RX AND TX IF/BASEBAND PROCESSORS

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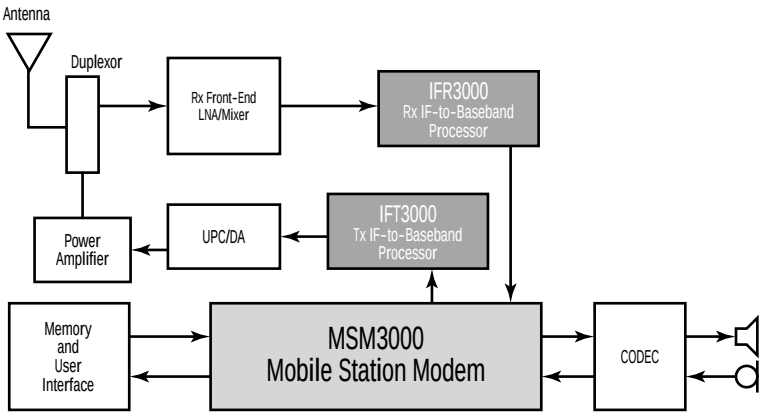
IFR3000/IFT3000

IFR3000™/IFT3000™
QUALCOMM CDMA TECHNOLOGIES

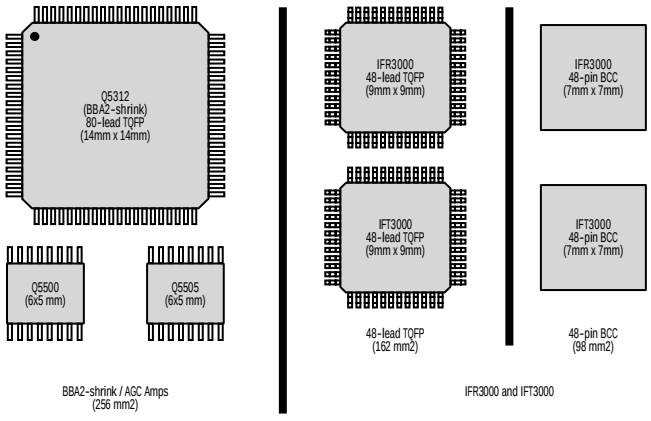
Figure 1. IFR3000 and IFT3000 Devices in a Subscriber Unit



SMALLER PACKAGING

The IFR3000 and IFT3000 devices incorporate all the Rx and Tx processing capability of the QUALCOMM Q5312 Analog Baseband Processor (BBA2-shrink) together with the automatic gain control functionality of the QUALCOMM Q5500™ Rx and Q5505™ Tx AGC amplifiers. The result is a more economic, two-chip analog baseband solution which provides handset designers over a 60% reduction in size.

