



## Product Requirements

Model No:  
Outlaw

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Prepared by:	Approved by:
HyperX	

Revision  
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### REVISION AND UPDATES

REV	ECN NO. ECN	DESCRIPTION	DATE	BY
A	---	<ul style="list-style-type: none"><li>▪ Initial</li></ul>	2023/12/11	
B	---	<ul style="list-style-type: none"><li>▪ Update Block diagram</li><li>▪ Update Battery spec</li><li>▪ Headset remove BT-only mode</li><li>▪ Update acoustic test item</li><li>▪ Update the pkg concept</li><li>▪ Update the DAC key feeling spec</li><li>▪ Update the ME BOM list</li></ul>	2024/01/30	
C	---	Update compliance requirement Mic – boom ID change Update Block diagram Update ME part list Update Package	2024/7/31	

Product Name: Outlaw

Product Description: Dual   wireless headset

**Commented [WL1]:** Noting that we have been referring to 'Dual Mode' as 2.4 GHz and Bluetooth headset that cannot simultaneously mix audio. Outlaw will have simultaneous dual wireless. If there is no confusion with this then no issue

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## 1 GENERAL:

Description	Product Requirement
Main Features	<ul style="list-style-type: none"><li>• Updated ID Design</li><li>• Superior Sound Stage &amp; Precise Imaging</li><li>• Premium Diaphragm Material</li><li>• Improved Microphone</li><li>• Earcup Audio Controls</li><li>• Detachable Cable</li><li>• Improved Comfort</li><li>• Customizable Components</li><li>• NGENUITY Customization</li><li>• DAC/AMP</li></ul>
Retail Box Content	<ul style="list-style-type: none"><li>• Headset</li><li>• Detachable Mic</li><li>• Detachable Cables</li><li>• DAC/AMP</li><li>• Travel Bag</li><li>• QSG</li></ul>
System Compatibility	<ul style="list-style-type: none"><li><input checked="" type="checkbox"/> PC/Windows 10 OS</li><li><input checked="" type="checkbox"/> Xbox Series S &amp; Series X (Wired Only)</li><li><input checked="" type="checkbox"/> Xbox One (Wired Only)</li><li><input checked="" type="checkbox"/> PS4 &amp; PS4 Pro</li><li><input checked="" type="checkbox"/> PS5</li><li><input checked="" type="checkbox"/> Nintendo Switch</li><li><input checked="" type="checkbox"/> Steam Deck</li><li><input checked="" type="checkbox"/> Mobile Device (Bluetooth)</li><li><input checked="" type="checkbox"/> Mac OS (basic keyboard functionality, stored lighting setting)</li><li><input checked="" type="checkbox"/> Other: Ngenuity 2.0 Software using Win10 support</li></ul>
Warranty	2-Year Warranty

Commented [WL2]: Added to align with Packaging section

Commented [SY3]: @Lew, Wesley As the meeting before, please help to remove the Steam Deck from the table.

Commented [WL4]: Added to align with Compatibility section



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## 2 Project Core Team

Function	Name
Product Manager	Wesley Lew
Product Launch Manager (FV)	Grace Chin
Product Launch Manager (FE)	Anita Lo
Mechanical Engineer	Bruce Ho
Acoustic Engineer	Jacky Hsu
Electrical Engineer	Steve Chen
Firmware Engineer	Sam Yang
Software Engineer	Jerry Chan
Validation Engineer	David Ko
ID	Key L.
Packaging Engineer	Fion Chou
Sourcing	Chile Wang / Ming Yi Tsai
Quality Engineer	Linda Yu
NPS	Jay Huang
Reliability Test	Jally Huang

## 3 ACOUSTIC REQUIREMENT:

### 3.1 Speaker Driver Spec

Driver vendor	TRANSOUND
Driver P/N	TSK-Y5308-064N02-HF
Sensitivity	
THD	<2%, 200~3.4KHz, 1mW
Impedance	64Ω±15%
Power (Rated/Maximum)	30mW/750mW



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Frequency response (IEC-318 High Leak):TBD

### 3.2 Mic Unit Spec for Voice Mic and Second Mic

Unit vendor	Knowles																			
Unit P/N	SPV61A0LR5H-1																			
Supply Voltage	2.3 - 3.6 V																			
Current Consumption	180uA																			
Sensitivity	-40±1 dBV/Pa																			
SNR	66 dBV/Pa (f=1KHz, S.P.L=1Pa, A-Weighted curve).																			
AOP (THD: 1%/10%)	130/132dB SPL																			
Diameter	<table border="1"> <thead> <tr> <th>Item</th> <th>Dimension</th> <th>Tolerance</th> </tr> </thead> <tbody> <tr> <td>Length (L)</td> <td>2.75</td> <td>±0.10</td> </tr> <tr> <td>Width (W)</td> <td>1.85</td> <td>±0.10</td> </tr> <tr> <td>Height (H)</td> <td>0.90</td> <td>±0.10</td> </tr> <tr> <td>Acoustic Port (AP)</td> <td>Ø0.25</td> <td>±0.05</td> </tr> <tr> <td>PCB Thickness (T)</td> <td>0.285</td> <td>+0.035, -0.035</td> </tr> </tbody> </table>		Item	Dimension	Tolerance	Length (L)	2.75	±0.10	Width (W)	1.85	±0.10	Height (H)	0.90	±0.10	Acoustic Port (AP)	Ø0.25	±0.05	PCB Thickness (T)	0.285	+0.035, -0.035
Item	Dimension	Tolerance																		
Length (L)	2.75	±0.10																		
Width (W)	1.85	±0.10																		
Height (H)	0.90	±0.10																		
Acoustic Port (AP)	Ø0.25	±0.05																		
PCB Thickness (T)	0.285	+0.035, -0.035																		
Note: .																				

### 3.3 Mic Unit Spec for Mic boom

Unit vendor	Gettop	
Unit P/N	BUM1045L-n422AC	
Supply Voltage	1.0 – 5.0 V	
Current Consumption	400uA	
Sensitivity	-42±2 dBV/Pa	
SNR	65 dBV/Pa (f=1KHz, S.P.L=1Pa, A-Weighted curve).	
AOP (THD: 1%/10%)	94/115dB SPL	



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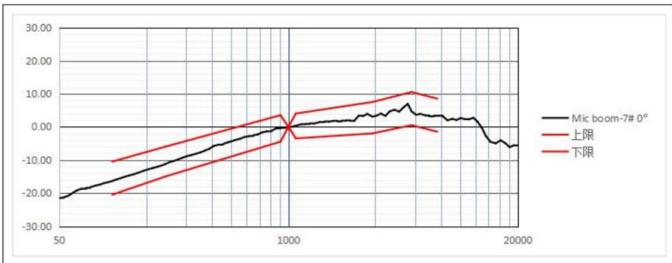
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Frequency response: 50cm far field test, Octave=1/12oct, Curve Smoothing=off



### 3.4 Product Level performance

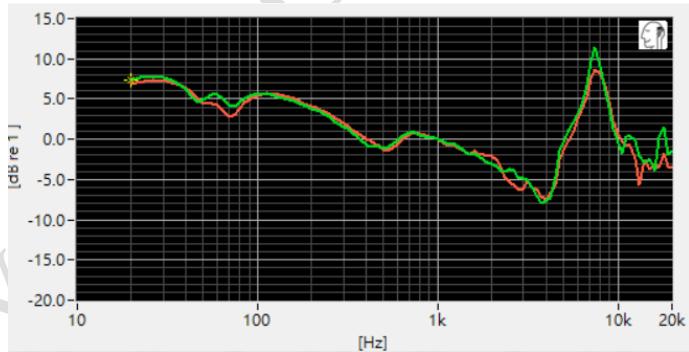
#### 1.1.1 Receive Path

##### 1.1.1.1 Passive wired mode

Test Equipment	GRAS45CA-3, with SoundCheck
Sensitivity	TBD ±3dB SPL at 1kHz Input 1mW
THD	<2% from 100Hz to 2.8KHz

Frequency Response: 20Hz - 20k Hz, 1/12 octave. (Aligned 1kHz limits)

HX will provide sound sample to ODM for reference.



##### 1.1.1.2 Wireless mode

Test Equipment	GRAS 45CA-3, with SoundCheck
Sensitivity	TBD ±3dB SPL at 1kHz
THD	<2% from 100 to 2.8KHz



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Frequency Response: 20Hz - 20k Hz, 1/12 octave. (Aligned 1kHz limits)

Will Define Until DVT

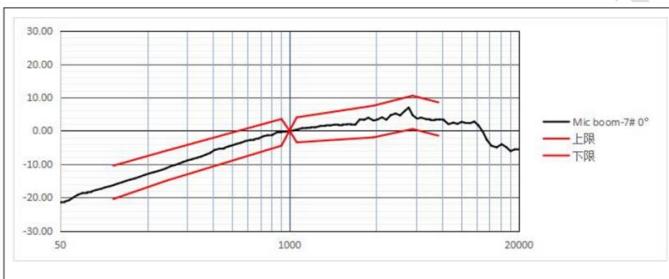
Note:

### 1.1.2 Transmit Path

#### 1.1.2.1 Passive wired mode – Microphone boom

Test Equipment	1 Pa at 50cm in free field test
Sensitivity	-40 dBV at 1kHz (1Pa @ 50cm in free field)

Frequency Response:

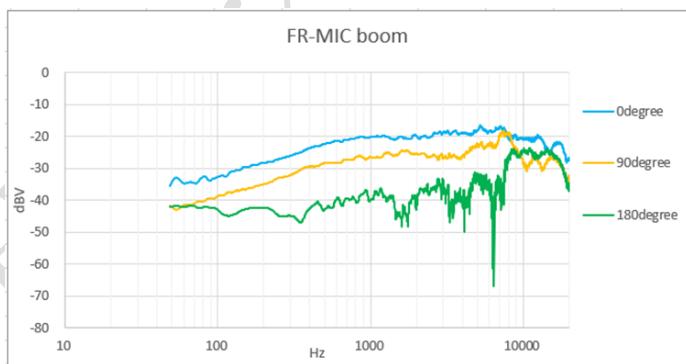


#### 1.1.2.2 Wireless mode

##### 1.1.2.2.1 Microphone boom

Test Equipment	1 Pa at 50cm in free field test
Sensitivity	-20 dBFS at 1kHz (1Pa @ 50cm in free field)

Frequency Response:



##### 1.1.2.2.2 Internal voice microphone

Test Equipment	B&K HATS 5128, with SoundCheck
Sensitivity	Main mic & second mic -13 dBFS at 1kHz (1Pa @ MRP)



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Frequency Response:

TBD

Voice Quality (Test Equipment: ACQUA)	3Quest noBGN:  G-MOS ≥ 4.0 N-MOS ≥ 4.0 S-MOS ≥ 4.0  3Quest Mensa:  G-MOS ≥ 3.5 N-MOS ≥ 3.5 S-MOS ≥ 3.5  3Quest CallCenter:  G-MOS ≥ 3.0 N-MOS ≥ 3.0 S-MOS ≥ 3.0  3Quest VoiceDistr:  G-MOS ≥ 3.0 N-MOS ≥ 3.0 S-MOS ≥ 3.0
Microphone sealing (Included ANC and Voice Mic)	> 20dB from 100 to 8KHz  Microphone sealing = Mic sensitivity – Mic sensitivity that sealed the mic hole  For voice mic and feed-forward mic

### 1.1.3 Other Acoustic Performance Requirement

Headphone assembly acoustic test																																			
Crosstalk (L & R channel)	> 65dB@1KHz, at max vol. for wireless mode, >40dB for wired mode																																		
Headphone LR difference	<table border="1"><thead><tr><th>Frequency</th><th>50</th><th>100</th><th>101</th><th>2500</th><th>2501</th><th>6300</th><th>6301</th><th>10000</th></tr></thead><tbody><tr><td>Upper limit</td><td>4</td><td>4</td><td>3</td><td>3</td><td>8</td><td>8</td><td>13</td><td>13</td></tr><tr><td>Lover limit</td><td>-4</td><td>-4</td><td>-3</td><td>-3</td><td>-8</td><td>-8</td><td>-13</td><td>-13</td></tr></tbody></table>								Frequency	50	100	101	2500	2501	6300	6301	10000	Upper limit	4	4	3	3	8	8	13	13	Lover limit	-4	-4	-3	-3	-8	-8	-13	-13
Frequency	50	100	101	2500	2501	6300	6301	10000																											
Upper limit	4	4	3	3	8	8	13	13																											
Lover limit	-4	-4	-3	-3	-8	-8	-13	-13																											
Headphone EN50332	95~97 dBA																																		
Echo Cancellation	Compatible with TEAMS standard																																		
Side tone	Compatible with TEAMS standard																																		
Idle noise	Compatible with TEAMS standard																																		
Double talk	Compatible with TEAMS standard																																		
Latency	Compatible with TEAMS standard																																		
DAC 2.4G &BT mode, headphone electrical test																																			
Mic boom input	Sensitivity: -14dBFS (test with Mic input -40dBV, max vol.) THD:<0.5%@100~10kHz (test with Mic input -40dBV, max vol.)																																		
Crosstalk (L & R channel)	> 60dB@1KHz, at max vol, with dummy load 33 Ohms.																																		
Crosstalk (SPK to Mic boom)	> 80dB@1KHz, at max vol. for wireless mode																																		
Crosstalk (SPK to internal Mic)	> 80dB@1KHz, at max vol. for wireless mode																																		



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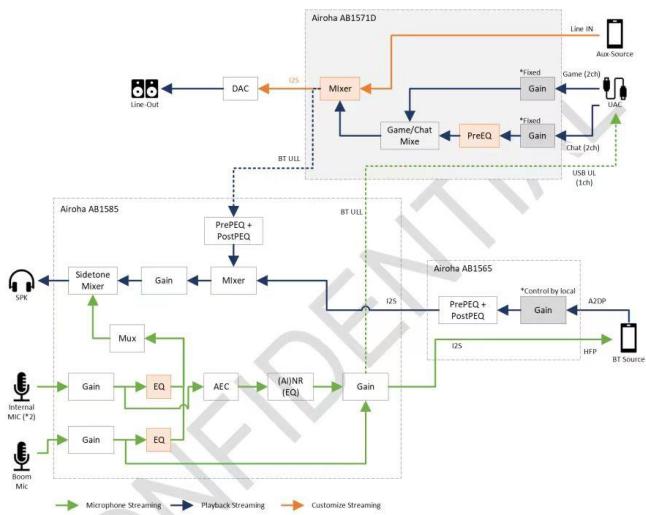
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Sidetone level	Default volume:-24dBV at SPK output (test with Mic input -40dBV)
<b>DAC USB to Line out, electrical test</b>	
FR	20Hz~20kHz
THD	THD < 0.05%@20~20kHz/input 0dBFS, max vol.
Sensitivity	Max.: -3dBV
Noise level	Noise Level <-100dBV@1kHz, A-weighted., max vol.
SNR	SNR: ≥90dB (at 1kHz/0dBFS, A-weighting).
<b>DAC USB Line in to Line out, electrical test</b>	
Gain	
Noise level	Noise Level <-100dBV@1kHz, A-weighted., max vol.

