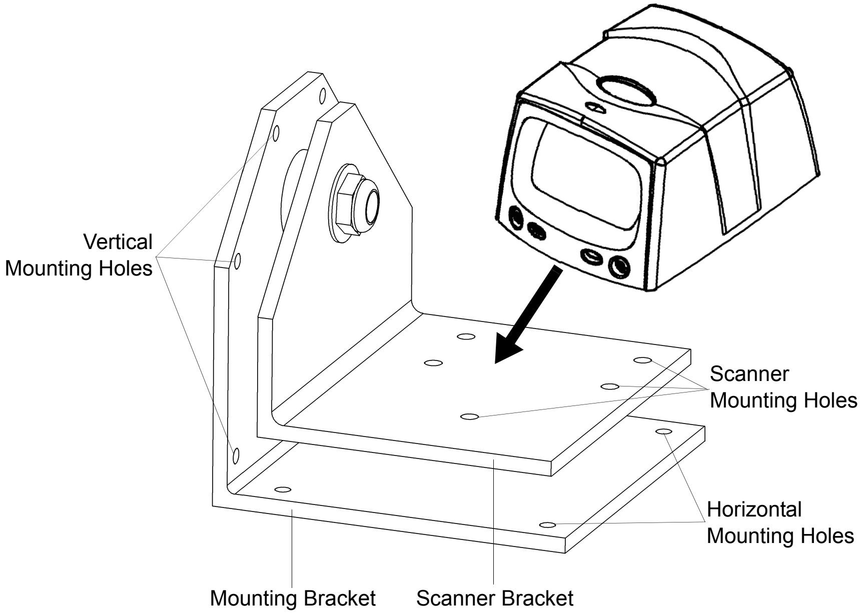


Figure 2-6. Mounting the Scanner and Bracket

Connecting the MiniScan

To connect the MiniScan to the host, connect the scanner cables in the order shown in Figure 2-7.

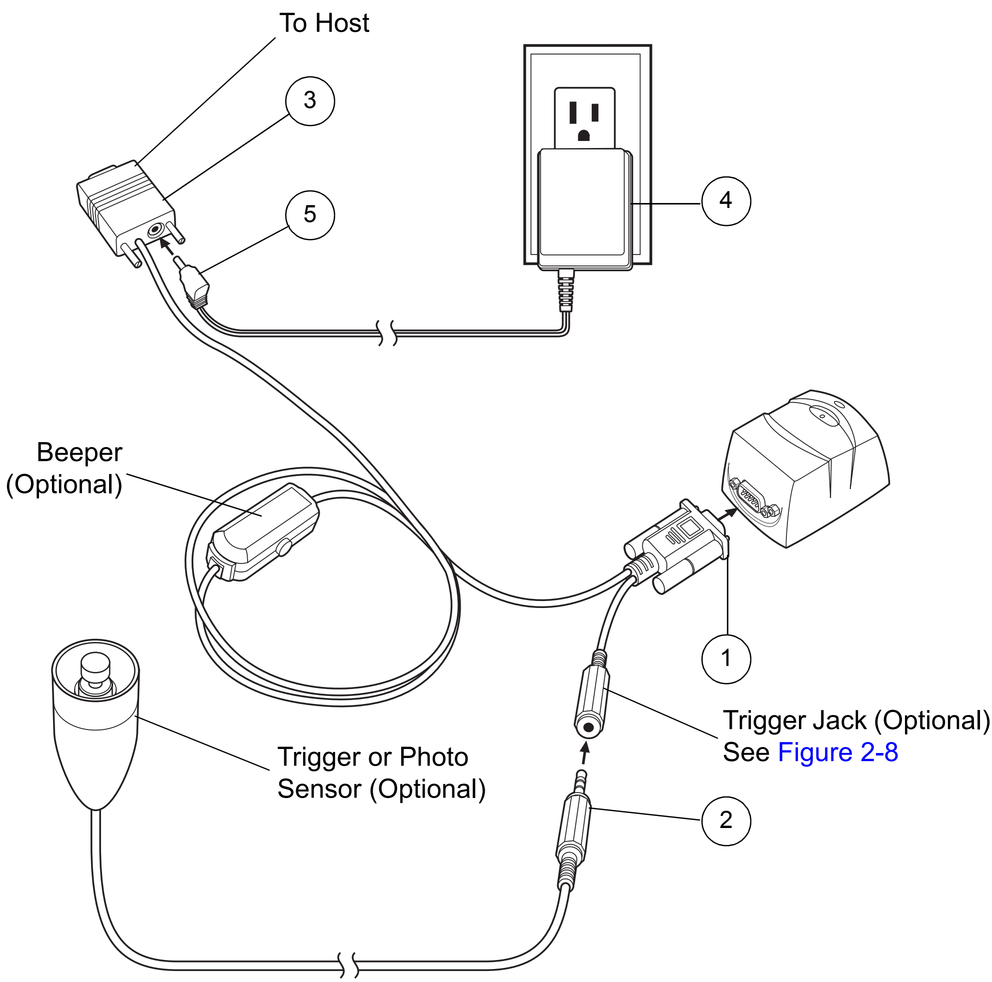


Figure 2-7. Typical Connection Diagram

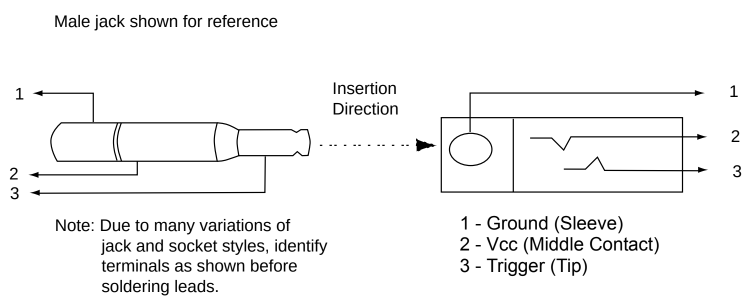


Figure 2-8. Trigger Jack Connector Pins

Location and Positioning

Caution

The location and positioning guidelines provided do not consider unique application characteristics. It is recommended that an opto-mechanical engineer perform an opto-mechanical analysis prior to integration.

Note: *Integrate the scanner in an environment no more extreme than the product's specification, where the scanner will not exceed its temperature range. For instance, do not mount the scanner onto or next to a large heat source. When placing the scanner with another device, ensure there is proper convection or venting for heat. Follow these suggestions to ensure product longevity, warranty, and overall satisfaction with the scanner.*

Using the MiniScan as an Embedded Scanner

The MiniScan can be mounted to read symbols that are automatically presented, or that are presented in a pre-determined location. In these applications, MinScan positioning with respect to the symbol is critical. Failure to properly position the MiniScan can result in unsatisfactory scanning performance. A thermal analysis is also recommended.

Two methods of positioning the scanner are provided:

- Use the *Calculating the Usable Scan Length Method* on page 2-12 with consistently good quality symbols. This provides a mathematical solution to find the usable scan length.
- The *Testing the Usable Scan Length Method* on page 2-13 uses real situation testing to adjust the usable scan length to fit the application conditions.

Calculating the Usable Scan Length Method

Calculate usable scan length as follows (see Figure 2-9 on page 2-13):

$$L = 1.8 \times (D+d+B) \times \mathrm{Tan}\ (A/2)$$

Table 2-1. Calculation Constants

Constants	B	A
MS 1204FZY (Default)	1.17	42°
MS 1204FZY (Narrow Mode)	1.17	30°
MS 2204	1.53	34°
MS 2204VHD	1.53	34°
MS 3204	1.93	34°
MS 804FZY	0.89	46.5°
MS 804FZY (Narrow Mode)	0.89	35°
MS 904HS	0.77	37°

where:

D = Distance (in inches) from the front edge of the host housing to the bar code.

d = The host housing's internal optical path from the edge of the housing to the front of the MiniScan scanner.

B = Internal optical path from the scan mirror to the front edge of the MiniScan scanner.

A = Scan angle in degrees.

Note: *Usable scan length determined by this formula, or 90% of scan line at any working distance. This formula is based on good quality symbols in the center of the working range and length of bar code.*

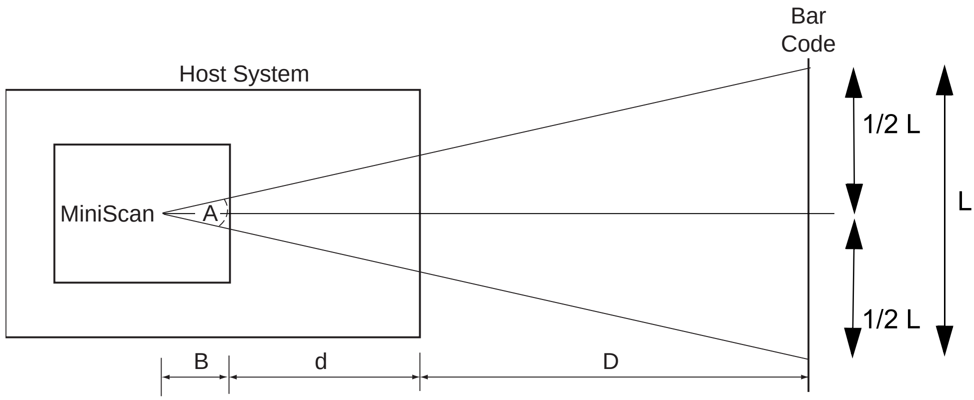


Figure 2-9. Usable Scan Length Diagram

Testing the Usable Scan Length Method

Due to the variety of symbol sizes, densities, print quality, etc., there is no simple way to calculate the ideal symbol distance. To optimize performance, use the *Testing The Usable Scan Length* positioning method:

1. Measure the maximum and minimum distances at which the symbols can be read.
2. Check the near and far range on several symbols. If they are not reasonably consistent there may be a printing quality problem that can degrade the performance of the system. Symbol Technologies can provide advice on how to improve the installation.

Note: *Poor quality symbols (from bad printing, wear, or damage) may not decode well when placed in the center of the depth of field (especially higher density codes). The scan beam has a minimum width in the central area, and when the scanner tries to read all symbol imperfections in this area it may not decode. After a preliminary spot is determined using good quality symbols, test several reduced quality symbols and adjust the spot for the best overall symbol position.*

---

3. Locate the scanner so the symbol is near the middle of the near/far range.

4. Center the symbol (left to right) in the scan line whenever possible.
5. Position the symbol so that the scan line is as near as possible to perpendicular to the bars and spaces in the symbol.
6. Avoid specular reflection (glare) off the symbol by tilting the top or bottom of the symbol away from the scanner. The exact angle is not critical, but it must be large enough so that if a mirror were inserted in the symbol location, the reflected scan line would miss the front surface of the scanner. For the maximum allowable angles refer to the Skew, Pitch and Roll angles listed in each MiniScan *Technical Specifications* table.
7. If an additional window is to be placed between the scanner and the symbol, determine the optimum symbol location using a representative window in the desired window position.
8. Give the scanner time to dwell on the symbol for several scans. When first enabled, the MiniScan may take two or three scans before it reaches maximum performance. Enable the MiniScan before the symbol is presented, if possible.

Conveyor Applications

Conveyor applications require setting the conveyor velocity to optimize the scanner's ability to read symbols. Also consider the orientation of the symbol with respect to the conveyor direction. Figure 2-10 on page 2-15 illustrates the relationship of the conveyor velocity with respect to a symbol positioned perpendicular to the conveyor direction and Figure 2-11 on page 2-16 illustrates the relationship of the conveyor velocity with respect to a symbol positioned parallel to the conveyor direction.

Symbol is Perpendicular to Conveyor Movement

With the symbol bars perpendicular to the conveyor belt direction (Picket Fence presentation) the relationship is:

V = (R x (F-W)) / N

where: V = Velocity of the conveyor (inches/second)

R = Scan Rate (see technical specifications)

F = 80% of width of scan beam

W = Symbol Width (inches)

N = Number of scans over symbol (minimum of 10 scans)

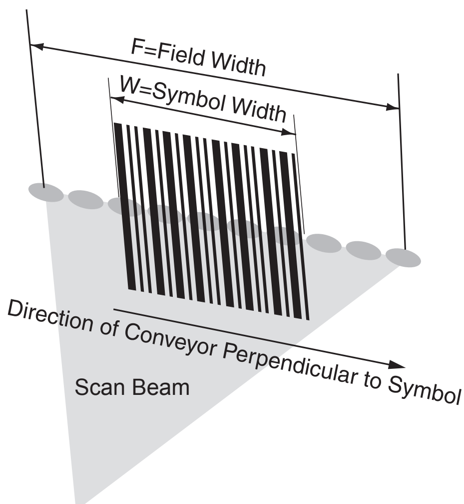


Figure 2-10. Symbol Perpendicular To Conveyor Movement

Example

R = 640 scans per second

F = 80% of 6 in.

W = 4 in.

N = 10

V = (640 x ((0.8 x 6) - 4))) / 10 = 51.2 in./sec

Symbol is Parallel to Conveyor Movement

With the symbol bars parallel to the conveyor belt direction (ladder presentation) the relationship is:

V = (R x H) / N

where: V = Velocity of the conveyor (inches/second)

R = Scan Rate of scanner (see technical specifications)

H = Symbol height

N = Number of scans over symbol (minimum of 10 scans)

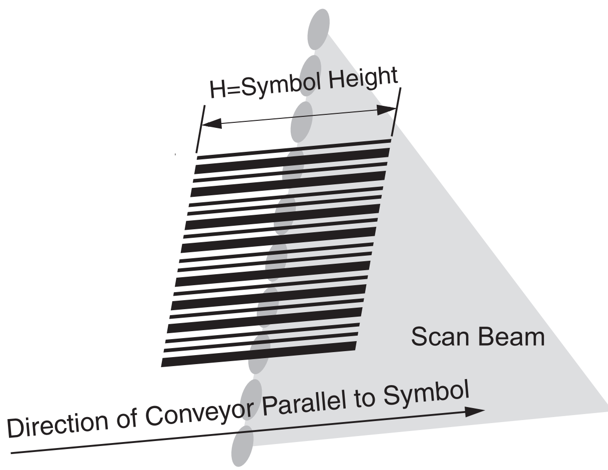


Figure 2-11. Symbol Parallel To Conveyor Movement

Example

Use the previous formula to calculate the number of scans for a specific bar code, scanner, and conveyor speed; **a minimum of 10 scans per symbol is recommended.**

R = 640 scans/sec

H = 60 mil

N = 10 scans

V = (640 x .060) / 10 = 3.84 in./sec

Accessories

The following accessories are available for the MiniScan scanner, and can be found in Symbol’s Solution Builder (ordering guide).

- **For power connection**
  - 110V power supply, US, p/n 50-14000-008
  - 220V power supply, Europe, p/n 50-14000-009
  - 100V power supply, Asia, p/n 50-14000-010
  - 264V Universal power supply (also order cables below), p/n 50-14001-001
    - DC line cord (power supply to scanner), p/n 50-16002-009
    - AC line cord (wall outlet to power supply), p/n 23844-00-00
- **RS-232**
  - Female DB9 with straight connector to RS-232 host (female DB9), with trigger jack and no beeper, p/n 25-13227-XX
  - Female DB9 with straight connector to RS-232 host (female DB9), with trigger jack and beeper, p/n 25-13228-XX
  - Female DB9 with straight connector to RS-232 host (female DB9), p/n 25-58918-XX
  - Female DB9 with right angle connector to RS-232 host (female DB9), p/n 25-58919-XX
  - Female DB9 with straight connector to RS-232 host (female DB9), with trigger jack and no hardware handshaking, p/n 25-63736-XX
- **Cable Adapters**
  - Female 25 pin D, TxD on pin 2, p/n 50-12100-378
  - Female 25 pin D, TxD on pin 3, p/n 50-12100-377
  - Male 25 pin D, TxD on pin 2, p/n 50-12100-380
  - Male 25 pin D, TxD on pin 3, p/n 50-12100-379
- **Optional Accessories**
  - Push button trigger cable, p/n 25-04950-XX
  - Photo sensor trigger cable, p/n 25-13176-XX
  - Fixed-mount stand, p/n 20-60136-XX
  - Mounting bracket, p/n KT-65578-01
- **Software**
  - Software Developer's CD, p/n SW-60371-XX

Software Developer's CD

The Software Developer's CD provides the software tools required to integrate and communicate with the MiniScan scanners, including:

- Sample Windows® program with source code
- DLL with source code for building user applications
- ActiveX component (including help file) for easy integration into VisualBasic programs
- Simple Serial Interface documentation.

With over 70 programmable parameters, MiniScan scanners can be configured by scanning bar code menus, or through the serial interface using Symbol's Simple Serial Interface protocol.

For Windows®, DOS, and embedded system environments, the CD enables the user to take full advantage of the scanner's features and obtain maximum performance.

Chapter 3
Scanning

Overview

This chapter provides information on scan patterns, scanning, triggering options, and beeper and LED definitions.

MiniScan Scan Patterns

MS 1204FZY, MS 804FZY, and MS 904HS Scan Pattern

MS 1204FZY, MS 804FZY, and MS 904HS scanners emit a single scan line to quickly decode 1D bar codes.

Figure 3-1. Single Scan Line Scan Pattern

MS 2204 and MS 2204VHD Scan Patterns

The MS 2204 and MS 2204VHD generate different scan patterns (Smart Raster and High Density Single Scan Line) based on the software command received at the interface. The raster pattern can be used to read 1D bar codes and PDF417 symbols.

Note: *The MS 2204 and MS 2204VHD also support omnidirectional and semi-omnidirectional scan patterns, but are not optimized for these patterns.*

Smart Raster Scan Pattern

The MS 2204 and MS 2204VHD can create a single line which opens vertically to read PDF417 symbols using the Smart Raster feature. This feature autodetects the type of bar code being scanned and adjusts its pattern accordingly, providing optimal performance on 1D, PDF417, RSS, and Composite codes.

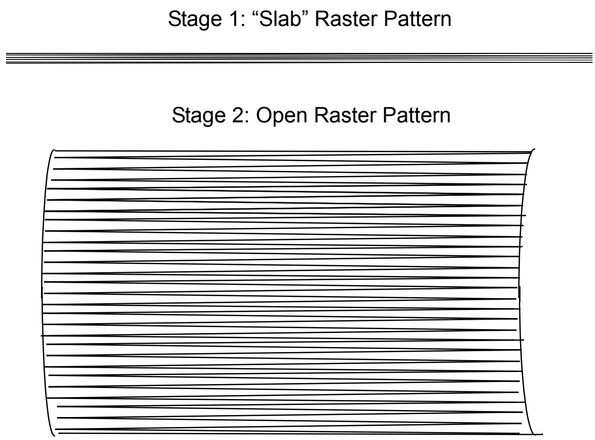


Figure 3-2. Raster Scan Pattern

High Density Single Scan Line Scan Pattern

The High Density single scan line appears as a "mini" raster and scans multiple areas of 1D codes to swiftly and accurately capture data on poorly printed and damaged bar codes.

Figure 3-3. High Density Single Scan Line Scan Pattern

MS 3204 Scan Patterns

The MS 3204 generates four scan patterns based on the software command received at the interface. These patterns are Smart Raster, Semi-omnidirectional, Omnidirectional, and High Density Single Scan Line. The raster pattern can be used to read 1D bar codes and PDF417 symbols. The omnidirectional pattern reads 1D bar codes in an omnidirectional manner.

Smart Raster Scan Pattern

The MS 3204 can create a single line which opens vertically to read PDF417 symbols using the Smart Raster feature. This feature autodetects the type of bar code being scanned and adjusts its pattern accordingly, providing optimal performance on 1D, PDF417, RSS, and Composite codes.

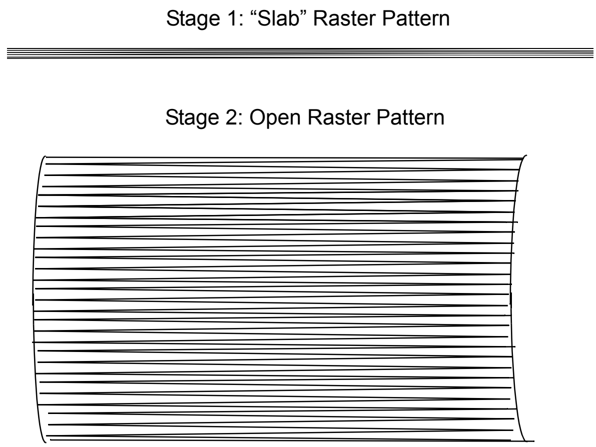


Figure 3-4. Raster Scan Pattern

Semi-omnidirectional Scan Pattern

The semi-omnidirectional pattern is an alternative to the full omnidirectional pattern that scans highly truncated 1D and RSS bar codes. Present bar codes horizontally with no more than a 20° tilt.

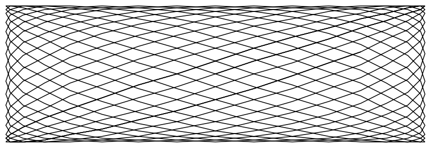


Figure 3-5. Semi-omnidirectional Scan Pattern

Omnidirectional Scan Pattern

The high-speed rotating omnidirectional scan pattern provides aggressive performance on 1D bar codes because there are no “holes” in the pattern. This ensures fast throughput at the point of activity and the ability to read 1D symbols in 360° of rotation, eliminating the need to orient the bar code in the field of view.

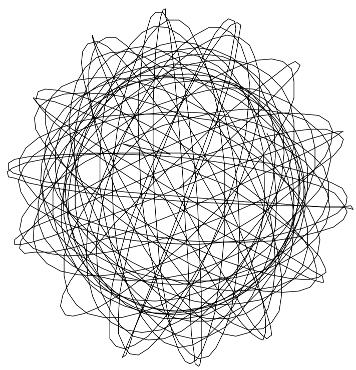


Figure 3-6. Omnidirectional Scan Pattern

High Density Single Scan Line Scan Pattern

The high density single scan line appears as a "mini" raster and scans multiple areas of 1D codes to swiftly and accurately capture data on poorly printed and damaged bar codes.

Figure 3-7. High Density Single Scan Line Scan Pattern

Scan Angle Selection

The MS 1204FZY and MS 804FZY scanners support two pre-set scan angles (see each scanner's technical specifications).

Selecting Scan Angle via SSI

To use SSI to select the scan angle, issue the SSI PARAM_SEND command with the NUM_SCAN_ANGLE (191) parameter number. This is set to the default angle (182), or can be set to the alternate angle (181). See the *Simple Serial Interface (SSI) Programmer's Guide (*p/n 72-40451-xx) for more information.

Selecting Scan Angle via Parameter Bar Code

The scan angle can also be set by scanning a parameter bar code (see *Scan Angle* on page 11-17). Once the parameter bar code is scanned, that scan angle setting is retained.

Operation in Blink Mode

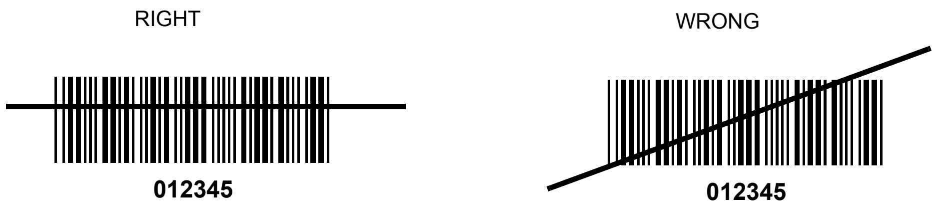
The scan angle during Blink Mode is determined by the scan angle system parameter.

Scanning Tips

When scanning, make sure the symbol to be scanned is within the scanning range. See *Calculating the Usable Scan Length Method* on page 2-12. Align the bar code with the scan beam. The green decode LED lights to indicate a successful decode.

Scan the Entire Symbol

- The scan beam must cross every bar and space on the symbol.
- The larger the symbol, the farther away the scanner should be positioned.
- Position the scanner closer for symbols with bars that are close together.



Position at an Angle

Do not position the scanner exactly perpendicular to the bar code. In this position, light can bounce back into the scanner's exit window and prevent a successful decode.

Trigger Options

Continuous

The laser is enabled continuously and decode processing is continuously active. The scanner can be configured to scan and transmit a bar code, and then not decode the same bar code or any bar code for a set period of time. See *Timeout Between Decodes* on page 11-23 to customize the application to the rate at which bar codes are presented.

Continuous

Note: *This option is not recommended during scanner programming via bar code menus.*

Level Trigger

The laser is enabled and decode processing begins when the trigger line is activated. Decode processing continues until a good decode occurs, the trigger is released, or the Laser On Time expires. The laser is disabled once decode processing is complete. The next decode attempt will not occur until the trigger line is released and then reactivated.

Level

Pulse Trigger

The laser is enabled and decode processing begins when the trigger line is activated. Decode processing continues regardless of the trigger line until a good decode occurs, or until the Laser On Time expires. The laser is disabled once decode processing is complete. The next decode attempt will not occur until the trigger line is released and then reactivated.

Pulse

Blink

Note: *This option is supported by the MS 1204FZY, MS 804FZY and MS 904HS only.*

The laser blinks at a 25% duty cycle (reduced to 10% after 30 seconds of inactivity), until a bar code is presented. When a bar code is presented, the laser remains on until either the bar code is decoded or removed, or the session timeout expires. Once the bar code is decoded, the scanner will not decode it again until the bar code is removed.

Blink

Host Trigger

The laser is enabled and decode processing begins in response to an SSI Start Decode message from the host. Decode processing continues until a good decode occurs, an SSI Stop Decode message is received, or the Laser On Time expires. The laser is disabled once decode processing is complete. The next decode attempt will not occur until the next Start Decode message is received.

Host

Beeper and LED Definitions

Table 3-1 provides beeper definitions, and Table 3-2 provides LED definitions.

Table 3-1. Beeper Definitions

Beeper Sequence	Indication
Standard Use	
1 Beep - short high tone	A bar code symbol was decoded (if decode beeper is enabled).
1 Beep - long high tone	Thermal shutdown.
3 Beeps - short high tone **(MS 2204/2204VHD/3204 only)**	Power-on or reset. Occurs immediately after the scanner is turned on, indicating that the system software is working properly. If three beeps occur during normal operation, it is due to a reset and any work in progress is lost. If this occurs often, contact the Symbol Support Center.
Parameter Menu Scanning	
2 Beeps - short high tone	Correct entry scanned or correct menu sequence performed.
1 Beep - hi/lo/hi/lo tone	Successful program exit with change in the parameter setting.
2 Beeps - lo/hi tone	Input error, incorrect bar code, or *Cancel* scanned, wrong entry, incorrect bar code programming sequence; remain in program mode.
Communication	
4 Beeps - short high tone	Communication error.
4 Beeps - hi/hi/hi/lo	Receive error.
3 Beeps - lo/hi/lo	ADF transmit error.

Table 3-2. LED Definitions

LED	Indication
Red	Scanner is on.
Green	A bar code was successfully decoded.

Chapter 4
MS 1204FZY Specifications

Overview

This chapter provides the technical specifications for the MS 1204FZY scanner.

MS 1204FZY Electrical Interface

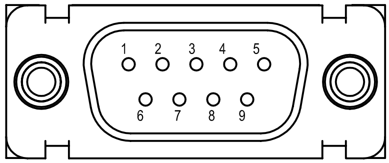


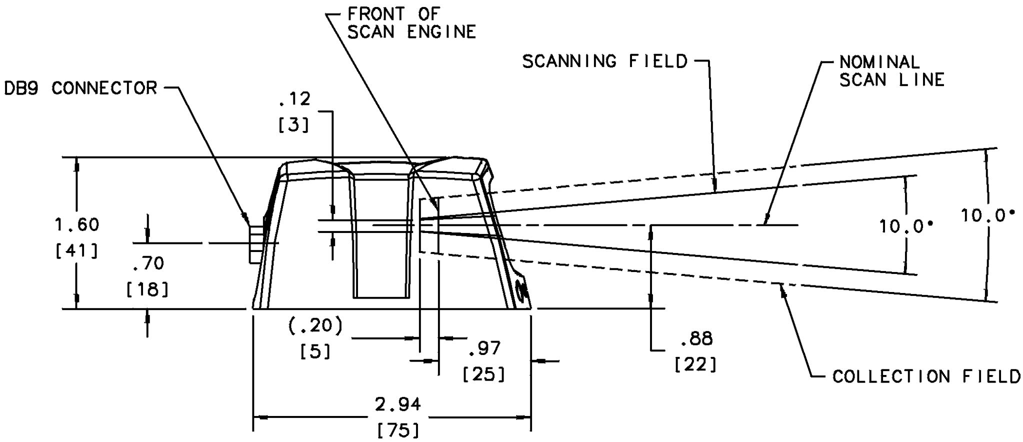
Figure 4-1. MiniScan Connector

Table 4-1 lists the pin functions of the MiniScan MS 1204FZY interface.

Table 4-1. MS 1204FZY Electrical Interface

Pin No.	Pin Name	Type*	Function
1	**Trigger**	I	Signals scanner to begin scanning session.
2	**TXD**	O	Serial data transmit output. Drives the serial data receive input on the device communicating with the scanner.
3	**RXD**	I	Serial data receive input. Driven by the serial data transmit output on the device communicating with the scanner.
4	**Not used**		
5	**Ground**		Power supply ground input and signal ground reference.
6	**Power**	I	5.0 VDC ± 10%
7	**CTS**	I	Clear-to-send handshaking input line, used only in conjunction with the RTS line. Optionally used by another device to signal the scanner to begin transmitting data.
8	**RTS**	O	Request-to-send handshaking output line, used only in conjunction with the CTS line. Optionally used by the scanner to signal another device that data is available to send.
9	**Beeper/ Download**	I/O	During normal operation this signal functions as an external beeper drive line. This signal can sink 50 mA of current to drive an external beeper, and is normally pulled up. This signal is also used to begin Flash Download operation when grounded externally during power up.
*I = Input O = Output			

MS 1204FZY Mechanical Drawings



Notes:

Unless otherwise specified:

- Dimensions are in inches, dimensions in [ ] are mm.
- User mounting tolerances are not included.

