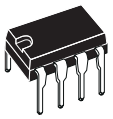
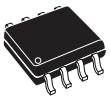
UA748

PRECISION SINGLE OPERATIONAL AMPLIFIER

- INPUT OFFSET VOLTAGE : 3mV max. OVER TEMPERATURE
- FREQUENCY COMPENSATION WITH A SINGLE 30pF CAPACITOR (C1)
- 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)

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

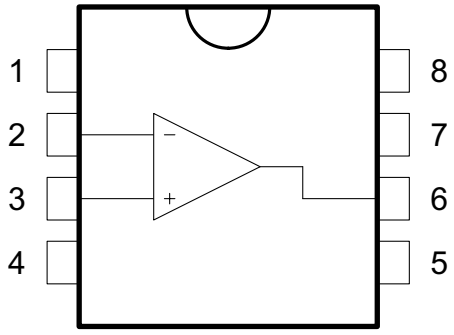
The unity-gain compensation specified makes the circuit stable for all feedback configurations, even with capacitive loads. However, it is possible to optimize compensation for best high frequency performance at any gain. The low power dissipation permits high voltage operation and simplifies packaging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

ORDER CODE

Part Number	Temperature Range	Package	
		N	D
UA748C	0°C, +70°C	•	•
UA748I	-40°C, +105°C	•	•
UA748M	-55°C, +125°C	•	•
Example : UA748CN			

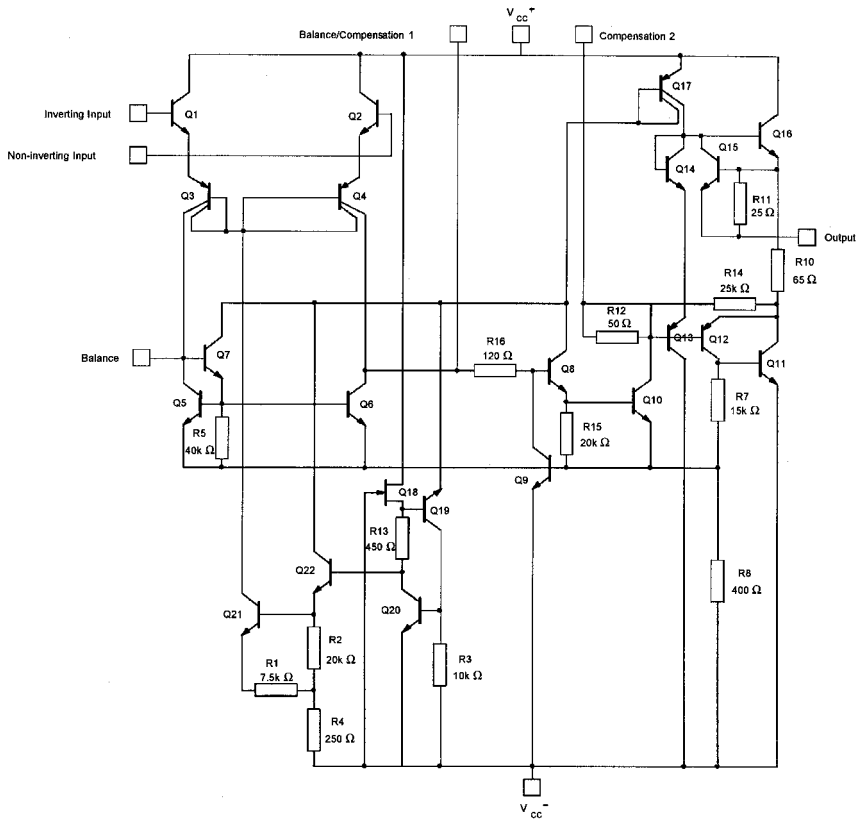
N = Dual in Line Package (DIP)
D = Small Outline Package (SO) - also available in Tape & Reel (DT)

PIN CONNECTIONS (top view)



1 - Offset null 1/frequency compensation
2 - Inverting input
3 - Non-inverting input
4 - V_{CC}^-
5 - Offset null 2
6 - Output
7 - V_{CC}^+
8 - Frequency compensation

SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	UA748M	UA748I	UA748C	Unit
V_{CC}	Supply voltage	±22			V
V_{id}	Differential Input Voltage	±30			V
V_i	Input Voltage	±15			V
P_{tot}	Power Dissipation [1]	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			°C

1. Power dissipation must be considered to ensure maximum junction temperature (Tj) is not exceeded.

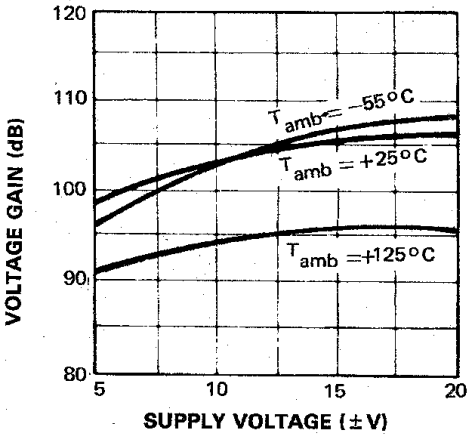
ELECTRICAL CHARACTERISTICS

V_{CC} = ±15V, T_{amb} = +25°C, C1 = 30pF (unless otherwise specified)

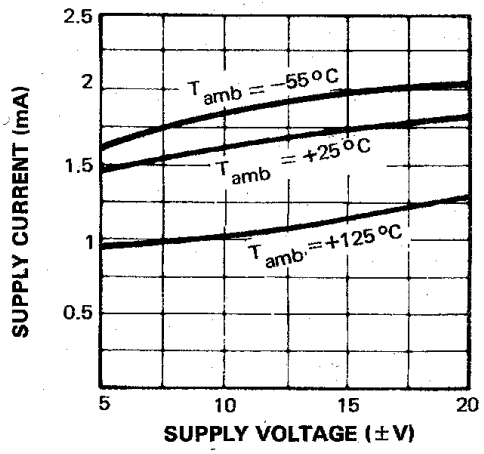
Symbol	Parameter	UA748I/M			UA748C			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
V_{io}	Input Offset Voltage ($R_S \leq 10k\Omega$) T_{amb} = +25°C $T_{min} \leq T_{amb} \leq T_{max}$		0.7	2 3		2	7.5 10	mV
I_{io}	Input Offset Current T_{amb} = +25°C $T_{min} \leq T_{amb} \leq T_{max}$		1.5	10 20		2	50 70	nA
I_{ib}	Input Bias 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_o = ±10V, R_L = 2kΩ) T_{amb} = +25°C $T_{min} \leq T_{amb} \leq T_{max}$	50 25	100		25 15	100		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} = ±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	10	30	50	10	30	50	mA
$\pm V_{opp}$	Output Voltage Swing (V_{CC} = ±15V) T_{amb} = +25°C R_L = 10kΩ R_L = 2kΩ $T_{min} \leq T_{amb} \leq T_{max}$ R_L = 10kΩ R_L = 2kΩ	12 10 12 10	14 13		12 10 12 10	14 13		V
SR	Slew Rate [1] V_i = ±10V, R_L = 2kΩ, C_L = 100pF, unity Gain	0.25	0.5		0.25	0.5		V/µs
t_r	Rise Time V_i = ±20mV, R_L = 2kΩ, C_L = 100pF, unity Gain		0.3			0.3		µs
K_{ov}	Overshoot V_i = 20mV, R_L = 2kΩ, C_L = 100pF, unity Gain		5			5		%
Z_i	Input Impedance (V_{CC} = ±15V)	1.5	4		1.5	4		MΩ
Ro	Output Resistance (V_{CC} = ±15V)		75			75		Ω
GBP	Gain Bandwith Product V_i =10mV, R_L = 2kΩ, C_L = 100pF, f =100kHz	0.5	1		0.5	1		MHz
THD	Total Harmonic Distortion f =1kHz, A_v =20dB, R_L =2kΩ, V_o =2V_{pp}, C_L = 100pF		0.015			0.015		%
DI_{io}	Input Offset Current Drift 25°C ≤ T_{max} $T_{min} \leq T_{amb} \leq T_{max}$		10 20	100 200		10 20	300 600	pA/°C
DV_{io}	Input Offset Voltage Drift $T_{min} \leq T_{amb} \leq T_{max}$		3	15		6	30	µV/°C

