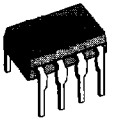
SGS-THOMSON MICROELECTRONICS

UA776

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



N
DIP8
(Plastic Package)

D
SO8
(Plastic Micropackage)

H
TO99
(Metal Can)

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.

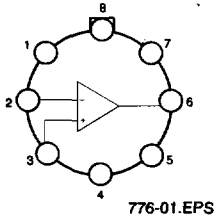
Coupled with programmable electrical characteristics, it is an extremely versatile amplifier for use in high accuracy, low power consumption analog applications.

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.

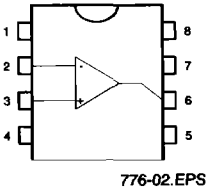
PIN CONNECTIONS (top views)

TO99



776-01.EPS

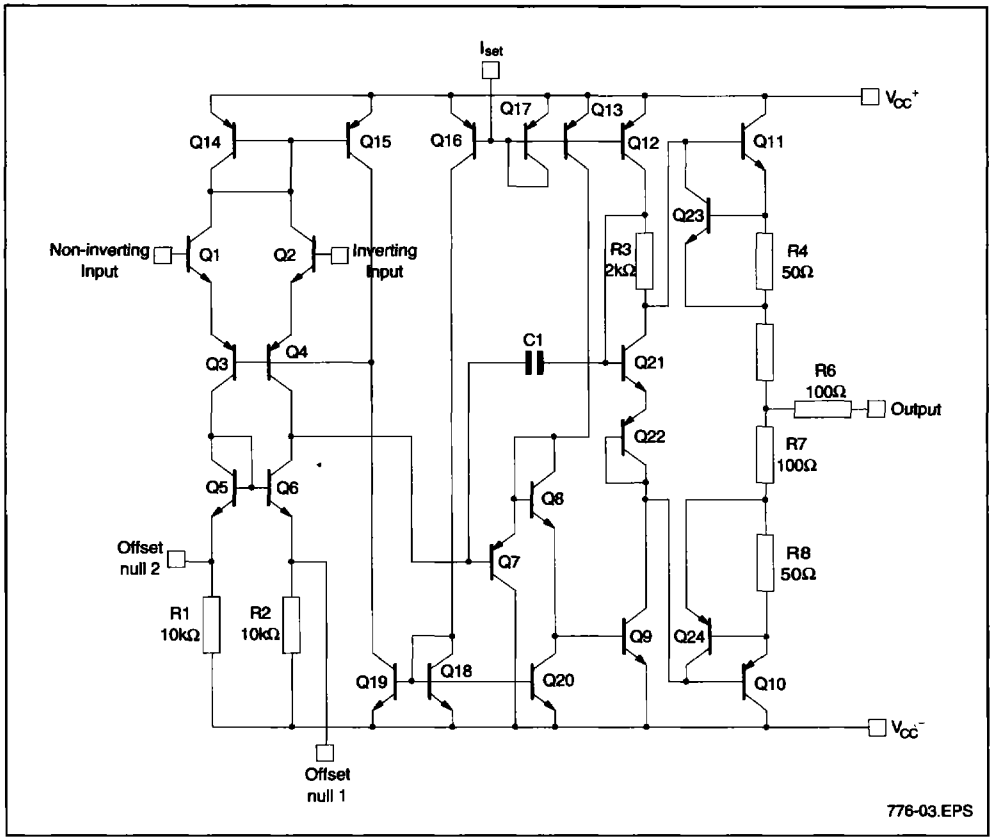
DIP8/SO8



776-02.EPS

1 - Offset null 1
2 - Inverting input
3 - Non-inverting input
4 - V_{CC}^-
5 - Offset null 2
6 - Output
7 - V_{CC}^+
8 - I_{set}

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 UA776CH	500	310	310 500	mW
	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 $T_{min.} \le T_{amb} \le T_{max.}$		2	5 6		2	5 6	mV
I_{io}	Input Offset Current T_{amb} = 25°C $T_{min.} \le T_{amb} \le T_{max.}$		0.7	3 10		2	15 40	nA
I_{ib}	Input Bias Current T_{amb} = 25°C UA776M UA776I,C $T_{min.} \le T_{amb} \le T_{max.}$		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 $T_{min.} \le T_{amb} \le T_{max.}$ R_L = 75kΩ R_L = 5kΩ	 200 100	 400		 100 75	 400		V/mV
SVR	Supply Voltage Rejection Ratio ($R_s \le$ 10kΩ) T_{amb} = 25°C $T_{min.} \le T_{amb} \le T_{max.}$	 77 77	 92		 77 77	 92		dB
I_{CC}	Supply Current - (no load) T_{amb} = 25°C $T_{min.} \le T_{amb} \le T_{max.}$		20	25 30		160	180 200	µA
V_{icm}	Input Common Mode Voltage Range	±10			±10			V
CMR	Common Mode Rejection Ratio ($R_s \le$ 10kΩ) T_{amb} = 25°C $T_{min.} \le T_{amb} \le T_{max.}$	 70 70	 90		 70 70	 90		dB
I_{os}	Output Short-circuit Current	0.5	3	15	6	12	30	mA
$\pm V_{OPP}$	Output Voltage Swing T_{amb} = 25°C R_L = 5kΩ R_L = 75kΩ $T_{min.} \le T_{amb} \le T_{max}$ R_L = 75kΩ	 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 R_L = 5kΩ f = 10kHz 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		$\frac{nV}{\sqrt{Hz}}$

