CPK-CAN(2.0B) 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-CAN product is a product that reproduces the MP3 sound source embedded in the memory through CAN 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 CAN communication network(Frame ID: 0x0200-0x02FF).
- Devices connected to the CAN communication network can be collectively controlled or individually controlled.

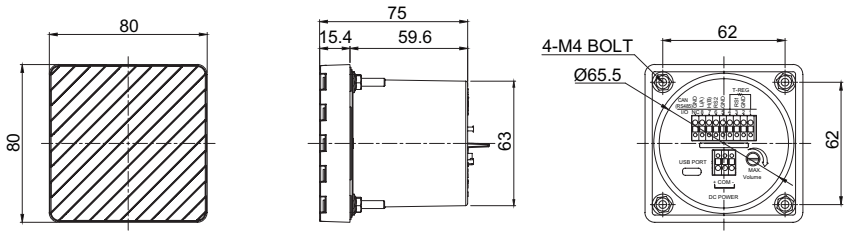
*** Caution**

- 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.

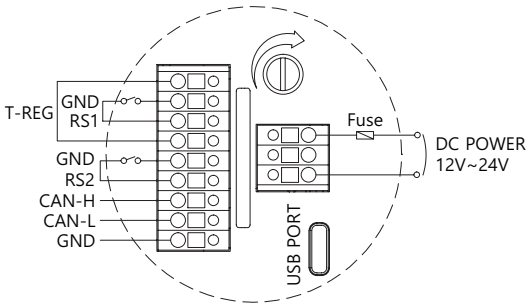
2. Specification

1) Dimension



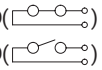
2) Wiring Instruction

- Connect using the terminal block for wiring on the back of the product.
- When the product is installed at the end of the CAN 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	125Kbps
OFF	ON	250Kbps
ON	OFF	500Kbps
ON	ON	1,000kbps

- 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 to 24V(use voltage range DC10V to DC36V)
2	current consumption	MAX. 0.6A
3	operating temperature	-25°C-+50°C
4	Number of sound sources	1ch - 255ch
5	connection quantity	Frame ID: 0x00000001-0x1FFFFFFF(Frame ID: 0x00000001)(Frame ID can be changed)
6	batch control	Simultaneous control of multiple devices(Broadcast ID: 0x00000000) (Broadcast ID can be changed)
7	dB	85dB(at 1Meter)
8	control method	CAN Communication(**Extended 2.0B**)
9	CAN communication speed	125Kbps, 250Kbps, 500Kbps, 1Mbps
10	Data Length	8 Byte
11	Packet Interval	Interval by Packet 12ms-300ms(Different by Packet)
12	DEVICE Frame ID	Frame ID: 0x00000001 (factory default) Frame ID changeable range: 0x00000001 to 0x1FFFFFFF - Frame ID per device cannot overlap with Broadcast ID
13	DEVICE Broadcast ID	Broadcast ID: 0x00000000 (factory default) Frame ID changeable range: 0x00000001 to 0x1FFFFFFF - Broadcast ID cannot be duplicated with Frame ID for each device.
14	Sound source 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

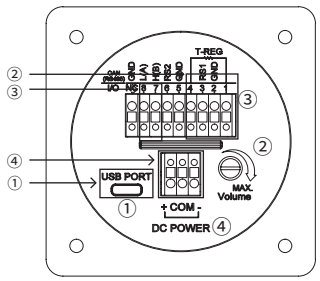
4) Function

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 0-28 levels 2. Hardware volume: located on the back of the product, adjustable with the volume knob

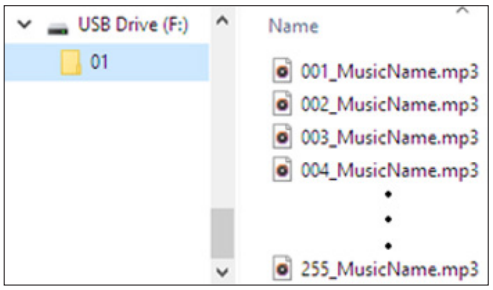
3. Product manual

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-CAN as shown in <3-1>. PC recognizes CPK-CAN 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.

