

Introduction

OEM-PA/OEM-MC/FMC

Version 1.0

REVISION HISTORY

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1. Product Introduction

Advanced OEM Solutions (AOS) designs, develops, and manufactures cutting-edge phased array and conventional multi-channel instruments for the NDT industry. These products are designed to be compact, CUSTOMIZABLE, cost effective and easy to use.

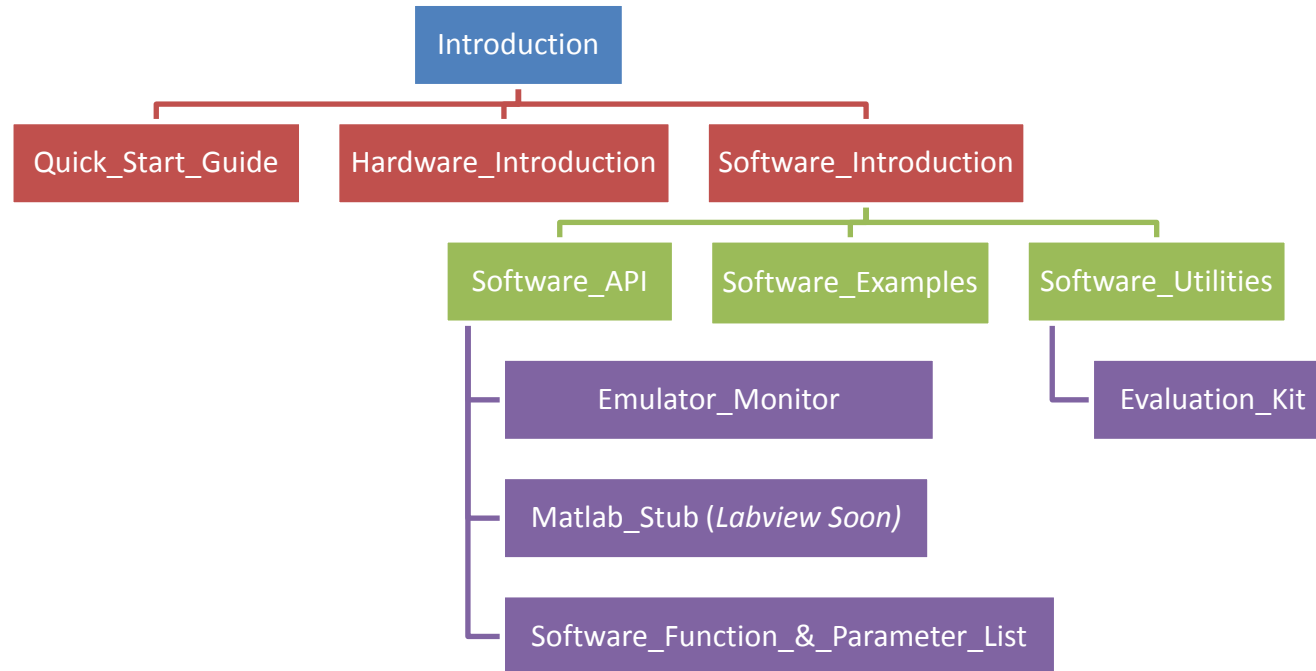
Products available from AOS are:

1. **OEM-PA** – Advanced Phased Array Solution
 - a. **FMC** – Full Matrix Capture Support
2. **OEM-MC** – Multi Channel Support for Conventional Ultrasonics



2. Documentation Summary

The Documentation provided with AOS Hardware and Software is well-documented and well-structured for Application Engineers, Hardware Engineers or System Integrators. Here is a chart which provides a basic idea of how it is structured:



It is recommended that the first time user start with the *Introduction.pdf* document to understand the specifications of the system and follow it up with the *Quick_Start_Guide.pdf*. The documents are numbered to indicate the order in which they should be read for best clarity.

This following table provides a list of documents provided by AOS, its applicability to OEM-PA/OEM-MC and a summary of their content.



