

A method of producing a linear current signal in a baseband Voltage - to-Current (V-I) converter

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Problem Statement

- The problem statement discussed in the present invention is **how to develop an up-conversion mixer with the improved linearity and power efficiency by employing a closed loop negative feedback control mechanism.**
- Hence, subject invention addresses the issue.

Technology Category/ Market

Technology: Voltage to current converter
Industry/Application: RF & Microwave systems, Communication Systems, Electric Vehicle, Medical Equipment, & etc. ;
Market: The global **power converter** market is projected to reach at a **CAGR of 7.8%** during the period **(2024-32)**.

Technology

- Present patent discussed a **baseband Voltage-to-Current (V-I) converter.**
- Said **V-I converter** comprises a **feedback converter** configured to
 - **receive** at least one **first current signal** from at least one first power transistor in a first stage & at least one second current signal from at least one second power transistor in a second stage;
 - **produce** at least **one feedback current signal** in said first stage & said second stage by sensing said at least one first current signal from said at least one first power transistor in said first stage & said at least one second current signal from said at least one second power transistor in said second stage.
- Said **V-I converter** comprises an **operational amplifier** configured to:
 - **receive** a plurality of said feedback current signals & at least one reference current signal

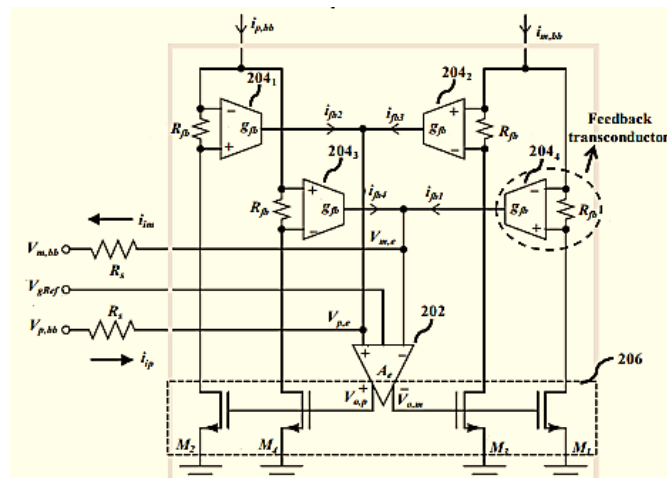


FIG. 1 illustrates a circuit diagram of a class-AB baseband Voltage-to-Current (V-I) converter,

obtained from at least one input voltage signal;

- **compare** the reference current signal with received plurality of feedback current signals;
- **send** an output voltage signal to the first power transistor in the first stage & the second power transistor in the second stage; and
- **produce** a linear output current signal based on the output voltage signal.

TRL (Technology Readiness Level)

TRL-4, Technology validated in Lab;

Intellectual Property

IITM IDF Ref. 1091;
IN Patent No. 481665 (Granted)

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Key Features / Value Proposition

⑩ Provides mechanism for an up-conversion mixer with the improved linearity and power efficiency by employing a closed loop negative feedback control mechanism.

• Facilitates a baseband voltage-to-current (V-I) converter operating in a class-AB mode.

• Facilitates a single stage error amplifier to drive one or more power transistors to operate in negative feedback.

⑩ Said invention is invented a way to directly sense the current driven into the mixer switches ($i_{p,bb}$ and $i_{m,bb}$ in FIG. 1)

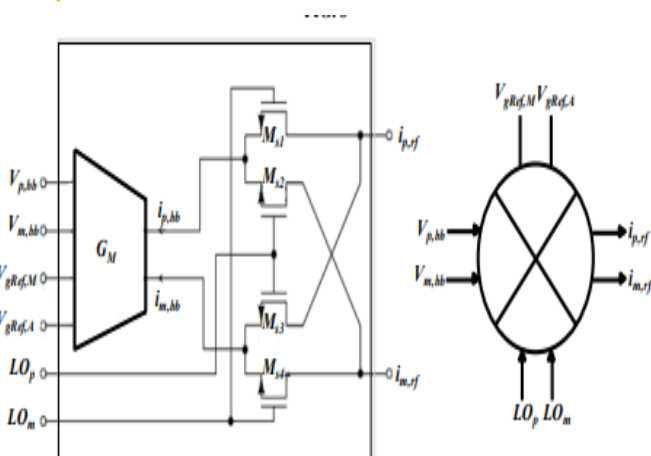


Fig.3 shows schematic of an up-conversion mixer core,

Images

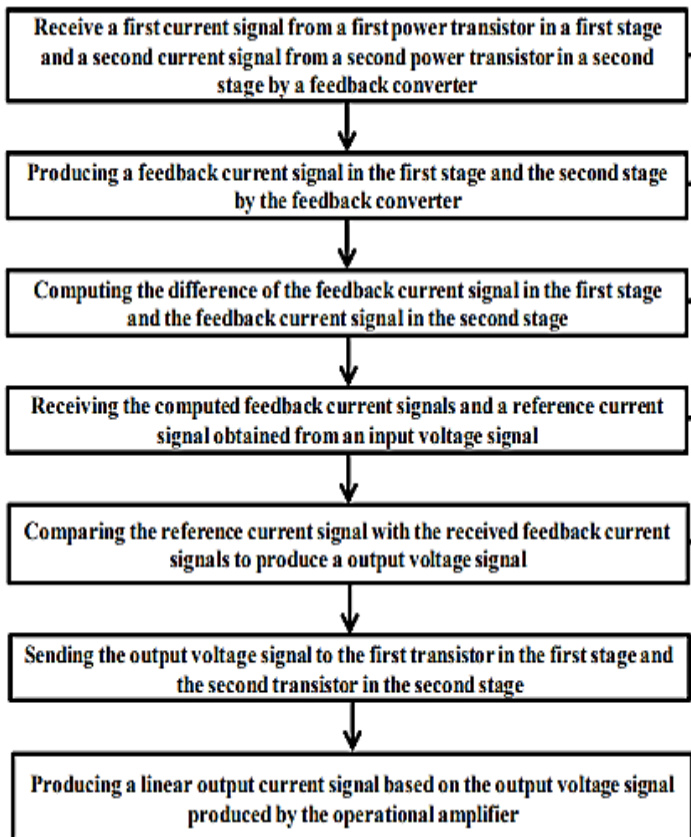


Fig.2 depicts a flow diagram illustrating a method for producing a linear current signal in a baseband V-I converter;

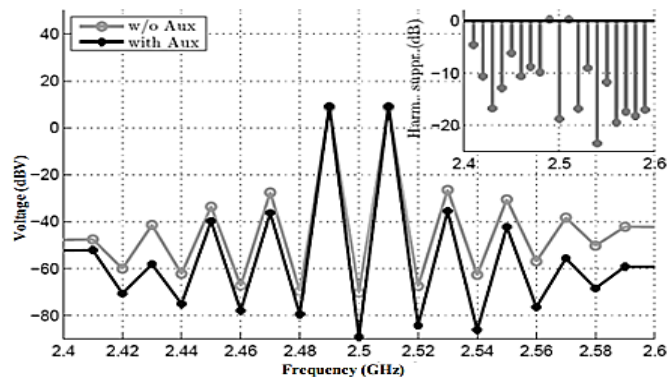


Fig. 4 depicts waveforms of a voltage spectrum output around a LO frequency of a Single-Sideband (SSB) mixer without and with an auxiliary path in a baseband V-I converter, and harmonic suppression due to an auxiliary path

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