

ICEpower200ASC Designer's Manual

200W ICEpower Amplifier with integrated ICEpower Supply

Version 2.0

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Introduction

This document is intended as a design-in guide for users of the ICEpower200ASC module. The recommendations of this document are based on the knowledge accumulated through the development and approval process of the ICEpower200ASC, but since no two applications are alike the recommendations of this document can only serve as a general guideline for your specific design.

ICEpower has taken great care to ensure quick and easy implementation of the module in any application. However, correct cable routing and grounding must be always observed to guarantee a quick and easy final product approval.

Important Notes

Over current protection

The over current protection of the ICEpower200ASC is only intended to protect the module from overload and phase-to-phase short circuits on the output. Shorting one of the speaker outputs to ground will cause irreparable damage to the module.

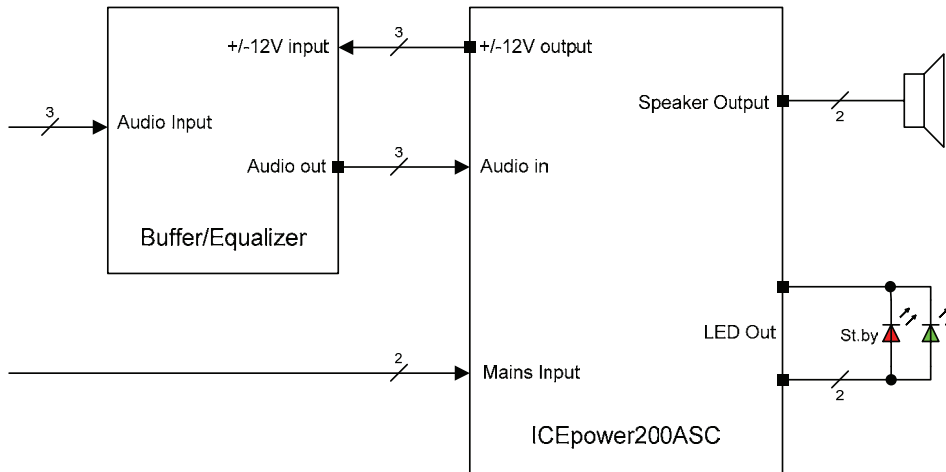
The auxiliary $\pm 12V$ outputs are not over current protected. Even a brief short circuit on these outputs may damage the device.

Powering 200AC hanger modules

The ICEpower200ASC can power up to two extra ICEpower200AC amplifier channels for use in stereo, multi-way or multi-channel configurations. For information on proper signal routing and grounding in such setups, please refer to the ICEpower200AC Application Note.

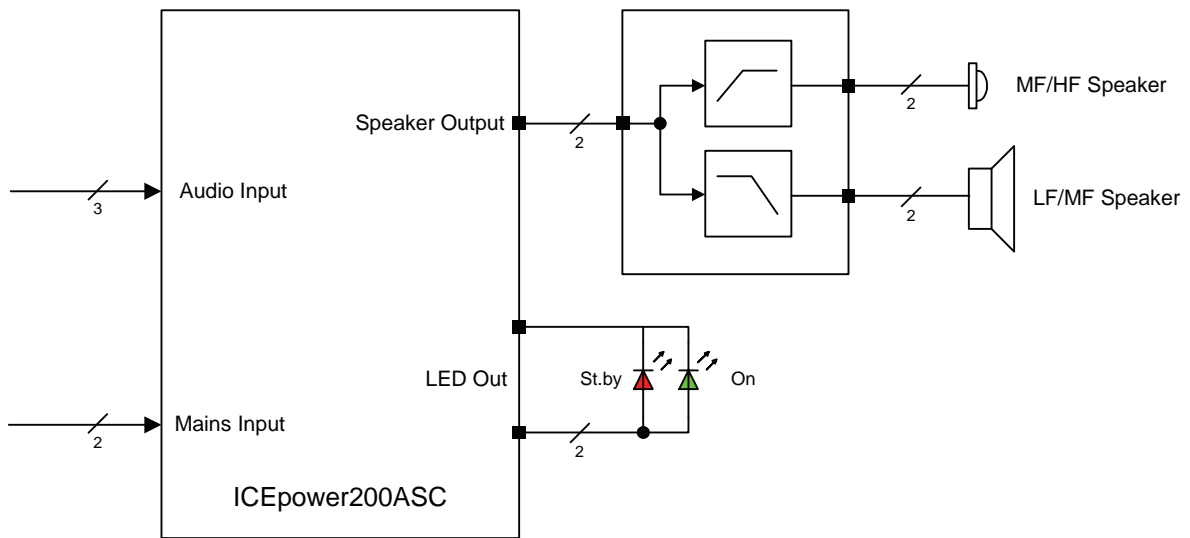
Typical Wiring Diagrams

Active Crossover



Example 1: 1 way active speaker (eg. subwoofer)

