Double Full Bridge Motor Driver

Product Profile

MS3142 / MS3142s is a dual full bridge motor driver.The power supply voltage ranges from 4V to 18V, the average current is 1.1A, and the peak current is 1.54A.

If higher current capacity is needed,Paralleling the outputs is possible

Four input pins (in1 to in4) can control the DC motor to work in forward rotation,Reverse, brake and coast mode.It can also control a stepper motor in full step and half step mode.

MSOP10PP

SSOP10

Features

- Low Rdson Outputs
- Drives two DC motors or single stepper motor
- Sleep Mode
- Paralleling the outputs for 1.6A rms，2.2A peak
- OCP：

  Output short to Supply，Output short to GND，Output Load short

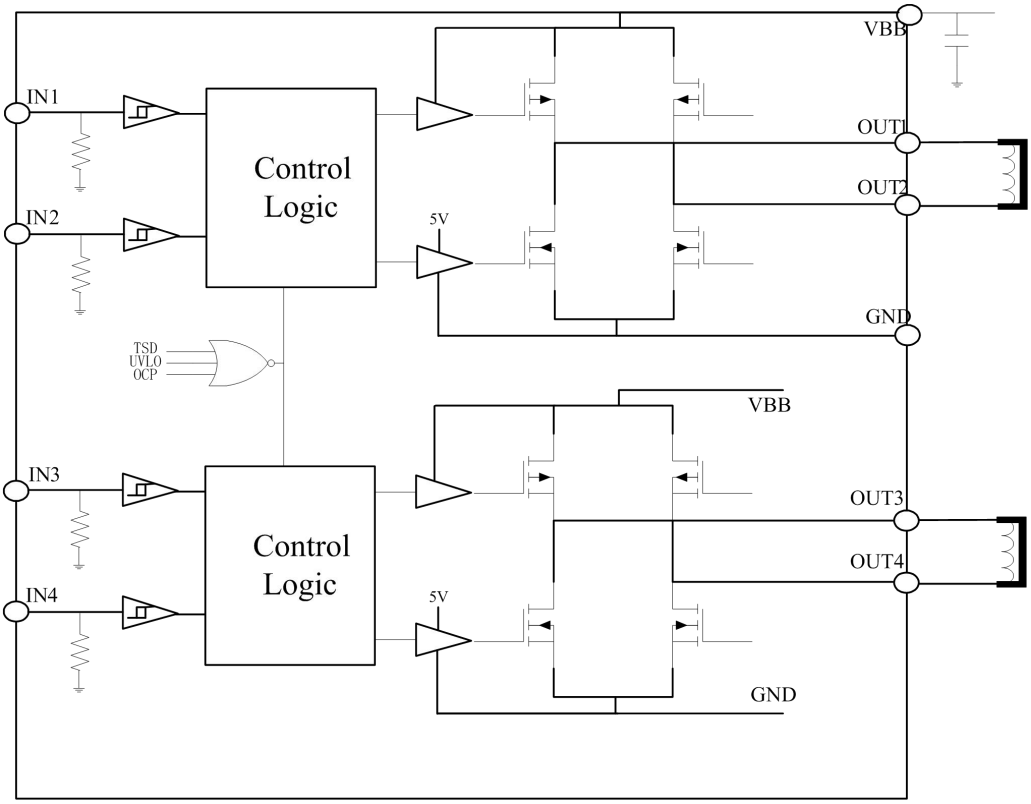
Application

- Camera
- Consumer products
- Toys

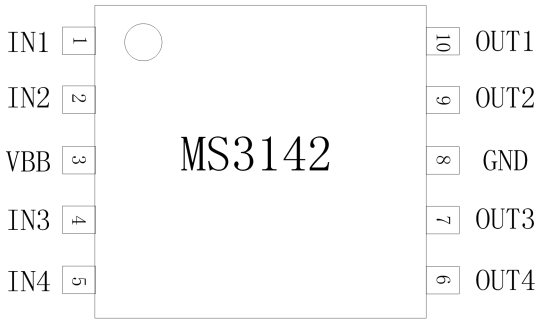
Product Classification

Product	Package	Print
MS3142	MSOP10PP	MS3142
MS3142S	SSOP10	MS3142S

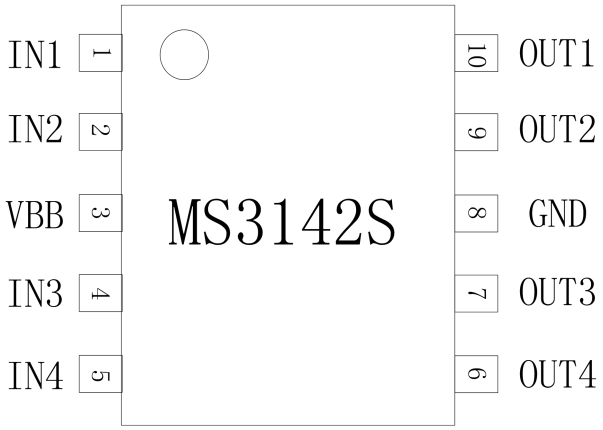
Block Diagram



Pin Diagram



MSOP10PP



SSOP10

Terminal List

No.	Name	I/O type	Description
1	IN1	I	Logic input
2	IN2	I	Logic input
3	VBB	-	Power Supply
4	IN3	I	Logic input
5	IN4	I	Logic input
6	OUT4	O	Bridge Output4
7	OUT3	O	Bridge Output3
8	GND	-	Ground
9	OUT2	O	Bridge Output2
10	OUT1	O	Bridge Output1

Limit Parameter

Absolute Maximum Rating

Parameters	Symbol	Rating	Unit
Supply Voltage	VBB	4～28	V
Logic Input Voltage Range	INx	-0.3～6	V
Output Peak Current	Ipeak	1.54	A
Junction Temperature	P_D	-40～120	℃
Storage Temperature	Tstg	-55～150	℃

Recommended Supply Voltage Range

Parameters	Symbol	Rating	Unit
Supply Voltage	VBB	4～18	V

Electrical Parameters

VBB=12V

