

SANYO

No. 5167

STK681-050**Bidirectional DC Brush-Type
Motor Driver ($I_O = 5A$)****Overview**

The STK681-050 is a bidirectional DC brush-type motor driver IC with brake function that incorporates MOSFET power elements.

Applications

- PPC drum and scanner motor drivers
- LBP drum motor drivers
- Printer head and carriage motor drivers
- General DC motor applications

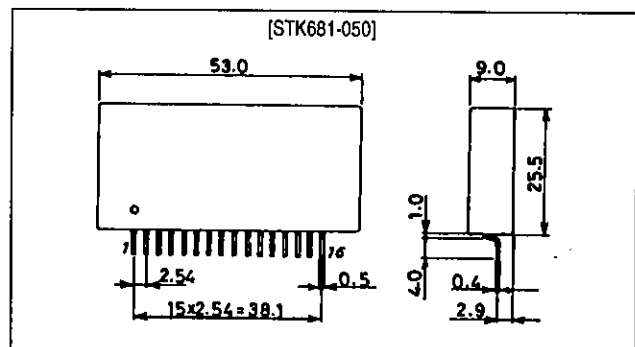
Features

- H-bridge output stage configuration employing 4 MOSFETs
- Independent TTL/CMOS-level control for each MOSFET (4-pin control)
- External signal control of forward, reverse and brake operation
- MOSFETs supporting 12A peak starting current and 13.5A peak brake current (F3 and F4 ON)
- DC input supporting saturation operation
- Only 1 charge pump electrolytic capacitor required, compared with the STK6875 which requires 2

Package Dimensions

unit: mm

4163

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

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage 1	$V_{CC1 \text{ max}}$	No signal	50	V
Maximum supply voltage 2	$V_{CC2 \text{ max}}$	No signal	10	V
Maximum input voltage	$V_{in \text{ max}}$	Pins 1, 3, 12, 14, 15	± 10	V
Maximum motor starting current	$I_O \text{ peak}$	1 pulse, pulse width = 70ms	12	A
Maximum motor brake current 1 (F1 and F2 ON)	$I_{OB1 \text{ peak}}$	1 pulse, pulse width = 70ms	12	A
Maximum motor brake current 2 (F3 and F4 ON)	$I_{OB2 \text{ peak}}$	1 pulse, pulse width = 25ms	16	A
		1 pulse, pulse width = 100ms	13.5	A
Allowable power dissipation 1	$Pd1 \text{ max}$	No heatsink, total loss	5.2	W
Allowable power dissipation 2	$Pd2 \text{ max}$	Arbitrary large heatsink, per MOSFET	25	W
Thermal resistance	θ_{j-c}	per MOSFET	5	$^\circ\text{C/W}$
Junction temperature	$T_J \text{ max}$	per MOSFET	150	$^\circ\text{C}$
Operating substrate temperature	$T_c \text{ max}$		105	$^\circ\text{C}$
Storage temperature	T_{stg}		-40 to +125	$^\circ\text{C}$

