MICROSCAN

Vision MINI Smart Camera Guide

84-016300-02 Rev C

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- Complete internal product audit and supplier transition by July 2013.
- Initial “Monitoring and Control Instruments” RoHS2-compliant products available by July 2014.
- Initial “Industrial Monitoring and Control Instruments” RoHS2-compliant products available by July 2015.
- All new products introduced in 2014 are expected to be WEEE and RoHS2 compliant.

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Contents

PREFACE

Welcome!

Purpose of This Manual

This manual contains detailed information about the Vision MINI Smart Camera.

Manual Conventions

The following typographical conventions are used throughout this manual.

- Items emphasizing important information are **bolded**.
- Menu selections, menu items and entries in screen images are indicated as: Run (triggered), Modify..., etc.

Preface

CHAPTER 1 Introduction

FIGURE 1–1. Vision MINI Smart Camera

Product Summary

The Vision MINI Smart Camera is designed for reliable vision performance in embedded identification and inspection applications. As the world's smallest fully-integrated vision system, the Vision MINI's compact size and wide angle optics provide the best performance available for machine vision tasks at close range.

The Vision MINI allows OEM design engineers to implement inspection, color matching, symbol decoding, OCR, and more, in a single compact solution. The camera's small form factor allows flexible positioning in tight spaces. The lightweight and durable magnesium alloy case weighs less than 2 ounces.

Pressing the AutoVISION button at the back of the Vision MINI enables real time dynamic autofocus. When an object is centered in the field of view and the AutoVISION button is pressed, the camera automatically adjusts focal distance and sets internal parameters to optimize image captures.

AutoVISION software, designed for use with the Vision MINI, provides an intuitive interface, step-by-step configuration, and a library of presets that allow easy setup and deployment. For more complex vision applications, the system can be upgraded from AutoVISION to Visionscape.

Features and Benefits

- World's smallest fully functional vision system
- Virtual Ethernet over USB
- OEM-ready for easy integration
- Integrated lighting and autofocus lens
- Flexible programming options for custom applications
- AutoVISION button for automatic targeting, calibration, and triggering
- Simplified configuration with AutoVISION software

Applications

- Part presence/absence
- Color detection and matching
- Medical device inspection
- Fiducial location
- Part location/orientation detection
- Packaging
- Robotics
- Auto ID (Data Matrix and other 2D symbologies, 1D, OCR)

Package Contents

Before you install AutoVISION software and connect your Vision MINI Smart Camera, please take a moment to confirm that the following items are available:

- Vision MINI Smart Camera — Your package contains one of the available models listed in Table 1–1.
- USB Type A to USB Type B Cable
- AutoVISION Software Installation USB Drive

Vision MINI Smart Camera Models

Table 1–1 lists and describes the Vision MINI Smart Camera models, including acquisition modes and resolutions.

TABLE 1–1. Vision MINI Smart Camera Models

Part Number	Vision MINI Smart Camera Model
GMV-6300-2100G	Vision MINI, USB, STD, WVGA, Built-In Lighting, AutoVISION
GMV-6300-2102G	Vision MINI, USB, STD, WVGA, Built-In Lighting, AutoVISION+Visionscape
GMV-6300-2104G	Vision MINI, USB, STD, WVGA, Built-In Lighting, AutoVISION+Verification/OCV
GMV-6300-2106G	Vision MINI, USB, STD, WVGA, Built-In Lighting, AutoVISION+Visionscape+Verification/OCV
GMV-6300-2110G	Vision MINI, USB, STD, SXGA, Built-In Lighting, AutoVISION
GMV-6300-2112G	Vision MINI, USB, STD, SXGA, Built-In Lighting, AutoVISION+Visionscape
GMV-6300-2114G	Vision MINI, USB, STD, SXGA, Built-In Lighting, AutoVISION+Verification/OCV
GMV-6300-2116G	Vision MINI, USB, STD, SXGA, Built-In Lighting, AutoVISION+Visionscape+Verification/OCV
GMV-6300-2172G	Vision MINI, USB, STD, QXGA Color, Built-In Lighting, Visionscape
GMV-6300-2200G	Vision MINI, USB, HD, WVGA, Built-In Lighting, AutoVISION
GMV-6300-2202G	Vision MINI, USB, HD, WVGA, Built-In Lighting, AutoVISION+Visionscape
GMV-6300-2204G	Vision MINI, USB, HD, WVGA, Built-In Lighting, AutoVISION+ Verification/OCV
GMV-6300-2206G	Vision MINI, USB, HD, WVGA, Built-In Lighting, AutoVISION+Visionscape+Verification/OCV
GMV-6300-2210G	Vision MINI, USB, HD, SXGA, Built-In Lighting, AutoVISION
GMV-6300-2212G	Vision MINI, USB, HD, SXGA, Built-In Lighting, AutoVISION+Visionscape
GMV-6300-2214G	Vision MINI, USB, HD, SXGA, Built-In Lighting, AutoVISION+Verification/OCV
GMV-6300-2216G	Vision MINI, USB, HD, SXGA, Built-In Lighting, AutoVISION+Visionscape+Verification/OCV
GMV-6300-2272G	Vision MINI, USB, HD, QXGA Color, Built-In Lighting, Visionscape

Part Number Structure

<table>
<tr><th>GMV</th><th colspan="6">6300</th></tr>
<tr><th rowspan="2">General Machine Vision</th><th rowspan="2">Vision MINI</th><th>Comm</th><th>Lens</th><th>Sensor</th><th>Options</th><th>RoHS</th><th>Custom</th></tr>
<tr><td rowspan="4">2 = USB</td><td rowspan="2">1 = Standard Density</td><td>0 = WVGA</td><td>0 = AutoVISION</td><td rowspan="4">G = RoHS compliant</td><td rowspan="4">0 to 99</td></tr>
<tr><td>1 = SXGA</td><td>2 = AutoVISION + Visionscape</td></tr>
<tr><td rowspan="2">2 = High Density</td><td rowspan="2">7 = Color QXGA</td><td>4 = AutoVISION + Verification/OCV</td></tr>
<tr><td>6 = AutoVISION + Visionscape + Verification/OCV</td></tr>
</table>

CHAPTER 2 System Components

This section contains information about system components as well as information to help you connect the Vision MINI Smart Camera. Specific information describes connectors, adapters, cables, pinouts, and signals.

Note: There are no user-serviceable parts inside.

Hardware Components

Table 2-1 lists Vision MINI Smart Camera hardware components.

TABLE 2–1. Vision MINI Smart Camera Hardware Components

Part Number	Description
Upgrade to Visionscape	
98-000217-01	Upgrade from AutoVISION to full Visionscape functionality
Demo Kit	
98-000215-01	Demo Kit (Carrying case, mounting blocks, mounting rods, power supply, IC-332, IB-131, cables, object detector, test cards, documentation)
Power Supply	
97-100004-15	Power Supply, 90-254 VAC, 24VDC, USA/Euro Plug
97-000002-02	Power Supply, 90-254 VAC, +5VDC
Communication and I/O Devices and Cables	
FIS-0001-0035G	IC-332 Adapter
FIS-0210-000XG	MS-Connect 210 Connectivity Box
99-000018-01	IB-131 Interface Box

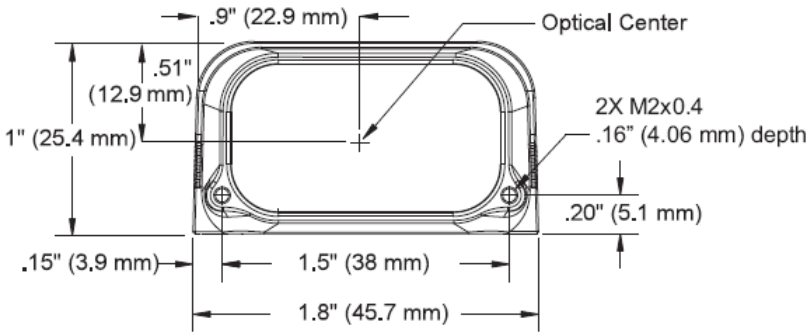
TABLE 2–1. Vision MINI Smart Camera Hardware Components (Continued)

Part Number	Description
61-000105-01	Host Cable, MS-Connect 210 to Host, stripped-to-9-pin
61-000127-01	Camera Cable, MS-Connect 210 to Camera, 6’
61-000208-01	USB Type A to USB Type B Cable, 6’
61-300026-03	Communication Cable, DB25 Plug to DB9 Socket, 6’
Mounting Options	
98-000048-01	Mounting Arm Kit
98-000053-01 (4”) 98-000053-02 (3”)	Extension Joint Kit
98-000054-01	Base Plate Kit
98-000057-01	Through-Hole Mount Bracket
98-000060-01	Side Mount Bracket
98-000088-01	Right-Angle Mirror Kit
98-000098-01	Diffuser Accessory Kit
Object Detectors	
99-000017-01	Photo Sensor, Visible, NPN, Dark On
99-000017-02	Photo Sensor, Visible, NPN, Light On, MS-Connect 210 Configuration
99-000019-01	Photo Sensor, Visible, NPN, Light On, USB Configuration
Documentation	
37-000010-01	Microscan Tools Drive (Software, User’s Manuals, Quick Start Guides, Configuration Guides, links to other documents on Microscan website

Front

Figure 2–1 shows the front of the Vision MINI Smart Camera.

