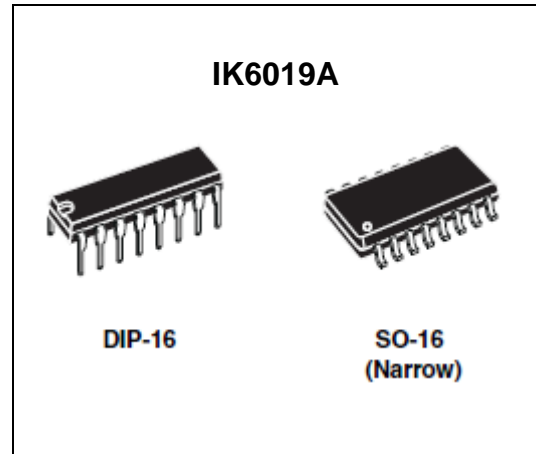


High-Voltage High-Current Stepper Motor Driver

IK6019A

FEATURES

- Eight Power Output LDMOS Transistors
- Output Current 250mA per Driver
- Output Voltage 24V
- Reset Function
- Integrated Suppression Diodes for Inductive Loads
- Temperature range is -40°C to +85°C
- DIP-16, SO-16 (Narrow) Packages



ORDERING INFORMATION

Device	Operating Temperature Range	Packing	Package
IK6019AN	T _{op} = -40°C ~+85°C	Tube	DIP-16
IK6019ADT		Tape & Reel	SO-16 (Narrow)
IK6019AD		Tube	SO-16 (Narrow)

APPLICATIONS

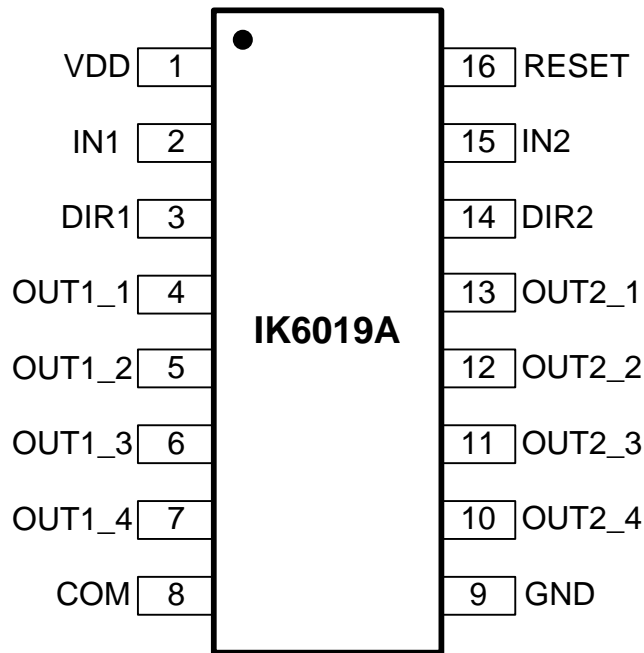
- Unipolar Stepper Motor Driver

GENERAL DESCRIPTION

The IK6019A is a high-voltage, high-current array containing eight open drain LDMOS. The drain-current rating of single LDMOS is 250mA. Suppression diodes are included for inductive load driving.

