

LINEAR INTEGRATED CIRCUITS

DESCRIPTION

The 516 is a high gain operational amplifier with differential input and output. Features include large gain-bandwidth product, stable open-loop operation, high output voltage swing under load, high input resistance, wide common mode voltage range and high common mode rejection.

FEATURES

- OPEN LOOP VOLTAGE GAIN = NE516 15,000
SE516 18,000
- OPEN LOOP GAIN STABILITY = $\pm 20\%$
- OUTPUT VOLTAGE SWING = NE516 +10 Volts
SE516 +11 Volts
- DIFFERENTIAL INPUT RESISTANCE = NE516 100K Ω
SE516 400K Ω
- INPUT COMMON MODE VOLTAGE RANGE = 23 Volts
- COMMON MODE REJECTION RATIO = 100 db
- INPUT OFFSET CURRENT = NE516 100nA
SE516 300nA
- OPEN LOOP BANDWIDTH = 300 kHz

ABSOLUTE MAXIMUM RATINGS

Voltage Applied (Between Pins 1 and 6)

NE516 34V

SE516 36V

Voltage Applied (Differential) 10V

Current Rating (Pins 1, 2, 6 and 10) 25mA

Current Rating (Other Pins) 10mA

Output Short Circuit Duration (25°C) 10sec

Storage Temperature -65°C to +150°C

Operating Temperature

NE516 0°C to +75°C

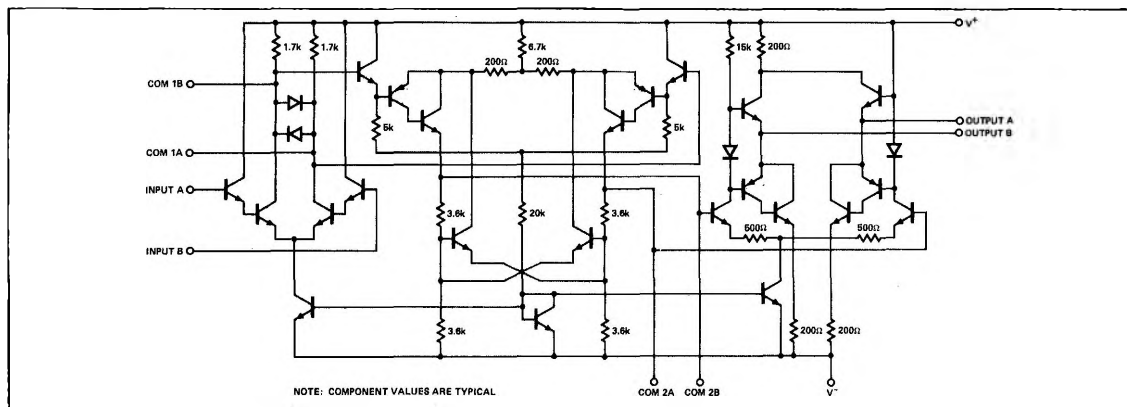
SE516 -55°C to +125°C

Junction Temperature

NE516 150°C

SE516 175°C

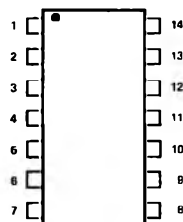
FUNCTIONAL CIRCUIT



PIN CONFIGURATION

A PACKAGE

(Top View)



- | | |
|-------------------|--------------------|
| 1. Input B | 8. Output A |
| 2. Com. 1A | 9. NC |
| 3. NC | 10. Com. 2A |
| 4. Com. 2B | 11. Com. 1B |
| 5. NC | 12. NC |
| 6. Output B | 13. Input A |
| 7. V ⁻ | 14. V ⁺ |

ORDER PART NOS.
SE516A/NE516A

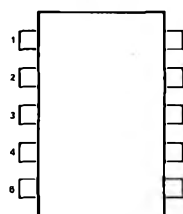
K PACKAGE



- | | |
|-------------------|-------------------|
| 1. V ⁻ | 6. V ⁺ |
| 2. Output A | 7. Input B |
| 3. Com. 2A | 8. Com. 1A |
| 4. Com. 1B | 9. Com. 2B |
| 5. Input A | 10. Output B |

ORDER PART NOS.
SE516K/NE516K

Q PACKAGE



- | | |
|-------------------|-------------------|
| 1. V ⁻ | 6. V ⁺ |
| 2. Output A | 7. Input B |
| 3. Com. 2A | 8. Com. 1A |
| 4. Com. 1B | 9. Com. 2B |
| 5. Input A | 10. Output B |

ORDER PART NOS.
SE516Q/NE516Q

Maximum ratings are limiting values above which serviceability may be impaired.

