

# USER MANUAL

for A5D Aerial



**HASSELBLAD**  
CREATE TO INSPIRE



**Medium format photography is about professionalism. Camera systems have to be professional, handling has to be professional and captures have to be professional in quality.**

Hasselblad knows it and delivers it; professionals know that too. The Hasselblad series of cameras consists of building new developments on the shoulders of the previous generation. In this way all the previous work-experience based and branch-demanding features are automatically included. So, just when you think things can't get much better, they do. And the A5D is that model - all the good things from before and then some!

The A5D heralds a step up that is noticeably greater than before. There are changes and many are 'from the ground up'. The A5D provides a reliable connection to the fleeting environment of digital imaging technology so when the wind changes direction, the A5D remains as the safeguarding companion to provide support.

Today's aerial photography is more demanding than ever and Hasselblad continues to rise to the occasion, introducing more and more advanced products and applications for this exciting segment. This is especially true of the Hasselblad A5D, the latest evolution of Hasselblad aerial cameras designed for these special applications.

The new camera has been developed to deliver the image quality and reliability required by our surveying and mapping customers. Listening to their feedback we have developed a camera to encompass these needs and much more.

Hasselblad's best kept secret is knowing that every link in the chain that leads to the page in the magazine has to reach a certain standard; it is that simple. That's why Hasselblad spends so much time and energy into checking those almost endless behind-the-scenes details and standards because we understand this simple concept. There is no magical formula to Hasselblad's success other than an understanding of what is required to produce the best results available in the world today, and an acceptance that there are no short cuts in this process. Hasselblad does its best to produce the best; there is no other way to achieve the Hasselblad star quality.

## WARNINGS, RESTRICTIONS AND RECOMMENDATIONS

- Keep the A5D away from moisture wherever possible. If your camera becomes wet, disconnect from power and allow it to dry before attempting to operate again.
- Always take great care when you remove the sensor unit for cleaning as the exposed sensor protective filter is vulnerable to damage.
- Keep all cables connected to or from your camera out of the way where they will not be tripped over.
- Your new Hasselblad camera may have been supplied in kit form or as separate items. There are a number of possible combinations depending on factors such as offers, bundles etc. Please ensure that all the items noted on the accompanying packing information have been supplied and are correct.
- Contact your Hasselblad dealer or distributor immediately if anything is missing or seems faulty in any way, quoting the serial numbers and purchase details where appropriate.
- Please keep purchase details and the warranty in a safe place.
- Become familiar with the various parts and components. Leave protective covers on as much as possible and avoid touching glass surfaces and inserting fingers into the camera body. Hasselblad cameras have a robust construction and are capable of withstanding fairly rough treatment but nevertheless are precision instruments and will serve you longer if treated with respect from the beginning.

## FIRMWARE UPDATES

If you have registered your camera you should automatically receive e-mail informing you of the latest developments. Otherwise you are advised to make regular checks regarding firmware updates to the camera body, the sensor unit and the viewfinder.

The aim is to ensure you have the latest firmware updates for camera body, sensor unit and viewfinder, which naturally ensures the optimum in performance. When updating you should also study the accompanying 'Release Notes' or 'Read Me' files where you will find details about improvements, developments and changes.

**Register your camera for regular news about the latest developments, updates, news, tips, and much else!**

– [www.hasselblad.com](http://www.hasselblad.com) –

# CONTENTS

<b>■ INTRODUCTION .....</b>	<b>2</b>
Warnings & restrictions .....	4
<b>■ GENERAL OVERVIEW</b>	
Parts & components.....	7
<b>■ GETTING STARTED .....</b>	<b>8</b>
Mounting the lens .....	9
Attaching the lens shield .....	9
Attaching the adapter plate.....	10
Power connection .....	10
Synchronous connections .....	10
Firewire & link to Phocus or SDK based application.....	10
Saving images to a CompactFlash card.....	10
<b>■ CAMERA MAINTENANCE .....</b>	<b>11</b>
Cleaning sensor unit & IR glass.....	12
<b>■ TECHNICAL APPENDIX .....</b>	<b>13</b>
A5D specifications .....	14
Lemo connector signal information.....	14 - 16
Electrical timings.....	17 - 18



# PARTS AND COMPONENTS – OVERVIEW



CompactFlash card cover

Lens mount locking bolt



Lens shield

Lens release button

Mounting point

Firewire socket

Digital capture unit



DC Power connector  
Control connector A  
Control connector B

Menu button  
P1 button  
Menu navigation button  
Zoom button

P2 button  
Display button  
Ready light



# GETTING STARTED

## MOUNTING THE LENS

- 1** The A5D lens mount contains a locking mechanism that securely holds the lens in place with an even pressure all around the barrel.



