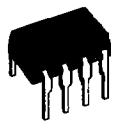
SGS-THOMSON MICROELECTRONICS

UA748

PRECISION SINGLE OPERATIONAL AMPLIFIERS

- FREQUENCY COMPENSATION WITH A SINGLE 30pF CAPACITOR
- OPERATION FROM ±5V TO ±15V
- LOW POWER CONSUMPTION : 50mW AT ±15V
- CONTINUOUS SHORT-CIRCUIT PROTECTION
- OPERATION AS A COMPARATOR WITH DIFFERENTIAL INPUTS AS HIGH AS ±30V
- NO LATCH-UP WHEN COMMON-MODE RANGE IS EXCEEDED
- SAME PIN CONFIGURATION AS THE LM101A



N
DIP8
(Plastic Package)

D
SO8
(Plastic Micropackage)

J
CERDIP8
(Cerdip Package)

H
TO99
(Metal Can)

Part Number	Temperature Range	Package			
		H	N	J	D
UA748C	0°C, +70°C	•	•	•	•
UA748I	-40°C, +105°C	•	•	•	•
UA748M	-55°C, +125°C	•	•	•	•
Example : UA748CH					

748-01.TBL

DESCRIPTION

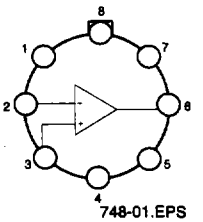
The UA748 is a general-purpose operational amplifier built on a single silicon chip. The resulting close match and tight thermal coupling gives low offsets and temperature drift as well as fast recovery from thermal transients.

- Short-circuit protection
- Offset voltage null capability
- Large common-mode and differential voltage ranges
- Low power consumption
- No latch-up

The unity-gain compensation specified makes the circuit stable for all feedback configurations, even with capacitive loads. However, it is possible to optimize compensation for best high frequency performance at any gain. The low power dissipation permits high voltage operation and simplifies packaging in full-temperature range systems.

PIN CONNECTIONS (top views)

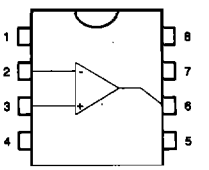
TO99



748-01.EPS

1 - Offset null 1/frequency compensation
2 - Inverting input
3 - Non-inverting input
4 - V_{CC}^-

