

SANYO

No. 4866

Unipolar Fixed-Current Chopper-Type 4-Phase Stepping Motor Driver

Overview

The STK6712AMK4 is a unipolar fixed-current chopper-type 4-phase stepping motor driver hybrid IC (HIC) which uses a MOSFET power device. The excitation sequence signal is active high.

Applications

- Serial printer, line printer, and laser beam printer (LBP) paper feed and carriage motor drivers
- PPC scanner and LBP paper feed drivers
- XY plotter pen drivers
- Industrial robot applications, etc.

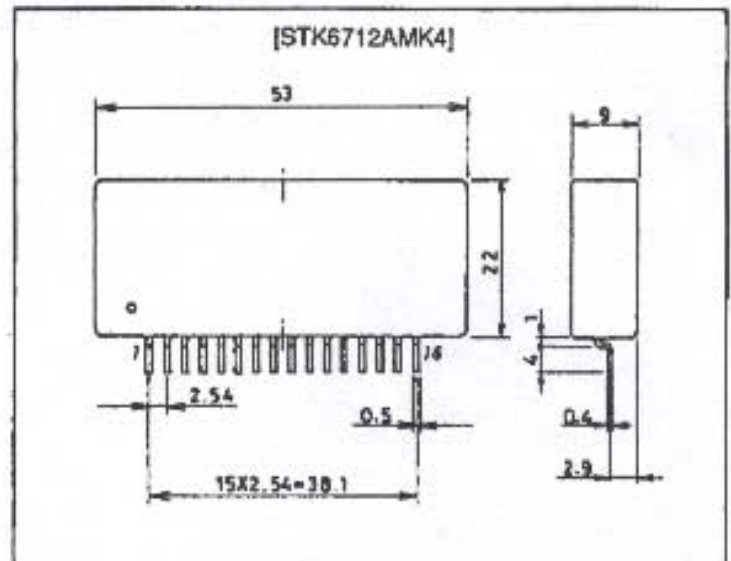
Features

- This IC has the features of the STK6712AMK3, plus a simultaneous input prevention circuit that protects the IC from any malfunction of the excitation signal.
- Self-excitation design means chopping frequency is determined by motor L and R. Supports chopping at 20 kHz or higher.
- Very low number of external components required.
- Wide operating supply voltage range ($V_{CC1} = 18$ to 42V)
- Excitation sequence signal is active high, and is TTL level for direct interfacing to the microcomputer and gate array.
- The unipolar design enables use as a driver for hybrid, PW, or VR type stepping motors.
- Supports W1-2 phase operation, with a dual Vref pin.

Package Dimensions

unit: mm

4129



Specifications

Maximum Ratings at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage 1	$V_{CC1 \text{ max}}$	No input signal	52	V
Maximum supply voltage 2	$V_{CC2 \text{ max}}$	No input signal	7	V
Maximum phase current	$I_{OH \text{ max}}$	per phase, $R_L = 5 \Omega$, 10 mH, 0.5 s 1 pulse, V_{CC} input	2.5	A
Substrate temperature	$T_c \text{ max}$		105	$^\circ\text{C}$
Junction temperature	$T_j \text{ max}$		150	$^\circ\text{C}$
Storage temperature	T_{stg}		-40 to +125	$^\circ\text{C}$
Repeated avalanche resistance	$E_{ar \text{ max}}$		38	mJ

Allowable Operating Ranges at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage 1	V_{CC1}	With input signal	18 to 42	V
Supply voltage 2	V_{CC2}	With input signal	4.75 to 5.25	V
Phase driver voltage resistance	V_{DSS}		(min) 120	V
Phase current	$I_{OH \text{ max}}$	Duty 50%	(max) 1.7	A

