UNISONIC TECHNOLOGIES CO., LTD

UMD9124   Advance   *CMOS IC*

# DC TAIL ROTOR MOTOR, STEERING GEAR MOTOR DRIVE CIRCUIT

SOT-26

■ **DESCRIPTION**

UTC **UMD9124** is an integrated brush DC motor drive solution for battery-powered toys, low-voltage or battery-powered motion control applications. It has H bridge driver and uses the PMOS and NMOS power transistors with low output resistance. Low on-resistance ensures the circuit to consume lower power in operating at a continuous current, and ensures the circuit to operate stably for a long time. The circuit has a wide working voltage range from 2.5V to 5V. The maximum continuous output current reaches 0.5A, and the maximum peak output current can be 0.8A when V_{CC} is 4V.

UTC **UMD9124** has on-chip temperature protection function. When load motor with low internal resistance is in locked rotor, UTC **UMD9124** output current will increase momentarily, power dissipation of the circuit will go up sharply, and the chip temperature will soar. But, when the chip temperature exceeds a maximum temperature point (typically 160°C) set by internal temperature protection circuit, the internal circuit will switch off the on-chip power switching transistor of UTC **UMD9124**, and switch off load current, preventing potential safety hazards such as fuming, igniting of plastic package caused by over temperature etc. Only after having confirmed that the circuit has returned to safety temperature, the on-chip temperature hysteresis circuit can be allowed to re-control the circuit.

■ **FEATURES**

* Low standby current (0.1μA typ.)
* PMOS and NMOS power transistors with low output resistance
   If I_O is 100mA, R_{ON} of power transistor is 1.5Ω
   If I_O is 200mA, R_{ON} of power transistor is 1.6Ω
   If I_O is 300mA, R_{ON} of power transistor is 1.7Ω
* Built-in Subsequent stream diode
  —No external diode required
* Low input current
  Pull-down resistance is 1.8MΩ typical
  1.6μA input current when input voltage is 3V
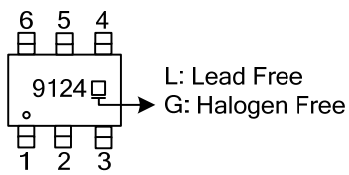* On-chip thermal shut down (TSD) with hysteresis
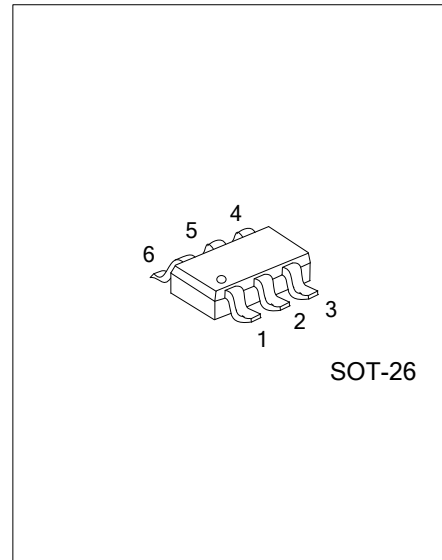
■ **ORDERING INFORMATION**

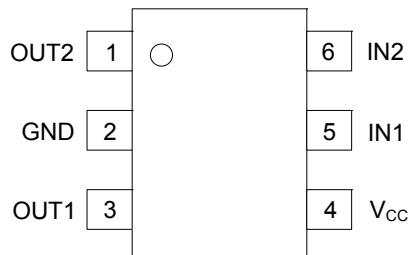| Ordering Number		Package	Packing
Lead Free	Halogen Free		
UMD9124L-AG6-R	UMD9124G-AG6-R	SOT-26	Tape Reel

UMD9124G-AG6-R

    (1)Packing Type   (1) R: Tape Reel

    (2)Package Type   (2) AG6: SOT-26

    (3)Green Package   (3) G: Halogen Free and Lead Free, L: Lead Free

■ **MARKING**

```
  6   5   4
  ┌┐  ┌┐  ┌┐
 ┌──────────┐
 │ 9124 □   │ ──► L: Lead Free
 │ o        │     G: Halogen Free
 └──────────┘
  ┌┐  ┌┐  ┌┐
  1   2   3
```