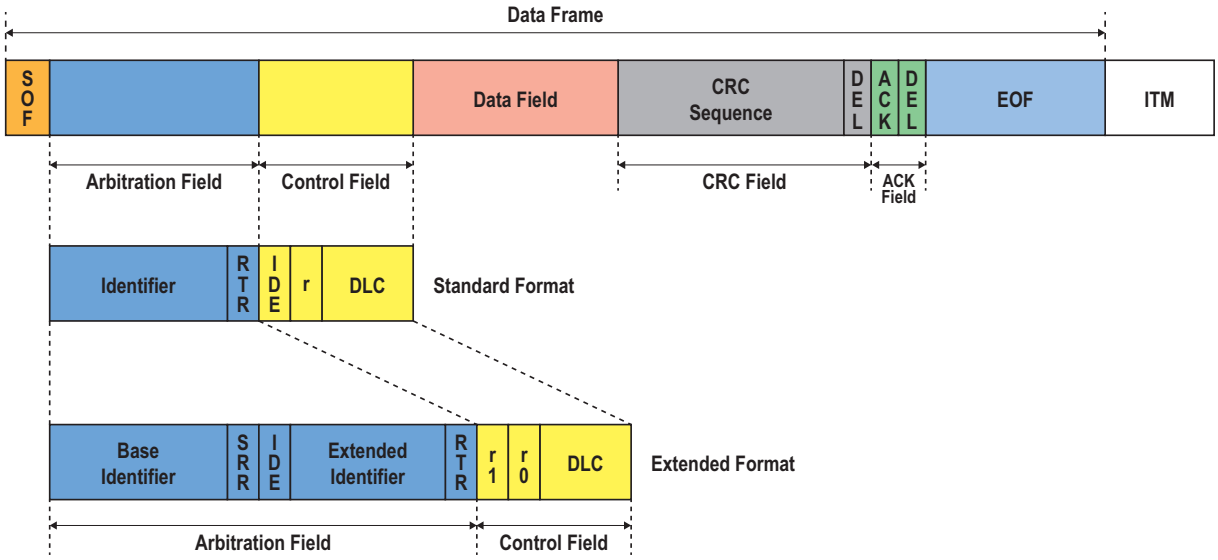
3) CAN communication cable connection

- It is recommended to use a dedicated CAN communication cable.
- <3-1> Connect the CAN-H and CAN-L signal lines to the terminal block ③ H(B), L(A) 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) CAN Data Frame

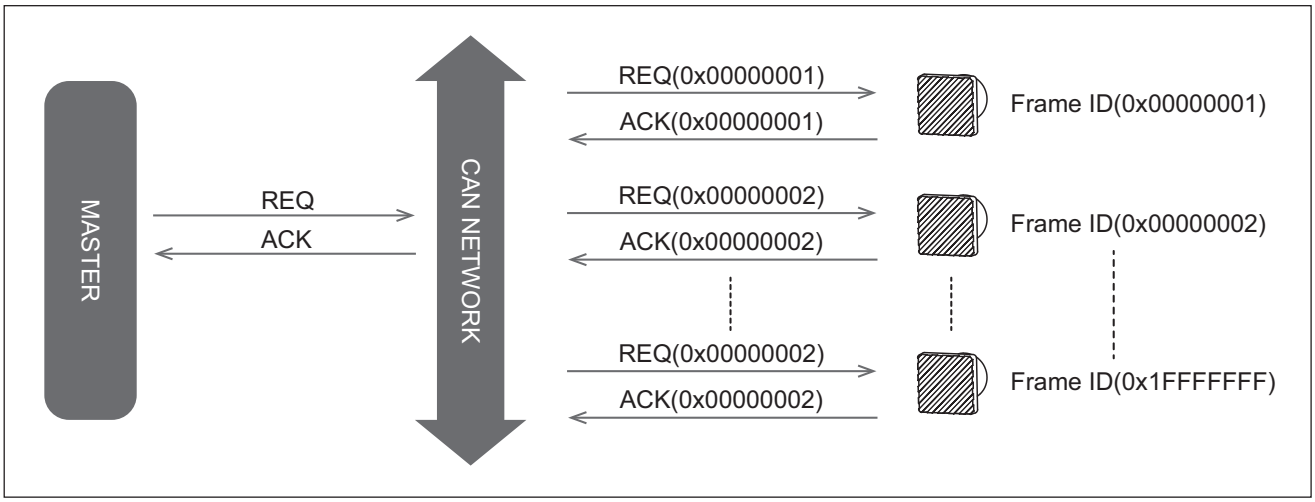


- The data frame of CAN communication has the structure as above, and CPK-CAN has an extended format applied. Frame ID consists of 0x00000001 to 0x1FFFFFFF, and the initial setting value is set to 0x00000001 at the factory.
- 0x00000000 is a Broadcast ID (factory default value) that can simultaneously control all CPK-CAN products within the same CAN communication network.
- There is no separate response from CPK-CAN when controlling by setting as Broadcast ID.

