



SANYO Semiconductors

DATA SHEET

LA6510 — Monolithic Linear IC

Dual Power Operational Amplifier

Overview

The LA6510 is a dual power operational amplifier IC capable of delivering larger output currents than conventional operational amplifiers.

The LA6510 features an on-chip current limiter and provides high voltage gain and a high common-mode rejection ratio. The LA6510 is an ideal choice for power applications such as DC servos, capstan drivers, actuator drivers, programmable power supplies and high-quality audio amplifiers.

Functions

- High output current ($I_O \text{ max} = 1.0\text{A}$)
- High gain
- Equipped with current limiter pin
- Supports single power source operation

Specifications

Maximum Ratings at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC} / V_{EE \text{ max}}$		± 18	V
Differential input voltage	V_{ID}		30	V
Common mode input voltage	V_{ICOM}		± 15	V
Maximum output current	$I_O \text{ max}$		1.0	A
Allowable power dissipation	$P_d \text{ max}$		2.5	W
Operating temperature	T_{opr}		-40 to +85	$^\circ\text{C}$
Storage temperature	T_{stg}		-55 to +150	$^\circ\text{C}$

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LA6510

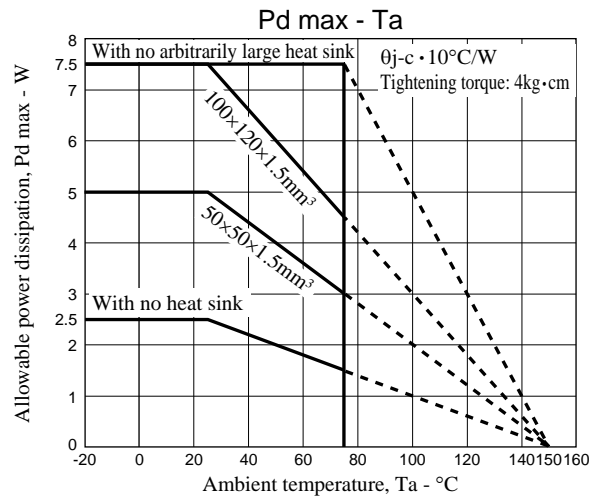
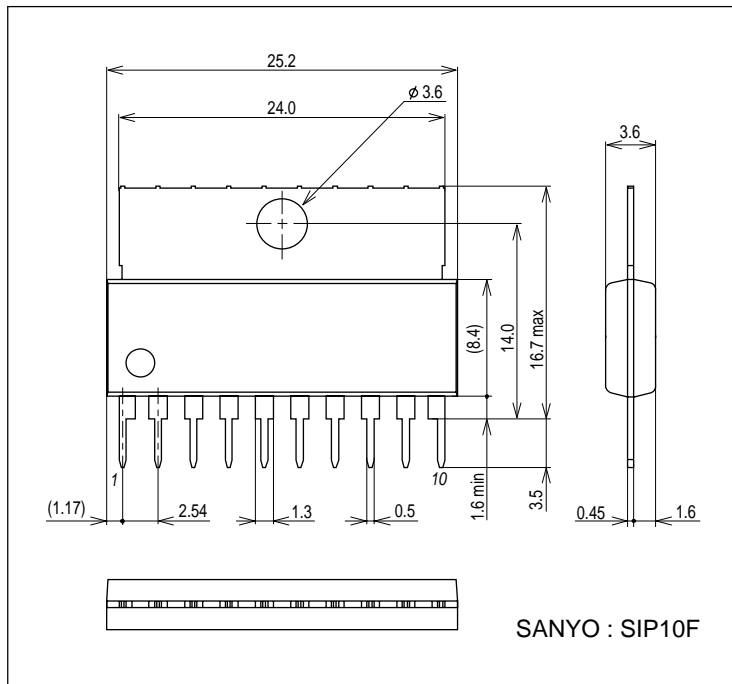
Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC} / V_{EE} = \pm 15\text{V}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
No-load current drain	I_{CCO}			12	20	mA
Input offset voltage	V_{IO}	$R_S \leq 10\text{k}\Omega$		2	6	mV
Input offset current	I_{IO}			10	200	nA
Input bias current	I_B			100	700	nA
Common-mode input voltage range	V_{ICM}		-15		+13	V
Common-mode signal rejection ratio	C_{MR}		70	80		dB
Output voltage	V_O	$R_L = 33\Omega$	± 12	± 13		V
Voltage gain	V_{GO}			100		dB
Slew rate	SR	$G_V = 0, R_L = 33\Omega, R = 2.2\Omega, C = 0.1\mu\text{F}$		0.15		V/ μs
Equivalent input noise voltage	V_{NI}	$R_g = 1\text{k}\Omega, \text{DIN AUDIO}$		2		μV
Supply voltage rejection ratio	SVR			30	150	$\mu\text{V/V}$
Limiting current	I_{SC}	$R_{sc} = 2.2\Omega$		0.35		A

