MITSUBISHI ELECTRIC

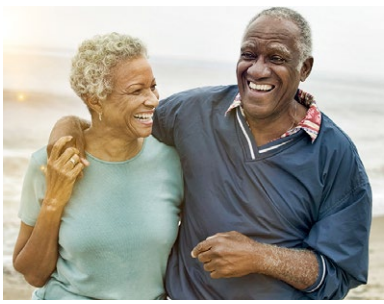
Changes for the Better

Automating the World

FACTORY AUTOMATION

Open Field Network
CC-Link Family Compatible Product Development Guidebook

CC-Link IE TSN
CC-Link IE
CC-Link



Our Factory Automation business is focused on "Automating the World" to make it a better, more sustainable environment supporting manufacturing and society, celebrating diversity and contributing towards an active and fulfilling role.

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.

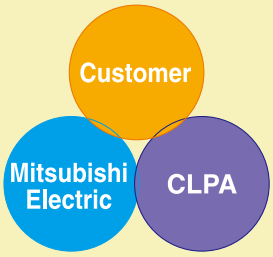
SUSTAINABLE DEVELOPMENT GOALS

The Mitsubishi Electric Group is actively solving social issues, such as decarbonization and labor shortages, by providing production sites with energy-saving equipment and solutions that utilize automation systems, thereby helping towards a sustainable society.

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.

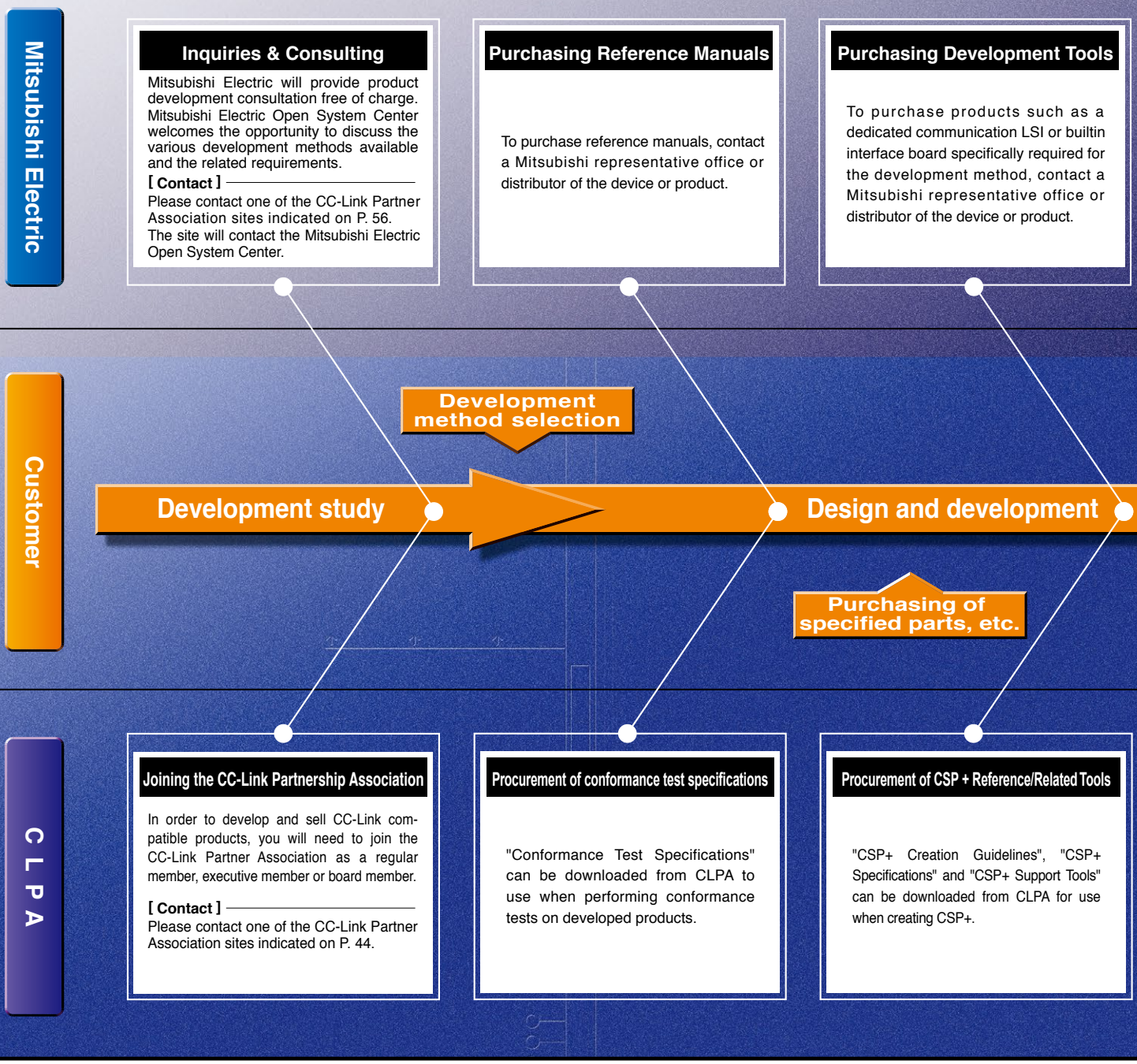


*1. "Application Integration Framework"
*2. Industrial Field bus protocol standard
*3. SEMI E54.12 E54.23-0513
*4. GB/T 19760 20299.4
*5. KSBISO15745-5
*6. JIS TR B0031

INDEX

Expanding business with the

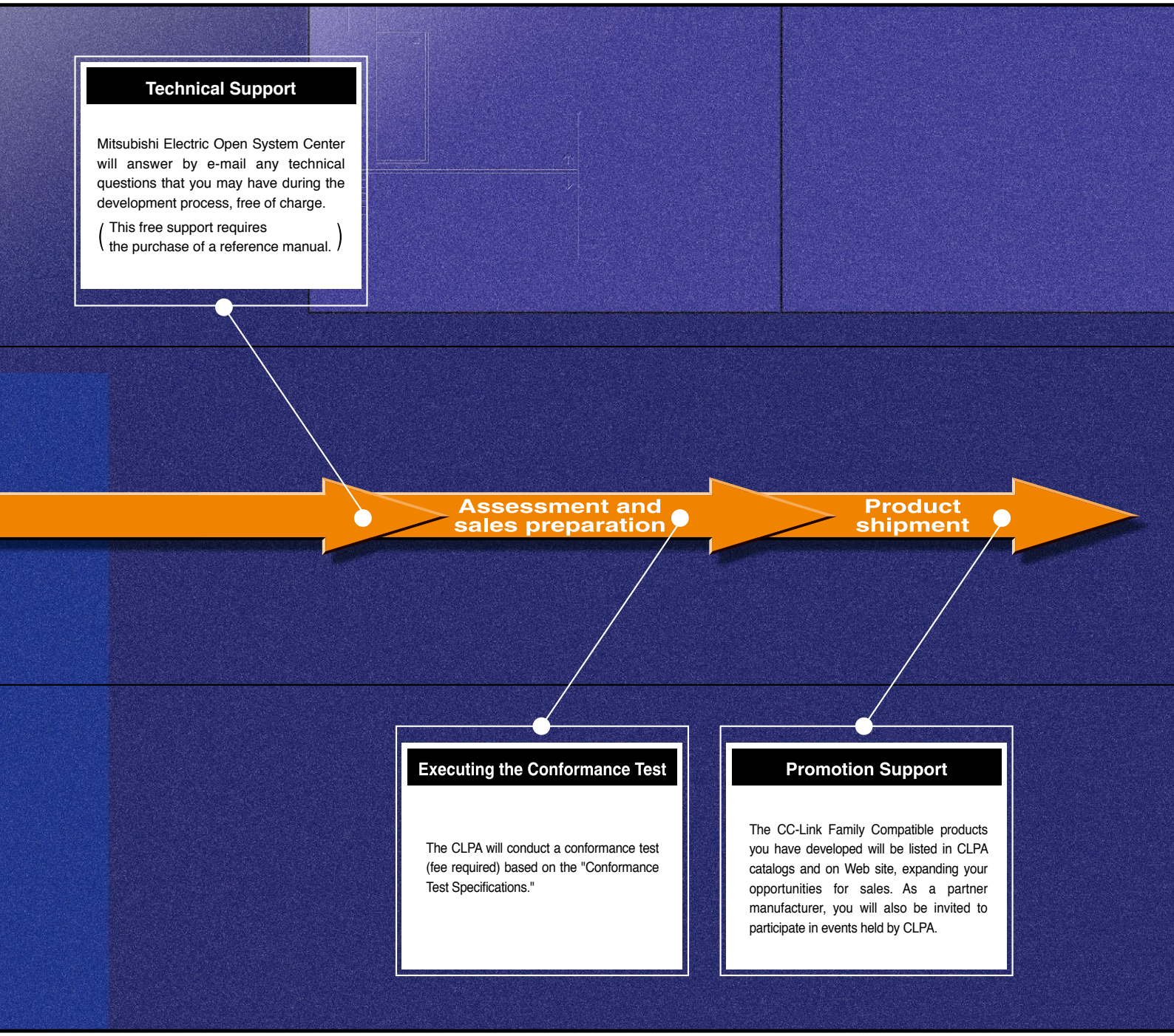
Recommended path to CC-Link Family compatible product development



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 and CC-Link–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**

CC-Link family.



In all areas of development, Mitsubishi Electric offers you solid support.

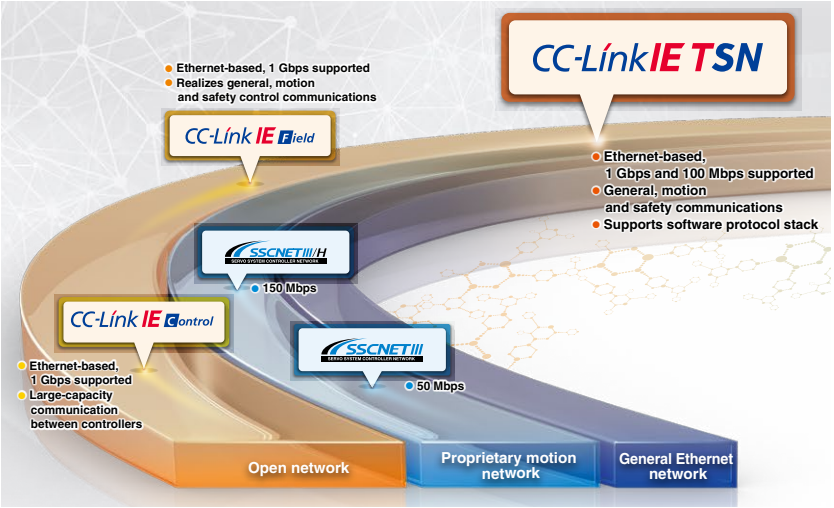
CC-Link IE TSN

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

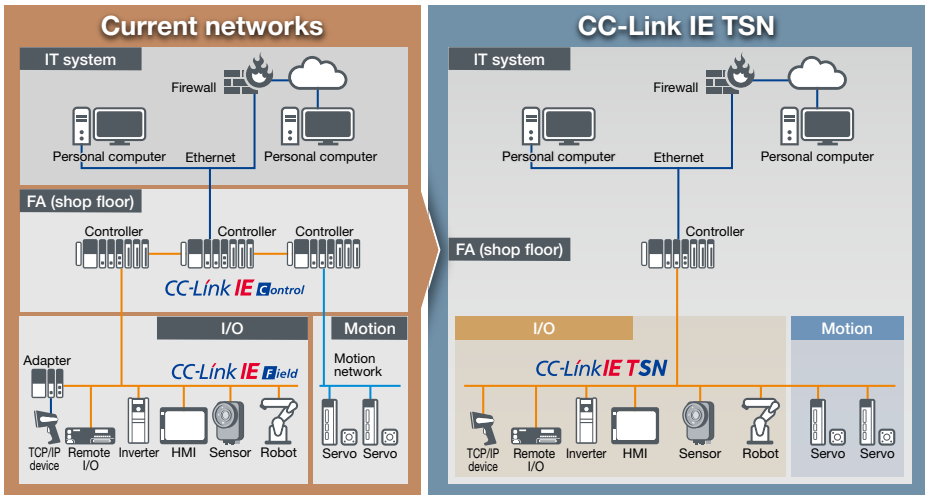
CC-Link IE TSN supports TCP/IP communications and applies it to industrial architectures through its support of TSN enabling real-time communications. With its flexible system architecture and extensive setup and troubleshooting features make CC-Link IE TSN ideal for building an IIoT infrastructure across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

