

# XGS X-Celerator Developer Kit

## EVBUM2747/D

### INTRODUCTION

The X-Celerator kit is designed to enable FPGA development around ON Semiconductor's XGS image sensor family. The kit provides a sensor HiSpi receiver example as starting point to allow for a quicker and more easy integration to standard FPGA evaluation environments. The interface example was created for a Xilinx™ Ultrascale™ architecture.

The headboard features ON Semiconductor XGS 45000, image sensor integrated on a standard High-Speed Array VITA 57.1 FPGA Mezzanine Card (FMC) with on-board power management.

### IP CORE ARCHITECTURE

Reference RTL code for the HiSpi receiver (See Figure 2) is available under NDA and structured as three modular IP core blocks (deserializer, decoder and remapper) that convert the XGS HiSpi output to a AXI4 video streaming standard. These blocks are written in a flexible and generic form that is easily modified and inserted in any FPGA vendor technology or design methodology. The X-Celerator contains a ready to use block diagram example solution for each of the sensor variants, designed for the Xilinx Kintex™ UltraScale architecture.

Although the RTL IP core blocks have been validated to work on Altera (Intel) development boards, active support for the HiSpi receiver on these systems is currently not yet available.

### SYSTEM OVERVIEW

Figure 1 shows the stripped XGS 45000 X-Celerator FMC headboard (100 x 69 mm). This is the single part that changes between the different Orderable Part Numbers (OPN's), provided in Table 1. The kit furthermore consists out of a F-mount lens holder, lens extension tube, fixing ring, THORLABS™ adaptor, High-pin Count (HPC) FMC cable, tripod mount and a tripod in order to enable a more user-friendly tripod configuration. The individual parts are discussed in more detail in the following subsections. Please note that these OPN's do NOT include a lens or development board.

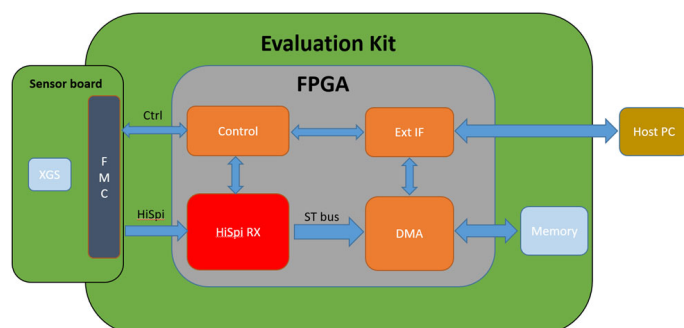


Figure 2. HiSpi Receiver in FPGA solution



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### EVAL BOARD USER'S MANUAL

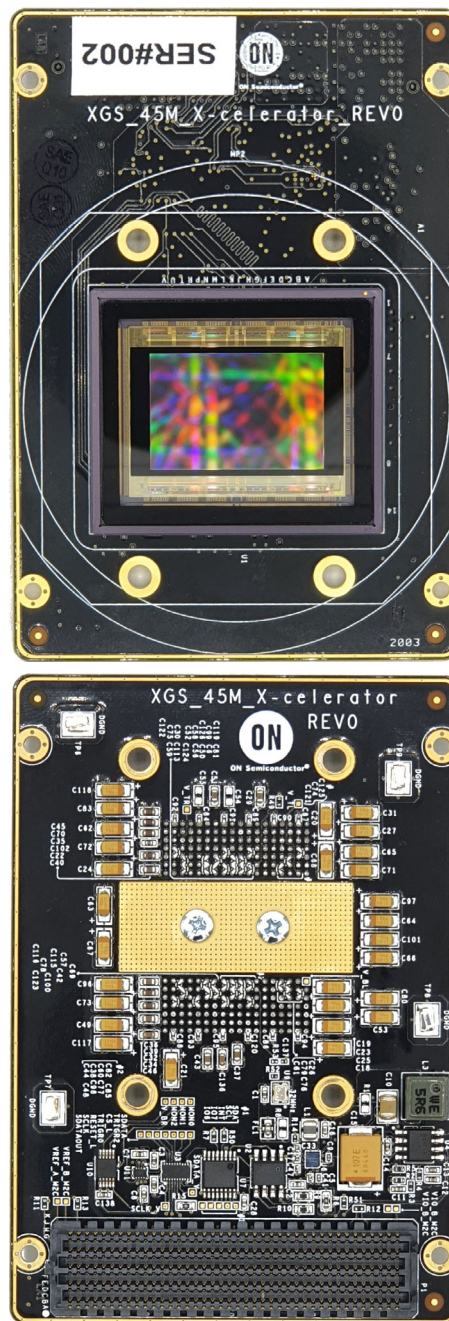


Figure 1. X-Celerator FMC Headboard

Table 1. ORDERABLE PART NUMBERS

| Part Number             | Product Description                                                                                                   |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------|
| XCEL-NOIX0SE045KBL-GEVK | X-Celerator – XGS 45000 – color image sensor board, includes HPC FMC cable, lens mount, tripod mount and tripod.      |
| XCEL-NOIX0SN045KBL-GEVK | X-Celerator – XGS 45000 – monochrome image sensor board, includes HPC FMC cable, lens mount, tripod mount and tripod. |

### Image Sensor Board

This board features one of ON Semiconductor XGS image sensors implemented on a ANSI/VITA 57.1 single width FMC standard module board with full channel (48 lanes for XGS 45000) HiSpi video output, the necessary sensor control signals provided over SPI and a single 3.3 V power

supply input. The ON Semiconductor's NCP6914 Mini-PMIC provides all the necessary low noise power supplies for the image sensor operations.

Figure 3 and Table 2 show the board layout and the Bill of Materials (BOM) for the X-Celerator. Detailed layout files and schematics are available under NDA.

