



SANYO Semiconductors DATA SHEET

LV8042LG — Bi-CMOS IC For Digital Still Cameras 7-Channel Single-Chip Motor Driver ICs

Overview

The LV8042LG is Motor driver 7ch single-chip for DSC.

Features

- Micro-step driven stepping motor driver×2
- PWM driven forward/reverse motor driver
(changeover to the micro-step driving stepping motor driver 1ch possible) × 2
- PWM driven forward/reverse motor driver×2
- Constant-current forward/reverse motor driver × 1
- Two-phase, single-two phase full torque, single-two phase, 4W1-2, phase excitation drive changeover possible (1/2/3/4ch)
- Progress of micro-step driven excitation steps by clock signal input only (1/2/3/4ch)
- Holding electrification current changeover in four steps possible by serial data (1/2/3/4ch)
- Constant-current control chopping frequency variable with external resistor (1/2/3/4ch)
- 8-bit wire serial data control

Actuator application example

| | Shutter | Iris | Focus | Zoom |
|---------------|-----------------------|------------------------|-----------------|------------------------|
| Application 1 | Constant current /VCM | Saturation /STM or VCM | Micro-step /STM | Micro-step /STM |
| Application 2 | Constant current /VCM | Saturation /STM or VCM | Micro-step /STM | Saturation /STM or DCM |
| Application 3 | Constant current /VCM | Micro-step /STM | Micro-step /STM | Saturation /STM or DCM |

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SANYO Semiconductor Co., Ltd.

TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

41107 TI IM B8-8935,8943 No.A0004-1/29

LV8042LG

Specifications

Absolute Maximum Ratings at Ta = 25°C

| Parameter | Symbol | Conditions | Ratings | Unit |
|-------------------------------|---------------------|---|-------------|------|
| Supply voltage 1 | V _M max | | 6 | V |
| Supply voltage 2 | V _{CC} max | | 6 | V |
| Output peak current | I _{Opeak} | 1ch/2ch/3ch/4ch/5ch/6ch/7ch Pulse width<10ms, ty≤20% | 600 | mA |
| Output continuous current | I _O max | 1ch/2ch/3ch/4ch/5ch/6ch/7ch | 400 | mA |
| Allowable power dissipation 1 | P _d max1 | Independent IC | 0.32 | W |
| Allowable power dissipation 2 | P _d max2 | Mounted on a specified board * | 1.4 | W |
| Operating temperature | T _{opr} | | -20 to +85 | °C |
| Storage temperature | T _{stg} | | -55 to +150 | °C |

Note *1: Mounted on a specified board: 40mm×50mm×0.8mm glass epoxy (four-layer substrate)

Allowable Operating Range at Ta = 25°C

| Parameter | Symbol | Conditions | Ratings | Unit |
|------------------------|-------------------|------------------------|---------------------------|------|
| Supply voltage range 1 | V _M | | 2 to 5.5 | V |
| Supply voltage range 2 | V _{CC} | | 2.7 to 5.5 | V |
| Logic input voltage | V _{IN} | | 0 to V _{CC} +0.3 | V |
| Chopping frequency | f _{chop} | 1ch, 2ch, 3ch, 4ch | 50 to 200 | kHz |
| Clock frequency | f _{CLK} | CLK12, CLK34 | to 64 | kHz |
| PWM frequency | f _{PWM} | PWM3, PWM4, PWM5, PWM6 | to 100 | kHz |

Electrical Characteristics at Ta = 25°C, V_M = 5V, V_{CC} = 3.3V

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---|---------------------------------|--------------------------------------|---------------------|-------------------|---------------------|------|
| | | | min | typ | max | |
| Standby current drain | I _{stn} | ST="L" | | | 1.0 | μA |
| Operating current drain 1 | I _M | ST="H", PWM="H", IN72="H" no load | | 50 | 100 | μA |
| Operating current drain 2 | I _{CC} | ST="H", PWM="H", IN72="H" no load | | 4.0 | 5.0 | mA |
| V _{CC} low-voltage cutting voltage | V _{th} V _{CC} | | 2.1 | 2.35 | 2.6 | V |
| Low-voltage hysteresis voltage | V _{th} HIS | | 100 | 150 | 200 | mV |
| VG reference voltage | V _{GL} | | 4.4 | 4.7 | 5.0 | V |
| Charge pump boost voltage | V _{GH} | | V _M +3.5 | V _M +4 | V _M +4.5 | V |
| Charge pump rise time | t _{ONG} | C (V _{GH})=0.1μF | | 0.1 | 0.2 | ms |
| Charge pump oscillation frequency | F _{chg} | R=20kΩ | 100 | 125 | 150 | kHz |
| Thermal shutdown temperature | T _{SD} | Design guarantee* | 150 | 160 | 180 | °C |
| Thermal hysteresis width | ΔT _{SD} | Design guarantee* | 20 | 30 | 40 | °C |
| Stepping motor driver (1ch/2ch) | | | | | | |
| Output ON resistance | R _{on1} | I _O =400mA, upper | | 0.6 | 0.7 | Ω |
| | R _{on2} | I _O =400mA, lower | | 0.6 | 0.7 | Ω |
| Output leak current | I _{Oleak1} | | | | 1.0 | μA |
| Diode forward voltage | V _{D1} | I _D =-400mA | 0.6 | 0.9 | 1.2 | V |
| Logic pin input current | I _{INL1} | V _{IN} =0V (ST, CLK12) | | | 1.0 | μA |
| | I _{INH1} | V _{IN} =3.3V (ST, CLK12) | 20 | 33 | 50 | μA |
| Logic input "H" level voltage | V _{INH1} | ST, CLK12 | 2.5 | | | V |
| Logic input "L" level voltage | V _{INL1} | ST, CLK12 | | | 1.0 | V |

Note: * Design target value. These items are not tested.

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| Parameter | Symbol | Conditions | Ratings | | | Unit |
|--|-----------------------------|--|---------|-------|-------|------|
| | | | min | typ | max | |
| Current selection reference voltage level | 4W1-2 phases | Step 16 (1ch comparing level during initialization) | 0.185 | 0.200 | 0.215 | V |
| | | Step 15 (initialization +1) | 0.185 | 0.200 | 0.215 | V |
| | | Step 14 (initialization +2) | 0.185 | 0.200 | 0.215 | V |
| | | Step 13 (initialization +3) | 0.176 | 0.191 | 0.206 | V |
| | | Step 12 (initialization +4) | 0.170 | 0.185 | 0.200 | V |
| | | Step 11 (initialization +5) | 0.162 | 0.177 | 0.192 | V |
| | | Step 10 (initialization +6) | 0.154 | 0.169 | 0.184 | V |
| | | Step 9 (initialization +7) | 0.146 | 0.161 | 0.176 | V |
| | | Step 8 (initialization +8) | 0.129 | 0.144 | 0.159 | V |
| | | Step 7 (initialization +9) | 0.113 | 0.128 | 0.143 | V |
| | | Step 6 (initialization +10) | 0.097 | 0.112 | 0.127 | V |
| | | Step 5 (initialization +11) | 0.079 | 0.094 | 0.109 | V |
| | | Step 4 (initialization +12) | 0.062 | 0.077 | 0.092 | V |
| | | Step 3 (initialization +13) | 0.044 | 0.059 | 0.074 | V |
| | | Step 2 (initialization +14) | 0.024 | 0.039 | 0.054 | V |
| | Step 1 (initialization +15) | 0.006 | 0.021 | 0.036 | V | |
| | 1-2 phases | Step 16 (1ch comparing level during initialization) | 0.185 | 0.200 | 0.215 | V |
| | | Step 8 (initialization +1) | 0.129 | 0.144 | 0.159 | V |
| | 1-2 phases full torque | Step 16 (1ch comparing level during initialization) | 0.185 | 0.200 | 0.215 | V |
| | | Step 8 (initialization +1) | 0.185 | 0.200 | 0.215 | V |
| 2 phase | Step 8 | 0.185 | 0.200 | 0.215 | V | |
| Chopping frequency | Fchop1 | R=20kΩ | 100 | 125 | 150 | kHz |
| Current setting reference voltage | VSEN11 | (D3, D2)=(0, 0) | 0.185 | 0.200 | 0.215 | V |
| | VSEN12 | (D3, D2)=(0, 1) | 0.119 | 0.134 | 0.149 | V |
| | VSEN13 | (D3, D2)=(1, 0) | 0.085 | 0.100 | 0.115 | V |
| | VSEN14 | (D3, D2)=(1, 1) | 0.051 | 0.066 | 0.081 | V |
| PWM drive/stepping motor driver (3ch/4ch) | | | | | | |
| Output ON resistance | Ronu2 | I _O =400mA, upper | | 0.6 | 0.7 | Ω |
| | Rond2 | I _O =400mA, lower | | 0.6 | 0.7 | Ω |
| Output leak current | I _O leak2 | | | | 1.0 | μA |
| Diode forward voltage | VD2 | ID=-400mA | 0.6 | 0.9 | 1.2 | V |
| Logic input current | I _{IN} L2 | VIN=0V (PWM3, PWM4) | | | 1.0 | μA |
| | I _{IN} H2 | VIN=3.3V (PWM3, PWM4) | 20 | 33 | 50 | μA |
| Logic input "H" level voltage | V _{IN} H2 | PWM3, PWM4 | 2.5 | | | V |
| Logic input "L" level voltage | V _{IN} L2 | PWM3, PWM4 | | | 1.0 | V |

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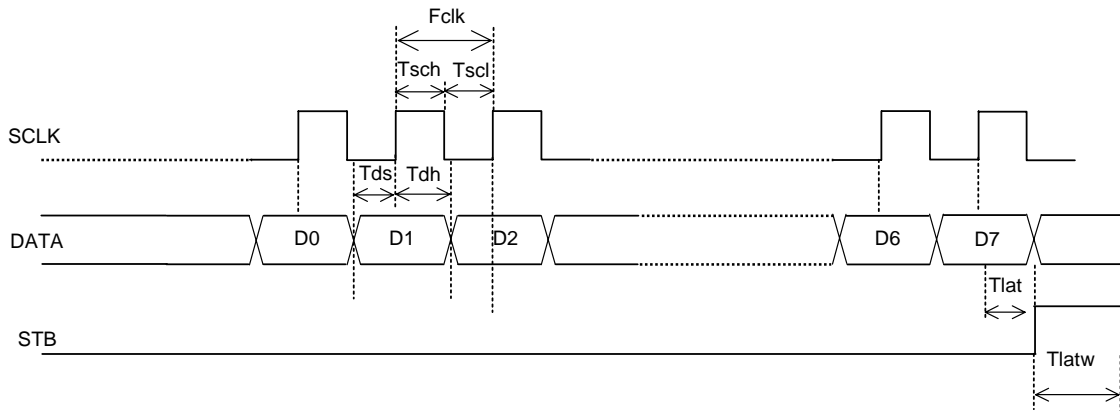
| Parameter | Symbol | Conditions | Ratings | | | Unit |
|--|-----------------------------|--|---------|-------|-------|------|
| | | | min | typ | max | |
| Current selection reference voltage level | 4W1-2 phases | Step 16 (3ch comparing level during initialization) | 0.185 | 0.200 | 0.215 | V |
| | | Step 15 (initialization +1) | 0.185 | 0.200 | 0.215 | V |
| | | Step 14 (initialization +2) | 0.185 | 0.200 | 0.215 | V |
| | | Step 13 (initialization +3) | 0.176 | 0.191 | 0.206 | V |
| | | Step 12 (initialization +4) | 0.170 | 0.185 | 0.200 | V |
| | | Step 11 (initialization +5) | 0.162 | 0.177 | 0.192 | V |
| | | Step 10 (initialization +6) | 0.154 | 0.169 | 0.184 | V |
| | | Step 9 (initialization +7) | 0.146 | 0.161 | 0.176 | V |
| | | Step 8 (initialization +8) | 0.129 | 0.144 | 0.159 | V |
| | | Step 7 (initialization +9) | 0.113 | 0.128 | 0.143 | V |
| | | Step 6 (initialization +10) | 0.097 | 0.112 | 0.127 | V |
| | | Step 5 (initialization +11) | 0.079 | 0.094 | 0.109 | V |
| | | Step 4 (initialization +12) | 0.062 | 0.077 | 0.092 | V |
| | | Step 3 (initialization +13) | 0.044 | 0.059 | 0.074 | V |
| | | Step 2 (initialization +14) | 0.024 | 0.039 | 0.054 | V |
| | Step 1 (initialization +15) | 0.006 | 0.021 | 0.036 | V | |
| | 1-2 phases | Step 16 (3ch comparing level during initialization) | 0.185 | 0.200 | 0.215 | V |
| | | Step 8 (initialization +1) | 0.129 | 0.144 | 0.159 | V |
| | 1-2 phases full torque | Step 16 (3ch comparing level during initialization) | 0.185 | 0.200 | 0.215 | V |
| | | Step 8 (initialization +1) | 0.185 | 0.200 | 0.215 | V |
| 2 phase | Step 8 | 0.185 | 0.200 | 0.215 | V | |
| Chopping frequency | Fchop2 | R=20kΩ | 100 | 125 | 150 | kHz |
| Current setting reference voltage | VSEN21 | (D5, D4)=(0, 0) | 0.185 | 0.200 | 0.215 | V |
| | VSEN22 | (D5, D4)=(0, 1) | 0.119 | 0.134 | 0.149 | V |
| | VSEN23 | (D5, D4)=(1, 0) | 0.085 | 0.100 | 0.115 | V |
| | VSEN24 | (D5, D4)=(1, 1) | 0.051 | 0.066 | 0.081 | V |
| PWM driven forward/reverse motor driver (5ch/6ch) | | | | | | |
| Output ON resistance | Ronu3 | I _O =400mA, upper | | 0.6 | 0.7 | Ω |
| | Rond3 | I _O =400mA, lower | | 0.6 | 0.7 | Ω |
| Output leak current | I _O leak3 | | | | 1.0 | μA |
| Diode forward voltage | VD3 | ID=-400mA | 0.6 | 0.9 | 1.2 | V |
| Logic pin input current | I _{IN} L3 | V _{IN} =0V (PWM5, PWM6) | | | 1.0 | μA |
| | I _{IN} H3 | V _{IN} =3.3V (PWM5, PWM6) | 20 | 33 | 50 | μA |
| Logic input "H" level voltage | V _{IN} H3 | PWM5, PWM6 | 2.5 | | | V |
| Logic input "L" level voltage | V _{IN} L3 | PWM5, PWM6 | | | 1.0 | V |
| Constant current forward/reverse motor driver (7ch) | | | | | | |
| Output ON resistance | Ronu4 | I _O =400mA, upper | | 0.6 | 0.7 | Ω |
| | Rond4 | I _O =400mA, lower | | 0.6 | 0.7 | Ω |
| Output leak current | I _O leak4 | | | | 1.0 | μA |
| Diode forward voltage | VD4 | ID=-400mA | 0.6 | 0.9 | 1.2 | V |
| Logic pin input current | I _{IN} L4 | V _{IN} =0V (IN71, IN72) | | | 1.0 | μA |
| | I _{IN} H4 | V _{IN} =3.3V (IN71, IN72) | 20 | 33 | 50 | μA |
| Logic input "H" level voltage | V _{IN} H4 | IN71, IN72 | 2.5 | | | V |
| Logic input "L" level voltage | V _{IN} L4 | IN71, IN72 | | | 1.0 | V |
| Output constant current | I _{OUT} 7 | Rload=3Ω, SEN7=0.5Ω, LIM7=0.2V | 384 | 400 | 416 | mA |
| VREF7 output voltage | VREF7 | (D7, D6)=(0, 0) | 0.190 | 0.200 | 0.210 | V |
| LIM7 input current | ILIM7 | LIM7=0V | | | 1.0 | μA |

