

CB-7000 DIO

User's Manual

CB-7041/7041D

CB-7042/7042D

CB-7043/7043D

CB-7044/7044D

CB-7050/7050D

CB-7052/7052D

CB-7053/7053D

CB-7060/7060D

CB-7063/7063D/A/AD/B/BD

CB-7065/7065D/A/AD/B/BD

CB-7066/7066D

CB-7067/7067D

Measurement Computing Corp.

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Table of Contents

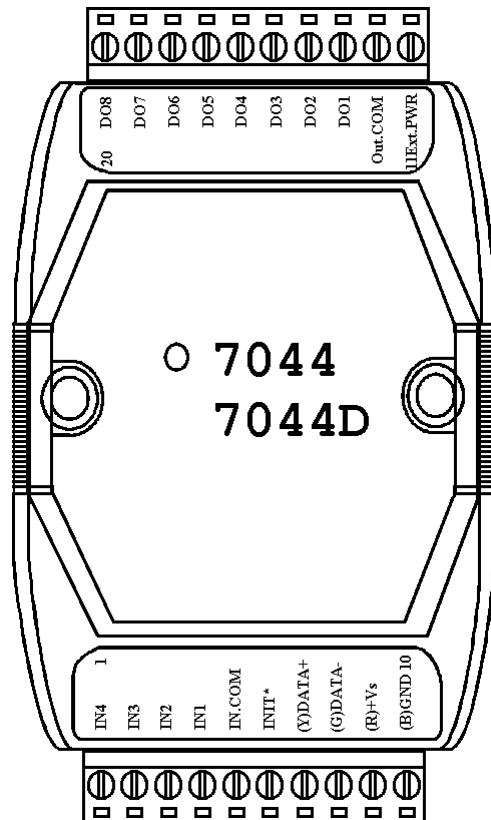
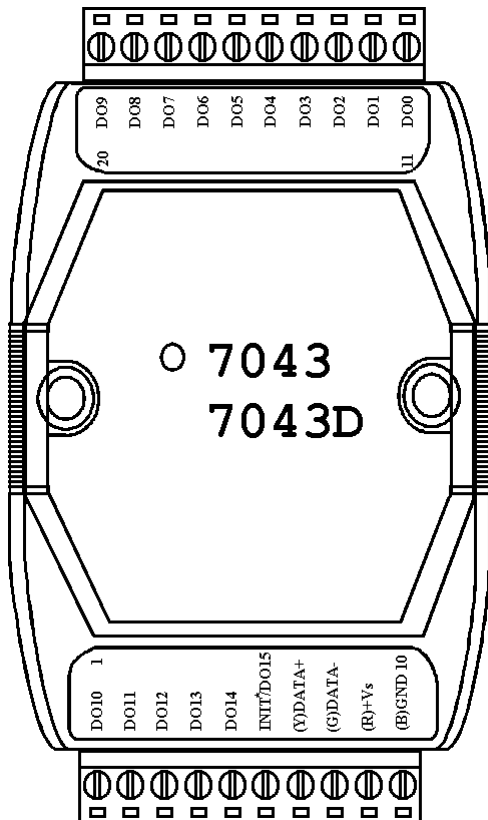
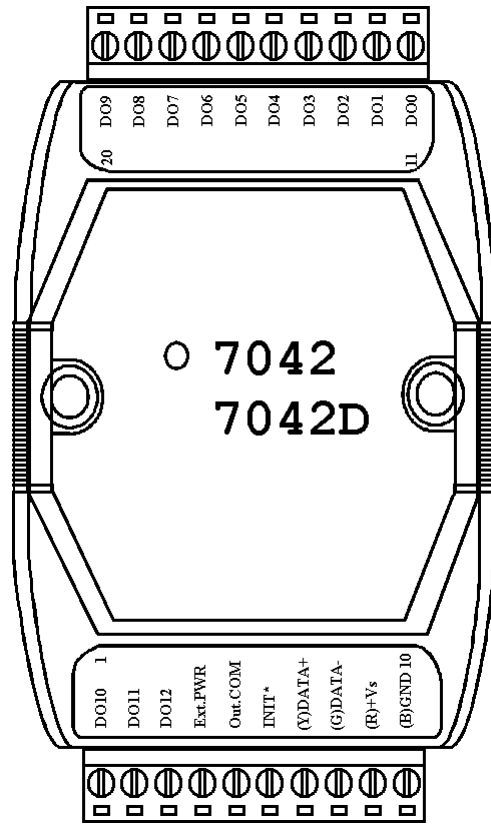
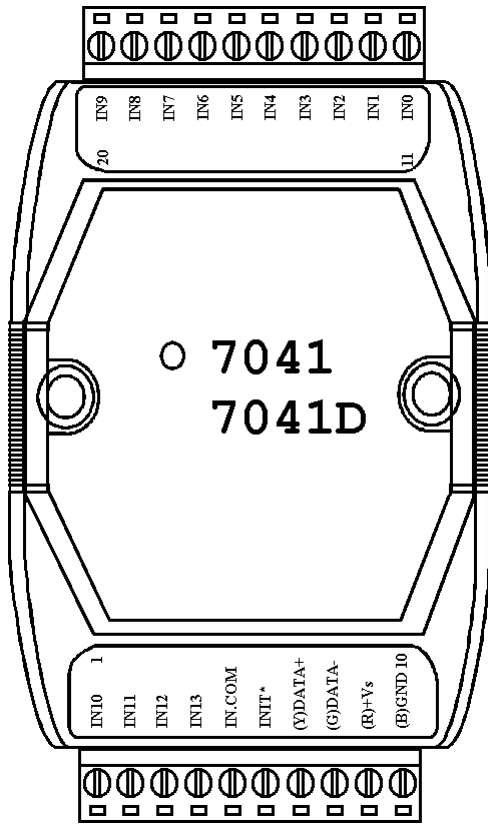
| | |
|--------------------------------|-----------|
| 1. Introduction | 4 |
| 1.1 More Information | 4 |
| 1.2 Pin Assignments | 5 |
| 1.3 Specifications | 9 |
| 1.4 Block Diagrams | 13 |
| 1.5 Wire Connection | 21 |
| 1.6 Quick Start | 24 |
| 1.7 Default Settings | 24 |
| 1.8 Jumper Settings | 24 |
| 1.9 Configuration Tables | 24 |
| 2. Command | 26 |
| 2.1 %AANNTTCCFF | 28 |
| 2.2 #** | 29 |
| 2.3 #AABBDD | 30 |
| 2.4 #AAN | 33 |
| 2.5 \$AA2 | 34 |
| 2.6 \$AA4 | 35 |
| 2.7 \$AA5 | 36 |
| 2.8 \$AA6 | 37 |
| 2.9 \$AAF | 38 |
| 2.10 \$AAM | 39 |
| 2.11 \$AAC | 40 |
| 2.12 \$AACN | 41 |

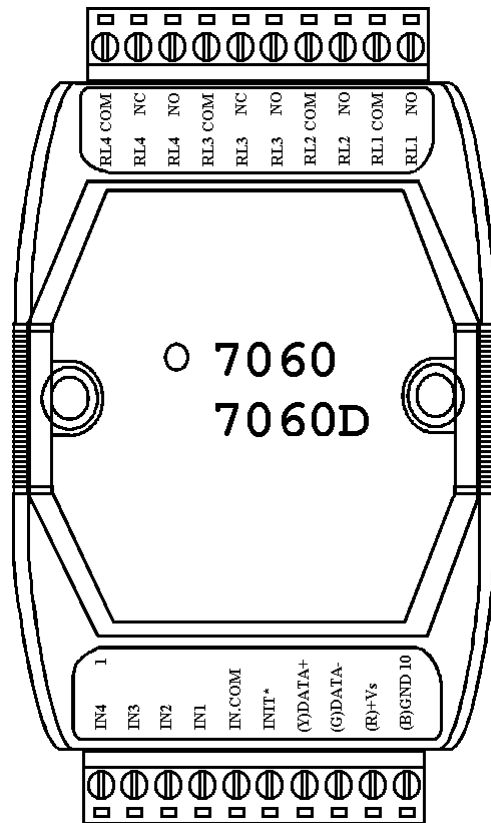
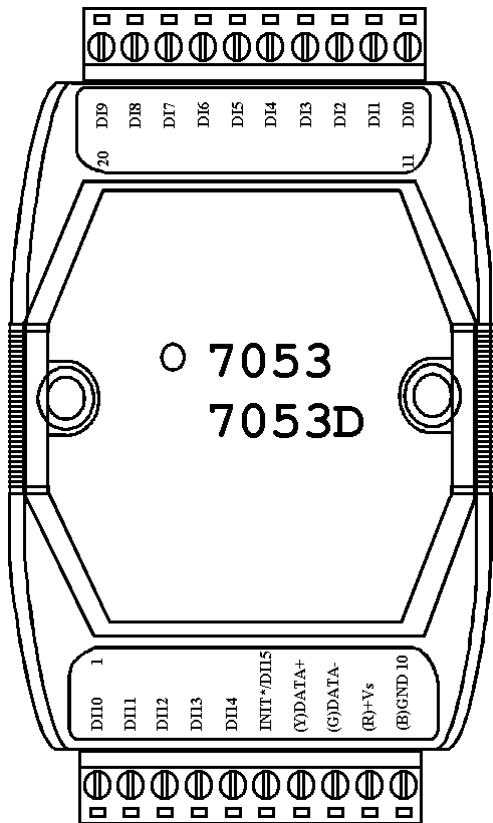
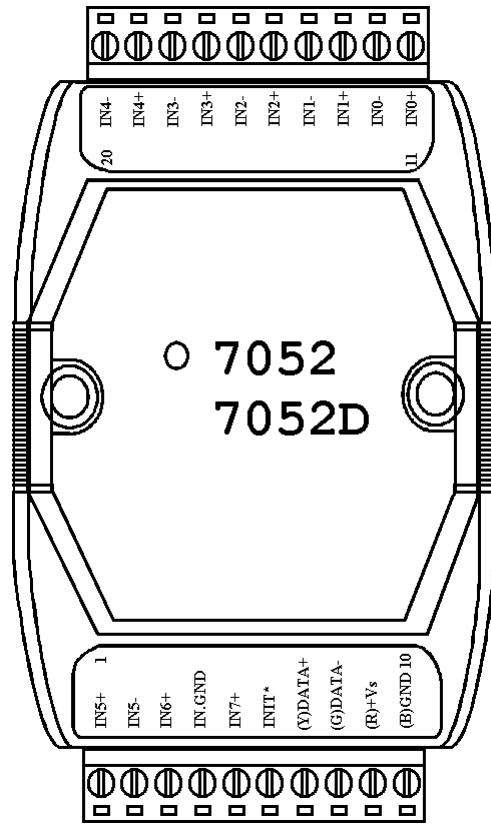
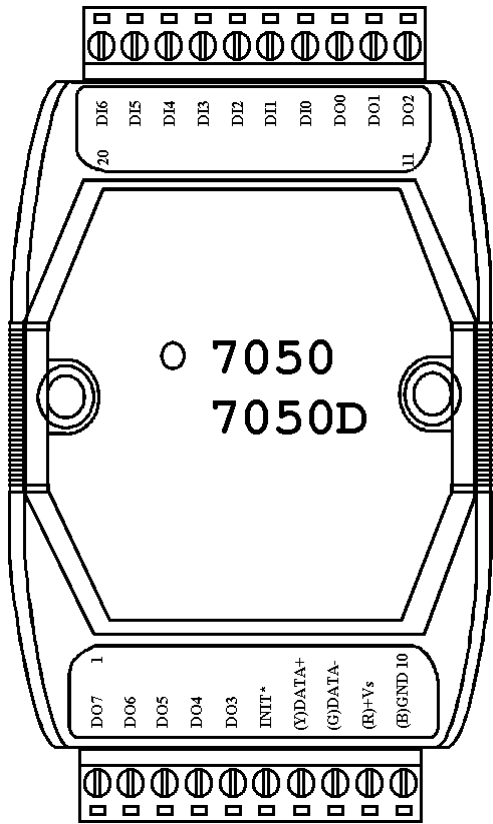
| | |
|-----------------------------------|-----------|
| 2.13 \$AALS | 42 |
| 2.14 @AA | 43 |
| 2.15 @AA(Data) | 44 |
| 2.16 ~AAO(Data) | 46 |
| 2.17 ~** | 47 |
| 2.18 ~AA0 | 48 |
| 2.19 ~AA1 | 49 |
| 2.20 ~AA2 | 50 |
| 2.21 ~AA3EVV | 51 |
| 2.22 ~AA4V | 53 |
| 2.23 ~AA5V | 55 |
| 3. Application Note..... | 57 |
| 3.1 INIT* pin Operation | 57 |
| 3.2 Module Status | 57 |
| 3.3 Dual Watchdog Operation | 58 |
| 3.4 Reset Status..... | 58 |
| 3.5 Digital Output | 58 |
| 3.6 Latch Digital Input | 59 |
| 4 DN Module..... | 60 |
| 4.1 DN-SSR4 | 60 |
| 4.2 DN-PR4 | 61 |
| 4.3 RM-104, RM-108, RM-116 | 62 |
| 4.4 RM-204, RM-208, RM-216 | 63 |
| 4.5 Application | 64 |

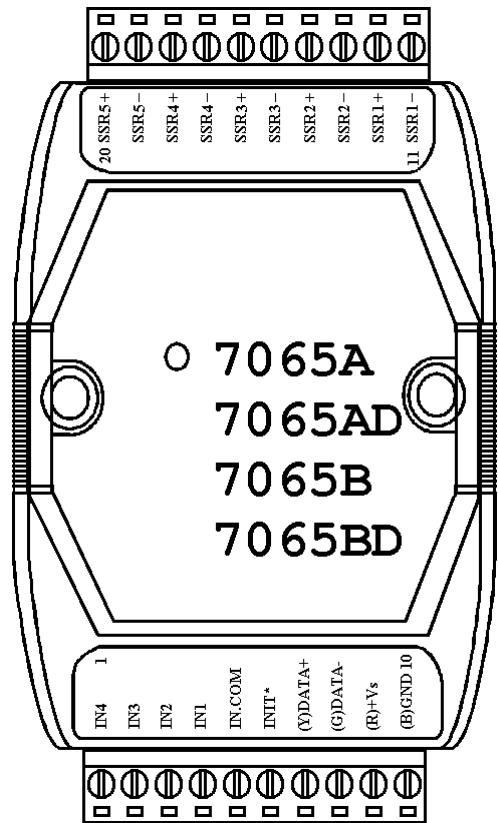
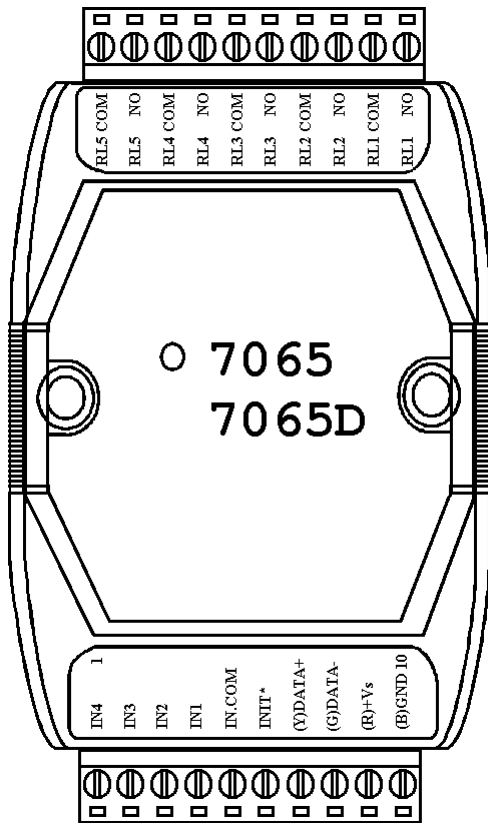
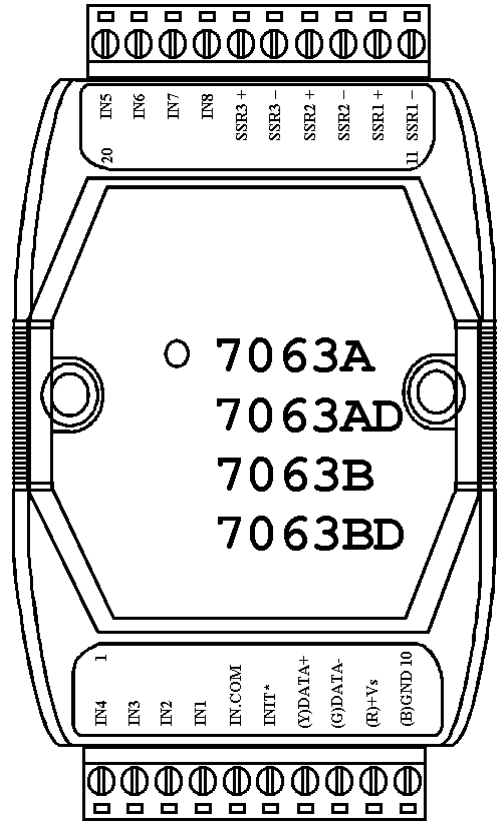
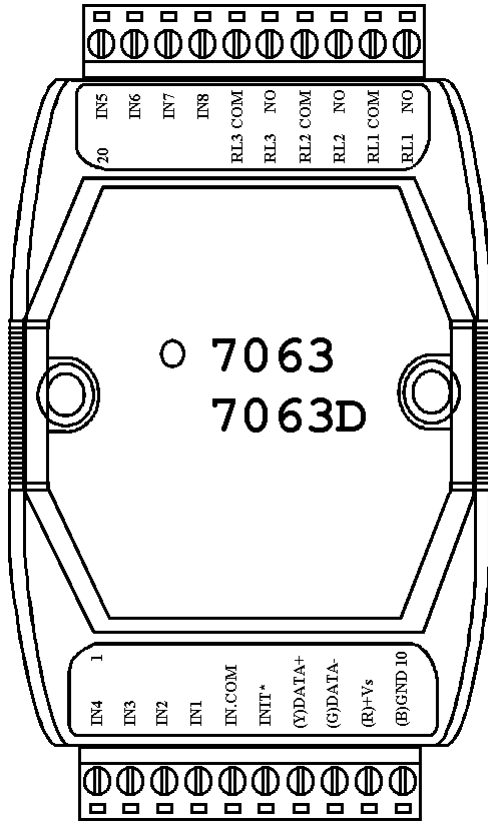
1. Introduction

