

ST1152B

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



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

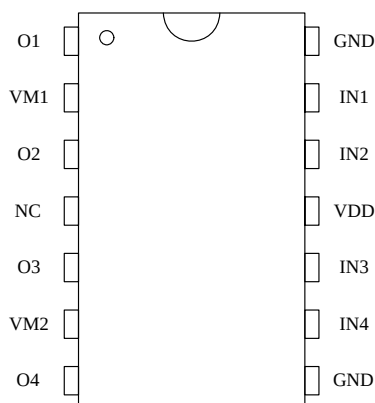
General Specifications

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

Features and Benefits

- Low voltage operation ($V_{DD\ min} = V_{S1\ min} = V_{S2\ min} = 1.5V$)
- High current output (max. 1.5A/channel)
- Built-in thermal shutdown circuit
- Built-in pull down resistor
- 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 (DIP-14,SOP14)

Pin Assignment



Pin NO.	Pin Name	Description
1	O1	Output sinking / driving pin
2	VM1	Power supply pin for driver
3	O2	Output sinking / driving pin
4	NC	No connection
5	O3	Output sinking / driving pin
6	VM2	Power supply pin for driver
7	O4	Output sinking / driving pin
8	GND	Ground pin
9	IN4	Input pin 4 that determines driving mode
10	IN3	Input pin 3 that determines driving mode
11	VDD	Power supply pin for controller.
12	IN2	Input pin 2 that determines driving mode
13	IN1	Input pin 1 that determines driving mode
14	GND	Ground pin

Absolute Maximum Ratings (Unless otherwise noted, $T_A = 25^{\circ}\text{C}$)

Characteristic	Symbol	Rating	Unit
Supply Voltage	V_{DD}	7.0	V
	V_M	7.0	V
Input Voltage	V_{IN}	$V_{DD} + 0.4$	V
I_{ODC} Maxium Current Per Channel (DIP14)	I_{ODC1}	1.5	A
I_{ODC} Maxium Current Per Channel (SOP14)	I_{ODC2}	1.3	A
Power Dissipation	P_D	800	mW
Operating Temperature Range	T_{OPR}	-40 ~ 150	$^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	-65 ~ 150	$^{\circ}\text{C}$

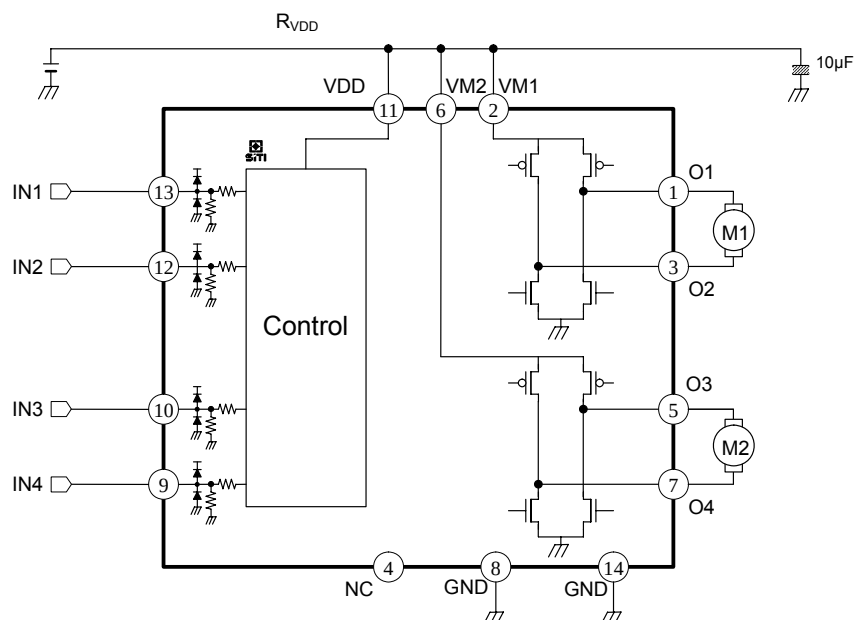
Electrical Characteristic(Unless otherwise noted, $T_A = 25^\circ\text{C}$ & $V_{DD} = V_M = 3\text{V}$)