DIP8/CERDIP8
SO8

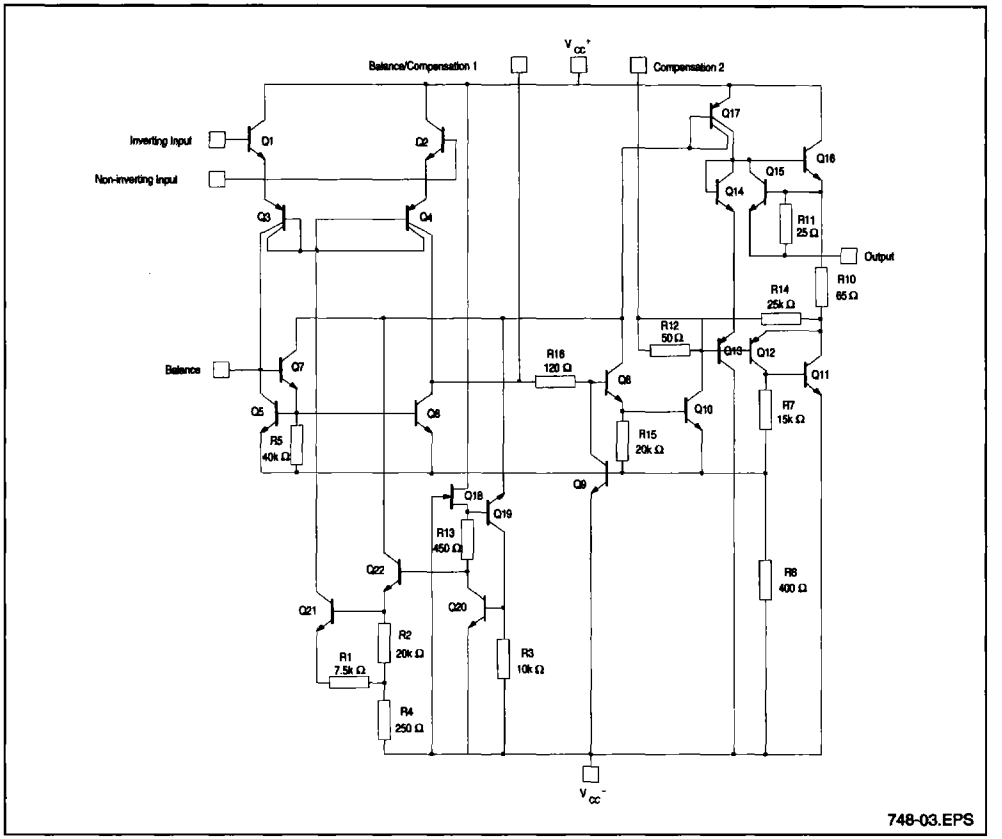


748-02.EPS

5 - Offset null 2
6 - Output
7 - V_{CC}^+
8 - Frequency compensation

December 1992

SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value			Unit
		UA748M	UA748I	UA748C	
V_{CC}	Supply Voltage	±22	±22	±22	V
V_i	Input Voltage	±15	±15	±15	V
V_{id}	Differential Input Voltage	±30	±30	±30	V
P_{tot}	Power Dissipation	500	500	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

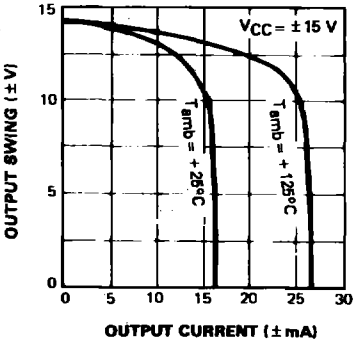
ELECTRICAL CHARACTERISTICS

$\pm 5V \leq V_{CC} \leq \pm 20V$, $C_1 = 30pF$, $T_{amb} = 25°C$ (unless otherwise specified)

