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National Semiconductor

LH4141C
0.2 Amp Power Operational Amplifier

General Description

The LH4141C is a general purpose operational amplifier capable of delivering large output currents not usually associated with conventional IC Op Amps. The LH4141C 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. The devices are compensated with a single external capacitor and are free of any unusual oscillation or latch-up problems.

The LH4141C is particularly suited for applications such as torque driver for inertial guidance systems, diddle yoke driver for alpha-numeric CRT displays, cable drivers, and programmable power supplies for automatic test equipment.

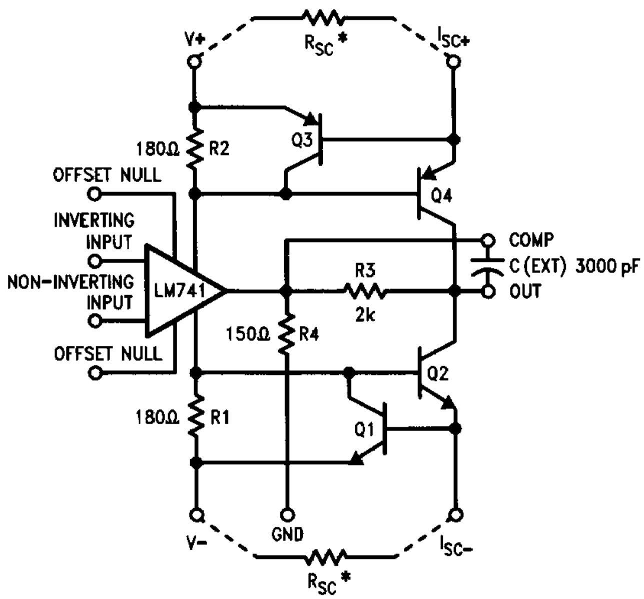
Features

■ Output current	0.2 Amp
■ Output voltage swing	±14V into 100Ω
■ Wide full power bandwidth	15 kHz
■ Low standby power	100 mW at ±15V
■ Low input offset voltage and current	1 mV and 20 nA
■ High slew rate	3.0 V/μs
■ High open loop gain	100 dB

Applications

- Yoke driver
- Programmable power supplies
- Cable driver
- Servo amplifier

Schematic and Connection Diagrams



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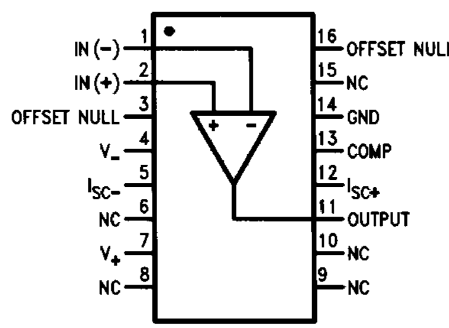

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Order Number LH4141CN
See NS Package Number N16A

*R_{SC} is an external short circuit current limiting resistor.

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Absolute Maximum Ratings

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage	±18V
Power Dissipation	See Curves
Differential Input Voltage	±30V
Input Voltage (Note 1)	±15V
Peak Output Current (Note 2)	0.5 Amp
Output Short Circuit Duration (Note 3)	Continuous
Operating Temperature Range	−25°C to +85°C
Storage Temperature Range	−65°C to +150°C
Lead Temperature (Soldering, 10 sec.)	300°C

DC Electrical Characteristics (Notes 4 & 5)

Parameter	Conditions	Limits			Units
		Min	Typ	Max	
Input Offset Voltage	$R_S \le 100\Omega$, $T_A = 25°C$		3.0	6.0	mV
	$R_S \le 100\Omega$			7.5	mV
Voltage Drift with Temperature	$R_S \le 100\Omega$		5		μV/°C
Offset Voltage Drift with Time			5		μV/Week
Offset Voltage Change with Output Power			15		μV/W
Offset Voltage Adjustment Range			20		mV
Input Offset Current	$T_A = 25°C$		50	200	nA
				500	nA
Offset Current Drift with Temperature			0.2	1.0	nA/°C
Offset Current Drift with Time			2		nA/Week
Input Bias Current	$T_A = 25°C$		200	500	nA
				1.0	μA
Input Resistance	$T_A = 25°C$	0.3	1.0		MΩ
Input Capacitance			3		pF
Common Mode Rejection Ratio	$R_S \le 100\Omega$, $\Delta V_{CM} = \pm10V$	70	90		dB
Input Voltage Range	$V_S = \pm15V$	±12			V
Power Supply Rejection Ratio	$R_S \le 100\Omega$, $\Delta V_S = \pm10V$	70	90		dB
Voltage Gain	$V_S = \pm15V$, $V_O = \pm10V$ $R_L = 1 k\Omega$, $T_A = 25°C$	100	200		V/mV
	$V_S = \pm15V$, $V_O = \pm10V$ $R_L = 100\Omega$	20			V/mV
Output Voltage Swing	$V_S = \pm15V$, $R_L = 100\Omega$	±13.0	±14.0		V
Output Short Circuit Current	$V_S = \pm15V$, $T_A = 25°C$ (Note 6)		200	300	mA
Power Supply Current	$V_S = \pm15V$, $V_{OUT} = 0V$		3.0	4.0	mA
Power Consumption	$V_S = \pm15V$, $V_{OUT} = 0V$		90	120	mW

