ELH0041G/883/8508701ZX

0.1 Amp Power Operational Amplifier

Features

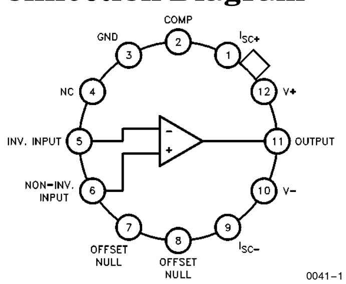
- High output current—200 mA
- Excellent open-loop gain—106 dB
- Low offset voltage—1 mV
- Wide full power bandwidth—20 kHz
- High slew rate—3 V/µs
- MIL-STD-883 devices 100% manufactured in U.S.A.

Ordering Information

Part No.	Temp. Range	Pkg.	Outline #
ELH0041G/883B	−55°C to +125°C	TO-8	MDP002

8508701ZX is the SMD version of this device.

Connection Diagram



Top View

General Description

The ELH0041 are general purpose operational amplifiers capable of delivering large output currents not usually associated with conventional IC op amps; the ELH0041 delivers currents of 200 mA at voltage levels closely approaching the available power supplies. In addition, both the inputs and outputs are protected against overload. These devices are compensated with a single external capacitor and are free of any unusual oscillation or latch-up problems.

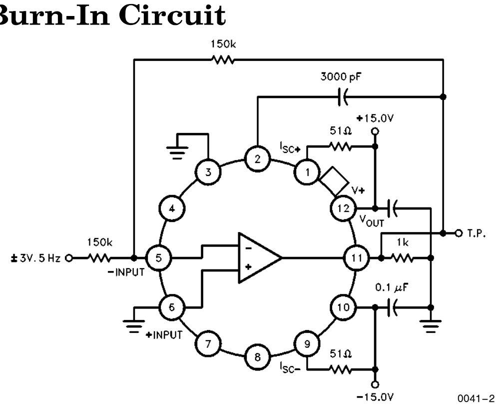
For applications requiring output currents in excess of 1A, see the ELH0021 data sheet.

The excellent input characteristics and high output capability of the ELH0041 make it an ideal choice for power applications such as DC servos, capstan drivers, deflection yoke drivers, and programmable power supplies.

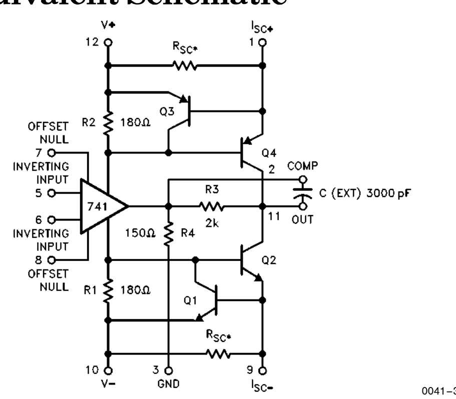
The ELH0041 is particularly suited for applications such as torque drivers for inertial guidance systems, diddle yoke drivers for alphanumeric CRT displays, cable drivers, and programmable power supplies for automatic test equipment.

Elantec facilities comply with MIL-I-45208A and other applicable quality specifications. Elantec's Military devices are 100% fabricated and assembled in our rigidly controlled, ultra-clean facilities in Milpitas, California. For additional information on Elantec's Quality and Reliability Assurance policy and procedures request brochure QRA-1.

Burn-In Circuit



Equivalent Schematic



September 1992 Rev G

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Absolute Maximum Ratings ($T_A = 25°C$)

V_S	Supply Voltage	±18V	T_A	Operating Temperature Range	
V_{IN}	Input Voltage (Note 1)	±15V		ELH0041	−55°C to +125°C
P_D	Power Dissipation (See curves)		T_{ST}	Storage Temperature	−65°C to +150°C
	Differential Input Voltage	±30V		Lead Temperature	
	Peak Output Current (Note 2)	0.5A		(Soldering, 10 seconds)	300°C
	Output Short Circuit Duration (Note 3)	Continuous			

Important Note:
All parameters having Min/Max specifications are guaranteed. The Test Level column indicates the specific device testing actually performed during production and Quality inspection. Elantec performs most electrical tests using modern high-speed automatic test equipment, specifically the LTX77 Series system. Unless otherwise noted, all tests are pulsed tests, therefore $T_J = T_C = T_A$.

Test Level	Test Procedure
I	100% production tested and QA sample tested per QA test plan QCX0002.
II	100% production tested at $T_A = 25°C$ and QA sample tested at $T_A = 25°C$, T_{MAX} and T_{MIN} per QA test plan QCX0002.
III	QA sample tested per QA test plan QCX0002.
IV	Parameter is guaranteed (but not tested) by Design and Characterization Data.
V	Parameter is typical value at $T_A = 25°C$ for information purposes only.

