

KA7405D

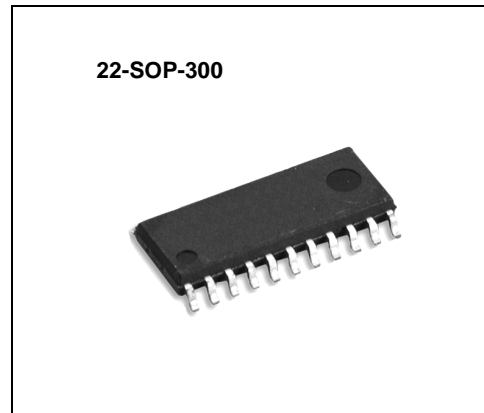
2-Channel DC Motor Drive IC

Features

- Output current up to 1.5A (Each channel).
- 4-function modes (CW, CCW, stop and brake) are controlled by 2-logic circuits.
- Operating voltage range: $V_{CC} = 2.5 \sim 6.0V$.
- Built-in spike killer diode.
- Low saturation voltage.

Description

The KA7405D is a monolithic integrated circuit, and suitable for the zoom and reel motor driver for camera, tape deck, any other consumer and industrial applications.



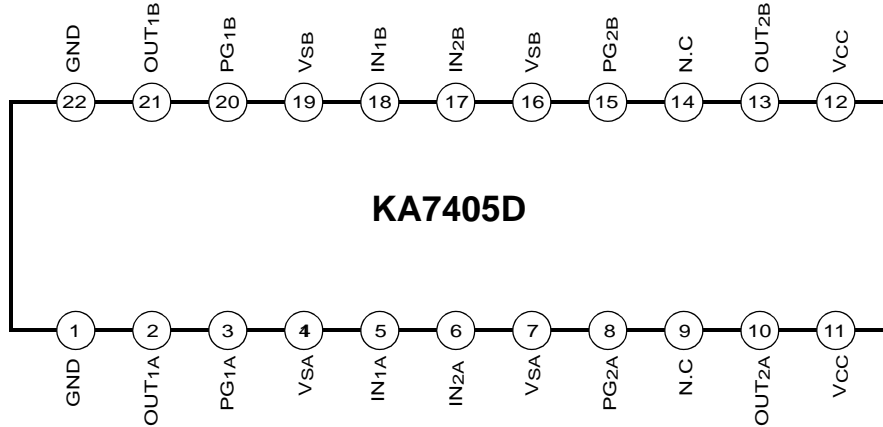
Typical Applications

- Camera zoom and film motors
- General DC motor

Ordering Information

| Device | Package | Operating Temp. |
|---------|------------|-----------------|
| KA7405D | 22-SOP-300 | -25°C to +75°C |

