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**Features**

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- High performance DSP process core
- High quality on-chip stereo DAC
- Decodes MP3/WAV audio format
- Supports bitrate from 32Kbps to 320Kbps
- Supports SD/SDHC memory card up to 32GB
- Low-power operation
- Ultra-low background noise
- TTL serial interface and external IO control pins
- Input voltage: 3.3~5VDC
- Compact design

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**General Description**

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The AU5016 is designed for use in embedded systems and in customer specific application. It is a fully integrated SD/SDHC MP3/WAV player module with the ability to decode MPEG Layer-3 (MP3) audio file and lossless WAV file. It can be controlled by buttons and digital inputs or via the TTL serial interface. It contains a high-performance DSP process core and a high-quality stereo DAC that providing high sound quality output. The AU5016 is built in voltage-level translator so it can accept any TTL voltage from 2.5v to 5.5v.

The AU5016 is also capable of driving a stereo earphone directly without the need of an amplifier.

**Application:** Automobile, home system, game machines, voice devices, communications equipment, industrial control, toys and so on



## Characteristics & Specifications

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### Absolute Ratings

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Parameter	Min	Max	Unit
Supply Voltage	3.15	5.5	V
TTL Voltage	2.5	5.5	V

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### Recommended Operating Conditions

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Parameter	Min	Type	Max	Unit
Operating Voltage	3.15	5	5.5	V
TTL Voltage	2.5	5	5.5	V
Operating Temperature	-40		+80	°C

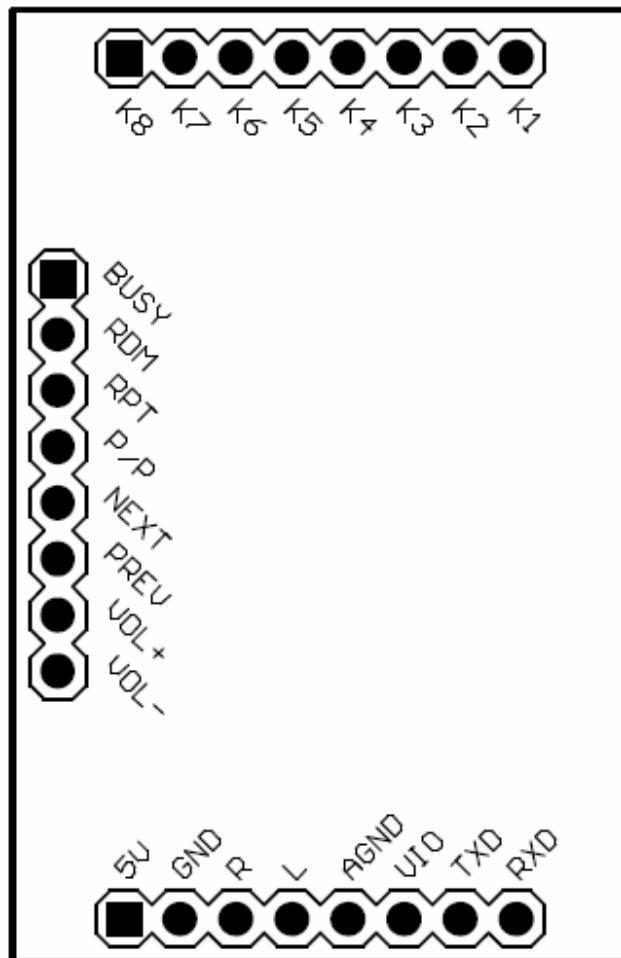
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### Electrical Characteristics

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Parameter	Symbol	Typ	Unit
DAC Resolution		24	bits
Total Harmonic distortion	THD	0.1	%
Dynamic Range	IDR	>90	dB
S/N Ratio	SNR	80	dB
Frequency Response		-0.1-0.1	dB
Analog Output Load Resistance	AOLR	30	Ohm
Analog Output Load Capacitance		100	pF
Current Rating		20~30	mA

