No. 4867A

STK6712BMK4

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

Overview

The STK6712BMK4 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 low.

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.

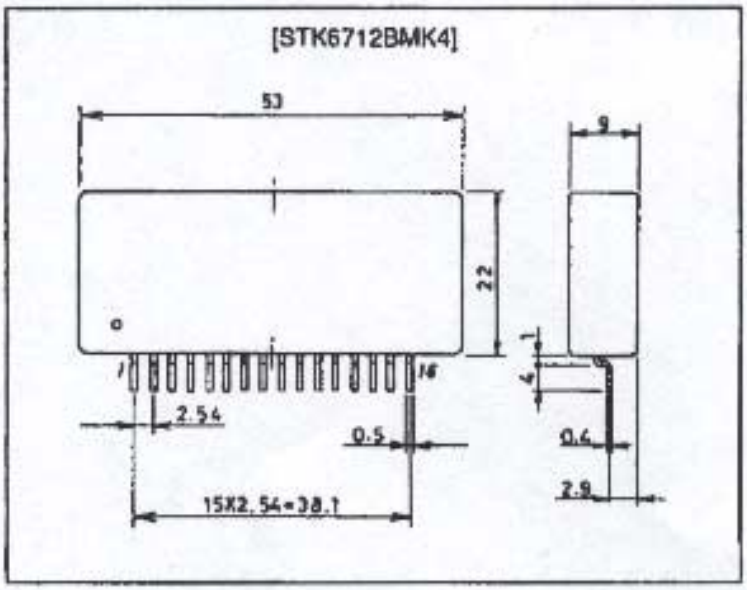
Features

- This IC has the features of the STK6712BMK3, 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 ($V_{CC}1$ = 18 to 42V)
- Excitation sequence signal is active low, 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 Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage 1	$V_{CC}1$ max	No input signal	52	V
Maximum supply voltage 2	$V_{CC}2$ max	No input signal	7	V
Maximum phase current	I_{OH} max	per phase, R/L = 5 Ω, 10 mH, 0.5 s 1 pulse, V_{CC} input	2.5	A
Substrate temperature	Tc max		105	°C
Junction temperature	Tj max		150	°C
Storage temperature	Tstg		–40 to +125	°C
Repeated avalanche resistance	Ear max		38	mJ

Allowable Operating Ranges at Ta = 25°C

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

Junction Thermal Resistance

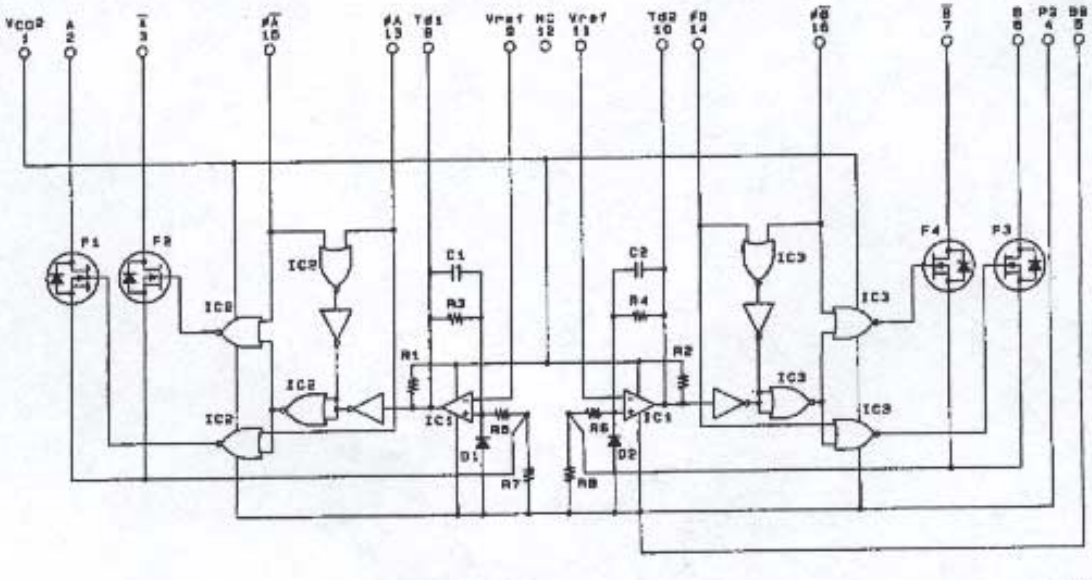
Parameter	Symbol	Conditions	Ratings	Unit
Power FET	θj-c		13.5	°C/W

