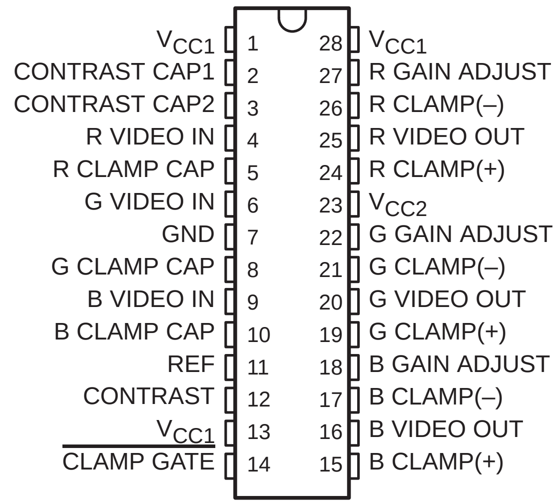
- **Wide Bandwidth Typ 70 MHz at −3 dB**
- **Matched ±0.5-dB Attenuators for Contrast Control**
- **Three Externally Gated Comparators for Brightness Control**
- **Independent Gain Control of Each Video Amplifier . . . A_V = 4 V/V to 10 V/V**
- **Video-Input Voltage Reference**
- **Low-Impedance Output Driver**
- **Designed to Be an Improved Replacement for Texas Instruments LM1203AN and National Semiconductor LM1203**

N PACKAGE
(TOP VIEW)