**Pins Assignment**



Bottom View

Pin Name	Function
K1*	I/O
K2*	I/O
K3*	I/O
K4*	I/O
K5*	I/O
K6*	I/O
K7*	I/O
K8*	I/O
BUSY	BUSY output (active high)
RDM*	Random play
RPT*	Repeat One or Repeat All
P/P*	Pause/Play
NEXT*	Play next song
PREV*	Play previous song
VOL+*	Volume +
VOL-*	Volume -
5V	Supply power input (3.3~5VDC)
GND	Power ground
R	Audio Right Channel output
L	Audio Left Channel output
AGND	Audio ground
VIO	TTL level voltage input (2.5~5.0VDC). If TTL is not used, connect VIO to VCC(5V) pin
TXD	TTL TX
RXD	TTL RX

\*All Control pins are active low.

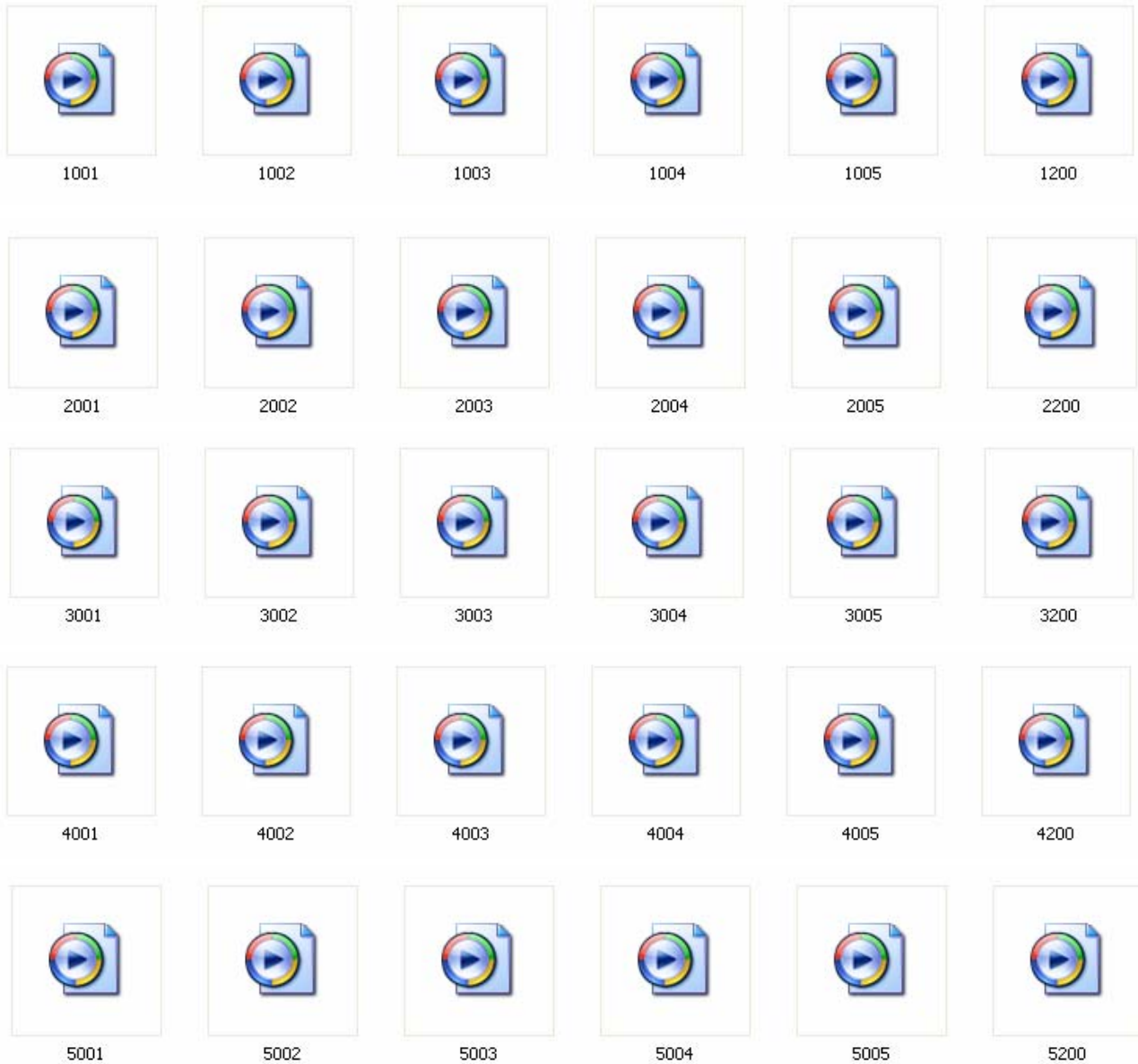
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### MP3 File Naming Rules

