



IMAGING TECHNOLOGY

ATOMAS-IOT-DUAL User Manual

IP Video Encoder Platform

Document Version 1.1



ATOMAS-IOT-DUAL User Manual

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The following words and symbols mark special messages throughout this guide:

Warning: Text set off in this manner indicates that failure to follow directions could result in damage to persons or equipment.

Note: Text set off in this manner indicates special instructions which should be paid attention to.

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1 About the ATOMAS-IOT-DUAL

The ATOMAS-IOT-DUAL dual port IP video encoder module delivers high quality H.265/H.264 video encoding to be used within a variety of applications in a multitude of markets. It is an embedded, high-performance IP video encoder module designed for integration into industry specific products looking to add state of the art IoT video capabilities such as unmanned vehicles, drones, thermal camera systems and many others.

Open Platform API

Embedding support for networked API's such as ONVIF and the ION API, products based on the ATOMAS-IOT-DUAL can be integrated into a networked video management system allowing for centralized monitoring and management in a scalable and expandable IP surveillance system. Contact IONODES for a list of supported VMS systems, on-premises and Cloud.

Simultaneous Dual Camera Support

The ATOMAS-IOT-DUAL is designed for direct connection to the leading LVDS zoom camera blocks, such as SONY and KT&C, with simultaneous support of a MIPI and or digital video source such, such as a thermal camera. Both cameras are processed simultaneously and published via ONVIF and other IP APIs for streaming / recording.

High Performance Video Engine

The ATOMAS-IOT-DUAL features a powerful video codec engine capable of generating multiple HEVC / H.264 IP video streams at different quality settings. In single input mode, it can generate streams at up to 4K30FPS; in dual input mode it can generate streams at up to 2K30FPS for each input.

IoT Enabled for Endless Possibilities

The ATOMAS-IOT-DUAL offers the latest in IoT and networking connectivity functions including Ethernet, 4G LTE, Wi-Fi, GPS, Bluetooth, CAN Bus, 9-axis IMU and much more.

2 Parts List

Qty	Description
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1x	ATOMAS-IOT-DUAL Module
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Note: When unpacking, inspect the shipment box and appliance to identify any possible damages due to shipping. Make sure all items have been delivered and that no items are missing. Contact your IONODES representative should you find any damages or defects.

Note: The product serial number label helps our product support team identify your device and its factory configuration in the event that your IONODES product or its components require service. The label is attached to the underside of the PCBA.

3 Hardware Integration

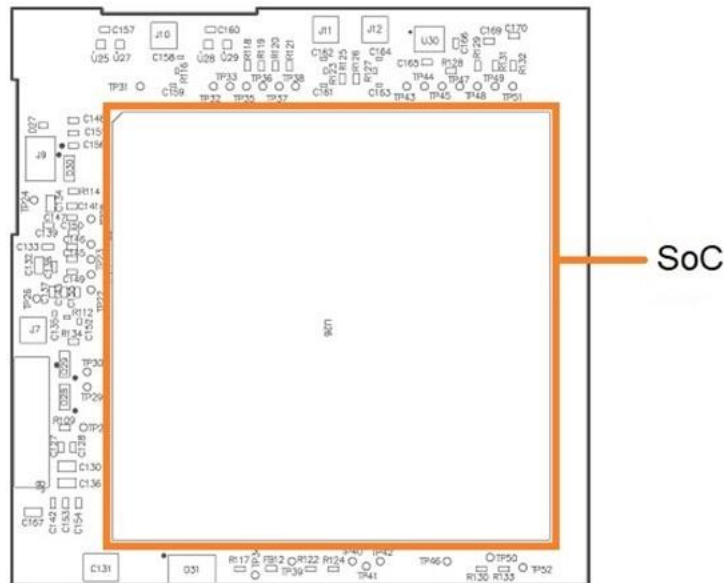
The ATOMAS-IOT-DUAL has been designed to allow for flexible hardware integration to existing or new product designs. The ATOMAS-IOT-DUAL proposes three (3) mounting holes for securing to your enclosure. In addition, a slight clearance around the board’s edge can also be used for extrusion-type enclosures.

When integrating the ATOMAS-IOT-DUAL into a product design, position the module to allow for air circulation around the board in order to maximize the chances of heat dissipation.

Warning: Be careful not to damage the module when using mounting screws.

4 Temperature Considerations

The ATOMAS-IOT-DUAL has been designed with extended temperature components (-20C to +70C); however, reaching your temperature requirements may require that you add heatsinks to certain board-level components which generate substantial heat (the main one being the SoC). The placement of the SoC is clearly marked in the picture below.



