

# $\mu$ A733/733C Differential Video Amplifier

## Product Specification

### Linear Products

#### DESCRIPTION

The 733 is a monolithic differential input, differential output, wide-band video amplifier. It offers fixed gains of 10, 100, or 400 without external components, and adjustable gains from 10 to 400 by the use of an external resistor. No external frequency compensation components are required for any gain option. Gain stability, wide bandwidth, and low phase distortion are obtained through use of the classic series-shunt feedback from the emitter-follower outputs to the inputs of the second stage. The emitter-follower outputs provide low output impedance, and enable the device to drive capacitive loads. The 733 is intended for use as a high-performance video and pulse amplifier in communications, magnetic memories, display and video recorder systems.

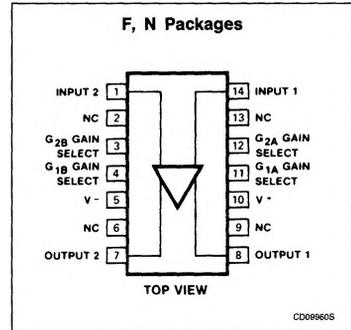
#### FEATURES

- 120MHz bandwidth
- 250k $\Omega$  input resistance
- Selectable gains of 10, 100, and 400
- No frequency compensation required
- MIL-STD-883A, B, C available

#### APPLICATIONS

- Video amplifier
- Pulse amplifier in communications
- Magnetic memories
- Video recorder systems

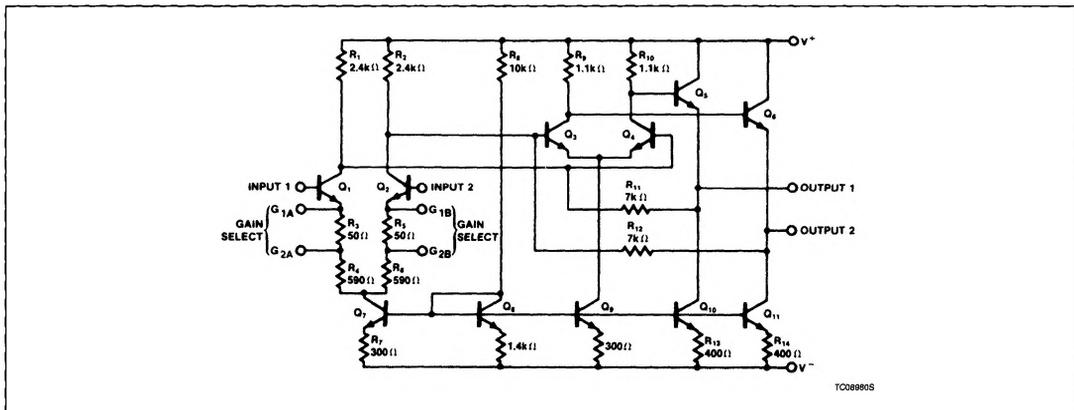
#### PIN CONFIGURATION



#### ORDERING INFORMATION

DESCRIPTION	TEMPERATURE	ORDER CODE
14-Pin Ceramic DIP	-55°C to +125°C	$\mu$ A733F
14-Pin Plastic DIP	-55°C to +125°C	$\mu$ A733N
14-Pin Plastic DIP	0 to +70°C	$\mu$ A733CN
14-Pin Ceramic DIP	0 to +70°C	$\mu$ A733CF

#### CIRCUIT SCHEMATIC



## Differential Video Amplifier

 $\mu$ A733/733C

## ABSOLUTE MAXIMUM RATINGS

SYMBOL	PARAMETER	RATING	UNIT
V <sub>DIFF</sub>	Differential input voltage	± 5	V
V <sub>CM</sub>	Common-mode input voltage	± 6	V
V <sub>CC</sub>	Supply voltage	± 8	V
I <sub>OUT</sub>	Output current	10	mA
T <sub>J</sub>	Junction temperature	+ 150	°C
T <sub>STG</sub>	Storage temperature range	-65 to +150	°C
T <sub>A</sub>	Operating ambient temperature range $\mu$ A733C $\mu$ A733	0 to +70 -55 to +125	°C °C
P <sub>MAX</sub>	Maximum power dissipation <sup>1</sup> 25°C ambient temperature (still-air) F package N package	1190 1420	mW mW

