LH2111/2211/2311

Dual Precision Voltage Comparator

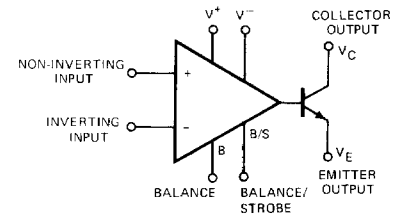
Distinctive Characteristics

- The LH2111/2211/2311 are functionally, electrically, and pin-for-pin equivalent to the National LH2111/2211/2311
- Output Drive – 50V and 50mA
- Input Bias Current – 150nA max.
- Input Offset Voltage – 4.0mV max.
- Differential Input Voltage – ±30V
- Reduced size and weight

FUNCTIONAL DESCRIPTION

The LH2111/2211/2311 are voltage comparators featuring low input currents, high differential and common mode voltage ranges, wide supply voltage range, and outputs compatible with all bipolar and MOS circuitry. The inputs and outputs can be isolated from system ground, and the output can drive loads referred to ground or either supply. Strobing and offset balancing are available and the outputs can be wire-ORed.

FUNCTIONAL DIAGRAM
(Each Half)



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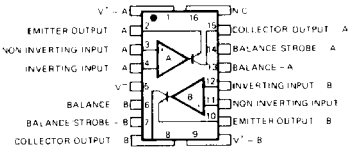
CONNECTION DIAGRAMS
Top Views

Hermetic Dual In-Line D-16-1



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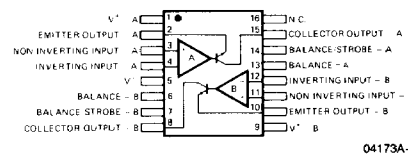
Flat Package F-16-1



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ORDERING INFORMATION

Part Number	Package Type	Temperature Range	Order Number
LH2311	Hermetic DIP	0 to +70°C	LH2311D
LH2311	Flat Pak	0 to +70°C	LH2311F
LH2211	Hermetic DIP	−25 to +85°C	LH2211D
LH2211	Flat Pak	−25 to +85°C	LH2211F
LH2111	Hermetic DIP	−55 to +125°C	LH2111D
LH2111	Flat Pak	−55 to +125°C	LH2111F

MAXIMUM RATINGS

Voltage from V^+ to V^-	36V
Voltage from Collector Output to V^-	
LH2111/LH2211	50V
LH2311	40V
Voltage from Emitter Output to V^-	30V
Voltage between Inputs	±30V
Voltage from Inputs to V^-	+30V, –0V
Voltage from Inputs to V^+	–30V
Power Dissipation (Note 1)	500mW
Output Short Circuit Duration	10 sec
Operating Temperature Range	
LH2111	–55°C to +125°C
LH2211	–25°C to +85°C
LH2311	0°C to +70°C
Storage Temperature Range	–65°C to +150°C
Lead Temperature (soldering, 10 sec)	300°C

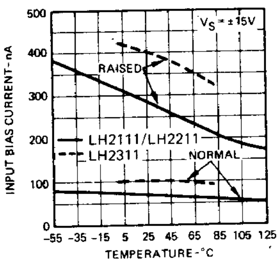
ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified) (Note 2)

Parameter (see definitions)	Conditions	LH2311 Min.	LH2311 Typ.	LH2311 Max.	LH2111 LH2211 Min.	LH2111 LH2211 Typ.	LH2111 LH2211 Max.	Units
Input Offset Voltage (Note 3)			2	7.5		0.7	3.0	mV
Input Offset Current (Note 3)			6.0	50.0		4.0	10.0	nA
Input Bias Current (Note 3)			100	250		60	100	nA
Response Time (Note 4)	R_L = 500Ω to +5V, V_E = 0		200			200		ns
Supply Current—Positive (Note 5)			7.0	15.0		7.0	12.0	mA
—Negative (Note 5)			4.8	10.0		4.8	10.0	
Voltage Gain			200			200		V/mV
Saturation Voltage	$V_{IN} \leq -5mV$, I_C = 50mA					0.75	1.5	V
	$V_{IN} \leq -10mV$, I_C = 50mA		0.75	1.5				
Output Leakage Current	$V_{IN} \geq +5mV$, V_C to V_E = 50V					0.2	10.0	nA
	$V_{IN} \geq +10mV$, V_C to V_E = 40V		0.2	50.0				
The Following Specifications Apply Over The Operating Temperature Ranges								
Input Offset Voltage (Note 3)				10.0			4.0	mV
Input Offset Current (Note 3)				70.0			20.0	nA
Input Bias Current (Note 3)				300			150	nA
Saturation Voltage	$V_{IN} \leq -6mV$, I_C = 8mA					0.23	0.40	V
	$V_{IN} \leq -10mV$, I_C = 8mA		0.23	0.40				
Output Leakage Current	$V_{IN} \geq +6mV$, V_C to V_E = 50V					0.1	0.5	μA
Input Voltage Range		±13	±14		±13	±14		V
Supply Current—Positive (Note 5)	T_A = 125°C					4.8	12.0	mA
—Negative (Note 5)						3.2	10.0	

