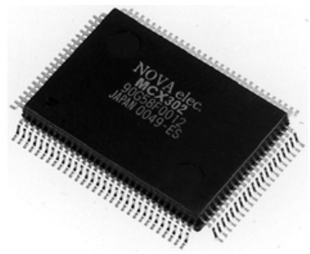
2-Axis Motor Control IC PbFree

MCX302 is 2-axis motion control IC which can independently control each 2 axes of either stepper motor driver or pulse type servo motor for position and speed control. This IC is pin-compatible with MCX312.

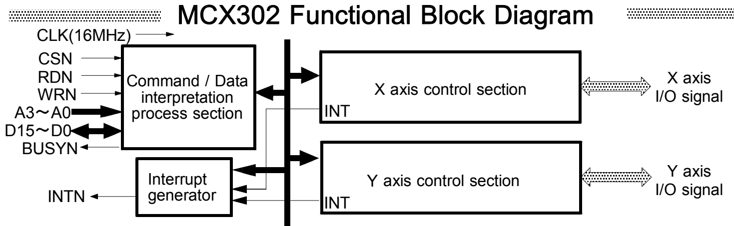


Specification

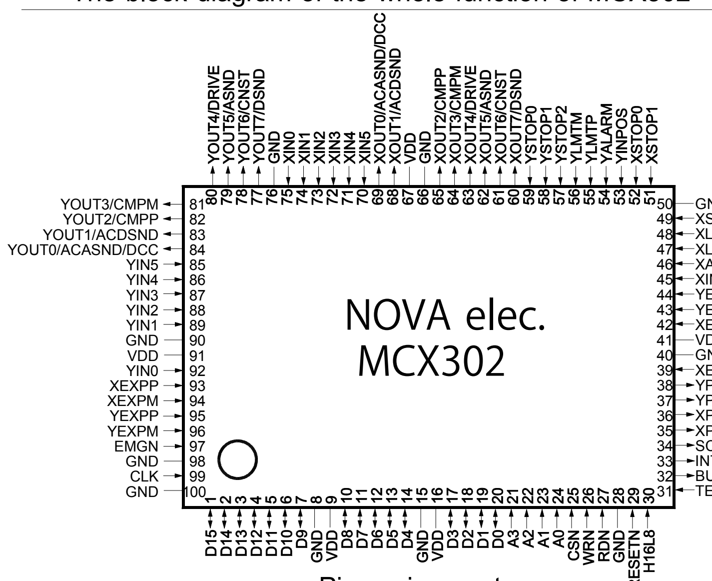
■Control axis 2 axes
■Data bus width 16/8 bit selectable
■Drive output pulse(at CLK=16MHz)
●Output speed range 1 PPS ~ 4 MPPS
●Output speed accuracy ±0.1%(according to the setting value)
●S-curve jerk 954 ~ 31.25×10^{9} PPS/SEC^{2}
●Accelerating/decelerating speed 125 ~ 500×10^{6} PPS/SEC
●Initial speed 1 ~ 4×10^{6} PPS
●Drive speed 1 ~ 4×10^{6} PPS
●Output pulse number 0 ~ 268,435,455 (Fixed drive) or Unlimited(Continuous drive)
●Speed curve
Constant, linear acceleration/deceleration or parabola S-curve acceleration/deceleration
●Deceleration mode for fixed pulse Auto(Non-symmmetry linear interpolation is allowed)/manual
●Output pulse number and speed during driving are changeable.
●Independent 2 pulse system or 1 pulse 1 direction system is selectable.
●Logical levels of pulse are selectable.
■Encoder input pulse
●2 phase pulse style or Up/Down pulse style is selectable.
●2 phase pulse single, double or quad counter edge evaluation is selectable.
■Position counter
●Logical position counter(for output pulse) -2,147,483,648 ~ +2,147,483,647
●Real position counter(for input pulse) -2,147,483,648 ~ +2,147,483,647
■Comparison register
●COMP+ register comparison range -1,073,741,824 ~ +1,073,741,823
●COMP-register comparison range -1,073,741,824 ~ +1,073,741,823
●Status and signal outputs for the comparisons of position counters.
●To work as software limit
■Automatic home search
●Automatic of execution of Step1(high-speed near home search)→Step2(low-speed home search)→Step3(low-speed encoder Z-phase search)→Step4(high-speed offset drive).
Enable/disable and search direction for each step are selectable.
●Deviation counter clear output
Clear pulse width within the range of 10μ ~ 20msec and logical level are selectable.
■Interrupt
..the start/finish of a constant-speed drive during the acceleration/deceleration driving
..the end of the driving
..transition to “position counter ≥ the volume of COMP-
..transition to “position counter < the volume of COMP-
..transition to “position counter ≥ the volume of COMP+
..transition to “position counter < the volume of COMP+

