

Max300 Manual

Rev 1

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Overview

Based on JFT's Intellipixel Architecture, Max300 is a high end yet most cost effect camera system in the industry. Equipped with top performance CMOS image sensor, powerful CPU + FPGA and flexible I/O's, Max300 is suitable to handle the most demanding image capturing and real-time processing applications.

Typical Applications

- Motion Capturing for Biomechanical Analysis and Animation
- Virtual Reality, Immersive Training and Simulation
- Machine Vision and Automation
- Centroid Detection and Projectile Tracking that require the highest tracking accuracy and speed
- Vehicle or Ship Mount
- High speed video and slow-motion Analysis
- Sports and medical

Key Camera Specs

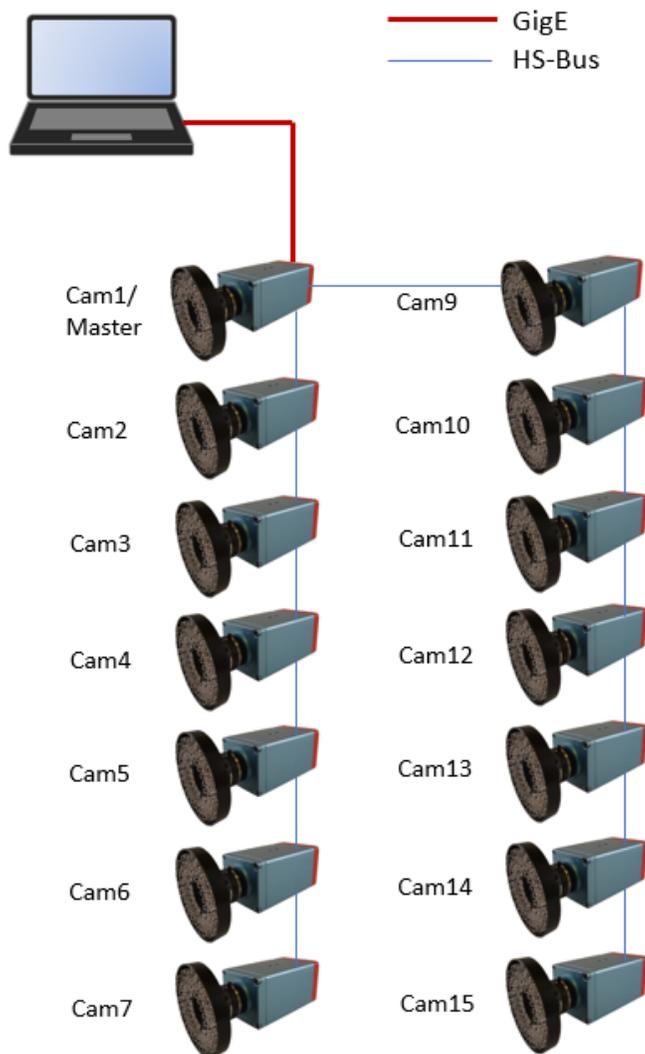
- Basic network consists of 1-14 cameras with global timing and genlocking
- Multiple basic networks can be joined to form a larger capturing system with up to 224 cameras
- 2048x1088 native resolution, 65536 x 34816 sub-pixel resolution
- 10-320 FPS at full resolution
- With 2:1 and 4:1 row skipping, support 600 FPS and 1200FPS with the same FOV
- Support both area and line scan mode
- 20000 FPS with 16 scan rows

