



## UMD9128

Advance

CMOS IC

### DC TAIL ROTOR MOTOR, STEERING GEAR MOTOR DRIVE CIRCUIT

#### DESCRIPTION

UTC **UMD9128** 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  $V_{DD}$  is 4V.

UTC **UMD9128** has on-chip temperature protection function. When load motor with low internal resistance is in locked rotor, UTC **UMD9128** 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 **UMD9128**, 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

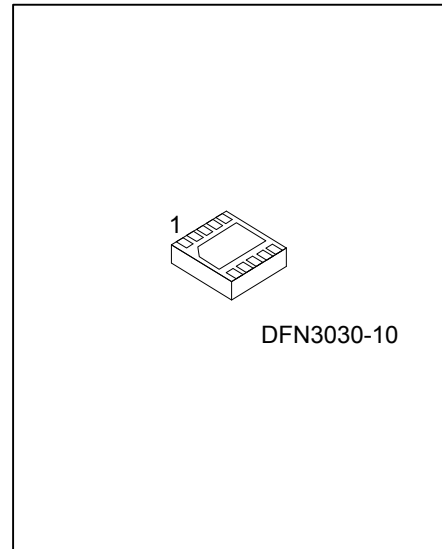
- \* Low standby current (0.1µA typ.)
- \* PMOS and NMOS power transistors with low output resistance
  - If  $I_O$  is 100mA,  $R_{ON}$  of power transistor is 1.5Ω
  - If  $I_O$  is 200mA,  $R_{ON}$  of power transistor is 1.6Ω
  - If  $I_O$  is 300mA,  $R_{ON}$  of power transistor is 1.7Ω

- \* Built-in Subsequent stream diode  
—No external diode required
- \* Low input current  
Pull-down resistance is 1.8MΩ typical  
2.0uA input current when input voltage is 3V  
On-chip thermal shut down (TSD) with hysteresis

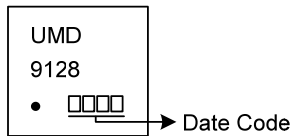
#### ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
UMD9128L-K10-3030-R	UMD9128G-K10-3030-R	DFN3030-10	Tape Reel

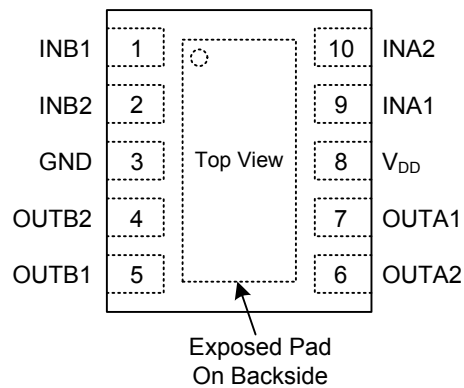
<p>UMD9128G-K10-3030-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel (2) K10-3030: DFN3030-10 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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### MARKING



