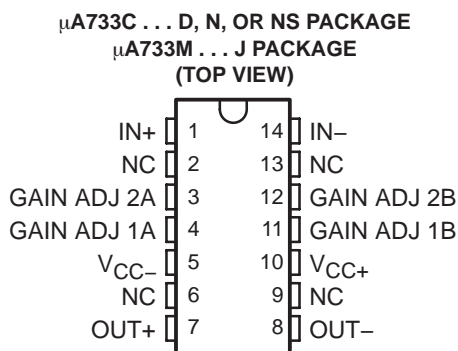
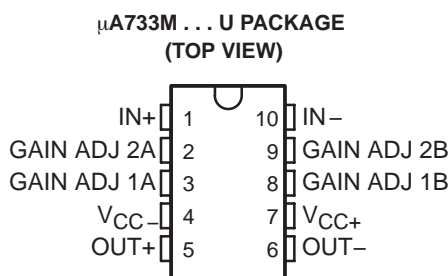


The μA733M is obsolete and no longer supplied.

- 200-MHz Bandwidth
- 250-kΩ Input Resistance
- Selectable Nominal Amplification of 10, 100, or 400
- No Frequency Compensation Required



NC — No internal connection



description/ordering information

The μA733 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.

The μA733C is characterized for operation from 0°C to 70°C; the μA733M is characterized for operation over the full military temperature range of –55°C to 125°C.

ORDERING INFORMATION

| TA | PACKAGE† | | ORDERABLE PART NUMBER | TOP-SIDE MARKING |
|-------------|--------------|--------------|-----------------------|------------------|
| 0°C to 70°C | P-DIP (N) | Tube of 25 | UA733CN | UA733CN |
| | | Reel of 2500 | UA733CDR | UA733C |
| | SOIC (D) | Tube of 50 | UA733CD | UA733C |
| | | Reel of 2500 | UA733CDR | UA733C |
| SOP (NS) | Reel of 2000 | UA733CNSR | UA733 | |

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.



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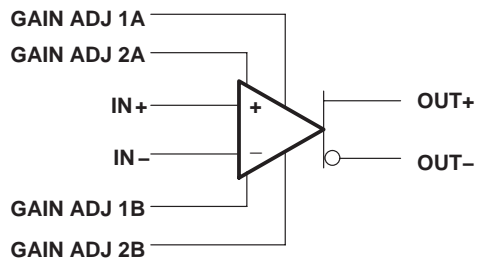
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μ A733C, μ A733M DIFFERENTIAL VIDEO AMPLIFIERS

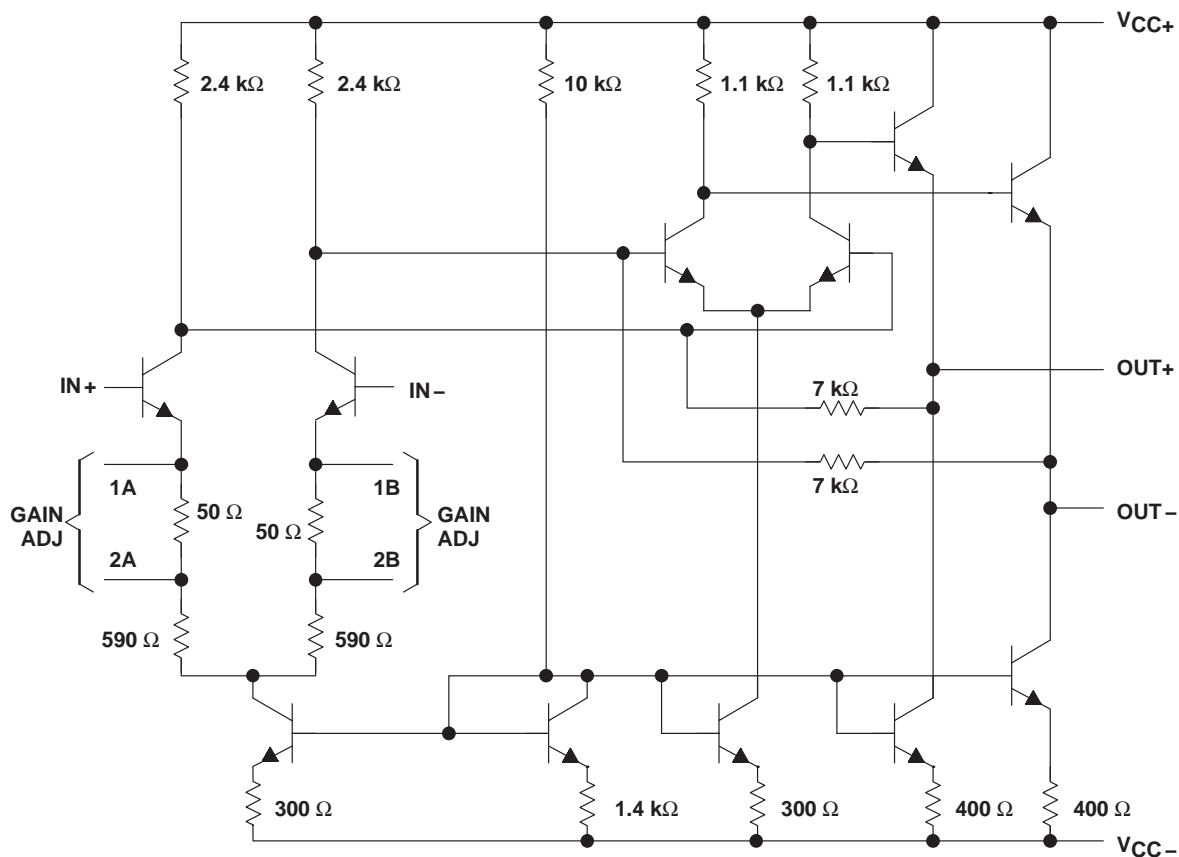
The μ A733M is obsolete
and no longer supplied.