DC Electrical Characteristics $V_S = \pm 15V$, $T_{MIN} \le T_A \le T_{MAX}$, $C_C = 3000$ pF

Parameter	Description	Test Conditions	ELH0041				Units
			Min	Typ	Max	Test Level	
V_{OS}	Input Offset Voltage	$R_S \le 100\Omega$, $T_A = 25°C$ (Note 4)		1	3	I	mV
		$R_S \le 100\Omega$ (Note 4)			5	I	mV
$\Delta V_{OS}/\Delta T$	Voltage Drift with Temperature	$R_S \le 100\Omega$		3		V	$\mu V/°C$
	Offset Voltage Drift with Time	$T_A = 25°C$		5		V	$\mu V/\sqrt{wk}$
$\Delta V_{OS}/\Delta P$	Offset Voltage Change with Output Power			15		V	$\mu V/W$
	Offset Voltage Adjustment Range			20		V	mV
I_{OS}	Input Offset Current	$T_A = 25°C$ (Note 4)		30	100	I	nA
		(Note 4)			300	I	nA
	Offset Current Drift with Temperature			0.1	1	IV	nA/°C
	Offset Current Drift with Time	$T_A = 25°C$		2		V	$nA/\sqrt{wk}$
I_B	Input Bias Current	$T_A = 25°C$ (Note 4)		100	300	I	nA
		(Note 4)			1	I	μA
R_{IN}	Input Resistance	$T_A = 25°C$	0.3	1		I	MΩ

TD is 3.9in

DC Electrical Characteristics $V_S = \pm 15V$, $T_{MIN} \le T_A \le T_{MAX}$, $C_C = 3000$ pF — Contd.

Parameter	Description	Test Conditions	ELH0041				Units
			Min	Typ	Max	Test Level	
CMRR	Common-Mode Rejection Ratio	$R_S \le 100\Omega$, $V_{CM} = \pm 10V$	70	90		I	dB
V_{INCM}	Input Voltage Range		±12			IV	V
PSRR	Power Supply Rejection Ratio	$R_S \le 100\Omega$, $V_S = \pm 5V$ to $\pm 15V$	80	96		I	dB
A_V	Voltage Gain (Note 5)	$V_O = \pm 10V$, $R_L = 1\ k\Omega$, $T_A = 25°C$	100	200		I	V/mV
		$V_O = \pm 10V$, $R_L = 100\Omega$	25			I	V/mV
V_O	Output Voltage Swing	$R_L = 100\Omega$	±13	14		I	V
I_{SC}	Output Short Circuit Current	$T_A = 25°C$, $R_{SC} = 3.3\Omega$		200	300	I	mA
I_S	Supply Current	$V_{OUT} = 0V$		2.5	3.5	I	mA
P_C	Power Consumption	$V_{OUT} = 0V$		75	105	I	mW

Note 1: Rating applies for supply voltages above ±15V. For supplies less than ±15V, rating is equal to supply voltage.
Note 2: Rating applies for LH0041G with $R_{SC} = 0\Omega$.
Note 3: Rating applies as long as package power rating is not exceeded.
Note 4: Specifications apply for $\pm 5V \le V_S \le 18V$.
Note 5: The ELH0041, like all Class B amplifiers, has a "dead band" when V_{OUT} is near zero volts. Typical values for the "dead band" are in the 50 µV to 200 µV range. Open-loop gain is measured at V_{OUT} from ±0.5 V_{DC} to ±10 V_{DC} which is out of the range of the "dead band".

AC Electrical Characteristics $T_A = 25°C$, $V_S = \pm 15V$, $C_C = 3000$ pF

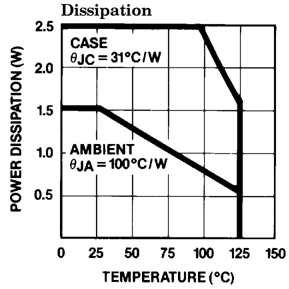
Parameter	Description	Test Conditions	ELH0041				Units
			Min	Typ	Max	Test Level	
SR	Slew Rate	$A_V = 1$, $R_L = 100\Omega$	1.5	3		I	V/µs
BW	Bandwidth	$R_L = 100\Omega$		20		V	kHz
t_r, t_f	Small Signal Rise or Fall Time			0.3	1	I	µs
	Small Signal Overshoot			5	20	I	%
t_S	Settling Time (0.1%)	$\Delta V_{IN} = 10V$, $A_V = 1$		4		V	µs
	Overload Recovery Time			3		V	µs
HD	Harmonic Distortion	f = 1 kHz, $P_O = 0.5W$		0.2		V	%
E_N	Input Noise Voltage	$R_S = 50\Omega$, BW = 10 Hz to 10 kHz		5		V	μV_{rms}
I_N	Input Noise Current	BW = 10 Hz to 10 kHz		0.05		V	nA_{rms}
C_{IN}	Input Capacitance			3		V	pF

