High Power VMOS Output Operational Amplifier

1460

The 1460 heralds a new era in high power, wideband operational amplifiers. Originally designed for ATE signal amplification and pin driving, the 1460 surpasses its competition in speed and output capabilities with a 1GHz gain-bandwidth product, a 300V/μsec slew rate, and a full ±30V, ±150mA output. The 1460 is a full differential input, single-ended output device with internal current limiting. External compensation with a single capacitor allows users to tailor 1460 performance for different applications.

With a maximum operating frequency of 10MHz, the 1460 is ideally suited for high speed, high gain configurations that require a ±30V, high current output. It has been optimized for gains greater than five, making it a superb choice for either analog or digital signal amplification at video frequencies. Secondary breakdown problems associated with most power op amps are virtually eliminated in the 1460 through the use of a unique VMOS output stage. The output voltages and currents are limited only by power dissipation and not by safe operating area curves.

The 1460 is a 0°C to +70°C device that comes in an 8 pin, TO-3 package. For any condition in which the amplifier will be dissipating more than one watt of power, an external heat sink must be used. The thermal resistance of the device is 20°C/watt θ_{JC} and 50°C/watt θ_{JA}. Junction temperatures should not exceed 150°C for normal operation or 200°C for a short-circuit condition.

For units with MIL-STD-883 screening, please contact factory.

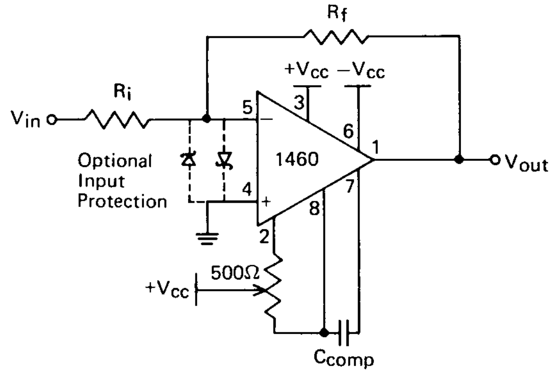
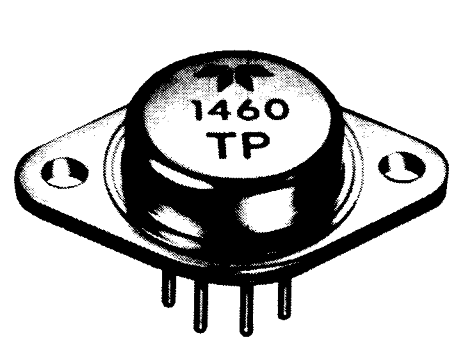


Figure 1. Standard Configuration



FEATURES

- ±30Volt, ±150mA Output
- VMOS Output Stage
- No SOA Restrictions
- 1GHz GBW Product
- 300V/μsec Slew Rate
- Fully Differential Input

APPLICATIONS

- Video Amplifiers
- Video Yoke Drivers
- ATE Pin Drivers
- Driving Inductive and Capacitive Loads

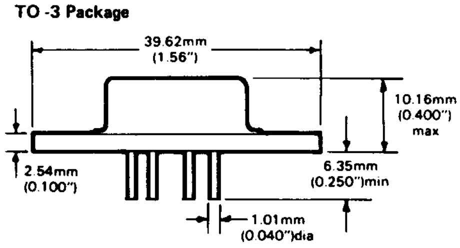
TELEDYNE PHILBRICK Allied Drive @ Rte. 128, Dedham, Massachusetts 02026
Tel: (617) 329-1600, TWX: (710) 348-6726, Tlx: 92-4439

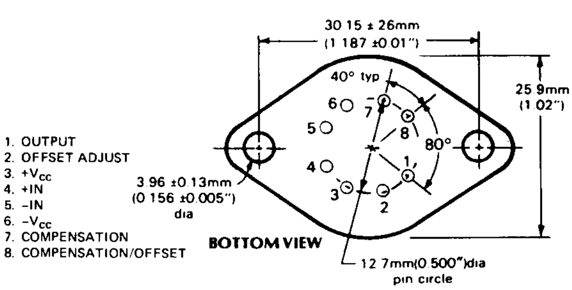
SPECIFICATIONS (+25°C, V_{CC} = ±36V), unless otherwise indicated.

