SoM-I-SX660 Module
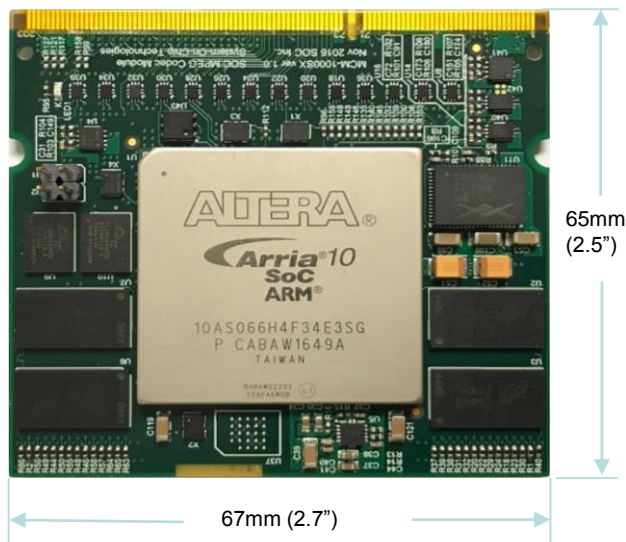## (Commercial and Industrial Versions)

Product Description

The SOC **SoM-I-SX660** System-On-Module (SoM) is a small circuit board based on the Intel Arria-10 SX660 FPGA. The SoM-I-SX660 comes with two versions; commercial and industrial. The product codes for these versions are SoM-I-SX660-C for commercial temperature and SoM-I-SX660-I for industrial temperature. Both of the commercial and the industrial versions use a 204 pin DDR3 SODIMM connector, for connecting the module to the carrier board. The SoM-I-SX660 can be used for any SoM applications with user firmware. SOC Technologies uses the SoM-I-SX660 for video/audio codec applications based on the SOC high-performance MPEG Codec IP Cores.

A SoM-I-SX480 which has an Arria-10 SX480 FPGA is also available. The SoM-I-SX480 module is identical to the SoM-I-SX660, except the FPGA chip on the module.

SoM-I-SX660 Features

- Arria-10 SX660 FPGA (with 2 ARM Cores)
- 4Gbits DDR3 RAM for FPGA logic
- 4Gbits DD3 RAM for the ARM Processors
- 256MB Flash Memory (for booting firmware storage)
- 27MHz and 100MHz Oscillators
- FPGA Firmware Key EEPROM
- Commercial and Industrial Versions
- Self-controlled booting sequence
- Small size, 2.6"X2.7"

65mm (2.5")

67mm (2.7")

SoM-I-SX660 top view

SOC Codec Modules based on SoM-I-SX660

SOC supplies several MPEG codec modules based on the SoM-I-SX660, which include encoder, decoder, and transcoder modules. Details are provided in the Product Brief of "SOC MPEG Codec Modules based on the SoM-I-SX660 ".

Features of the SOC Codec Modules are:
- Zero Latency (0.25ms for HD Resolution, and 0.5ms for 4K)
- Low Power
- High Video Quality
- Easy to Integrate with User PCB
- Reference PCB Designs are available
- Technical Supports are available

SOC provides Evaluation Kits for the SOC Codec Modules which are plug-n-play circuit boards for testing/evaluating the performance of the codec modules. Refer to the Product Brief of SOC Codec Evaluation Kits or contact sales@soctechnologies.com for further information.

Generic SoM based on SoM-X-SX660

The SoM-I-SX660 can also be used as a generic System-on-Module (SoM), which allows users to develop their firmware to make SoM products.

The SoM-I-SX660 connects to a user carrier board using a standard off-the-shelf 204 pin DDR3 SODIMM connector, as shown in the following Figure. A number of products are available on the market. The product codes of the compatible connectors are listed in the figure as well.

Compatible connectors for the SOC SoM-I-SX660 SoM:

- MM80-204B1-1
- MM80-204B1-1E
- AS0A621-U2SN-7F
- AS0A621-H2S6-7H

PCB Connectors for the SoM-I-SX660

SOC also supplies many Product development platforms for users to development the firmware for the SoM-I-SX660 SoM. Refer to the Product Development Kit on the SOC website at www.soctechnologies.com/dev-kits for further details.

