# CA3199

# VHF/UHF ÷ 4 Prescaler

**Features:**

- *Broadband operation - DC to 1.3 GHz*
- *High sensitivity*
- *Standard $T^2L$ or ECL power supply of 5 V ± 0.5 V*
- *Complementary ECL outputs*
- *High-frequency up-converters*

- *High-frequency divider for:*
  *UHF frequency counters*
  *UHF timers*
  *High-speed computers*
  *Frequency standards*
  *SHF second IF local-oscillator injection*
  *PCM communications*
  *Satellite communications*
  *Radar ranging systems*

The CA3199E* is a bipolar integrated fixed-ratio (divide-by-four) counter which operates over the VHF/UHF frequency band (DC to 1.3 GHz). It accepts either single or double-ended ac-coupled input signals and provides complementary emitter follower outputs at standard ECL logic levels.

The CA3199E is supplied in an 8-lead dual-in-line plastic (Mini-DIP) package, and operates over an ambient temperature range of 0 to +85° C.

*Formerly RCA Dev. Type No. TA10853.

**Applications:**

- *Digital frequency synthesizers for:*
  *VHF/UHF receivers*
  *Satellite communications*
  *Instrumentation*

**MAXIMUM RATINGS,** *Absolute-Maximum Values:*

DC SUPPLY VOLTAGE ..... 5.5 V

RMS INPUT VOLTAGE ..... 0.5 V

DEVICE DISSIPATION:

UP TO $T_A$ = 70° C ..... 630 mW

ABOVE $T_A$= 70° C ..... derate linearly at 7.7 mW/° C

AMBIENT TEMPERATURE RANGE:

OPERATING ..... 0 to 85° C

STORAGE ..... −55 to −150° C

LEAD TEMPERATURE (DURING SOLDERING):

AT DISTANCE 1/16 ± 1/32 IN. (1.59 ± 0.79 mm) FROM CASE FOR 10 SECONDS MAX. ..... −265° C

File Number **1302**

# CA3199

**STATIC CHARACTERISTICS ($T_A$=25° C, $V_{CC}$=+5.0 V, $V_5$=Ground)**

| CHARACTERISTICS | TEST CONDITIONS | LIMITS | | | UNITS |
|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | |
| "1" Output Voltage, $V_{OH}$ | Outputs Unloaded | — | 4.2 | — | V |
| "0" Output Voltage, $V_{OL}$ | Outputs Unloaded | — | 3.4 | — | V |
| Internal Bias Voltage, $V_{BIAS}$ | Pin #4 Left Floating | — | 2.4 | — | V |
| Power Supply Current Drain, $I_D$ | | 35 | 60 | 85 | mA |

**DYNAMIC CHARACTERISTICS ($T_A$=25° C, $V_{CC}$=+5.0 V, $V_5$=Ground)**

| CHARACTERISTICS | TEST CONDITIONS | LIMITS | | | UNITS |
|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | |
| Input Frequency Range (sinusoidal), $V_{IN}$ | Single-Ended Input, 1000 MHz | — | — | 400 | mVpp |
| Output Voltage Swing, $V_6$, $V_7$ | | 0.6 | 0.8 | — | Vpp |
| "1" Transition Time, $t_{-+}$ | Output Unloaded | — | 0.6 | — | ns |
| "0" Transition Time, $t_{+-}$ | Output Unloaded | — | 0.6 | — | ns |
| Input Capacitance, $C_{IN}$ | | — | 2.5 | — | pF |
| Input Resistance, $R_{IN}$ | | — | 400 | — | Ω |