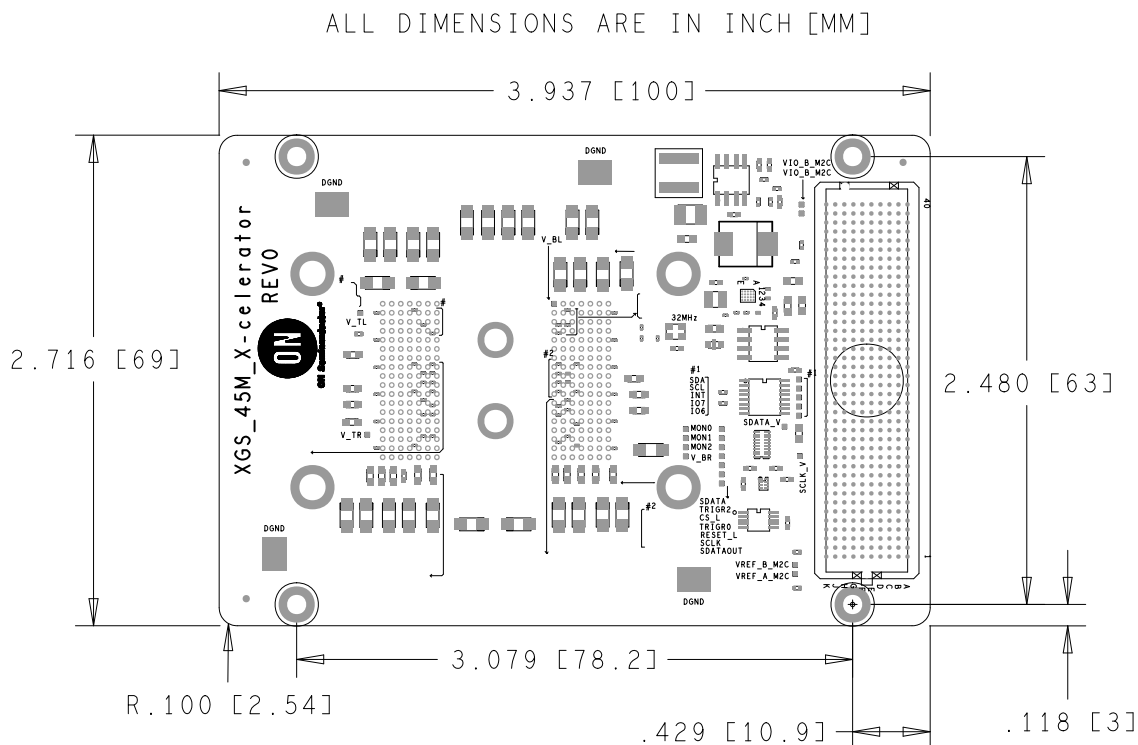


Figure 3. X-Celerator Headboard Dimensions

### High-pin Count (HPC) FMC Cable

Provided with the OPN's comes a VITA 57.1 FMC Samtec HPC HDR Cable, as shown in Figure 4, to connect the headboard in its tripod configuration. Specifications on the usable cables can be found on the [Samtec VITA family webpage](http://www.samtec.com/vita-family).

The provided cable (HDR-169468-01) is the HPC variant of the FMC connection in order to send all 48 data channels to the FPGA.

More details on the pin usage can be found in Table 3.



