

LV5600W WAVEFORM MONITOR

LV7600W RASTERIZER

LV5600-SER01	SDI INPUT
LV5600-SER02A	SDI INPUT / EYE
LV5600-SER03 / LV7600-SER03	DIGI / ANA AUDIO
LV5600-SER04 / LV7600-SER04	DOLBY
LV5600/LV7600-SER07	DOLBY
LV5600-SER05 / LV7600-SER05	10G IP INPUT
LV5600-SER06 / LV7600-SER06	25G IP INPUT
LV5600-SER23 / LV7600-SER23	HDR
LV5600-SER24 / LV7600-SER24	TSG
LV5600-SER25 / LV7600-SER25	FOCUS ASSIST
LV5600-SER26 / LV7600-SER26	LAYOUT
LV5600-SER27 / LV7600-SER27	TALLY
LV5600-SER28 / LV7600-SER28	4K
LV5600-SER29 / LV7600-SER29	12G-SDI
LV5600-SER30 / LV7600-SER30	VIDEO NOISE METER
LV5600-SER31 / LV7600-SER31	COLORIMETRY ZONE
LV5600-SER32 / LV7600-SER32	25G IP TSG
LV5600-SER33 / LV7600-SER33	JPEG XS
LV5600-SER40 / LV7600-SER40	EXTENDED VEC

Specification

Leader Electronics Corporation

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1. SDI Video Formats and Standards (SER01/SER02A/SER28/SER29)

Table 1-1 SD video signal formats and standards

Color System	Quantization	Image	Field Frequency/Scanning	Supported Standard
YCbCr 4:2:2	10 bit	720×487	59.94 /I	SMPTE ST 259
		720×576	50 /I	

Table 1-2 HD video signal formats and standards

Color System	Quantization	Image	Frame (Field) Frequency/Scanning	Supported Standard
YCbCr 4:2:2	10 bit	1280×720	60/59.94/50/30/29.97/25/24/23.98 /P	SMPTE ST 292-1
				SMPTE ST 296
		1920×1080	60/59.94/50 /I	SMPTE ST 274
			30/29.97/25/24/23.98 /P	SMPTE ST 292-1
	30/29.97/25/24/23.98 /PsF			

Table 1-3 3G-A video signal formats and standards

Color System	Quantization	Image	Frame (Field) Frequency/Scanning	Supported Standard		
YCbCr 4:2:2	10 bit	1920×1080	60/59.94/50 /P	SMPTE ST 274 SMPTE ST 425-1		
			48/47.95 /P	-		
		2048×1080	60/59.94/50/48/47.95 /P		SMPTE ST 425-1 SMPTE ST 2048-2	
			12 bit	1920×1080	60/59.94/50 /I	SMPTE ST 274
	30/29.97/25/24/23.98 /P	SMPTE ST 425-1				
	30/29.97/25/24/23.98 /PsF					
	2048×1080	30/29.97/25/24/23.98 /P		SMPTE ST 425-1		
		30/29.97/25/24/23.98 /PsF		SMPTE ST 2048-2		
YCbCr 4:4:4	10 bit	1280×720	60/59.94/50/30/29.97/25/24/23.98 /P		SMPTE ST 296 SMPTE ST 425-1	
			1920×1080	60/59.94/50 /I		SMPTE ST 274
		30/29.97/25/24/23.98 /P		SMPTE ST 425-1		
		30/29.97/25/24/23.98 /PsF				
		2048×1080	30/29.97/25/24/23.98 /P		SMPTE ST 425-1	
			30/29.97/25/24/23.98 /PsF		SMPTE ST 2048-2	
			12 bit	1920×1080	60/59.94/50 /I	
		30/29.97/25/24/23.98 /P			SMPTE ST 425-1	
	2048×1080	30/29.97/25/24/23.98 /P		SMPTE ST 425-1		
		30/29.97/25/24/23.98 /PsF		SMPTE ST 2048-2		
	RGB 4:4:4	10 bit	1280×720	60/59.94/50/30/29.97/25/24/23.98 /P		SMPTE ST 296 SMPTE ST 425-1
				1920×1080	60/59.94/50 /I	
30/29.97/25/24/23.98 /P			SMPTE ST 425-1			
30/29.97/25/24/23.98 /PsF						
2048×1080			30/29.97/25/24/23.98 /P		SMPTE ST 425-1	
			30/29.97/25/24/23.98 /PsF		SMPTE ST 2048-2	
			12 bit	1920×1080	60/59.94/50 /I	
30/29.97/25/24/23.98 /P					SMPTE ST 425-1	
2048×1080		30/29.97/25/24/23.98 /P		SMPTE ST 425-1		
		30/29.97/25/24/23.98 /PsF		SMPTE ST 2048-2		
30/25/24 /PsF						
		XYZ 4:4:4	2048×1080	30/25/24 /P		SMPTE ST 425-1
30/25/24 /PsF				SMPTE ST 428		

Table 1-4 3G-B-DL, HD(DL) Video Signal Formats and Standards

Color System	Quantization	Image	Frame (Field) Frequency/Scanning	Supported Standard
YCbCr 4:2:2	10 bit	1920×1080	60/59.94/50 /P	SMPTE ST 274 SMPTE ST 372 SMPTE ST 425-1
			48/47.95 /P	-
		2048×1080	60/59.94/50/48/47.95 /P	SMPTE ST 372 SMPTE ST 425-1 SMPTE ST 2048-2
	12 bit	1920×1080	60/59.94/50 /I	SMPTE ST 274
			30/29.97/25/24/23.98 /P	SMPTE ST 372
			30/29.97/25/24/23.98 /PsF	SMPTE ST 425-1
		2048×1080	30/29.97/25/24/23.98 /P	SMPTE ST 372
			30/29.97/25/24/23.98 /PsF	SMPTE ST 425-1 SMPTE ST 2048-2
	YCbCr 4:4:4	10 bit	1920×1080	60/59.94/50 /I
30/29.97/25/24/23.98 /P				SMPTE ST 372
30/29.97/25/24/23.98 /PsF				SMPTE ST 425-1
2048×1080			30/29.97/25/24/23.98 /P	SMPTE ST 372
			30/29.97/25/24/23.98 /PsF	SMPTE ST 425-1 SMPTE ST 2048-2
12 bit		1920×1080	60/59.94/50 /I	SMPTE ST 274
			30/29.97/25/24/23.98 /P	SMPTE ST 372
			30/29.97/25/24/23.98 /PsF	SMPTE ST 425-1
		2048×1080	30/29.97/25/24/23.98 /P	SMPTE ST 372
	30/29.97/25/24/23.98 /PsF		SMPTE ST 425-1 SMPTE ST 2048-2	
RGB 4:4:4	10 bit	1920×1080	60/59.94/50 /I	SMPTE ST 274
			30/29.97/25/24/23.98 /P	SMPTE ST 372
			30/29.97/25/24/23.98 /PsF	SMPTE ST 425-1
		2048×1080	30/29.97/25/24/23.98 /P	SMPTE ST 372
			30/29.97/25/24/23.98 /PsF	SMPTE ST 425-1 SMPTE ST 2048-2
	12 bit	1920×1080	60/59.94/50 /I	SMPTE ST 274
			30/29.97/25/24/23.98 /P	SMPTE ST 372
			30/29.97/25/24/23.98 /PsF	SMPTE ST 425-1
		2048×1080	30/29.97/25/24/23.98 /P	SMPTE ST 372
30/29.97/25/24/23.98 /PsF			SMPTE ST 425-1 SMPTE ST 2048-2	
XYZ 4:4:4	12bit	2048×1080	30/25/24 /P	SMPTE ST 372
			30/25/24 /PsF	SMPTE ST 425-1 SMPTE ST 428

* When these signals are displayed, phase differences of up to 100 clocks (approx. 1.34 μs) between HD(DL) links are automatically corrected.

Table 1-5 3G-B DS video signal formats and standards

Color System	Quantization	Image	Frame (Field) Frequency/Scanning	Supported Standard
YCbCr 4:2:2	10 bit	1920×1080	60/59.94/50 /I	SMPTE ST 274
			30/29.97/25/24/23.98 /P	SMPTE ST 425-1
			30/29.97/25/24/23.98 /PsF	
		1280×720	60/59.94/50/30/29.97/25/24/23.98 /P	SMPTE ST 296 SMPTE ST 425-1

Table 1-6 3G(DL)-2K Video Signal Formats and Standards

Color System	Quantization	Image	Frame (Field) Frequency/Scanning	Supported Standard
YCbCr 4:2:2	12 bit	1920×1080	60/59.94/50 /P	SMPTE ST 274 SMPTE ST 425-3
			48/47.95 /P	-
		2048×1080	60/59.94/50/48/47.95 /P	SMPTE ST 2048-2 SMPTE ST 425-3
YCbCr 4:4:4	10 bit	1920×1080	60/59.94/50 /P	SMPTE ST 274 SMPTE ST 425-3
		2048×1080	60/59.94/50/48/47.95 /P	SMPTE ST 2048-2 SMPTE ST 425-3
	12 bit	1920×1080	60/59.94/50 /P	SMPTE ST 274 SMPTE ST 425-3
		2048×1080	60/59.94/50/48/47.95 /P	SMPTE ST 2048-2 SMPTE ST 425-3
RGB 4:4:4	10 bit	1920×1080	60/59.94/50 /P	SMPTE ST 274 SMPTE ST 425-3
		2048×1080	60/59.94/50/48/47.95 /P	SMPTE ST 2048-2 SMPTE ST 425-3
	12 bit	1920×1080	60/59.94/50 /P	SMPTE ST 274 SMPTE ST 425-3
		2048×1080	60/59.94/50/48/47.95 /P	SMPTE ST 2048-2 SMPTE ST 425-3

- * When these signals are displayed, phase differences of up to 100 clocks (approx. 0.67 μs) between links are automatically corrected.
- * 3G-A and 3G-B-DL links are supported.

Table 1-7 3G(DL)-4K Video Signal Formats and Standards

Division Transmission System	Color System	Quantization	Image	Frame Frequency/Scanning	Supported Standard
Square	Y _C B _C R _R 4:2:2	10 bit	3840×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-3 SMPTE ST 2036-1
				30/29.97/25/24/23.98 /PsF	-
			4096×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-3 SMPTE ST 2048-1
				30/29.97/25/24/23.98 /PsF	-
2 sample interleave	Y _C B _C R _R 4:2:2	10 bit	3840×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-3 SMPTE ST 2036-1
			4096×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-3 SMPTE ST 2048-1

- * You also need the SER28.
- * When these signals are displayed, phase differences of up to 100 clocks (approx. 0.67 μs) between links are automatically corrected.
- * 3G-B DS links are supported.

Table 1-8 HD(QL) video signal formats and standards

Division Transmission System	Color System	Quantization	Image	Frame Frequency/Scanning	Supported Standard
Square	Y _C B _C R _R 4:2:2	10 bit	3840×2160	30/29.97/25/24/23.98 /P	-
				30/29.97/25/24/23.98 /PsF	-
			4096×2160	30/29.97/25/24/23.98 /P	-
				30/29.97/25/24/23.98 /PsF	-

- * You also need the SER28.
- * When these signals are displayed, phase differences of up to 100 clocks (approx. 0.67 μs) between links are automatically corrected.

