

# TLS1215 WIDE-BAND VIDEO PREAMPLIFIER SYSTEM WITH BLANKING

SLVS096A – OCTOBER 1995

- Wide Bandwidth . . . Typ 100 MHz at –3 dB
- 0-V to 4-V Digital Level-Contrast Control Voltage Range
- 0-V to 4-V Digital Level-Gain Adjust Control Voltage Range
- Individual Gain Adjust for Video Amplifiers
- Output-Stage Blanking
- Fewer Peripheral Components Required Than for Competitive Systems

## description

The TLS1215 is a wide-band video preamplifier system intended for high-resolution RGB (red-green-blue) color monitors with blanking control features. Each video amplifier (R, G, and B) contains a gain set for adjusting maximum system gain. The TLS1215 provides digital level-operated contrast, brightness, and gain adjustment. All the control inputs offer high input impedance and an operation range from 0 V to 4 V for easy interface to the serial digital buses. The TLS1215 also contains a blanking circuit, which clamps the video output voltage during blanking period to as low as 0.2 V above ground. The device operates from a 12-V supply. The TLS1215 is characterized for operation from 0°C to 70°C.

N PACKAGE  
(TOP VIEW)

CONTRAST CAP1	1	28	R GAIN ADJUST
CONTRAST CAP2	2	27	R CLAMP(+)
V <sub>CC1</sub>	3	26	R VIDEO OUT
R VIDEO IN	4	25	V <sub>CC1</sub>
R CLAMP CAP	5	24	GND
G VIDEO IN	6	23	V <sub>CC2</sub>
GND	7	22	V <sub>CC1</sub>
G CLAMP CAP	8	21	GND
B VIDEO IN	9	20	G VIDEO OUT
B CLAMP CAP	10	19	G CLAMP(+)
V <sub>CC1</sub>	11	18	G GAIN ADJUST
CONTRAST	12	17	B VIDEO OUT
BLANK GATE	13	16	B CLAMP(+)
CLAMP GATE	14	15	B GAIN ADJUST



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PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

 **TEXAS  
INSTRUMENTS**

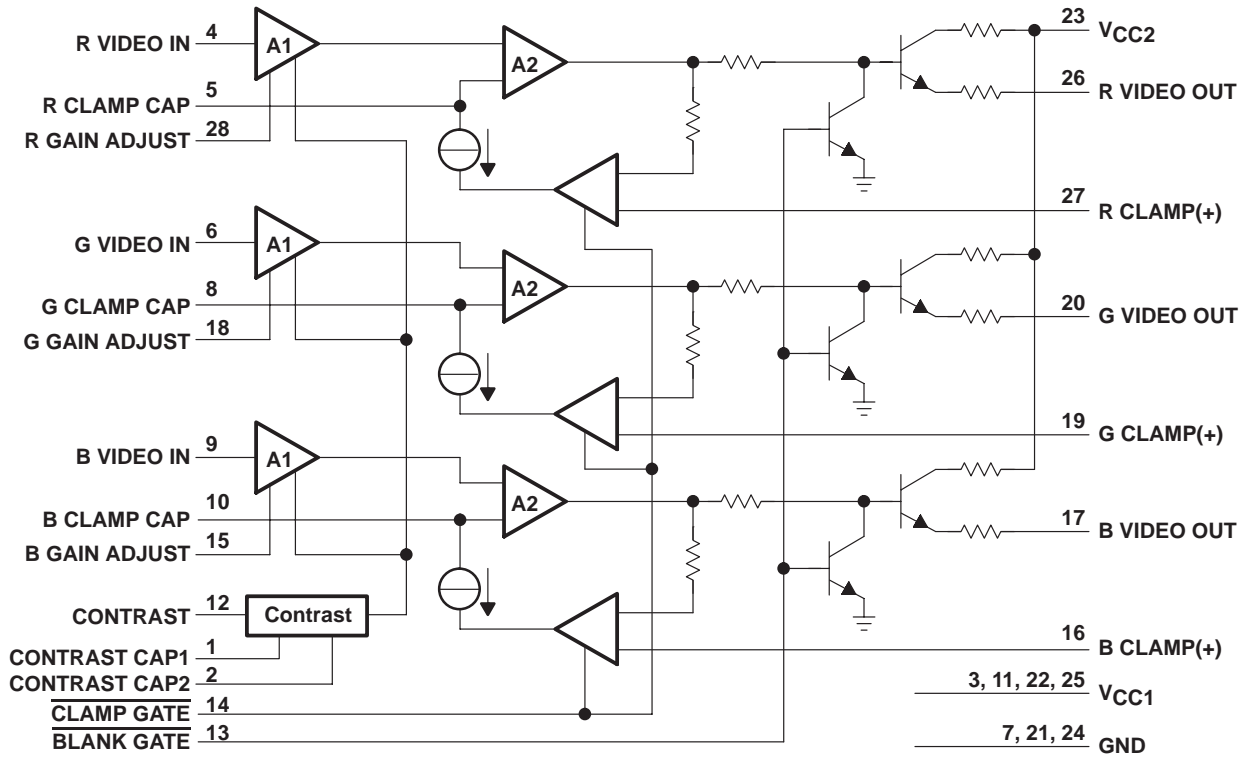
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## functional block diagram