### 1.1.4 Audio block diagram and corresponding user scenarios



- When BOOM MIC is inserted, AEC and AINR are interrupted.
- When BOOM MIC is inserted, Internal Mic is off.
- Internal Mic only works when active models.

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#### 4 Accessories:

- 4.1 Detachable Mic Boom
- 4.2 Adapter- USB type C Female to USB type A Male
- 4.3 Charging cable / data transmission cable- USB Type C to Type C

##### For headset Charging

- 4.3.1 CORD LENGTH: 0.5m.
- 4.3.2 DIAMETER: D=3.7mm
- 4.3.3 COLOR: Black TPE 75A, non-Braided.
- 4.3.4 MOLDING: Black, TPE 80A
- 4.3.5 MEMORY FACTOR: Please advise your standard as proposal.

##### For PC to DAC Charging

- 4.3.6 CORD LENGTH: 1.5m.
- 4.3.7 DIAMETER: D=3.7mm
- 4.3.8 COLOR: Black TPE 75A, non-Braided.
- 4.3.9 MOLDING: Black, TPE 80A
- 4.3.10 MEMORY FACTOR: Please advise your standard as proposal.

#### 4.4 Audio cable / 3.5 plug to 3.5 plug

- 4.4.1 CORD LENGTH: 1.5m.
- 4.4.2 DIAMETER: D=4mm
- 4.4.3 COLOR: Black TPE 75A, Braided.
- 4.4.4 MOLDING: Black, TPE 80A
- 4.4.5 MEMORY FACTOR: Please advise your standard as proposal.

#### 5 WEIGHT:

##### 5.1 Headset:

ASSEMBLY, cable excluded: Less than 330 +/- 10g (target)



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### 5.2 DAC:

ASSEMBLY, cable excluded: Less than 180 +/- 10g (target)

## 6 Acceptance criteria

6.1 Traceability Requirement: Refer to HWC-QACI-018

6.2 Shipping requirement: Refer to HWC-IES-001.002

6.3 Label requirement: Refer to HWC-MES-001

6.4 Production QA gate: Refer to vendor PMP. **To be confirmed**

### 6.5 Defect definition:

Defect of Cri:

The main features of products can't meet the quality requirement and have potential hazard on human safety and health.

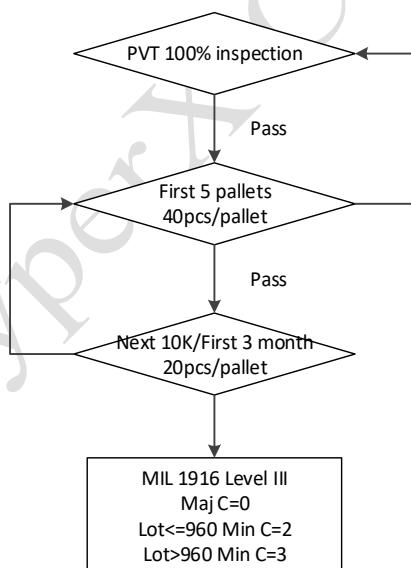
Defect of Maj:

The main features of products can't meet the quality requirement and can't work normally.

Defect of Min:

The general features of products can't meet the quality requirement, but it doesn't affect the normal operation.

### 6.6 Sampling plan:



PVT stage: 100% function and visual inspection

NPI stage:



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- First 5 pallets: 40pcs/pallet
- Next 10K/First 3 month: 20pcs/pallet

MP stage: MIL 1916 Level III

**6.7 S Inspection Instruction:** Refer to Product inspection instruction or vendor OQC SIP.

**To be confirmed**

**6.8 Visual inspection criteria:** Refer to vendor VI spec. **To be confirmed**

## 7 RELIABILITY REQUIREMENT:

**7.1 According to HYPERX PRODUCT VALIDATION PLAN** HWC-MDEF-001.002, HWC-MDEF-001.001.

**7.2 HyperX QA will define test items/samples for PVT build.**



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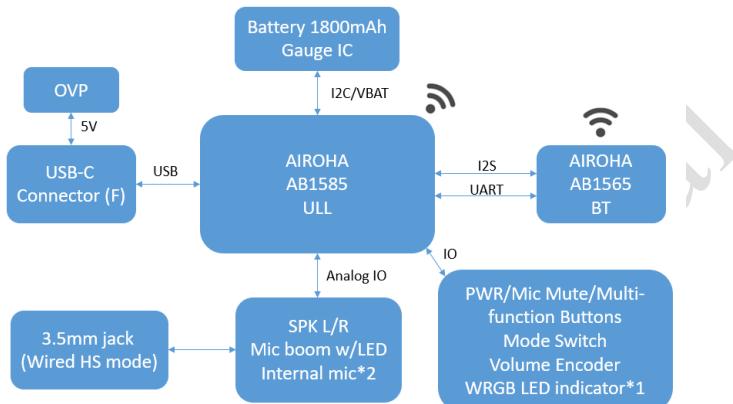
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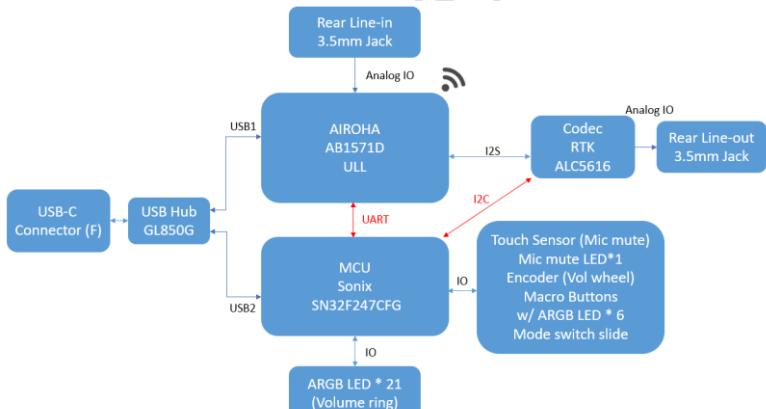
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## 8 Block DIAGRAM: (for reference)

### Headset



### Dongle(DAC)



## 9 ESD/EMI Requirement:

	Criteria	Remark
Electrostatic Discharge (ESD)		
Air Discharge	+/-12 KV	
Contact Discharge	+/- 8 KV	
EMI	CISPR 22 levels + 4dB margin	



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## 10 Compatibility

Feature	Remark	
System Compatibility	<input checked="" type="checkbox"/> PC/Windows 10+ [Full Function]	
	<input checked="" type="checkbox"/> Xbox Series S & Series X [Wired 3.5mm]	
	<input checked="" type="checkbox"/> Xbox One, Xbox One S/X [Wired 3.5mm]	
	<input checked="" type="checkbox"/> PS5 [Latest Firmware, ULL & Wired 3.5mm]	
	<input checked="" type="checkbox"/> PS4 & PS4 Pro [Latest Firmware, ULL & Wired 3.5mm]	
	<input checked="" type="checkbox"/> Nintendo Switch [Compatible]	
	<input checked="" type="checkbox"/> Mobile [Bluetooth]	
	<input checked="" type="checkbox"/> Mac OS [Compatible]	
	<input checked="" type="checkbox"/> Chromebook [Compatible]	
	<input checked="" type="checkbox"/> Steamdeck [Compatible]	
Application Compatibility	HyperX NGENUITY Gaming Software (Windows), Discord, TeamSpeak	

## 11 Electrical Specification

### Headset

Feature	Remark
Main Chipset Solution	Airoha AB1585(ULL)+ Airoha AB1565 (BT)
20m Wireless Range	Open field testing in all angles (0°, 90°, 180°, and 270°)
250 Hours Battery Life	Could hit up to 250 hours with defined scenario. By 50% volume configured and continued music streaming with "Batterylife.mp3" under ULL mode.
Battery information	Need to hit up to 250 hours battery life. Suggest using 1,800mAh Battery w/ connector (with breaker protection) Meet HP BDR requirement
Battery Gauge	Gauge IC: <b>CW2215</b> , or equivalent. Battery level monitoring with 1% granularity.
Power Button	Power on/off HS
LED Indicator*1	WRGB LED to indicate headset status.
USB-C Connector (Female)	Type-C, 5V/500mA max with data pins



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OVP (Over Voltage Protection)	Protect USB input up to 20V and system clamp at 6.5V max
Detachable Mic Boom	4 pole mic boom with mute red LED indicator on mic boom. Mic Mute LED only supports Wireless mode.
Internal Microphone*2	2 pcs analog internal microphone
Mic Mute Control Button	By mic mute button toggle mic mute/unmute and shows the corresponding status on mic mute LED.
Multi-function Button (on R-earcup)	Multi-function button
2 mode slide switches (on R-earcup)	<b>2 stage switches to toggle ULL only / Dual mode (Simultaneous-Audio Mixing)</b>
Volume Control (on R-earcup)	By encoder
Charging time	Reach out fully charged within 6 hours by USB charging. < 0°C & > 45°C need to stop charging
Charging Temperature Protection	(Recommend setting 3°C as low temp threshold & 42°C as high temp threshold) Detachable 3.5mm Analog Audio and Mic Cable
3.5mm Line In (Wired HS mode)	- When audio signal inputs 3.5mm Line In, system power turns off. - Only mic boom is workable.
3.5mm to 3.5mm cable	Analog pass through 3.5mm to 3.5mm cable PCB Halogen Free; Need to have "HF" logo on all PCBs.
PCB	Chlorine< 900 ppm; Bromine< 900 ppm; Total Chlorine and Bromine< 1500 ppm

## Dongle(DAC)

Feature	Remark
Chip Solution	Airoha AB1571D
USB-C Connector (Female)	Type-C, 5V/500mA max with data pins
MCU chip solution	Sonix SN32F247CFG for extra I/O pins support
Touch sensor	Toggle mic mute/unmute and shows the corresponding status on mic mute LED.
Mic mute LED	Red LED*1 for mic mute status
Volume Control	Adjust by encoder
Volume Ring LED indicator	ARGB*21 pcs to show the corresponding volume bar
Macro buttons w/ RGB LEDs*6	6 macro buttons with ARGB LEDs (SW can assign)
Output Slide Switch	Switches between wireless audio output / Line-out

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3.5mm Line-in jack Input stereo analog signal mix with USB audio

3.5mm Line-out jack      Output stereo analog signal (for external speaker)

PCB Halogen Free; Need to have "HF" logo on all PCBs.

PCB Chlorine< 900 ppm; Bromine< 900 ppm;

Total Chlorine and Bromine< 1500 ppm

12 RF Specification

Feature	Criteria	Remarks
Conducted TX Power	$8 \pm 2\text{dBm}$	On H/M/L channels
Conducted Power Difference	< 2dBm	Power difference between H/M/L channels
Harmonic	< -35dBm	On 2nd and 3rd harmonic and pass compliance requirement
Conducted RX Sensitivity	< $-96 \pm 2\text{ dBm}$	On H/M/L channels (Refer to Airoha IC spec.)
Antenna Efficiency	> 45%	On H/M/L channels in free space
Transmitting Range	> 20 Meters (ULL mode)	- Open field testing with clear music streaming in all angles (0°, 90°, 180°, and 270°)



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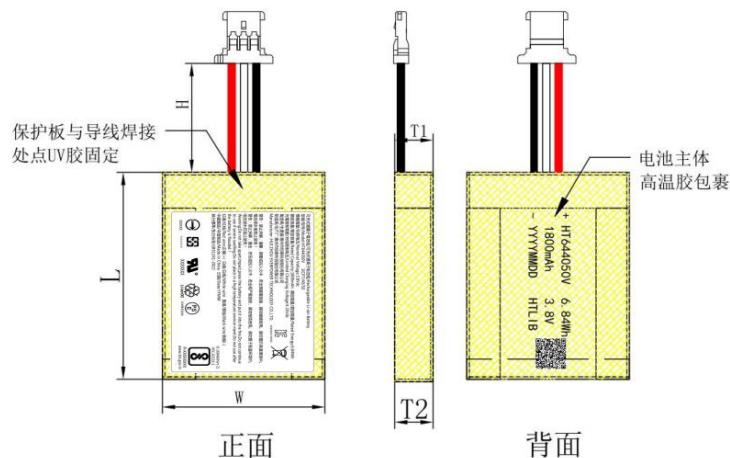
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### 13 Battery Specification

Feature	Remark
Nominal Voltage	3.8V
Rated capacity	1,800mAh
Maximum Charging Current	0°C~15°C : 0.2 C 15°C~45°C : 0.56 C
Recommendation Charging Current	0.2 C
Recommendation Discharging Current	0.2 C
Maximum Discharging Current	0.56 C
Limited charging voltage	4.35V
Discharge cut-off voltage	3.0V
Life cycles	500 cycles, >80% capacity

Battery Dimension(reference):



Length 长度 L(mm)	Wide 宽度 W(mm)	Head 厚度 头部厚度 T1(mm)	Thickness 厚度 T2(mm) (含标签)	Thickness after 500 cycles 500 周循环厚度(mm) (含标签、胶纸)	Conductor length 导线长度 H (mm)
51±1	39.5±0.5	6.9max	6.1±0.3	6.9max	30±3

### PCM Specification

Feature	Remark
OCV	4.4V
ODV	3.0V



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ODC	3 A
Breaker	With breaker protection(OT77C-20N)
Current consumption operation mode	4.0uA
Current consumption power-down mode	0.5uA



