

Features

- g_m Adjustable Over 6 Decades
- Excellent g_m Linearity
- Excellent Matching Between Amplifiers
- Linearizing Diodes for reduced output distortion
- High Impedance Buffers
- High Output Signal-to-Noise Ratio

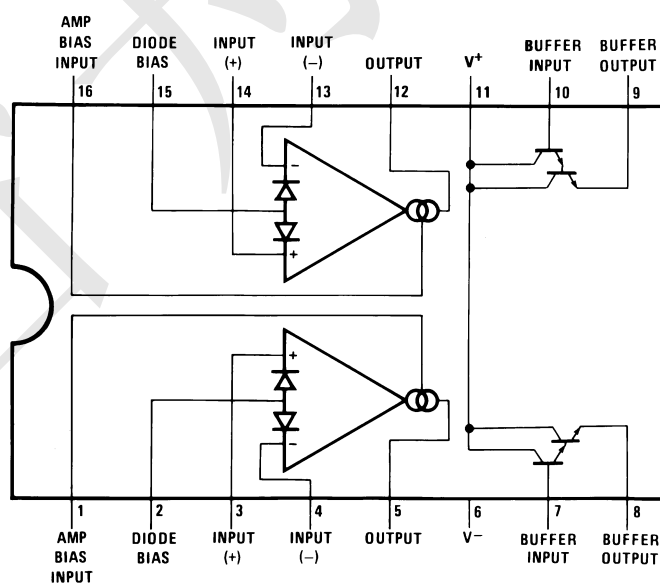
Applications

- Current-Controlled Amplifiers
- Stereo Audio Amplifiers
- Current-Controlled Impedances
- Current-Controlled Filters
- Current-Controlled Oscillators
- Multiplexers
- Timers
- Sample-and-Hold Circuits

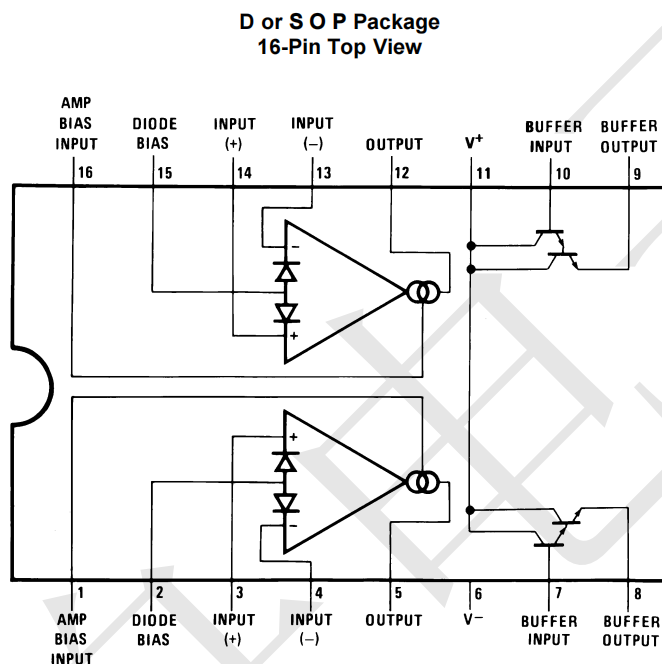
Description

The LM13700MX-TP 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. High impedance buffers are provided which are especially designed to complement the dynamic range of the amplifiers. The output buffers of the differ from those of the in that their input bias currents (and thus their output DC levels) are independent of I_{ABC} . This may result in performance superior to that of the in audio applications.

