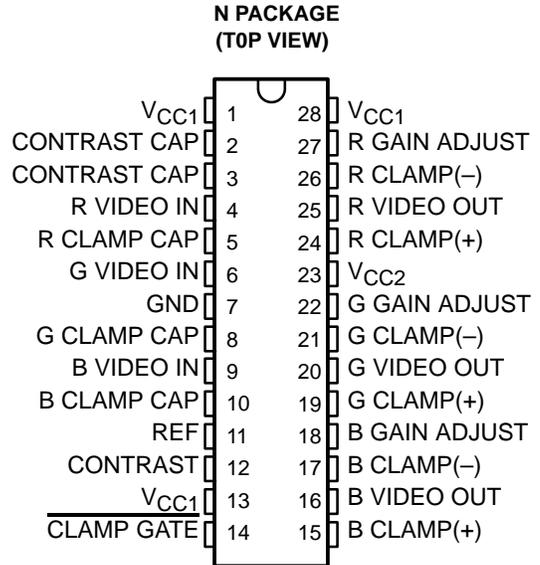


# LM1203, LM1203A RGB VIDEO AMPLIFIER SYSTEMS

SLFS048 – MARCH 1990 – REVISED OCTOBER 1991

- BW (–3 dB) . . . 70 MHz
- Matched  $\pm 0.5$ -dB Attenuators for Contrast Control
- Three Externally-Gated Comparators for Brightness Control
- Independent Gain Control of Each Video Amplifier . . .  $A_V = 4$  to 10
- Video Input Voltage Reference
- Low-Impedance Output Driver
- ESD Protection Exceeds 2000 V Per MIL Standard 833C, Method 3015
- Designed to Be an Improved Replacement for National Semiconductor LM1203



## description

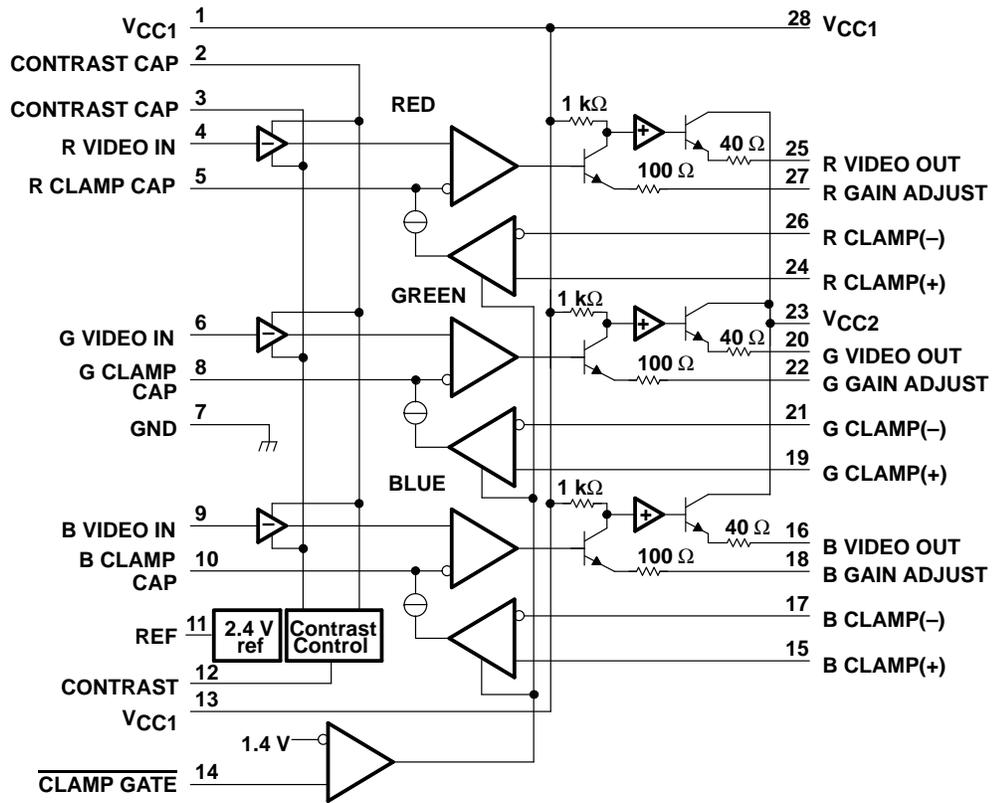
The LM1203 and LM1203A are wide-band video amplifier systems intended for high-resolution RGB color monitor applications. In addition to three matched video amplifiers, the LM1203 and LM1203A contain three gated differential input black-level clamp comparators for brightness control and three matched attenuator circuits for contrast control. Each video amplifier contains a gain set for adjusting maximum system gain ( $A_V = 4$  to 10) as well as providing trim capability. The LM1203 and LM1203A also contain a voltage reference for the video inputs.

