# MC1514L

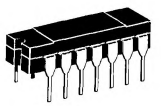
## DUAL DIFFERENTIAL COMPARATOR

### MONOLITHIC DUAL DIFFERENTIAL VOLTAGE COMPARATOR

. . . designed for use in level detection, low-level sensing, and memory applications.

**Typical Amplifier Features:**

- Two Separate Outputs
- Strobe Capability
- High Output Sink Current — 2.8 mA min Each Comparator
- Differential Input Characteristics:
  Input Offset Voltage = 1.0 mV
  Offset Voltage Drift = 3.0 $\mu V/^{o}C$
- Short Propagation Delay Time — 40 ns
- Output Compatible with All Saturating Logic Forms
  $V_{out}$ = +3.2 V to -0.5 V typical

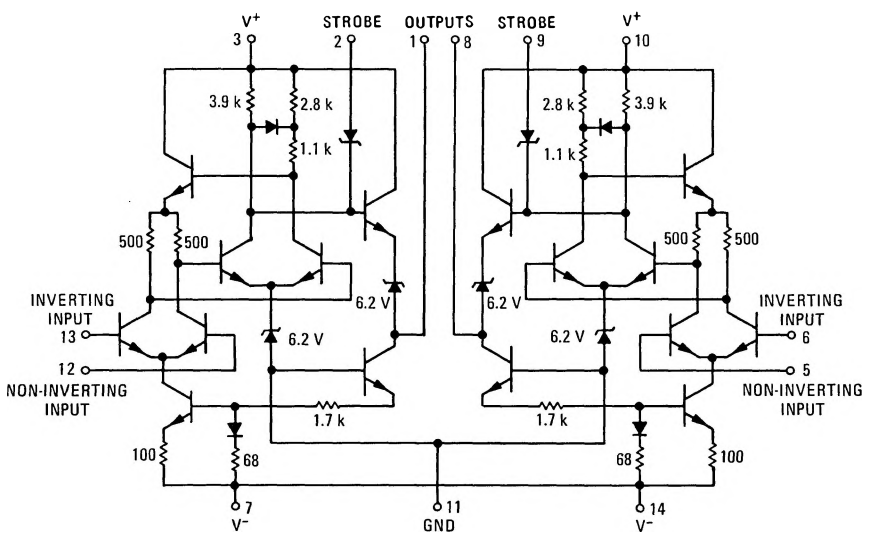


CERAMIC PACKAGE
CASE 632
TO-116

**MAXIMUM RATINGS** ($T_A$ = 25°C unless otherwise noted)

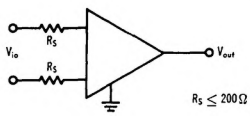
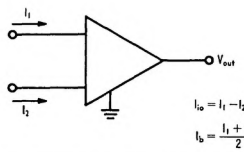
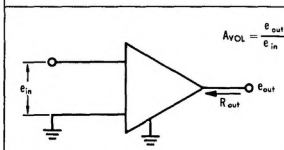
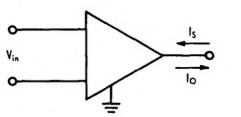
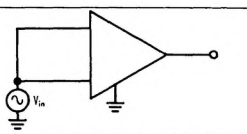
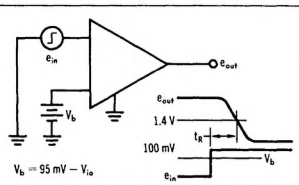
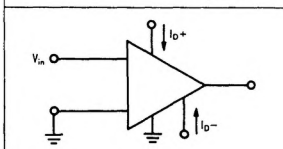
| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Power Supply Voltage | $V^+$<br>$V^-$ | +14<br>-7.0 | Vdc<br>Vdc |
| Differential Input Signal | $V_{in}$ | ±5.0 | Volts |
| Common Mode Input Swing | $CMV_{in}$ | ±7.0 | Volts |
| Peak Load Current | $I_L$ | 10 | mA |
| Power Dissipation (package limitation)<br>Ceramic Dual-In-Line Package<br>Derate above $T_A$ = +25°C | $P_D$ | <br>1000<br>6.7 | <br>mW<br>mW/°C |
| Operating Temperature Range | $T_A$ | -55 to +125 | °C |
| Storage Temperature Range | $T_{stg}$ | -65 to +150 | °C |

**CIRCUIT SCHEMATIC**




See Packaging Information Section for outline dimensions.

