

MFi Component Guide

R23

August 29, 2011

The availability & specifications of components described in this document is subject to change without notice. Licensees must submit a product plan and have it approved by the MFi Licensing Department prior to committing to a design that requires a specific component that is listed in this or other documents.

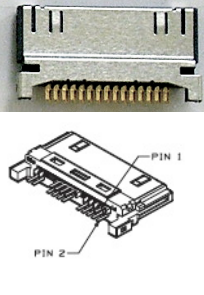
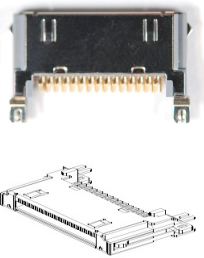
Connectors

Connector drawings are found in the iPod Connectors ZIP archive in the MFi Portal. RoHS information for connectors can be found on Avnet's MFi website. If you have questions about accessing the MFi section of the Avnet website, please contact the MFi Licensing Department by sending an email to MadeforiPod@apple.com.

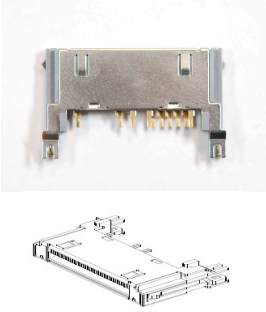
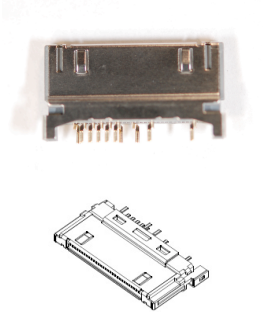
The connector drawings & images are not intended to be your only means to understand the applications of these connectors; Apple recommends that licensees purchase samples of all of the connectors from Avnet, so that they can be examined and referred to during research and development of new products.

These connectors must not be the sole or main point of support for an iPod, iPhone, or iPad. Accessories must use the universal dock & dock adapter approach to provide support, or, alternatively, must implement another means (other than the connector) to provide support to an iPod, iPhone, or iPad.

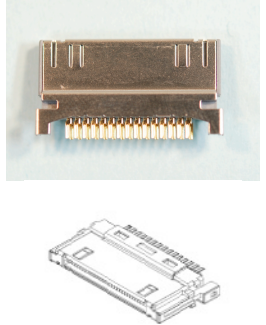
Mid-plane plugs

Description	Primary Usage	Avnet Part #	Image
30 Pin I/O plug, mid-plane <u>Associated metal shells sold separately</u>	A 30-pin plug. This plug should be used with products that require a metal shell around the connector (for shielding) or with products that do not require latching pins (friction or detent). This plug is designed so that the pins on the connector will straddle both sides of a PCB and is not designed for surface mount solutions. Commonly used with products that have electronics right in the plug that plugs into the iPod. Designed for use with the MFI805-6462 & MFI805-6463 shells (which provide an passive/friction latching mechanism). <i>Note: Only 16 pins are present in this connector. See the connector drawing for details.</i>	MFI512S0011	
30 Pin I/O plug, mid-plane, with friction latches <u>There are no metal shells used with this connector</u>	A 30-pin plug with friction latches. This plug is designed so that the pins on the connector will straddle both sides of a PCB. Commonly used with products that have electronics within the connector's housing. This plug should be used with products where a metal shell around the connector is not desired or supported, but does require friction latching pins.	MFI512S0017	

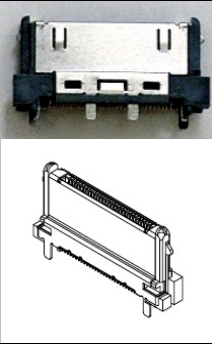
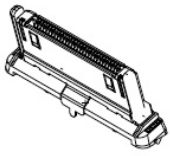
Power Only plugs