Connection Diagram



Pin Configuration and Functions



Pin Functions

PIN		I/O	DESCRIPTION
NAME	NO.		
Amp bias input	1, 16	A	Current bias input
Buffer input	7, 10	A	Buffer amplifier input
Buffer output	8, 9	A	Buffer amplifier output
Diode bias	2, 15	A	Linearizing diode bias input
Input+	3, 14	A	Positive input
Input-	4, 13	A	Negative input
Output	5, 12	A	Unbuffered output
V ⁺	11	P	Positive power supply
V ⁻	6	P	Negative power supply

Specifications

Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)⁽¹⁾

	MIN	MAX	UNIT
Supply voltage		36 V _{DC} or ±18	V
DC input voltage	+V _S	-V _S	V
Differential input voltage		±5	V
Diode bias current (I _D)		2	mA
Amplifier bias current (I _{ABC})		2	mA
Buffer output current ⁽²⁾		20	mA
Power dissipation ⁽³⁾ T _A = 25°C		570	mW
Output short circuit duration		Continuous	
Storage temperature, T _{stg}	-65	150	°C

(1) Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions*. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

(2) Buffer output current should be limited so as to not exceed package dissipation.

(3) For operation at ambient temperatures above 25°C, the device must be derated based on a 150°C maximum junction temperature and a thermal resistance, junction to ambient, as follows: LM13700MX-TP, 90°C/W; LM13700MX-TP, 110°C/W.

Recommended Operating Conditions

over operating free-air temperature range (unless otherwise noted)

	MIN	MAX	UNIT
V ₊ (single-supply configuration)	9.5	32	V
V ₊ (dual-supply configuration)	4.75	16	V
V ₋ (dual-supply configuration)	-16	-4.75	V
Operating temperature, T _A	0	70	°C

Thermal Information

THERMAL METRIC ⁽¹⁾	SOP16	UNIT
R _{θJA} Junction-to-ambient thermal resistance	83.0	°C/W
R _{θJC(top)} Junction-to-case (top) thermal resistance	44.0	°C/W
R _{θJB} Junction-to-board thermal resistance	40.5	°C/W
Ψ _{JT} Junction-to-top characterization parameter	11.5	°C/W
Ψ _{JB} Junction-to-board characterization parameter	40.2	°C/W

Electrical Characteristics

These specifications apply for $V_S = \pm 15\text{ V}$, $T_A = 25^\circ\text{C}$, amplifier bias current (I_{ABC}) = 500 μA , pins 2 and 15 open unless otherwise specified. The inputs to the buffers are grounded and outputs are open.

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input offset voltage (V_{OS})	Over specified temperature range		0.4	4	mV
	$I_{ABC} = 5\text{ }\mu\text{A}$		0.3	4	
V_{OS} including diodes	Diode bias current (I_D) = 500 μA		0.5	5	mV
Input offset change	$5\text{ }\mu\text{A} \leq I_{ABC} \leq 500\text{ }\mu\text{A}$		0.1	3	mV
Input offset current			0.1	0.6	μA
Input bias current			0.4	5	μA
	Over specified temperature range		1	8	
Forward transconductance (g_m)		6700	9600	13000	μS
	Over specified temperature range	5400			
g_m tracking			0.3		dB
Peak output current	$R_L = 0$, $I_{ABC} = 5\text{ }\mu\text{A}$		5		μA
	$R_L = 0$, $I_{ABC} = 500\text{ }\mu\text{A}$	350	500	650	
	$R_L = 0$, Over Specified Temp Range	300			
Supply current	$I_{ABC} = 500\text{ }\mu\text{A}$, both channels		2.6		mA
CMRR		80	110		dB
Common-mode range		± 12	± 13.5		V
Crosstalk	Referred to input ⁽¹⁾ $20\text{ Hz} < f < 20\text{ kHz}$		100		dB
Differential input current	$I_{ABC} = 0$, input = $\pm 4\text{ V}$		0.02	100	nA
Leakage current	$I_{ABC} = 0$ (refer to test circuit)		0.2	100	nA
Input resistance		10	26		k Ω
Open-loop bandwidth			2		MHz
Slew rate	Unity gain compensated		50		V/ μs
Buffer input current	See ⁽¹⁾		0.5	2	μA
Peak buffer output voltage	See ⁽¹⁾	10			V
PEAK OUTPUT VOLTAGE					
Positive	$R_L = \infty$, $5\text{ }\mu\text{A} \leq I_{ABC} \leq 500\text{ }\mu\text{A}$	12	14.2		V
Negative	$R_L = \infty$, $5\text{ }\mu\text{A} \leq I_{ABC} \leq 500\text{ }\mu\text{A}$	-12	-14.4		V
V_{OS} SENSITIVITY					
Positive	$\Delta V_{OS}/\Delta V^+$		20	150	$\mu\text{V/V}$
Negative	$\Delta V_{OS}/\Delta V^-$		20	150	$\mu\text{V/V}$