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AC Electrical Characteristics (Note 7), $T_A = 25°C$, $V_S = \pm15V$, $C_C = 3000\ pF$

Parameter	Conditions	Limits			Units
		Min	Typ	Max	
Slew Rate	$A_V = +1$, $R_L = 100\Omega$	1.0	3.0		V/μs
Power Bandwidth	$R_L = 100\Omega$		20		kHz
Small Signal Transient Response			0.3	1.5	μs
Small Signal Overshoot			10	30	%
Settling Time (0.1%)	$\Delta V_{IN} = 10V$, $A_V = +1$		4		μs
Overload Recovery Time			3		μs
Harmonic Distortion	f = 1 kHz, $P_O = 0.5W$		0.2		%
Input Noise Voltage	$R_S = 50\Omega$, B.W. = 10 Hz to 10 kHz		5		μV(rms)
Input Noise Current	B.W. = 10 Hz to 10 kHz		0.05		nA(rms)

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 $R_{SC} = 0\Omega$.

Note 3: Rating applies as long as package power dissipation rating is not exceeded.

Note 4: Specifications apply for $\pm5V \leq V_S \leq \pm18V$, and $-25°C \leq T_C \leq +85°C$ unless otherwise specified. Typical values are for 25°C only.

Note 5: LH4141C is 100% production tested at 25°C only, specifications at temperature extremes are verified by sample testing but these limits are not used to calculate outgoing quality level.

Note 6: Rating applies for $R_{SC} = 3.3\Omega$.

Note 7: Not 100% production tested; verified by sample testing only. Limits are not used to calculate outgoing quality level.

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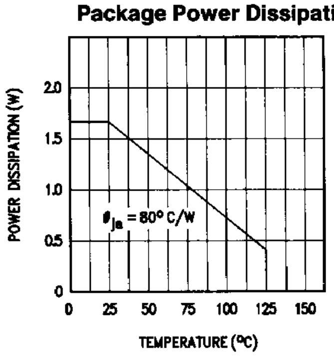
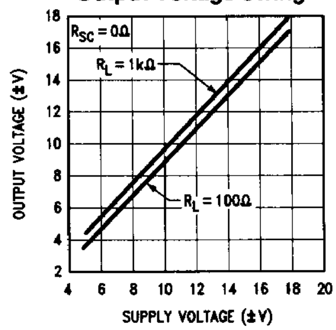
Typical Performance Characteristics

