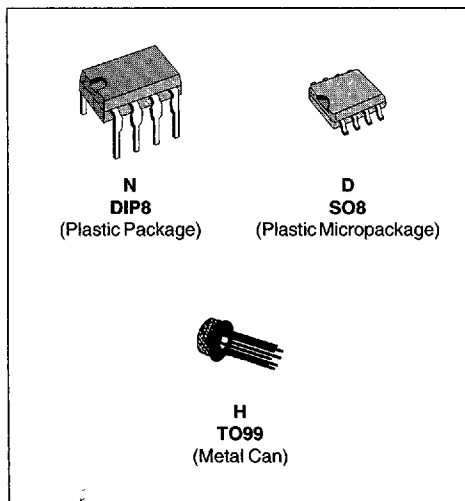


PROGRAMMABLE LOW POWER SINGLE OPERATIONAL AMPLIFIERS

- MICROPOWER OPERATION
- NO FREQUENCY COMPENSATION REQUIRED
- WIDE PROGRAMMING RANGE
- HIGH SLEW RATE
- SHORT-CIRCUIT PROTECTION
- PROGRAMMABLE SINGLE OP-AMPs



Part Number	Temperature Range	Package		
		H	N	D
UA776C	0°C, +70°C	•	•	•
UA776I	-40°C, +105°C	•	•	•
UA776M	-55°C, +125°C	•	•	•

Examples : UA776CH, UA776CN, UA776CD

776-01 TBL

DESCRIPTION

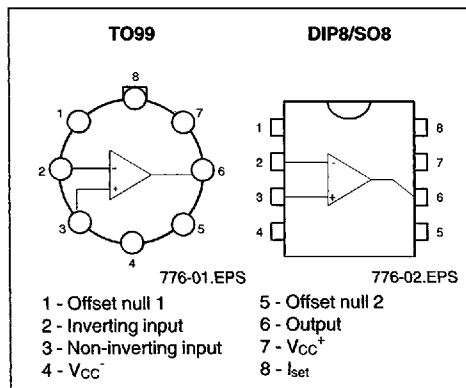
The UA776 programmable operational amplifier is characterized by, low supply current and low input noise over a wide range of operating supply voltages.

Coupled with programmable electrical characteristics, it is an extremely versatile amplifier for use in high accuracy, low power consumption analog applications.

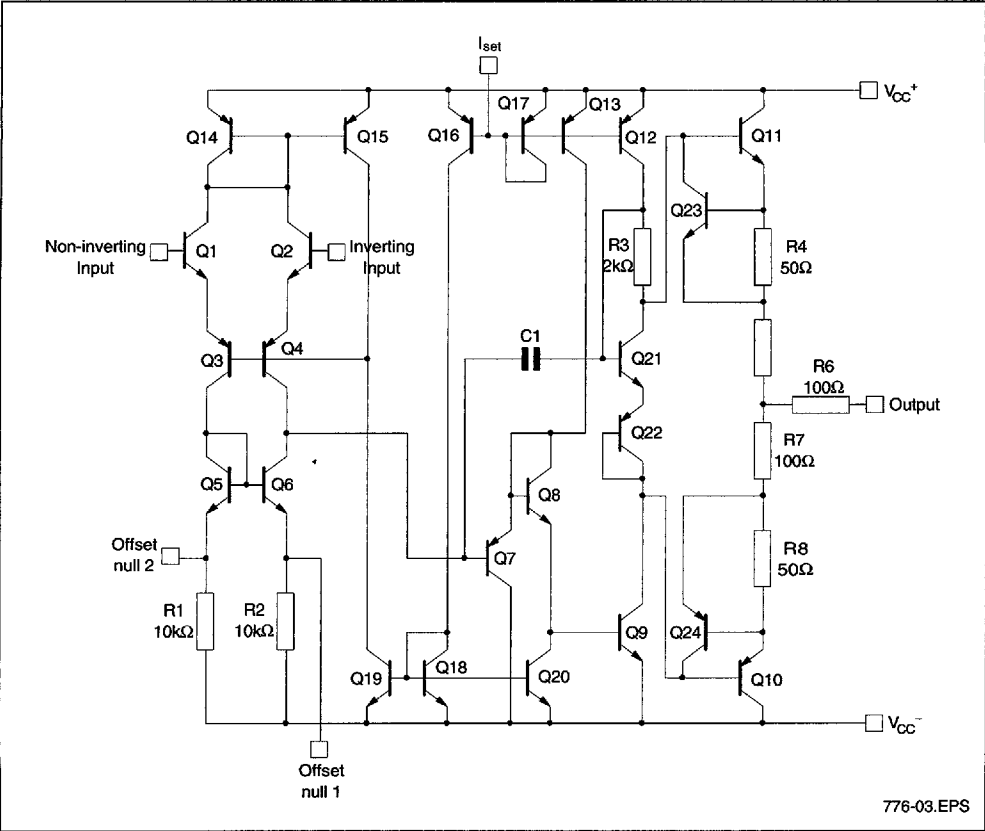
Input noise voltage and current, power consumption, and input current can be optimized by a single resistor or current source that sets the chip quiescent current for nano-watt power consumption or for characteristics similar to the UA741.

