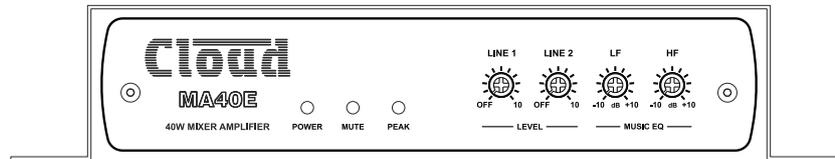
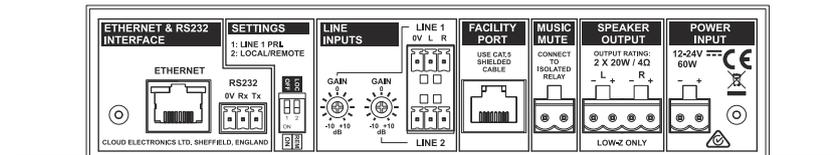


# MA40E Mini Amplifier with DSP



MA40E Front Panel



MA40E Rear Panel

## General Description

The MA40E is a very compact stereo amplifier of advanced design, intended for integration into audio and AV systems where de-centralised installation is advantageous. It may be considered an “install-and-forget” component, and is small enough to be fitted into a wall or ceiling void, or in any convenient location adjacent to projectors, flat screen displays or loudspeakers, for example. It is highly suitable for use with in-store digital signage, gallery and museum exhibits and in fixed or mobile tour guide systems.

The MA40E will operate “out of the box” in its basic configuration: a simple set of manual controls and configuration options makes it quick and easy to integrate into any audio system. Greatly enhanced control of the MA40E can be achieved through the internal web server, including further setup options and control of the amplifier’s DSP section.

The MA40E can drive 20 W per channel into a 4 ohm load when used with the external 24 V mains PSU supplied with the amplifier, but it will operate from any external DC supply of between 12 and 24 V, making it ideal for installation on buses, trams, river boats, or anywhere an AC mains supply may not be readily available. The maximum output power is reduced with supply voltages below 15V.

The power amplifier stage incorporates a Dynamic Clip Protection stage at its input and is fully protected against DC offset, PSU and amplifier overcurrent, PSU over- and under-voltage and is also thermally protected. A switch-on delay function mutes the output during power-up and power-down to protect loudspeakers.

The amplifiers have two unbalanced stereo line inputs. By default, the L and R inputs of each input are summed together to create a single stereo mix, though each input may be selected individually via the web control pages or an LM-2 remote control module.

Recessed front panel controls are provided for LINE 1 and LINE 2 levels; additionally, each input has rear panel adjustments for gain. The front panel also has LF and HF EQ controls for the summed inputs. A PEAK LED illuminates if the amplifier’s dynamic clip protection becomes active, and thus clearly indicates the onset of distortion.

A greatly enhanced set of device features is available once the password-protected web pages are accessed through the Ethernet port. Depending on which functions the installer wishes to devolve to software control, some or all of the MA40E’s physical controls may be disabled and thus the amplifier’s setup can be placed under the user’s control to a degree that suits the installation and the user.

The main control page is logically divided into five tabs. The Input Routing tab allows remote level control of each input and source selection (Line 1/Line 2/mixed/neither). The Room EQ tab allows remote control of EQ in either “simple” (two-band) or advanced (seven-band) modes, permitting extremely accurate equalisation to suit room acoustics. The Front Panel EQ tab is a read-only page showing the settings of the front panel EQ controls, but allows them to be disabled if desired. The Speaker EQ tab allows the installer to optimise the amplifier channels to suit specific loudspeakers. Certain speaker EQ curves may be recalled as presets (if installed via firmware update); alternatively they may be entered manually into a dedicated five-band equaliser section using manufacturers’ supplied data. A variable frequency fourth-order high-pass filter is included to remove LF content: this is desirable if the amplifier is used to drive 100/70 V-line systems via an external transformer. Finally, the Output tab gives control over output level, mono/stereo selection and independent 6 dB trim for each output channel.

Further web pages allow general device configuration, such as channel labelling, Ethernet settings, definition of power-up conditions and serial port baud rate. A multi-user system of passwords is catered for: each user can be given specific access privileges at installation to prevent unauthorised system adjustment.