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symbol



schematic



Component values shown are nominal.

The μ A733M is obsolete and no longer supplied.

μ A733C, μ A733M
DIFFERENTIAL VIDEO AMPLIFIERS

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

| | μ A733C | μ A733M | 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 | | | |
| Package thermal impedance, θ_{JA} (see Notes 2 and 3) | D package | 86 | °C/W | |
| | N package | 80 | | |
| | NS package | 76 | | |
| Maximum junction temperature, T_J | 150 | | °C | |
| Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds | J or U package | | 300 | °C |
| Storage temperature range, T_{stg} | - 65 to 150 | - 65 to 150 | °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.

- NOTES:
1. All voltage values, except differential input voltages, are with respect to the midpoint between V_{CC+} and V_{CC-} .
 2. Maximum power dissipation is a function of $T_J(\max)$, θ_{JA} , and T_A . The maximum allowable power dissipation at any allowable ambient temperature is $PD = (T_J(\max) - T_A)/\theta_{JA}$. Operating at the absolute maximum T_J of 150°C can affect reliability.
 3. The package thermal impedance is calculated in accordance with JESD 51-7.

DISSIPATION RATING TABLE

| PACKAGE | $T_A \leq 25^\circ\text{C}$ POWER RATING | DERATING FACTOR | DERATE ABOVE T_A | $T_A = 70^\circ\text{C}$ POWER RATING | $T_A = 125^\circ\text{C}$ POWER RATING |
|------------------|---|--------------------|-----------------------|--|---|
| J (μ A733M) | 500 mW | 11.0 mW/°C | 104°C | 500 mW | 269 mW |

μA733C, μA733M DIFFERENTIAL VIDEO AMPLIFIERS

The μA733M is obsolete
and no longer supplied.

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electrical characteristics, $V_{CC\pm} = \pm 6\text{ V}$, $T_A = 25^\circ\text{C}$

