

# T2 Express, Pro and Elite

## Intelligent Digital Disk Recorders



Each of the three T2 intelligent digital disk recorder (iDDR) models (T2 Express, Pro and Elite) brings full high-definition capture and playback to the video professional. Additionally, T2 iDDRs support real-time HD crossconversion and faster than real-time playlist rendering.

Grass Valley, a Belden Brand, T2 iDDRs are complete and self-contained SD and HD audio/video playout centers. The front-panel transport controls have the look and feel of a traditional VTR, and its two output and one record channels support SD and HD content. The crisp, clear LCD front panel can display high-quality images and is complemented by a software application suite for managing and selecting media clips, clip editing and trimming, and playout — including playlist creation.

Featuring extensive rear-panel audio/video connectivity, T2 iDDRs can also accept files via USB 2.0, or by data transfer over a standard Gigabit Ethernet network including Grass Valley HQ, Grass Valley HQ + Alpha (T2 Elite only), XDCAM, P2, AVCHD, MPEG-2, ProRes 422, ProRes 4444 (T2 Elite only), TIFF and TGA files.

Further, the T2 iDDR can be controlled by video production switchers, presentation mixers and audio mixers — to create a powerful presentation system. Every T2 iDDR has two playout channels for independent editing and previewing, or for delivering content to two different display systems simultaneously, useful for edge-blending and displaying 3D content.

### T2 iDDR Express (HDD)

- RAID-0 (500 GB HDD x2)
- 1 TB data disk — 14 hours recording capacity (Grass Valley HQ: 150 Mb/s) — 36 hours of XDCAM HD422 @ 50 Mb/s

### T2 iDDR Pro (HDD)

- RAID-10 (500 GB HDD x4)
- 1 TB data disk — 14 hours recording capacity (Grass Valley HQ: 150 Mb/s) — 36 hours of XDCAM HD422 @ 50Mb/s

### T2 iDDR Elite (SSD)

- RAID-0 (480 GB SSD x2)
- 960 GB data disk — 14 hours recording capacity (Grass Valley HQ: 150 Mb/s) — 36 hours XDCAM HD422 @ 50Mb/s

## T2 Intelligent Digital Disk Recorders

### KEY FEATURES

- True HD support — 720p, 1080i and 1080p24
- Up/downconversion for a wider range of resolutions and application support
- Native import/playback for most standard formats (see list below)
- Synchronize multiple T2s for 4K playback
- Multiformat support (transcoding to Grass Valley HQ AVI) for most standard and broadcast formats (see list below)
- Three decks for the price of one – 1 record and 2 playback channels work independently and simultaneously
- 2-channel synchronized playback for key/fill rolls, edge blend displays, multiscreen and 3D applications
- Embedded audio (8 channels per SDI connection)
- AES/EBU audio supported
- Easy-to-use front panel interface
- Workstation mode included as standard
- Simple on-the-fly editing, including trimming, mark in/out, basic transition effects and insertion of placeholders for playlists
- New, robust design – engineered to withstand punishing live event and mobile production environments
- Full back-up and restore feature
- Timecode chase playback with LTC input (SP 2.0 or later)
- Integration support for third-party control (BVW, GPIO and AMP)
- Ingest management including:
  - MXF XDCAM format support with closed caption data
  - Direct ingest to external media/storage
  - User-defined clip names
  - Scheduler
- Import from Final Cut Pro in QuickTime format using the free Grass Valley HQ codec for Mac onto an exFAT HDD
- Supports ProRes 422 and ProRes 4444 (T2 Elite only). (SP 2.0 or later)
- Fast playlist rendering speed (up to 10 times real-time)
- Supports 720p to 1080i real-time crossconversion
- File-based operation enhancements including:
  - FTP transfer rate limit to maintain playback performance
  - NTP Synchronization
  - Watch folder transfers
- Direct access to a media folder with EDIUS and the ability to edit a growing file - AVI (Grass Valley HQ) and MXF (XDCAM). T2 Elite only (SP2.0 or later)
- Export a growing MXF (XDCAM) file via FTP
- Export to Sony XDCAM drive (U1/U2)