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## 14 Firmware Features

### 14.1 Firmware Behavior and Requirement

Feature	Remark
DAC Basic Function	<p><b>USB</b></p> <p>The DAC should be able to enumerate three audio devices to the host PC. Two playback devices (Game and Chat channel) node and one microphone node. DAC also needs to support transfer the command from the host PC to headset via 2.4GHz.</p> <p><b>Audio</b></p> <p>The output streaming should include USB down streaming (Game/Chat) and line-in streaming if connected.</p> <p><b>Lighting</b></p> <p>All the LEDs on the DAC need to support HID command control and save one lighting profile on DAC.</p>
DAC Mode Select	DAC should support the local and 2.4GHz modes to transfer the audio streaming from the host PC to the headset. The mode should be able to be selected by the slider on the DAC.
DAC Audio I/O	There are two AUX port on the DAC. One is for audio streaming input which need to mix with USB streaming from USB host. Another is for audio output need to support external headset or speaker when slider switch to the local mode.
Headset Mode Select	Headset should support 2.4GHz mode and dual mode (Audio Mixing / Simultaneously). The mode should be able to select by the slider on the headset.
Headset 2.4GHz Mode	<p><b>Headset</b></p> <p>The headset should be able to receive the audio streaming from the host via a dongle with a playback latency under 50ms (full system).</p> <p><b>Connection</b></p> <p>When the DAC is powered on, the wireless link between the headset and DAC shall be automatically established if the headset is switched on and nearby.</p> <p><b>Pairing Mode</b></p> <p>Once the DAC enters pairing mode, it will remain active for pairing inquiries for at most 1 minute. After 1 minute, it will exit pairing mode and revert to searching mode.</p>



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Dual Mode	The headset should be able to establish connection with DAC (2.4GHz) and Bluetooth device with full function.  Mute the streaming from 2.4GHz when there is a phone call event happened. (Feature Reserve)
Bluetooth Feature	Support standard Bluetooth 5.2 (Client)  <u>Profiles</u> A2DP 1.3 and AVDTP 1.3 AVRCP 1.6 and AVCTP 1.4 HFP 1.8 and RFCOMM 1.2 DIP 1.3  <u>Multi-link</u> Headset ability to connect with 2 Bluetooth devices simultaneously under both Bluetooth mode and dual mode.
Equalizer	Minimum 5 band equalization apply to the 2.4GHz and Bluetooth streaming and ability to real-time adjust from the host PC via DAC.  Required 3 preset settings that can switch from the DAC and update from the host PC.
Audio Codec (Dongle Mode)	LC3 Plus
Audio Codec (Bluetooth Mode)	Playback: SBC / MPEG-2 AAC  Recording: HFP Decoder
Volume Setting	Both knobs on the DAC and headset should be able to adjust the master volume and then display the latest setting on the DAC.  The master volume of the headset should be 50% as default.  The headset needs to memorize the last volume setting and keep the same configuration after reboot.  <u>2.4GHz Mode / Dual Mode</u>  The DAC should be able to enumerate three audio devices to host PC. Two playback device (Game and Chat channel) node and one microphone mode.
Speaker Configuration Support	Stereo
Packet Loss Concealment	Packet loss should cause minimal impact
Microphone Input Processing	Noise Reduction (AINR, TBD)
Tone Notification / Voice Prompt	Default behavior on headset is Tone Notification
Sidetone	Default "Off", can be adjusted the sidetone volume thru the knob on the DAC and software.



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	Should stay the same as the state before the power cycle unless factory resetting.
Game/Chat Mix (Chatmix)	DAC should be able to adjust the ratio between game and chat channel.
Lighting	Each of the RGB LED on the DAC can be adjusted via the HID command with different color and effects.
Button	Each of the macro keys on the DAC can be defined to a different key code or function key via the HID commands.
Battery Level Reporting	Headset ability to report battery level thru HID / BLE command with 1% interval
Low Battery Alert	While battery hits below 10%, voice prompt: "Battery level low"
Power Saving	Automatic shutoff mechanism will be triggered if the headset is under below listed modes with mentioned conditions met,  <b>Searching Mode</b> The headset shall automatically shut off if it stays in searching mode for over 3minutes.  <b>Connected Mode</b> The headset shall automatically shut off if there is no signal output from device for 20 minutes. There shall be a counting loop for auto shutoff triggering. Firmware detects by seconds if there is any playback audio data, as in over a pre-set gain threshold. (test with 20-min 'pure silence' audio clip, headset should be auto shutoff after 20-min)  If there is playback audio data detected for 2 consecutive seconds, counter resets. (test with 20-min audio clip with 19 min 57 second silence and 3 seconds audio, headset should not be powered off unless other condition is triggered)  <b>While in Low Battery</b> When battery level is low (either detected/reported through gauge IC or main chipset), the headset should send the event message to DAC (if current is connected with DAC).
Detachable Microphone Detection	Need 1 GPIO pin on the headset to detect mic boom plug status and update to DAC.
Headset Re-Connected Behavior	The DAC should be able to send the HID command to notify the OS.
Suspend Mode	When PC or MAC enters suspend mode, the DAC will enter suspend mode as well. It will turn off RF and LED so that the headset and DAC



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	shall be disconnected. Once the PC or MAC resume, the dongle will automatically resume from suspend mode.
Link Loss Reconnection	Once the headset is out of range (Link Loss). Dongle shall try to reconnect it back continuously.
USB / HID Stack	DAC should be able to support distinguish the host platform is PC or consoles. USB Audio Class (UAC) 1.0 Enumerates as two Stereo for Playback. Enumerates as Mono for Recording. Enumerates as HID keyboard device. Endpoint for HID Class for Desktop App Control and status update. (HID API commands requirements in separate document)
Firmware Update	Firmware update via USB
NTC Temperature	$\leq 2^{\circ}\text{C}$ and $\geq 43^{\circ}\text{C}$ need to stop charging
Color Code	The color code should be able to write and store on the headset during the production. Headset should be able to update the color code to DAC then pass to the host PC with HID commands.
Mic Switch (Boom Mic / Internal Mic)	Based on boom mic status: <ul style="list-style-type: none"><li>• Plugged: boom mic</li><li>• Unplugged: internal mic</li></ul>
Playback	
Output	Gain level: Maximum level output while complying with EN50332
Sampling Rate (ULL)	ULL Mode: 48kHz / 96kHz, Default: 48kHz
Bit Depth (ULL)	ULL Mode: 16/24bit, Default: 16bit
Channel Number Setting	Stereo
Playback Volume Scale	1% Level difference in one step when adjusting the volume wheel
Minimum Power Output	Mute
Default Playback Volume on host PC	100% (Hard fixed)
Recording	
Mic Bias Voltage	> 2V
Sampling Rate	ULL Mode: 48kHz BT Mode: 16kHz
Channel Number Setting	Mono
Bit Depth	16bit
Default Recording Volume on Windows	100%



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### 14.2 Default State for Audio Function

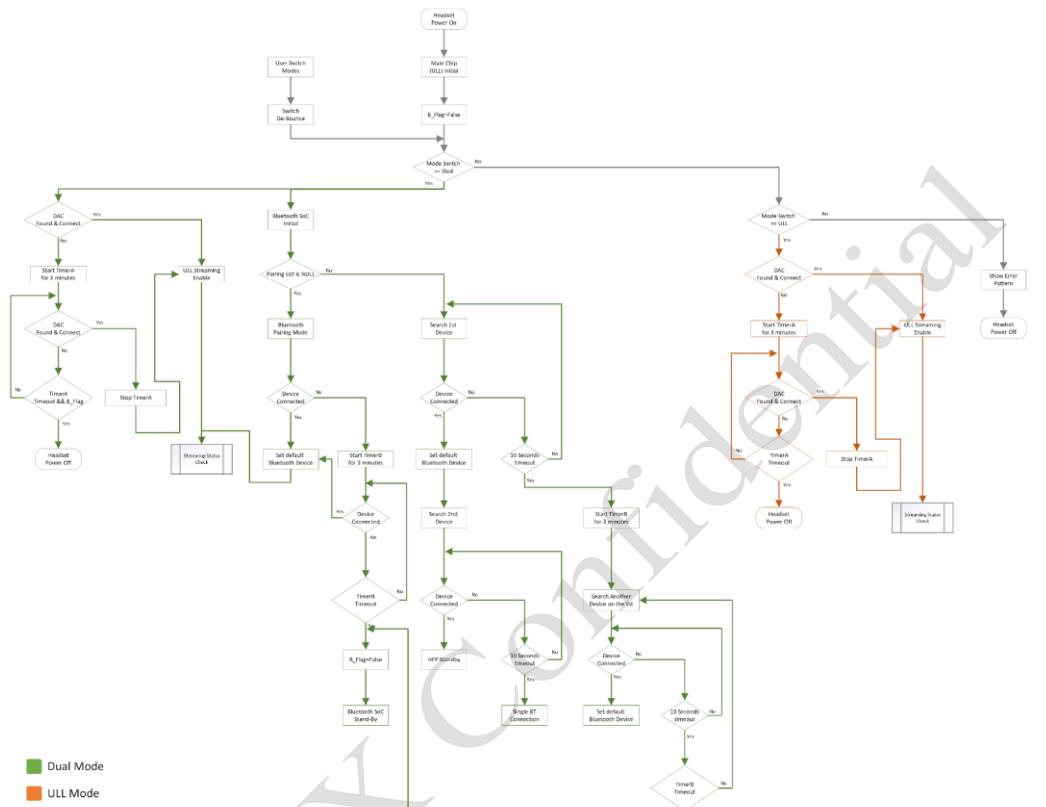
Item	State
Master Volume	50%
Microphone Gain	100%
Game/Chat Mix (2.4GHz Only)	50   50
Microphone Mute State	Default Unmute
Sidetone	Off
Equalizer	Preset - 1

### 14.3 Headset Connection/Re-connection Events

Re-connection	Expected State
Headset Out of Range	<ul style="list-style-type: none"><li>- Dongle needs to notify and update Headset device status to Host when Headset gets re-connected from out of range.</li><li>- All functions remain the same states as previous before connection lost.</li></ul>
Headset Power Cycle	<ul style="list-style-type: none"><li>- Dongle needs to notify and update Headset device status to Host when Headset gets re-connected from powered off (to power on)</li><li>- All functions are set back to default.</li></ul>
Dongle Power On	<ul style="list-style-type: none"><li>- When Dongle is powered on, the wireless link between Headset and Dongle shall be automatically established if the Headset is active and within range.</li><li>- All functions are set back to default</li></ul>

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## 14.4 Headset Connection Flow





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## 15 Firmware I/O Behavior

### 15.1 Headset Switch/Button/Wheel Behavior

Event	Functions	Button Press Duration	Button
Power	Toggle headset on/off	Long Press (2s)	Power
2.4GHz Pairing Mode	To enter ULL pairing mode when connection mode is ULL or dual, while HS is off	Very Long Press (10s)	Power
Bluetooth Pairing Mode	Enter the pairing mode with following condition - Headset is under Dual mode - Headset boot up. - ULL connection is not in pairing mode	Long Press (2s)	Power + MFB
Battery level	Toggle voice prompt for battery level status check	Single Press	Power
Mode Switching	Switch through 2 connection mode - 2.4GHz mode / Dual Mode	Slide (2positions)	Slider Switch
Mic Mute	Toggle mic mute/unmute	Single Press	Mic Mute
Sidetone	Toggle mic monitoring on/off	Long press (3s)	Mic Mute
Volume Wheel	Adjust playback gain	Wheel/Dial Rotation	Volume Wheel
Answer Call	Answer Call (BT Mode)	Single Press (300ms)	MFB
End Call	End Call (while call in progress)	Double Press (300ms)	MFB
Reject Call	Reject Call (BT Mode)	Double Press (300ms)	MFB
Play/Pause	Play/Pause music (BT Mode)	Single Press (300ms)	MFB
Next Song	Skips to next song (BT Mode)	Double Press (300ms)	MFB
Previous Song	Skips to last song (BT Mode)	Triple Press (300ms)	MFB
Voice Assistant	Activates mobile voice assistant	Long Press (2s)	MFB
Factory Reset	All functions are reset to default	Very Long Press (10s)	Power + MFB
Hardware Reset	Trigger the hardware reset on the headset	Long press (5s)	Mic Mute + MFB

\*When long press power/mic mute button, headset should change power/sidetone status immediately without waiting for button release.

The functionality of headset without connection.

