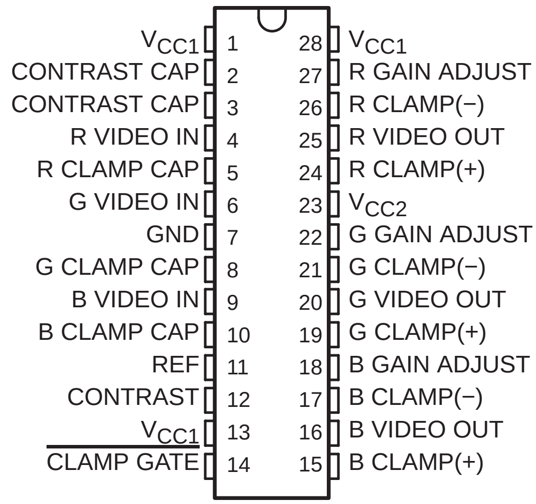
- **BW (−3 dB) . . . 70 MHz**
- **Matched ±0.5-dB Attenuators for Contrast Control**
- **Three Externally-Gated Comparators for Brightness Control**
- **Independent Gain Control of Each Video Amplifier . . . A_V = 4 to 10**
- **Video Input Voltage Reference**
- **Low-Impedance Output Driver**
- **ESD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

N PACKAGE
(T0P VIEW)

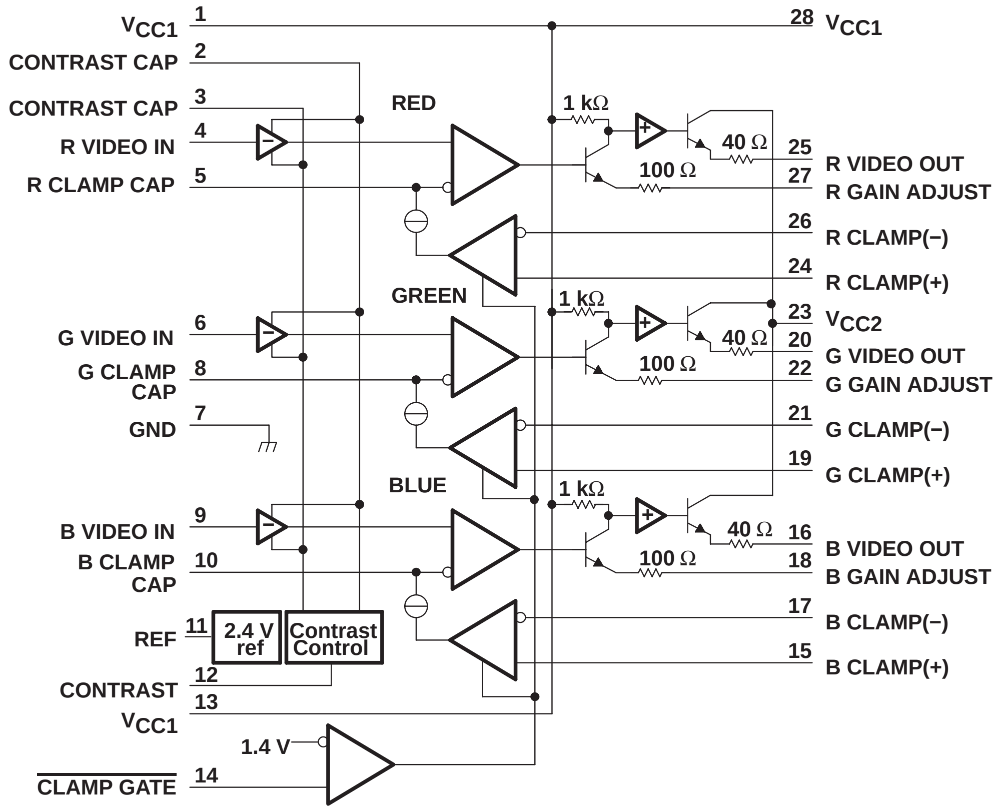


description

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.

