



Confidential

Theory of Operation

Vocabulary

CS	=Cellular System
AMPS	=Advanced Mobile Phones Service
CDMA	=Code Division Multiple Access
HW	=Hardware (drivers)
RAM	=Random-Access Memory
ROM	=Read-Only Memory
SPEC	=Specification
SW	=Software

Technical Summary

The NPD-1FW is a radio transceiver unit for CDMA 1900 networks. The power class for CDMA 1900 is class II providing power from -50dBm to +23.5dBm.

The transceiver consists of system/RF module (YA3), which is referred to as the Engine.

There are two antennas; an internal antenna, which is always active and a whip antenna, which is capacitively coupled to the internal antenna. An RF connector on the topside of the phone provides an external antenna connection for testing.

Circuit Description

The YA3 engine consists of a Baseband/RF module with connections to a display module. Baseband and RF modules are interconnected with PCB wiring. The phone can be connected to accessories via the system connector, TTY/TDD and Universal headset interface, and intelligent battery interface.

The RF sub-module receives and demodulates radio frequency signals from the base station and transmits modulated RF signals to the base station. It consists of the following functional sub-modules: a receiver, frequency synthesizer and transmitter.

The Baseband module contains audio, I/O control, signal processing, and power supply functions. It consists of functional sub-modules UPP and UEM

Basic Specifications:

Table 1. Basic Specifications (PCS band)

Parameter	CDMA 1900
Cellular system	T-STD - 018, T-STD – 008, IS2000
TX frequency band	1850...1910 MHz
RX frequency system	1930...1990 MHz
Duplex spacing	80.0 MHz
Number of RF channels	1150
Channel spacing	50 kHz
Power levels	-50dBm to +23.7dBm
Method of frequency synthesis	Three digital phase locked loops VHF RX 256.2 MHz VHF TX 416.2 MHz UHF 2058.05 – 2118.05 MHz
Frequency control	19.2 MHz VCTCXO: AFC used
Receiver type	Linear, one IF
Modulator type	OQPSK

Technical Specifications

Modes of Operation

NPD-1FW operates in cellular mode and a local mode for service:

- Cellular mode: phone controlled by Cellular System SW and partly by a basestation
- Locals mode: used by Production and Aftersales

Cellular Mode

In cellular mode, the phone performs all the tasks to place and release calls. The operating system SW handles charging and communication between the phone and any accessories. Signaling and handover functions are supported by the basestation.

Power Off

In the power-off mode, only the UEM is active. Power-off mode can be left by pushing the PWR- key, connecting charger to the phone, a real time clock interrupt, or an intelligent battery interrupt.

July 16, 2002

Idle/standby

The phone is in SERV-state in AMPS and Idle in CDMA, listening to the network and waiting for the page.

Call

The phone is in an active call, and most of the time all RF and Baseband sections are powered on. Individual sections are turned off when they are not needed in order to save power.

Local Mode

Product Development, Production and After Sales use local mode for testing purposes. The Cellular Software is stopped (no signaling to basestation), and the phone is controlled by MBUS/FBUS messages sent by a controlling PC.