

LINEAR INTEGRATED CIRCUITS

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TYPES TL811M, TL811C DUAL-CHANNEL DIFFERENTIAL COMPARATORS WITH STROBES

D1008, MARCH 1971—REVISED AUGUST 1983

- Fast Response Times
- Improved Voltage Amplification and Offset Characteristics
- Output Compatible with Most TTL Circuits

description

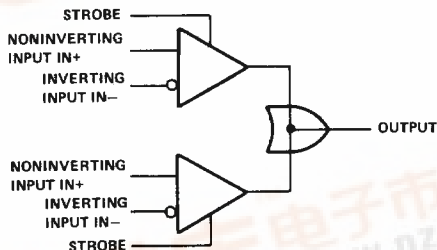
The TL811 is an improved version of the TL711 high-speed dual-channel voltage comparator. Voltage amplification is higher (typically 17,500) due to an extra stage, increasing the temperature accuracy. The output pulse width may be "stretched" by varying the capacitive loading.

Each channel has differential inputs, a strobe input, and an output in common with the other channel. When either strobe is taken low, it inhibits the associated channel. If both strobes are simultaneously low, the output will be low regardless of the conditions applied to the differential inputs.

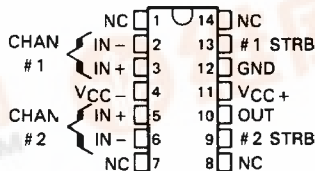
These dual-channel voltage comparators are particularly attractive for applications requiring an amplitude-discriminating sense amplifier with an adjustable threshold voltage.

The TL811M is characterized for operation over the full military range of -55°C to 125°C ; the TL811C is characterized for operation from 0°C to 70°C .

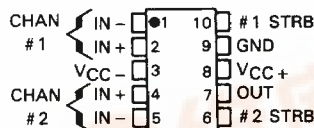
functional block diagram



TL811M . . . J DUAL-IN-LINE PACKAGE
TL811C . . . J OR N DUAL-IN-LINE PACKAGE
(TOP VIEW)



TL811M . . . U FLAT PACKAGE
(TOP VIEW)