## NOTE:

1. The following derating factors should be applied above 25°C:  
 F package at 9.5mW/°C  
 N package at 11.4mW/°C.

DC ELECTRICAL CHARACTERISTICS T<sub>A</sub> = +25°C, V<sub>S</sub> = ±6V, V<sub>CM</sub> = 0, unless otherwise specified. Recommended operating supply voltages V<sub>S</sub> = ±6.0V.

SYMBOL	PARAMETER	TEST CONDITIONS	$\mu$ A733C			$\mu$ A733			UNIT
			Min	Typ	Max	Min	Typ	Max	
	Differential voltage gain Gain 1 <sup>2</sup> Gain 2 <sup>2</sup> Gain 3 <sup>3</sup>	R <sub>I</sub> = 2k $\Omega$ , V <sub>OUT</sub> = 3V <sub>P-P</sub>	250 80 8	400 100 10	600 120 12	300 90 9	400 100 10	500 110 11	V/V V/V V/V
BW	Bandwidth Gain 1 <sup>1</sup> Gain 2 <sup>2</sup> Gain 3 <sup>3</sup>			40 90 120			40 90 120		MHz MHz MHz
t <sub>R</sub>	Rise time Gain 1 <sup>1</sup> Gain 2 <sup>2</sup> Gain 3 <sup>3</sup>	V <sub>OUT</sub> = 1V <sub>P-P</sub>		10.5 4.5 2.5	12		10.5 4.5 2.5	10	ns ns ns
t <sub>PD</sub>	Propagation delay Gain 1 <sup>1</sup> Gain 2 <sup>2</sup> Gain 3 <sup>3</sup>	V <sub>OUT</sub> = 1V <sub>P-P</sub>		7.5 6.0 3.6	10		7.5 6.0 3.6	10	ns ns ns
R <sub>IN</sub>	Input resistance Gain 1 <sup>2</sup> Gain 2 <sup>2</sup> Gain 3 <sup>3</sup>		10	4.0 30 250		20	4.0 30 250		k $\Omega$ k $\Omega$ k $\Omega$
	Input capacitance <sup>2</sup>	Gain 2		2.0			2.0		pF
I <sub>OS</sub>	Input offset current			0.4	5.0		0.4	3.0	$\mu$ A
I <sub>BIAS</sub>	Input bias current			9.0	30		9.0	20	$\mu$ A
V <sub>NOISE</sub>	Input noise voltage	BW = 1kHz to 10MHz		12			12		$\mu$ V <sub>RMS</sub>
V <sub>IN</sub>	Input voltage range		± 1.0			± 1.0			V
CMRR	Common-mode rejection ratio Gain 2 Gain 2	V <sub>CM</sub> = ± 1V, f ≤ 100kHz V <sub>CM</sub> = ± 1V, f = 5MHz	60	86 60		60	86 60		dB dB
SVRR	Supply voltage rejection ratio Gain 2	$\Delta$ V <sub>S</sub> = ± 0.5V	50	70		50	70		dB

## Differential Video Amplifier

 $\mu\text{A733/733C}$ **DC ELECTRICAL CHARACTERISTICS** (Continued)  $T_A = +25^\circ\text{C}$ ,  $V_S = \pm 6\text{V}$ ,  $V_{CM} = 0$ , unless otherwise specified.  
Recommended operating supply voltages  $V_S = \pm 6.0\text{V}$ .

