MITSUBISHI ELECTRIC

Changes for the Better

for a greener tomorrow eco Changes

Open Field Network
CC-Link Family Compatible Product Development Guidebook

CC-Link IE TSN

CC-Link IE

CC-Link CC-Link/LT

GLOBAL IMPACT OF MITSUBISHI ELECTRIC

Through Mitsubishi Electric's vision, "Changes for the Better" are possible for a brighter future.

Changes for the Better

We bring together the best minds to create the best technologies. At Mitsubishi Electric, we understand that technology is the driving force of change in our lives. By bringing greater comfort to daily life, maximizing the efficiency of businesses and keeping things running across society, we integrate technology and innovation to bring changes for the better.

Mitsubishi Electric is involved in many areas including the following

Energy and Electric Systems
A wide range of power and electrical products from generators to large-scale displays.

Electronic Devices
A wide portfolio of cutting-edge semiconductor devices for systems and products.

Home Appliance
Dependable consumer products like air conditioners and home entertainment systems.

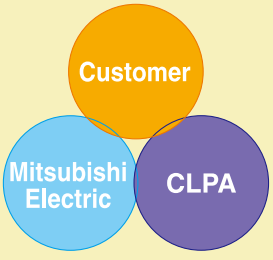
Information and Communication Systems
Commercial and consumer-centric equipment, products and systems.

Industrial Automation Systems
Maximizing productivity and efficiency with cutting-edge automation technology.

From consulting to the provision of development tools, Mitsubishi Electric is ready to assist you in speedy development of CC-Link Family compatible products.

Making your products compatible with CC-Link Family, an open field network originating from Japan, will not only ensure the level of system flexibility distinctively characteristic of multi-vendor products but also provide you with the opportunity to boost the competitiveness of your products to the global level once and for all.

With various certifications, including International Organization for Standardization ISO 15745-5*1, IEC 61158 and IEC 61784*2, SEMI*3, Chinese National Standards GB*4, Korean Industrial Standards KS*5, and Japanese Industrial Standards JIS*6, CC-Link has lived up to its name as a global standard. To ensure quick and certain development of CC-Link family compatible products, such as CC-Link IE TSN and CC-Link IE Control network, CC-Link IE Field network, Mitsubishi Electric will support you in every phase of development, including the provision of development tools.

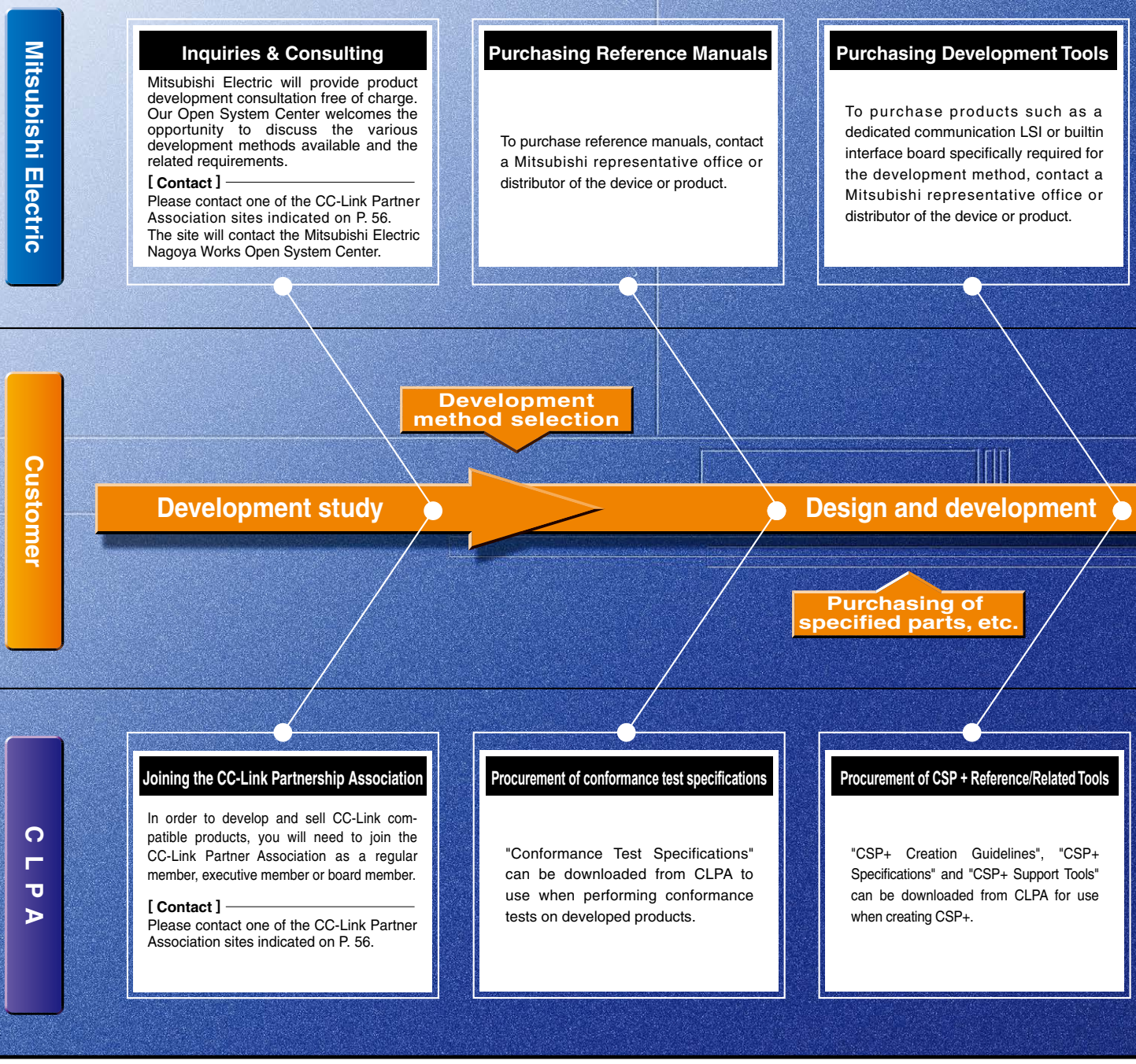


*1. "Application Integration Framework"
*2. Industrial Field bus protocol standard
*3. SEMI E54.12 E54.23-0513
*4. GB/T 19760 20299.4
*5. KSBISO15745-5
*6. JIS TR B0031

INDEX

Expanding business with CC-

Recommended path to CC-Link Family compatible product development

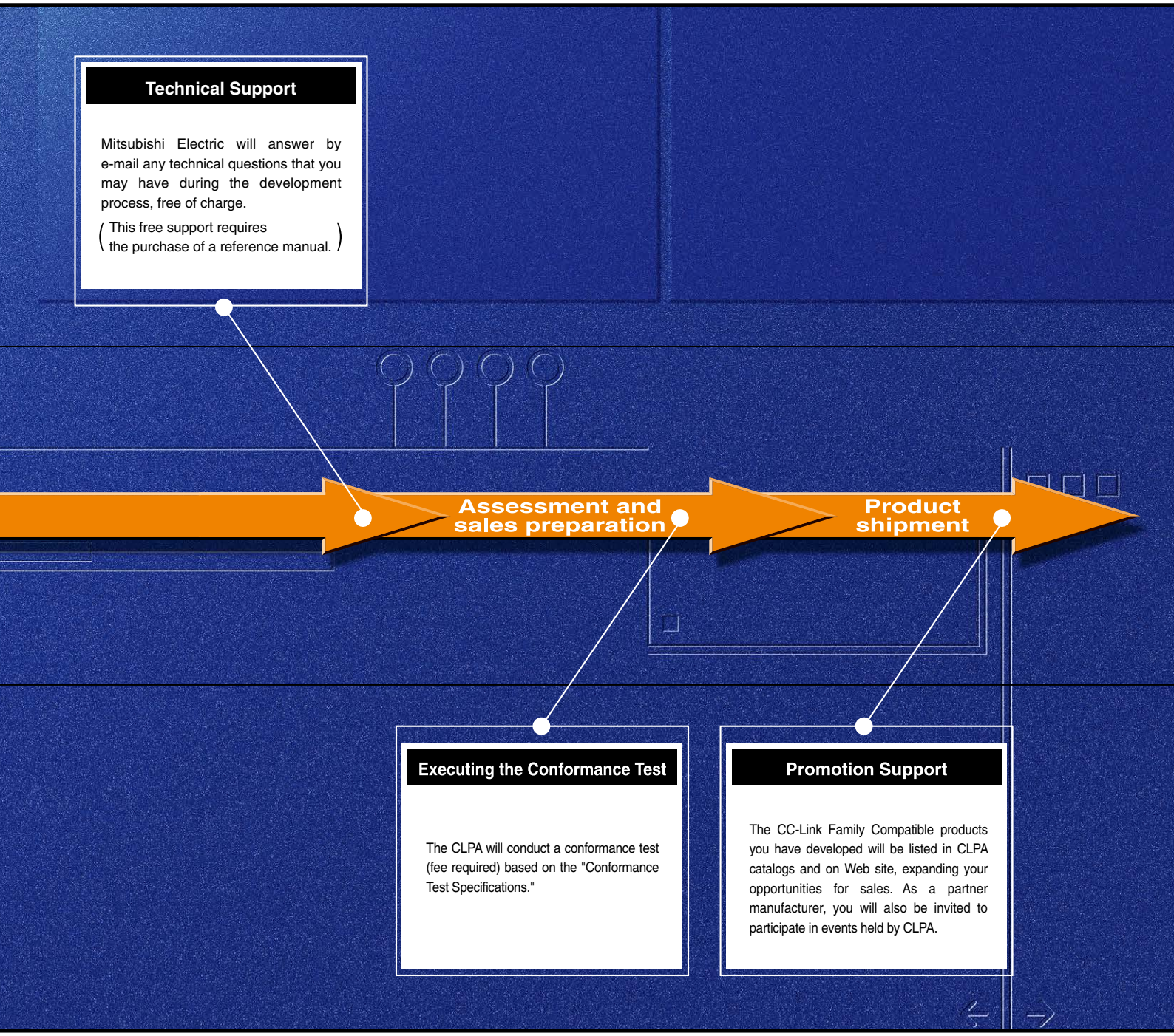


The strongest theme in CC-Link Family compatible product development is the simultaneous pursuit of quality and development speed. This includes the development of dedicated communication LSIs, which requires from the initial stages extreme efficiency with respect to both cost and speed. Mitsubishi Electric prepares development tools, including those for each type of dedicated communication LSI and built-in module, through our comprehensive CC-Link IE, CC-Link, & CC-Link/LT related technologies cultivated to date, and is pleased to offer its support in the development of efficient compatible products. Capable of highly detailed assistance, from consulting during the preparation stage to problem solving during development, Mitsubishi Electric and the CC-Link Partner Association (CLPA) are eager to serve you as your partners.

* CSP+: Control & Communication System Profile

In all

Link Family.



areas of development, Mitsubishi Electric offers you solid support.

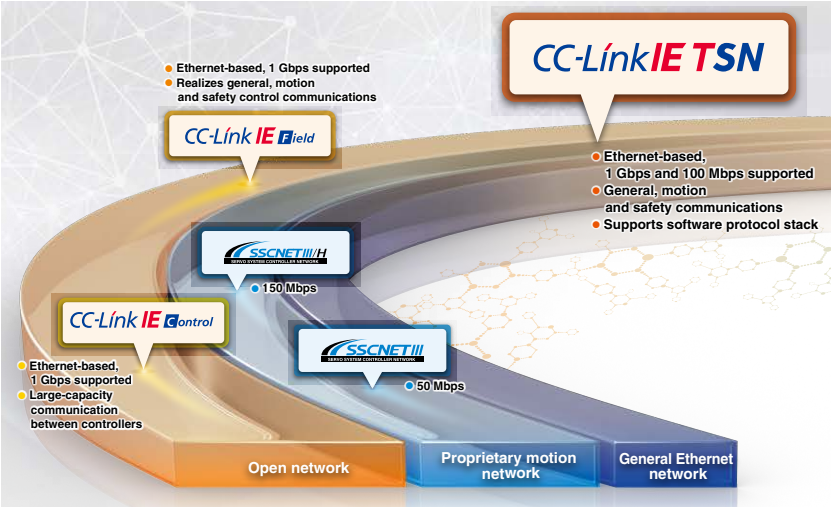
CC-Link IE TSN

Open integrated networking across the manufacturing enterprise

Leveraging an integrated and open network utilizing TSN technology realizes real-time data collection from the shop floor to IT systems

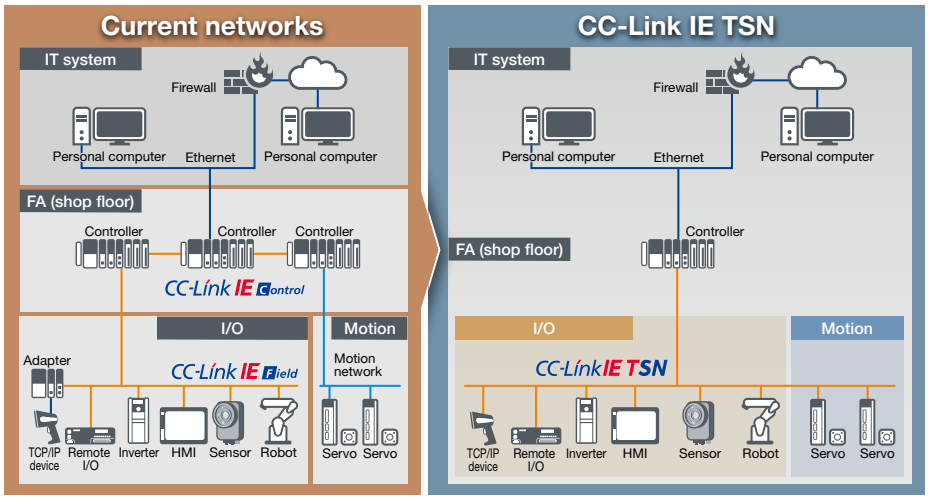
CC-Link IE TSN supports TCP/IP communications and applies it to industrial architectures through its support of TSN enabling real-time communications. With its flexible system architecture and extensive setup and troubleshooting features make CC-Link IE TSN ideal for building an IIoT infrastructure across the manufacturing enterprise.

* TSN: Time Sensitive Networking
* IIoT: Industrial Internet of Things



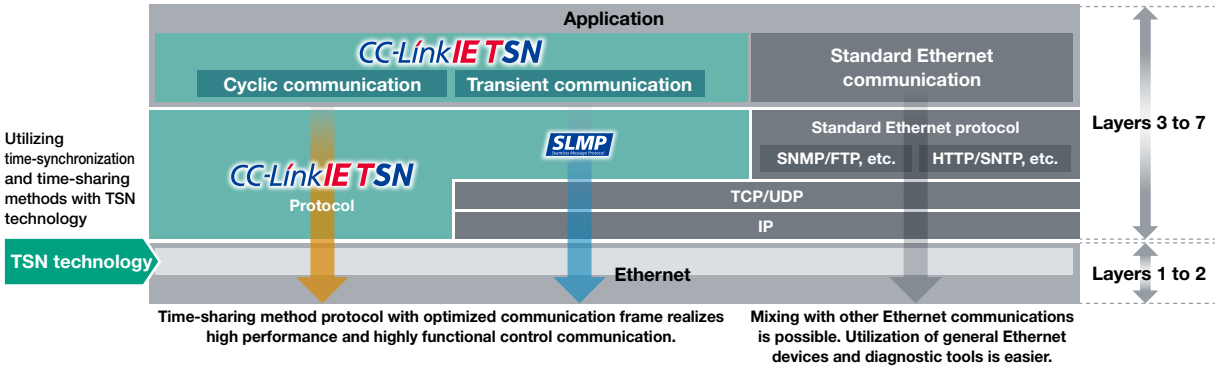
CC-Link IE TSN is an open industrial network inheriting the easy diagnostics of the CC-Link IE Field Network, the large-capacity data communications of the CC-Link IE Control Network, and the high-performance motion control features of SSCNET. Through the incorporation of TSN technology, this network further leverages control system performance to realize an open integrated network with advanced functionality.

The IT system and motion system configured with multiple networks can be integrated. Flexibility of system configuration is increased, reducing wiring cost.



TSN technology and protocol layers

High performance and functionality are realized owing to the use of the time-sharing method and TSN time-division protocol. Time division optimizes the communication frame and enables the mixing of standard Ethernet communications. Standard Ethernet protocol is also incorporated, enabling Ethernet devices and diagnostic tools to be utilized.



Highly scalable system utilizing best-in-class devices

Supports implementation of high-performance devices realized with a dedicated ASIC/FPGA, and low-cost devices using a software protocol stack on a standard Ethernet chip.
The allowable transmission rate is 1 G/100 Mbps.

Item	Configuration 1	Configuration 2	Configuration 3	Configuration 4
System configuration	Hardware *1 master Hardware slave *3	Software *2 master Hardware slave *3	Hardware master Software slave *3	Software master Software slave *3
Transmission rate				
1G [bps]	●	●	●	●
100M [bps]	●	●	●	●

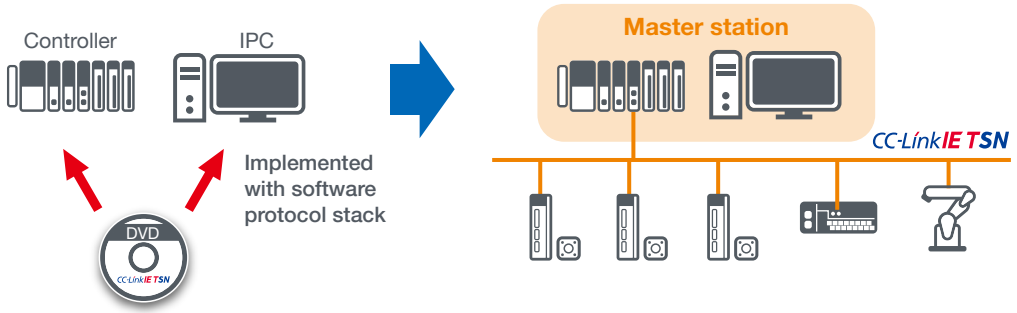
*1. Hardware master/slave: Development with dedicated LSI (ASIC, FPGA)
*2. Software master/slave: Development with software protocol stack (standard Ethernet chip)
*3. Slave: Stations (local and remote) other than master

CC-Link IE TSN

Developing Master Stations

Development with Software Development Kit (SDK)

Various controllers and IPCs implemented with the software protocol stack can control the network as a CC-Link IE TSN master station.

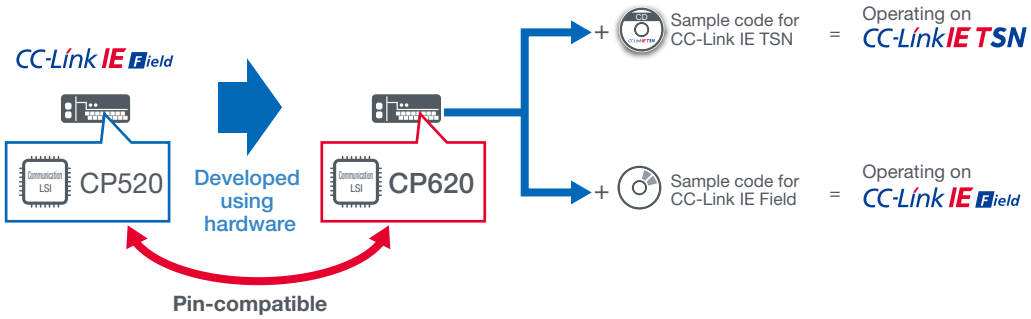


Master Station Software Development Kit

Developing Remote Stations

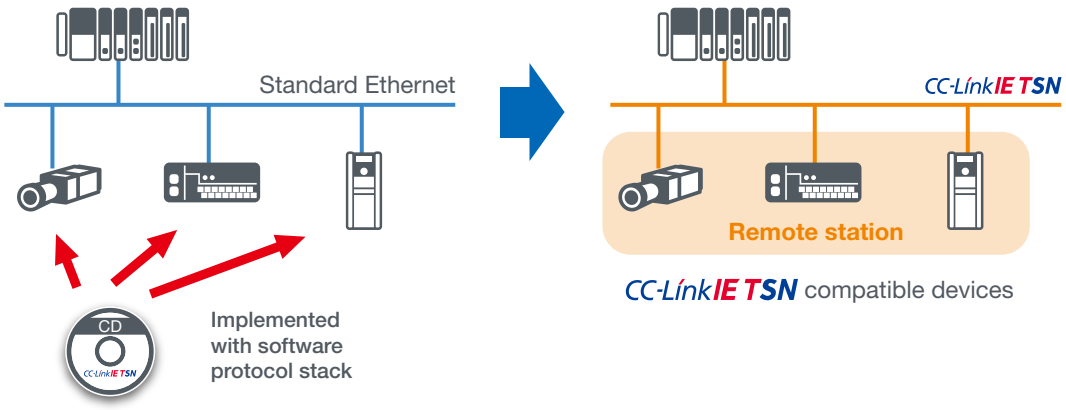
Development with dedicated LSI

The communication LSI, CP620, for CC-Link IE TSN remote station is pin-compatible with the communication LSI, CP520, for CC-Link IE Field Network. Therefore, CC-Link IE TSN compatible devices can be developed using the hardware of CC-Link IE Field Network compatible devices that use CP520. Since the hardware can operate on either CC-Link IE TSN or CC-Link IE Field Network by changing the sample code, the hardware can be shared.



Development with Software Development Kit (SDK)

CC-Link IE TSN compatible devices can be developed by implementing the software protocol stack on devices provided with Ethernet interface without developing hardware.



Remote Station Software Development Kit

Development method for CC-Link IE TSN

I want to develop a master station.

- To develop utilizing the existing Ethernet compatible devices
- To develop devices that support multiple protocols by sharing hardware

Master Station

P09 to P10

■Software Development Kit (SDK) Future support

This method allows you to develop master stations using software protocol stacks.
CC-Link IE TSN compatible devices can be developed without changing the hardware of devices compatible with general-purpose Ethernet.

Contract → Purchase SDK → Conformance test

I want to develop a remote station.

- To develop 1 Gbps compatible devices
- To develop devices that can fully utilize the performance and functions of CC-Link IE TSN

Remote Station

P11 to P14

■Communication LSI CP620 with GbE-PHY

This LSI integrates the CC-Link IE TSN communication ASIC, MPU and GbE-PHY.
CP620 is a communication LSI that allows you to develop devices that perform cyclic transmission and transient communication without concern about protocol.
CP620 is controlled with software.

Purchase reference manual → Purchase dedicated LSI → Conformance test

- To develop utilizing the existing Ethernet compatible devices
- To develop devices that support multiple protocols by sharing hardware

■Software Development Kit (SDK)

This method allows you to develop remote stations using software protocol stacks.
CC-Link IE TSN compatible devices can be developed without changing the hardware of devices compatible with general-purpose Ethernet.

