RGB Video Amplifier for Monitors
Monolithic IC MM1375

Outline

This IC is a wideband RGB video amplifier with DC control, developed for use in monitors. It has a differential input comparator for brightness adjustment, and three matched DC control attenuators for contrast adjustment. All DC control input is high impedance, and the operating range is set for easy interface with serial bus control systems, at 0~4V. Also, the building-in blanking circuit clamps video output to less than 0.2V during blanking, enabling blanking on the CRT cathode.

Features

1. Low power consumption (Vcc=8V, Icc=68mA)
2. Smaller capacity for clamping capacitor (0.1µF)
3. High band video amp 100MHZ @−3dB
4. Matched (±0.1dB) contrast adjustment attenuators built in
5. Built-in cutoff and brightness adjustment input comparators using external gate control
6. Built-in high input impedance DC contrast control, 0~4V
7. Output blanking function
8. Output can drive hybrid or discrete CRT driver directly

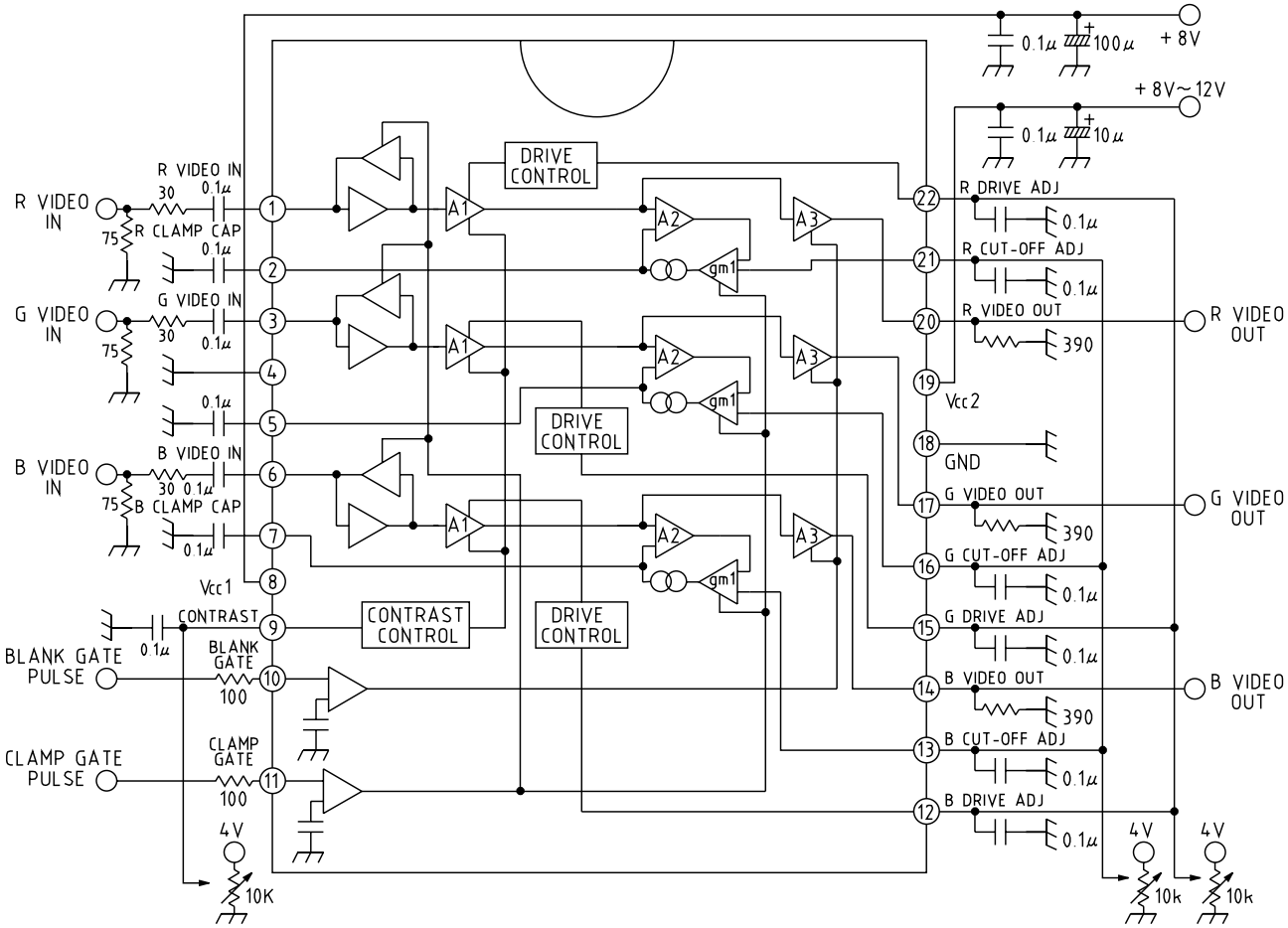
Package

SDIP-22A

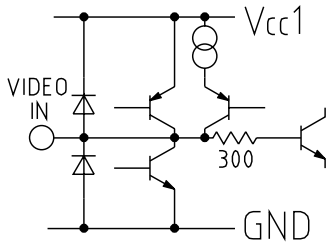
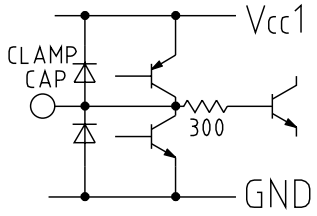
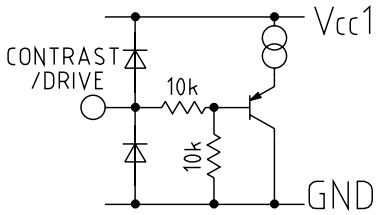
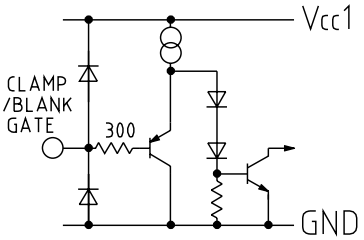