**ELECTRICAL CHARACTERISTICS** ($V^+ = +12$ Vdc, $V^- = -6$ Vdc, $T_A = 25°C$ unless otherwise noted) (Each Comparator)

| Characteristic Definitions (linear operation) | Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
|  | Input Offset Voltage<br>$V_{out}$ = 1.4 Vdc, $T_A$ = 25°C<br>$V_{out}$ = 1.8 Vdc, $T_A$ = -55°C<br>$V_{out}$ = 1.0 Vdc, $T_A$ = +125°C | $V_{io}$ | -<br>-<br>- | 1.0<br>-<br>- | 2.0<br>3.0<br>3.0 | mVdc |
| | Temperature Coefficient of Input Offset Voltage | $TC_{Vio}$ | - | 3.0 | - | µV/°C |
|  | Input Offset Current<br>$V_{out}$ = 1.4 Vdc, $T_A$ = 25°C<br>$V_{out}$ = 1.8 Vdc, $T_A$ = -55°C<br>$V_{out}$ = 1.0 Vdc, $T_A$ = +125°C | $I_{io}$ | -<br>-<br>- | 1.0<br>-<br>- | 3.0<br>7.0<br>3.0 | µAdc |
| | Input Bias Current<br>$V_{out}$ = 1.4 Vdc, $T_A$ = 25°C<br>$V_{out}$ = 1.8 Vdc, $T_A$ = -55°C<br>$V_{out}$ = 1.0 Vdc, $T_A$ = +125°C | $I_b$ | -<br>-<br>- | 12<br>-<br>- | 20<br>45<br>20 | µAdc |
|  | Open Loop Voltage Gain<br>$T_A$ = 25°C<br>$T_A$ = -55 to +125°C | $A_{VOL}$ | 1250<br>1000 | 1700<br>- | -<br>- | V/V |
| | Output Resistance | $R_{out}$ | - | 200 | - | ohms |
|  | Differential Voltage Range | $V_{in}$ | ±5.0 | - | - | Vdc |
| | Positive Output Voltage<br>$V_{in} \geq$ 5.0 mV, $0 \leq I_o \leq$ 5.0 mA | $V_{OH}$ | 2.5 | 3.2 | 4.0 | Vdc |
| | Negative Output Voltage<br>$V_{in} \geq$ -5.0 mV | $V_{OL}$ | -1.0 | -0.5 | 0 | Vdc |
| | Output Sink Current<br>$V_{in} \geq$ -5.0 mV, $V_{out} \geq 0$,<br>$T_A$ = -55 to +125°C | $I_s$ | 2.8 | 3.4 | - | mAdc |
|  | Input Common Mode Range<br>$V^-$ = -7.0 Vdc | $CMV_{in}$ | ±5.0 | - | - | Volts |
| | Common Mode Rejection Ratio<br>$V^-$ = -7.0 Vdc, $R_S \leq 200\Omega$ | $CM_{rej}$ | 80 | 100 | - | dB |
|  | Propagation Delay Time For Positive and Negative Going Input Pulse | $t_{pd}$ | - | 40 | - | ns |
|  | Total Power Supply Current<br>$V_{out} \leq 0$ Vdc | $I_D^+$<br>$I_D^-$ | -<br>- | 12.8<br>11 | 18<br>14 | mAdc |
| | Total Power Consumption | | - | 230 | 300 | mW |

