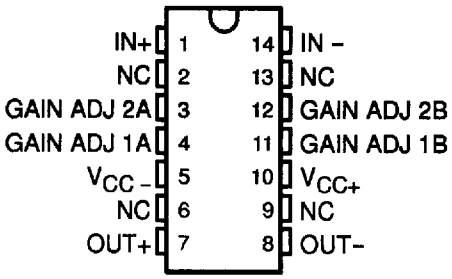
SLFS027A – D922, NOVEMBER 1970 – REVISED MARCH 1993

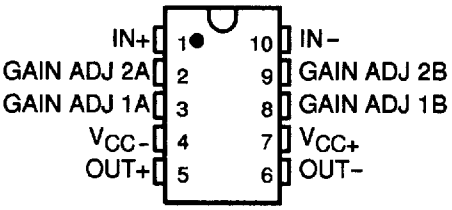
- **200-MHz Bandwidth**
- **250-kΩ Input Resistance**
- **Selectable Nominal Amplification of 10, 100, or 400**
- **No Frequency Compensation Required**
- **Designed to be Interchangeable With Fairchild uA733C and uA733M**

uA733C . . . D OR N PACKAGE
uA733M . . . J PACKAGE
(TOP VIEW)



NC — No internal connection

uA733M . . . U PACKAGE
(TOP VIEW)



description

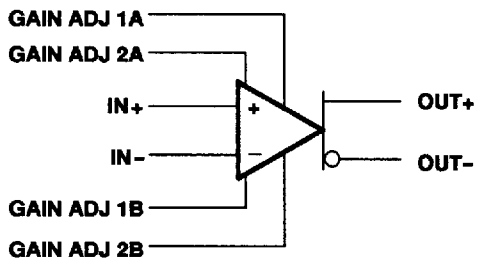
The uA733 is a monolithic two-stage video amplifier with differential inputs and differential outputs.

Internal series-shunt feedback provides wide bandwidth, low phase distortion, and excellent gain stability. Emitter-follower outputs enable the device to drive capacitive loads, and all stages are current-source biased to obtain high common-mode and supply-voltage rejection ratios.

Fixed differential amplification of 10 V/V, 100 V/V, or 400 V/V may be selected without external components, or amplification may be adjusted from 10 V/V to 400 V/V by the use of a single external resistor connected between 1A and 1B. No external frequency-compensating components are required for any gain option.