| PARAMETER | FIGURE | TEST CONDITIONS | GAIN OPTION† | μA733C | | | μA733M | | | UNIT |
|------------------------|--------|--|--------------|--------|-----|-----|--------|-----|-----|------|
| | | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| A _{VD} | 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 | 2 | R _S = 50 Ω | 1 | 50 | | | 50 | | | MHz |
| | | | 2 | 90 | | | 90 | | | |
| | | | 3 | 200 | | | 200 | | | |
| I _{IO} | | | Any | 0.4 | | 5 | 0.4 | | 3 | μA |
| I _{IB} | | | Any | 9 | | 30 | 9 | | 20 | μA |
| V _{ICR} | 1 | | Any | ±1 | | | ±1 | | | V |
| V _{OC} | 1 | | Any | 2.4 | 2.9 | 3.4 | 2.4 | 2.9 | 3.4 | V |
| V _{OO} | 1 | | 1 | 0.6 | | 1.5 | 0.6 | | 1.5 | V |
| | | | 2 & 3 | 0.35 | | 1.5 | 0.35 | | 1 | |
| V _{OPP} | 1 | | Any | 3 | 4.7 | | 3 | 4.7 | | V |
| r _i | 3 | V _{OD} ≤ 1 V | 1 | 4 | | | 4 | | | kΩ |
| | | | 2 | 10 | 24 | | 20 | 24 | | |
| | | | 3 | 250 | | | 250 | | | |
| r _o | | | | 20 | | | 20 | | | Ω |
| C _i | 3 | V _{OD} ≤ 1 V | 2 | 2 | | | 2 | | | pF |
| CMRR | 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} | 1 | ΔV _{CC±} = ±0.5 V | 2 | 50 | 70 | | 50 | 70 | | dB |
| V _n | 5 | BW = 1 kHz to 10 MHz | Any | 12 | | | 12 | | | μV |
| t _{pd} | 2 | R _S = 50 Ω, Output voltage step = 1 V | 1 | 7.5 | | | 7.5 | | | ns |
| | | | 2 | 6.0 | 10 | | 6.0 | 10 | | |
| | | | 3 | 3.6 | | | 3.6 | | | |
| t _r | 2 | R _S = 50 Ω, Output 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)} | | | Any | 2.5 | 3.6 | | 2.5 | 3.6 | | mA |
| I _{CC} | | 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.



The μ A733M is obsolete
and no longer supplied.

μ A733C, μ A733M
DIFFERENTIAL VIDEO AMPLIFIERS

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electrical characteristics, $V_{CC\pm} = \pm 6$ V, $T_A = 0^\circ\text{C}$ to 70°C for μ A733C, -55°C to 125°C for μ A733M

| PARAMETER | FIGURE | TEST CONDITIONS | GAIN OPTION† | μ A733C | | μ A733M | | UNIT |
|------------------------|--------|---|--------------|-------------|-----|-------------|-----|------------|
| | | | | MIN | MAX | MIN | MAX | |
| A _{VD} | 1 | V _{OD} = 1 V | 1 | 250 | 600 | 200 | 600 | V/V |
| | | | 2 | 80 | 120 | 80 | 120 | |
| | | | 3 | 8 | 12 | 8 | 12 | |
| I _{IO} | | | Any | | 6 | | 5 | μ A |
| I _{IB} | | | Any | | 40 | | 40 | μ A |
| V _{ICR} | 1 | | Any | ± 1 | | ± 1 | | V |
| V _{OO} | 1 | | 1 | | 1.5 | | 1.5 | V |
| | | | 2 & 3 | | 1.5 | | 1.2 | |
| V _{OPP} | 1 | | Any | 2.8 | | 2.5 | | V |
| r _i | 3 | V _{OD} \leq 1 V | 2 | 8 | | 8 | | k Ω |
| CMRR | 4 | V _{IC} = +1 V, f \leq 100 kHz | 2 | 50 | | 50 | | dB |
| k _{SVR} | 1 | $\Delta V_{CC\pm} = \pm 0.5$ V | 2 | 50 | | 50 | | dB |
| I _{sink(max)} | | | Any | 2.5 | | 2.2 | | mA |
| I _{CC} | | 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