(1) These specifications apply for $V_S = \pm 15\text{ V}$, $I_{ABC} = 500\text{ }\mu\text{A}$, $R_{OUT} = 5\text{-k}\Omega$ connected from the buffer output to $-V_S$ and the input of the buffer is connected to the transconductance amplifier output.

Typical Characteristics

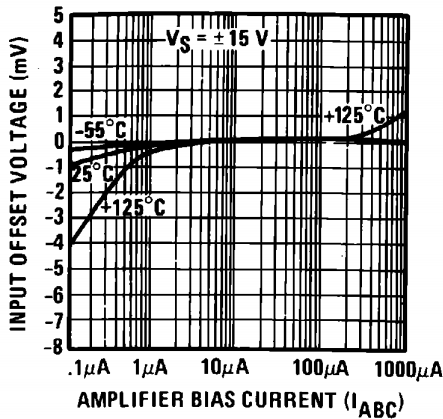


Figure 1. Input Offset Voltage

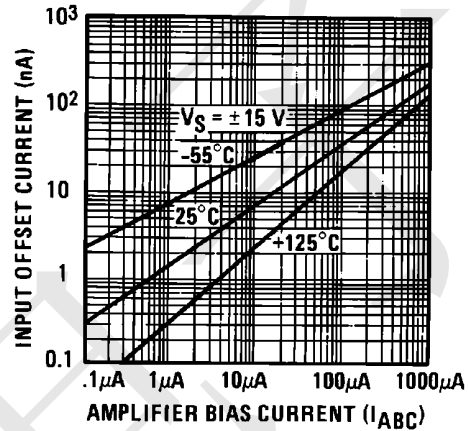


Figure 2. Input Offset Current

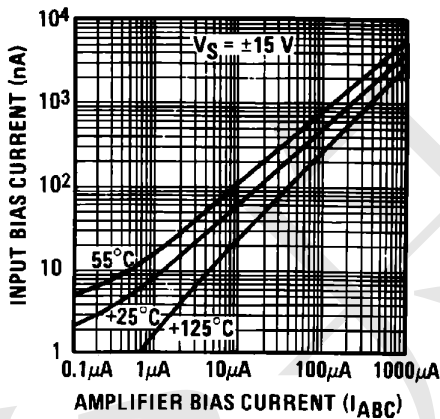


Figure 3. Input Bias Current

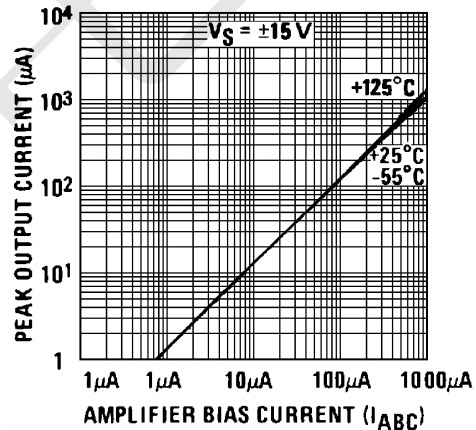


Figure 4. Peak Output Current

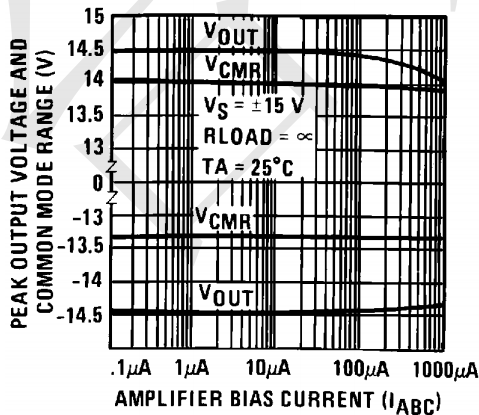


Figure 5. Peak Output Voltage and Common Mode Range

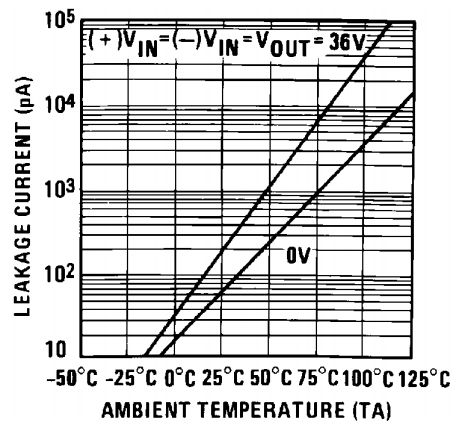


Figure 6. Leakage Current

Typical Characteristics (continued)

