
PART NUMBER**TL514CN-ROCV**

Rochester Electronics**Manufactured Components**

Rochester branded components are manufactured using either die/wafers purchased from the original suppliers or Rochester wafers recreated from the original IP. All re-creations are done with the approval of the Original Component Manufacturer. (OCM)

Parts are tested using original factory test programs or Rochester developed test solutions to guarantee product meets or exceeds the OCM data sheet.

Quality Overview

- ISO-9001
- AS9120 certification
- Qualified Manufacturers List (QML) MIL-PRF-38535
 - Class Q Military
 - Class V Space Level

Qualified Suppliers List of Distributors (QSLD)

- Rochester is a critical supplier to DLA and meets all industry and DLA standards.

Rochester Electronics, LLC is committed to supplying products that satisfy customer expectations for quality and are equal to those originally supplied by industry manufacturers.

The original manufacturer's datasheet accompanying this document reflects the performance and specifications of the Rochester manufactured version of this device. Rochester Electronics guarantees the performance of its semiconductor products to the original OCM specifications. 'Typical' values are for reference purposes only. Certain minimum or maximum ratings may be based on product characterization, design, simulation, or sample testing.

TL514M DUAL DIFFERENTIAL COMPARATOR WITH STROBE

D999, OCTOBER 1977—REVISED MARCH 1988

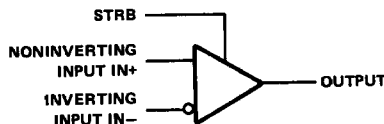
- Fast Response Times
- High Differential Voltage Amplification
- Low Offset Characteristics
- Outputs Compatible with Most TTL Circuits

description

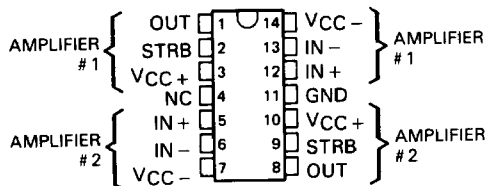
The TL514 is an improved version of the TL720 dual high-speed voltage comparator. When compared with the TL720, these circuits feature higher amplification (typically 33,000) due to an extra amplification stage, increased accuracy because of lower offset characteristics, and greater flexibility with the addition of a strobe to each comparator. Since the output cannot be more positive than the strobe, a low-level input at the strobe will cause the output to go low regardless of the differential input.

These circuits are especially useful in applications requiring an amplitude discriminator, memory sense amplifier, or a high-speed limit detector. The TL514M is characterized for operation over the full military temperature range of -55°C to 125°C .

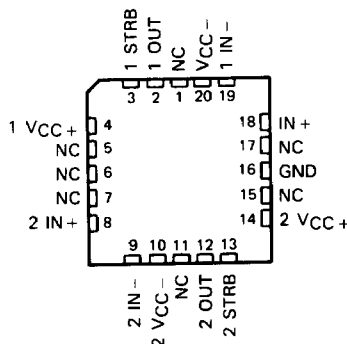
symbol (each comparator)



J OR W PACKAGE
(TOP VIEW)



FK CHIP CARRIER
(TOP VIEW)



NC -- No internal connection

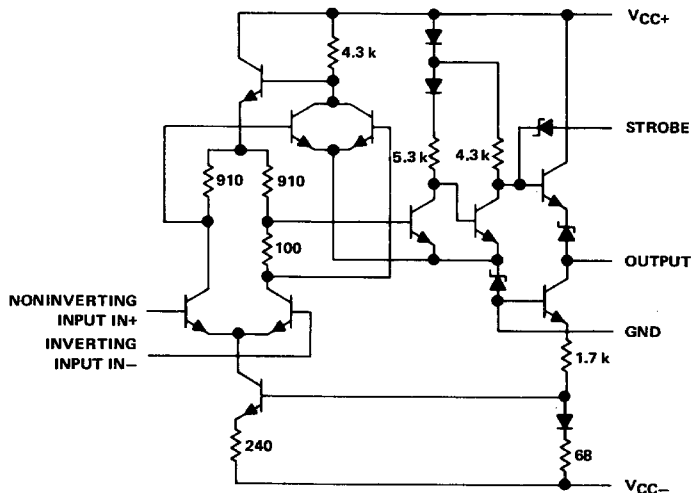
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Voltage Comparators

TL514M

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schematic (each comparator)



Resistor values shown are nominal in ohms.

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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)	10 mA
Continuous total dissipation (either comparator or both together)	See Dissipation Rating Table
Operating free-air temperature range	-55°C to 125°C
Storage temperature range	-65°C to 150°C
Case temperature for 60 seconds: FK package	260°C
Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds: J or W package	300°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.

