



Maxim MG3500 HD H.264 codec SoC development platform

The MG3500 EVP2 development platform provides a full set of hardware features and interfaces for application developers creating High Definition (up to 720p/1080i 60 Hz) H.264 based products. This board also supports software development targeting the MG2580 device.

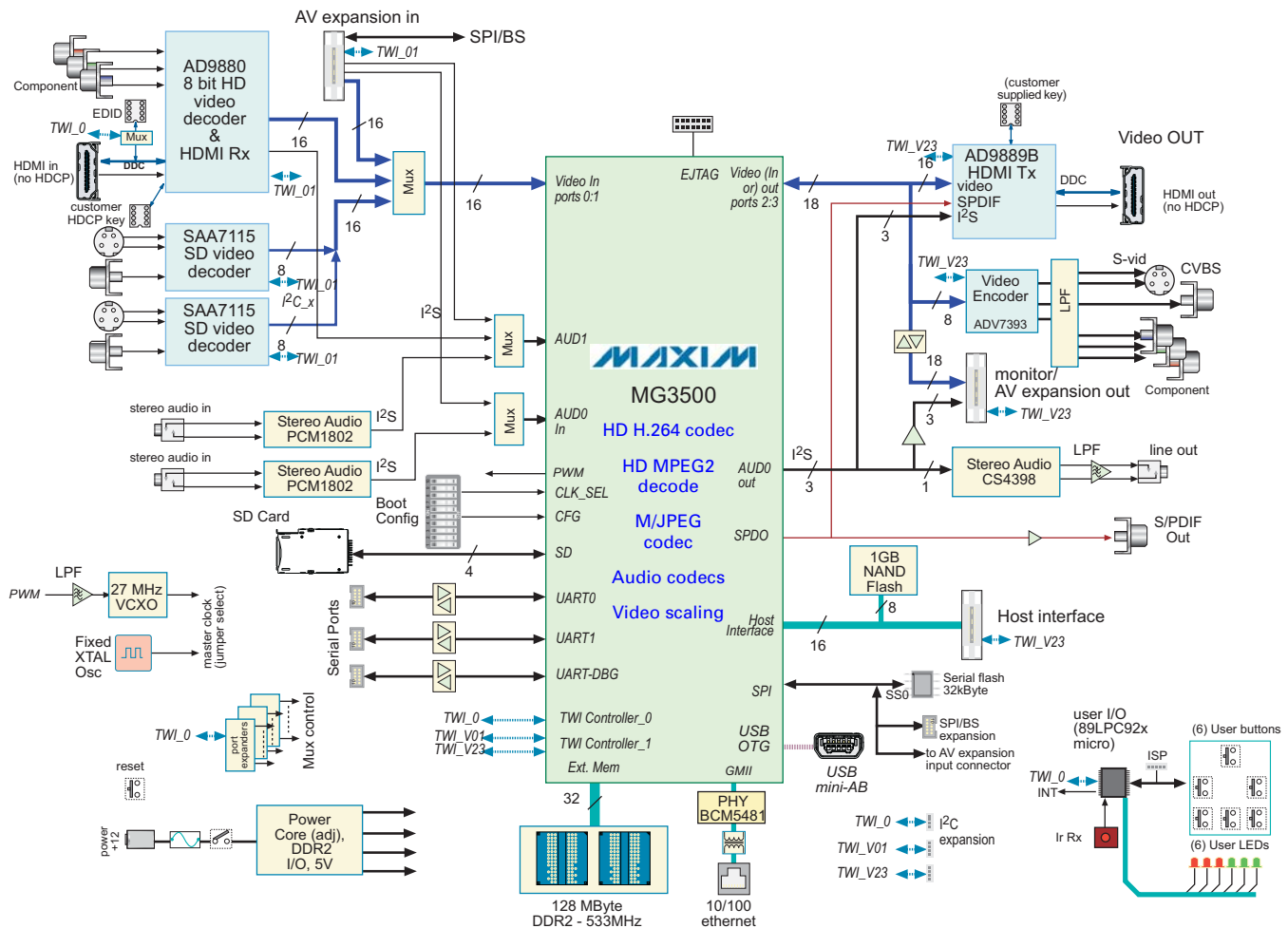
At the heart of the board is the advanced MG3500 Codec SoC from Maxim. Integrating a low power HD H.264 codec, 2 video scalars, 2 multimedia engines (MME), an ARM9 along with a multitude of peripherals, the MG3500 is the ultimate low cost solution to today's video applications.

