NORTEL NETWORKS

Model: T7406 Cordless Handset

Technical Specification

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Technical Description

The T7406 Cordless Telephone is a frequency hopped spread spectrum transmitter to be Compatible with US (FCC Part 15.247) and Canadian (RSS-210) regulations for license free Use in the 902-928MHz band.

The T7406 Cordless Telephone operates in the ISM (Industrial Scientific and Medical) 902-928 MHz band. The T7406 divides the ISM band into two sets of operating frequencies to Allow the coexistence of other ISM devices. Examples of these products are SKU scanners And remote controls for products such as garage door openers and home theatre systems. Note that, since the T7406 is a frequency hopper, it uses at least half of the available frequencies in the ISM band for operation and can make it difficult for other 900MHz devices to operate correctly. The following table identifies the frequencies used for the upper and lower bands of operation:
Lower: 902-914MHz
Upper: 916-928MHz
These bands are selectable for each base station through dip switches located on the back of The T7406 base station. Each base station supports up to three handsets. Selection of the Correct band for operation may or may not minimize interference between devices.

Specifications

Operating Frequency Range: 902-928 MHz

Number of Channels: 25

RF Output Power: 35.5mW (Handset) / 39mW (Base)

Type of Spread Spectrum: Frequency Hopped Spread Spectrum

Channel Separation: 657KHz

Duplexing: Time Division Duplex

Power Supply: 3.6 VDC (Handset) / 120VAC Adapter (Base)

Technical Description

1. General

The T7406 is a multiple-handset, single-base cordless telephone system. The T7406 telephone provides a full-integrated mobility solution for your business. The T7406 handset allows you to freely move around your working space while on a call, and still maintain access to all your telephone system features.

The T7406 telephone uses advanced digital frequency hopping spread spectrum (FHSS) technology to provide a quality audio path over a 900MHz radio link. Establishing a call over a radio link is comparable to a wire line communication.

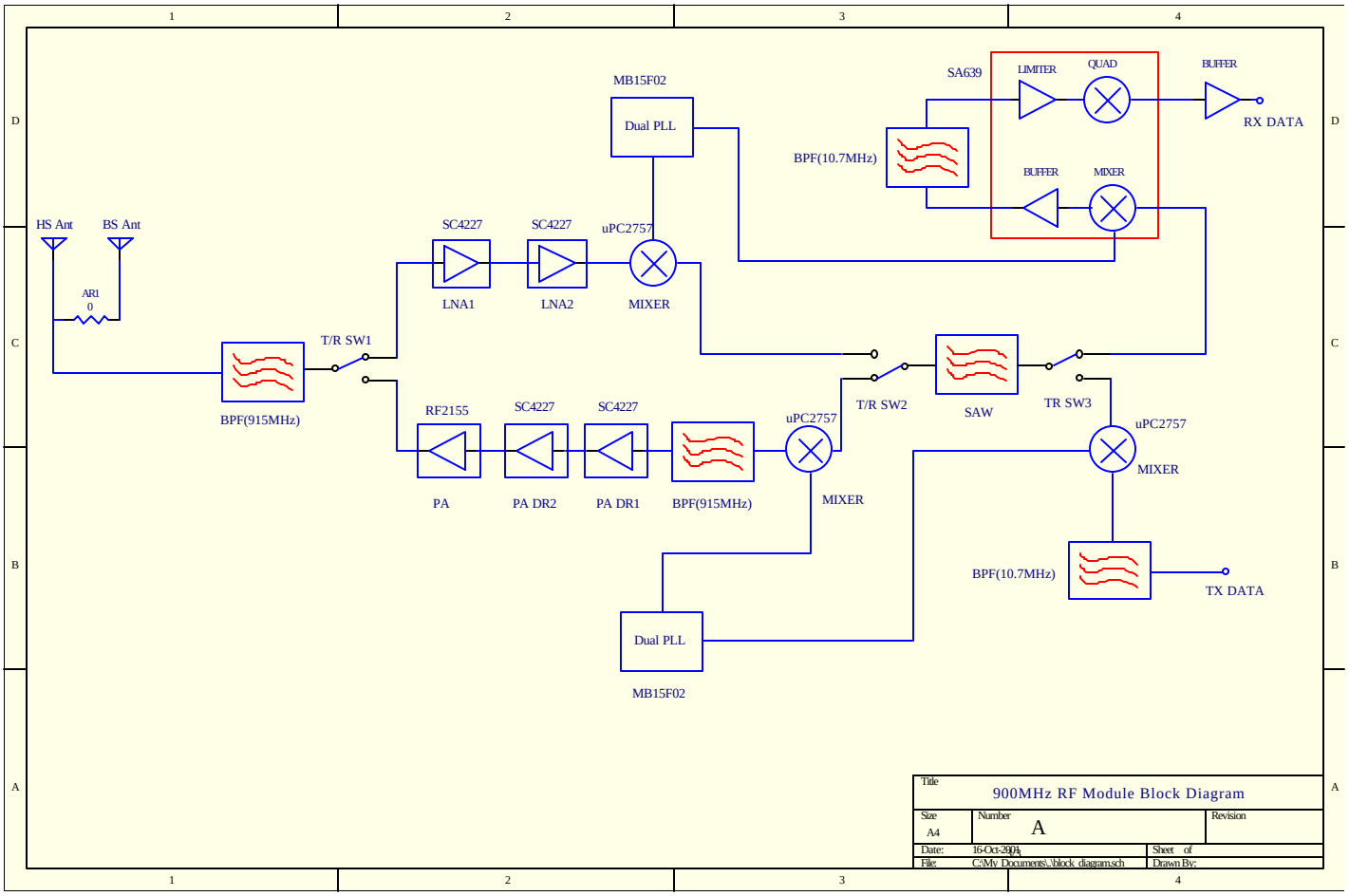
Each base station has a unique security code. All three handsets registered to the base station
Must share the same security code. Each of the three handsets assigned to a base station must also have a unique identification.