Internal frequency compensation, absence of latch up, high slew rate and short-circuit protection assure ease of use in long time integrators, active filters, and sample and hold circuits.

PIN CONNECTIONS (top views)



SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	UA776M	UA776I	UA776C	Unit
V _{CC}	Supply Voltage	±18	±18	±18	V
V _i	Input Voltage - (note 1)	±15	±15	±15	V
V _{id}	Differential Input Voltage	±30	±30	±30	V
P _{tot}	Power Dissipation	500	310	310	mW
		UA776CH			500
	Output Short-circuit Duration	Infinite			
T _{oper}	Operating Free Air Temperature Range	-55 to +125	-40 to +105	0 to +70	°C
T _{stg}	Storage Temperature Range	-65 to +150	-65 to +150	-65 to +150	°C

Note : 1. For supply voltages less than ±15V, the absolute maximum input voltage is equal to the supply voltage.

ELECTRICAL CHARACTERISTICS

V_{CC} = ±15V, T_{amb} = 25°C (unless otherwise specified)

Symbol	Parameter	I _{set} = 1.5μA			I _{set} = 15μA			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
V _{io}	Input Offset Voltage T _{amb} = 25°C T _{min} ≤ T _{amb} ≤ T _{max}		2	5 6		2	5 6	mV
I _{io}	Input Offset Current T _{amb} = 25°C T _{min} ≤ T _{amb} ≤ T _{max}		0.7	3 10		2	15 40	nA
I _{ib}	Input Bias Current T _{amb} = 25°C T _{min} ≤ T _{amb} ≤ T _{max} UA776M UA776L,C		2 2	7.5 10 20		15 15	50 50 100	nA
A _{vd}	Large Signal Voltage Gain (V _o = ±10V) T _{amb} = 25°C R _L = 5kΩ R _L = 75kΩ R _L = 75kΩ R _L = 5kΩ T _{min} ≤ T _{amb} ≤ T _{max}	200 100	400		100 75	400		V/mV
SVR	Supply Voltage Rejection Ratio (R _s ≤ 10kΩ) T _{amb} = 25°C T _{min} ≤ T _{amb} ≤ T _{max}	77 77	92		77 77	92		dB
I _{CC}	Supply Current - (no load) T _{amb} = 25°C T _{min} ≤ T _{amb} ≤ T _{max}		20	25 30		160	180 200	μA
V _{icm}	Input Common Mode Voltage Range	±10			±10			V
CMR	Common Mode Rejection Ratio (R _s ≤ 10kΩ) T _{amb} = 25°C T _{min} ≤ T _{amb} ≤ T _{max}	70 70	90		70 70	90		dB
I _{os}	Output Short-circuit Current	0.5	3	15	6	12	30	mA
±V _{OPP}	Output Voltage Swing T _{amb} = 25°C R _L = 5kΩ R _L = 75kΩ R _L = 75kΩ T _{min} ≤ T _{amb} ≤ T _{max}	12 10	14		10 10	13		V
V _{ior}	Offset Voltage Adjustment Range		9			18		mV
SR	Slew Rate (V _i = ±10V, C _L = 100pF, unity gain) R _L = 5kΩ R _L = 75kΩ	0.01	0.1		0.2	0.8		V/μs
t _r	Rise Time (V _i = ±20mV, C _L = 100pF, unity gain) R _L = 5kΩ R _L = 75kΩ		1.6			0.35		μs
K _{OV}	Overshoot (V _i = ±20mV, C _L = 100pF, unity gain) R _L = 5kΩ R _L = 75kΩ		0			10		%
R _i	Input Resistance		50			5		MΩ
C _{id}	Differential Input Capacitance		2			2		pF
R _o	Output Resistance		5			1		kΩ
GBP	Gain Bandwidth Product (T _{amb} = 25°C, C _L = 100pF) f = 100kHz f = 10kHz R _L = 5kΩ R _L = 75kΩ	0.03	0.1		0.4	0.7		MHz
THD	Total Harmonic Distortion (f = 1kHz, A _v = 20dB, V _o = 2V _{PP} , C _L = 100pF, T _{amb} = 25°C) R _L = 5kΩ R _L = 75kΩ		0.8			0.025		%
e _n	Equivalent Input Noise Voltage (f = 1kHz, R _s = 100Ω)		20			20		nV √Hz