Table 1-9 3G(QL) video signal formats and standards

Division Transmission System	Color System	Quantization	Image	Frame Frequency/Scanning	Supported Standard
Square	YCbCr 4:2:2	10 bit	3840×2160	60/59.94/50 /P	SMPTE ST 425-5 SMPTE ST 2036-1
				48/47.95 /P	-
		4096×2160	60/59.94/50/48/47.95 /P		SMPTE ST 425-5 SMPTE ST 2048-1
			12 bit	3840×2160	30/29.97/25/24/23.98 /P
		30/29.97/25/24/23.98 /PsF			-
		4096×2160	30/29.97/25/24/23.98 /P		SMPTE ST 425-5 SMPTE ST 2048-1
	30/29.97/25/24/23.98 /PsF		-		
	YCbCr 4:4:4	10 bit	3840×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2036-1
				30/29.97/25/24/23.98 /PsF	-
		4096×2160	30/29.97/25/24/23.98 /P		SMPTE ST 425-5 SMPTE ST 2048-1
			30/29.97/25/24/23.98 /PsF		-
		12 bit	3840×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2036-1
				30/29.97/25/24/23.98 /PsF	-
	4096×2160	30/29.97/25/24/23.98 /P		SMPTE ST 425-5 SMPTE ST 2048-1	
		30/29.97/25/24/23.98 /PsF		-	
	RGB 4:4:4	10 bit	3840×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2036-1
				30/29.97/25/24/23.98 /PsF	-
		4096×2160	30/29.97/25/24/23.98 /P		SMPTE ST 425-5 SMPTE ST 2048-1
			30/29.97/25/24/23.98 /PsF		-
		12 bit	3840×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2036-1
				30/29.97/25/24/23.98 /PsF	-
	4096×2160	30/29.97/25/24/23.98 /P		SMPTE ST 425-5 SMPTE ST 2048-1	
		30/29.97/25/24/23.98 /PsF		-	
	XYZ 4:4:4	12bit	4096×2160	30/25/24 /P	SMPTE ST 425-5 SMPTE ST 428
30/25/24 /PsF				-	
2 sample interleave	YCbCr 4:2:2	10 bit	3840×2160	60/59.94/50 /P	SMPTE ST 425-5 SMPTE ST 2036-1
				48/47.95 /P	-
		4096×2160	60/59.94/50/48/47.95 /P		SMPTE ST 425-5

Division Transmission System	Color System	Quantization	Image	Frame Frequency/Scanning	Supported Standard	
		12 bit	3840×2160	30/29.97/25/24/23.98 /P	SMPTE ST 2048-1 SMPTE ST 425-5 SMPTE ST 2036-1	
			4096×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1	
		YCbCr 4:4:4	10 bit	3840×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2036-1
				4096×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1
		12 bit	3840×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2036-1	
			4096×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1	
		RGB 4:4:4	10 bit	3840×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2036-1
				4096×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1
		12 bit	3840×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2036-1	
			4096×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1	
	XYZ 4:4:4	12bit	4096×2160	30/25/24 /P	SMPTE ST 425-5 SMPTE ST 428	

- * You also need the SER28.
- * When these signals are displayed, phase differences of up to 100 clocks (approx. 0.67 μs) between links are automatically corrected.
- * 3G-A and 3G-B-DL links are supported.

Table 1-10 6G video signal formats and standards

Division Transmission System	Color System	Quantization	Image	Frame Frequency/Scanning	Supported Standard
2 sample interleave	YCbCr 4:2:2	10bit	3840×2160	30/29.97/25/24/23.98 /P	SMPTE ST 2036-1 SMPTE ST 2081-10
			4096×2160	30/29.97/25/24/23.98 /P	SMPTE ST 2048-1 SMPTE ST 2081-10

- * You also need the SER28 and SER29.
- * If you input 6G-SDI signal without the Sync Bit Insertion, the instrument displays "NO SIGNAL" and cannot receive the signal.

Table 1-11 12G video signal formats and standards

Division Transmission System	Color System	Quantization	Image	Frame Frequency/Scanning	Supported Standard		
2 sample interleave	YCbCr 4:2:2	10 bit	3840×2160	60/59.94/50 /P	SMPTE ST 2036-1 SMPTE ST 2082-10		
				48/47.95/P	-		
			4096×2160	60/59.94/50/48/47.95 /P	SMPTE ST 2048-1 SMPTE ST 2082-10		
				30/29.97/25/24/23.98 /P	SMPTE ST 2036-1 SMPTE ST 2082-10		
		12 bit	3840×2160	30/29.97/25/24/23.98 /P	SMPTE ST 2036-1 SMPTE ST 2082-10		
				4096×2160	30/29.97/25/24/23.98 /P	SMPTE ST 2048-1 SMPTE ST 2082-10	
			YCbCr 4:4:4	10 bit	3840×2160	30/29.97/25/24/23.98 /P	SMPTE ST 2036-1 SMPTE ST 2082-10
						4096×2160	30/29.97/25/24/23.98 /P
	12 bit	3840×2160		30/29.97/25/24/23.98 /P	SMPTE ST 2036-1 SMPTE ST 2082-10		
				4096×2160	30/29.97/25/24/23.98 /P	SMPTE ST 2048-1 SMPTE ST 2082-10	
	RGB 4:4:4	10 bit	3840×2160	30/29.97/25/24/23.98 /P	SMPTE ST 2036-1 SMPTE ST 2082-10		
				4096×2160	30/29.97/25/24/23.98 /P	SMPTE ST 2048-1 SMPTE ST 2082-10	
		12 bit	3840×2160	30/29.97/25/24/23.98 /P	SMPTE ST 2036-1 SMPTE ST 2082-10		
				4096×2160	30/29.97/25/24/23.98 /P	SMPTE ST 2048-1 SMPTE ST 2082-10	

* You also need the SER28 and SER29.

* If you input 12G-SDI signal without the Sync Bit Insertion, the instrument displays "NO SIGNAL" and cannot receive the signal.

2. IP Video Formats and Standards (SER05/SER06)

Supported IP Formats

SER05 SMPTE ST 2022-6, SMPTE ST 2110-20

SER06 SMPTE ST 2022-6, SMPTE ST 2110-20

Redundant System Supported Standard SMPTE ST 2022-7

Synchronization Mode PTP (SMPTE ST 2059-1/2)

Supported Protocol

SER05 IPv4 (Internet Protocol version 4)
 IGMPv2/v3 (Internet Group Management Protocol)
 NMOS (IS-04 v1.2/v1.3 / IS-05 v1.0) (*1)

SER06 IPv4 (Internet Protocol version 4)
 IGMPv2/v3 (Internet Group Management Protocol)
 NMOS (IS-04 v1.2/v1.3 / IS-05 v1.0) (*1)

Table 2-1 10G IP input signal formats (SER05, SER06)

Link	Compression	Color System	Quantization	Image	Frame (Field) Frequency/Scanning
SD (*2)	Uncompressed	YCbCr 4:2:2	10bit	720x487	59.94 /I
				720x576	50 /I
HD	Uncompressed	YCbCr 4:2:2	10bit	1920x1080	60/59.94/50 /I 30/29.97/25/24/23.98 /P 30/29.97/25/24/23.98 /PsF
				1280x720	60/59.94/50 /P 30/29.97/25/24/23.98 /P
3G-A	Uncompressed	YCbCr 4:2:2	10bit	1920x1080	60/59.94/50 /P

Table 2-2 25G IP input signal formats (SMPTE ST 2022-6) (SER06)

Link	Compression	Color System	Quantization	Image	Frame (Field) Frequency/Scanning
SD (*2)	Uncompressed	YCbCr 4:2:2	10bit	720x487	59.94 /I
				720x576	50 /I
HD	Uncompressed	YCbCr 4:2:2	10bit	1920x1080	60/59.94/50 /I 30/29.97/25/24/23.98 /P 30/29.97/25/24/23.98 /PsF
				1280x720	60/59.94/50 /P 30/29.97/25/24/23.98 /P
3G-A	Uncompressed	YCbCr 4:2:2	10bit	1920x1080	60/59.94/50 /P

Table 2-3 25G IP input signal formats (SMPTE ST 2110-20) (SER06)

Link	Compression	Color System	Quantization	Image	Frame (Field) Frequency/Scanning
HD	Uncompressed	YCbCr 4:2:2	10bit	1920x1080	60/59.94/50 /I 30/29.97/25/24/23.98 /P 30/29.97/25/24/23.98 /PsF
				1280x720	60/59.94/50/ 30/29.97/25/24/23.98 /P
3G-A	Uncompressed	YCbCr 4:2:2	10bit	1920x1080	60/59.94/50 /P
4K (*3)	Uncompressed	YCbCr 4:2:2	10bit	3840x2160	60/59.94/50 /P 30/29.97/25/24/23.98 /P

*1 For NMOS control, the instrument's Ethernet port is used.

*2 Only SMPTE ST 2022-6 is supported.

*3 SER28 must be installed to input 4K signals

3. JPEG XS Video Formats and Standards (SER33)

Supported IP Standards

Transmission Standard	SMPTE ST 2110-22
Compression Standard	ISO/IEC 21122、RFC9134
profile	High Profile 422.12
Packetize	Codestream
Number of Streams	1

Table 3-1 JPEG XS input signal formats

Link	Compression	Compression Ratio	Color System	Quantization	Image	Frame (Field) Frequency/Scanning
HD	JPEG XS	40:1 to 2:1 (0.5 to 10.0 bpp)	YCbCr 4:2:2	10bit	1280x720	60/59.94/50/ 30/29.97/25/24/23.98 /P
		40:1 to 2.5:1 (0.5 to 8.0 bpp)	YCbCr 4:2:2	10bit	1920x1080	60/59.94/50 /I 30/29.97/25/24/23.98 /P 30/29.97/25/24/23.98 /PsF
3G-A	JPEG XS	40:1 to 2.5:1 (0.5 to 8.0 bpp)	YCbCr 4:2:2	10bit	1920x1080	60/59.94/50 /P
4K (*1)	JPEG XS	40:1 to 5:1 (0.5 to 4.0 bpp)	YCbCr 4:2:2	10bit	3840x2160	60/59.94/50/ 30/29.97/25/24/23.98 /P

*1 SER28 must be installed to input 4K signals

4. SDI Audio Formats and Standards (SER01/SER02A/SER03/SER04/SER07)

Supported Standard	
12G, 6G, 3G, HD, HD(DL)	SMPTE ST 299
SD	SMPTE ST 272
Sampling Frequency	48 kHz
Quantization	24 bit
Format	L-PCM, Dolby-E, Dolby ED2, Dolby Digital, Dolby Digital Plus
Clock Generation	Generated from the video clock
Synchronization	Synchronized to the video signal All SDI signals must be synchronized during Simul Display.
SDI Audio Channel Separation	
Single Input Mode	Separates up to two groups (8 channels) from any SDI input.
Simul Mode (2K SD/HD/3G-A/3G-B-DL)	Separates up to four groups (16 channels) from any SDI input.
SDI Audio Channel Separation (SER03)	Separates up to four groups (16 channels) from any SDI input.

5. IP Audio Formats and Standards (SER03/SER04/SER05/SER06/SER07)

Supported Standard	SMPTE ST 2022-6, SMPTE ST 2110-30
Sampling Frequency	48 kHz
Quantization	24 bit
Format	L-PCM
Packet time	1 msec, 125 usec
Clock Generation System	Generated from the video clock
Synchronization Relationship	Synchronized to the video signal All video and audio streams must be synchronized during Simul Display.
IP Audio Channel Separation	
Single Input Mode	Separates up to two groups (8 channels) from any IP input.
Simul Mode (2K SD/HD/3G-A/3G-B-DL/IP)	Separates up to four groups (8 channels) from any IP input.
IP Audio Channel Separation (SER03)	Separates up to four groups (16 channels) from any IP input.

Audio Channel Mapping	
Supported Channel Order	Mono, Dual Mono, Standard Stereo, Matrix Stereo, 5.1 Surround, 7.1 Surround, One SDI audio group, Undefined

6. External Digital I/O Audio Formats and Standards (SER03/SER04/SER07)

Supported Standard	AES-3id
Sampling Frequency	48 kHz
Quantization	24 bit
Format	L-PCM, Dolby-E, Dolby ED2, Dolby Digital, Dolby Digital Plus
Output Signal	Separates and outputs audio signals embedded in SDI or IP signals (audio channel displayed on the screen) Dolby signals are decoded and output.

7. SDI Input Connector (SER01/SER02A/SER28/SER29)

Connector Type	BNC
Number of Input Connectors	4 (SDI INPUT 1, 2, 3, 4)
Input Impedance	75Ω
Input Return Loss	
5 MHz to 1.485 GHz	-15 dB or more
1.485 to 2.970 GHz	-10 dB or more
2.970 to 5.940 GHz	-7 dB or more
5.940 to 11.880 GHz	-4 dB or more
Maximum Input Voltage	±1 V (DC + peak AC)
Eye Pattern Display	Eye pattern display is possible only on SDI INPUT 1.

8. SDI Output Connector (SER01/SER02A/SER24/SER28/SER29)

Connector Type	BNC
Number of Output Connectors	4 (SDI OUTPUT 1, 2, 3, 4)
Output Impedance	75Ω
Output Return Loss	
5 MHz to 1.485 GHz	-15 dB or more
1.485 to 2.970 GHz	-10 dB or more
2.970 to 5.940 GHz	-7 dB or more
5.940 to 11.880 GHz	-4 dB or more
Output Voltage	800 mVp-p ± 10 % (into 75 Ω)

Output Signal

Reclocked Signal	Reclocks the SDI signals of SDI INPUT 1 to 4 and outputs them through SDI OUTPUT 1 to 4 (*1)
Select Reclocked Signal	SDI OUTPUT 1 can reclock and output a signal from SDI INPUT 1 to 4 by switching. (*2)
IP / SDI Conversion Signal	If SER26 is installed, the instrument can output the SDI signal converted from the IP signal assigned by Display Assignment. (*3)
Payload ID Insertion	ST2110-40 / NMOS (SDP) / Manual (*4)
Signal Generation Function	SDI OUTPUT 1 to 4 output SDI signals as a TSG
3D LUT Signal	If SER23 is installed, outputs the signal after 3D-LUT conversion.
6G / 12G Signal	If the input signal is 4K Quad or 4K IP, it will be converted to a 6G/12G signal (single link) and output.

