CPK-RS485 user manual

Qlight

Contents

1. Introduction

- It is a panel-embedded signal phone that outputs clear and cheerful sound. Users can directly save and use MP3 sound through USB interface.
- CPK-RS485 product is a product that reproduces the MP3 sound source embedded in the memory through RS485 communication.
- Up to 255 sound sources can be stored and used in the built-in memory(capacity of the built-in memory is subject to change).
- Up to 255 units can be connected to the RS485 communication network(Frame ID: 0x0200-0x02FF).
- Devices connected to the RS485 communication network can be collectively controlled or individually controlled.

* Caution
- Since it takes up to 3 seconds to initialize after supplying power to the product, you can control the product after 3 seconds.
- The length of the sound source to be played repeatedly must be at least 250 ms.

2. Specification

1) Dimension
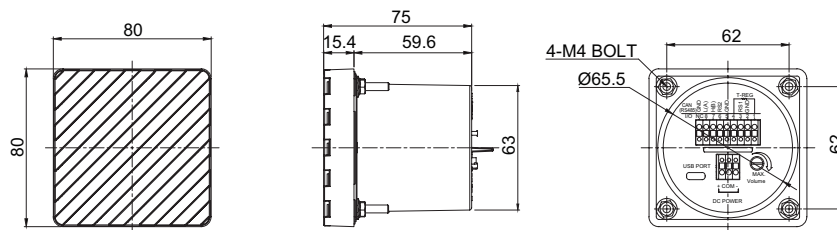
2) Wiring Instruction

- Connect using the terminal block for wiring on the back of the product.
- When the product is installed at the end of the RS485 network, connect T-REG(Terminating Resistance) as a terminating resistance(120Ω/0.5W capacity is recommended).

<wiring diagram>
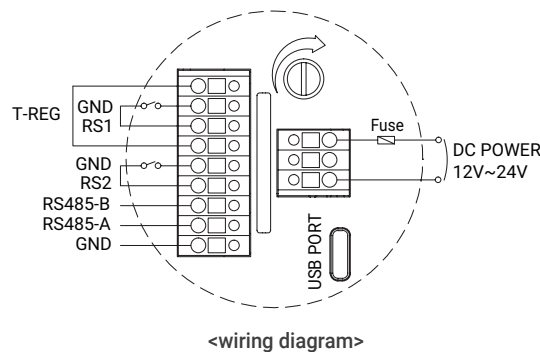
Baud rate Select		
RS2	RS1	Communication speed
OFF	OFF	9,600bps
OFF	ON	19,200bps
ON	OFF	38,400bps
ON	ON	115,200bps

- ON: RS1/RS2 terminals are connected to GND( )
- ON: RS1/RS2 terminals are connected to GND( )

<Communication speed connection diagram>

3) General specification

No.	Category	Description
1	Rated voltage	DC12-24V
2	current consumption	MAX. 0.6A
3	operating temperature	-25℃-+50℃
4	Number of sound sources	1ch - 255ch
5	connection quantity	Up to 254 units can be connected (ID: 0x01-0xFF) (Slave ID: 0x01) (Slave ID can be changed)
6	batch control	Simultaneous control of multiple devices (Broadcast ID: 0x00) (Broadcast ID can be changed)
7	dB	85dB(at 1Meter)
8	control method	RS-485 Communication
9	RS-485 Communication Setting	1. Baudrate - 9600bps, 19200bps, 38400bps, 115200bps 2. Communication Setting - Data Bit: 8bit - Parity: None - Stop Bits: 1 - Flow Control: None
10	Data Length	8 Byte
11	Packet Interval	Interval by Packet 20ms-300ms (Different by Packet)
12	DEVICE Slave ID	Frame ID: 0x01 (factory default) Frame ID changeable range: 0x00 to 0xFF (255) - Frame ID per device cannot overlap with Broadcast ID
13	DEVICE Broadcast ID	Broadcast ID: 0x00 (factory default) Frame ID changeable range: 0x00 to 0xFF (255) - Broadcast ID cannot be duplicated with Frame ID for each device.
14	MP3 playback mode	- Play once mode: Play the MP3 once - Repeated Play Mode: Repeated Playback of a MP3 Continuously - Restart option: option to replay from the beginning

4) Function

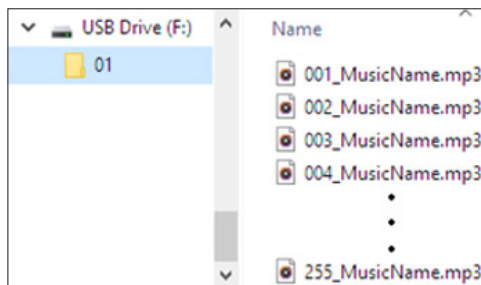| No.	Category	Description
1	Play	Functions used when playing MP3
2	Stop	Function used to stop the MP3
3	Volume	1. Software volume: adjustable in 29 levels 2. Hardware volume: located on the back of the product, adjustable with the volume knob