### Applications

- Events and staging
- Auditoriums
- Corporate A/V centers
- Educational facilities
- Broadcast display support
- Regional sports companies
- Switcher support for playback

### Full-Featured Front Panel



### NATIVE IMPORT/PLAYBACK FORMATS

AVCHD (H.264/AVC)  
 AVI (DV, DVCPRO 25, DVCPRO 50, DVCPRO HD, Grass Valley HQ, Grass Valley HQ + Alpha)  
 GF (DV, DVCPRO 25, DVCPRO 50, MPEG-2)  
 MXF (Grass Valley HQ, Grass Valley HQ + Alpha, AVC-Intra 50, AVC-Intra 100, D10, DV, DVCPRO 25, DVCPRO 50, DVCPRO HD, MPEG-2)  
 P2 (DV, DVCPRO 25, DVCPRO 50, DVCPRO HD, AVC-Intra 50, AVC-Intra 100)  
 XDCAM (DV, IMX, MPEG-2)  
 XDCAM EX (MPEG-2)  
 QuickTime (Grass Valley HQ, ProRes 422) (Grass Valley HQ + Alpha, ProRes 4444 – T2 Elite only) (SP2.0 or later)

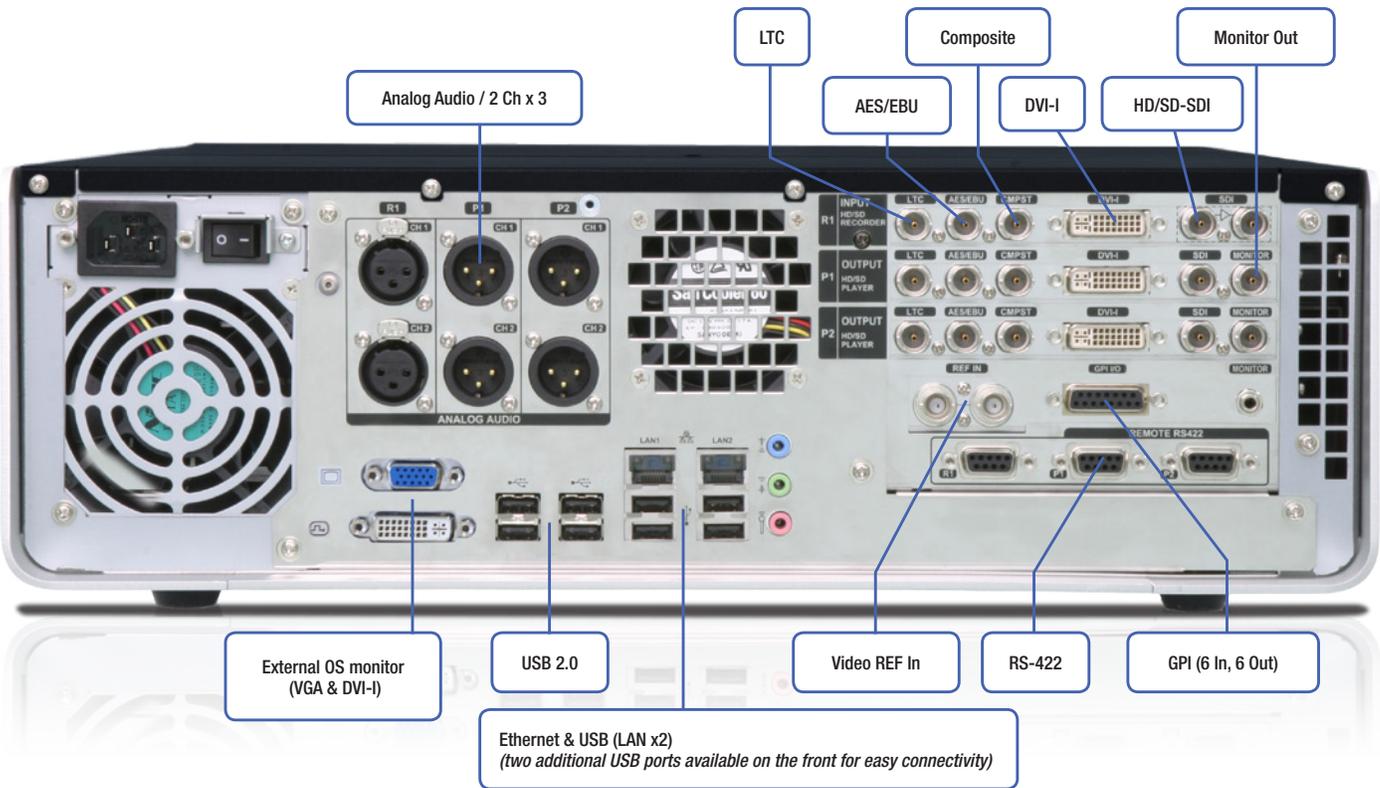
### FILE FORMAT SUPPORT

#### Transcoding to Grass Valley HQ AVI

AVCHD (H.264/AVC)  
 AVI (Grass Valley HQX, Grass Valley HQX + Alpha, Grass Valley Lossless, uncompressed)  
 GF (DV, DVCPRO 25, DVCPRO 50, MPEG-2)  
 MPEG-2  
 MXF (Grass Valley HQX, Grass Valley HQX + Alpha, Grass Valley HQ, Grass Valley HQ + Alpha, AVC-Intra 50, AVC-Intra 100, D10, DV, DVCPRO 25, DVCPRO 50, DVCPRO HD, JPEG2000, MPEG-2)  
 P2 (DV, DVCPRO 25, DVCPRO 50, DVCPRO HD, AVC-Intra 50, AVC-Intra 100)  
 QuickTime (Grass Valley HQ, Grass Valley HQ + Alpha, Grass Valley HQX, Grass Valley HQX + Alpha, DV, DVCPRO HD, H.264, ProRes 422, ProRes 4444, JPEG2000, animation, MPEG-4, Photo JPEG, PNG, uncompressed)  
 Windows Media (Windows Media Video)  
 XDCAM (DV, IMX, MPEG-2)  
 XDCAM EX (MPEG-2)  
 Sequenced files (TGA, BMP, JPG, TIFF, PNG, GIF)

#### Rewrapping MXF (OP-1a)

GXF (AVC-Intra 100, AVC-Intra 50, D10 DVCPRO HD, DVCPRO50, DVCPRO 25, DV, MPEG-2)  