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ELECTRICAL CHARACTERISTICS

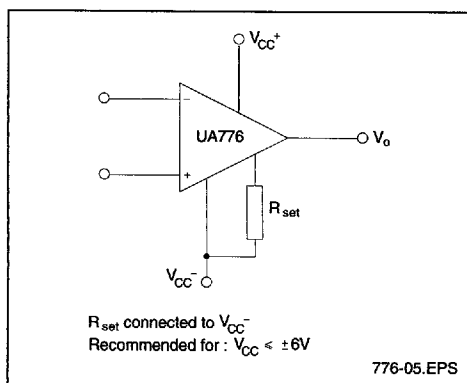
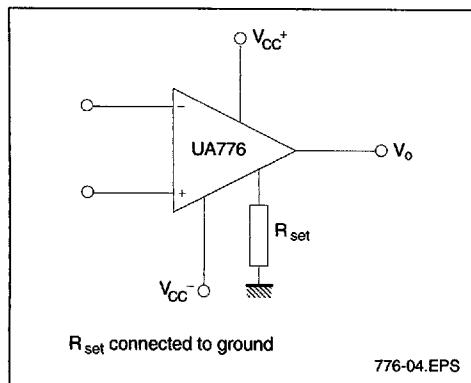
V_{CC} = ±3V, T_{amb} = 25°C (unless otherwise specified)