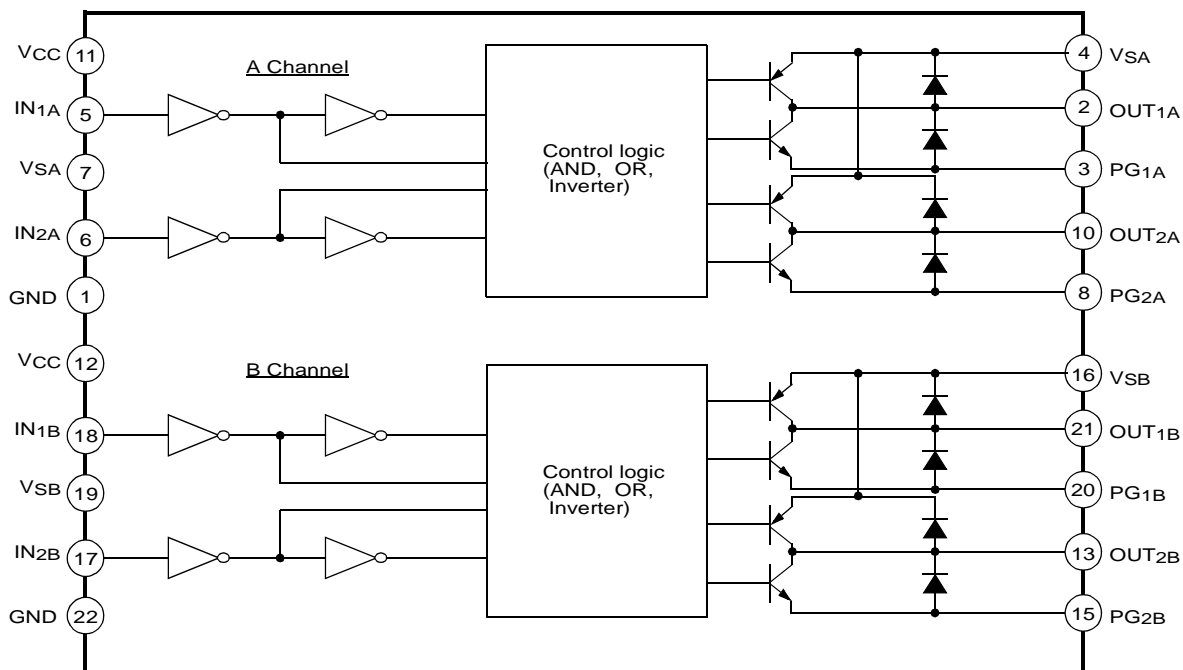
Pin Assignments



Pin Definitions

| Pin Number | Pin Name | I/O | Pin Function Description | Remark |
|------------|----------|-----|--------------------------|-----------|
| 1 | GND | - | Signal ground | - |
| 2 | OUT1A | O | Output 1 | Channel A |
| 3 | PG1A | - | Power ground 1 | Channel A |
| 4 | VSA | - | Output supply voltage | Channel A |
| 5 | IN1A | I | Input 1 | Channel A |
| 6 | IN2A | I | Input 2 | Channel A |
| 7 | VSA | - | Output supply voltage | Channel A |
| 8 | PG2A | - | Power ground 2 | Channel A |
| 9 | NC | - | No connection | - |
| 10 | OUT2A | O | Output 2 | - |
| 11 | VCC | - | Supply voltage | - |
| 12 | VCC | - | Supply voltage | - |
| 13 | OUT2B | O | Output 2 | Channel B |
| 14 | NC | - | No connection | - |
| 15 | PG2B | - | Power ground 2 | Channel B |
| 16 | VSB | - | Output supply voltage | Channel B |
| 17 | IN2B | I | Input 2 | Channel B |
| 18 | IN1B | I | Input 1 | Channel B |
| 19 | VSB | - | Output supply voltage | Channel B |
| 20 | PG1B | - | Power ground 1 | Channel B |
| 21 | OUT1B | O | Output 1 | Channel B |
| 22 | GND | - | Signal ground | - |