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

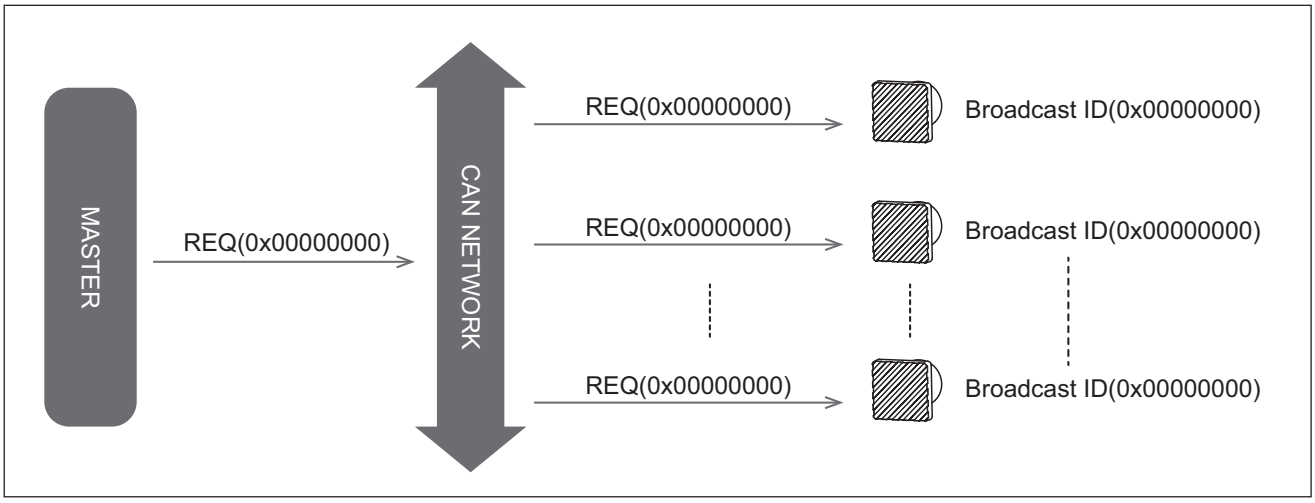
(1) Control by device

If a command is sent with the Frame ID set in CPK-CAN, CPK-CAN executes the command and responds with the set Frame ID.



(2) Simultaneous Control (Broadcast)

If a command is sent to the Broadcast ID (Default 0x00000000) set in CPK-CAN, CPK-CAN executes the command and does not respond.



4. Basic functions of CPK-CAN devices

- CPK-CAN can be controlled using a protocol with three functions

1) CPK-CAN ID setting (Frame ID/Broadcast ID)

- Frame ID filter of CPK-CAN product can be set.
- You can set the Frame ID for individual control and the Frame ID (Broadcast ID) for collective control of all products connected to the CAN bus

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

- CPK-CAN products have the ability to individually control each device within the CAN Network and collectively control all devices within the CAN Network.
- You can play/stop multiple MP3 stored in CPK-CAN 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-CAN Status Check

- You can check the current operation status of CPK-CAN.
- 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

