

# RGB Video Amplifier for Monitors

## Monolithic IC MM1375

January 13, 1998

### Outline

This IC is a wideband RGB video amplifier with DC control developed for monitors. It includes three matched video amps, a differential input comparator for brightness adjustment, and three matched DC control attenuators for contrast adjustment. All DC control inputs are high impedance, and the operating range is set for easy interface with serial bus control systems, at 0~4V. It also includes a blanking circuit to clamp a video output below 0.2V during blanking, which enables blanking lanking on the CRT cathode.

### Features

1. Realizes low power consumption (V<sub>CC</sub>=8V, I<sub>CC</sub>=68mA)
2. Smaller capacitance for clamping (0.1μF)
3. Wideband video amp 100MHZ @-3dB
4. Includes a matched (±0.1dB) attenuators for contrast adjustment
5. Includes input comparators for cutoff and brightness adjustment by external gate control
6. Built-in high input impedance DC contrast control, 0~4V
7. Includes an output blanking function
8. Output can drive hybrid or discrete CRT driver directly.

### Package

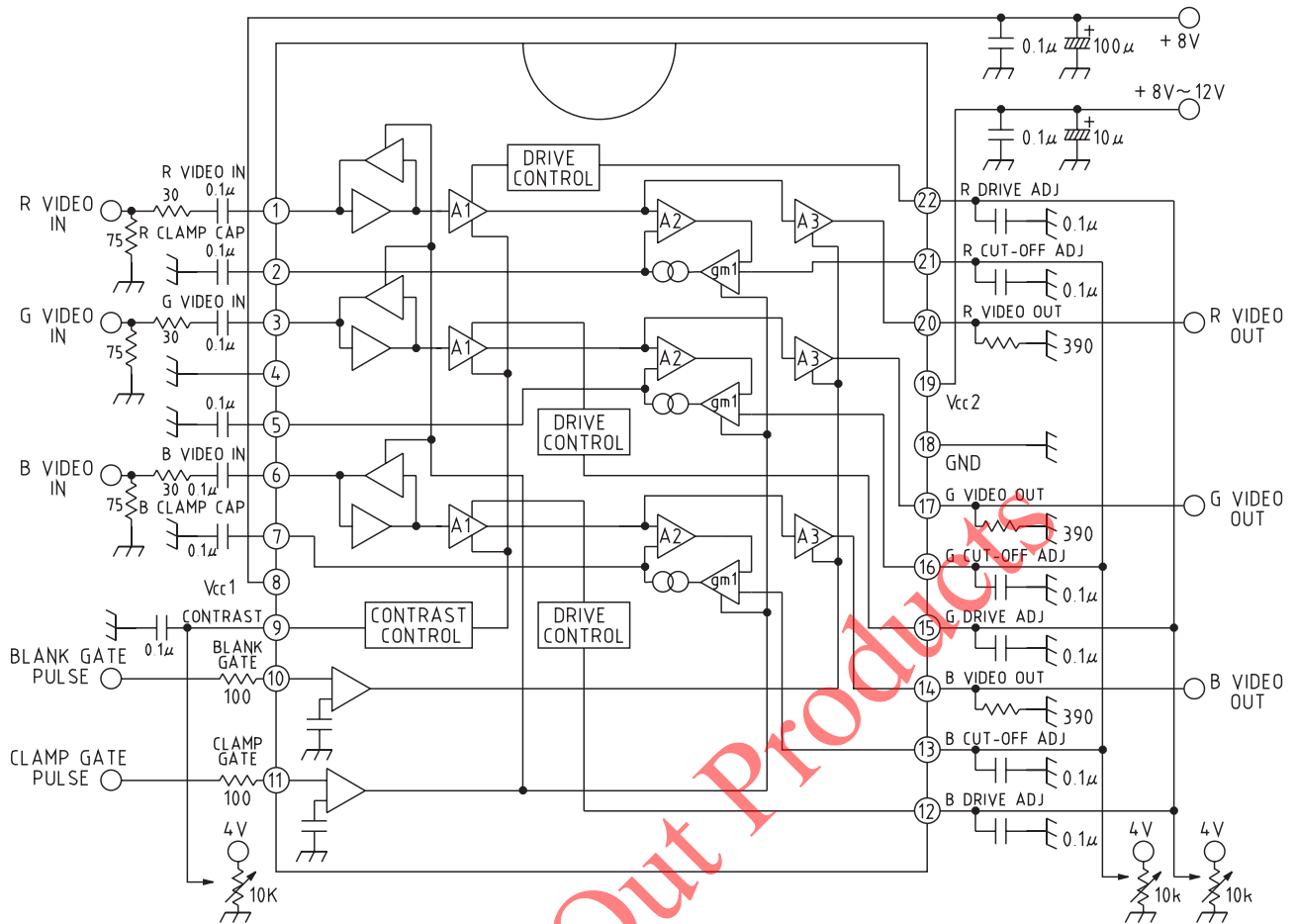
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### Applications

