

## DATA SHEET

April 2018

# IL5 / TS5

*Wherever high-speed imaging is needed...*

- Four models from QSXGA (2560 x 2048) @ 250fps to SVGA (800 x 600) @ 1650fps--all with faster frame rates at lower resolutions
- Control via powerful FasMotion Software on PC or Mac or via built-in web interface
- Flexible recording and triggering modes to assure you capture every shot, every time
- Multiple built in non-volatile storage devices, including optional SSDs with up to 2TB capacity allow you to shoot and save your high-speed video quickly and securely without downloading to a computer



*Four models to choose from, all very well suited for microscopy and macro videography applications...*

5MP CMOS sensor with global shutter and 5µm pixels has excellent sensitivity and dynamic range assure the greatest system magnification and imaging characteristics available in a high-speed camera.

*Binning and sub-sampling* features give the IL5 added flexibility with regard to Field of View and light-gathering capabilities.

*Perfect for laboratory applications...*

...whether atop a microscope or used with another optical system, the IL5 is an increasingly popular camera in laboratories worldwide for applications ranging from animal locomotion and neurosciences to materials testing.



## TS5

# Advantages of Small Pixels

*Microscopy and macro videography are common applications for high-speed cameras as high frame rates are usually needed as magnification increases. Whether you image microfluidic circuits or insects, the challenges are often very similar:*

## System Magnification

The IL5 sensor has  $5\mu\text{m}$  pixels while most high-speed cameras' pixels are in the  $10\mu\text{m}$  to  $20\mu\text{m}$  range. This gives the IL5 from 2x to 4x as much system magnification. Binning and Sub-sampling may be used to simulate larger pixels in order to change the field of view without changing optics.



Field of View with  $20\mu\text{m}$  Pixels

## Compatible Optics...



Field of View with  $10\mu\text{m}$  Pixels

All IL5 cameras use the same 5MP sensor, giving them 1" C-mount compatibility in all normal, binning and sub-sampling modes. When used at 1920 x 1080 resolution (Full HD), the IL5 is compatible with 3/4" C-mount optics.

## ...No Vignetting!

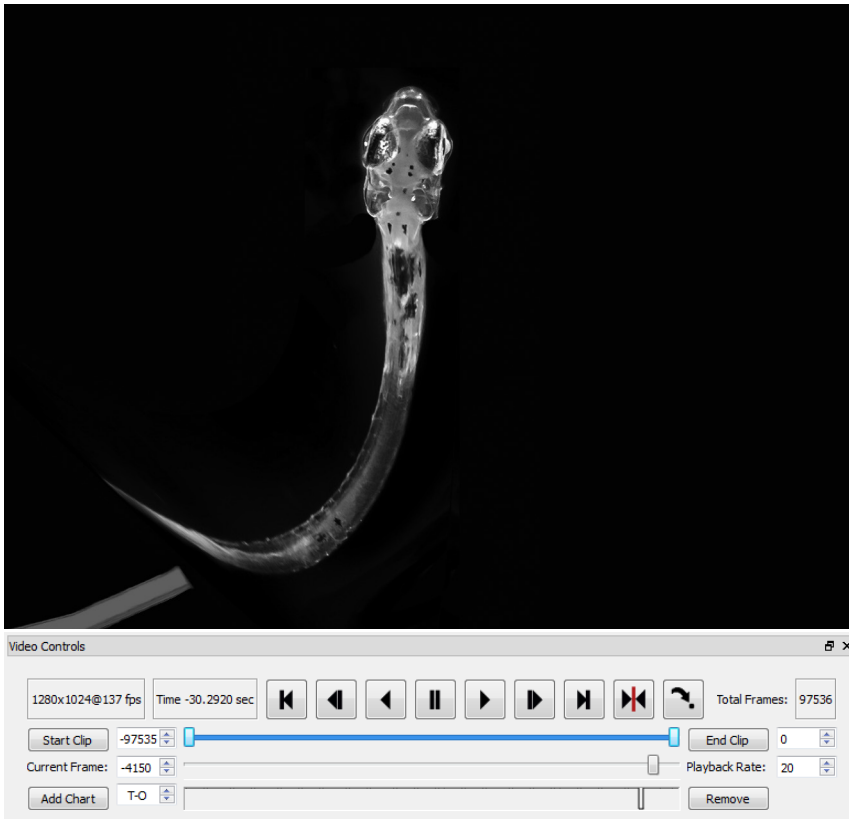
Vignetting (darkening at the corners of the image) often occurs when using cameras with larger pixels on optics designed for 3/4" or 1" sensors. For example, a camera with  $20\mu\text{m}$  pixels will begin vignetting at resolutions above 640 x 512 on 1" optics and above 480 x 384 on 3/4" optics.