The LM1203 and LM1203A are characterized for operation from 0°C to 70°C.

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SLFS048 – MARCH 1990 – REVISED OCTOBER 1991

## 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, $V_I$	$V_{CC} \geq V_I \geq \text{GND}$
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	150°C
Operating free-air temperature range	0°C to 70°C
Storage temperature range	-65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	260°C

- NOTES: 1. All  $V_{CC}$  pins must be externally wired together to prevent internal damage during  $V_{CC}$  power-on/off cycles.  
 2. For operating above 25°C free-air temperature, derate linearly at the rate of 20 mW/°C.

**electrical characteristics at 25°C free-air temperature,  $V_{12} = 6\text{ V}$ ,  $V_{14} = 0$ ,  $V_{15} = 2\text{ V}$ ,  
=  $V_{CC2} = 12\text{ V}$  (see Figure 1) (unless otherwise noted)**

**$V_{CC1}$**

PARAMETER		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	$\mu\text{A}$
$V_{IL(14)}$	Clamp gate low-level input voltage	Clamp comparators on	0.8	1.2		V
$V_{IH(14)}$	Clamp gate high-level input voltage	Clamp comparators off		1.6	2	V
$I_{IL(14)}$	Clamp gate low input current	$V_{14} = 0$		-0.5	-5	$\mu\text{A}$
$I_{IH(14)}$	Clamp gate high input current	$V_{14} = V_{CC}$		0.005	1	$\mu\text{A}$
$I_{K(chg)}$	Clamp capacitor charge current	$V_{5,8}$ or $10 = 0$		850		$\mu\text{A}$
$I_{K(dschg)}$	Clamp capacitor discharge current	$V_{5,8}$ or $10 = 5\text{ V}$		-850		$\mu\text{A}$
$V_{OL}$	Low-level output voltage	$V_{5,8}$ or $10 = 0$		1.2		V
$V_{OH}$	High-level output voltage	$V_{5,8}$ or $10 = 5\text{ V}$		8.9		V
$V_{Odiff}$	Output voltage difference between any two channels	$V_{15} = 2\text{ V}$		$\pm 0.5$	$\pm 50$	mV
		$V_{15} = 4\text{ V}$				

**operating characteristics at 25°C free-air temperature,  $V_{14} = 0\text{ V}$ ,  $V_{15} = 4\text{ V}$ ,  $f_{in} = 10\text{ kHz}$  (unless otherwise noted)**

PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
$A_{Vmax}$	Maximum voltage amplification	$V_{12} = 12\text{ V}$ ,	$V_{I(pp)} = 560\text{ mV}$	LM1203	8.8		V/V
				LM1203A	7.8		
$A_{Vmid}$	Mid-range voltage amplification	$V_{12} = 5\text{ V}$ ,	$V_{I(pp)} = 560\text{ mV}$	LM1203	3.5		V/V
				LM1203A	2.5		
$V_{12low}$	Contrast voltage for minimum amplification	$V_{I(pp)} = 1\text{ V}$ ,	See Note 3		2		V
$A_{Vmax(diff)}$	Amplification match at $A_V$ max	$V_{12} = 12\text{ V}$ ,	See Note 4		$\pm 0.2$		dB
$A_{Vmid(diff)}$	Amplification match at $A_V$ mid	$V_{12} = 5\text{ V}$ ,	See Note 3		$\pm 0.2$		dB
$A_{Vlow(diff)}$	Amplification match at $A_V$ low	$V_{12} = V_{12low}$ ,	See Notes 3 and 4		$\pm 0.2$		dB
THD	Total harmonic distortion	$V_{12} = 3\text{ V}$ ,	$V_{I(pp)} = 1\text{ V}$		0.5		%
BW(-3 dB)	Amplifier bandwidth	$V_{12} = 12\text{ V}$ ,	See Notes 5 and 7		70		MHz
$a_x$	Crosstalk attenuation	$V_{12} = 12\text{ V}$ ,	$f = 10\text{ kHz}$ ,	See Note 6	60		dB
			$f = 10\text{ MHz}$ ,	See Notes 6 and 7	40		

- NOTES: 3. Determine  $V_{12low}$  for -40-dB attenuation of output. Reference to  $A_V$  maximum.  
 4. Measure gain difference between any two amplifiers,  $V_{I(pp)} = 1\text{ V}$ .  
 5. Adjust input frequency from 10 kHz ( $A_V$  maximum ref level) to the -3-dB corner frequency ( $f - 3\text{ dB}$ ).  $V_{I(pp)} = 560\text{ mV}$ .  
 6.  $V_{I(pp)} = 560\text{ mV}$  at  $f = 10\text{ kHz}$  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  $f = 10\text{ MHz}$  for  $a_x = 10\text{ MHz}$ .  
 7. A special test fixture without a socket is required.