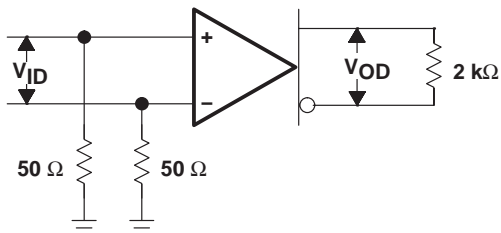


Figure 1

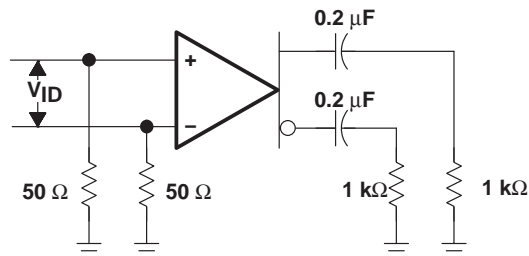


Figure 2

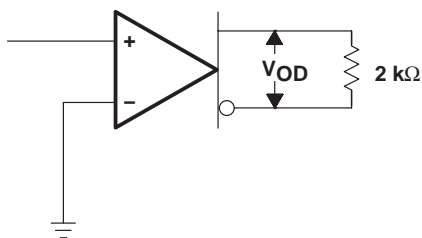


Figure 3

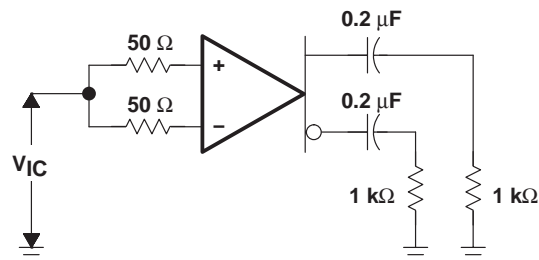


Figure 4

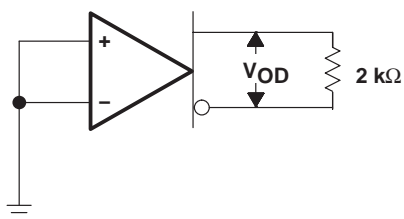
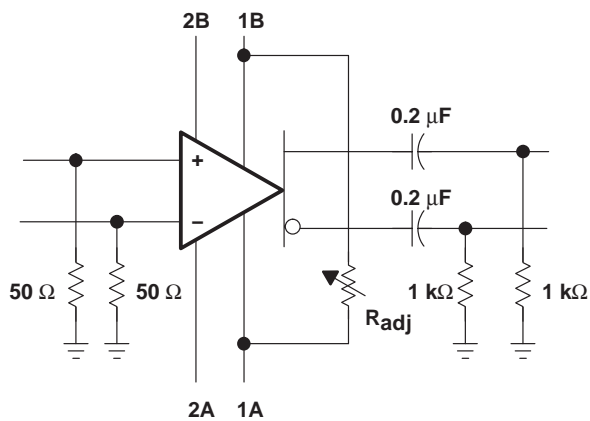