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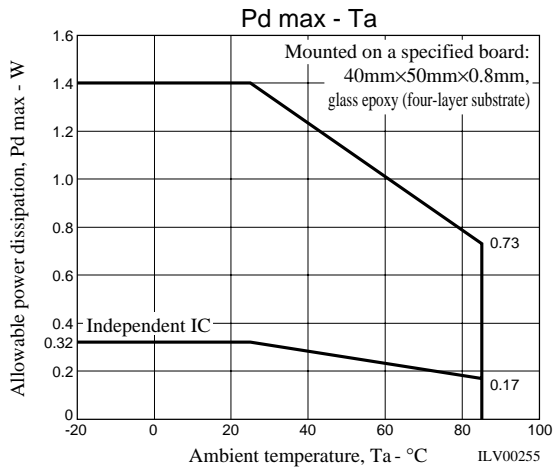
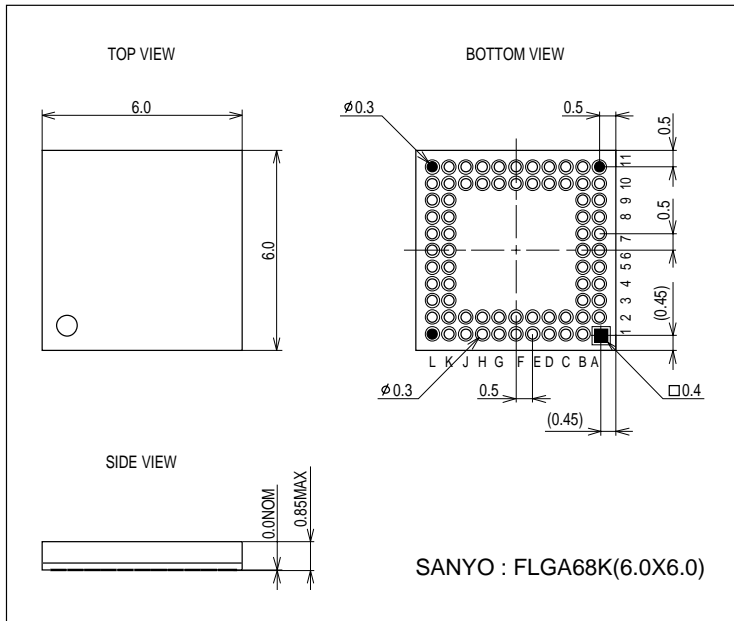
| Parameter | Symbol | Conditions | Ratings | | | Unit |
|-------------------------------------|---------------------|---|---------|-------|-------|------|
| | | | min | typ | max | |
| FC7 rapid charge current | I _{rafc7} | | 300 | 450 | 600 | μA |
| FC7 steady charge current | I _{chfc7} | | 5 | 10 | 15 | μA |
| FC7 steady discharge current | I _{disfc7} | | 5 | 10 | 15 | μA |
| Current setting reference voltage | VSEN41 | (D7, D6)=(0, 0) | 0.190 | 0.200 | 0.210 | V |
| | VSEN42 | (D7, D6)=(0, 1) | 0.124 | 0.134 | 0.144 | V |
| | VSEN43 | (D7, D6)=(1, 0) | 0.090 | 0.100 | 0.110 | V |
| | VSEN44 | (D7, D6)=(1, 1) | 0.056 | 0.066 | 0.076 | V |
| Serial data transmission pin | | | | | | |
| Logic pin input current | I _{INL5} | V _{IN} =0V (SCLK, DATA, STB) | | | 1.0 | μA |
| | I _{INH5} | V _{IN} =3.3V (SCLK, DATA, STB) | 20 | 33 | 50 | μA |
| Logic input "H" level voltage | V _{INH5} | SCLK, DATA, STB | 2.5 | | | V |
| Logic input "L" level voltage | V _{INL5} | SCLK, DATA, STB | | | 1.0 | V |
| Minimum SCLK "H" pulse width | T _{sch} | | 0.125 | | | μs |
| Minimum SCLK "L" pulse width | T _{scl} | | 0.125 | | | μs |
| STB specified time | T _{lat} | | 0.125 | | | μs |
| Minimum STB pulse width | T _{latw} | | 0.125 | | | μs |
| Data setup time | T _{ds} | | 0.125 | | | μs |
| Data hold time | T _{dh} | | 0.125 | | | μs |
| Maximum SCLK frequency | F _{clk} | | | | 4 | MHz |



Package Dimensions

unit : mm (typ)

3326



Pin Functions

| Pin No | Pin Name | Description |
|--------|----------|---|
| 5 | VM12 | STP 1ch/2ch Motor power connection pin |
| 2 | OUT1A | STP 1ch OUTA Output pin |
| 4 | OUT1B | STP 1ch OUTB Output pin |
| 3 | SEN1 | STP 1ch Current sensing resistor connection pin |
| 6 | OUT2A | STP 2ch OUTA Output pin |
| 8 | OUT2B | STP 2ch OUTB Output pin |
| 7 | SEN2 | STP 2ch Current sensing resistor connection pin |
| 68 | PGND12 | STP 1ch/2ch Power GND |
| 67 | CLK12 | STP Clock signal input pin |
| 66 | MO | STP Position detection monitor pin |
| 29 | SCLK | Serial data transmission CLK input pin |
| 27 | DATA | Serial data input pin |

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| Pin No | Pin Name | Description |
|--------|-----------------|--|
| 28 | STB | Serial data latch pulse input pin |
| 32 | R | Oscillation frequency setting resistor connection pin |
| 13 | VM34 | PWM/STP 3ch/4ch Motor power connection pin |
| 10 | OUT3A | PWM 3ch OUTA Output pin STP 3ch OUTA Output pin |
| 12 | OUT3B | PWM 3ch OUTB Output pin STP 3ch OUTB Output pin |
| 11 | SEN3 | STP 3ch Current sensing resistor connection pin |
| 14 | OUT4A | PWM 4ch OUTA Output pin STP 4ch OUTA Output pin |
| 17 | OUT4B | PWM 4ch OUTB Output pin STP 4ch OUTB Output pin |
| 15 | SEN4 | STP 4ch Current sensing resistor connection pin |
| 20 | PGND34 | PWM/STP 3ch/4ch Power GND |
| 21 | PWM3/CLK34 | PWM 3ch PWM Signal input pin STP Clock signal input pin |
| 22 | PWM4 | PWM 4ch PWM Signal input pin |
| 39 | VM56 | PWM 5ch/6ch Motor power connection pin |
| 36 | OUT5A | PWM 5ch OUTA Output pin |
| 38 | OUT5B | PWM 5ch OUTB Output pin |
| 33 | PWM5 | PWM 5ch PWM Signal input pin |
| 41 | OUT6A | PWM 6ch OUTA Output pin |
| 44 | OUT6B | PWM 6ch OUTB Output pin |
| 34 | PWM6 | PWM 6ch PWM Signal input pin |
| 43 | PGND56 | PWM 5ch/6ch Power GND |
| 49 | VM7 | Constant-current 7ch motor power connection pin |
| 58 | FC7 | Constant-current 7ch phase compensation capacitor connection pin |
| 47 | SEN7 | Constant-current 7ch current sensing resistor connection pin |
| 46 | OUT7A | Constant-current 7ch OUTA output pin |
| 48 | OUT7B | Constant-current 7ch OUTB output pin |
| 64 | IN71 | Constant-current 7ch 1 logic input pin |
| 65 | IN72 | Constant-current 7ch 2 logic input pin |
| 45 | PGND7 | Constant-current 7ch power GND |
| 62 | VREF7 | Constant-current 7ch current setting reference voltage output |
| 60 | LIM7 | Constant-current 7ch constant-current setting pin |
| 51 | CPL1 | Charge pump capacitor connection pin |
| 52 | CPL2 | Charge pump capacitor connection pin |
| 54 | CPH1 | Charge pump capacitor connection pin |
| 56 | CPH2 | Charge pump capacitor connection pin |
| 53 | VGL | Lower DMOS gate voltage capacitor connection pin |
| 57 | VGH | Upper DMOS gate voltage capacitor connection pin |
| 24 | ST | Chip enable pin |
| 30 | V _{CC} | Logic power connection pin |
| 26 | GND | Signal GND |

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Pin Assignment

| | L | K | J | H | G | F | E | D | C | B | A | | | | | | |
|--|--------------|----------------------|-------------|-------------|-------------|------------|-------------|-------------|-------------|-------------|--------------|----------|---|--|------------|------------|---|
| | | 17 OUT4B | 15 SEN4 | 13 VM34 | 11 SEN3 | 9 (NC) | 7 SEN2 | 5 VM12 | 3 SEN1 | 1 (NC) | | 1 | | | | | |
| | 18 (NC) | 16 (NC) | 14 OUT4A | 12 OUT3B | 10 OUT3A | 8 OUT2B | 6 OUT2A | 4 OUT1B | 2 OUT1A | 67 CLK12 | 68 PGND12 | 2 | | | | | |
| | 20 PGND34 | 19 (NC) | LV8042LG | | | | | | | | 65 IN72 | 66 MO | 3 | | | | |
| | 22 PWM4 | 21 PWM3/ CLK34 | | | | | | | | | | | | | 63 (NC) | 64 IN71 | 4 |
| | 24 ST | 23 (NC) | | | | | | | | | | | | | 61 (NC) | 62 VREF | 5 |
| | 26 GND | 25 (NC) | | | | | | | | | | | | | 59 (NC) | 60 LIM7 | 6 |
| | 28 STB | 27 DATA | | | | | | | | | | | | | 57 VGH | 58 FC7 | 7 |
| | 30 VCC | 29 SCLK | | | | | | | | | | | | | 55 (NC) | 56 CPH2 | 8 |
| | 32 R | 31 (NC) | | | | | | | 53 VGL | 54 CPH1 | 9 | | | | | | |
| | 34 PWM6 | 33 PWM5 | 36 OUT5A | 38 OUT5B | 40 (NC) | 42 (NC) | 44 OUT6B | 46 OUT7A | 48 OUT7B | 50 (NC) | 52 CPL2 | 10 | | | | | |
| | | 35 (NC) | 37 (NC) | 39 VM56 | 41 OUT6A | 43 PGND | 45 PGND | 47 SEN7 | 49 VM7 | 51 CPL1 | | 11 | | | | | |