5 ATOMAS-IOT-DUAL Specifications and Functions

5.1 Board layout

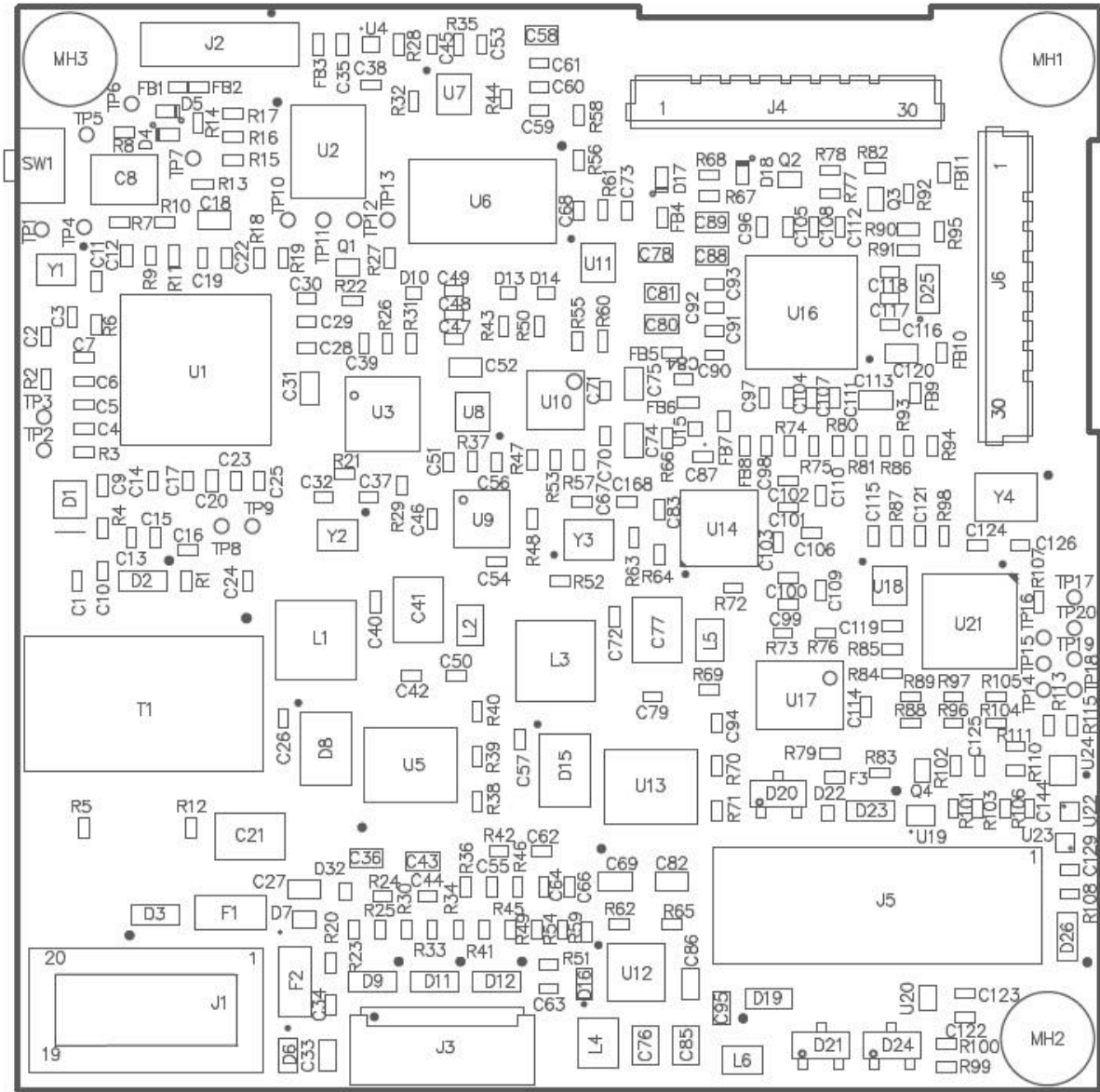


Figure 1 - ATOMAS-IOT-DUAL Top Side

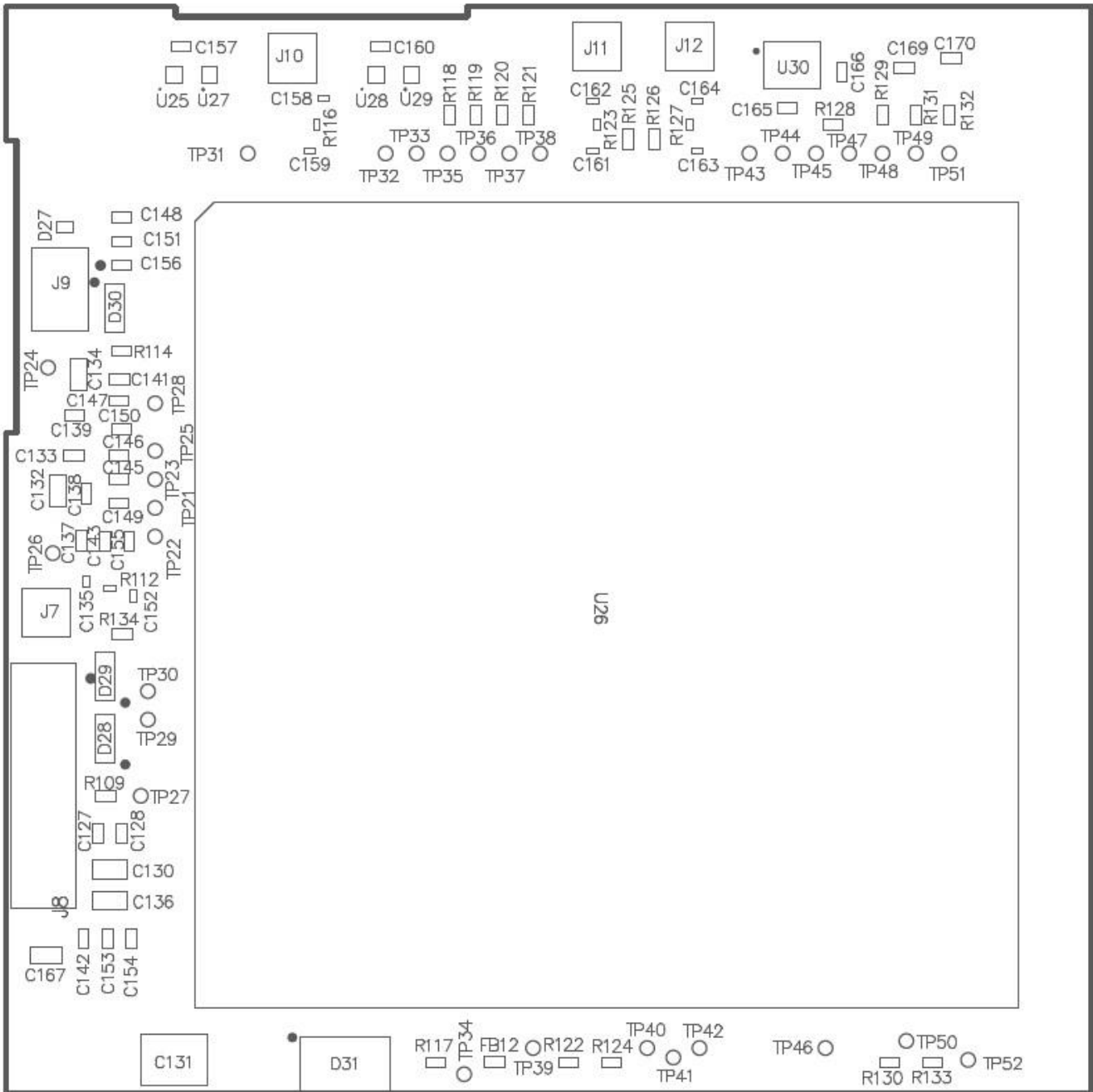


Figure 2 - ATOMAS-IOT-DUAL Bottom Side

5.2 Connector Part Numbers

- ATOMAS-IOT-DUAL
 - J1 – Ethernet + Power / Molex 203564-2017
 - J2 – MIPI Video Interface / Hirose BM20B(0.8)-30DS-0.4V
 - J3 – SD-CARD / SIM / Molex 503480-1600
 - J4 – LVDS Video Interface / KEL Corporation USL00-30L-A
 - J5 – Audio & I/O / Molex 203564-3017
 - J6 – Parallel Video Interface / KEL Corporation USL00-30L-A
 - J7 – Cellular Main Antenna / Hirose U.FL-R-SMT-1
 - J10 – Cellular Diversity Antenna / Hirose U.FL-R-SMT-1
 - J11 – GNSS Antenna / Hirose U.FL-R-SMT-1
 - J12 – Wi-Fi/Bluetooth Antenna / Hirose U.FL-R-SMT-1