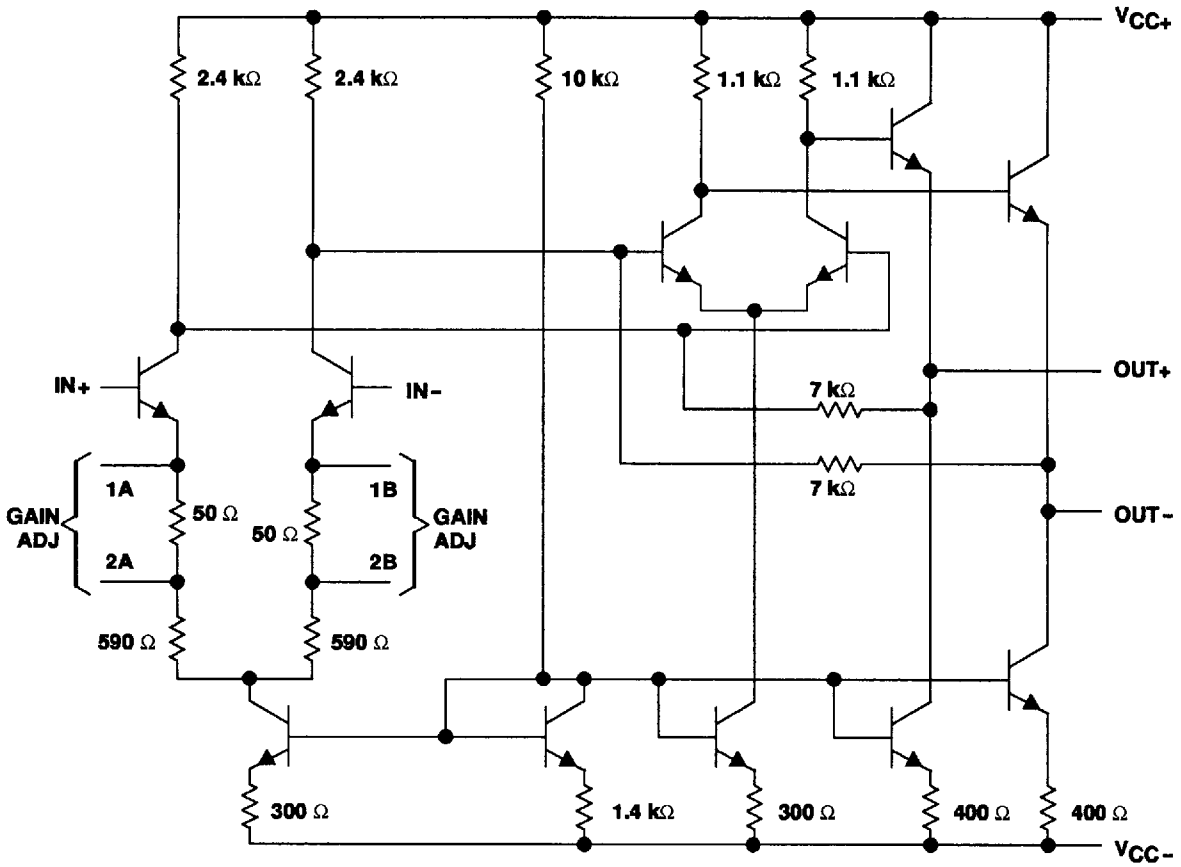
The device is particularly useful in magnetic-tape or disc-file systems using phase or NRZ encoding and in high-speed thin-film or plated-wire memories. Other applications include general-purpose video and pulse amplifiers where wide bandwidth, low phase shift, and excellent gain stability are required.

symbol



The uA733C is characterized for operation from 0°C to 70°C; the uA733M is characterized for operation over the full military temperature range of – 55°C to 125°C.

schematic



Component values shown are nominal.

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

		uA733C	uA733M	UNIT
Supply voltage V_{CC+} (see Note 1)		8	8	V
Supply voltage V_{CC-} (see Note 1)		– 8	– 8	V
Differential input voltage		± 5	± 5	V
Common-mode input voltage		± 6	± 6	V
Output current		10	10	mA
Continuous total power dissipation		See Dissipation Rating Table		
Operating free-air temperature range		0 to 70	– 55 to 125	°C
Storage temperature range		– 65 to 150	– 65 to 150	°C
Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds	J or U package		300	°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	D or N package	260		°C

† Stresses beyond those listed under absolute maximum ratings may cause permanent damage to the device. This is a stress rating only, and functional operation of the device at these or any other conditions beyond those indicated in the recommended operating conditions section of this specification is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTE 1: All voltage values, except differential input voltages, are with respect to the midpoint between V_{CC+} and V_{CC-}.

DISSIPATION RATING TABLE

PACKAGE	$T_A \leq 25°C$ POWER RATING	DERATING FACTOR	DERATE ABOVE T_A	$T_A = 70°C$ POWER RATING	$T_A = 125°C$ POWER RATING
D	500 mW	N/A	N/A	500 mW	N/A
J (uA733M)	500 mW	11.0 mW/°C	104°C	500 mW	269 mW
N	500 mW	N/A	N/A	500 mW	N/A
U	500 mW	5.4 mW/°C	57°C	430 mW	133 mW

