

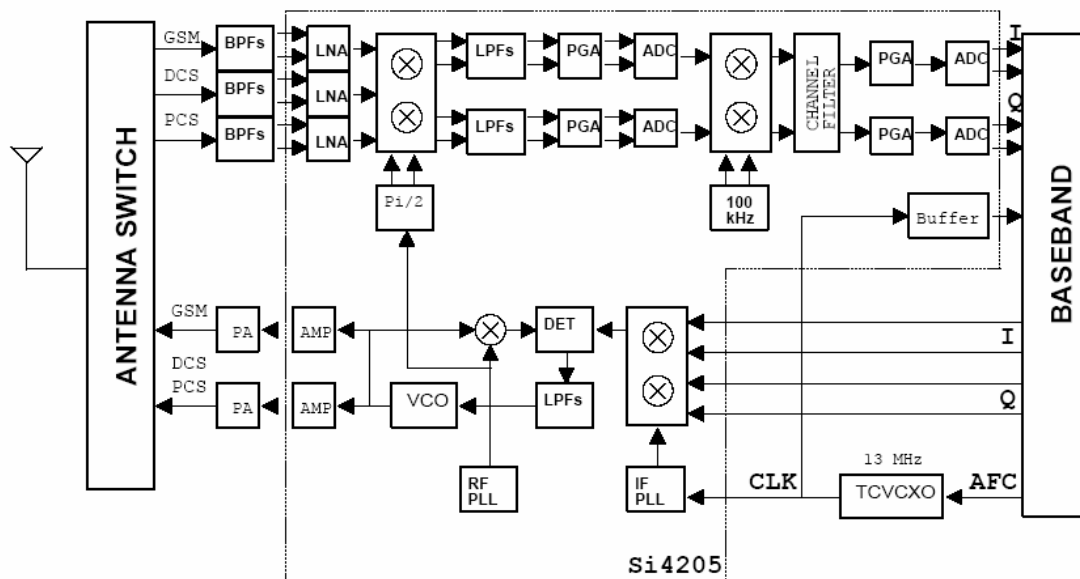
Confidentiality Requested

Exhibit 12. Transmitter Description -- Pursuant 47 CFR 2.1033(c)

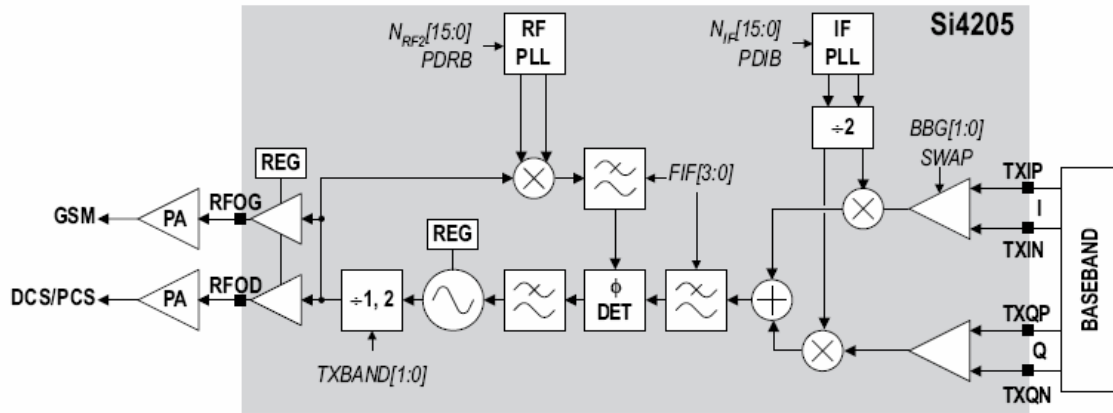
12.1 Transmitter Technical Characteristics --2.1033(c) 4, 5, 6, 7, 8

The RF circuits include: power amplifier, T/R switch+RF SAW Filter module, voltage regulator, VC-TCXO, antenna switch, and some other components. The VC-TCXO is used to generate a 13 MHz signal, which is the basic frequency source in the transceiver. The voltage regulator provides stable, low-noise 2.8 V, which supplies all RF circuits except the PA. The T/R switch is used to switch the PCS transmit/receive signal to the correct path. The receive section interfaces between the RF SAW filters and the baseband processor. The RF SAW Filter is used to filter out-of band noise. The transmit section interfaces between the baseband processor and the power amplifier. The PA is used to amplify uplink signal to the required signal strength.