- *1 When SDI system setting is 2K SD/HD/3G-B-DL/3G-A and input signal is 6G-SDI, reclock output is not possible.
- *2 Valid when the display assignment mode is set to off.
- *3 When 4K is measured, 12G-SDI output is not available.
- *4 The 4K SMPTE ST 2110-20 input signal (60/59.94/50/P) is converted to 3G Quad Link, so the 3G Quad Link payload ID is inserted. The 4K Single Stream SMPTE ST 2110-20 input signal (30/29.97/25/24/23.98/P) is converted to 3G Dual link, so the 3G Dual link payload ID is inserted.

9. IP Input/Output Connectors (SER05/SER06)

SER05

Connector Type	SFP+
Number of Ports	2
Supported Standard	10GBASE-SR, 10GBASE-LR
Fiber Types	Multi-mode, single-mode

SER06

Connector Type	QSFP+, QSFP28
Supported SFP	SFP+, SFP28 (*1)
Number of Ports	2 (*2)
Supported Standard	10GBASE-SR, 10GBASE-LR, 25GBASE-SR, 25GBASE-LR
Fiber Types	Multi-mode, single-mode

- *1 The conversion adapter included with the SER06 is used when installing the SFP+ or SFP28.
- *2 The standard must be matched between the two I/O connectors.

10. External Reference Input

Connector Type	BNC
Number of Input Connectors	1 pair
Input Impedance	15 k Ω passive loop-through
Input Return Loss	≥ 30 dB for 50 kHz to 30 MHz into 75 Ω
Maximum Input Voltage	± 5 V (DC + peak AC)
Input Signal	Tri-level sync or NTSC/PAL black burst signal (NTSC 10 field IDs are supported.)
Function	Video signal waveform display and phase difference display based on the phase of an external sync signal Waveform display of external sync signal

- * The display position of the video signal waveform display and the measured phase of the phase difference display based on the phase of the external sync signal may vary by ± 1 clock depending on the timing when the external sync signal or SDI signal is connected or disconnected or when the device is restarted.
- * Video signal waveform display based on the phase of an external sync signal is not possible for the following formats.
 - IP input video signal using SER05/SER06
 - 3G's 720/30P, 720/29.97P, 720/25P, 720/24P, 720/23.98P
 - HD(DL)'s 1080/60P, 1080/59.94P, 1080/50P
 - 3G(DL), 3G(QL), HD(QL), 6G, 12G
 - Frame frequency 48P, 47.95P
- * Phase difference display based on the phase of an external sync signal is not possible for the following formats.
 - 3G's 720/30P, 720/29.97P, 720/25P, 720/24P, 720/23.98P
 - Frame frequency 48P, 47.95P
- * Waveform display using an external sync signal is not possible for the following formats.
 - HD Dual Link, 3G Dual Link, 3G-B DS

11. External Audio Input/Output Connectors (SER03/SER04/SER07)

Digital Audio I/O Connectors

Connector Type	DIN 1.0/2.3 connector
Number of I/O Connectors	
Group A	4 pairs (8 channels)
Group B	4 pairs (8 channels)
I/O Impedance	75 Ω
Maximum Input Voltage	± 5 V (DC + peak AC)
Output Voltage	1.0 Vp-p ± 10 % (into 75 Ω)
Input/Output Switching	By group (4 pairs (8 channels))
Output Signal	Audio signal displayed on the screen

Analog Audio I/O Connectors

Connector Type	37-pin D-sub (female)
I/O Signal Format	Balanced DC coupling
I/O Channels	8 channels
Input/Output Switching	Switch all channels
Input Impedance	≤ 20 kΩ
Maximum Input Voltage	24 dBu
Output Impedance	Nominal 50 Ω
Output Signal	8 audio signal channels displayed on the screen Dolby E, Dolby Digital, and Dolby Digital Plus are decoded and output in analog format.
Maximum Output Level	24 dBu ± 0.5 dB 1 kHz (into a balanced load of 100 kΩ or more)

12. Monitor Output Connector

SDI Output Connector

Function	Output the displayed screen to an SDI monitor
Output Connector	BNC
Number of Output Connectors	1
Output Impedance	75Ω
Output Return Loss	
5 MHz to 1.485 GHz	15 dB or more
1.485 to 2.97 GHz	10 dB or more
Output Voltage	800 mVp-p ± 10 % (into 75 Ω)
Output Signal	Outputs the LCD screen in HD, 3G-A, or 3G-B-DL.
Output Format	

Color System	Quantization	Image	Frame (Field) Frequency/Scanning	Supported Standard
YCbCr 4:2:2	10 bit	1920×1080	60/59.94/50 /I	SMPTE ST 274
			24/23.98 /PsF (*1)	
			60/59.94/5048/47.95 /P	

Synchronization	Synchronized with the LCD refresh rate (free run or frequency synchronization with the external reference signal)
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TMD5 Output Connector

Function	Output the displayed screen to an HDMI monitor (*2)
Output Connector	HDMI
Number of Output Connectors	1
Signal Format	Single Link T.M.D.S
DDC	Not supported
HOT PLUG Detection	Not supported
Output Signal	Outputs the LCD screen
Image	1920×1080
Frame Frequency	60P, 59.94P, 50P, 48P, 47.95P
Synchronization	Synchronized with the LCD refresh rate (free run or frequency synchronization with the external reference signal)
Touch Control	Touch control possible by connecting the USB touch panel interface of a touch panel monitor to the LV5600W or LV7600W (*3)

*1 Equivalent to 48I when the SDI input is 48P.

*2 LEADER does not guarantee the operation on all HDMI monitors.

*3 LEADER does not guarantee that all touch panel type monitors will work with the LV5600W or LV7600W.

13. Headphone Output

Output Connector	
LV5600W	One 3.5 mm mini jack (stereo)
LV7600W	One stereo jack
Output Signal	2 channels from the audio signals that are being displayed on the screen (downmixed Lt and Rt are also possible)
Sampling Frequency	48 kHz
Volume Adjustment	Using the menu
Power Output	100 mW maximum (into 8 Ω load)

14. Control Connectors

USB Port	
Port Type	Standard A
Number of Ports	2
Specifications	USB 2.0

Compatible Devices	USB memory, USB mouse, touch panel monitor
USB Memory Feature	Saves capture data, preset data, event log data, data dumps, and loudness log data (SER03)
USB Memory Supported Format	FAT32 (*1)
USB Mouse Feature	Used to control on the screen
Touch panel monitor	Touch control of the displayed screen (*2, *3)
Ethernet Port 1	
Supported Standard	IEEE802.3
Supported Protocol	
TELNET (*4)	Command control, status query
FTP	File transfer
SNMP	Command control, alarm query
HTTP	Remote monitoring and control from WebRTC
SNTP	Internal clock synchronization
NMOS (IS-04/05) (SER05/SER06)	This instrument's registration control
TSL UMD Protocol V5.0 (SER27)	Tally, camera ID (LABEL-1) reception display
Connector Type	RJ-45
Type	10Base-T, 100Base-TX, 1000Base-T
Function	Remote control from an external PC or remote controller (*4), file transfer, status information query
Ethernet Port 2	
Supported Standard	IEEE802.3
Supported Protocol	
HTTP	Remote monitoring and control from WebRTC
Connector Type	RJ-45
Type	10Base-T, 100Base-TX, 1000Base-T
Function	Remote monitoring and control from WebRTC, connected to the same network as Ethernet port 1
Remote Connector	
Port Type	15-pin D-sub (female)
Locking Screws	Inch screws (No.4-40UNC)
Number of Ports	1
Control Signal	LV-TTL level (low active)
Input Voltage Range	0 to 5 V DC
	All inputs are pulled up to +3.3 V (control is also possible using +5 V)
Function	Load preset settings, switch input signals, transmit alarm signals activate tally, and start, stop, and clear the loudness measurement
Alarm Output	Outputs alarms signals when a format alarm occurs, when various errors occur, when the fan malfunctions, or when the internal temperature is abnormal

RS-422/485 Connector (SER27)

Supported Protocols

Leader Receives tally, camera ID, and camera iris signals and displays them

TSL UMD Protocol Tally (TALLY-1, TALLY-2), camera ID (LABEL-1) reception display

Supported Versions UMD 3.1, UMD 4.0

Port Type RJ-45

Number of Ports 2

- *1 LEADER does not guarantee that all USB-HDD and USB memory devices will work with the LV5600W or LV7600W. Depending on the USB device to be connected, LV5600W or LV7600W may not operate normally.
- *2 Pinch out and swipe operations are not supported.
- *3 LEADER does not guarantee that all touch panel type monitors will work with the LV5600W or LV7600W.
- *4 You cannot use TELNET and the LV7290 at the same time.

15. Front Panel

Display (LV5600W)

LCD Type 7-inch color TFT
 Resolution 1920×1080
 Refresh Rate 60 Hz, 59.94 Hz, 50 Hz
 (free run or frequency synchronization with the external reference signal(*1))

Touch Panel Electrostatic touch panel
 Tapping the display shows touch keys

Key LEDs All the keys are dimly back-lit.
 The selected key is lit more brightly.

Power Switch Electronic switch (which remembers whether the instrument is on or off)

Last Memory Backs up the panel settings to memory

Key Lock Lock by holding down the SYS key. Prevents unintentional operations on the instrument.

- *1 The LCD refresh rate changes automatically depending on the frame rate of the external reference signal.

Frame Rate of the External Reference Signal	LCD Refresh Rate
23.98Hz	Free run
24Hz	Free run
25Hz	50Hz
29.97Hz	59.94Hz
30Hz	60Hz

16. Capturing

Screen Capture

Function	Captures the screen
Display	Displays only the captured image or overlays the captured image over the input signal
Media	Internal memory (RAM) and USB memory You can only save one screen capture to the internal memory.
Data Output	Saved to bitmap format to a USB memory device or to a file format that the instrument can load (BSG). PCAP or SDP format (SER05, SER06)
Data Input	Data saved to a USB memory device can be loaded and displayed on the instrument.

Frame Capture

Function	Captures frame data (blanking included for SDI)
Input Signal	SDI signal (SER01/02), IP signal (SER05/SER06)
Display	Displays only the captured frame data or superimposes the captured frame data over the input signal
Media	Internal memory (RAM) and USB memory Stores 1 frame or 16 consecutive frames (32 frames for some formats) in the internal memory
Data Output	Saved to DPX or TIFF format to a USB memory device or to a file format that the instrument can load (FRM). (DPX and TIFF also support full range) SDP format (SER05, SER06)
Data Input	Data saved to a USB memory device can be loaded and displayed on the instrument. (*1)
Capture Timing	Manual and automatic (error capture)
Error Capturing	Automatically captures frame data when an error occurs
Error Location Search	Can be searched on Frame Capture Viewer

* An input signal in the same format as the frame data is required.

17. TSG (SER24/SER28/SER29)

Table 17-1 HD video signal formats and standards

Color System	Quantization	Image	Frame (Field) Frequency/Scanning	Supported Standard
YCbCr 4:2:2	10 bit	1280×720	60/59.94/50 /P	SMPTE ST 292-1
			30/29.97/25/24/23.98 /P	SMPTE ST 296
		1920×1080	60/59.94/50 /I	SMPTE ST 274
			30/29.97/25/24/23.98 /P	SMPTE ST 292-1
			30/29.97/25/24/23.98 /PsF	

Table 17-2 3G-A, 3G-B-DL video signal formats and standards

Color System	Quantization	Image	Frame (Field) Frequency/Scanning	Supported Standard
YCbCr 4:2:2	10 bit	1920×1080	60/59.94/50/48/47.95 /P	SMPTE ST 274
			48/47.95 /P	-
		2048×1080	60/59.94/50/48/47.95 /P	SMPTE ST 425-1 SMPTE ST 2048-2
YCbCr 4:4:4	10 bit	1920×1080	60/59.94/50 /I	SMPTE ST 274
			30/29.97/25/24/23.98 /P	SMPTE ST 425-1
			30/29.97/25/24/23.98 /PsF	
		2048×1080	30/29.97/25/24/23.98 /P	SMPTE ST 425-1
30/29.97/25/24/23.98 /PsF	SMPTE ST 2048-2			
RGB 4:4:4	10 bit	1920×1080	60/59.94/50 /I	SMPTE ST 274
			30/29.97/25/24/23.98 /P	SMPTE ST 425-1
			30/29.97/25/24/23.98 /PsF	
		2048×1080	30/29.97/25/24/23.98 /P	SMPTE ST 425-1
			30/29.97/25/24/23.98 /PsF	SMPTE ST 2048-2

Table 17-3 3G(DL)-4K Video Signal Formats and Standards

Division Transmission System	Color System	Quantization	Image	Frame Frequency/Scanning	Supported Standard
Square	YCbCr 4:2:2	10 bit	3840×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-3 SMPTE ST 2036-1
				30/29.97/25/24/23.98 /PsF	-
			4096×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-3 SMPTE ST 2048-1
				30/29.97/25/24/23.98 /PsF	-
2 sample interleave	YCbCr 4:2:2	10 bit	3840×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-3 SMPTE ST 2036-1
			4096×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-3 SMPTE ST 2048-1

* You also need the SER28.