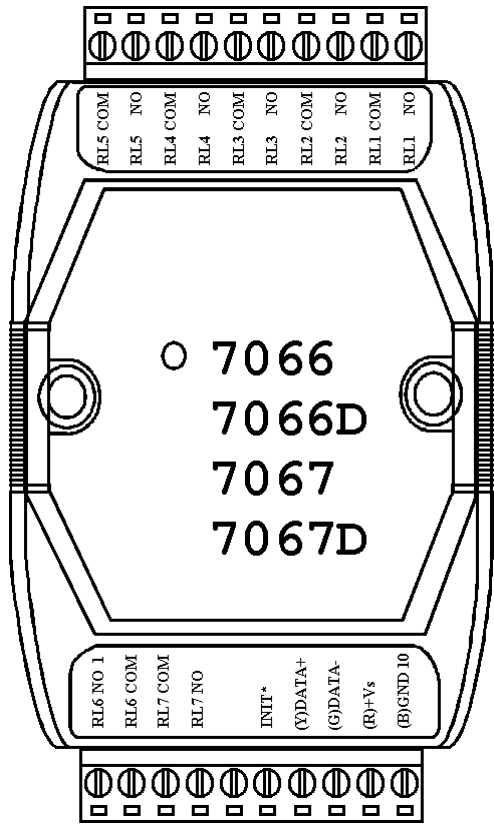
CB-7000 is a family of network data acquisition and control modules. They provide analog-to-digital, digital-to-analog, digital input/output, timer/counters and other functions. These modules can be remotely controlled by a set of commands. The DIO modules support TTL signals, photo-isolated digital inputs, relay contact outputs, solid-state relay outputs, PhotoMOS outputs, and open-collector outputs. Refer to *Sec. 1.3* for detailed information.

1.1 Pin Assignments









1.2 Specifications

| Digital Input Modules | | | |
|-----------------------|-------------------------------|------------------------------------|-------------------------------|
| | I-7041/41D | I-7052/52D | I-7053/53D |
| Input Channels | 14 | 8 | 16 |
| Isolation | Isolation with Common Source | 6 differential and 2 common ground | Non-Isolated |
| Isolation Voltage | 3750 Vrms | 5000 Vrms | Non-Isolated |
| Digital Level 0 | +1V max | +1V max | +2V max |
| Digital Level 1 | +4 to +30 V | +4 to +30 V | +4 to +30 V |
| Input Impedance | 3K ohms | 3K ohms | 820 ohms |
| Power Input | +10 to +30 VDC | | |
| Power Consumption | 0.2W(I-7041) 0.9W(I-7041D) | 0.2W(I-7052) 0.6W(I-7052D) | 0.7W(I-7053) 0.9W(I-7053D) |

| PhotoMOS Output Module | |
|------------------------|-------------------------------|
| | I-7066/66D |
| Output Channels | 7 |
| Load Current | 0.13A |
| Load Voltage | 350V max |
| Isolation Voltage | 5000VAC |
| TurnOn Time | 0.7mS typ |
| TurnOff Time | 0.05mS typ |
| Power Input | +10 to +30 VDC |
| Power Consumption | 0.5W(I-7066) 0.8W(I-7066D) |

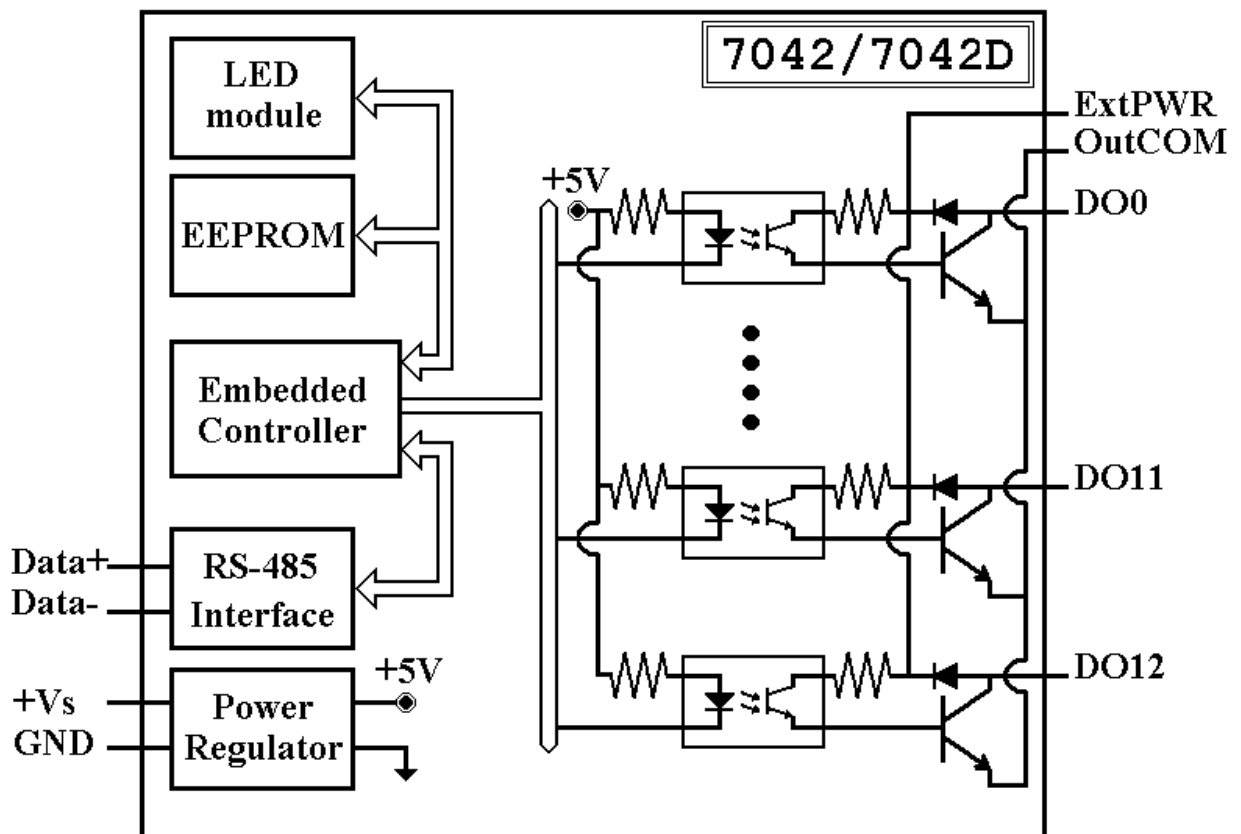
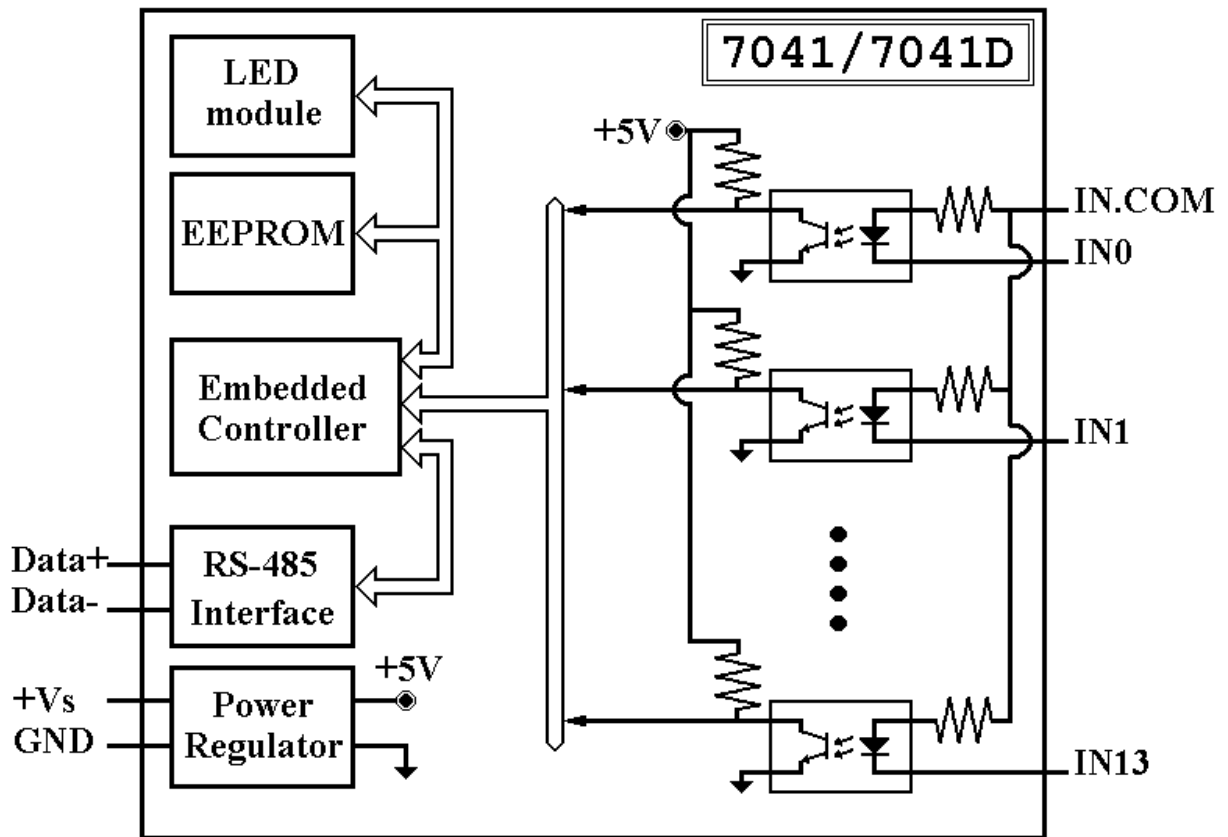
| Open Collector Output Modules | | | | |
|-------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| | I-7042 I-7042D | I-7043 I-7043D | I-7044 I-7044D | I-7050 I-7050D |
| Output Channels | 13 | 16 | 8 | 8 |
| Isolation | Isolation with Common Power | Non-Isola- tion | Isolation with Common Power | Non-Isola- tion |
| Isolation Voltage | 3750 Vrms | | 3750 Vrms | |
| Load Voltage | Max +30V | | | |
| Max Load Current | 100mA | | 375mA | 30mA |
| Input Channels | No-Inputs | | 4 | 7 |
| Isolation | | | Isolation with Common Source | Non-Isola- tion |
| Isolation Voltage | | | 3750 Vrms | |
| Digital Level 0 | | | 1V max | 1V max |
| Digital Level 1 | | | 4 to 30V | 3.5 to 30V |
| Input Impedance | | | 3K ohms | |
| Power Input | | | +10 to +30 VDC | |
| Power Consumption | 1.0W (I-7042) 1.7W (I-7042D) | 0.4W (I-7043) 1.1W (I-7043D) | 1.0W (I-7044) 1.7W (I-7044D) | 0.4W (I-7050) 1.1W (I-7050D) |

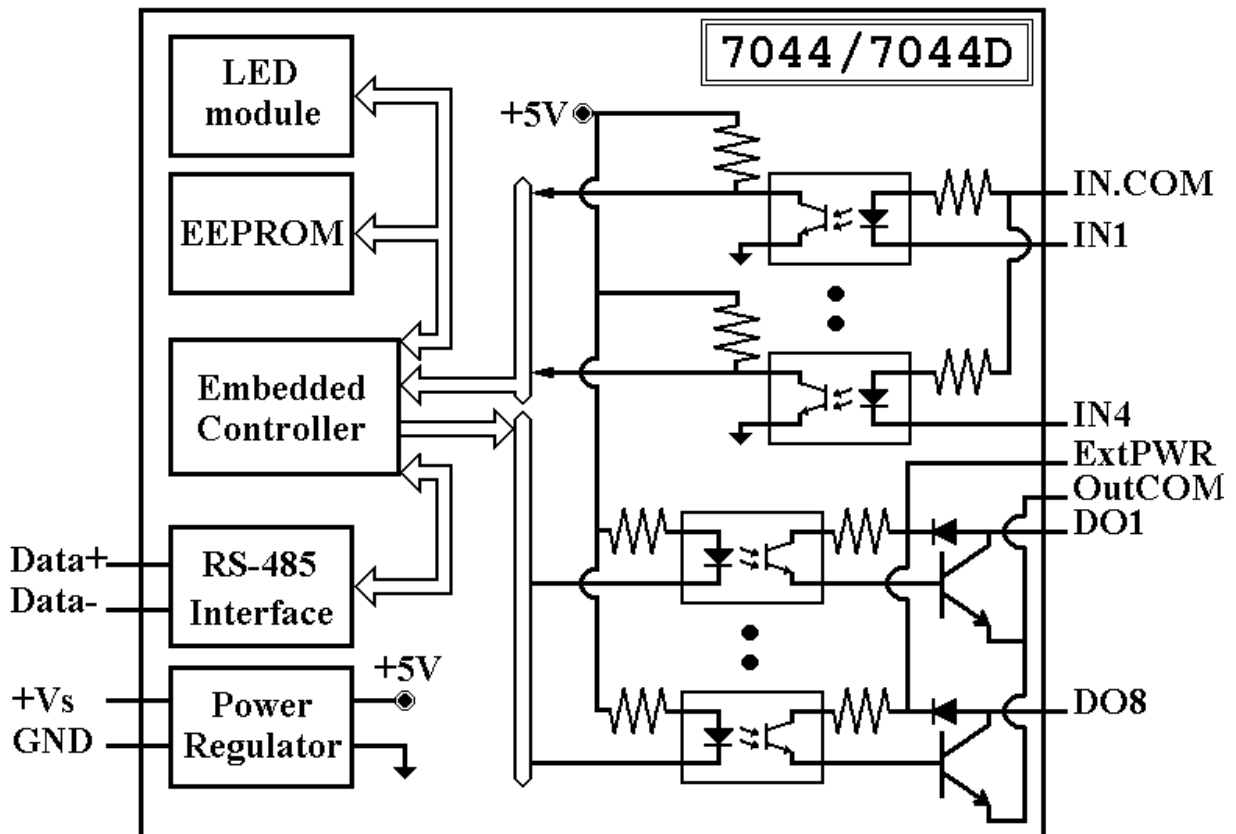
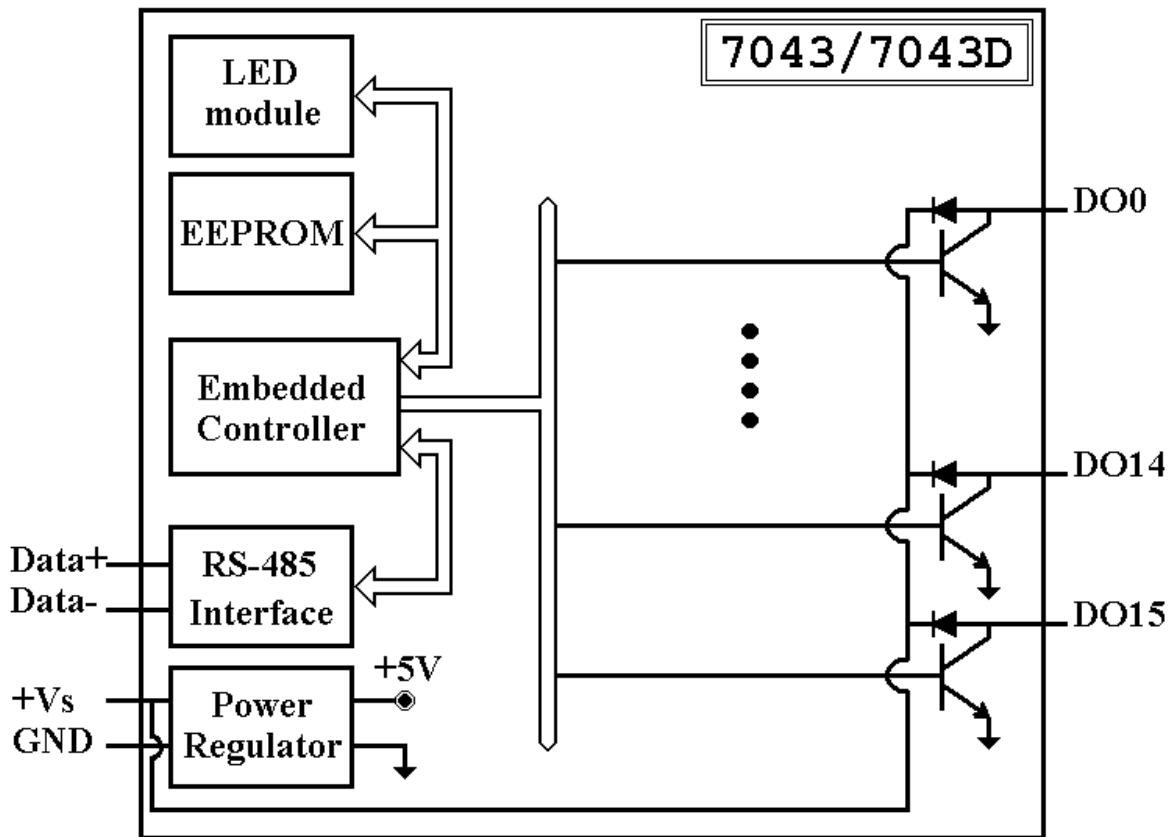
| Relay Output Modules | | | | |
|----------------------|--|---------------------------------------|---------------------------------------|---------------------------------------|
| | I-7060 I-7060D | I-7063 I-7063D | I-7065 I-7065D | I-7067 I-7067D |
| Output Channels | 4 | 3 | 5 | 7 |
| Relay Type | RL1, RL2 : Form A RL3, RL4 : Form C | Form A | Form A | Form A |
| Contact Rating | 0.6A @125VAC 2A @30VDC | 5A@250VAC 5A@30VDC | | 0.5A @120VAC 1.0A @24VDC |
| Surge Strength | 500V | 4000V | | 1500V |
| Operate Time | 3mS | 6mS Max. | | 5mS Max. |
| Release Time | 2mS | 3mS Max. | | 2mS Max. |
| Min. Life | 5*10 ⁵ ops. | 10 ⁵ ops. | | 10 ⁵ ops. |
| Input Channels | 4 | 8 | 4 | No input |
| Isolation | Isolation with Common Source | | | |
| Isolation Voltage | 3750Vrms | | | |
| Digital Level 0 | +1V max | | | |
| Digital Level 1 | +4 to +30 V | | | |
| Input Impedance | 3K ohms | | | |
| Power Input | +10 to +30 VDC | | | |
| Power Consumption | 1.3W (I-7060) 1.9W (I-7060D) | 1.0W (I-7063) 1.5W (I-7063D) | 1.3W (I-7065) 2.2W (I-7065D) | 1.5W (I-7067) 2.2W (I-7067D) |