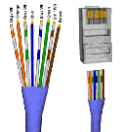
5.2.1 J1 – Ethernet + Power

Molex 203564-2017

Pin No.	Name	Comments
1	VIN	9V to 15V, with 4A fuse protection
2	VIN	9V to 15V, with 4A fuse protection
3	VIN	9V to 15V, with 4A fuse protection
4	VIN	9V to 15V, with 4A fuse protection
5	3.3V OUT	max 100mA, combined with J5 pin 21
6	5V OUT	max 1A
7	GND	
8	GND	
9	Factory Default	
10	GND	
11	GND	
12	Eth LED Yellow	Connects directly to RJ45 or network wiring
13	VRTC	DC Power Input for RTC (2.0V to 3.25V)
14	Eth LED Green	Connects directly to RJ45 or network wiring
15	NOT CONNECTED	
16	NOT CONNECTED	
17	ETH0 –	Connects directly to RJ45 or network wiring
18	ETH1 +	Connects directly to RJ45 or network wiring
19	ETH0 +	Connects directly to RJ45 or network wiring
20	ETH1 –	Connects directly to RJ45 or network wiring

VRTC is provided in order to allow for optional integration of an external battery source (2.0V to 3.25V) for feeding the module's real-time clock (RTC). VRTC is only required to keep the date/time when the main power supply is not connected. All other data is saved in the persistent FLASH memory. The expected consumption is around 0.0045 mA. Based on the desired holdup time, the system integrator should select the appropriate battery capacity. We recommend using Seiko Instruments MS621FE-FL11E coin cell battery, which is rated at 3V output and 5.5 mAh capacity.

J1 provides standard 4-wire network connectivity. You only need 4 wires for 10/100 Base-T network connection; please connect the appropriate network connection pins to your RJ45 connector or wiring. Network status LED pins are also accessible if needed.



5.2.2 J2 – MIPI Video Interface

Hirose BM20B(0.8)-30DS-0.4V

Pin No.	Name	Comments
1	MIPI-DATA1-	
2	MIPI-DATA1+	
3	DGND	
4	MIPI-DATA3-	
5	MIPI-DATA3+	
6	DGND	
7	MIPI-DATA0-	
8	MIPI-DATA0+	
9	DGND	
10	MIPI-DATA2-	
11	MIPI-DATA2+	
12	DGND	
13	MIPI-CLK-	
14	MIPI-CLK+	
15	AGND	
16	NOT CONNECTED	
17	AVDD	2.8V
18	DVDD	1.2V
19	DOVDD	1.8V
20	NOT CONNECTED	
21	CLK	
22	NOT CONNECTED	
23	SID	0 (connected to GND)
24	I2C SCL	
25	I2C SDA	
26	#Reset	
27	NOT CONNECTED	
28	NOT CONNECTED	
29	NOT CONNECTED	
30	NOT CONNECTED	

Note: This video interface is natively compatible with the IONODES MIPI camera with OV12A10 sensor and Panomorph lens (ION-CAM-OV12A10MIPI). For connecting other MIPI cameras an adapter board is required.

5.2.3 J3 – SD-CARD / SIM

Molex 503480-1600

Pin No.	Name	Comments
1	SD DATA2	
2	SD DATA3	
3	SD CMD	
4	SD VDD	
5	SD CLK	
6	GND	
7	SD DATA0	
8	SD DATA1	
9	SD Detect	
10	GND	
11	GND	
12	SIM VDD	
13	SIM RST	
14	SIM CLK	
15	SIM Detect	
16	SIM DATA	
17	GND	
18	GND	

Note: This socket is intended to be connected to the optional IONODES SIM/SD combo adapter board. In order to use the SD functionalities, make sure to install a microSD card of up to 512GB capacity, with speed class 10 or above for optimal performance. You must also make sure the card is formatted in EXT4 (formatting of the card can also be performed via the encoder).

5.2.4 J4 – LVDS Video Interface

KEL Corporation USL00-30L-A

Pin No.	Name	Comments
1	LVDS DATA3 +	
2	LVDS DATA3 -	
3	LVDS CLK +	
4	LVDS CLK -	
5	LVDS DATA2 +	
6	LVDS DATA2 -	
7	LVDS DATA1 +	
8	LVDS DATA1 -	
9	LVDS DATA0 +	
10	LVDS DATA0-	
11	GND	
12	CAM UART TX	Connects to the camera's Rx
13	CAM UART RX	Connects to the camera's Tx
14	DC IN	6V to 12V
15	DC IN	6V to 12V
16	DC IN	6V to 12V
17	DC IN	6V to 12V
18	DC IN	6V to 12V
19	GND	
20	GND	
21	LVDS DATA7 +	
22	LVDS DATA7 -	
23	LVDS DATA6 +	
24	LVDS DATA6 +	
25	NOT CONNECTED	
26	Reset#	
27	LVDS DATA5 +	
28	LVDS DATA5 -	
29	LVDS DATA4 +	
30	LVDS DATA4 -	