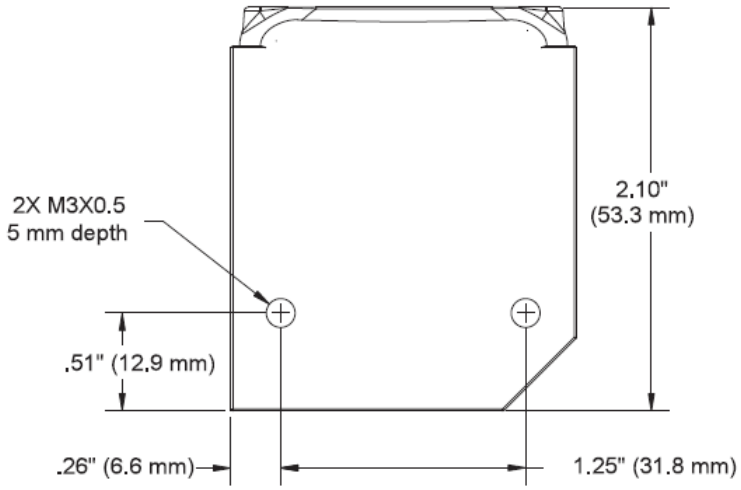
FIGURE 2–1. Front



Base

Figure 2–2 shows the base of the Vision MINI Smart Camera.

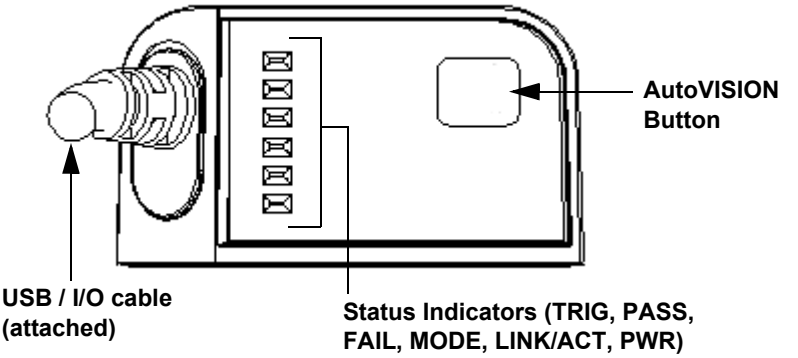
FIGURE 2–2. Base



Back

Figure 2-3 shows the back of the Vision MINI Smart Camera.

FIGURE 2–3. Back



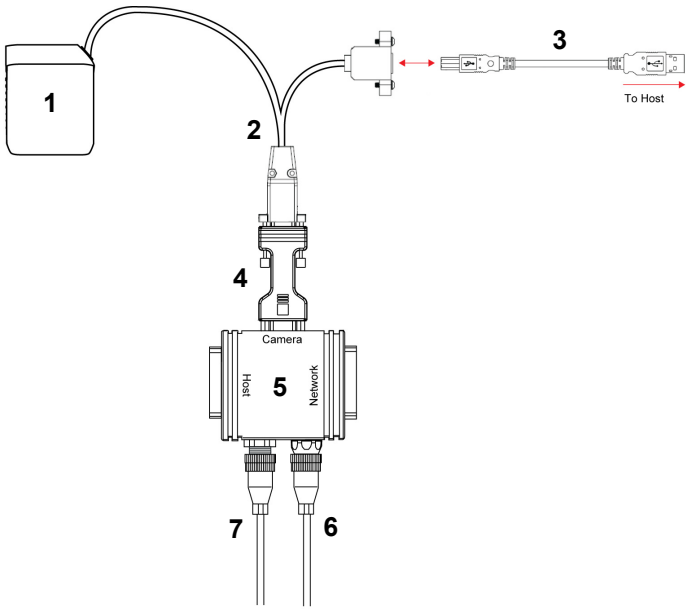
Important Label Information

Each Vision MINI Smart Camera has its own label, which contains important information about that camera.

- P/N – The Microscan part number of your Vision MINI Smart Camera.
- S/N — The serial number of your Vision MINI Smart Camera.
- MAC — The MAC address of your Vision MINI Smart Camera.
- Type — The model type of your Vision MINI Smart Camera.

Mounting and Wiring the Vision MINI Smart Camera

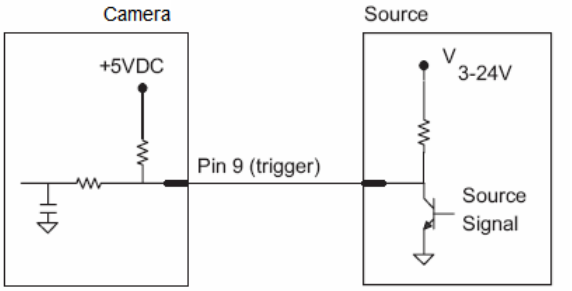
- Mount the camera (**1**) securely in its camera stand (not supplied).
- Make sure the camera (**1**) is mounted at the optimal distance of 2” to 6”.
- Mount the camera (**1**) as required by the application.
- Connect the USB side of the camera cable (**2**) to the USB host cable (**3**).
- Connect the IC-332 (**4**) to the IB-131 (**5**).
- Connect the D-sub side of the camera cable (**2**) to the IC-332 (**4**).
- Connect the trigger (**6**) to the IB-131 (**5**).
- Connect the power supply (**7**) to the IB-131 (**5**).
- Plug in the power supply (**7**).



Direct Input / Output Diagrams

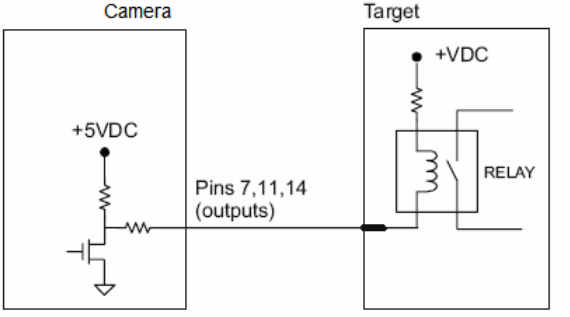
Trigger Input Example

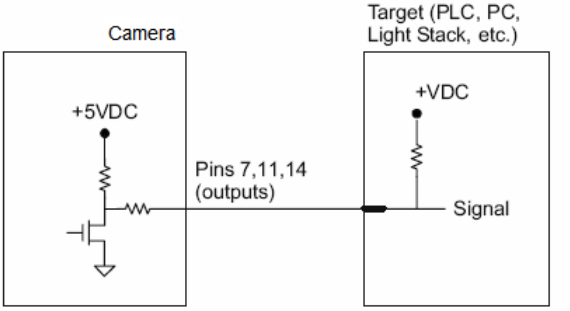
Trigger, New Master Inputs: 3 to 24V rated, 1mA @ 5VDC



Output Examples

Outputs (1, 2, 3): 5V TTL compatible, can sink 10mA and source 2mA

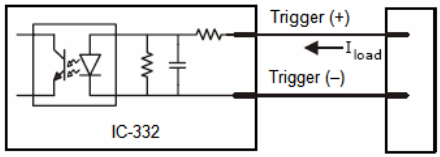




Isolated Trigger Input with IC-332

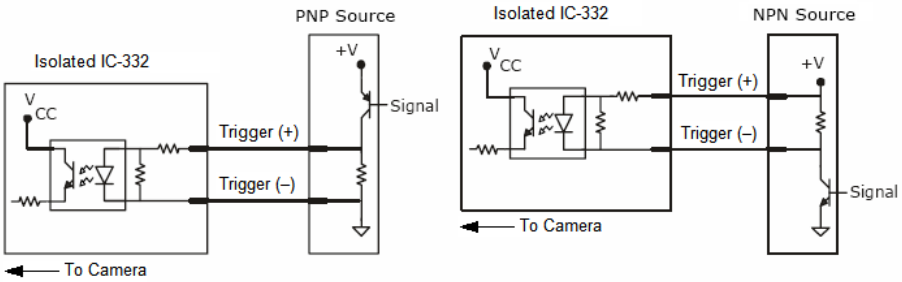
Trigger input can be fully electrically isolated from an NPN or PNP signal source.

	Minimum	Maximum
$V_{IN-HIGH}/I_{IN-HIGH}$	4.5V/3.0mA	28V/15mA
V_{IN-LOW}/I_{IN-LOW}	0V/0mA	2.0V/1mA
Pulse $Width_{min}$	48 µs	

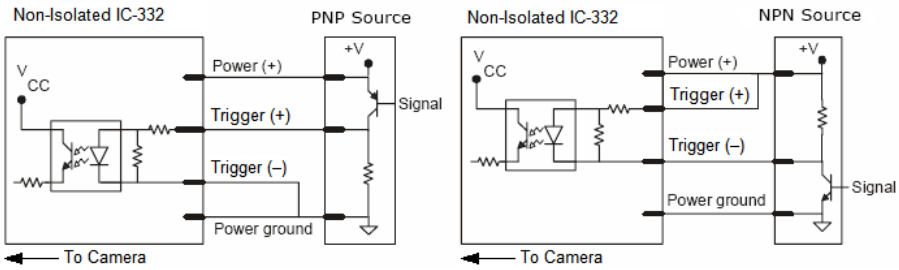


Input Examples

Fully Optoisolated



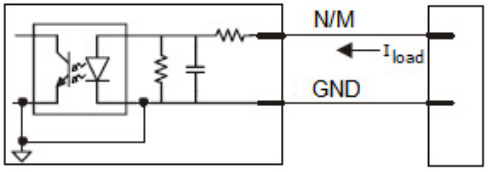
Not Optoisolated



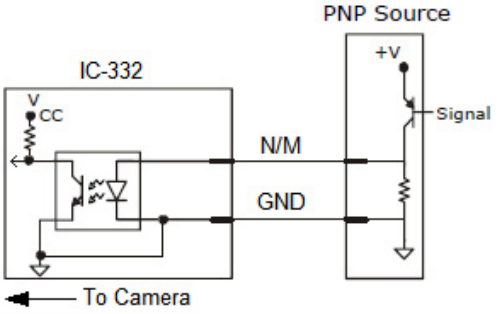
New Master Input with IC-332

The IC-332 converts N/M input to TTL signal through an optoisolator.
Note that the return for N/M is internally grounded, and therefore it is not fully electrically isolated.

