

# Differential video amplifier

$\mu$ A733/733C

## 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.

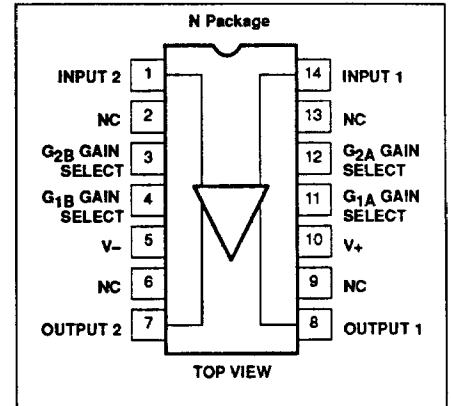
## FEATURES

- 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

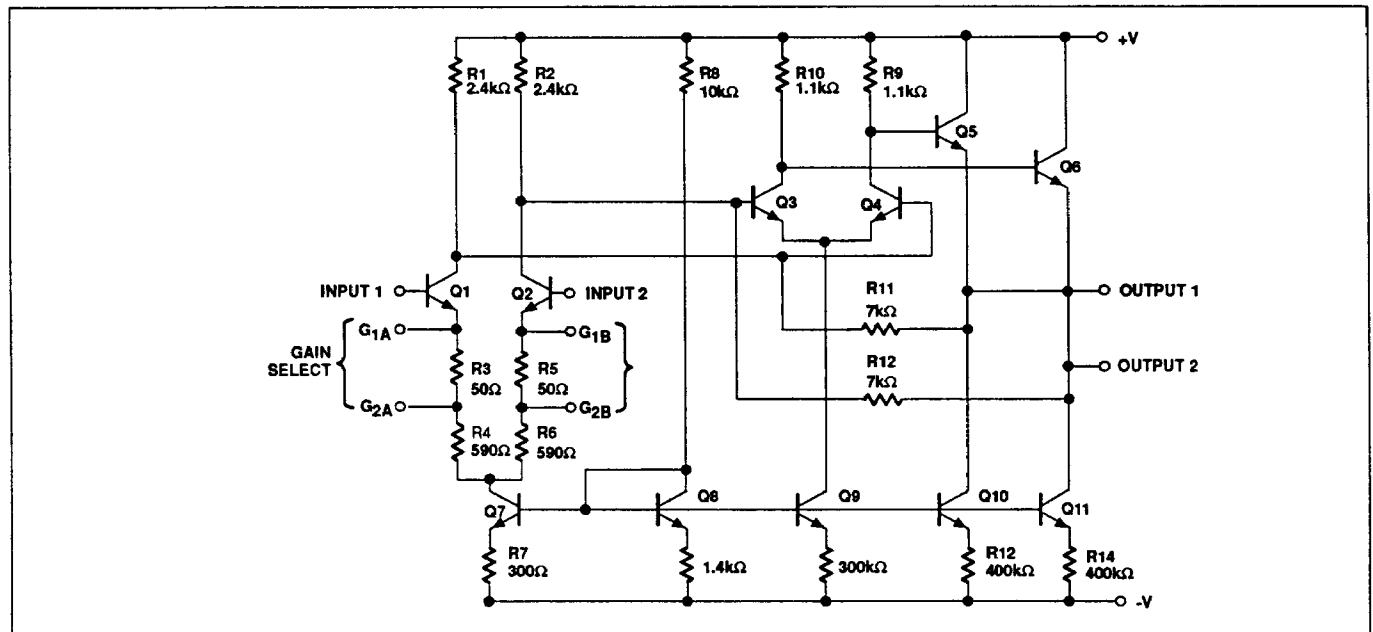
## PIN CONFIGURATION



## ORDERING INFORMATION

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

## CIRCUIT SCHEMATIC



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## ABSOLUTE MAXIMUM RATINGS

SYMBOL	PARAMETER	RATING	UNIT
$V_{DIFF}$	Differential input voltage	$\pm 5$	V
$V_{CM}$	Common-mode input voltage	$\pm 6$	V
$V_{CC}$	Supply voltage	$\pm 8$	V
$I_{OUT}$	Output current	10	mA
$T_J$	Junction temperature	+150	$^{\circ}$ C
$T_{STG}$	Storage temperature range	-65 to +150	$^{\circ}$ C
$T_A$	Operating ambient temperature range		$^{\circ}$ C
	$\mu$ A733C	0 to +70	$^{\circ}$ C
	$\mu$ A733	-55 to +125	$^{\circ}$ C
$P_{D MAX}$	Maximum power dissipation, 25 $^{\circ}$ C ambient temperature (still-air) <sup>1</sup>	1420	mW

## NOTE:

1. The following derating factors should be applied 25 $^{\circ}$ C:  
N package at 11.4mW/ $^{\circ}$ C

## DC ELECTRICAL CHARACTERISTICS

$T_A = +25^{\circ}$ C,  $V_S = \pm 6$ V,  $V_{CM} = 0$ , unless otherwise specified. Recommended operating supply voltages  $V_S = \pm 6.0$ V.

SYMBOL	PARAMETER	TEST CONDITIONS	$\mu$ A733C			$\mu$ A733			UNIT