5.2.5 J5 – Audio & I/O

Molex 203564-3017

Pin No.	Name	Comments
1	GPIO IN1	3.3V
2	I2C SCL	1.8V
3	GPIO IN2	3.3V
4	I2C SDA	1.8V
5	GPIO Out	3.3V
6	GND	
7	GND	
8	NOT CONNECTED	
9	Audio Line IN Left	
10	Audio Line OUT Left	
11	GND	
12	Audio Line OUT Right	
13	Audio Line IN Right	
14	Audio OUT Common	
15	PWM3	3.3V
16	NOT CONNECTED	
17	PWM2	3.3V
18	CAN -	
19	PWM1	3.3V
20	CAN +	
21	3V3 OUT	max 100mA, combined with J1 pin 5
22	GND	
23	UART0 RS-422/485 TX -	
24	UART0 RS-422/485 RX -	
25	UART0 RS-422/485 TX +	
26	UART0 RS-422/485 RX +	
27	UART0 RX	TTL level, 3.3V
28	UART1 RX	TTL level, 3.3V
29	UART0 TX	TTL level, 3.3V
30	UART1 TX	TTL level, 3.3V

Note: The RS-422/485 and UART 0 are internally using the same port, so they cannot be used both at the same time. The configuration is software selectable.

5.2.1 J6 – Parallel Video Interface

KEL Corporation USL00-30L-A

Pin No.	Name	Comments
1	VIN	3.3V or 5V, software selectable
2	VIN	3.3V or 5V, software selectable
3	GND	
4	DATA14	
5	DATA8	
6	DATA4	
7	DATA7	
8	#Reset	
9	UART To Sensor	TTL level, 1.8V
10	DATA5	
11	DATA6	
12	DATA13	
13	UART To CPU	TTL level, 1.8V
14	DATA15	
15	DATA10	
16	DATA12	
17	Pixel Clock	
18	DATA9	
19	DATA11	
20	DATA2	
21	GND	
22	VSYNC	
23	DATA3	
24	DATA1	
25	I2C SCL	1.8V
26	I2C SDA	1.8V
27	HSYNC	
28	DATA0	
29	FSYNC / DATA_EN	
30	GND	

Note: In order to connect a camera block via this interface an adapter board is required. Currently, the only available adapters are for the FLIR BOSON 320/640 (60 Hz version only), DRS Tenum 640 thermal cameras and analog HD component/ SD composite cameras.

5.3 Understanding LED Status

Status of the ATOMAS-IOT-DUAL is exposed via the on-board bi-color LED (Green/Red).

The following describes the system status LED mappings of the ATOMAS-IOT-DUAL:

Normal Operation:

- Operating system boot up – LED is steady red (2-5 seconds) and after that LED is steady orange (30-45 seconds)
- Internal application startup – LED is flashing orange (2 second interval)
- System ready – LED is steady green
- Media streaming – LED is flashing green (1/2 second interval)

Special Operations:

- Identify command received – LED is flashing orange/green
- Reset to factory settings – LED is flashing rapidly red/green
- Software watchdog is rebooting the appliance – LED is flashing rapidly red
- Firmware update in progress – LED is flashing slowly red/green

6 ATOMAS-MINI-BOSON-ADAPT

The ATOMAS-MINI-BOSON-ADAPT module is a video interface add-on module, fully compatible with the ATOMAS-IOT-DUAL encoder platform. This optional module provides a direct connection to FLIR BOSON 320/640 (60Hz variant) thermal camera on the parallel video interface of the ATOMAS-IOT-DUAL.

