

PRODUCT SPECIFICATIONS

LINEAR INTEGRATED CIRCUITS

Raytheon

**General Purpose
Operational Amplifier**

**LM101A/
201A/301A**

Features

- Offset voltage 3.0mV maximum over temperature
- Input current 100nA maximum over temperature
- Offset current 20nA maximum over temperature
- Offsets guaranteed over entire common-mode range and supply voltage range
- Frequency compensated 30pF
- Supply voltage $\pm 5.0V$ to $\pm 20V$

advanced epitaxial process. The units may be fully compensated with the addition of a 30pF capacitor stabilizing the circuit for all feedback configurations including capacitive loads.

The device may be operated as a comparator with a differential input as high as $\pm 30V$. Used as a comparator the output can be clamped at any desired level to make it compatible with logic circuits.

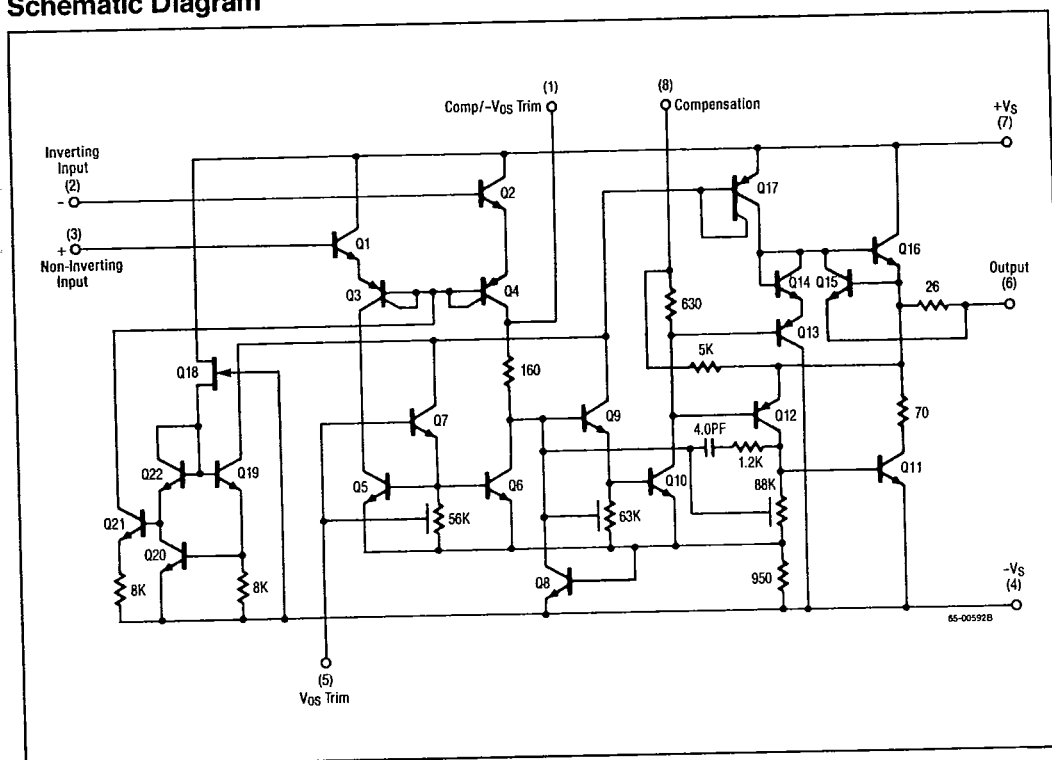
The LM101A operates over the full military temperature range from $-55^{\circ}C$ to $+125^{\circ}C$. The commercial version, LM301A operates over a temperature range from $0^{\circ}C$ to $+70^{\circ}C$.

Description

The LM101A, 201A, and 301A are general purpose high performance operational amplifiers fabricated monolithically on a silicon chip by an

The LM201A is the same as the LM101A except its performance is guaranteed from $-25^{\circ}C$ to $+85^{\circ}C$.

