UMD9127 **Preliminary** ***CMOS IC***

ONE CHANNEL H-BRIDGE POWER DRIVER

DFN2020-8

■ DESCRIPTION

UTC **UMD9127** 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. It operates on a motor power supply voltage from 2.5 to 5.5 V, and a device power supply voltage of 2.3 V to 5 V. The maximum continuous output current reaches 0.5A, and the maximum peak output current can be 0.8A when VM is 4V.

UTC **UMD9127** has on-chip temperature protection function. When load motor with low internal resistance is in locked rotor, UTC **UMD9127** 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 **UMD9127**, 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

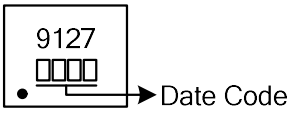
* Low standby current (0.1μA typ.)
* Low-Power Sleep Mode(0.08μA typ.)
  nSLEEP PIN
* PMOS and NMOS power transistors with low output resistance
  If I_O is 100mA, R_{ON} of power transistor is 1.4Ω
  If I_O is 200mA, R_{ON} of power transistor is 1.5Ω
  If I_O is 300mA, R_{ON} of power transistor is 1.6Ω
* 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

■ ORDERING INFORMATION

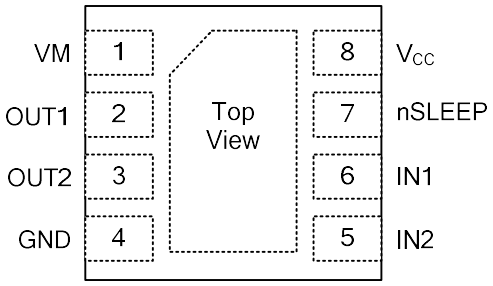
Ordering Number		Package	Packing
Lead Free	Halogen Free		
UMD9127L-K08-2020-R	UMD9127G-K08-2020-R	DFN2020-8	Tape Reel

UMD9127G-K08-2020-R (1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel (2) K08-2020: DFN2020-8 (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



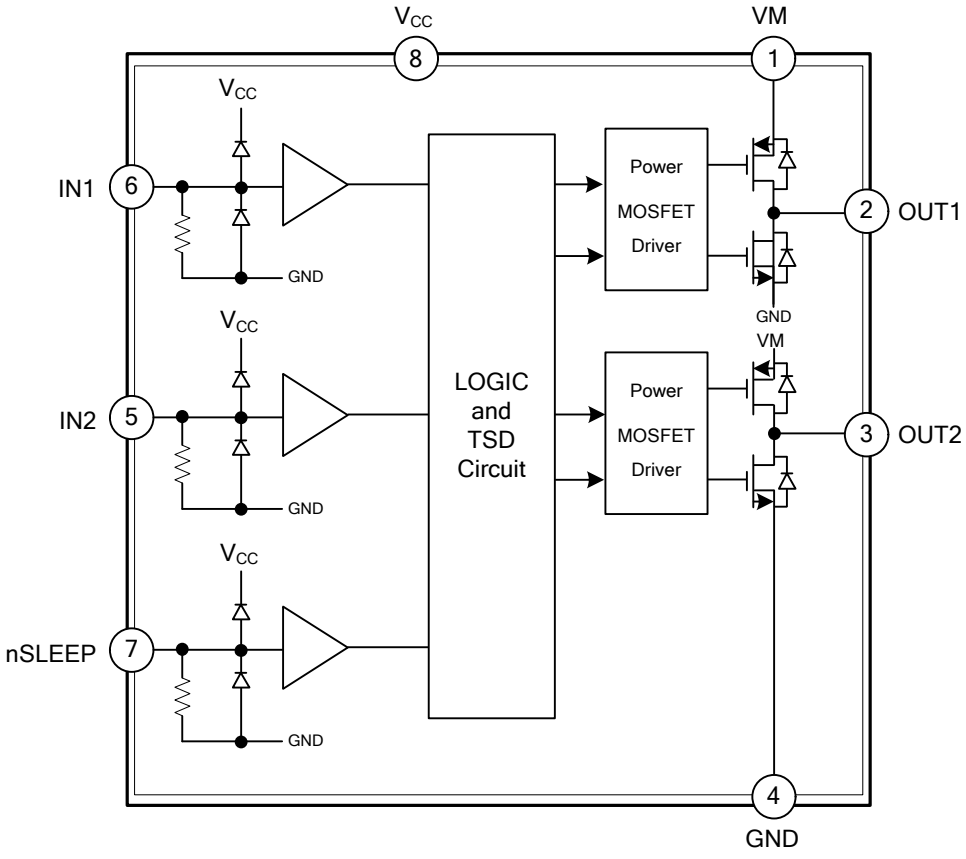
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	VM	Motor power supply
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
8	V_{CC}	Logic Power supply