Contract → Purchase SDK → Conformance test

CC-Link IE TSN Developing Master Stations

Software Development Kit (SDK) Future support

1. A software protocol stack that operates on a personal computer.
   Various systems can be configured with it regardless of a high performance or low-cost personal computer.

2. An API is compatible with CANopen®.
   Users who developed CANopen® compatible products can easily develop CC-Link IE TSN compatible devices.

3. The source code included version can be customized by users. This source code can enhance functions and can be easily ported to a different environment.
   In addition, a system can be configured with the library provided version at low cost.

■ Software protocol stack

■ Manual

■ Development environment

Name	Maker	Model
Development environment*1	Microsoft Corporation	Visual Studio® 2017
RealtimeOS*2	TenAsys Corporation	INtime

*1 For generating a real time execution file for INtime, the file must be built with Visual Studio® added on INtime SDK.
*2 If you are considering a different OS, please contact us.

■ Master Station Software Development Kit

Name	Model
CC-Link IE TSN Master Station Software Development Kit (Library with source code, INtime version)	SW1DTD-GNSDK1M
CC-Link IE TSN Master Station Software Development Kit (Library, INtime version)	SW1DTD-GNSDK2M

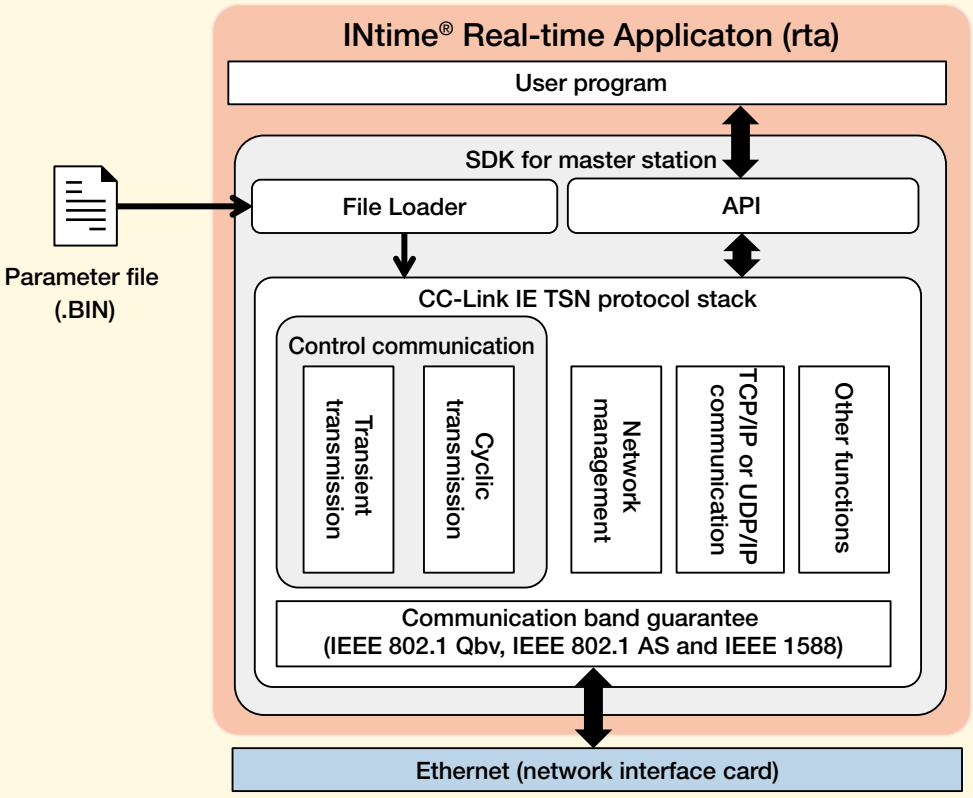
■ Manual

Title	Manual Number
CC-Link IE TSN Master Station Software Development Kit Reference Manual	SH(NA)-030322ENG

Contract | Purchase SDK | Conformance test

■ Software configuration

CC-Link IE TSN compatible products can be developed by embedding protocol stack library for the master station in user programs.
This development kit can also be used in a programming environment based on C language since a library group is implemented with the C language.



■ Performance specifications

No.	Item		Description
1	Maximum cyclic data size per network	Input data Output data	Total 36K bytes
2	Maximum cyclic data size per station	Input data Output data	Total 36K bytes
3	Communication speed		1Gbps, 100Mbps
4	Maximum number of connectable stations		129 stations (sum of master stations and remote stations) Excluding general-purpose TCP/IP communication device
5	Maximum station-to-station distance		100 m
6	Network topology		Line, star, line/star mixed
7	Communication method		Time sharing method
8	Time synchronization protocol		IEEE 802.1AS and IEEE 1588
9	Number of ports		1
10	Certified class		Can be used for development of certified Class B

CC-Link IE TSN Developing Remote Stations

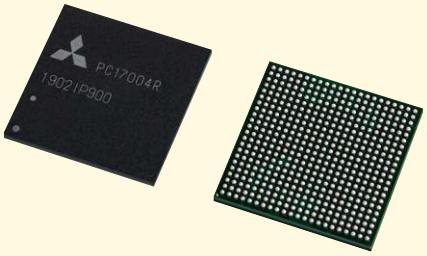
Communication LSI CP620 with GbE-PHY

CP620 is an LSI that integrates the communication IP core for CC-Link IE TSN, CPU, and GbE-PHY. This integrated LSI reduces the cost and man-hours for developing CPU and GbE-PHY. The following are the features of CP620-based development.

1. A remote station for CC-Link IE TSN can be developed without the consideration of protocols.
2. GbE-PHY in CP620 facilitates the designing of communication circuit patterns. In addition, only a small number of peripheral components and circuits are required for CPU and GbE-PHY, allowing the development of more compact circuit boards.
3. Sample code, which can be easily customized in accordance with the user hardware specifications and applications, is provided.
4. CP620 includes HW-RTOS, reducing the CPU load and achieving low power consumption in the developed device.

- The manual can be downloaded from the Mitsubishi Electric Factory Automation Website.
- Upon request, hardware and software development partners are introduced.
- Lead-free/RoHS directive compliant

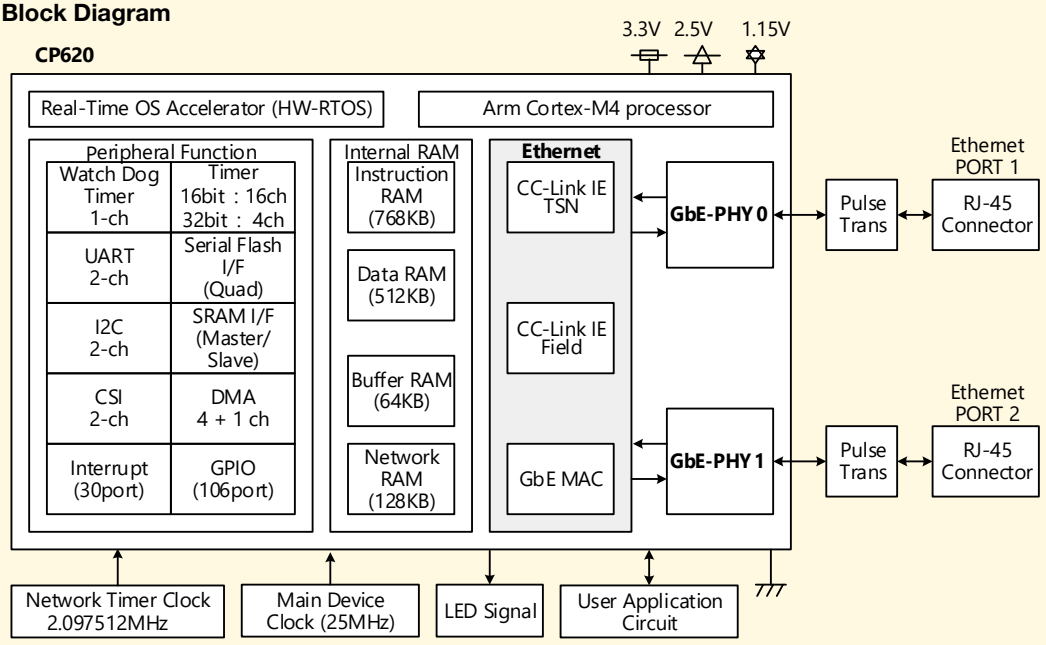
Communication LSI with GbE-PHY(CP620)



* Actual printing may differ from those shown in the figure.

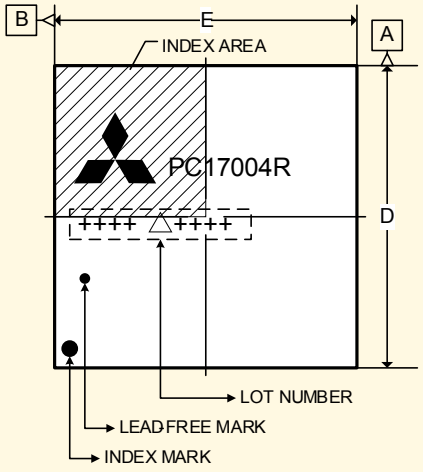
Manual

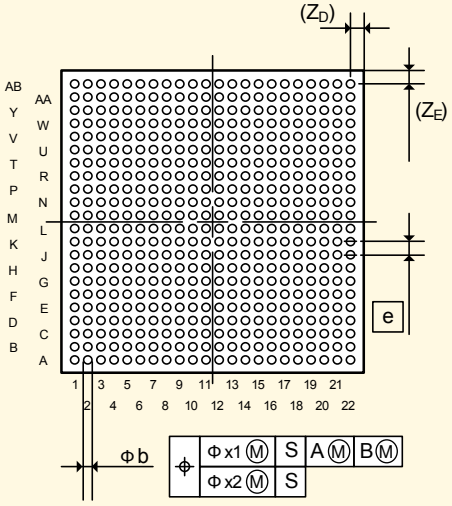
General Block Diagram

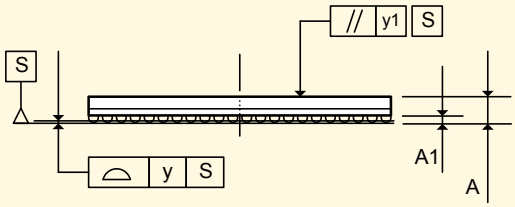


Purchase reference manual | Purchase dedicated LSI | Conformance test

External Dimensions







Reference Symbol	Dimension in Millimeters		
	Min.	Nom.	Max.
D	22.85	23.00	23.15
E	22.85	23.00	23.15
A	-	-	2.03
A1	0.40	0.50	0.60
e	-	1.00	-
b	0.50	0.60	0.70
x1	-	-	0.25
x2	-	-	0.10
y	-	-	0.15
y1	-	-	0.35
n	-	484	-
Z_D	-	1.00	-
Z_E	-	1.00	-

Communication LSI with GbE-PHY(CP620)

Name	Model	Packaging Unit
CP620 (PC17004R)	NZ2GACP620-60	60 pieces
	NZ2GACP620-300	300 pieces

Manual

Name	Manual Number
CC-Link IE TSN Remote Station Communication LSI CP620 with GbE-PHY Reference Manual	SH(NA)-082121ENG

CC-Link IE TSN Developing Remote Stations

Software Development Kit (SDK)

1. The amount of resources required for operating the software protocol stack is small, and therefore operation on a MCU for a low-cost device is available.

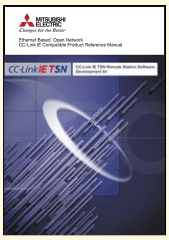
2. The product is provided in source code together with an API and wrapper layer, and therefore it can be easily ported to the customer's development environment.

3. By using the log function, when debugging, the customer can trace an error or the processing status in the protocol stock.

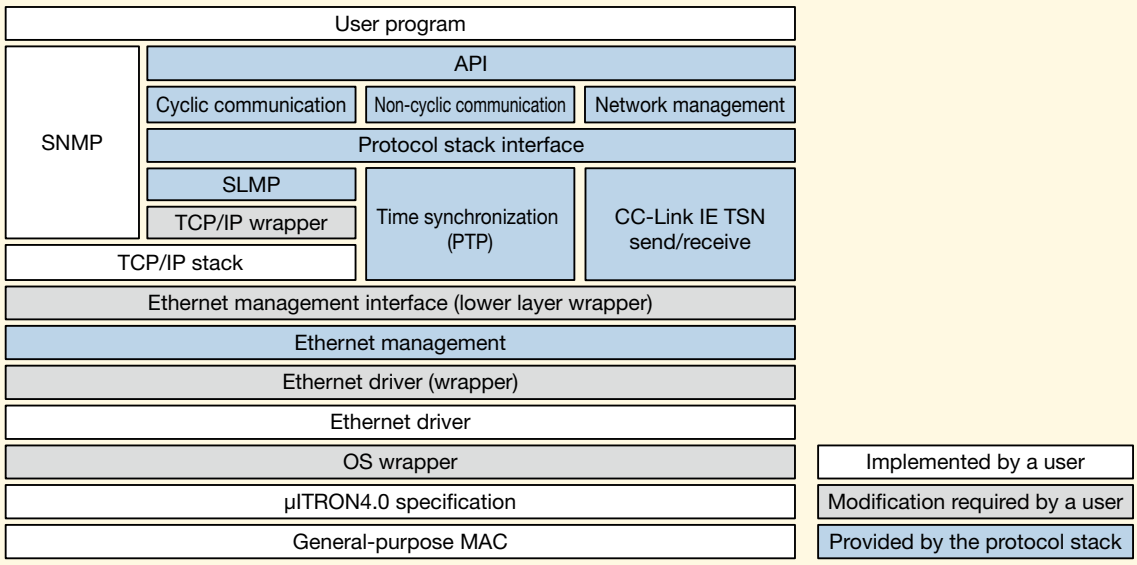
4. Since an API compatible with the CC-Link IE Field Network Basic remote station sample code is adopted, users who developed CC-Link IE Field Network Basic compatible product can easily develop the CC-Link IE TSN compatible product.

Software protocol stack

Manual



Software configuration



Remote Station Software Development Kit

Name	Model
CC-Link IE TSN Remote Station Software Development Kit	SW1DNC-GNSDK1S-M

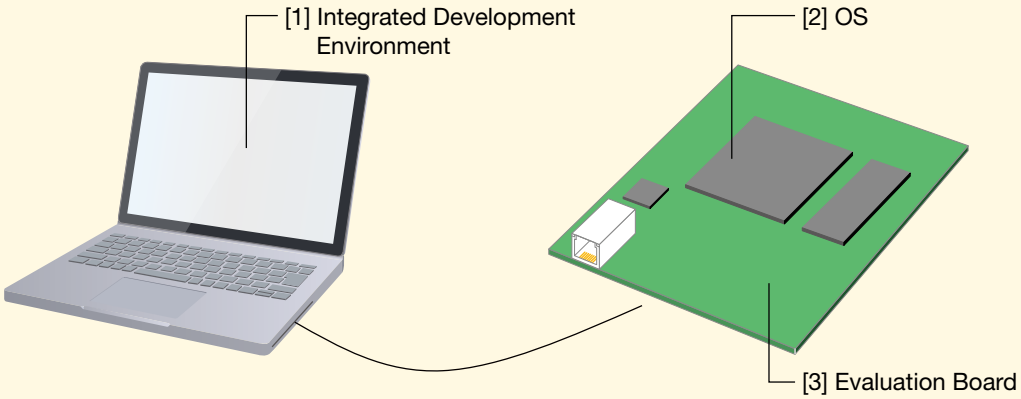
Manual

Title	Manual Number
CC-Link IE TSN Remote Station Software Development Kit Reference Manual *1	SH(NA)-082117ENG

*1 PDF data of the manual is included with the product. (The print book manual is not provided.)

Contract | Purchase SDK | Conformance test

■ The partner products that are widely used in domestic and overseas are used as the recommended development environment for the software development kit. For introducing the development environment, refer to the following.



	Name	Maker	Description
[1]	IAR Embedded Workbench for Arm	IAR Systems	A development environment that is completely integrated with a compiler, an assembler, a linker, and a debugger for C/C++ programming. This development environment enables code generations with high efficiency and high reliability. More than 12000 devices and more than 40 CPU architectures are supported.
[2]	µC3/Compact *2	eForce	A compact RTOS that is compliant with µITRON4.0. This can be designed with the configurator.
[3]	NUCLEO-F429ZI	STMicroelectronics	An MCU development board is provided by STMicroelectronics. An STM32 MCU (STM32F429ZIT6) is included. · Arm® Cortex®-M4 (integrated FPU): Maximum 180 MHz operation · Integrated Flash memory: 2 MB · SRAM: 256 KB (4 KB for backup) · Included 10/100 Ethernet MAC

*2 When examining the use of any OS other than those above, contact us.

■ Performance specifications

No.	Item		Description
[1]	Cyclic data size	RY	Total 256 + 1024 bytes *3
		RWw	
		RX	Total 256 + 1024 bytes *3
		RWr	
[2]	Communication speed		1Gbps, 100Mbps
[3]	Maximum station-to-station distance		100 m
[4]	Network topology		Line, star, line/star mixed
[5]	Communication method		Time sharing method
[6]	Time synchronization protocol		IEEE 1588-2008
[7]	Number of ports		2
[8]	Certified class		Can be used for development of certified Class A

*3 The data size shall be the integer multiple of 4 bytes (recommended). If not, the communication performance may be decreased.

Development Method for Other

CC-Link Family Products

CC-Link IE Control

CC-Link IE Field

CC-Link

CC-Link/LT

Development method for CC-Link IE

CC-Link IE Control

I want to develop a control station or normal station using a PC interface board.

Driver Development P17 to P18

■Driver Development*1

Drivers for various operating systems can be developed for use with the Mitsubishi PC interface board (Q80BD-J71GP21-SX).

Purchase reference manual

CC-Link IE Field

I want to develop a master station.

Master Station P19 to P20

■Source Code Development

Develop a master station using source codes.
A master station can be designed with a higher flexibility by combining source codes and communication LSI.

Contract | Purchase reference manual | Purchase dedicated LSI | Conformance test

I want to develop an intelligent device station or remote device station.

Intelligent Device Station, Remote Device Station P21 to P24

■Communication LSI CP520 with GbE-PHY

This LSI integrates the CC-Link IE Field Network communication ASIC, MPU and GbE-PHY.
CP520 is a communication LSI that allows you to develop devices that perform cyclic transmission and transient communication without concern about protocol.
CP520 is controlled with software.

Purchase reference manual | Purchase dedicated LSI | Conformance test

■Dedicated communication LSI CP220

CP220 is a communication LSI that allows you to develop devices that perform cyclic transmission and transient communication without concern about protocol. It is compatible with the motion function.
CP220 is controlled with software.

Purchase reference manual | Purchase dedicated LSI | Conformance test

I want to develop a master station or local station using a PC interface board.

Driver Development P25 to P26

■Driver Development*1

Drivers for various operating systems can be developed for use with the Mitsubishi PC interface board (Q80BD-J71GP11-T2/ Q81BD-J71GF11-T2).

Purchase reference manual

*1 CC-Link Partner Association membership is not always necessary. For details, contact your local CLPA office.

CC-Link IE Control

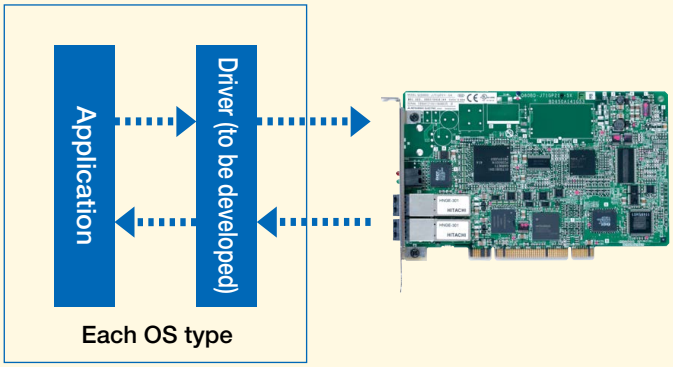
Developing Drivers for the Various Operating Systems of CC-Link IE Control Network PC Interface Board

Purchase reference manual

Q80BD-J71GP21-SX Driver Development

■Manual

■Conceptual Diagram



1. Developing a driver for the various operating systems enables use of the CC-Link IE Control Network compatible PC interface board as a control station or normal station.

2. The CC-Link IE Control Network Q80BD-J71GP21 Driver Development Reference Manual helps you develop a PC interface board Q80BD-J71GP21-SX driver compatible with the various operating systems.

3. The reference manual describes the hardware information (PCI configuration area, 2-port memory area, and hardware control memory area memory map) and software information (driver initialization procedure and parameter setup procedure) required for driver development.

4. This reference manual includes sample programs (C language), making it possible to reduce development costs and shorten development man-hours.

•Upon request, software development partners are introduced.

■Manual

Title	Manual No.
CC-Link IE Q80BD-J71GP21-SX Driver Development Reference Manual	SH(NA)-080819ENG

CC-Link IE Control

CC-Link IE Control Network PC Interface Board

Q80BD-J71GP21-SX/Q80BD-J71GP21S-SX, Q81BD-J71GP21-SX/Q81BD-J71GP21S-SX

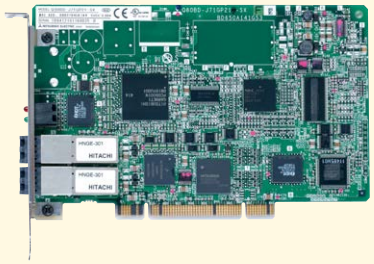
1. The interface board allows you to incorporate personal computers into the CC-Link IE Control Network.
   The interface board allows you to use a personal computer as a control station or normal station within a CC-Link IE Control Network when mounted.

2. The interface board enables simple parameter setup.
   Using the CC IE Control utility enables simple setup of the parameters required for CC-Link IE Control Network operation.

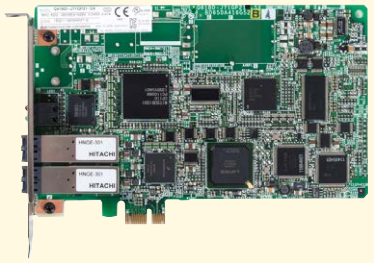
3. The interface board displays test information and monitor information related to the CC-Link IE Control Network system.
   The interface board enables simple display of CC-Link IE Control Network system related test and monitor status information on the personal computer.

4. The interface board offers RCPU and QCPU multiple CPU system compatibility.
   The interface board enables communication with each CPU of a multiple CPU system via specification of logical station numbers using the CC IE Control utility.