SYMBOL	PARAMETER	TEST CONDITIONS	$\mu\text{A733C}$			$\mu\text{A733}$			UNIT
			Min	Typ	Max	Min	Typ	Max	
	Output offset voltage Gain 1 <sup>1</sup> Gain 2 and 3 <sup>2, 3</sup>	$R_L = \infty$		0.6 0.35	1.5 1.5		0.6 0.35	1.5 1.0	V V
$V_{CM}$	Output common-mode voltage	$R_L = \infty$	2.4	2.9	3.4	2.4	2.9	3.4	V
	Output voltage swing, differential	$R_L = 2\text{k}\Omega$	3.0	4.0		3.0	4.0		$V_{P,P}$
$I_{SINK}$	Output sink current		2.5	3.6		2.5	3.6		mA
$R_{OUT}$	Output resistance			20			20		$\Omega$
$I_{CC}$	Power supply current	$R_L = \infty$		18	24		18	24	mA
<b>THE FOLLOWING SPECIFICATIONS APPLY OVER TEMPERATURE</b>			$0^\circ\text{C} \leq T_A \leq 70^\circ\text{C}$			$-55^\circ\text{C} \leq T_A \leq 125^\circ\text{C}$			
	Differential voltage gain Gain 1 <sup>1</sup> Gain 2 <sup>2</sup> Gain 3 <sup>3</sup>	$R_I = 2\text{k}\Omega$ , $V_{OUT} = 3V_{P,P}$	250 80 8		600 120 12	200 80 8		600 120 12	V/V V/V V/V
$R_{IN}$	Input resistance Gain 2 <sup>2</sup>		8			8			$\text{k}\Omega$
$I_{OS}$	Input offset current				6			5	$\mu\text{A}$
$I_{BIAS}$	Input bias current				40			40	$\mu\text{A}$
$V_{IN}$	Input voltage range		$\pm 1.0$			$\pm 1.0$			V
$CMRR$	Common-mode rejection ratio Gain 2	$V_{CM} = \pm V$ , $F \leq 100\text{kHz}$	50			50			dB
$SVRR$	Supply voltage rejection ratio Gain 2	$\Delta V_S = \pm 0.5\text{V}$	50			50			dB
$V_{OS}$	Output offset voltage Gain 1 <sup>1</sup> Gain 2 and 3 <sup>2, 3</sup>	$R_L = \infty$			1.5 1.5			1.5 1.2	V V
$V_{DIFF}$	Output voltage swing, differential	$R_L = 2\text{k}\Omega$	2.8			2.5			$V_{P,P}$
$I_{SINK}$	Output sink current		2.5			2.2			mA
$I_{CC}$	Power supply current	$R_L \pm \infty$			27			27	mA

