![ST logo]

TSH10

140MHz BANDWIDTH LOW NOISE
SINGLE OPERATIONAL AMPLIFIER

■ LOW NOISE : 6nV/√Hz
■ GAIN BANDWIDTH PRODUCT : 140MHz
■ UNITY GAIN STABLE
■ SLEW RATE : 150V/μs
■ STANDARD PIN OUT

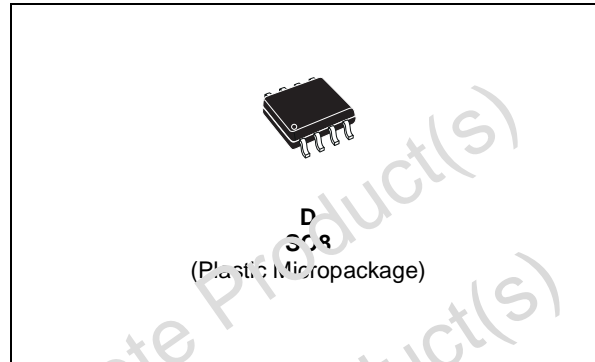### DESCRIPTION

The TSH10 is a low cost wide bandwidth single operational amplifier featuring low input noise of 6nV/√Hz. Other features as unity gain stability, fast settling time and high linearity make it suitable for any application requiring speed and precision as high resolution video or DAC buffer.
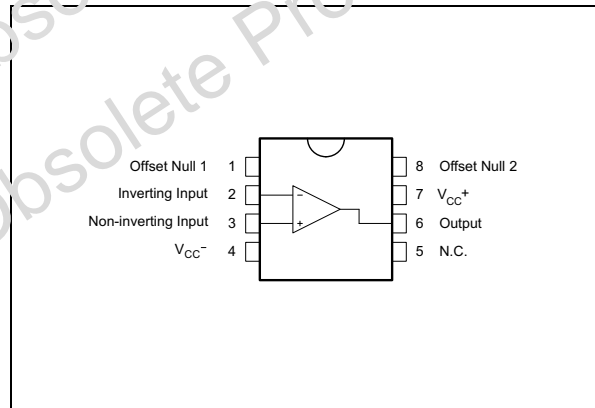

D
SO8
(Plastic Micropackage)

ORDER CODE

Part Number	Temperature Range	Package
		D
TSH10I	-40°C, +125°C	●

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

PIN CONNECTIONS (top view)

Offset Null 1	1	8	Offset Null 2
Inverting Input	2	7	V_{CC}^+
Non-inverting Input	3	6	Output
V_{CC}^-	4	5	N.C.

SCHEMATIC DIAGRAM
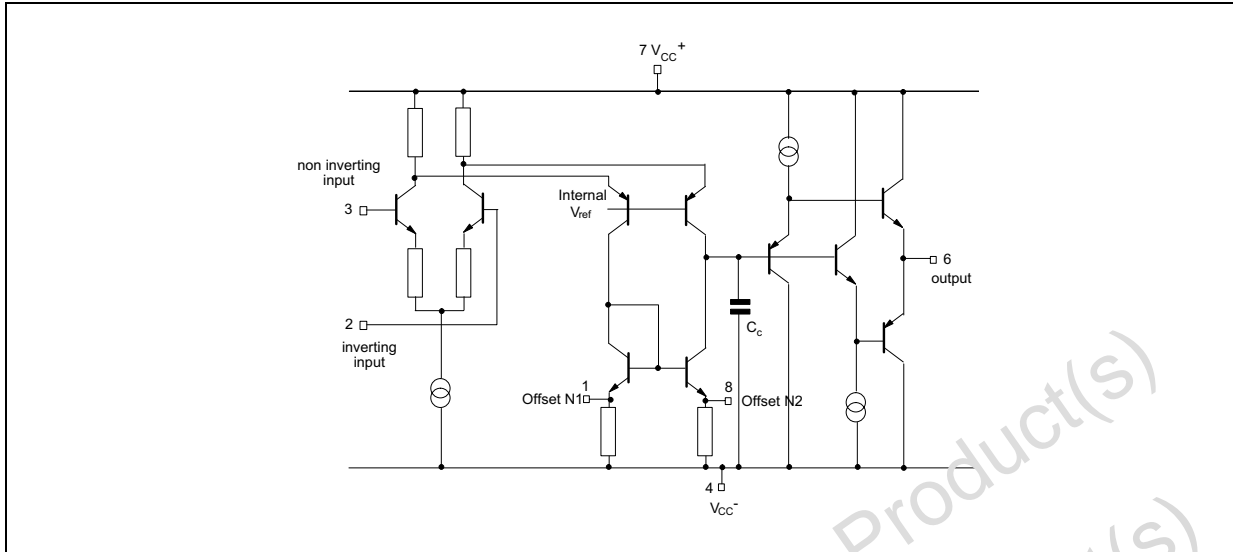
INPUT OFFSET VOLTAGE NULL CIRCUIT
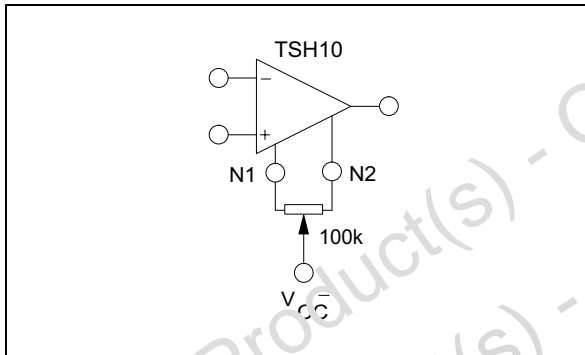
MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	±7	V
V_{id}	Differential Input Voltage	±5	V
V_i	Input Voltage	±5	V
I_{in}	Current On Inputs Current On Offset Null Pins	±50 ±20	V
T_{oper}	Operating Free-Air Temperature range	-40 to +125	°C
T_{stg}	Storage Temperature Range	-65 to +150	°C

OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	±3 to ±6	V
V_{ic}	Common Mode Input Voltage Range	V_{CC}^- +2 to V_{CC}^+ -1	V

ELECTRICAL CHARACTERISTICS

$V_{CC} = \pm 5V$, $T_{amb} = 25°C$ (unless otherwise specified)

| Symbol	Parameter		Min.	Typ.	Max.	Unit
V_{io}	Input Offset Voltage			1	10	mV
DV_{io}	Input Offset Voltage Drift $T_{min.} \leq T_{amb} \leq T_{max.}$			20		µV/°C
I_{ib}	Input Bias Current			5	30	µA
I_{io}	Input Offset Current			0.1	10	µA
I_{CC}	Supply Current, no load	$V_{CC} = \pm 5V$		20	40	mA
Avd	Large Signal Voltage Gain $Vo = \pm 2.5V$	$R_L = 100\Omega$	200	800		V/V
V_{icm}	Input Common Mode Voltage Range		-3 to +4	-3.5 to +4.5		V
CMR	Common-mode Rejection Ratio $V_{ic} = V_{icm\ min.}$		55	100		V
SVR	Supply Voltage Rejection Ratio $V_{CC} = \pm 5V$ to $\pm 3V$		45	70		dB
V_o	Output Voltage	$R_L = 100\Omega$	± 2.5	+3.5 -3.7		V
I_o	Output Short Circuit Current $Vid = \pm 1V$, $Vo = 0V$			± 70		mA
GBP	Gain Bandwidth Product $A_{VCL} = 100$, $R_L = 100\Omega$, $f = 7.5MHz$			140		MHz
SR	Slew Rate $V_{in} = \pm 2V$, $A_{VCL} = 1$, $R_L = 100\Omega$			150		V/µs
e_n	Equivalent Input Voltage Noise	$f = 1MHz$		6		nV/$\sqrt{Hz}$
ϕm	Phase Margin $A_{VM} = 1$, $R_L = 100\Omega$, $C_L = 15pF$			40		Degrees

EVALUATION CIRCUIT
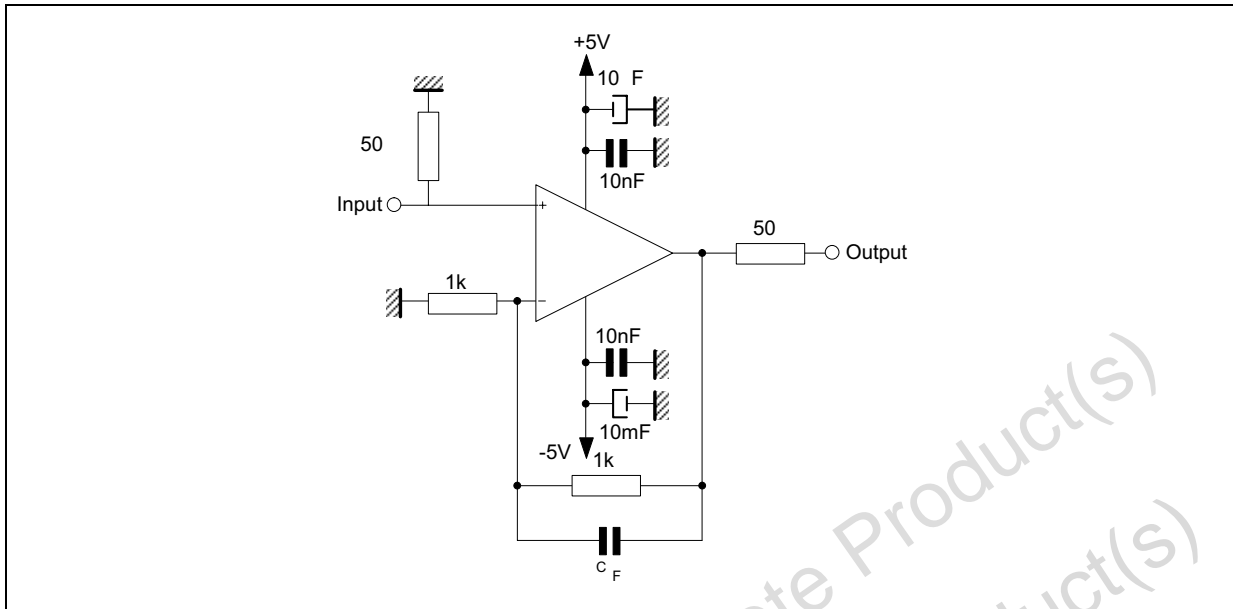
PRINTED CIRCUIT LAYOUT

As for any high frequency device, a few rules must be observed when designing the PCB to get the best performances from this high speed op amp.