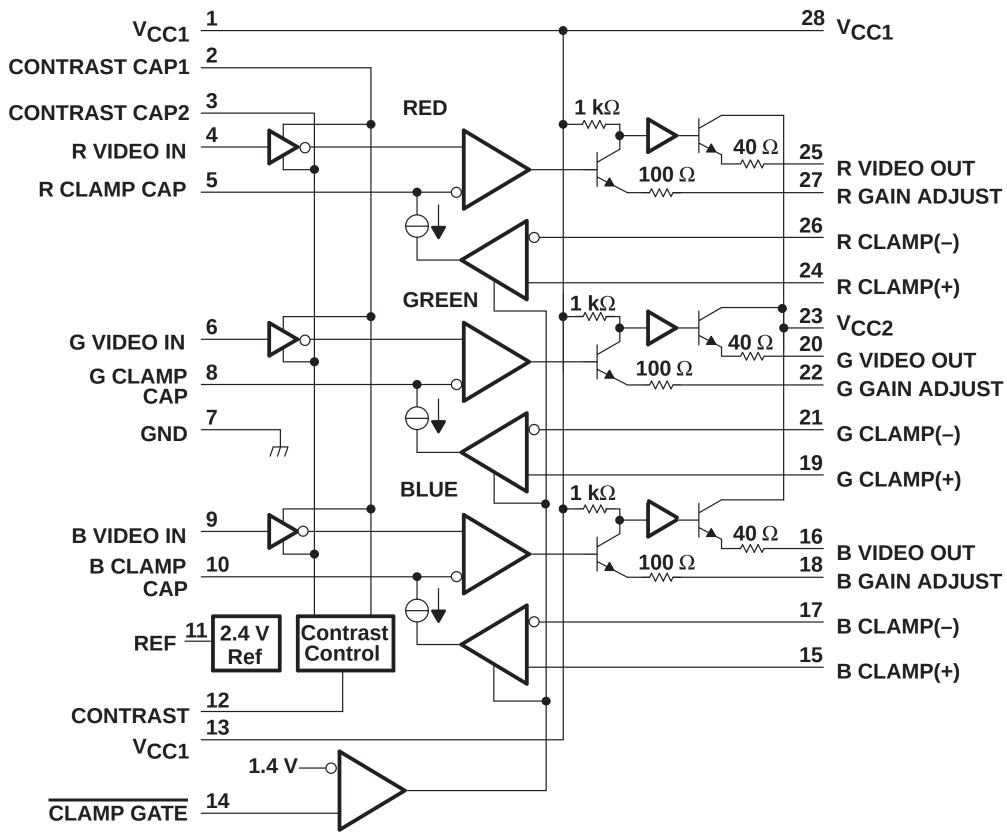
description

The LM1203C is a wide-band video-amplifier system intended for high-resolution RGB (red-green-blue) color monitor applications. In addition to three matched video amplifiers, the LM1203C contains three gated differential-input black-level clamp comparators for brightness control and three matched attenuator circuits for contrast control. Each video amplifier contains a gain set for adjusting maximum system gain (A_V = 4 V/V to 10 V/V) as well as providing trim capability. The LM1203C also contains a voltage reference for the video inputs.

The LM1203C is characterized for operation from 0°C to 70°C.

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.

functional block diagram



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

Supply voltage, V_{CC} (see Note 1)	13.5 V
Input voltage range, V_I	$V_{CC} \geq V_I \geq$ GND
Video output current	28 mA
Total power dissipation at (or below) 25°C free-air temperature (see Note 2)	2.5 W
Operating 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} terminals 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 at the rate of 20 mW/°C.

recommended operating conditions

		MIN	NOM	MAX	UNIT
Supply voltage, V_{CC1} and V_{CC2}			12		V
High-level input voltage range, $\overline{\text{CLAMP GATE}}$, V_{IH}	Clamp comparators off	2			V
Low-level input voltage range, $\overline{\text{CLAMP GATE}}$, V_{IL}	Clamp comparators on			0.8	V
Operating free-air temperature, T_A		0		70	°C

electrical characteristics at 25°C free-air temperature, CONTRAST = 6 V, $\overline{\text{CLAMP GATE}}$ = 0, $V_{clamp(+)}$ = 2 V, V_{CC1} = V_{CC2} = 12 V (see Figure 1) (unless otherwise noted)