■External signal for driving
EXPP and EXPM signal for +/- direction fixed/continuous pulse drive.
Driving in manual pulsar mode(Encoder input).
■External decelrating/instant stop signal
STOP0 ~ 2 3 points for each axis.
Enable/disable and logical levels are selectable.
■Input signal for servo motor
ALARM(Alarm) and INPOS(In position check)
■General input/output signal
IN 0~5 6 points for each axis
OUT 0~7 8 points for each axis(pin sharing with drive status output signal)
■Drive status signal output
DRIVE(Driving), ASND(accelerating), DSND(decelerating), CMPP(Position ≥COMP+), CMPM(Position<COMP-), ACASND (accelerating/decelerating speed increasing) and ACDSND (accelerating/decelerating speed decreasing).
■Limit signal input
1 point for each +/-direction
Logical levels and decelerating/instant stop are selectable.
■Emergency stop signal
EMGN 1 point for all axes
Stop the drive pulse of all axes immediately in Low level.
■Integral filter built-in.
Equipped integral filter in the input column of each input signal.
One time constant can be selected from 8 types.
■Electrical characters
Temperature range for operating 0 ~ + 85°C (32°F ~181°F)
Power voltage +5V ± 5 %(Consumption current 50 mA max.)
Input/output signal level TTL / CMOS level
Input clock 16.000MHz (Standard.)
■Dimension(including pins) 23.8×17.8×3.05mm
100-pin plastic QFP, pin pitch=0.65

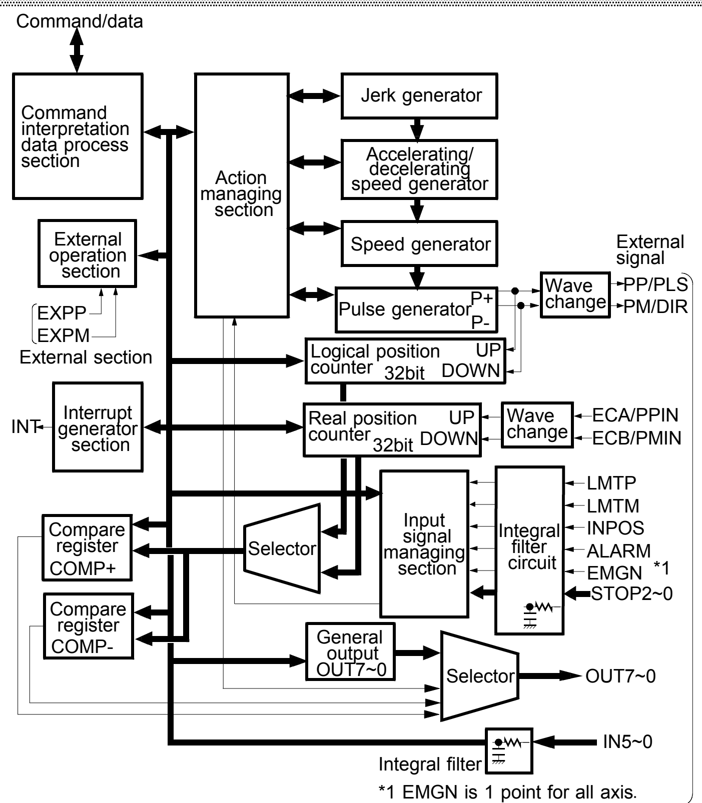
MCX302 Functional Block Diagram



The block diagram of the whole function of MCX302



Pin assignment



Block Diagram of the X and Y-axis Control Section

■Input/Output signals ((I): Input (O): Output (B): Bidirectional Each X and Y axis has nOOOO signal. "n" means each X and Y axis.)
●D15~0(B) Data bus ●A3~0(I) Adress ●CSN(I) Chip select ●WRN(I) Write strobe ●RDN(I) Read strobe ●RESETN(I) Reset ●H16L8(I) 16/8 Data bit bus width selectable ●BUSYN(O)Executing the command ●INTN(O) Interrupt ●SCLK(O) 1/2CLK ●nPP/PLS(O) + direction drive pulse/Drive pulse ●nPM/DIR(O) - direction drive pulse/Direction ●nECA/PPIN(I) Encoder A-phase/Up pulse ●nECB/PMIN(I) Encoder B-phase/Down pulse ●nINPOS(I) In-position for servo driver ●nALARM(I) Servo driver alarm ●nLMTP(I) + direction limit ●nLMTM(I) - direction limit ●nSTOP2~0(I) 3points for decelerating/instant stop ●nOUT0~7(O) General output 8 points (DSND:Decelerating, CNST:Constant speed drining, ASND:Accelerating, DRIVE:Drive pulse outputting status, CMPM:P<COMP-, CMPP:P≥COMP+, ACDSND:accelerating/decelerating speed decreasing, ACASND/DCC:accelerating/decelerating speed increasing/pin sharing with deviation counter clear and signal) ●nIN5~0(I) General input 6 points ●nEXPP(I) External + direction drive, manual pulsar A-phase ●nEXPM(I) External -direction drive, manual pulsar B-phase ●EMGN(I) Emergency stop ●CLK(I) Clock 16MHz(Standard)