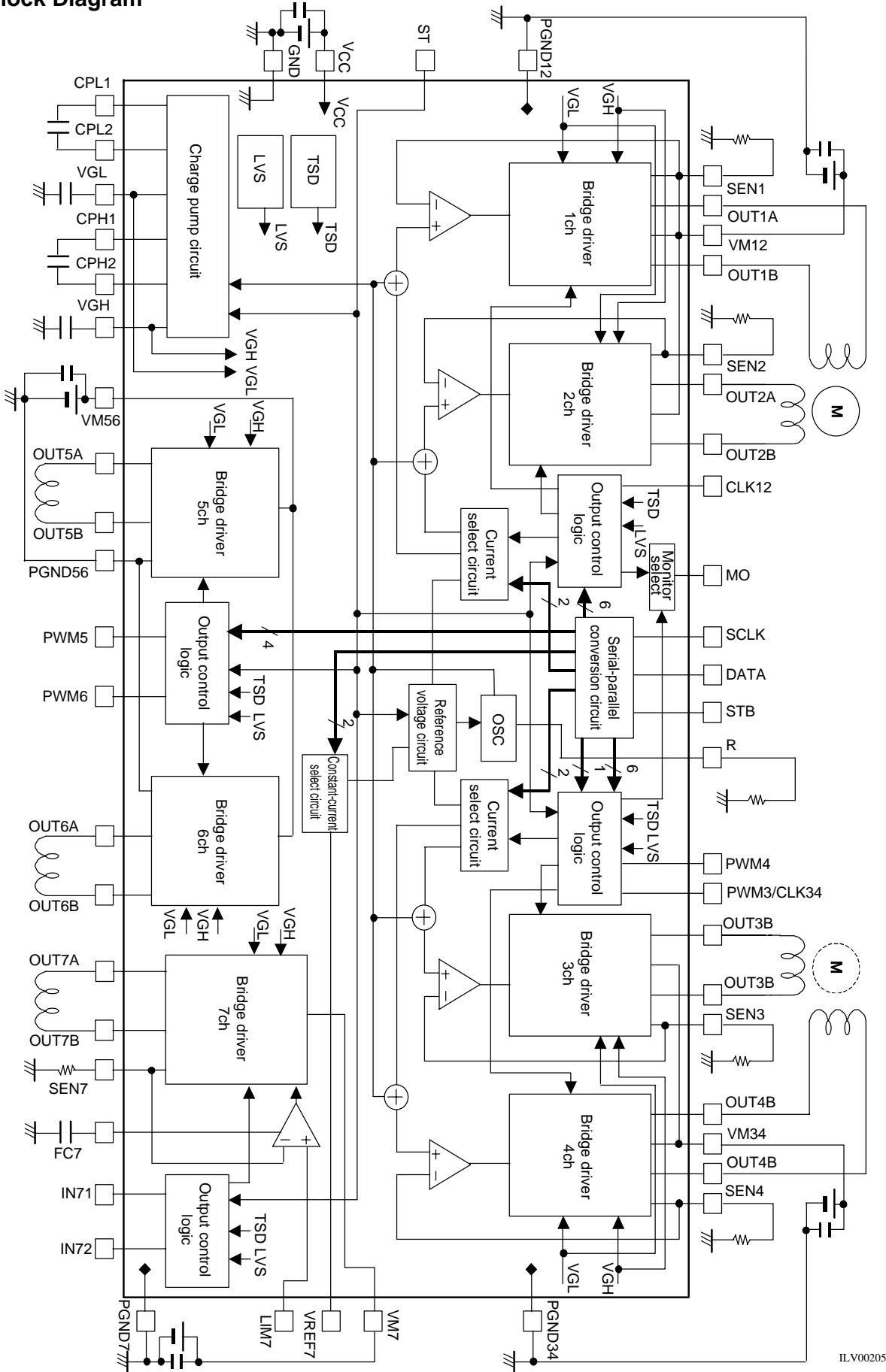
Top View

| | A | B | C | D | E | F | G | H | J | K | L | | | | | |
|----|--------------|-------------|-------------|-------------|-------------|--------------|-------------|-------------|-------------|-------------|------------|--------------|--|--|----------------------|------------|
| 1 | | 1 (NC) | 3 SEN1 | 5 VM12 | 7 SEN2 | 9 (NC) | 11 SEN3 | 13 VM34 | 15 SEN4 | 17 OUT4B | | | | | | |
| 2 | 68 PGND12 | 67 CLK12 | 2 OUT1A | 4 OUT1B | 6 OUT2A | 8 OUT2B | 10 OUT3A | 12 OUT3B | 14 OUT4A | 16 (NC) | 18 (NC) | | | | | |
| 3 | 66 MO | 65 IN72 | LV8042LG | | | | | | | | 19 (NC) | 20 PGND34 | | | | |
| 4 | 64 IN71 | 63 (NC) | | | | | | | | | | | | | 21 PWM3/ CLK34 | 22 PWM4 |
| 5 | 62 VREF7 | 61 (NC) | | | | | | | | | | | | | 23 (NC) | 24 ST |
| 6 | 60 LIM7 | 59 (NC) | | | | | | | | | | | | | 25 (NC) | 26 GND |
| 7 | 58 FC7 | 57 VGH | | | | | | | | | | | | | 27 DATA | 28 STB |
| 8 | 56 CPH2 | 55 (NC) | | | | | | | | | | | | | 29 SCLK | 30 VCC |
| 9 | 54 CPH1 | 53 VGL | | | | | | | 31 (NC) | 32 R | | | | | | |
| 10 | 52 CPL2 | 50 (NC) | 48 OUT7B | 46 OUT7A | 44 OUT6B | 42 (NC) | 40 (NC) | 38 OUT5B | 36 OUT5A | 33 PWM5 | 34 PWM6 | | | | | |
| 11 | | 51 CPL1 | 49 VM7 | 47 SEN7 | 45 PGND7 | 43 PGND56 | 41 OUT6A | 39 VM56 | 37 (NC) | 35 (NC) | | | | | | |

(NC): No Connect

Bottom view

Block Diagram



ILV00205

Serial Data Input Specification

Register (D1, D0): Selection of Data Transmission Destination

| D1 | D0 | Mode |
|----|----|---|
| 0 | 0 | STP reference voltage setting/Monitor output setting/3ch · 4ch drive mode setting |
| 0 | 1 | 1ch · 2ch (STP) setting |
| 1 | 0 | 3ch · 4ch (PWM/STP) setting |
| 1 | 1 | 5ch · 6ch(PWM) setting /7ch (constant current) reference voltage setting |

Setting (D1, D0) of serial data as shown in the table above enables selection of the register for status setting of each motor driver.

STP Reference Voltage Setting/Monitor Output Setting/3ch · 4ch Drive Mode Setting

| Register No. | Data | Nomenclature | Functions |
|--------------|--------|----------------|--------------------------------------|
| D0 | 0 | RG_SELECT 1 | Register select 1 |
| D1 | 0 | RG_SELECT 2 | Register select 2 |
| D2 | 0 or 1 | VSEN1_SELECT 1 | 1ch · 2ch reference voltage select 1 |
| D3 | 0 or 1 | VSEN1_SELECT 2 | 1ch · 2ch reference voltage select 2 |
| D4 | 0 or 1 | VSEN2_SELECT 1 | 3ch · 4ch reference voltage select 1 |
| D5 | 0 or 1 | VSEN2_SELECT 2 | 3ch · 4ch reference voltage select 2 |
| D6 | 0 or 1 | MO_SELECT | Monitor output channel select |
| D7 | 0 or 1 | PWM/MICRO | 3ch · 4ch drive mode setting |

1ch · 2ch (STP) Setting

| Register No. | Data | Nomenclature | Functions | Channel |
|--------------|--------|--------------|-------------------------|------------------|
| D0 | 1 | RG_SELECT 1 | Register select 1 | |
| D1 | 0 | RG_SELECT 2 | Register select 2 | |
| D2 | 0 or 1 | F/R 1 | Forward/reverse setting | 1ch/2ch (STP) |
| D3 | 0 or 1 | MS 11 | Micro-step select 1 | |
| D4 | 0 or 1 | MS 12 | Micro-step select 2 | |
| D5 | 0 or 1 | HOLD 1 | Step hold setting | |
| D6 | 0 or 1 | RESET 1 | Logic reset | |
| D7 | 0 or 1 | OUT ENABLE 1 | Output enable | |

3ch · 4ch (PWM/STP) Setting

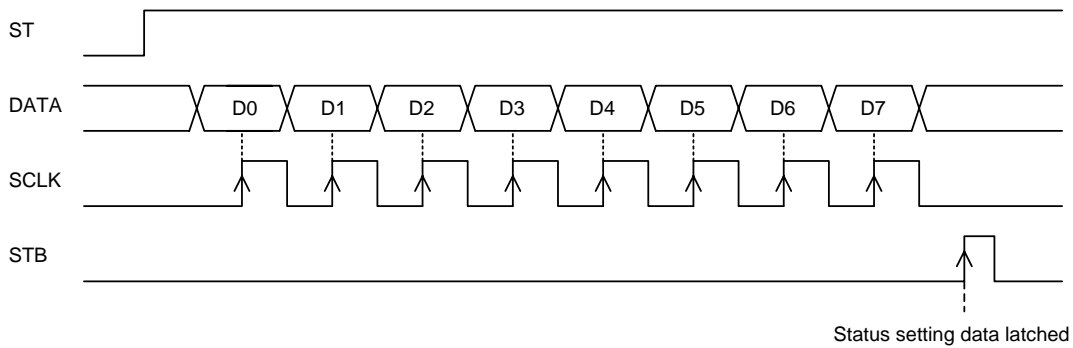
| Register No | Data | Nomenclature | | Functions | | Channel | |
|-------------|--------|------------------------------|--------------|----------------------------------|-------------------------|------------|------------------|
| | | 3ch · 4ch drive setting (D7) | | PWM mode | STP mode | | |
| | | "0" | "1" | | | | |
| D0 | 0 | RG_SELECT 1 | | Register select 1 | | | |
| D1 | 1 | RG_SELECT 2 | | Register select 2 | | | |
| D2 | 0 or 1 | F/R 3 | F/R 2 | Forward/reverse setting | Forward/reverse setting | 3ch PWM | 3ch/4ch (STP) |
| D3 | 0 or 1 | DECAY 3 | MS 21 | Current attenuation mode setting | Micro-step select 1 | 4ch PWM | |
| D4 | 0 or 1 | F/R 4 | MS 22 | Forward/reverse setting | Micro-step select 2 | | |
| D5 | 0 or 1 | DECAY 4 | HOLD 2 | Current attenuation mode setting | Step hold setting | | |
| D6 | 0 or 1 | (DUMMY) | RESET 2 | (Dummy data) | Logic reset | | |
| D7 | 0 or 1 | (DUMMY) | OUT ENABLE 2 | (Dummy data) | Output enable | | |

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5ch · 6ch (PWM) Setting/7ch (constant-current) Reference Voltage Setting

| Register No. | Data | Nomenclature | Functions | Channel |
|--------------|--------|----------------|---|-------------------------|
| D0 | 1 | RG_SELECT 1 | Register select 1 | |
| D1 | 1 | RG_SELECT 2 | Register select 1 | |
| D2 | 0 or 1 | F/R5 | Forward/reverse setting | 5ch PWM |
| D3 | 0 or 1 | DECAY5 | Current attenuation mode setting | |
| D4 | 0 or 1 | F/R6 | Forward/reverse setting | 6ch PWM |
| D5 | 0 or 1 | DECAY6 | Current attenuation mode setting | |
| D6 | 0 or 1 | VSEN7_SELECT 1 | 7ch constant-current reference voltage select 1 | 7ch Constant current |
| D7 | 0 or 1 | VSEN7_SELECT 1 | 7ch constant-current reference voltage select 2 | |

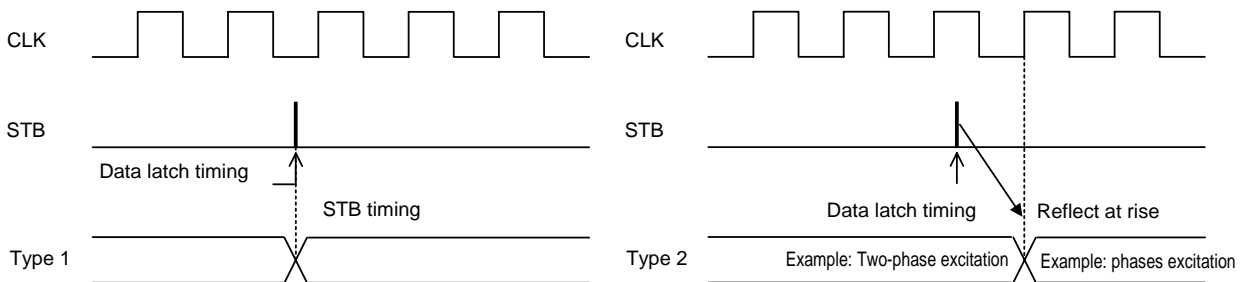
Serial Data Input Setting



Input DATA and SCLK after setting of STB = "L". SCLK is not accepted in the state with STB = "H".
 Input DATA from D0 to D7 in this order. CLK performs data transmission at the rise edge and latches all data at rise of STB after transmission of all data.
 All of serial data is reset to "0" with ST = "L". and at the voltage to cut V_{CC} low voltage.