Document Name	OEM-MC/FMC	Document Content Summary
0_Introduction		<ul style="list-style-type: none"> - Documentation Chart and Summary - Hardware/Electrical Specifications
1_Quick_Start_Guide		<ul style="list-style-type: none"> - Quick introduction to Hardware and Software Setup. - Network Adapter Configuration
2_Hardware_Introduction	X	<ul style="list-style-type: none"> - Hardware connectors, interfaces, - Digital IO, Encoders, External Triggers - IP Management, FW Update
3_Software_Introduction		<ul style="list-style-type: none"> - Installation procedure and software overview. - OEM Hardware and Filter configuration.
4_Software_API	X	<ul style="list-style-type: none"> - High-Level API description. - Medium-level API description. - Low-level API description.
5_Software_Utilities		<ul style="list-style-type: none"> - OEMPATool software explanation. - OEMPASector software explanation. - Hardware and Filter Configuration.
6_Software_Examples		<ul style="list-style-type: none"> - ToolBox - Example using High-level API (OEMPAWizardExample). - Example using Medium-level API (OEMPA Customized Example). - Example using Low-level API (OEMPA Application Example).
7_Software_Functions_&_Parameter_List		<ul style="list-style-type: none"> - List of all the parameters, their definition and how to use them to setup OEM-PA.
Evaluation_Kit		<ul style="list-style-type: none"> - Discusses Evaluation Kit procedure and overview for OEM-PA.
Advanced Utilities		
EmuMon		<ul style="list-style-type: none"> - Emulator - Monitor - FW Update
Matlab_Driver		<ul style="list-style-type: none"> - User guide for Matlab.

X - Special functions for OEM-MC/FMC included in this document

3. AOS Hardware

The specifications of AOS units are presented in this section.

3.1 OEM-PA

OEM-PA is a Phased Array solution available with 16 to 256 channels and with variants available as all parallel or multiplexed channels.

This hardware is also available with FMC support.



Figure 3.1: OEM-PA – 64/64 Channels

The following sections list out the essential electrical and hardware specifications.

3.1.1 Pulser

- Pulse Voltage: 145V
- Pulse Type: Negative Square
- Pulse Width: 10 to 1000ns
- Pulse Width Resolution: 4ns
- Pulse Focusing Delay: 0 to 40µs
- Focusing Delay Resolution: 5ns
- Max. Number of Cycles: 2048 (Optional 4096)
- Maximum PRF: > 20kHz

3.1.2 Receiver

- Receiver Sensitivity: 550mV
- Receiver Gain Range (Analog): 16 to 63.7dB
- Receiver Bandwidth: 0.3 to >20MHz
- Receiver Gain Range (Digital, including DAC): 80dB, Up to 64 DAC points
- Receiver Focusing Delay: 0 to 40μs
- Focusing Delay Resolution: 5ns
- DDF: Up to 64 points

3.1.3 Signal Processing

- FIR Filter taps: Up to 64 taps
- Filter Choice (per Cycle): 15 User-defined Filters
- A-scan Sampling: 100MHz
- Decimation: 50 to 0.39MHz (100MHz/n; n = 2 to 256)
- Compression: Yes
- A-Scan Video: Yes
- Acquire All A-scans: Yes
- A-Scan length: Up to 32KB
- Rectification: Yes
- A-Scan Resolution: 8, 12, 16-bits
- A-Scan Mode: Linear, Logarithmic

3.1.4 Communication

- LAN (100BT Connection): 5MB/s (STANDARD)*
- LAN (1000BT, Gigabit Ethernet): 10MB/s (UPGRADE)*

*Data Rate can vary with PC, OS settings and Software Environment

3.1.5 Gates

- Number of Gates: 4
- Interface Echo Tracking: Yes
- Synchronization (same Cycle): Yes
- Synchronization (other Cycle): Yes