TD is 2.6in

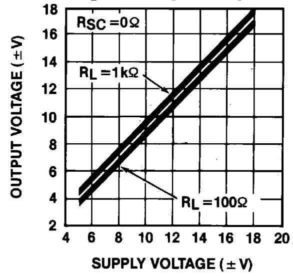
TD is 2.5in

Typical Performance Curves

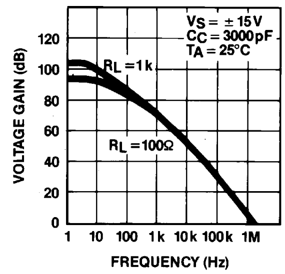
Maximum Power Dissipation



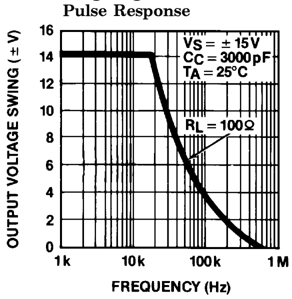
Output Voltage Swing



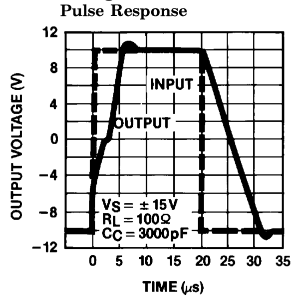
Open-Loop Frequency Response



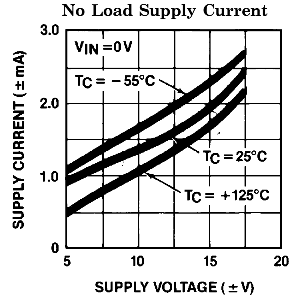
Large Signal Pulse Response



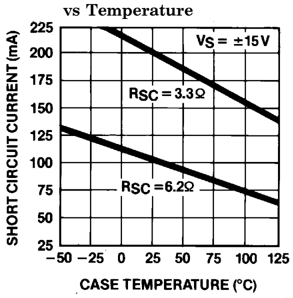
Voltage Follower Pulse Response



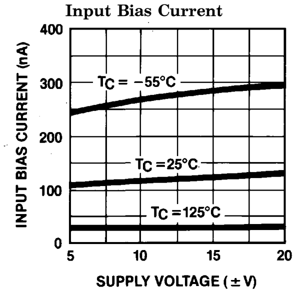
No Load Supply Current



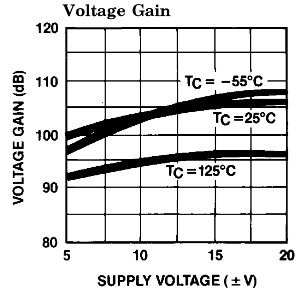
Short Circuit Current vs Temperature



Input Bias Current



Voltage Gain



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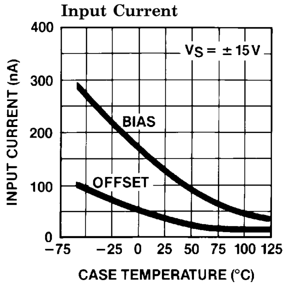
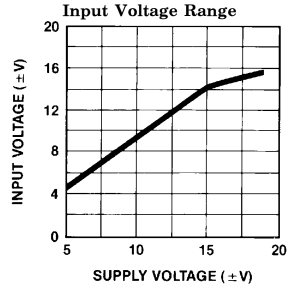
Typical Performance Curves — Contd.

