



Sweep generator

AN INTERSIL 8038 voltage-controlled oscillator can form the basis for a highly accurate sweep frequency generator when driven by a sawtooth waveform.

In the circuit, Q1 and Q2 form a linear sawtooth generator, with Q1 providing a constant current source charging capacitor C1 until the unijunction transistor Q2 conducts, discharging C1 through R5. Potentiometer RV1 adjusts the period of the waveform, normally about 20 ms, and hence the sweep speed.

Q3 and Q4 are a Darlington pair which reduce the non-linearity of the sawtooth due to loading. RV2 is a sweep width adjustment for the external X-input of an oscilloscope. IC1 enables

the amplitude and average dc level of the sawtooth to be varied independently, thus varying the sweep excursion (RV3) and the centre frequency (RV4).

IC2 provides a buffered input to the function generator and also compensates for the non-linear voltage-to-frequency characteristics of the 8038 by applying feedback through R9 from one of the two current sources on the 8038. IC4 provides a buffered sinewave output.

With zero volts applied to pin 8, i.e: RV4 set to mid-range and RV3 at ground, the frequency of oscillation is given by:

$$f = 0.15 / ((RV6 + R12) \times C4)$$

For the component values shown this

ranges from approximately 6 kHz to 55 kHz. RV6, R12 and C4 may be chosen to provide a centre frequency from 1/1000 Hz to 1 MHz. However, for optimum performance the charging current through RV6 and R12 should be in the range 20 μ A to 2 mA. Once RV6 is set, further variation of the centre frequency is obtained with RV4.

The duty cycle may be varied over a range of 50% by RV9, and a sweep excursion of up to 1000:1 is obtained by adjusting RV3. RV8 adjusts the symmetry and RV9 adjusts the distortion of the sinewave output. The output distortion was found to be less than 1% with a linearity of better than 0.1%.

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