	TYPICAL	GUARANTEED
OUTPUT RANGE		
Voltage (R_L = 200Ω)	±31V	±30V
Current	±200mA	±150mA
DYNAMIC RESPONSE		
Gain Bandwidth Product		
C_C = 0pF	1.0GHz	---
C_C = 40pF	150MHz	---
Rise Time		
0 to ±5V Step	70ns	---
0 to ±30V Step	400ns	---
Settling Time		
10V Step to 0.1%	800ns	---
30V Step to 0.1%	1μs	---
Slew Rate		
C_C = 0	300V/μs	---
C_C = 40pF	65V/μs	50V/μs
VOLTAGE GAIN (DC open loop)		
Rated Load	92dB	80dB
INPUT VOLTAGE RANGE		
Common Mode (Fault Condition)	---	$+V_{CC}$ −1.5V to $+V_{CC}$ −55V
Differential Input Voltage, max.	---	±6V
CMRR	85dB	70dB
PSRR	100dB	75dB
INPUT OFFSET VOLTAGE		
Initial	±1mV	±5mV
Vs. Temp. 0 to 70°C	±10μV/°C	±50μV/°C
INPUT BIAS CURRENT		
Initial	±5μA	±10μA
Input Offset Current	±0.3μA	---
Input Bias Current T.C.	0.8%/°C	---
POWER REQUIREMENTS		
Nominal Voltage	±36V	---
Quiescent Current	±20mA	±25mA
Short Circuit Current	250mA	300mA max.
Supply Voltage Range	---	±15V to ±40V
TEMPERATURE RANGE		
Operating Temperature	---	0°C to +70°C
Storage Range	---	−65°C to +150°C

Mechanical

TO-3 Package





OPTIONAL SOCKET: Robinson Nugent
PC MT. NO. 0001306
CHASSIS MT. NO. 0002011

For optimum performance and noise rejection, power supplies should be bypassed with 1μF tantalum capacitors. For driving heavy loads, more capacitance may be needed.

In the absence of a positive supply voltage, the output will follow the negative supply. If such a condition exists, it is possible (depending on the feedback network used) that the maximum allowable differential input voltage may be exceeded. Input overvoltage protection should be used if the differential input voltage may exceed ±6V (see Figure 1).

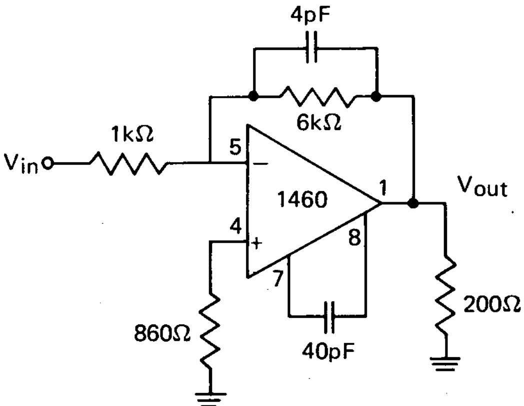


Figure 2. 10MHz Inverting Gain of Six Amplifier

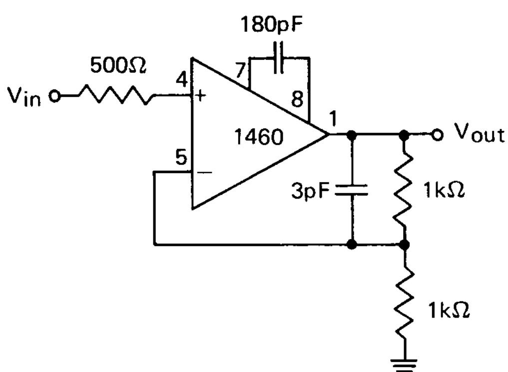


Figure 3. 10MHz Noninverting Gain of Two Amplifier

The following application has a 10MHz bandwidth and inverting gain of 100 yielding 1GHz gain bandwidth product. No compensation capacitor is needed for gains over 100.