electrical characteristics, $V_{CC\pm}$ = ±6 V, T_A = 25°C

PARAMETER		FIGURE	TEST CONDITIONS	GAIN OPTION†	uA733C			uA733M			UNIT
					MIN	TYP	MAX	MIN	TYP	MAX	
A_{VD}	Large-signal differential voltage amplification	1	V_{OD} = 1 V	1	250	400	600	300	400	500	V/V
				2	80	100	120	90	100	110	
				3	8	10	12	9	10	11	
BW	Bandwidth	2	R_S = 50 Ω	1		50			50		MHz
				2		90			90		
				3		200			200		
I_{IO}	Input offset current			Any		0.4	5		0.4	3	µA
I_{IB}	Input bias current			Any		9	30		9	20	µA
V_{ICR}	Common-mode input voltage range	1		Any	±1			±1			V
V_{OC}	Common-mode output voltage	1		Any	2.4	2.9	3.4	2.4	2.9	3.4	V
V_{OO}	Output offset voltage	1		1		0.6	1.5		0.6	1.5	V
				2 & 3		0.35	1.5		0.35	1	
V_{OPP}	Maximum peak-to-peak output voltage swing	1		Any	3	4.7		3	4.7		V
r_i	Input resistance	3	V_{OD} ≤ 1 V	1		4			4		kΩ
				2	10	24		20	24		
				3		250			250		
r_o	Output resistance					20			20		Ω
C_i	Input capacitance	3	V_{OD} ≤ 1 V	2		2			2		pF
CMRR	Common-mode rejection ration	4	V_{IC} = ± 1 V, f ≤ 100 kHz	2	60	86		60	86		dB
			V_{IC} = ± 1 V, f = 5 MHz	2		70			70		
k_{SVR}	Supply voltage rejection ratio ($\Delta V_{CC}/\Delta V_{IO}$)	1	$\Delta V_{CC\pm}$ = ± 0.5 V	2	50	70		50	70		dB
V_n	Broadband equivalent input noise voltage	5	BW = 1 kHz to 10 MHz	Any		12			12		µV
t_{pd}	Propagation delay time	2	R_S = 50 Ω, Ourput voltage step = 1 V	1		7.5			7.5		ns
				2		6.0	10		6.0	10	
				3		3.6			3.6		
t_r	Rise time	2	R_S = 50 Ω, Ourput voltage step = 1 V	1		10.5			10.5		ns
				2		4.5	12		4.5	10	
				3		2.5			2.5		
$I_{sink(max)}$	Maximum output sink current			Any	2.5	3.6		2.5	3.6		mA
I_{CC}	Supply current		No load, No signal	Any		16	24		16	24	mA

† The gain option is selected as follows:
Gain Option 1 . . . Gain-adjust pin 1A is connected to pin 1B, and pins 2A and 2B are open.
Gain Option 2 . . . Gain-adjust pin 1A and pin 1B are open, pin 2A is connected to pin 2B.
Gain Option 3 . . . All four gain-adjust pins are open.

electrical characteristics, $V_{CC\pm}$ = ±6 V, T_A = 0°C to 70°C for uA733C, – 55°C to 125°C for uA733M

PARAMETER		FIGURE	TEST CONDITIONS	GAIN OPTION†	uA733C		uA733M		UNIT
					MIN	MAX	MIN	MAX	
A_{VD}	Large-signal differential voltage amplification	1	V_{OD} = 1 V	1	250	600	200	600	V/V
				2	80	120	80	120	
				3	8	12	8	12	
I_{IO}	Input offset current			Any		6		5	µA
I_{IB}	Input bias current			Any		40		40	µA
V_{ICR}	Common-mode input voltage range	1		Any	±1		±1		V
V_{OO}	Output offset voltage	1		1		1.5		1.5	V
				2 & 3		1.5		1.2	
V_{OPP}	Maximum peak-to-peak output voltage swing	1		Any	2.8		2.5		V
r_i	Input resistance	3	V_{OD} ≤ 1 V	2	8		8		kΩ
CMRR	Common-mode rejection ratio	4	V_{IC} = +1V, f ≤ 100 kHz	2	50		50		dB
k_{SVR}	Supply voltage rejection ratio ($\Delta V_{CC}/(\Delta V_{IO})$	1	$\Delta V_{CC\pm}$ = ±0.5 V	2	50		50		dB
$I_{sink(max)}$	Maximum output sink current			Any	2.5		2.2		mA
I_{CC}	Supply current		No load, No signal	Any		27		27	mA

† The gain option is selected as follows:
Gain Option 1 . . . Gain-adjust pin 1A is connected to pin 1B, and pins 2A and 2B are open.
Gain Option 2 . . . Gain-adjust pin 1A and pin 1B are open, pin 2A is connected to pin 2B.
Gain Option 3 . . . All four gain-adjust pins are open.