Figure 4. High-pin Count (HPC) FMC Cable

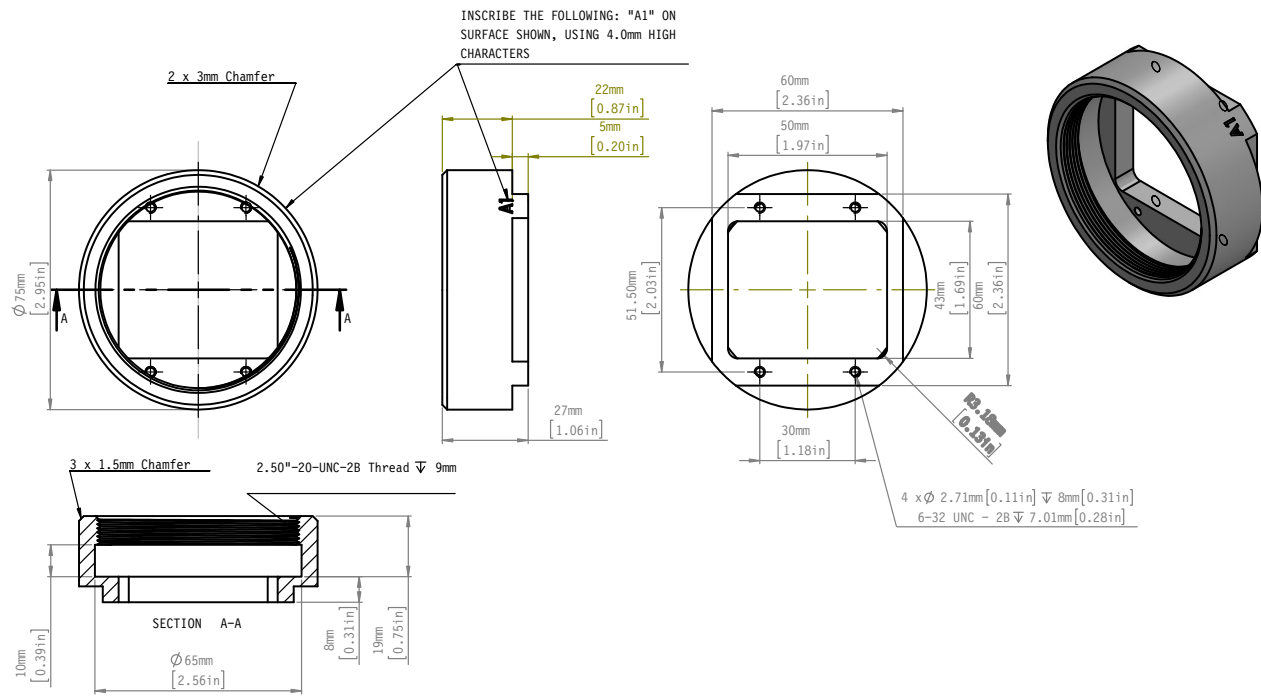


Figure 5. F-Mount Lens Holder Base

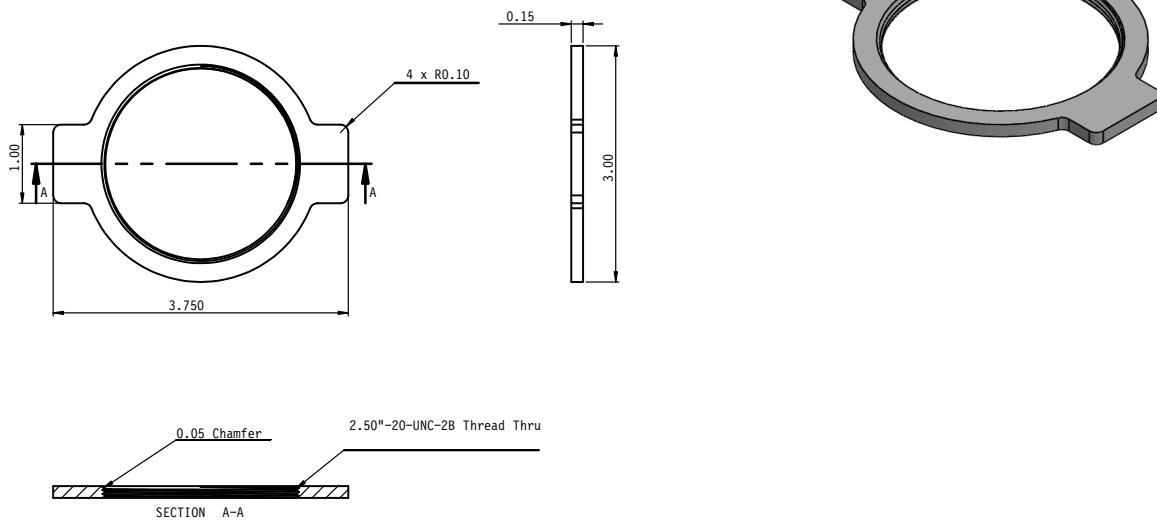


Figure 6. Fixing Ring for F-Mount Extension Tube

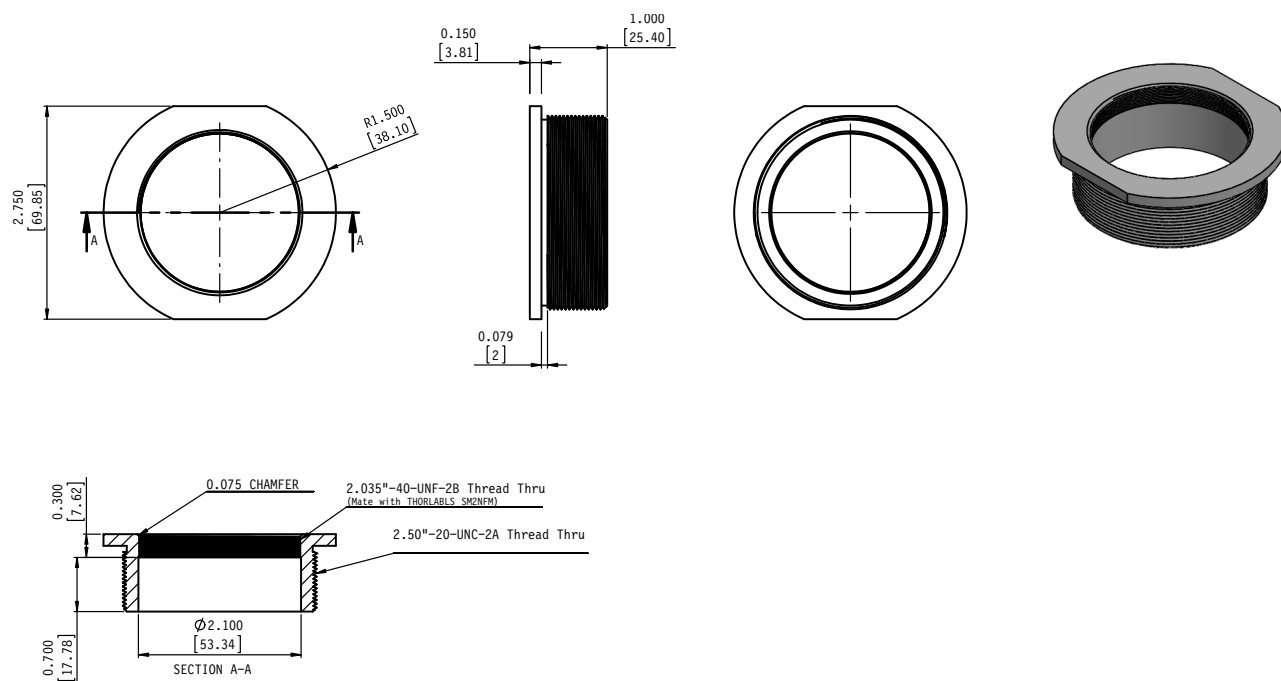


Figure 7. Lens Holder Extension Tube

#### Lens Mount

The headboard comes with a standard F-mount lens holder that is screwed onto the board. The lens mount is made of black aluminium and fits closely around the XGS 45000 sensor, as shown in Figure 4.

The lens mount comes with a F-mount extender tube, fixing ring and Thorlabs SM2NFM adaptor. See Figure 5 and Figure 6 for the tube and fixing ring.