■ **PIN CONFIGURATION**

```
OUT2 │ 1    ○         6 │ IN2

GND  │ 2              5 │ IN1

OUT1 │ 3              4 │ VCC
```

■ **PIN DESCRIPTION**

PIN NO.	PIN NAME	DESCRIPTION
1	OUT2	Reverse Drive Output Pin
2	GND	Ground
3	OUT1	Forward Drive Output Pin
4	V_{CC}	Supply Voltage
5	IN1	Forward Control Input Pin
6	IN2	Reverse Control Input Pin

■ **BLOCK DIAGRAM**
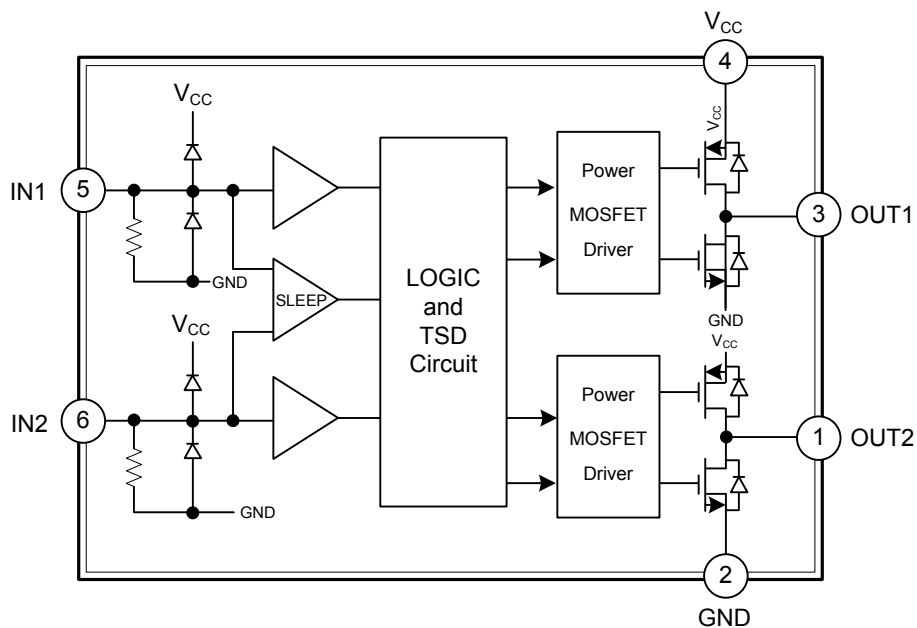
■ **LOGIC TRUTH TABLE**

IN1	IN2	OUT1	OUT2	FUNCTION
L	L	Z	Z	Standby (Stop)
H	L	H	L	Forward rotation
L	H	L	H	Backward rotation
H	H	L	L	Brake

■ **ABSOLUTE MAXIMUM RATING** (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Maximum Supply Voltage	V_{CC}	5.5	V
Maximum External Output Voltage	V_{OUT}	V_{CC}	V
Maximum External Input Voltage	V_{IN}	V_{CC}	V
Peak Output Current/Channel	$I_{OUT\ PEAK}$	0.8	A
Maximum continuous output current	I_{OUT}	0.55	A
Maximum power	P_D	0.45	W
Junction Temperature	T_J	+150	°C
Operational Temperature Range	T_{OPR}	-20 ~ +85	°C
Storage Temperature	T_{STG}	-55 ~ +150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ **THERMAL DATA**

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JAS}	278	°C/W

■ **RECOMMENDED OPERATIONAL CONDITIONS** (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}	2.5		5	V
Input Voltage	V_{IN}	0		V_{CC}	V
Output current from OUT1 to OUT2 when V_{CC}=4.5V	I_{OC}		300	500	mA