■ **Q80BD-J71GP21-SX**



■ **Q81BD-J71GP21-SX**



Item	Q80BD-J71GP21-SX Q80BD-J71GP21S-SX	Q81BD-J71GP21-SX Q81BD-J71GP21S-SX
Station type	Control station or normal station	
Number of boards that can be installed	Up to 4	
Installation slot	PCI slot or PCI-X slot (half size)	PCI Express® x1, x2, x4, x8, x16 slot (half size)
PCI bus / PCI Express® bus specifications	PCI Standard Rev. 2.2 (3.3 VDC / 5 VDC, 32-bit bus, Basic clock: 33 MHz)	PCI Express® Standard Rev. 1.1 (3.3 VDC, link width: 1 lane, Basic clock: 100 MHz)
No. of occupied slots	1 slot	
Internal current consumption	1.10A (5 VDC)	2.07A (3.3 VDC)
Weight	Q80BD-J71GP21-SX: 0.12 kg Q80BD-J71GP21S-SX: 0.14 kg	Q81BD-J71GP21-SX: 0.13 kg Q81BD-J71GP21S-SX: 0.14 kg
Included software	Windows® software package (1 CD-ROM)*	

* For information on compatible versions of Windows®, visit the Mitsubishi Electric Factory Automation Website.

Products that do not include a Windows® software package (CD-ROM) are also available.
For details, contact your local dealer network.

CC-Link IE Field

Developing Master Stations

CC-Link IE Field Network Source Code Development

The items shown on the right allow you to develop CC-Link IE Field Network master stations without concern for the protocol.*1

1. CP210 is a dedicated communication LSI for the master station of a CC-Link IE Field Network.
2. CP210 supports cyclic transmission (RX/RY: 16384 bits each; RWr/RWw: 8192 words each) and transient transmission. The network can be wired into star topology, line topology, and a combination of star and line topologies.*2
3. Parts are not particularly specified, allowing free parts selection. The source code can be customized in accordance with hardware specifications of the user board and application.
4. The source code development CD-ROM includes C-language source code and circuit examples (PDF), making it possible to reduce development costs and shorten the development process.

*1 Local stations are not supported.

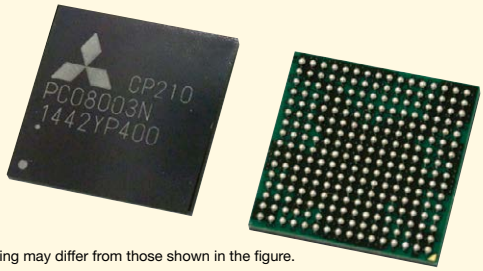
*2 Ring topologies are not supported.

- Upon request, hardware and software development partners are introduced.
- Lead-free / RoHS directive compliant
- Use of this product requires conclusion of the license agreement with Mitsubishi Electric.

Source Code

Manual

Dedicated Communication LSI (CP210)



*Actual printing may differ from those shown in the figure.

Source Code

Name	Model
Source Code Development CD-ROM	SW1DNC-EFI210SRC

*Source code operation has been verified using the recommended environment.

Dedicated Communication LSI (CP210)

Name	Model	Packaging Unit
CP210 (PC08003N)	NZ2GACP210-60	60 pieces
	NZ2GACP210-300	300 pieces

Manual

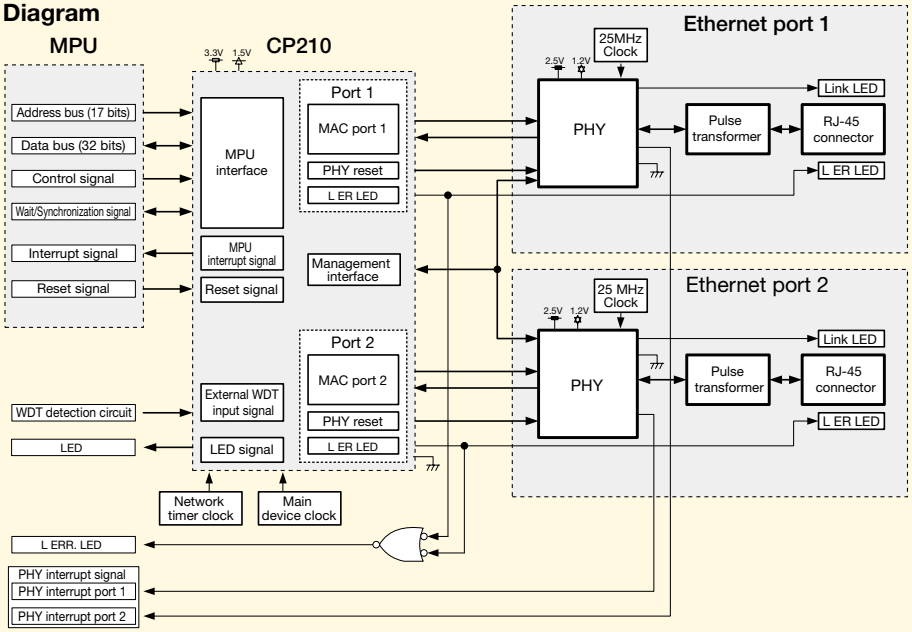
Title	Manual Number
CC-Link IE Field Network Source Code Development Master Station Communication LSI CP210 Reference Manual	SH(NA)-081455ENG

Recommended Environment

Item	Manufacturer	Product Name	Remarks
Compiler	Green Hills Software, Inc.	C/C++ CROSS V800 COMPILER	•Compiler version : v4.2.3-A5 •This compiler is included in the integrated development environment "MULTI".
OS	Renesas Electronics Corporation	RX850	•Version3.20 •µITRON 3.0 specifications compliant

Contract | Purchase reference manual | Purchase dedicated LSI | Conformance test

■General Block Diagram



■Basic Specifications of Source Code Development Application Circuit

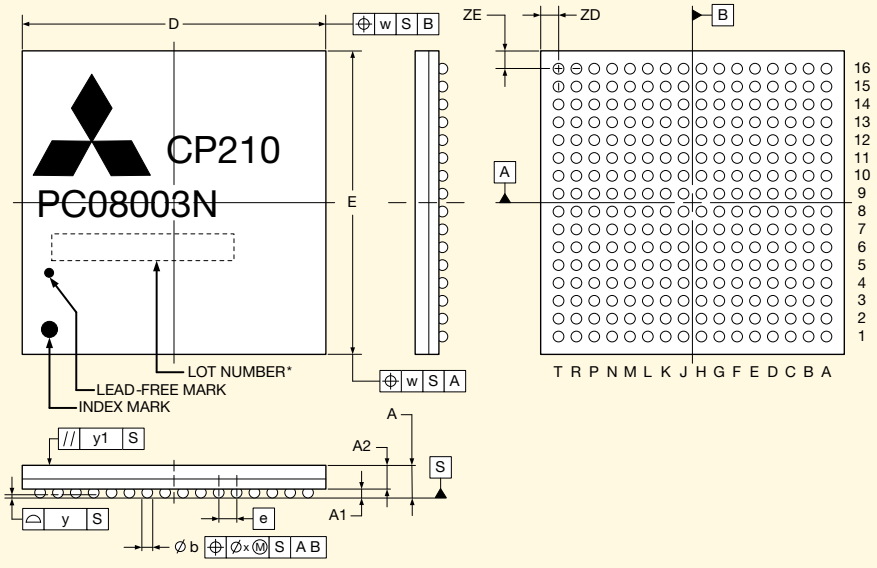
Classification	Item	Description
Control area	MPU	V850E/ME2(UPD703111BGM-15-UEU-A) LFQFP 176pins*1
Memory*2	ROM	FlashROM : 2M words × 16 bits (32 Mbits)
	RAM	SDRAM : 4 banks x 2M words x 16 bits x 2 (256 Mbits)
Communication area	Dedicated communication LSI	CP210 (PC08003N) BGA 256pins
Display area	LED	RUN, RD ,SD, D LINK ,ERR., L ERR., MST, User LED, LINK, L ER*3

*1 An MPU in which source code operation has been verified.
*2 The memory capacity is the capacity achieved in an environment in which operation has been verified by Mitsubishi Electric. The target memory size when the contents of the source code development CD-ROM are compiled in the recommended environment is 0.5M words (8M bits) of ROM and 4M words (64M bits) of RAM.
*3 The LED layout, colors, and shapes are not specified.

■External Dimensions

*Actual printing may differ from those shown in the figure.

Package: 256 pins Plastic BGA (Ball grid array) Shape: 17 x 17 mm, 1 mm between pins



(UNIT: mm)

ITEM	DIMENSIONS
D	17.00±0.20
E	17.00±0.20
w	0.30
e	1.00
A	1.83±0.20
A1	0.50±0.10
A2	1.33
b	0.60±0.10
x	0.10
y	0.15
y1	0.35
ZD	1.00
ZE	1.00

Developing Intelligent Device Stations and Remote

Communication LSI CP520 with GbE-PHY

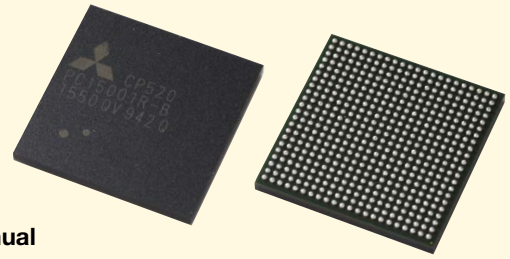
CP520 is an LSI that integrates the CC-Link IE Field Network communication ASIC, MPU, and GbE-PHY. This integrated LSI allows you to reduce MPU and GbE-PHY related development costs and manhours.
CP520-based development offers the following features:

1. CP520-based development allows you to develop an intelligent device station or remote device station for CC-Link IE Field Network without awareness of protocol.
2. Integrated with GbE-PHY, CP520-based development does not require pattern design between the CC-Link IE Field Network communication ASIC and GbE-PHY. As a result, the pattern design of the CC-Link IE Field Network communication circuit is simplified. This development decreases the number of MPU and GbE-PHY peripheral components and circuits, achieving a decrease in the size of the developed circuit board compared to conventional products.
3. A sample code is provided that can be easily customized in accordance with user hardware specifications and applications. This makes it easy to develop a CC-Link IE Field Network compatible product with user-defined functions.
4. CP520 includes HW-RTOS, reducing the MPU load and achieving low power consumption in the developed device.

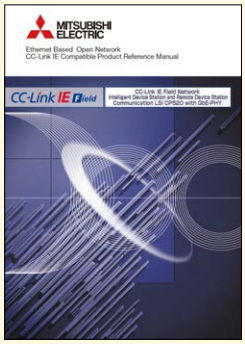
- The manual and sample code can be downloaded from the Mitsubishi Electric Factory Automation Website.
- Upon request, hardware and software development partners are introduced.
- Lead-free/RoHS directive compliant

Communication LSI with GbE-PHY (CP520)

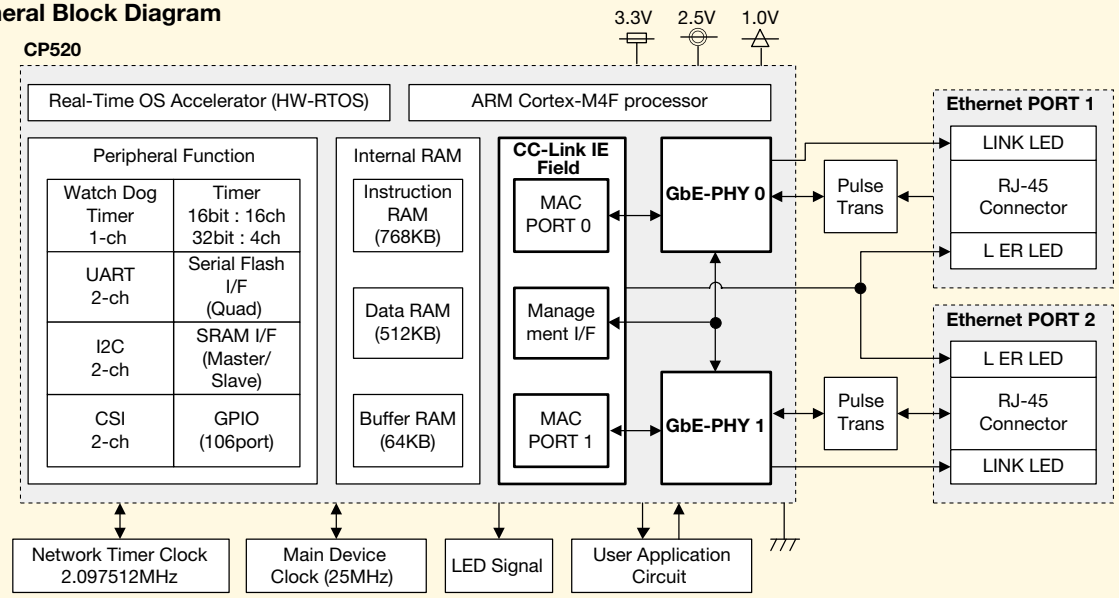
*Actual printing may differ from those shown in the figure.



Manual



General Block Diagram



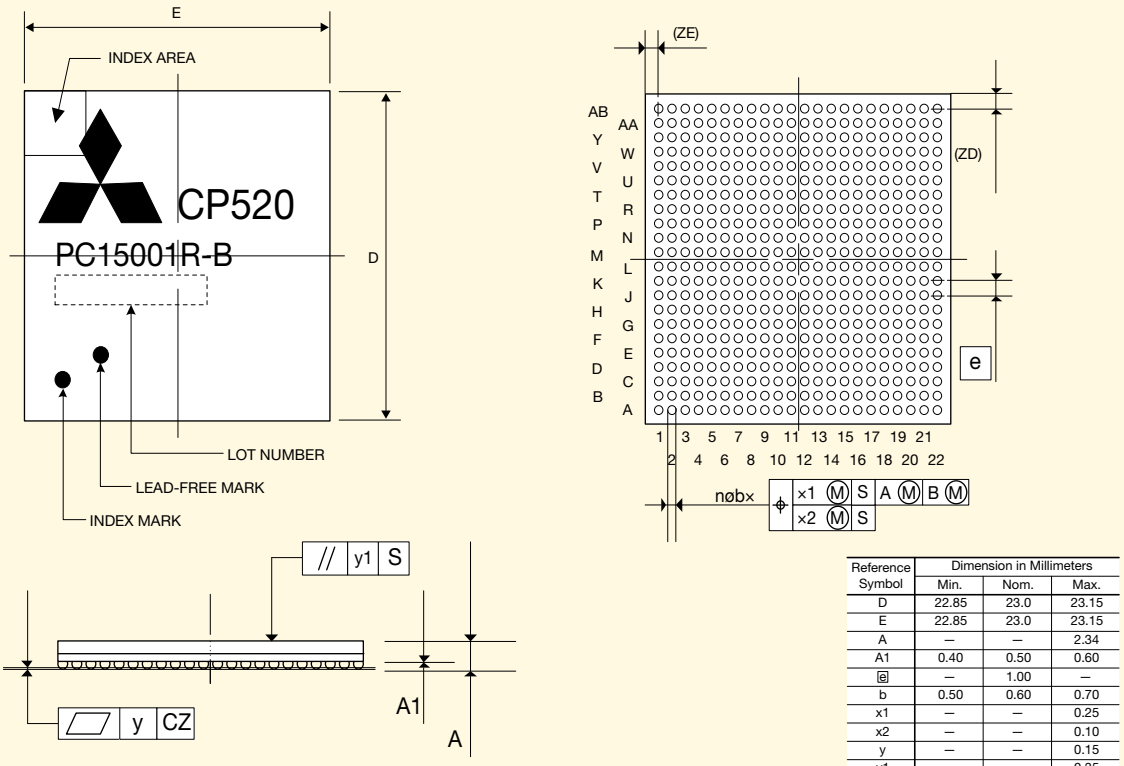
Device Stations

Purchase reference manual | Purchase dedicated LSI | Conformance test

■External Dimensions

*Actual printing may differ from those shown in the figure.

Package: 484 pins Plastic BGA (Ball grid array) Shape: 23 x 23 mm, 1 mm between pins



Reference Symbol	Dimension in Millimeters		
	Min.	Nom.	Max.
D	22.85	23.0	23.15
E	22.85	23.0	23.15
A	—	—	2.34
A1	0.40	0.50	0.60
e	—	1.00	—
b	0.50	0.60	0.70
x1	—	—	0.25
x2	—	—	0.10
y	—	—	0.15
y1	—	—	0.35
n	—	484	—
ZD	—	1.0	—
ZE	—	1.0	—

■Communication LSI with GbE-PHY (CP520)

Name	Model	Packaging Unit
CP520 (PC15001R-B)	NZ2GACP520-60	60 pieces
	NZ2GACP520-300	300 pieces

■Manual

Title	Manual No.
CC-Link IE Field Network Intelligent Device Station and Remote Device Station Communication LSI CP520 with GbE-PHY Reference Manual	SH(NA)-081570ENG

CC-Link IE Field

Developing Intelligent Device Stations and Remote

Dedicated Communication LSI CP220

The items shown on the right allow you to develop CC-Link IE Field Network products without concern for the protocol.

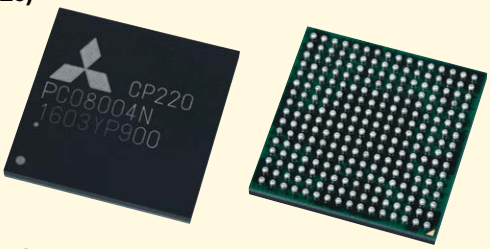
1. CP220 is a dedicated communication LSI for the intelligent device station of a CC-Link IE Field Network.
2. CP220 supports cyclic transmission (RX/RY: 2048 bits each; RWr/RWw: 1024 words each) and transient transmission.
3. Intelligent device stations compatible with the Motion function of CC-Link IE Field Network can be developed.
4. CP220 automatically performs a major portion of the communication functions, thereby reducing the MPU (microcomputer) load and enabling designs that employ low-performing MPUs as well. (Select a little endian type MPU that has a data bus width of at least 16 bits and an address bus width of at least 17 bits.)
5. The CD-ROM that comes with the reference manual includes C-language sample code and circuit examples (PDF), making it possible to reduce development costs and shorten the development process.

•Upon request, hardware and software development partners are introduced.

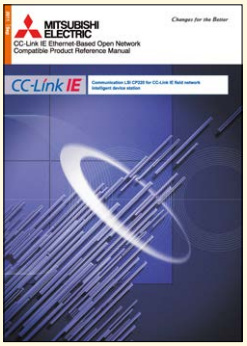
•Lead-free/RoHS directive compliant

■Dedicated Communication LSI (CP220)

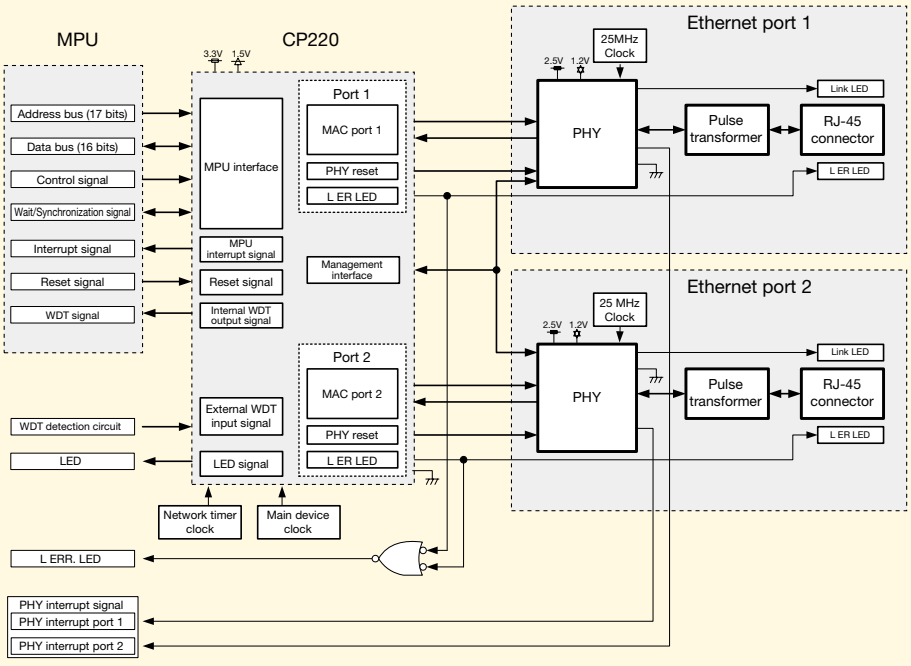
*Actual printing may differ from those shown in the figure.



■Manual



■General Block Diagram



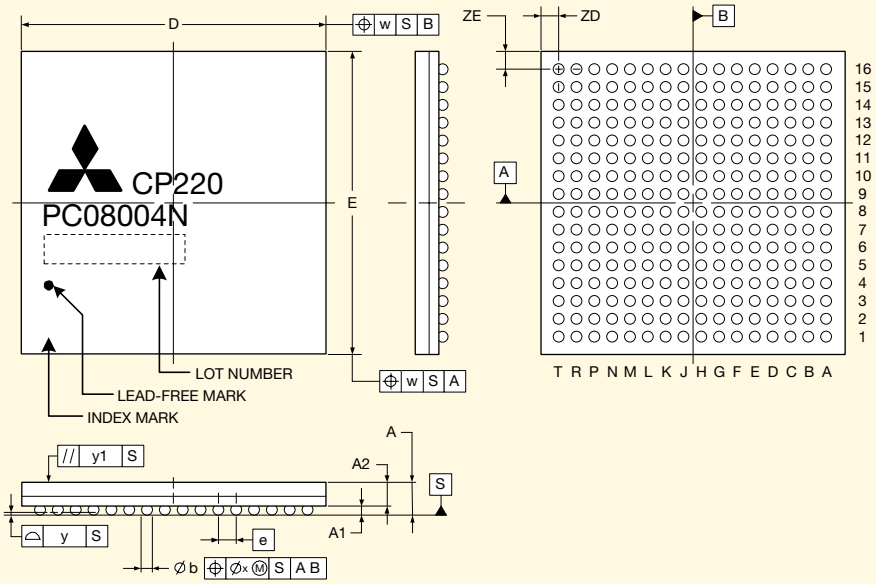
Device Stations

Purchase reference manual | Purchase dedicated LSI | Conformance test

External Dimensions

*Actual printing may differ from those shown in the figure.

Package: 256 pins Plastic BGA (Ball grid array) Shape: 17 x 17 mm, 1 mm between pins



(UNIT: mm)

ITEM	DIMENSIONS
D	17.000.20
E	17.000.20
w	0.30
e	1.00
A	1.83 0.20
A1	0.500.10
A2	1.33
b	0.600.10
x	0.10
y	0.15
y1	0.35
ZD	1.00
ZE	1.00

Dedicated Communication LSI (CP220)

Name	Model	Packaging Unit
CP220 (PC08004N)	NZ2GACP220-60	60 pieces
	NZ2GACP220-300	300 pieces

Manual

Title	Manual No.
CC-Link IE Field Network Intelligent Device Station Communication LSI CP220 Reference Manual	SH(NA)-081017ENG
CC-Link IE Field Network Remote Device Station Communication LSI CP220 Reference Manual	SH(NA)-081770ENG
CC-Link IE Field Network Intelligent Device Station Communication LSI CP220 Reference Manual (Motion function)	SH(NA)-030204ENG

*Provides circuit examples, timing charts, and firmware development methods.

