SGS-THOMSON MICROELECTRONICS

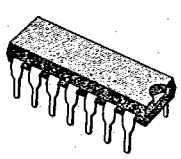
TS27L4C,I,M

S G S-THOMSON

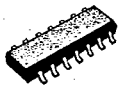
VERY LOW POWER QUAD CMOS OP-AMPs

T-79-08

- EXCELLENT PHASE MARGIN ON CAPACITIVE LOADS
- SYMETRICAL OUTPUT CURRENTS
- LOW OUTPUT DYNAMIC IMPEDANCE
- THE TRANSFER FUNCTION IS LINEAR
- PIN TO PIN COMPATIBLE WITH STANDARD QUAD OP-AMPs (TL084 -LM324)
- STABLE AND LOW OFFSET VOLTAGE
- INTERNAL ELECTROSTATIC DISCHARGE (ESD) PROTECTION CIRCUITS
- THREE INPUT OFFSET VOLTAGE SELECTIONS : STANDARD (10mV), A (5mV), B (2mV)



N
DIP14
(Plastic Package)



D
SO14
(Plastic Micropackage)

J
CERDIP14
(Cerdip Package)

ORDER CODES

Part Number	Temperature Range	Package		
		N	J	D
TS27L4C/AC/BC	0°C to + 70°C	•	•	•
TS27L4I/AI/BI	- 40°C to + 105°C	•	•	•
TS27L4M/AM/BM	- 55°C to + 125°C	•	•	•
Example : TS27L4ACN				

DESCRIPTION

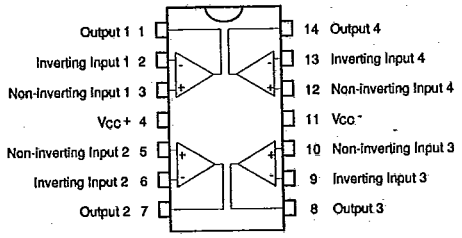
The TS274 series are low cost, low power quad operational amplifiers designed to operate with single or dual supplies. These operational amplifiers use the SGS-THOMSON silicon gate LIN MOS process giving them an excellent consumption-speed ratio. These series are ideally suited for low consumption applications.

Three power consumptions are available allowing to have always the best consumption-speed ratio :
- Icc= 10µA/amp. : TS27L4 (very low power)
- Icc= 150µA/amp. : TS27M4 (low power)
- Icc= 1mA/amp. : TS274 (high speed)

The input impedance is similar to the J-FET input impedance : very high input impedance and extremely low input offset and bias currents. They allow to minimize the static errors in low impedance applications.

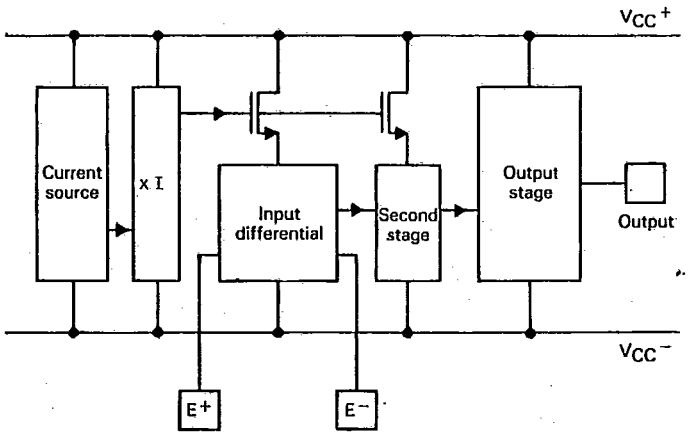
PIN CONNECTIONS (Top view)

DIP14 - CERDIP 14 - SO14



S90TS27L4-01

BLOCK DIAGRAM



S90TS27L4-02

MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}^+	Supply Voltage (Note 1)	18	V
V_{id}	Differential Input Voltage (Note 2)	± 18	V
V_i	Input Voltage (Note 3)	- 0.3 to 18	V
I_o	Output Current for $V_{CC}^+ \geq 15V$	± 30	mA
T_{oper}	Operating Free-Air Temperature Range TS27L4C/AC/BC TS27L4I/AI/BI TS27L4M/AM/BM	 0 to + 70 - 40 to + 105 - 55 to + 125	°C
T_{stg}	Storage Temperature Range	- 65 to + 150	°C

Notes : 1. All voltage values, except differential voltage, are with respect to network ground terminal.
2. Differential voltages are the non-inverting input terminal with respect to the inverting input terminal.
3. The magnitude of the input and the output voltages must never exceed the magnitude of the postive supply voltage.

OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V_{CC}^+	Supply Voltage	3* to 16	V
V_{ic}	Common Mode Input Voltage Range	0 to V_{CC}^+ - 1.5	V

* Selected devices only.

SCHEMATIC DIAGRAM (for 1/4 TS27L4)

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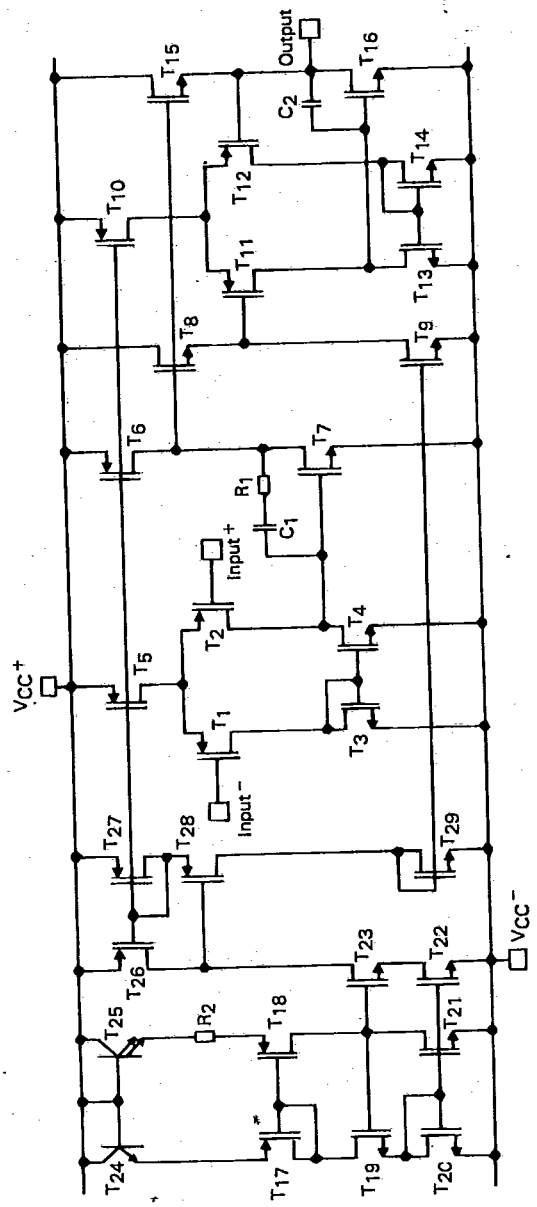

S90TS27L4-03

ELECTRICAL CHARACTERISTICS

$V_{CC}^+ = +10V$, $V_{CC}^- = 0V$, $T_{AMB} = 25°C$ (unless otherwise specified)