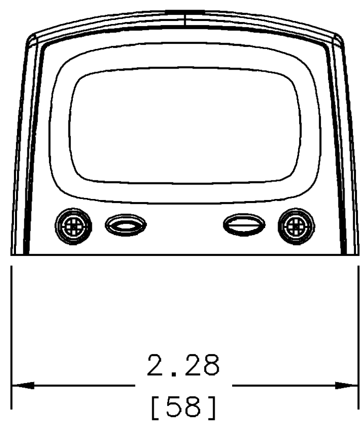
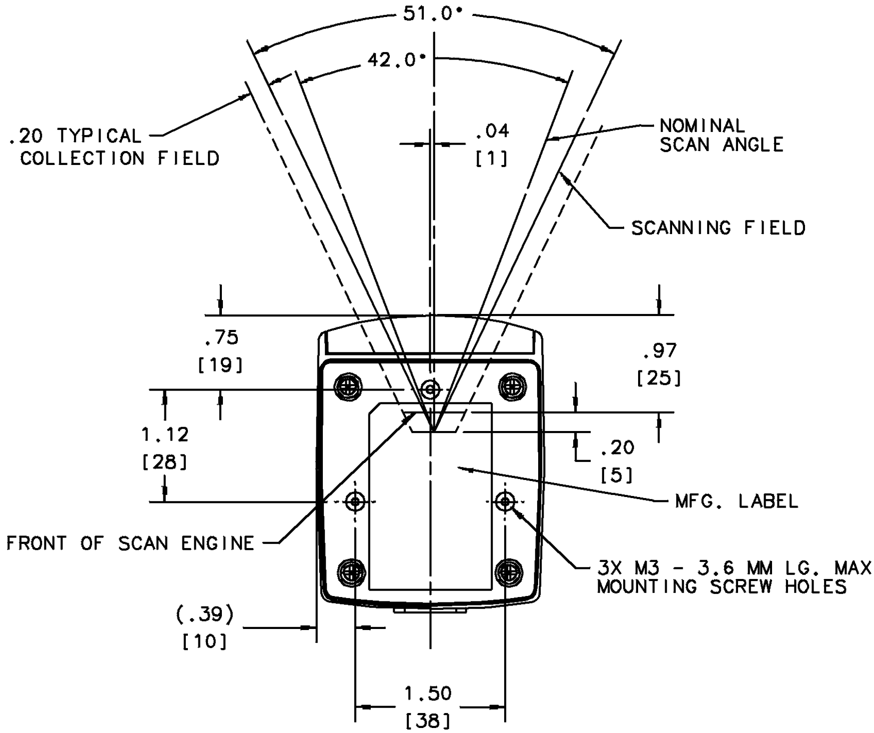


Figure 4-2. MS 1204FZY Mechanical Drawing



Notes:

Unless otherwise specified:

- Dimensions are in inches, dimensions in [ ] are mm.
- User mounting tolerances are not included.

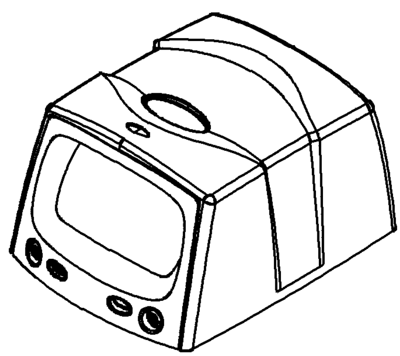


Figure 4-3. MS 1204FZY Mechanical Drawing

MS 1204FZY Technical Specifications

Table 4-2 provides the MS 1204FZY technical specifications.

Table 4-2. MS 1204FZY Technical Specifications @ 23°C

Item	Description
Power Requirements **Input Voltage** **Scanning Current** **Standby Current** **V_{CC} Noise Level**	 5.0 VDC ±10% 160 mA ±40 mA 20 mA ±5 mA typical 200 mV peak-to-peak max.
Laser Power	1.0 mW ± 0.12 mW, λ = 650 nm nominal
Scan Rate	36 (± 5) scans/sec (bidirectional)
Print Contrast	Minimum 25% absolute dark/light reflectance measured at 650 nm.
Scan Angle	Default (Wide): 42° ± 2° Alternate (Narrow): 30° ± 2°
Scan Pattern	Single scan line
Skew Tolerance	± 50° from normal (see Figure 4-4 on page 4-7)
Pitch Angle	± 65° from normal (see Figure 4-4 on page 4-7)
Roll	± 20° from vertical (see Figure 4-4 on page 4-7)
Decode Depth of Field	See Figure 4-5 on page 4-8
Ambient Light Immunity **Sunlight** **Artificial Light**	 8,000 ft. candles (86,112 lux) 450 ft. candles (4,844 lux)
Drop	Multiple 30” drops
Vibration	Unpowered scanner withstands a random vibration along each of the X, Y and Z axes for a period of one hour per axis, defined as follows: 20 to 80 Hz: Ramp up to 0.04 G^2/Hz at the rate of 3dB/octave. 80 to 350 Hz: 0.04 G^2/Hz 350 to 2000 Hz: Ramp down at the rate of 3 dB/octave.
Note: Environmental and/or tolerance parameters are not cumulative.	

Table 4-2. MS 1204FZY Technical Specifications @ 23°C (Continued)

Item	Description
ESD	± 20kV air discharge ± 8kV indirect discharge
Sealing	IP54
Operating Temperature	-4° to 122°F (-20° to 50°C)
Storage Temperature	-40° to 158°F (-40° to 70°C)
Humidity	5% to 95% non-condensing
Laser Class	CDRH Class II, IEC Class 2
Height	1.60 in. (4.06 cm)
Width	2.28 in. (5.79 cm)
Depth	2.94 in. (7.47 cm)
Weight	4.45 oz. (126 gm)
Note: Environmental and/or tolerance parameters are not cumulative.	

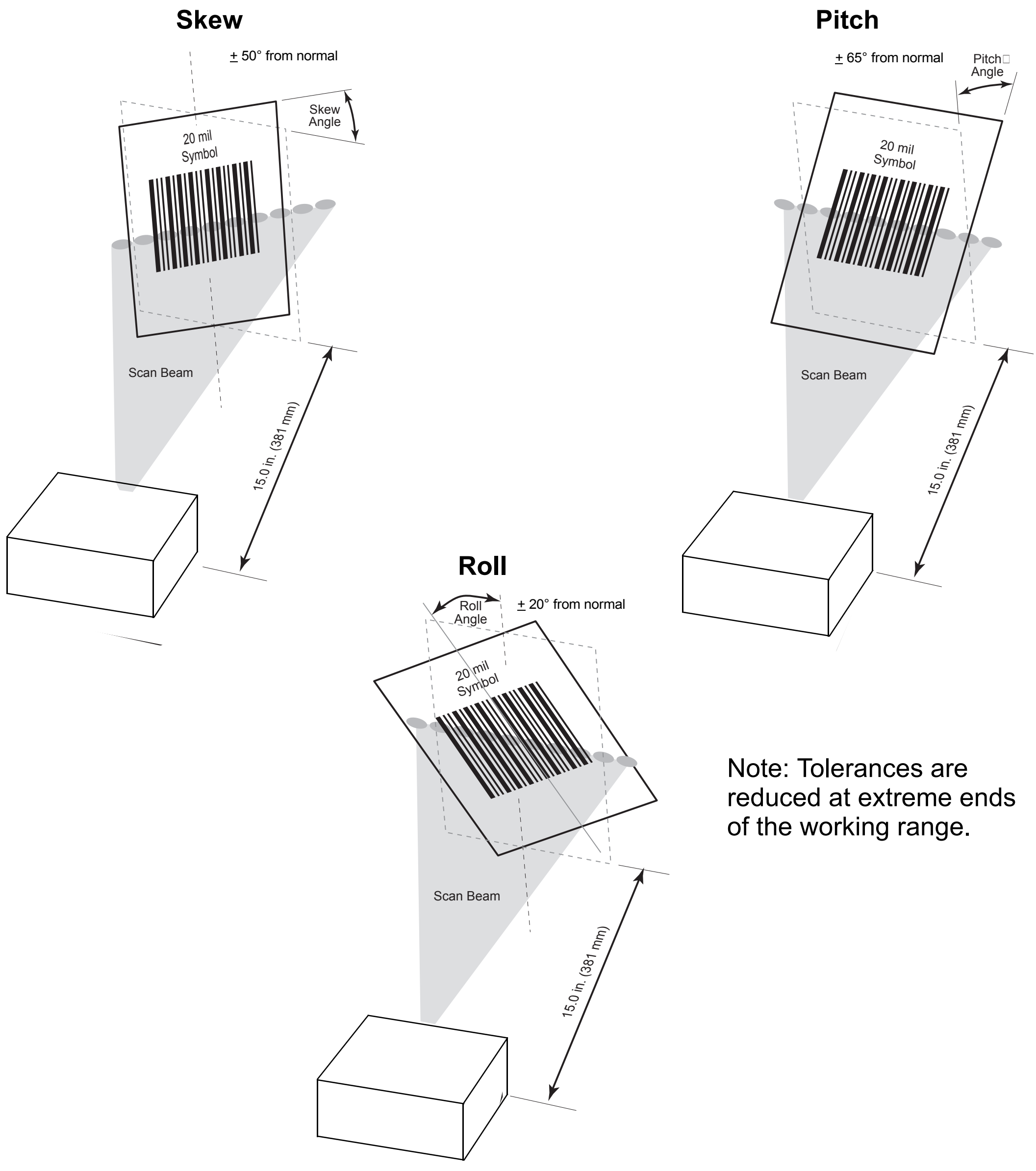


Figure 4-4. Skew, Pitch and Roll

MS 1204FZY Decode Zone

The scanner has a selectable scan angle of either 30° or 42°. The 42° symbol decodes are shown in Figure 4-5. The figures shown are typical values. Table 4-3 on page 4-9 lists the typical and guaranteed distances for the 42° scan angle for selected bar code densities. The minimum element width (or “symbol density”) is the width in mils of the narrowest element (bar or space) in the symbol. The maximum usable length of a symbol at any given range is shown below. To calculate this distance, see *Calculating the Usable Scan Length Method* on page 2-12.

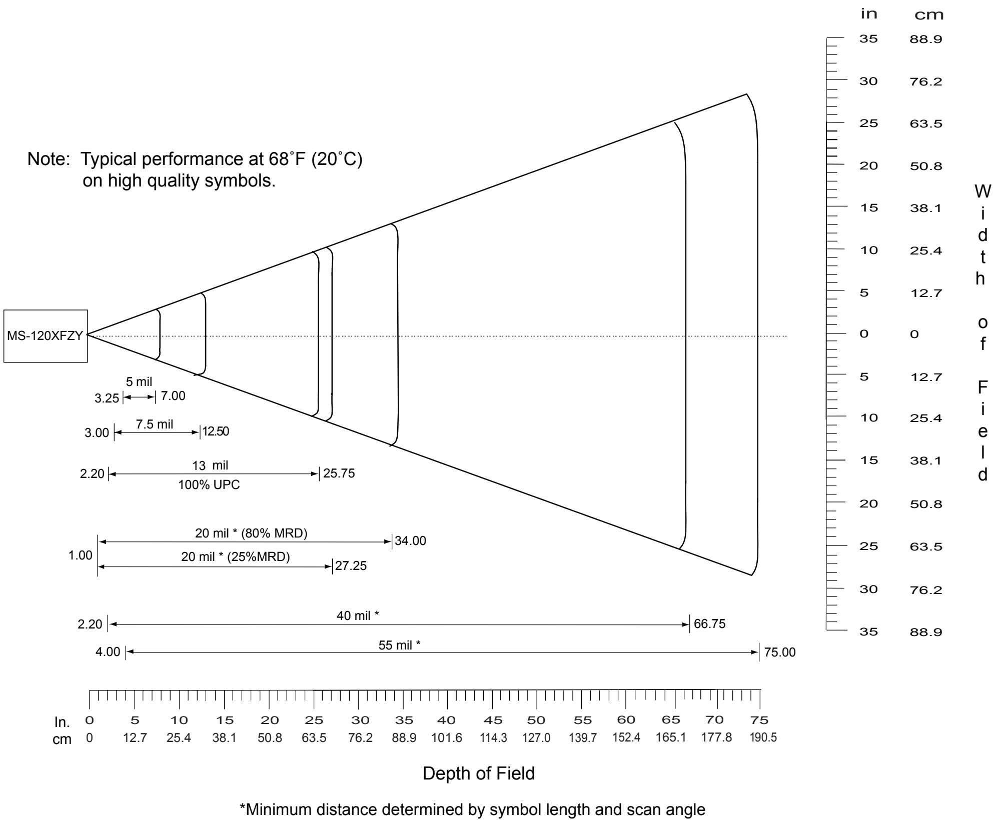


Figure 4-5. MS 1204FZY Typical Decode Zone (42° Scan Angle)

Table 4-3. MS 1204FZY Decode Distances (42° Scan Angle)

Symbol Density/ Symbol p/n / Bar Code Type/ W-N Ratio	Bar Code Content/ Contrast[1]	Typical Working Ranges[3]		Guaranteed Working Ranges[3]	
		Near	Far	Near	Far
5.0 mil 64-17453-01 Code 39; 2.5:1	**ABCDEFGH** 80% MRD	**3.25 in.** 8.26 cm	**7.00 in.** 17.78 cm	**4.75 in.** 12.07 cm	**5.25 in.** 13.34 cm
7.5 mil 64-17452-01 Code 39; 2.5:1	**ABCDEF** 80% MRD	**3.00 in.** 7.62 cm	**12.50 in.** 31.75 cm	**4.75 in.** 12.07 cm	**9.00 in.** 22.86 cm
13 mil 64-05303-01 100% UPC	**012345678905** 80% MRD	**2.20 in.** 5.59 cm	**25.75 in.** 65.41 cm	**Note 2**	**19.00 in.** 48.26 cm
20 mil 60-01429-01 Code 39; 2.2:1	**123** 80% MRD	**1.00 in.** 2.54 cm **(Note 2)**	**34.00 in.** 86.36 cm	**Note 2**	**24.00 in.** 60.96 cm
20 mil 60-02710-01 Code 39; 2.2:1	**123** 25% MRD	**1.00 in.** 2.54 cm **(Note 2)**	**27.25 in.** 69.22 cm	**Note 2**	**22.00 in.** 55.88 cm
40 mil 64-17457-01 Code 39; 2.2:1	**AB** 80% MRD	**2.20 in.** 5.59 cm **(Note 2)**	**66.75 in.** 169.55 cm	**Note 2**	**49.00 in.** 124.46 cm
55 mil 64-17458-01 Code 39; 2.2:1	**CD** 80% MRD	**4.00 in.** 10.16 cm **(Note 2)**	**75.00 in.** 190.50 cm	**Note 2**	**55.00 in.** 139.70 cm
Notes: 1. Contrast measured as Mean Reflective Difference (MRD) at 650 nm. 2. Near ranges on lower densities largely depend on the width of the bar code and the scan angle. 3. Working range specifications: Photographic quality symbols, pitch = 10°, skew = 0°, roll = 0°, ambient light < 150 ft. candles, and temperature = 23 °C.					

Usable Scan Length

The decode zone is a function of various symbol characteristics including density, print contrast, wide-to-narrow ratio, and edge accuracy. Consider the width of the scan line at any given distance when designing a system.

Calculating the Usable Scan Length Method on page 2-12 describes how to calculate the usable scan length. The scan angle is provided in Table 4-2 on page 4-5.

Chapter 5
MS 2204 Specifications

Overview

This chapter provides the technical specifications for the MS 2204 scanner.

MS 2204 Electrical Interface

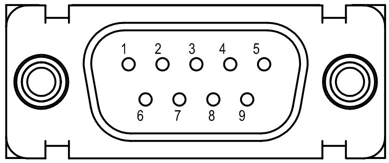


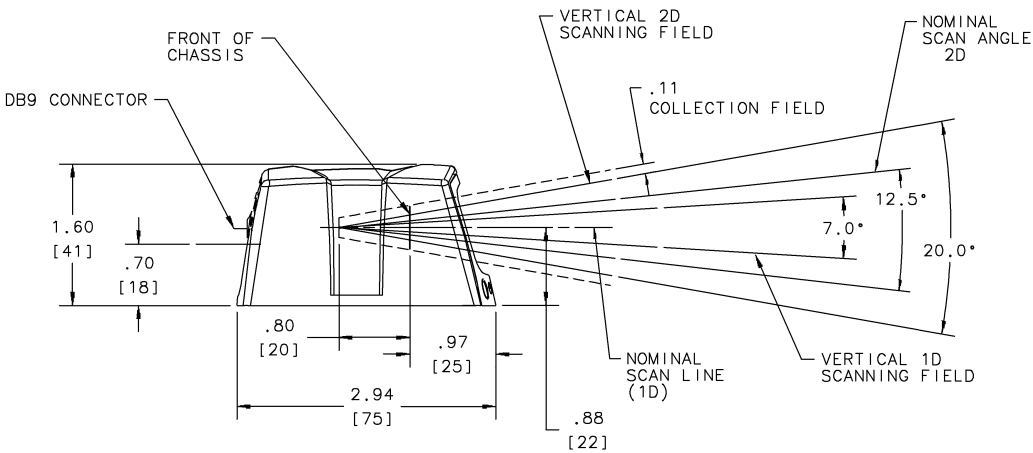
Figure 5-1. MiniScan Connector

Table 5-1 lists the pin functions of the MiniScan MS 2204 interface.

Table 5-1. MS 2204 Electrical Interface

Pin No.	Pin Name	Type*	Function
1	**Trigger**	I	Signals scanner to begin scanning session.
2	**TXD**	O	Serial data transmit output. Drives the serial data receive input on the device communicating with the scanner.
3	**RXD**	I	Serial data receive input. Driven by the serial data transmit output on the device communicating with the scanner.
4	**Not used**		
5	**Ground**		Power supply ground input and signal ground reference.
6	**Power**	I	5.0 VDC ± 10%
7	**CTS**	I	Clear-to-send handshaking input line, used only in conjunction with the RTS line. Optionally used by another device to signal the scanner to begin transmitting data.
8	**RTS**	O	Request-to-send handshaking output line, used only in conjunction with the CTS line. Optionally used by the scanner to signal another device that data is available to send.
9	**Beeper/ Download**	I/O	During normal operation this signal functions as an external beeper drive line. This signal can sink 50mA of current to drive an external beeper, and is normally pulled up. This signal is also used to begin Flash Download operation when grounded externally during power up.
*I = Input O = Output			

MS 2204 Mechanical Drawings



Notes:

Unless otherwise specified:

- Dimensions are in inches, dimensions in [ ] are mm.
- User mounting tolerances are not included.

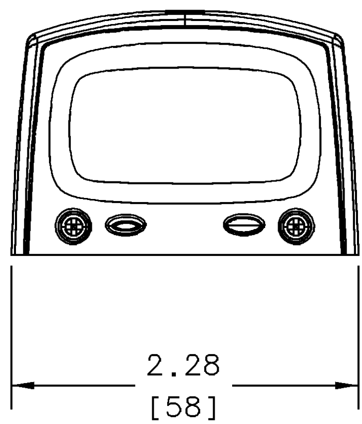
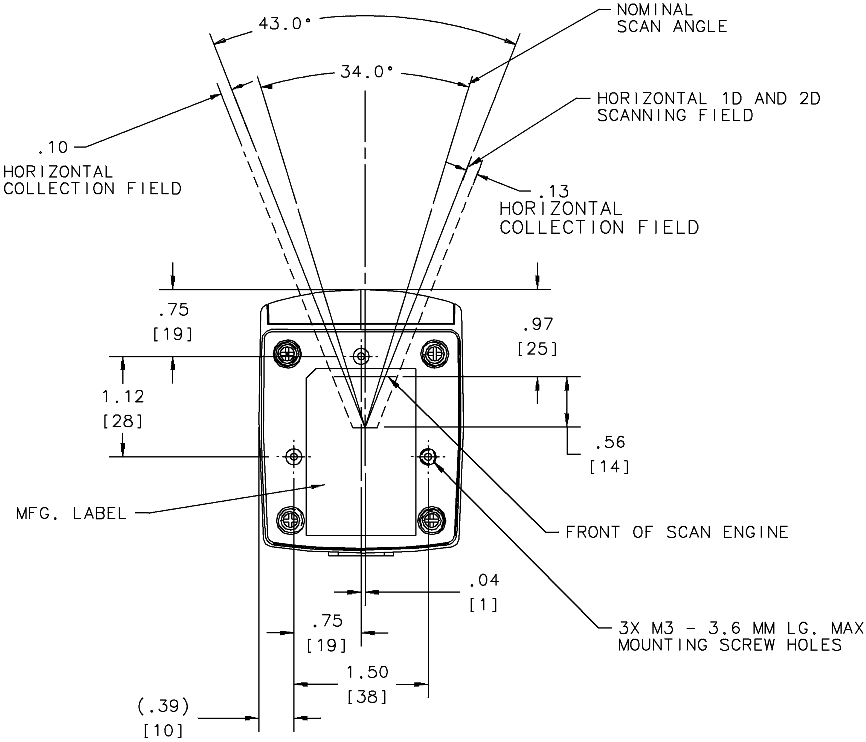


Figure 5-2. MS 2204 Mechanical Drawing



Notes:

Unless otherwise specified:

- Dimensions are in inches, dimensions in [ ] are mm.
- User mounting tolerances are not included.

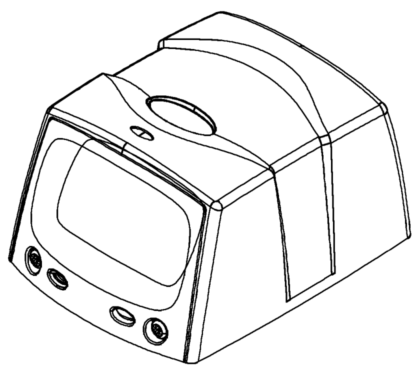


Figure 5-3. MS 2204 Mechanical Drawing

MS 2204 Technical Specifications

Table 5-2 provides the MS 2204 technical specifications

Table 5-2. MS 2204 Technical Specifications @ 23°C

Item	Description
Power Requirements	
Input Voltage	5.0 VDC ± 10%
Scanning Current	250 ± 30 mA typical
Standby Current	25 ± 5 mA typical
V_{CC} Noise Level	200 mV peak-to-peak max.
Laser Power	0.95 mW ± 0.1 mW, λ = 650 nm nominal
Scan Rate	640 scans/sec.
Scan Frequency: Horizontal	320 Hz ± 5 Hz
Scan Frequency: Vertical	282 Hz ± 5 Hz
Frame Rate	24 frames/sec. 12 Hz ±1 Hz (vertical)
Print Contrast	Minimum 35% absolute dark/light reflectance differential
Scan Angle	Horizontal: 34^{o} $\pm 1.5^{o}$ Vertical: 34^{o} $\pm 1.5^{o}$
Scan Pattern	Smart raster, high density single scan line
Start Time	0.065 sec. to 75% of steady state horizontal amplitude
Skew Tolerance	$\pm$ 15^{o} from plane parallel to symbol (see Figure 5-4 on page 5-7)
Pitch Angle	$\pm$ 30^{o} from normal (see Figure 5-4 on page 5-7)
Roll	$\pm$ 4^{o} from (for scanning benchmark label, assuming 3:1 codeword aspect ratio) (see Figure 5-4 on page 5-7)
Decode Depth of Field	See Figure 5-5 on page 5-8 and Figure 5-6 on page 5-10
Beam Deviation (offset from the nominal)	Horizontal: $\pm 3.0^{o}$ Vertical: $\pm 3.0^{o}$ Horizontal tilt: $\pm$ 2^{o}

Table 5-2. MS 2204 Technical Specifications @ 23°C (Continued)

Item	Description
Ambient Light Immunity **Sunlight** **Artificial Light**	 8,000 ft. candles (86,112 lux) 450 ft. candles (4,844 lux)
Drop	Multiple 30” drops
Vibration	Unpowered scanner withstands a random vibration along each of the X, Y and Z axes for a period of one hour per axis, defined as follows: 20 to 80 Hz — Ramp up to 0.04 G^2/Hz at the rate of 3dB/octave. 80 to 350 Hz — 0.04 G^2/Hz 350 to 2000 Hz — Ramp down at the rate of 3 dB/octave.
ESD	± 20kV air discharge ± 8kV indirect discharge
Sealing	IP54
Operating Temperature	-4° to 122°F (-20° to 50°C)
Storage Temperature	-40° to 158°F (-40° to 70°C)
Humidity	5% to 95% non-condensing
Laser Class	CDRH Class II, IEC Class 2
Height	1.60 in. (4.06 cm)
Width	2.28 in. (5.79 cm)
Depth	2.94 in. (7.47 cm)
Weight	4.73 oz. (134 gm)

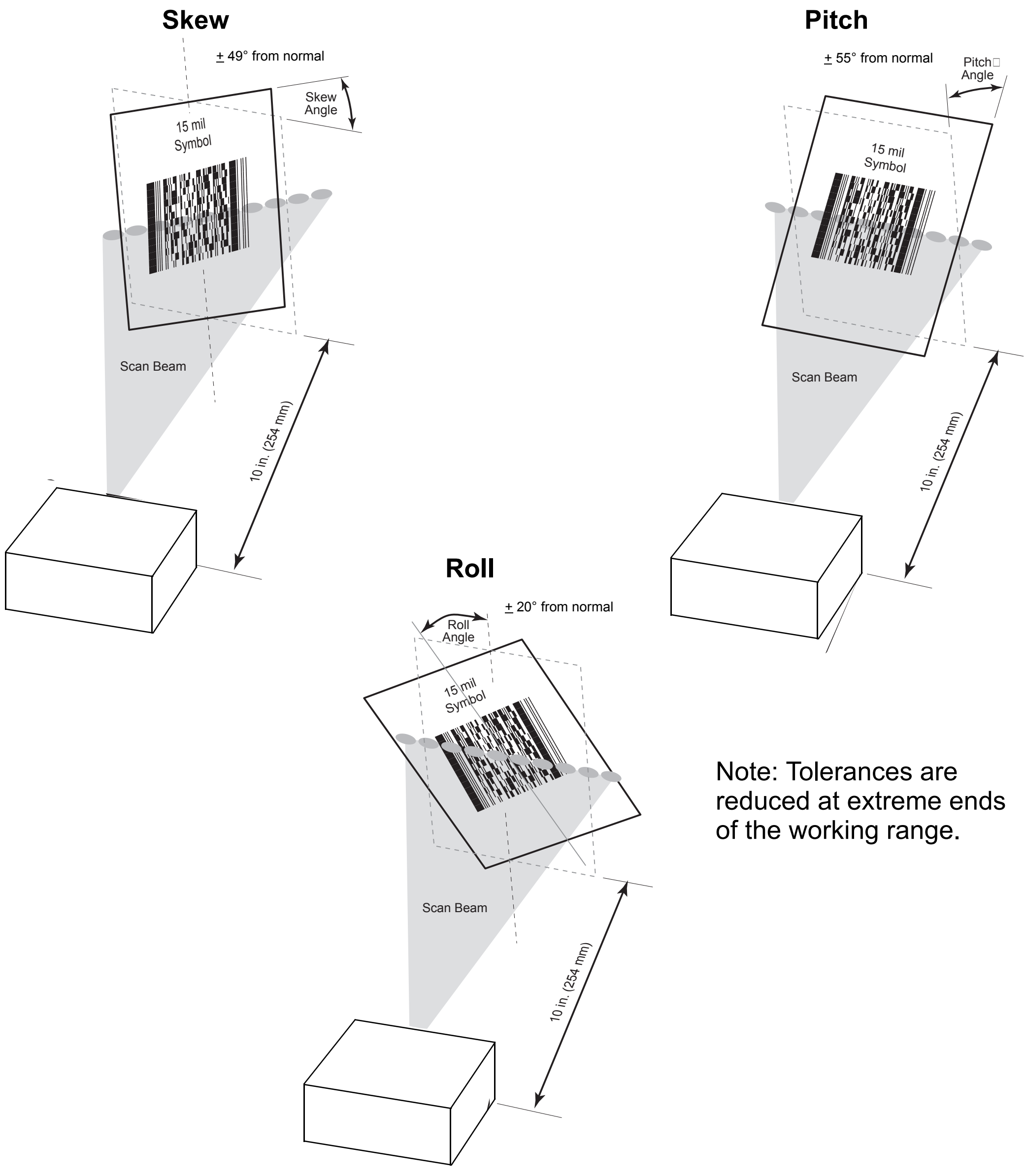


Figure 5-4. Skew, Pitch and Roll

MS 2204 Decode Zones

The decode zone is a function of various symbol characteristics including density, print contrast, wide to narrow ratio and edge acurity. Typical values are shown. Table 5-3 on page 5-9 and Table 5-4 on page 5-11 list the typical and guaranteed distances for selected bar code densities. The minimum element width (or "symbol density") is the width in mils of the narrowest element (bar or space) in the symbol. The maximum usable length of a symbol at any given range is shown below. To calculate this distance, see *Calculating the Usable Scan Length Method* on page 2-12.