Schematic Diagram



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57C 04444 D T-79-05-10

LM101A/201A/301A

General Purpose Operational Amplifier

Connection Information

**8-Lead
Metal Can Package
(Top View)**

65-00002A

**8-Lead
Dual In-Line Package
(Top View)**

65-00103A

Pin	Function
1	Comp/V _{OS} Trim
2	-Input
3	+Input
4	-V _S
5	V _{OS} Trim
6	Output
7	+V _S
8	Comp

Absolute Maximum Ratings

- Supply Voltage
 - LM101A/LM201A ±22V
 - LM301A ±18V
- Differential Input Voltage 30V
- Output Voltage¹ ±15V
- Storage Temperature
 - Range -65°C to +150°C
- Operating Temperature Range
 - LM101A -55°C to +125°C
 - LM201A -25°C to +85°C
 - LM301A 0°C to +70°C
- Lead Solder Temperature (60 Sec) +300°C

Notes: 1. For supply voltages less than ±15V, the absolute maximum input voltage is equal to the supply voltage.
 2. Continuous short-circuit is allowed for case temperatures to +125°C and ambient temperatures to +75°C for LM107; case temperatures to +70°C and ambient temperatures to +55°C for LM307.

Thermal Characteristics

	8-Lead Plastic DIP	8-Lead Ceramic DIP	8-Lead TO-99 Metal Can
Max. Junc. Temp.	125°C	175°C	175°C
Max. P _D T _A < 50°C	468mW	833mW	658mW
Therm. Res. θ _{JC}	—	45°C/W	50°C/W
Therm. Res. θ _{JA}	160°C/W	150°C/W	190°C/W
For T _A > 50°C Derate at	6.25mW per °C	8.33mW per °C	5.26mW per °C

Ordering Information

Part Number	Package	Operating Temperature Range
LM101ADE	Ceramic	-55°C to +125°C
LM101ADE/883C*	Ceramic	-55°C to +125°C
LM101AH	TO-99	-55°C to +125°C
LM101AH/883C*	TO-99	-55°C to +125°C
LM201ADE	Ceramic	-25°C to +85°C
LM201ADE/883C*	Ceramic	-25°C to +85°C
LM201AH	TO-99	-25°C to +85°C
LM201AH/883C*	TO-99	-25°C to +85°C
LM301ADE	Ceramic	0°C to +70°C
LM301AH	TO-99	0°C to +70°C
LM301AN	Plastic	0°C to +70°C

*MIL-STD-883, Level C Processing

Mask Pattern

65-01260A

Die Size: 55 x 55 mils
 Min. Pad Dimension: 4 x 4 mils

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LM101A/201A/301A

Electrical Characteristics

(C = 30pF; LM101A, LM201A: $\pm 5.0V \leq V_S \leq \pm 20V$; LM301A: $\pm 5.0V \leq V_S \leq \pm 15V$; see Note 1)

Parameters	Test Conditions	LM101A/LM201A			LM301A			Units
		Min	Typ	Max	Min	Typ	Max	
Input Offset Voltage	$T_A = +25^\circ C, R_S \leq 50k\Omega$		0.7	2.0		2.0	7.5	mV
Input Offset Current	$T_A = +25^\circ C$		1.5	10		3.0	50	nA
Input Bias Current	$T_A = +25^\circ C$		30	75		70	250	nA
Input Resistance	$T_A = +25^\circ C$	1.5	4.0		0.5	2.0		M Ω
Supply Current	$T_A = +25^\circ C$ (Note 2)		1.8	3.0		1.8	3.0	mA
Large Signal Voltage Gain	$T_A = +25^\circ C, V_S = \pm 15V, V_{OUT} = \pm 10V, R_L \geq 2k\Omega$	50	160		25	160		V/mV
Input Offset Voltage	$R_S \geq 50k\Omega$			3.0			10	mV
Average Input Offset Voltage Drift			3.0	15		6.0	30	$\mu V/^\circ C$
Input Offset Current				20			70	nA
Average Input Offset Current Drift	$+25^\circ C \leq T_A \leq +125^\circ C$		0.01	0.1				nA/°C
	$+25^\circ C \leq T_A \leq +70^\circ C$					0.01	0.3	
	$-55^\circ C \leq T_A \leq +25^\circ C$		0.02	0.2				
	$0^\circ C \leq T_A \leq +25^\circ C$					0.02	0.6	
Input Bias Current				100			300	nA
Supply Current	$T_A = +125^\circ C, V_S = \pm 20V$		1.2	2.5				mA
Large Signal Voltage Gain	$T_A = +15^\circ C, V_{OUT} = \pm 10V, R_L \geq 2k\Omega$	25			15			V/mV
Output Voltage Swing	$V_S = \pm 15V, R_L = 10k\Omega$	± 12	± 14		± 12	± 14		V
	$R_L \geq 2k\Omega$	± 10	± 13		± 10	± 13		V
Input Voltage Range	(Note 2)	± 15			± 12			V
Common Mode Rejection Ratio	$R_S \leq 50k\Omega$	80	96		70	90		dB
Power Supply Rejection Ratio	$R_S \leq 50k\Omega$	80	96		70	96		dB