	Minimum	Maximum
$V_{IN-HIGH}/I_{IN-HIGH}$	4.5V/3.0mA	28V/15mA
V_{IN-LOW}/I_{IN-LOW}	0V/0mA	2.0V/1mA
$Pulse\ Width_{min}$	48µS	



Example Circuit



Power Requirements

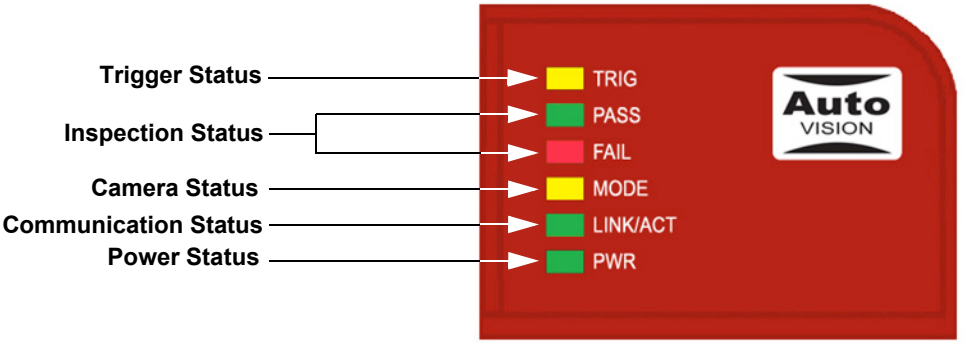
Refer to Table 2-3 when determining the power supply requirements for your camera.

TABLE 2–3. Camera Power Requirements

Component	5VDC
Vision MINI Smart Camera WVGA	5VDC +/– 5%, 200 mV p-p max. ripple, 400 mA @ 5VDC (typ.), 4.0 watts (max.)
Vision MINI Smart Camera SXGA	5VDC +/– 5%, 200 mV p-p max. ripple, 465 mA @ 5VDC (typ.), 4.5 watts (max.)
Vision MINI Smart Camera QXGA	5VDC +/– 5%, 200 mV p-p max. ripple, 400 mA @ 5VDC (typ.), 4.2 watts (max.)

Status Indicators

The back of the Vision MINI Smart Camera has multiple LEDs that indicate different trigger, inspection, camera, communication, and power states.



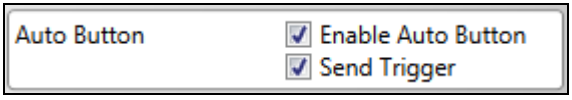
TRIG	**On Steady**	Continuous Trigger
	Off	Waiting for Trigger Event
	On Flashing	Trigger Event
PASS/FAIL	**On**	Active State
	Off	Inactive State
MODE	**On Steady**	Unit Ready
	Off	Unit Not Ready
LINK/ACT	**On Steady**	Link Established
	Off	No Link/Activity
	On Flashing	Link Established and Activity on Link
PWR	**On**	Power On
	Off	No Power Applied to Unit

Additional User Feedback

- Green Flash – A green flash from the front of the unit indicates a Good Read.
- Blue Targeting Pattern – The blue targeting pattern from the front of the unit allows the user to center an object in the camera's field of view.
- Beeper – The beeper is an audible verification that either a Pass or a Fail has occurred.

AutoVISION Button

The AutoVISION Button has three positions, selectable by the length of time the button is held down, and indicated by one, two, or three beeps and LED flashes in succession. It can also be used to send a trigger signal when **Send Trigger** is checked in AutoVISION software's **Connect** view. When the trigger functionality is enabled, pushing the AutoVISION Button triggers the camera to capture an image.



1st Position: Blue Targeting Pattern

The first AutoVISION Button position turns the targeting system on. This overrides any other targeting modes that have been configured.

2nd Position: Auto Calibration

The second AutoVISION Button position starts the Auto Calibration process, which selects the appropriate photometry and focus settings for the camera. The selected values are then saved for power-on.

3rd Position: Teach

The third AutoVISION Button position sets the Match String to the next OCR string or symbol data that is decoded.

Trigger Debounce

Trigger Debounce is the ability of the system to accomodate switching noise on a trigger state change – a common issue with relays that have some intermittent contact while engaging.

Trigger overruns (when the vision system is triggered faster than the device can process) can be avoided by increasing the “debounce” time in the camera definition file located in the C:\Microscan\Vscape\Drivers\CamDefs directory.

The IO Line Debounce High Time and IO Line Debounce Low Time can be added to the file as in the example below. The default debounce time is 1 ms (1,000 µs).

Note: Although the value entered for the "IO Line Debounce Time" is in microseconds, it will only be rounded up to a millisecond value. For example, entering the value **1001** will resolve to 2 ms; entering a value of **2800** will resolve to 3 ms.

The min value for "IO Line Debounce Time" is 0, which disables software debounce altogether. The maximum value is 100000 (100 ms).

Camera Definition File Example

```
// Camera Definition File
// Version: 1.02
Camera Name                          VisionMINI 1280x1024 // Name Displayed in
Camdef Selection Dialog
Digitizer Type               5000                                  // Number
associated with VisionMini SXGA
Stride                                       1280    // Image Width
Rows                                         1024    // Image Height
X Offset                             0               // Image X Offset
Y Offset                             0               // Image Y Offset
Bits Per Pixel               8               // Bits that represent Pixel Value
Pixel Type                           0               // Type of Pixel:
MONOCHROME=0, COLOR_RGB=1, COLOR_BGR=2, COLOR_BAYGR8=3, COLOR_BAYRG8=4,
COLOR_BAYGB8=5, COLOR_BAYBG8=6, COLOR_HSI=7
Image Structure        1             // Pixel Organization: Packed=1, TwoPlanes =
2, ThreePlanes = 3
Async Control                1               // Controllable shutter time. Usually
using a pulse width specified in usecs
Usecs Per Frame              62500   // Fastest time to acquire a frame:  16 FPS
                                             // -1 Disables timeout feature
X Offset                             0
Y Offset                             0
// IO Configuration
GPIO Edit Mask               0x0000
GPIO Defaults                0x0001  // 1 General Purpose Input 3 General Purpose
Outputs
GPIO Count                           4
GPIO Inputs                          1
GPIO Outputs                 3
Sensors                                      1               // One input dedicated
to Trigger signal
Strobes                                      0
Virtual IO                           2048
IO Line Debounce High Time 2000 //usecs
IO Line Debounce Low Time  2000 //usecs
// Focus & Photometry Ranges
```

```
Gain Dflt                       20
Gain Min                        0
Gain Max                        100             // 0 to 100%
Exp Dflt                        4000
Exp Min                                 66
Exp Max                                 66667   // 1/15 to 1/15,000
Focus Dflt                      400
Focus Min                       200
Focus Max                       600             // 2 to 6 inches
```

3

CHAPTER 3 Optics and Lighting

This section describes the optical and illumination characteristics of the Vision MINI Smart Camera.

Optics

The monochrome and color versions of the Vision MINI Smart Camera have a built-in CMOS sensor, available in Standard Density or High Density (2.5 mm).

WVGA (752 x 480) Field of View

Standard Density			High Density		
Working Distance	**Horizontal FOV**	**Vertical FOV**	**Working Distance**	**Horizontal FOV**	**Vertical FOV**
2	1.486	0.949	**2**	0.663	0.560
3	2.188	1.396	**3**	0.954	0.824
4	2.889	1.844	**4**	1.246	1.089
5	3.591	2.292	**5**	1.537	1.354
6	4.292	2.740	**6**	1.828	1.619

SXGA (1280 x 1024) Field of View

Standard Density			High Density		
Working Distance	**Horizontal FOV**	**Vertical FOV**	**Working Distance**	**Horizontal FOV**	**Vertical FOV**
2	2.186	1.749	**2**	1.264	1.011
3	3.182	2.545	**3**	1.850	1.480
4	4.177	3.342	**4**	2.436	1.949
5	5.173	4.138	**5**	3.022	2.418
6	6.168	4.935	**6**	3.608	2.886

QXGA (2048 x 1536) Field of View

Standard Density			High Density		
Working Distance	**Horizontal FOV**	**Vertical FOV**	**Working Distance**	**Horizontal FOV**	**Vertical FOV**
2	2.165	1.749	**2**	1.264	0.948
3	3.180	2.545	**3**	1.850	1.388
4	4.195	3.342	**4**	2.436	1.827
5	5.210	4.138	**5**	3.022	2.267

Illumination

The Vision MINI Smart Camera has built-in lighting (red LEDs). The LEDs can be configured to operate in multiple modes – Continuous, Strobe, and Off.

Lighting Examples

The following lighting examples were captured with a Standard Density Vision MINI.

FIGURE 3–1. Semi-Specular Surface (Fine Matte Metal Ruler) at 2”, 90°

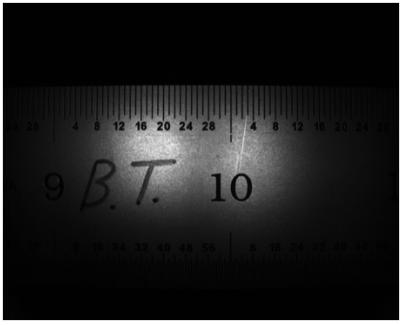
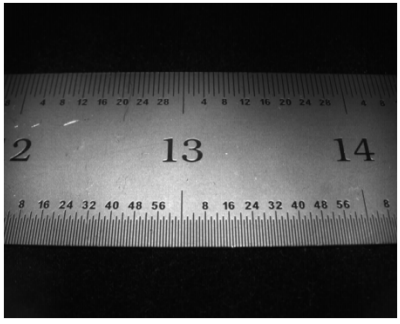


FIGURE 3–2. Off-Axis – Semi-Specular Surface (Fine Matte Metal Ruler) at 2”, 90°



Machine Vision Lighting Principles

Proper lighting is critical to the success of a machine vision application. The Vision MINI features integrated lighting (built-in red LEDs @ 617nm). Depending on the requirements of your application, you may also need to add external lighting from Microscan's NERLITE family of machine vision lighting products.