Button Type	Functionality
Power	Default
Slider	Default
MFB	Disabled
Mute	Disabled
Volume	Disabled



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### 15.2 DAC Control Peripheral Behavior (Default)

Button	Button Press Duration	Event	Functions
Mode Switch	Slide ( 2 Position )	Output Switch	Output to local AUX port or 2.4GHz
Knob	Rotate	Gain settings, balance, EQ preset	Adjust the gain setting or switch the preset EQ.
		Master volume adjust	Adjust the master volume when LED ring is under idle page.
Mute	Touch	Mic Mute	Toggle microphone mute/unmute
Mic Gain (Button-1)	Single Press	Mic Gain	Enters mic gain level page. Use knob to adjust
	Double Press	Reserve Features	
	Long Press	Macro Key	Assignable on host by HID command.
Game/Chat Mix (Button-2)	Single Press	Chatmix Adjust	Enters chatmix balance level page. Use knob to adjust
	Double Press	Reserve Features	
	Long Press	Chatmix Reset	Set chatmix to balance
Sidetone (Button-3)	Single Press	Sidetone Adjust	Enters sidetone level page. Use knob to adjust
	Double Press	Reserve Features	
	Long Press	Sidetone Switch	Toggle sidetone on/off
Audio Mute (Button-4)	Single Press	Audio Output	Toggle output mute / un-mute.
	Double Press	Reserve Features	
	Long Press	Macro Key	Assignable on host by HID command
EQ (Button-5)	Single Press	Preset EQ Switch	Enters EQ select page. Use knob to adjust
	Double Press	Reserve Features	
	Long Press	EQ Switch	Toggle EQ on/off (Flat)
Media (Button-6)	Single Press	Audio Streaming	Toggle host media application play / pause.
	Double Press	Reserve Features	
	Long Press	Macro Key	Assignable on host by HID command.
Combo Key (Button 1-2-3)	Press 10 Seconds	DAC Re-pairing	Enable DAC into pairing mode.
Combo Key (Button 4-5-6)	Press 10 Seconds	Factory Reset	Factory Reset



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### 15.3 Assign Button List

Type	Feature	Description	Note
Playback	Playback Gain	Able to use volume wheel to make adjustment level	
	Playback Mute	Toggle playback streaming mute/unmute	
Microphone	MIC Gain	Able to use volume wheel to make adjustment level	
	Advance Function	-	Reserve Feature
Game/Chat Mix	Balance Level	Able to use volume wheel to make adjustment level	
	Reset to balance	Reset the level to balance	
	Increase/Decrease	Able to assign Game/Chat increase/decrease to button	
Sidetone	Sidetone Level	Able to use volume wheel to make adjustment level	
	Increase/Decrease	Able to assign level increase/decrease to button	
	On/Off	Able to toggle on/off	
Keyboard	Keycode	Able to assign the stander keycode to button.	
	Media	Able to assign the media function (play/pause, skip to next/previous, etc.)	
DTS Spatial Audio	-	-	Reserve Feature
EQ	Preset EQ	Able to use volume wheel to scroll between on-board preset.	
Meter	VU Meter	Visual input monitor (Microphone)	
	Audio Visualizer	Visual output monitor (Playback)	
Brightness	Brightness Level	Able to use volume wheel to make adjustment level	



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## 16 Firmware LED Behavior

### 16.1 Headset LED

Case	Priority	Conditions	Behavior
Power Off	Top	Power button pressed for 3s	Blink Short white to LED Off
Factory Reset	2 <sup>nd</sup>	As soon as factory reset is initiated. Lighting behavior will end when the factory reset has been completed or interrupted.	Blinking Double Red-White
Firmware Update	2 <sup>nd</sup>	As soon as firmware update is initiated. Lighting behavior will end when the firmware update has been completed or interrupted.	Blinking Fast Yellow
Update Success	2 <sup>nd</sup>	As soon as update is complete	Solid Fade White
Update Fail	2 <sup>nd</sup>	As soon as the update is interrupted or ends without completing.	Solid Fade Red
ULL Pairing	3 <sup>rd</sup>	Under dongle pairing mode	Blinking Fast White (remains until connected or timeout)
BT Pairing	3 <sup>rd</sup>	Under BT pairing mode	Blinking Fast Blue (remains until connected or timeout)
Discharge_VL	3 <sup>rd</sup>	Trigger by user press the power button. Power Level: <7%	Blink Short Red
Discharge_L	4 <sup>th</sup>	Trigger by user press the power button. Power Level (Low): 7~20% (Discharged mode)	Solid fade Red
Discharge_M	4 <sup>th</sup>	Trigger by user press the power button. Power Level (Medium): 21%~60% (Discharged mode)	Solid fade Yellow
Discharge_H	4 <sup>th</sup>	Trigger by user press the power button. Power Level (High): 61%~100% (Discharged mode)	Solid fade Green
Searching	5 <sup>th</sup>	Searching mode	Blinking (remains until connected or timeout) Dual mode: Blinking Purple ULL mode: Blinking White
Connected	6 <sup>th</sup>	Connection successful	Solid fade with the color Dual mode: Purple ULL mode: White
Charge Full*1	Last	Power Level Full	Solid Green
Charge_H*1	Last	Power Level (High): 61%~99% (Charging mode)	Breathing Green
Charge_M*1	Last	Power Level (Medium): 21%~60% (Charging mode)	Breathing Yellow
Charge_L*1	Last	Power Level (Low): <20% (Charging mode)	Breathing Red
<b>MIC LED</b>			
Mic mute	-	Microphone is mute	LED on
Mic unmute	-	Microphone is unmute	LED off



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## 16.2 DAC LED

### 16.2.1 Button LED Behavior

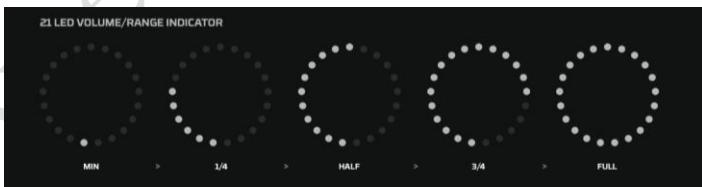
Button	Default Color	Color Code	Scenario	Functions
Idle	-	-	DAC Idle State	Dim all the LEDs with its color.
Mic Gain		#974BFF	Enter Mic Gain Page	Light up.
Game/Chat Mix		#00E5A3	Enter Chatmix Page	Light up
Sidetone		#FF3395	Enter Sidetone Page	Light up
Audio Mute		#FA5F5F	Reflect the Status	Light up
EQ Presets		#0D841A	Enter EQ Page	Light up
Media		#9E4800	Reflect the button	Flash once with the color
DAC Re-pairing	White	#FFFFFF	DAC enter pairing mode	Fast blinking white
Factory Reset	White-Red	-	Factory reset is engaged	Blinking (Ring sync with buttons)
Non-Function Macro Key	Assign Color	-	Reflect the button	Blinking Three Times

### 16.2.2 LED Ring Behavior

All the lighting behavior configurations needs to be stored in the DAC. DAC should be able to support an idle mode. It'll automatically return to idle state after 5 seconds of no user interaction.

Display Page	Default Color	Color Code	Scenario	Behavior
Idle	RGB	-	DAC Idle State	RGB Wave
Playback Volume		#EBBF00	Playback Gain Page	Gain Lighting Page
Mic Gain		#974BFF	Mic Gain Page	Gain Lighting Page
Game/Chat Mix		#00E5A3	Chat Mix Page	Light up
Sidetone		#FF3395	Sidetone Page	Gain Lighting Page
EQ Presets		#0D841A	Enter EQ Page	Light up
Media		#9E4800	Reflect the button	Flash once with the color

#### - Gain Lighting Page



#### - Chat Mix Page

The clockwise order for increase in Chat. The counterclockwise for increase in game. Quick single flash once in assigned color with lighter (orange -> white orange) when Game and Chat are in balance. [For a short turn testing](#), we'll need to disable two LEDs which are one left limited and one right limited.



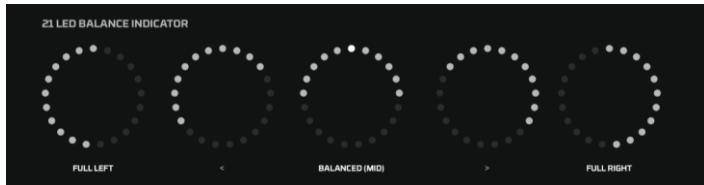
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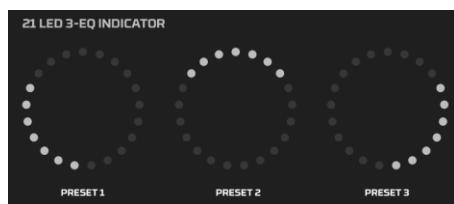
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### - EQ Setting Page



### 16.3 LED Timing Behavior

Name	Pattern
Solid	LED on
Solid-50	On at limited power (to conserve energy)
Solid-Fade	On 4s – Falling 1s
Solid-Double	Color A 500ms – Color B 500ms (repeating)
Breathing	Rising 2s – On 500ms – Falling 2s – Off 500ms (repeating)
Breathing 5s	Rising 2s – On 500ms – Falling 2s – Off 5s (repeating)
Blinking	On 500ms – Off 500ms (repeating)
Blinking Fast	On 100ms – Off 100ms (repeating)
Blinking-Hold	On 250ms – Off 250ms – On 2s
Blinking-Short	On 250ms – Off 250ms – On 250ms
Blinking-Double	Color A 250ms – Off 250ms – Color B 250ms – Off 250ms (repeating)
Cycle	Continuous color transition – 250ms for each defined color (repeating)

## 17 Firmware Audio Cues

### 17.1 Headset behavior

Function	Event	Behavior on Headset	Timing	Note
Fade Out	Entering Notifications	Source will fade out from current volume within 100ms.	Before playing notifications	Should save current volume level
Fade In	Exiting Notifications	Source will fade in from current volume within 400ms.	After notifications are played.	Should restore previous current volume level
Playback Volume	Playback volume	Fix playback volume as 10% during playing voice prompt/tone		



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during voice prompt				
Playback Levels for Voice prompts	Voice prompt levels	if playback is <40%, play voice prompt at 30% If playback is <70%, play voice prompt at 50% If playback is >70%, play voice prompt at 70%		



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### 17.2 Tone Notifications

State	Behavior	Conditions
Sidetone On/Off	584Hz(100ms), Pause(20ms), 584Hz(100ms)	As soon as sidetone is turned on/off.

### 17.3 Voice Prompt

State	File	Conditions
Power On	Power On.mp3	As soon as headset is powered on.
Power off	Power Off.mp3	Just before headset shuts down.
Switch to ULL mode	Adapter Mode.mp3	When user switches to ULL mode
Switch to dual mode	Dual Mode.mp3	When user switches to dual mode
Connected	Connected.mp3	Only in ULL mode, as soon as when DAC connected with headset.
Disconnected	Disconnected.mp3	Only in ULL mode, as soon as when DAC connection lost.
Connected to DAC	Connected to Adapter.mp3	As soon as headset establish connection.
Connected to BT	Connected to Bluetooth.mp3	As soon as headset establish connection.
DAC Disconnected	Adapter Disconnected.mp3	When DAC disconnected in dual mode.
BT Disconnected	Bluetooth Disconnected.mp3	When Bluetooth disconnected in dual mode.
Pairing with DAC	Adapter Paring.mp3	As soon as ULL pairing initiated.
BT Pairing	Bluetooth Pairing.mp3	As soon as BT pairing initiated.
Mic Mute	Mute On.mp3	As soon as mic is muted.
Mic Unmute	Mute Off.mp3	As soon as mic is unmuted.
Call Incoming	Call Incoming.mp3	To notify user when there is an incoming call from HFP.
Call Ended	Call Ended.mp3	To notify user when HFP call ended.
Call Rejected	Call Rejected.mpt3	To notify user when they rejected the HFP call.
Low Battery	Low Battery.mp3	Plays when: 1. As soon as battery reaches <10%. 2. During start up sequence if battery is <10% 3. Prior to power of battery saving scenario.
100% Battery	100% Battery.mp3	Reporting level: 95%-100%=>100%.
90% Battery	90% Battery.mp3	Reporting level: 85%-94%=>90%
80% Battery	80% Battery.mp3	Reporting level: 75%-84%=>80%
70% Battery	70% Battery.mp3	Reporting level: 65%-74%=>70%
60% Battery	60% Battery.mp3	Reporting level: 55%-64%=>60%
50% Battery	50% Battery.mp3	Reporting level: 45%-54%=>50%
40% Battery	40% Battery.mp3	Reporting level: 35%-44%=>40%
30% Battery	30% Battery.mp3	Reporting level: 25%-34%=>30%
20% Battery	20% Battery.mp3	Reporting level: 15%-24%=>20%
10% Battery	10% Battery.mp3	Reporting level: 10%-14%=>10%



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## 18 DEVICE API REQUIREMENTS

### 18.1 Custom Desktop APIs via Case

Device supports the following functions needed for a desktop factory application via vendor commands. It is preferred to utilize Set/Get/Reports.

\*\* All set commands require notification to indicate commands are set successfully

Feature	Remark
Get Device Information (One command to fetch required device info)	<p>One command to get devices descriptions below:</p> <ol style="list-style-type: none"><li>1. Headset PID/VID</li><li>2. Headset Firmware version</li><li>3. Headset Color Code</li><li>4. DAC PID/VID</li><li>5. DAC Serial Number</li><li>6. Device name</li><li>7. Connection info for 2.4GHz<ul style="list-style-type: none"><li>- Disconnect</li><li>- ULL Pairing</li><li>- Connected</li><li>- Searching</li></ul></li><li>8. Sidelone status<ul style="list-style-type: none"><li>- Mute</li><li>- Unmute</li></ul></li><li>9. Mic status<ul style="list-style-type: none"><li>- Mute</li><li>- Unmute</li></ul></li><li>10. Charging status<ul style="list-style-type: none"><li>- Discharging</li><li>- Charging</li><li>- Fully charged</li></ul></li><li>11. Boom mic status<ul style="list-style-type: none"><li>- Plugged</li><li>- Unplugged</li></ul></li><li>12. Headset Connection Mode<ul style="list-style-type: none"><li>- ULL Mode</li><li>- Dual Mode (Audio Mixing / Simultaneously)</li></ul></li><li>13. DAC Playback Mode<ul style="list-style-type: none"><li>- 2.4GHz</li><li>- Local</li></ul></li><li>14. Spatial Sound</li></ol>



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DAC status	Set/get commands are both required: - Searching
Battery status	Get command is required: - Battery Voltage - Battery Level % (with 1% interval)
Charging status	Get command is required: - Fully charged - Charging - Discharging
Master Volume	Set/get commands are both required.
Sidetone status	Set/get commands are both required: - On/Off - Volume
Pairing mode	Set/get commands are both required: - Entering ULL pairing mode - Exiting ULL pairing mode - Entering BT pairing mode (Dual Mode Only) - Exiting BT pairing mode (Dual Mode Only)
Dongle ID	Able to fetch dongle ID
Preset EQ	Set/get commands are both required: - Preset Configuration - Real-time adjust
Spatial Sound Status	Set/get commands are both required to toggle on/off.
Auto shut-off timing	Set/get commands are both required: - Default 20min - Support: off, 10mins, 20mins, 30mins
Microphone status	Set/get commands are both required: - Mute - Unmute
Microphone volume	Set/get commands are both required:
Firmware update	Required
Lighting	Set/Get commands are both support for each LEDs on DAC. - Colors - Brightness - Idle Effects
Mic Boom status	Get command is required: - Plugged - Unplugged



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### 18.2 Required Firmware Notification

Feature	Remark
Master Volume Change	Device should inform host if master is changed by user then HyperX NGENUITY software can update GUI accordingly.
Low battery mode	While battery hits defined level (9%), there shall be a notification sent from device to host therefore HyperX NGENUITY can update GUI accordingly
Microphone mute status changed	Device should inform host if mic is on or off triggered by users then HyperX NGENUITY software can update GUI accordingly
DAC Mode Change	Device should inform host if DAC output mode is changed by users then HyperX NGENUITY software can update GUI accordingly
Headset Connection Status	Device should inform host if headset mode is changed by users then HyperX NGENUITY software can update GUI accordingly
Sidetone on/off status changed	Device should inform host if sidetone level is changed or toggle on/off by users then HyperX NGENUITY software can update GUI accordingly
Game/Chat Balance	Device should inform host if game/chat balance is changed by users then HyperX NGENUITY software can update GUI accordingly
Preset EQ	Device should inform host if sidetone is on or off triggered by users so HyperX NGENUITY software can update GUI accordingly.
Mic boom status	Device should inform host if the boom MIC is removed/plugged by users so HyperX NGENUITY software can update GUI accordingly. <ul style="list-style-type: none"><li>- While boom mic is plugged in</li><li>- While boom mic is unplugged</li></ul>
LED Brightness	Device should inform host if user adjust the LED brightness on the DAC.