Field of View with  $5\mu\text{m}$  Pixels

# Flexible Recording Modes

**IL5** is an extremely efficient tool for capturing high-speed footage, recording exactly what you need, no more, no less.



*IL5 circular buffer captures images before and/or after an event trigger.*

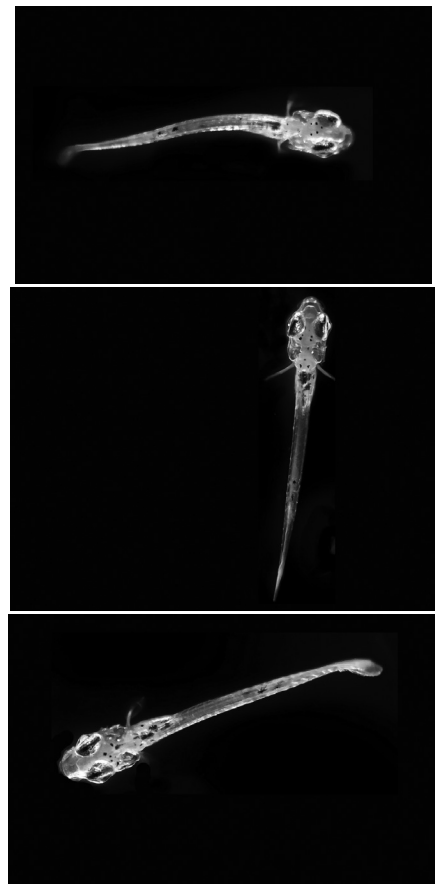
- Triggering in response to uncontrolled events as (or after) they occur make it possible to catch unpredictable behaviors.
- Tie external control signals to the camera's trigger to demonstrate behaviors before and after a stimulus.
- Up to six signals may be input directly to the IL5 I/O ports. The status of each is recorded for each frame and may be graphically represented during playback.

*FasFire automatically saves one clip to onboard storage while continuing to record the next, queueing up as many as 16 partitions at a time. As soon as a partition is saved, it is cleared and becomes available for another recording.*