Figure 2. Substantial Board Real Estate Savings



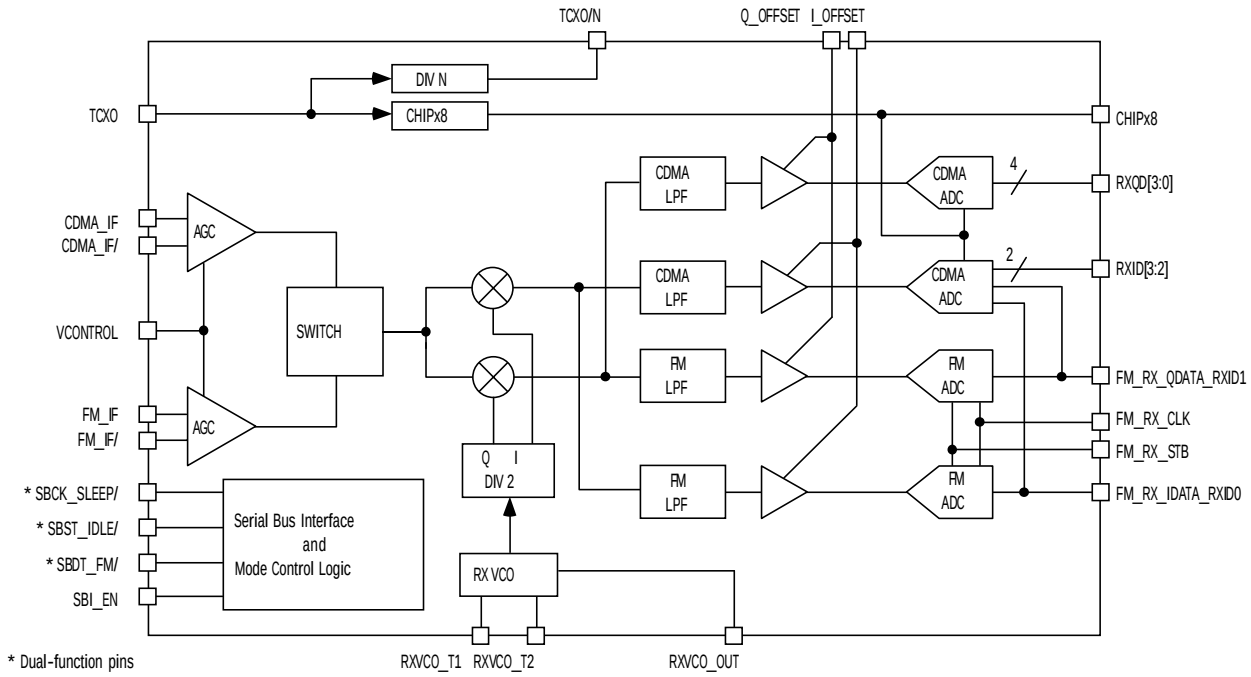
OVERVIEW

The QUALCOMM IFR3000 and IFT3000 Rx and Tx IF/Baseband processors offer significant reduction in cost, size and pin count over previous generation products. By integrating the functionality of three Application Specific Integrated Circuits (ASICs) into two ASICs, designers now possess IF-to-Baseband and Baseband-to-IF processing power, and Rx and Tx Automatic Gain Control (AGC) circuitry on either two 48-pin Low-profile Quad Flat Pack (LQFP) packages or two 48-pin Bump Chip Carrier (BCC) packages.

The IFR3000 and IFT3000 Rx and Tx IF/Baseband processors are designed for use in dual-mode CDMA and FM portable cellular telephones. The IFR3000 and IFT3000 devices interface between the radio-frequency (RF) section and the digital processing circuitry of the telephone.