Characteristic	Sym.	Condition	Limit			Unit
			Min.	Typ.	Max.	
Supply Voltage	V_{DD}		1.5	3	7.0	V
	V_S		1.5	3	7.0	V
Supply Current ($I_{DD} + I_S$)	I_{DD0}	$V_{IN1, IN2, IN3, IN4} = 0\text{V}$		0.1	10	μA
	I_{DD1}	$V_{IN1}=3\text{V}, V_{IN2, IN3, IN4}=0\text{V}$		0.1	1	mA
IN1 / IN2 / IN3 / IN4 Input Terminal ($T_J = 25^\circ\text{C}$)						
Input Voltage "H"	V_{IH}	-	$0.5 \cdot V_{DD}$	-	$V_{DD} + 0.4$	V
Input Voltage "L"	V_{IL}	-	-0.4	-	$0.2 \cdot V_{DD}$	V
Input Current "H"	I_{IH}	$V_{IN} = V_{DD} = 3\text{V}$	30	50	70	μA
Input Current "L"	I_{IL}	$V_{IN} = 0\text{V}$	-	-	± 5	μA
O1 / O2 / O3 / O4 Output Terminal ($T_J = 25^\circ\text{C}$)						
Output Voltage (upper + lower)	V_{OUT1}	$I_{OUT} = 200\text{ mA}$	-	0.15	0.3	V
	V_{OUT2}	$I_{OUT} = 400\text{ mA}$	-	0.3	0.6	V
	V_{OUT3}	$I_{OUT} = 750\text{ mA}$	-	0.6	0.95	V
	V_{OUT4}	$I_{OUT} = 400\text{ mA}$ (parallel connection)	-	0.2	0.35	V
	V_{OUT5}	$I_{OUT} = 800\text{ mA}$ (parallel connection)	-	0.4	0.7	V
Thermal Protection Circuit						
Protection Temperature	T_{TSD}	$V_{EN} = V_{DD}$		150		$^\circ\text{C}$

Truth Table

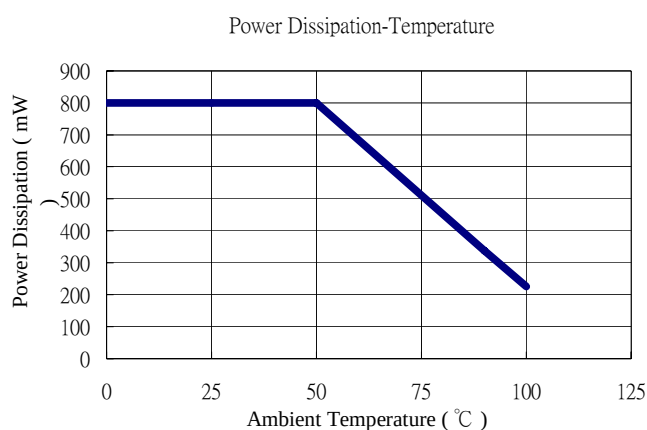
IN1 / IN3	IN2 / IN4	O1 / O3	O2 / O4	Mode
H	L	H	L	Forward
L	H	L	H	Reverse
H	H	H	H	Brake
L	L	OFF	OFF	Standby