Before mounting a lens ensure the metal collar is in position and the joint is aligned with the location lug.

- 2** To mount a lens, locate the red dot on the rear lens mount and ensure it is facing upwards. Offer up the lens into the camera body and rotate clockwise until a click is heard.



To detach the lens, press the lens release button on the side of the camera and turn the lens anti-clockwise.

- 3** Locate the lens mount locking bolt.



- 4** Insert the supplied Allen key into the bolt and rotate clockwise half a turn to engage the lens mount lock.



**NB:** Do not overtighten as damage to the lens mount may occur

## ATTACHING THE LENS SHIELD

There are three lens shields available depending on the lens in use. To mount the shield for the 50, 80 or 100mm lens, simply offer up the shield to the outer lens mount and rotate the shield clockwise until the shield locks.



To mount the shield for the 35mm lens it is first necessary to mount the adaptor ring to the existing outer lens mount. This adaptor ring is held in place with 4 screws.

Once this has been mounted, you can attach the lens and then mount the shield and secure it with a turn in the clockwise direction.



## ATTACHING THE ADAPTER PLATE (P1)

- 1 To attach the A5D camera unit to an existing OEM camera mount point you will need the adaptor plate (P1). This plate is attached to the camera body with 4 bolts. You must ensure that the plate is correctly oriented – please see the image below and align the plate correctly.



- 2 Secure the plate with the 4 supplied bolts, ensuring that you tighten them one turn at a time to provide even pressure. Once the plate is secure you can mount the lens. Attach the lens shield and the unit is now ready to mount in the camera pod using the existing P1 bolt layout.



## POWER CONNECTION

The A5D camera unit is equipped with three connectors. The connector furthest away (left hand side of the camera and coloured grey) is the DC power connector. The unit requires a power source of 12-30 VDC to operate. This will normally be supplied via the aircraft power system.

DC power connector

**NB:** Correct voltage **AND** polarity must be applied to the power connection or damage to the camera will occur



## SYNCHRONOUS CONNECTIONS

The remaining two connectors are used to synchronise additional daisy chained camera units so that all exposures take place within 20 microseconds of each other. The centre connector is the signal input and the right hand connector is the signal output for the next unit.

## FIREWIRE & LINK TO PHOCUS OR SDK BASED APPLICATION

Located on the left hand side of the camera you will find the Firewire socket. Using the supplied cable ensures the connection will be securely locked. Once the connector is locked in place and the other end of the cable attached to your computer system, the camera should show as connected and camera controls should be configurable via Hasselblad Phocus software or your own application designed from the SDK.

## SAVING IMAGES TO A COMPACTFLASH CARD

If you do not wish to transfer the captured images to a remote computer, the CompactFlash card slot is available to allow in camera storage up to 128GB (UDMA7 compatible cards).



## CAMERA MAINTENANCE

### CLEANING SENSOR UNIT & IR GLASS

If you see dark or colored spots or lines in your images, then you may need to clean the outer surface of the sensor unit's infrared (IR) filter. In most cases, the careful use of compressed air will be adequate though if you use canned compressed air, read the instructions very carefully before use to avoid spraying impurities or even ice on the filter! Sometimes, however, small particles will get stuck to the surface of the IR filter, requiring for a more thorough cleaning, involving either fluid or swab wipes.

- 1 If compressed air did not remove all the problems on the filter, then use a long-handled swab style wipe (swab style wipes are recommended due to the distance from the lens mount to the sensor surface).
- 2 Ensure that the swab matches the width of the IR filter (if possible).
- 3 Apply firm pressure at the edge of the swab to ensure an even, firm contact with filter surface. Wipe the surface in one unbroken motion.
- 4 Finally check if the IR filter has been properly cleaned either by visual inspection by making a test capture. If further cleaning is needed, repeat cleaning procedure.





