VANGUARD SEMICONDUCTOR

Division of California Micro Devices **VN2218**

DUAL VIDEO DIFFERENTIAL AMPLIFIER AND SUBTRACTOR

FEATURES

- Dual Wideband Amplifier
- 180 MHz Unity-Gain Bandwidth
- 25 ns Settling Time to 0.1%
- 500 V/µs Slew Rate
- 2ns/2.5ns Rise/Fall Times
- ± 1V Output Voltage Swing
- ± 70mA Output Current(each output)
- 100dB Open Loop Gain

APPLICATIONS

- High Speed A/D, D/A Conversion
- Video Communications
- Pulse Amplifiers
- ATE Pin Electronics
- High Speed Fiber Optics
- Imaging/Display systems
- Radar and IF Processors

PACKAGING OPTIONS

Package Type	Temp. Range
16-pin Cerdip	C, I, M
16-pin P-Dip	C
20-pad LCC	C, I, M

C = 0°C to +70°C
I = -40°C to +85°C
M = -55°C to +125°C

GENERAL DESCRIPTION

The VN2218 is a monolithic device including a dual differential amplifier and a subtractor. It is fabricated using Vanguard Semiconductor's proprietary BiCMOS process technology. The best features of MOS and bipolar devices are used in the VN2218 to achieve excellent dc characteristics while maintaining stable dynamic performance over a wide range of frequencies.

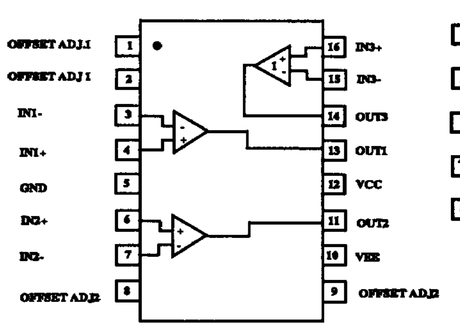
Each differential amplifier features a typical dc gain of 100 dB and current drive of ±70mA. Their unity-gain bandwith is 180 MHz and settling time to 0.1% is 25ns. The subtractor is a differential input, unity-gain buffer with 2mA drive capability. It allows to perform algorithmic functions between the two high-gain , high-drive amplifiers. The VN2218 is ideally suited for analog-to-digital conversion systems operating at video frequencies and above, as well as for wide bandwidth filters. Additionally, its high slew rate of 500V/µs and fast rise and fall times makes the VN2218 an ideal choice for applications requiring pulse detection and amplification.

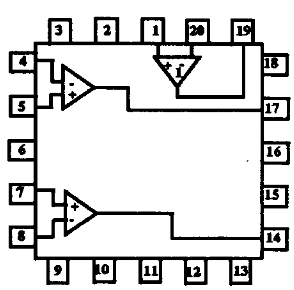
Innovative circuit design techniques have been incorporated in the VN2218 to ensure unity gain stability while driving 50 ohm loads to meet the stringent requirements of high speed pin electronics applications for automated test equipment, and other systems requiring unity gain stability.

The VN2218 provides excellent transient performance in the inverting, non-inverting and differential configurations. Its dc-coupled differential amplifiers have a built-in compensation network reducing the number of external components required. The class AB output stages ensure unity-gain stability with high output swings and low impedance output loads. In addition, this feature eliminates power dissipation variations versus output load.

Offered in 20-pad LCC, 16-pin Cerdip and 16-pin P-Dip packages, the VN2218 is guaranteed to operate over the commercial, industrial, and military temperature ranges using ±5V power supplies.