Timing to Reflect Serial Data to the Output

- PWM mode (Applicable to 3, 4, 5, and 6ch)
 Type 1: FR and DECAY settings during PWM drive are reflected simultaneously with the STB signal of data latching.
- STP mode (Applicable to 1, 2, 3, and 4ch)
 Type 1: HOLD, RESET, CUT ENABLE settings and reference voltage setting are reflected simultaneously with the STB signal of data latching.
 Type 2: Forward/reverse (F/R) and excitation mode (MS) settings made during STEP setting are reflected at rise of the next clock of data latching.



Stepping Motor Driver (1ch/2ch)

CLK Function

| Input | | Operation mode | Charge pump circuit |
|-------|-------|----------------------|---------------------|
| ST | CLK12 | | |
| L | * | Standby mode | Stop |
| H | | Excitation step feed | Operating |
| H | | Excitation step hold | |

1ch · 2ch (STP) Status Setting Serial Data: (D1, D0=0, 1)

| D7 (OE) | D6 (RST) | D5 (HOLD) | D4 (MS2) | D3 (MS1) | D2 (F/R) | Operation mode |
|---------|----------|-----------|----------|----------|----------|--|
| * | * | * | * | * | 0 | CW (forward) |
| * | * | * | * | * | 1 | CCW (reverse) |
| * | * | * | 0 | 0 | * | 2 phase excitation drive |
| * | * | * | 0 | 1 | * | 1-2 phases full torque excitation drive |
| * | * | * | 1 | 0 | * | 1-2 phases excitation drive |
| * | * | * | 1 | 1 | * | 4W1-2 phases excitation drive |
| * | * | 0 | * | * | * | Step hold cancel |
| * | * | 1 | * | * | * | Step hold |
| * | 0 | * | * | * | * | Counter reset (Excitation at initial position) |
| * | 1 | * | * | * | * | Counter reset cancel |
| 0 | * | * | * | * | * | Output high impedance |
| 1 | * | * | * | * | * | Output operation state |

*: Don't Care

1ch · 2ch Reference Voltage Setting Serial Data: (D1, D0=0, 0)

| D3 (VSEN1_SELECT2) | D2 (VSEN1_SELECT1) | Current setting reference voltage (at 100%) |
|--------------------|--------------------|---|
| 0 | 0 | 0.2V |
| 0 | 1 | 0.134V |
| 1 | 0 | 0.1V |
| 1 | 1 | 0.066V |

The reference voltage to set the output current can be changed over in four stages by the serial data. This is effective for power saving during hold power application of the motor.

Set Current Calculation Method

$$I_{OUT} = (\text{reference voltage} \times \text{set current ratio}) / \text{SEN resistance}$$

As the reference voltage is variable (0.2V, 0.134V, 0.1V, 0.066V) by the serial data, the output current can be set from the reference voltage and SEN resistance.

(Example) The output current as shown below flows when the reference voltage is 0.2V, the set current ratio is 100%, and the SEN resistance is 1Ω.

$$I_{OUT} = 0.2V \times 100\% / 1\Omega = 200mA$$

Monitor Output Channel Setting Serial Data: (D1, D0=0, 0)

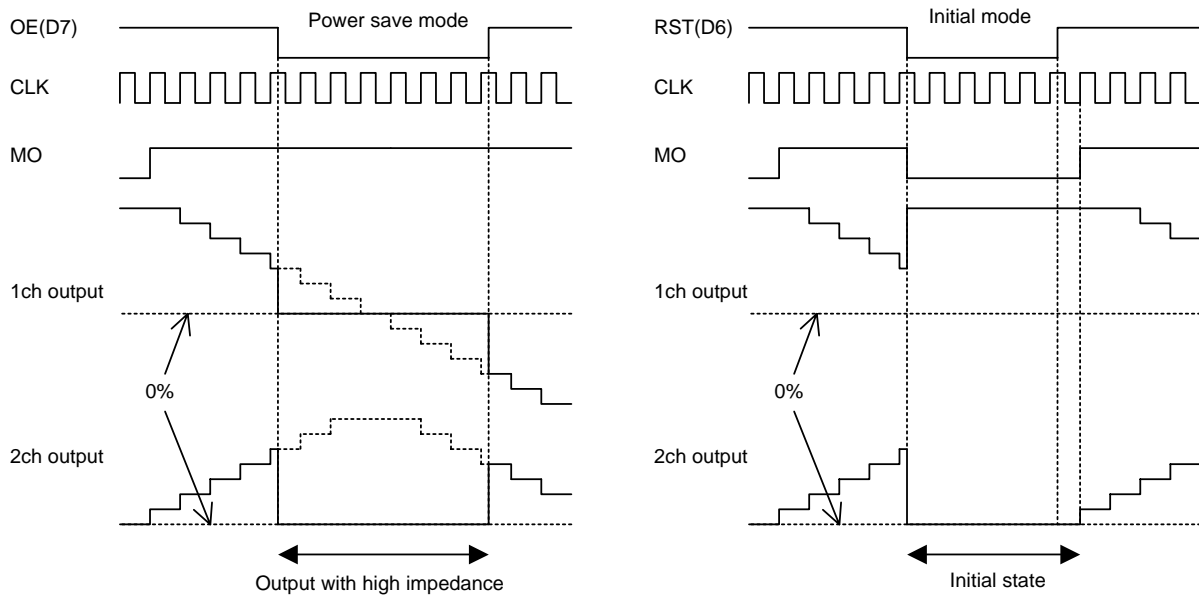
MO Pin (Pin 66)

| D6 (MO_SELECT) | Monitor output channel | Monitor output state |
|----------------|------------------------|--|
| 0 | 1ch · 2ch STP | "L" output at the initialization position of STP |
| 1 | 3ch · 4ch STP | |

Initial Excitation Position (Monitor output position)

| Excitation mode | 1ch | 2ch |
|------------------------|------|-------|
| 2 phase | 100% | -100% |
| 1-2 phases full torque | 100% | 0% |
| 1-2 phases | 100% | 0% |
| 4W1-2 phases | 100% | 0% |

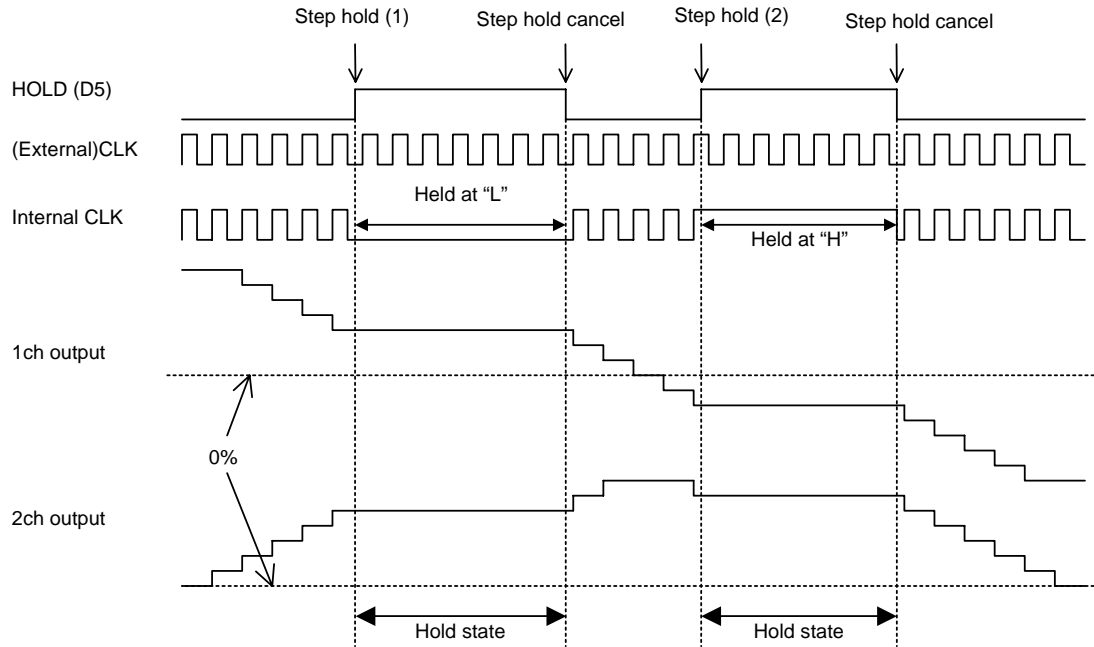
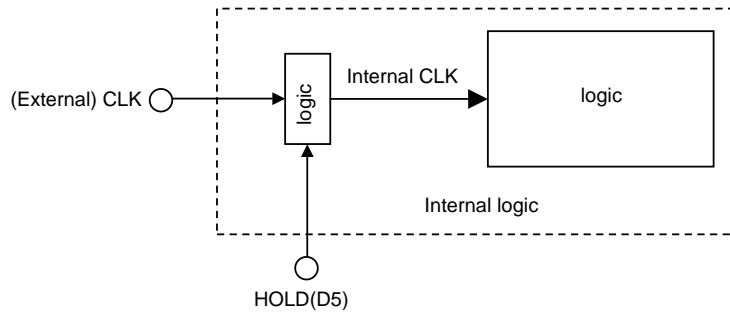
OUTPUT ENABLE (D7), RESET (D6) Operation Description



With OE (D7) data = "0", the output is turned OFF and becomes high impedance at rise of STB.
 As the internal logic circuit is operating, however, the position number proceeds while CLK is input.
 Therefore, with OE (D7) data returned to "1", the level along the position number proceeding with the CLK input is output.

With RST (D6)= "0", the output is initialized at rise of STB and the MO output becomes Low.
 With RST (D6)= "1" subsequently, the position number proceeds at the next CLK input.

HOLD (D5) Operation Description



With HOLD (D5) data = "1", the external CLK data is held as it is in the internal CLK.

In the step hold (1) timing as shown above, the (external) CLK is at "L", so that the internal CLK is held at "L."

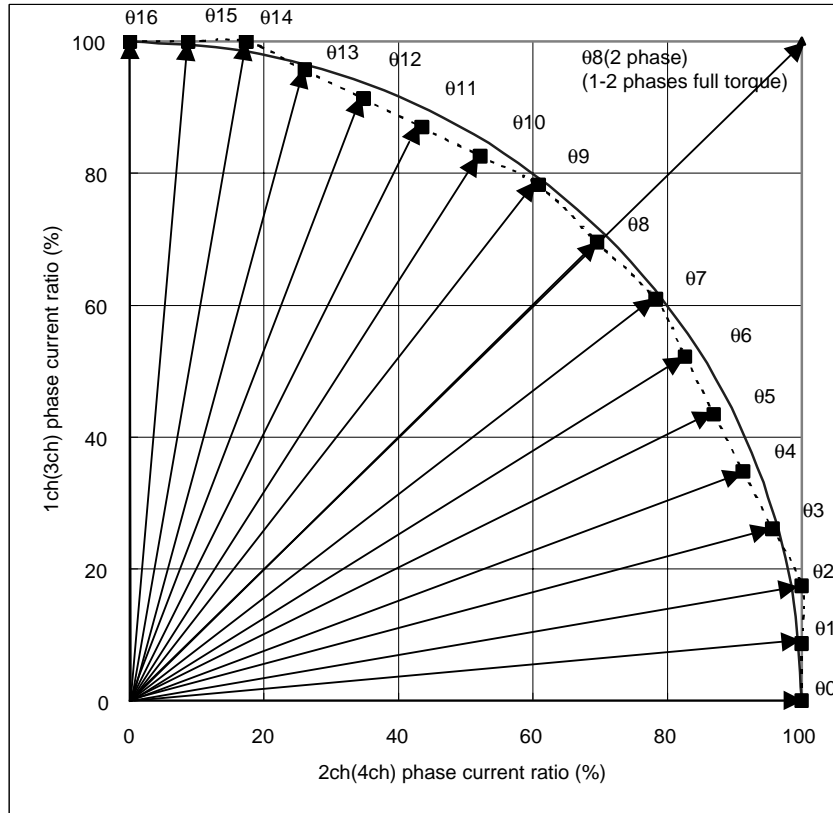
In the step hold (2) timing, the (external) CLK is at "H", so that the internal CLK is held at "H."

