

# DATA SHEET

## **$\mu$ A733/733C** Differential video amplifier

Product specification  
IC11

April 15, 1992

**Philips Semiconductors**



**PHILIPS**

# 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

## PIN CONFIGURATION

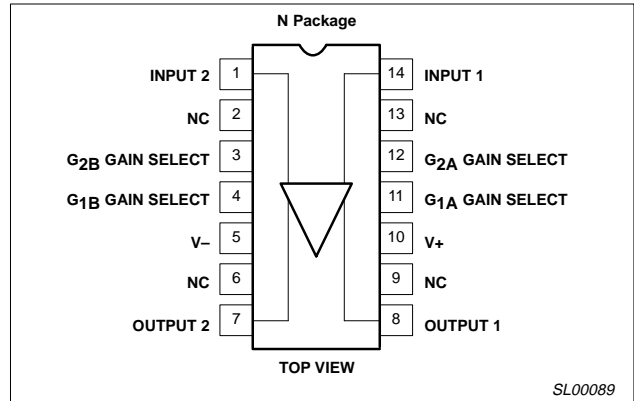


Figure 1. Pin Configuration

## APPLICATIONS

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

## ORDERING INFORMATION

DESCRIPTION	TEMPERATURE	ORDER CODE	DWG #
14-Pin Plastic Dual In-Line Package (DIP)	-55°C to +125°C	$\mu$ A733N	SOT27-1
14-Pin Plastic Dual In-Line Package (DIP)	0 to +70°C	$\mu$ A733CN	SOT27-1

## CIRCUIT SCHEMATIC

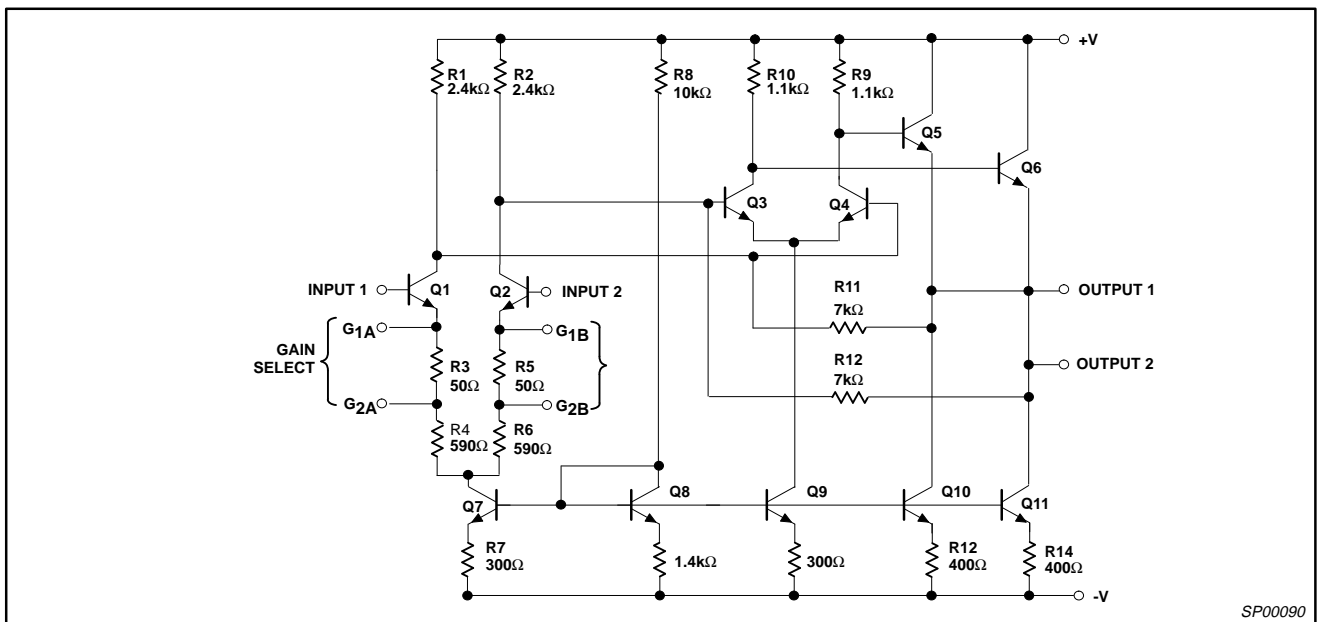


Figure 2. Circuit Schematic

## Differential video amplifier

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## 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	0 to +70	°C
	$\mu$ A733	-55 to +125	°C
P <sub>D MAX</sub>	Maximum power dissipation, 25°C ambient temperature (still-air) <sup>1</sup>	1420	mW