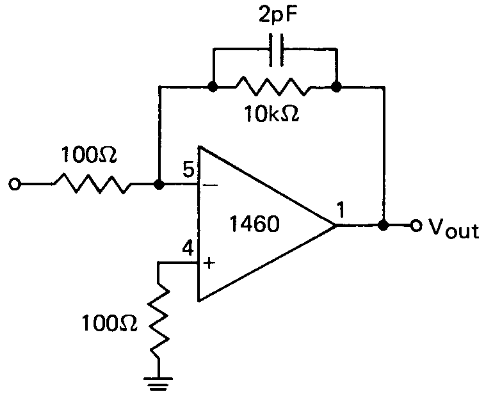
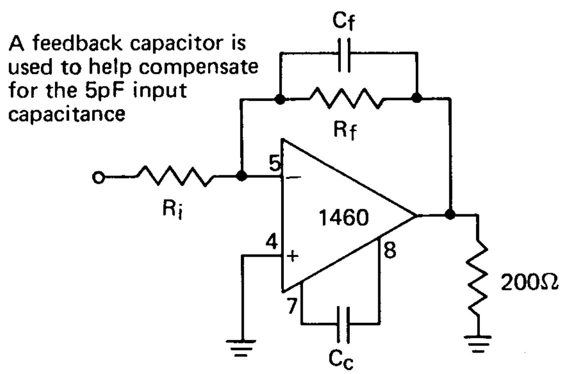


Figure 4. 10MHz Inverting Gain of 100

Operating Characteristics



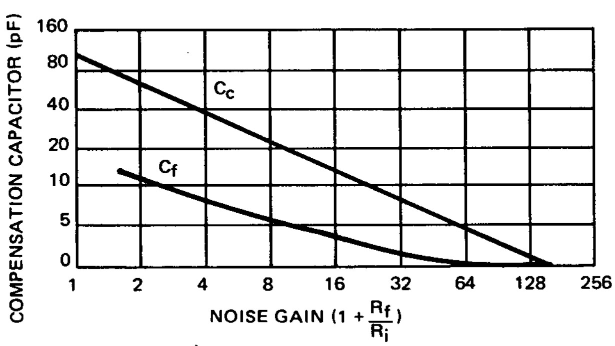
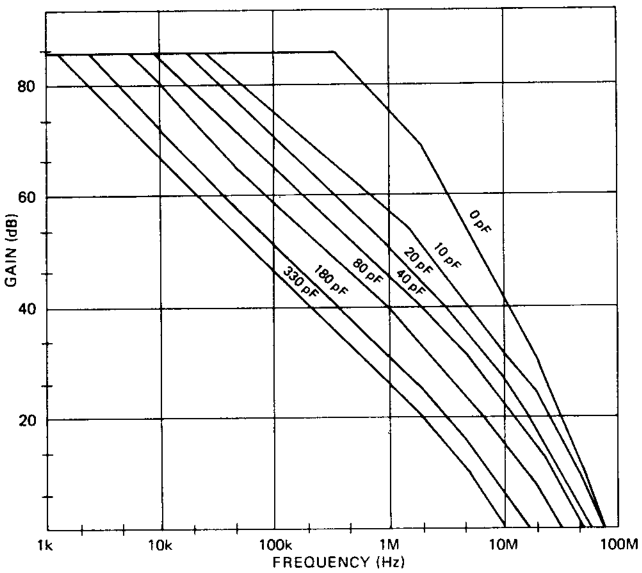
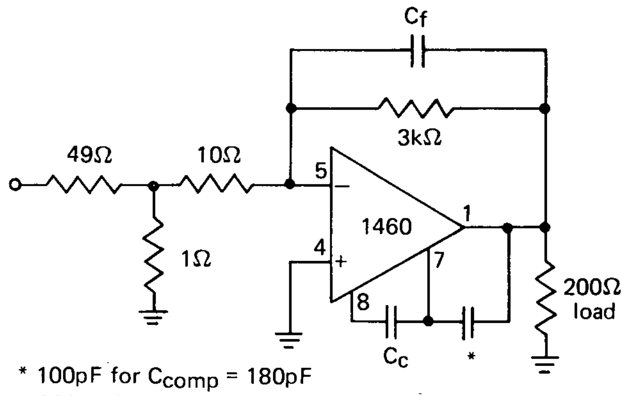