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



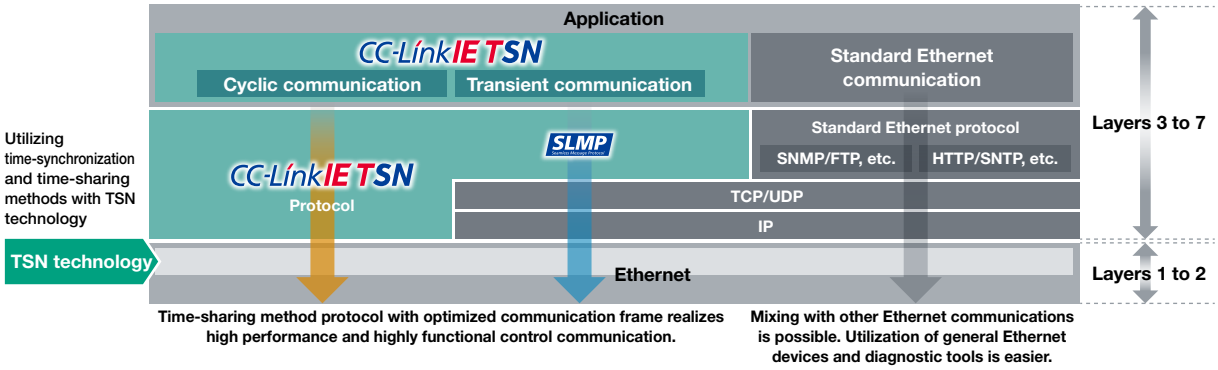
CC-Link IE TSN is an open industrial network inheriting the easy diagnostics of the CC-Link IE Field Network, the large-capacity data communications of the CC-Link IE Control Network, and the high-performance motion control features of SSCNET. Through the incorporation of TSN technology, this network 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 LSI, 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 remote	Software *2 master Hardware remote	Hardware master Software remote	Software master Software remote
Transmission rate				
1G [bps]	●	●	●	●
100M [bps]	●	●	●	●

*1. Hardware master/remote: Development with dedicated LSI

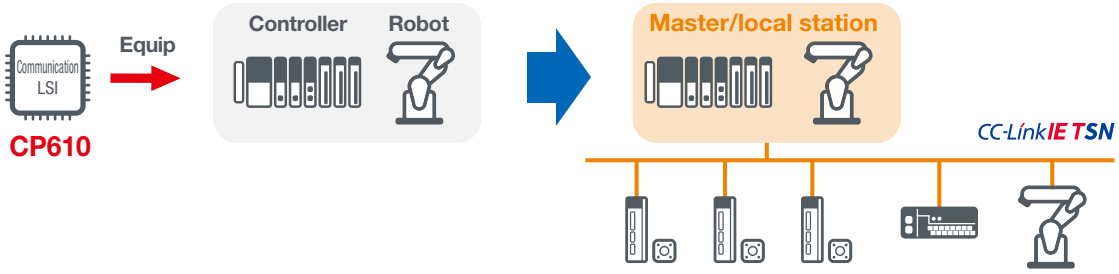
*2. Software master/remote: Development with software protocol stack (standard Ethernet chip)

CC-Link IE TSN

Developing Master/Local Stations

Development with dedicated LSI

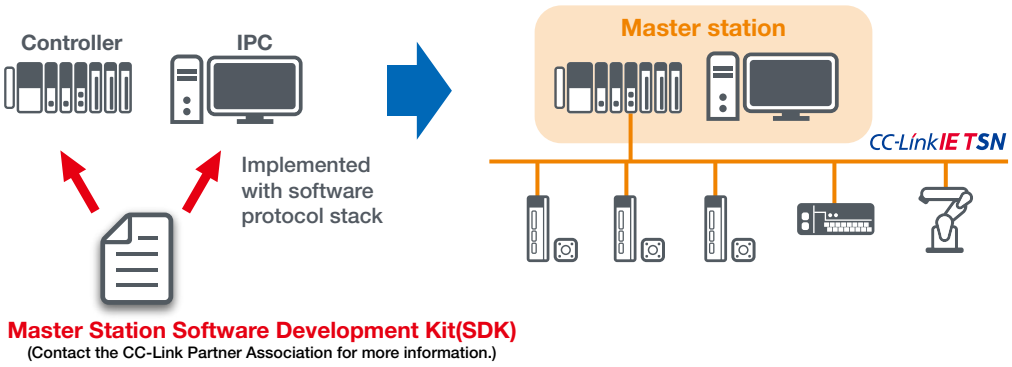
Utilizing the CP610—a dedicated communication LSI designed for master/local station communication—on various controllers and robots adds compatibility as a CC-Link IE TSN master/local station.



Developing Master Stations

Development with the Software

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

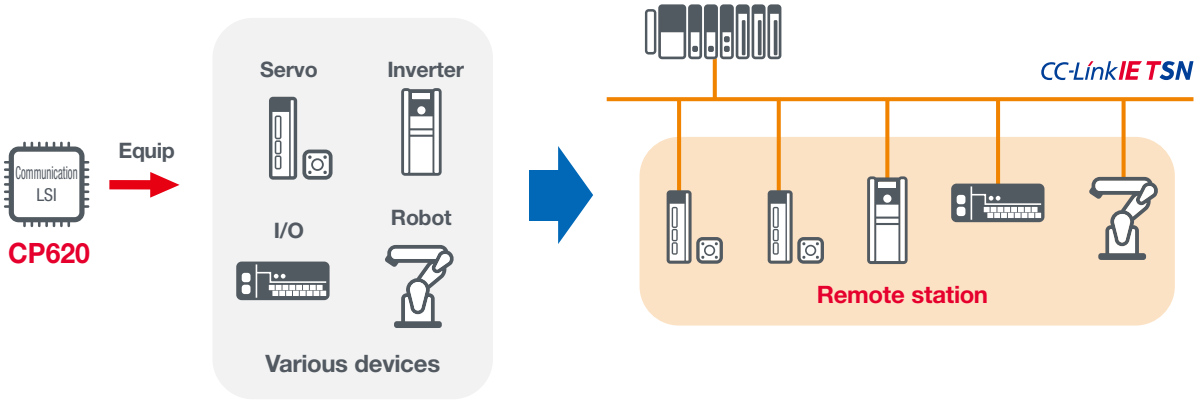


Master Station Software Development Kit(SDK)
(Contact the CC-Link Partner Association for more information.)

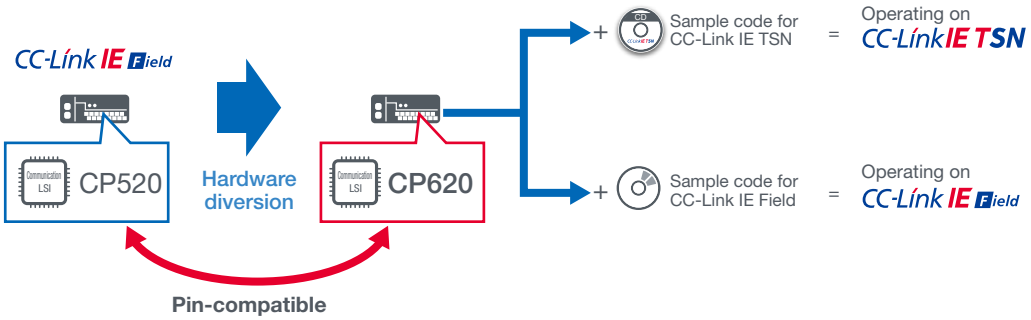
Developing Remote Stations

Development with dedicated LSI

Utilizing the CP620—a dedicated communication LSI designed for remote station communication—on various devices such as I/O devices, servos, inverters, and robots adds compatibility as a CC-Link IE TSN remote station.

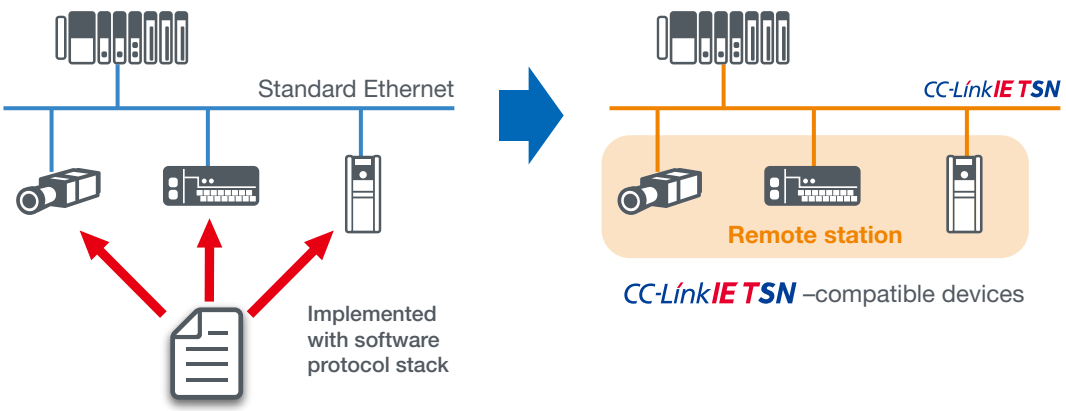


The CP620 is pin-compatible with the CP520, a dedicated CC-Link IE Field Network communication LSI. Therefore, CC-Link IE TSN–compatible devices can be developed using the hardware of CC-Link IE Field Network–compatible devices that use the CP520. Because the hardware can operate on either CC-Link IE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



Development with the Software

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



CC-Link IE TSN remote station: Sample code for Class A
(Can be downloaded from the CC-Link Partner Association HP.)

CC-Link IE TSN
Development Methods

CC-Link IE TSN

CC-Link IE TSN Development Methods

I want to develop a master/local station.

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

Master/Local Stations

■Dedicated Communication LSI CP610 (P11 to P12)

This communication LSI makes it possible to develop devices capable of cyclic transmission or transient transmission without consideration of protocols. CP610 is controlled with software.

Purchase reference manual | Purchase dedicated LSI | 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

■Communication LSI CP620 with GbE-PHY (P13 to P14)

This LSI integrates a communication IP core, 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

CC-Link IE TSN

Developing Master/Local Stations

Dedicated Communication LSI CP610

The CP610 is a communication LSI for use with CC-Link IE TSN master/local stations. The source code development kit is a software development package that can also be used to develop CC-Link IE TSN master/local stations. The CP610 must be controlled from an external MPU. The features of development using the CP610 and the source code development kit are introduced below.

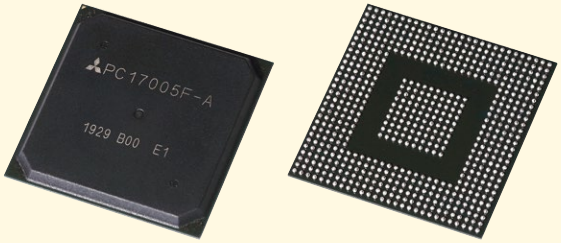
1. CC-Link IE TSN master/local stations can be developed without consideration of protocols.
2. The MPU and OS can be selected as needed, and sample code (two types) is provided that can be customized according to the selected hardware specifications and application. *1
3. The CC-Link IE TSN configuration tool included in the source code development kit can be used to configure parameter settings and run diagnostics on CC-Link IE TSN master/local stations.