#### Tripod Mount

In order to mount the cable firmly to the provided headboard, two different aluminium mounting pieces are provided that serve a dual purpose. Both as tripod mount for the provided tripod, see Figure 8, and as FMC cable

connector lock, see Figure 9, to secure your hardware connection. These pieces are connected by two M2.5 screws and nuts.

#### Tripod

The last part to make the development kit complete is a standard adjustable tripod to aim the image sensor in any direction that is desired.

#### Not Included: Lens and FPGA Development Platform

The development kit does not include a F-mount lens or FPGA development platform as different needs require different platforms.

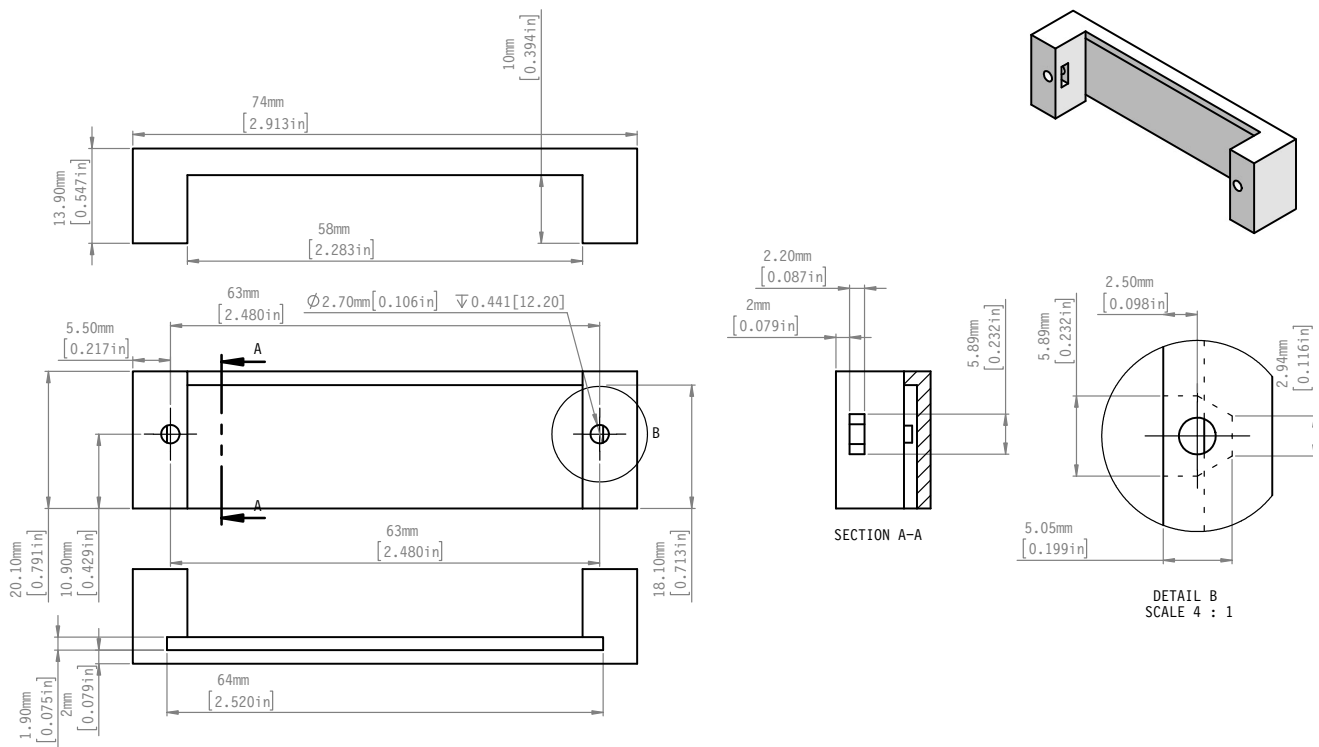
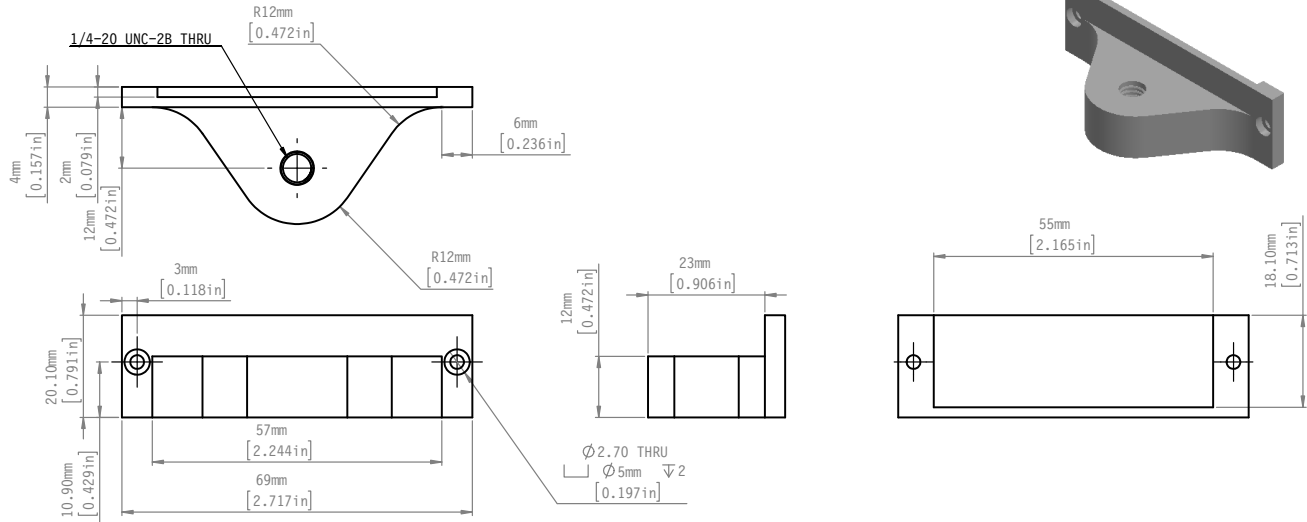