## NOTE:

1. The following derating factors should be applied above 25°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	R <sub>I</sub> = 2k $\Omega$ , V <sub>OUT</sub> = 3V <sub>P-P</sub>							
	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		
	Gain 3 <sup>3</sup>			120			120		
t <sub>R</sub>	Gain 1 <sup>1</sup>	V <sub>OUT</sub> = 1V <sub>P-P</sub>		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 <sub>PD</sub>	Gain 1 <sup>1</sup>	V <sub>OUT</sub> = 1V <sub>P-P</sub>		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 <sub>IN</sub>	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 <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	Gain 2	V <sub>CM</sub> =±1V, f≤100kHz	60	86		60	86		dB
	Gain 2	V <sub>CM</sub> =±1V, f=5MHz		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	$R_L = \infty$							
	Gain 1 <sup>1</sup>			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
<b>THE FOLLOWING SPECIFICATIONS APPLY OVER TEMPERATURE</b>			<b>0°C ≤ T<sub>A</sub> ≤ 70°C</b>			<b>-55°C ≤ T<sub>A</sub> ≤ 125°C</b>			
			<b>Min</b>	<b>Typ</b>	<b>Max</b>	<b>Min</b>	<b>Typ</b>	<b>Max</b>	<b>UNIT</b>
	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		$\pm 1.0$			$\pm 1.0$			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	$R_L = \infty$							
	Gain 1 <sup>1</sup>				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