1. High-resolution RGB CRT monitors
2. AGC amps for video
3. Wideband amps for gain and DC offset control
4. Interface amps for LCD or CCD systems

Pressed Out Products

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 <sub>STG</sub>	-40~+125	°C
Operating temperature	T <sub>OPR</sub>	-20~+80	°C
Power supply voltage 1	V <sub>CC1</sub>	10	V
Power supply voltage 2	V <sub>CC2</sub>	15	V
Input voltage range	V <sub>IN</sub>	GND ≤ V <sub>IN</sub> ≤ V <sub>CC1</sub>	V
Video output current	I <sub>O</sub>	28	mA
Allowable loss	P <sub>d</sub>	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 <sub>CC1</sub>	7.6	8.0	8.4	V
Operating power supply voltage 2	V <sub>CC2</sub>	7.6		12.6	V

**DC Electrical Characteristics** (Except where noted otherwise, Ta=25°C, V<sub>CC1</sub>=8V, V<sub>CC2</sub>=8~12V, V<sub>9</sub>=4V, V<sub>10</sub>=4V, V<sub>11</sub>=0V, V<sub>C-O</sub>=1.0V, V<sub>DRV</sub>=4V)

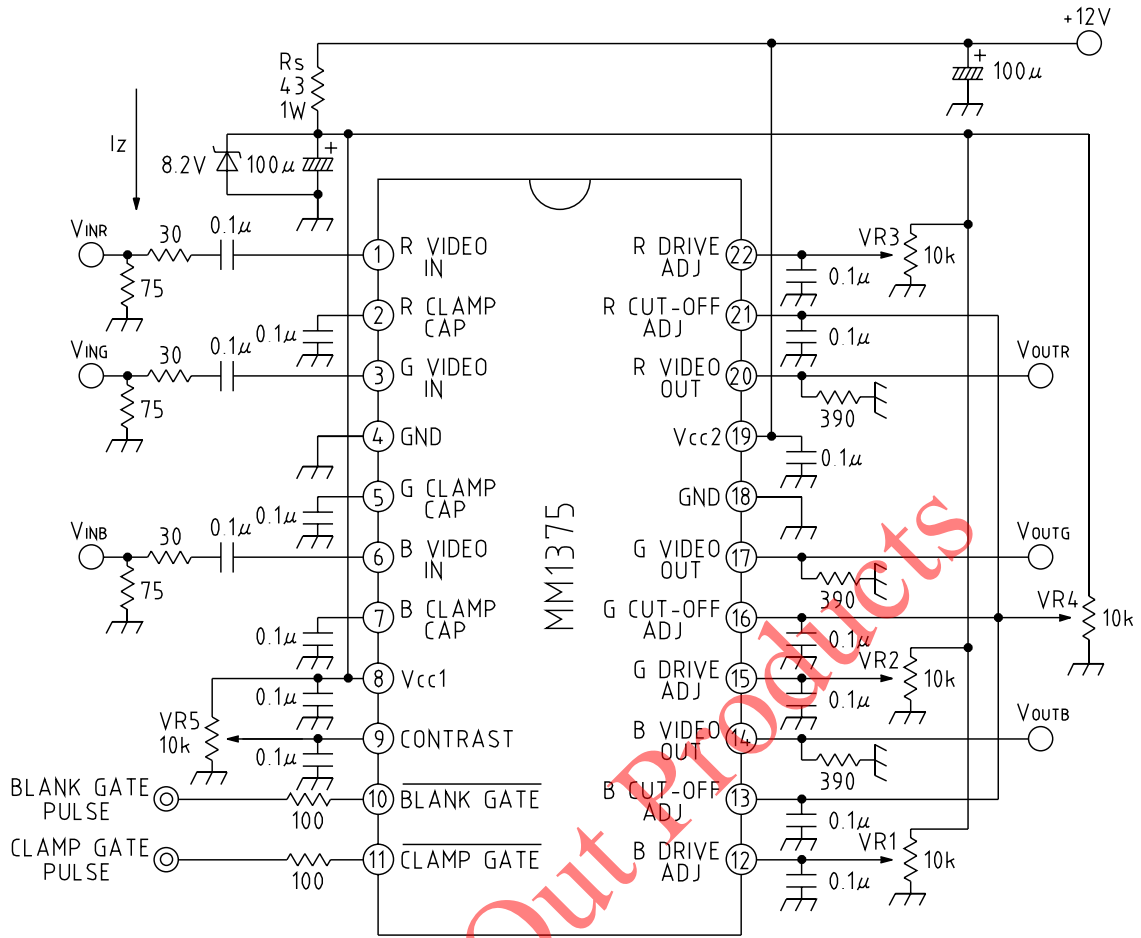
Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Units
Power supply current	I <sub>CC1</sub>	V <sub>CC1</sub> +V <sub>CC2</sub>		68	80	mA
Video amp input voltage	V <sub>B</sub>			2.2		V
Video input resistance	R <sub>B</sub>			100		kΩ
Clamp gate input voltage L	V <sub>CGL</sub>		0.8	1.2		V
Clamp gate input voltage H	V <sub>CGH</sub>			1.6	2.0	V
