

Super-fast High noise immunity Long distance Built-in protocols Wiring saving

## Remote I/O Control Network IC

SEMI Standard E54.17 compliant

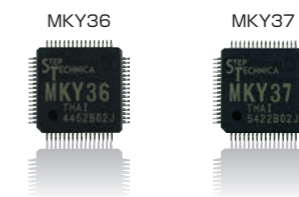
# Two open-field network IC families optimized for internal network of FA device

Step Technica meets the challenge of developing products not previously available.

Simple and super-fast digital I/O batch control !

Ultrahigh-speed remote I/O control

**HLS** Hi-speed Link System



Easy remote control of digital I/O and analog I/O. All data is shared by all devices.

Data sharing and remote I/O control

**CU**net



● For further information, contact

**STEP TECHNICA** StepTechnica Co., Ltd.  
<https://www.steptecnica.com>

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# Control network to enable all advanced functions simultaneously

Open-field networks (HLS and CUnet) address various needs of customers from simple ICs to boards or units

## What are **HLS** and **CUnet** ?

HLS and CUnet are I/O level networks specific to high-speed control of I/O (sensor and motor) in FA devices

|              |  |
|--------------|--|
| <b>HLS</b>   | A network of "one master : multiple slaves" that can provide ultrahigh-speed and batch control over digital I/O  |
| <b>CUnet</b> | A network of "multiple masters : multiple slaves" that can provide control over digital I/O and analog I/O. These control data are shared in real time throughout the network. |

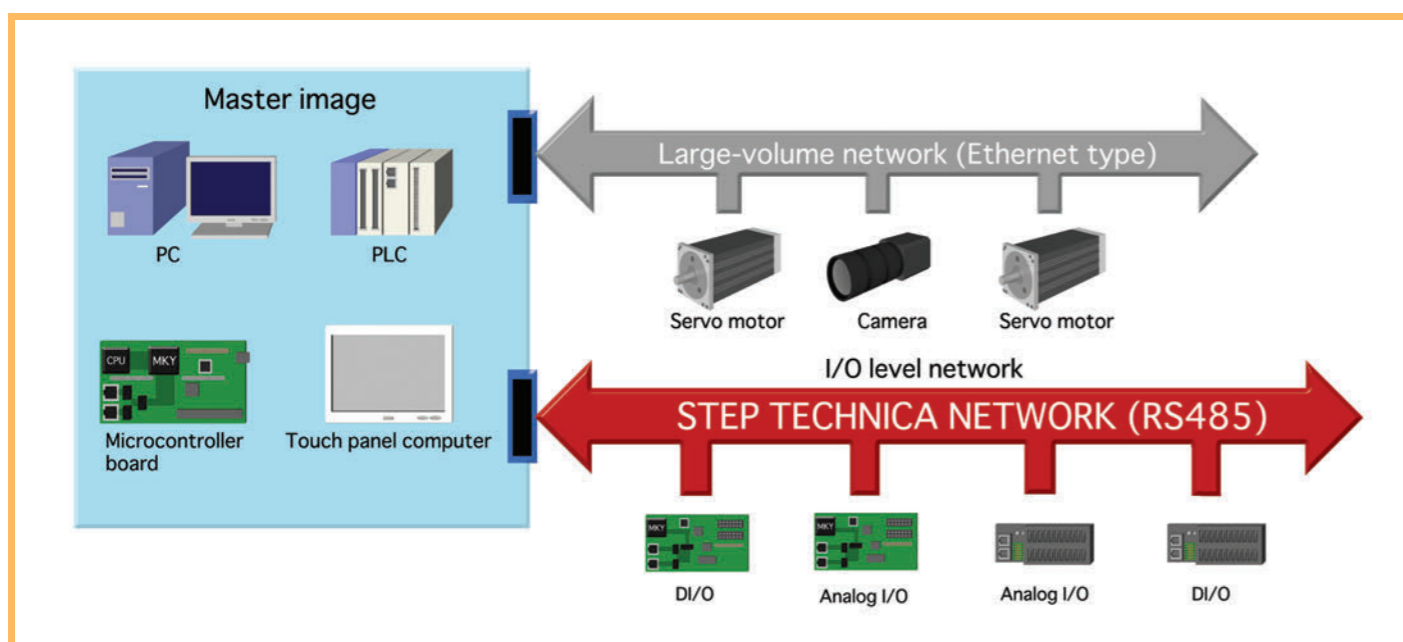
### Image of HLS and CUnet : Two-line configuration

A mass network and an I/O network are used parallel.

If you build your network only with large-volume network such as Ethernet, not only the cost but also the load of user CPU and application software will become heavy. Also, it will become difficult to control I/O with accurate cycle.

Therefore, Step Technica proposes two-line network configuration as follows.

- Ethernet-type networks are used for large-volume data required to control servo motors and images
- In addition, networks with high tolerance for noise based on RS485 (field bus) are used for I/O control



As shown above, by building large-volume data line and I/O line individually (two-line),

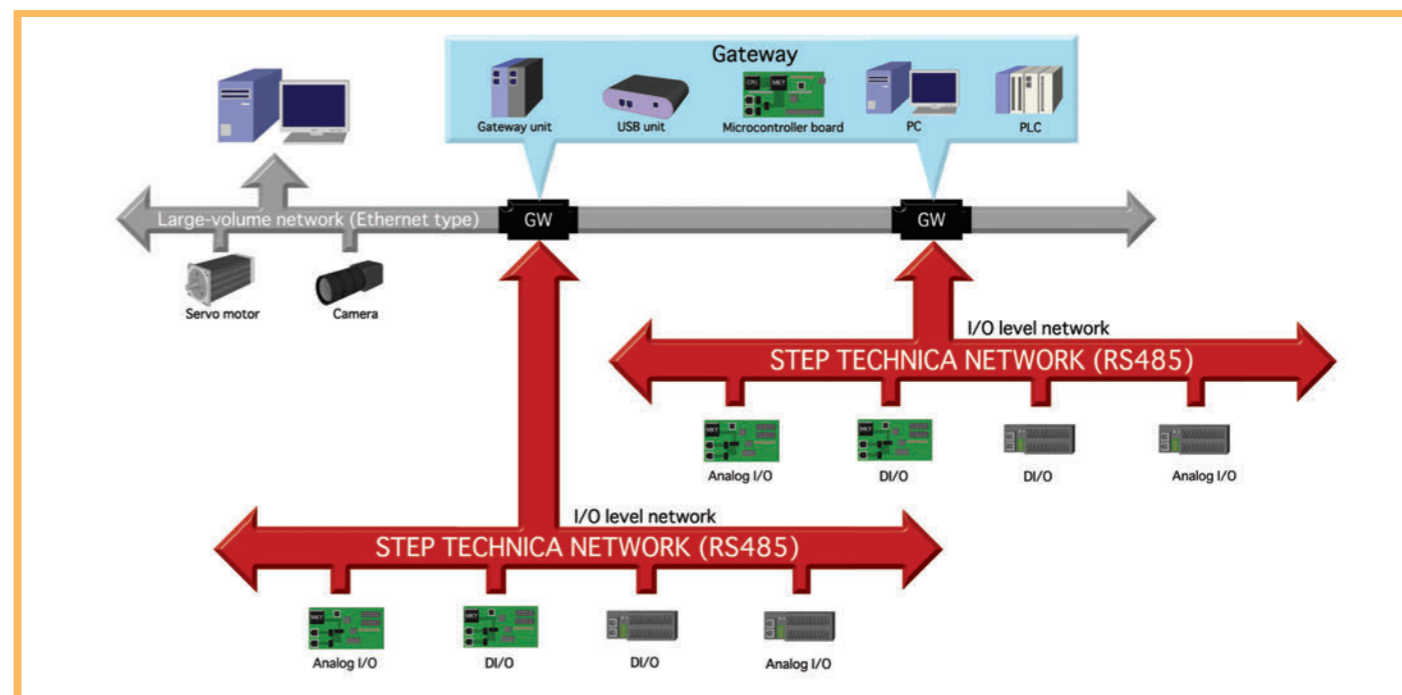
- ▶ **Cost reduction**
  - ▶ **High noise immunity**
  - ▶ **Stability**
  - ▶ **High-speed response**
- can be achieved within the network.