Symbol	Parameter	UA748-M-I			UA748C			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
V_{io}	Input Offset Voltage ($R_s \leq 10k\Omega$) $T_{amb} = 25°C$ $T_{min.} \leq T_{amb} \leq T_{max.}$		0.2	2 3		2	7.5 10	mV
I_{ib}	Input Bias Current $T_{amb} = 25°C$ $T_{min.} \leq T_{amb} \leq T_{max.}$		1.5	10 20		2	50 70	nA
I_{io}	Input Offset Current $T_{amb} = 25°C$ $T_{min.} \leq T_{amb} \leq T_{max.}$		25	75 10		70	250 300	nA
A_{vd}	Large Signal Voltage Gain ($V_{CC} = \pm 15V$, $V_o = \pm 10V$, $R_L = 2k\Omega$) $T_{amb} = 25°C$ $T_{min.} \leq T_{amb} \leq T_{max.}$	50 25	100		25 15	10		V/mV
SVR	Supply Voltage Rejection Ratio ($R_s \leq 10k\Omega$) $T_{amb} = 25°C$ $T_{min.} \leq T_{amb} \leq T_{max.}$	80 80	96		70 70	96		dB
I_{CC}	Supply Current, no load $T_{amb} = 25°C$ $T_{min.} \leq T_{amb} \leq T_{max.}$		1.8	3 3		1.8	3 3	mA
V_{icm}	Input Common Mode Voltage Range ($V_{CC} = \pm 20V$) $T_{amb} = 25°C$ $T_{min.} \leq T_{amb} \leq T_{max.}$	±15 ±15			±15 ±15			V
CMR	Common Mode Rejection Ratio ($R_s \leq 10k\Omega$) $T_{amb} = 25°C$ $T_{min.} \leq T_{amb} \leq T_{max.}$	80 80	96		70 70	96		dB
I_{os}	Output Short-circuit Current ($V_{CC} = \pm 15V$)	10	30	50	10	30	50	mA
$\pm V_{OPP}$	Output Voltage Swing ($V_{CC} = \pm 15V$) $T_{amb} = 25°C$ $R_L = 10k\Omega$ $R_L = 2k\Omega$ $T_{min.} \leq T_{amb} \leq T_{max}$ $R_L = 10k\Omega$ $R_L = 2k\Omega$	12 10 12 10	14 13		12 10 12 10	14 13		V
SR	Slew Rate ($V_{CC} = \pm 15V$, $V_i = \pm 10V$, $R_L = 2k\Omega$, $C_L = 100pF$, $T_{amb} = 25°C$, unity gain)	0.25	0.5		0.25	0.5		V/µs
t_r	Rise Time ($V_{CC} = \pm 15V$, $V_i = \pm 20mV$, $R_L = 2k\Omega$, $C_L = 100pF$, $T_{amb} = 25°C$, unity gain)		0.3			0.3		µs
K_{OV}	Overshoot ($V_{CC} = \pm 15V$, $V_i = 20mV$, $R_L = 2k\Omega$, $C_L = 100pF$, $T_{amb} = 25°C$, unity gain)		5			5		%
Z_i	Input Impedance ($V_{CC} = \pm 15V$)	1.5	4		1.5	4		MΩ
R_o	Output Resistance ($V_{CC} = \pm 15V$)		75			75		Ω
GBP	Gain Bandwidth Product ($V_{CC} = \pm 15V$, $V_i = 10mV$, $R_L = 2k\Omega$, $C_L = 100pF$, $f = 100kHz$)	0.5	1		0.5	1		MHz
THD	Total Harmonic Distortion ($V_{CC} = \pm 15V$, $f = 1kHz$, $A_V = 20dB$, $R_L = 2k\Omega$, $V_o = 2V_{PP}$, $C_L = 100pF$)		0.015			0.015		%
e_n	Equivalent Input Noise Voltage ($V_{CC} = \pm 15V$, $f = 1kHz$, $R_s = 100\Omega$)		25			25		$\frac{nV}{\sqrt{Hz}}$
DV_{io}	Input Offset Current Drift $25°C \leq T_{amb} \leq T_{max}$ $T_{min.} \leq T_{amb} \leq 25°C$		10 20	100 200		10 20	300 600	pA/°C
DI_{io}	Input Offset Voltage Drift $T_{min.} \leq T_{amb} \leq T_{max.}$		3	15		6	30	µV/°C

