

# 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



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

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.



Copyright © 1995, Texas Instruments Incorporated

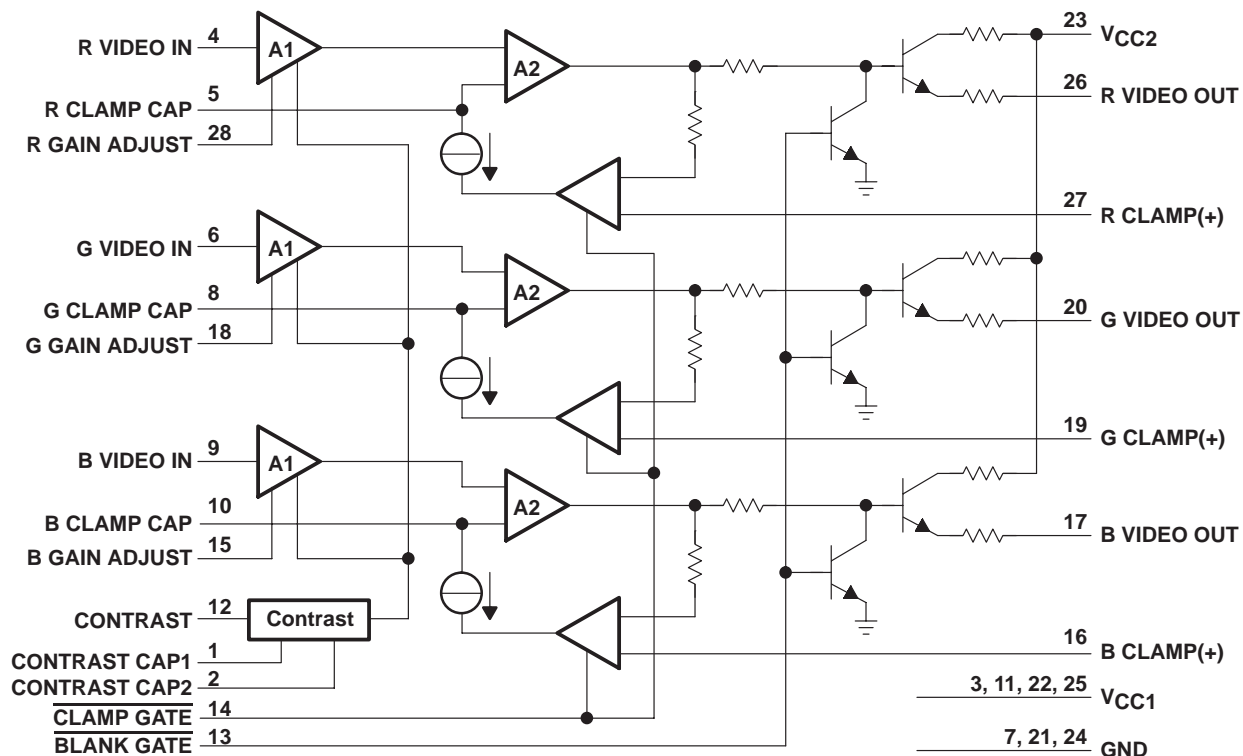
POST OFFICE BOX 655303 • DALLAS, TEXAS 75265  
POST OFFICE BOX 1443 • HOUSTON, TEXAS 77251-1443

# TLS1215

## WIDE-BAND VIDEO PREAMPLIFIER SYSTEM WITH BLANKING

SLVS096A – OCTOBER 1995

### functional block diagram



# TLS1215

## WIDE-BAND VIDEO PREAMPLIFIER SYSTEM WITH BLANKING

SLVS096A – OCTOBER 1995

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

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

<sup>†</sup> 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, $\overline{\text{CLAMP GATE}}$ , $V_{IH}$	2.4		5	V
Low-level input voltage, $\overline{\text{CLAMP GATE}}$ , $V_{IL}$	0		0.8	V
High-level input voltage, $\overline{\text{BLANK GATE}}$ , $V_{IH}$	2.4		5	V
Low-level input voltage, $\overline{\text{BLANK GATE}}$ , $V_{IL}$	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,  $\text{CONTRAST} = \text{R, G, B GAIN ADJUST} = 4$  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
$V_{O(blankd)}$ Blanked output voltage		Blanking circuit active		0.2		V
$V_{O(diff)}$ Output voltage difference	$V_{Odiff}$	Between any two channels		±0.5	±50	mV