Passive Crossover

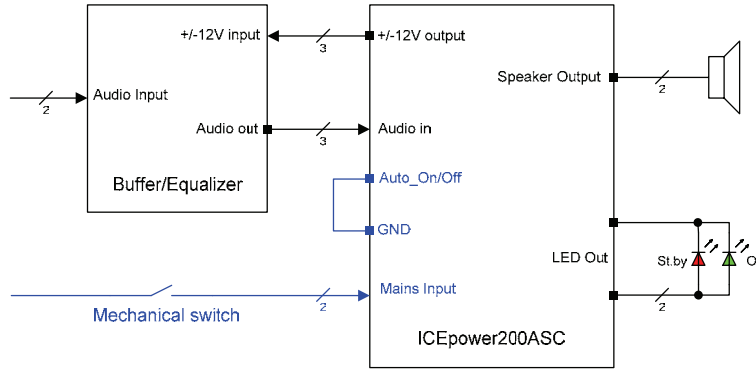


Example 2: 2-way passive loudspeaker

Different Ways to Power-up

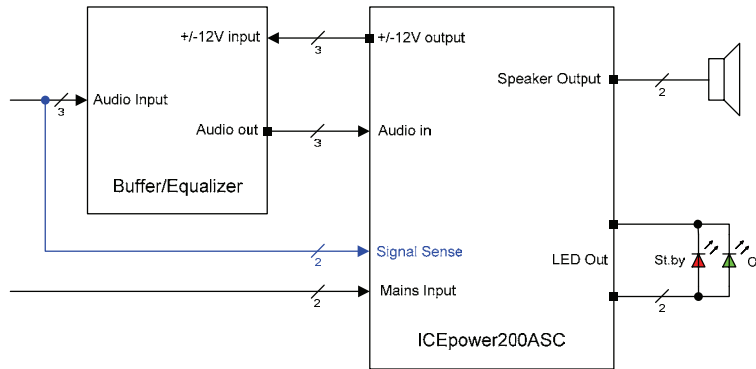
For further information regarding power-up please refer to the datasheet under the section *Features*.

Mains Switch



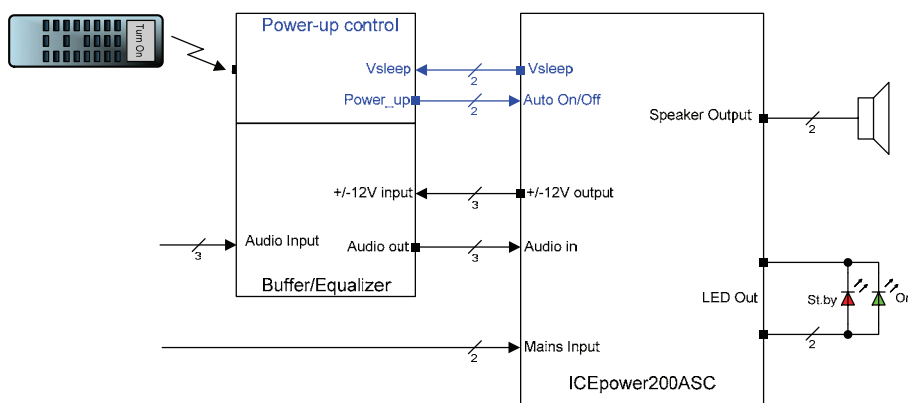
Example 3: Power-up by switching on mains

Signal Sense



Example 4: Power-up controlled by Signal Sense-pin

IR Receiver



Example 5: Power-up by remote-controller

Shielding and Grounding of Audio Signals

To eliminate hum and noise due to ground loops and induced noise, proper grounding and cable routing are very important. Schematics showing the recommended ground and shielding philosophy can be found in Appendix A.