MS 2204 1D Decode Zone

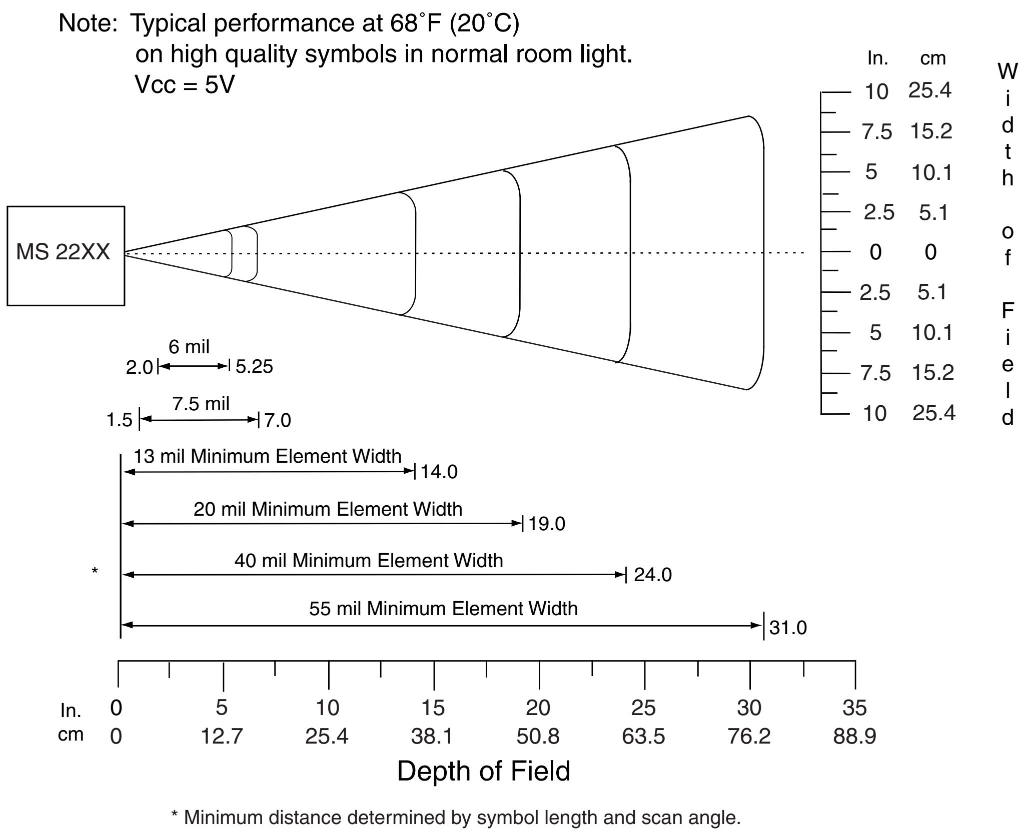


Figure 5-5. MS 2204 1D Decode Distances

MS 2204 1D Decode Distances

Table 5-3. MS 2204 1D Decode Distances

Symbol Density/ Symbol p/n / Bar Code Type	Bar Code Content/ Contrast[1]	Typical Working Ranges[3]		Guaranteed Working Ranges[3]	
		Near	Far	Near	Far
6.0 mil 60-01755-01 Code 39	**123** 80% MRD	**2.0 in.** 5.08 cm	**5.25 in.** 13.34 cm	**2.75 in.** 7.00 cm	**4.0 in.** 10.16 cm
7.5 mil 64-17452-01 Code 39	**ABCDEF** 80% MRD	**1.5 in.** 3.81 cm	**7.0 in.** 17.78 cm	**2.25 in.** 5.72 cm	**5.0 in.** 12.7 cm
13 mil 64-05303-01 100% UPC	**012345678905** 80% MRD	Note 2	**14.0 in.** 35.56 cm	N/A	**10.5 in.** 26.67 cm
20 mil 64-17456-01 Code 39	**123** 80% MRD	Note 2	**19.0 in.** 48.26 cm	N/A	**14.0 in.** 35.56 cm
40 mil 64-17457-01 Code 39	**AB** 80% MRD	Note 2	**24.0 in.** 60.96 cm	N/A	**18.0 in.** 45.72 cm
55 mil 60-01601-01 Code 39	**A** 80% MRD	Note 2	**31.0 in.** 78.74 cm	Note 2	**25.0 in.** 63.50 cm

Notes:

1. Contrast measured as Mean Reflective Difference (MRD) at 650 nm.
2. Near ranges on lower densities largely depend on the width of the bar code and the scan angle.
3. Working range specifications: Photographic quality symbols, pitch = 10°, skew = 0°, roll = 0°, ambient light < 150 ft. candles, and temperature = 23 °C.

MS 2204 2D Decode Zone

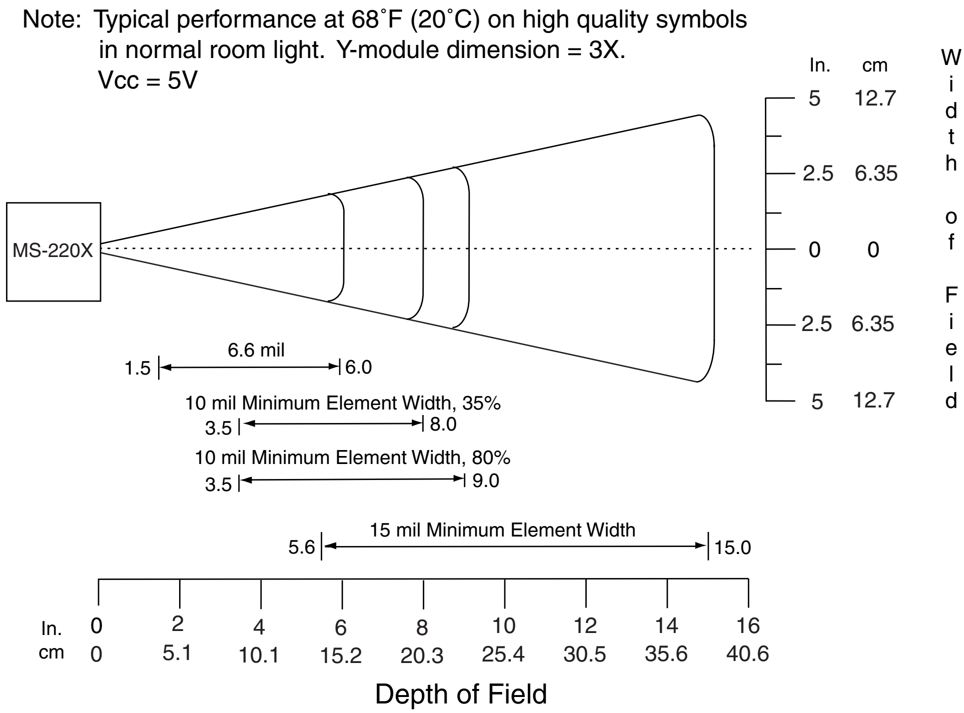


Figure 5-6. MS 2204 2D Slab/Raster Decode Distances

Note: ***Not optimized for omnidirectional mode.***

MS 2204 2D Decode Distances

Table 5-4. MS 2204 2D Slab/Raster Decode Distances

Symbol Density/ Symbol p/n / Bar Code Type	Bar Code Content/ Contrast[1]	Typical Working Ranges[3]		Guaranteed Working Ranges[3]	
		Near	Far	Near	Far
6.6 mil 64-14035-01 PDF417	**ABCDEF** 80% MRD	**1.5 in.** 3.81 cm	**6.00 in.** 15.24 cm	Note 2	**4.75 in.** 12.07 cm
10 mil 64-14937-01 PDF417	**012345678905** 35% MRD	**3.5 in.** 8.89 cm	**8.0 in.** 20.32 cm	Note 2	**5.0 in.** 12.7 cm
10 mil 64-14037-01 PDF417	80% MRD	**3.5 in.** 8.89 cm	**9.0 in.** 22.86 cm	Note 2	**7.5 in.** 19.05 cm
15 mil 64-14038-01 PDF417	80% MRD	**5.6 in.** 14.22 cm	**15.0 in.** 38.10 cm	Note 2	**13.0 in.** 33.02 cm

Notes:
1. Contrast measured as Mean Reflective Difference (MRD) at 650 nm.
2. Near ranges on lower densities largely depend on the width of the bar code and the scan angle.
3. Working range specifications: Photographic quality symbols, pitch = 10°, skew = 0°, roll = 0°, ambient light < 150 ft. candles, and temperature = 23 °C.

Note: ***Not optimized for omnidirectional mode.***

Usable Scan Length

The decode zone is a function of various symbol characteristics including density, print contrast, wide-to-narrow ratio, and edge acuity. Consider width of decode zone at any given distance when designing a system.

Calculating the Usable Scan Length Method on page 2-12 describes how to calculate the usable scan length.

Chapter 6
MS 2204VHD Specifications

Overview

This chapter provides the technical specifications for the MS 2204VHD scanner.

MS 2204VHD Electrical Interface

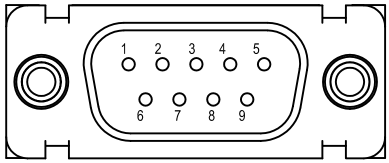


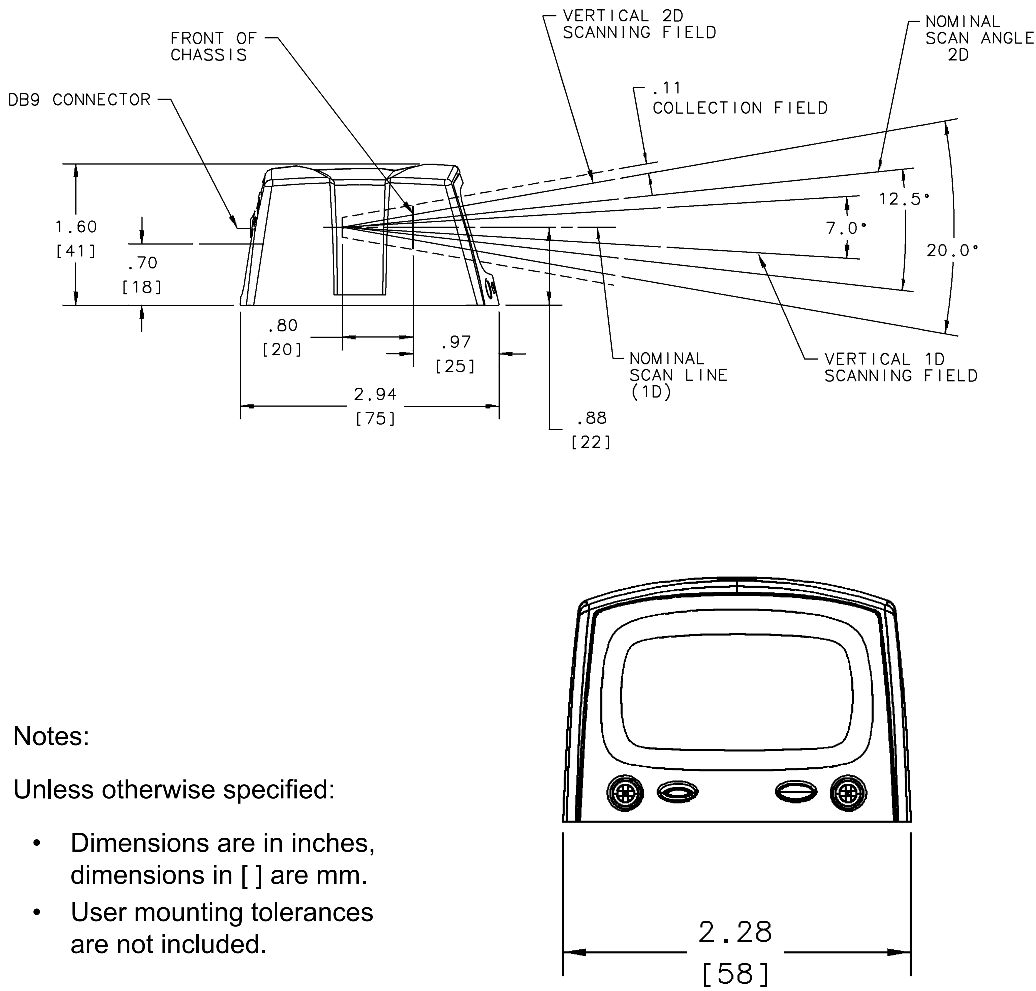
Figure 6-1. MiniScan Connector

Table 6-1 lists the pin functions of the MS 2204VHD.

Table 6-1. MS 2204VHD Electrical Interface

Pin No.	Pin Name	Type*	Function
1	**Trigger**	I	Signals scanner to begin scanning session.
2	**TXD**	O	Serial data transmit output. Drives the serial data receive input on the device communicating with the scanner.
3	**RXD**	I	Serial data receive input. Driven by the serial data transmit output on the device communicating with the scanner.
4	**Not used**		
5	**Ground**		Power supply ground input and signal ground reference.
6	**Power**	I	5.0 VDC ± 10%
7	**CTS**	I	Clear-to-send handshaking input line, used only in conjunction with the RTS line. Optionally used by another device to signal the scanner to begin transmitting data.
8	**RTS**	O	Request-to-send handshaking output line, used only in conjunction with the CTS line. Optionally used by the scanner to signal another device that data is available to send.
9	**Beeper/ Download**	I/O	During normal operation this signal functions as an external beeper drive line. This signal can sink 50mA of current to drive an external beeper, and is normally pulled up. This signal is also used to begin Flash Download operation when grounded externally during power up.
*I = Input O = Output			

MS 2204VHD Mechanical Drawings

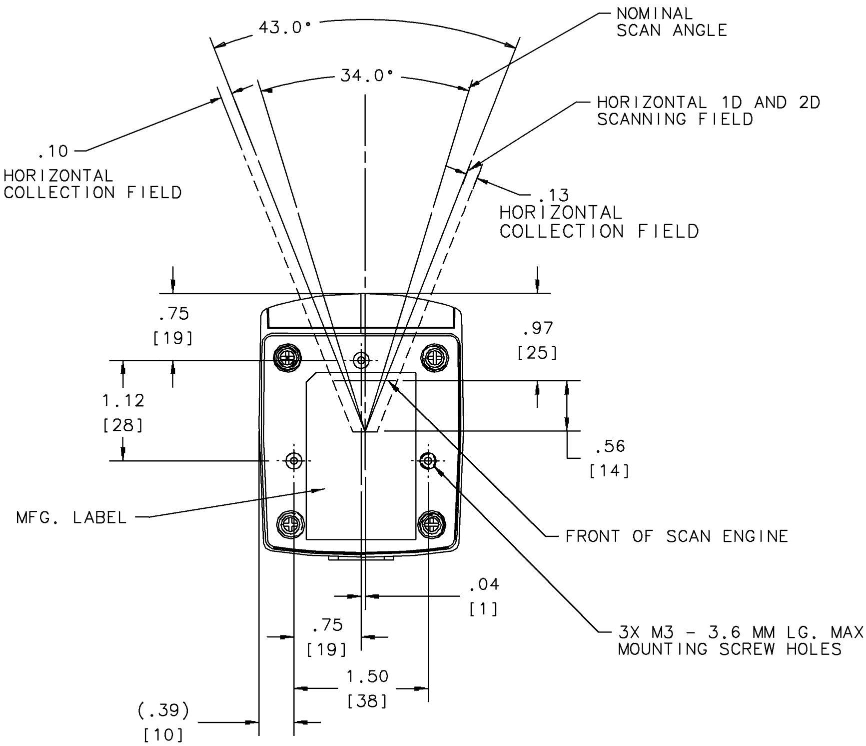


Notes:

Unless otherwise specified:

- Dimensions are in inches, dimensions in [ ] are mm.
- User mounting tolerances are not included.

Figure 6-2. MS 2204VHD Mechanical Drawing



Notes:

Unless otherwise specified:

- Dimensions are in inches, dimensions in [ ] are mm.
- User mounting tolerances are not included.

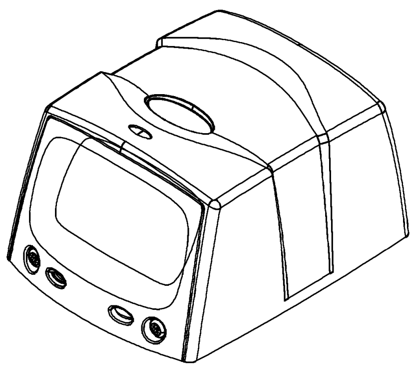


Figure 6-3. MS 2204VHD Mechanical Drawing

MS 2204VHD Technical Specifications

Table 6-2 provides the MS 2204VHD technical specifications.

Table 6-2. MS 2204VHD Technical Specifications @ 23°C

Item	Description
Power Requirements **Input Voltage** **Scanning Current** **Standby Current** **V_{cc} Noise Level**	 5.0 VDC ± 10% 250 ± 30 mA typical 25 ± 5 mA typical 200 mV peak-to-peak max.
Laser Power	0.7 mW ± 0.1 mW, λ = 650 nm nominal
Scan Rate	640 scans/sec.
Scan Frequency: Horizontal	320 Hz ± 5 Hz
Scan Frequency: Vertical	282 Hz ± 5 Hz
Frame Rate	24 frames/sec. 12 Hz ±1 Hz (vertical)
Print Contrast	Minimum 35% absolute dark/light reflectance differential
Scan Angle	Horizontal: 34^{o} $\pm 3^{o}$ Vertical: 12.5^{o} $\pm 3^{o}$
Scan Pattern	Smart raster, high density single scan line
Start Time	0.065 sec. to 75% of steady state horizontal amplitude
Skew Tolerance	± 15^{o} from plane parallel to symbol (see Figure 6-4 on page 6-7)
Pitch Angle	± 30^{o} from normal (see Figure 6-4 on page 6-7)
Roll	± 4^{o} (for scanning benchmark label, assuming 3:1 codeword aspect ratio) (see Figure 6-4 on page 6-7)
Decode Depth of Field	See Figure 6-5 on page 6-8 and Figure 6-6 on page 6-10
Beam Deviation (offset from the nominal)	Horizontal: $\pm 3.0^{o}$ Vertical: $\pm 3.0^{o}$ Horizontal tilt: ± 2^{o}
Additional Post Shock Beam Deviation (2000G Shock)	Horizontal: $\pm 3.0^{o}$ max Vertical: $\pm 6.0^{o}$ max

Table 6-2. MS 2204VHD Technical Specifications @ 23°C (Continued)

Item	Description
Ambient Light Immunity **Sunlight** **Artificial Light**	 8,000 ft. candles (86,112 lux) 450 ft. candles (4,844 lux)
Drop	Multiple 30” drops
Vibration	Unpowered scanner withstands a random vibration along each of the X, Y and Z axes for a period of one hour per axis, defined as follows: 20 to 80 Hz Ramp up to 0.04 G^2/Hz at the rate of 3dB/octave. 80 to 350 Hz 0.04 G^2/Hz 350 to 2000 Hz Ramp down at the rate of 3 dB/octave.
ESD	± 20kV air discharge ± 8kV indirect discharge
Sealing	IP54
Operating Temperature	-4° to 122°F (-20° to 50°C)
Storage Temperature	-40° to 158°F (-40° to 70°C)
Humidity	5% to 95% non-condensing
Laser Class	CDRH Class II, IEC Class 2
Height	1.60 in. (4.06 cm)
Width	2.28 in. (5.79 cm)
Depth	2.94 in. (7.47 cm)
Weight	4.73 oz. (134 gm)

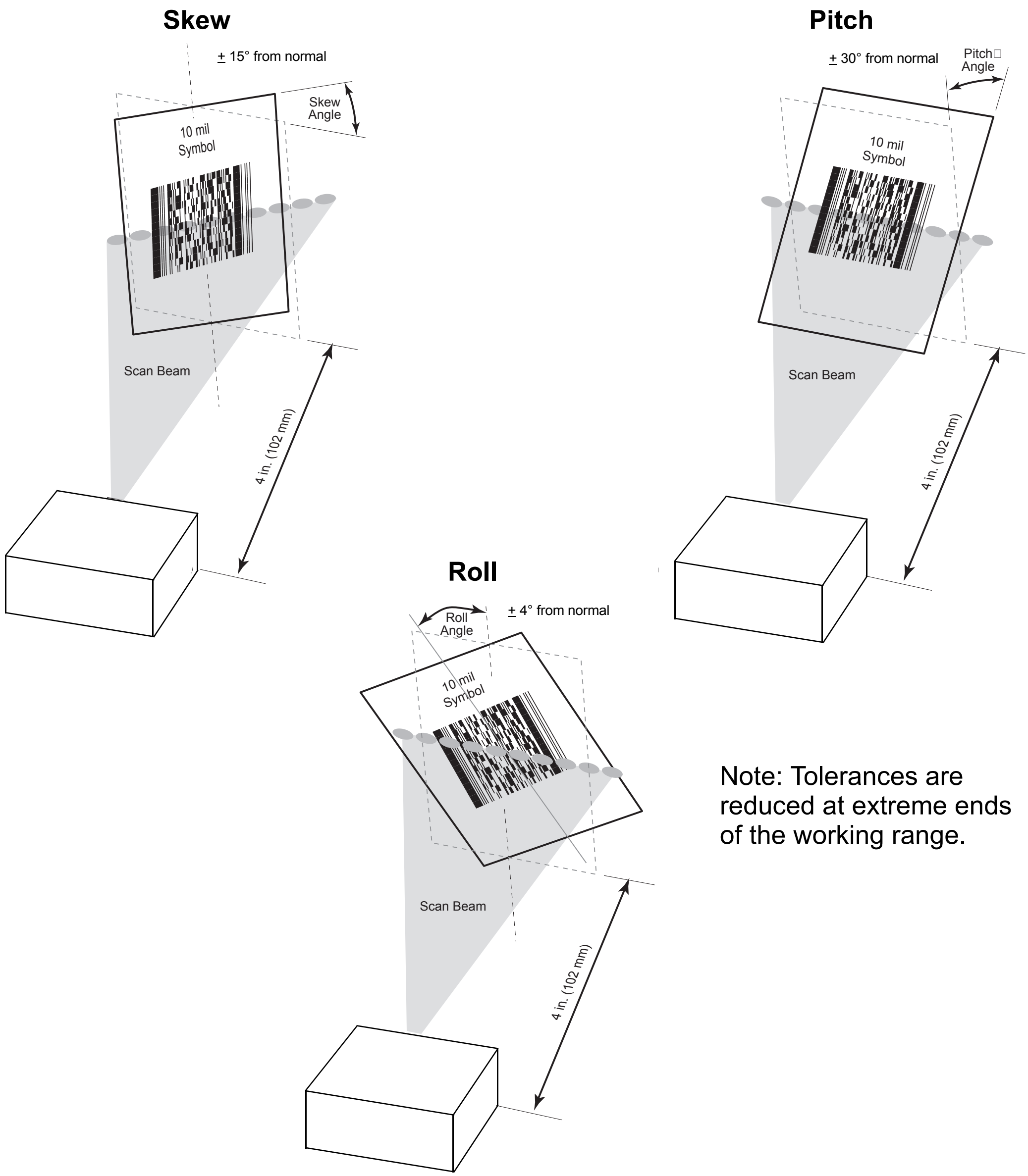


Figure 6-4. Skew, Pitch and Roll

MS 2204VHD Decode Zones

The decode zone is a function of various symbol characteristics including density, print contrast, wide to narrow ratio and edge acurity. Typical values are shown. Table 6-3 on page 6-9 and Table 6-4 on page 6-11 list the typical and guaranteed distances for selected bar code densities. The minimum element width (or “symbol density”) is the width in mils of the narrowest element (bar or space) in the symbol. The maximum usable length of a symbol at any given range is shown below. To calculate this distance, see *Calculating the Usable Scan Length Method* on page 2-12.

MS 2204VHD 1D Decode Zone

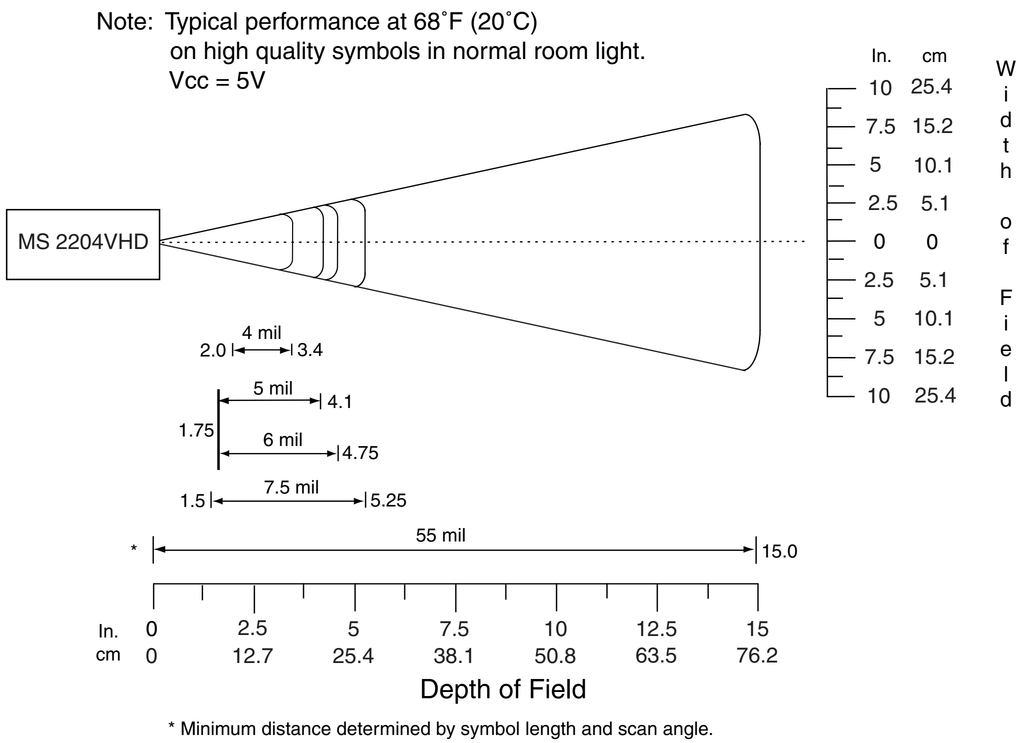


Figure 6-5. MS 2204VHD 1D Slab/Raster Decode Distances

MS 2204VHD 1D Decode Distances

Table 6-3. MS 2204VHD 1D Decode Distances

Symbol Density/ Symbol p/n / Bar Code Type	Bar Code Content/ Contrast[1]	Typical Working Ranges[3]		Guaranteed Working Ranges[3]	
		Near	**Far**	**Near**	**Far**
4 mil 64-15660-01 Code 39	**STI4026** 80% MRD	**2.0 in.** 5.08 cm	**3.4 in.** 8.64 cm	**2.75 in.** 7.00 cm	**2.8 in.** 7.11 cm
5 mil 64-18779-01 Code 39	**STI5025** 80% MRD	**1.75 in.** 4.45 cm	**4.1 in.** 10.41 cm	**2.25 in.** 5.72 cm	**3.5 in.** 8.89 cm
6 mil 64-01755-01 Code 39	**123** 80% MRD	**1.75 in.** 4.45 cm	**4.75 in.** 12.07 cm	**2.25 in.** 5.72 cm	**4.0 in.** 10.16 cm
7.5 mil 63-04191-01 Code 39	**STI30F4** 80% MRD	**1.50 in.** 3.81 cm	**5.25 in.** 13.34 cm	**2.00 in.** 5.08 cm	**4.75 in.** 12.07 cm
55 mil 60-01601-01 Code 39	**A** 80% MRD	Note 2	**15.0 in.** 38.10 cm	Note 2	**12.5 in.** 31.75 cm

Notes:

1. Contrast measured as Mean Reflective Difference (MRD) at 650 nm.
2. Near ranges on lower densities largely depend on the width of the bar code and the scan angle.
3. Working range specifications: Photographic quality symbols, pitch = 10°, skew = 0°, roll = 0°, ambient light < 150 ft. candles, and temperature = 23 °C.

MS 2204VHD 2D Decode Zone

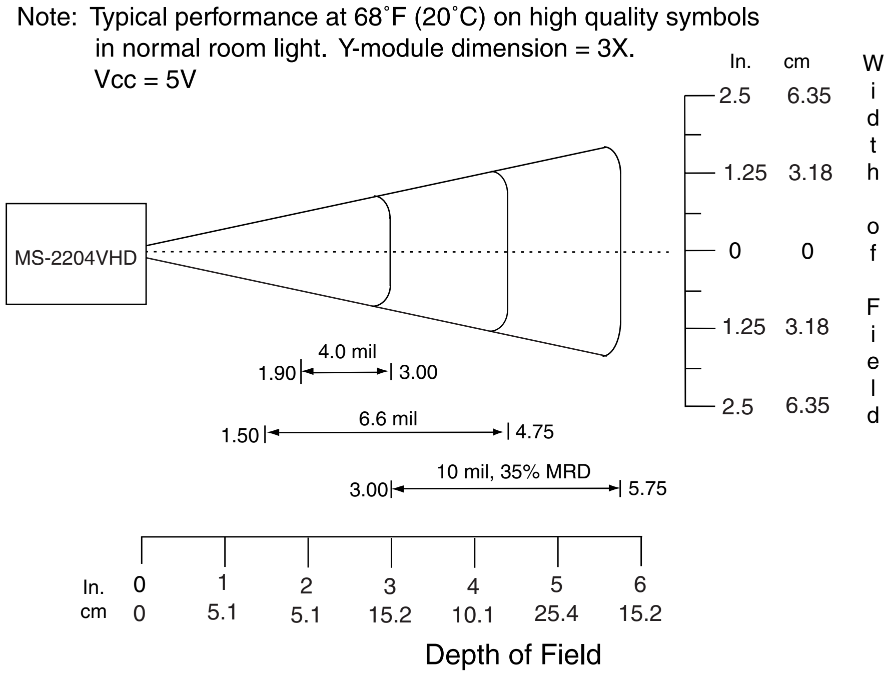


Figure 6-6. MS 2204VHD 2D Slab/Raster Decode Distances

Note: ***Not optimized for omnidirectional mode.***

MS 2204VHD 2D Decode Distances

Table 6-4. MS 2204VHD 2D Slab/Raster Decode Distances

Symbol Density/ Symbol p/n / Bar Code Type	Bar Code Content/ Contrast[1]	Typical Working Ranges[3]		Guaranteed Working Ranges[3]	
		Near	Far	Near	Far
4 mil 64-17025-01 PDF417	**123** 80% MRD	**1.90 in.** 4.83 cm	**3.00 in.** 7.62 cm	**2.20 in.** 5.59 cm	**2.70 in.** 6.89 cm
6.6 mil 64-14035-01 PDF417	**ABCDEF** 80% MRD	**1.50 in.** 3.81 cm	**4.75 in.** 12.07 cm	**2.00 in.** 5.08 cm	**4.50 in.** 11.43 cm
10 mil 64-14937-01 PDF417	**012345678905** 80% MRD	**3.00 in.** 7.62 cm	**5.75 in.** 14.61 cm	**4.25 in.** 10.80 cm	**5.00 in.** 12.72 cm
Notes: 1. Contrast measured as Mean Reflective Difference (MRD) at 650 nm. 2. Near ranges on lower densities largely depend on the width of the bar code and the scan angle. 3. Working range specifications: Photographic quality symbols, pitch = 10°, skew = 0°, roll = 0°, ambient light < 150 ft. candles, and temperature = 23 °C.					

Note: ***Not optimized for omnidirectional mode.***

Usable Scan Length

The decode zone is a function of various symbol characteristics including density, print contrast, wide-to-narrow ratio, and edge acuity. Consider width of decode zone at any given distance when designing a system.