Electrical Characteristics at Tc = 25°C, $V_{CC}1$ = 36 V, $V_{CC}2$ = 5 V

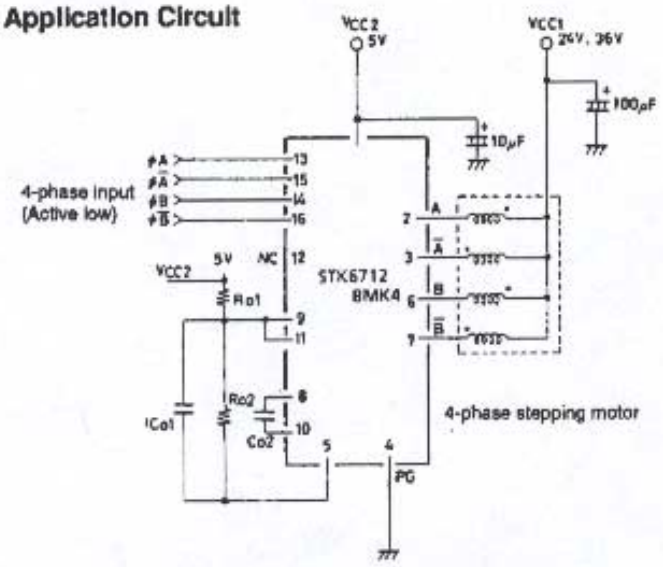
Parameter	Symbol	Conditions	min	typ	max	Unit
Output saturation voltage	V_{ST}	R_L = 23 Ω, V_{IN} = 0.8 V		1.1	1.5	V
Output current (average)	Io ave	R/L = 3.5 Ω/3.8 mH, V_{IN} = 0.8 V per phase	0.45	0.50	0.55	A
Pin current dissipation (average)	$I_{CC}2$	Load, R = 3.5 Ω, L = 3.8 mH, V_{IN} = 0.8 V per phase		15	25	mA
FET diode voltage	Vdf	Idf = 1.0 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 Ω, V_{IN} = 0.8 V		100		ns
	t_{OFF}	R_L = 24 Ω, V_{IN} = 0.8 V		0.2		µs

Note: With constant voltage power supply.

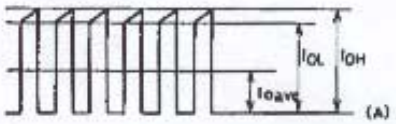
Internal Equivalent Circuit



Sample Application Circuit



Output current waveform when phases are held (locked)



Measure output current values in this state.

Note: For reference, when I_{OH} = 1.1 A, R_O1 = 6.8 kΩ and R_O2 = 390 Ω.

$$I_{OH} = K \times \frac{R_O2}{R_O1 + R_O2} \times V_{CC}2/R_7$$

K = 1.3

R7 = R8 ≈ 0.33 Ω ± 3%

To reduce noise during motor hold, it is possible to mount C_O1 = 0.01 μF and C_O2 = 100-200 pF. Normally these are not required.

STK6712BMK4 Circuit Operation

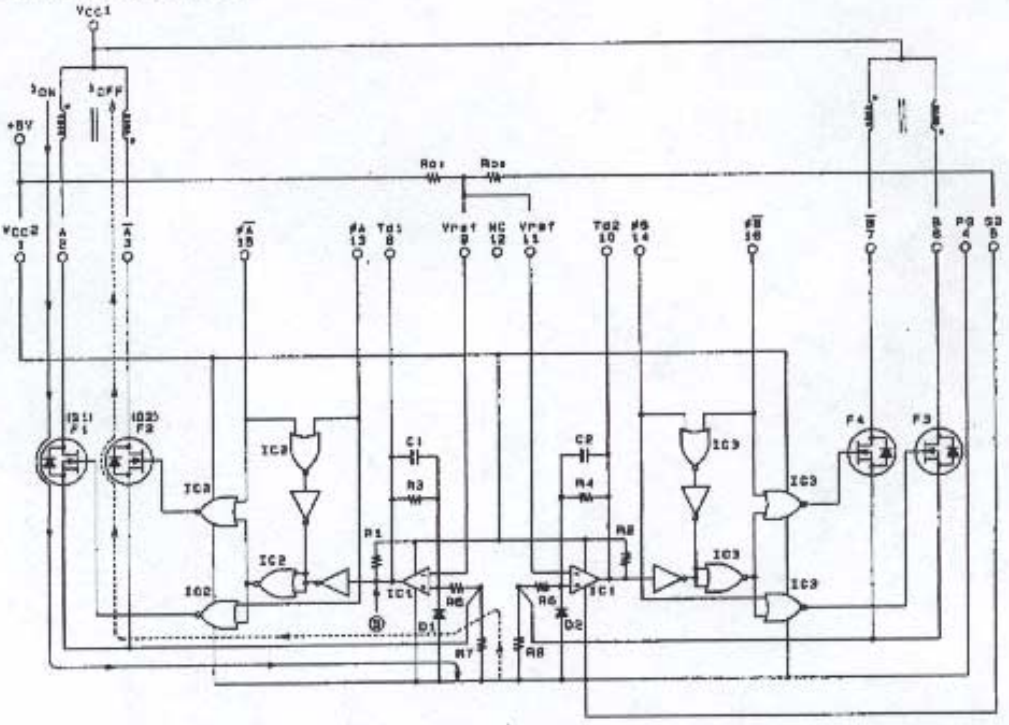


Fig. 1 STK6712BMK4 Internal Equivalent Circuit