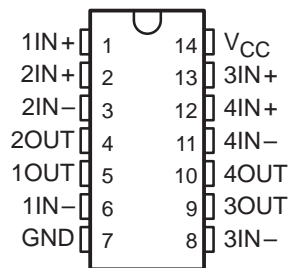


LM2900, LM3900 QUADRUPLE NORTON OPERATIONAL AMPLIFIERS

SLOS059 – JULY 1979 – REVISED SEPTEMBER 1990

- Wide Range of Supply Voltages, Single or Dual Supplies
- Wide Bandwidth
- Large Output Voltage Swing
- Output Short-Circuit Protection
- Internal Frequency Compensation
- Low Input Bias Current
- Designed to Be Interchangeable With National Semiconductor LM2900 and LM3900, Respectively

N PACKAGE
(TOP VIEW)

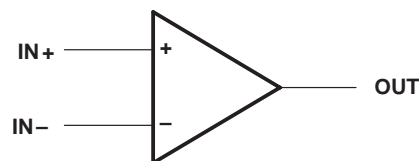


description

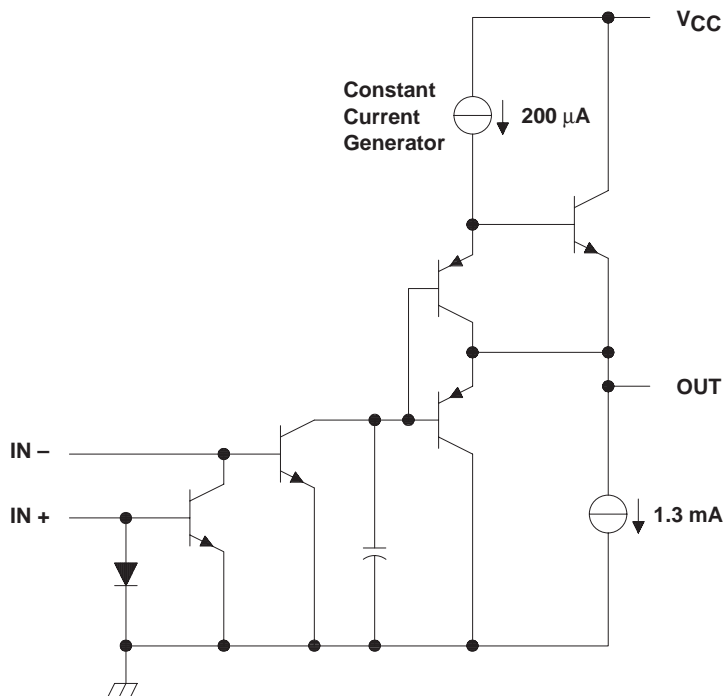
These devices consist of four independent, high-gain frequency-compensated Norton operational amplifiers that were designed specifically to operate from a single supply over a wide range of voltages. Operation from split supplies is also possible. The low supply current drain is essentially independent of the magnitude of the supply voltage. These devices provide wide bandwidth and large output voltage swing.

The LM2900 is characterized for operation from -40°C to 85°C , and the LM3900 is characterized for operation from 0°C to 70°C .

symbol (each amplifier)



schematic (each amplifier)



LM2900, LM3900 QUADRUPLE NORTON OPERATIONAL AMPLIFIERS

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

	LM2900	LM3900	UNIT
Supply voltage, V_{CC} (see Note 1)	36	36	V
Input current	20	20	mA
Duration of output short circuit (one amplifier) to ground at (or below) 25°C free-air temperature (see Note 2)	unlimited	unlimited	
Continuous total dissipation	See Dissipation Rating Table		
Operating free-air temperature range	-40 to 85	0 to 70	°C
Storage temperature range	-65 to 150	-65 to 150	°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	260	260	°C

- NOTES: 1. All voltage values, except differential voltages, are with respect to the network ground terminal.
2. Short circuits from outputs to V_{CC} can cause excessive heating and eventual destruction.