When dealing with switching amplifiers unwanted frequency components may be present at the output of the amplifier. These signals (called spurious output) must be kept to a minimum to avoid audible effects. Avoiding spurious output requires attention to cabling and grounding. ICEpower recommends connecting the ground to the chassis through the centre mounting hole (shown in appendix A)

The analogue audio signal input interface is intended for balanced signal routing for best performance. However, a single-ended audio input interface can be configured by shorting the negative signal input to ground. Short pin 6 and pin 7 in the signal connector (J3).

EMI Management

ICEpower amplifiers and power supplies utilize the latest switching technology to offer intelligent, compact and efficient audio power conversion systems. However, operating with fast switching signals generates unwanted high frequency noise. Unless the necessary high frequency design precautions are not taken this noise may exceed the standardized EMI limits.

The ICEpower200ASC has been pre-approved according to the following EMC standards:

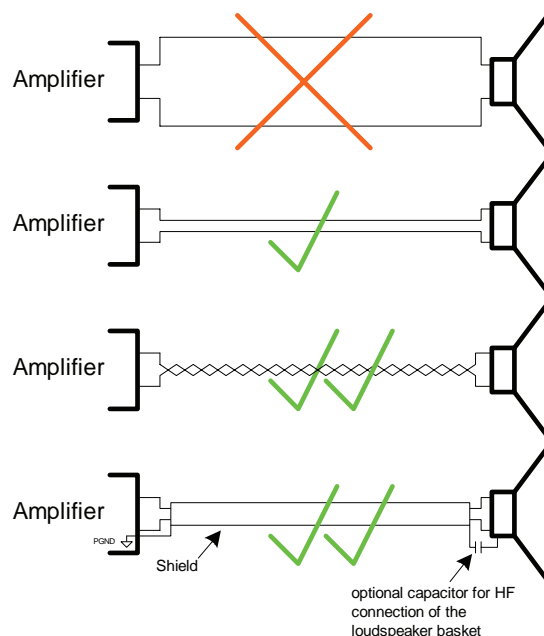
- EN55013
- EN55020
- EN61000-2
- EN61000-3
- FCC part 15-B

The device under test is mounted on a backplane and loaded with a resistive load (see test setup on page 8). The test signal is pink noise corresponding to $1/8^{\text{th}}$ of the rated power dissipated in the load. Even though the ICEpower200ASC module is pre-approved for EMC, it is always necessary to approve the final product according to the applicable standards on EMC.