			Min	Typ	Max	Min	Typ	Max	
	Differential voltage gain	$R_I = 2k\Omega$ , $V_{OUT} = 3V_{P-P}$							
	Gain 1 <sup>2</sup>		250	400	600	300	400	500	V/V
	Gain 2 <sup>2</sup>		80	100	120	90	100	110	V/V
	Gain 3 <sup>3</sup>		8	10	12	9	10	11	V/V
BW	Gain 1 <sup>1</sup>			40			40		MHz
	Gain 2 <sup>2</sup>			90			90		MHz
	Gain 3 <sup>3</sup>			120			120		MHz
$t_R$	Gain 1 <sup>1</sup>	$V_{OUT} = 1V_{P-P}$		10.5			10.5		ns
	Gain 2 <sup>2</sup>			4.5	12		4.5	10	ns
	Gain 3 <sup>3</sup>			2.5			2.5		ns
$t_{PD}$	Gain 1 <sup>1</sup>	$V_{OUT} = 1V_{P-P}$		7.5			7.5		ns
	Gain 2 <sup>2</sup>			6.0	10		6.0	10	ns
	Gain 3 <sup>3</sup>			3.6			3.6		ns
$R_{IN}$	Gain 1 <sup>2</sup>			4.0			4.0		k $\Omega$
	Gain 2 <sup>2</sup>		10	30		20	30		k $\Omega$
	Gain 3 <sup>3</sup>			250			250		k $\Omega$
	Input capacitance <sup>2</sup>	Gain 2		2.0			2.0		pF
$I_{OS}$	Input offset current			0.4	5.0		0.4	3.0	$\mu$ A
$I_{BIAS}$	Input bias current			9.0	30		9.0	20	$\mu$ A
$V_{NOISE}$	Input noise voltage	BW=1kHz to 10MHz		12			12		$\mu$ V <sub>RMS</sub>
$V_{IN}$	Input voltage range		$\pm 1.0$			$\pm 1.0$			V
CMRR	Gain 2	$V_{CM} = \pm 1$ V, $f_s = 100$ kHz	60	86		60	86		dB
	Gain 2	$V_{CM} = \pm 1$ V, $f = 5$ MHz		60			60		dB

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## DC ELECTRICAL CHARACTERISTICS (Continued)