Table 2. XGS 45000 X-CELERATOR BOM

| Item | Qty | Part Reference                                                                                                                                                                         | Value | Package | Description                                                    | Manufacturer                 | Manufacturer Part Number |
|------|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------|----------------------------------------------------------------|------------------------------|--------------------------|
| 1    | 8   | C1 C2 C3 C4 C7<br>C8 C28 C138                                                                                                                                                          | 100nF | 402     | CAP, CERAMIC,<br>100nF, 16V,<br>X7R, 10%, 0402                 | Murata                       | GRM155R71C104<br>KA88D   |
| 2    | 6   | C5 C107 C108<br>C109 C111 C112                                                                                                                                                         | 2.2uF | 201     | CAP, CERAMIC,<br>2.2uF, 10V, X5R,<br>10%, 0201                 | Murata                       | GRM033R61A225K<br>E47D   |
| 3    | 37  | C6 C26 C57 C59<br>C60 C61 C74 C75<br>C76 C77 C78 C79<br>C81 C82 C84 C85<br>C86 C87 C88 C89<br>C90 C91 C92 C93<br>C94 C95 C98 C99<br>C116 C119 C120<br>C121 C122 C123<br>C124 C125 C126 | 100nF | 201     | CAP, CERAMIC,<br>100nF, 10V,<br>X7S, 20%, 0201,<br>-55/+125C   | TDK                          | C0603X7S1A104M<br>030    |
| 4    | 1   | C10                                                                                                                                                                                    | 100uF | 1210    | CAP, CERAMIC,<br>100uF, 6.3V,<br>X5R, 20%, 1210                | Murata                       | GRM32ER60J107<br>ME20L   |
| 5    | 1   | C11                                                                                                                                                                                    | 680pF | 402     | CAP, CERAMIC,<br>680pF, 25V,<br>X7R, 10%, 0402                 | Panasonic                    | ECJ0EB1E681K             |
| 6    | 1   | C12                                                                                                                                                                                    | 12nF  | 402     | CAP, CERAMIC,<br>12nF, 16V, X7R,<br>10%, 0402                  | Panasonic                    | ECJ0EB1C123K             |
| 7    | 1   | C13                                                                                                                                                                                    | 150pF | 402     | CAP, CERAMIC,<br>150pF, 50V,<br>X7R, 10%, 0402                 | AVX                          | 04025C151KAT2A           |
| 8    | 1   | C14                                                                                                                                                                                    | 10nF  | 402     | CAP, CERAMIC,<br>10nF, 50V, X6S,<br>10%, 0402                  | TDK Corporation              | C1005X6S1H103K           |
| 9    | 1   | C15                                                                                                                                                                                    | 100uF | 7361-38 | CAP,<br>TANTALUM<br>CHIP, LOW<br>ESR, 100uF,<br>25V, 10%, 7361 | AVX                          | TPSV107K025R01<br>00     |
| 10   | 28  | C18 C19 C20 C21<br>C23 C24 C25 C27<br>C31 C49 C53 C62<br>C63 C64 C65 C66<br>C67 C68 C71 C72<br>C73 C80 C83 C96<br>C97 C101 C117<br>C118                                                | 10uF  | 3216-18 | CAP,<br>TANTALUM<br>CHIP, LOW<br>ESR, 10uF, 10V,<br>10%, 3216  | AVX                          | TPSA106K010R09<br>00     |
| 11   | 6   | C22 C32 C35 C39<br>C45 C70                                                                                                                                                             | 10uF  | 603     | CAP, CERAMIC,<br>10uF, 10V, X5R,<br>10%, 0603                  | Murata                       | GRM188R61A106K<br>AALD   |
| 12   | 7   | C29 C34 C36 C37<br>C40 C43 C51                                                                                                                                                         | 4.7uF | 603     | CAP, CERAMIC,<br>4.7uF, 6.3V,<br>X7R, 10%, 0603                | Samsung_Electr<br>o_mechanic | CL10B475KQ8NQ<br>N       |
| 13   | 5   | C30 C38 C42 C113<br>C115                                                                                                                                                               | 220nF | 201     | CAP, CERAMIC,<br>220nF, 10V,<br>X5R, 20%, 0201                 | Taiyo Yuden                  | LMK063BJ224MP-<br>F      |
| 14   | 7   | C44 C48 C50 C52<br>C56 C58 C69                                                                                                                                                         | 100nF | 201     | CAP, CERAMIC,<br>100nF, 10V,<br>X5R, 20%, 0201                 | Murata                       | GRM033R61A104<br>ME15D   |
| 15   | 2   | C46 C136                                                                                                                                                                               | 2.2uF | 603     | CAP, CERAMIC,<br>2.2uF, 10V, X7R,<br>10%, 0603                 | Murata                       | GRM188R71A225K<br>E15D   |