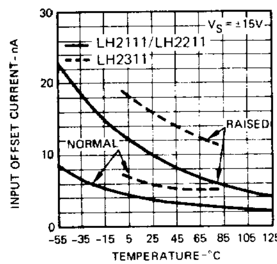
Notes:
1. For the Flat Package derate at 6.5 mW/°C for operation at ambient temperatures above 83°C, and the Dual-In-Line at 9 mW/°C for operation at ambient temperatures above 95°C.
2. Unless otherwise specified, these specifications apply for V^+ = 15V, V^- = –15V, V_E = –15V, and R_L at collector output = 7.5kΩ to +15V.
3. The offset voltage, offset current and bias current given are the maximum values required to drive the collector output to within 1V of the supplies with a 7.5kΩ load. These parameters define an error band and take into account the worst case effects of voltage gain and input impedance.
4. The response time specified (see definitions) is for a 100mV input step with 5mV overdrive.
5. The LH2111 supply current is the sum of the supply currents required by each side.

PERFORMANCE CURVES

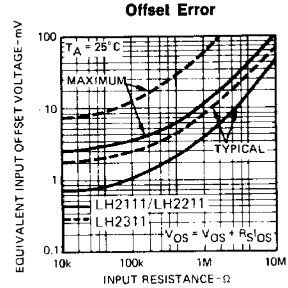
Input Bias Current



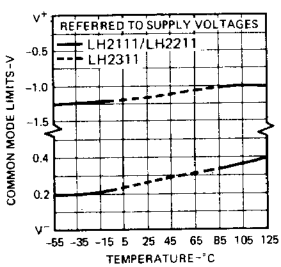
Input Offset Current



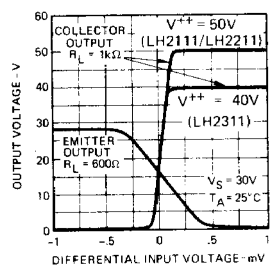
Offset Error



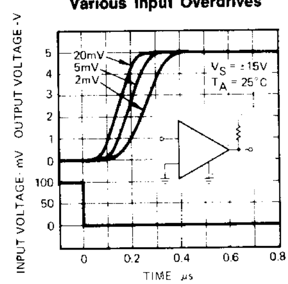
Common Mode Limits



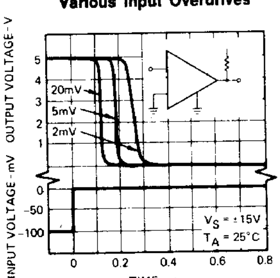
Transfer Function



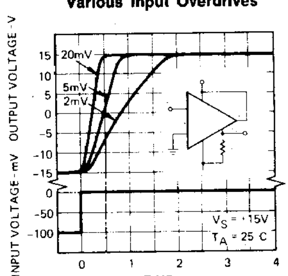
Response Time For Various Input Overdrives



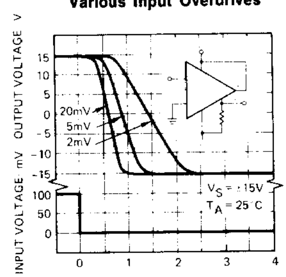
Response Time For Various Input Overdrives



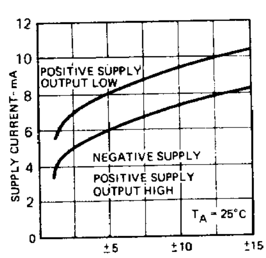
Response Time For Various Input Overdrives



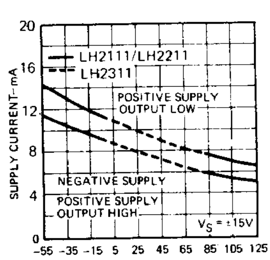
Response Time For Various Input Overdrives



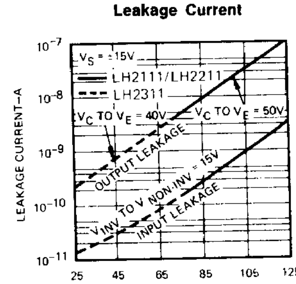
Supply Current



Supply Current



Leakage Current



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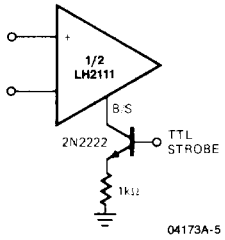
APPLICATIONS

Strobing



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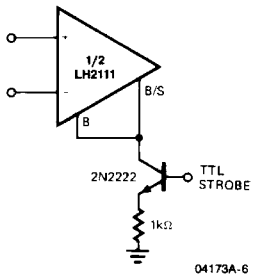
Strobing Off Both Input and Output Stages**



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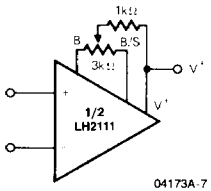
Offset Balancing



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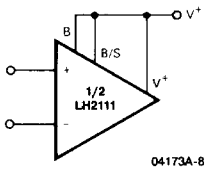
Increasing Input Stage Current*



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*Increases input bias current and common-mode slew rate by a factor of 3.
**Typical input current = 50pA with inputs strobed OFF.

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