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

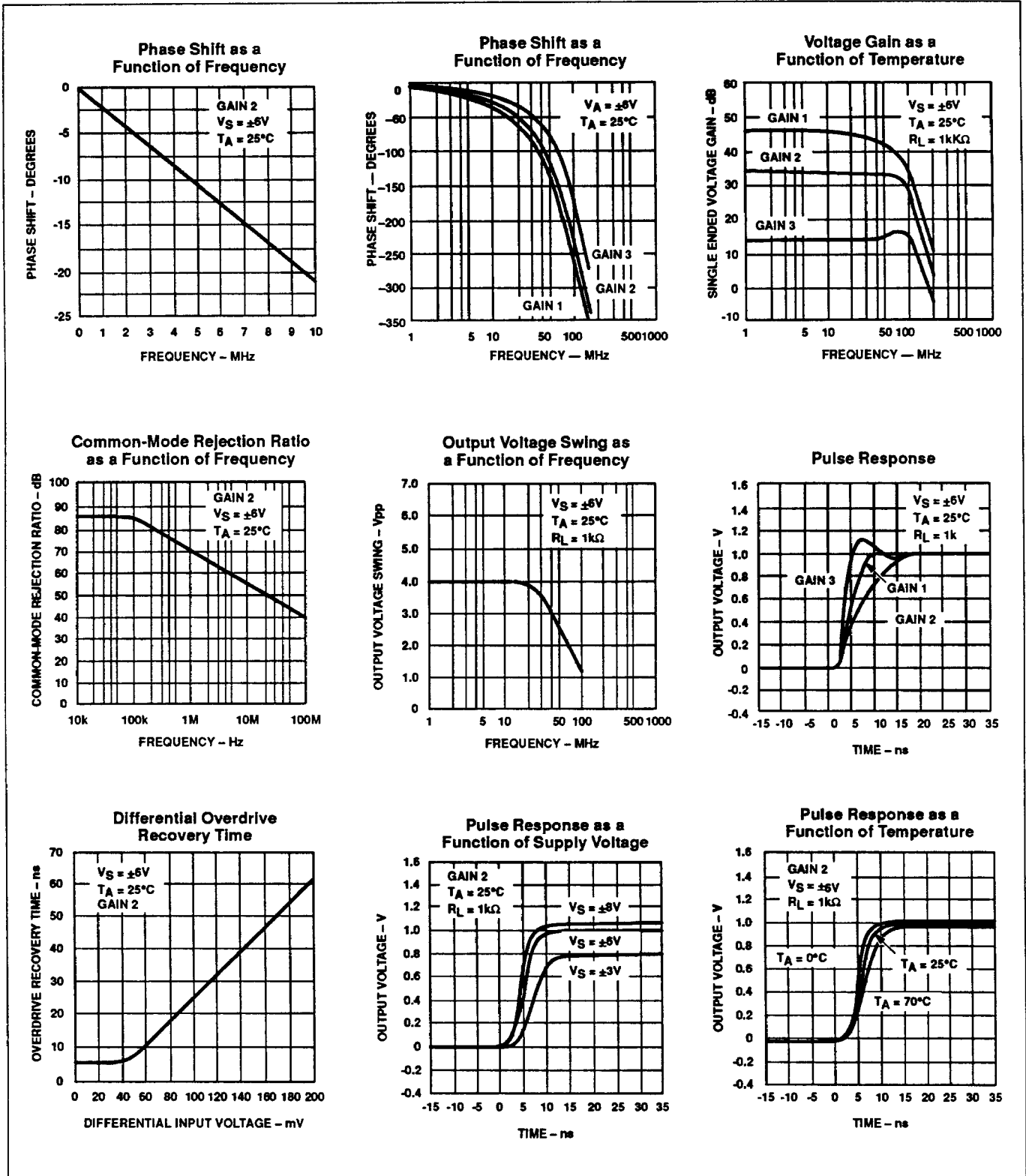
## NOTES:

- Gain select pins G<sub>1A</sub> and G<sub>1B</sub> connected together.
- Gain select pins G<sub>2A</sub> and G<sub>2B</sub> connected together.
- All gain select pins open.

