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Mobile Computing Promotion Consortium

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Analog Headset Extension for USB Connector

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Revision History

Date	Version	Description
June 11,2010	1.00	Base version initial release.
November 11,2010	1.00(E)	English translated version release.

Notice

This guideline is English translated version of MCPC TR-014 Japanese version. Though all contents including technical definitions and values are covered by this document, original technical definitions and values shall be in MCPC TR-014 Japanese version.

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How we distinguish binary, decimal and hexadecimal numbers

- For binary numbers, we append small letter "b" (e.g. 10b))
- For binary numbers, we insert a space after every four bits. (e.g. 1000 0101 0010b)
- For hexadecimal numbers, we append small letter "h" (e.g. FFFFh and 80h)
- All other numbers shall be considered to be written in decimal

Key Words

- "May" means that something is recommended or optional at the free discretion of the vendor.
- "Should" means that although something is not essential, it is strongly recommended. When implementing, the vendor shall take this requirement into consideration and determine whether this is essential or not.
- "Shall" means that something is an essential requirement. For connectivity and specification compliance, the feature must be implemented, and is mandatory.

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- In general "Inc.," "Corporation," "Co., Ltd.," have been excluded from company names.

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1. Overview

This guideline describes the Analog headset interface via micro USB connector (receptacle connector, type B or AB at the handset) for both mobile handsets and accessory devices (i.e. Earphones with/without Mic).

The Guidelines contain a set of recommendations, and implementation of those functions and values described in this document into the handset are optional.

2. References

[USB2.0]	USB-IF, Universal Serial Bus Specification: Revision 2.0, April 27, 2000
[USB-OTG]	USB-IF, On-The-Go and Embedded Host Supplement to the USB Revision 2.0 Specification: Revision 2.0, May 8, 2009
[USB-BC]	USB-IF, Battery Charging Specification: Revision 1.1, April 15, 2009

3. PIN Assignment

Pin assignments for each mode are shown in **Table 1**. The circuit diagram and its parameter are shown in **Figure 1** and **Table 2** respectively.
When a call button is implemented on an accessory device, **Rcsw** shall be placed in series to the call button.
Each operation mode shall be identified with summary resistance value of **R$_{FSEL}$** and **Rcsw**

Note: Call button -- Button to answer/end a call with some button press actions (ex; Tap (brief press) or Hold (long press) actions)

Table 1 Pin Assignment

	Mode 1 Stereo Earphone with Mic	Mode 2 Monaural Earphone with Mic	Reserved for device maintenance	Reserved
V$_{BUS}$	N.C. MIC [1]	N.C. MIC [1]		
D-	EAR_L	EAR_(L+R)		
D+	EAR_R	N.C.		
ID	R$_{CSW}$ / R$_{FSEL1}$+R$_{CSW}$ [2]	R$_{CSW}$ / R$_{FSEL2}$+R$_{CSW}$ [2]	R$_{IDm}$ [3]	R$_{IDr}$ [3]
GND	GND			

*1) Vbus remains open when Mic is not implemented on the accessory device
*2) When the call button is pressed, the resistance from the ID pin to GND is Rcsw
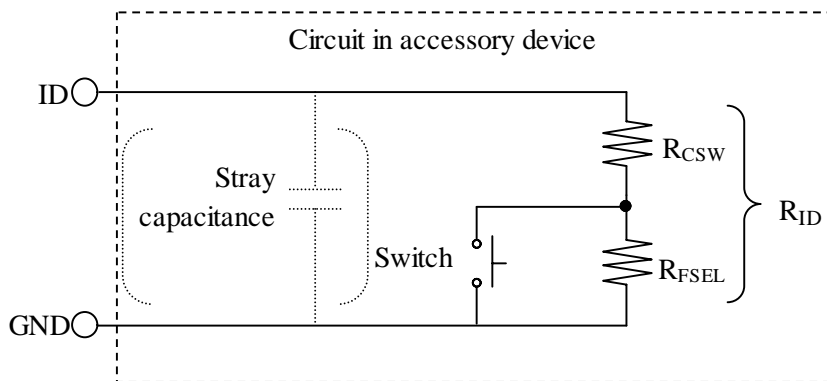*3) These values shall not be used for other purposes

Figure 1 Equivalent circuit for USB ID pin

Table 2 Resistance parameters

	Resistance [Ω]
R_{CSW}	47k ±5%
R_{FSEL1}	240k ±5%
R_{FSEL2}	750k ±5%
R_{IDm}	180k ±5%
R_{IDr}	390k ±5%

To allow the mobile handset to distinguish Tap or Hold of Call button (Switch), the stray capacitance between ID pin and GND (refer to **Figure 1**) should be less than 1nF.