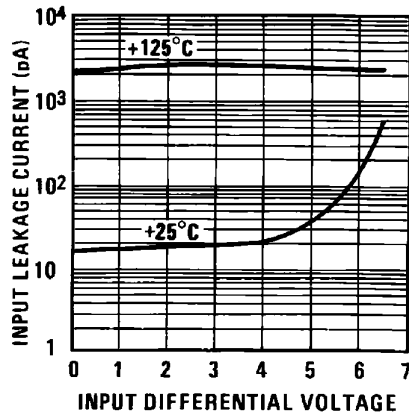


Figure 7. Input Leakage

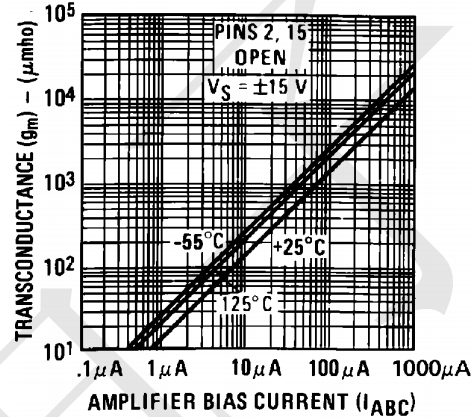


Figure 8. Transconductance

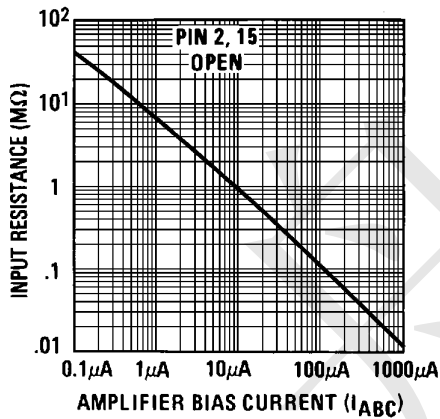


Figure 9. Input Resistance

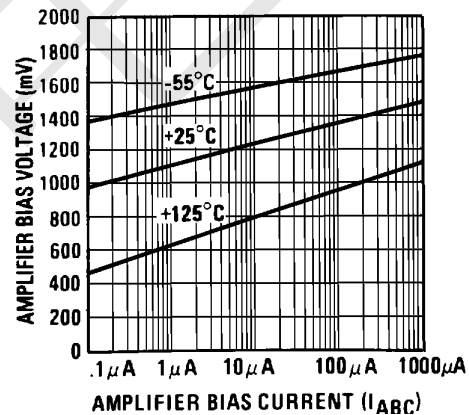


Figure 10. Amplifier Bias Voltage vs. Amplifier Bias Current

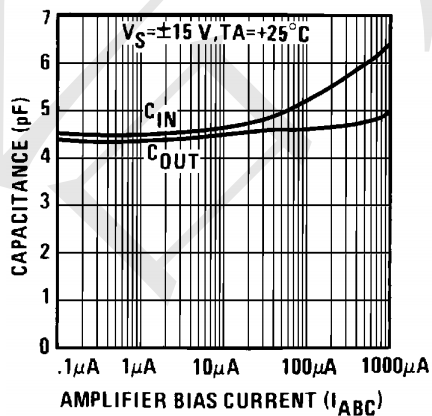


Figure 11. Input and Output Capacitance

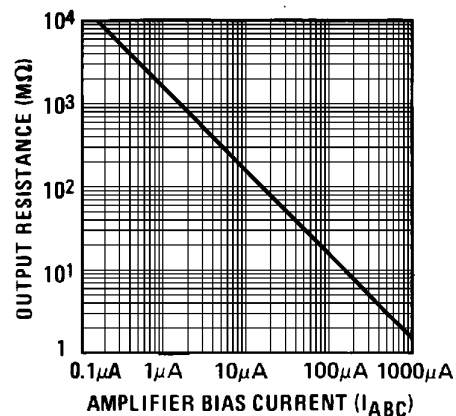


Figure 12. Output Resistance

Typical Characteristics (continued)

