OPERATIONAL DESCRIPTION OF i-mate 810-F

The equipment under test (EUT) is the transmitter of i-mate 810-F, a seven-band 850M/900M/1800M/1900M/UMTS/850/UMTS1900/UMTS2100/HSDPA windows mobile phone. The transmitter operates in a half-duplex system according to the 3gpp standards.

The majority of the phone circuitry is two the CPU which device integrates the ARM926EJ-S™ processor, offering the ARM Jazelle™ Java hardware accelerator, two low-power, high-performance QDSP4u8 digital signal processor (DSP) cores, and a wideband stereo codec to support enhanced digital audio applications. The QDSP4u8 core eliminates the need for the multimedia companion processors normally required for video and audio-based applications, playing MP3 music files, MIDI synthesizer, video and still-image record and playback, and 2D/3D graphics functions.

A analog and power management part; A Flash; A transceiver which is highly integrated module supporting quad-band GSM, GPRS and EDGE cellular standards in the GSM850, EGSM, DCS, and PCS bands; A seven -BAND GSM850/GSM900/DCS/PCS / UMTS 850/UMTS 1900, and UMTS 2100 STRANSMIT MODULE; different peripheral devices like a LCD panel, a Multi-Media Card, WIFI modem ， a Bluetooth modem and so on. The system is powered by a rechargeable lithium-ion battery with a nominal voltage of 3.8 volts.

The transmit includes four transmit signal paths (two high bands and two low bands) supporting multibands and multimodes GSM/GPRS/EDGE polar transmit and WCDMA/HSDPA transmit architectures.

The transmit path begins with differential baseband signals (I and Q) from the MSM device. These analog input signals are buffered, filtered by low-path filter, corrected for DC offsets, amplified, and then applied to the quadrature upconverter mixers.

The upconverter outputs are amplified by multiple variable gain stages that provide transmit AGC control. A pulse density modulated (PDM) signal coming from the MSM IC is used to generate the gain range control signal. The AGC outputs are then applied to the high-band and low-output fengzhi-techfaith.cn driver amplifiers; the specified driver amplifier output level is achieved while supporting the GSM/EDGE and UMTS transmit standard’s requirements for GSM ORFS, carrier and image suppression, WCDMA ACLR, spurious emissions, Rx-band noise, and so forth.

Again, the upconverter LO signals are generated by circuits discussed in Section 1.2.3. These upconverters translate the polar GMSK-modulated or 8-PSK modulated baseband PM signals and/or WCDMA baseband signals directly to the RF signals, which are filtered and feed into the GSM/EDGE polar PA and/or WCDMA PA. The WCDMA TX power is coupled back to the ic internal power detector input pin, PWD_DET_IN, using a coupler for power measurement. The low-band drive amplifiers are used to transmit the polar phase modulated (PM) signal for GSM/EDGE 850/900 while the high-band driver amplifiers are for the GSM/EDGE 1800/1900. By using the radioOne architecture, the same high-band transmit path can be used to transmit the UMTS 2100/1900/1800/1700 signal, and the low-band transmit path can be used to transmit the UMTS 800/850/900 signal, depending on the application.

The envelope path is used in polar mode of operation for GSM and EDGE. Input from the MSM IC, the baseband envelope (AM) current signal, is applied directly to the ramp control pin of the GSM/EDGE polar PA to modulate the power supply of the PA so that the polar modulated GSM/EDGE signal in the MSM can be recovered and transmitted.

The receive paths include four GSM/EDGE Rx signal paths that support GSM 850, GSM 900, GSM 1800, and GSM 1900 bands and one WCDMA Rx signal path for UMTS 1800/1900/2100 band.
The quad-band GSM/EDGE Rx paths start from the handset frontend circuits (GSM Rx filters and antenna switch module). The four differential inputs are amplified with gain-stepped LNA circuits. Gain control is provided through software and serial interface. The LNA outputs drive the RF ports of quadrature RF-to-baseband downconverters. The downconverted baseband outputs are multiplexed and routed to lowpass filters (one I and one Q) whose passband and stopband characteristics supplement MSM device processing. These filter circuits allow DC offset corrections, and their differential outputs are buffered to interface with the MSM IC.
The IC accepts its UMTS 2100/1900/1800/1700 input signal from the handset RF frontend filters. The UMTS Rx input is provided with an on-chip LNA that amplifies the signal before a second stage filter that provides differential downconverter. This second stage input is configured differentially to optimize second-order intermodulation and common mode rejection performance. The gain of the UMTS frontend amplifier and the UMTS second stage differential amplifier are adjustable, under MSM control, to extend the dynamic range of the receivers.
The second stage UMTS Rx amplifiers drive the RF ports of the quadrature RF-to-baseband downconverters. The downconverted UMTS Rx baseband outputs are routed to lowpass filters having passband and stopband characteristics suitable for UMTS Rx processing. These filter circuits allow DC offset corrections, and their differential outputs are buffered to interface shared with GSM Rx to the MSM IC. The UMTS baseband outputs are turned off when the IC is downconverting GSM signals and on when the UMTS is operating.
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 ARM926EJ-S processor. The DSP handles the physical and layer 1 processing, while the ARM9 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 mixed signal device. 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.