DISSIPATION RATING TABLE

PACKAGE	$T_A \leq 25^\circ\text{C}$ POWER RATING	DERATING FACTOR	DERATE ABOVE T_A	$T_A = 125^\circ\text{C}$ POWER RATING
FK	600 mW	11.0 mW/°C	95°C	275 mW
J	600 mW	11.0 mW/°C	95°C	275 mW
W	600 mW	8.0 mW/°C	75°C	200 mW

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

PARAMETER		TEST CONDITIONS†	MIN	TYP	MAX	UNIT
V_{IO} Input offset voltage	$R_S \leq 20\ \Omega$, See Note 4	25°C		0.6	2	mV
		-55°C to 125°C			3	
αV_{IO} Average temperature coefficient of input offset voltage	$R_S = 50\ \Omega$, See Note 4	-55°C to 25°C		3	10	$\mu\text{V}/^\circ\text{C}$
		25°C to 125°C		3	10	
I_{IO} Input offset current	See Note 4	25°C		0.75	3	μA
		-55°C		1.8	7	
		125°C		0.25	3	
αI_{IO} Average temperature coefficient of input offset current	See Note 4	-55°C to 25°C		15	75	$\text{nA}/^\circ\text{C}$
		25°C to 125°C		5	25	
I_{IB} Input bias current	See Note 4	25°C		7	15	μA
		-55°C		12	25	
$I_{IH(S)}$ High-level strobe current	$V_{(\text{strobe})} = 5\text{ V}$, $V_{ID} = -5\text{ mV}$	25°C			± 100	μA
$I_{IL(S)}$ Low-level strobe current	$V_{(\text{strobe})} = -100\text{ mV}$, $V_{ID} = 5\text{ mV}$	25°C		-1	-2.5	mA
V_{ICR} Common-mode input voltage range	$V_{CC} = -7\text{ V}$	-55°C to 125°C	± 5			V
V_{ID} Differential input voltage range		-55°C to 125°C	± 5			V
AVD Large-signal differential voltage amplification	No load, $V_O = 0$ to 2.5 V	25°C	12.5	33		V/mV
		-55°C to 125°C	10			
V_{OH} High-level output voltage	$V_{ID} = 5\text{ mV}$, $I_{OH} = 0$	-55°C to 125°C		4 [§]	5	V
	$V_{ID} = 5\text{ mV}$, $I_{OH} = -5\text{ mA}$	-55°C to 125°C	2.5	3.6 [§]		
V_{OL} Low-level output voltage	$V_{ID} = -5\text{ mV}$, $I_{OL} = 0$	-55°C to 125°C	-1	-0.5 [§]	0 [‡]	V
	$V_{(\text{strobe})} = 0.3\text{ V}$, $V_{ID} = 5\text{ mV}$, $I_{OL} = 0$	-55°C to 125°C	-1		0 [‡]	V
I_{OL} Low-level output current	$V_{ID} = -5\text{ mV}$, $V_O = 0$	25°C		2	2.4	mA
		-55°C		1	2.3	
		125°C		0.5	2.3	
r_o Output resistance	$V_O = 1.4\text{ V}$	25°C		200		Ω
$CMRR$ Common-mode rejection ratio	$R_S \leq 200\ \Omega$	-55°C to 125°C	80	100 [§]		dB
I_{CC+} Supply current from V_{CC+} †	$V_{ID} = -5\text{ mV}$,	-55°C to 125°C		11 [§]	18	mA
I_{CC-} Supply current from V_{CC-} †		-55°C to 125°C		-7 [§]	-14	mA
P_D Total power dissipation†	No load	-55°C to 125°C		180 [§]	300	mW

† Unless otherwise noted, all characteristics are measured with the strobe open.

‡ 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 $T_A = 25^\circ\text{C}$.

¶ Supply current and power dissipation limits apply for both comparators operating simultaneously.

NOTE 4: These characteristics are verified by measurements at the following temperatures and output voltage levels: $V_O = 1.8\text{ V}$ 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 $T_A = 125^\circ\text{C}$. These output voltage levels were selected to approximate the logic threshold voltages of the types of digital logic circuits this comparator is intended to drive.

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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
Strobe release time	$R_L = \infty$	$C_L = 5\text{ pF}$	See Note 6		5	25	ns

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

6. 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 which rises above 1.4 V. The time interval is measured from the 50% point of the strobe voltage curve to the point where the overdriven output voltage crosses the 1.4-V level.