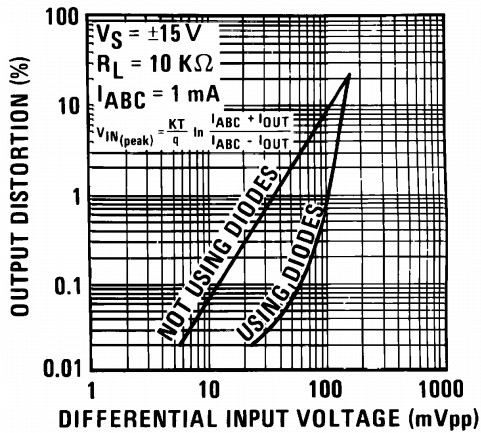


Figure 13. Distortion vs. Differential Input Voltage

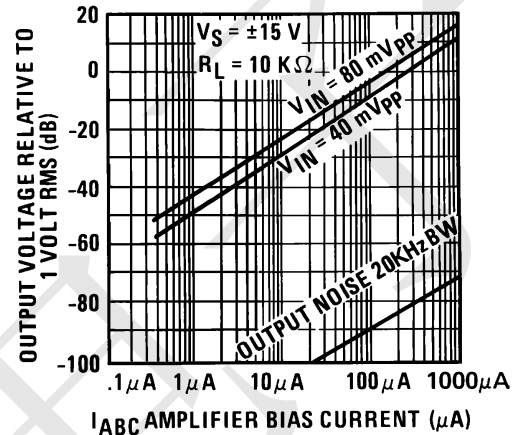


Figure 14. Voltage vs. Amplifier Bias Current

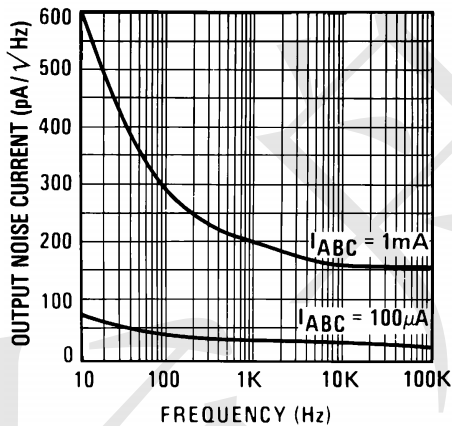
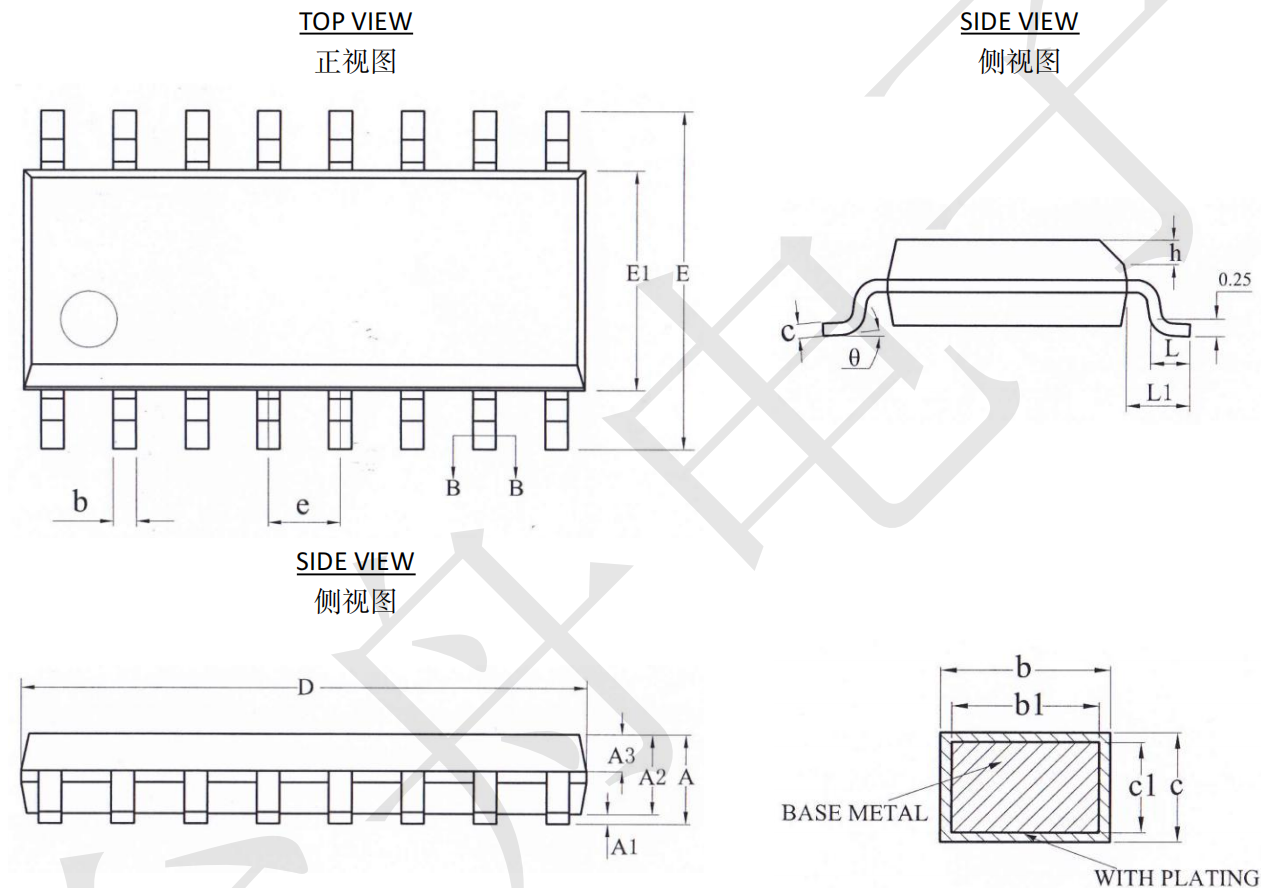


Figure 15. Output Noise vs Frequency

封装机械数据:

SOP16封装



标号	毫米			标号	毫米		
	MIN	NOM	MAX		MIN	NOM	MAX
A	-	-	1.75	D	9.80	9.90	10.00
A1	0.10	-	0.225	E	5.80	6.00	6.20
A2	1.30	1.45	1.50	E1	3.80	3.90	4.00
A3	0.60	0.65	0.70	e	1.27 (BSC)		
b	0.39	-	0.47	H	0.25	-	0.50
b1	0.38	0.41	0.44	L	0.50	-	0.80
c	0.20	-	0.24	L1	1.05 (REF)		
c1	0.19	0.20	0.21	θ	0°	-	8°