6.1 Board layout

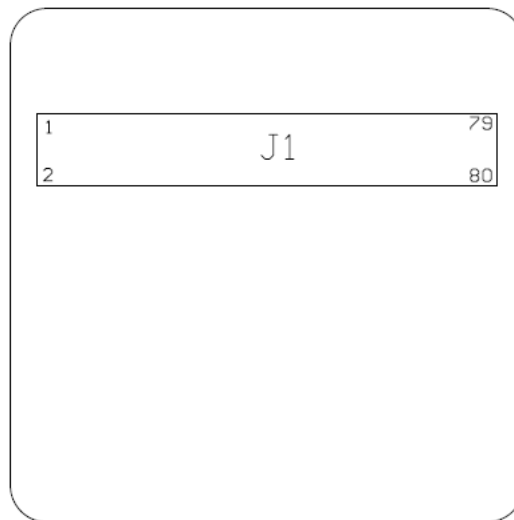


Figure 3 - ATOMAS-MINI-BOSON-ADAPT Top Side

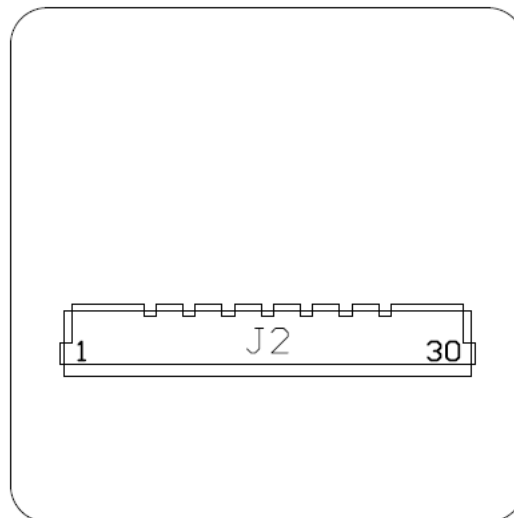


Figure 4 - ATOMAS-MINI-BOSON-ADAPT Bottom Side

6.2 Connector Part Numbers

- J1 – FLIR Connector / Hirose DF40HC-(4.0)-80DS-0.4V
- J2 – KEL Connector (towards ATOMAS-IOT-DUAL) / KEL USL00-30L

Note: The J2 connector on the ATOMAS-MINI-BOSON-ADAPT module is designed to mate with connector J6 of the ATOMAS-IOT-DUAL module.

7 ATOMAS-MINI-TENUM-ADAPT

The ATOMAS-MINI-TENUM-ADAPT module is a video interface add-on module, fully compatible with the ATOMAS-IOT-DUAL encoder platform. This optional module provides a direct connection to DRS Tenum 640 thermal camera on the parallel video interface of the ATOMAS-IOT-DUAL.

7.1 Board layout

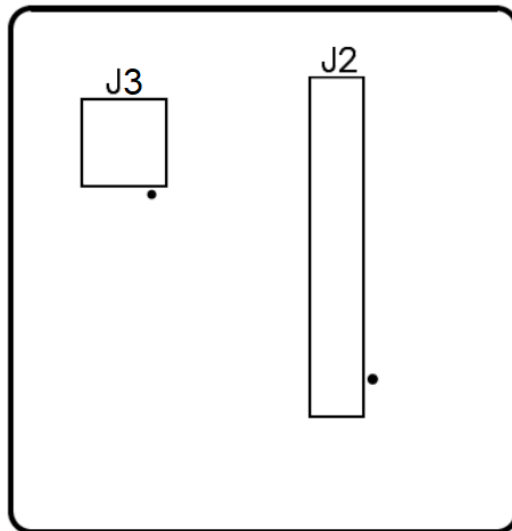


Figure 5 - ATOMAS-MINI-TENUM-ADAPT Top Side

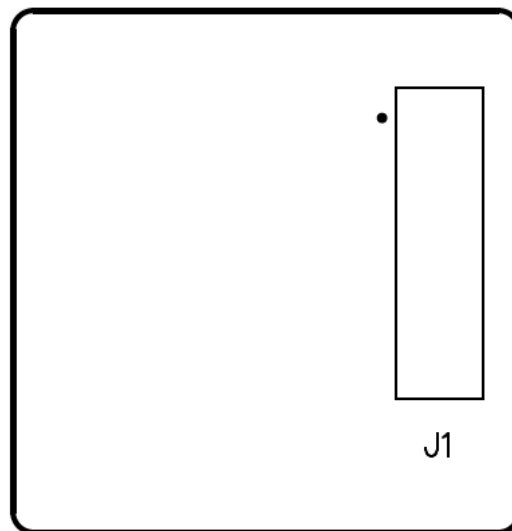


Figure 6 - ATOMAS-MINI-TENUM-ADAPT Bottom Side

7.2 Connector Part Numbers

- J1 – TENUM Connector / Samtec SS4-30-3.50-L-D-K-TR
- J2 – KEL Connector (towards ATOMAS-IOT-DUAL) / KEL USL00-30L

Note: The J2 connector on the ATOMAS-MINI-TENUM-ADAPT module is designed to mate with connector J6 of the ATOMAS-IOT-DUAL.