Internal Block Diagram



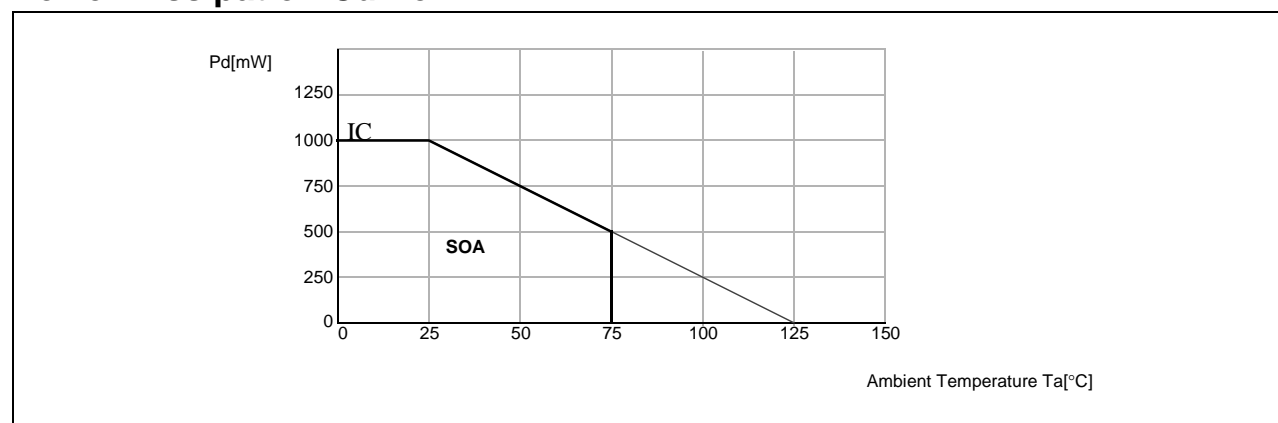
Equivalent Circuits

| Description | Pin No. | Internal Circuit |
|---------------|---------|------------------|
| Control Input | | |
| IN1A | 5 | |
| IN2A | 6 | |
| IN1B | 18 | |
| IN2B | 17 | |
| VCC | 11, 12 | |
| GND | 1, 22 | |
| Motor Output | | |
| OUT1A | 2 | |
| OUT2A | 10 | |
| OUT1B | 21 | |
| OUT2B | 13 | |
| VSA | 4, 7 | |
| VSB | 16, 19 | |
| PG1A | 3 | |
| PG2A | 8 | |
| PG1B | 20 | |
| PG2B | 15 | |

Absolute Maximum Ratings (Ta = 25°C)

| Parameter | Symbol | Value | Unit |
|------------------------|--------------------|------------|------|
| Power supply voltage | V _{CCMAX} | 6.0 | V |
| Channel supply voltage | V _{SMAX} | 6.0 | V |
| Power dissipation | P _D | 1000 | mW |
| Operating temperature | T _{OPR} | -25 ~ +75 | °C |
| Storage temperature | T _{STG} | -40 ~ +125 | °C |
| Output current | I _{OMAX} | 1.5 | A |

Power Dissipation Curve



Recommended Operating Conditions (Ta = 25°C)

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|--------------------------|-----------------|------|------|------|------|
| Operating supply voltage | V _{CC} | 2.5 | - | 6.0 | V |

Electrical Characteristics

(VCC=3V, Ta=25°C, unless otherwise specified)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|------------------|--|------|------|------|------|
| Supply current 1 | ICC1 | V _{IN(all)} = 0V, V _{CC} =5V | - | 0.1 | 10 | μA |
| Supply current 2 | ICC2 | V _{IN1} =3V, V _{CC} =5V | - | 15 | 30 | mA |
| Supply current 3 | ICC3 | V _{IN2} =3V, V _{CC} =5V | - | 15 | 30 | mA |
| Supply current 4 | ICC4 | V _{IN} =3V | - | 30 | 50 | mA |
| Input current | I _{IN} | V _{CC} =6V, V _{IN} =2V | - | 45 | 80 | μA |