## General Description (continued)

A particularly useful feature of the MA40E is the RJ45 Facility Port; this allows a remote input module from the Cloud LM-2 Series (for wired sources) or BT-1 Series (for Bluetooth wireless sources) to be connected via easy-to-install screened Cat 5 cable. Microphones, and/or line sources such as radio mics, DJ mixers, MP3 players, laptops or other audio sources - including Bluetooth-equipped laptops, tablets and smartphones – can then be connected locally, simplifying the use of the area for presentations where portable audio sources are in use. The Facility Input is equipped with a fixed threshold noise gate to eliminate background noise in the absence of an input signal. LM-2 modules also provide remote control of music level and LINE 1/LINE 2 selection.

In addition to the control facilities provided by the web browser pages, the MA40E can also be controlled via RS-232 serial commands, which can be applied either to the unit's standard serial port, or via Ethernet.

In common with most Cloud products, a Music Mute Input is provided, which may permit compliance with local Fire Authority regulations.

The MA40E is energy-efficient\* and draws very little power in a quiescent state. A user-selectable automatic power-down function puts the module into an ultra-low-current standby mode after a preset period with no signal. A bicolour front panel LED indicates standby and active statuses.

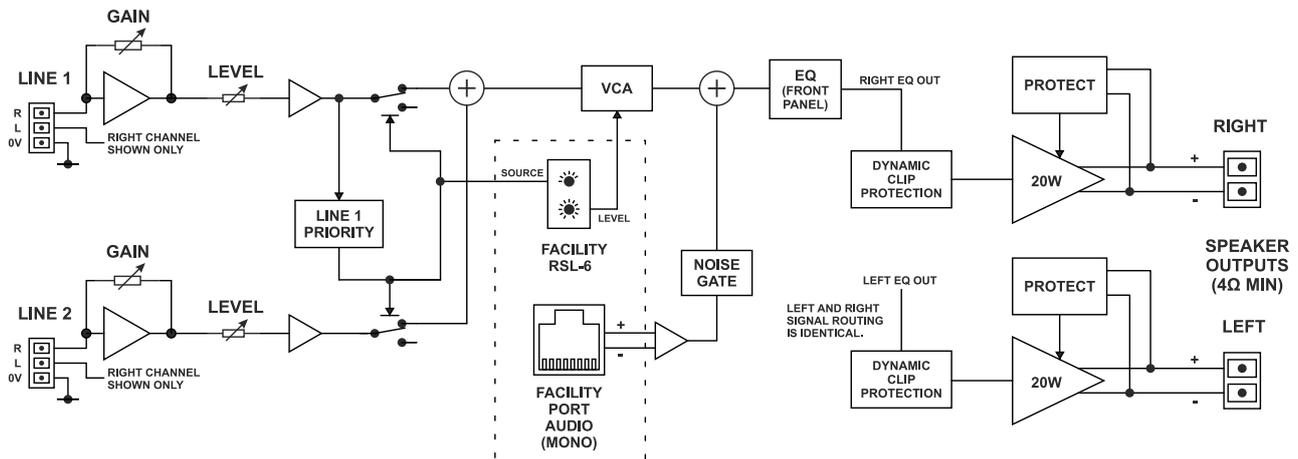
\*ENERGY STAR certification applied for.

## Key features

- Compact stereo amplifier module for “install-and-forget” situations
- Ready for “out-of-the-box” installation
- Internal web server for simple and secure setup and control from any location
- Two (unbalanced) stereo line inputs with individual gain trims
- Front panel per-channel control of level
- Front panel HF & LF EQ controls
- Selectable LINE 1-over-LINE 2 priority
- Extensive set of DSP functions for advanced configuration:
  - Input source selection
  - Remote input and output level control
  - 7-band room EQ section
  - Variable-frequency high-pass filter for use with 100/70 V-line systems
  - 5-band Speaker EQ to suit various popular installation loudspeakers
  - Output level trims
  - Mono/stereo mode selection
  - Comprehensive password/access privilege control
- Front panel controls are disabled when browser control is in use
- Facility port for connection of LM-2 or BT-1 remote input modules via screened Cat 5 cable; also allows remote control of music level and source
- 2 x 20 W (into 4 ohms) power amplifiers
- Music Mute control input (N/O or N/C) for interface to emergency system
- Power amplifier fully protected by open and short circuit load detection, temperature sensing, power rail monitoring
- RS-232 port for full serial control; serial commands may also be sent via Ethernet
- Automatic power-down function (user-selectable)
- Less than 3 W power consumption in sleep mode
- Convection cooled – silent in operation.
- PSU meets US DoE Level VI energy requirements
- Power requirements: 12 to 24V DC, 60 W
- Universal AC adaptor included (both models), operates from 100 to 240 V AC