Do's and Don'ts

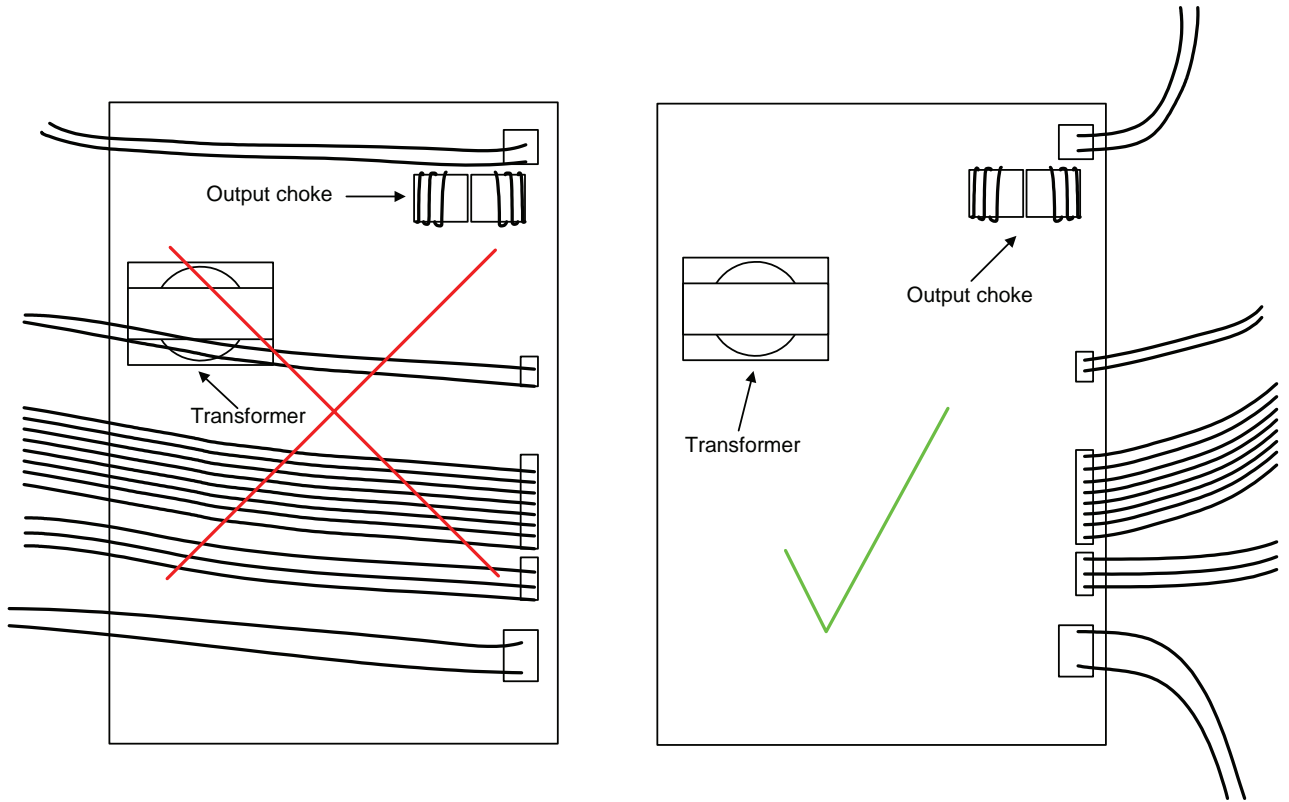
EMI is emitted from any cable carrying RF currents. This chapter describes some guidelines to help reduce EMI in an ICEpower system.

- Loops conducting RF currents emit EMI. It is important that speaker cables are twisted, shielded or at least run closely paralleled to reduce the loop area as much as possible. The same applies to mains and internal power supply cables as well as signal cables.

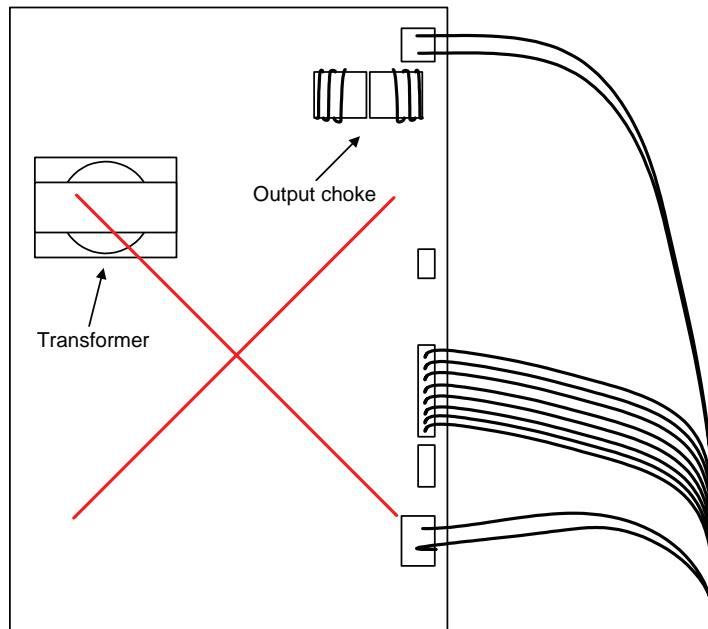


Note: When using shielded loudspeaker cable, the shield should not be connected directly to the basket of the loudspeaker. Loudspeakers may short the voice coil to the basket during heavy load resulting in damage to the module due to the short to ground. This can be avoided by making the connection to the basket through a small capacitor.

