Design Brief – SC15 Prisma

SC15 Prisma is a full-featured pre-amplifier and network player featuring WiSA wireless speaker connection technology. Employing Prisma control and connectivity technology, advanced digital to analog conversion, and, with its three-quarter sized cabinet, the SC15 Prisma not only continues a Primare tradition of delivering astonishing performance from compact and elegant devices, but also offers even greater possibilities for easy installation into virtually any and every room of the house.

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Design philosophy

All of Primare designs are a result of our Practical Design Approach, resulting in a focus on two fundamental design elements:

1. Thoroughly implemented power supply designs – so that all elements of any design to operate effortlessly at their fullest effectiveness. Every product and sub-circuit demands unique power supply solutions - a more conventional linear supply or advanced switch mode main supply may work best dependent upon the application, and carefully crafted individual discrete power supplies are strategically inserted into the circuit to deliver power exactly where and how much is needed.
2. Artfully crafted ultra-short signal paths - so that each individual component and sub circuit operates sympathetically to achieve a cohesive whole. Elegant and simple electrical designs are used in even the most complex product, utilizing ultra-short signal paths with all gain in one device whenever possible. Ultimately, this results in fewer, higher quality parts for a reduction in associated distortions and an increase in overall electrical efficiency.
   To that end, basic technologies have been selected to realize those benefits:
   - 2 and 4-layer double-sided circuit board construction allows for the most direct and efficient layout of circuit components not only for the shortest signal path, but also to more easily achieve a sympathetic layout of circuit and sub-circuit components for best performance.
   - Surface mount components are used whenever possible as this allows for direct connection of the circuit device or component to the circuit board trace with the solder being used solely to mechanically hold the part in place. The elimination of the small metal lead or wire at each connection point in a more conventional large scale circuit device or component cumulatively shortens the signal path. Additionally, conventional large scale components demand through hole or "eyelet" construction, limiting direct contact of the component's lead to the circuit board trace and resulting in the solder providing electrical connection as well as mechanical connection for the device. Neither solder nor the metal used in the leads of most large scale devices provide the best signal transmission, therefore limiting potential performance of even the best designed circuits.
   - Class D amplifier technology has many inherent advantages, one of which is the ability to locate the heat sink directly on the circuit board within the amplification module, considerably reducing circuit path length and allowing for the power output devices to be directly connected to the speaker output connection posts.

Pre-amplifier Technology

Input section

Carefully crafted input circuitry utilizes relays for input switching providing better isolation and sound than found in more conventional CMOS (Complementary metal–oxide–semiconductor) switches, and improved 2 x 4 channel balanced mode volume control IC selected for optimal channel balance and low listening level performance.

Output section

- Analog Out – selectable fixed or variable

- WiSA wireless loudspeaker connection technology
  - Audio Quality - WiSA transmits 24bits at 48kHz/96kHz, that's twice the quality of CD audio.
  - Nearly Zero Latency – less than 1/10th the latency of Bluetooth audio devices.
  - Immediate Synchronization – even with a 7.1 configuration, synchronization is certified less than 1/1,000,000 of a second.

Control Section

- The latest generation OLED display technology used in the SC15 Prisma was originally developed for the automobile industry to ensure long life in even the most hostile environments, and improved readability due to greater consistency of color value and brightness level.
- Auto sense input circuitry automatically selects any input source as it is activated.
- C25 IR remote control with completely new, proprietary control codes for faster response and reduced interference.
- RS-232 connection, in addition to being used for component quality control testing of each and every product, allows for the use of whole home system control technologies such as Control 4.
- 12V triggers for coordinated system turn on and turn off.

