

DVI-Ramp² DVI-Ramp² DSK User's Manual

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Miranda

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- UL 60950-1 (1st Edition) / Safety of Information Technology Equipment, Including Electrical Business Equipment.
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EN 61000-3-2 & -3-3, Disturbance in Supply Systems
EN 61000-4-2, -3, -4, -5, -6, -8 & -11 Electromagnetic Immunity

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1 DVI-Ramp² Graphic to HD/SD Video Interface

1.1 Introduction

Miranda's DVI-Ramp² performs live extraction of computer graphics to generate HD/SD video for post-production, broadcast and digital cinema. There are two models of the DVI-Ramp²:

- 1) Basic DVI-Ramp²
- 2) DVI-Ramp² DSK

The DSK model adds an SD/HD SDI input with a bypass relay to the basic model. This additional input serves the purpose of supplying a background channel for the built-in Keyer. Unless specified otherwise, the term DVI-Ramp² is used to describe both models.

This document is a very general description of the DVI-Ramp2.

- Please refer to www.miranda.com for updated information about new features that have been added to this product since the release of this document.

The unit features many synchronization modes, including frame sync, genlock, and free run. Configuration and control of the DVI-Ramp2 is via USB, RS-232 or Ethernet. Firmware upgrades are done through RS-232 or USB.

1.2 Features

- Graphic to HD/SD video interface with the following operating modes:
 1. Single Channel – Pixel-to-Pixel Extraction
 2. Single Channel – Scaling Mode (future)
 3. Dual Channel – Pixel-to-Pixel Extraction on each discrete channel
 4. Dual Channel – Fill & Key using external Keyer or internal Keyer (DSK only)

- 3 synchronization modes
 - Frame Synchronizer (graphics card without external reference)
 - Genlock (graphics card with external reference)
 - Free run