- The source code development kit and manual can be downloaded from the Mitsubishi Electric Factory Automation Website.
- The CP610 can be used for developing certified CC-Link IE TSN Class B equipment.
- As a transmission line route simulation model, a SPICE model is available for the PCI Express® interface, and an IBIS model is available for other interface.

*1 Sample code is provided for when the PCI Express® bus is used as the connection interface for the CP610 and an external MPU, and for when a parallel bus is used.

*2 Conclusion of a confidentiality agreement is required in order to receive the SPICE model or IBIS model.
Please contact a branch office or the Mitsubishi Electric Open System Center.

Dedicated Communication LSI (CP610)

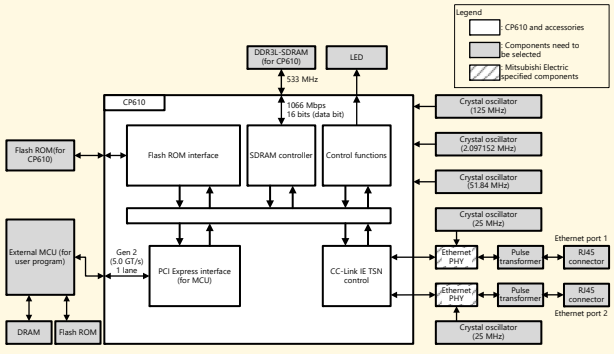


* Actual printing may differ from those shown in the figure.

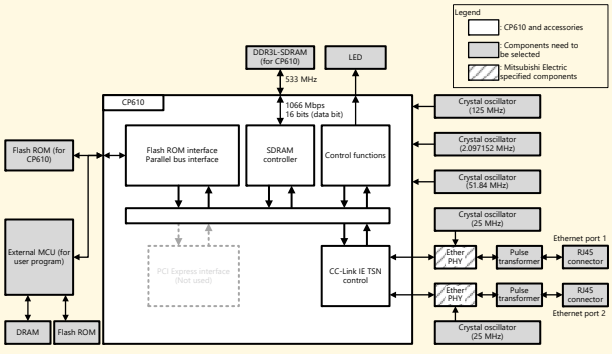
Manual

General Block Diagram

- When connecting the CP610 and external MPU using the PCI Express® bus

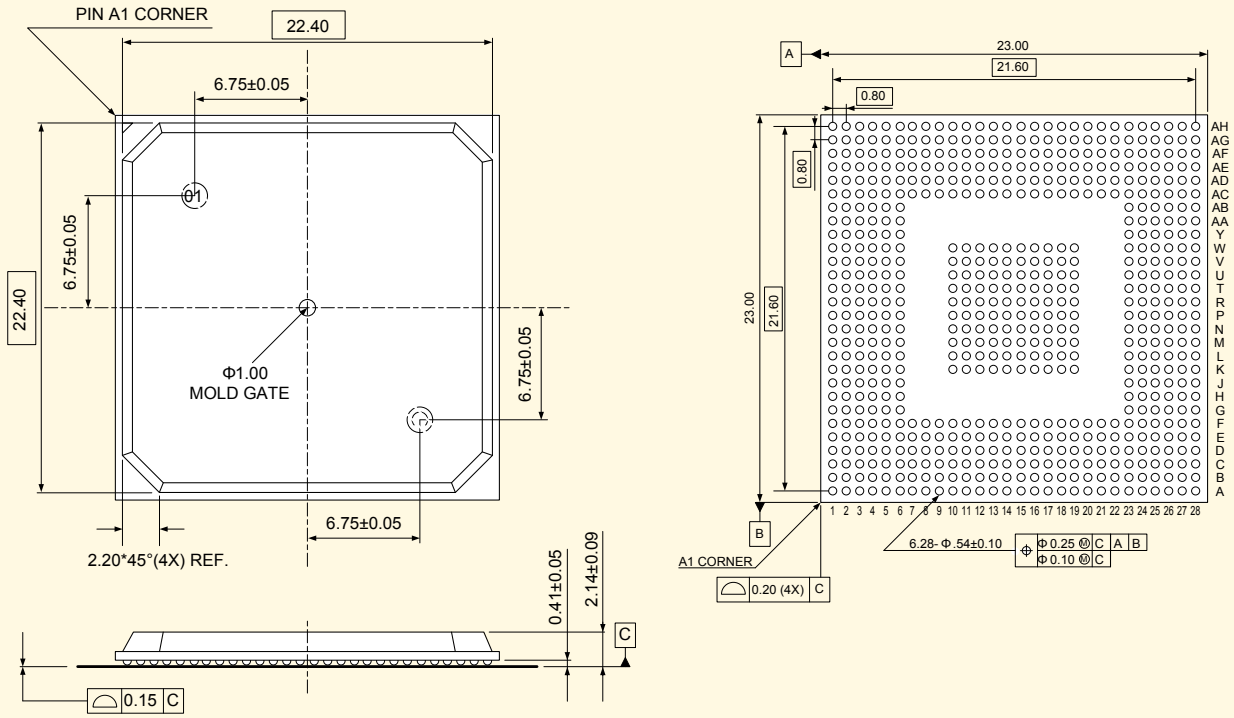


- When connecting the CP610 and external MPU using a parallel bus



Purchase reference manual | Purchase dedicated LSI | Conformance test

External Dimensions



Device Kit, Dedicated Communication LSI (CP610), Source Code Development Kit

Name	Model	Packaging Unit
Device Kit (CP610 × 60, Flash ROM*1 × 60)	NZ2KT-NPETNG51	1 set
CP610 (PC17005F-A)*2	NZ2GACP610-60	60 pieces
Source Code Development Kit (Communication firmware, user program, configuration tool)	SW1DNN-GN610SRC-M	*3

*1 A flash ROM to which the communication firmware has been written is included.
*2 The flash ROM must be prepared separately. Refer to the Recommended Parts/Specified Parts section for details. The communication firmware can be downloaded from the Mitsubishi Electric Factory Automation Website.
*3 Downloadable from the Mitsubishi Electric Factory Automation Website.

Manual

Title	Manual Number
CC-Link IE TSN Master/Local Station Communication LSI CP610 Reference Manual*4	SH(NA)-082320ENG

*4 Downloadable from the Mitsubishi Electric Factory Automation Website.

CC-Link IE TSN

Developing Remote Stations

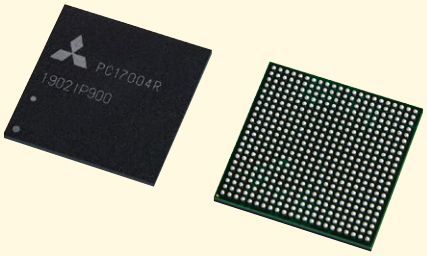
Communication LSI with GbE-PHY CP620

The CP620 is an LSI that includes a CC-Link IE TSN communication IP core, CPU, and GbE-PHY. The integrated design of the LSI reduces costs and labor required for developing a separate CPU and GbE-PHY. The features of development using the CP620 are introduced below.

1. CC-Link IE TSN remote stations and CC-Link IE field network intelligent device stations and remote device stations can be developed without consideration of protocols.
2. The inclusion of the GbE-PHY makes it easier to design communication circuit patterns. In addition, only a small number of peripheral components and circuits are required for the CPU and GbE-PHY, enabling development of more compact circuit boards.
3. The provided sample code can be customized to suit the applicable hardware specifications and applications.
4. The included H/W-RTOS reduces the CPU load and enables a lower power consumption in the developed equipment.

- The manual and sample code can be downloaded from the Mitsubishi Electric Factory Automation Website.
- Information on hardware and software development partners is available upon request.
- Compliant with lead-free/RoHS directives.
- The CP610 can be used for developing certified CC-Link IE TSN Class B equipment.

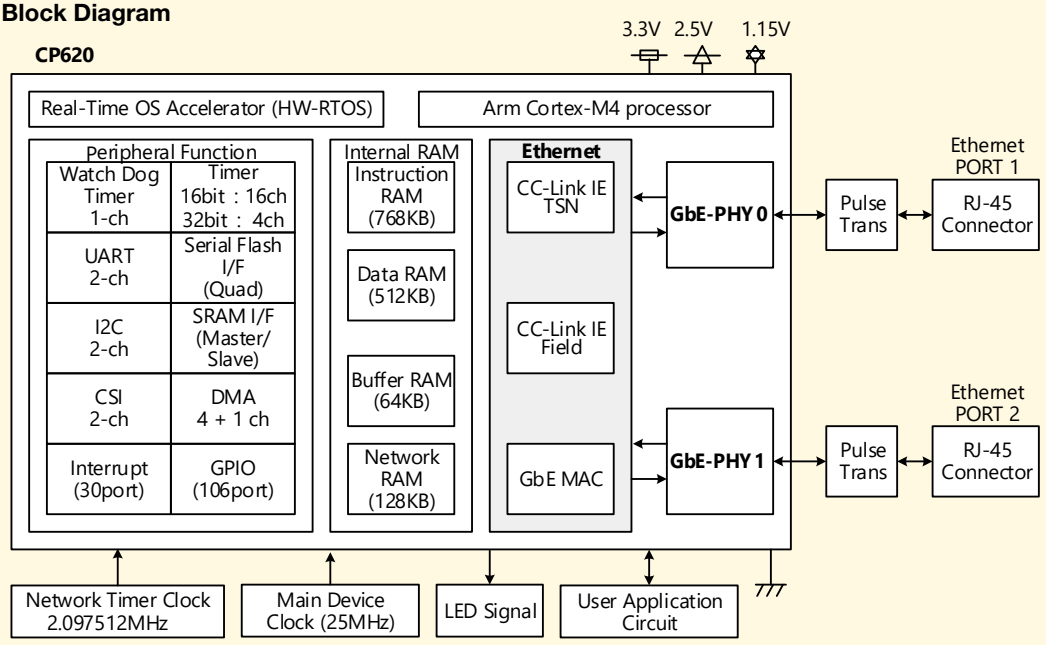
Communication LSI with GbE-PHY (CP620)



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

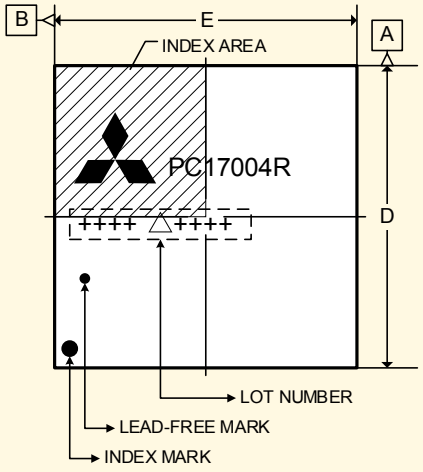
Manual

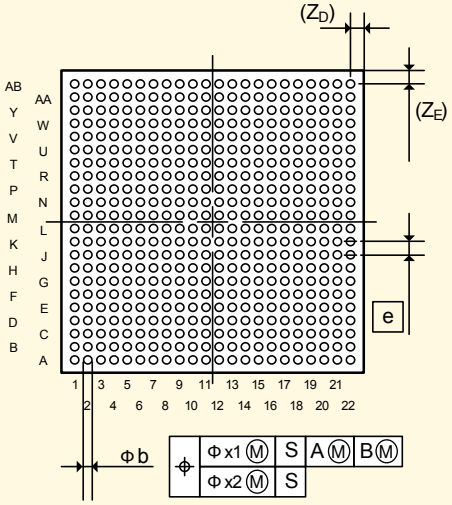
General Block Diagram

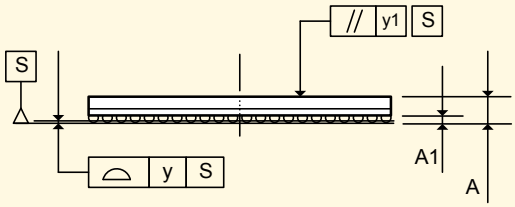


Purchase reference manual | Purchase dedicated LSI | Conformance test

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

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

Development Method for Other **CC-Link Family** Products

CC-Link IE Control

CC-Link IE Field

CC-Link

CC-Link IE Development Methods

CC-Link IE Control

I want to develop control/normal stations.