- Notes: 1. These specifications apply for $-55^\circ C < T_A < +125^\circ C$ LM101A, $-25^\circ C$ to $+85^\circ C$ LM201A, and $0^\circ C < T_A < +70^\circ C$ LM301A, unless otherwise specified.
 2. $V_S = \pm 20V$ for LM101A and LM201A, $V_S = \pm 15V$ for LM301A.

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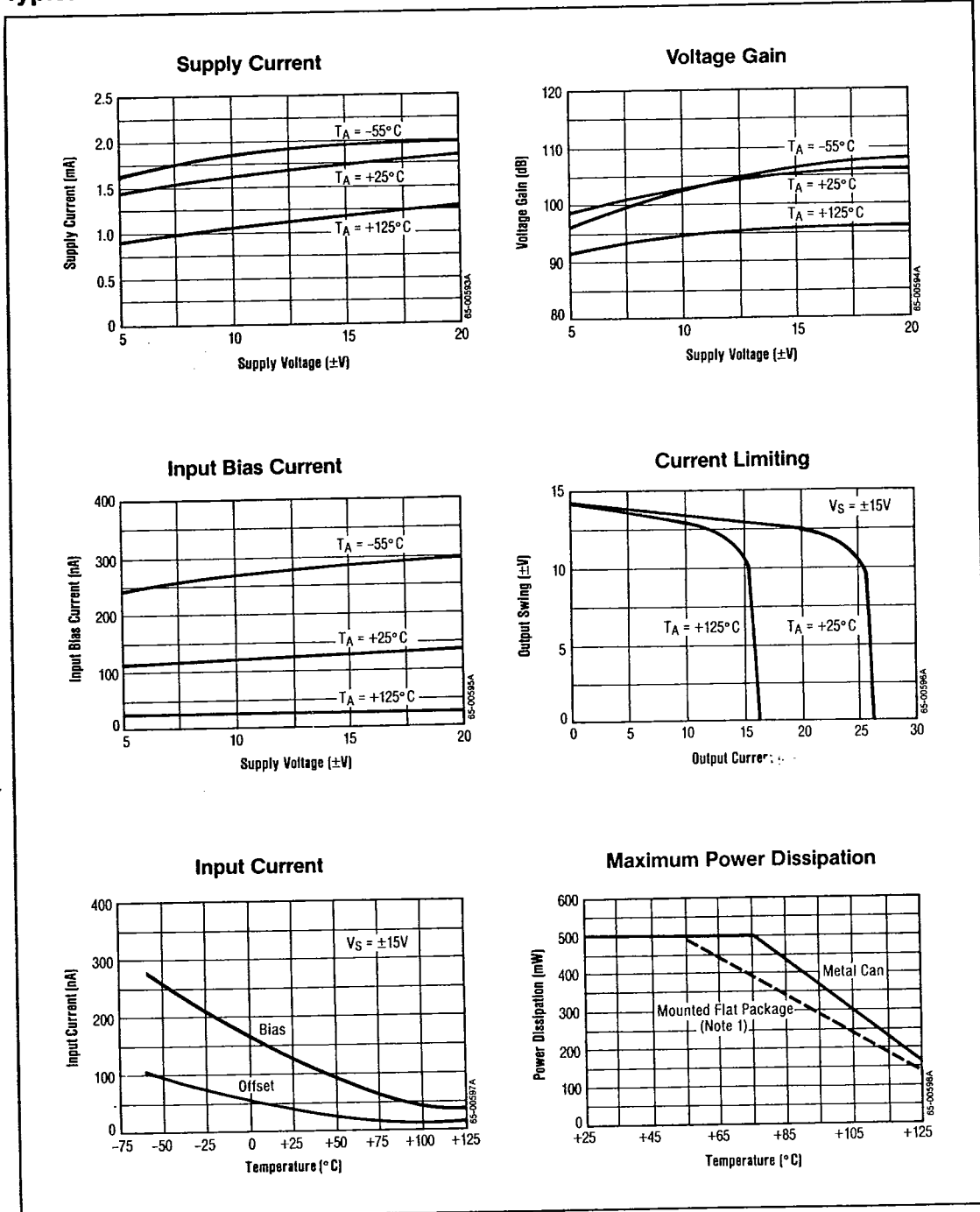
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LM101A/201A/301A