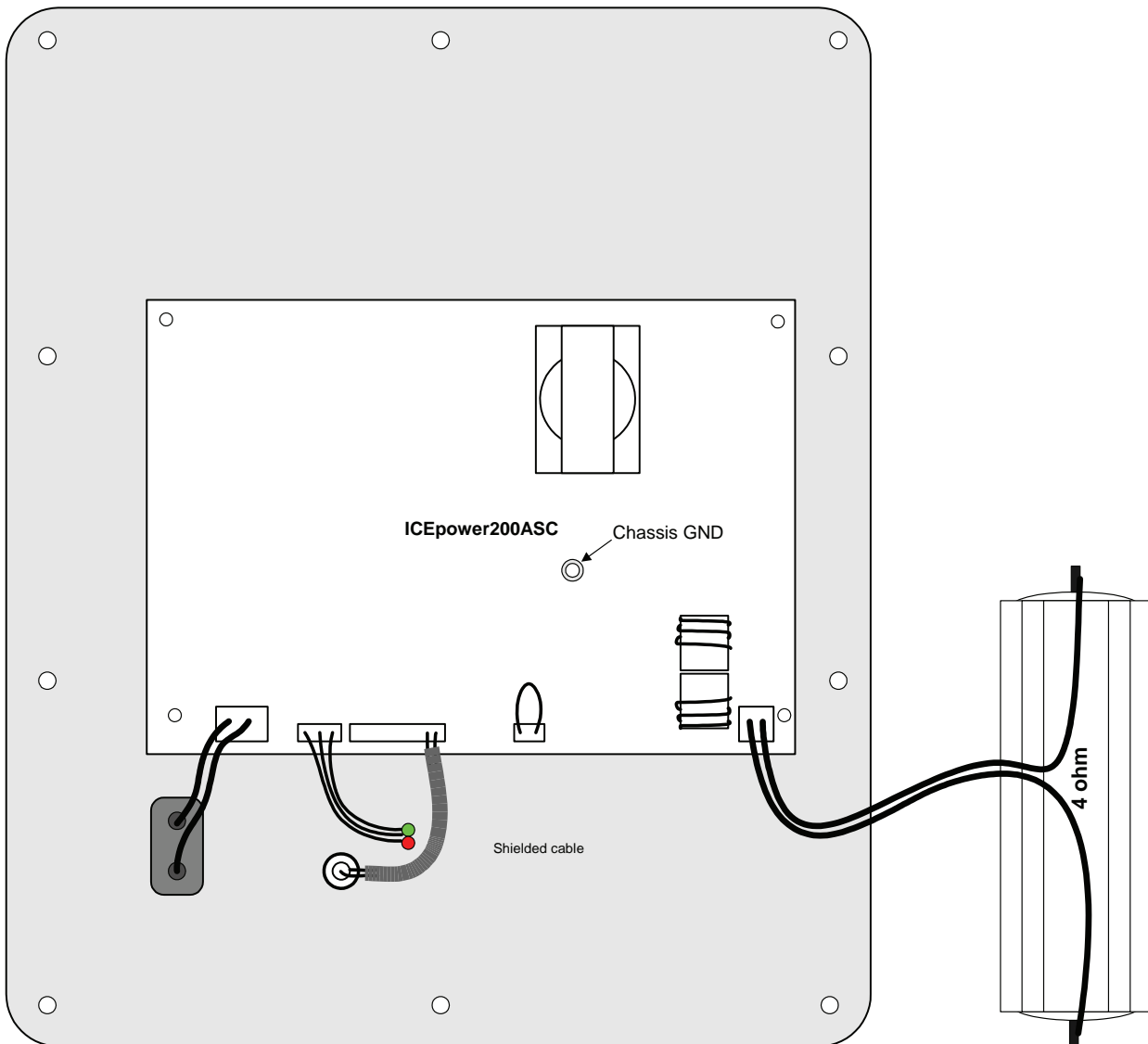
- Do not run the cables to the modules near the amplifier output choke or the power supply transformer.



- Do not bundle input, output and mains cables to the modules.



During the ASC approval phase the following internal wiring setup was used:



Note the proper routing of the cables.

Mechanical Mounting

The ICEpower200ASC module is designed for mounting either inside or outside the acoustic volume of a speaker enclosure or inside a normal amplifier metal cabinet. Avoid loudspeaker cabinet damping material close to the module and ensure free airflow around the module to maximize thermal performance. Vertical mounting is preferred.

The module is mounted by means of the five 3.5mm holes in the board. The holes are indicated on the illustration on this page.

Safety

To ease the design-in process the ICEpower200ASC module have been safety approved by CSA according to the following standards:

Europe: IEC60065 7th ed. (2001)

US: UL6500 2nd ed.