NC—No internal connection

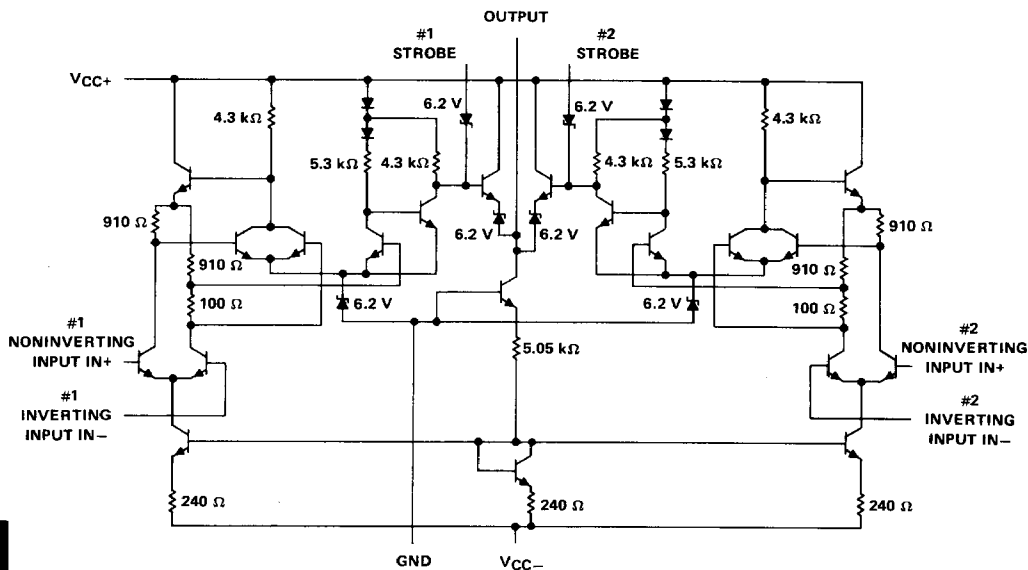
4

Voltage Comparators



TYPES TL811M, TL811C **DUAL-CHANNEL DIFFERENTIAL COMPARATORS WITH STROBES**

schematic



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Voltage Comparators

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

Supply voltage V_{CC+} (see Note 1)	14 V
Supply voltage V_{CC-} (see Note 1)	-7 V
Differential input voltage (see Note 2)	± 5 V
Input voltage (any input, see Note 1)	± 7 V
Strobe Voltage (see Note 1)	6 V
Peak output current ($t_w \leq 1$ s)	50 mA
Continuous total power dissipation at (or below) 70°C free-air temperature (see Note 3)	300 mW
Operating free-air temperature range: TL811M Circuits	-55°C to 125°C
TL811C Circuits	0°C to 70°C
Storage temperature range	-65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds: J or U package	300°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds: N package	260°C

- NOTES: 1. All voltage values, except differential voltages, are with respect to the network ground terminal.
2. Differential voltages are at the noninverting input terminal with respect to the inverting input terminal.
3. For operation of the TL811M above 70°C free-air temperature, refer to Dissipation Derating Curves, Section 2. In the J package, the TL811M chips are alloy-mounted; TL810C chips are glass-mounted.

TYPES TL811M, TL811C **DUAL-CHANNEL DIFFERENTIAL COMPARATORS WITH STROBES**

electrical characteristics at specified free-air temperature, $V_{CC+} = 12\text{ V}$, $V_{CC-} = -6\text{ V}$
(unless otherwise noted)

PARAMETER		TEST CONDITIONS†		TL811M			TL811C			UNIT
				MIN	TYP	MAX	MIN	TYP	MAX	
V _{IO}	Input offset voltage	V _{IC} = 0, See Note 4	25°C	1	3.5		1	5	mV	
			Full range		4.5		6			
		See Note 4	25°C	1	5		1	7.5		
			Full range		6		10			
α _{VIO}	Average temperature coefficient of input offset voltage	V _{IC} = 0, See Note 4	Full range	5			5		μV/°C	
I _{IO}	Input offset current	See Note 4	25°C	0.5	3		0.5	5	μA	
			Full range		5		10			
I _{IB}	Input bias current	See Note 4	25°C	7	20		7	30	μA	
			Full range		30		50			
I _{L(S)}	Low-level strobe current	V(strobe) = −100 mV	25°C	−1.2	−2.5		−1.2	−2.5	mA	
V _{ICR}	Common-mode input voltage range	V _{CC−} = −7 V	25°C	±5			±5		V	
V _{ID}	Differential input voltage range		25°C	±5			±5		V	
A _{VD}	Large-signal differential voltage amplification	V _O = 0 to 2.5 V, No load	25°C	12.5	17.5		10	17.5	V/mV	
			Full range	8			5			
V _{OH}	High-level output voltage	V _{ID} = 10 mV, I _{OH} = 0	25°C	4		5	4		V	
		V _{ID} = 10 mV, I _{OH} = −5 mA	25°C	2.5	3.6		2.5	3.6		
V _{OL}	Low-level output voltage	V _{ID} = −10 mV, I _{OL} = 0	25°C	−1	−0.4	0‡	−1	−0.4	0‡	V
		V _{ID} = 10 mV, V(strobe) = 0.3 V, I _{OL} = 0	25°C	−1		0‡	1		0‡	
I _{OL}	Low-level output current	V _{ID} = −10 mV, V _O = 0	25°C	0.5	0.8		0.5	0.8	mA	
r _o	Output resistance	V _O = 1.4 V	25°C	200			200		Ω	
CMRR	Common-mode rejection ratio		25°C	70	90		65	90	dB	
I _{CC+}	Supply current from V _{CC+}	V _{ID} = −5 to 5 V (10 mV for typ), No load, See Note 5	25°C	6.5			6.5		mA	
I _{CC−}	Supply current from V _{CC−}		25°C	−2.7			−2.7		mA	
P _n	Total power dissipation		25°C	94	150		94	200	mW	

[†] Unless otherwise noted, all characteristics are measured with the strobe of the channel under test open, the strobe of the other channel is grounded. Full range for TL811M is -55°C to 125°C and for the TL811C is 0°C to 70°C.

