OMRON
MICROSCAN

Vision MINI Smart Camera Guide

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MKO-QuadrusMINI

Korean Radio Regulations (KC Mark)

The Vision MINI has been registered under Clause 3, Article 58-2 of the Radio Waves Act.

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Key milestones for the transition plan are as follows:

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

Omron Microscan will mark the products with the ‘CE’ marking that complies with the RoHS2 process to acquire ‘CE’ certification per the example given: Example >> Machinery directive + EMC directive + RoHS2 = Declaration of Conformity

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PREFACE

Welcome

Purpose of This Manual

This manual contains detailed information about how to configure and operate 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.

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>

2

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	
97-000012-02	Power Supply, 90-254 VAC, 24VDC, USA/Euro Plug
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
61-000105-01	Host Cable, MS-Connect 210 to Host, stripped-to-9-pin

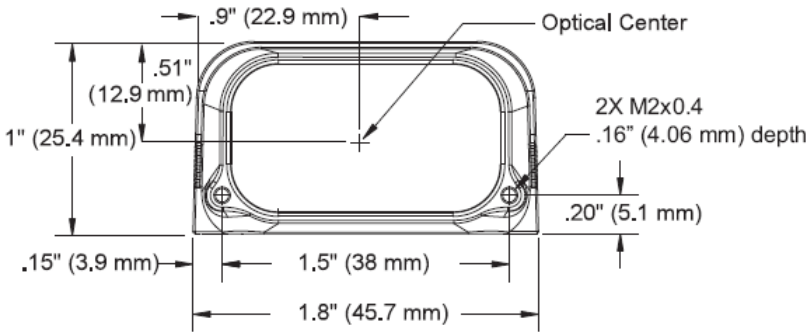
TABLE 2–1. Vision MINI Smart Camera Hardware Components (Continued)

Part Number	Description
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
Documentation	
37-000010-01	Omron Microscan Tools Drive (Software, User Manuals, Quick Start Guides, Configuration Guides, links to other documents on Omron Microscan website)

Front

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

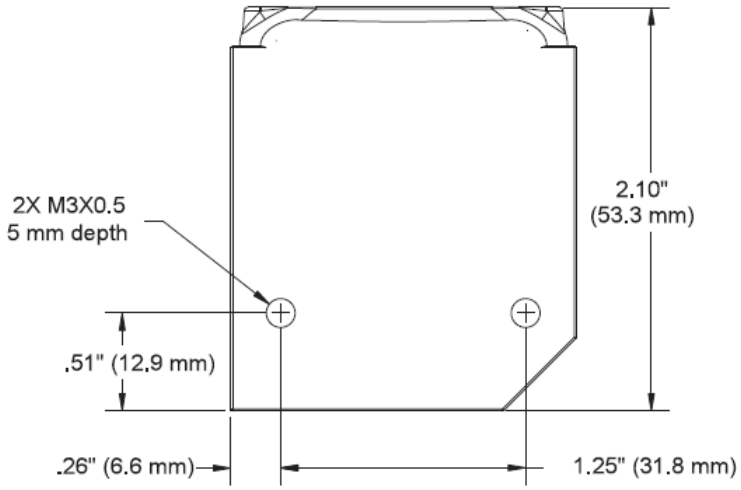
FIGURE 2–1. Front



Base

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

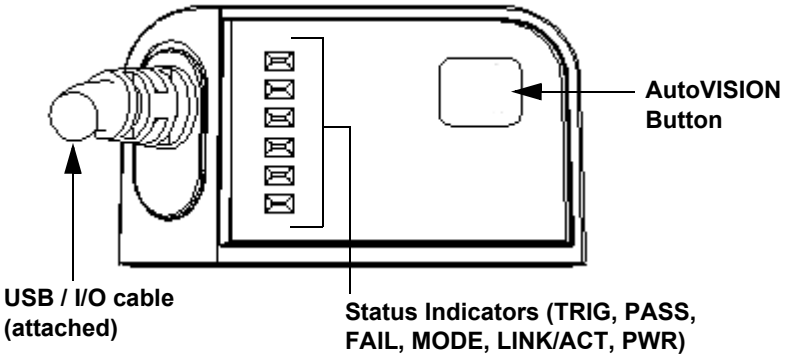
FIGURE 2–2. Base



Back

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

FIGURE 2–3. Back



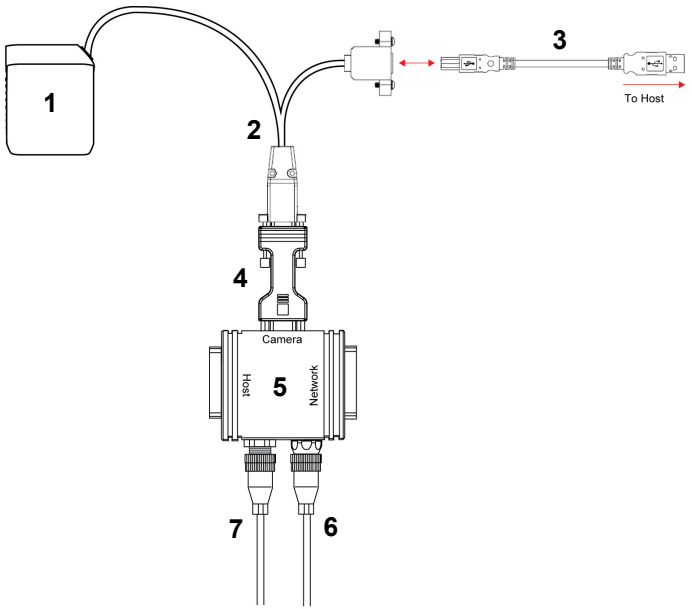
Important Label Information

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

- P/N – The Omron 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

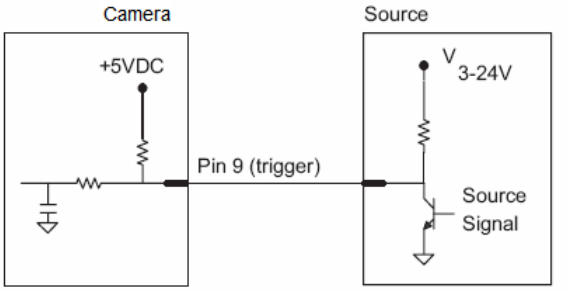
- Mount the camera (**1**) securely in its camera stand (not supplied).
- Make sure the camera (**1**) is mounted at the optimal distance of 2” to 6”.
- Mount the camera (**1**) as required by the application.
- Connect the USB side of the camera cable (**2**) to the USB host cable (**3**).
- Connect 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