TYPICAL CHARACTERISTICS

LARGE-SIGNAL DIFFERENTIAL
VOLTAGE AMPLIFICATION
vs
FREE-AIR TEMPERATURE

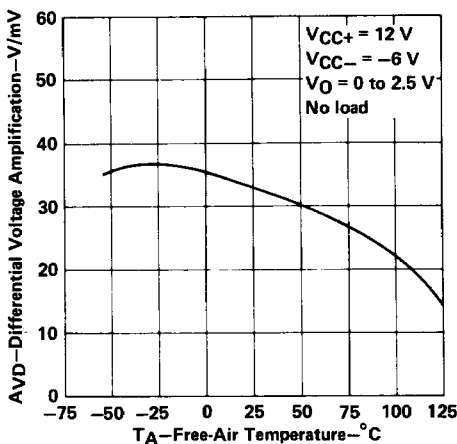


FIGURE 1

LARGE-SIGNAL DIFFERENTIAL
VOLTAGE AMPLIFICATION
vs
SUPPLY VOLTAGE

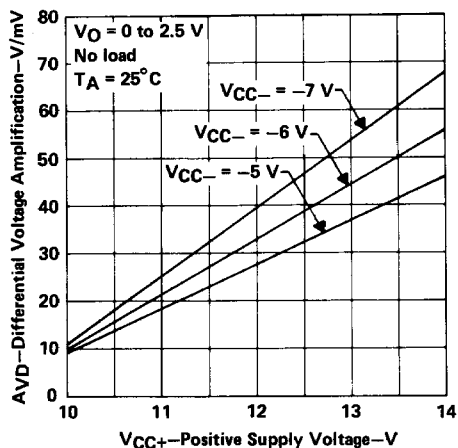


FIGURE 2

Voltage Comparators

TYPICAL CHARACTERISTICS

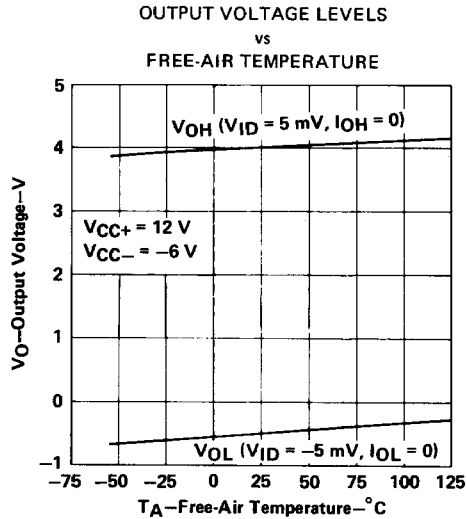


FIGURE 3

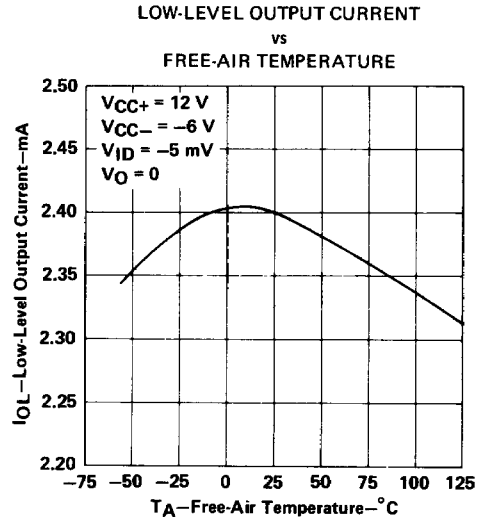


FIGURE 4

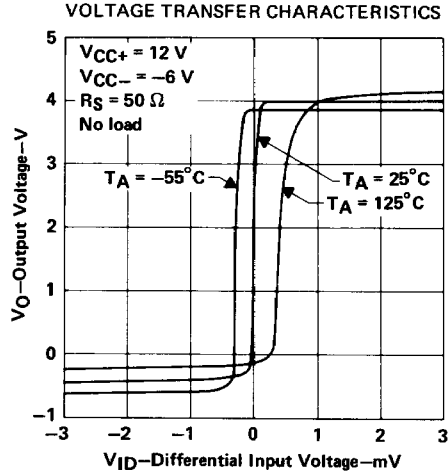


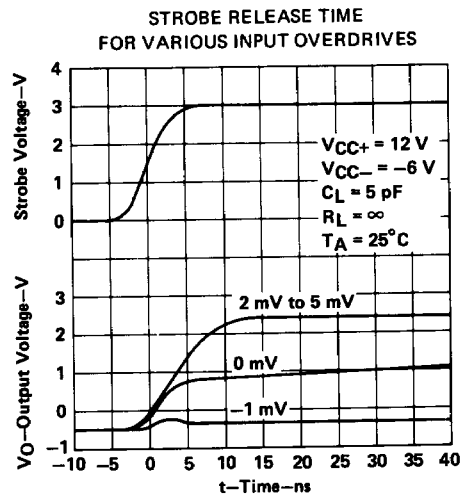
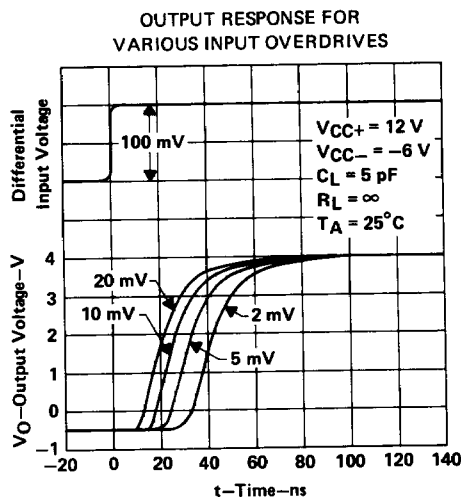
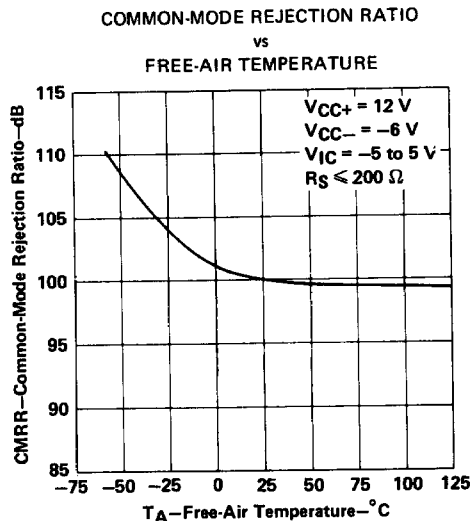
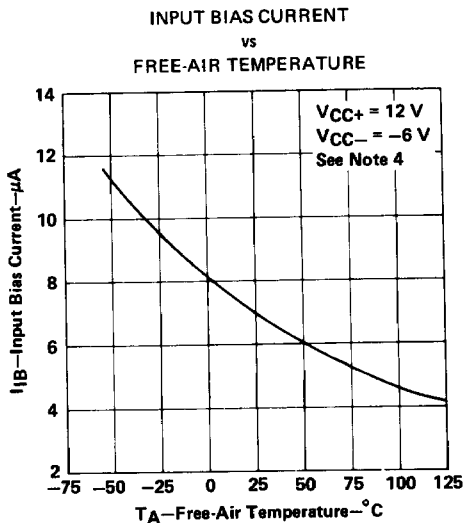
FIGURE 5