If there is no special regulation, the ambient temperature is ta = 25 ℃± 2 ℃.

Power Supply Current：

Parameters	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Power Supply Current	$IBB_{standby}$	Sleep Mode	-	1	10	uA
Power Supply Current	IBB	Normal Working	-	3.3	8	mA

Logic Input：

Parameters	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Input High Level	$V_{in(H)}$		2	-	-	V
Input Low Level	$V_{in(L)}$		-	-	0.8	V
Input Low Level	$V_{in(L)Standby}$	All input low	-	-	0.4	V
Input Hysteresis	V_{inhys}			300		mV
Input Pull Down Res	$R_{pullres}$		60	80	100	kΩ
Sleep Mode Detecting Time	t_{stb}	IN1=IN2=IN3=IN4< $V_{in(L)Standby}$		1.5		ms

Bridge Output：

Parameters	Symbol	Test Condition	Min.	Typ.	Max.	Unit
High side Rdson	R_{dsh}	@500mA	-	0.5	-	Ω
Low side Rdson	R_{dsl}	@500mA		0.35	-	Ω
Full Bridge Rdson	R_{dstot}	@500mA		0.85	-	Ω
Over Current Protect	I_{ocp}		2.5			A
OCP Detecting Time	t_{docp}			4		us
Auto Start Off Time	t_{off}			3		ms

Protect：

Parameters	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Over Temperature Protect	T_{tsd}	Temperature Rise		165		℃
Temperature Hysteresis	T_{tsdhys}	-	-	20		℃
Under Voltage Protect	V_{uvlo}	Supply Voltage Rise		3.8		V
Voltage Hysteresis	$V_{uvlohys}$			0.22		V

Function Description

Function

MS3142/MS3142S can be used to drive two DC motors or one stepper motor.The output H-bridge adopts PMOS + NMOS structure with low on resistance.

When the four inputs (in1 to in4) of the chip are connected to low (< 0.4V) at the same time for more than 1.5ms, MS3142 will turn into sleep mode.It will turns off all the modules in the chip during sleep mode, which has very low power consumption.