STK681-050

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

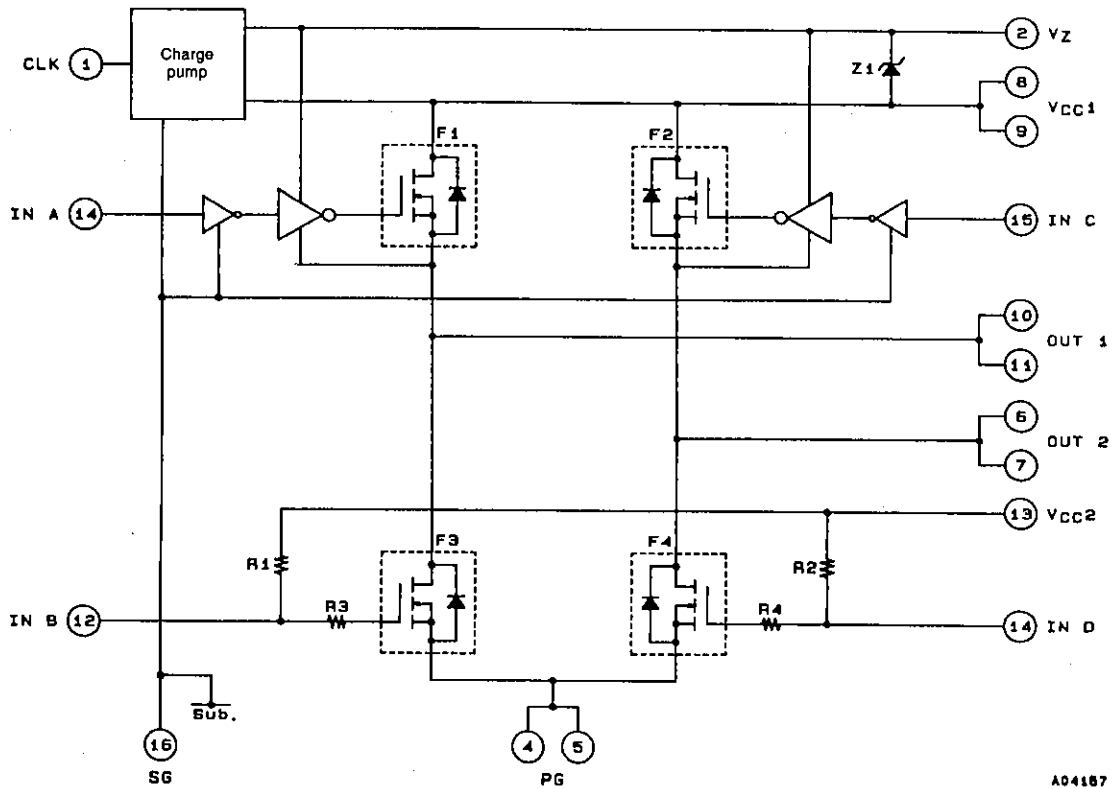
Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage 1	V_{CC1}	With signal	18 to 42	V
Supply voltage 2	V_{CC2}	With signal	4.75 to 7.00	V
Input voltage	V_{in}	Pins 1, 3, 12, 14, 15	-7 to +7	V
Motor output current	I_O	PWM frequency $f_p = 25\text{kHz}$	5	A
Motor starting current	I_{OD}	1 pulse, $t = 200\text{ms}$	8	A
Motor brake current 1 (F1 and F2 ON)	I_{OB1}	Triangle wave, 1 pulse, pulse width = 100ms	11	A
Motor brake current 2 (F3 and F4 ON)	I_{OB2}	Triangle wave, 1 pulse, pulse width = 100ms	13.5	A
PWM frequency	f_p		0 to 30	kHz
CLK input frequency	f_{CLK}	40 to 60% duty	10 to 30	kHz
Sensing voltage	V_S	Between pins 4/5 and ground	0 to 0.6	V
Gate input voltage	V_{IG}	Between pins 3/12 and SG	V_{CC2}	V
MOSFET withstand voltage	V_{OSS}	F1, F2, F3, F4	60	V

Electrical Characteristics at $T_c = 25^\circ\text{C}$, $V_{CC1} = 24\text{V}$, $V_{CC2} = 5.0\text{V}$, $f_{CLK} = 25\text{kHz}$

Parameter	Symbol	Conditions	min	typ	max	Unit
Output saturation voltage 1	V_{st1}	$I_O = 5\text{A}$, F1, F2	-	0.75	1.05	V
Output saturation voltage 2	V_{st2}	$I_O = 5\text{A}$, F3, F4	-	0.43	0.65	V
Output leakage current	I_L	Pins 12, 14, 15 = 0.8V, pin 3 open	-	-	100	μA
		Pins 3, 14, 15 = 0.8V, pin 12 open	-	-	-	-
Supply current	I_{CCO}	Pins 3, 12, 14, 15 = 0.8V	2.0	2.7	4.0	mA
Input ON voltage	V_{IH}	Pins 1, 14, 15	2.0	-	V_{CC2}	V
Input OFF voltage	V_{IL}	Pins 1, 3, 12, 14, 15	-	-	0.80	V
Input ON current	I_{IH}	Pins 1, 14, 15 ($V_{IH} = 2.7\text{V}$)	-	0.21	0.42	mA
Input OFF current	I_{IL}	Pins 3, 12 ($V_{IL} = 0.4\text{V}$)	-	1.0	1.2	mA
Diode forward-bias voltage	V_F	$I_F = 5\text{A}$	-	1.0	1.4	V
Turn ON delay time 1	t_{d-ON1}	F1, F2 ($I_O = 5\text{A}$)	-	0.6	-	μs
Turn OFF delay time 1	t_{d-OFF1}	F1, F2 ($I_O = 5\text{A}$)	-	3.9	-	μs
Turn ON delay time 2	t_{d-ON2}	F3, F4 ($I_O = 5\text{A}$)	-	0.2	-	μs
Turn OFF delay time 2	t_{d-OFF2}	F3, F4 ($I_O = 5\text{A}$)	-	0.6	-	μs

Note: All tests made using a constant-voltage supply.