# TLS1215

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### absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Supply voltage, $V_{CC}$	13.5 V
Input voltage range, $V_I$ (see Note 1)	0 V to $V_{CC}$
Video output current (per channel)	28 mA
Total power dissipation at (or below) 25°C free-air temperature (see Note 2)	2.1 W
Operating virtual junction temperature, $T_J$	150°C
Operating free-air temperature range, $T_A$	0°C to 70°C
Storage temperature range, $T_{stg}$	–65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	260°C

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

- NOTES: 1. All  $V_{CC}$  pins must be externally wired together to prevent internal damage during  $V_{CC}$  power-on/off cycles.  
 2. For operation above 25°C free-air temperature, derate linearly to 1.5 W at the rate of 13 mW/°C.

### recommended operating conditions

		MIN	NOM	MAX	UNIT
Supply voltage, $V_{CC1}$ and $V_{CC2}$		10.8	12	13.2	V
High-level input voltage, $\overline{\text{CLAMP GATE}}$ , $V_{IH}$	Clamp comparators off	2.4		5	V
Low-level input voltage, $\overline{\text{CLAMP GATE}}$ , $V_{IL}$	Clamp comparators on	0		0.8	V
High-level input voltage, $\overline{\text{BLANK GATE}}$ , $V_{IH}$	Blanking circuit inactive	2.4		5	V
Low-level input voltage, $\overline{\text{BLANK GATE}}$ , $V_{IL}$	Blanking circuit active	0		0.8	V
Operating free-air temperature, $T_A$		0		70	°C

### electrical characteristics at 25°C operating free-air temperature range, $\overline{\text{CLAMP GATE}} = 0$ V, $\overline{\text{BLANK GATE}} = 4$ V, $\text{CLAMP}(+) = 2$ V, $\text{CONTRAST} = R, G, B \text{ GAIN ADJUST} = 4$ V, $V_{CC1} = V_{CC2} = 12$ V (see Figure 2) (unless otherwise noted)

PARAMETER	ALT SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$I_{CC}$ Supply current		$V_{CC1} + V_{CC2}$	78	90	100	mA
$V_{ref}$ Video input reference voltage		Measure R, G, B VIDEO IN	2.1	2.3	2.6	V
$I_I$ Contrast, R, G, B gain adjust input current	$I_I$	Measure CONTRAST and B, G, R GAIN ADJUST		–1	–2.5	μA
$I_{IL}$ Clamp gate low input current		$\overline{\text{CLAMP GATE}} = 0$ V		–1	–2.5	μA
$I_{IH}$ Clamp gate high input current		$\overline{\text{CLAMP GATE}} = 5$ V		0.03	1	μA
Clamp capacitor charge current	$I_{K(chg)}$	R, G, B CLAMP CAP = 0 V		–850		μA
Clamp capacitor discharge current	$I_{K(dschg)}$	R, G, B CLAMP CAP = 5 V		+850		μA
$V_{OL}$ Low-level output voltage		R, G, B CLAMP CAP = 0 V		0.3		V
$V_{OH}$ High-level output voltage		R, G, B CLAMP CAP = 5 V		7.8		V
$V_{O(\text{blanked})}$ Blanked output voltage		Blanking circuit active		0.2		V
$V_{O(\text{diff})}$ Output voltage difference	$V_{Odiff}$	Between any two channels		±0.5	±50	mV