Table 17-4 3G(QL) video signal formats and standards

Division Transmission System	Color System	Quantization	Image	Frame Frequency/Scanning	Supported Standard
Square	Y _{C_BC_R} 4:2:2	10 bit	3840×2160	60/59.94/50 /P	SMPTE ST 425-5 SMPTE ST 2036-1
				48/47.95 /P	-
			4096×2160	60/59.94/50/48/47.95 /P	SMPTE ST 425-5 SMPTE ST 2048-1
				30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2036-1
			4096×2160	30/29.97/25/24/23.98 /PsF	-
				30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1
	Y _{C_BC_R} 4:4:4	10 bit	3840×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2036-1
				30/29.97/25/24/23.98 /PsF	-
			4096×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1
				30/29.97/25/24/23.98 /PsF	-
			4096×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1
				30/29.97/25/24/23.98 /PsF	-
RGB 4:4:4	10 bit	3840×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2036-1	
			30/29.97/25/24/23.98 /PsF	-	
		4096×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1	
			30/29.97/25/24/23.98 /PsF	-	
		4096×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1	
			30/29.97/25/24/23.98 /PsF	-	
2 sample interleave	Y _{C_BC_R} 4:2:2	10 bit	3840×2160	60/59.94/50 /P	SMPTE ST 425-5 SMPTE ST 2036-1
				48/47.95 /P	-
			4096×2160	60/59.94/50/48/47.95 /P	SMPTE ST 425-5 SMPTE ST 2048-1
				30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2036-1
			4096×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1
				30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1
	Y _{C_BC_R} 4:4:4	10 bit	3840×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2036-1
				30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1
			4096×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1
				30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1
			4096×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1
				30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1
RGB 4:4:4	10 bit	3840×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2036-1	
			30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1	
		4096×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1	
			30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1	
		4096×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1	
			30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1	

- * You also need the SER28.
- * 3G-A and 3G-B-DL links are supported.

Table 17-5 6G video signal formats and standards

Division Transmission System	Color System	Quantization	Image	Frame Frequency/Scanning	Supported Standard
2 sample interleave	YCbCr 4:2:2	10bit	3840×2160	30/29.97/25/24/23.98 /P	SMPTE ST 2036-1 SMPTE ST 2081-10
			4096×2160	30/29.97/25/24/23.98 /P	SMPTE ST 2048-1 SMPTE ST 2081-10

* You also need the SER28 and SER29.

Table 17-6 12G video signal formats and standards

Division Transmission System	Color System	Quantization	Image	Frame Frequency/Scanning	Supported Standard
2 sample interleave	YCbCr 4:2:2	10 bit	3840×2160	60/59.94/50 /P	SMPTE ST 2036-1 SMPTE ST 2082-10
				48/47.95/P	-
			4096×2160	60/59.94/50/48/47.95 /P	SMPTE ST 2048-1 SMPTE ST 2082-10
	YCbCr 4:4:4	10 bit	3840×2160	30/29.97/25/24/23.98 /P	SMPTE ST 2036-1 SMPTE ST 2082-10
				4096×2160	30/29.97/25/24/23.98 /P
	RGB 4:4:4	10 bit	3840×2160	30/29.97/25/24/23.98 /P	SMPTE ST 2036-1 SMPTE ST 2082-10
4096×2160				30/29.97/25/24/23.98 /P	SMPTE ST 2048-1 SMPTE ST 2082-10

* You also need the SER28 and SER29.

Output Pattern

100% color bar, 75% color bar, HD multiformat color bar (*1), 4K multiformat color bar (*1), color raster, gamma, cross hatch, 10 step, limit lamp, check field, lip sync pattern (SER03), HDR color bar (SER23) (*1)

YCbCr/RGB on/off, Level Adjustment

When the following patterns are selected, you can turn on and off YCbCr or RGB separately.

When COLOR RASTER pattern is selected, you can set the YCbCr or RGB levels separately. Moreover, if Structure is set to RGB, You can set R, G, and B level in interlocking.

Pattern	YCbCr/RGB on/off separately	YCbCr/RGB level adjustment separately	RGB level adjustment interlocking
100% color bar	Yes		
75% color bar	Yes		
HD multiformat color bar	Yes		
4K multiformat color bar	Yes		
Color raster	Yes	Yes	Yes
Gamma	Yes		
Cross hatch	Yes		
10 step	Yes		
Limit lamp	Yes		
Check field			
Lip sync pattern			
HDR color bar	Yes		

Scrolling (*2)	ON, OFF
Direction	Eight directions (up, down, left, right, and their combinations)
Speed Range and Unit	Per frame (field) 4 to 124 dots, in 4 dot steps
Moving Box (*2)	ON, OFF
Colors	WHITE, YELLOW, CYAN, GREEN, MAGENTA, RED, BLUE, BLACK
Speed	1 to 3
Frequency Phase Adjustment (*2, *3)	
Quad link	Vary the phases of SDI OUTPUT 2 to 4 independently relative to SDI OUTPUT 1
Dual link	Vary the phase of SDI OUTPUT 2 relative to SDI OUTPUT 1 and the phase of SDI OUTPUT 4 relative to SDI OUTPUT 3
Adjustment Range	±0.5 lines (in unit of video clocks) ±1/2 frames (in unit of lines)
Embedded Audio	
Number of Embedded Channels	16 channels max. (*4)
Embedding On/Off	On/off at the audio group level
Audio Level	-20d BFS, -18 dBFS, 0 dBFS, mute
Audio Frequency	1 kHz
CRC Error Addition	An incorrect CRC is inserted into the Y component of the first line.

- *1 It cannot be set in horizontal 4096 and 2048 pixel format.
- *2 Either scrolling, moving box, or frequency phase adjustment can be turned on.
- *3 The output phase may be off by ±2 clock from the specified value as a result of switching the format or turning on and off the power.
- *4 For horizontal 4096/2048 pixel format at frame rates 60, 59.94, 30, 29.97 Hz, only 8 channels are embedded.

18. 25G IP TSG (SER06/SER32/SER33)

Supported IP Standard

IP Formats

SMPTE ST 2022-6, SMPTE ST 2110-20/22/30/40

Synchronization Mode

PTP (SMPTE ST 2059)

Supported IP Formats

Table 18-1 IP video signal formats and standards

Color System	Quantization	Image	Frame (Field) Frequency/ Scanning	Supported Standard	Compression Ratio
YCbCr 4:2:2	10bit	1280×720	60/59.94/50/ 30/29.97/25/24/23.98 /P	SMPTE ST 2022-6	-
				SMPTE ST 2110-20	-
		1920×1080	60/59.94/50 /I 60/59.94/50/ 30/29.97/25/24/23.98 /P 30/29.97/25/24/23.98 /PsF	SMPTE ST 2022-6	-
				SMPTE ST 2110-20	-
		3840×2160 (*1)	60/59.94/50/ 30/29.97/25/24/23.98 /P	SMPTE ST 2110-22 (JPEG XS)	40:1 to 2:1 (0.5 to 10.0 bpp)
				SMPTE ST 2110-20	-
SMPTE ST 2110-22 (JPEG XS)	40:1 to 5:1 (0.5 to 4.0 bpp)				

Output Pattern

100% color bar, 75% color bar, multiformat color bar, lip sync pattern (to be supported in the future)

Audio Signal

1 KHz audio signal complying with SMPTE ST 2110-30

Supported Protocol

IPv4 (Internet Protocol version 4)
IGMPv2/v3 (Internet Group Management Protocol)
NMOS (IS-04/05) (*2)

IP Packet Emulation

Function

Adds jitter and checksum error to the SMPTE ST 2110-20 test signal.

Error

FCS ERROR, IP CS, UDP CS

Jitter (*3, 4, 5, 6)

1 packet, 10 packet, 20 packet, 30 packet, 40 packet, 50 packet, 60 packet, 70 packet, 80 packet, 90 packet, 100 packet

* You also need the SER06.

* Error and jitter are added on the output from port 1.

*1 For 4K, only a single stream is supported. You also need the SER28.

*2 For NMOS control, the instrument's Ethernet port is used.

*3 In outputting 4K signal, you can set up to 20 packets.

*4 The packet jitter depends on the output signal format.

*5 The packet jitter may be off by ±10%.

*6 The RTP time stamp causes twice delay of the packet transmission interval.

19. Presets

Preset	Saves panel settings (with a few exceptions)
Number of Presets	60
Preset Loading Method	Front panel or remote connector (*1)
Copying	All preset data can be copied from the instrument to a USB memory device or from a USB memory device to the instrument. (To be shared between LV5600W and LV7600W)

*1 The number of presets loaded from the remote connector can be 8 or 60.

20. Display

Number of simultaneously displayed SDI input signals

SD, HD, 3G-A, 3G-B-DL	4
HD(DL)	2
3G-B DS	1
3G(DL)-2K	2
3G(DL)-4K (SER28)	1
HD(QL) (SER28)	1
3G(QL) (SER28)	1
6G (SER28/SER29)	1
12G (SER28/SER29)	1

Number of Display Systems in the IP Input Signal (SER05/SER06)

1

Display Mode

Single display	Displays a single input signal
Simul Display	Displays two or more input signals simultaneously SDI and IP can be displayed simultaneously. (*1)
Display Assignment Mode (SER26)	Maps the input video signal of a channel to multiple areas (*2)

Alarm Indications

System Alarm Indication	Displays an alarm when the fan malfunctions or when the internal temperature is abnormal
Error Indication	Displays an error when an receive signal error occurs

Display Layout

Multi Display	Control the WFM/PIC and other display functions in multiple areas from a single screen
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Customized Layout (SER26)

Function	Freely arrange the windows shown with the WFM, VECT, PIC, AUDIO, STATUS, and EYE (SER02A) keys (one of each), and a window consisting of six displays shown with MULTI
Display Format	Displays up to four single link input signals in tiled, mixed, V aligned, or H aligned mode.
Normal Mode	Each display area is divided evenly.
Tiled Display	The windows are divided into four quadrants.
Mixed Display	The windows are cascaded.
V Aligned Display	The windows are arranged top to bottom.
H Aligned Display	The windows are arranged side by side.
Tile Mode	The display contents arranged in the display are shown in four quadrants per screen.
V Aligned Mode	The display contents arranged in the display are shown in four vertical divided windows per screen.
H Aligned Mode	The display contents arranged in the display are shown in four horizontally divided windows per screen.

Enhanced Layout (SER26)

Function	When multiple channels of single link are displayed, the selected channel is automatically shown in a specific area. You can make the specific area larger than the other areas to show the selected channel enlarged.
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3G-B DS Display Format

Aligned Display	The screen is divided into windows.
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Time Display

Displayed Contents	Current time, time code
Current Time Display	The time based on the internal clock
Time Code Display	LTC, VITC, D-VITC (SD only), PTP
Supported Standard	
LTC, VITC	SMPTE ST 12-2
D-VITC	SMPTE ST 266

Tally Display (SER27)

Remote Connector	Turn on and off the tally display by controlling through the remote connector
RS-485 Control	Shows tallies through RS-485 control
Network Control	Shows tallies through network control (TSL 5.0)

Camera ID Display (SER27)

Instrument Setting	Shows the camera ID set with the instrument's menu
RS-485 Control	Shows the camera ID through RS-485 control
Network Control	Shows the camera ID through network control (TSL 5.0)

Iris Display (SER27)

Instrument Setting	Shows the iris set with the instrument's menu
RS-485 Control	Shows the iris through RS-485 control
Network Control	Shows the iris through network control (TSL 5.0)

- *1 IP signals can be displayed when the SDI system is set to 2K SD/HD/3G-A/3G-B-DL.
- *2 Simultaneous display of HDR (SER23) and normal picture or CINEZONE and normal picture is possible. However, there is a limit to the number of channels that can be displayed. This can be set only for SD/HD/3G-A/3G-B-DL single link. It cannot be set for 4K signals or SDI system that transmits multiple lines.

