LINEAR INTEGRATED CIRCUITS

LM748
LM748C

OPERATIONAL AMPLIFIERS

- SHORT CIRCUIT PROTECTION
- OFFSET VOLTAGE NULL CAPABILITY
- LARGE COMMON MODE AND DIFFERENTIAL VOLTAGE RANGE
- NO LATCH-UP
- SLEW-RATE = 5.5V/μs (G_v = 10, C_C = 3.5 pF)

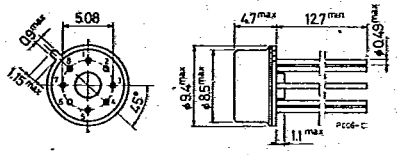
The LM748 series consists of general purpose operational amplifiers, intended for a wide range of analog applications where tailoring of frequency characteristics is desirable. High common mode voltage range and absence of "Latch-up" tendencies make the LM748 series ideal for use as a voltage follower. The high gain and wide range of operating voltage provide superior performance in integrators, summing amplifiers and general feedback applications. Unity gain frequency compensation is achieved by means of a single 30 pF capacitor.

ABSOLUTE MAXIMUM RATINGS		LM748	LM748C
V_s	Supply voltage	± 22V	± 22V
V_I (1)	Input voltage	± 15V	± 15V
ΔV_I	Differential input voltage	± 30V	± 30V
T_{op}	Operating temperature	-55 to 125 °C	0 to 70 °C
	Output short circuit duration (2)	indefinite	indefinite
P_{tot}	Power dissipation at T_{amb} = 70°C: TO-99	520 mW	520 mW
	Minidip	—	665 mW
T_{stg}	Storage temperature	65 to 150 °C	-55 to 150 °C

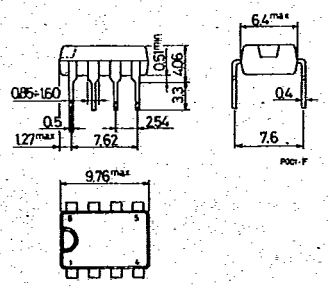
1) For supply voltage less than ± 15V, input voltage is equal to the supply voltage
2) The short circuit duration is limited by thermal dissipation.

MECHANICAL DATA

Dimensions in mm



TO-99



Minidip

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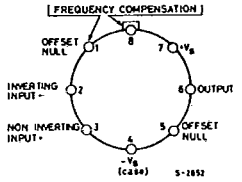
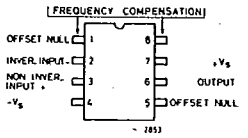
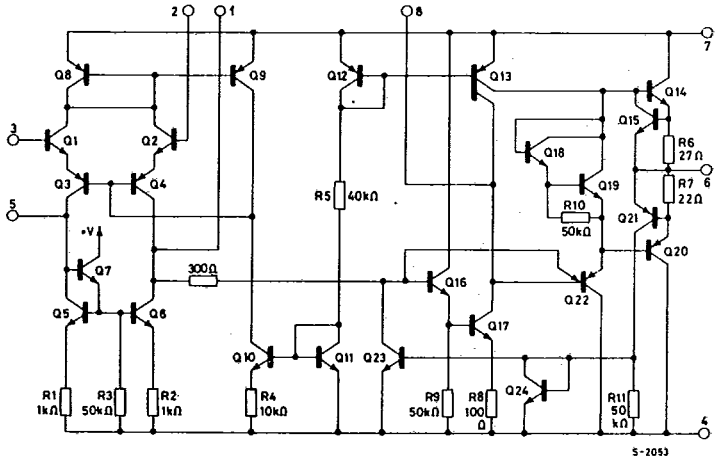
CONNECTION DIAGRAMS AND ORDERING NUMBERS
(top views)





Type	TO-99	Minidip
LM 748	LM 748H	—
LM 748C	LM 748 CH	LM 748 CN

SCHEMATIC DIAGRAM



THERMAL DATA			TO-99	Minidip
$R_{th\ j\text{-}amb}$	Thermal resistance junction-ambient	max	155 °C/W	120 °C/W

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LM748C

ELECTRICAL CHARACTERISTICS (see note)

Parameter		Test conditions		LM748 Min.	LM748 Typ.	LM748 Max.	LM748C Min.	LM748C Typ.	LM748C Max.	Unit
V_{os}	Input offset voltage	T_{amb}= 25°C $R_g \leq 10\ k\Omega$ $R_g \leq 50\Omega$			1	5		2	6	mV
		T_{amb}= T_{min} to T_{max} $R_g \leq 10\ k\Omega$ $R_g \leq 50\Omega$			1	6			7.5	mV
ΔV_{os}	Input offset voltage adjust. range	T_{amb}= 25°C			±15			±15		mV
I_{os}	Input offset current	T_{amb}= 25°C T_{amb}= T_{min} to T_{max}			20 50	200 500		20	200 300	nA nA
I_b	Input bias current	T_{amb}= 25°C T_{amb}= T_{min} to T_{max}			80	500 1.5		80	500 0.8	nA µA
R_I	Input resistance	T_{amb}= 25°C		0.3	2		0.3	2		MΩ
V_I	Input voltage range			±12	±13		±12	±13		V
G_v	Large signal voltage gain	T_{amb}= 25°C $R_L \geq 2\ k\Omega$ V_s= ±15V V_o= ±10V T_{amb}= T_{min} to T_{max} $R_L \geq 2\ k\Omega$ V_s= ±15V V_o= ±10V		94 88	104		86 84	104		dB dB
V_o	Output voltage swing	V_s= ±15V $R_L \geq 10\ k\Omega$ $R_L \geq 2\ k\Omega$		±12 ±10	±14 ±13		±12 ±10	±14 ±13		V V
I_{sc}	Output short circuit current				25			25		mA
CMR	Common mode rejection	$R_g \leq 10\ k\Omega$ V_{CM}= ±12V		70	90		70	90		dB
SVR	Supply voltage rejection	V_s= ±5 to ± 20V $R_g \leq 10\ k\Omega$		76	90		76	90		dB
SR	Slew rate	T_{amb}= 25°C $R_L \geq 2\ k\Omega$	G_v= 1		0.5			0.5		V/µs
			G_v= 10*		5.5			5.5		V/µs