| Leakage current | I _{IK} | V _{CC} =5V | - | 0.1 | 10 | μA |
| Upper spark diode forward voltage | V _{SF1} | I _O =500mA | - | 1.0 | 1.7 | V |
| Lower spark diode forward voltage | V _{SF2} | I _O =500mA | - | 1.0 | 1.7 | V |
| Output saturation voltage (1A) | V _{O1A} | I _O A=300mA, V _{IN1A} =3V | - | 0.45 | 0.70 | V |
| Output saturation voltage (1B) | V _{O1B} | I _O B=300mA, V _{IN1B} =3V | - | 0.45 | 0.70 | V |
| Output saturation voltage (2A) | V _{O2A} | I _O A=600mA, V _{IN1A} =3V | - | 1.0 | 1.5 | V |
| Output saturation voltage (2B) | V _{O2B} | I _O B=600mA, V _{IN1B} =3V | - | 1.0 | 1.5 | V |
| Output saturation voltage (3A) | V _{O3A} | I _O A=300mA, V _{IN2A} =3V | - | 0.45 | 0.70 | V |
| Output saturation voltage (3B) | V _{O3B} | I _O B=300mA, V _{IN2B} =3V | - | 0.45 | 0.70 | V |
| Output saturation voltage (4A) | V _{O4A} | I _O A=600mA, V _{IN2A} =3V | - | 1.0 | 1.5 | V |
| Output saturation voltage (4B) | V _{O4B} | I _O B=600mA, V _{IN2B} =3V | - | 1.0 | 1.5 | V |
| Output saturation voltage 5 | V _{O5} | I _O B=600mA, V _{IN1} =3V | - | 0.6 | 0.8 | V |
| Output saturation voltage 6 | V _{O6} | I _O =600mA, V _{IN2} =3V | - | 0.6 | 0.8 | V |
| Output saturation voltage 7 | V _{O7} | I _O =1200mA, V _{IN1} =3V | - | 1.2 | 1.6 | V |
| Output saturation voltage 8 | V _{O8} | I _O =1200mA, V _{IN2} =3V | - | 1.2 | 1.6 | V |
| Output sustain voltage | V _{SUS} | I _O =200mA | 10 | 15 | - | V |
| Output saturation low voltage A ^{note} | V _{OLA} | V _{CC} =1.9V, I _O A=400mA | - | 0.45 | 0.90 | V |
| Output saturation low voltage B ^{note} | V _{OLB} | V _{CC} =1.9V, I _O B=400mA | - | 0.45 | 0.90 | V |

