Symbol SE2223/3223 Scan Engine

Integration Guide

Symbol SE2223/3223 Scan Engine Integration Guide

70E-36636-05
Revision A
January 2008

Motorola, Inc.
One Motorola Plaza
Holtsville, New York 11742-1300
http://www.symbol.com

Patents

This product is covered by one or more of the patents listed on the website: http://www.symbol.com/patents.

Warranty

For the complete Motorola hardware product warranty statement, go to: http://www.symbol.com/warranty.

Revision History

Changes to the original manual are listed below:

Change	Date	Description
-01 Rev A	5/2000	Initial release.
-02 Rev A	1/2002	Update with VHD version information.
-03 Rev A	10/2006	Update with RoHS-compliant information and accessories.
-04 Rev A	3/2007	Update technical specifications.
-05 Rev A	1/2008	Update scan angle specifications, add new UPC/EAN supplemental options, Bookland ISBN format option, and Code 11 parameters.

Table of Contents

About This Guide

Introduction

The Symbol SE2223/3223 Scan Engine Integration Guide provides general instructions for mounting, setting up, and programming the Symbol SE2223 and Symbol SE3223 scan engines.

✓ ***NOTE*** This guide provides general instructions for the installation of the scan engine into a customer's device. 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, Getting Started* provides an overview of the Symbol SE2223/3223 scan engine, and explains the theory of operation.
- *Chapter 2, Installation* describes the mechanical, electrical, optical and other environments related to installing the scan engine.
- *Chapter 3, Symbol SE2223 Specifications* provides the technical and scanning specifications for the Symbol SE2223 scan engine.
- *Chapter 4, Symbol SE2223VHD Specifications* provides the technical and scanning specifications for the Symbol SE2223VHD scan engine.
- *Chapter 5, Symbol SE3223 Specifications* provides the technical and scanning specifications for the Symbol SE3223 scan engine.
- *Chapter 6, End-User Documentation* includes tips for developing user documentation for your scan engine product.
- *Chapter 7, Regulatory Requirements* explains regulatory issues that must be considered when integrating the scan engine.
- *Chapter 8, Application Notes* explains electrical characteristics and timing waveforms.
- *Chapter 9, Parameter Menus* provides the bar codes necessary to program your scan engine.

- *Appendix A, Miscellaneous Code Information* provides general programming information, such as the UCC/EAN-128 convention, AIM Code identifiers, and prefix and suffix values.

Notational Conventions

The following conventions are used in this document:

- *Italics* are used to highlight chapters and sections in this and related documents.
- 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.

✓ ***NOTE*** This symbol indicates something of special interest or importance to the reader. Failure to read the note will not result in physical harm to the reader, equipment or data.

CAUTION This symbol indicates that if this information is ignored, the possiblity of data or material damage may occur.

WARNING! **This symbol indicates that if this information is ignored the possibility that serious personal injury may occur.**

Related Documents

- *Simple Serial Interface (SSI) Programmer's Guide,* p/n 72-40451-XX.
- *Simple Serial Interface (SSI) Developer's Guide,* p/n 72E-50705-XX.

For the latest version of this guide and all guides, go to: http://www.symbol.com/manuals.

Service Information

If you have a problem with your equipment, contact Motorola Enterprise Mobility Support for your region. Contact information is available at: http://www.symbol.com/contactsupport.

When contacting Enterprise Mobility Support, please have the following information available:

- Serial number of the unit
- Model number or product name
- Software type and version number.

Motorola responds to calls by E-mail, telephone or fax within the time limits set forth in support agreements.

If your problem cannot be solved by Motorola Enterprise Mobility Support, you may need to return your equipment for servicing and will be given specific directions. Motorola 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 you purchased your Enterprise Mobility business product from a Motorola business partner, contact that business partner for support.

Chapter 1 Getting Started

CAUTION Per FDA and IEC standards, the scan engines described in this guide are not given a laser classification. However, the following precautions should be observed:

This laser component emits FDA/IEC Class 2 laser light at the exit port. Do not stare into beam.

Introduction

The Symbol SE2223/3223 is a miniaturized 1-D and 2-D bar code scanning device intended for integration into OEM equipment. The Symbol SE2223/3223 has a retrocollective scan element, generates laser light in a raster, cyclone or semi-omni pattern that opens in both X and Y directions, and processes bar code information into digitized data.

The Symbol SE2223 and Symbol SE3223 are two members of a family of decoded scan engines that provide a number of scan patterns selectable through the interface. These patterns include single line, raster, semi-omni, and full omnidirectional.

A flex cable connector mounted on the Symbol SE2223/3223 provides connection between the scanner and host. The Symbol SE2223 and Symbol SE3223 use the same hardware and software components, but differ from each other in the following ways:

- The Symbol SE2223 employs focusing more suited to reading 1-D and PDF symbols using a raster laser pattern. The working range is larger than the Symbol SE3223.
- The Symbol SE3223 uses focusing more suited to reading 1-D bar codes in an omnidirectional manner while still able to decode PDF symbols in a raster mode.

Theory of Operation

The scan pattern is created via a laser diode that produces a single beam of coherent light. Two orthogonal scanning elements are contained within the chassis of the Symbol SE2223/3223. The laser light first hits the Y scan element mirror that can move the beam in a vertical direction. The light beam is reflected to the mirror of the X scan element. By controlling the scan angle and scan frequencies, the movement of the X and Y scan element mirrors creates the various scan patterns.

When the laser light strikes a bar code, the dark bars absorb the light, and the light spaces reflect it. The reflected laser light is bounced back to the scan engine where it reflects off the X element mirror to the Y element mirror, then to the collection mirror. The collection mirror focuses the light onto a photo diode which generates a current proportional to the reflected light signal. That current, in turn, produces an analog voltage which is amplified, filtered, and sent to a digitizer. Here the signal is transformed into a digital representation of the bar code called the Digitized Bar Pattern (DBP). The DBP data is then sent to the decoder board for processing into the SSI format.

The heart of the Symbol SE2223/3223 is a custom Application-Specific Integrated Circuit (ASIC) and a single chip decoding system (SCDS), which control the majority of functions associated with a laser-based scanner. The ASIC controls the analog front end, the digitizer, the Visible Laser Diode (VLD) driver, and control circuitry. The VLD driver circuit turns the laser on and off, and regulates power to the laser. It incorporates a motor fail detection circuit that turns the laser off should the motor fail.

The SCDS controls the X and Y scan element mirror motion, which oscillates the X and Y mirrors at the required frequencies in order to produce the various scan patterns.

Analog Front End

This transforms the signal current from the photodiode into a voltage signal, then filters and amplifies for use by a digitizer. That signal is amplified, while noise and the effects of ambient light are removed.

Digitizer

This analyzes the conditioned analog signal and threshold amplitudes to create a digitized representation of the bar code being read.

Visible Laser Diode (VLD) Driver

This consists mainly of an operational amplifier, which regulates optical power from the laser.

Single Chip Decoding System (SCDS)

This controls operating frequencies and amplitudes of both the X (horizontal) and Y (vertical) patterns and contains the decoding algorithms.

The SCDS provides two functions:

- The motor control sections generate the waveform frequencies and shape to control highly efficient scan elements.
- The decoder section has logic that converts the digital bar pattern (DBP) into an SSI-compatible format that is sent serially to the host system.

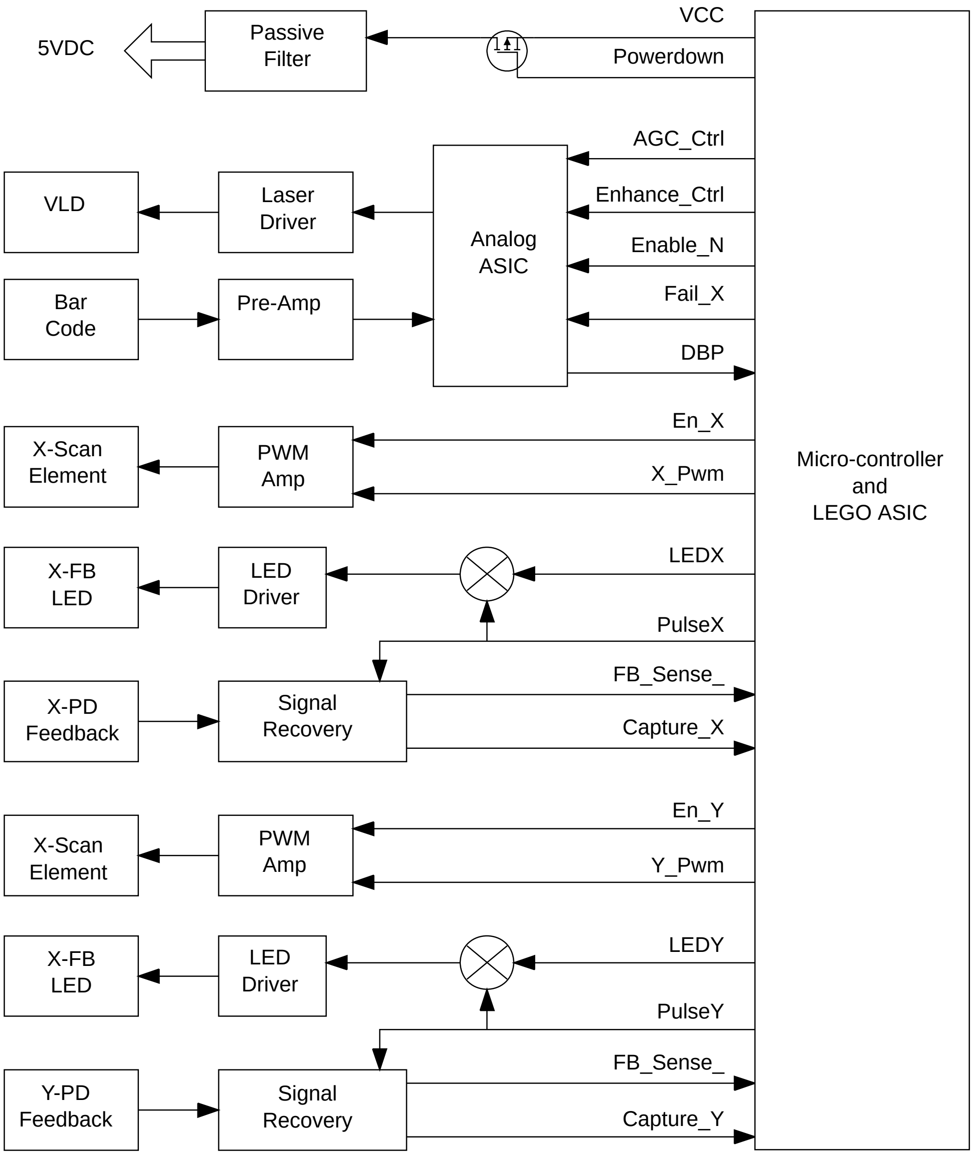


Figure 1-1 *Functional Block Diagram*

Decoder

The heart of the decoder is a micro-controller that provides the necessary intelligence for bar code decoding, host I/O interface protocol, and general decoder maintenance.

Power Management

The Symbol SE2223/3223 has two power modes:

- Continuous Power
- Low Power.

In Continuous Power mode, the Symbol SE2223/3223 always waits for a trigger pull or serial communication.

In Low Power mode, the Symbol SE2223/3223 draws less current than when in Continuous Power mode, making it more suitable for battery powered applications. The Symbol SE2223/3223 can be put into Low Power mode via the SSI *SLEEP* command. See the *Simple Serial Interface (SSI) Programmer's Guide*, p/n 72-40451-XX

The Symbol SE2223/3223 must be awakened from the Low Power mode before performing any functions.

When the Symbol SE2223/3223 is in the Low Power mode, the PWRDWN signal is asserted. This signal alerts the host that the Symbol SE2223/3223 is in sleep mode. Table 1-1 shows how to put the Symbol SE2223/3223 into Low Power mode. Table 1-2 shows how to awaken it.

Table 1-1 *Putting the Symbol SE2223/3223 into Low Power Mode*

Action	Behavior
Send the serial SLEEP command	The Symbol SE2223/3223 enters Low Power mode only once, as soon as possible.
Note: **All Wake Up signals (see Table 1-2) must be inactive in order to enter Low Power mode.**	

Table 1-2 *Waking Up the Symbol SE2223/3223*

Signal	State to Wake Up
AIM/WKUP*	Low
TRIG*	Low
CTS*	Low
RXD	Send 0x00

Serial I/O

Simple Serial Interface Protocol (SSI) is a half-duplex asynchronous serial interface with two hardware handshaking lines. The four SSI specific interface signals are:

- TXD - Transmitted Data
- RXD - Received Data
- RTS* - Request to Send
- CTS* - Clear to Send.

Signal names with the “*” modifier are asserted when at the positive logic 0 state (active low). Signal names without the “*” modifier are asserted when at the positive logic 1 state (active high).

NOTE This guide uses “decoder” to mean the scan engine. “Host” refers to the OEM host.

The TXD transmits asynchronous serial data from the decoder to the host. The RXD is used by the decoder to receive asynchronous serial data from the host. The SSI protocol does not support full-duplex data transfers; data is either transmitted or received by the decoder, but never both simultaneously.

The RTS* and CTS* signals help coordinate data transfers between the decoder and the host.

Beeper and Decode LED

The BPR* and DLED* output lines do not provide enough current drive for the actual beeper and LED device. Additional buffering is needed.

The Symbol SE2223/3223 beeper output ranges from 1.8 to 2.5 kHz. The beeper output is a 50% duty cycle square wave.

If a non-inverting driver is used to buffer the DLED* line, the output of the driver should be connected to the cathode (-) end of the LED.

Electrical Interface

See Table 2-2 on page 2-4 for the pin functions of the Symbol SE2223/3223 interface and typical input and output circuitry.

Scanning Patterns

The Symbol SE2223/3223 generates four scanning patterns based on the software command received at the interface. These patterns are raster, semi-omni, and cyclone. The slab and raster patterns can be used to read1-D bar codes and PDF symbols. The cyclone pattern reads 1-D bar codes in an omnidirectional manner.

Raster Scan Pattern

The decoder determines when to open the “slab” to a full raster depending on the bar code presented to the Symbol SE2223/3223. For a 1-D bar code the Symbol SE2223/3223 can remain in the slab pattern until the bar code is decoded. When reading a PDF417 bar code, the decoder instructs the Symbol SE2223/3223 to open the raster pattern to the height of the bar code presented. *Figure 1-2 on page 1-6* illustrates the slab and full raster patterns.

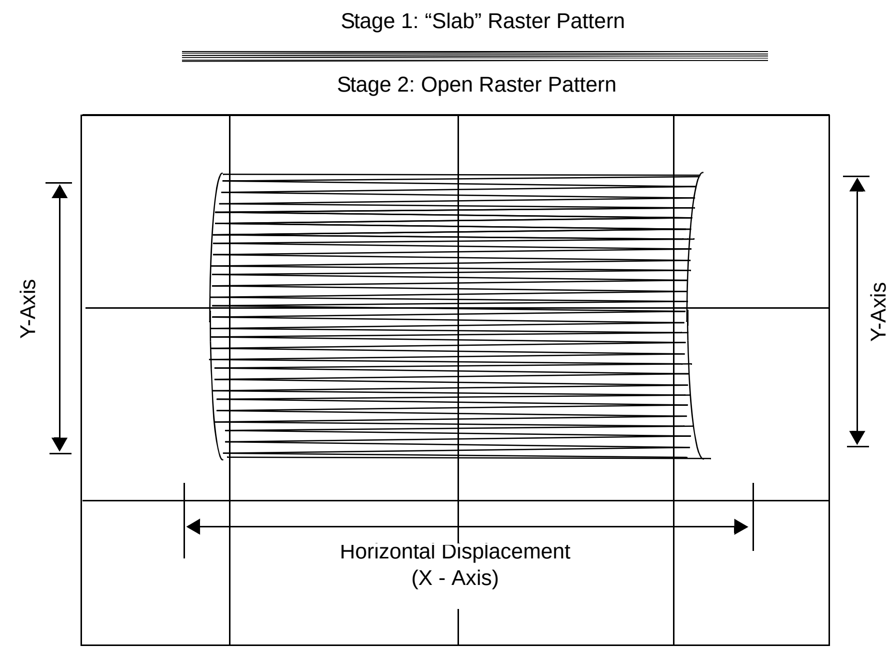


Figure 1-2 *Symbol SE2223/3223 Raster Scan Pattern*

The slab and open raster pattern perform a process called “dithering” in which the entire pattern moves up and down by one degree. This ensures that the pattern covers the entire bar code.

Semi-omnidirectional Scan Pattern

The semi-omnidirectional pattern is used to scan highly truncated bar codes. The bar code must be presented horizontally with up to a 20^{o} tilt.

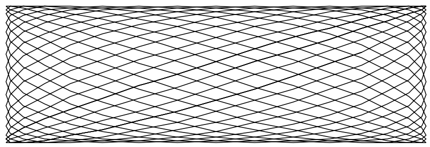


Figure 1-3 *Semi-omnidirectional Scan Pattern*

Cyclone Omnidirectional Scan Pattern

The cyclone omnidirectional pattern illustrated below is used by the Symbol SE3223 for omnidirectional decoding of 1-D symbols.

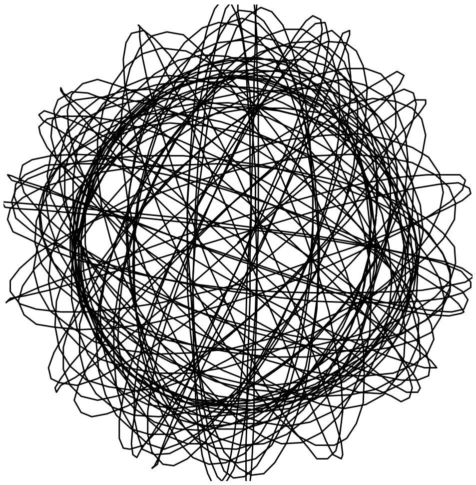


Figure 1-4 *Symbol SE3223 Cyclone Omnidirectional Scan Pattern*

Beeper Definitions

Table 1-3 provides standard beeper definitions.

Table 1-3 *Standard 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	Power-on or reset. Occurs immediately after the unit 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 a Motorola Enterprise Mobility Support representative.
Parameter Menu Scanning	
1 Beep- short high tone	Correct entry scanned or correct menu sequence performed.
1 Beep- high/low/high/low tone	Successful program exit with change in the parameter setting.
2 Beeps - low/high tone	Input error, incorrect bar code, or “Cancel” scanned, wrong entry, incorrect bar code programming sequence; remain in program mode.

Table 1-3 *Standard Beeper Definitions (Continued)*

Beeper Sequence	Indication
Communication	
4 Beeps - short high tone	Communication error in the indication field.
4 Beeps - high/high/high/low	Receive error.
3 Beeps - low/high/low	ADF transmit error.

Macro PDF

Table 1-4 provides beeper definitions for Macro PDF mode.

Table 1-4 *Macro PDF Beeper Indications*

Beeper Sequence	Indication
Error	
1 Low Long	Hi-level decode error caused by incorrect symbol.
2 Low Long	File ID error. A bar code not in the current MPDF sequence was scanned.
3 Low Long	Out of memory. There is not enough buffer space to store the current MPDF symbol.
4 Low Long	Bad symbology. You scanned a 1-D or 2-D bar code in an MPDF sequence, a duplicate MPDF label, an incorrect sequence, or are trying to transmit an empty or illegal MPDF field.
5 Low Long	Flushing buffer.
Fast Warble	Successful parameter scanned.
Decode Beep Sequence	
Single short	Standard decode and transmit beep for all symbols.
Double short	MPDF symbol is buffered. A single beep indicates transmission of the buffered data.

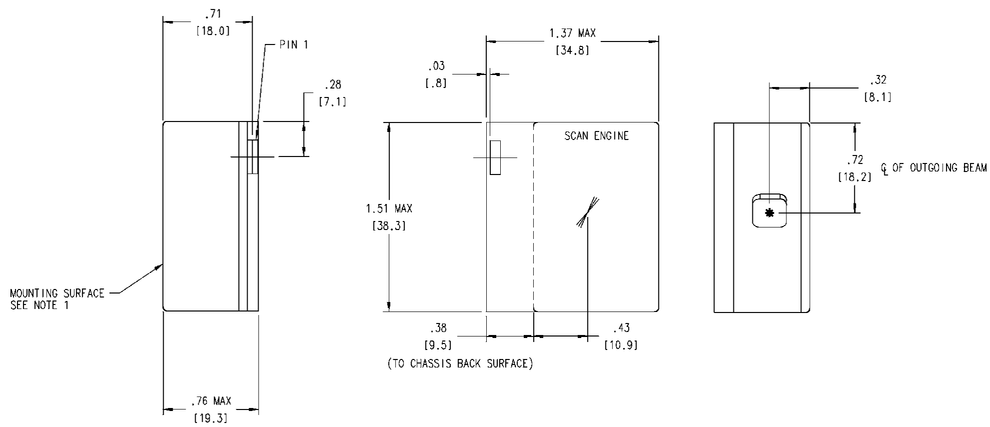
Chapter 2 Installation

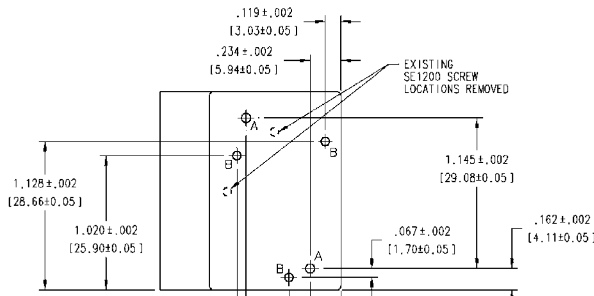
Mechanical Interface

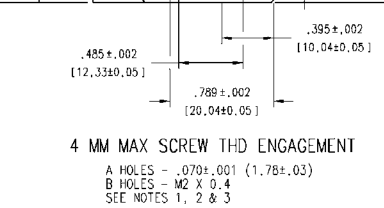
Physical dimensions of the Symbol SE2223/3223 are shown in *Figure 2-1*. Mounting holes for both products are on the bottom surface of the zinc die-cast chassis. One of the three mounting holes is in the same location as the Symbol SE1200. Symbol SE2223/3223 mounting holes are also illustrated in these figures.

The Symbol SE2223/3223 is resistant to the shock of drop for up to 1000 Gs. If the shock level is anticipated to be above 1000 Gs, the use of shock mounts is recommended.

The Symbol SE2223/3223 scan patterns are two-dimensional. The height of the exit window must take into account the vertical component of the pattern. See *Table 2-9* and *Table 2-10* for window height specifications.







Notes:

1. Chassis is electrically grounded.
2. Holes marked “A” are scan engine location aids. Locate engine with .08 max long pins in two places marked “A”.
3. Mounting screws and locating pins may be magnetic or non-magnetic material.