21. Video Signal Waveform Display

Waveform Control

Display Mode	
Overlay	Overlays component signals
Parade	Displays component signals side by side
Blanking Interval	H and V blanking periods can be masked.
RGB Conversion	Converts a $Y C_B C_R$ signal into an RGB signal and displays the result
Channel Assignment	GBR or RGB order
Pseudo-Composite Display	Artificially converts component signals into composite signals and displays the result
Line Select	Displays the selected line
Sweep Modes	H, V
Color	7 colors to choose from

Vertical Axis

Gain	$\times 1, \times 5, \times 10$
Variable Gain	
Gain $\times 1$	$\times 0.2$ to $\times 2.0$
Gain $\times 5$	$\times 1.0$ to $\times 10.0$
Gain $\times 10$	$\times 2.0$ to $\times 10.0$
Amplitude Accuracy	$\pm 0.5\%$ (single default display)
3G, HD(DL) (1080/60P, 1080/59.94P, 1080/50P)	
Y Signal	$\pm 0.5\%$ (1 to 60 MHz)
$C_B C_R$ Signal	$\pm 0.5\%$ (0.5 to 30 MHz)
Low-Pass Attenuation	≥ 20 dB (at 40 MHz)
3G, HD, HD(DL) (1080/60P, 1080/59.94P, 1080/50P)	
Y Signal	$\pm 0.5\%$ (1 to 30 MHz)
$C_B C_R$ Signal	$\pm 0.5\%$ (0.5 to 15 MHz)
Low-Pass Attenuation	≥ 20 dB (at 20 MHz)
SD	
Y Signal	$\pm 0.5\%$ (1 to 5.75 MHz)
$C_B C_R$ Signal	$\pm 0.5\%$ (0.5 to 2.75 MHz)
Low-Pass Attenuation	≥ 20 dB (at 3.8 MHz)

Horizontal Axis	
Line Display	
Display Format	Overlay (1H, 2H) (*1) Parade (1H, 2H, 3H) 4Y parade (4H)
Magnification	×1, ×10, ×20, ACTIVE, BLANK
Field Display	
Display Format	Overlay (1V, 2V) (*2) Parade (1V, 2V, 3V)
Magnification	×1, ×20, ×40
Time Accuracy	±0.5% (single default display)
Cursor Measurement	
Composition	
Horizontal Cursors	2 (REF and DELTA)
Vertical Cursors	2 (REF and DELTA)
Simultaneous Display	Displays the horizontal cursors and vertical cursors simultaneously
Amplitude Measurement	mV, %, R%, DEC, HEX
Time Measurement	Second display
Frequency Display	Computes and displays the frequency with the length of one period set to the time between two cursors
Cursor Value Display	Displays measured values at the cursors
Scale	
Type	%, V, decimal, hexadecimal
Display Colors	7 colors to choose from
HDR Scale (SER23)	Adds an HDR scale to each scale for HDR
External Sync Signal Waveform Display	
Compatible SDI Systems	Can be displayed for SD, HD, 3G-A, and 3G-B-DL
Features	Waveform display of external sync signal
Vertical Axis	
Gain	×1
Variable Gain	CAL
Horizontal Axis	
Line Display	
Display Format	1H, 2H
Magnification	×1
Field Display	
Display Format	1V, 2V
Magnification	×1
Scale	
Type	%
Display Colors	7 colors to choose from

*1 2H display is not possible when the input signal is 4K.

*2 2V display is not possible when the input signal is progressive.

22. Vector Display

Vector Mode	Vector, RGB vector (SER40), YCbCr vector (SER40)
Display Colors	7 colors to choose from
Blanking Interval	H and V blanking periods can be masked (according to the video signal waveform display settings).
Pseudo-Composite Display	Artificially converts component signals into composite signals and displays the result
Line Select	Displays the selected line
Gain	×1, ×5, IQ-MAG
Variable Gain	
Gain ×1	×0.2 to ×2.0
Gain ×5	×1.0 to ×10.0
Gain IQ-MAG	
Not SD, component display	0.620 to 6.240
SD, component display	0.580 to 5.840
Not SD, pseudo-composite display	0.570 to 5.700
SD, pseudo-composite display	0.520 to 5.260
Amplitude Accuracy	±0.5 %
Scale	
Type	AUTO, ITU-R BT.601, ITU-R BT.709, DCI, ITU-R BT.2020
Color Bar Saturation	75 %, 100 %
IQ Axis	Show or hide
ARIB Check Marker	OFF, STD-B66, STD-B72
Display Colors	7 colors to choose from
Variable Scale	ON, OFF
Color Wheel	ON, OFF
Vector Marker Display	Displays a marker and numeric value at the specified location on the vector display
Number of Markers	1
Numeric Display	Displays the marker position numerically
Cb	Displays the C_B position as a percentage
Cr	Displays the C_R position as a percentage
deg	Displays the hue in degrees.
d	Displays the distance from the center as a percentage
Variable Marker	Marker and frame resizing

Histogram Display	Displays the Y, R, G, and B histograms
5-Bar Display	
Function	Converts an SDI signal into Y, R, G, B, and composite values, and then displays the five peak levels.
Channel Assignment	RGB, GBR
Scale	%, mV, HEX, DEC
Error Level	Based on the gamut error, composite gamut error, and luminance error thresholds
Line Select	Displays the selected line
Low-Pass Filter	The same as for gamut errors

23. Picture Screen

Quantization	8 bit (internal signal processing is performed with signed 12 bit or higher)
Level Mapping	Maps the black level to 0 (8bit), SDI code value (when receiving 10 bit RGB) 1024 to 255 (8 bit)
Display Sizes	Reduced, actual size, ×2 (4K not supported), full frame (4K not supported)
Quality Adjustment and Color Selection	Brightness, contrast, RGB gain, RGB bias, chroma gain, monochrome display (RGB gain, RGB bias, chroma gain not valid)
Frame Rate	Converts the frame rate based on the LCD frame rate (60P, 59.94P, 50P)
SCTE-104 Display	
Function	SCTE-104 message monitoring
Supported Standard	SMPTE 2010, ANSI/SCTE 104
Supported Format	For Dual / Quad Link, Link1 only (Link cannot be changed)
Supported Input Channel	SDI INPUT 1 / 2 / 3 / 4 (DS1 only)
Display	Superimpose when SCTE-104 message is detected
Display Location	OFF / Top left / Top right / Bottom left / Bottom right
Display Time	1 to 10 seconds (1 second step)
SPLICE Display	When a splice_request_data message is detected, the details of the message are displayed
Aspect Marker Display	
3G (17:9 aspect ratio)	16:9, 14:9, 13:9, 4:3, 2.39:1
3G (16:9 aspect ratio), HD, HD(DL)	17:9, 14:9, 13:9, 4:3, 2.39:1, AFD (*1)
SD	16:9, 14:9, 13:9, AFD (*1)
Aspect Marker Format	Line, shadow (99 levels), or black
Safety Marker Size	ARIB TR-B4, SMPTE RP-218, or user-defined
AFD Display (*1)	Displays abbreviations for SMPTE ST 2016-1-2007 standard AFD codes
Line Select	Marks the selected line
Error Indication	Displays markers in the gamut error and level error areas

*1 AFD Supports only SD or HD.

24. Colorimetry Zone Display (SER31)

Function	Colors in the ITU-R BT.2020 color gamut and outside the ITU-R BT.709 or DCI color gamut are displayed as a mesh pattern on the picture.
Color Gamut Selection	Selects the color gamut inside the colorimetry zone display ITU-R BT.709 / DCI
Mesh Pattern Size	×1, ×2, ×4, ×6, ×8
Display Selection	Color, monochrome
Log	Records as the event log when a color outside the ITU-R BT.709 or DCI color gamut exists inside the ITU-R BT.2020 color gamut.

25. Superimpose Display

Displays closed captions, European closed captions, and Japanese closed captions over the picture

Closed Caption	
Supported Standards (Mapping Standards)	
EIA-708	SMPTE ST 334
Supported Languages	English, Danish, Dutch, Faroese, Finnish, French, German, Icelandic, Irish, Italian, Norwegian, Portuguese, Spanish, Swedish, Korean
EIA/CEA-608-B (EIA-708-B)	SMPTE ST 334
EIA/CEA-608-B (EIA/CEA-608-B)	SMPTE ST 334
VBI (EIA/CEA-608-B Line21)	CIA/EIA-608-B
Supported Languages	English, Spanish, French, Portuguese, German, Danish, Italian, Finnish, Swedish
Supported Video Formats	SD, HD, 3G-A, 3G-B-DL, HD(DL) (close caption decoding only for link A), 3G(DL)-4K (close caption decoding only for link 1), HD(QL) (close caption decoding only for link 1), 3G(QL) (close caption decoding only for link 1), 6G (close caption decoding only for sub 1), 12G (close caption decoding only for sub 1)
European Closed Caption	
Supported Standards	
Teletext	VBI (ITU-R BT. 653-3 System B) (SD only), OP47
Supported Languages	English, Czech, Slovak, Estonian, French, German, Italian, Romansh, Lithuanian, Polish, Portuguese, Spanish, Romanian, Serbian, Croatian, Slovenian, Swedish, Finnish, Hungarian, Turkish, Ukrainian, Romanian, Bulgarian

Simple Japanese Closed Caption Display

	Displays a simple Japanese closed caption on the picture display. (Select HD, SD, analog, or portable closed caption to display. Select language 1 or 2.)
Supported Standard	ARIB STD-B37 short form data
Supported Video Formats	SD, HD, 3G-A, HD(DL) (close caption decoding only for link A), 3G(DL)-4K (close caption decoding only for link 1), HD(QL) (close caption decoding only for link 1), 3G(QL) (close caption decoding only for link 1), 12G (close caption decoding only for sub 1)
Display	Display position control is supported only for HD and SD closed captions.
Characters	Only Kanji, roman numerals, katakana, hiragana, additional characters (ARIB STD-B24), additional kanji (ARIB STD-B24), and 1-byte DRCS are displayed.
Character Sizes	Supports only standard, medium, small, and specified size codes
Logging	
Logged Events	Clear screen command, text closed caption display event, time code, TV commercial material check result
Data Format	Text
TV Commercial Material Checking	
Function	Checks whether closed caption displays are present during the closed caption prohibited time
Check Period	The material start time and end time can be specified using timecodes.
Log Display Color	
Closed Caption during Prohibited Time	Red
Closed Caption Not during Prohibited Time	Green
Check Result Display	Displays OK or NG when measurements are complete
Loudness Synchronization (SER03)	Simultaneous measurement with loudness measurement

26. CINELITE Display

Function	Video levels are displayed numerically.
f Stop Display (not supported on the SER23)	<p>Displays f Stop values relative to a reference point Set in reference to an object with an 18% reflectance f Stop gamma correction</p>
Fundamental Gamma	ITU-R BT.709, hybrid log gamma (HLG) (SER23), PQ (SER23), S-Log3 (SER23)
User Correction Table	3 types (data acquired with a real device)
% Display (SDR)	
Narrow Range	Displays the luminance level or RGB level as a percentage with the SDI code value 64 assumed to be 0% and the SDI code value 940 assumed to be 100%
Full Range	Displays the luminance level or RGB level as a percentage with the SDI code value 0 assumed to be 0% and the SDI code value 1023 assumed to be 100%
Gradation Display	
Narrow Range	Displays the luminance or RGB value with the SDI code value 64 assumed to be 0 and the SDI code value 940 assumed to be 255
Full Range	Displays the luminance or RGB value with the SDI code value 0 assumed to be 0 and the SDI code value 1023 assumed to be 255
CV Display	<p>Decimal, hexadecimal Displays the SDI signal code value as YCBCR or RGB according to the input signal (only for measurement size 1×1)</p>
HDR Display (SER23)	
HLG	
System Gamma OFF	
Narrow Range	Displays the relative HLG luminance with the SDI code value 64 assumed to 0% and 940 assumed to be 1200% or 100%
Full Range	Displays the relative HLG luminance with the SDI code value 0 assumed to 0% and 1023 assumed to be 1200% or 100%
System Gamma ON	Assuming a Display with a peak brightness of 1000 Nits
Narrow Range	Displays the relative HLG luminance with the SDI code value 64 assumed to 0 Nits and 940 assumed to be 1000 Nits
Full Range	Displays the relative HLG luminance with the SDI code value 0 assumed to 0 Nits and 1023 assumed to be 1000 Nits

PQ	Converts the luminance level to the display's Nits and displays the result
Narrow Range	SDI code value 64 to 940 are assumed to be 0 Nits to 10000 Nits
Full Range	SDI code value 0 to 1023 are assumed to be 0 Nits to 10000 Nits
S-Log3	Converts the reflectance to IRE with SDI code value 95 assumed to be 0% and 589 assumed to be 100% and displays it as a percentage
C-Log	Displays the percentage with the SDI code value 128 assumed to 0% and 614 assumed to be 100%
Log-C	
EI200	Displays the percentage with the SDI code value 95 assumed to 0.39% and 853 assumed to be 83%
EI400	Displays the percentage with the SDI code value 95 assumed to 0.39% and 917 assumed to be 90%
EI800	Displays the percentage with the SDI code value 95 assumed to 0.39% and 976 assumed to be 95%
EI1600	Displays the percentage with the SDI code value 95 assumed to 0.39% and 1022 assumed to be 94%
Measured Points	3
Measurement Sizes	1 × 1 pixel, 3 × 3 pixels, and 9 × 9 pixels