Functional Block Diagram



The transmit section is a complete up conversion path from the baseband subsystem to the power amplifier, and uses an offset phase locked loop (PLL) with a fully integrated transmit VCO. The frequency synthesizer includes integrated RF and IF VCOs, varactors, and loop filters.



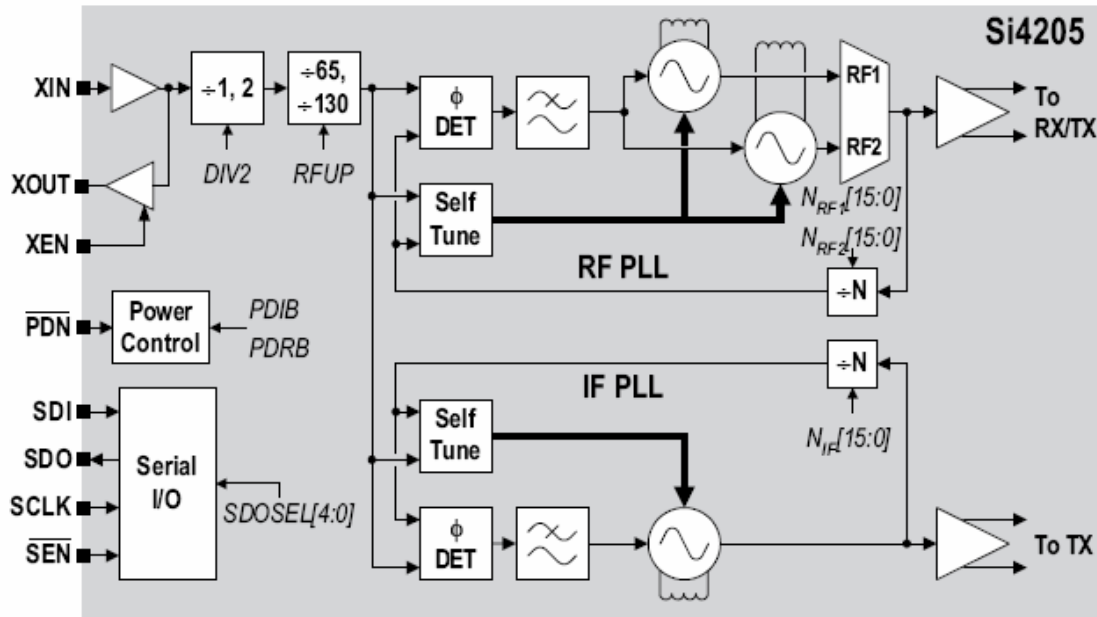
The transmit (TX) section consists of an I/Q baseband upconverter, an offset phase-locked loop (OPLL) and two output buffers that can drive external power amplifiers (PA), one for the GSM 850 (824 to 849 MHz) and E-GSM 900 (880 to 915 MHz) bands and one for the DCS 1800 (1710 to 1785 MHz) and PCS 1900 (1850 to 1910 MHz) bands. The OPLL requires no external duplexer is needed to attenuate transmitter noise or spurious signals in the receive band, saving both cost and power. Additionally, the output of the transmit VCO is a constant-envelope signal which reduces the problem of spectral spreading caused by non-linearity in the PA.