Figure 5



VOLTAGE AMPLIFICATION ADJUSTMENT

Figure 6

TYPICAL CHARACTERISTICS

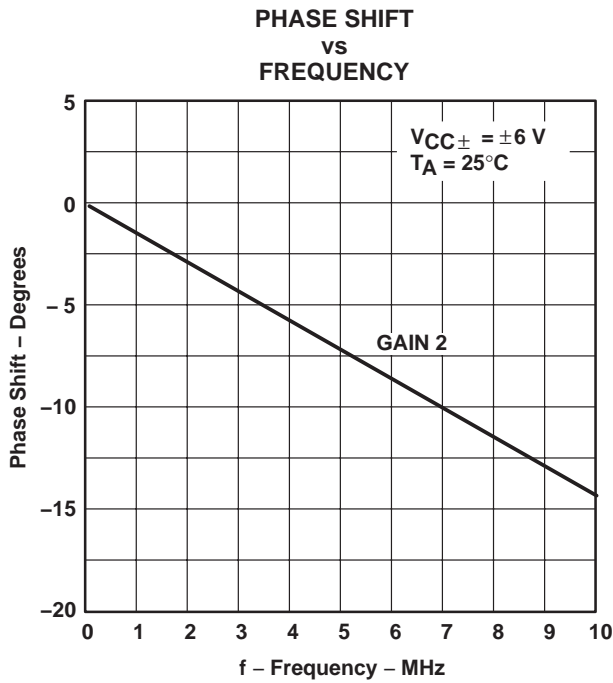


Figure 7

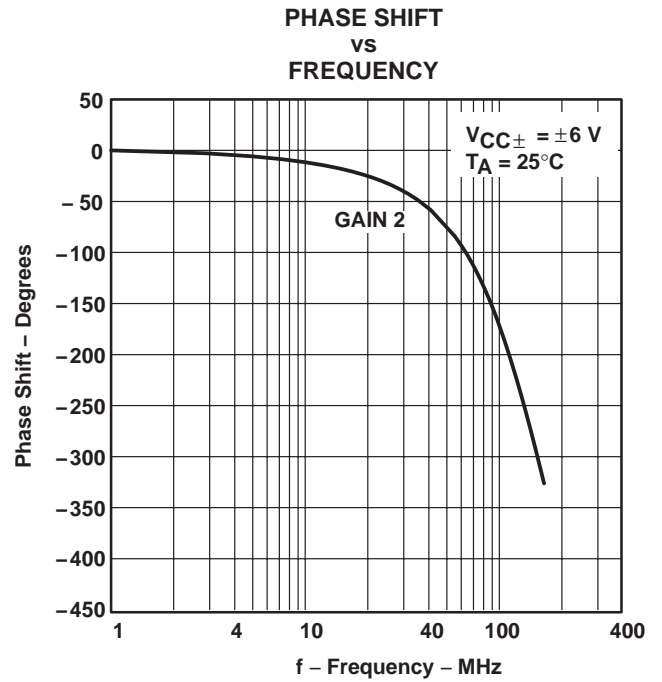


Figure 8

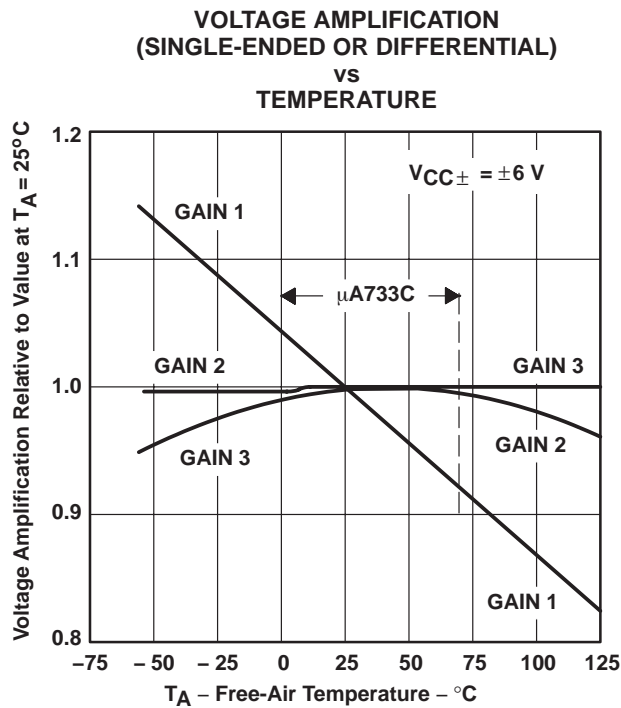


Figure 9

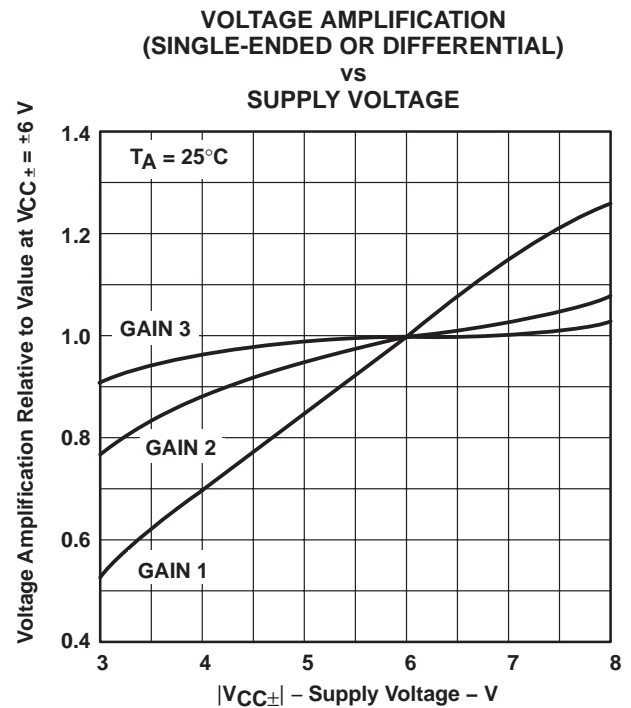


Figure 10

TYPICAL CHARACTERISTICS

**DIFFERENTIAL VOLTAGE AMPLIFICATION
 vs
 RESISTANCE BETWEEN G1A AND G1B**

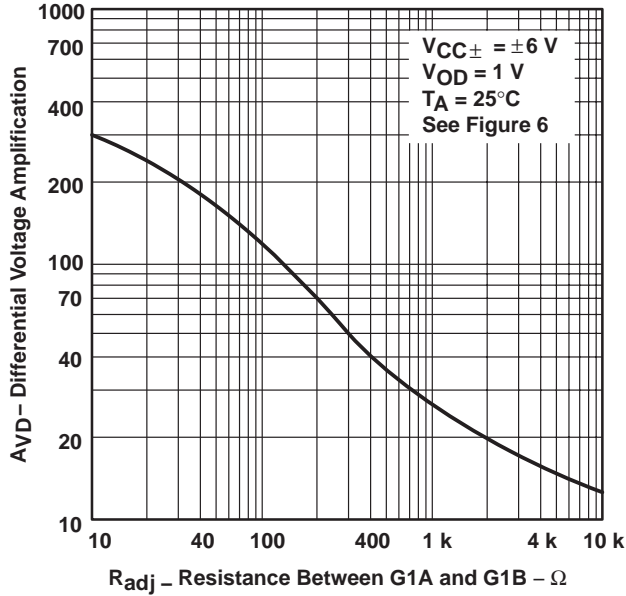


Figure 11

**SINGLE-ENDED VOLTAGE AMPLIFICATION
 vs
 FREQUENCY**

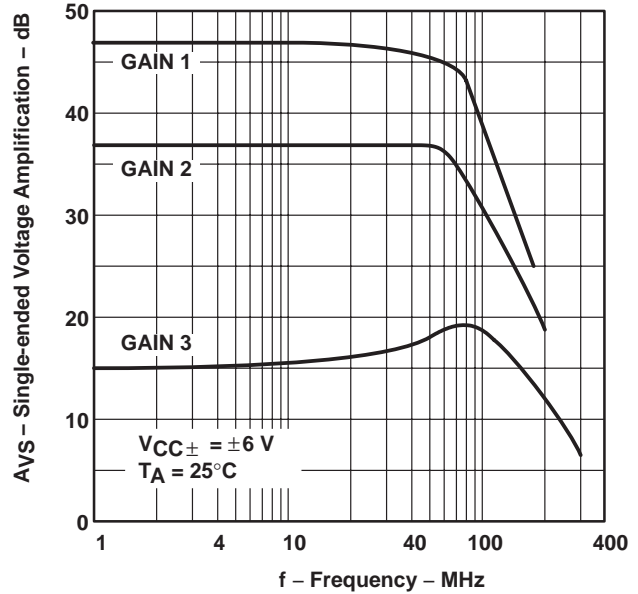


Figure 12

**SUPPLY CURRENT
 vs
 FREE-AIR TEMPERATURE**

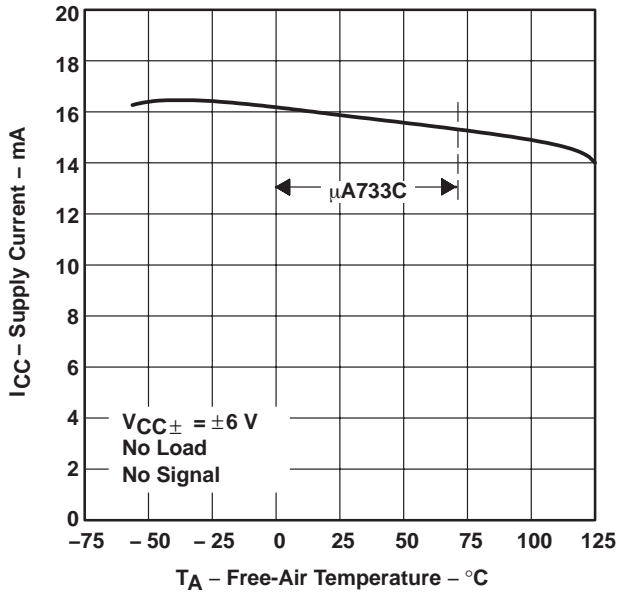


Figure 13

**SUPPLY CURRENT
 vs
 SUPPLY VOLTAGE**

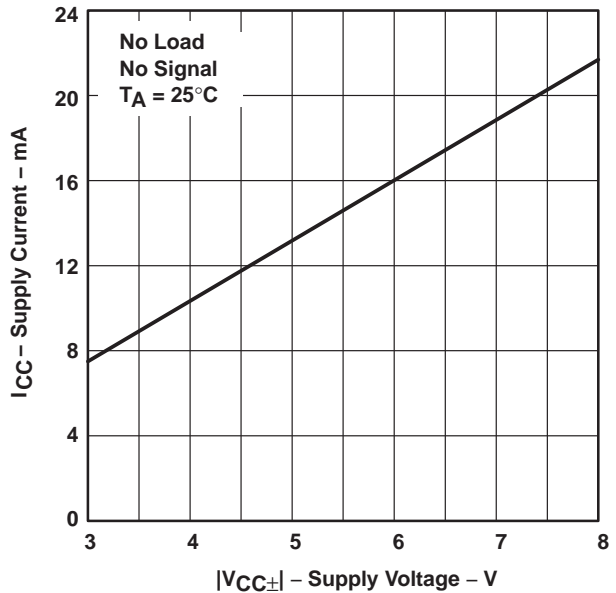


Figure 14

TYPICAL CHARACTERISTICS

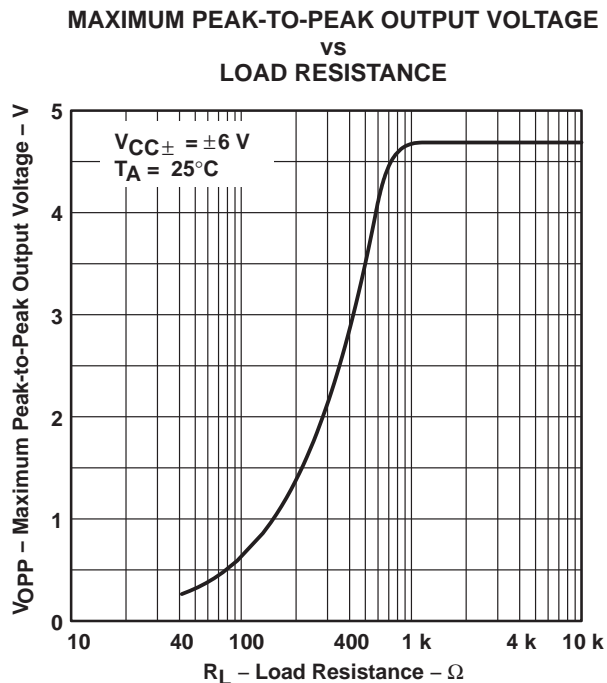


Figure 15

