

IS-54/-136 TDMA Digital Cellular

North American Digital Cellular (NADC) IS-54/-136 TDMA RF Transceiver Chipset

IS-54/-136 (D-AMPS; TDMA) AND IS-95 (CDMA)

Designed to address the problem of using existing channels more efficiently, IS-54/-136 employs the same 30 kHz channel spacing and frequency bands (824-849 and 869-894 MHz) as the current North American analog cellular standard: AMPS. By using TDMA instead of FDMA, IS-54/-136 increases the number of users from 1 to 3 per channel (up to 10 with enhanced TDMA). The IS-54/-136 specification states that the digital handset and system must also support the analog AMPS system. Experience from the low power AMPS chip-set, together with customer inputs, were combined to produce a 4-chip solution for an IS-54/-136 RF/IF section.

IS-95 is another digital standard that uses the same frequency bands as AMPS and supports AMPS operation. This standard uses CDMA, employing spread-spectrum technology and a special coding scheme. This standard is at a very early stage but promises a threefold increase in user capacity over IS-54/-136.

IS-54/-136 transceiver chip-set

To compete with existing analog standards, a low power, highly integrated solution is a must for any digital standard to succeed. Our new chip-set for IS-54/-136 meets these criteria. The chip-set combines all of the necessary RF and IF functions into four integrated devices: the SA621 RF front end, the SA7025 dual frequency synthesizer, the SA900 I/Q transmit modulator and the SA637 digital IF receiver *or* SA606 FM IF receiver + external I/Q demodulator. These devices were designed as a system and therefore have interface levels which are matched, eliminating the need for additional buffers and interface devices. There is also a common high speed serial interface bus, making addressing the devices simpler. Additionally the frequency plan was designed to eliminate the need for an additional synthesizer and VCO loop. All of these features dramatically reduces the cost and size while improving the performance of the overall system.

Although this is not the only IS-54/-136 solution, our 4-chip configuration is the most integrated and easy to use chip-set available today. For example, the SA900 provides I/Q modulators, the phase shifter, the VGA, a filter, control logic, clock distribution and more in a single IC. The need for two RF synthesizers was eliminated by closely coupling the SA7025 and the SA900 so it is possible to use the main synthesizer to simultaneously generate receive and transmit signals. The integration and connectivity of the chip-set promote significant cost reduction. In addition this integrated solution reduces the time to a final product by simplifying the design effort. The result is a smaller, cost effective, low-power phone that is ultimately more attractive to the end users.

Moving to a digital standard not only provides for increase in capacity, but offers the advantages of service integration. With the use of a digital modulation, other services such as data and fax can also be handled more easily over this system.

The Philips Semiconductors IS-54/-136 TDMA RF transceiver chipset consists of the following ICs: IC17 Page

SA621	1GHz low voltage LNA, mixer and VCO	166
SA606	Low voltage high performance mixer FM/IF system	490
SA637	Low-voltage digital IF receiver	643
SA7025	Low-voltage 1GHz fractional-N synthesizer	733
SA900	I/Q transmit modulator	1003

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