### Image of HLS and CUnet : One-line configuration

Connectable through the gateway to the backbone network of Ethernet-base

Control networks composed only of Ethernet-based networking often have problems with cost, stability, real-time I/O control, and I/O device expansion. To solve these problems, Step Technica proposes the use of gateways for HLS and CUnet.

These gateways are recognized as I/O memory on the backbone network, so there is no need to adjust the overall network or drastically change the master program. This makes it easy to expand I/O and to adapt to a variety of device specifications.



### The advantages of using HLS and CUnet on I/O level network

HLS and CUnet which can realize high-speed response easily

HLS and CUnet are highly valued by various customers using semiconductor manufacturing devices and machine tools that require high noise immunity, long distance, and high-speed response.

- Cost saving** ▶ Enabling configuration of the network with I/O devices of appropriate bit number
- Few load on user CPU** ▶ HLS and CUnet communicate independently without user CPU (built-in protocol.)
- Stable communication** ▶ Packet data amount on I/O network is small and has high tolerance for noise
- Configuring an optimal network for the system required by customers** ▶ Two-line connection with controller and gateway connection with large-volume network are available.
- Extension of control target on I/O network** ▶ Even the devices conventionally controlled in upper level such as motor control can be controlled.



# Common features of **HLS** and **CUnet**

## Four high efficiency is realized simultaneously !

Accelerating response time by  
**High speed**

Step Technica's network can robustly and quickly control small data (bit data) including I/O that is required to control FA devices. Protocol specification designed not for transmission rate but for substantial response speed of each slave allows communication at the maximum speed of 15  $\mu$ s per node although it is RS485-base network.

Zero communication burdens  
**Built-in protocol**

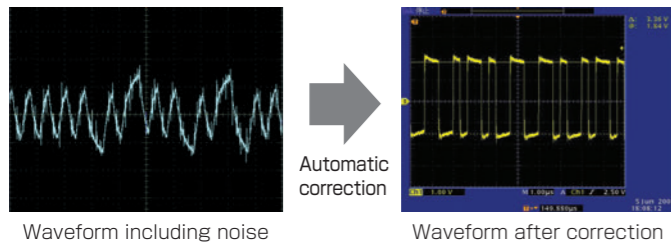
Since Step Technica's network IC has built-in communication protocol, customers do not need to develop communication software. User CPU has no communication burden because network ICs in this network automatically communicate each other. Also, user CPU can control only by master IC-memory read and write. This will allow simple high-reliability communications and reduce the burden of application software development.

100% guaranteed data  
**Automatic waveform correction**

Step Technica's network IC is always correcting the waveform automatically for received data. They also determine if the corrected data comply with the specified format. This will help to ensure the received data as "100% correct data" without data corruption.

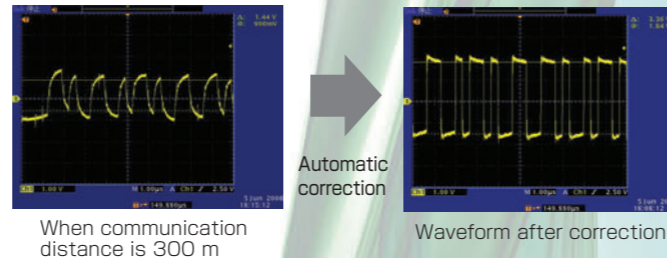
**High noise immunity**

Even if the transmission waveform is broken due to being affected by various noises from the environment, "Automatic Waveform Correction Function" corrects the waveform, realizing the high noise immunity.



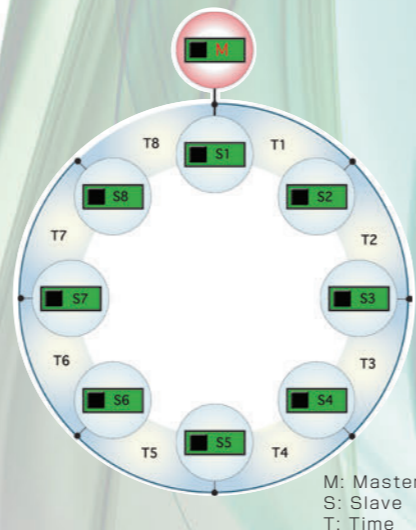
**Long distance**

Even if the transmission waveform is broken due to long-distance communication (as shown in the diagram), "Automatic Waveform Correction Function" corrects the waveform, realizing the long-distance communication.



No scan time gap by  
**Constant-cycle communication**

Step Technica's network adopts constant-cycle scan method so that response speed does not change at all. The turnaround time given to each terminal on the network is fixed. Therefore, the turnaround time for a scan depends on the number of terminals on the network. If a communication error occurs, the error data is discarded and retry is not executed. Thanks to the built-in ultrahigh-speed communication and automatic waveform correction functions, the correct data can be obtained at the next scan without retry.



# User advantages of using **HLS** and **CUnet**

## Solutions to annoying network problems

Ultrahigh response speed for more control

Long-distance connection with ultrahigh-speed kept

Built-in protocols enable simple program development.

Wiring saving (by serial connection) helps reduce the cost, maintenance activities, and space.

High noise immunity solves problems of unstable communications caused by noise.

## Actual installation and application examples of HLS and CUnet

### HLS

HLS is widely used for various systems in FA field.

- Chip mounters
- Semiconductor manufacturing equipment
- Injection molding machines
- Large printers
- Automatic carrier robots
- Welding machines
- Electrical discharge machines
- Pachinko hall control systems
- Security control systems
- Train traffic control system
- Medical equipment
- Traffic information control systems (road signal)
- Amusement park control systems
- RFID systems
- Warehouse management system
- Building management system
- NC machine tools

### CUnet

CUnet is used in a wide range of businesses requiring control by real-time parallel processing.

- Chip mounters
- Multi-axis motion controller
- Semiconductor manufacturing equipment
- Large printers
- Wafer carrier devices
- LCD panel carrier device
- Parking management systems
- Industrial robots
- Humanoid robots
- Building access control systems (entrance/exit)
- Baggage sorting system
- RFID systems
- Golf driving range system
- Fireworks launch system
- Medical equipment
- Platform door



**HLS and CUnet are user-friendly FA-dedicated control network ICs.**





## “1:N” Ultrahigh-speed, high-reliability, open-field network

Connecting “up to 63 slave ICs” to “one master IC” supports a network for controlling remote I/Os at ultrahigh-speed

### Flexible combinations

Up to 63 slave ICs (MKY37) can be connected to one master IC (MKY36).

| Series name       | Master (center) IC  | Slave (satellite) IC  | HUB-IC  |
|-------------------|---|---|---|
| Type              | MKY36   | MKY37   | MKY02   |
| Package           |  |  |  |
| Number of I/O     | —   | 16 DIN 16 DOUT  | —   |
| Operating voltage | 3.3 V (5 V tolerant)  | 5.0 V   | 3.3 V (5 V tolerant)  |
| Features          | 16/8 bit bus Interface support  | No CPU needed<br>Basic model<br>Low power consumption                             | No CPU needed<br>T-type branching and wiring extension possible                   |

### HLS specifications

|                                   |  |                           |
|-----------------------------------|--|---------------------------|
| Communication method              | HLS (Hi-speed Link System) Master/slave type polling method    |                           |
| Connection type                   | Multi-drop method (RS485)                                      |                           |
| Communication speed               | 12 Mbps/6 Mbps/3 Mbps (full-duplex/half-duplex)                |                           |
| Communication cable               | Shield cable of category 3 or higher                           |                           |
| Maximum number of connection node | 63 nodes   |                           |
| Number of I/O control             | 1 terminal : 16 IN, 16 OUT<br>63 terminals : 1008 IN, 1008 OUT |                           |
| Communication distance            | Communication distance   | Maximum length of network |
|                                   | 12 Mbps  | 100 m                     |
|                                   | 6 Mbps   | 200 m                     |
|                                   | 3 Mbps   | 300 m                     |
| Topology                          | Bus (at using HUB : tree/star)                                 |                           |

(The Communication distance described above is just for a scale. It varies from system requirements and environment.)