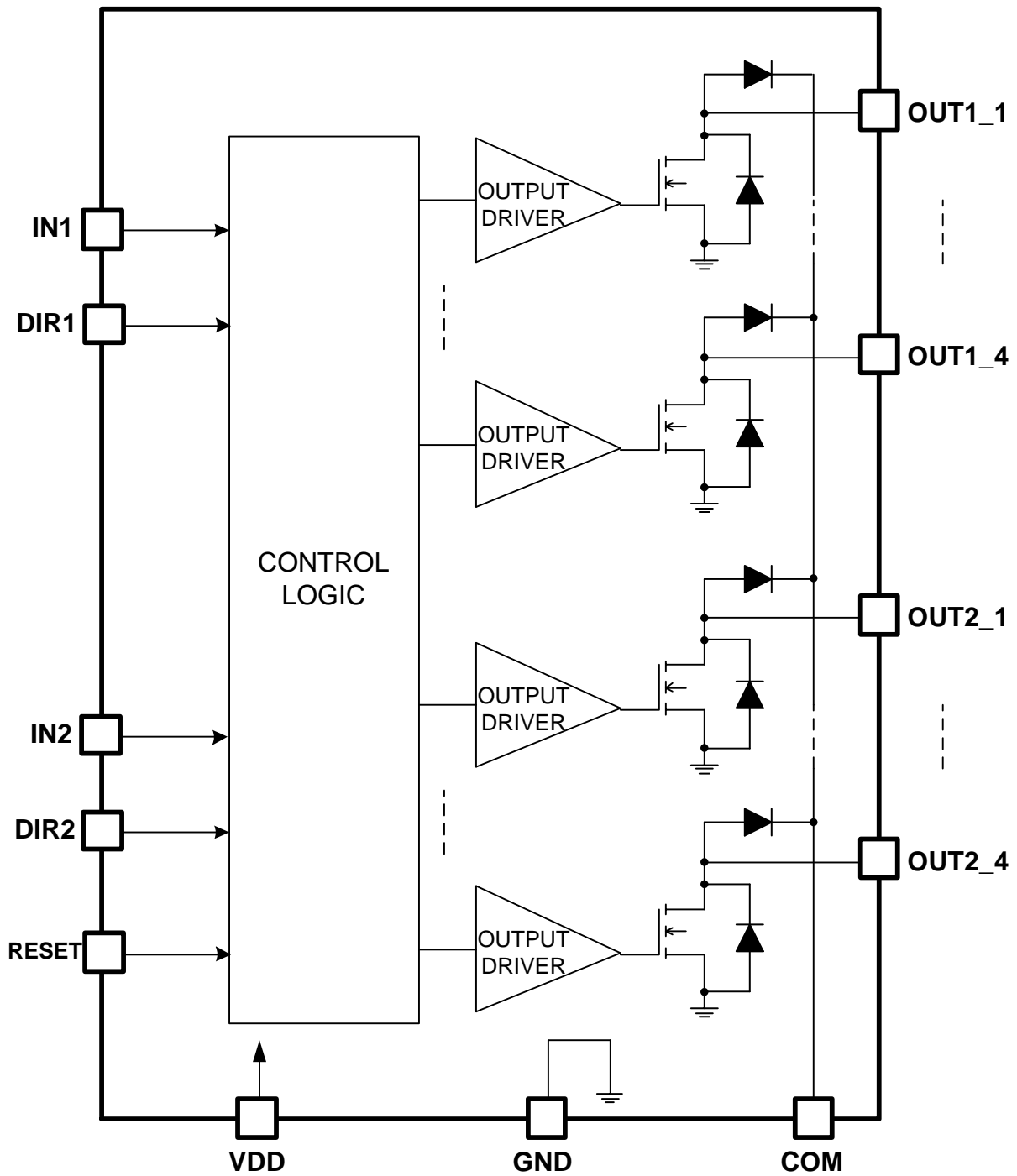
The IK6019A is supplied in 16 pin plastic DIP packages with a copper leadframe to reduce thermal resistance. The IK6019A is available also in small outline package (SO-16).

PIN DESCRIPTION



Pin #	Pin Name	I/O	Description
1	VDD	P	Power supply for digital part.
2	IN1	I	Input pin to activate outputs OUT1_1÷OUT1_4 and to determine the stepping mode by the first falling edge.
3	DIR1	I	Input pin to determine the motor's rotation direction (OUT1_1÷OUT1_4).
4-7	OUT1_1 to OUT1_4	O	Output pins.
8	COM	P	Power pin to connect common free-wheeling diodes.
9	GND	P	Ground for output transistors.
10-13	OUT2_1 to OUT2_4	O	Output pins.
14	IN2	I	Input pin to activate outputs OUT2_1÷OUT2_4 and to determine the stepping mode by the first falling edge .
15	DIR2	I	Input pin to determine the motor's rotation direction (OUT2_1÷OUT2_4).
16	RESET	I	Input pin to reset the circuit when it LOW.