776-03.TBL

ELECTRICAL CHARACTERISTICS

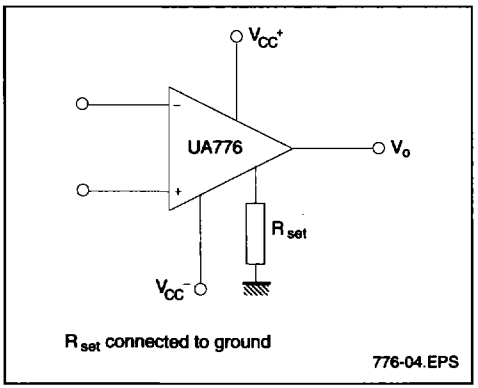
V_{CC} = ±3V, T_{amb} = 25°C (unless otherwise specified)

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 $T_{min.} \le T_{amb} \le T_{max.}$		2	5 6		2	5 6	mV
I_{io}	Input Offset Current T_{amb} = 25°C $T_{min.} \le T_{amb} \le T_{max.}$		0.7	3 10		2	15 40	nA
I_{ib}	Input Bias Current T_{amb} = 25°C UA776M UA776I,C $T_{min.} \le T_{amb} \le T_{max.}$		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 $T_{min.} \le T_{amb} \le T_{max.}$ R_L = 5kΩ R_L = 75kΩ	 50 25	 200	 	 50 25	 200	 	V/mV
SVR	Supply Voltage Rejection Ratio ($R_s \le$ 10kΩ) T_{amb} = 25°C $T_{min.} \le T_{amb} \le T_{max.}$	 77 77	 92	 	 77 77	 92	 	dB
I_{CC}	Supply Current, no load T_{amb} = 25°C $T_{min.} \le T_{amb} \le T_{max.}$		13	20 25		130	160 180	µA
V_{icm}	Input Common Mode Voltage Range	±1			±1			V
CMR	Common Mode Rejection Ratio ($R_s \le$ 10kΩ) T_{amb} = 25°C $T_{min.} \le T_{amb} \le T_{max.}$	 70 70	 90	 	 70 70	 90	 	dB
I_{os}	Output Short-circuit Current	0.5	3	15	2	5	20	mA
$\pm V_{OPP}$	Output Voltage Swing T_{amb} = 25°C R_L = 75kΩ R_L = 5kΩ $T_{min.} \le T_{amb} \le T_{max}$ 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 R_L = 5kΩ f = 10kHz 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 TBI

