Lepton™ 3.x VoSPI Developer's Guide

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Version 3.0.0

1.1 Changes in the 160x120 camera from 80x60

The 80x60 camera sent out full frames at a rate of 30Hz. The 160x120 camera will send out 4 segments of 80x60 each at a rate of 120Hz. The host is responsible for assembling the segments, using the TTT bits in the header, to create a single 160x120 image. Four segments at a rate of 120Hz will give us an effective frame rate of 30Hz.

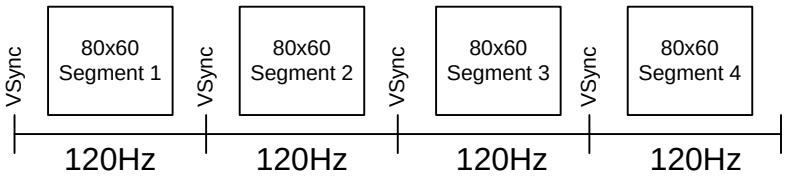

Figure 1: Four 80x60 segments are captured at a rate of 120Hz, having an effective frame rate of 30Hz

The host must be able to read these 80x60 segments at 120Hz or it will lose sync with the ASIC.

1.2 Segment Numbers

There are four segments that comprise of a 160x120 frame. In each of the segments, the packet sizes for each line as well as the number of lines per frame are the same in the 160x120 camera as they were in the 80x60 camera. Each row in an 80x60 segment corresponds to a half-row in the 160x120 frame. Row numbers are 0 through 59 for each segment, regardless of the segment number. The host is responsible for calculating the final row and column position in the final 160x120 frame.

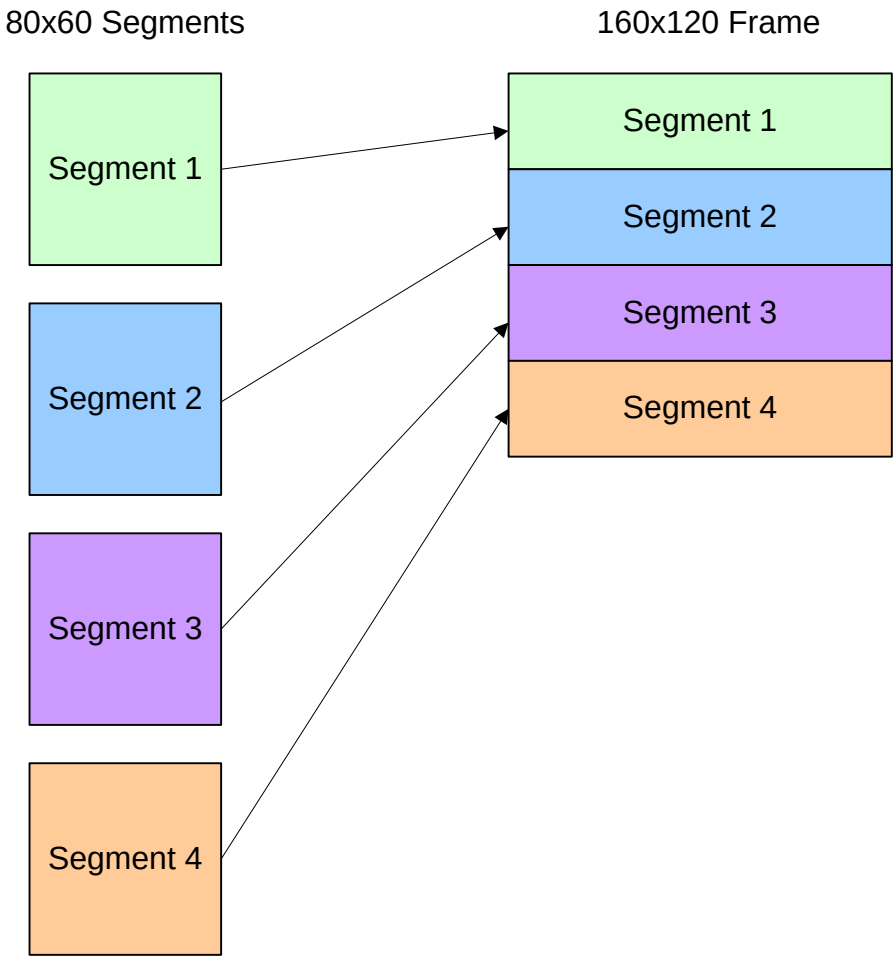

Figure 2: Although the segments are read out of SPI as 80x60 frames, they correspond to 160x30 sub-frames in the 160x120 frame.