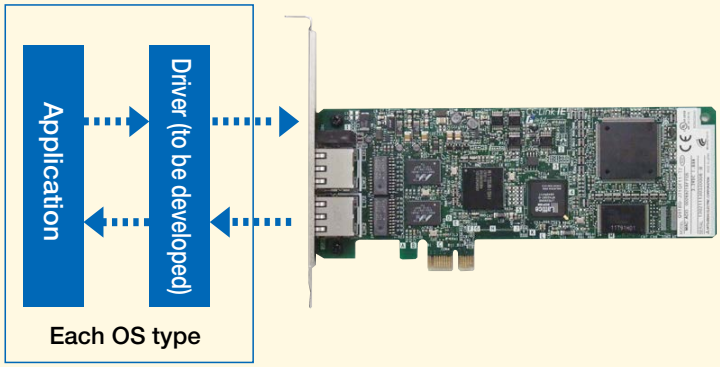
Developing Drivers for the Various Operating Systems of CC-Link IE Field Network PC Interface Board

Purchase reference manual

Q80BD-J71GF11-T2/Q81BD-J71GF11-T2 Driver Development

■Manual

■Conceptual Diagram



1. Developing a driver for the various operating systems enables use of the CC-Link IE Field Network compatible PC interface board as a master station or local station.

2. The CC-Link IE Field Network Q80BD-J71GF11-T2/Q81BD-J71GF11-T2 Driver Development Reference Manual helps you develop a PC interface board Q80BD-J71GF11-T2/Q81BD-J71GF11-T2 driver compatible with the various operating systems.

3. The reference manual describes the hardware information (PCI configuration area, 2-port memory area, and register area memory map) and software information (driver initialization procedure and parameter setup procedure) required for driver development.

4. This reference manual includes sample programs (C language), making it possible to reduce development costs and shorten development man-hours.

•Upon request, software development partners are introduced.

■Manual

Title	Manual No.
CC-Link IE Field Network Q80BD-J71GF11-T2/Q81BD-J71GF11-T2 Driver Development Reference Manual	SH(NA)-081155ENG

CC-Link IE Field

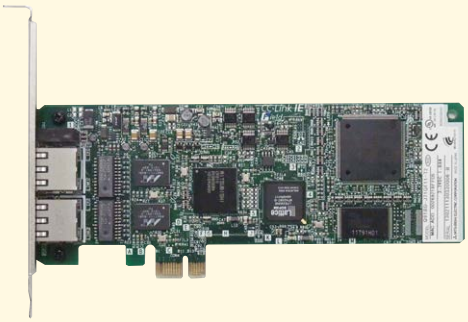
CC-Link IE Field Network PC Interface Boards

Q80BD-J71GF11-T2/Q81BD-J71GF11-T2

1. The interface board allows you to incorporate personal computers into the CC-Link IE Field Network.
   The interface board allows you to use a personal computer as a master station or local station within a CC-Link IE Field Network when mounted.
2. The interface board enables simple parameter setup.
   Using the CC IE Field utility enables simple setup of the parameters required for CC-Link IE Field Network operation.
3. The interface board enables system control and high-speed data collection.
   For a reduction of takt time in a manufacturing system, control data, logging data of manufacturing processes, management data for traceability, and management/diagnostic data for equipment predictive maintenance can be collected at high speed and monitored.
   A control system using a programming language such as C language can be configured when a personal computer is used as a master station.
   Control data and logging data can be collected at high speed when a personal computer is used as a local station.
4. The interface board allows you to check CC-Link IE Field Network status on the screen.
   The status of CC-Link IE Field Network can be checked using CC IE Field Utility. Error locations, error causes, and event history are displayed on the screen. This helps to reduce the time for the system to recover from the error.
5. The interface board offers RCPU and QCPU multiple CPU system compatibility.
   The interface board enables communication with each CPU of a multiple CPU system via specification of logical station numbers using the CC IE Field utility.

■Q80BD-J71GF11-T2

■Q81BD-J71GF11-T2



■Specifications

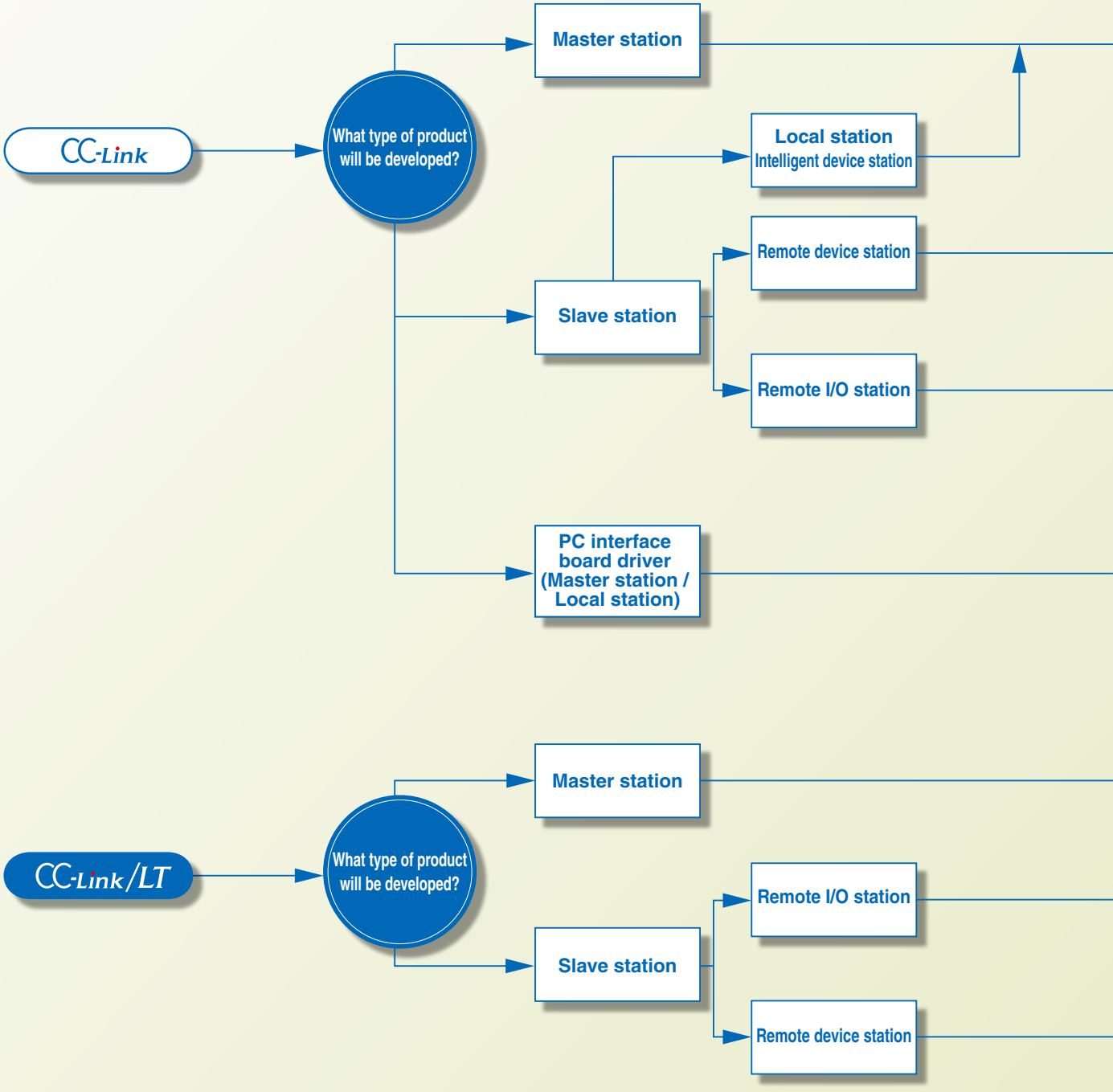
Item	Q80BD-J71GF11-T2	Q81BD-J71GF11-T2
Station type	Master station or local station	
Number of boards that can be installed	Up to 4	
Installation slot	PCI slot or PCI-X slot (half size)	PCI Express® x1, x2, x4, x8, x16 slot (Standard/Low profile, half size)
PCI bus / PCI Express® bus specifications	PCI Standard Rev. 2.2 (3.3/5 VDC, 32-bit bus, Reference clock: 33 MHz)	PCI Express® 1.1 Standard (3.3 VDC, Maximum data bandwidth: 250 MB/s, Reference clock: 100 MHz)
No. of occupied slots	1slot	
Internal consumption current	1.10 A (5 VDC)	1.68 A (3.3 VDC)
Weight	0.11 kg	Standard size: 0.08 kg, Low profile size: 0.07 kg
Included software	Windows® software package (1 CD-ROM)*	

* For information on compatible versions of Windows®, visit the Mitsubishi Electric Factory Automation Website.

Products that do not include a Windows® software package (CD-ROM) are also available.
For details, contact your local dealer network.

It's Easy & Speedy.

Mitsubishi Electric provides development methods tailored to the CC-



Link & CC-Link/LT compatible product type.

CC-Link

Master Station, Local Station, Intelligent Device Station

P29 to P32

Built-in interface board Q50BD-CCV2

In this method, stations are developed using a built-in interface board. The CC-Link master station, local station and intelligent device station functions are realized by mounting the interface board on a user circuit board.

Purchase reference manual | Purchase specified parts | Conformance test

Object development

In this method, stations are developed using the object code and the device kit. By developing with object codes, a design with higher flexibility can be achieved compared to using the built-in interface board.

Contract | Purchase reference manual | Purchase dedicated LSI | Purchase specified parts | Conformance test

Remote Device Station

P33 to P34

Dedicated communication LSI MFP3N

MFP3N is a communication LSI that allows you to develop devices that handle bit data and word data without concern about protocol. MFP3N is controlled with software. Support of both CC-Link Ver. 1 and Ver. 2 is possible by changing the software.

Purchase reference manual | Purchase dedicated LSI | Purchase specified parts | Conformance test

Remote I/O Station

P35 to P38

Dedicated communication LSI MFP2N/MFP2AN

MFP2N and MFP2AN are communication LSIs that allow you to develop devices that handle bit data without concern about protocol. The two types are provided for different package sizes (number of pins) and I/O point quantity.

Purchase reference manual | Purchase dedicated LSI | Purchase specified parts | Conformance test

Embedded I/O Adapter*1*2

This small-sized Embedded adapter allows you to develop devices that handle bit data without concern about protocol. The adapter can be mounted directly on the circuit board you developed, and allows expansion of the number of I/O points through cascade connection. (A maximum of two adapters can be mounted on a single circuit.)

Purchase reference manual | Conformance test

Driver Development

P39 to P40

Driver development*1

Drivers for various operating systems can be developed for use of the Mitsubishi PC interface board (Q80BD-J61BT11N).

Purchase reference manual

CC-Link/LT

Master Station

P41

Dedicated communication LSI CLC13

CLC13 is a communication LSI that allows you to develop devices compliant with the master station used for network management. The network can be constructed by connecting the various slave stations.

Purchase reference manual | Purchase dedicated LSI | Purchase recommended Parts | Conformance test

Remote I/O Station

P41

Dedicated communication LSI CLC21

CLC21 is a communication LSI that allows you to develop devices that handle bit data without concern about protocol. This LSI enables development of digital I/O and other remote I/O stations.

Purchase reference manual | Purchase dedicated LSI | Purchase recommended Parts | Conformance test

Remote Device Station

P42

Dedicated communication LSI CLC31

CLC31 is a communication LSI that allows you to develop devices that handle word data (16-bit data). The data amount of four words can be handled by a single LSI, allowing development of analog I/O and other remote device stations.

Purchase reference manual | Purchase dedicated LSI | Purchase recommended Parts | Conformance test

*1. CC-Link Partner Association membership is not always necessary. For details, contact your local CLPA office.
*2. The conformance test is sometimes not required. For details, contact your local CLPA office.

CC-Link Developing Master Stations, Local Stations and

CC-Link Ver.2 Built-in Interface Board Q50BD-CCV2

1. Master stations, standby master stations, local stations and intelligent device stations can be developed.
   CC-Link master station, standby master station, local station and intelligent device station functions can be realized by mounting the interface board onto the user circuit board (user application circuit).

2. The interface board is compatible with CC-Link Ver.2.
   With CC-Link Ver.2, the maximum number of cyclic data can be extended to 8192 bits for RX/RY and 2048 words for RWr/RWw. CC-Link Ver.2 is also compatible with old specifications (Ver.1).

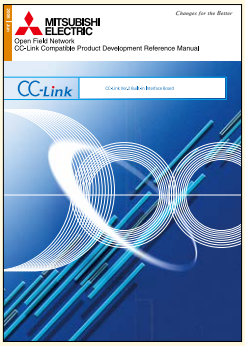
3. Minimal space is required.
   The interface board is designed with a compact size of 70mm x 80mm.

4. Communication with user application circuit can be performed using a general-purpose bus interface.
   The interface between the user application circuit and the interface board is comprised of general memory control signals (address bus, data bus, read, write, etc.), making communication with the user application circuit easy.

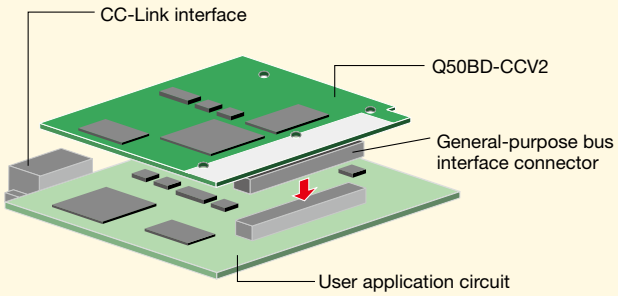
- Upon request, hardware and software development partners are introduced.
- Lead-free/RoHS directive compliant

■Built-in interface board (Q50BD-CCV2)

■Manual



■Configuration example of the built-in interface board and the user circuit board (user application circuit)



■Built-in interface board basic specifications

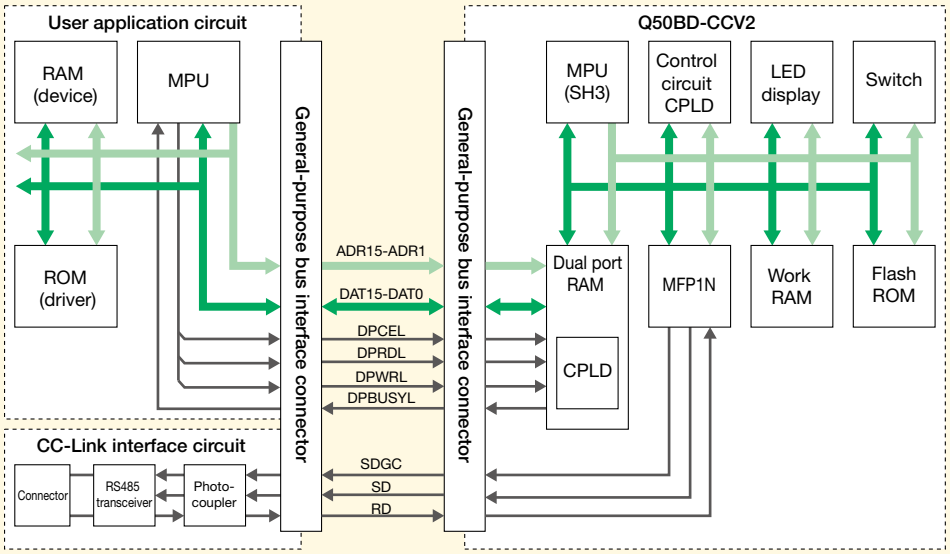
Classification	Item	Description
Control area	Bus interface	General-purpose bus interface
	MPU	SH3 (SH7708R) QFP 144 pins
Memory	ROM	ROM 512K words x 16 bits (8Mbits)
	SRAM	Dual port RAM 32K words x 16 bits (512Kbits)
		Work RAM 256K words x 16 bits (4Mbits)
Communication area	Dedicated communication LSI	MFP1N
Display area	LED	6 LEDs: Green (RUN, L RUN, SD, RD) Red (ERR., L ERR.)
Setting selection area	Hardware switch*1	Station number setting switch, transmission speed, mode setting switch, select switch
Current consumption		0.32A
Circuit board dimensions		70.0×80.0mm
Weight		0.03kg

*1 Settings can also be configured by software.

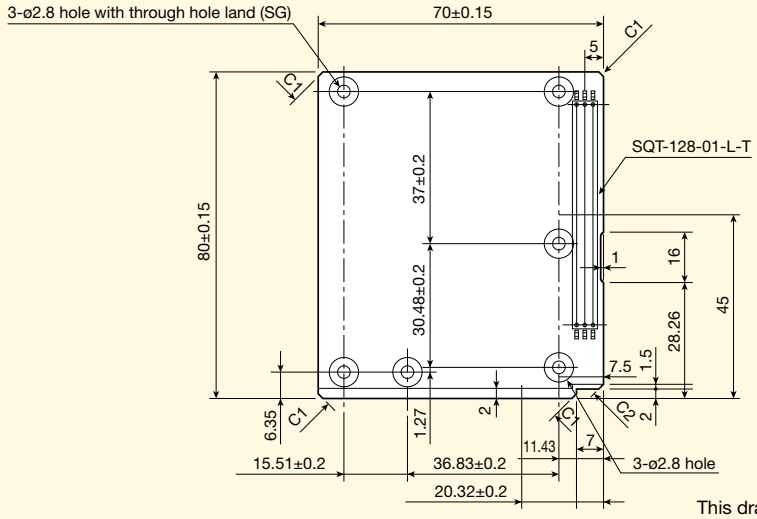
Intelligent Device Stations

Purchase reference manual | Purchase specified parts | Conformance test

■Interface Board and User Application Circuit Block Diagram



■Circuit Board Dimensions



SG : Signal Ground
This drawing is a C-side view of the circuit board.

Unit : mm

■CC-Link Ver.2 Built-in Interface Board (Q50BD-CCV2)

Name	Model
CC-Link Ver.2 Built-in Interface Board	Q50BD-CCV2

■Manual

Title	Manual No.
CC-Link Ver.2 Built-in Interface Board Reference Manual	SH(NA)-080700ENG

*Provides circuit examples, timing charts, pin assignments and driver develop methods.

CC-Link

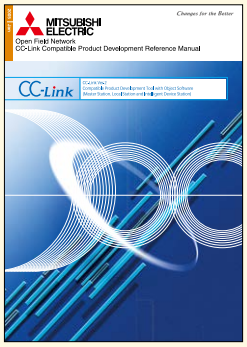
Developing Master Stations, Local Stations and

CC-Link Ver.2 Object Development

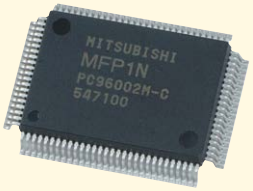
1. The CC-Link Ver.2 object development kit allows you to develop master stations, local stations, intelligent device stations, and standby master stations.
2. The object development kit is compatible with CC-Link Ver.2.
   With CC-Link Ver.2, the maximum number of cyclic data points can be extended to 8,192 bits for RX/RY and 2,048 words for RWr/RWw. CC-Link Ver.2 is also compatible with conventional specifications (Ver.1).
3. Data communication can be easily performed.
   Use of a dual port RAM enables easy data communication between the object development application circuit and user application circuit.
4. The object code installation method is selectable.
   The object development application products require the installation of an object code. An installation method can be selected from two methods: using serial communication and using a ROM writer.
5. The object development application circuit is realized using the dedicated communication LSI (MFP1N) and device kit (Q6KT-NPC2OG51).

- Upon request, hardware and software development partners are introduced.
- Lead-free/RoHS directive compliant
- Use of this product requires conclusion of the license agreement with Mitsubishi Electric.

Object development kit



Dedicated Communication LSI (MFP1N)



Device kit

*Actual printing may differ from those shown in the figure.

Object Development Kit

Name	Model	Packaging Unit
CC-Link Ver.2 Object Development Kit •CC-Link Ver.2 Object Development CD-ROM* •CC-Link Ver.2 Object Development (master station, local station, intelligent device station) Reference Manual SH(NA)-080701ENG	SW1D5C-CCV2OBJ-E	1 set

*Includes object code and circuit diagram electronic data.

Dedicated Communication LSI (MFP1N), Device Kit

[1] Dedicated Communication LSI (MFP1N)

Name	Model	Packaging Unit
MFP1N(PC96002M-C)	A6GA-CCMFP1NN60F	60 pieces
	A6GA-CCMFP1NN300F	300 pieces
MFP1N(PC17001E)	A6GA-CCMFP1NN66FN	66 pieces
	A6GA-CCMFP1NN330FN	330 pieces

*Package: 100-pins QFP , size: 20×14mm , Pin spacing: 0.65mm , Power supply voltage: 5.0VDC
*The production of MFP1N (PC96002M-C) will be discontinued on June 30, 2020.