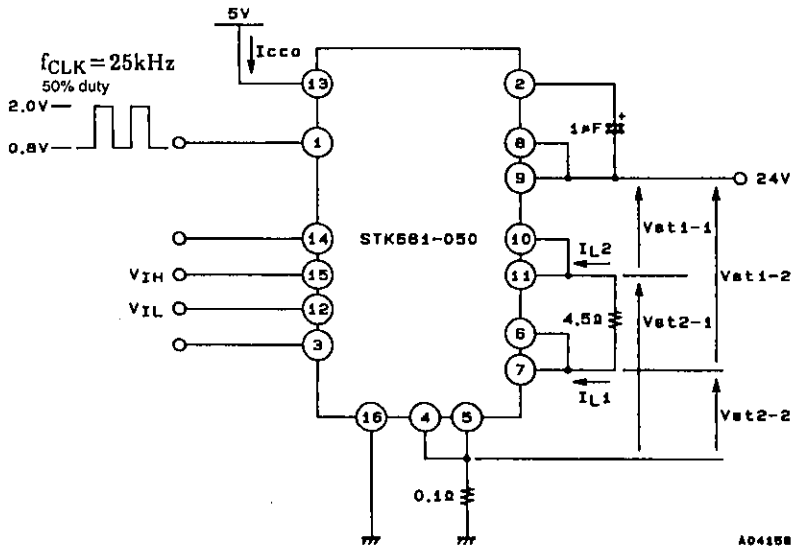
Block Diagram



A04187

Test Circuit

Vst1, Vst2, I_{CCO}, I_L



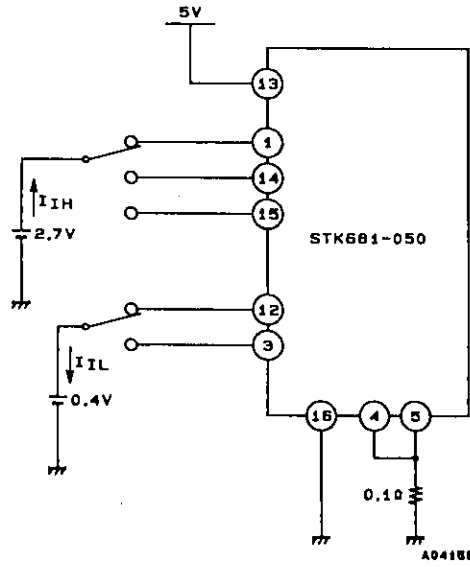
A04188

Test parameter	Input conditions			
	Pin 14	Pin 15	Pin 12	Pin 3
Vst1-1	High	Low	Low	Open
Vst1-2	Low	High	Open	Low
Vst2-1	Low	High	Open	Low
Vst2-2	High	Low	Low	Open
I _{CCO}	Low	Low	Low	Low
I _{L1}	Low	Low	Low	Open
I _{L2}	Low	Low	Open	Low

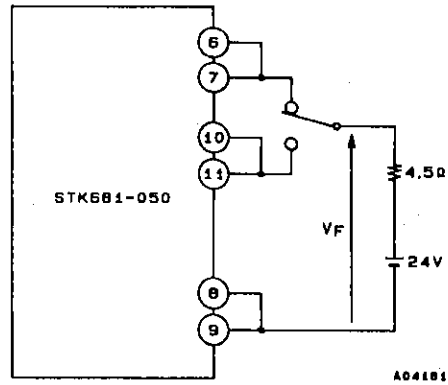
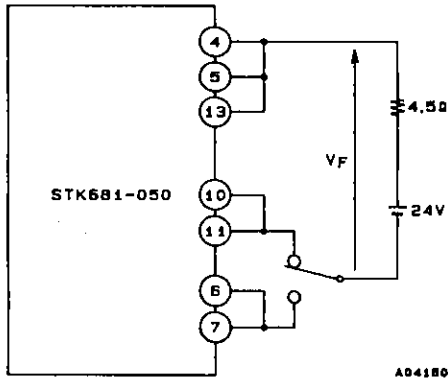
High: V_{IH} = 2.0V
Low: V_{IL} = 0.8V