Notes:

User's option.

Operation Truth Table

| Input/Output Motor Operation | Input 1 | Input 2 | Output 1 | Output 2 | Remark |
|---------------------------------|---------|---------|----------|----------|----------------|
| Stop | Low | Low | Off | Off | High impedance |
| Forward Operation | Low | High | Low | High | CW / CCW |
| Backward Operation | High | Low | High | Low | CCW / CW |
| Fast stop | High | High | Low | Low | Brake |

Typical Performance Characteristics

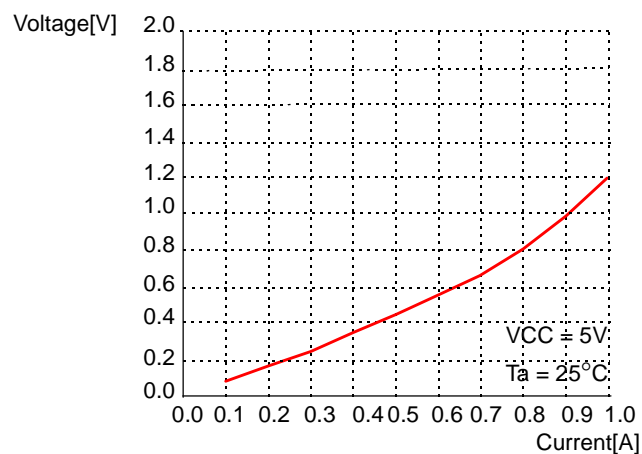


Figure 1. PNP Saturation Voltage

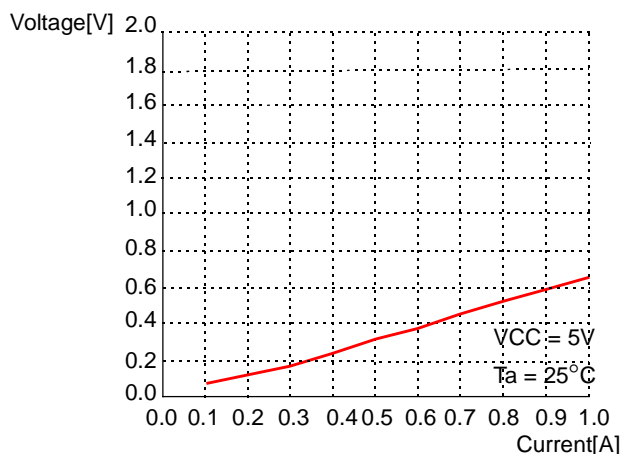
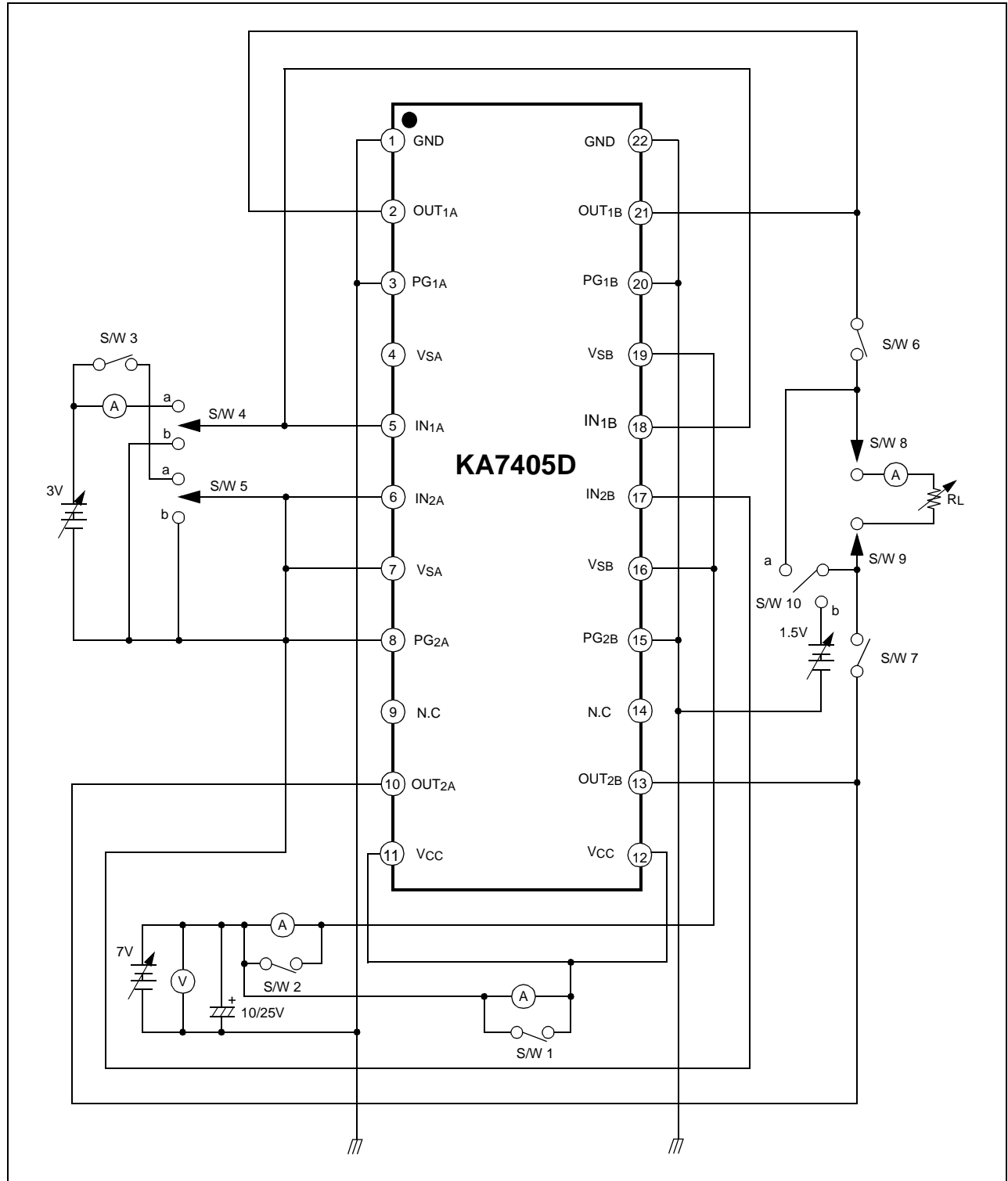


