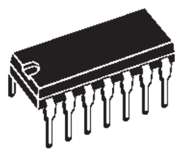
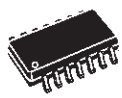
TL074
TL074A - TL074B

LOW NOISE J-FET QUAD OPERATIONAL AMPLIFIERS

- WIDE COMMON-MODE (UP TO V_{CC}^{+}) AND DIFFERENTIAL VOLTAGE RANGE
- LOW INPUT BIAS AND OFFSET CURRENT
- LOW NOISE e_n = 15nV/√Hz (typ)
- OUTPUT SHORT-CIRCUIT PROTECTION
- HIGH INPUT IMPEDANCE J–FET INPUT STAGE
- LOW HARMONIC DISTORTION : 0.01% (typ)
- INTERNAL FREQUENCY COMPENSATION
- LATCH UP FREE OPERATION
- HIGH SLEW RATE : 13V/µs (typ)



N
DIP14
(Plastic Package)



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SO14
(Plastic Micropackage)

DESCRIPTION

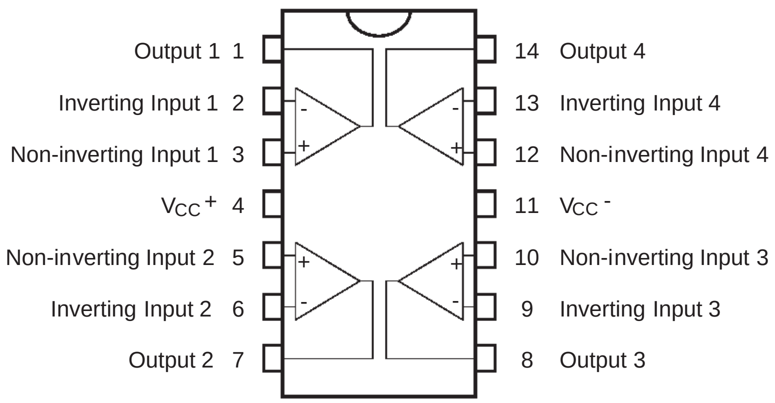
The TL074, TL074A and TL074B are high speed J–FET input quad operational amplifiers incorporating well matched, high voltage J–FET and bipolar transistors in a monolithic integrated circuit.

The devices feature high slew rates, low input bias and offset currents, and low offset voltage temperature coefficient.

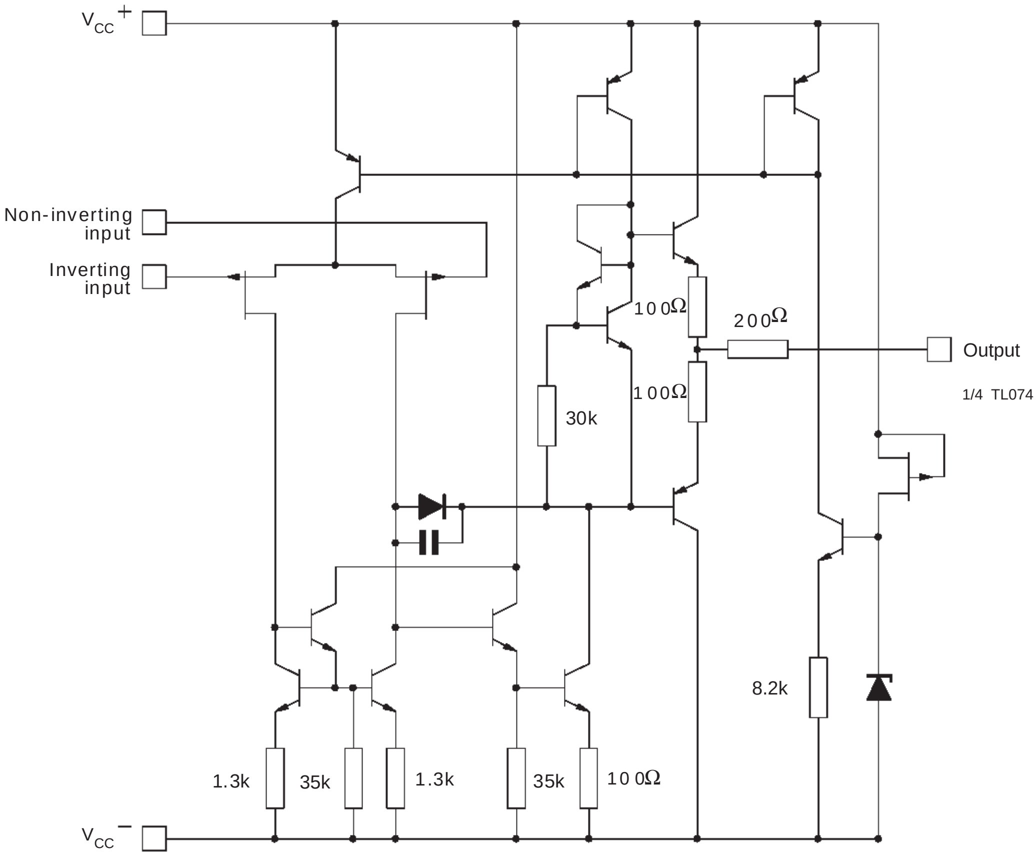
ORDER CODES

Part Number	Temperature Range	Package	
		N	D
TL074M/AM/BM	–55°C, +125°C	•	•
TL074I/AI/BI	–40°C, +105°C	•	•
TL074C/AC/BC	0°C, +70°C	•	•
Example : TL074IN			