## TYPICAL CHARACTERISTICS
(Each Comparator)

FIGURE 1 – VOLTAGE TRANSFER CHARACTERISTICS

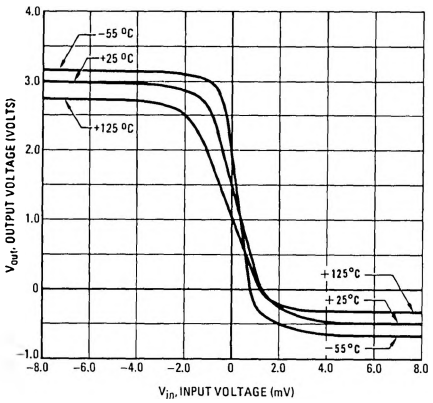



FIGURE 2 – INPUT OFFSET VOLTAGE versus TEMPERATURE

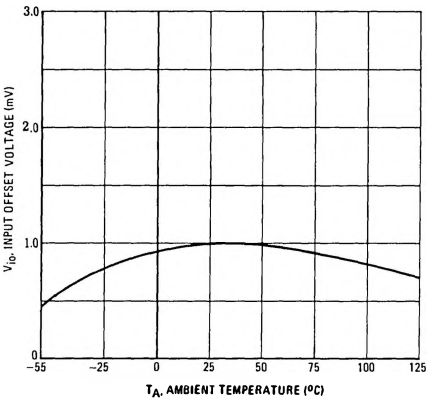



FIGURE 3 – INPUT OFFSET CURRENT versus TEMPERATURE

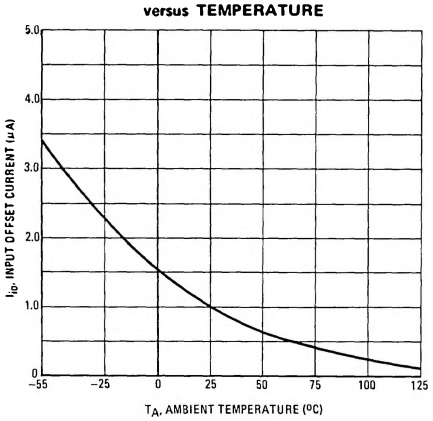



FIGURE 4 – INPUT BIAS CURRENT versus TEMPERATURE

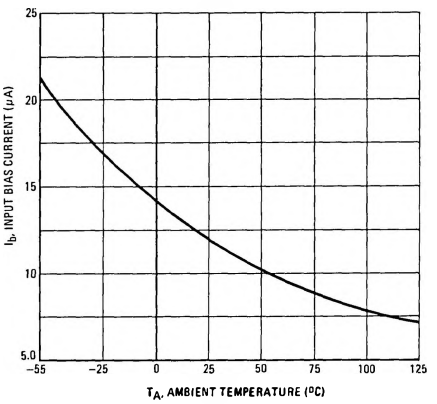



FIGURE 5 – GAIN VARIATION WITH POWER SUPPLY VOLTAGE

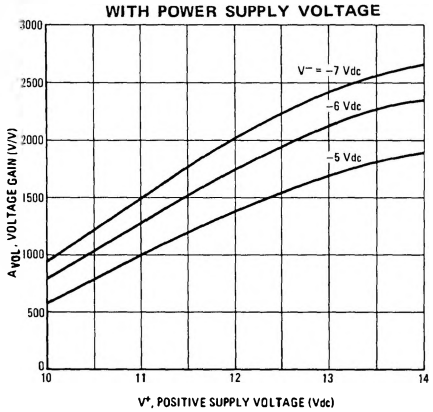



FIGURE 6 – VOLTAGE GAIN versus TEMPERATURE

