signetics

DIFFERENTIAL VIDEO AMPLIFIER | μA733

LINEAR INTEGRATED CIRCUITS

DESCRIPTION

The 733 is a monolithic differential input, differential output, wideband 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

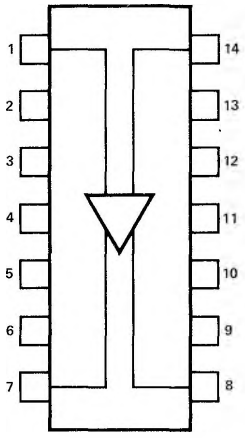
- **120 MHz BANDWIDTH**
- **250kΩ INPUT RESISTANCE**
- **SELECTABLE GAINS OF 10,100 and 400**
- **NO FREQUENCY COMPENSATION REQUIRED**

ABSOLUTE MAXIMUM RATINGS

Differential Input Voltage	±5V
Common Mode Input Voltage	±6V
V_{CC}	±8V
Output Current	10mA
Junction Temperature	+150°C
Storage Temperature Range	-65°C to +150°C
Operation Temperature Range	
μA733C	0°C to +75°C
μA733	-55°C to +75°C

PIN CONFIGURATIONS

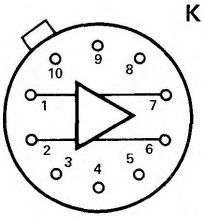
A & F PACKAGE



1. Input 2
2. NC
3. G_{2B} Gain Select
4. G_{1B} Gain Select
5. V^-
6. NC
7. Output 2
8. Output 1
9. NC
10. V^+
11. G_{1A} Gain Select
12. G_{2A} Gain Select
13. NC
14. Input 1

ORDER PART NOS.
μA733A/ μA733F/
μA733CA/ μA733CF

K PACKAGE



1. Input 1
2. Input 2
3. G_{2B} Gain Select
4. G_{1B} Gain Select
5. V^-
6. Output 2
7. Output 1
8. V^+
9. G_{1A} Gain Select
10. G_{2A} Gain Select

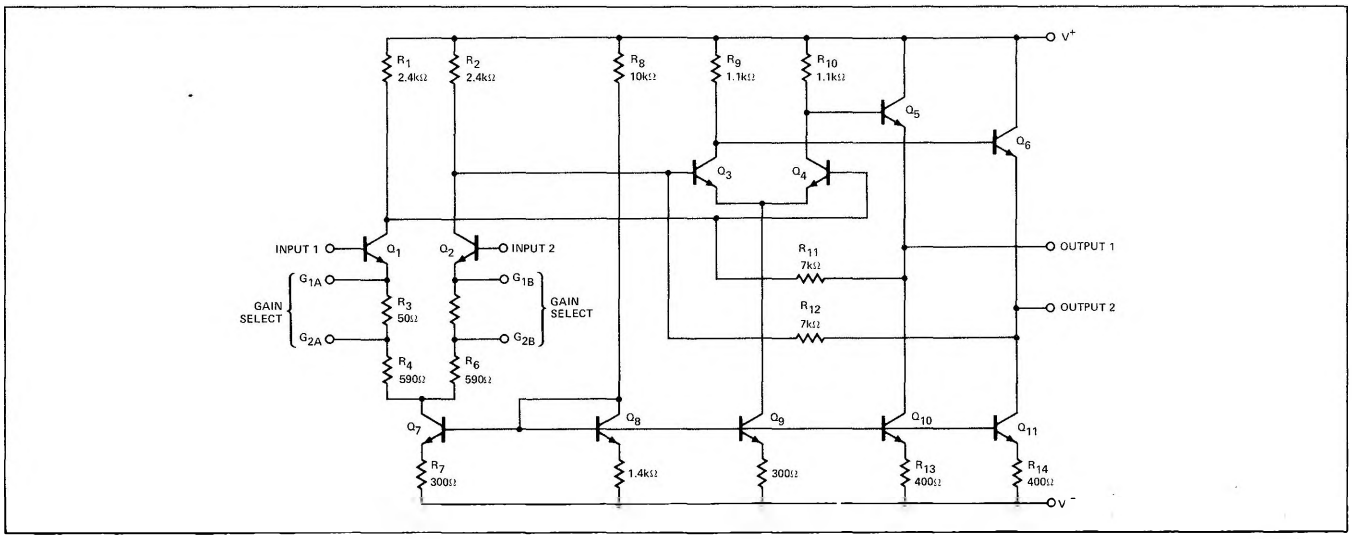
NOTE: Pin 5 connected to case.