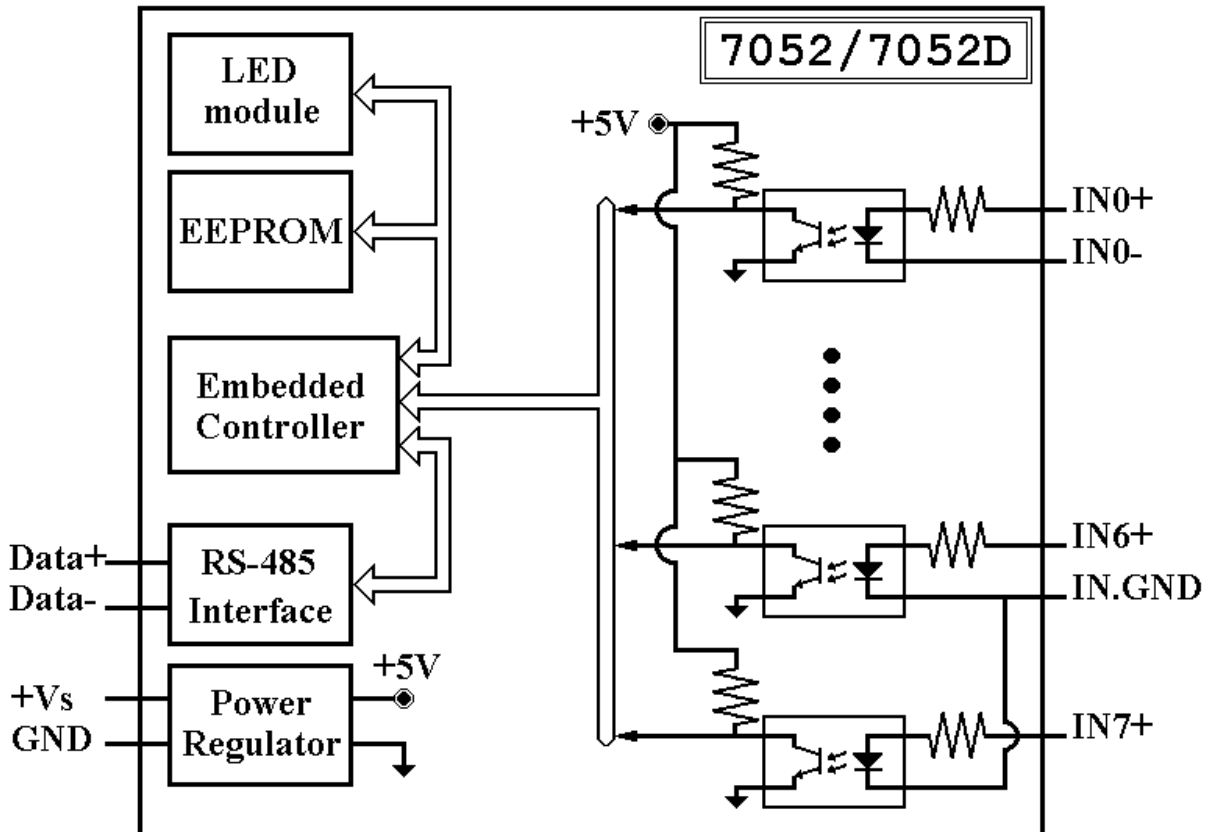
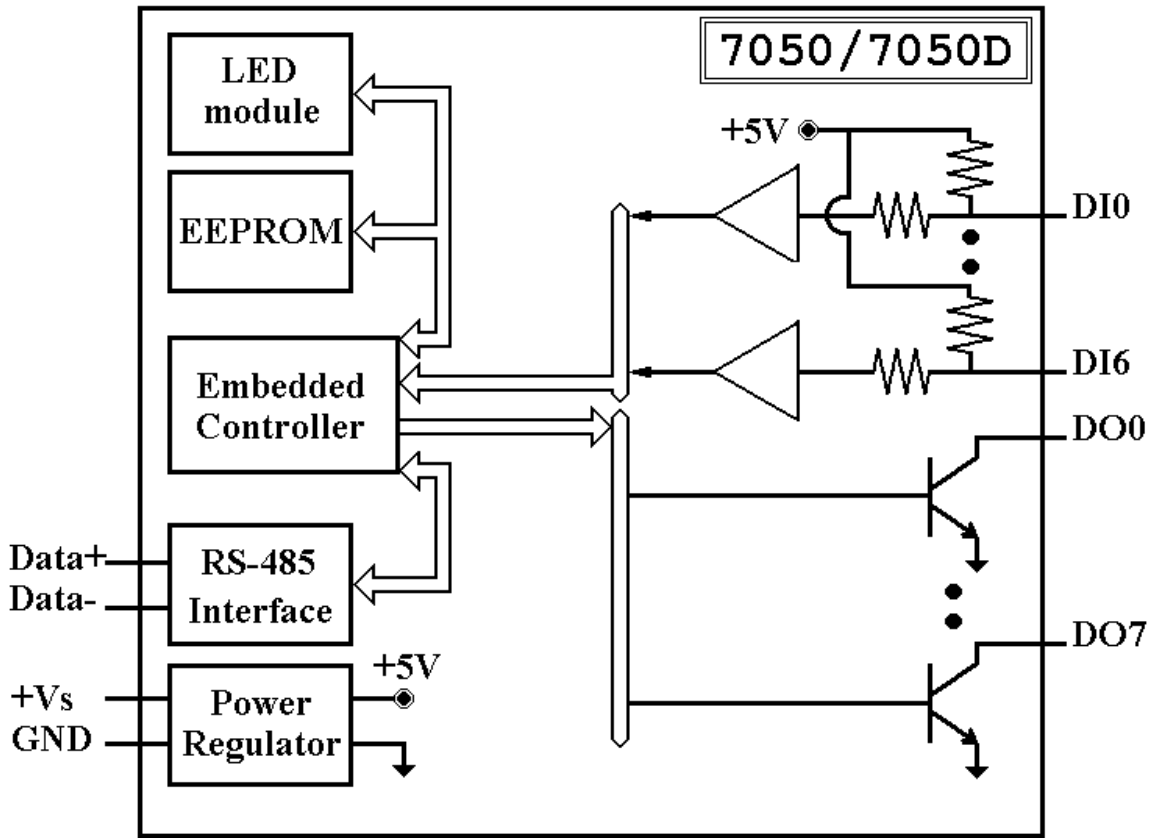
| Solid-State Relay Output Modules | | | | |
|----------------------------------|---|---|---|---|
| | I-7063A I-7063AD | I-7065A I-7065AD | I-7063B I-7063BD | I-7065B I-7065BD |
| Output Channels | 3 | 5 | 3 | 5 |
| SSR Type | AC-SSR, Normal Open | | DC-SSR, Normal Open | |
| Load Voltage Range | 24 to 265 Vrms | | 3 to 30 VDC | |
| Leakage Current | 1.5 mArms | | 0.1 mA | |
| Max Load Current | 1.0 Arms | | 1.0 A | |
| Min. Operate Time | 1mS | | | |
| Min. Release Time | 1/2 cycle + 1mS | | 1mS | |
| Dielectric Strength | 2500 Vrms | | | |
| Input Channels | 8 | 4 | 8 | 4 |
| Isolation | Isolation with Common Source | | | |
| Isolation Voltage | 3750Vrms | | | |
| Digital Level 0 | +1V max | | | |
| Digital Level 1 | +4 to +30 V | | | |
| Input Impedance | 3K ohms | | | |
| Power Input | +10 to +30 VDC | | | |
| Power Consumption | 0.7W (I-7063A) 1.5W (I-7063AD) | 0.8W (I-7065A) 1.6W (I-7065AD) | 0.6W (I-7063B) 1.4W (I-7063BD) | 0.7W (I-7065B) 1.5W (I-7065BD) |

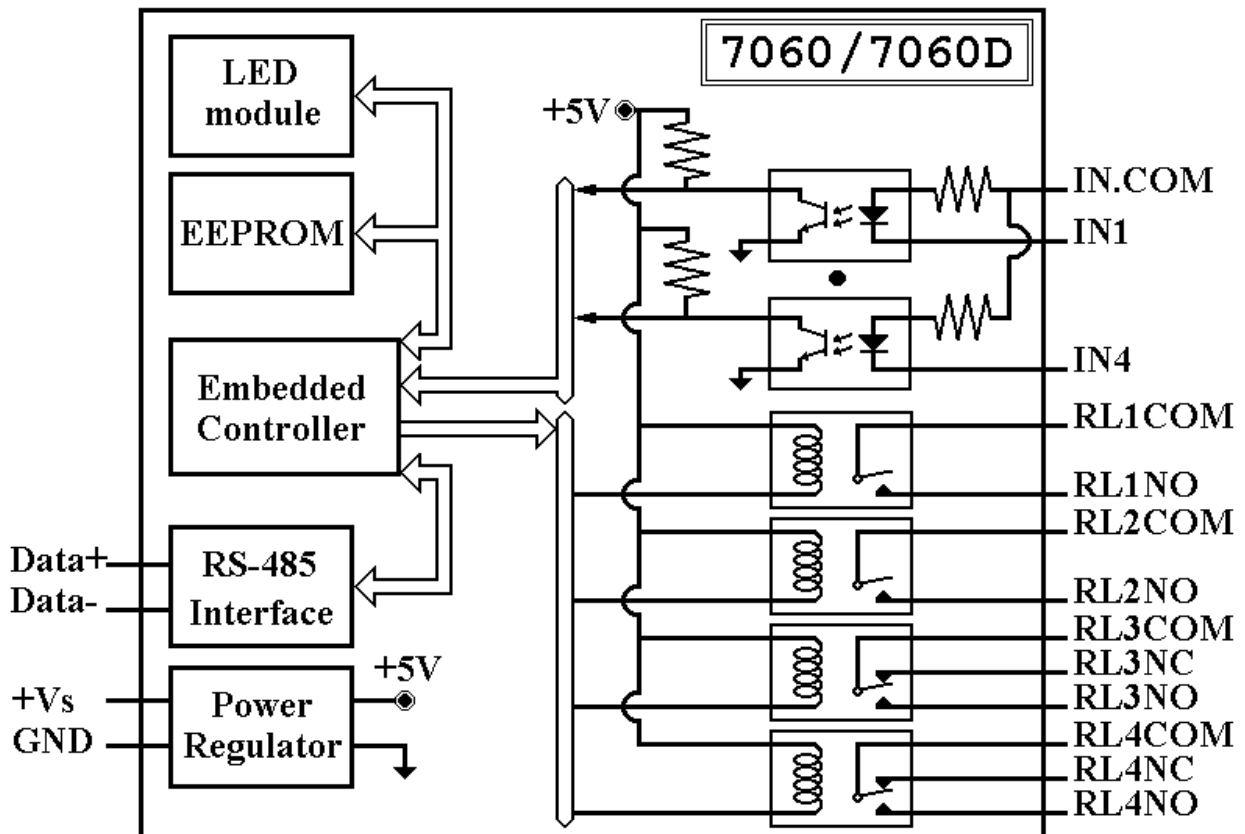
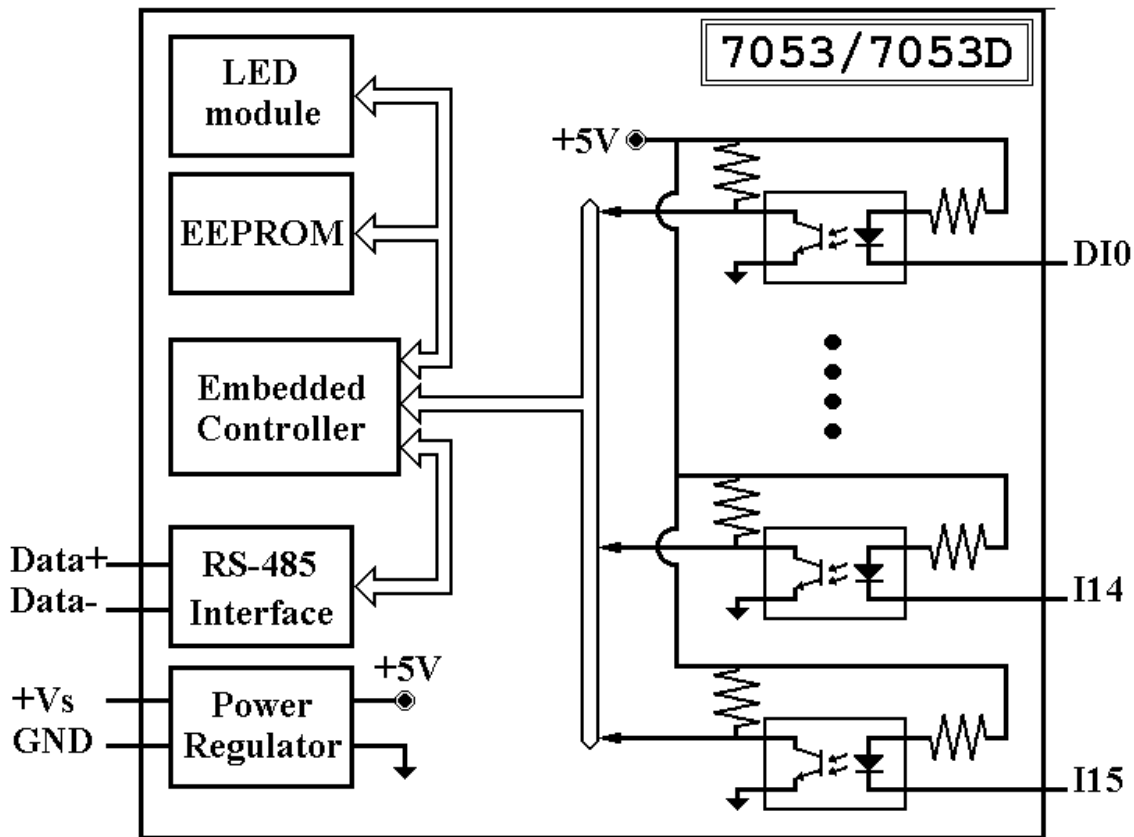
Note: Model numbers “I-nnnn” and model numbers “CB-nnnn” are identical.