Figure 2. PNP Saturation Voltage

Test Circuits



Test Conditions

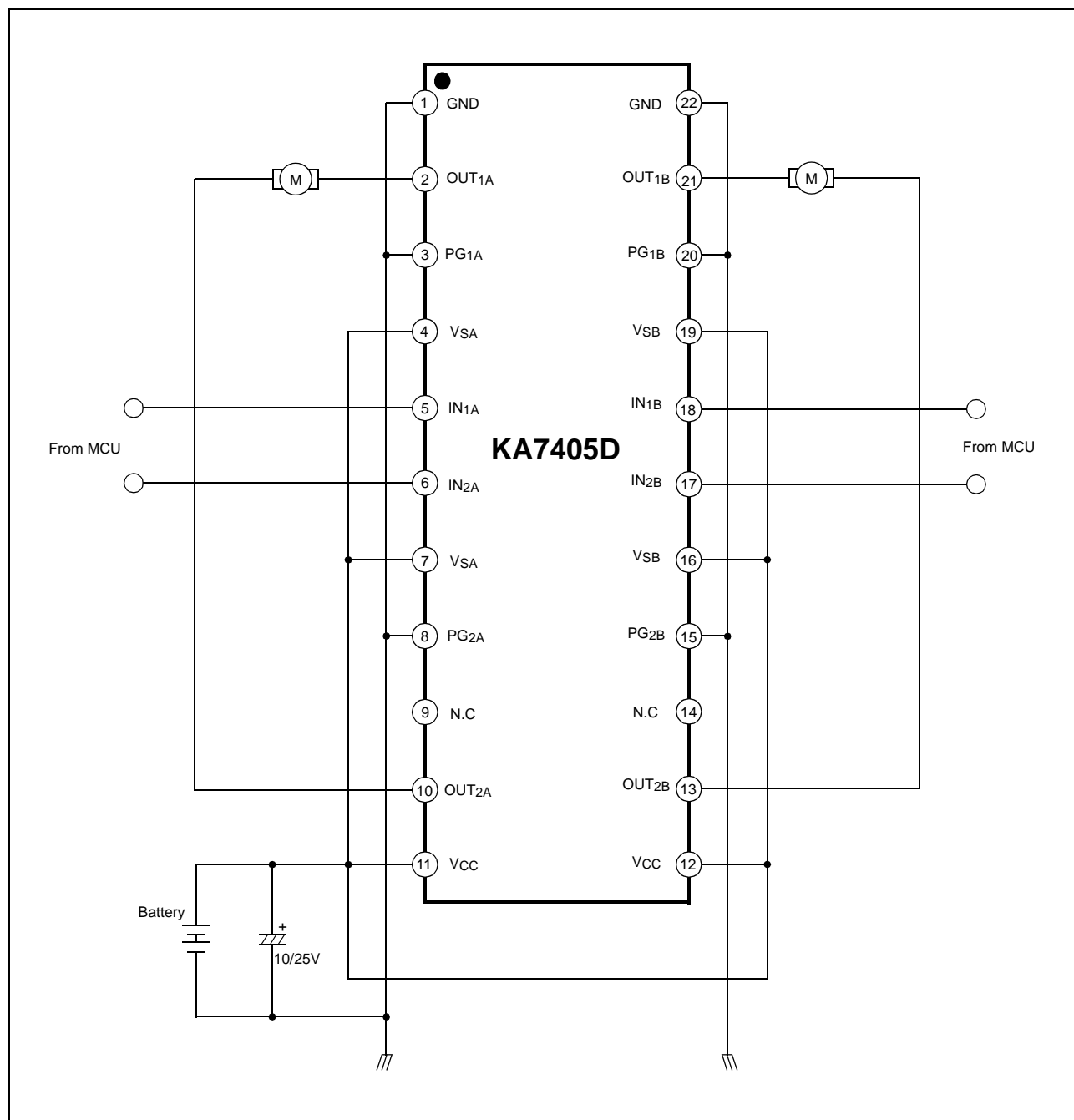
| Characteristics | SW1 | SW2 | SW3 | SW4 | SW5 | SW6 | SW7 | SW8 | SW9 | SW10 | Remark |
|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----------------|
| ICC1 | Off | Off | X | b | b | Off | Off | X | X | Off | Supply current |
| ICC2 | Off | Off | On | a | b | Off | Off | X | X | Off | Supply current |
| ICC3 | Off | Off | On | b | a | Off | Off | X | X | Off | Supply current |
| ICC4 | Off | Off | On | a | a | Off | Off | X | X | Off | Supply current |
| IIN | On | On | On | a | a | Off | Off | X | X | Off | Input current |
| IIK | Off | Off | Off | b | b | Off | Off | X | X | Off | Leakage current |
| VSF1 | On | On | On | a | b | On | On | Off | Off | a | Spark diode |
| VSF2 | On | On | On | b | a | On | On | Off | Off | b | Spark diode |
| VO1A | On | On | On | a | b | On | On | On | On | Off | Single mode |
| VO2A | On | On | On | b | a | On | On | On | On | Off | Single mode |
| VO3A | On | On | On | a | b | On | On | On | On | Off | Single mode |
| VO4A | On | On | On | b | a | On | On | On | On | Off | Single mode |
| VO5 | On | On | On | a | b | On | On | On | On | Off | Parallel mode |
| VO6 | On | On | On | b | a | On | On | On | On | Off | Parallel mode |
| VO7 | On | On | On | a | b | On | On | On | On | Off | Parallel mode |
| VO8 | On | On | On | b | a | On | On | On | On | Off | Parallel mode |
| VSUS | Off | Off | X | b | b | On | On | On | On | Off | Sustain voltage |

Notes:

' X ' : Don't care.