IFR3000/IFT3000

Figure 3. IFR3000 Functional Block Diagram



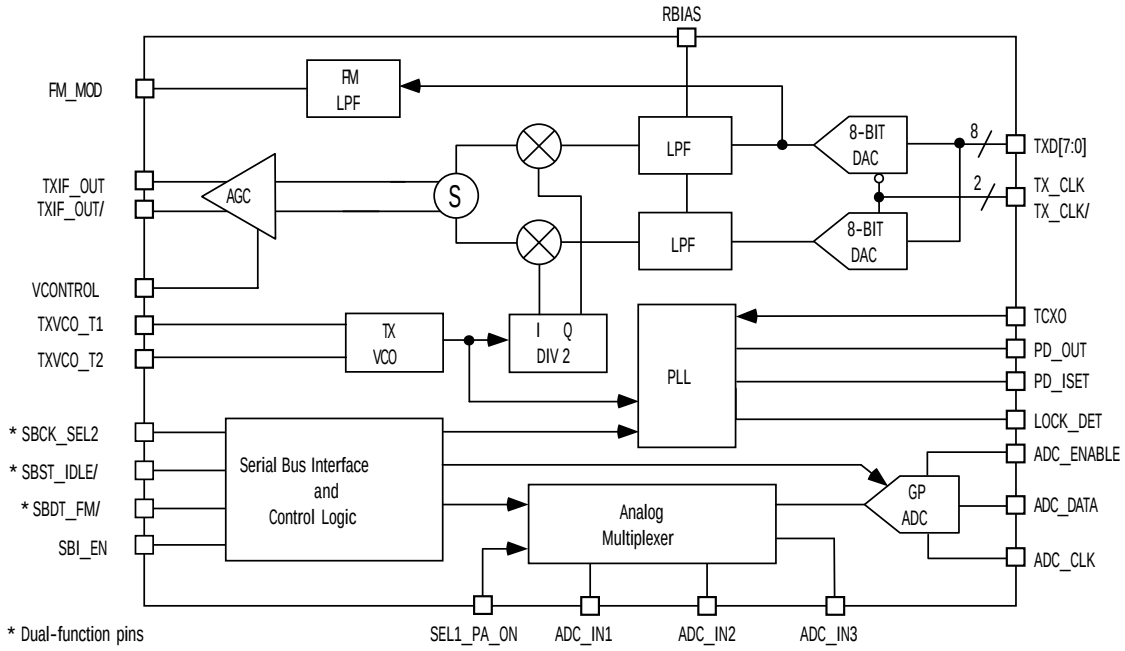
IFR3000

The circuit blocks within the IFR3000 include the Rx AGC amplifier with 90 dB dynamic range, IF mixer and CDMA/FM low-pass filters for down-converting IF to analog baseband, and analog-to-digital converters (ADC) for converting to digital baseband. The IFR3000 includes clock generators that drive the telephone's digital processor and a voltage-controlled oscillator (VCO) which generates the Rx mixer local oscillator (LO) signal.

IFR3000 Device Features

- Supports IS-98 (CDMA) and IS-19 (AMPS) standards for dual-mode operation
- 2.7 V to 3.15 V supply voltage
- Low current: 26 / 21 mA in CDMA
  Rx / FM Rx Modes
- Rx power control through 90 dB dynamic range AGC amplifier
- IF mixer for down-converting IF to analog baseband
- Low-pass filtering for CDMA and FM I- and Q-component baseband signal demodulation
- 4-bit ADCs convert CDMA I and Q analog baseband components to digital baseband
- 8-bit ADCs convert FM I and Q analog baseband to digital baseband
- Clock generators for CDMA / AMPS operation
- VCO for generation of Rx LO mixing signal
- I- and Q-channel DC offset control inputs drive baseband DC voltage offset to zero in CDMA and FM signal paths
- Operational Mode compatibility with the MSM2300™, MSM3000™ and MSM3100™ devices
- Enhanced features with MSM3000 device through three-line serial bus interface (SBI):
  – Slotted FM Mode
  – Selective power-down
  – Mode selection
- 48-lead LQFP and 48-pin BCC packaging options for dense circuit assemblies

Figure 4. IFT3000 Functional Block Diagram



IFT3000

The circuit blocks within the IFT3000 device include digital-to-analog converters (DACs) for converting digital baseband to analog baseband, low-pass filters, a mixer for up-converting to IF and an 85 dB dynamic range Tx AGC amplifier. The IFT3000 device includes a fully programmable phase-locked loop (PLL) for generating Tx LO and IF frequencies. The IFT3000 device also has an 8-bit general purpose ADC with three selectable inputs for monitoring battery level, RF signal strength and phone temperature.

IFT3000 Device Features

- Supports IS-98 (CDMA) and IS-19 (AMPS) standards for dual-mode operation
- Operates on 2.7 V to 3.15 V supply voltage
- 8-bit DACs convert digital baseband signals to analog baseband
- CDMA and FM signal paths include low-pass filters for I and Q output waveform smoothing
- IF mixer up-converts analog baseband to IF
- Tx power control through 85 dB dynamic range AGC amplifier
- Programmable Tx PLL for generating Tx IF frequency
- VCO for generation of Tx LO mixing signal
- 8-bit general-purpose ADC with 3-input analog multiplexer and selectable input ranges
- Operational Mode compatibility with the MSM2300 and MSM3000 devices
- Enhanced features with MSM3000 device through three-line serial bus interface (SBI):
  - Tx PLL phase-detector polarity
  - Tx PLL programmability
  - Punctured CDMA transmission
  - Selective power-down
  - Mode selection
- 48-lead LQFP and 48-pin BCC packaging options for dense circuit assemblies