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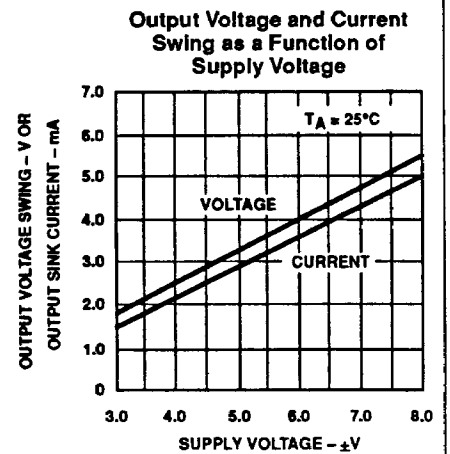
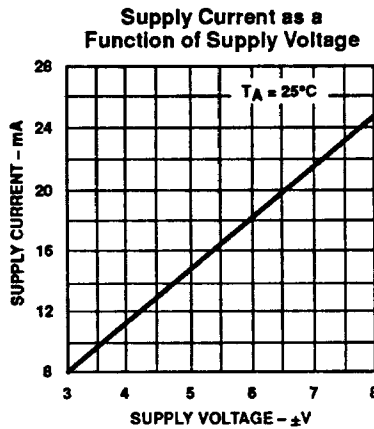
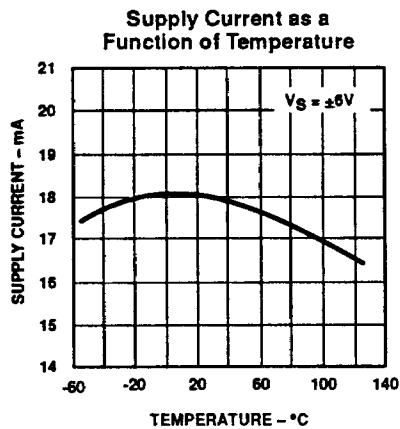
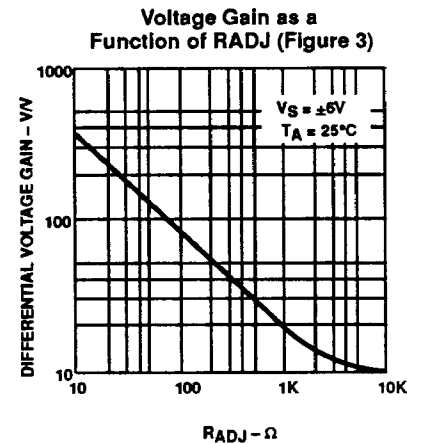
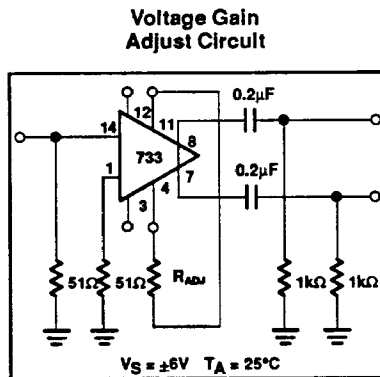
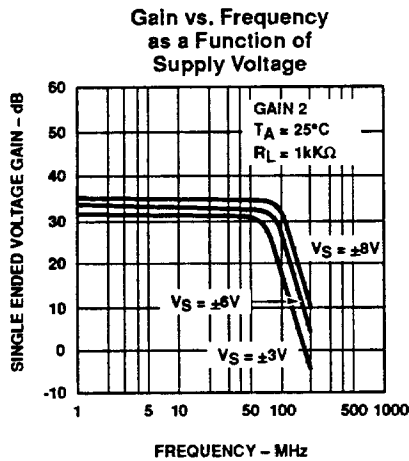
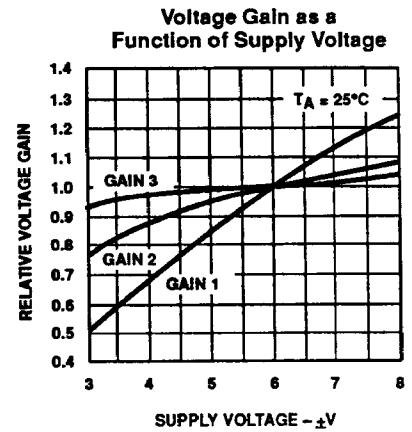
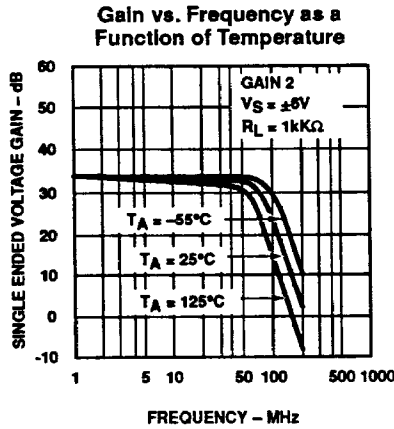
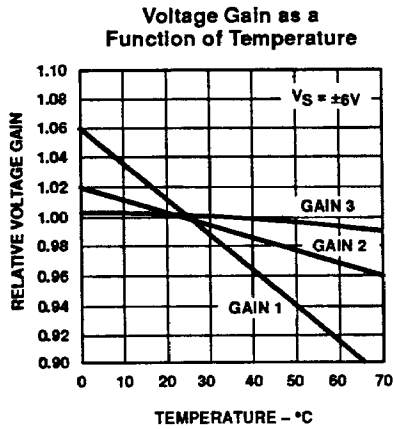
## TYPICAL PERFORMANCE CHARACTERISTICS