- Mode: Max, Min, ABS, Zero Before, Zero After

3.1.6 I/O Management

- Encoders: X,Y
- Encoder Modes: Quadrature, Quadrature 4 Edges, Direction Count, Forward Backward
- Synch In: Pulse Trigger, Sequence Trigger, Encoders
- Synch Out: Pulse Trigger, Sequence Trigger, Output
- Time Stamps: Yes, Position and Line Speed
- Pin Assignments: Programmable
- I/O Available: 6 Inputs, 6 Outputs

3.1.7 System

- Configurations: 16/16, 16/128, 32/32, 32/128, 64/64, 128/128, 256/256
- System Voltage Input*: 24V Nominal; 18V to 28V Range
- Temperature Sensors: Yes
- Operating Temperature: 0 to 40°C
- 16/16 Unit Dimension: 110 x 80 x 40 mm³ for Bare Electronics†
- 64/64 Unit Dimension: 110 x 70 x 80 mm³ for Bare Electronics†
- Weight: <300g for Bare Electronics
- Probe Connector: Omni-Type Only

*The DC Voltage input is a 2.1mm DC jack for most of the systems except for OEM-PA 128/128, which uses a 2.5 mm jack.

†Consult with AOS for exact specifications of your configuration.

3.1.8 Power Consumption

- OEM-PA 16/16: 16.5W
- OEM-PA 32/32: 23W
- OEM-PA 64/64: 36W
- OEM-PA 16/128: 21W
- OEM-PA 32/128: 28W
- OEM-PA 128/128: 72W

Power Consumption for all devices is measured at 2kHz PRF with all channels enabled.

3.1.9 Optional Packages

- Full Matrix Capture
- 3D Focal Law Calculator for Matrix PA
- LabView driver
- MATLAB driver
- Low Frequency Version
- USB 3.0 (for data throughput up to 160 MB/s; available on 128/128 and 256/256 devices)

3.2 OEM-MC

OEM-MC provides support to conventional ultrasonic transducers. This unit is available with 16 or 32 channels.



Figure 3.2: OEM-MC - 16 Channels

The following sections list out the essential electrical and hardware specifications.

3.2.1 Pulser

- Pulse Voltage: 145V
- Pulse Type: Negative Square
- Pulse Width: 10 to 1000ns
- Pulse Width Resolution: 4ns
- Maximum PRF: >20kHz

3.2.2 Receiver

- Receiver Sensitivity: 550mV
- Receiver Gain Range (Analog)*: 16 to 63.7dB
- Receiver Bandwidth: 0.3 to >20MHz
- Receiver DAC Gain (Digital): 36dB

*Analog gain is common to all channels that are acquired in parallel.

3.2.3 Signal Processing

- FIR Filter taps: Up to 64 taps
- A-scan Sampling: 100MHz
- Decimation: 50 to 0.39MHz (100MHz/n; n = 2 to 256)
- Compression: Yes
- A-Scan Video: Yes
- Acquire All A-scans: Yes
- A-Scan length: Up to 32KB (Multiplexed Mode),
Up to 10KB (Parallel mode)
- Rectification: Yes
- A-Scan Resolution: 8, 12-bits
- A-Scan Mode: Linear, Logarithmic (8-bit resolution)

3.2.4 Communication

- LAN (100BT Connection): 5MB/s (STANDARD)*
- LAN (1000BT, Gigabit Ethernet): 10MB/s (UPGRADE)*

*Data Rate can vary with PC, OS settings and Software Environment

3.2.5 Gates

- Number of Gates: 4
- Interface Echo Tracking: Yes
- Synchronization (same Cycle): Yes
- Synchronization (other Cycle): Yes
- Mode: Max, Min, ABS, Zero Before, Zero After

3.2.6 I/O Management

- Encoders: X,Y
- Encoder Modes: Quadrature, Quadrature 4 Edges, Direction
Count, Forward, Backward
- Synch In: Pulse Trigger, Sequence Trigger, Encoders
- Synch Out: Pulse Trigger, Sequence Trigger
- Time Stamps: Yes, Position and Line Speed
- Pin Assignments: Programmable
- I/O Available: 6 Inputs, 6 Outputs

