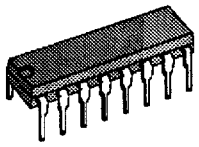
SGS-THOMSON MICROELECTRONICS

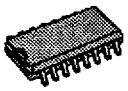
TSH94

HIGH SPEED LOW POWER QUAD OPERATIONAL AMPLIFIER (WITH **STANDBY** POSITION)

- **2 SEPARATE STANDBY** : REDUCED **CONSUMPTION** AND **HIGH IMPEDANCE OUTPUTS**
- SPECIFIED FOR **600Ω** AND **150Ω** LOADS
- LOW SUPPLY CURRENT : 4.5mA/amp. typ.
- HIGH SPEED : 150MHz - 110V/µs
- UNITY GAIN STABILITY
- LOW OFFSET VOLTAGE : 3mV
- LOW NOISE 4.2 nV/√Hz
- LOW COST
- HIGH VIDEO PERFORMANCES :
  Differential Gain : 0.03%
  Differential Phase : 0.07°
  Gain Flatness : 0.1dB max. at 6MHz
- HIGH AUDIO PERFORMANCES



N
DIP16
(Plastic Package)



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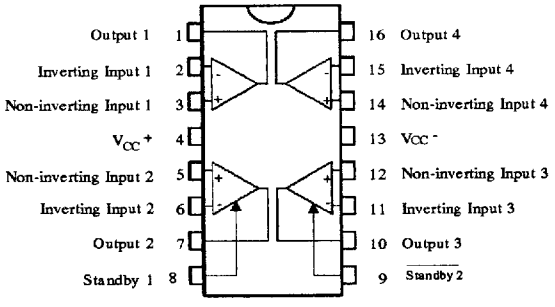
SO16
(Plastic Micropackage)

ORDER CODES

Part Number	Temperature Range	Package	
		N	D
TSH94I	-40, +125°C	•	•

PIN CONNECTIONS (top view)



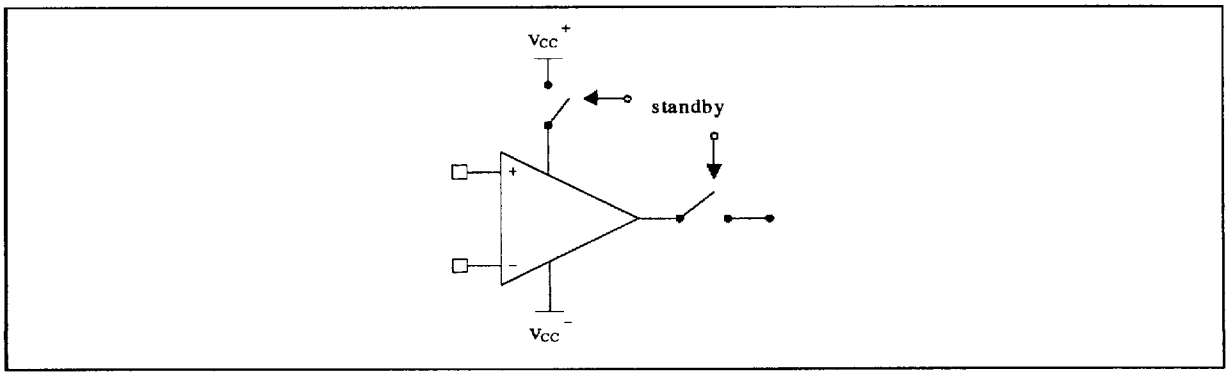
DESCRIPTION

The TSH94 is a quad low power high frequency op-amp, designated for high quality video signal processing. The device offers an excellent speed consumption ratio with 4.5mA/amp. for 150MHz bandwidth.
High slew rate and low noise make it also suitalbe for high quality audio applications.
The TSH94 offers 2 separate complementary **STANDBY pins** :

- STANDBY 1 acting on the n°2 operator
- STANDBY 2 acting on the n°3 operator

They reduce the consumption of the corresponding operator and put the output in a high impedance state.

STANDBY POSITION



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage - (note 1)	14	V
V_{id}	Differential Input Voltage - (note 2)	±5V	V
V_i	Input Voltage - (note 3)	-0.3 to 12	V
T_{oper}	Operating Free Air Temperature Range	-40 to +125	°C
T_{stg}	Storage Temperature	-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 input and output voltages must never exceed V_{CC}^+ +0.3V.

OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	6 to 12	V
V_{icm}	Common Mode Input Voltage Range	V_{CC}^- +2V to V_{CC}^+ -1	V

ELECTRICAL CHARACTERISTICS

$V_{CC}^+ = 5V$, $V_{CC}^- = -5V$, pin 8 connected to 0V, pin 9 connected to V_{CC}^+, $T_{amb} = 25°C$ (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{io}	Input Offset Voltage ($V_{ic} = V_o = 0V$) $T_{min.} \le T_{amb.} \le T_{max.}$			3 5	mV
I_{io}	Input Offset Current $T_{min.} \le T_{amb.} \le T_{max.}$		1	2 5	µA
I_{ib}	Input Bias Current $T_{min.} \le T_{amb.} \le T_{max.}$		5	15 20	µA
I_{CC}	Supply Current (per amplifier, no load) $T_{min.} \le T_{amb.} \le T_{max.}$		4.5	6 8	mA
CMR	Common Mode Rejection Ratio (V_{ic} = -3V to +4V, $V_o = 0V$) $T_{min.} \le T_{amb.} \le T_{max.}$	80 70	100		dB
SVR	Supply Voltage Rejection Ratio ($V_{CC} = \pm5V$ to $\pm3V$) $T_{min.} \le T_{amb.} \le T_{max.}$	60 50	75		dB
A_{vd}	Large Signal Voltage Gain ($R_L = 10k\Omega$, $V_O = \pm2.5V$) $T_{min.} \le T_{amb.} \le T_{max.}$	57 54	70		dB
V_{OH}	High Level Output Voltage ($V_{id} = 1V$) $R_L = 600\Omega$ $T_{min.} \le T_{amb.} \le T_{max.}$ $R_L = 150\Omega$	 3 2.5	 3.5 3		V
V_{OL}	Low Level Output Voltage (V_{id} = -1V) $R_L = 600\Omega$ $T_{min.} \le T_{amb.} \le T_{max.}$ $R_L = 150\Omega$		 -3.5 -2.8	 -3 -2.5	V
I_o	Output Short Circuit Current ($V_{id} = \pm1V$) Source Sink $T_{min.} \le T_{amb.} \le T_{max.}$ Source Sink	20 20 20 20	36 40		mA
GBP	Gain Bandwidth Product (A_{VCL} = 100, $R_L = 600\Omega$, C_L = 15pF, f =7.5MHz)	90	150		MHz
SR	Slew Rate (A_{VCL} = +1, $R_L = 600\Omega$, C_L = 15pF, V_{in} = -2 to +2V)	70	110		V/µs
Øm	Phase Margin (A_{VM} = +1)		35		Degrees
e_n	Equivalent Input Noise Voltage ($R_s = 50\Omega$, f = 1kHz)		4.2		$\frac{nV}{\sqrt{Hz}}$
V_{O1}/V_{O2}	Channel Separation (f = 1MHz to 10MHz)		65		dB
Gf	Gain Flatness (f = DC to 6MHz, A_{VCL} = 10dB)			0.1	dB
THD	Total Harmonic Distortion (f = 1kHz, $V_o = \pm2.5V$, $R_L = 600\Omega$)		0.01		%
ΔG	Differential Gain (f = 3.58MHz, A_{VCL} = +2, $R_L = 150\Omega$)		0.03		%
Δφ	Differential Phase (f = 3.58MHz, A_{VCL} = +2, $R_L = 150\Omega$)		0.07		Degree

