Claims

What is claimed is:

1. A system, comprising:

a linearizer module configured to adjust a first intermediate frequency signal to produce an adjusted first intermediate frequency signal, the linearizer module adjusting the first intermediate frequency signal based on a reference signal and on a first signal, the first signal being based on a second intermediate frequency signal;

a first upconverter module configured to up-convert a second signal to produce a radio frequency signal, the second signal being based on the adjusted first intermediate frequency signal;

a power amplifier module configured to amplify a power of a third signal to produce an amplified radio frequency signal, the third signal being based on the radio frequency signal, the power amplifier module comprising an adjustable power supply module configured to provide an adjustable power level to the power amplifier module;

a signal sampler module configured to sample a fourth signal to produce a sampled radio frequency signal, the fourth signal based on the amplified radio frequency signal; and

a downconverter module configured to down-convert a fifth signal to produce the second intermediate frequency signal, the fifth signal being based on the sampled radio frequency signal,

wherein the linearizer module is further configured to compare the reference signal to the first ~~second intermediate frequency~~ signal, detect a distortion of the amplified radio frequency signal based on the comparison, at least a portion of the distortion being due to a power adjustment of the power amplifier module, and adjust the first intermediate frequency signal in order to reduce the distortion of the amplified radio frequency signal, thereby resulting in the adjusted first intermediate frequency signal.

2. The system of claim 1, wherein the linearizer module is further configured to:

detect the distortion based on comparing the reference signal to the first signal ~~based on the second intermediate frequency signal~~ by generating an error function from the comparing comparison, and

adjust the first intermediate frequency signal in order to reduce the distortion of the amplified radio frequency signal by adjusting the first intermediate frequency signal based on the error function.

3. The system of claim 2, wherein the linearizer module is further configured to adjust the first intermediate frequency signal using the linearizer module based on the error function by adjusting the first intermediate frequency signal such that a result of the error function indicates minimal distortion of the amplified radio frequency signal.

4. The system of claim 1, wherein the linearizer module is further configured to determine a percentage of adjustment applied to the first intermediate frequency signal in order to reduce the distortion of the amplified radio frequency signal.

5. The system of claim 4, wherein the linearizer module is further configured to generate an alert when the percentage is greater than or equal to a threshold value.

6. The system of claim 1, wherein the power amplifier module comprises a power amplifier, and wherein the power amplifier module contributes at least some of the distortion of the amplified radio frequency signal due to an output non-linearity characteristic of the power amplifier or due to a power level supplied to the power amplifier.

7. The system of claim 1, wherein the power amplifier module comprises a class C, a class AB, or a class A power amplifier.

~~8. The system of claim 1, wherein the power amplifier module comprises an adjustable power supply module configured to provide an adjustable power level to the power amplifier module.~~

8~~9~~. The system of claim ~~8~~ 7, wherein the power amplifier module is configured to use the adjustable power supply module to reduce a power level utilized by the power amplifier module.

9~~10~~. The system of claim 1, wherein the signal sampler module comprises a directional coupler.

10~~11~~. The system of claim 1, wherein the first upconverter module and the downconverter module share a local oscillator.

11~~12~~. The system of claim 1, wherein the first intermediate frequency signal is the reference signal.

12~~13~~. A method, comprising:

receiving a first intermediate frequency signal;

up-converting a second signal to produce a radio frequency signal, the second signal being based on the first intermediate frequency signal;

amplifying, with a power amplifier module, a power of a third signal to produce an amplified radio frequency signal, the third signal being based on the radio frequency signal, the power amplifier module comprising an adjustable power supply module configured to provide an adjustable power level to the power amplifier module;

sampling a fourth signal to produce a sampled radio frequency signal, the fourth signal being based on the amplified radio frequency signal;

down-converting a fifth signal to produce a second intermediate frequency signal, the fifth signal being based on the sampled radio frequency signal;

comparing a reference signal to a first signal, the first signal being based on the second intermediate frequency signal;

detecting a distortion of the amplified radio frequency signal, the detecting being based on the comparing, at least a portion of the distortion being due to a power adjustment of the power amplifier module; and

adjusting the first intermediate frequency signal using a linearizer module to reduce the distortion of the amplified radio frequency signal, thereby resulting in an adjusted first intermediate frequency signal.

13~~14~~. The method of claim ~~13~~ 12, further comprising repeating the steps of up-converting, amplifying, sampling, down-converting, comparing and detecting for the adjusted first intermediate frequency signal.

14~~15~~. The method of claim ~~13~~ 12, wherein detecting the distortion based on the comparison comprises generating an error function based on comparing the reference signal to the signal based on the second intermediate frequency signal, and wherein

adjusting the first intermediate frequency signal using the linearizer module in order to reduce the distortion of the amplified radio frequency signal comprises adjusting the first intermediate frequency signal based on the error function using the linearizer module.

15~~16~~. The method of claim ~~15~~ 14, wherein adjusting the first intermediate frequency signal based on the error function using the linearizer module comprises adjusting the first intermediate frequency signal such that a result of the error function indicates minimal distortion of the amplified radio frequency signal.