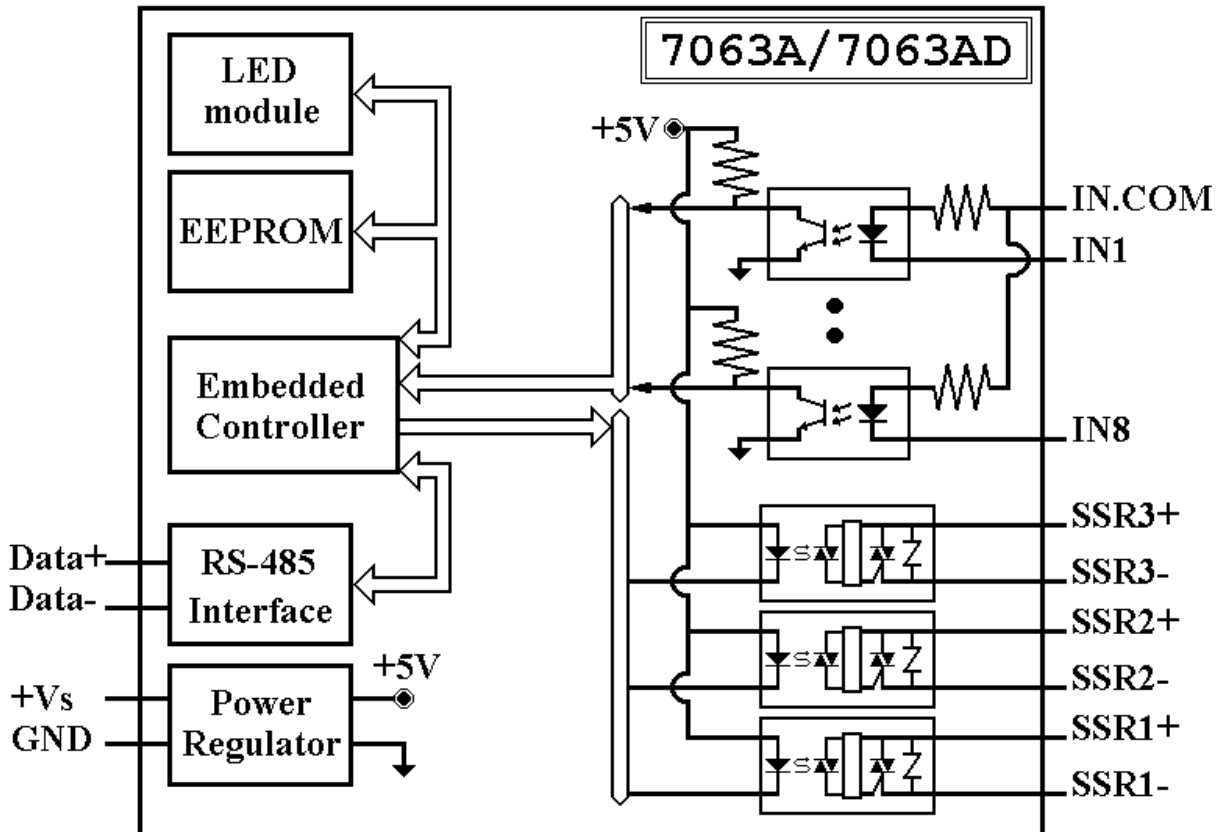
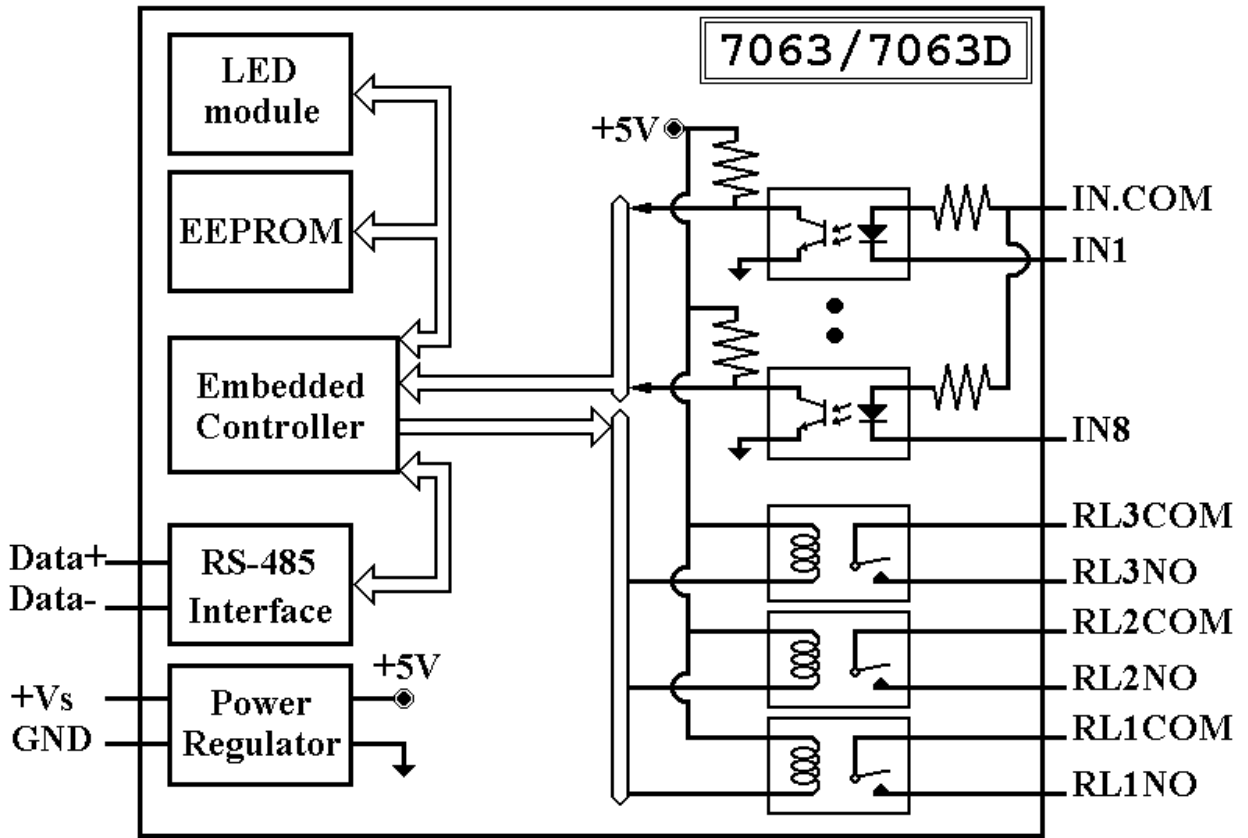
1.3 Block Diagrams

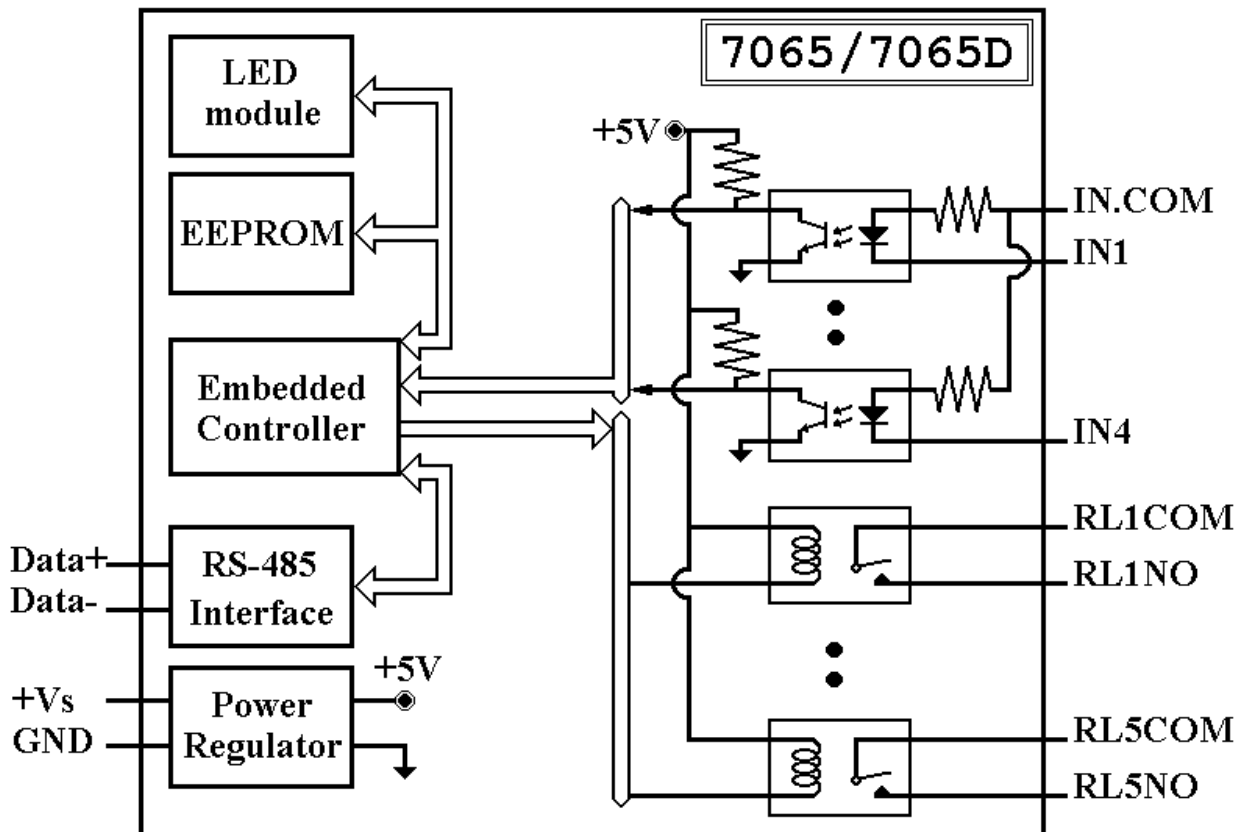
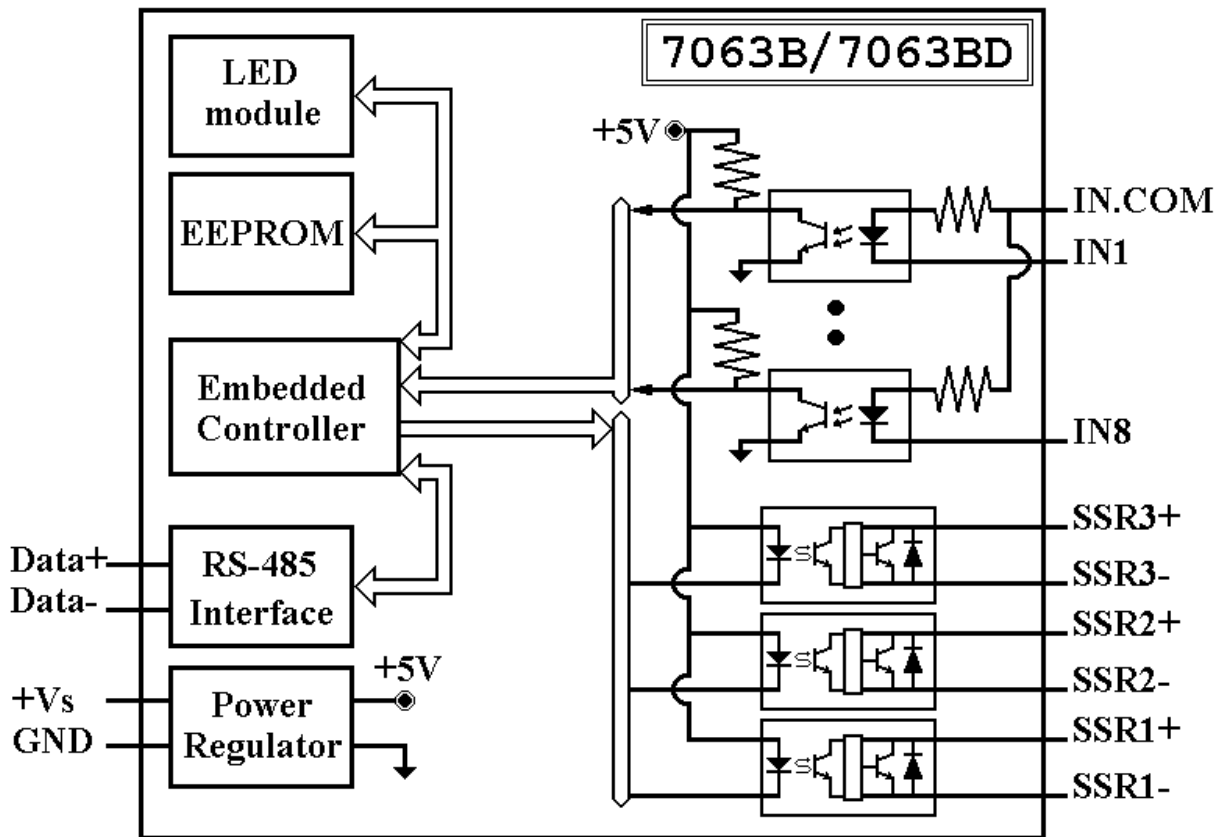