Figure 2-1 *Symbol SE2223/3223 Mechanical Drawing*

Table 2-1 *Mounting Hole Specifications*

Hole	Function	Diameter		Engagement Length (max)	
		in.	mm	in.	mm
A	Locating	0.70 ± 0.001	1.78 ± 0.03	0.08	2.0
B	Mounting	M2x0.4mm		0.16	4.0

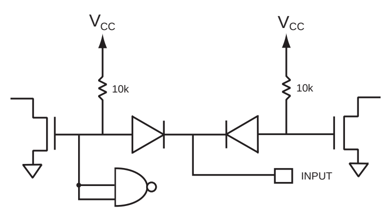
Electrical Interface

The Symbol SE2223/3223 is controlled by a 12-pin interface that uses the Simple Serial Interface (SSI) communication protocol. SSI provides a communications link between Motorola decoders (e.g., Symbol SE2223 scan engine, slot scanners, hand-held scanners, two-dimensional scanners, hands-free scanners, and RF base stations) and a serial host. It provides the means for the host to control the decoder.

Table 2-2 *Electrical Interface*

<table>
<tr><th>Mnemonic</th><th>No.</th><th>Type</th><th>Name and Function</th></tr>
<tr><td></td><td>1</td><td></td><td>Not connected. Reserved for future versions of the Symbol SE2223/3223.</td></tr>
<tr><td>VBATT</td><td>2</td><td></td><td>Power Supply: Power supply voltage for the Symbol SE2223/3223.</td></tr>
<tr><td>GND</td><td>3</td><td></td><td>Ground: 0 V reference.</td></tr>
<tr><td rowspan="2">RXD
CTS*</td><td rowspan="2">4
6</td><td rowspan="2">I
I</td><td>Received Data: Serial input port.
Clear to Send: Serial port handshaking line.</td></tr>
<tr><td>

	Min.	Max.	Condition
V_{IL}	-0.5V	0.4V	V_{CC} = 4.5
V_{IH}	2.5V	5.5V	V_{CC} = 5.5



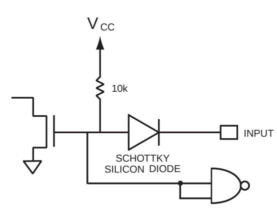
</td></tr>
<tr><td rowspan="2">AIM/WAKE*

TRIG*</td><td rowspan="2">11

12</td><td rowspan="2">I

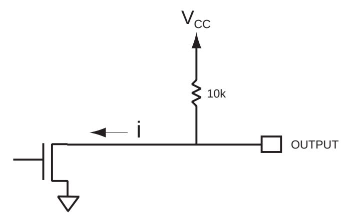
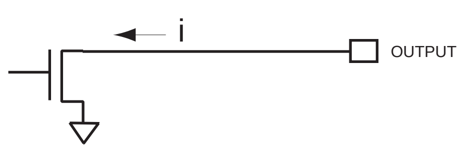
I</td><td>Wake Up: When the Symbol SE2223/3223 is in the low power mode, pulsing this pin low for 2µs awakens the Symbol SE2223/3223.
Trigger: This pin is the hardware triggering line. Driving this pin low causes the Symbol SE2223/3223 to start a scan and decode session.</td></tr>
<tr><td>

	Min.	Max.	Condition
V_{IL}	-0.5V	0.4V	V_{CC} = 4.5
V_{IH}	2.5V	5.5V	V_{CC} = 5.5



</td></tr>
<tr><td colspan="4">Signal names with the “*” modifier are asserted when at the ground level (active low). Signal names without the “*” modifier are asserted when at the positive supply voltage level (active high).</td></tr>
</table>

Table 2-2 *Electrical Interface (Continued)*

Mnemonic	No.	Type	Name and Function
RTS*	7	O	**Request to Send:** Serial port handshaking line.
PWRDWN	8	O	**Power Down Ready**: When high, the decoder is in low power mode.
BPR*	9	O	**Beeper*:** Low current beeper output.
DLED*	10	O	**Decode LED:** Low current decode LED output.
			Min. / Max. / Condition V_{OL} — Max. 0.45 — I_{OL} = 1.6mA V_{OH} — Min. 2.40 — I_{OH} = -1.6mA, V_{CC}=4.5V Min. 4.0 — I_{OH} = -250µA@V_{CC}=4.5V 
TXD	5	O	**Transmitted Data**: Serial output port.
			Min. / Max. / Condition V_{OL} — Max. 0.45 — I_{OL} = 1.6mA V_{OH} — Min. 2.40 — I_{OH} = -1.6mA, V_{CC}=4.5V Min. 4.0 — I_{OH} = -250µA@V_{CC}=4.5V 

Signal names with the "*" modifier are asserted when at the ground level (active low). Signal names without the "*" modifier are asserted when at the positive supply voltage level (active high).

1-D and PDF Decoding

The on-board SCSD provides fully decoded PDF and 1-D output using the SSI protocol.

Scan Pattern Control: Scan Engine and Decoder Interface

The scanner's aggressiveness depends on how well the scan pattern covers the target bar code. This partly depends on the operator's aiming skill, but the Symbol SE2223/3223 also allows for decoder adjustments of the scan pattern. The decoder can adjust the scan pattern to fit the target symbol by evaluating optical feedback from the area scanned.

Grounding

Because the Symbol SE2223/3223 chassis is at GND potential, a grounded host can accept the Symbol SE2223/3223 directly. If the host is not at GND potential (as in Symbol SE1200 installations), isolation can be accomplished by inserting an insulator between the two chassis, and if metallic screws are used, shoulder washers are required to isolate the screws from the host. Non-metallic screws may also be used if mechanical considerations permit.

Power

The Symbol SE2223/3223 uses +5V power ±10% with a typical current draw of 300 mA. “Hot-plugging” the interface connector with power activated is not allowed.

ESD

The Symbol SE2223/3223 is protected from ESD events that may occur in an ESD-controlled environment. Use care when handling the scan engine. Be sure grounding wrist straps and properly grounded work areas are used.

Environment

The Symbol SE2223/3223 must be sufficiently enclosed to prevent dust particles from gathering on the mirrors, laser lens and the photodiode. Dust and other external contaminants eventually cause degradation in unit performance. Motorola does not warrant performance of the engine when used in an exposed application.

Optical

The Symbol SE2223/3223 uses a sophisticated optical system that can provide scanning performance that matches or exceeds the performance of much larger scanners. However, an improperly designed enclosure, or improper selection of the window material can reduce scanner performance.

✓ ***NOTE*** This guide provides general instructions for the installation of the scan engine into a customer's device. It is strongly recommended that an opto-mechanical engineer perform an opto-mechanical analysis prior to integration.

Positioning the Window

The window must be positioned so that laser light reflected off the inside of the window is not reflected back into the collection optics of the scanner. See *Table 2-9* to determine position and angle of the window. The window can be positioned more nearly parallel to the face of the scanner if an anti-reflection coating is used. An improperly positioned window can result in significant performance degradation.

Avoiding Scratched Windows

Scratches on the window can reduce the performance of the scanner. Recess the window into the housing, or apply a scratch resistance coating to minimize scratching.

Window Material

Many window materials that look perfectly clear to the eye can contain stresses and distortions that can reduce scanner performance. For this reason, cell cast acrylic or CR-39 is highly recommended. Following is a description of these window materials.

Acrylic

Easily fabricated by extruding, injection-molding, or by cell-casting. Very good optical quality and low initial cost, but surface must be protected from the environment due to its susceptibility to attack by chemicals, mechanical stresses, and UV light. Reasonably good impact resistance. Can be ultrasonically welded.

CR-39

A thermal-setting plastic produced by the cell casting process. Excellent chemical and environmental resistance. Good surface hardness, so does not have to be hard-coated, but may be for severe environments. Reasonably good impact resistance. Most plastic eye glasses sold today are uncoated, cell cast CR-39. Cannot be ultrasonically welded.

Table 2-3 *Suggested Window Properties*

Property	Description
Material	Red cell cast acrylic
Spectral Transmission	85% minimum from 630 to 680 nanometers
Thickness	.060 ±.005
Wavefront Distortion (transmission)	0.2 wavelengths peak-to-valley maximum over any .08 in. diameter within the clear aperture
Clear Aperture	To extend to within .04 in. of the edges all around
Surface Quality	60-20
Coating	Both sides to be anti-reflection coated to provide 0.5% max reflectivity (each side) from 630 to 680 nanometers at nominal window tilt angle. Coating must meet the hardness adherence requirements of MIL-M-13508.

Commercially Available Coatings

✓ ***NOTE*** You may not be able to ultrasonically weld these coatings.

Anti-Reflection Coatings

An anti-reflection coating can be applied to the inside and/or outside of the window, which greatly reduces the amount of light reflected off the window back into the scanner. This coating can increase the range of acceptable window positions and minimize performance degradation due to signal loss as the light passes through the window. Anti-reflection coatings on the inside of the window is highly recommended because coating on the outside is subject to scratching.

Polysiloxane Coating

Polysiloxane coatings are applied to plastic surfaces to improve the surface resistance to both scratch and abrasion. They are generally applied by dipping and air drying in an oven with filtered hot air.

A Word About Coatings

If using an anti-reflective coating, a polysiloxane coating is not needed. It is strongly recommended that an anti-reflective coating be used on the inside surface first, unless high performance requirements require coating on the outside surface. If not, a CR-39 without a protective coat is recommended. In all cases, adhere to the minimum tilt angle outlined in *Location and Positioning on page 2-9*. Also, it is recommended to recess the exit window to minimize scratches and digs.

Following is a table of exit window manufacturers and anti-reflection coaters.

Table 2-4 *Exit Window Manufacturers and Coaters*

Company	Discipline	Specifics
Evaporated Coatings, Inc. 2365 Maryland Road Willow Grove, PA 19090 (215) 659-3080	Anti-reflection coater	Acrylic window supplier Anti-reflection coater
Fosta-Tek Optics, Inc. 320 Hamilton Street Leominster, MA 01453 (978) 534-6511	Cell caster, hard coater, laser cutter	CR39 exit window manufacturer
Glasflex Corporation 4 Sterling Road Sterling, NJ 07980 (908) 647-4100	Cell caster	Acrylic exit window manufacturer
Optical Polymers Int. (OPI) 110 West Main Street Milford, CT 06460 (203) 882-9093	CR-39 cell-caster, coater, laser cutter	CR39 exit window manufacturer
Polycast 70 Carlisle Place Stamford, CT 06902 800-243-9002	Acrylic cell-caster, hard coater, laser cutter	Acrylic exit window manufacturer
TS Polyers 2009 Glen Parkway Batavia, OH 45103 800-277-9778	Acrylic cell-caster, coater, laser cutter	Acrylic exit window manufacturer

Mounting

On the bottom of the chassis there are three mounting holes (M2x0.4) and two locator holes, shown in *Figure 2-1*.

The Symbol SE2223/3223 may be mounted in any orientation with no degradation in performance.

Location and Positioning

Symbol Position with Respect to a Fixed-Mount Scan Engine

The Symbol SE2223/3223 may need to be mounted to read symbols that are automatically presented to it, or that are always presented in a pre-determined location. In these situations positioning of the Symbol SE2223/3223 with respect to the symbol location is critical, or unsatisfactory reading performance may result.

Use the following steps to ensure satisfactory operation of the Symbol SE2223/3223 in your installation.

1. Determine the optimum distance between the scan engine and the symbol. Due to the large variety of symbol sizes, densities, print quality, etc., there is no simple formula to calculate this optimum symbol distance. Try this:
   a. Measure the maximum and minimum reading range that can be achieved with your symbols.
   b. Locate the scanner so the symbols are near the middle of this range when being scanned.

      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 your system. Motorola can provide advice on how to improve your installation.

      Table 2-5 and *Table 2-6* provide general guidelines for bar code ranges.
2. Center the symbol (left to right) in the scan beam whenever possible.
3. Position the symbol so that the scan beam is as near as possible to perpendicular to the bars and spaces in the symbol. Although the scanner can tolerate some tilt of the symbols, best results are obtained with no tilt. This is especially important with 2-D symbols.
4. Avoid specular reflection (glare) off the symbol by tilting the top or bottom of the symbol away from the engine. 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 engine. 15 degrees is recommended (see *Figure 3-5 on page 3-6*).
5. If a window is to be placed between the engine and the symbol, use a representative window in the desired window position to determine optimum symbol location. See the sections concerning window quality, coatings and positioning.
6. Give the scanner time to dwell on the symbol for several scans. Poor quality symbols may not read on the first scan. When the scanner is first enabled, it may take two or three scans before the scanner reaches maximum performance. Enable the scanner before the symbol is presented, if possible.

Table 2-5 *Symbol SE2223 Decode Distances*

Symbol Density/ Bar Code Type	Typical Working Ranges	
	Near	Far
6.0 mil Code 39	2.25 in / 5.72 cm	6.0 in / 15.24 cm
7.5 mil Code 39	2 in / 5.08 cm	8.0 in / 20.32 cm
13 mil 100% UPC	See Note	15.0 in / 38.10 cm
20 mil Code 39	See Note	20.0 in / 50.80 cm
40 mil Code 39	See Note	25.0 in / 63.50 cm
55 mil Code 39	See Note	32.0 in / 81.28 cm
6.6 mil PDF417	2.3 in / 5.72 cm (Note)	7.0 in / 17.78 cm
10 mil PDF417	2.0 in / 5.08 cm (Note)	10.0 in / 25.40 cm
15 mil PDF417	2.0 in / 5.08 cm (Note)	16.0 in / 40.64 cm
Note: Near ranges for lower density bar codes are limited by the width of the bar code and the scan angle.		

Table 2-6 *Symbol SE3223 Decode Distances*

Symbol Density/ Bar Code Type	Typical Working Ranges	
	Near	Far
6.0 mil Code 39	1.25 in / 3.18 cm	4.25 in / 10.80 cm
80% UPC	2 in / 5.08 cm	7.5 in / 19.05 cm
13 mil 100% UPC	2.5 in / 6.35 cm	14.0 in / 35.56 cm
20 mil Code 39	2.75 in / 6.99 cm	14.25 in / 36.20 cm
55 mil 1-D	2.0 in / 5.08 cm (Note)	33.0 in / 83.82 cm
6.6 mil PDF417	2.0 in / 5.08 cm (Note)	6.25 in / 15.88 cm
10 mil PDF417	5.75 in / 14.61 cm	10.75 in / 27.31 cm
15 mil PDF417	8.5 in / 21.59 cm	16.5 in / 41.91 cm
10 mil PDF417	2.0 in / 5.08 cm (Note)	10.0 in / 25.40 cm
Note: Near ranges for lower density bar codes are limited by the width of the bar code and the scan angle.		

Installing the Symbol SE2223/3223

Before installing the Symbol SE2223/3223 into your host equipment, there are two important points to consider:

- The Symbol SE2223/3223 chassis is electrically connected to ground. However, if other members of this scan engine family are used, isolate the chassis since the family chassis is connected to Vcc.
- Recommended screw torque is 2.5 to 3.5 in. lbs.

Accessories

Table 2-7 *Symbol Accessories*

Item	Part Number
Tapered 12-Pin Flex Strip	15-81378-01
Even Width 12 pin Straight Flex Strip - 10 in. (254 mm)	50-16000-134R
Even Width 12-Pin Straight Flex Strip - 2 in. (53 mm)	50-16000-139R
12-Pin Straight Flex - connectors on opposite sides	50-16000-308R
Universal (Scan Engine) Developer Kit	DKSE-1000-000R

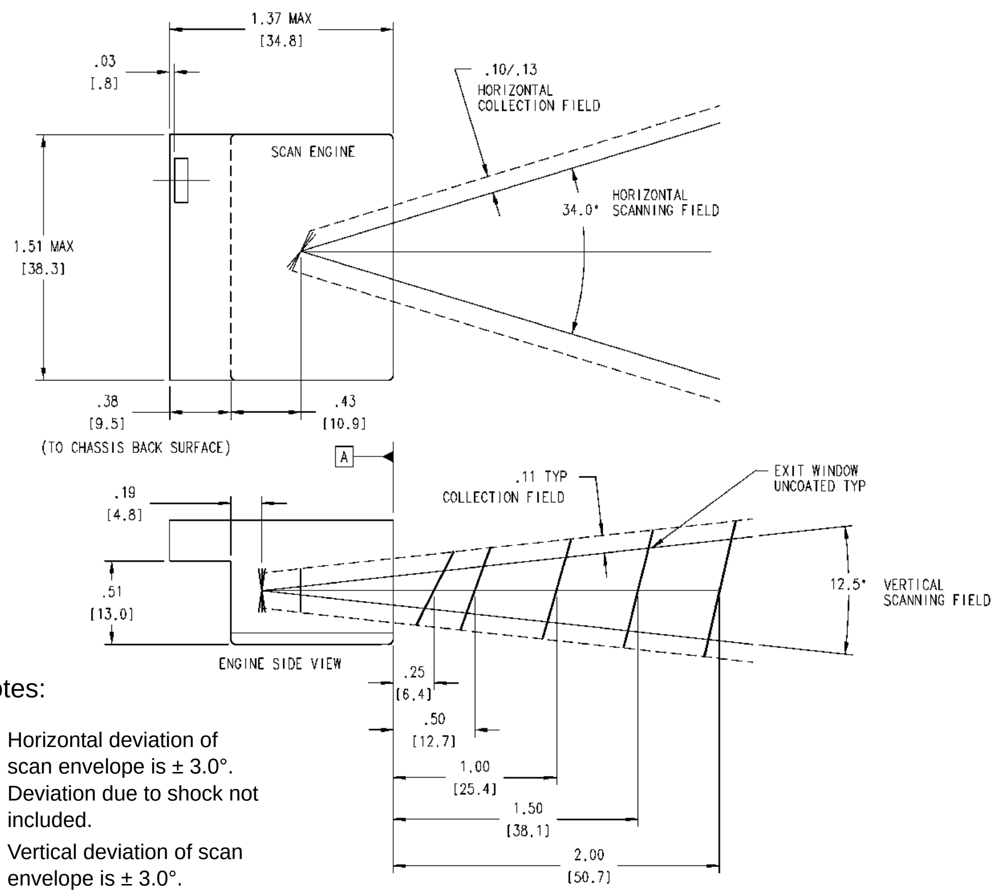
Hardware Accessories

Table 2-8 lists sources for hardware accessories for the scan engine.

Table 2-8 *Hardware Accessories*

Company	Discipline	Specifics
Tower Fasteners Inc. 1690 North Ocean Ave. Holtsville, New York 11742-1823 (631) 289-8800	Fasteners	Metallic, non-magnetic M1.6 x 0.35 machine screws. Length is integration dependent. However, a minimum of 5 threads is recommended.
AXON' Cable Inc. 1314 Plum Grove Road Schaumburg, IL 60173 (847) 230-7800	Flex Cables	Ensure flex mates with Molex 54548-1271.

Symbol SE2223 Optical Path and Exit Window

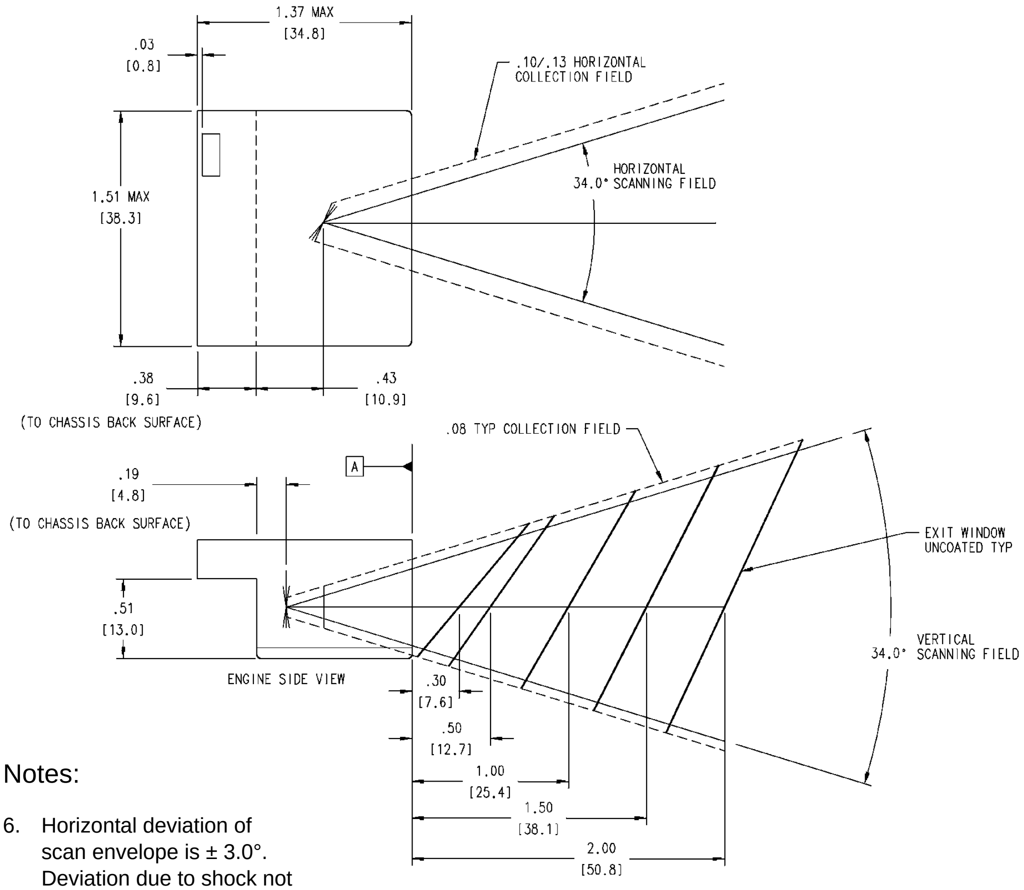


Notes:

4. Horizontal deviation of scan envelope is ± 3.0°. Deviation due to shock not included.
5. Vertical deviation of scan envelope is ± 3.0°. Deviation due to shock not included.

Figure 2-2 *Symbol SE2223 Optical Path*

Symbol SE3223 Optical Path and Exit Window



Notes:

6. Horizontal deviation of scan envelope is ± 3.0°. Deviation due to shock not included.
7. Vertical deviation of scan envelope is ± 3.0°. Deviation due to shock not included.