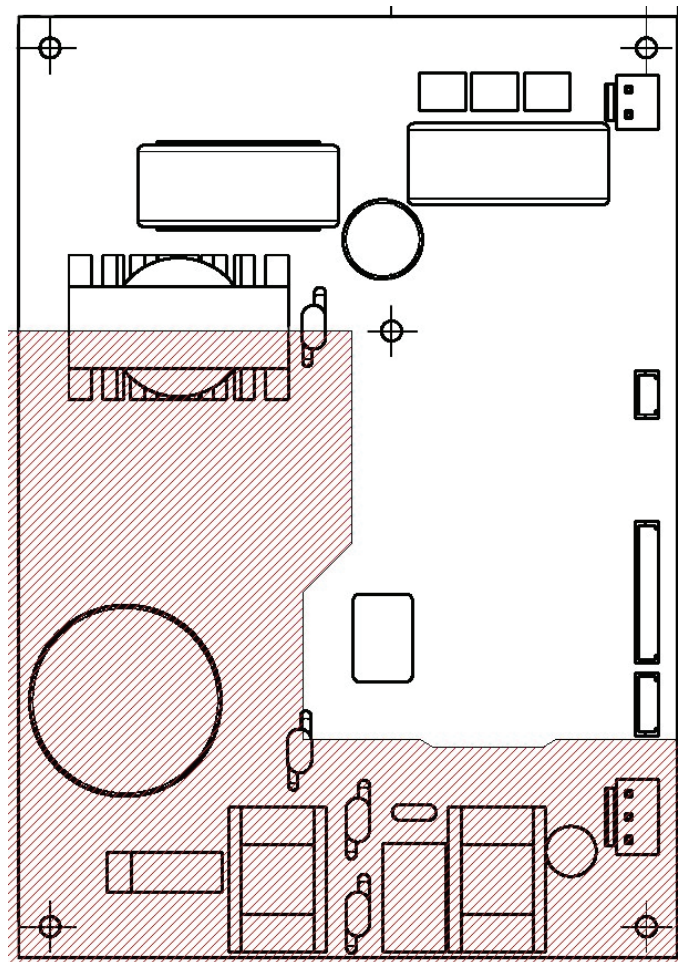
CA: E60065 6th ed.

Safety class

Class 2 (without earth)

Safety guidelines. ⚠

The ICEpower200ASC module is developed for class-2 equipment. Therefore all secondary parts must be kept at least 6mm away from the primary side. On the illustration below the primary side is indicated with a red hatching. All components and PCB tracks within this area are connected to the primary side, including components on the back of the PCB.



Thermal Design

General

Even with the high efficiency of the ICEpower200ASC module, proper thermal design is very important

When doing the thermal design and tests it is important to note that the amplifiers are to be used for music signal reproduction. Thorough investigations have shown that the RMS level of any music signal does not normally exceed $1/8^{\text{th}}$ of the peak value. Consequently, pink noise with an RMS level corresponding to $1/8^{\text{th}}$ of the rated maximum power should be used as the worst-case signal along with various music signals.

The ICEpower200ASC module has full onboard thermal protection for both the power supply and amplifier section. This protection circuitry shuts down the module if the temperature reaches critical levels.

Please note that in case of thermal shutdown the module must be reset by disconnecting the mains.

