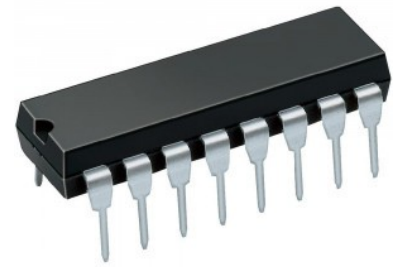




**PRODUCT NAME :** LM13600 Dual Operational Transconductance Amplifier

**PRICE :** Rs 49.00

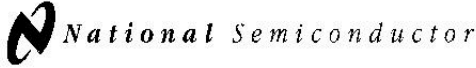
**SKU :** RM1979



## DESCRIPTION

## Features

- Two Current Controlled Amplifiers with Differential Inputs
- Excellent Matching Between Amplifiers
- Linearizing Diodes
- Controlled Impedance Buffers
- High Output Signal-to-Noise Ratio
- Ideal for Current Controlled Amplifiers, Filters and Oscillators



May 1998

## LM13600 Dual Operational Transconductance Amplifiers with Linearizing Diodes and Buffers

### General Description

The LM13600 series consists of two current controlled transconductance amplifiers each with differential inputs and a push-pull output. The two amplifiers share common supplies but otherwise operate independently. Linearizing diodes are provided at the inputs to reduce distortion and allow higher input levels. The result is a 10 dB signal-to-noise improvement referenced to 0.5 percent THD. Controlled impedance buffers which are especially designed to complement the dynamic range of the amplifiers are provided.

### Features

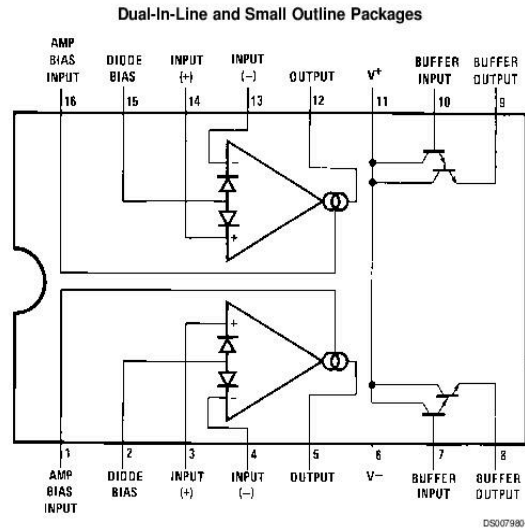
- $g_m$  adjustable over 6 decades
- Excellent  $g_m$  linearity

- Excellent matching between amplifiers
- Linearizing diodes
- Controlled impedance buffers
- High output signal-to-noise ratio

### Applications

- Current-controlled amplifiers
- Current-controlled impedances
- Current-controlled filters
- Current-controlled oscillators
- Multiplexers
- Timers
- Sample and hold circuits

### Connection Diagram



Top View  
 Order Number LM13600M, LM13600N or LM13600AN  
 See NS Package Number M16A or N16A

LM13600 Dual Operational Transconductance Amplifiers with Linearizing Diodes and Buffers

Absolute Maximum Ratings (Note 1)		Operating Temperature Range		0°C to +70°C	
If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.		DC Input Voltage		+V <sub>S</sub> to -V <sub>S</sub>	
Supply Voltage (Note 2)		Storage Temperature Range		-65°C to +150°C	
LM13600	36 V <sub>DC</sub> or ±18V	Soldering Information			
LM13600A	44 V <sub>DC</sub> or ±22V	Dual-In-Line Package			
Power Dissipation (Note 3) T <sub>A</sub> = 25°C	570 mW	Soldering (10 seconds)		260°C	
Differential Input Voltage	±5V	Small Outline Package			
Diode Bias Current (I <sub>D</sub> )	2 mA	Vapor Phase (60 seconds)		215°C	
Amplifier Bias Current (I <sub>ABC</sub> )	2 mA	Infrared (15 seconds)		220°C	
Output Short Circuit Duration	Continuous	See AN-450 "Surface Mounting Methods and Their Effect on Product Reliability" for other methods of soldering surface mount devices.			
Buffer Output Current (Note 4)	20 mA				

Electrical Characteristics (Note 5)		LM13600			LM13600A			Units
Parameter	Conditions	Min	Typ	Max	Min	Typ	Max	
		Input Offset Voltage (V <sub>OS</sub> )			0.4	4		
	Over Specified Temperature Range						2	mV
	I <sub>ABC</sub> = 5 µA		0.3	4		0.3	1	mV
V <sub>OS</sub> Including Diodes	Diode Bias Current (I <sub>D</sub> ) = 500 µA		0.5	5		0.5	2	mV
Input Offset Change	5 µA ≤ I <sub>ABC</sub> ≤ 500 µA		0.1	3		0.1	1	mV
Input Offset Current			0.1	0.6		0.1	0.6	µA
Input Bias Current			0.4	5		0.4	5	µA
	Over Specified Temperature Range		1	8		1	7	µA
Forward Transconductance (g <sub>m</sub> )		6700	9600	13000	7700	9600	12000	µmho
	Over Specified Temperature Range	5400			4000			µmho
g <sub>m</sub> Tracking			0.3			0.3		dB
Peak Output Current	R <sub>L</sub> = 0, I <sub>ABC</sub> = 5 µA		5		3	5	7	µA
	R <sub>L</sub> = 0, I <sub>ABC</sub> = 500 µA	350	500	650	350	500	650	µA
	R <sub>L</sub> = 0, Over Specified Temp Range	300			300			µA
Peak Output Voltage								V
Positive	R <sub>L</sub> = ∞, 5 µA ≤ I <sub>ABC</sub> ≤ 500 µA	+12	+14.2		+12	+14.2		V
Negative	R <sub>L</sub> = ∞, 5 µA ≤ I <sub>ABC</sub> ≤ 500 µA	-12	-14.4		-12	-14.4		V
Supply Current	I <sub>ABC</sub> = 500 µA, Both Channels		2.6			2.6		mA
V <sub>OS</sub> Sensitivity								µV/V
Positive	Δ V <sub>OS</sub> /ΔV+		20	150		20	150	µV/V
Negative	Δ V <sub>OS</sub> /ΔV-		20	150		20	150	µV/V
CMRR		80	110		80	110		dB
Common Mode Range		±12	±13.5		±12	±13.5		V
Crosstalk	Referred to Input (Note 6) 20 Hz < f < 20 kHz		100			100		dB
Differential Input Current	I <sub>ABC</sub> = 0, Input = ±4V		0.02	100		0.02	10	nA
Leakage Current	I <sub>ABC</sub> = 0 (Refer to Test Circuit)		0.2	100		0.2	5	nA
Input Resistance		10	26		10	26		kΩ
Open Loop Bandwidth			2			2		MHz
Slew Rate	Unity Gain Compensated		50			50		V/µs
Buffer Input Current	(Note 6), Except I <sub>ABC</sub> = 0 µA		0.2	0.4		0.2	0.4	µA
Peak Buffer Output Voltage	(Note 6)	10			10			V

