



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

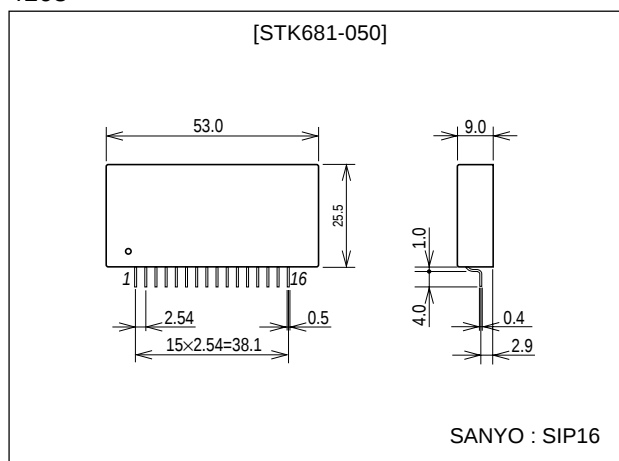
Features

- 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 1 pulse, pulse width=100ms	16 13.5	A
Allowable power dissipation 1	$P_{d1 \text{ max}}$	No heatsink, total loss	5.2	W
Allowable power dissipation 2	$P_{d2 \text{ max}}$	Arbitrary large heatsink, per MOSFET	25	W

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Parameter	Symbol	Conditions	Ratings	Unit
Thermal resistance	θ_{j-c}	Per MOSFET	5	°C/W
Junction temperature	Tj max	Per MOSFET	150	°C
Operating substrate temperature	Tc max		105	°C
Storage temperature	Tstg		-40 to +125	°C

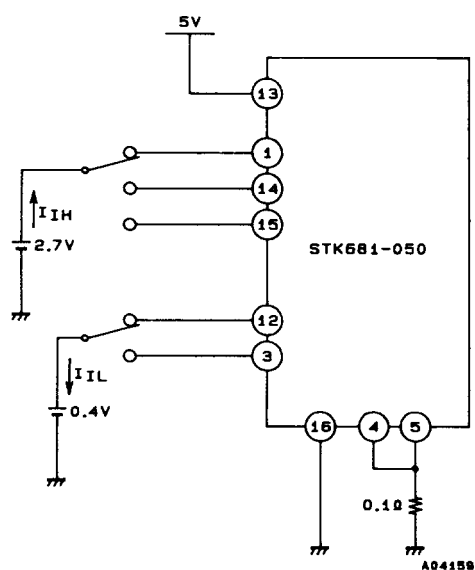
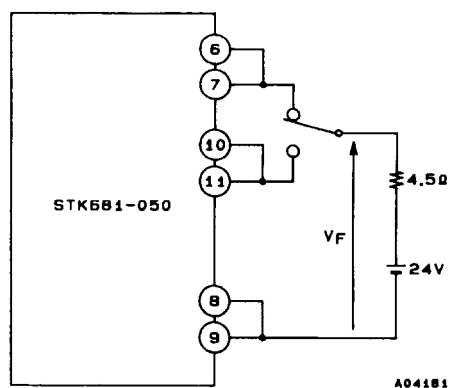
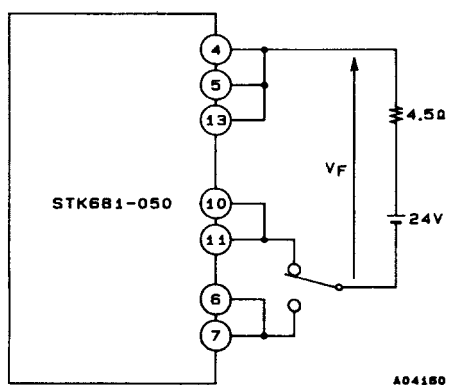
Allowable Operating Ranges at Ta = 25°C

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 =25kHz	5	A
Motor starting current	I _{OD}	1 pulse, t=200ms	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 _{DSS}	F1, F2, F3, F4	60	V

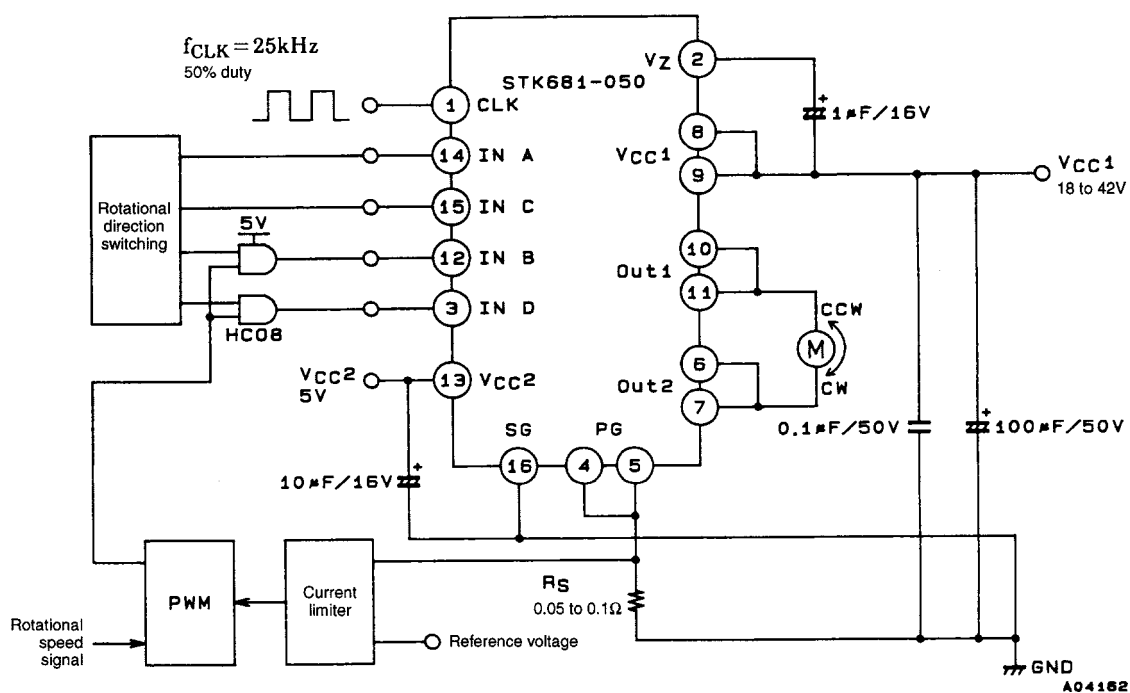
Electrical Characteristics at Ta = 25°C, V_{CC1}=24V, V_{CC2}=5.0V, f_{CLK}=25kHz

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output saturation voltage 1	V _{st1}	I _O =5A, F1, F2		0.75	1.05	V
Output saturation voltage 2	V _{st2}	I _O =5A, 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} =2.7V)		0.21	0.42	mA
Input OFF current	I _{IL}	Pins 3, 12 (V _{IL} =0.4V)		1.0	1.2	mA
Diode forward-bias voltage	V _F	I _F =5A		1.0	1.4	V
Turn ON delay time 1	t _{d-ON1}	F1, F2 (I _O =5A)		0.6		μs
Turn OFF delay time 1	t _{d-OFF1}	F1, F2 (I _O =5A)		3.9		μs
Turn ON delay time 2	t _{d-ON2}	F3, F4 (I _O =5A)		0.2		μs
Turn OFF delay time 2	t _{d-OFF12}	F3, F4 (I _O =5A)		0.6		μs

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

I_H, I_L  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

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