Junction Thermal Resistance

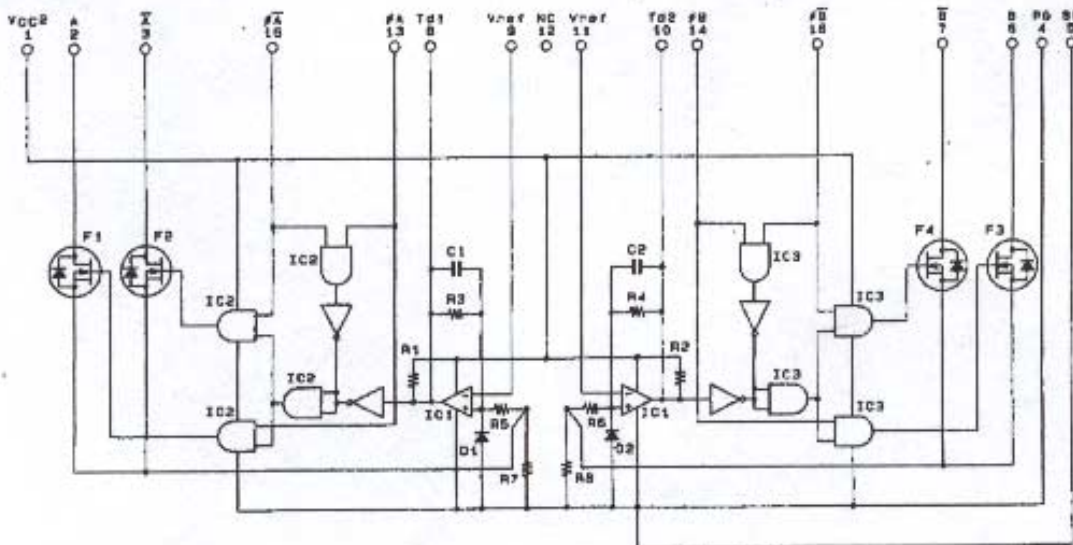
Parameter	Symbol	Conditions	Ratings	Unit
Power FET	θ_{j-c}		13.5	$^\circ\text{C/W}$

Electrical Characteristics at $T_c = 25^\circ\text{C}$, $V_{CC1} = 36 \text{ V}$, $V_{CC2} = 5 \text{ V}$

Parameter	Symbol	Conditions	min	typ	max	Unit
Output saturation voltage	V_{ST}	$R_L = 23 \Omega$, $V_{IN} = 2.4 \text{ V}$		1.1	1.5	V
Output current (average)	$I_{o \text{ ave}}$	$R/L = 3.5 \Omega/3.8 \text{ mH}$, $V_{IN} = 2.4 \text{ V}$ per phase	0.45	0.50	0.55	A
Pin current dissipation (average)	I_{CC2}	Load: $R = 3.5 \Omega$, $L = 3.8 \text{ mH}$, $V_{IN} = 2.4 \text{ V}$ per phase		15	25	mA
FET diode voltage	V_{df}	$I_{df} = 1.0 \text{ A}$		1.2	1.8	V
TTL Input ON voltage	V_{IH}	Input voltage when F1, 2, 3, 4 ON	2.0			V
TTL Input OFF voltage	V_{IL}	Input voltage when F1, 2, 3, 4 OFF			0.8	V
Switching time	t_{ON}	$R_L = 24 \Omega$, $V_{IN} = 2.4 \text{ V}$		50		ns
	t_{OFF}	$R_L = 24 \Omega$, $V_{IN} = 2.4 \text{ V}$		0.2		μs

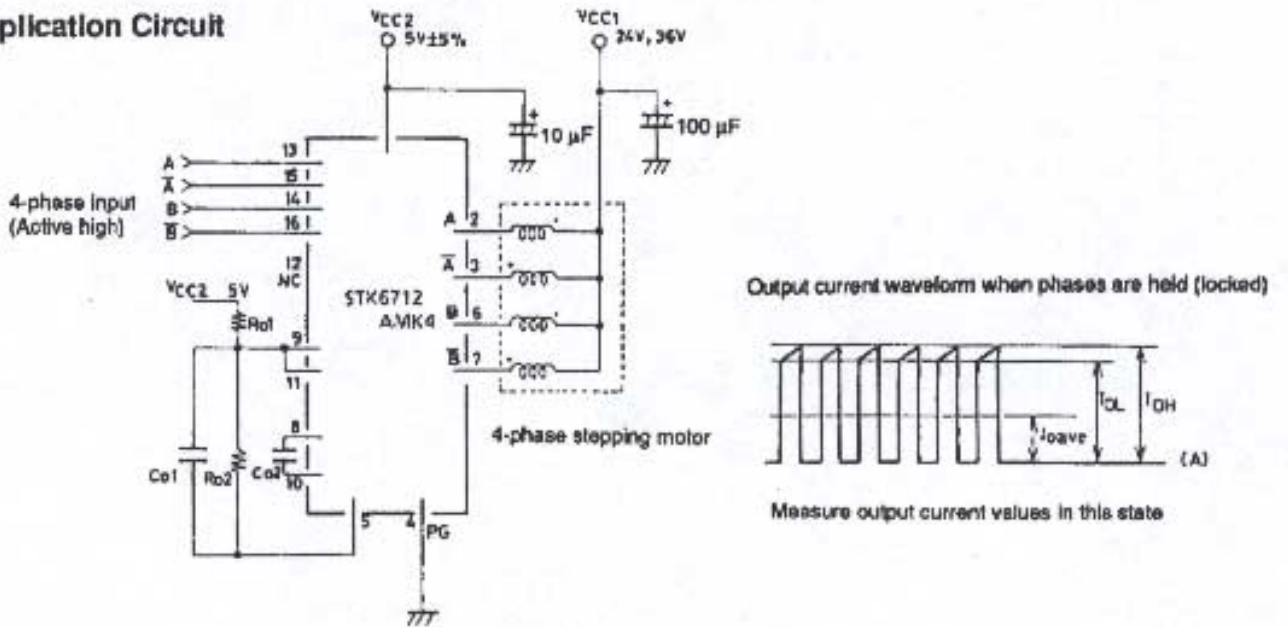
Note: With constant voltage power supply.

