K20 DSP+AESOP

2-Channel Power Amplifier with DSP and Networking for High-Performance Touring

Architect's and Engineer's Specifications

The amplifier shall be a two-channel model with a switch mode power-supply with power factor correction and bridgeable switch mode fixed frequency class D output circuit topology. The amplifier shall operate from 100 V - 240 V ± 10%, 50/60 Hz, universal AC input power with power factor cos(ϕ) greater than 0.95 from 500 W to full output power and shall draw no more than 1625 W (7.9 A @ 230 V; 15.8 A @ 115 V) when driven with pink noise signal at 1/8 of rated power into 4-ohm loads. The amplifier shall be provided with a AMP CPC main detachable connector and power cord set with AMP CPC 45A on amplifier side and open end on the other (white for live, black for neutral, green for earth). The amplifier shall have internal heat sinks cooled by a continuously variable speed fan with two microprocessors for temperature control. Air flow shall be from front to rear.

The amplifier shall contain a module which shall connect the amplifier to 100Mbps Ethernet networks, allowing it to be remotely controlled and monitored via proprietary software running on an external PC. In addition the module shall allow the transport of real-time digital audio via AES-3 protocol in the two unused pairs of the same cat 5e Ethernet cable connected to RJ45 port.

The amplifier shall contain a DSP board for real-time audio processing: Various crossover filters will be present: Butterworth, Linkwitz-Riley, Bessel, Arbitrary Asymmetric 6 dB/oct to 48 dB/oct (IIR), linear phase (FIR), Hybrid (FIR+IIR); separate input and output EQs with a wide variety of filters; Delay up to 4 seconds on the input section, up to 32 ms per output, sample-by-sample stepping; dynamics processing with look ahead; peak limiter and TruePower™ limiter on each output; Active DampingControl™, LiveImpedance™ Measurement.

The amplifier shall have a synchronized off-on muting, acting for four seconds after turn-on and within 500 ms after turn-off or loss of AC power. Each channel shall have DC protection in order to protect against infrasonic signals and very low frequencies at the output that could damage loudspeakers. Each channel shall have VHF protection in order to protect loudspeakers against strong, very high frequency signals. Each channel shall have circuitry to protect against short circuits or other stressful events for the output circuit. Each channel shall an independent clip limiter in order to prevent severely clipped waveforms from reaching loudspeakers, whilst maintaining full peak power. Each channel shall have a long term limiter in order to protect loudspeakers against non musical signals such as sine waves, feedback etc.

Front panel controls shall include:
a switch for selecting power on and off, removable dust covers, LCD display with backlight providing full control and monitoring of amplifier status; four navigation keys for navigating through the LCD menu: functions will be displayed on the display itself; LCD display provides user menu access to the following settings: amplifier setting, output attenuation, input gain/sensitivity, input selection (analog/digital/network), maximum output voltage, maximum mains current draw, clip limiter for each channel, gate on input for each channel, mute at power on, idle mode;
The LCD display shall provide user menu access to the following DSP parameters: AES-3 input level control, source mode (stereo, parallel from input 1 or input 2), main delay, input level control of each channel, polarity control of each channel, delay of each channel, both channel equalizer (low pass filter, high pass filter, peaking/low shelving/high shelving/high pass/low pass/band stop/all pass filters), peak limiter of each channel, power limiter of each channel, cable impedance compensation network (damping factor adjustment) of each channel.
The LCD display shall provide user menu access to the following information: hardware info (amplifier serial number, hardware identifier connected to rear rotary encoders, front panel version number, controller version number, DSP board version number, Ethernet board version number, operating life of the amplifiers in hours), hardware monitor with status check (internal rails voltage, internal auxiliary voltage, auxiliary analog voltage, external remote control voltage, frequency system clock, DC/DC converter monitor), LCD contrast, set security password, security locking menu (all locked, allow safe, allow all); real time monitoring of amplifier temperature and history log, load impedance, output voltage, mains voltage.

The front panel shall also contain a LED bar for each channel with 5 green, 1 yellow and 1 red LEDs: for signal presents or -60 dB(green), -10 dB(green), -6 dB(green), -3 dB(green), -2 dB(green), -1 dB(yellow) and reached maximum output(red); yellow and red LEDs will be also used for protection alert as well: yellow will flash when temperature will be between 80° C (176° F) and 85° C (185° F), solid light to indicate when temperature will be over 85° (185°F), solid red LED to indicate when the channel is in protection status: the nature of protection will be displayed on the LCD screen.

The rear panel shall contain these features:
dual paralleled RJ45 connectors for auto-sense 100 Mbit Ethernet network capabilities and AES-3 audio protocol transport, providing full monitoring and control via proprietary software running on an external PC. These RJ45 dual ports shall allow daisy chain and redundant ring topologies. The output connectors for each channel shall be Neutrik© Speakon© NL4MD (mates with NL4FC or NL4) (1+/2+ paralleled, 1-/2- paralleled; stereo 1+/1-; bridge positive on 1+/2+ on ch 1, negative 1-/2- on ch 2); Analogue input connectors for each channel shall be Neutrik© Combo (XLR+Jack) with pin 2 positive (hot) on XLR, tip positive (hot) on jack, pin 3 negative (cold) on XLR, ring negative (cold) on Jack, pin 1 ground on XLR, sleeve ground on jack.

Each channel shall capable of meeting the following performance criteria: EIAJ (1 kHz @ 1% THD) in stereo mode: 2x2700 W @8 Ohm, 2x5200 W @4 Ohm, 2x9000 W @2 Ohm; EIAJ (1KHz @1% THD) in bridge mode: 1x10400 W @8 Ohm, 1x18000 W @4 Ohm; maximum output voltage per channel shall be 225 V peak; maximum output current shall be 125 A peak. Input impedance: 10 kOhm; voltage gain: 26, 29, 32, 35 dB single channel user menu definable (32dB as factory default); input sensitivity: 7.37 Vrms (@26 dB gain), 5.22 Vrms (@29 dB gain), 3.68 Vrms (@32 dB gain), 2.62 Vrms (@35 dB gain); maximum input level: 27 dBu (@26 dB gain), 24 dBu (@29 dBu gain), 21 dBu (@32dB gain), 18 dBu (@35 dB gain); gate: user menu selectable for each channel (-52 dBu @25 dB gain, -55 dBu @29 dB gain, -58 dBu @32 dB gain, -61 dBu @35 dB gain);frequency response (1 W @8 Ohm): 20 Hz - 20 kHz (± 0.5 dB); damping factor: 20 Hz - 200 Hz >5000; slew Rate @8 Ohm: 50 V/us (input filter bypassed); S/N Ratio (20 Hz - 20 kHz A weighted) >110 dBA; THD+N: <0.5% from 1 W to full power (typically <0.05%); SMPTE IMD: <0.5% from 1 W to full power (typically <0.05%); DIM 100 IMD: <0.5% from 1W to full power (typically <0.05%); crosstalk > 66 dB @1 kHz.

The dimensions of the amplifier shall allow for 19 inch (48.3 cm) EIA standard (RS-310-B) rack mounting and it shall occupy one rack space; the amplifier shall be 4.5 cm (1.75 inches) tall and 47.5 cm (18.7 inches) deep behind the rack-mounting surface. The amplifier's weigh shall not exceed 12 kg (26.5 lb). The amplifier shall be approved for use as specified by CE, CSA and KETI.

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