■ 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_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Motor Power Supply Voltage Range	V_M	6	V
Logic Power Supply Voltage Range	V_{CC}	5.5	V
Maximum External Output Voltage	V_{OUT}	V_M	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	0.9 (Note 2)	W
Junction Temperature	T_J	+150	°C
Operational Temperature Range	T_{OPR}	-20 ~ +85	°C
Storage Temperature	T_{STG}	-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 inch2 FR-4 board with 2OZ copper.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	135	°C/W

Note: The data tested by surface mounted on a 2 inch2 FR-4 board with 2OZ copper.

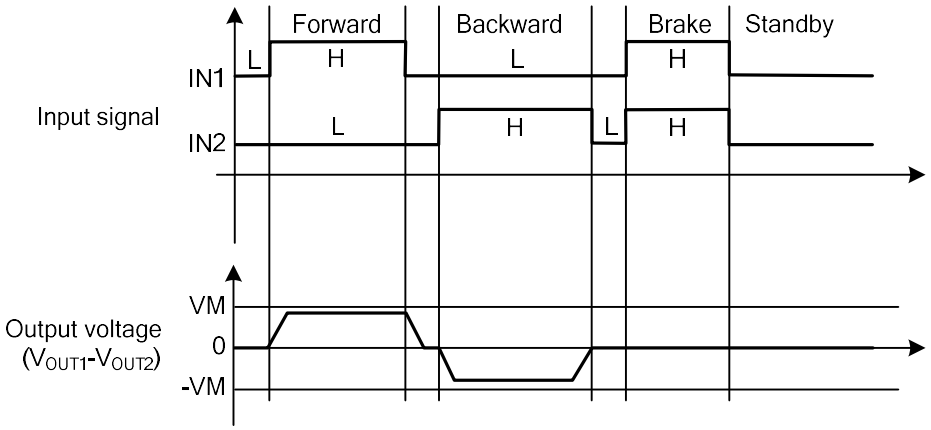
■ RECOMMENDED OPERATIONAL CONDITIONS (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
V_M Operating Voltage	V_M	2.5		5.5	V
V_{CC} Operating Voltage	V_{CC}	2.3		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, V_M=3V, unless otherwise stated)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
THE POWER SUPPLY PARAMETERS						
V_M Standby Current	I_{VMST}	IN1=IN2=L, V_{CC}=5.5V, V_M=6V, Output opened		0.1	0.99	μA
V_M Static Supply Current	I_{VM}	IN1=H or IN2=H; Output opened		90		μA
V_M Sleep Mode Supply Current	I_{VMQ}	V_{CC}=3V; V_M=3V; nSLEEP=0		0.08	0.9	μA
V_{CC} Standby Current	I_{VCCST}	IN1=IN2=L, V_{CC}=5.5V, V_M=6V, Output opened		0.1	0.96	μA
V_{CC} Static Supply Current	I_{VCC}	IN1=H or IN2=H; Output opened		130		μA
V_{CC} Sleep Mode Supply Current	I_{VCCQ}	V_{CC}=3V; V_M=3V; nSLEEP=0		0.08	0.9	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		1.4		μA
Input the Pull-Down Resistor	R_{IN}	V_{INH}=3V, V_{CC} =3V		2.1		MΩ
THE POWER TUBE LEADS TO INTERNAL RESISTANCE						
Output Resistance	R_{ON}	I_O=±100mA, V_M =3V		1.4		Ω
		I_O=±200mA, V_M =3V		1.5		
		I_O=±300mA, V_M =3V		1.6		
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 **UMD9127**, preventing potential safety hazards caused by over temperature. The temperature hysteresis of TSD is 25°C typical.

■ TYPICAL APPLICATION CIRCUIT