BURR - BROWN®

OPA501

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High Current, High Power OPERATIONAL AMPLIFIER

FEATURES

- HIGH OUTPUT CURRENT: ±10A Peak
- WIDE POWER SUPPLY RANGE: ±10 to ±40V
- LOW QUIESCENT CURRENT: 2.6mA
- ISOLATED CASE TO-3 PACKAGE

APPLICATIONS

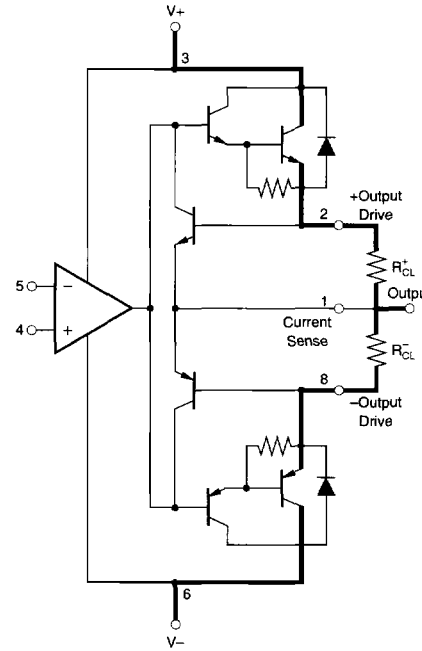
- MOTOR DRIVER
- SERVO AMPLIFIER
- VALVE ACTUATOR
- SYNCRO DRIVER
- PROGRAMMABLE POWER SUPPLY

DESCRIPTION

The OPA501 is a high output current operational amplifier. It can be used in virtually all common op amp circuits, yet is capable of output currents up to ±10A. Power supply voltages up to ±40V allow very high output power for driving motors or other electromechanical loads.

Safe operating area is fully specified, and user-set current limits provide protection for both the amplifier and load. The class-B (zero output stage bias) provides low quiescent current during small-signal conditions.

This rugged hybrid integrated circuit is packaged in a metal 8-pin TO-3 package. Both industrial and military temperature range models are available.



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SPECIFICATIONS

ELECTRICAL

At T_C = +25°C, V_S = ±28V, (OPA501RM, AM); V_S = ±34V (OPA501SM, BM), unless otherwise noted.

PARAMETER	CONDITIONS	OPA501RM, AM			OPA501SM, BM			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
RATED OUTPUT[1, 2]								
Output Current	R_L = 2Ω (RM, AM)	±10			*			A
Continuous[3]	R_L = 2.6Ω (SM, BM)	±10			*			A
Output Voltage[3]	I_O = 10A peak	±20	±23		±26	±29		V
DYNAMIC RESPONSE								
Bandwidth, Unity Gain	Small Signal		1			*		MHz
Full Power Bandwidth	V_O = 40Vp-p, R_L = 8Ω	10	16		*	*		kHz
Slew Rate	R_L = 5Ω (RM, AM)	1.35			*			V/µs
	R_L = 6.5Ω (SM, BM)	1.35			*			v/µs
INPUT OFFSET VOLTAGE								
Initial Offset			±5	±10		±2	±5	mV
vs Temperature	–25°C < T < +85°C (AM, BM)		±10	±65				µV/°C
	–55°C < T < +125°C (RM, SM)					±10	±40	µV/°C
vs Supply Voltage			±35			*		µV/V
INPUT BIAS CURRENT								
Initial	T_{CASE} = +25°C		15	40		*	20	nA
vs Temperature			±0.05			*		nA/°C
vs Supply Voltage			±0.02			*		nA/V
INPUT DIFFERENCE CURRENT								
Initial	T_{CASE} = +25°C		±5	±10		±2	±3	nA
vs Temperature	–25°C < T < +85°C (AM, BM)		±0.01					nA/°C
	–55°C < T < +125°C (RM, SM)					±0.01		nA/°C
OPEN-LOOP GAIN, DC	R_L = 5Ω (RM, AM)	94	115					dB
R_L = 6.5Ω (SM, BM)					98	115		dB
INPUT IMPEDANCE								
Differential			10			*		MΩ
Common-mode			250			*		MΩ
INPUT NOISE								
Voltage Noise	f_n = 0.3Hz to 10Hz		3			*		µVp-p
f_n = 10Hz to 10kHz		5			*		µVrms	
Current Noise	f_n = 0.3Hz to 10Hz		20			*		pAp-p
f_n = 10Hz to 10kHz		4.5			*		pArms	
INPUT VOLTAGE RANGE								
Common-mode Voltage[4]	Linear Operation	±($\|V_S\|$–6)	±($\|V_S\|$–3)		*	*		V
Common-mode Rejection	f = DC, V_{CM} = ±($\|V_S\|$–6)	70	110		80	*		dB
POWER SUPPLY								
Rated Voltage			±28			±34		V
Operating Voltage Range		±10		±36	*		±40	V
Current, quiescent			±2.6	±10		*	*	mA
TEMPERATURE RANGE	case							
Specification, RM, SM		–55		+125	*		*	°C
AM, BM		–25		+85	*		*	°C
Operating, derated								
performance, AM, BM		–55		+125	*		*	°C
Storage		–65		+150	*		*	°C
THERMAL RESISTANCE	Steady State θ_{JC}		2.0	2.2		*	*	°C/W

