

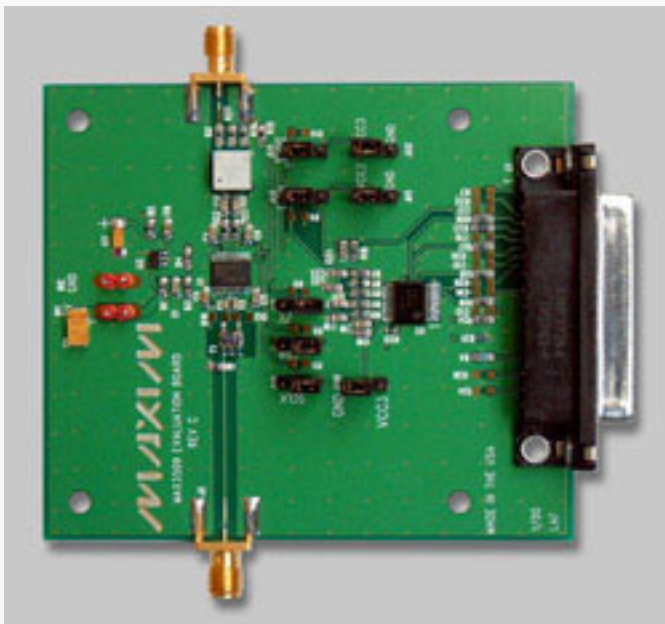
APPLICATION NOTE 812

REP031: MAX3509 Upstream Amplifier Drives +68dBmV DOCSIS Cable Telephony

Rapid engineering prototypes are real circuits that Maxim application engineers have built and measured in our labs. They can provide a starting point for new RF designs.

Additional Information:

- [Wireless Product Line Page](#)
- [Quick View Data Sheet for the MAX3509](#)
- [Applications Technical Support](#)



Objective: To modify the MAX3509 upstream CATV amplifier for higher output.

Many producers of cable telephony require a high output upstream amplifier to overcome coupler loss. Manufacturers may need 67dBmV to 68dBmV at the amplifier output to overcome duplexer and coupler losses. By using a 1:2 (voltage) step-up output transformer and series output resistance of 35.5Ω , the MAX3509 can offer good on state return loss and still meet DOCSIS off-state return loss after duplexer and coupler. A typical system can have a 1dB loss at the duplexer and a 6dB loss at the coupler for a total loss, after D.U.T., of 7dB.

The MAX3509 is a cable upstream amplifier which operates over a 5MHz to 65MHz frequency range. It features variable gain control (VGA) by a 3-wire digital serial bus in 1dB steps. It offers low-impedance op-amp outputs which permit flexibility in output match and drive levels. The MAX3509 can output up to 66dBmV QPSK through a 1:1 transformer. It also offers a transmit-disable mode and a power-down mode. It is available in a 20-pin TSSOP-EP package for the extended-industrial range (-40°C to $+85^{\circ}\text{C}$).

[Test Conditions](#) (PDF, 60K)

[Bench Test Equipment List](#) (PDF, 50K)
[Circuit Modification Description](#) (PDF, 46K)
[Performance Matrix](#) (PDF, 50K)
[System Performance Matrix](#) (PDF, 73K)

Harmonics Performed at 22MHz:

[33dBmV](#) (PDF, 22K),
[33P_{OUT}](#) (PDF, 20K),
[34dBmV](#) (PDF, 20K),
[34P_{OUT}](#) (PDF, 20K),
[35dBmV](#) (PDF, 22K),
[35P_{OUT}](#) (PDF, 20K),
[Sum](#) (PDF, 24K)

Harmonics Performed at 65MHz:

[33dBmV](#) (PDF, 19K), _
[33P_{OUT}](#) (PDF, 20K), _
[34dBmV](#) (PDF, 20K), _
[34P_{OUT}](#) (PDF, 20K), _
[35dBmV](#) (PDF, 22K), _
[35P_{OUT}](#) (PDF, 20K), _
[Sum](#) (PDF, 24K)

Related Parts

MAX3509: [QuickView](#) -- [Full \(PDF\) Data Sheet](#) -- [Free Samples](#)

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