



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

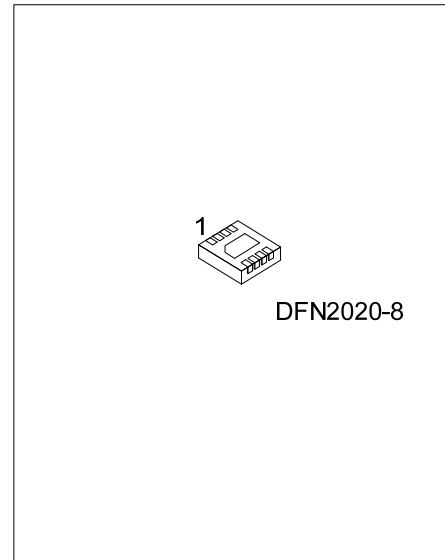
### ■ DESCRIPTION

UTC **UMD9117** 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 **UMD9117** has on-chip temperature protection function. When load motor with low internal resistance is in locked rotor, UTC **UMD9117** 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 **UMD9117**, 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.

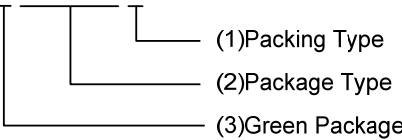
### ■ FEATURES

- \* Low standby current (0.1μA typ.)
- \* Low-Power Sleep Mode(0.08μA typ.)
  - nSLEEP PIN
- \* 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 2.1MΩ typical
  - 1.4uA input current when input voltage is 3V
- \* On-chip thermal shut down (TSD) with hysteresis
- \* ESD rate: 2.5KV(HBM)

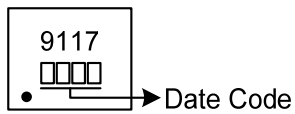


■ ORDERING INFORMATION

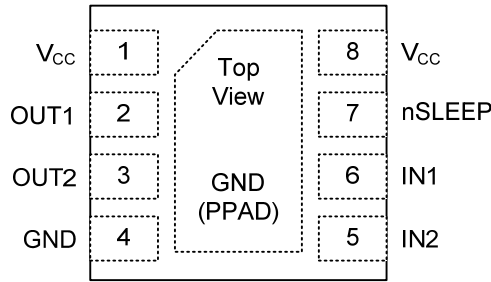
Ordering Number		Package	Packing
Lead Free	Halogen Free		
UMD9117L-K08-2020-R	UMD9117G-K08-2020-R	DFN2020-8	Tape Reel

<p>UMD9117G-K08-2020-R</p>  <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel (2) K08-2020: DFN2020-8 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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■ MARKING



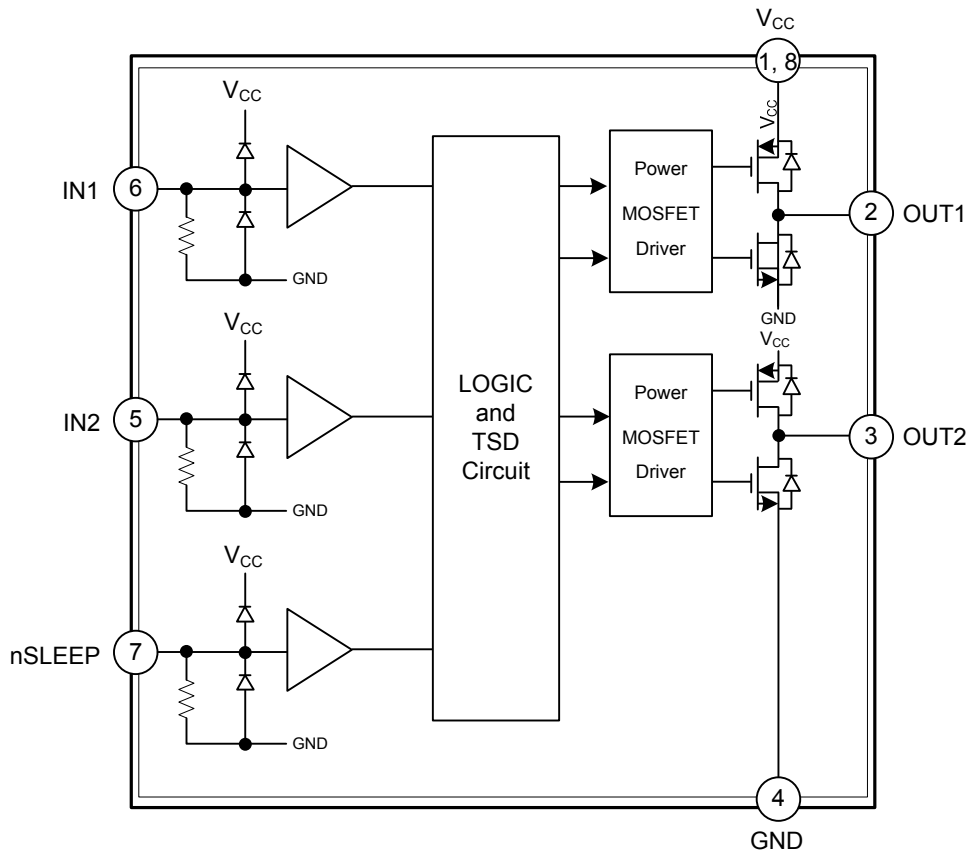
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1, 8	V <sub>CC</sub>	Supply Voltage
2	OUT1	Forward Drive Output Pin
3	OUT2	Reverse Drive Output Pin
4	GND	Ground
5	IN2	Reverse Control Input Pin
6	IN1	Forward Control Input Pin
7	nSLEEP	Sleep mode input When this pin is in logic low, the device enters low-power sleep mode. The device operates normally when this pin is logic high. Internal pulldown