ORDER PART NOS.
μA733K/μA733CK

Thermal Resistance (θ_{J-A}, Junction to Ambient for each package):

A Package	0.16°C/mW
F Package	0.10°C/mW
K Package	0.145°C/mW
Power Dissipation	500mW

BASIC CIRCUIT SCHEMATIC



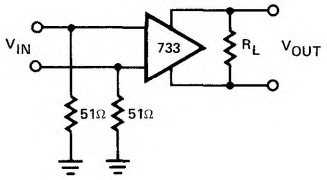
ELECTRICAL CHARACTERISTICS Standard Conditions (T_A = +25°C, V_S = ±V, V_{CM} = 0 unless otherwise specified)

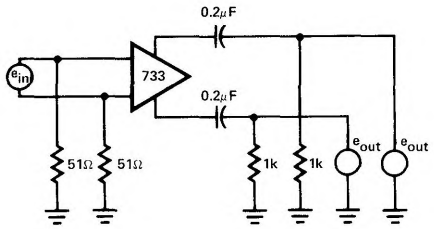
PARAMETERS	TEST CONDITIONS		μA733C			μA733			UNITS
			MIN	TYP	MAX	MIN	TYP	MAX	
Differential Voltage Gain									
Gain 1		Note 1	250	400	600	300	400	500	
Gain 2	R_i = 2kΩ, V_{out} = $3V_{p-p}$	Note 2	80	100	120	90	100	110	
Gain 3		Note 3	8.0	10	12	9.0	10	11	
Bandwidth									
Gain 1		Note 1		40			40		MHz
Gain 2		Note 2		90			90		MHz
Gain 3		Note 3		120			120		MHz
Rise Time									
Gain 1		Note 1		10.5			10.5		ns
Gain 2	V_{out} = $1V_{p-p}$	Note 2		4.5	12		4.5	10	ns
Gain 3		Note 3		2.5			2.5		ns
Propagation Delay									
Gain 1		Note 1		7.5			7.5		ns
Gain 2	V_{out} = $1V_{p-p}$	Note 2		6.0	10		6.0	10	ns
Gain 3		Note 3		3.6			3.6		ns
Input Resistance									
Gain 1		Note 1		4.0			4.0		kΩ
Gain 2		Note 2	10	30		20	30		kΩ
Gain 3		Note 3		250			250		kΩ
Input Capacitance	Gain 2	Note 2		2.0			2.0		pF
Input Offset Current				0.4	5.0		0.4	3.0	μA
Input Bias Current				9.0	30		9.0	20	μA
Input Noise Voltage	BW = 1 kHz to 10 MHz			12			12		$μV_{rms}$
Input Voltage Range			±1.0			±1.0			V
Common Mode Rejection Ratio									
Gain 2	V_{CM} = ±1V, f ⩽ 100 kHz		60	86		60	86		dB
Gain 2	V_{CM} = ±1V, F = 5 MHz			60			60		dB
Supply Voltage Rejection Ratio									
Gain 2	$ΔV_S$ = ±0.5V		50	70		50	70		dB
Output Offset Voltage									
Gain 1	R_L = ∞	Note 1		0.6	1.5		0.6	1.5	V
Gain 2 and 3		Notes 2,3		0.35	1.5		0.35	1.0	V
Output Common Mode Voltage	R_L = ∞		2.4	2.9	3.4	2.4	2.9	3.4	V
Output Voltage Swing	R_L = 2k		3.0	4.0		3.0	4.0		
Output Sink Current			2.5	3.6		2.5	3.6		mA
Output Resistance				20			20		Ω
Power Supply Current	R_L = ∞			18	24		18	24	mA

Recommended Operating Supply Voltages (V_S = ±6.0V)