Symbol	Parameter	I _{set} = 1.5μA			I _{set} = 15μA			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
V _{io}	Input Offset Voltage T _{amb} = 25°C T _{min.} ≤ T _{amb} ≤ T _{max.}		2	5 6		2	5 6	mV
I _{io}	Input Offset Current T _{amb} = 25°C T _{min.} ≤ T _{amb} ≤ T _{max.}		0.7	3 10		2	15 40	nA
I _{ib}	Input Bias Current T _{amb} = 25°C T _{min.} ≤ T _{amb} ≤ T _{max.} UA776M UA776I,C		2 2	7 10 20		15 15	50 50 100	nA
A _{vd}	Large Signal Voltage Gain (V _o = ±1V) T _{amb} = 25°C R _L = 5kΩ R _L = 75kΩ T _{min.} ≤ T _{amb} ≤ T _{max.} R _L = 5kΩ R _L = 75kΩ	50 25	200		50 25	200		V/mV
SVR	Supply Voltage Rejection Ratio (R _s ≤ 10kΩ) T _{amb} = 25°C T _{min.} ≤ T _{amb} ≤ T _{max.}	77 77	92		77 77	92		dB
I _{CC}	Supply Current, no load T _{amb} = 25°C T _{min.} ≤ T _{amb} ≤ T _{max.}		13	20 25		130	160 180	μA
V _{icm}	Input Common Mode Voltage Range	±1			±1			V
CMR	Common Mode Rejection Ratio (R _s ≤ 10kΩ) T _{amb} = 25°C T _{min.} ≤ T _{amb} ≤ T _{max.}	70 70	90		70 70	90		dB
I _{os}	Output Short-circuit Current	0.5	3	15	2	5	20	mA
±V _{OPP}	Output Voltage Swing T _{amb} = 25°C T _{min.} ≤ T _{amb} ≤ T _{max.} R _L = 75kΩ R _L = 5kΩ R _L = 75kΩ R _L = 5kΩ	2 2	2.4		2 1.9 2 1.9	2.4 2.1		V
V _{ior}	Offset Voltage Adjustment Range		9			18		mV
SR	Slew Rate (V _i = ±1V, C _L = 100pF, unity gain) R _L = 5kΩ R _L = 75kΩ		0.03			0.35		V/μs
t _r	Rise Time (V _i = ±20mV, C _L = 100pF, unity gain) R _L = 5kΩ R _L = 75kΩ		3			0.6		μs
K _{OV}	Overshoot (V _i = ±20mV, C _L = 100pF, unity gain) R _L = 5kΩ R _L = 75kΩ		0			5		%
R _i	Input Resistance		50			5		MΩ
C _{id}	Differential Input Capacitance		2			2		pF
R _o	Output Resistance		5			1		kΩ
GBP	Gain Bandwidth Product (T _{amb} = 25°C, C _L = 100pF) f = 100kHz f = 10kHz R _L = 5kΩ R _L = 75kΩ		0.075			0.5		MHz
THD	Total Harmonic Distortion (f = 1kHz, A _v = 20dB, V _o = 1V _{PP} , C _L = 100pF, T _{amb} = 25°C) R _L = 5kΩ R _L = 75kΩ		1			0.03		%
e _n	Equivalent Input Noise Voltage (f = 1kHz, R _s = 100Ω)		20			20		$\frac{nV}{\sqrt{Hz}}$