Calculating the Usable Scan Length Method on page 2-12 describes how to calculate the usable scan length. The scan angle is provided in the *Usable Scan Length Diagram* on page 2-13.

Chapter 7
MS 3204 Specifications

Overview

This chapter provides the technical specifications for the MS 3204 scanner.

MS 3204 Electrical Interface

This section describes the pin functions of the MS 3204 scanner.

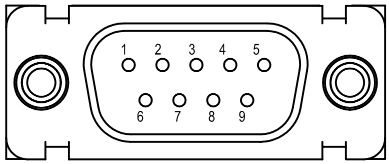
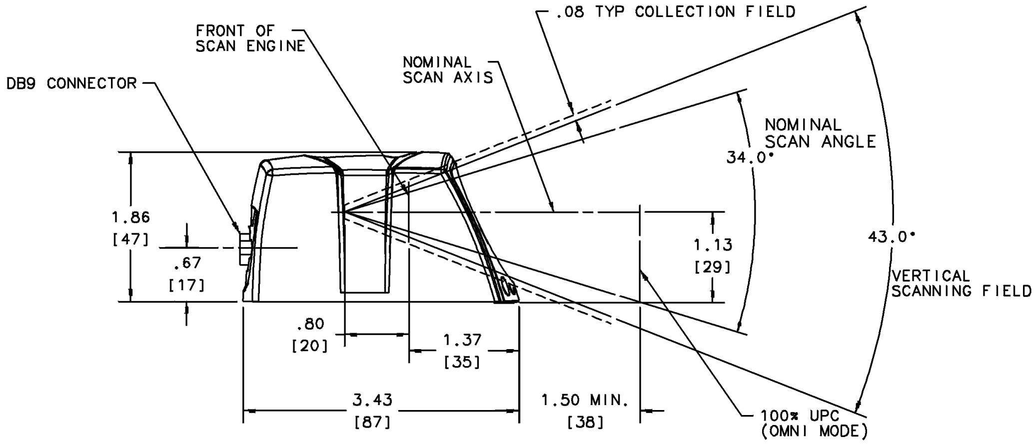


Figure 7-1. MS 3204 Connector

Table 7-1. MS 3204 Electrical Interface

Pin No.	Pin Name	Type*	Function
1	**Trigger**	I	Signals scanner to begin scanning session.
2	**TXD**	O	Serial data transmit output. Drives the serial data receive input on the device communicating with the scanner.
3	**RXD**	I	Serial data receive input. Driven by the serial data transmit output on the device communicating with the scanner.
4	**Not used**		
5	**Ground**		Power supply ground input and signal ground reference.
6	**Power**	I	5.0 VDC ± 10%
7	**CTS**	I	Clear-to-send handshaking input line, used only in conjunction with the RTS line. Optionally used by another device to signal the scanner to begin transmitting data.
8	**RTS**	O	Request-to-send handshaking output line, used only in conjunction with the CTS line. Optionally used by the scanner to signal another device that data is available to send.
9	**Beeper/ Download**	I/O	During normal operation this signal functions as an external beeper drive line. This signal can sink 50mA of current to drive an external beeper, and is normally pulled up. This signal is also used to begin Flash Download operation when grounded externally during power up.
*I = Input O = Output			

MS 3204 Mechanical Drawings



Notes:

Unless otherwise specified:

- Dimensions are in inches, dimensions in [ ] are mm.
- User mounting tolerances are not included.

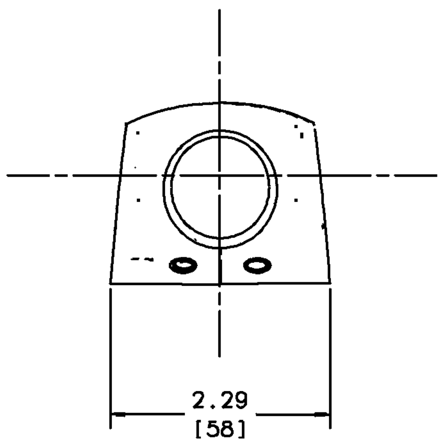
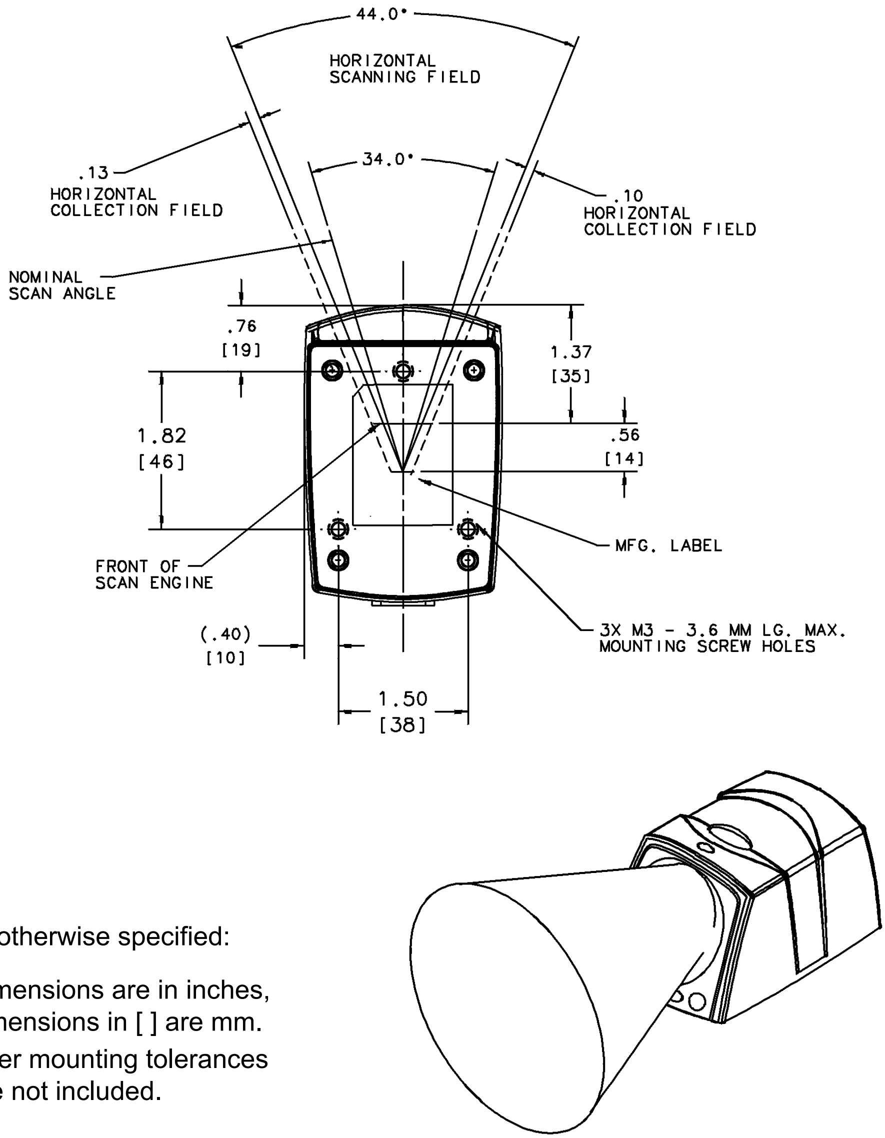


Figure 7-2. MS 3204 Mechanical Drawing



Notes:

Unless otherwise specified:

- Dimensions are in inches, dimensions in [ ] are mm.
- User mounting tolerances are not included.

Figure 7-3. MS 3204 Mechanical Drawing

MS 3204 Technical Specifications

Table 7-2. MS 3204 Technical Specifications @ 23°C

Item	Description
Power Requirements **Input Voltage** **Scanning Current** **Standby Current** **V_{cc} Noise Level**	 +5.0 VDC ± 10% 250 ± 30 mA typical 25 ± 5 mA typical 200 mV peak-to-peak max.
Laser Power	0.7 mW typical, 0.8 mW maximum, λ = 650 nm
Scan Rate	640 scans/second
Scan Frequency: Horizontal	320 Hz ± 5 Hz
Scan Frequency: Vertical	282 Hz ± 5 Hz
Frame Rate	24 frames/sec. 12 Hz ±1 Hz (vertical)
Print Contrast	Minimum 35% absolute dark/light reflectance differential (PDF); 35% absolute dark/light reflectance differential (1D)
Scan Angle	Horizontal: 34^{o} $\pm 1.5^{o}$ Vertical: 34^{o} $\pm 1.5^{o}$
Scan Pattern	**MS-3204-I000**: Omnidirectional, semi-omnidirectional, smart raster, high density single scan line **MS-3204-E000**: Omnidirectional only
Start Time	0.065 sec. to 75% of steady state horizontal amplitude
Skew Tolerance	± 15^{o} from normal (see Figure 7-4 on page 7-7)
Pitch Angle	± 30^{o} from normal (see Figure 7-4 on page 7-7)
Roll	± 4^{o} from vertical (see Figure 7-4 on page 7-7) (For scanning benchmark label, assuming 3:1 codeword aspect ratio). Note that this is dependent on the decoder.
Decode Depth of Field	See Figure 7-5 on page 7-8 and Figure 7-6 on page 7-10
Beam Deviation **(offset from the nominal)**	Horizontal: $\pm 3.0^{o}$ Vertical: $\pm 3.0^{o}$ Horizontal tilt: ± 2^{o}

Table 7-2. MS 3204 Technical Specifications @ 23°C (Continued)

Item	Description
Additional Post Shock Beam Deviation (2000G Shock)	Horizontal: ±3.0^{o} max Vertical: ±6.0^{o} max
Ambient Light Immunity **Sunlight** **Artificial Light**	 8,000 ft. candles (86,112 lux) 450 ft. candles (4,844 lux)
Drop	30 inch drop
Vibration	Unpowered scanner withstands a random vibration along each of the X, Y and Z axes for a period of one hour per axis, defined as follows: 20 to 80 Hz — Ramp up to 0.04 G^2/Hz at the rate of 3dB/octave. 80 to 350 Hz — 0.04 G^2/Hz 350 to 2000 Hz — Ramp down at the rate of 3 dB/octave.
ESD	± 20kV air discharge ± 8kV indirect discharge
Sealing	IP54
Operating Temperature	-86 °F to 122 °F (-30 °C to 50 °C)
Storage Temperature	-104 °F to 158 °F (-40 °C to 70 °C)
Humidity	5% to 95% non-condensing
Laser Class	CDRH Class II, IEC Class 2
Height	1.89 in. (4.80 cm)
Width	2.31 in. (5.87 cm)
Depth	3.50 in. (8.89 cm)
Weight	4.8 oz. (137 g)

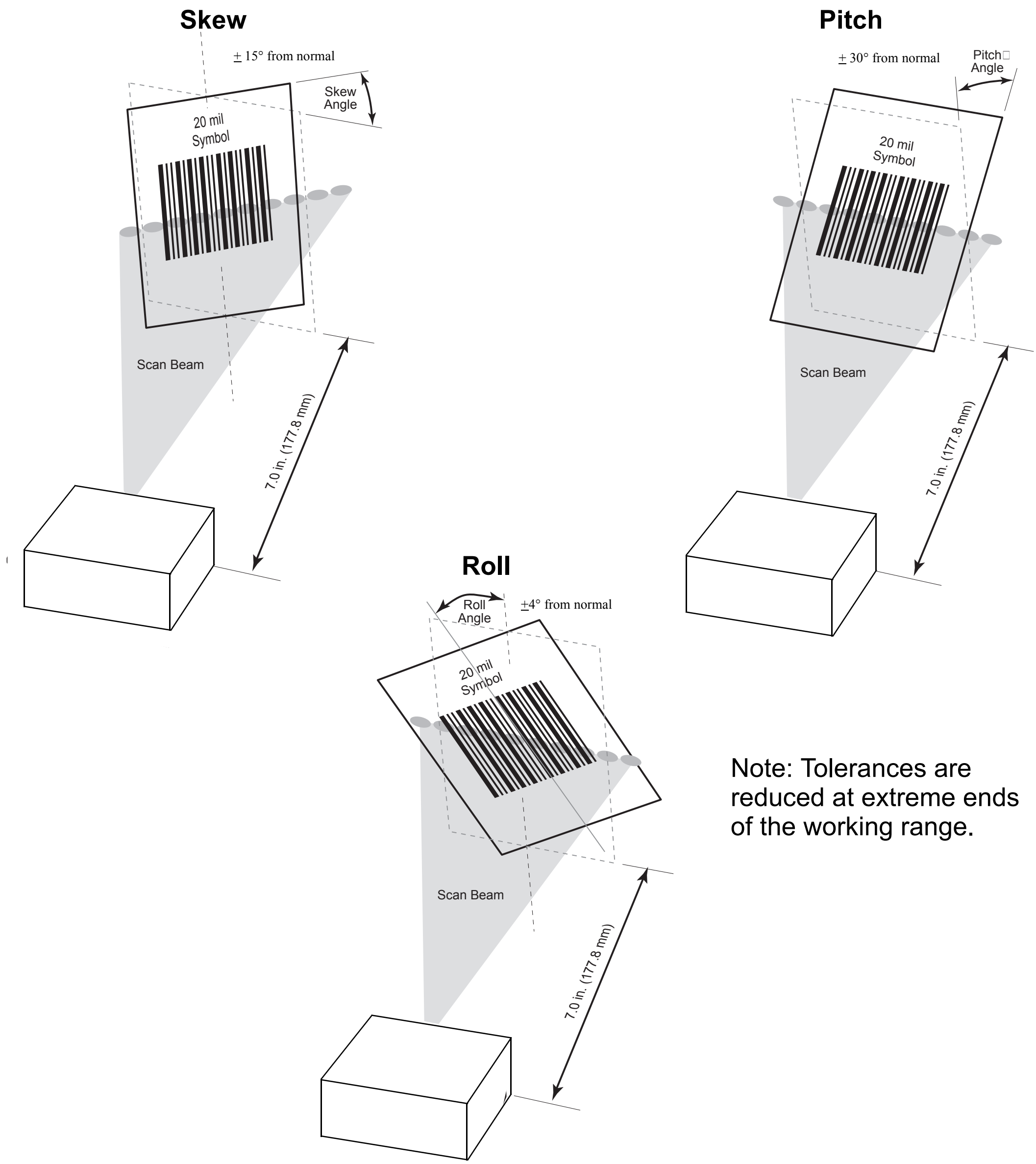


Figure 7-4. Skew, Pitch and Roll

MS 3204 Decode Zones

The decode zone is a function of various symbol characteristics including density, print contrast, wide to narrow ratio and edge acuity. The figures shown are typical values. Table 7-3 on page 7-9 and Table 7-4 on page 7-11 list the typical and guaranteed distances for selected bar code densities. The minimum element width (or "symbol density") is the width in mils of the narrowest element (bar or space) in the symbol. The maximum usable length of a symbol at any given range is shown below. To calculate this distance, see *Calculating the Usable Scan Length Method* on page 2-12.

Omnidirectional Decode Distances

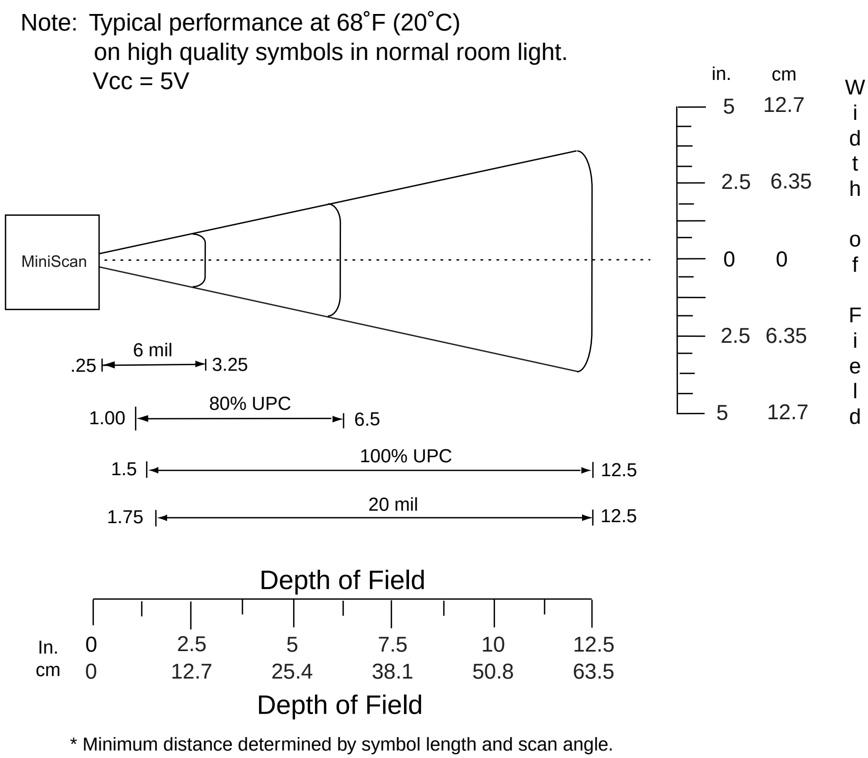


Figure 7-5. MS 3204 Omnidirectional Decode Zone

Table 7-3. MS 3204 Omnidirectional Decode Distances

Symbol Density/ Symbol p/n / Bar Code Type	Bar Code Content/ Contrast[1]	Typical Working Ranges[3]		Guaranteed Working Ranges[3]	
		Near	**Far**	**Near**	**Far**
6.0 mil 60-01755-01 Code 39	**123** 80% MRD	**0.25 in.** 0.64 cm	**3.25 in.** 8.3 cm	**0.75 in.** 1.9 cm	**2.25 in.** 5.7 cm
64-06629-01 80% UPC	**0080015** 80% MRD	**1.0 in.** 2.5 cm	**6.5 in.** 16.5 cm	**1.5 in.** 3.8 cm	**4.5 in.** 11.4 cm
13 mil 64-05303-01 100% UPC	**012345678905** 80% MRD	**1.5 in.** 3.8 cm	**12.5 in.** 31.2 cm	Note 2	**9.5 in.** 24.1 cm
20 mil 1D 60-02710-03 LC 35%	**123** 80% MRD	**1.75 in.** 4.4 cm	**12.5 in.** 31.8 cm	Note 2	**10.0 in.** 25.4 cm

Notes:

1. Contrast measured as Mean Reflective Difference (MRD) at 650 nm.
2. Near ranges on largely depend on the width of the bar code and the scan angle.
3. Working range specifications: Photographic quality symbols, pitch = 15°, skew = 0°, roll = 0°, ambient light < 150 ft. candles, and temperature = 23 °C, Vcc = 5V.
4. Measured from the front of the scanner.

2D Slab/Raster Decode Distances (MS 3204-I000 Only)

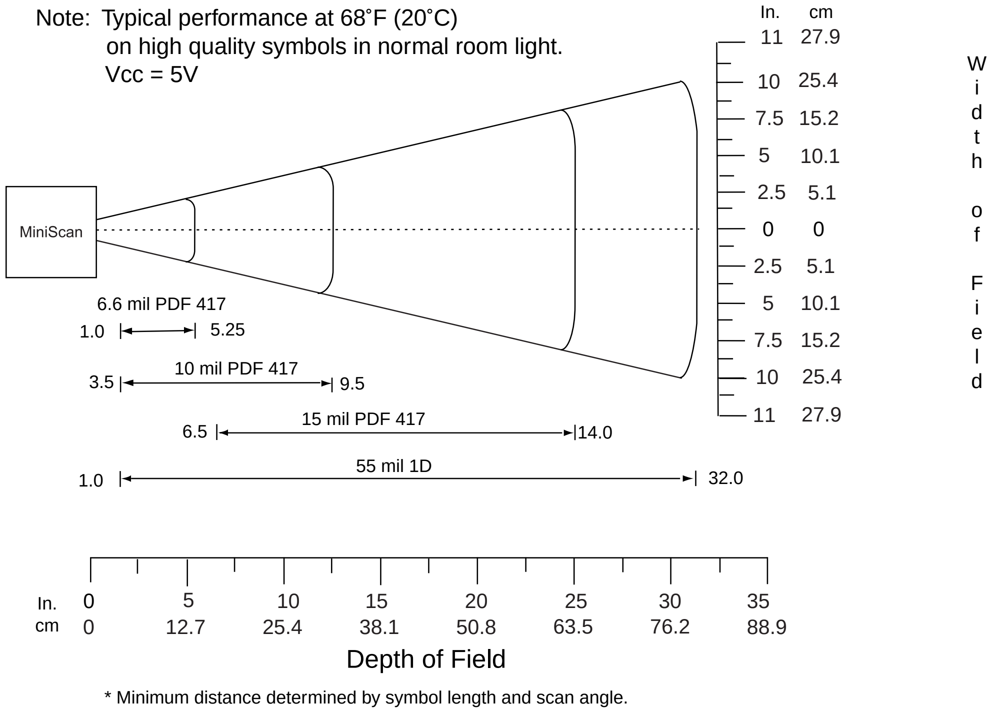


Figure 7-6. MS 3204 2D Slab/Raster Decode Distance

Table 7-4. MS 3204-I000 2D Slab/Raster Decode Distances

Symbol Density/ Symbol p/n / Bar Code Type	Bar Code Content/ Contrast[1]	Typical Working Ranges[3]		Guaranteed Working Ranges[3]	
		Near	Far	Near	Far
6.6 mil 64-14035-01 2D	**123** 80% MRD	**1.0 in.** 2.54 cm	**5.25 in.** 13.34 cm	**1.5 in.** 3.8 cm	**3.75 in.** 9.5 cm
10 mil 64-14037-01 2D	**ABCDEF** 80% MRD	**3.5 in.** 8.89 cm	**9.5 in.** 24.13 cm	**5.0 in.** 12.7 cm	**7.5 in.** 9.5 cm
15 mil 64-14038-01 2D	**012345678905** 80% MRD	**6.5 in.** 16.51 cm	**14.0 in.** 35.6 cm	Note 2	**11.0 in.** 24.1 cm
55 mil 64-17458-01 1D	**CD** 80% MRD	**1.0 in.** 2.54 cm	**32 in.** 81.3 cm	Note 2	**22.0 in.** 55.9 cm

Notes:
1. Contrast measured as Mean Reflective Difference (MRD) at 650 nm.
2. Near ranges on largely depend on the width of the bar code and the scan angle.
3. Working range specifications: Photographic quality symbols, pitch = 15°, skew = 0°, roll = 0°, ambient light < 150 ft. candles, and temperature = 23 °C, Vcc = 5V.
4. Measured from the front of the scanner.

Usable Scan Length

The decode zone is a function of various symbol characteristics including density, print contrast, wide-to-narrow ratio, and edge acuity. Consider width of decode zone at any given distance when designing a system.

Calculating the Usable Scan Length Method on page 2-12 describes how to calculate the usable scan length. The scan angle is provided in Table 7-2 on page 7-5.

Chapter 8
MS 804FZY Specifications

Overview

This chapter provides the technical specifications for the MS 804FZY scanner.

MS 804FZY Electrical Interface

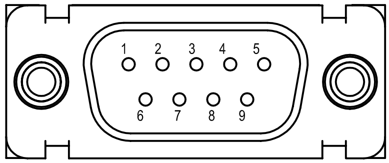


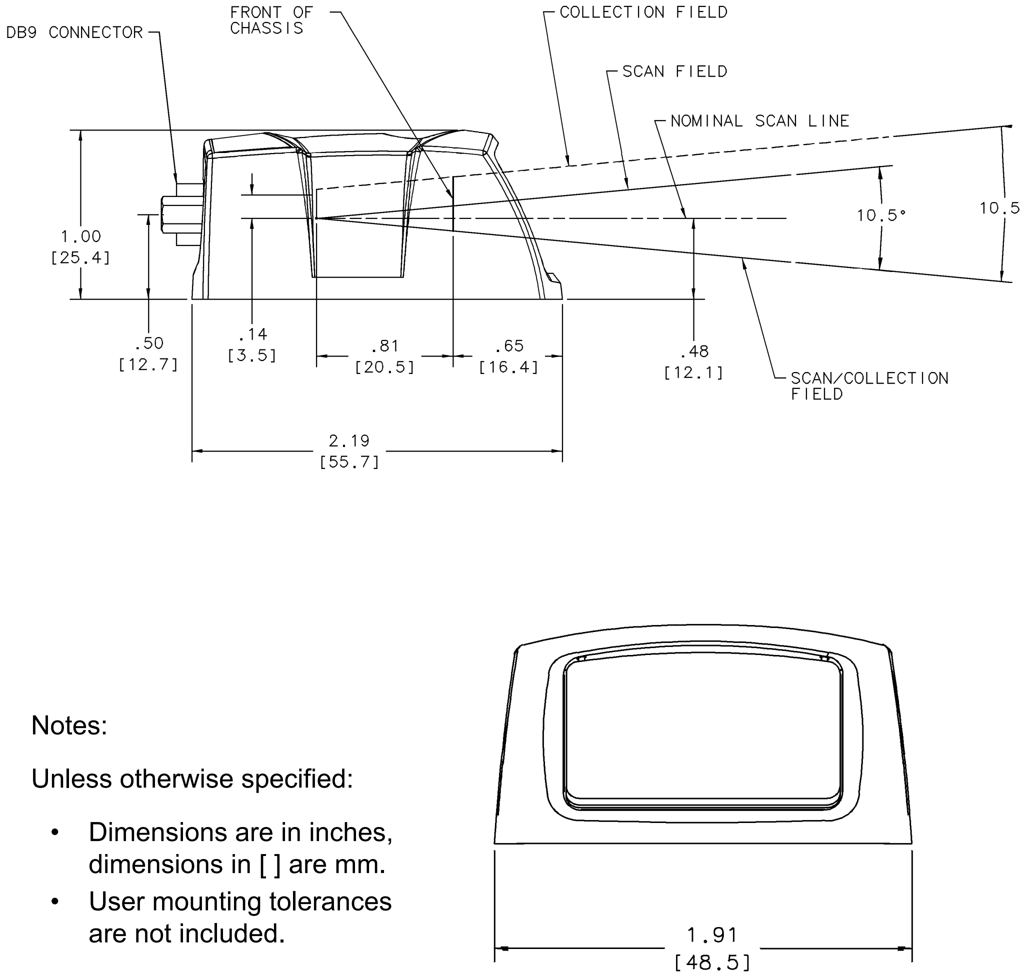
Figure 8-1. MiniScan Connector

Table 8-1 lists the pin functions of the MS 804FZY interface.

Table 8-1. MS 804FZY Electrical Interface

Pin No.	Pin Name	Type*	Function
1	**Trigger**	**I**	Signals scanner to begin scanning session.
2	**TXD**	**O**	Serial data transmit output. Drives the serial data receive input on the device communicating with the scanner.
3	**RXD**	**I**	Serial data receive input. Driven by the serial data transmit output on the device communicating with the scanner.
4	**Not used**		
5	**Ground**		Power supply ground input and signal ground reference.
6	**Power**	**I**	5.0 VDC ± 10%
7	**CTS**	**I**	Clear-to-send handshaking input line, used only in conjunction with the RTS line. Optionally used by another device to signal the scanner to begin transmitting data.
8	**RTS**	**O**	Request-to-send handshaking output line, used only in conjunction with the CTS line. Optionally used by the scanner to signal another device that data is available to send.
9	**Beeper/ Download**	**I/O**	During normal operation this signal functions as an external beeper drive line. This signal can sink 50 mA of current to drive an external beeper, and is normally pulled up. This signal is also used to begin Flash Download operation when grounded externally during power up.
*I = Input O = Output			

MS 804FZY Mechanical Drawings

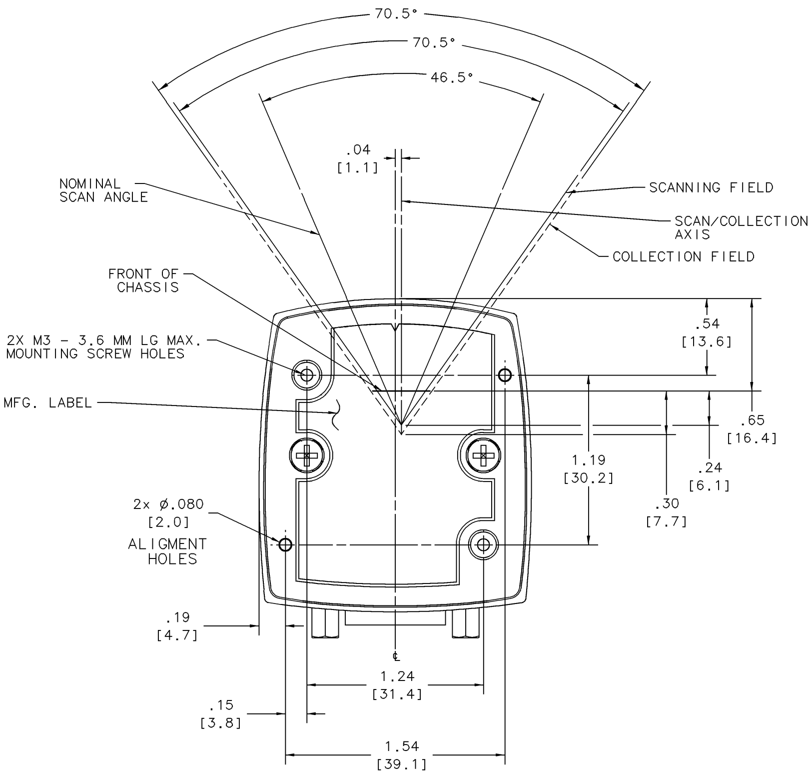


Notes:

Unless otherwise specified:

- Dimensions are in inches, dimensions in [ ] are mm.
- User mounting tolerances are not included.

Figure 8-2. MS 804FZY Mechanical Drawing



Notes:

Unless otherwise specified:

- Dimensions are in inches, dimensions in [ ] are mm.
- User mounting tolerances are not included.