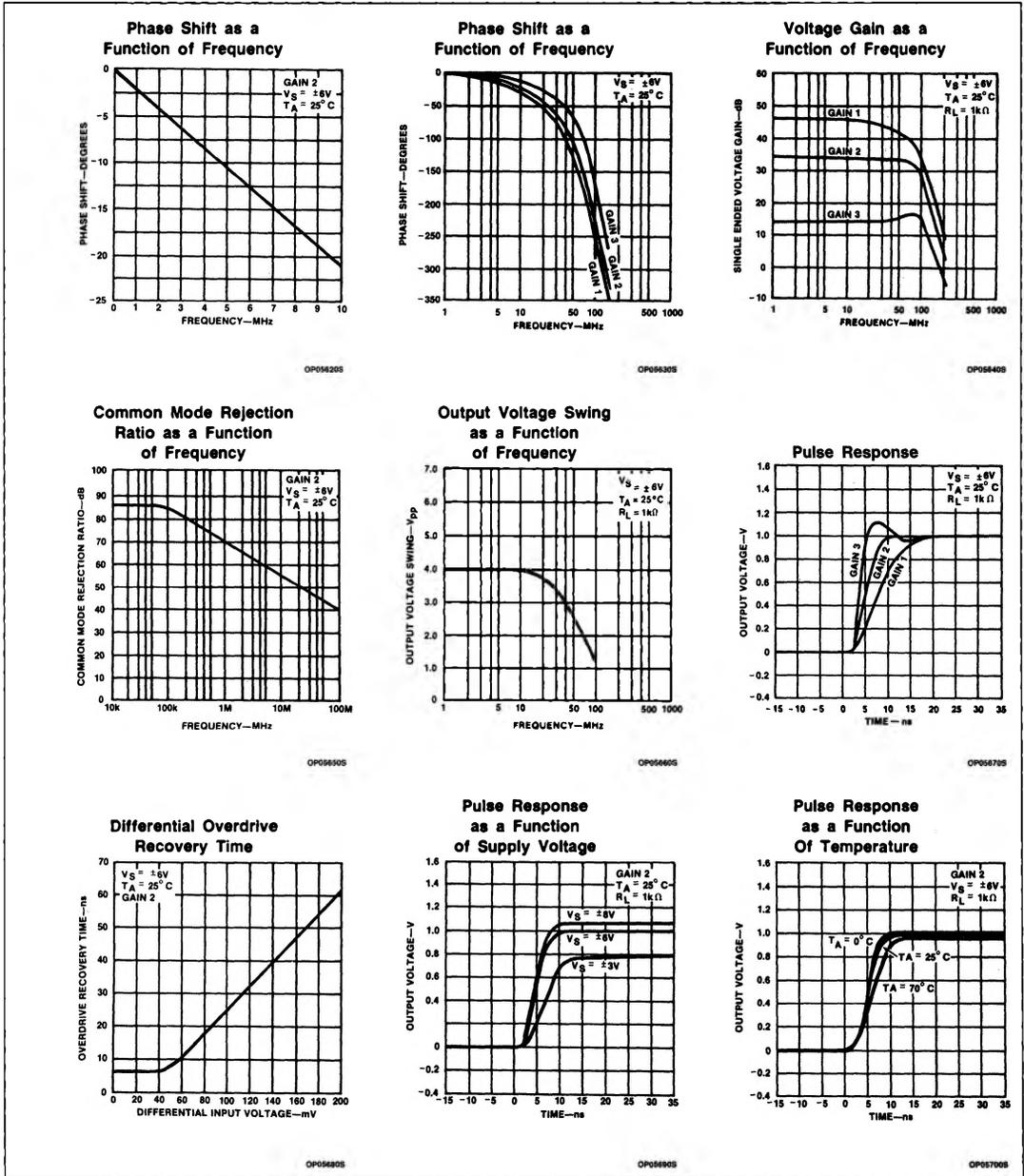
**NOTES:**

- Gain select pins  $G_{1A}$  and  $G_{1B}$  connected together.
- Gain select pins  $G_{2A}$  and  $G_{2B}$  connected together.
- All gain select pins open.

# Differential Video Amplifier

## $\mu$ A733/733C

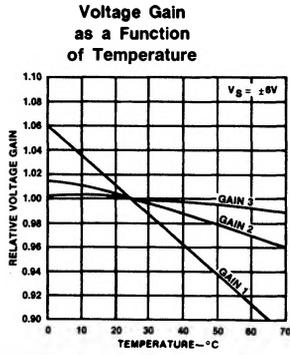
### TYPICAL PERFORMANCE CHARACTERISTICS



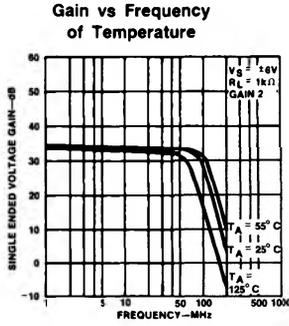
# Differential Video Amplifier

# $\mu$ A733/733C

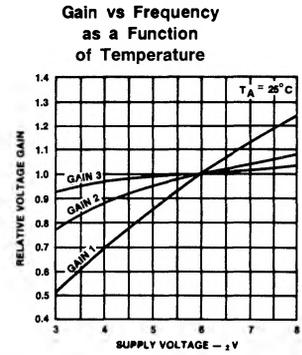
## TYPICAL PERFORMANCE CHARACTERISTICS (Continued)



