SGS-THOMSON
MICROELECTRONICS

TS522

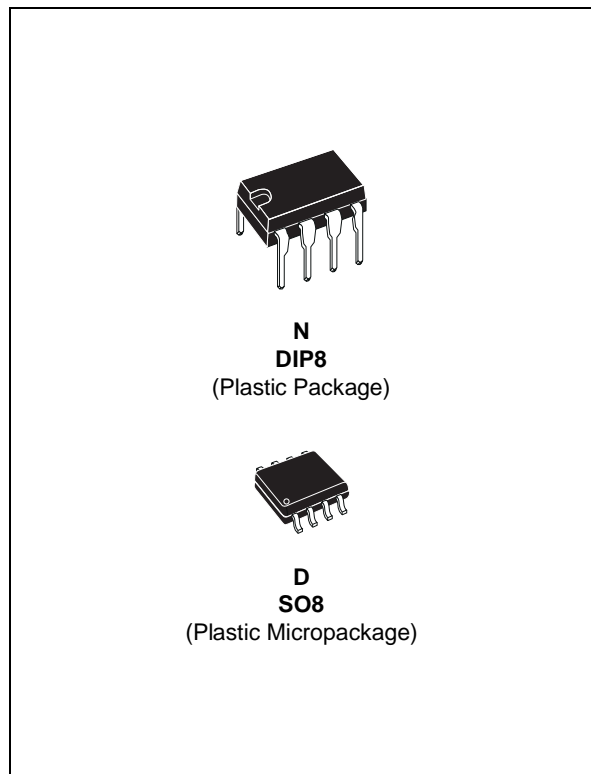## PRECISION LOW NOISE
DUAL OPERATIONAL AMPLIFIERS

- LOW INPUT OFFSET VOLTAGE **850**μV max.
- LOW VOLTAGE NOISE : **4.5nV/$\sqrt{\text{Hz}}$**
- HIGH GAIN BANDWIDTH PRODUCT : **15MHz**
- HIGH SLEW RATE : **7V/μs**
- LOW DISTORTION : 0.002%
- ESD INTERNAL PROTECTION 2kV

N
DIP8
(Plastic Package)
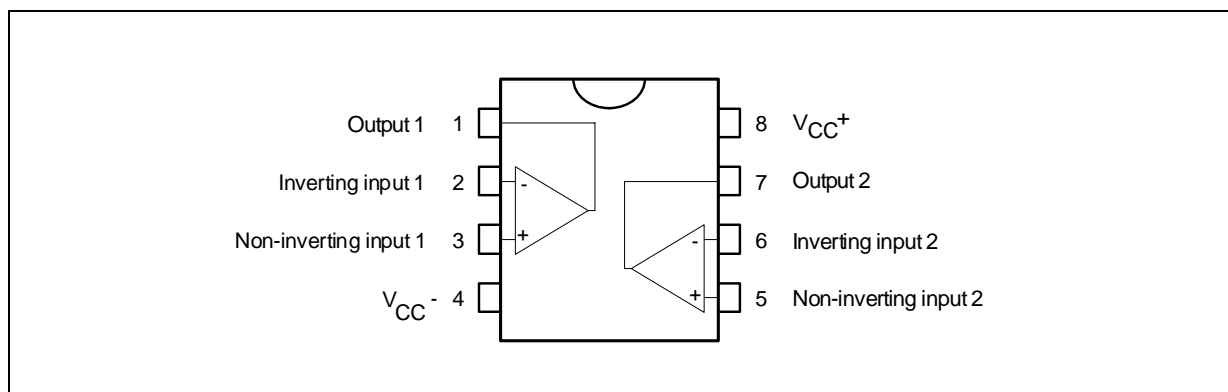
D
SO8
(Plastic Micropackage)