With HOLD (D5) data = "0", the internal CLK is synchronized with the normal (external) CLK.

The output holds the status in the timing of input of step hold. After canceling of step hold, the position No. proceeds in the timing of CLK (rise).

As long as the hold status continues, the position No. does not proceed even when (external) CLK is input.

Output Current Vector Locus (one step is normalized to 90 degree)

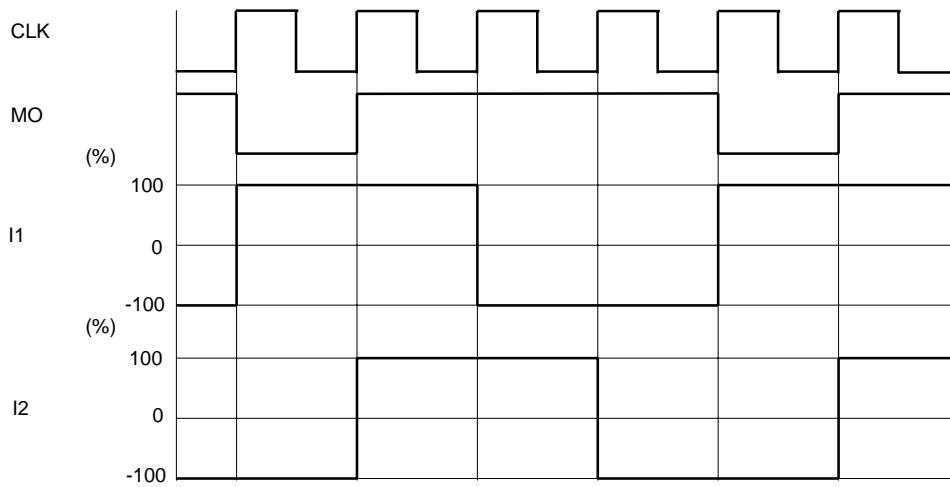


Set Current Ratio in Each Excitation Mode

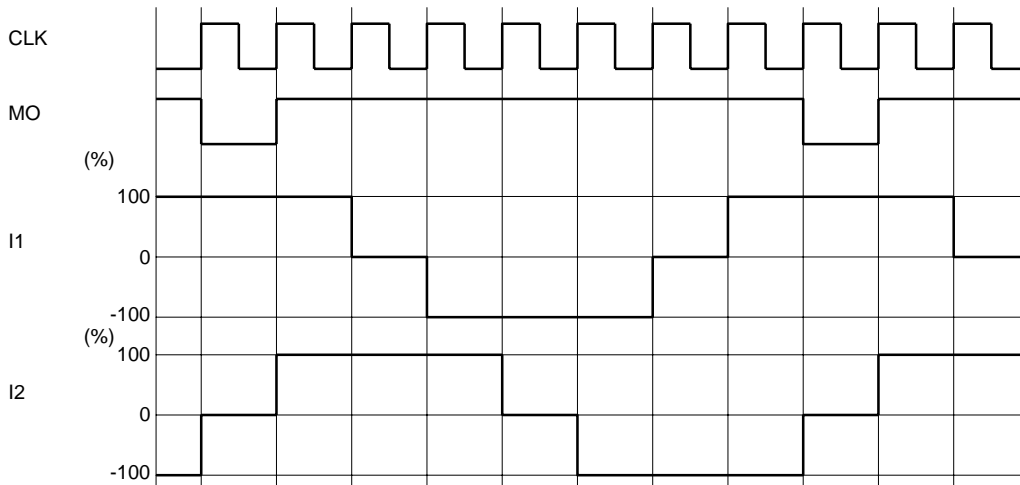
| STEP | 4W1-2 phase (%) | | 1-2 phases (%) | | 1-2 phases full torque (%) | | 2 phase (%) | |
|------|-----------------|-----------|----------------|-----------|----------------------------|-----------|-------------|-----------|
| | 1ch (3ch) | 2ch (4ch) | 1ch (3ch) | 2ch (4ch) | 1ch (3ch) | 2ch (4ch) | 1ch (3ch) | 2ch (4ch) |
| 00 | 0 | 100 | 0 | 100 | 0 | 100 | | |
| 01 | 8.69 | 100 | | | | | | |
| 02 | 17.39 | 100 | | | | | | |
| 03 | 26.08 | 95.65 | | | | | | |
| 04 | 34.78 | 91.3 | | | | | | |
| 05 | 43.48 | 86.95 | | | | | | |
| 06 | 52.17 | 82.61 | | | | | | |
| 07 | 60.87 | 78.26 | | | | | | |
| 08 | 69.56 | 69.56 | 69.56 | 69.56 | 100 | 100 | 100 | 100 |
| 09 | 78.26 | 60.87 | | | | | | |
| 10 | 82.61 | 52.17 | | | | | | |
| 11 | 86.95 | 43.48 | | | | | | |
| 12 | 91.3 | 34.78 | | | | | | |
| 13 | 95.65 | 26.08 | | | | | | |
| 14 | 100 | 17.39 | | | | | | |
| 15 | 100 | 8.69 | | | | | | |
| 16 | 100 | 0 | 100 | 0 | 100 | 0 | | |

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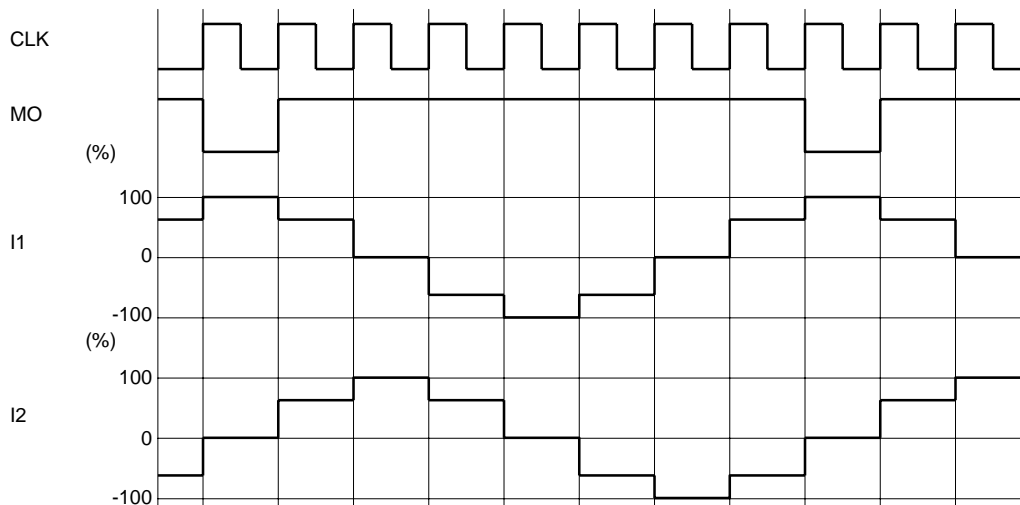
2 Phase Excitation (D4="0", D3="0", D2="0": CW mode)



1-2 Phases Full Torque (D4="0", D3="1", D2="0": CW mode)

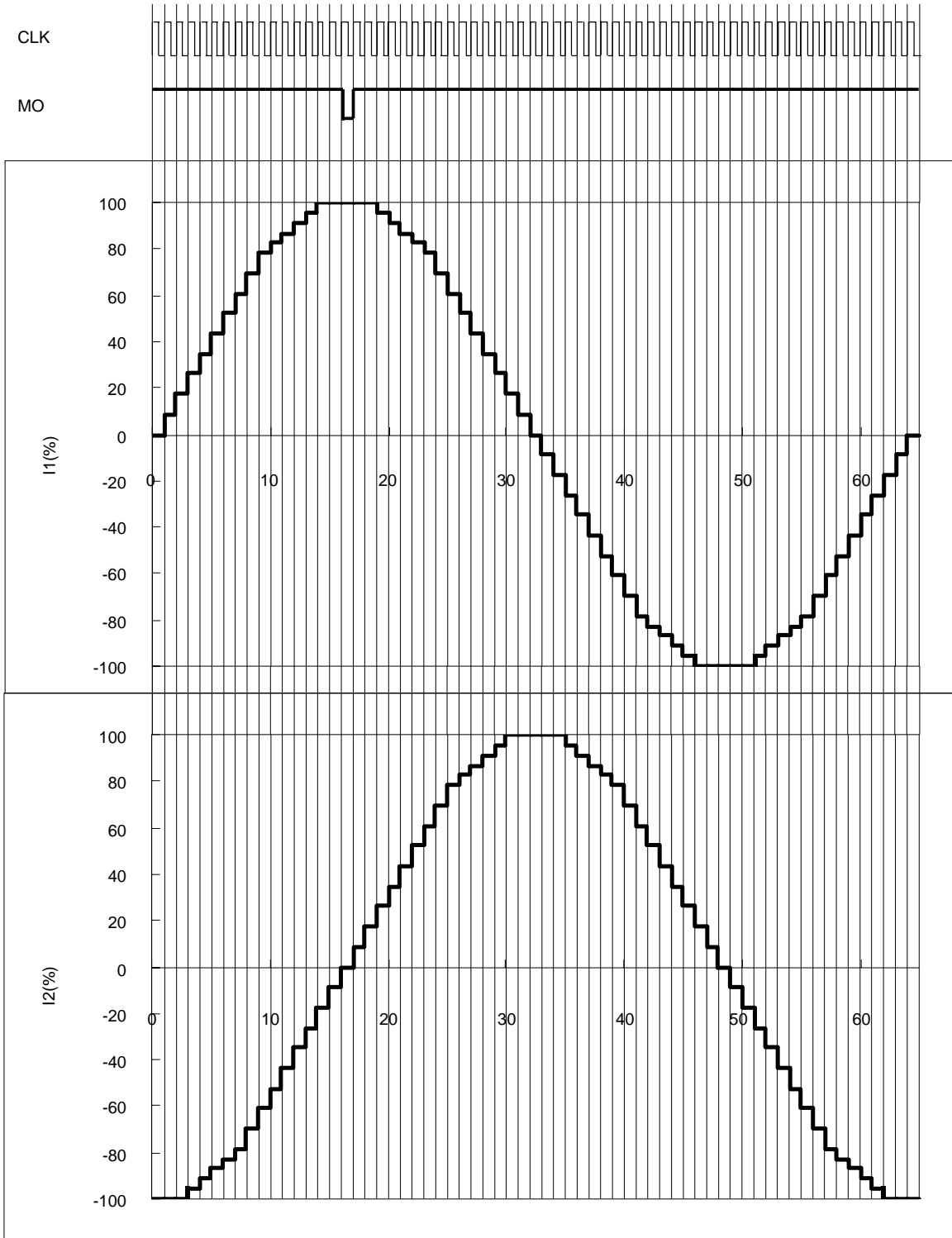


1-2 Phases Excitation (D4="1", D3="0", D2="0": CW mode)