### 18.3 AP Mode

Feature	Remark
Lighting Preview	DAC will stop the local lighting effect immediately and wait for the lighting command from NGENUITY when the DAC is connected to host with NGENUITY.
Equalizer	The configuration that user adjusts on the NGENUITY should update and apply to the headset with short latency.



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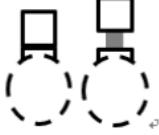
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## 19 Mechanical Specification

### 19.1 Headphone specification

No	Item	Specification	Conditions/References /Comments
1	Type of Ear Cup	Over ear	
2	Ear Cup Tilt Angle	Ear cup upward/ downward tilt (default + 5° / - 30° )	
3	Ear Cup Thickness	From edge of the earcup to the bottom of the ear cushion should be < 2.25 inches	
4	Ear Cup L Controls	a. Mute button b. Power LED indicator c. Power button d. Audio jack I/O e. USB type C socket f. Mute LED indicator on mic boom	
5	Ear Cup R Controls	a. Multi-function button b. Volume wheel c. Mode slide button	
6	Driver Tilt Angle	10 degrees	
7	Headband	Extendable Design Maximum length: 35mm	
8	Headband Pad	Foam: 6503 Foam (Ref. cloud III)  Cover Material: PU leather DE-123# lip + patchwork + with Stitching line  Inner Material: Plastic inner	Approved vendor: UBO
9	Clamping Force (N)	4.75N+/-0.75N	
10	Fork Sliding Force	5.5+/-2N (The L/R difference <30%)	
11	Acoustic Type	Closed Back	



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12 Weight Less than 350 ± 10% g

**Commented [MP5]:** Internal estimation weight for realistic target.

### 19.2 Microphone specification:

No	Item	Specification	Conditions/References /Comments
1	Mic Boom Design	Detachable (thin tube covered gooseneck) Bendable (gooseneck needs to be able to bend vertically)	
2	LED	LED mute indicator on Mic boom	
3	Mic Boom Foam	No need	
4	Size of Microphone Unit	12mm	
5	Condenser Type	ECM, BUM1045L-n422C- (Gettop Acoustic CO., LTD.)	
6	Polar Pattern	Uni-directional	

### 19.3 Earpads specification:

No	Item	Specification	Conditions/References /Comments
1	Design	Over Cup	Approved vendor: UBO
2	Dimension	Outer dimensions: Length: 110.12mm Width: 87.97mm Inner dimensions: Length: 66.87mm. Width: 44.43mm.	
		Thickness: 21.5mm	
		Height: 25mm Minimum(external)	



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3	Material (outer)	Ultrasuede	
4	Material (Middle)	D43	
5	Material (Bottom)	DE7 hot pressing 0.3TPU	
6	Material (inner)	Foam: 402B	
7	Inner holes	None	
8	Center mesh	N 美佳+YR50PPI foam	

### 19.4 DAC RGB Ring specification:

No	Item	Specification	Conditions/References/Comments
1	Optical	<ul style="list-style-type: none"> <li>Optics cannot be blurred at the junction.</li> <li>No dark spots.</li> </ul>	

### 19.5 DAC Button:

No	Item	Specification	Conditions/References/Comments
1	key Feeling	<ul style="list-style-type: none"> <li>Pick force &gt; 60g</li> <li>Total travel=2mm</li> <li>On travel=1.8mm</li> </ul>	• TBD
2	Key life	Class 1 = 50000 cycles	

### 19.6 Accessory specification:

No	Item	Specification	Conditions/References /Comments
1	Audio Cable	3.5 plug to 3.5 plug Braided cable Length – 1.5M / OD: 4mm	
2	Adapter	USB type C Female to USB type A Male	



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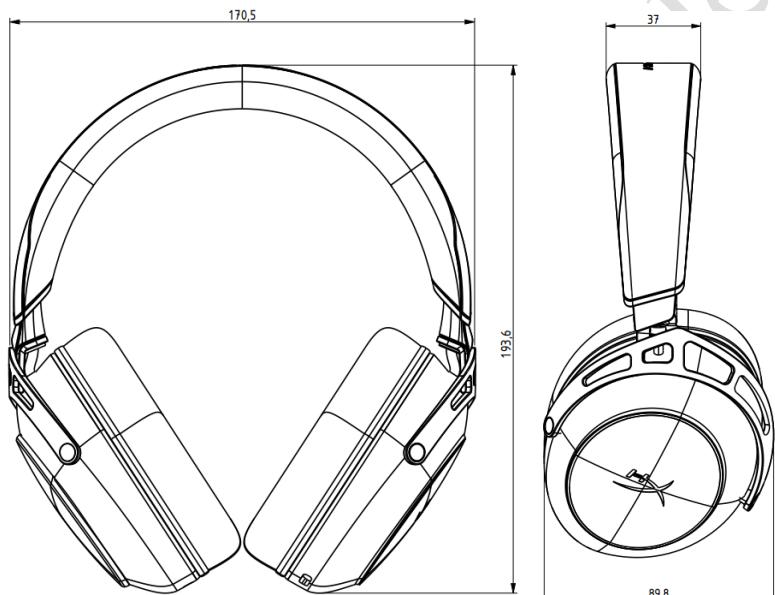
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Charging Cable	USB type C Male to USB type C Male
3 (For headphone charging)	Non-Braided cable Length – 0.5M / OD: 3.7mm
3 Charging Cable (PC to DAC)	USB type C Male to USB type C Male Non-Braided cable Length – 1.5M / OD: 3.7mm

## 20 DIMENSION

### 20.1 Headphone



### 20.2 DAC



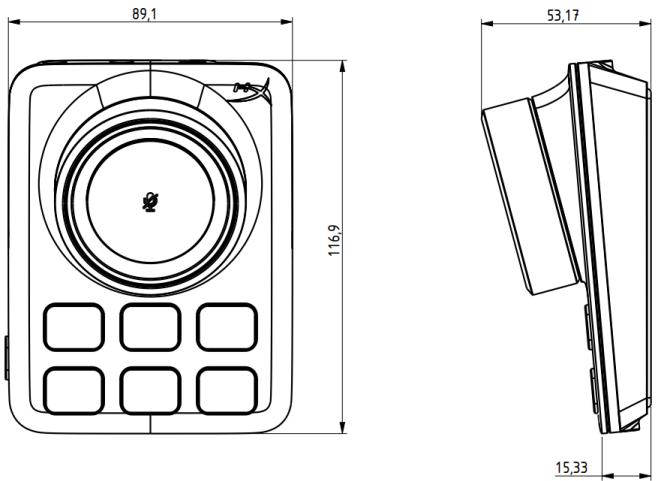
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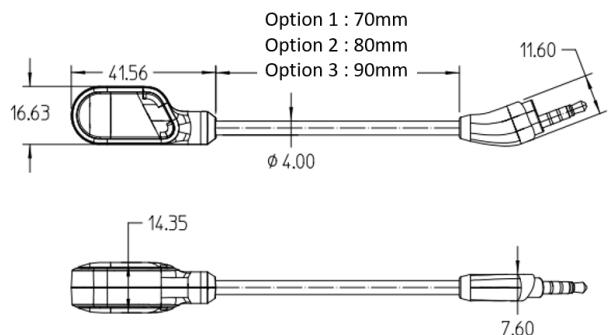
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### 20.3 Mic Boom





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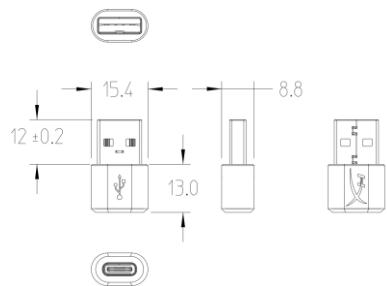
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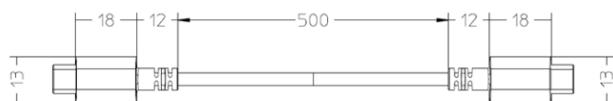
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### 20.4 Adapter

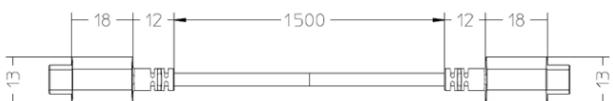


### 20.5 Charging cable

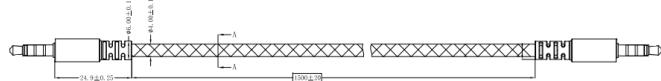
(For headphone charging)



(PC to DAC)



### 20.6 Audio cable



## 21 Part List

Item	Picture	Parts Name	Commodity Class	Material (CMF)	Usage Q'ty
------	---------	------------	-----------------	----------------	------------



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Headband Ass'y					1
1	A curved green and grey headband component.	Headband PAD	Cushion	C: HX Black, M: PU leather DE-123# lip+ memory foam 6503 + EVA / Inner PP F: Sainted Matte	1
2	A curved yellow and grey metal headband component.	Headband Metal	Metal	C: Mica Silver M: SUS301 3/4H F: Painting / Sandblasting # 150 Logo C: Sliver F: Printing / Sliver / Polish#5000	1
3	A curved black and red cable component.	Headband cable	Cable	C: HX Black M: Braided cable F: Matte	1
4	A curved grey plastic buckle component.	Buckle inner L	Plastic	C: PMS Black M: POM F: Matte	1
5	A curved grey plastic buckle component.	Buckle inner R	Plastic	C: PMS Black M: POM F: Matte	1
6	A small green metal slider clip component.	Slider Clip	Metal	C: Natural Color M: SUS 301 F: Matte	2



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Part Number	Image	Description	Material	Requirements	
				Color	Notes
7		Slider L	Plastic	C: Dark Gray M: PA6+30%GF / Insert molding metal hinge F: Matte / HMT11007	1
8		Slider R	Plastic	C: Dark Gray M: PA6+30%GF / Insert molding metal hinge F: Matte / HMT11007	1
9		Slider Metal L	Metal	C: Mica Silver M: SUS301 F: Painting Matte	1
10		Slider Metal R	Metal	C: Mica Silver M: SUS301 F: Painting Matte	1
11		Slider Hinge	Metal	C: Mica Silver M: SUS301 F: Matte	2
12		Slider Rubber	Plastic	C: HX Black M: Silicone Rubber Shore A75 F: Matte	2
13		UPE	Plastic	C: HX Black M: UPE F: Matte	4
14		FORK Hinge	Metal	C: Mica Silver M: SUS301 F: PVD Matte	2



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15		Fork L	Metal	C: Mica Silver M: AL 6061 F: Anodized/ Sandblasting # 150 (metallic satin)	1
16		Fork R	Metal	C: Mica Silver M: AL 6061 F: Anodized/ Sandblasting # 150 (metallic satin)	1
17		Screw PB T1.7*L8mm	Screw	PBT1.7*L8mm, OD ⌀ 3.0 Cross groove Black Zinc Plated	8
18		Screw KB T1.7*L6mm	Screw	KB 1.7X6mm OD ⌀ 3.0 Quincunx groove T5, Black Zn	4
Earcup Ass'y					1
19		Ear Cup Housing L	Plastic	C: HX Black M: GA65 AG00BK180004 F: Matte HMT11007	1
20		Ear Cup Housing R	Plastic	C: HX Black M: GA65 AG00BK180004 F: Matte HMT11007 <b>Logo icon for switch mode</b> C: Pantone cool gray 7C	1

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21	A circular metal plate with a central logo and a textured pattern around the edges.	Logo Plate Outer Cover L	Metal	<b>Logo plate</b> C: Mica Silver M: Al6061-T6 T0.6mm F: Anodized / Sandblasting # 150 (metallic satin) / Two tone <b>Logo</b> C: LOGO / Anodized / (PANTONE 10395 C)	1
22	A circular metal plate with a central logo and a textured pattern around the edges.	Logo Plate Outer Cover R	Metal	<b>Logo plate</b> C: Mica Silver M: Al6061-T6 T0.6mm F: Anodized / Sandblasting # 150 (metallic satin) / Two tone <b>Logo</b> C: LOGO / Anodized / (PANTONE 10395 C)	1
23	A yellow plastic chamber component with a circular opening and internal structural features.	Chamber L	Plastic	C: HX Black M: Option 1 - ABS 85% PCR GAR-011(H85) ZY S2B-G1732, Option 2 - ABS 95% PCR GAR-011(H95) ZY S2B-G1732 F: Matte	1
24	A blue plastic chamber component with a circular opening and internal structural features.	Chamber R	Plastic	C: HX Black M: Option 1 - ABS 85% PCR GAR-011(H85) ZY S2B-G1732, Option 2 - ABS 95% PCR GAR-011(H95) ZY S2B-G1732 F: Matte	1
25	A green plastic plate with a circular mesh-like pattern and mounting holes.	SPK Plate L	Plastic	C: HX Black M: Option 1 - ABS 85% PCR GAR-011(H85) ZY S2B-G1732, Option 2 - ABS 95% PCR GAR-011(H95) ZY S2B-G1732 F: Matte	1