- Programmable color space conversion

- Platform/OS independent

1.3 Functional Block Diagrams

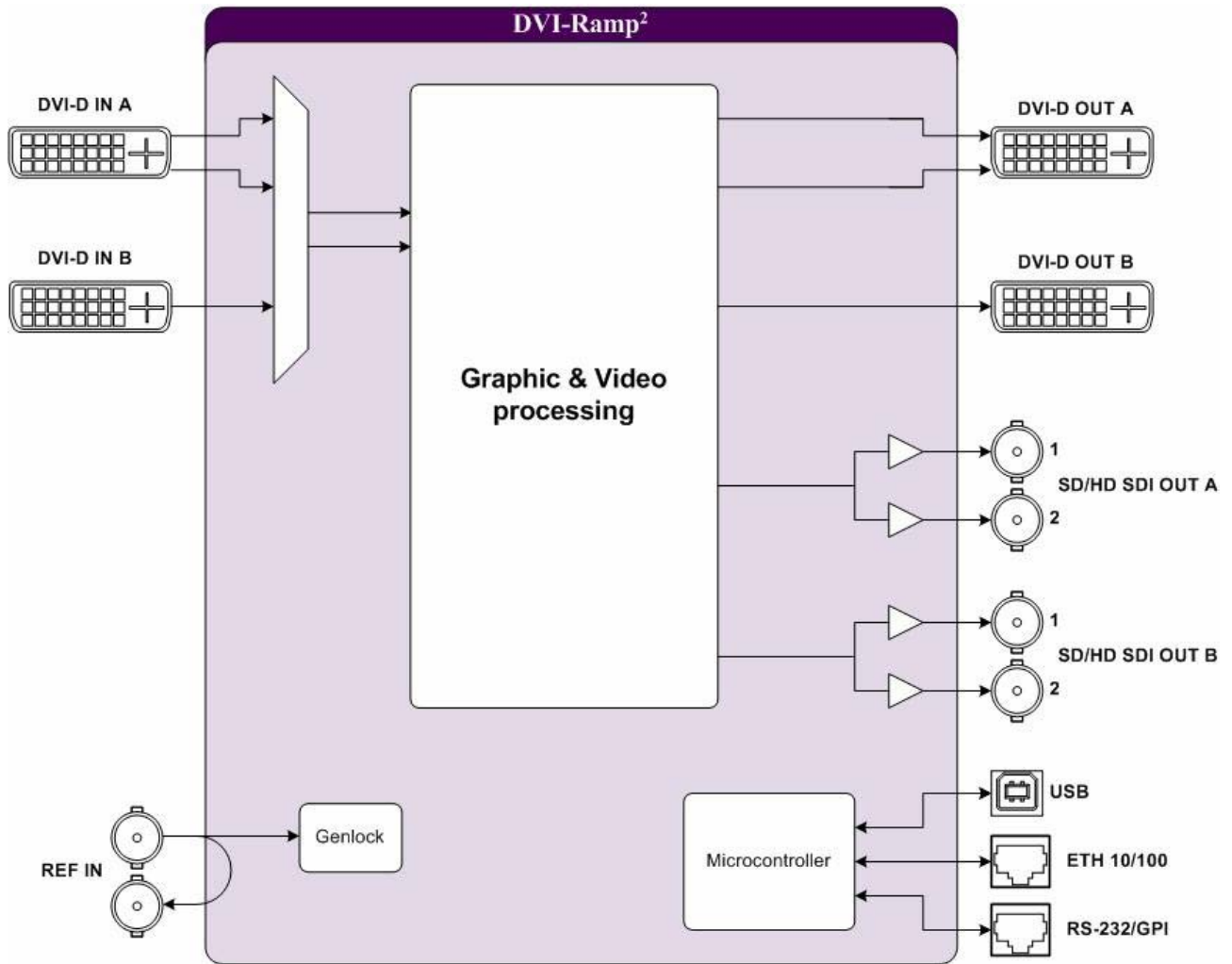


Figure 1.1a DVI-Ramp² Functional Block Diagram

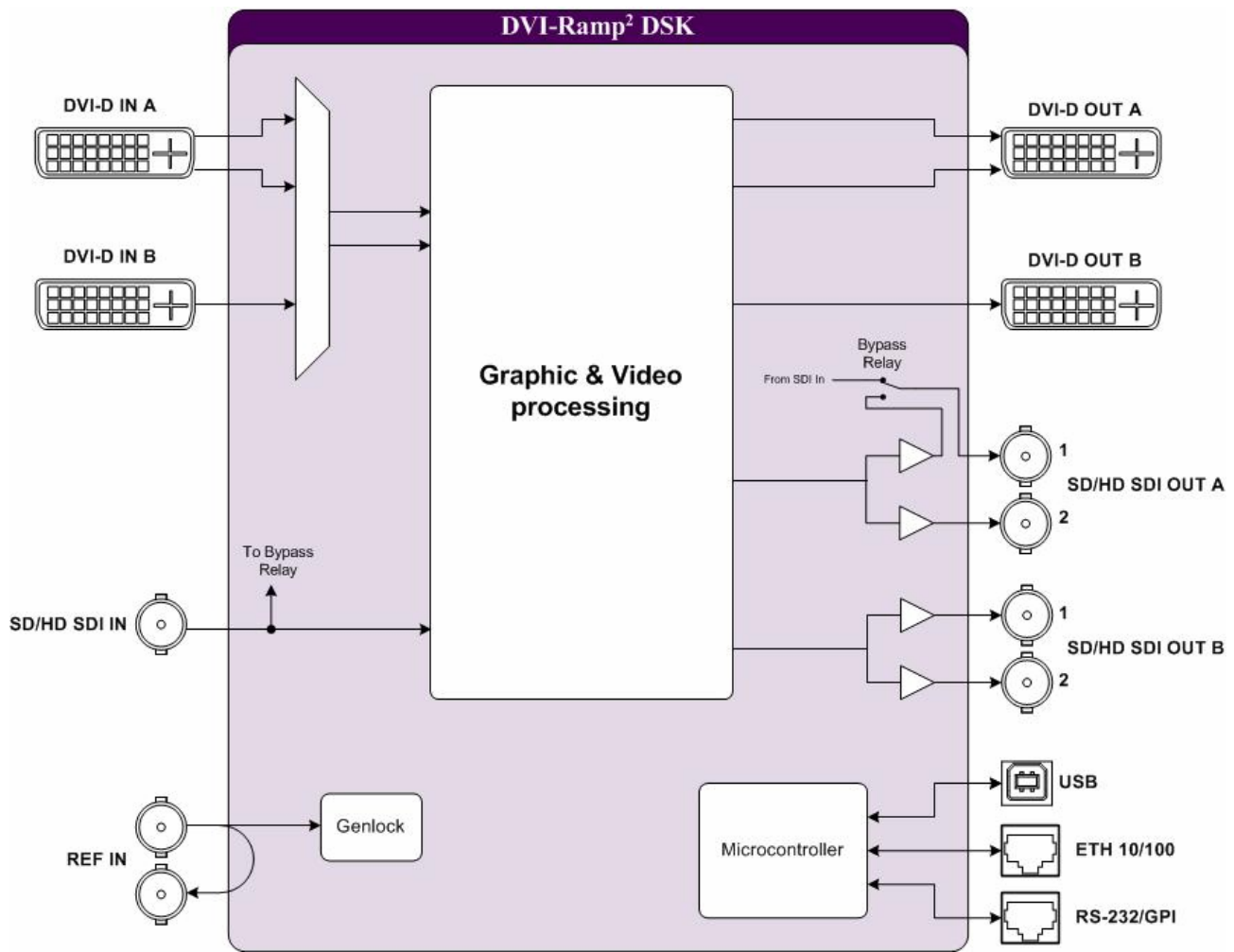