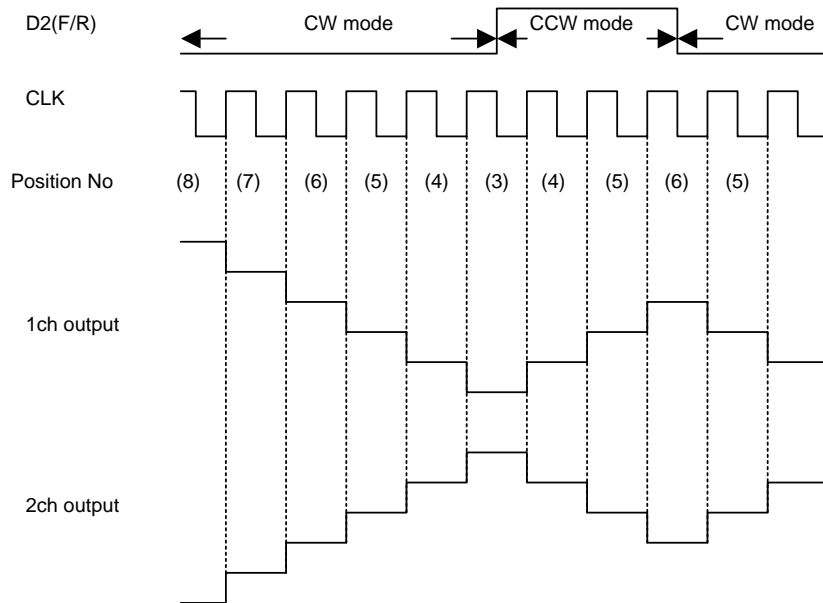
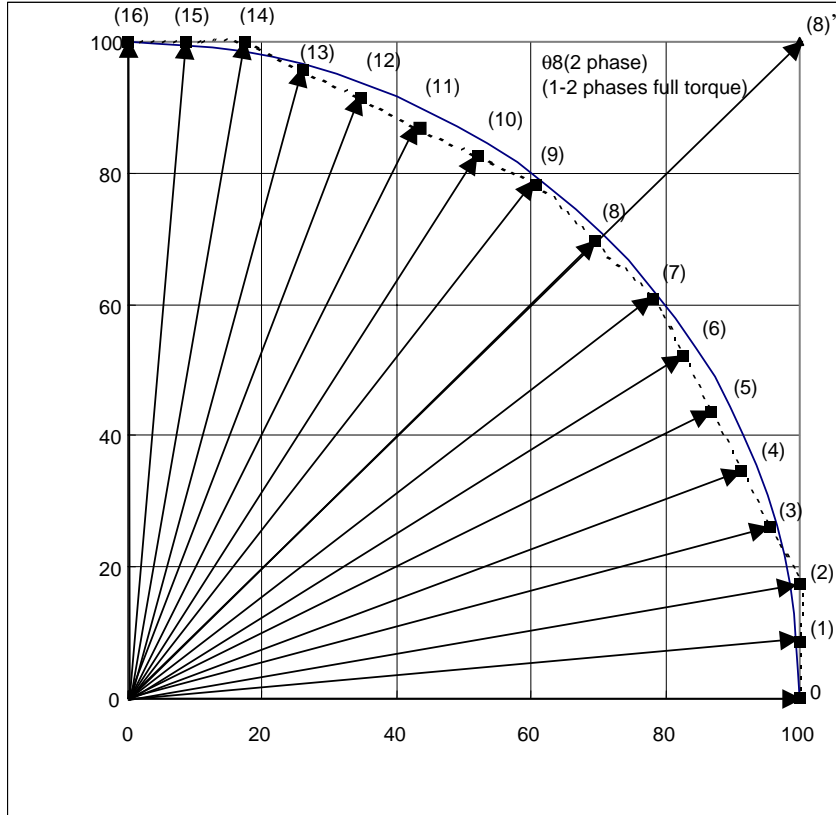
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4W1-2 Phases Excitation (D4="1", D3="1", D2="0": CW mode)



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Basic Operation of Set Current Step Changeover and Forward/Reverse Changeover (D2 (F/R))



DA converter in IC proceeds by one bit at rise of input clock pulse.

D2 (F/R) data causes changeover of CW and CCW modes; the position No. decreases in the CW mode and increases in the CCW mode.

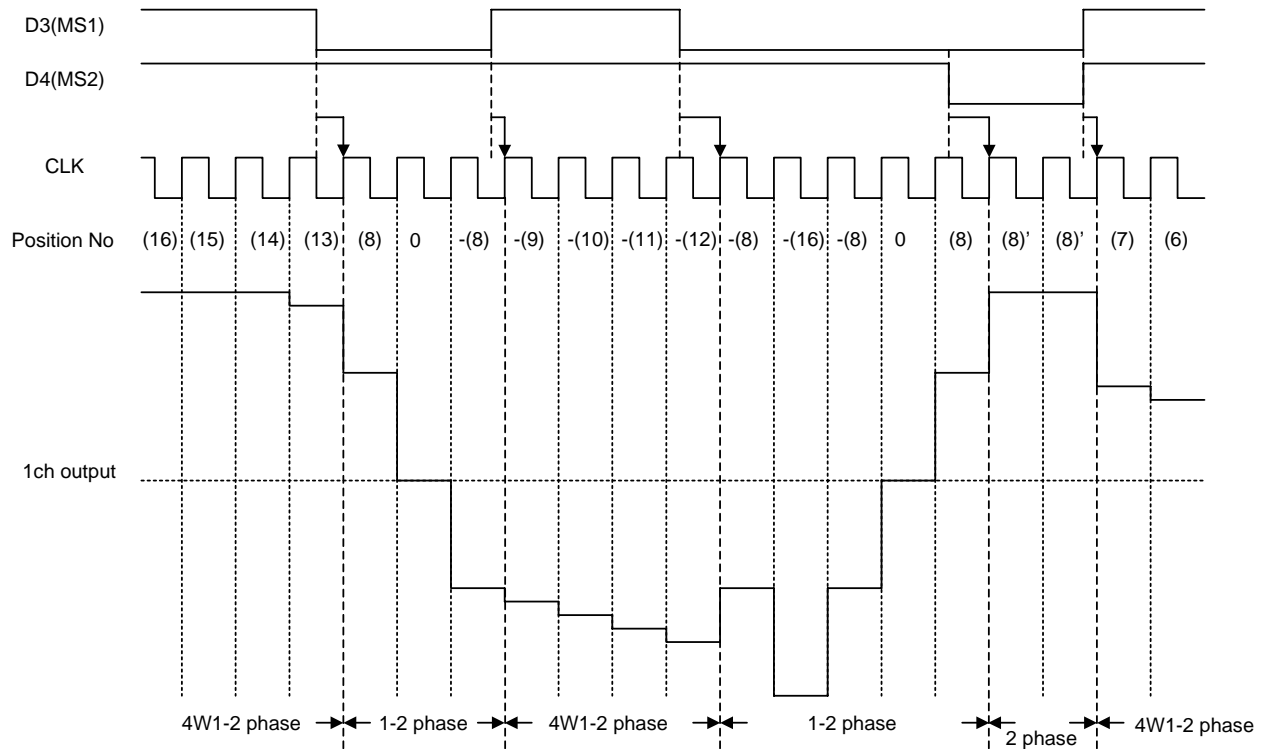
When viewed from the 1ch current, the 2ch current is delayed by 90 degree in phase in the CW mode.

When viewed from the 1ch current, the 2ch current is delayed by 90 degree in the CCW mode.

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Basic Operation of Excitation Mode Changeover (D3, D4 (MS1, MS2))

CW Mode



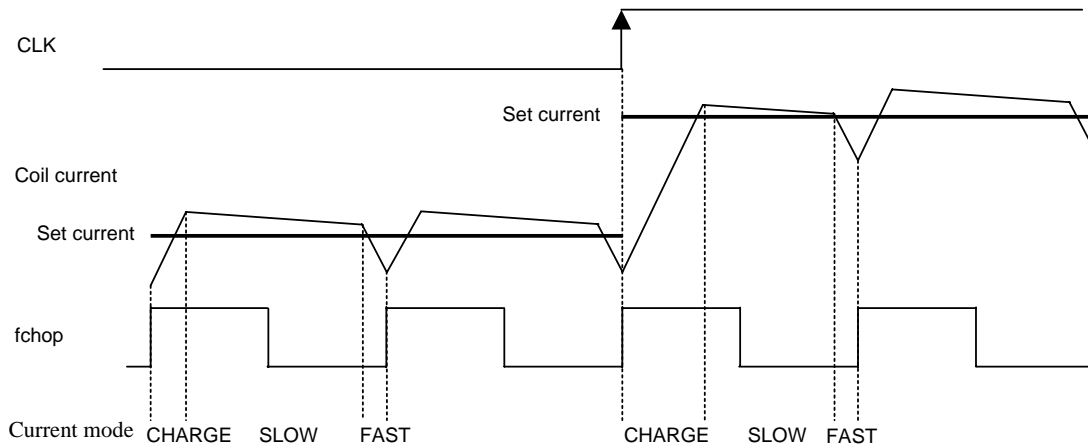
When the excitation mode is changed over during power application to the motor, the motor operates in the following sequence. (CW mode)

| Before excitation mode changeover | | Step position after excitation mode changeover | | | |
|-----------------------------------|--------------|--|------------|------------------------|---------|
| Excitation mode | Position No. | 4W1-2 phase | 1-2 phases | 1-2 phases full torque | 2 phase |
| 4W1-2 phase | (16) | / | (8) | (8)' | (8)' |
| | (15) to (9) | | (8) | (8)' | (8)' |
| | (8) | | 0 | 0 | (8)' |
| | (7) to (1) | | (8) | (8)' | (8)' |
| | 0 | | -8) | -(8)' | -(8)' |
| 1-2 phases | (16) | (15) | / | (8)' | (8)' |
| | (8) | (7) | | 0 | (8)' |
| | 0 | -(1) | | -(8)' | -(8)' |
| 1-2 phases full torque | (16) | (15) | (8) | / | (8)' |
| | (8)' | (7) | 0 | | (8)' |
| | 0 | -(1) | -(8) | | -(8)' |
| 2 phase | (8)' | (7) | 0 | 0 | / |

* The symbol “-” such as -(8) in the table indicates that the phase has been reversed.

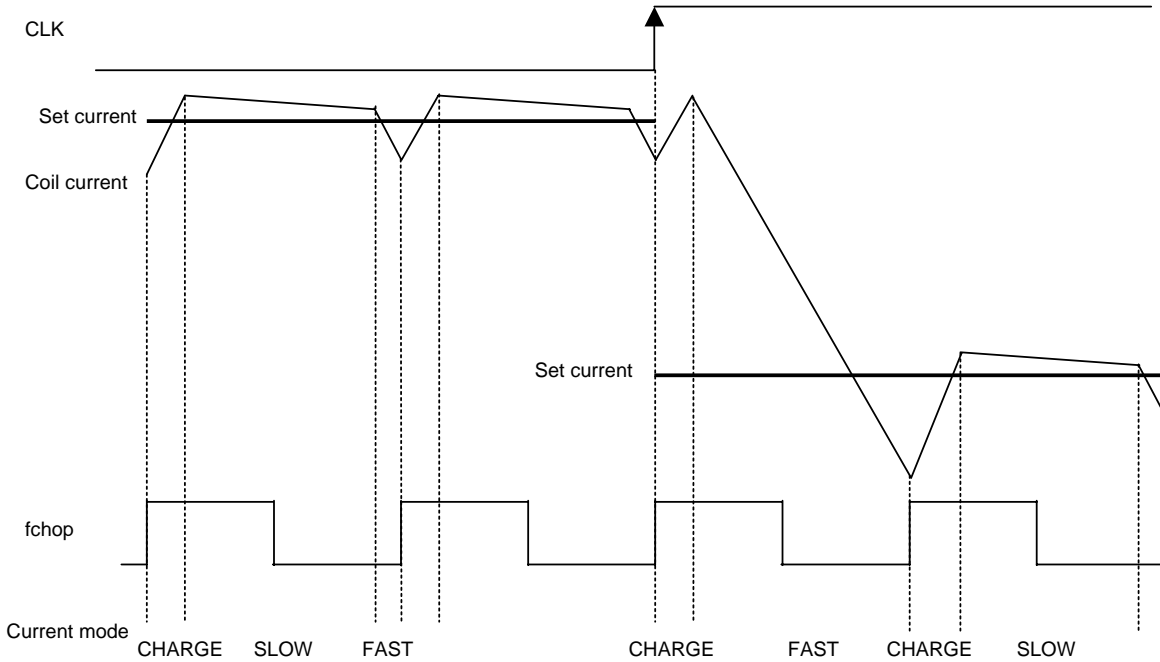
Current Control Operation Specification

Sine wave increasing direction



Sine wave decreasing direction

In each current mode, the motor operates in the following sequence.



- The motor enters the CHARGE mode at rise of chopping oscillation. (Regardless of the magnitude of the coil current (ICOIL) and set current (IREF), the section in which the CHARGE mode is forced (hereinafter called the “forced CHARGE” mode) exists for 1/8 of one chopping cycle.)
- The coil current (ICOIL) is compared with the set current (IREF) in the CHARGE mode.

In the case of $ICOIL < IREF$ in the forced CHARGE section

The CHARGE mode continues up to the point where $ICOIL \geq IREF$. Subsequently, the mode is changed to the SLOW DECAY mode and finally to the FAST DECAY mode within the 1/8 portion of one chopping cycle.