### Response speed (in full-duplex communication)

|          | 12 Mbps   | 6 Mbps     | 3 Mbps     |
|----------|-----------|------------|------------|
| 2 nodes  | 30.33 μs  | 60.67 μs   | 121.33 μs  |
| 8 nodes  | 121.33 μs | 242.67 μs  | 485.33 μs  |
| 16 nodes | 242.67 μs | 485.33 μs  | 970.67 μs  |
| 32 nodes | 485.33 μs | 970.67 μs  | 1941.33 μs |
| 63 nodes | 955.50 μs | 1911.00 μs | 3822.00 μs |

(Approximately twice the described value in half-duplex communication)

### Communication distance when using HUB

|       | 12 Mbps | 6 Mbps | 3 Mbps |
|-------|---------|--------|--------|
| HUB 1 | 200 m   | 400 m  | 600 m  |
| HUB 2 | 300 m   | 600 m  | 900 m  |
| HUB 3 | 400 m   | 800 m  | 1200 m |
| HUB 4 | 500 m   | 1000 m | 1500 m |
| HUB 5 | 600 m   | 1200 m | 1800 m |
| HUB 6 | 700 m   | 1400 m | 2100 m |
| HUB 7 | 800 m   | 1600 m | 2400 m |

(For the response speed when using HUB, refer to MKY02 Manual.)

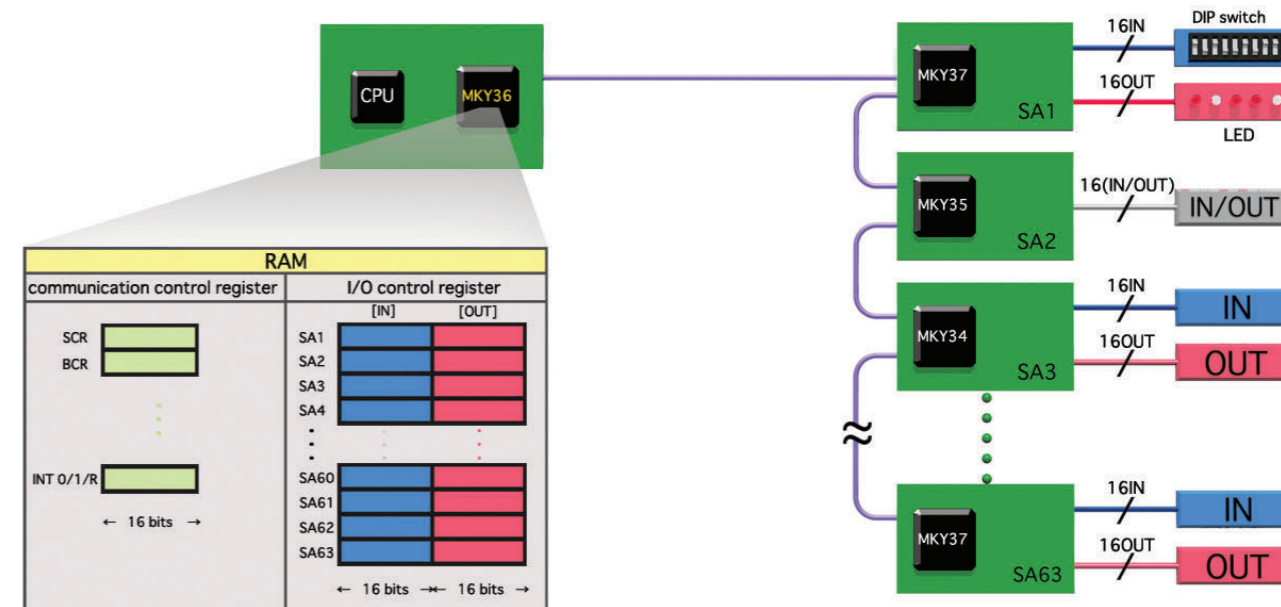
### HLS network configuration diagram

HLS is a remote I/O control network of “one master and multiple slaves”. Master and slave ICs communicate automatically with each other and the system can connect up to 63 slave ICs. Although multi-drop wiring using RS485 is utilized for the connection, branching and wiring extension are also possible by using HUB-IC (MKY02).

In master IC, there is a memory area corresponding to each slave IC.

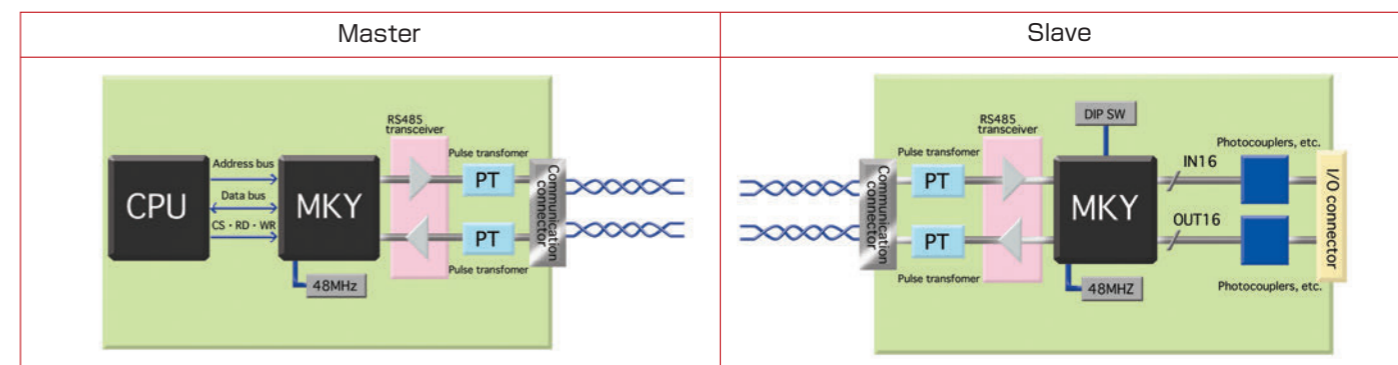
This memory area is composed of communication status, interruption, communication control register for communication error, and I/O control register.

CPU can control I/O connected to each slave IC just by reading or writing the memory of master IC.



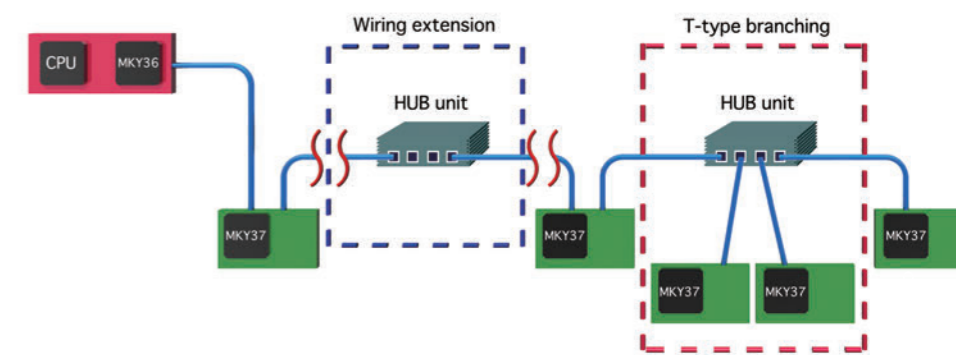
### Board block diagram

The figure below is a typical block diagram of HLS board while in full-duplex. As shown in the diagram, the board can be configured with simple circuit.



### Wiring extension and T-type branching

HLS is a network configured with multi-drop connection (RS485). To extend the network, T-type branching wiring and wiring extension are possible by using HUB-IC (MKY02) for HLS.