From the most to the least important points :

- ❏ Each power supply lead has to be by-passed to ground with a 10nF ceramic ca-pacitor very close to the device and a 10μF tantalum capacitor.
- ❏ To provide low inductance and low resist-ance common return, use a ground plane or common point return for power and sig-nal.
- ❏ All leads must be wide and as short as pos-sible especially for op amp inputs. This is in order to decrease parasitic capacitance and inductance.

- ❏ Use small resistor values to decrease time constant with parasitic capacitance. Be aware on TSH10 device of the Iio error and input noise currents with high feedback re-sistor values.
- ❏ Choose component sizes as small as pos-sible (SMD).
- ❏ On output, decrease capacitor load so as to avoid circuit stability being degraded which may cause oscillation. You can also add a serial resistor in order to minimise its influence.
- ❏ One can add in parallel with feedback re-sistor a few pF ceramic capacitor C_F adjust-ed to optimize the settling time.

PACKAGE MECHANICAL DATA
8 PINS - PLASTIC MICROPACKAGE (SO)
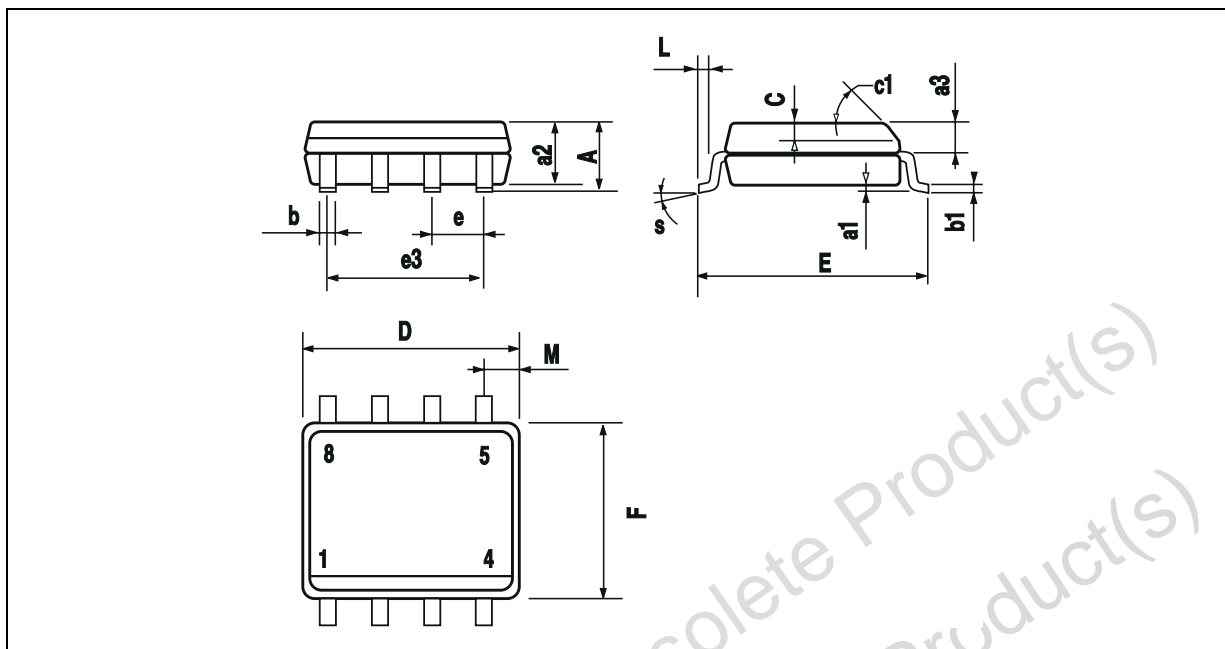
Dim.	Millimeters			Inches		
	Min.	**Typ.**	**Max.**	**Min.**	**Typ.**	**Max.**
A			1.75			0.069
a1	0.1		0.25	0.004		0.010
a2			1.65			0.065
a3	0.65		0.85	0.026		0.033
b	0.35		0.48	0.014		0.019
b1	0.19		0.25	0.007		0.010
C	0.25		0.5	0.010		0.020
c1			45° (typ.)			
D	4.8		5.0	0.189		0.197
E	5.8		6.2	0.228		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.)			

Mouser Electronics

Authorized Distributor

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