PARAMETER MEASUREMENT INFORMATION

test circuits

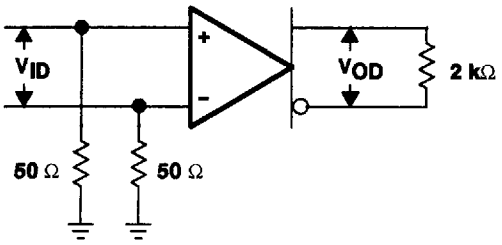


Figure 1

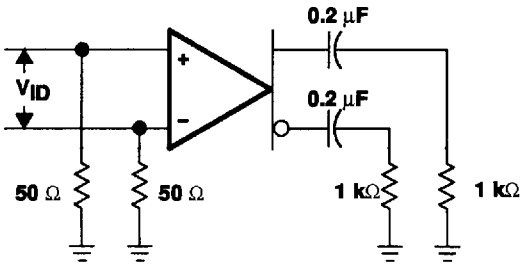


Figure 2

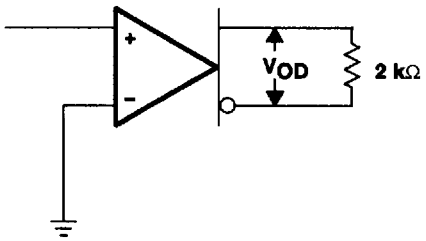


Figure 3

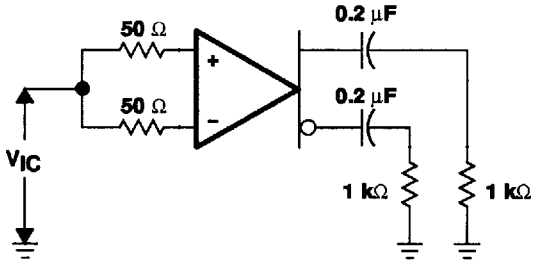


Figure 4

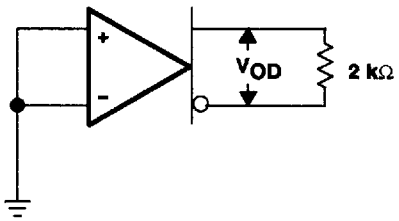
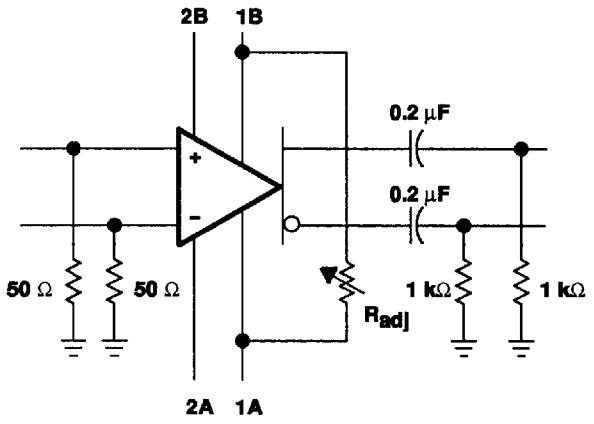