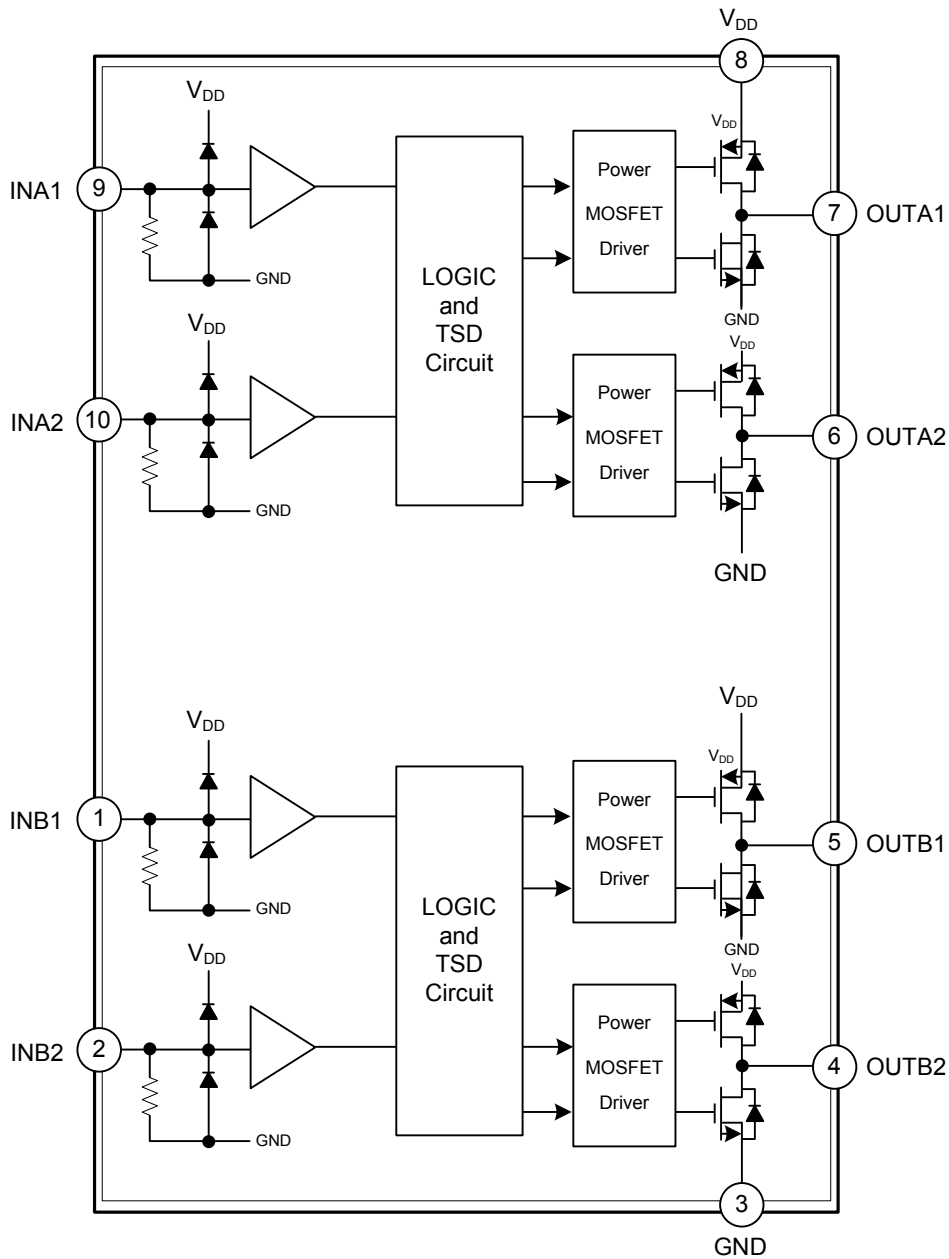
### PIN CONFIGURATION



### PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	INB1	B channel Forward Control Input Pin
2	INB2	B channel Reverse Control Input Pin
3	GND	Ground
4	OUTB2	B channel Reverse Drive Output Pin
5	OUTB1	B channel Forward Drive Output Pin
6	OUTA2	A channel Reverse Drive Output Pin
7	OUTA1	A channel Forward Drive Output Pin
8	V <sub>DD</sub>	Supply Voltage
9	INA1	A channel Forward Control Input Pin
10	INA2	A channel Reverse Control Input Pin

■ BLOCK DIAGRAM



■ LOGIC TRUTH TABLE

INA1/INB1	INA2/INB2	OUTA1/OUTB1	OUTA2/OUTB2	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<sub>A</sub>=25°C, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Maximum Supply Voltage	V <sub>DD</sub>	5.5	V
Maximum External Output Voltage	V <sub>OUT</sub>	V <sub>DD</sub>	V
Maximum External Input Voltage	V <sub>IN</sub>	V <sub>DD</sub>	V
Peak Output Current/Channel	I <sub>OUT PEAK</sub>	0.85	A
Maximum Continuous Output current	I <sub>OUT</sub>	0.6	A
Maximum Power Dissipation	P <sub>D</sub>	1.05 (Note)	W
Junction Temperature	T <sub>J</sub>	+150	°C
Operational Temperature Range	T <sub>OPR</sub>	-20 ~ +85	°C
Storage Temperature	T <sub>STG</sub>	-55 ~ +150	°C

Notes: 1. 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.  
 2. The data tested by surface mounted on a 2 inch<sup>2</sup> FR-4 board with 2OZ copper.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ <sub>JA</sub>	119	°C/W

Note: The data tested by surface mounted on a 2 inch<sup>2</sup> FR-4 board with 2OZ copper.