3. Product manual

1) How to connect with PC and save MP3 audio file

- After turning off the product, ① connect the USB C Type cable to the connector rear of the CPK-RS485 as shown in <3-1>.
  PC recognizes CPK-RS485 as external memory.
- As shown in <3-2>, after creating the 01 folder on the PC, you can save up to 255 MP3 songs in the 01 folder.
- **When removing the USB cable, use the function of Windows. Use [Safely Remove Hardware]. If not safely removed, it may cause memory failure.**
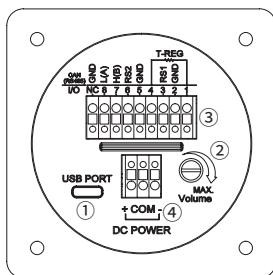
3-1. Product back drawing>   <3-2. Built-in memory folder and audio file name >

■ File format   • Following instruction is how to name an audio file name.

Example) | 001 | _ | Music Name | .mp3

Filename(Korean/Chinese Up to 20 characters, English Up to 40 characters)
Separator(Track# and file title)
Track#

2) How to set "T-REG"

- When installing the product at the end of CAN networks, add a terminating resistor to ②"T-REG(Terminating Resistance)"
  position among the terminal blocks on the back of the product.
- The recommended capacity of the termination resistor is 120Ω/0.5W.

3) RS-485 communication cable connection

- It is recommended to use a dedicated RS-485 communication cable.
- <3-1> Connect the RS485-A and RS485-B signal lines to the terminal block ③ L(A), H(B) on the back of the product.

4) Power connection

- As shown in <3-1>, apply the rated voltage to the ④ 3P terminal block power input terminal on the back of the product and connect it(The voltage supply capacity must be greater than 25W).
- It takes about 3 seconds to initialize after turning on the power.

5) Basic communication method

- When a command is sent by specifying the Slave ID of CPK-RS485, the CPK-RS485 with the corresponding Slave ID executes the command and responds with Slave ID.
- If there is a Master ID in the user's system, the user can arbitrarily designate and use the Master ID.
- When the product is shipped, the default Slave ID is set to 0x01.

6) Control by device and simultaneous control of all devices (Broadcast)

(1) Control by device
   When a command is sent to the Slave ID set in CPK-RS485, CPK-RS485 executes the command and responds with the set Slave ID.
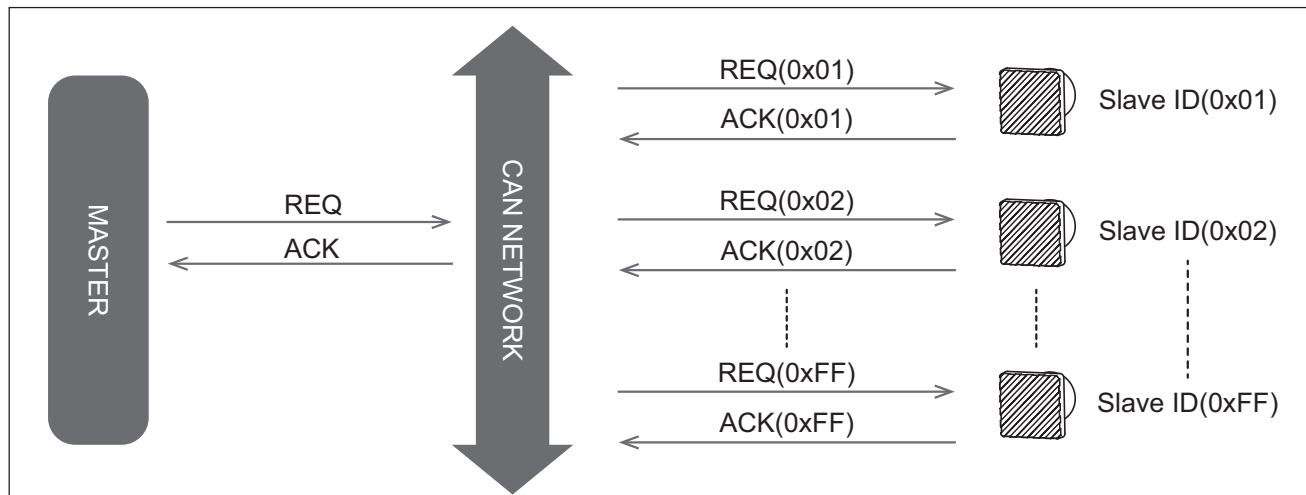
(2) Simultaneous Control (Broadcast)
   When the MASTER device sends a command to CPK-RS485 NETWORK with Broadcast ID (Default 0x00), all CPK-RS485 devices execute commands and do not respond.