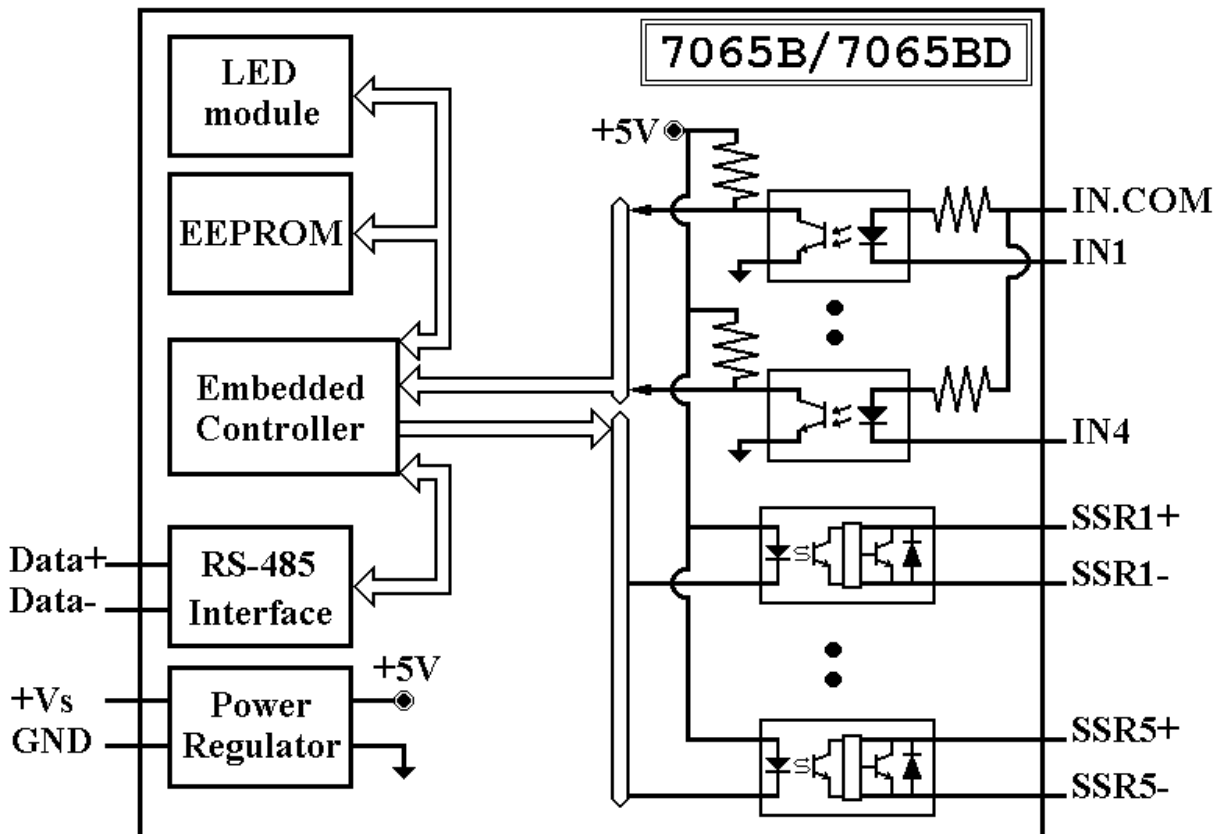
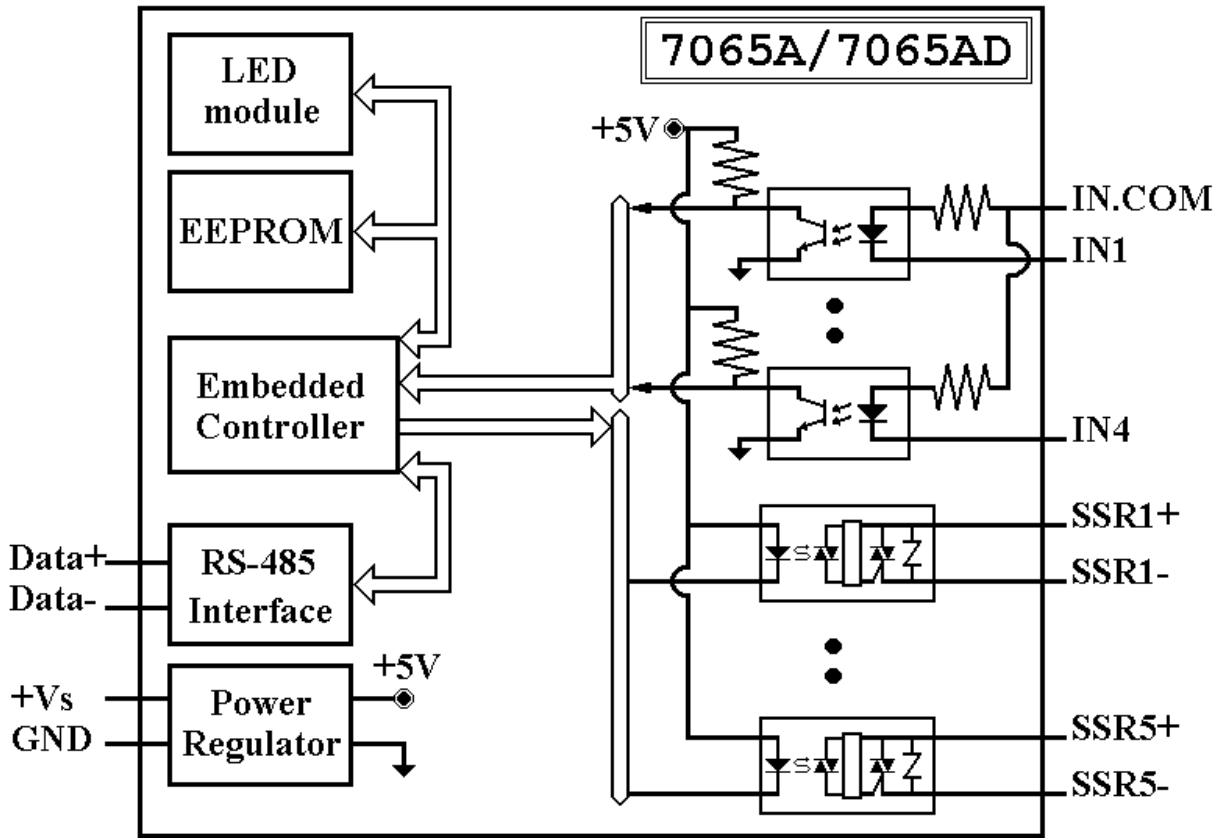


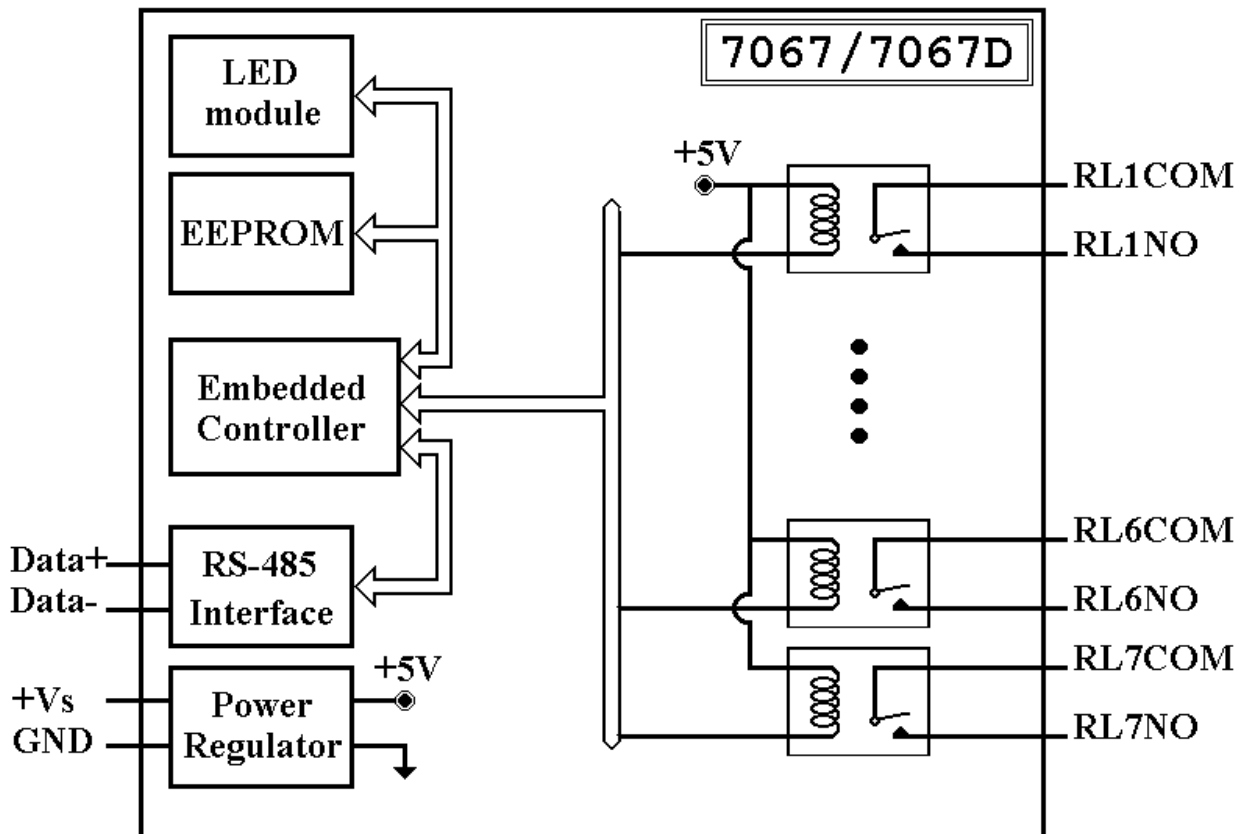
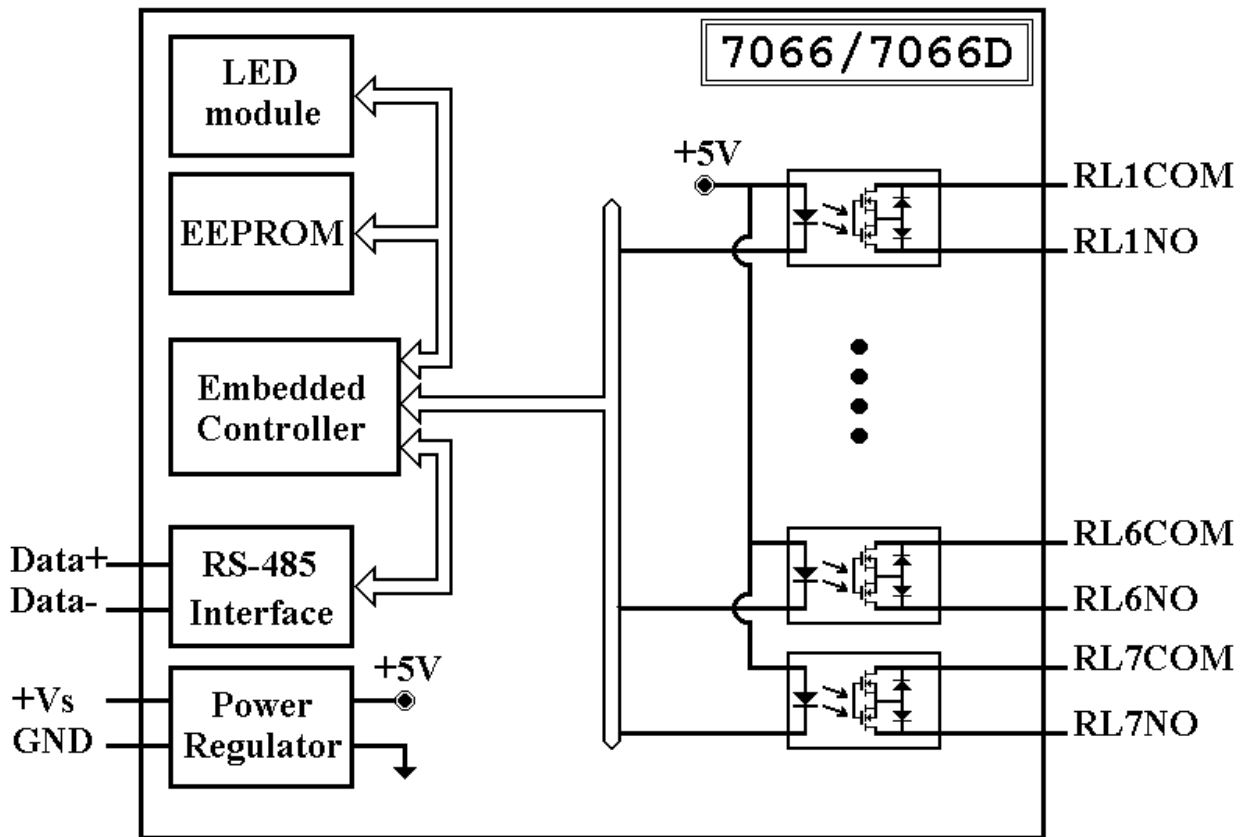








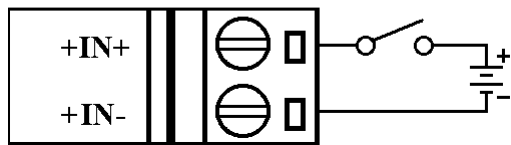
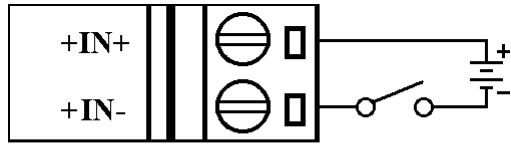




1.4 Connections

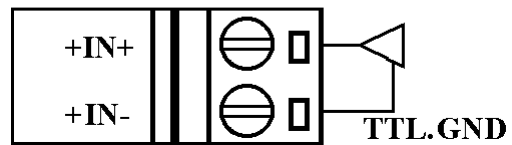
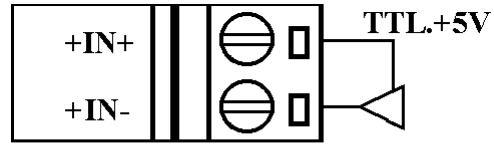
Dry Contact signal input

CB-7052/52D

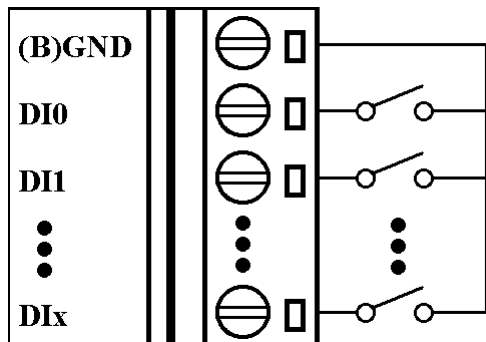


TTL/CMOS signal input

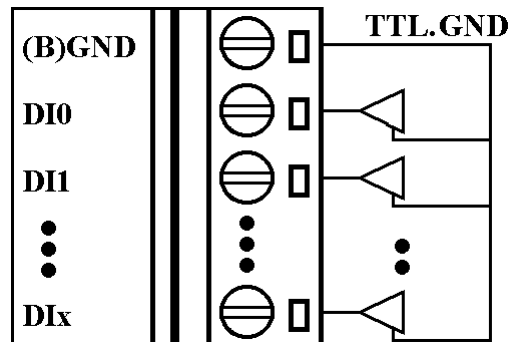
CB-7052/52D



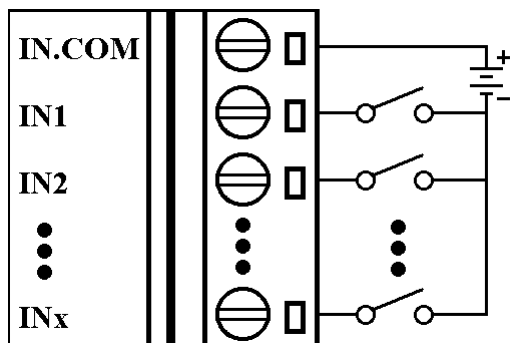
CB-7050/50D/53/53D



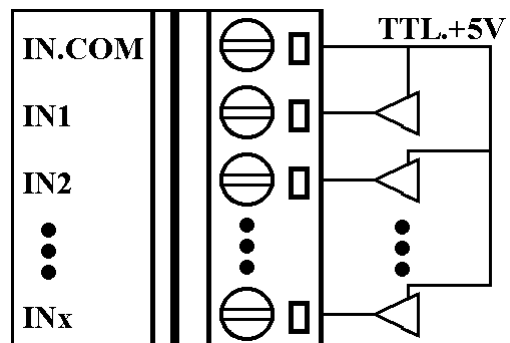
CB-7050/50D/53/53D



CB-7041/41D/44/44D/60/60D/
63/63D/63A/63AD/63B/63BD/
65/65D/65A/65AD/65B/65BD

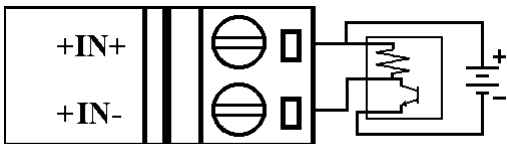
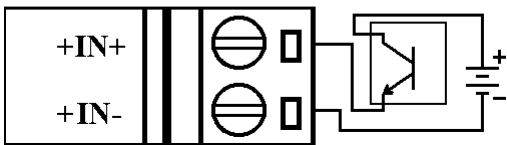
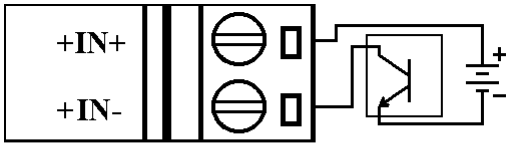


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65/65D/65A/65AD/65B/65BD

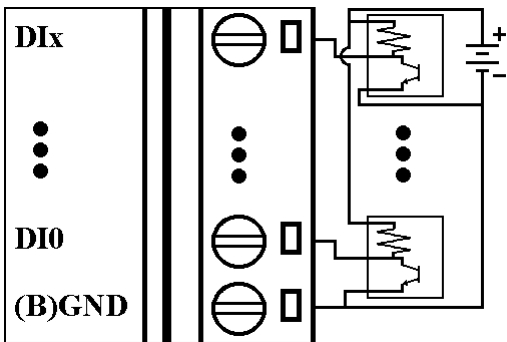
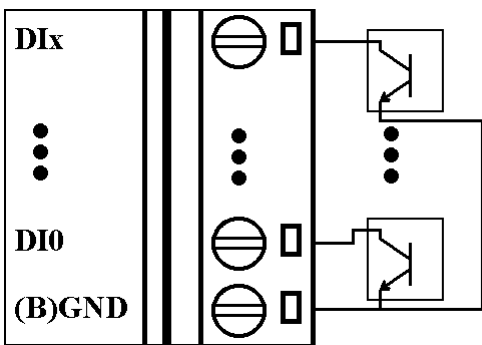