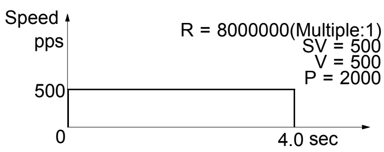
Individual control for 2 Axes

MCX302 has 32 bit position counter for each X and Y axis and function to drive constant speed, linear and S-curve acceleration/deceleration to the maximam speed 4MPPS.Drive command is operated by +/- direction fixed pulse drive or continuous drive basically.

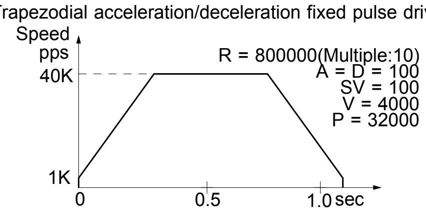
- ●Fixed pulse:Output the specified pulse number.
- ●Countinuous pulse:Keep outputting the pulse unlimitedly until the stop factor is generated.

Either drive can be operated in constant speed and linear/S-curve acceleration/decelration by operation parameter and mode setting.

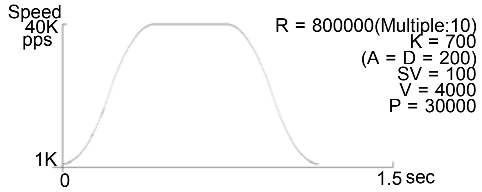
Constant speed / fixed pulse drive



Trapezodial acceleration/deceleration fixed pulse drive



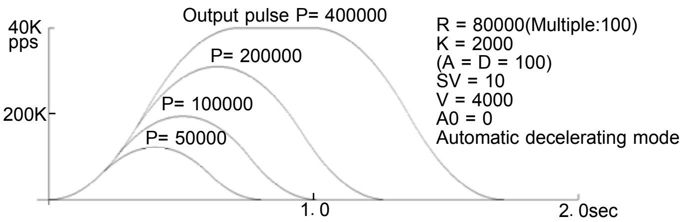
S-curve acceleration/deceleration fixed pulse drive



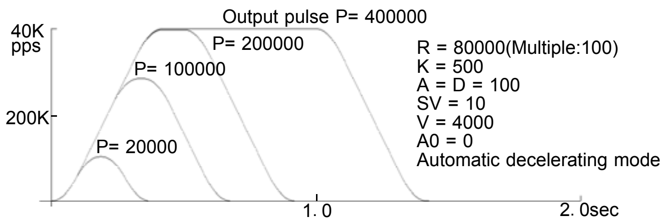
■ S-curve acceleration/deceleration drive

S-curve acceleration/deceleration has a style to increase or decrease accelerating/decelerating speed by linear function. Therefore, its speed curve moves as parabola S-curve. Triangle forms during S-curve acceleration/deceleration are prevented by a special method as the following figure however the number of output pulse is small. Perfect S-curve acceleration/deceleration drives as quadratic curve without linear accelration/deceleration at all during accelrating/decelerating, contrarily, partial S-curve acceleration/deceleration drives as combining linear and curve driving during accelerating/decelerating.

400KPPS Perfect S-curve accelerating/decelerating

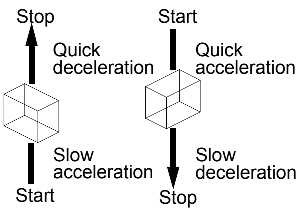


400KPPS Partial S-curve accelerating/decelerating



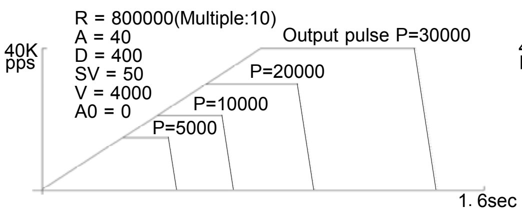
■ Automatic deceleration for non-symmetrical trapezodial drive

In non-symmetrical trapezodial acceleration/deceleration drive whose accelerating and decelerating speed are different, automatic decelerating is started since the start point of decelerating is calculated inside MCX302. There is no need to set the start point of decelerating from CPU for users.