Figure 2-3 *Symbol SE3223 Optical Path*

Table 2-9 *Symbol SE2223 Exit Window Height & Angles*

Distance from Engine at Scan Center Line (in.)	0.25	.50	1.00	1.50	2.00
Minimum Window Width Coated or Uncoated	0.96	1.10	1.45	1.85	2.20
Minimum Window Height One Side Antireflective Coated or Uncoated (Note 1)	0.85	0.85	0.97	1.12	1.30
Minimum Window Tilt One Side Antireflective Coated or Uncoated (Note 2)	27°	20°	16°	14°	13°
Minimum Window Height Two Sides Antireflective Coated (Note 1)	0.70	0.75	0.92	1.10	1.25
Minimum Window Tilt Two Sides Antireflective Coated (Note 2)	12.5°	12.5°	12.5°	12.5°	12.5°
Notes: **1. Measured parallel to window surface.** **2. Window may tilt away from or toward scan engine.** **3. Mounting tolerances are not included.**					

Interface Specifications

Table 2-10 *Symbol SE3223 Exit Window Height & Angles*

Distance from Engine at Scan Center Line (in.)	.30	.50	1.00	1.50	2.00
Minimum Window Width Coated or Uncoated	1.10	1.25	1.60	1.95	2.30
Minimum Window Height One Side Antireflective Coated or Uncoated (Note 1)	1.50	1.55	1.90	2.25	2.60
Minimum Window Tilt One Side Antireflective Coated or Uncoated (Note 2)	40°	35°	30°	27°	25°
Minimum Window Height Two Sides Antireflective Coated (Note 1)	1.20	1.30	1.70	2.10	2.50
Minimum Window Tilt Two Sides Antireflective Coated (Note 2)	24°	24°	24°	24°	24°
Notes: **1. Measured parallel to window surface.** **2. Window may tilt away from or toward scan engine.** **3. Mounting tolerances are not included.**					

Flex Cable

A flex strip cable is used to connect the Symbol SE3223 to your host interface. If desired, the flex strip is available from Motorola (p/n 15-81378-01).

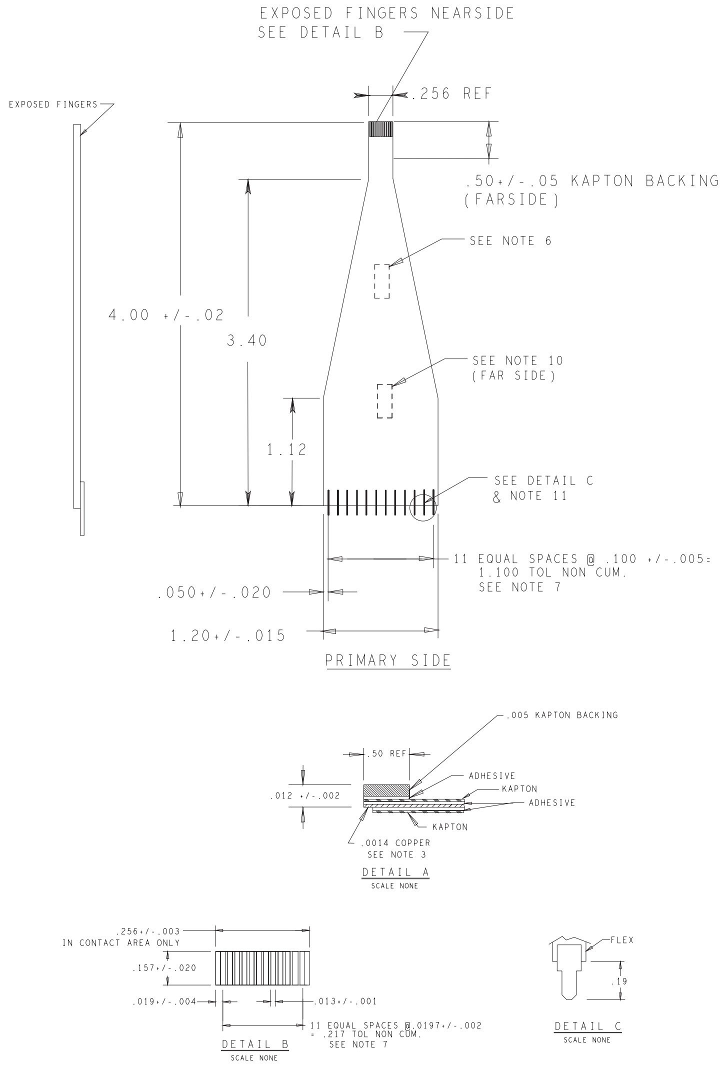


Figure 2-4 *Flex Cable (For Evaluation)*

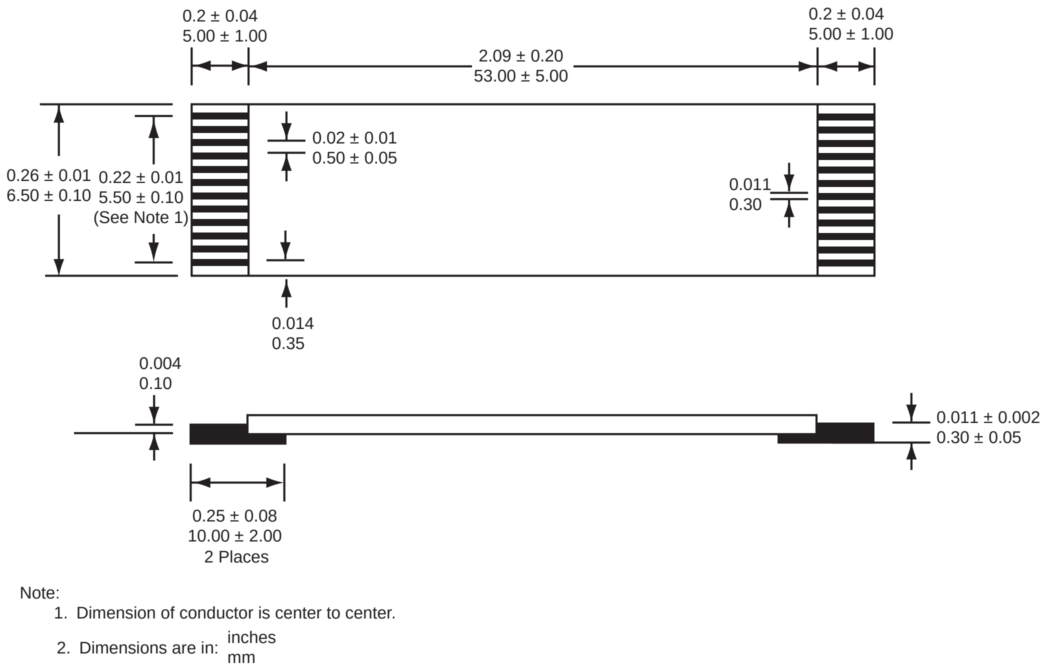


Figure 2-5 *Flex Strip, p/n 50-16000-139R (Even Width, 53 mm)*

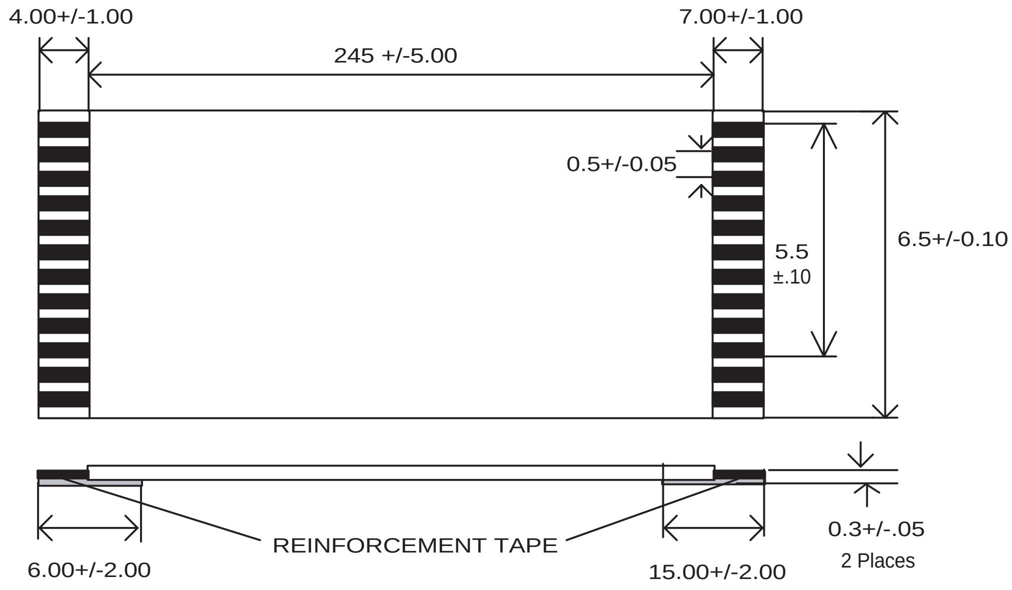


Figure 2-6 *Flex Strip, p/n 50-16000-134R (Even Width, 245 mm)*

Scan Engine Developer Kit

The Scan Engine Developer Kit (p/n DKSE-1000-000R) enables development of products and systems around the SE2223/3223 using the Windows 98, 2000, or XP platform. The kit provides the software and hardware tools required to design and test the embedded scan engine application before integration into the host device.

The kit allows you to use the Symbol Simple Serial Interface (SSI) protocol to design bar code scanning applications, and contains an SSI ActiveX component to simplify the scan engine application.

The Scan Engine Developer Kit contains:

- CD, which includes:
  - Simple Serial Interface header files
  - Windows Serial Communication Library and source code
  - Simple Serial Interface Library and source code
  - Dynamic Link Library (DLL) with source code
  - ActiveX component
  - Windows demo programs and source code
  - Simple Serial Interface Developer Guide
  - Library documentation
- Developer board for connecting the scan engine to the PC development workstation. Functions of the development board include:
  - Mounting location for scan engine
  - Beeper and LED drivers
  - 9-pin RS232 for connection to PC workstation
  - Aim and trigger buttons
  - Beeper
  - Power, Decode, Low Power Mode LEDs
  - Test points
- Flex strips
- Interface cables for connection between the development board and the PC workstation
- 5V universal power supply.

✓ ***NOTE*** If using the Cyclone pattern, be sure to mount the scan engine close to the edge of the development board to prevent the pattern from being clipped by any portion of the board.

Incoming Test Procedure (V_{cc} = 5V)

Test Fixture Requirements

A platform must be part of the test fixture, and it must tilt in the corresponding axes to compensate for the deviations. The pivoting point of this platform should be at or near the x-scan mirror.

For maximizing test efficiency, use the aim line prior to scanning the symbols.

Chapter 3 Symbol SE2223 Specifications

Technical Specifications

Table 3-1 *Symbol SE2223 Technical Specifications*

Item	Description
Power Requirements Input Voltage Continuous Mode (max. current draw) Low Power (min. current draw) Idle (power applied, laser off) Surge Current V_{cc} Noise Level	 +5.0 VDC ± 10% 230 ± 25 mA typical 6.5 ± 3 mA max. 80 mA ± 10 mA typical 440 mA typical with 15 msec duration (using 5V supply with 10 ms rise time) 200 mV p to p max.
Laser Diode Power	1.2 mW maximum @ 650 nm
Scan Pattern	Cyclone (omnidirectional), raster, line, dot
Start Time	0.065 sec. to 75% of steady state horizontal amplitude
Scan Angle Semi-Omni Smart Raster / Always Raster Omnidirectional Slab Pattern	 Horizontal: $34^{o} \pm 1.5^{o}$ Vertical: $10.5^{o} \pm 1.5^{o}$ Horizontal: $34^{o} \pm 1.5^{o}$ Vertical: $12.5^{o} \pm 1.5^{o}$ Horizontal: $34^{o} \pm 1.5^{o}$ Vertical: $34^{o} \pm 1.5^{o}$ Horizontal: $34^{o} \pm 1.5^{o}$

Table 3-1 *Symbol SE2223 Technical Specifications (Continued)*

Item	Description
Beam Deviation (offset from the nominal)	Horizontal: ±3.0^{o} Vertical: ±3.0^{o} Horizontal tilt: ± 2^{o}
Additional Post Shock Beam Deviation (1000G Shock)	Horizontal: ±3.0^{o} max Vertical: ±6.0^{o} max
Scan Frequency: Horizontal	295 Hz ± 5 Hz
Scan Frequency: Vertical	10 Hz ± 2 Hz
Frame Rate	22 frames/sec. 11 Hz ±1 Hz (vertical)
Optical Resolution	Can decode a 6.6 mil (minimum X-dimension) symbol (PDF417); *Y-dimension must be 3X*.
Angular Orientation Tolerances	
Pitch	± 30^{o} (“front to back”)
Yaw	± 15^{o} from plane parallel to symbol (“side-to-side”)
Rotation	± 4^{o} (for scanning benchmark label, assuming 3:1 codeword aspect ratio). Note that this is dependent on the decoder.
Specular Dead Zone	1.5” from front of chassis
Print Contrast Minimum	35% absolute dark/light reflectance differential (PDF); 25% absolute dark/light reflectance differential (1-D)
Humidity	5% to 95% non-condensing
Shock	1000 G. max, 0.85 ms sine
Vibration	Unpowered engine 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.
SCDS Memory	256Kb flash, 64Kb RAM
Ambient Light Immunity	
Sunlight	8000 ft. candles (86,112 lux) with correct enclosure
Incandescent	450 ft. candles (4845 lux)
Fluorescent	450 ft. candles (4845 lux)
Sodium Vapor	450 ft. candles (4845 lux)
Mercury	450 ft. candles (4845 lux)
Operating Temperature	-22° to 140° F; (-30° to 60° C) @ 100% duty cycle

Table 3-1 *Symbol SE2223 Technical Specifications (Continued)*

Item	Description
Storage Temperature	-40° to 158° F; (-40° to 70° C)
Humidity	5% to 95% non-condensing
Dimensions	
Height	0.76 in. max. (1.93 cm) (see *Figure 2-1*)
Width	1.51 in. max. (3.84 cm) (see *Figure 2-1*)
Length	1.37 in. max. (3.48 cm) (see *Figure 2-1*)
Weight	1.4 oz. max. (40 gm)
Laser Class	The scan engine, by itself, is an unclassified component. It is intended for use in CDRH Class II (or Class IIa/IEC Class 1 with software to control the laser duty cycle) devices with proper housing, labeling, and instructions to comply with federal and/or international standards.
RoHS	Meets RoHS requirements

Symbol SE2223 Scanning Specifications

Symbol SE2223 1-D Decode Zone

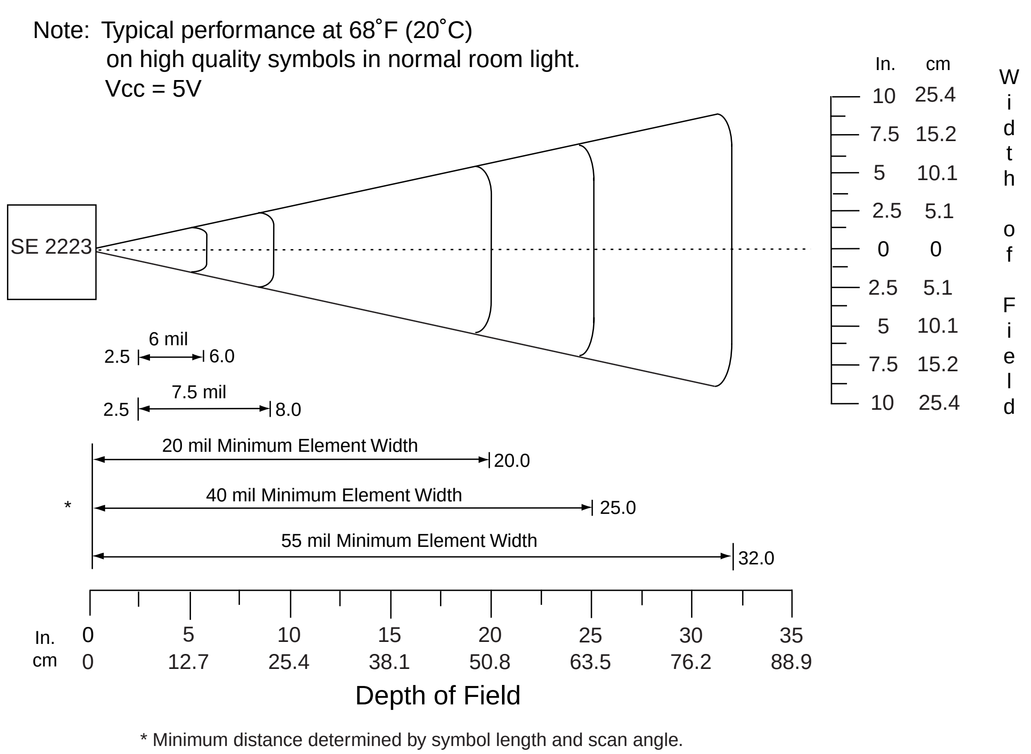


Figure 3-1 *Symbol SE2223 1-D Decode Zone*

The decode zone is a function of various symbol characteristics including density, print contrast, wide to narrow ratio and edge acuity. Scanner is in horizontal orientation.

Symbol SE2223 PDF Decode Zone

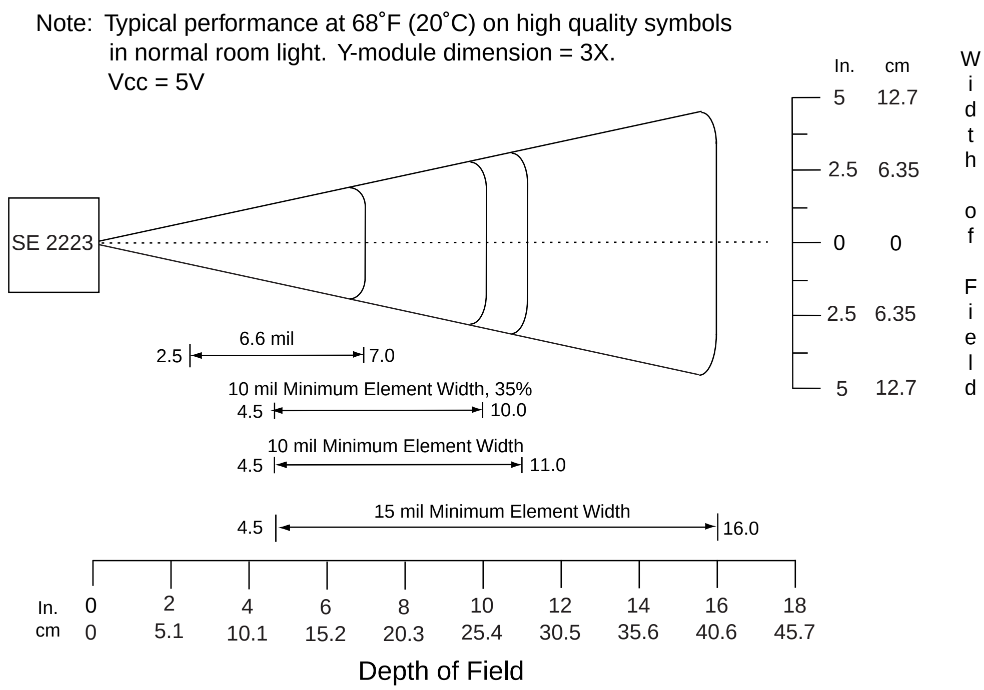


Figure 3-2 *Symbol SE2223 2-D Decode Zone*

The decode zone is a function of various symbol characteristics including density, print contrast, wide to narrow ratio and edge acuity. Scanner is in horizontal orientation.

Table 3-2 *Symbol SE2223 1-D Decode Distances*

Part Number	Symbol Density/ Bar Code Type	Bar Code Content/ Contrast[1]	Typical Working Ranges		Guaranteed Working Ranges	
			Near	Far	Near	Far
60-01755-01	6.0 mil Code 39	123 80% MRD	2.5 in 6.35 cm	6.0 in 15.24 cm	3.5 in 8.89 cm	4.75 in 12.07 cm
64-17452-01	7.5 mil Code 39	ABCDEF 80% MRD	2.5 in 6.35 cm	8.0 in 20.32 cm	3.25 in 8.26 cm	6.0 in 15.24 cm
64-05303-01	13 mil 100% UPC	012345678905 80% MRD	Note 2	15.0 in 38.10 cm	N/A	11.5 in 29.21 cm
64-17456-01	20 mil Code 39	123 80% MRD	Note 2	20.0 in 50.80 cm	N/A	15.0 in 38.10 cm
64-17457-01	40 mil Code 39	AB 80% MRD	Note 2	25.0 in 63.50 cm	N/A	19.0 in 48.26 cm
60-01601-01	55 mil Code 39	A 80% MRD	Note 2	32.0 in 81.28 cm	Note 2	26.0 in 66.04 cm

Notes:
1. CONTRAST measured as Mean Reflective Difference (MRD) at 650 nm.
2. Near ranges on lower densities (not specified) are largely dependent upon 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 chassis.

Table 3-3 *Symbol SE2223 2-D Decode Distances*

Part Number	Symbol Density/ Bar Code Type	Typical Working Ranges		Guaranteed Working Ranges	
		Near	Far	Near	Far
64-14035-01	6.6 mil, 80% MRD PDF417	2.5 in 6.35 cm	7.0 in 17.78 cm	See Note	5.75 in 14.61 cm
64-14937-01	10 mil, 35% MRD PDF417	4.5 in 11.43 cm	10.0 in 25.40 cm	See Note	6.0 in 15.24 cm
64-14037-01	10 mil, 80% MRD PDF417	4.5 in 11.43 cm	11.0 in 27.94 cm	See Note	8.5 in 21.59 cm
64-14038-01	15 mil, 80% MRD PDF417	4.5 in 11.43 cm	16.0 in 40.64 cm	See Note	14.0 in 35.56 cm

Note: Near ranges for some bar codes (typically low density) are limited by the scan angle.

Pitch, Skew, and Specular Dead Zone (Horizontal Spread of Pattern)

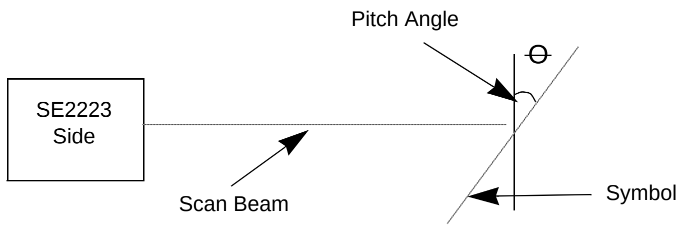


Figure 3-3 *Pitch (Side View of Module)*

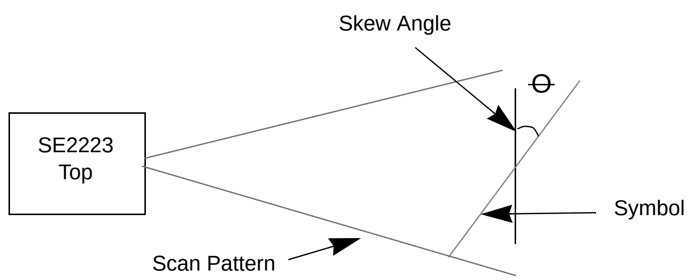


Figure 3-4 *Yaw (Top View of Module)*

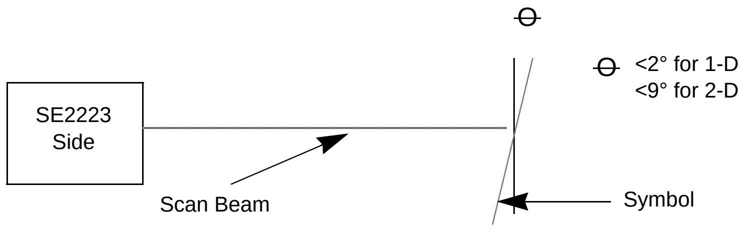


Figure 3-5 *Specular Dead Zone (Side View of Module)*

Decode Zone

The decode zone is a function of various symbol characteristics including density, print contrast, wide to narrow ratio and edge acuity. Width of field at any given distance must be considered when designing a system.