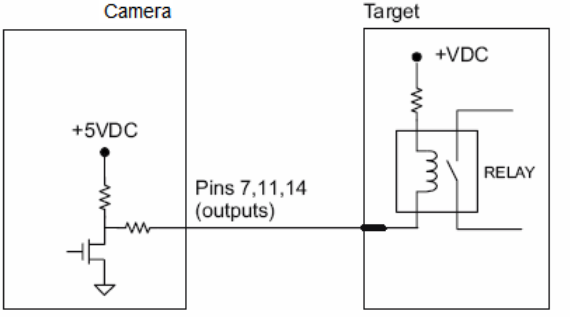
Trigger Input Example

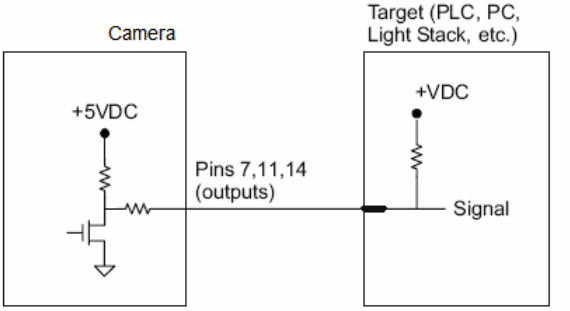
Trigger, New Master Inputs: 3 to 24V rated, 1mA @ 5VDC



Output Examples

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

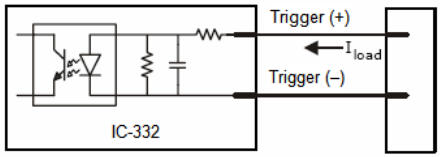




Isolated Trigger Input with IC-332

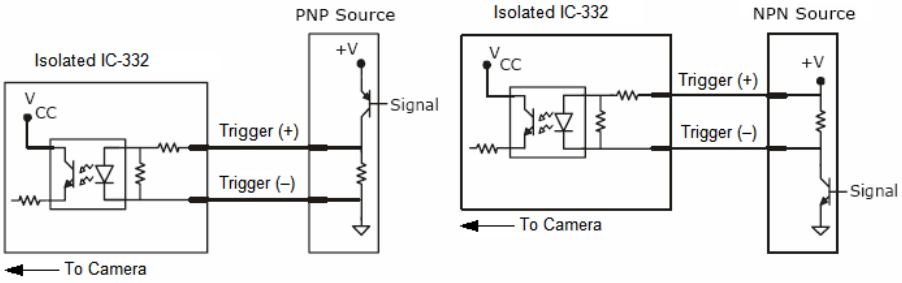
Trigger input can be fully electrically isolated from an NPN or PNP signal source.

	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	

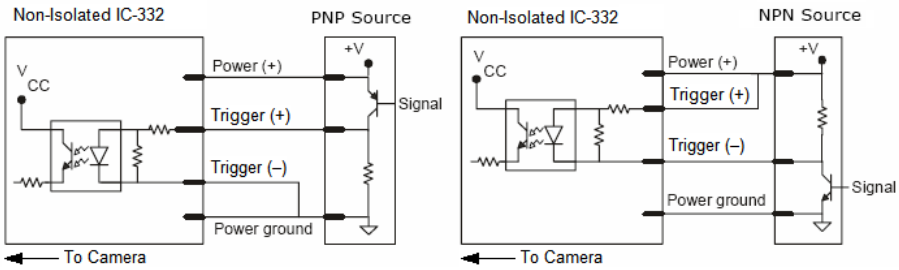


Input Examples

Fully Optoisolated



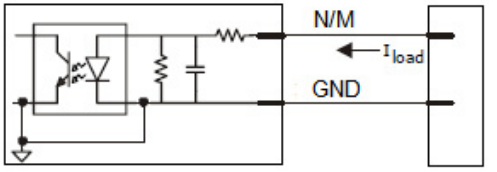
Not Optoisolated



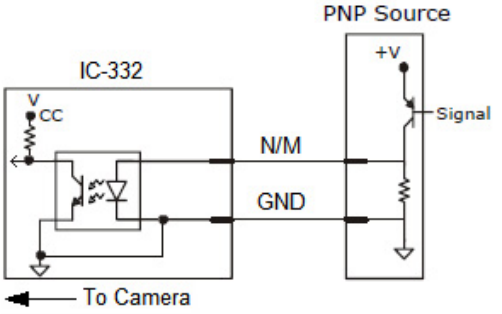
New Master Input with IC-332

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

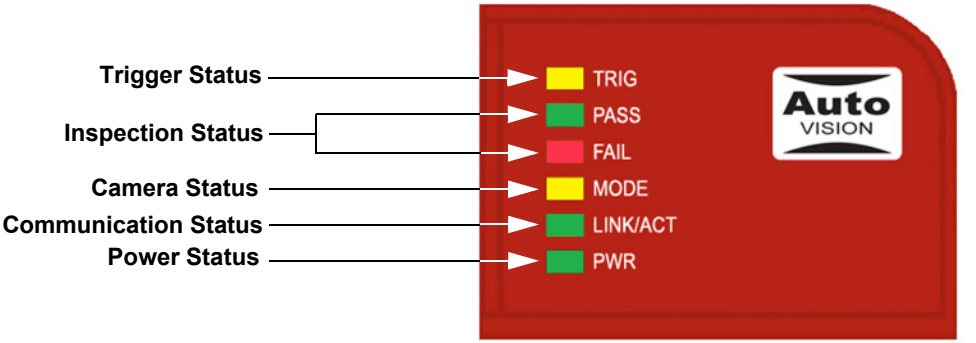
Refer to Table 2-3 when determining the power supply requirements for your camera.