A quadrature mixer upconverts the differential in-phase (TXIP, TXIN) and quadrature (TXQP, TXQN) signals with the IFLO to generate a SSB IF signal which is filtered and used as the reference input to the OPLL. The IFLO frequency is generated between 766 and 896 MHz and internally divided by two to generate the quadrature LO signals for the quadrature modulator, resulting in an IF between 383 and 448 MHz. For the E-GSM 900 band, two different IFLO frequencies are required for spur management. Therefore, the IF PLL must be programmed per channel in the E-GSM 900 band. The IFLO frequencies are 798 MHz for GSM band except Tx in 895~900 MHz, 790 MHz for GSM band for Tx in 895~900 MHz, 766MHz for DCS band, and 854 MHz for PCS band.

The OPLL consists of a feedback mixer, a phase detector, a loop filter, and a fully integrated transmit VCO. The transmit VCO is centered between the DCS1800 and PCS1900 bands, and its output is divided by two for the GSM 850 and E-GSM 900 bands. The U407 generates the RFLO frequency between 1272 and 1483 MHz. To allow a single VCO to be used for the RFLO, high-side injection is used for the GSM 850 and E-GSM 900 bands, and low-side injection is used for the DCS 1800 and PCS 1900 bands.

Note: As described in Exhibit 13, this transmitter is part of a “receive-first” radio product and may be enabled only if an authorized base station is identified during the scan process. Therefore, in North America this transmitter may operate in PCS band only. The detailed technical information on operation in other bands is provided for reference only.

12.2 Frequency Synthesizer



The transceiver integrates two complete PLLs including VCOs, varactors, resonators, loop filters, reference, VCO dividers, and phase detectors. The RF PLL uses two multiplexed VCOs. The RF1 VCO is used for receive mode, and the RF2 VCO is used for transmit mode. The IF PLL is used only during transmit mode. All VCO tuning inductor are also integrated.

The IF and RF output frequencies are set by programming the N-Divider registers, NRF1, NRF2 and NIF. Programming the N-Divider register for either RF1 or RF2 automatically selects the proper VCO.

12.3 Transmitter Application

The following features, options, and accessories characterize the radio product:

Power Supplies:

- 8 mm High Performance Battery (SNN5685)
- 11mm Extra Capacity Battery (SNN5706)

This radio product contains a built in battery charger which charges the attached battery from an external DC power supply. Additional DC power supplies are available with which the radio may be operated:

- Rapid Travel Charger (NNTN4963)
- Q-Series Dual Pocket Desktop Cradle (NTN2073)

Body-worn Accessories:

Holster (NNTN4758)

Car Accessories Available:

Easy install hands free car kit (NNTN4744)

Hard Install Car Kit Base (NNTN4846)

Vehicle Power Adapter (NNTN5165)

Universal dash mount holder (NNTN5113)

Gemini Hard Install Car Kit Cradle (NNTN5114)

Pro Install Car Kit Data Port Cable (NNTN5127)

Data Cables & Accessories / Adapters Available:

RS-232 Data Cable (NKN6560, NNTN5406A)

USB Cable (NKN6559, NNTN5405A)

Gemini USB Sync Cradle (NNTN4743)

USB to Mini USB Data Cable (SKN6371B)

Qwerty keypad (NTN2074)

PDA Adapters

Palm V (NKN6547)

HP Jornada 500 Series (NNTN4245)

Compaq iPaq (models H3100/H3600/H3700) (NNTN4244)

Palm m100/m105 (NNTN4247)

Palm m500/m505 (NNTN4246)

Audio Accessories:

Light Duty Remote Speaker Mic (NSN6066)

PTT Headset (ear bud) (NNTN5006)

PTT Headset (over the head) (NNTN5005)

PTT Headset (over the ear) (NNTN5004)

Gemini Stereo Headset (NNTN5774)

Earbud w/ microphone (SYN8390)

Over the ear headset w/ boom mic (SYN8146)

Lightweight headset w/ mic (NTN8496)

Privacy earbud w/ PTT button (NNTN4033)

Hearing aid neckloop (SYN7875)

12.4 Transmitter Programmability

The subject transmitter is not front panel programmable by the operator. The transmitter internal control computer automatically selects one of the preprogrammed frequency channels in coordination with the trunking systems control channel. The transceivers authorized transmit frequency list is preprogrammed at the factory and cannot be changed by the operator.