PIN CONNECTIONS (top view)



SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V_{CC}	Supply Voltage - (note 1)		±18	V
V_i	Input Voltage - (note 3)		±15	V
V_{id}	Differential Input Voltage - (note 2)		±30	V
P_{tot}	Power Dissipation		680	mW
	Output Short-circuit Duration - (note 4)		Infinite	
T_{oper}	Operating Free Air Temperature Range	TL074C,AC,BC TL074I,AI,BI TL074M,AM,BM	0 to 70 –40 to 105 –55 to 125	^oC

Notes :
1. All voltage values, except differential voltage, are with respect to the zero reference level (ground) of the supply voltages where the zero reference level is the midpoint between V_{CC}^+ and V_{CC}^-.
2. Differential voltages are at the non-inverting input terminal with respect to the inverting input terminal.
3. The magnitude of the input voltage must never exceed the magnitude of the supply voltage or 15 volts, whichever is less.
4. The output may be shorted to ground or to either supply. Temperature and /or supply voltages must be limited to ensure that the dissipation rating is not exceeded.

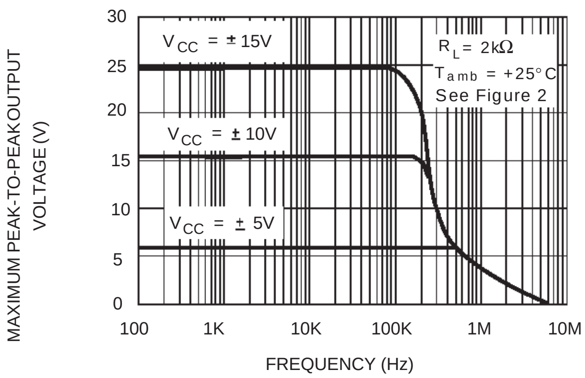
ELECTRICAL CHARACTERISTICS

$V_{CC} = \pm 15V$, $T_{amb} = 25^oC$ (unless otherwise specified)

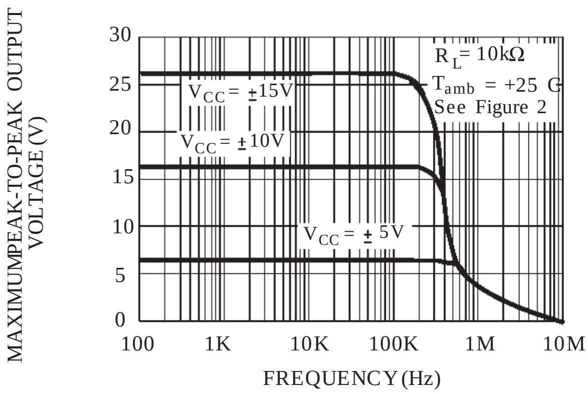
Symbol	Parameter	TL074I,M,AC,AI, AM,BC,BI,BM			TL074C			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
V_{io}	Input Offset Voltage ($R_S = 50\Omega$) $T_{amb} = 25^oC$ TL074 TL074A TL074B $T_{min.} \le T_{amb} \le T_{max.}$ TL074 TL074A TL074B		3 3 1	10 6 3 13 7 5		3	10 13	mV
DV_{io}	Input Offset Voltage Drift		10			10		$\mu V/^oC$
I_{io}	Input Offset Current * $T_{amb} = 25^oC$ $T_{min.} \le T_{amb} \le T_{max.}$		5	100 4		5	100 10	pA nA
I_{ib}	Input Bias Current * $T_{amb} = 25^oC$ $T_{min.} \le T_{amb} \le T_{max.}$		20	200 20		30	200 20	pA nA
A_{vd}	Large Signal Voltage Gain ($R_L = 2k\Omega$, $V_O = \pm 10V$) $T_{amb} = 25^oC$ $T_{min.} \le T_{amb} \le T_{max.}$	50 25	200		25 15	200		V/mV
SVR	Supply Voltage Rejection Ratio ($R_S = 50\Omega$) $T_{amb} = 25^oC$ $T_{min.} \le T_{amb} \le T_{max.}$	80 80	86		70 70	86		dB
I_{CC}	Supply Current, per Amp, no Load $T_{amb} = 25^oC$ $T_{min.} \le T_{amb} \le T_{max.}$		1.4	2.5 2.5		1.4	2.5 2.5	mA
V_{icm}	Input Common Mode Voltage Range	±11	+15 -12		±11	+15 -12		V
CMR	Common Mode Rejection Ratio ($R_S = 50\Omega$) $T_{amb} = 25^oC$ $T_{min.} \le T_{amb} \le T_{max.}$	80 80	86		70 70	86		dB
Ios	Output Short-circuit Current $T_{amb} = 25^oC$ $T_{min.} \le T_{amb} \le T_{max.}$	10 10	40	60 60	10 10	40	60 60	mA
$\pm V_{OPP}$	Output Voltage Swing $T_{amb} = 25^oC$ $R_L = 2k\Omega$ $R_L = 10k\Omega$ $T_{min.} \le T_{amb} \le T_{max.}$ $R_L = 2k\Omega$ $R_L = 10k\Omega$	10 12 10 12	12 13.5		10 12 10 12	12 13.5		V
SR	Slew Rate ($V_{in} = 10V$, $R_L = 2k\Omega$, $C_L = 100pF$, $T_{amb} = 25^oC$, unity gain)	8	13		8	13		V/µs
t_r	Rise Time ($V_{in} = 20mV$, $R_L = 2k\Omega$, $C_L = 100pF$, $T_{amb} = 25^oC$, unity gain)		0.1			0.1		µs
K_{OV}	Overshoot ($V_{in} = 20mV$, $R_L = 2k\Omega$, $C_L = 100pF$, $T_{amb} = 25^oC$, unity gain)		10			10		%
GBP	Gain Bandwidth Product (f = 100kHz, $T_{amb} = 25^oC$, $V_{in} = 10mV$, $R_L = 2k\Omega$, $C_L = 100pF$)	2	3		2	3		MHz
R_i	Input Resistance		10^{12}			10^{12}		Ω
THD	Total Harmonic Distortion (f = 1kHz, $A_V = 20dB$, $R_L = 2k\Omega$, $C_L = 100pF$, $T_{amb} = 25^oC$, $V_O = 2V_{PP}$)		0.01			0.01		%
e_n	Equivalent Input Noise Voltage (f = 1kHz, $R_s = 100\Omega$)		15			15		$\frac{nV}{\sqrt{Hz}}$
∅m	Phase Margin		45			45		Degrees
V_{O1}/V_{O2}	Channel Separation ($A_v = 100$)		120			120		dB