Usable scan length is calculated as follows (assuming 10% on each side of scan line is not decodable):

L = 1.8 x (D+d) x Tan (A/2)

Where:

D	=	Distance (in inches) from the front edge of the housing.
d	=	The housing's internal optical path (in inches) from the x mirror to the front edge of the housing.
A	=	Scan angle in degrees (34°).

So:

L = 1.8 x (D+d) x Tan 17°

NOTE Usable scan length determined by above formula, or 90% of scan line at any working distance.

The calculations above are based on good quality symbols in the center of the working range.

For 2D PDF417 symbols the height of the symbol must be considered to determine if the scanner can open in the Y direction sufficiently to read the symbol. The formula is the same as above except that the Y angle is 12.5°**.**

L = 1.8 x (D + d) x Tan (A/2)

L = 1.8 x (D + d) x Tan 6.25°

If the above equation yields a greater height than the symbol height, the scan engine automatically adjusts the Y pattern to fit the symbol. If the symbol is taller, a manual swipe in the Y direction may be necessary to read the symbol.

Chapter 4 Symbol SE2223VHD Specifications

Technical Specifications

Table 4-1 *Symbol SE2223VHD Technical Specifications*

Item	Description
Power Requirements Input Voltage Continuous Mode (max. current draw) Low Power (min. current draw) Idle (power applied, laser off) Surge Current V_{cc} Noise Level	 +5.0 VDC ± 10% 230 ± 25 mA typical 6.5 ± 3 mA max. 80 mA ± 10 mA typical 440 mA typical with 15 msec duration (using 5V supply with 10 ms rise time) 200 mV p to p max.
Laser Diode Power	1.2 mW maximum @ 650 nm
Scan Pattern	Cyclone (omnidirectional), raster, line, dot
Start Time	0.065 sec. to 75% of steady state horizontal amplitude
Scan Angle Semi-Omni Smart Raster / Always Raster Omnidirectional Slab Pattern	 Horizontal: $34^{o} \pm 1.5^{o}$ Vertical: $10.5^{o} \pm 1.5^{o}$ Horizontal: $34^{o} \pm 1.5^{o}$ Vertical: $12.5^{o} \pm 1.5^{o}$ Horizontal: $34^{o} \pm 1.5^{o}$ Vertical: $34^{o} \pm 1.5^{o}$ Horizontal: $34^{o} \pm 1.5^{o}$

Table 4-1 *Symbol SE2223VHD Technical Specifications (Continued)*

Item	Description
Beam Deviation (offset from the nominal)	Horizontal: ±3.0^{o} Vertical: ±3.0^{o} Horizontal tilt: ± 2^{o}
Additional Post Shock Beam Deviation (1000G Shock)	Horizontal: ±3.0^{o} max Vertical: ±6.0^{o} max
Scan Frequency: Horizontal	295 Hz ± 5 Hz
Scan Frequency: Vertical	10 Hz ± 1 Hz
Frame Rate	20 frames/sec. 10 Hz ±1 Hz (vertical)
Optical Resolution	Can decode a 6.6 mil (minimum X-dimension) symbol (PDF417); *Y-dimension must be 3X*.
Angular Orientation Tolerances	
Pitch	± 30^{o} (“front to back”)
Yaw	± 15^{o} from plane parallel to symbol (“side-to-side”)
Rotation	± 4^{o} (for scanning benchmark label, assuming 3:1 codeword aspect ratio). Note that this is dependent on the decoder.
Specular Dead Zone	1.5” from front of chassis
Print Contrast Minimum	35% absolute dark/light reflectance differential (PDF); 25% absolute dark/light reflectance differential (1-D)
Humidity	5% to 95% non-condensing
Shock	1000 G. max, 0.85 ms sine
Vibration	Unpowered engine 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.
SCDS Memory	256Kb flash, 64Kb RAM
Ambient Light Immunity	
Sunlight	8000 ft. candles (86,112 lux) with correct enclosure
Incandescent	450 ft. candles (4845 lux)
Fluorescent	450 ft. candles (4845 lux)
Sodium Vapor	450 ft. candles (4845 lux)
Mercury	450 ft. candles (4845 lux)
Operating Temperature	-22° to 140° F; (-30° to 60° C) @ 100% duty cycle

Table 4-1 *Symbol SE2223VHD Technical Specifications (Continued)*

Item	Description
Storage Temperature	-40° to 158° F; (-40° to 70° C)
Humidity	5% to 95% non-condensing
Dimensions	
Height	0.76 in. max. (1.93 cm) (see *Figure 2-1*)
Width	1.51 in. max. (3.84 cm) (see *Figure 2-1*)
Length	1.37 in. max. (3.48 cm) (see *Figure 2-1*)
Weight	1.4 oz. max. (40 gm)
Laser Class	The scan engine, by itself, is an unclassified component. It is intended for use in CDRH Class II (or Class IIa/IEC Class 1 with software to control the laser duty cycle) devices with proper housing, labeling, and instructions to comply with federal and/or international standards.
RoHS	Meets RoHS requirements

Symbol SE2223VHD Scanning Specifications

Symbol SE2223VHD 1-D Decode Zone

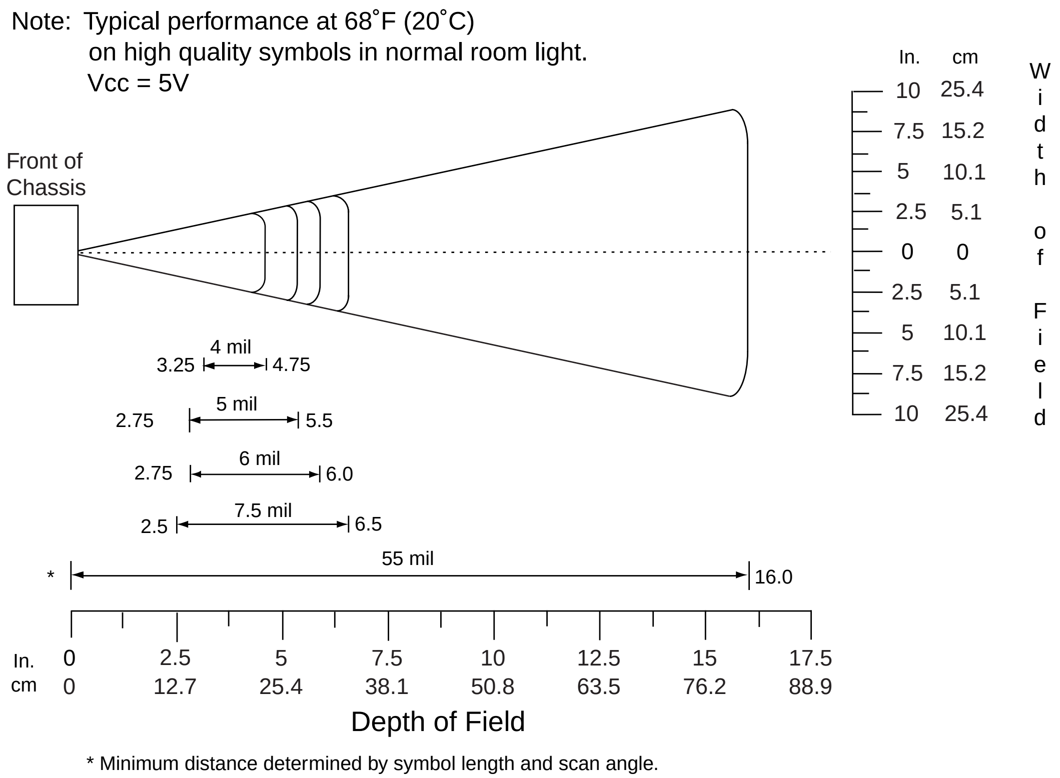


Figure 4-1 *Symbol SE2223VHD 1-D Decode Zone*

The decode zone is a function of various symbol characteristics including density, print contrast, wide to narrow ratio and edge acuity. Scanner is in horizontal orientation.

Symbol SE2223VHD PDF Decode Zone

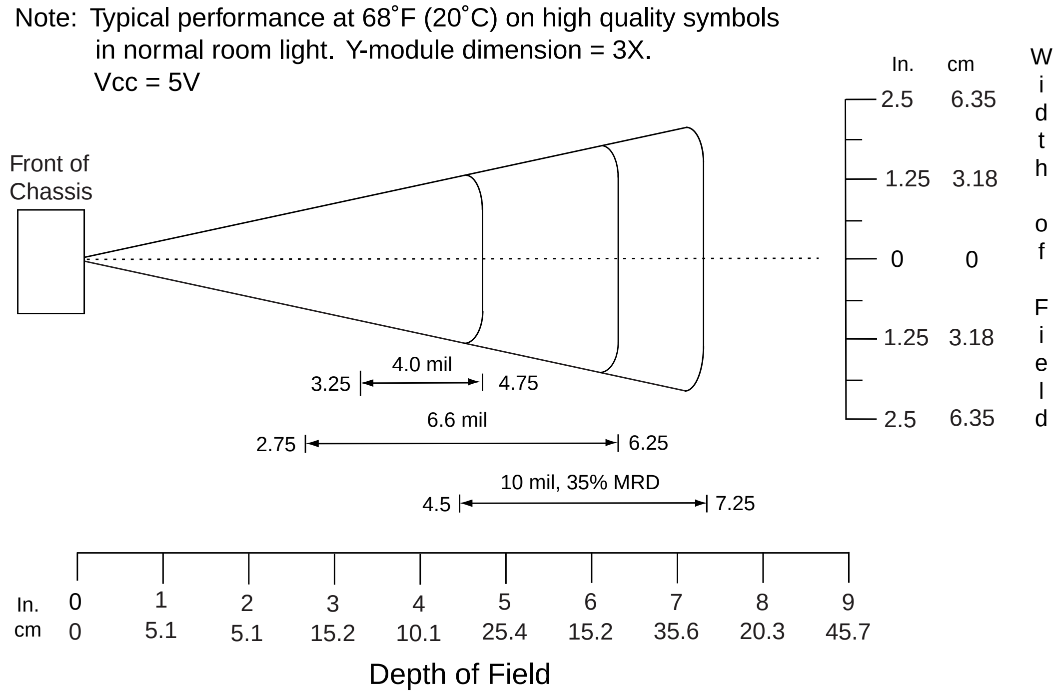


Figure 4-2 *Symbol SE2223VHD 2-D Decode Zone*

The decode zone is a function of various symbol characteristics including density, print contrast, wide to narrow ratio and edge acuity. Scanner is in horizontal orientation.

Table 4-2 *Symbol SE2223VHD 1-D Decode Distance*

Part Number	Symbol Density/ Bar Code Type	Bar Code Content/Contrast[1]	Typical Working Ranges		Guaranteed Working Ranges	
			Near	Far	Near	Far
64-15660-01	4.0 mil Code 39	STI4026 80% MRD	3.25 in 8.26 cm	4.75 in 12.07 cm	3.75 in 9.53 cm	4.00 in 10.16 cm
64-18779-01	5 mil Code 39	STI5025 80% MRD	2.75 in 6.99 cm	5.50 in 13.97 cm	3.25 in 8.26 cm	4.75 in 12.07 cm
64-01755-01	6 mil Code 39	123 80% MRD	2.75 in 6.99 cm	6.0 in 15.24 cm	3.25 in 8.26 cm	5.50 in 13.97 cm
63-04191-01	7.5 mil Code 39	STI30F4 80% MRD	2.5 in 6.35 cm	6.5 in 16.51 cm	3.00 in 7.62 cm	6.00 in 15.24 cm
60-01601-01	55 mil Code 39	A 80% MRD	Note 2	16.0 in 40.64 cm	Note 2	13.5 in 34.29 cm
Notes: **1. CONTRAST measured as Mean Reflective Difference (MRD) at 650 nm.** **2. Near ranges on lower densities (not specified) are largely dependent upon 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 chassis.**						

Table 4-3 *Symbol SE2223VHD 2-D Decode Distances*

Part Number	Symbol Density/ Bar Code Type	Typical Working Ranges		Guaranteed Working Ranges	
		Near	Far	Near	Far
64-17025-01	4 mil, 80% MRD PDF417	3.25 in 8.26 cm	4.75 in 12.07 cm	3.65 in 9.27 cm	4.15 in 10.54 cm
64-14035-01	6.6 mil, 80% MRD PDF417	2.75 in 6.99 cm	6.25 in 15.88 cm	3.15 8.00 cm	5.75 in 14.61 cm
64-14937-01	10 mil, 35% MRD PDF417	4.5 in 11.43 cm	7.25 in 18.42 cm	5.35 in 13.59	6.25 in 15.88 cm

Pitch, Skew, and Specular Dead Zone (Horizontal Spread of Pattern)

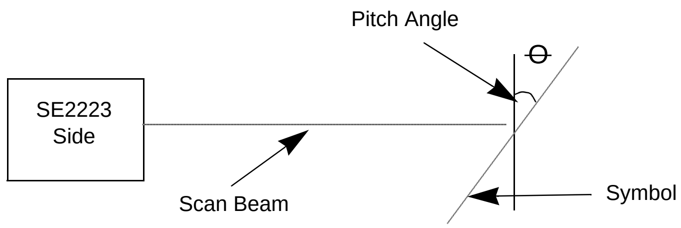


Figure 4-3 *Pitch (Side View of Module)*

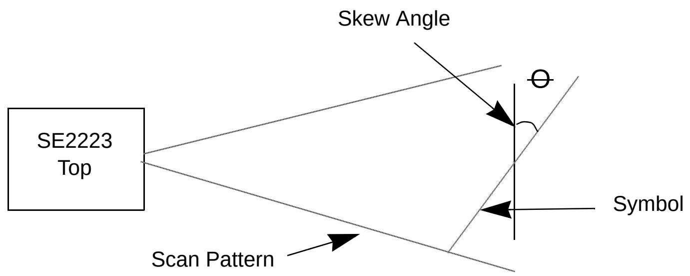


Figure 4-4 *Yaw (Top View of Module)*

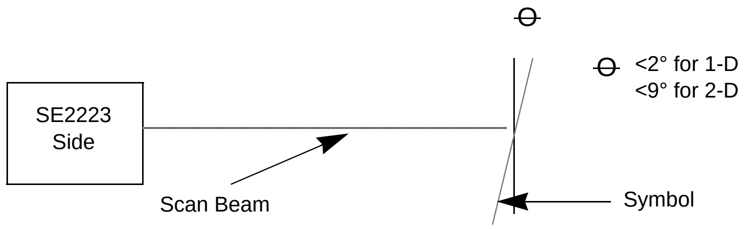


Figure 4-5 *Specular Dead Zone (Side View of Module)*

Decode Zone

The decode zone is a function of various symbol characteristics including density, print contrast, wide to narrow ratio and edge acuity. Width of field at any given distance must be considered when designing a system.

Usable scan length is calculated as follows (assuming 10% on each side of scan line is not decodable):

L = 1.8 x (D+d) x Tan (A/2)

Where:

D = Distance (in inches) from the front edge of the housing.

d = The housing's internal optical path (in inches) from the x mirror to the front edge of the housing.

A = Scan angle in degrees (34°).

So:

L = 1.8 x (D+d) x Tan 17°

✓ ***NOTE*** Usable scan length determined by above formula, or 90% of scan line at any working distance.

The calculations above are based on good quality symbols in the center of the working range.

For 2D PDF417 symbols the height of the symbol must be considered to determine if the scanner can open in the Y direction sufficiently to read the symbol. The formula is the same as above except that the Y angle is 11.5°**.**

L = 1.8 x (D + d) x Tan (A/2)

L = 1.8 x (D + d) x Tan 5.75°

If the above equation yields a greater height than the symbol height, the scan engine automatically adjusts the Y pattern to fit the symbol. If the symbol is taller, a manual swipe in the Y direction may be necessary to read the symbol.

Chapter 5 Symbol SE3223 Specifications

Technical Specifications

Table 5-1 *Symbol SE3223 Technical Specifications*

Item	Description
Power Requirements Input Voltage Continuous Mode (max. current draw) Low Power (min. current draw) Idle (power applied, laser off) Surge Current V_{cc} Noise Level	 +5.0 VDC ± 10% 230 ±25 mA typical 6.5 ±3 mA typical 80 mA ± 10 mA typical 440 mA typical with 15 msec duration (using 5V supply with 10 ms rise time) 200 mV p to p max.
Laser Diode Power	.83 mW maximum @ 650 nm
Scan Pattern	Cyclone (omnidirectional), raster, line, dot
Start Time:	0.065 sec. to 75% of steady state horizontal amplitude
Scan Angle Semi-Omni Smart Raster / Always Raster Omnidirectional Slab Pattern	 Horizontal: $34^o \pm 1.5^o$ Vertical: $10.5^o \pm 1.5^o$ Horizontal: $34^o \pm 1.5^o$ Vertical: $12.5^o \pm 1.5^o$ Horizontal: $34^o \pm 1.5^o$ Vertical: $34^o \pm 1.5^o$ Horizontal: $34^o \pm 1.5^o$

Table 5-1 *Symbol SE3223 Technical Specifications (Continued)*

Item	Description
Beam Deviation - raster (offset from the nominal)	Horizontal = ±3.0°; Vertical = ± 3.0° Horizontal tilt: ± 2°.
Additional Post Shock Beam Deviation - raster (1000G shock)	Horizontal = ±3.0° max; Vertical = ± 6.0° max
Beam Deviation - cyclone (offset from the nominal)	Horizontal = ±3.0°; Vertical = ± 3.0° Horizontal tilt: ± 2°.
Additional Post Shock Beam Deviation - cyclone (1000G shock)	Horizontal = ±3.0° max; Vertical = ± 3.0° max
Scan Frequency: Horizontal	320 Hz ±5 Hz
Scan Frequency: Vertical	295 Hz ±5 Hz
Frame Rate	20 frames/sec. 10 Hz ±1 Hz (vertical raster)
Optical Resolution	Can decode a 6.6 mil (minimum X-dimension) symbol (PDF417); *Y-dimension must be 3X*.
Angular Orientation Tolerances	
Pitch	± 30° ("front to back")
Yaw	± 15° from plane parallel to symbol ("side-to-side")
Rotation	± 4° (for scanning benchmark label, assuming 3:1 codeword aspect ratio). Note that this is dependent on the decoder.
Specular Dead Zone	1.5" from front of chassis
Print Contrast Minimum	35% absolute dark/light reflectance differential (PDF); 25% absolute dark/light reflectance differential (1-D)
Humidity	5% to 95% non-condensing
Shock	1000 G. max, 0.85 ms sine
Vibration	Unpowered engine 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.
SCDS Memory	256Kb flash, 64Kb RAM
Ambient Light Immunity	
Sunlight	8000 ft. candles (86,112 lux) with correct enclosure
Incandescent	450 ft. candles (4845 lux)
Fluorescent	450 ft. candles (4845 lux)

Table 5-1 *Symbol SE3223 Technical Specifications (Continued)*

Item	Description
Sodium Vapor	450 ft. candles (4845 lux)
Mercury	450 ft. candles (4845 lux)
Operating Temperature	-22° to 140° F; (-30° to 60° C) @ 100% duty cycle
Storage Temperature	-40° to 158° F; (-40° to 70° C)
Humidity	5% to 95% non-condensing
Dimensions	
Height	0.76 in. max. (1.93 cm) (see *Figure 2-1*)
Width	1.51 in. max. (3.84 cm) (see *Figure 2-1*)
Length	1.37 in. max. (3.48 cm) (see *Figure 2-1*)
Weight	1.4 oz. max. (40 gm)
Laser Class	The scan engine, by itself, is an unclassified component. It is intended for use in CDRH Class II (or Class IIa/IEC Class 1 with software to control the laser duty cycle) devices with proper housing, labeling, and instructions to comply with federal and/or international standards.
RoHS	Meets RoHS requirements

Symbol SE3223 Scanning Specifications

Symbol SE3223 Slab/Raster Decode Zone

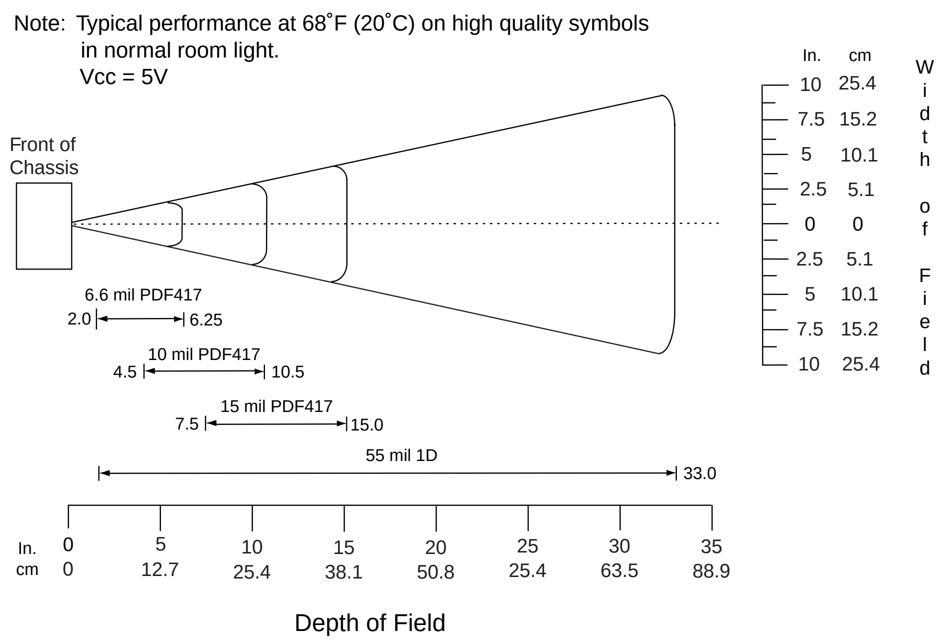


Figure 5-1 *Symbol SE3223 Slab/Raster Decode Zone*

The decode zone is a function of various symbol characteristics including density, print contrast, wide to narrow ratio and edge acuity. Scanner is in horizontal orientation.