Clamp gate input current L	I <sub>CGL</sub>	V <sub>11</sub> =0V		-0.5	-5.0	μA
Clamp gate input current H	I <sub>CGH</sub>	V <sub>11</sub> =8V		0.01	1.0	μA
Input charging current	I <sub>IN+</sub>		0.75	1.0		mA
Input discharge current	I <sub>IN-</sub>		-0.75	-1.0		mA
Clamp cap charge current	I <sub>CL+</sub>		0.75	1.0		mA
Clamp cap discharge current	I <sub>CL-</sub>		-0.75	-1.0		mA
Clamp cap bias discharge current	I <sub>CLB</sub>			50		nA
Blanking gate input voltage L	V <sub>BGL</sub>		0.8	1.2		V
Blanking gate input voltage H	V <sub>BGH</sub>			1.6	2.0	V
Blanking gate input current L	I <sub>BGL</sub>	V <sub>10</sub> =0V		-1.0	-5.0	μA
Blanking gate input current H	I <sub>BGH</sub>	V <sub>10</sub> =8V		0.01	1.0	μA
Video output voltage L	V <sub>OL</sub>	V <sub>C-O</sub> =0V		0.15	0.5	V
Video output voltage H	V <sub>OH</sub>	V <sub>C-O</sub> =6V	5.0	5.5		V
Black level output voltage	V <sub>O</sub>	V <sub>C-O</sub> =1V		1.0		V
ΔBlack level output voltage	ΔV <sub>O</sub>	V <sub>C-O</sub> =1V		±100		mV
Output blanking voltage	V <sub>OBLK</sub>	V <sub>10</sub> =0V		100	300	mV
Contrast control input current	I <sub>9</sub>	V <sub>9</sub> =4V		190		μA
Drive control input current	I <sub>DBV</sub>	V <sub>DBV</sub> =4V		190		μA
Cutoff control input current	I <sub>C-O</sub>	V <sub>C-O</sub> =0~4V		-500		nA