DISSIPATION RATING TABLE

PACKAGE	$T_A \leq 25^\circ\text{C}$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25^\circ\text{C}$	$T_A = 70^\circ\text{C}$ POWER RATING	$T_A = 85^\circ\text{C}$ POWER RATING
N	1150 mW	9.2 mW/°C	736 mW	598 mW

recommended operating conditions

	LM2900		LM3900		UNIT
	MIN	MAX	MIN	MAX	
Supply voltage, V_{CC} (single supply)	4.5	32	4.5	32	V
Supply voltage, V_{CC+} (dual supply)	2.2	16	2.2	16	V
Supply voltage, V_{CC-} (dual supply)	-2.2	-16	-2.2	-16	V
Input current (see Note 3)		-1		-1	mA
Operating free-air temperature, T_A	-40	85	0	70	°C

NOTE 3: Clamp transistors are included that prevent the input voltages from swinging below ground more than approximately -0.3 V. The negative input currents that may result from large signal overdrive with capacitive input coupling must be limited externally to values of approximately -1 mA. Negative input currents in excess of -4 mA causes the output voltage to drop to a low voltage. These values apply for any one of the input terminals. If more than one of the input terminals are simultaneously driven negative, maximum currents are reduced. Common-mode current biasing can be used to prevent negative input voltages.

LM2900, LM3900

QUADRUPLE NORTON OPERATIONAL AMPLIFIERS

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electrical characteristics, $V_{CC} = 15\text{ V}$, $T_A = 25^\circ\text{C}$ (unless otherwise noted)

PARAMETER	TEST CONDITION†		LM2900			LM3900			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
I_{IB} Input bias current (inverting input)	$I_{I+} = 0$	$T_A = 25^\circ\text{C}$	30	200		30	200	nA	
		$T_A = \text{Full range}$		300		300			
Mirror gain	$I_{I+} = 20\ \mu\text{A}$ to $200\ \mu\text{A}$ $T_A = \text{Full range}$, See Note 4		0.9		1.1	0.9		1.1	$\mu\text{A}/\mu\text{A}$
Change in mirror gain			2%		5%	2%		5%	
Mirror current	$V_{I+} = V_{I-}$, See Note 4	$T_A = \text{Full range}$,	10		500	10		500	μA
A_{VD} Large-signal differential voltage amplification	$V_O = 10\text{ V}$, $f = 100\text{ Hz}$	$R_L = 10\text{ k}\Omega$,	1.2		2.8	1.2		2.8	V/mV
r_i Input resistance (inverting input)			1			1			M Ω
r_o Output resistance			8			8			k Ω
B_1 Unity-gain bandwidth (inverting input)			2.5			2.5			MHz
k_{SVR} Supply voltage rejection ratio ($\Delta V_{CC}/\Delta V_{IO}$)			70			70			dB
V_{OH} High-level output voltage	$I_{I+} = 0$, $I_{I-} = 0$	$R_L = 2\text{ k}\Omega$	13.5			13.5			V
		$V_{CC} = 30\text{ V}$, No load	29.5			29.5			
V_{OL} Low-level output voltage	$I_{I+} = 0$, $R_L = 2\text{ k}\Omega$	$I_{I-} = 10\ \mu\text{A}$,	0.09		0.2	0.09		0.2	V
I_{OS} Short-circuit output current (output internally high)	$I_{I+} = 0$, $V_O = 0$	$I_{I-} = 0$,	-6		-18	-6		-10	mA
			Pulldown current	0.5		1.3	0.5		
I_{OL} Low-level output current‡	$I_{I-} = 5\ \mu\text{A}$	$V_{OL} = 1\text{ V}$	5			5			mA
I_{CC} Supply current (four amplifiers)	No load		6.2		10	6.2		10	mA

† All characteristics are measured under open-loop conditions with zero common-mode voltage unless otherwise specified. Full range for T_A is -40°C to 85°C for LM2900 and 0°C to 70°C for LM3900.

‡ The output current-sink capability can be increased for large-signal conditions by overdriving the inverting input.

