

### FEATURES

- Input Quadrature Frequency of Up to 2.5 MHz
- Built In Common Mode Noise Rejection Circuit
- Selectable Output Mode as Pulse and Direction or Pulse and Pulse (Normal Mode)
- Selectable Output Pulses in Multiples of x1, x2, and x4, and Even Frequency Division from 1/2 to 1/56
- Up to 10 MHz Clock Frequency

### APPLICATIONS

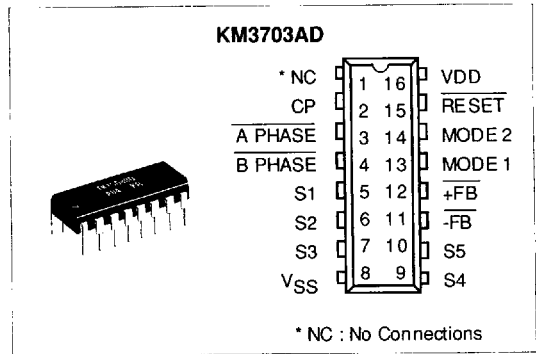
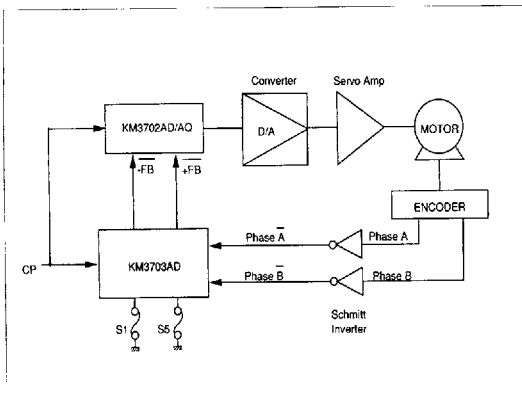
- Quadrature Encoders
- Feedback Pulse Decoder
- For Use with any Application that Requires the Discrimination of Rotation by using a Quadrature Encoder

\*See KM3703AD Operation Manual for further detail.

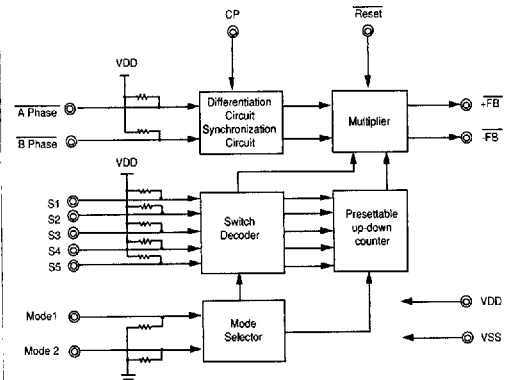
### DESCRIPTION

KM3703AD is a quadrature encoder interface designed for closed-loop systems which discriminates direction. The output can be selected as pulse and direction signals or pulse and pulse signals. The output pulses are synchronized with the clock pulse and used as feedback pulses, +FB and -FB. S1 - S5 are used to determine the multiplication and division ratio settings.

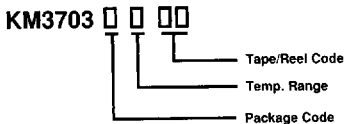
### APPLICATION



### BLOCK DIAGRAM



### ORDERING INFORMATION



|                     |                    |                              |
|---------------------|--------------------|------------------------------|
| <b>PACKAGE CODE</b> | <b>TEMP. RANGE</b> | <b>TAPE/REEL CODE</b>        |
| D: Plastic Dip      | A: -20 to +75 °C   | BX: Bulk/Bag<br>MG: Magazine |

## ABSOLUTE MAXIMUM RATINGS

Input Voltage .....  $V_{SS} - 0.3$  to  $V_{DD} + 0.3$ V  
 Input Voltage .....  $V_{SS} - 0.3$  to  $V_{DD} + 7.0$ V  
 Power Dissipation ..... 460 mW  
 Junction Temperature ..... 150 °C

Storage Temperature Range ..... -65 to +150 °C  
 Operating Temperature Range ..... -20 to +75 °C  
 Lead Soldering Temp. (10 sec.) ..... 300 °C

