Alcorn McBride Inc.

RideAmp User's Guide

INTELLIGENT ON-BOARD AMPLIFIER

August 26, 2022

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WELCOME!

Congratulations on your shiny new Alcorn McBride RideAmp!

RideAmp has been designed to provide a rugged, flexible, and powerful audio amplifier solution that is purpose-built for on-board audio applications such as coasters, dark ride vehicles, and parade floats.

For a lack of better options, these applications are often forced to use commercial grade amplifiers that were designed for automotive or marine applications. There are many unfortunate drawbacks to this approach such as:

1. **Consumer-grade Interconnects** - Unbalanced analog RCA inputs.
2. **Vibration-sensitive Design** – No protective coating and no protection for electronic components.
3. **No Intelligence** – No ability to remotely monitor amplifier health, power status, temperature, etc.

RideAmp changes the game by providing a platform that was designed specifically for this niche application. It is a rugged solid-state solution that's designed to endure the high-vibration environments frequently encountered within ride vehicles. We've taken steps like reducing high-mass electronic components, conformal coating circuit boards, and adding protection to larger components to make it an extremely durable design.

All interconnects offer professional inputs and outputs that are better suited for this type of environment. Captive Molex connectors with gold-plated pins provide reliable connections for power, speakers, balanced analog audio inputs, and serial control/monitoring. M12 connectors offer mechanically secure network connections that provide an all-digital signal path for network audio and reliable access to control/status information.

When one or more RideAmp units are paired with an Alcorn McBride RidePlayer, you have a complete solution that offers perfectly synchronized audio, DSP, high-power amplification, and comprehensive status monitoring of the entire on-board audio system.

These products leverage our 35 years of experience in designing products specifically for themed entertainment applications. In true Alcorn McBride fashion, the solid-state and rugged design of these products will ensure years of 24/7 maintenance free operation which is essential to zero downtime for attractions. It is our mission to provide solutions that are suited for the unique demands of themed entertainment applications like theme park attractions, amusement parks, and museums.

PRODUCT FEATURES

AUDIO FEATURES

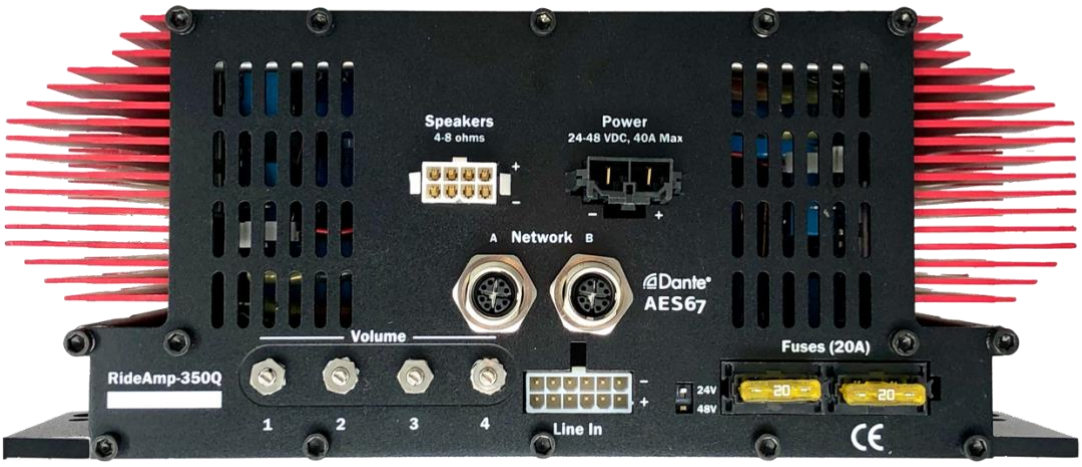
This product features a powerful 4-channel audio amplifier system with professional input options and monitoring.

The audio features are:

- **4-channel High-power Amplification**

Mode	24VDC	48VDC
Single (4Ω)	250W	350W
Single (8Ω)	135W	190W
Single (16Ω)	68W	95W
Bridged (8Ω)	500W	700W
Bridged (16Ω)	270W	380W

- **Balanced Audio Inputs**
- **4x4 AES67/Dante Network Audio Input**
- **Remote configuration and monitoring via Control Network**
- **Gain control /w military-grade locking potentiometers**