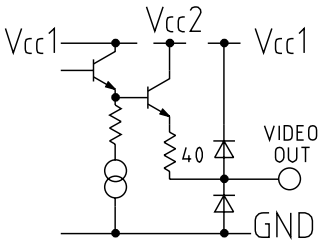
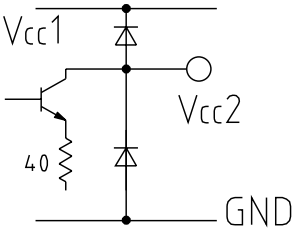
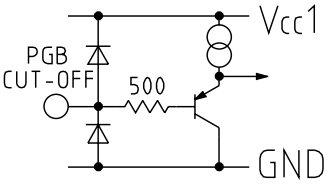
Applications

1. High resolution RGB CRT monitors
2. AGC amps for video
3. Gain and DC offset control high bandwidth amps
4. Interface amps for LCD or CCD systems

Block Diagram



Pin Description

Pin no.	Pin name	Internal equivalent circuit diagram
1 3 6	R VIDEO IN G VIDEO IN B VIDEO IN	
2 5 7	R CLAMP CAP G CLAMP CAP B CLAMP CAP	
8	Vcc1	
4, 18	GND	
9 22 15 12	CONTRAST R DRIVE G DRIVE B DRIVE	
10 11	BLANK GATE CLAMP GATE	
20 17 14	R VIDEO OUT G VIDEO OUT B VIDEO OUT	
19	Vcc2	
21 16 13	R CUT–OFF ADJ G CUT–OFF ADJ B CUT–OFF ADJ	

Absolute Maximum Ratings (Ta=25°C)

Item	Symbol	Ratings	Units
Storage temperature	T_{STG}	−40~+125	°C
Operating temperature	T_{OPR}	−20~+80	°C
Power supply voltage 1	$V_{CC}1$	10	V
Power supply voltage 2	$V_{CC}2$	15	V
Input voltage range	V_{IN}	GND ≦ V_{IN} ≦ $V_{CC}1$	V
Video output current	I_O	28	mA
Allowable loss	Pd	1.6	W
Electrostatic breakdown		2	kV
Pin temperature		265 *	°C

Note : Solder for 10S

Recommended Operating Conditions (Ta=25°C)

Item	Symbol	Min.	Typ.	Max.	Units
Operating power supply voltage 1	$V_{CC}1$	7.6	8.0	8.4	V
Operating power supply voltage 2	$V_{CC}2$	7.6		12.6	V