Over Current Protection(OCP)

MS3142/MS3142S designed over-current protection module.When the output is directly connected to the power supply, or connected to the ground, or the output is short circuited, the over-current protection function will be started.If the current exceeds 2.5A for longer than 4us, the over-current protection will be triggered and the output will be closed.

If the over-current protection function is triggered and the output is shut down for about 3ms, the output will be restarted.Each bridge has independent over-current protection and auto-restart function.

Over Temperature Protection(OTP)

When the chip temperature exceeds the set threshold of over temperature protection, all outputs will be turned off, and the chip output will not turn on again until the temperature drops by 20 ℃.

Under Voltage Protection(UVP)

MS3142/MS3142S designed undervoltage protection function to detect VBB voltage and prevent output logic error caused by too low voltage.

Control Logic：

IN1	IN2	OUT1	OUT2
0	0	Z	Z
0	1	L	H
1	0	H	L
1	1	L	L

IN3	IN4	OUT3	OUT4
0	0	Z	Z
0	1	L	H
1	0	H	L
1	1	L	L

IN1=IN2=IN3=IN4=0for more than 1.5ms, the chip will turn into sleep mode.

Motor Drive Truth table：

Stepper Motor									
IN1	IN2	IN3	IN4	OUT1	OUT2	OUT3	OUT4	Function	
0	0	0	0	Z	Z	Z	Z	Sleep Mode	Sleep Mode
1	0	1	0	H	L	H	L	Step 1	Step 1
0	0	1	0	Z	Z	H	L	-	Step 2
0	1	1	0	L	H	H	L	Step 2	Step 3
0	1	0	0	L	H	Z	Z	-	Step 4
0	1	0	1	L	H	L	H	Step 3	Step 5
0	0	0	1	Z	Z	L	H	-	Step 6
1	0	0	1	H	L	L	H	Step 4	Step 7
1	0	0	0	H	L	Z	Z	-	Step 8
DC Motor（two）									
IN1 or IN3	IN2 or IN4	OUT1	OUT2	OUT3	OUT4	Function			
0	0	Z	Z	Z	Z	Z(Sleep Mode)/Coast			
1	0	H	L	H	L	Forward			
0	1	L	H	L	H	Reverse			
1	1	L	L	L	L	Brake			
DC Motor（Single,Paralleling the outputs）									
IN1 or IN3	IN2 or IN4	OUT1	OUT2	OUT3	OUT4	功能			
0	0	Z	Z	Z	Z	Z(Sleep Mode)/Coast			
1	0	H	L	H	L	Forward			
0	1	L	H	L	H	Reverse			
1	1	L	L	L	L	Brake			