Open Collector signal input

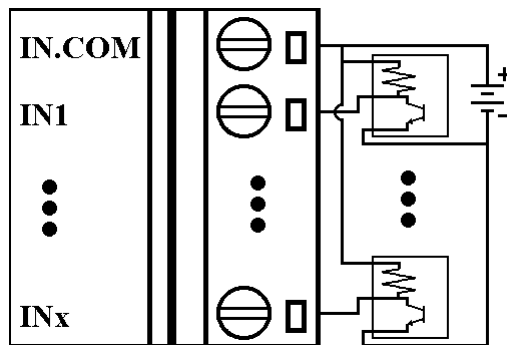
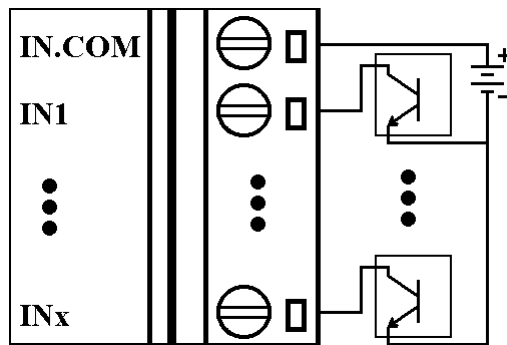
CB-7052/52D



CB-7050/50D/53/53D



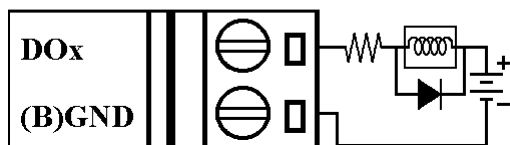
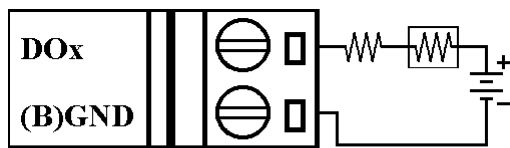
CB-7041/41D/44/44D/60/60D/
63/63D/63A/63AD/63B/63BD/
65/65D/65A/65AD/65B/65BD



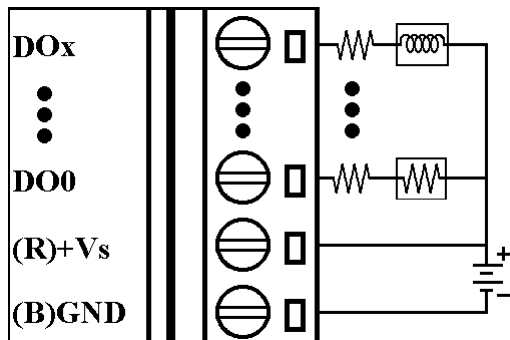
Open Collector output

CB-7050/50D

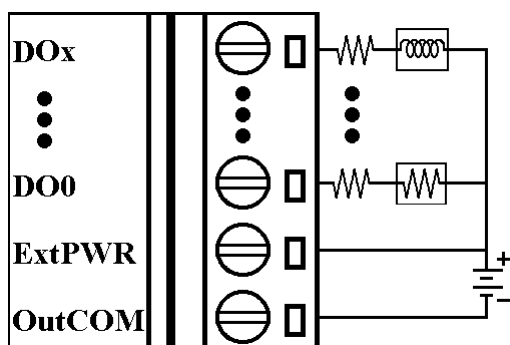
Note: When connecting inductive loads (for example, a relay), install a diode to prevent counter EMF kickback.



CB-7043/43D



CB-7042/42D/44/44D



1.5 Quick Start

Refer to “CBCOM Series Network Setup and Quick Start Manual” and “Getting Started” for details.


1.6 Default Setting

Default setting for CB-7000 DIO modules:

- Address: 01
- Baud rate: 9600 bps
- Type: Type 40 for DIO mode
- Checksum Disable
- CB-7043/43D jumper setting at INIT*
- CB-7053/53D jumper setting at INIT*

1.7 Jumper Setting

CB-7043/43D: Jumper J3 for select the pin INIT*/DO15

Select DO15 DO15  INIT*

Select INIT* DO15  INIT* (default)

CB-7053/53D: Jumper J1 for select the pin INIT*/DI15

Select DI15 DI15  INIT*

Select INIT* DI15  INIT* (default)

1.8 Configuration Tables

Configuration Table of CB-7000 DIO modules

Baud rate Setting (CC)

| Code | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 0A |
|----------|------|------|------|------|-------|-------|-------|--------|
| Baudrate | 1200 | 2400 | 4800 | 9600 | 19200 | 38400 | 57600 | 115200 |

Type Setting (TT)

Type = **40** for DIO mode

Data Format Setting (FF)

| | | | | | | | |
|----|----|---|---|---|----|---|---|
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| *1 | *2 | 0 | 0 | 0 | *3 | | |

*1: Counter Update Direction: 0=Falling Edge, 1=Rising Edge

*2: Checksum Bit: 0=Disable, 1=Enable

*3: 7050 = 0 (Bit[2.1.0] = 000), 7060 = 1 (Bit[2.1.0] = 001)

7052 = 2 (Bit[2.1.0] = 010), 7053 = 3 (Bit[2.1.0] = 011)

Read Digital Input/Output Data Format

Data of \$AA6,\$AA4,\$AALS: (First Data)(Second Data)00

Data of @AA: (First Data)(Second Data)

| | First Data | | Second Data | |
|---|------------|----------|-------------|----------|
| I-7041/41D | DI(8-13) | 00 to 3F | DI(0-7) | 00 to FF |
| I-7042/42D | DO(8-12) | 00 to 1F | DO(0-7) | 00 to FF |
| I-7043/43D | DO(8-15) | 00 to FF | DO(0-7) | 00 to FF |
| I-7044/44D | DO(1-8) | 00 to FF | DI(1-4) | 00 to 0F |
| I-7050/50D | DO(0-7) | 00 to FF | DI(0-6) | 00 to 7F |
| I-7052/52D | DI(0-7) | 00 to FF | 00 | 00 |
| I-7053/53D | DI(8-15) | 00 to FF | DI(0-7) | 00 to FF |
| I-7060/60D | DO(1-4) | 00 to 0F | DI(1-4) | 00 to 0F |
| I-7063s *1 | DO(1-3) | 00 to 07 | DI(1-8) | 00 to FF |
| I-7065s *2 | DO(1-5) | 00 to 1F | DI(1-4) | 00 to 0F |
| I-7066/66D | DO(1-7) | 00 to 7F | 00 | 00 |
| I-7067/67D | DO(1-7) | 00 to 7F | 00 | 00 |
| *1 I-7063s include : I-7063/63D/63A/63AD/63B/63BD | | | | |
| *2 I-7065s include : I-7065/65D/65A/65AD/65B/65BD | | | | |

2. Commands

Command Format: **(Leading)(Address)(Command)[CHK](cr)**

Response Format: **(Leading)(Address)(Data)[CHK](cr)**

[CHK] 2-character checksum

(cr) end-of-Command character, character return(0x0D)

Calculate Checksum:

1. Calculate ASCII sum of all characters of command (or response) string except the carriage return (cr).
2. Mask the sum of string with 0ffh.

Example:

Command string: \$012(cr)

Sum of string = '\$'+ '0'+ '1'+ '2' = 24h+30h+31h+32h = B7h

The checksum is B7h, and [CHK] = "B7"

Command string with checksum: \$012B7(cr)

Response string: !01400600(cr)

Sum of string: '!'+ '0'+ '1'+ '4'+ '0'+ '0'+ '6'+ '0'+ '0'

= 21h+30h+31h+34h+30h+30h+36h+30h+30h = 1ACh

The checksum is ACh, and [CHK] = "AC"

Response string with checksum: !01400600AC(cr)

| General Command Sets | | | |
|-----------------------------|-----------------|-----------------------------|-----------------|
| Command | Response | Description | Section |
| %AANN TTCCFF | !AA | Set Module Configuration | <i>Sec.2.1</i> |
| *** | No Response | Synchronized Sampling | <i>Sec.2.2</i> |
| #AABBDD | > | Digital Output | <i>Sec.2.3</i> |
| #AAN | !AA(Data) | Read Digital Input Counter | <i>Sec.2.4</i> |
| \$AA2 | !AATTCFF | Read Configuration | <i>Sec.2.5</i> |
| \$AA4 | !S(Data) | Read Synchronized Data | <i>Sec.2.6</i> |
| \$AA5 | !AAS | Read Reset Status | <i>Sec.2.7</i> |
| \$AA6 | !(Data) | Read Digital I/O Status | <i>Sec.2.8</i> |
| \$AAF | !AA(Data) | Read Firmware Version | <i>Sec.2.9</i> |
| \$AAM | !AA(Data) | Read Module Name | <i>Sec.2.10</i> |
| \$AAC | !AA | Clear Latched Digital Input | <i>Sec.2.11</i> |
| \$AACN | !AA | Clear Digital Input Count | <i>Sec.2.12</i> |
| \$AALS | !(Data) | Read Latched Digital Input | <i>Sec.2.13</i> |
| @AA | >(Data) | Read Digital Input | <i>Sec.2.14</i> |
| @AA(Data) | > | Set Digital Output | <i>Sec.2.15</i> |
| ~AAO(Data) | !AA | Set Module Name | <i>Sec.2.16</i> |

| Host Watchdog Command Sets | | | |
|-----------------------------------|-----------------|----------------------------------|-----------------|
| Command | Response | Description | Section |
| ~** | No Response | Host OK | <i>Sec.2.17</i> |
| ~AA0 | !AASS | Read Module Status | <i>Sec.2.18</i> |
| ~AA1 | !AA | Reset Module Status | <i>Sec.2.19</i> |
| ~AA2 | !AAVV | Read Host Watchdog Timeout Value | <i>Sec.2.20</i> |
| ~AA3EVV | !AA | Set Host Watchdog Timeout Value | <i>Sec.2.21</i> |
| ~AA4V | !AA(Data) | Read PowerOn/Safe Value | <i>Sec.2.22</i> |
| ~AA5V | !AA | Set PowerOn/Safe Value | <i>Sec.2.23</i> |

2.1 %AANNTCCFF

Description: Set module Configuration

Syntax: %AANNTCCFF[CHK](cr)

| | |
|----|---|
| % | Delimiter character |
| AA | Address of setting module (00 to FF) |
| NN | New Address for setting module (00 to FF) |
| TT | Type 40 for DIO module |
| CC | New baud rate for setting module (Ref. <i>Sec. 1.9</i>). Short INIT* to ground when changing baud rate. (Ref <i>Sec. 3.1</i>) |
| FF | New data format for setting module (Ref. <i>Sec. 1.9</i>). Short the INIT* to ground to change checksum setting. (Ref. <i>Sec. 3.1</i>) |

Response: Valid Command: !**AA**[CHK](cr)

Invalid Command: ?**AA**[CHK](cr)

Syntax or communication error may get no response.

! Delimiter for valid Command

? Delimiter for invalid Command

AA Address of response module(00 to FF)

Example:

Command: %0102400600 Receive: !02

Set module Address 01 to 02; return successful.

Related Command:

Sec. 2.5 \$AA2

Related Topics:

Sec. 1.9 Configuration Tables, Sec. 3.1 INIT pin Operation*

2.2 #**

Description: Synchronized Sampling

Syntax: #**[CHK](cr)

Delimiter character

** Synchronized sampling Command

Response: No response

Example:

Command: #** No response

Send synchronized sampling Command to all modules.

Command: \$014 Receive: !10F0000

Read synchronized data from Address 01, return S=1, first read and data.

Command: \$014 Receive: !00F0000

Read synchronized data from Address 02, return S=0, have read data.

Related Command:

Sec. 2.6 \$AA4

2.3 #AABBDD

Description: Digital Output

Command: #AABBDD[CHK](cr)

Delimiter character

AA Address of reading module(00 to FF)

BBDD Output command and parameter

For multichannel outputs, set BB = 00, 0A, or 0B. It selects the output group. DD is the output value.

| Parameter for Multi-Channel Output | | | | | |
|---|-----------------|------------------------|---------|----------|----------|
| | Output Channels | DD for command #AABBDD | | | |
| | | BB=00/0A | | BB=0B | |
| I-7042/42D | 13 | 00 to FF | DO(0-7) | 00 to 1F | DO(8-12) |
| I-7043/43D | 16 | 00 to FF | DO(0-7) | 00 to FF | DO(8-15) |
| I-7044/44D | 8 | 00 to FF | DO(1-8) | NA | NA |
| I-7050/50D | 8 | 00 to FF | DO(0-7) | NA | NA |
| I-7060/60D | 4 | 00 to 0F | RL(1-4) | NA | NA |
| I-7063s ^{*1} | 3 | 00 to 07 | RL(1-3) | NA | NA |
| I-7065s ^{*2} | 5 | 00 to 1F | RL(1-5) | NA | NA |
| I-7066/66D | 7 | 00 to 7F | RL(1-7) | NA | NA |
| I-7067/67D | 7 | 00 to 7F | RL(1-7) | NA | NA |
| *1 I-7063s include : I-7063/63D/63A/63AD/63B/63BD | | | | | |
| *2 I-7065s include : I-7065/65D/65A/65AD/65B/65BD | | | | | |

To output a single-channel, set BB = 1c, Ac, or Bc where c is the selected channel. Set DD to 00 to clear output and 01 to set the output.

Assume module is CB-7067, set Address 02 channel 0 on, return is successful.

Command: #021701

Receive: ?

Set Address 02 channel 7 on, return the channel is invalid for CB-7067; it only has seven outputs (0 to 6).

Command: #0300FF

Receive: !

Set Address 03 output value FF, return ignore. The module's host watchdog timeout status is set, and the output is set to Safe Value.

Related Command:

Sec. 2.15 @AA(Data), Sec. 2.18 ~AA0, Sec. 2.19 ~AA1

Related Topics:

Sec. 1.9 Configuration Tables, Sec. 3.2 Module Status, Sec. 3.3 Dual Watchdog Operation

Note:

The Command is not for CB-7041/41D/52/52D/53/53D.

2.8 \$AA6

Description: Read Digital I/O Status

Command: \$AA6[CHK](cr)

\$ Delimiter character

AA Address of reading module (00 to FF)

6 Command for read digital input/output status

Response: Valid Command: !(Data)[CHK](cr)

Invalid Command: ?AA[CHK](cr)

Syntax or communication error may get no response.

! Delimiter for valid Command

? Delimiter for invalid Command

AA Address of response module(00 to FF)

(Data) Digital input/output value (Ref. *Sec. 1.9*)

Example:

Command: \$016

Receive: !0F0000

Assume module is CB-7060. Read Address 01 DIO status, return 0F00; digital input IN1 to IN4 are open, digital output RL1 to RL4 are off.

Related Command:

Sec. 2.14, @AA

Related Topics:

Sec. 1.9, Configuration Tables

2.11 \$AAC

Description: Clear Latched Digital Input

Command: \$AAC[CHK](cr)

\$ Delimiter character

AA Address of setting module (00 to FF)

C Command for clear latched digital input

Response: Valid Command: !AA[CHK](cr)

Invalid Command: ?AA[CHK](cr)

Syntax or communication error may get no response.

! Delimiter for valid Command

? Delimiter for invalid Command

AA Address of response module(00 to FF)

Example:

Command: \$01L0 Receive: !01FFFF00

Read Address 01 latch-low data, return FFFF.

Command: \$01C Receive: !01

Clear Address 01 latched data, return successful.

Command: \$01L0 Receive: !01000000

Read Address 01 latch-low data, return 0000.

Related Command:

Sec. 2.13, \$AALS

Note:

The Command is not for CB-7042/42D/43/43D/66/66D/67/67D.

2.12 \$AACN

Description: Clear Digital Input Counter

Command: \$AACN[CHK](cr)

\$ Delimiter character

AA Address of setting module (00 to FF)

C Command for clear digital input counter

N Digital counter channel N to clear

Response: Valid Command: !AA[CHK](cr)

Invalid Command: ?AA[CHK](cr)

Syntax or communication error may get no response.

! Delimiter for valid Command

? Delimiter for invalid Command

AA Address of response module(00 to FF)

Example:

Command: #010 Receive: !0100123

Read Address 01 input channel 0 counter value, return 123.

Command: \$01C0 Receive: !01

Clear Address 01 input channel 0 counter value, return successful.

Command: #010 Receive: !0100000

Read Address 01 input channel 0 counter value, return 0.

Related Command:

Sec. 2.4, #AAN

Note:

The Command is not for CB-7042/42D/43/43D/66/66D/67/67D.

2.13 \$AALS

Description: Read Latched Digital Input

Command: \$AALS[CHK](cr)

\$ Delimiter character

AA Address of reading module (00 to FF)

L Command for reading latched digital input

S 1 = select latched high status, 0 = select latched low

Response: Valid Command: !(Data)[CHK](cr)

Invalid Command: ?AA[CHK](cr)

Syntax or communication error may get no response.