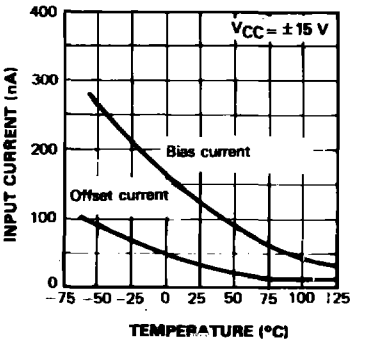
748-03.TBL

CURRENT LIMITING



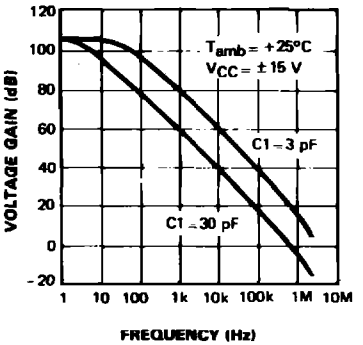
748-04.EPS

INPUT CURRENT



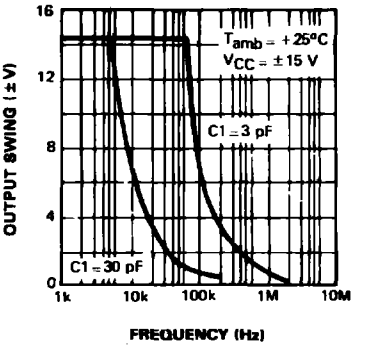
748-05.EPS

OPEN LOOP FREQUENCY RESPONSE



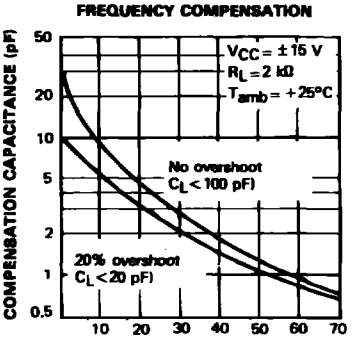
748-06.EPS

LARGE SIGNAL FREQUENCY RESPONSE



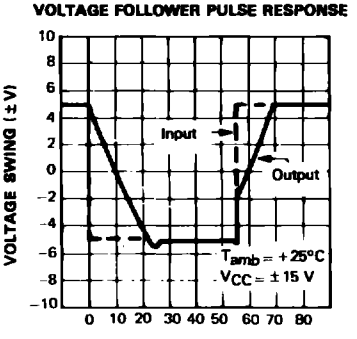
748-07.EPS

FREQUENCY COMPENSATION



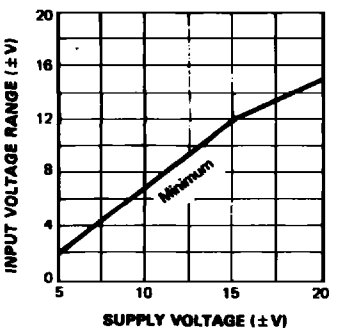
748-08.EPS

VOLTAGE FOLLOWER PULSE RESPONSE



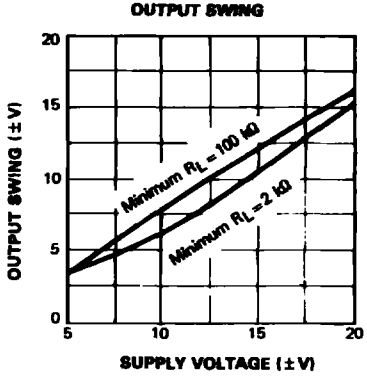
748-09.EPS

INPUT VOLTAGE RANGE



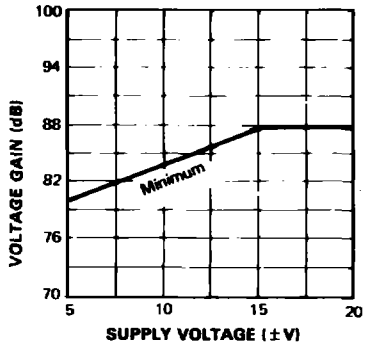
748-10.EPS

OUTPUT SWING