## Block Diagram

BLOCK DIAGRAM SHOWN IN “OUT OF THE BOX” MODE



## Examples of web control pages

### Zone 1

▼ Input Routing

Enable  Yes

Input Source ◀ Mixed ▶

Enable  Yes

Line 1 Level ◀ -39 ▶

Enable  Yes

Line 2 Level ◀ -48 ▶

Input Routing

### Room EQ

▼ Room EQ

Enabled  Yes

Advanced mode  On

Band 1 2 3 4 5 6 7

Low Shelf  On

◀ 60 ▶  
Freq (Hz)

◀ 0 ▶  
Gain (dB)

Room EQ

### Front Panel EQ

▼ Front Panel EQ

Enabled  Yes

◀ 6 ▶  
LF (dB)

◀ -3 ▶  
HF (dB)

Front Panel EQ

### Speaker EQ

▼ Speaker EQ

Protect Enabled  Yes

HP Filter ◀ 65 ▶  
Freq (Hz)

EQ Enabled  Yes

Advanced mode  Off

Manufacturer ◀ None ▶

Model ◀ Flat ▶

Speaker EQ

### Output

▼ Output

Enable  Yes

Output Level ◀ 0 ▶

Mute  Off

Mono  No

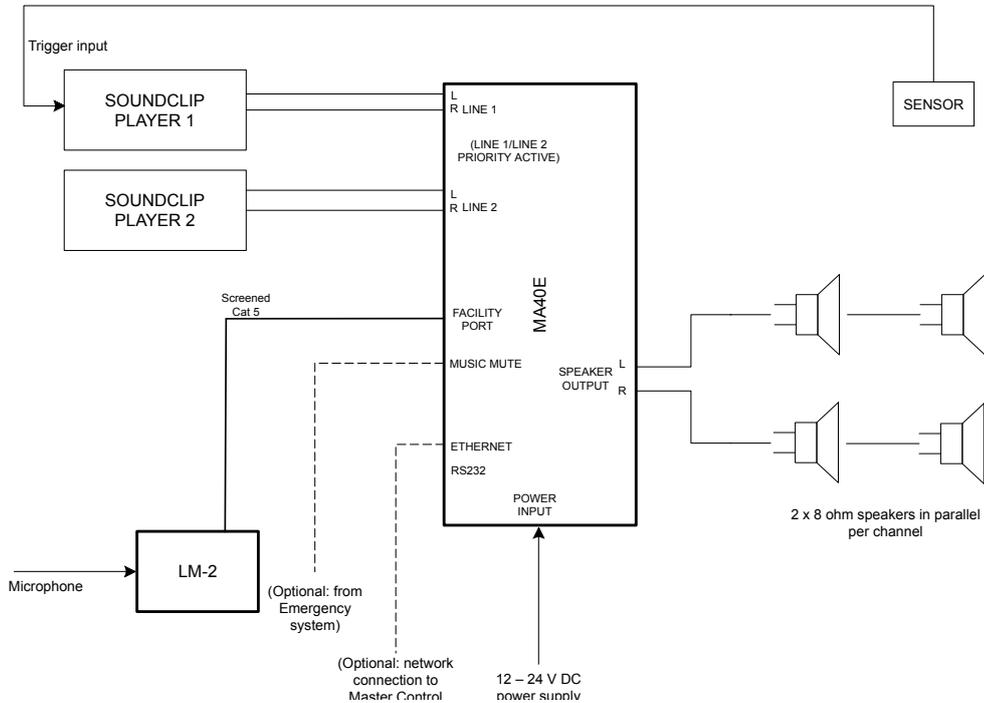
Trim Left ◀ 0 ▶  
dB

Trim Right ◀ 0 ▶  
dB

Output

## System Example

### Theme park attraction with an MA40E



The system shown here shows how the features of an MA40E could be used provide sound effects for an attraction in a theme park or museum. Soundclip Player 2 plays continuous background FX until an approaching visitor triggers a PIR sensor (or similar) to initiate replay of an alternative sound effect from Soundclip Player 1. Setting Line 1/Line 2 Priority to ON will ensure that the audio from Player 1 will override that from Player 2. An LM-2 remote input module is connected to the Facility Port (using screened Cat 5) allowing a commentary microphone to be routed through the sound system when required.