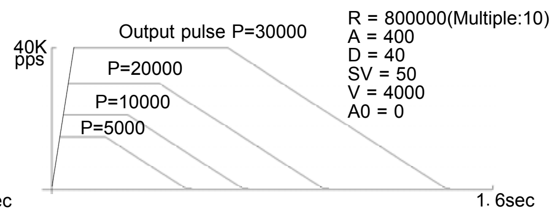


As the above figure shows, when the obejects are moved in up/down direction, gravity acceleration is added. For efective transporting, non-symmetry trapezodial drive is needed.

Non-symmetry trapezodial acceleration/deceleration drive(acceleration<deceleration)



Non-symmetry trapezodial acceleration/deceleration drive(acceleration>deceleration)



Individual acceleration/deceleraion : WR3/D1 =1,
Preventing triangle forms ON : WR3/D5 =1

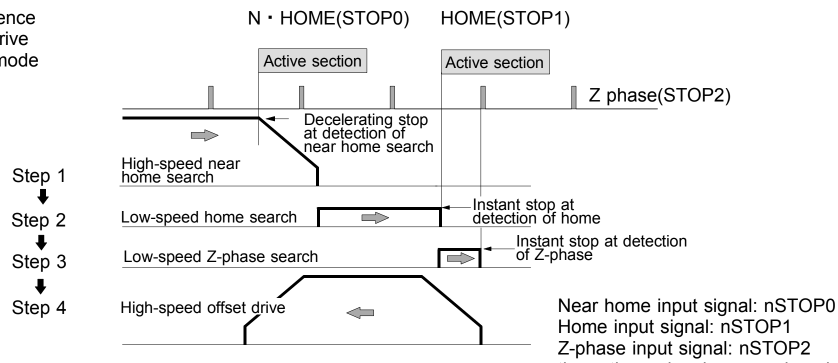
【Note】In acceleration>deceleration, there is limitation for the rate of acceleration and deceleration which can be operated by automatic deceleration. The limitation depends on the value of driving speed. For example, when the driving speed is 100kpps, its rate is to 1/40.

Automatic home search

The automatic home search function executes the home search sequence from step1:high-speed near home search to step4:high-speed offset drive as the right figure. Set execution/non-execution and search direction mode for each step.

■Search speed
In step 1 and 4, search action is executed by high speed which is set as the drive speed(V). Or, in step 2 and 3, search action is executed by low speed which is set as the home detection speed(HV)

■Irregular operation
In irregular case, for example, the signal is already active in sensor active part before the searching starts or which is detecting the limit for the direction of movement during searching, the correct home search is executed.

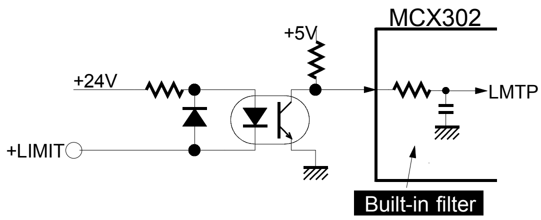


Scheme of automatic home search

Near home input signal: nSTOP0
Home input signal: nSTOP1
Z-phase input signal: nSTOP2
these three signals are assigned.

Built-in integral filter

The signal of limit and driving stop for each axis are influenced by external noise.
To cut these noises, photo coupler or CR integral filter is mounted on the circuit normaly.
However MCX302 is equipped with integral type filters in the input stage of each input signal. It is possible to set a number of input signals whether the filter function is enabled or the signal is passed through.
A filter time constant is selectable from eight stages, min.22μsec ~ max.16msec.



FL2~0	Input delay time
0	2μSEC
1	256μSEC
2	512μSEC
3	1.024mSEC
4	2.048mSEC
5	4.096mSEC
6	8.192mSEC
7	16.384mSEC