Tips：

$0=V_{INx}<V_{IN(0)(max)}$；

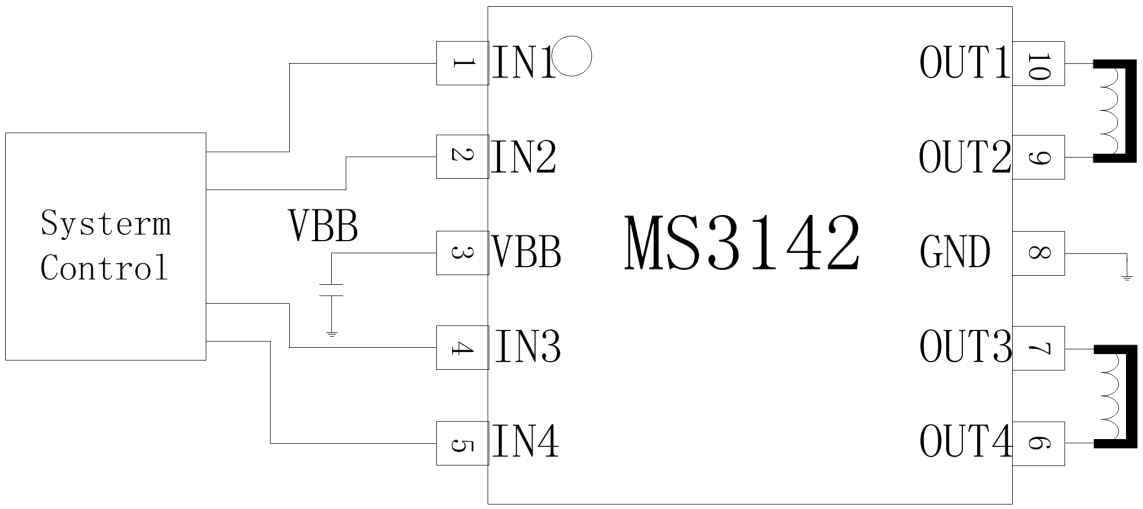
$1=V_{INx}>V_{IN(1)(min)}$；

H=High;

L=Low;

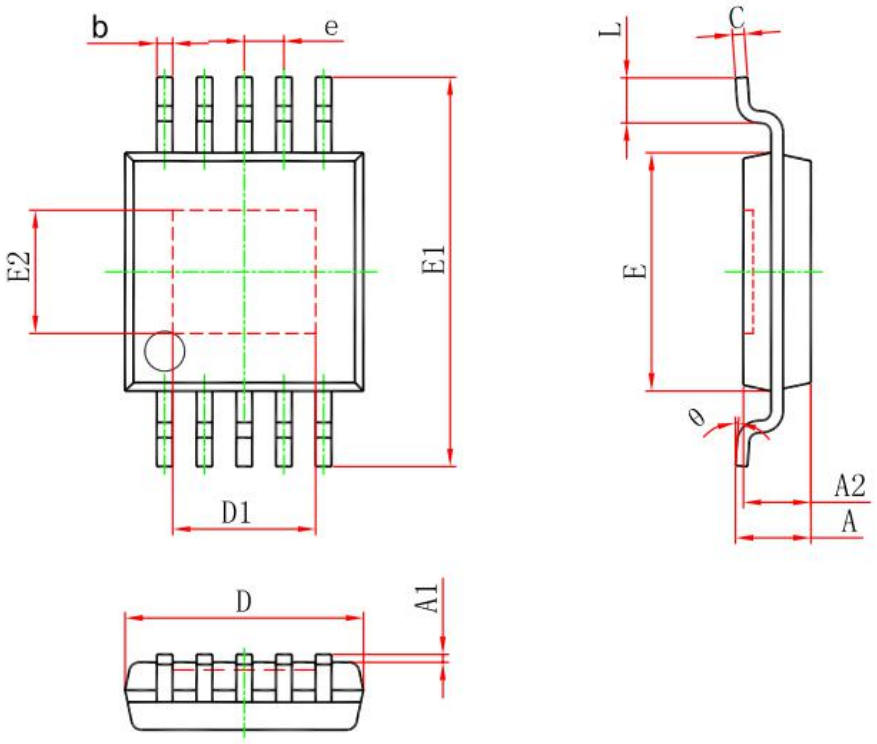
Z=High Impedance State;