DESCRIPTION

The TS522 is a monolithic dual operational amplifier mainly dedicated to audio applications. The TS522 offers a very low input offset voltage as well as low voltage noise (4.5nV/$\sqrt{\text{Hz}}$) and high dynamic performances (15MHz gain bandwidth product, 7V/μs slew rate).
The output stage allows a large output voltage swing and symmetrical source and sink currents.
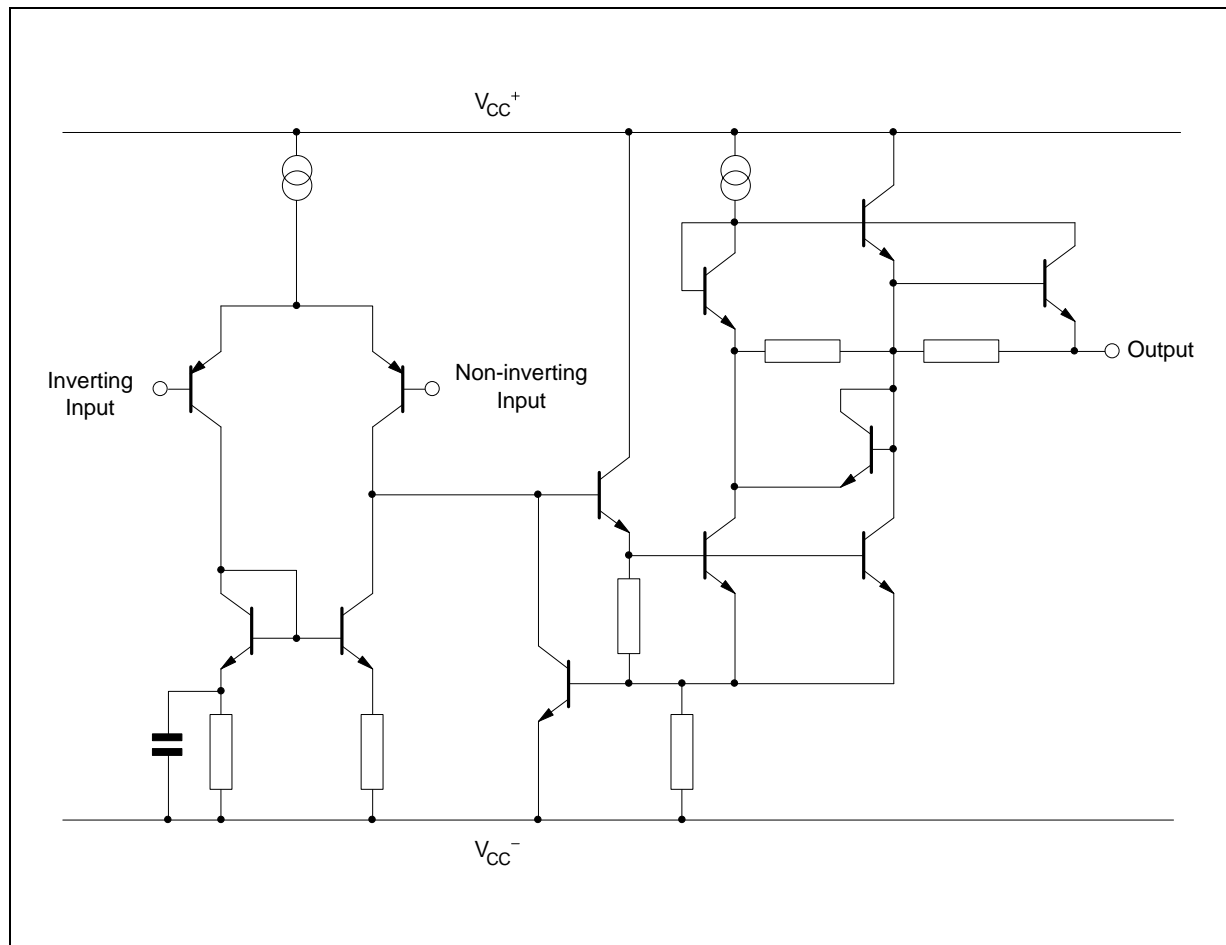
ORDER CODES

Part Number	Temperature Range	Package	
		N	**D**
TS522I	-40, +125°C	•	•

PIN CONNECTIONS (top view)

Output 1	1		8	V_{CC}^{+}
Inverting input 1	2	-	7	Output 2
Non-inverting input 1	3	+	6	Inverting input 2
V_{CC}^{-}	4		5	Non-inverting input 2

SCHEMATIC DIAGRAM (1/2 TS522)

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	±18 or +36	V
V_{id}	Differential Input Voltage - (note 1)	±30	V
V_i	Input Voltage - (note 1)	±15	V
	Output Short-Circuit Duration - (note 2)	Infinite	
T_{oper}	Operating Free-air Temperature Range	-40 to +105	^{o}C
T_j	Maximum Junction Temperature	+150	^{o}C
T_{stg}	Storage Temperature	-65 to +150	^{o}C
P_{tot}	Maximum Power Dissipation - (note 2)	500	mW

Notes :   1.   Either or both input voltages must not exceed the magnitude of V_{CC}^+ or V_{CC}^-
2.   Power dissipation must be considered to ensure maximum junction temperature (T_j) is not exceeded

OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	±2.5 to ±15	V

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ELECTRICAL CHARACTERISTICS

V_{CC}^+ = +15V, V_{CC}^- = -15V, T_{amb} = 25°C (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{io}	Input Offset Voltage (V_o = 0V, V_{ic} = 0V) T_{amb} = +25°C $T_{min.} \leq T_{amb} \leq T_{max.}$			0.85 1.7	mV
DV_{io}	Input Offset Voltage Drift V_{ic} = 0V, V_o = 0V, $T_{min.} \leq T_{amb} \leq T_{max.}$		2		$\mu V/^oC$
I_{io}	Input Offset Current (V_{ic} = 0V, V_O = 0V) T_{amb} = +25°C $T_{min.} \leq T_{amb} \leq T_{max.}$		10	150 175	nA
I_{ib}	Input Bias Current (V_{ic} = 0V, V_O = 0V) T_{amb} = +25°C $T_{min.} \leq T_{amb} \leq T_{max.}$		250	750 800	nA
V_{icm}	Common Mode Input Voltage Range (ΔV_{IO} = 5mV, V_O = 0V)	±13	±14		V
A_{vd}	Large Signal Voltage Gain (R_L = 2kΩ, V_O = ±10V) T_{amb} = +25°C $T_{min.} \leq T_{amb} \leq T_{max.}$	90 85	100		dB
±V_{opp}	Output Voltage Swing (V_{id} = ±1V) R_L = 600Ω R_L = 600Ω R_L = 2.0kΩ R_L = 2.0kΩ R_L = 10kΩ R_L = 10kΩ	 13.2 13.5	12.2 -12.7 14 -14.2 14.3 -14.6	 -13.2 -14	V
CMR	Common Mode Rejection Ratio (V_{ic} = ±13V)	80	100		dB
SVR	Supply Voltage Rejection Ratio V_{CC}^+ / V_{CC}^- = +15V / -15V to +5V / -5V	80	105		dB
I_o	Output Short Circuit Current (V_{id} = ±1V, Output to Ground) Source Sink	15 20	29 37		mA
I_{CC}	Supply current (V_O = 0V, All Amplifiers) T_{amb} = +25°C $T_{min.} \leq T_{amb} \leq T_{max.}$		4	5 5.5	mA
SR	Slew Rate V_i = -10V to +10V, R_L = 2kΩ, C_L = 100pF, A_V = +1	5	7		V/μs
GBP	Gain Bandwidth Product (f = 100kHz, R_L = 2kΩ, C_L = 100pF)	10	15		MHz
B	Unity Gain Bandwidth (Open loop)		9		MHz
A_m	Gain Margin (R_L = 2kΩ) C_L = 0pF C_L = 100pF		-11 -6		dB
$\varnothing m$	Phase Margin (R_L = 2kΩ) C_L = 0pF C_L = 100pF		55 30		Degrees
e_n	Equivalent Input Noise Voltage (R_S = 100Ω, f = 1kHz)		4.5		$\frac{nV}{\sqrt{Hz}}$
i_n	Equivalent Input Noise current (f = 1kHz)		0.5		$\frac{pA}{\sqrt{Hz}}$
THD	Total Harmonic Distortion R_L = 2kΩ, f = 20Hz to 20kHz, V_O = 3V_{rms}, A_V = +1		0.002		%
V_{O1}/V_{O2}	Channel Separation (f = 20Hz to 20kHz)		120		dB
FPB	Full Power Bandwidth (V_O = 27V_{pp}, R_L = 2kΩ, THD $\leq$ 1%)		120		kHz
Z_o	Output Impedance (V_O = 0V, f = 9MHz)		37		Ω
R_i	Input Resistance (V_{ic} = 0V)		175		kΩ
C_i	Input Capacitance (V_{ic} = 0V)		12		pF

