



VTC
Incorporated

VA733

DIFFERENTIAL VIDEO AMPLIFIER

T-74-07-01

FEATURES

- 80MHz Bandwidth at $A_v = 400$
- Selectable Gains of 10, 100 and 400
- No Frequency Compensation Required
- Low Input Noise: Broadband Noise $4\mu\text{Vrms}$
Spot Noise $0.9\text{nV}/\sqrt{\text{Hz}}$

DESCRIPTION

The VA733 is a two-stage differential input, differential output wideband video amplifier. It offers jumper selectable gain configurations of 10, 100 and 400 or adjustable gains from 10 to 400 with the use of an external resistor. The amplifier has a bandwidth in excess of 80MHz for all three gain configurations without any gain compensating components.

The VA733 is intended for use as a high quality video and pulse processing amplifier for the communications and computer industries. For example, the large gain bandwidth product and low input noise level of $4\mu\text{Vrms}$ makes the amplifier an excellent choice as a read amplifier in tape and disk data recovery applications.

ABSOLUTE MAXIMUM RATINGS

Supply Voltages	$\pm 8\text{V}$
Differential Input Voltage	$\pm 5\text{V}$
Common Mode Input Voltage	$\pm 6\text{V}$
Output Current	10mA
Junction Temperature	150°C
Power Dissipation ($T_A = 70^\circ\text{C}$, Note 1)	550mW
Operating Temperature Range:	
Commercial (733 J)	0°C to 70°C
Storage Temperature Range	-65°C to $+150^\circ\text{C}$
Lead Temperature (Soldering to 60 Sec.)	300°C

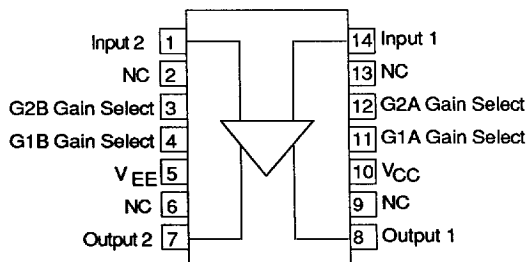
Note 1: Power derating above $T_A = 70^\circ\text{C}$ to be based on a maximum junction temperature of 150°C and the thermal resistance factors of $\theta_{JC} = 75^\circ\text{C}/\text{W}$ and $\theta_{JA} = 145^\circ\text{C}/\text{W}$

PACKAGE TYPES AVAILABLE

- 14-Pin SOIC

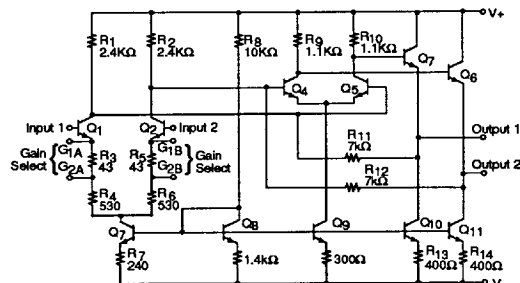
CONNECTION DIAGRAM

14-Lead SOIC Package



Top View

SIMPLIFIED SCHEMATIC



DISCONTINUED

VA733

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ELECTRICAL CHARACTERISTICS $V_{CC} = +6.0VDC$, $V_{EE} = -6.0Vdc$, at $T_A = 25^\circ C$ (unless otherwise stated)

PARAMETER	SYM	TEST CONDITIONS	VA733J			UNITS
			MIN	TYP	MAX	
Differential Voltage Gain, Gain 1 (Note 1) Gain 2 (Note 2) Gain 3 (Note 3)	Avd	$R_{OD} = 2K\Omega$ $V_{OD} = 1V$	250 75 7.5	380 85 8.5	600 110 11	V/V
Bandwidth Gain 1 Gain 2 Gain 3	BW	$R_S = 50\Omega$		80 80 90		MHz
Rise Time Gain 1 Gain 2 Gain 3	t_{TLH} t_{THL}	$R_S = 50\Omega$ $V_{OUT} = 1V_{pp}$		6.0 5.0 5.0	12	ns
Propagation Delay Gain 1 Gain 2 Gain 3	t_{PLH} t_{PHL}	$R_S = 50\Omega$ $V_{OUT} = 1V_{pp}$		4.8 4.8 4.3	10	ns
Input Resistance Gain 1 Gain 2 Gain 3	R_{in}		4	1.5 7 70		k Ω
Input Capacitance (Gain 2)	C_{in}			9		pF
Input Offset Current (Gain 3)	$ I_{IO} $			0.4	10	μA
Input Bias Current (Gain 3)	$ I_{IB} $			45	100	μA
Input Noise Voltage Broadband (Gain 1)	V_n	$R_S = 50\Omega$ $BW = 1kHz$ to $10MHz$		4		$\mu V(rms)$
Input Noise Voltage Spot Noise (Gain 1)		$BW = 20Hz$ $f = 1kHz$ to $20MHz$		0.9		$nV/\sqrt{Hz}$
Input Voltage Range (Gain 3)	V_{in}		± 1.0	+1.4 -3.2		V
Common-Mode Rejection Ratio Gain 2 Gain 2	CMRR	$V_{CM} \pm 1V$, $f < 100kHz$ $V_{CM} \pm 1V$, $f = 5MHz$	60	88 50		dB
Supply Voltage Rejection Ratio Gain 2	PSRR	$(\Delta V_S = \pm 0.5V)$	50	70		dB
Output Offset Voltage Gain 1 Gain 2 and Gain 3	V_{OO}			0.2 0.2	1.5 1	V V
Output Common-Mode Voltage Gain 3	V_{CMO}		2.4	2.9	3.4	V
Output Voltage Swing (Gain 2)	V_O		3.0	4.0		V _{p-p}
Output Sink Current (Gain 2)	I_O		2.5	3.6		mA
Output Resistance	R_{OUT}			35		Ω
Power Supply Current (Gain 2)	I_D			17	24	mA