PINOUT CONFIGURATION S

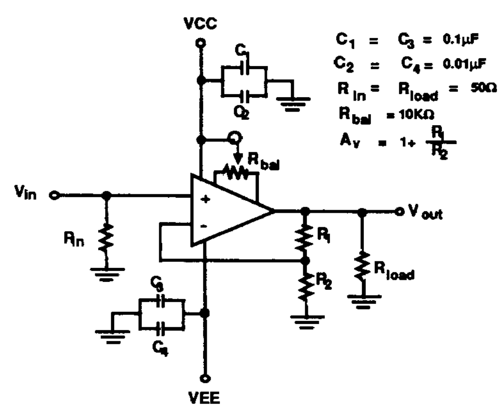




1	IN3+	11	NC
2	OFFSET ADJ.1	12	VEE
3	OFFSET ADJ.1	13	NC
4	IN1-	14	OUT2
5	IN1+	15	NC
6	GND	16	NC
7	IN2+	17	OUT1
8	IN2-	18	NC
9	OFFSET ADJ.2	19	OUT3
10	OFFSET ADJ.2	20	IN3-

This is advance information and specifications are subject to change without notice.

NON-INVERTING CONFIGURATION



ADVANCED PRODUCT INFORMATION

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Absolute Maximum Ratings

Rating	Symbol	Value
Supply Voltage	V_S	±7V
Input Voltage	V_{IN}	±5V
Peak Output Current	I_{OP}	±200mA
Continuous Output Current	I_{OC}	±150mA
Internal Power Dissipation	P_D	1500mW
Junction Temperature	T_J	150°C
Storage Temperature	T_S	-60°C to +150°C

Note : Exceeding these ratings may cause permanent damage . Functional operation under these conditions is not implied .

DC Electrical Characteristics

V_s = ±5V, R_L= 50Ω, T_A= 25°C, For each amplifier, Unless Otherwise Specified

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Offset Voltage	V_{os}			±5	±10	mV
Offset Voltage Drift	TCV_{os}			10		μV/°C
Bias Current	I_B			10	100	nA
Offset Current	I_{os}			1	10	nA
Input Resistance	R_{IN}		30	60		KΩ
Input Capacitance	C_{IN}			1	2	pF
Common Mode Range	V_{CM}		±1	±2.5		V
Input Noise Voltage	e_{IN}	f= 1KHz		10		$nV/\sqrt{Hz}$
Large Signal Voltage Gain	A_{vol}	$V_o = \pm 1V$	60	100		dB
Common Mode Rejection Ratio	CMRR	$V_{cm} = \pm 1V$	55	65		dB
Output Voltage Swing	V_o		±1	±2.5		V
Output Current	I_o	$V_o = \pm 1V$	±50	±70		mA
Output Resistance	R_o	Open Loop		8	12	Ω
Total Supply Current	I_S	Quiescent		120		mA
Power Supply Rejection Ratio	PSRR	$V_S = \pm 5V$	50	65		dB

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AC Electrical Characteristics

$V_S = \pm 5V, R_L = 50\Omega, T_A = 25°C$, For each amplifier, Unless Otherwise Specified

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Small Signal Bandwidth	GBW	$V_o = \pm 1V, A_v = 1$	100	200		MHz
Full Power Bandwidth (1)	FPBW	$V_o = \pm 1V$	60	80		MHz
Rise Time (2)	t_r	Step = ±0.5V		2		ns
Fall Time (2)	t_f	Step = ±0.5V		2.5		ns
Slew Rate (2)	SR		300	500		V/µs
Settling Time to 0.1% (2)	t_s	Step = ±0.5V		25		ns

Interchannel Characteristics

$V_S = \pm 5V, R_L = 50\Omega, T_A = 25°C$, Unless Otherwise Specified

Parameter	Conditions	Min.	Typ.	Max.	Units
Interchannel Isolation	$V_{in} = \pm 5V$, 100KHz	80	86		dB
Interchannel Offset Voltage			0.1	2	mV

Subtractor Section

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Current Output	I_{out}			2		mA
Input Bias Current	I_B			6		µA
Gain	G			-1		
Bandwidth	SSBW		100	200		MHz
Noise Across Bandwidth				0.25		mV(rms)
Input Impedance	R_{IN}			100		KΩ
Input Capacitance	C_{IN}			1		pF
Initial Offset Voltage	V_{OS}			1		mV
Slew Rate	SR		300	500		V/µs

Notes :

(1) FPBW = Slew Rate / $2\pi * V_{peak}$
(2) Refer to AC Test Circuit on the next page.