# TECHNICAL APPENDIX

## A5D-50c SPECIFICATIONS

Sensor size	50 megapixels (8272 x 6200)
Sensor dimensions	43.8 x 32.9mm
Image size (RAW 3FR capture)	65MB on average. TIFF 8 bit: 154MB
RAW File Format	Lossless compressed Hasselblad 3FR
Shutter Speed Range	34 minutes to 1/800 sec.
ISO Speed Range	100, 200, 400, 800, 1600, 3200 & 6400
Colour Definition	16 bit
Colour Management	Hasselblad Natural Colour Solution
Focusing	Focus locked at infinity
Capture Rate: ( Based on SanDisk Extreme UDMA7 120 MB/s)	1.5 frames per second. 50 per minute
Storage Capacity (16GB CompactFlash card)	Holds 240 images on average
Storage Options	CompactFlash card type UDMA (e.g. SanDisk Extreme Pro) or tethered to Mac or PC
Software	Phocus for Mac and Windows (included). Phocus SDK (available on request)
Tethered Operation	Supported in Phocus and Phocus SDK
Platform Support	Macintosh: OS x 10.5 and later. Windows: XP, Vista, Windows 7 (32/64 bit), Windows 8
Host Connection Type	FireWire 800 (IEEE1394b). Thunderbolt supported via optional adapters. LEMO connectors for FMS and multiple camera synchronisation
Exposure Metering	None
Power Supply	12-24 VDC required via LEMO connector
Operating Temperature	0 - 45°C/32 - 113°F
Dimensions (Complete camera with HC 80mm lens) (W x H x D)	100 x 100 x 151mm
Weight (Body and sensor unit only)	1315g
Approval	FCC (Class B), CE, RoHS

## A5D-80 SPECIFICATIONS

Sensor size	80 megapixels (up to 10320 x 7752)
Sensor dimensions	53.7 x 40.3mm
Image size (RAW 3FR capture)	130MB on average. TIFF 8 bit: 160MB
RAW File Format	Lossless compressed Hasselblad 3FR
Shutter Speed Range	1/2 to 1/800 sec.
ISO Speed Range	50, 100, & 200
Colour Definition	16 bit
Colour Management	Hasselblad Natural Colour Solution
Focusing	Focus locked at infinity
Capture Rate: ( Based on SanDisk Extreme UDMA7 120 MB/s)	1.8 frames per second. 30 per minute
Storage Capacity (16GB CompactFlash card)	Holds 130 images on average
Storage Options	CompactFlash card type UDMA (e.g. SanDisk Extreme Pro) or tethered to Mac or PC
Software	Phocus for Mac and Windows (included). Phocus SDK (available on request)
Tethered Operation	Supported in Phocus and Phocus SDK
Platform Support	Macintosh: OS x 10.6 and later. Windows: XP, Vista, Windows 7 (32/64 bit), Windows 8
Host Connection Type	FireWire 800 (IEEE1394b). Thunderbolt supported via optional adapters. LEMO connectors for FMS and multiple camera synchronisation
Exposure Metering	None
Power Supply	12-24 VDC required via LEMO connector
Operating Temperature	0 - 45°C/32 - 113°F
Dimensions (Complete camera with HC 80mm lens) (W x H x D)	100 x 100 x 151mm
Weight (Body and sensor unit only)	1360g
Approval	FCC (Class A), CE, RoHS

## LEMO CONNECTOR SIGNAL INFORMATION

### POWER CONNECTOR

#### Voltage Limit

Characteristics	Symbol	Value	Unit (DC)
Maximum input voltage	VSOH	30	V
Minimum input voltage	VSOH	12	V

### CURRENT LIMIT

The Power + signal will conform to the following current requirements:

Characteristics	Symbol	Value	Unit (DC)
Typically average current consumption for Power +	ICCA	500	mA
Typically peak current consumption for Power +	ICCP	1500	mA
Typically peak power consumption for Power +	ICCP	15	Watt

It is recommended to use a Class II double insulated power supply, or a power limited external battery. The source should always be limited to a output power of no more than 100 watts in total.

