SLFS001A – JUNE 1985 – REVISED APRIL 1988

- **Adjustable Gain to 400 Typ**
- **No Frequency Compensation Required**
- **Low Noise . . . 3 μV Typ V_n**

description

This device is a monolithic two-stage video amplifier with differential inputs and differential outputs. It features internal series-shunt feedback that provides wide bandwidth, low phase distortion, and excellent gain stability. Emitter-follower outputs enable the device to drive capacitive loads. All stages are current-source biased to obtain high common-mode and supply-voltage rejection ratios.

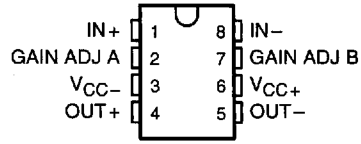
The differential gain is typically 400 when the gain adjust pins are connected together, or amplification may be adjusted for near 0 to 400 by the use of a single external resistor connected between the gain adjustment pins A and B. No external frequency-compensating components are required for any gain option.

The device is particularly useful in magnetic-tape or disk-file systems using phase or NRZ encoding and in high-speed thin-film or plated-wire memories. Other applications include general-purpose video and pulse amplifiers.

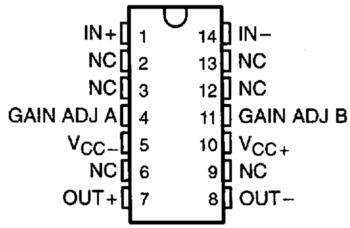
The device achieves low equivalent noise voltage through special processing and a new circuit layout incorporating input transistors with low base resistance.

The TL592B is characterized for operation from 0°C to 70°C.

D8† OR P PACKAGE
(TOP VIEW)

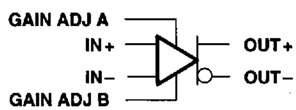


D14† OR N PACKAGE
(TOP VIEW)



† D8 and D14 are the codes to differentiate the 8-pin and 14-pin versions, respectively.

symbol



TEXAS INSTRUMENTS
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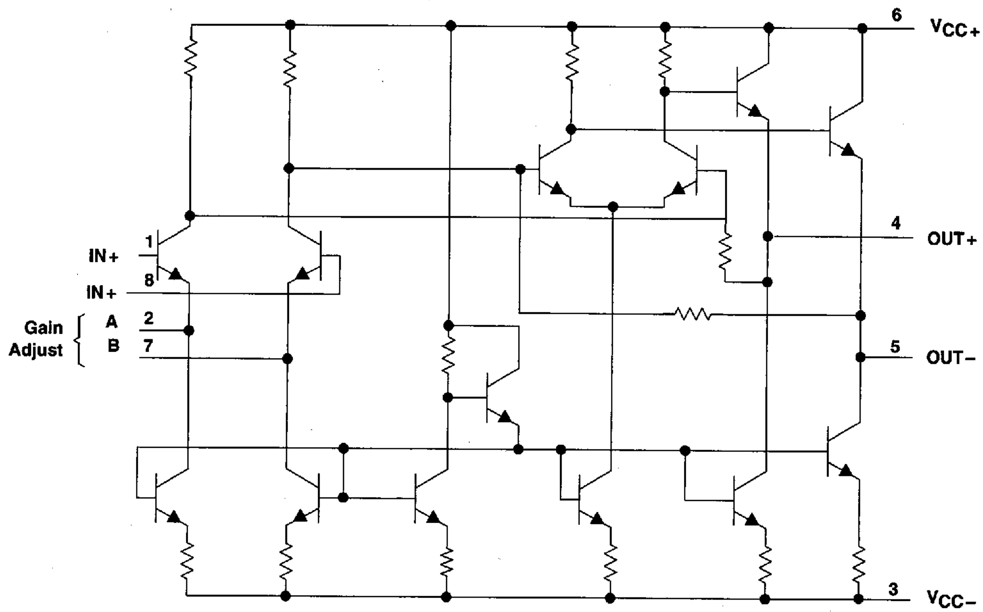
schematic



Pin numbers are for D8 and P packages.

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

Supply voltage, V_{CC+} (see Note 1) .... 8 V
Supply voltage, V_{CC-} .... –8 V
Differential input voltage .... ±5 V
Voltage range, any input .... V_{CC+} to V_{CC-}
Output current .... 10 mA
Continuous total power dissipation .... See Dissipation Rating Table
Operating free-air temperature range .... 0°C to 70°C
Storage temperature range .... –65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds .... 260°C

NOTES: 1. All voltage values except differential input voltages are with respect to the midpoint between V_{CC+} and V_{CC-}.