Consider the following when setting up your application:

– Is the surface of the object flat, slightly bumpy, or very bumpy?

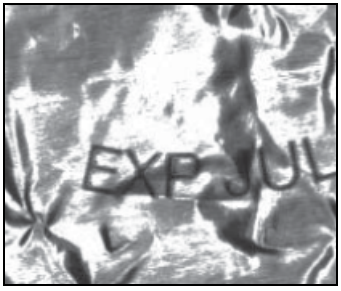
– Is the surface matte or shiny?

– Is the object curved or flat?

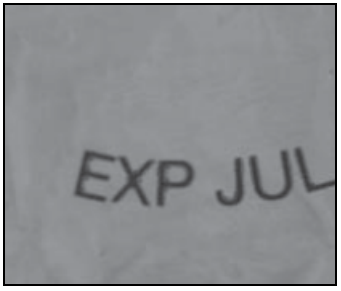
– What is the color of the object or area being inspected?

– Is the object moving or stationary?

Machine vision lighting should maximize contrast of the areas or features being inspected while minimizing the contrast of everything else.



Before correct lighting



After correct lighting with a NERLITE Illuminator

A

APPENDIX A Connector Pinouts

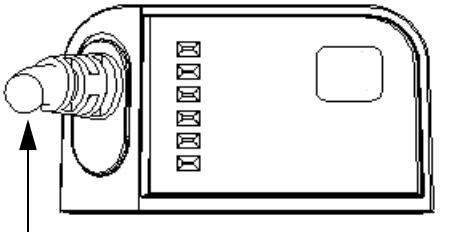
This section contains information about the Vision MINI Smart Camera's USB and I/O connectors.

Vision MINI Smart Camera Connectors

USB and I/O Cable

Figure A–1 shows the location of the USB and I/O cable.

FIGURE A–1. USB and I/O Cable



USB / I/O Cable (attached)

TABLE A–1. and TABLE A-2. describe the USB and I/O cable signals.

TABLE A–1. USB and I/O Cable Pin Assignments (15-pin D-sub Socket)

Pin	Host RS-232	In/Out
1	Power +5VDC	In
2	TxD	Out
3	RxD	In
4	Power/Signal Ground	
5	NC	
6	NC	Out
7	Output 1 TTL (Can sink 10mA and souce 10mA)	Out
8	Default configuration (activated by connecting pin 8 to ground pin 4)	In
9	Trigger	In
10	NC	In
11	Output 3 TTL (Can sink 10mA and souce 10mA)	Out
12	Input 1 (NPN)	In
13	Chassis ground (Connects chassis body to earth ground only. Do not use as power or signal return.)	
14	Output 2 TTL (Can sink 10mA and souce 10mA)	Out
15	NC	

Figure A-2 shows the pinout of the 15-pin D-sub Socket.

FIGURE A–2. 15-pin D-sub Socket

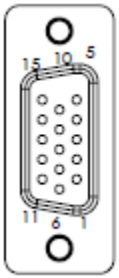
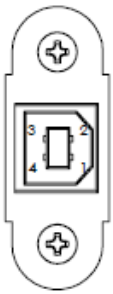


TABLE A–2. USB and I/O Cable Pin Assignments (USB Type B Socket)

Pin	Function
1	Vbus (5V)
2	D–
3	D+
4	Ground

Figure A-3 shows the pinout of the USB Type B Socket.

FIGURE A–3. USB Type B Socket



Appendix A Connector Pinouts

APPENDIX B

Cable Specifications

This section contains information about Vision MINI Smart Camera cables.

Note: Cable specifications are published for information only. Microscan does not guarantee the performance or quality of cables provided by other suppliers.

TABLE B–1. Cable Part Numbers and Descriptions

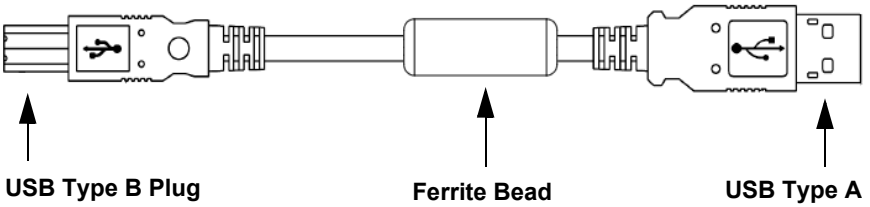
Part Number	Description
61-000105-01	Host Cable, MS-Connect 210 to Host, stripped-to-9-pin
61-000196-02	Cable, Vision MINI, USB / I/O (attached to camera)
61-000208-01	USB Type A to USB Type B Cable, 6’
61-300026-03	Communication Cable, DB25 Plug to DB9 Socket, 6’
97-000002-02	Power Supply, 90-254 VAC, +5VDC
97-100004-15	Power Supply, 90-254 VAC, 24VDC, USA/Euro Plug
99-000017-01	Photo Sensor, Visible, NPN, Dark On
99-000017-02	Photo Sensor, Visible, NPN, Light On, MS-Connect 210 Configuration
99-000019-01	Photo Sensor, Visible, NPN, Light On, USB Configuration

61-000208-01 USB Type A to USB Type B Plug Cable

The 61-000208-01 USB Type A to USB Type B Plug Cable is a double-ended shielded ferrite bead USB cable.

Figure B-1 shows the 61-000208-01 USB Type A to USB Type B Plug Cable.

FIGURE B–1. USB Type A to USB Type B Plug Cable

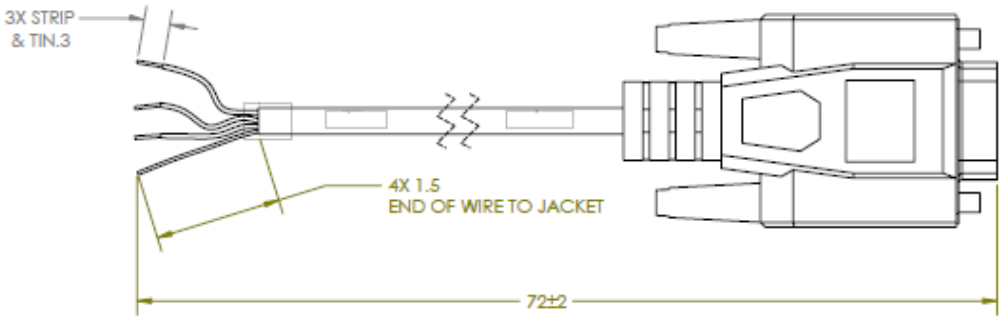


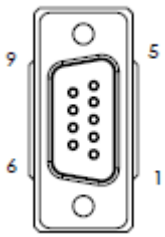
61-000105-01 Host Cable, MS-Connect 210 to Host, Stripped to 9-Pin Socket

The 61-000105-01 Host Cable, MS-Connect 210 to Host is a single-ended shielded serial cable with a DB9 connector on one end, intended for configurations that include the MS-Connect 210 Wiring Box.

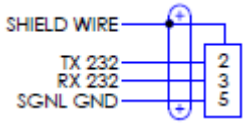
Figure B-2 shows the 61-000105-01 Host Cable, MS-Connect 210 to Host.

FIGURE B–2. Host Cable, MS-Connect 210 to Host





9-Pin D-sub Socket



61-000105-01 Schematic

Table B-2 describes the signals for the 61-000105-01 Host Cable, MS-Connect 210 to Host.

TABLE B–2. Host Cable, MS-Connect 210 to Host Pin Assignments

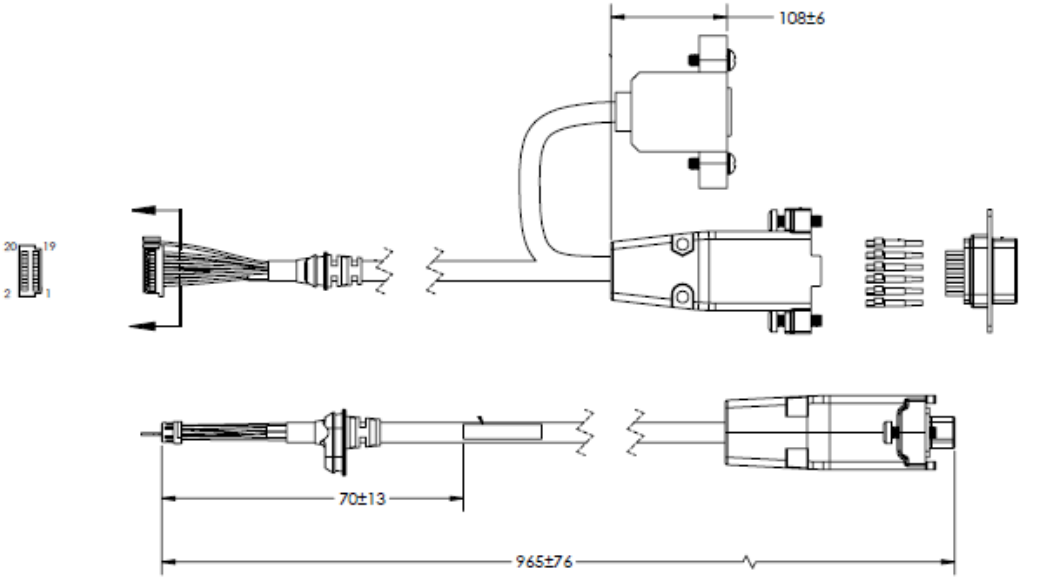
Pin	Function
2	TX 232
3	RX 232
5	Signal Ground

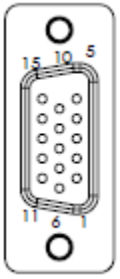
61-000196-02 Vision MINI USB / I/O Cable (Attached)

The 61-000196-02 Vision MINI USB / I/O Cable is attached to the camera. It is a shielded cable in a “pigtail” configuration with a USB Type B socket and an RS-232 15-pin D-sub socket.