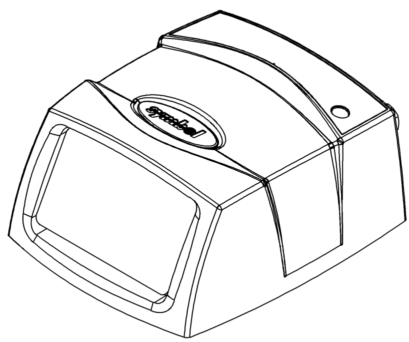


Figure 8-3. MS 804FZY Mechanical Drawing

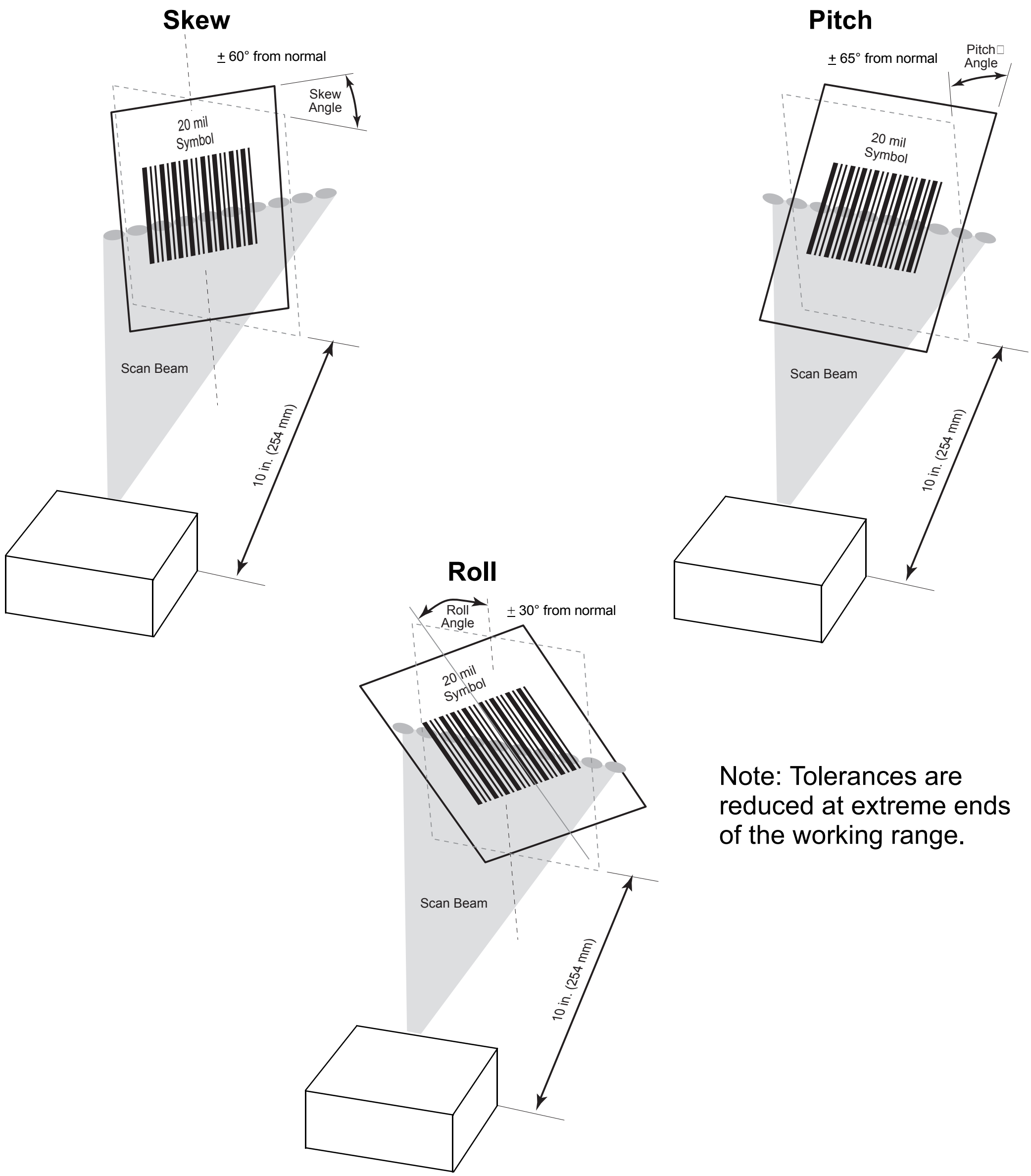
MS 804FZY Technical Specifications

Table 8-2. MS 804FZY Technical Specifications @ 23°C

Item	Description
Power Requirements	
Input Voltage	5.0 VDC ±10%
Scanning Current	150 mA ±30 mA typical
Idle Current	110 mA ±10 mA typical
Standby Current	20 mA ±5 mA typical
V_{CC} Noise Level	200 mV peak-to-peak max.
Laser Power	0.9 mW ±0.1 mW, λ = 650 nm nominal
Scan Rate	50 (±6) scans/sec (bidirectional)
Print Contrast	Minimum 25% absolute dark/light reflectance measured at 650 nm.
Scan Angle	Default (Wide): 46.5° Alternate (Narrow): 35°
Scan Pattern	Single scan line
Skew Tolerance	± 60° from normal (see Figure 8-4 on page 8-7)
Pitch Angle	± 65° from normal (see Figure 8-4 on page 8-7)
Roll	± 30° from vertical (see Figure 8-4 on page 8-7)
Decode Depth of Field	See Figure 8-5 on page 8-8
Ambient Light Immunity	
Sunlight	8,000 ft. candles (86,112 lux)
Artificial Light	450 ft. candles (4,844 lux)
Drop	Multiple 30” drops
Vibration	Withstands a random vibration of 6.5 G’s RMS along each of the 3 mutually perpendicular axes for a period of 1 hr per axis, over a frequency range of 20 Hz to 2,000 Hz.
ESD	± 15kV air discharge ± 8kV indirect discharge
Operating Temperature	-4° to 104°F (-20° to 40°C)
Storage Temperature	-40° to 158°F (-40° to 70°C)

Table 8-2. MS 804FZY Technical Specifications @ 23°C (Continued)

Item	Description
Humidity	95% (non-condensing)
Laser Class	CDRH Class II, IEC Class 2
Height	1.02 in. (2.59 cm) maximum
Width	1.93 in. (4.90 cm) maximum
Depth	2.31 in. (5.87 cm) maximum
Weight	1.67 oz. (47.34 g)



Note: Tolerances are reduced at extreme ends of the working range.

Figure 8-4. Skew, Pitch and Roll

MS 804FZY Decode Zone

The decode zone for the MS 804FZY scanner is shown in Figure 8-5. The figures shown are typical values. Table 8-3 lists the typical and guaranteed distances for selected bar code densities. The minimum element width (or "symbol density") is the width in mils of the narrowest element (bar or space) in the symbol. To calculate this distance, see *Calculating the Usable Scan Length Method* on page 2-12.

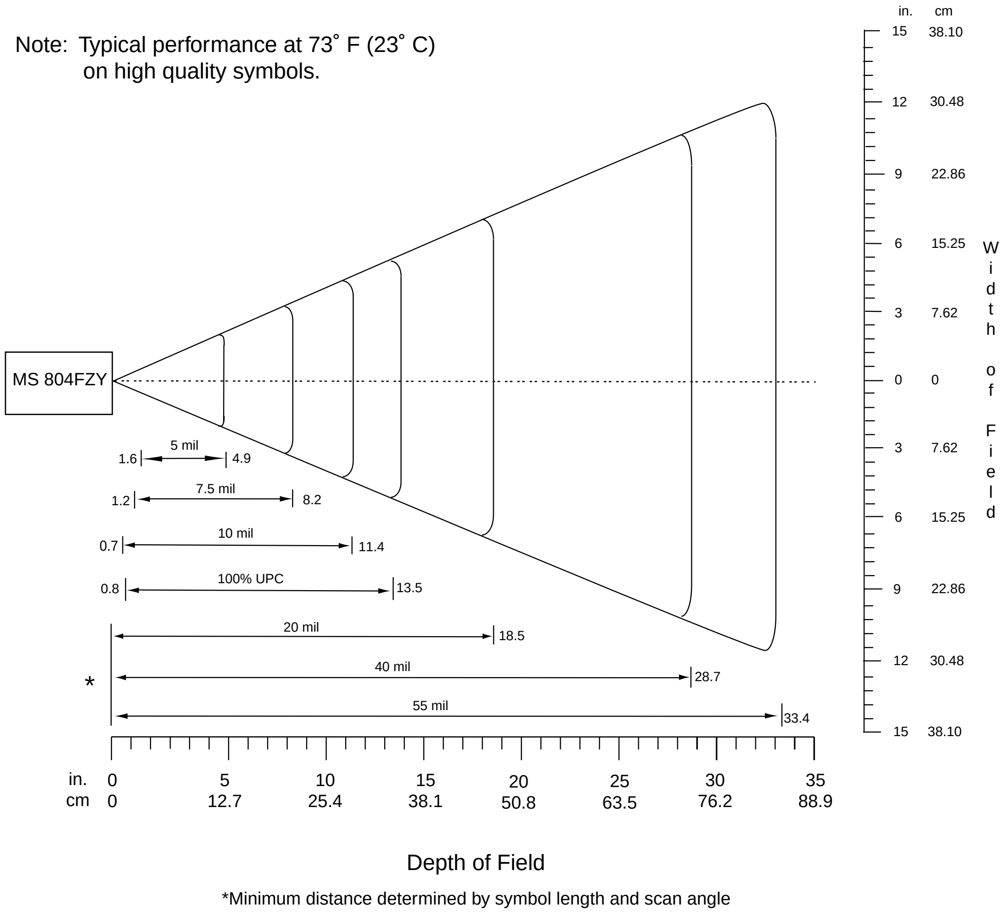


Figure 8-5. MS 804FZY Decode Zone

Table 8-3. MS 804FZY Decode Distances

Symbol Density/ Symbol p/n / Bar Code Type/ W-N Ratio	Bar Code Content/ Contrast[1]	Typical Working Ranges		Guaranteed Working Ranges	
		Near	Far	Near	Far
5 mil 64-17453-01 Code 39; 2.5:1	**ABCDEFGH** 90% MRD	1.6 in. 4.06 cm	4.9 in. 12.45 cm	2.5 in. 6.35 cm	4.0 in. 10.16 cm
7.5 mil 64-17452-01 Code 39; 2.5:1	**ABCDEF** 90% MRD	1.2 in. 3.05 cm	8.2 in. 20.83 cm	2.0 in. 5.08 cm	6.5 in. 16.51 cm
10 mil Code 39; 1:2.5	**ABCDE** 90% MRD	0.7 in. 1.78 cm	11.4 in. 28.96 cm	1.25 in. 3.18 cm	8.7 in. 22.10 cm
13 mil 64-05303-01 100% UPC	**12345678905** 90% MRD	0.8 in. 2.03 cm	13.5 in. 34.29 cm	1.5 in. 3.81 cm	11.0 in. 27.94 cm
20 mil 60-01429-01 Code 39; 2.2:1	**123** 90% MRD	Note 2	18.5 in. 46.99 cm	Note 2	14.0 in. 35.56 cm
40 mil 64-17457-01 Code 39; 2.2:1	**AB** 90% MRD	Note 2	28.7 in. 72.90 cm	Note 2	21.0 in. 53.34 cm
55 mil 64-17458-01 Code 39; 2.2:1	**CD** 90% MRD	Note 2	33.4 in. 84.84 cm	Note 2	23.0 in. 58.42 cm

Notes:

1. Contrast measured as Mean Reflective Difference (MRD) at 650 nm.
2. Near ranges on lower densities (not specified) largely depend on the width of the bar code and the scan angle.
3. Working range specifications at ambient temperature (23°C), pitch=15°, roll=0°, skew=0°, photographic quality, ambient light<200 ft-c.

Usable Scan Length

The decode zone is a function of various symbol characteristics including density, print contrast, wide-to-narrow ratio, and edge accuracy. Consider the width of the scan line at any given distance when designing a system.

Calculating the Usable Scan Length Method on page 2-12 describes how to calculate the usable scan length. The scan angle is provided in Table 8-3.

Chapter 9
MS 904HS Specifications

Overview

This chapter provides the technical specifications for the MS 904HS (High Speed) scanner.

MS 904HS Electrical Interface

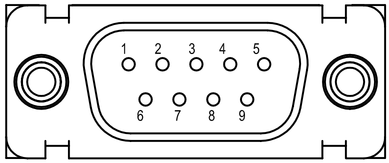


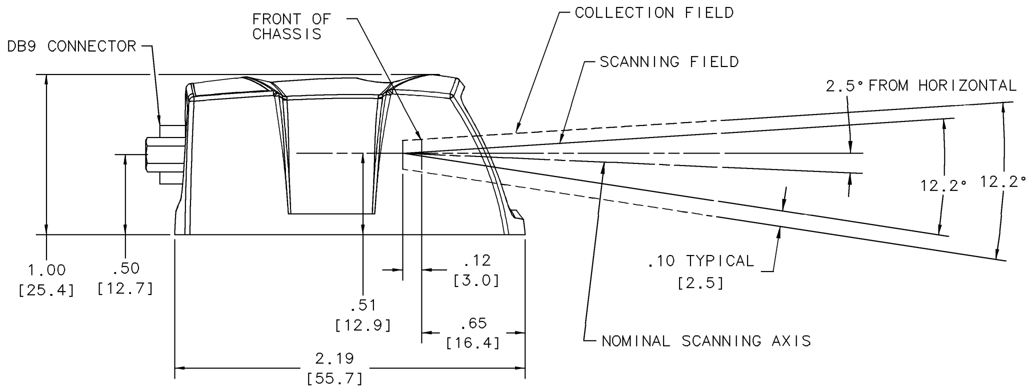
Figure 9-1. MiniScan Connector

Table 9-1 lists the pin functions of the MS 904HS interface.

Table 9-1. MS 904HS Electrical Interface

Pin No.	Pin Name	Type*	Function
1	**Trigger**	I	Signals scanner to begin scanning session.
2	**TXD**	O	Serial data transmit output. Drives the serial data receive input on the device communicating with the scanner.
3	**RXD**	I	Serial data receive input. Driven by the serial data transmit output on the device communicating with the scanner.
4	**Not used**		
5	**Ground**		Power supply ground input and signal ground reference.
6	**Power**	I	5.0 VDC ± 10%
7	**CTS**	I	Clear-to-send handshaking input line, used only in conjunction with the RTS line. Optionally used by another device to signal the scanner to begin transmitting data.
8	**RTS**	O	Request-to-send handshaking output line, used only in conjunction with the CTS line. Optionally used by the scanner to signal another device that data is available to send.
9	**Beeper/ Download**	I/O	During normal operation this signal functions as an external beeper drive line. This signal can sink 50 mA of current to drive an external beeper, and is normally pulled up. This signal is also used to begin Flash Download operation when grounded externally during power up.
*I = Input O = Output			

MS 904HS Mechanical Drawings



Notes:

Unless otherwise specified:

- Dimensions are in inches, dimensions in [ ] are mm.
- User mounting tolerances are not included.

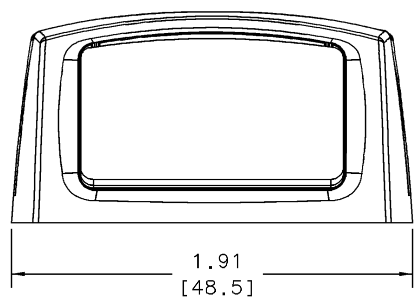
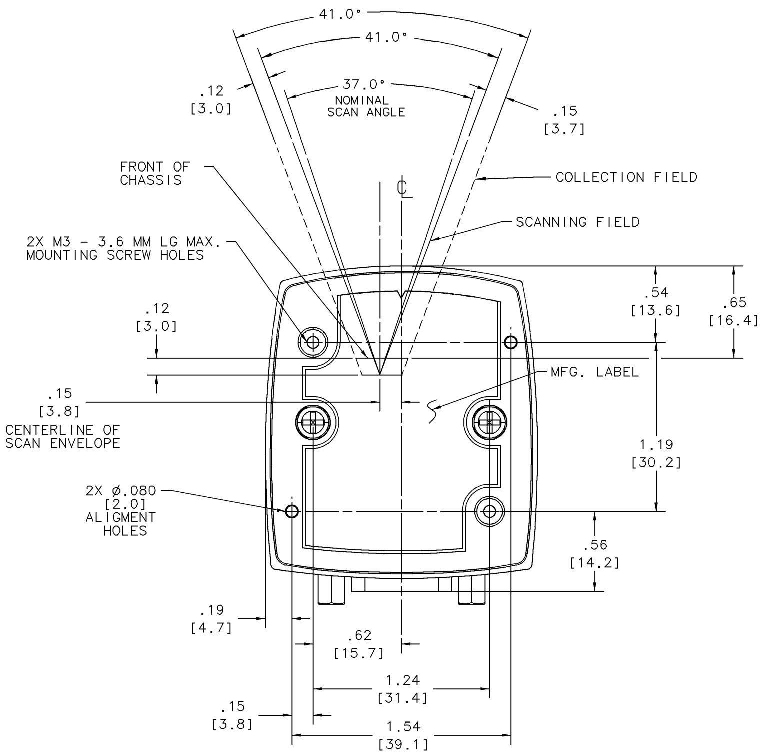


Figure 9-2. MS 904HS Mechanical Drawing



Notes:

Unless otherwise specified:

- Dimensions are in inches, dimensions in [ ] are mm.
- User mounting tolerances are not included.

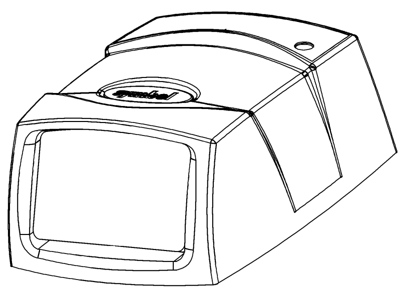


Figure 9-3. MS 904HS Mechanical Drawing

MS 904HS Technical Specifications

Table 9-2. MS 904HS Technical Specifications @ 23°C

Item	Description
Power Requirements **Input Voltage** **Scanning Current** **Idle Current** **Standby Current** **V_{CC} Noise Level**	 5.0 VDC ±10% 130 mA ±30 mA typical 70 mA ±10 mA typical 20 mA ±5 mA typical 100 mV peak-to-peak max.
Laser Power	0.8 mW ±0.1 mW, λ = 650 nm nominal
Scan Rate	186 (±13) scans/sec (bidirectional)
Print Contrast	Minimum 25% absolute dark/light reflectance measured at 650 nm
Scan Angle	37° (typical)
Scan Pattern	Single scan line
Skew Tolerance	± 45° from normal (see Figure 9-4 on page 9-7)
Pitch Angle	± 60° from normal (see Figure 9-4 on page 9-7)
Roll	± 30° from vertical (see Figure 9-4 on page 9-7)
Decode Depth of Field	See Figure 9-5 on page 9-8
Ambient Light Immunity **Sunlight** **Artificial Light**	 8,000 ft. candles (86,112 lux) 450 ft. candles (4,844 lux)
Drop	Multiple 30” drops
Vibration	Withstands a sinusoidal vibration of 4 G along each of the mutually perpendictular axes for a period of 1 hr per axis over a frequency range of 20Hz to 1600 Hz.
ESD	± 15kV air discharge ± 8kV indirect discharge
Operating Temperature	32° to 104°F (0° to 40°C)
Note: Environmental and/or Tolerance Parameters are not cumulative.	

Table 9-2. MS 904HS Technical Specifications @ 23°C (Continued)

Item	Description
Storage Temperature	-40° to 140°F (-40° to 60°C)
Humidity	5% to 95% non-condensing
Laser Class	CDRH Class II, IEC Class 2
Height	1.02 in. (2.59 cm) maximum
Width	1.93 in. (4.90 cm) maximum
Depth	2.31 in. (5.87 cm) maximum
Weight	1.70 oz. (48.20 g)
Note: Environmental and/or Tolerance Parameters are not cumulative.	

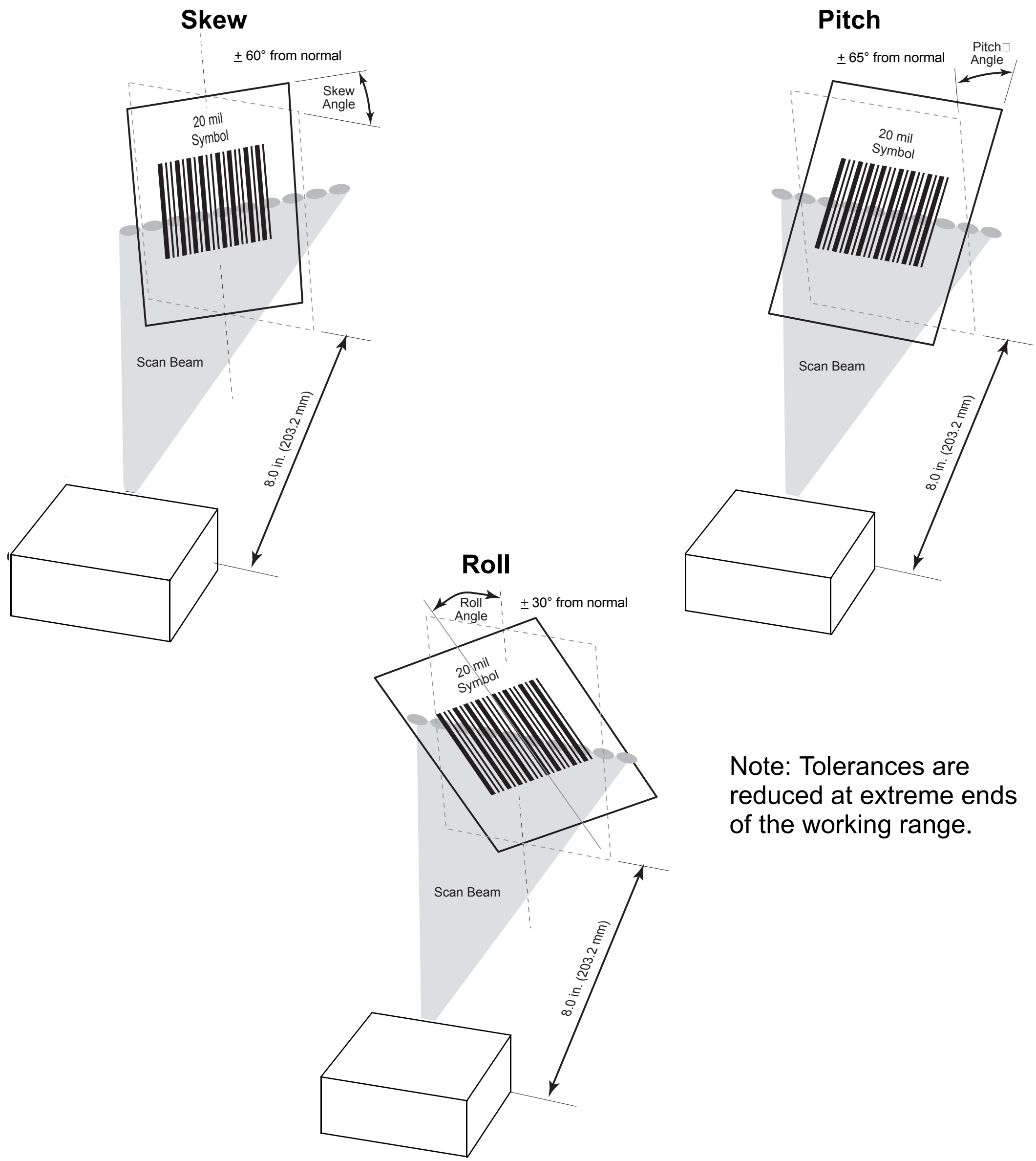


Figure 9-4. MS 904HS Skew, Pitch and Roll

MS 904HS Decode Zone

The figures shown are typical values. Table 9-3 on page 9-9 lists the typical and guaranteed distances for selected bar code densities. The minimum element width (or "symbol density") is the width in mils of the narrowest element (bar or space) in the symbol. The maximum usable length of a symbol at any given range is shown below. To calculate this distance, see *Calculating the Usable Scan Length Method* on page 2-12.

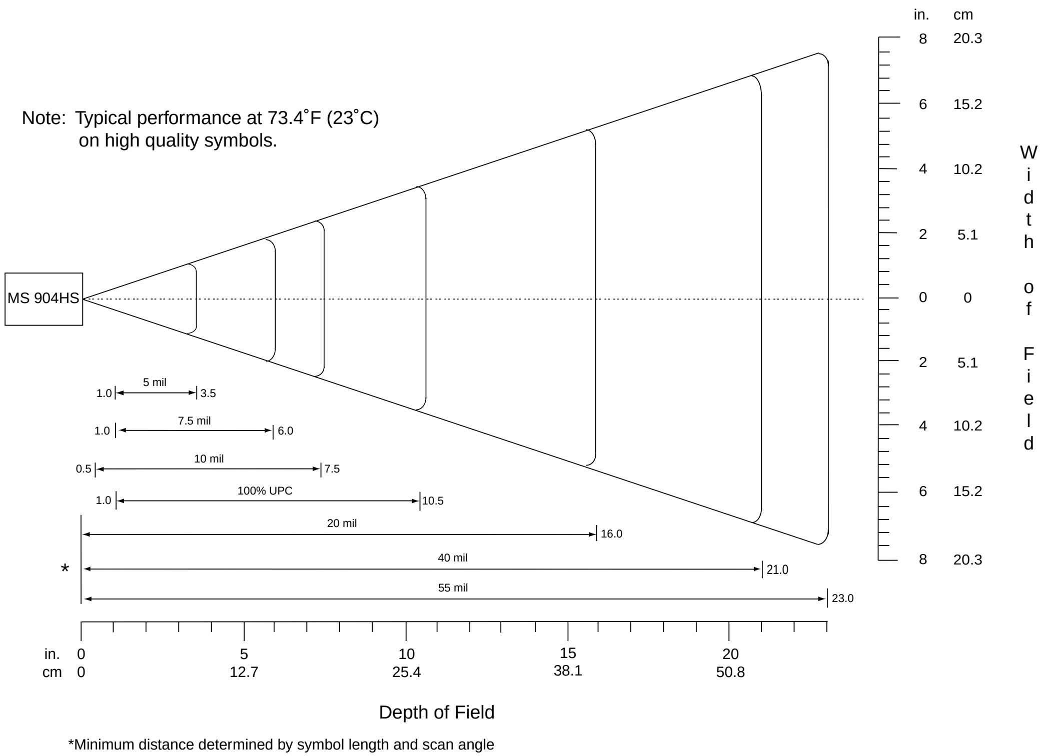


Figure 9-5. MS 904HS Decode Zone (Typical)

Table 9-3. MS 904HS Decode Distances

Symbol Density/ Symbol p/n / Bar Code Type/ W-N Ratio	Bar Code Content/ Contrast[1]	Typical Working Ranges		Guaranteed Working Ranges	
		Near	Far	Near	Far
5 mil 64-17453-01 Code 39; 1:2.5	**ABCDEFGH** 90% MRD	**1.0 in.** 2.54 cm	**3.5 in.** 8.89 cm	**1.5 in.** 3.81 cm	**2.5 in.** 6.35 cm
7.5 mil 64-17452-01 Code 39; 1:2.5	**ABCDEF** 90% MRD	**1.0 in.** 2.54 cm	**6.0 in.** 15.24 cm	**1.5 in.** 3.81 cm	**5.0 in.** 12.7 cm
10 mil Code 39; 1:2.2	**FGH** 90% MRD Note 4	**0.5 in.** 1.27 cm	**7.5 in.** 19.05 cm	**1.1 in.** 2.79 cm	**6.0 in.** 15.24 cm
13 mil 64-05303-01 100% UPC	**12345678905** 90% MRD	**1.0 in.** 2.54 cm	**10.5 in.** 26.67 cm	**1.5 in.** 3.81 cm	**9.0 in.** 22.86 cm
20 mil 60-01429-01 Code 39; 1:2.2	**123** 90% MRD Note 4	Note 2	**16.0 in.** 40.64 cm	Note 2	**14.0 in.** 35.56 cm
40 mil 64-17457-01 Code 39; 1:2.2	**AB** 90% MRD Note 4	Note 2	**21.0 in.** 53.34 cm	Note 2	**16.5 in.** 41.91 cm
55 mil 64-17458-01 Code 39; 1:3	**CD** 90% MRD Note 4	Note 2	**23.0 in.** 58.42 cm	Note 2	**17.5 in.** 44.45 cm

Notes:

1. Contrast measured as Mean Reflective Difference (MRD) at 650 nm.
2. Near ranges on lower densities (not specified) largely depend on the width of the bar code and the scan angle.
3. Working range specifications at ambient temperature (23°C), pitch=15°, roll=0°, skew=0°, photographic quality, ambient light<200 ft-c.
4. The MS 904HS does not decode 1 to 4 digit Code 39 bar codes by default. To test this specification, enable Code 39 Length 2 bar codes (see *Set Lengths for Code 39* on page 11-62).

Usable Scan Length

The decode zone is a function of various symbol characteristics including density, print contrast, wide-to-narrow ratio, and edge accuracy. Consider the width of the scan line at any given distance when designing a system.

Calculating the Usable Scan Length Method on page 2-12 describes how to calculate the usable scan length. The scan angle is provided in Table 9-3.

Chapter 10
Maintenance and Troubleshooting

Overview

The chapter provides information on maintenance and troubleshooting.

Maintenance

Cleaning the exit window is the only maintenance required. Do not allow any abrasive material to touch the window. Clean the scan window with a damp cloth and, if necessary, a non-ammonia based detergent.

Troubleshooting

Problem	Possible Cause	Possible Solutions
No red LED or nothing happens during a scan attempt.	No power to the scanner.	Check the system power. Confirm that the correct host interface cable is used.
		Connect the power supply.
		Re-connect loose cables.
Scanner cannot read the bar code.	Interface/power cables are loose.	Re-connect loose cables.
	Scanner is not programmed for the correct bar code type.	Make sure the scanner is programmed to read the type of bar code to be scanned. Try scanning other bar code(s) and other bar code types.
	Incorrect communication parameters.	Set the correct communication parameters (baud rate, parity, stop bits, etc.)
	Bar code symbol is unreadable.	Check the symbol to make sure it is not defaced. Try scanning similar symbols of the same code type.
	Inappropriately hot environment.	Remove the scanner from the hot environment, and allow it to cool down.
Laser activates, followed by a beep sequence.	Beeper is configured.	Refer to Table 3-1 on page 3-9 for beeper indication descriptions.

Note: *If after performing these checks the symbol still does not scan, contact the distributor or call the Symbol Support Center at the telephone number listed on page xiii.*

Chapter 11
Parameter Menus

This chapter describes the programmable parameters, and provides bar codes for programming and hexadecimal equivalents for host download programming.