DISSIPATION RATING TABLE

PACKAGE	$T_A \le 25°C$ POWER RATING	DERATING FACTOR	DERATE ABOVE T_A	$T_A = 70°C$ POWER RATING
D8	530 mW	5.8 mW/°C	59°C	464 mW
D14	530 mW	N/A	N/A	530 mW
N	530 mW	N/A	N/A	530 mW
P	530 mW	N/A	N/A	530 mW

recommended operating conditions

	MIN	NOM	MAX	UNIT
Supply voltage, V_{CC+}	3	6	8	V
Supply voltage, V_{CC-}	–3	–6	–8	V
Operating free-air temperature, T_A	0		70	°C

electrical characteristics at specified free-air temperature, $V_{CC\pm} = \pm 6$ V, $R_L = 2$ kΩ (unless otherwise noted)

PARAMETER		TEST FIGURE	TEST CONDITIONS†		T_A	MIN	TYP	MAX	UNIT
A_{VD}	Large-signal differential voltage amplification	1	$V_{OPP} = 3$ V, $R_{AB} = 0$	$R_L = 2$ kΩ,	25°C	300	400	500	V/V
					0°C to 70°C	250		600	
A_{VD2}	Large-signal differential voltage amplification	1	$V_{OPP} = 3$ V, $R_{AB} = 1$ kΩ	$R_L = 2$ kΩ,	25°C		13		V/V
BW	Bandwidth (–3 dB)	2	$V_{OPP} = 1$ V,	$R_{AB} = 0$	25°C		50		MHz
I_{IO}	Input offset current				25°C		0.4	5	μA
					0°C to 70°C			6	
I_{IB}	Input bias current				25°C		9	30	μA
					0°C to 70°C			40	
V_{ICR}	Common-mode input voltage range	3			25°C	±1			V
					0°C to 70°C	±1			
V_{OC}	Common-mode output voltage	1	$R_L = \infty$		25°C	2.4	2.9	3.4	V
V_{OO}	Output offset voltage	1	$V_{ID} = 0$, $R_L = \infty$	$R_{AB} = \infty$,	25°C		0.35	0.75	V
					0°C to 70°C			1.5	
V_{OPP}	Peak-to-peak output voltage swing	1	$R_L = 2$ kΩ,	$R_{AB} = 0$	25°C	3	4		V
					0°C to 70°C	2.8			
r_i	Input resistance		$V_{OD} = 1$ V,	$R_{AB} = 0$	25°C		4		kΩ
					0°C to 70°C		3.6		
r_o	Output resistance				0°C to 70°C			30	Ω
C_i	Input capacitance				25°C		5		pF
CMRR	Common-mode rejection ratio	3	$V_{IC} = \pm 1$ V, $R_{AB} = 0$	f = 100 kHz	25°C	60	86		dB
				f = 5 MHz			60		
				f = 100 kHz	0°C to 70°C	50			
				f = 5 MHz			60		
k_{SVR}	Supply voltage rejection ratio ($\Delta V_{CC}/\Delta V_{IO}$)	4	$\Delta V_{CC+} = \pm 0.5$ V, $\Delta V_{CC-} = \pm 0.5$ V,	$R_{AB} = 0$	25°C	50	70		dB
					0°C to 70°C	50			
V_n	Broadband equivalent input noise voltage	4	BW = 1 kHz to 10 MHz		25°C		3		μV
t_{pd}	Propagation delay time	2	$\Delta V_O = 1$ V		25°C		7.5		ns
t_r	Rise time	2	$\Delta V_O = 1$ V		25°C		10.5		ns
$I_{sink(max)}$	Maximum output sink current		$V_{ID} = 1$ V,	$V_O = 3$ V		3	4		mA
I_{CC}	Supply current		No load,	No signal	25°C		18	24	mA
					0°C to 70°C			27	

† R_{AB} is the gain-adjustment resistor connected between gain-adjust pins A and B. If not specified for a particular parameter, its value is irrelevant to that parameter.

