

VM114

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Micro-actuator Driver with I²C Interface



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VM114

Micro-actuator Driver with I²C Interface

General Specifications

VM114 is a micro-actuator driver IC with miniature package. It is one channel low voltage bi-directional motor driver IC. The design is optimal for driving different type micro-actuator, such as voice coil motor, piezo-actuator, or other DC motor actuators. It is suitable for camera module application or other portable devices.

Features and Benefits

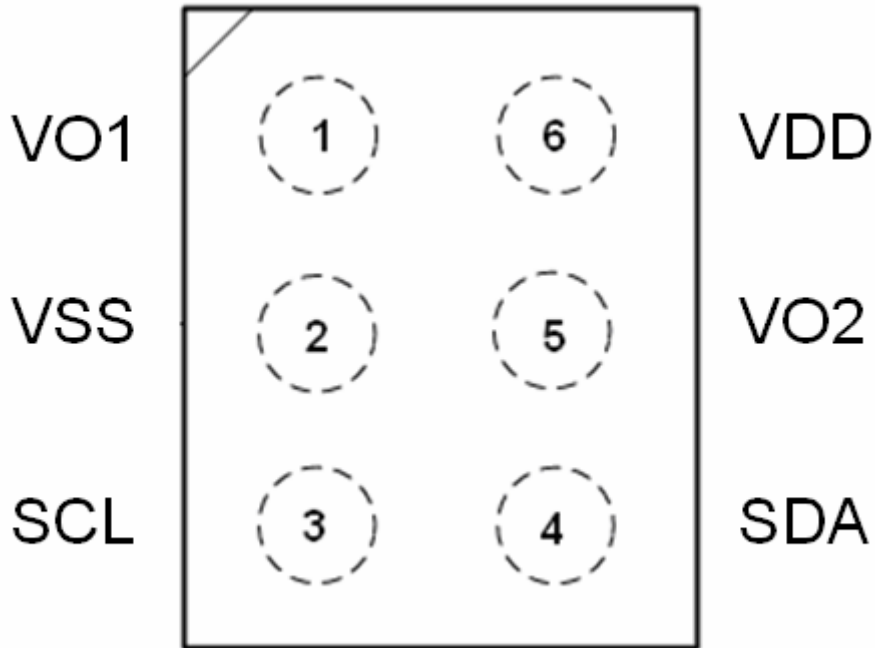
- ◆ Low voltage operation ($V_{DD\ Min} = 1.8\ V$)
- ◆ Low input current
- ◆ Zero standby current
- ◆ I²C serial interface
- ◆ Automatic power on reset
- ◆ Ultra small package: WLCSP (0.78*1.27*0.35mm)

Ordering Information

| Part Number | Package | Marking |
|-------------|-------------|---------|
| VM114 WLCSP | WLCSP, 6Pin | TBD |

Pin Assignment of WLCSP (0.78*1.27*0.35mm)

TOP View



| Pin Number | Pin Name | Description |
|------------|----------|--|
| 1 | VO1 | Driver output 1 |
| 2 | VSS | Ground |
| 3 | SCL | I ² C Interface Clock Line(Serial Clock Line) |
| 4 | SDA | I ² C Interface Data Line(Serial Data Line) |
| 5 | VO2 | Driver output 2 |
| 6 | VDD | Power supply |

Absolute Maximum Ratings (Unless otherwise noted, $T_A=25^{\circ}\text{C}$)

| Characteristic | Symbol | Rating | Unit |
|-----------------------------|-------------|--------------|--------------------|
| Supply Voltage | V_{DD} | 4.5 | V |
| Input Voltage | V_{P1} | $V_{DD}+0.4$ | V |
| I_O Peak Current | I_{OPeak} | 400 | mA |
| I_{ODC} Current | I_{ODC} | 280 | mA |
| Power Dissipation | P_D | 300 | mW |
| Operating Temperature Range | T_{OPR} | -40 ~ 80 | $^{\circ}\text{C}$ |
| Storage Temperature Range | T_{STG} | -65 ~ 150 | $^{\circ}\text{C}$ |