## “N:N” next-generation open-field network

**Multi-master type network that can control digital I/O and analog I/O.**  
**The maximum 512-byte control data can be shared automatically among all CUnet ICs.**

### Flexible combinations

CUnet family is composed of “MEM mode IC”, which can function as a master or slave IC connected to CPU, and “IO mode IC”, which can control digital I/O and analog I/O. A network can be configured by freely combining these ICs. Also, combination of “Master:Slave” can be selected freely from “1:N” to “N:N”.

| Series name       | MEM mode IC (master/slave)  | MEM mode IC (master/slave)   | IO mode IC (DIO slave)                                | IO mode IC (DIO slave)  | IO mode IC (AD slave)   |
|-------------------|---|--|---|---|---|
| Type              | MKY43   | MKY44-SPI  | MKY46   | MKY44-IO32A   | MKY44-AD12A   |
| Package           |   |  |   |   |   |
| Function          | Data (memory) sharing   | Data (memory) sharing  | 32 DIN/DOU  | 32 DIN/DOU with filter<br>2 ch 24 bit up/down counter<br>2 ch 16 bit PWM output | 12 bit AD 4ch<br>4 DIN/4 DOU                                      |
| Operating voltage | 3.3 V (5 V tolerant)  | 3.3 V  | 5.0 V   | 3.3 V   | 3.3 V   |
| Features          | Support mail function (256-byte data transmission)<br>Support 16/8 bit bus interface. | Support mail function (256-byte data transmission)<br>SPI communication interface supported (Max 1 Mbps) | No CPU is required<br>32 DIN/DOU switchable in 4 bits | No CPU is required<br>32 DIN/DOU switchable in 8 bits<br>ST44SW: Required       | No CPU is required<br>Built-in AD converter<br>ST44SW: Unrequired |

| Series name       | IO mode IC (AD slave)  | IO mode IC (AD slave)  | IO mode IC (DA slave)  | IO mode IC (DA slave)  | HUB-IC   |
|-------------------|--|--|--|--|--|
| Type              | MKY44-AD16A  | MKY44-AD16B  | MKY44-DA16A  | MKY44-DA16B  | MKY02  |
| Package           |  |  |  |  |  |
| Function          | 16 bit AD 2ch<br>8DIN/8DOU   | 16 bit AD 4ch  | 16 bit DA 2ch<br>8 DIN/8 DOU   | 16 bit DA 4ch  | —  |
| Operating voltage | 3.3 V  | 3.3 V  | 3.3 V  | 3.3 V  | 3.3 V (5 V tolerant)   |
| Features          | No CPU is required<br>External AD converter (AD7682)<br>ST44SW: Required | No CPU is required<br>External AD converter (AD7682)<br>ST44SW: Unrequired | No CPU is required<br>External DA converter (AD5752)<br>ST44SW: Required | No CPU is required<br>External DA converter (AD5754)<br>ST44SW: Unrequired | No CPU is required<br>T-type branching and wiring extension possible |

\* The ST44SW is an IC for switch expansion for communication settings when using the MKY44.

### CUnet specifications

|                                   |   |                           |
|-----------------------------------|---|---------------------------|
| Communication method              | CUnet communication, multi-master type broadcast method |                           |
| Connection type                   | Multi-drop method (RS485)                               |                           |
| Communication speed               | 12 Mbps/6 Mbps/3 Mbps (half-duplex)                     |                           |
| Communication cable               | Shield cable of category 5 or higher                    |                           |
| Maximum number of connection node | 64 nodes  |                           |
| Data sharing amount               | 1 node: 8 bytes unit, 64 nodes MAX.: 512 bytes          |                           |
| Communication distance            | Communication distance                                  | Maximum length of network |
|                                   | 12 Mbps   | 100 m                     |
|                                   | 6 Mbps  | 200 m                     |
| Topology                          | Bus (at using HUB: tree/star)                           |                           |

Note: The communication distance above are approximate data, it may vary on its operating conditions.

### Response speed

|          | 12 Mbps    | 6 Mbps     | 3 Mbps     |
|----------|------------|------------|------------|
| 2 nodes  | 102.00 μs  | 204.00 μs  | 408.00 μs  |
| 8 nodes  | 265.00 μs  | 530.00 μs  | 1060.00 μs |
| 16 nodes | 501.00 μs  | 1002.00 μs | 2004.00 μs |
| 32 nodes | 1037.00 μs | 2074.00 μs | 4148.00 μs |
| 64 nodes | 2365.00 μs | 4730.00 μs | 9460.00 μs |

Note: The above response speed is only when a self-owned area of one node is 8 bytes. The nodes of CUnet means “The number of memory block used in the whole network (self-owned area)”, NOT “The number of actual terminals.”

### Communication distance when using HUB

|       | 12 Mbps | 6 Mbps | 3 Mbps |
|-------|---------|--------|--------|
| HUB 1 | 200 m   | 400 m  | 600 m  |
| HUB 2 | 300 m   | 600 m  | 900 m  |

Note: For the response speed when using HUB, refer to MKY02 Manual.

### CUnet network configuration diagram

CUnet ICs communicate (share data) automatically with each other without intervening communication software. Each CUnet IC has a built-in 512-byte memory consists of 64 blocks, which includes both 8-byte “self-owned area” to which only the IC itself can write data and the area where the data of other CUnet ICs is copied. The data written in “self-owned area” will be shared (copied) immediately to all terminals by broadcasting. This allows each terminal (CPU) to understand the status of other CUnet ICs just by reading the memory of CUnet ICs connected to itself.

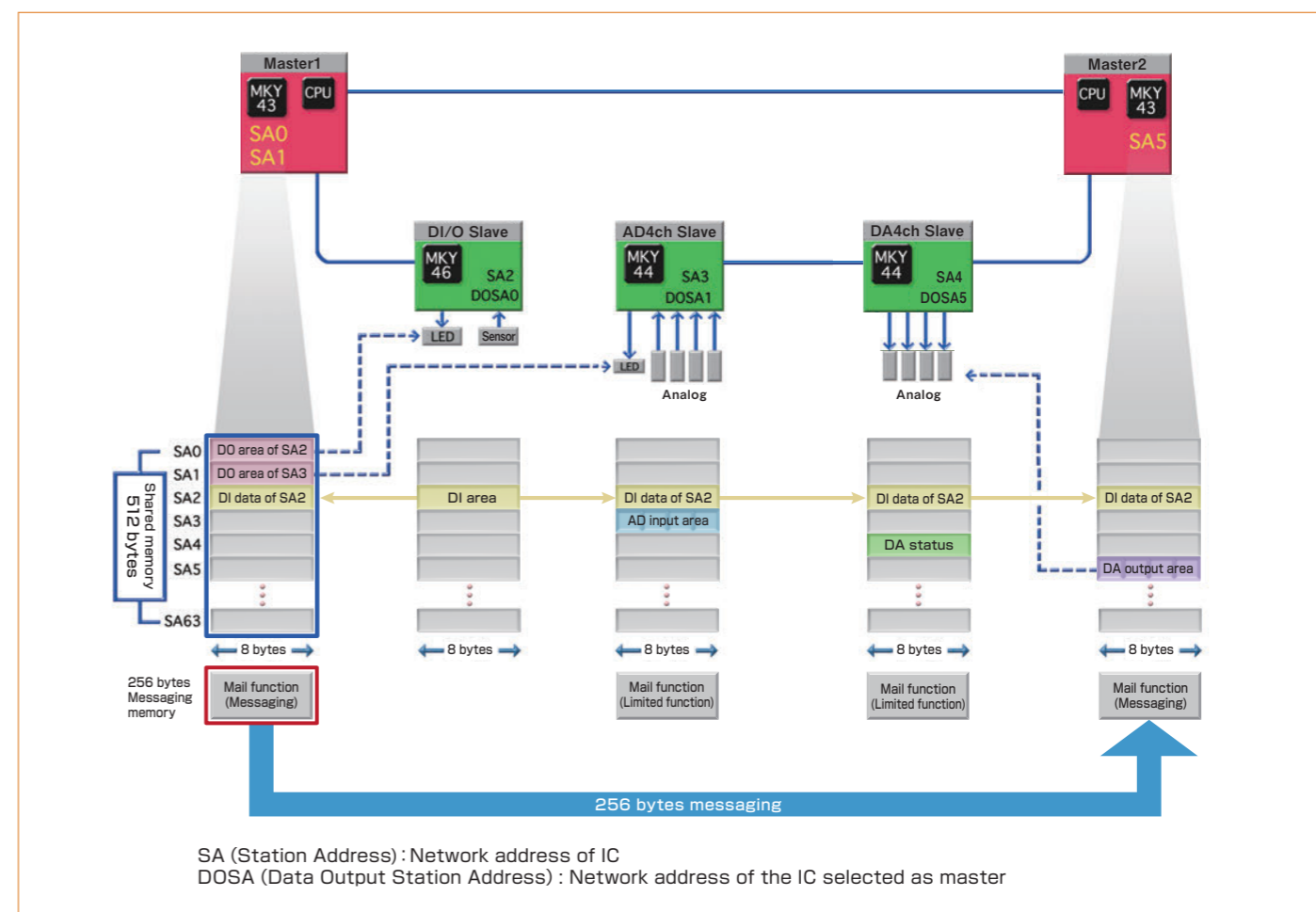
#### [Input operation of the slave]

Input data of the slave is automatically written in “self-owned area” and shared (or copied) to all terminals.