- J3 – Power Connector / JST BM02B-ACHSS-GAN-ETF

Pin No.	Name	Comments
1	VIN	Requires +5V at 750mA
2	GND	

Note: The J3 connector on the ATOMAS-MINI-TENUM-ADAPT module is designed to mate with a JST ACHR-02V-S connector. It can be connected directly to the +5V output of the J1 connector of the ATOMAS-IOT-DUAL.

8 ATOMAS-IOT-DUAL-SDSIM-ADAPT

The ATOMAS-IOT-DUAL-SDSIM-ADAPT module is a micro-SD/nano-SIM add-on board, fully compatible with the ATOMAS-IOT-DUAL encoder platform. This optional module brings edge recording and 3G/4G LTE networking support to your ATOMAS-IOT-DUAL.

8.1 Board layout

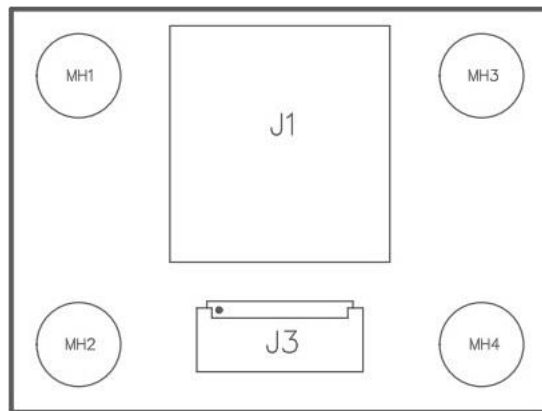


Figure 7 - ATOMAS-IOT-DUAL-SDSIM-ADAPT Top Side

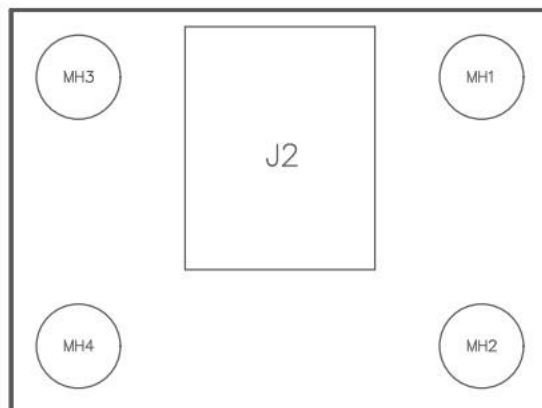


Figure 8 - ATOMAS-IOT-DUAL-SDSIM-ADAPT Bottom Side

8.2 Connector Part Numbers

- J1 – microSD card Socket
- J2 – nano SIM card Socket
- J3 – Molex Connector (towards ATOMAS-IOT-DUAL) / Molex 503480-1600

Note: The J3 connector on the ATOMAS-IOT-DUAL-SDSIM-ADAPT module is designed to mate with connector J3 of the ATOMAS-IOT-DUAL module.

9 ATOMAS-IOT-DUAL-HDCOMP-ADAPT

The ATOMAS-IOT-DUAL-HDCOMP-ADAPT module is an add-on board designed for use with the ATOMAS-IOT-DUAL line of encoders. This optional module brings support for Analog SD Composite (PAL/NTSC), as well as Analog HD Component (Y/Pb/Pr) video to your ATOMAS design. The ATOMAS-IOT-DUAL-HDCOMP-ADAPT module connects to the ATOMAS-IOT-DUAL on the parallel video input.