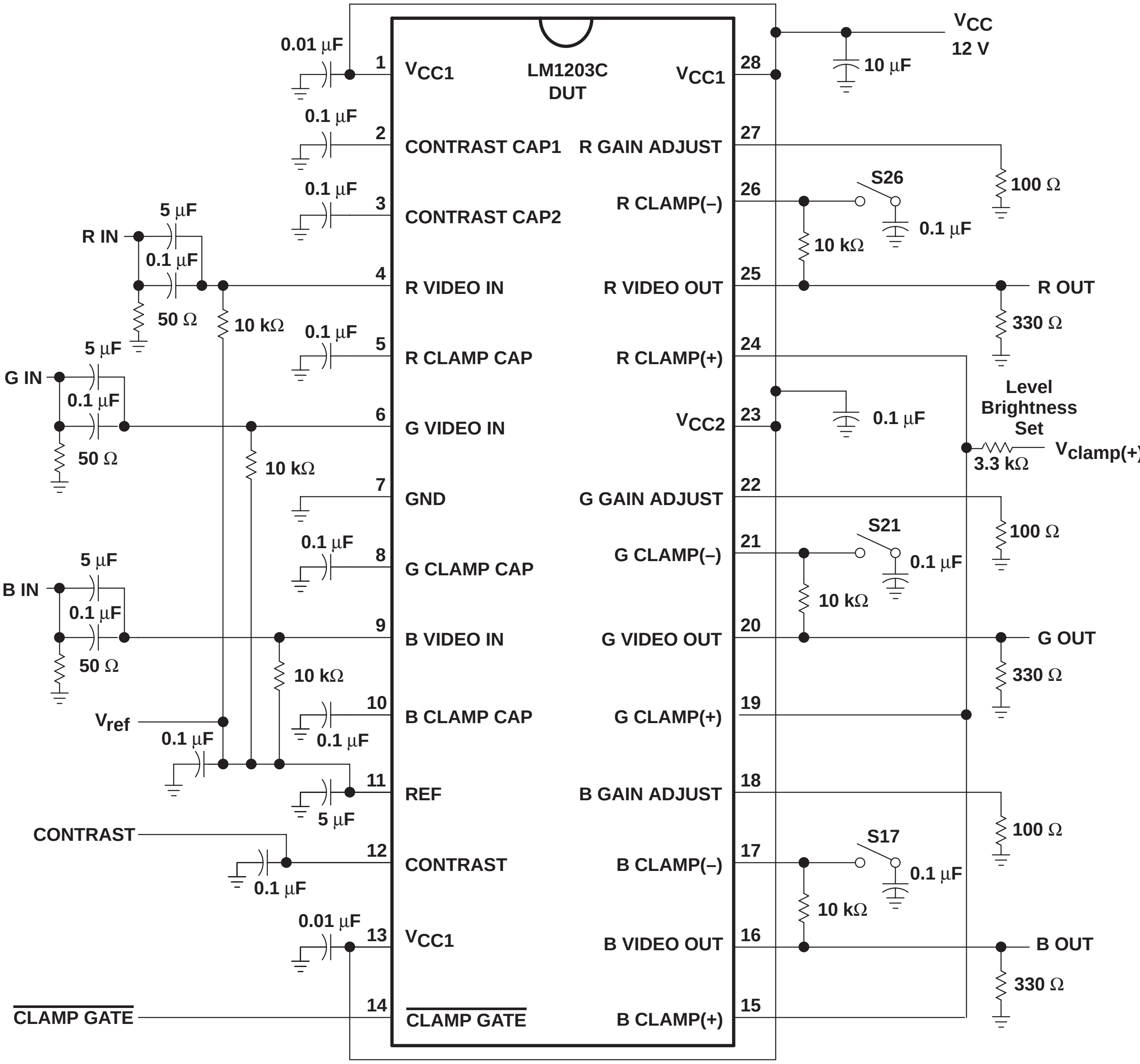
PARAMETER		ALT SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
I_{CC}	Supply current		V_{CC1} only		60	90	mA
V_{ref}	Video input reference voltage			2.2	2.4	2.6	V
I_{IB}	Video input bias current (any amplifier)				5	20	µA
I_{IL}	$\overline{\text{CLAMP GATE}}$ low input current	$I_{IL(14)}$	$\overline{\text{CLAMP GATE}}$ = 0		–0.5	–5	µA
I_{IH}	$\overline{\text{CLAMP GATE}}$ high input current	$I_{IH(14)}$	$\overline{\text{CLAMP GATE}}$ = V_{CC}		0.005	1	µA
	Clamp capacitor charge current	$I_{K(chg)}$	R, G, or B CLAMP CAPS = 0		850		µA
	Clamp capacitor discharge current	$I_{K(dschg)}$	R, G, or B CLAMP CAPS = 5 V		–850		µA
V_{OL}	Low-level output voltage		R, G, or B CLAMP CAPS = 0		1.2		V
V_{OH}	High-level output voltage		R, G, or B CLAMP CAPS = 5 V		8.9		V
$V_{O(diff)}$	Output voltage difference between any two channels	V_{Odiff}	$V_{clamp(+)}$ = 2 V $V_{clamp(+)}$ = 4 V		±0.5	±50	mV

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