#### [Output operation of the slave]

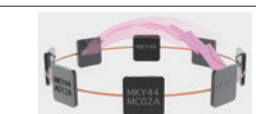
The slave selects a master IC for multi-master configuration and outputs the data in “self-owned area” of the master CUnet IC.

\* The master is set by DOSA (Data Output Station Address) pin of the slave.



### Mail function (P2P data transmission)

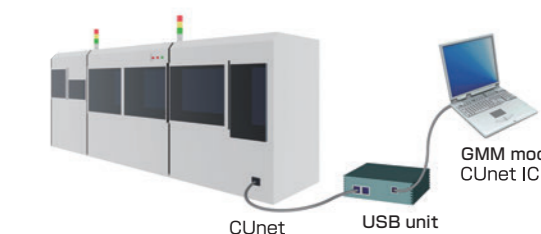
The data up to 256 bytes can be sent and received in P2P (one-to-one) system between CUnet ICs in the MEM mode. Also, the mail function can operate concurrently with data sharing or I/O control without the cycle time delay in the CUnet.



### GMM (Global Memory Monitor) function

GMM function is available in CUnet ICs in MEM mode.

“GMM function” is a function that enables monitoring the shared memory and register while operating the network. In GMM mode, CUnet IC is not counted as a terminal that constitutes the network.





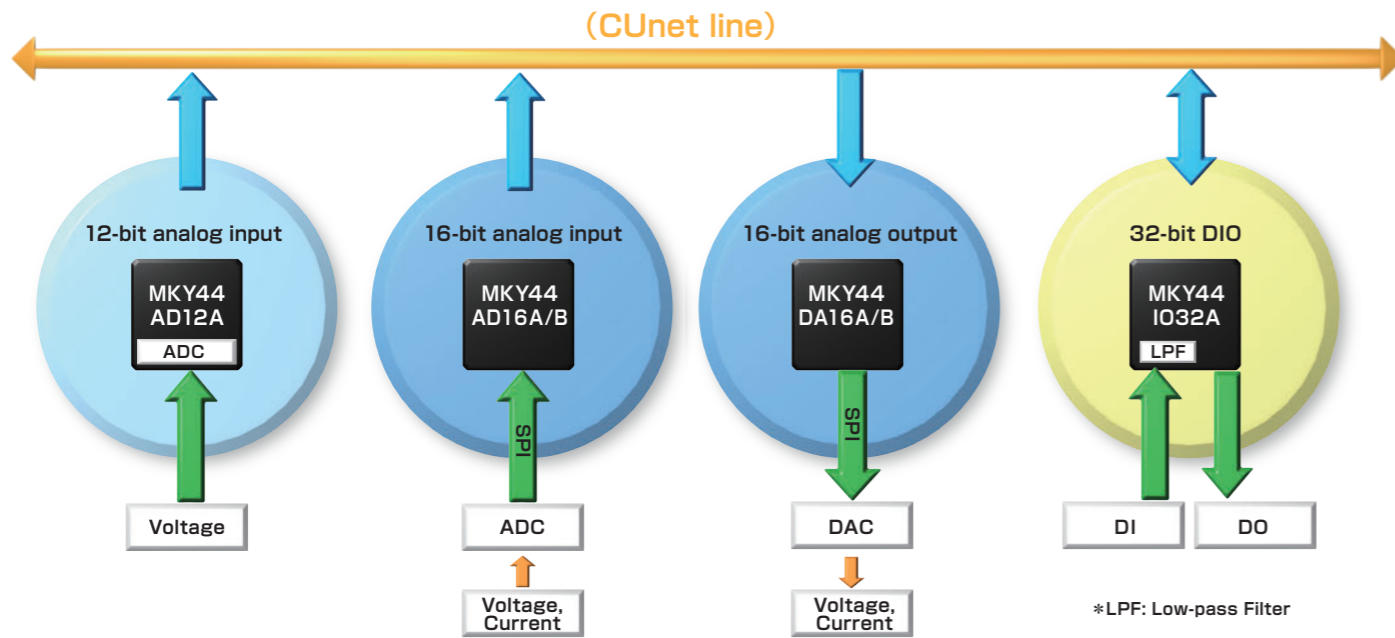
# MKY44 Series

Intelligent slave IC supporting **CUnet** family

- Easily networking digital I/O and analog I/O
- Enabling various controls with one chip and no CPU
- Built-in middleware even though it is a slave IC

MKY44 is an intelligent slave IC that enables easily networking of digital I/O control and analog I/O control. The MKY44 (except MKY44-SPI) does not require user CPU.

Though user CPU is normally required in order to control digital I/O and analog I/O, these controls can be executed by one chip using MKY44.



## Digital I/O

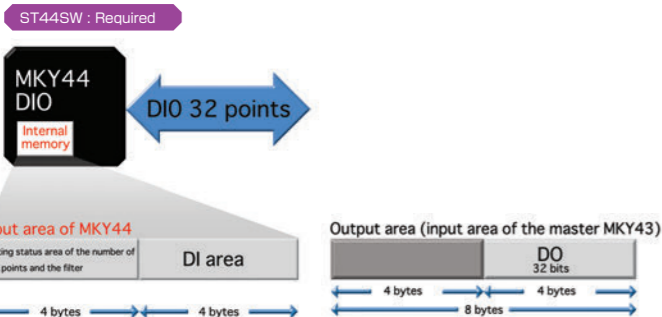
### Easy remote control over intelligent DIO

MKY44-IO Series can remotely control digital IO intelligently without using CPU.

The MKY44-IO32A has two different modes, and you can select either.

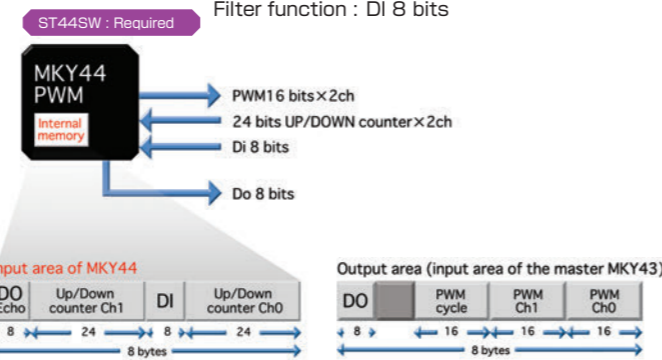
#### MKY44-IO32A (DIO mode)

**Function** DIO 32 points : Switching I/O by 8 bits  
DI filter function : Settable low-pass filter  
Sampling cycle : 100 μs to 1s  
Number of sampling times : 2, 4, 8, 16



#### MKY44-IO32A (PWM, UP/DOWN counter mode)

**Function** 16-bit PWM 2ch : PWM cycle can be changed  
24-bit counter 2ch : UP/DOWN counter input  
Filter function : DI 8 bits



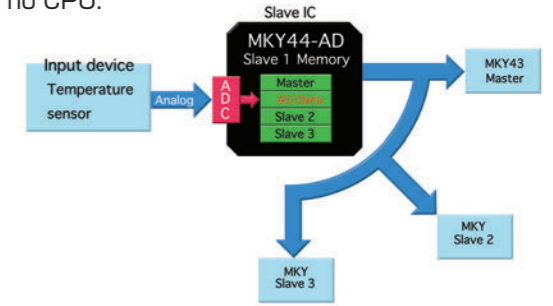
## Analog I/O

### Easy remote control over analog I/O

MKY44-AD/DA Series can remotely control analog I/O with one chip and no CPU.