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

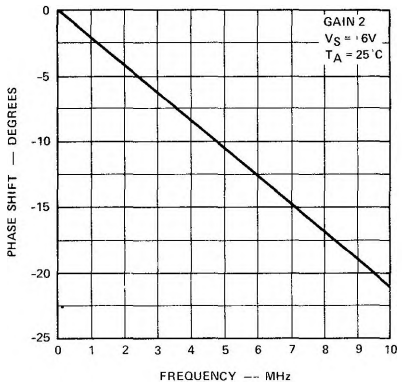
TEST CIRCUITS (T_A = 25°C unless otherwise specified)



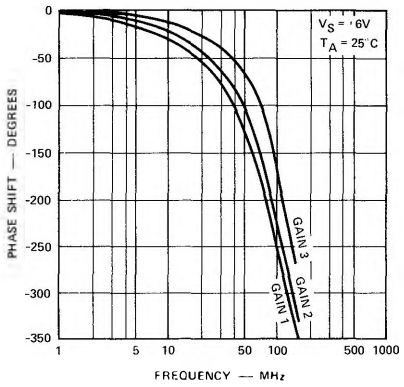


TYPICAL CHARACTERISTIC CURVES

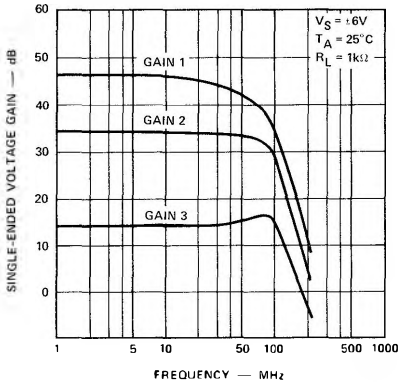
PHASE SHIFT AS A FUNCTION OF FREQUENCY



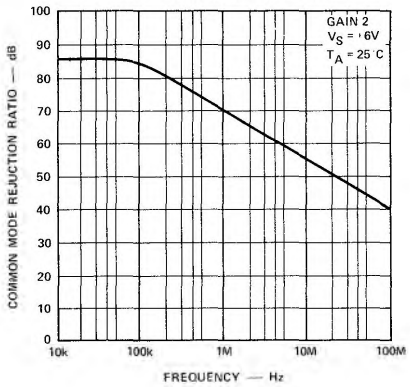
PHASE SHIFT AS A FUNCTION OF FREQUENCY



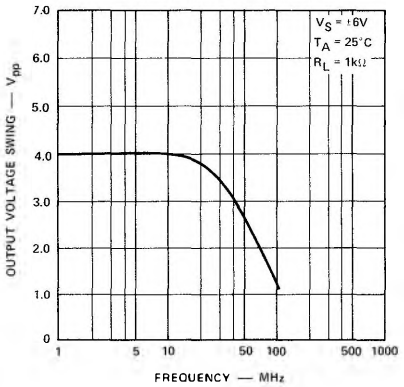
VOLTAGE GAIN AS A FUNCTION OF FREQUENCY



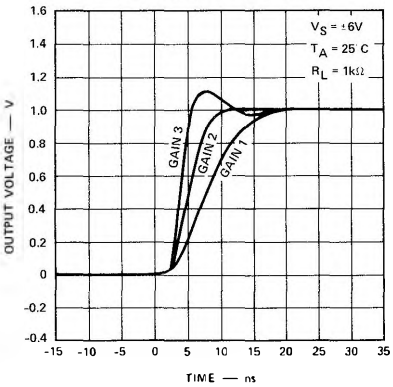
COMMON MODE REJECTION RATIO AS A FUNCTION OF FREQUENCY



OUTPUT VOLTAGE SWING AS A FUNCTION OF FREQUENCY

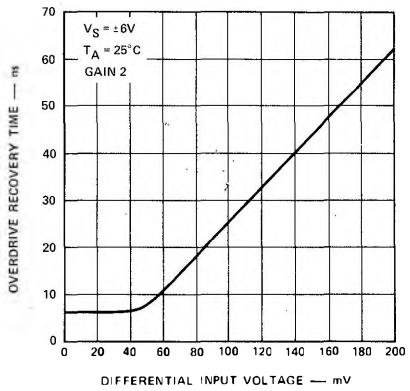