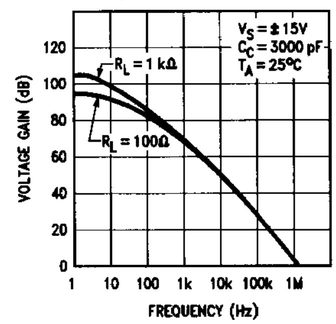
Package Power Dissipation



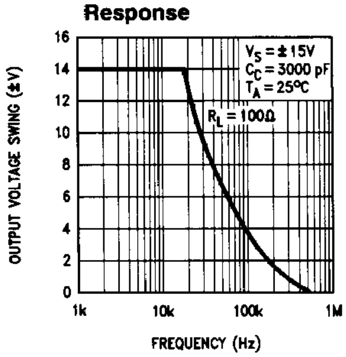
Output Voltage Swing



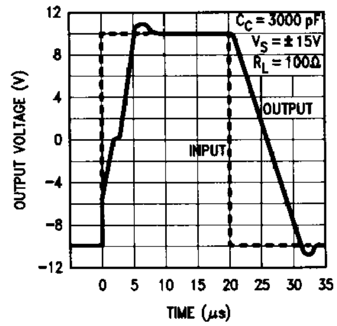
Open Loop Frequency Response



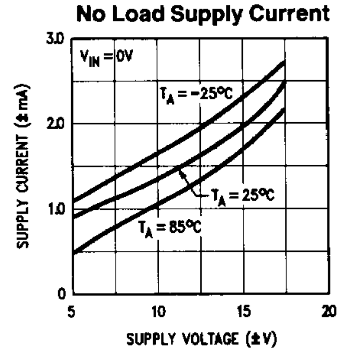
Large Signal Frequency Response



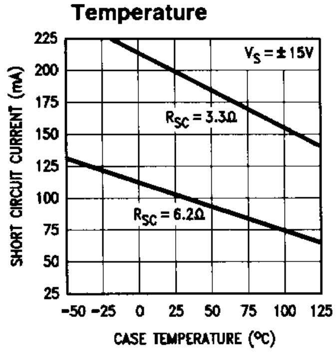
Voltage Follower Pulse Response



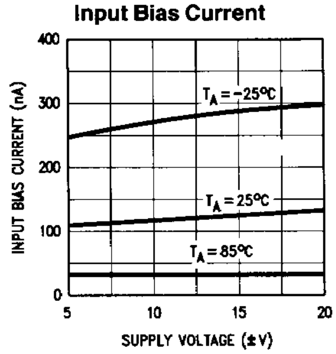
No Load Supply Current



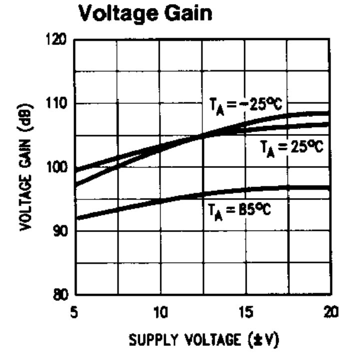
Short Circuit Current vs Temperature



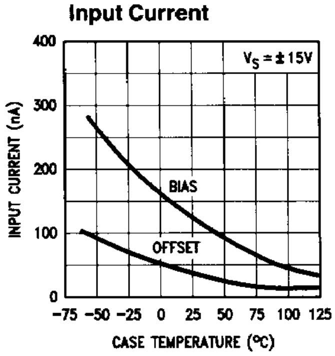
Input Bias Current



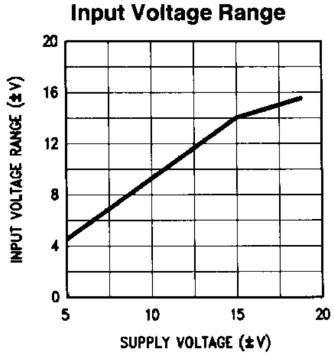
Voltage Gain



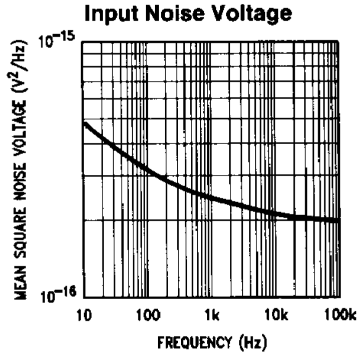
Input Current



Input Voltage Range



Input Noise Voltage



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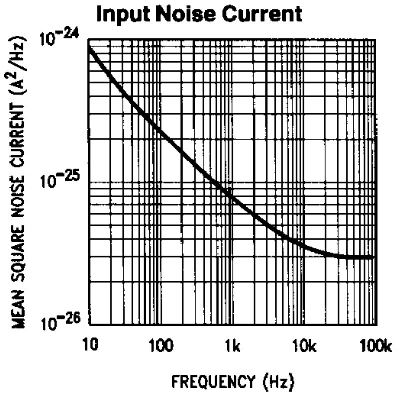
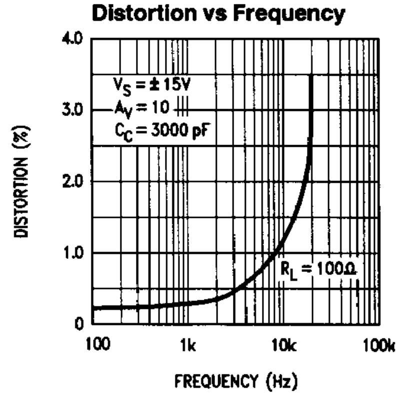
Typical Performance Characteristics (Continued)

