

TAsic co., Ltd.

User's Manual for Czerny

Czerny Ver1.0

User's Guide



www.tasic.co.kr



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1 Document Revision History

<i>Revision</i>	<i>Date</i>	<i>Description</i>
0.9	2012-12-20	First Release
0.91	2013-02-05	Remove I ² C Update command Modified picture(5.2.1,5.3.1)
0.92	2013-03-05	Added voltage of I/O and peripheral Fixed 5.4.1 picture
0.93	2013-06-05	Rectified typos
0.94	2013-06-14	Added Reset Timing Rectified typos
0.95	2013-12-26	Rectified typos
0.96	2016-03-23	Added volume control on stand alone mode Modified picture(5.4.1) Rectified typos
0.97	2016-11-07	Added version info Rectified typos

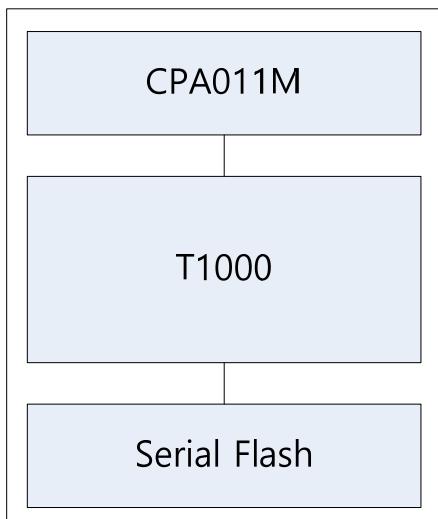


2 Introduction

2.1 Feature

- Plays voice from SPI Flash
- Uses wave audio format
- Triggered via SPI, UART or IO pins (3.3V I/O)
- Very simple to use, UART is enough to send commands
- Operates from a single supply (3.4~5.5V)
- 2.6W Mono Audio Amplifier
- SPI FLASH for data storage
- Most internal nodes are routed to pin headers for easy access and customization

2.2 Block Diagram



Czerny



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2.3 Description

The Czerny Module is a small, low-cost, high performance, easy to use voice player that is controlled from the IO-pins, UART or SPI. It can be used as a "plug-in" audio board in electronic systems or as a standalone small audio player.

The product is supported by design services, audio content preparation and pre-programming. Pin headers of the PCB are compatible with DIL32 footprint 2.54 pitch 15.24mm wide (100 mils pitch, 600 mils wide). This makes it possible to use standard DIL32 ZIF sockets or solder it by using DIL32 footprint.

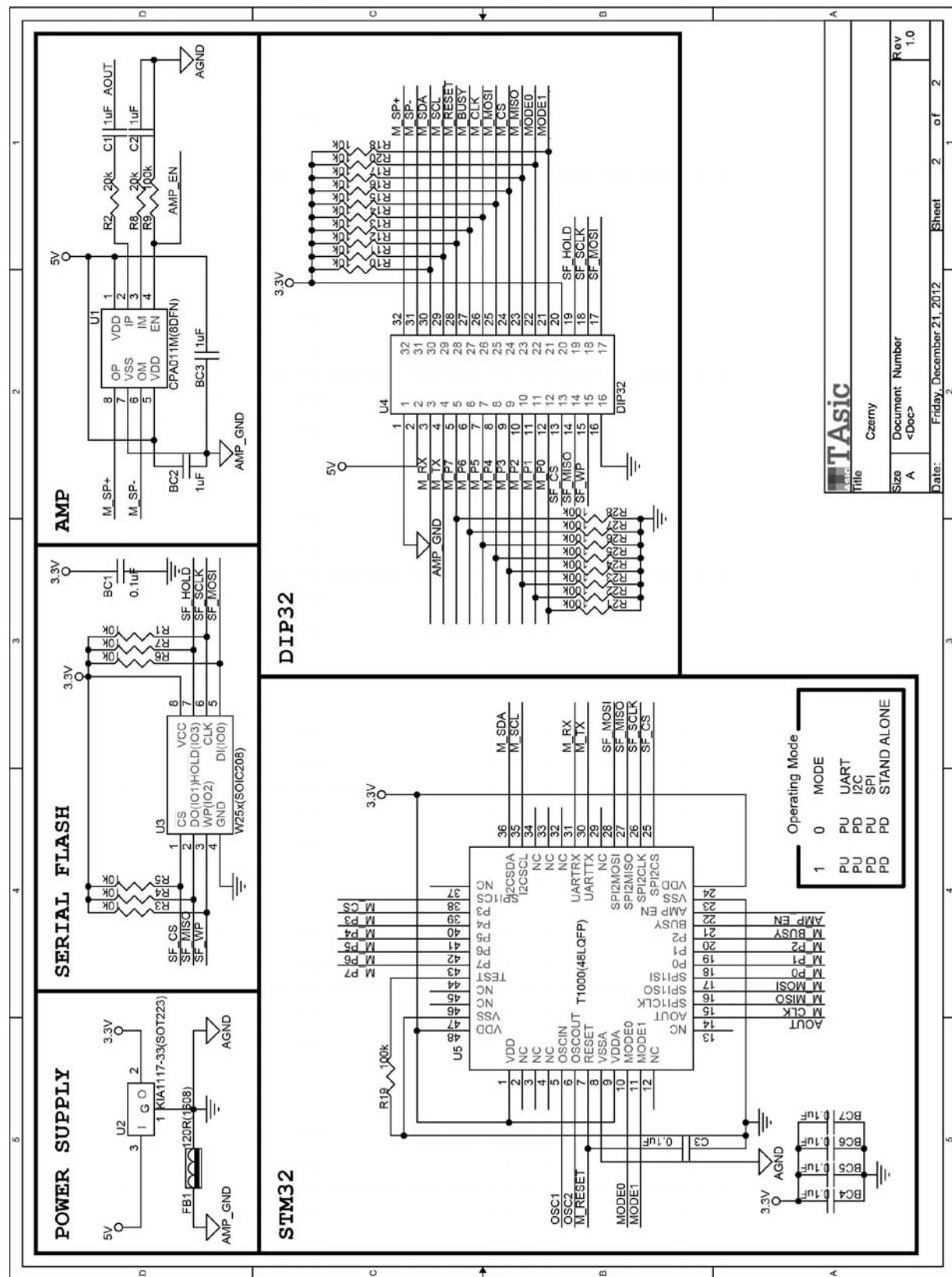
The Czerny Module operates from a single power supply. The board has 16 Mbits of on-board FLASH for playing voice audio files.

2.4 Applications

- Plays voice from SPI Flash
- Elevators
- Ticket machines
- Audio user's manuals
- Vending machines
- Car accessories
- Alarm systems
- PC accessories
- Speaking hi-tech toys

3 Schematic

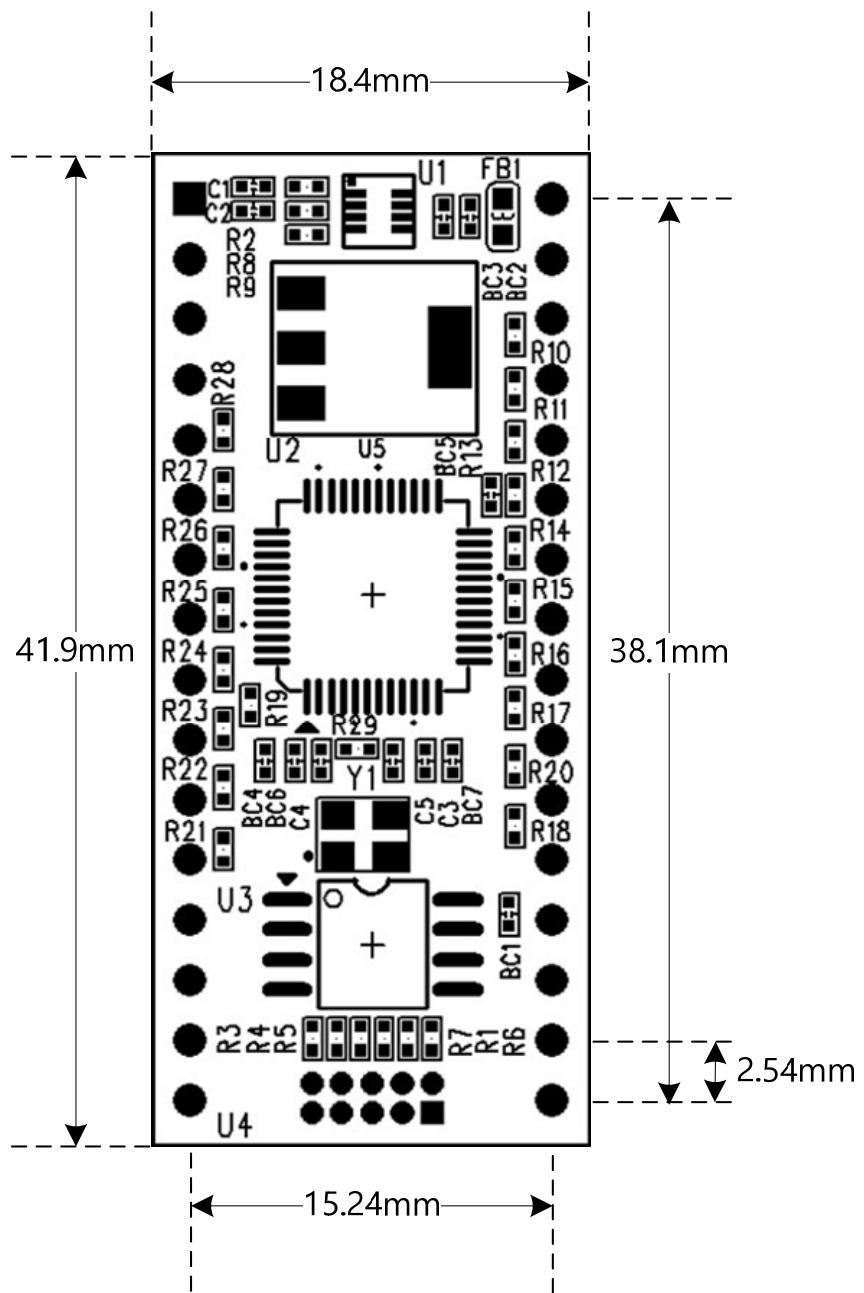
This chapter contains detailed information about the electrical and mechanical design of the Czerny Module.



4 Physical Design

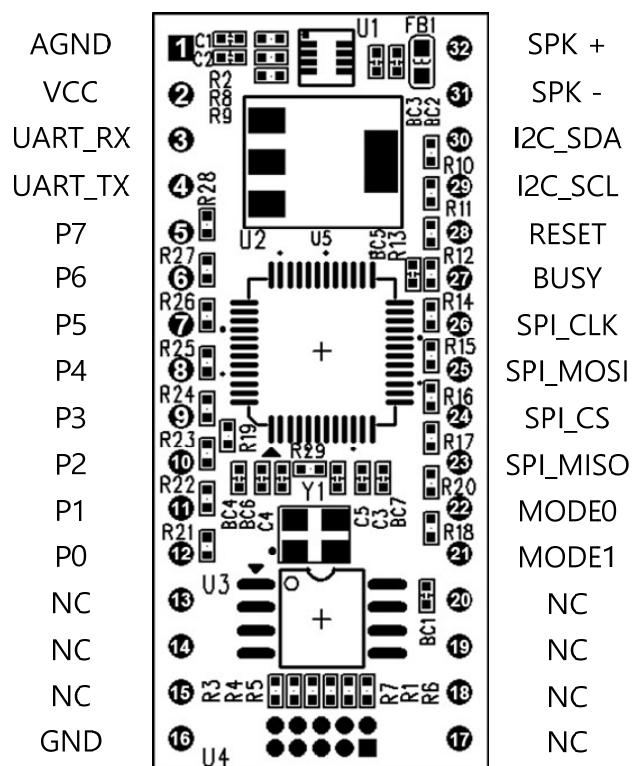
4.1 Main Components

4.2 Mechanical Dimensions





4.3 Expansion Connectors



Pin	Name	Description	Pin	Name	Description
1	AGND	Analog Ground	32	SPK +	Positive Output
2	VCC	Input Voltage ¹	31	SPK -	Negative Output
3	UART_RX	Serial port receive	30	SDA	I2C bus data pin
4	UART_TX	Serial port transmit	29	SCL	I2C bus clock pin
5	P7	Input pin	28	RESET	Active Low reset for T1000
6	P6	Input pin	27	BUSY	High : Busy state
7	P5	Input pin	26	SCLK	SPI bus clock input
8	P4	Input pin	25	MOSI	SPI bus data input
9	P3	Input pin	24	SS	SPI bus chip select
10	P2	Input pin	23	MISO	SPI bus data output
11	P1	Input pin	22	MODE0	Mode select 0 ²
12	P0	Input pin	21	MODE1	Mode select 1 ²
13	XCS		20	NC	
14	SI		19	NC	
15	NC		18	SCLK	
16	GND	Ground	17	SO	

¹ Power supply for the board 3.4V-5.5V allowed

² Default is UART MODE.