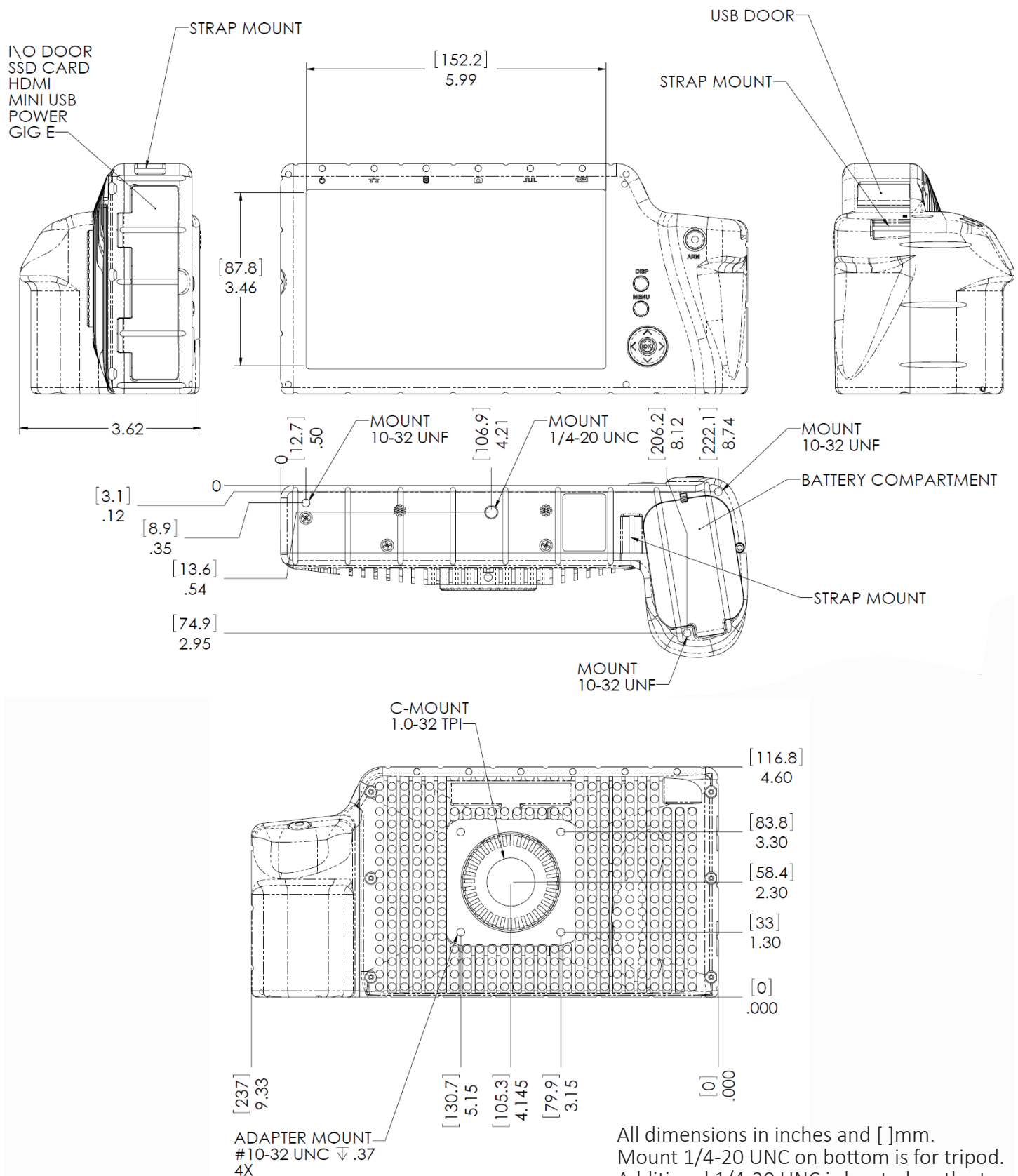
This feature may be particularly useful whenever there are multiple events to record that may occur in succession such as rapidly changing operating modes in a microfluidic device, or an unpredictable animal exhibiting interesting behaviors.

## Onboard SSD

*Save to an optional SSD (up to 2TB)! Short clips may be saved in seconds, or, with the Long Record option, the IL5 may stream directly to SSD for very long recordings!*