Table 2. XGS 45000 X-CELERATOR BOM (continued)

| Item | Qty | Part Reference | Value          | Package     | Description                                                                                        | Manufacturer             | Manufacturer Part Number |
|------|-----|----------------|----------------|-------------|----------------------------------------------------------------------------------------------------|--------------------------|--------------------------|
| 16   | 1   | C100           | 470nF          | 201         | CAP, CERAMIC, 470nF, 6.3V, X5R, 10%, 0201                                                          | Murata                   | GRM033R60J474K E90D      |
| 17   | 1   | C102           | 680nF          | 402         | CAP, CERAMIC, 680nF, 6.3V, X6S, 5%, 0402                                                           | Samsung_Electro_mechanic | CL05X684JQ5NNN C         |
| 18   | 2   | C103 C110      | 10uF           | 402         | CAP, CERAMIC, 10uF, 6.3V, X5R, 20%, 0402                                                           | Murata                   | GRM155R60J106M E15D      |
| 19   | 1   | C104           | 4.7uF          | 402         | CAP, CERAMIC, 4.7uF, 6.3V, X5R, 20%, 0402, Automotive AEC-Q200                                     | Taiyo Yuden              | JMK105BBJ475MV HF        |
| 20   | 2   | C114 C127      | 1uF            | 603         | CAP, CERAMIC, 1uF, 16V, X7R, 10%, 0603, Automotive AEC-Q200                                        | TDK Corporation          | CGA3E1X7R1C105 K080AC    |
| 21   | 1   | FL1            | 1uF            | 603         | EMI FILTER, MLC CAPACITORS, LOW ESL, 1uF, 2A, 6.3V, 0603                                           | Murata                   | NFM18PC105R0J3 D         |
| 22   | 1   | L2             | 1.0uH          | 805         | IND, CHIP COIL, MULTILAYER, SMD, 1.0uH, 1.3A, +/-30%, 0805                                         | Murata                   | LQM21PN1R0NGR            |
| 23   | 1   | L3             | 5.6uH          | 254x262x240 | IND, POWER, SMD, 5.6uH, 6.9A, .254"L x .262"W x .240"H                                             | Würth Elektronik         | 74439346056              |
| 24   | 1   | P1             | HDR400-10x40-P |             | CONN, HEADER, SINGLE END ARRAY, 10x40, 400 PIN, 1.27MM PITCH, ALGNMNT PINS, SMD                    | Samtec                   | ASP-134488-01            |
| 25   | 1   | R2             | 24K            | 402         | RESISTOR, PRECISION THICK FILM CHIP, SMD, 24K, 0.1W, 1%, 0402, AEC-Q200 compliant                  | Panasonic                | ERJ2RKF2402X             |
| 26   | 1   | R3             | 1K             | 402         | RESISTOR, PRECISION THICK FILM CHIP, SMD, 1K, 0.1W, 1%, 0402, Automotive grade, AEC-Q200 compliant | Panasonic                | ERJ-2RKF1001X            |

Table 2. XGS 45000 X-CELERATOR BOM (continued)

| Item | Qty | Part Reference | Value | Package | Description                                                                                               | Manufacturer | Manufacturer Part Number |
|------|-----|----------------|-------|---------|-----------------------------------------------------------------------------------------------------------|--------------|--------------------------|
| 27   | 1   | R4             | 14.7K | 402     | RESISTOR, PRECISION THICK FILM CHIP, SMD, 14.7K Ohm, 0.1W, 1%, 0402, Automotive grade, AEC-Q200 compliant | Panasonic    | ERJ-2RKF1472X            |
| 28   | 1   | R5             | 7.15K | 402     | RESISTOR, PRECISION THICK FILM CHIP, SMD, 7.15K, 0.1W, 1%, 0402                                           | Panasonic    | ERJ2RKF7151X             |
| 29   | 2   | R6 R15         | 0     | 603     | RESISTOR, THICK FILM CHIP, SMD, 0 OHM JUMPER, 0.1W, 5%, 0603, AEC-Q200 compliant                          | Panasonic    | ERJ3GEY0R00V             |
| 30   | 3   | R7 R50 R51     | 4.7K  | 402     | RESISTOR, THICK FILM CHIP, SMD, 4.7K, 0.063W, 5%, 0402                                                    | Panasonic    | ERJ2GEJ472X              |
| 31   | 2   | R9 R10         | 10K   | 603     | RESISTOR, PRECISION THICK FILM CHIP, SMD, 10K, 0.1W, 1%, 0603                                             | Panasonic    | ERJ3EKF1002V             |
| 32   | 1   | R11            | 300K  | 402     | RESISTOR, PRECISION THICK FILM CHIP, SMD, 300K, 0.1W, 1%, 0402                                            | Panasonic    | ERJ-2RKF3003             |
| 33   | 2   | R12 R13        | 0     | 402     | RESISTOR, PRECISION THICK FILM CHIP, SMD, 0 Ohm, 0.1W, 1%, 0402, Automotive grade, AEC-Q200 compliant     | Panasonic    | ERJ2GE0R00X              |
| 34   | 1   | R49            | 10K   | 402     | RESISTOR, THICK FILM CHIP, SMD, 10K, 0.063W, 5%, 0402, AEC-Q200 compliant                                 | Panasonic    | ERJ2GEJ103X              |
| 35   | 1   | R52            | 0     | 201     | RESISTOR, THICK FILM CHIP, SMD, 0 OHM JUMPER, 0.05W, 5%, 0201                                             | Panasonic    | ERJ1GE0R00C              |



Table 2. XGS 45000 X-CELERATOR BOM (continued)