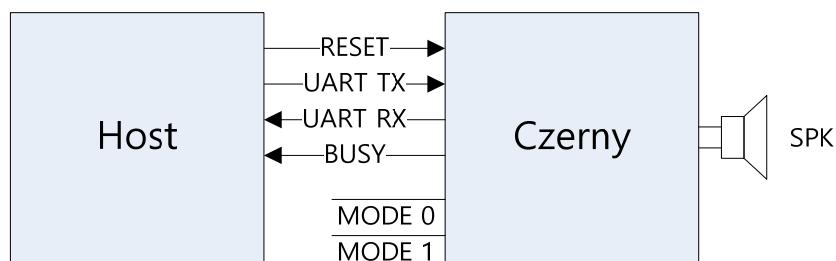
5 Operating Mode and Setting

5.1 Serial Mode

Mode 0 과 Mode 1 Pin 0이 Open 상태 일 때 Serial Mode로 동작한다. UART 레벨은 3.3V이다.

Serial Port 설정은 115200bps, Data 8bit, Parity none, Stop 1bit이다.

5.1.1 Hardware Interface



5.1.2 Serial command

5.1.2.1 Host Send Packet

1byte	2byte	1Byte
Protocol ID	Data	Checksum

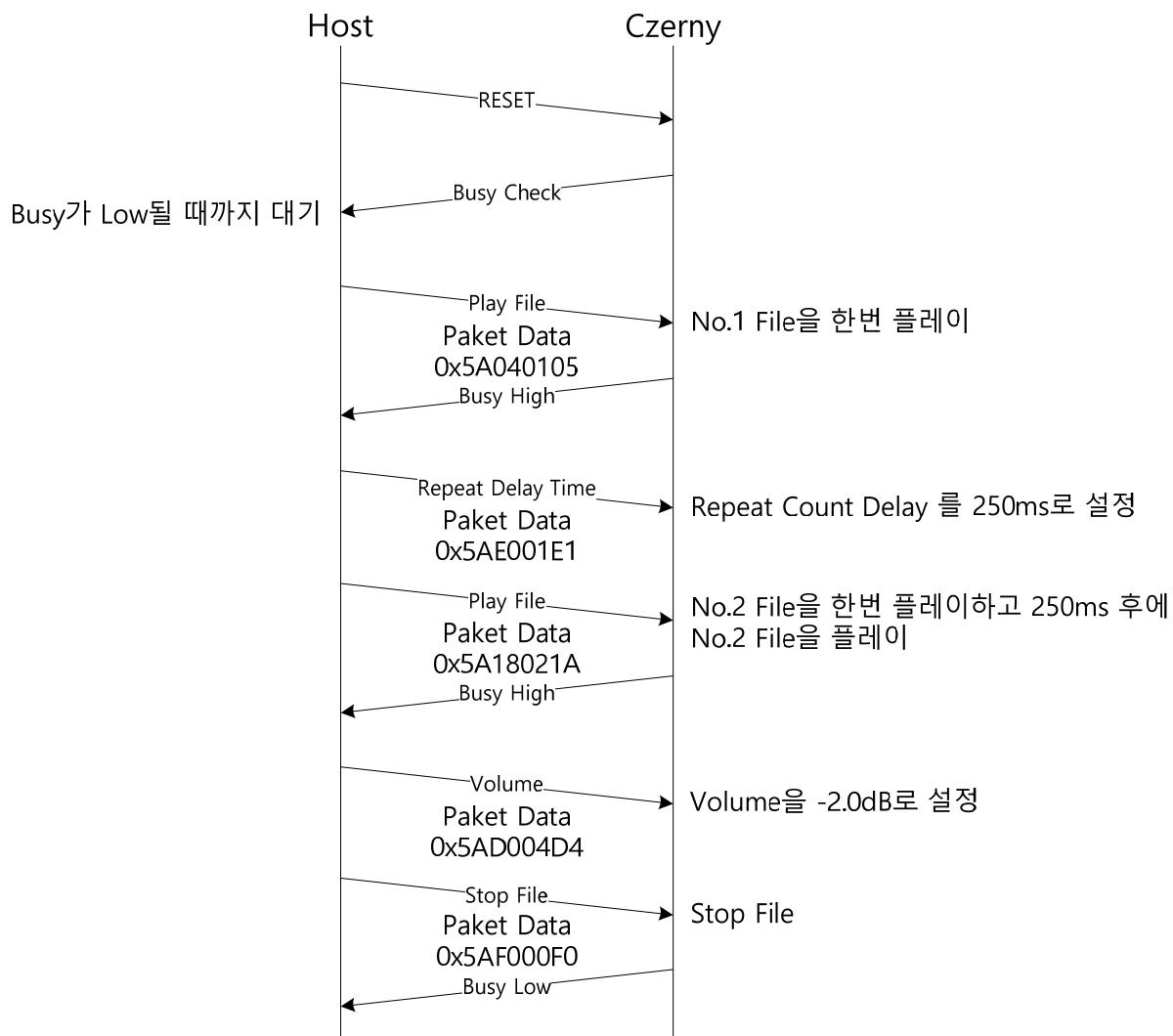
Protocol ID
0x5A

Command Name	Data		
	Command [15:12]	Mode [11:10]	Number[9:0]
Play File	0000	00 : Infinite	0000000000(0000) : No.0 File
		01 : 1 times	0000000001(0001) : No.1 File
		10 : 2 times	~
		11 : 3 times	1111111111(1023) : No.1023 File
Volume	1101	00	0000000000(00) : Mute
			0000000001(01) : -60 dB
			0000000010(02) : -59 dB
			0000000011(03) : -58 dB
			0000000100(04) : -57 dB
			~
			0000111101(61) : 0 dB

Repeat Delay time	1110	00	0000000000(0000) : 0 ms 0000000001(0001) : 250 ms 0000000010(0002) : 500 ms 0000000011(0003) : 750 ms 0000000100(0004) : 1s
Stop File	1111	00	0000000000 : Stop
WriteMode	1111	11	1100000000
Version	1100	00	0000000000

Checksum
Data[15:8] + Data[7:0]

5.1.2.2 Example Flow





5.1.3 Serial Update command

5.1.3.1 Host Send Packet

1byte	1byte	4byte	1byte	0 or 128byte	1byte
Protocol ID	Mode	Packet Number	Data Length	Data	Checksum

Protocol ID
0x5A

Mode
0xFF

Packet Number
0x00000001 부터 증가

Data Length
Total Packet 을 알려 줄 때는 Data Length 는 0
음원 데이터 경우에는 Data Length 는 0x80(128)

Data
Total Packet 을 알려 줄 때는 0byte
음원 데이터 경우에는 128byte

Checksum
Mode + Packet Number + Data Length + Data



5.1.3.2 Host Receive Packet

1byte	1byte	4byte	1Byte
Protocol ID	Mode	Request Packet Number	Checksum

Protocol ID
0xA5

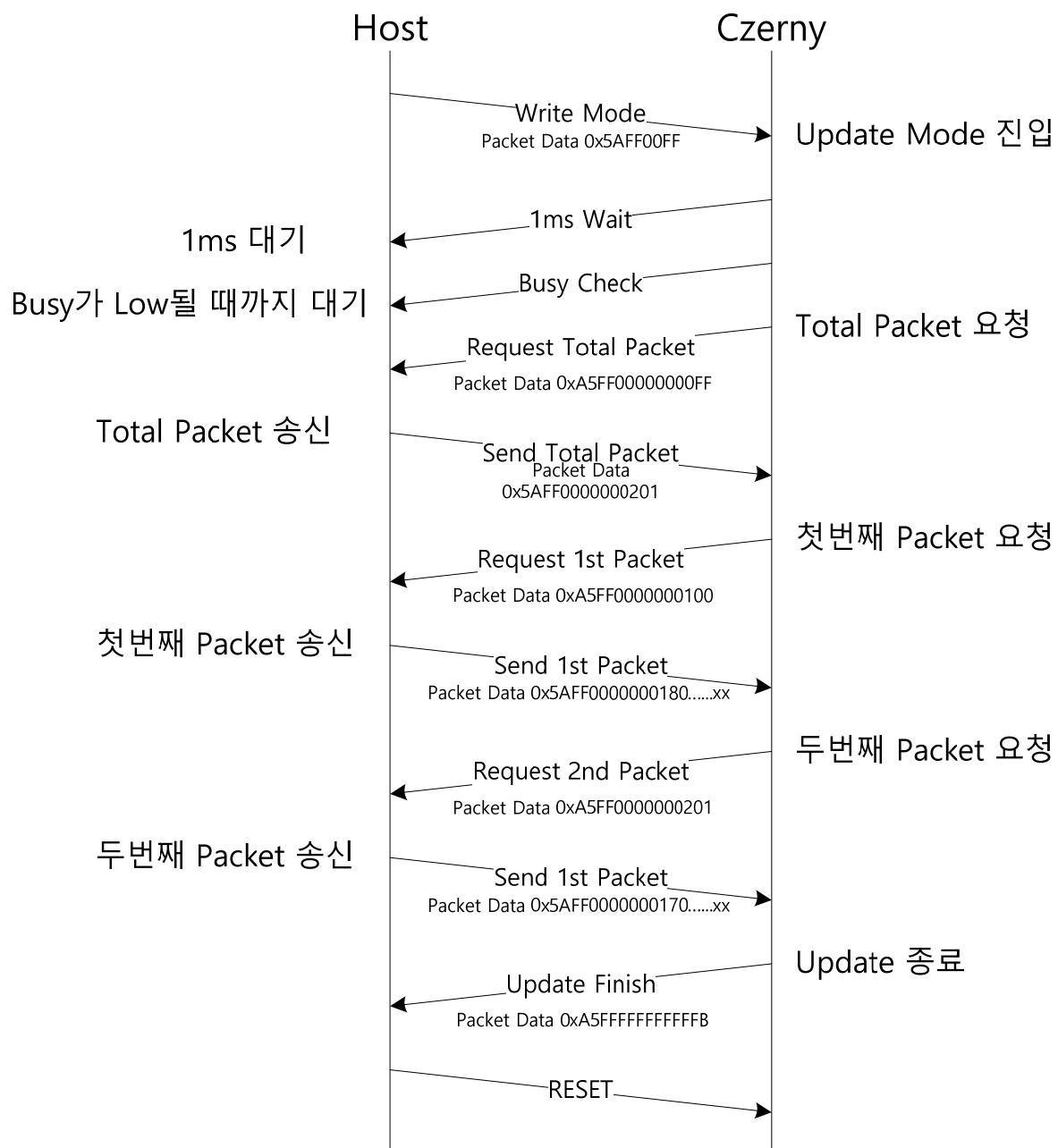
Mode
0xFF

Request Packet Number
Request Total Packet 경우는 0
음원 데이터인 경우 0x00000001 부터 증가
Update 완료인 경우 0xFFFFFFFF

Checksum
Mode + Request Packet Number



5.1.3.3 Example Flow





5.1.4 Version

5.1.4.1 Host Send Packet

1byte	2byte	1Byte
Protocol ID	Data	Checksum

Protocol ID
0x5A

Command Name	Data		
	Command [15:12]	Mode [11:10]	Number[9:0]
Version	1100	00	0000000000

Checksum
Data[15:8] + Data[7:0]