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**(One bit) Index number + (three bit) Song number**

The AU5016 supports up to 1200 (6x200) mp3 files. Index number range: 1~6. Song number range: 1~200





6001



6002



6003



6004



6005



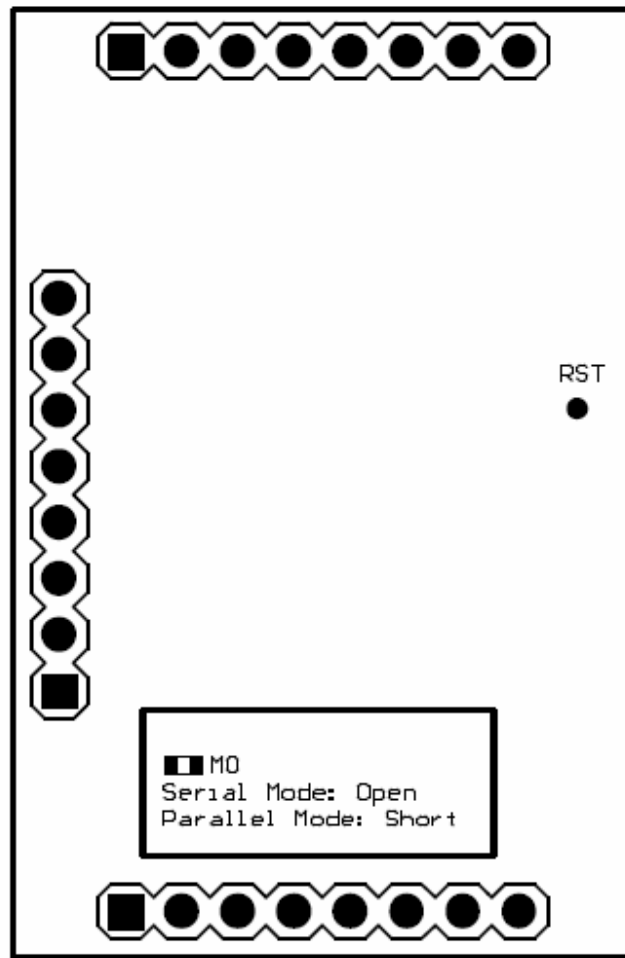
6200

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## Working Mode

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The AU5016 has two working modes, serial control mode and parallel control mode. Parallel mode can be selected by shorting the on-board two solder pads marked 'MO'. [You can always control the module via TTL interface either in serial mode or in parallel mode](#)