Control Configuration

Either from the front panel, C25 IR remote control or Prisma app, the SC15 Prisma can be configured to best suit system needs, including:

- Input settings
  - Status – enable or disable the input to make it visible or not, so only those you use are visible for easier input selection
  - Alias – edit the alias, or rename, each input to give it a specific name, for easier identification
  - Auto-sense – enable auto-sense to determine which inputs will be automatically selected when a signal is detected
  - Volume – choose between variable or fixed volume, allowing any input to pass through the preamp stage to connect directly to the amplifier for use of within a home theater system configuration.
    Or fixed gain setting allows for any input to be use in a theater or surround sound pass through configuration
  - Input Gain – adjusting the input gain so that all inputs to be at the same relative volume level, and as result the ability to raise or lower overall gain for preferred output volume setting
- Audio Settings
  - Balance – to adjust the output balance between the left and right speaker
  - Startup volume – sets the volume level at a predetermined level upon turn on from standby or at the level when last switched off.
  - Maximum volume – sets the maximum volume
  - Mute volume – sets the output level when muted, from 0 to any preferred setting
  - Digital output – to select between 48kHz and 96kHz settings for the digital output from analog inputs, as some devices in your system might not be compatible with the default 96kHz output.
  - Analog Out – selectable fixed or variable

- General
    - Show inputs – choose between showing all enabled inputs or only those with signal
    - Front panel – to lock the front panel to disable all front panel controls
    - Auto dim – select the amount of time at which the front panel display will dim
    - LED brightness – set the level of display brightness for three specified dim levels
    - Standby settings
        - Standby mode – select
            - "normal" standby, which allows any activated input device set to "wake up" enable to wake up the Prisma integrated amp or preamplifier from standby
            - or "Eco" in order for the device to consume less than 0.5W in standby mode, disabling auto wake-up
        - Auto-standby – sets the amount of time without user interface action or signal from last selected source before the device automatically goes into standby
        - Wake up – enables auto-sense to wake up the device from standby upon detecting an input signal source
        - Factory reset – allows for the device to be returned to factory default settings

Power Supply Section

A switch mode power supply allows for rapidly varying demand, providing much more stable voltage, with ancillary capacitive storage to meet peak transient burst requirements.

Digital to Analog Conversion (DAC) Technology

In order to allow for playback of virtually any digital source with absolute accuracy and musicality a high performance 32-bit stereo AKM DAC AK4490EQ chipset was selected for the I15 Prisma, incorporating AKM's VELVET SOUNDTM technology, and capable of achieving -112dB THD+N with 120dB (stereo) S/N, while supporting up to 768kHz PCM and 256/11.2MHz DSD.

The AK4490EQ integrates a newly developed switched capacitor filter "OSR Doubler" that greatly reduces sound degradation from noise shaping, achieving a flat noise floor up to 200kHz. An innovative design technique utilizing a symmetrical layout for the left and right channels prevents signal quality deterioration, and a 32-bit digital operation block provides full 32-bit processing.

Prisma Connectivity and Control Technology

Prisma provides multi-room/multi-zone connectivity and control for playback of stored and streamed media, wired or wireless, all managed from any mobile device through a dedicated system control app. In addition to Bluetooth®, AirPlay, and Spotify Connect, Prisma features Chromecast built-in, a unique streaming portal allowing effortless direct connection to hundreds of streaming applications for the best possible performance and user experience.

Prisma App, in addition to the configuration settings control listed above, provides:

- Switching of all inputs, analog and digital, stored or streamed
- Playback functions: Play, stop, track forward and back, shuffle play, repeat single or all tracks, volume mute, volume adjustment either by tapping the -/+ icons or sliding your finger across the volume bar
- Multi-room multi-zone control between other Prisma enabled devices
- Search by artist, album, track, and title from stored media
- Complete track information, including file format, bit and sample rate
- Playlist and Queue creation from stored media