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Voltage Comparators

TL514M **DUAL DIFFERENTIAL COMPARATOR WITH STROBE**

TYPICAL CHARACTERISTICS



NOTE 4: These characteristics are verified by measurements at the following temperatures and output voltage levels: $V_O = 1.8 \text{ V}$ 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 $T_A = 125^\circ\text{C}$. These output voltage levels were selected to approximate the logic threshold voltages of the types of digital logic circuits this comparator is intended to drive.

TYPICAL CHARACTERISTICS

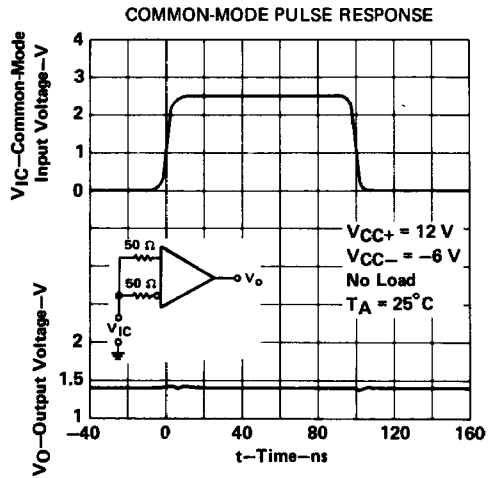


FIGURE 10

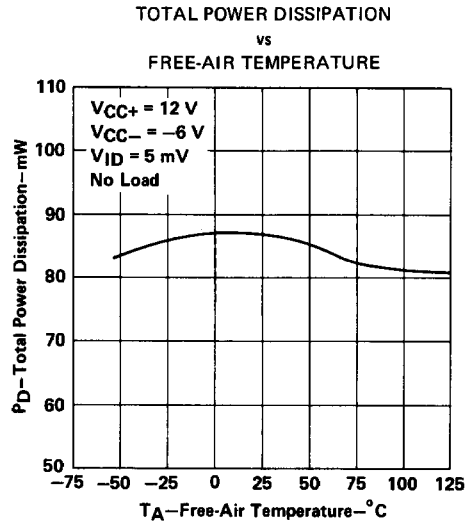


FIGURE 11