STK681-050

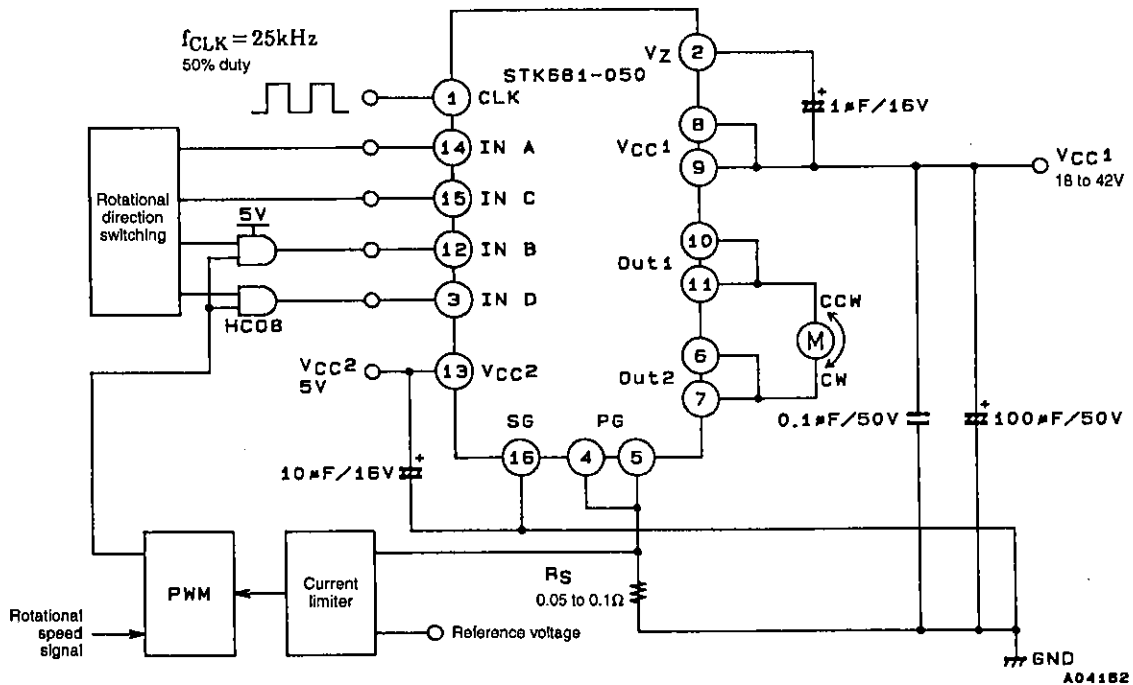
I_{IH}, I_{IL}



V_F



Sample Application Circuit



Mode	IN A	IN C	IN B	IN D
Standby (before drive)	Low	Low	Low	Low
CW	High	Low	Low	PWM
CCW	Low	High	PWM	Low
Brake	Low	Low	V _{CC2}	V _{CC2}
Inhibit mode	High	×	High	×
	×	High	×	High

High: V_{IH} ≥ 2.7V

Low: V_{IL} ≤ 0.4V

High level during PWM operation = V_{CC2}

× = don't care

- No products described or contained herein are intended for use in surgical implants, life-support systems, aerospace equipment, nuclear power control systems, vehicles, disaster/crime-prevention equipment and the like, the failure of which may directly or indirectly cause injury, death or property loss.
- Anyone purchasing any products described or contained herein for an above-mentioned use shall:
 - ① Accept full responsibility and indemnify and defend SANYO ELECTRIC CO., LTD., its affiliates, subsidiaries and distributors and all their officers and employees, jointly and severally, against any and all claims and litigation and all damages, cost and expenses associated with such use;
 - ② Not impose any responsibility for any fault or negligence which may be cited in any such claim or litigation on SANYO ELECTRIC CO., LTD., its affiliates, subsidiaries and distributors or any of their officers and employees, jointly or severally.
- Information (including circuit diagrams and circuit parameters) herein is for example only; it is not guaranteed for volume production. SANYO believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.

This catalog provides information as of November, 1995. Specifications and information herein are subject to change without notice.