5.1.4.2 Host Receive Packet

1byte	1byte	4byte	1Byte
Protocol ID	Command	Version Number	Checksum

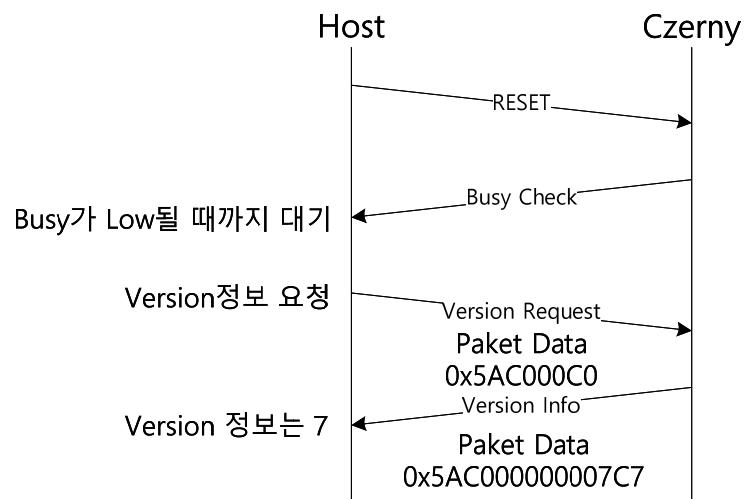
Protocol ID
0xA5

Command
0xC0

Version Number
TVoys 에서 입력한 버전 정보

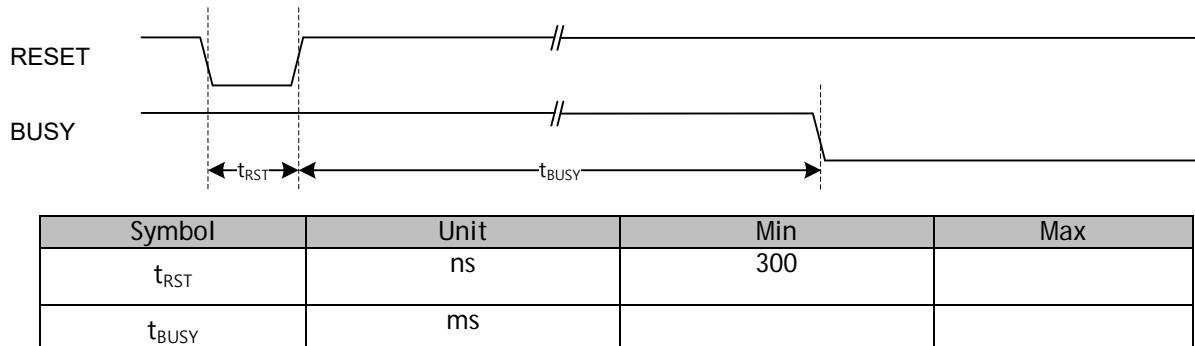
Checksum
Command + Version Number

5.1.4.3 Example Flow

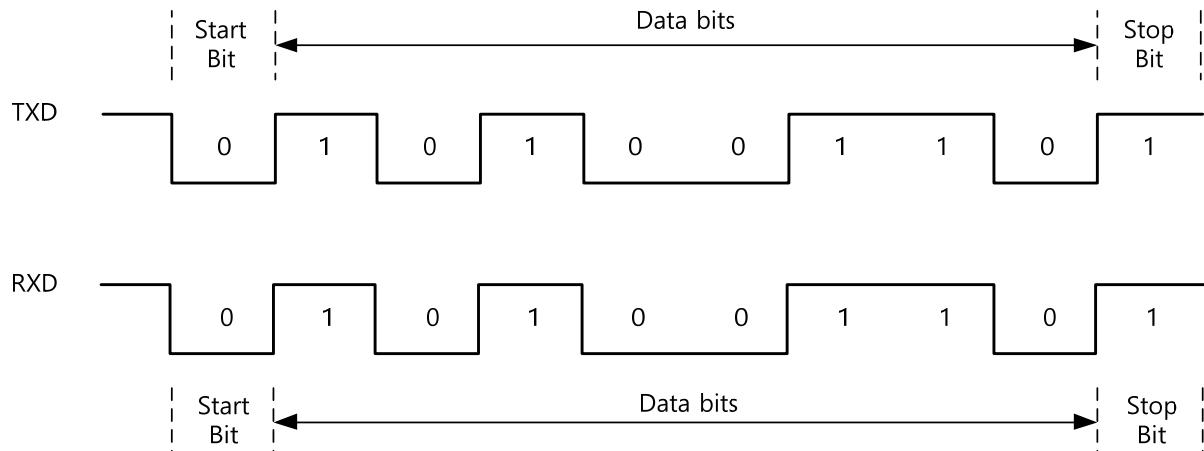




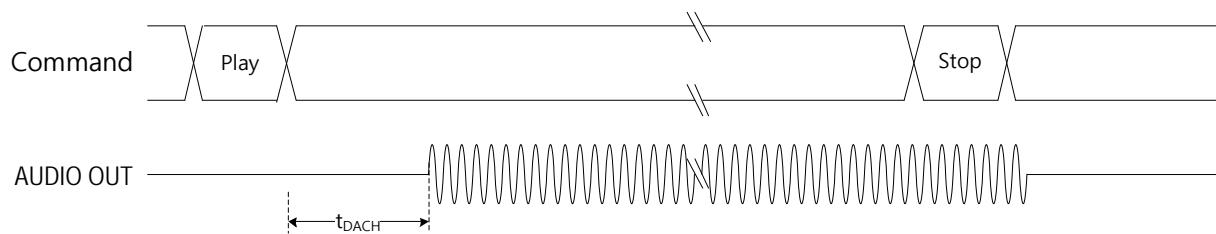
5.1.5 RESET Timing



5.1.6 UART Frame Structure



5.1.7 Audio Output Timing

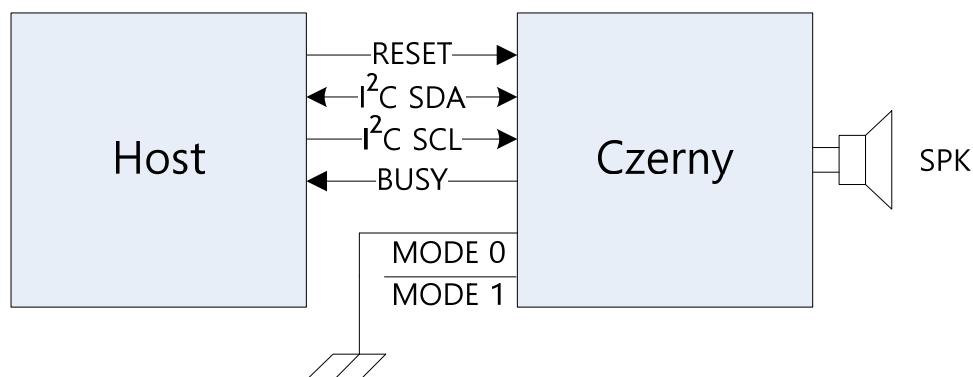




5.2 I²C Mode

Mode 0 Pin 을 GND 에 연결하고 Mode 1 이 OPEN 상태일 때 I²C Mode 로 동작한다.
I²C 레벨은 3.3V 이다. Slave Address 는 0xC0 이다.

5.2.1 Hardware Interface



5.2.2 I²C command

5.2.2.1 Host Send Packet

1byte	2byte	1Byte
Slave Address	Data	Checksum

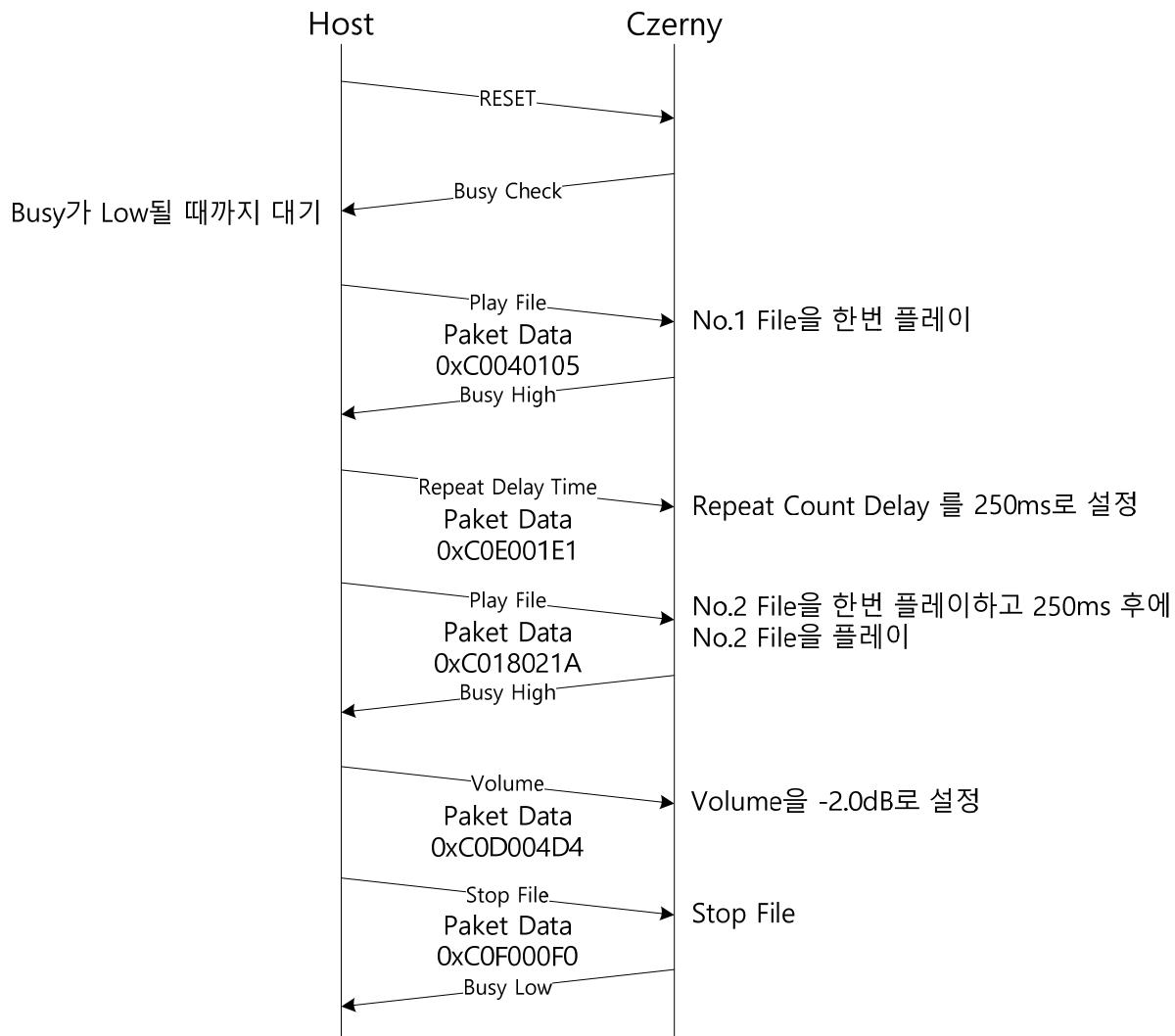
Slave Address
0xC0

Command Name	Data		
	Command [15:12]	Mode [11:10]	Number[9:0]
Play File	0000	00 : Infinite	0000000000(0000) : No.0 File
		01 : 1 times	0000000001(0001) : No.1 File
		10 : 2 times	~
		11 : 3 times	1111111111(1023) : No.1023 File
Volume	1101	00	0000000000(00) : Mute 0000000001(01) : -60 dB 0000000010(02) : -59 dB 0000000011(03) : -58 dB 0000000100(04) : -57 dB ~ 0000111101 (61) : 0 dB

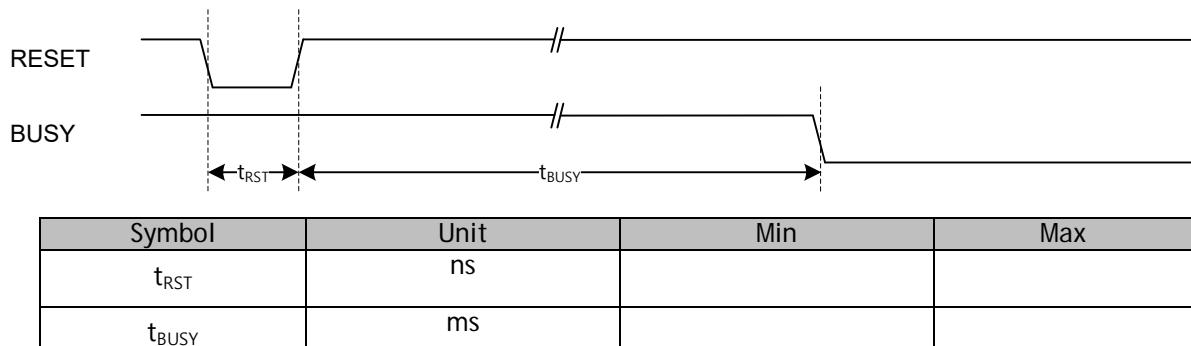
Repeat Delay time	1110	00	0000000000(0000) : 0 ms 0000000001(0001) : 250 ms 0000000010(0002) : 500 ms 0000000011(0003) : 750 ms 0000000100(0004) : 1s
Stop File	1111	00	0000000000 : Stop

Checksum
Data[15:8] + Data[7:0]