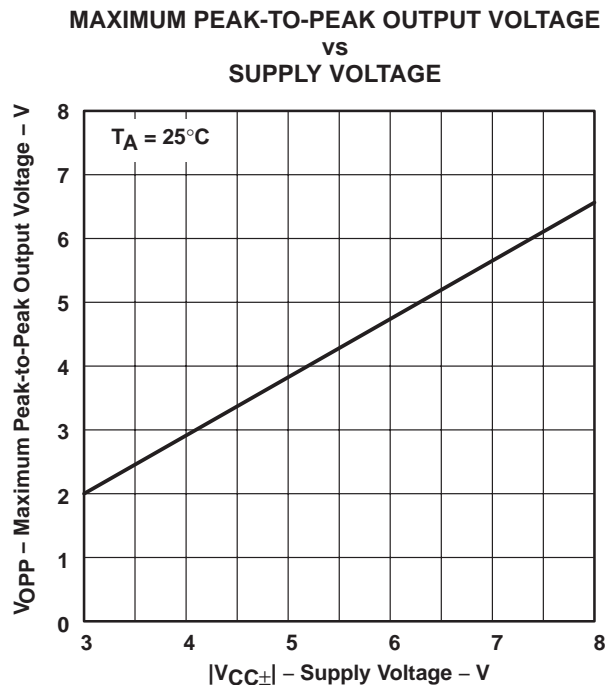


Figure 16

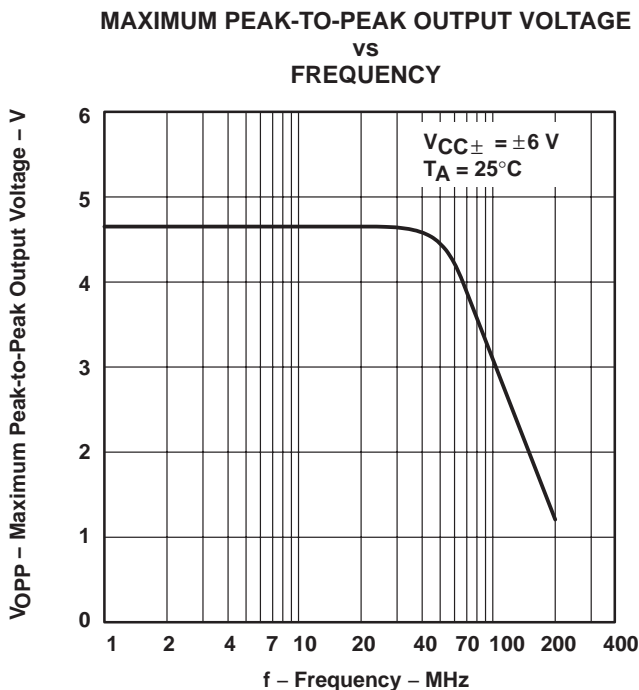


Figure 17

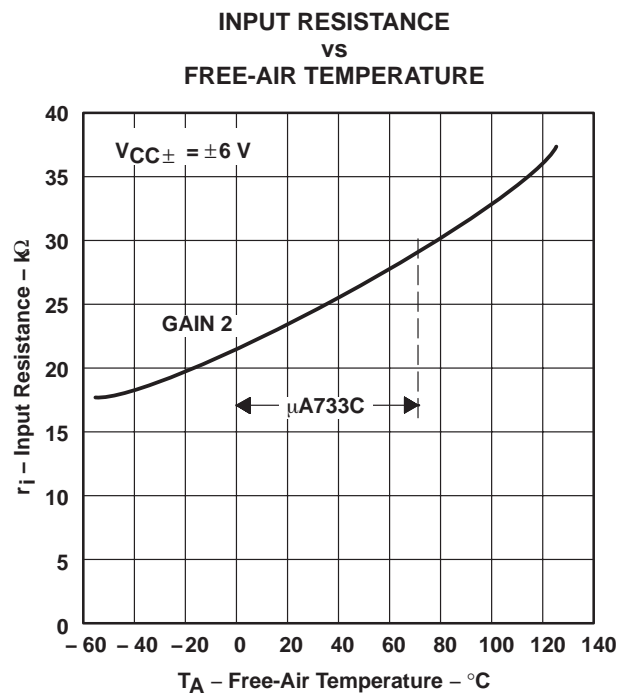


Figure 18

PACKAGING INFORMATION

| Orderable Device | Status (1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan (2) | Lead finish/ Ball material (6) | MSL Peak Temp (3) | Op Temp (°C) | Device Marking (4/5) | Samples |
|------------------|---------------|--------------|-----------------|------|-------------|-----------------|--------------------------------------|----------------------|--------------|-------------------------|-------------------------|
| UA733CD | ACTIVE | SOIC | D | 14 | 50 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | UA733C | Samples |
| UA733CDR | ACTIVE | SOIC | D | 14 | 2500 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | UA733C | Samples |