**General Purpose
Operational Amplifier**

Typical Performance Characteristics



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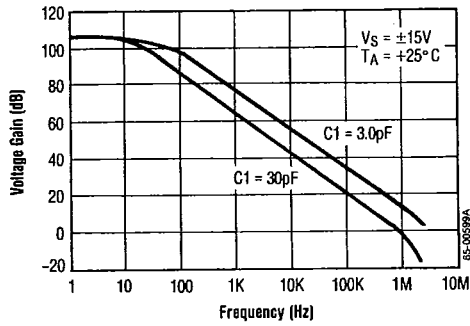
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**General Purpose
Operational Amplifier**

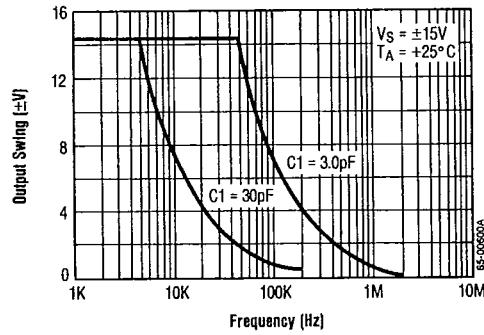
LM101A/201A/301A

Typical Performance Characteristics (Continued)

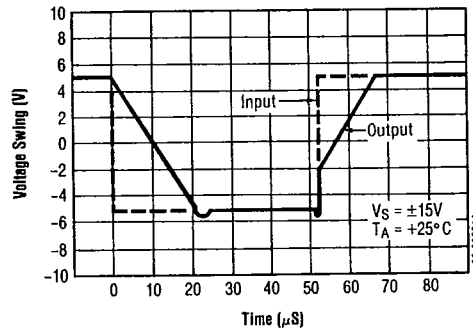
Open Loop Frequency Response



Large Signal Frequency Response



Voltage Follower Pulse Response

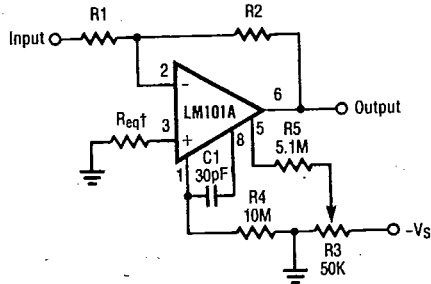


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LM101A/201A/301A

Typical Applications

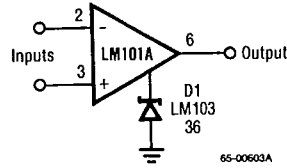
Inverting Amplifier With Balancing Circuit



†May be zero or equal to parallel combination of R1 and R2 for minimum offset.

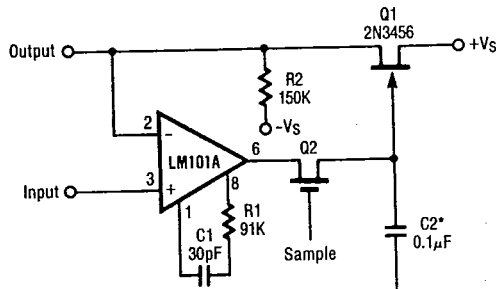
65-00602A

Voltage Comparator for Driving DTL or TTL Integrated Circuits



65-00603A

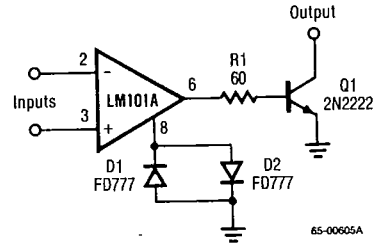
Low Drift Sample and Hold



*Polycarbonate dielectric capacitor

65-00604A

Voltage Comparator for Driving RTL Logic or High Current Driver



65-00605A