Figure 5



VOLTAGE AMPLIFICATION ADJUSTMENT

Figure 6

TEXAS INSTRUMENTS
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TYPICAL CHARACTERISTICS

PHASE SHIFT
vs
FREQUENCY

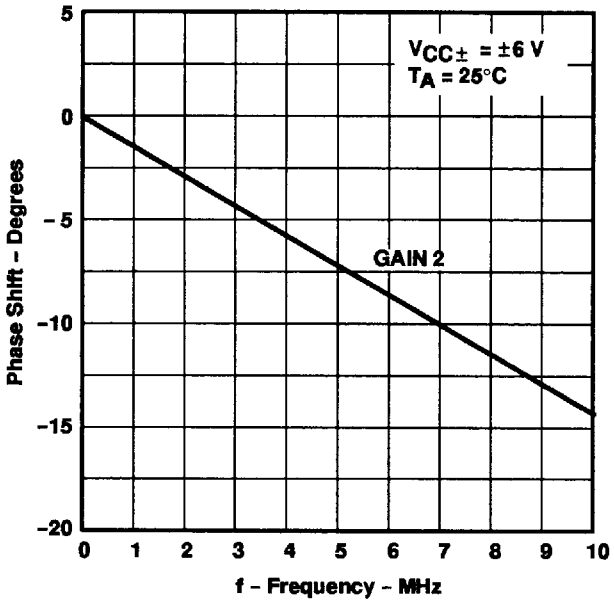

Figure 7

PHASE SHIFT
vs
FREQUENCY

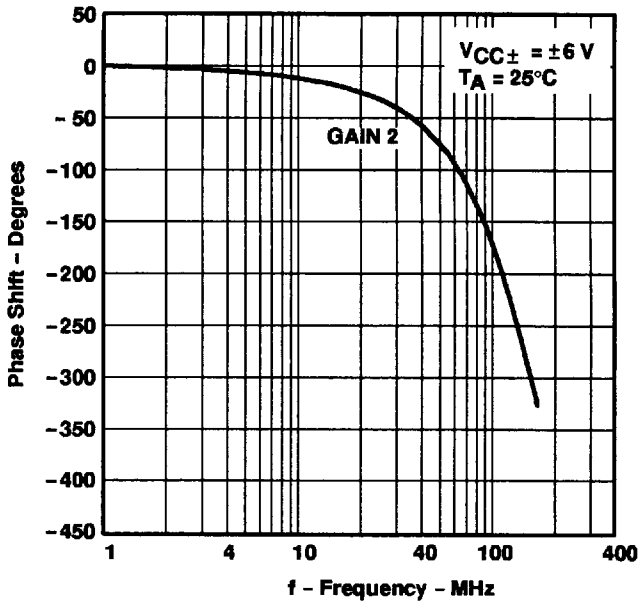

Figure 8

VOLTAGE AMPLIFICATION
(SINGLE-ENDED OR DIFFERENTIAL)
vs
TEMPERATURE