* The input bias currents are junction leakage currents which approximately double for every 10^oC increase in the junction temperature.

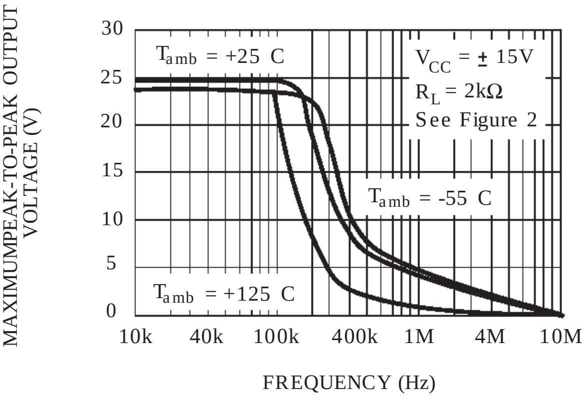
MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS FREQUENCY



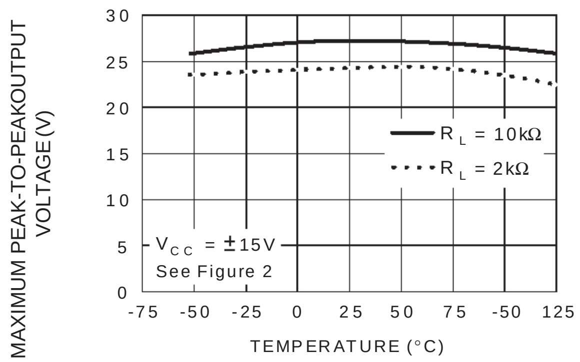
MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS FREQUENCY



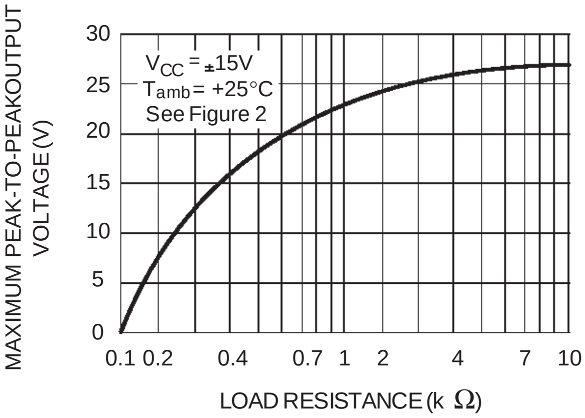
MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS FREQUENCY



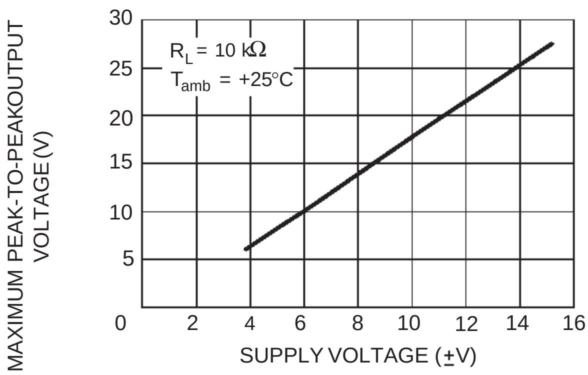
MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS FREE AIR TEMP.