16~~17~~. The method of claim ~~13~~ 12, further comprising determining a percentage of adjustment applied to the first intermediate frequency signal using the linearizer module in order to reduce the distortion of the amplified radio frequency signal.

17~~18~~. The method of claim ~~17~~ 16, further comprising generating an alert when the percentage is greater than or equal to a threshold value.

18~~19~~. The method of claim ~~13~~ 12, wherein a power amplifier used to amplify the power of the radio frequency signal during the amplifying step contributes at least some of the distortion of the amplified radio frequency signal due to an output non-linearity characteristic of the power amplifier or due to a power level supplied to the power amplifier.

19~~20~~. The method of claim ~~19~~ 18, wherein the power amplifier is a class C, a class AB, or a class A power amplifier.

20~~21~~. The method of claim ~~13~~ 12, further comprising reducing a power level to a power amplifier used to amplify the power of the radio frequency signal during the amplifying step.

21~~22~~. The method of claim ~~13~~ 12, wherein the first intermediate frequency signal is the reference signal.

22~~23~~. The system of claim 1, wherein the power adjustment comprises a direct current (DC) power adjustment.

2324. The system of claim 1, wherein the power adjustment comprises entry into a power saving mode of the power amplifier module.

2425. The system of claim 1, wherein the power amplifier module comprises a radio frequency (RF) power amplifier module.

2526. The method of claim ~~13~~ 12, wherein the power adjustment comprises a direct current (DC) power adjustment.

2627. The method of claim ~~13~~ 12, wherein the power adjustment comprises entry into a power saving mode of the power amplifier module.

2728. The method of claim ~~13~~ 12, wherein the power amplifier module comprises a radio frequency (RF) power amplifier module.

2829. A system, comprising:

means for receiving a first intermediate frequency signal;

means for up-converting a second signal to produce a radio frequency signal, the second signal being based on the first intermediate frequency signal;

means for amplifying, with a power amplifier module, a power of a third signal to produce an amplified radio frequency signal, the third signal being based on the radio frequency signal, the power amplifier module comprising an adjustable power supply module configured to provide an adjustable power level to the power amplifier module;

means for sampling a fourth signal to produce a sampled radio frequency signal, the fourth signal being based on the amplified radio frequency signal;

means for down-converting a fifth signal to produce a second intermediate frequency signal, the fifth signal being based on the sampled radio frequency signal;

means for comparing a first intermediate frequency ~~reference~~ signal to a first signal, the first signal being based on the second intermediate frequency signal;

means for detecting a distortion of the amplified radio frequency signal, the detecting being based on the comparing, at least a portion of the distortion being due to a power adjustment of the power amplifier module; and

means for adjusting the first intermediate frequency signal using a linearizer module to reduce the distortion of the amplified radio frequency signal, thereby resulting in an adjusted first intermediate frequency signal.

29. A system, comprising:

a linearizer module configured to adjust a first intermediate frequency signal to produce an adjusted first intermediate frequency signal, the linearizer module adjusting the first intermediate frequency signal based on a reference signal and on a first signal, the first signal being based on a second intermediate frequency signal;

a first upconverter module configured to up-convert a second signal to produce a radio frequency signal, the second signal being based on the adjusted first intermediate frequency signal;

a power amplifier module configured to amplify a power of a third signal to produce an amplified radio frequency signal, the third signal being based on the radio frequency signal;

a signal sampler module configured to sample a fourth signal to produce a sampled radio frequency signal, the fourth signal based on the amplified radio frequency signal; and

a downconverter module configured to down-convert a fifth signal to produce the second intermediate frequency signal, the fifth signal being based on the sampled radio frequency signal,

wherein the first intermediate frequency signal is the reference signal and the linearizer module is further configured to compare the first intermediate frequency signal to the first signal, detect a distortion of the amplified radio frequency signal based on the comparison, at least a portion of the distortion being due to a power adjustment of the power amplifier module, and adjust the first intermediate frequency signal in order to reduce the distortion of the amplified radio frequency signal, thereby resulting in the adjusted first intermediate frequency signal.

30. A method, comprising:

receiving a first intermediate frequency signal;

up-converting a second signal to produce a radio frequency signal, the second signal being based on the first intermediate frequency signal;

amplifying, with a power amplifier module, a power of a third signal to produce an amplified radio frequency signal, the third signal being based on the radio frequency signal;

sampling a fourth signal to produce a sampled radio frequency signal, the fourth signal being based on the amplified radio frequency signal;

down-converting a fifth signal to produce a second intermediate frequency signal, the fifth signal being based on the sampled radio frequency signal;

comparing a reference signal to a first signal, the first signal being based on the second intermediate frequency signal;

detecting a distortion of the amplified radio frequency signal, the detecting being based on the comparing, at least a portion of the distortion being due to a power adjustment of the power amplifier module; and

adjusting the first intermediate frequency signal using a linearizer module to reduce the distortion of the amplified radio frequency signal, thereby resulting in an adjusted first intermediate frequency signal,

wherein the first intermediate frequency signal is the reference signal.