Input Noise Current



Distortion vs Frequency



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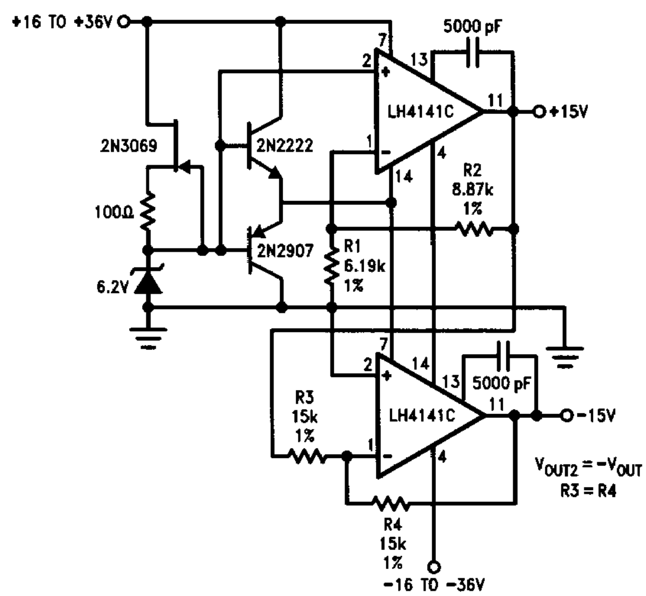
Typical Applications

Dual Tracking One Amp Power Supply



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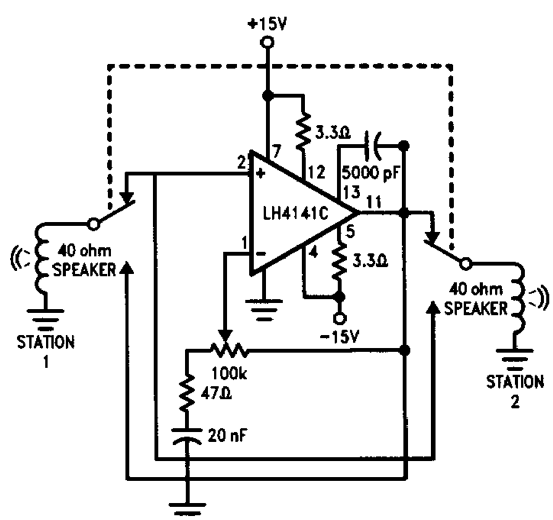
Two Way Intercom



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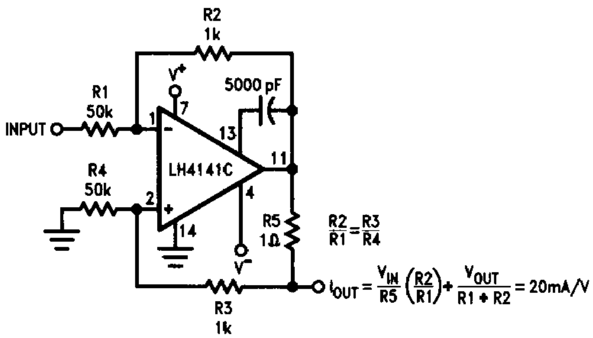
Typical Applications (Continued)

Programmable High Current Source/Sink



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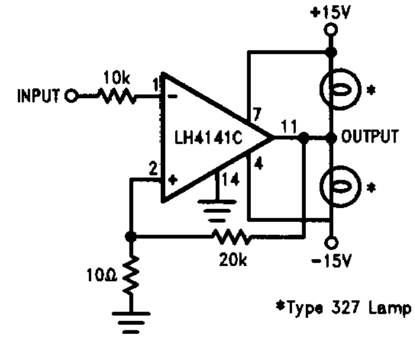
Power Comparator



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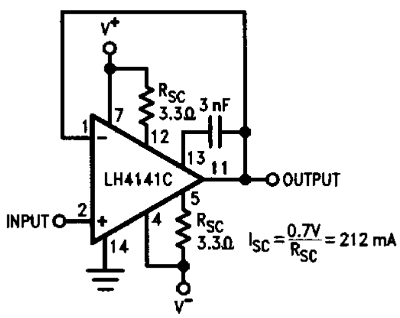
Unity Gain Circuit with Short Circuit Limiting