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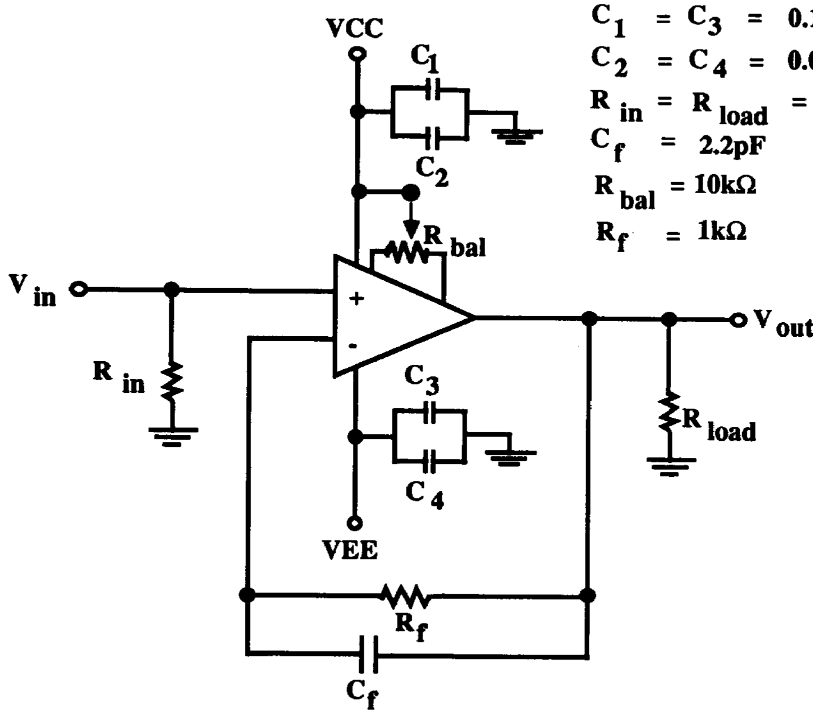
UNITY GAIN TEST CIRCUIT



$C_1 = C_3 = 0.1\mu F$

$C_2 = C_4 = 0.01\mu F$

$R_{in} = R_{load} = 50\Omega$

$C_f = 2.2pF$

$R_{bal} = 10k\Omega$

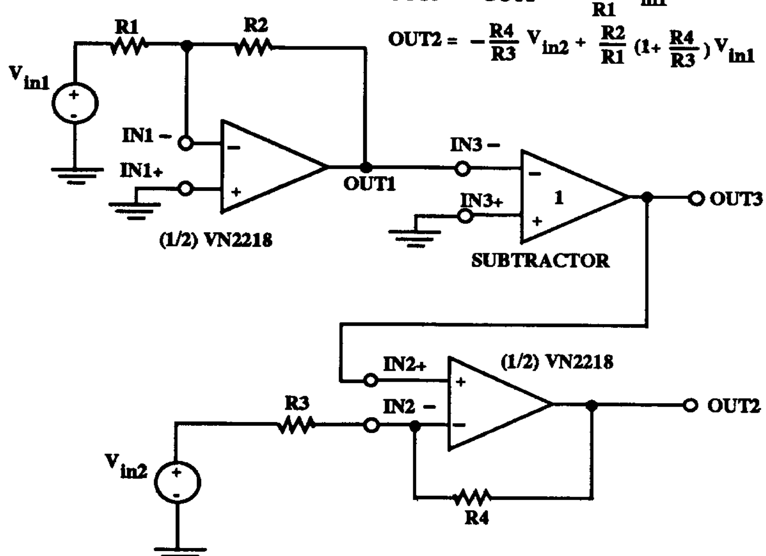
$R_f = 1k\Omega$

EXAMPLE OF APPLICATION CIRCUIT

$$OUT1 = -\frac{R2}{R1} V_{in1}$$

$$OUT3 = -OUT1 = \frac{R2}{R1} V_{in1}$$

$$OUT2 = -\frac{R4}{R3} V_{in2} + \frac{R2}{R1} \left(1 + \frac{R4}{R3}\right) V_{in1}$$



Notes: All resistors are external components.

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