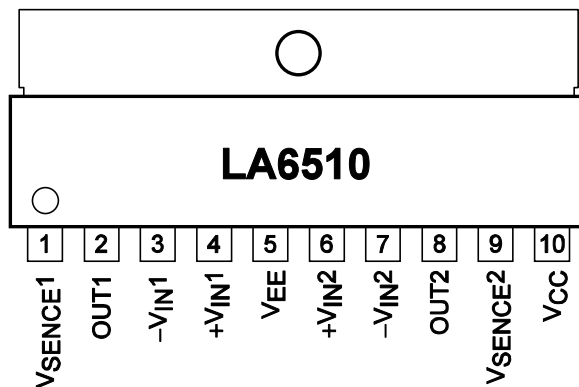
Package Dimensions

unit : mm (typ)

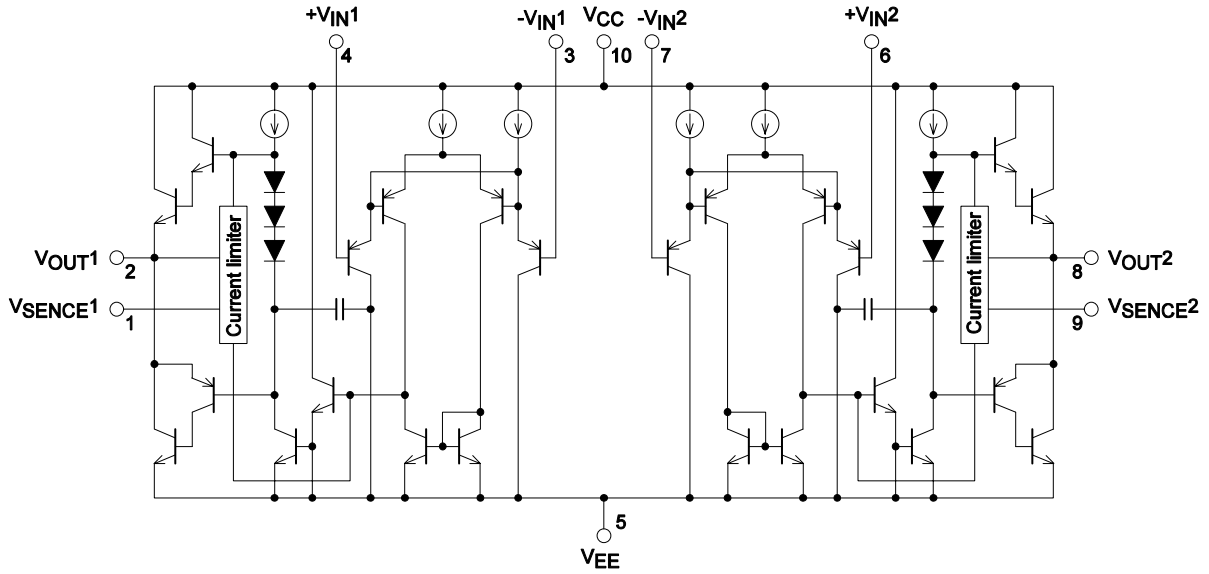
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Pin Assignment

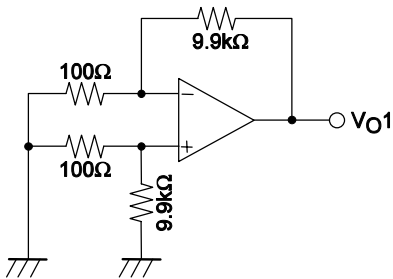


Equivalent Circuit



Test Circuits

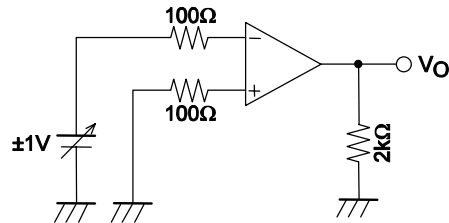
1. Input offset voltage [V_{IO}]
Supply voltage rejection ratio [SVR]



$$V_{IO} \quad V_{CC} / V_{EE} = \pm 15V$$

$$SVR \quad \left[\begin{array}{l} V_{CC} = 15V, 5V \\ V_{EE} = -5V, -15V \end{array} \right]$$