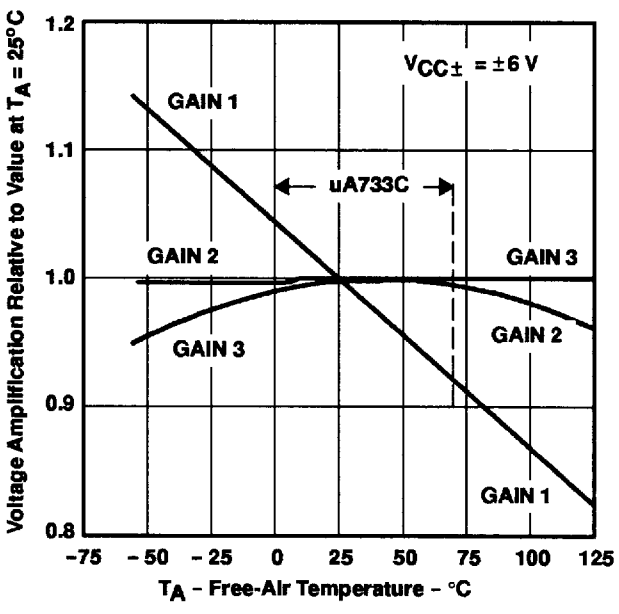

Figure 9

VOLTAGE AMPLIFICATION
(SINGLE-ENDED OR DIFFERENTIAL)
vs
SUPPLY VOLTAGE

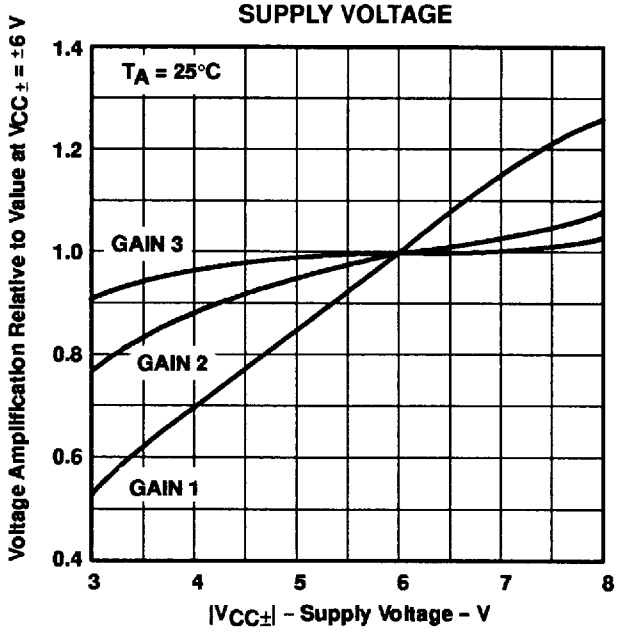

Figure 10

TYPICAL CHARACTERISTICS

DIFFERENTIAL VOLTAGE AMPLIFICATION
vs
RESISTANCE BETWEEN G1A AND G1B

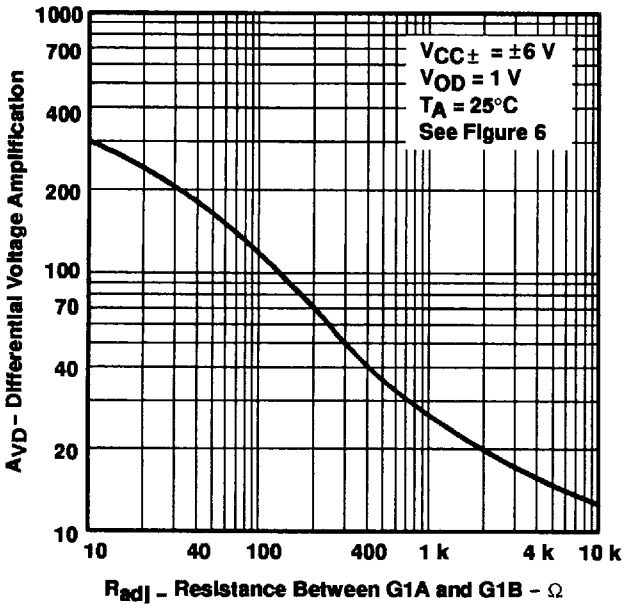

Figure 11

SINGLE-ENDED VOLTAGE AMPLIFICATION
vs
FREQUENCY