TABLE 2–3. Camera Power Requirements

Vision MINI Sensor	5VDC
WVGA	400 mA @ 5 VDC (typ.), 4.0 watts max.
SXGA	465 mA @ 5 VDC (typ.), 4.5 watts max.
QXGA	400 mA @ 5 VDC (typ.), 4.2 watts max.
Optional	10-28 V with IC-332 accessory

Status Indicators

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



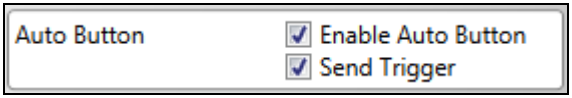
TRIG	**On Steady**	Continuous Trigger
	Off	Waiting for Trigger Event
	On Flashing	Trigger Event
PASS/FAIL	**On**	Active State
	Off	Inactive State
MODE	**On Steady**	Unit Ready
	Off	Unit Not Ready
LINK/ACT	**On Steady**	Link Established
	Off	No Link/Activity
	On Flashing	Link Established and Activity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

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 using a Standard Density Vision MINI with built-in lighting (red LEDs).

FIGURE 3–1. On-Axis – Semi-Specular Surface (Fine Matte Metal Ruler) at 2", Optical Axis of Camera Positioned at 90° from Image Plane

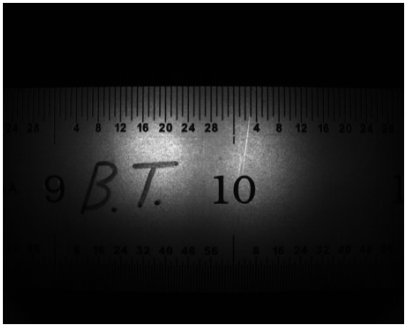
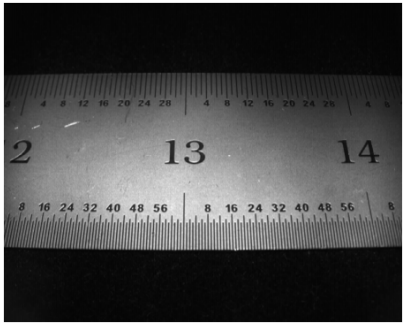


FIGURE 3–2. Off-Axis – Semi-Specular Surface (Fine Matte Metal Ruler) at 2", Optical Axis of Camera Positioned at 60° from Image Plane



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?

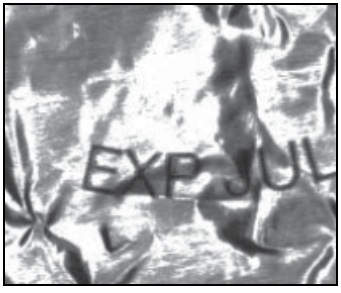
– Is the surface matte or shiny?

– Is the object curved or flat?

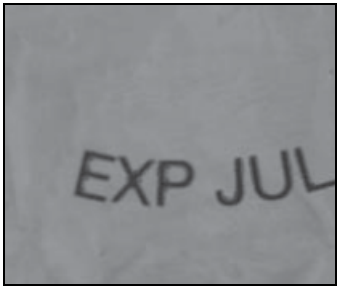
– What is the color of the object or area being inspected?

– 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

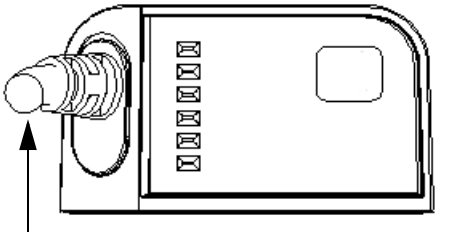
This section contains information about the Vision MINI Smart Camera's USB and I/O connectors.

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	
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	Learn (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

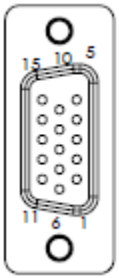
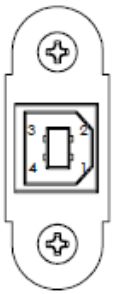


TABLE A–2. USB and I/O Cable Pin Assignments (USB Type B Socket)

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. Omron Microscan does not guarantee the performance or quality of cables provided by other suppliers.

TABLE B–1. Cable Part Numbers and Descriptions

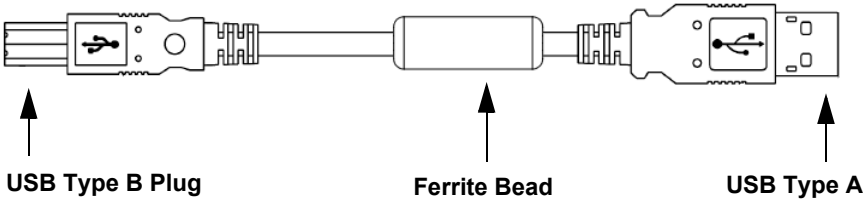
Part Number	Description
61-000105-01	Host Cable, MS-Connect 210 to Host, stripped-to-9-pin
61-000196-02	Cable, Vision MINI, USB / I/O (attached to camera)
61-000208-01	USB Type A to USB Type B Cable, 6’
61-300026-03	Communication Cable, DB25 Plug to DB9 Socket, 6’
97-000012-02	Power Supply, 90-254 VAC, 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

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

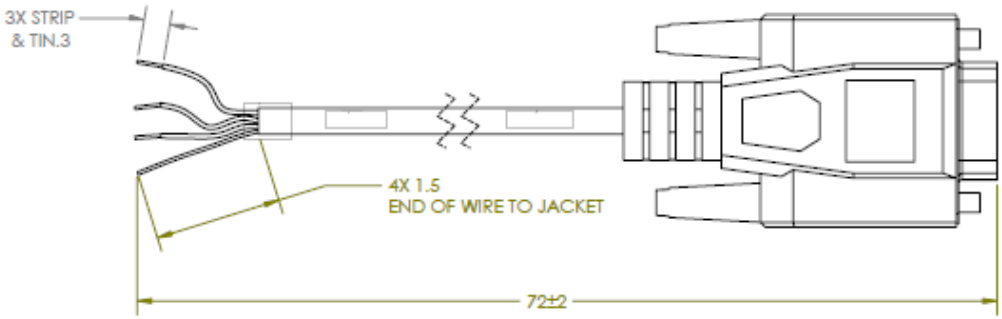


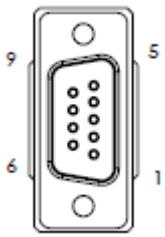
61-000105-01 Host Cable, MS-Connect 210 to Host, Stripped to 9-Pin Socket

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.