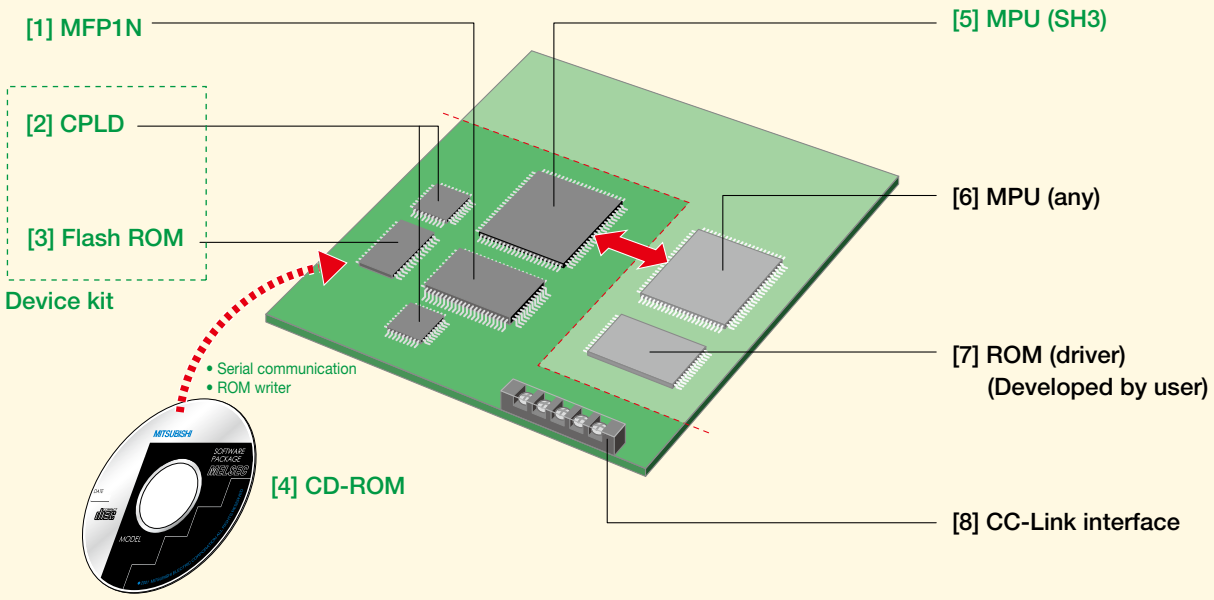
[2] Device Kit

Name	Model	Packaging Unit
Device Kit (Flash ROM x 1, CPLD x 2)	Q6KT-NPC2OG51	40 sets

Intelligent Device Stations

Contract | Purchase reference manual | Purchase dedicated LSI | Purchase specified parts | Conformance test

■Mounting Example with Object Development



	Name	Description	Manufacturer
[1]	MFP1N(PC96002M-C) MFP1N(PC17001E)	A6GA-CCMFP1NN**F A6GA-CCMFP1NN**FN Master, Local, Intelligent Device Station LSI	Mitsubishi Electric Corporation
[2]	CPLD	Q6KT-NPC2OG51 (Device Kit) (Flash ROM x 1, CPLD x 2)	Mitsubishi Electric Corporation
[3]	Flash ROM		
[4]	CD-ROM	Includes object code and circuit diagram electronic data. (SW1D5C-CCV2OBJ-E)	Mitsubishi Electric Corporation
[5]	MPU (for object development application circuit)	SH3(SH7708R) HD6417708RF100AV	Renesas Electronics Corporation
[6]	MPU (for user application circuit)	SH3 (SH7708R) HD6417708RF100AV	Any manufacturer
[7]	ROM (for driver)	Stores firmware for communicating with the object development application circuit.	Developed by user
[8]	CC-Link interface	Use the parts recommended by the CC-Link Partner Association.	Each manufacturer

■ Object Development Application Circuit Basic Specifications

Classification	Item	Description
Control area	MPU	SH3 (SH7708R) HD6417708RF100AV QFP 144pin
Memory	ROM	Flash ROM 512K words × 16 bits (8Mbits)
	SRAM	Dual port RAM 32K words x 16 bits (512K bits) Work RAM 256K words x 16 bits (4M bits)
Communication area	Dedicated communication LSI	MFP1N(PC96002M-C) MFP1N(PC17001E)
Display area	LED	RUN, L RUN, SD, RD, BOOT, BOOT OK, ERR., L ERR., BOOT ERR *1
Setting selection area	Hardware switch*2	Station number setting switch, transmission speed, mode switch, select switch

*1 The LED layout, colors, and shapes are not specified.
*2 Settings can also be configured by software.

CC-Link Developing Remote Device Stations

Dedicated Communication LSI MFP3N

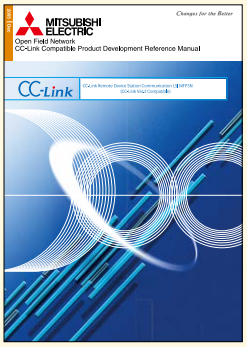
1. The dedicated communication LSI MFP3N allows you to develop CC-Link remote device stations.
2. The memory access to the send/receive buffer of MFP3N from the user application allows you to develop devices that handle bit and word data without concern about protocol.
3. The MFP3N can apply to CC-Link Ver.1 and CC-Link Ver.2. (For applying to Ver.2, the software must be modified.)

•Upon request, hardware and software development partners are introduced.

•Lead-free/RoHS directive compliant

■Dedicated Communication LSI (MFP3N)

■Manual



*Actual printing may differ from those shown in the figure.

■Data Size

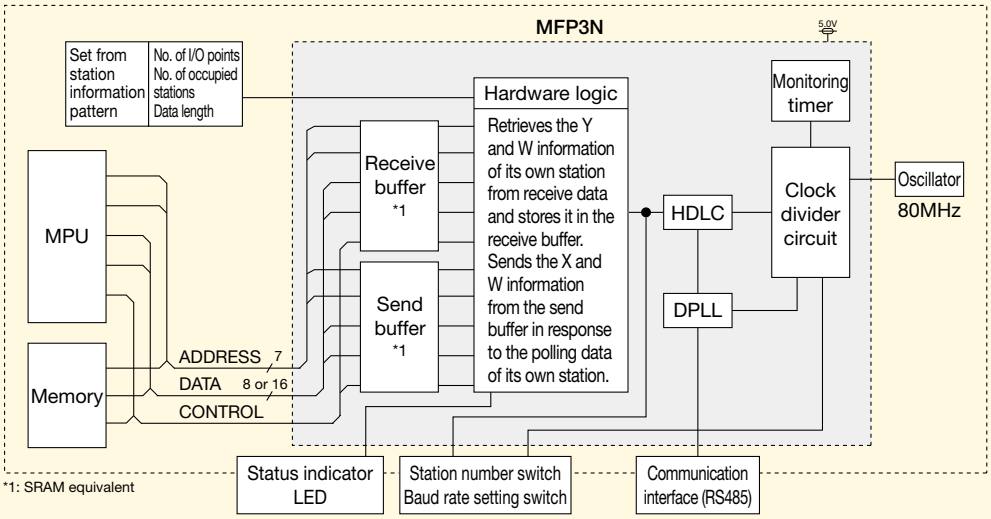
The remote Input/Output (RX/RY: bit data) and remote register (RWw/RWr: word data) can handle the amount of data shown in the table below, based on the number of occupied stations.

Type		Version	Expanded Cyclic Setting	Number of occupied stations			
				1 station occupied	2 station occupied	3 station occupied	4 station occupied
Remote input: RX*		Ver.1	–	32 bits	64 bits	96 bits	128 bits
		Ver.2	Double	32 bits	96 bits	160 bits	224 bits
			Quadruple	64 bits	192 bits	320 bits	448 bits
			Octuple	128 bits	384 bits	640 bits	896 bits
Remote output: RY*		Ver.1	–	32 bits	64 bits	96 bits	128 bits
		Ver.2	Double	32 bits	96 bits	160 bits	224 bits
			Quadruple	64 bits	192 bits	320 bits	448 bits
			Octuple	128 bits	384 bits	640 bits	896 bits
Remote register	M→R:RWw	Ver.1	–	4 words	8 words	12 words	16 words
		Ver.2	Double	8 words	16 words	24 words	32 words
			Quadruple	16 words	32 words	48 words	64 words
			Octuple	32 words	64 words	96 words	128 words
	R→M:RWr	Ver.1	–	4 words	8 words	12 words	16 words
		Ver.2	Double	8 words	16 words	24 words	32 words
			Quadruple	16 words	32 words	48 words	64 words
			Octuple	32 words	64 words	96 words	128 words

*The last 16 points are reserved by the system.

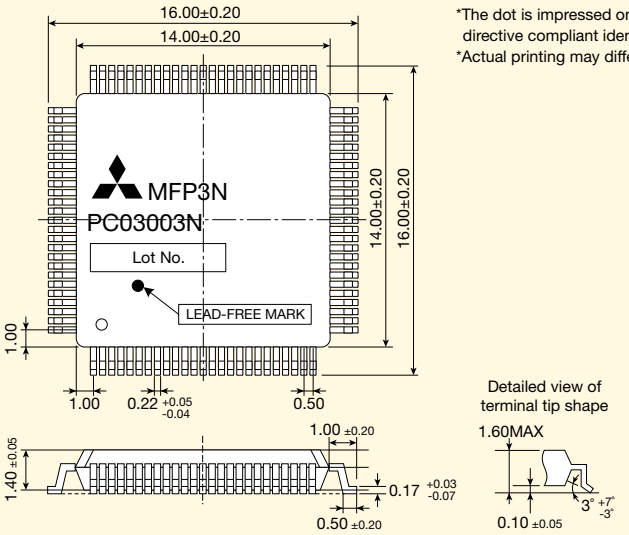
Purchase reference manual | Purchase dedicated LSI | Purchase specified parts | Conformance test

■General Block Diagram



■External Dimensions

Package: 100 pins QFP, Shape: 14 x 14 mm, 0.5 mm between pins



*The dot is impressed on the package as a lead-free/RoHS directive compliant identification mark.
*Actual printing may differ from those shown in the figure.

Unit : mm

■ Dedicated Communication LSI (MFP3N)

Name	Model	Packaging Unit
MFP3N (PC03003N)	A6GA-CCMFP3NN60F	60 pieces
	A6GA-CCMFP3NN300F	300 pieces

■ Manual

Title	Manual No.
CC-Link Remote Device Station Communication LSI MFP3N (CC-Link Ver.2 Compatible) Reference Manual	SH(NA)-080624ENG

*Provides circuit examples, MFP3N electrical characteristics, pin assignments, a detailed memory map, and sample flow.

CC-Link Developing Remote I/O Stations

Dedicated Communication LSI MFP2N / MFP2AN

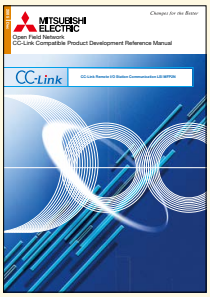
1. The dedicated communication LSI MFP2N and MFP2AN allow you to develop CC-Link remote I/O stations.
2. The difference between MFP2N and MFP2AN lies in the package size (number of pins) and I/O point quantity. Other than the package size (number of pins) and I/O point quantity, the LSIs are identical. The master treats both LSIs as remote I/O stations without differentiation. Having both MFP2N and MFP2AN remote I/O stations in the same system is no problem.
3. With MFP2N and MFP2AN, CC-Link protocol is fully realized using the dedicated communication LSI, enabling product development with hardware only. (Devices such as an MPU or software are not required.)

•Upon request, hardware development partners are introduced.
•Lead-free/RoHS directive compliant

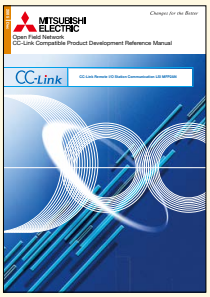
■Dedicated Communication LSI (MFP2N)

■Dedicated Communication LSI (MFP2AN)

■Manual (MFP2N)



■Manual (MFP2AN)



*Actual printing may differ from those shown in the figure.

■Number of MFP2N I/O Points

The remote I/O station has only one station occupied.The number of I/O points can be selected from the following combinations.

	I/O type		Remarks
	Remote Input	Remote Output	
(1)	8 points	–	Any setting other than the 8 types is not possible.
(2)	–	8 points	
(3)	16 points	–	
(4)	–	16 points	
(5)	8 points	8 points	
(6)	32 points	–	
(7)	–	32 points	
(8)	16 points	16 points	

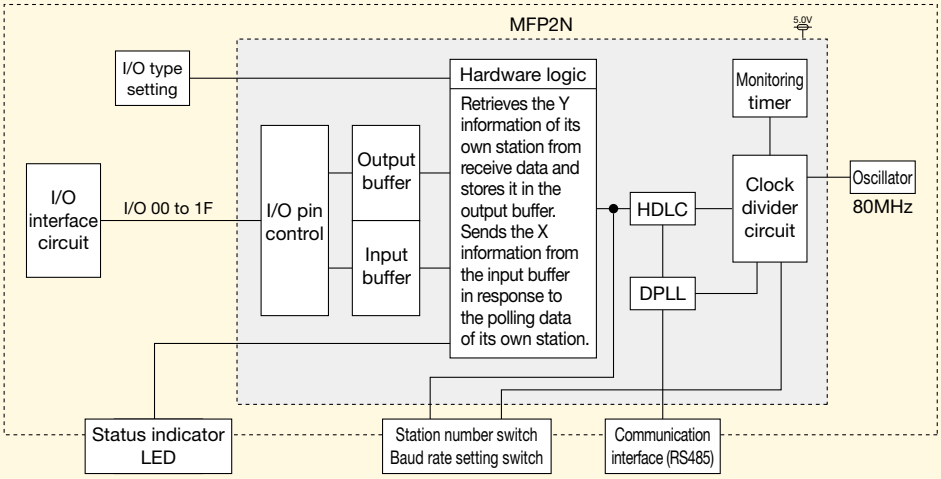
■Number of MFP2AN I/O Points

The remote I/O station has only one station occupied. The number of I/O points can be selected from the following combinations.

	I/O type		Remarks
	Remote Input	Remote Output	
(1)	16 points	–	Any setting other than the 3 types is not possible.
(2)	–	16 points	
(3)	8 points	8 points	

Purchase reference manual | Purchase dedicated LSI | Purchase specified parts | Conformance test

■General Block Diagram (MFP2N)

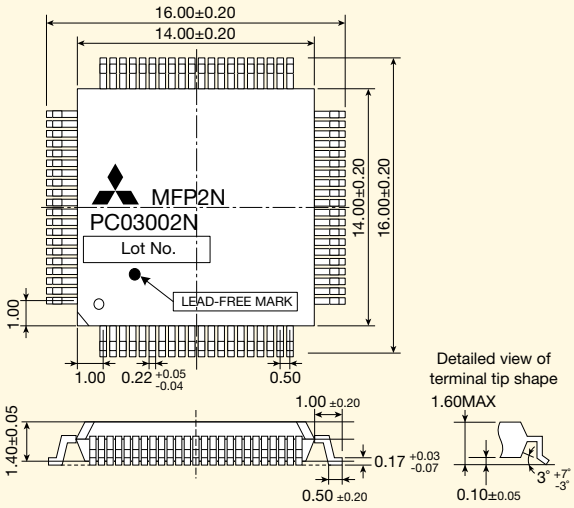


■External Dimensions

*The dot is impressed on the package as a lead-free/RoHS directive compliant identification mark.
*Actual printing may differ from those shown in the figure.

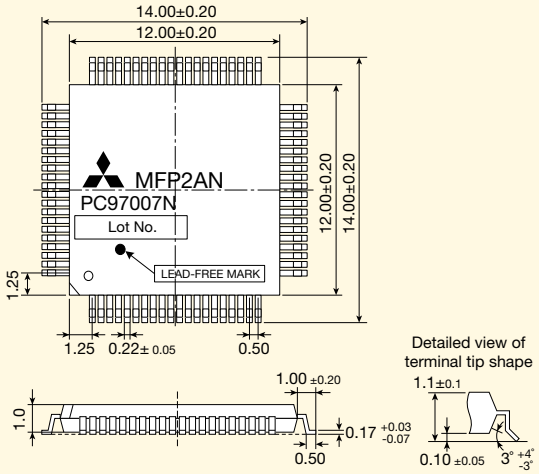
MFP2N

Package: 100 pins QFP, Shape: 14 x 14 mm, 0.5 mm between pins



MFP2AN

Package: 80 pins QFP, Shape: 12 x 12 mm, 0.5 mm between pins



Unit : mm

■Dedicated Communication LSI (MFP2N / MFP2AN)

Name	Model	Packaging Unit
MFP2N (PC03002N)	A6GA-CCMFP2NN60F	60 pieces
	A6GA-CCMFP2NN300F	300 pieces
MFP2AN (PC97007N)	A6GA-CCMFP2ANN60F	60 pieces
	A6GA-CCMFP2ANN300F	300 pieces

■Manual (MFP2N / MFP2AN)

Title	Manual No.
CC-Link Remote I/O Station Communication LSI MFP2N Reference Manual	SH(NA)-080622ENG
CC-Link Remote I/O Station Communication LSI MFP2AN Reference Manual	SH(NA)-080623ENG

*Provides circuit examples, electrical characteristics, and pin assignments.

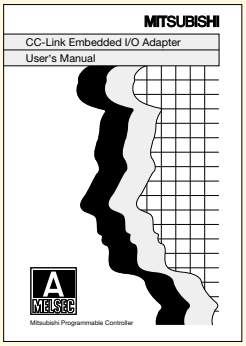
CC-Link

Developing Remote I/O Stations

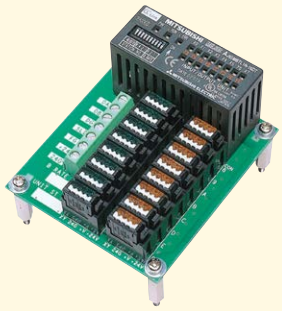
CC-Link Embedded I/O Adapter

■CC-Link Embedded I/O Adapter

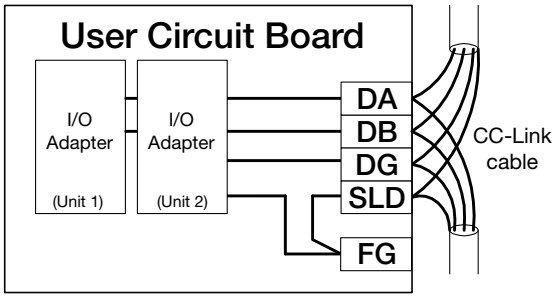
■Manual



■Mounting Example



1. This adapter is a modular remote I/O used as a device-embedded adapter.
2. Using a pin header as the external interface for adapter power supply, transmission, I/O signals and others, the adapter can be installed directly to a user board.
   AJ65MBTL1N-16DT, AJ65MBTL1N-16D, AJ65MBTL1N-16T: 44-pin, 2-row, 2mm-pitch pin header
   AJ65MBTL1N-32D, AJ65MBTL1N-32T: 62-pin, 2-row, 2mm-pitch pin header
3. The adapter power supply uses a transformer insulation method and the external I/O uses a photocoupler insulation method.
4. The transistor output section has the overload, overvoltage, and overheat protection functions.
5. This adapter includes the dedicated LSI, specified parts, station number switches, and LED indicators.
6. The CC-Link embedded I/O adapters can be cascaded. Two CC-Link embedded I/O adapters can be installed side by side within the same board.
   A distance of 5mm or more is required between the CC-Link embedded I/O adapters.
   The station number and baud rate settings must be set for each adapter.
   The I/O allocation for the CC-Link embedded I/O adapter is 32 points per station. Although the latter 16 points are open for 16-point I/O adapters, they cannot be used even if I/O adapters are cascaded.



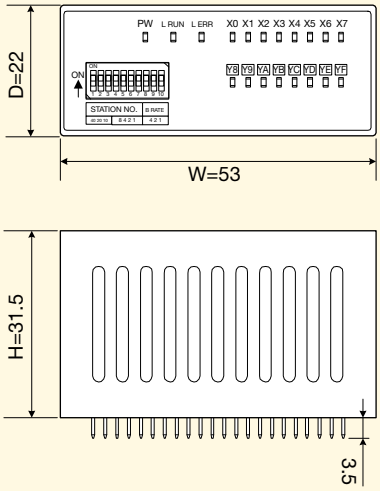
The adapters can be cascaded on the user circuit board as illustrated above. (Cascade connection limit: 2 units, max.)

Purchase reference manual

Conformance test

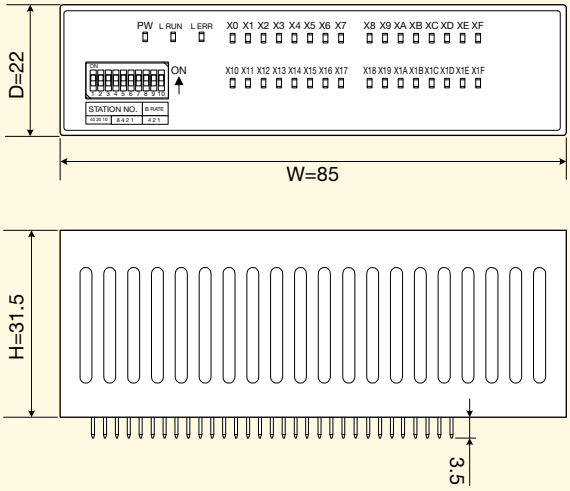
■External Dimensions

AJ65MBTL1N-16DT, AJ65MBTL1N-16D, AJ65MBTL1N-16T



53 (W) x 31.5 (H) x 22 (D) (Unit: mm)

AJ65MBTL1N-32D, AJ65MBTL1N-32T



85 (W) x 31.5 (H) x 22 (D) (Unit: mm)

■CC-Link Embedded I/O Adapter

Name	Model	Specifications	Packaging Unit
CC-Link Embedded I/O Adapter	AJ65MBTL1N-16DT	24V DC input, plus common (sink type): 8 bits (points); Transistor 0.1A sink output: 8 bits (points)	1piece
	AJ65MBTL1N-16D	24V DC input, plus common (sink type): 16 bits (points)	
	AJ65MBTL1N-16T	Transistor 0.1A sink output: 16 bits (points)	
	AJ65MBTL1N-32D	24V DC input, plus common (sink type): 32 bits (points)	
	AJ65MBTL1N-32T	Transistor 0.1A sink output: 32 bits (points)	

■Manual

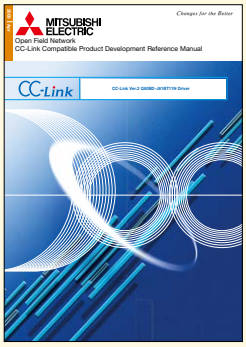
Title	Manual No.
CC-Link Embedded I/O Adapter User's Manual	SH(NA)-080324E

Developing Drivers for the Various Operating Systems of CC-Link Ver.2 PC Interface Board

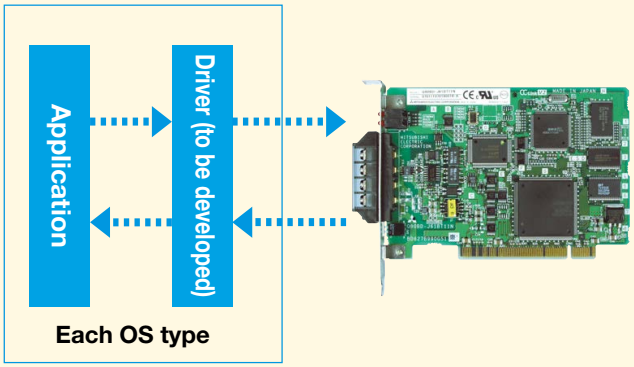
Purchase reference manual

Q80BD-J61BT11N Driver Development

■Manual



■Conceptual Diagram



1. Developing a driver for the various operating systems enables use of the CC-Link Ver.2 compatible PC interface board as a master station or local station.

2. The CC-Link Ver.2 Q80BD-J61BT11N Driver Development Reference Manual helps you develop a PC interface board Q80BD-J61BT11N driver compatible with the various operating systems.

3. The reference manual describes the hardware information (PCI configuration area, 2-port memory area and I/O port area memory maps) and software information (driver initialization procedure and parameter setup procedure) required for driver development.

4. This reference manual includes sample programs (C language), making it possible to reduce development costs and shorten development man-hours.

•Upon request, software development partners are introduced.