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS (Note 1)

COM to GND		28V
OUT to GND		28V
VDD to GND		6V
INPUT to GND		VDD+0.5V
OUT current/Pin		250mA
Output Current/Total		-1.25A
Thermal Resistance (θ_{JA})	DIP-16	70°C/W
	SO-16	120°C/W
Storage Temperature Range		-55°C ~ 150°C
ESD Rating (Note 2)		4kV

Notes

1. Stress beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under “Recommended Operating Conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
2. Human body model: equivalent to discharging a 100 pF capacitor through a 1.5 kΩ resistor.

OPERATING RATINGS

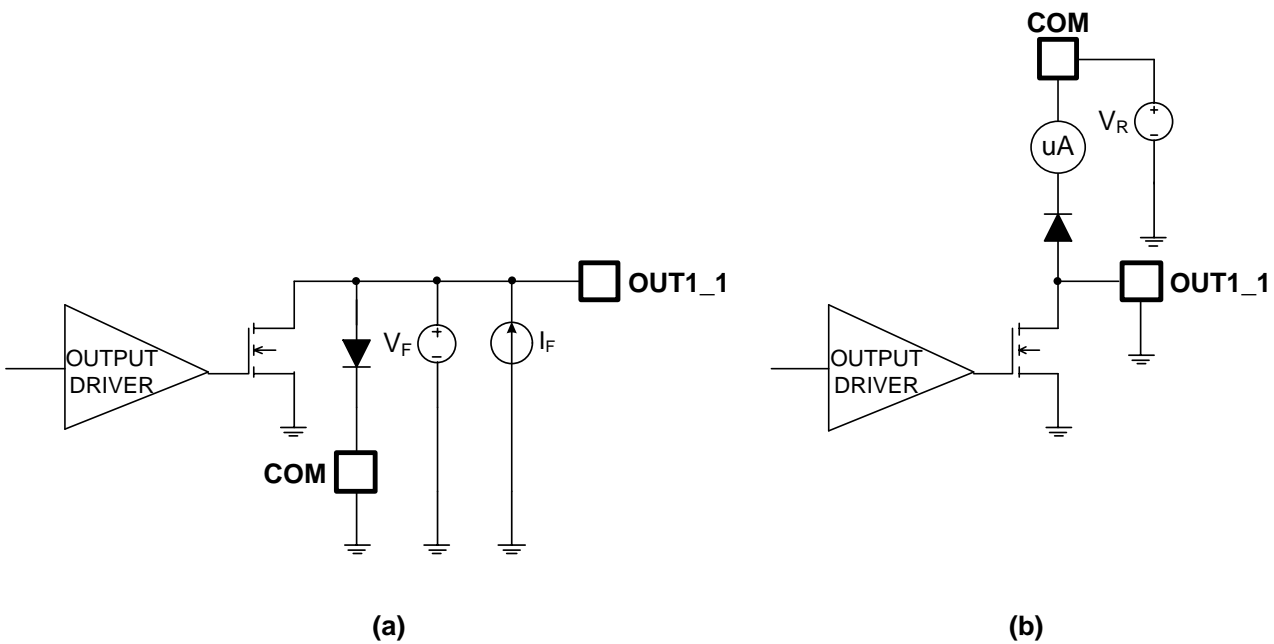
Parameter	Symbol	Value			Unit
		Min	Typ	Max	
Logic supply voltage	VDD	3	5	5.5	V
High-level voltage	V _{IH}	0.7VDD	-	VDD	V
Low-level voltage	V _{IL}	0	-	0.3VDD	V
Operating temperature	T _{OP}	-40	+25	+85	°C