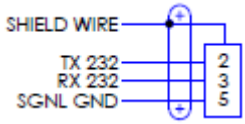
Figure B-2 shows the 61-000105-01 Host Cable, MS-Connect 210 to Host.

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

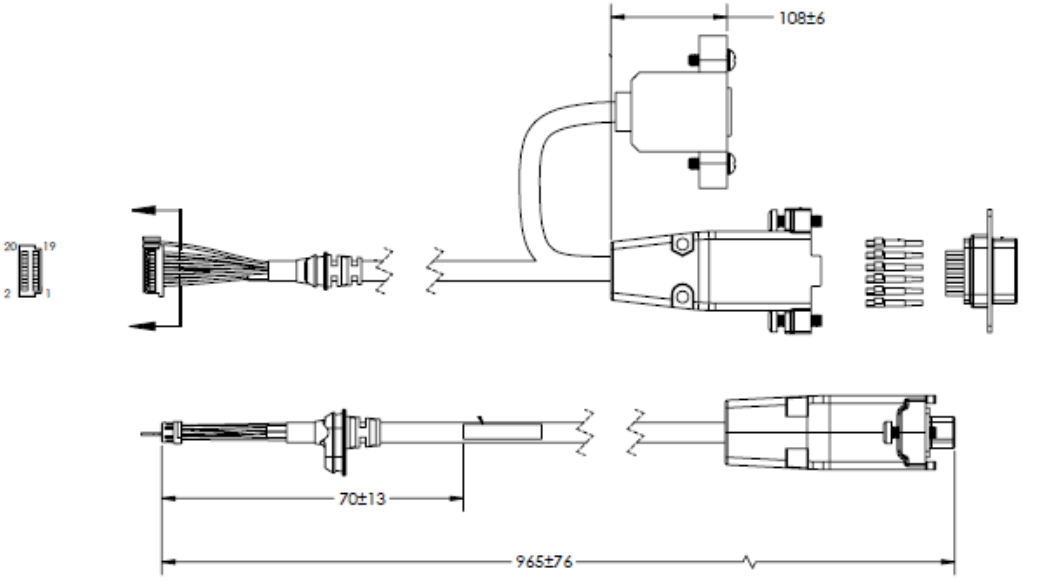
Pin	Function
2	TX 232
3	RX 232
5	Signal Ground

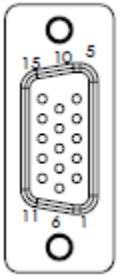
61-000196-02 Vision MINI USB / I/O Cable (Attached)

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.

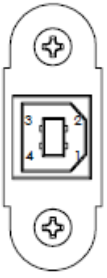
Figure B-3 shows the 61-000196-02 Vision MINI USB / I/O Cable.

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

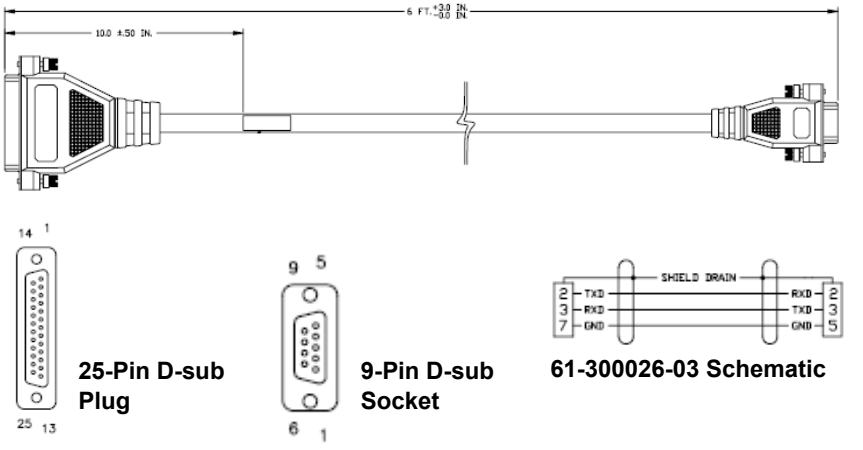


Table B-5 describes the signals for the 61-300026-03 Communication Cable, DB25 Plug.

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

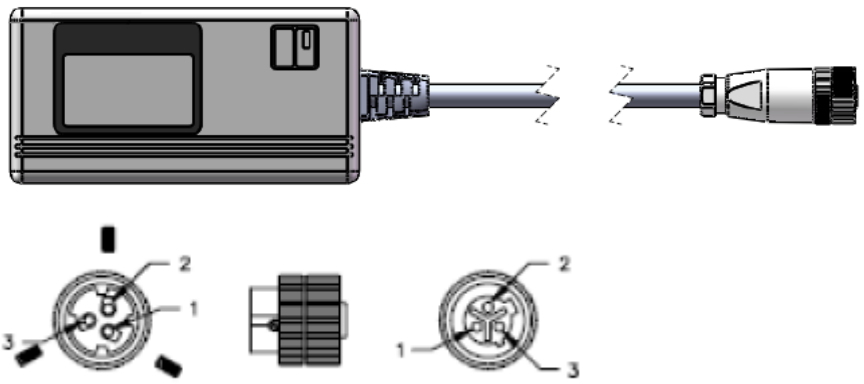
Pin	Function
2	RxD
3	TxD
5	Ground

97-000012-02 Power Supply, 90-254 VAC, 24VDC, USA/Euro Plug

The 97-000012-02 Power Supply, 90-254 VAC, 24VDC, USA/Euro Plug ends in a 3-pin connector and comes with both a U.S. and Euro plug.

Figure B-5 shows the 97-000012-02 Power Supply, 90-254 VAC, 24VDC, USA/Euro Plug.

FIGURE B–5. Power Supply, 90-254 VAC, 24VDC, USA/Euro Plug



3-Pin Micro-Change Connector

Table B-7 describes the signals for the 97-000012-02 Power Supply, 90-254 VAC, 24VDC, USA/Euro Plug.