5.2.2.2 Example Flow

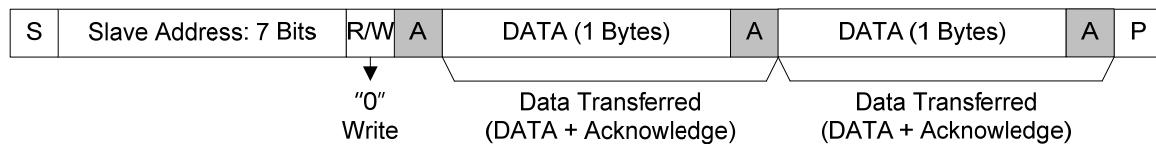


5.2.1 RESET Timing

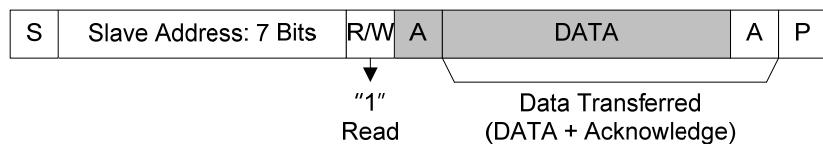


5.2.1 I²C-Bus Interface Data Format

Write Mode Format with 7-bit Addresses



Read Mode Format with 7-bit Addresses



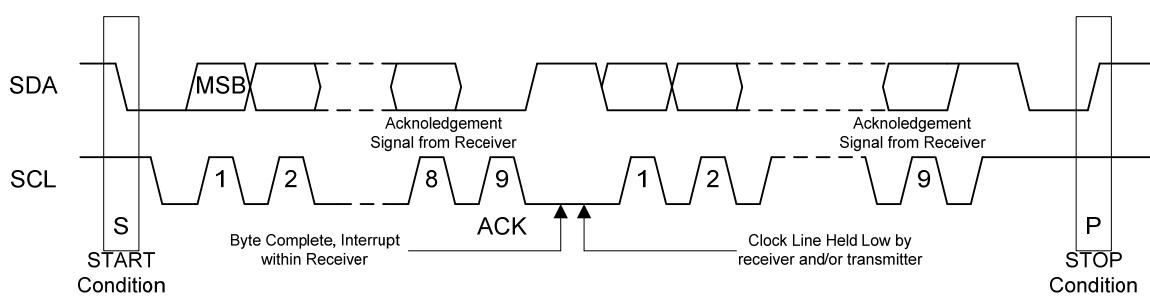
- S: Start, P: Stop, A: Acknowledge

- From Slave to Master

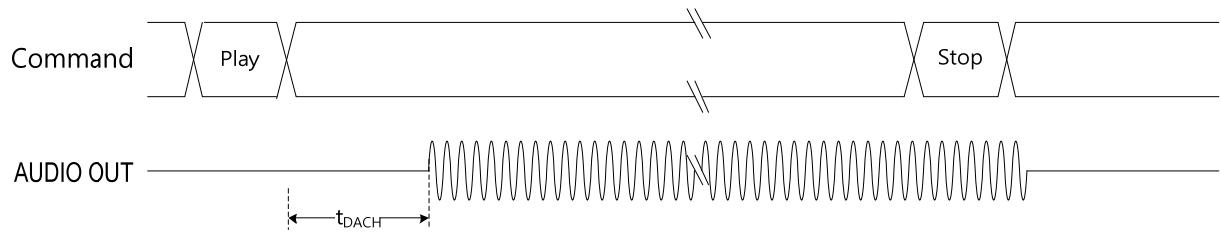
- From Master to Slave



5.2.2 Data Transfer on the I²C-Bus



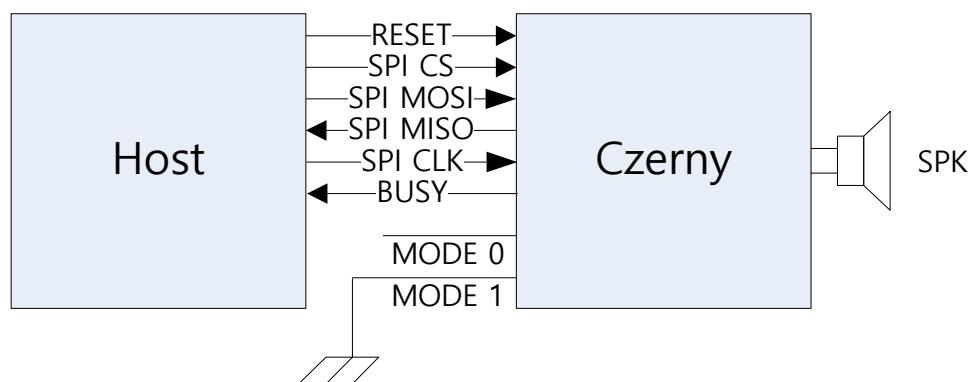
5.2.3 Audio Output Timing



5.3 SPI Mode

Mode 0 Pin 이 Open 상태 이고 Mode 1 를 GND 로 연결했을 때 SPI Mode 로 동작한다.
SPI 레벨은 3.3V 이다

5.3.1 Hardware Interface



5.3.2 SPI command

5.3.2.1 Host Send Packet

1byte	2byte	1Byte
Protocol ID	Data	Checksum

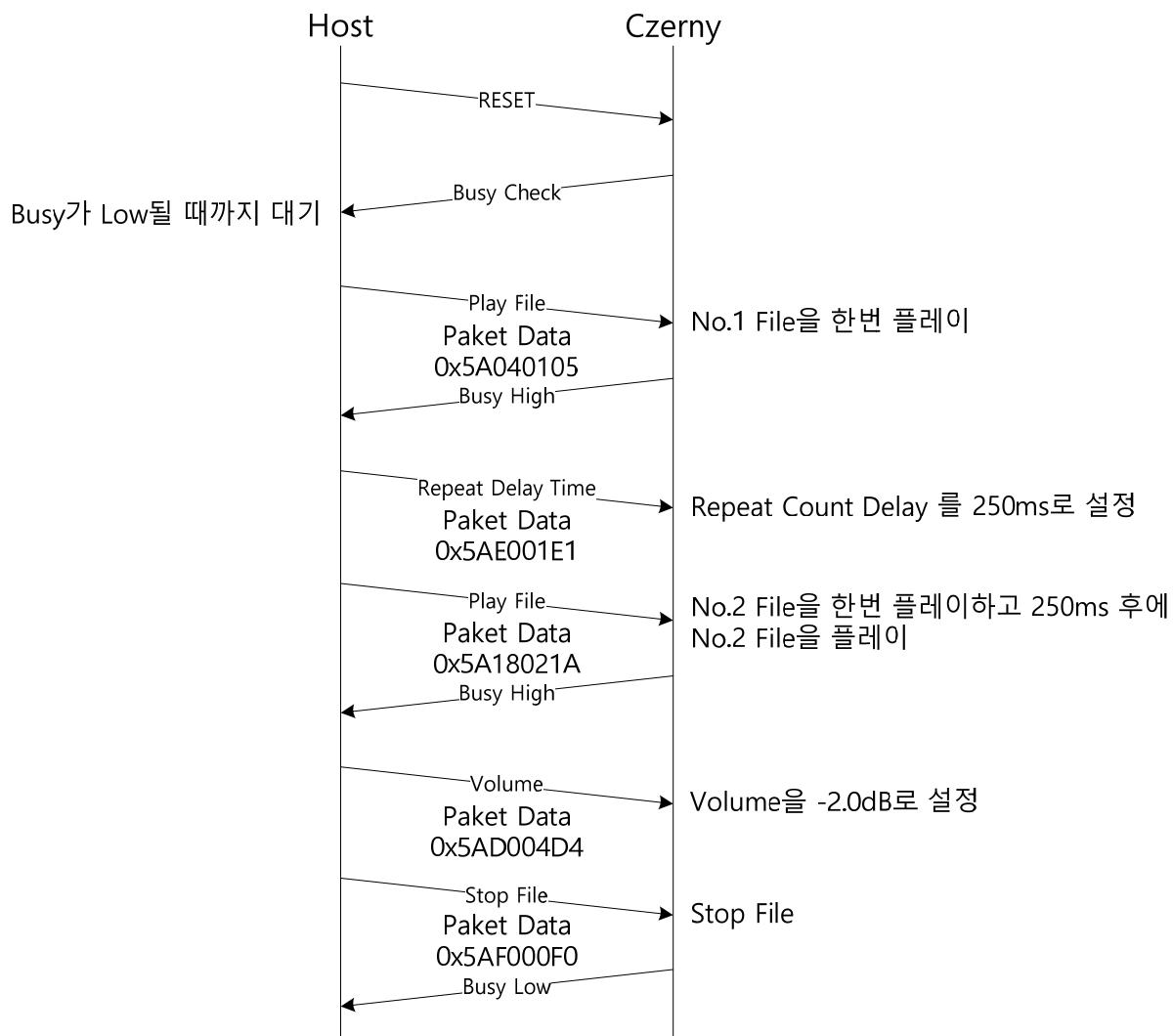
Protocol ID
0x5A

Command Name	Data		
	Command [15:12]	Mode [11:10]	Number[9:0]
Play File	0000	00 : Infinite	0000000000(0000) : No.0 File
		01 : 1 times	0000000001(0001) : No.1 File
		10 : 2 times	~
		11 : 3 times	1111111111(1023) : No.1023 File
Volume	1101	00	0000000000(00) : Mute
			0000000001(01) : -60 dB
			0000000010(02) : dB
			0000000011(03) : dB
			0000000100(04) : dB
			~
			0000111101 (61) : 0 dB

Repeat Delay time	1110	00	0000000000(0000) : 0 ms 0000000001(0001) : 250 ms 0000000010(0002) : 500 ms 0000000011(0003) : 750 ms 0000000100(0004) : 1s
Stop File	1111	00	0000000000 : Stop
WriteMode	1111	11	1100000000
Version	1100	00	0000000000

Checksum
Data[15:8] + Data[7:0]

5.3.2.2 Example Flow





5.3.3 SPI Update command

5.3.3.1 Host Send Packet

1byte	1byte	4byte	1byte	0 or 128byte	1byte
Protocol ID	Mode	Packet Number	Data Length	Data	Checksum

Protocol ID
0x5A

Mode
0xFF

Packet Number
0x00000001 부터 증가

Data Length
Total Packet 을 알려 줄 때는 Data Length 는 0
음원 데이터 경우에는 Data Length 는 0x80(128)