ELECTRICAL CHARACTERISTICS

$V_{DD}=3.3\sim 5.5V$, $T_A=T_{OP}=+25^{\circ}C$. All voltages are defined with respect to ground. Positive currents flow into the device. Unless otherwise specified. Please refer to test circuit section.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{OX}	Output leakage current	$V_O=24V$			50	μA
$V_{O(SAT)}$	Output saturation voltage	$I_O=100mA$		0.9		V
		$I_O=150mA$		1		V
		$I_O=200mA$		1.2		V
I_{IX}	Input leakage current		-1	-	1	μA
V_R	Clamp diode forward voltage	$I_F=250mA$ (test circuit (a))		1.7	2	V
I_R	Clamp diode leakage current	$V_R=24V$ (test circuit (b))			50	μA

TEST CIRCUIT FOR ELECTRICAL CHARACTERISTICS

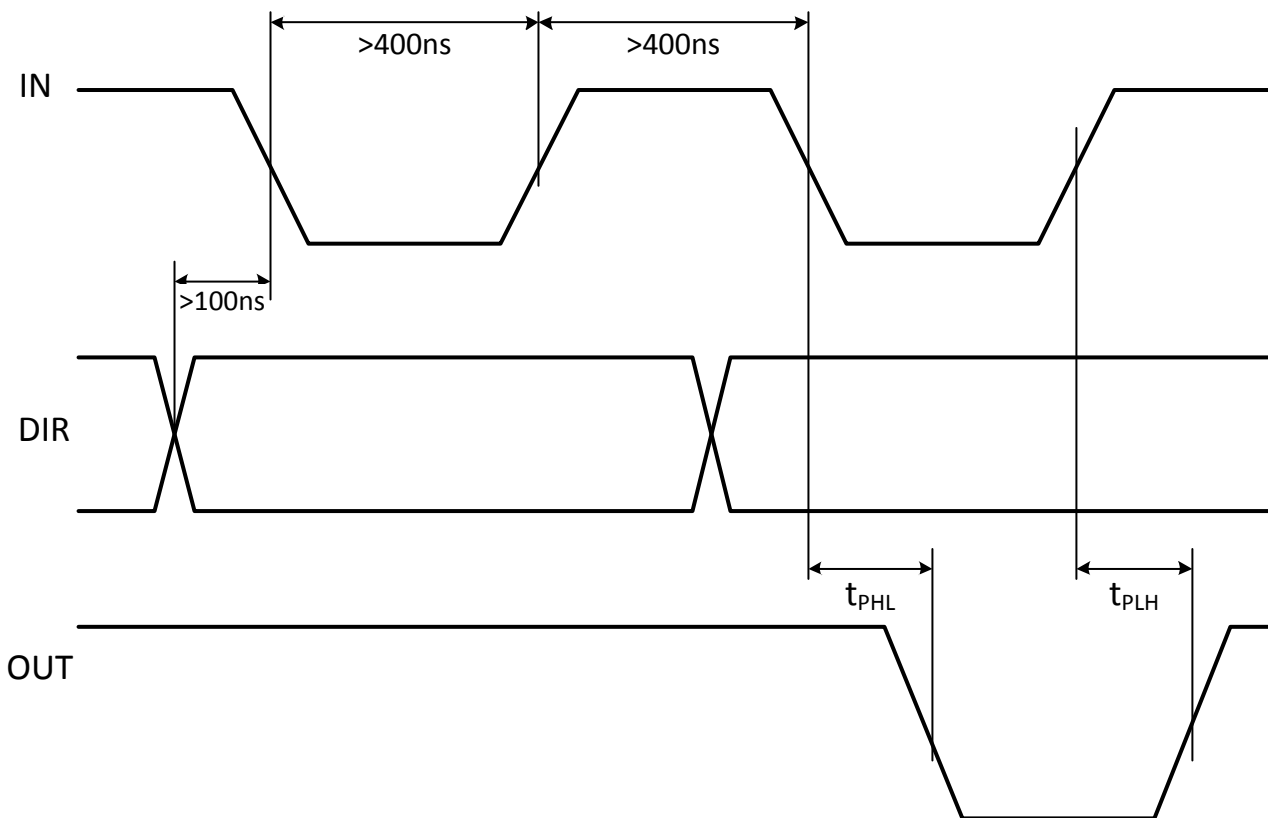


SWITCHING CHARACTERISTICS

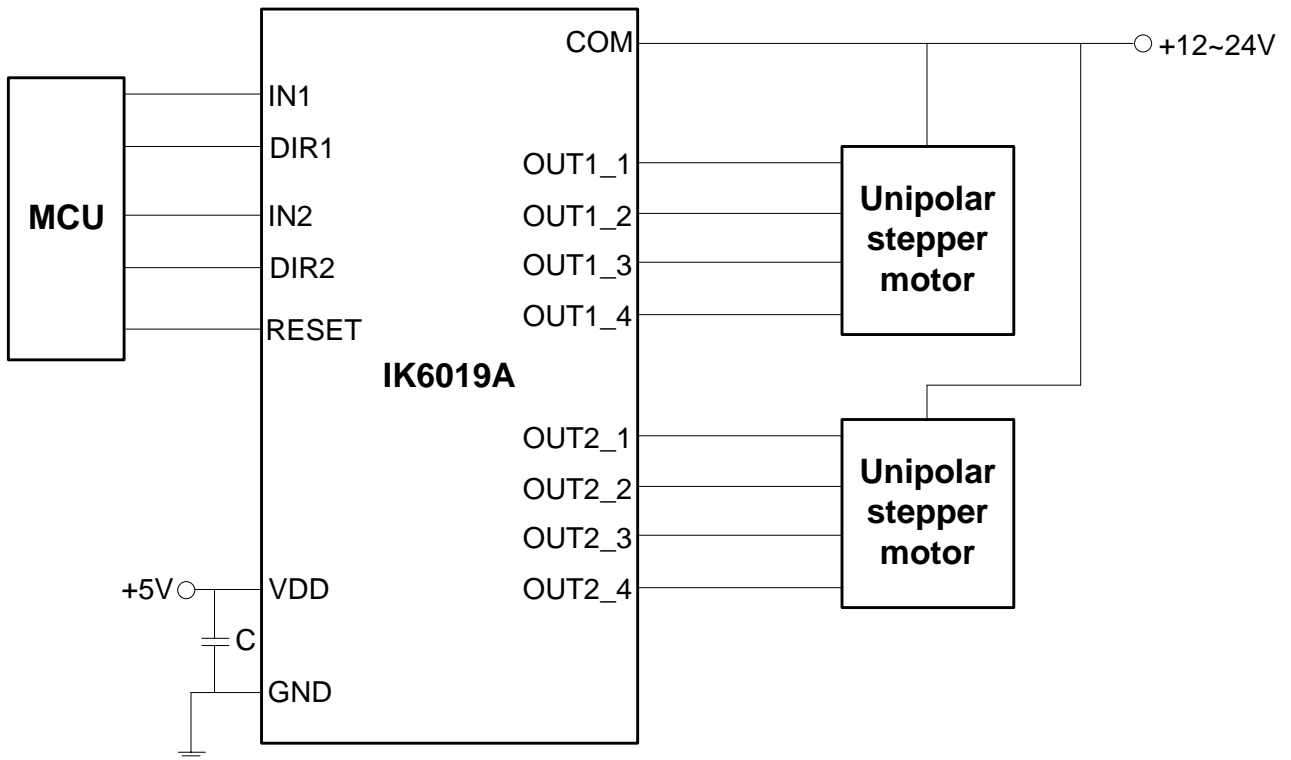
$V_{DD}=3.3\sim 5.5V$, $T_A=T_{OP}=+25^{\circ}C$. All voltages are defined with respect to ground. Positive currents flow into the device. Unless otherwise specified. Please refer to test circuit section.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
t_{PLH}	Turn-on delay time	$0.5V_{IN}$ to $0.5V_O$		0.25	1	μs
t_{PHL}	Turn-off delay time	$0.5V_{IN}$ to $0.5V_O$		0.25	1	μs

