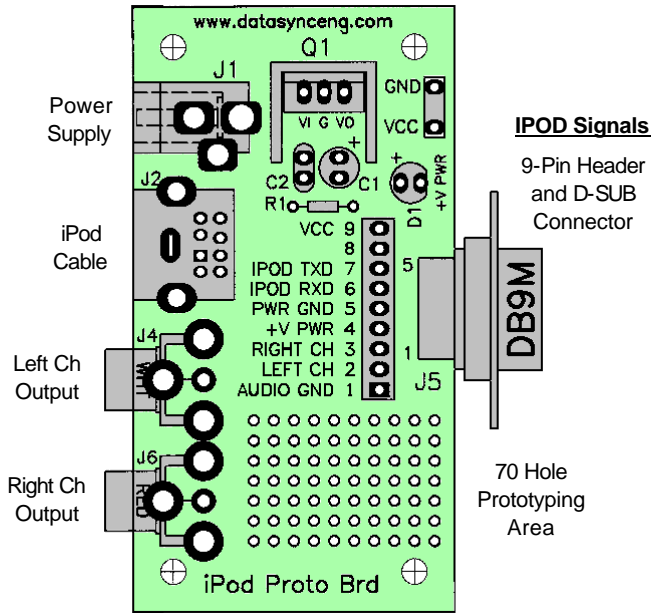


iPod® Prototyping Kit



The iPod Prototyping Kit provides designers and hobbyists with a connection platform that is used to evaluate and develop iPod accessories.

Easy access to the iPods audio, serial port interface and battery charging pins are available at J5, a 9pin header. Pads on the PCB also allow for an alternate 9pin male DSUB connector as well. The proto kit includes a DC power jack and 120VAC to 9VDC wall-mount power adapter (charges iPod). Also includes two RCA line-out jacks for external amplifier connections. The 30-Pin iPod connector cable is pre-wired with a 500K ohm Accessory resistor to enable serial port communications.

The proto board contains a VCC power supply output for external circuits. The iPods serial interface operates at 0 to 3.3-volts, therefore, the supplied Q1 regulator is 3.3-volts.

The serial port signals are active low (not inverted). You can connect directly to a microcontrollers serial port pins or a BASIC Stamp module. If your circuit is 5-volt powered, you will need to limit the iPods RXD high level to 3.3-volts.

IPOD SIGNALS (9-Pin Header and/or DSUB)

Pin #	Name	Signal Description
9	VCC	Vcc power output from on-board Q1 regulator.
8		Reserved. Connection to DIN J2 Pin 8.
7	IPOD TXD	Serial data output from iPod. 0 to 3.3-volt level.
6	IPOD RXD	Serial data input to iPod. 0 to 3.3-volt level.
5	PWR GND	Power supply ground.
4	+V PWR	9-VDC power supply input from AC adapter.
3	RIGHT CH	Right channel line-out audio. (Red RCA jack)
2	LEFT CH	Left channel line-out audio. (White RCA jack)
1	AUDIO GND	Line out audio common.

IPOD PROTO BOARD COMPONENT LIST

Des	Component Description
C1	Capacitor, 33uF, 16V, Aluminum Electrolytic
C2	Capacitor, 0.1uF, 50V, Mono Ceramic
D1	LED, 3mm, Red, Clear Lens (longer lead to plus sign marking)
J1	Connector, DC Power Jack, 2.1mm, PCB, center pin positive
J2	Connector, 8-Pin R/A shielded Mini Din receptacle
J4	Connector, RCA Phono Jack, WHITE, PCB Mount Right-Angle
J5	Connector, 9-Pin Straight Post Header, 0.100" Pin Spacing
J6	Connector, RCA Phono Jack, RED, PCB Mount Right-Angle
Q1	Regulator, 78RM33, LDO, 3.3-Volts, 500 mA, TO-220
R1	Resistor, 1K ohm, 5%, 1/8W (Brown Black Red Gold)



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Serial Command Strings

The iPods' 30-pin connector uses a serial port interface to pass command, status and data frames between the iPod and the controlling device. The serial port voltage level is 0 to 3.3-volts (not inverted RS-232). The format is 8N1, 8-data bits, no parity, 1-stop bit. The iPod detects the communication speed from the sync byte portion of the transmitted frame. Baud rates from 9600 to 57600 are supported but may be limited in early generation iPods. Mode 0 commands perform the switching between simple remote or advanced modes. Mode 2 commands are simple button commands such as play, pause, next & previous without any return data being received. Mode 4 commands offer advanced two-way communication such as requesting number of songs in a list, song name, playing time and status or jumping directly to a song within a list.