* Specification same as for OPA501RM, AM.

NOTES: (1) Package must be derated based on a junction-to-case thermal resistance of 2.2°C/W or a junction-to-ambient thermal resistance of 30°C/W. (2) Safe Operating Area and Power Derating Curves must be observed. (3) With ±R_{SC} = 0. Peak output current is typically greater than 10A if duty cycle and pulse width limitations are observed. Output current greater than 10A is not guaranteed. (4) The absolute maximum voltage is 3V less than supply voltage.

ABSOLUTE MAXIMUM RATINGS

Power Supply Voltage (V_S)	±40V
Power Dissipation at +25°C[1, 2]	79W
Differential Input Voltage	$\pm V_S$ –3V
Common-Mode Input Voltage	$\pm V_S$
Operating Temperature Range	–55°C to +125°C
Storage Temperature Range	–65°C to +150°C
Lead Temperature (soldering, 10s)	+300°C
Junction Temperature	+200°C
Output Short-Circuit Duration[3]	Continuous

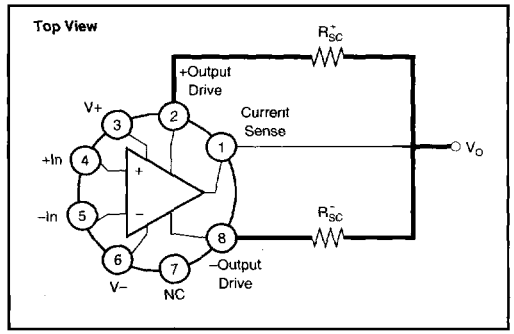
NOTES: (1) At case temperature of +25°C. Derate at 2.2°C/W above case temperature of +25°C. (2) Average dissipation. (3) Within safe operating area and with appropriate derating.

PACKAGE/ORDERING INFORMATION

PRODUCT	PACKAGE	PACKAGE DRAWING NUMBER[1]	TEMPERATURE RANGE
OPA501AM	8-Pin Metal TO-3	030	–25°C to +85°C
OPA501BM	8-Pin Metal TO-3	030	–25°C to +85°C
OPA501RM	8-Pin Metal TO-3	030	–55°C to +125°C
OPA501SM	8-Pin Metal TO-3	030	–55°C to +125°C

NOTE: (1) For detailed drawing and dimension table, please see end of data sheet, or Appendix C of Burr-Brown IC Data Book.

CONNECTION DIAGRAM



ELECTROSTATIC DISCHARGE SENSITIVITY

This integrated circuit can be damaged by ESD. Burr-Brown recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.