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	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 V, V_{14} = 0, V_{15} = 2 V, V_{CC1} = V_{CC2} = 12 V (see Figure 1) (unless otherwise noted)

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

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

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

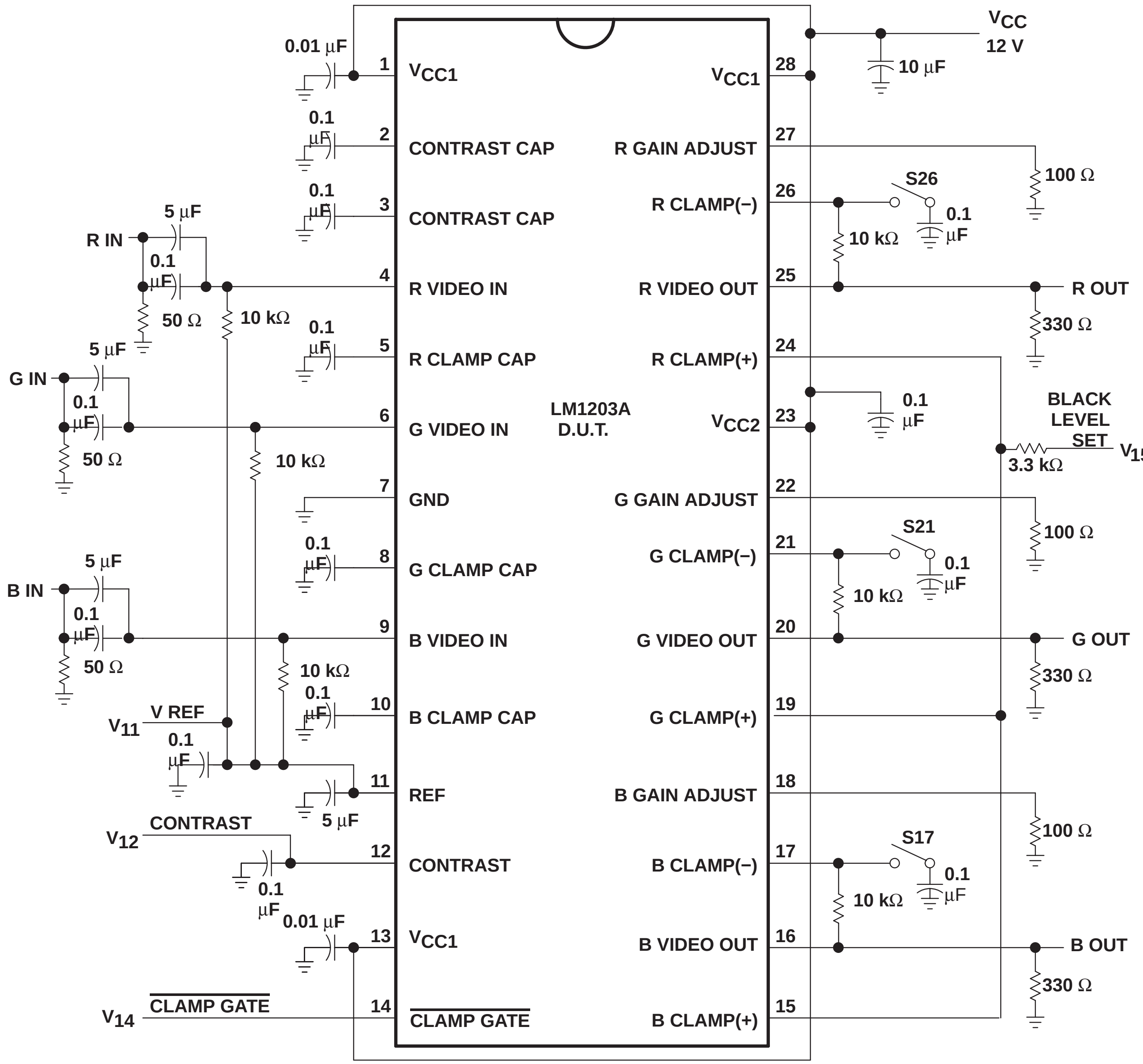


Figure 1. Test Circuit