### CONTROL CONNECTOR A & B

The below table shows the connectors pin numbers, signal names and signal direction in the control connector.

Connect or pin no.	Control cable	Signal name	Signal description	Direction	Type
1	White	VSYS -	0 VDC Logic supply	Camera - Externals	POWER
2	Brown	VSYS +	+5 VDC Logic supply	Camera - Externals	POWER
3	Green	RX	RS232 channel, RX signal	Camera - Externals	CMOS
4	Yellow	TX	RS232 channel, TX signal	Camera - Externals	CMOS
5	Grey	TRIG	Reserved for future use	Camera - Externals	CMOS
6	Pink	- BUSY	Reserved for future use	Camera - Externals	OC
7	Blue	- EXPOSE	Reserved for future use	Camera - Externals	OC
8	Red	INTERNAL	Reserved for internal use	-	-
Shield	-	GROUND	Chassis ground	Camera - External flash	-

### CONNECT OR PIN NO.

Signal Name	Power cable wire colour	Signal description
1 GND	White	Power GND (-)
2 VCC	Brown	Main power (+)

### SYSTEM LOGIC SUPPLY SIGNALS

The VSYS+ power is always supplied to the control connector from the Camera housing.

### SYSTEM STARTUP

During system startup (when the main power is applied into the Camera housing) the following requirements will apply for the System Logic supply signal +VSYS:

Characteristics	Symbol	Value	Unit (AC)
Maximum +VSYS voltage rise time	TRVS	40	ms

The total capacitive load between +VSYS and -VSYS should not exceed the following limit:

Characteristics	Symbol	Value	Unit
Maximum capacitive load on VSYS	CLVS	150	µf

### VOLTAGE LIMIT

The VSYS+ signal will conform to the following voltage requirements:

Characteristics	Symbol	Value	Unit (AC)
Maximum output voltage	VSOH	5.25	V
Minimum output voltage	VSOL	4.75	V

### CURRENT LIMIT

The VSYS+ signal will conform to the following current requirements:

Characteristics	Symbol	Value	Unit (AC)
Peak current consumption for VSYS+	ICC	40	mA

## VOLTAGE LIMIT

The electrical definition of signal type “CMOS” will be according to the limits specified below:

Characteristics	Symbol	Value	Unit (DC)
H level output voltage (min)	VOH	4.0	V
L level output voltage (max @ IOL)	VOL	0.4	V
L level output current	IOL	4.0	mA
H level input voltage (min)	VIH	3.5	V
L level input voltage (max)	VIH	1.5	V
H level input leakage current	I <sub>IH</sub>	7	μA

