Biasing the diode improves a-m detector performance

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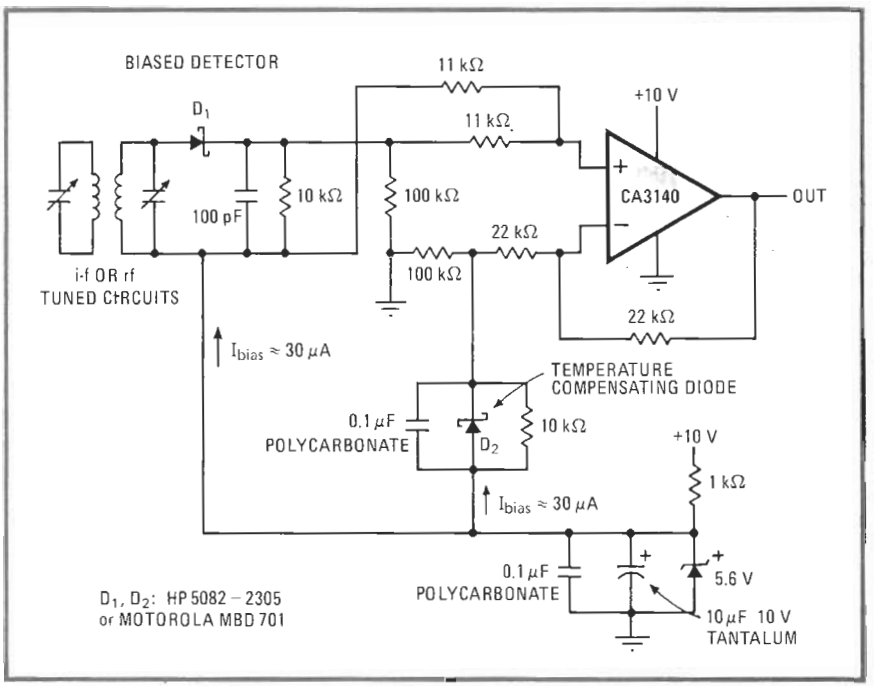
The sensitivity, dynamic range, and linearity of a standard amplitude-modulation diode detector improve if the diode is biased into its conducting region. Sensitivity and dynamic range increase because the incoming radio-frequency signal does not encounter the barrier-potential voltage of the diode before the onset of rectification. Linearity improves because the biasing voltage shifts the operating point of the diode into the linear portion of its characteristic curve.

As shown in the figure, signals are applied to D_1, a Schottky diode that can be used at frequencies approaching 1 gigahertz. It has a low barrier potential (0.35 volt), about one half that of conventional silicon diodes, and allows linear operation at a lower biasing voltage than is possible with conventional diodes.

A 5.6-v zener and the voltage divider composed of the 10-kilohm resistor and D_1 send 350 mv across D_1, making it conduct. The voltage drop across D_1 is in effect eliminated for rf signals, making possible the detection of millivolt-level signals. The demodulated signal appears across the resistance-capacitance filter



Tweaked detector. Even the old reliable a-m detector can be improved. Increased sensitivity, linearity, and dynamic range are obtained by dc biasing diode D_1 into conduction, to eliminate voltage drop as seen by rf driver. D_2 provides temperature compensation.