■ Write register

<table>
<tr><th colspan="3">Address</th><th rowspan="2">Symbol</th><th rowspan="2">Name</th><th rowspan="2">Contents</th></tr>
<tr><th>A2</th><th>A1</th><th>A0</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>WR0</td><td>Command register</td><td>Axis assignment and writing the command code.
<table>
<tr><td>D15</td><td>D14</td><td>D13</td><td>D12</td><td>D11</td><td>D10</td><td>D9</td><td>D8</td><td>D7</td><td>D6</td><td>D5</td><td>D4</td><td>D3</td><td>D2</td><td>D1</td><td>D0</td></tr>
<tr><td>RESET</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>Y</td><td>X</td><td>0</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="6"></td><td colspan="2">Axis assignment</td><td></td><td colspan="7">Command code</td></tr>
</table>
● D9,8 Axis assignment 0:non-select/1:select (Mulit-axis are selectable at one time) ● D15 1:Reset</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>XWR1
YWR1</td><td>X axis mode register 1
Y axis mode register 1</td><td>Setting of the logical levels and enable/disable of external decelerating/instant stop, interruption enable/disable and the operation mode setting for real posiotion counter for each axis
<table>
<tr><td>D15</td><td>D14</td><td>D13</td><td>D12</td><td>D11</td><td>D10</td><td>D9</td><td>D8</td><td>D7</td><td>D6</td><td>D5</td><td>D4</td><td>D3</td><td>D2</td><td>D1</td><td>D0</td></tr>
<tr><td>D-END</td><td>C-STA</td><td>C-END</td><td>P≥C+</td><td>P<C+</td><td>P<C-</td><td>P≥C-</td><td>SMOD</td><td>EPINV</td><td>EPCLR</td><td>SP2-E</td><td>SP2-L</td><td>SP1-E</td><td>SP2-L</td><td>SP0-E</td><td>SP0-L</td></tr>
<tr><td colspan="7">Interrupt enable/disable</td><td colspan="3"></td><td colspan="6">Drive decelerating/instant stop input signal</td></tr>
</table>
●D5~0 ***-E 0:disable/1:enable ***-L Logical level 0:Low/1:Hi ●D6: Real position counter cleared by STOP2 signal 0:disable/1:enable ●D7:Real position counter increase/decrease inversion function 0:disable/1:enable ●D8:Speed prior in S-curve acceleration/deceleration 0:disable/1:enable ●D15~9 0:Interrupt enable/1:disable ●D9:Logical/real position counter≥COMP-variation ●D10:Logical/real position counter<COMP-variation ●D11:Logical/real position counter<COMP+ variation ●D12:Logical/real position counter≥COMP+variation ●D13:The termination of constant speed drive during acceleration/deceleration driving ●D14:The start of constant speed drive during acceleration/deceleration driving ●D15:Termination of driving</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>XWR2
YWR2</td><td>X axis mode register 2
Y axis mode register 2</td><td>Setting of enable/disable of software limit, the mode of the limit input signal, the mode of drive pulse, the mode of encoder input signal and the logical levels and enable/disable of servo motor signal for each axis.
<table>
<tr><td>D15</td><td>D14</td><td>D13</td><td>D12</td><td>D11</td><td>D10</td><td>D9</td><td>D8</td><td>D7</td><td>D6</td><td>D5</td><td>D4</td><td>D3</td><td>D2</td><td>D1</td><td>D0</td></tr>
<tr><td>INP-E</td><td>INP-L</td><td>ALM-E</td><td>ALM-L</td><td>PIND1</td><td>PIND0</td><td>PINMD</td><td>DIR-L</td><td>PLS-L</td><td>PLSMD</td><td>CMPSL</td><td>HLMT-</td><td>HLMT+</td><td>LMTMD</td><td>SLMT-</td><td>SLMT+</td></tr>
</table>