Symbol SE3223 Omnidirectional Decode Zone

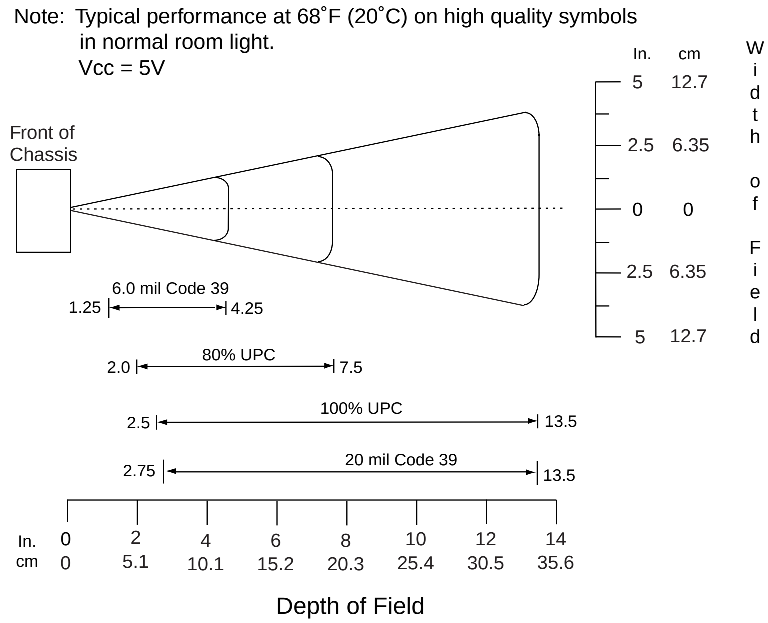


Figure 5-2 *Symbol SE3223 Omnidirectional Decode Zone*

Table 5-2 *Symbol SE3223 Slab/Raster Decode Distances*

Part Number	Symbol Density/ Bar Code Type	Typical Working Ranges		Guaranteed Working Ranges	
		Near	Far	Near	Far
64-14035-01	6.6 mil 2D	2.0 in 5.08 cm	6.25 in 15.88 cm	2.5 in 6.35 cm	4.75 in 12.07 cm
64-14037-01	10 mil 2D	4.5 in 11.43 cm	10.5 in 26.67 cm	6.0 in 15.24 cm	8.5 in 21.59 cm
64-14038-01	15 mil 2D	7.5 in 19.05 cm	15.0 in 38.1 cm	*See note	12.0 in 30.48 cm
60-01601-01	55 mil 1D	*2.0 in 5.08 cm	33 in 83.82 cm	N/A	23.0 in 58.42 cm
***Near ranges on are largely dependent upon the width of the bar code and the scan angle.**					

Table 5-3 *Symbol SE3223 Omnidirectional Decode Distances*

Part Number	Symbol Density/ Bar Code Type	Bar Code Content/Contrast[1]	Typical Working Ranges		Guaranteed Working Ranges	
			Near	Far	Near	Far
60-01755-01	6.0 mil Code 39	123 80% MRD	**1.25 in** 3.18 cm	**4.25 in** 10.80 cm	**1.75 in** 4.45 cm	**3.25 in** 8.26 cm
64-06629-01	80% UPC	ABCDEF 80% MRD	**2.0 in** 5.08 cm	**7.5 in** 19.05 cm	**2.5 in** 6.35 cm	**5.5 in** 13.97 cm
64-05303-01	13 mil 100% UPC	012345678905 80% MRD	**2.5 in** 6.35 cm	**13.5 in** 34.29 cm	Note 2	**10.5 in** 26.67 cm
60-02710-03	20 mil 1D LC 35%	123 80% MRD	**2.75 in** 13.97 cm	**13.5 in** 34.29 cm	Note 2	**11.0 in** 27.94 cm

Notes:
1. CONTRAST measured as Mean Reflective Difference (MRD) at 650 nm.
2. Near ranges on are largely dependent upon 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 chassis.

Pitch, Skew, and Specular Dead Zone (Horizontal Spread of Pattern)

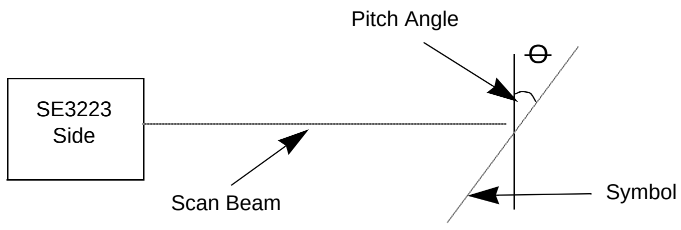


Figure 5-3 *Pitch (Side View of Module)*

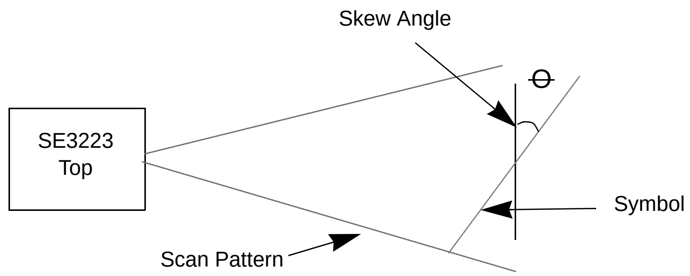


Figure 5-4 *Yaw (Top View of Module)*

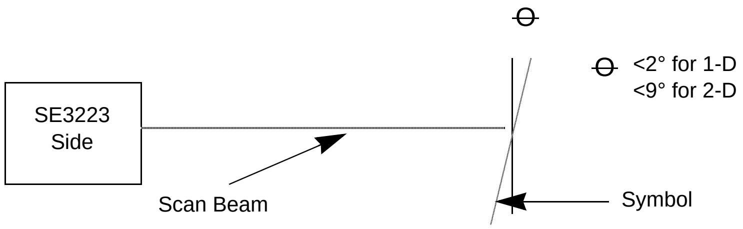


Figure 5-5 *Specular Dead Zone (Side View of Module)*

Decode Zone

The decode zone is a function of various symbol characteristics including density, print contrast, wide to narrow ratio and edge acuity. Width of field at any given distance must be considered when designing a system.

Usable scan length is calculated as follows (assuming 10% on each side of scan line is not decodable):

L = 1.8 x (D+d) x Tan (A/2)

Where:

D = Distance (in inches) from the front edge of the housing.

d = The housing's internal optical path (in inches) from the x mirror to the front edge of the housing.

A = Scan angle in degrees (34°).

So:

L = 1.8 x (D+d) x Tan 17°

NOTE Usable scan length determined by above formula, or 90% of scan line at any working distance.

The calculations above are based on good quality symbols in the center of the working range.

For 2D PDF417 symbols the height of the symbol must be considered to determine if the scanner can open in the Y direction sufficiently to read the symbol. The formula is the same as above except that the Y angle is 12.5°**.**

L = 1.8 x (D + d) x Tan (A/2)

L = 1.8 x (D + d) x Tan 6.25°

If the above equation yields a greater height than the symbol height, the scan engine automatically adjusts the Y pattern to fit the symbol. If the symbol is taller, a manual swipe in the Y direction may be necessary to read the symbol.

Chapter 6 End-User Documentation

Introduction

Following are suggested topics to cover when creating end user documentation.

Scanning Hints

Position at an Angle

The bar codes to be read should not be presented to the scanner perpendicularly. This orientation permits too much light to be reflected back into the photodiode, blinding the optics. Position bar codes at a 15° angle to the scanner.

Scan the Entire Symbol

Be sure the bar codes are positioned so that the scan beam crosses all the bars and spaces.

Troubleshooting

- Check all the connections to be sure they are secure.
- Check the system power.
- Be sure the interface controller is programmed to read the type of bar codes you are trying to decode.
- Make sure the symbol is not defaced.
- Be sure the symbol is aligned correctly and is within the range of the scanner.

Servicing

Provide a phone number, and if appropriate, a procedure for returning the scanner for servicing.

Chapter 7 Regulatory Requirements

Introduction

This scan element does not comply with 21 CFR 1040. It is to be used only as a component. It is the buyer's responsibility to comply with all federal laser safety regulations and submit an FDA Laser Product Report.

Laser products are regulated by federal safety standards administered by the Center for Devices and Radiological Health (CDRH), Food and Drug Administration.

The following label appears on the shipping tray.

THIS DEVICE DOES NOT

COMPLY WITH 21 CFR 1040.

USE ONLY AS A COMPONENT.

symbol technologies.

The following section outlines the legal requirements for the United States, Canada, and Europe. This scan engine (Symbol SE2223/3223) is designed to comply with the U.S. and foreign standards for Information Technology Equipment (ITE).

United States

Food and Drug Administration, Center For Devices and Radiological Health (CDRH)

U.S. Federal Laser Product Performance Standard

Laser products fall into two major categories, components and finished products. The scan engine is a component. When placed in a properly labeled housing it becomes a laser product.

The FDA requires a laser product report to be on file with the FDA prior to introducing the product into commerce. The person (i.e., a one-person operation) or company who places the scan engine into a housing is the “manufacturer” of this laser product. This “manufacturer” establishes the specifications for the finished product and is responsible for compliance with Federal CDRH laser product requirements. These Federal regulations include:

21 CFR Subchapter J - Radiological Health:

Part 1000 - General

Part 1002 - Records And Reports

Part 1003 - Notification Of Defects Or Failure To Comply

Part 1004 - Repurchase, Repairs, Or Replacement Of Electronic Products

Part 1005 - Importation Of Electronic Products

Part 1010 - Performance Standards For Electronic Products: General

Part 1040 - Performance Standards For Light-Emitting Products
Under the requirements of Part 1040 the manufacturer is required to classify the laser product, and then certify through the Laser Product Report that all requirements (performance features) of the standard have been complied with.

To support the customer with the FDA filing requirements, the scan engine has been registered with the FDA as a component under the following model number scheme:
SE-3XXXXXX-XXXXX, SE-2XXXXXX-XXXXX. Customers are encouraged to refer to this model number and Motorola in their laser product report. For more information the customer should contact:

Center For Devices And Radiological Health
Office of Compliance
Attn.: Electronic Product Report
2098 Gaither Road
Rockville, MD 20850
(301) 594-4654
www.fda.gov/cdrh/index.html

The Code Of Federal Regulations (CFR 21) is available from:

Superintendent Of Documents
U.S. Government Printing Office
Washington D.C. 20402

✓ ***NOTE*** State and local governments may regulate the use of products containing lasers. The manufacturer should consult the applicable government regulations for more information.

Federal Communications Commission (EMI/RFI)

Certain combinations of scan engines and associated electronics may require testing to insure compliance with the following federal regulation:

47 CFR Part 15

✓ ***NOTE*** Scan engines used with RF equipment, modems, etc. may require examination(s) to the standard(s) for the specific equipment combination. It is the manufacturer's responsibility to comply with the applicable federal regulation(s).

Canada

Health And Welfare Canada (Laser Safety)

Products meeting the FDA standards are currently accepted in Canada by Health And Welfare Canada, Bureau Of Radiation And Medical Devices.

For more information the customer should contact:

Health And Welfare Canada
Health Protection Branch
Bureau Of Radiation And Medical Devices
Room 233
Environmental Health Centre
Tunney's Pasture
Ottawa, Ontario K1A OL2

Department Of Communications (EMI/RFI)

Products meeting FCC 47 CFR Part 15 will meet DOC standards for computing equipment. Additional testing is not required.

Europe

Laser Safety

EN60825-1:1994+A1:2002+A2;2001 & IEC60825-1993+A1:1997+A2:2001 “Safety Of Laser Products And Equipment Classification, Requirements And User's Guide."

✓ ***NOTE*** Non-EC countries may impose additional testing/certification requirements.

EMI/RFI

Certain combinations of scan engines and associated electronics may require certification of compliance with the European EMI/RFI directive. EMI/RFI compliance of finished products in Europe may be accomplished via one of two strategies:

- The manufacturer may certify to the EC's Electromagnetic Compatibility Directive 89/336/EEC. Compliance allows placing the product in any EC nation.
- The manufacturer may meet EMI/RFI requirements on a country-by-country basis.

Testing and certification may be conducted by TUV Rheinland or other European “Notified” Laboratory.

For more information the customer should contact TUV or:

Interference Technology International
41-42 Shrivenham Hundred Business Park
Shrivenham, Swindon
Wilts, SN6 8TZ
England

Note: *Non-EC countries may impose additional testing/certification requirements.*

Electrical Safety

The scan engine conforms to the European Low Voltage directive. Additional testing/certification is not required.

Patents and Licenses

No license is granted, either expressly or by implication, estoppel, or otherwise under any patent right or patent, covering or relating to any combination, system, apparatus, machine, material, method, or process in which Motorola products might be used. An implied license only exists for equipment, circuits, and subsystems contained in Motorola products.

Chapter 8 Application Notes

Introduction

This chapter includes AC electrical characteristics as well as timing information.

AC Electrical Characteristics

For the AC electrical characteristics shown in *Table 8-1*, T_{amb} = -30°C to 60°C, V_{BATT} = 4.5 V to 5.5 V. All output lines are measured with 10K pull-up.

Table 8-1 *Timing Characteristics*

Symbol	Figure	Parameter	Min	Max	Unit
General Characteristics					
t_f	*Figure 8-1*	High-to-Low fall time, all outputs, C_L = 50 pf		1.0	µsec
tr	*Figure 8-1*	Low-to-High rise time, all outputs, C_L = 50 pf		1.0	µsec
Serial I/O Timing, Host Transmit					
trlcl	*Figure 8-2*	Request to Send low to Clear to Send low	0	25	msec
tclxl	*Figure 8-2*	Clear to Send low to first start bit		note 2	
txlxl	*Figure 8-2*	Byte to byte delay, (see note 1)		990	msec

Notes:
1.If byte to byte delay exceeds the maximum specified time, a transmission error occurs. The sender must retransmit the entire packet.
2. The host may hold the Host RTS* low indefinitely, but it locks out the Symbol SE2223/3223 from transmitting.
3. The decoder may transmit any time the Host RTS* is high.
4. The host should release its Host RTS* as soon as possible after transmitting so that the decoder can process the message.
5. The Symbol SE2223/3223's micro-controller is in full operation whenever the PWRDWN line is driven low.
6. See ***Power Management on page 1-4*** **if trigger is not pulled after the maximum specified amount of time.**
7. In addition, refer to ***Parameter # 88h on page 9-10*** **and** ***Parameter # 8Ah on page 9-12*****.**

Table 8-1 *Timing Characteristics (Continued)*

Symbol	Figure	Parameter	Min	Max	Unit
Serial I/O Timing, Decoder Transmit, (see Note 3)					
tvlvl	*Figure 8-4*	Byte to byte delay, (see note 1)		99	msec
tvhvh	*Figure 8-3*	End of the packet to RTS* high		note 4	msec
Hardware Trigger Timing					
tglwl	*Figure 8-5*	Trigger hold time, level trigger mode, (see note 6)	6		msec
tghtw	*Figure 8-5*	Trigger release time, level trigger mode (see note 6)	25		msec
tglwl	*Figure 8-5*	Trigger hold time, pulse trigger mode (see note 6)	6		msec
tghtw	*Figure 8-5*	Trigger release time, pulse trigger mode (see note 6)	25		msec
Beeper Timing					
tblht	*Figure 8-6*	Beeper frequency	1800	2500	Hz
Power Up Timing					
tehpm	*Figure 8-7*	V_{BATT} rise time		10	msec
Wake Up Timing					
taldl	*Figure 8-8*	From wake up to full operation (see note 5)		TBD	msec
tdlgl	*Figure 8-8*	Trigger low after full operation (see notes 6 and 7)	0	TBD	sec

Notes:
1.If byte to byte delay exceeds the maximum specified time, a transmission error occurs. The sender must retransmit the entire packet.
2. The host may hold the Host RTS* low indefinitely, but it locks out the Symbol SE2223/3223 from transmitting.
3. The decoder may transmit any time the Host RTS* is high.
4. The host should release its Host RTS* as soon as possible after transmitting so that the decoder can process the message.
5. The Symbol SE2223/3223's micro-controller is in full operation whenever the PWRDWN line is driven low.
6. See *Power Management on page 1-4* if trigger is not pulled after the maximum specified amount of time.
7. In addition, refer to *Parameter # 88h on page 9-10* and *Parameter # 8Ah on page 9-12*.

Timing Waveforms

Explanation Of The AC Symbols

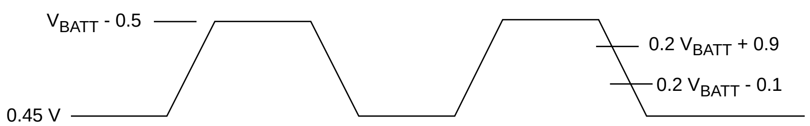
Each timing symbol has five characters. The first character is always “t.” The other characters indicate the name of the signal or the logical status of that signal. Designations are:

a = WKUP*
b = BPR
c = Host CTS
d = PWRDWN
e = PWREN
f = float, fall time
g = trigger
h = logic level high
l = logic level low
pm = minimum voltage level
r = Host RTS
tw = time duration
v = Host RXD
w = width
x = Host TXD

Example:

tbltw = Beeper drive low time
trlcl = Time for RTS low to CTS low

AC Test Points



NOTE AC inputs during testing are driven at V_{BATT} -0.5 for logic “1” and 0.45 for logic “0.” Timing measurements are made at 0.2 V_{BATT} +0.9 and 0.2 V_{BATT} -0.1.

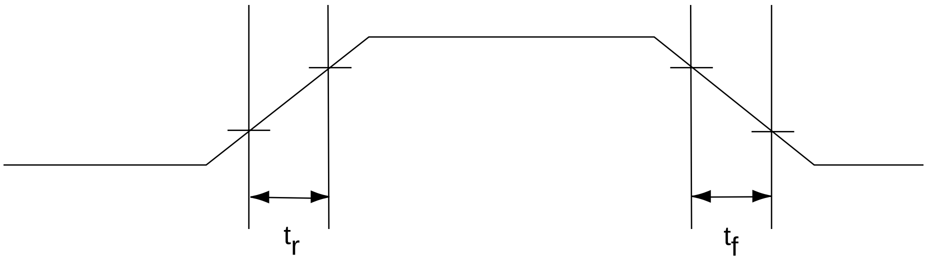


Figure 8-1 *General Characteristics*

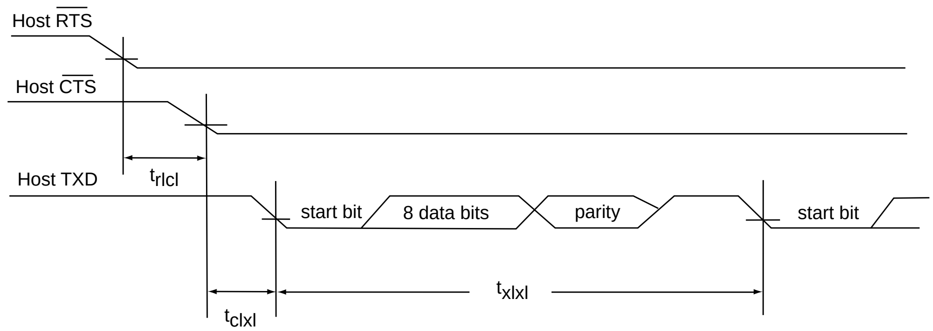


Figure 8-2 *Serial I/O Timing, Host Transmit*

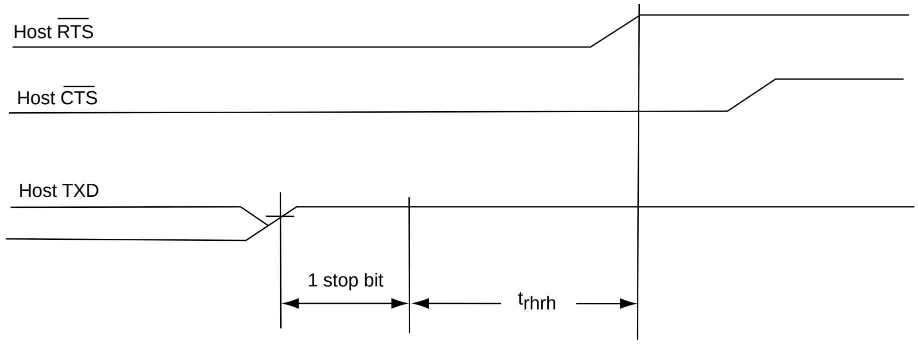


Figure 8-3 *Serial I/O Timing, Host Transmit*

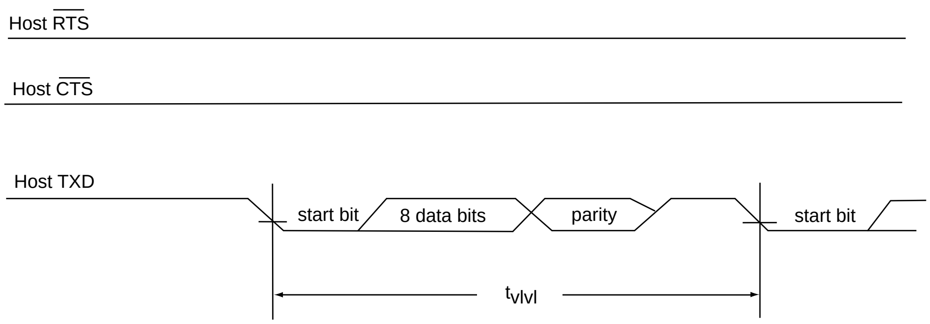


Figure 8-4 *Serial I/O Timing, Decoder Transmit*

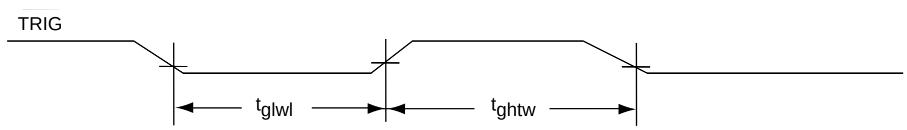


Figure 8-5 *Hardware Trigger Timing*

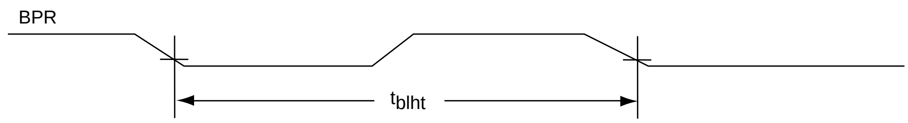


Figure 8-6 *Beeper Timing*

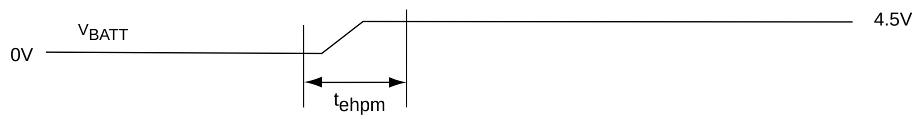


Figure 8-7 *V_{BATT} Rise Time*

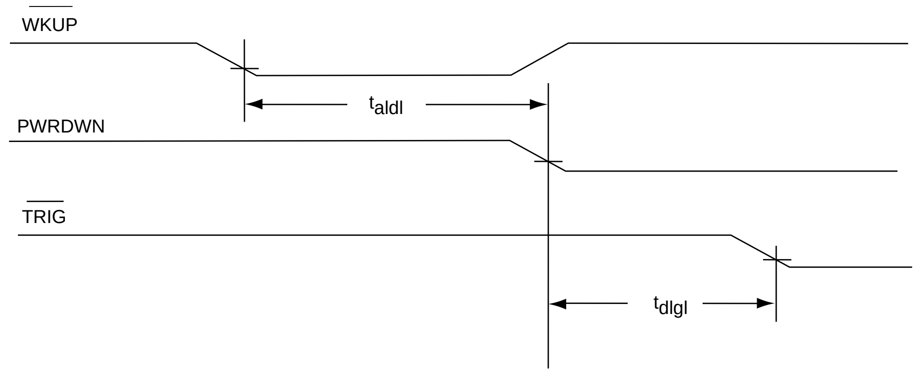


Figure 8-8 *Wake Up Timing*

Chapter 9 Parameter Menus

Introduction

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

Operational Parameters

The Symbol SE2223/3223 is shipped with the default settings shown in *Table 9-2 on page 9-3*. These default values are stored in non-volatile memory and are preserved even when the scanner is powered down.