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operating characteristics at 25°C free-air temperature range,  $\overline{\text{CLAMP GATE}} = 0 \text{ V}$ ,  $\text{BLANK GATE} = 4 \text{ V}$ ,  $\text{CLAMP}(+) = 4 \text{ V}$ ,  $\text{CONTRAST} = \text{R, G, B GAIN ADJUST} = 4 \text{ V}$ ,  $f_i = 10 \text{ kHz}$  (unless otherwise noted)

PARAMETER	ALT SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$A_{V(\text{max})}$	Maximum voltage amplification	$A_{V\text{MAX}}$	CONTRAST = 4 V, $V_{I(\text{PP})} = 700 \text{ mV}$		7.8	V/V
$A_{V(\text{mid})}$	Mid-range voltage amplification	$A_{V\text{MID}}$	CONTRAST = 2 V, $V_{I(\text{PP})} = 700 \text{ mV}$		2	V/V
	Contrast voltage for minimum amplification	$V_{\text{CONTRASTLOW}}$	$V_{I(\text{PP})} = 1 \text{ V}$ ,	See Note 3	1	V
	Amplification match at $A_{V(\text{max})}$	$A_{V\text{MAX}}(\text{DIFF})$	CONTRAST = 4 V, See Note 4		$\pm 0.2$	dB
	Amplification match at $A_{V(\text{mid})}$	$A_{V\text{MID}}(\text{DIFF})$	CONTRAST = 2 V, See Note 3		$\pm 0.2$	dB
	Amplification match at $A_{V(\text{low})}$	$A_{V\text{LOW}}(\text{DIFF})$	CONTRAST = $V_{\text{CONTRASTLOW}}$ . See Notes 3 and 4		$\pm 0.2$	dB
THD	Total harmonic distortion	THD	CONTRAST = 1 V, $V_{I(\text{PP})} = 1 \text{ V}$		1.0%	
BW	Amplifier bandwidth	$\text{BW}(-3 \text{ dB})$	CONTRAST = 4 V, See Notes 5 and 7		100	MHz
	Crosstalk attenuation	$a_x$	CONTRAST = 4 V, $f = 10 \text{ kHz}$ , See Note 6		80	dB
			CONTRAST = 4 V, $f = 10 \text{ MHz}$ , See Notes 6 or 7		40	dB
	Pulse test	$T_r$ , video $T_f$ , video	$V_{O(\text{PP})} = 4 \text{ V}$ , Clamp(+) = 2 V, CONTRAST = 4 V, See Notes 5 and 7		4	ns
		$T_r$ , blank $T_f$ , blank	CONTRAST = 4 V, Clamp(+) = 2 V, See Notes 5 and 7		7	

- NOTES:
- Determine  $V_{\text{CONTRASTLOW}}$  for -40 dB attenuation of output. Reference to  $A_V$  maximum.
  - Measure gain difference between any two amplifiers,  $V_{I(\text{PP})} = 1 \text{ V}$ .
  - Adjust input frequency from 10 kHz ( $A_V$  maximum ref level) to the -3 dB corner frequency ( $f - 3 \text{ dB}$ ).  $V_{I(\text{PP})} = 700 \text{ mV}$ .
  - $V_{I(\text{PP})} = 700 \text{ mV}$  at  $f = 10 \text{ kHz}$  to any amplifier. Measure output levels of the other two undriven amplifiers relative to driven amplifier.
  - A special text fixture without a socket and a double-sided full-ground-plane PC board are required.



