

RF2051 WLAN Band Shift Application

RFMD Worldwide Applications

Introduction

This application uses the RF2051 device as a band shifter to convert the input and output from a 2450MHz WLAN transceiver to another frequency band, typically around 915MHz.

Tests were carried out to ensure that the RF2051 transmit mixer and synthesizer performance meet the EVM requirement for the IEEE 802.11g specification at 52Mbps, OFDM with 64QAM modulation. The transmit mixer takes the 2450MHz transmit output from the transceiver and converts it to 915MHz, with an LO frequency of 1544MHz.

Test Setup

The following setup was used to measure EVM versus power level. The R&S vector signal generator and analyzer have WLAN profiles.

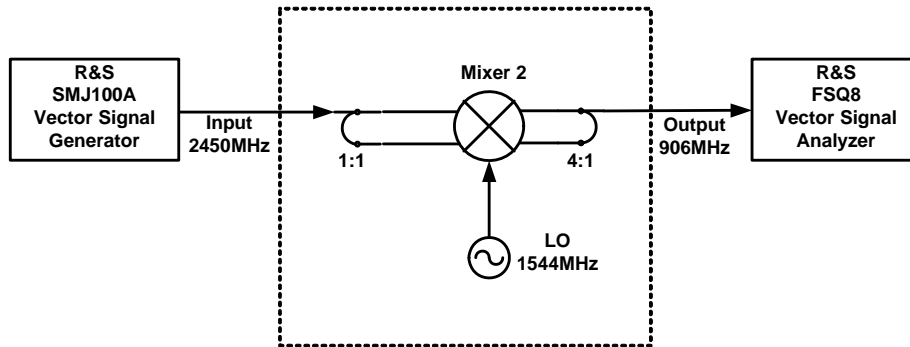


Figure 1. RF2051 Evaluation Board

The RF2051 mixer output was modified as shown below to improve performance at 906MHz.

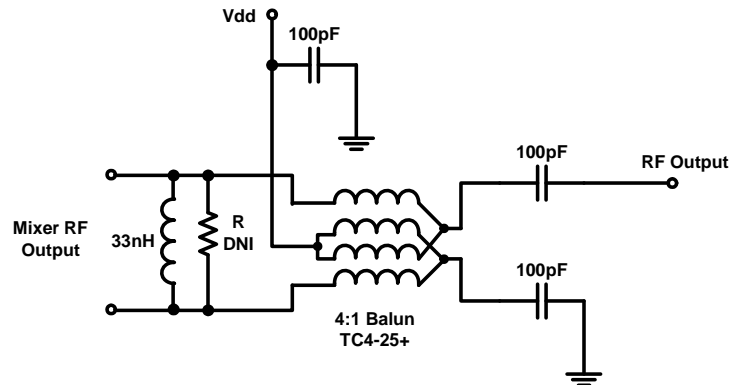


Figure 2. RF2051 Mixer Output

Results: Default Mixer Current Setting of 30mA

The EVM measured was between 0.7% and 0.8% for input power levels of -1dBm to -16dBm. The RF2051 mixer did not show any signs of distortion or compression with the power level generated by the SMJ signal generator with a -1dBm maximum. A power amplifier would need to be used to take the RF2051 into compression to see the EVM rise with the input power. The main contribution to the EVM at these power levels is in the RF2051’s synthesizer phase noise.

Note that the residual EVM of the test equipment was measured as 0.4% to 0.5% at 2450MHz.