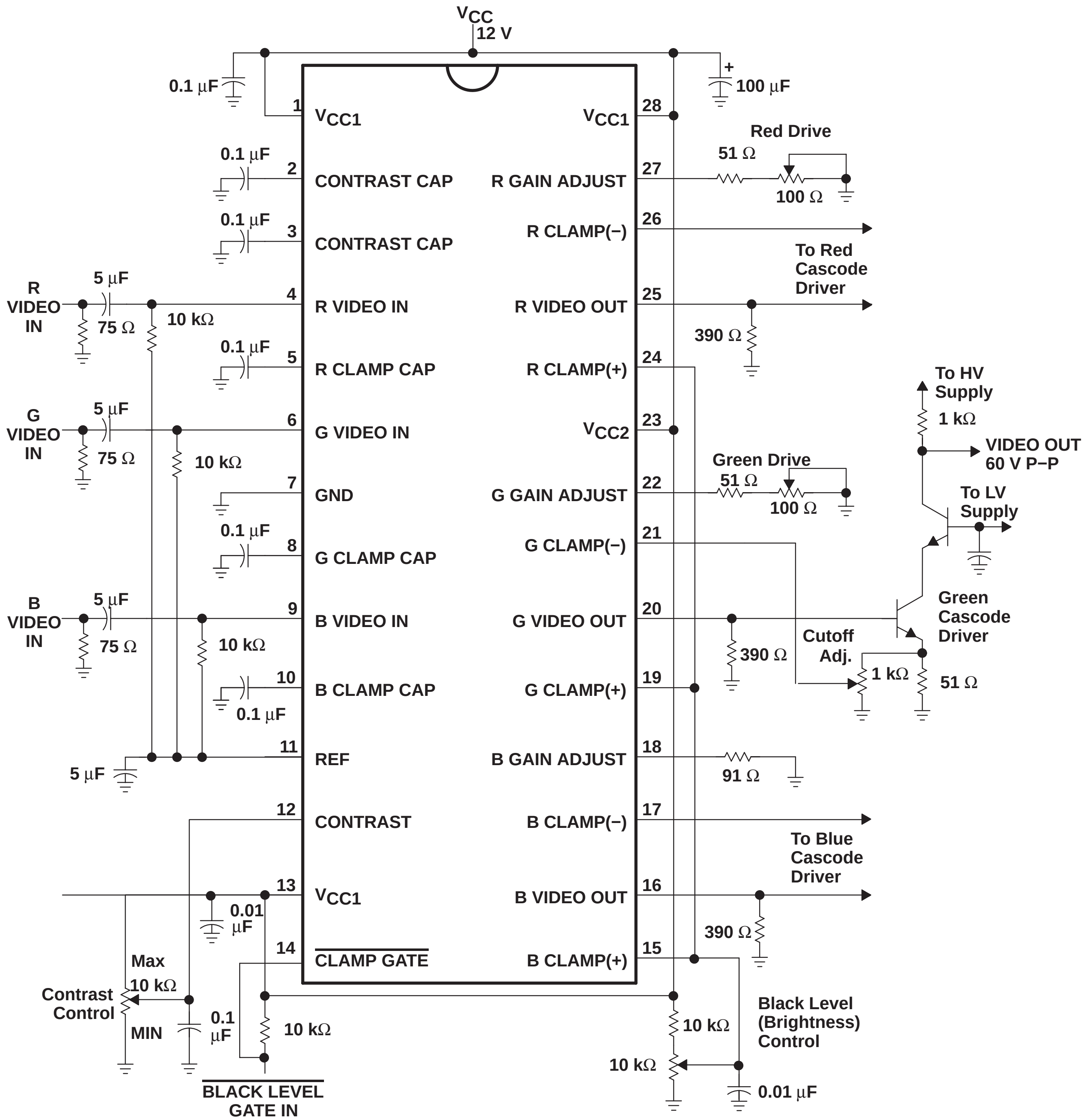


Figure 2. Typical Application

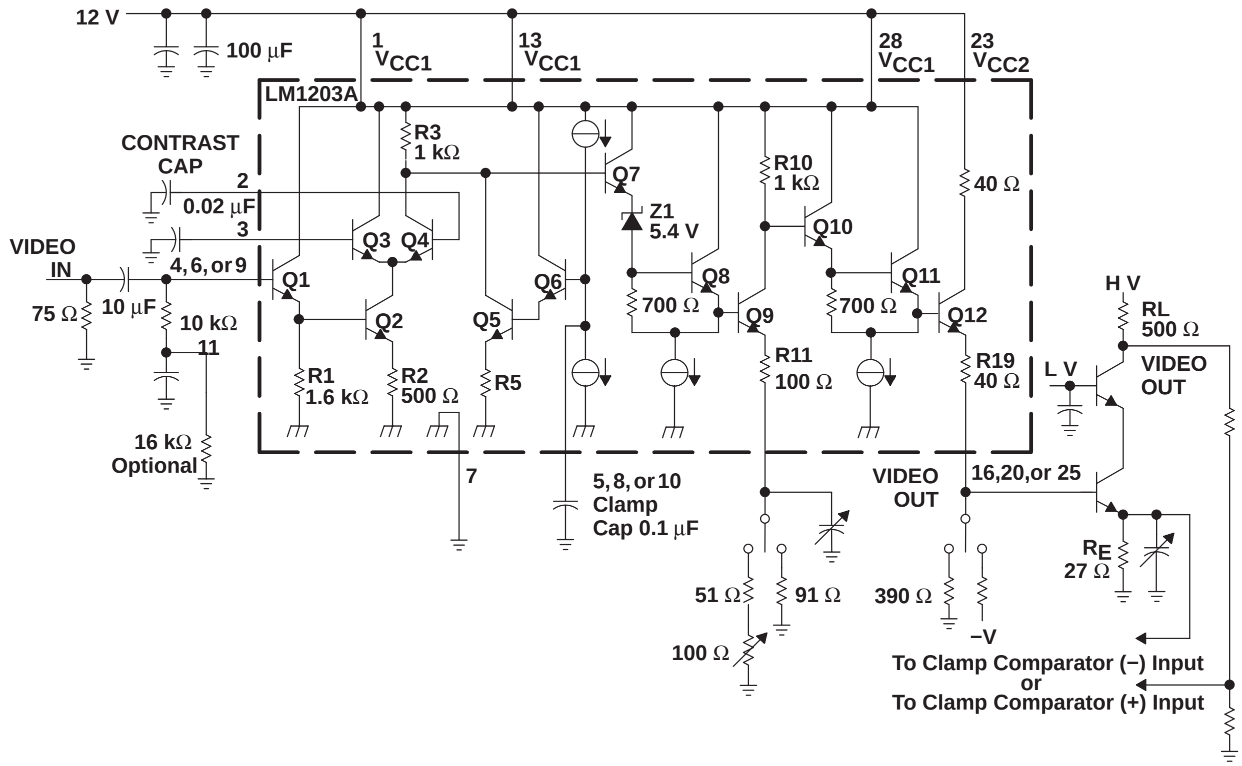


Figure 3. Simplified Video Amplifier Section With Recommended External Components