- Support multi-camera interleaving with increased effective frame rate. N x 320 FPS at full resolution with N camera interleaving
- Support embedded in line gen-locking and SYNC offset among cameras. A camera can be configured as either SYNC master or SYNC slave
- 1 to 256 markers. Real time marker detection, extraction and streaming
- 0.02 mRad object, marker or light tracking accuracy (at 36° FOV)
- Marker information includes timing, centroid, size and intensity plus other customer specified info.
- Software controllable gain, exposure, frame rate and threshold
- Uncompressed digital image can be streamed through Ethernet or HDMI with variable resolutions such as 1080P
- Single cable connection. Cameras are daisy chained by RJ45 cable with inline power. Cable length up to 250 feet
- Enhanced NIR performance. Working spectral response 380 ~ 980nm
- NIR illuminator synchronized to shutter exposure for best motion capturing performance
- True synchronous global shutter to eliminate image blurring and distortion
- Sub 0.01 lux light sensitivity (F1.4 lens without IR illuminator)
- During motion capturing, each camera can simultaneously record high speed video while streaming out marker information
- 1GB internal DDR3 memory
- Optional SnapFilter allows the user to select the wavelength of interest by software controlled filter mover
- Sun light and background suppression allow the system to be used for both indoor and outdoor applications
- GigaBit Ethernet connection from Master Camera to host PC
- Trigger In and Trigger Out support for precise user controlled motion capturing
- Sync In and Sync Out ports can be used to join multiple basic camera networks for scalability
- Image sensor size : 2/ 3"
- Power Input : 15V-50V. Inrush current < 0.5A, operating current < 0.3A (at 15V)
- Operating Temperature Range: -20°C ~ 50°C
- Camera mount: Standard tripod mounts, two on the top, two on the bottom, 1/4 - 20 UNC
- Latency (event to processed output): < 1 frame time

System Connection

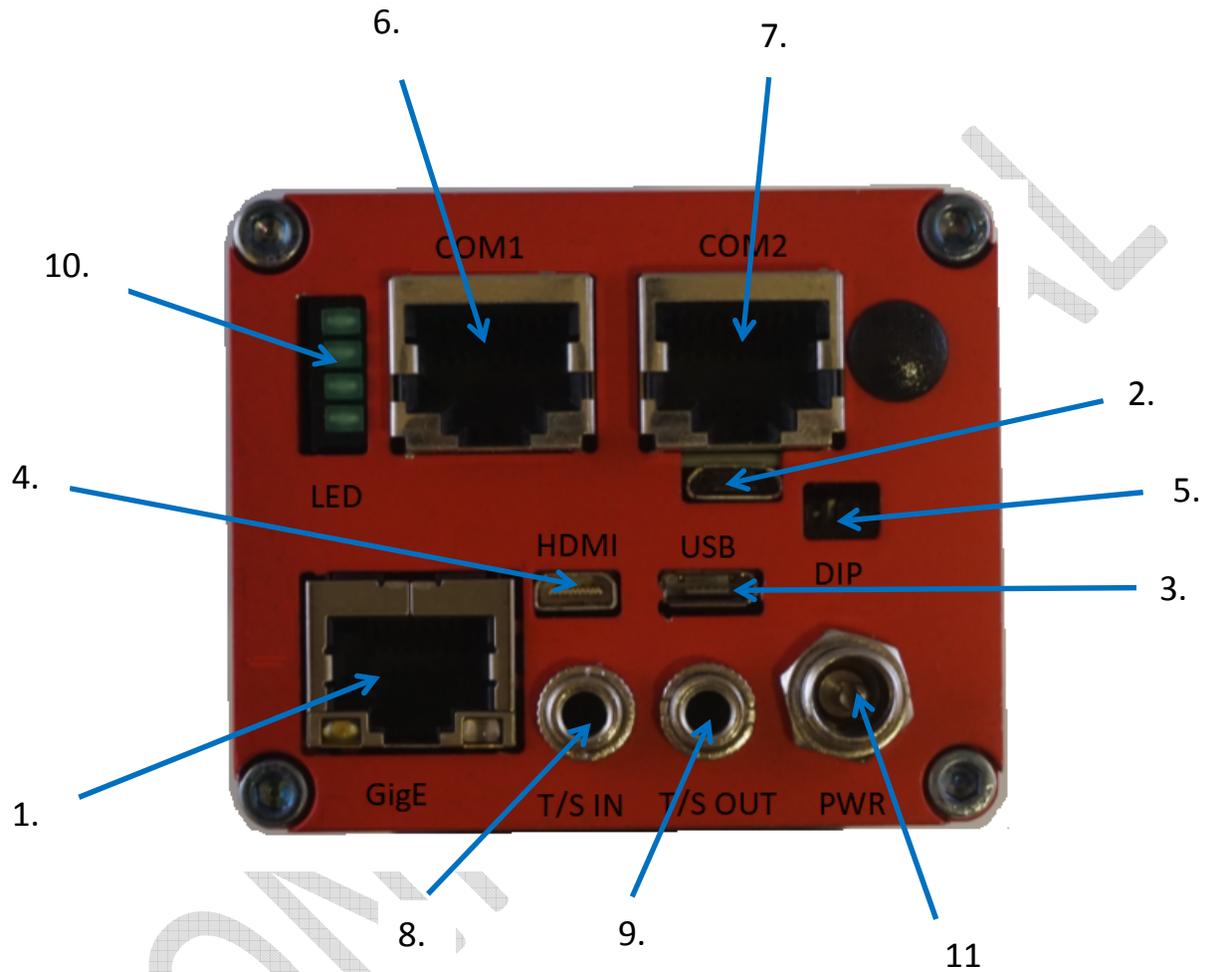
A Basic Network consists of 1-14 cameras. Camera 1 is also the master camera, which serves as the bridge between PC and all cameras.