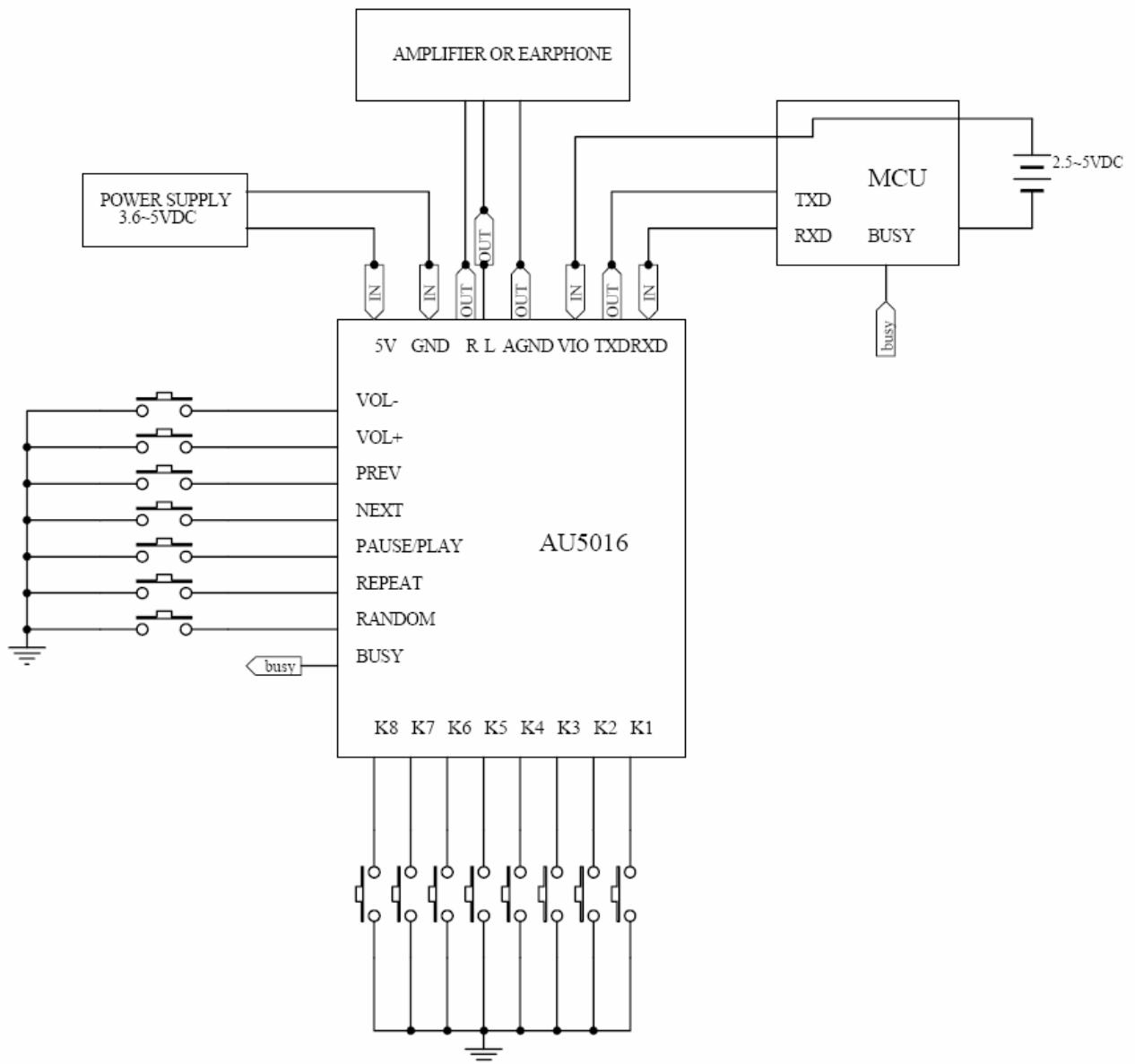


Top View

**Serial Control Mode via TTL interface**

In Serial mode, K1 to K8 are used as input pins for triggering track X001.mp3 to X008.mp3. (X is index number, selected by serial command 0xF1~0XF6.) For instance: If current index number is set to 1, K1 will trigger 1001.mp3, K2 will trigger 1002.mp3 and K8 will trigger 1008.mp3.