PULSE RESPONSE

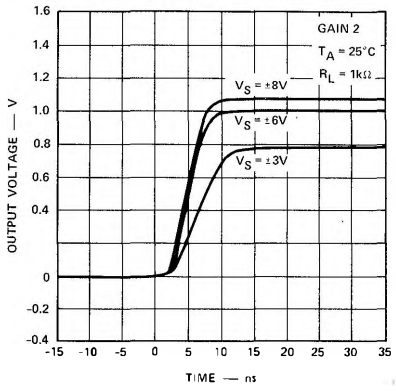


TYPICAL CHARACTERISTIC CURVES (Cont'd.)

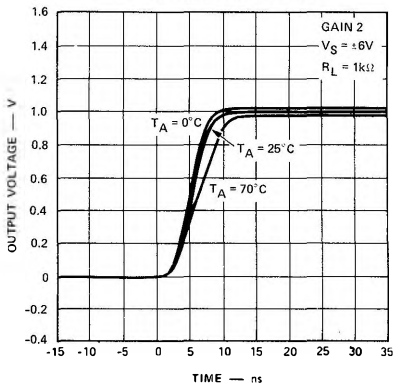
DIFFERENTIAL OVERDRIVE RECOVERY TIME



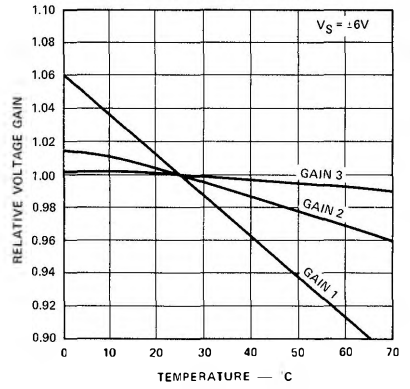
PULSE RESPONSE AS A FUNCTION OF SUPPLY VOLTAGE



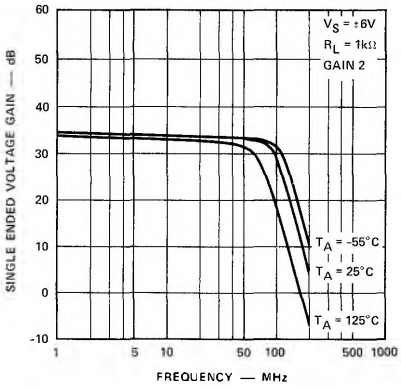
PULSE RESPONSE AS A FUNCTION OF TEMPERATURE



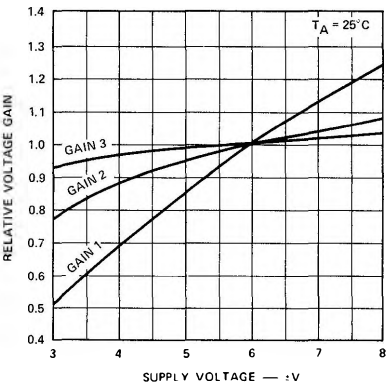
VOLTAGE GAIN AS A FUNCTION OF TEMPERATURE



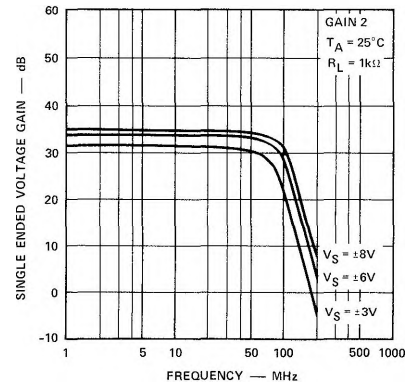
GAIN VS FREQUENCY AS A FUNCTION OF TEMPERATURE



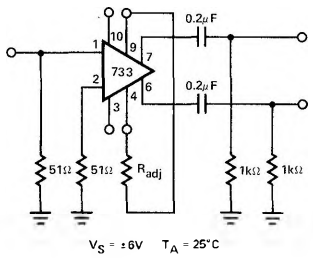
VOLTAGE GAIN AS A FUNCTION OF SUPPLY VOLTAGE