Connectivity

- Digital - USB-A
    - Sample rates up to PCM 24/192kHz and DSD 128/5.6mHz
    - File formats: WAV, LPCM, AIFF, FLAC, ALAC, MP3, MP4 (AAC), WMA, OGG, DSD
- Network
    - Wired/LAN – two Ethernet connection ports allow Prisma to act as network switch for flexible wired network system connection options
    - Wireless/WLAN - dual band wireless technology (WLAN IEEE 802.11 a/b/g/n and 802.11ac compliant)
- Streaming
    - Bluetooth – connects Apple, Android, and Windows devices directly for playback of either streamed or stored content from the associated device with lossy compression. Given the wide availability of this technology and lower resolution capabilities, Bluetooth is an easy way to stream content for informal listening.
    - AirPlay – connects Apple devices over the WiFi network for playback of either streamed or stored content from the associated device with lossless compression. As a result, AirPlay has the capability of playing over greater distances than Bluetooth, and as the Apple Lossless Audio Codec is used to allow streaming quality up to CD quality (44.1kHz), is appropriate for more critical listening.
    - Spotify Connect – connects any device with the Spotify application over the WiFi network directly to that service, and allows for playback at the highest level offered by the required Premium service (up to 320 kbps).
    - Chromecast built-in - offering the greatest level of connectivity and control options:
        - The Chromecast built-in associated Google Home application connects the Prisma device to your WiFi network for casting hundreds of enabled music streaming services.
        - Because it provides a direct connection between the I35 Prisma and the preferred music service through the network, playback quality is limited only by the quality of resolution provided by that service, meaning the possibility of higher resolution playback from services like TIDAL HiFi and Qobuz (up to 24-bit/96kHz).
        - More than one device can be connected at a time, content can be cast to any Chromecast built-in device on the network, and control of all functions can be accomplished from anywhere within the network.
        - Automatic Prisma firmware updating through Google Home application.

- Voice control though the Google Home speaker and Google Assistant is anticipated as that system becomes readily available.

For more on Prisma see “Design Brief – Prisma”

System Building

SC15 Prisma + Pre-amplifiers and Integrated Amplifiers
Selecting fixed output configures SC15 to act as a complete stored and streamed digital music source and digital to analog converter for virtually any high-performance audio system.

SC15 Prisma + Powered Speakers
Selecting variable output allows the SC15 Prisma to be the centerpiece of a compact digital audio system by simply connecting a pair of powered loudspeakers.

SC15 Prisma + WiSA Loudspeakers
Connecting SC15 Prisma with a pair of WiSA enabled wireless speakers can easily create an elegant and compact digital audio system.

SC15 Prisma + DD15
Adding a DD15 CD transport will allow for CD disc playback with any SC15 Prisma based audio system.

SC15 Prisma Rear Panel

SC15 Prisma Specifications

<u>Amplification</u>

Analogue Inputs:

- 1 pair RCA (L & R)
- 1 3.5mm stereo jack

Input Impedance: RCA 9.5 kΩ

Pre Out – selectable fixed or variable: 1 pair RCA (L & R)

Output Impedance: 150Ω

Gain:

- Pre out 16.5 dB
- Speaker out 42.5 dB

Frequency Response:

- Analog: 20Hz – 20kHz -0,5dB
- Digital:
    - 44.1kHz 20Hz – 20kHz +0.1/-0,6dB
    - 96kHz 20Hz – 20kHz +0.1 /-0,2dB
    - 192kHz 20Hz – 20kHz +/- 0.1dB

THD + N: < 0.05%, 20Hz – 20kHz, 10W at 8Ω

Signal to Noise:

- >90 dB digital
- >80 dB analog

<u>DAC</u>

Chip set: AKM AK4490

Digital Inputs

- 3 x Optical/TOSLINK 192 kHz
- 1x 3.55mm mini-plug: 192 kHz
- 1 x SPDIF/RCA: 192 kHz
- 1 x USB-B: up to 384 kHz/24 bit; DSD 5.6/128

Digital Output: 1 x RCA

- Analog input = 48 kHz out
- Digital input = pass through

Prisma

Audio formats: WAV, LPCM, AIFF, FLAC, ALAC, MP3, MP4 (AAC), WMA, OGG, DSD

WLAN: IEE 802.11 a/b/g/n/ac compliant; 2.4/5gHz; b, g, n mode

Wired Inputs:

- USB-A: 192 kHz/24 bit; DSD 64/128
- 2 x LAN: 192 kHz/24 bit; DSD 64/128
- WLAN: 192 kHz/24 bit; DSD 64/128

Wireless Inputs:

- Airplay®
- Bluetooth®
- Chromecast built-in®
- Spotify Connect®

WiSA wireless loudspeaker connection technology

General

Control

- C25 system remote control
- RS232 – Control 4
- IR in/out
- Trigger out

Power Consumption:

- Standby: <0.5W
- Operate: <25W

Dimensions (wxdxh):

- 350 x 329 x 73 mm with knobs and connectors
- 350 x 310 x 73 mm without knobs and connectors

Weight: 6.4 kg

Color Options: Black and Titanium