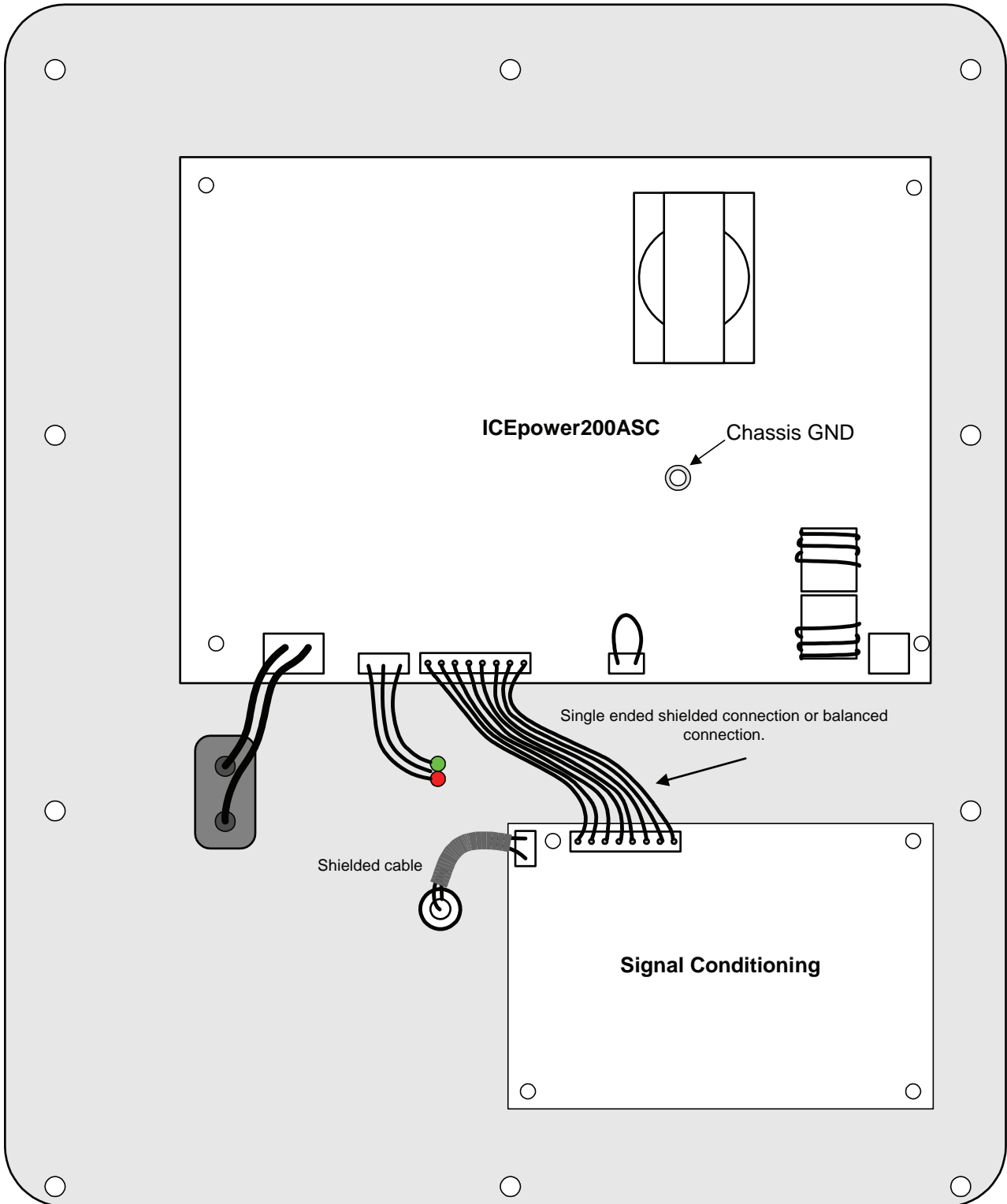
Notice

The data sheet contains specifications that may be subject to change without prior notice. ICEpower® is a trademark of Bang & Olufsen ICEpower a/s.

Bang & Olufsen ICEpower a/s products are not authorized for use as critical components in life support devices or systems without the express written approval of the president and general counsel of Bang & Olufsen ICEpower a/s. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

Appendix A - Recommended Wiring Diagram



Appendix B - Evaluation Kit Cables

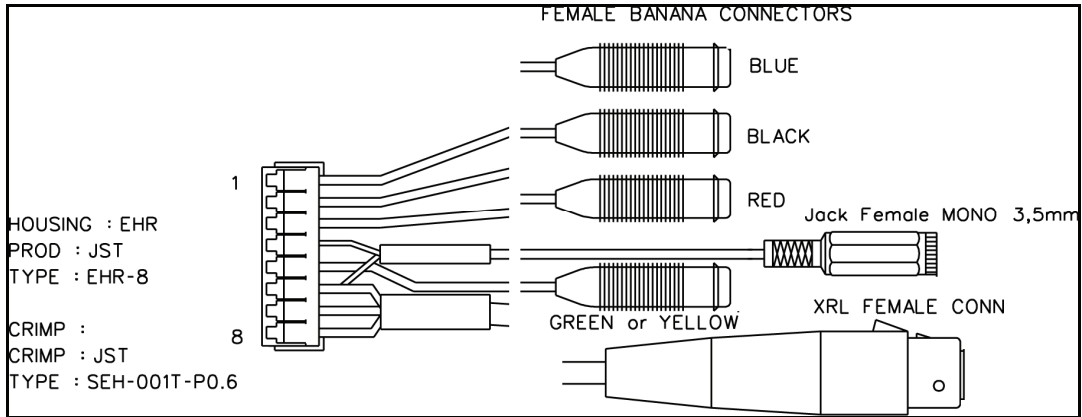


Fig. 1: Signal cable (ICEpower part number 6277846)

