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Dish Network Receiver: Analog pulls in the signal

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The Dish Network 332 Receiver is one of several customer premise equipment (CPE) boxes available for satellite TV programming. Using a constellation of nine satellites, Dish delivers digital video, data, and audio channels of programming to your rooftop. Despite the

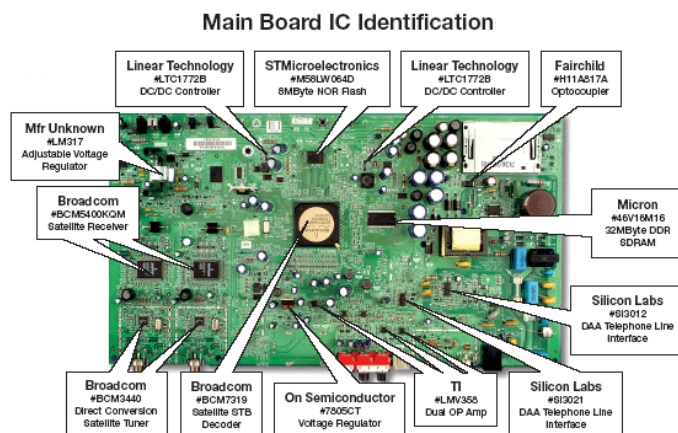
digital nature of satellite content, it all starts with an analog radio front end and the supporting analog power supply components.

Virtually all components in the Dish 322 box are mounted to one side of a large circuit board within a sheet metal enclosure. Interestingly, the unit could have been substantially smaller, but cost constraints and—to some extent—consumer expectations for receiver box size allow Dish to buck the diminutive form-factor drivers from the portable electronics world. A two-layer PCB with generously-spaced SMT and through-hole components supports most chips and helps keep cost down.

All I/O to the unit are via threaded coax receptacles and RCA jacks that, along with a phone jack and S-video socket, are mounted to the back of the unit. The user interfaces along with a Smart Card receptacle for user authentication are located on the front of the unit.

The Receiver is designed around a Broadcom chipset. There are two separate RF analog satellite inputs, each connected to a Broadcom BCM3440 receiver chip. These are each connected to Broadcom BCM4500 tuners, which in turn connect to the Broadcom BCM7319 STB decoder chip. The decoder chip is mounted in a large 456 I/O BGA package while the other chips are mounted in leaded surface mount packages.

Both the receiver chips and the tuner chips sit atop dense arrays of vias on the Main Board for thermal management.



While not shown, there is a separate Remote Antenna Board with a FSK/FM/ASK Receiver (#TH71101) from Melexis, providing a mechanism for external programming to merge with satellite-based content. A

second shielded daughtercard contains a Motorola PLL Tuned Modulator (#MC44BC374) to launch received programming onto a standard TV cable outlet. Because the satellite system relies on standard telephone service to handle traffic for programming and authentication, a Silicon Labs telephone interface chipset (#Si3021 and #Si3012) are also found.

Estimated cost of manufacturing hovers around \$90, a figure offset by the various programming and/or box rental fees associated with Dish service.

Box profits may not be the story, but hardware enables the Dish service, and in turn analog components enable the hardware.



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