**AC Electrical Characteristics** (Except where noted otherwise,  $T_a=25^\circ\text{C}$ ,  $V_{CC1}=8\text{V}$ ,  $V_{CC2}=8\sim 12\text{V}$ )

Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Units
Video amp gain	A <sub>v</sub> max.	V <sub>IN</sub> =635mV <sub>P-P</sub> , V <sub>9</sub> =4V V <sub>DRV</sub> =4V	5.4	7.0		V/V
			14.6	16.9		dB
Gain attenuation 1	∠A <sub>v1</sub>	V <sub>IN</sub> =635mV <sub>P-P</sub> , V <sub>9</sub> =2V		-6		dB
Gain attenuation 2	∠A <sub>v2</sub>	V <sub>IN</sub> =635mV <sub>P-P</sub> , V <sub>9</sub> =0.5V		-38		dB
Drive control range	∠A <sub>vDRV</sub>	V <sub>DRV</sub> =0~4V, V <sub>9</sub> =4V		6		dB
Gain matching	A <sub>VMAT</sub>	V <sub>9</sub> =V <sub>DRV</sub> =4V		0.3		dB
Gain change between amps	∠A <sub>VMAT</sub>	V <sub>9</sub> =4~2V		0.1		dB
Video amp distortion	THD	V <sub>OUT</sub> =1V <sub>P-P</sub>		1		%
Video amp frequency bandwidth	f <sub>BW</sub>	V <sub>OUT</sub> =4V <sub>P-P</sub> , V <sub>9</sub> =V <sub>DRV</sub> =4V		100		MHz
Output rise time	t <sub>r</sub>	V <sub>OUT</sub> =4V <sub>P-P</sub>		3		ns
Output fall time	t <sub>f</sub>	V <sub>OUT</sub> =4V <sub>P-P</sub>		4		ns
Video amp isolation 1 (f <sub>IN</sub> =10kHz)	V <sub>SEP1</sub>	V <sub>9</sub> =4V		-70		dB
Video amp isolation 2 (f <sub>IN</sub> =10MHz)	V <sub>SEP2</sub>	V <sub>9</sub> =4V		-50		dB
Blanking output fall time	t <sub>r</sub>	V <sub>OUT</sub> =1V <sub>P-P</sub>		7		ns
Blanking output fall time	t <sub>f</sub>	V <sub>OUT</sub> =1V <sub>P-P</sub>		7		ns
Back-porch clamping pulse width	tpw			200		ns

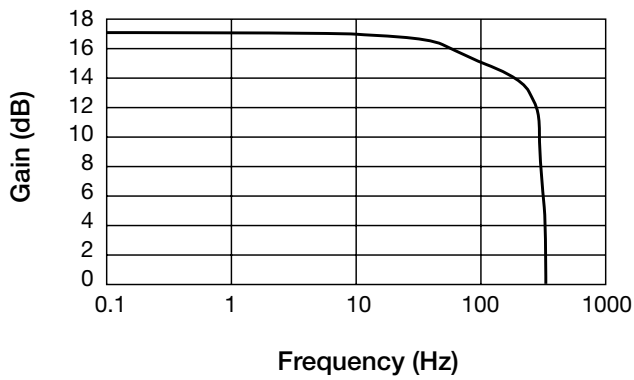
Phased Out Products

Application Circuits



Characteristics

Gain vs Frequency



Pulse reaction