27. CINELITE Advanced Display

Function	Synchronizes the markers on the waveform display, vector display, and chromaticity diagram display to the points selected with CINELITE
Waveform Display Link Markers	Synchronizes the markers on the waveform display to the points selected with CINELITE
Number of Link Markers	Up to 16 (for YRGB, YGBR display) (including the 4 reference points)
Vector Link Markers	Synchronizes the markers on the vector display to the points selected with CINELITE
Number of Link Markers	Up to 4 (including the 1 reference point)
Vector Numeric Display	Displays numerically the active marker position
Cb	Displays the CB position as a percentage
Cr	Displays the CR position as a percentage
deg	Displays the hue as an angle (°).
d	Displays the distance from the center as a percentage
CIE Chromaticity Diagram Display Link Markers	Synchronizes the markers on the CIE chromaticity diagram display to the points selected with CINELITE
Number of Link Markers	Up to 4 (including the 1 reference point)

28. CINEZONE Display

SDR Display

Gradation and Step

Function	Adds colors to the display in accordance with luminance levels
Display Colors	Linear (1024 colors), step (12 colors)
Upper Limit	Values equal to or greater than the upper limit are displayed in white
Narrow Range	-6.3 to 109.4 %
Full Range	1.0 to 100.0 %
Lower Limit	Values less than the lower limit are displayed in black
Narrow Range	-7.3 to 108.4 %
Full Range	0.0 to 99.0 %

Search

Function	Monochrome display of the set luminance level range Color display within $\pm 0.5\%$ of the set luminance level
Display Colors	Green
Level Setting	
Narrow Range	-7.3 to 109.4 %
Full Range	0.0 to 100.0 %
Upper Limit	Values equal to or greater than the upper limit are displayed in red
Narrow Range	-6.3 to 109.4 %
Full Range	1.0 to 100.0 %
Lower Limit	Values less than the lower limit are displayed in blue
Narrow Range	-7.3 to 108.4 %
Full Range	0.0 to 99.0 %

False Color

Function	Adds colors to the display of the set luminance level range
Display Colors	11 colors (Red, Orange, Yellow, Straw, Pink, Light Pink, Cyan, Green, Teal or Light Blue, Blue, Purple)

HDR Display (SER23)

Function	Adds colors to the display in accordance with luminance levels
HDR Area Setting	Displays color according to the brightness
SDR Area Setting	Monochrome display
Upper Limit	Displays magenta for values exceeding the limit Ref.LEVEL to 100% (code values 64 to 940 or 0 to 1023 assumed to be 100%)
Lower Limit	Displays black for values less than the limit 0% to Ref.LEVEL% (code values 64 to 940 or 0 to 1023 assumed to be 100%)

29. Focus Assist (SER25)

Detection Sensitivity	LOW, MIDDLE, HIGH
Highlight Display Color	WHITE, GREEN, BLUE, RED
Picture Luminance Level	OFF, EMBOSS, 25%, 50%, 75%, 100%

30. CIE Chromaticity Diagram Display

Display Standard	CIE1931 (xy display), CIE1976 (u'v' display)
Display Type	Chromaticity diagram display, color temperature display
Display Mode	
Chromaticity Diagram Display	Luminance display, color display
Color Temperature Display	Luminance display
Colorimetry	ITU-R BT.601 (525), ITU-R BT.601 (625), BT.709, DCI, ITU-R BT.2020
Clipping	
ON	Clips negative values of the input signal to zero
OFF	Displays negative values of the input signal according to ITU-R BT.1361
Smoothing	Displays by averaging data every two pixels
Accuracy	±0.005 (relative to the measurement coordinate value)
Chromaticity Diagram Display Scale	
Triangle	Select two from ITU-R BT.601 (525), ITU-R BT.601 (625), ITU-R BT.709, DCI, and ITU-R BT.2020
User-defined Triangle	Set a single user-defined triangle
Background	Color sample, white background, black background
Sub scale	Color temperature curve, grid (0.1 steps), white point (D65), triangle name (each can be turned on or off)
Cursor	Displays the cursor position in coordinates
Gamma	ITU-R BT.709, user (1.5 to 3.0), HLG (SER23), PQ (SER23), S-Log3 (SER23), C-Log (SER23), Log-C (SER23)

31. Video Noise Measurement (SER30)

Measurement Function

Measured Signal	Select Y, G, B, or R.
Measurement Area	Set the size and position of the area to be measured
Noise Level Display	mVrms, dB
Alarm Function	Displays measured values in red when the values exceed the specified threshold

Low-Pass Filter -12 dB±1 dB at the cutoff frequencies in the following table

Format	Cutoff frequencies						
	5.5MHz	4.4MHz	3.6MHz	2.7MHz	1.4MHz	0.7MHz	Through
SD 720×487	5.5MHz	4.4MHz	3.6MHz	2.7MHz	1.4MHz	0.7MHz	Through
SD 720×576	5.5MHz	4.4MHz	3.6MHz	2.7MHz	1.4MHz	0.7MHz	Through
HD 1280×720	30MHz	24MHz	20MHz	15MHz	7.5MHz	3.7MHz	Through
HD 1920×1080 (frame rate ≤ 30 Hz)	30MHz	24MHz	20MHz	15MHz	7.5MHz	3.7MHz	Through
HD 1920×1080 (frame rate > 30 Hz)	60MHz	48MHz	40MHz	30MHz	15MHz	7.5MHz	Through
HD 2048×1080 (frame rate ≤ 30 Hz)	30MHz	24MHz	20MHz	15MHz	7.5MHz	3.7MHz	Through
HD 2048×1080 (frame rate > 30 Hz)	60MHz	48MHz	40MHz	30MHz	15MHz	7.5MHz	Through
4K 3840×2160 (frame rate ≤ 30 Hz)	120MHz	96MHz	80MHz	60MHz	30MHz	15MHz	Through
4K 3840×2160 (frame rate > 30 Hz)	240MHz	192MHz	160MHz	120MHz	60MHz	30MHz	Through
4K 4096×2160 (frame rate ≤ 30 Hz)	120MHz	96MHz	80MHz	60MHz	30MHz	15MHz	Through
4K 4096×2160 (frame rate > 30 Hz)	240MHz	192MHz	160MHz	120MHz	60MHz	30MHz	Through

Passband Ripple ±0.5dB

High-Pass Filter -12 dB±1 dB at the cutoff frequencies in the following table

Format	Cutoff frequencies	
	ON	OFF
SD 720×487	36kHz	Through
SD 720×576	36kHz	Through
HD 1280×720	200kHz	Through
HD 1920×1080 (frame rate ≤ 30 Hz)	200kHz	Through
HD 1920×1080 (frame rate > 30 Hz)	400kHz	Through
HD 2048×1080 (frame rate ≤ 30 Hz)	200kHz	Through
HD 2048×1080 (frame rate > 30 Hz)	400kHz	Through
4K 3840×2160 (frame rate ≤ 30 Hz)	800kHz	Through
4K 3840×2160 (frame rate > 30 Hz)	1.6MHz	Through
4K 4096×2160 (frame rate ≤ 30 Hz)	800kHz	Through
4K 4096×2160 (frame rate > 30 Hz)	1.6MHz	Through

Passband Ripple ±0.5dB

Measurement Accuracy (when filters are not applied)

0 to -65.00dB	±0.3dB
-65.01 to -70.00dB	±0.7dB
-70.01 to -75.00dB	±2.0dB

32. HDR Display (SER23)

Supported Standard	ITU-R BT.2100 (HLG: Hybrid Log Gamma, Full range / Narrow range), ITU-R BT.2100 (PQ: Perceptual Quantization, Full range / Narrow range), S-Log3, C-Log, Log-C
Supported Formats	All formats except SD-SDI
Function	
Video Waveform Display	Scale, cursor
Vector Display	Histogram
Picture Screen	
HDR CINEZONE	
HDR CINELITE	
MAX CLL, MAX FALL (CEA-861 Supported)	Supports HLG and PQ
START	MAX CLL, MAX FALL computation start
STOP	MAX CLL, MAX FALL computation stop
MAX CLL, MAX FALL Error	When the measurement result is equal to or greater than the specified threshold, it is displayed turns red and recorded as the event log.

33. Audio Display

Input Signal	SDI embedded audio Digital audio I/O connector (SER03) Analog audio input (SER03) SFP IP Audio (SER05/SER06)
Format	L-PCM, Dolby-E (SER04/SER07), Dolby ED2 (SER04/SER07), Dolby Digital (SER04/SER07), Dolby Digital Plus (SER04/SER07)
Sampling Frequency	48 kHz
Quantization	24 bit
SDI Embedded Audio	
Supported Standard	
2K (except SD), 4K	SMPTE ST 299
SD	SMPTE ST 272
Clock Generation	Generated from the video clock
Synchronization	Must be synchronized to the video clock. All SDI signals must be synchronized.
Channel Separation	
Single Input Mode	Separates up to two groups (8 channels) from any SDI input.
Simul Mode (2K SD/HD/3G-A/3G-B-DL)	Separates up to four groups (8 channels) from any SDI input.

Channel Separation (SER03)	Separates up to four groups (16 channels) from any SDI input. (For 3G, channels 1 to 16 and channels 17 to 32 are divided.)
IP Input (SER05/SER06)	
Clock Generation System	Generated from the video clock
Synchronization Relationship	Must be synchronized to the video clock. All the content video signals must be synchronized.
Channel Separation	
Single Input Mode	Separates up to two groups (8 channels) from any IP input.
Simul Mode (2K SD/HD/3G-A/3G-B-DL)	Separates up to four groups (8 channels) from any IP input.
Channel Separation (SER03)	Separates up to four groups (16 channels) from any SDI input. (For 3G, channels 1 to 16 and channels 17 to 32 are divided.)
Maximum Number of Display Channels	
SDI embedded audio signal (SER03)	16 (from any SDI input, displayed in groups)
External Audio Signals (SER03)	16 (A, B)
Analog Audio Signals (SER03)	8
Dolby Signals (SER04/SER07)	8 (A, B) Decodes SDI embedded audio or external audio signal and displays 8 channels
IP Input Audio Signal (SER05/SER06)	8 (from any IP input, displayed in groups)
IP Input Audio Signal (SER03/SER05/SER06)	16 (from any IP input, displayed in groups)
Display Types	Level meter, Lissajous (SER03), correlation meter (SER03), surround (SER03), status (SER03), loudness (SER03)

Level meter

Displayed Channels	8 channels
Displayed Channels (SER03)	8 channels, 16 channels
Dynamic Range	
SDI Embedded Audio	SDI-60 dBFS, -90 dBFS, reference level \pm 3 dB
External Digital Audio (SER03)	-60 dBFS, -90 dBFS, reference level \pm 3 dB
External Analog Audio (SER03)	-60dBFS, reference level \pm 3 dB
Level Accuracy	Scales the scale reference level 4dBu to -20dBFS \pm 0.3 dB (-50 to 0 dBFS, 1 kHz, signal source impedance 40 Ω or less)
Frequency Response	30 Hz to 20 kHz \pm 0.4 dB (4 dBu, 1 kHz reference, TRUE PEAK response) 20 Hz to 20 kHz + 0.4 dB, -0.6 dB (4 dBu, 1 kHz reference, TRUE PEAK response)
Meter Response Model	TRUE PEAK, PPM type I , PPM type II , VU
Peak Hold Time	0.0 to 5.0 s (in 0.5 s steps), HOLD
Level Setting	-40.0 to 0.0 dBFS (standard level, warning level, over level)
Level Numeric Display	Displays the levels numerically Numeric display in red when level-over is detected Displays a blue "M" when mute is detected (ON/OFF selectable. The displays changes to a blue ■ when the layout size is small.)
Dolby Detection (SER04/SER07)	Displays "U.L" when audio is not detected Displays a cyan ■ for Dolby audio channels Displays "DOLBY" in green for decode selection channels

Lissajous Display (SER03/SER04/SER07)

Displayed Channels	2 channels \times 1 2 channels \times 4 2 channels \times 8
Display Mode	X-Y, MATRIX
Correlation Meter	Displays the correlation between two channels as a value from -1 to 1
Channel Assignment	
SINGLE LISSAJOU	L, R
MULTI LISSAJOU	L1, R1 to L4, R4 to L8, R8
Indicator Display	Displays Dolby E, Dolby ED2 frame locations with indicators

Surround Display (SER03/SER04/SER07) (*1)

Function	Displays a graphical representation of a sound field
Surround Format	5.1 channels
Channel Mapping	L, R, C, LFE, Ls, Rs, Lt, Rt
Center Channel Format	NORMAL, PHANTOM CENTER
Gain	×1, AUTO
Indicator Display	Displays Dolby E, Dolby ED2 frame locations with indicators

Status Display (SER03/SER04/SER07)