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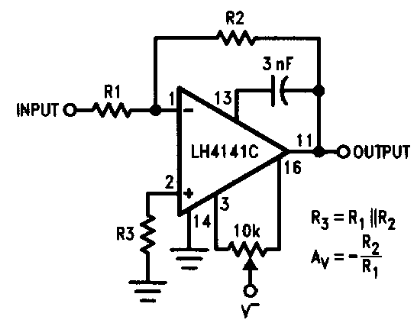
Offset Voltage Null Circuit*



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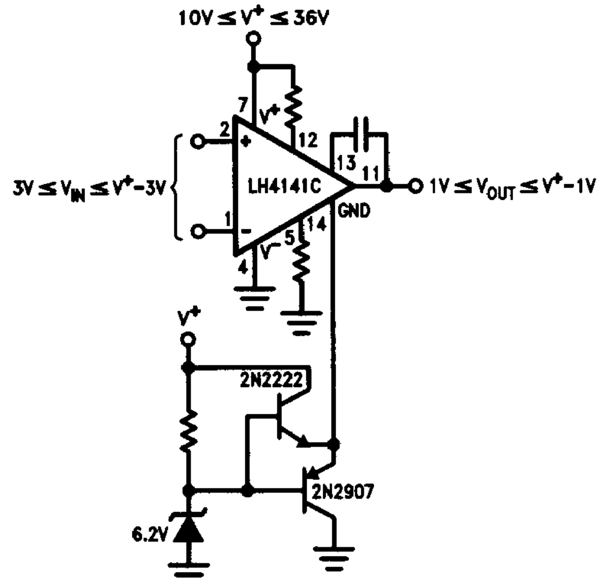
Typical Applications (Continued)

Operation from Single Supplies



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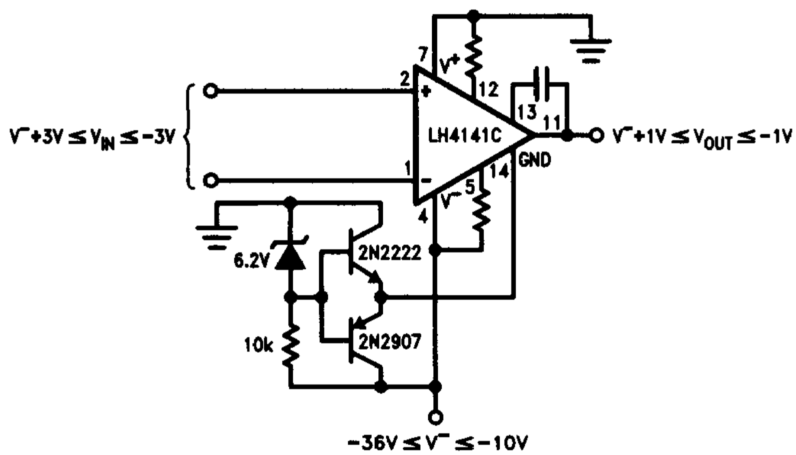

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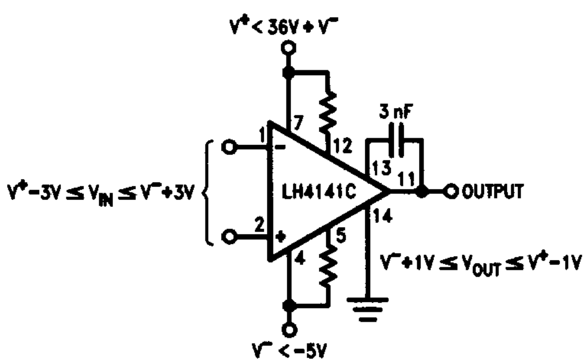
Operation from Non-Symmetrical Supplies



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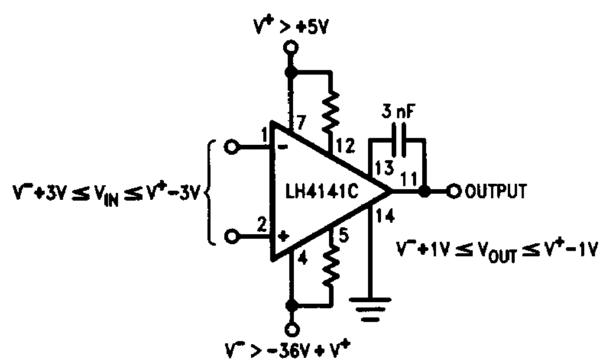

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*For additional offset null circuit techniques see National Linear Applications Handbook.

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