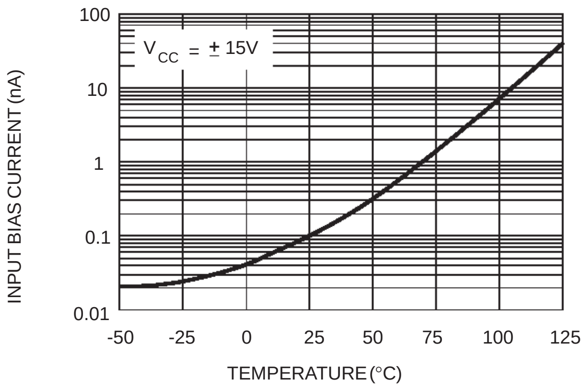
MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS LOAD RESISTANCE



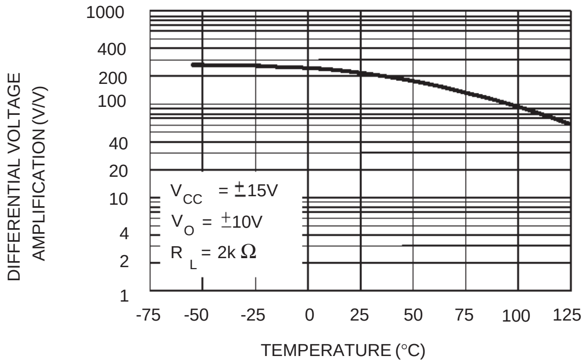
MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS SUPPLY VOLTAGE



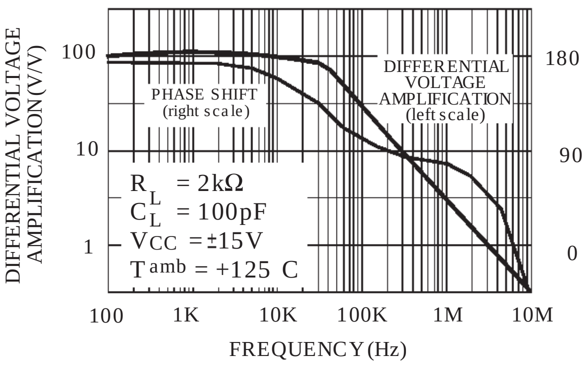
INPUT BIAS CURRENT VERSUS FREE AIR TEMPERATURE



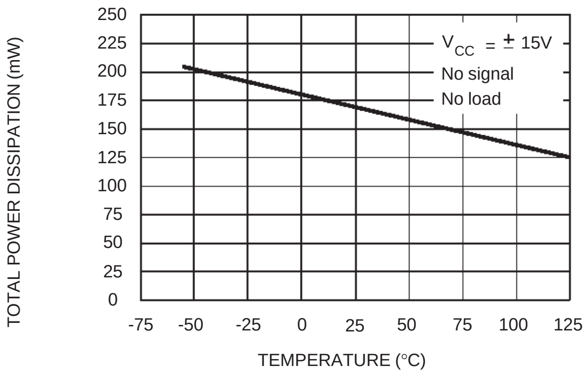
LARGE SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION VERSUS FREE AIR TEMPERATURE



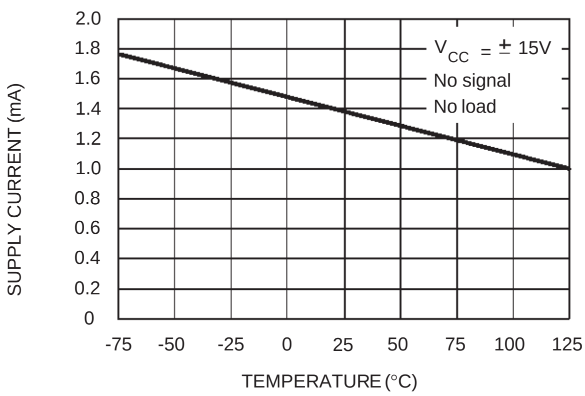
LARGE SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION AND PHASE SHIFT VERSUS FREQUENCY



