ST1152A

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Low-saturation, Low-voltage

Bi-directional Motor Driver

SILICON TOUCH TECHNOLOGY INC.
新竹市科學園區展業一路九號四樓之三
9-4F-3 Prosperity Road I Science-Based Industrial Park
Hsinchu, Taiwan 300, R.O.C.
Tel：886-3-5645656 Fax：886-3-5645626

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Low-saturation, Low-voltage Bi-directional Motor Driver

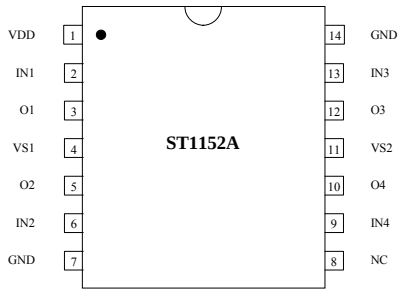
General Specifications

The device is a two-channel low-saturation bi-directional motor driver IC. The design is optimal for stepper-motor applications, such as cameras, printers, FDDs, or other portable devices.

Features and Benefits

- Low voltage operation ($V_{DD\ min}$ = $V_{S1\ min}$ = $V_{S2\ min}$ = 1.5V)
- Low saturation voltage (Upper transistor + low transistor residual voltage; 0.3V typ. at 400mA, 0.6V typ. at 750mA)
- Parallel connection (two-channel driver: Upper transistor + low transistor residual ; 0.4V typ. at 800mA)
- Separate control logic power supply and motor driver power supply
- Brake function
- High output sinking and driving capability
- Thin, highly reliable package (SOP-14)

Pin Assignment



PIN NO.	PIN NAME	DESCRIPTION
1	VDD	Power supply pin for controller.
2	IN1	Input pin that determines driving mode.
3	O1	Output sinking / driving pin.
4	VS1	Power supply pin for output driver O1/ O2.
5	O2	Output sinking / driving pin.
6	IN2	Input pin that determines driving mode.
7	GND	Ground pin
8	NC	No connecting
9	IN4	Input pin that determines driving mode.
10	O4	Output sinking / driving pin.
11	VS2	Power supply pin for output driver O3/ O4.
12	O3	Output sinking / driving pin.
13	IN3	Input pin that determines driving mode.
14	GND	Ground pin

Absolute Maximum Ratings *(Unless otherwise noted, T_A= 25℃)*

Characteristic	Symbol	Rating	Unit
Supply Voltage	V_{DD}	5.5	V
	V_S	5.5	V
Input Voltage	V_{IN}	V_{DD}+0.4	V
I_O Peak Current (in parallel connection)	I_{OPeak}	3	A
I_{ODC} Current (in parallel connection)	I_{ODC}	1.5	A
Power Dissipation	P_D	800	mW
Operating Temperature Range	T_{OPR}	-40 ~ 125	°C
Storage Temperature Range	T_{STG}	-65 ~ 150	°C

Electrical Characteristic

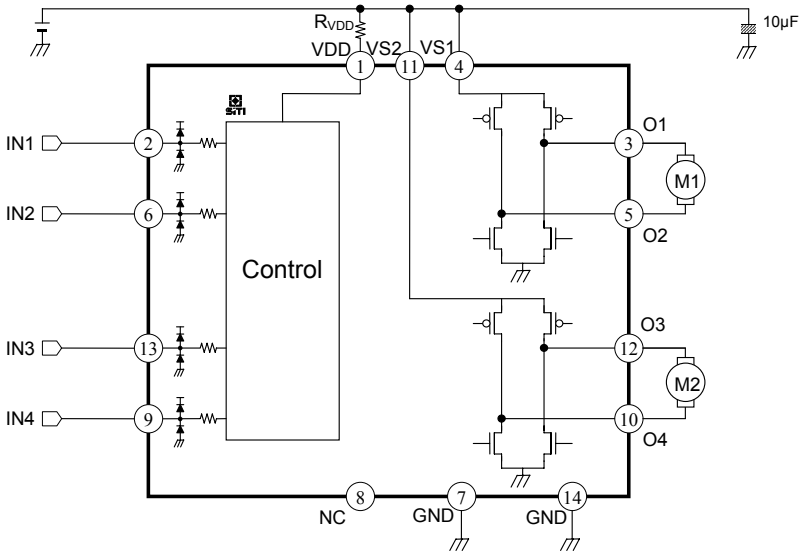
(Unless otherwise noted, T_A= 25℃ & V_{DD} = V_S = 3V)