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26	A circular green component with a mesh center and a central hole.	SPK Plate R	Plastic	C: HX Black M: Option 1 - ABS 85% PCR GAR-011(H85) ZY S2B-G1732, Option 2 - ABS 95% PCR GAR-011(H95) ZY S2B-G1732 F: Matte	1
27	A red handwritten mark.	SPK Cable	Cable	M : OD: Ø 1.mm ; 2C ; Length:110mm	2
28	A blue curved component.	Earcup MESH	Acoustic Paper	C: PMS Black C M: Satti HD7 + 3M 55261 tape	2
29	A green curved component.	Chamber MESH inner	Acoustic Paper	C: PMS Black C M: Satti HD7 + 3M 55261 tape	2
30	A grey curved component.	SPK Plate Acoustic Paper	Acoustic Paper	C: PMS Black C M: Satti HD7 + 3M 55261 tape	2
31	A grey curved component.	SPK Plate Acoustic Paper	Acoustic Paper	C: PMS Black C M: Satti HD7 + 3M 55261 tape	2
32	A grey curved component with a purple center.	Chamber EVA mesh	Acoustic Paper	C: PMS Black C M: Satti HD7 + EVA + 3M 55261 tape	2
33	A blue curved component.	Chamber Mesh	Acoustic Paper	C: PMS Black C M: Satti HD7 + EVA + 3M 55261 tape	2

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34		Chamber EVA	EVA	C: PMS Black C M: EVA+3M9448A tape F: Matte	2
35		Hinge	Plastic	C: HX Black M: POM F: Matte HMT11007	4
36		O-ring	Rubber	C: HX Black M: Rubber 60A F: Matte	4
37		Hinge outer R	Metal	C: Black Pantone 10399C M: SUS301 / SPCC F: Painting	4
38		Ear Pad	Cushion	C: HX Black M: Outside - Fabric : Ultrasuede Middle Fabric: Regular PU leatherette Bottom Fabric: Regular PU leatherette Foam: 622C-24mm Approved vendor: UBO	2
39		Tube	Rubber	C: HX Black M: Silicone Rubber Shore A60 F: Matte	2
40		Volume Wheel	Plastic	C: HX Black M: PC1250Y F: Matte HMT11007	1



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41		Mute Button	Plastic	C: HX Black M: GAR-011(H65) S2B-G1731 F: Matte HMT11007 <b>Logo</b> F: Polish# 3000	1
42		Power Button	Plastic	C: HX Black M: GAR-011(H65) S2B-G1731 F: Matte HMT11007 <b>Logo</b> F: Polish# 3000	1
43		Multi-function button	Plastic	C: HX Black M: GAR-011(H65) S2B-G1731 F: Matte HMT11007 <b>Logo</b> F: Polish# 3000	1
44		Mode slide button	Plastic	C: HX Black M: GAR-011(H65) S2B-G1731 F: Matte HMT11007 <b>Logo</b> C: Pantone cool gray 7C F: Printing (on earcup)	1
45		Mode slide button holder	Plastic	C: HX Black M: GAR-011(H65) S2B-G1731 F: Matte HMT11007	1
46		Internal mic MESH	MESH	C: HX Black M: PE 9448A T=0.15mm / 150 MESH / PE 9448A T=0.5mm F: N/A	2
47		Power Status LED Light Guide	Plastic	C: Translucent M: PC 1250Y F: Matte	1
48		Battery tape	EVA	M: 3M 3M9448 tape 30.0mm*12mm*1mm	2



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Part Number	Image	Description	Material	Requirements	
				Specification	Quantity
49		Battery EVA	EVA	M: EVA + 3M9448 tape ¢ 30.0mm*0.5mm	1
50		Screw KB T2*L7mm	Screw	KB2X7mm OD ¢ 3.6 Cross groove Black Zinc Plated	4
51		Screw PWA T1.6*L6mm	Screw	PWA1.6X6mm OD ¢ 4.7 Cross groove Nickel plated	7
52		Screw PB T2*L5mm	Screw	PB2X5mm OD ¢ 3.5 Cross groove Black Zinc Plated	6
53		Screw PA T2*L8mm	Screw	PA2X8mm OD ¢ 3.6 Cross groove Black Zinc Plated	8
<b>MIC BOOM Ass'y</b>					<b>1</b>
54		Boom MIC Molding - sub	Cable	C: HX Black M: DC 3.5 plug/ OD4.0mm Gooseneck + heat shrink tube/ SR molding (PP/TPE) / MIC cable OD: Ø 1.2mm ; 4C, Mic boom length: Option 1 : 70mm, Option 2: 80mm, Option 3: 90mm F: Matte HMT11007	1
55		Microphone Outer Housing	Plastic	Common part: Cloud III C: HX Black M: GAR-011(H65) S2B-G1731 F: Matte HMT11007 Approved vendor: Mold - Tech	1



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56		Microphone Sponge	Sponge	Common part: Cloud III C: PMS Black C M: Sponge F: Matte	2
57		Microphone Inner Housing	Plastic	Common part: Cloud III C: HX Black M: GAR-011(H65) S2B-G1731 F: Matte HMT11007 Approved vendor: Mold - Tech	1
58		MIC Rubber	Rubber	Common part: Cloud III C: PMS Black M: Silicone Rubber Shore A60 F: Matte	1
59		Microphone Outer Mesh	Metal	Common part: Cloud III C: Mica Silver M: Metal Mesh SUS304 Finish: metallic satin (PVD)	1
60		Microphone Inner Mesh	Metal	Common part: Cloud III C: Mica Silver M: Metal Mesh SUS304 Finish: metallic satin (PVD)	1
61		Microphone Nylon Mesh	Mesh	Common part: Cloud III C: HX Black M: Nylon Mesh 150 # F: Matte	2
62		Shading EVA	EVA	C: PMS Black C M: EVA+3M9448A tape F: Matte	1
<b>DAC Ass'y</b>					<b>1</b>
63		DAC TOP COVER	Plastic	C: Mica Silver	1



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				M: GA65 AG00BK180004 F: Matte HMT11007 / Painting shadow black <b>Logo</b> C: Sliver F: Printing Polish# 3000	
63		DAC Bottom COVER	Plastic	C: HX Black M: GA65 AG00BK180004 F: Matte HMT11007	1
64		DAC LED RING	Plastic	C: Translucent white / Pantone black C M: ABS758 F: Matte / Painting polish#5000	1
65		MUTE plate	Plastic	C: Translucent + Painting Black M: ABS758 F: Matte <b>Logo:</b> Laser icon polish#5000	1
66		Wheel out cover	Metal	C: Metal version / HX Dark gray Option: plastic version /HX Dark gray M: AL 5052 F: Anodized/ Sandblasting # 150 (metallic satin)	1
67		Wheel Cover	Plastic	C: HX Black M: POM F: Matte HMT11007	1
68		LED EVA	EVA	C: PMS Black C M: EVA+3M9448A tape F: Matte	1



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69		Button	Plastic	C: Translucent M: ABS758 F: Matte	6
70		Button outer	Plastic	C: Translucent M: PC1250Y F: Matte <b>Logo:</b> C: Pantone cool grey 8C M: Printing icon	6
71		TOGLE	Plastic	C: HX Black M: ABS757 F: Matte HMT11007	1
72		Button Rubber	Rubber	C: PMS Black M: Silicone Rubber Shore A60 (class 1 level on life test) F: Matte	6
73		Counterweight	Metal	C: N/A M: SPCC F: Matte HMT11007	1
74		Rubber food pad	Rubber	C: PMS Black M: Silicone Rubber Shore A60 F: Matte	1
<b>Adapter</b>					<b>1</b>
75		USB Adapter (Type-C to Type-A)	Adapter	C: HX Black M: type-A USB & type-C USB SUS304 silver + TPE + PP molding F: Matte HMT11007 / HyperX logo and USB logo Polish	1
<b>Cable</b>					<b>1</b>



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76		USB C to C Charging cable (Headset)	Cable	C: HX Black, M: TPE 75A + PP F: Matte HMT11007 / HyperX logo & TYPE C logo &USB LOGO Polished, Length – 0.5M /Diameter – OD.3.7mm / with Cable tie	1
77		USB C to C Charging cable (PC to DAC)	Cable	C: HX Black, M: TPE 75A + PP F: Matte HMT11007 / HyperX logo & TYPE C logo &USB LOGO Polished, Length – 1.5M /Diameter – OD.3.7mm / with Cable tie	1
78		Audio Cable 3.5 to 3.5	Cable	C: HX Black, M: TPE 75A + PP F: Matte HMT11007 / HyperX LOGO Polished, Length – 1.5M /Diameter – OD4mm / with Braided cable	
<b>Others</b>					<b>1</b>
79		Damping oil	lubricating oil	LWD-3241	0.2g

\*The table excludes EE, AE components, inner cables, lubricating oil, glue and other additional die cut parts.



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### CMF HEADSET



### CMF HEADSET





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CMF  
HEADSET IO

- 1 LED LENS  
Material: PC1250Y  
Color: Translucent White  
Finish: Matte
- 2 POWER BUTTON  
Material: Plastic  
Color: Black (#CPN-90-08-21-31-0001)  
Finish: HMT11007  
Power icon / Polish#3000
- 3 MUTE BUTTON  
Material: Plastic  
Color: Black (#CPN-90-08-21-31-0001)  
Finish: HMT11007  
Mute icon / Polish#3000
- 4 AUDIO JACK PORT
- 5 CHARGING PORT (TYPE C)
- 6 BOOMMIC PORT (INPUT)
- 7 SWITCH MODE  
Material: Plastic  
Color: Black (#CPN-90-08-21-31-0001)  
Finish: HMT11007  
DUAL & 2.4G Icons / PAD PRINTING / PANTONE 10395 C
- 8 MULTI BUTTON  
Material: Plastic  
Color: Black (#CPN-90-08-21-31-0001)  
Finish: HMT11007  
Multi icon / Polish#3000
- 9 VOLUME WHEEL  
Material: Plastic  
Color: Black (#CPN-90-08-21-31-0001)  
Finish: Matte



CMF  
BOOM-MIC





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CMF  
DAC



CMF  
DAC





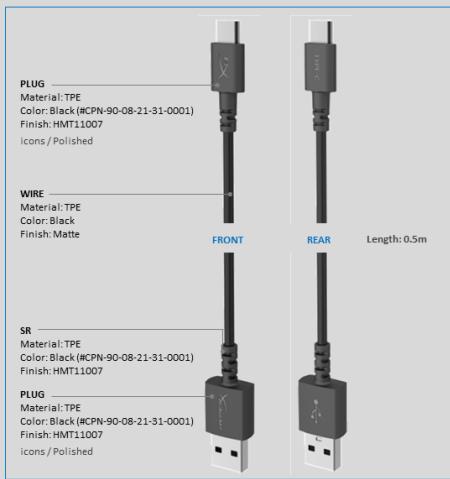
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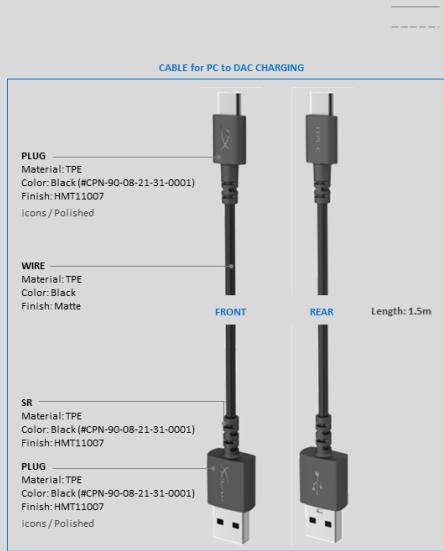
### CMF CABLE

CABLE for HEADSET CHARGING

— Part  
- - - - Finish



CABLE for PC to DAC CHARGING



### CMF AUDIO CABLE

Length: 1.5m

— Part  
- - - - Finish



**22.1 Sustainable material validation:** Product will validate new PCR plastics in earcup (ABS) and PIR metal in earcup logo plate & fork (Alu alloy). Here are recommended grades for validation.

**PCR ABS:** 95% PCR contain



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**PIR metal:** AL5052 (PIR50%+PCR5%) and AL1060 (PIR85%)

## 23 Packaging

# Positioning and Styling



### Packaging Style





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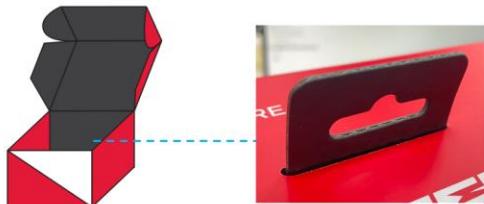
Outlaw

## Label Plan

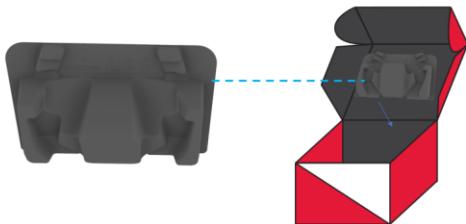
### On Headset



No.	Items	Color/Print	Material	Finish	Dimension	Others
1	Color Box	Outer: CMYK + 1PMS Inner: n/a	350g CCBN + Yellow E-flute + Black inner paper	Outer: DP coated film(普塑油) Outer Spot UV: NA Inner: n/a	Die-line: L220*W210*H112mm 展開尺寸: L756*W678mm	DieLine: CLOUD III PIZZA BOX DIELINE
2	Hanger	Black	350G black card + yellow E flute + 350G black card(recycle 35%)	N/A	L100*W50 mm ( $\pm 0.2$ )	Embedded on the box. (recycle 35%)



No.	Items	Color/Print	Material	Finish	Dimension	Others
3a	Inner structure (Top tray)	NA	Color: Black 11mm厚E紙板 背膠：雙面膠 (Recycle 40%)	n/a	(L)204x(W)135x(H)54 mm ( $\pm 1$ )	Have to be stabilized in the box or installed in the lid part of the box.  Marking: 1. P/N 2. Recycle marking 3. Cavity#





