SpeedREACH™ DPS8000/DPS8001– ADSL Full Rate Analog Front Ends

OVERVIEW

According to a 1983 Bell system survey, 18,000 feet (18 kfeet) is the loop distance reach needed to qualify over 95 percent of U.S. residents for asymmetric digital subscriber line (ADSL) megabit dial-up services. ADSL access equipment currently using chips that operate from 12-to-16 kfeet can only enable service up to 60 percent of U.S. residents to be "loop qualified" for such megabit dial-up services. That leaves the other 40 percent of U.S. residents outside the reach of the telephone company's central office (CO). This performance limitation can result in a significant loss of revenue for service providers. It would cost millions to build more central offices to cover the remaining 40 percent of home users.

The performance chart (Figure 1, next page) shows that ADSL analog front-end (AFE) chips delivered by other companies do not connect beyond distances of 12-to-16 kfeet between a CO and a dial-up user's remote site. The chart also shows that LSI Logic's SpeedREACH AFEs can deliver the best speed and distance performance, receiving and transmitting data well over 18 kfeet.

ADSL access equipment and high-speed modems using LSI Logic's SpeedREACH DPS8000/DPS8001 AFEs could increase the megabit dial-up services loop reach to 95 percent of U.S. residents, thereby providing a significant competitive speed and distance advantage to ADSL equipment providers.

LSI Logic's SpeedREACH AFEs support both full rate ADSL and G.lite.

FEATURES

- Complete DMT-based ADSL CO and CPE AFEs with full RX and TX analog signal paths [excluding POTS reject filter and high-voltage line drivers/receivers]
- Fully monolithic: Only two precision resistors and decoupling capacitors required
- Support for echo-cancelled and frequency-division based systems; full analog echo path support
- Compatible with ITU G.992.1 (G.dmt) and G.992.2 (G.lite) standards
- Supports up to 8 Mbit/s downstream and 800 kbits/s upstream duplex
- Support for 276 KHz upstream channel for ISDN compatibility
- 14-Bit Linear 4.416 MS/s ADCs and dual 14-Bit linear 4.416 MHz DACs
- Programmable RX/TX attenuation/gain
- 4th-order low-pass filters for RX/TX paths, with ±5% cutoff frequency accuracy
- RX path noise floor: –160 dBm/Hz
- 12-bit DAC to support external VCXO
- Power dissipation:
  – 675 mW for frequency-division mode
  – 825 mW with full echo on
- Integrated "wakeup" energy detector for CO (DPS8000 only)

LSI LOGIC®

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SpeedREACH™ DPS8000/DPS8001

DESCRIPTION

ADSL technology meets the need for high-bandwidth communications using existing twisted-pair copper infrastructure.

DPS8000/DPS8001 are a pair of highly integrated AFEs for CO-side and remote terminal (RT)-side, respectively, for discrete multi-tone (DMT) ADSL. To support world-wide compatibility, both chips support either frequency-division or echo-cancellation systems, under either the full-rate ADSL or G.lite standard. Furthermore, operation of ADSL over ISDN is also supported. Therefore, modems equipped with SpeedREACH AFEs can operate on the vast majority of phone lines worldwide, enabling maximum data rate with maximum reach between the CO and the RT sites.

To simplify the design, and reduce design and deployment costs, SpeedREACH AFEs perform all of the functions of the receive (RX) and transmit (TX) paths for ADSL. Excluding plain old telephone service (POTS) reject filtering and high-voltage line drivers/receivers, the entire RX and TX functionality is fully integrated and requires no external circuitry beyond a few precision resistors and bypass/coupling capacitors.

A 4-wire serial port provides a simple DSP interface. The serial port is used to modify internal register values, which in turn control attenuation/gain settings, filter bandwidths and the power down of individual blocks. The chips are powered off a +5 V supply while all digital I/Os run off a +3.3 V supply. The DPS8000/DPS8001 are available in 128-pin LQFP plastic packages. The operating temperature range is between -40° C and +85° C.

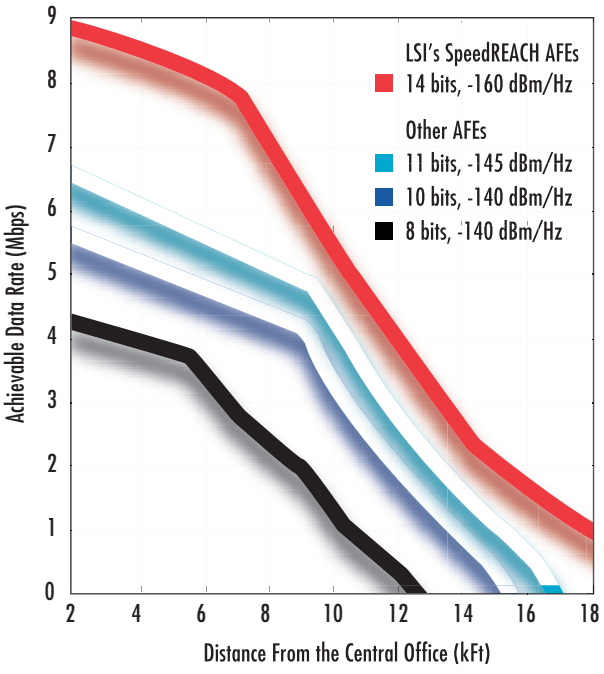

Figure 1. The two critical AFE performance parameters are linearity (in bits) and noise floor (in dBm/Hz).

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Order No. R20029
101.1k.JG.TP - Printed in USA

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