Through the use of input and output expansion ports, developers can add application specific peripherals to the platform. By allowing development of end product applications right on the EVP2 board, R&D costs and time to market are both reduced.

EVP Platform Hardware Features

- Dual CVBS and S-video in, CVBS and S-video out
- Component and digital (HDMI) inputs and outputs
- Dual stereo audio in and stereo out.
- A/V input and output expansion connectors
- 10/100 Ethernet
- USB OTG
- SD flash card
- Serial ports for debug and control

For more information on the MG3500 and MG2580 and other members of the en-ViE product family, please contact your local Maxim distributor or see <http://www.maxim-ic.com>.



MG3500 based HD H.264 development system for security, video, & media applications

GENERAL SPECIFICATIONS:

Processor: MG3500 with 240MHz ARM9, 128 MB DDR2 RAM at 266MHz clock (533 MHz data rate), 1 GByte NAND flash with accelerators for

- H.264 HD codec (or multichannel SD)
- MPEG2 HD decoder
- M/JPEG codec

SD Analog Video in: Philips SAA7115

- NTSC/PAL input (CVBS/S)
- Dual input devices support encoding two SD streams

HD Video in: Analog Devices AD9980

- Component video up to 1080i
- supports formats allowed by HDMI 1.2 (dependent on app & driver)
 - external EEPROM socket for customer supplied HDCP key

Audio in: TI PCM1802

- Stereo ADC, 24 bit format. 20 kΩ input impedance
- Line level 2V P-P, approx 100 dB dynamic range, 90 dB THD+N
- Sample rate controlled by MG3500
 - supports 16 kHz to 96 kHz sample rates

SD & HD Analog Video out: Analog Devices ADV7393

- NTSC/PAL (CVBS/S)
- Component video up to 1080i

HDMI Video out: Analog Devices AD9889B

- Resolution up to 1080i
- Multichannel PCM audio or compressed streams
- output formats allowed by HDMI 1.2 (dependent on app & driver)
 - external EEPROM socket for customer supplied HDCP key

Audio out: Cirrus CS4398

- Stereo DAC, 24 bit format. Min. suggested load impedance: 600Ω
- FS out approx 2V P-P, 110 dB dynamic range, 100 dB THD+N
- AC coupled, Fc approx 20Hz
- Sample rate controlled by MG3500
 - supports 16 kHz to 96 kHz sample rates

Host connector

- Provides (unbuffered) access to all host port pins on MG3500

Ethernet: 10/100

- Broadcom BCM5481 PHY
- RJ-45 jack with status LEDs on board
- Use TCP/IP stack of (ARM) Linux or customer provided OS

General Purpose I/O

- Buttons, LEDs and IR with 89LPC92xx microprocessor acting as a peripheral to the MG3500 (for customer developed driver software)
- TWI (I2C), SPI expansion connectors

JTAG

- JTAG connector
- 14 pin JTAG pinout with board reset implemented

UART

- Two general purpose RS232 ports (10 pin IDC, 9 pin dsub adapter included)
- Debug port (also doubles as boot port)

USB

- Mini A/B (HS, OTG, or can be Host or Device)
- Use Linux class drivers or customer provided OS for USB peripherals