3.2.7 System

- Configurations: 16, 32 Channels
- Channel Mode Parallel or Multiplexed
- System Voltage Input*: 24V Nominal; 18V to 36V Range
- Operating Temperature: 0 to 40°C
- Temperature Sensors: Yes
- 16CH Unit Dimension: 110 x 70 x 40 mm³ for Bare Electronics†
- 32CH Unit Dimension: 110 x 70 x 60 mm³ for Bare Electronics†
- Weight: <300g for Bare Electronics
- Probe Connector: SMB

*The DC Voltage input is via a 2.1mm DC jack.

†Consult with AOS for the exact specifications of your system.

3.2.8 Power Consumption

- OEM-MC 16CH <15W
- OEM-MC 32CH <25W

Power Consumption for all devices is measured with a 5MHz probe at 2kHz PRF, not including the power supply board.

4. AOS Software

For all units, AOS provides an Open Source Software Development Kit (SDK) with a very well documented API. Software languages used to build the applications are C++ and C# with driver support tools for LabVIEW, MATLAB & more.

The provided software package contains an easy to install *AOS OEMPA Kitxx Open Source* (xx: 32 or 64) installer available for 32-bit and 64-bit systems. This package consists of:

- AOS Custom tools,
- Example software applications,
- Documentation:
 - Hardware & Software Introduction,
 - Quick Start Guide,
 - API,
 - Detailed Open Source API description, and,
 - Elaborate explanation of software examples.

To install the AOS software package, a system must meet the following requirements:

- Operating System: (Recommended) Windows7
- Memory: (Recommended) Minimum 4GB RAM
- Processor: (Recommended) Intel i5 2nd Gen and above or equivalent
- .NET framework 4.0 – If unavailable, it will be installed with AOS software
- Development Tool: (Recommended) Visual Studio 2010

The software installation guide is provided in the *Software_Intoduction.pdf* document which provides step-by-step instructions.

5. Documentation

All documentation regarding OEM-PA/OEM-MC is located within the installation directory folder. The easiest ways to navigate to the documentation is through the *Start Menu* or *Computer* in Windows Explorer:

- Start Menu

Click on *Start Menu* > *All Programs* > *AOS* > *OEMPA (Current Software Version)* > *Documents*

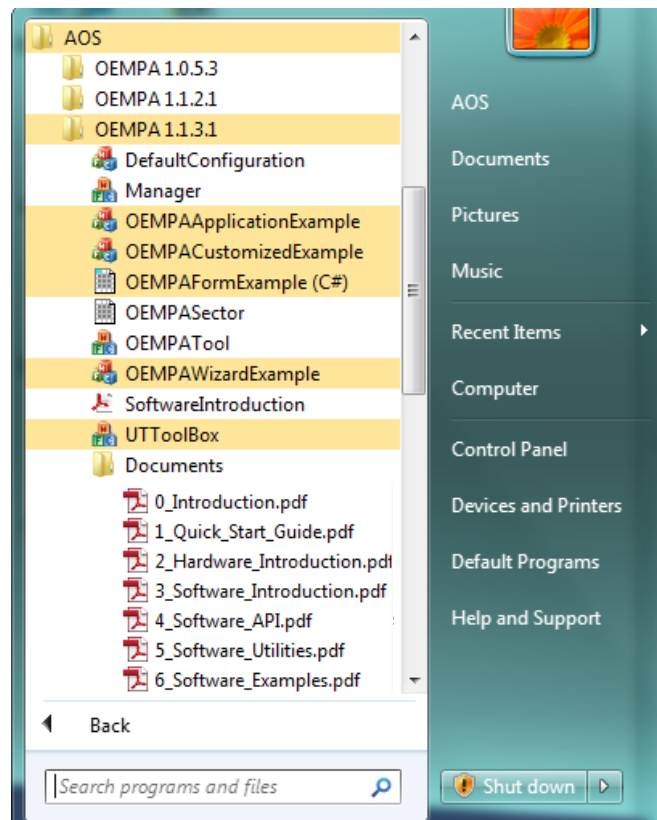


Figure 5.1: Documentation via Start Menu

- My Computer (C:)

