



MOTOROLA

MC14450

CMOS SSI

(LOW-POWER COMPLEMENTARY MOS)

**OSCILLATOR/2¹⁶ DIVIDER/
BUFFER**

**OSCILLATOR/2¹⁶ DIVIDER/BUFFER
with Integrated Feedback Capacitor**

The MC14450 consists of an oscillator, 16-stage divider, and two buffers in a single monolithic structure. This circuit employs complementary MOS devices for low-voltage operation and extremely low power dissipation. It finds primary use in crystal controlled timing circuitry, and is particularly suited for wristwatch and low-voltage clock operation.

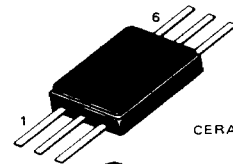
The oscillator section has an output capacitor integrated on the chip. The addition of a crystal, an input capacitor, and a feedback resistor is all that is necessary to complete the oscillator circuit.

The divider section consists of a 16-stage binary divider. Two outputs are provided, 180 degrees out of phase. The outputs of the last six stages of the divider are used to gate the output pulses, providing narrow output pulse widths. Both outputs are buffered to provide fast rise and fall times, and to maximize energy transfer to the load for the pulse duration.

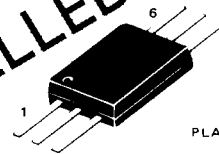
The MC14450 utilizes a 1.58 volt silver oxide battery, and provides peak output pulse voltages of more than 1.20 volts with a 5.2 kilohm load.

This device provides a divide-by-65,536 function and can be operated at frequencies to 1.0 MHz. When operated at 32.768 kHz, it provides 0.5 Hz, 1.563% duty cycle alternating output pulses.

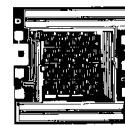
- Extremely Low Operating Current Consumption: 4.0 μ A Typical
- Typical Power Supply = 1.58 V
- Inverting Amplifier with Integrated Feedback Capacitor
- Gated and Buffered Outputs
- Diode Protection on Input
- High Output Drive at Low Voltage



**L SUFFIX
CERAMIC PACKAGE
CASE 688**



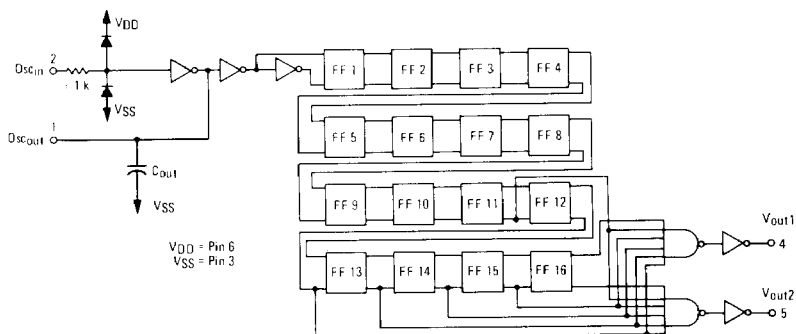
**P SUFFIX
PLASTIC PACKAGE
CASE 704**



**MCC PREFIX
CHIP**

PRODUCT CANCELLED

BLOCK DIAGRAM



7

MAXIMUM RATINGS (Voltages referenced to V_{SS} , Pin 3.)

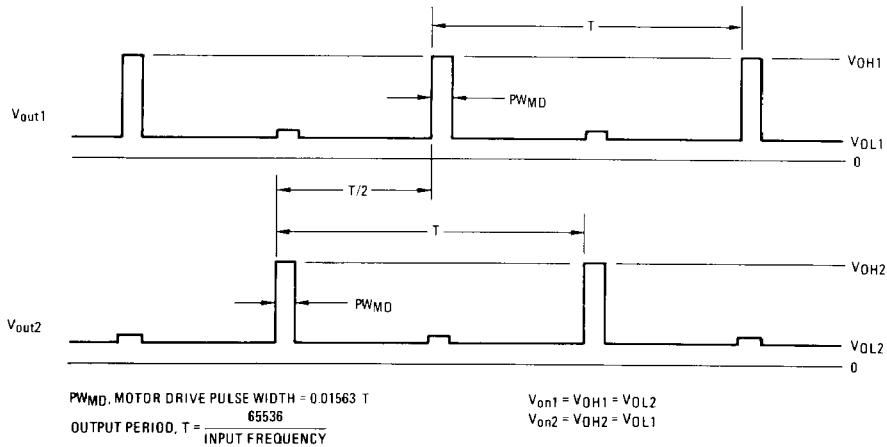
Rating	Symbol	Value	Unit
DC Supply Voltage	V_{DD}	+3.0 to -0.5	Vdc
Input Voltage, All Inputs	V_{in}	$V_{DD} + 0.5$ to $V_{SS} - 0.5$	Vdc
DC Current Drain per Pin	I	10	mAdc
Operating Temperature Range	T_A	0 to +50	$^{\circ}C$
Storage Temperature Range	T_{stg}	-30 to +85	$^{\circ}C$

This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields; however, it is advised that normal precautions be taken to avoid application of any voltage higher than maximum rated voltages to this high impedance circuit. For proper operation it is recommended that V_{in} and V_{out} be constrained to the range $V_{SS} \leq (V_{in} \text{ or } V_{out}) \leq V_{DD}$. Unused inputs must always be tied to an appropriate logic voltage level (e.g., either V_{SS} or V_{DD}).