<p>'Power Only' 30 Pin I/O plug, 10 contact, mid-plane, with friction latches</p> <p><u>There are no metal shells used with this connector</u></p>	<p>For use in 'Power Only' products. A 30-pin plug with friction latches. This plug is designed so that the pins on the connector will straddle both sides of a PCB.</p> <p>This plug should be used with products where a metal shell around the connector is not desired or supported, but do require friction latching pins.</p> <p><i>Note: Only 10 pins are present in this connector. See the connector drawing for details.</i></p>	<p>MFi514S0164</p>	
<p>'Power Only' 30 Pin I/O plug, 10 contact, cable end</p> <p><u>Associated metal shells sold separately</u></p>	<p>For use in 'Power Only' products.</p> <p>A 30-pin plug. Designed to be soldered to the end of a cable. Should be used with cable assemblies, where the connector cannot be unplugged unless the user presses release buttons on the side of the connector housing. This connector has solder tail pins, and is not suitable for mounting onto a PCB.</p> <p>Designed for use with the MFi870-1281 & MFi870-1282 shells (which provide an active latch mechanism).</p> <p><i>Note: Only 10 pins are present in this connector. See the connector drawing for details.</i></p>	<p>MFi517-0595</p>	

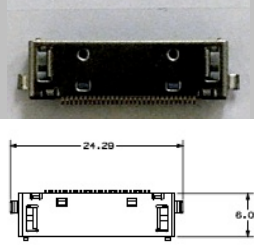
Cable End (Solder-tail) plug

<p>30 Pin I/O plug, cable end</p> <p><u>Associated metal shells sold separately</u></p>	<p>A 30-pin plug. Designed to be soldered to the end of a cable. Should be used with cable assemblies, where the connector cannot be unplugged unless the user presses release buttons on the side of the connector housing. This connector has solder tail pins, and is not suitable for mounting onto a PCB.</p> <p>Designed for use with the MFi870-1281 & MFi870-1282 shells (which provide an active latch mechanism).</p>	<p>MFi517-0433</p>	
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Dock plugs


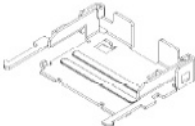
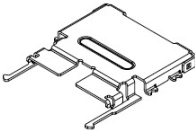

30 Pin I/O dock plug, vertical (SMT)	A 30-pin dock plug. This plug is used in products where the iPod needs to sit vertically (perpendicular to the PCB), such as battery packs.	MF1514S0084	
30 Pin I/O dock plug, with support tab. Designed for use with products that support the universal dock technology.	A 30-pin dock plug, angled 15 degrees off vertical, with a support tab. The plastics in this connector were designed to accept the plastic sleeve and adapters used with the universal dock.	MF1514S0117	

Receptacle

30 Pin I/O receptacle	<p>A 30--pin receptacle.</p> <p>This receptacle is only available in sample quantities, and is only for use in manufacturing and R&D test fixtures. It is not available for use in production/shipping products.</p>	MF1514S0037	
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Note: With the exception of the 'power only' connectors and the MF1512S0011, 30-pin connectors have all 30 contacts present.

Connector Shells

Description	Primary Usage	Avnet Part #	Image
Top shell for MFI517-0433 and 517-0595-01 (Detent Latch)	<p>Used in combination with MFI870-1282</p> <p>This component includes latch 'fingers' that hold the connector into the iPod. Users are required to press detent buttons on the side of the connector to disconnect the accessory.</p> <p>Not a plastic over-mold or shell. Helps shield against EMI.</p>	MFI870-1281	
Bottom shell for MFI517-0433 and 517-0595-01 (Detent Latch)	<p>Used in combination with MFI870-1281</p>	MFI870-1282	
Top shell for MFI512S0011 (Friction Latch)	<p>Used in combination with MFI805-6463.</p> <p>This component includes latch 'fingers' that hold the connector into the iPod. Users are <i>not</i> required to press detent buttons on the side of the connector to disconnect the accessory.</p> <p>Not a plastic over-mold or shell. Helps shield against EMI.</p>	MFI805-6462	
Bottom Shell for MFI512S0011 (Friction Latch)	<p>Used in combination with MFI805-6462.</p>	MFI805-6463	

Discontinued Connectors

Some connectors are no longer available for new products. Below is a list of possible alternatives for discontinued (end-of-life) connectors. Please note that the currently available connectors are not interchangeable with the discontinued connectors and design changes are required in order to use them. It is strongly recommended that the drawings for the currently available connectors be reviewed, and samples of the currently available connectors obtained, before changing to the alternate connectors. There may be valid reasons in particular circumstances to ignore this recommendation, but their full implications must be understood and carefully weighed before choosing to do so.