Level	Audio levels are displayed using numbers (dBFS).
Error Detection	Counts the number of errors that occur for each channel
Level Over	Counts the number of times that the level of the input signal exceeds the set value
Detection Setting	-40.0 to 0.0 dBFS
Clipping	Counts the number of times that a received signal exceeds the maximum signal value for the specified number of consecutive samples
Detection Setting	1 to 100 sample
Mute	Counts the number of times that the length of a received mute signal exceeds the specified period
Detection Setting	1 to 5000 ms
Parity Error	Counts the number of times that the input signal's parity bit and the parity bit recalculated by the instrument differ
Validity Error	Counts the number of times that the input signal's validity bit is 1
CRC Error	Counts the number of times that the CRC of the channel status bits and the calculated CRC are different
Code Violation	Counts the number of times that the state of the input signal's biphase modulation is abnormal
Elapsed Time	Displays the amount of time that has elapsed since the instrument was reset
Channel Status Bits	Dump display, text display
User Data Bits	Dump Display
DOLBY Metadata	Text display
Dolby E, Dolby ED2 Frame Location	Displays the header position and mode

Loudness Display (SER03)

Function	Loudness chart display, numeric display, log, level meter display, peak value display
Supported Standard	ITU-R BS.1770, ARIB TR-B32, EBU R128, ATSC A/85
Measurement Channel	Simultaneous measurement of two audio sources
Mode (Main)	Monaural, stereo, 5.1, user specified channel
Mode (Sub)	Off, monaural, stereo
Channel Selection	User-defined assignment of eight channels
LFE Gain	0 to 10 times
Measurement Trigger	Manual (panel), remote, timecode, mute
Measurement Mode	BS1770, ARIB, EBU, ATSC, CUSTOM
Target Level	
BS1770	-24.0 LKFS
ARIB	-24.0 LKFS (± 1 LK)
EBU	-23.0 LUFS (LIVE ON ± 1 LU / LIVE OFF ± 0.5 LU)
ATSC	-24.0 LKFS (± 2 LK)
CUSTOM	-25.0 to -23.0 LKFS
Average Time	
Momentary Loudness	200 to 10000 ms
Short-term Loudness	200 to 10000 ms
Chart Display	
1 During Audio Measurement	Graph display of integrated loudness and momentary or short-term loudness
2 During Audio Measurement	Graph display of integrated, momentary, or short-term loudness
Measurement Time	2min, 10min, 30min, 1hour, 2hour, 6hour, 12hour, 24hour
MAG	Zoomed display of the target level from -18 to +9 (LK/LU)
Numeric Display	Absolute value and relative value displays of integrated loudness and momentary or short-term loudness
Integrated Loudness	Displayed in red when the target level range is exceeded
Momentary, Short-term Loudness	Displayed in red when the target level is exceeded
Log	
Log Time	Up to 24 hours
File	
Log	Saves gating block loudness in CSV format
Summary	Saves settings and measurement results in text format
Level Meter Display	Displays level meters for eight channels
Peak Value Display	Displays peak values of a measurement channel numerically

*1 Only CH Mode 8 channels is supported.

34. Status Display

Signal Detection	Detects the presence of an SDI signal
Format Display	Displays the video signal format
Frequency Deviation Display (not displayed for IP signals)	
Function	Displays the sampling frequency deviation Displays an error if ± 10 ppm is exceeded
Measurement Range	± 100 ppm
Precision	± 2 ppm
Equivalent Cable Length Display (not displayed for IP signals)	
Function	Displays SDI signal attenuation in terms of cable length Displays an error if the specified cable length is exceeded
Supported Cables	
12G	L-5.5CUHD
3G, HD	LS-5CFB, 1694A
SD	L-5C2V, 8281
Display Range	
12G	< 10 m, 10 to 80 m, > 80 m
3G	< 10 m, 10 to 100 m, > 100 m
HD	< 10 m, 10 to 130 m, > 130 m
SD	< 50 m, 50 to 200 m, > 200 m
Precision	
12G, 3G, HD	± 20 m
SD	± 30 m
Resolution	10 m
Error Count Display	Up to 999999 errors for each error type
Count Period	1 second, 1 field (frame)
Embedded Audio Channel Display	Displays the embedded audio channel numbers

* If the input signal is 3G-B-DL, only stream 1 is supported.

SDI Signal Error Detection

CRC Error	Detects 3G and HD signal transmission errors
EDH Error	Detects SD signal transmission errors
TRS Position Error	Detects TRS embedding position errors
TRS Code Error	Detects TRS protection bit errors
Line Number Error	Detects errors with the line numbers embedded in 3G and HD signals
Illegal Code Error	Detects data within the range of 000 to 003h and 3FC to 3FFh in locations other than TRS and ADF

* IP signals comply only with ST2022-6.

Embedded Audio Packet Error Detection (*1)

BCH Error	Detects audio packet transmission errors
Parity Error	Detects audio packet parity errors
DBN Error	Detects audio packet continuity errors
Embedded Position Error	Detects the presence of audio in lines where it should not be embedded
Sample Counter Error	Detects asynchronous audio by measuring the number of audio samples

* IP signals comply only with ST2022-6.

*1 If the input signal is 3G-B-DL, only stream 1 is supported.

Ancillary Data Packet Error Detection

Checksum error	Detects ancillary data transmission errors
Parity Error	Detects ancillary data header parity errors

* IP signals comply only with ST2022-6.

Video Error Detection

Freeze Error	Detects freezing of video within the specified time range
Detection Method	Video interval checksum
Time Specification	2 to 300 frames
Black Error	Detects video blackouts
Black Level Specification	0 to 100%
Area Specification	1 to 100%
Time Specification	1 to 300 frames
Level Error	Detects luminance level errors and chrominance level errors
Luminance Level Detection Range	
Upper limit	-51 to 766 mV
Lower Limit	-51 to 766 mV
Chrominance Level Detection Range	
Upper limit	-400 to 399 mV
Lower Limit	-400 to 399 mV

Gamut Error Detects gamut errors
 Detection Range
 Upper limit 90.8 to 109.4%
 Lower Limit -7.2 to 6.1%
 Low-Pass Filter

Format	Low-Pass Filter	
	HD/SD: 1 MHz	HD: 2.8 MHz SD: 1 MHz
SD 720×487	Approx. 1 MHz (EBU R103-2000)	Approx. 1 MHz
SD 720×576	Approx. 1 MHz (EBU R103-2000)	Approx. 1 MHz
HD 1280×720	Approx. 1 MHz	Approx. 2.8 MHz
HD 1920×1080 (frame rate ≤ 30 Hz)	Approx. 1 MHz (IEEE STD 205)	Approx. 2.8 MHz
HD 1920×1080 (frame rate > 30 Hz)	Approx. 2 MHz	Approx. 5.5 MHz
HD 2048×1080 (frame rate ≤ 30 Hz)	Approx. 1 MHz (IEEE STD 205)	Approx. 2.8 MHz
HD 2048×1080 (frame rate > 30 Hz)	Approx. 2 MHz	Approx. 5.5 MHz
4K 3840×2160 (frame rate ≤ 30 Hz)	Approx. 4 MHz	Approx. 11 MHz
4K 3840×2160 (frame rate > 30 Hz)	Approx. 8 MHz	Approx. 22 MHz
4K 4096×2160 (frame rate ≤ 30 Hz)	Approx. 4 MHz	Approx. 11 MHz
4K 4096×2160 (frame rate > 30 Hz)	Approx. 8 MHz	Approx. 22 MHz

Area Specification 0.0 to 5.0%
 Time Specification 1 to 60 frames
 Composite Gamut Error Detects level errors that occur when component signals are converted to composite signals
 Detection Range
 Upper limit 90.0 to 135.0%
 Lower Limit -40.0 to 20.0%
 Low-Pass Filter The same as the gamut error
 Area Specification 0.0 to 5.0%
 Time Specification 1 to 60 frames

SDI Analysis Features

Event Log Display

Function	Records detected errors, events—such as the instrument switching between input signals, and timestamps.
Log Capacity	Up to 1000 events
Operation	Logs all events from start to finish
Data Output	Overwrite mode, Stop after 1,000 events

Data Dump Display

Display Format Displays serial data sequence or displays each color component separately

SD, HD, 3G-A, 3G-B DS	PICTURE, stream 1, stream 2
3G-B-DL	PICTURE, link A, link B
HD(DL)	PICTURE, link A, link B
3G(DL)-2K	PICTURE, link 1, link 2
3G(DL)-4K (SER28)	PICTURE, link 1, link 2
3G(QL) (SER28), HD(QL) (SER28)	PICTURE, link 1, link 2, link 3, link 4
6G (SER28/SER29), 12G (SER28/SER29)	PICTURE, sub1, sub2, sub3, sub4

Display Format Details

PICTURE	Links or streams 1 and 2 are combined and displayed in a picture structure.
Stream 1/2	Displays each stream in a transmission structure
Link A, B, 1, 2, 3, 4	Displays the selected link
Line Select	Displays the selected line
Sample Select	Displays from the selected sample
Jump Feature	Jumps to an EAV or SAV
Data Output	Text output to USB memory

Phase Difference Display

Function	Displays the phase difference between a reference signal and an SDI signal numerically and graphically
Reference Signal	
SD, HD, 3G-A, 3G-B-DL	External sync signal, Ach
3G-B DS	External sync signal
HD(DL)	External sync signal, Ach, Cch
3G(DL)-2K (SER28)	External sync signal, Ach, Cch
3G(DL)-4K (SER28)	External sync signal, Ach, Cch
HD(QL) (SER28), 3G(QL) (SER28)	External sync signal, Ach
6G (SER28/SER29), 12G (SER28/SER29)	External sync signal
PTP (SER05/SER06) (*1)	RTP, External sync signal (BB), FPT (SER06)
Display Range	
Vertical	1 frame For 3G-B-DL 47.95P to 60P, ± 1 frame measurement possible
Horizontal	± 1 line

* If the reference signal is set to an external sync signal, the measured phase may vary by ± 1 clock depending on the timing when the external sync signal or SDI signal is connected or disconnected or when the power is turned on and off.

*1 Complies only with SMPTE ST 2110.

SDI Ancillary Data List Display

List Display Details	Presence or absence of each ancillary data type, embedded line number, and number of packets per frame
Dump Display	The selected ancillary data is displayed in hexadecimal or binary.

EDH Display (Only for SD)

Supported Standard	SMPTE RP 165
Displayed Contents	Analyzes and displays EDH packets and displays received CRC errors
Display Format	Text, hexadecimal, binary

Payload ID Display

Supported Standard	SMPTE ST 352
Displayed Contents	Analyzes and displays payload information
Display Format	Text and binary

Displaying Audio Control Packets

Supported Standard	SMPTE ST 299-1, SMPTE ST 272
Displayed Contents	Displays audio control packet analysis
Display Format	Text, hexadecimal, binary
Display Format	1, 2, 3, 4

Japanese Closed Caption Display (*1)

Supported Standard	ARIB STD-B37
Displayed Contents	Analysis display of closed caption signals
Display Format	Text, hexadecimal, binary

English Closed Caption Display

Supported Video Formats SD, HD, 3G-A, 3G-B-DL,
 HD(DL) (close caption decoding only for link A),
 3G(DL)-4K (close caption decoding only for link 1),
 HD(QL) (close caption decoding only for link 1),
 3G(QL) (close caption decoding only for link 1),
 6G (close caption decoding only for sub 1),
 12G (close caption decoding only for sub 1)

CDP Packet Display Details

CDP packet header information

Presence or absence of timecode packet,
 Presence or absence of closed caption packet and
 validity of this packet,
 Presence or absence of closed caption service packet
 and validity of this packet,
 Presence or absence of the FUTURE data packet

Time Code

When time code packets are present

Closed Caption Data

When valid closed caption packets are present

Presence or absence of CC1 to 4, TEXT1 to 4, XDS packets

XDS Packet Display Details

Contents adviser information
 Copy management information

Display content of Program Description packet

Stuffing Descriptor
 AC3 Audio Descriptor
 Caption Service Descriptor
 Content Advisory Descriptor
 Extended Channel Name Descriptor
 Service Location Descriptor
 Time-Shifted Service Descriptor
 Component Name Descriptor
 DCC Arriving Request Descriptor
 DCC Arriving Request Descriptor
 Redistribution Control Descriptor

Inter-Stationary Control Signal (NET-Q) Display (*1)

ARIB STD-B39
 Analysis display of inter-stationary control signals
 Text, hexadecimal, binary
 Q signal logging
 Analysis display of the format ID
 Outputs Q signal logs in CSV format through a USB
 memory device

Data Broadcast Trigger Signal Display (*1)