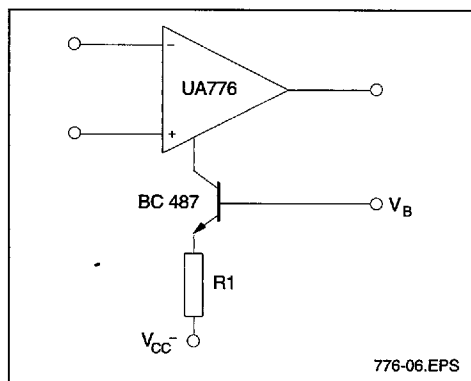
776-04.TBL

BIASING CIRCUITS

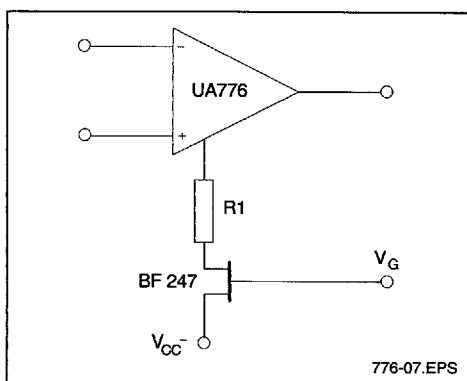
RESISTOR BIASING



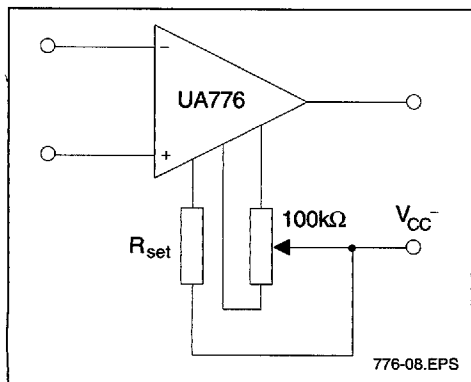
TRANSISTOR CURRENT SOURCE BIASING



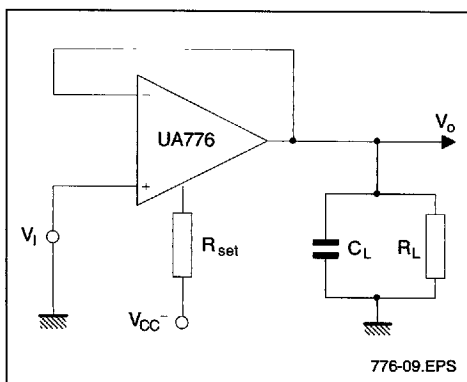
FET CURRENT SOURCE BIASING



OFFSET VOLTAGE NULL CIRCUIT

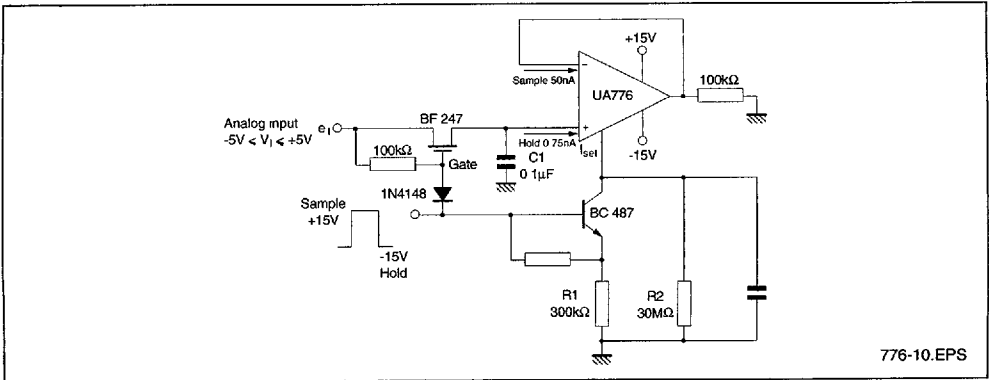


TRANSIENT RESPONSE TIME TEST CIRCUIT

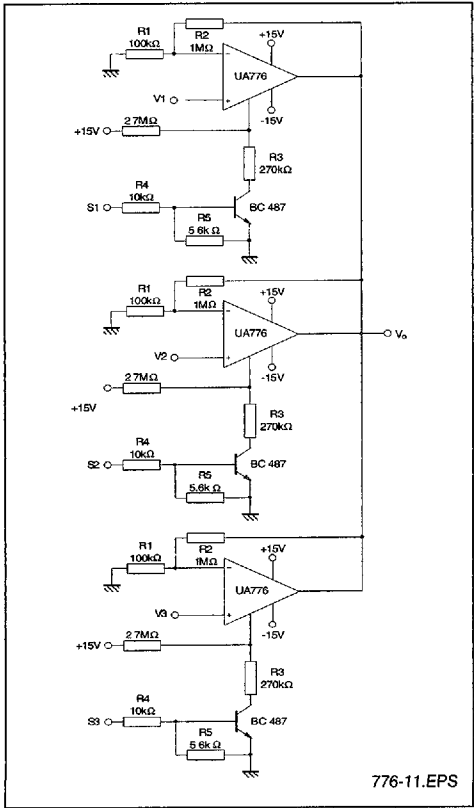


TYPICAL APPLICATIONS

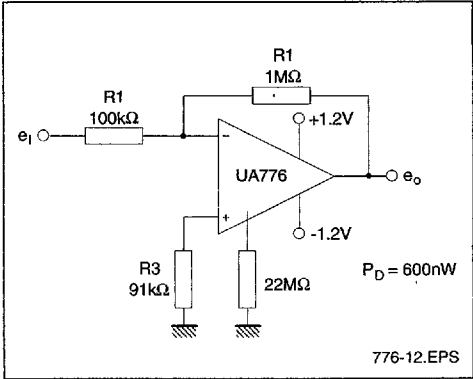
HIGH ACCURACY SAMPLE AND HOLD



MULTIPLEXING AND SIGNAL CONDITIONING WITHOUT FETs



NANO-WATT AMPLIFIER



HIGH INPUT IMPEDANCE AMPLIFIER