Control Station, Normal Station

Driver Development*1 (P17 to P18)

Drivers for various operating systems can be developed for use with Mitsubishi Electric PC interface boards (Q80BD-J71GP21-SX/Q81BD-J71GP21-SX).

Purchase reference manual

CC-Link IE Field

I want to develop master/local stations.

Master Station, Local Station

Driver Development*1 (P19 to P20)

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

Purchase reference manual

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

Intelligent Device Station, Remote Device Station

Communication LSI CP620 with GbE-PHY (P13 to P14)

This LSI integrates a communication IP core, MPU, and GbE-PHY. CC-Link IE TSN remote stations and CC-Link IE field network intelligent device stations and remote device stations can be developed by changing the sample code. This makes it possible to develop devices capable of cyclic transmission or transient transmission without consideration of protocols.
CP620 is controlled with software.

*Refer to “CC-Link IE TSN Development Methods” for more information on the CP620.

Purchase reference manual | Purchase dedicated LSI | Conformance test

Communication LSI CP520 with GbE-PHY (P21 to P22)

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 (P23 to P24)

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

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

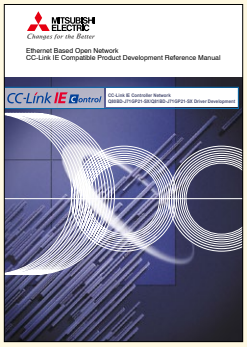
CC-Link IE Control

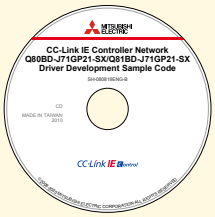
Developing Control/Normal Stations

Purchase reference manual

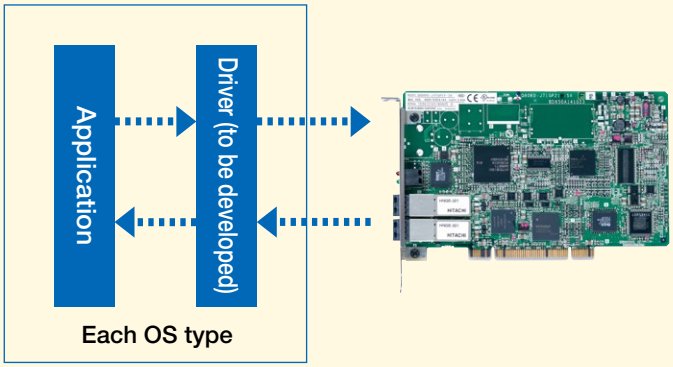
Q80BD-J71GP21-SX/Q81BD-J71GP21-SX Driver Development

■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/Q81BD-J71GP21-SX Driver Development Reference Manual helps you develop a PC interface board Q80BD-J71GP21-SX/Q81BD-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/Q81BD-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

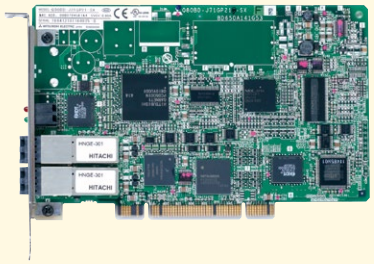
1. The interface board allows you to incorporate personal computers into the CC-Link IE Control Network.
   The interface board allows you to use a personal computer as a control station or normal station within a CC-Link IE Control Network when mounted.

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.

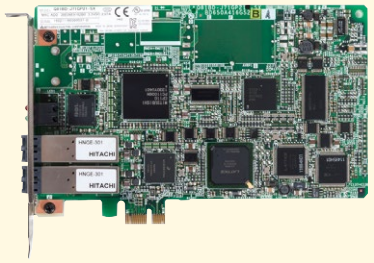
3. The interface board displays test information and monitor information related to the CC-Link IE Control Network system.
   The interface board enables simple display of CC-Link IE Control Network system related test and monitor status information on the personal computer.

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-Link IE Control utility.

■ Q80BD-J71GP21-SX



■ Q81BD-J71GP21-SX



■Specifications

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

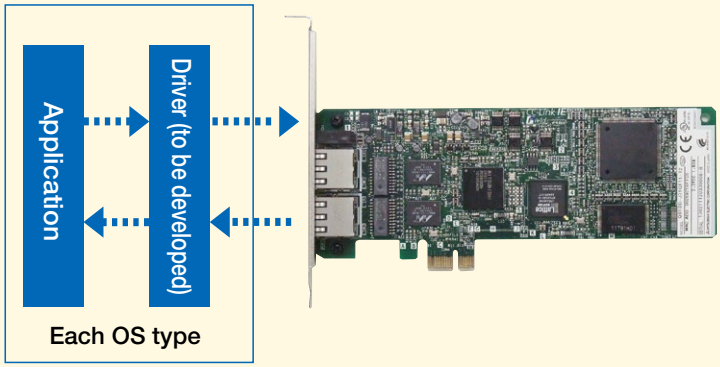
Developing Master/Local Stations

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

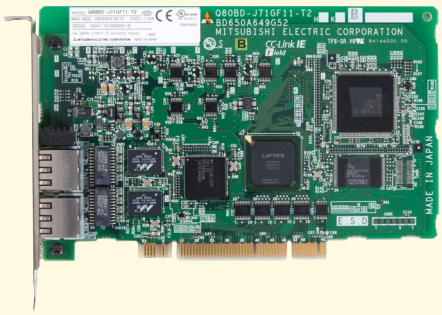
Title	Manual No.
CC-Link IE Field Network Q80BD-J71GF11-T2/Q81BD-J71GF11-T2 Driver Development Reference Manual	SH(NA)-081155ENG

CC-Link IE Field Network PC Interface Boards

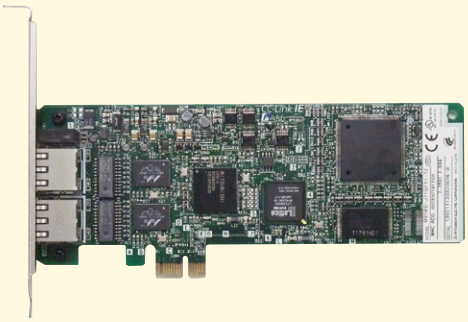
Q80BD-J71GF11-T2/Q81BD-J71GF11-T2

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-Link 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-Link 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.

CC-Link IE Field

Developing Intelligent Device Stations and Remote

Communication LSI CP520/CP620* with GbE-PHY

***Refer to P. 13 to 14 for more information on the CP620.**

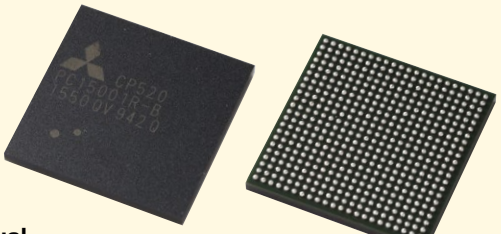
CP520 is an LSI that integrates a communication IP core, MPU, and GbE-PHY. This integrated LSI allows you to reduce MPU and GbE-PHY related development costs and manhours.
CP520-based development offers the following features:

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 a communication IP core 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.

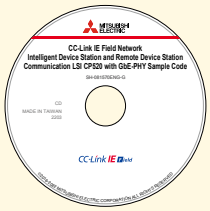
- The manual and sample code can be downloaded from the Mitsubishi Electric Factory Automation Website.
- Upon request, hardware and software development partners are introduced.
- Lead-free/RoHS directive compliant

Communication LSI with GbE-PHY (CP520)

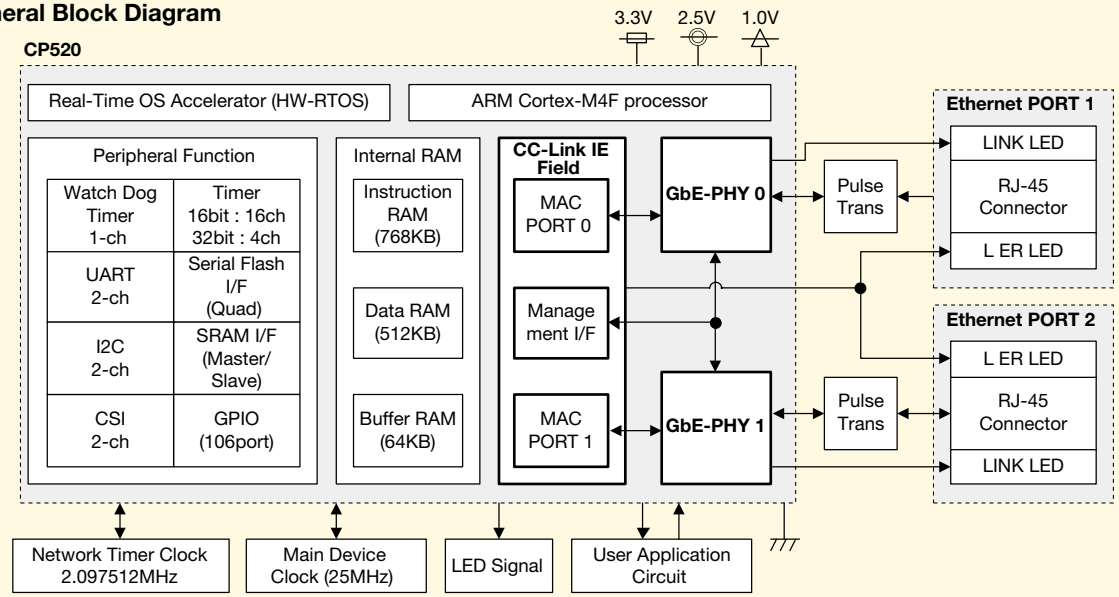
*Actual printing may differ from those shown in the figure.



Manual



General Block Diagram



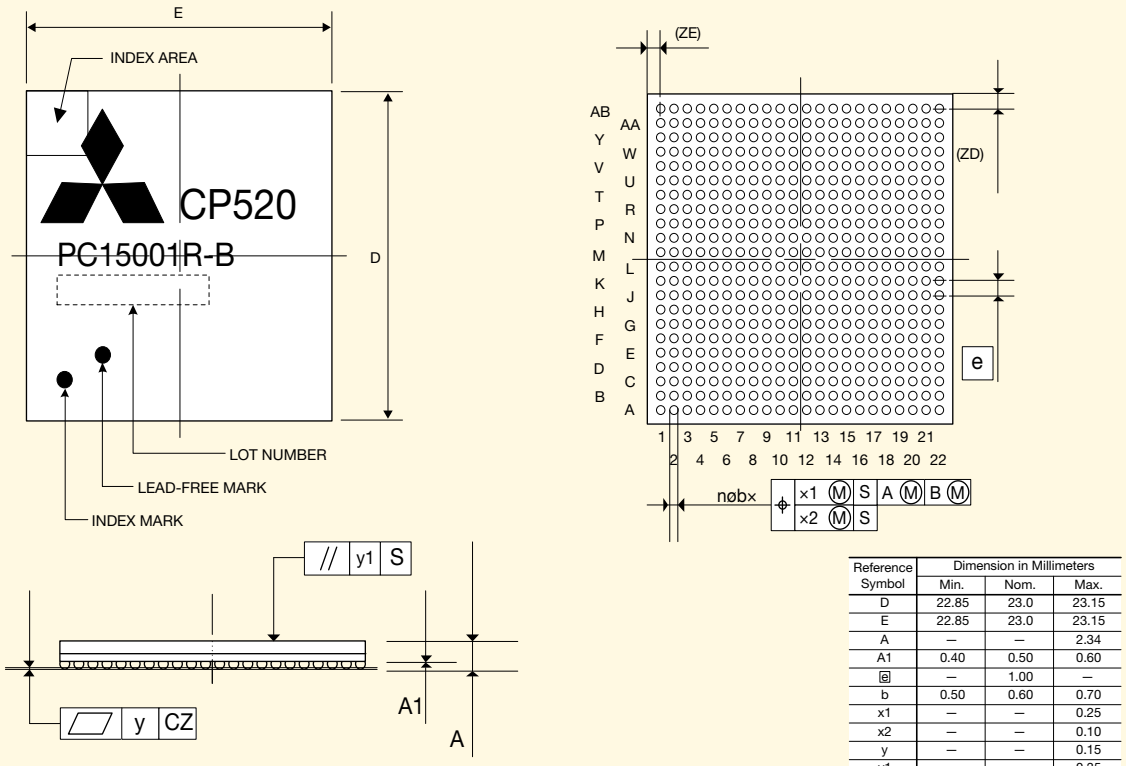
Device Stations

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

■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.