PARAMETER		ALT SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
$A_{V(max)}$	Maximum voltage amplification	A_{VMAX}	CONTRAST = 12 V,	$V_{I(PP)}$ = 560 mV		7.8		V/V
$A_{V(mid)}$	Mid-range voltage amplification	A_{VMID}	CONTRAST = 5 V,	$V_{I(PP)}$ = 560 mV		2.5		V/V
	Contrast voltage for minimum amplification	V_{12low}	$V_{I(PP)}$ = 1 V,	See Note 3		2		V
	Amplification match at $A_{V(max)}$	$A_{VMAX(DIFF)}$	CONTRAST = 12 V,	See Note 4		±0.2		dB
	Amplification match at $A_{V(mid)}$	$A_{VMID(DIFF)}$	CONTRAST = 5 V,	See Note 3		±0.2		dB
	Amplification match at $A_{V(low)}$	$A_{VLOW(DIFF)}$	CONTRAST = V_{12low}, See Notes 3 and 4			±0.2		dB
THD	Total harmonic distortion		CONTRAST = 3 V,	$V_{I(PP)}$ = 1 V		0.5%		
BW	Amplifier bandwidth	BW(–3 dB)	CONTRAST = 12 V,	See Notes 5 and 7		70		MHz
	Crosstalk attenuation	a_x	CONTRAST = 12 V, See Note 6	f = 10 kHz,		60		dB
	Crosstalk attenuation	a_x	CONTRAST = 12 V, See Notes 6 and 7	f = 10 MHz,		40		dB