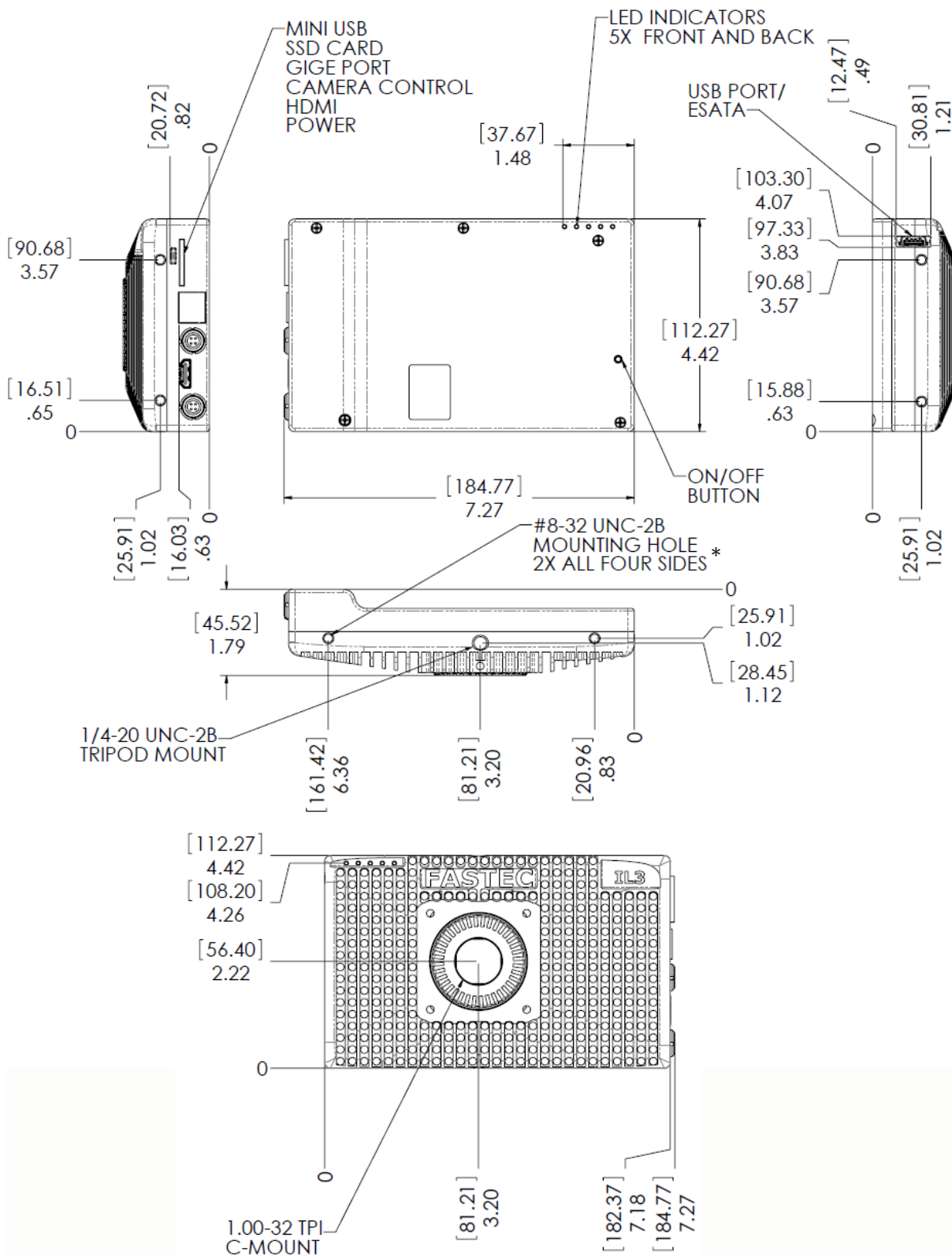
# TS5 Dimensions



All dimensions in inches and [ ]mm.  
Mount 1/4-20 UNC on bottom is for tripod.  
Additional 1/4-20 UNC is located on the top of the camera.



# IL5 Dimensions



All dimensions in inches and [ ]mm.  
Mount 1/4-20 UNC on bottom is for tripod.  
Additional 1/4-20 UNC is located on the top  
of the camera.

\*On request 8-32 helicoils may be installed at the  
factory before the camera is shipped

# Recording Rates and Time

## Normal Mode\*

|                  |                     | Resolution              | Max Frame Rate | Recording Time |
|------------------|---------------------|-------------------------|----------------|----------------|
| TS5/IL5-Q: QSXGA | TS5/IL5-H: HD 1080p | 2560 x 2048 (QSXGA)     | 253 fps        | 6.3 sec        |
|                  |                     | 2560 x 1440 (QHD)       | 359 fps        | 6.3 sec        |
|                  |                     | 1920 x 1080 (HD: 1080p) | 634 fps        | 6.5 sec        |
|                  |                     | 1440 x 1080             | 634 fps        | 8.5 sec        |
|                  | TS5/IL5-S: SXGA     | 1280 x 1024 (SXGA)      | 991 fps        | 6.4 sec        |
|                  |                     | 1280 x 1014             | 1001 fps       | 6.4 sec        |
|                  |                     | 1280 x 720 (HD: 720p)   | 1403 fps       | 6.5 sec        |
|                  |                     | 1000 x 1000             | 1015 fps       | 8.2 sec        |
|                  | TS5/IL5-L: SVGA     | 1024 x 768 (XGA)        | 1316 fps       | 8.1 sec        |
|                  |                     | 800 x 600 (SVGA)        | 1677 fps       | 10.4 sec       |
|                  |                     | 800 x 450               | 2221 fps       | 10.5 sec       |
|                  |                     | 768 x 576               | 2764 fps       | 6.8 sec        |
|                  |                     | 640x480 (VGA)           | 3289 fps       | 8.3 sec        |
|                  |                     | 512 x 384               | 4061 fps       | 10.5 sec       |
|                  |                     | 320 x 240               | 6267 fps       | 17.4 sec       |
|                  |                     | 64 x 32                 | 29090 fps      | 2min 19 sec    |