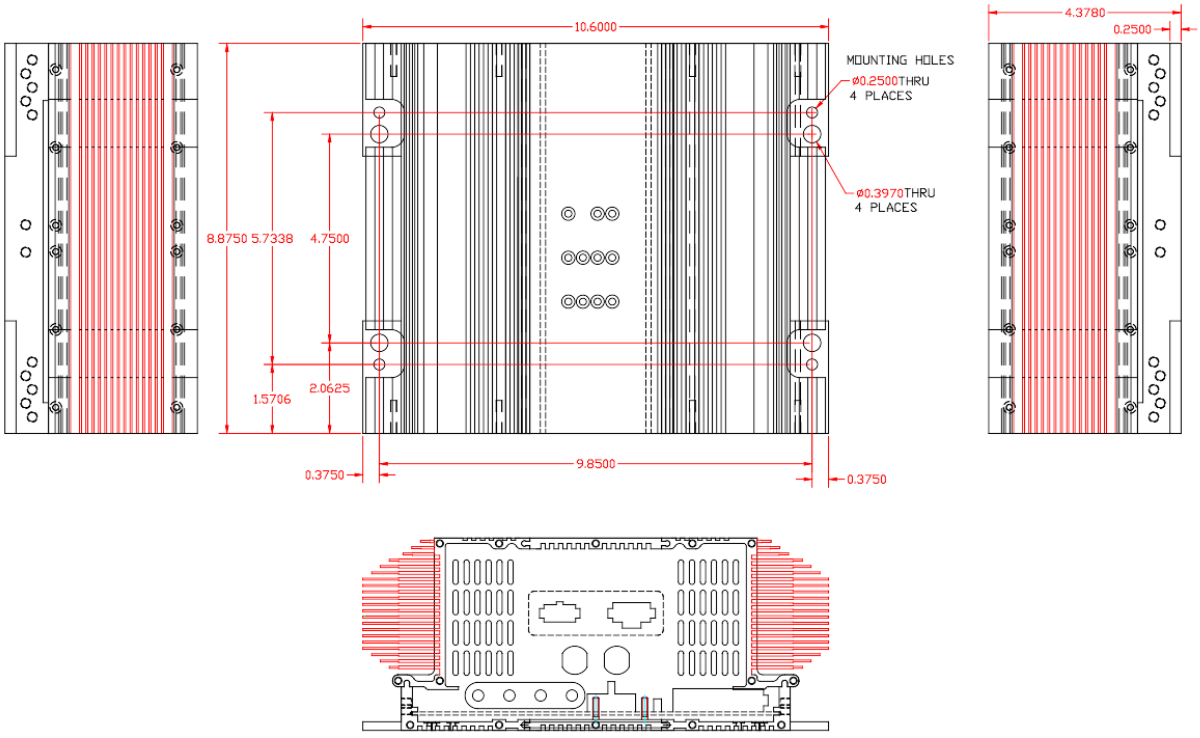


PHYSICAL FEATURES

This product's rugged solid-state design enables it to endure the harsh environments of coaster, dark ride, and applications. It offers flexible mounting options, industrial-grade connectors, DC power input, and a rock-solid chassis design.

Physical features include:

- **Vibration Resistant Design**
  - Coasters, Dark Rides, Parade Floats, Parking Trams, etc.
- **24-48VDC Power Input /w software monitoring**
- **Rugged Locking Molex connectors**
  - Power
  - Analog Audio Inputs
- **M12 X-Coded Ethernet Connectors**
  - AES67/Dante Network Audio
  - Control and Status Monitoring
- **Dimensions – 10.6"L x 8.9"W x 4.4"H – Surface Mount**
  - Compatible with JL Audio MHD600/4 Mounting Points
- **Weight – 10.3lbs**



TECHNICAL SUPPORT

Now that we've tantalized you with all of the wonderful things this product can do, I'll bet you're chomping at the bit to flip all the switches and push all the buttons. Not so fast! Before we get to the fun stuff, we just want to take a moment to remind you that we are here to help. Chances are that you're building something really cool and we want you to have access to the resources and support you need to be successful.

To start, you'll find a wealth of information on our website. This includes Application Notes that give you detailed documentation and examples for how this product is used in common types of themed entertainment projects. You'll also find the latest downloads for software, firmware, drawings, 3D models, cutsheets, and other helpful resources on our Support page. The Knowledge Base is especially handy for common questions and helpful troubleshooting tips. And last, but certainly not least, you always have our friendly and mildly entertaining staff available by email or telephone.

Application Notes	http://www.alcorn.com/applications
Support Resources	http://www.alcorn.com/support
Knowledge Base (FAQ)	https://alcornmcbride.zendesk.com/hc/en-us
Email Support	support@alcorn.com
Telephone Support	(407) 296-5800 (Mon-Fri 9am-6pm EST)

GETTING STARTED

Alright, time to roll up your sleeves and get to work! This section will guide you through basic concepts that will help you get on your way with RideAmp.

WIRING AND CONNECTIVITY

A few connections are required to experience the core functionality of RideAmp. If you're the DIY-type that's comfortable with purchasing and crimping your own connectors and pins, you'll be happy to know that this product uses industry-standard connectors which are documented in detail in the **Hardware Information** section of this User's Guide. For those looking for the path of least resistance, we strongly encourage you to order a RideAmp-350Q Development Kit covered in the **Accessories** section of this document. This kit provides a full set of pre-fabricated connectors and a power supply, so you spend less time crimping and get right to bench testing your RideAmp-350Q.