TABLE B–7. Power Supply, 90-254 VAC, 24VDC, USA/Euro Plug Pin Assignments

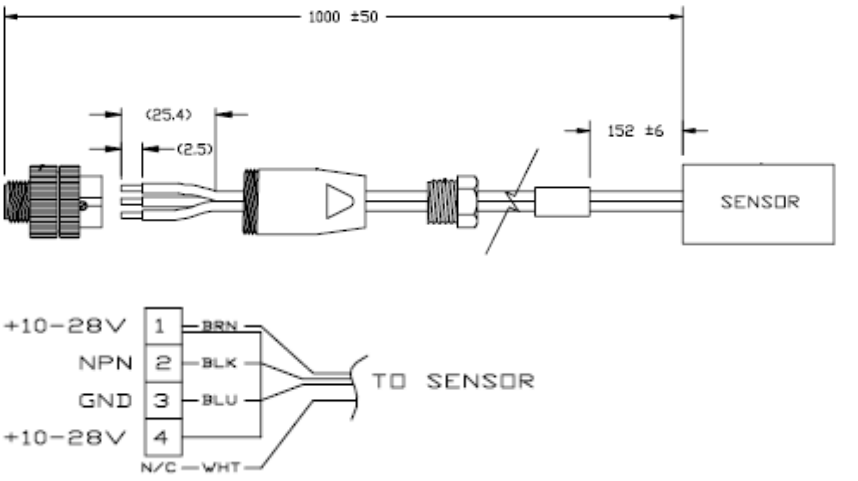
Pin	Function
1	Ground (Black)
2	Shield (Bare)
3	+24VDC (White)

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-6 shows the 99-000017-01 Photo Sensor, Visible, NPN, Dark On.

FIGURE B–6. Photo Sensor, Visible, NPN, Dark On



99-000017-01 Schematic

Table B-8 describes the signals for the 99-000017-01 Photo Sensor, Visible, NPN, Dark On.

TABLE B–8. Photo Sensor, Visible, NPN, Dark On Pin Assignments

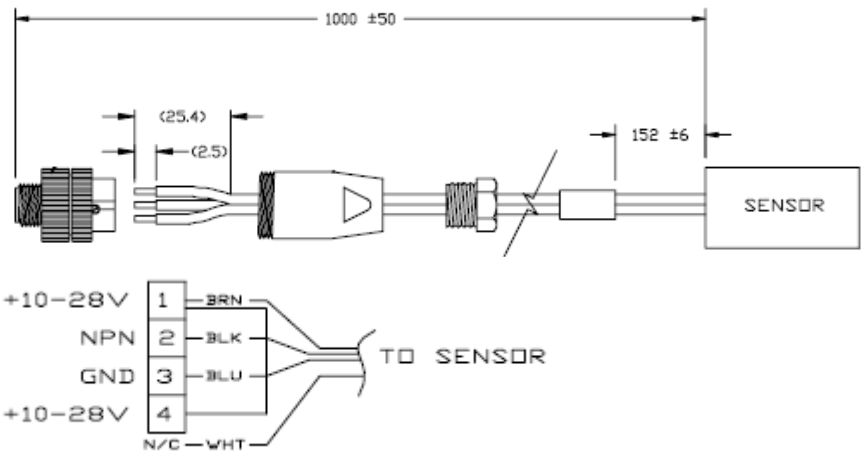
Pin	Function
1	+10-28V
2	NPN
3	Ground
4	+10-28V

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-7 shows the 99-000017-02 Photo Sensor, Visible, NPN, Light On, MS-Connect 210 Configuration.

FIGURE B–7. Photo Sensor, Visible, NPN, Light On, MS-Connect 210 Configuration



99-000017-02 Schematic

Table B-9 describes the signals for the 99-000017-02 Photo Sensor, Visible, NPN, Light On, MS-Connect 210 Configuration.

TABLE B–9. Photo Sensor, Visible, NPN, Light On, MS-Connect 210 Configuration Pin Assignments

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

Appendix B Cable Specifications

APPENDIX C

General Specifications

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

Vision MINI Smart Camera General Specifications

Physical Characteristics

P/N / Model	Lens Type	Dimensions	Weight	Connector
GMV-6300-2110G	Fixed Lens	1” (25.4 mm) x 1.80” (45.7 mm) x 2.10” (53.3 mm)	2 oz. (57 g)	3 ft. cable terminated with high density 15-pin D-sub socket connector and USB Type B socket connector
GMV-6300-2112G				
GMV-6300-2210G				
GMV-6300-2212G				
GMV-6300-2172G				
GMV-6300-2272G				
GMV-6300-2100G				
GMV-6300-2102G				
GMV-6300-2200G				
GMV-6300-2202G				
GMV-6300-2104G				
GMV-6300-2106G				
GMV-6300-2114G				
GMV-6300-2116G				
GMV-6300-2204G				
GMV-6300-2206G				
GMV-6300-2214G				
GMV-6300-2216G				

Optics

P/N / Model	Sensor	Shutter	Pixel Size	Focal Range	Image Acquisition
GMV-6300-2110G	1/2", SXGA (1280 x 1024) CMOS, up to 15 FPS, Mono	Software-adjustable, 10 µs to 16.7 ms; Rolling Shutter	5.2 um x 5.2 um	2 to 6" (50.8 mm to 152.4 mm – autofocus)	Progressive scan, square pixel
GMV-6300-2112G					
GMV-6300-2210G					
GMV-6300-2212G					
GMV-6300-2172G	1/2", QXGA (2048 x 1536) CMOS, up to 5 FPS, Color		3.2 um x 3.2 um		
GMV-6300-2272G					
GMV-6300-2100G	1/3", WVGA (752 x 480) CMOS, up to 60 FPS, Mono	Software-adjustable, 10 µs to 16.7 ms; Global Shutter	6.0 um x 6.0 um		
GMV-6300-2102G					
GMV-6300-2200G					
GMV-6300-2202G					
GMV-6300-2104G		Software-adjustable, 10 µs to 16.7 ms; Global Shutter			
GMV-6300-2106G					
GMV-6300-2114G	1/2", SXGA (1280 x 1024) CMOS, up to 15 FPS, Mono	Software-adjustable, 10 µs to 16.7 ms; Rolling Shutter	5.2 um x 5.2 um		
GMV-6300-2116G					
GMV-6300-2204G	1/3", WVGA (752 x 480) CMOS, up to 60 FPS, Mono	Software-adjustable, 10 µs to 16.7 ms; Global Shutter	6.0 um x 6.0 um		
GMV-6300-2206G					
GMV-6300-2214G	1/2", SXGA (1280 x 1024) CMOS, up to 15 FPS, Mono	Software-adjustable, 10 µs to 16.7 ms; Rolling Shutter	5.2 um x 5.2 um		
GMV-6300-2216G					