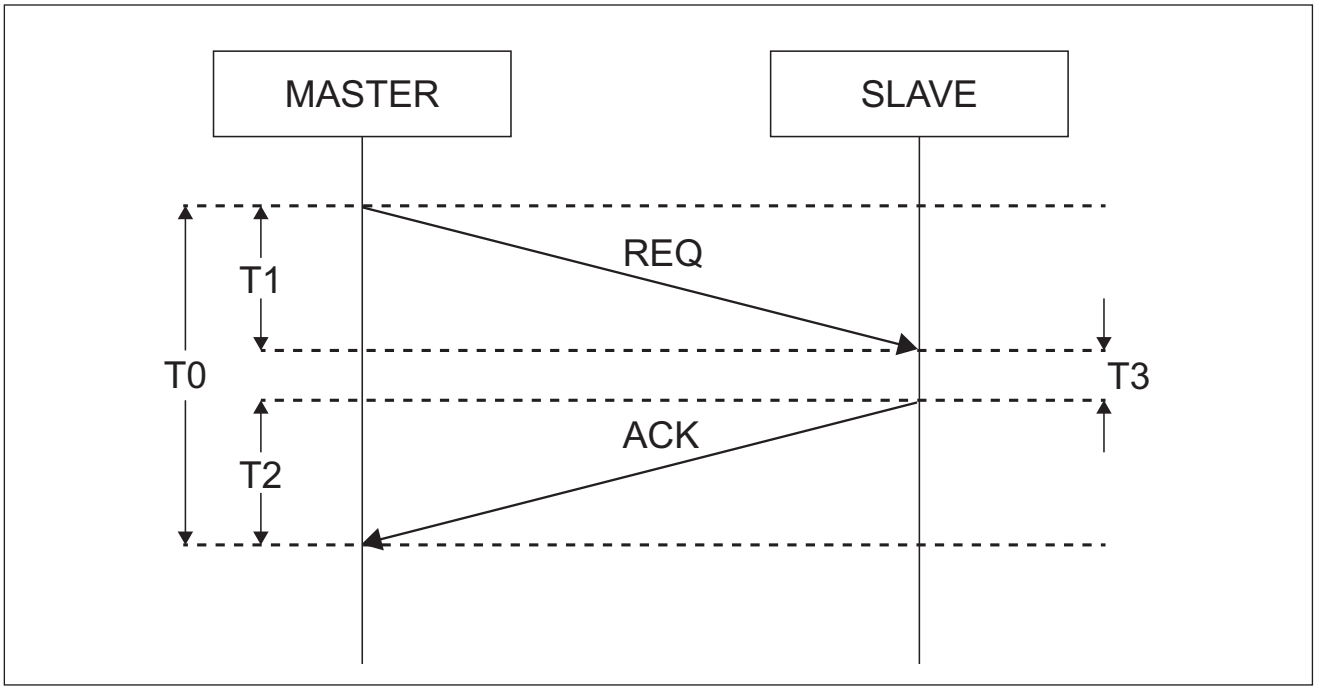
- CAN Communication device has 4 functional protocols as below.

No.	Function	Description
1	ID (Frame/Broadcast) setting	Set ID (Frame/Broadcast) of CPK-CAN device.
2	Motion control by device	Controls play/stop/volume control of CPK-CAN devices.
3	Broadcast control	Controls the operation of all CPK-CAN devices connected to the CAN network. Device-specific ACKs are not received.
4	Check status	You can check the operating status of devices connected to the CAN network.