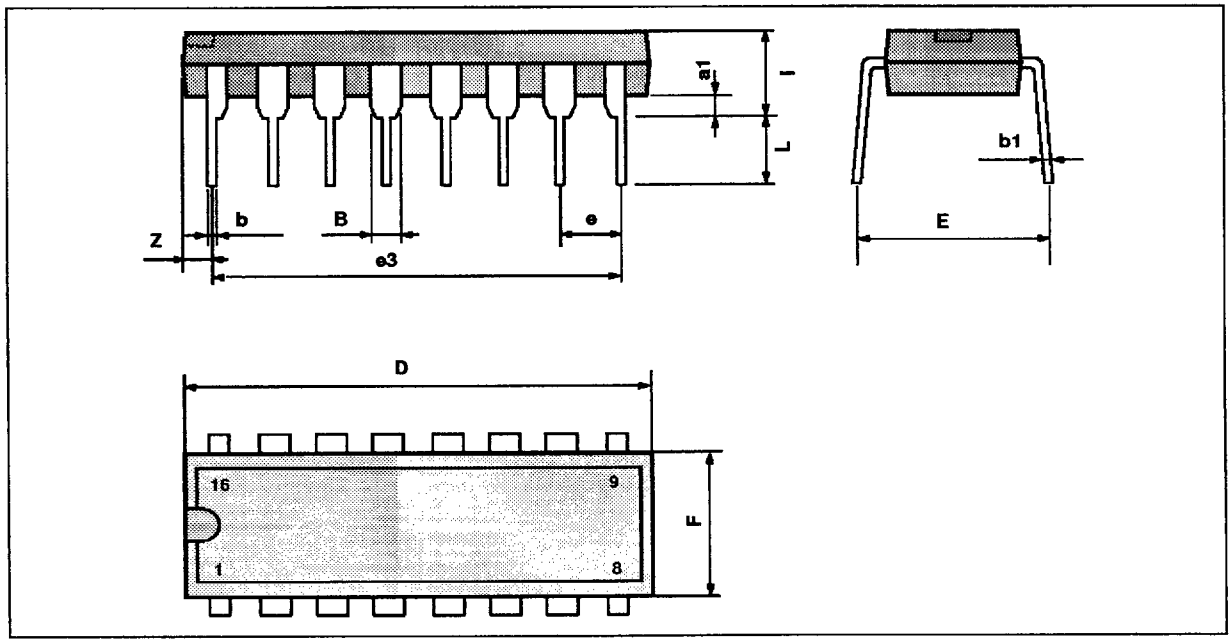
STANDBY MODE

$V_{CC}^+ = 5V$, $V_{CC}^- = -5V$, $T_{amb} = 25°C$ (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{SBY}	Pin 8/9 Threshold Voltage for STANDBY Mode	$V_{CC}^+ -2.2$		$V_{CC}^+ -1$	V
$I_{CC\ SBY}$	Total Consumption Standby 1 & 2 = 0 Standby 1 & 2 = 1 Standby 1 = 1, Standby 2 = 0		 13.7 13.7 9.4		mA
I_{sol}	Input/Output Isolation (f = 1MHz to 10MHz)		70		dB
t_{ON}	Time from Standby Mode to Active Mode		200		ns
t_{OFF}	Time from Active Mode to Standby Mode		200		ns
I_D	Standby Driving Current		2		pA

LOGIC INPUT		STATUS		
Standby 1	Standby 2	Op-amp 2	Op-amp 3	Op-amp 1 & 4
0	0	Enable	Standby	Enable
0	1	Enable	Enable	Enable
1	0	Standby	Standby	Enable
1	1	Standby	Enable	Enable

PACKAGE MECHANICAL DATA
16 PINS - PLASTIC DIP

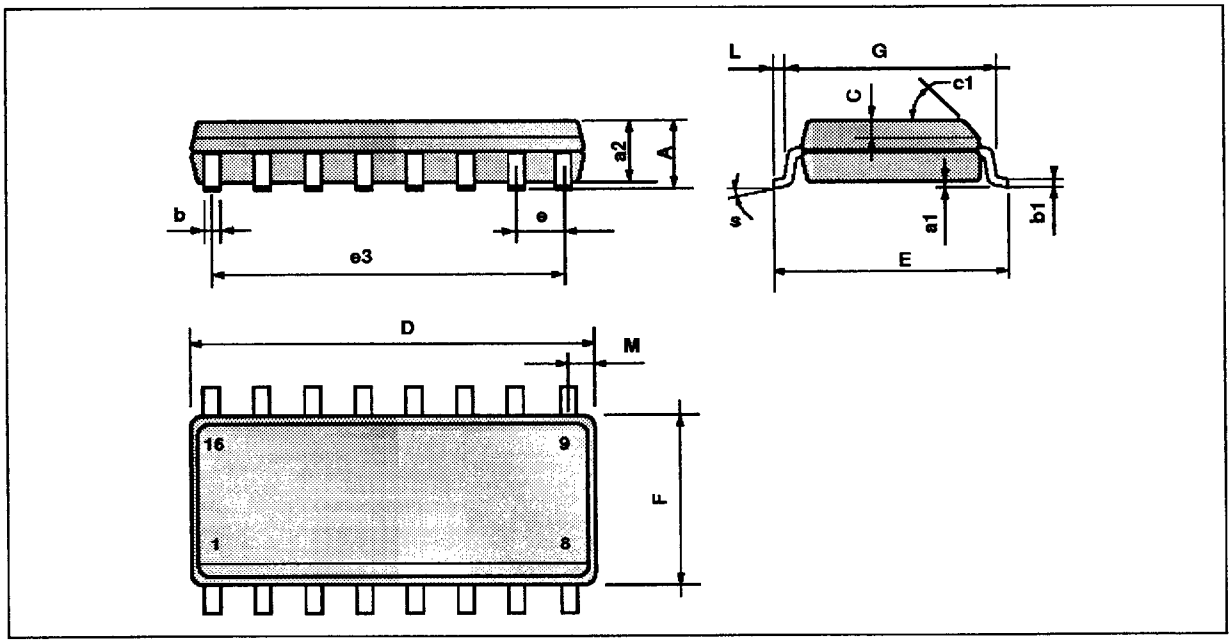


PM-DIP16.EPS

Dimensions	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
a1	0.51			0.020		
B	0.77		1.65	0.030		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		17.78			0.700	
F			7.1			0.280
i			5.1			0.201
L		3.3			0.130	
Z			1.27			0.050

DIP16.TBL

PACKAGE MECHANICAL DATA
16 PINS - PLASTIC MICROPACKAGE (SO)



PM-SO16.EPS

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° (typ.)					
D	9.8		10	0.386		0.394
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		8.89			0.350	
F	3.8		4.0	0.150		0.157
G	4.6		5.3	0.181		0.209
L	0.5		1.27	0.020		0.050
M			0.62			0.024
S	8° (max.)					

SO16.TBL

ORDER CODE :

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