Figure 1. Interconnecting Host PC, Master Camera and DS (Daisy Chain) Cameras



Both GigE and HS-BUS use standard RJ45 cross over cables. Please note that the power to all the DS cameras are provided in line through RJ45 Cables. If a router is used, the connection between PC to router and router to master camera will use standard RJ45 straight through cables. For basic network with less than 4 cameras, POE can supply power to master and DS camera, otherwise, an external power adaptor will have to be used.

Master Camera I/O Description:

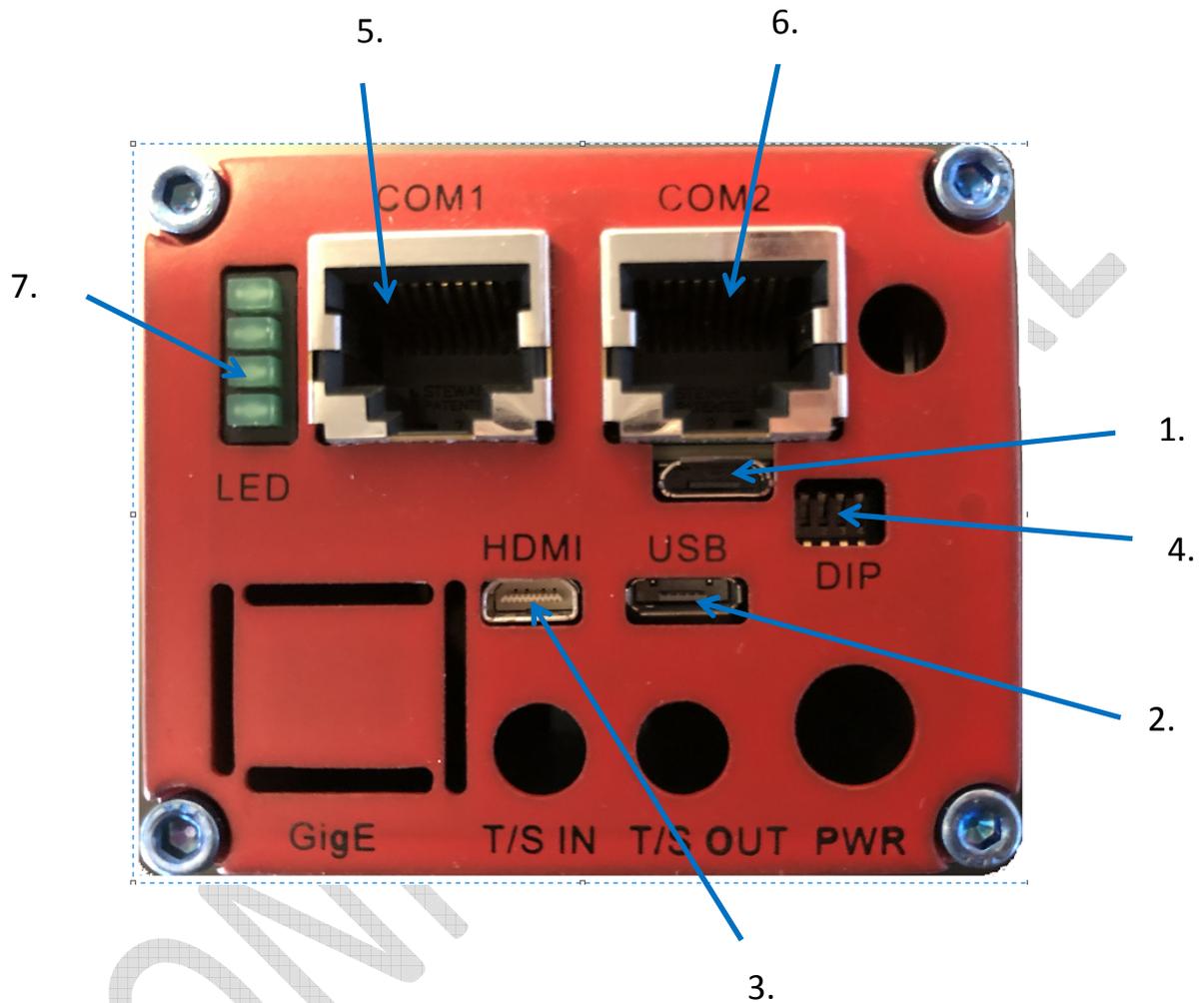


1. GigaBit Ethernet Port with POE
2. USB Serial
3. USB 2.0 (Optional)
4. HDMI output
5. External Accessible DIP Switch to set the operation mode

6. HS-BUS for DS cameras 2-7
7. HS-BUS for DS cameras 9015
8. Trigger In and Sync In to control capturing start stop and for multi-network gen-locking
9. Trigger Out and Sync Out to control start stop of peripheral devices and for multi-network gen-locking
10. LED Indicator
11. Power input, 15VDC ~ 50VDC

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DS Camera I/O Description:



1. USB Serial
2. USB 2.0 (Optional)
3. HDMI output
4. External Accessible DIP Switch to set the operation mode
5. HS-BUS for upstream camera connection
6. HS-BUS for downstream camera connection
7. LED Indicator

HS-BUS Connector Pinout (At Camera Side):

Pin Number (RJ45)	Signal Name	Type	Definition
1	TX_P	Output	HS-BUS TX+
2	TX_N	Output	HS-BUS TX-
3	RX_P	Input	HS-BUS RX+
4	POWER	Power In/Out	DC power, 15V-50V
5	POWER	Power In/Out	DC power, 15V-50V
6	RX_N	Input	HS-BUS RX-
7	GND	Ground	Ground
8	GND	Ground	Ground

Status LED

Number	Position	Name	Description
1	Top	EVENT_EN	Event detect is enabled when lit.
2	2 nd to the top	FRM_CNT	This LED flashes at a frequency that is frame rate divided by 64
3	3 rd to the top	nBG_SUPPRESSION	Lit for normal operation, dim when background suppression is enabled
4	Bottom	EVENT_DET	Flash on when event(s) is detected