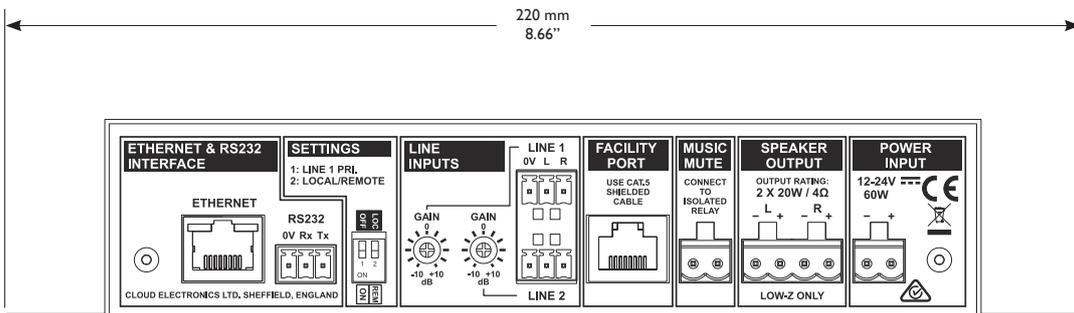
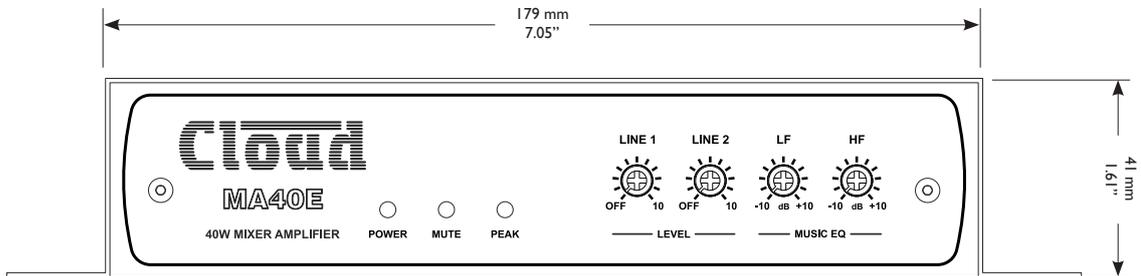
The ability of the MA40E to operate from a low-voltage DC supply could make it particularly useful for an outdoor installation remote from a power source.

The amplifier is connected to the attraction's Ethernet network, making it possible for staff in the master control room to adjust levels, etc. In common with most other Cloud products, the amplifier's Music Mute input can be connected to a site-wide alarm system to ensure that the audio is muted in the event of an emergency.

## Technical Specifications

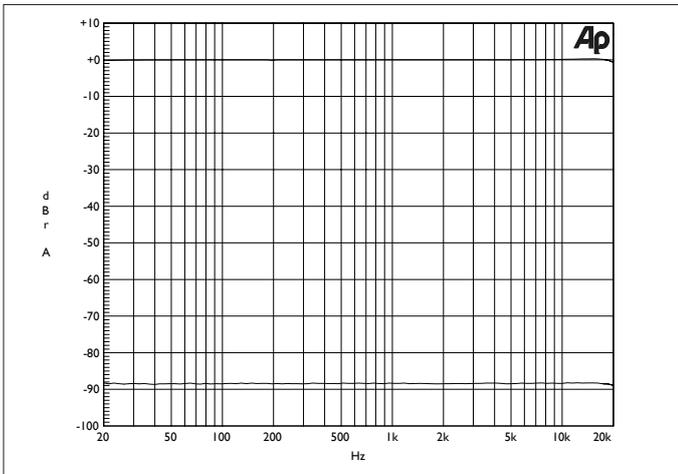
Line inputs		
Frequency Response	±1 dB, 20 Hz to 20 kHz	
Distortion	<0.05% THD+N @ 1 kHz, full power	
Sensitivity	0.2 V (-12 dBu) to 1.95 V (+8 dBu)	
Input Gain Control	20 dB range	
Input Impedance	10 kohms (unbalanced)	
Headroom	>10 dB	
Noise	<-85 dB	
Facility input		
Input Impedance	10 kohms (balanced)	
Sensitivity	0.775 V (0 dBu)	
Noise Gate	-55 dBu	
Equalisation		
Front Panel	HF: +/- 10 dB @ 10 kHz; LF: +/- 10 dB @ 50 Hz	
Room EQ (via web pages)	7-band parametric EQ with optional low and high shelf	
Protection EQ (via web pages)	Fourth-order high-pass filter, 40 Hz – 20 kHz	
Speaker EQ (via web pages)	5-band parametric EQ	
Output		
Output Power (1 kHz continuous sine wave)	2 x 20 W, DC input >15 V	
General		
Power Input	12V to 24V DC. (External 24V AC adaptor supplied.)	
Power consumption	47 W	
External AC PSU adaptor	Universal type, 100V to 240V, 47 to 63 Hz	
Amplifier protection	Fixed level signal limiter. Protection against DC, PSU overcurrent, amplifier overcurrent, over-temperature, supply voltage under/over-voltage, Resettable internal breaker (no fuses)	
Dimensions (w x h x d)	Net	220 mm x 41 mm x 144.5 mm, 8.7" x 1.6" x 5.7"
	Shipping	290 mm x 160 mm x 210 mm, 11.4" x 6.3" x 8.3"
Weight	Net	750 g
	Shipping	1.0 kg