## Long Record Mode\*\*

|                  |                     | Resolution              | Max Frame Rate | Recording Time |
|------------------|---------------------|-------------------------|----------------|----------------|
| TS5/IL5-Q: QSXGA | TS5/IL5-H: HD 1080p | 2560 x 2048 (QSXGA)     | 91 fps         | 34.9 min       |
|                  |                     | 2560 x 1440 (QHD)       | 130 fps        | 34.7 min       |
|                  |                     | 1920 x 1080 (HD: 1080p) | 231 fps        | 34.7 min       |
|                  |                     | 1440 x 1080             | 308 fps        | 34.7 min       |
|                  | TS5/IL5-S: SXGA     | 1280 x 1024 (SXGA)      | 366 fps        | 34.7 min       |
|                  |                     | 1280 x 1014             | 369 fps        | 34.7 min       |
|                  |                     | 1280 x 720 (HD: 720p)   | 520 fps        | 34.7 min       |
|                  |                     | 1000 x 1000             | 478 fps        | 34.7 min       |
|                  | TS5/IL5-L: SVGA     | 1024 x 768 (XGA)        | 610 fps        | 34.7 min       |
|                  |                     | 800 x 600 (SVGA)        | 993 fps        | 34.7 min       |
|                  |                     | 800 x 450               | 1331 fps       | 34.7 min       |
|                  |                     | 768 x 576               | 1084 fps       | 34.7 min       |
|                  |                     | 640x480 (VGA)           | 1562 fps       | 34.7 min       |
|                  |                     | 512 x 384               | 2441 fps       | 34.7 min       |
|                  |                     | 320 x 240               | 5000 fps       | 42.8 min       |

All specifications subject to change. All record rates assume 8-bit data.

\*Record times assume 8GB of memory. Divide Record times by 2 for approximate 4GB record times.

\*\*LR Record times assume "D" option and 1TB SSD. Divide by 2 for 512GB SSD; multiply by 2 for 2TB SSD.

# TS5 Specifications

## Standard Features

|                               |                                                                                                                                                               |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>System Design</b>          | Handheld, battery-powered, portable with touchscreen LCD                                                                                                      |
| <b>Sensor</b>                 | 12-bit CMOS sensor with 5µm square pixels, color or monochrome                                                                                                |
| <b>Sensor Modes</b>           | Standard, binning 2x2 or 4x4; sub-sampling 2x2 or 4x4; Or 2x binning + 2x sub-sampling                                                                        |
| <b>Resolution by Model</b>    | TS5-Q: QSXGA 2560 x 2048; TS5-H: HD 1920x1080; -S: SXGA 1280x1024; -L SVGA 800x600                                                                            |
| <b>Light Sensitivity</b>      | 1600 to 12,800* ISO monochrome, 800 to 6400* ISO color (depending on mode)                                                                                    |
| <b>Shutter</b>                | Global electronic shutter from 3µsec to 41.654ms                                                                                                              |
| <b>Image Memory</b>           | 4GB (std.) or 8GB (optional)                                                                                                                                  |
| <b>Removable Storage</b>      | SD card (SDHC: 32GB maximum); USB flash drive                                                                                                                 |
| <b>File Formats</b>           | Stacks – BMP, DNG (color), JPEG (selectable quality), TIFF, TIFF(raw); Video – AVI (selectable quality (compressed) or un-compressed), CAP(raw); Still – JPEG |
| <b>Lens Mounts</b>            | C-mount (all cameras ship with C-mount), F-mount or PL-mount (optional)                                                                                       |
| <b>Built-in Monitor</b>       | High resolution, 178mm (7") diagonal LCD                                                                                                                      |
| <b>Communication Ports</b>    | USB 2.0 device port (micro-B), Ethernet (10/100/1000Base-T)                                                                                                   |
| <b>Control Software</b>       | FasMotion (PC/Mac application), web interface (web browser on all platforms)                                                                                  |
| <b>Six External I/O Ports</b> | Trigger In/Out, Sync In/Out, Arm In/Out (LVTTTL (3.3V) or switch closure); Any or all of the I/O ports may be used as Marker inputs                           |
| <b>Marker Data Views</b>      | Camera display info line, playback timeline, FasMotion o-scope mode, XML file                                                                                 |
| <b>Video Out</b>              | HDMI (1080p30, 1080p60, 720p, 480p)                                                                                                                           |
| <b>Construction</b>           | Anodized machined aluminum housing                                                                                                                            |
| <b>Power</b>                  | Rechargeable Internal Li-ion battery or 10-26 VDC external                                                                                                    |
| <b>Power Consumption</b>      | 42W maximum                                                                                                                                                   |
| <b>Operating Environment</b>  | +5°C to +40°C                                                                                                                                                 |
| <b>Size and Weight</b>        | 228mm (9.0") W x 114mm (4.5") H x 89mm (3.5") D. 1.8 Kg (3.9 lbs.)                                                                                            |