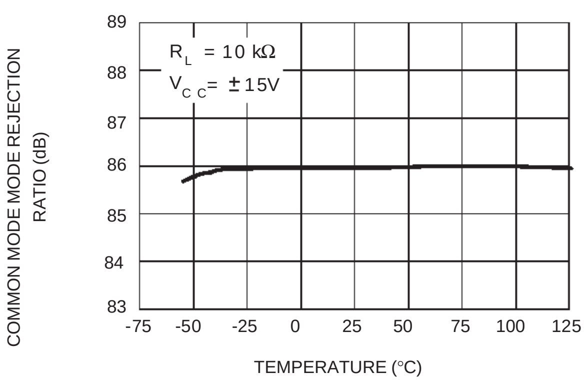
TOTAL POWER DISSIPATION VERSUS FREE AIR TEMPERATURE



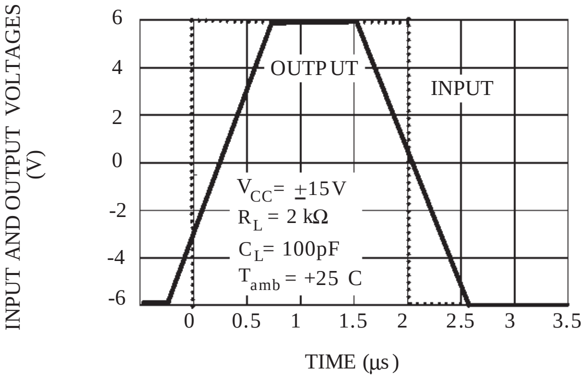
SUPPLY CURRENT PER AMPLIFIER VERSUS FREE AIR TEMPERATURE



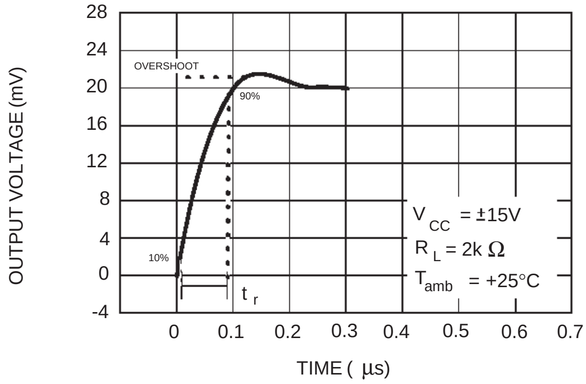
COMMON MODE REJECTION RATIO VERSUS FREE AIR TEMPERATURE



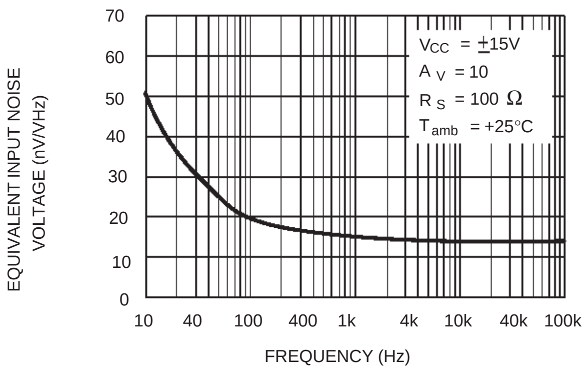
VOLTAGE FOLLOWER LARGE SIGNAL PULSE RESPONSE