Typical operating circuit for serial mode:





**Baud Rate Format: baud rate + 8 data bits + parity of None + 1 stop bit (9600-8-N-1)**

**Control commands: (Hexadecimal format, one byte)**

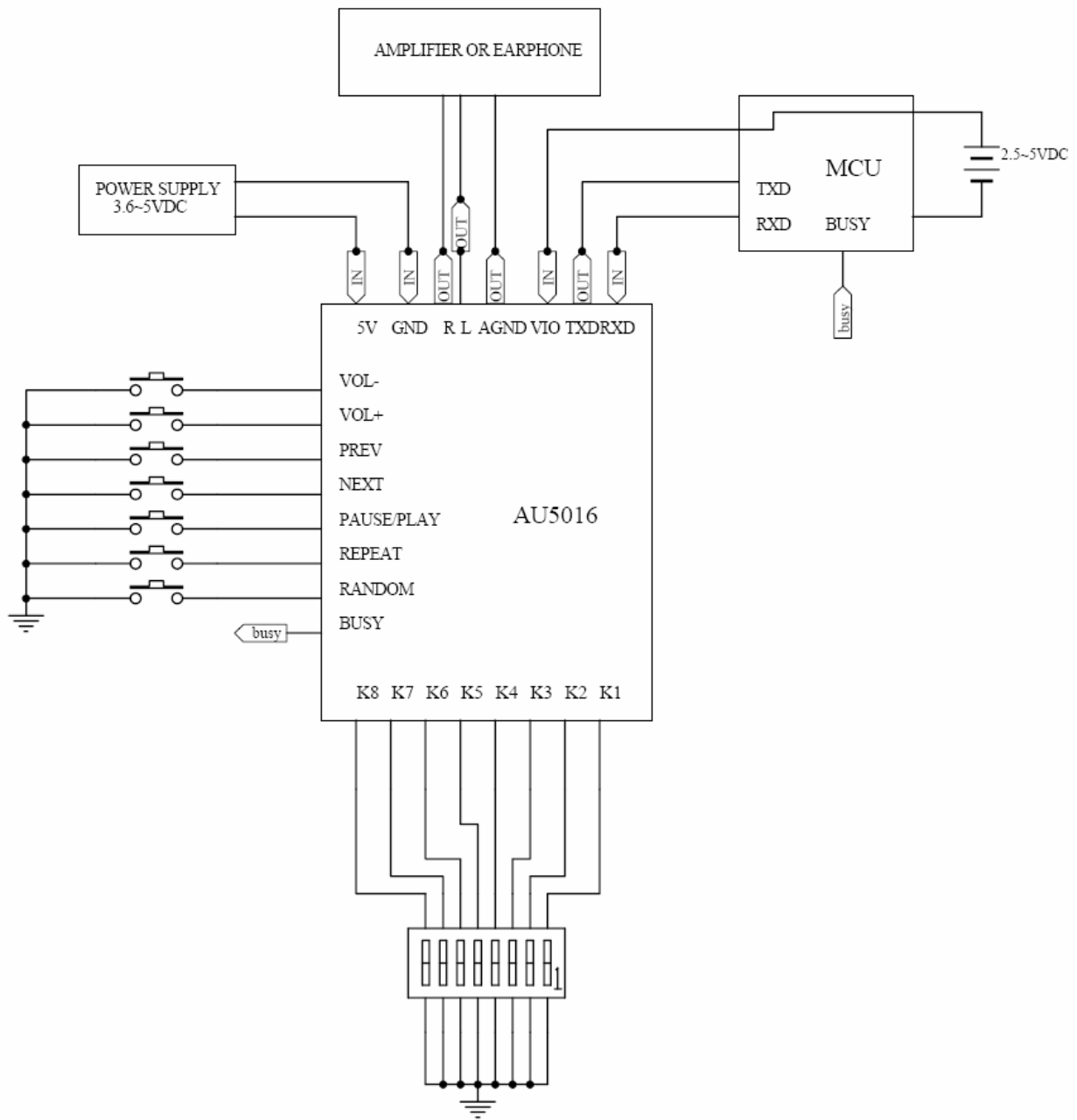
Command	Function	Return Code (HEX)
0x01~0xC8	Play track X001.mp3 ~ X200.mp3	0X XX (two bytes) 0X: Index number XX: Track number
0xD0	Set baud rate to 4800	0x00
0xD0	Set baud rate to 9600	0x01 (default)
0xD2	Set baud rate to 14400	0x02
0xD3	Set baud rate to 19200	0x03
0xD4	Set baud rate to 28800	0x04
0xD5	Set baud rate to 38400	0x05
0xD6	Set baud rate to 57600	0x06
0xD7	Set baud rate to 115200	0x07
0xE0	Repeat One or Repeat All	0x00: Repeat One 0x01: Repeat All
0xE1	After power on, it will play the 1001.mp3 automatically	0x00: Disable 0x01: Enable
0xE2	Continues to play	0x00: Disable 0x01: Enable
0xE3	Return total number of MP3 files	0x00~0xC8
0xE4	Previous	0x01~0xC8 or 0xFF (file not existed)
0xE5	Next	0x01~0xC8 or 0xFF (file not existed)
0xE6	EQ	
0xE7	Mute	
0xE8	Volume -	0x01~0x1E
0xE9	Volume +	0x01~0x1E
0xEA	Pause/Play	0x00: Pause 0x01: Play
0xEB	Random play	0x01~0xC8 or 0xFF (file not existed)
0xEC	Return total track time of current track	0xXX 0xXX (two bytes) First byte: Minute Second byte: Second