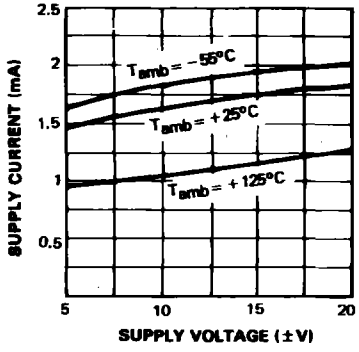
748-11.EPS

VOLTAGE GAIN



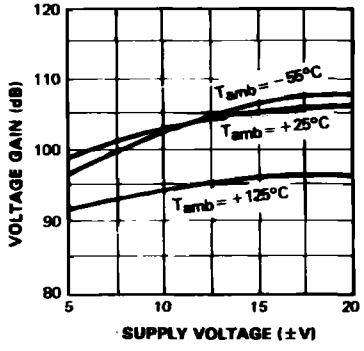
748-12.EPS

SUPPLY CURRENT



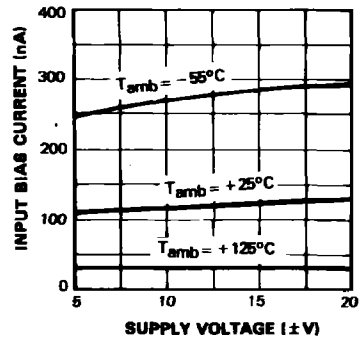
748-13.EPS

VOLTAGE GAIN



748-14.EPS

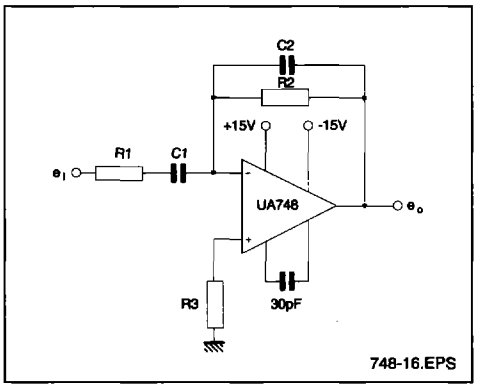
INPUT BIAS CURRENT



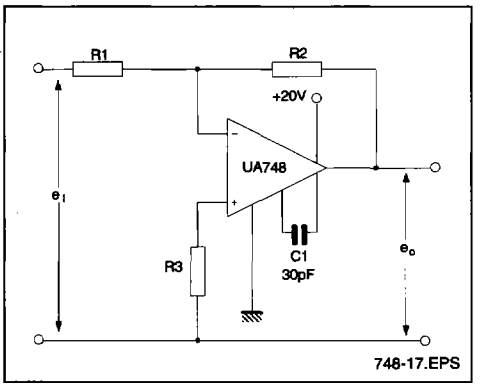
748-15.EPS

TYPICAL APPLICATIONS

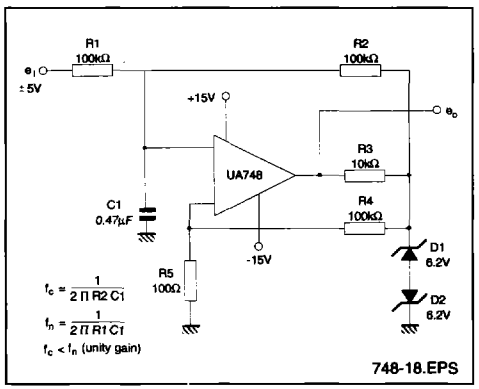
PRACTICAL DIFFERENTIATOR



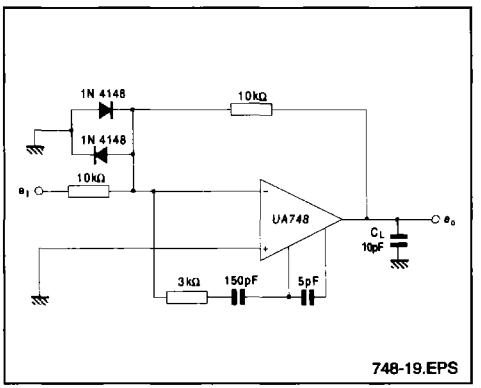
SINGLE SUPPLY OPERATION



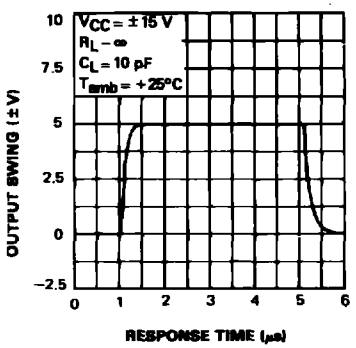
PULSE WIDTH MODULATOR



FEED-FORWARD COMPENSATION



LARGE SIGNAL FEED-FORWARD TRANSIENT RESPONSE



748-20.EPS