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SLFS048 – MARCH 1990 – REVISED OCTOBER 1991

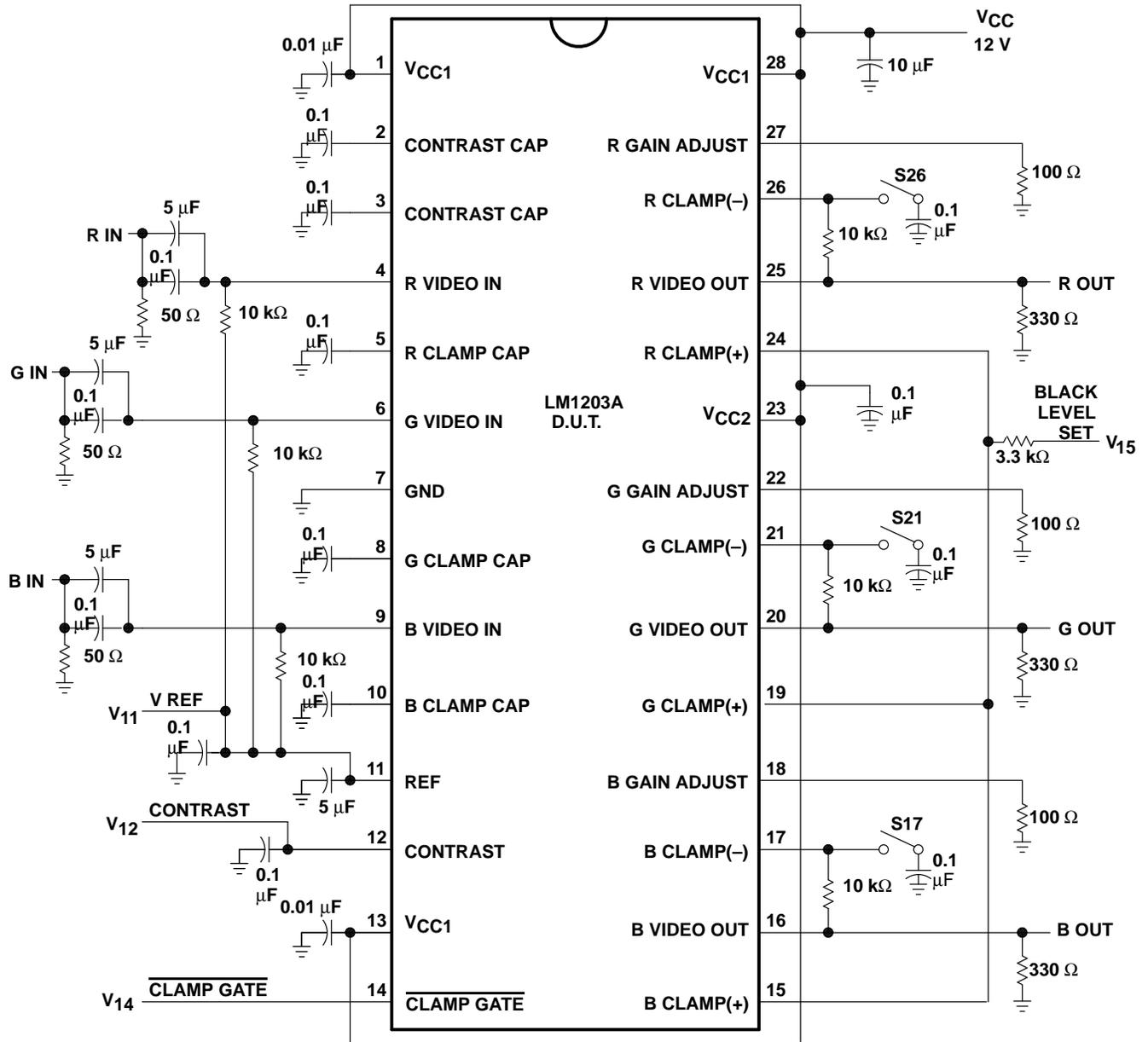


