

LM566C Voltage Controlled Oscillator

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

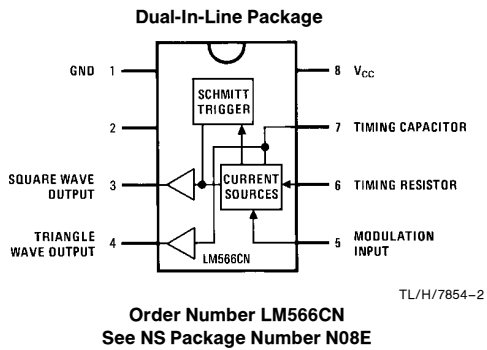
- Wide supply voltage range: 10V to 24V
- Very linear modulation characteristics

- 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

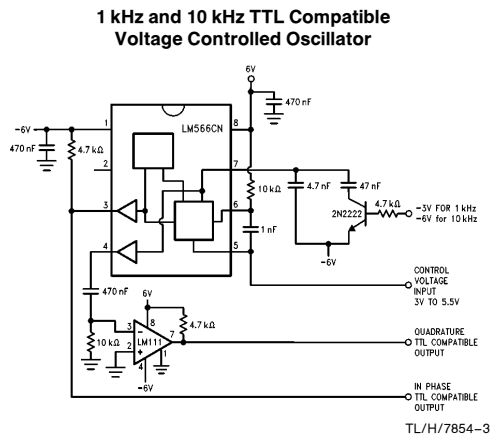
Applications

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

Connection Diagram



Typical Application



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 $V_{CC} = 12V, T_A = 25^\circ C, AC$ Test Circuit

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

Note 1: The maximum junction temperature of the LM566CN is 150°C. For operation at elevated junction temperatures, maximum power dissipation must be derated based on a thermal resistance of 115°C/W, junction to ambient.

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 kΩ 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.

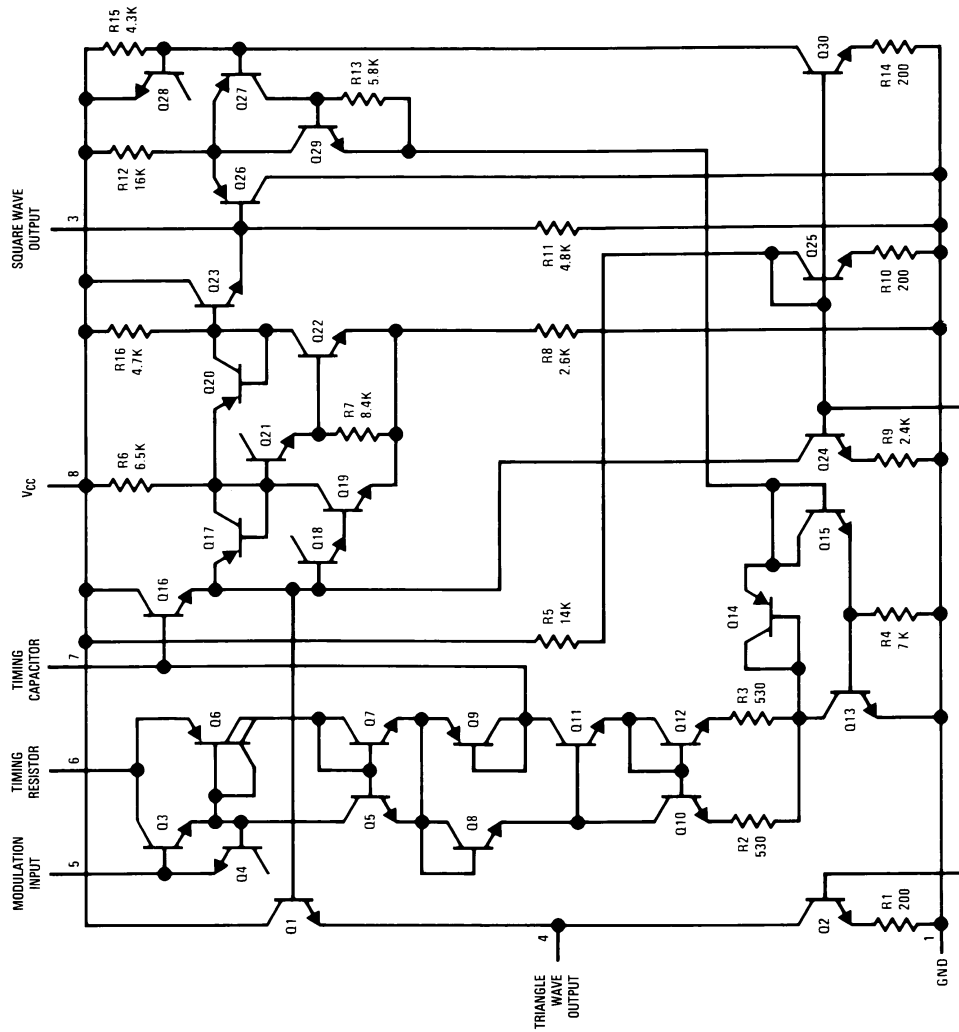
$$f_O = \frac{2.4(V^+ - V_5)}{R_O C_O V^+}$$

where

$$2K < R_O < 20K$$

and V_5 is voltage between pin 5 and pin 1.