Communications, I/O, Illumination, Laser Output

P/N / Model	Comm.	Discrete I/O	Indicators	Illumination
GMV-6300-2110G	RS-232, USB 1.1 (Ethernet emulation mode driver available)	**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)	**LEDs:** Trigger, Pass, Fail, Mode, Power, Link/Act; **Green Flash:** Pass; **Blue V:** Target	Red @ 617nm
GMV-6300-2112G				
GMV-6300-2210G				
GMV-6300-2212G				
GMV-6300-2172G				White
GMV-6300-2272G				
GMV-6300-2100G				Red @ 617nm
GMV-6300-2102G				
GMV-6300-2200G				
GMV-6300-2202G				
GMV-6300-2104G				
GMV-6300-2106G				
GMV-6300-2114G				
GMV-6300-2116G				
GMV-6300-2204G				
GMV-6300-2206G				
GMV-6300-2214G				
GMV-6300-2216G				

Power

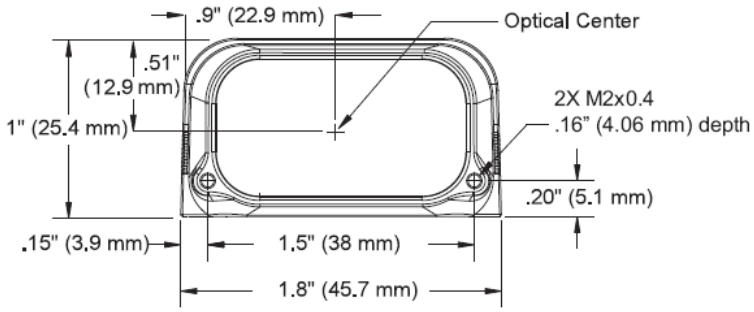
P/N / Model	Power
GMV-6300-2110G	5VDC +/– 5%, 200 mV p-p max. ripple, 465 mA @ 5VDC (typ.), 4.5 watts (max.)
GMV-6300-2112G	
GMV-6300-2210G	
GMV-6300-2212G	
GMV-6300-2172G	5VDC +/– 5%, 200 mV p-p max. ripple, 400 mA @ 5VDC (typ.), 4.2 watts (max.)
GMV-6300-2272G	
GMV-6300-2100G	5VDC +/– 5%, 200 mV p-p max. ripple, 400 mA @ 5VDC (typ.), 4.0 watts (max.)
GMV-6300-2102G	
GMV-6300-2200G	
GMV-6300-2202G	
GMV-6300-2104G	5VDC +/– 5%, 200 mV p-p max. ripple, 400 mA @ 5VDC (typ.), 4.0 watts (max.)
GMV-6300-2106G	
GMV-6300-2114G	5VDC +/– 5%, 200 mV p-p max. ripple, 465 mA @ 5VDC (typ.), 4.5 watts (max.)
GMV-6300-2116G	
GMV-6300-2204G	5VDC +/– 5%, 200 mV p-p max. ripple, 400 mA @ 5VDC (typ.), 4.0 watts (max.)
GMV-6300-2206G	
GMV-6300-2214G	5VDC +/– 5%, 200 mV p-p max. ripple, 465 mA @ 5VDC (typ.), 4.5 watts (max.)
GMV-6300-2216G	

Operating Environment; Agency Compliance

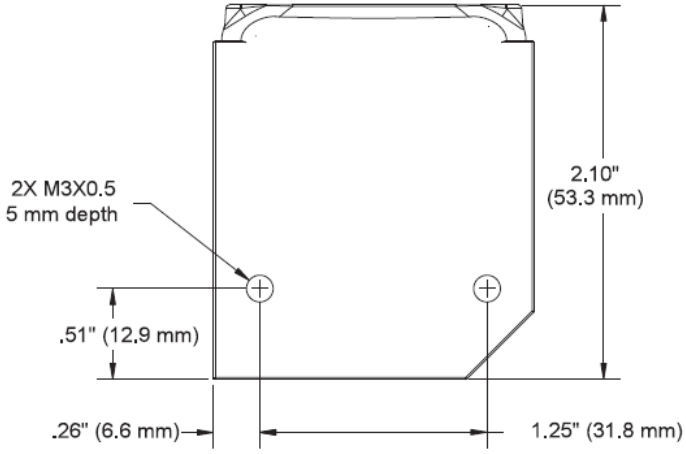
P/N / Model	Operating Temperature	Storage Temperature	Humidity	Enclosure	Agency Compliance
GMV-6300-2110G	0° to 40° C (32° to 104° F)	–50° to 75° C (–58° to 167° F)	Up to 90% (non-condensing)	IP54 (category 2)	**FCC, UL/cUL, CE (General Immunity for Light Industry:** EN 55024 ITE Immunity Standard; **Radiated and Conducted Emissions of ITE Equipment:** EN 55022 ITE Disturbances**)**, **CB**, **RoHS/WEEE**
GMV-6300-2112G					
GMV-6300-2210G					
GMV-6300-2212G					
GMV-6300-2172G					
GMV-6300-2272G					
GMV-6300-2100G					
GMV-6300-2102G					
GMV-6300-2200G					
GMV-6300-2202G					
GMV-6300-2104G					
GMV-6300-2106G					
GMV-6300-2114G					
GMV-6300-2116G					
GMV-6300-2204G					
GMV-6300-2206G					
GMV-6300-2214G					
GMV-6300-2216G					

