OPERATIONAL DESCRIPTION

GSM Function Description (850/900/1800/1900)

The GSM receiving path includes LNA, an RF band pass filter. The receiver IC down-converts the received signal from RF to baseband using ZIF techniques. The analog baseband signal is processed by baseband processor (SM8150).

The GSM transmitting path consists of a transmitter, two power amplifiers, front end module (FEM), diplexer, duplexer and switch. Beginning with analog baseband signal out from baseband processor (SM8150), the transmitter up-converts the baseband signal directly to RF signal by modulating with an internal LO which is generated by Phase Locked Loop (PLL) circuit.

The PLL circuit which is in SDR8150 consists of a VCO, a frequency synthesizer, a loop filter, and a reference frequency oscillator. The TX up mixer is incorporated in the transmitter (SDR8150). After modulation in transmitter, the RF enters into the power amplifier circuit.

WCDMA Function Description (B1 /B2 /B3 /B4 /B5 / B6 /B8 /B19)

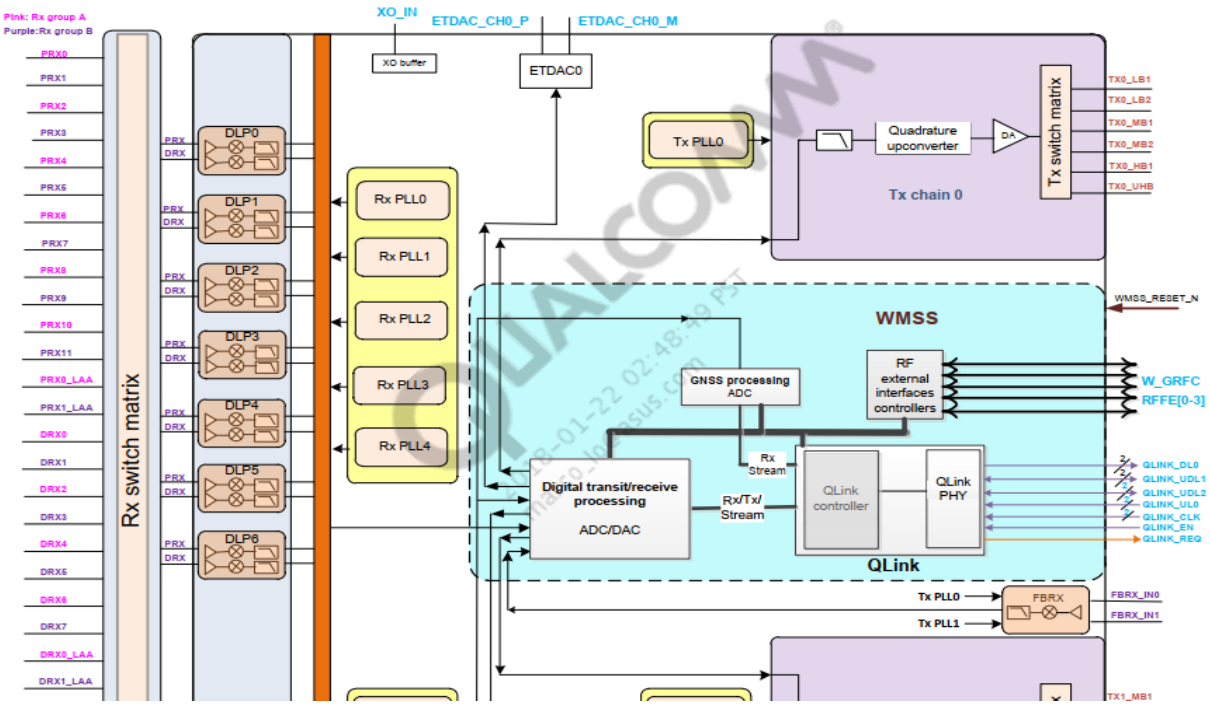
The UMTS receiving path includes LNA, an RF band pass filter. The receiver IC down-converts the received signal from RF to baseband using ZIF techniques. The analog baseband signal is processed by baseband processor (SM8150).

The UMTS transmitting path consists of a transmitter, two power amplifiers (PA with HSPA capability), front end module (FEM), diplexer, duplexer and switch. Beginning with analog baseband signal out from baseband processor (SM8150), the transmitter up-converts the baseband signal directly to RF signal by modulating with an internal LO which is generated by Phase Locked Loop (PLL) circuit.