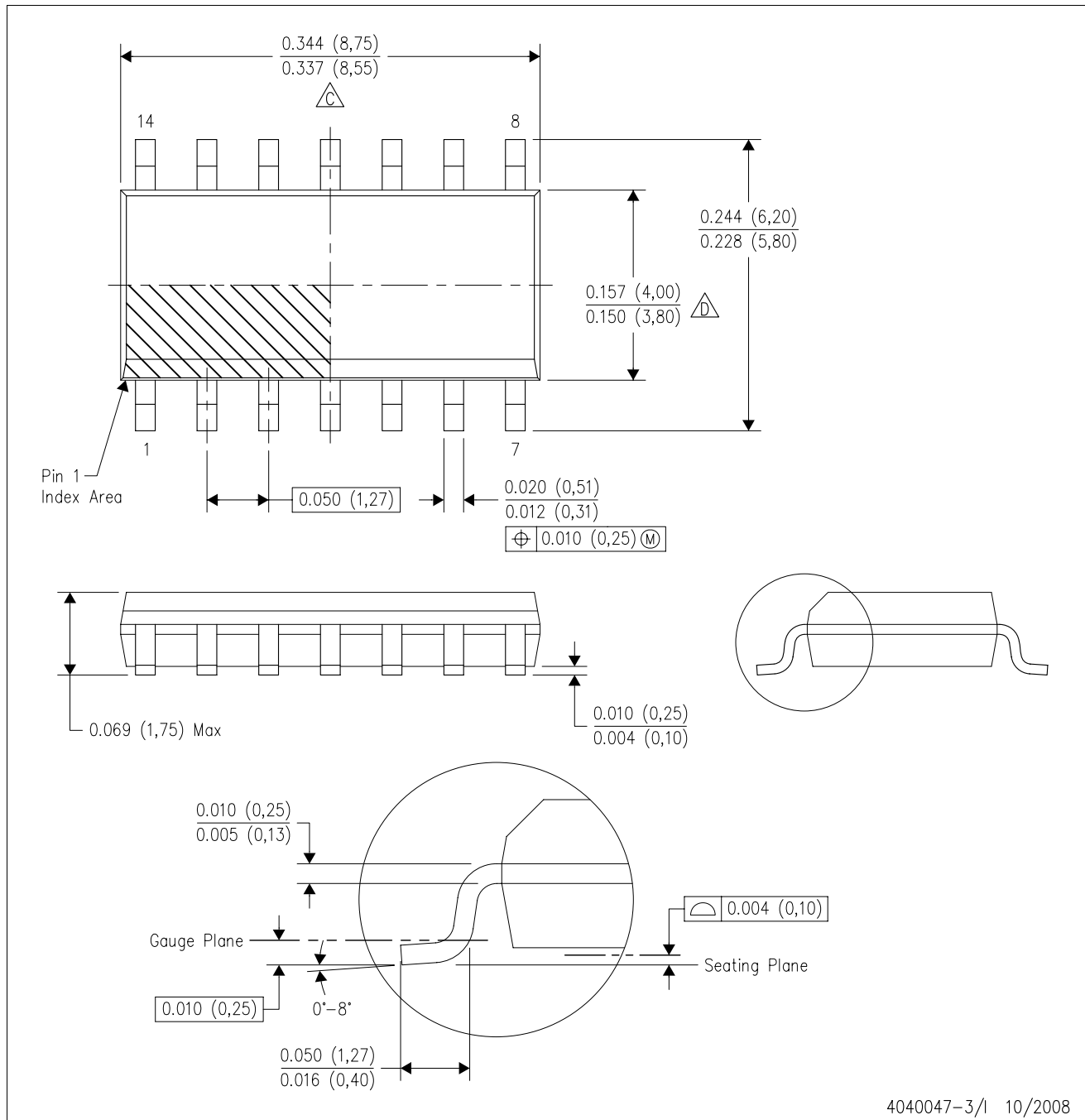
NOTE 4: These parameters are measured with the output balanced midway between V_{CC} and GND.

operating characteristics, $V_{CC\pm} = \pm 15\text{ V}$, $T_A = 25^\circ\text{C}$

PARAMETER	TEST CONDITIONS			MIN	TYP	MAX	UNIT
SR Slew rate at unity gain	Low-to-high output	$V_O = 10\text{ V}$, $C_L = 100\text{ pF}$, $R_L = 2\text{ k}\Omega$			0.5		V/ μs
	High-to-low output				20		

D (R-PDSO-G14)

PLASTIC SMALL-OUTLINE PACKAGE



$\triangle C$ Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not

$\triangle D$ E. Reference JEDEC MS-012 variation AB.

N (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
 - D The 20 pin end lead shoulder width is a vendor option, either half or full width.