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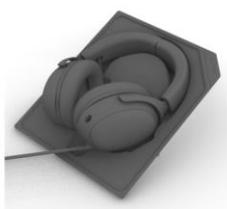
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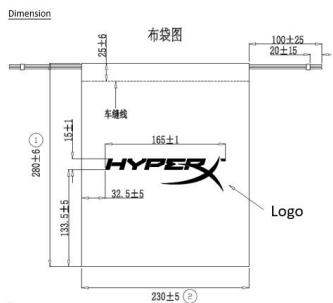
No.	Items	Color/Print	Material	Finish	Dimension	Others
3b	Inner structure (Top tray)	NA	Color: Black 1.0mm厚紙式 面膠 (Recycle 40%)	n/a	(L)225x(W)205x(H)47.5mm (±1)	Have to be stabilized in the box or installed in the lid part of the box.  Marking: 1. P/N 2. Recycle marking 3. Cavity#



No.	Items	Color/Print	Material	Finish	Dimension	Others
4b	Accessory box	Inside: Black Outside: Black	350g C1S FBB (符合FSC and recycle 40%)	Aqueous varnish on both sides.	成型尺寸 : L190*W50*H57mm 展开尺寸 : L367*W217mm	



No.	Items	Color/Print	Material	Finish	Dimension	Others
5	Accessory (only for Belts)	Black.	Refer to Alpha Pouch.	Refer to Alpha pouch	L280 x W230 mm	NA





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No.	Items	Color/Print	Material	Finish	Dimension	Others
6	Paper Seal Tape	N/A	160g art paper 青膠：永久膠印期：Pantone Gray 6C 表面處理：Aqueous varnish 使用回收料0%	N/A	Ø 49mm (±0.2)	
7	Anti-Mold Chip		35.5*35.5mm		35.5*35.5mm	
8	UPC Label	Pre-Print: N/A Second-Print : Black	80g Coated Paper	N/A	L38 x W38, R=1.5 (±0.2)	Printing SPEC: HWC-QACI-018.xxx Printing SPEC: HWC-MES-001.xxx
9	QSG	Front: K Back: K	60g Text Paper	Front: N/A Back: N/A	O.D. L140x W108 mm (±1) Die-Cut: L558.8 x W324 mm (±1)	Folding: 5 times DieLine: HWC-MES-005.XXX (24 Panel)
10	Welcome LT	正面4C;背面1C	200g C2S雙鋼紙+雙面霧膜 印刷：使用回收料0%	N/A	L140 * W108 mm	
11	Environmental Notice Leaflet	Front: K Back: K	60g Text Paper	Front: N/A Back: N/A	O.D. L106.0 x W106.0 mm (±1) Die-Cut: L318.0 x W106.0 mm (±1)	Folding: 2 times HWC-MDES-007.001 (6 pages) 適用產品適用
12	Product Label		材質：50# PET + 打字霧膜 颜色： PMS Cool Gray 6C (自製標貼)		尺寸: L87*W60mm	
13	SKU Label		材質：10.1mm 50#PET白 PET 表面處理：霧P / Black matte finish		尺寸: L12.4 X W5.4 mm	

No.	Items	Color/Print	Material	Finish	Dimension	Others
14	Traceability Label					
15	Paper Film for Headband		100g art paper(白色)		L303*W34mm	
16	Paper film for DAC		100g art paper(白色)		尺寸: L80*W70mm	
17	Paper Film for Earcup		100g art paper(白色)		尺寸: L58.4*W50mm	

No.	Items	Color/Print	Material	Finish	Dimension	Others
TBD	Tie	n/a	200G black card	n/a	Width: 20mm 	N/A
TBD	Tie	n/a	200G black card	n/a	Width: 20mm 	N/A

## 24 Compliance and Regional requirement

### SATETY:

NRTL Certification shall be issued by Nationally Recognized Laboratory i.e. TUV, etc.

A Competent Body CB certification report and Certificate will be created based on the requirements of IEC standard with all National Deviations.

ITEMS	STANDARDS	CERTIFICATIONS
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Safety (Host)	UL 62368-1 / CAN/CSA C22.2 No. 62368-1-14  IEC 62368-1 / EN 62368-1	NRTL Certification  CB Certification
Acoustic for personal music player (PMP)	EN 50332-1 (Sound system equipment) EN 50332-2 (Headphones and earphones)  * Evaluated separately or under IEC/EN 62368-1	CB Certification

### EMC:

Products subject to EMC regulations in any country must have an EMC test report to the latest officially accepted version of the standards.

FCC CFR 47 Part 15 / ICES-003, Class B

EN 55032 / CISPR 32 Class B ;EN 55035 / CISPR 35 ;EN 61000-3-2; EN 61000-3-3 ;EN 301 489-x

\*All EMC test reports must be obtained from a HP TCOP approved test lab.

### RF:

Products having a radio transmitter must have a radio test report to the latest officially accepted version of FCC or EU standard, or target country requirements.

ITEMS	STANDARDS	CERTIFICATIONS
Telecom	EN 300 328; EN 300 440	EU RED Directive
SAR	EN 50663; EN 62479; EN 50360; EN 50556	EU RED Directive
	FCC 47 CFR Part 2 & ANSI/IEEE C95.1-1999/IEEE C95.3-2002/IEEE P1528-2003	FCC Grant
	IC RSS-102, RSS-210	IC Certificate
	Products with radios shall only be shipped to countries where their frequency bands are legally permitted.	

### BATTERY:

The Battery Pack shall comply with HP BDR (Battery Design Requirements) for construction and Component Requirements.

Target country requirements: Taiwan BSMI / CNS 15364:102 ; Japan PSE Appendix 9 ; Korea KC / K62133-2 ; China GB 31241-2022 ; India IS 16046 (PART 2) /IEC 62133-2

The battery pack polymeric parts shall be constructed of UL "Recognized" plastic.

External parts shall be flame rated of 94V-0, 75°C or better.

Internal polymeric parts shall be flame rated of 94V-2, 75°C or better.

ITEMS	STANDARDS	CERTIFICATIONS
Cell	UL 1642 (Cell)	UL Recognized Component *



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Battery Pack	UL2054 (Battery Pack)	UL Recognized Component *
Cell / Battery Pack	IEC/EN 62133-2 (Battery Lithium Systems)	CB Certification
Battery	UN Transportation Testing (UN38.3) and PI96X for Lithium Batteries	Report Check with HX PLM

The component shall comply with the latest version of the following specifications:

Object/part no.	Technical Data	Standard
Plastic Enclosure	HB or better, 60°C	UL 94, UL 746C CAN/CSA C22.2 No. 0.17
PCB	V-1 or better, 105°C	UL 796 CAN/CSA C22.2 No. 0.17
USB cable (Type C)	--	EN IEC 62680-1-2/ EN IEC 62680-1-3
LED sensor	--	IEC62471
USB cable	VW-1	UL2556/ IEC60332

## 25 Product Environmental Requirement

- Follow WW Channel HyperX Peripheral Product Environmental Compliance Specification (**HWC-COMS-001.xxx**)
- Be compliant with US The Consumer Product Safety Improvement Act (CPSIA)
- Be compliant with Canada SOR/2011-17, SOR/2016-188, SOR/2018-83

## 26 Product Test Report Requirement

For products to sell in China, supplier needs to apply for certification with report that contains CMA, ilac-MRA and CNAS (as logos below).



中国认可  
国际互认  
检测  
TESTING  
CNAS L0296



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## 27 Reliability Requirement

Will do Reliability for both Normal Plastic & PCR Plastic in DVTx stage

No	Item	Condition	Specification	Specimen
1	Frequency response	* Initial * Record the FR data	AE Curve not exceed to the limit	Sample for Drop test, Ramdon vibration test, HTS, LTS, TCT, HTO, LTO, Rated input power and Maximum input power
2	Function check	Initial	Function as normal	all samples
3	Appearance	* FG Color/ Scratch / Damage / Gap / Contamination / burr... not allowed * Printing/Coating Color/ Pin hole/Illegible/contamination/Shift...not allowed * L/M, label Clear and no brust * LED lightness LED lighting	No problem	all samples

### Mechanical test

Generic items

No	Item	Condition	Specification	Specimen
1	Drop test	*Headset (with microphone) 1.5m, one time per face, total : 6 times on metal floor which thicker than 3mm. *Dongle/Control box 1.0m, one time per face, total : 6 times on metal floor which thicker than 3mm.	Mechanical Check - Fitting parts were not bust, crack. - Loose standard can be defined by Engineer team -Tear down d-check for DOE incl. Screw, Soldering, gluing, pressing	3pcs
2	Ramdon Vibration test(without package)	P.S.D : 5~100 Hz 0.015G^2/Hz, 100~200Hz 0.0038 G^2/Hz at 200Hz Overall Grms: 1.48grms Frequency : 5~200Hz Direction: 3 axis (X,Y,Z direction) Duration:1 hour per direction	Mechanical Check - Fitting parts were not bust, crack. - Loose standard can be defined by Engineer team -Tear down d-check for DOE incl. Screw, Soldering, gluing, pressing  Acoustic Check - FR discrepancy: 100-2KHz (±3dB); After 2KHz (FR in spec.) - Listening test: No noise - Recording function normal	3pcs
3	Switch force	Encoder VR Sliding switch Tact switch	Encoder: 175±125g-cm VR: 175±125g-cm Sliding switch: 3~5N Tactility switch: 3~5N	3pcs
4	Knob/Switch/Button durability	Encoder: 10000 times with 360-degree, 20cycles/min VR: 10000 times , 20cycles/min Sliding switch: Tactility Switch: Initial pushing force is 500g +/-100g, testing cycle is 10000 times, about 15 times per minute. Pushing force: average force +100 grams Class I: 50000 cycles , 20cycles/min (vol+/-, chat and playing music) Class II: 5000 cycles , 20cycles/min (Mute, Dolby, Pairing and Battery checking button )	No functional question No noise	3pcs
5	Button press force test	30N , 10sec	No damage Functional test	3pcs
6	Kid safety requirement	Follow EN71-1, ASTM 963 standard. In order to prevent tiny components are swallowed from kids. Small part has to guarantee its attached ability. clip the testing part then pull it out with 10mm/min.	> 3kg	3pcs



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### Headset

No	Item	Condition	Specification	Specimen
1	Clamping force	open the headset to W160 mm, H130mm Stay for 1 minute then test the clamping force Head pad doesn't be supported, ear pad need fitting jig during test.	5N	3pcs
2	Clamping force durability	Enlarge the headset, and open from 100 to 210mm, 3000 times, 20 times/min	initial - 30% off function test	3pcs
3	Ear cup flattening test (for plastic headband only)	See description of remark 15.	1. Slider can't out of the rail 2. Sliding function should be normal.	3pcs
4	Lateral over expansion cycle test	Enlarge the headset at full extraction status, and open to 300mm, 20 times, 10 times/min	Slider function has to be normal	3pcs
5	Sliding lock force	Initial locker force Validate by manual	700 ~800g	3pcs
6	Sliding lock force durability	5000 cycles, 10 times/min	1. Ear cup wouldn't drop down when take headband hanging a 100g weight. 2. Functional test inspection	3pcs
7	Sliding pulling against	Step 1: Pulling force: 150N, 10sec Step 2 : Measurement limit	Step 1: No damage Step 2: Record the breaking force	3pcs
8	Ear cup rotate durability	Inspect deference between L and R shoule be under 30% before testing. 5000 cycles, 20cycles/min	1. Feeling of resistance should be existed. 2. No noise was happened.	3pcs
9	Fork and spk rear cover rotate torque test	50N	function test	3pcs
10	Ear cup torque test	250N-cm	Breaking torque needs to over 250N-cm.	3pcs
11	Mic. Boom bending durability	Rotaring radius is 3 cm Step 1 : 500 times, +60 degree, 10 times/min Step 2 : Step 2 :1000 times, ±90 degree, 10 times/min	Step 1: No noise and flex pipe should be hold position. Step2: Function normal	3pcs
12	Mic. Housing twisting durability	1000 times, +90/-90 degree, 10 times/min 1 time means +90 and -90 degrees"	1. No noise on pipe housing can't split from boom 2. Mic Housing should be able to move back after twisting to limited position.	3pcs
13	Static pull force of MIC tube	Step 1: 10kg ,10sec Step2: Measurement limit	Functional test No noise	3pcs
15	Mic torque force	Mic rotating point from 90 to 135 degrees	3.8+/2.6N. Mic boom falls automatically is not allowed at lower limit, Mic boom should be normally rotated at upper limit.	3pcs
16	Mic torque force durability	Step 1 : 3000 cycles, locker force, 10 times/min Step 2 : 5000 cycles , only check Functionality should be normal	initial - 30% off function test	3pcs
19	Headband folding test	1500 cycles, 2 seconds per cycle. 1 cycle means folding then returning.	Place headset horizontally, ear cup can't across folding nub by gravity.	3pcs
24	Ball drop test for wheel (VR/encoder)	Steel ball weight : 250 g Height : 150 cm Ball drop times : 1 time	1. Listening test: No noise 2. Wheel function normal 3. No damage	3pcs
25	Sliding test of sliding door ( Reference : Alpha 5 )	Initial pushing force is 500g +/-100g, testing cycle is 10000 times, about 15 times per minute.	door can't be loose and clicking feel has to be existed.	3pcs
26	Pushing force against for metal part.	Use Dia, 3cm steel stick with 50N force pushing on center of metal part for 30 seconds. (on product) e.g. metal deco cover (Less than 3cm can be discard)	Deformation/ Dent is not allowed	3pcs
New	Button life reliability - Power Switch	Loading : 300 +/- 5g Frequency: 1 times/sec Operation cycle: 3000 times	Function ok No functional damage No Noise while pushing Force Difference after test < +/-30%	3pcs



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Cable / SR /Audio plug/ USB connector / Audio jack /USB Receptacle