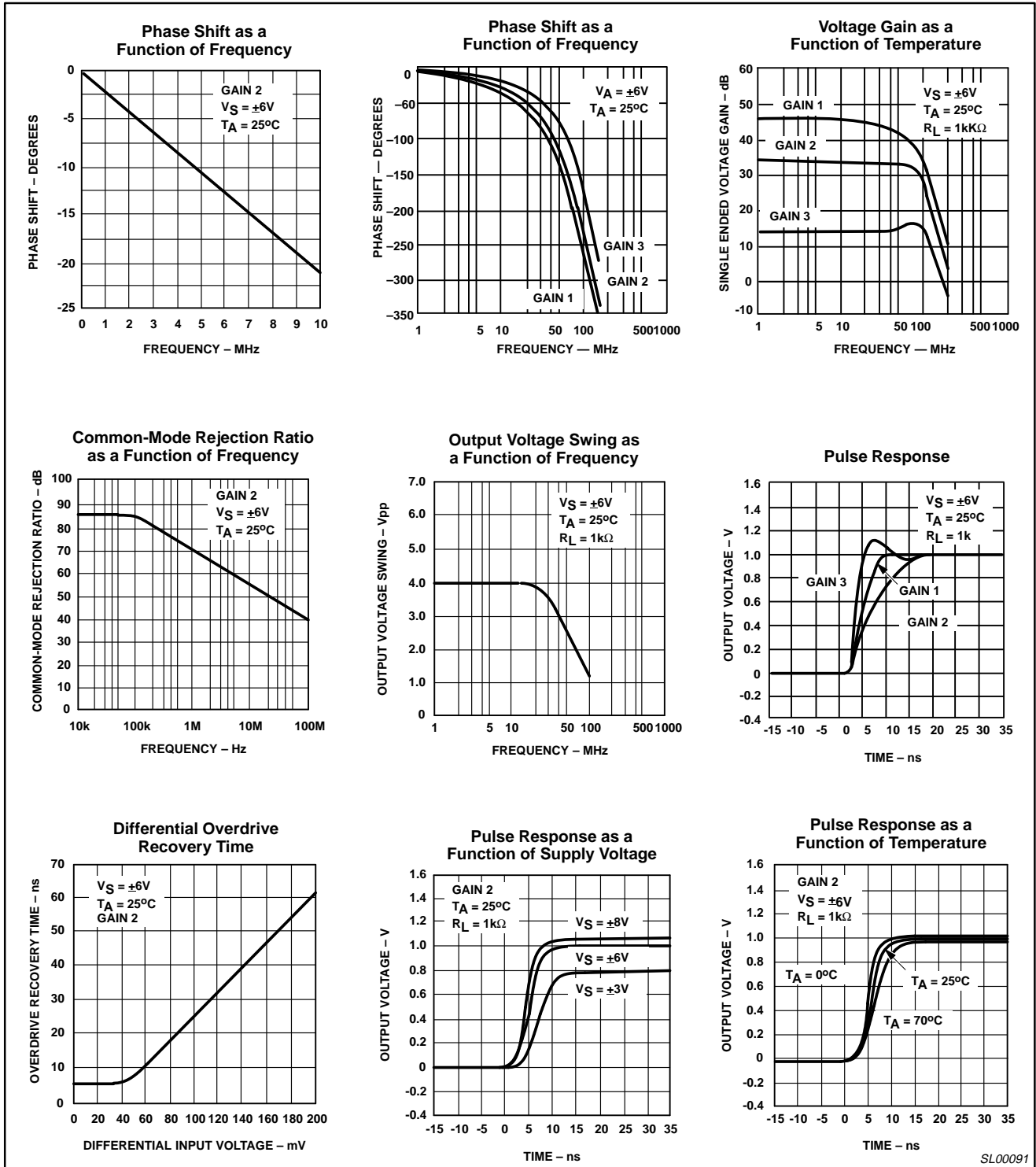


Figure 3. Typical Performance Characteristics

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TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