Figure 1.1b DVI-Ramp² DSK Functional Block Diagram

1.4 Front and Rear Panel views

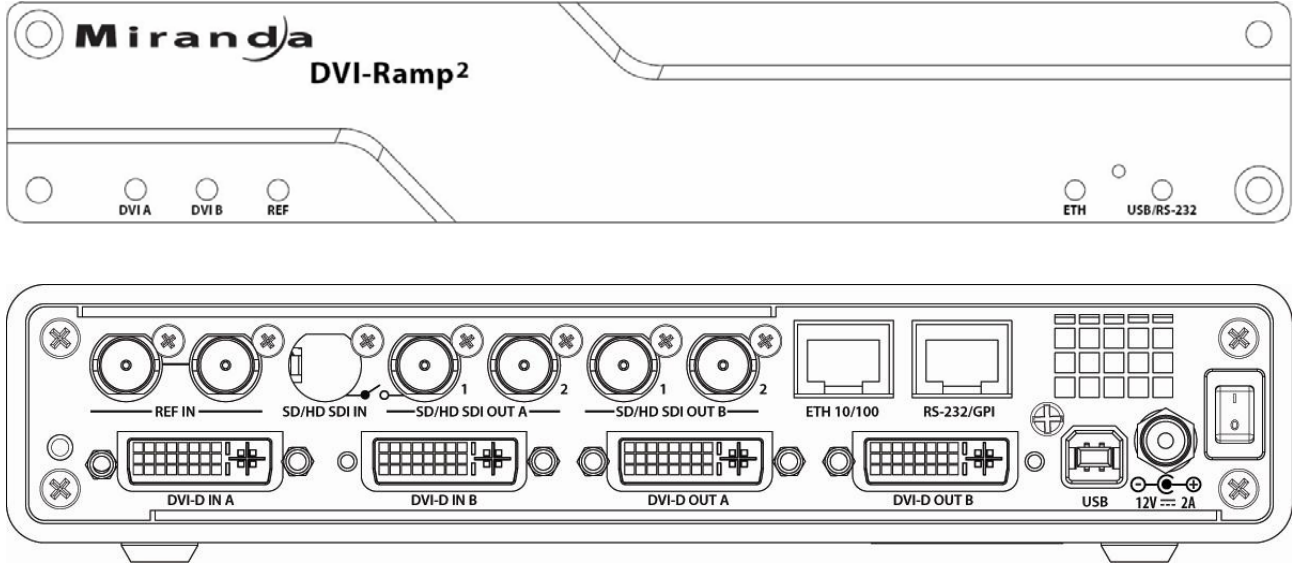


Figure 1-2a DVI-Ramp² Front and Rear panels

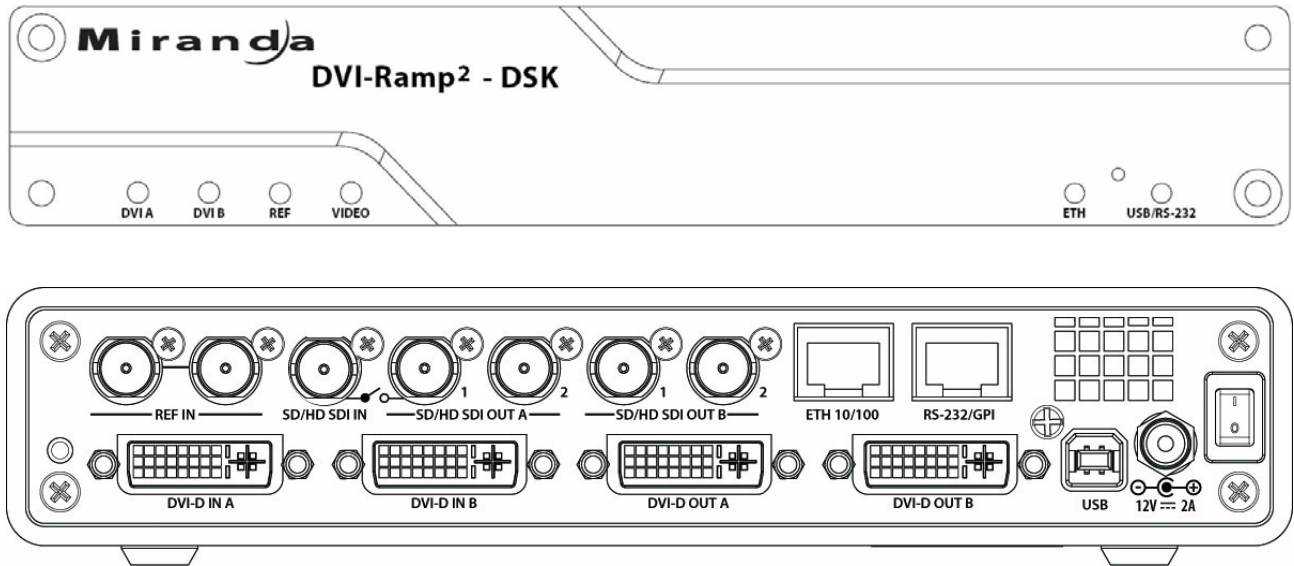
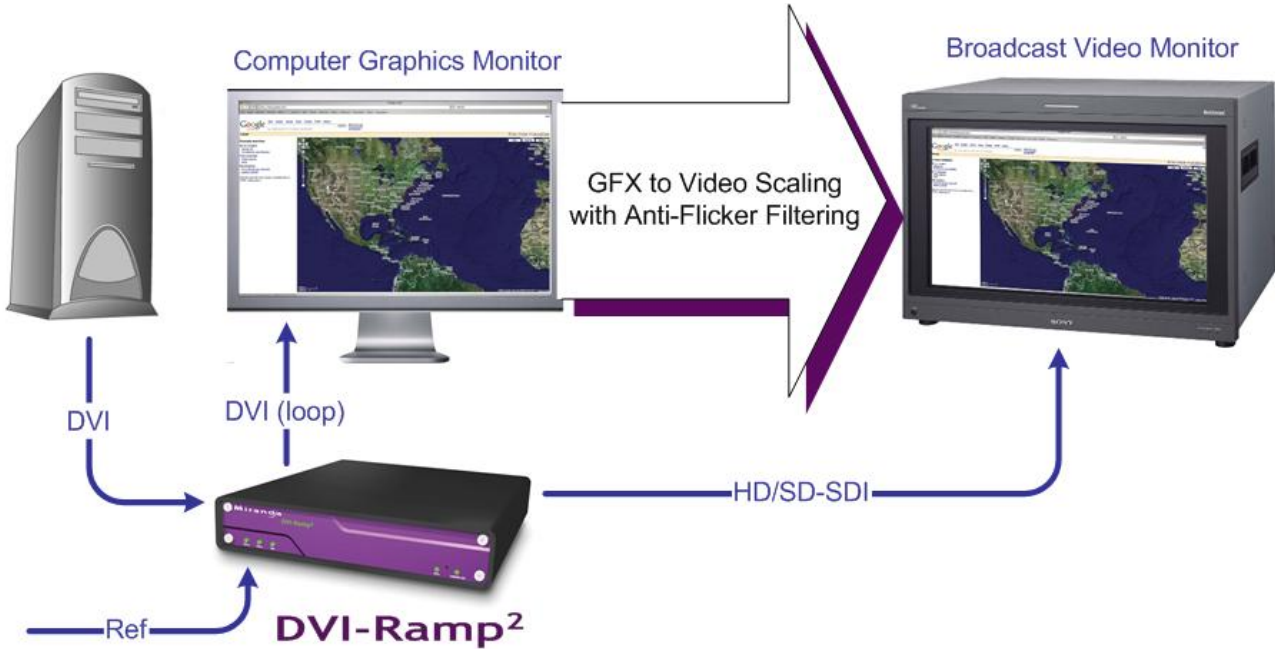