Dimensions

Front



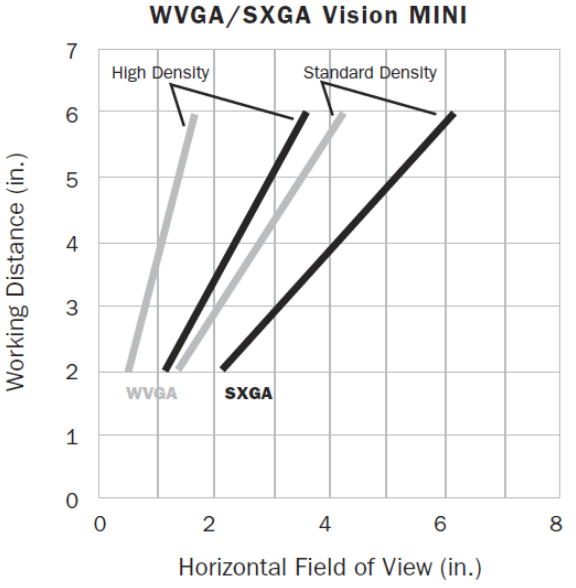
Base



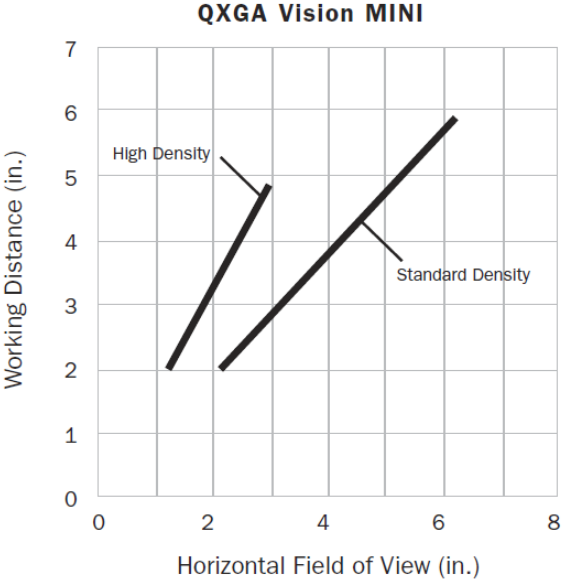
Note: Nominal dimensions shown. Typical tolerances apply.

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.

Serial Command Syntax

< > = Required argument. Replace appropriately.

For example:

-u <DB_User_name> becomes **-u av** where **av** replaces **DB_User_name**.

| = Mutually exclusive arguments. Choose one from the list.

{ } = Used with **|** to specify a list of choices for an argument.

[ ] = Optional parameter.

Important: Unless otherwise stated, commands will respond with **!OK** on success and **!ERROR** on failure.

GETIMAGE <-transfer=ymodem> [-format={jpg|png}] [-quality={0-100}] [-woi=left,top,right,bottom] [-inspection=n]

Initiates serial transfer of inspection image (RS-232 only).

Note: This command always returns the last (most recent) image.

-transfer=ymodem is currentlynot optional - only Ymodem protocol is supported.

-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.

Note: The PNG format provides lossless image compression. If **format** is set to **PNG**, the **quality** setting does not apply.

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.

-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.

The following example will retrieve an image from the camera with these settings: **Protocol:** ymodem; **Format:** png; **Quality:** N/A; **Inspection:** second inspection.

GETIMAGE –transfer=ymodem –format=png –inspection=2

The following example will retrieve an image from the camera with these settings: **Protocol:** ymodem; **Format:** jpg (default); **Quality:** 50; **Inspection:** first inspection (default).

GETIMAGE –transfer=ymodem –quality=50

ONLINE

Starts all inspections.

OFFLINE

Stops all inspections.

TRIGGER

Triggers an inspection.

vt [n]

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.

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.

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

For example:

!ERROR No such trigger

when the index specified '**n**' is out of range of virtual triggers.

REBOOT [-noload]

Reboots the device.

-noload = do not load BOOT job.

MEMAVAIL [-cp]

Returns available memory for device or coprocessor.

MEMCONTIG [-cp]

Returns maximum memory block for device or coprocessor.

MEMFRAGS [-cp]

Returns memory fragments for device or coprocessor.

MEMINFO [-cp] [-v]

Returns memory summary "avail/contig/frags" for device or coprocessor. Verbose.

VERSION

Returns Visionscape software version.

JOBSAVE [-slot=]<n>

Saves current job to slot ***n***.

JOBDELETE {[-slot=]n|-all}

Deletes job in slot ***n***, or all jobs if **-all**.

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

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

Gets job summary or info about slot ***n***.

JOBINFO with no arguments returns a list of all jobs on the device.

-v = Verbose ***n***. 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>

Sets bootup job slot ***n*** (RS-232 only).

JOBDOWNLOAD <-transfer={ymodem|ftp}> [-size=value] [-c]

Downloads a **.avz** job file via the specified transfer method (ymodem supported only over RS-232; FTP supported only over network connection).

The **ymodem transfer method** only requires that the user send the .avz file via the ymodem protocol over RS-232, and the job will load automatically after the transfer is complete.

The **FTP transfer method** requires the user to perform the following steps to load the job:

1. **JOBDOWNLOAD: -transfer=ftp [-size=avpsizeinbytes]**
2. User FTPs the job to /streamd0
3. **JOBLOAD: -mem -r**

Step 1: Pre-creates a fixed-size /streamd0 RAMdisk to receive the .avz over FTP. If size is omitted, the default RAM disk size is used to create /streamd0. The size of /streamd0 is limited to (available contiguous RAM – minimum target contiguous RAM) / 2.

Camera Model	*Default RAM Disk Size*	*Minimum Target Continuous RAM*
Vision MINI	5 MB	7 MB

Step 3: Loads .avz from /streamd0 into RAM, deletes the RAMDisk /streamd0, and optionally starts the job (if -r is specified).

JOBLOAD {[-slot=]<n>|-mem} [-r]

Loads a job from slot *n* or from memory when used with the JOBDOWNLOAD command via FTP.

-r = Start inspections.

SET <tagname> <value>

Sets value of a global tag.