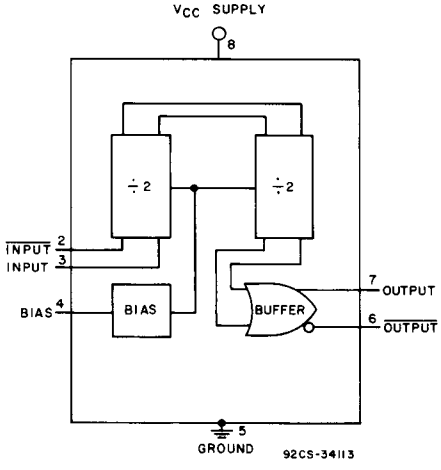


*Fig. 1 - Logic diagram for divide-by-four counter.*

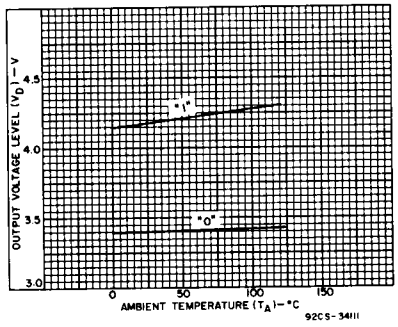


*Fig. 2 - Typical output levels as a function of ambient temperature.*

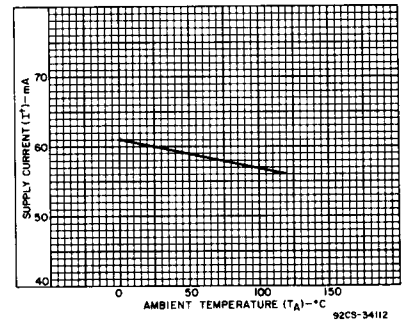


*Fig. 3 - Typical power-supply current as a function of ambient temperature.*

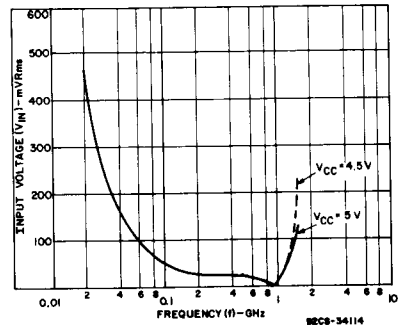


*Fig. 4 - Sinusoidal input sensitivity.*

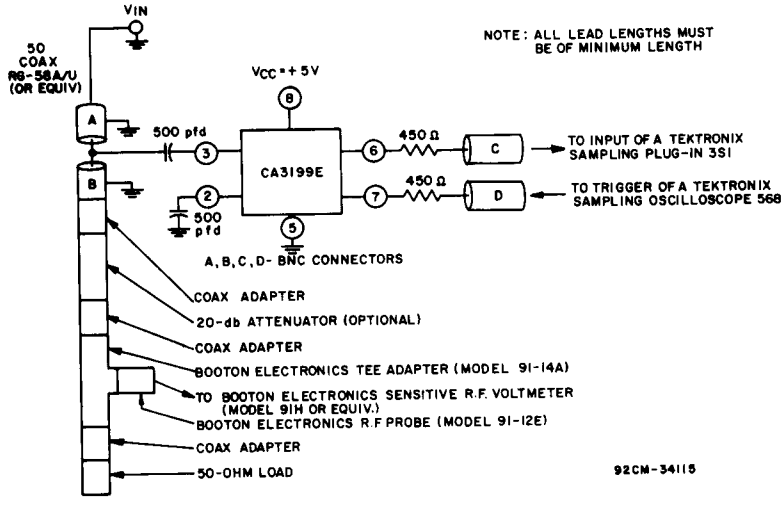


*Fig. 5 - Test circuit for CA3199E.*

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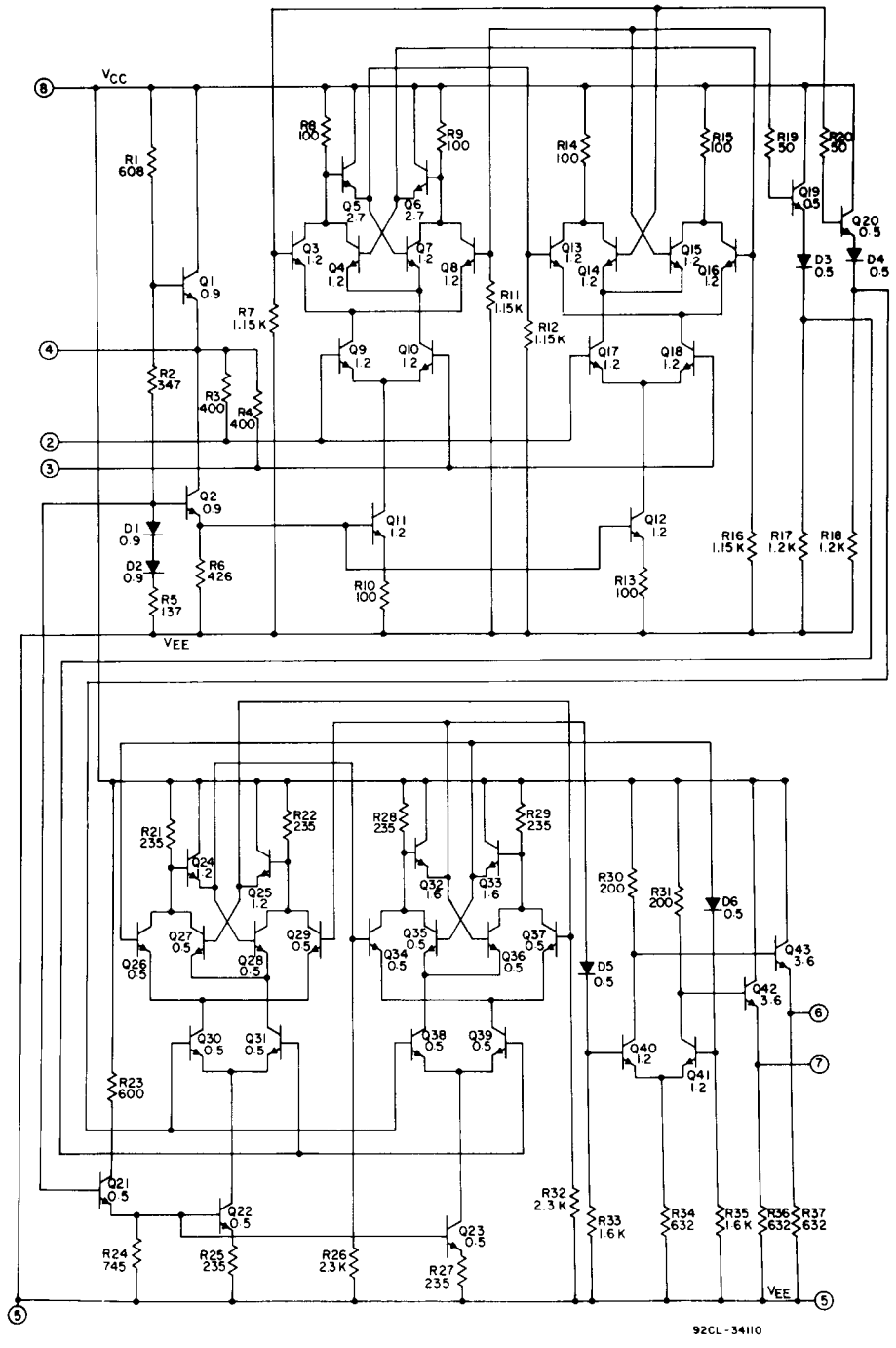


*Fig. 6 - Schematic diagram for CA3199E.*

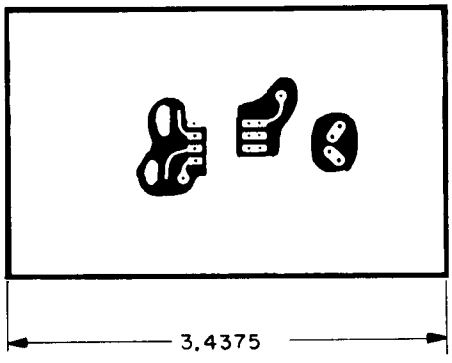


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*Fig. 7 - Printed-circuit board for the test circuit.*

**Application and Test Notes**

1. Both complementary inputs and outputs are provided. When driven single-ended, normally at pin 3, the unused input (pin 2) should be ac by-passed (500 pF) to ground for best performance.
2. Internal bias monitor, pin 4, is normally left floating or ac by-passed to ground.
3. Device inputs should be ac coupled to the signal source. 500-pF coupling capacitors are adequate above 50 MHz.
4. Input signal voltage (sinusoidal) required is 100 mV RMS (typical) over the frequency range of 100-1000 MHz
5. When the input signal voltage is a square wave, a rise time of ≤5 ns is required. The signal should be 400-800 mV peak-to-peak over the frequency range from dc-1000 MHz. This corresponds to an input slew rate minimum of 62.5 V/$\mu$s.
6. All test data are for the 8-pin dual-in-line packaged circuit as mounted in a standard IC socket. Somewhat improved higher frequency performance can be obtained by attaching directly to a suitable PC board.
7. High-frequency construction and design techniques must be followed if the operation of the test circuit is to be stable and if the results of repeated tests are to be consistent. Listed below are some precautionary construction considerations for the circuit and test fixture.
    1. Supply the ground plane with frequent ground connections.
    2. Use 50-Ω coaxial cable for input connections.
    3. Use a "dead bug" type socket to minimize lead lengths and reduce series inductances.
    4. Use input pads that reduce impedance mismatch at the generator-test and meter-test input interfaces.
    5. Use leadless ceramic disc capacitors wherever possible.
    6. Provide capacitor by-passing near active terminals where ac grounds are required.

Specific applications may require changes in the procedures listed above. The socket, for instance, can be eliminated by soldering the device directly to the PC board or by using individual board-mounted socket pins. Input and output interface connections and circuitry will also vary according to specific circuit requirements.