

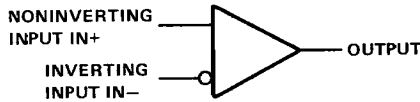
- **Fast Response Times**
- **High Differential Voltage Amplification**
- **Low Offset Characteristics**
- **Outputs Compatible with Most TTL Circuits**

description

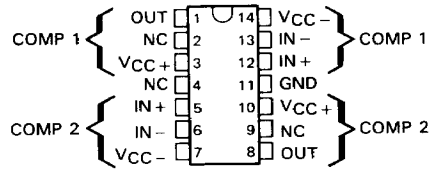
The TL820 is an improved version of the TL720 dual high-speed voltage comparator. Each comparator has differential inputs and a low-impedance output. When compared with the TL720, these circuits feature high amplification (typically 33,000) due to an extra amplification stage and increased accuracy because of lower offset characteristics. They are particularly useful in applications requiring an amplitude discriminator, memory sense amplifier, or a high-speed limit detector.

The TL820M is characterized for operation over the full military temperature range of -55°C to 125°C ; the TL820C is characterized for operation from 0°C to 70°C .

symbol (each comparator)

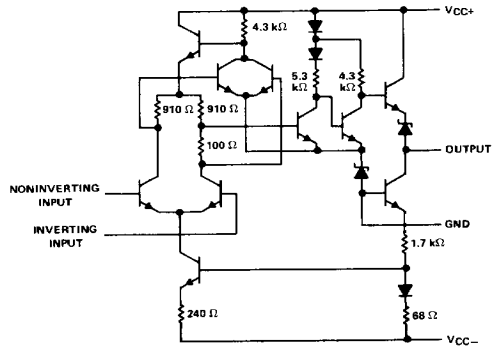


**J OR N DUAL-IN-LINE
PACKAGE (TOP VIEW)**



NC—No internal connection

schematic (each comparator)



Component values shown are nominal.

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
Peak output current ($t_w \leq 1$ s)	10 mA
Continuous total power dissipation at (or below) 70°C free-air temperature: each comparator	300 mW
total package (see Note 3)	600 mW
Operating free-air temperature range: TL820M Circuits	-55°C to 125°C
TL820C 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 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 TL820M above 70°C free-air temperature, refer to Dissipation Derating Curves, Section 2. In the J package, TL820M chips are alloy-mounted, TL820C chips are glass-mounted.

TYPES TL820M, TL820C DUAL DIFFERENTIAL COMPARATORS

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

PARAMETER	TEST CONDITIONS†		TL820M			TL820C			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
V_{IO} Input offset voltage	$R_S < 200\ \Omega$, See Note 4	25°C Full range	0.6	2		1.6	3.5		mV
α_{VIO} Average temperature coefficient of input offset voltage	$R_S = 50\ \Omega$, See Note 4	MIN to 25°C 25°C to MAX		3	10		3	20	$\mu\text{V}/^\circ\text{C}$
I_{IO} Input offset current	See Note 4	25°C MIN MAX		0.75	3		1.8	5	μA
α_{IIO} Average temperature coefficient of input offset current	See Note 4	MIN to 25°C 25°C to MAX		15	75		24	100	$\text{nA}/^\circ\text{C}$
I_{IB} Input bias current	See Note 4	25°C MIN		7	15		7	20	μA
V_{ICR} Common-mode input voltage range	$V_{CC-} = -7\text{ V}$	Full range		± 5			± 5		V
V_{ID} Differential input voltage range		Full range		± 5			± 5		V
AVD Large-signal differential voltage amplification	No load, $V_O = 0$ to 2.5 V	25°C Full range	12.5	33		10	33		V/mV
V_{OH} High-level output voltage	$V_{ID} = 5\text{ mV}$, $I_{OH} = 0$	Full range		4§	5		4§	5	V
V_{OL} Low-level output voltage	$V_{ID} = 5\text{ mV}$, $I_{OH} = -5\text{ mA}$	Full range	2.5	3.6§		2.5	3.6§		V
V_{OL} Low-level output voltage	$V_{ID} = -5\text{ mV}$, $I_{OL} = 0$	Full range	-1	-0.5§	0‡	-1	-0.5§	0‡	V
I_{OL} Low-level output current	$V_{ID} = -5\text{ mV}$, $V_O = 0$	25°C MIN MAX	2	2.4		1.6	2.4		mA
r_O Output resistance	$V_O = 1.4\text{ V}$	25°C		200			200		Ω
CMRR Common-mode rejection ratio	$R_S < 200\ \Omega$	Full range	80	100§		70	100§		dB
I_{CC+} Supply current from V_{CC+} (each comparator)	$V_{ID} = -5\text{ mV}$, No load	Full range		5.5§	9		5.5§	9	mA
I_{CC-} Supply current from V_{CC-} (each comparator)		Full range		-3.5§	-7		-3.5§	-7	mA
P_D Total power dissipation (each comparator)		Full range		90§	150		90§	150	mW

† Full range (MIN to MAX) for TL820M is -55°C to 125°C and for the TL820C 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.

§ These typical values are at $T_A = 25^\circ\text{C}$.