■ **ELECTRICAL CHARACTERISTICS** (T_A=25°C, V_{CC}=3V, unless otherwise stated)

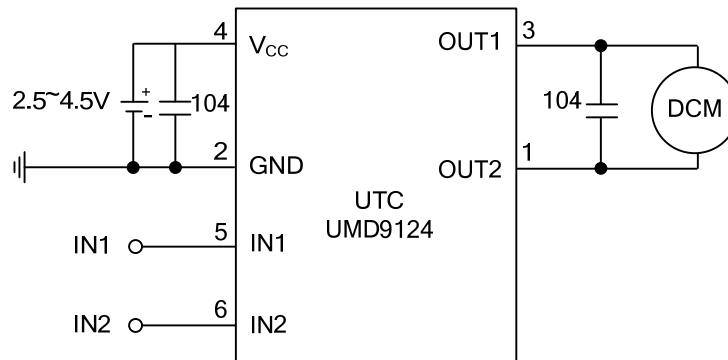| PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
THE POWER SUPPLY PARAMETERS						
V_{CC} Standby Current	I_{VCCST}	IN1=IN2=L, V_{CC}=5.5V, Output opened			4	μA
V_{CC} Static Supply Current	I_{VCC}	IN1=H or IN2=H; Output opened		100		μA
INPUT LOGIC LEVEL						
Input High Level	V_{INH}	V_{CC}=3V	0.7×V_{CC}			V
Input Low Level	V_{INL}	V_{CC}=3V			0.2×V_{CC}	V
Input High Level Current	I_{INH}	V_{INH}=3V, V_{CC}=3V		2.0		μA
Input the Pull-Down Resistor	R_{IN}	V_{INH}=3V, V_{CC}=3V		1.8		MΩ
THE POWER TUBE LEADS TO INTERANL RESISTANCE						
Output Resistance	R_{ON}	I_O=±100mA, V_{CC}=3V		1.5		Ω
		I_O=±200mA, V_{CC}=3V		1.6		Ω
		I_O=±300mA, V_{CC}=3V		1.7		Ω
PROTECTION FUNCTION PARAMETERS						
Protection Temperature	TSD			160		°C
TSD Hysteresis	TSDH			20		°C

■ **TYPICAL WAVEFORM**
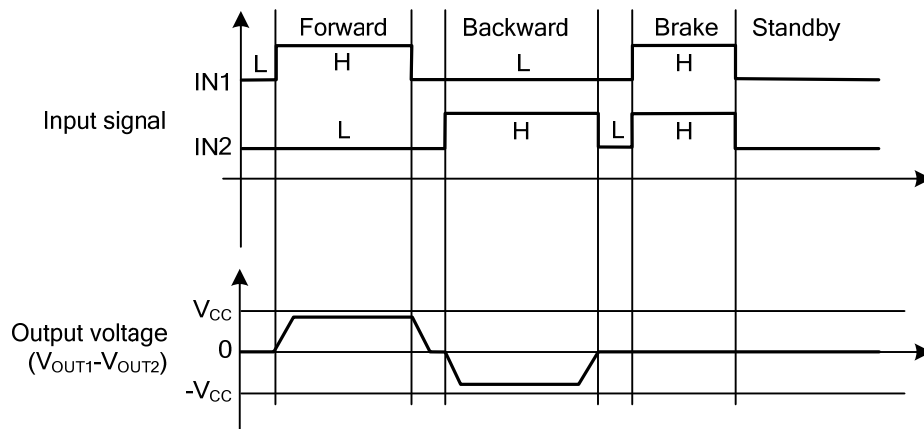
■ **APPLICATION INFORMATION**

Thermal shut down (TSD)

When Junction Temperature reaches 160°C, the internal circuit will switch off the on-chip power switching transistor of UTC **UMD9124**, preventing potential safety hazards caused by over temperature. The temperature hysteresis of TSD is 25°C typical.

■ **TYPICAL APPLICATION CIRCUIT**