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PACKAGE MECHANICAL DATA
8 PINS - PLASTIC DIP
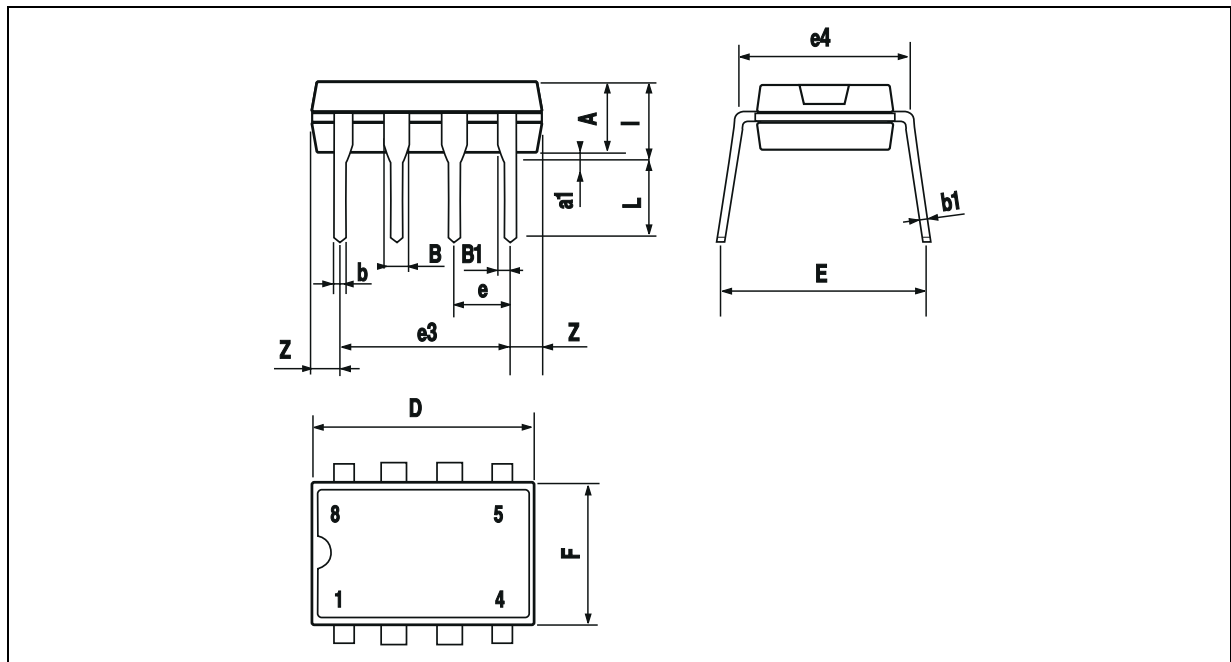
Dim.	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A		3.32			0.131	
a1	0.51			0.020		
B	1.15		1.65	0.045		0.065
b	0.356		0.55	0.014		0.022
b1	0.204		0.304	0.008		0.012
D			10.92			0.430
E	7.95		9.75	0.313		0.384
e		2.54			0.100	
e3		7.62			0.300	
e4		7.62			0.300	
F			6.6			0260
i			5.08			0.200
L	3.18		3.81	0.125		0.150
Z			1.52			0.060

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PACKAGE MECHANICAL DATA
8 PINS - PLASTIC MICROPACKAGE (SO)
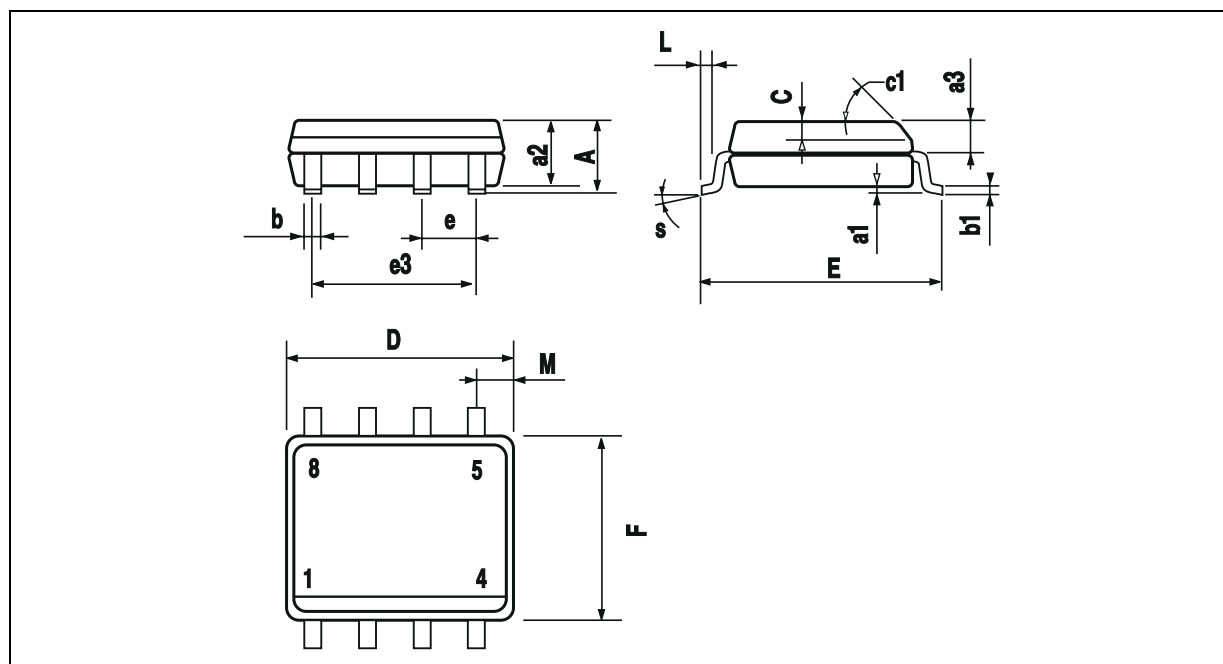
PM-SO8.EPS

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.)					

SO8.TBL

ORDER CODE :

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