| UA733CN | ACTIVE | PDIP | N | 14 | 25 | RoHS & Green | NIPDAU | N / A for Pkg Type | 0 to 70 | UA733CN | Samples |
| UA733CNSR | ACTIVE | SO | NS | 14 | 2000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | UA733 | Samples |

(1) The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "-" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead finish/Ball material - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

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TAPE AND REEL INFORMATION

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE


*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|-----------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| UA733CDR | SOIC | D | 14 | 2500 | 330.0 | 16.4 | 6.5 | 9.0 | 2.1 | 8.0 | 16.0 | Q1 |
| UA733CNSR | SO | NS | 14 | 2000 | 330.0 | 16.4 | 8.2 | 10.5 | 2.5 | 12.0 | 16.0 | Q1 |

TAPE AND REEL BOX DIMENSIONS


*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|-----------|--------------|-----------------|------|------|-------------|------------|-------------|
| UA733CDR | SOIC | D | 14 | 2500 | 853.0 | 449.0 | 35.0 |
| UA733CNSR | SO | NS | 14 | 2000 | 853.0 | 449.0 | 35.0 |

MECHANICAL DATA

NS (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

D (R-PDSO-G14)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Publication IPC-7351 is recommended for alternate designs.
 - D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
 - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

N (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
 - The 20 pin end lead shoulder width is a vendor option, either half or full width.

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