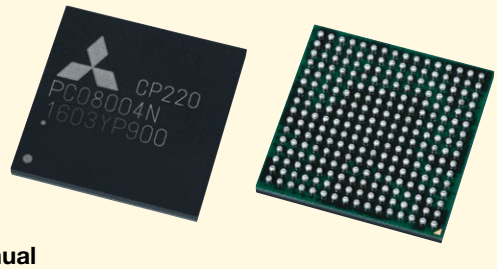
1. CP220 is a dedicated communication LSI for the intelligent device station of a CC-Link IE Field Network.
2. Cyclic transmission (intelligent device stations: 2048 bits each for RX/RY, 1024 words each for RWr/RWw; remote device stations: 128 bits each for RX/RY, 64 words each for RWr/RWw) and transient transmission (intelligent device station: client/server functions; remote device station: server function) are possible.
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.

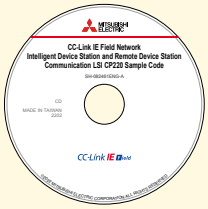
•Lead-free/RoHS directive compliant

■Dedicated Communication LSI (CP220)

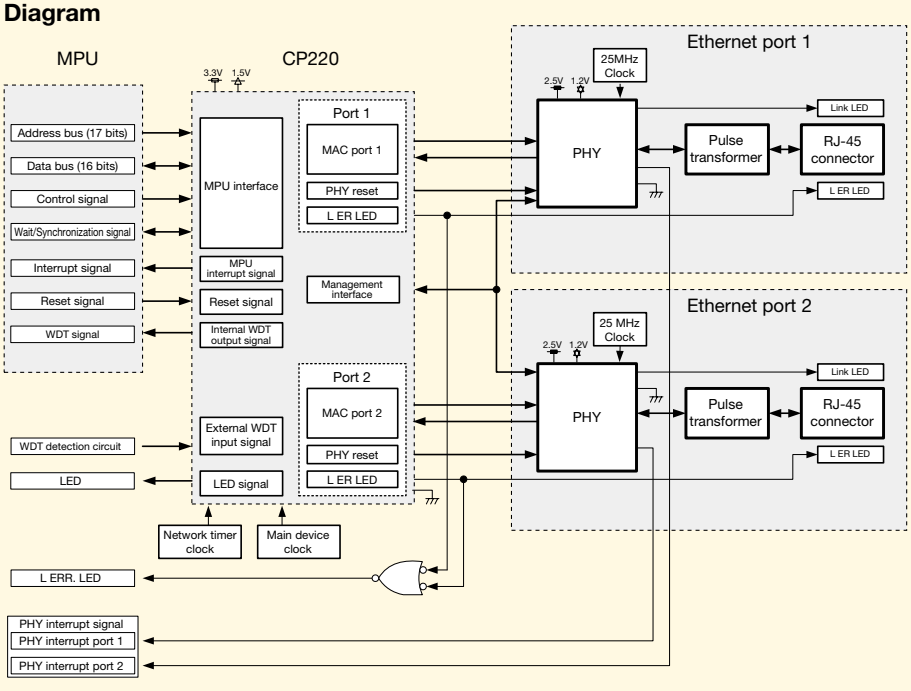
*Actual printing may differ from those shown in the figure.



■Manual



■General Block Diagram



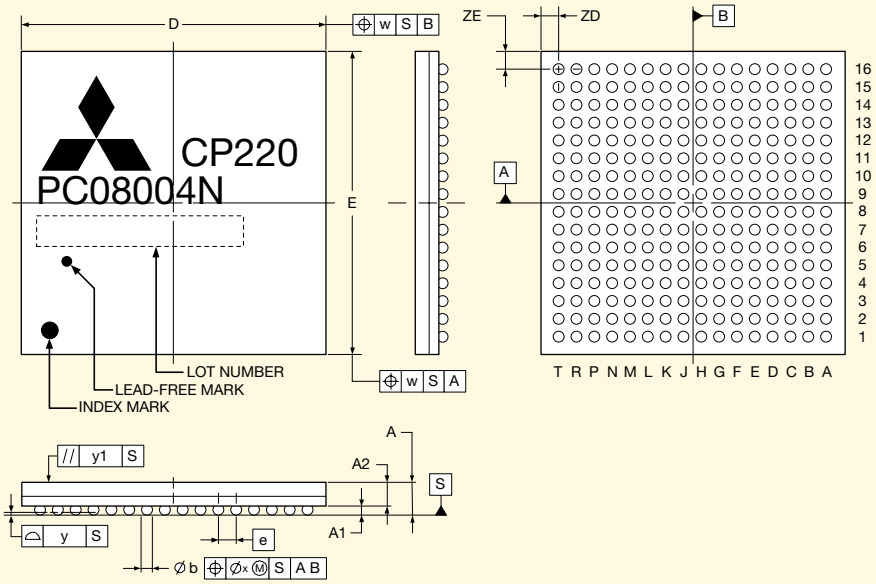
Device Stations

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	17.00±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

Dedicated Communication LSI (CP220)

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

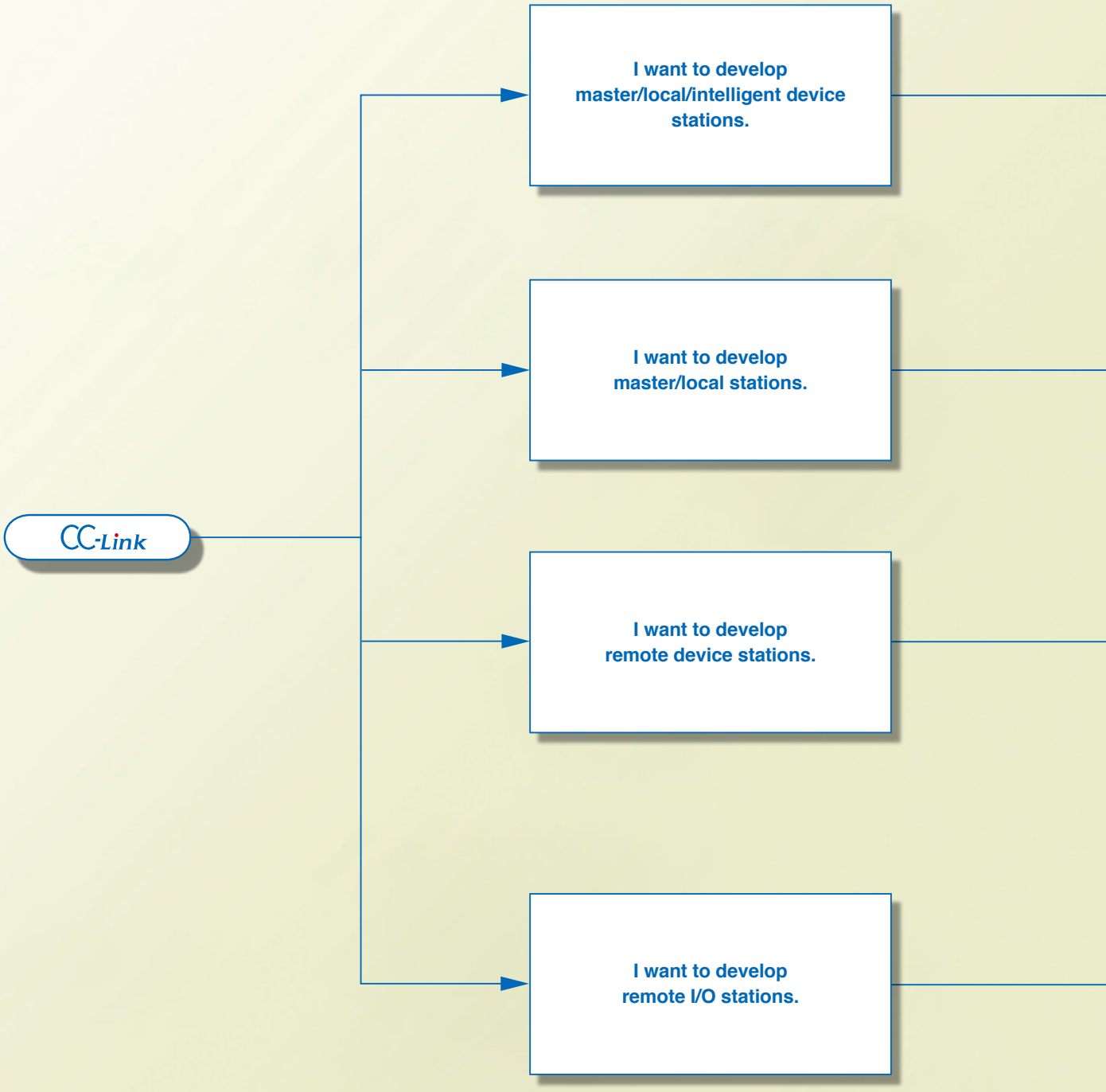
Manual

Title	Manual No.
CC-Link IE Field Network Intelligent Device Station and Remote Device Station Communication LSI CP220 Reference Manual	SH(NA)-082461ENG
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.

It's Easy & Speedy.

Mitsubishi Electric provides development methods tailored to



specific types of CC-Link–compatible products.

CC-Link

Master Station, Local Station, Intelligent Device Station

■Built-in interface board Q50BD-CCV2 (P27 to P28)

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

Master Station, Local Station

■Driver development*1 (P29 to P30)

Drivers for various operating systems can be developed for use with Mitsubishi Electric PC interface boards (Q80BD-J61BT11N/Q81BD-J61BT11).

Purchase reference manual

Remote Device Station

■Dedicated communication LSI MFP3N (P31 to P32)

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

■Dedicated communication LSI MFP2N/MFP2AN (P33 to P34)

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 (P35 to P36)

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

*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).

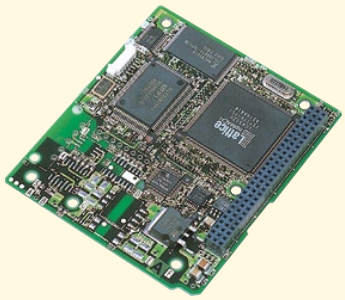
2. The interface board is compatible with CC-Link Ver.2.
   With CC-Link Ver.2, the maximum number of cyclic data can be extended to 8192 bits for RX/RY and 2048 words for RWr/RWw. CC-Link Ver.2 is also compatible with old specifications (Ver.1).