GAIN VS FREQUENCY AS A FUNCTION OF SUPPLY VOLTAGE



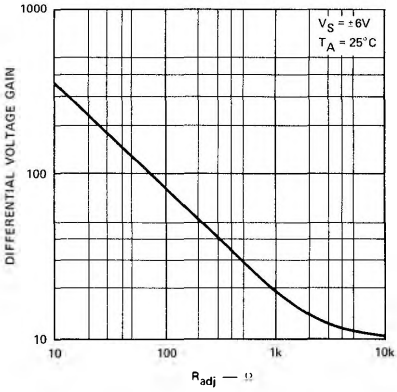
VOLTAGE GAIN ADJUST CIRCUIT



(Pin numbers apply to K Package)

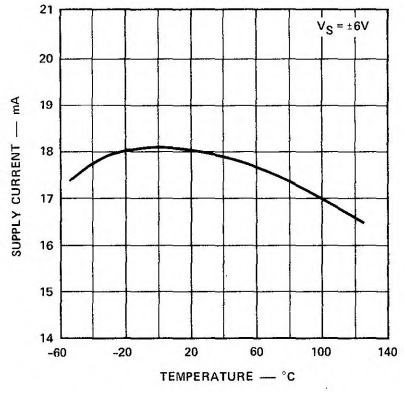
FIGURE 3

VOLTAGE GAIN AS A FUNCTION OF R_{ADJ} (FIGURE 3)

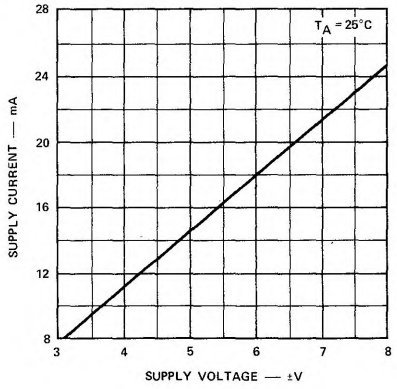


TYPICAL CHARACTERISTIC CURVES (Cont'd.)

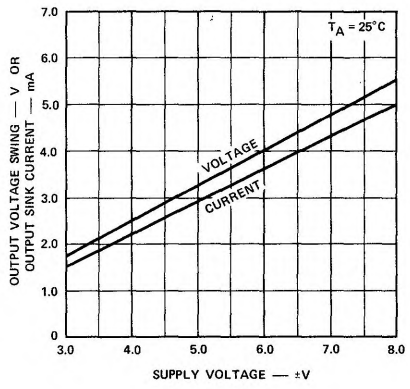
SUPPLY CURRENT AS A FUNCTION OF TEMPERATURE



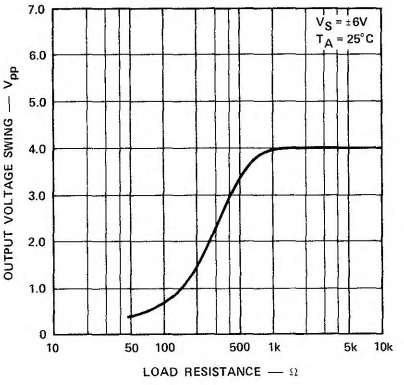
SUPPLY CURRENT AS A FUNCTION OF SUPPLY VOLTAGE



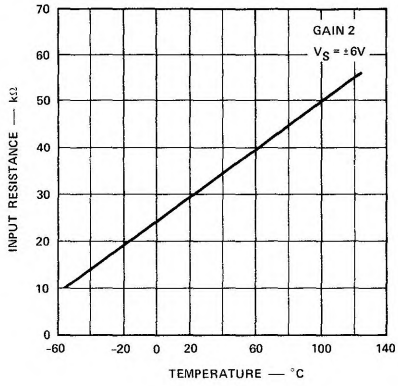
OUTPUT VOLTAGE AND CURRENT SWING AS A FUNCTION OF SUPPLY VOLTAGE



OUTPUT VOLTAGE SWING AS A FUNCTION OF LOAD RESISTANCE



INPUT RESISTANCE AS A FUNCTION OF TEMPERATURE



INPUT NOISE VOLTAGE AS A FUNCTION OF SOURCE RESISTANCE