Internal Equivalent Circuit



402881

Sample Application Circuit



Note: For reference, when $I_{OH} = 1.0 \text{ A}$, $R_{O1} = 6.8 \text{ k}\Omega$ and $R_{O2} = 390 \Omega$.

$$I_{OH} = K \times \frac{R_{O2}}{R_{O1} + R_{O2}} \times V_{CC2}/R_7$$

$$K = 1.2$$

$$R_7 = R_8 = 0.33 \Omega \pm 3\%$$

To reduce noise during motor hold, it is possible to mount $C_{O1} = 0.01 \mu\text{F}$ and $C_{O2} = 100\text{-}200 \text{ pF}$. Normally these are not required.

STK6712AMK4 Circuit Operation

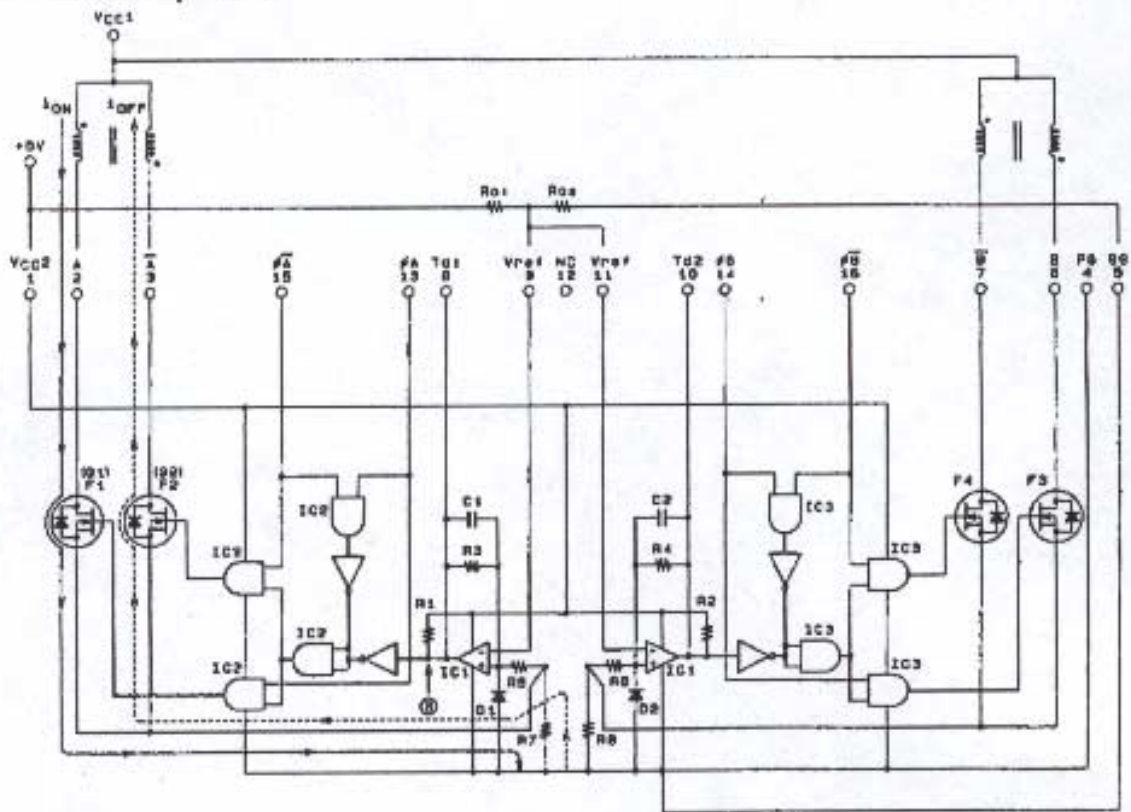


Fig. 1 STK6712AMK4 Internal Equivalent Circuit