 P2 (DV, DVCPRO 25, DVCPRO 50, DVCPRO HD, AVC-Intra 50, AVC-Intra 100)



**Import File Compatibility – Transcode Import**

Container	Video Codec	Audio Codec	Native Import/ Playback	Transcoding (AVI (HQ))	Rewrap MXF (OP-1a)
AVCHD	H.264/AVC	Dolby Digital (AC-3), Linear PCM	Yes	Yes	—
AVI	Grass Valley HQ, Grass Valley HQ + Alpha, DV, DVCPRO 25, DVCPRO 50, DVCPRO HD	Linear PCM	Yes	—	—
AVI	Grass Valley Lossless, Grass Valley HQX, Grass Valley HQX + Alpha, uncompressed	Linear PCM	—	Yes	—
GF	DV, DVCPRO 25, DVCPRO 50, MPEG-2	Linear PCM (48 kHz, 16-bit/24-bit)	Yes	Yes	—
GXF	AVC-Intra 100, AVC-Intra 50, D10, DVCPRO HD, DVCPRO 50, DVCPRO 25, DV, MPEG-2	Linear PCM, A-law	—	—	Yes
MPEG-2	MPEG-2	MPEG-1 Audio Layer-2, Dolby Digital (AC-3), Linear PCM	—	Yes	—
MXF	AVC-Intra 50, AVC-Intra 100, D10, DV, DVCPRO 25, DVCPRO 50, DVCPRO HD, MPEG-2	Linear PCM, A-law	Yes	Yes	—
MXF	JPEG 2000	Linear PCM, A-law	—	Yes	—
MXF	Grass Valley HQ, Grass Valley HQ + Alpha	Linear PCM	Yes	Yes	—
MXF	Grass Valley HQX, Grass Valley HQX + Alpha	Linear PCM	—	Yes	—
P2	DV, DVCPRO 25, DVCPRO 50, DVCPRO HD, AVC-Intra 50, AVC-Intra 100	Linear PCM (48 kHz, 16-bit/24-bit)	Yes	Yes	Yes
QuickTime (SP2.0 or later)	Grass Valley HQ, Grass Valley HQ + Alpha, ProRes 422, ProRes 4444*	AAC, Apple Lossless, MP3, ADPCM, A-law, U-law, Linear PCM	Yes	Yes	—
QuickTime	Grass Valley HQX, Grass Valley HQX + Alpha, DV, DVCPRO HD, H.264, JPEG 2000, Animation, MPEG-4, Photo JPEG, PNG, uncompressed	AAC, Apple Lossless, MP3, ADPCM, A-law, U-law, Linear PCM	—	Yes	—
Windows Media	Windows Media Video	Windows Media Audio	—	Yes	—
XDCAM	DV, IMX, MPEG-2	8 channels AES3, Linear PCM, A-law	Yes	Yes	—
XDCAM EX	MPEG-2	Linear PCM (48 kHz, 16-bit)	Yes	Yes	—