NOTES: 3. Determine contrast voltage for minimum amplification for –40-dB attenuation of output. Reference to A_V maximum.
4. Measure gain difference between any two amplifiers, $V_{I(PP)}$ = 1 V.
5. Adjust input frequency from 10 kHz (A_V maximum ref level) to the –3-dB corner frequency (f –3 dB). $V_{I(PP)}$ = 560 mV.
6. $V_{I(PP)}$ = 560 mV at f = 10 kHz to any amplifier. Measure output levels of the other two undriven amplifiers relative to driven amplifier to determine channel separation. Terminate the undriven amplifier inputs to simulate generator loading. Repeat test at f = 10 MHz for a_x = 10 MHz.
7. A special text fixture without a socket is required.

PARAMETER MEASUREMENT INFORMATION

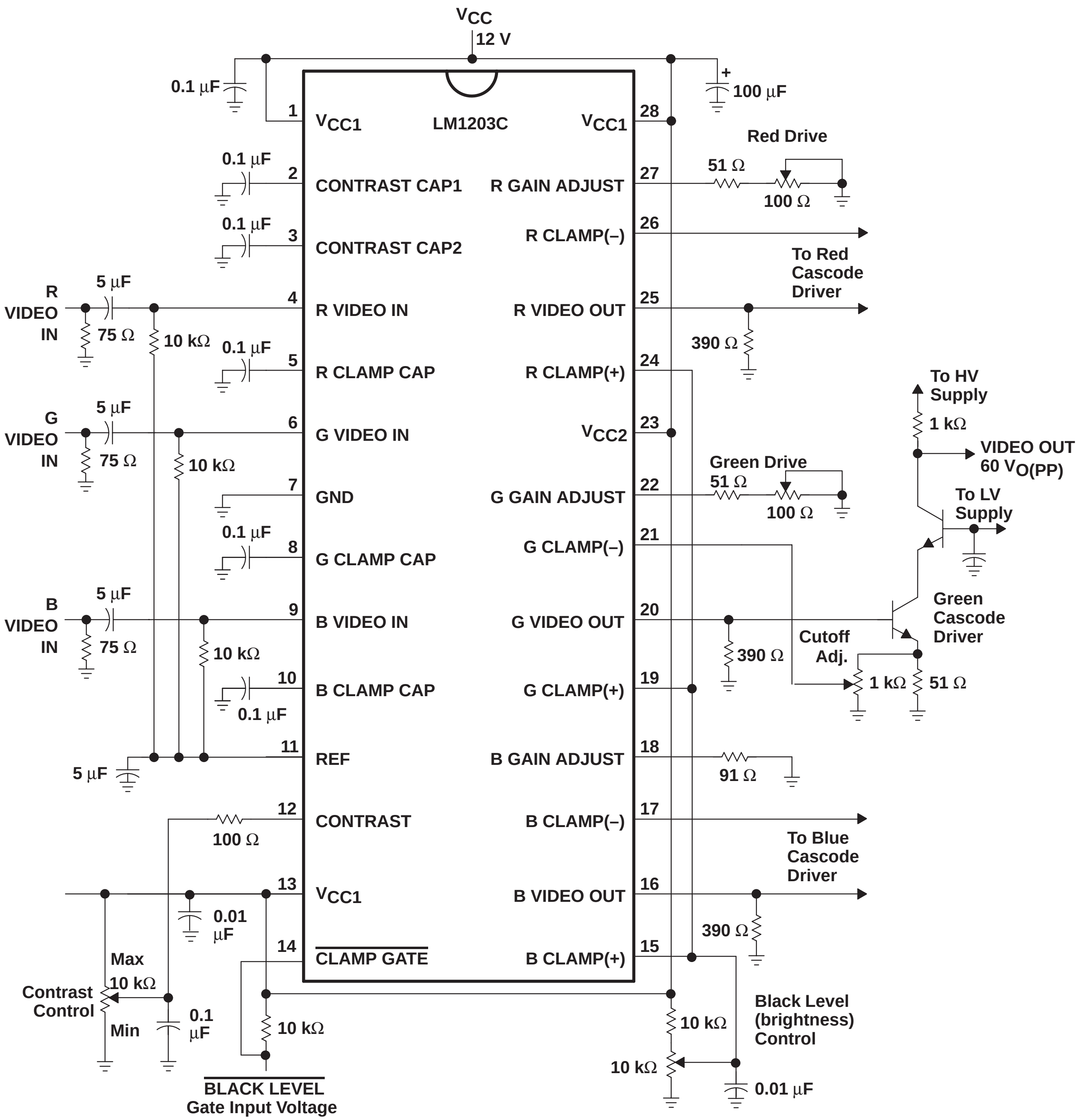


NOTES: A. For optimal performance, Texas Instruments recommends the exact values shown for the components represented in this circuit schematic.

B. For optimized video-board design, discrete capacitors at CONTRAST CAP1 and CONTRAST CAP2 connected to ground can be eliminated, depending on individual requirements for noise reduction.

Figure 1. Test Circuit

APPLICATION INFORMATION



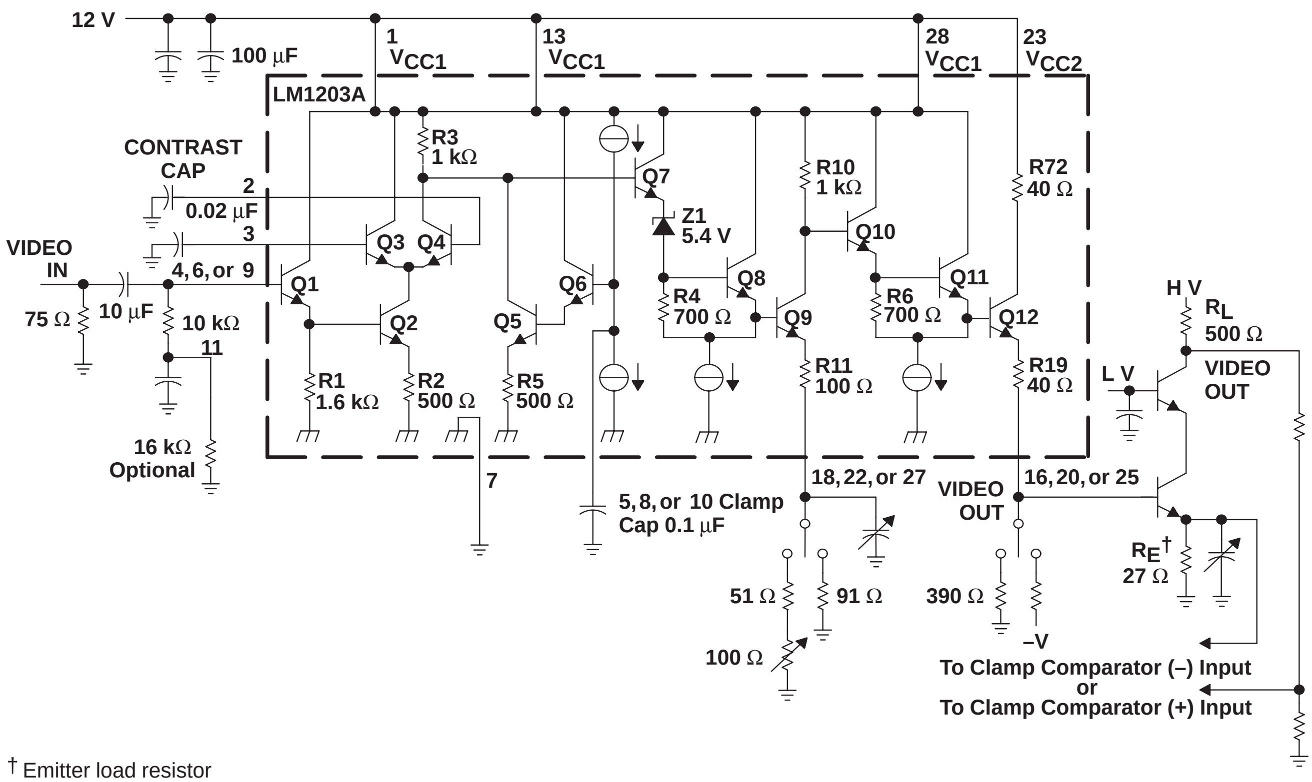
NOTES: A. For optimal performance, Texas Instruments recommends the exact values shown for the components represented in this circuit schematic.