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Symbol	Parameter	TS27L4C/AC/BC			TS27L4I/AI/BI TS27L4M/AM/BM			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
V_{io}	Input Offset Voltage $V_O = 1.4V$, $V_I = 0V$ TS27L4C/I/M TS27L4AC/AI/AM TS27L4BC/BI/BM $T_{MIN} \le T_{AMB} \le T_{MAX}$ TS27L4C/I/M TS27L4AC/AI/AM TS27L4BC/BI/BM		 1.1 0.9 0.25	 10 5 2 12 6.5 3		 1.1 0.9 0.25	 10 5 2 12 6.5 3.5	mV
DV_{io}	Input Offset Voltage Drift		0.7			0.7		µV/°C
I_{io}	Input Offset Current $V_I = 5V$, $V_o = 5V$ $T_{MIN} \le T_{AMB} \le T_{MAX}$		1	 100		1	 200	pA
I_{ib}	Input Bias Current $V_I = 5V$, $V_o = 5V$ $T_{MIN} \le T_{AMB} \le T_{MAX}$		1	 150		1	 300	pA
V_{OH}	High Level Output Voltage $V_I = 10mV$, $R_L = 1M\Omega$ $T_{MIN} \le T_{AMB} \le T_{MAX}$	8.8 8.7	9		8.8 8.6	9		V
V_{OL}	Low Level Output Voltage Vi = - 10mV			50			50	mV
A_{vd}	Large Signal Voltage Gain $V_o = 1V$ to $6V$, $R_L = 1M\Omega$, $V_I = 5V$ $T_{MIN} \le T_{AMB} \le T_{MAX}$	60 45	100		60 40	100		V/mV
GBP	Gain Bandwidth Product $A_v = 40dB$, $R_L = 1M\Omega$, $C_L = 100pF$ $f_{in} = 10$ kHz		0.1			0.1		MHz
CMR	Common Mode Rejection Ratio $V_o = 1.4V$, $V_I = 1V$ to $7.4V$	65	80		65	80		dB
SVR	Supply Voltage Rejection Ratio $V_{CC}^+ = 5V$ to $10V$, $V_o = 1.4V$	60	80		60	80		dB
I_{CC}	Supply Current (per amplifier) $A_v = 1$, no load, $V_o = 5V$ $T_{MIN} \le T_{AMB} \le T_{MAX}$		10	15 17		10	15 18	µA
I_o	Output Short Circuit Current $V_I = 10mV$, $V_o = 0V$	45	60	85	45	60	85	mA
I_{sink}	Output Sink Current Vi = - 10mV, $V_o = V_{CC}$	35	45	65	35	45	65	mA
S_{vo}	Slew-Rate at Unity Gain $R_L = 1M\Omega$, $C_L = 100pF$		0.04			0.04		V/µs
Ø m	Phase Margin at Unity Gain $A_v = 40$ dB, $R_L = 1M\Omega$, $C_L = 100pF$		45			45		degrees
K_{ov}	Overshoot Factor		30			30		%
V_n	Equivalent Input Noise Voltage f = 1kHz, $R_S = 10\Omega$		68			68		$nV/\sqrt{Hz}$
V_{O1}/V_{O2}	Cross Talk Attenuation		120			120		dB

TYPICAL CHARACTERISTICS

Figure 1 : Supply Current (each amplifier) versus Supply Voltage.

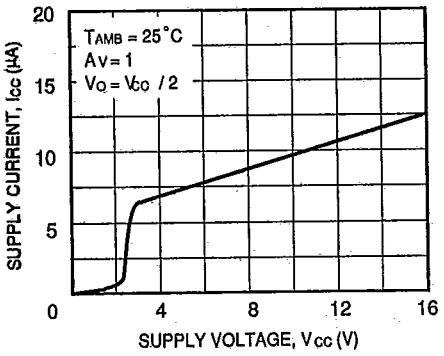


Figure 2 : Input Bias Current versus Free Air Temperature.

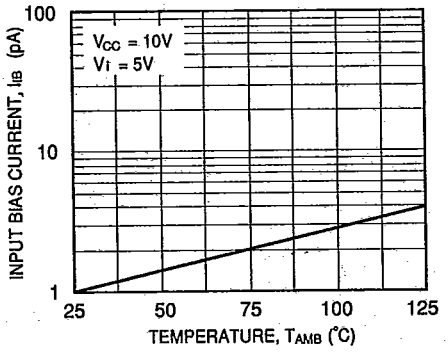


Figure 3a : High Level Output Voltage versus High Level Output Current.

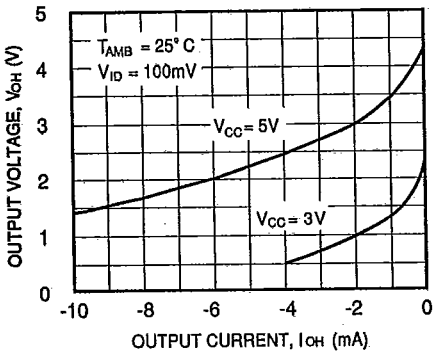


Figure 3b : High Level Output Voltage versus High Level Output Current.