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## APPLICATION INFORMATION

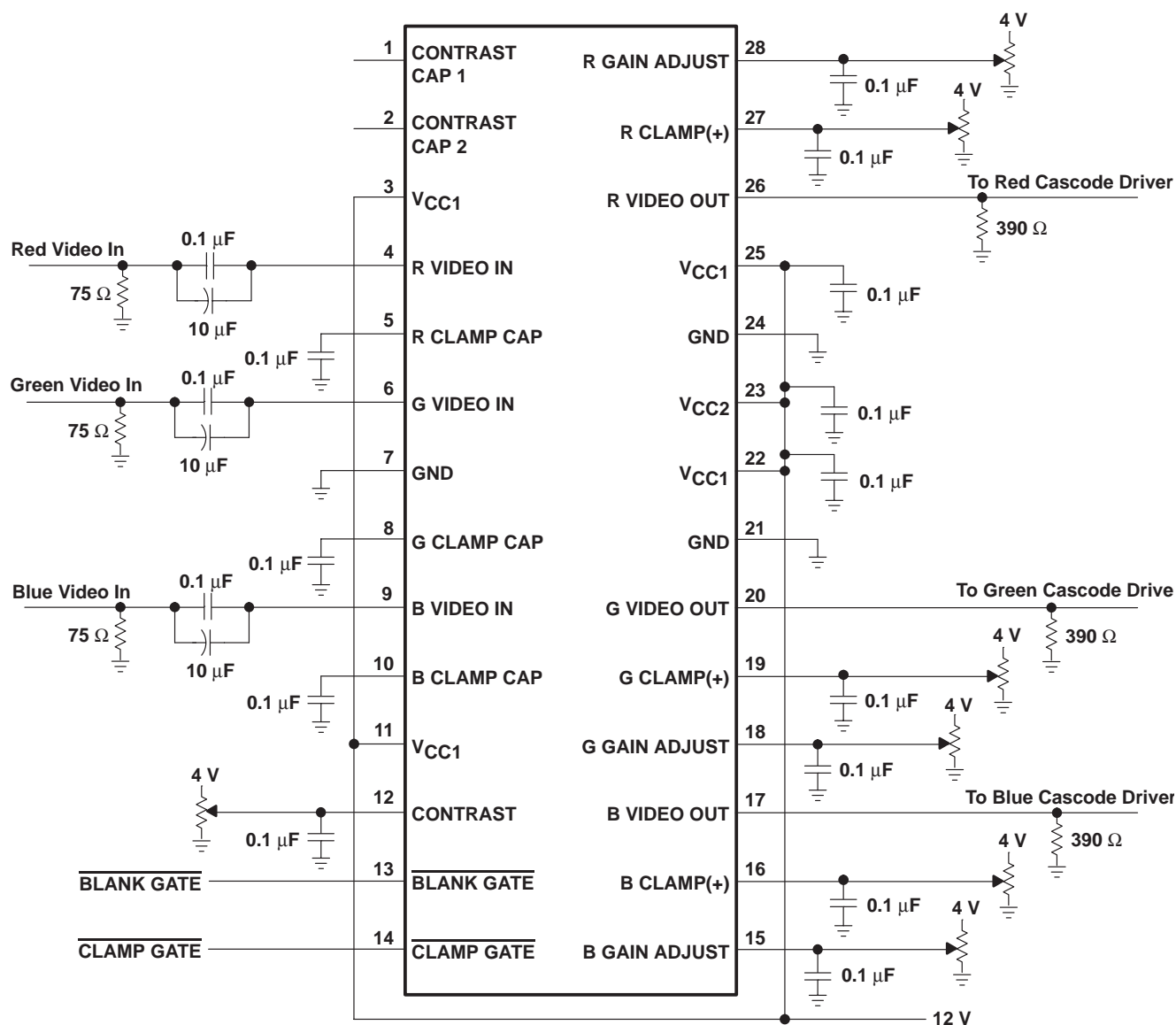
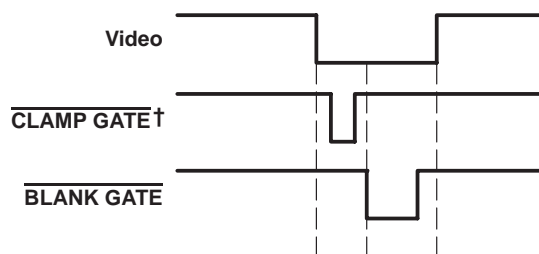


Figure 1. Test/Application Circuit



† Minimum CLAMP GATE pulse: 300 ns

Figure 2. Test/Application Circuit Timing Diagram



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