Figure 1. Test Circuit

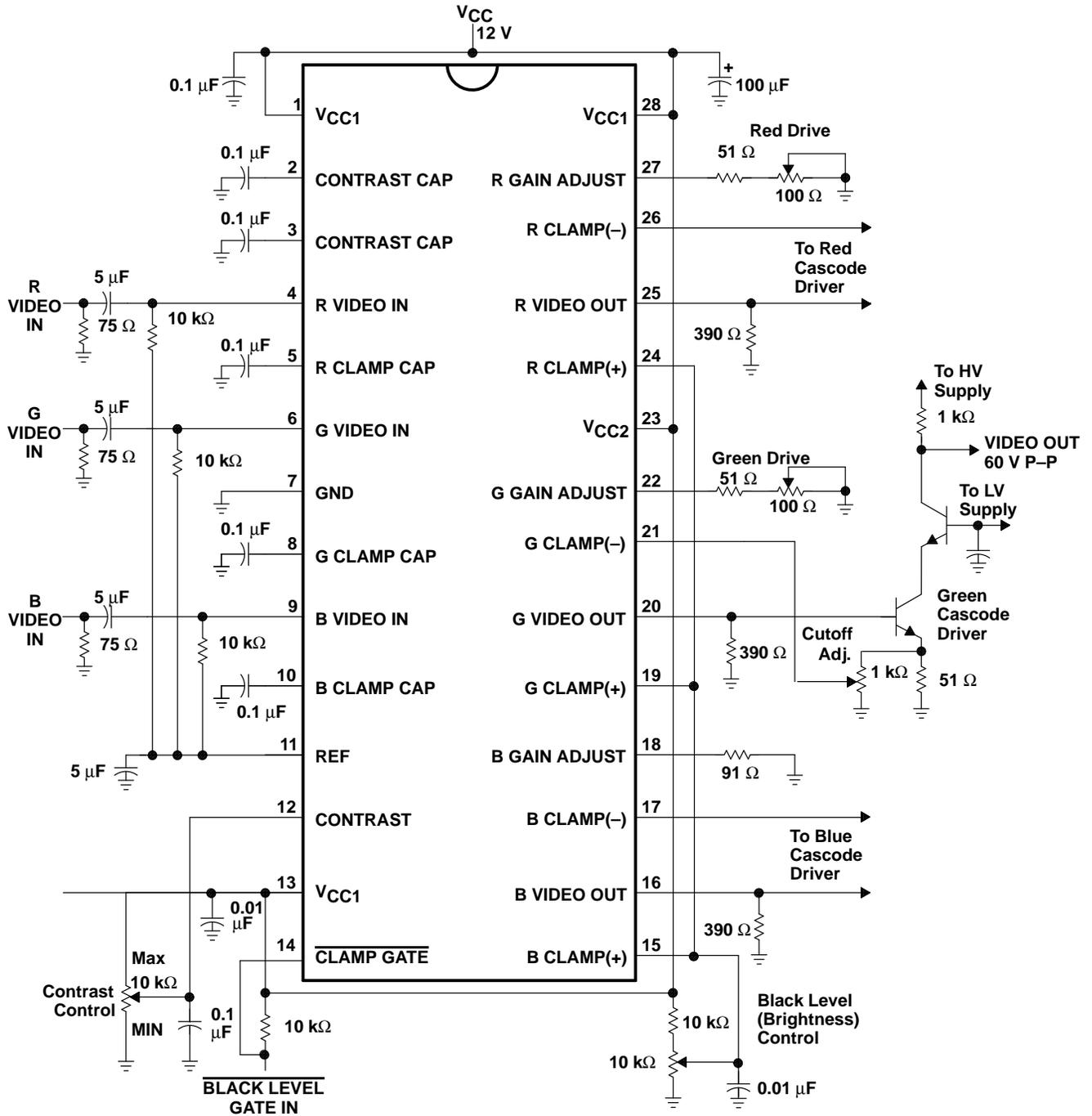


Figure 2. Typical Application

# LM1203, LM1203A RGB VIDEO AMPLIFIER SYSTEMS

SLFS048 – MARCH 1990 – REVISED OCTOBER 1991

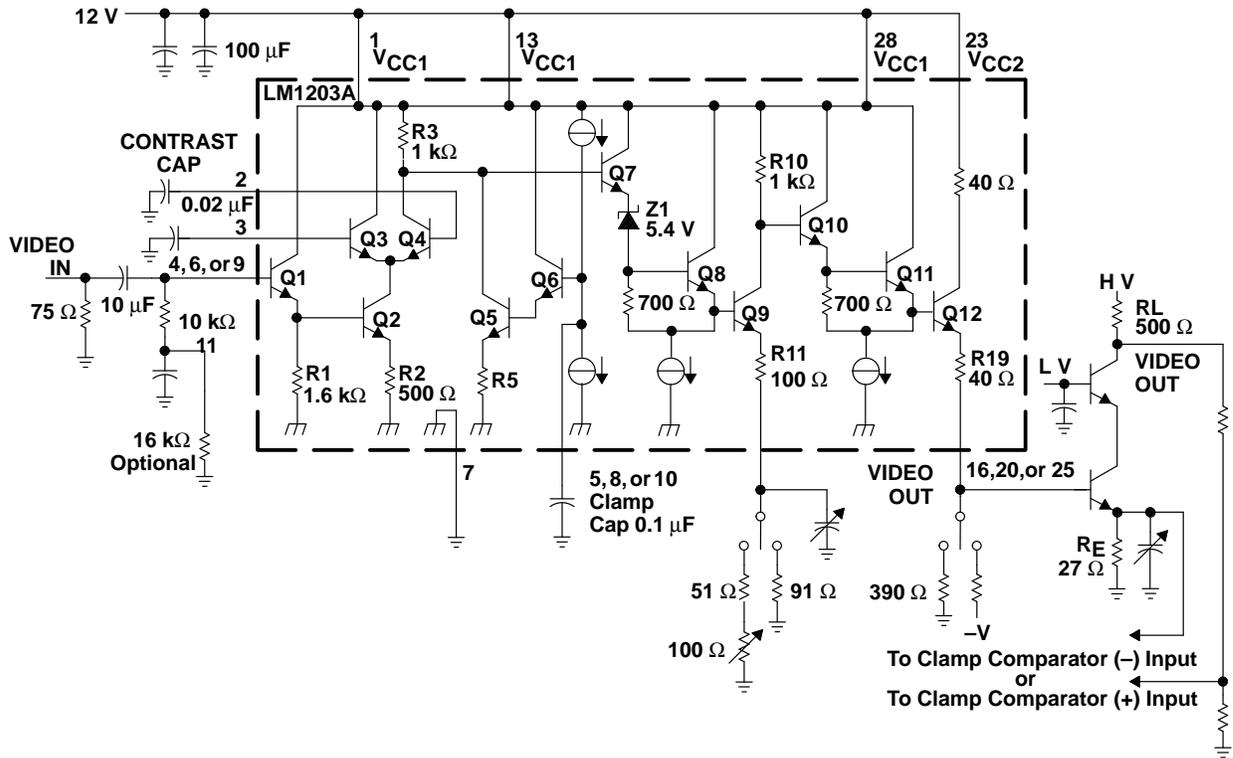


Figure 3. Simplified Video Amplifier Section With Recommended External Components