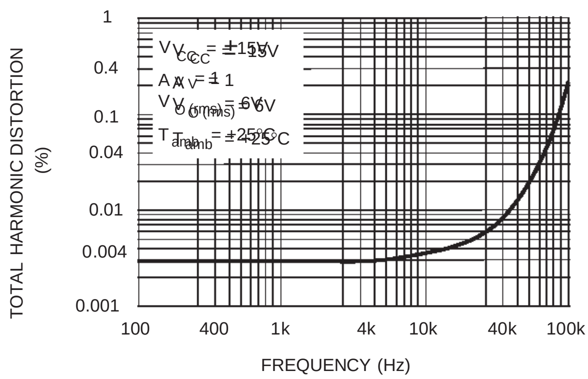
OUTPUT VOLTAGE VERSUS ELAPSED TIME



EQUIVALENT INPUT NOISE VOLTAGE VERSUS FREQUENCY



TOTAL HARMONIC DISTORTION VERSUS FREQUENCY



PARAMETER MEASUREMENT INFORMATION

Figure 1 : Voltage Follower

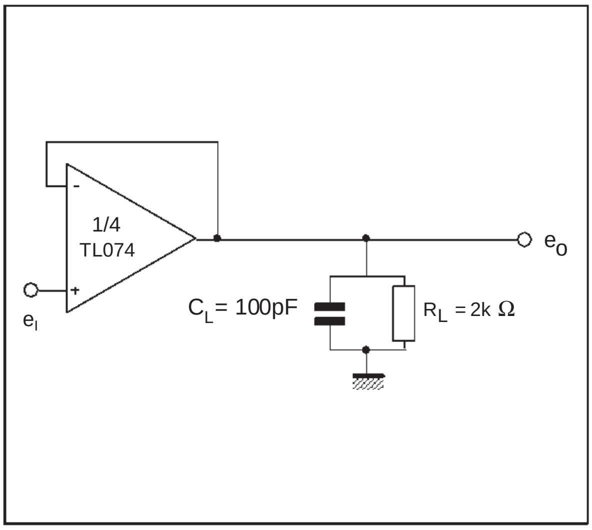
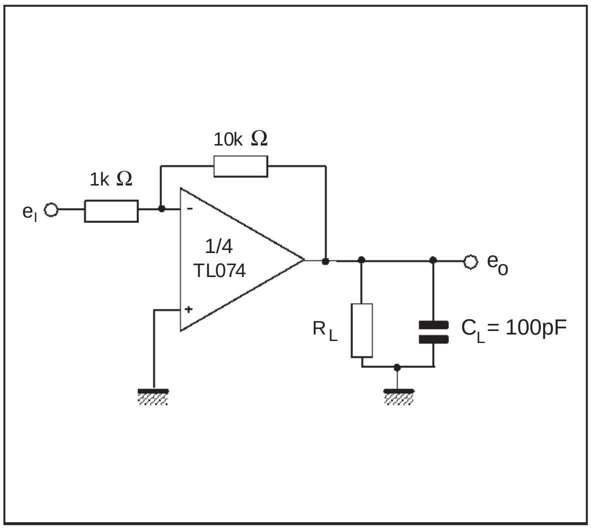
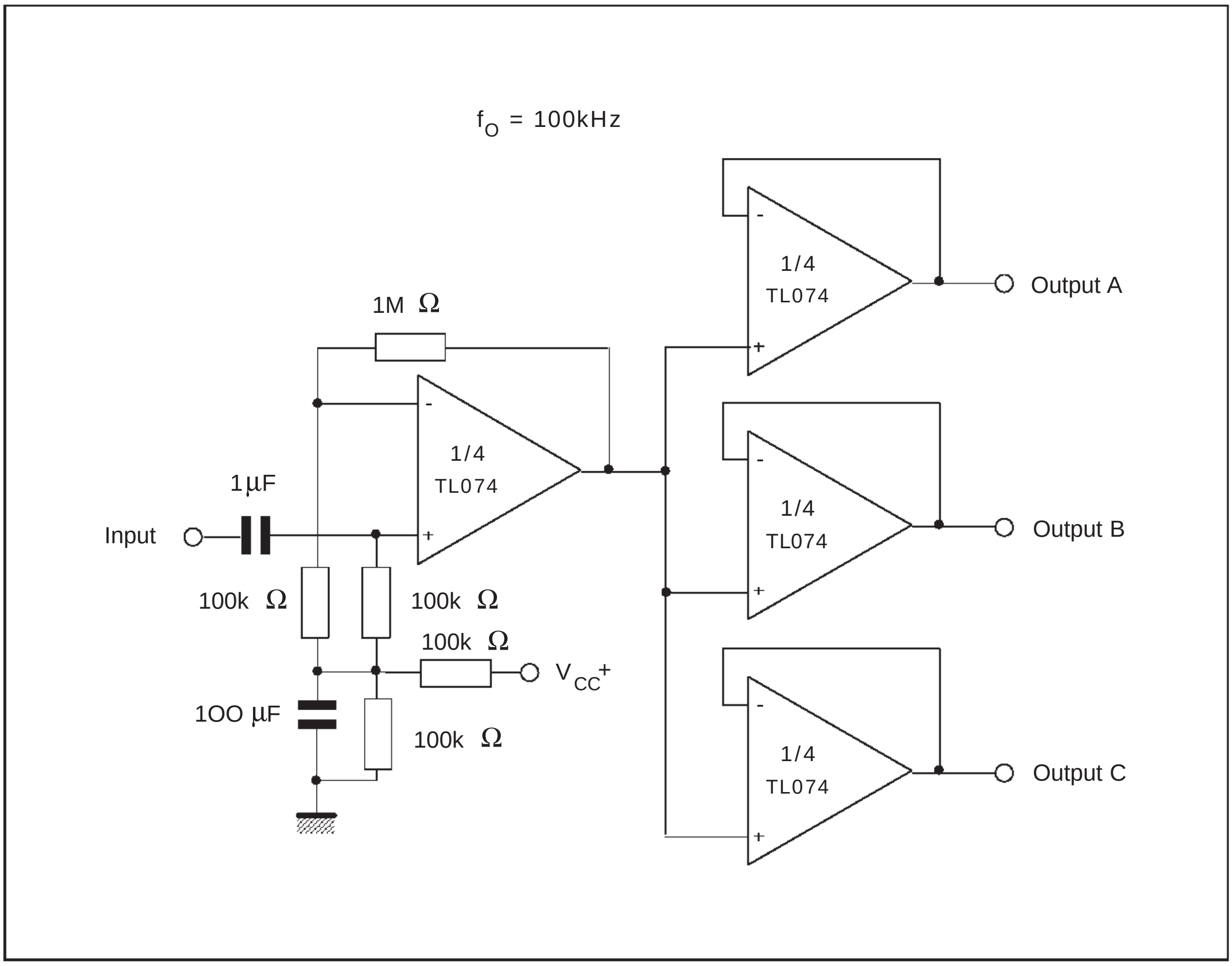