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

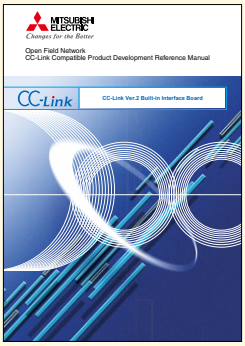
4. Communication with user application circuit can be performed using a general-purpose bus interface.
   The interface between the user application circuit and the interface board is comprised of general memory control signals (address bus, data bus, read, write, etc.), making communication with the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

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

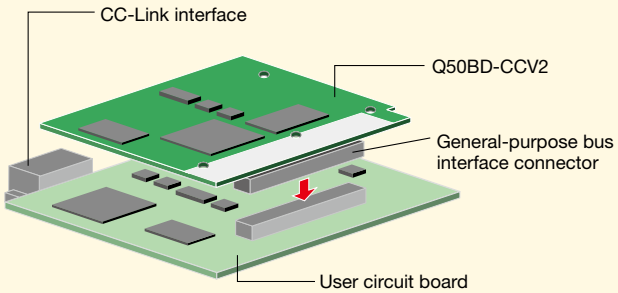
■Built-in interface board (Q50BD-CCV2)



■Manual



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



■Built-in interface board basic specifications

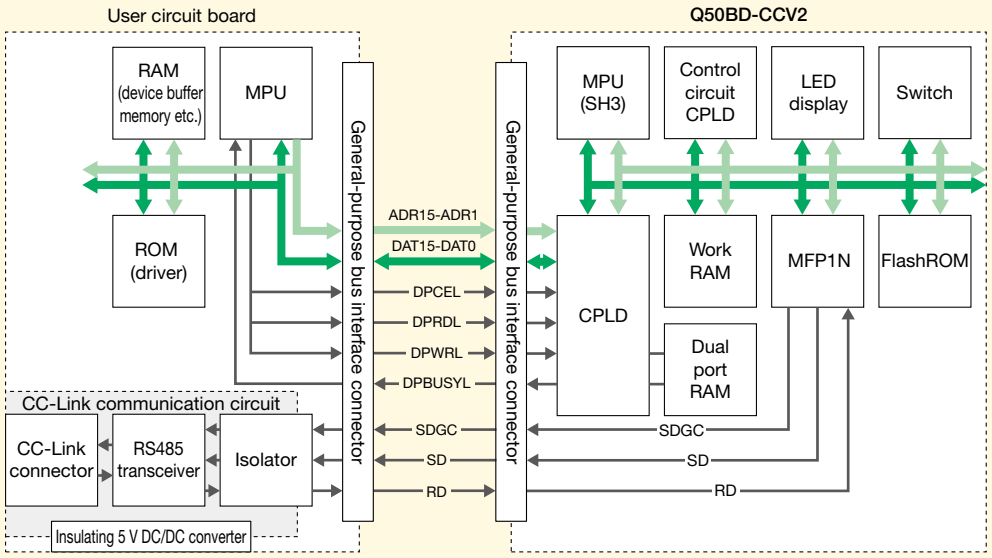
Classification	Item	Description
Control area	Bus interface	General-purpose bus interface
	MPU	SH3 (SH7708R) QFP 144 pins
Memory	ROM	ROM 512K words x 16 bits (8Mbits)
	SRAM	Dual port RAM 32K words x 16 bits (512Kbits)
		Work RAM 256K words x 16 bits (4Mbits)
Communication area	Dedicated communication 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.

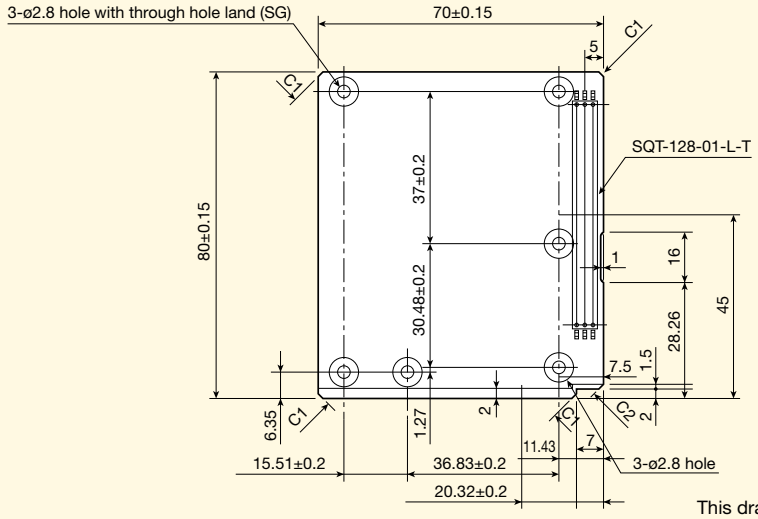
Intelligent Device Stations

Purchase reference manual | Purchase specified parts | Conformance test

■Interface Board and User Application Circuit Block Diagram



■Circuit Board Dimensions



Unit : mm

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

■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

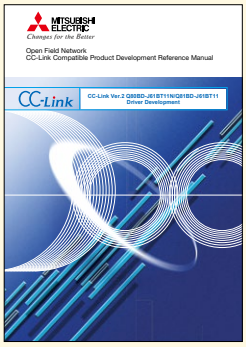
*Provides circuit examples, timing charts, pin assignments and driver develop methods.

CC-Link Developing Master/Local Stations

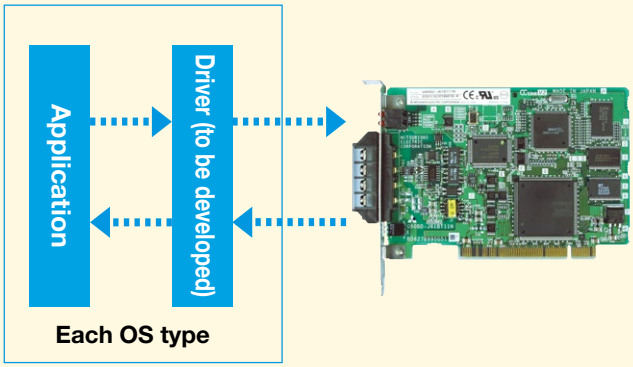
Purchase reference manual

Q80BD-J61BT11N/Q81BD-J61BT11 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/Q81BD-J61BT11 Driver Development Reference Manual helps you develop a PC interface board Q80BD-J61BT11N/Q81BD-J61BT11 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

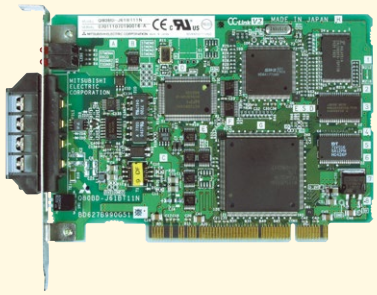
Title	Manual No.
CC-Link Ver.2 Q80BD-J61BT11N/Q81BD-J61BT11 Driver Development Reference Manual	SH(NA)-080702ENG

CC-Link Ver.2 PC Interface Board

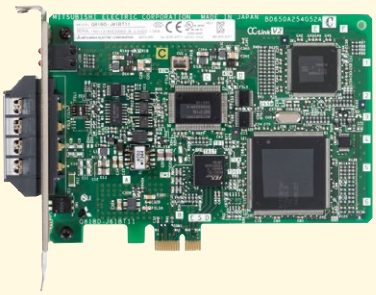
Q80BD-J61BT11N/Q81BD-J61BT11

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)
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 Developing Remote Device Stations

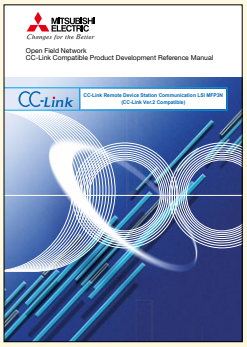
Dedicated Communication LSI MFP3N

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

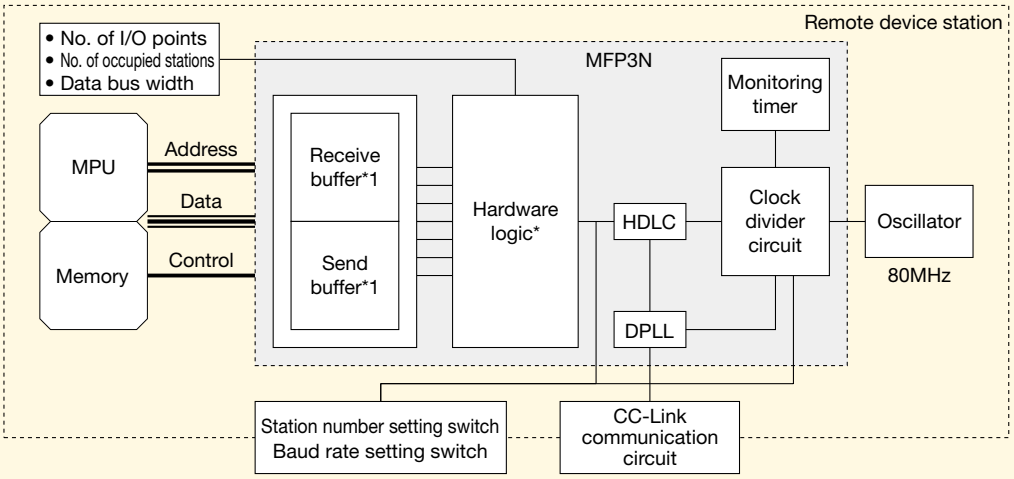
The remote Input/Output (RX/RY: bit data) and remote register (RWw/RWr: word data) can handle the amount of data shown in the table below, based on the number of occupied stations.

Type		Version	Expanded Cyclic Setting	Number of occupied stations			
				1 station occupied	2 station occupied	3 station occupied	4 station occupied
Remote input: RX*1		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*1		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

*1 The last 16 points are reserved by the system.

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

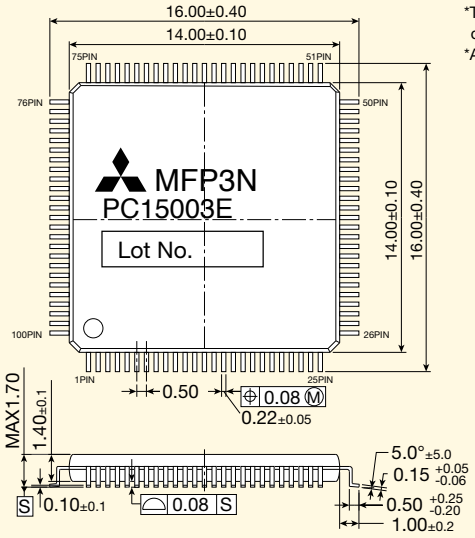
■General Block Diagram



*: Extracts the bit data (RY) and word data (RWw) intended for its own station from the received data, and stores them in the receive buffer.
Extracts the bit data (RX) and word data (RWr) intended for the master station from the send buffer, and sends them to the master station.