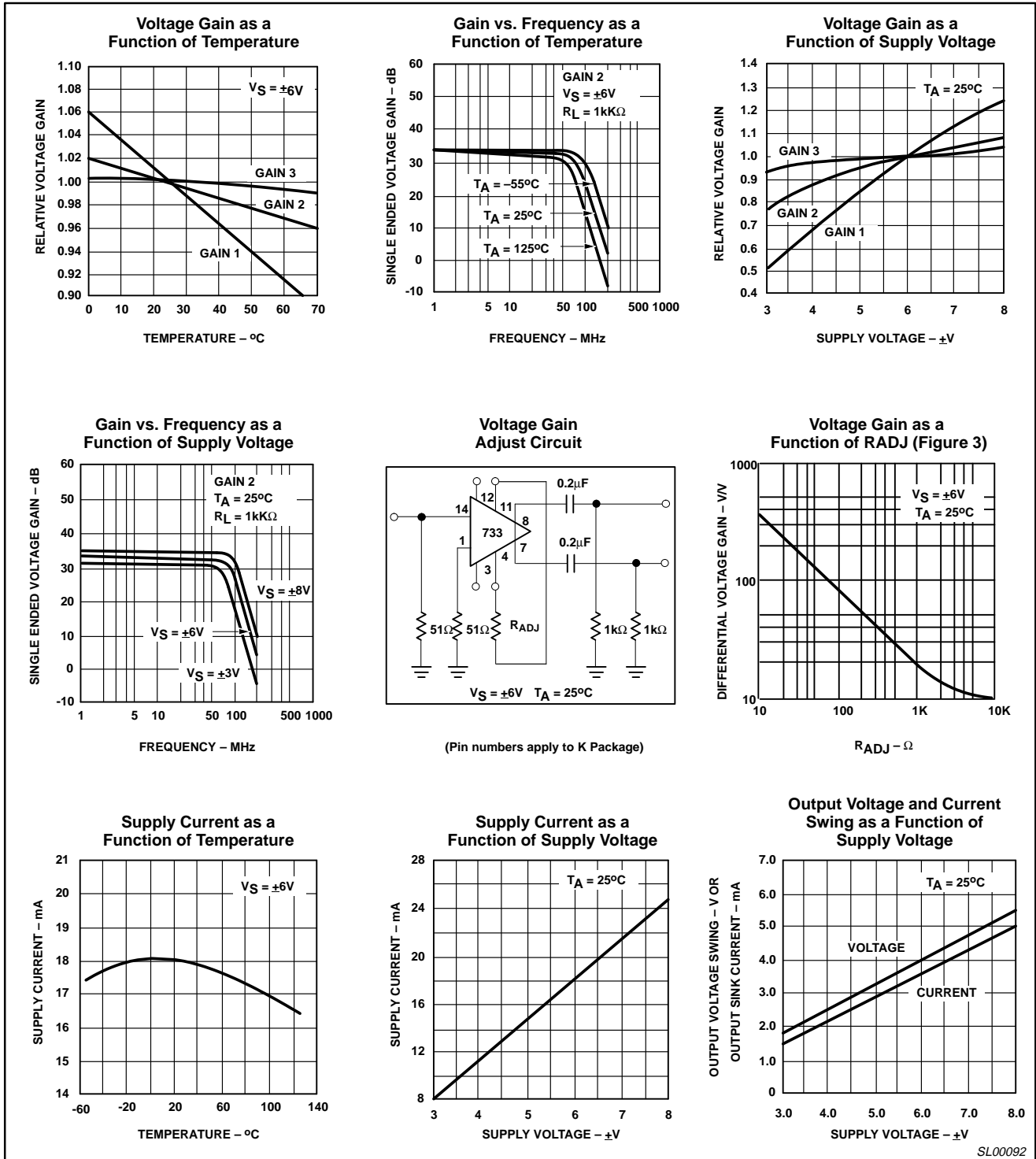


Figure 4. Typical Performance Characteristics (cont.)

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TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

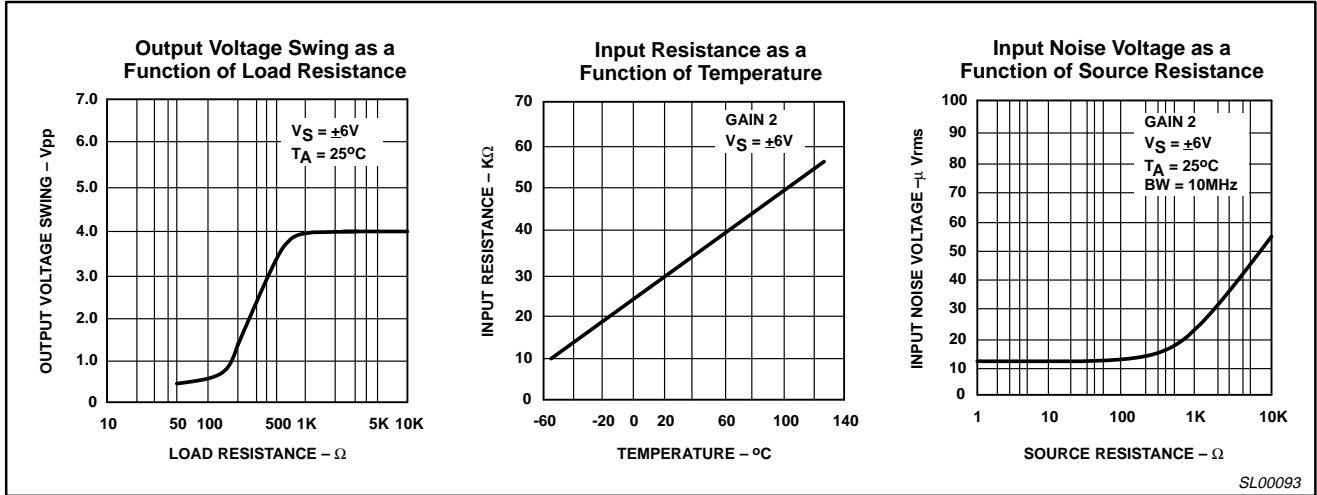


Figure 5. Typical Performance Characteristics (cont.)

