Operational Description of S3502L

The equipment under test (EUT) is the transmitter of S3502L a SIX-band digital mobile phone (GSM850/GSM900/GSM1800/GSM1900/WCDMA2100/WCDMA850).The transmitter operates in a duplex system according to the GSM/WCDMA standards.

The majority of the phone circuitry consists : the VC7584 Power Amplifier, VC5341 Power Amplifier and the MT6572 Baseband Processor. There is also a Flash Memory/PSRAM IC. The system is powered by a rechargeable lithium-ion battery with a nominal voltage of 3.8 volts.

The receive paths include four Rx signal paths that support GSM 850,GSM 900, GSM 1800, and GSM 1900 bands and WCDMA Rx signal paths.WCDMA RX signal paths is single-ended .The quad-band GSMRx paths start from the handset front-end circuits (PAM VC7584 and Rx SAW). The gain control is provided through software and serial interface. The downconverted baseband outputs are multiplexed and routed to lowpass filters (one I and one Q) whose passband and stopband characteristics supplement the BB IC processing.These filter circuits allow DC offset corrections, and their differential outputs are buffered to interface with the BB IC.The VC5341-210 UMTS single-ended inputs accept UMTS 2100 input signals from the handset RF front-end filters. The UMTS Rx inputs are provided with a shared downconverter. This second-stage input is configured differentially to optimize second-order ntermodulation and common mode rejection performance. The gain of the UMTS front-end amplifier and the UMTS second-stage amplifier is adjustable, under BB IC 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 an interface shared with GSM Rx to the BB IC. The UMTS baseband outputs are turned off when the VC5341 downconverting GSM signals and turned on when the UMTS is operating.

The transmit includes four transmit signal paths supporting multi-bands and multi-modes GSM/GPRS polar transmit and WCDMA/HSPA+ 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. SSBI is used to do the gain control. The specified driver amplifier output level is achieved while supporting the GSM and UMTS transmit standard’s requirements for GSM ORFS,carrier and image suppression, WCDMA ACLR, spurious emissions, Rx-band noise, etc.

Again, the upconverter LO signals are generated by integrated fractional-N PLL synthesizerscircuits circuits These upconverters translate the polar GMSK-modulated baseband PM signals and WCDMA baseband signals directly to the RF signals, which are filtered and feed into the GSM linear PA and/or WCDMA PA. The WCDMA Tx power is coupled back to the VC7584 internal power detector input pin, PWD_DET_IN, using a coupler for power measurement.

The integrated LO generation and distribution circuits are driven by internal VCOs to support various modes to yield highly flexible quadrature LO outputs that drive all GSM, UMTS band and GPS upconverters and downconverters; with the help of these LO generation and distribution

circuits, true ZIF architecture is employed in all GSM and UMTS band receivers and transmitters to translate the signal directly from RF to baseband and from baseband to RF.Three fully functional fractional-N synthesizers, including VCOs and loop filters, are integrated within the IC. The first synthesizer (PLL1) reates the transceiver LOs that support the UMTS transmitter, and all four GSM band receivers and transmitters including: GSM 850, GSM900, GSM 1800, and GSM 1900. The second synthesizer (PLL2) provides the LO for the UMTS receivers. The third synthesizer (PLL3) provides the LO for the GPS receiver. An external 19.2MHz XO input signal is required to provide the synthesizer frequency reference to which the PLL is phase-locked and frequency-locked.

RF section also includes Bluetooth and FM chips MT6572.

Device features:

Bluetooth Features

■ Compliant with Bluetooth 3.0+EDR specification
■ Bluetooth v4.0 Low Energy (LE)
■ Bluetooth Piconet and Scatternet support meet class 2 transmitting power requirement
■ ZIF receiver with -90dBm sensitivity

WIFI Features

■ Operation frequency: 2.4GHz ISM band
■ WLAN function: Supports 802.11b, 802.11g, 802.11n-20
■ Modulation Type: Supports OFDM(BPSK,QPSK,16QAM and 64QAM)
■ Transfer Rate (Mbps):1/2/5.5/11;6/18/36/54;6.5/13/19.5/26/39/52/58.8/65；
pe: PIFA
■ Gain: -1.5dBi

GSM Module

■ Frequency band: GSM850/GSM900/DCS1800//PCS1900;
■ Support GPRS for internet
■GPRS : Multislot class 12
■ Modulation type: GMSK
■ Antenna type: inner PIFA antenna
■ Gain:-1.5dBi

3G Module

■ Operation frequency: Band 1(2100)/ Band5(850)
■ Support 3G internet;
■ Modulation type: QPSK
■ Antenna type: Inner PIFA antenna
■ Gain:-1.5dBi

The USB interface supports high-speed device operation.

Three outputs are provided to drive RF switches of the phone, e.g. for switching between bands.

The baseband processor handles all physical layer radio control signals and network interfaces. The baseband processor is a quad-core device that splits the processing ARM cortex-A7 processor. 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 audio interface and allows for an external battery charging voltage.

The MMI completes the phone design and includes the displays, keypads, vibration motor, speaker, microphone, and headset.