■Manual

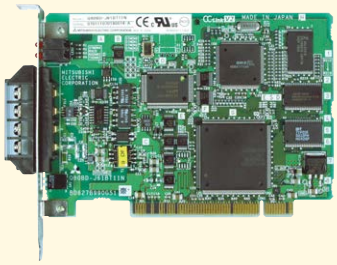
Title	Manual No.
CC-Link Ver.2 Q80BD-J61BT11N Driver Development Reference Manual	SH(NA)-080702ENG

CC-Link Ver.2 PC Interface Board

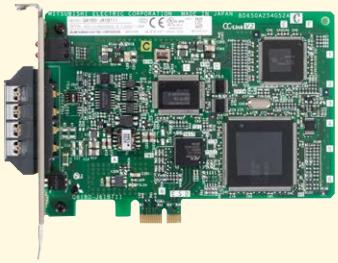
Q80BD-J61BT11N/Q81BD-J61BT11

1. The interface board allows you to incorporate personal computers into the CC-Link Ver.2 system.
   The interface board allows you to use a personal computer as a master station, standby master station or local station within a CC-Link Ver.2 system when mounted.
2. The interface board enables simple parameter setup.
   Using the CC-Link Ver.2 utility enables simple setup of the parameters required for CC-Link system operation.
3. The interface board displays test information and monitor information related to the CC-Link system.
   The interface board enables simple display of CC-Link system related test and monitor status information on the personal computer.
4. The interface board offers RCPU and QCPU multiple CPU system compatibility.
   The interface board enables communication with each CPU of a multiple CPU system via specification of logical station numbers using the CC-Link Ver.2 utility.

■Q80BD-J61BT11N



■Q81BD-J61BT11



■Specifications

Item	Q80BD-J61BT11N	Q81BD-J61BT11
Station type	Master station, standby master station or local station	
Number of occupied stations (for local station)	1 to 4 stations (changed using the parameter settings of Utilities)	
Number of boards that can be installed	Up to 4	
Installation slot	PCI slot (half size)	PCI Express® x1, x2, x4, x8, x16 slot (half size)
PCI bus / PCI Express® bus specifications	PCI Standard Rev. 2.2 (5 VDC, 32-bit bus, Basic clock: 33 MHz)	PCI Express® Standard Rev. 1.0a (3.3 VDC±9%, link width: 1 lane, Basic clock :100MHz)
Number of occupied slots	1 slot	
Internal consumption current	0.56 A (5 VDC)	1.06 A (3.3 VDC)
Weight	0.11kg	
Included software	Windows® software package (1 CD-ROM)*	

* For information on compatible versions of Windows®, visit the Mitsubishi Electric Factory Automation Website.

Products that do not include a Windows® software package (CD-ROM) are also available.
For details, contact your local dealer network.

CC-Link/LT Developing Master Stations, Remote I/O Stations

Dedicated Communication LSI CLC13

The master station is comprised of a master station communication LSI (CLC13) and peripheral communication circuit.

1. CC-Link/LT Communication Interface

[1] Master Station Function

CLC13 has a CC-Link/LT master station function, enabling data link with CC-Link/LT remote stations.

[2] Monitor Function

The monitor function allows you to monitor transmission frames (master station send frames and remote station transmission frames).

(The function lets you monitor transmission frame remote I/O data and remote station status information.)

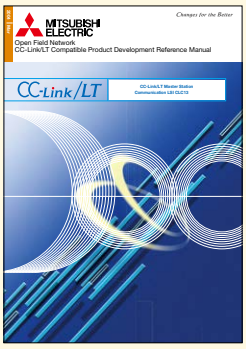
2. Microcomputer Interface

CLC13 includes an interface that enables general-purpose microcomputer connection, allowing you to read and write remote I/O and other data using a general-purpose microcomputer. (CLC13 can be accessed as regular memory from the general-purpose microcomputer.)

- Upon request, hardware and software development partners are introduced.
- Lead-free/RoHS directive compliant

■Dedicated Communication LSI (CLC13)

■Manual



*Actual printing may differ from those shown in the figure.

Remote I/O Station Communication LSI CLC21

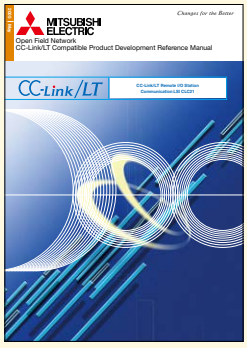
The remote I/O station is comprised of a remote I/O station communication LSI (CLC21) and peripheral communication circuit.

CC-Link/LT protocol is fully realized with CLC21, allowing development with hardware only. (MPU, software and other devices are not required.)

- Upon request, hardware development partners are introduced.
- Lead-free/RoHS directive compliant

■Dedicated Communication LSI (CLC21)

■Manual



*Actual printing may differ from those shown in the figure.

and Remote Device Stations

Purchase reference manual | Purchase dedicated LSI | Purchase recommended Parts | Conformance test

Remote Device Station Communication LSI CLC31

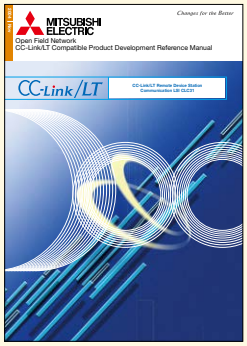
The remote device station is comprised of a remote device station communication LSI (CLC31) and peripheral communication circuit.

1. The remote device station with CLC31 has the MPU and memory device, and is controlled by user-developed software.
2. CLC31 has the CC-Link/LT protocol built-in, allowing developers to develop software without concern about protocol.
3. The data amount of 4 words can be handled with a single chip. (One word is allocated for each station, and up to 4 stations can be occupied.) By setting the number of occupied stations, the developer can specify the optimum data amount for the device to be developed. This enables reduction of the number of occupied stations of the device.
4. CLC31 has a built-in function that assures 1-word (16-bit) data communication (i.e., prevents data separation). For this reason, a remote device station connected to the network must be operated in 16-bit mode.

•Upon request, hardware and software development partners are introduced.
•Lead-free/RoHS directive compliant

■Dedicated Communication LSI (CLC31)

■Manual



*Actual printing may differ from those shown in the figure.

■ Dedicated Communication LSI

Name	Model	Packaging Unit
CLC13(PC02003E-A)	CL2GA13-60	60 pieces
CLC21(PC01003N)	CL2GA21-60	60 pieces
	CL2GA21-300	300 pieces
CLC31(PC02004N-A)	CL2GA31-60	60 pieces

■ Manual

Title	Manual No.
CC-Link/LT Master Station Communication LSI CLC13 Reference Manual	SH(NA)-080703ENG
CC-Link/LT Remote I/O Station Communication LSI CLC21 Reference Manual	SH(NA)-080707ENG
CC-Link/LT Remote Device Station Communication LSI CLC31 Reference Manual	SH(NA)-080704ENG

* Provides circuit examples, LSI electrical characteristics and pin assignments, etc.

CC-Link IE TSN Recommended Part / Specified Parts

CC-Link IE TSN

■ Recommended Parts and Specified Parts

There are no parts recommended or specified by the CC-Link Partner Association or Mitsubishi Electric.

■ Parts Requiring Caution at the Time of Selection

For the parts in the table below, use those that satisfy the selection conditions.

Item	Selection Conditions
RJ-45 connector	"ANSI/TIA/EIA-568-B" 8-pin connector with shield IEEE802.3 1000BASE-T compatible
25MHz crystal oscillator	Frequency deviation : Within ±50 ppm RMS jitter (1-sigma) : 5 ps rms or less
2.097152 MHz crystal oscillator	Frequency deviation: Within ±100 ppm

Select items with consideration of electrical characteristics described in the manual.
See the specification prepared by CC-Link Partner Association and the reference manual for notes on selection of other parts.

CC-Link IE Field

Recommended Parts/Specified Parts

CC-Link IE Field Network

■Recommended Parts and Specified Parts

There are no parts recommended or specified by the CC-Link Partner Association or Mitsubishi Electric.

■Parts Requiring Caution at the Time of Selection

For the parts in the table below, use parts that satisfy the selection conditions specified by the CC-Link Partner Association and Mitsubishi Electric.

Item	Selection Conditions	Condition Specified By	Reference Model*1	Reference Manufacturer*1
RJ-45 connector	"ANSI/TIA/EIA-568-B" 8-pin connector with shield IEEE802.3 1000BASE-T compatible	CC-Link Partner Association	1827585-1*2	Tyco Electronics Japan G.K.
			2201061-1*3	
Pulse transformer	IEEE802.3 1000BASE-T compatible		MGF101	Sinka Japan Co., Ltd.
PHY*4	IEEE802.3 1000BASE-T compatible Full duplex compatible Auto-negotiation function compatible GMII interface compatible Auto MDI/MDIX negotiation compatible MDC clock 7.812 MHz compatible	CC-Link Partner Association / Mitsubishi Electric Corporation	88E1111-B2-BAB1C000	Marvell Semiconductor, Inc.
MPU*4	Data width: 32 bits or more (CP220-based development: 16 bits or more) Address width: 17 bits or more Endian: Little endian	Mitsubishi Electric Corporation	V850E/ME2	Renesas Electronic Corporation
25 MHz crystal oscillator*5	Frequency deviation: Within ±50 ppm RMS jitters (1-sigma): 5 ps rms or less		KC2520B25.0000C1GESJ	Kyocera Crystal Device Corporation
125 MHz crystal oscillator*4	Frequency deviation: Within ±50 ppm		DSO321SV 125.000MHz*2	Daishinku Corporation*2
2.097152 MHz crystal oscillator			DSO321SR 2.097152MHz*2	
			KC2520B2.09715C1GESJ*3	Kyocera Crystal Device Corporation*3

*1 Reference models and manufacturers of parts described in the manual (circuit diagram examples).
*2 Reference models and manufacturers of parts described in the manual (circuit diagram examples) for source code development or of the CP220.
*3 Reference models and manufacturers of parts described in the manual (circuit diagram examples) of the CP520.
*4 Parts used in the source code development and CP220-based development.
*5 Parts used in the CP520-based development.

CC-Link

Recommended Parts/Specified Parts

CC-Link

■CC-Link Partner Association Recommended Parts

The following shows the parts recommended by the CC-Link Partner Association for use in the CC-Link interface circuits.

Item	Model	Manufacturer
Filter	MCT7050-A401	Sinka Japan Co., Ltd.
RS485 transceiver	SN75ALS181NS	Texas Instruments, Ltd.
Zener diode	RD6.2Z	Renesas Electronics Corporation
	PESD5V0U1UA	NXP Semiconductors N.V.
Photocoupler	HCPL-7720-500E *1	Avago Technologies, Ltd.
	HCPL-0720-500E *2	
Photocoupler	HCPL-2611-500E *1	
	HCPL-M611-500E *2	
	PS9117A	Renesas Electronics Corporation

*1 Specify Option 060 when VIORM = 630VPEAK electrical isolation is required.
*2 Specify Option 060 when VIORM = 560VPEAK electrical isolation is required.
Note: For the model information of CC-Link Partner Association recommended parts, contact the CC-Link Partner Association.

■Mitsubishi Electric Corporation Specified Parts

The following shows the specified parts to be used when developing a product based on a development method provided by Mitsubishi Electric.

Item	Model	Manufacturer
MPU	SH3 (SH7708R) HD6417708RF100AV *	Renesas Electronics Corporation
Device kit	Q6KT-NPC2OG51* (Flash ROM x 1, CPLD x 2) x 40	Mitsubishi Electric Corporation
Crystal oscillator	DSO751SBM 80MHz	Daishinku Corporation
	DSO751SB 80MHz	
	KC7050B80.0000C5ZBQZ (FXO-37FNB 80MHz)	Kyocera Crystal Device Corporation

* Used with CC-Link Ver.2 object development only.

■Combinations of Development Methods, CC-Link Partner Association Recommended Parts, and Mitsubishi Electric Corporation Specified Parts.

Item	Model	Built-In Interface Board (Q50BD-CCV2)	Object Development	MFP3N	MFP2N, MFP2AN	Embedded I/O Adapter (AJ65MBTL1N-***)
Filter	MCT7050-A401	○	○	○	○	—
RS485 transceiver	SN75ALS181NS	○	○	○	○	—
Zener diode	RD6.2Z	○	○	○	○	—
	PESD5V0U1UA					
Photocoupler	HCPL-7720-500E	○	○	△	△	—
	HCPL-0720-500E					
Photocoupler	HCPL-2611-500E	○	○	△	△	—
	HCPL-M611-500E					
	PS9117A					
MPU	SH3 (SH7708R)	—	○	—	—	—
Device kit	Q6KT-NPC2OG51	—	○	—	—	—
Crystal oscillator	DSO751SBM 80MHz	—	○	○	○	—
	DSO751SB 80MHz					
	KC7050B 80.0000C5ZBQZ					

○: Required △: Optional —: Already provided in product or not required
* EMC Directive compatibility needs to be verified by the customer.

CC-Link/LT Recommended Parts/Specified Parts

CC-Link/LT

■CC-Link Partner Association Recommended Parts

The following shows the parts recommended by the CC-Link Partner Association for use in the CC-Link/LT interface circuits.

Item	Model	Manufacturer
Filter (for master station)	M-521CT	NEC TOKIN Corporation
Filter (for slave station)	DLW31SN102SQ2	Murata Manufacturing Co., Ltd.
RS485 transceiver	MAX1487CSA+	Maxim Integrated Products, Inc.
Zener diode*	PESD5V0U1UA	NXP Semiconductors N.V.
	UDZU5.6B	ROHM Co., Ltd.
Photocoupler	PS9117A	Renesas Electronics Corporation

*For the Zener diode, use PESD5V0U1UA and UDZU5.6B in combination.

■Mitsubishi Electric Corporation Recommended Parts

Item	Model	Manufacturer
Crystal oscillator (for master station)	DSO751SBM 20MHz	Daishinku Corporation
	DSO751SB 20MHz	
Crystal resonator (for slave station)	SMD-49 20MHz	
Single bus buffer gate with 3-state output (CMOS)	SN74AHCT1G125	Texas Instruments, Ltd.

■Combinations of Development Methods, CC-Link Partner Association Recommended Parts, and Mitsubishi Electric Corporation Recommended Parts.

Item	Model	CLC13	CLC31	CLC21
Filter	M-521CT	○	–	–
	DLW31SN102SQ2	–	○	○
RS485 transceiver	MAX1487CSA+	○	○	○
Zener diode	PESD5V0U1UA	○	○	○
	UDZU5.6B			
Photocoupler	PS9117A	○	○	○
Crystal oscillator	DSO751SBM 20MHz	○	–	–
	DSO751SB 20MHz			
Crystal resonator	SMD-49 20MH	–	○	○
Single bus buffer gate with 3-state output (CMOS)	SN74AHCT1G125	–	○	–

■Connector (Circuit Board Side)

Item	Model	Manufacturer
Right angle	38204-52S3-MOM SC	3M Japan Limited
Straight type	38204-62S3-MOM SC	

Memo

CC-Link IE TSN Technical Information

CC-Link IE TSN Specifications CC-Link IE TSN

Performance specifications

Item			Specifications
Control specifications	Maximum number of link points per network	RX	16K bits (16384 points, 2K bytes)
		RY	16K bits (16384 points, 2K bytes)
		RWr	8K words (8192 points, 16K bytes)
		RWw	8K words (8192 points, 16K bytes)
		LB	32K bits (32768 points, 4K bytes)
		LW	16K words (16384 points, 32 bytes)
	Maximum number of link points per station	RX	16K bits (16384 points, 2K bytes)
		RY	16K bits (16384 points, 2K bytes)
		RWr	8K words (8192 points, 16K bytes)
		RWw	8K words (8192 points, 16K bytes)
		LB	32K bits (32768 points, 4K bytes)
		LW	16K words (16384 points, 32 bytes)
Communication speed			1Gbps / 100Mbps
Distance between stations (maximum)			100m
Topology			Line, star, line/star mixed, ring*1

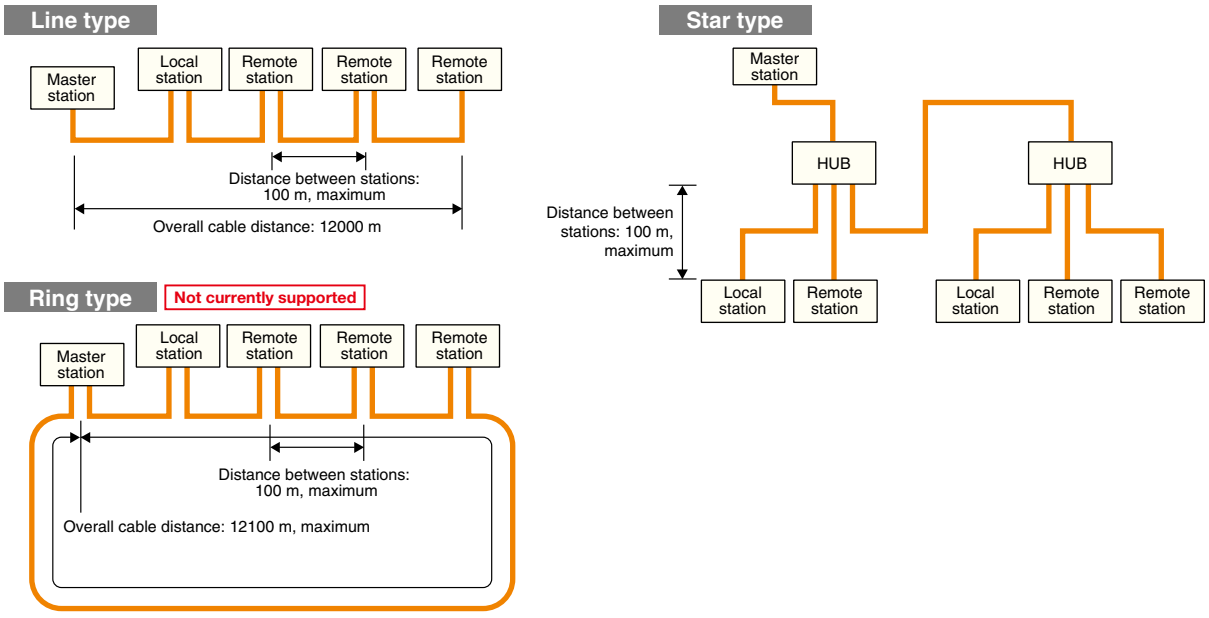
*1 Ring topology will be supported in the future. Ring topology cannot be combined with line or star topologies.

Cable specifications

Item		Specifications
Ethernet cable		Straight cable (shielded or double shielded)
	Standard	•1 Gbps: IEEE 802.3 1000BASE-T , ANSI/TIA/EIA-568-B (Category 5e or higher) •100 Mbps: IEEE 802.3 100BASE-TX , ANSI/TIA/EIA-568-B (Category 5 or higher)
	Connector	RJ-45 jack

For CC-Link IE Field Network wiring, use the wiring parts recommended by the CC-Link Partner Association.

Network wiring example



CC-Link IE Control Technical Information

CC-Link IE Control Network Specifications

Performance specifications

Item			Specifications	
Control specifications	Maximum number of link points per network	LB	32 K bits (32768 points, 4 Kbytes) (Basic model QCPU, safety CPU: 16 K words (16384 points, 2 Kbytes)	
		LW	128 K words (131072 points, 256 Kbytes) (Basic model QCPU, safety CPU: 16 K words (16384 points, 32 Kbytes)	
		LX	8 K bits (8192 points, 1 Kbyte)	
		LY	8 K bits (8192 points, 1 Kbyte)	
	Maximum number of link points per station		Normal mode	Extended mode*1
		LB	16 K bits (16384 points, 2 Kbytes)	32 K bits (32768 points, 4 Kbytes)
		LW	16 K words (16384 points, 32 Kbytes)	128 K words (131072 points, 256 Kbytes)
		LX	8 K bits (8192 points, 1 Kbyte)	8 K bits (8192 points, 1 Kbyte)
		LY	8 K bits (8192 points, 1 Kbyte)	8 K bits (8192 points, 1 Kbyte)
Communication speed			1Gbps	
Number of connected stations per network			Maximum of 120 stations (control stations: 1, normal stations: 119)	
Connection cable			Optical fiber cable (multi-mode fiber)	
Overall cable distance			66000 m (with 120 stations connected)	
Distance between stations (maximum)			550 m [core/clad = 50/125 (μm)]	
Maximum number of networks			239	
Maximum number of groups			32	
Topology			Ring	

*1 When extended mode is used, a CC-Link IE Control Network module with "12052" or thereafter as the first five digits of its serial number [QJ71GP21(S)-SX], a universal model QCPU with "12052" or thereafter as the first five digits of its serial number, and GX Works 2, Version 1.34L or later, are required. Additionally, all stations must support extended mode.

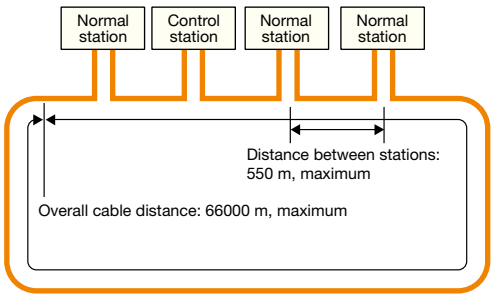
Cable specifications

Item		Specifications
Optical fiber specifications		1000BASE-SX (MMF) compatible optical fiber cable
	Standard	IEC 60793-2-10 Type A1a.1 (50/125 μm multimode)
	Transmission loss (max)	3.5 (dB/km) or less (λ =850nm)
	Transmission band (min)	500 (MHz/km) or more (λ =850nm)
Connector specifications		Duplex LC connector
	Standard	IEC61754-20: Type LC connector
	Connection loss	0.3 (dB) or less
	Polished surface	PC (Physical Contact) polishing

For details regarding the connection cable, etc., contact the CC-Link Partner Association.

Network wiring example

Ring type



CC-Link IE Field Technical Information

CC-Link IE Field Network Specifications

Performance specifications

Item			Specifications
Control specifications	Maximum number of link points per network	RX	16 K bits (16384 points, 2 K bytes)
		RY	16 K bits (16384 points, 2 K bytes)
		RWr	8 K words (8192 points, 16 K bytes)
		RWw	8 K words (8192 points, 16 K bytes)
	Maximum number of link points per station	RX	2 K bits (2048 points, 256 bytes)
		RY	2 K bits (2048 points, 256 bytes)
		RWr	1 K words (1024 points, 2 K bytes)
		RWw	1 K words (1024 points, 2 K bytes)
Communication speed			1Gbps
Number of connected stations per network			121 stations (master stations: 1, slave stations: 120, maximum)
Connection cable			Ethernet cable (Category 5e or higher)
Overall cable distance (maximum)		Line type	12000 m (with 1 master station and 120 slave stations connected)
		Star type	According to system configuration*1
Distance between stations (maximum)			100m
Maximum number of networks			239
Topology			Line, star, line/star mixed, ring*2

*1 Up to 20 hubs are connectable.
*2 Ring topology cannot be combined with line or star topologies.
The ring topology requires, master/local modules (QJ71GF11-T2) whose serial number (first five digits) is "12072" or later, and GX Works2, Version 1.34L or later.
The software package SW1DNC-CCIEF-E that comes with the PC interface board is not ring topology compatible. For compatibility, download SW1DNC-CCIEF-B from the Mitsubishi Electric Factory Automation Website.
The source code (SW1DNC-EFI210SRC) is not ring-topology compatible.