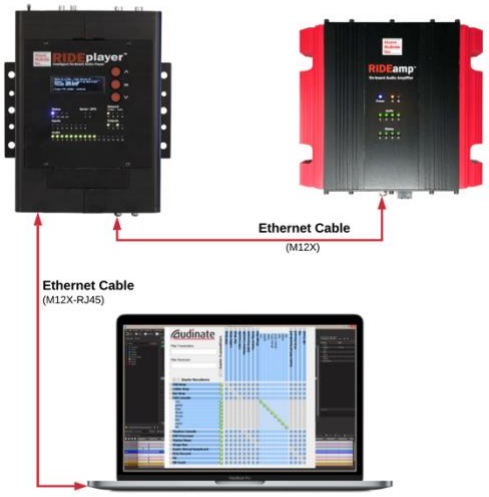
POWER

Our engineers are working around the clock to eliminate the need for those pesky Electrons. However, until they inevitably succeed, RideAmp needs power to work properly.

You'll want to start by connecting RideAmp's power input to a 48VDC or 24VDC power source like a battery, super-capacitor, or power supply. To get the most power out of this product, we recommend a 48VDC/20A power source.

AUDIO INPUTS

The network audio inputs are the best way to feed audio into the RideAmp, which means it needs to be connected to the same network as a device that can source network audio.



RidePlayer is the designed to be the ideal audio source for RideAmp. You can easily interface them without any network switch hardware by connecting a standard M12 X-Code patch cable between the Primary network audio port of RidePlayer to network port A of RideAmp. Other audio source options could be your computer (using Dante Virtual Sound Card) or a DSP core. Either way, the concept is the same; RideAmp needs to be connected to the same audio network as the source device.

In addition to the physical network connection, Dante and AES67 network audio need to be configured for audio to route properly from RidePlayer to RideAmp. We'll cover the details of that in a little bit but, for now, you will need to connect your computer to the audio network as well. This should be done by connecting an RJ45→M12 X-Coded cable or adapter between your computer and the Secondary port of RidePlayer.

SPEAKER OUTPUTS

To make great sound, we're going to have to move some air! For this, we recommend at least one 4Ω or 8Ω unpowered speaker. Keep in mind that the RideAmp-350Q can output up to 350W of power from a single unbridged output, so choose your speaker wisely or you might accidentally let the smoke out of it!

The next step is pretty simple. Connect the positive (+) terminal of Speaker Output 1 to the positive (+) input of the speaker. Connect the negative (-) terminal of Speaker Output 1 to the (-) terminal of the speaker. Rinse and repeat for any other speakers that you wish to connect.

You'll need to terminate these connections into a Molex Mini-Fit Jr. connector, so be sure to check out the **Hardware Information** section later on in this User's Guide for pinout and part information.

NETWORK AUDIO CONFIGURATION

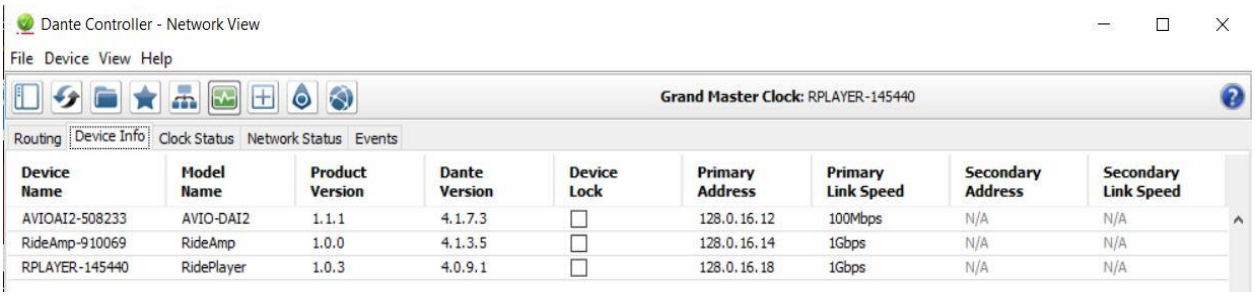
RideAmp-350Q supports the industry-standard Dante and AES67 protocols for audio distribution. If you've used other devices based on these standards, setting up the audio inputs of this amplifier will be a piece of cake.

All Alcorn McBride devices that support Dante are shipped with DHCP mode enabled by default. However, it's strongly recommended to assign a static IP address to each device to prevent to avoid addressing issues the next time the amplifier is powered up.

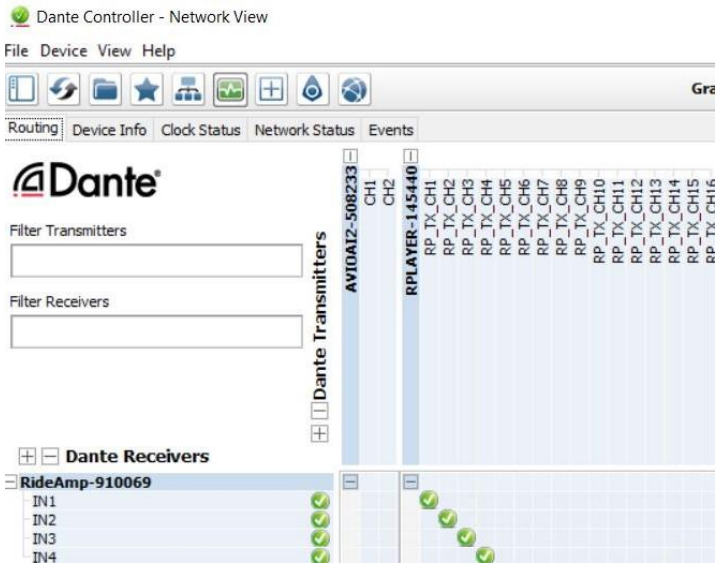
Whether you use DHCP or static IP addresses, the goal is to get all devices on the same subnet so that they can interface to one another. Once this is taken care of, you can follow these steps to patch RidePlayer (or another network audio transmitter) to the RideAmp-350Q.