1. May be improved up to 10V/µs in inverting amplifier configuration.

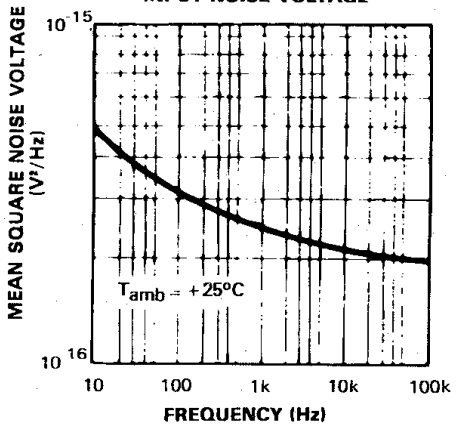
VOLTAGE GAIN



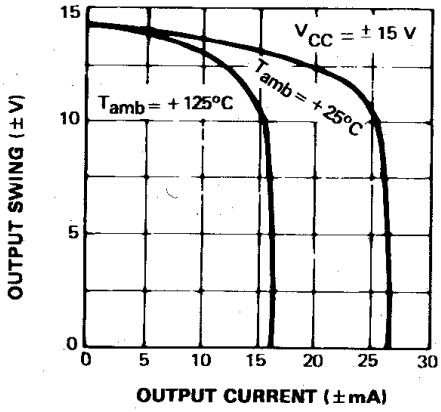
SUPPLY CURRENT



INPUT NOISE VOLTAGE

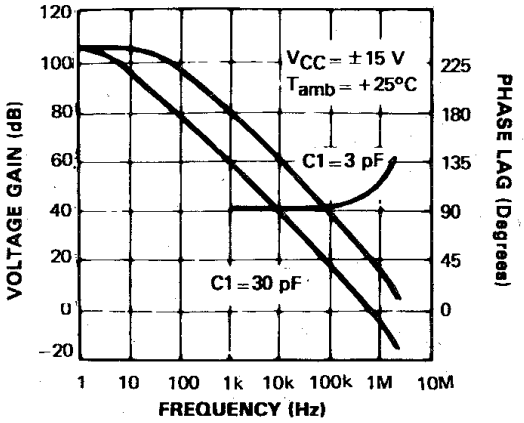


CURRENT LIMITING



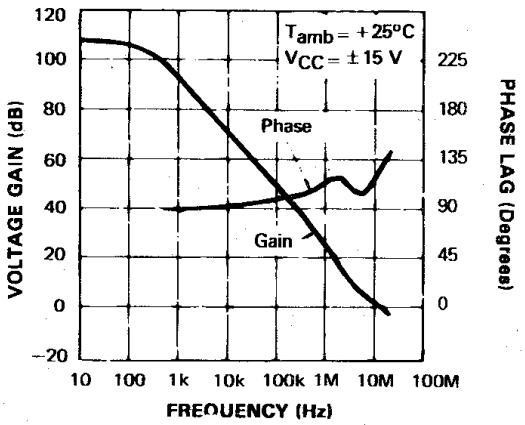
SINGLE POLE COMPENSATION

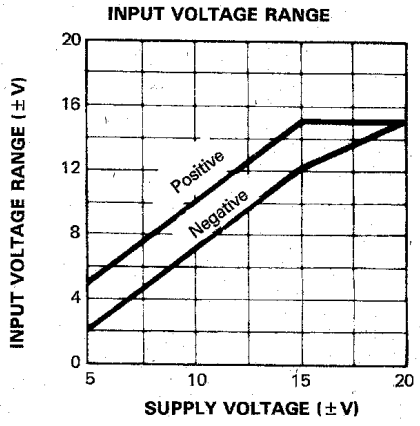
OPEN LOOP FREQUENCY RESPONSE

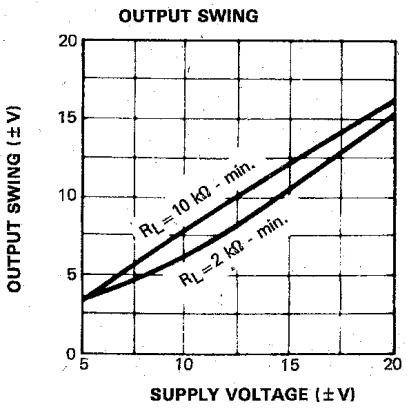


FEED FORWARD COMPENSATION

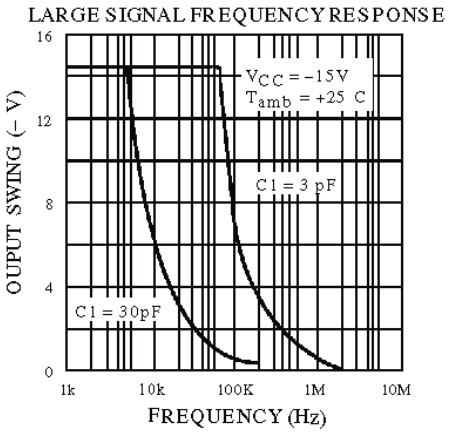
OPEN LOOP FREQUENCY RESPONSE

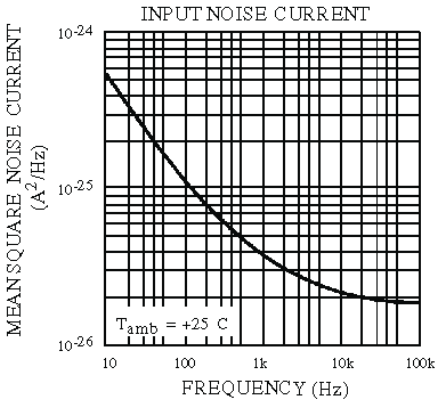