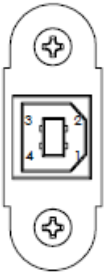
Figure B-3 shows the 61-000196-02 Vision MINI USB / I/O Cable.

FIGURE B–3. Vision MINI USB / I/O Cable (Attached)





15-Pin D-sub Socket



USB Type B Socket

Tables B-3 and B-4 describe the signals for the 61-000196-02 Vision MINI USB / I/O Cable.

TABLE B–3. USB and I/O Cable Pin Assignments (15-pin D-sub Socket)

Pin	Host RS-232	In/Out
1	Power +5VDC	In
2	TxD	Out
3	RxD	In
4	Power/Signal Ground	
5	NC	
6	NC	Out
7	Output 1 TTL (Can sink 10mA and souce 10mA)	Out
8	Default configuration (activated by connecting pin 8 to ground pin 4)	In
9	Trigger	In
10	NC	In
11	Output 3 TTL (Can sink 10mA and souce 10mA)	Out
12	Input 1 (NPN)	In
13	Chassis ground (Connects chassis body to earth ground only. Do not use as power or signal return.)	
14	Output 2 TTL (Can sink 10mA and souce 10mA)	Out
15	NC	

TABLE B–4. USB and I/O Cable Pin Assignments (USB Type B Socket)

Pin	Function
1	Vbus (5V)
2	D–
3	D+
4	Ground

61-300026-03 Communication Cable, DB25 Plug to DB9 Socket

The 61-300026-03 Communication Cable, DB25 Plug to DB9 Socket is a shielded RS-232 cable ending in a 25-pin D-sub plug and a 9-pin D-sub socket.

Figure B-4 shows the 61-300026-03 Communication Cable, DB25 Plug to DB9 Socket.

FIGURE B–4. Communication Cable, DB25 Plug to DB9 Socket

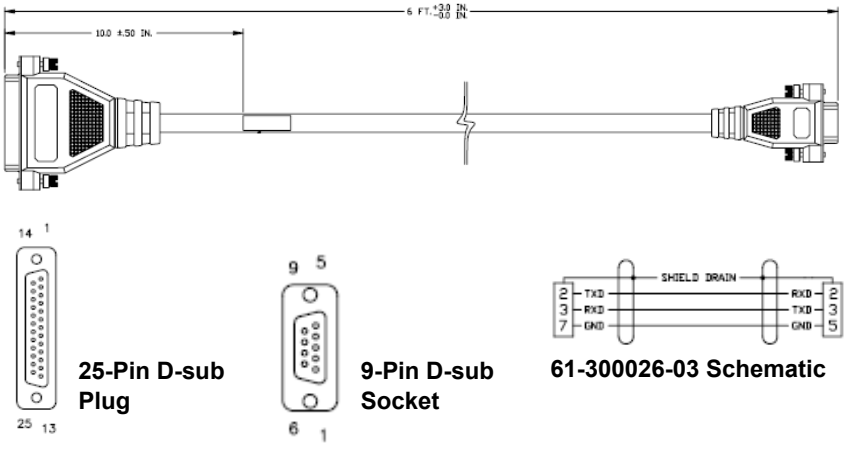


Table B-5 describes the signals for the 61-300026-03 Communication Cable, DB25 Plug.

TABLE B–5. Communication Cable, DB25 Plug Pin Assignments

Pin	Function
2	TxD
3	RxD
7	Ground

Table B-6 describes the signals for the 61-300026-03 Communication Cable, DB9 Socket.

TABLE B–6. Communication Cable, DB9 Socket Pin Assignments

Pin	Function
2	RxD
3	TxD
5	Ground

97-000002-02 Power Supply, 90-254 VAC, +5VDC

The 97-000002-02 Power Supply, 90-254 VAC, +5VDC ends in a 3-pin Micro-Change connector.

Figure B-5 shows the 97-000002-02 Power Supply, 90-254 VAC, +5VDC.

FIGURE B–5. Power Supply, 90-254 VAC, +5VDC

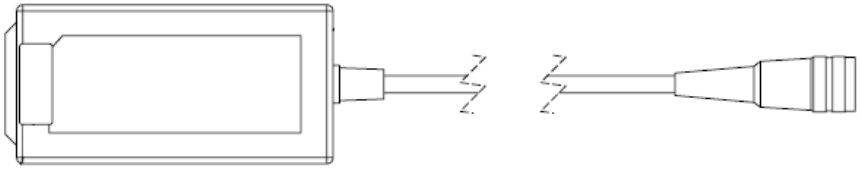


Table B-7 describes the signals for the 97-000002-02 Power Supply, 90-254 VAC, +5VDC.

TABLE B–7. Power Supply, 90-254 VAC, +5VDC Pin Assignments

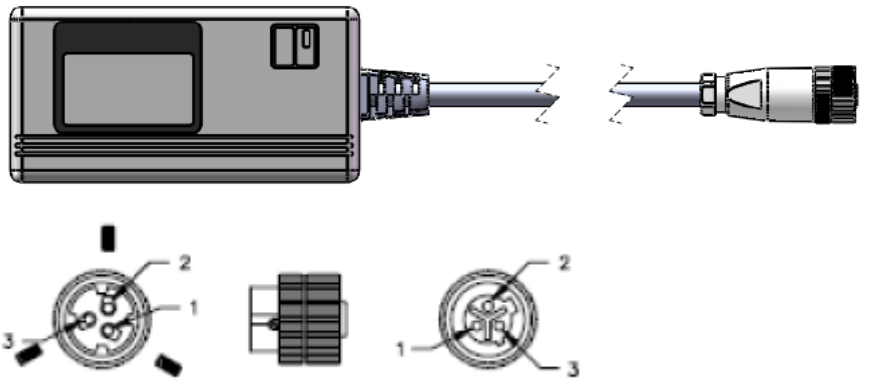
Pin	Function
1	Ground (Black)
2	Shield (Bare)
3	+5VDC (White)

97-100004-15 Power Supply, 90-254 VAC, 24VDC, USA/Euro Plug

The 97-100004-15 Power Supply, 90-254 VAC, 24VDC, USA/Euro Plug ends in a 3-pin Micro-Change connector and comes with both a U.S. and Euro plug.

Figure B-6 shows the 97-100004-15 Power Supply, 90-254 VAC, 24VDC, USA/Euro Plug.

FIGURE B–6. Power Supply, 90-254 VAC, 24VDC, USA/Euro Plug



3-Pin Micro-Change Connector

Table B-8 describes the signals for the 97-100004-15 Power Supply, 90-254 VAC, 24VDC, USA/Euro Plug.

TABLE B–8. Power Supply, 90-254 VAC, 24VDC, USA/Euro Plug Pin Assignments

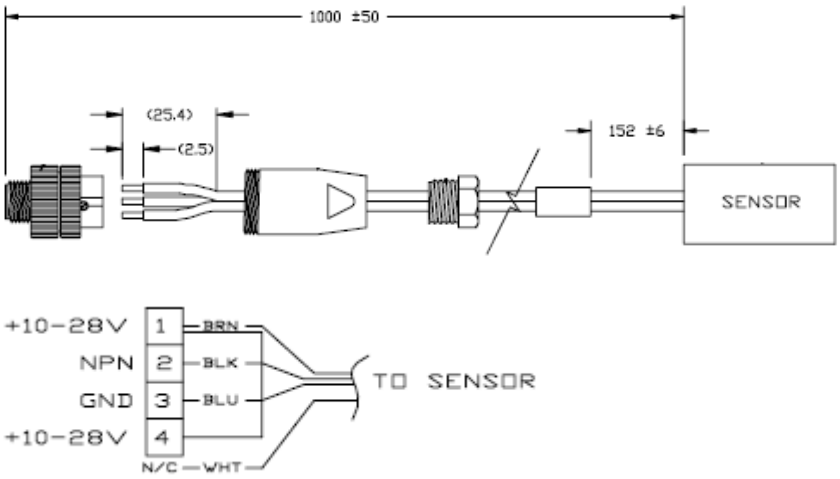
Pin	Function
1	Ground (Black)
2	Shield (Bare)
3	+24VDC (White)

99-000017-01 Photo Sensor, Visible, NPN, Dark On

The 99-000017-01 Photo Sensor, Visible, NPN, Dark On is an external trigger device with a 4-pin Micro-Change connector.

Figure B-7 shows the 99-000017-01 Photo Sensor, Visible, NPN, Dark On.

FIGURE B–7. Photo Sensor, Visible, NPN, Dark On



99-000017-01 Schematic

Table B-9 describes the signals for the 99-000017-01 Photo Sensor, Visible, NPN, Dark On.

TABLE B–9. Photo Sensor, Visible, NPN, Dark On Pin Assignments

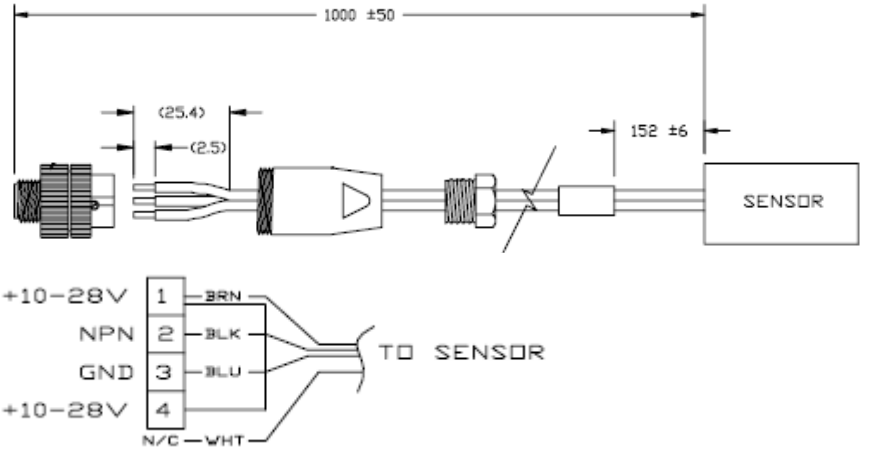
Pin	Function
1	+10-28V
2	NPN
3	Ground
4	+10-28V

99-000017-02 Photo Sensor, Visible, NPN, Light On, MS-Connect 210 Configuration

The 99-000017-02 Photo Sensor, Visible, NPN, Light On, MS-Connect 210 Configuration is an external trigger device with a 4-pin Micro-Change connector, intended for use in configurations that include an MS-Connect 210 Wiring Box.