Throughout the programming bar code menus, default values are indicated with asterisks (*).

***Low Power**

(01h)

* Indicates Default

Feature/Option

Hex Value

Operational Parameters

MiniScan scanners are shipped with the default settings shown in Table 11-1 on page 11-3. These default values are stored in non-volatile memory and are preserved even when the scanner is powered down.

There are two ways to change the default values:

- Scan the appropriate bar codes in this chapter. These new values replace the standard default values in memory. To recall the default parameter values, scan the *Set All Defaults* bar code on page 11-12.
- Download data through the scanner's serial port using Symbol's Simple Serial Interface (SSI). Hexadecimal parameter numbers are shown in this chapter below the parameter title, and options are shown in parenthesis beneath the accompanying bar codes. See the *Simple Serial Interface (SSI) Programmer's Guide* for detailed instructions for changing parameters using this method.

Default Table

Table 11-1 lists the defaults for all parameters, and the page number each parameter appears on. To change any option, scan the appropriate bar code(s).

Table 11-1. Default Table

Parameter	Parameter Number	Default	Page Number
Set Default Parameter		All Defaults	11-12
Scanning Options			
Beeper Volume	8Ch	High Volume	11-13
Beeper Tone	91h	High Frequency	11-14
Beeper Frequency Adjustment (not supported by MS 904HS)	F07 91h	2500 Hz	11-15
Laser On Time	88h	3.0 sec (MS 2204/ 2204VHD/3204: 5.0 sec)	11-16
Scan Angle (MS 1204FZY and MS 804FZY only)	BFh	Wide	11-17
Power Mode	80h	Low Power	11-18
Trigger Mode	8Ah	Level	11-19
Scanning Mode (MS 2204, MS 2204VHD, and MS 3204 only)	8Dh	Smart Raster	11-20
Aiming Mode	F0h 7Eh	Disabled	11-21
Raster Height (MS 2204, MS 2204VHD, and MS 3204-I000 only)	E4h	15	11-22
Raster Expansion Rate (MS 2204, MS 2204VHD, and MS 3204-I000 only)	E5h	11	11-22
Time-out Between Same Symbol	89h	0.6 sec (MS 804FZY/904HS: 1.0 sec)	11-23
Time-out Between Different Symbols	90h	0.0 sec	11-23

Table 11-1. Default Table (Continued)

Parameter	Parameter Number	Default	Page Number
Beep After Good Decode	38h	Enable	11-24
Transmit “No Read” Message	5Eh	Disable	11-25
Parameter Scanning	ECh	Enable	11-26
Linear Code Type Security Level	4Eh	1 (MS 2204/2204VHD/ 3204: 2)	11-27
Bi-directional Redundancy	43h	Disable	11-29
UPC/EAN			
UPC-A	01h	Enable	11-30
UPC-E	02h	Enable	11-30
UPC-E1	0Ch	Disable	11-32
EAN-8	04h	Enable	11-33
EAN-13	03h	Enable	11-34
Bookland EAN	53h	Disable	11-35
UPC/EAN Coupon Code	55h	Disable	11-36
Decode UPC/EAN Supplementals	10h	Ignore	11-37
Decode UPC/EAN Supplemental Redundancy	50h	20 (MS 804FZY/ MS 904HS: 7)	11-39
Transmit UPC-A Check Digit	28h	Enable	11-40
Transmit UPC-E Check Digit	29h	Enable	11-41
Transmit UPC-E1 Check Digit	2Ah	Enable	11-42

Table 11-1. Default Table (Continued)

Parameter	Parameter Number	Default	Page Number
UPC-A Preamble	22h	System Character	11-43
UPC-E Preamble	23h	System Character	11-44
UPC-E1 Preamble	24h	System Character	11-45
Convert UPC-E to A	25h	Disable	11-46
Convert UPC-E1 to A	26h	Disable	11-47
EAN-8 Zero Extend	27h	Disable	11-48
UPC/EAN Security Level	4Dh	0	11-49
Linear UPC/EAN Decode	44h	Disable	11-51
UPC Half Block Stitching (MS 2204/ MS 2204VHD/MS 3204 only)	4Ah	Disable	11-52
Code 128			
Code 128	08h	Enable	11-53
UCC/EAN-128	0Eh	Enable	11-54
ISBT 128	54h	Disable (MS 1204FZY: Enable)	11-55
Code 128 Decode Performance (MS 2204/MS 2204VHD/ MS 3204 only)	48h	Enable	11-56
Code 128 Decode Performance Level (MS 2204/MS 2204VHD/ MS 3204 only)	49h	Level 3	11-57

Table 11-1. Default Table (Continued)

Parameter	Parameter Number	Default	Page Number
Code 39			
Code 39	00h	Enable	11-58
Trioptic Code 39	0Dh	Disable	11-59
Convert Code 39 to Code 32	56h	Disable	11-60
Code 32 Prefix	E7h	Enable (MS 804FZY/ MS 904HS: Disable)	11-61
Set Length(s) for Code 39	12h 13h	Length within Range: MS 1204FZY/MS 804FZY: 02-55 MS 2204/2204VHD/ MS 3204: 01-55 MS 904HS: 04-37	11-62
Code 39 Check Digit Verification	30h	Disable	11-64
Transmit Code 39 Check Digit	2Bh	Disable	11-65
Code 39 Full ASCII Conversion	11h	Disable	11-66
Code 39 Decode Performance (MS 2204/MS 2204VHD/ MS 3204 only)	46h	Enable	11-67
Code 39 Decode Performance Level (MS 2204/MS 2204VHD/ MS 3204 only)	47h	Level 3	11-68
Code 93			
Code 93	09h	Disable	11-69
Set Length(s) for Code 93	1Ah 1Bh	Length within Range: 04-55	11-70

Table 11-1. Default Table (Continued)

Parameter	Parameter Number	Default	Page Number
Code 11			
Code 11	0Ah	Disable	11-72
Set Length(s) for Code 11	1Ch 1Dh	Length within Range: 04-55	11-73
Code 11 Check Digit Verification	34h	Disable	11-75
Transmit Code 11 Check Digits	2Fh	Disable	11-76
Interleaved 2 of 5			
Interleaved 2 of 5	06h	Disable (MS 1204FZY: Enable)	11-77
Set Length(s) for I 2 of 5	16h 17h	1 Discrete Length: 14	11-78
I 2 of 5 Check Digit Verification	31h	Disable	11-80
Transmit I 2 of 5 Check Digit	2Ch	Disable	11-81
Convert I 2 of 5 to EAN 13	52h	Disable	11-82
Discrete 2 of 5			
Discrete 2 of 5	05h	Disable	11-83
Set Length(s) for D 2 of 5	14h 15h	1 Discrete Length: 12	11-84
Codabar			
Codabar	07h	Disable	11-86
Set Lengths for Codabar	18h 19h	Length within Range: 05-55	11-87

Table 11-1. Default Table (Continued)

Parameter	Parameter Number	Default	Page Number
CLSI Editing	36h	Disable	11-89
NOTIS Editing	37h	Disable	11-90
MSI Plessey			
MSI Plessey	0Bh	Disable	11-91
Set Length(s) for MSI Plessey	1Eh 1Fh	Length Within Range: 06 - 55 (MS 904HS: 05 - 55)	11-92
MSI Plessey Check Digits	32h	One	11-94
Transmit MSI Plessey Check Digit	2Eh	Disable	11-95
MSI Plessey Check Digit Algorithm	33h	Mod 10/Mod 10	11-96
PDF417/MicroPDF417 (MS 2204, MS 2204VHD, and MS 3204 only)			
PDF417	0Fh	MS 220X: Enable MS 3204: Disable	11-97
MicroPDF417	E3h	Disable	11-98
MicroPDF Performance	F0h 65h	Standard	11-99
Code 128 Emulation	7Bh	Disable	11-100
RSS (not supported by MS 904HS)			
RSS-14	F0h 52h	Disable	11-101
RSS-Limited	F0h 53h	Disable	11-102
RSS-Expanded	F0h 54h	Disable	11-103
Convert RSS to UPC/EAN (MS 1204FZY only)	F0h 8Dh	Disable	11-103

Table 11-1. Default Table (Continued)

Parameter	Parameter Number	Default	Page Number
Composite (MS 2204, MS 2204VHD and MS 3204 only)			
CC-C	F0h 55h	Disable	11-105
CC-AB	F0h 56h	Disable	11-106
TLC-39	F0h 73h	Disable	11-107
UPC Composite Mode	F0h 58h	Always Linked	11-108
Data Options			
Transmit Code ID Character	2Dh	None	11-109
Prefix/Suffix Values Prefix Suffix 1 Suffix 2	 69h 68h 6Ah	 NULL LF CR	11-111
Scan Data Transmission Format	EBh	Data as is	11-113
Simple Serial Interface (SSI) Options			
Baud Rate	9Ch	9600	11-115
Parity	9Eh	None	11-117
Check Parity	97h	Enable	11-119
Software Handshaking	9Fh	ACK/NAK	11-120
Host RTS Line State	9Ah	Low	11-121
Decode Data Packet Format	EEh	Unpacketed	11-122
Stop Bit Select	9Dh	1	11-123
Intercharacter Delay	6Eh	0	11-124

Table 11-1. Default Table (Continued)

Parameter	Parameter Number	Default	Page Number
Host Serial Response Time-out	9Bh	2 sec	11-124
Host Character Time-out	EFh	200 msec	11-125
Event Reporting			
Decode Event	F0h 00h	Disable	11-127
Boot Up Event	F0h 02h	Disable	11-128
Parameter Event	F0h 03h	Disable	11-129
Macro PDF (MS 2204, MS 2204VHD, and MS 3204 only)			
Transmit Each Symbol in Codeword Format	Afh	Disable	11-130
Transmit Unknown Codewords	BAh	Disable	11-132
Escape Character	E9h	None	11-133
ECI (MS 2204, MS 2204VHD and MS 3204 only)			
Delete Character Set ECIs	E6h	Enable	11-134
ECI Decoder	E8h	Enable	11-135
Transmit Macro PDF User-Selected Field (MS 2204, MS 2204VHD, and MS 3204 only)			
Transmit File Name	B0h	Disable	11-137
Transmit Block Count	B1h	Disable	11-138
Transmit Time Stamp	B2h	Disable	11-139
Transmit Sender	B3h	Disable	11-140
Transmit Addressee	B4h	Disable	11-141
Transmit Checksum	B6h	Disable	11-142

Table 11-1. Default Table (Continued)

Parameter	Parameter Number	Default	Page Number
Transmit File Size	B5h	Disable	11-143
Transmit Macro PDF Control Header	B7h	Disable	11-144
Last Block Marker	B9h	Disable	11-145

Set Default Parameter

Scan this bar code to return all parameters to the values listed in Table 11-1 on page 11-3.

Set All Defaults

Scanning Options

Beeper Volume

Parameter # 8Ch

To select a decode beep volume, scan the **Low Volume, Medium Volume**, or **High Volume** bar code.

Low Volume

Medium Volume

***High Volume**

Beeper Tone

Parameter # 91h

To select a decode beep frequency (tone), scan the appropriate bar code.

Low Frequency

(02h)

Medium Frequency

(01h)

***High Frequency**

(00h)

Beeper Frequency Adjustment

Parameter # F0h 91H

Note: *This option is not supported by MS 904HS.*

This parameter adjusts the frequency of the high beeper tone from the nominal 2500 Hz to another frequency matching the resonances of the installation. It is programmable in 10 Hz increments from 1220 Hz to 3770 Hz.

To increase the frequency, scan the bar code below, then scan three numeric bar codes beginning on page 11-146 that correspond to the desired frequency adjustment divided by 10. For example, to set the frequency to 3000 Hz (an increase of 500 Hz), scan numeric bar codes 0, 5, 0, corresponding to 50, or (500/10).

To decrease the frequency, scan the bar code below, then scan three numeric bar codes beginning on page 11-146 that correspond to the value (256 - desired adjustment/10). For example, to set the frequency to 2000 Hz (a decrease of 500 Hz), scan numeric bar codes 2, 0, 6, corresponding to 206, or (256 - 500/10).

Beeper Frequency Adjustment

Laser On Time

Parameter # 88h

This parameter sets the maximum time decode processing continues during a scan attempt. It is programmable in 0.1 second increments from 0.5 to 9.9 seconds.

To set a Laser On Time, scan the bar code below. Next scan two numeric bar codes beginning on page 11-146 that correspond to the desired on time. Times less than 1.0 second must have a leading zero. For example, to set an on time of 0.5 seconds, scan the bar code below, then scan the *0* and *5* bar codes. To change the selection or to cancel an incorrect entry, scan the *Cancel* bar code on page 11-148.

Laser On Time

Scan Angle

Parameter # BFh

Note: *This option is supported by the MS 1204FZY and MS 804FZY only.*

This parameter sets the scan angle.

***Default Angle**

(06h)

Alternate Angle

(05h)

Power Mode

Parameter # 80h

This parameter determines whether or not power remains on after a decode attempt. In Low Power mode, the scanner enters into a low power consumption mode when possible, provided all WAKEUP signals are released. In Continuous On mode, power remains on after each decode attempt.

Continuous On

(00h)

***Low Power**

(01h)

Trigger Modes

Parameter # 8Ah

- **Level** - A trigger pull activates the laser and decode processing. The laser remains on and decode processing continues until a trigger release, a valid decode, or the Laser On Time-out is reached.
- **Pulse** - A trigger pull activates the laser and decode processing. The laser remains on and decode processing continues until a valid decode or the Laser On Time-out is reached.
- **Continuous** - The laser is always on and decoding.
- **Blink** - This trigger mode is used for triggerless ScanStand operation. Scanning range is reduced in this mode. This mode is only supported by MS 1204FZY, MS 804FZY, and MS 904HS.
- **Host** - A host command issues the triggering signal. The scanner interprets an actual trigger pull as a Level triggering option.

***Level**
(00h)

Pulse
(02h)

Continuous
(04h)

Blink
(07h)

Host
(08h)

Scanning Mode

Parameter # 8Dh

Note: *This option is supported by the MS 2204, MS 2204VHD and MS 3204 only.*

Select one of the following scanning modes:

- Smart Raster
- Slab Only Raster
- Omnidirectional (Cyclone)
- Always Raster
- Programmable Raster
- Semi-Omnidirectional

Note: *If Omnidirectional is selected, disabling the following parameters is recommended: PDF417, MicroPDF417, RSS-Limited, CC-C, CC-AB, TLC-39 and Linear UPC.*

*** Smart Raster**
(01h)

Always Raster
(02h)

Programmable Raster
(03h)

Slab Pattern
(04h)

Omnidirectional Pattern
(06h)

Semi-Omni Pattern
(07h)

Aiming Mode

Parameter # F0h 7Eh

For handheld mode only, select an aiming dot to appear for a normal or extended period of time.

***No Aiming Dot**
(00h)

Aiming Dot
Normal (200 ms) Timeout
(01h)

Aiming Dot
Extended (400 ms) Timeout
(02h)

Programmable Raster Height And Raster Expansion Speed

Parameter # E4h, E5h

Note: *This option is supported by the MS 2204, MS 2204VHD and MS 3204-I000 only.*

This parameter selects the laser pattern's height and rate of expansion, and is only used when Programmable Raster or Always Raster is enabled. This parameter is intended for very specific applications, and is usually not necessary.

Select the laser pattern's height and/or rate of expansion.

1. Scan the bar code for either **Raster Height** or **Raster Expansion Speed** below.
2. Scan two numeric bar codes beginning on page 11-146 that represent a two-digit value. Valid values are between 01 and 15.

To change the selection or to cancel an incorrect entry, scan *Cancel* on page 11-148.

Raster Height (Default 15)

Raster Expansion Speed (Default 11)

Timeout Between Decodes

Timeout Between Decodes, Same Symbol
Parameter # 89h

When in Continuous triggering mode, this parameter sets the minimum duration of not decoding data before the scanner decodes a second bar code identical to one just decoded. This reduces the risk of accidently scanning the same symbol twice. It is programmable in 0.1 second increments from 0.0 to 9.9 seconds. The recommended interval is 0.6 seconds.

Timeout Between Decodes, Different Symbol
Parameter # 90h

This option sets the minimum duration of not decoding data before the scanner decodes a second (different) bar code. This is used in continuous-on mode to prevent the beeper from beeping when a different symbol appears in the scanner's field of view before the timeout period between decodes expires. This is programmable in 0.1 second increments from 0.0 to 9.9 seconds. The recommended value is 0.0 seconds.

Select the timeouts between decodes for the same or different symbols.

1. Scan the option bar code you wish to set.
2. Scan two numeric bar codes beginning on page 11-146 which correspond to the desired interval, in 0.1 second increments.

To change the selection or to cancel an incorrect entry, scan the *Cancel* bar code on page 11-148.

Timeout Between Decodes - Same Symbol

Timeout Between Decodes - Different Symbols

Beep After Good Decode

Parameter # 38h

Scan this symbol to set the scanner to beep after a good decode.

***Beep After Good Decode**

(01h)

Scan this symbol to set the scanner not to beep after a good decode. The beeper still operates during parameter menu scanning and indicates error conditions.

Do Not Beep After Good Decode

(00h)

Transmit "No Read" Message

Parameter # 5Eh

Enable this option to transmit "NR" if a symbol does not decode. Any enabled prefix or suffixes are appended around this message.

Enable No Read

(01h)

When the parameter is disabled, and a symbol can not be decoded, no message is sent to the host.

***Disable No Read**

(00h)

Parameter Scanning

Parameter # ECh

To disable the decoding of parameter bar codes, scan the bar code below. The **Set Defaults** parameter bar code can still be decoded. To enable decoding of parameter bar codes, either scan **Enable Parameter Scanning*, *Set All Defaults* or set this parameter to 01h via a serial command.

***Enable Parameter Scanning**

(01h)

Disable Parameter Scanning

(00h)

Linear Code Type Security Level

Parameter # 4Eh

Note: *Does not apply to Code 128.*

The MiniScan scanner offer four levels of decode security for linear code types (e.g., Code 39, Interleaved 2 of 5). Select higher security levels for decreasing levels of bar code quality. As security levels increase, the scanner's aggressiveness decreases.

Select the security level appropriate for your bar code quality.

Linear Security Level 1

The following code types must be successfully read twice before being decoded:

Code Type	Length
Codabar	All
MSI Plessey	4 or less
D 2 of 5	8 or less
I 2 of 5	8 or less

***Linear Security Level 1**
(01h)

Linear Security Level 2

All code types must be successfully read twice before being decoded.

***Linear Security Level 2**
(02h)

Linear Security Level 3

Code types other than the following must be successfully read twice before being decoded. The following codes must be read three times:

Code Type	Length
MSI Plessey	4 or less
D 2 of 5	8 or less
I 2 of 5	8 or less

Linear Security Level 3

(03h)

Linear Security Level 4

All code types must be successfully read three times before being decoded.

Linear Security Level 4

(04h)

Bi-directional Redundancy

Parameter # 43h

This parameter is only valid when a *Linear Code Type Security Level* is enabled (see page 11-27). When this parameter is enabled, a bar code must be successfully scanned in both directions (forward and reverse) before being decoded.

Enable Bi-directional Redundancy

(01h)

***Disable Bi-directional Redundancy**

(00h)

UPC/EAN

Enable/Disable UPC-A

Parameter # 01h

To enable or disable UPC-A, scan the appropriate bar code below.

***Enable UPC-A**

(01h)

Disable UPC-A

(00h)

Enable/Disable UPC-E

Parameter # 02h

To enable or disable UPC-E, scan the appropriate bar code below.

***Enable UPC-E**

(01h)

Disable UPC-E

(00h)

Enable/Disable UPC-E1

Parameter # 0Ch

To enable or disable UPC-E1, scan the appropriate bar code below.

Enable UPC-E1

(01h)

***Disable UPC-E1**

(00h)

Enable/Disable EAN-8

Parameter # 04h

To enable or disable EAN-8, scan the appropriate bar code below.

***Enable EAN-8**

(01h)

Disable EAN-8

(00h)

Enable/Disable EAN-13

Parameter # 03h

To enable or disable EAN-13, scan the appropriate bar code below.

***Enable EAN-13**

(01h)

Disable EAN-13

(00h)

Enable/Disable Bookland EAN

Parameter # 53h

To enable or disable EAN Bookland, scan the appropriate bar code below.

Enable Bookland EAN

(01h)

***Disable Bookland EAN**

(00h)

UPC/EAN Coupon Code

Parameter # 55h

When enabled, this parameter decodes UPC-A bar codes starting with digit ‘5’, EAN-13 bar codes starting with digit ‘99’, and UPC-A/EAN-128 Coupon Codes. UPC-A, EAN-13 and EAN-128 must be enabled to scan all types of Coupon Codes.

Enable UPC/EAN Coupon Code

***Disable UPC/EAN Coupon Code**

Note: *Use the Decode UPC/EAN Supplemental Redundancy parameter to control autodiscrimination of the EAN-128 (right half) of a coupon code.*

Decode UPC/EAN Supplementals

Parameter # 10h

Supplementals are additionally appended characters (2 or 5) according to specific code format conventions (e.g., UPC A+2, UPC E+2, EAN 8+2). Three options are available.

- If **UPC/EAN with supplemental characters** is selected, the scanner does not decode UPC/EAN symbols without supplemental characters.
- If **UPC/EAN without supplemental characters** is selected, and the scanner is presented with a UPC/EAN plus supplemental symbol, the scanner decodes the UPC/EAN and ignores the supplemental characters.
- If **autodiscriminate** is selected, scan *Decode UPC/EAN Supplemental Redundancy* on page 11-39, then select a value from the numeric bar codes beginning on page 11-146. A value of 5 or more is recommended.
- If **Enable 378/379 Supplemental Mode** is selected, the scanner identifies supplementals for EAN-13 bar codes starting with a '378' or '379' prefix only. All other UPC/EAN bar codes are decoded immediately and the supplemental characters ignored.
- If **Enable 978 Supplemental Mode** is selected, the scanner identifies supplementals for EAN-13 bar codes starting with a '978' prefix only. All other UPC/EAN bar codes are decoded immediately and the supplemental characters ignored.
- If **Enable Smart Supplemental Mode** is selected, the scanner identifies supplementals for EAN-13 bar codes starting with a '378', '379', or '978' prefix only. All other UPC/EAN bar codes are decoded immediately and the supplemental characters ignored.

Note: *To minimize the risk of invalid data transmission, we recommend selecting whether to read or ignore supplemental characters.*

Select the desired option by scanning one of the following bar codes.

Decode UPC/EAN With Supplementals

(01h)

Decode UPC/EAN Supplementals (continued)

***Ignore UPC/EAN With Supplementals**

(00h)

Autodiscriminate UPC/EAN Supplementals

(02h)

Enable 378/379 Supplemental Mode

(04h)

Enable 978 Supplemental Mode

(05h)

Enable Smart Supplemental Mode

(03h)

Decode UPC/EAN Supplemental Redundancy

Parameter # 50h

With *Autodiscriminate UPC/EAN Supplementals* selected, this option adjusts the number of times (from 2 to 30) a symbol without supplementals is decoded before transmission. Five or above is recommended when decoding a mix of UPC/EAN symbols with and without supplementals, and the autodiscriminate option is selected.

Scan the bar code below to select a decode redundancy value. Next scan two numeric bar codes beginning on page 11-146. Enter a leading zero for single digit numbers. To change the selection or to cancel an incorrect entry, scan the *Cancel* bar code on page 11-148.

Decode UPC/EAN
Supplemental Redundancy

Transmit UPC-A Check Digit

Parameter # 28h

Scan the appropriate bar code below to transmit the symbol with or without the UPC-A check digit.

***Transmit UPC-A Check Digit**

(01h)

Do Not Transmit UPC-A Check Digit

(00h)

Transmit UPC-E Check Digit

Parameter # 29h

Scan the appropriate bar code below to transmit the symbol with or without the UPC-E check digit.

***Transmit UPC-E Check Digit**

(01h)

Do Not Transmit UPC-E Check Digit

(00h)

Transmit UPC-E1 Check Digit

Parameter # 2Ah

Scan the appropriate bar code below to transmit the symbol with or without the UPC-E1 check digit.

***Transmit UPC-E1 CHECK DIGIT**

(01h)

Do Not Transmit UPC-E1 Check Digit

(00h)

UPC-A Preamble

Parameter # 22h

Preamble characters (Country Code and System Character) can be transmitted as part of a UPC-A symbol. Select one of the following options for transmitting UPC-A preamble to the host device: transmit system character only, transmit system character and country code (“0” for USA), or transmit no preamble.

No Preamble
(<DATA>)

(00h)

***System Character**
(<SYSTEM CHARACTER> <DATA>)

(01h)

System Character & Country Code
(< COUNTRY CODE> <SYSTEM CHARACTER> <DATA>)

(02h)

UPC-E Preamble

Parameter # 23h

Preamble characters (Country Code and System Character) can be transmitted as part of a UPC-E symbol. Select one of the following options for transmitting UPC-E preamble to the host device: transmit system character only, transmit system character and country code (“0” for USA), or transmit no preamble.

No Preamble
(<DATA>)

(00h)

***System Character**
(<SYSTEM CHARACTER> <DATA>)

(01h)

System Character & Country Code
(< COUNTRY CODE> <SYSTEM CHARACTER> <DATA>)

(02h)

UPC-E1 Preamble

Parameter # 24h

Preamble characters (Country Code and System Character) can be transmitted as part of a UPC-E1 symbol. Select one of the following options for transmitting UPC-E1 preamble to the host device: transmit system character only, transmit system character and country code (“0” for USA), or transmit no preamble.

No Preamble
(<DATA>)

(00h)

***System Character**
(<SYSTEM CHARACTER> <DATA>)

(01h)

System Character & Country Code
(< COUNTRY CODE> <SYSTEM CHARACTER> <DATA>)

(02h)

Convert UPC-E to UPC-A

Parameter # 25h

This parameter converts UPC-E (zero suppressed) decoded data to UPC-A format before transmission. After conversion, data follows UPC-A format and is affected by UPC-A programming selections (e.g., Preamble, Check Digit).

Scan **DO NOT CONVERT UPC-E TO UPC-A** to transmit UPC-E (zero suppressed) decoded data.

Convert UPC-E To UPC-A
(Enable)

(01h)

***Do Not Convert UPC-E To UPC-A**
(Disable)

(00h)

Convert UPC-E1 to UPC-A

Parameter # 26h

Enable this parameter to convert UPC-E1 (zero suppressed) decoded data to UPC-A format before transmission. After conversion, data follows UPC-A format and is affected by UPC-A programming selections (e.g., Preamble, Check Digit).

Scan **DO NOT CONVERT UPC-E TO UPC-A** to transmit UPC-E1 (zero suppressed) decoded data.

Convert UPC-E1 To UPC-A
(Enable)

(01h)

***Do Not Convert UPC-E1 To UPC-A**
(Disable)

(00h)

EAN Zero Extend

Parameter # 27h

When this parameter is enabled, five leading zeros are added to decoded EAN-8 symbols to make them compatible in format to EAN-13 symbols.

Disable this parameter to transmit EAN-8 symbols as is.

Enable EAN Zero Extend

(01h)

***Disable EAN Zero Extend**

(00h)

UPC/EAN Security Level

Parameter # 4Dh

The MiniScan scanner offers four levels of decode security for UPC/EAN bar codes. Select higher levels of security for decreasing levels of bar code quality. Increasing security decreases the scanner's aggressiveness, so choose only that level of security necessary for the application.

UPC/EAN Security Level 0

This default setting allows the scanner to operate in its most aggressive state, while providing sufficient security in decoding "in-spec" UPC/EAN bar codes.

***UPC/EAN Security Level 0**

(00h)

UPC/EAN Security Level 1

Select this option if misdecodes occur. This security level eliminates most misdecodes.

UPC/EAN Security Level 1

(01h)

UPC/EAN Security Level 2

Select this option if Security level 1 fails to eliminate misdecodes.

UPC/EAN Security Level 2

(02h)

UPC/EAN Security Level 3

If misdecodes still occur after selecting Security Level 2, select this security level. Be advised, selecting this option is an extreme measure against misdecoding severely out of spec bar codes. Selecting this level of security significantly impairs the decoding ability of the scanner. If this level of security is necessary, try to improve the quality of the bar codes.

UPC/EAN Security Level 3

(03h)

Linear UPC/EAN Decode

Parameter # 44h

This option applies to code types containing two adjacent blocks (e.g., UPC-A, EAN-8, EAN-13). When enabled, a bar code is transmitted only when both the left and right blocks are successfully decoded within one laser scan. Enable this option when bar codes are in proximity to each other.

Enable Linear UPC/EAN Decode

(01h)

***Disable Linear UPC/EAN Decode**

(00h)

UPC Half Block Stitching

Parameter # 4Ah

Note: *This option is supported by the MS 2204, MS 2204VHD and MS 3204 only.*

This parameter enables UPC Half Block Stitching.

Enable UPC Half Block Stitching

(01h)

***Disable UPC Half Block Stitching**

(00h)

Code 128

Enable/Disable Code 128

Parameter # 08h

To enable or disable Code 128, scan the appropriate bar code below.

***Enable Code 128**

(01h)

Disable Code 128

(00h)

Enable/Disable UCC/EAN-128

Parameter # 0Eh

To enable or disable UCC/EAN-128, scan the appropriate bar code below.

***Enable UCC/EAN-128**

(01h)

Disable UCC/EAN-128

(00h)

Enable/Disable ISBT 128

Parameter # 54h

To enable or disable ISBT 128, scan the appropriate bar code below.

Enable ISBT 128

(01h)

***Disable ISBT 128**

(00h)

Lengths for Code 128

No length setting is required for Code 128.

Code 128 Decode Performance

Parameter # 48h

Note: *This option is supported by the MS 2204, MS 2204VHD and MS 3204 only.*

This option offers three levels of decode performance or “aggressiveness” for Code 128 symbols. Increasing the performance level reduces the amount of required bar code orientation, which is useful when scanning very long and/or truncated bar codes. Increased levels reduce decode security.

If you enable this option, you can select a Decode Performance level from the next page to suit performance needs.