! Delimiter for valid Command

? Delimiter for invalid Command

AA Address of response module(00 to FF)

(Data) read status (Ref. Sec. 1.9) 1= the input channel is latched,
0=the input channel is not latched.

Example:

Command: \$01L1 Receive: !012300

Read Address 01 latch-high data, return 0123.

Command: \$01C Receive: !01

Clear Address 01 latched data, return successful.

Command: \$01L1 Receive: !000000

Read Address 01 latch-high data, return 0.

Related Command:

Sec. 2.11, \$AAC

Note:

The Command is not for CB-7042/42D/43/43D/66/66D/67/67D.

2.15 @AA(Data)

Description: Set Digital Output

Command: @AA(Data)[CHK](cr)

@ Delimiter character
AA Address of setting module (00 to FF)
(Data) output value, the data format is following:
(Data) is one character for output channel less than 4
For CB-7060/60D, from 0 to F
For CB-7063/63D/63A/63AD/63B/63BD, from 0 to 7
(Data) is two characters for output channel less than 8
For CB-7044/44D/50/50D, from 00 to FF
For CB-7065/65D/65A/65AD/65B/65BD, from 00 to 1F
For CB-7066/66D/67/67D, from 00 to 7F
(Data) is four characters for output channel less than 16
For CB-7042/42D, from 0000 to 1FFF
For CB-7043/43D, from 0000 to FFFF

Response: Valid Command: >[CHK](cr)

Invalid Command: ?[CHK](cr)

Ignore Command: ![CHK](cr)

Syntax or communication error may get no response.

> Delimiter for valid Command.

? Delimiter for invalid Command.

! Delimiter for ignore Command. The module is in Host Watchdog Timeout Mode, and the output is set to Safe Value.

Example:

Command: @017

Receive: >

Output Address 02 value 7, return successful.(The example is suitable for CB-7060/60D/63/63D/63A/63AD/63B/63BD)

Command: @0200 Receive: >

Output Address 01 value 00, return successful.(The example is suitable for CB-7044/44D/50/50D/65/65D/65A/65AD/65B/65BD/66/66D/67/67D)

Command: @030012 Receive: !

Output Address 03 value 0012, return the module is in host watchdog timeout mode, the output Command is ignored. (The example is suitable for CB-7042/42D/43/43D)

Related Command:

Sec. 2.3, #AABBDD; Sec. 2.18, ~AA0; Sec. 2.19, ~AA1

Related Topics:

Sec. 1.9, Configuration Tables; Set.3.2, Module Status; Sec. 3.3 Dual Watchdog Operation; Sec. 3.5, Digital Output

Note:

The Command is not for CB-7041/41D/52/52D/53/53D.

2.16 ~AAO(Data)

Description: Set Module Name

Command: ~AAO(Data)[CHK](cr)

~ Delimiter character

AA Address of setting module (00 to FF)

O Command for set module name

(Data) New name for module, max 6 characters

Response: Valid Command: !AA[CHK](cr)

Invalid Command: ?AA[CHK](cr)

Syntax or communication error may get no response.

! Delimiter for valid Command

? Delimiter for invalid Command

AA Address of response module(00 to FF)

Example:

Command: ~01O7050 Receive: !01

Set Address 01 module name 7050, return successful.

Command: \$01M Receive: !017050

Read Address 01 module name, return name 7050.

Related Command:

Sec. 2.10, \$AAM

2.18 ~AA0

Description: Read Module Status

Command: ~AA0[CHK](cr)

~ Delimiter character

AA Address of reading module (00 to FF)

0 Command for read module status

Response: Valid Command: !AASS[CHK](cr)

Invalid Command: ?AA[CHK](cr)

Syntax or communication error may get no response.

! Delimiter for valid Command

? Delimiter for invalid Command

AA Address of response module(00 to FF)

SS Module status, 00=host watchdog timeout status is clear, 04=host watchdog timeout status is set. The status will store into EEPROM and only may reset by the Command ~AA1.

Example:

Refer to *Sec. 2.21*, ~AA3EVV example.

Related Command:

Sec. 2.17, ~**;
Sec. 2.19, ~AA1;
Sec. 2.20, ~AA2;
Sec. 2.21, ~AA3EVV;
Sec. 2.22, ~AA4V;
Sec. 2.23, ~AA5V

Related Topic:

Sec. 3.2, Module Status;
Sec. 3.3, Dual Watchdog Operation

2.19 ~AA1

Description: Reset Module Status

Command: ~AA1[CHK](cr)

~ Delimiter character

AA Address of setting module (00 to FF)

1 Command for reset module status

Response: Valid Command: !AA[CHK](cr)

Invalid Command: ?AA[CHK](cr)

Syntax or communication error may get no response.

! Delimiter for valid Command

? Delimiter for invalid Command

AA Address of response module (00 to FF)

Example:

Refer to *Sec. 2.21*, ~AA3EVV example.

Related Command:

Sec. 2.17, ~**;
Sec. 2.18, ~AA0;
Sec. 2.20, ~AA2;
Sec. 2.21, ~AA3EVV;
Sec. 2.22, ~AA4V;
Sec. 2.23, ~AA5V

Related Topic:

Sec. 3.2, Module Status;
Sec. 3.3, Dual Watchdog Operation

2.20 ~AA2

Description: Read Host Watchdog Timeout Value

Command: ~AA2[CHK](cr)

~ Delimiter character

AA Address of reading module (00 to FF)

2 Command for read host watchdog timeout value

Response: Valid Command: !AAEVV[CHK](cr)

Invalid Command: ?AA[CHK](cr)

Syntax or communication error may get no response.

! Delimiter for valid Command

? Delimiter for invalid Command

AA Address of response module(00 to FF)

E Host watchdog enable status, 1 = Enable, 0 = Disable

VV Timeout value in HEX format, each count is 0.1 second, 01h = 0.1 second and FFh = 25.5 seconds

Example:

Refer to *Sec. 2.21*, ~AA3EVV example.

Related Command:

Sec. 2.17, ~**;
Sec. 2.18, ~AA0;
Sec. 2.19, ~AA1;
Sec. 2.21, ~AA3EVV;
Sec. 2.22, ~AA4V;
Sec. 2.23, ~AA5V

Related Topic:

Sec. 3.2, Module Status;
Sec. 3.3, Dual Watchdog Operation

2.21 ~AA3E VV

Description: Set Host Watchdog Timeout Value

Command: ~AA3E VV[CHK](cr)

~ Delimiter character
AA Address of setting module (00 to FF)
3 Command for set host watchdog timeout value
E 1 = Enable, 0 = Disable host watchdog
VV Timeout value, from 01 to FF, each for 0.1 second

Response: Valid Command: !AA[CHK](cr)

 Invalid Command: ?AA[CHK](cr)

 Syntax or communication error may get no response.

! Delimiter for valid Command

? Delimiter for invalid Command

AA Address of response module (00 to FF)

Example:

Command: ~010 Receive: !0100

Read Address 01 module status, return host watchdog timeout status is clear.

Command: ~013164 Receive: !01

Set Address 01 host watchdog timeout value 10.0 seconds and enable host watchdog, return successful.

Command: ~012 Receive: !01164

Read Address 01 host watchdog timeout value; return that host watchdog is enabled, and time interval is 10.0 seconds.

Command: ~** No response

2.22 ~AA4V

Description: Read PowerOn/Safe Value.

Command: ~AA4V[CHK](cr)

~ Delimiter character

AA Address of reading module (00 to FF)

4 Command for read PowerOn/Safe Value

V P = read PowerOn value, S = read Safe Value

Response: Valid Command: !AA(Data)[CHK](cr)

Invalid Command: ?AA[CHK](cr)

Syntax or communication error may get no response.

! Delimiter for valid Command

? Delimiter for invalid Command

AA Address of response module(00 to FF)

(Data) PowerOn Value or Safe Value

For CB-7042/42D/43/43D (Data) is VVVV, where VVVV is the PowerOn Value (or Safe Value).

For other modules, (Data) is VV00, where VV is the PowerOn Value(or Safe Value).

Example:

Command: @010000 Receive: >

Output Address 01 value 0000, return successful.

Command: ~015S Receive: !01

Set Address 01 Safe Value, return successful.

Command: @01FFFF Receive: >

Output Address 01 value FFFF, return successful.

Command: ~015P Receive: !01

2.23 ~AA5V

Description: Set PowerOn/Safe Value.

Command: ~AA5V[CHK](cr)

~ Delimiter character
AA Address of setting module (00 to FF)
5 Command for set PowerOn/Safe Value
V P = set current output as PowerOn Value, S = set current
 output as Safe Value

Response: Valid Command: !AA[CHK](cr)

 Invalid Command: ?AA[CHK](cr)

 Syntax or communication error may get no response.

! Delimiter for valid Command

? Delimiter for invalid Command

AA Address of response module(00 to FF)

Example:

Command: @01AA Receive: >

 Output Address 01 value AA, return successful.

Command: ~015P Receive: !01

 Set Address 01 PowerOn Value, return successful.

Command: @0155 Receive: >

 Output Address 01 value 55, return successful.

Command: ~015S Receive: !01

 Set Address 01 Safe Value, return successful.

Command: ~014P Receive: !01AA00

 Read Address 01 PowerOn Value, return PowerOn Value AA.

Command: ~014S Receive: !015500

Read Address 01 Safe Value, return Safe Value 55.

Related Command:

*Sec. 2.17, ~**;* *Sec. 2.18, ~AA0;* *Sec. 2.19, ~AA1;* *Sec. 2.20, ~AA2;*
Sec. 2.21, ~AA3Evv; *Sec. 2.22, ~AA4V*

Related Topic:

Sec. 3.2, Module Status; *Sec. 3.3, Dual Watchdog Operation*

Note:

The Command is not for CB-7041/41D/52/52D/53/53D.

3. Application Notes

3.1 INIT* pin Operation

Each CB-7000 module has a build-in EEPROM to store configuration information such as address, type, baud rate and other information. Sometimes, a user may forget the configuration of the module. Therefore, the CB-7000 have a special mode named “**INIT mode**”, to help user to resolve the problem. The “**INIT mode**” is setting as **Address=00, baud rate=9600bps, no checksum**

To enable INIT mode, please follow these steps:

- Step 1. Power-down the module.
- Step 2. Connect the INIT* pin to the GND pin.
- Step 3. Power-up the module.
- Step 4. Send Command \$002(cr) in 9600 bps to read the configuration stored in the module’s EEPROM.

Refer to “**7000 Bus Converter User Manual**” *Sec. 5.1* and “**Getting Started**” for more information.

3.2 Module Status

PowerOn Reset or **Module Watchdog Reset** will set all outputs to the **PowerOn Value**. The module can accept the host’s Command to change the output value.

Host Watchdog Timeout will set all output to the **Safe Value**. The module’s status (read by Command ~AA0) will be 04, and the output Command will be ignored.

3.3 Dual Watchdog Operation

Dual Watchdog = Module Watchdog + Host Watchdog

The Module Watchdog is a hardware reset circuit that monitors the module's operating status. When working in harsh or noisy environment, the module may go down by a noise signal. The Module Watchdog times out and sets output to PowerOn value.

The Host Watchdog is a software function to monitor the host's operating status. Its purpose is to detect a network communication problem or a halted host. When the timeout interval expired, the module will put all outputs to the predefined Safe Value. This places the controlled element in a known-safe condition.

The CB-7000 module with Dual Watchdog makes the control system more reliable and stable.

3.4 Reset Status

The Reset Status is set while the module power on or reset by Module Watchdog, and is cleared when the Command read Reset Status (\$AA5) is applied. This is useful for user to check the module's working status. When the Reset Status is set means the module is reset and the output may be changed to the PowerOn Value. When the Reset Status is clear means the module is not reset, and the output cannot be changed.

3.5 Digital Output

A module's output can have one of three values:

1. **Safe Value.** If the host watchdog timeout status is set, the output is set to Safe Value. If the module receives an output

Command, such as @AA(Data) or #AABBDD, the module ignores the command and returns '!', and will not change the output to the output command value. **The host watchdog timeout status is set and stored in EEPROM when the host watchdog timeout interval expired, and only can be cleared by Command ~AA1.** If user wants to change the output, he first needs to clear the host watchdog timeout status, then send an output command to change the output to a desired value.

2. **PowerOn Value.** When the Module Watchdog Timer is set, and the host watchdog timeout status is clear, the module's output is set to the predefined PowerOn Value.

3. **Output Command value.** If the host watchdog timeout status is clear, the user issues a digital output command such as @AA(Data) or #AABBDD to the module for changing the output value. The module will respond successful (receive >).

3.6 Latched Digital Inputs

If, for example, the user connects a PB switch to a digital I/O module input channel and wants to read the switch stroke. The input is a pulse digital input, and user will lose the data. When read by Command \$AA6 in A or B position, the response is that no input occurred and he will lose the pulse information. However, the read latch-low digital input Command \$AAL0 will solve this problem. When \$AAL0 Command in A and B position is issued, the response indicates that there was a low pulse between A and B position for a switch closure.



4 DN Module

4.1 DN-SSR4

Output Channel: Four Solid State Relay Contacts

Output Specification:

Type: Zero-Cross AC Solid-State Relay Output

Rated Load Voltage: 200 to 240 VAC

Rated Load Current: 4 Amps

Surge Current: 50 A,

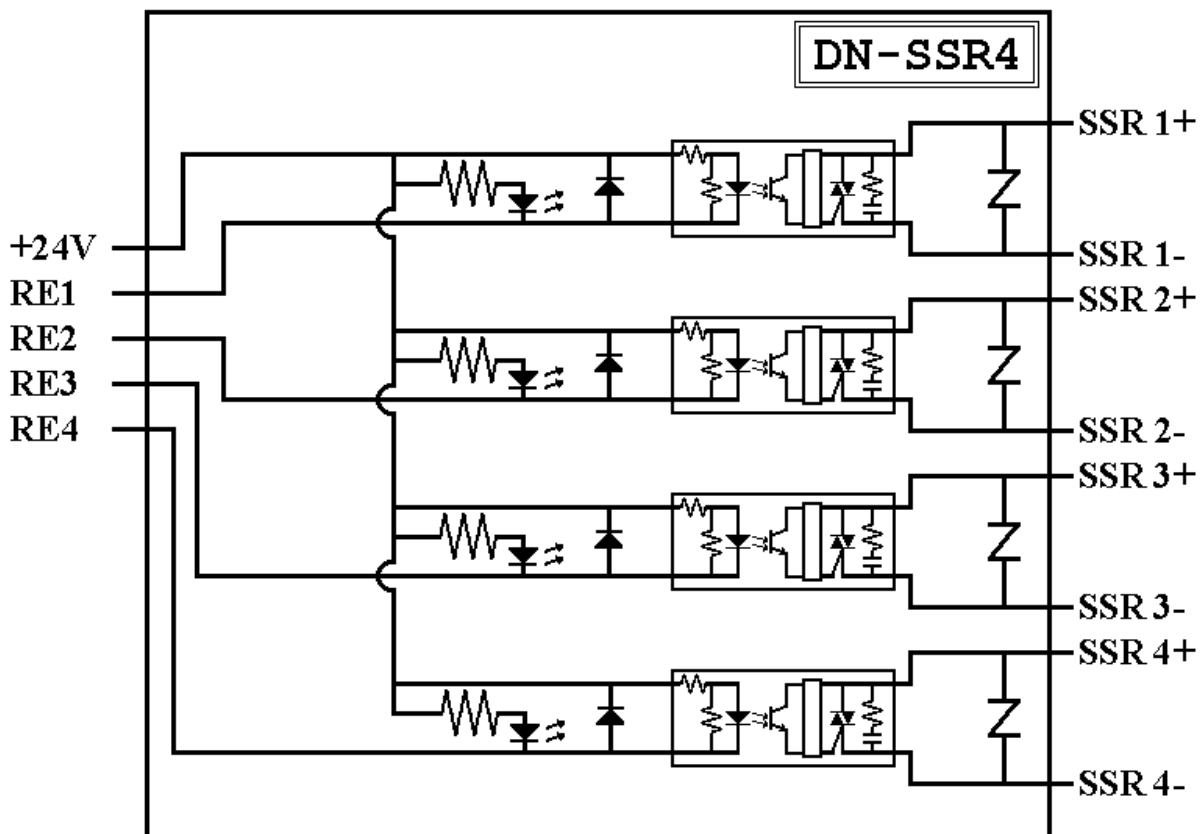
Max. Off-State Leakage Current: 5.0 mA

Operate Time: 1/2 cycle of voltage sine wave + 1ms

Input Impedance: 1.5K Ohms

DIN-Rail mounted

Power Input: +24VDC



4.2 DN-PR4

Output Channel: Four Mechanical Relay Contacts

Output Specification:

Type: 1 form-C Relay Contact

Nominal Load: 5A@250VAC, 5A@30VDC

Max. Switching Power: 1250VAC

Max. Switching Voltage: 250VAC, 150VDC

Max. Switching Current: 5 A.