* C_C = 3.5 pF

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ELECTRICAL CHARACTERISTICS (continued)

Parameter		Test conditions	LM748			LM748C			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
	Transient respon. (unity gain)	T_{amb}= 25°C V_i= 20 mV C_c= 30 pF R_L= 2 kΩ $C_L \leq$ 100 pF							
	Rise time			0.2			0.2		µs
	Overshoot			5			5		%
I_s	Supply current	T_{amb}= 25°C		1.9	2.8		1.9	2.8	mA
P_S	Power consumption	T_{amb}= 25°C V_s= ±15V		60	85		60	85	mW
		V_s= ±15V T_{amb}= T_{min}		60	100		60	100	mW
		T_{amb}= T_{max}		45	75				mW

Note: These specifications, unless otherwise specified, apply for V_s= ±15V and T_{amb}= -55 to 125°C for LM748. For LM748C these specifications apply for T_{amb}= 0 to 70°C (C_c = 30 pF).

Fig. 1 - Voltage offset null circuits

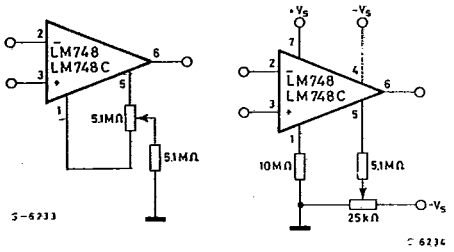

Fig. 2 - Transient response test circuit

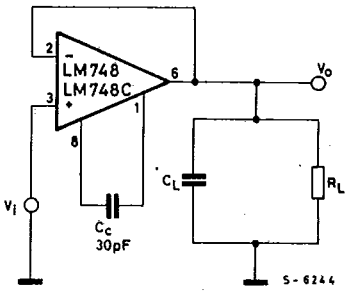

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Fig. 3 - Input noise voltage vs. frequency

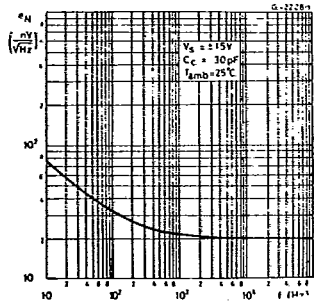

Fig. 4 - Input noise current vs. frequency

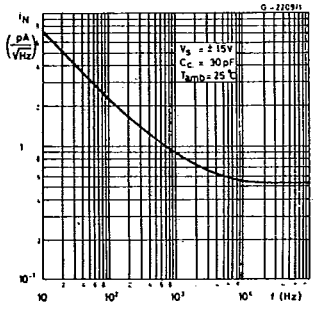

Fig. 5 - Broadband noise for various bandwidths

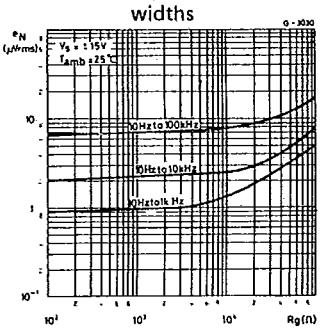

Fig. 6 - Open loop frequency and phase response vs. frequency

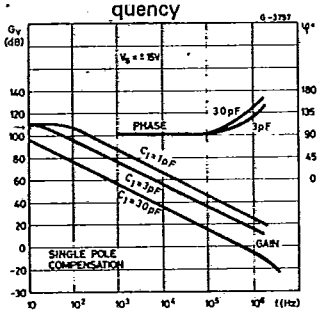

Fig. 7 - Output voltage swing vs. frequency

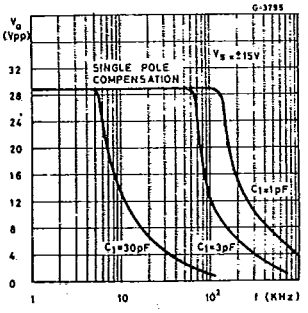

Fig. 8 - Slew-rate

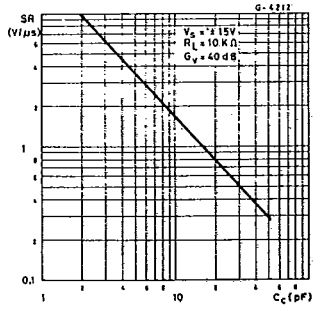

Fig. 9 - Compensation capacitance vs. closed loop voltage gain

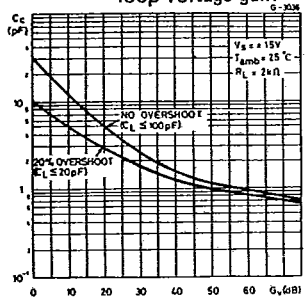

Fig. 10 - Input resistance and input capacitance vs. frequency

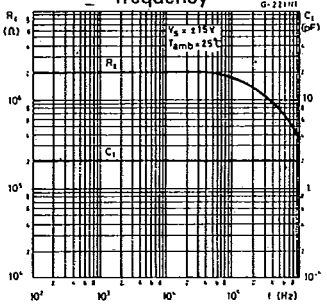

Fig. 11 - Output resistance vs. frequency