**General Description**

The LM566CN is a general purpose voltage controlled oscillator which may be used to generate square and triangular waves, the frequency of which is a very linear function of a control voltage. The frequency is also a function of an external resistor and capacitor. The LM566CN is specified for operation over the 0°C to +70°C temperature range.

**Features**
- Wide supply voltage range: 10V to 24V
- Very linear modulation characteristics
- High temperature stability
- Excellent supply voltage rejection
- 10 to 1 frequency range with fixed capacitor
- Frequency programmable by means of current, voltage, resistor or capacitor

**Applications**
- FM modulation
- Signal generation
- Function generation
- Frequency shift keying
- Tone generation

**Connection Diagram**

Dual-In-Line Package

Order Number LM566CN
See NS Package Number N08E

**Typical Application**

1 kHz and 10 kHz TTL Compatible Voltage Controlled Oscillator

TL/H/7854–2

TL/H/7854–3
**Absolute Maximum Ratings**
If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

- Power Supply Voltage: 26V
- Power Dissipation (Note 1): 1000 mW
- Operating Temperature Range, LM566CN: 0°C to +70°C
- Lead Temperature (Soldering, 10 sec.): +260°C

**Electrical Characteristics**  
$V_{CC} = 12V, T_A = 25°C, AC Test Circuit$

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Conditions</th>
<th>LM566C</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Operating Frequency</td>
<td>$R_O = 2k$</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>$C_O = 2.7 \mu F$</td>
<td></td>
<td>MHz</td>
</tr>
<tr>
<td>VCO Free-Running Frequency</td>
<td>$C_O = 1.5 \mu F$</td>
<td>-30</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>$R_O = 20k$</td>
<td>+30</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>$f_O = 10 \text{ kHz}$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input Voltage Range Pin 5</td>
<td>$\frac{1}{4} V_{CC}$</td>
<td></td>
<td>$V_{CC}$</td>
</tr>
<tr>
<td>Average Temperature Coefficient of Operating Frequency</td>
<td>200 ppm/°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply Voltage Rejection</td>
<td>10–20V</td>
<td>0.1</td>
<td>2</td>
</tr>
<tr>
<td>Input impedance Pin 5</td>
<td>0.5</td>
<td>1</td>
<td>$\Omega$</td>
</tr>
<tr>
<td>VCO Sensitivity</td>
<td>For Pin 5, From $8–10V$, $f_O = 10 \text{ kHz}$</td>
<td>6.0</td>
<td>6.6</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>7.2</td>
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<tr>
<td>FM Distortion</td>
<td>±10% Deviation</td>
<td>0.2</td>
<td>1.5</td>
</tr>
<tr>
<td>Maximum Sweep Rate</td>
<td>1</td>
<td></td>
<td>MHz</td>
</tr>
<tr>
<td>Sweep Range</td>
<td>10:1</td>
<td></td>
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<tr>
<td>Output Impedance Pin 3</td>
<td>50</td>
<td></td>
<td>$\Omega$</td>
</tr>
<tr>
<td>Pin 4</td>
<td>50</td>
<td></td>
<td>$\Omega$</td>
</tr>
<tr>
<td>Square Wave Output Level</td>
<td>$R_{L1} = 10k$</td>
<td>5.0</td>
<td>5.4</td>
</tr>
<tr>
<td>Triangle Wave Output Level</td>
<td>$R_{L2} = 10k$</td>
<td>2.0</td>
<td>2.4</td>
</tr>
<tr>
<td>Square Wave Duty Cycle</td>
<td>40</td>
<td>50</td>
<td>60</td>
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<tr>
<td>Square Wave Rise Time</td>
<td>20</td>
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<td>ns</td>
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<tr>
<td>Square Wave Fall Time</td>
<td>50</td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td>Triangle Wave Linearity</td>
<td>$+1V$ Segment at $\frac{1}{2} V_{CC}$</td>
<td>0.5</td>
<td></td>
</tr>
</tbody>
</table>

**Applications Information**

The LM566CN may be operated from either a single supply as shown in this test circuit, or from a split ($\pm$) power supply. When operating from a split supply, the square wave output (pin 3) is TTL compatible (2 mA current sink) with the addition of a 4.7 k$\Omega$ resistor from pin 3 to ground.

A 0.001 µF capacitor is connected between pins 5 and 6 to prevent parasitic oscillations that may occur during VCO switching.

\[ f_O = \frac{2.4(V^+ - V_5)}{R_O C_O V^+} \]

where

$2K < R_O < 20K$

and $V_5$ is voltage between pin 5 and pin 1.
Typical Performance Characteristics

Operating Frequency as a Function of Timing Resistor

Operating Frequency as a Function of Timing Capacitor

Normalized Frequency as a Function of Control Voltage

Power Supply Current

Temperature Stability

VCO Waveforms

Frequency Stability vs Load Resistance (Square Wave Output)

Frequency Stability vs Load Impedance (Triangle Output)

Square Wave Output Characteristics

Triangle Wave Output Characteristics

AC Test Circuit

TL/H/7854–4

TL/H/7854–5

TL/H/7854–6
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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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