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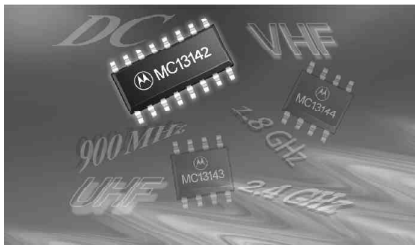
Information Brief



Versatile RF Front End Building Blocks Enable Cost-Effective Solutions from DC to 2.4 GHz

Can also contribute to extended battery life

This new family of RF building blocks consists of the MC13142, MC13143 and MC13144. All three ICs are designed using Motorola's MOSAIC V™ high frequency bipolar wafer process to provide excellent performance in both analog and digital communication systems.

The MC13142 provides a general purpose solution for RF front ends because it contains all of the basic functions needed. The MC13143 and MC13144 combine to provide a higher performance solution for RF front ends. The system partitioning between the MC13143 and 13144 provides *improved isolation, more versatility*, and *simplifies the interface* with external devices such as filters and other active components.

The MC13142 is a *complete* RF front end with a first amplifier, voltage controlled oscillator (VCO), and a downconverter. This device is suitable for use in a wide variety of RF applications, and features wideband operation, low noise, high gain and high linearity, while maintaining low power consumption. The wide IF bandwidth of the mixer (DC to 1.8 GHz) allows the MC13142 to also be used as an upconverter and exciter amplifier.

The MC13143 is a high compression linear mixer with a single-ended RF input, differential IF output, and differential local oscillator (LO) inputs, which consumes as little as 1.8 mW. This mixer is designed for up or down conversion anywhere from DC to 2.4 GHz.

The MC13144 is a low noise amplifier (LNA) with programmable bias. The device includes a cascode LNA that is usable at up to 2.0 GHz with a 1.8 Vdc supply. This IC incorporates a two-bit digital programming capability of the LNA bias, which allows the user to optimize the noise figure (NF) and the gain associated with the NF.

The MC13142 *or* the MC13143 and MC13144 together can be easily combined with the MC13158 Wideband FM IF for data radios or other FM applications.

FEATURES

MC13142 DC to 1.8 GHz LNA, Mixer and VCO

- Complete RF front end
- Low power consumption of 13 mA with a V_{CC} of 2.7 to 6.5 V
- Linearity adjustment increases the amplifier third order intercept (IP_{3in}) up to 20 dBm
- High mixer linearity ($P_{i1.0\ dB}$) of 3.0 dBm
- Single-ended 50Ω input, double balanced mixer
- Wide RF, LO, and IF bandwidths of DC to 1.8 GHz

MC13143 DC to 2.4 GHz Linear Mixer

- Ultra low power consumption of 1.0 mA with a V_{CC} of 1.8 to 6.5 V
- Linearity adjustment of up to 20 dBm for IP_{3in}
- High mixer linearity ($P_{i1.0dB}$) of 3.0 dBm
- Single-ended 50Ω input, double balanced mixer
- Wide input, LO, and output bandwidths of DC to 2.4 GHz
- Can be used as an up or down mixer, or in a direct conversion solution.

MC13144 VHF to 2.0 GHz LNA with Programmable Bias

- Low power supply voltage of 1.8 to 6.0 V
- Programmable bias optimizes NF and the gain associated with NF
- Gain of 17 dB at 900 MHz
- Noise figure of 1.4 dB at 900 MHz
- 1.0 dB compression point of -7.0 dB

TYPES OF APPLICATIONS

- Any 900 MHz ISM band applications such as:
  - Active RF tags
  - Video or data link security systems
  - Consumer or industrial remote control
  - Remote keyless entry
  - TV video links
  - High fidelity audio links
  - Wireless telephone headsets

TYPES OF APPLICATIONS (CONTINUED)

- UHF Family Radio Services
- UHF and 800 MHz Special Mobile Radio
- 800 MHz cellular phones
- GSM, PCS, DECT and PHS handsets at 1.8 to 2.0 GHz
- Cordless phones in the 902 to 928 MHz band
- High power spread spectrum and low power data links in the 900 MHz ISM band
- Wideband data links

BENEFITS TO YOU

- Lowers system cost and manufacturing costs by reducing component count and circuit complexity over other solutions.
- Can be used in two-cell battery-powered applications with a power supply voltage as low as 1.8 V (MC13143/144).
- Improved battery life due to low power consumption, and standby mode when receiver is not in use.
- Provides system design flexibility with one-chip (MC13142) or two-chip (MC13143/144) RF front end solutions.
- Higher circuit and system density with small surface mount packages.
- Flexibility in receiver system partitioning because the differential open collector mixer outputs of the MC13142 and MC13143 simplify the interface to filters and back-end IF devices, such as the MC13158.
- Improved reliability due to lower power dissipation.
- Smaller battery for portable applications with 1.8 to 2.7 V operation.
- Optimized mixer loading for improved linearity with single-ended 50Ω double balanced mixer design.

A SOLUTION FOR THESE QUESTIONS

- Are you designing a wireless communications system that operates in the 900 MHz ISM or1.8 to 2.0 GHz frequency range?
- Is reduced space or small printed circuit board size a critical design requirement?
- Do you want to reduce your system cost with a more cost-effective design requiring fewer external components?

A SOLUTION FOR THESE QUESTIONS (CONTINUED)

- Do you need to decrease the battery size and improve the battery life in your wireless system by reducing the operating voltage and power consumption?
- Does your application require an optimized noise figure for your LNA?
- Do you want a complete general purpose RF front end in a single IC?
- Do you need to optimize your mixer loading to improve system linearity?

LITERATURE

Complete data sheets containing full specifications, characteristic curves, circuit configurations, applications information, and sample printed circuit board layouts are available through Motorola's LDC as MC13142/D, MC13143/D and MC13144/D. Alternately, call Mfax at 602/244-6609 and key-in MC13142, MC13143 and/or MC13144.

ORDERING INFORMATION

Device	Operating Temperature Range	Package
MC13142D	T_A = –40°C to +85°C	SO-16
MC13143D		SO-8
MC13144D		SO-8

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