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

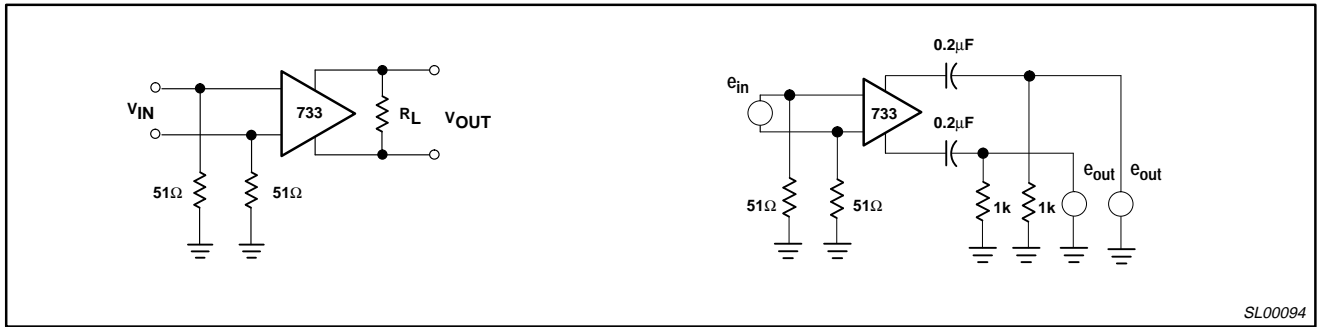


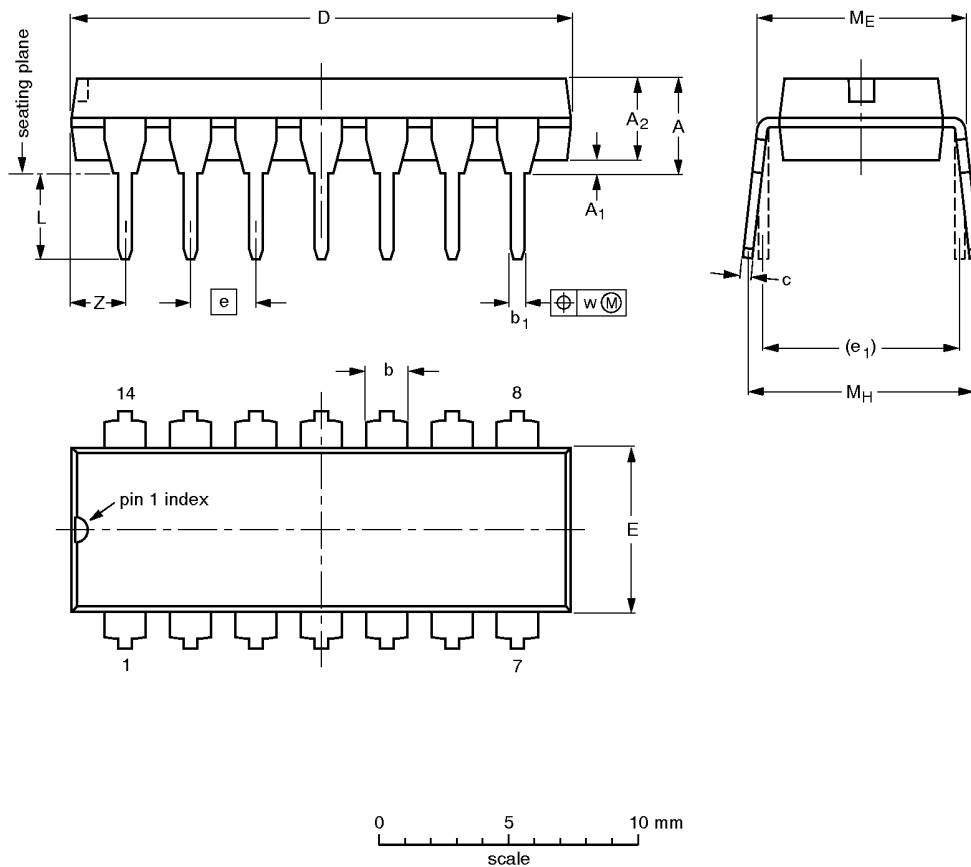
Figure 6. Test Circuits

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DIP14: plastic dual in-line package; 14 leads (300 mil)

SOT27-1



**DIMENSIONS (inch dimensions are derived from the original mm dimensions)**

UNIT	A max.	A <sub>1</sub> min.	A <sub>2</sub> max.	b	b <sub>1</sub>	c	D <sup>(1)</sup>	E <sup>(1)</sup>	e	e <sub>1</sub>	L	M <sub>E</sub>	M <sub>H</sub>	w	Z <sup>(1)</sup> max.
mm	4.2	0.51	3.2	1.73 1.13	0.53 0.38	0.36 0.23	19.50 18.55	6.48 6.20	2.54	7.62	3.60 3.05	8.25 7.80	10.0 8.3	0.254	2.2
inches	0.17	0.020	0.13	0.068 0.044	0.021 0.015	0.014 0.009	0.77 0.73	0.26 0.24	0.10	0.30	0.14 0.12	0.32 0.31	0.39 0.33	0.01	0.087

**Note**

1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT27-1	050G04	MO-001AA				92-11-17 95-03-11



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## DEFINITIONS

Data Sheet Identification	Product Status	Definition
<i>Objective Specification</i>	<b>Formative or in Design</b>	This data sheet contains the design target or goal specifications for product development. Specifications may change in any manner without notice.
<i>Preliminary Specification</i>	<b>Preproduction Product</b>	This data sheet contains preliminary data, and supplementary data will be published at a later date. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.
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