1. Launch the Dante Controller application on your Windows or OS X computer.

2. Click on Device Info to view the current IP address, firmware version, and link speed. If their IP addresses are configured properly, you should see both the RidePlayer and RideAmp in this list.



3. Click on Routing tab to make your first audio patch or subscription. Remember the Rideamp-350Q is capable of receiving 4 audio inputs. Let's go ahead and patch the 4 audio inputs of RideAmp to the first 4 audio outputs of RidePlayer by clicking the grid intersection of these items.



4. You're good to go! Both the RidePlayer and RideAmp will retain these settings from now on.

GAIN CONFIGURATION

RideAmp ships from the factory with the gain knobs in a calibrated testing position. If you are using low-powered speakers or working alongside irritable co-workers, you may take this opportunity to turn down the gain if you wish.

RideAmp used industrial-grade locking potentiometers. To adjust the gain, you must first loosen the lock nut. Once loosened, gain can be adjusted with a small flat-tip screwdriver; clockwise to increase, counter-clockwise to decrease. The potentiometers have a built-in mechanical stop that kick in once you reach the minimum and maximum gain values.

Just make sure you tighten down the lock nut before you install RideAmp on a vehicle, ok?

HARDWARE INFORMATION

OVERVIEW

RideAmp has quite an assortment of dedicated hardware for the purpose of configuration, status monitoring, and interfacing to other hardware. This section covers these features in more detail.

INDICATOR LEDS

The top panel of RideAmp has a full set of indicator LEDs to provide an overall status of different features of the device. This includes power, network, audio signal, and amplifier status. Read on for details on the functionality of each LED.

POWER

LED State	Description
OFF	No Power
BLUE	DC Power Applied

NETWORK

These indicators display both network link and activity for all of the Network Audio ethernet ports.

LED State	Description
OFF	No network link
SOLID ORANGE	Network link active – No network activity detected
BLINKING ORANGE	Network link active – Network activity detected

AUDIO

These indicators display the signal activity for all 4 audio inputs as well as the mute status.

LED State	Description
OFF	No audio signal – Audio output enabled
GREEN	Active audio signal
RED	Audio output is MUTED

**If all four Audio LEDs are solid red and all four Status LEDs are off, this may be because you are feeding the RideAmp 24V but the dip switch on the side of the unit is set to 48V. Flipping the dip switch to 24V will correct this problem.*

STATUS

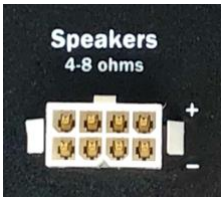
These indicators display the operational status of each amplifier channel.

LED State	Description
OFF	Amplifier Off/Inactive
SOLID GREEN	Amplifier READY
BREIFLY TURN RED	Amplifier FAULT – Audio Clipping
STEADY FLASHING RED	Amplifier FAULT – Thermal Warning
SOLID RED	Amplifier FAULT – In Protect Mode

CONNECTORS

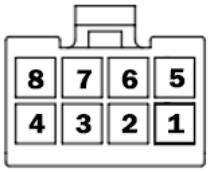
SPEAKER OUTPUTS

This is where you connect speakers to the RideAmp. You can wire up to 4 discrete channels of speakers at 350W each, or you can bridge each channel pair to achieve 700W.



Connector Information

Connector Type	2x4 Molex Mini-Fit Jr.
Mating Connector	Molex 0039012080
Mating Pins	Molex 0039000185
Recommended Wire	16 AWG Stranded



Plug Layout (Wire-Side View)

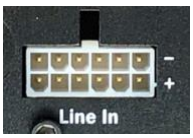
Pinouts

Speakers (Standard)	
SPK 1 (-)	1
SPK 1 (+)	5
SPK 2 (-)	2
SPK 2 (+)	6
SPK 3 (-)	3
SPK 3 (+)	7
SPK 4 (-)	4
SPK 4 (+)	8

Speakers (Bridged)	
SPK 1/2 (-)	1
SPK 1/2 (+)	6
SPK 3/4 (-)	3
SPK 3/4 (+)	8

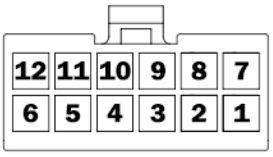
BALANCED ANALOG INPUTS

These are balanced analog audio inputs that can be used to drive the amplifier channels. Note that these inputs are simultaneously active along with the network audio inputs.