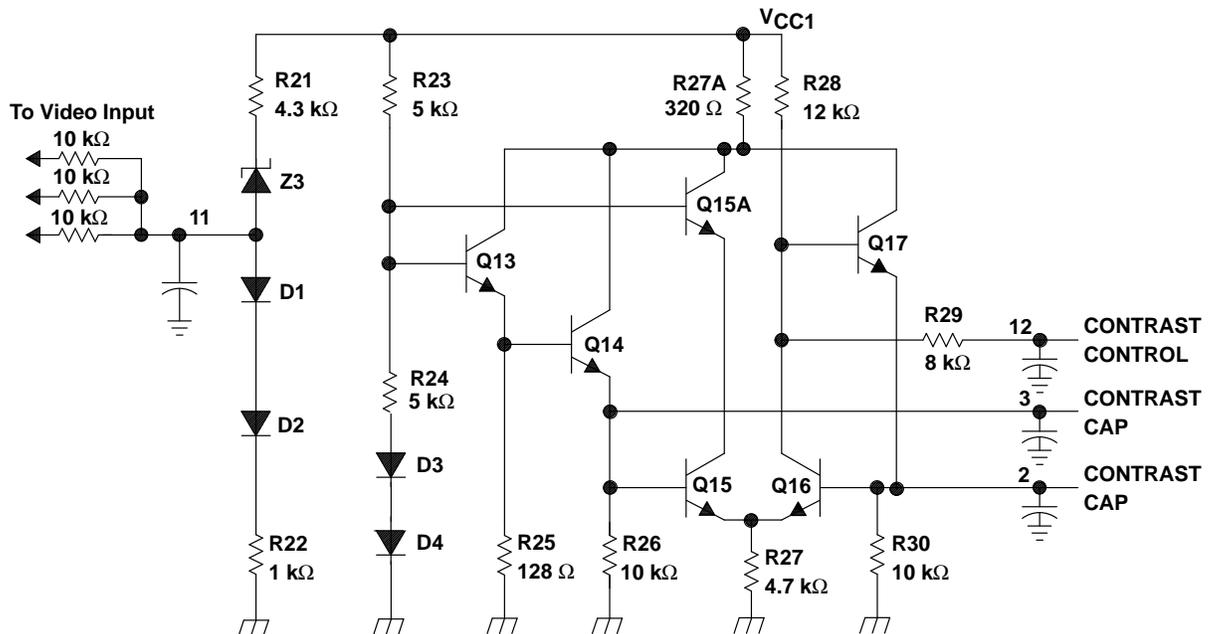


Figure 4. Input Voltage Reference and Contrast Control Circuits

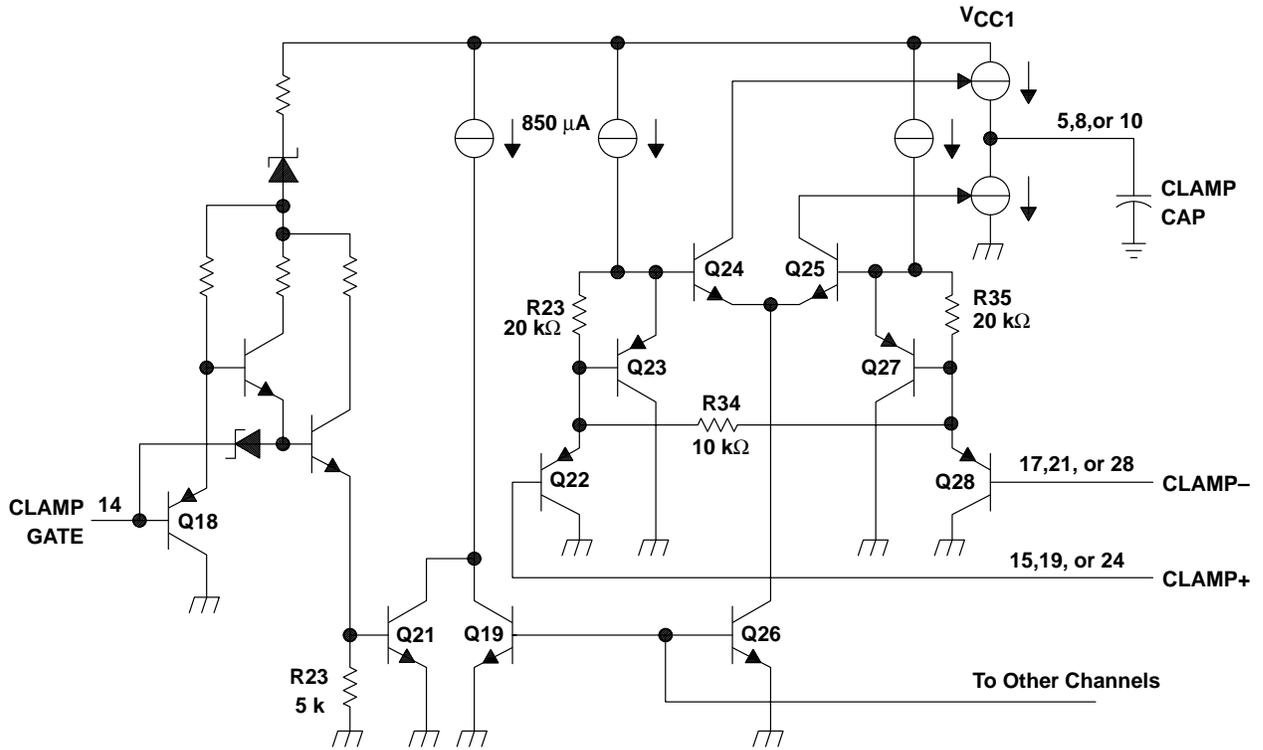


Figure 5. Simplified Schematic of LM1203A Clamp Gate  
(Common to Each Channel) and Clamp Comparator Circuits

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