1) ID (Frame ID/Broadcast ID) settings

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

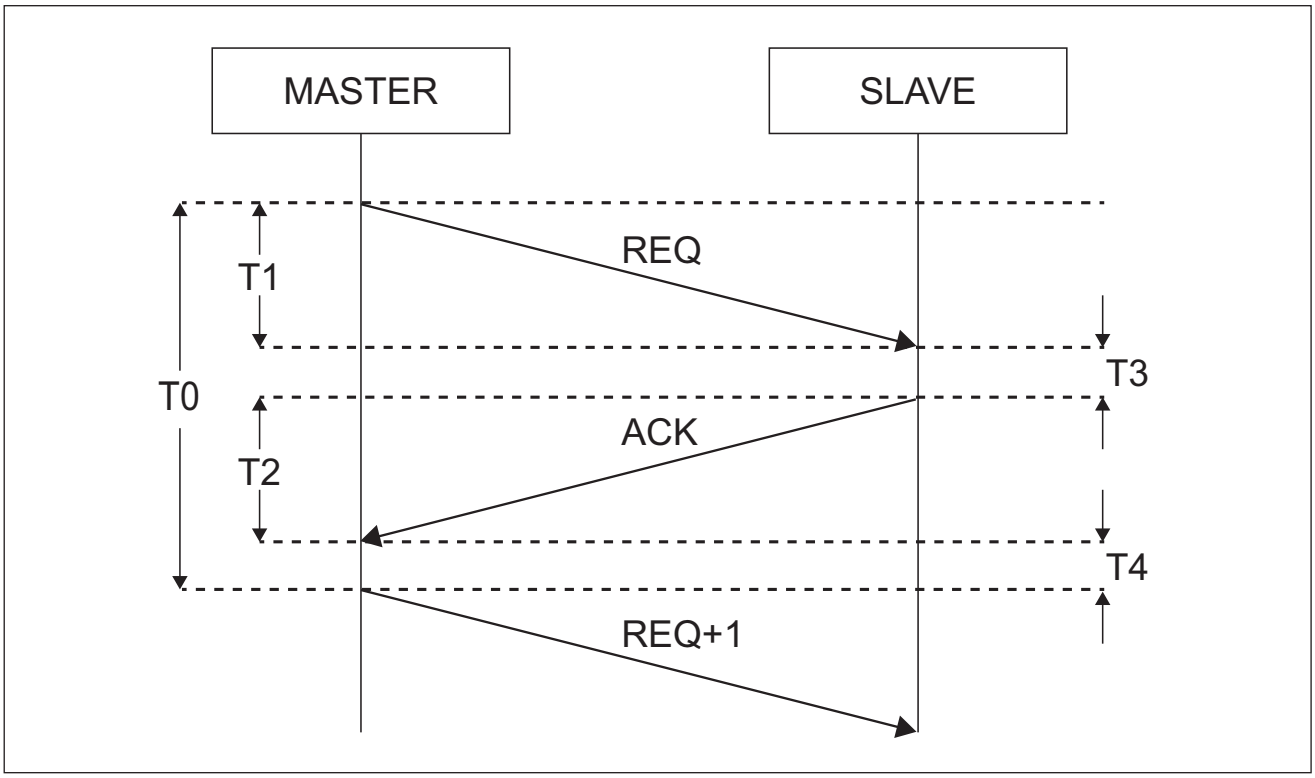
◆ T0: ≤50ms, ◆ T1/T2: ≤1ms, ◆ T3: ≤30ms



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.

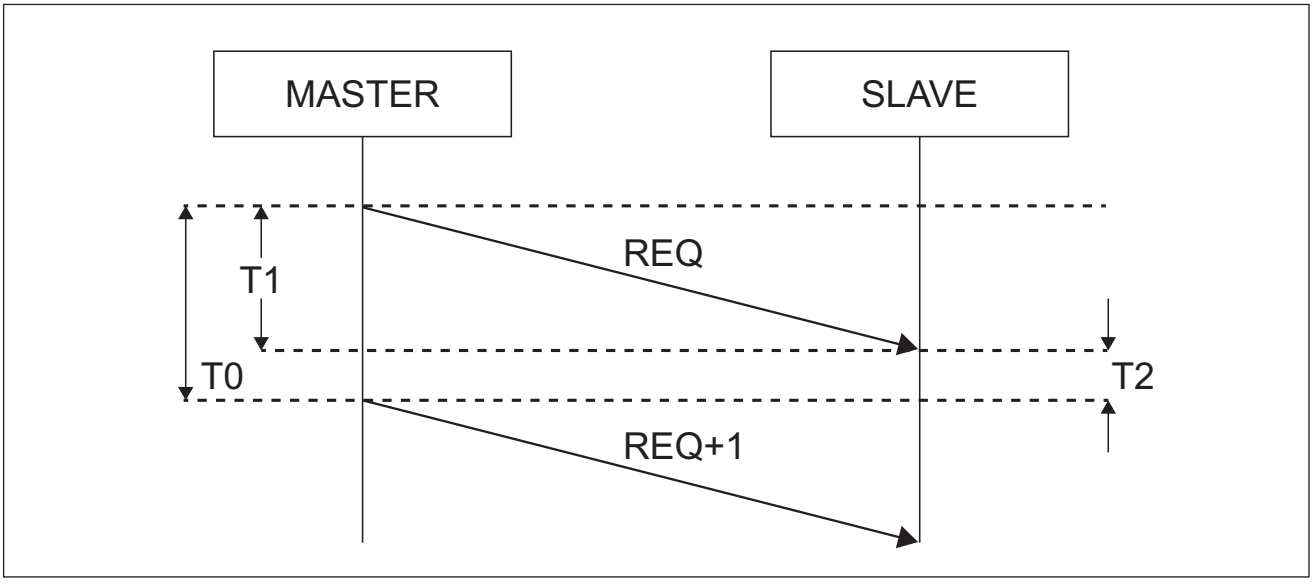
◆ T0: ≤300ms, ◆ T1, T2: ≤1ms, ◆ T3: ≤297ms, ◆ T4: ≤1ms



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.