Typcical Application Diagram



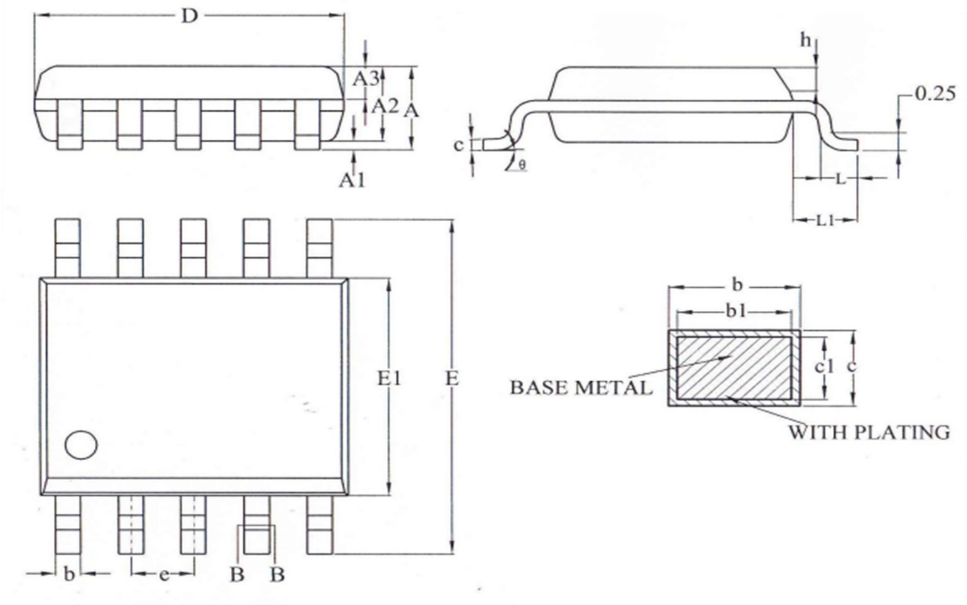
Package Outline

MSOP10PP（with Thermal Pad on the back）：



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.820	1.100	0.032	0.043
A1	0.020	0.150	0.001	0.006
A2	0.750	0.950	0.030	0.037
b	0.180	0.280	0.007	0.011
c	0.090	0.230	0.004	0.009
D	2.900	3.100	0.114	0.122
D1	1.700	1.900	0.067	0.075
e	0.50(BSC)		0.020(BSC)	
E	2.900	3.100	0.114	0.122
E1	4.750	5.050	0.187	0.199
E2	1.450	1.650	0.057	0.065
L	0.400	0.800	0.016	0.028
θ	0°	6°	0°	6°

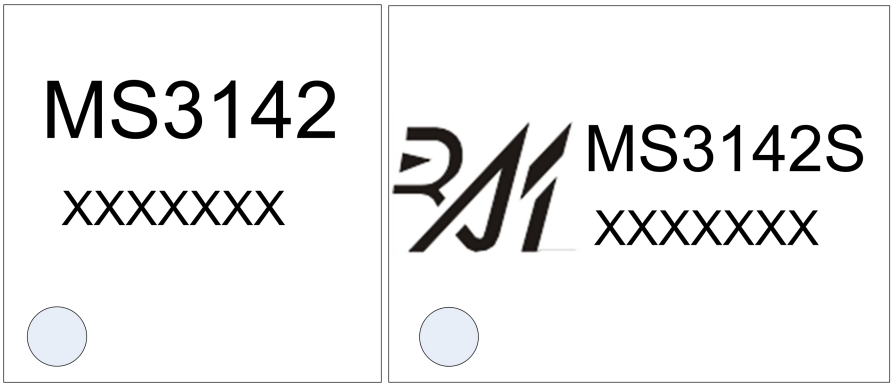
SSOP10：



Symbol	Millimeters		
	Min	NOM	MAX
A	-	-	1.75
A1	0.10	-	0.225
A2	1.30	1.40	1.50
A3	0.6	0.65	0.70
b	0.39	-	0.47
b1	0.38	0.41	0.44
c	0.20	-	0.24
c1	0.19	0.20	0.21
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.00BSC		
h	0.25	-	0.50
L	0.50	-	0.80
L1	1.05REF		
θ	0	-	8°

Seal And Packaging Specification

1.Seal content Introduction



Product Name:MS3142,MS3142S

Product Batch Number：XXXXXXX

2.Seal Specification requirements

Using laser printing, the whole center and the use of Arial font.

3.Package Description

Name	Package	Piece/Roll	Roll/Box	Piece/Box	Box/Case	Piece/Case
MS3142	MSOP10PP	3000	1	3000	8	24000
MS3142S	SSOP10	2000	1	2000	8	16000

MOS circuit operation precautions:

Static electricity can be generated in many places. The following precautions can be taken to effectively prevent the damage of MOS circuit caused by electrostatic discharge:

1. The operator shall ground through the anti-static wristband.
2. The equipment shell must be grounded.
3. The tools used in the assembly process must be grounded.
4, must be used conductor packaging or antistatic materials packaging or transportation.

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