Dimensions: MA40E

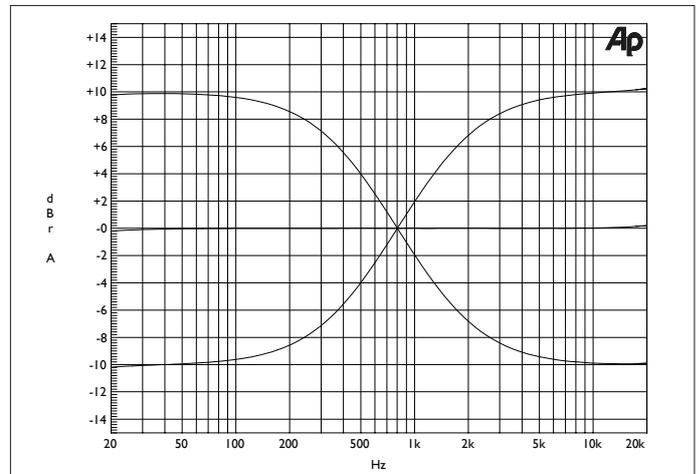


## Performance Graphs

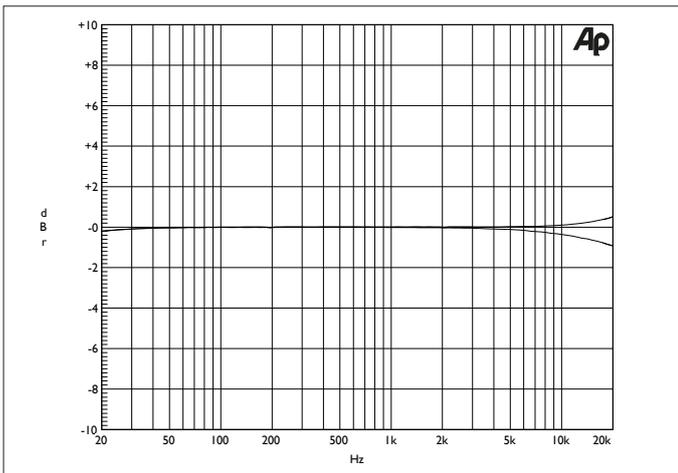
Line Attenuation



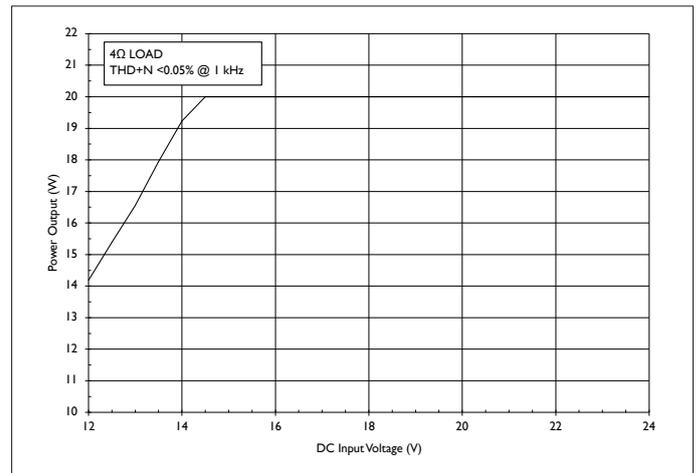
Line EQ (Front Panel)