4. Examples of Accessory devices

4.1 [Mode 1] Stereo Earphone with Mic

Implementation of Mic and/or Call button is optional.
In the configuration of **Figure 3**, when a Monaural earphone is connected into its φ3.5mm audio jack, the R_{ID} ($R_{FSEL}+R_{CSW}$) and operation mode may not be changed from **[Mode 1]**.
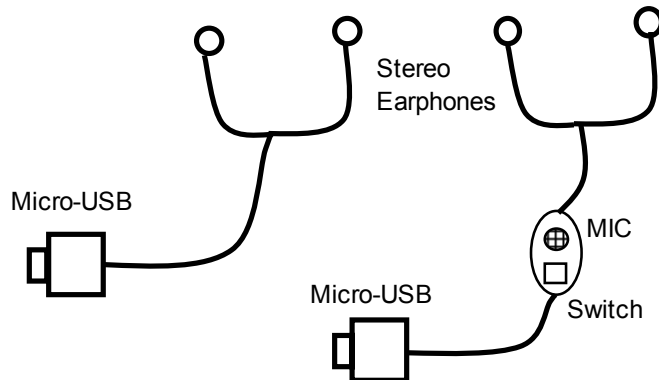
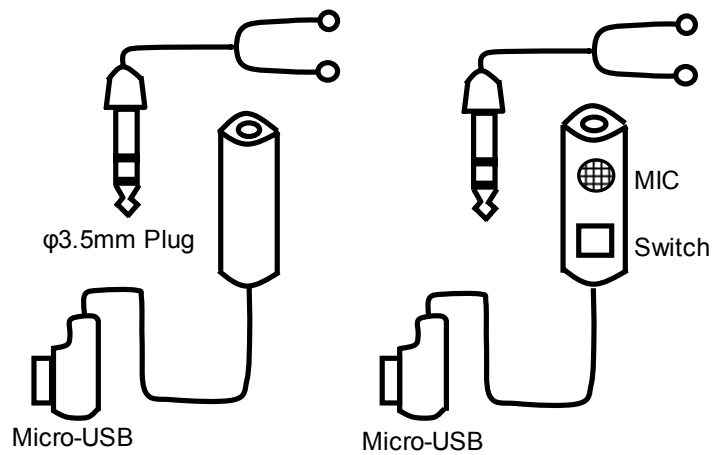**Figure 2 Example for Stereo Earphone (with Mic) with micro USB connector**

Figure 3 Example for Stereo Earphone (φ3.5mm) - USB adapter

4.2 [Mode 2] Monaural Earphone with Mic

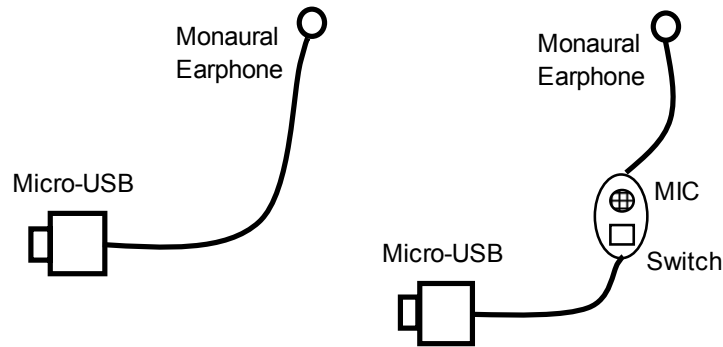Implementation of Mic and/or Call button is optional.

Figure 4 Example for Monaural Earphone (with Mic) with micro USB connector

5. Notice for implementation

5.1 Notice for Mobile Handsets

The mobile handsets should also take safety precautions into account as it may also have a battery charger connected through the Micro-USB connector.

With the Accessory Charger Adapter (ACA) defined in **[USB-BC]**, in some condition, the register value of the ID pin may conflict with some mode described in this document. We recommend that developers take care when designing mobile terminals and consider the implications that ACA may have.

5.2 Notice for Accessory devices

When connecting an accessory which implements Mic in Vbus pin and a mobile terminal that adheres to **[USB-OTG]**, which is not supported in this document, if the call button is held down on the mobile terminal, the mobile terminal might output 5V on Vbus pin. Accessory developers shall take this into account when designing the accessory for this case.