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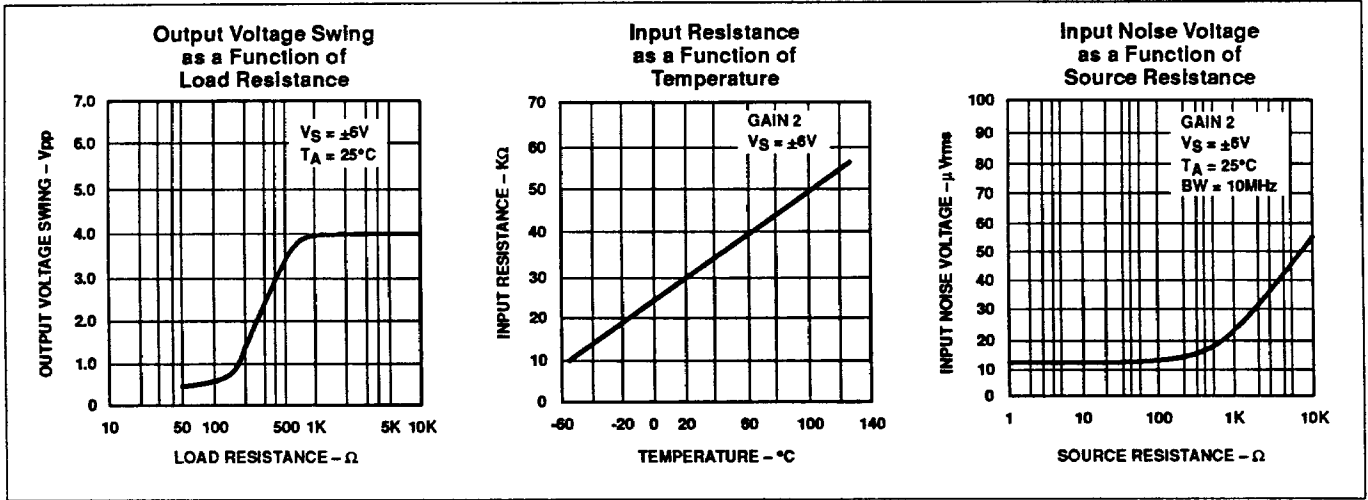
## TYPICAL PERFORMANCE CHARACTERISTICS (Continued)



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## TYPICAL PERFORMANCE CHARACTERISTICS (Continued)



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