■ BLOCK DIAGRAM



## ■ LOGIC TRUTH TABLE

nSLEEP	IN1	IN2	OUT1	OUT2	FUNCTION
0	X	X	Z	Z	Coast
H	L	L	Z	Z	Coast
H	H	L	H	L	Forward rotation
H	L	H	L	H	Backward rotation
H	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>CC</sub>	5.5	V
Maximum External Output Voltage	V <sub>OUT</sub>	V <sub>CC</sub>	V
Maximum External Input Voltage	V <sub>IN</sub>	V <sub>CC</sub>	V
Peak Output Current/Channel	I <sub>OUT PEAK</sub>	0.8	A
Maximum continuous output current	I <sub>OUT</sub>	0.55	A
Maximum power	P <sub>D</sub>	0.9 (Note 2)	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>	135	°C/W

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

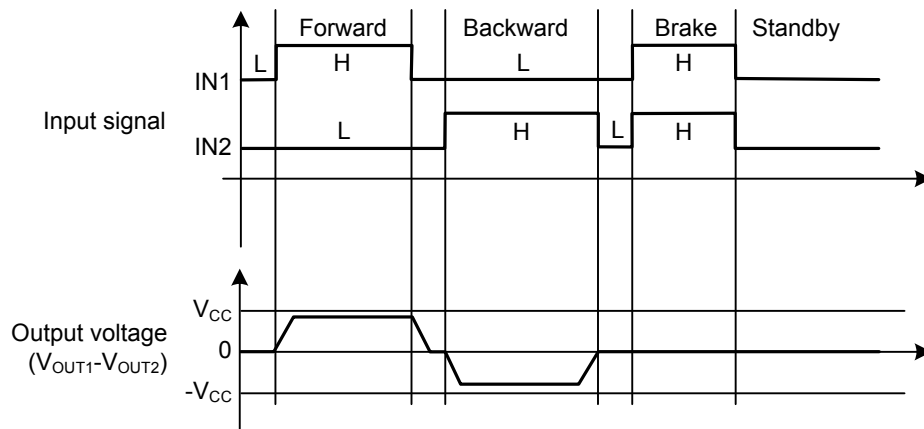
■ RECOMMENDED OPERATIONAL CONDITIONS (T<sub>A</sub>=25°C, unless otherwise specified)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Supply Voltage	V <sub>CC</sub>	2.5		5	V
Input Voltage	V <sub>IN</sub>	0		V <sub>CC</sub>	V
Output current from OUT1 to OUT2 when V <sub>CC</sub> =4.5V	I <sub>OC</sub>		300	500	mA

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>THE POWER SUPPLY PARAMETERS</b>						
V <sub>CC</sub> Standby Current	I <sub>VCCST</sub>	IN1=IN2=L, V <sub>CC</sub> =6V, Output opened		0.1	0.99	μA
V <sub>CC</sub> Static Supply Current	I <sub>VCC</sub>	IN1=H or IN2=H; Output opened		100		μA
V <sub>CC</sub> Sleep Mode Supply Current	I <sub>VCCQ</sub>	V <sub>CC</sub> =3V; nSLEEP=0		0.08	0.9	μA
<b>INPUT LOGIC LEVEL</b>						
Input High Level	V <sub>INH</sub>	V <sub>CC</sub> =3V	0.7×V <sub>CC</sub>			V
Input Low Level	V <sub>INL</sub>	V <sub>CC</sub> =3V			0.2×V <sub>CC</sub>	V
Input High Level Current	I <sub>INH</sub>	V <sub>INH</sub> =3V, V <sub>CC</sub> =3V		1.4		μA
Input the Pull-Down Resistor	R <sub>IN</sub>	V <sub>INH</sub> =3V, V <sub>CC</sub> =3V		2.1		MΩ
<b>THE POWER TUBE LEADS TO INTERNAL RESISTANCE</b>						
Output Resistance	R <sub>ON</sub>	I <sub>O</sub> =±100mA, V <sub>CC</sub> =3V		1.5		Ω
		I <sub>O</sub> =±200mA, V <sub>CC</sub> =3V		1.6		
		I <sub>O</sub> =±300mA, V <sub>CC</sub> =3V		1.7		
<b>Protection Function Parameters</b>						
Protection Temperature	TSD			160		°C
TSD Hysteresis	TSDH			20		°C

■ TYPICAL WAVEFORM

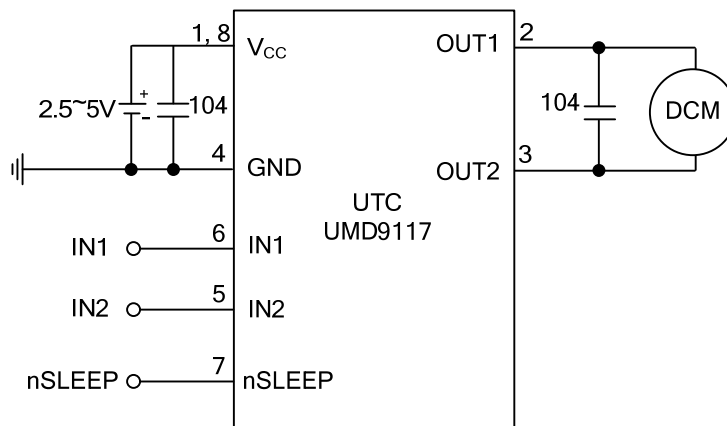


■ APPLICATION INFORMATION

**Thermal shut down (TSD)**

When Junction Temperature reaches 160°C, the internal circuit will switch off the on-chip power switching transistor of UTC **UMD9117**, preventing potential safety hazards caused by over temperature. The temperature hysteresis of TSD is 25°C typical.

■ TYPICAL APPLICATION CIRCUIT



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