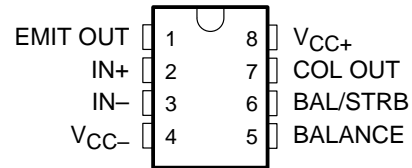


LP211, LP311 LOW-POWER DIFFERENTIAL COMPARATORS WITH STROBES

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- Low Power Drain . . . 900 μ W Typical With 5-V Supply
- Operates From ± 15 V or From a Single Supply as Low as 3 V
- Output Drive Capability of 25 mA
- Emitter Output Can Swing Below Negative Supply
- Response Time . . . 1.2 μ s Typ
- Low Input Currents:
Offset Current . . . 2 nA Typ
Bias Current . . . 15 nA Typ
- Wide Common-Mode Input Range:
 -14.5 V to 13.5 V Using ± 15 -V Supply
- Same Pinout as LM211, LM311
- Designed To Be Interchangeable With Industry Standard LP311

LP211 . . . D, JG, P, OR PS PACKAGE
LP311 . . . D, P, PS, OR PW PACKAGE
(TOP VIEW)



description

The LP211 and LP311 devices are low-power versions of the industry-standard LM211 and LM311 devices. They take advantage of stable, high-value, ion-implanted resistors to perform the same function as the LM311 series, with a 30:1 reduction in power consumption but only a 6:1 slowdown in response time. They are well suited for battery-powered applications and all other applications where fast response times are not needed. They operate over a wide range of supply voltages, from ± 18 V down to a single 3-V supply with less than 300- μ A current drain, but are still capable of driving a 25-mA load. The LP211 and LP311 are quite easy to apply free of oscillation if ordinary precautions are taken to minimize stray coupling from the output to either input or to the trim pins.

The LP211 is characterized for operation from -25°C to 85°C . The LP311 is characterized for operation from 0°C to 70°C .

AVAILABLE OPTIONS

T _A	V _{IO} max AT 25°C	PACKAGE		
		SMALL OUTLINE (D, PS)	CERAMIC DIP (JG)	PLASTIC DIP (P)
0°C to 70°C	7.5 mV	LP311D LP311PS	—	LP311P
-25°C to 85°C	7.5 mV	LP211D	LP211JG	—

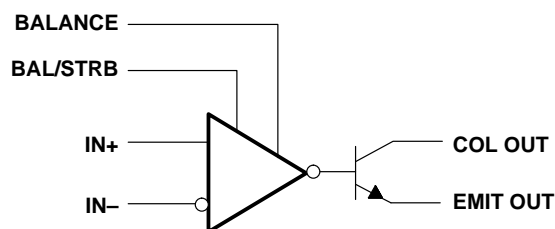
The D package is available taped and reeled. Add the suffix R (e.g., LP311DR). The PS package is only available taped and reeled.

LP211, LP311

LOW-POWER DIFFERENTIAL COMPARATORS WITH STROBES

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functional block diagram



absolute maximum ratings over operating free-air temperature range (unless otherwise noted)[†]

Supply voltage: V_{CC+} (see Note 1)	18 V
V_{CC-} (see Note 1)	–18 V
Differential input voltage, V_{ID} (see Note 2)	± 30 V
Input voltage, V_I (either input, see Notes 1 and 3)	± 15 V
Voltage from emitter output to V_{CC-}	30 V
Voltage from collector output to V_{CC-}	40 V
Voltage from collector output to emitter output	40 V
Duration of output short circuit (see Note 4)	40 V
Continuous total dissipation	See Dissipation Rating Table
Package thermal impedance, θ_{JA} (see Note 5): D package	97°C/W
P package	85°C/W
PS package	95°C/W
PW package	149°C/W
Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds: JG package	300°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds: D, P, or PS package	260°C
Storage temperature range, T_{stg}	–65°C to 150°C

[†] Stresses beyond those listed under absolute maximum ratings may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the recommended operating conditions section of this specification is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

- NOTES: 1. All voltage values, unless otherwise noted, are with respect to the midpoint between V_{CC+} and V_{CC-} .
2. Differential input voltages are at $IN+$ with respect to $IN-$.
3. The magnitude of the input voltage must never exceed the magnitude of the supply voltage of ± 15 V, whichever is less.
4. The output may be shorted to ground or to either power supply.
5. The package thermal impedance is calculated in accordance with JESD 51-7.

