



# STK6713BMK3

## Stepping Motor Fixed-current Driver

### Overview

The STK6713BMK3 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, PPC, laser beam printer (LBP) paper feed and carriage motor drivers

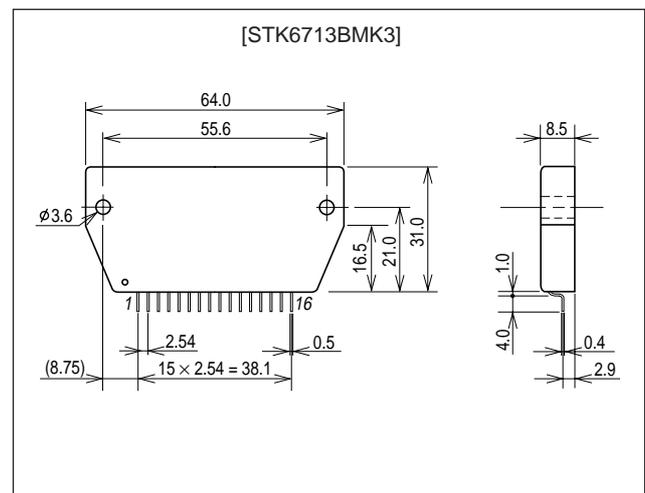
### Features

- Fixed-current driver device which uses MOSFET
- Input signal supporting TTL level (Active Low drive type)
- On-chip current detection resistor

### Package Dimensions

unit: mm

#### 4131



### Specifications

#### Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage 1	V <sub>CC1max</sub>	No input signal	52	V
Maximum supply voltage 2	V <sub>CC2max</sub>	No input signal	7	V
Maximum phase current	I <sub>OH max</sub>	per phase, R/L = 5Ω/10mH, 0.5 s 1 pulse, V <sub>CC</sub> input	3.9	A
Repeated avalanche handling capability	E <sub>ar max</sub>		42	mJ
Storage temperature	T <sub>stg</sub>		-40 to +125	°C
Junction temperature	T <sub>j max</sub>		150	°C
Operating substrate temperature	T <sub>c max</sub>		105	°C

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

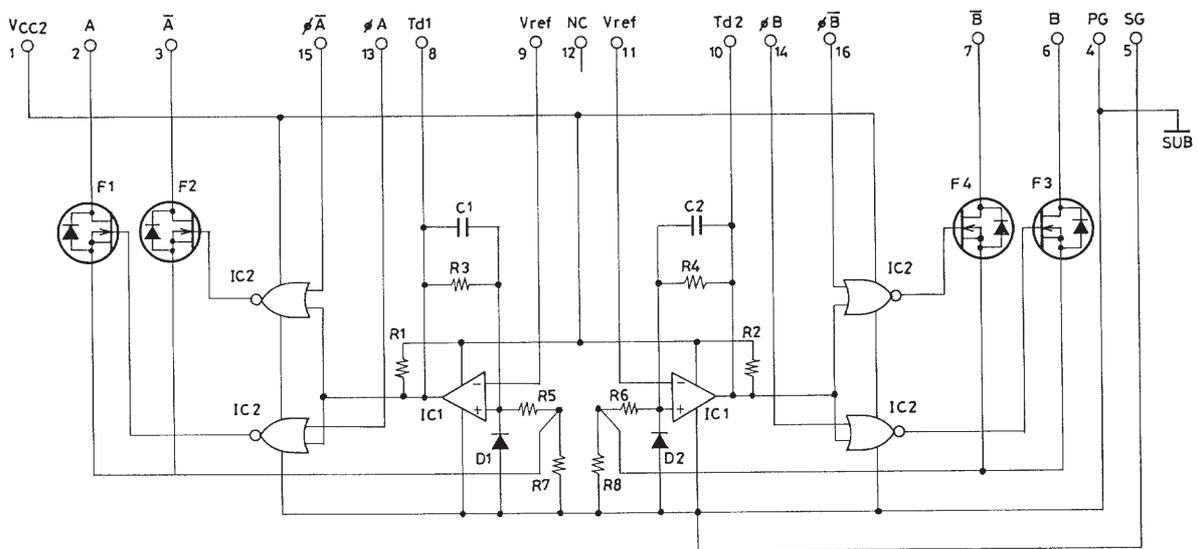
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Supply voltage 1	$V_{CC1}$	With input signal	18		42	V
Supply voltage 2	$V_{CC2}$	With input signal	4.75	5.0	5.25	V
Phase driver withstand voltage	$V_{DSS}$		100			V
Phase current	$I_{OH}$ max	Duty 50%			3.0	A