Data
Total Packet 을 알려 줄 때는 0byte
음원 데이터 경우에는 128byte

Checksum
Mode + Packet Number + Data Length + Data



5.3.3.2 Host Receive Packet

1byte	4byte	1Byte
Mode	Request Packet Number	Checksum

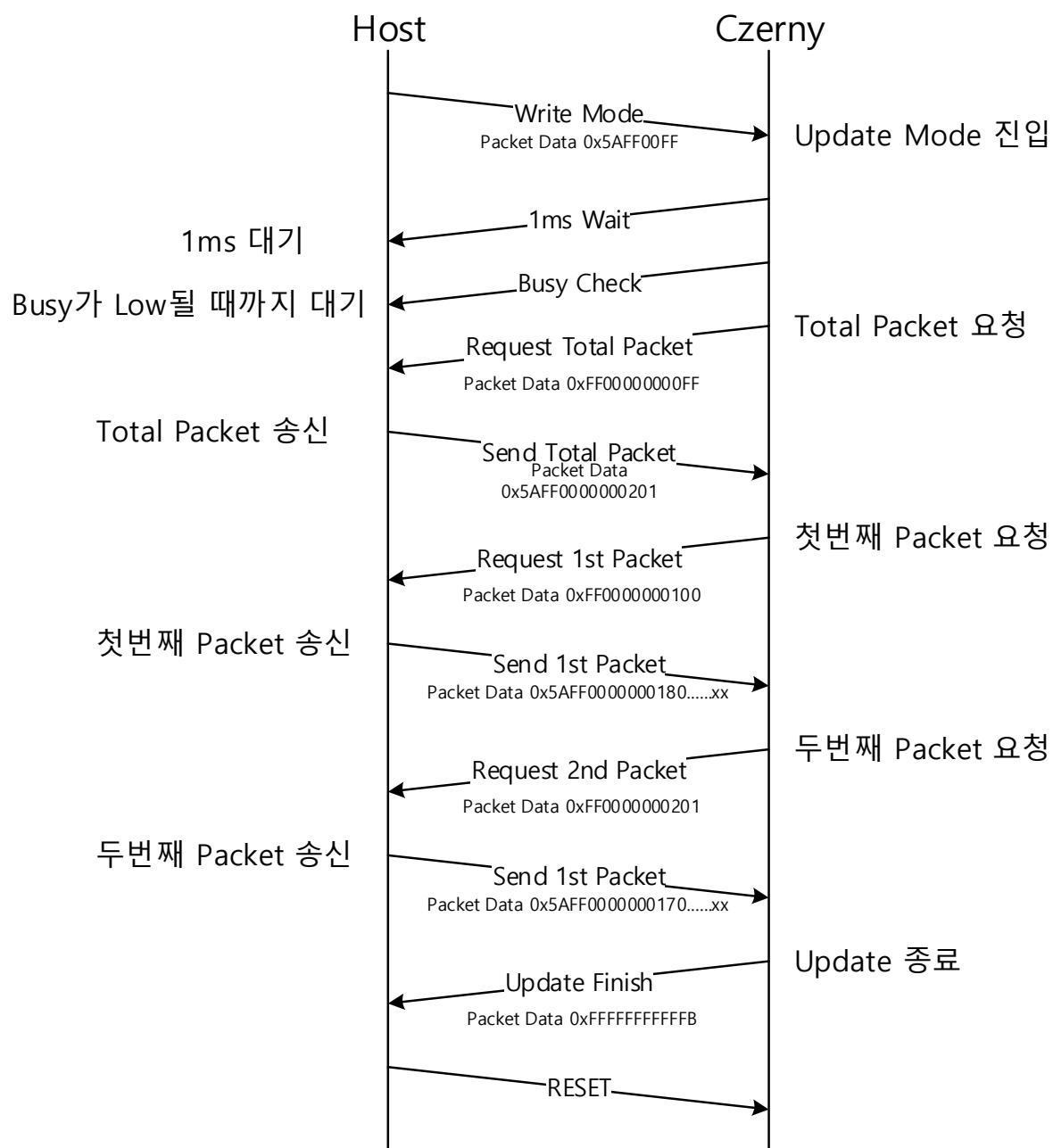
Mode
0xFF

Request Packet Number
Request Total Packet 경우는 0
음원 데이터인 경우 0x00000001 부터 증가
Update 완료인 경우 0xFFFFFFFF

Checksum
Mode + Request Packet Number



5.3.3.3 Example Flow





5.3.1 Version

5.3.1.1 Host Send Packet

1byte	2byte	1Byte
Protocol ID	Data	Checksum

Protocol ID
0x5A

Command Name	Data		
	Command [15:12]	Mode [11:10]	Number[9:0]
Version	1100	00	0000000000

Checksum
Data[15:8] + Data[7:0]

5.3.1.2 Host Receive Packet

1byte	4byte	1Byte
Command	Version Number	Checksum

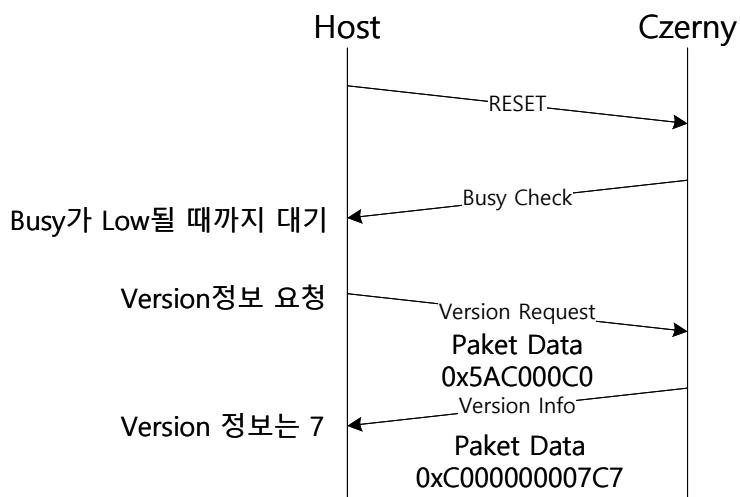
Command
0xC0

Version Number
TVoys에서 입력한 버전 정보

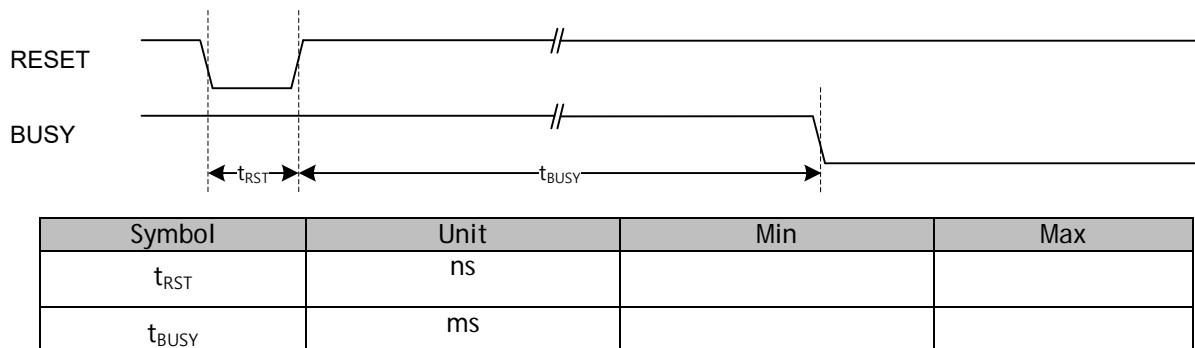
Checksum
Command + Version Number



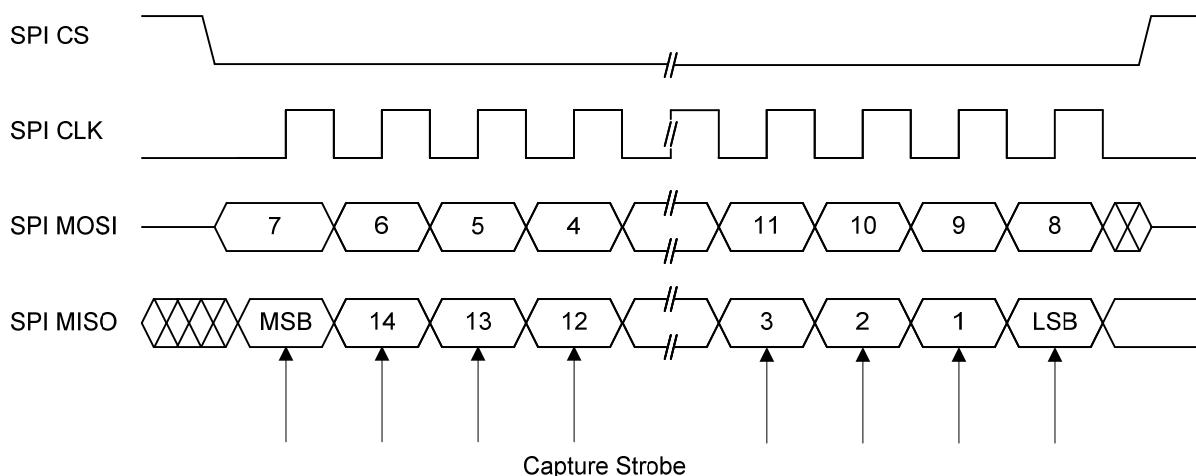
5.3.1.3 Example Flow



5.3.1 RESET Timing

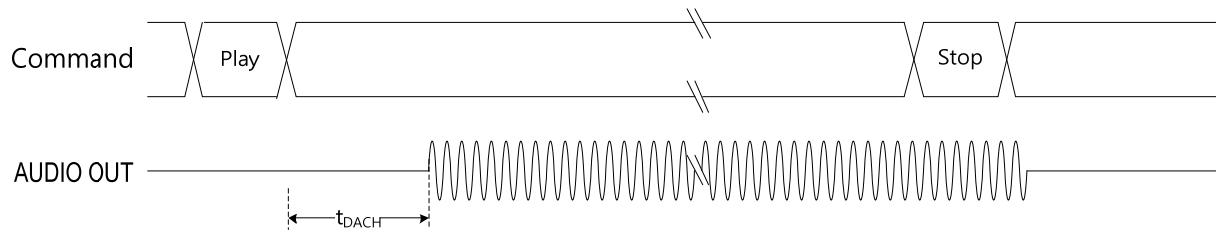


5.3.2 SPI Transfer Format





5.3.3 Audio Output Timing

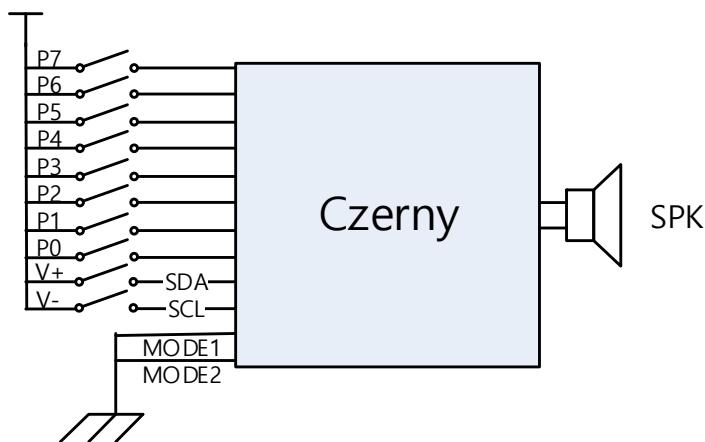




5.4 Stand Alone Mode

Mode 1 과 Mode 2 Pin 이 GND 와 연결했을 때 Stand Alone Mode 로 동작한다. I/O 레벨은 3.3V 이다. V+(Volume +)와 V-(Volume -)는 Active Low 로 동작하며, 60ms 이상에서 Short Key 로 동작하고, 200ms 이상이면 Long Key 로 동작한다.

5.4.1 Hardware Interface



5.4.2 Data Port Description

P0~P7 은 Rising Edge 일때 음원을 플레이 할 수 있다.

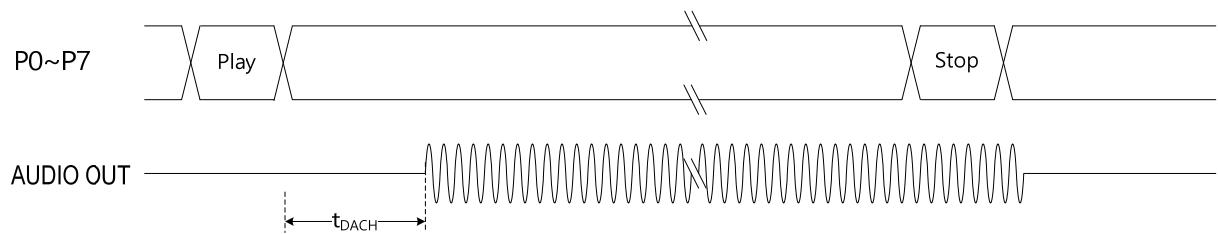
아래 표에 포트 동작에 따라 플레이 되는 파일의 파일 No.가 나열되어 있다.

P7	P6	P5	P4	P3	P2	P1	P0	File No.	Description
0	0	0	0	0	0	0	1	1	Rising Edge
0	0	0	0	0	0	1	0	2	Rising Edge
0	0	0	0	0	0	1	1	3	Rising Edge
0	0	0	0	0	1	0	0	4	Rising Edge
0	0	0	0	0	1	0	1	5	Rising Edge
0	0	0	0	0	1	1	0	6	Rising Edge
0	0	0	0	0	1	1	1	7	Rising Edge
0	0	0	0	1	0	0	0	8	Rising Edge
:	:	:	:	:	:	:	:	:	:
0	0	0	1	0	0	0	0	16	Rising Edge
0	0	1	0	0	0	0	0	17	Rising Edge
0	0	1	1	0	0	0	0	0	Rising Edge
:	:	:	:	:	:	:	:	:	:
1	1	1	1	1	1	1	0	254	Rising Edge
1	1	1	1	1	1	1	1	255	Rising Edge