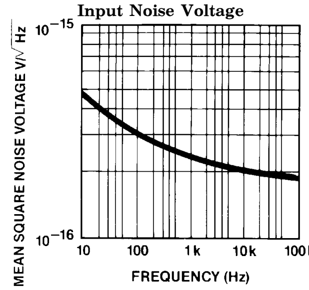
Input Current



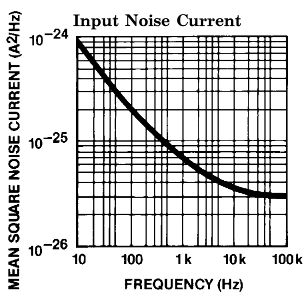
Input Voltage Range



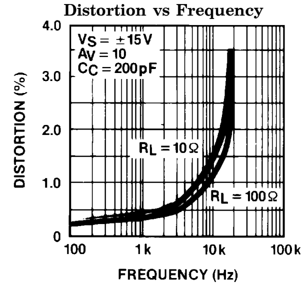
Input Noise Voltage



Input Noise Current



Distortion vs Frequency



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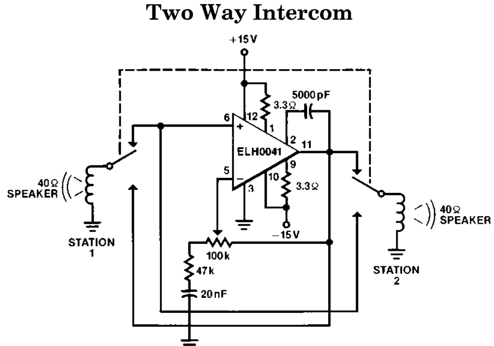
Typical Applications

Two Way Intercom



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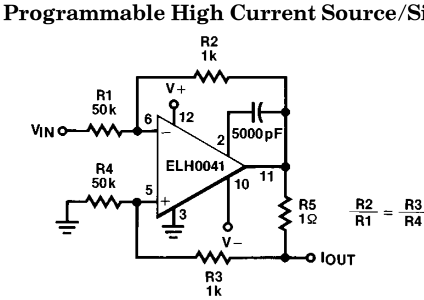
Programmable High Current Source/Sink



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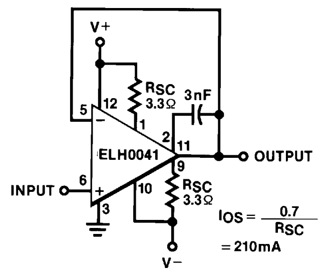
$$I_{OUT} = \frac{V_{IN}}{R5}\left(\frac{R2}{R1}\right) + \frac{V_{OUT}}{R1 + R2} = 20\ mA/V_{IN}$$

Typical Applications — Contd.

Unity Gain with Short Circuit Limiting



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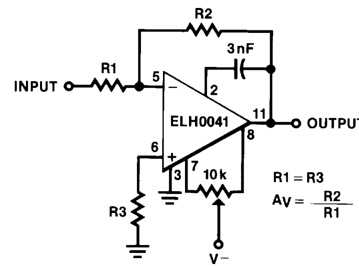
Offset Voltage Null Circuit



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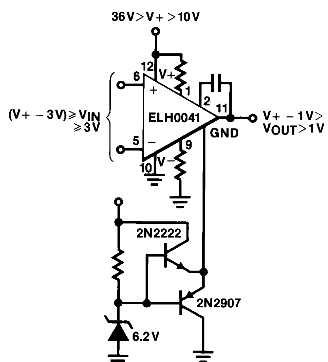
Operation from Single Supplies

Positive



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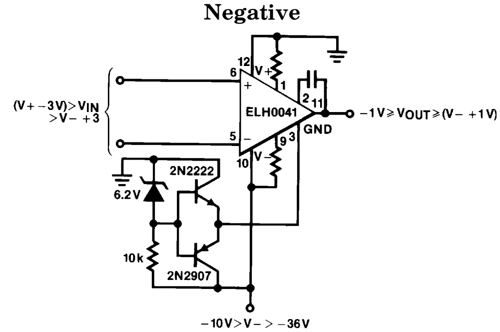
Negative



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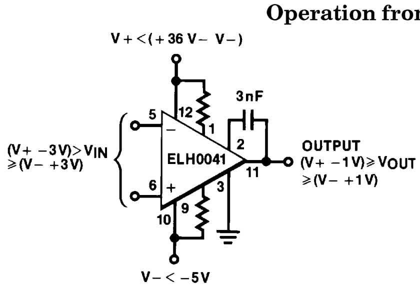
Operation from Non-Symmetrical Supplies



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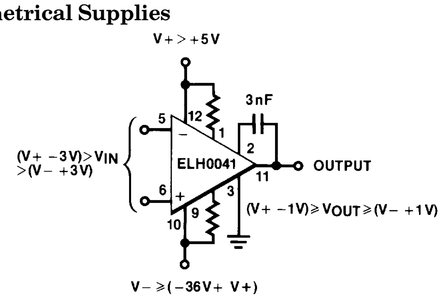

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ELH0041G/883/8508701ZX

0.1 Amp Power Operational Amplifier

General Disclaimer

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