Figure 1-2b DVI-Ramp² DSK Front and Rear panels

1.5 Typical Applications



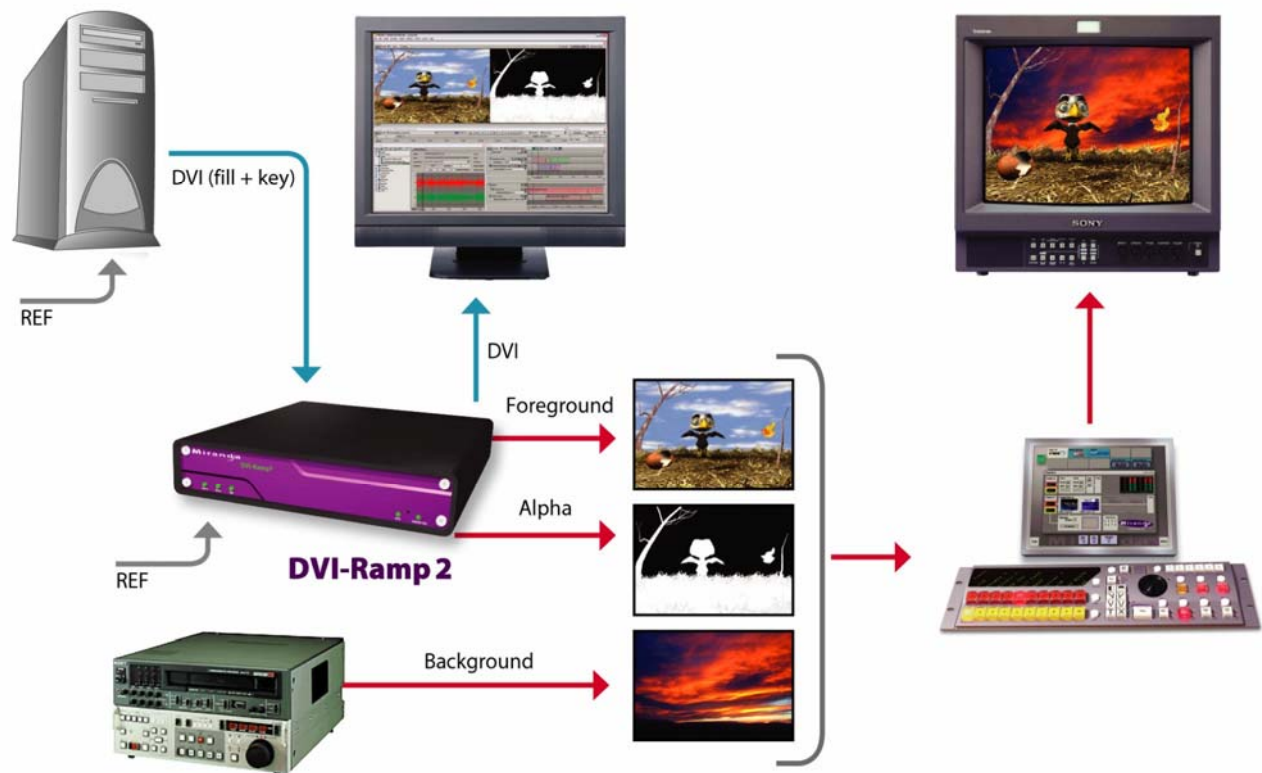
In this application, the DVI-Ramp² extracts a video window from the DVI input and converts it (pixel-to-pixel) to a video output. The highest quality is achieved by minimizing the processing done on the source images. The HD/SD-SDI output can include the entire graphic image or a window within the image so that unwanted graphic elements from the computer screen can be excluded.

For a clean presentation, the DVI-Ramp² and the computer's graphic card should be locked on the same reference signal to achieve the highest quality.

For this application, the DVI-Ramp² can be controlled by software available at www.miranda.com or by using third party software.

Broadcast keying of 3D animation using character generation and virtual set

DVI-Ramp 2 provides elegant interfacing for keying HD/SD 3D animations over a background using a mixer.