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5.4.3 Audio Output Timing



6 Voys

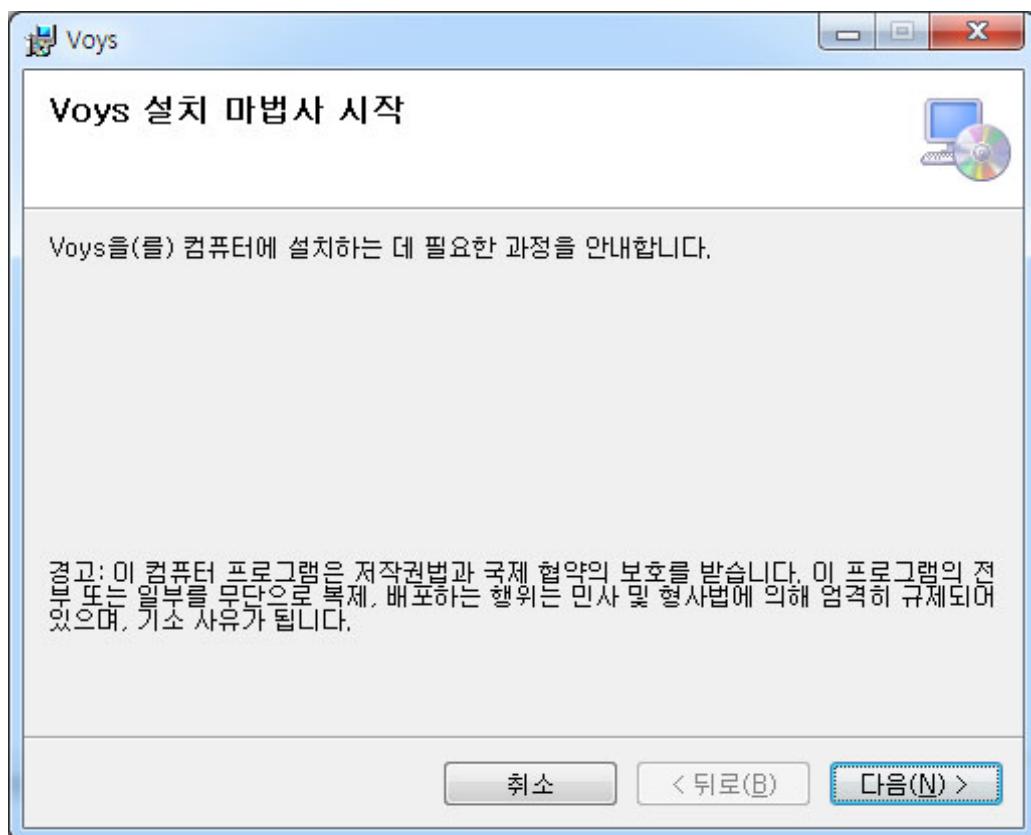
6.1 Voys 설치

6.1.1 설치 파일 Download

Czerny 모듈의 다운로딩 및 테스트를 위해서는 Voys 가 설치되어야 합니다.

6.1.1 설치 진행

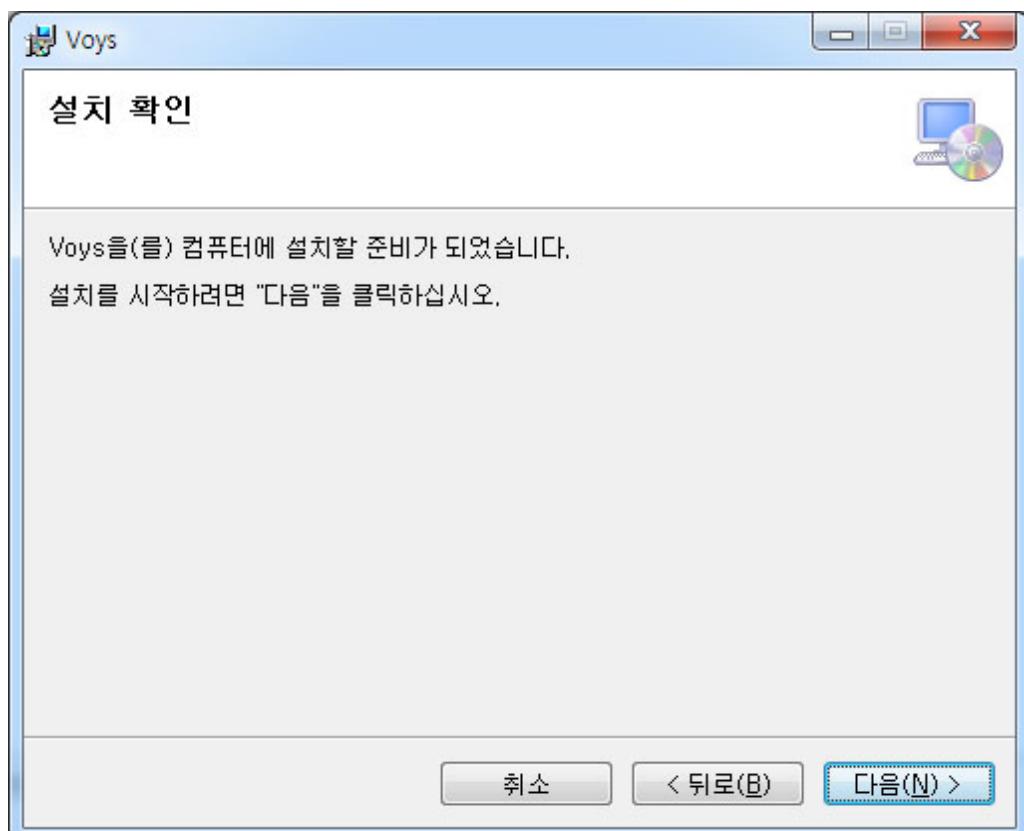
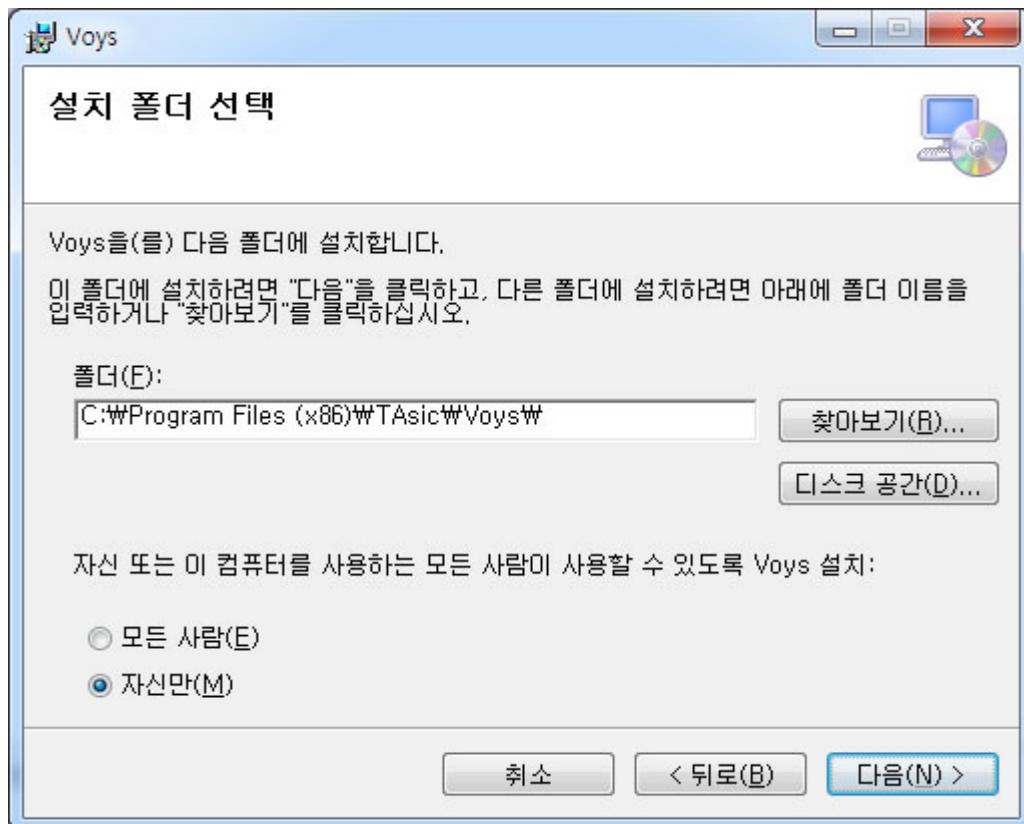
설치파일을 실행 시키면 다음과 같은 화면이 나타나면서 설치 과정이 시작됩니다. 다음 클릭





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프로그램을 설치할 경로를 선택한 후 다음 클릭.

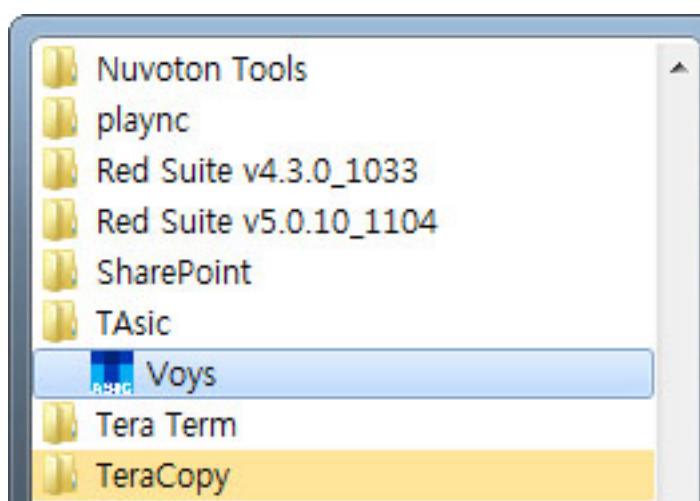




6.2 Voys

6.2.1 Voys 실행

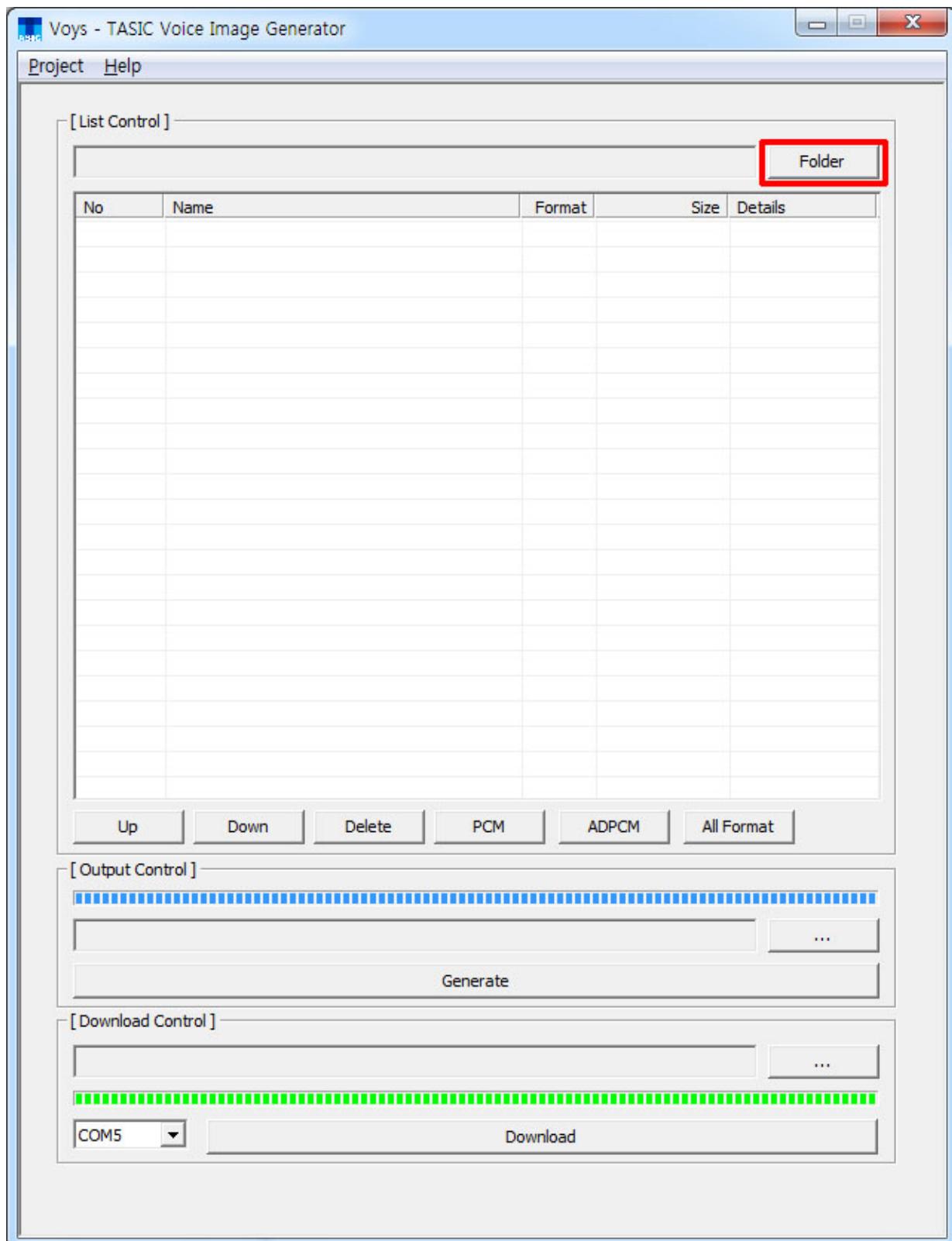
프로그램 메뉴에서 TAsic 폴더 안에 있는 Voys.exe를 실행 시킵니다.