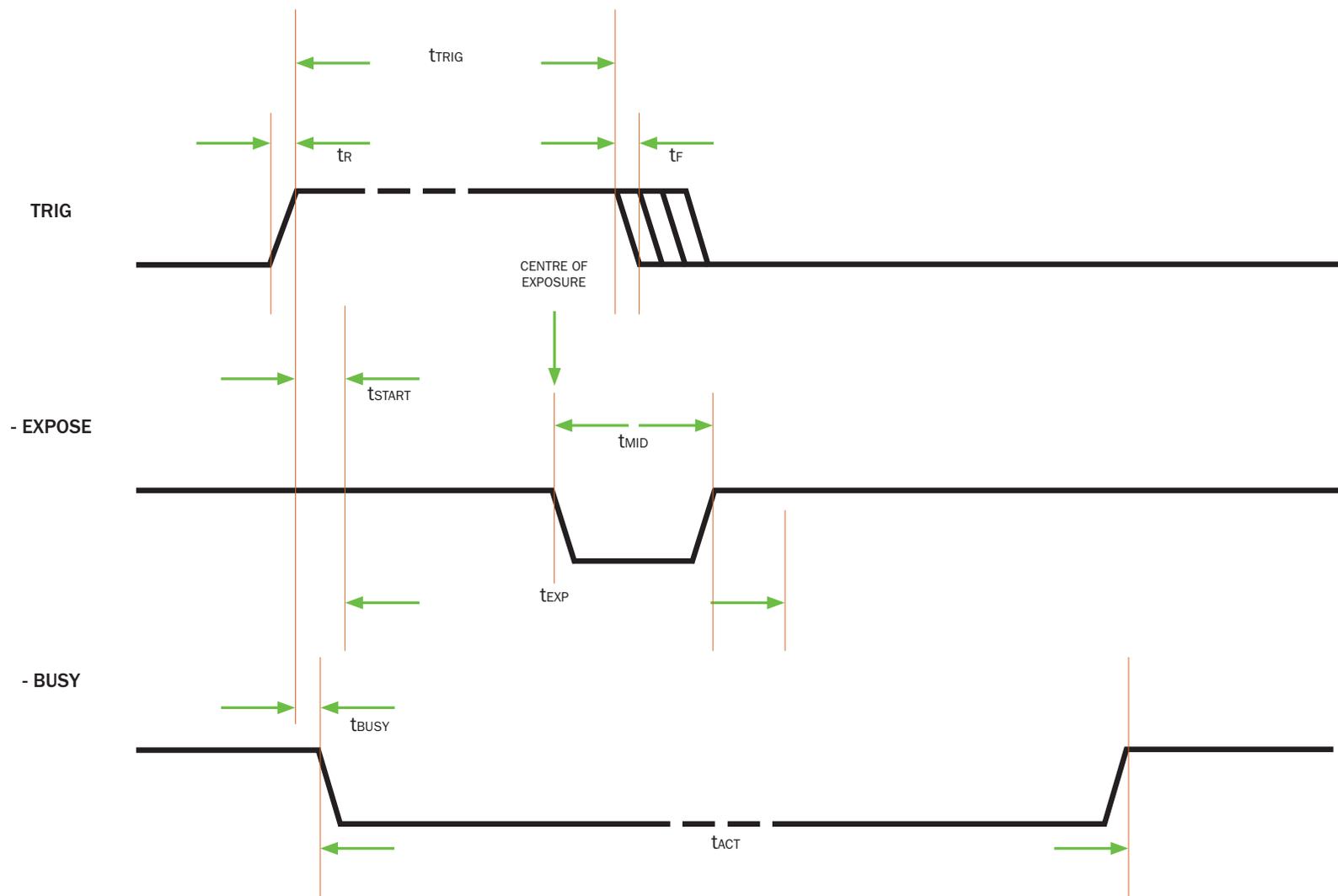
The electrical definition of signal type “OC” will be according to the limits specified below:

Characteristics	Symbol	Value	Unit (DC)
H level output voltage (max)	VOH	V <sub>SYS</sub> +	V
Pull-up impedance	R	10	Kohm
L level output voltage (max @ IOL)	VOL	0.4	V
L level output current	IOL	20.0	mA