You can change the default values by:

- Scanning the appropriate bar codes in this chapter. These new values replace the standard default values in memory. The default parameter values can be recalled by scanning the *Set All Defaults* bar code on *page 9-8*.

or

- Downloading data through the scan engine serial port using the Symbol 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. Detailed instructions for changing parameters using this method are found in the *Simple Serial Interface (SSI) Programmer's Guide*.

Simple Serial Interface (SSI)

The *Simple Serial Interface (SSI) Programmer's Guide* provides general information on SSI, includes information on the decoder's hardware signals, and details the commands. The following SSI information is specific to the Symbol SE2223/3223 Scan Engine.

Symbol SE2223/3223 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 scan engine paired with the decoder
- **PGM_CHKSUM** is the two byte checksum of the program code.

Table 9-1 lists the scan engine codes identifying the Symbol SE2223/3223 when using SSI.

Table 9-1 *Scan Engine Codes*

Engine Code	Engine Description
38h	Symbol SE2223 Standard
48h	Symbol SE3223 Standard
3Eh	Symbol SE2223VHD

SSI Commands Not Supported

The following SSI Commands included in the *Simple Serial Interface (SSI) Programmer's Guide* are NOT supported by the Symbol SE2223/3223 Scan Engine:

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

Multipacketing

The Symbol SE2223/3223 only supports Multipacketing Option 1.

Default Table

Table 9-2 lists the defaults for all parameters, and the page number each parameter appears on. If you wish to change any option, scan the appropriate bar code(s).

Table 9-2 *Default Table*

Parameter	Parameter Number	Default	Page Number
Set Default Parameter		All Defaults	*9-8*
Scanning Options			
Beeper Tone	91h	High Frequency	*9-9*
LED Mode	F0h 51h	Decode LED Mode	*9-10*
Laser On Time	88h	5.0 sec	*9-10*
Power Mode	80h	Low Power	*9-11*
Trigger Mode	8Ah	Level	*9-12*
Scanning Mode	8Dh	Smart Raster	*9-13*
Aiming Mode	F0h 7Eh	Disabled	*9-14*
Raster Height	E4h	15	*9-15*
Raster Expansion Rate	E5h	11	*9-15*
Time Delay to Low Power	92h	30 sec	*9-16*
Time-out Between Same Symbol	89h	0.6 sec	*9-17*
Time-out Between Different Symbols	90h	0.0 sec	*9-17*
Beep After Good Decode	38h	Enable	*9-18*
Transmit “No Decode” Message	5Eh	Disable	*9-18*
Parameter Scanning	ECh	Enable	*9-19*
Linear Code Type Security Levels	4Eh	2	*9-20*
Bi-directional Redundancy	43h	Disable	*9-22*
UPC/EAN			
UPC-A	01h	Enable	*9-23*
UPC-E	02h	Enable	*9-23*
UPC-E1	0Ch	Disable	*9-24*
EAN-8	04h	Enable	*9-24*
EAN-13	03h	Enable	*9-25*
Bookland EAN	53h	Disable	*9-25*
Decode UPC/EAN Supplementals	10h	Ignore	*9-26*

Table 9-2 *Default Table (Continued)*

Parameter	Parameter Number	Default	Page Number
User-Programmable Supplementals Supplemental 1: Supplemental 2:	 F1h 43h F1h 44h		9-30
Decode UPC/EAN Supplemental Redundancy	50h	20	9-30
Transmit UPC-A Check Digit	28h	Enable	9-31
Transmit UPC-E Check Digit	29h	Enable	9-31
Transmit UPC-E1 Check Digit	2Ah	Enable	9-32
UPC-A Preamble	22h	System Character	9-33
UPC-E Preamble	23h	System Character	9-34
UPC-E1 Preamble	24h	System Character	9-35
Convert UPC-E to A	25h	Disable	9-36
Convert UPC-E1 to A	26h	Disable	9-37
EAN-8 Zero Extend	27h	Disable	9-38
Bookland ISBN Format	F1h 40h	ISBN-10	9-39
UPC/EAN Security Level	4Dh	0	9-40
Linear UPC/EAN Decode	44h	Disable	9-41
UPC Half Block Stitching	4Ah	Disable	9-42
UPC Composite Mode	F0h 58h	Never Linked	9-43
Code 128			
Code 128	08h	Enable	9-44
UCC/EAN-128	0Eh	Enable	9-44
ISBT 128	54h	Disable	9-45
Code 128 Decode Performance	48h	Enable	9-46
Code 128 Decode Performance Level	49h	Level 1	9-47
Code 39			
Code 39	00h	Enable	9-48
Trioptic Code 39	0Dh	Disable	9-48
Convert Code 39 to Code 32	56h	Enable	9-49
Code 32 Prefix	E7h	Enable	9-50

Table 9-2 *Default Table (Continued)*

Parameter	Parameter Number	Default	Page Number
Set Length(s) for Code 39	12h 13h	Length within Range: 01-55	*9-51*
Code 39 Check Digit Verification	30h	Disable	*9-52*
Transmit Code 39 Check Digit	2Bh	Disable	*9-52*
Code 39 Full ASCII Conversion	11h	Disable	*9-53*
Code 39 Decode Performance	46h	Enable	*9-54*
Code 39 Decode Performance Level	47h	Level 1	*9-55*
Code 93			
Code 93	09h	Disable	*9-56*
Set Length(s) for Code 93	1Ah 1Bh	Length within Range: 04-55	*9-57*
Code 11			
Code 11	0Ah	Disable	*9-58*
Set Length(s) for Code 11	1Ch 1Dh	Length within Range: 04-55	*9-59*
Code 11 Check Digit Verification	34h	Disable	*9-60*
Transmit Code 11 Check Digits	2Fh	Disable	*9-61*
Interleaved 2 of 5			
Interleaved 2 of 5	06h	Disable	*9-62*
Set Length(s) for I 2 of 5	16h 17h	1 Discrete Length: 14	*9-63*
I 2 of 5 Check Digit Verification	31h	Disable	*9-64*
Transmit I 2 of 5 Check Digit	2Ch	Disable	*9-65*
Convert I 2 of 5 to EAN 13	52h	Disable	*9-65*
Discrete 2 of 5			
Discrete 2 of 5	05h	Disable	*9-66*
Set Length(s) for D 2 of 5	14h 15h	1 Discrete Length: 12	*9-66*
Codabar			
Codabar	07h	Disable	*9-68*
Set Lengths for Codabar	18h 19h	Length within Range: 05-55	*9-69*

Table 9-2 *Default Table (Continued)*

Parameter	Parameter Number	Default	Page Number
CLSI Editing	36h	Disable	9-70
NOTIS Editing	37h	Disable	9-70
MSI Plessey			
MSI Plessey	0Bh	Disable	9-71
Set Length(s) for MSI Plessey	1Eh 1Fh	Length Within Range: 06 - 55	9-71
MSI Plessey Check Digits	32h	One	9-73
Transmit MSI Plessey Check Digit	2Eh	Disable	9-73
MSI Plessey Check Digit Algorithm	33h	Mod 10/Mod 10	9-74
PDF417/MicroPDF417			
PDF417	0fh	Enable	9-75
MicroPDF417	E3h	Disable	9-75
Code 128 Emulation	7Bh	Disable	9-76
GS1 DataBar (Formerly RSS, Reduced Space Symbology)			
GS1 DataBar-14	F0h 52h	Disable	9-77
GS1 DataBar Limited	F0h 53h	Disable	9-77
GS1 DataBar Expanded	F0h 54h	Disable	9-78
Composite			
CC-C	F0h 55h	Disable	9-79
CC-AB	F0h 56h	Disable	9-79
TLC-39	F0h 73h	Disable	9-80
Data Options			
Transmit Code ID Character	2Dh	None	9-81
Prefix/Suffix Values Prefix Suffix 1 Suffix 2	 69h 68h 6Ah	 NULL CR LF	9-83
Scan Data Transmission Format	EBh	Data as is	9-84
Simple Serial Interface (SSI) Options			
Baud Rate	9Ch	9600	9-86
Parity	9Eh	None	9-87

Table 9-2 *Default Table (Continued)*

Parameter	Parameter Number	Default	Page Number
Check Parity	97h	Enable	9-89
Software Handshaking	9Fh	ACK/NAK	9-90
Decode Data Packet Format	EEh	Unpacketed	9-91
Stop Bit Select	9Dh	1	9-91
Intercharacter Delay	6Eh	0	9-92
Host Serial Response Time-out	9Bh	2 sec	9-92
Host Character Time-out	EFh	200 msec	9-92
Event Reporting			
Decode Event	F0h 00h	Disable	9-93
Boot Up Event	F0h 02h	Disable	9-94
Parameter Event	F0h 03h	Disable	9-94
Macro PDF			
Transmit Each Symbol in Codeword Format	Afh	Disable	9-95
Transmit Unknown Codewords	BAh	Disable	9-96
Escape Character	E9h	None	9-97
ECI			
Delete Character Set ECIs	E6h	Enable	9-98
ECI Decoder	E8h	Enable	9-99
Transmit Macro PDF User-Selected Field			
Transmit File Name	B0h	Disable	9-100
Transmit Block Count	B1h	Disable	9-101
Transmit Time Stamp	B2h	Disable	9-101
Transmit Sender	B3h	Disable	9-102
Transmit Addressee	B4h	Disable	9-102
Transmit Checksum	B6h	Disable	9-103
Transmit File Size	B5h	Disable	9-103
Transmit Macro PDF Control Header	B7h	Disable	9-104
Last Block Marker	B9h	Disable	9-104

Set Default Parameter

Scanning this bar code returns all parameters to the values listed in *Table 9-2 on page 9-3*.

Set All Defaults

Scanning Options

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)

LED Mode

Parameter # F0h, 51h

Scan a bar code below to select whether the LED illuminates on decode, or whenever the laser is on.

Decode LED Mode

(00h)

Laser LED Mode

(01h)

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 9-105* 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. If you make an error, or wish to change your selection, scan the *Cancel* bar code on *page 9-107*.

Laser On Time

Power Mode

Parameter # 80h

This parameter determines whether or not power remains on after a decode attempt. When in Low Power mode, the scanner enters into a low power consumption mode when possible, provided all WAKEUP signals are released. See *Power Management on page 1-4*. When in Continuous On mode, power remains on after each decode attempt.

Continuous On

(00h)

Low Power

(01h)

Triggering Modes

Parameter # 8Ah

Choose one of the options below to trigger the scan engine. Bar codes and option numbers are on the following page.

- 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.
- Host - The triggering signal comes from a host command. An actual trigger pull is interpreted as a Level triggering option.

Level
(00h)

Pulse
(02h)

Continuous
(04h)

Host
(08h)

Scanning Mode

Parameter # 8Dh

Select one of the following scanning modes:

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

NOTE For Cyclone pattern, it is recommended to disable the following parameters: PDF417, MicroPDF417, GS1 DataBar Limited, CC_C, CC-AB, TLC-39 and Linear UPC.

Smart Raster
(01h)

Always Raster
(02h)

Programmable Raster
(03h)

Slab Pattern
(04h)

Cyclone Pattern
(06h)

Semi-Omni Pattern
(07h)

Aiming Mode

Parameter # F0h 7Eh

For hand-held 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

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 9-105* that represent a two-digit value. Valid values are between 01 and 15.
3. If you make an error, or wish to change your selection, scan **Cancel**.

Raster Height (Default 15)

Raster Expansion Speed (Default 11)

Time Delay to Low Power Mode

Parameter # 92h

To extend laser life in continuous-on mode, select the time the scanner remains active following a successful decode. Selectable options include 30 seconds, 1 minute, 2 minutes, 3 minutes. To awaken the scanner in low power mode, present a symbol to the scan path. A successful decode restores it to normal blinking.

30 Second Delay

(00h)

1 Minute Delay

(01h)

2 Minute Delay

(02h)

3 Minute Delay

(03h)

Timeout Between Decodes

Timeout Between Decodes, Same Symbol

Parameter # 89h

This option is used in continuous-on mode to prevent the beeper from continuously beeping when a symbol is left in the scanner's field of view. 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

Timeout Between Decodes, Different Symbols 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 9-105 which correspond to the desired interval, in 0.1 second increments.
3. If you make an error, or wish to change your selection, scan **Cancel**.

Timeout Between Decodes - The Same Symbol

Timeout Between Decodes - Different Symbols

Beep After Good Decode

Parameter # 38h

Scan this symbol if you want the scanner to beep after a good decode.

Beep After Good Decode

(01h)

Scan this symbol if you do not want the scanner 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

When enabled, if a 1-D symbol does not decode, “NR” is transmitted. If a 2-D symbol does not decode, “FR” is transmitted. Any prefix or suffixes which have been enabled are appended around this message.

Enable No Read

(01h)

When disabled, if a symbol does not read, nothing is sent to the host.

Disable No Read

(00h)

Parameter Scanning

Parameter # ECh

To disable decoding of parameter bar codes, scan the bar code below. Note that the Set Defaults parameter bar code will 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 Symbol SE2223/3223 offers four levels of decode security for linear code types (e.g., Code 39, Interleaved 2 of 5). Higher security levels are selected 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 9-20*). 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)

NOTE If you enable Bookland EAN, select a *Bookland ISBN Format on page 9-39*. Also select either Decode UPC/EAN Supplementals, Autodiscriminate UPC/EAN Supplementals, or Enable 978/979 Supplemental Mode in *Decode UPC/EAN Supplementals on page 9-26*..

Decode UPC/EAN Supplementals

Parameter # 10h

Supplementals are bar codes appended according to specific format conventions (e.g., UPC A+2, UPC E+2, EAN 13+2). The following options are available:

- If you select **Ignore UPC/EAN with Supplementals**, and the scanner is presented with a UPC/EAN plus supplemental symbol, the scanner decodes UPC/EAN and ignores the supplemental characters.
- If you select **Decode UPC/EAN with Supplementals**, the scanner only decodes UPC/EAN symbols with supplemental characters, and ignores symbols without supplementals.
- If you select **Autodiscriminate UPC/EAN Supplementals**, the scanner decodes UPC/EAN symbols with supplemental characters immediately. If the symbol does not have a supplemental, the scanner must decode the bar code the number of times set via *Decode UPC/EAN Supplemental Redundancy on page 9-30* before transmitting its data to confirm that there is no supplemental.
- If you select one of the following **Supplemental Mode** options, the scanner immediately transmits EAN-13 bar codes starting with that prefix that have supplemental characters. If the symbol does not have a supplemental, the scanner must decode the bar code the number of times set via *Decode UPC/EAN Supplemental Redundancy on page 9-30* before transmitting its data to confirm that there is no supplemental. The scanner transmits UPC/EAN bar codes that do not have that prefix immediately.
  - **Enable 378/379 Supplemental Mode**
  - **Enable 978/979 Supplemental Mode**

NOTE If you select 978/979 Supplemental Mode and are scanning Bookland EAN bar codes, see *Enable/Disable Bookland EAN on page 9-25* to enable Bookland EAN, and select a format using *Bookland ISBN Format on page 9-39*.

  - **Enable 977 Supplemental Mode**
  - **Enable 414/419/434/439 Supplemental Mode**
  - **Enable 491 Supplemental Mode**
  - **Enable Smart Supplemental Mode** - applies to EAN-13 bar codes starting with any prefix listed previously.
  - **Supplemental User-Programmable Type 1** - applies to EAN-13 bar codes starting with a 3-digit user-defined prefix. Set this 3-digit prefix using *User-Programmable Supplementals on page 9-30*.
  - **Supplemental User-Programmable Type 1 and 2 -** applies to EAN-13 bar codes starting with either of two 3-digit user-defined prefixes. Set the 3-digit prefixes using *User-Programmable Supplementals on page 9-30*.
  - **Smart Supplemental Plus User-Programmable 1** - applies to EAN-13 bar codes starting with any prefix listed previously or the user-defined prefix set using *User-Programmable Supplementals on page 9-30*.
  - **Smart Supplemental Plus User-Programmable 1 and 2 -** applies to EAN-13 bar codes starting with any prefix listed previously or one of the two user-defined prefixes set using *User-Programmable Supplementals on page 9-30*.

NOTE To minimize the risk of invalid data transmission, select either to decode or ignore supplemental characters.

Decode UPC/EAN Supplementals (continued)

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

Decode UPC/EAN With Supplementals
(01h)

***Ignore UPC/EAN Supplementals**
(00h)

Autodiscriminate UPC/EAN Supplementals
(02h)

Enable 378/379 Supplemental Mode
(04h)

Enable 978/979 Supplemental Mode
(05h)

Decode UPC/EAN Supplementals (continued)

Enable 977 Supplemental Mode
(07h)

Enable 414/419/434/439 Supplemental Mode
(06h)

Enable 491 Supplemental Mode
(08h)

Enable Smart Supplemental Mode
(03h)

Decode UPC/EAN Supplementals (continued)

Supplemental User-Programmable Type 1
(09h)

Supplemental User-Programmable Type 1 and 2
(0Ah)

Smart Supplemental Plus User-Programmable 1
(0Bh)

Smart Supplemental Plus User-Programmable 1 and 2
(0Ch)

User-Programmable Supplementals

Supplemental 1: Parameter # F1h 43h

Supplemental 2: Parameter # F1h 44h

If you selected a Supplemental User-Programmable option from *Decode UPC/EAN Supplementals on page 9-26*, select **User-Programmable Supplemental 1** to set the 3-digit prefix. Then select the 3 digits using the numeric bar codes beginning on *page 9-105*. Select **User-Programmable Supplemental 2** to set a second 3-digit prefix. Then select the 3 digits using the numeric bar codes beginning on *page 9-105*.

User-Programmable Supplemental 1

User-Programmable Supplemental 2

Decode UPC/EAN Supplemental Redundancy

Parameter # 50h

With *Autodiscriminate UPC/EAN Supplementals* selected, this option adjusts the number of times a symbol without supplementals is decoded before transmission. The range is from 2 to 20 times. 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 9-105*. Single digit numbers must have a leading zero. If you make an error, or wish to change your selection, scan the *Cancel* bar code on *page 9-107*.

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

Three options are given for lead-in characters for UPC-A symbols transmitted to the host device: transmit system character only, transmit system character and country code (“0” for USA), and no preamble transmitted. The lead-in characters are considered part of the symbol.

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

Three options are given for lead-in characters for UPC-E symbols transmitted to the host device: transmit system character only, transmit system character and country code (“0” for USA), and no preamble transmitted. The lead-in characters are considered part of the symbol.

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

Three options are given for lead-in characters for UPC-E1 symbols transmitted to the host device: transmit system character only, transmit system character and country code (“0” for USA), and no preamble transmitted. The lead-in characters are considered part of the symbol.

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).

Scanning **DO NOT CONVERT UPC-E TO UPC-A** allows you 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

This parameter converts 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).

Scanning **DO NOT CONVERT UPC-E1 TO UPC-A** allows you 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.

Disabling this parameter returns EAN-8 symbols to their normal format.

Enable EAN Zero Extend

(01h)

Disable EAN Zero Extend

(00h)

Bookland ISBN Format

Parameter # F1h 40h

If you enabled Bookland EAN using *Enable/Disable Bookland EAN on page 9-25*, select one of the following formats for Bookland data:

- **Bookland ISBN-10** - The scanner reports Bookland data starting with 978 in traditional 10-digit format with the special Bookland check digit for backward-compatibility. Data starting with 979 is not considered Bookland in this mode.
- **Bookland ISBN-13** - The scanner reports Bookland data (starting with either 978 or 979) as EAN-13 in 13-digit format to meet the 2007 ISBN-13 protocol.

***Bookland ISBN-10**
(00h)

Bookland ISBN-13
(01h)

NOTE For Bookland EAN to function properly, first enable Bookland EAN using *Enable/Disable Bookland EAN on page 9-25*, then select either Decode UPC/EAN Supplementals, Autodiscriminate UPC/EAN Supplementals, or Enable 978/979 Supplemental Mode in *Decode UPC/EAN Supplementals on page 9-26*.

UPC/EAN Security Level

Parameter # 4Dh

The Symbol SE2223/3223 offers four levels of decode security for UPC/EAN bar codes. Increasing levels of security are provided for decreasing levels of bar code quality. There is an inverse relationship between security and scanner aggressiveness, so be sure to choose only that level of security necessary for any given application.

UPC/EAN Security Level 0

This is the default setting which 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

As bar code quality levels diminish, certain characters become prone to misdecodes before others (i.e., 1, 2, 7, 8). If you are experiencing misdecodes of poorly printed bar codes, and the misdecodes are limited to these characters, select this security level.

UPC/EAN Security Level 1

(01h)

UPC/EAN Security Level 2

If you are experiencing misdecodes of poorly printed bar codes, and the misdecodes are not limited to characters 1, 2, 7, and 8, select this security level.

UPC/EAN Security Level 2

(02h)

UPC/EAN Security Level 3

If you have tried Security Level 2, and are still experiencing misdecodes, select this security level. Be advised, selecting this option is an extreme measure against misdecoding severely out of spec bar codes. Selection of 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 your 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. This option should be enabled 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

This parameter enables UPC Half Block Stitching for the Symbol SE3223 omnidirectional engine only.

Enable UPC Half Block Stitching

(01h)

Disable UPC Half Block Stitching

(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:

- If **UPC Never Linked** is selected, UPC bar codes are transmitted regardless of whether a 2D symbol is detected.
- If **UPC Always Linked** is selected, UPC bar codes are only transmitted when the 2D portion is detected.
- If **Autodiscriminate UPC Composites** is selected, the scanner determines if there is a 2D portion, then transmits the UPC portion only.

UPC Never Linked

UPC Always Linked

Autodiscriminate UPC Composites

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. (See *Miscellaneous Code Information* for details on *UCC/EAN-128*.)

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. The default setting is Any Length.

Code 128 Decode Performance

Parameter # 48h

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 if you are scanning very long and/or truncated bar codes. Increased levels reduce decode security.

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

Enable Code 128 Decode Performance

(01h)

Disable Code 128 Decode Performance

(00h)

Code 128 Decode Performance Level

Parameter # 49h

Select a level of decode performance.

