

Rail-to-rail amp provides biasing in RF amp

Frank Cox, Linear Technology Corp, Milpitas, CA

IT IS OFTEN USEFUL to monitor the dc level of an RF signal. However, most RF systems use capacitive coupling; thus, the dc information is lost. The circuit in **Figure 1** is an RF amplifier comprising two monolithic microwave integrated circuits (MMICs), IC_1 and IC_2 , and a quad rail-to-rail op amp (IC_3 , an LT1633). IC_{3A} restores the dc level at the

output. Inductors at both the input and the output of the op amp isolate the amplifier from the RF signal. The isolation is good practice, because frequencies higher than the bandwidth of the op amp can undergo rectification in the amplifier's input stages, thereby introducing offset. MMICs IC_1 and IC_2 are Hewlett-Packard HP MSA-0785 devices, which

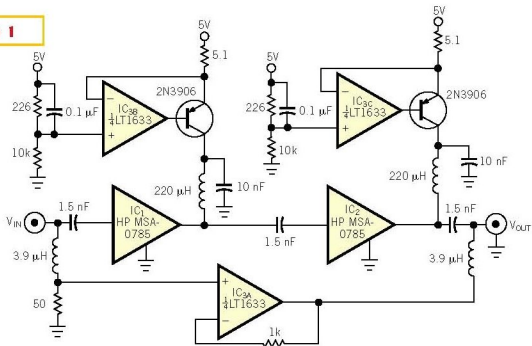
have an inverting gain of 13 dB; the result is a total gain of approximately 26 dB and a noninverted signal. IC_1 and IC_2 have a 3-dB bandwidth of approximately 2 GHz. The 1.5-nF blocking capacitors set the low-frequency cutoff at 2 MHz.

IC_1 and IC_2 have a 1-dB compression point of 4 dBm, or 1V p-p, into 50 Ω , allowing for an input level as high as 18 mV

rms. The maximum output current of IC_{3A} , typically 40 mA with a single 5V supply, limits the dc level

on the output to 2V into 50 Ω . The output saturation (low) voltage of the LT1633, typically 40 mV, sets the minimum pedestal voltage. IC_1 and IC_2 use constant-current bias sources to stabilize their gain with respect to temperature. Two other sections of the quad op amp, IC_{3B} and IC_{3C} , form active 22-mA current sources. You can make the voltage dividers on the noninverting inputs of IC_{3B} and IC_{3C} adjustable to trim the gain of the RF amplifier. The rail-to-rail inputs of IC_3 allow the circuit to operate to within 110 mV of the positive rail. (DI #2467)

Figure 1



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A simple op-amp-follower circuit with the aid of inductive blocking restores the dc level of an RF signal.