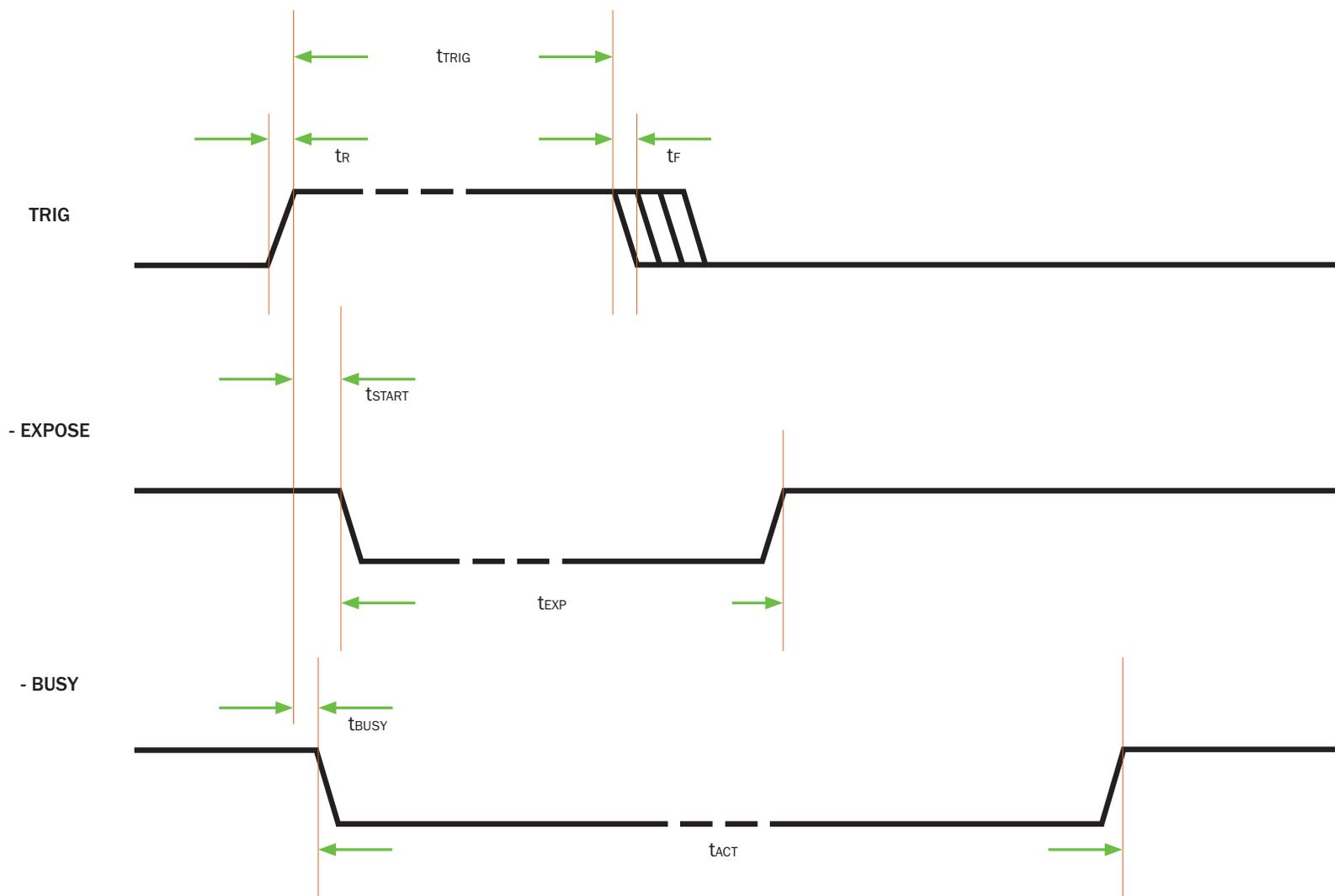
TRIG, -EXP and -BUSY timing relationship

Characteristics	Symbol	Value	Unit (AC)
Rise time (max)	t <sub>R</sub>	1.0	μs
Fall time (max)	t <sub>F</sub>	1.0	μs
TRIG pulse width (min)	t <sub>TRIG</sub>	1.0	ms
Expose start (min)	t <sub>START</sub>	100	μs
Expose start (max)	t <sub>START</sub>	1	ms
BUSY start (min)	t <sub>BUSY</sub>	0	ms
BUSY start (max)	t <sub>BUSY</sub>	200	ms
ACTIVE time (min)	t <sub>ACT</sub>	1000	ms
ACTIVE time (max)	t <sub>ACT</sub>	∞	s
Mid expose pulse width (typ)	t <sub>MID</sub>	100	us

The electrical timing when using -EXPOSE signal as mid expose indicator:



The electrical timing when using -EXPOSE signal as full indicator:



**FCC CLASS B NOTICE FOR A5D-50C**

This A5D-50c camera system has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

**FCC CLASS A NOTICE FOR A5D-80**

This A5D-80 has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and if it is not installed and used in accordance with the instruction manual, it may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

**BATTERY WARNING**

**Caution** - There is danger of explosion if batteries are mishandled or incorrectly replaced. On systems with replaceable batteries, replace only with the same manufacturer and type or equivalent type recommended by the manufacturer per the instructions provided in the product service manual. Do not disassemble batteries or attempt to recharge them outside the system. Do not dispose of batteries in fire. Dispose of batteries properly in accordance with the manufacturer's instructions and local regulations. Note that there are lithium batteries soldered on A5D internal boards. These batteries are not customer replaceable parts.