A/V Expansion

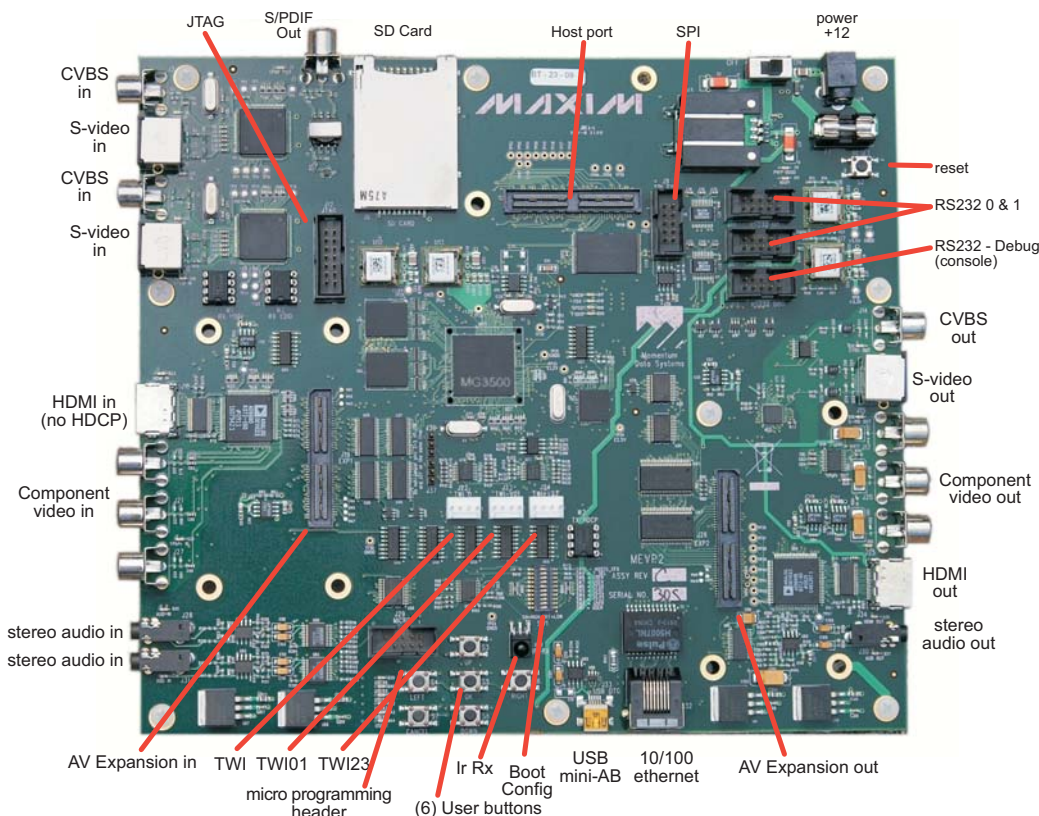
- 88 pin controlled impedance board-board style connector (Samtec QSE)
- Full access to processor's video and audio signals
 - 16 bit wide HD 656 like video in, I²S audio in
 - 16 bit wide HD 656 like video out or 18 bit RGB, I²S audio out
 - TWI (I²C), SPI interfaces (SPI shared with high speed serial interface)

Misc.

- Power: External 12V 60W brick, universal 100 - 240V input, IEC cord
- Size: Approx 10" x 10" (250mm x 250mm)

Please see the product manual for complete details of connectors.

Please note that hardware support of a particular mode does not mean examples and drivers support that mode. Supplied examples generally support PAL and NTSC standard definition modes, and HD signals at 720p or 1080i resolution and 50/60 Hz rates.



**EVP connector location/
function diagram**

Software

To use the MG3500 (of MG2580, this description applies equally) as a standalone video encoder or decoder, software must be written for the on-chip ARM9 processor. A default Linux tool chain is included with the software kit. This Linux toolset is provided as is and is not supported by MDS or Maxim. If you need in-depth Linux support please consider the advantages of outside resources with the prerequisite background.

Support for peripherals controlled by the ARM9 is the responsibility of the kernel. Support for certain sophisticated features, like USB OTG, may require additional drivers. As with the Linux kernel, you should discuss your driver needs with a commercial driver provider.

MDS is also available to assist with services for support and integration of certain features; specifically MDS has extensive experience in the audio and video peripheral area. For more information please send your requirements to the MDS sales office for a quotation.

Software Developers Kit (SDK)

The SDK provides an API for use of the hardware audio and video codec features of the MG3500. The SDK is a licensed product, please see the Maxim Software License Agreement for complete details. The SDK is provided electronically.

The diagram on the next page further illustrates the relationships between the software components used in a typical application running on the MG3500.

Example applications

The following examples are being developed for the board and will be made available for download as they are released. All examples are scripts run from Lua (see <http://lua.org>) and can be modified to demonstrate specific features without need to write/compile software.

- embedded web server
- encode/decode to USB or hard drive
- RTP/RTSP streaming
- USB based 6x real time MPEG2 to H.264 SD transcoder
- IP-Camera (SD or HD)
- Multi-channel DVR
- Full duplex 720p24 video conference with PIP
- (with optional 4 CVBS input module) multichannel encoder

SDK Core Components

Linux/GPL/LGPL based tool chain & libraries:

- GCC
- GDB w/GDBserver
- 2.6.20 kernel
- mboot, MTD, busybox
- DirectFB
- LUA (scripting language used for examples)

MG3500 codec support

The following codecs are included in the Mobilygen firmware, which requires a Mobilygen software license.