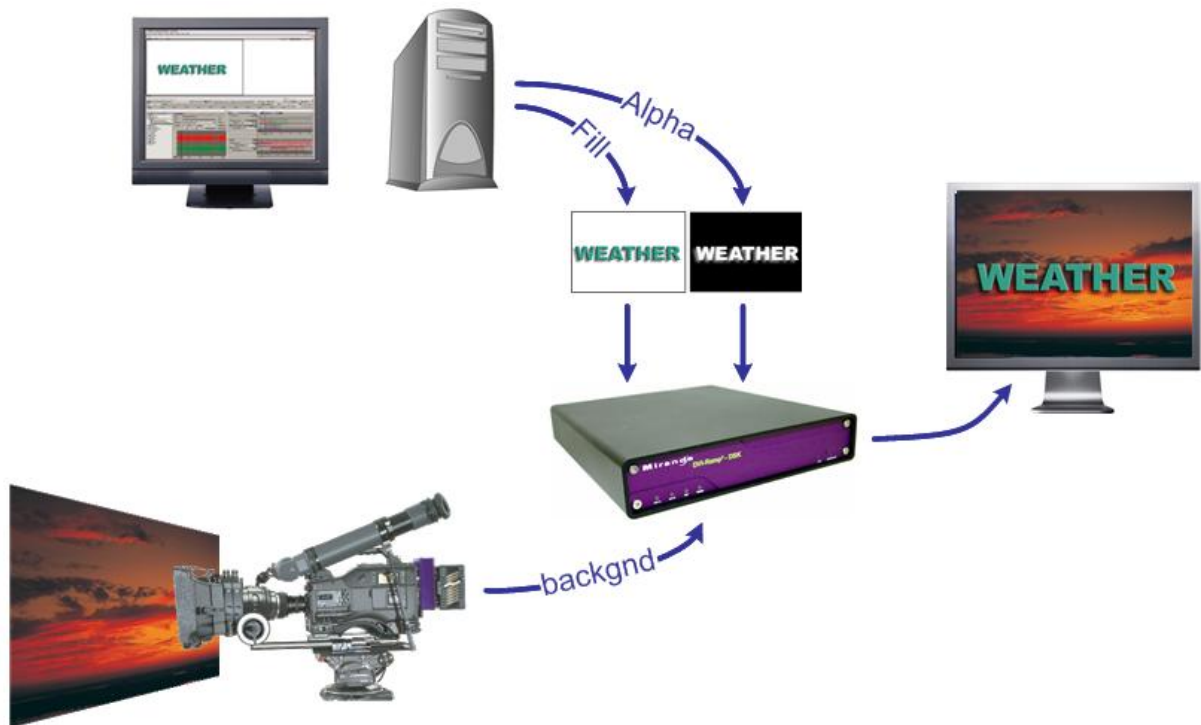


In this application, the DVI-Ramp² extracts two windows from the DVI source(s): a FILL window and a KEY window (window-A is the FILL while window-B is the KEY). The FILL window is converted to an SD/HD SDI "Foreground" output. The KEY window is converted to an SD/HD SDI "Alpha" output. These outputs with an appropriate background signal can be fed to a downstream keyer.

For a clean presentation, the DVI-Ramp² and the computer's graphic card should be locked on the same reference signal to achieve the highest quality.

For this application, the DVI-Ramp² can be controlled by software available at www.miranda.com or by using third party software.

Live application using internal keyer of DSK model (CG)



In this application, the DVI-Ramp² DSK extracts two windows from the DVI source(s) : a FILL window and a KEY window (window-A is the FILL while window-B is the KEY). The internal keyer of the device generates the video output by mixing the BACKGROUND (SD/HD SDI input) with the FILL image according to the KEY signal. When the KEY signal is black, the keyer outputs the BACKGROUND image. When the KEY signal is white, the keyer outputs the FILL image. With intermediate grey levels of the KEY signal, the keyer outputs a weighted sum of the FILL and BACKGROUND. Through software, the mixing polarity can be inverted (reverse interpretation of the black and white levels of the KEY signal).

In this application, the DVI-Ramp² DSK should be locked to the video input (BACKGROUND). For a clean presentation, the computer's graphics card should also be locked on the same reference as the video input.

For this application, the DVI-Ramp² DSK can be controlled by software available at www.miranda.com or by using third party software.

2 Installation

2.1 Unpacking

Make sure the following items have been shipped with your DVI-Ramp². If any of the following items are missing, contact your distributor or Miranda Technologies Inc.

- DVI-Ramp² unit
- AC power cord
- Power supply (AC to 12V DC converter)

2.2 Mechanical Installation

The DVI-Ramp² is packaged in a free-standing case with feet on the bottom, suitable for installation on a desk or tabletop.

The DVI-Ramp² is sized so that two DVI-Ramp² units can be installed side-by-side on a 1 RU tray for rack mounting.