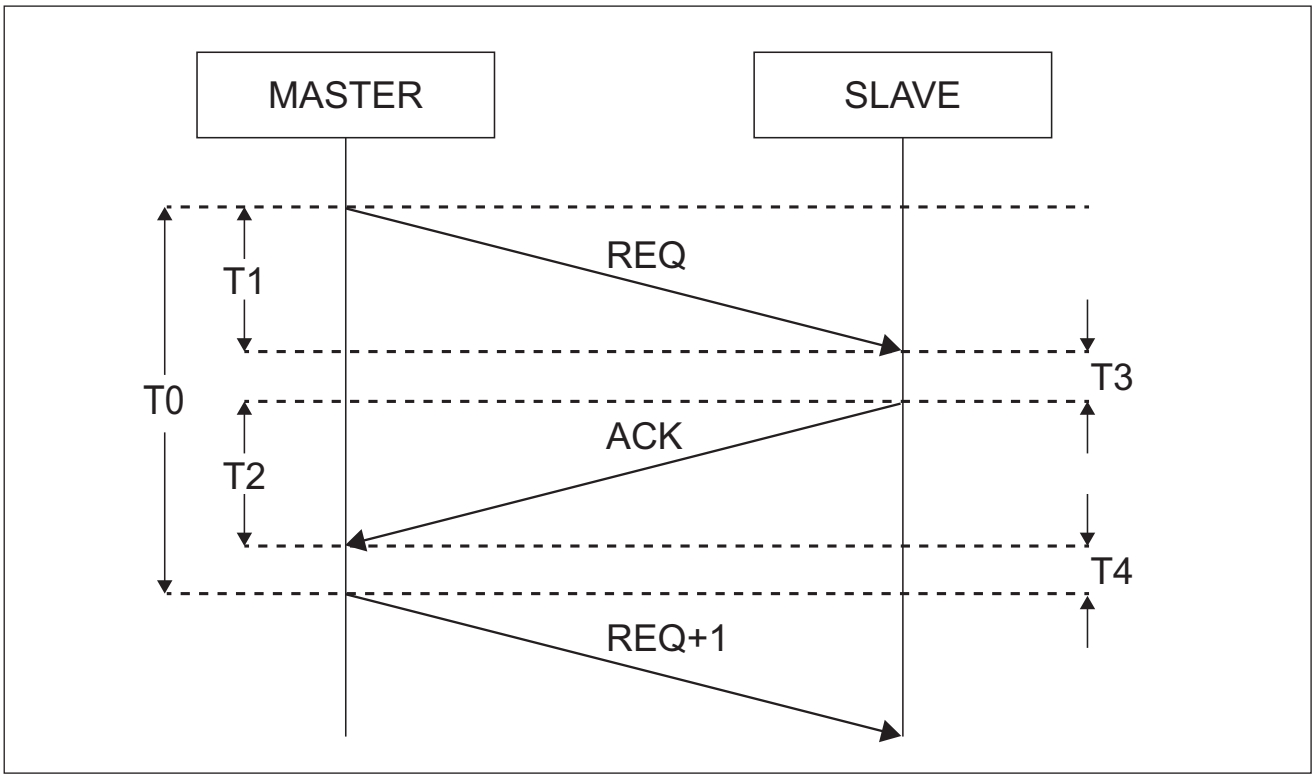
◆ T0: ≤300ms, ◆ T1: ≤1ms, ◆ T2: ≤299ms



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.
- **You can check the real-time product operation status.**
- **The Timing Chart below shows the time required to check the status.**

◆ T0: ≤12ms, ◆ T1, T2: ≤1ms, ◆ T3: ≤5ms, ◆ T4: ≤5ms



6. Basic Data Format of CPK-CAN Device

1) Basic Data Format Structure

- This is a description of the data format of the protocol used for CPK-CAN products.
- CAN Data size is 8Byte.

Packet Number	0	1	2	3	4	5	6	7
ITEM	STX	Function Code	Data1	Data2	Data3	Data4	CHK	ETX
length	1byte	1byte	1byte	1byte	1byte	1byte	1byte	1byte

■ Description

Frame ID is 29bit

No.	ITEM	Description	BYTE
0	STX	0x01: Code indicating the start of Packet(Start of Text)	1
1	Function CODE	**0x41/0x42**: For CPK-CAN device ID setting (Frame) **0x43/0x44**: REQ/ACK code for CPK-CAN device ID setting (Broadcast) REQ/ACK code **0x51/0x52**: REQ/ACK code for operation control of CPK-CAN device **0x61/0x62**: REQ/ACK code for Alive Check of CPK-CAN device	1
2	Data1	Refer to the description of each data format	1
3	Data2	Refer to the description of each data format	1
4	Data3	Refer to the description of each data format	1
5	Data4	Refer to the description of each data format	1
6	CHK	**- Calculate by XOR from Packet 0 to 5** **- If the checksum value does not match, it does not work.**	1
7	ETX	**0x02**: Code indicating the end of Packet(End of Text)	1

2) ID (Frame ID/ Broadcast ID) setting and checking Data Format

- This packet is sent to set Frame ID/Broadcast ID of CPK-CAN products.