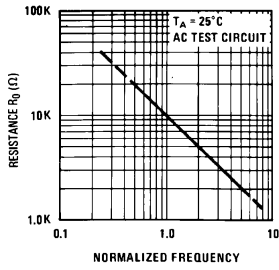
Schematic Diagram



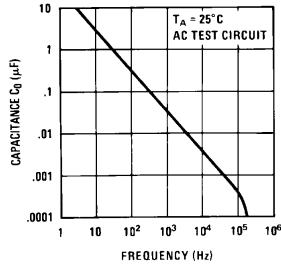
TL/H/7654-1

Typical Performance Characteristics

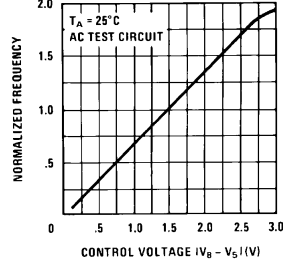
Operating Frequency as a Function of Timing Resistor



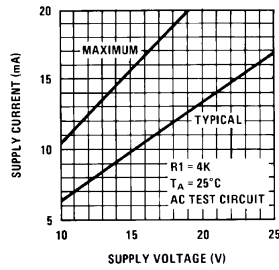
Operating Frequency as a Function of Timing Capacitor



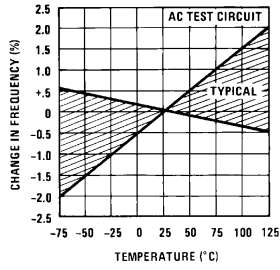
Normalized Frequency as a Function of Control Voltage



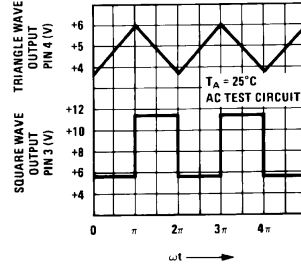
Power Supply Current



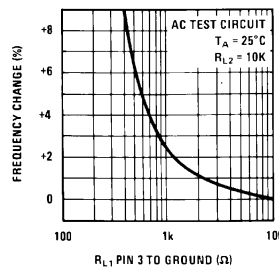
Temperature Stability



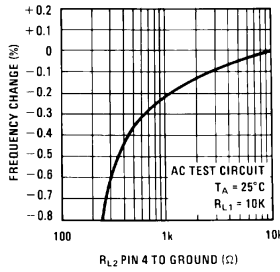
VCO Waveforms



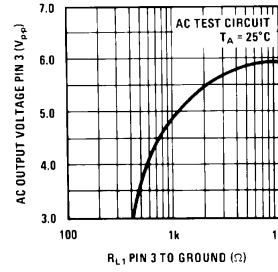
Frequency Stability vs Load Resistance (Square Wave Output)



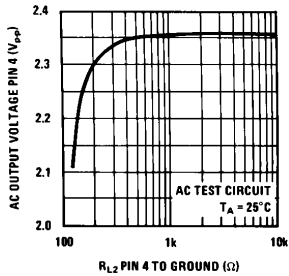
Frequency Stability vs Load Impedance (Triangle Output)



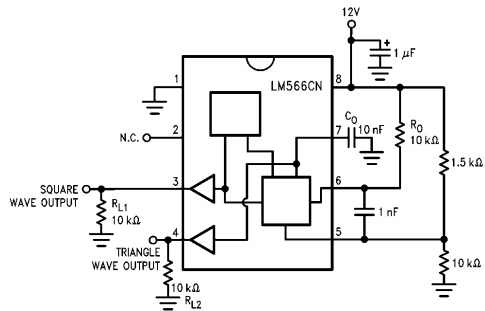
Square Wave Output Characteristics



Triangle Wave Output Characteristics



AC Test Circuit



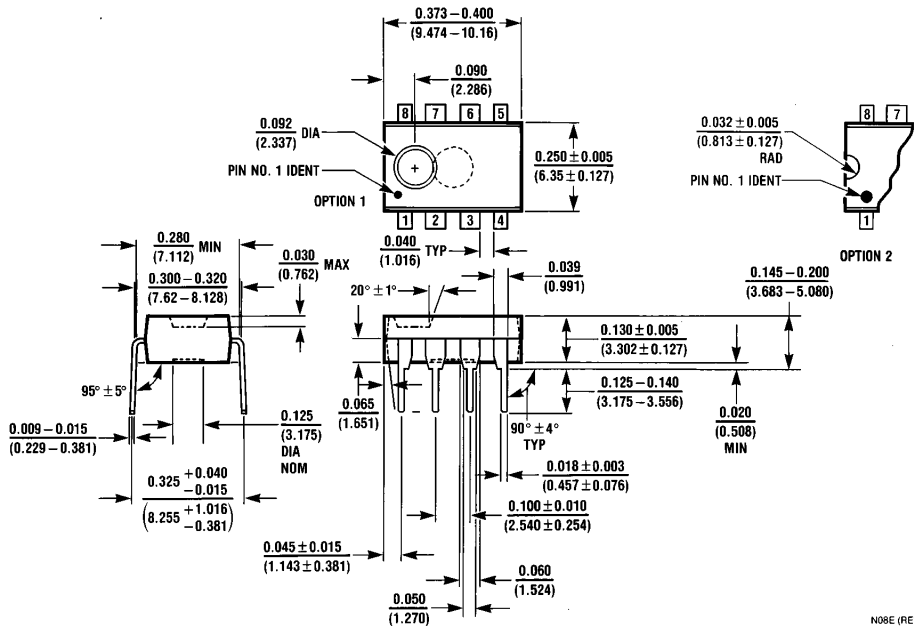
TL/H/7854-4

TL/H/7854-5

TL/H/7854-6



Physical Dimensions inches (millimeters)



Molded Dual-In-Line Package (N)
Order Number LM566CN
NS Package Number N08E

N08E (REV F)

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