Electrical Characteristic

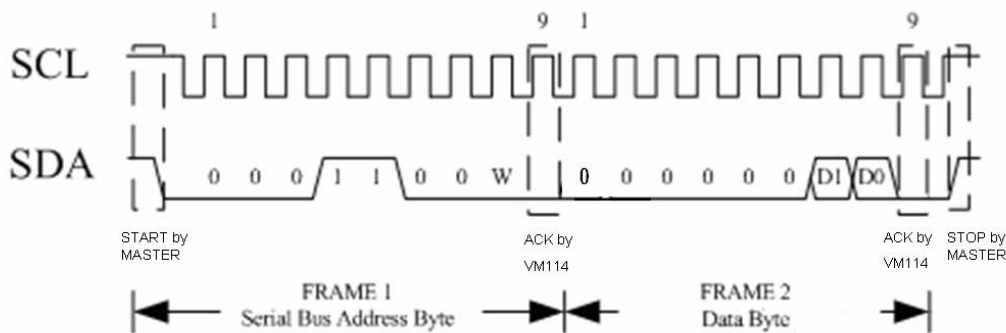
(Unless otherwise noted, $T_A=25^{\circ}\text{C}$ & $V_{DD}=2.8\text{V}$)

| Characteristic | Sym. | Condition | Limit | | | Unit |
|---|----------|------------------------|--------------------|------|--------------------|---------------|
| | | | Min. | Typ. | Max. | |
| Supply Voltage | V_{DD} | | 1.8 | 2.8 | 4.5 | V |
| Standby Current | I_{DD} | No load | - | - | 3 | μA |
| SDA SCL Input Terminal ($T_J = 25^{\circ}\text{C}$) | | | | | | |
| Input Voltage "H" | V_{IH} | - | $0.5 \cdot V_{DD}$ | - | $V_{DD}+0.4$ | V |
| Input Voltage "L" | V_{IL} | - | -0.4 | - | $0.2 \cdot V_{DD}$ | V |
| Input Current "H" | I_{IH} | $V_{IN} = V_{DD}$ | - | - | ± 1 | μA |
| Input Current "L" | I_{IL} | $V_{IN} = 0\text{V}$ | - | - | ± 1 | μA |
| Output Terminal (O1, O2) | | | | | | |
| Output Resistance (Upper) | R_{OH} | $I_{OUT}=200\text{mA}$ | - | 1.3 | 1.6 | Ohm |
| Output Resistance (Low) | R_{OL} | $I_{OUT}=200\text{mA}$ | - | 0.7 | 0.9 | Ohm |

Data Format

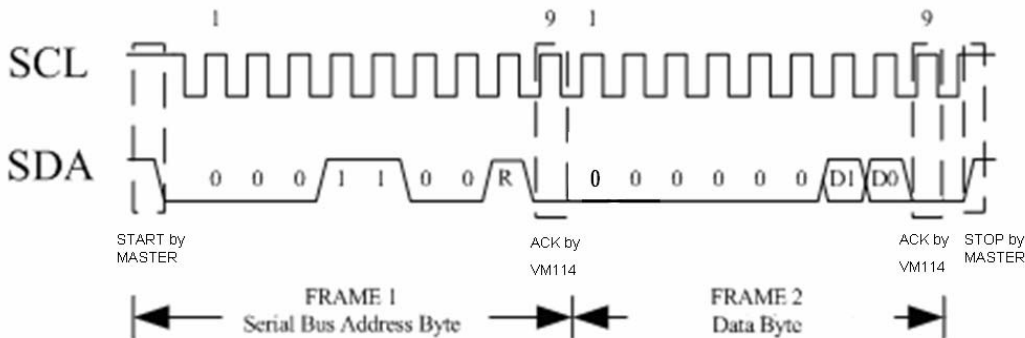
VM114 Write Mode

In the writing mode, data is written to VM114 and shifted into a 8-bit input register. After all 8 bits of data have been shifted in, a STOP signal is generated by master controller. The data in the input register is transferred to VM114 internal controller at the same time.



VM114 Read Mode

In reading mode, data is read from IC to a master controller in the same bit order.