9.1 Board layout

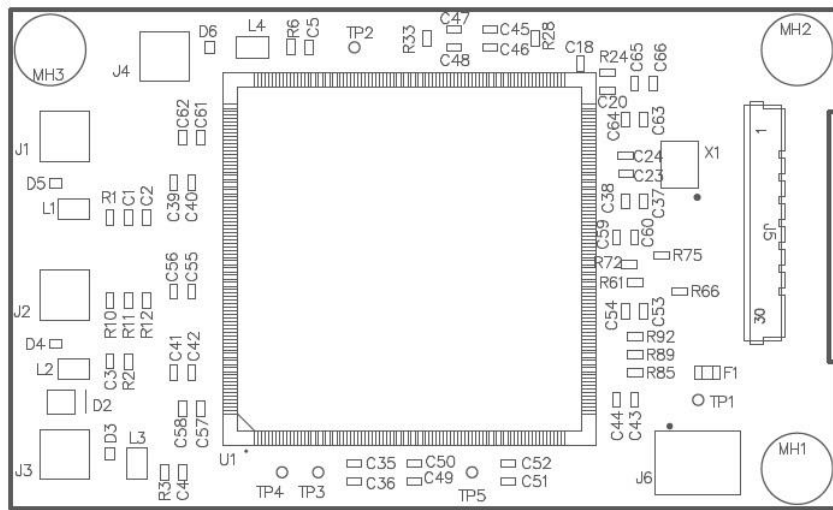


Figure 9 - ATOMAS-IOT-DUAL-HDCOMP-ADAPT Top Side

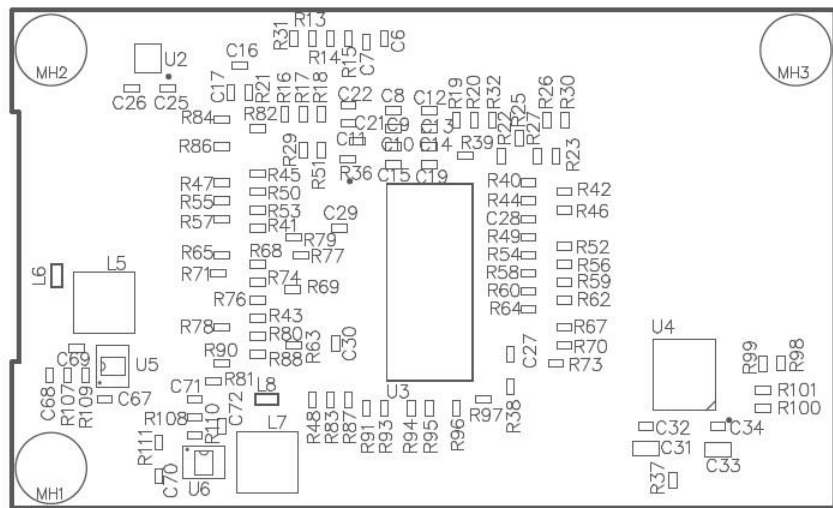


Figure 10 - ATOMAS-IOT-DUAL-HDCOMP-ADAPT Bottom Side

9.2 Connector Part Numbers

- J1 – HD Component Y / Samtec MMCX7-J-P-HF-ST-TH1
- J2 – HD Component PR / Samtec MMCX7-J-P-HF-ST-TH1
- J3 – HD Component PB / Samtec MMCX7-J-P-HF-ST-TH1
- J4 – SD Composite / Samtec MMCX7-J-P-HF-ST-TH1
- J5 - KEL Connector (towards ATOMAS-IOT-DUAL) / KEL USL00-30L

Note: The J5 connector on the ATOMAS-IOT-DUAL-HDCOMP-ADAPT module is designed to mate with connector J6 of the ATOMAS-IOT-DUAL module.

- J6 – Power Connector / JST BM03B-ADHKS-GAN-ETB(LF)(SN)

Pin No.	Name	Comments
1	VIN	+5V
2	GND	
3	GND	

Note: The J6 connector on the ATOMAS-IOT-DUAL-HDCOMP-ADAPT module is designed to mate with a JST ADHR-03V-H connector. It can be connected directly to the +5V output (pin #6) of the J1 connector of the ATOMAS-IOT-DUAL

10 System Configuration

For initial set-up, the ATOMAS-IOT-DUAL needs to be configured prior to using it with your network video management system. In most cases, only network configuration will be required. Since not all ATOMAS-IOT-DUAL parameters can be controlled via networked video management systems, advanced parameters may need to be set-up as well through the ION specific software tools.

The initial configuration can be done locally on the ATOMAS-IOT-DUAL using a laptop/workstation directly connected to the device's network port, or remotely over the network.

10.1 Initial Network Configuration

By factory default, the ATOMAS-IOT-DUAL is configured in DHCP.

Note: Please make sure to have a DHCP server on the network where the ATOMAS-IOT-DUAL is connected.

Initial device network configuration is done via the IonConfigTool (ICT), a tool provided by IONODES that can be downloaded from the company's web site (www.ionodes.com), under the Support > Tools section.

The ICT plays 5 important roles:

1. Discovery of all ATOMAS-IOT-DUAL and other ION devices on the network
2. Remote configuration of the IP address and subnet mask
3. Identify an ION device by flashing the LED (orange/green)
4. Batch firmware upgrade of all common ION devices
5. Access to the web-based ION management application

In order to better understand all of its functionalities, please check the ICT user manual.

Note: Your computer must be in the same subnet in order to be able to communicate with the ATOMAS-IOT-DUAL.