- video codecs: H.264 (SD/HD), MJPEG
- images codec: JPEG
- audio codecs: AAC-LC, MPEG layer 2 audio
- video decoder: MPEG2 (SD/HD)
- audio decoders: MPEG layer 2/3 audio

All compressed data is in Maxim's QBox format, which is similar to a MPEG2 PS (Program Stream) with additional information to correspond to the underlying hardware.

Driver software (libraries) for internal peripherals and external flash are included. Please see the MG3500 datasheet for complete details on the codec capabilities.

Optional component packages

These components are developed/provided by Maxim, please consult Maxim website for further details, licensing terms, and availability:

- Dolby Digital Decode (AC3 decode)
- G.722, G.728
- AAC-LD, AAC-HE
- Analytics extension
- Image stabilization extension

Open source tools

A number of open source tools are typically used to create the examples supplied with the system. Sources to those tools are supplied with the board as required by the GPL/LGPL licenses.

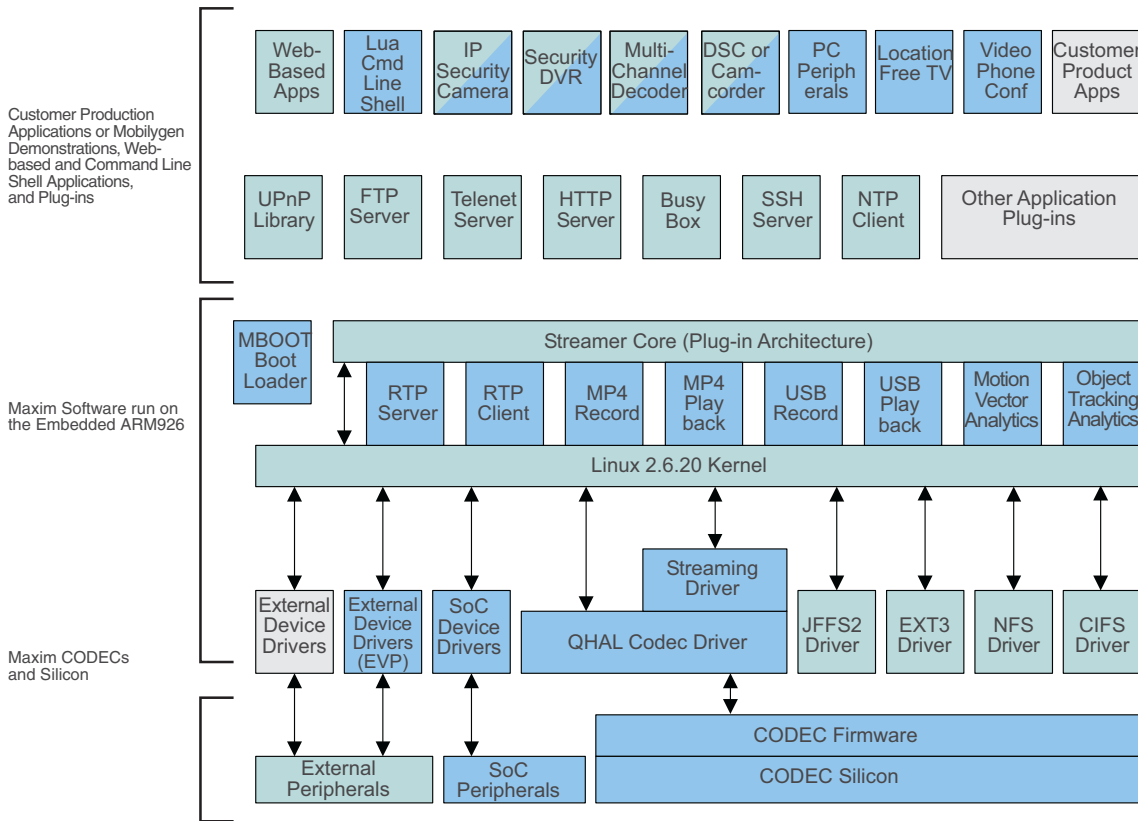
Products incorporating libraries used by these tools may also have a GPL or LGPL license and therefore have certain obligations under the GPL/LGPL licenses, please seek competent legal advice if you are unsure of the implications of this on your product.

Codec licensing

H.264, MPEG2, and the various audio formats supported by the MG3500 use intellectual property (IP) that require the system builder to secure licensing with the IP patent holders. This includes MPEG LA, Thomson, Sisvel, Via Licensing, and others that may have patent claims on audio and video codec technology. Some IP, such as the Dolby Decoder, require a license before the decoder can be supplied.

