

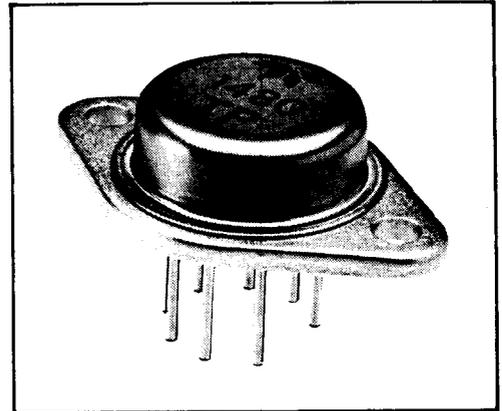
Fast Settling High Voltage Operational Amplifier

1480

The 1480 is a fully differential FET-input op amp capable of operating over a supply voltage range of $\pm 15V$ to $\pm 150V$ with common-mode and output voltages ranging to within 10V of the supply voltages and with output currents to $\pm 75mA$. The 1480 is pin compatible with the Burr-Brown 3583, but has traded off dc and drift characteristics for time and frequency performance. The 1480 settles a full 100V step to $\pm 0.01\%$ (10mV) in less than $2.5\mu sec$. Gain-bandwidth product is 20MHz. Slew rate is $100V/\mu sec$, and full power bandwidth is 100kHz.

The input of the 1480 is fully overvoltage protected. It can withstand common mode voltages to $\pm (V_{CC} + 5)V$, differential voltages to $\pm 450V$, and input voltage slew rates to $150kV/\mu sec$. Output current is short circuit limited at $\pm 125mA$. The true differential FET input (typical CMRR is 125dB) limits input bias current to $\pm 200pA$ maximum. The bias and offset current drifts are small enough to greatly reduce the large offset drifts normally associated with high voltage circuits.

The 1480 is packaged in a TO-3 can. Standard units are fully specified for $0^\circ C$ to $+70^\circ C$ operation. For military/aerospace applications, the 1480-83 is fully specified and tested for $-55^\circ C$ to $+125^\circ C$ (case) operation and screened to MIL-STD-883, Method 5008.

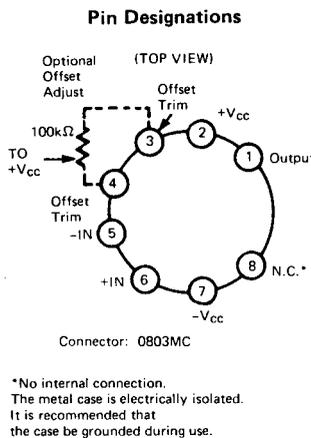
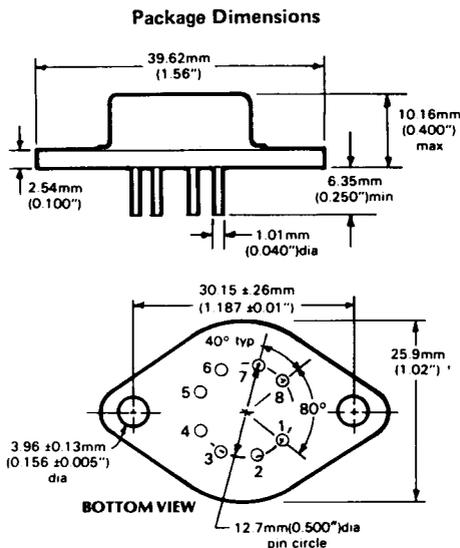


FEATURES

- $\pm 150V$, $\pm 75mA$ Output
- $2.5\mu sec$ Max Settling Time (100V Step to $\pm 0.01\%$)
- $\pm 140V$ Common Mode Voltage
- Input Overvoltage and Output Short Circuit Protected
- Standard TO-3 Can
- BB3583 Compatible
- $-55^\circ C$ to $+125^\circ C$ Operation
- MIL-STD-883 Screening

