APPLICATION INFORMATION (Cont'd)

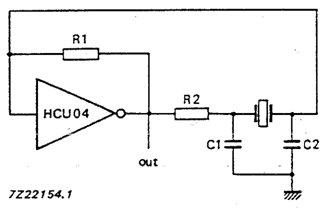

Fig. 13 Crystal oscillator configuration.

Note to Fig. 13

C_1 = 47 pF (typ.)
C_2 = 33 pF (typ.)
R_1 = 1 to 10 MΩ (typ.)

R_2 optimum value depends on the frequency and required stability against changes in V_{CC} or average minimum I_{CC} (I_{CC} is typically 5 mA at V_{CC} = 5 V and f = 10 MHz).

OPTIMUM VALUE FOR R_2

FREQUENCY (MHz)	R_2 (kΩ)	OPTIMUM FOR
3	2 8	minimum required I_{CC} minimum influence due to change in V_{CC}
6	1 4.7	minimum I_{CC} minimum influence by V_{CC}
10	0.5 2	minimum I_{CC} minimum influence by V_{CC}
14	0.5 1	minimum I_{CC} minimum influence by V_{CC}
> 14	replace R_2 by C_3 with a typical value of 35 pF	

EXTERNAL COMPONENTS FOR RESONATOR (f < 1 MHz)

FREQUENCY (kHz)	R_1 (MΩ)	R_2 (kΩ)	C_1 (pF)	C_2 (pF)
10 to 15.9	22	220	56	20
16 to 24.9	22	220	56	10
25 to 54.9	22	100	56	10
55 to 129.9	22	100	47	5
130 to 199.9	22	47	47	5
200 to 349.9	10	47	47	5
350 to 600	10	47	47	5

Where:

All values given are typical and must be used as an initial set-up.

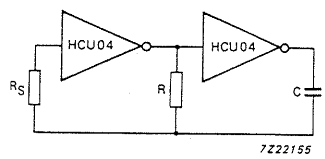

Fig. 14 HCU04 used as an astable multivibrator

Note to Fig. 14

$f = \frac{1}{T} \approx \frac{1}{2.2\ RC}$.

$R_S \approx 2 \times R$.

The average I_{CC} (mA) is approximately 3.5 + 0.05 x f (MHz) x C (pF) at V_{CC} = 5.0 V (for more information refer to DESIGNERS GUIDE).

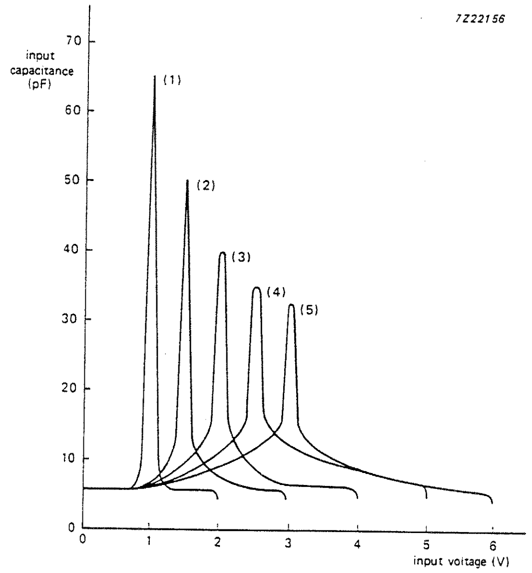

Fig. 15 Typical input capacitance as a function of input voltage.

Note to Fig. 15

1. V_{CC} = 2.0 V.
2. V_{CC} = 3.0 V.
3. V_{CC} = 4.0 V.
4. V_{CC} = 5.0 V.
5. V_{CC} = 6.0 V.

Note to Application information

All values given are typical unless otherwise specified.

APPLICATION INFORMATION

The slow input rise and fall times cause additional power dissipation, this can be calculated using the following formula:

$P_{ad} = f_i \times (t_r \times I_{CCa} + t_f \times I_{CCa}) \times V_{CC}$.

Where:

P_{ad} = additional power dissipation (μW)
f_i = input frequency (MHz)
t_r = input rise time (μs); 10% — 90%
t_f = input fall time (μs); 10% — 90%
I_{CCa} = average additional supply current (μA)

Average I_{CCa} differs with positive or negative input transitions, as shown in Figs 14 and 15.

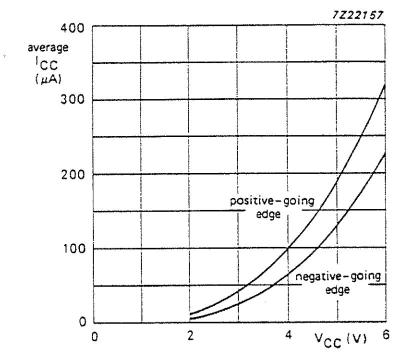

Fig. 14 Average I_{CC} for HC Schmitt trigger devices; linear change of V_i between 0.1 V_{CC} to 0.9 V_{CC}.

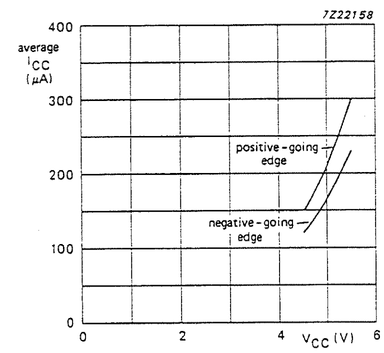

Fig. 15 Average I_{CC} for HCT Schmitt trigger devices; linear change of V_i between 0.1 V_{CC} to 0.9 V_{CC}.

HC/HCT14 used in a relaxation oscillator circuit, see Fig. 16.

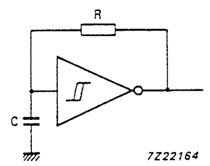

Fig. 16 Relaxation oscillator using HC/HCT14.

Note to Fig. 16

HC : $f = \frac{1}{T} \approx \frac{1}{0.8\ RC}$

HCT: $f = \frac{1}{T} \approx \frac{1}{0.67\ RC}$

Note to Application information

All values given are typical unless otherwise specified.