ELECTRICAL CHARACTERISTICS (Notes: 1, 2, 3, 8) (Standard Conditions: $V_E = +15V$, $V_K = -15V$, $V_A = 0V$)

PARAMETERS	TEST CONDITIONS	NE516				SE516				UNITS
		MIN	TYP	MAX	TEMP.	MIN	TYP	MAX	TEMP.	
Open Loop Voltage Gain (DC)	$R_L \geq 2k\Omega$, Notes 5, 7		16,000		0°C		22,000		-55°C	V/V
		10,000	15,000		+25°C	13,000	18,000		+25°C	V/V
		8,000	13,000		+75°C	10,000	15,000		+125°C	V/V
Open Loop Voltage Gain (AC)	$R_L \geq 2k\Omega$, $f = 250 \text{ kHz}$, Note 7	8,000	12,000		+25°C	10,000	15,000		+25°C	V/V
Input Offset Voltage	Note 6		5.0	15	0°C		3.0	10	-55°C	mV
			5.0	15	+25°C		3.0	10	+25°C	mV
			5.0	15	+75°C		3.0	10	+125°C	mV
Input Bias Current	Note 6		1.5	4.5	0°C		0.6	2.0	-55°C	μA
			1.0	3.0	+25°C		0.3	1.0	+25°C	μA
			0.6		+75°C		0.15		+125°C	μA
Input Offset Current	Note 6						0.06		-55°C	μA
			0.1	0.6	+25°C		0.03	0.2	+25°C	μA
							0.02		+125°C	μA
Differential Input Resistance	Notes 4, 6					40	150		-55°C	$k\Omega$
		40	100		+25°C	100	400		+25°C	$k\Omega$
							1,000		+125°C	$k\Omega$
Input Common Mode Range		+8.0	+10		+25°C	+8.0	+10		+25°C	V
		-12	-13			-12	-13			
Power Supply Sensitivity (Referred to Input)			50		+25°C	50			+25°C	$\mu V/V$
			50		+25°C	50			+25°C	$\mu V/V$
Balanced Output dc Level	$R_L \geq 2k\Omega$, Note 6					-2.0	+0.5	+2.5	-55°C	V
		-2.5	0	+2.5	+25°C	-1.5	0	+1.5	+25°C	V
						-2.5	-0.5	+2.0	+125°C	V
Output Voltage Swing	$R_L \geq 2k\Omega$	± 8.0	± 10		0°C	± 10	± 11		-55°C	V
		± 8.0	± 10		+25°C	± 10	± 11		+25°C	V
		± 8.0	± 10		+75°C	± 10	± 11		+125°C	V
Output Resistance	Note 6		500		+25°C		500		+25°C	Ω
Common Mode Rejection Ratio			100		+25°C		100		+25°C	dB
Power Supply Current	Note 6		5.0		0°C		5.0		-55°C	mA
			5.0	6.0	+25°C		5.0	6.0	+25°C	mA
			5.0	6.0	+75°C		5.0	6.0	+125°C	mA

Letter subscripts refer to pins on circuit schematic.

NOTES:

1. Voltage and current subscripts refer to pin numbers.
2. All measurements are referenced to an external ground. Positive current flow is defined as into the terminal indicated.
3. All specifications herein apply for interchange of voltages and currents at Pins 5 and 7.
4. Differential Input Resistance is a value computed from input bias current limits.
5. Output voltage swing = 5V peak to peak.
6. Adjust V_{I5} to obtain $V_{I2} = V_{I10}$.
7. Differential input, single ended output.