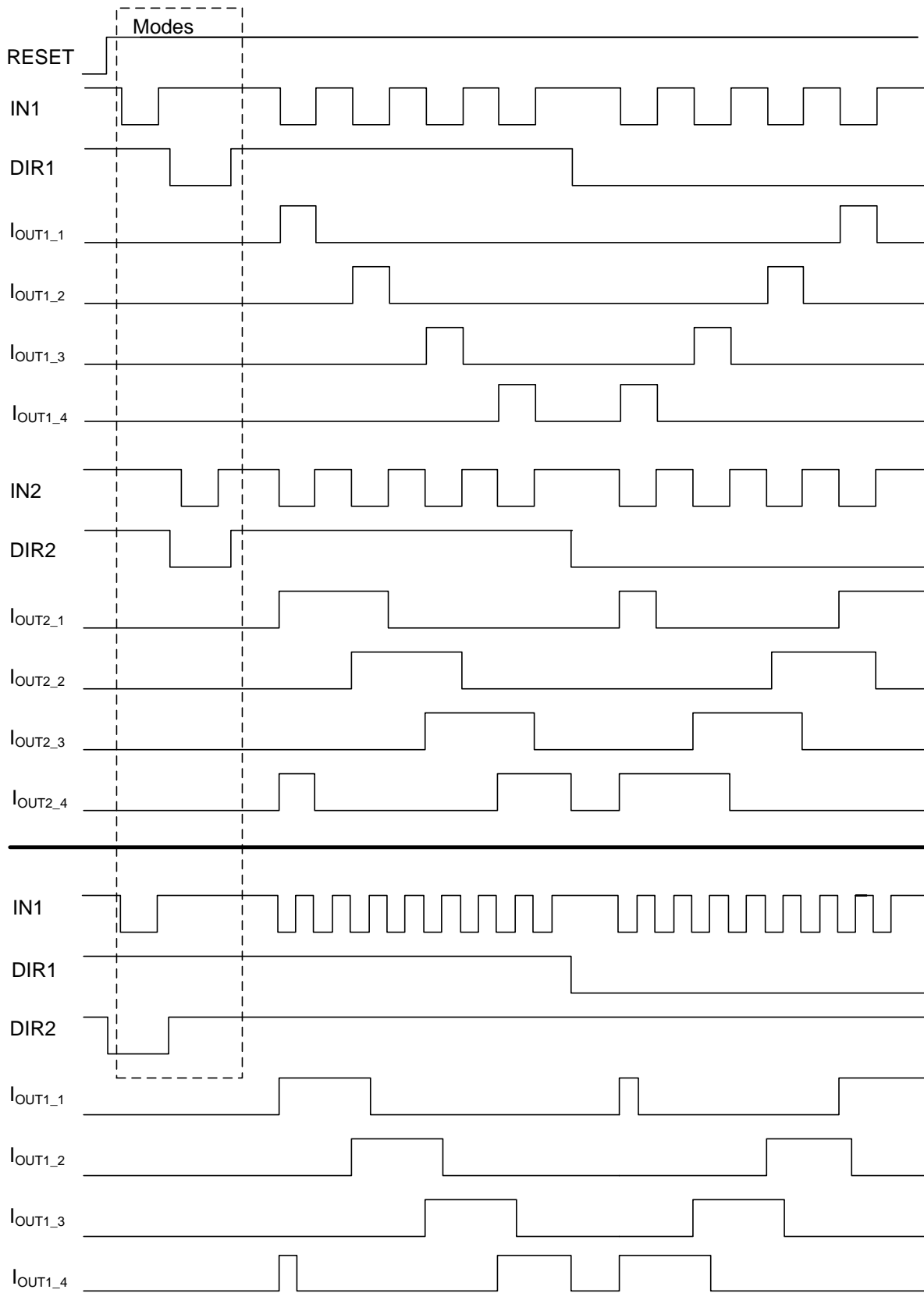
TEST CIRCUIT FOR SWITCHING CHARACTERISTICS



APPLICATION CIRCUIT



TIMING DIAGRAM



FUNCTIONAL DESCRIPTION

The IK6019A provides 3 stepping modes setting as shown in the table below. The stepping mode depends on signals DIR1 and DIR2 at the falling edge of the first pulse of IN1 (IN2):

DIR1	DIR2	Stepping mode
1	1	Single stepping
1	0	Half stepping
0	0	High torque stepping

The second pulse of IN1 (IN2) (time from falling edge till raising edge) determines the duration of the output's operation, whereas the next time from raising edge till falling edge sets the delay time between output channels in depend on stepping mode.