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PARAMETER MEASUREMENT INFORMATION

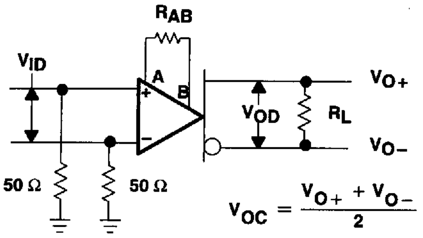

Figure 1

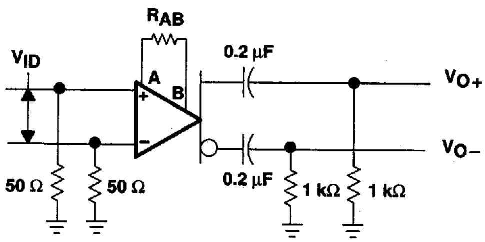

Figure 2

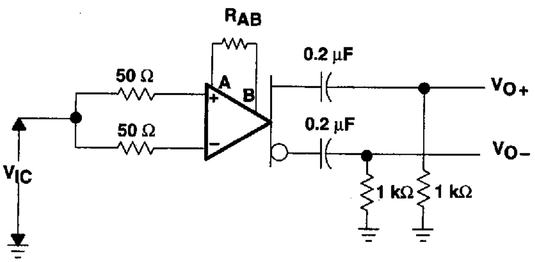

Figure 3

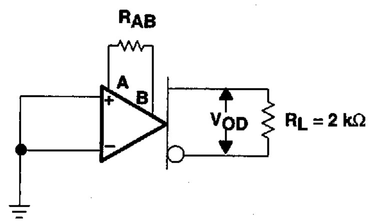

Figure 4

TYPICAL CHARACTERISTICS

LARGE-SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION vs SUPPLY VOLTAGE

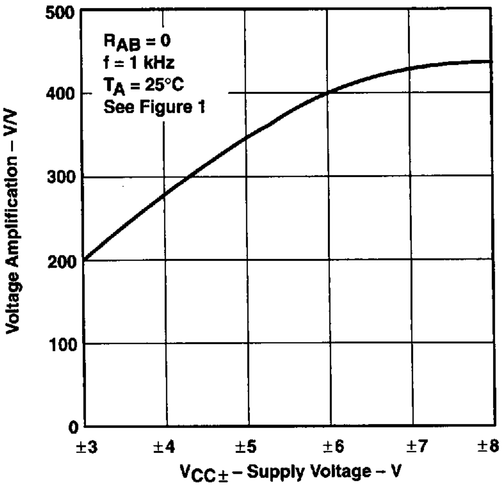

Figure 5

LARGE-SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION vs GAIN-ADJUSTMENT RESISTANCE

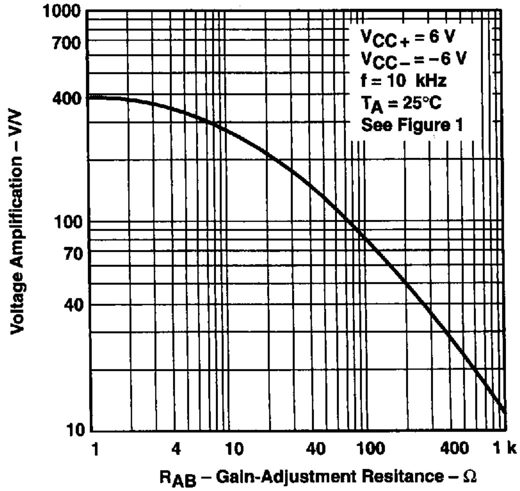

Figure 6

SUPPLY CURRENT vs SUPPLY VOLTAGE

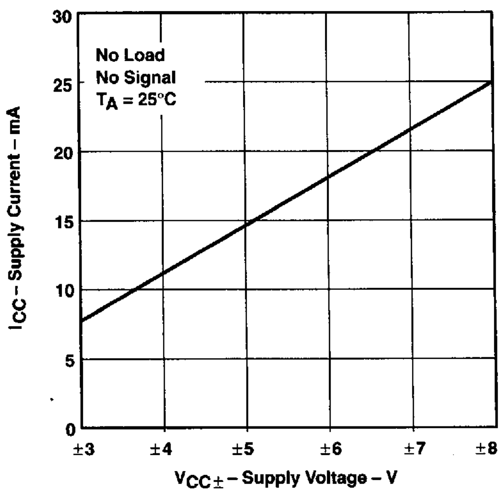

Figure 7