Connector Information

Connector Type	2x6 Molex Mini-Fit Jr.
Mating Connector	Molex 0039012120
Mating Pins	Molex 0039000073
Recommended Wire	18 AWG Stranded/Shielded



Plug Layout (Wire-Side View)

Pinouts

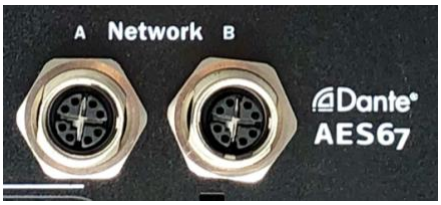
Audio Inputs	
IN 1 (+)	1
IN 1 (-)	7
IN 1 (S)	2
IN 2 (+)	3
IN 2 (-)	9
IN 2 (S)	8
IN 3 (+)	4
IN 3 (-)	10
IN 3 (S)	5
IN 4 (+)	6
IN 4 (-)	12
IN 4 (S)	11

NETWORK

The RideAmp provides a total of two M12 X-Coded network ports. These ports are devoted to a 4x0 network audio interface that supports the AES67 and Dante standards. When using Dante, these ports also pass back important status information via the network link to RidePlayer for monitoring amplifier health.

Two connectors are provided for each of these network connections to allow multiple RideAmp units to be daisy-chained without the need for an external M12 Ethernet switch.

Note that these audio inputs are simultaneously active along with the balanced analog inputs.



POWER

RideAmp is designed to accept either a 24VDC or 48VDC power source. Two inline automotive blade fuses (20A/80V) are accessible on the RideAmp side panel. Voltage levels are electronically monitored, and low voltage conditions can be reported back via the network audio connection to RidePlayer.

Connector Information

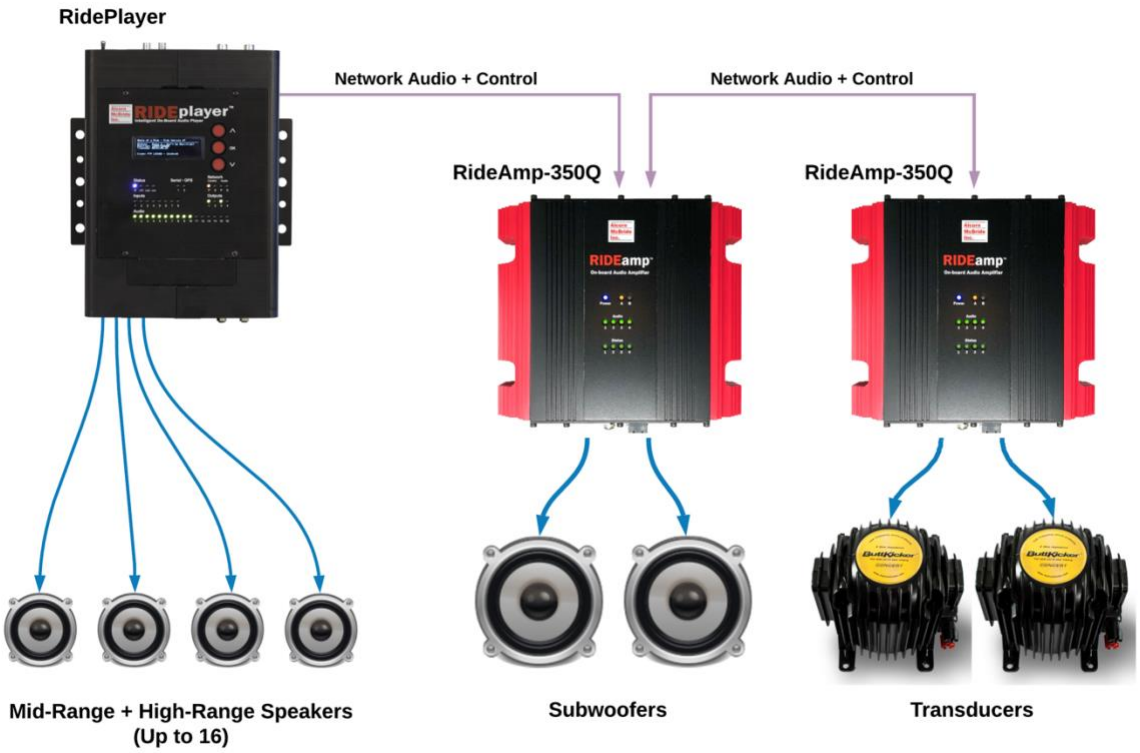
Connector Type	Molex Mini-Fit Sr.
Mating Connector	Molex 0428160212
Mating Pins	Molex 0428150032
Recommended Wire	8 AWG Stranded

Pinouts

Analog In	
DC (-)	1
DC (+)	2

RIDEPLAYER INTEGRATION

RideAmp serves as a natural extension to the Alcorn McBride RidePlayer. RidePlayer easily handles the complexities of synchronizing on-board audio playback while RideAmp units greatly enhance its amplification capabilities. The dual AES67/Dante network audio interfaces allow you to daisy-chain up to 8 RideAmp units while maintaining an all-digital signal path with rugged M12 connections. These network connections also allow you to remotely control and monitor the RideAmp units via RidePlayer.