#### MKY44-AD Series

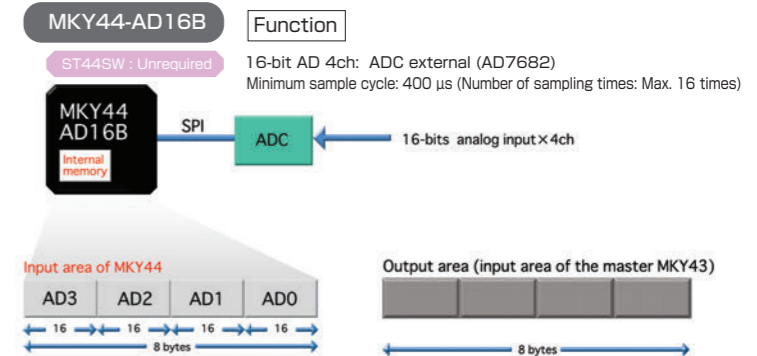
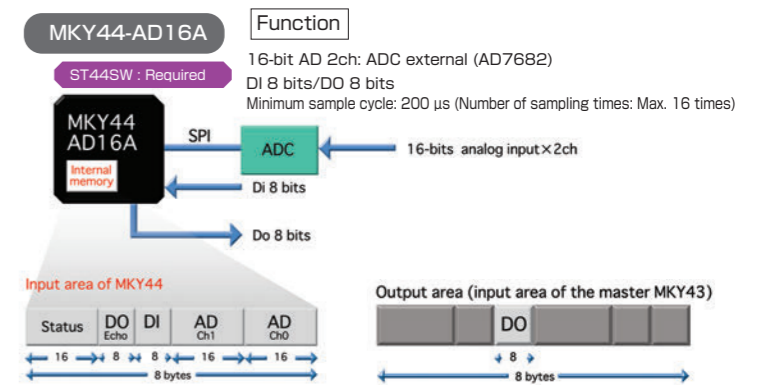
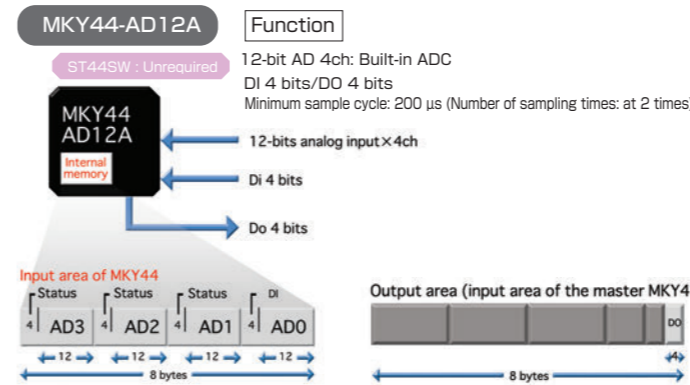
MKY44-AD Series selects the timing to load data from 5 modes and sets the detailed operation using parameters. The result data of the selected mode is automatically input to MKY44-AD Series. Since the input data is automatically copied (shared memory) to all CUnet ICs, analog control can be executed when user CPU just reads each CUnet IC memory. Although an external converter is required to use MKY44-16A/B, it is not necessary to be aware of its setting.



#### Five data loading modes

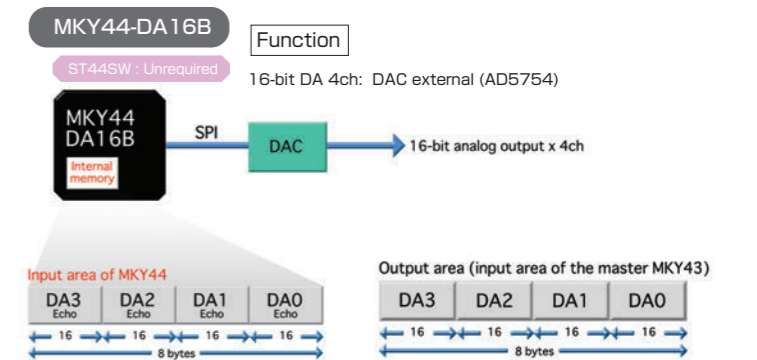
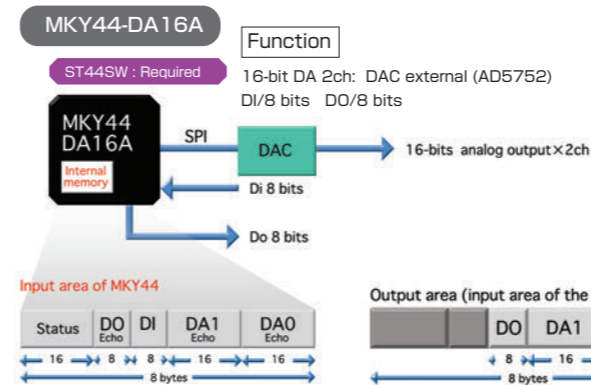
- Cyclic mode
- Hardware trigger mode
- Software trigger mode
- Moving average mode
- Period average mode

Parameter setting of **moving average mode** and **period average mode**: Number of sampling times (2 times, 4 times, 8 times, 16 times)  
Sampling cycle (200 μs to 1 s (100 μs unit))  
\*: Minimum cycle may change according to the setting condition



#### MKY44-DA Series

MKY44-DA Series can control DA just by writing the data from user CPU to the memory of master IC (MKY43) corresponding to each slave (MKY44-DA Series).



# Connection patterns of CUnet

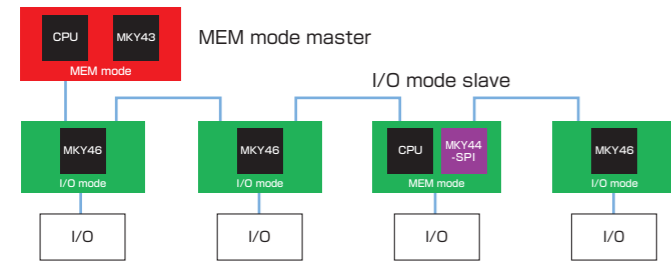
● Read the following to understand the connection patterns of CUnet.

● Color coding in connection patterns

|             | Master board |             | Slave board            |                   |
|-------------|--------------|-------------|------------------------|-------------------|
| Board image |              |             |                        |                   |
| Mode        | MEM mode     | I/O mode    | I/O mode               | MEM mode          |
| CPU         | Required     | Unrequired  | Unrequired             | Required          |
| Function    | Master board | Control DIO | Control DIO, AD and DA | Intelligent slave |

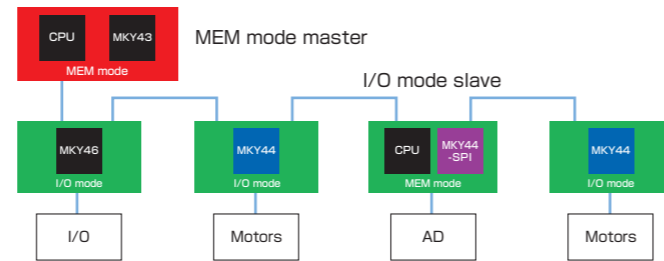
## “1: N” pattern

① Optimum “1:N” pattern for I/O control



This is a network pattern consisting of one master board and several slave boards. One slave board can flexibly set and control 32-bit DIO in 4-bit units. \* If a higher-speed baud rate is required in this pattern, also HLS is available.

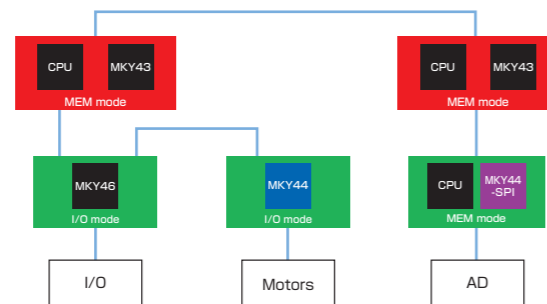
② Optimum “1:N” pattern for sharing control data of devices such as actuators



This is a network pattern consisting of one master board and several intelligent slaves. You can easily control AD and DA. You can also realize decentralized control easily because every CUnet IC shares these controlling data (operating status) in real-time.