4. Basic functions of CPK-RS485 devices

- CPK-RS485 can be controlled using a protocol with three functions
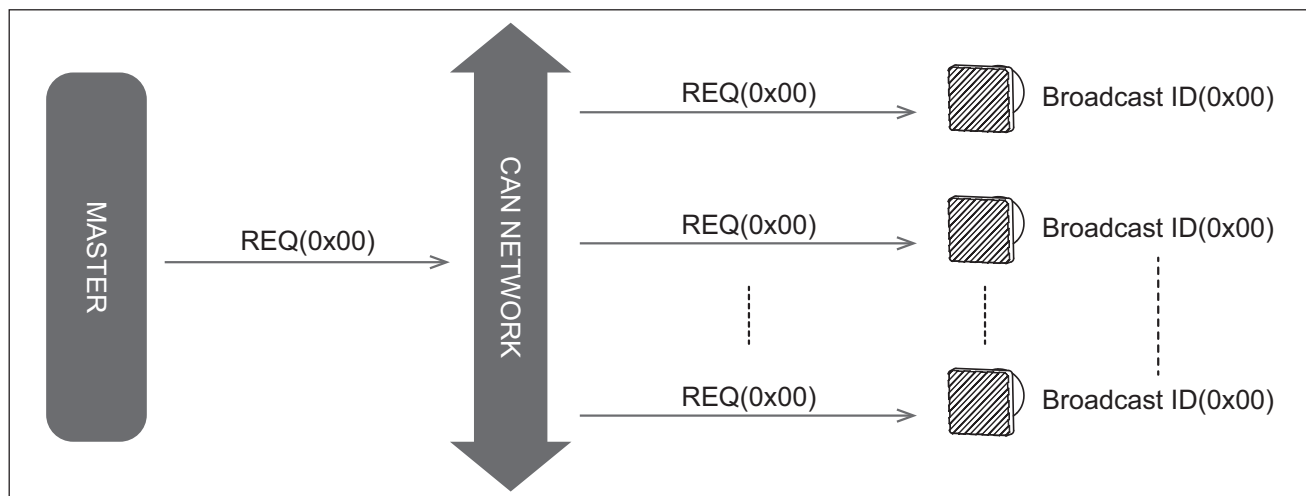
1) CPK-RS485 ID setting (Slave ID/Broadcast ID)

- User can set Slave ID and Broadcast ID of CPK-RS485 product.

2) Control by CPK-RS485 device and simultaneous control of all devices (Broadcast)

- The CPK-RS485 product has a function to individually control each device within the RS485 Network and collectively control all devices within the RS485 Network.
- You can play/stop multiple MP3 stored in CPK-RS485 per channel.
- Depending on the purpose, the user can use the motion control function to set play once, play repeatedly, or restart.
• Play once mode plays the saved MP3 only once.
• In the repeat play mode, the stored MP3 can be played repeatedly.
• Restart function: If you input the same channel play command by setting the restart function, the MP3 is played from the beginning.
   If the restart function is not set, it does not work even if the playback signal of the same channel is input.

3) CPK-RS485 Status Check

- You can check the current operation status of CPK-RS485.
- You can check the currently playing music channel (or stopped state) and currently set volume information.
- If the device does not respond, it does not operate normally and requires maintenance.

5. Timing Chart by function

- RS485 Communication device has 4 functional protocols as below.

No.	Function	Description
1	ID setup and verification	Set ID of CPK-RS485 device or check set ID.
2	Motion control by device	Controls play/stop/volume control of CPK-RS485 devices.
3	Broadcast control	Controls the operation of all CPK-RS485 devices connected to the RS485 network. Device-specific ACKs are not received.
4	Check status	You can check the operating status of devices connected to the RS-485 network.