# TLS1215

## WIDE-BAND VIDEO PREAMPLIFIER SYSTEM WITH BLANKING

SLVS096A – OCTOBER 1995

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

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

# TLS1215 WIDE-BAND VIDEO PREAMPLIFIER SYSTEM WITH BLANKING

SLVS096A – OCTOBER 1995

## APPLICATION INFORMATION

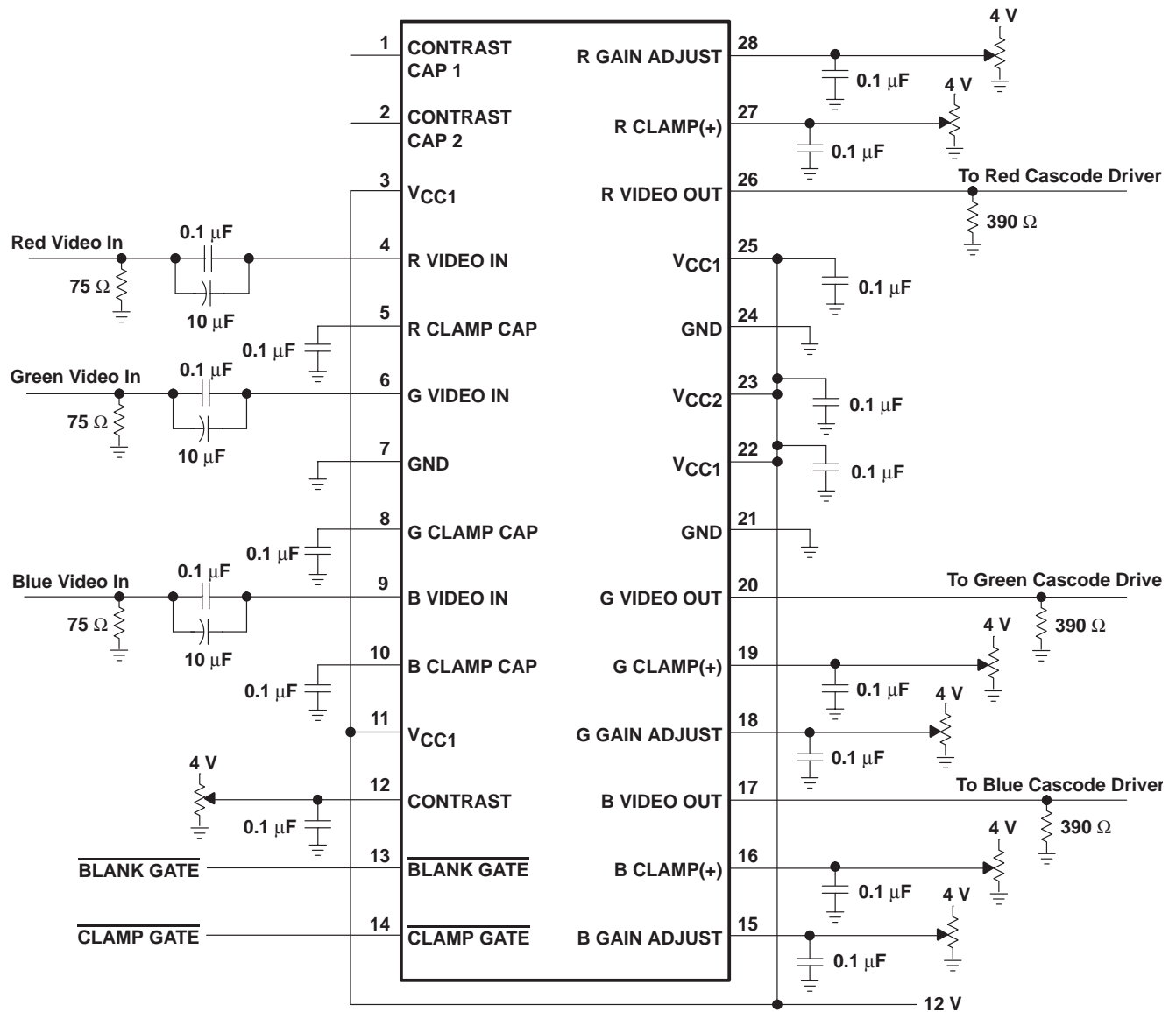


Figure 1. Test/Application Circuit

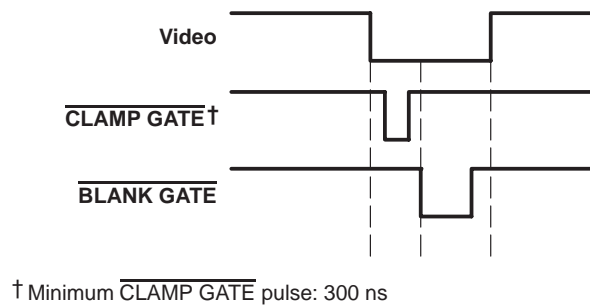


Figure 2. Test/Application Circuit Timing Diagram



POST OFFICE BOX 655303 • DALLAS, TEXAS 75265  
POST OFFICE BOX 1443 • HOUSTON, TEXAS 77251-1443

## IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

### Products

Amplifiers	<a href="http://amplifier.ti.com">amplifier.ti.com</a>
Data Converters	<a href="http://dataconverter.ti.com">dataconverter.ti.com</a>
DSP	<a href="http://dsp.ti.com">dsp.ti.com</a>
Clocks and Timers	<a href="http://www.ti.com/clocks">www.ti.com/clocks</a>
Interface	<a href="http://interface.ti.com">interface.ti.com</a>
Logic	<a href="http://logic.ti.com">logic.ti.com</a>
Power Mgmt	<a href="http://power.ti.com">power.ti.com</a>
Microcontrollers	<a href="http://microcontroller.ti.com">microcontroller.ti.com</a>
RFID	<a href="http://www.ti-rfid.com">www.ti-rfid.com</a>
RF/IF and ZigBee® Solutions	<a href="http://www.ti.com/lprf">www.ti.com/lprf</a>

### Applications

Audio	<a href="http://www.ti.com/audio">www.ti.com/audio</a>
Automotive	<a href="http://www.ti.com/automotive">www.ti.com/automotive</a>
Broadband	<a href="http://www.ti.com/broadband">www.ti.com/broadband</a>
Digital Control	<a href="http://www.ti.com/digitalcontrol">www.ti.com/digitalcontrol</a>
Medical	<a href="http://www.ti.com/medical">www.ti.com/medical</a>
Military	<a href="http://www.ti.com/military">www.ti.com/military</a>
Optical Networking	<a href="http://www.ti.com/opticalnetwork">www.ti.com/opticalnetwork</a>
Security	<a href="http://www.ti.com/security">www.ti.com/security</a>
Telephony	<a href="http://www.ti.com/telephony">www.ti.com/telephony</a>
Video & Imaging	<a href="http://www.ti.com/video">www.ti.com/video</a>
Wireless	<a href="http://www.ti.com/wireless">www.ti.com/wireless</a>

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265  
Copyright © 2008, Texas Instruments Incorporated