The base package of the SDK does not require any advance licensing requirements, but does require that appropriate licenses be obtained before you ship your product to customers.

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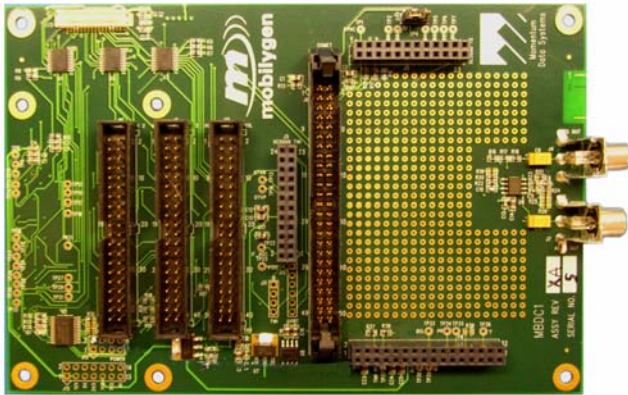


SDK architecture

A modular architecture based on open source standards allows for efficient creation of high performance real time video processing applications.

Key:

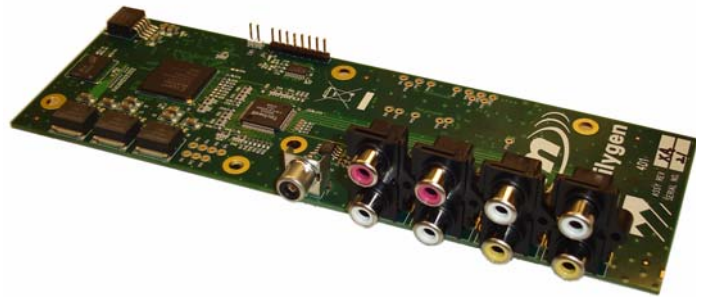
- Third Party Software
- Provided by Mobilygen
- Customer Provided



General purpose expansion daughter card

MG3500EVP-EXP GP

This optional daughter card provides several connectors for expanding the capability of the MG3500 EVP.



Custom daughter card example

This custom input daughter card allowed prototyping of an encoder application with 4 standard definition inputs.

A/V clocking

To create glitch free A/V transport systems, care must be taken in considering how audio and video inputs and outputs will be synchronized. Generally, for encoding, the audio input (ADC) clock must be slaved to the recovered video clock.

For decoding, the method of local clock generation depends on whether the compressed data stream is being "pulled" by

the processor (for example, flash card playback) or being "pushed" by the source (for example, broadcast or multicast video).

The board's flexibility ensures that all of these scenarios can be accommodated to create reliable and glitch free systems.

Expansion options

The daughter card (MG3500EVP-EXPGP, see picture on previous page) is a general purpose expansion card illustrated in the figure below. The card can be used with both the port 01 (input) and port 23 (output in most cases) connector.

While the board can be plugged into either of the EVP's AV expansion connector, some uses require it to be plugged into a specific connector as not all signals are in the same place on both connectors.

50 pin COMET3 style connector

This connector allows use of accessories developed for the MG1264 based COMET3 development board to be reused.

Tuner connectors

These three connectors allow tuner evaluation modules (XC5000 EVM) by XCeive (see <http://www.xceive.com>) to be used. The EVMs provide hardware that allows reception of most worldwide PAL, NTSC, SECAM, ATSC, QAM, DVB, and ISDB broadcasts.

RCA jacks provide access to the tuner output for analog broadcast signals and can be connected to the EVP's analog video input.

For digital broadcast reception, the demod's serial transport stream output is used.

General expansion

These three (40 pin) connectors provide a convenient way to breakout the EVP's high density AV expansion connector. Note that while a signal-ground arrangement has been made, the ability to drive cable is limited to a dozen cm or less in typical applications.