[‡] The algebraic convention, where the most-positive (least-negative) limit is designated as maximum, is used in this data sheet for logic levels only, e.g., when 0 V is the maximum, the minimum limit is a more-negative voltage.

NOTES: 4. These characteristics are verified by measurements at the following temperatures and output voltage levels: for TL811M, $V_O = 1.8\text{ V}$ at $T_A = -55^\circ\text{C}$, $V_O = 1.4\text{ V}$ at $T_A = 25^\circ\text{C}$, and $V_O = 1\text{ V}$ at $T_A = 125^\circ\text{C}$; for TL811C, $V_O = 1.5\text{ V}$ at $T_A = 0^\circ\text{C}$, $V_O = 1.4\text{ V}$ at $T_A = 25^\circ\text{C}$, and $V_O = 1.2\text{ V}$ at 70°C . These output voltage levels were selected to approximate the logic threshold voltages of the types of digital logic circuits these comparators are intended to drive.

5. The strobes are alternately grounded.

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Voltage Comparators

TYPES TL811M, TL811C **DUAL-CHANNEL DIFFERENTIAL COMPARATORS WITH STROBES**

switching characteristics, $V_{CC+} = 12\text{ V}$, $V_{CC-} = -6\text{ V}$, $T_A = 25^\circ\text{C}$

PARAMETER	TEST CONDITIONS	TL811M			TL811C			UNIT
		MIN	TYP	MAX	MIN	TYP	MAX	
Response time	$R_L = \infty$, $C_L = 5\text{ pF}$, See Note 6		33	80		33		ns
Strobe release time	$R_L = \infty$, $C_L = 5\text{ pF}$, See Note 7		5	25		5		ns

NOTES: 6. The response time specified is for a 100-mV input step with 5-mV overdrive and is the interval between the input step function and the instant when the output crosses 1.4 V.
7. For testing purposes, the input bias conditions are selected to produce an output voltage of 1.4 V. A 5-mV overdrive is then added to the input bias voltage to produce an output voltage that rises above 1.4 V. The time interval is measured from the 50% point on the strobe voltage waveform to the instant when the overdriven output voltage crosses the 1.4-V level.

