Wired Audio Headset Specification (v1.1)

This section specifies requirements for headsets and mobile devices to function uniformly across the Android ecosystem.

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Headset accessory (plug) specifications

The following requirements apply to headset accessories.

Functions

Function	Accessory Support
Stereo Audio Out	Required
Audio in (Mic)	Required
Ground	Required

Control-function mapping

Control Function	Accessory Support	Description
Function A	Required	Play/pause/hook (Short Press), Trigger Assist (Long Press), Next (Double Press)
Function B	Optional	Vol+
Function C	Optional	Vol-
Function D	Optional	Reserved (Nexus devices use this to launch Voice Assist)

Assign functions to buttons as follows:

- All one-button headsets must implement Function A.
- Headsets with multiple buttons must implement functions according to the following pattern:
  - 2 functions: A and D
  - 3 functions: A, B, C
  - 4 functions: A, B, C, D

Mechanical

Function	Accessory Support	Notes
4 conductor 3.5mm plug	Required	Ref: EIAJ-RC5325A standard
CTIA pinout order (LRGM)	Required	Except in regions with legal requirements for OMTP pinout
OMTP pinout order (LRMG)	Optional	
Microphone	Required	Must not be obstructed when operating headset controls

Electrical

Function	Accessory Support	Description
Ear speaker impedance	16 ohms or higher	Recommend 32 - 300 ohms

Mic DC resistance	1000 ohms or higher	Mic characteristics must be compliant with section 5.4 “Audio Recording” of the current Android CDD
Control Function Equivalent impedance*	0 ohm	[Function A] Play/Pause/Hook
	240 ohm +/- 1% resistance	[Function B]
	470 ohm +/- 1% resistance	[Function C]
	135 ohm +/- 1% resistance	[Function D]

**Total impedance from positive mic terminal to GND when button is pressed with 2.2 V mic bias applied through 2.2 kOhm resistor*

In the following diagrams, Button A maps to Function A, Button B to Function B, and so on.

Reference headset test circuits

The following diagram for Reference Headset Test Circuit 1 shows the CTIA pinout for a 4-segment plug. For the OMTP pinout, switch the positions of the MIC and GND segments.

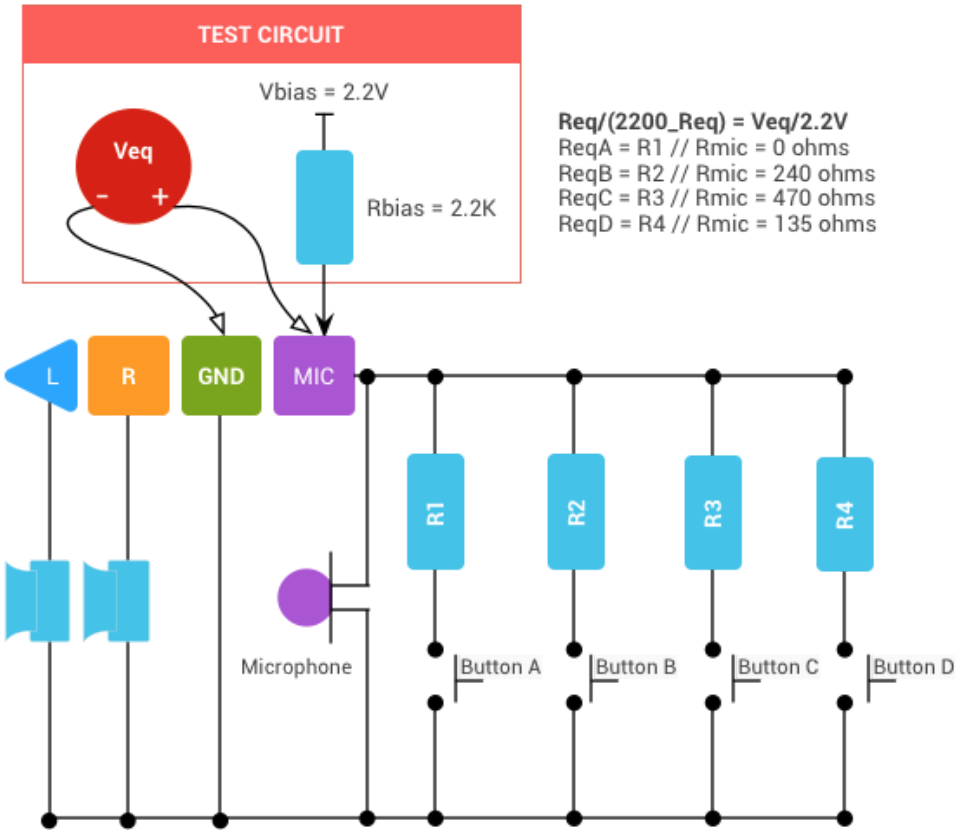

Figure 1. Reference headset test circuit 1

The following diagram for Reference Headset Test Circuit 2 shows how the actual resistor values (R1 - R4) are altered to meet this specification.