B. For optimized video-board design, discrete capacitors at CONTRAST CAP1 and CONTRAST CAP2 connected to ground can be eliminated, depending on individual requirements for noise reduction.

Figure 2. Typical Application

SLVS099B – NOVEMBER 1994 – REVISED FEBRUARY 1996

APPLICATION INFORMATION



† Emitter load resistor

Figure 3. Simplified Video-Amplifier Section With Recommended External Components

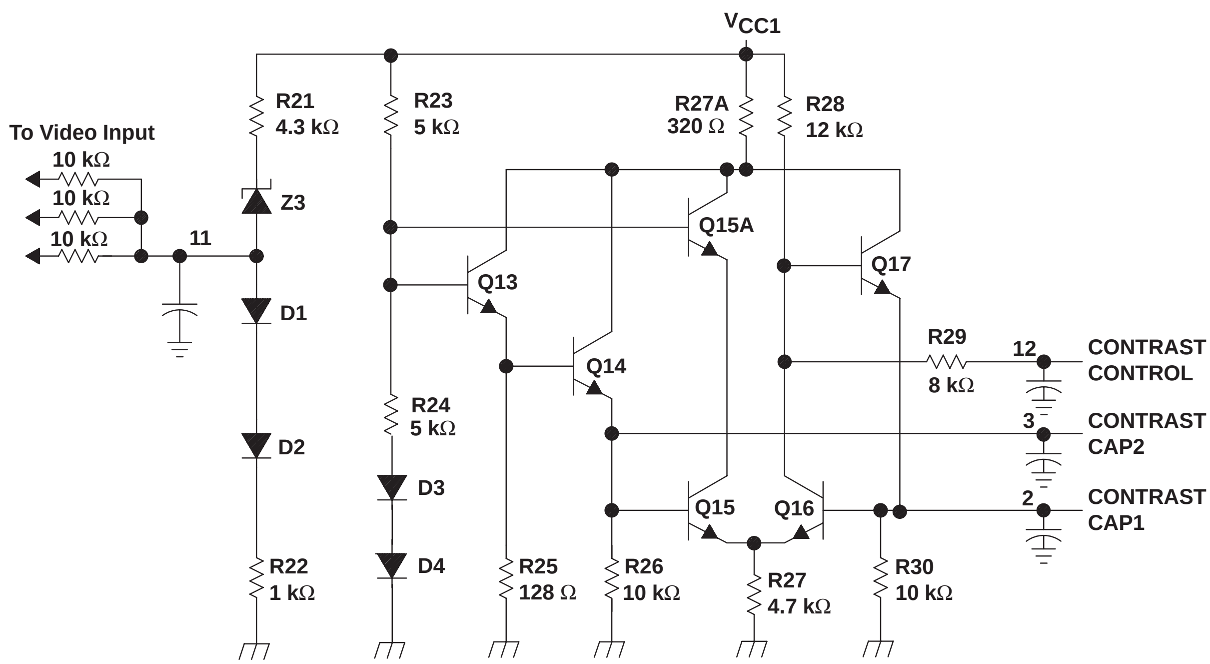


Figure 4. Input Voltage Reference and Contrast Control Circuits

APPLICATION INFORMATION

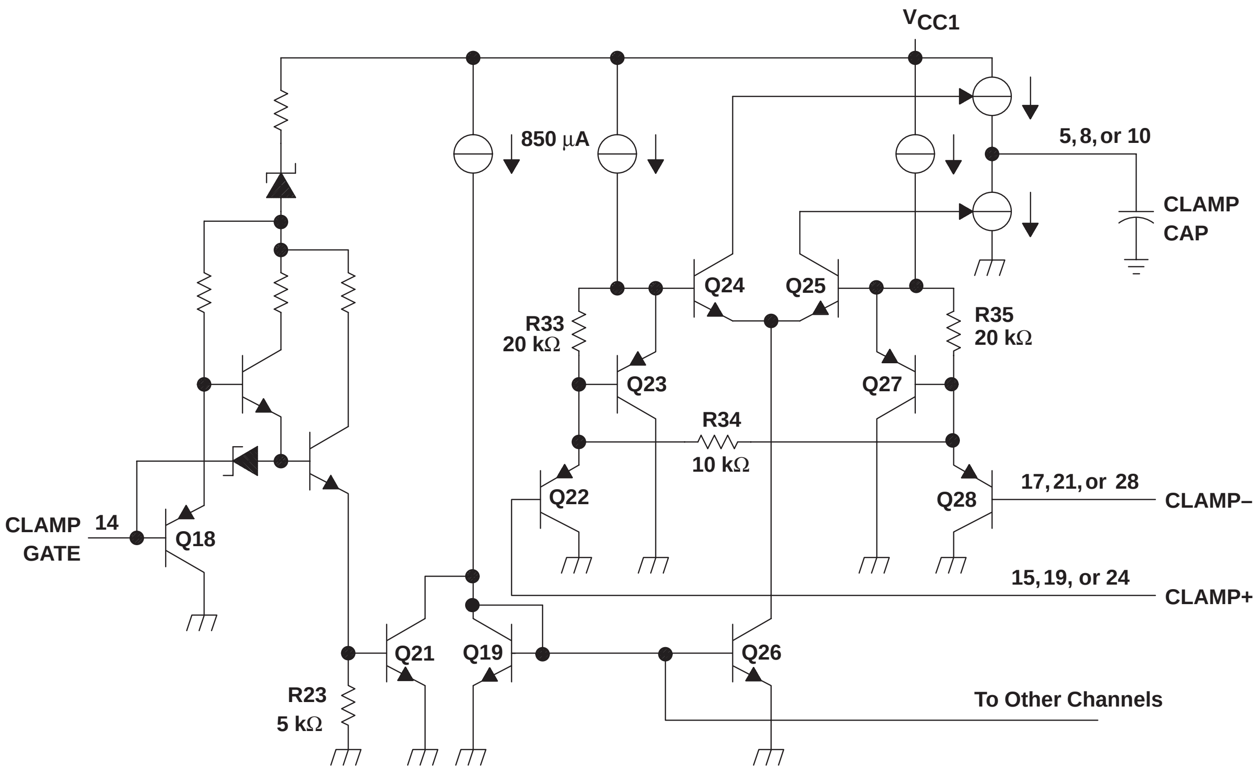


Figure 5. Simplified Schematic of Clamp-Gate (Common to Each Channel) and Clamp-Comparator Circuits

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