## ELECTRICAL CHARACTERISTICS

### D. C. CHARACTERISTICS

Test conditions:  $V_{SS} = 0$  V,  $T_A = -20$  to +75 °C

| SYMBOL                          | PARAMETER                 | TEST CONDITIONS   | MIN  | TYP | MAX      | UNITS |
|---------------------------------|---------------------------|-------------------|------|-----|----------|-------|
| $V_{DD}$                        | Supply Voltage            |                   | 4.75 | 5.0 | 5.25     | V     |
| $I_{DD}$                        | Supply Current            | $V_{DD} = 5.0$ V  |      |     | 5.0      | mA    |
| <b>Input Signal 1 (Note 1)</b>  |                           |                   |      |     |          |       |
| $V_{IL1}$                       | Low Level Input Voltage   |                   | 0.0  |     | 0.8      | V     |
| $V_{IH1}$                       | High Level Input Voltage  |                   | 2.0  |     | $V_{DD}$ | V     |
| $I_{LEAK}$                      | Input Leak Current        |                   |      |     | ±10      | µA    |
| <b>Input Signal 2 (Note 2)</b>  |                           |                   |      |     |          |       |
| $V_{IL2}$                       | Low Level Input Voltage   |                   | 0.0  |     | 0.8      | V     |
| $V_{IH2}$                       | High Level Input Voltage  |                   | 2.0  |     | $V_{DD}$ | V     |
| <b>Input Signal 3 (Note 3)</b>  |                           |                   |      |     |          |       |
| $I_{IL1}$                       | Low Level Input Signal    | $V_{IN} + V_{SS}$ | -200 |     | -10      | µA    |
| $I_{IH1}$                       | High Level Input Signal   | $V_{IN} = V_{DD}$ |      |     | ±10      | µA    |
| <b>Input Signal 4 (Note 4)</b>  |                           |                   |      |     |          |       |
| $I_{IL2}$                       | Low Level Output Current  | $V_{IN} = V_{SS}$ |      |     | ±10      | µA    |
| $I_{IH2}$                       | High Level Output Current | $V_{IN} = V_{DD}$ | 10   |     | 200      | µA    |
| <b>Output Signal 5 (Note 5)</b> |                           |                   |      |     |          |       |
| $V_{OL}$                        | Low Level Output Voltage  | $I_{OL} = 1$ mA   |      |     | .4       | V     |
| $V_{OH}$                        | High Level Output Voltage | $I_{OH} = -1$ mA  | 2.4  |     |          | V     |

Note 2: CP

Note 2: A PHASE, B PHASE, S1, S2, S3, S4, S5, MODE 1, MODE 2, RESET

Note 3: A PHASE, B PHASE, S1, S2, S3, S4, S5, RESET

Note 4: MODE 1, MODE 2

Note 5: +FB, -FB

**ELECTRICAL CHARACTERISTICS (CONT.)****A. C. CHARACTERISTICS**Test conditions:  $V_{DD} = 5\text{ V} + 5\%$ ,  $T_A = -20\text{ to }+75\text{ }^\circ\text{C}$ 

| SYMBOL                           | PARAMETER             | TEST CONDITIONS      | MIN         | TYP | MAX            | UNITS         |
|----------------------------------|-----------------------|----------------------|-------------|-----|----------------|---------------|
| <b>CLOCKED SIGNAL 1 (Note 1)</b> |                       |                      |             |     |                |               |
| $T_{CYC}$                        | Clock Pulse Period    |                      | 0.1         |     | 10             | $\mu\text{S}$ |
| $T_W$                            | Clock Pulse Width     |                      | 30          |     | $T_{CYC} - 30$ | ns            |
| $T_{CR}$                         | Clock Pulse Rise Time |                      |             |     | 30             | ns            |
| $T_{CF}$                         | Clock Pulse Fall Time |                      |             |     | 30             | ns            |
| <b>Input Signal 2 (Note 2)</b>   |                       |                      |             |     |                |               |
| $T/W$                            | Input Pulse Width     |                      | $2 T_{CYC}$ |     |                | ns            |
| <b>Reset Signal 3 (Note 3)</b>   |                       |                      |             |     |                |               |
| $T_{RW}$                         | Reset Pulse Width     |                      | $T_{CYC}$   |     |                | $\mu\text{s}$ |
| <b>Output Signal 4 (Note 4)</b>  |                       |                      |             |     |                |               |
| $T_{OD}$                         | Output Delay Time     | $C_L = 60\text{ pF}$ |             |     | 55             | ns            |

Note 2: CP

Note 2: A PHASE, B PHASE, S1, S2, S3, S4, S5, MODE 1, MODE 2, RESET

Note 3: A PHASE, B PHASE, S1, S2, S3, S4, S5, RESET

Note 5: +FB, -FB

**PIN FUNCTION**

| SIGNAL  | PIN NO. | I/O | DESCRIPTION  |
|---------|---------|-----|--|
| VDD     | 16      | --  | Supply Voltage (+5 V $\pm$ 5%)   |
| VSS     | 8       | --  | Ground   |
| CP      | 2       | I   | Clock Input (10 MHz Max.)  |
| A Phase | 3       | I   | A Phase and B Phase for position feedback signals from the encoder with 90° phase shift. |
| B Phase | 4       | I   |  |
| S1 ~ S5 | 5~10    | I   | Multiplication or frequency division ratio switch  |
| -FB     | 11      | O   | - Direction feedback pulse output or direction signal output                             |
| +FB     | 12      | O   | + Direction feedback pulse output or feedback pulse                                      |
| Mode 1  | 13      | I   | Multiplication/Frequency Division selection switch                                       |
| Mode 2  | 14      | I   | Pulse and pulse or pulse and direction output mode switch                                |
| Reset   | 15      | I   | Reset the internal status  |