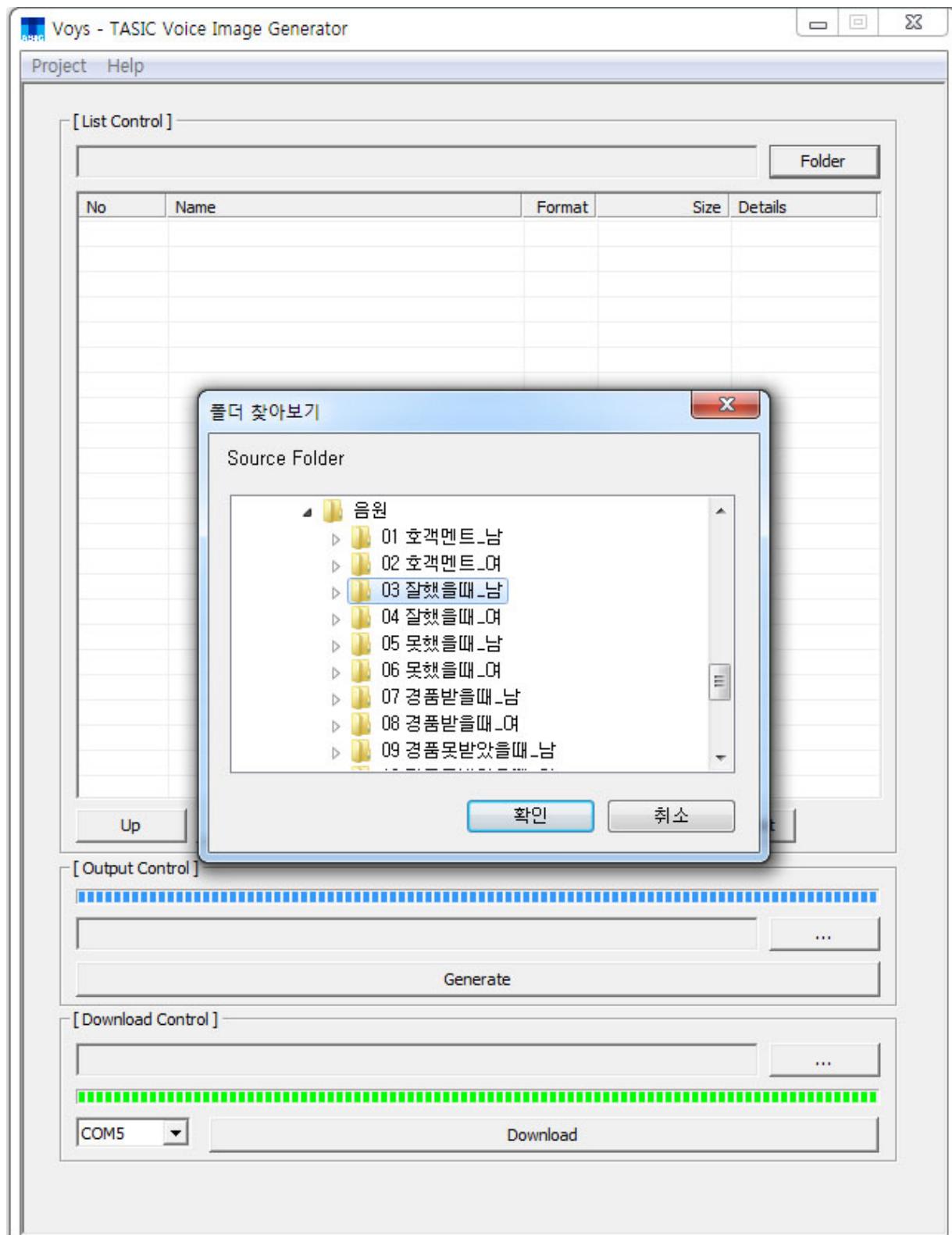
6.2.1 음원 파일 추가

- ① Folder 를 클릭해서 음원이 있는 폴더를 선택합니다.



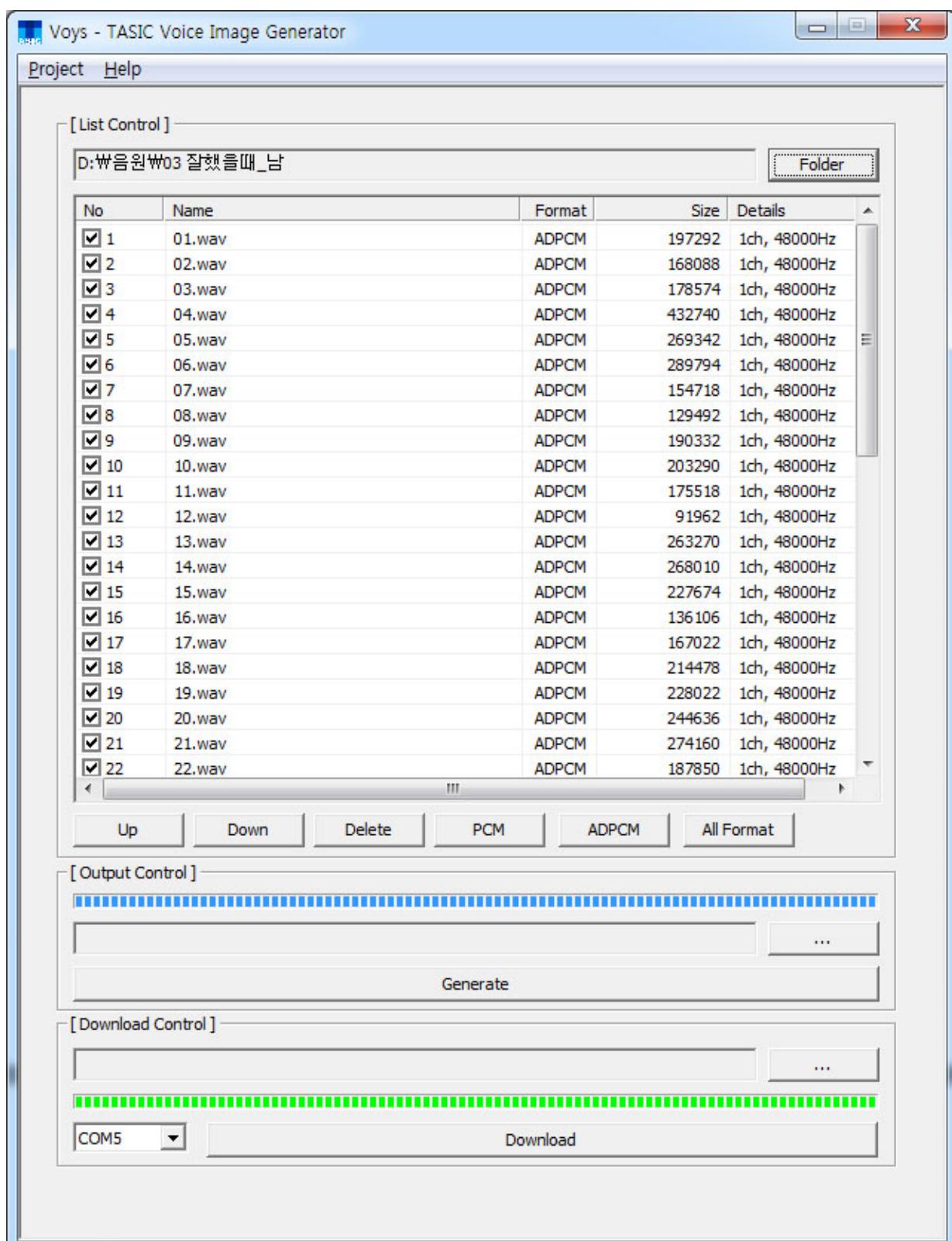


TASIC Co., Ltd.





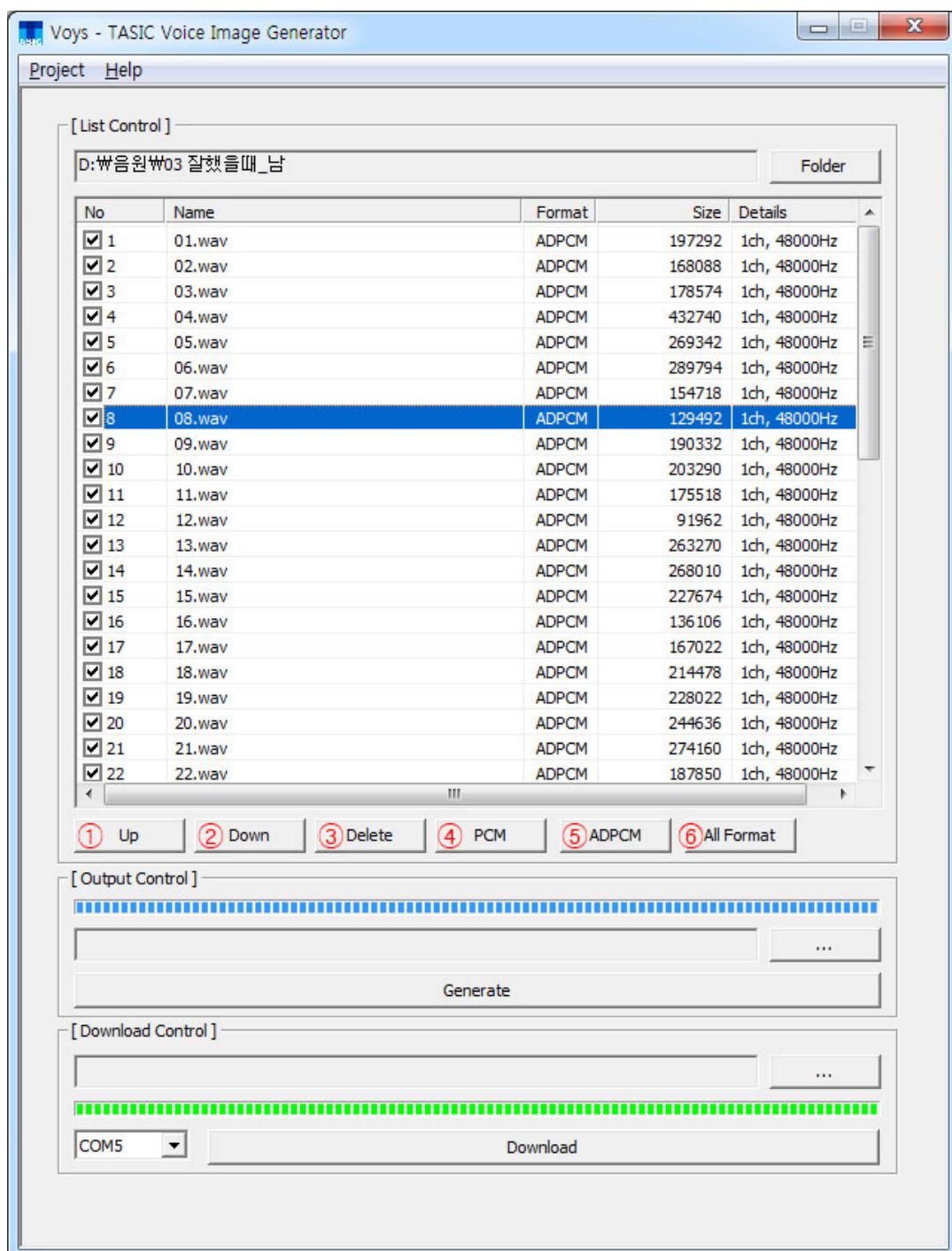
- ② 폴더에 있는 음원 파일이 표시됩니다.



6.2.1 음원 설정

선택한 음원의 설정을 바꿀 수 있습니다.