Figure 2 : Gain-of-10 Inverting Amplifier



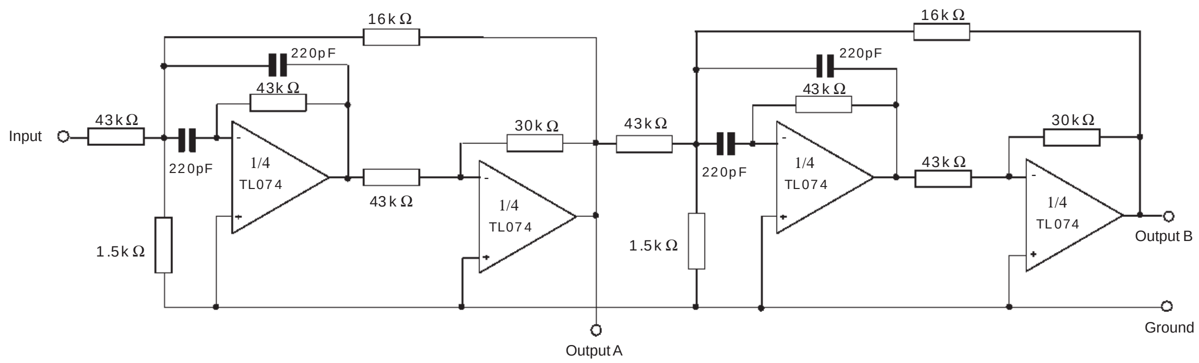
TYPICAL APPLICATIONS

AUDIO DISTRIBUTION AMPLIFIER

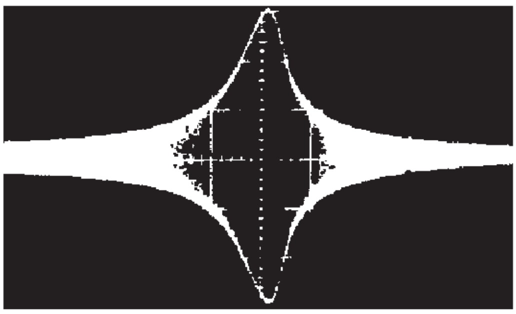


TYPICAL APPLICATIONS (continued)