\* ProRes 4444 and Grass Valley HQ + Alpha are supported on the T2 Elite only.

## T2 Intelligent Digital Disk Recorders

### SPECIFICATIONS

#### T2 iDDR Configurations

1 SD/HD input, 2 SD/HD outputs

#### Video Input

**Format Support Types:** High-definition, standard-definition

**Connections:** SD/HD SDI, analog component (Y-Pb-Pr), DVI-I, composite

**Recording Format:** AVI-Grass Valley HQ, 4:2:2, XDCAM HD422 (50 Mb/s), HD (25 Mb/s), IMX, DVCAM

Beginning with SP1, T2 can record directly in XDCAM format

**Bit Rate:** Up to 200 Mb/s

**Resolutions SD/Frame Rate:** 720x576i50, 720x486i59.94

**Resolutions HD/Frame Rate:** 1920x1080i59.94, 1920x1080i50, 1920x1080p24, 1920x1080PsF24, 1920x1080p23.98, 1920x1080PsF23.98, 1440x1080i59.94, 1440x1080i50, 1440x1080p24, 1440x1080PsF24, 1440x1080p23.98, 1440x1080PsF23.98, 1280x720p59.94, 1280x720p50

#### Video Outputs

**Format Support Types:** High-definition, standard-definition, computer

**Connections:** SD/HD SDI (one for each playback channel), analog component, DVI-I (one for each playback channel, except RGB), composite

#### Playback Format (Native Import/Playback):

AVCHD – H.264/AVC

AVI – Grass Valley HQ, Grass Valley HQ + Alpha, DV, DVCPRO 25, DVCPRO 50, DVCPRO HD

GF – HD I-Frame only (100 Mb/s), HD Long GOP (50 Mb/s), DVCPRO 50, DVCPRO 25, DV, MPEG-2

MXF – Grass Valley HQ, Grass Valley HQ + Alpha, AVC-Intra 100, AVC-Intra 50, DVCPRO HD, DVCPRO 50, DVCPRO 25, DV, D10, MPEG-2

P2 – AVC-Intra 100, AVC-Intra 50, DVCPRO HD, DVCPRO 50, DVCPRO 25, DV

XDCAM – HD422 (50 Mb/s), HD (35 Mb/s, 25 Mb/s, 18 Mb/s), IMX, DVCAM

XDCAM EX – HD (35 Mb/s, 25 Mb/s)

QuickTime – Grass Valley HQ, Grass Valley HQ + Alpha\*, ProRes 422, ProRes 4444\* (SP2.0 or later)

**Bit Rate:** Up to 200 Mb/s per channel

**Resolutions SD/Frame Rate:** 720x576i50, 720x486i59.94

**Resolutions HD/Frame Rate:** 1920x1080i59.94, 1920x1080i50, 1920x1080p24, 1920x1080PsF24, 1920x1080p23.98, 1920x1080PsF23.98, 1280x720p59.94, 1280x720p50, 1280x720p23.98