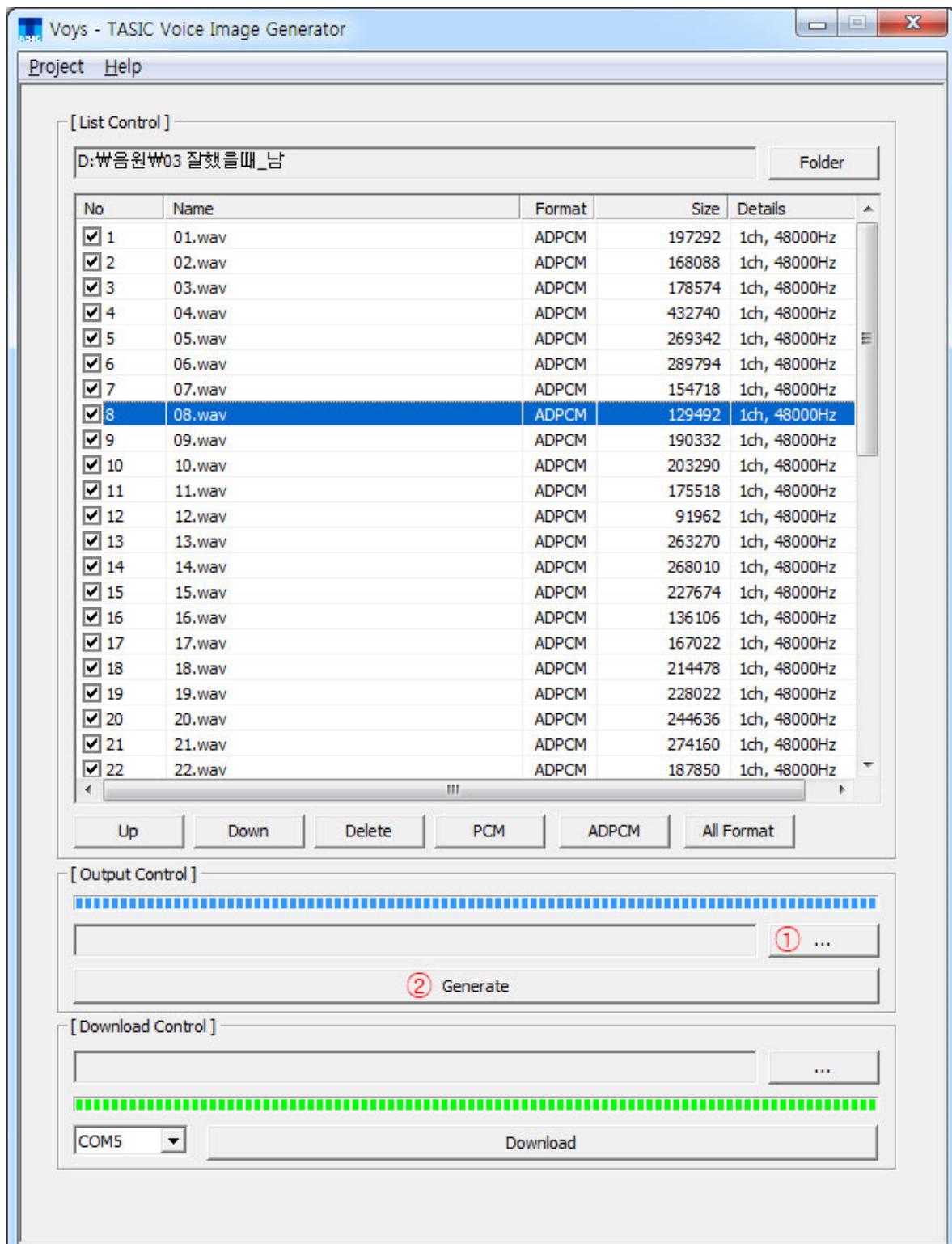
- ① Up : 선택한 음원을 위로 이동
- ② Down : 선택한 음원을 아래로 이동
- ③ Delete : 선택한 음원을 삭제
- ④ PCM : 선택한 음원을 PCM 포맷으로 변경
- ⑤ ADPCM : 선택한 음원을 ADPCM 포맷으로 변경
- ⑥ All Format : 모든 파일의 포맷 변경



6.2.2 음원 Binary 생성

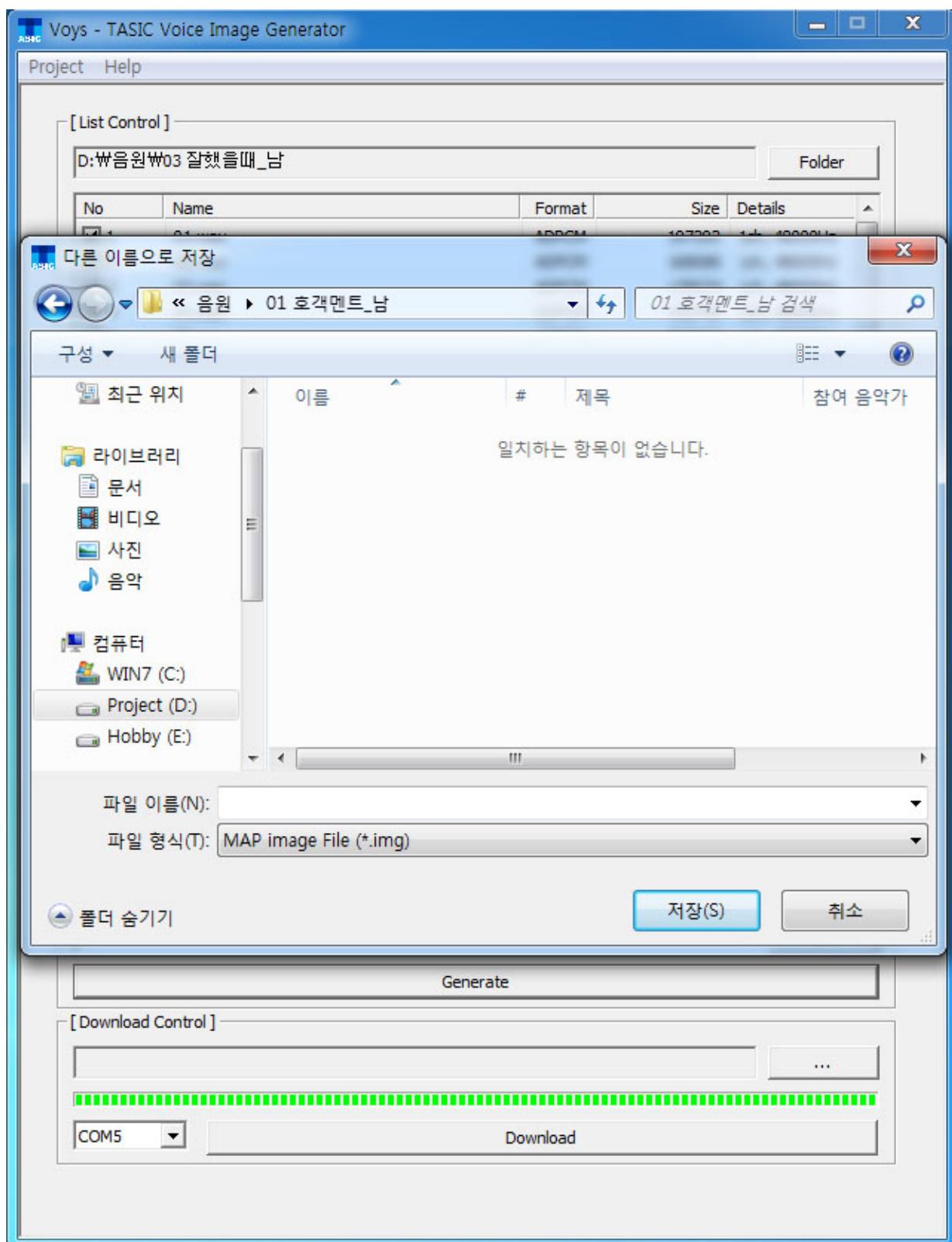
음원파일의 확장자는 *.bin 입니다.

- ① ... : Binary 가 저장될 폴더 선택
- ② Generate : Binary 생성

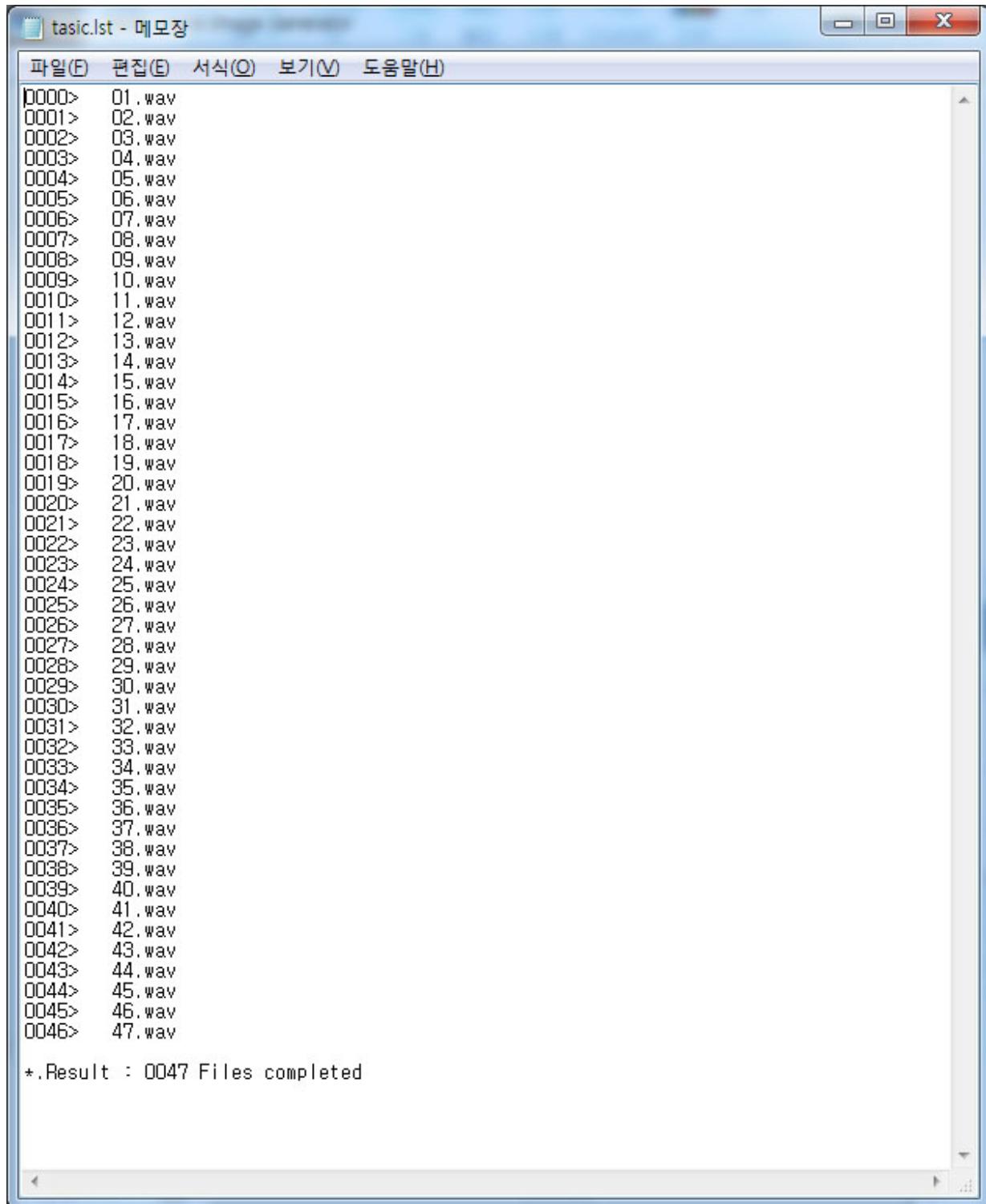




③ Generate 클릭 후 생성할 Binary 이름을 쓰고 저장을 누릅니다.



④ Binary 가 생성된 폴더에 *.lst 파일에 음원 목록이 저장 되어있습니다.



tasic.lst - 메모장

파일(F) 편집(E) 서식(O) 보기(V) 도움말(H)

```
0000> 01.wav
0001> 02.wav
0002> 03.wav
0003> 04.wav
0004> 05.wav
0005> 06.wav
0006> 07.wav
0007> 08.wav
0008> 09.wav
0009> 10.wav
0010> 11.wav
0011> 12.wav
0012> 13.wav
0013> 14.wav
0014> 15.wav
0015> 16.wav
0016> 17.wav
0017> 18.wav
0018> 19.wav
0019> 20.wav
0020> 21.wav
0021> 22.wav
0022> 23.wav
0023> 24.wav
0024> 25.wav
0025> 26.wav
0026> 27.wav
0027> 28.wav
0028> 29.wav
0029> 30.wav
0030> 31.wav
0031> 32.wav
0032> 33.wav
0033> 34.wav
0034> 35.wav
0035> 36.wav
0036> 37.wav
0037> 38.wav
0038> 39.wav
0039> 40.wav
0040> 41.wav
0041> 42.wav
0042> 43.wav
0043> 44.wav
0044> 45.wav
0045> 46.wav
0046> 47.wav

*.Result : 0047 Files completed
```



6.2.3 음원 Binary Download

Binary 파일을 Czerny 모듈에 Serial 통신으로 Download 할 수 있습니다.

- ① ... : Binary 가 저장된 폴더의 파일 선택
- ② Serial Port 선택
- ③ Download : Binary 를 모듈에 Download