## Optional Features

|                               |                                                                                                              |
|-------------------------------|--------------------------------------------------------------------------------------------------------------|
| <b>WiFi</b>                   | 802.11 b/g/n, Security: open, WEP, WPA(2) - PSK                                                              |
| <b>Built-In Storage</b>       | Solid State Drive (SSD): 256GB, 512GB, 1TB, 2TB                                                              |
| <b>Long Record "D" Option</b> | Streams uncompressed video to SSD at 480MB/sec; 8GB mem. + SSD required; ships with an external battery pack |

\*Higher ISO settings available via bit-shifting and analog gains result in lower SNR. Binning modes reduce noise.

All specifications subject to change.

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|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Sensor</b>                 | 12-bit CMOS sensor with 5µm square pixels, color or monochrome                                                                                                |
| <b>Sensor Modes</b>           | Standard, binning 2x2 or 4x4; sub-sampling 2x2 or 4x4; Or 2x binning + 2x sub-sampling                                                                        |
| <b>Resolution by Model</b>    | IL5-Q: QXGA 2560 x 2048; IL5-H: HD 1920x1080; IL5-S: SXGA 1280x1024; IL5-L SVGA 800x600                                                                       |
| <b>Light Sensitivity</b>      | 1600 to 12,800* ISO monochrome, 800 to 6400* ISO color (depending on mode)                                                                                    |
| <b>Shutter</b>                | Global electronic shutter from 3µsec to 41.654ms                                                                                                              |
| <b>Image Memory</b>           | 4GB (std.) or 8GB (optional)                                                                                                                                  |
| <b>Removable Storage</b>      | SD card (SDHC: 32GB maximum); USB flash drive                                                                                                                 |
| <b>File Formats</b>           | Stacks – BMP, DNG (color), JPEG (selectable quality), TIFF, TIFF(raw); Video – AVI (selectable quality (compressed) or un-compressed), CAP(raw); Still – JPEG |
| <b>Lens Mounts</b>            | C-mount (all cameras ship with C-mount), F-mount or PL-mount (optional)                                                                                       |
| <b>Communication Ports</b>    | USB 2.0 device port (micro-B), Ethernet (10/100/1000Base-T)                                                                                                   |
| <b>Control Software</b>       | FasMotion (PC/Mac application), web interface (web browser on all platforms)                                                                                  |
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| <b>Marker Data Views</b>      | Camera display info line, playback timeline, FasMotion o-scope mode, XML file                                                                                 |
| <b>Video Out</b>              | HDMI (1080p30, 1080p60, 720p, 480p)                                                                                                                           |
| <b>Construction</b>           | Anodized machined aluminum housing                                                                                                                            |
| <b>Power</b>                  | 10-26 VDC external                                                                                                                                            |
| <b>Power Consumption</b>      | 22W maximum                                                                                                                                                   |
| <b>Operating Environment</b>  | +5°C to +50°C                                                                                                                                                 |
| <b>Size and Weight</b>        | 184mm W x 112mm H x 50mm D. 1 Kg (2.2 lbs.)                                                                                                                   |

## Optional Features

|                         |                                                                                                              |
|-------------------------|--------------------------------------------------------------------------------------------------------------|
| <b>WiFi</b>             | 802.11 b/g/n, Security: open, WEP, WPA(2) - PSK                                                              |
| <b>Built-In Storage</b> | Solid State Drive (SSD): 256GB, 512GB, 1TB                                                                   |
| <b>Long Record</b>      | Streams uncompressed video to SSD at 480MB/sec; 8GB mem. + SSD required; ships with an external battery pack |

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