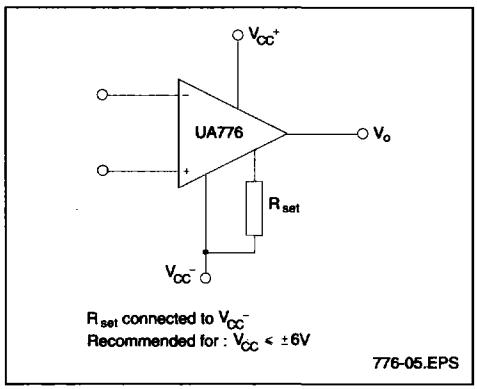
BIASING CIRCUITS

RESISTOR BIASING



R_{set} connected to ground

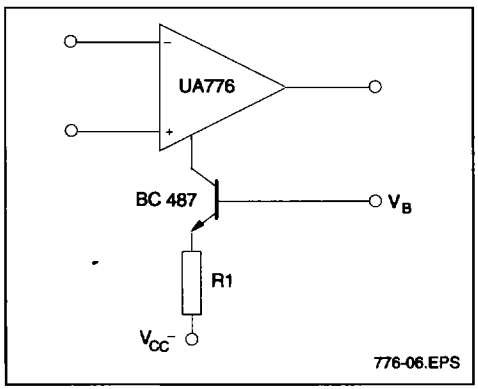
776-04.EPS



R_{set} connected to V_{CC}^-
Recommended for : $V_{CC} < \pm 6V$

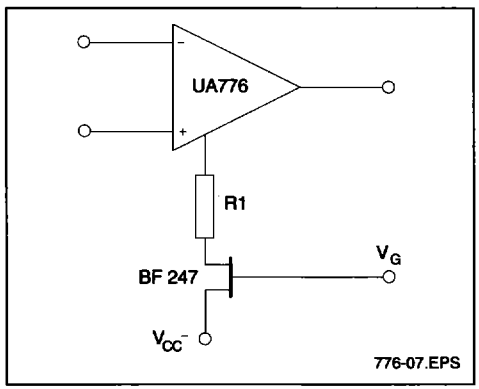
776-05.EPS

TRANSISTOR CURRENT SOURCE BIASING



776-06.EPS

FET CURRENT SOURCE BIASING



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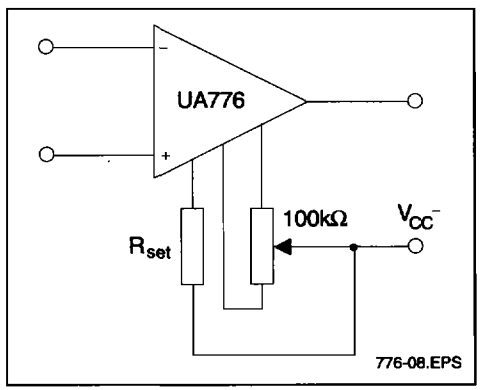
OFFSET VOLTAGE NULL CIRCUIT



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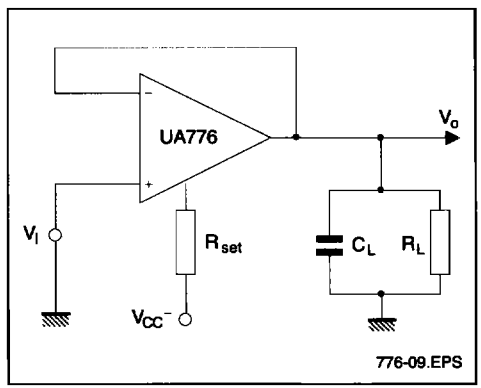
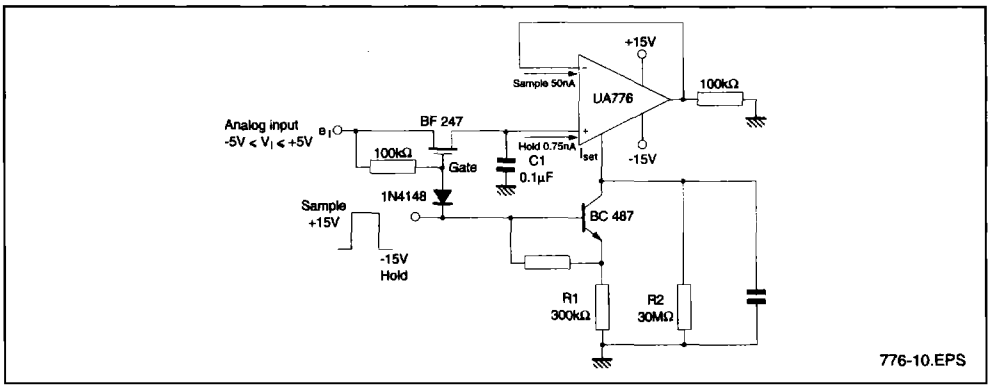
TRANSIENT RESPONSE TIME TEST CIRCUIT



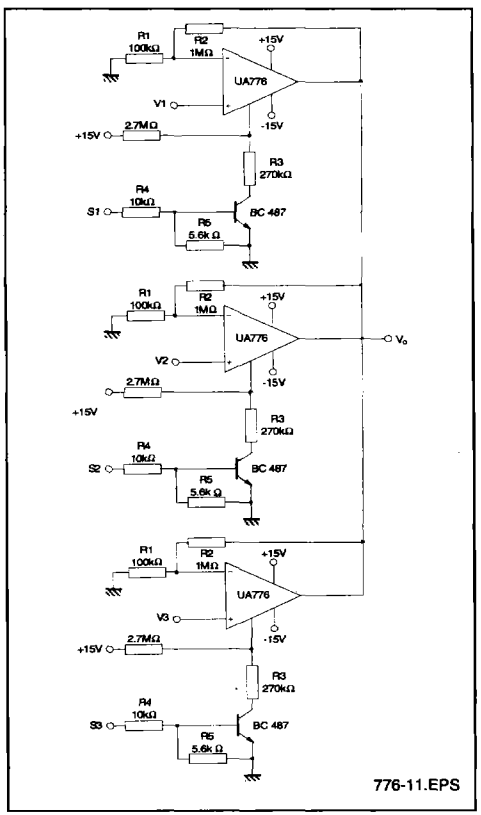
776-09.EPS

TYPICAL APPLICATIONS

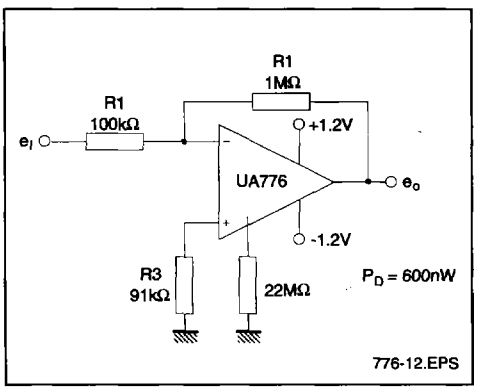
HIGH ACCURACY SAMPLE AND HOLD



MULTIPLEXING AND SIGNAL CONDITIONING WITHOUT FETs



NANO-WATT AMPLIFIER



HIGH INPUT IMPEDANCE AMPLIFIER