No	Item	Condition	Specification	Specimen
1	Swing test of cable & SR	<p>*<b>Audio cable (Audio plug)</b>  Step 1 : +/- 90 degree, R3 , 20 times/min, 10000 cycles  Cable diameter  1.0 ~ 2.4mm , 100g  2.5 ~ 3.0mm , 150g  3.1 ~ 4.0mm , 300g</p> <p>Step 2 : Measurement limit or achieve 20000 cycles .</p> <p>*<b>USB cable (Standard A, Type C)</b>  +/- 90 degree, R3 , 20 times/min, 5000 cycles  Cable diameter  1.0 ~ 2.4mm , 100g  2.5 ~ 3.0mm , 150g  3.1 ~ 4.0mm , 300g</p>	Function test  Impedance increase should not be greater than 50%. ( Each wire must be individually recorded, but does not include shielding.)	3pcs
2	SR Shock test	<p>*<b>Headset</b>  -Cable length: 50 cm, 10 times  -Plug direction: vertical &amp; horizontal  -Weight: base on headset's weight</p> <p>*<b>Dongle &amp; Cable plug</b>  -Cable length: 50 cm, 10 times  -Plug direction: vertical &amp; horizontal  -Weight: 250g</p>	Plug: No damage  Functional existed	3+3pcs
3	Static pulling test for SR	Apply 8kg with 10 sec; Direction : 180 degree Cable length: 50 cm	No mechanical damage found  Functionality should be normal	3pcs
4	Bending Test - Audio plug pin	1. Fix the last pin of the plug on the fixture, the jig width: d2.5mm plug, width is 4mm. d3.5mm plug, width is 5mm. 2. Apply a pushing force in tip of plug remaining 10 seconds. Speed is 25mm/min. 3. Inspect appearance, construction and function.	After pushing force with 8kgf, plug function should be normal, no permanent deformation, each joint can't be loose.  After pushing force with 10kgf, Plug can't be broken.	3pcs
5	Pulling test- Audio plug	*20N, 10 sec	No damage	3pcs
6	Bending test - (Audio/USB) Plug	<p>*<b>Plug of cable ( Audio plug/ standard A/ type C )</b>  Plug (Fix Headset then press Audio plug)  25N, 20mm, 4 direction, 3 cycles with 10 seconds</p> <p>*<b>Tx dongle (Standard A)</b>  20N, 40mm, 4 direction, Velocity is 10mm/min provide the maximum strength force.</p> <p>*<b>Tx dongle (type C)</b>  23N, 35mm, 4 direction, Velocity is 10mm/min provide the maximum strength force.</p>	No damage  Function test	3pcs
7	Torque test - USB connector	* <b>Tx dongle only (Standard A/Type C)</b> +/- 3 degree, 500 cycles, 10 time/min	No damage  Functional test	3pcs
8	Plug insertion/extraction force test	Removal /Insertion speed – at a maximum rate of 12.5 mm(0.492") per minute	<p>*<b>Stand A connector</b>  Removal Force – 10-25N  Insertion Force – 10-35N</p> <p>*<b>Type C connector</b>  Removal Force – 8-20N  Insertion Force – 5-20N</p> <p>*<b>Audio plug</b>  Removal/Insertion Force – 6-30N</p>	3pcs



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9	Plug Insertion/extraction durability test	<p><b>*Stand A connector</b> Test cycle: 1500 insertion/extraction cycles at a maximum rate of 200 cycles/hrs</p> <p><b>*Type C connector</b> Test cycle: <b>10000</b>, insertion/extraction cycles at a maximum rate of 500 cycles/hrs</p> <p><b>*Audio plug</b> Test cycle: 1500 insertion/extraction cycles at a maximum rate of 1200 cycles/hrs</p>	<p>Functionality should be normal No mechanical damage found</p> <p><b>*Stand A connector</b> Removal Force &gt;10N at a maximum rate of 12.5 mm(0.492") per minute Insertion Force &lt;35N at a maximum rate of 12.5 mm(0.492") per minute</p> <p><b>*Type C connector</b> Removal Force &gt; 6N at a maximum rate of 12.5 mm(0.492") per minute Insertion Force &lt;20N at a maximum rate of 12.5 mm(0.492") per minute</p> <p><b>*Audio plug</b> Removal/Insertion Force 6~30N at a maximum rate of 12.5 mm(0.492") per minute</p>	3pcs
10	Pushing test- Audio Jack/ USB Receptacle	Pushing force 70N	Functional test	3pcs
11	Bending test -Audio Jack/USB Receptacle	50N at 15mm from the edge of the receptacle : each directions(4 directions)	Function test	3pcs

### Environmental stress

No	Item	Condition	Specification	Specimen
1	HTS (High Temperature Storage)	55°C, 85%RH Duration : 48 hours	<p><b>Mechanical Check</b></p> <ul style="list-style-type: none"> <li>- Fitting parts were not bust, crack.</li> <li>- Loose standard can be defined by Engineer team</li> <li>-Tear down d-check for DOE incl. Screw, Soldering, gluing, pressing</li> </ul> <p><b>Acoustic Check</b></p> <ul style="list-style-type: none"> <li>- FR discrepancy: 100-2KHz (<math>\pm 3</math>dB); After 2KHz (FR in spec.)</li> <li>- Listening test: No noise</li> <li>- Recording function normal</li> </ul>	3pcs
2	LTS (Low Temperature Storage)	-10°C Duration: 48 hours	<p><b>Mechanical Check</b></p> <ul style="list-style-type: none"> <li>- Fitting parts were not bust, crack.</li> <li>- Loose standard can be defined by Engineer team</li> <li>-Tear down d-check for DOE incl. Screw, Soldering, gluing, pressing</li> </ul> <p><b>Acoustic Check</b></p> <ul style="list-style-type: none"> <li>- FR discrepancy: 100-2KHz (<math>\pm 3</math>dB); After 2KHz (FR in spec.)</li> <li>- Listening test: No noise</li> <li>- Recording function normal</li> </ul>	3pcs
3	TCT (Temperature Cycle Test)	-10°C ~ 55 °C Duration: 5 cycles Zone 1: 60 min. Zone 2: <= 60 min Zone 3: 60 min, Zone 4: <=30 min	<p><b>Mechanical Check</b></p> <ul style="list-style-type: none"> <li>- Fitting parts were not bust, crack.</li> <li>- Loose standard can be defined by Engineer team</li> <li>-Tear down d-check for DOE incl. Screw, Soldering, gluing, pressing</li> </ul> <p><b>Acoustic Check</b></p> <ul style="list-style-type: none"> <li>- FR discrepancy: 100-2KHz (<math>\pm 3</math>dB); After 2KHz (FR in spec.)</li> <li>- Listening test: No noise</li> <li>- Recording function normal</li> </ul>	3pcs



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4	HTO (High Temperature Operation)	40+/-3°C, 60+/-5 %RH Duration : 24 hours Input rated power with Pink Noise bandwidth rated power	<p>Mechanical Check</p> <ul style="list-style-type: none"> <li>- Fitting parts were not bust, crack.</li> <li>- Loose standard can be defined by Engineer team</li> <li>-Tear down d-check for DOE incl. Screw, Soldering, gluing, pressing</li> </ul> <p>Acoustic Check</p> <ul style="list-style-type: none"> <li>- FR discrepancy: 100-2KHz (<math>\pm 3</math>dB); After 2KHz (FR in spec.)</li> <li>- Listening test: No noise</li> <li>- Recording function normal</li> </ul>	3pcs
5	LTO (Low Temperature Operation)	-10°C Duration : 24 hours Input rated power with Pink Noise bandwidth rated power Wireless headset need to be connected to the power cord for this test	<p>Mechanical Check</p> <ul style="list-style-type: none"> <li>- Fitting parts were not bust, crack.</li> <li>- Loose standard can be defined by Engineer team</li> <li>-Tear down d-check for DOE incl. Screw, Soldering, gluing, pressing</li> </ul> <p>Acoustic Check</p> <ul style="list-style-type: none"> <li>- FR discrepancy: 100-2KHz (<math>\pm 3</math>dB); After 2KHz (FR in spec.)</li> <li>- Listening test: No noise</li> <li>- Recording function normal</li> </ul>	3pcs
6	UV Light Resistance Test	For finish good, 1. Light Source : UVA-340 2. Irradiance : 0.72w/m^2 3. Wavelength : 340nm 4. Irradiation (dry) : 700C 5. Distance : 5cm 6. Testing time : For all cosmetic parts :72 hours	<p>1. Color shifts less than 4 of 5 according to grey scale ISO 105-A02 for dark colors 2. Color shifts less than 4.5 of 5 according to grey scale ISO 105 - A03 for light colors</p>	3pcs
7	Salt Spray Test (metal parts)	ASTM B117 Temperature : 35°C Salt concentration: 5% PH value:6.5~7.5 Test time:24hr	<p>No cosmetic issue found No peeling off or any visual defect observed on tested surface. Discoloration is unacceptable.</p>	3pcs
8	ESD	Internal/ODM testing SPEC Contact Discharge: +/- 8kV Air Discharge: +/- 12kV Discharge ten (10) times who focus on gap and opening.	<p>Function and Visual must meet requirement of Headset product inspection criteria.</p> <p>Acoustic Check</p> <ul style="list-style-type: none"> <li>- FR discrepancy: 100-2KHz (<math>\pm 3</math>dB); After 2KHz (FR in spec.)</li> <li>- Listening test: No noise</li> <li>- Recording function normal</li> </ul>	3pcs
9	Chemical Test (finish good)	Temperature: 45°C Humidity: 90% Testing period: 24 hours Chemicals: sunscreen lotion (SPF 50), olive oil, Hand cream, Hair Gel, Human Perspiration( $\text{pH } 6.50 \pm 0.10$ ). 1. Using the pipette to apply chemicals as below onto the surface of product 2. Leave the chemical on the surface for 24 hours at room temperature 3. After the 24 hours, wipe off the chemical from the surface with cloth lightly 4. Check the sample visually after two hours recovery time	<p>Acceptance Criteria Product should function normally after test Any change in color, surface roughness, blistering or cracking is a fail.</p>	3pcs
10	移形試驗 (migration)	For leather and fabric 72 hrs, Weight with 500g, 50mm diameter of Contact area, test board material: ABS, PC 55°C, 50%RH	No change	3pcs



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### Acoustic : Input Power capability

No	Item	Condition	Specification	Specimen
1	Rated input power	100% of rated input power for specification, 100hr	1. Functional test 2. No damage 3. FR check (Before/ After testing): Headset : 100 ~ 2K Hz(±3dB) / After 2KHz (FR in spec.) Microphone: 100 ~ 2K Hz(±3dB) / After 2KHz (FR in spec.)	3pcs
2	Maximum input power	100% / 150% of maximum input power for specification, 1min ON/2min Off as 1cycle, 10cycle for minimum requirement.	1. Functional test 2. No damage 3. FR check (Before/ After testing): Headset : 100 ~ 2K Hz(±3dB) / After 2KHz (FR in spec.) Microphone: 100 ~ 2K Hz(±3dB) / After 2KHz (FR in spec.)	3pcs

### Painting / Printing Test (For cosmetic parts with surface treatment)

No	Item	Condition	Specification	Specimen
1	Tape adhesive	Tape : Scotch No.600, peel it quickly, 3 times	No peeled off	3pcs
2	Cross cutting	Hundred square test: electroplating, rubber coating, painting	<= 5% Refer ASTM-D3359	3pcs
3	Alcohol test	99%, Load: 500gf, Stroke: 25.4mm, Speed : 1time(to and from) 2 sec, total 30 times Cable printing, 200g, 10 times	Appearance change is not allowed	3pcs
4	Wear test ( Rubber Eraser )	Rubber Eraser : TABER CS-10F Load : 150gf, Stroke: 25.4mm, Speed : 1time(to and from) 2 sec, total 70 times	Exposing base material is not allowed	3pcs
5	Hardness Test by Pencil	Use Mitsubishi UNI/2H, Angle : 45 degree, Load : 500gf, 5 times	Exposing base material is not allowed	3pcs
6	RCA	RCA Abrasion machine 175 grams load counter weight 11/16" Abrasion tape 15 times/min with 15 cycles. travelling 16 mm per cycle.	Exposing base material is not allowed	3pcs
7	Palm perspiration	Apply on the surface, 24 hrs - synthetic sweat (PH6.5&PH10)	No significant or noticeable changes to the surface are allowable, such as; blisters, spots, chips, deviation in brightness, bleeding or change of color.	3pcs



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### Package test

No	Item	Condition	Specification	Specimen
1	Product Label Barcode Grading Test	2D Barcode Grading, 2pcs	2D Barcode Grading, better than D.	2pcs
2	Product Label Abradant Test	Abradant Test, a. Alcohol, 2pcs, - Alcohol type: Isopropanol Alcohol - Load: 100 gf - Rubbing Rate: 30 cycles (2 sec/cycle) b. Rubber, 2pcs - Abradant type: TABER CS-10F - Load: 80 gf - Rubbing Rate: 70 cycles (2 sec/cycle) for 2nd print, 30 cycles (2 sec/cycle) for pre-print.	1.No visible damage or peeling. 2. Abradant Test, Barcode readable by smart phone after Abradant Test is pass, no need grading review.	4 pcs (2pcs/eac h item)
3	Seal sticker	1.Single box drop , 97cm , 1 time 2.Environment test in below 3 conditions. Hanger & label affected should be hanging with 120% of content weight to validate. a.Temp. 55 degree C, Hum. 85%, 48hrs -> room temp. 6hrs b.Temp.-10-55 degree C, Scycle, -> room temp. 6hrs c.Temp.-10 degree C, 48hrs -> room temp. 6hrs	No visible damage or peeling. Provide clear sticker picture of before / after test.	2 pcs
4	Hanger Durability Test	1. Bending 50 times 2. Apply weight, 120% of the content weight. 3. Room temperature, 6 hours 4. 38°C; 85%RH; ±5%, 5 days	Hanger function review, no visible damage or peeling on both Hanger or Box.	1pcs
5	Drop test - AMZ SIOC self test [Single box]	Step 1. Packaging Sealing: All open edges must be adequately sealed to ensure the product remains protected. Step 2, follow the procedure from below 2 videos to perform drop test Step 3, Record picture / testing result in amazon template if test is passed.	1. Function test 2. Package structure check 3. No hazardous on user during unboxing. 4. No visible damage on Label and product	1 Box
6	ISTA 2A Test [Shipping Box]	(Pre Test: Drop + Vibration 3 face, 30mins) Follow ISTA 2A sequence S2 Atmospheric conditioning: 38°C , 85%RH, 72 hrs S3 Compression: Machine Apply and Hold S: stack q'ty of ocean ship F: use 5 S4 Vibration : Random S5 Drop S6 Vibration : Random	1. Function test 2. Package structure check 3. No hazardous on user during unboxing. 4. No visible damage on Label and product	1 Carton

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