NOTE 4: These characteristics are verified by measurements at the following temperatures and output voltage levels: for TL820M, $V_O = 1.8\text{ V}$ 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 TL820C, $V_O = 1.5\text{ V}$ at $T_A = 0^\circ\text{C}$, $V_O = 1.4\text{ V}$ at 25°C , and $V_O = 1.2\text{ V}$ at $T_A = 70^\circ\text{C}$. 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.

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

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Response time	$R_L = \infty$, $C_L = 5\text{ pF}$, See Note 5		30	80	ns

NOTE 5: 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.

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Voltage Comparators

TYPICAL CHARACTERISTICS

LARGE-SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION VS FREE-AIR TEMPERATURE

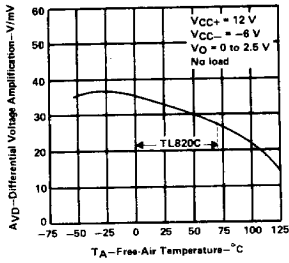


FIGURE 1

LARGE-SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION VS SUPPLY VOLTAGE

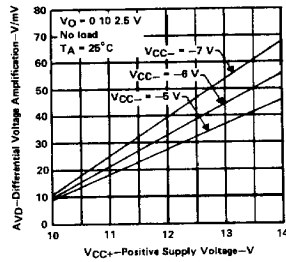


FIGURE 2

OUTPUT VOLTAGE LEVELS VS FREE-AIR TEMPERATURE

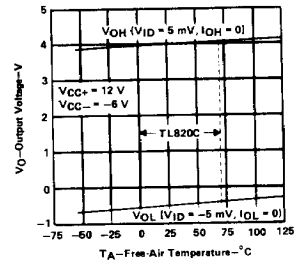


FIGURE 3

LOW-LEVEL OUTPUT CURRENT VS FREE-AIR TEMPERATURE

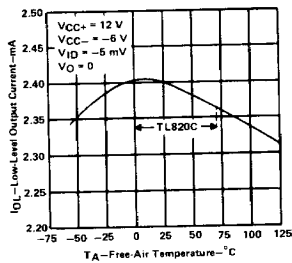


FIGURE 4

TL820M VOLTAGE TRANSFER CHARACTERISTICS

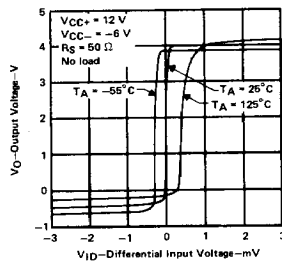


FIGURE 5

TL820C VOLTAGE TRANSFER CHARACTERISTICS

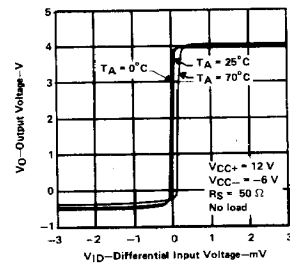


FIGURE 6

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Voltage Comparators

TYPES TL820M, TL820C DUAL DIFFERENTIAL COMPARATORS

TYPICAL CHARACTERISTICS

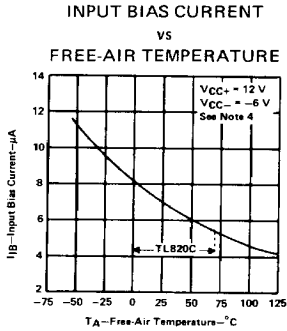


FIGURE 7

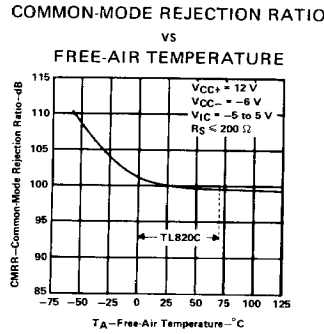


FIGURE 8

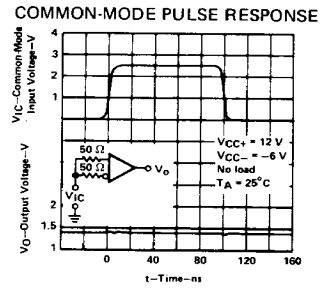


FIGURE 9

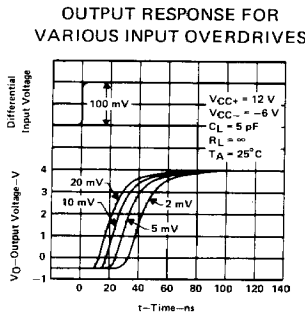


FIGURE 10

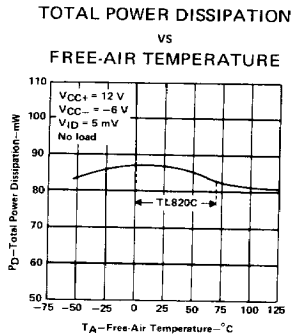


FIGURE 11

NOTE 4: These characteristics are verified by measurements at the following temperatures and output voltage levels: for TL820M, $V_O = 1.8$ V at $T_A = -55^\circ\text{C}$, $V_O = 1.4$ V at $T_A = 25^\circ\text{C}$, and $V_O = 1$ V at $T_A = 125^\circ\text{C}$; for TL820C, $V_O = 1.5$ V at $T_A = 0^\circ\text{C}$, $V_O = 1.4$ V at 25°C , and $V_O = 1.2$ V at $T_A = 70^\circ\text{C}$. 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.

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Voltage Comparators