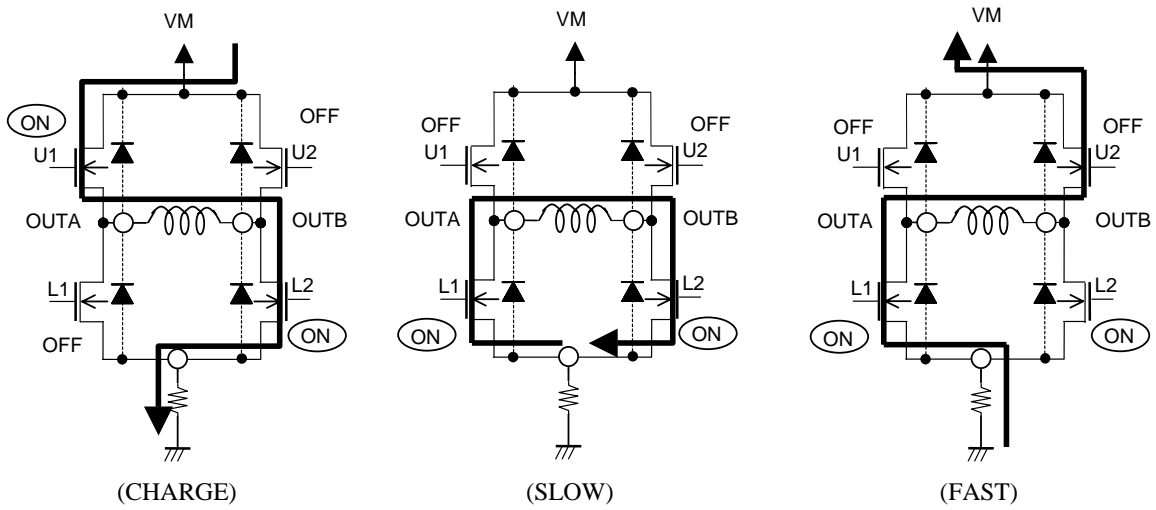
In case when $ICOIL < IREF$ does not exist in the forced CHARGE section

The mode changes to the FAST DECAY mode. The coil current is attenuated in the FAST DECAY mode till one chopping cycle is over.

Above steps are repeated. Normally, the SLOW (+FAST) DECAY mode is effective in the sine wave increasing direction, the FAST DECAY mode continues till the current is attenuated to the set level, then the SLOW (+FAST) DECAY mode becomes effective subsequently.

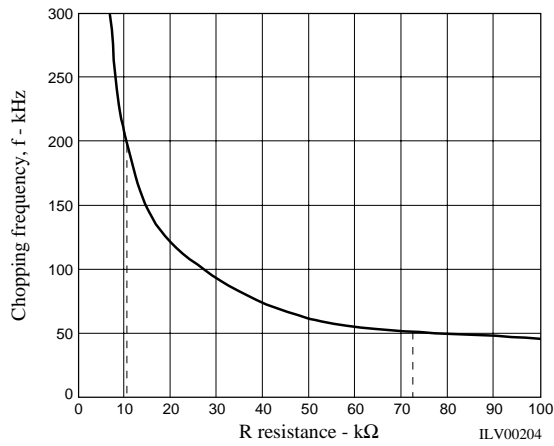
Output stage transistor function

The OUTA → OUTB direction is assumed to be for charge (current increasing direction).



Chopping frequency (fchop) setting method

This is the frequency for chopping, which is determined by the external resistor for constant-current control. The chopping frequency set by the resistance connected to R pin (pin 32) is shown below.



The recommended chopping frequency ranges from 50 to 200kHz.

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PWM Drive/Stepping Motor Driver (3ch/4ch)

3ch · 4ch drive motor setting serial data: (D1, D0=0, 0)

| D7 (PWM/MICRO) | Operation mode | Pin function | |
|----------------|-------------------------------|--------------|----------|
| | | Pin 21 | Pin 22 |
| 0 | PWM2 system | PWM3 | PWM4 |
| 1 | Micro-step driven STP1 system | CLK34 | Not used |

By setting D7 (PWM/MICRO) data as shown in the table above, changeover to two systems of direct PWM drive H-bridge driver and single system of micro-step driven stepping motor driver can be made.

PWM Drive Mode (3ch · 4ch drive mode setting D7="0")

3ch (PWM) truth table: (D1, D0=1, 0)

| Input | | | | Output | | Operation mode | Charge pump circuit |
|-------|------|----|----|-------------------|-------------------|------------------------|---------------------|
| ST | PWM3 | D2 | D3 | OUT3A | OUT3B | | |
| L | * | * | * | OFF | OFF | Standby | Stop |
| H | H | 0 | * | H ^{Note} | L | CW(Forward) | Operating |
| H | H | 1 | * | L | H ^{Note} | CCW(Reverse) | |
| H | L | * | 0 | OFF | OFF | FAST DECAY(output OFF) | |
| H | L | * | 1 | L | L | SLOW DECAY(brake) | |

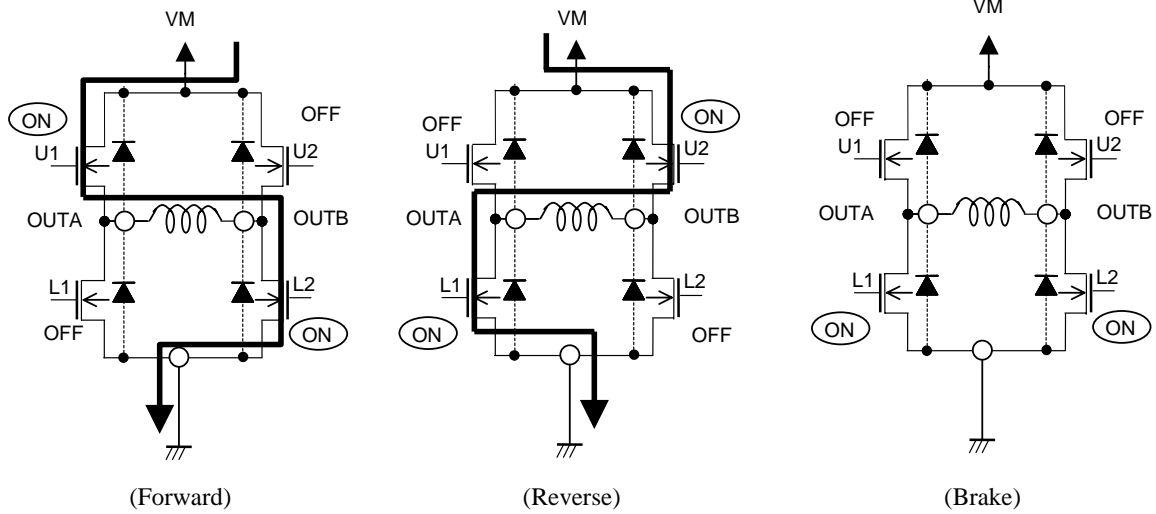
4ch (PWM) truth table: (D1, D0=1, 0)

| Input | | | | Output | | Operation mode | Charge pump circuit |
|-------|------|----|----|-------------------|-------------------|------------------------|---------------------|
| ST | PWM4 | D4 | D5 | OUT4A | OUT4B | | |
| L | * | * | * | OFF | OFF | Standby | Stop |
| H | H | 0 | * | H ^{Note} | L | CW(Forward) | Operating |
| H | H | 1 | * | L | H ^{Note} | CCW(Reverse) | |
| H | L | * | 0 | OFF | OFF | FAST DECAY(output OFF) | |
| H | L | * | 1 | L | L | SLOW DECAY(brake) | |

*: Don't care

Note: When the sensing resistor is connected to SEN 3 and 4 pins, the constant-current drive through chopping is made for the set current. Connection of SEN3 and 4 pins to GND allows saturation drive.

Output Stage Transistor Function



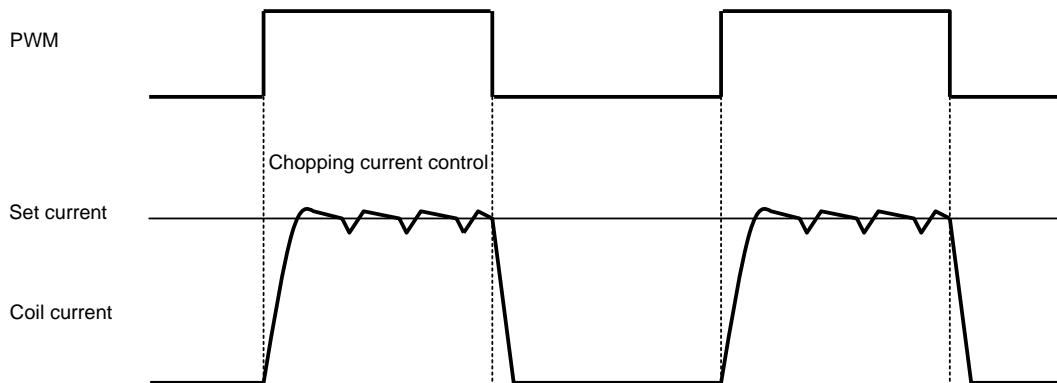
3ch · 4ch Reference Voltage Setting Serial Data: (D1, D0=0, 0)

| D5 (VSEN2_SELECT2) | D4 (VSEN2_SELECT1) | Current setting reference voltage |
|--------------------|--------------------|-----------------------------------|
| 0 | 0 | 0.2V |
| 0 | 1 | 0.134V |
| 1 | 0 | 0.1V |
| 1 | 1 | 0.066V |

Since the reference voltage is changed over for 3ch and 4ch simultaneously, individual setting cannot be made.

Constant-Current Chopping Drive

When the sensing resistor is connected to SEN 3 and 4 pins, the constant-current drive through chopping is made for the set current calculated from the reference voltage and SEN resistor.



Set Current Value (constant current) Calculation Method

$$I_{OUT} = \text{Reference voltage} / \text{SEN resistor}$$

Since the reference voltage can be made variable (0.2V, 0.134V, 0.1V, 0.066V) with the serial data, the output current can be set from the reference voltage and SEN resistor.



(Example) The output current as follows flows when the reference voltage is 0.2V and SEN resistance is 1Ω.

$$I_{OUT} = 0.2V / 1\Omega = 200mA$$

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Stepping Mode (3ch · 4ch drive mode setting D7="1")

CLK Function

| Input | | Operation mode | Charge pump circuit |
|-------|---|----------------------|---------------------|
| ST | CLK34 | | |
| L | * | Standby mode | Stop |
| H |  | Excitation step feed | Operating |
| H |  | Excitation step hold | |

3ch · 4ch (STP) Status Setting Serial Data: (D1, D0=1, 0)

| D7(OE) | D6(RST) | D5(HOLD) | D4(MS2) | D3(MS1) | D2(F/R) | Operation mode |
|--------|---------|----------|---------|---------|---------|--|
| * | * | * | * | * | 0 | CW (Forward) |
| * | * | * | * | * | 1 | CCW (Reverse) |
| * | * | * | 0 | 0 | * | 2 phase excitation drive |
| * | * | * | 0 | 1 | * | 1-2 phases full torque excitation drive |
| * | * | * | 1 | 0 | * | 1-2 phases excitation drive |
| * | * | * | 1 | 1 | * | 4W1-2 phase excitation drive |
| * | * | 0 | * | * | * | Step hold cancel |
| * | * | 1 | * | * | * | Step hold |
| * | 0 | * | * | * | * | Counter reset (Excitation at initial position) |
| * | 1 | * | * | * | * | Counter reset cancel |
| 0 | * | * | * | * | * | Output high-impedance |
| 1 | * | * | * | * | * | Output operation status |

*: Don't care

3ch · 4ch Reference Voltage Setting Serial Data: (D1, D0=0, 0)

| D5 (VSEN2_SELECT2) | D4 (VSEN2_SELECT1) | Current setting reference voltage (at 100%) |
|--------------------|--------------------|---|
| 0 | 0 | 0.2V |
| 0 | 1 | 0.134V |
| 1 | 0 | 0.1V |
| 1 | 1 | 0.066V |

The output current setting reference voltage can be changed in four stages by the serial data. This is useful for power saving during hold power application to the motor.

Set Current Value Calculation Method

$$I_{OUT} = (\text{reference voltage} \times \text{set current ratio}) / \text{SEN resistance}$$

Since the reference voltage can be made variable (0.2V, 0.134V, 0.1V, 0.066V) with the serial data, the output current can be set from the reference voltage and SEN resistor.

(Example) The output current as shown below flows when the reference voltage is 0.2V, the set current ratio is 100%, and SEN resistance is 1Ω.

$$I_{OUT} = 0.2V \times 100\% / 1\Omega = 200mA$$

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Initial Excitation Position (Monitor output position)

| Excitation mode | 3ch | 4ch |
|------------------------|------|-------|
| 2 phase | 100% | -100% |
| 1-2 phases full torque | 100% | 0% |
| 1-2 phases | 100% | 0% |
| 4W1-2 phase | 100% | 0% |

* For the monitor setting, refer to the description made for 1ch/2ch.