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

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output saturation voltage	$V_{ST}$	$R_L=14\Omega$ , $V_{IN}=0.8\text{V}$		1.5	2.1	V
Output current (average)	$I_{O\text{ ave}}$	Load; $R/L=3.5\Omega/3.8\text{mH}$ , $V_{IN}=0.8\text{V}$ per phase	0.477	0.53	0.583	A
Pin 1 current consumption (average)	$I_{CC2}$	Load; $R/L=3.5\Omega/3.8\text{mH}$ , $V_{IN}=0.8\text{V}$ per phase		10	20	mA
FET diode forward voltage	$V_{df}$	$I_f = 1.0\text{A}$		1.2	1.8	V
TTL input ON voltage	$V_{IH}$	Input voltage when F1, 2, 3, 4 OFF	2.0			V
TTL input OFF voltage	$V_{IL}$	Input voltage when F1, 2, 3, 4 ON			0.8	V
Switching time	$t_{ON}$	$R_L=24\Omega$ , $V_{IN}=0.8\text{V}$		120		ns
	$t_{OFF}$	$R_L=24\Omega$ , $V_{IN}=0.8\text{V}$		0.2		$\mu\text{s}$

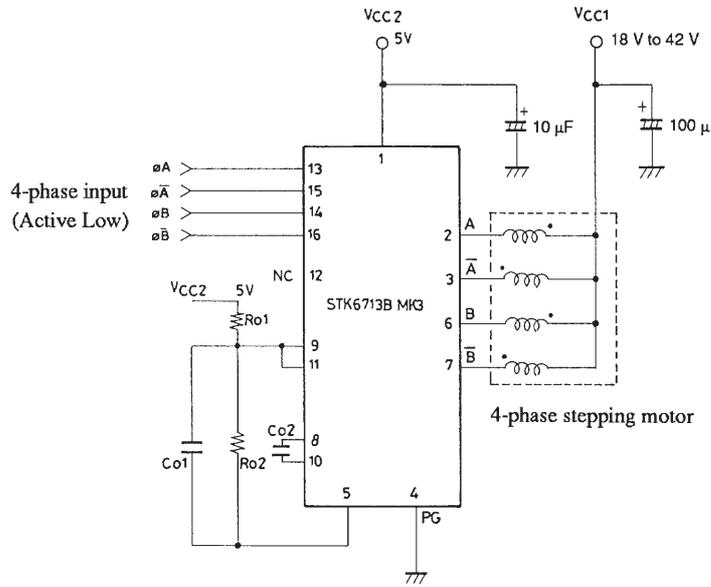
Note: With regulated voltage power supply.

### Equivalent Circuit



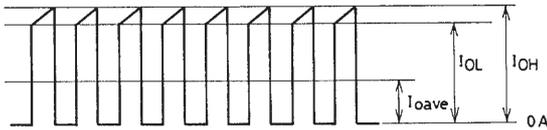
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## Application Circuit



Note: For reference, when  $I_{OH} \approx 1.1A$ ,  $R_{O1} = 6.8k\Omega$  and  $R_{O2} = 390\Omega$ .

Output current waveform when phases held (locked)



Measure output current values in this state.

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

$$K \approx 1.3$$

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

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

Note: Both input signals cannot be L at the same time.

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