Navigate to *C:\Program Files\AOS\OEMPA (Current Software Version)\Documents*

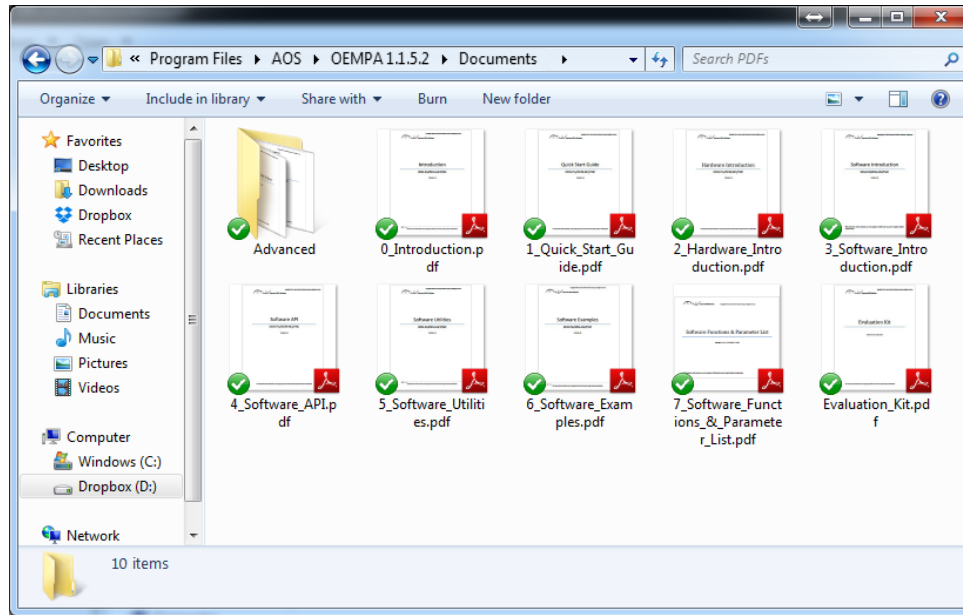


Figure 5.2: Documentation under Installation Folders

Note: The 32-bit directory is located within the AOS32 folder and the 64-bit directory is located within the AOS folder. The purpose is to allow users to install both 32-bit and 64-bit software on the same computer.

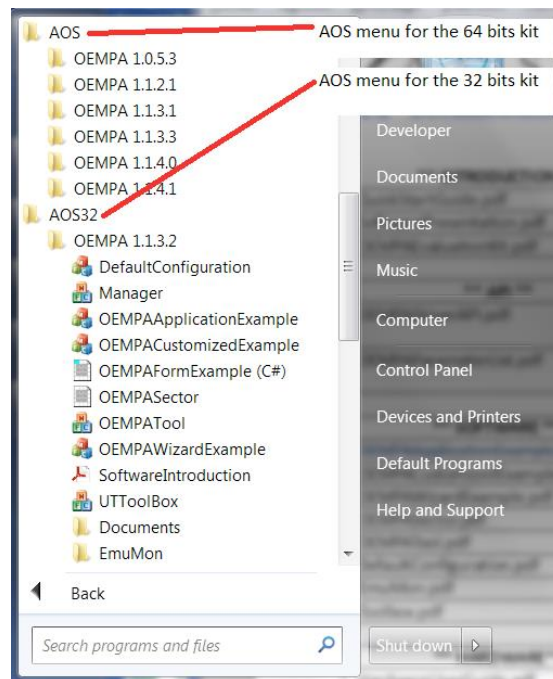


Figure 5.3: 32-bit and 64-bit Installation Directories