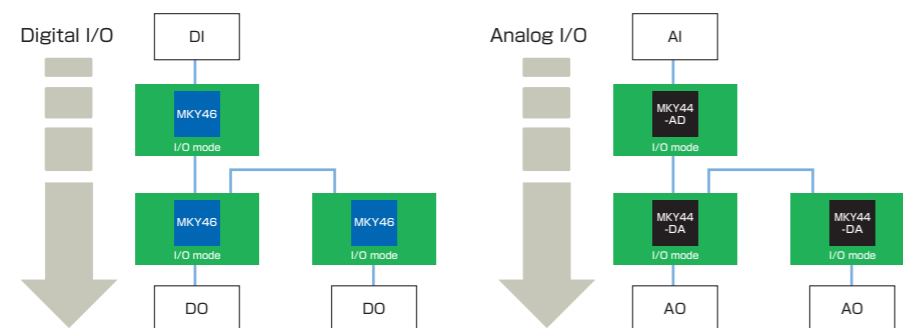
## “N: N” pattern

● “N:N” pattern for sensor actuator control and data sharing (multi-master type)



This network pattern consists of several MEM mode masters and several I/O mode slaves. Visualize several “1:N networks” being connected. Since several MEM mode masters also share all the data, it can easily provide multi-master type distributed control.

## Non-CPU pattern with IO mode only



This network pattern consists of I/O mode only. It provides non-CPU DIO control with I/O mode only. Enabling CPU-less communication, it demonstrates built-in communication protocols. Since it does not require programs and CPUs, development cost can be reduced significantly.

## IC Family

| Family   | Series      | Type                | Operating voltage                     | Size   | Function  | Features  |   |  |
|--|-------------|---------------------|---------------------------------------|--|---|---|---|--|
| HLS<br>High-speed Link System<br>RoHS compatible | Master IC   | MKY36               | 3.3 V (5 V tolerant)                  | 64-pin, TQFP<br>0.5 mm pitch<br>10 mm×10 mm  | Supporting 16/8-bit bus<br>CPU interface  | Requiring CPU connection  |   |  |
|  | Slave IC    | MKY37               | 5.0 V                                 | 64-pin, TQFP<br>0.5 mm pitch<br>10 mm×10 mm  | DIN: 16 bits<br>DOU: 16 bits  | Non-CPU<br>Low power consumption  |   |  |
|  | HUB-IC      | MKY02               | 3.3 V (5 V tolerant)                  | 64-pin, TQFP<br>0.5 mm pitch<br>10 mm×10 mm  | HUB function  | Non-CPU<br>T-type branching and wiring extension possible<br>Up to 7-level connection possible                  |   |  |
| CUnet<br>RoHS compatible                         | MEM mode IC | MKY43               | 3.3 V (5 V tolerant)                  | 64-pin, TQFP<br>0.5 mm pitch<br>10 mm×10 mm  | Master/Slave IC<br>Supporting 16/8-bit bus<br>CPU interface                                     | Requiring CPU connection<br>Supporting data sharing<br>Supporting mail function<br>(256-byte data transmission) |   |  |
|  |             | MKY44-SPI           | 3.3 V                                 | 64-pin, TQFP<br>0.5 mm pitch<br>10 mm×10 mm  | Master/Slave IC<br>SPI slave function<br>(Max 1 Mbps)   | Requiring CPU connection<br>Supporting data sharing<br>Supporting mail function<br>(256-byte data transmission) |   |  |
|  | I/O mode IC | MKY46               | 5.0 V                                 | 100-pin, TQFP<br>0.5 mm pitch<br>14 mm×14 mm | DIN/DOU: 32 bits  | Non-CPU<br>Switching DIN/DOU in 4 bits  |   |  |
|  |             | MKY44-IO32A         | 3.3 V                                 | 64-pin, TQFP<br>0.5 mm pitch<br>10 mm×10 mm  | 32 DIN/DOU with filter<br>2 ch 24 bits Up/<br>Down Counter (Encoder)<br>2 ch 16 bits PWM output | Non-CPU<br>Switching DIN/DOU in 8 bits<br>ST44SW: Required  |   |  |
|  |             | MKY44-AD12A         | 3.3 V                                 | 64-pin, TQFP<br>0.5 mm pitch<br>10 mm×10 mm  | 12 bits AD 4 ch<br>4 DIN/4 DOU  | Non-CPU<br>Built-in ADC<br>ST44SW: Unrequired   |   |  |
|  |             | MKY44-AD16A         | 3.3 V                                 | 64-pin, TQFP<br>0.5 mm pitch<br>10 mm×10 mm  | 16 bits AD 2 ch<br>8 DIN/8 DOU  | Non-CPU<br>ADC external: AD7682<br>ST44SW: Required   |   |  |
|  |             | MKY44-AD16B         | 3.3 V                                 | 64-pin, TQFP<br>0.5 mm pitch<br>10 mm×10 mm  | 16 bits AD 4 ch   | Non-CPU<br>ADC external: AD7682<br>ST44SW: Unrequired   |   |  |
|  |             | MKY44-DA16A         | 3.3 V                                 | 64-pin, TQFP<br>0.5 mm pitch<br>10 mm×10 mm  | 16 bits DA 2 ch<br>8 DIN/8 DOU  | Non-CPU<br>DAC external: AD5752<br>ST44SW: Required   |   |  |
|  |             | MKY44-DA16B         | 3.3 V                                 | 64-pin, TQFP<br>0.5 mm pitch<br>10 mm×10 mm  | 16 bits DA 4 ch   | Non-CPU<br>DAC external: AD5754<br>ST44SW: Unrequired   |   |  |
|  |             | MKY44-FS00A         | 3.3 V                                 | 64-pin, TQFP<br>0.5 mm pitch<br>10 mm×10 mm  | Improving the speed of<br>communication between I/O   | Used in communication<br>between I/O modes  |   |  |
|  |             | HUB-IC              | MKY02                                 | 3.3 V (5 V tolerant)                         | 64-pin, TQFP<br>0.5 mm pitch<br>10 mm×10 mm   | HUB function  |   |  |
|  |             | IC supporting MKY44 | IC for MKY44 communication setting SW | ST44SW                                       | 3.3 V   | 32-pin, TQFP<br>0.8 mm pitch<br>7 mm×7 mm   | Baud rate, address (SA),<br>Master specifying address (DOSA),<br>and other 2 bits | IC for MKY44 Series setting SW<br>Required for several<br>MKY44 Series |






## Recommended Components












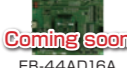







| Family   | Series                               | Type                         | Operating voltage            | Size           | Function                            | Specifications   |  |
|--|--------------------------------------|------------------------------|------------------------------|----------------|-------------------------------------|--|--|
| Recommended component<br>(Other manufacturer)<br>Supporting RoHS | Pulse transformer                    | DMX 8 E                      | SPT401-DMX                   | —              | 9.4 mm(W)<br>4.6 mm(D)<br>2.5 mm(H) | Isolates each device electrically<br>(with DC components).<br>Protects devices from<br>external noise. | 1.5-kV withstand voltage<br>Winding ratio: 1:1<br>Inductance: 400 μH<br>Operating temperature limit:<br>-25°C to +70°C |
|  | Oscillator                           | OSP535 48MHz<br>OSP533 48MHz | OSP535 48MHz<br>OSP533 48MHz | 5.0 V<br>3.3 V | 5.0 mm(W)<br>3.2 mm(D)<br>0.9 mm(H) | Oscillator dedicated for MKY<br>(48 MHz)   | Frequency: 48 MHz  |
| Contact Plonics<br>for inquiries                                 | Cable<br>(Shinko Seisen<br>Industry) | ZHT262PS                     | —                            | —              | 300 m/reel                          | Impedance: 100 Ω   | 2 pairs of aluminum-shielded<br>single wire  |
|  |                                      | ZHY262PS                     | —                            | —              | 300 m/reel                          |  | 2 pairs of aluminum-shielded<br>twisted wire   |
|  |                                      | ZHY221PS                     | —                            | —              | 200 m/reel                          |  | 1 pair of aluminum-shielded<br>twisted wire  |
|  |                                      | ZHY282PS                     | —                            | —              | 300 m/reel                          |  | 2 pairs of flex resistant<br>aluminum-shielded twisted wire  |
|  |                                      | ZHY262PBA                    | —                            | —              | 300 m/reel                          |  | Braided 2 pairs of<br>aluminum-shielded twisted wire   |