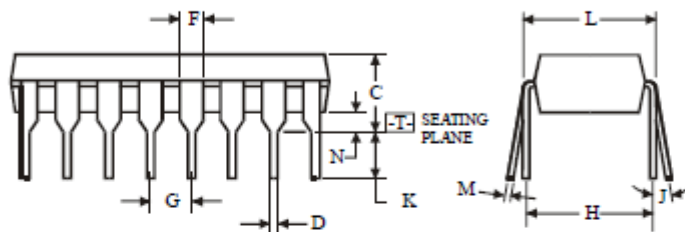
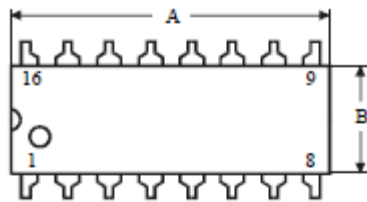
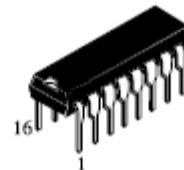
After changing direction (DIR1 (DIR2) falls from "1" to "0" or rises from "0" to "1"), outputs OUT1_1 to OUT1_4 (OUT2_1 to OUT2_4) are turned off and will be switched at the next pulse of IN1 (IN2) in according with stepping mode.

If the input RESET changes the level from HIGH to LOW, all outputs and internal triggers are turned off. After returning the HIGH level to the input RESET, it is needed to determine the stepping mode again as was described earlier. Note: in during of changing the RESET level from LOW to HIGH the IN1 (IN2) level must be HIGH.

Please, for more detail description of operation see the section TIMING DIAGRAM.

PACKAGE INFORMATION

N SUFFIX PLASTIC DIP
(MS - 001BB)



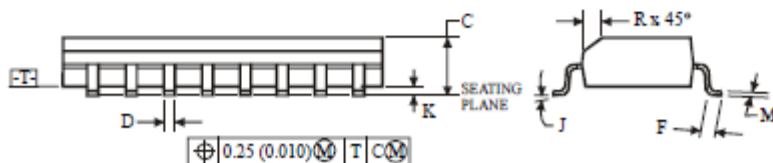
$$\text{⌀} 0.25 (0.010) \text{⌀} \text{ T}$$

NOTES:

1. Dimensions "A", "B" do not include mold flash or protrusions.
Maximum mold flash or protrusions 0.25 mm (0.010) per side.

Symbol	Dimension, mm	
	MIN	MAX
A	18.67	19.69
B	6.10	7.11
C		5.33
D	0.36	0.56
F	1.14	1.78
G	2.54	
H	7.62	
J	0°	10°
K	2.92	3.81
L	7.62	8.26
M	0.20	0.36
N	0.38	

D SUFFIX SOIC
(MS - 012AC)



$$\text{⌀} 0.25 (0.010) \text{⌀} \text{ T C} \text{⌀}$$

NOTES:

1. Dimensions A and B do not include mold flash or protrusion.
2. Maximum mold flash or protrusion 0.15 mm (0.006) per side for A; for B - 0.25 mm (0.010) per side.

Symbol	Dimension, mm	
	MIN	MAX
A	9.80	10.00
B	3.80	4.00
C	1.35	1.75
D	0.33	0.51
F	0.40	1.27
G	1.27	
H	5.72	
J	0°	8°
K	0.10	0.25
M	0.19	0.25
P	5.80	6.20
R	0.25	0.50