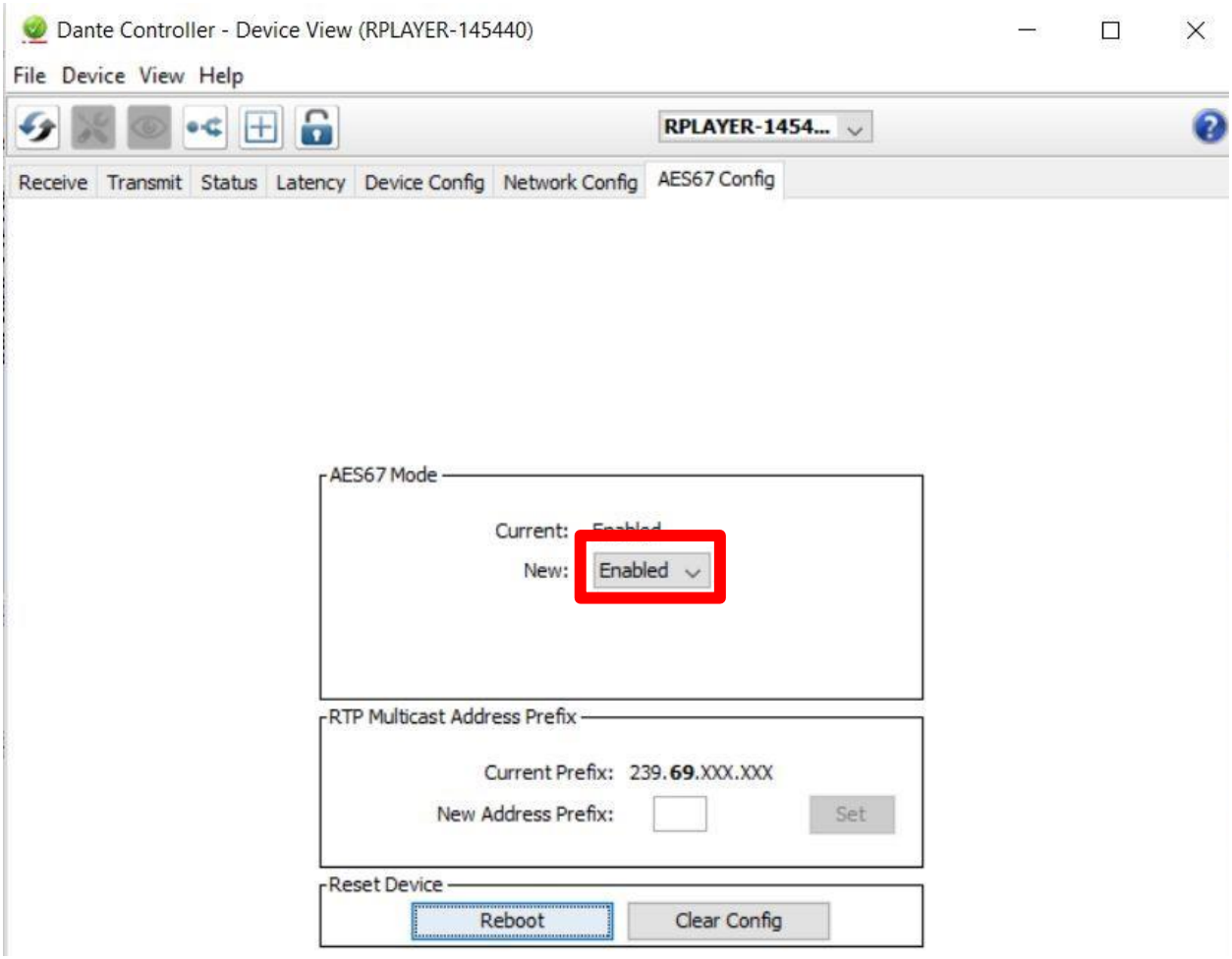
For more information about RidePlayer or RideAmp, please visit our website at www.alcorn.com.

ENABLING AES67 NETWORK AUDIO INPUT

The default mode of the network audio interface is Dante, however it is very easy to enable the use of AES67 using the Dante Controller application.

You can follow these steps to configure RideAmp to accept AES67 inputs:

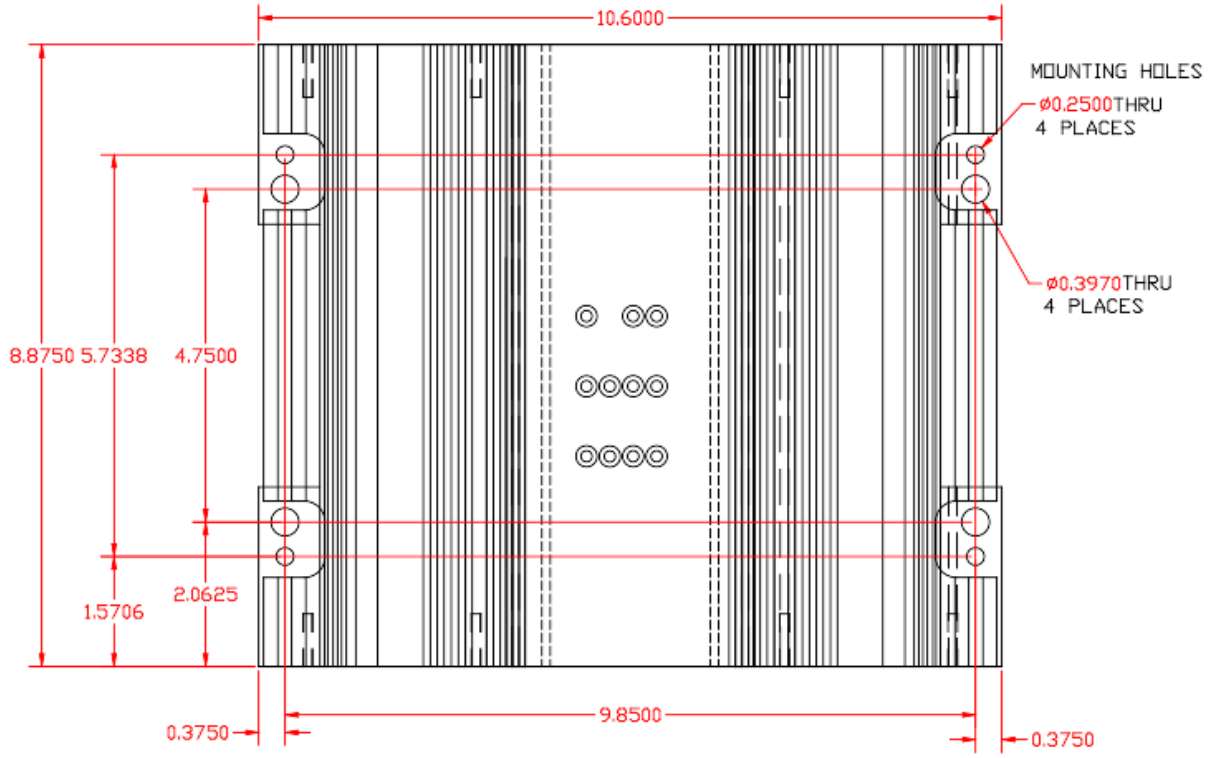
1. Launch Dante Controller
2. Click on the "Device info" tab and double click on the RideAmp.
3. Click on the **AES67 Config** tab, enable AES67 using the box shown below, and then click **Reboot**.



4. Congratulations! Your RideAmp-350Q can now be configured to receive incoming AES67 flows!

MOUNTING

RideAmp is designed to be flush mounted to a flat surface. The drawing below indicates the position of the various mount points:



For more precise measurements and mounting hole locations, drawings and models are available in the Downloads section of the RideAmp-350Q web page at www.alcorn.com.

SPECIFICATIONS

CONTROL

LED Indicators	Power Network – Link/Activity Audio – Signal/Mute Status – Amp OK, Protect, High Temp, Clipping
DIP Switches	24V/48V DX Power Input Configuration
Network Control*	Amp Enable/Disable Mute Enable/Disable
Network Monitoring*	Amp Status Power Status Clipping