Code 128 Decode Performance Level 1

(01h)

Code 128 Decode Performance Level 2

(02h)

Code 128 Decode Performance Level 3

(03h)

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 symbols always contain six characters. Trioptic Code 39 and Code 39 Full ASCII should not be enabled 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

Scan this symbol if you want to convert Code 39 to Code 32.

Convert Code 39 To Code 32
(Enable)

(01h)

NOTE Code 39 must be enabled in order for this parameter to function.

Scan this symbol if you do not want to convert Code 39 to Code 32.

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

Lengths for Code 39 may be set for any length, one or two discrete lengths, or lengths within a specific range. The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. If Code 39 Full ASCII is enabled, **Length Within a Range** or **Any Length** are the preferred options. See *Table A-5 on page A-8* for ASCII equivalents. To set lengths via serial commands, see *Setting Code Lengths Via Serial Commands on page A-8*.

One Discrete Length - This option allows you to decode only those codes containing a selected length. For example, if you select **Code 39 One Discrete Length**, then scan **1**, **4**, only Code 39 symbols containing 14 characters are decoded. Numeric bar codes begin on *page 9-105*. If you make an error, or wish to change your selection, scan the *Cancel* bar code on *page 9-107*.

Code 39 - One Discrete Length

Two Discrete Lengths - This option allows you to decode only those codes containing two selected lengths. For example, if you select **Code 39 Two Discrete Lengths**, then scan **0**, **2**, **1**, **4**, only Code 39 symbols containing 2 or 14 characters are decoded. Numeric bar codes begin on *page 9-105*. If you make an error, or wish to change your selection, scan the *Cancel* bar code on *page 9-107*.

Code 39 - Two Discrete Lengths

Length Within Range - This option allows you to decode a code type within a specified range. 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). Numeric bar codes begin on *page 9-105*. If you make an error, or wish to change your selection, scan the *Cancel* bar code on *page 9-107*.

Code 39 - Length Within Range

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

Code 39 - Any Length

Code 39 Check Digit Verification

Parameter # 30h

When enabled, this parameter checks the integrity of a Code 39 symbol to ensure it complies with specified algorithms.

Only those Code 39 symbols which include a modulo 43 check digit are decoded when this parameter is enabled.

Enable Code 39 Check Digit

(01h)

Disable Code 39 Check Digit

(00h)

Transmit Code 39 Check Digit

Parameter # 2Bh

Scan this symbol if you want to transmit the check digit with the data.

Transmit Code 39 Check Digit (Enable)

(01h)

Scan this symbol if you want to transmit the 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**. Refer to the *Table A-6 on page A-9*.

Code 39 Full ASCII and Trioptic Code 39 should not be enabled 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

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 if you are scanning very long and/or truncated bar codes. Increased levels reduce decode security.

If you enable this option, you may select a Decode Performance level from the next page to suit your 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

Select a level of decode performance.

Code 39 Decode Performance Level 1

(01h)

Code 39 Decode Performance Level 2

(02h)

Code 39 Decode Performance Level 3

(03h)

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

Lengths for Code 93 may be set for any length, one or two discrete lengths, or lengths within a specific range. The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. See *Table A-6 on page A-9* for ASCII equivalents. To set lengths via serial commands, see *Setting Code Lengths Via Serial Commands on page A-8*.

One Discrete Length - This option allows you to decode only those codes containing a selected length. For example, if you select **Code 93 One Discrete Length**, then scan **1**, **4**, only Code 93 symbols containing 14 characters are decoded. Numeric bar codes begin on *page 9-105*. If you make an error, or wish to change your selection, scan the *Cancel* bar code on *page 9-107*.

Code 93 - One Discrete Length

Two Discrete Lengths - This option allows you to decode only those codes containing two selected lengths. For example, if you select **Code 93 Two Discrete Lengths**, then scan **0**, **2**, **1**, **4**, only Code 93 symbols containing 2 or 14 characters are decoded. Numeric bar codes begin on *page 9-105*. If you make an error, or wish to change your selection, scan the *Cancel* bar code on *page 9-107*.

Code 93 - Two Discrete Lengths

Length Within Range - This option allows you to decode a code type 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 9-105*. If you make an error, or wish to change your selection, scan the *Cancel* bar code on *page 9-107*.

Code 93 - Length Within Range

Any Length - Scanning this option allows you 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 9-105*. To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on *page 9-107*.

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 9-105*. To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on *page 9-107*.

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 9-105*. To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on *page 9-107*.

***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

Lengths for I 2 of 5 may be set for any length, one or two discrete lengths, or lengths within a specific range. The length of a code refers to the number of characters (i.e., human readable characters) the code contains, and includes check digits. See *Table A-6 on page A-9* for ASCII equivalents. To set lengths via serial commands, see *Setting Code Lengths Via Serial Commands on page A-8*.

One Discrete Length - This option allows you to decode only those codes containing a selected length. For example, if you select **I 2 of 5 One Discrete Length**, then scan **1**, **4**, the only I 2 of 5 symbols decoded are those containing 14 characters. Numeric bar codes begin on *page 9-105*. If you make an error, or wish to change your selection, scan the *Cancel* bar code on *page 9-107*.

I 2 of 5 - One Discrete Length

Two Discrete Lengths - This option allows you to decode only those codes containing two selected lengths. For example, if you select **I 2 of 5 Two Discrete Lengths**, then scan **0**, **2**, **1**, **4**, the only I 2 of 5 symbols decoded are those containing 2 or 14 characters. Numeric bar codes begin on *page 9-105*. If you make an error, or wish to change your selection, scan the *Cancel* bar code on *page 9-107*.

I 2 of 5 - Two Discrete Lengths

Length Within Range - This option allows you to decode a code type 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 9-105*. If you make an error, or wish to change your selection, scan the *Cancel* bar code on *page 9-107*.

I 2 of 5 - Length Within Range

Any Length - Scanning this option allows you to decode I 2 of 5 symbols containing any number of characters.

✓ ***NOTE*** Selecting this option may 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 if you want to transmit the check digit with the data.

Transmit I 2 of 5 Check Digit
(Enable)

(01h)

Scan this symbol if you want to transmit the 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, the I 2 of 5 code 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

Lengths for D 2 of 5 may be set for any length, one or two discrete lengths, or lengths within a specific range. The length of a code refers to the number of characters (i.e., human readable characters) the code contains, and includes check digits. See *Table A-6 on page A-9* for ASCII equivalents. To set lengths via serial commands, see *Setting Code Lengths Via Serial Commands on page A-8*.

One Discrete Length - This option allows you to decode only those codes containing a selected length. For example, if you select **D 2 of 5 One Discrete Length**, then scan **1**, **4**, the only D 2 of 5 symbols decoded are those containing 14 characters. Numeric bar codes begin on *page 9-105*. If you make an error, or wish to change your selection, scan the *Cancel* bar code on *page 9-107*.

D 2 of 5 - One Discrete Length

Two Discrete Lengths - This option allows you to decode only those codes containing two selected lengths. For example, if you select **D 2 of 5 Two Discrete Lengths**, then scan **0**, **2**, **1**, **4**, the only D 2 of 5 symbols decoded are those containing 2 or 14 characters. Numeric bar codes begin on *page 9-105*. If you make an error, or wish to change your selection, scan the *Cancel* bar code on *page 9-107*.

D 2 of 5 - Two Discrete Lengths

Length Within Range - This option allows you to decode a code type 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 always be preceded by a leading zero). Numeric bar codes begin on *page 9-105*. If you make an error, or wish to change your selection, scan the *Cancel* bar code on *page 9-107*.

D 2 of 5 - Length Within Range

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

NOTE Selecting this option may 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

Lengths for Codabar may be set for any length, one or two discrete lengths, or lengths within a specific range. The length of a code refers to the number of characters (i.e., human readable characters) the code contains. It also includes any start or stop characters. See *Table A-6 on page A-9* for ASCII equivalents. To set lengths via serial commands, see *Setting Code Lengths Via Serial Commands on page A-8*.

One Discrete Length - This option allows you to decode only those codes containing a selected length. For example, if you select **Codabar One Discrete Length**, then scan **1**, **4**, the only Codabar symbols decoded are those containing 14 characters. Numeric bar codes begin on *page 9-105*. If you make an error, or wish to change your selection, scan the *Cancel* bar code on *page 9-107*.

Codabar - One Discrete Length

Two Discrete Lengths - This option allows you to decode only those codes containing two selected lengths. For example, if you select **Codabar Two Discrete Lengths**, then scan **0**, **2**, **1**, **4**, the only Codabar symbols decoded are those containing 2 or 14 characters. Numeric bar codes begin on *page 9-105*. If you make an error, or wish to change your selection, scan the *Cancel* bar code on *page 9-107*.

Codabar - Two Discrete Lengths

Length Within Range - This option allows you to decode a code type 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 9-105*. If you make an error, or wish to change your selection, scan the *Cancel* bar code on *page 9-107*.

Codabar - Length Within Range

Any Length - Scanning this option allows you 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

Lengths for MSI Plessey may be set for any length, one or two discrete lengths, or lengths within a specific range. The length of a code refers to the number of characters (i.e., human readable characters) the code contains, and includes check digits. See *Table A-6 on page A-9* for ASCII equivalents. To set lengths via serial commands, see *Setting Code Lengths Via Serial Commands on page A-8*.

One Discrete Length - This option allows you to decode only those codes containing a selected length. For example, if you select **MSI Plessey One Discrete Length**, then scan **1**, **4**, the only MSI Plessey symbols decoded are those containing 14 characters. Numeric bar codes begin on *page 9-105*. If you make an error, or wish to change your selection, scan the *Cancel* bar code on *page 9-107*.

MSI Plessey - One Discrete Length

Two Discrete Lengths - This option allows you to decode only those codes containing two selected lengths. For example, if you select **MSI Plessey Two Discrete Lengths**, then scan **0**, **2**, **1**, **4**, the only MSI Plessey symbols decoded are those containing 2 or 14 characters. Numeric bar codes begin on *page 9-105*. If you make an error, or wish to change your selection, scan the *Cancel* bar code on *page 9-107*.

MSI Plessey - Two Discrete Lengths

Length Within Range - This option allows you to decode a code type 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 9-105*. If you make an error, or wish to change your selection, scan the *Cancel* bar code on *page 9-107*.

MSI Plessey - Length Within Range

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

NOTE Selecting this option may 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 always required. Check digits are not automatically transmitted with the data.

One MSI Plessey Check Digit

(00h)

If two check digits is selected, an *MSI Plessey Check Digit Algorithm* must also be selected. See *page 9-74*.

Two MSI Plessey Check Digit

(01h)

Transmit MSI Plessey Check Digit

Parameter # 2Eh

Scan this symbol if you want to transmit the check digit with the data.

Transmit MSI Plessey Check Digit
(Enable)

(01h)

Scan this symbol if you want to transmit the 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. Either of the two following algorithms may be selected.

MOD 10/ MOD 11

(00h)

MOD 10/ MOD 10

(01h)

PDF417/MicroPDF417

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)

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)

GS1 DataBar (Formerly RSS, Reduced Space Symbology)

GS1 DataBar-14

Parameter # F0h 52h

To enable or disable GS1 DataBar-14, scan the appropriate bar code below.

Enable GS1 DataBar-14
(01h)

Disable GS1 DataBar-14
(00h)

GS1 DataBar Limited

Parameter # F0h 53h

To enable or disable GS1 DataBar Limited, scan the appropriate bar code below.

Enable GS1 DataBar Limited
(01h)

Disable GS1 DataBar Limited
(00h)

GS1 DataBar Expanded

Parameter # F0h 54h

To enable or disable GS1 DataBar Expanded, scan the appropriate bar code below.

Enable GS1 DataBar Expanded
(01h)

Disable GS1 DataBar Expanded
(00h)

Composite

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)

Data Options

Transmit Code ID Character

Parameter # 2Dh

A code ID character identifies the code type of a scanned bar code. This may be useful when the scanner is decoding more than one code type. In addition to any single character prefix already selected, the code ID character is inserted between the prefix and the decoded symbol.

The user may select no code ID character, a Symbol Code ID character, or an AIM Code ID character. The Symbol Code ID characters are listed below; see *AIM Code Identifiers on page A-3*.

Table 9-3 *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
GS1 DataBar (all variants)	R
Composite*	T
Scanlet	W
PDF417, Micro PDF-417, Macro PDF-417, Micro MacroPDF-417	X
***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 may be appended to scan data for use in data editing. These values are set by scanning a four digit number (i.e., four bar codes) that corresponds to key codes for various terminals. See the *Table A-6 on page A-9*, and *Numeric Bar Codes* beginning on *page 9-105*. If you make an error, or wish to change your selection, scan the *Cancel* bar code on *page 9-107*. To set the Prefix/Suffix values via serial commands, see *Setting Prefixes and Suffixes Via Serial Commands on page A-9*.

NOTE In order to use Prefix/Suffix values, the *Scan Data Transmission Format* must be set. See *page 9-84*.

Scan Prefix

Scan Suffix 1

Scan Suffix 2

Data Format Cancel

Scan Data Transmission Format

Parameter # EBh

To change the Scan Data Transmission Format, scan one of the following eight bar codes corresponding to the desired format.

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 4800

(05h)

Baud Rate (continued)

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)

Parity (continued)

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)

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 the parity of received characters is checked. The type of parity used is selectable 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 when this option is selected.

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)

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 device for the next character in the serial data stream. The number of stop bits selected (one or two) depends on the number the receiving terminal is programmed to accommodate. Set the number of stop bits to match host device requirements.

1 Stop Bit

(01h)

2 Stop Bits

(02h)

Intercharacter Delay

Parameter # 6Eh

Select the intercharacter delay option matching host requirements. The intercharacter delay gives the host system time to service its receiver and perform other tasks between characters. 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 9-105* to set the desired time-out. If you make an error, or wish to change your selection, scan the *Cancel* bar code on *page 9-107*.

Iintercharacter 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 9-105*. Time durations of less than 1.0 second require a leading zero. If you make an error, or wish to change your selection, scan the *Cancel* bar code on *page 9-107*.

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 9-105* to set the desired time-out. If you make an error, or wish to change your selection, scan the *Cancel* bar code on *page 9-107*.

Host Character Time-out

Event Reporting

The host can request the decoder to provide certain information (events) relative to the decoder's behavior. The events listed in *Table 9-4* and on the following pages can be enabled or disabled by scanning the appropriate bar codes. 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 9-4 *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 decoder generates a message to the host whenever a bar code is successfully decoded. When disabled, no notification is sent.

Enable

(01h)

Disable

(00h)

Boot Up Event

Parameter # F0h 02h

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

Enable

(01h)

Disable

(00h)

Parameter Event

Parameter # F0h 03h

When enabled, the decoder generates a message to the host when one of the events specified in *Table 9-4 on page 9-93* occurs. When disabled, no notification is sent.

Enable

(01h)

Disable

(00h)

Macro PDF Features

Transmit Symbols in Codeword Format

Parameter # Afh

Enabling this activates transmission of each PDF symbol as directly decoded data codewords, whether that symbol is part of a macro PDF sequence or not. 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 the user may 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 take up exactly 4 characters for GLIs and 6 characters for ECIs. However, there may be nondecodable 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 just like any other codeword, e.g., \927\001.

Because GLIs are indistinguishable from other codewords in the output data stream, the host must intelligently 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.

Enable or disable by scanning the appropriate bar code.

Enable Transmit In Codeword Format

(01h)

Disable Transmit In Codeword Format

(00h)

Transmit Unknown Codewords

Parameter # BAh

This enables using the output codeword format for transmitting any non-GLI or non-macro PDF codeword. If this is not enabled and an unknown codeword is found, a decode error beep sounds.

Enable or disable by scanning the appropriate bar code.

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

This parameter enables the scanner 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.

When deletion is selected, the scanner transmits 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

This parameter enables the scanner to interpret any Extended Channel Interpretations (ECIs) that are supported by the scanner firmware. This parameter has no effect on symbols that were 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

When enabled, the following parameters cause transmission of the specified field in subsequently scanned Macro PDF417 symbols. Unless transmission of a specific field is enabled, it is not transmitted. 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\00221234432432 34.

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\003Motorola 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 may 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 / Disable Last Block Marker enables marking 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

4

Numeric Bar Codes (continued)

5

6

7

8

9

Cancel

If you make an error, or wish to change your selection, scan the bar code below.

Cancel

Appendix A Miscellaneous Code Information

Introduction

This Appendix provides information on the following:

- UCC/EAN-128
- AIM Code Identifiers
- Setting Code Lengths
- Setting Prefixes and Suffixes Via Serial Commands
- Character Equivalents.

UCC/EAN-128

UCC/EAN-128 is a convention for printing data fields with standard Code 128 bar code symbols. UCC/EAN-128 symbols are distinguished by a leading FNC 1 character as the first or second character in the symbol. Other FNC 1 characters are used to delineate fields.

When EAN-128 symbols are read, they are transmitted after special formatting strips off the leading FNC 1 character, and replaces other FNC 1 characters with the ASCII 29 GS control character.

When AIM symbology identifiers are transmitted, the modifier character indicates the position of the leading FNC 1 character according to AIM guidelines. For example, **]c1** indicates a UCC/EAN-128 symbol with a leading FNC1 character.

Standard Code 128 bar codes which do not have a leading FNC 1 may still be used, but are not encoded according to the EAN-128 convention. Standard Code 128 and UCC/EAN-128 may be mixed in an application. The Symbol SE2223 autodiscriminates between these symbols, and can enable or disable one or both code types via bar code menus. Table B-1 indicates the behavior of the Symbol SE2223 in each of the four possible parameter settings.

Table A-1 *Reading Standard Code128 & UCC/EAN 128*

Standard Code 128	UCC/EAN-128	Effect and Example
Disable	Disable	No Code 128 symbols can be read.
Disable	Enable	Read only symbols with leading FNC 1. Examples: $^{\text{FNC1}}$ABCD$^{\text{FNC1}}$E are read as ABCD^{29}E A$^{\text{FNC1}}$BCD$^{\text{FNC1}}$E are read as ABCD^{29}E $^{\text{FNC1FNC1}}$ABCD$^{\text{FNC1}}$E are read as ABCD^{29}E ABCD$^{\text{FNC1}}$E cannot be read ABCDE cannot be read
Enable	Disable	Read only symbols without leading FNC 1. Examples: $^{\text{FNC1}}$ABCD$^{\text{FNC1}}$E cannot be read A$^{\text{FNC1}}$BCD$^{\text{FNC1}}$E cannot be read $^{\text{FNC1FNC1}}$ABCD$^{\text{FNC1}}$E cannot be read ABCD$^{\text{FNC1}}$E is read as ABCD^{29}E ABCDE is read as ABCDE
Enable	Enable	Read both types of symbols. Examples: $^{\text{FNC1}}$ABCD$^{\text{FNC1}}$E are read as ABCD^{29}E A$^{\text{FNC1}}$BCD$^{\text{FNC1}}$E are read as ABCD^{29}E $^{\text{FNC1FNC1}}$ABCD$^{\text{FNC1}}$E are read as ABCD^{29}E ABCD$^{\text{FNC1}}$E is read as ABCD^{29}E ABCDE is read as ABCDE

AIM Code Identifiers

Each AIM Code Identifier contains the three-character string **]cm** where:

] = Flag Character (ASCII 93)
c = Code Character (see Table A-2)
m = Modifier Character (see Table A-4)

Table A-2 *Code Characters*

Code Character	Code Type
A	Code 39, Code 39 Full ASCII
C	Code 128, EAN-128, ISBT 128
E	UPC/EAN
F	Codabar
G	Code 93
H	Code 11
I	Interleaved 2 of 5
L	PDF417, MicroPDF417, MacroPDF417
M	MSI Plessey
S	D2 of 5, IATA 2 of 5
X	Code 39 Trioptic, Bookland EAN, other types not defined by AIM.

See Table A-3 for information on GS1 DataBar and Composite Codes.

Table A-3 *Composite Code Data Formats*

1-D Component	Data Format	
	Standard Mode	EAN-128 Emulation Mode
EAN-13, UPC-A, UPC-E	1D:]E0 2D:]e0 See note 5 below	1D:]E0 2D:]C1 before each EAN-128 split transmission See notes 3 - 5 below
EAN-8	1D:]E4 2D:]e0 See note 5 below	1D:]E4 2D:]C1 before each EAN-128 split transmission See notes 3 - 5 below
GS1 DataBar-14 GS1 DataBar Limited	1D:]e0 2D:]e1 See note 2 below	]C1 before each EAN-128 split transmission See notes 3 - 5 below
EAN-128 GS1 DataBar Expanded	If the last AI in the EAN-128 is a predefined, fixed length:]e0 Otherwise,]e0 GS See note 2 below	]C1 before each EAN-128 split transmission See notes 3 and 4 below
Code 39 (TLC39)	ANSI MH10.8.3M syntax: 06 Format:]L2 [)>$^{R}{}_{S}$06 $^{G}{}_{S}$ 6P {1D data}$^{G}{}_{S}$ S {2D data}$^{R}{}_{S}$ E_T 05 Format:]L2 [)>$^{R}{}_{S}$05 $^{G}{}_{S}$ 906P {1D data}$^{G}{}_{S}$ 8004 {2D data}$^{R}{}_{S}$ E_T See note 6 below	

Notes:
1. All Function 1 characters in the 1-D and 2-D are sent as $^{G}{}_{S}$ ASCII character (29); the first Function 1 in the EAN-128 is not transmitted.
2. In standard mode, data following the Composite Symbol Separator is prefixed with "]e1".
3. In EAN-128 emulation mode, each packet is split on an AI boundary and limited to less than 48 characters.
4. In EAN-128 emulation mode, data is discarded after the first symbol separator or escape mechanism.
5. If the UPC/EAN component has a supplemental,]E1 precedes a 2-digit supplemental and]E2 precedes the 5-digit supplemental.
6. R_S is ASCII character (30) and E_T is ASCII character (4). The transmitted format (05 or 06) is data dependent.

The modifier character is the sum of the applicable option values based on the following table.