Mechanical/Electrical Life: Min. $10 \times 10^6 / 10 \times 10^4$ operations.

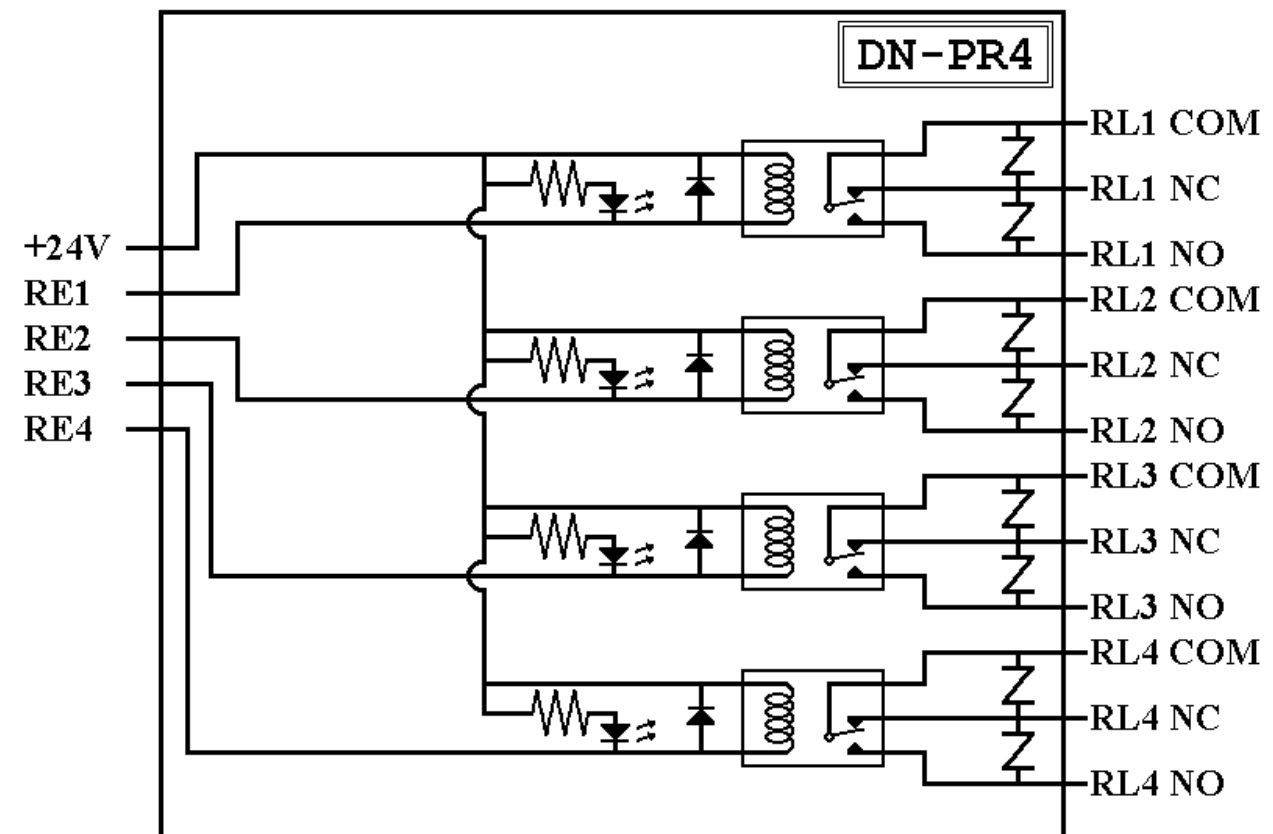
Operate/Release Time: Max. 10 ms/5 ms

Dielectric Strength: 2000VAC 1 minute

Nominal Coil Power: 360 mW

DIN-Rail mounted

Power Input: 24VDC



4.3 RM-104, RM-108, RM-116

Output Channel: 4/8/16 Relay Contacts

Output Specification:

- Type: 1 Form-C Relay Contact
- Rated Load: 16 A. @250VAC
- Max. Switching Voltage: 400VAC
- Max. Peak Current: 30 A.
- Standard Contact Material: AgCd0
- Min. Life: 100,000 operations.

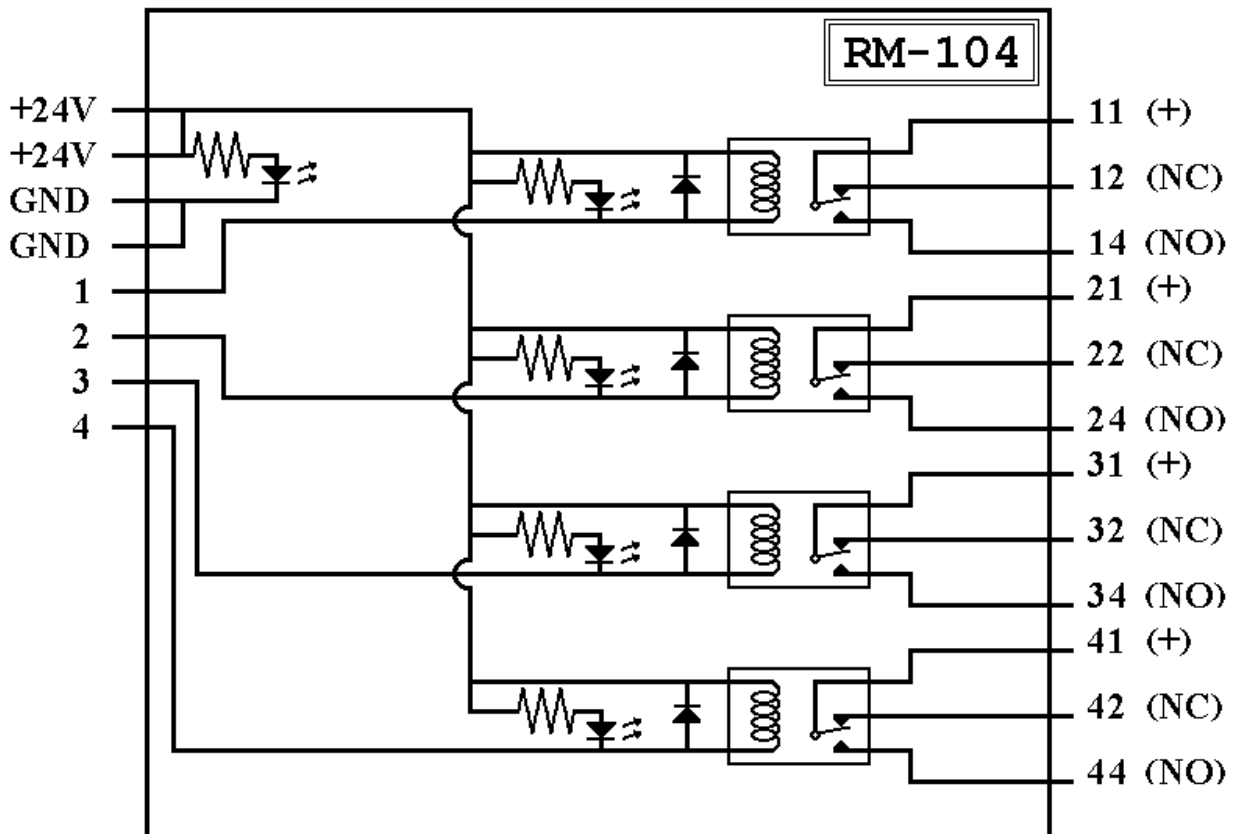
Din-Rail mounted

Dimension:

RM-104: 78 x 77mm RM-108: 135 x 77mm

RM-116: 270 x 77mm

Power Input: 24VDC



4.4 RM-204, RM-208, RM-216

Output Channel: 4/8/16 Relay Contacts

Relay Specification:

Type: 2 Form-C

Rated Load: 5 A.@250VAC

Max. Switching Voltage: 400VAC

Max. Peak Current: 10 A.

Standard Contact Material: Ag Nt

Min. Life: 100,000 operations.

Din-Rail mounted

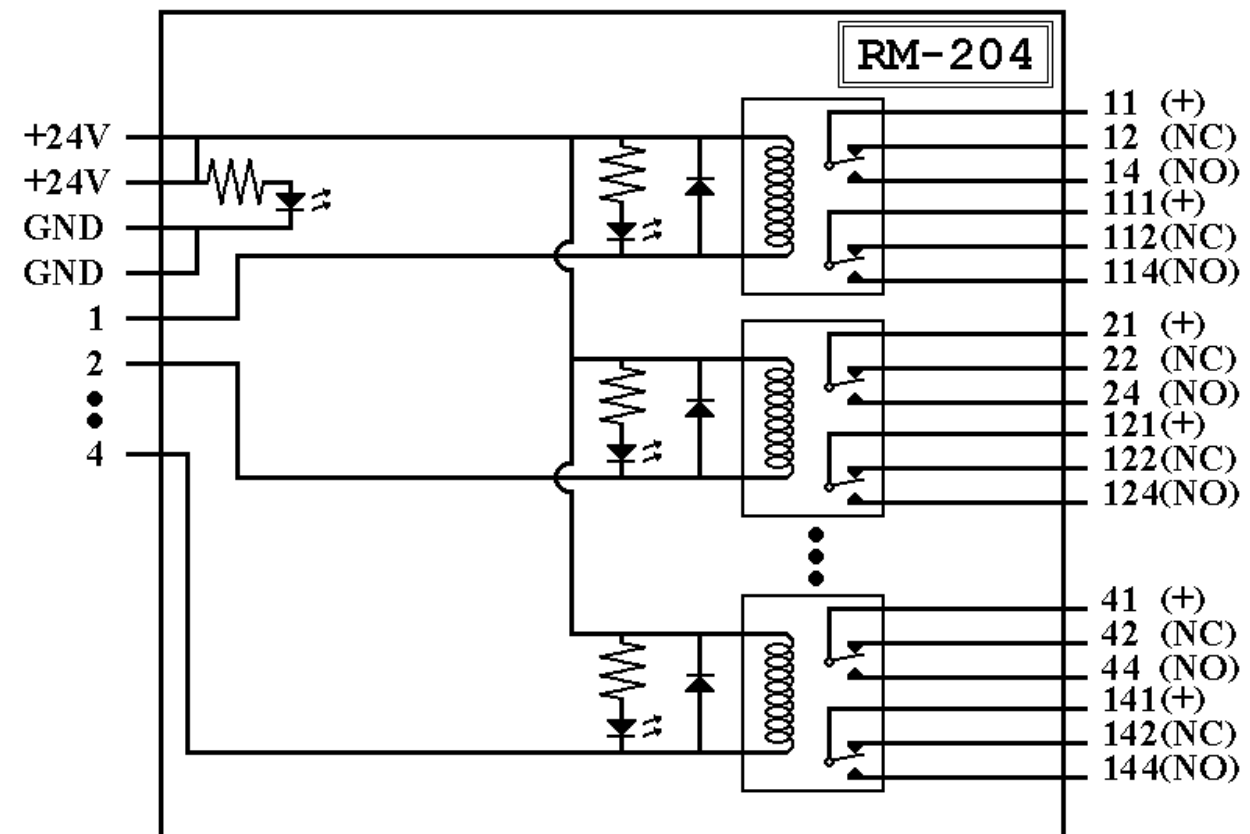
Dimension:

RM-204: 78 x 77mm

RM-208: 135 x 77mm

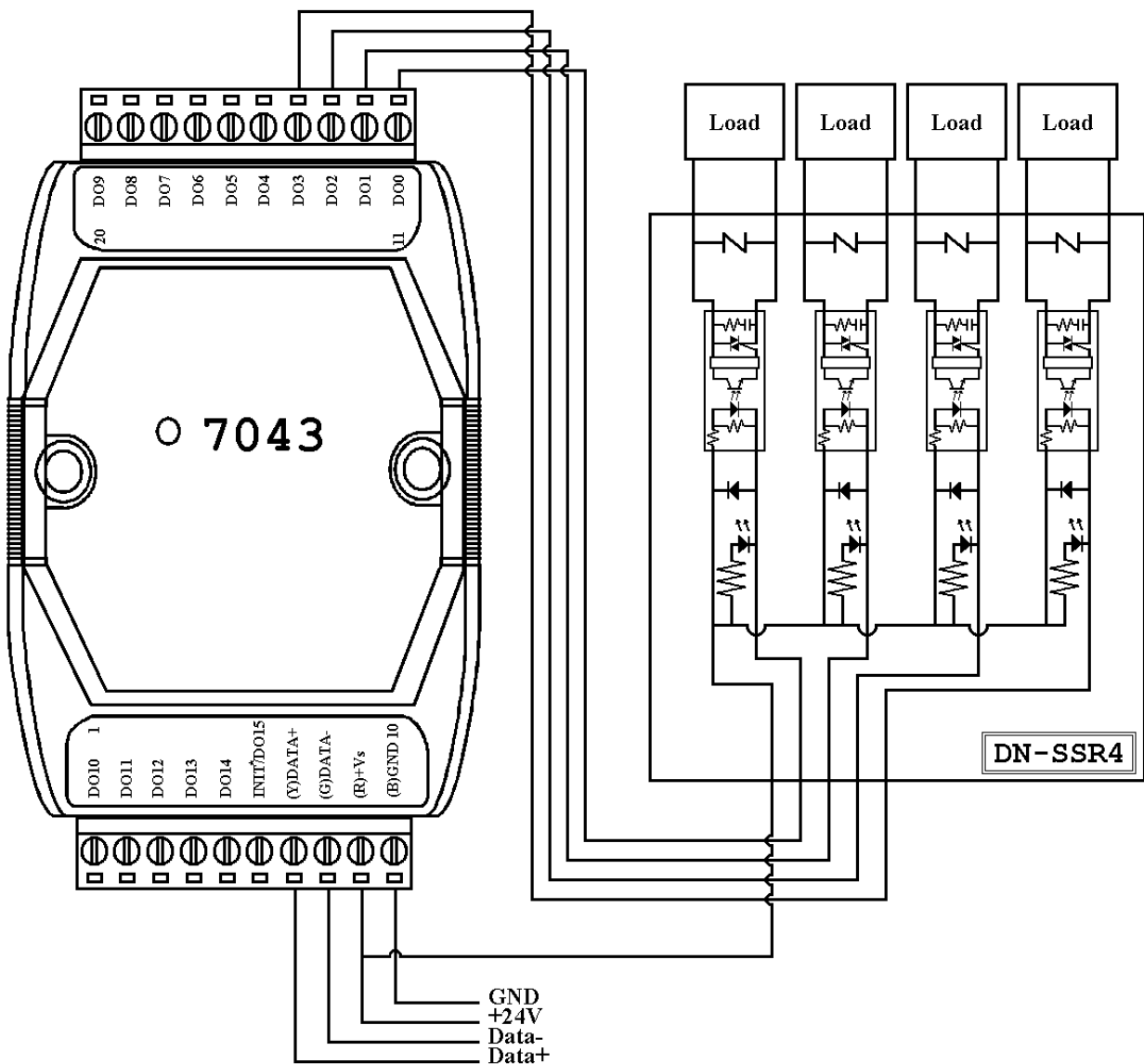
RM-216: 270 x 77mm

Power Input: 24VDC



4.5 Application

The DN Modules are the IO extension of CB-7000 modules. These modules can drive more power and heavy loads. User may use CB-7000 modules, like CB-7043 or others, to control the DN modules to drive loads.



For your notes.

For your notes.

EC Declaration of Conformity

We, Measurement Computing Corp., declare under sole responsibility that the product:

CB-7041/42/43/44/50/52/ Digital I/O Modules
53/60/63/65/66/67

| Part Number | Description |
|-------------|-------------|
|-------------|-------------|

to which this declaration relates, meets the essential requirements, is in conformity with, and CE marking has been applied according to the relevant EC Directives listed below using the relevant section of the following EC standards and other normative documents:

EU EMC Directive 89/336/EEC: Essential requirements relating to electromagnetic compatibility.

EU 55022 Class B: Limits and methods of measurements of radio interference characteristics of information technology equipment.

EN 50082-1: EC generic immunity requirements.

IEC 801-2: Electrostatic discharge requirements for industrial process measurement and control equipment.

IEC 801-3: Radiated electromagnetic field requirements for industrial process measurements and control equipment.

IEC 801-4: Electrically fast transients for industrial process measurement and control equipment.

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