

SHIELDED DIVERSITY RECEIVE MODULE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to U.S. Prov. App. No. 62/330,046 filed April 29, 2016 and entitled "SHIELDED DIVERSITY RECEIVE MODULE," which is expressly incorporated by reference herein in its entirety for all purposes.

BACKGROUND

Field

[0002] The present disclosure generally relates to electronic modules with shielding such as shielded radio-frequency (RF) modules, and relates in particular to shielded diversity receive modules.

Description of Related Art

[0003] In wireless communication applications, size, cost, and performance are examples of factors that can be important for a given product. For example, to increase performance, wireless components such as a diversity receive antenna and associated circuitry are becoming more popular.

[0004] In many radio-frequency (RF) applications, a diversity receive antenna is placed physically far from a primary antenna. When both antennas are used at once, a transceiver can process signals from both antennas in order to increase data throughput.

[0005] In such RF applications, RF circuits and related devices can be implemented in a packaged module. Such a packaged module can include shielding functionality to inhibit or reduce electromagnetic interference associated with some or all of such RF circuits.

SUMMARY

According to an aspect, the present disclosure relates to a radio-frequency (RF) module that includes a packaging substrate configured to receive a plurality of components. The RF module also includes a

[0009] In some embodiments, the RF receiving system includes a combination of at least two of the first feature, the second feature, the third feature, the fourth feature, the fifth feature, or the sixth feature. In some embodiments, the RF receiving system includes a combination of at least two of the first feature, the second feature, the third feature, the fourth feature, the fifth feature, or the sixth feature. In some embodiments, the RF receiving system includes a combination of at least three of the first feature, the second feature, the third feature, the fourth feature, the fifth feature, or the sixth feature. In some embodiments, the RF receiving system includes a combination of at least four of the first feature, the second feature, the third feature, the fourth feature, the fifth feature, or the sixth feature. In some embodiments, the RF receiving system includes a combination of at least five of the first feature, the second feature, the third feature, the fourth feature, the fifth feature, or the sixth feature.

According to an aspect, the present disclosure relates to a wireless device that includes a first antenna configured to receive one or more radio-frequency (RF) signals. The wireless device also includes a first front-end module (FEM) in communication with the first antenna, the first FEM including a packaging substrate configured to receive a plurality of components. The first FEM further includes a receiving system implemented on the packaging substrate. The receiving system includes a controller configured to selectively activate one or more of a plurality of paths between an input of the receiving system and an output of the receiving system. The receiving system also includes a plurality of amplifiers, each one of the plurality of amplifiers disposed along a corresponding one of the plurality of paths and configured to amplify a signal received at the amplifier. The receiving system also includes one or more of a first feature, a second feature, a third feature, a fourth feature, a fifth feature, and a sixth feature, implemented for the RF receiving system. The first feature includes a plurality of bandpass filters, each one of the plurality of bandpass filters disposed along a corresponding one of the plurality of paths and configured to filter a signal received at the bandpass filter to a respective frequency band, and at least some of the plurality of amplifiers implemented as a plurality of variable-gain amplifiers (VGAs), each one of the plurality of VGAs