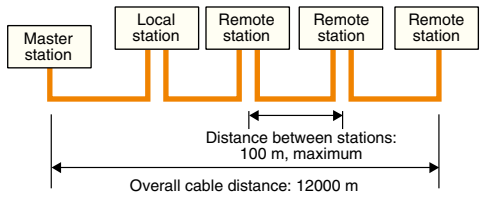
Cable specifications

Item		Specifications
Ethernet cable		Straight cable (with double shield, STP)
	Standard	A cable that satisfies either of the following standards: •IEEE 802.3 1000BASE-T •ANSI/TIA/EIA-568-B (Category 5e)
	Connector	Category 5e or higher, RJ-45 jack

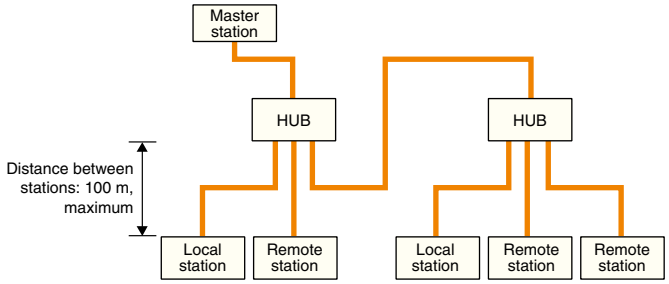
For CC-Link IE Field Network wiring, use the wiring parts recommended by the CC-Link Partner Association.
A CC-Link IE Control Network cable cannot be used in a CC-Link IE Field Network.

Network wiring example

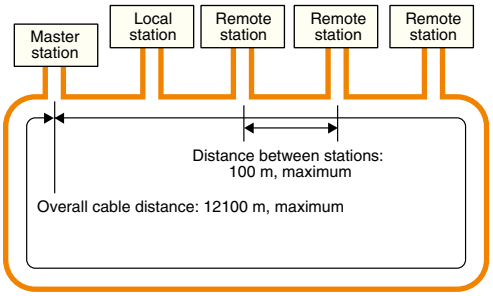
Line type



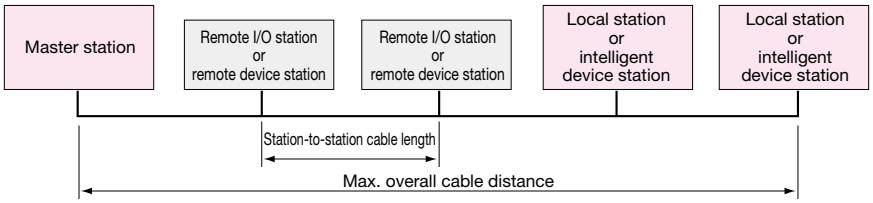
Star type



Ring type



CC-Link (Ver.1.10) specifications

Item		Specifications
Control specification	Maximum number of link points per system	Remote I/O (RX,RY) : 2048 bits each Remote register (RWw) : 256 words Remote register (RWr) : 256 words
	Number of link points per station	Remote I/O (RX,RY) : 32 bits each Remote register (RWw) : 4 words Remote register (RWr) : 4 words
Communication specification	Transmission speed	10M/5M/2.5M/625k/156kbps
	Transmission method	Broadcast polling method
	Synchronization method	Frame synchronization method
	Encoding method	NRZI method
	Network topology	Bus type (conforming to EIA RS485)
	Transmission format	HDLC compliant
	Error control method	CRC ($X^{16} + X^{12} + X^5 \times 1$)
	Number of connected modules	64 modules. However, the following conditions must be satisfied. (1 x a) + (2 x b) + (3 x c) + (4 x d) =<64 a: Number of modules occupying 1 station, b: Number of modules occupying 2 stations, c: Number of modules occupying 3 stations, d: Number of modules occupying 4 stations (16 x A) + (54 x B) + (88 x C) =< 2304 A: Number of remote I/O stations ····· Max. 64 modules B: Number of remote device stations ····· Max. 42 modules*1 C: Number of local station, standby master station, and intelligent device station····· Max. 26 modules
	Remote station No.	1 to 64
	Maximum overall cable distance and cable length between stations	 Ver.1.10-compatible CC-Link dedicated cable (with 110 Ω terminating resistors)

Transmission speed	Station-to-station cable length	Max. overall cable distance
156kbps	20cm or more	1200m
625kbps		900m
2.5Mbps		400m
5Mbps		160m
10Mbps		100m

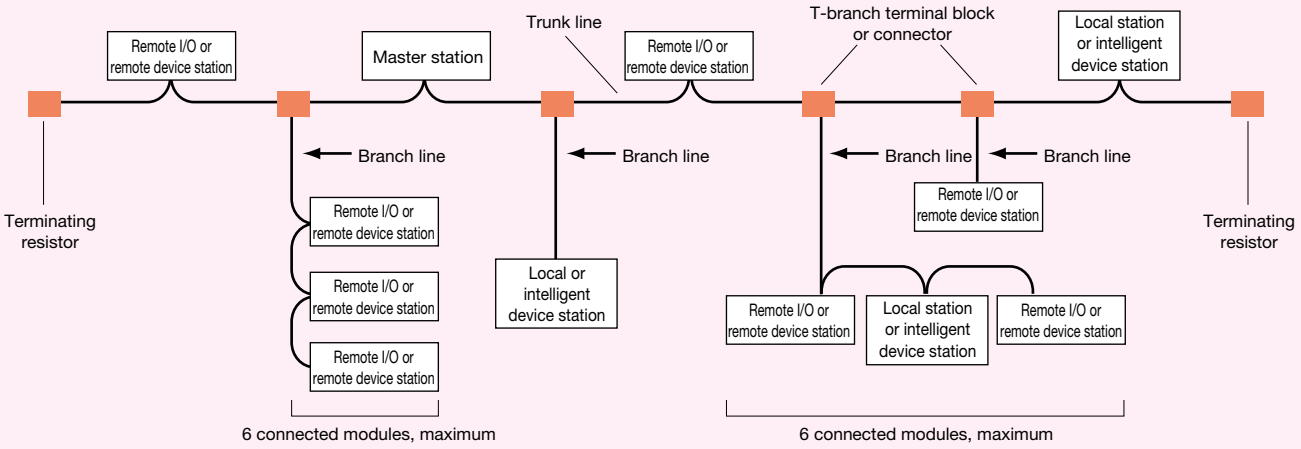
For a system including Ver.1.00-compatible modules, the maximum overall distance and the station-to-station distance of the Ver.1.00 cable specifications apply.

	Connection cable	Ver.1.10-compatible CC-Link dedicated cable • Use the dedicated cable certified by CC-Link Partner Association. • Ver.1.10-compatible CC-Link dedicated cables manufactured by different companies can be used together. • For the specifications of the CC-Link dedicated cable or the contact information on them, refer to the partner product catalogs published by CC-Link Partner Association or visit its web site at http://www.cc-link.org
Function	Auto refresh function*2 RAS functions (standby master, automatic return, slave station separation, error detection by the link special relay and register, test/monitor)	Remote I/O network mode*2 Scan synchronization function Automatic CC-Link startup*3 Reserved station function Error invalid station setting function Support for duplex function*3

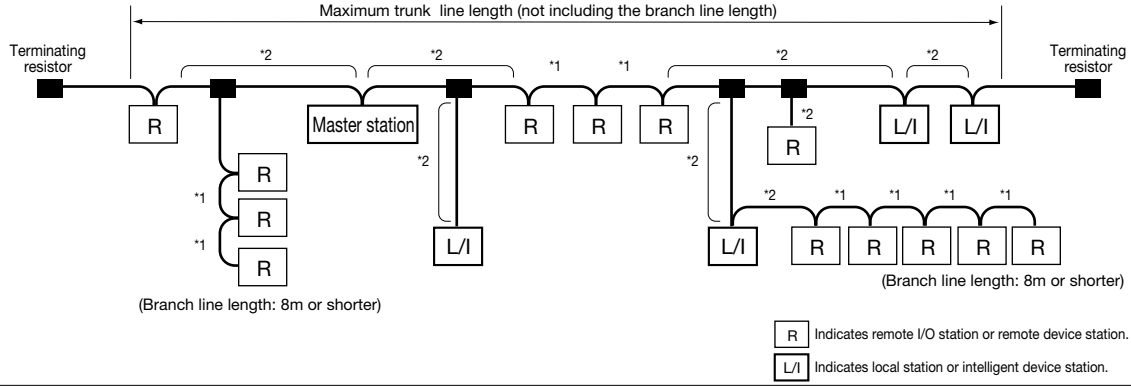
*1. Max. 64 modules for connecting the MELSEC iQ-R Series (RJ61BT11) modules using the remote device net Ver.1 mode or the remote device net Ver.2 mode.
*2. May not be supported depending on CPUs to be used together.
*3. This function is available only for the Q Series.

T-Branch Communication Specifications [Without Repeater (T-Branch) Module Use] CC-Link

System configuration



The following shows the communication specifications in the case of T-branch connection without use of a repeater (T-branch) module.
The communication specifications not listed below depends on the with CC-Link specifications.

<table>
<tr><th>Item</th><th colspan="2">Specifications</th><th>Remarks</th></tr>
<tr><td>Transmission speed</td><td>625kbps</td><td>156kbps</td><td>10M/5M/2.5Mbps not permitted</td></tr>
<tr><td>Maximum trunk line length</td><td>100m</td><td>500m</td><td>Cable length between terminating resistors (Branch line length not included)</td></tr>
<tr><td>Maximum branch line length</td><td colspan="2">8m</td><td>Total cable length per branch</td></tr>
<tr><td>Overall branch line length</td><td>50m</td><td>200m</td><td>Total length for all branch cables</td></tr>
<tr><td>Maximum number of modules connected to a branch line</td><td colspan="2">6 modules per branch</td><td>Total number of connected modules depends on the CC-Link specifications.</td></tr>
<tr><td>Cable</td><td colspan="2">• Ver.1.10-compatible CC-Link dedicated cable
• CC-Link dedicated cable (Ver.1.00-compatible)</td><td>• Ver.1.10-compatible CC-Link dedicated cables manufactured by different companies can be used together.
• CC-Link dedicated cables (Ver.1.00-compatible) manufactured by different companies cannot be used together.
• CC-Link dedicated high-performance cables (Ver.1.00-compatible) cannot be used.</td></tr>
<tr><td>T-branch terminal block or connector</td><td colspan="2">• Terminal block: A commercially available terminal block
• Connector: FA sensor connector NECA4202 (IEC947-5-2) equivalent product is recommended. (NECA: Nippon Electric Control Equipment Industries Association)</td><td>• Do not remove the jacket of the cables on the trunk line, if possible.</td></tr>
<tr><td>Maximum trunk line length, distance between T-branches and cable length between stations</td><td colspan="3">Ver.1.10-compatible CC-Link dedicated cable (a terminating resistor of 110Ω used)
<table>
<tr><th>Transmission speed</th><th>Maximum trunk length</th><th>Distance between T-branches</th><th>Cable length between remote I/O stations or remote device stations*1</th><th>Cable length between a master/local station and the station one before/after the master/local station or an intelligent device station and the station before/after the intelligent device station*2</th></tr>
<tr><td>625kbps</td><td>100m</td><td rowspan="2">No restriction</td><td rowspan="2">30cm or longer</td><td rowspan="2">1m or longer (A), 2m or longer (B)</td></tr>
<tr><td>156kbps</td><td>500m</td></tr>
</table>
(A) : This applies to a system configured with a remote I/O station and remote device station only.
(B) : This applies to a system configuration including a local station and intelligent device station.
*1,*2 Refer to the following figure.

</td></tr>
</table>

Differences between CC-Link Ver.2 and Ver.1 CC-Link

With Ver.2, the cyclic data size can be increased through extended cyclic setting.

CC-Link Ver.1 specification

Item		Specifications		
Maximum number of link points		Remote I/O (RX, RY): 2048 bits each	Remote register (RWw): 256 words	Remote register (RWr): 256 words
Number of link points per station		Remote I/O (RX, RY): 32 bits each	Remote register (RWw): 4 words	Remote register (RWr): 4 words
Number of link points for each number of occupied station	1 station occupied	Remote I/O (RX, RY): 32 bits each	Remote register (RWw): 4 words	Remote register (RWr): 4 words
	2 station occupied	Remote I/O (RX, RY): 64 bits each	Remote register (RWw): 8 words	Remote register (RWr): 8 words
	3 station occupied	Remote I/O (RX, RY): 96 bits each	Remote register (RWw): 12 words	Remote register (RWr): 12 words
	4 station occupied	Remote I/O (RX, RY): 128 bits each	Remote register (RWw): 16 words	Remote register (RWr): 16 words
Number of connected modules		1. Total number of stations (1 x a) + (2 x b) + (3 x c) + (4 x d) =< 64 a: Number of 1-station occupying modules, b: Number of 2-station occupying modules, c: Number of 3-station occupying modules, d: Number 4-station occupying modules 2. Number of connected modules (16 x A) + (54 x B) + (88 x C) =< 2304 A: Number of remote I/O stations ····· Max. 64 modules B: Number of remote device stations ····· Max. 42 modules* C: Number of local stations, standby master stations, intelligent device stations ····· Max. 26 modules		

* Max. 64 modules for connecting the MELSEC iQ-R Series (RJ61BT11) modules using the remote device net Ver.1 mode or the remote device net Ver.2 mode.

CC-Link Ver.2 specification

Item			Specifications			
Maximum number of link points			Remote I/O (RX, RY): 8192 bits each, Remote register (RWw): 2048 words, Remote register (RWr): 2048 words			
Expanded cycle setting			Single	Double	Quadruple	Octuple
Number of link points per station		Remote I/O (RX, RY)	32 bits each	32 bits each	64 bits each	128 bits each
		Remote register (RWw)	4 words	8 words	16 words	32 words
		Remote register (RWr)	4 words	8 words	16 words	32 words
Number of link points for each number of occupied station	1 station occupied	Remote I/O (RX, RY)	32 bits each	32 bits each	64 bits each	128 bits each
		Remote register (RWw)	4 words	8 words	16 words	32 words
		Remote register (RWr)	4 words	8 words	16 words	32 words
	2 station occupied	Remote I/O (RX, RY)	64 bits each	96 bits each	192 bits each	384 bits each
		Remote register (RWw)	8 words	16 words	32 words	64 words
		Remote register (RWr)	8 words	16 words	32 words	64 words
	3 station occupied	Remote I/O (RX, RY)	96 bits each	160 bits each	320 bits each	640 bits each
		Remote register (RWw)	12 words	24 words	48 words	96 words
		Remote register (RWr)	12 words	24 words	48 words	96 words
	4 station occupied	Remote I/O (RX, RY)	128 bits each	224 bits each	448 bits each	896 bits each
		Remote register (RWw)	16 words	32 words	64 words	128 words
		Remote register (RWr)	16 words	32 words	64 words	128 words
Number of connected modules			1. Total number of stations (a + a2 + a4 + a8) + (b + b2 + b4 + b8) x 2 + (c + c2 + c4 + c8) x 3 + (d + d2 + d4 + d8) x 4 =<64 2. Number of input/output points of all remote stations (a x 32 + a2 x 32 + a4 x 64 + a8 x 128) + (b x 64 + b2 x 96 + b4 x 192 + b8 x 384) + (c x 96 + c2 x 160 + c4 x 320 + c8 x 640) + (d x 128 + d2 x 224 + d4 x 448 + d8 x 896) =<8192 3. Number of all remote register words (a x 4 + a2 x 8 + a4 x 16 + a8 x 32) + (b x 8 + b2 x 16 + b4 x 32 + b8 x 64) + (c x 12 + c2 x 24 + c4 x 48 + c8 x 96) + (d x 16 + d2 x 32 + d4 x 64 + d8 x 128) =<2048 a: Number of 1-station occupying modules with single extended cyclic setting a2: Number of 1-station occupying modules with double extended cyclic setting a4: Number of 1-station occupying modules with quadruple extended cyclic setting a8: Number of 1-station occupying modules with octuple extended cyclic setting b: Number of 2-station occupying modules with single extended cyclic setting b2: Number of 2-station occupying modules with double extended cyclic setting b4: Number of 2-station occupying modules with quadruple extended cyclic setting b8: Number of 2-station occupying modules with octuple extended cyclic setting c: Number of 3-station occupying modules with single extended cyclic setting c2: Number of 3-station occupying modules with double extended cyclic setting c4: Number of 3-station occupying modules with quadruple extended cyclic setting c8: Number of 3-station occupying modules with octuple extended cyclic setting d: Number of 4-station occupying modules with single extended cyclic setting d2: Number of 4-station occupying modules with double extended cyclic setting d4: Number of 4-station occupying modules with quadruple extended cyclic setting d8: Number of 4-station occupying modules with octuple extended cyclic setting 4. Number of connected modules 16 x A+54 x B+88 x C =< 2304 A: Number of remote I/O stations ····· Max. 64 modules B: Number of remote device stations ····· Max. 42 modules* C: Number of local stations, standby master stations, intelligent device stations ····· Max. 26 modules			

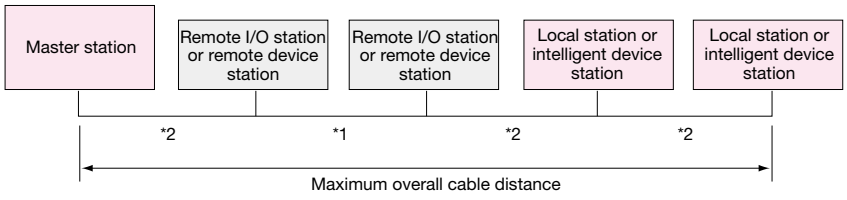
* "2." and "3." are Ver.2 mode only; calculation is necessary.

* There is no change in the cable and wiring specification for CC-Link Ver.2. Use Ver.1.10-compatible CC-Link dedicated cables for the connection of Ver.2 devices.

CC-Link specifications CC-Link

■The CC-Link Ver.1.10 and Ver.1.00 specifications differ in the following two items:
- Maximum overall cable length and cable length between stations
- Cable

CC-Link Ver.1.00 Specifications (Differences from Ver.1.10)

<table>
<tr><th>Item</th><th>Specifications</th></tr>
<tr><td>Maximum overall cable distance and cable length between stations</td><td>


*1. Cable length between remote I/O stations or remote device stations
*2. Cable length between a master, local, or intelligent device station and the station connected before or after it

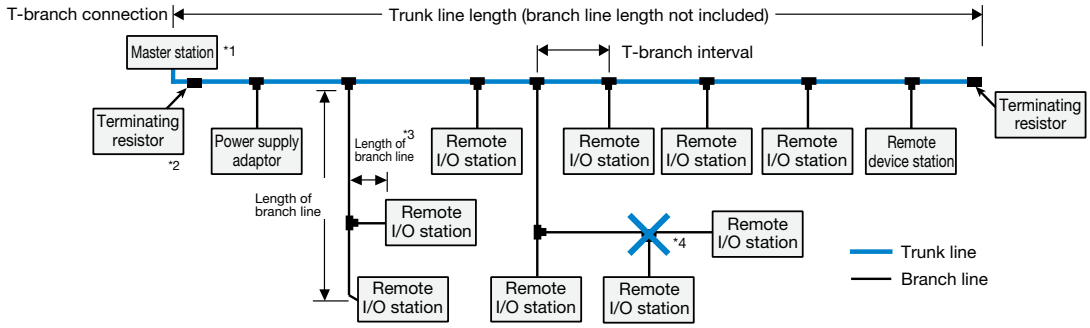
CC-Link dedicated cable (Ver.1.00-compatible) (terminating resistors of 110Ω used)
<table>
<tr><th rowspan="2">Transmission speed</th><th colspan="2">Cable length between stations</th><th rowspan="2">Maximum overall cable distance</th></tr>
<tr><th>*1</th><th>*2</th></tr>
<tr><td>156kbps</td><td rowspan="3">30cm or longer</td><td rowspan="6">1m or longer(A),
2m or longer(B)</td><td>1200m</td></tr>
<tr><td>625kbps</td><td>600m</td></tr>
<tr><td>2.5Mbps</td><td>200m</td></tr>
<tr><td rowspan="2">5Mbps</td><td>30cm to 59cm</td><td>110m</td></tr>
<tr><td>60cm or longer</td><td>150m</td></tr>
<tr><td rowspan="3">10Mbps</td><td>30cm to 59cm</td><td>50m</td></tr>
<tr><td>60cm to 99cm</td><td>80m</td></tr>
<tr><td>1m or longer</td><td>100m</td></tr>
</table>
(A) : This applies to a system configured with a remote I/O station and remote device station only.
(B) : This applies to a system configuration including a local station and intelligent device station.
The above maximum overall cable distance applies when the cable length between remote I/O stations or remote device stations is within the indicated range at one or more locations.
</td></tr>
<tr><td>Cable</td><td>CC-Link dedicated cable (Ver.1.00-compatible) or CC-Link dedicated high-performance cable (Ver.1.00-compatible)
• CC-Link dedicated cables (Ver.1.00-compatible) and CC-Link dedicated high-performance cables cannot be used together.
• Cables of different manufacturers cannot be used together.</td></tr>
</table>

CC-Link/LT specifications CC-Link/LT

<table>
<tr><th colspan="4">Item</th><th>4-point mode</th><th>8-point mode</th><th>16-point mode</th></tr>
<tr><td rowspan="11">Control specifications</td><td colspan="3">Maximum number of link points (When the same I/O address is used)</td><td>256 bits (512 bits)</td><td>512 bits (1024 bits)</td><td>1024 bits (2048 bits)</td></tr>
<tr><td colspan="3">Number of link points per station (When the same I/O address is used)</td><td>4 bits (8 bits)</td><td>8 bits (16 bits)</td><td>16 bits (32 bits)</td></tr>
<tr><td rowspan="9">Link scan time (ms)</td><td rowspan="4">When 32 stations are connected</td><td>Number of points</td><td>128 bits</td><td>256 bits</td><td>512 bits</td></tr>
<tr><td>2.5 Mbps</td><td>0.7</td><td>0.8</td><td>1.0</td></tr>
<tr><td>625 kbps</td><td>2.2</td><td>2.7</td><td>3.8</td></tr>
<tr><td>156 kbps</td><td>8.0</td><td>10.0</td><td>14.1</td></tr>
<tr><td rowspan="4">When 64 stations are connected</td><td>Number of points</td><td>256 bits</td><td>512 bits</td><td>1024 bits</td></tr>
<tr><td>2.5 Mbps</td><td>1.2</td><td>1.5</td><td>2.0</td></tr>
<tr><td>625 kbps</td><td>4.3</td><td>5.4</td><td>7.4</td></tr>
<tr><td>156kbps</td><td>15.6</td><td>20.0</td><td>27.8</td></tr>
<tr><td rowspan="12">Communication specification</td><td colspan="3">Transmission speed</td><td colspan="3">2.5M/625k/156kbps</td></tr>
<tr><td colspan="3">Communication protocol</td><td colspan="3">BITR (Broadcast polling+Interval Timed Response)</td></tr>
<tr><td colspan="3">Network topology</td><td colspan="3">T-branch</td></tr>
<tr><td colspan="3">Error control method</td><td colspan="3">CRC</td></tr>
<tr><td colspan="3">Number of connected modules</td><td colspan="3">64</td></tr>
<tr><td colspan="3">Remote station number</td><td colspan="3">1 to 64</td></tr>
<tr><td colspan="3">Maximum number of connectable stations per branch line</td><td colspan="3">8</td></tr>
<tr><td colspan="3">Distance between stations</td><td colspan="3">No restriction</td></tr>
<tr><td colspan="3">T-branch interval</td><td colspan="3">No restriction</td></tr>
<tr><td colspan="3">Master station connection position</td><td colspan="3">End of trunk line</td></tr>
<tr><td colspan="3">RAS functions</td><td colspan="3">Network diagnostics, internal loopback diagnostics, station detach function, automatic return function</td></tr>
<tr><td colspan="3">Connection cable</td><td colspan="3">Dedicated flat cable(0.75mm² x 4), VCTF cable, high flexible cable</td></tr>
</table>

Technical Information

CC-Link/LT network wiring specifications CC-Link/LT



Item	Specifications			Remarks
Transmission speed	2.5Mbps	625 kbps	156kbps	–
Distance between stations	No restriction			–
Maximum number of modules on a branch line	8 modules			–
Length of trunk line	35m	100 m	500m	Cable length between 2 terminating resistors (Branch line length not included)
T-branch interval	No restriction			–
Maximum length of branch line	4m	16 m	60m	Cable length per branch line
Overall length of branch lines	15m	50 m	200m	Total length of all branch lines

*1 Always install the master module at one end of the trunk line.
*2 Install a terminating resistor near the master module (within 20 cm).
*3 The length of a line branched from a branch line is also included in the max. branch line length and overall branch line length.
*4 Cables cannot be connected between drop lines. Line branching is allowed to the second level. Line branching is not allowed for the third or further level.