TYPICAL CHARACTERISTICS

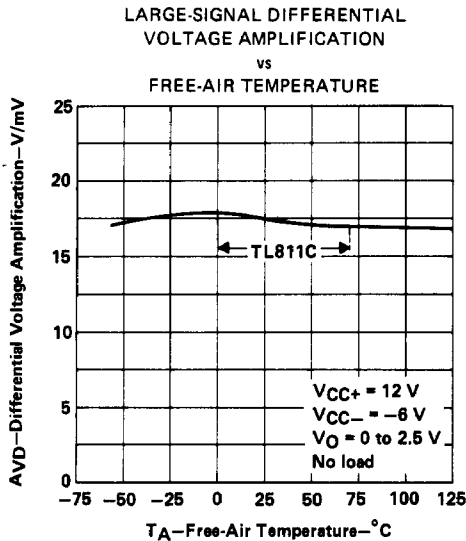


FIGURE 1

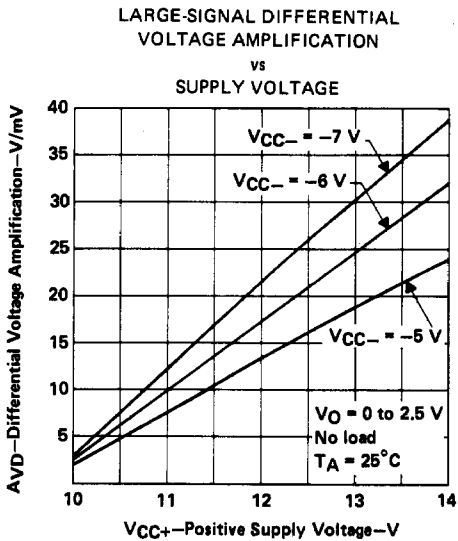


FIGURE 2

TYPES TL811M, TL811C DUAL-CHANNEL DIFFERENTIAL COMPARATORS WITH STROBES

TYPICAL CHARACTERISTICS

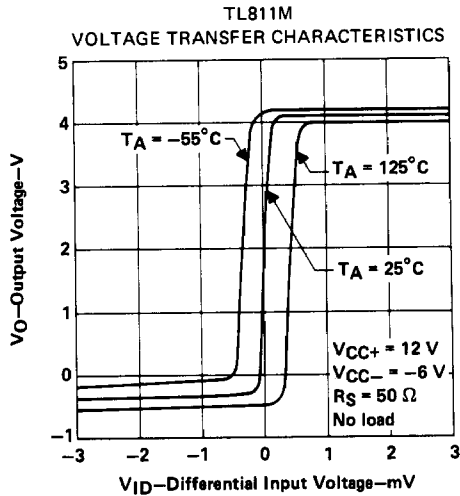


FIGURE 3

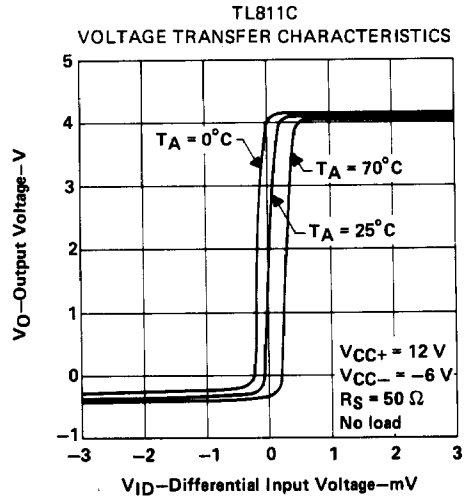


FIGURE 4

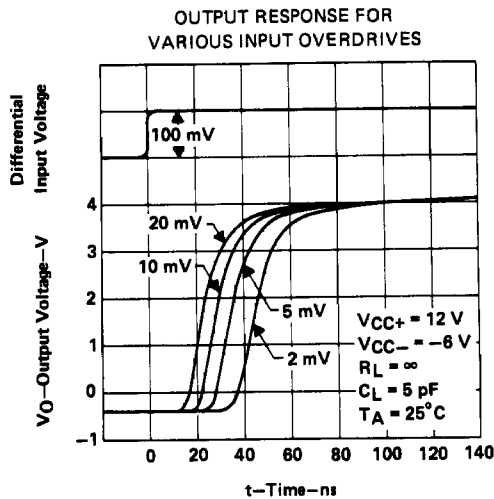


FIGURE 5

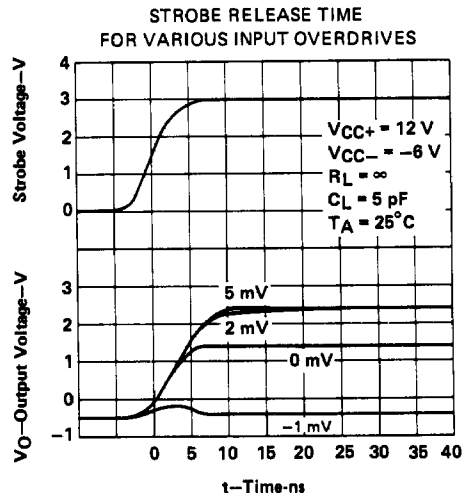


FIGURE 6

TYPES TL811M, TL811C DUAL-CHANNEL DIFFERENTIAL COMPARATORS WITH STROBES

TYPICAL CHARACTERISTICS

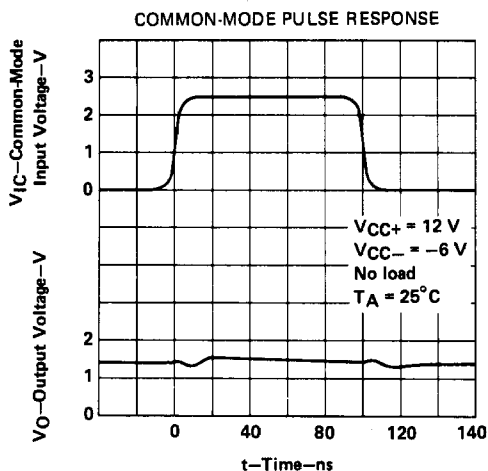
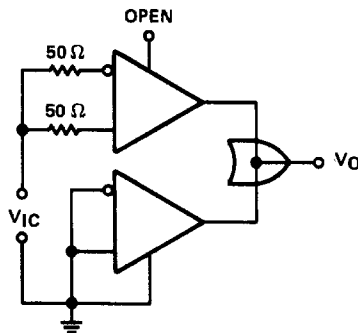


FIGURE 7



TEST CIRCUIT
FOR FIGURE 7