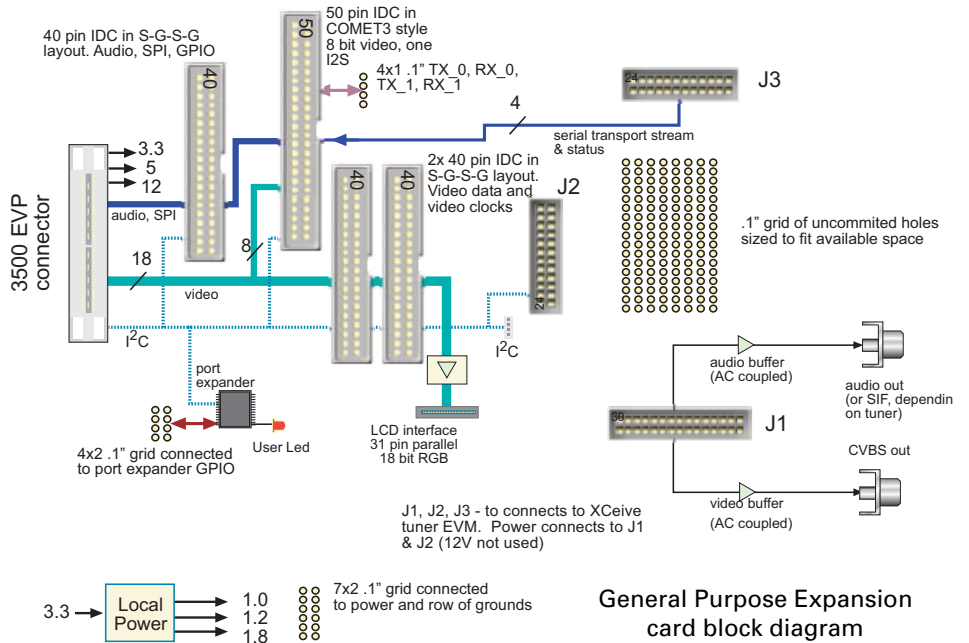
LCD connector

A 31 pin DF9MA-31P-1V (Hirose Electric Co., Ltd.) connector will interface to most LCD parallel interface RGB format displays.

Other features

A .1" grid allows installation of IDC style connectors in configurations other than the ones provided.

An I²C port expander provides local GPIO capability.



Ordering Information (order code is in *Italics*)

Please note: The amount of NAND flash installed may vary due to market availability.

MG3500EVP-KIT MG35000 based development board

- Development board
- Power supply
- S video cable, RCA plug to RCA plug cable
- Component video cable
- HDMI cable
- 1/8" mini-phono (male) audio cable
- mini USB to USB A adapter
- (2) 10 pin IDC to 9 pin serial port adapter
- Null modem cable
- IR remote
- MDS board manual, schematics (pdf), and examples provided by download

MG3500EVP-SDK Software Development Kit.

- A Mobilygen Software License Agreement (SLA) must be executed to receive this software. Please contact your local distributor or MDS for assistance.
- Default Linux tool chain
- API libraries for accessing codec functions
- Sources to examples
- Design database for the EVP2 (Orcad schematic, BOM, PADS layout)
- Access to online-support system*

*The support system allows access to extra documentation, FAQ/Knowledge base, and the ability to post questions. While every reasonable effort will be made to resolve problems, no guarantee of support for a specific problem is represented in this datasheet.

Design database contents:

- Documents except gerbers are also included as pdf versions
- Schematic (Orcad) and layout (Mentor PADS)
- Gerber files
- Parts list
- PCB Assembly drawing
- Datasheets (excluding those needing an NDA)**

**The Broadcom and Analog Devices parts require an NDA to obtain the datasheet and/or source code to the drivers.

MG3500EVP-EXPGP General purpose expansion board

- Board with flexible connectors for a variety of expansion possibilities
- IDC connectors shipped uninstalled and must be soldered in place to create specific configurations
- Supports XCeive tuner modules
- 50 pin connector backwards compatible with COMET3 (MG1264) accessories

MG3500EVP-XCABLE Kit of extra A/V cables

- Extra HDMI and analog video and audio cables, serial cable

To order

Please contact MDS, your local MDS distributor, or local Maxim distributor to order.

To process your order an executed Maxim NDA (Non Disclosure Agreement) and SLA (Software License Agreement) are needed.

More information about the MG3500 can be found on Maxim's website: <http://www.maxim-ic.com/products/video/>

Note that the EVP2, from the software perspective, is functionally identical to the original EVP board. The changes to the board are to remove ECOs and/or better match the functionality of the EVP2 with the MG3500.

MG3500 and en-ViE are trademarks of Maxim Inc.

Available from:

Use the MG3500 EVP to develop these and other video application

- Video conferencing
- IPCAM
- Multichannel DVR
- Webcam
- PC Transcoder/transrater
- TV/STB
- Digital camcorder



MG3500 EVP2 data sheet - subject to change, rev 2b Aug-10

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