POSITIVE FEEDBACK BANDPASS FILTER

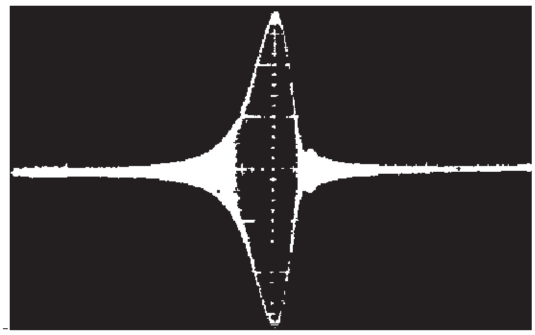


OUTPUT A



SECOND ORDER BANDPASS FILTER
fo = 100kHz ; Q = 30 ; Gain = 16

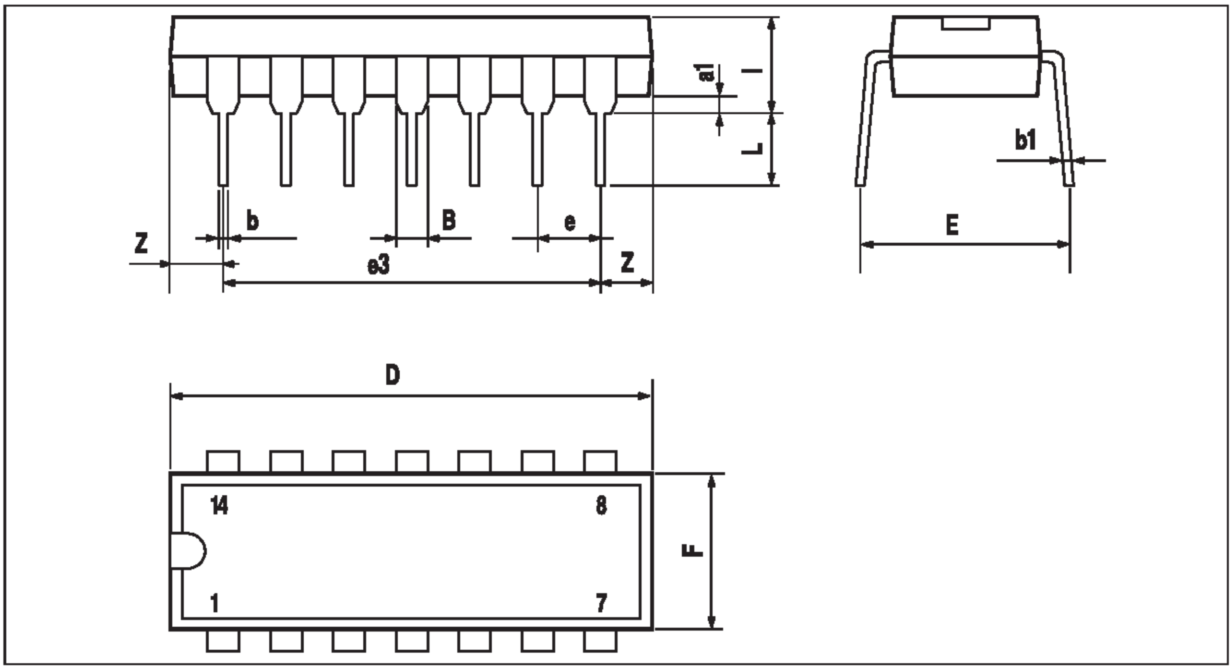
OUTPUT B



CASCADED BANDPASS FILTER
fo = 100kHz ; Q = 69 ; Gain = 16

PACKAGE MECHANICAL DATA

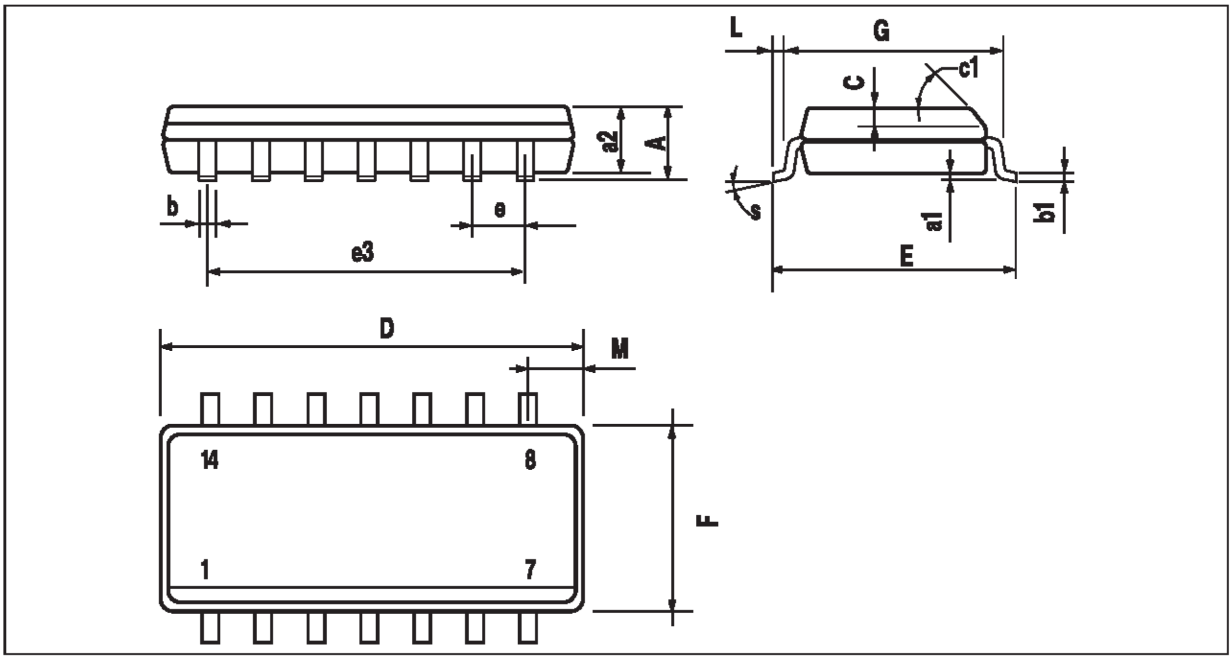
14 PINS - PLASTIC DIP



Dimensions	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
a1	0.51			0.020		
B	1.39		1.65	0.055		0.065
b		0.5			0.020	
b1		0.25			0.010	
D			20			0.787
E		8.5			0.335	
e		2.54			0.100	
e3		15.24			0.600	
F			7.1			0.280
i			5.1			0.201
L		3.3			0.130	
Z	1.27		2.54	0.050		0.100

PACKAGE MECHANICAL DATA

14 PINS - PLASTIC MICROPACKAGE (SO)



Dimensions	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.75			0.069
a1	0.1		0.2	0.004		0.008
a2			1.6			0.063
b	0.35		0.46	0.014		0.018
b1	0.19		0.25	0.007		0.010
C		0.5			0.020	
c1	45^o (typ.)					
D	8.55		8.75	0.336		0.334
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		7.62			0.300	
F	3.8		4.0	0.150		0.157
G	4.6		5.3	0.181		0.208
L	0.5		1.27	0.020		0.050
M			0.68			0.027
S	8^o (max.)					