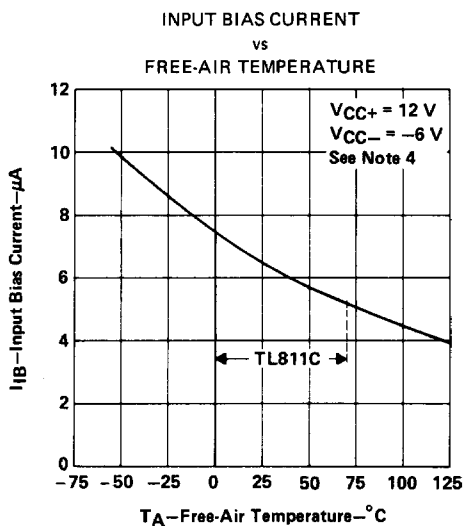


FIGURE 8

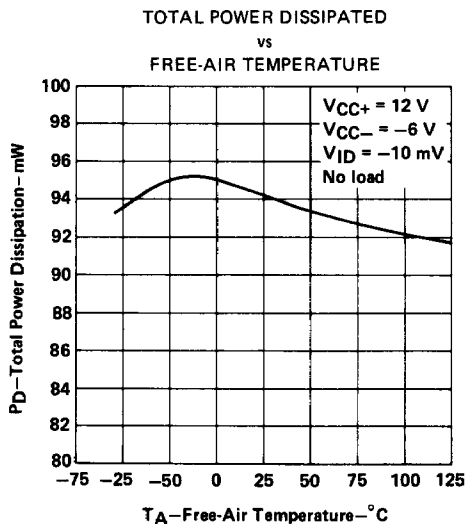


FIGURE 9

NOTE 4: These characteristics are verified by measurements at the following temperatures and output voltage levels: for TL811M, $V_O = 1.8\text{ V}$ at $T_A = -55^\circ\text{C}$, $V_O = 1.4\text{ V}$ at $T_A = 25^\circ\text{C}$, and $V_O = 1\text{ V}$ at $T_A = 125^\circ\text{C}$; for TL811C, $V_O = 1.5\text{ V}$ at $T_A = 0^\circ\text{C}$, $V_O = 1.4\text{ V}$ at $T_A = 25^\circ\text{C}$, and $V_O = 1.2\text{ V}$ at 70°C . These output voltage levels were selected to approximate the logic threshold voltages of the types of digital logic circuits these comparators are intended to drive.