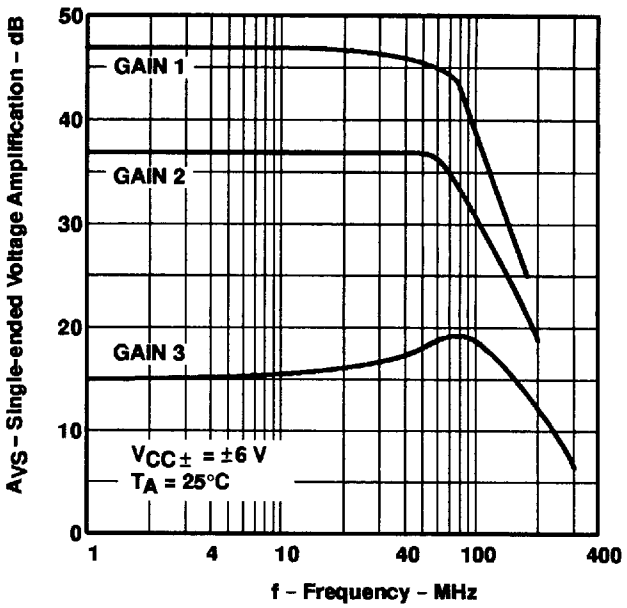

Figure 12

SUPPLY CURRENT
vs
FREE-AIR TEMPERATURE

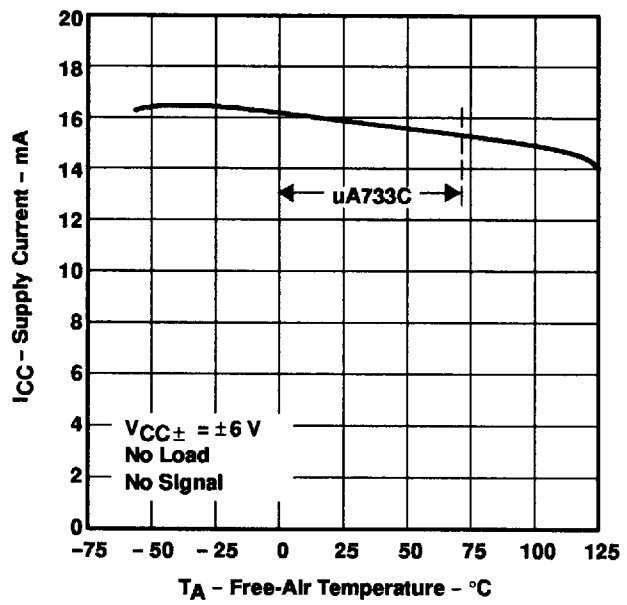

Figure 13

SUPPLY CURRENT
vs
SUPPLY VOLTAGE

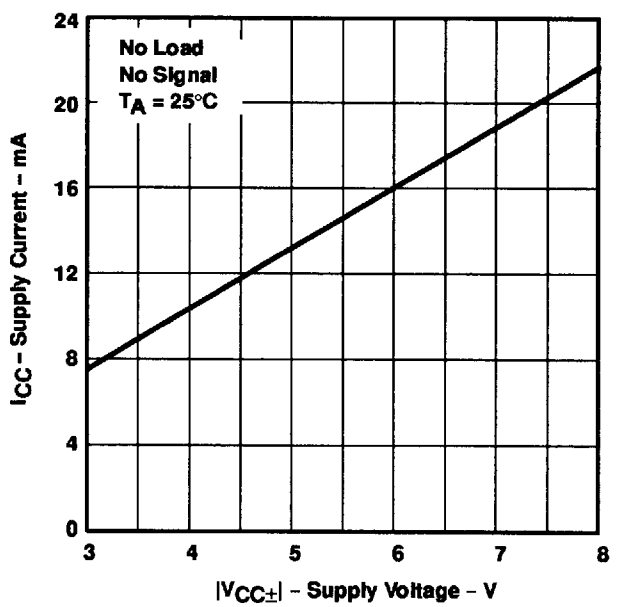

Figure 14

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TYPICAL CHARACTERISTICS

MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE
vs
LOAD RESISTANCE