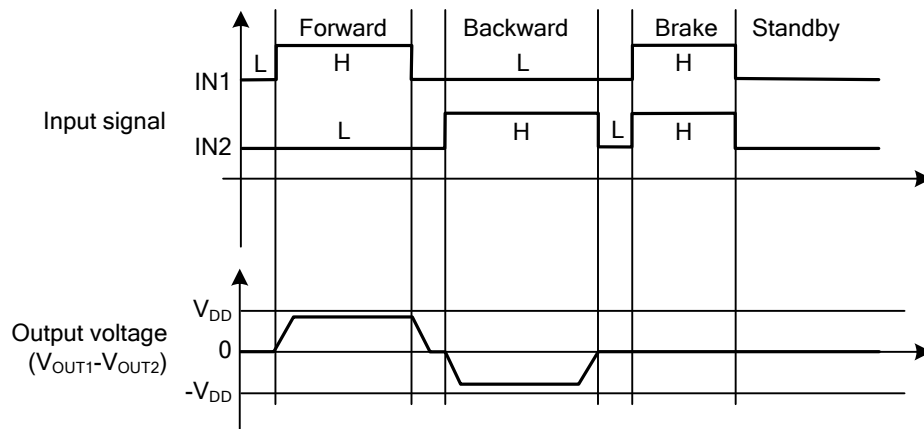
■ RECOMMENDED OPERATIONAL CONDITIONS (T<sub>A</sub>=25°C, unless otherwise specified)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Supply Voltage	V <sub>DD</sub>	2.5		5	V
Input Voltage	V <sub>IN</sub>	0		V <sub>DD</sub>	V
Output current from OUT1 to OUT2 when V <sub>DD</sub> =4.5V	I <sub>OC</sub>		300	550	mA

■ ELECTRICAL CHARACTERISTICS (V<sub>DD</sub>=3V, T<sub>A</sub>=25°C, unless otherwise stated)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
The Power Supply Parameters						
VDD Standby Current	I <sub>VDDST</sub>	IN1=IN2=L, V <sub>DD</sub> =5.5V, Output opened			4	μA
VDD Static Supply Current	I <sub>VDD</sub>	IN1=H or IN2=H; Output opened		100		μA
Input Logic Level						
Input High Level	V <sub>INH</sub>	V <sub>DD</sub> =3V		0.7×V <sub>DD</sub>		V
Input Low Level	V <sub>INL</sub>	V <sub>DD</sub> =3V			0.2×V <sub>DD</sub>	V
Input High Level Current	I <sub>INH</sub>	V <sub>INH</sub> =3V, V <sub>DD</sub> =3V		2.0		μA
Input the Pull-Down Resistor	R <sub>IN</sub>	V <sub>INH</sub> =3V, V <sub>DD</sub> =3V		1.8		MΩ
The Power Tube Leads to Internal Resistance						
Output Resistance	R <sub>ON</sub>	I <sub>O</sub> =±100mA, V <sub>DD</sub> =3V		1.5		Ω
		I <sub>O</sub> =±200mA, V <sub>DD</sub> =3V		1.6		Ω
		I <sub>O</sub> =±300mA, V <sub>DD</sub> =3V		1.7		Ω
Protection Function Parameters						
Protection Temperature	TSD			160		°C
TSD Hysteresis	TSDH			20		°C

■ TYPICAL WAVEFORM

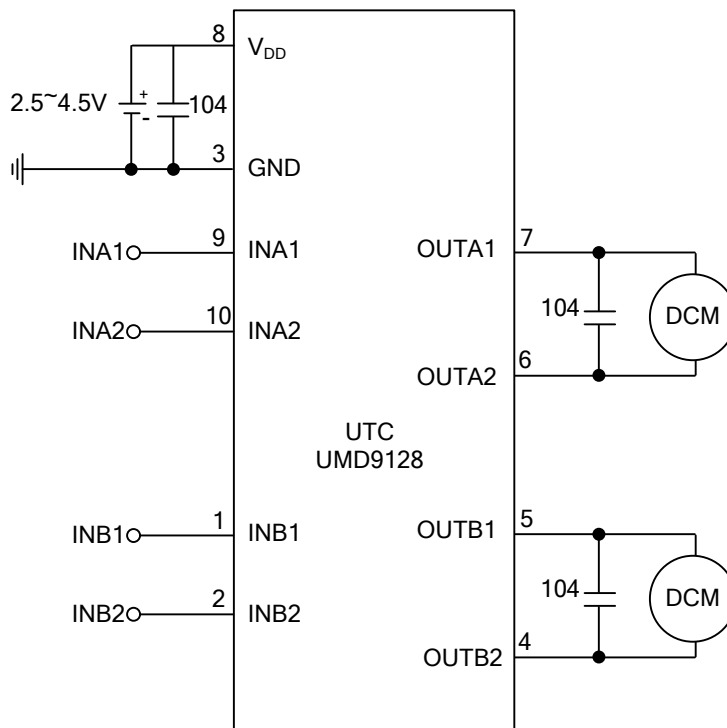


■ APPLICATION INFORMATION

**Thermal shut down (TSD)**

When Junction Temperature reaches 160°C, the internal circuit will switch off the on-chip power switching transistor of UTC **UMD9128**, preventing potential safety hazards caused by over temperature. The temperature hysteresis of TSD is 20°C typical.

■ TYPICAL APPLICATION CIRCUIT



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