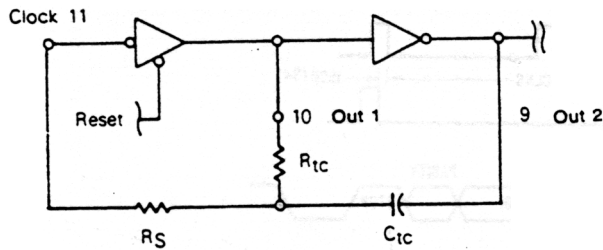


# INFORMACIÓN PARA EL DISEÑO DE OSCILADORES CMOS

FIGURE 3 — OSCILLATOR CIRCUIT USING RC CONFIGURATION



$$f \approx \frac{1}{2.3 R_{tc} C_{tc}}$$

if  $1 \text{ kHz} \leq f \leq 100 \text{ kHz}$   
and  $2R_{tc} < R_s < 10R_{tc}$   
(f in Hz, R in ohms, C in farads)

The formula may vary for other frequencies. Recommended maximum value for the resistors is  $1 \text{ M}\Omega$ .

TYPICAL RC OSCILLATOR CHARACTERISTICS

FIGURE 4 — RC OSCILLATOR STABILITY

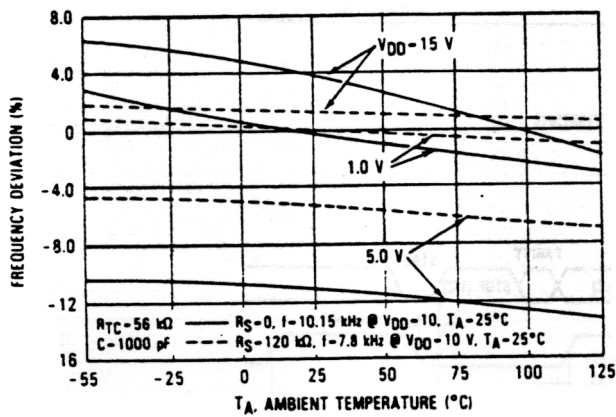


FIGURE 5 — RC OSCILLATOR FREQUENCY AS A FUNCTION OF  $R_{TC}$  AND C

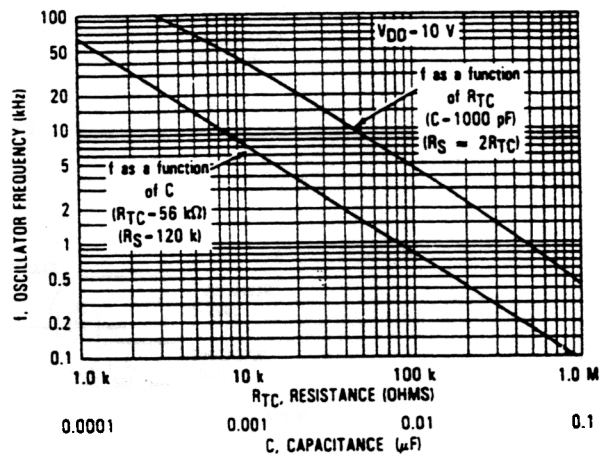


FIGURE 6 — TYPICAL CRYSTAL OSCILLATOR CIRCUIT

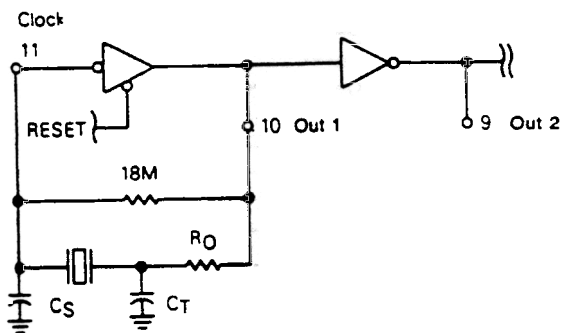


FIGURE 7 — TYPICAL DATA FOR CRYSTAL OSCILLATOR CIRCUIT

Characteristic	500 kHz Circuit	32 kHz Circuit	Unit
<b>Crystal Characteristics</b>			
Resonant Frequency	500	32	kHz
Equivalent Resistance, $R_s$	1.0	6.2	kΩ
<b>External Resistor/Capacitor Values</b>			
$R_O$	47	750	kΩ
$C_T$	82	82	pF
$C_S$	20	20	pF
<b>Frequency Stability</b>			
Frequency Changes as a Function of $V_{DD}$ ( $T_A = 25^\circ\text{C}$ )			
$V_{DD}$ Change from 5.0 V to 10 V	+6.0	+2.0	ppm
$V_{DD}$ Change from 10 V to 15 V	+2.0	+2.0	ppm
Frequency Change as a Function of Temperature ( $V_{DD} = 10 \text{ V}$ )			
$T_A$ Change from $-55^\circ\text{C}$ to $+25^\circ\text{C}$ Complete Oscillator*	+100	+120	ppm
$T_A$ Change from $+25^\circ\text{C}$ to $+125^\circ\text{C}$ Complete Oscillator*	-160	-560	ppm

\*Complete oscillator includes crystal, capacitors, and resistors.