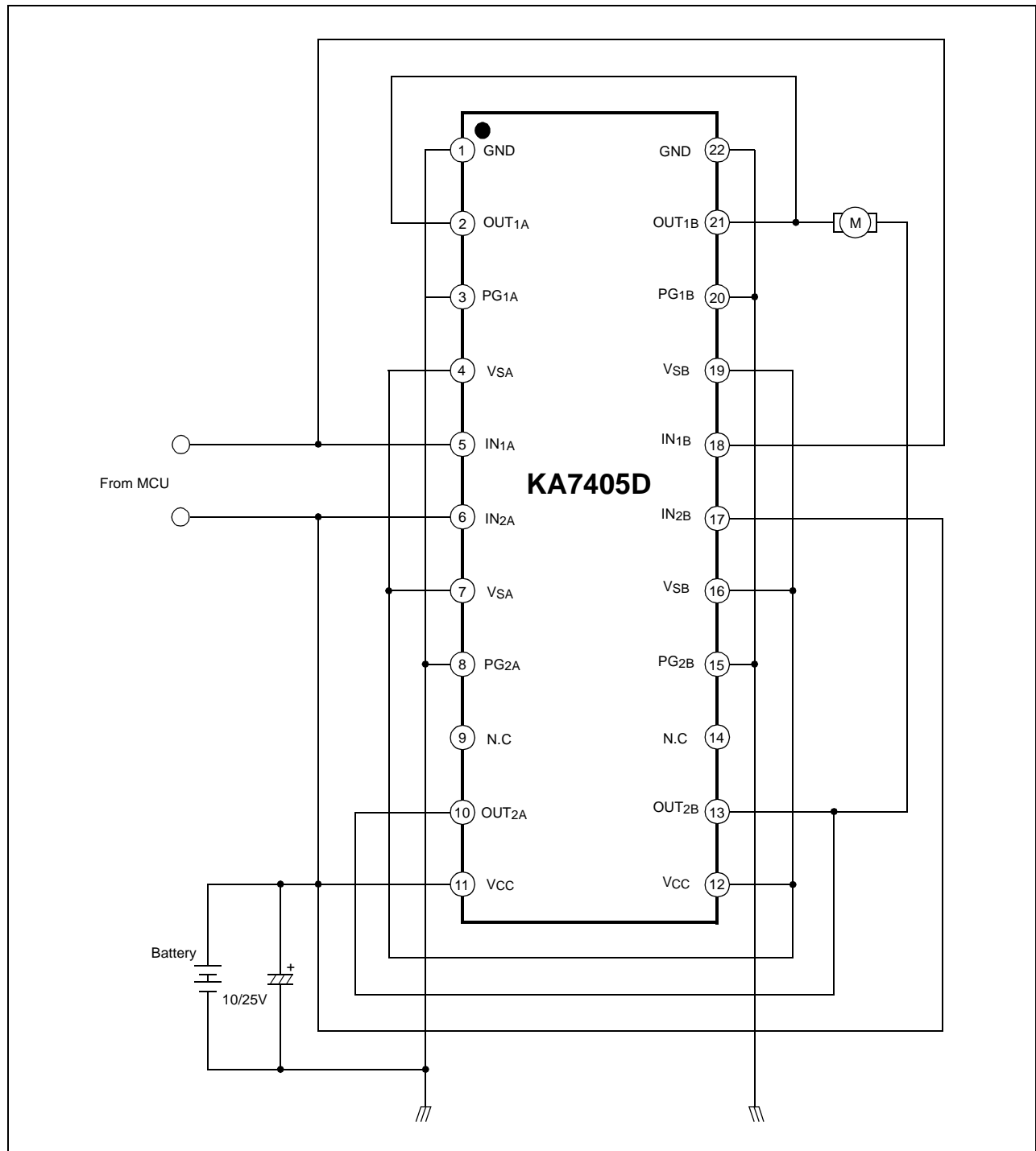
Typical Application Circuits 1

(Single drive mode)



Typical Application Circuits 2

(Parallel drive mode)



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