Discontinued Connector	Alternate Connector
MF1514S0043 – 30 Pin I/O plug (SMT)	MF1514S0117
MF1514S0098 – 30 Pin I/O plug, angled tall (SMT), for use with universal dock	MF1514S0117
MF1512S0120 – 30 Pin I/O plug, mid-plane, with latches, short (no shell)	MF1512S0017

A - receptacle is not available for use in production products. Licensees are prohibited from using unlicensed components, including a 30-pin receptacle, in their products.

Automotive Plug & Cable Kits

Plug kits are only available to automotive head unit & car radio manufacturers. A plug kit contains plug connector, shell, lock, hood A and B, clamp and bushing.

Description	Avnet Part #
White plug cover. Cable diameter of 5.0mm	MFIDD1P030MAD
Black plug cover. Cable diameter of 5.0mm	MFIDD1P030MA2
Black plug cover. Cable diameter of 6.0mm	MFIDD1P030MA5
Black plug cover. Cable diameter of 7.0mm	MFIDD1P030MA6

Headphone Remote and Microphone System Chips

A Headphone Remote and Microphone system product requires the use of an Apple designed transmitter chip. There are two classes of transmitter chips available:

- Noise occluding – used with noise canceling/noise occluding earphones, headsets or headphones. ‘Noise occluding’ refers to the situation where outside noises cannot be heard by the person wearing the headset/headphones, regardless of whether the outside noise is suppressed in non-active way, due to a form fitting earphone in the ear itself, or through the use of noise canceling electronics.
- Non-noise occluding – used with headsets or headphones which do not occlude or cancel external noise, and with iPod shuffle remote control adapters.

Part Number	Usage
MFI353S2429	MFi noise-occluding headphones
MFI353S2430	MFi non-noise occluding headphones

Microphone

A Headphone Remote and Microphone system product requires the use of an Apple designated microphone from Knowles.

Apple Part Number	Knowles Part Number
MFI731-0130*	SPQ-2409-HE5H-PB**

* The MFI731-0130 part number may change in the future to MFI731-0136. This is a record keeping issue only, and the actual part remains unchanged.

** Earlier versions of the iPod Accessory Protocol Std Spec document incorrectly indicated that the Knowles Part Number was SPQ-0409-HE5. The correct Knowles part number is SPQ-2409-HE5H-PB, and the specification has been revised to show the correct part number.

Authentication Coprocessors

RoHS information for the authentication coprocessors can be found on Avnet’s MFi website. If you have questions about accessing the MFi section of the Avnet website, please contact the MFi Licensing Department (MadeforiPod@apple.com).

Authentication Coprocessor V2.0C

Recommended for use in new products.

For automotive & non-automotive use with all Apple devices. iPhone will not display the interference warning alert. All Authentication Coprocessor 2.0C parts are Class 6, regardless of whether the part is used for automotive or non-automotive purposes.

A development board (MFISP000918596) containing an Authentication Coprocessor V2.0C part (MFI337S3959) from Avnet. This board is only available in sample quantities for the prototyping and development purposes; it is not available in production quantities.

Authentication Coprocessor V2.0B

Not recommend for use in new products.

For iPod only – iPhone will display the warning alert.

Class 1 – For automotive use only. Deprecated – Not for use in new products. Enables all authenticated features.

For iPod & iPhone – iPhone will not display the interference warning alert

Class 4 – For automotive & non-automotive use. Enables all authenticated features

Class 6 – For non-automotive use only. Deprecated – Not for use in new products. Enables all authenticated features

Please read the Authentication Coprocessor specifications for details on interfacing to, and communicating with, 2.0B & 2.0C parts.

The Class 6 2.0B (MFI341S2164) is deprecated and should not be used in new products. The Class 4 2.0B (MFI341S2162) part is electrically and physically identical to the Class 6 part. If an accessory currently uses the MFI341S2164, then no design charges are required in order for this accessory to use the MFI341S2162.