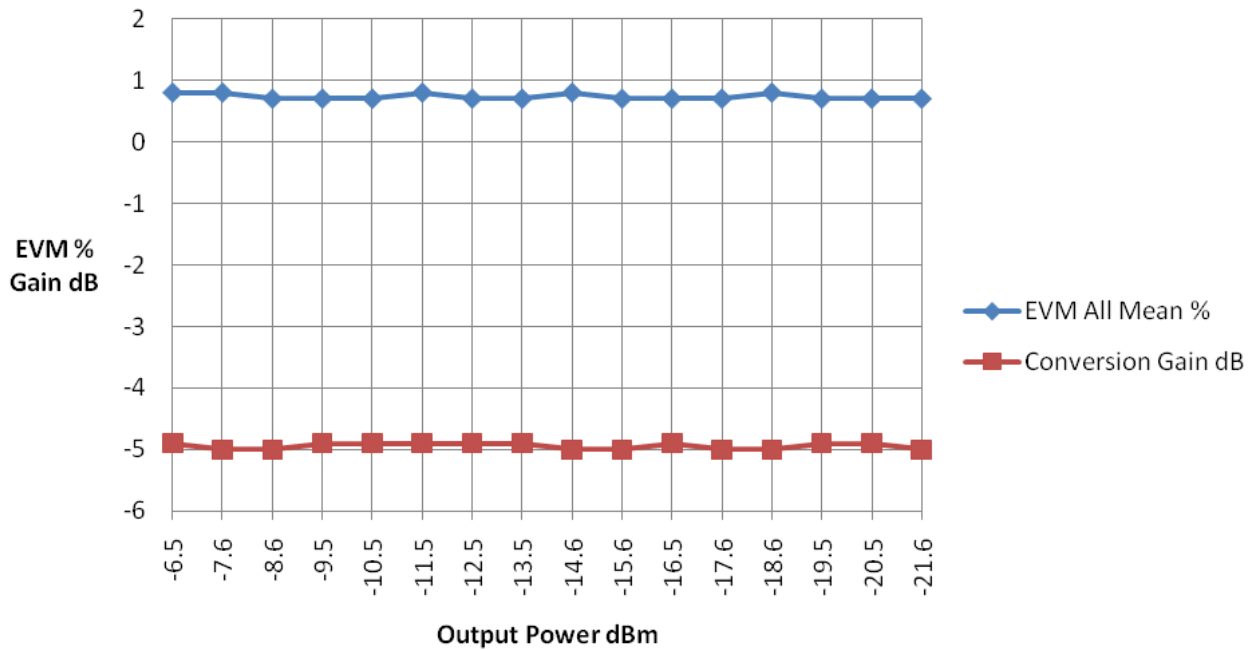


Figure 3. EVM versus Power for Mixer Current of 30mA

Results: Minimum Mixer Current Setting of 15mA

As an experiment, the mixer current setting was reduced to the minimum of 15mA, reducing linearity, and the same test performed. It can be seen that at -1dBm input power the RF2051 mixer is compressing slightly and, as a result, the EVM has increased to 4.3%. The EVM reduces to the minimum of 0.7% to 0.8% for output powers less than -13dBm.

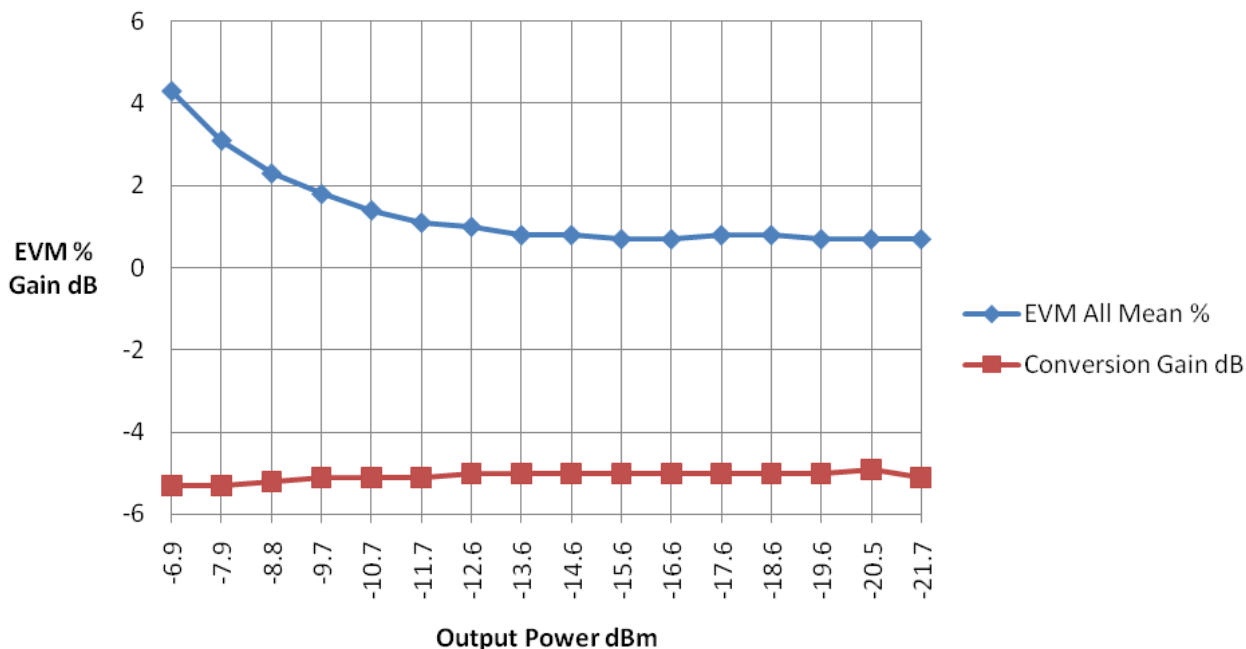


Figure 4. EVM versus Power for Mixer Current of 15mA

Conclusions

The information presented here shows that the RF2051 works well in this application as a WLAN band shifter. The device is well-suited for band-shifting applications, containing the two mixers for up and down conversion as well as all of the local oscillator circuitry.

This information further demonstrates that the EVM of the RF2051 is less than 1% when driving input powers of up to -1dBm. This was measured with IEEE802.11g modulation at a rate of 52Mbps, with the default mixer current setting. Typically the output power of the WLAN transceiver will be around -10dBm; the RF2051 has sufficient linearity to handle this signal level. Depending on application requirements, the mixer current setting could be reduced to minimize the total current consumption.