Table A-4 *Modifier Characters*

Code Type	Option Value	Option
Code 39		
	0	No Check character.
	1	Reader has checked one check character.
	3	Reader has checked and stripped check character.
	4	Reader has performed Full ASCII character conversion.
	5	Reader has performed Full ASCII character conversion and checked one check character.
	7	Reader has performed Full ASCII character conversion and checked and stripped check character.
	Example: A Full ASCII bar code with check character W, **A+I+MI+DW**, is transmitted as **]A7**AimId where 7 = (3+4).	
Trioptic Code 39		
	0	No option specified at this time. Always transmit 0.
	Example: A Trioptic bar code 412356 is transmitted as **]X0**412356	
Code 128		
	0	Standard data packet, No Function code 1 in first symbol position.
	1	Function code 1 in first symbol character position.
	2	Function code 1 in second symbol character position.
	Example: A Code (EAN) 128 bar code with Function 1 character in the first position, **FNC1** Aim Id is transmitted as **]C1**AimId	
I 2 of 5		
	0	No check digit processing.
	1	Reader has validated check digit.
	3	Reader has validated and stripped check digit.
	Example: An I 2 of 5 bar code without check digit, 4123, is transmitted as **]I0**4123	
Codabar		
	0	Standard Codabar
	1	ABC Codabar
	Example: A standard Codabar bar code, 4123, is transmitted as **]F0**4123	

Table A-4 *Modifier Characters (Continued)*

Code Type	Option Value	Option
Code 93		
	0	No options specified at this time. Always transmit 0.
	Example: A Code 93 bar code 012345678905 is transmitted as **]G0**012345678905	
MSI Plessey		
	0	Mod 10 check digit validated and transmitted.
	1	Mod 10 check digit validated but not transmitted.
	Example: An MSI Plessey bar code 4123, with Mod 10 check digit validated, is transmitted as **]M0**4123	
D 2 of 5		
	0	No options specified at this time. Always transmit 0.
	Example: A D 2 of 5 bar code 4123, is transmitted as **]S0**4123	
UPC/EAN		
	0	Standard packet in full EAN country code format, which is 13 digits for UPC-A and UPC-E (not including supplemental data).
	1	Two digit supplement data only.
	2	Five digit supplement data only.
	4	EAN-8 data packet.
	Example: A UPC-A bar code 012345678905 is transmitted as **]E0**0012345678905	
Bookland EAN		
	0	No options specified at this time. Always transmit 0.
	Example: A Bookland EAN bar code 123456789X is transmitted as **]X0**123456789X	

Table A-4 *Modifier Characters (Continued)*

Code Type	Option Value	Option
PDF417, MicroPDF417		
	0	Reader set to conform to protocol defined in 1994 PDF417 symbology specifications. **Note:** When this option is transmitted, the receiver cannot reliably determine whether ECIs have been invoked or whether data byte 92_{DEC} has been doubled in transmission.
	1	Reader set to follow the ECI protocol (Extended Channel Interpretation). All data characters 92_{DEC} are doubled.
	2	Reader set for Basic Channel operation (no escape character transmission protocol). Data characters 92_{DEC} are not doubled. **Note:** When decoders are set to this mode, unbuffered Macro symbols and symbols requiring the decoder to convey ECI escape sequences cannot be transmitted.
	3	The bar code contains a UCC/EAN-128 symbol, and the first codeword is 903-907, 912, 914, 915.
	4	The bar code contains a UCC/EAN-128 symbol, and the first codeword is in the range 908-909.
	5	The bar code contains a UCC/EAN-128 symbol, and the first codeword is in the range 910-911.
	Example: A PDF417 bar code ABCD, with no transmission protocol enabled, is transmitted as]L2ABCD.	

According to AIM standards, a UPC with supplemental bar code is transmitted in the following format:

]E0 (UPC chars) (terminator) **]E2** (supplemental) (terminator)

In the Symbol SE2223, however, the format is changed to:

]E0 (UPC chars) **]E2** (supplemental)

Therefore, a UPC with two supplemental characters, 01234567890510, is transmitted to the host as a 21-character string, **]E0**0012345678905**]E1**10.

Setting Code Lengths Via Serial Commands

There are two lengths (L1 and L2) for each variable length code type. See the individual code types in *Chapter 8* for the L1 and L2 parameter numbers.

Depending on the selected option, the scanner decodes:

- One discrete length bar code
- Two discrete length bar codes
- Bar codes within a range of lengths
- Any length of bar codes.

Table B-4 lists the requirements for each option.

Table A-5 *Setting Variable Code Lengths*

Code length option	L1 value	L2 value
One discrete length is decoded	Discrete length to decode	00h
Two discrete lengths are decoded	Higher length value	Lower length value
Lengths within a range are decoded	Lower length value	Higher length value
Any length bar code is decoded	00h	00h

Setting Prefixes and Suffixes Via Serial Commands

To append a prefix and suffixes to the decode data:

1. Set the Scan Data Transmission Format (parameter E2h) to the desired option.
2. Enter the required value(s) for Prefix (68h), Suffix1 (69h) or Suffix2 (6Ah) using the hex values for the desired ASCII value from Table B-5.

Table A-6 *Character Equivalents*

Scan Value	Hex Value	Full ASCII Code 39 Encode Char.	Keystroke
1000	00h	%U	CTRL 2
1001	01h	$A	CTRL A
1002	02h	$B	CTRL B
1003	03h	$C	CTRL C
1004	04h	$D	CTRL D
1005	05h	$E	CTRL E
1006	06h	$F	CTRL F
1007	07h	$G	CTRL G
1008	08h	$H	CTRL H
1009	09h	$I	CTRL I
1010	0Ah	$J	CTRL J
1011	0Bh	$K	CTRL K
1012	0Ch	$L	CTRL L
1013	0Dh	$M	CTRL M
1014	0Eh	$N	CTRL N
1015	0Fh	$O	CTRL O
1016	10h	$P	CTRL P
1017	11h	$Q	CTRL Q
1018	12h	$R	CTRL R
1019	13h	$S	CTRL S
1020	14h	$T	CTRL T
1021	15h	$U	CTRL U
1022	16h	$V	CTRL V

Table A-6 *Character Equivalents (Continued)*

Scan Value	Hex Value	Full ASCII Code 39 Encode Char.	Keystroke
1023	17h	$W	CTRL W
1024	18h	$X	CTRL X
1025	19h	$Y	CTRL Y
1026	1Ah	$Z	CTRL Z
1027	1Bh	%A	CTRL [
1028	1Ch	%B	CTRL \
1029	1Dh	%C	CTRL]
1030	1Eh	%D	CTRL 6
1031	1Fh	%E	CTRL -
1032	20h	Space	Space
1033	21h	/A	!
1034	22h	/B	‘
1035	23h	/C	#
1036	24h	/D	$
1037	25h	/E	%
1038	26h	/F	&
1039	27h	/G	‘
1040	28h	/H	(
1041	29h	/I	)
1042	2Ah	/J	*
1043	2Bh	/K	+
1044	2Ch	/L	,
1045	2Dh	-	-
1046	2Eh	.	.
1047	2Fh	/	/
1048	30h	0	0
1049	31h	1	1
1050	32h	2	2
1051	33h	3	3

Table A-6 *Character Equivalents (Continued)*

Scan Value	Hex Value	Full ASCII Code 39 Encode Char.	Keystroke
1052	34h	4	4
1053	35h	5	5
1054	36h	6	6
1055	37h	7	7
1056	38h	8	8
1057	39h	9	9
1058	3Ah	/Z	:
1059	3Bh	%F	;
1060	3Ch	%G	<
1061	3Dh	%H	=
1062	3Eh	%I	>
1063	3Fh	%J	?
1064	40h	%V	@
1065	41h	A	A
1066	42h	B	B
1067	43h	C	C
1068	44h	D	D
1069	45h	E	E
1070	46h	F	F
1071	47h	G	G
1072	48h	H	H
1073	49h	I	I
1074	4Ah	J	J
1075	4Bh	K	K
1076	4Ch	L	L
1077	4Dh	M	M
1078	4Eh	N	N
1079	4Fh	O	O
1080	50h	P	P

Table A-6 *Character Equivalents (Continued)*

Scan Value	Hex Value	Full ASCII Code 39 Encode Char.	Keystroke
1081	51h	Q	Q
1082	52h	R	R
1083	53h	S	S
1084	54h	T	T
1085	55h	U	U
1086	56h	V	V
1087	57h	W	W
1088	58h	X	X
1089	59h	Y	Y
1090	5Ah	Z	Z
1091	5Bh	%K	[
1092	5Ch	%L	\
1093	5Dh	%M	]
1094	5Eh	%N	^
1095	5Fh	%O	_
1096	60h	%W	‘
1097	61h	+A	a
1098	62h	+B	b
1099	63h	+C	c
1100	64h	+D	d
1101	65h	+E	e
1102	66h	+F	f
1103	67h	+G	g
1104	68h	+H	h
1105	69h	+I	i
1106	6Ah	+J	j
1107	6Bh	+K	k
1108	6Ch	+L	l
1109	6Dh	+M	m

Table A-6 *Character Equivalents (Continued)*

Scan Value	Hex Value	Full ASCII Code 39 Encode Char.	Keystroke
1110	6Eh	+N	n
1111	6Fh	+O	o
1112	70h	+P	p
1113	71h	+Q	q
1114	72h	+R	r
1115	73h	+S	s
1116	74h	+T	t
1117	75h	+U	u
1118	76h	+V	v
1119	77h	+W	w
1120	78h	+X	x
1121	79h	+Y	y
1122	7Ah	+Z	z
1123	7Bh	%P	{
1124	7Ch	%Q	|
1125	7Dh	%R	}
1126	7Eh	%S	~
1127	7Fh		Undefined

Values from 1128 through 1255 (hex values 80h through FFh for SSI) may also be set, but the conversion of these characters to printable characters is not standardized. Therefore, they are not included in the table.

Glossary

A

Aperture. The opening in an optical system defined by a lens or baffle that establishes the field of view.

API. An interface by means of which one software component communicates with or controls another. Usually used to refer to services provided by one software component to another, usually via software interrupts or function calls

Application Programming Interface. See **API**.

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 is decoded.

B

Bar. The dark element in a printed bar code symbol.

Bar Code. A pattern of variable-width bars and spaces which represents numeric or alphanumeric data in machine-readable form. The general format of a bar code symbol consists of a leading margin, start character, data or message character, check character (if any), stop character, and trailing margin. Within this framework, each recognizable symbology uses its own unique format. See **Symbology**.

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.

BIOS. Basic Input Output System. A collection of ROM-based code with a standard API used to interface with standard PC hardware.

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.

Bits per Second (bps). Bits transmitted or received.

Boot or Boot-up. The process a computer goes through when it starts. During boot-up, the computer can run self-diagnostic tests and configure hardware and software.

BOOTP. A protocol for remote booting of diskless devices. Assigns an IP address to a machine and may specify a boot file. The client sends a bootp request as a broadcast to the bootp server port (67) and the bootp server responds using the bootp client port (68). The bootp server must have a table of all devices, associated MAC addresses and IP addresses.

bps. See **Bits Per Second**.

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 is used to store one ASCII character.

C

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 1. This is the lowest power CDRH laser classification. This class is considered intrinsically safe, even if all laser output were directed into the eye's pupil. There are no special operating procedures for this class.

CDRH Class 2. No additional software mechanisms are needed to conform to this limit. Laser operation in this class poses no danger for unintentional direct human exposure.

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 encoding 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.

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.

Cold Boot. A cold boot restarts the mobile computer and erases all user stored records and entries.

COM Port. Communication port; ports are identified by number, e.g., COM1, COM2.

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.

Cradle. A cradle is used for charging the terminal battery and for communicating with a host computer, and provides a storage place for the terminal when not in use.

D

DCP. See **Device Configuration Package**.

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.

Decryption. Decryption is the decoding and unscrambling of received encrypted data. Also see, **Encryption** and **Key**.

Depth of Field. The range between minimum and maximum distances at which a scanner can read a symbol with a certain minimum element width.

Device Configuration Package. The Symbol Device Configuration Package provides the Product Reference Guide (PRG), flash partitions, Terminal Configuration Manager (TCM) and the associated TCM scripts. With this package hex images that represent flash partitions can be created and downloaded to the mobile computer.

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.

DRAM. Dynamic random access memory.

E

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.

ENQ (RS-232). ENQ software handshaking is also supported for the data sent to the host.

ESD. Electro-Static Discharge

F

File Transfer Protocol (FTP). A TCP/IP application protocol governing file transfer via network or telephone lines. See **TCP/IP.**

Flash Disk. An additional megabyte of non-volatile memory for storing application and configuration files.

Flash Memory. Flash memory is responsible for storing the system firmware and is non-volatile. If the system power is interrupted the data is not be lost.

FTP. See **File Transfer Protocol**.

H

Hard Reset. See **Cold Boot**.

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

Hz. Hertz; A unit of frequency equal to one cycle per second.

I

IDE. Intelligent drive electronics. Refers to the solid-state hard drive type.

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

IEC (825) Class 1. This is the lowest power IEC laser classification. Conformity is ensured through a software restriction of 120 seconds of laser operation within any 1000 second window and an automatic laser shutdown if the scanner's oscillating mirror fails.

IEEE Address. See **MAC Address**.

Input/Output Ports. I/O ports are primarily dedicated to passing information into or out of the terminal's memory. Series 9000 mobile computers include Serial and USB ports.

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

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.

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.

Internet Protocol Address. See **IP**.

I/O Ports. interface The connection between two devices, defined by common physical characteristics, signal characteristics, and signal meanings. Types of interfaces include RS-232 and PCMCIA.

IOCTL. Input/Output Control.

IP. Internet Protocol. The IP part of the TCP/IP communications protocol. IP implements the network layer (layer 3) of the protocol, which contains a network address and is used to route a message to a different network or subnetwork. IP accepts “packets” from the layer 4 transport protocol (TCP or UDP), adds its own header to it and delivers a “datagram” to the layer 2 data link protocol. It may also break the packet into fragments to support the maximum transmission unit (MTU) of the network.

IP Address. (Internet Protocol address) The address of a computer attached to an IP network. Every client and server station must have a unique IP address. A 32-bit address used by a computer on a IP network. Client workstations have either a permanent address or one that is dynamically assigned to them each session. IP addresses are written as four sets of numbers separated by periods; for example, 204.171.64.2.

IPX/SPX. Internet Package Exchange/Sequential Packet Exchange. A communications protocol for Novell. IPX is Novell’s Layer 3 protocol, similar to XNS and IP, and used in NetWare networks. SPX is Novell's version of the Xerox SPP protocol.

IS-95. Interim Standard 95. The EIA/TIA standard that governs the operation of CDMA cellular service. Versions include IS-95A and IS-95B. See CDMA.

K

Key. A key is the specific code used by the algorithm to encrypt or decrypt the data. Also see, **Encryption** and **Decrypting**.

L

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.

Laser Scanner. A type of bar code reader that uses a beam of laser light.

LCD. See **Liquid Crystal Display**.

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.

Light Emitting Diode. See **LED**.

Liquid Crystal Display (LCD). A display that uses liquid crystal sealed between two glass plates. The crystals are excited by precise electrical charges, causing them to reflect light outside according to their bias. They use little electricity and react relatively quickly. They require external light to reflect their information to the user.

M

MC. Mobile Computer.

MDN. Mobile Directory Number. The directory listing telephone number that is dialed (generally using POTS) to reach a mobile unit. The MDN is usually associated with a MIN in a cellular telephone -- in the US and Canada, the MDN and MIN are the same value for voice cellular users. International roaming considerations often result in the MDN being different from the MIN.

MIL. 1 mil = 1 thousandth of an inch.

MIN. Mobile Identification Number. The unique account number associated with a cellular device. It is broadcast by the cellular device when accessing the cellular system.

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.

Mobile Computer. In this text, *mobile computer* refers to the Symbol Series 9000 wireless portable computer. It can be set up to run as a stand-alone device, or it can be set up to communicate with a network, using wireless radio technology.

N

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 are used over a range of magnifications (e.g., from 0.80 to 2.00 of nominal).

NVM. Non-Volatile Memory.

O

ODI. See **Open Data-Link Interface**.

Open Data-Link Interface (ODI). Novell’s driver specification for an interface between network hardware and higher-level protocols. It supports multiple protocols on a single NIC (Network Interface Controller). It is capable of understanding and translating any network information or request sent by any other ODI-compatible protocol into something a NetWare client can understand and process.

Open System Authentication. Open System authentication is a null authentication algorithm.

P

PAN . Personal area network. Using Bluetooth wireless technology, PANs enable devices to communicate wirelessly. Generally, a wireless PAN consists of a dynamic group of less than 255 devices that communicate within about a 33-foot range. Only devices within this limited area typically participate in the network.

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

PC Card. A plug-in expansion card for laptop computers and other devices, also called a PCMCIA card. PC Cards are 85.6mm long x 54 mm wide, and have a 68 pin connector. There are several different kinds:

- Type I; 3.3 mm high; use - RAM or Flash RAM
- Type II; 5 mm high; use - modems, LAN adaptors
- Type III; 10.5 high; use - Hard Disks

PCMCIA. Personal Computer Memory Card Interface Association. See **PC Card**.

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%.

PING. (Packet Internet Groper) An Internet utility used to determine whether a particular IP address is online. It is used to test and debug a network by sending out a packet and waiting for a response.

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 = (RL - RD) / RL, where RL is the reflectance factor of the background and RD the reflectance factor of the dark bars.

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

Q

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

QWERTY. A standard keyboard commonly used on North American and some European PC keyboards. “QWERTY” refers to the arrangement of keys on the left side of the third row of keys.

R

RAM. Random Access Memory. Data in RAM can be accessed in random order, and quickly written and read.

Reflectance. Amount of light returned from an illuminated surface.

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

RF. Radio Frequency.

ROM. Read-Only Memory. Data stored in ROM cannot be changed or removed.

Router. A device that connects networks and supports the required protocols for packet filtering. Routers are typically used to extend the range of cabling and to organize the topology of a network into subnets. See **Subnet**.

RS-232. An Electronic Industries Association (EIA) standard that defines the connector, connector pins, and signals used to transfer data serially from one device to another.

S

Scan Area. Area intended to contain a symbol.

Scanner. An electronic device used to scan bar code symbols and produce a digitized pattern that corresponds to the bars and spaces of the symbol. Its three main components are: 1) Light source (laser or photoelectric cell) - illuminates a bar code,; 2) Photodetector - registers the difference in reflected light (more light reflected from spaces); 3) Signal conditioning circuit - transforms optical detector output into a digitized bar pattern.

Scanning Mode. The scanner is energized, programmed and ready to read a bar code.

Scanning Sequence. A method of programming or configuring parameters for a bar code reading system by scanning bar code menus.

SDK. Software Development Kit

Self-Checking Code. A symbology that uses a checking algorithm to detect encoding errors within the characters of a bar code symbol.

Shared Key. Shared Key authentication is an algorithm where both the AP and the MU share an authentication key.

SHIP. Symbol Host Interface Program.

SID. System Identification code. An identifier issued by the FCC for each market. It is also broadcast by the cellular carriers to allow cellular devices to distinguish between the home and roaming service.

SMDK. Symbol Mobility Developer's Kit.

Soft Reset. See **Warm Boot**.

Space. The lighter element of a bar code formed by the background between bars.

Specular Reflection. The mirror-like direct reflection of light from a surface, which can cause difficulty decoding a bar code.

Start/Stop Character. A pattern of bars and spaces that provides the scanner with start and stop reading instructions and scanning direction. The start and stop characters are normally to the left and right margins of a horizontal code.

STEP. Symbol Terminal Enabler Program.

Subnet. A subset of nodes on a network that are serviced by the same router. See **Router**.

Subnet Mask. A 32-bit number used to separate the network and host sections of an IP address. A custom subnet mask subdivides an IP network into smaller subsections. The mask is a binary pattern that is matched up with the IP address to turn part of the host ID address field into a field for subnets. Default is often 255.255.255.0.

Substrate. A foundation material on which a substance or image is placed.

SVTP. Symbol Virtual Terminal Program.

Symbol. A scannable unit that encodes data within the conventions of a certain symbology, usually including start/stop characters, quiet zones, data characters and check characters.

Symbol Aspect Ratio. The ratio of symbol height to symbol width.

Symbol Height. The distance between the outside edges of the quiet zones of the first row and the last row.

Symbol Length. Length of symbol measured from the beginning of the quiet zone (margin) adjacent to the start character to the end of the quiet zone (margin) adjacent to a stop character.

Symbology. The structural rules and conventions for representing data within a particular bar code type (e.g. UPC/EAN, Code 39, PDF417, etc.).

T

TCP/IP. (Transmission Control Protocol/Internet Protocol) A communications protocol used to internetwork dissimilar systems. This standard is the protocol of the Internet and has become the global standard for communications. TCP provides transport functions, which ensures that the total amount of bytes sent is received correctly at the other end. UDP is an alternate transport that does not guarantee delivery. It is widely used for real-time voice and video transmissions where erroneous packets are not retransmitted. IP provides the routing mechanism. TCP/IP is a routable protocol, which means that all messages contain not only the address of the destination station, but the address of a destination network. This allows TCP/IP messages to be sent to multiple networks within an organization or around the world, hence its use in the worldwide Internet. Every client and server in a TCP/IP network requires an IP address, which is either permanently assigned or dynamically assigned at startup.

Telnet. A terminal emulation protocol commonly used on the Internet and TCP/IP-based networks. It allows a user at a terminal or computer to log onto a remote device and run a program.

Terminal. See **Mobile Computer**.

Terminal Emulation. A “terminal emulation” emulates a character-based mainframe session on a remote non-mainframe terminal, including all display features, commands and function keys. The VC5000 Series supports Terminal Emulations in 3270, 5250 and VT220.

TFTP. (Trivial File Transfer Protocol) A version of the TCP/IP FTP (File Transfer Protocol) protocol that has no directory or password capability. It is the protocol used for upgrading firmware, downloading software and remote booting of diskless devices.

Tolerance. Allowable deviation from the nominal bar or space width.

Transmission Control Protocol/Internet Protocol. See **TCP/IP.**

Trivial File Transfer Protocol. See **TFTP.**

U

UDP. User Datagram Protocol. A protocol within the IP protocol suite that is used in place of TCP when a reliable delivery is not required. For example, UDP is used for real-time audio and video traffic where lost packets are simply ignored, because there is no time to retransmit. If UDP is used and a reliable delivery is required, packet sequence checking and error notification must be written into the applications.

UPC. Universal Product Code. A relatively complex numeric symbology. Each character consists of two bars and two spaces, each of which is any of four widths. The standard symbology for retail food packages in the United States.

V

Visible Laser Diode (VLD). A solid state device which produces visible laser light.

W

Warm Boot. A warm boot restarts the mobile computer by closing all running programs. All data that is not saved to flash memory is lost.

Index

R

S

T

V

W

Tell Us What You Think...

We'd like to know what you think about this Manual. Please take a moment to fill out this questionnaire and fax this form to: (631) 738-4618, or mail to:

Motorola, Inc.
One Motorola Plaza   M/S B-10
Holtsville, NY 11742-1300
Attention: Technical Publications Manager
Advanced Data Capture Division

IMPORTANT: If you need product support, please call the appropriate customer support number provided. Unfortunately, we cannot provide customer support at the fax number above.

Manual Title:____
(please include revision level)

How familiar were you with this product before using this manual?

☐ Very familiar ☐ Slightly familiar ☐ Not at all familiar

Did this manual meet your needs? If not, please explain.

What topics need to be added to the index, if applicable?

What topics do you feel need to be better discussed? Please be specific.

What can we do to further improve our manuals?

Thank you for your input—We value your comments.

Motorola, Inc.
One Motorola Plaza
Holtsville, New York 11742, USA
1-800-927-9626
http://www.symbol.com

70E-36636-05 Revision A - January 2008