① Composition of REQ/ACK Packet

Packet Number	0	1	2	3	4	5	6	7
ITEM	STX	Function Code	ID	ID	ID	ID	CHK	ETX
Frame ID Code	0x01	**0x41/0x42**	[ID]	[ID]	[ID]	[ID]	XOR(0-5)	0x02
Broadcast ID Code	0x01	**0x41/0x42**	[ID]	[ID]	[ID]	[ID]	XOR(0-5)	0x02

② REQ Packet Details

No.	ITEM	Description	BYTE
0	STX	0x01: Code indicating the start of Packet	1
1	Function CODE	**0x41:** REQ code for setting Frame ID of CPK-CAN device in Master **0x43:** REQ code for setting Broadcast ID of CPK-CAN device in Master	1
2	ID	Frame ID and Broadcast. ID 0x00000001-0x1FFFFFFF. The basic ID is 29 bits long and is compatible with 2.0B.	1
3	ID		1
4	ID		1
5	ID		1
6	CHK	Checksum CODE: XOR value of 6 bytes from No.0 to 5	1
7	ETX	0x02: Code indicating the end of Packet	1

③ ACK Packet Details

No.	ITEM	Description	BYTE
0	STX	0x01: Code indicating the start of Packet	1
1	Function CODE	**0x42**: ACK code from CPK-CAN to MASTER(FrameID) **0x44**: ACK code from CPK-CAN to MASTER (BroadcastID)	1
2	ID	Currently set Frame ID	1
3	ID		1
4	ID		1
5	ID		1
6	CHK	Checksum CODE: XOR value of 6 bytes from No.0 to 5	1
7	ETX	0x02: Code indicating the end of Packet	1

④ Example

[EX-01] Frame ID 0x00000001 Change the Frame ID of the device to 0x00000002
(However, Broadcast ID is set to 0x00000000)
[REQ] [Frame ID(0x0201)] 01 41 **00 00 00 02** 42 02
[ACK] [Frame ID(0x020A)] 01 42 **00 00 00 02** 41 02

[EX-01] Broadcast ID 0x00000000 Change the device's Broadcast ID to 0x10000000
(However, Frame ID is set to 0x00000001)
[REQ] [Frame ID(0x0201)] 01 43 **10 00 00 00** 52 02
[ACK] [Frame ID(0x020A)] 01 44 **10 00 00 00** 55 02

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

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

①Composition of REQ/ACK Packet

Packet Number	0	1	2	3	4	5	6	7
ITEM	STX	Function Code	Sound Source Code	Volume Code	Parameter	Reserve	CHK	ETX
Code	0x01	**0x51/0x52**	Data1	Data2	Data3	[Don't care]	XOR(0-5)	0x02

② REQ Packet Details

No.	ITEM	DESCRIPTION	BYTE
0	STX	0x01: Code indicating Packet start	1
1	Function CODE	**0x51**: REQ code for operation control of CPK-CAN device in Master	1
2	Sound Source Code	- The number of the MP3 to be stopped or played back (refer to P.5 of this manual for setting the MP3 name) - 0x00: stop playback - Set to 0x01 (Hex) when playing MP3 in the '001_MusicName' folder. Set to 0x01 (Hex) when playing MP3 in the '001_MusicName' folder. Set to 0x22 (Hex) when playing MP3 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	<table><tr><td>**Bit**</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>**Name**</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>**B**</td><td>**S**</td></tr></table> **S: Play once/repeat mode setting Bit** 0 – play the MP3 of the selected channel 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 MP3 playback, it is ignored without restarting. - When Bit is set to 1, if the same channel playback signal is input during MP3 playback, it is played again from the beginning.	1

NO.	ITEM	DESCRIPTION	BYTE
5	Reserve	[Don't care]	1
6	CHK	Checksum CODE: XOR value of 6 bytes from No.0 to 5	1
7	ETX	0x02: Code notifying the end of Packet	1

③ ACK Packet Details

NO.	ITEM	DESCRIPTION	BYTE
0	STX	0x01: Code indicating Packet start	1
1	Function CODE	**0x52**: ACK code from CPK-CAN to MASTER	1
2	Sound Folder Code	- Current playback status/MP3 number of currently playing sound source - 0x00: Stopping - 0x01-0xFF: Sound source number of currently playing sound source (Refer to P.5 of this manual for sound source name setting)	1
3	Volume CODE	- Software Volume Value: 0x00-0x1C, 29 levels (0-28) - 0x00: Sound OFF - 0x1C: Sound Max	1
4	Result	- motion control result - 0x00: OK - 0xF1: Channel setting problem - 0xF2: Volume setting problem - 0xF3: Problems with both channel and volume	1
5	Reserve	[Don't care]	1
6	CHK	Checksum CODE: XOR value of 6 bytes from No.0 to 5	1
7	ETX	0x02: Code notifying the end of Packet	1