***Enable Code 128 Decode Performance**

(01h)

Disable Code 128 Decode Performance

(00h)

Code 128 Decode Performance Level

Parameter # 49h

Note: *This option is supported by the MS 2204, MS 2204VHD and MS 3204 only.*

Select a level of decode performance.

Code 128 Decode Performance Level 1

(03h)

Code 128 Decode Performance Level 2

(02h)

***Code 128 Decode Performance Level 3**

(01h)

Code 39

Enable/Disable Code 39

Parameter # 00h

To enable or disable Code 39, scan the appropriate bar code below.

***Enable Code 39**

(01h)

Disable Code 39

(00h)

Enable/Disable Trioptic Code 39

Parameter # 0Dh

Trioptic Code 39 is a variant of Code 39 used in marking computer tape cartridges. Trioptic Code 39 symbols always contain six characters. Do not enable Trioptic Code 39 and Code 39 Full ASCII simultaneously.

To enable or disable Trioptic Code 39, scan the appropriate bar code below.

Enable Trioptic Code 39

(01h)

***Disable Trioptic Code 39**

(00h)

Convert Code 39 to Code 32

Parameter # 56h

Code 32 is a variant of Code 39 used by the Italian pharmaceutical industry. Scan the appropriate bar code below to enable or disable converting Code 39 to Code 32.

Convert Code 39 To Code 32
(Enable)

(01h)

Note: *Code 39 must be enabled for this parameter to function.*

***Do Not Convert Code 39 To Code 32**
(Disable)

(00h)

Code 32 Prefix

Parameter # E7h

Enable this parameter to add the prefix character “A” to all Code 32 bar codes. *Convert Code 39 to Code 32* must be enabled for this parameter to function.

***Enable Code 32 Prefix**

(01h)

Disable Code 32 Prefix

(00h)

Set Lengths for Code 39

Parameter # L1 = 12h, L2 = 13h

The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. Lengths for Code 39 may be set for any length, one or two discrete lengths, or lengths within a specific range. If Code 39 Full ASCII is enabled, **Length Within a Range** or **Any Length** are the preferred options.

One Discrete Length - This option limits decodes to only those Code 39 symbols containing a selected length. Lengths are selected from the numeric bar codes beginning on page 11-146. For example, to decode only Code 39 symbols with 14 characters, scan **Code 39 - One Discrete Length**, then scan **1** followed by **4**. To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on page 11-148.

Code 39 - One Discrete Length

Two Discrete Lengths - This option limits decodes to only those Code 39 symbols containing either of two selected lengths. Lengths are selected from the numeric bar codes beginning on page 11-146. For example, to decode only those Code 39 symbols containing either 2 or 14 characters, select **Code 39 - Two Discrete Lengths**, then scan **0**, **2**, **1**, and then **4**. To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on page 11-148.

Code 39 - Two Discrete Lengths

Length Within Range - This option limits decodes to only those Code 39 symbols within a specified range. The range is selected using the numeric bar codes beginning on page 11-146. For example, to decode Code 39 symbols containing between 4 and 12 characters, first scan **Code 39 Length Within Range**. Then scan **0**, **4**, **1** and **2** (single digit numbers must always be preceded by a leading zero). To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on page 11-148.

***Code 39 - Length Within Range**

Any Length - Scan this option to decode Code 39 symbols containing any number of characters.

Code 39 - Any Length

Code 39 Check Digit Verification

Parameter # 30h

When this feature is enabled, the scanner checks the integrity of all Code 39 symbols to verify that the data complies with specified check digit algorithm. Only those Code 39 symbols which include a modulo 43 check digit are decoded.

Enable Code 39 Check Digit

(01h)

***Disable Code 39 Check Digit**

(00h)

Transmit Code 39 Check Digit

Parameter # 2Bh

Scan this symbol to transmit the check digit with the data.

Transmit Code 39 Check Digit
(Enable)

(01h)

Scan this symbol to transmit data without the check digit.

***Do Not Transmit Code 39 Check Digit**
(Disable)

(00h)

Enable/Disable Code 39 Full ASCII

Parameter # 11h

To enable or disable Code 39 Full ASCII, scan the appropriate bar code below.

When enabled, the ASCII character set assigns a code to letters, punctuation marks, numerals, and most control keystrokes on the keyboard.

The first 32 codes are non-printable and are assigned to keyboard control characters such as BACKSPACE and RETURN. The other 96 are called printable codes because all but SPACE and DELETE produce visible characters.

Code 39 Full ASCII interprets the bar code special character ($ + % /) preceding a Code 39 character and assigns an ASCII character value to the pair. For example, when Code 39 Full ASCII is enabled and a **+B** is scanned, it is interpreted as **b**, **%J** as **?**, and **$H** emulates the keystroke **BACKSPACE**. Scanning **ABC$M** outputs the keystroke equivalent of **ABC ENTER**.

Do not enable Code 39 Full ASCII and Trioptic Code 39 simultaneously.

The scanner does not autodiscriminate between Code 39 and Code 39 Full ASCII.

Enable Code 39 Full ASCII

(01h)

***Disable Code 39 Full ASCII**

(00h)

Code 39 Decode Performance

Parameter # 46h

Note: *This option is supported by the MS 2204, MS 2204VHD and MS 3204 only.*

This option offers three levels of decode performance or “aggressiveness” for Code 39 symbols. Increasing the performance level reduces the amount of required bar code orientation, which is useful when scanning very long and/or truncated bar codes. Increased levels reduce decode security.

If you enable this option, you can select a Decode Performance level from the next page to suit performance needs.

Note: *This option only works with Code 39 One Discrete Length.*

***Enable Code 39 Decode Performance**

(01h)

Disable Code 39 Decode Performance

(00h)

Code 39 Decode Performance Level

Parameter # 47h

Note: *This option is supported by the MS 2204, MS 2204VHD and MS 3204 only.*

Select a level of decode performance.

Code 39 Decode Performance Level 1

(03h)

Code 39 Decode Performance Level 2

(02h)

***Code 39 Decode Performance Level 3**

(01h)

Code 93

Enable/Disable Code 93

Parameter # 09h

To enable or disable Code 93, scan the appropriate bar code below.

Enable Code 93

(01h)

***Disable Code 93**

(00h)

Set Lengths for Code 93

Parameter # L1 = 1Ah, L2 = 1Bh

The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. Lengths for Code 93 can be set for any length, one or two discrete lengths, or lengths within a specific range.

One Discrete Length - Select this option to decode only those codes containing a selected length. For example, select **Code 93 One Discrete Length**, then scan **1**, **4**, to limit the decoding to only Code 93 symbols containing 14 characters. Numeric bar codes begin on page 11-146. To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on page 11-148.

Code 93 - One Discrete Length

Two Discrete Lengths - Select this option to decode only those codes containing two selected lengths. For example, select **Code 93 Two Discrete Lengths**, then scan **0**, **2**, **1**, **4**, to limit the decoding to only Code 93 symbols containing 2 or 14 characters. Numeric bar codes begin on page 11-146. To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on page 11-148.

Code 93 - Two Discrete Lengths

Length Within Range - Select this option to decode only those codes within a specified range. For example, to decode Code 93 symbols containing between 4 and 12 characters, first scan **Code 93 Length Within Range,** then scan **0**, **4**, **1** and **2** (single digit numbers must always be preceded by a leading zero). Numeric bar codes begin on page 11-146. To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on page 11-148.

***Code 93 - Length Within Range**

Any Length - Scan this option to decode Code 93 symbols containing any number of characters.

Code 93 - Any Length

Code 11

Enable/Disable Code 11

Parameter # 0Ah

To enable or disable Code 11, scan the appropriate bar code below.

Enable Code 11

(01h)

***Disable Code 11**

(00h)

Set Lengths for Code 11

Parameter # L1 = 1Ch, L2 = 1Dh

The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. Lengths for Code 11 can be set for any length, one or two discrete lengths, or lengths within a specific range.

One Discrete Length - Select this option to decode only those codes containing a selected length. For example, select **Code 11 One Discrete Length**, then scan **1**, **4**, to limit the decoding to only Code 11 symbols containing 14 characters. Numeric bar codes begin on page 11-146. To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on page 11-148.

Code 11 - One Discrete Length

Two Discrete Lengths - Select this option to decode only those codes containing two selected lengths. For example, select **Code 11 Two Discrete Lengths**, then scan **0**, **2**, **1**, **4**, to limit the decoding to only Code 11 symbols containing 2 or 14 characters. Numeric bar codes begin on page 11-146. To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on page 11-148.

Code 11 - Two Discrete Lengths

Length Within Range - Select this option to decode only those codes within a specified range. For example, to decode Code 11 symbols containing between 4 and 12 characters, first scan **Code 11 Length Within Range,** then scan **0**, **4**, **1** and **2** (single digit numbers must always be preceded by a leading zero). Numeric bar codes begin on page 11-146. To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on page 11-148.

***Code 11 - Length Within Range**

Any Length - Scan this option to decode Code 11 symbols containing any number of characters.

Code 11 - Any Length

Code 11 Check Digit Verification

Parameter # 34h

When enabled, this parameter checks the integrity of a Code 11 symbol to ensure it complies with a specified check digit algorithm. Select either to check for one check digit, check for two check digits, or to disable the feature.

***Disable**

(00h)

One Check Digit

(01h)

Two Check Digits

(02h)

Transmit Code 11 Check Digit

Parameter # 2Fh

Scan this symbol to transmit the check digit with the data.

Transmit Code 11 Check Digit
(Enable)

(01h)

Scan this symbol to transmit data without the check digit.

***Do Not Transmit Code 11 Check Digit**
(Disable)

(00h)

Interleaved 2 of 5

Enable/Disable Interleaved 2 of 5

Parameter # 06h

To enable or disable Interleaved 2 of 5, scan the appropriate bar code below.

Enable Interleaved 2 of 5

(01h)

***Disable Interleaved 2 of 5**

(00h)

Set Lengths for Interleaved 2 of 5

Parameter # L1 = 16h, L2 = 17h

The length of a code refers to the number of characters (i.e., human readable characters) the code contains, and includes check digits. Lengths for I 2 of 5 can be set for any length, one or two discrete lengths, or lengths within a specific range.

One Discrete Length - Select this option to decode only those codes containing a selected length. For example, select **I 2 of 5 One Discrete Length**, then scan **1**, **4**, to decode only I 2 of 5 symbols containing 14 characters. Numeric bar codes begin on page 11-146. To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on page 11-148.

***I 2 of 5 - One Discrete Length**

Two Discrete Lengths - Select this option to decode only those codes containing two selected lengths. For example, select **I 2 of 5 Two Discrete Lengths**, then scan **0**, **2**, **1**, **4**, to decode only I 2 of 5 symbols containing 2 or 14 characters. Numeric bar codes begin on page 11-146. To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on page 11-148.

I 2 of 5 - Two Discrete Lengths

Length Within Range - Select this option to decode only codes within a specified range. For example, to decode **I** 2 of 5 symbols containing between 4 and 12 characters, first scan **I 2 of 5 Length Within Range**, then scan **0**, **4**, **1** and **2** (single digit numbers must always be preceded by a leading zero). Numeric bar codes begin on page 11-146. To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on page 11-148.

I 2 of 5 - Length Within Range

Any Length - Scan this option to decode **I** 2 of 5 symbols containing any number of characters.

Note: *Selecting this option can lead to misdecodes for I 2 of 5 codes.*

I 2 of 5 - Any Length

I 2 of 5 Check Digit Verification

Parameter # 31h

When enabled, this parameter checks the integrity of an I 2 of 5 symbol to ensure it complies with a specified algorithm, either USS (Uniform Symbology Specification), or OPCC (Optical Product Code Council).

***Disable**

(00h)

USS Check Digit

(01h)

OPCC Check Digit

(02h)

Transmit I 2 of 5 Check Digit

Parameter # 2Ch

Scan this symbol to transmit the check digit with the data.

Transmit I 2 of 5 Check Digit
(Enable)

(01h)

Scan this symbol to transmit data without the check digit.

***Do Not Transmit I 2 of 5 Check Digit**
(Disable)

(00h)

Convert I 2 of 5 to EAN-13

Parameter # 52h

This parameter converts a 14 character I 2 of 5 code into EAN-13, and transmits to the host as EAN-13. To accomplish this, I 2 of 5 must be enabled, one length must be set to 14, and the code must have a leading zero and a valid EAN-13 check digit.

Convert I 2 of 5 to EAN-13
(Enable)

(01h)

***Do Not Convert I 2 of 5 to EAN-13**
(Disable)

(00h)

Discrete 2 of 5

Enable/Disable Discrete 2 of 5

Parameter # 05h

To enable or disable Discrete 2 of 5, scan the appropriate bar code below.

Enable Discrete 2 of 5

(01h)

***Disable Discrete 2 of 5**

(00h)

Set Lengths for Discrete 2 of 5

Parameter # L1 = 14h, L2 = 15h

The length of a code refers to the number of characters (i.e., human readable characters) the code contains, and includes check digits. Lengths for D 2 of 5 can be set for any length, one or two discrete lengths, or lengths within a specific range.

One Discrete Length - Select this option to decode only those codes containing a selected length. For example, select **D 2 of 5 One Discrete Length**, then scan **1**, **4**, to decode only D 2 of 5 symbols containing 14 characters. Numeric bar codes begin on page 11-146. To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on page 11-148.

***D 2 of 5 - One Discrete Length**

Two Discrete Lengths - Select this option to decode only those codes containing two selected lengths. For example, select **D 2 of 5 Two Discrete Lengths**, then scan **0**, **2**, **1**, **4**, to decode only D 2 of 5 symbols containing 2 or 14 characters. Numeric bar codes begin on page 11-146. To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on page 11-148.

D 2 of 5 - Two Discrete Lengths

Length Within Range - Select this option to decode codes within a specified range. For example, to decode D 2 of 5 symbols containing between 4 and 12 characters, first scan **D 2 of 5 Length Within Range**, then scan **0**, **4**, **1** and **2** (single digit numbers must be preceded by a leading zero). Numeric bar codes begin on page 11-146. To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on page 11-148.

D 2 of 5 - Length Within Range

Any Length - Scan this option to decode D 2 of 5 symbols containing any number of characters.

Note: *Selecting this option can lead to misdecodes for D 2 of 5 codes.*

D 2 of 5 - Any Length

Codabar

Enable/Disable Codabar

Parameter # 07h

To enable or disable Codabar, scan the appropriate bar code below.

Enable Codabar

(01h)

***Disable Codabar**

(00h)

Set Lengths for Codabar

Parameter # L1 = 18h, L2 = 19h

The length of a code refers to the number of characters (i.e., human readable characters) the code contains, including start or stop characters. Lengths for Codabar may be set for any length, one or two discrete lengths, or lengths within a specific range.

One Discrete Length - Select this option to decode only those codes containing a selected length. For example, select **Codabar One Discrete Length**, then scan **1**, **4**, to decode only Codabar symbols containing 14 characters. Numeric bar codes begin on page 11-146. To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on page 11-148.

Codabar - One Discrete Length

Two Discrete Lengths - Select this option to decode only those codes containing two selected lengths. For example, select **Codabar Two Discrete Lengths**, then scan **0**, **2**, **1**, **4**, to decode only Codabar symbols containing 2 or 14 characters. Numeric bar codes begin on page 11-146. To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on page 11-148.

Codabar - Two Discrete Lengths

Length Within Range - Select this option to decode a code within a specified range. For example, to decode Codabar symbols containing between 4 and 12 characters, first scan **Codabar Length Within Range**, then scan **0**, **4**, **1** and **2** (single digit numbers must always be preceded by a leading zero). Numeric bar codes begin on page 11-146. To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on page 11-148.

***Codabar - Length Within Range**

Any Length - Scan this option to decode Codabar symbols containing any number of characters.

Codabar - Any Length

CLSI Editing

Parameter # 36h

When enabled, this parameter strips the start and stop characters and inserts a space after the first, fifth, and tenth characters of a 14-character Codabar symbol.

Note: *Symbol length does not include start and stop characters.*

Enable CLSI Editing

(01h)

***Disable CLSI Editing**

(00h)

NOTIS Editing

Parameter # 37h

When enabled, this parameter strips the start and stop characters from decoded Codabar symbol.

Enable NOTIS Editing

(01h)

***Disable NOTIS Editing**

(00h)

MSI Plessey

Enable/Disable MSI Plessey

Parameter # 0Bh

To enable or disable MSI Plessey, scan the appropriate bar code below.

Enable MSI Plessey

(01h)

***Disable MSI Plessey**

(00h)

Set Lengths for MSI Plessey

Parameter # L1 = 1Eh, L2 = 1Fh

The length of a code refers to the number of characters (i.e., human readable characters) the code contains, and includes check digits. Lengths for MSI Plessey can be set for any length, one or two discrete lengths, or lengths within a specific range.

One Discrete Length - Select this option to decode only those codes containing a selected length. For example, select **MSI Plessey One Discrete Length**, then scan **1**, **4**, to decode only MSI Plessey symbols containing 14 characters. Numeric bar codes begin on page 11-146. To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on page 11-148.

MSI Plessey - One Discrete Length

Two Discrete Lengths - Select this option to decode only those codes containing two selected lengths. For example, select **MSI Plessey Two Discrete Lengths**, then scan **0**, **2**, **1**, **4**, to decode only MSI Plessey symbols containing 2 or 14 characters. Numeric bar codes begin on page 11-146. To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on page 11-148.

MSI Plessey - Two Discrete Lengths

Length Within Range - Select this option to decode codes within a specified range. For example, to decode MSI Plessey symbols containing between 4 and 12 characters, first scan **MSI Plessey Length Within Range**, then scan **0**, **4**, **1** and **2** (single digit numbers must always be preceded by a leading zero). Numeric bar codes begin on page 11-146. To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on page 11-148.

***MSI Plessey - Length Within Range**

Any Length - Scan this option to decode MSI Plessey symbols containing any number of characters.

Note: *Selecting this option can lead to misdecodes for MSI Plessey codes.*

MSI Plessey - Any Length

MSI Plessey Check Digits

Parameter # 32h

These check digits at the end of the bar code verify the integrity of the data. At least one check digit is required. Check digits are not automatically transmitted with the data.

***One MSI Plessey Check Digit**

(00h)

If two check digits is selected, also select an *MSI Plessey Check Digit Algorithm*. See page 11-96.

Two MSI Plessey Check Digit

(01h)

Transmit MSI Plessey Check Digit

Parameter # 2Eh

Scan this symbol to transmit the check digit with the data.

Transmit MSI Plessey Check Digit
(Enable)

(01h)

Scan this symbol to transmit data without the check digit.

***Do Not Transmit MSI Plessey Check Digit**
(Disable)

(00h)

MSI Plessey Check Digit Algorithm

Parameter # 33h

When the Two MSI Plessey check digits option is selected, an additional verification is required to ensure integrity. Select one of the following algorithms.

MOD 10/ MOD 11

(00h)

***MOD 10/ MOD 10**

(01h)

PDF417/MicroPDF417

Note: *These options are supported by the MS 2204, MS 2204VHD and MS 3204 only.*

Enable/Disable PDF417

Parameter # 0Fh

To enable or disable PDF417, scan the appropriate bar code below.

Enable PDF417

(01h)

Disable PDF417

(00h)

Enable/Disable MicroPDF417

Parameter # E3h

To enable or disable MicroPDF417, scan the appropriate bar code below.

Enable MicroPDF417

(01h)

***Disable MicroPDF417**

(00h)

MicroPDF Performance

Parameter # F0h 65h

If the scanner is having trouble decoding MicroPDF symbols, select Selective Performance. Note that this can decrease decoding aggressiveness on some symbols.

***Standard Performance for MicroPDF**

Selective Performance for MicroPDF

Code 128 Emulation

Parameter # 7Bh

When this parameter is enabled, the scanner transmits data from certain MicroPDF417 symbols as if it was encoded in Code 128 symbols. Transmit AIM Symbology Identifiers must be enabled for this parameter to work.

If Code 128 Emulation is enabled, these MicroPDF417 symbols are transmitted with one of the following prefixes:

]C1 if the first codeword is 903-907, 912, 914, 915

]C2 if the first codeword is 908 or 909

]C0 if the first codeword is 910 or 911

If disabled, they are transmitted with one of the following prefixes:

]L3 if the first codeword is 903-907, 912, 914, 915

]L4 if the first codeword is 908 or 909

]L5 if the first codeword is 910 or 911

Scan a bar code below to enable or disable Code 128 Emulation.

Enable Code 128 Emulation

(01h)

***Disable Code 128 Emulation**

(00h)

RSS Codes

Note: *These options are not supported by MS 904HS.*

RSS-14

Parameter # F0h 52h

To enable or disable RSS-14, scan the appropriate bar code below.

Enable RSS-14
(01h)

***Disable RSS-14**
(00h)

RSS-Limited

Parameter # F0h 53h

To enable or disable RSS-Limited, scan the appropriate bar code below.

Enable RSS-Limited
(01h)

***Disable RSS-Limited**
(00h)

RSS-Expanded

Parameter # F0h 54h

To enable or disable RSS-Expanded, scan the appropriate bar code below.

**Enable RSS-Expanded
(01h)**

***Disable RSS-Expanded
(00h)**

Convert RSS to UPC/EAN

Parameter # F0h 8Dh

Note: *This option is supported by the MS 1204FZY only.*

This parameter only applies to RSS-14 and RSS Limited symbols not decoded as part of a Composite symbol. When this conversion is enabled, RSS-14 and RSS Limited symbols encoding a single zero as the first digit have the leading '010' stripped and the bar code reported as EAN-13.

Bar codes beginning with two or more zeros but not six zeros have the leading '0100' stripped and the bar code reported as UPC-A. The UPC-A Preamble parameter to transmit the system character and country code applies to converted bar codes. Note that neither the system character nor the check digit can be stripped.

Enable Convert RSS to UPC/EAN

***Disable Convert RSS to UPC/EAN**

Composite

Note: *These options are supported by the MS 2204, MS 2204VHD, and MS 3204 only.*

Composite CC-C

Parameter # F0h 55h

Scan a bar code below to enable or disable Composite bar codes of type CC-C.

Enable CC-C
(01h)

***Disable CC-C**
(00h)

Composite CC-A/B

Parameter # F0h 56h

Scan a bar code below to enable or disable Composite bar codes of type CC-A/B.

Enable CC-A/B
(01h)

***Disable CC-A/B**
(00h)

Composite TLC-39

Parameter # F0h 73h

Scan a bar code below to enable or disable Composite bar codes of type TLC-39.

Enable TLC39
(01h)

***Disable TLC39**
(00h)

UPC Composite Mode

Parameter # F0h 58h

UPC symbols can be “linked” with a 2D symbol during transmission as if they were one symbol. Three options are offered for these symbols:

- Select **UPC Never Linked** to transmit UPC bar codes regardless of whether a 2D symbol is detected.
- Select **UPC Always Linked** to transmit UPC bar codes and the 2D portion. If 2D is not present, the UPC bar code does not transmit.
- If **Autodiscriminate UPC Composites** is selected, the scanner determines if there is a 2D portion, then transmits the UPC, as well as the 2D portion if present.

UPC Never Linked

(00h)

***UPC Always Linked**

(01h)

Autodiscriminate UPC Composites

(02h)

Data Options

Transmit Code ID Character

Parameter # 2Dh

A code ID character identifies the code type of a scanned bar code. This can be useful when decoding more than one code type. The code ID character is inserted between the prefix character (if selected) and the decoded symbol.

Select no code ID character, a Symbol Code ID character, or an AIM Code ID character. The Symbol Code ID characters are listed below.

Table 11-2. Symbol Code ID Characters

Code Type	Symbol Identifier
UPC-A, UPC-E, UPC-E1, EAN-13, EAN-8	A
Code 39, Code 32	B
Codabar	C
Code 128, ISBT 128	D
Code 93	E
Interleaved 2 of 5	F
Discrete 2 of 5, D 2of 5 IATA	G
Code 11	H
MSI Plessey	J
UCC/EAN 128	K
Bookland EAN	L
Trioptic Code 39	M
Coupon Code	N
RSS (all variants)	R
Composite*	T
Scanlet	W
*Note: UPC/EAN Composite is transmitted in two portions, each with a "T" prefix.	

Transmit Code ID Character (continued)

Symbol Code ID Character

(02h)

AIM Code ID Character

(01h)

***None**

(00h)

Prefix/Suffix Values

Parameter # P = 69h, S1 = 68h, S2 = 6Ah

A prefix and/or one or two suffixes can be appended to scan data for use in data editing. To set a value for a prefix or suffix, scan a four-digit number (i.e., four bar codes; see *Numeric Bar Codes* beginning on page 11-146) that corresponds to that value. See Table A-1 on page A-1 for the four-digit codes.

To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on page 11-148.

Note: *In order to use Prefix/Suffix values, first set the Scan Data Transmission Format. See page 11-113.*

Prefix/Suffix Values (continued)

Scan Prefix

(07h)

Scan Suffix 1

(06h)

Scan Suffix 2

(08h)

Data Format Cancel

Scan Data Transmission Format

Parameter # EBh

To change the scan data format, scan one of the following eight bar codes corresponding to the desired format.

Note: *To set values for the prefix and/or suffix, see Prefix/Suffix Values on page 11-111.*

***Data As Is**

(00h)

<DATA> <SUFFIX 1>

(01h)

<DATA> <SUFFIX 2>

(02h)

<DATA> <SUFFIX 1> <SUFFIX 2>

(03h)

Scan Data Transmission Format (continued)

<PREFIX> <DATA >

(04h)

<PREFIX> <DATA> <SUFFIX 1>

(05h)

<PREFIX> <DATA> <SUFFIX 2>

(06h)

<PREFIX> <DATA> <SUFFIX 1> <SUFFIX 2>

(07h)

Simple Serial Interface (SSI) Options

Baud Rate

Parameter # 9Ch

Baud rate is the number of bits of data transmitted per second. The scanner's baud rate setting should match the data rate setting of the host device. If not, data may not reach the host device or may reach it in distorted form.

Baud Rate 300

(01h)

Baud Rate 600

(02h)

Baud Rate 1200

(03h)

Baud Rate 2400

(04h)

Baud Rate (continued)

Baud Rate 4800

(05h)

***Baud Rate 9600**

(06h)

Baud Rate 19,200

(07h)

38,400

(08h)

Parity

Parameter # 9Eh

A parity check bit is the most significant bit of each ASCII coded character. Select the parity type according to host device requirements.

If you select **Odd** parity, the parity bit has a value 0 or 1, based on data, to ensure that an odd number of 1 bits is contained in the coded character.

Odd

(00h)

If you select **Even** parity, the parity bit has a value 0 or 1, based on data, to ensure that an even number of 1 bits is contained in the coded character.

Even

(01h)

Parity (continued)

Select **Mark** parity and the parity bit is always 1.

Mark

(02h)

Select **Space** parity and the parity bit is always 0.

Space

(03h)

If no parity is required, select **None**.

***None**

(04h)

Check Parity

Parameter # 97h

Select whether or not to check the parity of received characters. Select the type of parity through the *Parity* parameter.

***Check Parity**

(01h)

Do Not Check Parity

(00h)

Software Handshaking

Parameter # 9Fh

This parameter offers control of the data transmission process in addition to that offered by hardware handshaking. Hardware handshaking is always enabled and cannot be disabled by the user.

Disable ACK/NAK Handshaking

When this option is selected, the decoder neither generates nor expects ACK/NAK handshaking packets.

Disable ACK/NAK

(00h)

Enable ACK/NAK Handshaking

When this option is selected, after transmitting data, the scanner expects either an ACK or NAK response from the host. The scanner also ACKs or NAKs messages from the host.

The scanner waits up to the programmable Host Serial Response Time-out to receive an ACK or NAK. If the scanner does not get a response in this time, it resends its data up to two times before discarding the data and declaring a transmit error.

***Enable ACK/NAK**

(01h)

Host RTS Line State

Parameter # 9Ah

This parameter is used to set the idle state of the Serial Host RTS line.

The SSI Interface is intended to be used with host applications which also implement the SSI protocol. However, the scanner can be used in a "scan-and-transmit" mode to communicate with any standard serial communications software on a host PC (see *Decode Data Packet Format* on page 11-122). If transmission errors occur in this mode, the host PC may be asserting hardware handshaking lines which interfere with the SSI protocol. Scan the **HOST: RTS HIGH** bar code to address this problem.

***Host: RTS Low**

(00h)

Host: RTS High

(01h)

Decode Data Packet Format

Parameter # EEh

This parameter selects whether decoded data is transmitted in raw format (unpacketed), or transmitted with the packet format as defined by the serial protocol.

If the raw format is chosen, ACK/NAK handshaking is automatically disabled for decode data.

***Send Raw Decode Data**

(00h)

Send Packeted Decode Data

(01h)

Stop Bit Select

Parameter # 9Dh

The stop bit(s) at the end of each transmitted character marks the end of transmission of one character and prepares the receiving (host) device for the next character in the serial data stream. Set the number of stop bits (one or two) to match host device requirements.

***1 Stop Bit**

(01h)

2 Stop Bits

(02h)

Intercharacter Delay

Parameter # 6Eh

The intercharacter delay gives the host system time to service its receiver and perform other tasks between characters. Select the intercharacter delay option matching host requirements. The delay period can range from no delay to 99 msec in 1 msec increments. After scanning the bar code below, scan two bar codes beginning on page 11-146 to set the desired time-out. To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on page 11-148.

Intercharacter Delay

Host Serial Response Time-out

Parameter # 9Bh

This parameter specifies how long the decoder waits for an ACK or NAK before resending. Also, if the decoder wants to send, and the host has already been granted permission to send, the decoder waits for the designated time-out before declaring an error.

The delay period can range from 0.0 to 9.9 seconds in 0.1 second increments. After scanning the bar code below, scan two numeric bar codes beginning on page 11-146. Time durations of less than 1.0 second require a leading zero. To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on page 11-148.

Host Serial Response Time-out

Host Character Time-out

Parameter # EFh

This parameter determines the maximum time the decoder waits between characters transmitted by the host before discarding the received data and declaring an error. The time-out is set in 0.01 second increments from 0.01 seconds to 0.99 seconds. After scanning the bar code below, scan two bar codes beginning on page 11-146 to set the desired time-out. To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on page 11-148.