Characteristic	Sym.	Condition	Limit			Unit
			Min.	Typ.	Max.	
Supply Voltage	V_{DD}		1.5	3	5.5	V
	V_S		1.5	3	5.5	V
Supply Current (I_{DD} + I_S)	I_{DD0}	$V_{IN1, IN2, IN3, IN4}$ = 0V		0.1	10	μA
	I_{DD1}	V_{IN1}=3V, $V_{IN2, IN3, IN4}$=0V		0.05	0.5	mA
	I_{DD2}	$V_{IN1, IN2}$=3V, $V_{IN3, IN4}$=0V		0.1	10	μA
IN1 / IN2 / IN3 / IN4 Input Terminal (T_J = 25℃)						
Input Voltage “H”	V_{IH}	-	0.8*V_{DD}	-	V_{DD}+0.4	V
Input Voltage “L”	V_{IL}	-	-0.4	-	0.2*V_{DD}	V
Input Current “H”	I_{IH}	V_{IN} = V_{DD}	-	-	±5	μA
Input Current “L”	I_{IL}	V_{IN} = 0 V	-	-	±5	μA
O1 / O2 / O3 / O4 Output Terminal (T_J = 25℃)						
Output Voltage (upper + lower)	V_{OUT1}	I_{OUT} = 200 mA	-	0.15	0.3	V
	V_{OUT2}	I_{OUT} = 400 mA	-	0.3	0.6	V
	V_{OUT3}	I_{OUT} = 750 mA	-	0.6	0.95	V
	V_{OUT4}	I_{OUT} = 400 mA (parallel connection)	-	0.2	0.35	V
	V_{OUT5}	I_{OUT} = 800 mA (parallel connection)	-	0.4	0.7	V
Output Resistance	Ron	V_{DD}=V_S=3V, I_{OUT}=400 mA	-	0.75	-	Ω
Output Sustaining Voltage	$V_{O(SUS)}$	I_{OUT} = 400 mA	-	-	V_S	V

Truth Table

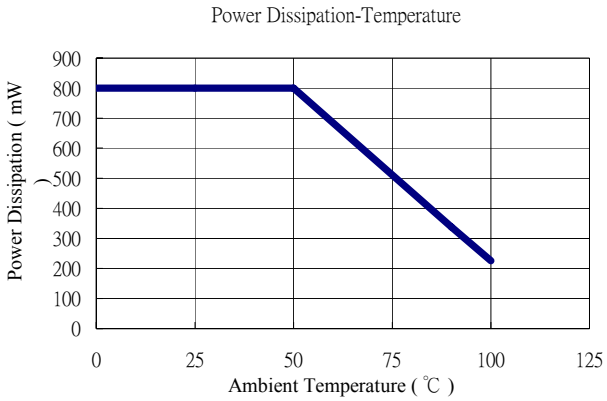
IN1 / IN3	IN2 / IN4	O1 / O3	O2 / O4	Mode
H	L	H	L	Forward
L	H	L	H	Reverse
H	H	H	H	Brake
L	L	OFF	OFF	Standby

Block Diagram & Application Circuit



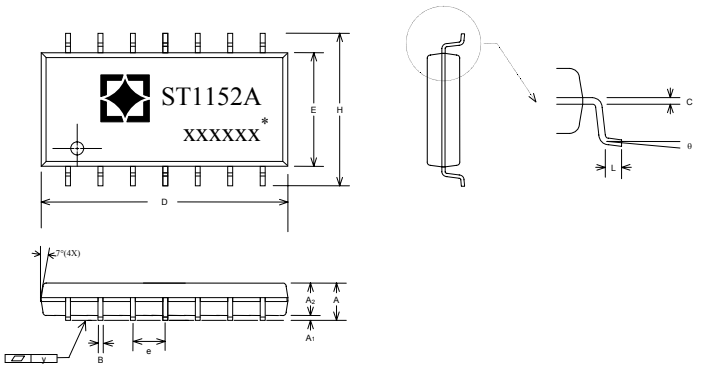
Application Notes

- To increase system stability, it is suggestion to connect a resistor R_{VDD} about 470Ω between battery power and driver's VDD pin as shown on application circuit.
- In multiple power supply application, although power supply of control logic (VDD) and motor driver (VS1, VS2) are separated for noise reduction, the voltage of VDD, VS1 and VS2 pins can be expressed by $V(VDD) - 0.5 \geq V(VS)$, where V(VDD) is the voltage of VDD pin and V(VS) is the voltage of VS1 and VS2 pins.
- The power dissipated by the IC varies widely with the supply voltage, the output current, and loading. It is important to ensure the application does not exceed the allowable power dissipation of the IC package. The recommended motor driver power dissipation versus temperature is depicted as follows:



Package Specifications(SOP-14)

(14-pin SOP)



SYMBOL	Dimensions in Millimeter			Dimensions in Inches		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.35	—	1.75	0.0532	—	0.0688
A_1	0.10	—	0.25	0.0040	—	0.0098
A_2	—	—	—	—	—	—
B	0.33	—	0.51	0.013	—	0.020
C	0.19	—	0.25	0.0075	—	0.0098
D	8.55	—	8.75	0.3367	—	0.3444
E	3.8	—	4.0	0.1497	—	0.1574
e	—	1.27	—	—	0.050	—
H	5.8	—	6.2	0.2264	—	0.2440
L	0.40	—	1.27	0.016	—	0.050
Y	—	—	0.10	—	—	0.004
θ	0°	—	8°	0°	—	8°

* The package marking "xxxxxx" is a lot number, and therefore being subject to change.

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