PWM Driven Motor Driver (5ch/6ch)

5ch (PWM) truth table: (D1, D0=1, 1)

| Input | | | | Output | | Operation mode | Charge pump circuit |
|-------|------|----|----|-------------------|-------------------|-------------------------|---------------------|
| ST | PWM5 | D2 | D3 | OUT5A | OUT5B | | |
| L | * | * | * | OFF | OFF | Standby | Stop |
| H | H | 0 | * | H ^{Note} | L | CW (Forward) | Operating |
| H | H | 1 | * | L | H ^{Note} | CCW (Reverse) | |
| H | L | * | 0 | OFF | OFF | FAST DECAY (output OFF) | |
| H | L | * | 1 | L | L | SLOW DECAY (brake) | |

6ch (PWM) truth table: (D1, D0=1, 1)

| Input | | | | Output | | Operation mode | Charge pump circuit |
|-------|------|----|----|-------------------|-------------------|-------------------------|---------------------|
| ST | PWM6 | D4 | D5 | OUT6A | OUT6B | | |
| L | * | * | * | OFF | OFF | Standby | Stop |
| H | H | 0 | * | H ^{Note} | L | CW (Forward) | Operating |
| H | H | 1 | * | L | H ^{Note} | CCW (Reverse) | |
| H | L | * | 0 | OFF | OFF | FAST DECAY (output OFF) | |
| H | L | * | 1 | L | L | SLOW DECAY (brake) | |

*: Don't care

Note: Since there is no SEN pin, saturation drive is made.

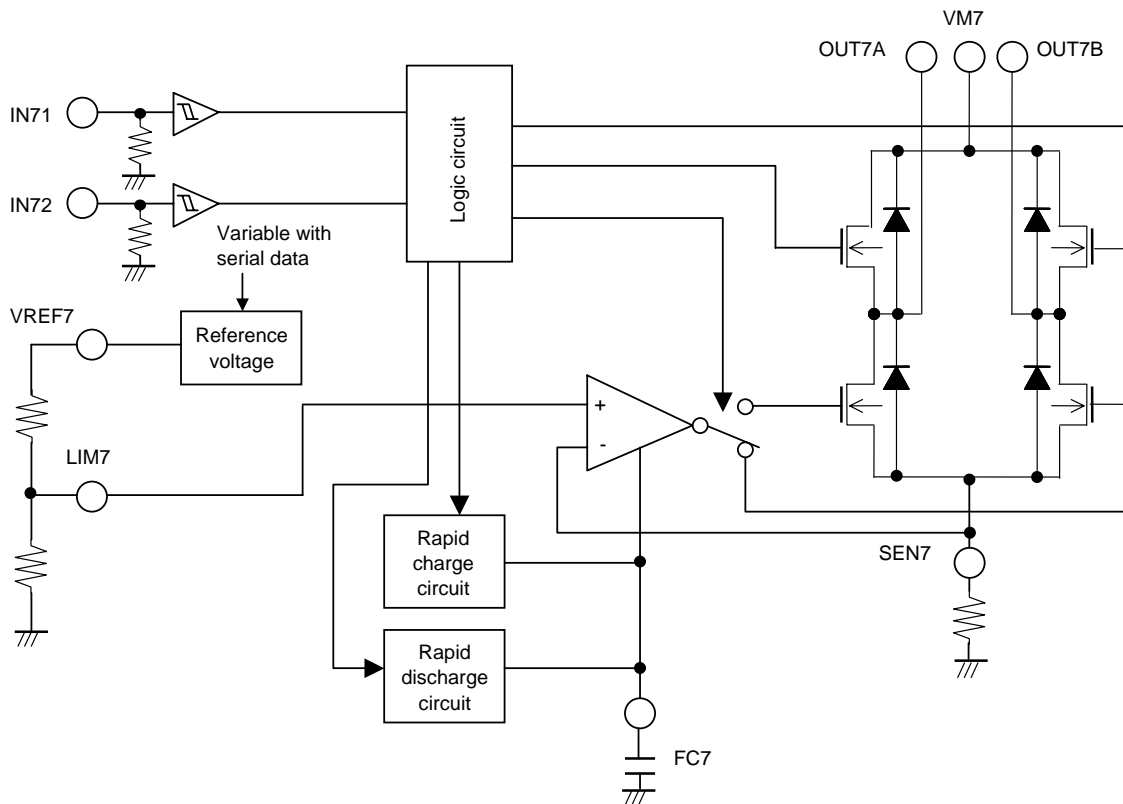
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Constant-Current Forward/Reverse Motor Driver (7ch)

7ch (Constant-current) Truth Table

| Input | | | Output | | Mode | Charge pump circuit |
|-------|------|------|--------|-------|---------------|---------------------|
| ST | IN71 | IN72 | OUT7A | OUT7B | | |
| L | * | * | OFF | OFF | Standby | Stop |
| H | L | L | OFF | OFF | Output OFF | Operating |
| H | L | H | H | L | CW (Forward) | |
| H | H | L | L | H | CCW (Reverse) | |
| H | H | H | L | L | Brake | |

*: Don't care



7ch Reference Voltage (VREF7 voltage) Setting Serial Data: (D1, D0=1, 1)

| D7 (VSEN7_SELECT2) | D6 (VSEN7_SELECT1) | Current setting reference voltage (VREF7 voltage) |
|--------------------|--------------------|---|
| 0 | 0 | 0.2V |
| 0 | 1 | 0.134V |
| 1 | 0 | 0.1V |
| 1 | 1 | 0.066V |

Set Current Value Calculation Method

$$I_{OUT} = \text{LIM7 voltage} / \text{SEN7 resistance}$$

Since LIM7 voltage is the external input, the reference voltage can be freely set.

Since the VREF7 voltage can be made variable (0.2V, 0.134V, 0.1V, 0.066V) with the serial data, short-circuiting the VREF7 pin with the LIM7 pin enables varying the reference voltage.

Input of the voltage obtained by dividing VREF7 with the resistor can produce any arbitrary reference voltage (0.2V or less).

LV8042LG

Recommended Application Circuit

The value at each element is the recommended one.

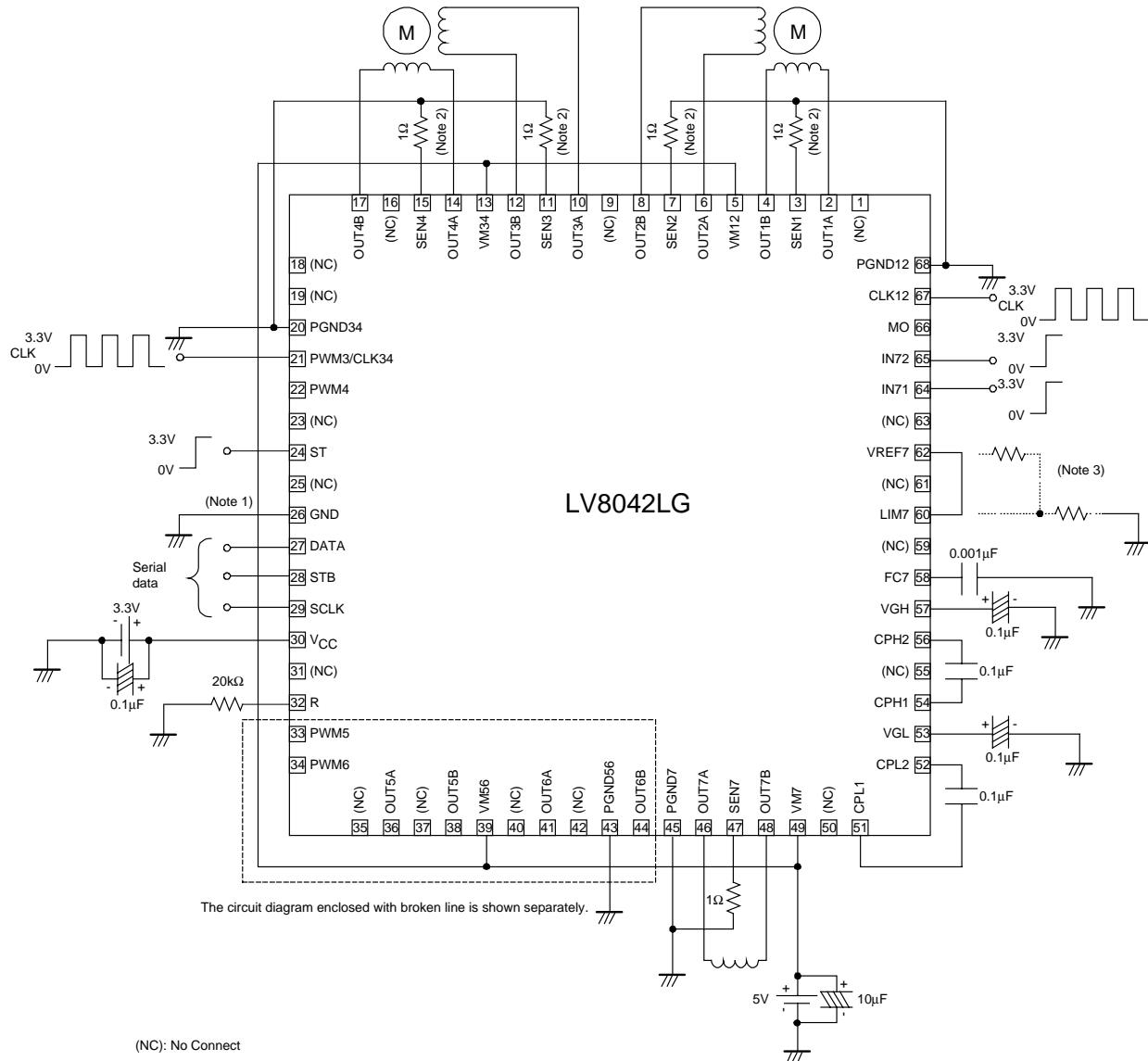
For each input condition numerical value, confirm the previous allowable operation range.

1ch/2ch micro-step drive

3ch/4ch micro-step drive (changeover to PWM drive possible: See 5ch/6ch recommended circuit)

5ch/6ch saturation drive (described separately)

7ch constant current drive



ILV00206

Note 1: GND wiring should be made with one-point grounding as much as possible.

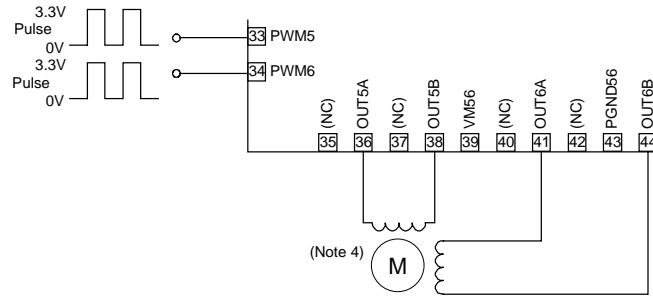
Note 2: A 1Ω resistor is attached for each of the SEN pin registers. This sets an output of 200mA when the current ratio is 100%.

Note 3: Set the LIM7 reference voltage by short-circuiting VREF7 (or dividing with resistance) before input or by applying the voltage from the outside.

5ch/6ch Recommended Circuit

For 5ch/6ch, STM and DCM (VCM) can be driven by using two H-bridge circuits.
 (For 3ch/4ch, the following application is possible when the mode is set to the PWM drive mode.)

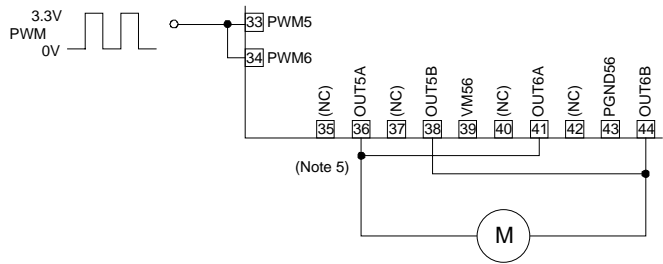
Application (1) . . . STM



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Note 4: To drive STM, serial data must be input for each excitation (phase changeover)

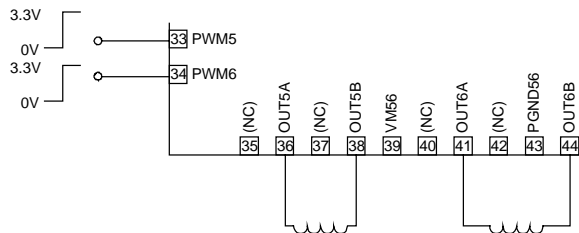
Application (2) . . . DCM (Double output capacity)



ILV00208

Note 5: Short-circuit each input/output.
 (When short-circuiting, be sure to connect OUT5A and OUT6A, OUT5B and OUT6B correctly.)

Application (3) . . . VCM



ILV00209

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