| Item | Qty | Part Reference  | Value                | Package | Description                                                                                                               | Manufacturer              | Manufacturer Part Number |
|------|-----|-----------------|----------------------|---------|---------------------------------------------------------------------------------------------------------------------------|---------------------------|--------------------------|
| 36   | 4   | TP6 TP7 TP8 TP9 | TSTPT-5016           |         | CONN,<br>TERMINAL,<br>TEST POINT<br>COMPACT, .015<br>THICK, SMT                                                           | Keystone<br>Electronics   | 5016                     |
| 37   | 1   | U1              | XGS45M_PG<br>A251_HS | PGA251  | IC, SENSOR,<br>ACTIVE-PIXEL<br>DIGITAL<br>IMAGE, CMOS,<br>XGS45M,<br>PGA251, WITH<br>HEATSINK PIN                         | ON<br>Semiconductor       | XGS45M_PGA251            |
| 38   | 1   | U2              | CAT24C64             | SO8     | IC, SERIAL<br>EEPROM, I2C,<br>64Kbit, +1.7V<br>TO +5.5V, -40°C<br>to +85°C, SO8<br>Narrow                                 | ON<br>Semiconductor       | CAT24C64WI-GT3           |
| 39   | 1   | U3              | NLSV8T244            | UDFN20  | IC, LEVEL<br>TRANSLATOR,<br>NON-INVERTIN<br>G, DUAL<br>SUPPLY, 8-BIT,<br>0.9V TO 4.5V,<br>UDFN20                          | ON<br>Semiconductor       | NLSV8T244MUTA<br>G       |
| 40   | 1   | U4              | NCP3170              | SO8     | IC, VOLTAGE<br>REGULATOR,<br>500kHz<br>SYNCHRONOU<br>S BUCK<br>CONVERTER,<br>4.5 TO 18V IN,<br>ADJUSTABLE<br>OUT, 3A, SO8 | ON<br>Semiconductor       | NCP3170ADR2G             |
| 41   | 1   | U6              | FAN53880             | WLCSP25 | IC, PMIC, 6<br>CHANNEL, ONE<br>BUCK, ONE<br>BOOST AND<br>FOUR LDO,<br>WLCSP25                                             | ON<br>Semiconductor       | FAN53880UC002X           |
| 42   | 1   | U7              | PCA9654E             | TSSOP16 | IC, I/O<br>EXPANDER,<br>I2C, 8-BIT,<br>1MHz, 1.65V TO<br>5.5V, TSSOP16                                                    | ON<br>Semiconductor       | PCA9654EDTR2G            |
| 43   | 1   | U8              | NCP167-2.8V          | XDFN4   | IC, VOLTAGE<br>REGULATOR,<br>LDO, +2.8V,<br>700mA, 1.9V TO<br>5.5V INPUT,<br>Ultra-Low Noise<br>and High PSRR,<br>XDFN4   | ON<br>Semiconductor       | NCP167AMX280T<br>BG      |
| 44   | 1   | U9              | 32Mhz                |         | OSC, SPXO,<br>32Mhz, 50 ppm,<br>SMD, 1.6V -<br>3.6V, 2.5MM x<br>2.0MM x 0.8MM                                             | SEIKO EPSON<br>CORPORATON | SG-210STF<br>32.0000ML   |

**Table 2. XGS 45000 X-CELERATOR BOM** (continued)

| Item | Qty | Part Reference | Value            | Package | Description                                                                                     | Manufacturer         | Manufacturer Part Number |
|------|-----|----------------|------------------|---------|-------------------------------------------------------------------------------------------------|----------------------|--------------------------|
| 45   | 1   | U10            | TMUX1104D<br>GSR | VSSOP10 | IC, PRECISION<br>MULTIPLEXER,<br>4:1, LOW<br>LEAKAGE<br>CURRENT,<br>1.08V TO 5.5V,<br>VSSOP10   | Texas<br>Instruments | TMUX1104DGSR             |
| 46   | 1   | U11            | NLSV2T244        | UDFN8   | IC, LEVEL<br>TRANSLATOR,<br>NON-INVERTIN<br>G, DUAL<br>SUPPLY, 2-BIT,<br>0.9V TO 4.5V,<br>UDFN8 | ON<br>Semiconductor  | NLSV2T244MUTA<br>G       |

### DEVWARE AS INTERFACING SOFTWARE LAYER

From DevWare version 6.0.38 onward, Devware is able to recognize and interface with FPGA boards, that contain the latest X-Celerator bitfiles. With the RADON driver from MyON installed. DevWare should automatically recognize the X-Celerator on your FPGA board connected to the PC the correct sensor INI file still needs to be selected (and downloaded from the image sensor portal) to load the latest

register settings and demonstrate the best capabilities of the sensor.

Figure 10 shows a complete development kit setup using the XGS 45000 X-Celerator headboard, lens mount, extension tube with fixing ring. Together with a tripod, FMC cable and their corresponding fixtures. All parts are included in the kit.

**Table 3. FMC CONNECTOR P1 PIN DESCRIPTION**

| Pin No. | Dir | Function  | Pin No. | Dir | Function  |   |
|---------|-----|-----------|---------|-----|-----------|---|
| H16     | OUT | DATA_20_P | H17     | OUT | DATA_20_N | 1 |
| G15     | OUT | DATA_22_P | G16     | OUT | DATA_22_N | 1 |
| C14     | OUT | DATA_18_P | C15     | OUT | DATA_18_N | 1 |
| D14     | OUT | DATA_16_P | D15     | OUT | DATA_16_N | 1 |
| H13     | OUT | DATA_14_P | H14     | OUT | DATA_14_N | 1 |
| G12     | OUT | DATA_12_P | G13     | OUT | DATA_12_N | 1 |
| D11     | OUT | DATA_0_P  | D12     | OUT | DATA_0_N  | 1 |
| C10     | OUT | DATA_8_P  | C11     | OUT | DATA_8_N  | 1 |
| G9      | OUT | DATA_6_P  | G10     | OUT | DATA_6_N  | 1 |
| H10     | OUT | DATA_10_P | H11     | OUT | DATA_10_N | 1 |
| D8      | OUT | DATA_4_P  | D9      | OUT | DATA_4_N  | 1 |
| H7      | OUT | DATA_2_P  | H8      | OUT | DATA_2_N  | 1 |
| H31     | OUT | DATA_1_P  | H32     | OUT | DATA_1_N  | 1 |
| G30     | OUT | DATA_3_P  | G31     | OUT | DATA_3_N  | 1 |
| G27     | OUT | DATA_5_P  | G28     | OUT | DATA_5_N  | 1 |
| H28     | OUT | DATA_7_P  | H29     | OUT | DATA_7_N  | 1 |
| C26     | OUT | DATA_9_P  | C27     | OUT | DATA_9_N  | 1 |
| D26     | OUT | DATA_11_P | D27     | OUT | DATA_11_N | 1 |
| H25     | OUT | DATA_13_P | C26     | OUT | DATA_13_N | 1 |
| G24     | OUT | DATA_15_P | G25     | OUT | DATA_15_N | 1 |
| D23     | OUT | DATA_17_P | D24     | OUT | DATA_17_N | 1 |
| H22     | OUT | DATA_19_P | H23     | OUT | DATA_19_N | 1 |