Appendix A. Charging Extension Mode

A.1 Pin Assignment

In addition to the audio connection described in **Table 1**, when the charging function is supported, Charging Extension Mode is defined for that purpose. Pin definitions for Charging Extension Mode and their values are shown in **Table 3** and **Table 4** respectively.

In Charging Extension Mode, the Mic pin is reassigned for charging. If the handset supports Charging Extension Mode, suppressing the noise from the Mic pin should be considered.

Table 3 Pin Assignment for Charging Extension Mode

	Mode 1a Stereo Earphone and Charging	Mode 2a Monaural Earphone and Charging	Mode 3 Charging capable Monaural Earphone with Mic
V_BUS	**V_BUS**	**V_BUS**	**V_BUS**
D-	EAR_L	EAR_(L+R)	EAR_(L+R)
D+	EAR_R	N.C.	MIC
ID	R_{CSW} / $R_{FSEL1}+R_{CSW}$ [*1]	R_{CSW} / $R_{FSEL2}+R_{CSW}$ [*1]	R_{CSW} / $R_{FSEL3}+R_{CSW}$ [*1]
GND	**GND**		

*1) When the call button is pressed, the resistance from the ID pin to GND is Rcsw (see **Figure 1**)

Table 4 Resistance parameters for Charging Extension Mode

	Resistance [Ω]
R_{FSEL3}	**510k ±5%**

A.2 Examples of Accessory devices

A.2.1 [Mode 1a] Charging capable Stereo Earphone Adapter

Implementation of Call button is optional. The Mic cannot be implemented into the adapter.
Pin assignment of this adapter is the same as **[Mode 1]**, and when the charging power is supplied from AC Adapter etc, and output to the USB connector, it shall use **[Mode 1a]** pin assignment.
Although a Monaural earphone is connected into its φ3.5mm audio jack, the R_{ID}(R_{FSEL}+R_{CSW}) and operation mode may not be changed from **[Mode 1]** or **[Mode1a]**.
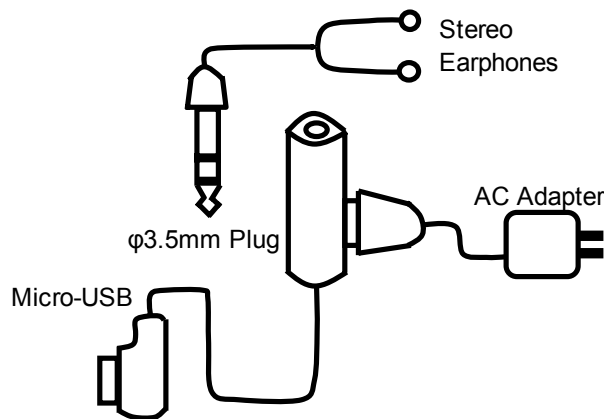

Figure 5 Example for Stereo Earphone(φ3.5mm) - USB converter (Charging Extension Mode)

A.2.2 [Mode 3] Charging capable Monaural Earphone with Mic Adapter

Implementation of Mic and/or Call button is optional.
The operation mode of this adapter is always **[Mode 3]** whether it is charging or not.
Even if a Stereo earphone is connected into its φ3.5mm audio jack, the R_{ID} (R_{FSEL}+R_{CSW}) and operation mode may not be changed from **[Mode 3]**.
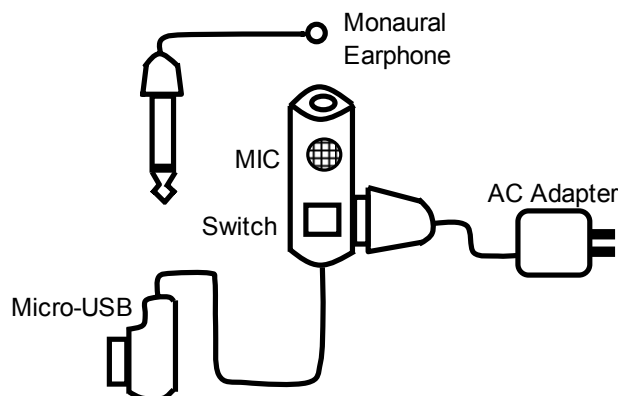

Figure 6 Example for Monaural Earphone (φ3.5mm) - USB converter (Charging Extension Mode)