The tagname must correspond to one of the supported tags within the device. Use the **INFO** command to get a full list of tags and services, as well as attributes of the tag and list of subtags.

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

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

For example:

!ERROR Tag matchstring66 not found

GET {tagname|service|service.tagname}

Gets value of a global tag.

The tagname must correspond to one of the supported tags within the device. Use the **INFO** command to get a full list of tags and services, as well as attributes of the tag and list of subtags.

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|service.tagname|service}** 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 [tagname|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. **INFO avp/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.

QUERYAUTOCAL

Returns photometry settings: Gain, Exposure, and Focus.

AUTOCAL

Performs automatic calibration of photometry settings: Gain, Exposure, and Focus.

TARGET {0|1|off|on}

Turns targeting LEDs On or Off.

target 1 = Turn Target On

target 0 = Turn Target Off

CHECKSUM {BOOT | KERNEL | BOOTPARAM}

Gets a checksum on an individual part of the system.

HELP

Returns a list of all serial commands showing correct syntax and functionality descriptions.

APPENDIX E

Vision MINI Diagnostic Boot Mode

This section describes the Vision MINI's Diagnostic Boot Mode and other boot parameters.

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)

Additional Boot Parameters

BP_UpdateCameraName(cameraName)

where **cameraName** is a double-quoted string representing the new camera name.

Function: Allows you to change the name of the smart camera.

BP_UpdateLaserOn(state)

where **state** = **0** or **1**

Function: Allows you to disable or enable the state of the targeting laser during image acquisition. The actual display of the targeting laser is a logical AND of job settings with this parameter. Note that when the laser is disabled it is still possible to turn the laser on when a job is not running by issuing the serial command **target 1** (Turn Target On).

BP_UpdateGreenFlash(state)

where **state** = **0** or **1**

Function: Allows you to disable the flash-on-pass feature to eliminate green flash interference during color image processing.

APPENDIX F

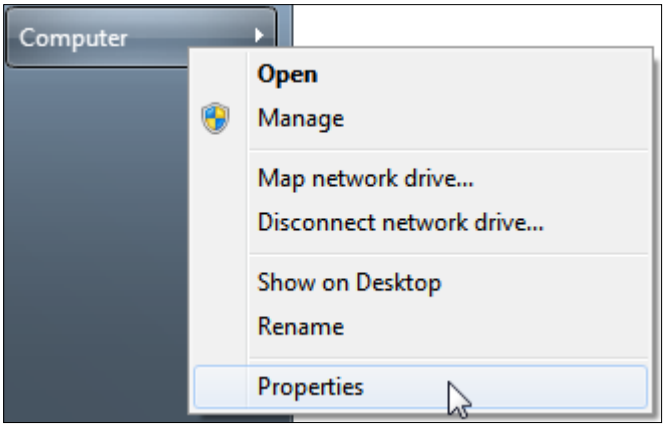
USB Power Management

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.

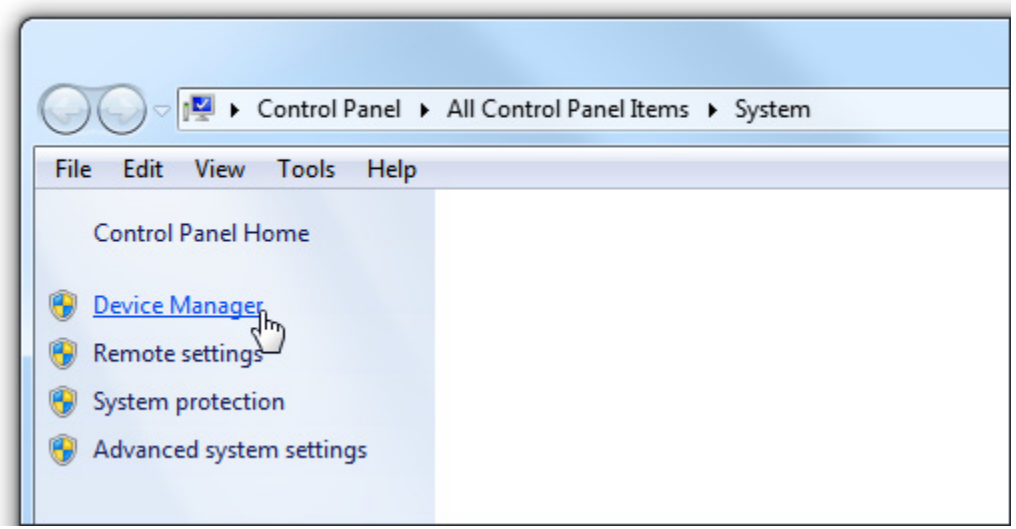
USB Root Hub Power Management

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

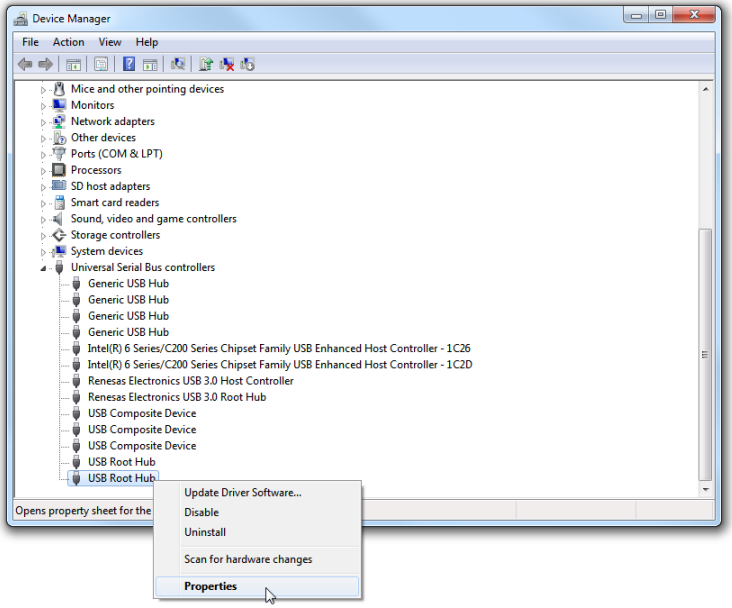
1. From the Windows **Start** menu, right-click on **Computer** and select **Properties**.



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.