APPLICATIONS

- ATE Pin Drivers
- Electrostatic Deflection
- High Voltage DAC's



ABSOLUTE MAXIMUM RATINGS

Supply Voltage ($\pm V_{CC}$, Pins 2, 7)	± 160 Volts
Input Voltage (Pins 2, 7) (Note 1)	$\pm (V_{CC} + 5)$ Volts
Differential Input Voltage (Note 1)	± 450 Volts
Input Slew Rate (Notes 1, 2)	± 150 kV/ μ sec
Output Short Circuit Current (Note 3)	± 125 mA
Operating Temperature Range (Case)	-55°C to $+125^{\circ}\text{C}$
Specified Temperature Range (Case)	
1480	0°C to $+70^{\circ}\text{C}$
1480-83 (Note 4)	-55°C to $+125^{\circ}\text{C}$
Storage Temperature Range	-65°C to $+150^{\circ}\text{C}$

SPECIFICATIONS ($T_A = +25^{\circ}\text{C}$, $\pm V_{CC} = \pm 150\text{V}$, unless otherwise indicated)

PARAMETER	MIN.	TYP.	MAX.	UNITS
OPEN LOOP VOLTAGE GAIN: $R_L = 10\text{k}\Omega$		120		dB
$R_L = \text{Rated Load}$	95	115		dB
INPUT CHARACTERISTICS				
Common Mode Voltage for DC Linear Operation		$\pm (V_{CC} - 10)$		Volts
Common Mode Rejection Ratio: @DC	110	125		dB
@1MHz		43		dB
Input Offset Voltage: Initial ($+25^{\circ}\text{C}$) (Note 5)		± 1	± 3	mV
Drift vs. Temperature		± 15	± 100	$\mu\text{V}/^{\circ}\text{C}$
Drift vs. Supply (PSRR)		± 0.001	± 0.01	mV/V
Input Bias Current: Initial ($+25^{\circ}\text{C}$)		± 50	± 200	pA
Drift vs. Temperature		Doubles every 10°C		
Input Offset Current: Initial ($+25^{\circ}\text{C}$)		± 40		pA
Drift vs. Temperature		± 5		pA/ $^{\circ}\text{C}$
OUTPUT CHARACTERISTICS				
Output Voltage ($I_O = \pm 75\text{mA}$)		± 143	± 140	Volts
Output Current (Note 3)	± 75	± 100		mA
Noise (Referred to Input) (Note 6):				
0.1Hz to 10Hz		10		μV_{rms}
10Hz to 10kHz		2.5		μV_{rms}
Maximum Capacitive Load	100	250		pF
FREQUENCY RESPONSE				
Gain-Bandwidth Product ($f = 100\text{kHz}$, $R_L = 10\text{k}\Omega // 2\text{pF}$)		18		MHz
Unity-Gain Bandwidth (Open Loop)		5		MHz
Full Power Bandwidth (280V _{p-p} , $R_L = 10\text{k}\Omega$)		120		kHz
TIME RESPONSE				
Slew Rate		100		V/ μ sec
Settling Time: 100V Step to $\pm 0.01\%$ ($\pm 10\text{mV}$)		1.5	2.5	μ sec
100V Step to $\pm 0.1\%$ ($\pm 100\text{mV}$)		1	1.5	μ sec
Overload Recovery Time		1		μ sec
POWER REQUIREMENTS				
Supply Voltage Range	± 15		± 150	Volts
Quiescent Current		± 10	± 12	mA

SPECIFICATION NOTES:

- Includes power-off conditions.
- The high differential voltage and dv/dt ratings of the input prevent input stage blowout even if the input is directly shorted to either rail. Such shorts do stress the input, however, and we cannot guarantee protection for durations exceeding a few seconds.
- The 1480's output is short-circuit protected to ground or either supply for supply voltages totaling less than 100V. It is short-circuit protected to ground only for supplies totaling up to 160V.
- The 1480-83 is fully processed and screened to the requirements of MIL-STD-883, Method 5008.
- Trimmable to zero with external 100k Ω potentiometer between pins 3 and 4 and $+V_{CC}$.
- Measured in a high-gain configuration with the input grounded through a small resistance.

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