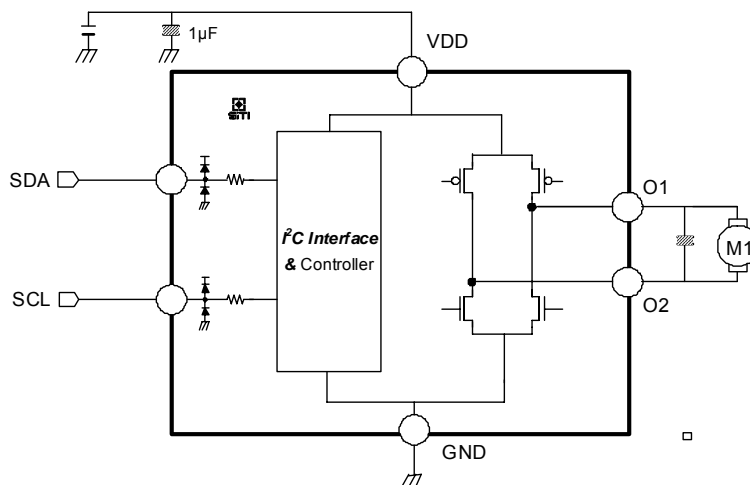
Table

| | Address | | | | | | | | Data | | | | | | | |
|-------------------------|---------|-----|-----|-----|-----|-----|-----|-----|------|---|---|---|---|---|----|----|
| Serial Data Bits | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Function | ID6 | ID5 | ID4 | ID3 | ID2 | ID1 | ID0 | R/W | 0 | 0 | 0 | 0 | 0 | 0 | D1 | D0 |

D[1:0]: The output O1/O2 is set by D[1:0] as defined below.

| Input | | Output | |
|-------|----|--------|----|
| D1 | D0 | O1 | O2 |
| 0 | 0 | H | H |
| 0 | 1 | H | L |
| 1 | 0 | L | H |
| 1 | 1 | L | L |

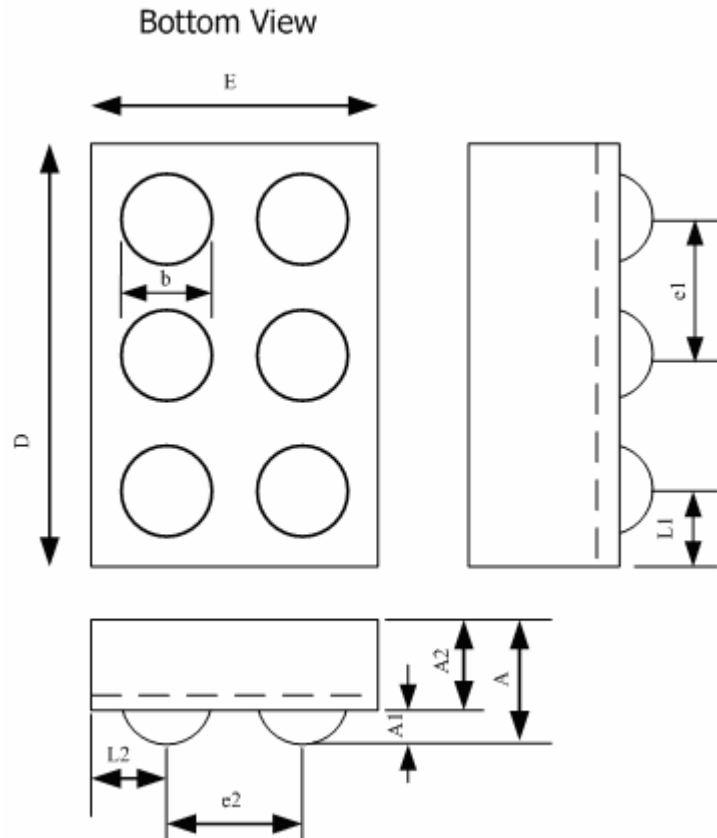
Function Block



Application Notes

- The O1/O2 output H/H or L/L will brake the motor. Though the active current of driver is near to zero, if the application is required to turn off driver, please turn off the driver's power from VDD.
- The capacitor connected between the output nodes O1/O2 will reduce the noise generated by the motor when the motor is switched to opposed direction.

Package Specifications (WLCSP1): (0.78*1.27*0.35mm)



| SYMBOL | DIMENSION (mm) | | |
|--------|----------------|-------|-------|
| | MIN. | NOM. | MAX. |
| A | 0.325 | 0.350 | 0.375 |
| A1 | 0.090 | 0.100 | 0.110 |
| A2 | 0.235 | 0.250 | 0.265 |
| b | 0.234 | 0.260 | 0.286 |
| D | 1.255 | 1.270 | 1.285 |
| E | 0.765 | 0.780 | 0.795 |
| e1 | 0.380 | 0.400 | 0.420 |
| e2 | 0.380 | 0.400 | 0.420 |
| L1 | 0.215 | 0.235 | 0.255 |
| L2 | 0.170 | 0.190 | 0.210 |

The products listed herein are designed for ordinary electronic applications, such as electrical appliances, audio-visual equipment, communications devices and so on. Hence, it is advisable that the devices should not be used in medical instruments, surgical implants, aerospace machinery, nuclear power control systems, disaster/crime-prevention equipment and the like. Misusing those products may directly or indirectly endanger human life, or cause injury and property loss.

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