ARIB STD-B35
 Text, hexadecimal, binary

V-ANC User Data Display (*1)	ARIB TR-B23 Hexadecimal, binary
AFD Packet Display	SMPTE ST 2016-3 Text, hexadecimal, binary
SCTE-104 Display	
Function	SCTE-104 message monitoring
Supported Standard	SMPTE 2010, ANSI/SCTE 104
Supported Format	For Dual / Quad Link, Link1 only (Link cannot be changed)
Supported Input Channel	SDI INPUT 1 / 2 / 3 / 4 (DS1 only)
Display	Superimpose when SCTE-104 message is detected
Display Time	1 to 10 seconds (1 second step)
Log	Records when SCTE-104 message is detected
DUMP Display	Displays DUMP data when SCTE-104 message is detected
SPLICE Display	When a splice_request_data message is detected, the details of the message are displayed
SPLICE Log	Records when a splice_request_data message is detected
SR Live Packet Display	Text, hexadecimal, binary
ARRI Metadata Display	Text, hexadecimal, binary
User-Defined ANC Packet Display	DID, SDID Y, C Hexadecimal, binary

*1 Supported video formats are as follows:
SD, HD, 3G-A, HD(DL) (close caption decoding only for link A),
3G(DL)-4K (close caption decoding only for link 1), HD(QL) (close caption decoding only for link 1),
3G(QL) (close caption decoding only for link 1), 12G (close caption decoding only for sub 1)

Lip Sync Display (SER03)	Displays the phase difference between the video and audio
Lip Sync Measurement	
Function	Measures the time difference between the SDI signal and digital audio signal and displays the results numerically and graphically
Reference Signal	A Leader TSG that supports lip syncing (*1)
Measurement Method	Measures the time difference when the luminance level of the video signal exceeds the specified value and when the audio level signal exceeds the specified value
Luminance Level Setting	25 to 100%
Audio Signal Level Setting	-30 to 0 dBFS
Supported Audio Signals	Embedded audio signal, digital audio signal
Measurement Range (Bar Display)	±50 ms, ±100 ms, ±500 ms, ±1.0 s, ±2.5 s
Measurement Range (Numeric Display)	±3999 ms
Measurement Resolution	1 ms

*1 TSG patterns not made by Leader may be supportable by specifying the video signal setting and audio

signal setting.

IP Analysis Function (SER05/SER06)

IP Status Display

Function

SER05

Display the 10G Ethernet (IP 1/2) traffic and streams

SER06

Display the 10G and 25G Ethernet (IP 1/2) traffic and streams

Status Display

Linkup

Detects Ethernet linkup

Protocol

ST2022-6, ST2110-20/30/40, PTP, UDP

Bit Rate Display

Displays the bit rate (Mbps) of the user data section of each stream excluding the header section

Number of Measured Streams

Up to 64

Integration Rate Display

Displays the total number of bits per second (Gbps) excluding the Ethernet frame header and FCS

Measurement Range

2 min, 10 min, 30 min, 1 h, 2 h, 6 h, 12 h, 24 h, 72 h

Resolution

1 s

IP Packet Jitter Display

Function

Measures packet arrival intervals of the IP stream and graphically displays fluctuations over time

Measurement Range

2 min, 10 min, 30 min, 1 h, 2 h, 6 h, 12 h, 24 h, 72 h

Resolution

1 s

Display Mode

Video Active, Video All, Audio, ANC

PTP Status Display

Function

Displays the PTP time, delay, and grandmaster clock information

Measurement Range

2 min, 10 min, 30 min, 1 h, 2 h, 6 h, 12 h, 24 h, 72 h

Resolution

1 s

Display Mode

Delay Time, Time Offset, PTP Info

PTP-RTP Timing Comparison Display

Function

Displays the phase difference between the PTP and ST2110-20 timestamps

Measurement Range

2 min, 10 min, 30 min, 1 h, 2 h, 6 h, 12 h, 24 h, 72 h

Resolution

1 s

Display Mode

Video, Audio, ANC, turns on and off separately
One of them is on

Path Delay Display

Function

Displays the stream delay of each input port complied with SMPTE ST 2022-7

Measurement Range

2 min, 10 min, 30 min, 1 h, 2 h, 6 h, 12 h, 24 h, 72 h

Resolution

1 s

SFP Module Display	
Function	Displays information about the installed SFP transceiver module
Packet Header Display	
Function	Displays information on the selected packet header
Display Mode	MAC/IP, UDP/IP, PAYLOAD
Buffer Display (When SER06 is installed and ST2110 is selected as the IP signal standard.)	
Function	Displays the measured values of Cinst, VRX, or FPT when the transmission type of ST2110-21 is Narrow, Narrow Linear, or Wide
Measurement Range	2 min, 10 min, 30 min, 1 h, 2 h, 6 h, 12 h, 24 h, 72 h
Resolution	1 s
Display Mode	CINST, VRX, FPT
NMOS Status Display	
Function	Displays the CONNECTION and REGISTRATION informations of NMOS. (*1)
Display Mode	CONNECTION / REGISTRATION
Number of REGISTRATION Displays	32
DNS-SD	Multicast / Unicast / Manual
*1 The informations are cleared when the power is turned on and off.	
JPEG XS Packet Header Analysis Display (SER33)	
Function	Analyze and display JPEG XS packet header information and Box information
Display Mode	VIDEO SUPPORT / PROFILE / BUFFER / METADATA / TRANSPORT / IMAGE / COLOR
Display Content	
Transmission mode (T)	Transmission mode
Packetization mode (K)	Packetization mode
Last packet (L)	Last packet of frame
Interlaced (I)	Frame scan
Frame counter	Frame counter
Slice counter	Slice counter
Packet counter	Packet counter
Video Information box	
Bit Rate	Maximum bitrate of video stream
Frame Rate	Frames per second
Sample Struct	Pixel configuration
Timecode	Timecode
Profile and Level box	
Profile	Codestream profile
Level	Codestream level
Color Specification box	
Color Space Type	Color space

JPEG XS Status Display (SER33)

Error Detection	Detect out-of-order or missing JPEG XS packet errors
Format Display	Detects and displays format information from JPEG XS stream data
RTP Timestamp	Displays the maximum and minimum values of RTP timestamp per field or frame
Packet Count	Displays the maximum and minimum number of packets per field or frame
Payload Data	Displays the maximum and minimum amount of payload data per field or frame

JPEG XS Format Comparison Display (SER33)

Function	Comparative display of formats detected by SDP, ST2110-40 (PID), ST2110-22 (JPEG XS)
Supported Standard	SDP, SMPTE ST 2110-40 (PID), SMPTE ST2110-22 (JPEG XS)

IP Event Log Display

Function	Displays logs according to the event information of each input port
Number of Events	1,000

35. Eye Pattern (SER02A)

SDI Input Connector Display

SDI INPUT 1

Number of Displays	Displays the input SDI waveform before equalizing
1-Screen Display	Displays the eye pattern of the selected filter in a single screen
2-Screen Display	Displays the timing filter and eye pattern of the selected filter in two screens
Waveform Display Color	7 colors to choose from
Scale Display Color	7 colors to choose from
Method	Equivalent time sampling
Amplitude Accuracy	800 mV ± 5 % (for 800 mV input)
Time Axis	
2 UI Display	
12G (SER28/SER29)	12.5 ps/div
6G (SER28/SER29)	25ps/div
3G	50 ps/div
HD	100 ps/div
SD	550 ps/div
4 UI Display	
12G (SER28/SER29)	25 ps/div
6G (SER28/SER29)	50ps/div
3G	100 ps/div
HD	200 ps/div
SD	1100 ps/div

16 UI Display	
12G (SER28/SER29)	100 ps/div
6G (SER28/SER29)	200ps/div
3G	400 ps/div
HD	800 ps/div
SD	4400 ps/div
Time Axis Accuracy	±3 %
Jitter Filter	
10Hz	HPF 10Hz
100Hz	HPF 100Hz
1 kHz	HPF 1 kHz
100 kHz	HPF 100 kHz
TIMING	HPF 10Hz
ALIGNMENT	
12G (SER28/SER29), 6G (SER28/SER29)	HPF 100 kHz
3G, HD	HPF 100 kHz
SD	HPF 1 kHz
Cursor Measurement	Amplitude measurement using Y cursors Time measurement using X cursors Rise time and fall time measurement using the TrTf cursor
Automatic Measurement Items	Eye pattern's amplitude Rise time (the time for the signal to rise from 20 to 80 % of its amplitude) Fall time (the time for the signal to fall from 80 to 20 % of its amplitude) Timing jitter Jitter Rising edge overshoot Falling edge overshoot
Histogram Display	Displays the frequency distribution of the eye pattern waveform amplitudes

36. Jitter Display (SER02A)

SDI Input Connector	SDI INPUT 1
Display	Displays the jitter component of an SDI signal
Number of Displays	
1-Screen Display	Displays the jitter waveform of the selected filter in a single screen
2-Screen Display	Displays the timing jitter and the jitter waveform of the selected filter in two screens
Waveform Display Color	7 colors to choose from
Scale Display Color	7 colors to choose from
Method	Phase detection method
Gain	×16, ×8, ×4, ×2, ×1

Measurement Range	
12G (SER28/SER29)	
×16	0.00 to 1.20 UI
×4	1.20 to 4.80 UI
×2	4.80 to 9.60 UI
×1	9.60 to 19.20 UI
3G, HD, SD, 6G (SER28/SER29)	
×8	0.00 to 1.20 UI
×2	1.20 to 4.80 UI
×1	4.80 to 9.60 UI
Time Axis	1H, 2H, 1V, 2V (*1)
Time Axis Accuracy	±3 %
Jitter Filter	
10Hz	HPF 10Hz
100Hz	HPF 100Hz
1 kHz	HPF 1 kHz
100 kHz	HPF 100 kHz
TIMING	HPF 10Hz
ALIGNMENT	
12G (SER28/SER29), 6G (SER28/SER29)	HPF 100 kHz
3G, HD	HPF 100 kHz
SD	HPF 1 kHz
Cursor Measurement	Jitter value measurement through the use of cursors
Automatic Measurement Display Feature	Displays the jitter value in seconds (sec) and unit intervals (UI)
Automatic Measurement Items	Timing jitter, alignment jitter, jitter
Accuracy	Input jitter frequency: 1 kHz. Filter setting: 10 Hz, within measurement range
0 UI < automatic measured value ≤ 1 UI	±10 % + 0.07 UI
1 UI < automatic measured value ≤ 7 UI	±10 %

*1 2V display is not possible when the input signal is progressive except for 60/59.94/50P of HD(DL).

37. Tally Display (SER27)

Number of Displays	3 (TALLY-1, TALLY-2, TALLY-EXT) (*1)
Display Colors	7 colors to choose from
Control Method	Remote connector, RS-422/485 connector, Ethernet port 1

*1 The number of displays per channel. Arranged using the customized layout feature or the enhanced layout feature.

38. Camera ID Display (SER27)

Number of Displays	2 (LABEL-1, LABEL-2) (*1)
Iris Display	1 (IRIS) (*1)
Control Method	Instrument, RS-422/485 connector, Ethernet port 1

*1 The number of displays per channel. Arranged using the customized layout feature or the enhanced layout feature.

39. General Specifications

Environmental Conditions

Operating Temperature	0 to 40 °C
Operating Humidity Range	85 %RH or less (no condensation)
Optimal Temperature	10 to 30 °C
Operating Environment	Indoors
Elevation	Up to 2,000 m
Overvoltage Category	II
Pollution Degree	2

Power Requirements

Voltage	100 to 250 VAC
Frequency	50/60Hz
Power Consumption	160 W max.

Dimensions

LV5600W	215 (W) × 132 (H) × 298 (D) mm (excluding protrusions)
LV7600W	426 (W) × 44 (H) × 300 (D) mm (excluding protrusions)

Weight

LV5600W	4.6 kg max. (including options, excluding accessories)
LV7600W	4.2 kg max. (including options, excluding accessories)

Accessories

LV5600W, LV7600W	Power cord	
	AC cord clamp	1
LV5600-SER06, LV7600-SER06	IP 1/2 / SFP conversion adapter	2

40. Sold Separately

LC2148

Product Name	SFP+ MULTI-MODE
Classification	Class 1
Output Level	-1 dBm max.
Wavelength	850 nm
Manufacturer	GIGALIGHT TECHNOLOGY

LC2149

Product Name	SFP+ SINGLE-MODE
Classification	Class 1
Output Level	+0.5 dBm max.
Wavelength	1310 nm
Manufacturer	GIGALIGHT TECHNOLOGY

LC2151

Product Name	SFP28 MULTI-MODE
Classification	Class 1
Output Level	+2.4 dBm max.
Wavelength	850 nm
Manufacturer	GIGALIGHT TECHNOLOGY

LC2152

Product Name	SFP28 SINGLE-MODE
Classification	Class 1
Output Level	+2.0 dBm max.
Wavelength	1310 nm
Manufacturer	GIGALIGHT TECHNOLOGY