Host Character Time-out

Event Reporting

The host can request the decoder to provide certain information (events) relative to the decoder's behavior. Enable or disable the events listed in Table 11-3 by scanning the appropriate bar codes on the following pages. Parameter number format for these parameters follows those shown in the *Simple Serial Interface (SSI) Programmer's Guide* for parameters numbered 256 or higher.

Table 11-3. Event Codes

Event Class	Event	Code Reported
Decode Event	Non parameter decode	01h
Boot Up Event	System power-up	03h
Parameter Event	Parameter entry error Parameter stored Defaults set (and parameter event is enabled by default) Number expected	07h 08h 0Ah 0Fh

Decode Event

Parameter # F0h 00h

When enabled, the scanner sends a message to the host whenever a bar code is successfully decoded. When disabled, no message is sent.

Enable

(01h)

***Disable**

(00h)

Boot Up Event

Parameter # F0h 02h

When enabled, the sends a message a message to the host whenever power is applied. When disabled, no message is sent.

Enable

(01h)

***Disable**

(00h)

Parameter Event

Parameter # F0h 03h

When enabled, the scanner sends a message to the host when one of the events specified in Table 11-3 on page 11-126 occurs. When disabled, no message is sent.

Enable

(01h)

***Disable**

(00h)

Macro PDF Features

Note: *These options are supported by the MS 2204, MS 2204VHD and MS 3204 only.*

Transmit Symbols in Codeword Format

Parameter # Afh

Enable this to transmit each PDF symbol as directly decoded data codewords, whether or not that symbol is part of a macro PDF sequence. Note that data is output as codeword values, not as interpreted data.

"Codeword values" is an ASCII representation of a number from 000 to 928 for each codeword, preceded by an escape character. This escape character is a backslash by default, but you can change this value. For example, the codeword value 005 is sent to the host in the form of \005 for GLIs, and \C005C for ECIs. This output format is based on the AIM USA Uniform Symbology Specification for PDF417 (1994).

All output codewords are exactly 4 characters for GLIs and 6 characters for ECIs. However, there can be non-decodable characters in the PDF symbol, such as a GLI sequence. This special codeword sequence activates a certain kind of interpretation to the encoded data. Non-decodable codewords like GLIs are embedded in the output stream like any other codeword, e.g., \927\001.

Because GLIs are indistinguishable from other codewords in the output data stream, the host must recognize them as GLIs and process their interpretations.

Note that when a macro PDF sequence is transmitted, the last character in the last block of data transmitted is always \922 (if selected). This indicates the end of that macro PDF transmission.

Transmit Symbols in Codeword Format (Continued)

Scan the appropriate bar code to enable or disable this.

Enable Transmit In Codeword Format

(01h)

***Disable Transmit In Codeword Format**

(00h)

Transmit Unknown Codewords

Parameter # BAh

Select **Transmit Unknown Codewords** to use the output codeword format for transmitting any non-GLI or non-macro PDF codeword. Select **Do Not Transmit Unknown Codewords** to sound a decode error beep when an unknown codeword is found.

Transmit Unknown Codewords

(01h)

***Do Not Transmit Unknown Codewords**

(00h)

Escape Characters

Parameter # E9h

This enables the backslash (\) character as an Escape character for systems that can process transmissions containing special data sequences. Scan a bar code below to either format special data (e.g., GLI escapes, MacroPDF417 Control Block optional fields) according to the GLI (Global Label Identifier) protocol or the ECI (Extended Channel Interpretation) protocol, or to disable this parameter.

ECI Protocol

(01h)

GLI Protocol

(02h)

***None**

(00h)

Delete Character Set ECIs

Parameter # E6h

Note: *This option is supported by the MS 2204, MS 2204VHD and MS 3204 only.*

Select **Delete Character Set ECIs** to delete any escape sequences representing Character Set ECIs (also known as GLIs) from its buffer before transmission. In many receiving systems, Character Set ECIs can be removed without affecting the way data is displayed or processed.

Select **Transmit Character Set ECIs** to transmit data from PDF417 and MicroPDF417 bar codes containing Character Set ECIs, even when the ECI Protocol is disabled.

Scan a bar code to delete or transmit character set ECIs.

Delete Character Set ECIs

(01h)

***Transmit Character Set ECIs**

(00h)

ECI Decoder

Parameter # E8h

Note: *This option is supported by the MS 2204, MS 2204VHD and MS 3204 only.*

This parameter enables the scanner to interpret any Extended Channel Interpretations (ECIs) that are supported by the scanner firmware. This does not affect symbols not encoded using ECIs. This version of the product supports ECIs 000900 through 000913, used for efficient encoding of Common Data Syntax Format 00-99. If this parameter is disabled, and a symbol is scanned that was encoded using an ECI escape, the scanner transmits the ECI escape followed by the uninterpreted data.

Scan a bar code to enable or disable this option.

***Enable ECI Decoder**

(01h)

Disable ECI Decoder

(00h)

Transmit Macro PDF User-Selected Fields

Note: *These options are supported by the MS 2204, MS 2204VHD and MS 3204 only.*

Enable or disable each of the following parameters to indicate whether or not to transmit the specified field in subsequently scanned Macro PDF417 symbols. The options cannot be changed in the middle of a Macro PDF set entry. All user-selected fields are prefixed by \923 for GLIs, and \C923C for ECIs. Tags and examples in the following parameters demonstrate GLI protocol, but the ECI tag (\C923C) can be used instead if ECI protocol is enabled.

Transmit File Name

Parameter # B0h

Transmit File Name activates transmission of the file name field. The field character tag is \923\000. For example, the filename MANHOURS.WK1 is sent as: \923\000MANHOURS.WK1.

Enable File Name Transmit

(01h)

***Disable File Name Transmit**

(00h)

Transmit Block Count

Parameter # B1h

Transmit Block Count activates transmission of the block count field. The field character tag is \923\001. For example, the field may be: \923\0011856.

Enable Transmit Block Count

(01h)

***Disable Transmit Block Count**

(00h)

Transmit Time Stamp

Parameter # B2h

Transmit Time Stamp activates transmission of the time stamp field. The field character tag is \923\002. For example, the field may be: \923\0022123443243234.

Enable Transmit Time Stamp

(01h)

***Disable Transmit Time Stamp**

(00h)

Transmit Sender

Parameter # B3h

Transmit Sender activates transmission of the sender field. The field character tag is \923\003. For example, the field may be: \923\003Symbol Technologies Holtsville, NY.

Enable Sender Transmit

(01h)

***Disable Sender Transmit**

(00h)

Transmit Addressee

Parameter # B4h

Transmit Addressee activates transmission of the addressee field. The field character tag is \923\004. For example, the field may be: \923\004AIM USA.

Enable Addressee Transmit

(01h)

***Disable Addressee Transmit**

(00h)

Transmit Checksum

Parameter # B6h

Transmit Checksum activates transmission of the checksum field. The field character tag is \923\006. For example, the field may be: \923\00663823.

Enable Checksum Transmit

(01h)

***Disable Checksum Transmit**

(00h)

Transmit File Size

Parameter # B5h

Transmit File Size activates transmission of the file size field. The field character tag is \923\005. For example, the field may be: \923\005179234.

Enable File Size Transmit

(01h)

***Disable File Size Transmit**

(00h)

Transmit Macro PDF Control Header

Parameter # B7h

Transmit Macro PDF Control Header activates transmission of the control header, which contains the segment index and the file ID. For example, the field can be: \92800000\725\120\343. The five digits after the \928 are the segment index (or block index), and \725\120\343 is the file ID.

Enable Macro PDF Control Header Transmit

(01h)

***Disable Macro PDF Control Header Transmit**

(00h)

Last Blocker Marker

Parameter # B9h

Enable Last Block Marker marks the last block in the set by the codeword \922.

Enable Last Block Marker

(01h)

***Disable Last Block Marker**

(00h)

Numeric Bar Codes

For parameters requiring specific numeric values, scan the appropriately numbered bar code(s).

0

1

2

3

Numeric Bar Codes (continued)

4

5

6

7

Numeric Bar Codes (continued)

8

9

Cancel

To change a selection or cancel an incorrect entry, scan the bar code below.

Cancel

Chapter 12
Simple Serial Interface (SSI)

Introduction

MiniScan scanners communicate with a host device using Symbol's Simple Serial Interface (SSI). This interface is only available on MS XX04 models.

The *Simple Serial Interface (SSI) Programmer's Guide (*p/n 72-40451-xx) provides general information on SSI, includes information on the decoder's hardware signals, and describes the commands. The following SSI information is specific to the MiniScan scanner.

Note: *MiniScan scanners only support Multipacketing Option 1. See the SSI Programmer's Guide for more information.*

Revision String

When the decoder sends the REPLY_REVISION message, the revision string is in the following format:

S/W_REVISION <space> BOARD_TYPE <space> ENGINE_CODE <space> PGM_CHKSUM

where:

- **S/W_REVISION** is the release name of the software
- **BOARD_TYPE** is *N* for non-flash decoder board, *F* for flash
- **ENGINE_CODE** indicates the type of scanner paired with the decoder
- **PGM_CHKSUM** is the two-byte checksum of the program code.

Table 12-1 lists the codes identifying the MiniScan scanner when using SSI.

Table 12-1. MiniScan Codes

Code	Description
07h	MS 1204FZY
38h	MS 2204
3Eh	MS 2204VHD
48h	MS 3204-I000
4ch	MS 3204-E000
37h	MS 804FZY
00h	MS 904HS

SSI Commands Not Supported

The following SSI Commands included in the *Simple Serial Interface (SSI) Programmer's Guide* are NOT supported by the MiniScan scanner:

- C4h AIM_OFF
- C5h AIM_ON
- B1h IMAGE_DATA
- F7h IMAGER_MODE
- B4h VIDEO_DATA

Chapter 13
Mounting Templates

Overview

This chapter provides mounting templates for MiniScan scanners. Copy the page with your MiniScan model's template to aid in mounting.

MS 1204FZY/MS 2204/MS 2204VHD Mounting Template

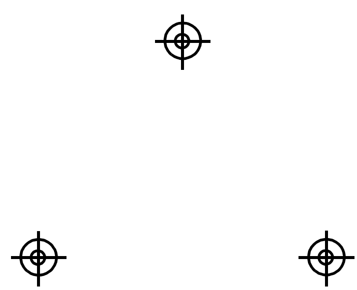


Figure 13-1. MS 1204FZY/MS 2204/MS 2204VHD Mounting Template

MS 3204 Mounting Template

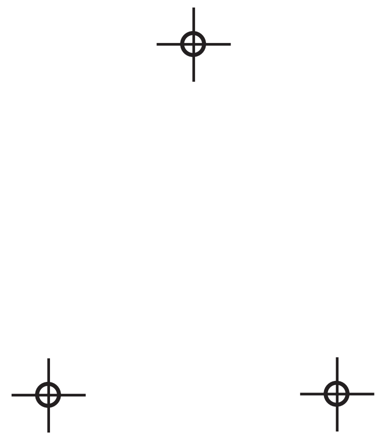


Figure 13-2. MS 3204 Mounting Template

MS 804FZY/MS 904HS Mounting Template

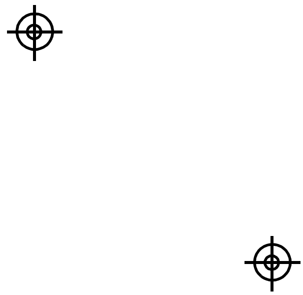


Figure 13-3. MS 804FZY/MS 904HS Mounting Template

Appendix A
ASCII Character Sets

RS-232 ASCII Character Set

The values in Table A-1 can be assigned as prefixes or suffixes for ASCII character data transmission in an RS-232 environment.

Table A-1. Prefix/Suffix Values

Prefix/Suffix Value	Full ASCII Code 39 Encode Character	ASCII Character
1000	%U	NUL
1001	$A	SOH
1002	$B	STX
1003	$C	ETX
1004	$D	EOT
1005	$E	ENQ
1006	$F	ACK
1007	$G	BELL
1008	$H	BACKSPACE
1009	$I	HORIZONTAL TAB
1010	$J	LF/NEW LINE
1011	$K	VT

Table A-1. Prefix/Suffix Values (Continued)

Prefix/Suffix Value	Full ASCII Code 39 Encode Character	ASCII Character
1012	$L	FF
1013	$M	CR/ENTER
1014	$N	SO
1015	$O	SI
1016	$P	DLE
1017	$Q	DC1
1018	$R	DC2
1019	$S	DC3
1020	$T	DC4
1021	$U	NAK
1022	$V	SYN
1023	$W	ETB
1024	$X	CAN
1025	$Y	EM
1026	$Z	SUB
1027	%A	ESC
1028	%B	FS
1029	%C	GS
1030	%D	RS
1031	%E	US
1032	Space	Space
1033	/A	!
1034	/B	"
1035	/C	#
1036	/D	$
1037	/E	%

Table A-1. Prefix/Suffix Values (Continued)

Prefix/Suffix Value	Full ASCII Code 39 Encode Character	ASCII Character
1038	/F	&
1039	/G	‘
1040	/H	(
1041	/I	)
1042	/J	*
1043	/K	+
1044	/L	,
1045	-	-
1046	.	.
1047	/O	/
1048	0	0
1049	1	1
1050	2	2
1051	3	3
1052	4	4
1053	5	5
1054	6	6
1055	7	7
1056	8	8
1057	9	9
1058	/Z	:
1059	%F	;
1060	%G	<
1061	%H	=
1062	%I	>
1063	%J	?

Table A-1. Prefix/Suffix Values (Continued)

Prefix/Suffix Value	Full ASCII Code 39 Encode Character	ASCII Character
1064	%V	@
1065	A	A
1066	B	B
1067	C	C
1068	D	D
1069	E	E
1070	F	F
1071	G	G
1072	H	H
1073	I	I
1074	J	J
1075	K	K
1076	L	L
1077	M	M
1078	N	N
1079	O	O
1080	P	P
1081	Q	Q
1082	R	R
1083	S	S
1084	T	T
1085	U	U
1086	V	V
1087	W	W
1088	X	X
1089	Y	Y

Table A-1. Prefix/Suffix Values (Continued)

Prefix/Suffix Value	Full ASCII Code 39 Encode Character	ASCII Character
1090	Z	Z
1091	%K	[
1092	%L	\
1093	%M	]
1094	%N	^
1095	%O	_
1096	%W	`
1097	+A	a
1098	+B	b
1099	+C	c
1100	+D	d
1101	+E	e
1102	+F	f
1103	+G	g
1104	+H	h
1105	+I	i
1106	+J	j
1107	+K	k
1108	+L	l
1109	+M	m
1110	+N	n
1111	+O	o
1112	+P	p
1113	+Q	q
1114	+R	r
1115	+S	s

Table A-1. Prefix/Suffix Values (Continued)

Prefix/Suffix Value	Full ASCII Code 39 Encode Character	ASCII Character
1116	+T	t
1117	+U	u
1118	+V	v
1119	+W	w
1120	+X	x
1121	+Y	y
1122	+Z	z
1123	%P	{
1124	%Q	|
1125	%R	}
1126	%S	~
1127		Undefined
7013		ENTER

USB ASCII Character Set

The values in Table A-2 can be used for ASCII character data transmission in a USB environment.

Table A-2. USB ASCII Character Set

Prefix/ Suffix Value	Full ASCII Code 39 Encode Char.	Keystroke
1000	%U	CTRL 2
1001	$A	CTRL A
1002	$B	CTRL B
1003	$C	CTRL C
1004	$D	CTRL D
1005	$E	CTRL E
1006	$F	CTRL F
1007	$G	CTRL G
1008	$H	CTRL H / **BACKSPACE***
1009	$I	CTRL I / **HORIZONTAL TAB***
1010	$J	CTRL J
1011	$K	CTRL K
1012	$L	CTRL L
1013	$M	CTRL M / **ENTER***
1014	$N	CTRL N
1015	$O	CTRL O
1016	$P	CTRL P
1017	$Q	CTRL Q
1018	$R	CTRL R
1019	$S	CTRL S
1020	$T	CTRL T
*The keystroke in bold is sent only if Function Key Mapping is enabled.		

Table A-2. USB ASCII Character Set (Continued)

1021	$U	CTRL U
1022	$V	CTRL V
1023	$W	CTRL W
1024	$X	CTRL X
1025	$Y	CTRL Y
1026	$Z	CTRL Z
1027	%A	CTRL [/ **ESC***
1028	%B	CTRL \
1029	%C	CTRL]
1030	%D	CTRL 6
1031	%E	CTRL -
1032	Space	Space
1033	/A	!
1034	/B	“
1035	/C	#
1036	/D	$
1037	/E	%
1038	/F	&
1039	/G	‘
1040	/H	(
1041	/I	)
1042	/J	*
1043	/K	+
1044	/L	,
1045	-	-
1046	.	.
*The keystroke in bold is sent only if Function Key Mapping is enabled.		

Table A-2. USB ASCII Character Set (Continued)

1047	/o	/
1048	0	0
1049	1	1
1050	2	2
1051	3	3
1052	4	4
1053	5	5
1054	6	6
1055	7	7
1056	8	8
1057	9	9
1058	/Z	:
1059	%F	;
1060	%G	<
1061	%H	=
1062	%I	>
1063	%J	?
1064	%V	@
1065	A	A
1066	B	B
1067	C	C
1068	D	D
1069	E	E
1070	F	F
1071	G	G
1072	H	H

*The keystroke in bold is sent only if Function Key Mapping is enabled.

Table A-2. USB ASCII Character Set (Continued)

1073	I	I
1074	J	J
1075	K	K
1076	L	L
1077	M	M
1078	N	N
1079	O	O
1080	P	P
1081	Q	Q
1082	R	R
1083	S	S
1084	T	T
1085	U	U
1086	V	V
1087	W	W
1088	X	X
1089	Y	Y
1090	Z	Z
1091	%K	[
1092	%L	\
1093	%M	]
1094	%N	^
1095	%O	_
1096	%W	`
1097	+A	a
1098	+B	b
*The keystroke in bold is sent only if Function Key Mapping is enabled.		

Table A-2. USB ASCII Character Set (Continued)

1099	+C	c
1100	+D	d
1101	+E	e
1102	+F	f
1103	+G	g
1104	+H	h
1105	+I	i
1106	+J	j
1107	+K	k
1108	+L	l
1109	+M	m
1110	+N	n
1111	+O	o
1112	+P	p
1113	+Q	q
1114	+R	r
1115	+S	s
1116	+T	t
1117	+U	u
1118	+V	v
1119	+W	w
1120	+X	x
1121	+Y	y
1122	+Z	z
1123	%P	{
1124	%Q	|
*The keystroke in bold is sent only if Function Key Mapping is enabled.		

Table A-2. USB ASCII Character Set (Continued)

1125	%R	}
1126	%S	~
ALT Keys	**Keystroke**	
2064	ALT 2	
2065	ALT A	
2066	ALT B	
2067	ALT C	
2068	ALT D	
2069	ALT E	
2070	ALT F	
2071	ALT G	
2072	ALT H	
2073	ALT I	
2074	ALT J	
2075	ALT K	
2076	ALT L	
2077	ALT M	
2078	ALT N	
2079	ALT O	
2080	ALT P	
2081	ALT Q	
2082	ALT R	
2083	ALT S	
2084	ALT T	
2085	ALT U	
2086	ALT V	
*The keystroke in bold is sent only if Function Key Mapping is enabled.		

Table A-2. USB ASCII Character Set (Continued)

2087	ALT W
2088	ALT X
2089	ALT Y
2090	ALT Z
GUI Shift Keys The Apple™ iMac keyboard has an apple key on either side of the space bar. Windows-based systems have a GUI key to the left of the left ALT key, and to the right of the right ALT key.	
Other Value	**Keystroke**
3000	Right Control Key
3048	GUI 0
3049	GUI 1
3050	GUI 2
3051	GUI 3
3052	GUI 4
3053	GUI 5
3054	GUI 6
3055	GUI 7
3056	GUI 8
3057	GUI 9
3065	GUI A
3066	GUI B
3067	GUI C
3068	GUI D
3069	GUI E
3070	GUI F
3071	GUI G
3072	GUI H
*The keystroke in bold is sent only if Function Key Mapping is enabled.	

Table A-2. USB ASCII Character Set (Continued)

3073	GUI I
3074	GUI J
3075	GUI K
3076	GUI L
3077	GUI M
3078	GUI N
3079	GUI O
3080	GUI P
3081	GUI Q
3082	GUI R
3083	GUI S
3084	GUI T
3085	GUI U
3086	GUI V
3087	GUI W
3088	GUI X
3089	GUI Y
3090	GUI Z
F Keys	**Keystroke**
5001	F1
5002	F2
5003	F3
5004	F4
5005	F5
5006	F6
5007	F7
*The keystroke in bold is sent only if Function Key Mapping is enabled.	

Table A-2. USB ASCII Character Set (Continued)

5008	F8
5009	F9
5010	F10
5011	F11
5012	F12
5013	F13
5014	F14
5015	F15
5016	F16
5017	F17
5018	F18
5019	F19
5020	F20
5021	F21
5022	F22
5023	F23
5024	F24
Keypad	**Keystroke**
6042	*
6043	+
6044	undefined
6045	-
6046	.
6047	/
6048	0
6049	1
*The keystroke in bold is sent only if Function Key Mapping is enabled.	

Table A-2. USB ASCII Character Set (Continued)

6050	2
6051	3
6052	4
6053	5
6054	6
6055	7
6056	8
6057	9
6058	Enter
6059	Num Lock
Extended Keypad	**Keystroke**
7001	Break
7002	Delete
7003	PgUp
7004	End
7005	Pg Dn
7006	Pause
7007	Scroll Lock
7008	Backspace
7009	Tab
7010	Print Screen
7011	Insert
7012	Home
7013	Enter
7014	Escape
7015	Up Arrow
*The keystroke in bold is sent only if Function Key Mapping is enabled.	

Table A-2. USB ASCII Character Set (Continued)

7016	Down Arrow
7017	Left Arrow
7018	Right Arrow
*The keystroke in bold is sent only if Function Key Mapping is enabled.	

Glossary

Aperture An opening which limits the amount of light or radiation passing through an optical system.

ASCII American Standard Code for Information Interchange. A 7 bit-plus-parity code representing 128 letters, numerals, punctuation marks, and control characters. It is a standard data transmission code in the U.S.

Autodiscrimination The ability of an interface controller to determine the code type of a scanned bar code. After this determination is made, the information content can be decoded.

Bar The dark element in a printed bar code symbol.

Bar Code Density The number of characters represented per unit of measurement (e.g., characters per inch).

Bar Height The dimension of a bar measured perpendicular to the bar width.

Bar Width Thickness of a bar measured from the edge closest to the symbol start character to the trailing edge of the same bar.

Baud Rate A measure of the data flow or number of signaling events occurring per second. When one bit is the standard “event,” this is a measure of bits per second (bps). For example, a baud rate of 50 means transmission of 50 bits of data per second.

Bit Binary digit. One bit is the basic unit of binary information. Generally, eight consecutive bits compose one byte of data. The pattern of 0 and 1 values within the byte determines its meaning.

Byte On an addressable boundary, eight adjacent binary digits (0 and 1) combined in a pattern to represent a specific character or numeric value. Bits are numbered from the right, 0 through 7, with bit 0 the low-order bit. One byte in memory can be used to store one ASCII character.

CDRH Center for Devices and Radiological Health. A federal agency responsible for regulating laser product safety. This agency specifies various laser operation classes based on power output during operation.

CDRH Class I This is the lowest power CDRH laser classification. CDRH Class I devices are safe under reasonably foreseeable conditions of operation. Software and other controls to limit exposure to laser light may be required to achieve CDRH Class I operation. The CDRH time base for Class I devices is 10,000 seconds.

CDRH Class II CDRH Class II devices may not emit more than 1 milliwatt average radiant power. Eye protection for CDRH Class II devices is normally afforded by aversion responses, including the blink reflex.

Character A pattern of bars and spaces which either directly represents data or indicates a control function, such as a number, letter, punctuation mark, or communications control contained in a message.

Character Set Those characters available for encodation in a particular bar code symbology.

Check Digit A digit used to verify a correct symbol decode. The scanner inserts the decoded data into an arithmetic formula and checks that the resulting number matches the encoded check digit. Check digits are required for UPC but are optional for other symbologies. Using check digits decreases the chance of substitution errors when a symbol is decoded.

CLSI Editing An option which inserts a space after the 1st, 5th, and 10th characters of a 14-character Codabar symbol. Length does not include start and stop characters.

Codabar A discrete self-checking code with a character set consisting of digits 0 to 9 and six additional characters: (- $: / , +).

Code 128 A high density symbology which allows the controller to encode all 128 ASCII characters without adding extra symbol elements.

Code 3 of 9 (Code 39)	A versatile and widely used alphanumeric bar code symbology with a set of 43 character types, including all uppercase letters, numerals from 0 to 9, and 7 special characters (- . / + % $ and space). The code name is derived from the fact that 3 of 9 elements representing a character are wide, while the remaining 6 are narrow.
Code 93	An industrial symbology compatible with Code 39 but offering a full character ASCII set and a higher coding density than Code 39.
Code Length	Number of data characters in a bar code between the start and stop characters, not including those characters.
Continuous Code	A bar code or symbol in which all spaces within the symbol are parts of characters. There are no intercharacter gaps in a continuous code. The absence of gaps allows for greater information density.
CTS	Clear to send.
Dead Zone	An area within a scanner's field of view, in which specular reflection may prevent a successful decode.
Decode	To recognize a bar code symbology (e.g., UPC/EAN) and then analyze the content of the specific bar code scanned.
Decode Algorithm	A decoding scheme that converts pulse widths into data representation of the letters or numbers encoded within a bar code symbol.
Depth of Field	The range between minimum and maximum distances at which a scanner can read a symbol with a certain minimum element width.
Digitized Bar Pattern (DBP)	A digital representation of a decoded bar code.
Discrete 2 of 5	A binary bar code symbology representing each character by a group of five bars, two of which are wide. The location of wide bars in the group determines which character is encoded; spaces are insignificant. Only numeric characters (0 to 9) and START/STOP characters may be encoded.
Discrete Code	A bar code or symbol in which the spaces between characters (intercharacter gaps) are not part of the code.

EAN European Article Number. This European/International version of the UPC provides its own coding format and symbology standards. Element dimensions are specified metrically. EAN is used primarily in retail.

Element Generic term for a bar or space.

Encoded Area Total linear dimension occupied by all characters of a code pattern, including start/stop characters and data.

Host Computer A computer that serves other terminals in a network, providing such services as computation, database access, supervisory programs, and network control.

IEC International Electrotechnical Commission. This international agency regulates laser safety by specifying various laser operation classes based on power output during operation.

IEC 60825 Class 1 This is the lowest power IEC laser classification. IEC Class 1 devices are safe under reasonably foreseeable conditions of operation. Software and other controls to limit exposure to laser light may be required to achieve IEC Class 1 operation. The IEC time base for Class 1 devices is 100 seconds if intentional viewing of laser light is not required in the design or function of the device. The IEC time base for Class 1 devices is 30,000 seconds where intentional viewing of laser light is inherent in the design or function of the device.

IEC 60825 Class 2 IEC Class 2 devices may not emit more than 1 milliwatt average radiant power. Eye protection for IEC Class 2 devices is normally afforded by aversion responses, including the blink reflex.

Intercharacter Gap The space between two adjacent bar code characters in a discrete code.

Interleaved Bar Code A bar code in which characters are paired together, using bars to represent the first character and the intervening spaces to represent the second.

Interleaved 2 of 5 A binary bar code symbology representing character pairs in groups of five bars and five interleaved spaces. Interleaving provides for greater information density. The location of wide elements (bar/spaces) within each group determines which characters are encoded. This continuous code type uses no intercharacter spaces. Only numeric (0 to 9) and START/STOP characters may be encoded.

LASER - **Light Amplification by Stimulated Emission of Radiation**
The laser is an intense light source. Light from a laser is all the same frequency, unlike the output of an incandescent bulb. Laser light is typically coherent and has a high energy density.

Laser Diode
A gallium-arsenide semiconductor type of laser connected to a power source to generate a laser beam. This laser type is a compact source of coherent light.

LED Indicator
A semiconductor diode (LED - Light Emitting Diode) used as an indicator, often in digital displays. The semiconductor uses applied voltage to produce light of a certain frequency determined by the semiconductor's particular chemical composition.

MIL
1 mil = 1 thousandth of an inch.

Misread (Misdecode)
A condition which occurs when the data output of a reader or interface controller does not agree with the data encoded within a bar code symbol.

MSI Plessey
A numeric-only bar code type. MSI Plessey consists of four bars and four adjacent spaces. Each bar\space pair consists of one information bit. A zero bit consists of a narrow bar followed by a wide space, while one bit consist of a wide bar followed by a narrow bar. The zero bit is one unit bar followed by a two-unit space and the one bit is a two-unit bar followed by a one unit space. The primary application for the MSI Plessey code is marking of retail shelves and subsequent scanning with portable devices for inventory purposes.

Nominal
The exact (or ideal) intended value for a specified parameter. Tolerances are specified as positive and negative deviations from this value.

Nominal Size
Standard size for a bar code symbol. Most UPC/EAN codes can be used over a range of magnifications (e.g., from 0.80 to 2.00 of nominal).

NOTIS Editing
An option that strips the start and stop characters from a decoded Codabar symbol.

Parameter
A variable that can have different values assigned to it.

Percent Decode
The average probability that a single scan of a bar code would result in a successful decode. In a well-designed bar code scanning system, that probability should approach near 100%.

Print Contrast Signal (PCS) Measurement of the contrast (brightness difference) between the bars and spaces of a symbol. A minimum PCS value is needed for a bar code symbol to be scannable. PCS = $(R_L - R_D) / R_L$, where R_L is the reflectance factor of the background and R_D the reflectance factor of the dark bars.

Programming Mode The state in which a scanner is configured for parameter values. See *Scanning Mode*.

Quiet Zone A clear space, containing no dark marks, which precedes the start character of a bar code symbol and follows the stop character.

Random Access Memory (RAM) Memory devices where any location in memory can be accessed as quickly as any other location.

Reflectance Amount of light returned from an illuminated surface.

Resolution The narrowest element dimension which can be distinguished by a particular reading device or printed with a particular device or method.

RTS Request to send.

RSS Reduced Space Symbology: A family of space efficient symbologies developed by UCC.EAN.

RxD Received data.

Scan Area Area intended to contain a symbol.

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