Table 3. FMC CONNECTOR P1 PIN DESCRIPTION

| Pin No.            | Dir | Function                     | Pin No.            | Dir      | Function               |   |
|--------------------|-----|------------------------------|--------------------|----------|------------------------|---|
| C22                | OUT | DATA_21_P                    | C23                | OUT      | DATA_21_N              | 1 |
| G21                | OUT | DATA_23_P                    | G22                | OUT      | DATA_23_N              | 1 |
| H4                 | OUT | D_CLK_2_P                    | H5                 | OUT      | D_CLK_2_N              | 1 |
| G2                 | OUT | D_CLK_3_P                    | G3                 | OUT      | D_CLK_3_N              | 1 |
| F4                 | OUT | DATA_32_P                    | F5                 | OUT      | DATA_32_N              | 1 |
| E2                 | OUT | DATA_26_P                    | E3                 | OUT      | DATA_26_N              | 1 |
| K7                 | OUT | DATA_36_P                    | K8                 | OUT      | DATA_36_N              | 1 |
| J6                 | OUT | DATA_34_P                    | J7                 | OUT      | DATA_34_N              | 1 |
| F7                 | OUT | DATA_30_P                    | F8                 | OUT      | DATA_30_N              | 1 |
| E6                 | OUT | DATA_24_P                    | E7                 | OUT      | DATA_24_N              | 1 |
| K10                | OUT | DATA_46_P                    | K11                | OUT      | DATA_46_N              | 1 |
| J9                 | OUT | DATA_38_P                    | J10                | OUT      | DATA_38_N              | 1 |
| F10                | OUT | DATA_42_P                    | F11                | OUT      | DATA_42_N              | 1 |
| E9                 | OUT | DATA_28_P                    | E10                | OUT      | DATA_28_N              | 1 |
| K13                | OUT | DATA_44_P                    | K14                | OUT      | DATA_44_N              | 1 |
| J12                | OUT | DATA_40_P                    | J13                | OUT      | DATA_40_N              | 1 |
| F13                | OUT | DATA_37_P                    | F14                | OUT      | DATA_37_N              | 1 |
| E12                | OUT | DATA_45_P                    | E13                | OUT      | DATA_45_N              | 1 |
| J15                | OUT | DATA_47_P                    | J16                | OUT      | DATA_47_N              | 1 |
| F16                | OUT | DATA_43_P                    | F17                | OUT      | DATA_43_N              | 1 |
| E15                | OUT | DATA_29_P                    | E16                | OUT      | DATA_29_N              | 1 |
| K16                | OUT | DATA_41_P                    | K17                | OUT      | DATA_41_N              | 1 |
| J18                | OUT | DATA_39_P                    | J19                | OUT      | DATA_39_N              | 1 |
| F19                | OUT | DATA_27_P                    | F20                | OUT      | DATA_27_N              | 1 |
| E18                | OUT | DATA_25_P                    | E19                | OUT      | DATA_25_N              | 1 |
| K19                | OUT | DATA_35_P                    | K20                | OUT      | DATA_35_N              | 1 |
| J21                | OUT | DATA_31_P                    | J22                | OUT      | DATA_31_N              | 1 |
| K22                | OUT | DATA_33_P                    | K23                | OUT      | DATA_33_N              | 1 |
| G6                 | OUT | D_CLK_8_P                    | G7                 | OUT      | D_CLK_8_N              | 1 |
| D20                | OUT | D_CLK_9_P                    | D21                | OUT      | D_CLK_9_N              | 1 |
| C35, C37           | PWR | 12 V FMC                     | C39, D36, D38, D40 | PWR      | 3.3V FMC               | 1 |
| F40, E39, G39, H40 | PWR | VADJ (for voltage convertor) | D32                | PWR      | 3.3V VAUX_FMC (EEPROM) | 1 |
| H1                 | PWR | VREF_A_M2C                   | K1                 | PWR      | VREF_B_M2C             | 1 |
| J39, K40           | PWR | VIO_B_M2C                    | H19                | IN       | RESET_L_VADJ           | 1 |
| H20                | IN  | TRIGGER_INT_VADJ             | G19                | IN       | TRIGGER_RD_VADJ        | 1 |
| D17                | IN  | SCLK_VADJ                    | D18                | IN       | SDATA_VADJ             | 1 |
| C18                | IN  | CS_L_VADJ                    | C19                | OUT      | SDATAOUT_VADJ          | 1 |
| C30                | IN  | SCL (EEPROM)                 | C31                | IN / OUT | SDA (EEPROM)           |   |
| C34                | IN  | GA0 (EEPROM)                 | C35                | IN       | GA1 (EEPROM)           |   |

## SPECIFICATIONS AND USEFUL REFERENCES

Detailed schematics, layout files, EEPROM bin content and FPGA bitfiles of the X-Celerator together with the sensor specific DevWare software can be found under NDA on the [image sensor portal](#).

The X-Celerator headboard outline was designed according to the ANSI/VITA 57.1 standard specifications.

More information about this standard can be found at: <https://www.samtec.com/standards/vita/fmc>

More information on ON Semiconductor XGS 45000 image sensor can be found on the [image sensor portal](#) under standard products → XGS.



Figure 10. XGS 45000 Development Kit Setup

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