Figure 5. Recommended Compensation





* 100pF for C_{comp} = 180pF
200pF for C_{comp} = 330pF
0pF otherwise

C_{comp} "pF"	Frequency at Unity Gain	Phase at Unity Gain	Frequency at 180°	Slew
0	74 MHz	275°	5 MHz	250 V/μs
10	74 MHz	267°	25 MHz	125 V/μs
20	55 MHz	277°	32 MHz	84 V/μs
40	50 MHz	216°	36 MHz	50 V/μs
80	32 MHz	165°	37 MHz	28 V/μs
180	17 MHz	132°	45 MHz	25 V/μs
330	10 MHz	118°	50 MHz	7 V/μs

Figure 6. 1460 Bode Plot

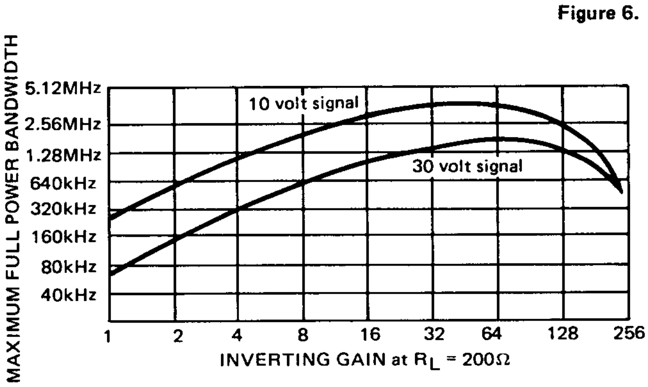


Figure 7. Full Power Bandwidth vs. Inverting Gain

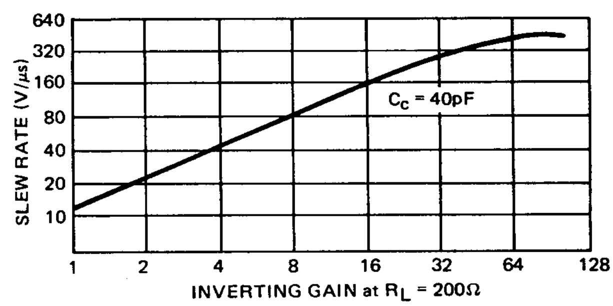


Figure 8. Slew Rate vs. Inverting Gain

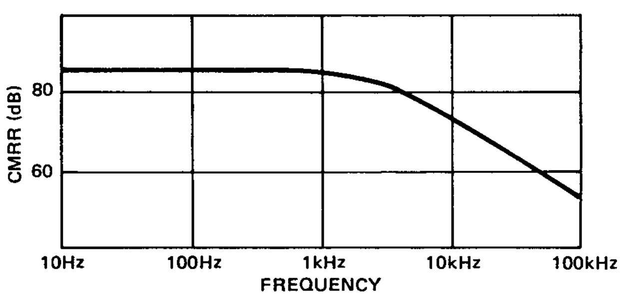


Figure 9. CMRR vs. Frequency

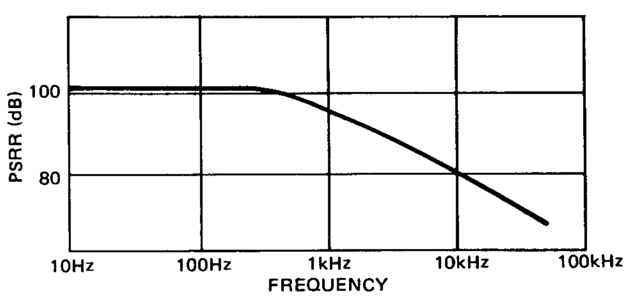


Figure 10. PSRR vs. Frequency

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