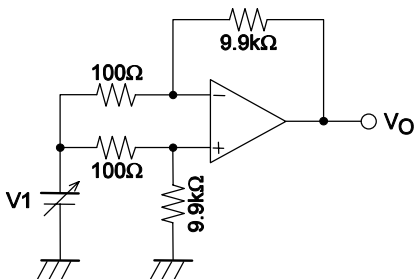
2. Output voltage [V_O]



$$V_{IO} = V_{O1} / 100$$

$$SVR(+), SVR(-) = \left| \frac{\Delta V_{O1}}{100 \times 10V} \right|$$

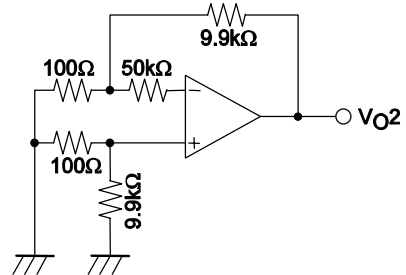
3. Common-mode signal rejection ratio [CMR]
Common-mode input voltage range [V_{ICM}]



$$CMR \quad V_1 = \pm 7.5V$$

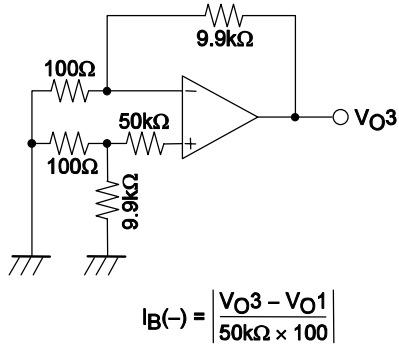
$$CMR = 20 \log \frac{15 \times 100}{|\Delta V_{O1}|}$$

4. Input bias current [$I_{B(+)}$]

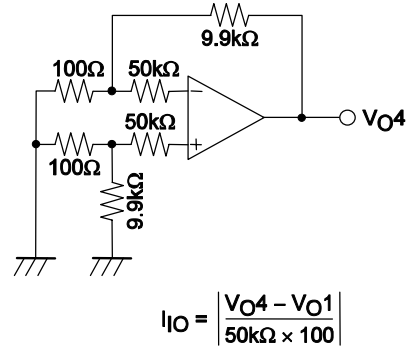


$$I_{B(+)} = \frac{V_{O2} - V_{O1}}{50k\Omega \times 100}$$

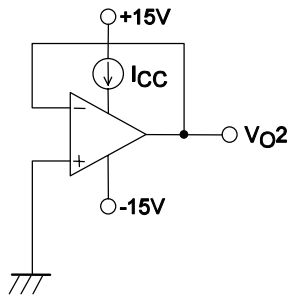
5. Input bias current [I_{B(-)}]



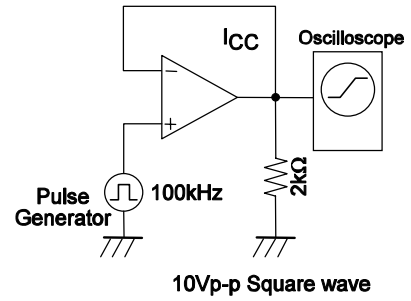
6. Input offset current [I_{IO}]



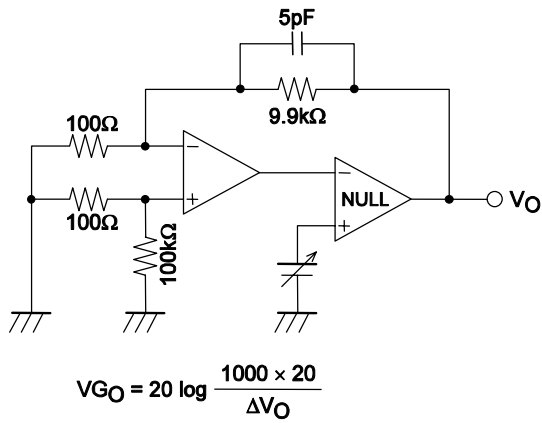
7. Current drain [I_{CC}]