1) ID (Slave ID/Broadcast ID) settings

- This is a timing chart for setting Slave ID.
- **The minimum interval between packets for stable communication is 50ms.**
- **The Timing Chart below shows the time required to set ID.**

◆ **T0: ≤50ms,** ◆ **T1: ≤30ms,** ◆ **T2: ≤10ms,** ◆ **T3: ≤1ms**
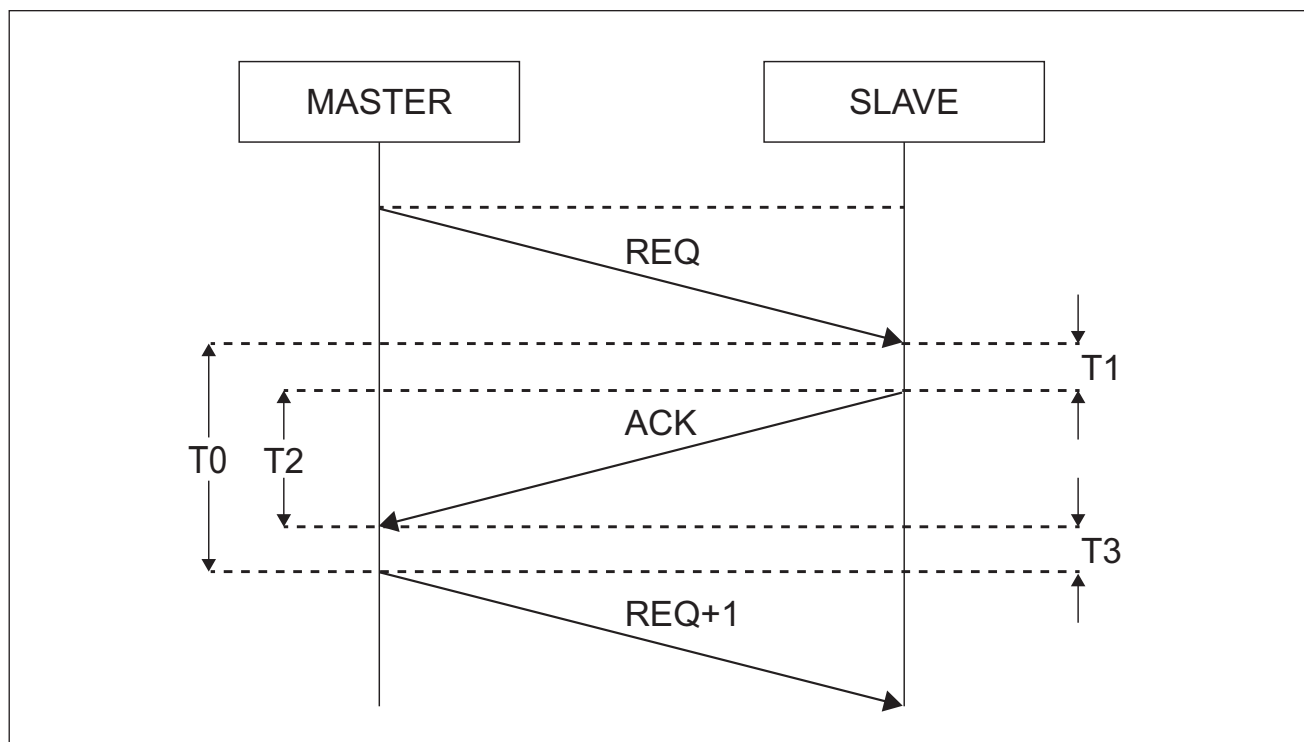
2) Control by device

- This protocol is used when playing/stopping/volume control of the sound source of the device.
- **The minimum interval between packets for stable communication is 300ms.**

◆ **T0: ≤300ms,** ◆ **T1: ≤289ms,** ◆ **T2: ≤10ms,** ◆ **T3: ≤1ms**

3) Simultaneous control of all devices (Broadcast)

- This protocol is used when all devices connected to the same network operate at the same time.
- Batch control does not receive ACK from each device.
- **The minimum interval between packets for stable communication is 300ms.**