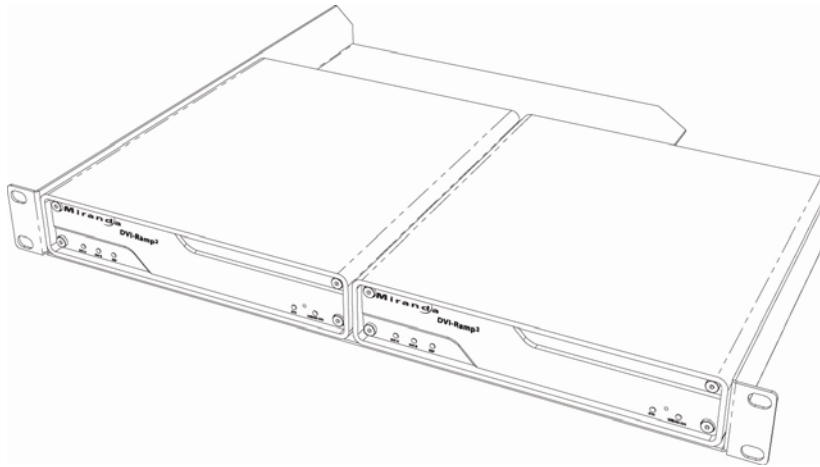


Figure 2.1 Installing two DVI-Ramp² units on a 1 RU tray (TRAY-120)

The rear panel of the DVI-Ramp² includes a threaded connection point for a mounting screw (left side of the rear panel – see figure 2.2) so that the device can be securely mounted on the tray. The Miranda [TRAY-120](#) is recommended, as it is configured to hold the DVI-Ramp² case and incorporates a hole for the mounting screw.

2.3 Connections

All inputs and outputs are located on the rear panel of the DVI-Ramp². Signals and connector types are listed below. The rear panel labels indicate the appropriate connection point for each signal.

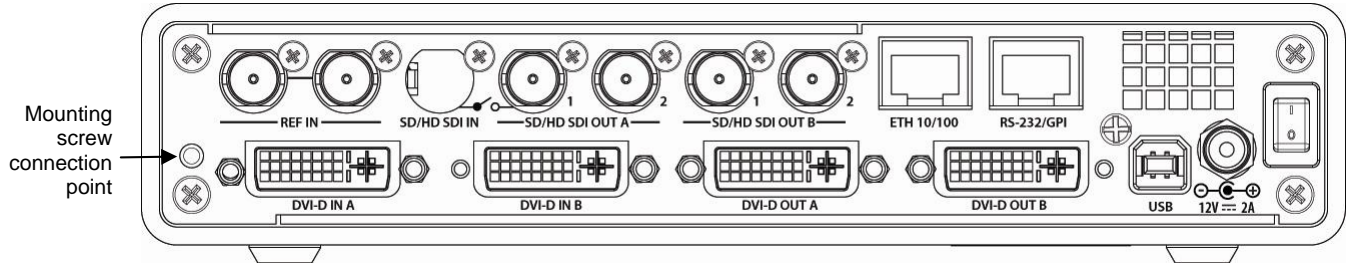


Figure 2.2a Rear panel and connectors of DVI-Ramp²

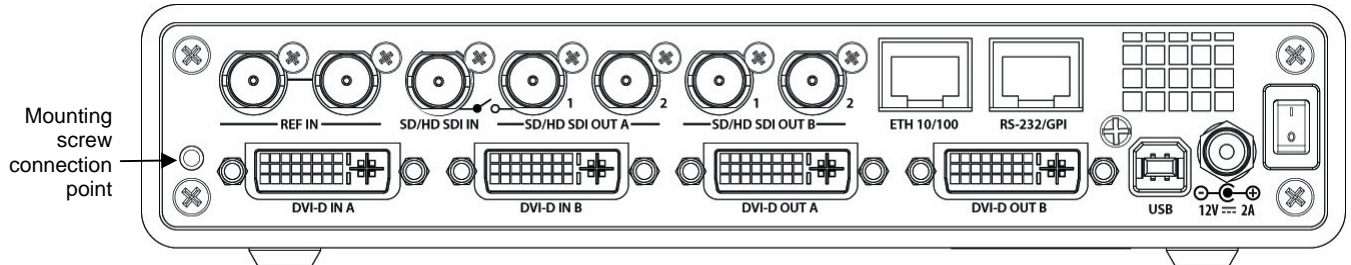


Figure 2.2b Rear panel and connectors of DVI-Ramp² DSK

Signal connections:

2 DVI inputs (DVI-D IN A and DVI-D IN B)	(DVI connectors)
1 HD/SD reference input and passive loop-through	(BNC connectors)
2 DVI outputs (DVI-D OUT A and DVI-D OUT B)	(DVI connectors)
4 HD/SD SDI outputs	(BNC connectors)
1 HD/SD SDI input	(BNC connector for DSK model ONLY)

For optimum performance, high-quality DVI cables should be used. One recommended cable model is D-766 from Cable4PC (www.cable4pc.com)

Communication connections:

External control (10/100 Ethernet)	(RJ-45 connector, implemented in future release)
External control (RS232/GPI)	(RJ-45 connector)
External control (USB)	(USB connector)

See section 1.5 for an example of how these inputs and outputs are connected in a basic operating setup.

2.4 Control Interface

The DVI-Ramp² has no local controls beyond the power switch and the Reset pushbutton. All adjustment is done using a software interface running on a computer connected to one of the three control ports.

Miranda has developed software for this purpose. The software and documentation can be downloaded from Miranda's website at www.miranda.com. The software includes Context-Sensitive Help.

Alternatively, users may create their own software. Programming documentation is available on demand.