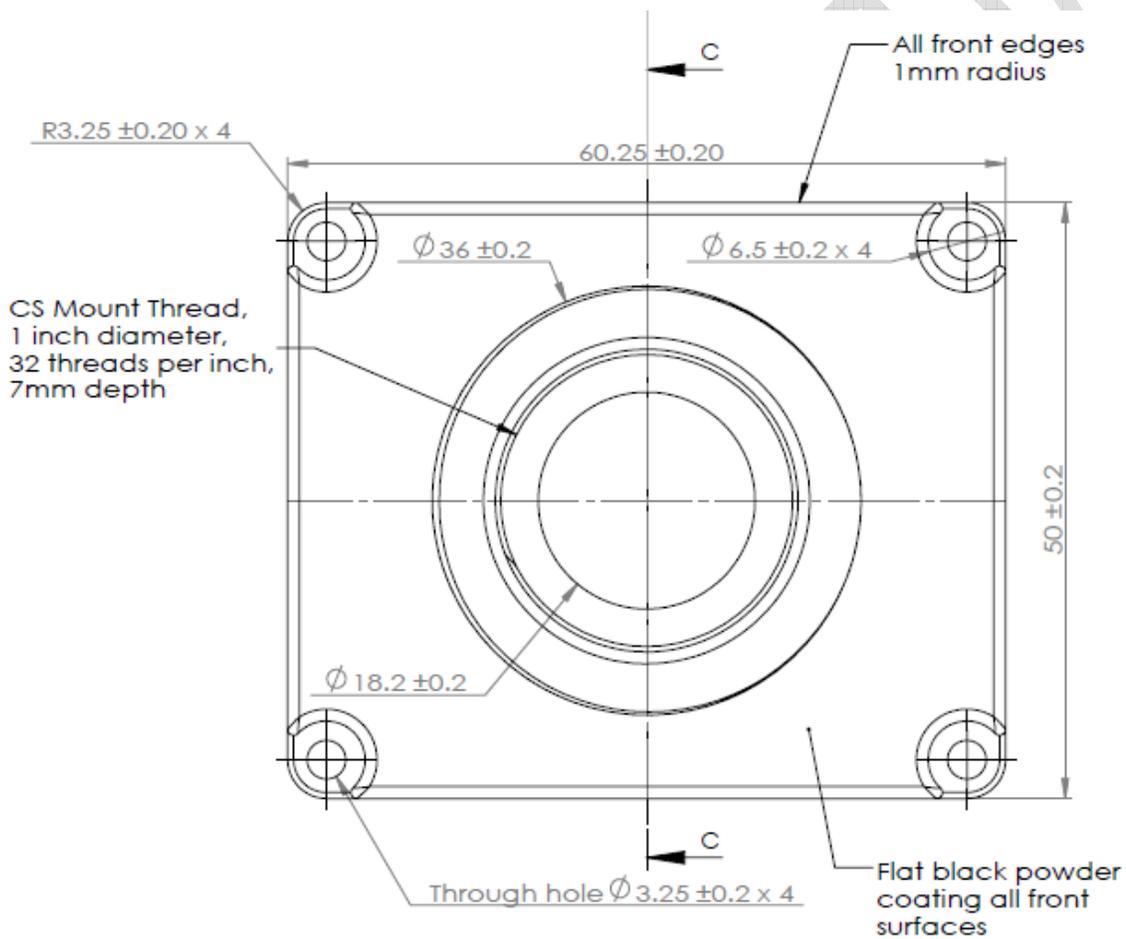
Functions Supported by Software API

Commands	Comments
<i>Read Register and Memory of Master Camera</i>	
<i>Read Register and Memory of DS Camera</i>	
<i>Write Register and Memory of Master Camera</i>	
<i>Write Register and Memory of DS Camera</i>	
<i>Init</i>	<i>Initialize cameras in the network and achieve gen-locking</i>
<i>Read Version Number of Selected Camera(s)</i>	
<i>Set a Selected Camera to Stream Frame Data</i>	
<i>Set All or Selected Cameras to Stream Processed Data</i>	
<i>Clear Local Timers of Selected Cameras</i>	
<i>Enable Local Timers of Selected Cameras</i>	<i>The timer is used to time tag processed image data</i>
<i>Assign Cameras to be Active</i>	<i>Inactive Cameras do not Stream Data or Respond to Host Command</i>
<i>Check Camera Presence and Sync Status</i>	
<i>Get the Number of Cameras Connected</i>	
<i>Get Exposure Time of Selected Camera(s)</i>	
<i>Set Exposure Time of Selected Camera(s)</i>	
<i>Get Frame Rate of Selected Camera(s)</i>	
<i>Set Frame Rate of Selected Camera(s)</i>	
<i>Set Max Frame Rate of Selected Camera(s)</i>	<i>Set maximum frame rate at the current resolution</i>