■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	Manufacturer
MFP3N (PC15003E)	A6GA-CCMFP3NN60FN NEW	60 pieces	Mitsubishi Electric Corporation
	A6GA-CCMFP3NN300FN NEW	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

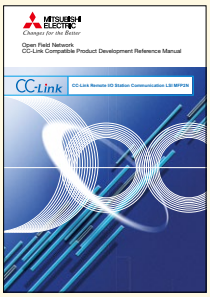
1. The dedicated communication LSI MFP2N and MFP2AN allow you to develop CC-Link remote I/O stations.
2. The difference between MFP2N and MFP2AN lies in the package size (number of pins) and I/O point quantity. Other than the package size (number of pins) and I/O point quantity, the LSIs are identical. 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

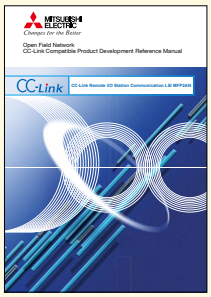
■Dedicated Communication LSI (MFP2N)

■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	

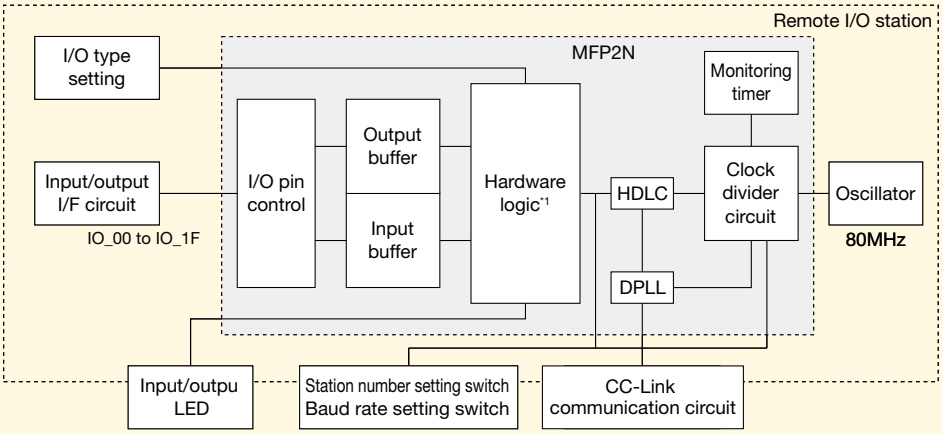
■Number of MFP2AN I/O Points

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)



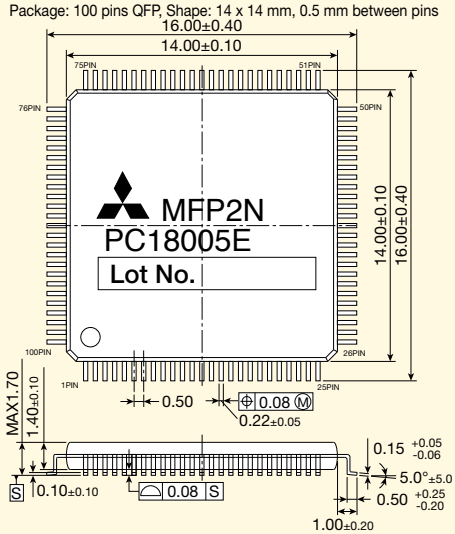
*1: Extracts the bit data (RY) intended for its own station from the received data, and stores it in the output buffer.
Extracts the input data from the input buffer, and sends it as bit data (RX) to the master station.

■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.

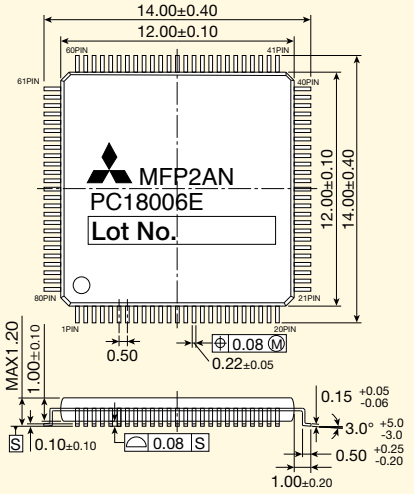
MFP2N

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	Manufacturer
MFP2N(PC18005E)	A6GA-CCMFP2NN60FN	NEW	60 pieces	Mitsubishi Electric Corporation
	A6GA-CCMFP2NN300FN	NEW	300 pieces	
MFP2AN(PC18006E)	A6GA-CCMFP2ANN60FN	NEW	60 pieces	Mitsubishi Electric Corporation
	A6GA-CCMFP2ANN300FN	NEW	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

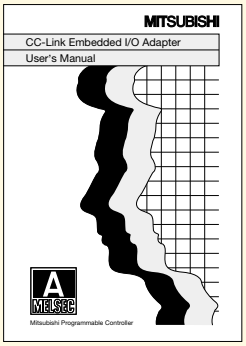
*Provides circuit examples, electrical characteristics, and pin assignments.

CC-Link Developing Remote I/O Stations

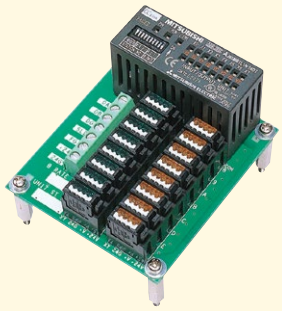
CC-Link Embedded I/O Adapter

■CC-Link Embedded I/O Adapter

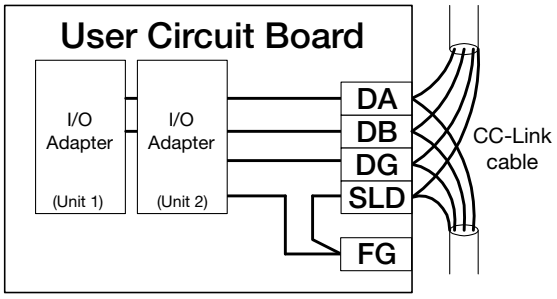
■Manual



■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.



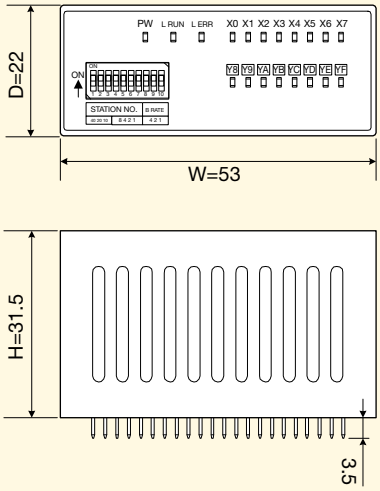
The adapters can be cascaded on the user circuit board as illustrated above. (Cascade connection limit: 2 units, max.)

Purchase reference manual

Conformance test

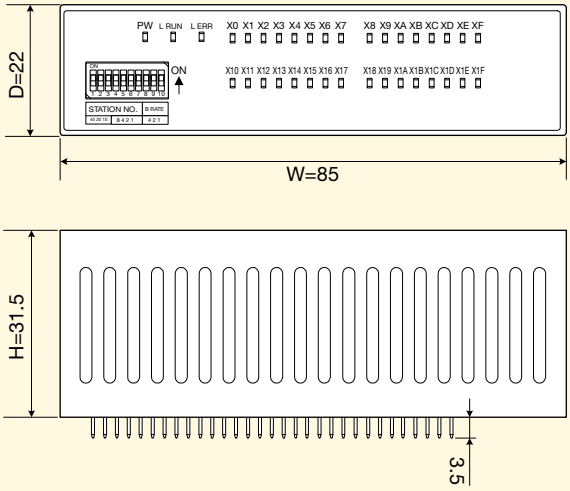
External Dimensions

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

CC-Link IE TSN Technical Information

CC-Link IE TSN Specifications

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 cannot be combined with line or star topologies.

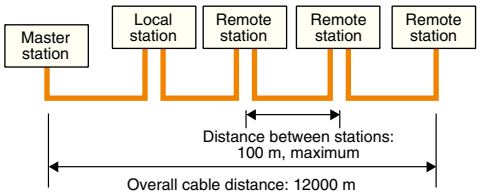
Cable specifications

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

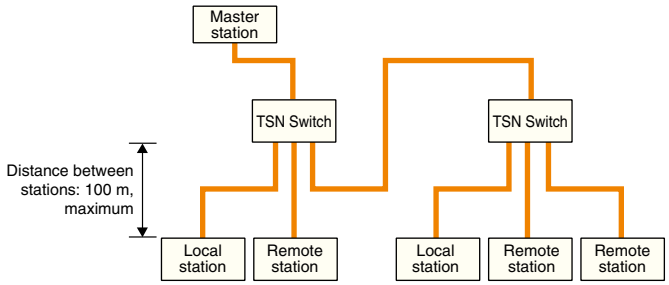
For CC-Link IE Field Network wiring, use the wiring parts recommended by the CC-Link Partner Association.

Network wiring example

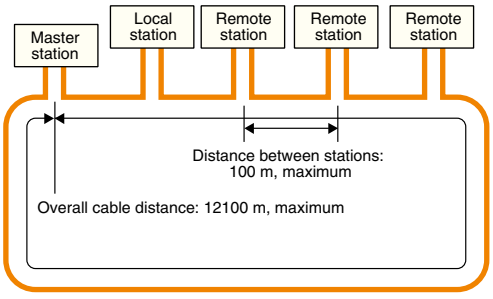
Line type



Star type



Ring type *2



*2 Use a unit compatible with ring connections for all stations.

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 bits (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.

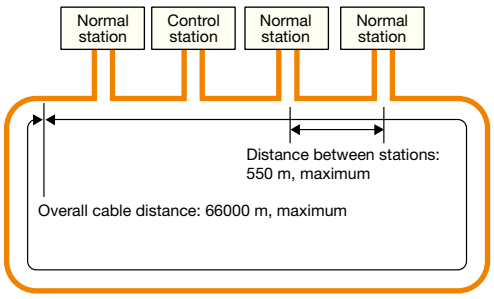
Cable specifications

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.

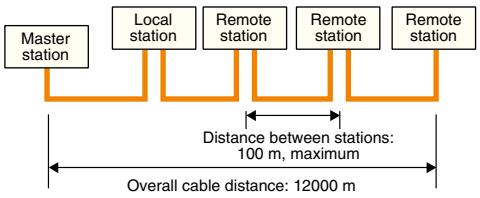
Cable specifications

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

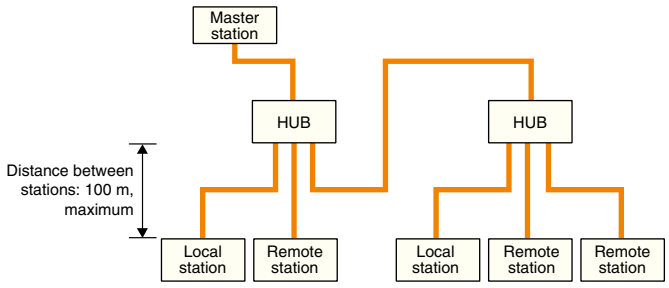
For CC-Link IE Field Network wiring, use the wiring parts recommended by the CC-Link Partner Association.
A CC-Link IE Control Network cable cannot be used in a CC-Link IE Field Network.

Network wiring example

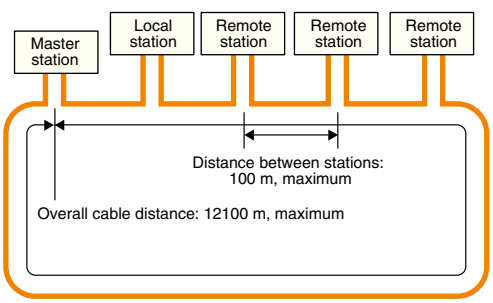
Line type



Star type

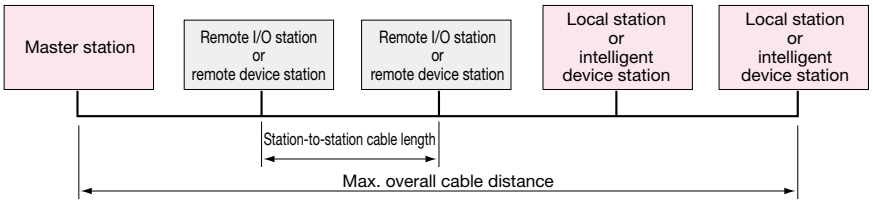


Ring type



CC-Link Technical Information

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

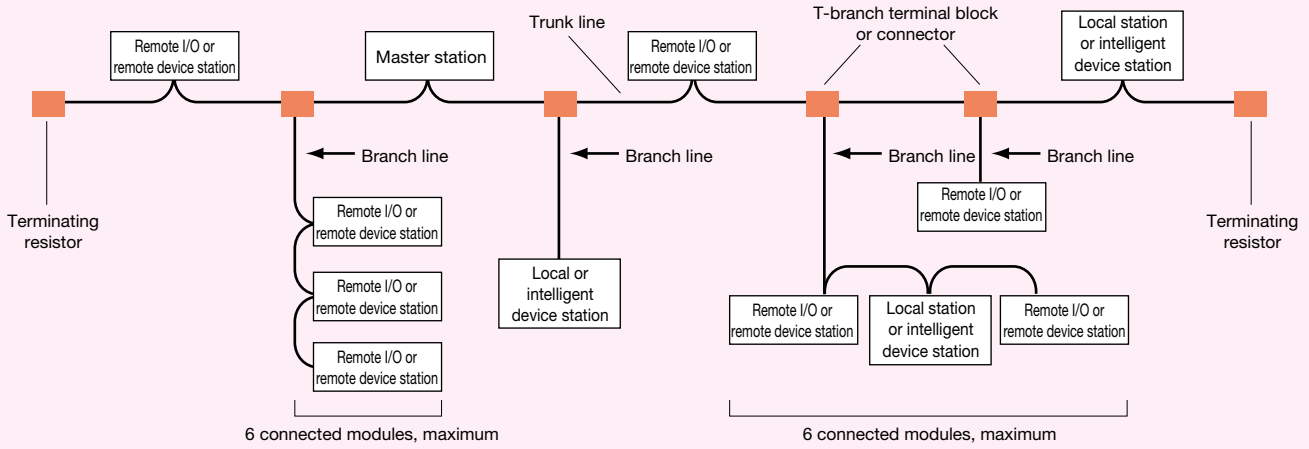
For a system including Ver.1.00-compatible modules, the maximum overall distance and the station-to-station distance of the Ver.1.00 cable specifications apply.