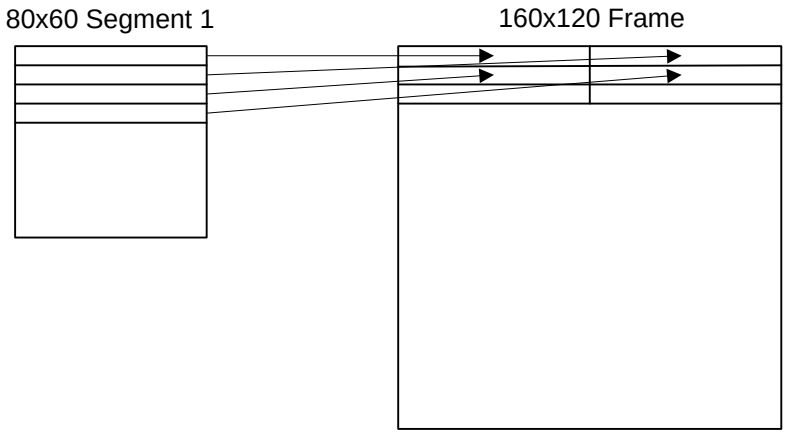

Figure 3: Each row in an 80x60 segment corresponds to a half row in the 160x120 frame.

1.3 Assembling segments into a 160x120 frame

The packet size and composition in the 80x60 segments are the same as they were in the 80x60 camera.

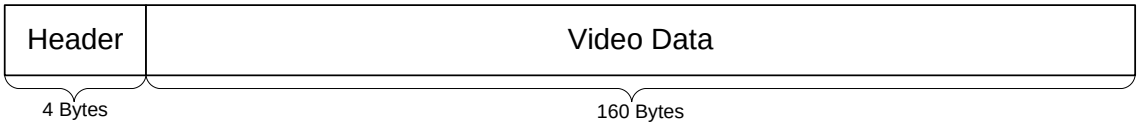

Figure 4: Packet size and composition and the same as they were in the 80x60 camera

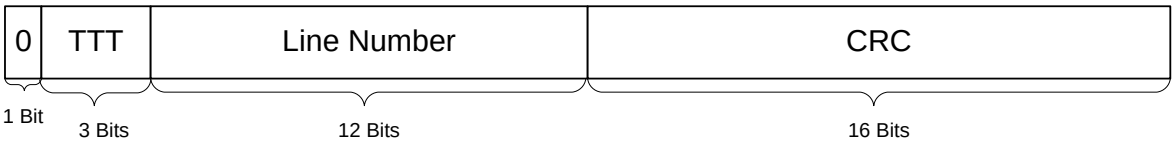

Figure 5: Zoomed in view of the header

The host will be required to read the TTT bits in the packet header to determine where this 80x60 segment belongs. Encoded in the TTT bits is a 12-bit field that conveys the segment number as well as the total number of segments that comprise of a single frame. These TTT bits are sent 3 bits per packet.

x	2	1	0	Line Number = 20	CRC
x	5	4	3	Line Number = 21	CRC
x	8	7	6	Line Number = 22	CRC
x	11	10	9	Line Number = 23	CRC

Segment Number = [3:0]
Segments per Frame = [7:4]
Reserved = [11:8]

Figure 6: Lines 20 through 23 give us a 12-bit field that conveys the segment number as well as the total number of segments that make up a frame.

Valid values for the Segment Number field are 1, 2, 3, and 4. Any segment that has a segment number other than these values is considered invalid and is to be discarded.

The only valid value for the Number of Segments per Frame field for the 160x120 image is 4.

The reserved bits are always set to zero.

1.4 Example Capture Data

The packet header will contain this data for segment 3.

0	0	1	1	0000 0001 0100	CRC
0	0	0	0	0000 0001 0101	CRC
0	0	0	1	0000 0001 0110	CRC
0	0	0	0	0000 0001 0111	CRC

Figure 7: Example capture data for lines 20 - 23 of segment 3