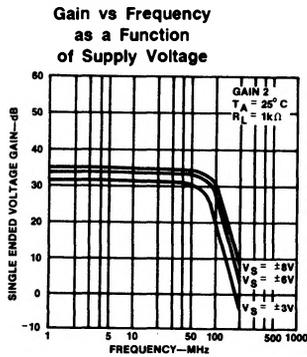
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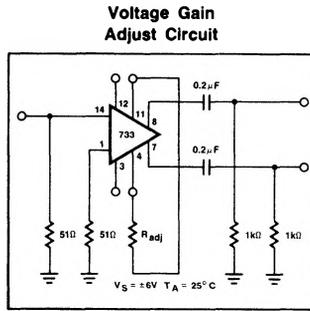
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OP057305

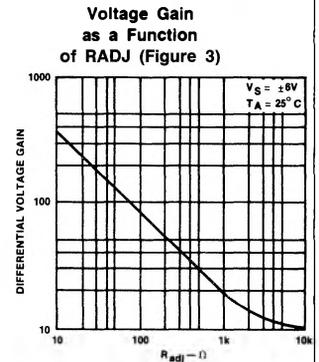


OP057405

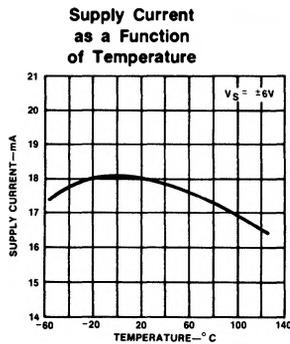


(Pin numbers apply to K Package)

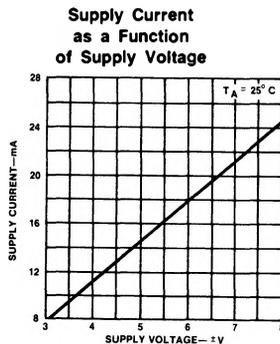
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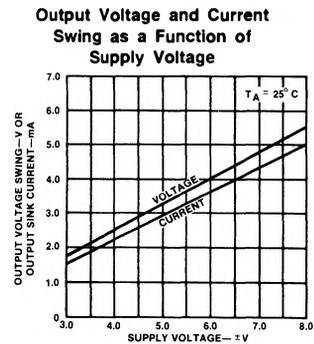
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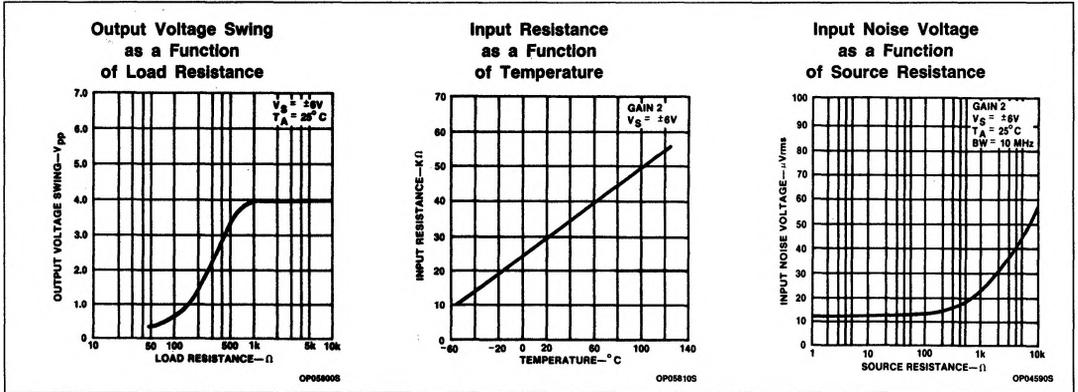


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# $\mu$ A733/733C

## TYPICAL PERFORMANCE CHARACTERISTICS (Continued)



## TEST CIRCUITS $T_A = 25^\circ C$ , unless otherwise specified.