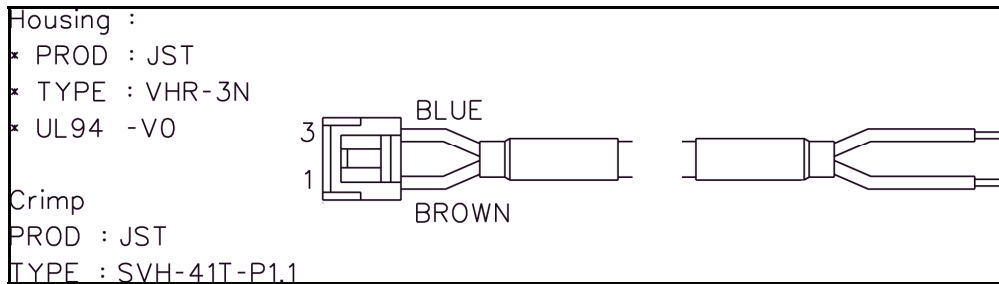


Fig. 2: Mains cable (ICEpower part number 6277847)

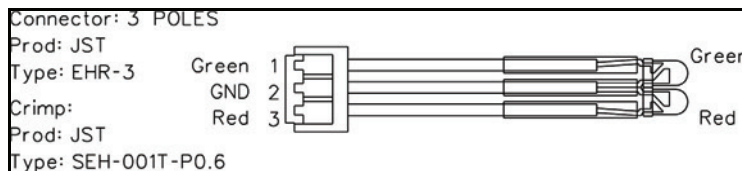


Fig. 3: On/Standby Indicator LEDs (ICEpower part number 6277848)

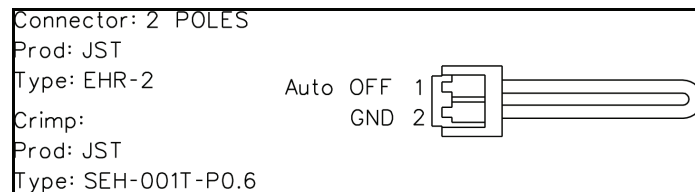


Fig. 4: Auto On/Off Jumper (ICEpower part number 6277849)

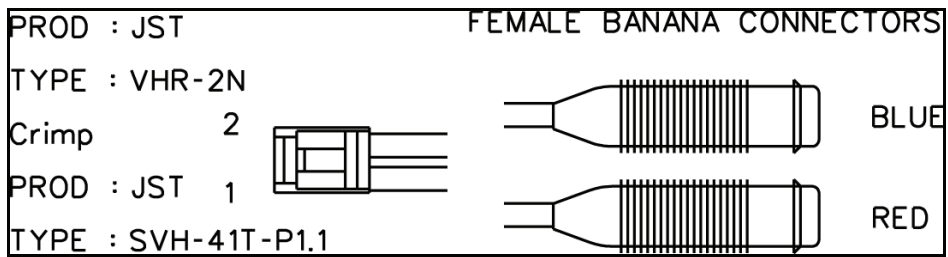


Fig. 5: Speaker Cable (ICEpower part number 6277692)

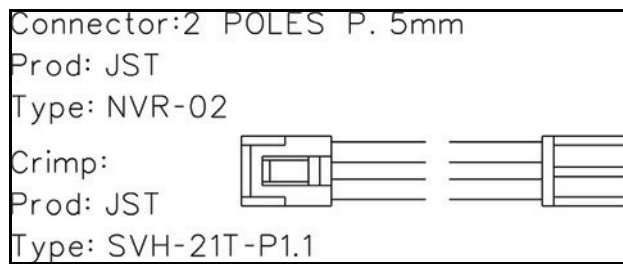


Fig. 6: Optional +47V Loop cable for powering 200AC hangers (ICEpower part number 6277922)