OPERATIONAL DESCRIPTION OF THE ARIMA 2710 GSM PHONE

The equipment under test (EUT) is the transmitter of the Arima Model 2710, a Tri-band (900/1800/1900) GSM mobile phone. The transmitter operates in a half-duplex system according to the GSM standards.

The majority of the phone circuitry consists of device chipsets; the TRF6151BRGZR Transceiver IC, the RF3133 Power Amplifier, PTWL3014CGQW Analog Baseband PMU and the HERCROM400G2 Digital Baseband Processor. The remainder of the major radio components is Front-End Module. There is also a combination Flash Memory/SRAM IC. A rechargeable lithium-ion battery with a nominal voltage of 3.8 volts powers the system.

The transmitter oscillators that comprise the translation loop architecture are integrated on the transceiver IC and are phase locked to a 26 MHz VCXO reference signal. The UHF MAIN N-integer synthesizer operates on a frequency from 925 MHz to 960 MHz for using in the 900 MHz GSM band, from 1805 MHz to 1880 MHz for using in the 1800 MHz DCS band and from 1930 MHz to 1990 MHz for using in the 1800 MHz PCS band.

The main oscillator signals are amplified by the power amplifier and pass through FEM and then finally delivered to the antenna port. Power control circuitry are fully integrated on PA. The power settings are calibrated at the factory and stored in the flash memory IC. These settings are used as the reference level for the power control circuitry that is integrated on PA. The Analog Baseband device also controls power ramping functions. The GMSK modulation is provided in-loop by quadrature I/Q signals that are sent to the transceiver IC from the Analog Baseband IC that converted the digital stream from the Digital Baseband processor into an analog signal used by the modulator. The RF performance conforms to the ETSI specifications for spectrum due to modulation, transient switching modulation spectrum, power ramp, and output power, as well as all the other ETSI requirements.

The receiver is a direct-conversion design. The RF preamplifiers are integrated to the transceiver and provide the signal to the mixers, low-pass filters, variable gain amplifiers, and DC offset correction circuits comprise the remainder of the receiver. The received signals now

at Baseband frequencies are routed from the transceiver to the Analog baseband IC for further processing and ultimately to the digital baseband processor.

The Analog baseband IC digitizes the baseband I/Q signals using Sigma-Delta DACs and sends them to the Digital baseband processor. This IC also has analog-to-digital converters (ADCs) and digital-to-analog converters (DACs) to directly interface to the handset speaker and microphone. The voiceband Codec converts voice signals into digital samples and vice versa. Additional the Analog baseband IC contains all required system power supply regulators. The function of Analog baseband IC also includes: auxiliary RF control, battery charging control, on/off switch analysis and on-chip test support.

The baseband processor handles all physical layer radio control signals and network interfaces. The 32 KHz clock oscillator operates the baseband IC from a backup battery when the main battery is removed. The baseband processor is a dual-core device that splits the processing between a DSP core and an ARM TDMI processor. The DSP handles the physical and layer 1 processing, while the ARM7 executes the layer 2 and layer 3 protocol and the man-machine interface (MMI). The dual cores communicate through a dedicated block of dual port memory. It also communicates with the Subscriber Identity Module (SIM) through an interface to the Analog baseband IC. The baseband processor also communicates to the calibration system or external devices through a digital serial link that is available on the system connector. The other main signals on the system connector include the digital audio interface (DAI) and allows for an external battery charging voltage.
The MMI completes the phone design and includes the displays, keypads, vibration motor, LEDs, speaker, microphone, and headset.