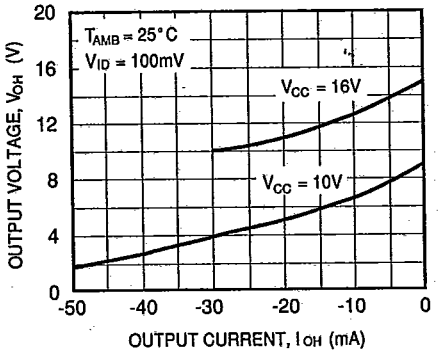


Figure 4a : Low Level Output Voltage versus Low Level Output Current.

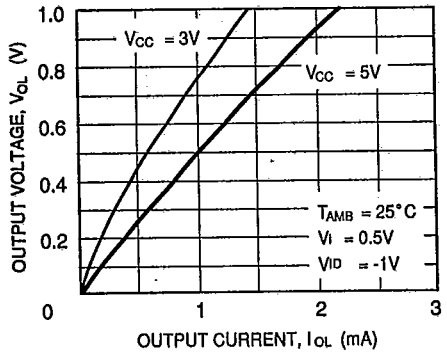
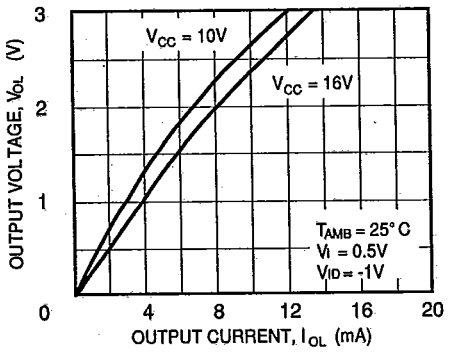


Figure 4b : Low Level Output Voltage versus Low Level Output Current.



TYPICAL CHARACTERISTICS (continued)

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Figure 5 : Open Loop Frequency Response and Phase Shift.

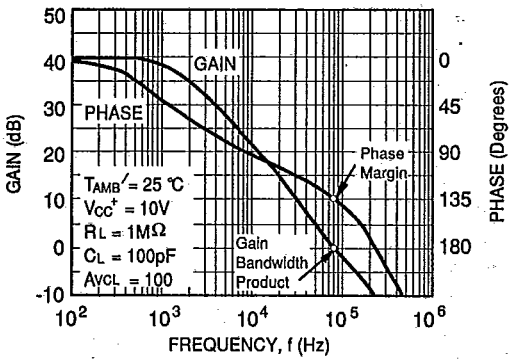

Figure 6 : Gain Bandwidth Product versus Supply Voltage.

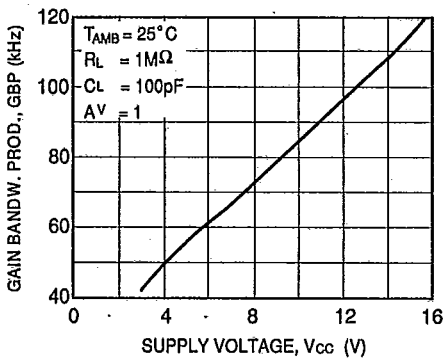

Figure 7 : Phase Margin versus Supply Voltage.

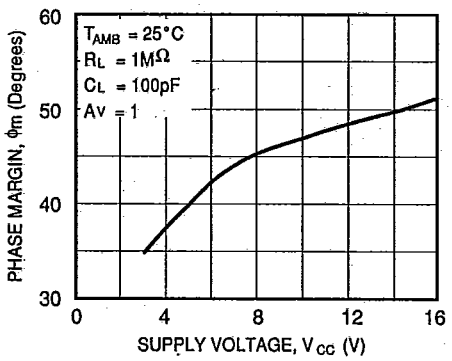

Figure 8 : Phase Margin versus Capacitive Load.

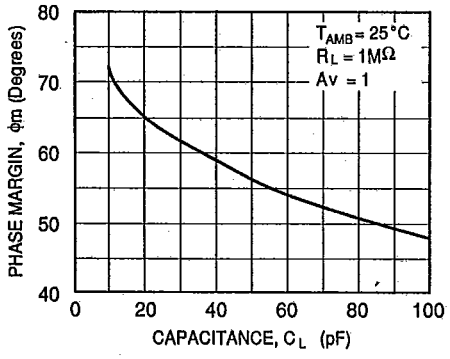

Figure 9 : Slew Rates versus Supply Voltage.