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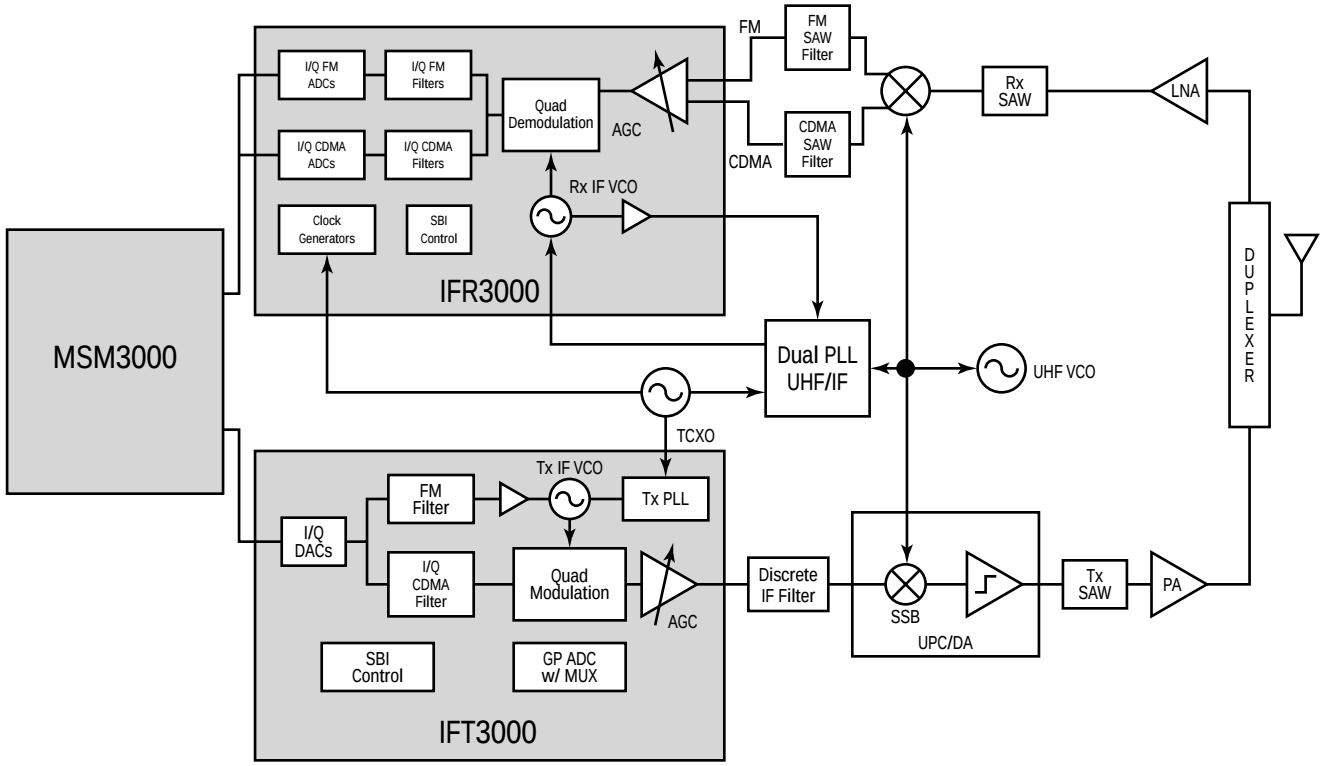
Figure 5. IFR3000 and IFT3000 devices as part of QUALCOMM's 5th Generation Chipset
Dual-mode Cellular (CDMA/AMPS) Handset Architecture



IFT3000/IFR3000 INTERFACES

Both the IFR3000 device and IFT3000 device interface directly with QUALCOMM's Mobile Station Modem (MSM™) ASICs. The MSM ASICs are CMOS VLSI integrated circuits that perform all digital processing in the CDMA/FM subscriber unit. The combination of IFR3000, IFT3000 devices and MSM family ASICs form the core of the portable CDMA/FM subscriber unit.

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