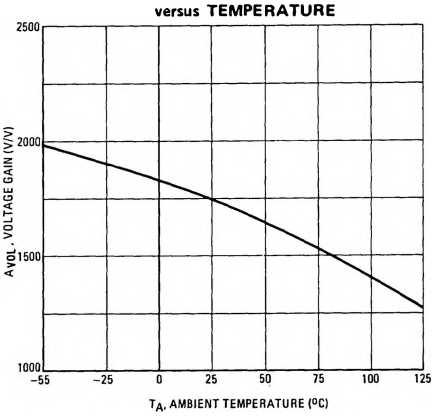


**FIGURE 7 – RESPONSE TIME**

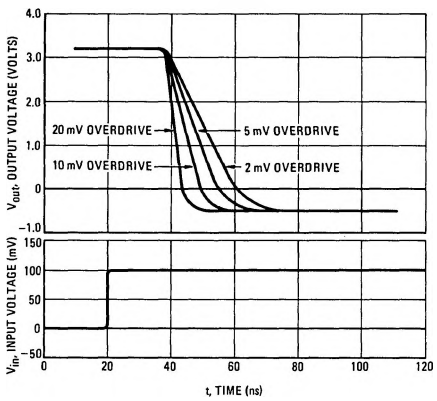



**FIGURE 8 – POWER DISSIPATION versus TEMPERATURE**

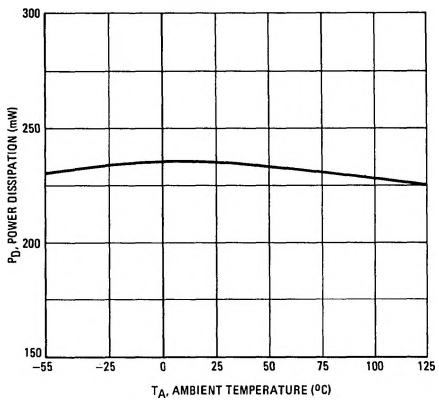



**FIGURE 9 – RECOMMENDED SERIES RESISTANCE versus MRTL LOADS**

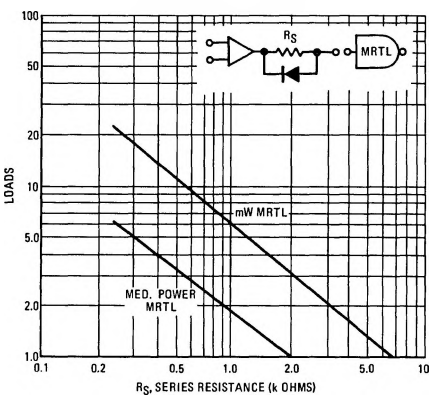



**FIGURE 10 – SINK CURRENT versus TEMPERATURE**

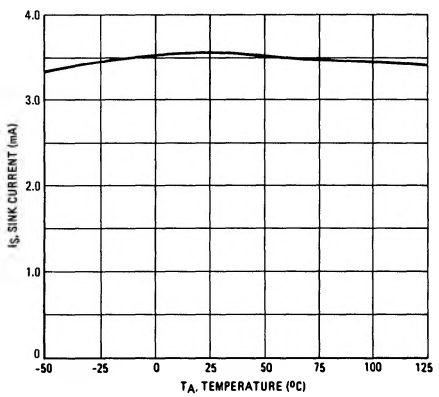
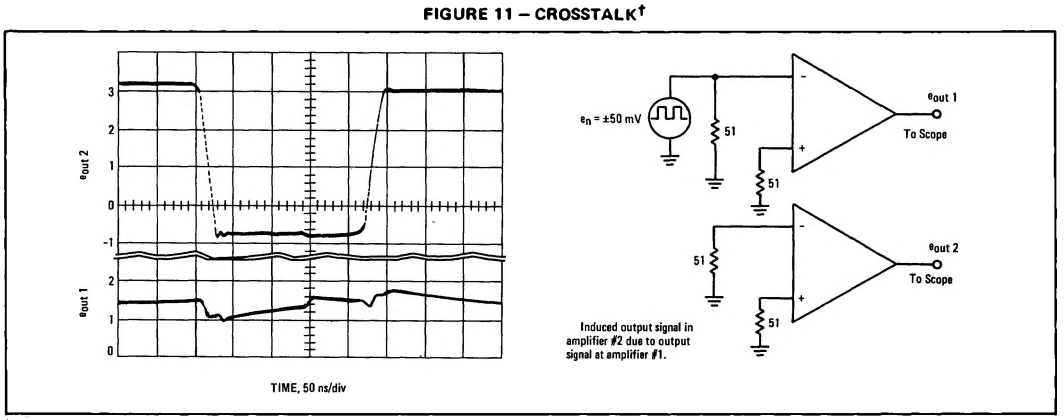



**FIGURE 11 – CROSSTALK†**




†Worst case condition shown – no load.