Note: Connecting to an RS-232 device or network

The "RS-232/GPI" RJ45 connector is used to preserve space on a busy panel while accommodating RS-232 and GPI interfaces. The RS-232 interface specifies a DE-9S connector, so if you are using this interface you may require a DE-9S-to-RJ45 adapter cable. The pin-out of the "RS-232/GPI" connector is shown below:

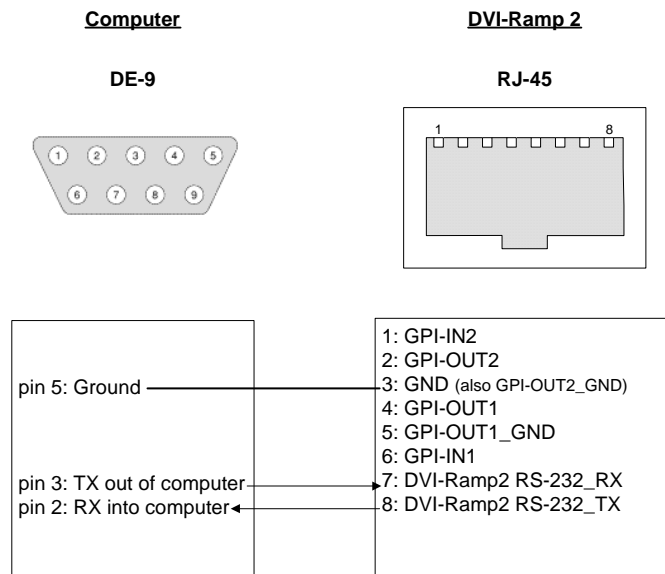


Figure 2.3 RS-232 / GPI RJ45 connector pin-out

3 Operation

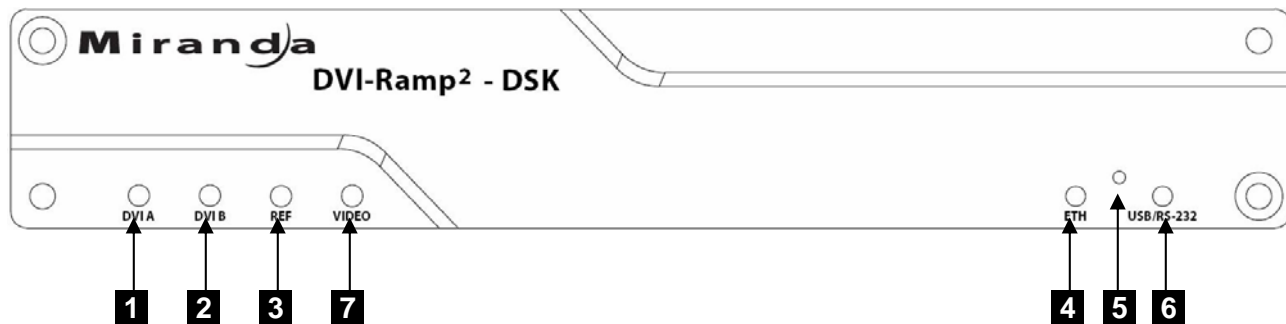
The DVI-Ramp² has no local controls beyond the power switch and the reset pushbutton. Operational concerns are outlined here, but for detailed operating instructions, see the documentation at www.miranda.com.

3.1 Powering Up

The power switch is located on the rear panel of the DVI-Ramp², just above the power connector. Connect the provided power supply to the power connector and set the switch to ON (I).

3.2 Front Panel Indicators and Controls

There are five Input Status LEDs which are mounted on the front edge of the DVI-Ramp²'s circuit board, and which can be seen through holes in the front panel of the case. The DVI-Ramp² DSK model has an extra LED for the video input status.



Status LEDs

- 1** DVI A GREEN when a valid input is detected on DVI-D IN A
 RED when no valid input is detected on DVI-D IN A
- 2** DVI B When the DVI input mode is DUAL-HEAD mode (software configuration):
 GREEN when a valid input is detected on DVI-D IN B
 RED when no valid input is detected on DVI-D IN B
 When the DVI input mode is DUAL-LINK or SINGLE-LINK (default):
 OFF
- 3** REF GREEN when unit is genlocked on reference input
 RED when unit is programmed to genlock on reference input but none is present. Unit is then free-running
 ORANGE – FLASHING when unit is programmed to genlock on reference input but wrong format is detected. Unit is free-running.
 GREEN-FLASHING when unit is programmed to be free-running but a valid reference signal is present
 ORANGE unit is programmed to be free-running and an unknown reference signal is present
 OFF when unit is programmed to be free-running and no reference signal is present
- 4** ETH OFF – no link
 GREEN – link available (from PHY)
 ORANGE FLASHING – transmitting (from PHY)
At power-up, this LED will be GREEN or OFF depending on whether a network is connected.
- 6** USB/RS-232 OFF – No USB or RS-232
 GREEN when USB is recognized by the PC or valid RS-232 is detected
 ORANGE FLASHING when transmitting packets
 ORANGE QUICK FLASH – heart-beat with USB or RS-232 connection available. This indicates that firmware is in working order
 RED QUICK FLASH – heart-beat with no USB or RS-232 connection available. This indicates that firmware is in working order
At power-up, this LED is OFF

7 VIDEO

This LED is only found on the DSK model.

GREEN when unit is genlocked on SD/HD SDI input

RED when unit is programmed to genlock on SD/HD SDI input but none is present. Unit is then free-running

ORANGE – FLASHING when unit is programmed to genlock on SD/HD SDI input but wrong format is detected. Unit is free-running.