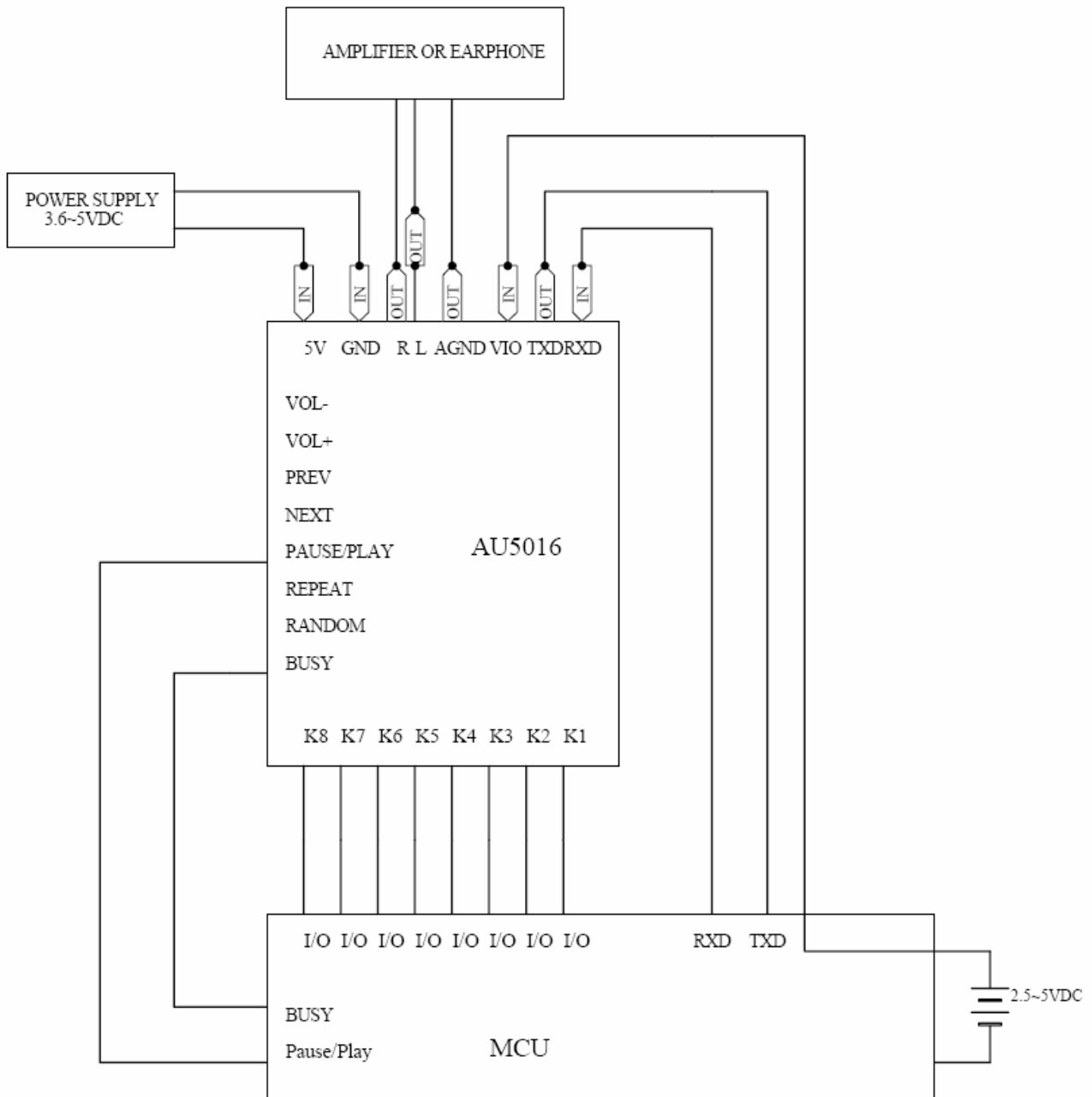
0xED	Return current time of track	0xXX 0xXX (two bytes) First byte: Minute Second byte: Second
0xEE	Fast Forward	
0xEF	Fast Backward	
0xFA	Stop	
0xFB	Change BUSY pin output status	0x00: Active high 0x01: Active low
0xF1	Select Index No. 1	0x01
0xF2	Select Index No. 2	0x02
0xF3	Select Index No. 3	0x03
0xF4	Select Index No. 4	0x04
0xF5	Select Index No. 5	0x05
0xF6	Select Index No. 6	0x06
0xFE	Save Current Index No. to Memory.	0x01~0x06