Figure B-8 shows the 99-000017-02 Photo Sensor, Visible, NPN, Light On, MS-Connect 210 Configuration.

FIGURE B–8. Photo Sensor, Visible, NPN, Light On, MS-Connect 210 Configuration



99-000017-02 Schematic

Table B-10 describes the signals for the 99-000017-02 Photo Sensor, Visible, NPN, Light On, MS-Connect 210 Configuration.

TABLE B–10. Photo Sensor, Visible, NPN, Light On, MS-Connect 210 Configuration Pin Assignments

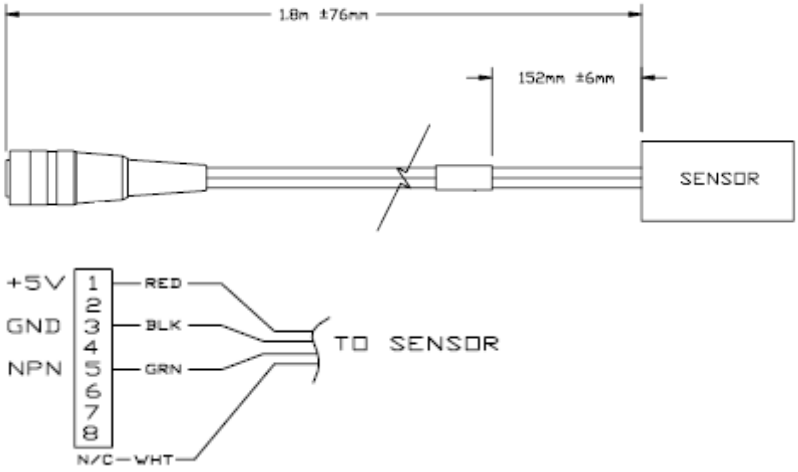
Pin	Function
1	+10-28V
2	NPN
3	Ground
4	+10-28V

99-000019-01 Photo Sensor, Visible, NPN, Light On, USB Configuration

The 99-000019-01 Photo Sensor, Visible, NPN, Light On, USB Configuration is an external trigger device with an 8-pin Micro-Change connector, intended for USB configuration.

Figure B-9 shows the 99-000019-01 Photo Sensor, Visible, NPN, Light On, USB Configuration.

FIGURE B–9. Photo Sensor, Visible, NPN, Light On, USB Configuration



99-000019-01 Schematic

Table B-11 describes the signals for the 99-000019-01 Photo Sensor, Visible, NPN, Light On, USB Configuration.

TABLE B–11. Photo Sensor, Visible, NPN, Light On, USB Configuration Pin Assignments

Pin	Function
1	+5V
3	Ground
5	NPN

Appendix B Cable Specifications

APPENDIX C General Specifications

This section contains specifications and dimensions for the Vision MINI Smart Camera.

TABLE C–1. General Specifications

Part Number	GMV-6300-2110G	GMV-6300-2112G	GMV-6300-2210G	GMV-6300-2212G	GMV-6300-2172G	GMV-6300-2272G
Sensor	SXGA (1280 x 1024) CMOS, up to 15 fps				QXGA (2048 x 1536) CMOS, up to 5 fps	
Sensor Format	1/2"					
Sensor Color	Monochrome				Color	
Height	1” (25.4 mm)					
Width	1.80” (45.7 mm)					
Depth	2.10” (53.3 mm)					
Weight	2 oz. (57 g)					
Power	5VDC +/– 5%, 200 mV p-p max. ripple, 465 mA @ 5VDC (typ.), 4.5 watts (max.)				5VDC +/– 5%, 200 mV p-p max. ripple, 400 mA @ 5VDC (typ.), 4.2 watts (max.)	
Connector	3 ft. cable terminated with high density 15-pin D-sub socket connector and USB Type B socket connector					
Lens Type	Fixed Lens					
Comm.	RS-232, USB 1.1 (Ethernet emulation mode driver available)					
Illumination	Red @ 617nm				White	
Indicators	**LEDs:** Trigger, Pass, Fail, Mode, Power, Link/Act; **Green Flash:** Pass; **Blue V:** Target					
I/O	**Trigger Input:** 5 to 28VDC rated (.16 mA); **Input 1:** 5 to 28VDC rated (.16 mA); **Outputs (1, 2, 3):** 5V TTL compatible, can sink 10 mA and source 10 mA; **Optional I/O:** Optoisolated (with IC-332 accessory)					
Image Acquisition	Progressive scan, square pixel					
Focal Range	2 to 6” (50.8 mm to 152.4 mm – autofocus)					
Shutter	Software-adjustable, 10 µs to 16.7 ms; Rolling Shutter					
Pixel Size	5.2 um x 5.2 um				3.2um x 3.2um	
Operating Temperature	0° to 40° C (32° to 104° F)					
Storage Temperature	–50° to 75° C (–58° to 167° F)					
Humidity	Up to 90% (non-condensing)					
Enclosure	IP54 (category 2)					
Compliance	**FCC, UL/cUL, CE (General Immunity for Light Industry:** EN 55024 ITE Immunity Standard; **Radiated and Conducted Emissions of ITE Equipment:** EN 55022 ITE Disturbances**), CB**, **RoHS/WEEE**					

TABLE C–1. General Specifications (Continued)

Part Number	GMV-6300-2100G	GMV-6300-2102G	GMV-6300-2200G	GMV-6300-2202G
Sensor	WVGA (752 x 480) CMOS, up to 60 fps			
Sensor Format	1/3”			
Sensor Color	Monochrome			
Height	1” (25.4 mm)			
Width	1.80” (45.7 mm)			
Depth	2.10” (53.3 mm)			
Weight	2 oz. (57 g)			
Power	5VDC +/– 5%, 200 mV p-p max. ripple, 400 mA @ 5VDC (typ.), 4.0 watts (max.)			
Connector	3 ft. cable terminated with high density 15-pin D-sub socket connector and USB Type B socket connector			
Lens Type	Fixed Lens			
Comm.	RS-232, USB 1.1 (Ethernet emulation mode driver available)			
Illumination	Red @ 617nm			
Indicators	**LEDs:** Trigger, Pass, Fail, Mode, Power, Link/Act; **Green Flash:** Pass; **Blue V:** Target			
I/O	**Trigger Input:** 5 to 28VDC rated (.16 mA); **Input 1:** 5 to 28VDC rated (.16 mA); **Outputs (1, 2, 3):** 5V TTL compatible, can sink 10 mA and source 10 mA; **Optional I/O:** Optoisolated (with IC-332 accessory)			
Image Acquisition	Progressive scan, square pixel			
Focal Range	2 to 6” (50.8 mm to 152.4 mm)			
Shutter	Software-adjustable, 10 µs to 16.7 ms; Global Shutter			
Pixel Size	6.0um x 6.0 um			
Operating Temperature	0° to 40° C (32° to 104° F)			
Storage Temperature	–50° to 75° C (–58° to 167° F)			
Humidity	Up to 90% (non-condensing)			
Enclosure	IP54 (category 2)			
Compliance	**FCC, UL/cUL, CE (General Immunity for Light Industry:** EN 55024 ITE Immunity Standard; **Radiated and Conducted Emissions of ITE Equipment:** EN 55022 ITE Disturbances**)**, **CB**, **RoHS/WEEE**			

TABLE C–1. General Specifications (Continued)

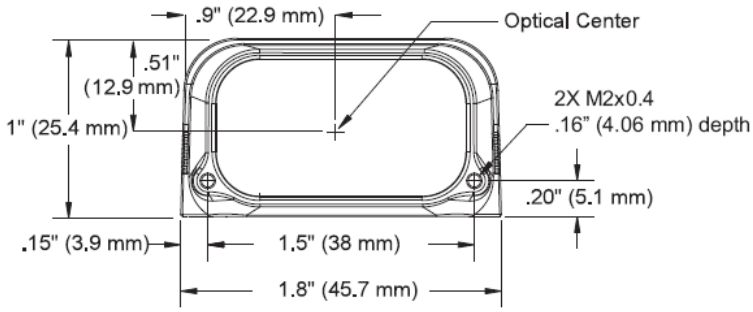
Part Number	GMV-6300-2104G	GMV-6300-2106G	GMV-6300-2114G	GMV-6300-2116G
Sensor	WVGA (752 x 480) CMOS, up to 60 fps		SXGA (1280 x 1024) CMOS, up to 15 fps	
Sensor Format	1/3”		1/2”	
Sensor Color	Monochrome			
Height	1” (25.4 mm)			
Width	1.80” (45.7 mm)			
Depth	2.10” (53.3 mm)			
Weight	2 oz. (57 g)			
Power	5VDC +/– 5%, 200 mV p-p max. ripple, 400 mA @ 5VDC (typ.), 4.0 watts (max.)		5VDC +/– 5%, 200 mV p-p max. ripple, 465 mA @ 5VDC (typ.), 4.5 watts (max.)	
Connector	3 ft. cable terminated with high density 15-pin D-sub socket connector and USB Type B socket connector			
Lens Type	Fixed Lens			
Comm.	RS-232, USB 1.1 (Ethernet emulation mode driver available)			
Illumination	Red @ 617nm			
Indicators	**LEDs:** Trigger, Pass, Fail, Mode, Power, Link/Act; **Green Flash:** Pass; **Blue V:** Target			
I/O	**Trigger Input:** 5 to 28VDC rated (.16 mA); **Input 1:** 5 to 28VDC rated (.16 mA); **Outputs (1, 2, 3):** 5V TTL compatible, can sink 10 mA and source 10 mA; **Optional I/O:** Optoisolated (with IC-332 accessory)			
Image Acquisition	Progressive scan, square pixel			
Focal Range	2 to 6” (50.8 mm to 152.4 mm)			
Shutter	Software-adjustable, 10 µs to 16.7 ms; Global Shutter		Software-adjustable, 10 µs to 16.7 ms; Rolling Shutter	
Pixel Size	6.0um x 6.0 um		5.2 um x 5.2 um	
Operating Temperature	0° to 40° C (32° to 104° F)			
Storage Temperature	–50° to 75° C (–58° to 167° F)			
Humidity	Up to 90% (non-condensing)			
Enclosure	IP54 (category 2)			
Compliance	**FCC, UL/cUL, CE (General Immunity for Light Industry:** EN 55024 ITE Immunity Standard; **Radiated and Conducted Emissions of ITE Equipment:** EN 55022 ITE Disturbances**), CB**, **RoHS/WEEE**			