④ Example

[EX-01] Repeat playback of sound source channel 3 with volume 10 in Frame ID 0x0201 device
[REQ] [Frame ID(0x0201)] 01 51 **03 0A** 00 00 59 02
[ACK] [Frame ID(0x0201)] 01 52 **03 0A** 00 00 5A 02

[EX-02] Play sound source number 10 channel once at MAX volume to all devices with Broadcast ID (0xFF)
[REQ] [Frame ID(0x02FF)] 01 51 **0A 1C 01** 00 47 02
[ACK](NONE)

[EX-03] Repeat playback of sound source channel 9 from the beginning at MAX volume to all devices with Broadcast ID (0xFF)
[REQ] [Frame ID(0x02FF)] 01 51 **09 1C 02** 00 47 02
[ACK](NONE)

4) Status Check (Alive) Data Format

- Packet for checking the current status of each CPK-CAN device

① Composition of REQ/ACK Packet

Packet Number	0	1	2	3	4	5	6	7
ITEM	STX	Function Code	Reserve/ State	Reserve/ Volume	Reserve	Reserve	CHK	ETX
Code	0x01	**0x61/0x62**	Data1	Data2	[Don't care]	[Don't care]	XOR(0-5)	0x02

② REQ Packet Details

No.	ITEM	DESCRIPTION	BYTE
0	STX	0x01: Code indicating Packet start	1
1	Function CODE	**0x61:** ACK code from CPK-CAN to MASTER	1
2	Reserve	[Don't care]	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	0x02: Code notifying the end of Packet	1

③ ACK Packet Details

No.	ITEM	DESCRIPTION	BYTE
0	STX	0x01: Code indicating Packet start	1
1	Function CODE	**0x62**: ACK code from CPK-CAN to MASTER	1
2	State	- Current playback status/source number of currently playing MP3 - 0x00: Stopping - 0x01-0xFF: MP3 number of currently playing sound source (Refer to P.5 of this manual for sound source name setting)	1
3	Volume	- Software Volume Value: 0x00-0x1C, 29 levels (0-28) - 0x00: Sound OFF - 0x1C: Sound Max	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	0x02: Code notifying the end of Packet	1

④ Example

[EX-01] Frame ID 0x0201 Check device status (MP3 playback X)
[REQ] [Frame ID(0x0201)] 01 **61** 00 00 00 00 60 02
[ACK] [Frame ID(0x0201)] 01 **62** 00 00 00 00 63 02

[EX-02] Frame ID 0x0201 Device Status Check (Channel 6 volume 16 playing)
[REQ] [Frame ID(0x0201)] 01 **61** 00 00 00 00 60 02
[ACK] [Frame ID(0x0201)] 01 **62 06 10** 00 00 75 02

⚠ 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.

Qlight Co., Ltd. www.qlight.com | trade@qlight.com
Head Office | Suite #1510, STX-V Tower, 128 Gasan digital 1-ro, Geumcheon-gu, Seoul, Korea
Tel. +82-2-2679-6152(Toll free. +82-80-328-2222) Fax. +82-2-2679-6154
Factory | 185-25, Mukbang-ro, Sangdong-myeon, Gimhae-si, Gyeongsangnamdo, Korea Tel. +82-55-328-1111(Toll free. +82-80-328-1111)
Qlight OverSEAs Sales Dept | 704 Nakdong-daero, Sasang-gu, Busan, Korea(Eomgung-Dong) Tel : +82-51-620-4100
Qlight Public Relations & Marketing Team Office | 704 Nakdong-daero, Sasang-gu, Busan, Korea(Eomgung-Dong) Tel. +82-51-245-0017

Qlight USA, Inc. www.qlight.com www.qlightusa.com | sales@qlightusa.com
3003 North First Street, Suite #341, San Jose, CA 95134 USA Tel. +1-408-519-5740 Fax. +1-408-519-5739

SHANGHAI Qlight Electronic Co., Ltd. www.qlight.com www.qlightcn.com | qlightcn@qlight.com
China Factory/ Shanghai Sales Office | #19, Nanda Road, Baoshan Area, Shanghai, China Tel. +86-21-6651-7100 Fax. +86-21-6315-3929
China Factory Site 2 (Qidong) | #33, Haiyan Road, Qidong High-tech Industrial Development Zone, Qidong, Jiangsu Province, China
Tel +86-513-8384-9999 Fax +86-513-8384-9910

Qlightec
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