Types of Authentication Coprocessors

	2.0B STD	2.0B WTR	2.0C
Size	4.2 mm x 4.2 mm	4.2 mm x 4.2 mm	2.5 mm x 2.5 mm
Package	QFN-20	SOP-8	PG-USON-8-1
Pins	20	8	8

Authentication Coprocessor V2.0C part numbers

Class	2.0C Samples & Production
Class 6 (auto & non-auto)	MFI337S3959

Authentication Coprocessors by part number

Part Number	Type	Class	Package	Mfg.	Auto/Non-Auto	Product certification
MFI341S2162	2.0B STD	Class 4	QFN-20	Renesas	Auto & non-Auto	Made for iPod, Made for iPhone & Made for iPad
MFI341S2313	2.0B WTR	Class 4	SOP-8	Renesas	Auto & non-Auto	Made for iPod, Made for iPhone & Made for iPad
MFI341S2164	2.0B STD	Class 6	QFN-20	Renesas	Non-Auto Only	Made for iPod, Made for iPhone & Made for iPad
MFI337S3959	2.0C	Class 6	PG-USON-8-1	N/A	Auto & non-Auto	Made for iPod, Made for iPhone & Made for iPad

Discontinued & Deprecated Authentication Coprocessors

The following authentication coprocessor information is provided for legacy purposes. Products that are already in production may continue to use the discontinued or deprecated authentication coprocessors only if the product was previously approved by the MFi Licensing Department. Unless specifically approved by the MFi Licensing Department, new MFi accessories *may not* use Authentication 1.0 or 2.0A coprocessors.

	1.0	2.0A	2.0B STD
Size	6mm x 6mm	6mm x 6mm	4.2mm x 4.2mm
Package	QFN-40	QFN-40	QFN-20
Pins	40	40	20
External Oscillator	Required	Required	Not Required
Discontinued & Deprecated Classes	All	All	1, 2, 3, 5 & 6

- Authentication Coprocessor V1.0 and Authentication Coprocessor V2.0A parts are not available for use in new accessories.
- All new accessories must use V2.0B Authentication Coprocessors. Existing products should be transitioned to Class 4 2.0B or
- Class 2, 3 & Class 5 Authentication Coprocessors are not available for use in new products. Classes 1 & 6 must not be used in new products without prior approval from the MFi Licensing Department.

Discontinued V2.0A Authentication Coprocessors

Class	2.0A Samples	2.0A Production
Class 1 (auto)	MFI341S1962	MFI341S2094
Class 2 (non-auto)	MFI341S1963	MFI341S2095
Class 3 (non-auto)	MFI341S2150	MFI341S2154
Class 4 (auto)	MFI341S2307	MFI341S2307
Class 5 (non-auto)	MFI341S2152	MFI341S2156
Class 6 (non-auto)	MFI341S2153	MFI341S2157

Deprecated V2.0B Authentication Coprocessors

Part Number	Type	Class	Package	Mfg.	Auto/Non-Auto	Product certification
MFI341S2159	2.0B STD	Class 1	QFN-20	Renesas	Auto Only	Made for iPod only
MFI341S2164	2.0B STD	Class 6	QFN-20	Renesas	Non-Auto Only	Made for iPod, Made for iPhone & Made for iPad

Deprecated Authentication Coprocessors must not be used in new products without prior approval from the MFi Licensing Department.

Discontinued V2.0B Authentication Coprocessors

Part Number	Type	Class	Package	Mfg.	Auto/Non-Auto	Product certification
MFI341S2160	2.0B STD	Class 2	QFN-20	Renesas	Non-Auto Only	Made for iPod only
MFI341S2161	2.0B STD	Class 3	QFN-20	Renesas	Non-Auto Only	Made for iPod only
MFI341S2646	2.0BV2 STD	Class 3	QFN-20	Renesas	Non-Auto Only	Made for iPod only
MFI341S2163	2.0B STD	Class 5	QFN-20	Renesas	Non-Auto Only	Made for iPod, Made for iPhone & Made for iPad

Discontinued Authentication Coprocessors are not available for use in new products.

Date	Revision	Comments
2011-06-6	R22	Added Auth 2.0C Deprecated Class 1 & Class 3 Authentication Coprocessors. Although still available, these components may only be used in new accessories with the approval of the MFi Licensing Department.
2010-09-10	R21	Revised comment about MFI512S0011 to indicate that the metal shells used with this connector provide a passive (friction) latching mechanism rather than an active latching mechanism. Revised comment about MFI517-0433 to indicate that the metal shells used with this connector provide an active (detent) latching mechanism rather than a passive latching mechanism. Deprecated Class 3 2.0B (MFI341S2161), replaced by Class 3 2.0BV2 (MFI341S2646)
2010-01-15	R20	Added comment that new products must use the Authentication 2.0B coprocessors.