TABLE C–1. General Specifications (Continued)

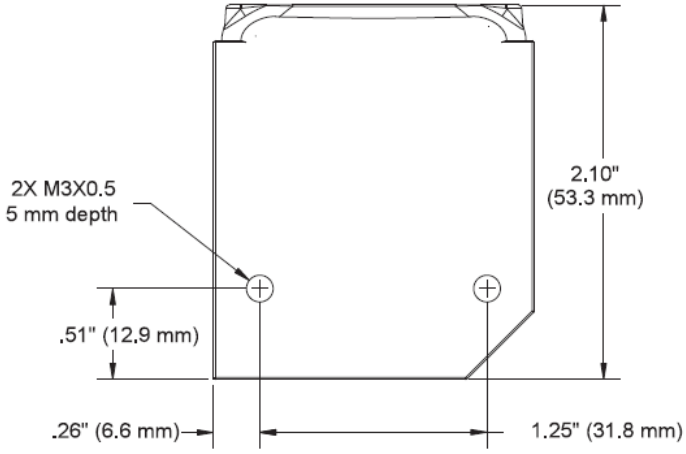
Part Number	GMV-6300-2204G	GMV-6300-2206G	GMV-6300-2214G	GMV-6300-2216G
Sensor	WVGA (752 x 480) CMOS, up to 60 fps		SXGA (1280 x 1024) CMOS, up to 15 fps	
Sensor Format	1/3”		1/2”	
Sensor Color	Monochrome			
Height	1” (25.4 mm)			
Width	1.80” (45.7 mm)			
Depth	2.10” (53.3 mm)			
Weight	2 oz. (57 g)			
Power	5VDC +/– 5%, 200 mV p-p max. ripple, 400 mA @ 5VDC (typ.), 4.0 watts (max.)		5VDC +/– 5%, 200 mV p-p max. ripple, 465 mA @ 5VDC (typ.), 4.5 watts (max.)	
Connector	3 ft. cable terminated with high density 15-pin D-sub socket connector and USB Type B socket connector			
Lens Type	Fixed Lens			
Comm.	RS-232, USB 1.1 (Ethernet emulation mode driver available)			
Illumination	Red @ 617nm			
Indicators	**LEDs:** Trigger, Pass, Fail, Mode, Power, Link/Act; **Green Flash:** Pass; **Blue V:** Target			
I/O	**Trigger Input:** 5 to 28VDC rated (.16 mA); **Input 1:** 5 to 28VDC rated (.16 mA); **Outputs (1, 2, 3):** 5V TTL compatible, can sink 10 mA and source 10 mA; **Optional I/O:** Optoisolated (with IC-332 accessory)			
Image Acquisition	Progressive scan, square pixel			
Focal Range	2 to 6” (50.8 mm to 152.4 mm)			
Shutter	Software-adjustable, 10 µs to 16.7 ms; Global Shutter		Software-adjustable, 10 µs to 16.7 ms; Rolling Shutter	
Pixel Size	6.0um x 6.0 um		5.2 um x 5.2 um	
Operating Temperature	0° to 40° C (32° to 104° F)			
Storage Temperature	–50° to 75° C (–58° to 167° F)			
Humidity	Up to 90% (non-condensing)			
Enclosure	IP54 (category 2)			
Compliance	**FCC, UL/cUL, CE (General Immunity for Light Industry:** EN 55024 ITE Immunity Standard; **Radiated and Conducted Emissions of ITE Equipment:** EN 55022 ITE Disturbances**), CB**, **RoHS/WEEE**			

Dimensions

Front



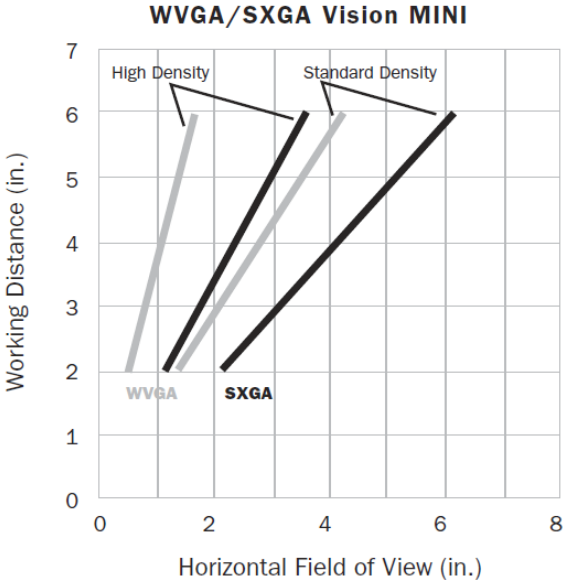
Base



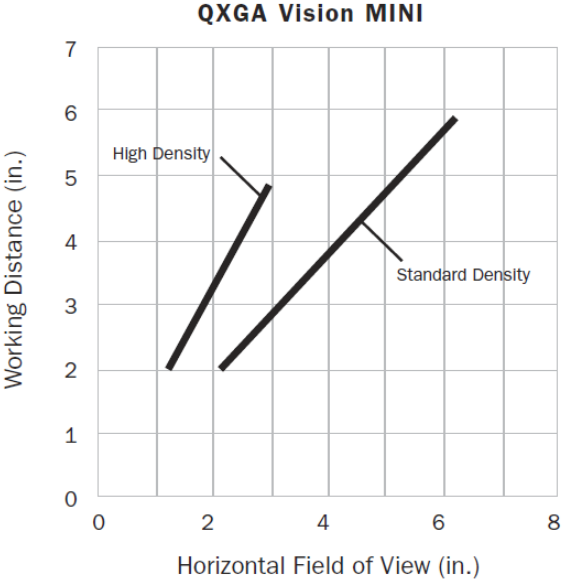
Note: Nominal dimensions shown. Typical tolerances apply.

Field of View and Working Distance

WVGA/SXGA



QXGA



APPENDIX D

Serial Commands

This section provides descriptions of the serial commands that can be sent to the camera via TCP (Telnet) port, AutoVISION Terminal, or HyperTerminal.

SET {tagname}{value}

Sets value of a global tag.

The tagname must correspond to one of the supported tags within the device.

The value can contain spaces.

The command is terminated by a carriage return and/or line feed character.

The value can be a list of comma-separated items to set a sequence of tags:

Send **SET int1 1, 2, 3** to set int1 = 1, int2 = 2, int3 = 3.

The AVP service allows setting of step and datum information from the job tree using forward slash '/' in the symbolic name path. **SET avp/insp1/snapshot1/acq1/gain 2.0** paths are not case-sensitive and do not need to be fully qualified if unique.

SET avp/acq1/gain 2.0 will set the same gain value if there is only one acquire.

Control tags in the AVP service such as **START**, **STOP**, and **TRIGGER** act as momentary switches. **SET avp.start 1** is equivalent to the **ONLINE** command. **avp.start** will reset immediately and always read as **0**.

Success Return: On success will return **!OK** followed by an echo of the command. For example:

!OK SET matchstring1 ABCD

Fail Return: On failure will return **!ERROR** followed by the reason for the failure. For example:

!ERROR Tag matchstring66 not found

GET {tagname}

Gets value of a global tag.

The tagname must correspond to one of the supported tags within the device.

The command is terminated by a carriage return and/or line feed character.

Include an index to get a single value from an array such as **GET int1**. If the index is omitted, the full array of values will be returned in a comma-separated list of values.

Send **Get {tagname}** to get the value of a tag within the global data service. To get the value of a tag within another service, prefix the tagname with the service name. For example, a **GET {service.tagname}** command such as **GET eip.input** for the EIP input assembly.

The AVP service allows retrieval of step and datum information from the job tree using forward slash '**/**' in the symbolic name path. **GET avp/insp1/snapshot1/status** paths are not case-sensitive and do not need to be fully qualified if unique.

GET avp/snapshot1/status will return the same result if there is only one inspection.

When issued against a step, **GET avp/snapshot1** will return the values for all datums.

Success Return: On success will return the value stored in the tag. For example:

ABCD

Fail Return: On failure will return **!ERROR** followed by the reason for the failure. For example:

!ERROR Tag matchstring66 not found

INFO {service.tagname or service}

Gets information about a tag or service.

INFO with no arguments gets a list of services.

INFO {service} gets a list of tags in that service.

INFO {service.tagname} gets attributes of the tag as well as a list of subtags.

The AVP service allows retrieval of step and datum information from the job tree using forward slash '*/*' in the symbolic name path. **INFOavp/insp1/snapshot1/status** paths are not case-sensitive and do not need to be fully qualified if unique.