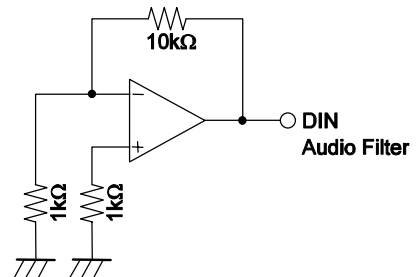
8. Slew rate [SR]



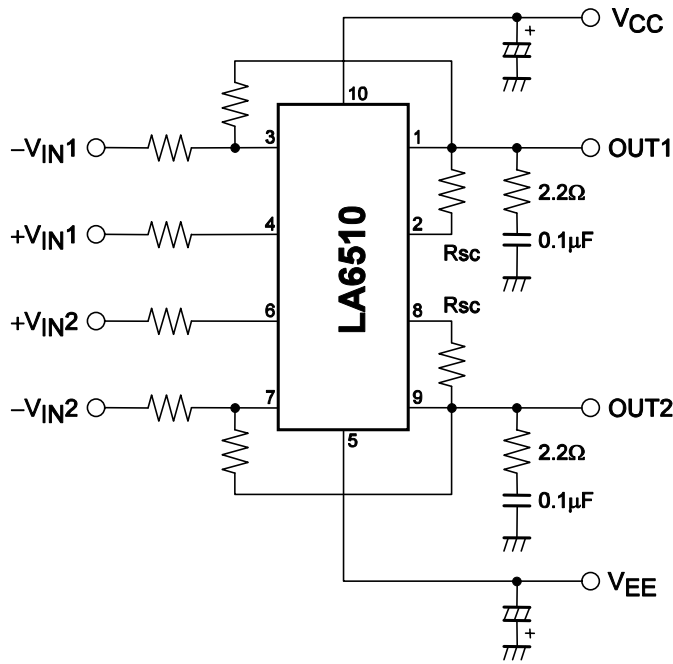
9. Voltage gain [V_{G0}]



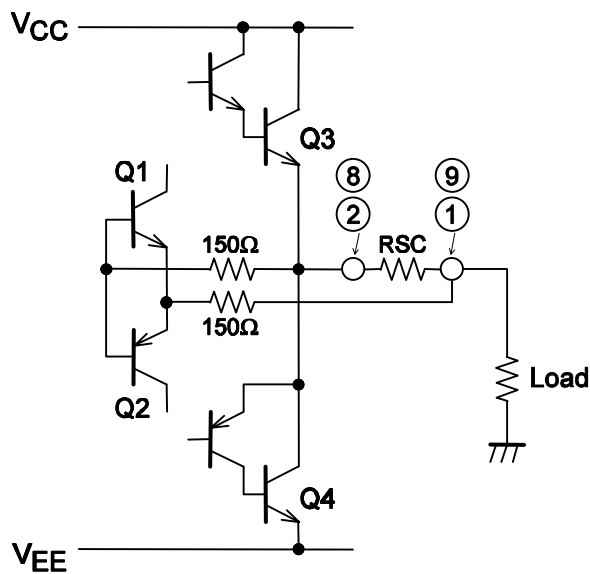
10. Equivalent input noise voltage [V_{NI}]



Application Circuit Examples



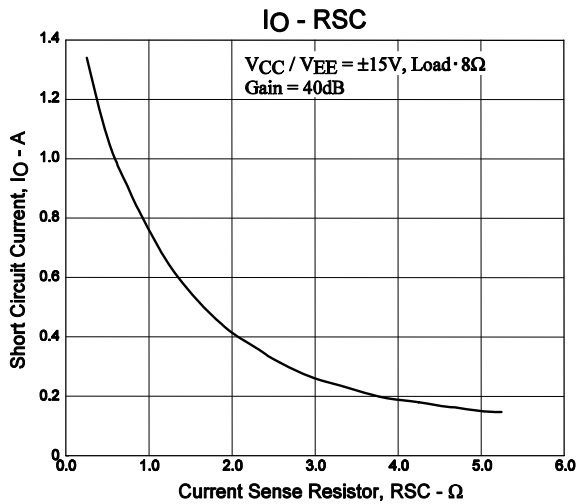
Current Limiter Circuit and Output Stage



In source mode, when Q3 turns on and current flows into the load resistor, a voltage difference occurs across RSC, turning on Q1 and activating the current limiter.

In sink mode, Q4 turns on to develop a voltage difference of the polarity opposite to that in the source mode across RSC, thus turning on Q2 and activating the limiter.

A RSC can be used to set the maximum output current, but the maximum output current will vary slightly depending on the V_{BE} temperature characteristics of the transistor.



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