Precautions when mixed cables are used

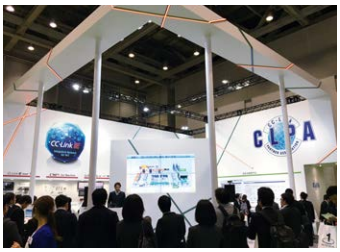
1. *Different types of cables cannot be used together in the trunk line.*
2. *Dedicated flat cables, VCTF cables and flexible cables can be used together for branch lines.*
   * The wiring specifications do not change according to the used cables and mixed use of cables.
3. *Different types of cables cannot be used together on the same branch line.*
   * When the module with cable (e.g. CL1Y2-T1D2S) is used, it can be connected to a different type of cable by making sure the dedicated cables in within 20 cm.

CC-Link Partner Association (CLPA) - Actively promoting worldwide adoption of CC-Link networks

Proactively supporting CC-Link, from promotion to specification development

The CC-Link Partner Association (CLPA) was established to promote the worldwide adoption of the CC-Link open-field network. By conducting promotional activities such as organizing trade shows and seminars, conducting conformance tests, and providing catalogs, brochures and website information, CLPA activities are successfully increasing the number of CC-Link partner manufacturers and CC-Link-compatible products. As such, CLPA is playing a major role in the globalization of CC-Link.

Seminar



Trade show

Conformance testing lab

Visit the CLPA website for the latest CC-Link information.

URL:www.cc-link.org

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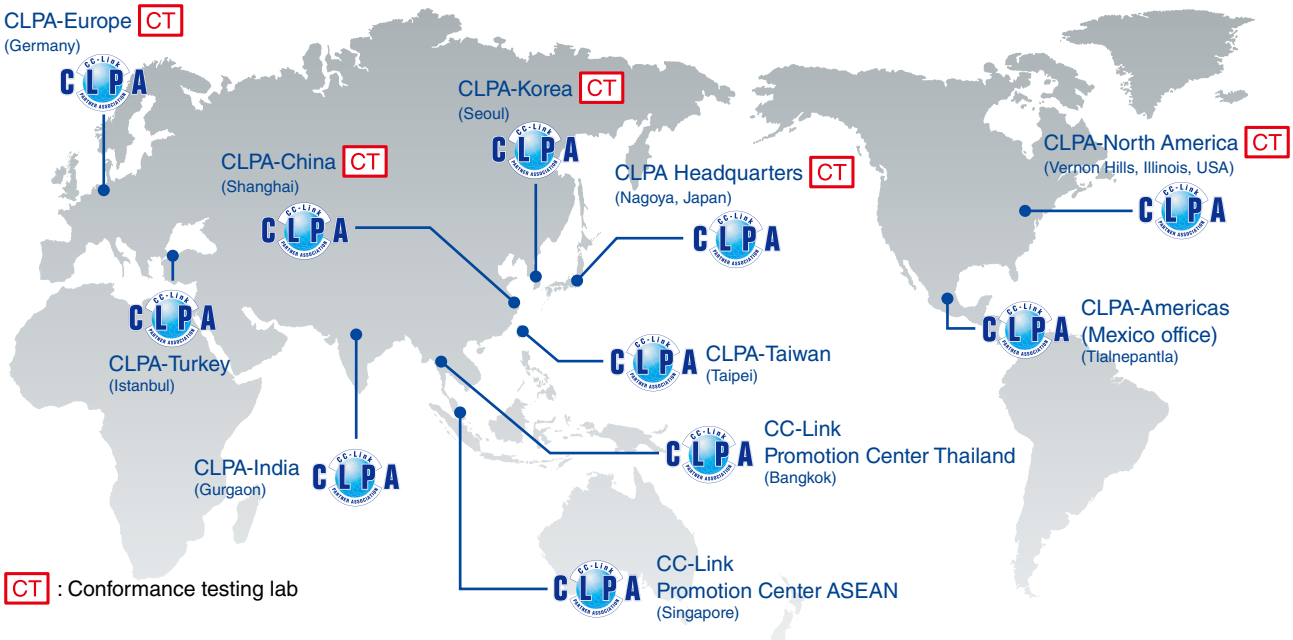
e-mail: info@cc-link.org

CC-Link Partner Association

Global influence of CC-Link continues to spread

CC-Link is supported globally by CLPA. With offices throughout the world, support for partner companies can be found locally. Each regional CLPA office undertakes various support and promotional activities to further the influence of CC-Link/CC-Link IE in that part of the world. For companies looking to increase their presence in their local area, CLPA is well placed to assist these efforts through offices in all major regions.



CC-Link IE TSN
CC-Link IE Control
CC-Link IE Field
CC-Link
CC-Link/LT

Related Product List

Products

Development Application		Name	Model (for Ordering)	Packaging Unit
CC-Link IE TSN	Master station	CC-Link IE TSN Master Station Software Development Kit (Library with source code, INtime version) Future release	SW1DTD-GNSDK1M	1 set
		CC-Link IE TSN Master Station Software Development Kit (Library, INtime version) Future release	SW1DTD-GNSDK2M	1 set
	Remote station	CC-Link IE TSN Remote Station Software Development Kit	SW1DNC-GNSDK1S-M	1 set
		Communication LSI CP620 with GbE-PHY for CC-Link IE TSN remote station (PC17004R)	NZ2GACP620-60	60 pieces
			NZ2GACP620-300	300 pieces
CC-Link IE Control	Control station, normal station	CC-Link IE Control Network PC Interface Board	Q80BD-J71GP21-SX	1 board
			Q81BD-J71GP21-SX	
		CC-Link IE Control Network PC Interface Board (with external power supply function)	Q80BD-J71GP21S-SX	1 board
			Q81BD-J71GP21S-SX	
CC-Link IE Field	Master station	Source Code Development CD-ROM	SW1DNC-EFI210SRC	1 copy
		Dedicated Communication LSI CP210 (PC08003N)	NZ2GACP210-60	60 pieces
			NZ2GACP210-300	300 pieces
	Master station, local station	CC-Link IE Field Network PC Interface Board	Q80BD-J71GF11-T2	1 board
			Q81BD-J71GF11-T2	
	Intelligent device station, Remote device station	Dedicated Communication LSI CP220 (PC08004N)	NZ2GACP220-60	60 pieces
			NZ2GACP220-300	300 pieces
		Communication LSI CP520 with GbE-PHY (PC15001R-B)	NZ2GACP520-60	60 pieces
			NZ2GACP520-300	300 pieces
CC-Link	Master station, local station, intelligent device station	CC-Link Ver.2 Built-In Interface Board	Q50BD-CCV2	1 board
		CC-Link Ver.2 Object Development Kit • CC-Link Ver.2 Object Development CD-ROM • CC-Link Ver. 2 Object Development Reference Manual SH(NA)-080701ENG	SW1D5C-CCV2OBJ-E	1 set
		Dedicated Communication LSI MFP1N (PC96002M-C) *1	A6GA-CCMFP1NN60F	60 pieces
			A6GA-CCMFP1NN300F	300 pieces
		Dedicated communication LSI MFP1N (PC17001E)	A6GA-CCMFP1NN66FN	66 pieces
			A6GA-CCMFP1NN330FN	330 pieces
		Device Kit (Flash ROM × 1, CPLD × 2)	Q6KT-NPC2OG51	40 sets
	Master station, local station	CC-Link Ver. 2 PC Interface Board	Q80BD-J61BT11N	1 board
			Q81BD-J61BT11	1 board
	Remote device station	Dedicated Communication LSI MFP3N (PC03003N)	A6GA-CCMFP3NN60F	60 pieces
			A6GA-CCMFP3NN300F	300 pieces
	Remote I/O station	Dedicated Communication LSI MFP2N (PC03002N)	A6GA-CCMFP2NN60F	60 pieces
			A6GA-CCMFP2NN300F	300 pieces
		Dedicated Communication LSI MFP2AN (PC97007N)	A6GA-CCMFP2ANN60F	60 pieces
			A6GA-CCMFP2ANN300F	300 pieces
		CC-Link Embedded I/O Adapter	AJ65MBTL1N-16DT	1 piece
			AJ65MBTL1N-16D	
			AJ65MBTL1N-16T	
			AJ65MBTL1N-32D	
			AJ65MBTL1N-32T	
CC-Link/LT	Master station	Dedicated Communication LSI CLC13 (PC02003E-A)	CL2GA13-60	60 pieces
	Remote device station	Dedicated Communication LSI CLC31 (PC02004N-A)	CL2GA31-60	60 pieces
	Remote I/O station	Dedicated Communication LSI CLC21 (PC01003N)	CL2GA21-60	60 pieces
			CL2GA21-300	300 pieces

*1 The production of MFP1N (PC96002M-C) will be discontinued on June 30, 2020.

■ Manual

Development Application		Title	Manual No.
CC-Link IE TSN	Master station	CC-Link IE TSN Master Station Software Development Kit Reference Manual Future release	SH(NA)-030322ENG
	Remote station	CC-Link IE TSN Remote Station Software Development Kit Reference Manual	SH(NA)-082117ENG
		CC-Link IE TSN Remote Station Communication LSI CP620 with GbE-PHY Reference Manual	SH(NA)-082121ENG
CC-Link IE Control	Control station, normal station	CC-Link IE Q80BD-J71GP21-SX Driver Development Reference Manual	SH(NA)-080819ENG
CC-Link IE Field	Master station	CC-Link IE Field Network Source Code Development Master Station Communication LSI CP210 Reference Manual	SH(NA)-081455ENG
	Master station, local station	CC-Link IE Field Network Q80BD-J71GF11-T2/Q81BD-J71GF11-T2 Driver Development Reference Manual	SH(NA)-081155ENG
	Intelligent device station	CC-Link IE Field Network Intelligent Device Station Communication LSI CP220 Reference Manual	SH(NA)-081017ENG
		CC-Link IE Field Network Intelligent Device Station Communication LSI CP220 Reference Manual (Motion function)	SH(NA)-030204ENG
	Remote device station	CC-Link IE Field Network Remote Device Station Communication LSI CP220 Reference Manual	SH(NA)-081770ENG
	Intelligent device station, remote device station	CC-Link IE Field Network Intelligent Device Station and Remote Device Station Communication LSI CP520 with GbE-PHY Reference Manual	SH(NA)-081570ENG
CC-Link	Master station, local station, intelligent device station	CC-Link Ver.2 Built-In Interface Board Reference Manual	SH(NA)-080700ENG
		CC-Link Ver.2 Object Development Reference Manual	SH(NA)-080701ENG
	Master station, local station	CC-Link Ver.2 Q80BD-J61BT11N Driver Development Reference Manual	SH(NA)-080702ENG
	Remote device station	CC-Link Remote Device Station Communication LSI MFP3N Reference Manual	SH(NA)-080624ENG
	Remote I/O station	CC-Link Remote I/O Station Communication LSI MFP2N Reference Manual	SH(NA)-080622ENG
		CC-Link Remote I/O Station Communication LSI MFP2AN Reference Manual	SH(NA)-080623ENG
		CC-Link Embedded I/O Adapter User's Manual	SH(NA)-080324E
CC-Link/LT	Master station	CC-Link/LT Master Station Communication LSI CLC13 Reference Manual	SH(NA)-080703ENG
	Remote device station	CC-Link/LT Remote Device Station Communication LSI CLC31 Reference Manual	SH(NA)-080704ENG
	Remote I/O station	CC-Link/LT Remote I/O Station Communication LSI CLC21 Reference Manual	SH(NA)-080707ENG

CC-Link IE TSN
CC-Link IE Control
CC-Link IE Field
CC-Link
CC-Link/LT

Warranty

Please confirm the following product warranty details before using the product.
For the warranty for the software development kit (SDK), please see the separate agreement.

Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired [replaced for the dedicated communication LSI and device kit free of charge] at no cost via the sales representative or Mitsubishi Service Company.
However, if repairs are required onsite at domestic or overseas location, expenses to send an engineer will be solely at the customer's discretion. Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed product.

Gratis Warranty Term

The gratis warranty term of the product shall be for one(1) year after the date of purchase or delivery to a designated place.
Note that after manufacture and shipment of the product from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months.
The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.

Gratis Warranty Range

(1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.

(2) Even within the gratis warranty term, repairs [the cost of replacement for the dedicated communication LSI and device kit] shall be charged for in the following cases.

1. Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.
2. Failure caused by unapproved modifications, etc., to the product by the user.
3. When the Mitsubishi product is assembled into a user's device, Failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
4. Failure caused by external irresistible forces such as fires or abnormal voltages, and Failure caused by force majeure such as earthquakes, lightning, wind and water damage.
5. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
6. Any other failure found not to be the responsibility of Mitsubishi or that admitted not to be so by the user.

Handling after discontinuation of production

(1) Mitsubishi shall accept onerous product repairs for seven (7) years after production of the product is discontinued. Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.

(2) Product supply (including repair parts) is not available after production is discontinued.

Customer service

(1) When the cause of failure requires an investigation, Mitsubishi shall conduct the investigation using the dedicated LSI only. Remove the dedicated LSI from the product in which it is incorporated and bring it to Mitsubishi. Mitsubishi will not conduct business travel in connection with the investigation.

(2) Overseas, repairs shall be accepted [replacements shall be provided for the dedicated communication LSI and device kit] by Mitsubishi's local FA Centers. Note that the repair conditions [the conditions under which replacements are provided for the dedicated communication LSI and device kit] at each FA Center may differ.

Exclusion of loss in opportunity and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to:

(1) Damages caused by any cause found not to be the responsibility of Mitsubishi.

(2) Loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products.

(3) Special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products.

(4) Replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

Changes in product specifications

The specifications given in the catalogs, manuals or technical documents are subject to change without prior notice.

Conditions of use for the product

(1) Mitsubishi product ("the PRODUCT") shall be used in conditions;

i) where any problem, fault or failure occurring in the PRODUCT or the overall system in which the PRODUCT is used, if any, shall not lead to any major or serious accident; and

ii) where the backup and fail-safe function are systematically or automatically provided outside of the PRODUCT for the case of any problem, fault or failure occurring in the PRODUCT.

(2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries.

MITSUBISHI SHALL HAVE NO RESPONSIBILITY OR LIABILITY (INCLUDING, BUT NOT LIMITED TO ANY AND ALL RESPONSIBILITY OR LIABILITY BASED ON CONTRACT, WARRANTY, TORT, PRODUCT LIABILITY) FOR ANY INJURY OR DEATH TO PERSONS OR LOSS OR DAMAGE TO PROPERTY CAUSED BY the PRODUCT THAT ARE OPERATED OR USED IN APPLICATION NOT INTENDED OR EXCLUDED BY INSTRUCTIONS, PRECAUTIONS, OR WARNING CONTAINED IN MITSUBISHI'S USER, INSTRUCTION AND/OR SAFETY MANUALS, TECHNICAL BULLETINS AND GUIDELINES FOR the PRODUCT.

("Prohibited Application")

Prohibited Applications include, but not limited to, the use of the PRODUCT in;

- Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the PRODUCT.
- Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.
- Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Manned transportation, Equipment for Recreation and Amusement, Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.

Notwithstanding the above restrictions, Mitsubishi may in its sole discretion, authorize use of the PRODUCT in one or more of the Prohibited Applications, provided that the usage of the PRODUCT is limited only for the specific applications agreed to by Mitsubishi and provided further that no special quality assurance which exceed the general specifications of the PRODUCTs are required. For details, please contact the Mitsubishi representative in your region.

Memo

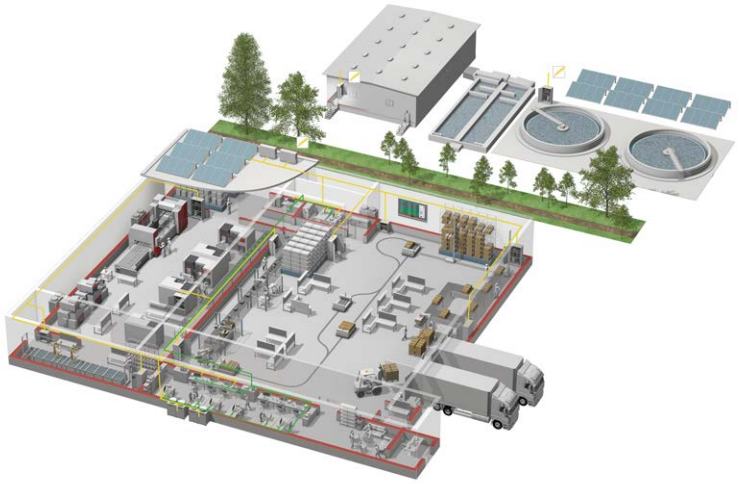
Precautions before use

This publication explains the typical features and functions of the products herein and does not provide restrictions and other information related to usage and module combinations. Before using the products, always read the product user manuals. Mitsubishi Electric will not be held liable for damage caused by factors found not to be the cause of Mitsubishi Electric; opportunity loss or lost profits caused by faults in Mitsubishi Electric products; damage, secondary damage, or accident compensation, whether foreseeable or not, caused by special factors; damage to products other than Mitsubishi Electric products; and to other duties.

⚠ For safe use

- To use the products given in this publication properly, always read the relevant manuals before use.
- The products have been manufactured as general-purpose parts for general industries, and have not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the products for special purposes such as nuclear power, electric power, aerospace, medicine or passenger movement vehicles, consult with Mitsubishi.
- The products have been manufactured under strict quality control. However, when installing the products where major accidents or losses could occur if the products fail, install appropriate backup or fail-safe functions in the system.

YOUR SOLUTION PARTNER



Mitsubishi Electric offers a wide range of automation equipment from PLCs and HMIs to CNC and EDM machines.

Low voltage: MCCB, MCB, ACB

Medium voltage: VCB, VCC

Power monitoring, energy management

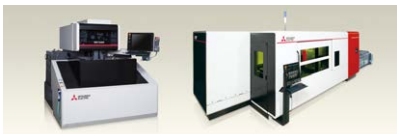
Compact and Modular Controllers

Inverters, Servos and Motors

Visualisation: HMIs

Numerical Control (NC)

Robots: SCARA, Articulated arm



Processing machines: EDM, Lasers, IDS

Transformers, Air conditioning, Photovoltaic systems

A NAME TO TRUST

Since its beginnings in 1870, some 45 companies use the Mitsubishi name, covering a spectrum of finance, commerce and industry.

The Mitsubishi brand name is recognized around the world as a symbol of premium quality.

Mitsubishi Electric Corporation is active in space development, transportation, semi-conductors, energy systems, communications and information processing, audio visual equipment and home electronics, building and energy management and automation systems, and has 237 factories and laboratories worldwide in over 121 countries.

This is why you can rely on Mitsubishi Electric automation solution - because we know first hand about the need for reliable, efficient, easy-to-use automation and control in our own factories.

As one of the world's leading companies with a global turnover of over 4 trillion Yen (over $40 billion), employing over 100,000 people, Mitsubishi Electric has the resource and the commitment to deliver the ultimate in service and support as well as the best products.

* Not all products are available in all countries.

Open Field Network
CC-Link Family Compatible Product Development Guidebook

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USA	MITSUBISHI ELECTRIC AUTOMATION, INC. 500 Corporate Woods Parkway, Vernon Hills, IL 60061, U.S.A.	Tel : +1-847-478-2100 Fax : +1-847-478-2253
Mexico	MITSUBISHI ELECTRIC AUTOMATION, INC. Mexico Branch Boulevard Miguel de Cervantes Saavedra 301, Torre Norte Piso 5, Ampliacion Granada, Miguel Hidalgo, Ciudad de Mexico, Mexico, C.P.115200	Tel : +52-55-3067-7512
Brazil	MITSUBISHI ELECTRIC DO BRASIL COMERCIO E SERVICOS LTDA. Avenida Adelino Cardana, 293, 21 andar, Bethaville, Barueri SP, Brasil	Tel : +55-11-4689-3000 Fax : +55-11-4689-3016
Germany	MITSUBISHI ELECTRIC EUROPE B.V. German Branch Mitsubishi-Electric-Platz 1, 40882 Ratingen, Germany	Tel : +49-2102-486-0 Fax : +49-2102-486-7780
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Ireland	MITSUBISHI ELECTRIC EUROPE B.V. Irish Branch Westgate Business Park, Ballymount, Dublin 24, Ireland	Tel : +353-1-4198800 Fax : +353-1-4198890
Italy	MITSUBISHI ELECTRIC EUROPE B.V. Italian Branch Centro Direzionale Colleoni - Palazzo Sirio, Viale Colleoni 7, 20864 Agrate Brianza (MB), Italy	Tel : +39-039-60531 Fax : +39-039-6053-312
Spain	MITSUBISHI ELECTRIC EUROPE, B.V. Spanish Branch Carretera de Rubi, 76-80-Apdo. 420, E-08190 Sant Cugat del Valles (Barcelona), Spain	Tel : +34-935-65-3131 Fax : +34-935-89-1579
France	MITSUBISHI ELECTRIC EUROPE B.V. French Branch 25, Boulevard des Bouvets, 92741 Nanterre Cedex, France	Tel : +33-1-55-68-55-68 Fax : +33-1-55-68-57-57
Czech Republic	MITSUBISHI ELECTRIC EUROPE B.V. Czech Branch, Prague Office Pekarska 621/7, 155 00 Praha 5, Czech Republic	Tel : +420-255-719-200
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