For this system to be interference-free, install a maximum of two base stations and six handsets per location. Each base station provides three independent time compression multiplexing (TCM) line connections to the telephone system.

Each base station uses half of the Industrial Scientific Medical (ISM) band for its frequency Hopping channels. The dip switches on the base station allow you to assign the base station to
Use either the lower half (902-914MHz) or the upper half (916-928MHz). Each base station must use a separate ISM half band.

If other devices operating on the ISM band interference with the T7406 base, the other half of The band may be used to try to minimize interference. In this situation, install only one base station and three handsets per location.

2. Block diagram



3. Functional description

3.1 Radio section

The radio uses FSK modulation at 320k bits per second, and utilizes channels of 450KHz bandwidth. All transmissions are hopped over 25 channels chosen from a pseudo-random table, with equal transmission time on all channels. Transmissions are typically of 4.5 ms duration on a given channel, and never exceed 400 ms duration. The radio is half-duplex; meaning it is either receiving or transmitting at any given time.

3.1.1 Antenna

The antenna used is a vertical monopole antenna that protrudes from the top of the handset unit. Because of its small size and the limited size of the “ground plane” in the

antenna system, the gain of this antenna configuration is -1dBi.

3.1.2 Tunable Local Oscillator

3.1.2.1 19.2 MHz Crystal circuit

A crystal circuit at 19.2 MHz with 19.2MHz crystal is used as the reference frequency for the phase-lock loop and direct digital synthesizer. This reference oscillator is specified to be accurate to within ±10ppm over the temperature range of 0 to +50° C.

3.1.2.2 Voltage Controlled Oscillator

The local oscillator signal originates in the voltage controlled oscillator, which is tuned between 1146.97 and 1171.20 MHz at a constant 243.95 MHz offset from the receive or transmit frequencies in the 903.021 to 927.25 MHz range.

3.1.2.3 Phase Lock Loop

The phase-lock loop integrated circuit tunes the voltage-controlled oscillator to a given channel based on the control words received from the microprocessor. Tuning is achieved in 600ì s.

3.1.3 Receiver

The receiver architecture is dual-downconversion, with intermediate frequencies of 243.95 MHz and 10.7 MHz. The first conversion is performed in the RF front-end circuit, the second conversion is performed in the IF integrated circuit, which generates its own LO signal using a 19.2 MHz crystal oscillator.

3.1.3.1 902-928 MHz Ceramic Bandpass Filter

A ceramic bandpass filter has been used at the antenna port of the radio receiver front-end. Note that this filter also appears in the transmission signal path. The selected filter has excellent out-of-band rejection to eliminate undesired signals received at the antenna and reduce emissions other than the desired RF output during transmission.

3.1.3.2 Transmit / Receive Switch

Two PIN diodes are used to switch the antenna between transmit and receive functions. The unit does not transmit and receive simultaneously.

3.1.3.3 SAW Bandpass Filter

The IF circuit utilizes an external surface-acoustic-wave (SAW) bandpass filter between its IF IC and mixer to reduce image noise and further reduce the receiver's susceptibility to out-of-band signals.

3.1.4 Transmitter

In a manner quite analogous to the receiver, the transmitter uses a dual-upconversion architecture. The signal is converted to 10.7 MHz and finally to the desired RF frequency in the 902.00 to 928.00 MHz range. Transmit power is typically 12dBm for Handset and 18dBm for Base at the antenna port with the antenna gain is -1dBi.

3.1.4.1 First Upconversion Mixer

In the first integrated circuit upconversion mixer, the signal is mixed with the local oscillator signal at 233.75 MHz that is produced by the dual synthesizer IC. The result is an FSK modulated signal centered at 243.95 MHz.

3.1.4.2 Second Upconversion Mixer

A second integrated circuit mixer is used to convert the transmit signal to the final RF frequency in the 902.00 to 928.00 MHz range. The tunable LO signal is used to select the exact channel that is used for any transmission.

3.1.4.3 902-928 MHz Ceramic Bandpass Filter

To reduce the levels of the local oscillator and image signals produced in the second upconversion mixer, a bandpass filter is used between the mixer and the PA driver.

3.1.4.4 PA Driver

Two stages of amplifiers, designed by the NPN transistor, to amplify the signal from the bandpass filter to 0dBm radio output power.

3.1.4.5 Power Amplifier

An integrated circuit power amplifier boost the transmission signal level to nominal 14dBm for Handset and 20dBm for Base at the radio output port. The power gain is controlled by the control pins of the device; thus, the output power can be controlled.

3.1.4.6 902-928 MHz Ceramic Bandpass Filter

As mentioned above in the receiver section, this final filter in the transmit chain is also shared with the receive chain. The selected filter has excellent out-of-band rejection to reduce undesired emissions.

4. Precautions Taken to Avoid Interference

4.1 RF Filtering

The transmit signal passes through a SAW bandpass and a three-section ceramic bandpass filter before reaching the output port. These filters greatly reduce spurious signals, harmonics, and out-of-band transmitter phase noise.

4.2 Shielding

The circuit boards are contained in a shielded enclosure formed by the coated plastic housing, which also provides the antenna ground plane.