	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.

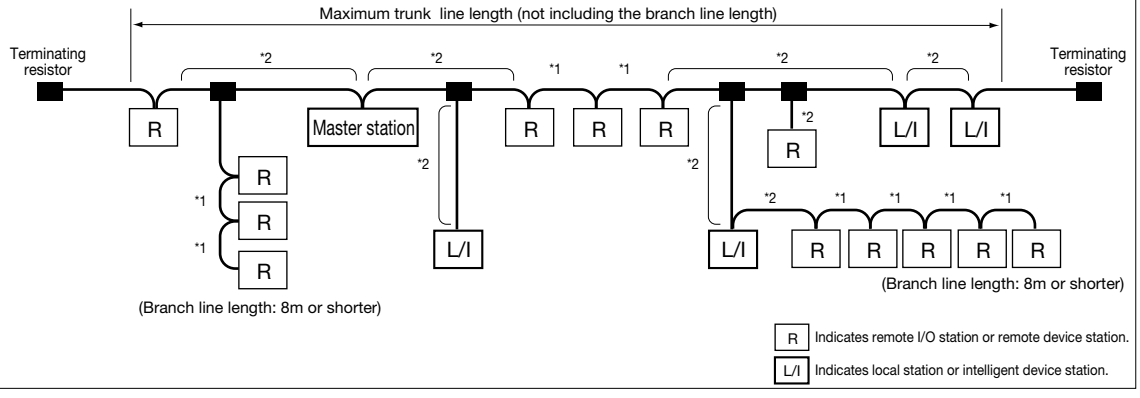
Item	Specifications		Remarks
Transmission speed	625kbps	156kbps	10M/5M/2.5Mbps not permitted
Maximum trunk line length	100m	500m	Cable length between terminating resistors (Branch line length not included)
Maximum branch line length	8m		Total cable length per branch
Overall branch line length	50m	200m	Total length for all branch cables
Maximum number of modules connected to a branch line	6 modules per branch		Total number of connected modules depends on the CC-Link specifications.
Cable	• Ver.1.10-compatible CC-Link dedicated cable • CC-Link dedicated cable (Ver.1.00-compatible)		• 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.
T-branch terminal block or connector	• 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)		• Do not remove the jacket of the cables on the trunk line, if possible.

Maximum trunk line length, distance between T-branches and cable length between stations

Ver.1.10-compatible CC-Link dedicated cable (a terminating resistor of 110Ω used)

Transmission speed	Maximum trunk length	Distance between T-branches	Cable length between remote I/O stations or remote device stations*1	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
625kbps	100m	No restriction	30cm or longer	1m or longer (A), 2m or longer (B)
156kbps	500m			

(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.



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			

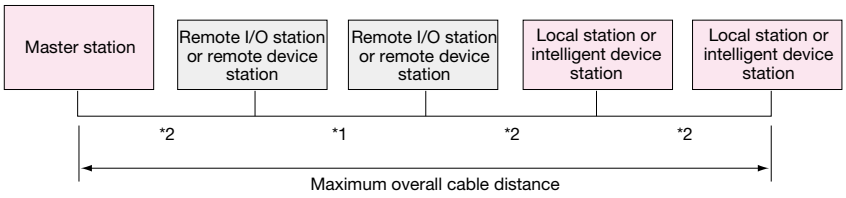
* "2." and "3." are Ver.2 mode only; calculation is necessary.

* 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

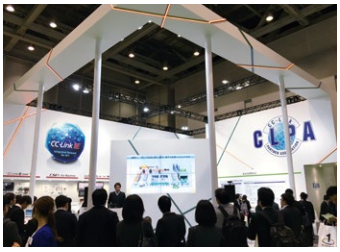
CC-Link dedicated cable (Ver.1.00-compatible) (terminating resistors of 110Ω used)
<table>
<tr><th rowspan="2">Transmission speed</th><th colspan="2">Cable length between stations</th><th rowspan="2">Maximum overall cable distance</th></tr>
<tr><th>*1</th><th>*2</th></tr>
<tr><td>156kbps</td><td rowspan="3">30cm or longer</td><td rowspan="8">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 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.

CLPA website
www.cc-link.org/en

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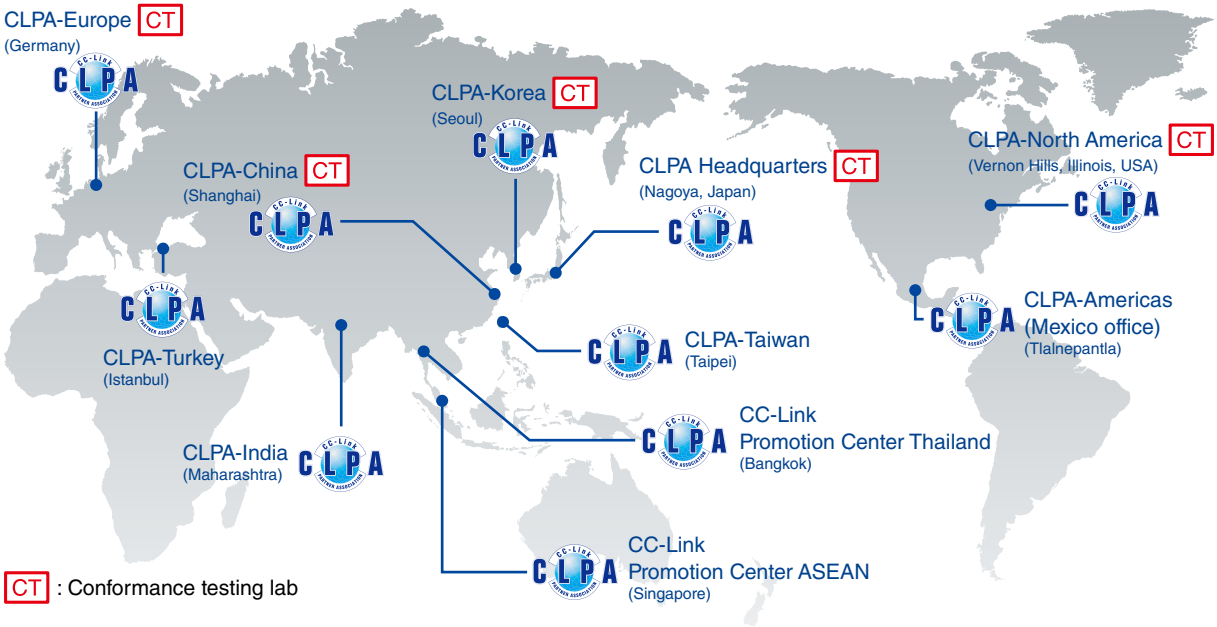
e-mail: info@cc-link.org

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

Related Product List

Products

Development Application		Name	Model (for Ordering)	Packaging Unit
CC-Link IE TSN	Master station, Local station	CC-Link IE TSN Master/Local Station Communication LSI Device Kit (CP610 × 60, Flash ROM × 60)	NZ2KT-NPETNG51	1 set
		CC-Link IE TSN Master/Local Station Communication LSI CP610 (PC17005F)	NZ2GACP610-60	60 pieces
	Remote station	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, 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
		Communication LSI CP520 with GbE-PHY (PC15001R-B)	NZ2GACP520-60	60 pieces
CC-Link	Master station, local station, intelligent device station	CC-Link Ver.2 Built-In Interface Board	Q50BD-CCV2	1 board
	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 (PC15003E)	A6GA-CCMFP3NN60FN NEW	60 pieces
			A6GA-CCMFP3NN300FN NEW	300 pieces
	Remote I/O station	Dedicated Communication LSI MFP2N (PC18005E)	A6GA-CCMFP2NN60FN NEW	60 pieces
			A6GA-CCMFP2NN300FN NEW	300 pieces
		Dedicated Communication LSI MFP2AN (PC18006E)	A6GA-CCMFP2ANN60FN NEW	60 pieces
			A6GA-CCMFP2ANN300FN NEW	300 pieces
		CC-Link Embedded I/O Adapter	AJ65MBTL1N-16DT	1 piece
			AJ65MBTL1N-16D	
			AJ65MBTL1N-16T	
			AJ65MBTL1N-32D	
			AJ65MBTL1N-32T	

■ Manual

Development Application		Title	Manual No.
CC-Link IE TSN	Master station, Local station	CC-Link IE TSN Master/Local Station Communication LSI CP610 Reference Manual	SH(NA)-082320ENG
	Remote station	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 /Q81BD-J71GP21-SX Driver Development Reference Manual	SH(NA)-080819ENG
CC-Link IE Field	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, remote device station	CC-Link IE Field Network Intelligent Device Station and Remote Device Station Communication LSI CP220 Reference Manual	SH(NA)-082461ENG
		CC-Link IE Field Network Intelligent Device Station Communication LSI CP220 Reference Manual (Motion function)	SH(NA)-030204ENG
		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
	Master station, local station	CC-Link Ver.2 Q80BD-J61BT11N/Q81BD-J61BT11 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 (CC-LINK-M-I/O-U)	SH(NA)-080324E

CC-Link IE TSN
CC-Link IE Control
CC-Link IE Field
CC-Link

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 or 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; or any other duties.

⚠ For safe use

- To use the products given in this publication properly, always read the relevant manuals before beginning operation.
- The products have been manufactured as general-purpose parts for general industries, and are not 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-carrying vehicles, consult with Mitsubishi Electric.
- 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.

Automating the World

Creating Solutions Together.

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Collaborative and Industrial Robots

Processing machines: EDM, Lasers

SCADA, analytics and simulation software

Mitsubishi Electric's product lineup, from various controllers and drives to energy-saving devices and processing machines, all help you to automate your world. They are underpinned by software, innovative data monitoring, and modelling systems supported by advanced industrial networking and Edgecross IT/OT connectivity. Together with a worldwide partner ecosystem, Mitsubishi Electric factory automation (FA) has everything to make IoT and Digital Manufacturing a reality.

With a complete portfolio and comprehensive capabilities that combine synergies with diverse business units, Mitsubishi Electric provides a one-stop approach to how companies can tackle the shift to clean energy and energy conservation, carbon neutrality and sustainability, which are now a universal requirement of factories, buildings, and social infrastructure.

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Note: not all products are available in all countries

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Mitsubishi Electric's e-F@ctory concept utilizes both FA and IT technologies, to reduce the total cost of development, production and maintenance, with the aim of achieving manufacturing that is a "step ahead of the times". It is supported by the e-F@ctory Alliance Partners covering software, devices, and system integration, creating the optimal e-F@ctory architecture to meet the end users needs and investment plans.

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