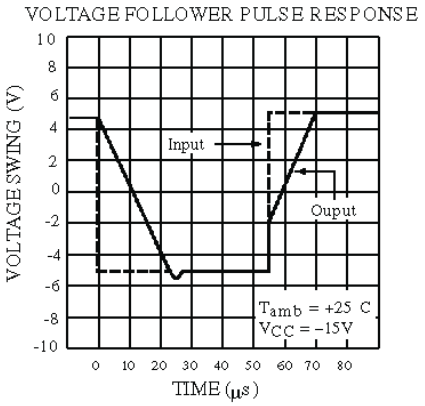


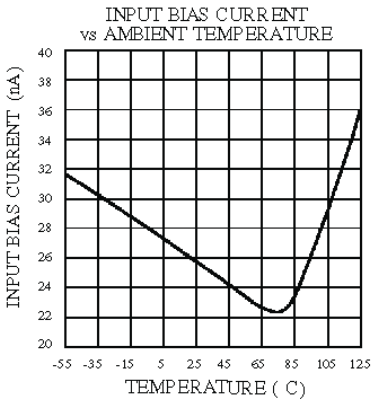


SINGLE POLE COMPENSATION



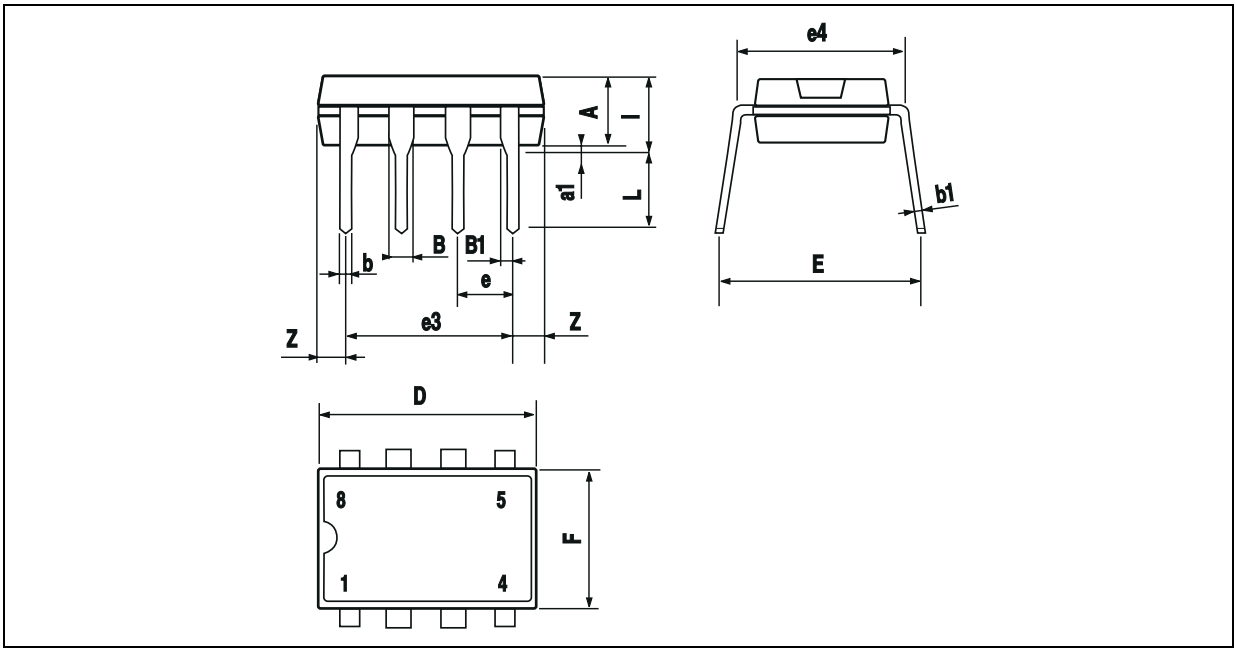






PACKAGE MECHANICAL DATA

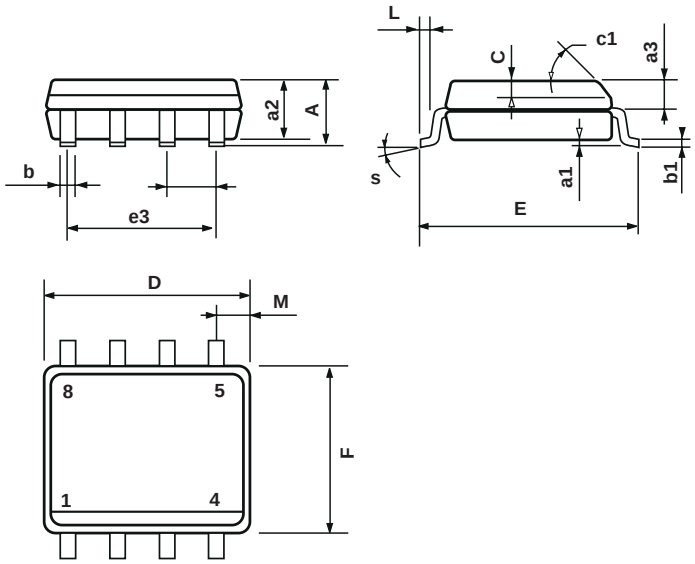
8 PINS - PLASTIC DIP



Dim.	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A		3.32			0.131	
a1	0.51			0.020		
B	1.15		1.65	0.045		0.065
b	0.356		0.55	0.014		0.022
b1	0.204		0.304	0.008		0.012
D			10.92			0.430
E	7.95		9.75	0.313		0.384
e		2.54			0.100	
e3		7.62			0.300	
e4		7.62			0.300	
F			6.6			0260
i			5.08			0.200
L	3.18		3.81	0.125		0.150
Z			1.52			0.060

PACKAGE MECHANICAL DATA

8 PINS - PLASTIC MICROPACKAGE (SO)



Dim.	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.75			0.069
a1	0.1		0.25	0.004		0.010
a2			1.65			0.065
a3	0.65		0.85	0.026		0.033
b	0.35		0.48	0.014		0.019
b1	0.19		0.25	0.007		0.010
C	0.25		0.5	0.010		0.020
c1	45° (typ.)					
D	4.8		5.0	0.189		0.197
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		3.81			0.150	
F	3.8		4.0	0.150		0.157
L	0.4		1.27	0.016		0.050
M			0.6			0.024
S	8° (max.)					

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