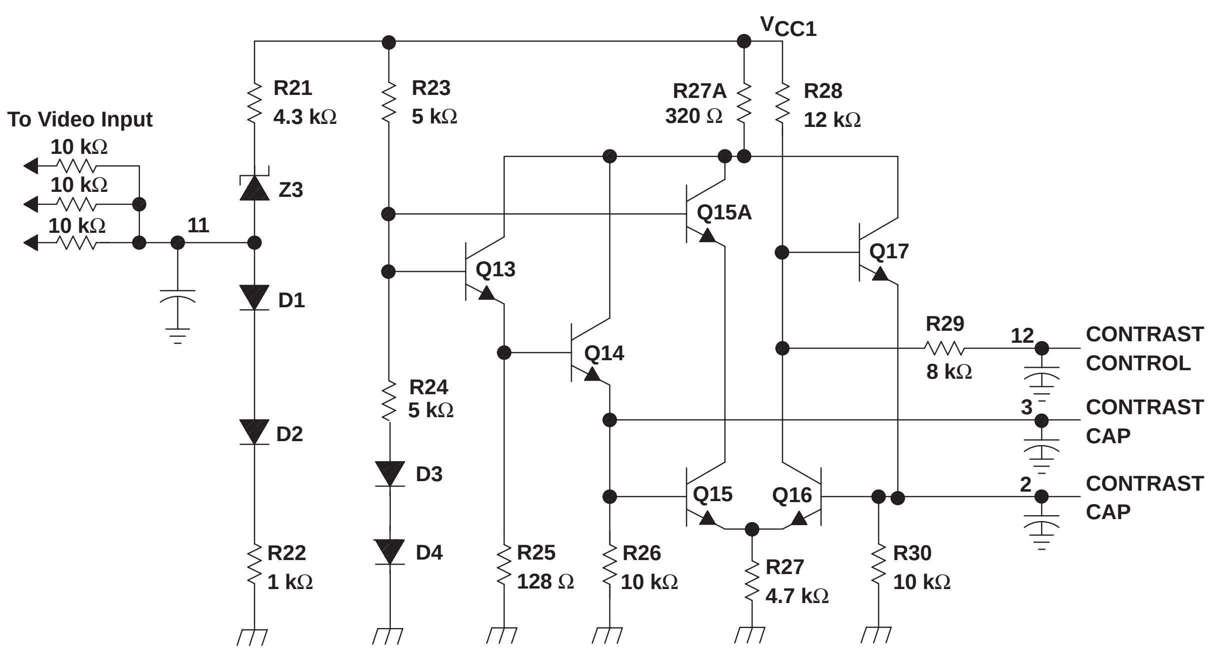


Figure 4. Input Voltage Reference and Contrast Control Circuits

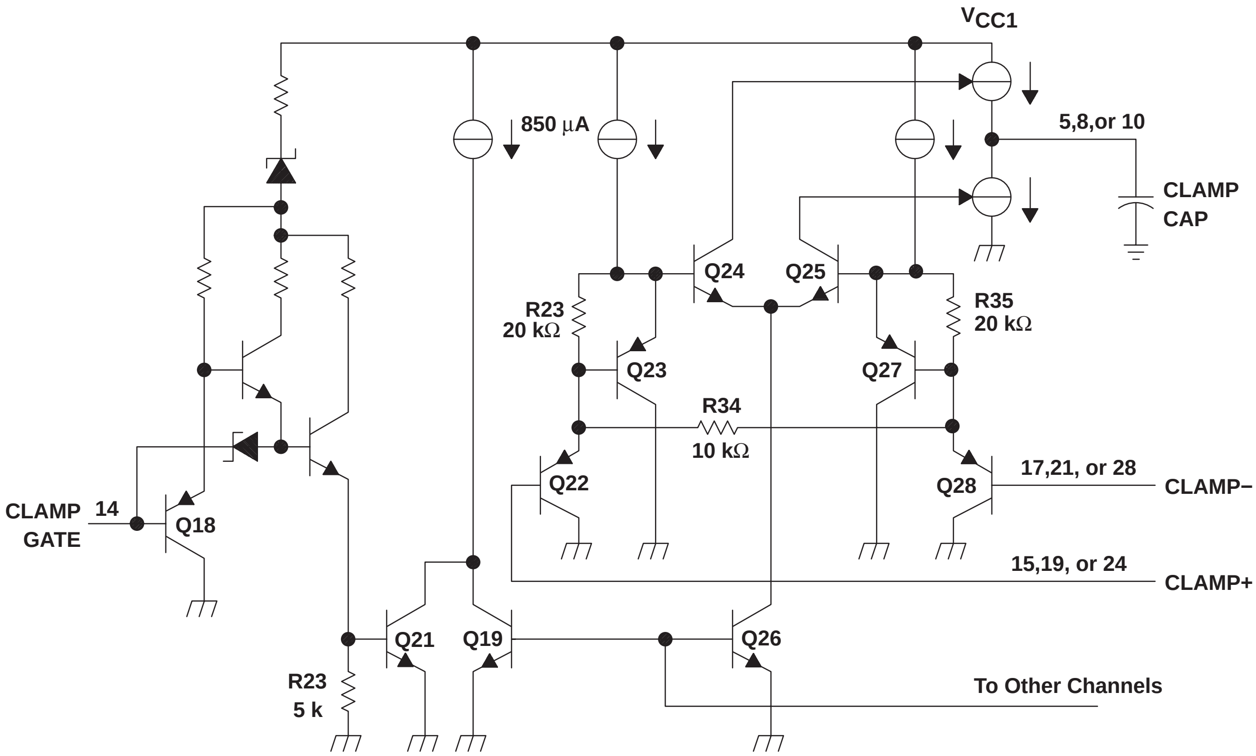


Figure 5. Simplified Schematic of LM1203A Clamp Gate (Common to Each Channel) and Clamp Comparator Circuits

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

Products		**Applications**	
Amplifiers	amplifier.ti.com	Audio	www.ti.com/audio
Data Converters	dataconverter.ti.com	Automotive	www.ti.com/automotive
DSP	dsp.ti.com	Broadband	www.ti.com/broadband
Clocks and Timers	www.ti.com/clocks	Digital Control	www.ti.com/digitalcontrol
Interface	interface.ti.com	Medical	www.ti.com/medical
Logic	logic.ti.com	Military	www.ti.com/military
Power Mgmt	power.ti.com	Optical Networking	www.ti.com/opticalnetwork
Microcontrollers	microcontroller.ti.com	Security	www.ti.com/security
RFID	www.ti-rfid.com	Telephony	www.ti.com/telephony
RF/IF and ZigBee® Solutions	www.ti.com/lprf	Video & Imaging	www.ti.com/video
		Wireless	www.ti.com/wireless

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265