ELECTRICAL CHARACTERISTICS ($V_{DD} = 1.58$ Vdc, $V_{SS} = 0$, $T_A = 25^{\circ}C$ unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Power Supply Operating Range	V_{DD}	1.3	1.5	3.0	Vdc
Output Voltage (No Load)	V_{OH}	1.4	1.5	-	Vdc
	V_{OL}	-	0.0	0.1	Vdc
Output Drive Current ($V_{OH} = 1.3$ Vdc) ($V_{OL} = 0.2$ Vdc)	I_{OH}	700	-	-	μ Adc
	I_{OL}	1000	-	-	μ Adc
Input Current	I_{in}	-	0.00001	-	μ Adc
Quiescent Device Current	I_Q	-	-	1.0	μ Adc
Dynamic Device Current (f = 32.768 kHz, No Output Load) Square Wave, Pin 2 MTQ32A Crystal	I_{DD}	-	2.6	7.0	μ Adc
		-	4.0	-	
Minimum Voltage Required for Oscillator Start	V_{DDS}	-	1.4	1.5	Vdc
Feedback Oscillator Capacitance	C_{out}	-	20	-	pF

FIGURE 1 – OUTPUT WAVEFORMS



Note: Refer to Figure 4 for connection diagram.

FIGURE 2 – TYPICAL 32-kHz OSCILLATOR CIRCUIT

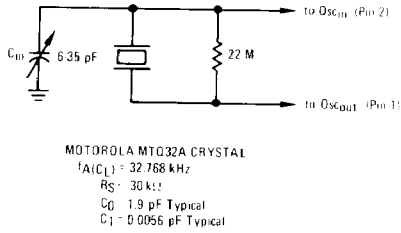
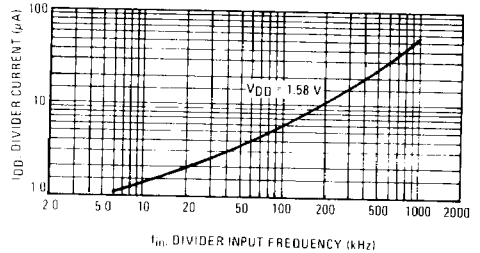


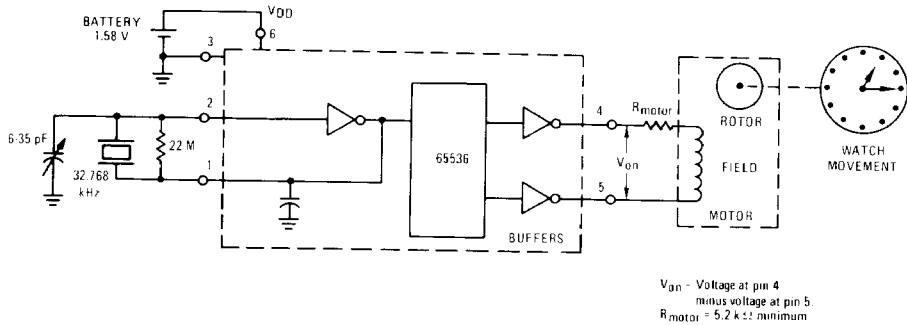
FIGURE 3 – TYPICAL CURRENT DRAIN versus FREQUENCY (No Output Load)



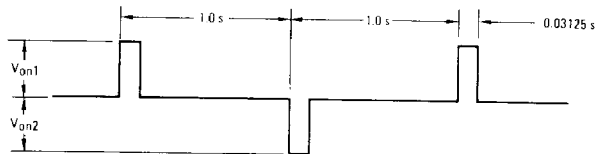
APPLICATIONS INFORMATION

Figure 4 illustrates a typical wristwatch system. The MC14450 drives a rotary motor which rotates 180° with each input pulse.

FIGURE 4 – TYPICAL WRISTWATCH SYSTEM



OUTPUT WAVEFORM ACROSS MOTOR



Circuit diagrams utilizing Motorola products are included as a means of illustrating typical semiconductor applications; consequently, complete information sufficient for construction purposes is not necessarily given. The information has been carefully checked and

is believed to be entirely reliable. However, no responsibility is assumed for inaccuracies. Furthermore, such information does not convey to the purchaser of the semiconductor devices described any license under the patent rights of Motorola Inc. or others.

PACKAGE DIMENSIONS