You can search the internet for [iPod advanced remote](#) to find more iPod command strings.

#1	#2	#3	#4	#5	#6	#7
0xFF	0x55	0x03	0x00	0x01	0x02	0xFA

Mode 0 Command - Switch to iPod Remote Mode

#1 FF Sync byte (autobaud)
 #2 55 Sync byte
 #3 03 Length (mode + # of command bytes to follow)
 #4 00 Mode (or Lingo)
 #5 01 Command byte 1
 #6 02 Command byte 2
 #7 FA Checksum (subtract from 00 starting with length byte)
 00 -03 -00 -01 -02 = FA

#1	#2	#3	#4	#5	#6	#7	#8
0xFF	0x55	0x04	0x02	0x00	0x00	0x01	0xF9

Mode 2 Command - Button = "PLAY"

#1 FF Sync byte (autobaud)
 #2 55 Sync byte
 #3 04 Length (mode + # of command bytes to follow)
 #4 02 Mode (or Lingo)
 #5 00 Command byte 1
 #6 00 Command byte 2
 #7 01 Command byte 3
 #8 F9 Checksum (subtract from 00 starting with length byte)
 00 -04 -02 -00 -00 -01 = F9

About 3 milliseconds after a button function command is sent, the button release command must be sent.

#1	#2	#3	#4	#5	#6	#7
0xFF	0x55	0x03	0x02	0x00	0x00	0xFB

Mode 2 Command - Button released

#1 FF Sync byte (autobaud)
 #2 55 Sync byte
 #3 03 Length (mode + # of command bytes to follow)
 #4 02 Mode (or Lingo)
 #5 00 Command byte 1
 #6 00 Command byte 2
 #7 FB Checksum (subtract from 00 starting with length byte)
 00 -03 -02 -00 -00 = FB

Summary of Mode 2 Button Command Strings (Don't forget to send "Button released" after command function)

Button Released	FF 55 03 02 00 00 FB	Next Playlist	FF 55 04 02 00 00 20 DA
Play/Pause (toggle)	FF 55 03 02 00 01 FA	Previous Playlist	FF 55 04 02 00 00 40 BA
Volume Up	FF 55 03 02 00 02 F9	Shuffle to next mode	FF 55 04 02 00 00 80 7A
Volume Down	FF 55 03 02 00 04 F7	Repeat to next mode	FF 55 05 02 00 00 00 01 F8
Next Track	FF 55 03 02 00 08 F3	Power On	FF 55 05 02 00 00 00 02 F7
Previous Track	FF 55 03 02 00 10 EB	Power Off	FF 55 05 02 00 00 00 04 F5
Next Album	FF 55 03 02 00 20 DB	Backlight	FF 55 05 02 00 00 00 08 F1
Previous Album	FF 55 03 02 00 40 BB	Begin FF (fast forward)	FF 55 05 02 00 00 00 10 E9
Stop	FF 55 03 02 00 80 7B	Begin FR (fast reverse)	FF 55 05 02 00 00 00 20 D9
Play	FF 55 04 02 00 00 01 F9	Menu Button	FF 55 05 02 00 00 00 40 B9
Pause	FF 55 04 02 00 00 02 F8	OK/Select Button	FF 55 05 02 00 00 00 80 79
Mute (toggle)	FF 55 04 02 00 00 04 F6	Scroll Up (menu)	FF 55 06 02 00 00 00 00 01 F7
Next Chapter	FF 55 04 02 00 00 08 F2	Scroll Down (menu)	FF 55 06 02 00 00 00 00 02 F6
Previous Chapter	FF 55 04 02 00 00 10 EA		