**Parallel Mode**

In Parallel mode, K1 to K8 are used as binary address input. To play a song you need to select the track number using binary inputs (K1~K8) and then simply giving a ground pulse on P/P pin.

Typical operating circuit for Parallel mode:





Binary	K8	K7	K6	K5	K4	K3	K2	K1	Track No.
1111 1110	NC	NC	NC	NC	NC	NC	NC	0	X001
1111 1101	NC	NC	NC	NC	NC	NC	0	NC	X002
1111 1100	NC	NC	NC	NC	NC	NC	0	0	X003
1111 1011	NC	NC	NC	NC	NC	0	NC	NC	X004
1111 1010	NC	NC	NC	NC	NC	0	NC	0	X005
1111 1001	NC	NC	NC	NC	NC	0	0	NC	X006
1111 1000	NC	NC	NC	NC	NC	0	0	0	X007
....	....	....	....	....	....	....	....	....	...
00110111	0	0	NC	NC	0	NC	NC	NC	X200

NC: NOT CONNECT

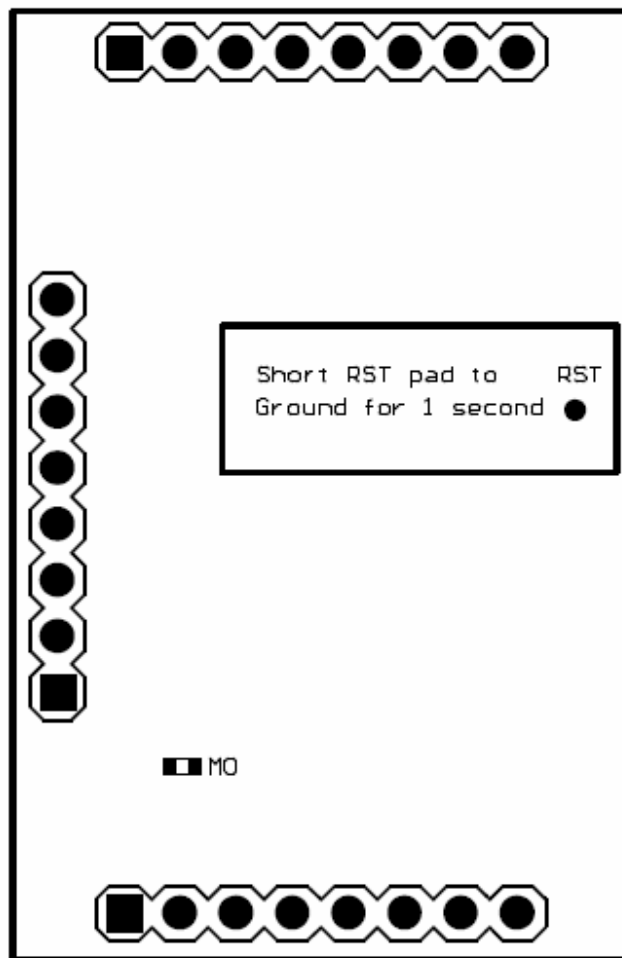
0: Connect to Ground

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### Reset to default setting