●D1, 0 Software limit 0:disable/1:enable ●D2 Hardware limit 0:instant/1:decelerating stop ●D4, 3 Logical level of limit signal 0:Low/1:Hi ●D5 COMP+/- register comparison 0:logical position counter/1:real position counter ●D6 Drive pulse outputting type 0:2-pulse system /1:1-pulse 1-direction system ●D7 Logicai level of drive pulse 0:positive logical pulse / 1:negative logical pulse ●D8 Logical level of the direction signal 0:Low level for + direction/1:Hi level for + direction ●D9 Encoder input signals 0:2-phase pulse/1:Up/Down pulse ●D11, 10 Encoder input divide 00:1/1, 01:1/2, 10:1/4 ●D12 Logical level of ALARM signal 0:Low/1:Hi ●D13 ALARM signal 0:disable/1:enable ●D14 Logical level of INPOS signal 0:Low/1:Hi ●D15 INPOS signal 0:disable/1:enable</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>XWR3
YWR3</td><td>X axis mode register 3
Y axis mode register 3</td><td>Setting of the manual deceleration, symmmetry/non-symmmetry of acceleration/deceleration, acceleration/deceleration mode, external operation mode, switching between general purpose output and drive status output and input signal filter.
<table>
<tr><td>D15</td><td>D14</td><td>D13</td><td>D12</td><td>D11</td><td>D10</td><td>D9</td><td>D8</td><td>D7</td><td>D6</td><td>D5</td><td>D4</td><td>D3</td><td>D2</td><td>D1</td><td>D0</td></tr>
<tr><td>FL2</td><td>FL1</td><td>FL0</td><td>FE4</td><td>FE3</td><td>FE2</td><td>FE1</td><td>FE0</td><td>OUTSL</td><td>VRING</td><td>AVTRI</td><td>EXOP1</td><td>EXOP0</td><td>SACC</td><td>DSNDE</td><td>MANLD</td></tr>
<tr><td colspan="3">Filter time constant</td><td colspan="5">Input signal filter enable/disable</td><td colspan="8"></td></tr>
</table>
●D0 Deceleration of fixed pulse drive 0:automatic/1:manual ●D1 Decelerating speed 0:using the value of accelerating speed(Symmetry)/1:using the value of decelerating speed(non-symmetry) ●D2 Acceleration/deceleration mode 0:Trapezodial/1:S-curve ●D4,3 External driving operation 00:disable/01:continuous drive/10:fixed pulse drive/11:manual pulsar ●D5 Prevention of the triangle forms at linear acceleration/decelration driving 0:disable/1:enable ●D6 Enable the variabble ring function of position counter 0:disable/1:enable ●D7 nOUT7~0 outputting pin 0:outputting OUT7~0/ 1:outputting drive status(DSND,CNST,ASND,DRIVE,CMPM,CMPP,ACDSND,ACASND) ●D8 EMG,LMTP/M,STOP0,1 signal filter 0:disable/1:enable ●D9 STOP2 signal filter 0:disable/1:enable ●D10 INPOS and ALARM signal filter 0:disab le/1:enable ●D11 EXPP/M signal filter 0:disable/1:enable ●D12 IN5~0 signal filter 0:disable/1:enable ●D15~D13 Setting of input filter time constant(000:0.002msec/ 001:0.2msec/ 010:0.5msec/ 011:1msec/ 100:2msec/ 101: 4msec/ 110:8msec/111:16msec)</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>WR4</td><td>Output register</td><td>Setting of the outputting value of general output signal nOUT7~0. 0:Low/ 1:Hi
<table>
<tr><td>D15</td><td>D14</td><td>D13</td><td>D12</td><td>D11</td><td>D10</td><td>D9</td><td>D8</td><td>D7</td><td>D6</td><td>D5</td><td>D4</td><td>D3</td><td>D2</td><td>D1</td><td>D0</td></tr>
<tr><td>YOUT7</td><td>YOUT6</td><td>YOUT5</td><td>YOUT4</td><td>YOUT3</td><td>YOUT2</td><td>YOUT1</td><td>YOUT0</td><td>XOUT7</td><td>XOUT6</td><td>XOUT5</td><td>XOUT4</td><td>XOUT3</td><td>XOUT2</td><td>XOUT1</td><td>XOUT0</td></tr>
</table></td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>WR5</td><td></td><td>None</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>WR6</td><td>Write data register 1</td><td>Setting of the low word 16-bit for data writing. (D15~D0)</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>WR7</td><td>Write data register 2</td><td>Setting of the high word 16-bit for data writing. (D31~D16)</td></tr>
</table>