**RidePlayer is required for Network Control/Monitoring via the network audio link.*

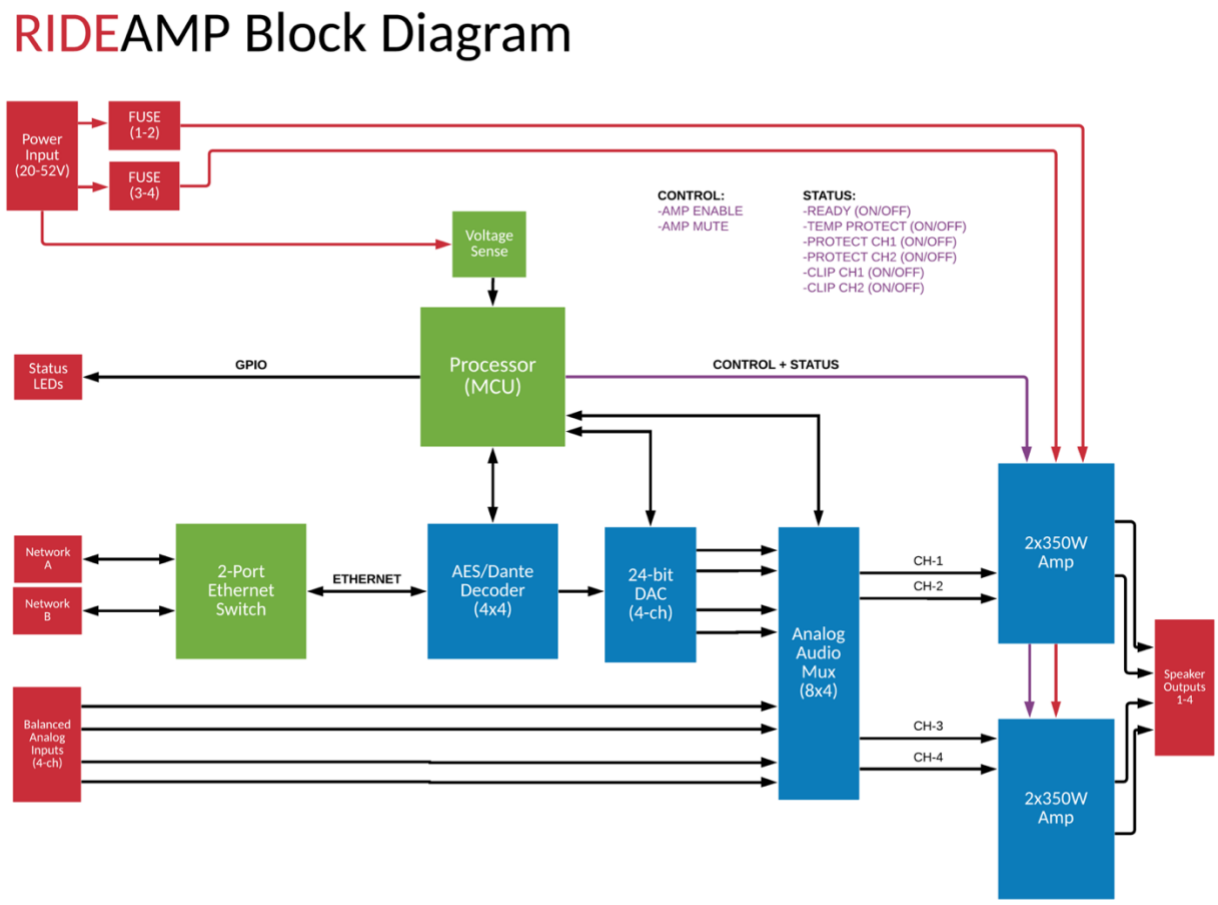
AUDIO

Speaker Outputs	4 x Speaker outputs (2 x 4-pin Molex) 48VDC - 4 x 350W @ 4Ω (bridgeable to 700W @ 8Ω) 24VDC - 4 x 250W @ 4Ω (bridgeable to 500W @ 8Ω)
Minimum Load	Standard - 2Ω Bridged - 4Ω
Network Audio	4 Input AES67/Dante Interface (4x0) 100/1000 BaseT (2 x M12 X-Coded) Internal Switch to support daisy-chaining RideAmp units
Analog Inputs	4 x Balanced inputs (1 x 12-pin Molex) 10kΩ Input Impedance
Gain Control	4 x Industrial-grade locking potentiometers
Frequency Response	3Hz – 45kHz
S/N Ratio	>113 dB
THD+N	<0.005%

PHYSICAL

Size	10.6”L x 8.9”W x 4.4”H
Weight	10.3 lbs
Power	20-52VDC 48VDC @ 18A 24VDC @ 36A
Fuse	2 x 20A/80V ATO-FKH Blade Fuses
Operating Temperature	0C (32F) to 38C (100F) 0-90% Relative Humidity
Mounting	Surface Mount – Compatible with JL Audio MHD600/4 mount points

BLOCK DIAGRAM



ACCESSORIES

DEVELOPMENT KIT

Part Number: DEVKIT-RIDEAMP

We offer this kit to enable users to quickly bench test or build mockups with RideAmp units. This kit includes prefabricated cables for each of the connectors on the unit. It also includes a 24V/20A DIN Rail power supply to power up the unit.

We recommend that new users order at least one of these kits to get started with RideAmp development. Since most on-board audio applications use highly customized cabling, this kit is probably not practical for wiring up an entire fleet of ride vehicles.

CONNECTOR KIT

Part Number: CONKIT-RIDEAMP

This kit provides a full set of blank Molex connectors and pins for RideAmp's connectors. We offer this kit as a convenience to fabricators so that the individual parts don't have to be researched and ordered. Unlike the Development Kit, the Connector Kit is intended to be used for fleet deployments. We recommend ordering a Connector Kit for each RidePlayer in the ride vehicle fleet.

M12 X-CODED ETHERNET CABLE

Part Number: CM12X-2M

This is an M12 X-Coded patch cable that allows RideAmp to connect to an M12 X-Coded Ethernet switch or other device like RidePlayer. Our stock cable is 2 Meters (6.5ft) in length. For fleet deployments, we have the capability to manufacture cables to custom lengths to suit your application. Please contact us for quotes for custom length M12 X-Coded cables.

M12-TO-RJ45 ETHERNET ADAPTER

Part Number: CM12X-RJ45F

This is an adapter that converts from the M12 X-Coded connectors of RideAmp to a standard RJ45F Ethernet connector.

POWER SUPPLY

Part Number: PSD24V20A

This supply is capable of providing RideAmp with a 24VDC/20A power source. It accepts an input between 100-240VAC and is designed to mount on a DIN Rail alongside the RideAmp.

PRODUCT PHOTOS

Top

Left

Right

Connector Side

Bottom