**Computer Resolutions:** 1280x1024, 1024x768, 800x600, 640x480

#### Audio Input

**Analog Audio:** 2 channels, XLR connections

#### Digital:

AES/EBU (2 channels), BNC connections

Embedded audio on SDI, HD or SD (8 channels)

**Recording Format:** 24-bit, PCM, 48 kHz sampling (20-bit PCM for SD-SDI)

#### Audio Output

**Analog Audio:** 2 channels per output video, XLR connections

#### Digital:

AES/EBU (2 channels), BNC connections

Embedded audio on SDI, HD or SD (8 channels)

**Recording Format:** 24-bit, PCM, 48 kHz sampling (20-bit PCM for SD-SDI)

#### Export File Compatibility

**Export:** Grass Valley HQ, Grass Valley HQ + Alpha, MXF (XDCAM HD422 (50 Mb/s), HD (25 Mb/s), IMX, DV)

#### Transcoding to Grass Valley HQ AVI:

AVCHD (H.264/AVC)

AVI (Grass Valley HQX, Grass Valley HQ + Alpha, Grass Valley Lossless, uncompressed)

GF (DV, DVCPRO 25, DVCPRO 50, MPEG-2)

MPEG-2

MXF (Grass Valley HQX, Grass Valley HQX + Alpha, Grass Valley HQ, Grass Valley HQ + Alpha, AVC-Intra 50, AVC-Intra 100, D10, DV, DVCPRO 25, DVCPRO 50, DVCPRO HD, JPEG2000, MPEG-2)

P2 (DV, DVCPRO 25, DVCPRO 50, DVCPRO HD, AVC-Intra 50, AVC-Intra 100)

QuickTime (Grass Valley HQ, Grass Valley HQX, Grass Valley HQX + Alpha, DV, DVCPRO HD, H.264, ProRes 422, ProRes 4444, JPEG2000, animation, MPEG-4, Photo JPEG, PNG, uncompressed)

Windows Media (Windows Media Video)

XDCAM (DV, IMX, MPEG-2)

XDCAM EX (MPEG-2)

Sequenced files (TGA, BMP, JPG, TIFF, PNG, GIF)

#### Rewrapping MXF (OP-1a):

GXF (AVC-Intra 100, AVC-Intra 50, D10)

DVCPRO HD, DVCPRO50, DVCPRO 25, DV, MPEG-2)

P2 (DV, DVCPRO 25, DVCPRO 50, DVCPRO HD, AVC-Intra 50, AVC-Intra 100)

#### Control

**Protocol:** BWV (pre-roll/post-roll, variable control in sync mode, audio monitoring with variable speed), GPI, AMP (Advanced Media Protocol) for Grass Valley switchers and external control software

Timecode chase playback with LTC input (SP 2.0 or later)

**Connections:** RS-422 (9-pin D Conn per channel), Ethernet

#### Technology

**Connections:** Gigabit Ethernet, USB 2.0, VGA, DVI-I

#### Storage Capacity:

Express: 1 TB (RAID-0, 500 GB HDD x2), Approx. 14 hours of HD @ Grass Valley HQ (150 Mb/s) – 36 hours XDCAM HD422 @ 50Mb/s

Pro: 1 TB (RAID-10, 500 GB HDD x4), Approx. 14 hours of HD @ Grass Valley HQ (150 Mb/s) – 36 hours of XDCAM HD422 @ 50Mb/s

Elite: 960 GB (RAID-0, 480 GB SSD x2), Approx. 14 hours of HD @ Grass Valley HQ (150 Mb/s) – 36 hours of XDCAM HD422 @ 50 Mb/s

**Service Pack:** Updated for Service Pack 2.0 (November 2014)

#### Physical

**Dimensions:** 550x430x140 mm (21.6x16.9x5.5 in.)

**Weight:** 15 kg (33 lbs.)

**Operating Temperature:** 5°C to 35°C (41°F to 95°F)

#### Options and Accessories

##### Rackmount Kit

**SNFS Option:** Required to connect the T2 to a K2 SAN using the SNFS file system. This option is only supported by Service Pack 1.1 or later.

Note: The T2 can connect to a K2 SAN via FTP without this option.

\*ProRes 4444 and Grass Valley HQ + Alpha are supported on the T2 Elite only.



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