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ELECTRICAL CHARACTERISTICS (continued)

VCC = +6.0Vdc, VEE = -6.0Vdc, at TA = THIGH to TLOW (unless otherwise stated) (Note 4)

PARAMETER	SYMBOL	VA733J			UNITS
		MIN	TYP	MAX	
Differential Voltage Gain Gain 1 (Note 1) Gain 2 (Note 2) Gain 3 (Note 3)	A _{vd}	250 65 6.5		600 110 11	V/V
Input Resistance (Gain 2)	R _{in}	3K			kΩ
Input Offset Current (Gain 3)	I _{IO}			20	μA
Input Bias Current (Gain 3)	I _B			200	μA
Input Voltage Range (Gain 3)	V _{IN}	± 1.0			V
Common Mode Rejection Ratio	CMRR	50			dB
Supply Voltage Rejection Ratio Gain 2 (ΔV _S = ± 0.5V)	PSRR	50			dB
Output Offset Voltage Gain 1 Gain 2 and Gain 3	V _{OO}			1.5 1.5	V
Output Voltage Swing (Gain 2)	V _O	2.5			Vp-p
Output Sink Current (Gain 2)	I _O	2.5			mA
Power Supply Current (Gain 2)	I _D			27	mA

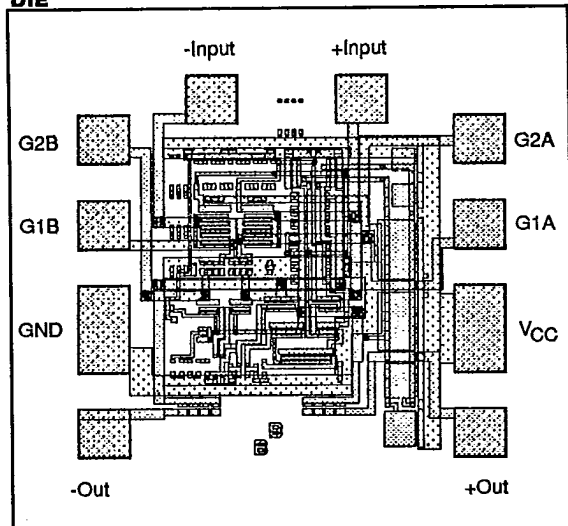
Notes: 1. Gain select pins G_{1A} and G_{1B} connected together
 2. Gain select pins G_{2A} and G_{2B} connected together
 3. All gain select pins open
 4. T_{LOW} = 0°C
 T_{HIGH} = 70°C

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DIE INFORMATION

WAFER TEST LIMITS $V_{CC} = +6.0 \text{ Vdc}$, $V_{EE} = -6.0 \text{ Vdc}$, $T_A = 25^\circ\text{C}$ (unless otherwise specified)					
PARAMETER	SYMBOL	VA733			UNITS
		MIN	TYP	MAX	
Differential Voltage Gain	A_{vd}	300	380	500	V/V
Gain 1 (Note 1)		75	85	100	
Gain 2 (Note 2)		7.5	8.5	10	
Gain 3 (Note 3)					
Input Resistance (Gain 2)	R_{in}	4	7		$k\Omega$
Input Offset Current (Gain 3)	$ I_{IO} $			10	μA
Input Bias Current (Gain 3)	I_{IB}			100	μA
Input Voltage Range (Gain 3)	V_{IN}	± 1.0			V
Common Mode Rejection Ratio	CMRR	50			dB
Supply Voltage Rejection Ratio Gain 2 ($\Delta V_S = \pm 0.5\text{V}$)	PSRR	50			dB
Output Offset Voltage	V_{OO}			1.5	V
Gain 1				1.2	
Gain 2 and Gain 3					
Output Voltage Swing (Gain 2)	V_O	2.5			Vp-p
Output Sink Current (Gain 2)	I_O	2.2			mA
Power Supply Current (Gain 2)	I_D		17	24	mA

Notes: 1. Gain Option 1, Gain-adjust pin G_{1A} is connected to pin G_{1B} , and pins G_{2A} and G_{2B} are open.
 2. Gain Option 2, Gain-adjust pin G_{1A} and G_{1B} are open, and pin G_{2A} is connected to pin G_{2B} .
 3. Gain Option 3, All four gain-adjust pins are open.

DIE

Die size = 0.046 X 0.046 inch (2116 sq mils)
 = 1.17 X 1.17mm (1.37sq mm)

DICE POLICY**Electrical Characteristics**

Each die is electrically tested to the commercial or military grade DC parameters to guard band limits at 25°C to guarantee operation over the full temperature range.

Quality Assurance

All dice are 100% visually inspected to the requirement of MIL-STD-883C, Method 2010.2, Condition 3.

All dice are glass passivated with only the bonding pads exposed to provide scratch protection.

All dice are provided with gold backing.

Shipping Packages/Order Information

All dice are packaged in die crates with individual compartments which prevent damage to the die during shipping. Minimum order for dice is 100, supplied only in multiples of 100.