The PLL circuit which is in SDR8150 consists of a VCO, a frequency synthesizer, a loop filter, and a reference frequency oscillator. The TX up mixer is incorporated in the transmitter (SDR8150). After modulation in transmitter, the RF enters into the power amplifier circuit.

LTE Function Description (B1 /B2 /B3 /B4 /B5 /B7 /B8 /B18 /B19 /B26 /B28/ B38 / B39 /B41 (2535~2655MHz) / B46)

The LTE receiving path includes diplexers and duplexers. The receiver IC down-converts the received signal from RF to baseband using ZIF techniques. The analog baseband signal is processed by baseband processor (SM8150). Five dedicated WAN Rx PLLs divider and distribution circuits to support all Rx bands. SDR8150 can be up to support inter-band 3CC 4 × 4 MIMO + 1CC 2 × 2 MIMO. In this project, we only support LTE B3 4 × 4 MIMO + B7 4 × 4 MIMO at the same time.



The LTE transmitting path consists of a transmitter (SDR8150), TX saw filter, power amplifier, Low pass filter, duplexer and diplexer. Beginning with analog baseband signal out from baseband processor (SM8150), the transmitter up-converts the baseband signal directly to RF signal by modulating with an internal LO which is generated by Phase Locked Loop (PLL) circuit.
The PLL circuit which is in SDR8150 consists of a VCO, a frequency synthesizer, a loop filter, and a reference frequency oscillator. The TX up mixer is incorporated in the transmitter (SDR8150). After modulation in transmitter, the RF signal is filtered by TX SAW filter and then enters into the power amplifier circuit.

WLAN Function Description

This WLAN device (BT and WLAN combo module) is adapted to 11a/b/g/n/ac. Operation of each part is based and explained in a module RF Block diagram. The transceiver includes PLL, VCO, LNA, PA, modulator and demodulator.
By using the reference signal (38.4MHz) currently used by the external clock input, stable RF signal and the table baseband clock are generated.
The operating band is 2412-2472MHz for FCC and IC / 2412-2472MHz for CE (2.4GHz), and 5150-5350MHz and 5470-5725MHz for FCC / 5150-5825MHz for CE (5GHz), which 2.4GHz and 5GHz signals are separated by Diplexer.
A transmitting part is constituted in the WLAN block of WCN3998. The data signal is modulated by CCK / OFDM Modulator inside WCN3998 and the digital modulation signal is changed into the analog modulation signal by digital / analog converter (DAC).
PIFA type antenna with -2.3dBi gain at 2.4GHz and -0.4dBi at 5GHz is used for this function.

Antenna type	**PIFA Antenna with -2.3 dbi gain(main)/ -0.4 dbi(AUX)**

Antenna type	**PIFA Antenna with -3.7dbi gain(main)/ -2.2dbi(AUX)(5180~5240 MHz)** **PIFA Antenna with -4.7dbi gain(main)/ -1.1dbi(AUX)(5260~5320 MHz)** **PIFA Antenna with -1.4dbi gain(main)/ -0.7dbi(AUX)(5500~5720 MHz)** **PIFA Antenna with -2.5dbi gain(main)/ -0.4dbi(AUX)(5745~5825 MHz)**

Bluetooth Function Description

The Bluetooth transceiver includes PLL, VCO, LNA, PA, modulator and demodulator. The Bluetooth baseband signal processor incorporates hardware engines performs frequency hopping, error correcting, whitening, encrypting, data packet assembling and de-assembling. Bluetooth function is fully compliant with Bluetooth specification 4.0 and 5.0. Bluetooth basic rate use GFSK modulation, where an instantaneous data rate of 1 and 2 Mbit/s are possible. Bluetooth Enhanced Data Rate (EDR) adopts π/4-DPSK and 8DPSK schemes, each with 2 and 3 Mbits/s respectively.

PIFA type antenna with -3.5dBi gain is used for this function.

Antenna type	PIFA Antenna with -3.5 dbi gain

NFC Function Description

For NFC operation, devices communicate using near filed EM wave with 13.56 MHz based on NFC pattern coupling. The modulation is ASK and its transmission data rate can be set as 106Mbps, 424Mbps, 848 Mbps for different types of standards. After enabling NFC function, the device will keep polling signal periodically until it receives response from the other card. There are three roles for NFC, that are reader mode, card mode, and peer-to-peer mode. Those functions make transaction, data exchange done contactless in the close proximity.