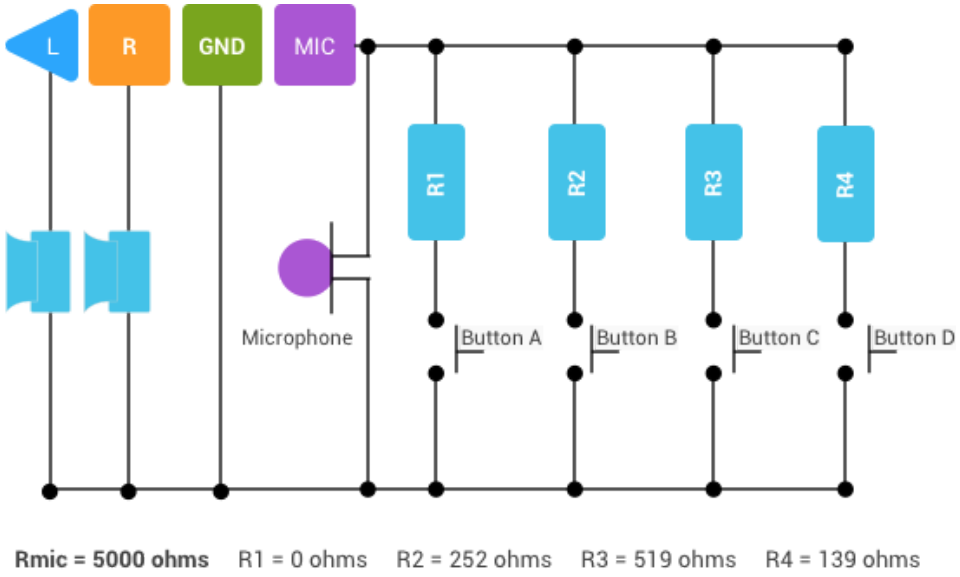

Figure 2. Reference headset test circuit 2

The actual resistance of the buttons parallel with the microphone (R1-R4) is based on the microphone capsule resistance (Rmic) and the equivalent impedance values (ReqA-ReqD). Use the following formula:

*Rn=(Rmic*ReqN) / (ReqN-Rmic)*

Where R*n* is the actual resistance of a button, Req*N* is the equivalent impedance value of that button (provided), and Rmic is the microphone impedance value.

The example above assumes a 5 kohm microphone impedance (Rmic); to achieve an equivalent R4 impedance of 135 ohm (ReqD), the actual resistor value (R4) must be 139 ohms.

Mobile device (jack) specifications

Caution: To achieve compatibility with the headset specification, devices that include a 4 conductor 3.5mm audio jack must meet the following specifications. For Android compatibility requirements, refer to the *Analog audio ports* section of the Android CDD (/compatibility/android-cdd.pdf).

Functions

Function	Device Support
Stereo Audio Out	Required
Audio in (Mic)	Required
Ground	Required

Software mapping

Function	Device Support	Description
Function A control event	Required	input event KEY_MEDIA Android key KEYCODE_HEADSETHOOK input event KEY_VOICECOMMAND

Function D control event	Required	Android key KEYCODE_VOICE_ASSIST
Function B control event	Required	input event KEY_VOLUMEUP Android key VOLUME_UP
Function C control event	Required	input event KEY_VOLUMEDOWN Android key VOLUME_DOWN
Headset insertion detection	Required	input event SW_JACK_PHYSICAL_INSERT 7
Headset type detection	Mic	input event SW_MICROPHONE_INSERT 4
	No Mic	input event SW_HEADPHONE_INSERT 2
Headset speaker impedance	Required Headphone (low)	Failure mode is to indicate headphones so limitation would be on
	Required Line In (high)	input event SW_LINEOUT_INSERT 6

Mechanical

Function	Device Support	Description
4 conductor 3.5mm jack	Required	
CTIA pinout order (LRGM)	Required	3 Pin & Mono Plug Compatible
OMTP pinout order (LRMG)	Optional but strongly recommended	
Headset detect sequence	Required	Plug insert notification must be triggered only after all contacts on plug are touching their relevant segments (this prevents unreliable headset detection due to slow insertion.

Electrical

General

Function	Notes
Maximum output voltage drive	>= 150mV on 32 ohm
Mic bias resistance	Test conditions: EN50332-2 Flexible on detection method used and microphone bias resistor selection. Require that all button resistance value ranges specified below be detected and related to their respective function
Mic bias voltage	To guarantee compatibility to common microphone capsules.

Interfaces

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1.8V - 2.9V

Function impedance and threshold detection

Devices must detect the following resistor ladder on the accessories. The accessories will be tested to the standardized circuit diagram in the diagram illustrated earlier (Reference Headset Test Circuit) where the total impedance is measured from MIC terminal to GND when a button is pressed with 2.2V mic bias applied through 2.2 kOhm resistor. This is the same effective resistance as the button detection circuit with the microphone in parallel with the button resistor.

Button Impedance Level	Device Support	Notes
70 ohm or less	Required	[Function A]
110 - 180 ohm	Required	[Function D]
210 - 290 ohm	Required	[Function B]
360 - 680 ohm	Required	[Function C]

Headset Speaker Impedance Level	Device Support	Notes
Low Threshold Detection	Required	Headphone (low) < 1 Kohm
High Threshold Detection	Required	Line In (high) > 5 Kohm

4-Segment Plug Detection Resistance (between 3rd and 4th segment)	Device Support	Notes
4-Segment Plug Threshold	Required	Resistance >= 100 ohms
3-Segment Plug Threshold	Required	Resistance < 100 ohms