GREEN-FLASHING when unit is programmed to be free-running but a valid SD/HD SDI signal is detected

ORANGE unit is programmed to be free-running and an unknown SD/HD SDI signal is present

OFF when unit is programmed to be free-running and no SD/HD SDI signal is detected

Controls

Only one control is provided at the front panel:

5 RESET button

The RESET button is a dual-function control, and operates as follows:

- Quick push and release – resets the USB communication port.
- Push and hold for 5 seconds before releasing – copy the display settings to the DVI-Ramp² input. This ensures that the input of the DVI-Ramp² will mimic the display that is connected to its DVI output.
 - Settings on "DVI-D OUT A" are copied to "DVI-D IN A"
 - Settings on "DVI-D OUT B" are copied to "DVI-D IN B"

Use a bent paper clip or equivalent thin wire to activate the RESET button through the hole in the front panel.

3.3 Synchronizing the DVI-Ramp² and the graphics card

The DVI-Ramp² processes the output of the computer graphics card and outputs a video signal. The timing relationship between the graphics card output and the video system is important in determining the success of the transfer.

The DVI Ramp² supports 2 different approaches to this situation:

3.3.1 Frame sync (graphics card without reference)

The graphics card is not synchronized with the video system. The DVI-Ramp² operates as a frame synchronizer, meaning that its input from the graphics card is buffered, and frames are repeated or dropped if the buffer underflows or overflows.

The frame-sync will drop frames when the DVI rate is larger than the SDI rate. Conversely, it will repeat frames when the DVI rate is smaller than the SDI rate.

3.3.2 Genlock (graphics card with reference)

Both the graphics card and the DVI-Ramp² are locked to the video system timing reference. The buffer in the DVI-Ramp² is replenished at the same rate as it is emptied, so there is never an underflow or overflow that would trigger a discontinuity in the image content.

3.4 DVI format considerations

The format of the SDI output generated by the DVI-Ramp² depends on the refresh rate of its DVI input and on the use of the internal frame-sync function. Use the table below to select the appropriate DVI refresh rate to achieve the desired output.

When the frame-sync function is OFF (Note 1), the following table of refresh rate compatibilities applies:

Desired SDI output format	Recommended DVI frame rate (Hz)
SD-525	59.94 ³
SD-625	50 ³
1280x720@50p	50
1280x720@59.94p	59.94
1280x720@60p	60
1920x1080@23.98p	23.98
1920x1080@23.98PsF	47.95 ³
1920x1080@24p	24
1920x1080@24PsF	48 ³
1920x1080@25p	25
1920x1080@50i / 25PsF	50 ³
1920x1080@59.94i	59.94 ³
1920x1080@60i	60 ³

NOTES:

1. When the frame-sync is OFF, the graphic card MUST be genlocked to the same reference as the DVI-Ramp². When the frame-sync function is ON, the DVI refresh rate can deviate from the suggested one but will cause drop/repeat of frames at a rate proportional to the deviation.
2. For interlaced scan formats, the refresh rate is specified in terms of field rate. Thus, a refresh rate of 59.94 fields per second is specified as 59.94i.
3. When the recommended DVI frame rate is twice the SDI frame rate, each "source" frame content must be repeated. Example: with the DVI input as 1920x1080@59.94p and SDI output as 1920x1080@59.94i (frame rate @ 29.97 fps), the processing would be as follows:
DVI: frameA, frameA, frameB, frameB, ... → DVI-Ramp → SDI: frameA, frameB, ...
4. All supported DVI resolutions are progressive scan formats

4 Technical Specifications

INPUT

DVI (x2)

SIGNAL: Digital Visual Interface (DVI Revision 1.0)
CONNECTORS: DVI-D. "DVI-D IN A" is DUAL-LINK whereas "DVI-D IN B" is SINGLE-LINK.

SD/HD SDI (x1 on DSK model only)

SIGNAL: SMPTE-259M-C (270Mbps) and SMPTE-292M (1.485, 1.485/1.001 Gbps)
FORMATS: SD 525 and 625 lines.
HD 1920x1080i @ 50, 59.94 and 60 fields per seconds
HD 1280x720p @ 50, 59.94 and 60 frames per seconds
RETURN LOSS: > 15 dB up to 1.5 GHz
CONNECTOR: 75 Ω BNC

REFERENCE INPUT (x1 with passive loop-through)

SIGNAL: SMPTE 170M/ITU 624-4 black burst (with no video content)
SMPTE 274M / SMPTE 296M Tri-Level Sync
RETURN LOSS: > 35 dB up to 5.75 MHz
CONNECTORS: 75 Ω BNC

OUTPUT

SD/HD SDI (x4)

SIGNAL: SMPTE 292M (1.485, 1.485/1.001 Gbps) and SMPTE-259-C (270 Mbps)
FORMATS: SD 525 and 625 lines.
HD 1920x1080i @ 50, 59.94 and 60 fields per seconds
HD 1920x1080psf @ 23.98 and 24 frames per seconds
HD 1920x1080p @ 23.98, 24 and 25 frames per seconds
HD 1280x720p @ 50, 59.94 and 60 frames per seconds
RETURN LOSS >15 dB up to 1.5 GHz
Except for output A1 of DSK model (through relay):
In bypass mode: > 12 dB up to 1.5 GHz
In active mode: 0 – 750 MHz: > 10 dB
750 – 1500 MHz: > 8 dB
JITTER SD: < 0.2 UI p-p wideband
HD: < 0.2 UI p-p above 100 KHz

OTHER

POWER 22 W @ 12V (Universal AC Adaptor supplied)
FORM FACTOR Standalone – half-width of standard 19" rack
1 RU high, 8 13/16" deep (224 mm) including BNC connectors