DISSIPATION RATING TABLE

PACKAGE	$T_A \leq 25^\circ\text{C}$ POWER RATING	DERATING FACTOR	DERATE ABOVE T_A	$T_A = 70^\circ\text{C}$ POWER RATING	$T_A = 85^\circ\text{C}$ POWER RATING	$T_A = 125^\circ\text{C}$ POWER RATING
D	500 mW	5.8 mW/°C	64°C	464 mW	377 mW	—
FK	1375 mW	11.0 mW/°C	25°C	880 mW	715 mW	275 mW
JG (LP211)	825 mW	6.6 mW/°C	25°C	528 mW	429 mW	—
P	500 mW	8.0 mW/°C	88°C	500 mW	500 mW	—

recommended operating conditions

	MIN	MAX	UNIT
Input voltage ($ V_{CC\pm} \leq 15$ V)	$V_{CC-} + 0.5$	$V_{CC+} - 1.5$	V
Supply voltage, $V_{CC+} - V_{CC-}$	3.5	30	V



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LP211, LP311
LOW-POWER DIFFERENTIAL COMPARATORS
WITH STROBES

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electrical characteristics at specified free-air temperature, $V_{CC\pm} = \pm 15$ V (unless otherwise noted)

PARAMETER		TEST CONDITIONS		T_A	MIN	TYP†	MAX	UNIT
V_{ID}	Input offset voltage	$R_S < 100$ k Ω , See Note 6		25°C		2	7.5	mV
				Full range			10	
V_{OL}	Low-level output voltage	$V_{ID} > 10$ mV, See Note 7	$I_{OL} = 25$ mA,	25°C		0.4	1.5	V
		$V_{CC} = 4.5$ V, $V_{ID} < -10$ mV, See Note 7	$V_{CC-} = 0$, $I_{OL} = 1.6$ mA,	Full range		0.1	0.4	
I_{IO}	Input offset current	See Note 6		25°C		2	25	nA
				Full range			35	
I_{IB}	Input bias current			25°C		15	100	nA
				Full range			150	
	Low-level strobe current	$V_{(strobe)} = 0.3$ V, See Note 8	$V_{ID} < -10$ mV,	25°C		100	300	μ A
$I_{O(off)}$	Output off-state current	$V_{ID} > 10$ mV,	$V_{CE} = 35$ V	25°C		0.2	100	nA
A_{VD}	Large-signal differential-voltage amplification	$R_L = 5$ k Ω		25°C	40	100		V/mV
I_{CC+}	Supply current from V_{CC+}	$V_{ID} = -50$ V,	$R_L = \infty$	Full range		150	300	μ A
I_{CC-}	Supply current from V_{CC-}	$V_{ID} = 50$ V,	$R_L = \infty$	Full range		- 80	- 180	μ A

† All typical values are at $V_{CC\pm} = \pm 15$ V, $T_A = 25^\circ\text{C}$.

NOTES: 6. The offset voltages and offset currents given are the maximum values required to drive the output within 1 V of either supply with a 1-mA load. Thus, these parameters define an error band and take into account the worst-case effects of voltage gain and input impedance.

7. Voltages are with respect to EMIT OUT and V_{CC-} tied together.

8. The strobe should not be shorted to ground; it should be current driven at 100 μ A to 300 μ A.

switching characteristics, $V_{CC\pm} = \pm 5$ V, $T_A = 25^\circ\text{C}$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS	TYP	UNIT
Response time	See Note 9	1.2	μ s

NOTE 9: The response time is specified for a 100-mV input step with 5-mV overdrive.

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