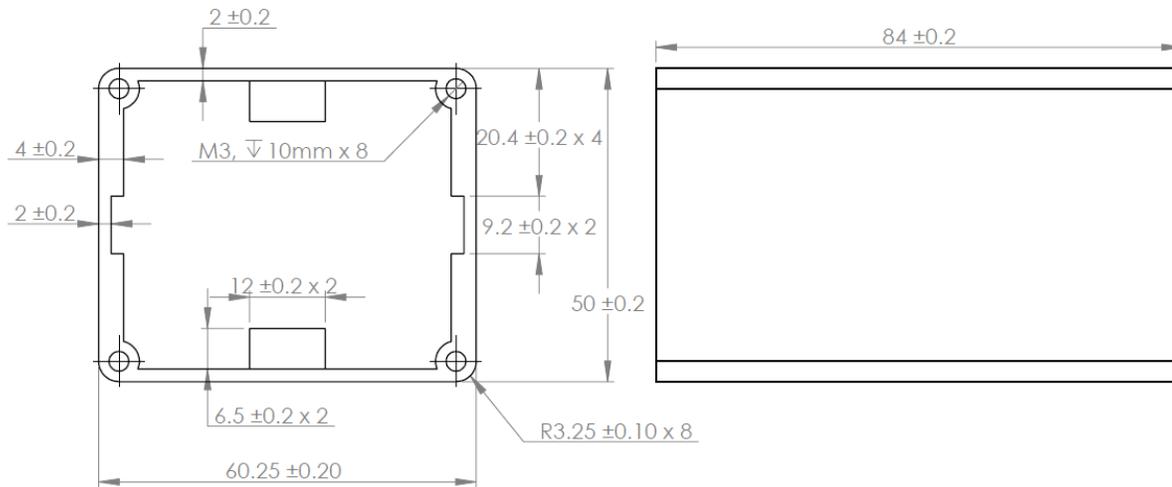
<i>Get Gain of Selected Camera(s)</i>	
<i>Set Gain of Selected Camera(s)</i>	
<i>Get Threshold of Selected Camera(s)</i>	
<i>Set Threshold of Selected Camera(s)</i>	
<i>Set Threshold Type</i>	<i>E.g., white detection, black detection, delta detection</i>
<i>Set Spot Separation Get</i>	<i>Define the pixel separation to be considered as two spots</i>
<i>Set Minimum Spot Size</i>	<i>Define the minimum size of an object that will be detected</i>
<i>Get Filter Position of Selected Camera(s)</i>	
<i>Set Filter Position of Selected Camera(s)</i>	
<i>Enable External Trigger</i>	<i>Allows starting and stopping capturing and/or video recording with external trigger button</i>
<i>Start/Stop Triggering</i>	<i>Software controlled start and stop without external button</i>
<i>Disable External Trigger</i>	
<i>Enable Video Recording of Selected Camera(s)</i>	<i>Allow a given camera to record high speed video into internal memory storage</i>
<i>Start Video Recording of Selected Camera(s)</i>	
<i>Stop Video Recording of Selected Camera(s)</i>	
<i>Get the Size of Frame Storage</i>	<i>In number of frames based on the current resolution setting. The frame storage is circular</i>
<i>Set the Size of Frame Storage</i>	
<i>Get the Position of the Last Frame when Video</i>	

<i>Recording is Stopped</i>	
<i>Play Back Recorded Video</i>	<i>Through Ethernet, HDMI, HS-BUS</i>
<i>Play Back Selected Frame(s)</i>	
<i>Background Filtering</i>	<i>Eliminate unwanted background scenes and lights. Useful for outdoor operation and ultra-low signal detection</i>
<i>Image Inversion</i>	
<i>Image X and/or Y Flip</i>	
<i>Set Sensor Resolution</i>	
<i>Set Row Skipping</i>	
<i>Set Video Record X Subsampling</i>	<i>This does not change the sensor output. It only affects the recording format to increase the effective recording time</i>
<i>Set Video Record Y Subsampling</i>	<i>This does not change the sensor output. It only affects the recording format to increase the effective recording time</i>
<i>Enable Image Processing with Subsampled Data</i>	<i>The default is to process every line and every pixel from sensor output</i>
<i>2:1 Image Playback Scaling Enable</i>	<i>Only applies to Ethernet and HS-Bus video streaming. Used to accommodate PC's with lower screen resolution</i>
<i>Read Camera Internal Temperature</i>	
<i>Read Operating Voltages</i>	<i>For trouble shoot purpose</i>
<i>Reset Camera</i>	
<i>Set Internal Image Pattern Generation</i>	<i>For testing purpose</i>

Set SYNC Offset to Allow Camera Interleaving	To increase the effective combined frame rate of a camera network
Disable Gen-locking for Selected Camera(s)	Allows cameras in the network to operate at different frame rates and resolutions
Set Selected Camera(s) to Report Extracted Data	Report pixels that are extracted based on extraction algorithm
Set Selected Camera(s) to Report Spot Centroid	



Middle Body Section:



Reversion History	
3-15-2015	Rev1 Created