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To reset the AU5016 to its default setting, simply short the RST pad to ground for 1s. The ACT LED and BUSY LED should flash alternately.

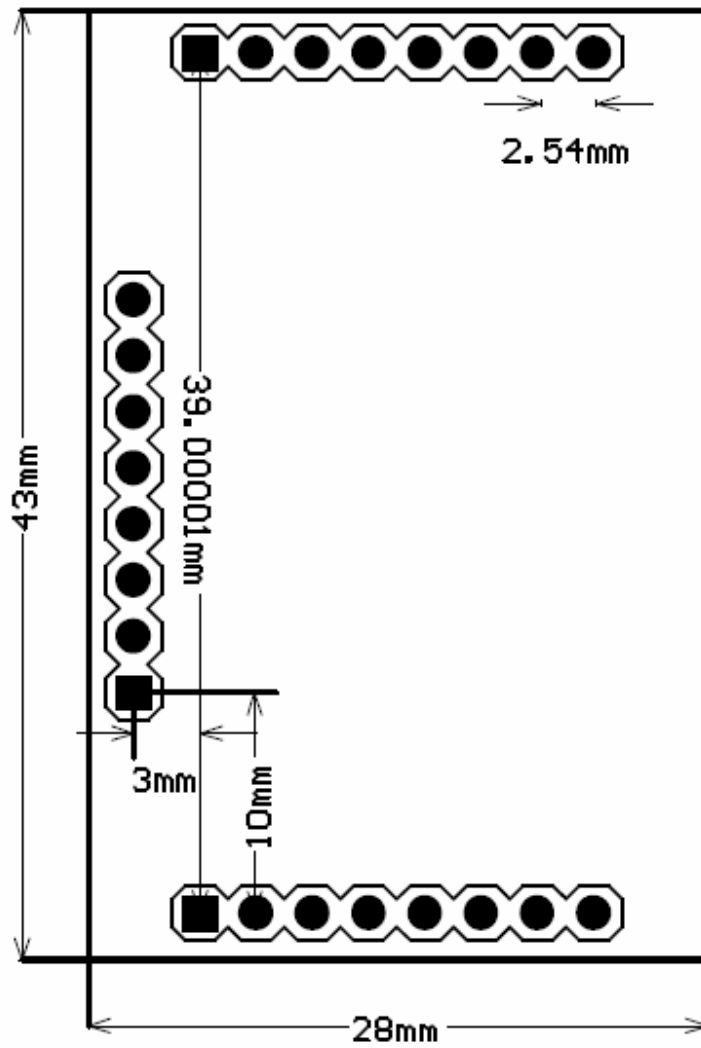


Top View

Default Setting Value:

1. Baud Rate: 9600
2. Disable Play\_After\_PowerOn
3. Disable Continues to play
4. Set index number to No. 1

**Dimensions**



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**Documentations**

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[1] Sample MP3 files #0~#9 (<http://mdfly.com/Download/Module/AU5016-SampleMus.rar>)



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**IMPORTANT NOTICE**

MDFLY reserve the right to make modifications, enhancements, improvements, corrections or other changes without further notice to any product herein.