Block Diagram & Application Circuit

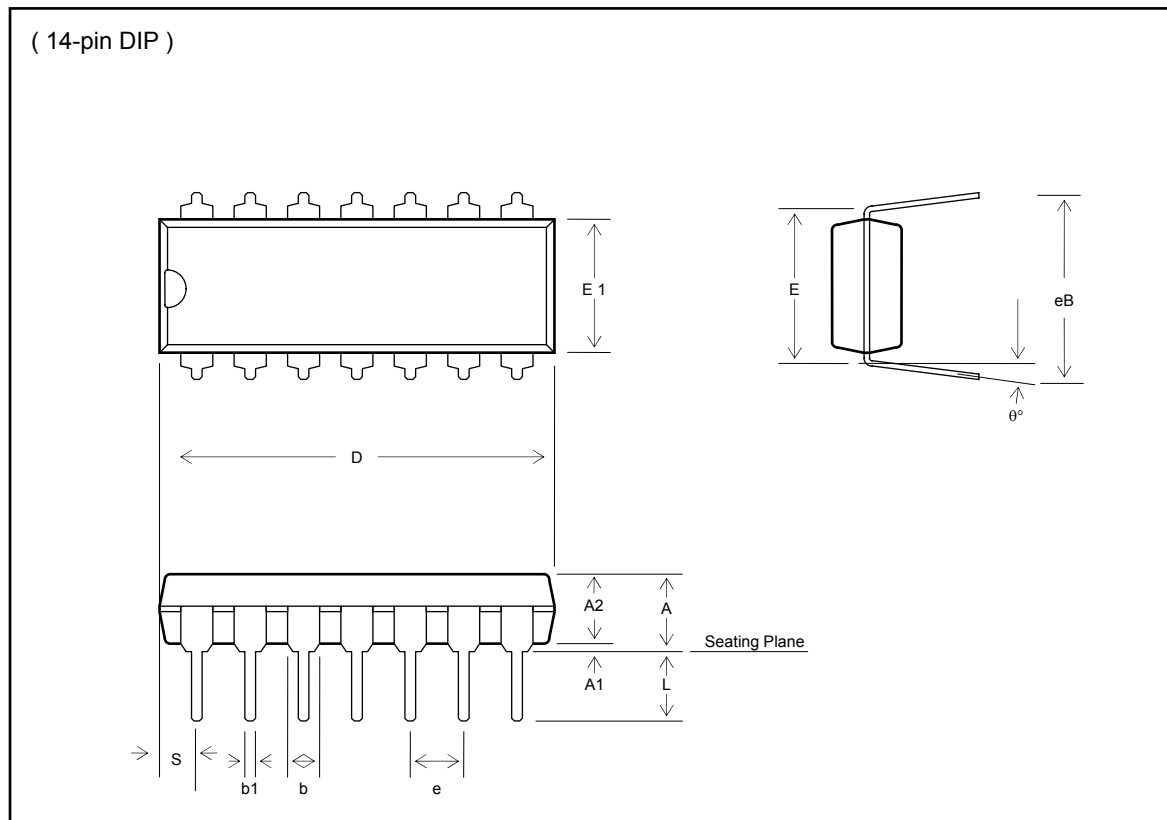


Application Notes

- 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:

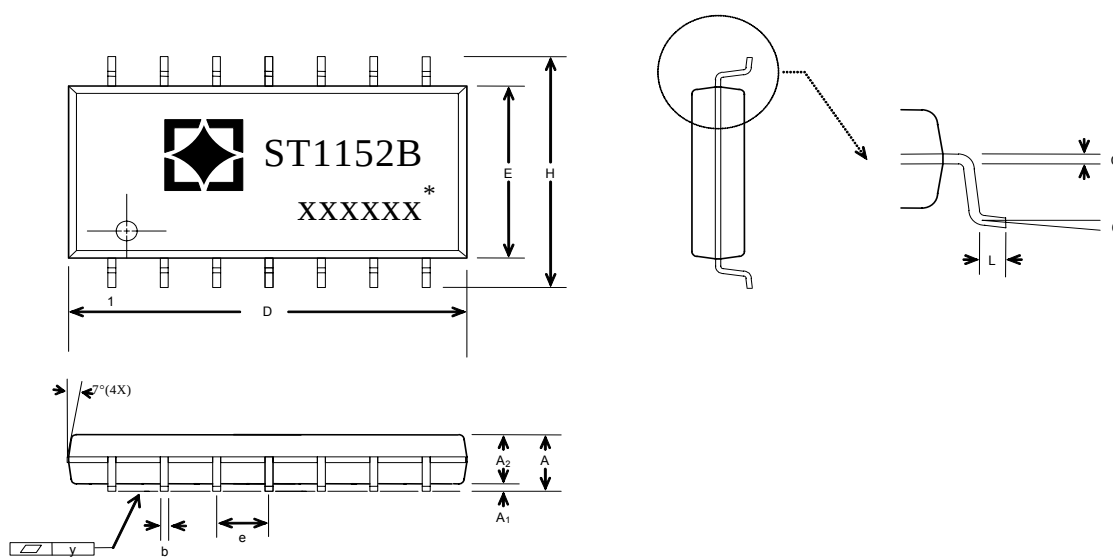


Package Specification



SYMBOL	DIMENSION (mm)		
	MIN.	NOM.	MAX.
A			5.334
A1	0.381		
A2	3.175	3.302	3.429
b	1.300	1.500	1.700
b1	0.400	0.480	0.560
D	18.669	19.495	20.320
E	7.366	7.620	7.874
E1	6.223	6.812	7.400
e	2.290	2.540	2.790
eB	8.509	9.017	9.525
L	2.540	3.175	3.810
S			2.390
θ°	0	7	15

(SOP- 14)



SYMBOL	Dimensions in Millimeter		
	MIN	NOM	MAX
A	1.473	1.626	1.727
A ₁	0.102	—	0.254
A ₂	—	—	—
b	0.33	0.406	0.508
C	0.191	0.203	0.249
D	8.534	8.661	8.738
E	3.810	3.912	3.988
e	1.270 BSC		
H	5.791	5.994	6.198
θ	0°	—	8°
L	0.381	0.635	1.270

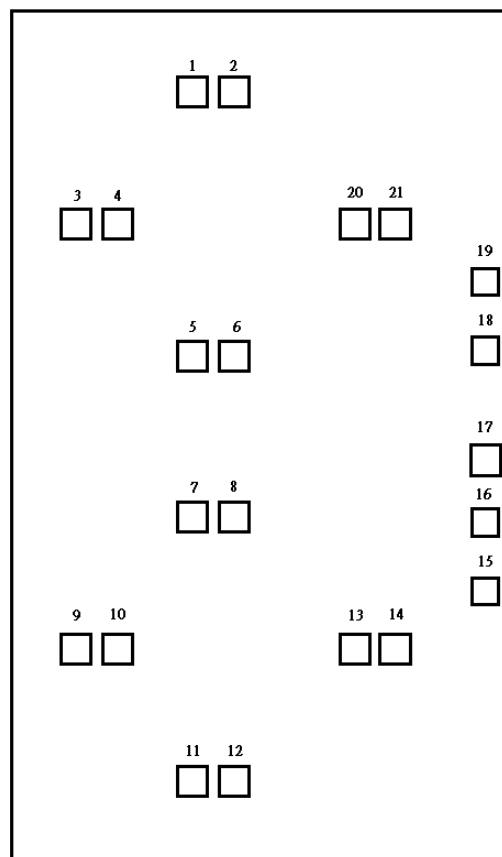
* The package marking “xxxxxx” is a lot number, and therefore being subject to change.

Pad Windows Location

- The following table and figure show the pad windows location in layout view.

Unit : um

Pad NO	PAD Name	Center Coordinate (X,Y)		PAD Size
1	O1	544	2309	90X90
2	O1	669	2309	90X90
3	VM1	193	1912	90X90
4	VM1	318	1912	90X90
5	O2	544	1516	90X90
6	O2	669	1516	90X90
7	O3	544	1035	90X90
8	O3	669	1035	90X90
9	VM2	193	639	90X90
10	VM2	318	639	90X90
11	O4	544	242	90X90
12	O4	669	242	90X90
13	VSS	1033	639	90X90
14	VSS	1153	639	90X90
15	IN4	1424	811	80X80
16	IN3	1424	1018	80X80
17	VDD	1424	1204	90X90
18	IN2	1424	1533	80X80
19	IN1	1424	1740	80X80
20	VSS	1033	1912	90X90
21	VSS	1153	1912	90X90



The products listed herein are designed for ordinary electronic applications, such as electrical appliances, audio-visual equipment, communications devices and so on. Hence, it is advisable that the devices should not be used in medical instruments, surgical implants, aerospace machinery, nuclear power control systems, disaster/crime-prevention equipment and the like. Misusing those products may directly or indirectly endanger human life, or cause injury and property loss.

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