Line Frequency Response (4 and 8 ohms)



Power vs Supply Voltage



## Architect's and Engineer's Specification

Each channel of the two channel amplifier shall be able to deliver 20 W into a 4 ohm load. The amplifier shall be equipped with two unbalanced stereo line inputs: each input shall have a rear panel sensitivity control of the preset type. The two inputs shall be mixed internally to a single stereo channel: the front panel shall be fitted with separate level controls for each input and HF and LF equalisation controls for the summed channel. All front panel controls shall be of the preset type. The input and output connections shall be via plug-in screw terminal connectors. There shall be visual indication on the front panel if any input signal activates the amplifier's clip protection.

The amplifier shall include an RJ45 Ethernet interface and internal web server. It shall be possible to control various amplifier functions from a standard web browser on a device connected to the same network as the amplifier. Access to the web pages shall be PIN-protected; it shall be possible to store at least six PINs and to designate access to different control functions for each PIN. It shall be possible to control the following amplifier functions from the web browser pages: i) selection of each individual input; it shall also be possible to select the inputs to be mixed, or for neither to be selected; ii) level adjustment of each input; iii) parametric equalisation adjustment with at least seven frequency bands; iv) remote control of the front panel equalisation controls; v) a variable-frequency high-pass filter with a slope of 24 dB/octave; vi) recall of previously-stored equalisation curves to optimise the amplifier for use with various popular installation loudspeakers; vii) a five-band parametric equaliser to achieve loudspeaker optimisation should the presets in vi) be unavailable; viii) control of overall output level, including the option to mute the output; ix) configuration of the amplifier for mono operation; x) fine adjustment of output levels for each amplifier channel; xii) it shall be possible to save all current settings and reload these settings when power is applied. Alternative power-up options shall be available to load the original factory settings or those in force at power-down, even if they were not specifically saved.

It shall also be possible to configure the mixer to automatically override the signal on one line input on detection of a signal on the other input. It shall be possible to select this configuration without removing any part of the amplifier housing.

The amplifier shall be provided with a multi-function control port using a connector of the RJ45 type. Optional active input modules shall be available which may be wired to this connector using standard screened Category 5 cable. One version of active module shall enable external mic and/or line level signals to be routed to the zone from a remote location and also to select either input and adjust overall amplifier volume via this control port. An alternative version of module, which shall also connect using standard Category 5 cable, shall permit stereo audio to be routed to the control port using Bluetooth wireless connectivity. The connector shall also permit the direct connection of a balanced audio source, and provide DC power for the remote modules.

An external control input shall be provided on a plug-in screw terminal connector to allow muting of the amplifier by a fire alarm or other external emergency system via isolated, 'voltage-free' contacts, and this input shall be configurable to respond to either a short or open external circuit. There shall be visual indication of the mute input's state on the front panel.

The amplifier shall include a bi-directional RS232 serial port permitting remote control of all unit functions and settings. It will be possible to configure the serial port to operate at a range of baud rates, including 9600 baud. It shall also be possible to perform the same remote control functions by transmitting the same serial commands via the Ethernet connector.

The amplifier shall be compliant with the relevant provisions of EnergyStar® Eligibility Criteria Ver. 3.0 for Audio-Video Products. In the absence of an input signal, it shall automatically enter "standby" mode wherein the DC power consumption shall be less than 3 W. It shall be possible to override this mode by an internal jumper.

The amplifier shall be built in a robust steel housing suitable for installation in unattended locations. Cooling shall be by natural convection. The amplifier shall be supplied with an external 24 V DC power supply capable of operating on any AC mains supply voltage from 100 V to 240 V, however the amplifier shall be capable of operating from a DC power supply in the range 12 V and 24 V; the maximum output power of 2 x 20 W shall be available when the amplifier is operated from a supply of 15 V or higher. The power input connector shall be of the plug-in screw terminal type. There shall be colour-coded visual indication of the amplifier's power status (i.e., active or standby modes) on the front panel.

The amplifier shall be the Cloud MA40E. The optional active modules shall be the Cloud LM-2 Series (for wired devices) and the Cloud BT-1 (for wireless devices).