●The above table indicates the address for 16-bit data bus. In 8-bit data bus access, the 16-bit data bus are divided into the high word byte (D15~8) and the low word byte (D7~0) by using address signal A3~A0.
●Each axis has WR1,WR2 and WR3 (mode register 1, 2 and 3). Writing the data in these registers by the same adrress. It depends on the axis assignment of the last command to write the data in the mode register of which axis. Or, uesr can select the axis by writing the NOP command whichis assigned an axis just before.
●At resetting, all the bits of nWR1, nWR2, nWR3, WR4 and WR5 registers are cleared to 0(n=X and Y). The other registers are undetermined.

■ Automatic home search mode setting

Mode setting of automatic home search is executed by the setting command of automatic home search mode (60h), writing the axis assignment and the command code 60h in WR0 register after setting each bit of WR6 register as follows.

<table>
<tr><th colspan="3">Address</th><th rowspan="2">Symbol</th><th rowspan="2">Name</th><th rowspan="2">Contents</th></tr>
<tr><th>A2</th><th>A1</th><th>A0</th></tr>
<tr><td>1</td><td>1</td><td>0</td><td>WR6</td><td>Write data register 1</td><td>
<table>
<tr><td>D15</td><td>D14</td><td>D13</td><td>D12</td><td>D11</td><td>D10</td><td>D9</td><td>D8</td><td>D7</td><td>D6</td><td>D5</td><td>D4</td><td>D3</td><td>D2</td><td>D1</td><td>D0</td></tr>
<tr><td>DCCW2</td><td>DCCW1</td><td>DCCW0</td><td>DCC-L</td><td>DCC-E</td><td>LIMIT</td><td>SAND</td><td>PCLR</td><td>ST4-D</td><td>ST4-E</td><td>ST3-D</td><td>ST3-E</td><td>ST2-D</td><td>ST2-E</td><td>ST1-D</td><td>ST1-E</td></tr>
<tr><td colspan="5">Setting of deviation counter clear outputting</td><td colspan="3"></td><td colspan="2">Step4</td><td colspan="2">Step3</td><td colspan="2">Step2</td><td colspan="2">Step1</td></tr>
</table>
●D6,4,2,0 STm-E Stepm execution 0:non-execution/1:execution ●D7,5,3,1 STm-D Stepm search direction 0:+ direction /1:- direction ●D8 Logical/real position counter clear after Step4 is executed 0:disable/1:enable ●D9 AND of Z-phase signal and home signal at Step3 0:disable/1:enable ●D10 Using limit signal as home signal 0:disable/1:enable ●D11 Deviation counter clear outputting 0:disable/1:enable ●D12 Deviation counter clear outputting and logical level 0:active Hi/1:Low ●D15~13 Deviation counter clear outputting active pulse width(000:0.01msec/ 001:0.02msec/ 010:0.1msec/ 011:0.2msec/ 100:1msec/ 101:2msec/ 110:10msec/ 111:20msec)</td></tr>
</table>

■ Read register

Address A2	A1	A0	Symbol	Name	Contents
0	0	0	RR0	Main status register	Displaying the drive and error status and automatic home search execution status of each axis . D15 D14 D13 D12 D11 D10 D9 D8 D7 D6 D5 D4 D3 D2 D1 D0 - 0 0 0 0 0 Y-HOM X-HOM - - Y-ERR X-ERR - - Y-DRV X-DRV Automatic home search execution (D9~D8) / Error (D5~D4) / Drive (D1~D0) ●D1~0 1:driving ●D7~4 1:error occuring(become "1" whichever from RR2/D7~0,RR1/D15~12.) ●D9,8 1:automatic home search executing
0	0	1	XRR1 YRR1	X axis status register 1 Y axis status register 1	Displaying the comparison of positoin counter and COMP± register, status of aceeleration/deceleration during the driving and driving termination status. D15 D14 D13 D12 D11 D10 D9 D8 D7 D6 D5 D4 D3 D2 D1 D0 EMG ALARM LMT- LMT+ - STOP2 STOP1 STOP0 ADSND ACNST AASND DSND CNST ASND CMP- CMP+ Driving execution status (D15~D8) ●D0 1:position counter≥COMP+ ●D1 1:position counter<COMP- ●D2 1:accelerating ●D3 1:constant speed driving ●D4 1:decelerating ●D5 1:increasing accelerating/decelerating speed ●D6 1:constant accelerating/decelerating speed ●D7 1 decreasing accelerating/decelerating speed ●D15~8 1:factor of driving termination
0	1	0	XRR2 YRR2	X axis status register 2 Y axis status register 2	Displaying the error information and the state of automatic home search. D15 D14 D13 D12 D11 D10 D9 D8 D7 D6 D5 D4 D3 D2 D1 D0 - - - HMST4 HMST3 HMST2 HMST1 HMST0 HOME 0 EMG ALARM HLMT- HLMT+ SLMT- SLMT+ Automatic home searching state (D12~D8) / Error information (D7~D0) ●D0 1:+direction software limit ●D1 1:-direction software limit ●D2 1:+direction limit signal on ●D3 1:-direction limit signal on ●D4 1:alarm signal for servo motor on ●D5 1:emergency stop signal on ●D7 1:automatic home search error ●D12~8 1:automatic home searching state(contents of driving)
0	1	1	XRR3 YRR3	X axis status register 3 Y axis status register 3	Displaying the factor of interrupt occring. D15 D14 D13 D12 D11 D10 D9 D8 D7 D6 D5 D4 D3 D2 D1 D0 - - - - - - - - D-END C-STA C-END P≥C+ P<C+ P<C- P≥C- - 1: interrupt occuring Each bit of D7~D0 is corresponding to D15~D9 bit of WR1(mode register1)
1	0	0	RR4	Input register 1	Displaying the input signal status of X axis. 0:Low 1:Hi D15 D14 D13 D12 D11 D10 D9 D8 D7 D6 D5 D4 D3 D2 D1 D0 X-LM- X-LM+ X-IN5 X-IN4 X-IN3 X-IN2 X-IN1 X-IN0 X-ALM X-INP X-EX- X-EX+ EMG X-ST2 X-ST1 X-ST0
1	0	1	RR5	Input register 2	Displaying the input signal status of Y axis. 0:Low 1:Hi D15 D14 D13 D12 D11 D10 D9 D8 D7 D6 D5 D4 D3 D2 D1 D0 Y-LM- Y-LM+ Y-IN5 Y-IN4 Y-IN3 Y-IN2 Y-IN1 Y-IN0 Y-ALM Y-INP Y-EX- Y-EX+ - Y-ST2 Y-ST1 Y-ST0
1	1	0	RR6	Read register 1	Displaying the low word 16-bit for the read data.(D15~D0)
1	1	1	RR7	Read register 2	Displaying the high word 16-bit for the read data.(D31~D16)