◆ **T0: ≤300ms**
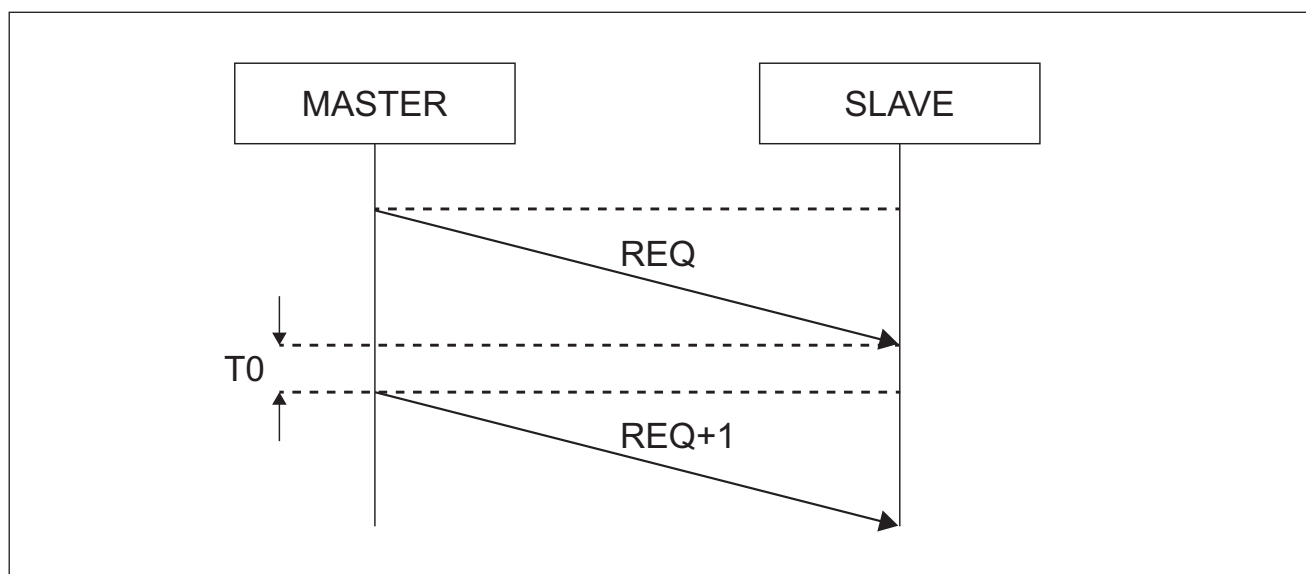
4) Alive Check

- It is a protocol that checks the operation status of each device, and can be used periodically to check the operation status of the product in real time.
- **The minimum interval between packets for stable communication is 20 ms.**
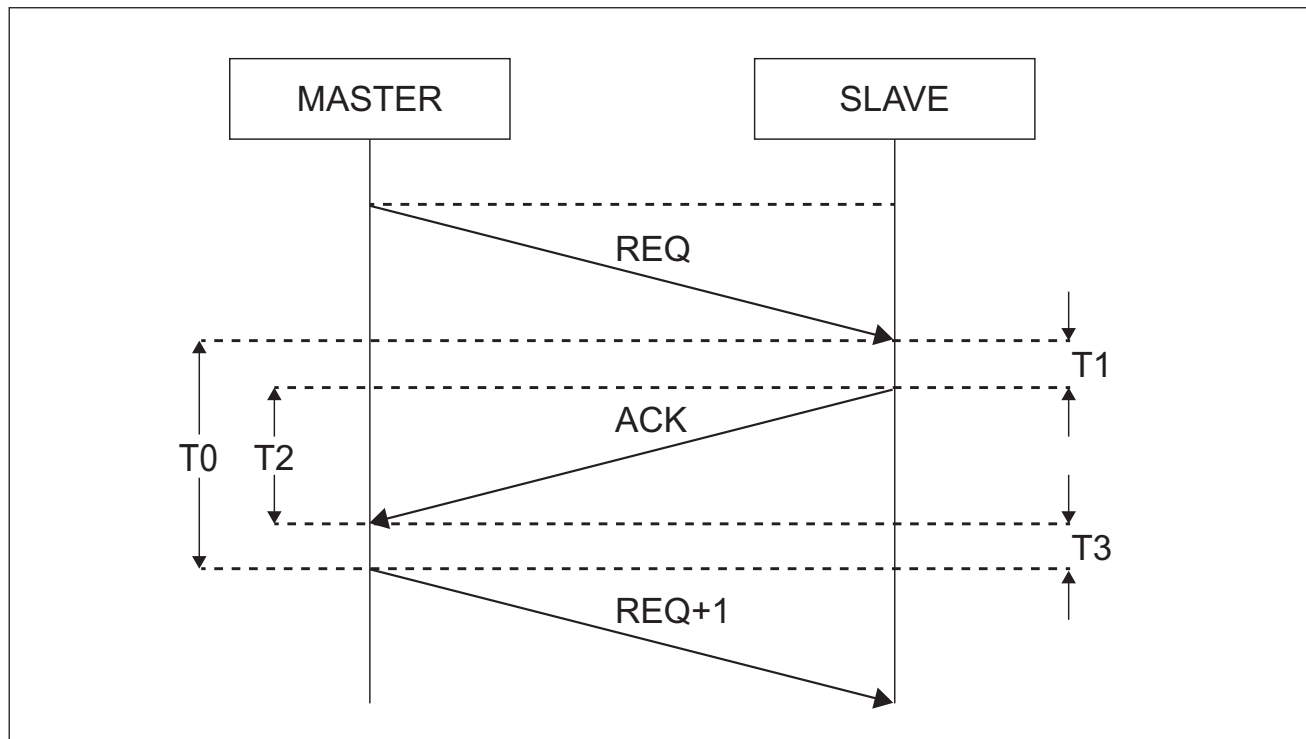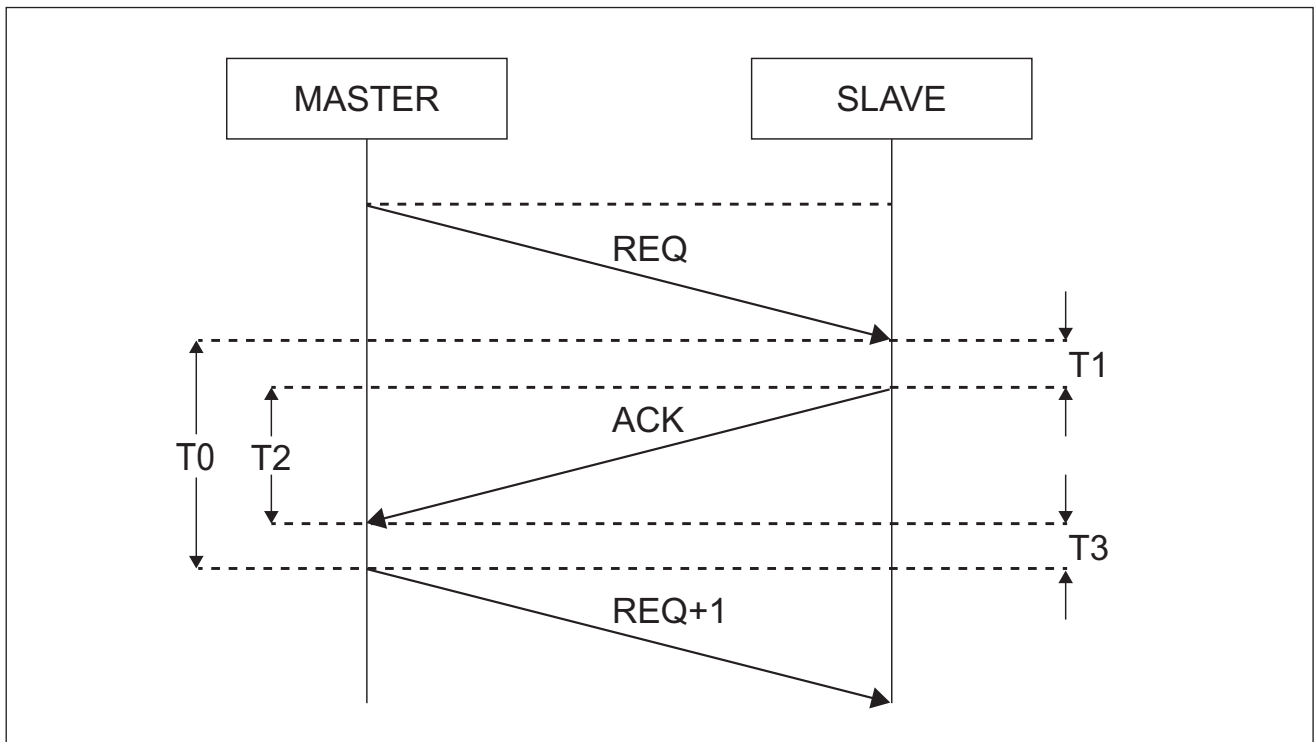- **The Timing Chart below shows the time required to check the status.**

◆ **T0 : ≤20ms,** ◆ **T1: ≤5ms,** ◆ **T2 : ≤10ms,** ◆ **T3 : ≤1ms**

6. Basic Data Format of CPK-RS485 Device

1) Basic Data Format Structure

- This is a description of the data format of the protocol used for CPK-RS485 products.

- CAN Data size is 8Byte.

Packet Number	0	1	2	3	4	5	6	7
ITEM	STX	Function Code	Slave ID	Data1	Data2	Data3	CHK	ETX
length	1byte	1byte	1byte	1byte	1byte	1byte	1byte	1byte

■ Description

No.	ITEM	Description	BYTE
0	STX	**0x02**: Code indicating the start of Packet(Start of Text)	1
1	Function CODE	**0x41/0x42**: REQ/ACK code for ID setting/confirmation of CPK-RS485 device **0x51/0x52**: REQ/ACK code for operation control of CPK-RS485 device **0x61/0x62**: REQ/ACK code for **Alive Check** of CPK-RS485 device	1
2	Slave ID	**0x01-0xFF**: CPK-RS485 device ID (0x01 factory setting) **0x00**: Batch operation of CPK-RS485 device (no separate ACK due to broadcast operation)	1
3	Data1	Refer to the description of each data format (Page 11-16)	1
4	Data2	Refer to the description of each data format (Page 11-16)	1
5	Data3	Refer to the description of each data format (Page 11-16)	1
6	CHK	**- Calculate by XOR from Packet 0 to 5**	1
7	ETX	**0x03**: Code indicating the end of Packet(End of Text)	1

2) ID setting and confirmation Data Format

- ID setting and confirmation Data Format.