## Evaluation board family

The board product family is for evaluation.  
Cannot be using these boards embedded in your application.

| Family   | Series       | Type   | Mounted IC  | Communication Speed/Mode                   | Operating voltage | Size   | Function  | Features   |
|--|--------------|--|---|--|-------------------|--|---|--|
| HLS<br>Hi-speed Link System<br>Supporting RoHS | Master board |  Coming soon<br>EB-36 |  MKY36 | 12/6/3 Mbps<br>Full-duplex/<br>Half-duplex | 24.0 V            | 200 mm (W)<br>160 mm (D)<br>15 mm (H)<br>Nucleo not included | HLS master function<br>Can be controlled by ST-Micro's Nucleo. *1 | Communication connector: Modular                               |
|  |              |  HLS-36USB            |   |  | 5.0 V             | 66.5 mm (W)<br>92 mm (D)<br>28 mm (H)                        | HLS master function<br>Supported OS<br>Windows 10 (64/32 bits)    | Compatible with USB 2.0 HS<br>Communication connector: Modular |
|  | Slave board  |  Coming soon<br>EB-37 |  MKY37 |  | 24.0 V            | 210 mm (W)<br>180 mm (D)<br>15 mm (H)                        | Isolated 16DIN<br>Isolated 16DOUT                                 | Communication connector: Modular                               |

| Family                   | Series       | Type  | Mounted IC  | Communication Speed/Mode   | Operating voltage                     | Size   | Function  | Features   |
|--------------------------|--------------|---|---|----------------------------|---------------------------------------|--|---|--|
| CUnet<br>Supporting RoHS | Master board |  Coming soon<br>EB-43        |  MKY43         | 12/6/3 Mbps<br>Half-duplex | 24.0 V                                | 200 mm (W)<br>160 mm (D)<br>15 mm (H)<br>Nucleo not included | CUnet master function<br>Can be controlled by ST-Micro's Nucleo. *1 | Communication connector: Modular                               |
|                          |              |  CU-43USB                    |   |                            | 5.0 V                                 | 66.5 mm (W)<br>92 mm (D)<br>28 mm (H)                        | CUnet master function<br>Supported OS<br>Windows 10 (64/32 bits)    | Compatible with USB 2.0 HS<br>Communication connector: Modular |
|                          |              |  Coming soon<br>EB-44SPI     |  MKY44-SPI     |                            | 24.0 V                                | 255 mm (W)<br>180 mm (D)<br>15 mm (H)<br>Nucleo not included | CUnet master function<br>Can be controlled by ST-Micro's Nucleo. *1 | Communication connector: Modular                               |
|                          | Slave board  |  Coming soon<br>EB-46        |  MKY46         | 24.0 V                     | 250 mm (W)<br>205 mm (D)<br>15 mm (H) | 32DIO<br>(Isolated DIN,<br>Isolated DOUT)                    | Communication connector: Modular<br>DIN, DOUT points selectable     |  |
|                          |              |  Coming soon<br>EB-44I032A |  MKY44-I032A |                            | 255 mm (W)<br>205 mm (D)<br>15 mm (H) | 32DIO<br>(Isolated DIN,<br>Isolated DOUT)                    | Communication connector: Modular<br>DIN, DOUT points selectable     |  |
|                          |              |  Coming soon<br>EB-44AD12A |  MKY44-AD12A |                            | 185 mm (W)<br>185 mm (D)<br>15 mm (H) | 12-bit AD 4 ch<br>Isolated 4DIN<br>Isolated 4DOUT            | Communication connector: Modular                                    |  |
|                          |              |  Coming soon<br>EB-44AD16A |  MKY44-AD16A |                            | 185 mm (W)<br>200 mm (D)<br>15 mm (H) | 16-bit AD 2 ch<br>Isolated 8DIN<br>Isolated 8DOUT            | Communication connector: Modular                                    |  |
|                          |              |  Coming soon<br>EB-44AD16B |  MKY44-AD16B |                            | 155 mm (W)<br>220 mm (D)<br>15 mm (H) | 16-bit AD 4 ch   | Communication connector: Modular                                    |  |
|                          |              |  Coming soon<br>EB-44DA16A |  MKY44-DA16A |                            | 185 mm (W)<br>185 mm (D)<br>15 mm (H) | 16-bit DA 2 ch<br>Isolated 8DIN<br>Isolated 8DOUT            | Communication connector: Modular                                    |  |
|                          |              |  Coming soon<br>EB-44DA16B |  MKY44-DA16B |                            | 155 mm (W)<br>185 mm (D)<br>15 mm (H) | 16-bit DA 4 ch   | Communication connector: Modular                                    |  |

\*1: Please obtain the ST-Micro Nucleo yourself.

## Buy online

You can get quotations and buy StepTechnica's products, partners' products, and recommended components on Pionics' (the sole distributor) website.

 Pionics Co., Ltd.

Official website [www.pionics.co.jp](http://www.pionics.co.jp)



## Free software

### ◆Editor

These editors are GUI-type developing support software dedicated for each of the master boards.  
You can operate the memory status and the registers of the device in detail.

- **HLSEditor** (for HLS) Target board: HLS-36USB
- **CUEditor** (for CUnet) Target board: CU-43USB



HLSEditor

### ◆Assistance software

These softwares are GUI-type developing support software dedicated for each of the master boards. You can easily monitor and operate HLS and CUnet if you are not sure about the details of the network.

- **ASSIST-HLS** (for HLS) Target board: HLS-36USB
- **ASSIST-CU** (for CUnet) Target board: CU-43USB



ASSIST-HLS

### ◆CUnet Slave Address Auto Mapper

This is a support tool for CUnet slave settings.  
You can easily consider the network structure consisting of different slave terminals by automatically calculating the values required for the setting of CUnet slave addresses.



SETUP44

### ◆SETUP44

This is a tool for MKY44 series IC.  
You can set each of the required function parameters to operate MKY44 series IC.  
This software requires CU-43USB.

## Comparative table of HLS and CUnet

|   | HLS   | CUnet  |
|---|---|--|
| Network structure                                   | 1:N   | N:N  |
| Features  | High-speed DIO control                          | Data sharing<br>Intelligent DIO and analog I/O |
| Control method                                      | Read/Write memory                               | Read/Write memory                              |
| Communication method                                | Master/Slave type polling method                | Multi-master type broadcast method             |
| Network topology                                    | Multi-drop (RS485)                              | Multi-drop (RS485)                             |
| Communication speed                                 | 12 Mbps/6 Mbps/3 Mbps (full duplex/half duplex) | 12 Mbps/6 Mbps/3 Mbps (half duplex)            |
| Communication cable                                 | Shielded cable of more than category 5          | Shielded cable of more than category 5         |
| Number of connection nodes                          | 63  | 64   |
| Minimum data length                                 | DIN: 16 bits, DOUT: 16 bits                     | 8 bytes  |
| Maximum data length                                 | DIN: 1008 bits, DOUT: 1008 bits                 | 512 bytes                                      |
| Fastest response (per terminal)                     | Approx. 15 μsec                                 | Approx. 37 μsec                                |
| Fastest response (when all terminals are operating) | Approx. 955 μsec                                | Approx. 2365 μsec                              |
| Digital I/O control                                 | ○   | ○  |
| Analog I/O control                                  | △   | ○  |
| Mail function (Messaging)                           | ×   | ○(256 bytes)                                   |
| Monitoring function (GMM)                           | ×   | ○  |
| Communication distance                              | 12 Mbps:100 m 6 Mbps:200 m 3 Mbps:300 m         | 12 Mbps:100 m 6 Mbps:200 m 3 Mbps:300 m        |
| Topology  | Bus (when using HUB: tree/star)                 | Bus (when using HUB: tree/star)                |

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