●The above table indicates the address for 16-bit data bus. In 8-bit data bus access, the 16bit data bus are divided into the high word byte (D15~8) and the low word byte (D7~0) by using address signal A3~A0.
●Each axis has RR1,RR2 and RR3 (status register 1,2 and 3). It can be read the data in these registers by the same address. It depends on the axis assignment of the last command to read the data in the mode register of which axis. Or, user can select the axis by writing the NOP command which is assigned an axis just before.

■ Data writing commnads

Code	Setting Command	Symbol	Data range	Data length (byte)
00	Range	R	R8,000,000(multiple=1) ~ 16,000(=500)	4 bytes
01	Jerk	K	1 ~ 65,535	2
02	Acceleration	A	1 ~ 8,000	2
03	Deceleration	D	1 ~ 8,000	2
04	Initial speed	SV	1 ~ 8,000	2
05	Drive speed	V	1 ~ 8,000	2
06	Output pulse numbers	P	0 ~ 268,435,455	4
07	Manual deceleration point	DP	0 ~ 268,435,455	4
09	Logical position counter	LP	-2,147,483,648 ~ +2,147,483,647	4
0A	Real position counter	EP	-2,147,483,648 ~ +2,147,483,647	4
0B	COMP+ register	CP	-1,073,741,824 ~ +1,073,741,823	4
0C	COMP- register	CM	-1,073,741,824 ~ +1,073,741,823	4
0D	Acceleration counter offset	AO	-32,768 ~ +32,767	2
0F	NOP(for switching)			
60	Automatic home search mode	HM		2
61	Home search speed	HV	1 ~ 8,000	2

■ Parameter calculation at CLK= 16MHz

Multiple(M)= $\frac{8,000,000}{R}$

Initial speed(PPS)= SV × M

Drive speed(PPS)= V × M

Accelerating speed(PPS/SEC)= A × 125 × M

Jerk(PPS/SEC^2)= $\frac{62.5\times10^6}{K}$ × M

Decelerating speed(PPS/SEC)= D × 125 × M

Decelerating speed increasing (PPS/SEC^2)= $\frac{62.5\times10^6}{L}$ × M

■Data reading commands

Code	Reading Command	Symbol	Data range	Data length (byte)
10	Logical position counter	LP	-2,147,483,648~+2,147,483,647	4 bytes
11	Real position counter	EP	-2,147,483,648~+2,147,483,647	4
12	Current drive speed	CV	1 ~ 8,000	2
13	Acceleration / deceleration	CA	1 ~ 8,000	2

■Driving commands

Code	Commands
20	+direction fixed pulse drive
21	-direction fixed pulse drive
22	+direction continuous drive
23	-direction continuous drive
24	drive start holding
25	drive start holding release /termination status clear
26	decelerating stop
27	instant stop

■Other commnands

Code	Commands
62	Automatic home search execution
63	Deviation counter clear output

The Specifications are subject to change without notice due to the technical development. 2011.4

Distributor
达格美（上海）集成电路有限公司
TAKUMI (SHANGHAI) INTEGRATED CUICUIT CO.,LTD.
地址：上海市浦东新区张杨路188号汤臣中心B栋801室
电话：021-5840-8299 E-mail：dgmsh@takumi-hkg.com
传真：021-5840-1590 WEB：www.takumi-sh.com

NOVA electronics
3F,Grand Axe Bldg.,1-7-20 Uehara,Shibuya-Ku,Tokyo 151-0064,Ja
WEB SITE http://www.novaelec.co.jp/eng/index.html
EMAIL ADDRESS novaelec_info@novaelec.co.jp
TEL 81-3-5738-3666 FAX 81-3-5738-3665