SOC
System-On-Chip Technologies

SOC MPEG Codec Modules based on SoM-I-SX660
(Commercial and Industrial Versions)

Product Description

SOC Technologies supplies several MPEG Codec modules based on the SoM-I-SX660, which include video/audio encoders, decoders, and transcoders, for both H.264/AVC and H.265/HEVC standard. Available codec modules are listed on the SOC website at www.soctechnologies.com/modules. A sample Product Table is shown below. The Product Code naming convention is shown in the chart at the bottom of this page.

The I/O's for the SOC Codec Modules based on the SoM-I-SX660 are listed below:

Module Type	Input	Output
Encoder Module	YUV Video Data	TS Stream Data
Decoder Module	TS Stream Data	YUV Video Data
Transcoder Module	TS Stream Data	TS Stream Data

The SOC Codec Modules based on the SoM-I-SX660 also have a –NET version which allows the modules to connect directly to an Ethernet PHY.

Codec Modules Specifications

- MPEG Standard: H.264/AVC or H.265/HEVC
- Profiles: High, Main, Main 4:2:2 12
- Output bit rates: 1-800Mbps & above
- Video resolutions: Up to 4K
- Frame Rate: Up to 60fps
- Chroma Formats: 4:2:2 or 4:2:0
- Precision: 8 bits or 10 bits or 12 bits
- Stream format: Transport Stream, or
           UDP/IP over Ethernet
- Video format: RGB or YUV
- Zero Latency: 0.25ms for HD and 0.5ms for 4K
- Power Consumption: 2-8w
- Working Temperature: 0ºC-70ºC (Commercial Version)
           -40ºC-85ºC (Commercial Version)

Sample Product Table (SOC Codec Modules based on the SoM-I-SX660)

Product Code	Standard	Profile	Resolution	Chroma	Precision	Frame Rate	Audio
EC-VA-H264-10b-30-4k-MD	H.264	up to High	up to 4K	4:2:0/4:2:2	up to 10 bits	30fps	AAC or MPEG2-L2
DC-VA-H264-10b-30-4k-MD	H.264	up to High	up to 4K	4:2:0/4:2:2	up to 10 bits	30fps	AAC or MPEG2-L2
EC-VA-H265-10b-60-4k-MD	H.265	Main 10	up to 4K	4:2:0/4:2:2	up to 10 bits	60fps	AAC or MPEG2-L2
DC-VA-H265-10b-60-4k-MD	H.265	Main 10	up to 4K	4:2:0/4:2:2	up to 10 bits	60fps	AAC or MPEG2-L2

SOC Product Code Naming Convention

Example code → NEC-V-H264-8b-30-1080-EVVXC-A200TRB

Optional

N = # of channels (i.e, 2,3,4…)

EC = Encoder
DC = Decoder
TC = Transcoder

V = Video only
A = Audio only
VA = Video+Audio

H264 = H.264/AVC
H265 = H.265/HEVC
MPEG2 = MPEG-2

12b = 12bit Precision
10b = 10bit Precision
8b = 8 bit Precision

120 = 120 Frames/Sec.
60   = 60 Frames/Sec.
30   = 30 Frames/Sec.

No Module: 0000
A200T = SOM-X-A200T Module
A200TRB = SOM-X-A200T-RB Module
A200TWF = SOM-X-A200T-WIFI Module
SX660 = SOM-I-SX660 Module
Z7945 = SoM-X-Z7045 Module

C= Commercial Temperature: 0~85°C
I = Industrial Temperature: -40~85 °C

00 = No Carrier Board
VX=VOIP-X-4K Carrier Board
VI =VOIP-I-4K Carrier Board
VS= VTR-S1000 Carrier Board
VC=VTR-4000C Carrier Board
V4 = VOIP-I-4K-4SDI Carrier Board
P8 = PCIe-I-8K Carrier Board

EV = Evaluation Kit
MD = Module
IP = IP core
CS = Chipset
OP = OEM Product

4K = 3840X2160 Resolution
1080 = 1920X1080 Resolution
720 = 1280X720 Resolution
480 = 640X480 Resolution