① Composition of REQ/ACK Packet

Packet Number	0	1	2	3	4	5	6	7
ITEM	STX	Function Code	Slave ID	Setting ID	ID Type	Parameter	CHK	ETX
Code	0x02	0x41/0x42	[ID]	Data1	Data2	Data3	XOR(0-5)	0x03

② REQ Packet Details

No.	ITEM	Description	BYTE
0	STX	0x02: Code indicating Packet start	1
1	Function CODE	0x41: REQ code for ID setting of CPK-RS485 device in Master	1
2	Slave ID	0x01-0xFF: Slave ID of CPK-RS485 device to receive command	1
3	Setting ID	0x00-0xFF: ID to set ※ Slave ID and Broadcast ID cannot be set identically	1
4	ID Type	0x00: Apply ID setting to Slave ID 0x01: Apply ID setting to Broadcast ID	1
5	Parameter	0x00: Apply ID setting to device 0x01: Request to return the current ID to the device (do not set the ID to the device)	1
6	CHK	Checksum CODE: XOR value of 6 bytes from No.0 to 5	1
7	ETX	0x03: Code indicating the end of Packet	1

③ ACK Packet Details

No.	ITEM	Description	BYTE
0	STX	0x02: Code indicating the start of Packet	1
1	Function CODE	0x42: ACK code from CPK-RS485 to MASTER	1
2	Slave ID	Currently set Slave ID	1
3	Broadcast ID	Currently set Broadcast ID	1
4	Reserve	[Don't care]	1
5	Reserve	[Don't care]	1
6	CHK	Checksum CODE: XOR value of 6 bytes from No.0 to 5	1
7	ETX	0x03: Code indicating the end of Packet	1

④ Example

[EX-01] Slave ID 0x01 Change the Slave ID of the device to 0x0A
(However, the existing Broadcast ID of 0x01 is set to 0xFF)
[REQ] [Slave ID(0x01)] 02 41 **01 0A** 00 00 48 03
[ACK] [Slave ID(0x01)] 02 42 **0A FF** 00 00 B5 03

3) Control by device and simultaneous control of all devices (Broadcast) Data Form

- Packet used for stop/play and volume control of CPK-RS485 product sound sources when controlling individual
  motions and collectively.

① Composition of REQ/ACK Packet

Packet Number	0	1	2	3	4	5	6	7
ITEM	STX	Function Code	Slave ID	Sound Folder Code	Volume Code	Parameter	CHK	ETX
Code	0x02	**0x51/0x52**	ID	Data1	Data2	Data3	XOR(0-5)	0x03

② REQ Packet Details

No.	ITEM	Description	BYTE
0	STX	0x02: Code indicating the start of Packet	1
1	Function CODE	**0x51**: REQ code for operation control of CPK-RS485 device in Master	1
2	Slave ID	0x01-0xFF : Slave ID of CPK-RS485 device to receive command.	1

2	Sound Folder Code	- The number of the sound source to be stopped or played back (refer to P.5 of this manual for setting the sound source name)
		- 0x00: stop playback
		- 0x01-0xFF (001-255_MusicName) Hex value of the first 3 digits of MP3 number
		  Set to 0x01 (Hex) when playing MP3 in the '001_MusicName' folder.
		  Set to 0x22 (Hex) when playing sound sources in the '034_MusicName' folder
			1

3	Volume CODE	- Software Volume Value: 0x00-0x1C, 29 levels (0-28). - 0x00: Sound OFF - 0x1C: SOUND Max	1
4	Parameter	 | Bit	7	6	5	4	3	2	1	0
Name	-	-	-	-	-	-	B	S	 **S: Play once/repeat mode setting Bit** 0 – The MP3 of the selected channel is played repeatedly. 1 – The MP3 of the selected channel is played once (Default). **B: Restart mode Bit** - When Bit is set to 0, if the same channel playback signal is input during sound source playback, it is ignored without restarting. - When Bit is set to 1, if the same channel playback signal is input during sound source playback, it is played again from the beginning.	1