DC Electrical Characteristics

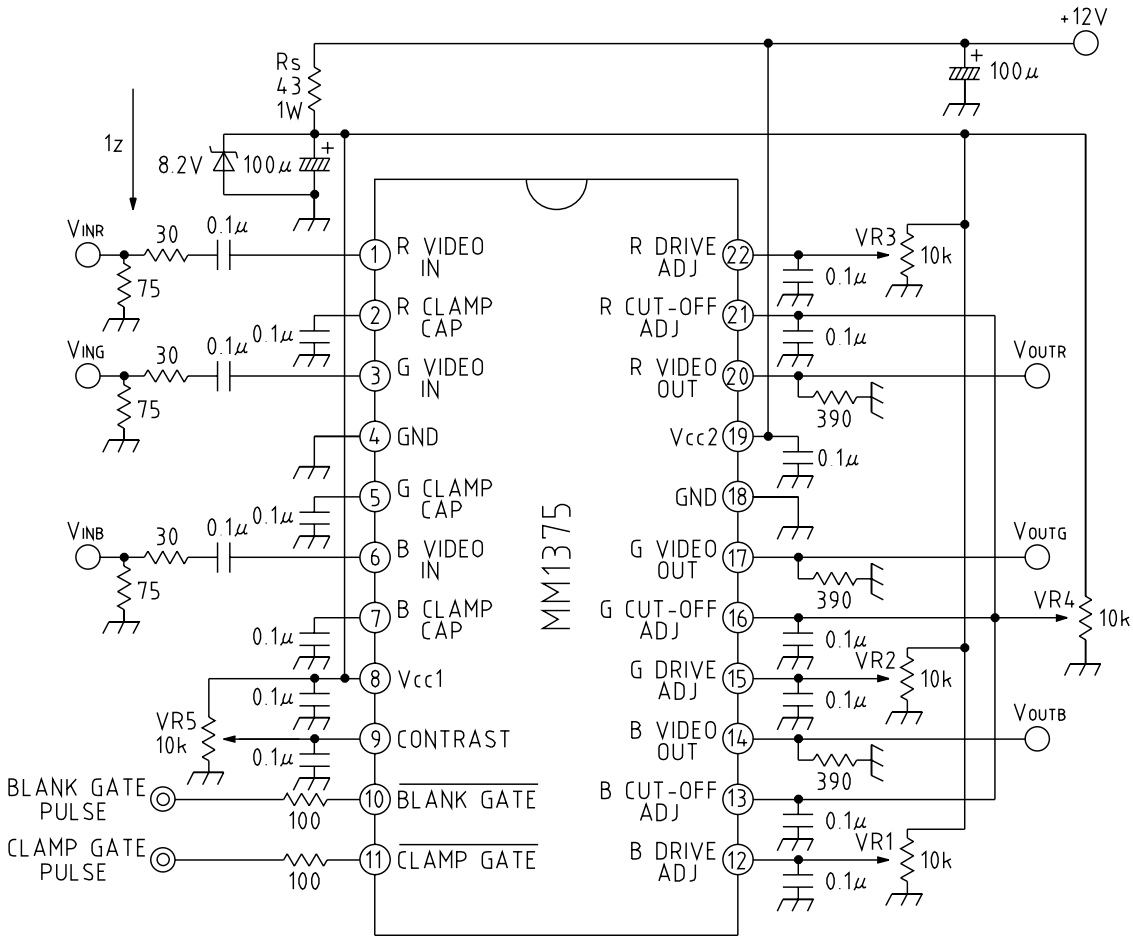
(Except where noted otherwise, Ta=25°C, $V_{CC}1$=8V, $V_{CC}2$=8~12V, V9=4V, V10=4V, V11=0V, $V_{C\text{-}O}$=1.0V, V_{DRV}=4V)

Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Units
Power supply current	$I_{CC}1$	$V_{CC}1$+$V_{CC}2$		68	80	mA
Video amp input voltage	V_B			2.2		V
Video input resistance	R_B			100		kΩ
Clamp gate input voltage L	V_{CGL}		0.8	1.2		V
Clamp gate input voltage H	V_{CGH}			1.6	2.0	V
Clamp gate input current L	I_{CGL}	V11=0V		−0.5	−5.0	μA
Clamp gate input current H	I_{CGH}	V11=8V		0.01	1.0	μA
Input charging current	I_{IN+}		0.75	1.0		mA
Input discharge current	I_{IN-}		−0.75	−1.0		mA
Clamp cap charge current	I_{CL+}		0.75	1.0		mA
Clamp cap discharge current	I_{CL-}		−0.75	−1.0		mA
Clamp cap bias discharge current	I_{CLB}			50		nA
Blanking gate input voltage L	V_{BGL}		0.8	1.2		V
Blanking gate input voltage H	V_{BGH}			1.6	2.0	V
Blanking gate input current L	I_{BGL}	V10=0V		−1.0	−5.0	μA
Blanking gate input current H	I_{BGH}	V10=8V		0.01	1.0	μA
Video output voltage L	V_{OL}	$V_{C\text{-}O}$=0V		0.15	0.5	V
Video output voltage H	V_{OH}	$V_{C\text{-}O}$=6V	5.0	5.5		V
Black level output voltage	V_O	$V_{C\text{-}O}$=1V		1.0		V
⊿Black level output voltage	⊿V_O	$V_{C\text{-}O}$=1V		±100		mV
Output blanking voltage	V_{OBLK}	V10=0V		100	300	mV
Contrast control input current	I9	V9=4V		190		μA
Drive control input current	I_{DBV}	V_{DBV}=4V		190		μA
Cutoff control input current	$I_{C\text{-}O}$	$V_{C\text{-}O}$=0~4V		−500		nA

AC Electrical Characteristics (Except where noted therwise, Ta=25°C, $V_{CC}1$=8V, $V_{CC}2$=8~12V)

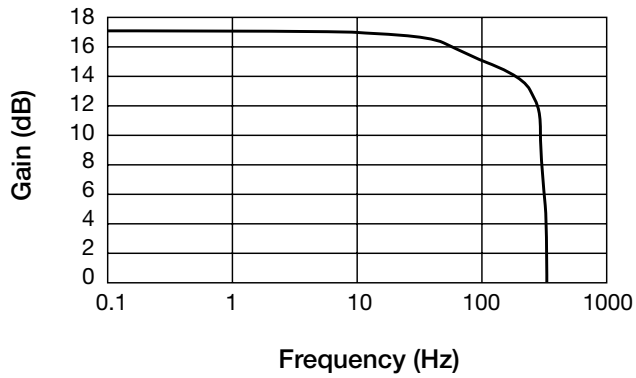
Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Units
Video amp gain	Av max.	V_{IN}=635mV_{P-P}, V9=4V	5.4	7.0		V/V
		V_{DRV}=4V	14.6	16.9		dB
Gain attenuation 1	⊿Av1	V_{IN}=635mV_{P-P}, V9=2V		–6		dB
Gain attenuation 2	⊿Av2	V_{IN}=635mV_{P-P}, V9=0.5V		–38		dB
Drive control range	⊿A_{VDRV}	V_{DRV}=0~4V, V9=4V		6		dB
Gain matching	A_{VMAT}	V9=V_{DRV}=4V		0.3		dB
Gain change between amps	⊿A_{VMAT}	V9=4~2V		0.1		dB
Video amp distortion	THD	V_{OUT}=1V_{P-P}		1		%
Video amp frequency bandwidth	f_{BW}	V_{OUT}=4V_{P-P}, V9=V_{DRV}=4V		100		MHz
Output rise time	tr	V_{OUT}=4V_{P-P}		3		nS
Output fall time	tf	V_{OUT}=4V_{P-P}		4		nS
Video amp isolation 1 (f_{IN}=10kHz)	$V_{SEP}1$	V9=4V		–70		dB
Video amp isolation 2 (f_{IN}=10MHz)	$V_{SEP}2$	V9=4V		–50		dB
Blanking output fall time	tr	V_{OUT}=1V_{P-P}		7		nS
Blanking output fall time	tf	V_{OUT}=1V_{P-P}		7		nS
Back-porch clamping pulse width	tpw			200		nS

Application Circuits

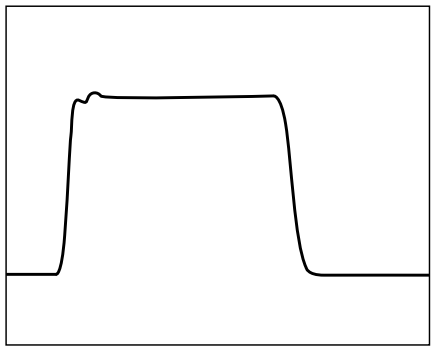


Characteristics

Gain vs Frequency



Pulse reaction



tr=2.7nS
tr=4.3nS
X : 10nS/div
Y : 1v/div