INFO avp/snapshot1/status will return the same result if there is only one inspection.

When issued against a step, **INFO avp/snapshot1** returns properties of the step, a list of child datums, and a list of child steps. Child steps are indicated by a trailing forward slash.

GETIMAGE {-transfer=ymodem} {-type=failed}{-format=[jpg|png]} {-quality=n} {-inspection=n} {woi=l,t,r,b}

Initiates serial transfer of inspection image.

-transfer=ymodem is not currently optional - only Ymodem protocol is supported.

-type=failed to retrieve the last failed image. If omitted, the current image is returned.

-format=[jpg|png] specifies the format of the image. If omitted, the image format is JPG.

-quality=*n* specifies a JPG compression quality of *n* less than or equal to 100. The default quality is **80** if not specified.

-inspection=*n* specifies the inspection from which to retrieve an image. The image will be from the first snapshot within that inspection. If not specified, the image will be from the first inspection that does contain a snapshot.

woi=left,top,right,bottom specifies a rectangular area of the image to be included in the output image. If omitted, the full image buffer is returned.

ONLINE

Starts all inspections.

OFFLINE

Stops all inspections.

TRIGGER {inspection index}

Triggers inspection. If {inspection index} is omitted, inspection 1 is triggered.

VT (Virtual Trigger) Command

Triggers an inspection by pulsing a Virtual I/O point. For example:

VT 1

will return pulse **VIO1**. The inspection will run if it is configured to use **VIO 1** as a trigger.

Syntax: VT [VIO Index]

- If specified, the VIO index must be in the allowed range for Virtual I/O points within Visionscape. The virtual I/O line will be set high then low.
- If VIO Index is not specified, VIO1 is assumed

Success Return: Nothing is echoed on success of the VT command.

Fail Return: Return **!ERROR** followed by the reason for the failure. For example:

!ERROR No such trigger

JOBSAVE [-slot=]n

Save job to slot *n.*

JOBLOAD [-slot=n][-r]

Load job from slot *n*.

-r = Start inspections.

JOBDELETE [-slot=n]

Delete job in slot *n.*

JOBINFO [[-slot=]n][-v]

Get job summary or info about slot *n*.

-v = Verbose. This option shows the amount of space that would be freed if the job were deleted. It also lists the total disk space and free disk space.

JOBBOOT {-slot=n}

Set bootup job slot *n.*

JOBDOWNLOAD [-transfer=]{YMODEM}

Download .avz job packaged via transfer method.

JOBDELETE -all

Delete all jobs in job slots.

Important: Does not delete the current job loaded in camera memory.

GET SYSTEM.JOBSLOT

Retrieve the slot of the current job. Note that the current job in the camera can be loaded from a job slot or the PC. If it isn't loaded from a job slot then this command will return **-1**.

APPENDIX E

Vision MINI Diagnostic Boot Mode

This section describes the Vision MINI's Diagnostic Boot Mode.

Diagnostic Boot Mode

The Vision MINI supports a special boot mode used for diagnostics and recovery. There are two ways in which the camera can be put into this mode:

1. This method requires an Ethernet connection between the host PC and Vision MINI. Power-on the unit and hold down the AutoVISION button until the green flash illuminates once. The unit is now configured for IP address 192.168.188.10 with subnet mask 255.255.255.0. Establish a telnet connection between the host PC and Vision MINI. The [SAFE-KERNEL] prompt is displayed.

2. This method requires a serial connection between the host PC running a terminal emulator and Vision MINI camera. Power-on the unit and hold down the Tab key for several seconds. The unit will boot to a [SAFE-KERNEL] prompt with communication settings of 115200, N, 8, 1 (baud, parity, data bits, stop bits).

Once the unit is booted, there are many possible actions the user can take. However, the most useful actions are listed below.

In rare situations, the boot job executed at camera startup can cause unexpected behavior. If this is the suspected case, it is possible to disable loading and running of the boot job at startup using the following command.

[SAFE-KERNEL] BP_UpdateStartupOptions(0, 0)

Note that the loading and running of the boot job is automatically re-enabled the next time a job is saved to camera flash from AutoVISION or FrontRunner.

At boot time, the system configures itself using a set of information known as boot parameters. To obtain a list of the current configuration's boot parameters, issue the following command.

[SAFE-KERNEL] BP_Dump()

Should your device need to be configured with different IP information, follow the example below and substitute the appropriate settings for IP address, subnet mask, and gateway address, respectively.

[SAFE-KERNEL] BP_UpdateIP("192.168.188.10", "255.255.255.0", "192.168.188.1")

It is possible to configure the system to acquire its IP address via DHCP or to use a static IP address. Issue the following command with a ‘0’ for static IP or a ‘1’ for DHCP.

[SAFE-KERNEL] BP_UpdateDHCP(0)

APPENDIX F

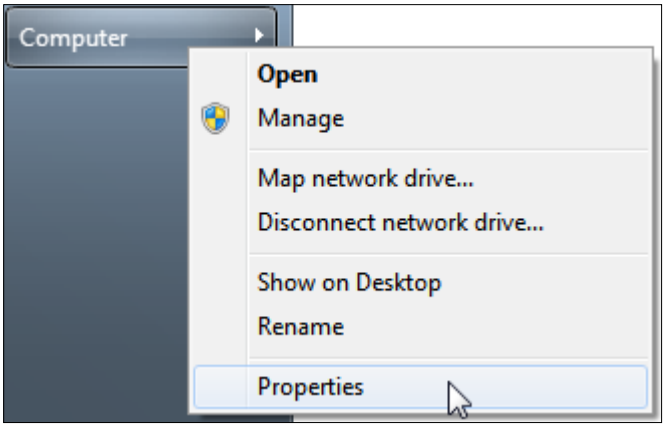
USB Power Management

When your PC enters “sleep mode”, the USB ports may shut down and the camera may be disconnected. This section describes how to keep your PC’s USB ports active if the PC enters sleep mode or other low-power modes.

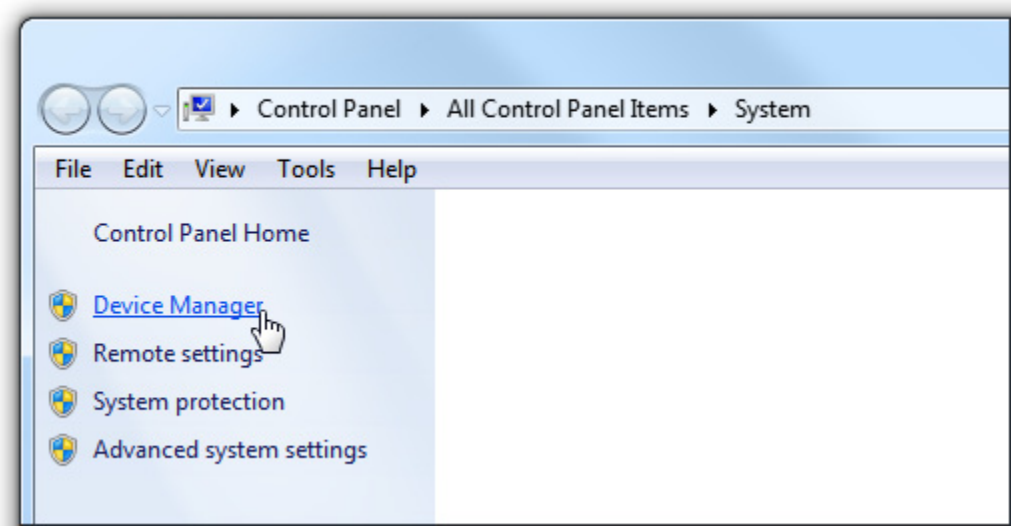
USB Root Hub Power Management

Perform the following procedure to ensure that your PC does not shut down the USB connection to your Vision MINI.

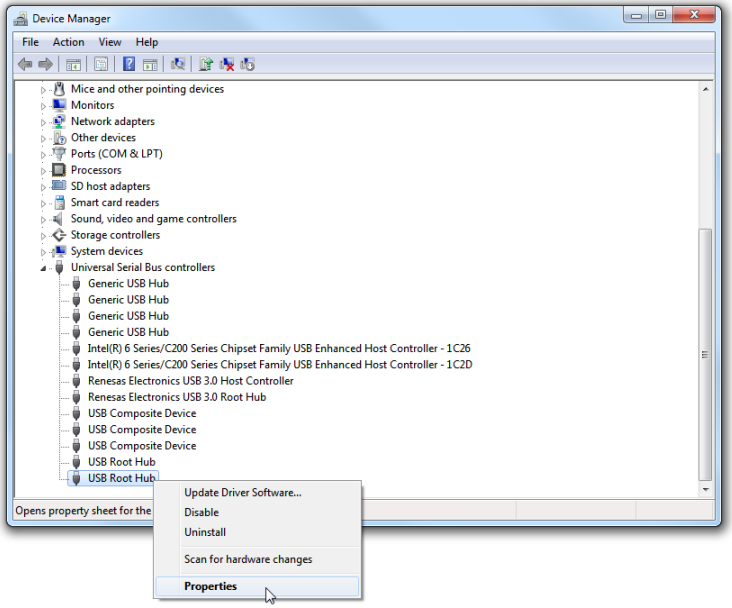
1. From the Windows **Start** menu, right-click on **Computer** and select **Properties**.



2. Select **Device Manager** from the options at the left side of the screen.



3. In the Device Manager, locate and expand the **Universal Serial Bus controllers** item. Right-click on **USB Root Hub** and select **Properties**.



4. In the **USB Root Hub Properties** dialog, select the **Power Management** tab. Un-check the box next to **Allow the computer to turn off this device to save power**. Repeat steps **3** and **4** for each **USB Root Hub** item in the **Universal Serial Bus controllers** list.