NO.	ITEM	Description	BYTE
6	CHK	Checksum CODE: XOR value of 6 bytes from No.0 to 5	1
7	ETX	0x03: Code indicating the end of Packet	1

③ ACK Packet Details

NO.	ITEM	Description	BYTE
0	STX	0x02: Code indicating the start of Packet	1
1	Function CODE	**0x52**: ACK code from CPK-RS485 to MASTER	1
2	Slave ID	Slave ID of CPK-RS485	
3	State	- Current playback status/MP3 number of currently playing MP3 - 0x00: Stopping - 0x01-0xFF: MP3 number of currently playing sound source (Refer to P.5 of this manual for MP3 name setting)	1
4	Volume CODE	- Software Volume Value: 0x00-0x1C, 29 levels (0-28) - 0x00: Sound OFF - 0x1C: Sound Max	1
5	Result	- motion control result - 0x00: OK - 0xF1: Channel setting problem - 0xF2: Volume setting problem - 0xF3: Problems with both channel and volume	1
6	CHK	Checksum CODE: XOR value of 6 bytes from No.0 to 5	1
7	ETX	0x03: Code indicating the end of Packet	1

④ Example

[EX-01] Repeat playback of MP3 channel 3 at volume 10 in Slave ID **0x01 device**
[REQ] [Slave ID(0x01)] 02 51 **01 03** 0A 00 5B 03
 [ACK] [Slave ID(0x01)] 02 52 **01 03** 0A 00 58 03

[EX-02] Play MP3 number 10 channel once at MAX volume to all devices with Broadcast ID (0xFF)
[REQ] [Slave ID(0xFF)] 02 51 **FF 0A 1C 01** BB 03
[ACK] (NONE)

[EX-03] Repeat playback of MP3 channel 9 from the beginning at MAX volume to all devices with Broadcast ID (0xFF)
[REQ] [Slave ID(0xFF)] 02 51 **FF 09 1C 02** BB 03
[ACK] (NONE)

4) Status Check (Alive) Data Format

- Packet for checking the current status of each CPK-RS485 device.

① REQ Packet configuration

Packet Number	0	1	2	3	4	5	6	7
ITEM	STX	Function Code	Slave ID	Reserve	Reserve	Reserve	CHK	ETX
Code	0x02	0x61/0x62	ID	[Don't care]	[Don't care]	[Don't care]	XOR(0-5)	0x03

② REQ Packet Details

No.	ITEM	Description	BYTE
0	STX	0x02: Code indicating the start of Packet	1
1	Function CODE	0x61: REQ code for operation control of CPK-RS485 device in Master	1
2	Slave ID	0x01-0xFF: Slave ID of CPK-RS485 device to receive command.	1
3	Reserve	[Don't care]	1
4	Reserve	[Don't care]	1
5	Reserve	[Don't care]	1
6	CHK	Checksum CODE: XOR value of 6 bytes from No.0 to 5	1
7	ETX	0x03: Code indicating the end of Packet	1

③ ACK Packet Details

No.	ITEM	Description	BYTE
0	STX	0x02: Code indicating the start of Packet	1
1	Function CODE	**0x62**: ACK code from CPK-RS485 to MASTER	1
2	Slave ID	Slave ID of CPK-RS485	
3	Play State	- Current playback status/MP3 number of currently playing MP3 - 0x00: Stopping - 0x01-0xFF: MP3 number of currently playing MP3 (Refer to P.5 of this manual for sound source name setting)	1
4	Volume	- Software Volume Value: 0x00-0x1C, 29 levels (0-28) - 0x00: Sound OFF - 0x1C: Sound Max	1
5	Reserve	[Don't care]	1
6	CHK	Checksum CODE: XOR value of 6 bytes from No.0 to 5	1
7	ETX	0x03: Code indicating the end of Packet	1

④ Example

[EX-01] Check Slave ID 0x01 device status (music playback X)
  [REQ] [Slave ID(0x01)] 02 61 **01 00 00** 00 62 03
  [ACK] [Slave ID(0x01)] 02 62 **01 00 00** 00 61 03

[EX-02] Check Slave ID 0x01 device status (Channel 6 volume 16 playing)
  [REQ] [Slave ID(0x01)] 02 61 **01 00 00** 00 62 03
  [ACK] [Slave ID(0x01)] 02 62 **01 06 10 0**0 77 03
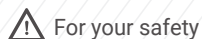
⚠ For your safety | Specification and dimensions listed in this catalogue subject to change without notice for product quality improvement.
The newest product information is available on our website.(www.qlight.com)
Please read the instruction manual attached to the product carefully before installation and use.

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