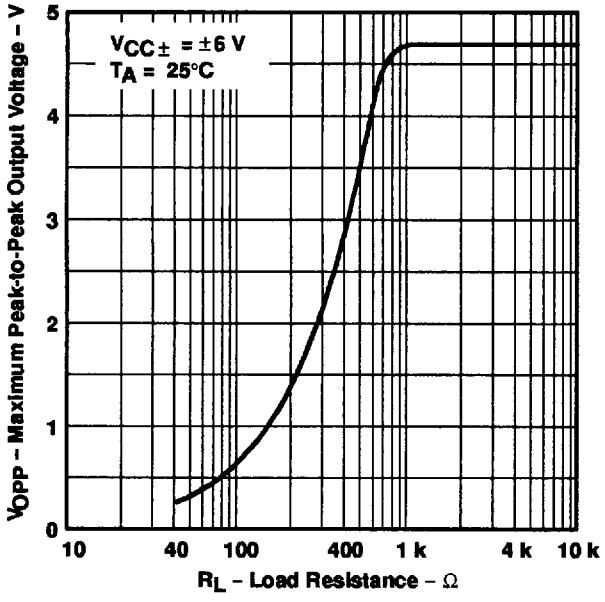

Figure 15

MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE
vs
SUPPLY VOLTAGE

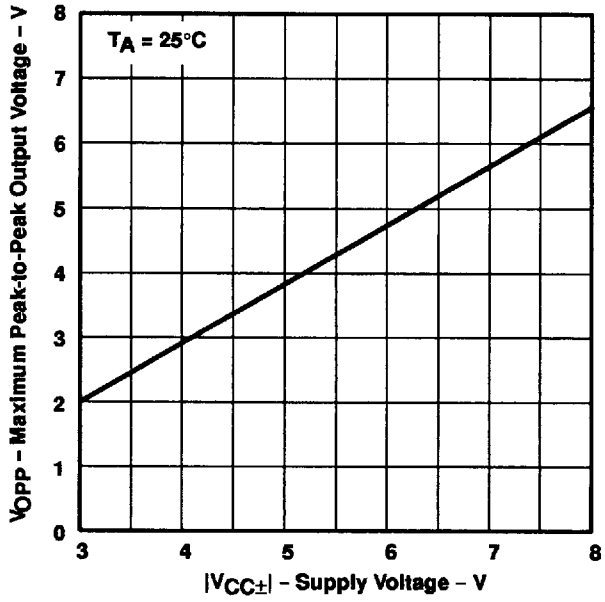

Figure 16

MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE
vs
FREQUENCY

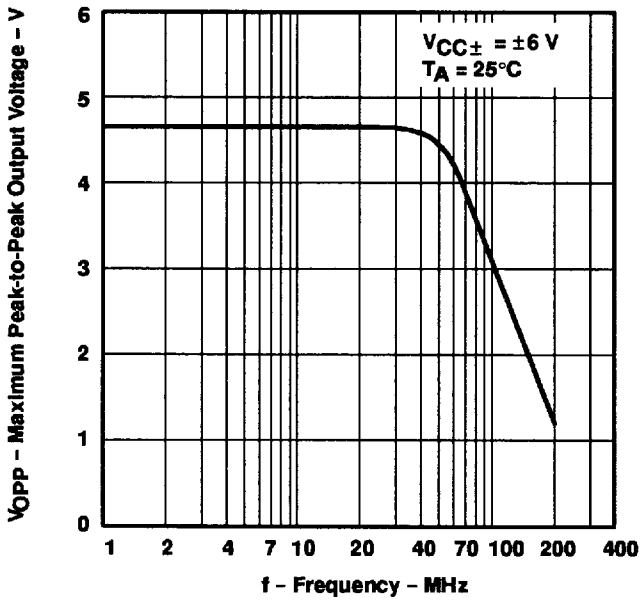

Figure 17

INPUT RESISTANCE
vs
FREE-AIR TEMPERATURE

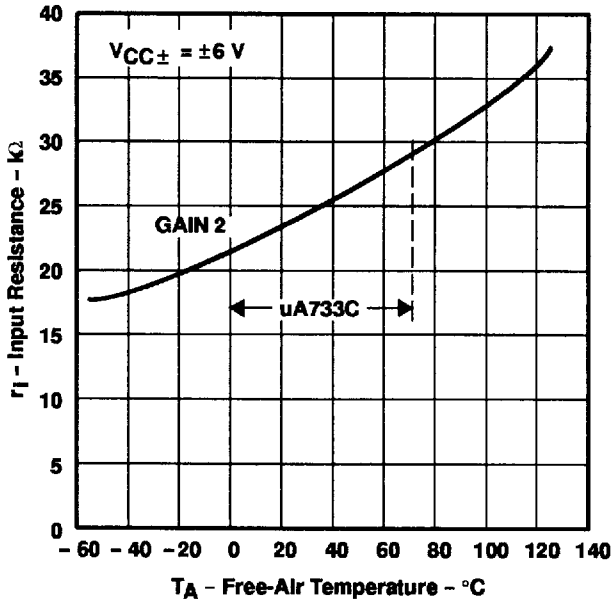

Figure 18